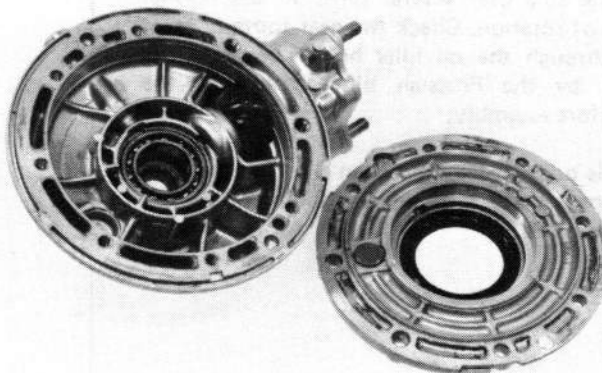


Clean all sealing material off the mating surfaces of the gear case and cover.

NOTE:

- Keep dust and dirt out of the gear case.
- Be careful not to damage the mating surfaces.

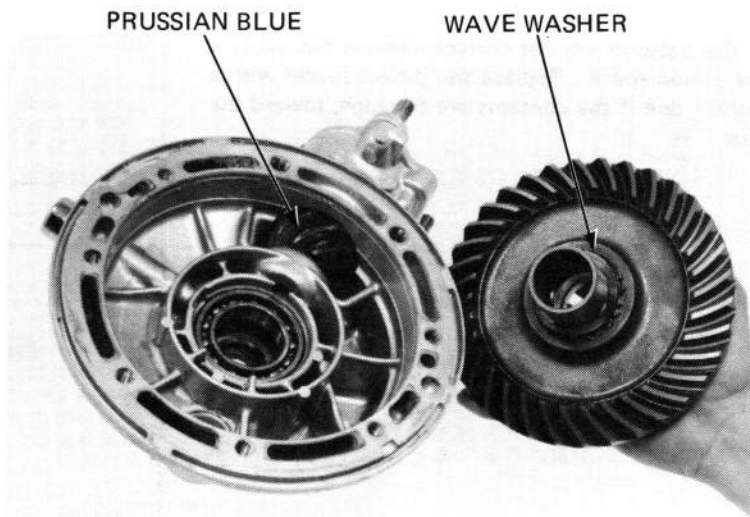
Apply liquid sealant to the mating surface of the gear case cover.



GEAR TOOTH CONTACT PATTERN CHECK

Apply a thin coat of Prussian Blue to the pinion gear teeth for a gear tooth contact pattern check. Place the wave washer and ring gear into the gear case.

Apply gear oil to the lip of the oil seal on the gear case cover and install the gear case cover.

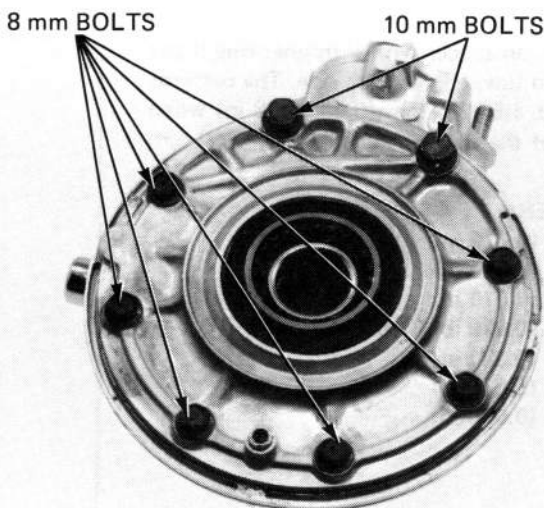


Tighten the cover bolts in 2–3 steps until the cover evenly touches the gear case, then tighten the 8 mm bolts to the specified torque in a crisscross pattern in two or more steps.

TORQUE: 23–28 N·m (2.3–2.8 kg-m, 17–20 ft-lb)

Then tighten the 10 mm bolts.

TORQUE: 40–50 N·m (4.5–5.0 kg-m, 33–36 ft-lb)

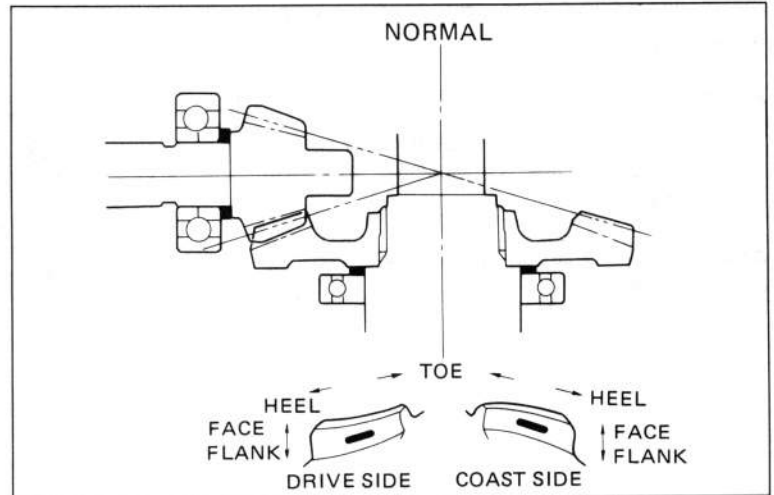


DRIVE TRAIN

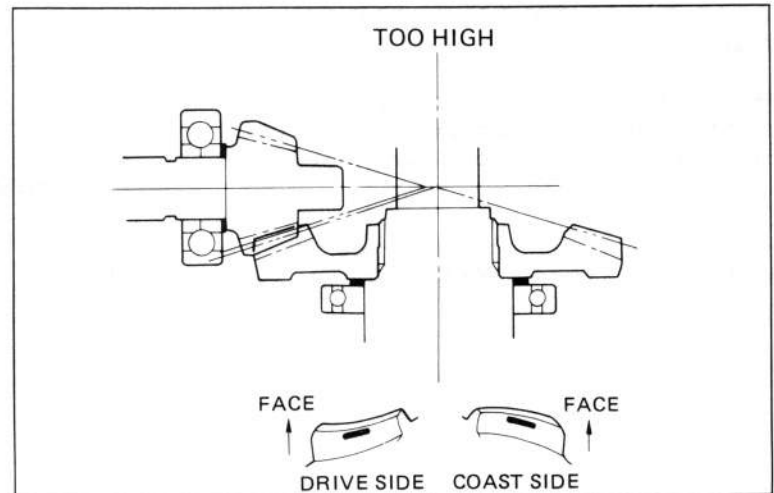
Remove the oil filler cap from the final gear case.

Rotate the ring gear several times in the normal direction of rotation. Check the gear tooth contact pattern through the oil filler hole. The pattern is indicated by the Prussian Blue applied to the pinion before assembly.

Contact is normal if the Prussian Blue is transferred to the approximate center of each tooth and slightly to the flank side.



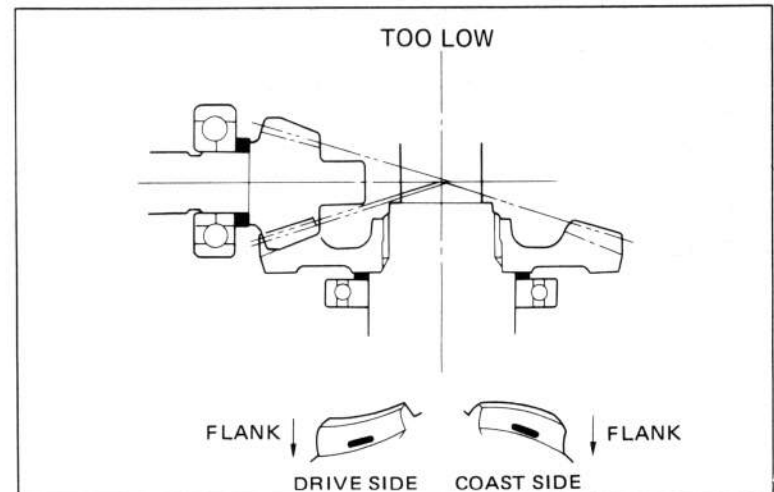
If the patterns are not correct, remove and replace the pinion spacer. Replace the pinion spacer with a thicker one if the contacts are too high, toward the face.



Replace the pinion spacer with a thinner one if the contacts are too low, to the flank side. The patterns will shift about 1.5–2.0 mm (0.06–0.08 in) when the thickness of the spacer is changed by 0.10 mm (0.004 in).

PINION SPACER:

- A 1.82 mm (0.072 in)
- B 1.88 mm (0.074 in)
- C 1.94 mm (0.076 in)
- D 2.00 mm (0.079 in) Standard
- E 2.06 mm (0.081 in)
- F 2.12 mm (0.084 in)
- G 2.18 mm (0.086 in)

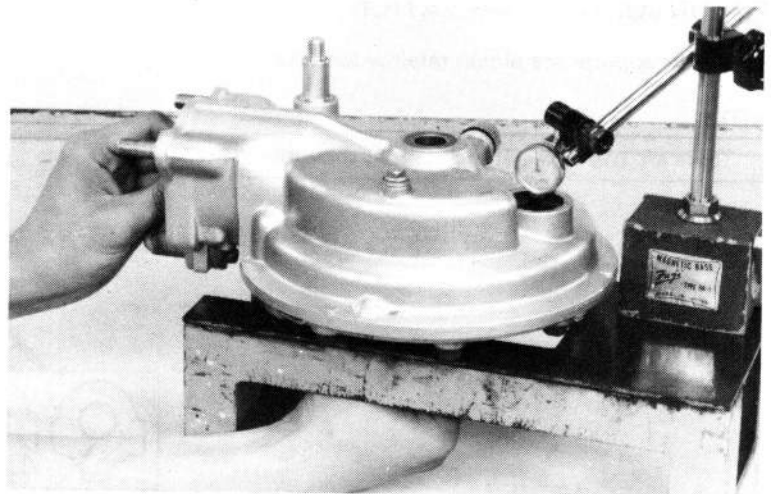


BACKLASH INSPECTION

Remove the oil filler cap.

Set the final gear assembly into a jig or stand to hold it steady. Set a horizontal type dial indicator on the ring gear, through the oil filler hole. Hold the pinion gear spline by hand. Rotate the ring gear by hand until gear slack is taken up. Turn the ring gear back and forth to read backlash.

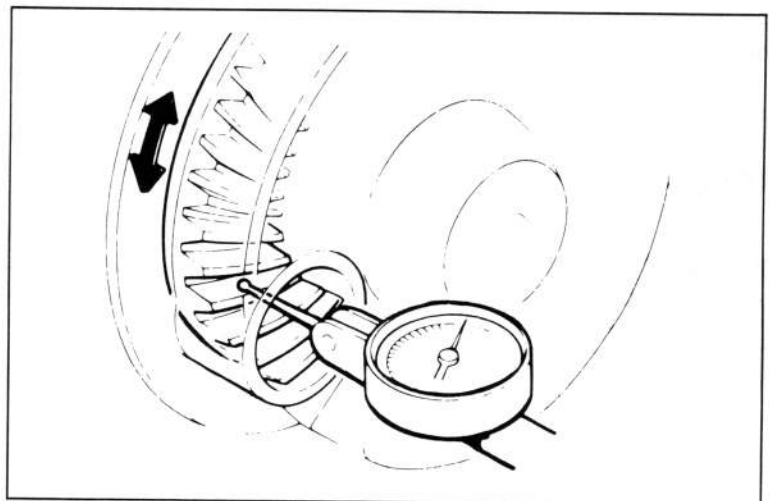
STANDARD: 0.08–0.18 mm (0.003–0.007 in)
SERVICE LIMIT: 0.30 mm (0.02 in)



Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more.

Compare the difference of the three measurements.

DIFFERENCE OF MEASUREMENT
SERVICE LIMIT: 0.10 mm (0.004 in)



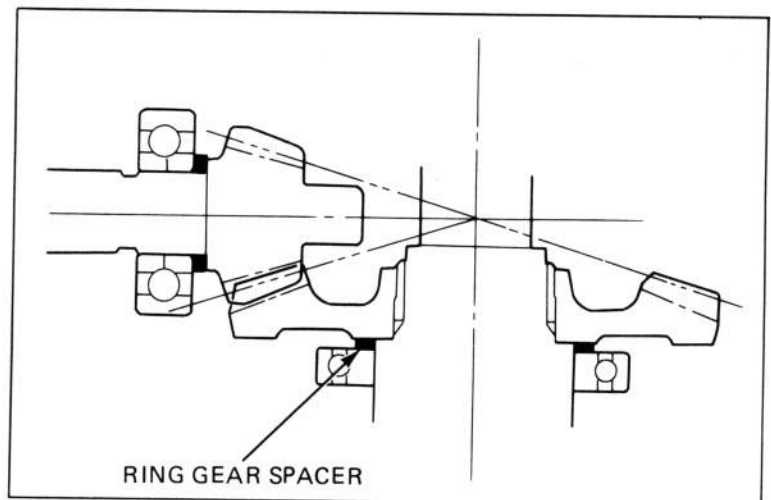
If the difference in measurements exceeds the limit, it indicates that the bearing is not installed squarely. Inspect the bearings and reinstall if necessary.

If backlash is too small, replace the ring gear spacer with a thinner one.

Backlash is changed by about 0.06–0.07 mm (0.002–0.003 in) when thickness of the spacer is changed by 0.10 mm (0.004 in).

RING GEAR SPACER:

- A 1.82 mm (0.072 in)
- B 1.88 mm (0.074 in)
- C 1.94 mm (0.076 in)
- D 2.00 mm (0.079 in) **Standard**
- E 2.06 mm (0.081 in)
- F 2.12 mm (0.084 in)
- G 2.18 mm (0.086 in)
- H 2.24 mm (0.088 in)
- I 2.30 mm (0.091 in)



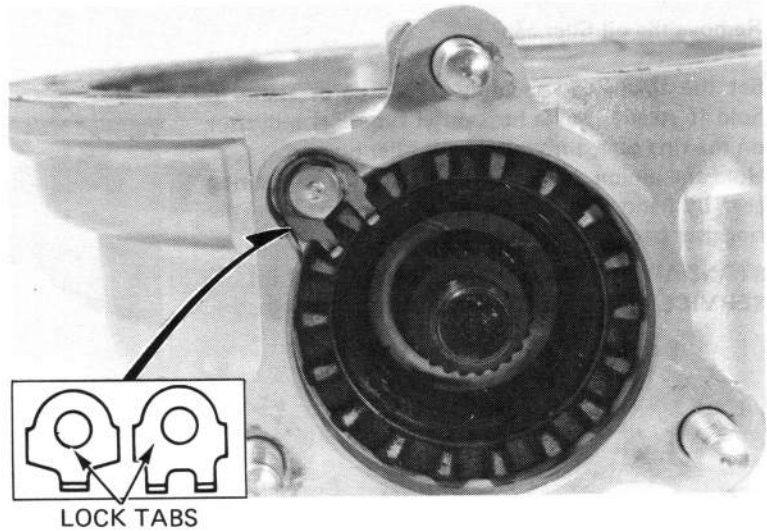
DRIVE TRAIN

PINION JOINT INSTALLATION

Install the appropriate pinion retainer lock tab.

NOTE:

There are two types of lock tabs as shown.



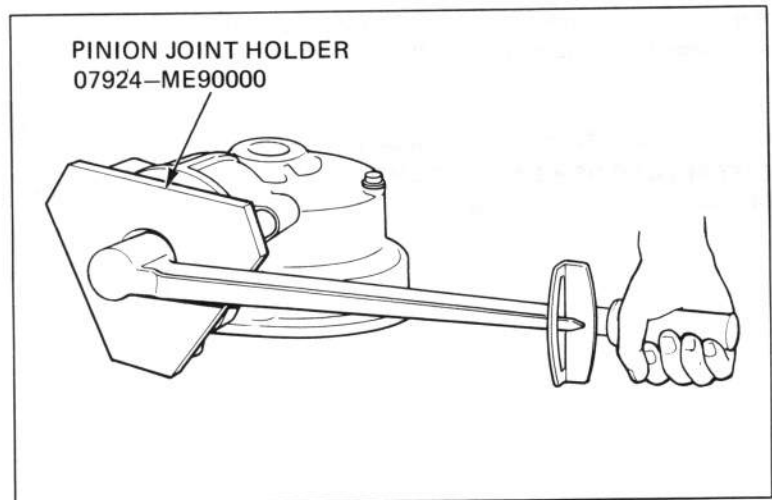
Apply gear oil to the oil seal lip contact surface of the pinion joint and install the pinion joint.

Install the pinion joint holder tool and tighten the pinion nut.

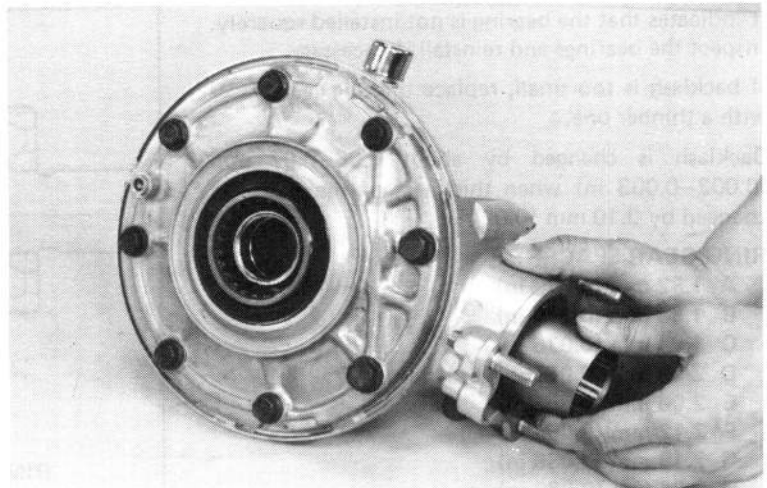
TORQUE:

100–120 N·m (10–12 kg·m, 72–87 ft·lb)

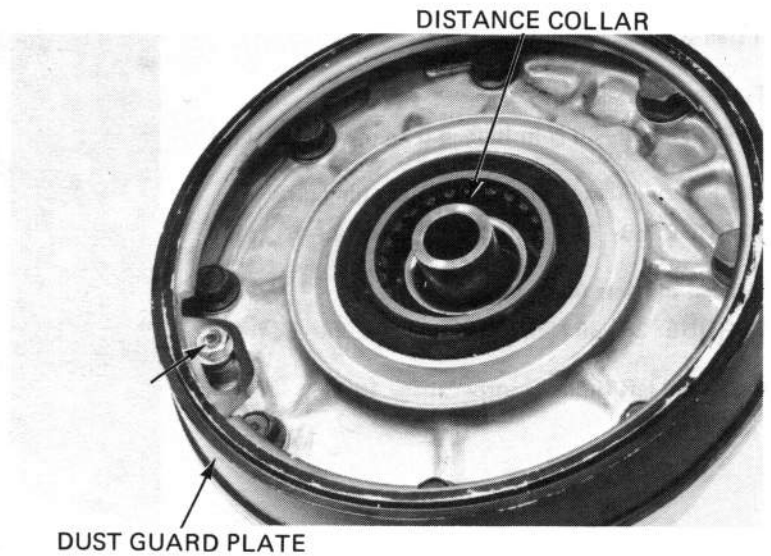
Remove the pinion joint holder tool.



Make sure that the gear assembly rotates smoothly without binding by turning the pinion joint.



Install the dust guard plate and torque the bolt.
Install the distance collar.



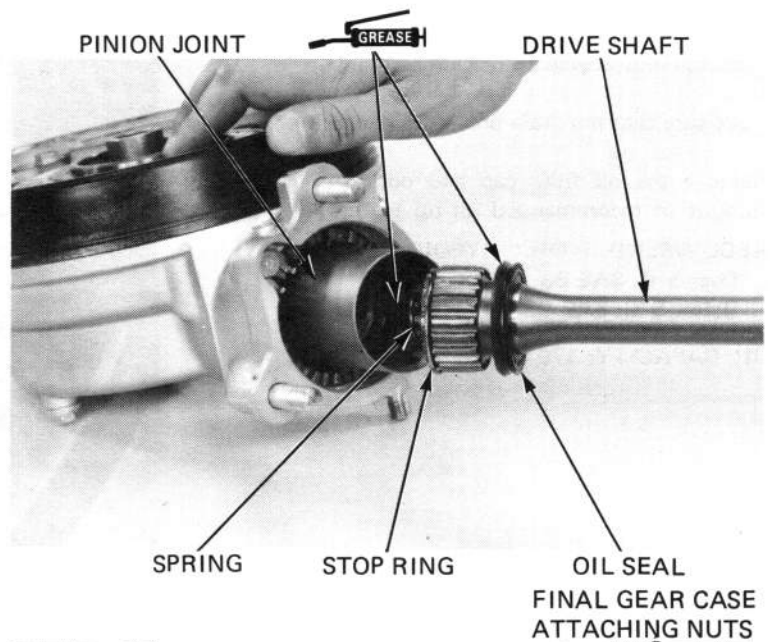
FINAL DRIVE INSTALLATION

Apply grease to the pinion joint splines and drive shaft oil seal.

Insert the drive shaft into the pinion joint until the stop ring seats in the pinion joint spline grooves.

NOTE:

- Make sure that the stop ring is seated properly by pulling on the drive shaft lightly.
- Be careful not to damage the drive shaft oil seal.

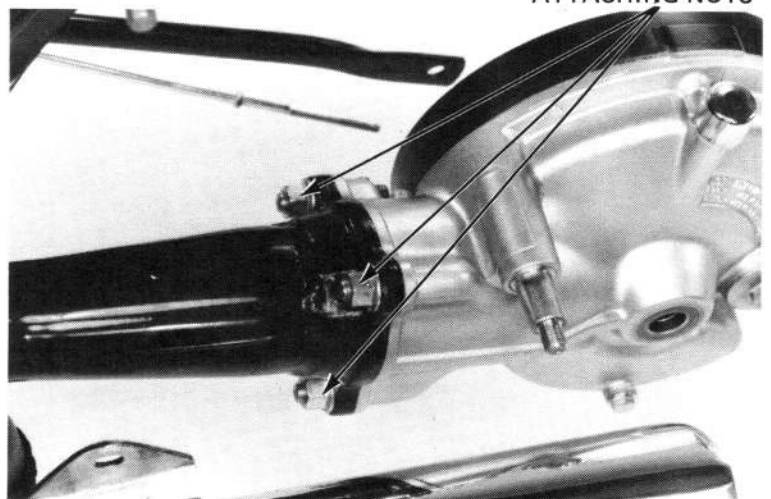


Insert the drive shaft assembly into the swingarm and align its splines with the universal joint.

Attach the gear case onto the swingarm loosely.

NOTE:

- To ease axle installation, do not tighten the gear case nuts until after the axle is installed.



DRIVE TRAIN

Install the rear wheel (page 16-7).

Tighten the axle nut.

TORQUE: 60–80 N·m (6.0–8.0 kg·m, 44–58 ft·lb)

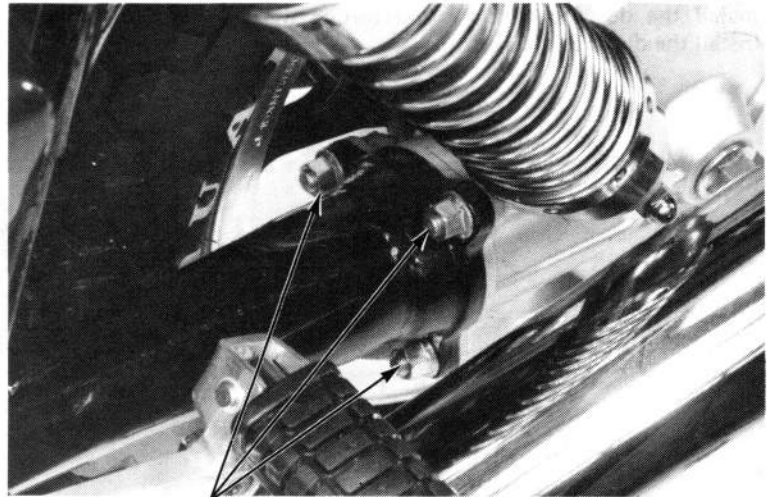
Tighten the three final gear case attaching nuts.

TORQUE: 60–70 N·m (6.0–7.0 kg·m, 43–51 ft·lb)

Tighten the axle pinch bolt.

TORQUE: 20–30 N·m (2.0–3.0 kg·m, 14–22 ft·lb)

Install the left shock absorber (page 16-12).



FINAL GEAR CASE
ATTACHING NUTS

Place the motorcycle on its center stand.

Make sure that the drain bolt is tightened.

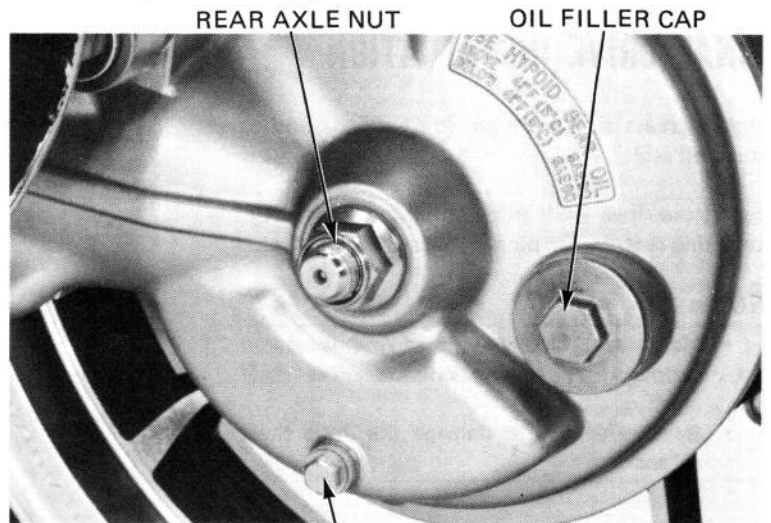
Remove the oil filler cap and pour the specified amount of recommended oil up to the filler neck.

RECOMMENDED OIL: HYPOID GEAR OIL

Over 5°C: SAE 90

Below 5°C: SAE 80

OIL CAPACITY: 170 cc (5.8 oz)

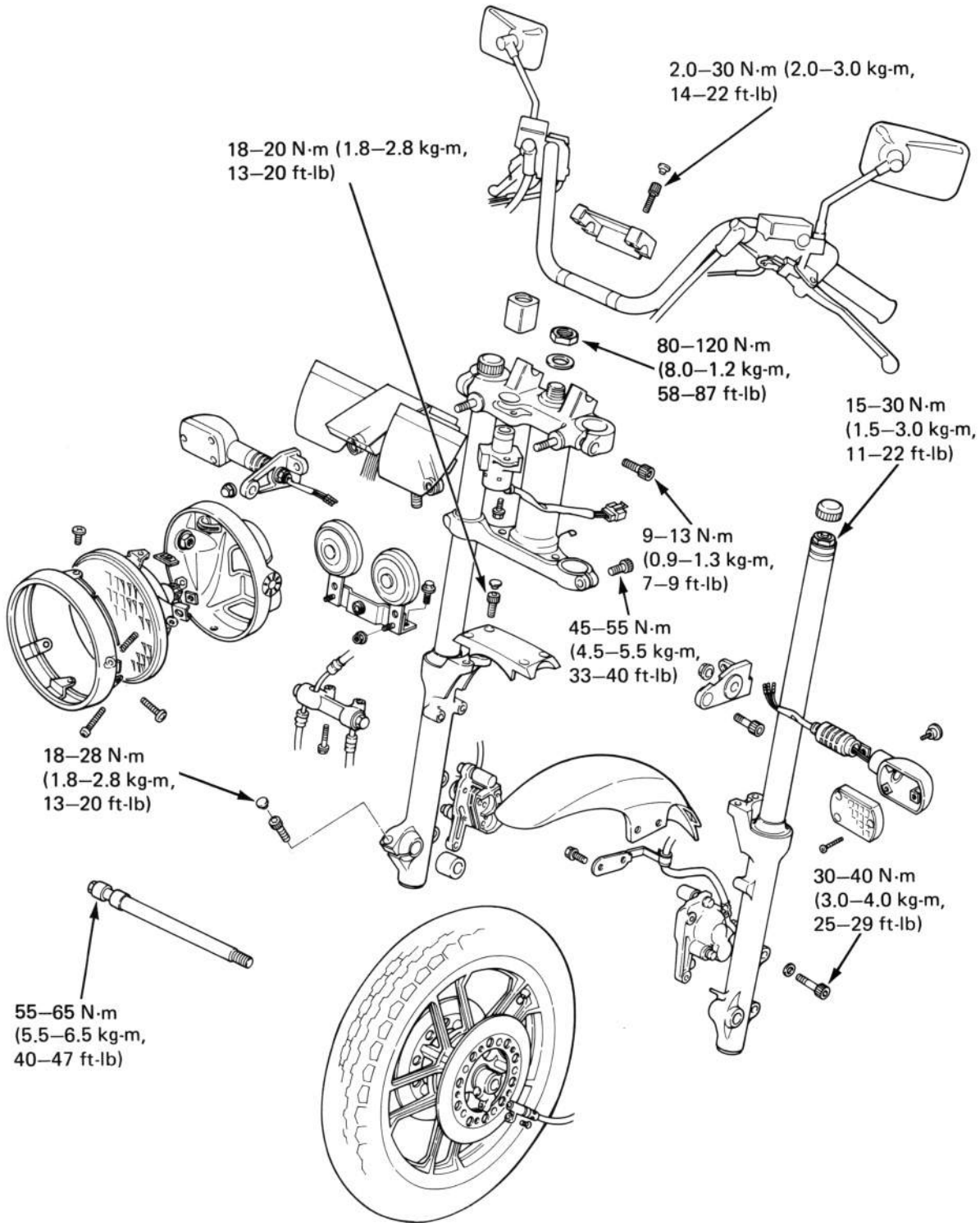


REAR AXLE NUT

OIL FILLER CAP

DRAIN BOLT

FRONT WHEEL/SUSPENSION



15. FRONT WHEEL / SUSPENSION

SERVICE INFORMATION	15-1	HANDLEBARS	15-9
TROUBLESHOOTING	15-2	FRONT WHEEL	15-13
HEADLIGHT	15-3	FRONT FORKS	15-20
IGNITION SWITCH	15-4	STEERING STEM	15-28
INSTRUMENTS	15-6		

SERVICE INFORMATION

GENERAL

- A jack or other support is required to support the motorcycle.
- Never ride on the rim.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Axle shaft runout		—	0.2 mm (0.01 in)
Front wheel rim runout	Radial	0.3 mm (0.01 in) max.	2.0 mm (0.08 in)
	Axial	0.3 mm (0.01 in) max.	2.0 mm (0.08 in)
Wheel bearing play		—	0.03 mm (0.001 in)
Fork spring free length		465.6 mm (18.33 in)	456.3 mm (18.0 in)
Fork tube runout		—	0.2 mm (0.01 in)
Front fork fluid capacity		467.5–472.5 cc (15.82–15.99 ozs)	—
Front fork air pressure		0–6 psi (0–40 kPa, 0–0.4 kg/cm ²)	—

15

TORQUE VALUES

Handlebar upper holder	20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)
Caliper mounting bolt	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Front axle	55–65 N·m (5.5–6.5 kg-m, 40–47 ft-lb)
Axle pinch bolt	18–28 N·m (1.8–2.8 kg-m, 13–20 ft-lb)
Front fork socket bolt	15–25 N·m (1.5–2.5 kg-m, 11–18 ft-lb)
Fork tube cap	15–30 N·m (1.5–3.0 kg-m, 11–22 ft-lb)
Steering stem nut	80–120 N·m (8.0–12.0 kg-m, 58–87 lb-ft)
Brake disc	35–40 N·m (3.5–4.0 kg-m, 25–29 ft-lb)
Front fork top pinch bolt	9–13 N·m (0.9–1.3 kg-m, 7–9 ft-lb)
Front fork bottom pinch bolt	45–55 N·m (4.5–5.5 kg-m, 33–40 ft-lb)
Front fork brace socket bolt	18–28 N·m (1.8–2.8 kg-m, 13–20 ft-lb)

FRONT WHEEL/SUSPENSION

TOOLS

Special

Hex. wrench, 6 mm	07917-3230000 or commercially available
Snap ring pliers	07914-3230001 or commercially available
Fork seal driver	07947-4630100
Race remover/installer	07946-3710400
Steering stem driver	07946-MB00000 or 07946-3710100 and 07964-MB00200

Common

Driver	07749-0010000
Pilot, 15 mm	07746-0010300
Lock nut wrench, 30 x 32 mm	07716-0020400 or commercially available

Common

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 15 mm	07746-0040300
Lock nut wrench, 30 x 32 mm	07716-0020400 or commercially available
Extension bar	07716-0020500 or commercially available
Wheel bearing remover expander	07746-0050100 or commercially available
Wheel bearing remover collet, 15 mm	07746-0050400 or commercially available
Pin spanner	07702-0010000

TROUBLESHOOTING

Hard steering

1. Steering bearing adjustment nut too tight.
2. Faulty steering stem bearings.
3. Damaged steering stem bearings.
4. Insufficient tire pressure.

Front suspension noise

1. Worn slider or guide bushings.
2. Insufficient fluid in forks.
3. Loose front fork fasteners.
4. Lack of grease in speedometer gearbox.

Steers to one side or does not track straight

1. Unevenly adjusted right and left shock absorbers.
2. Bent front forks.
3. Bent front axle; wheel installed incorrectly.

Front wheel wobbling

1. Bent rim.
2. Worn front wheel bearings.
3. Faulty tire.
4. Axle nut tightened properly.

Soft suspension

1. Weak for springs.
2. Insufficient fluid in front forks.
3. Front fork air pressure incorrect.

Hard suspension

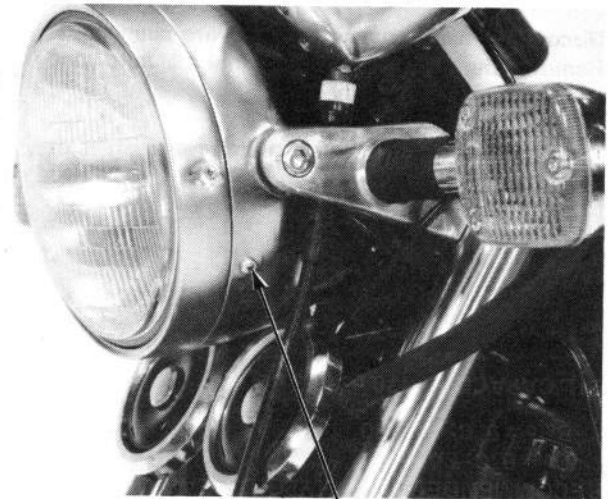
1. Incorrect fluid weight in front forks.
2. Front fork air pressure incorrect.
3. Bent fork tubes.
4. Clogged fluid passage.

HEADLIGHT

REMOVAL

Remove the two headlight mounting screws.

Disconnect the wire coupler and remove the headlight.

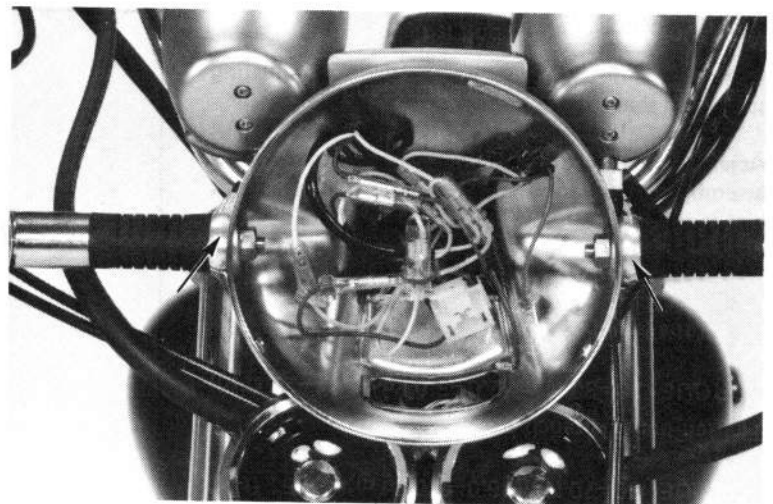


HEADLIGHT MOUNTING SCREW

CASE REMOVAL/INSTALLATION

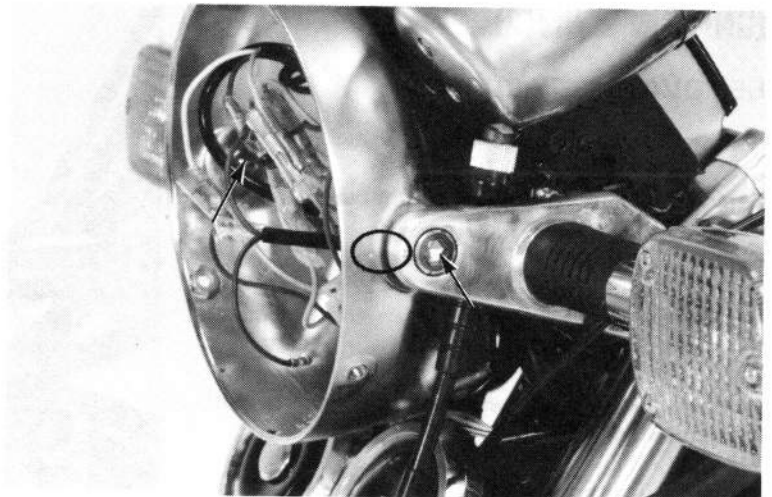
Disconnect the wire connectors in the headlight case.

Remove the headlight case mounts and headlight case.



Install the headlight case in the reverse order of removal.

Align the index mark on the headlight case with index mark on the headlight bracket.



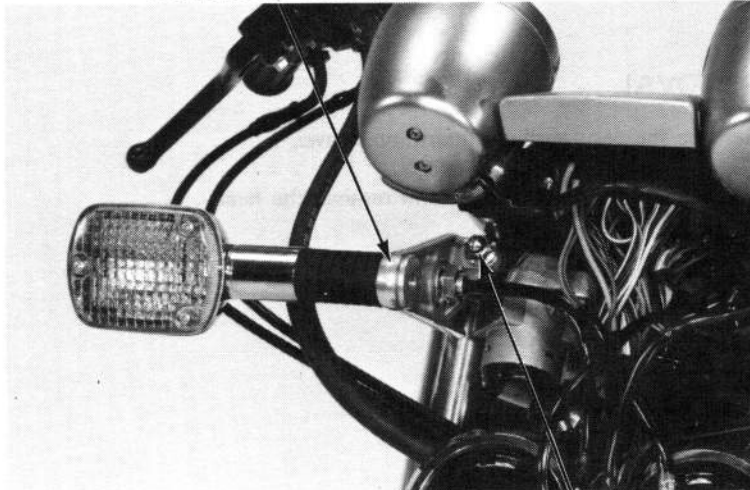
FRONT WHEEL/SUSPENSION

BRACKET REMOVAL/INSTALLATION

Disconnect the front turn signal wire connectors. Remove the headlight bracket mount bolts and bracket/turn signal assemblies.

Install the headlight bracket in the reverse order of removal.

HEADLIGHT BRACKET

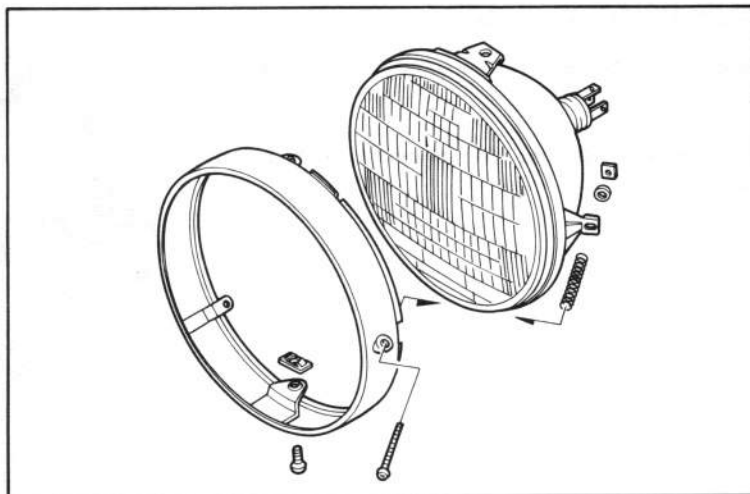


BOLT

DISASSEMBLY/ASSEMBLY

Remove the retaining screws, horizontal adjusting screw and sealed beam unit from the rim.

Assemble the headlight in the reverse order of disassembly. After installation, adjust the headlight aim (page 3-16).



IGNITION SWITCH

REMOVAL/INSTALLATION

Remove the headlight and headlight case.

Remove the bolt attaching the right horn and horn.

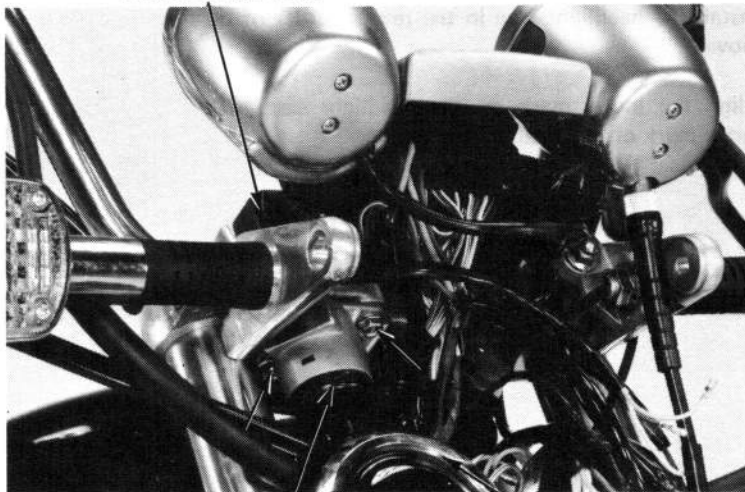
Remove the ignition switch rubber cover.

Remove the instrument lower cover and disconnect the ignition switch wire couplers.

Remove the ignition switch mounting bolts, and ignition switch.

Install the ignition switch in the reverse order of removal.

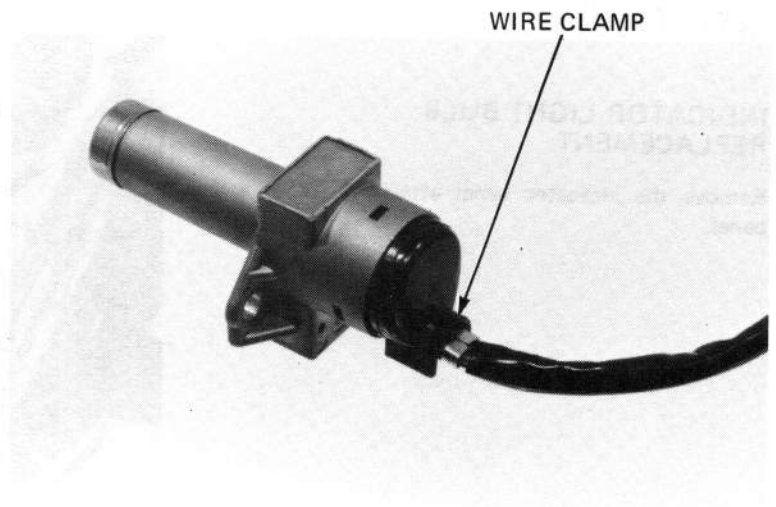
RUBBER COVER



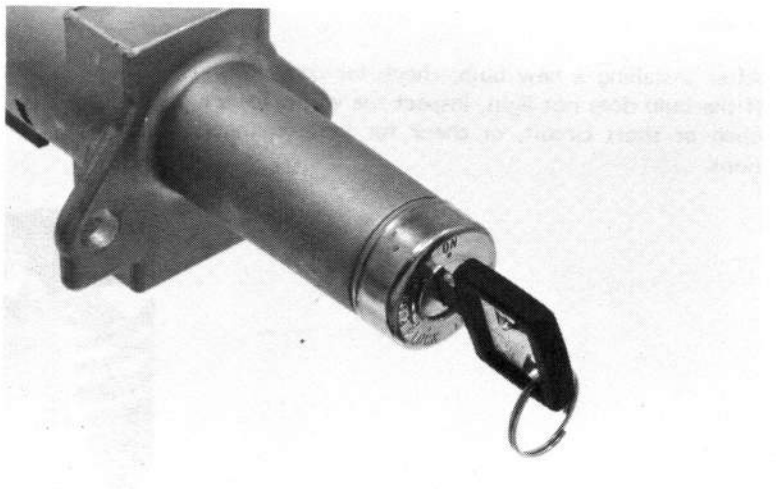
IGNITION SWITCH RIGHT HORN

DISASSEMBLY/ASSEMBLY

Open the wire clamp.

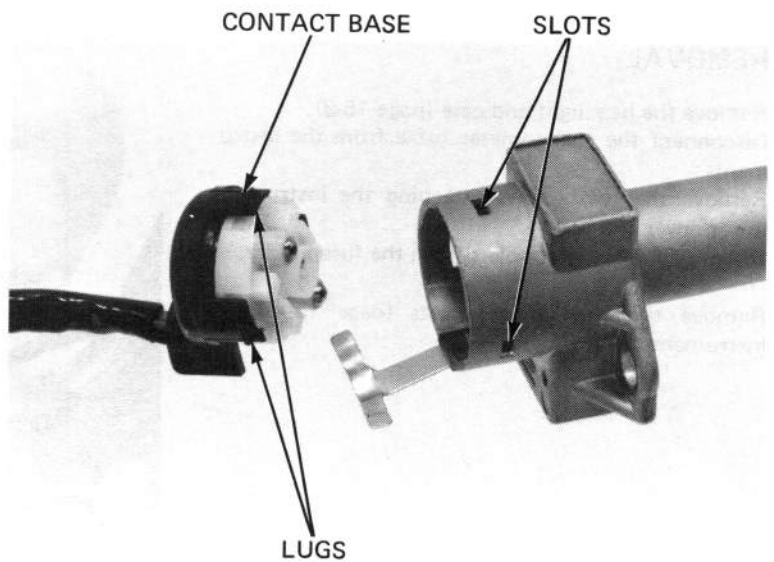


Insert the ignition key and turn it to between the ON and OFF detent positions.



Push in the lugs in the slots and pull the contact base from the switch.

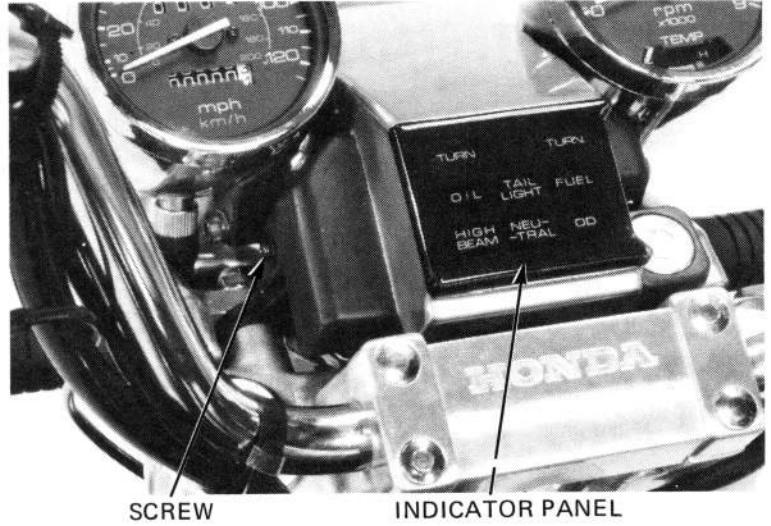
Assemble the ignition switch in the reverse order of disassembly.



INSTRUMENTS

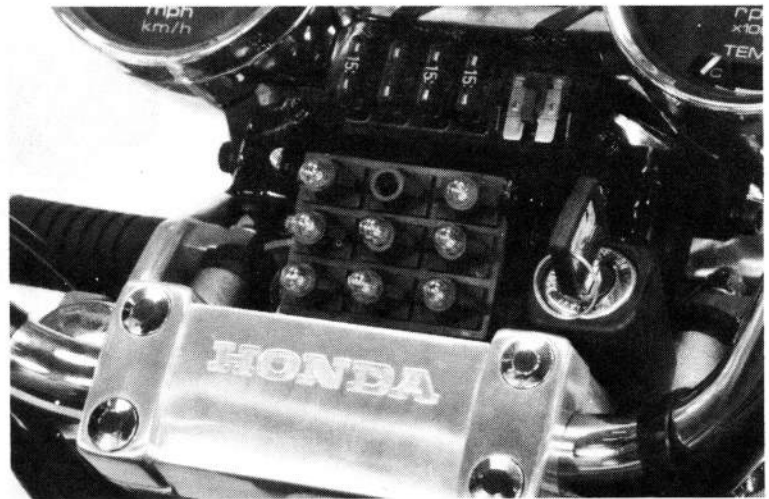
INDICATOR LIGHT BULB REPLACEMENT

Remove the indicator panel attaching screws and panel.



Replace the bulb.

After installing a new bulb, check for continuity. If the bulb does not light, inspect the wiring for an open or short circuit, or check for loose connections.



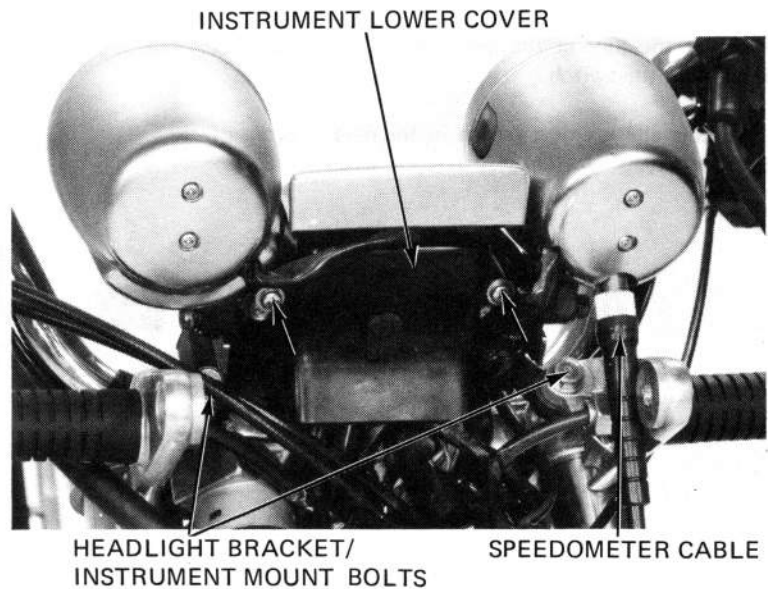
REMOVAL

Remove the headlight and case (page 15-3). Disconnect the speedometer cable from the instruments.

Remove the two screws attaching the instrument lower cover and cover.

Disconnect all wire couplers from the fuse holder.

Remove the headlight brackets (page 15-4) and instruments.

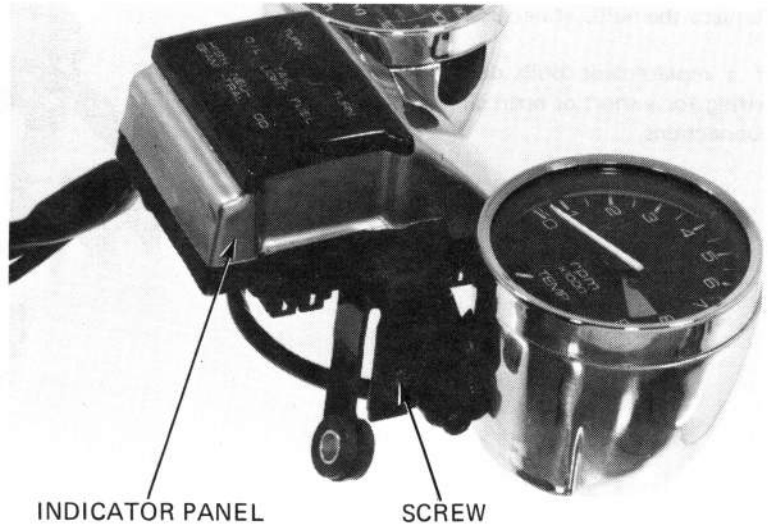


DISASSEMBLY

CAUTION:

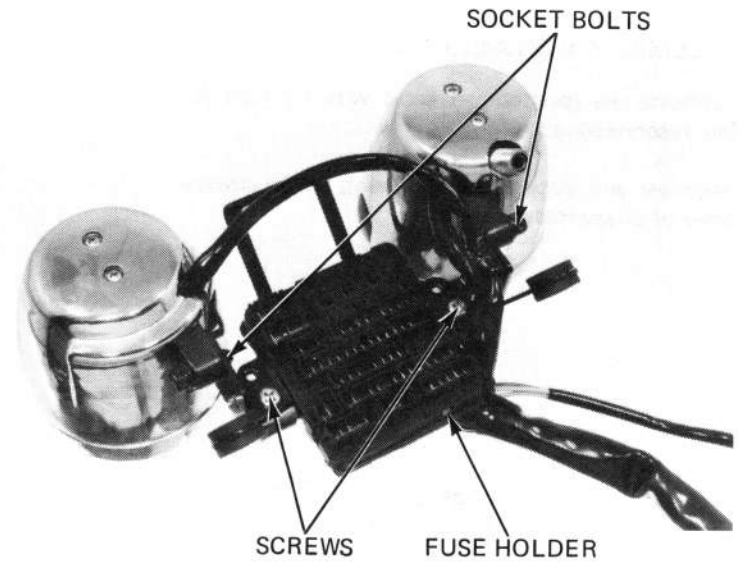
Do not leave the instruments upside down or damping fluid will leak onto the inside of the lens.

Remove the screws attaching the indicator panel and panel.

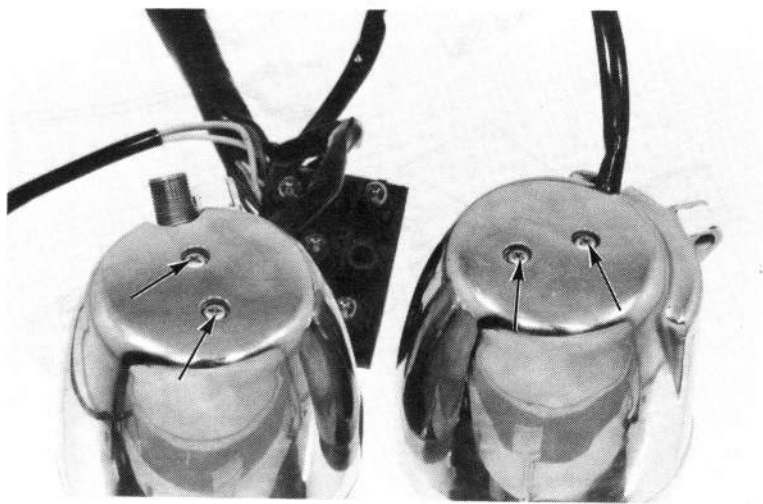


Remove the screws attaching the fuse holder and fuse holder from the instruments.

Remove the socket bolts attaching the instruments to the bracket.



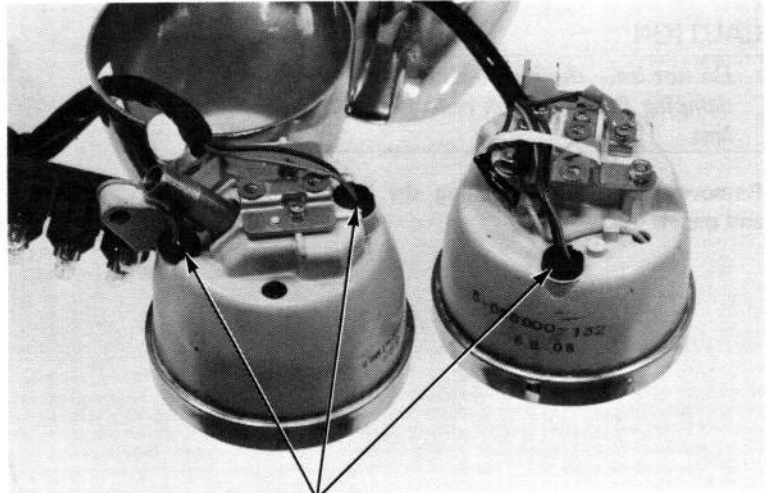
Remove the meter lower cover screws.



FRONT WHEEL/SUSPENSION

Replace the bulbs, if necessary.

If a replacement bulb does not light, check the wiring for a short or open circuit, or check for loose connections.

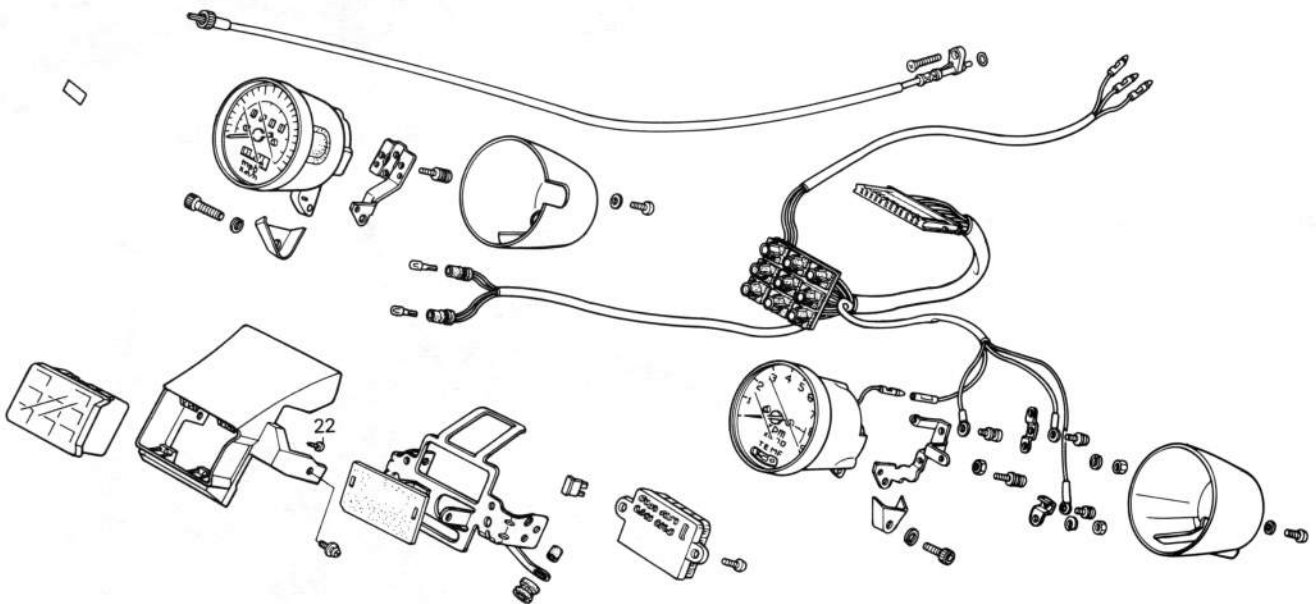


BULBS

ASSEMBLY/INSTALLATION

Lubricate the speedometer cable with light oil before reconnecting.

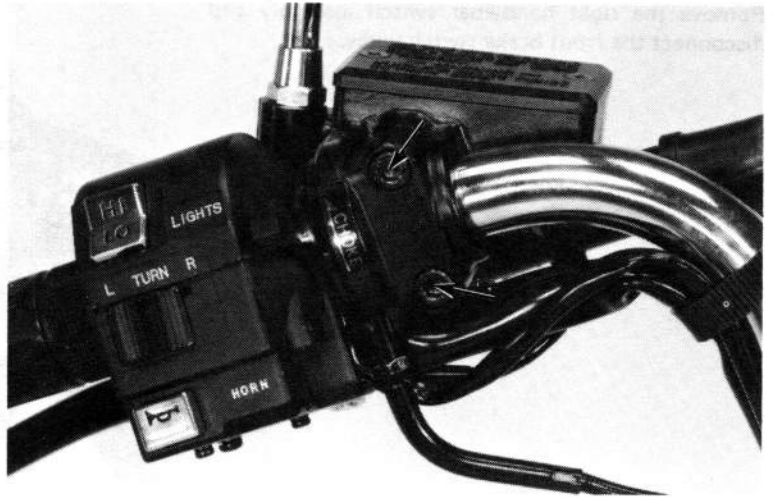
Assemble and install the instruments in the reverse order of disassembly and removal.



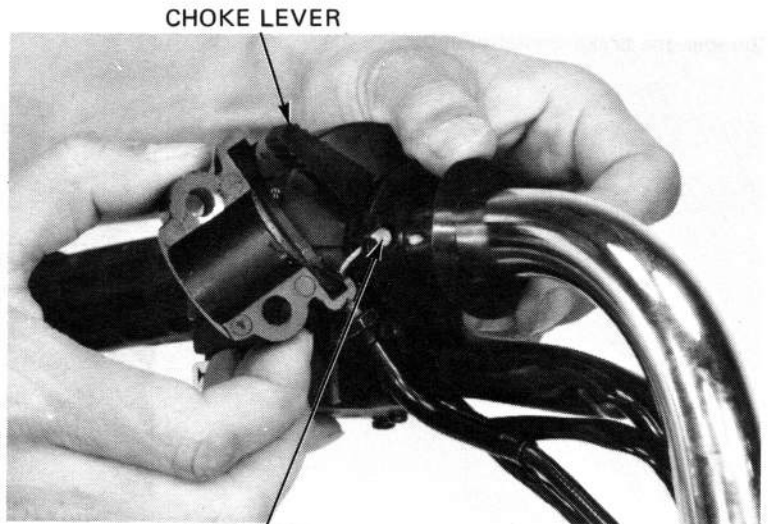
HANDLEBARS

REMOVAL

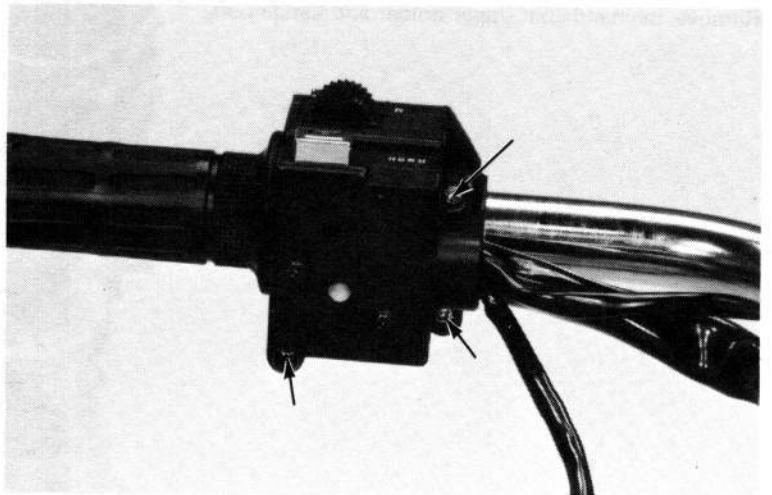
Disconnect the clutch switch wires and remove the clutch master cylinder.



Disconnect the choke cable from the choke lever.

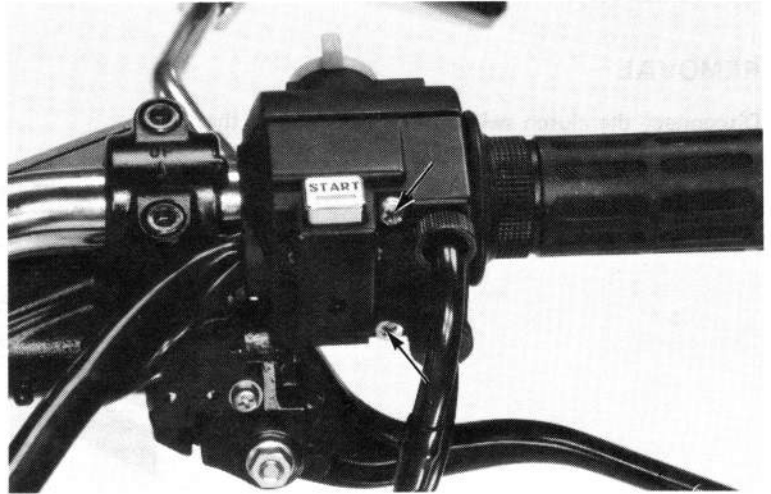


Remove the left handlebar switch assembly.

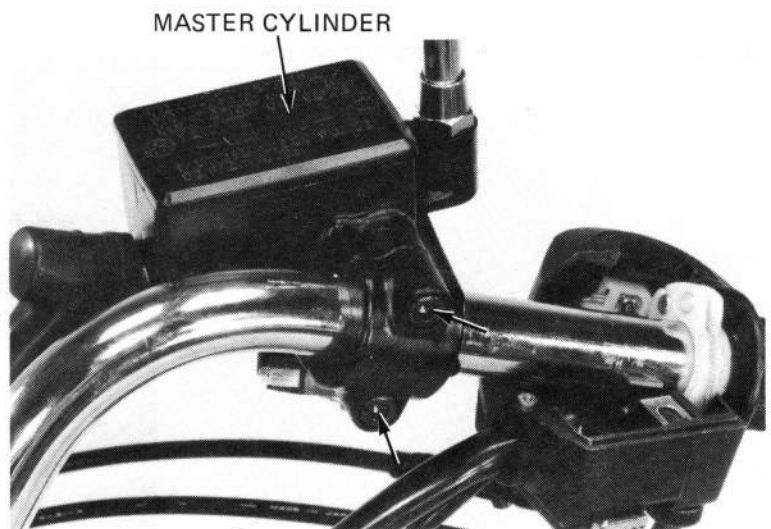


FRONT WHEEL/SUSPENSION

Remove the right handlebar switch assembly and disconnect the front brake switch wires.



Remove the brake master cylinder.

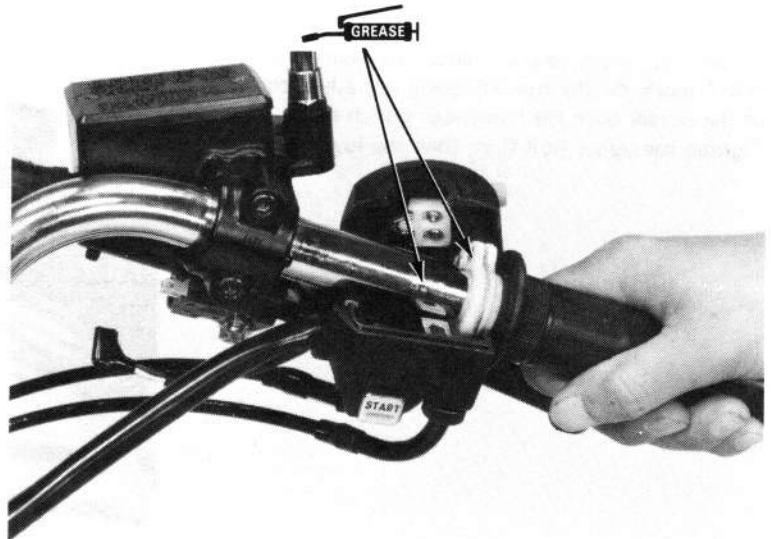


Remove the handlebar upper holder and handlebars.

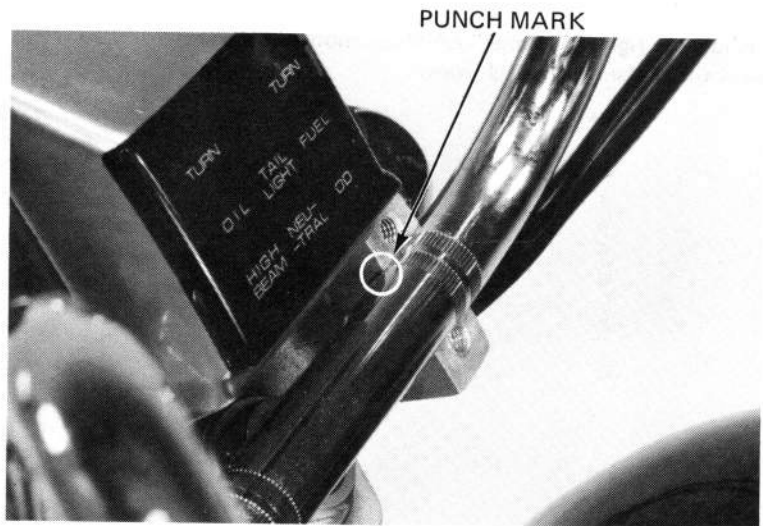


INSTALLATION

Apply grease to the throttle grip sliding surface and slide the throttle grip over the handlebar.

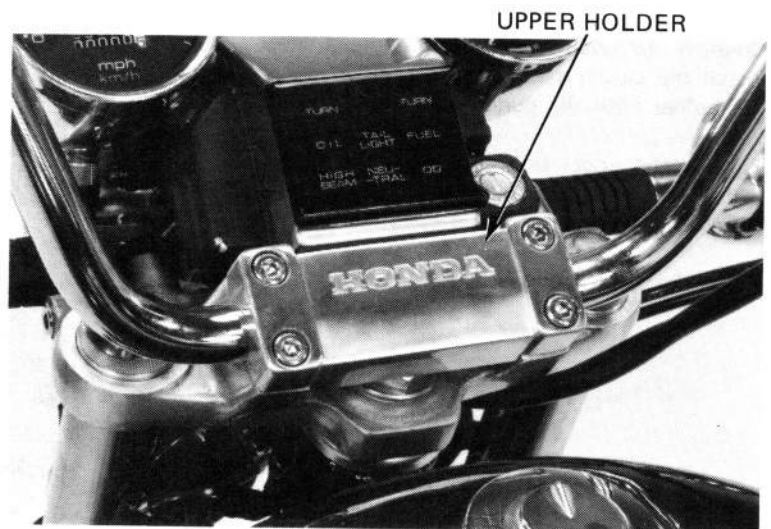


Place the handlebar onto the lower holder aligning the punch mark with the upper face of the lower holder.



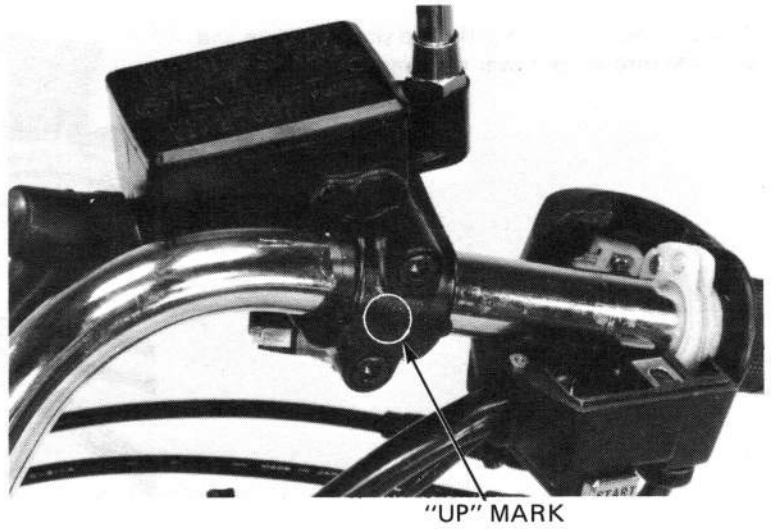
Install the upper holder, tighten the forward bolts first, then tighten the rear bolts.

TORQUE: 20–30 N·m (2.0–3.0 kg·m, 14–22 ft·lb)

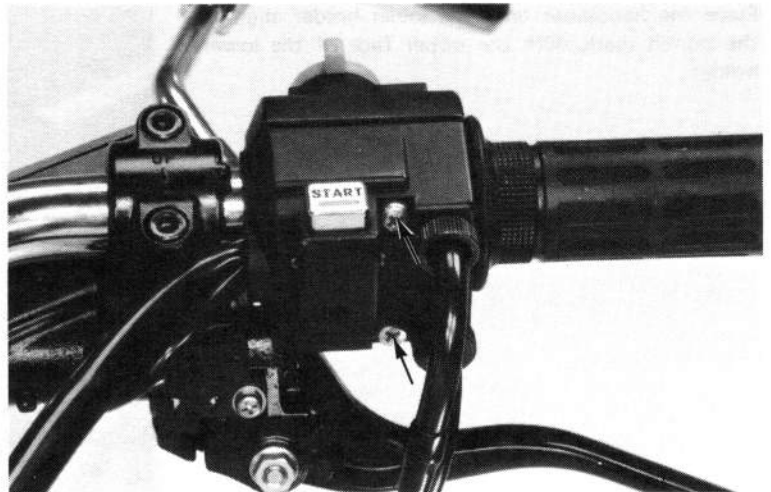


FRONT WHEEL/SUSPENSION

Install the front brake master cylinder with the "UP" mark on the holder facing up. Align the end of the holder with the handlebar punch mark. Tighten the upper bolt first, then the lower bolt.



Install the right handlebar switch assembly and connect the brake light switch wires.



Connect the choke cable to the choke lever and install the clutch master cylinder. Align the end of the holder with the punch mark on the handlebar.

Tighten the upper bolt first, then the lower bolt. Install the left handlebar switch and connect the clutch switch wires.

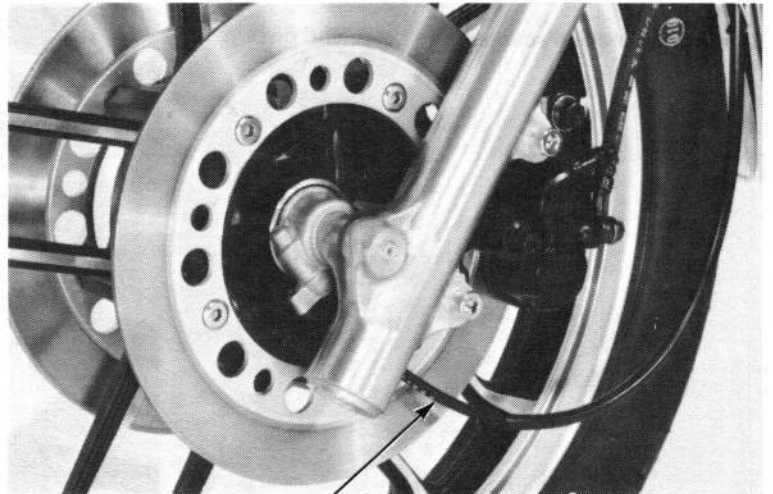
Route the switch wires properly (page 1-9).



FRONT WHEEL

REMOVAL

Place the motorcycle on its center stand.
Place a jack under the engine and raise the front wheel off the ground.
Remove the speedometer cable set screw and the speedometer cable.

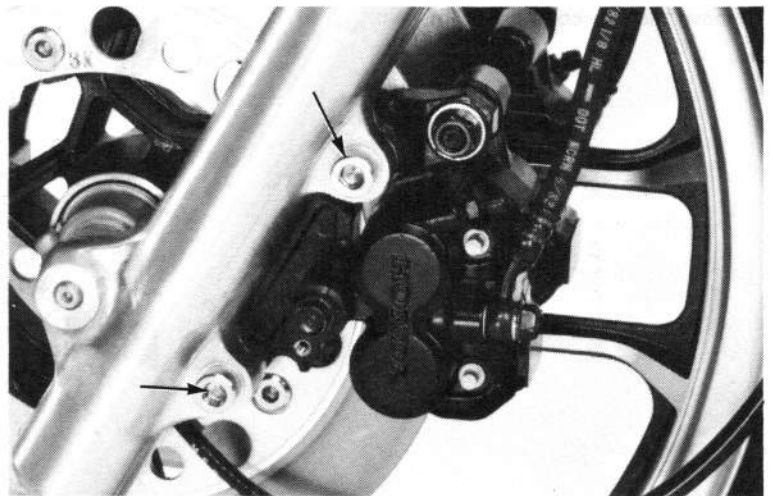


SPEEDOMETER CABLE

Remove the left brake caliper mounting bolts and remove the caliper from the fork leg.

NOTE:

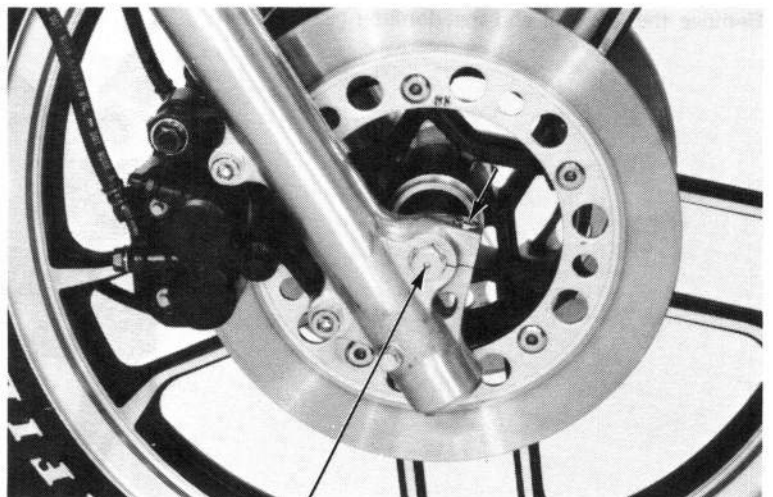
Do not operate the front brake lever after removing the caliper. To do so will cause difficulty in refitting the brake disc between the brake pads.



Loosen the axle pinch bolt.

Loosen and remove the front axle.

Remove the front wheel.

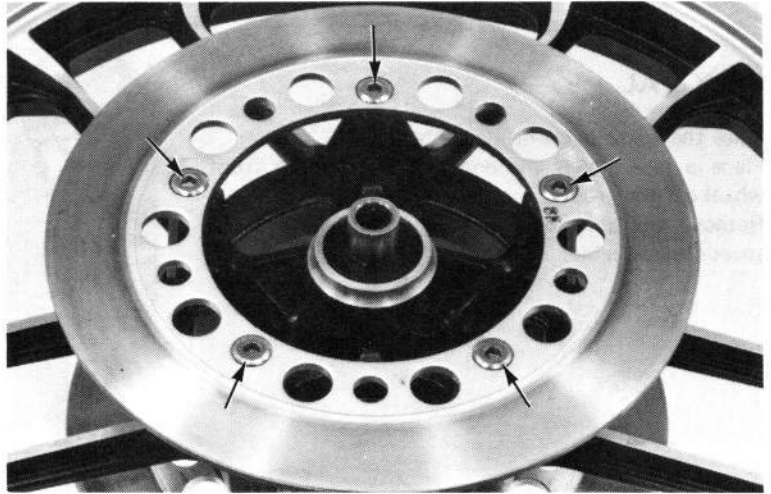


FRONT AXLE

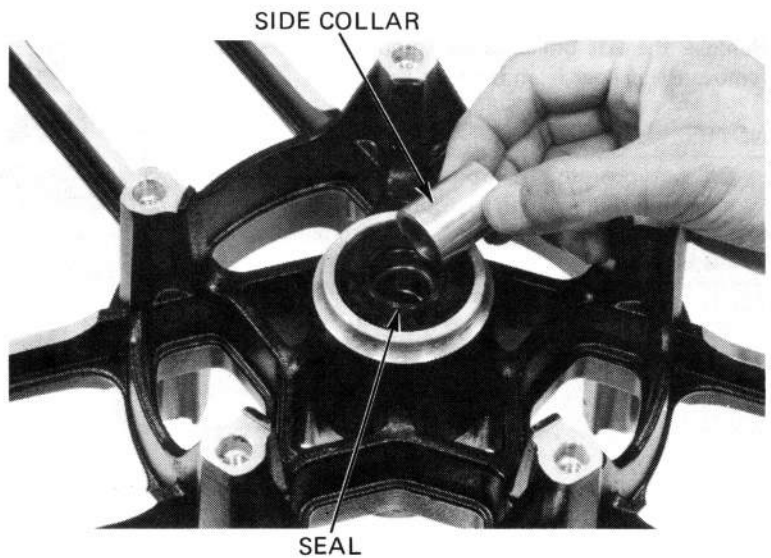
FRONT WHEEL/SUSPENSION

DISASSEMBLY

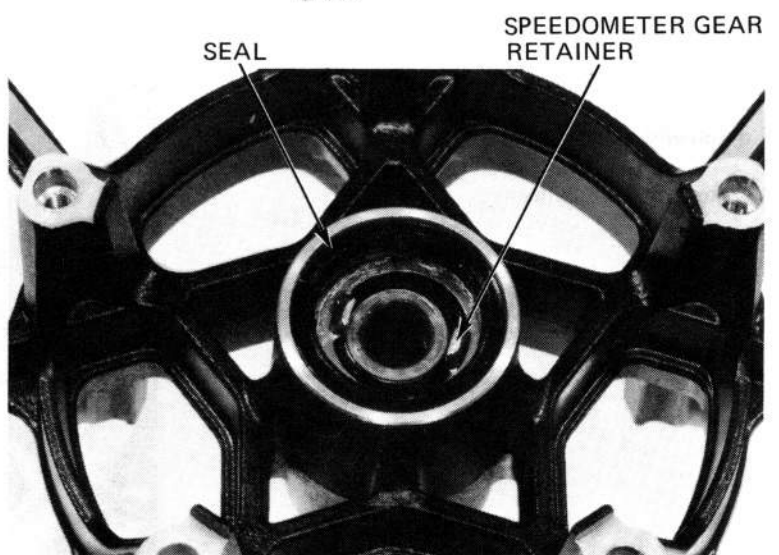
Remove the brake disc mounting bolts, and discs.



Remove the side collar and right seal.



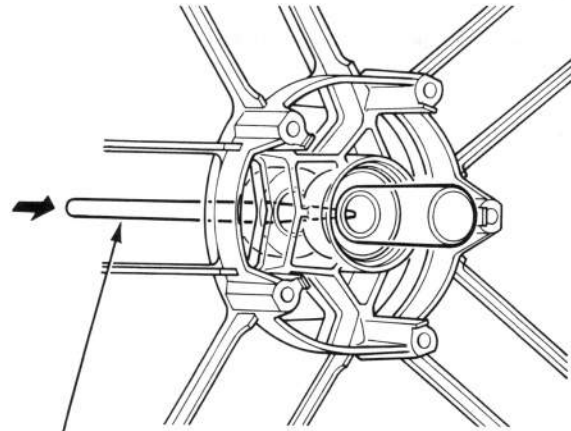
Remove the left seal and speedometer gear retainer.



Remove the wheel bearings and the distance collar from the hub.

NOTE:

If the bearings are removed, they should be replaced with new ones.

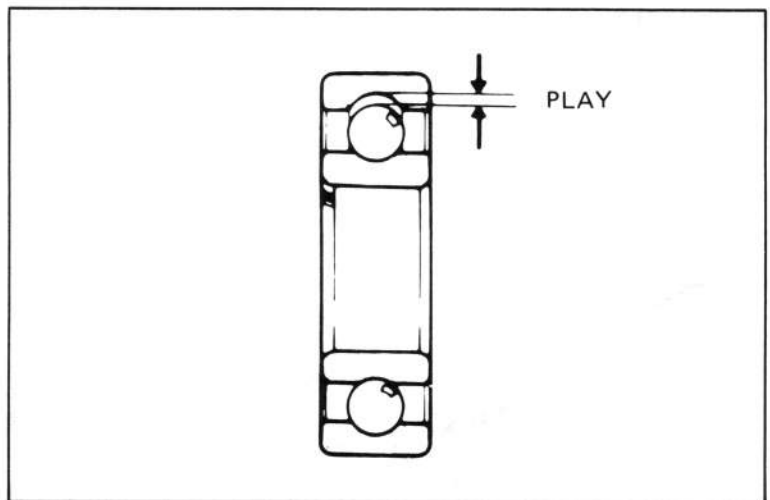


WHEEL BEARING REMOVER EXPANDER
07746-0050100
WHEEL BEARING REMOVER COLLET,
15 mm 07746-0050400 OR
COMMERCIALLY AVAILABLE IN U.S.A.

WHEEL BEARING INSPECTION

Check wheel bearing play by placing the wheel in a truing stand and spinning the wheel by hand. Replace the bearings with new ones if they are noisy or have excessive play.

SERVICE LIMIT: 0.03 mm (0.001 in)



WHEEL INSPECTION

Check the rim runout by placing the wheel in a truing stand. Spin the wheel slowly and read the runout using a dial indicator.

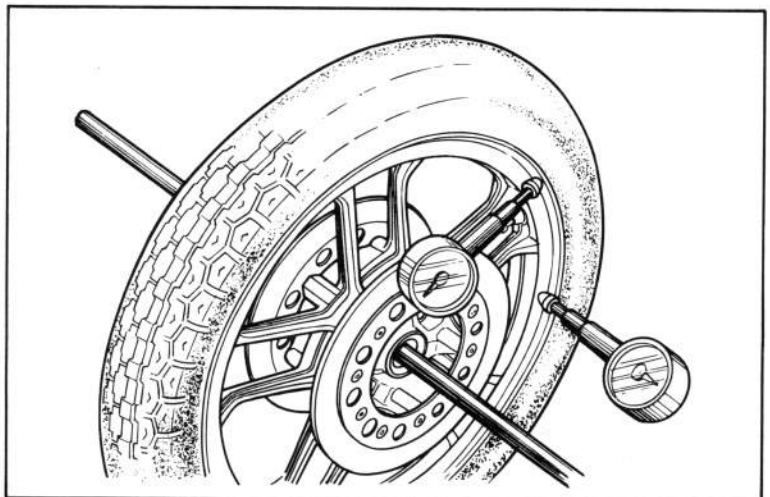
SERVICE LIMITS:

RADIAL RUNOUT: 2.0 mm (0.08 in)

AXIAL RUNOUT: 2.0 mm (0.08 in)

NOTE:

The wheel cannot be repaired and must be replaced with a new one if the service limits are exceeded.

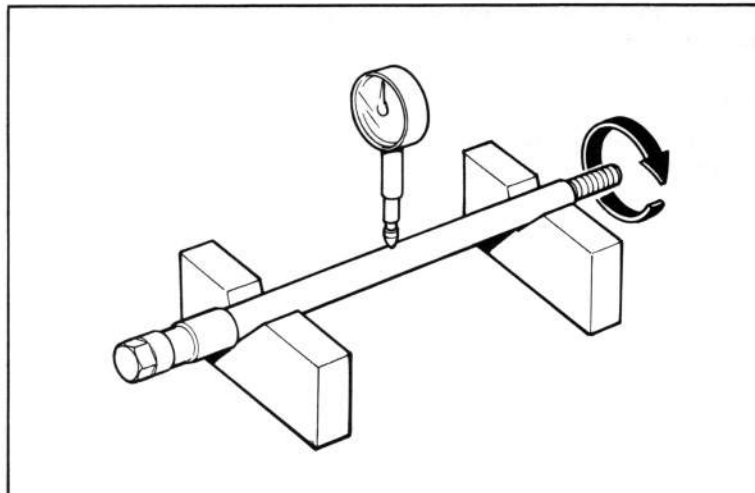


FRONT WHEEL/SUSPENSION

AXLE INSPECTION

Set the axle in V blocks and measure the runout. The actual runout is 1/2 of the total indicator reading.

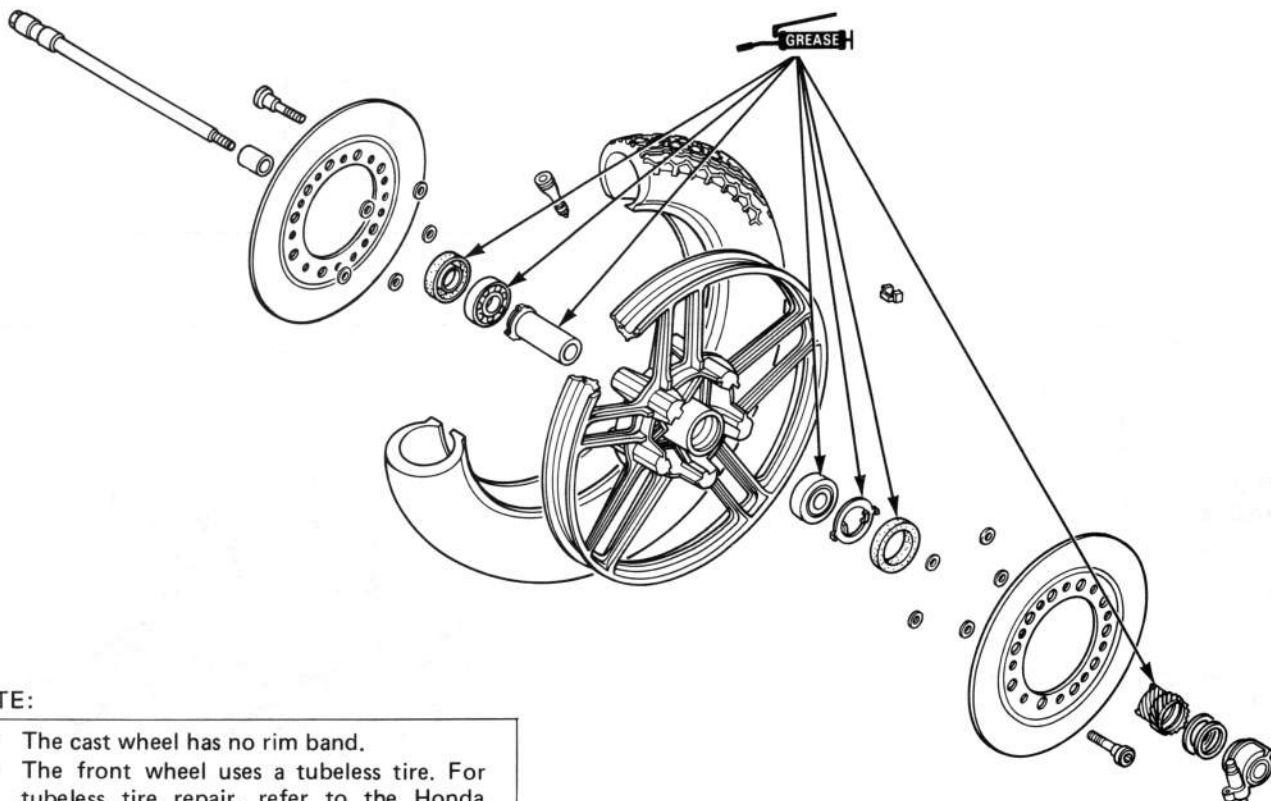
SERVICE LIMIT: 0.2 mm (0.01 in)



ASSEMBLY

WARNING

Do not get grease on the brake disc or stopping power will be reduced.



NOTE:

- The cast wheel has no rim band.
- The front wheel uses a tubeless tire. For tubeless tire repair, refer to the Honda Tubeless Tire Manual.

Pack all bearing cavities with grease.

Drive in the right bearing first and press the distance collar into place.

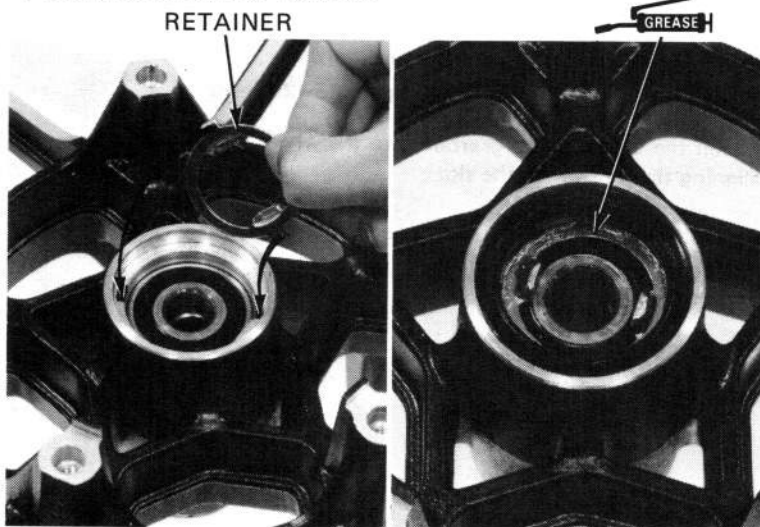
Drive in the left bearing squarely making sure that it is fully seated and that the sealed side is facing out.



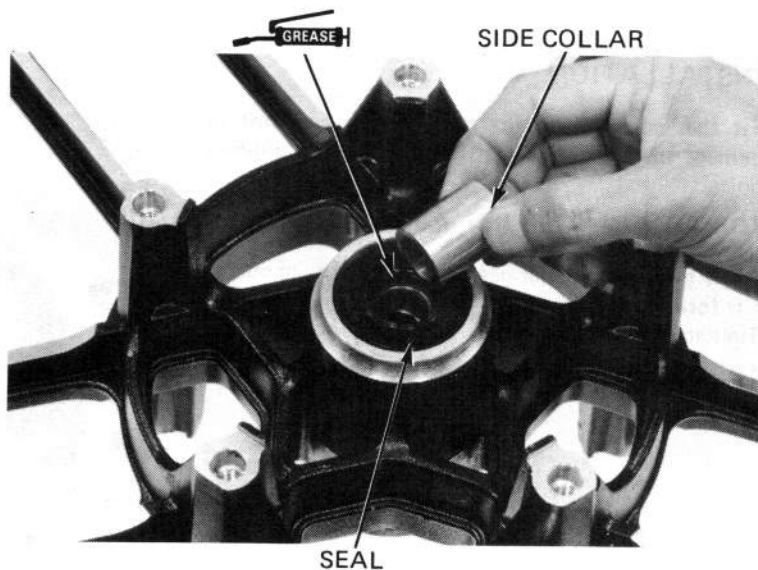
ATTACHMENT, 42 x 47 mm 07746-0010300
PILOT, 15 mm 07746-0040300

Install the speedometer gear retainer into the wheel hub, aligning the tangs with the slots.

Install the left seal.

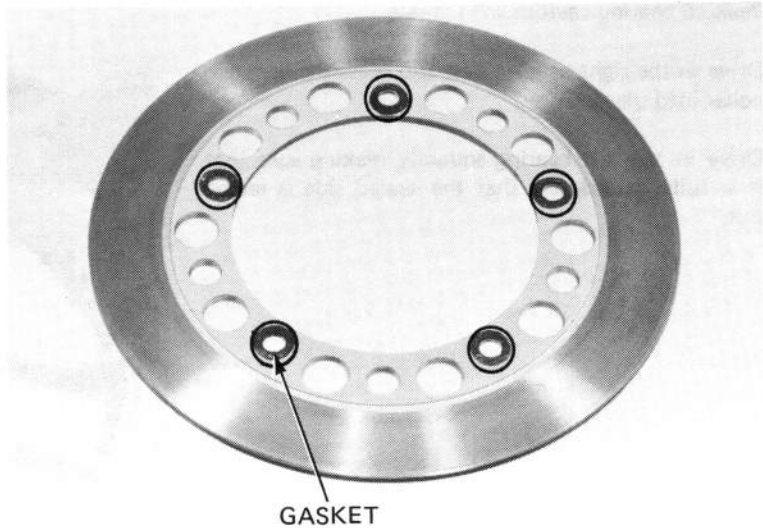


Install the right seal and side collar.



FRONT WHEEL/SUSPENSION

Attach new gaskets to the brake discs.

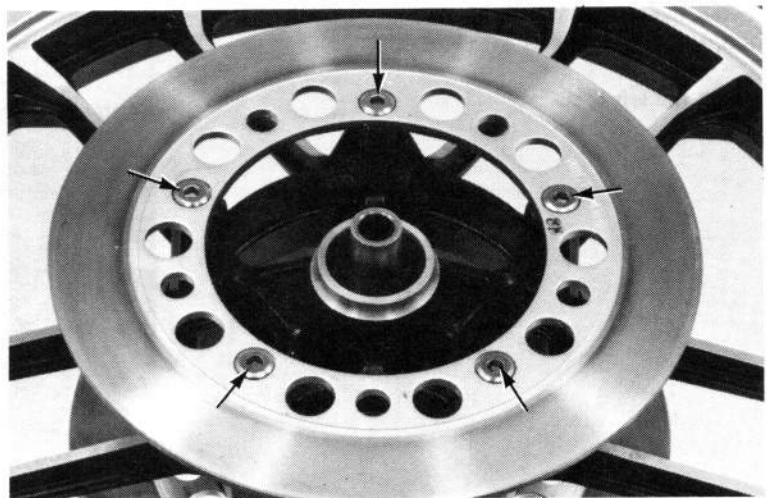


Install the brake discs onto the wheel hub.

TORQUE: 35–40 N·m (3.5–4.0 kg·m, 25–29 ft·lb)

Install the speedometer gearbox into the wheel hub, aligning the tangs with the slots.

Clean the brake discs with a high quality degreasing agent.



INSTALLATION

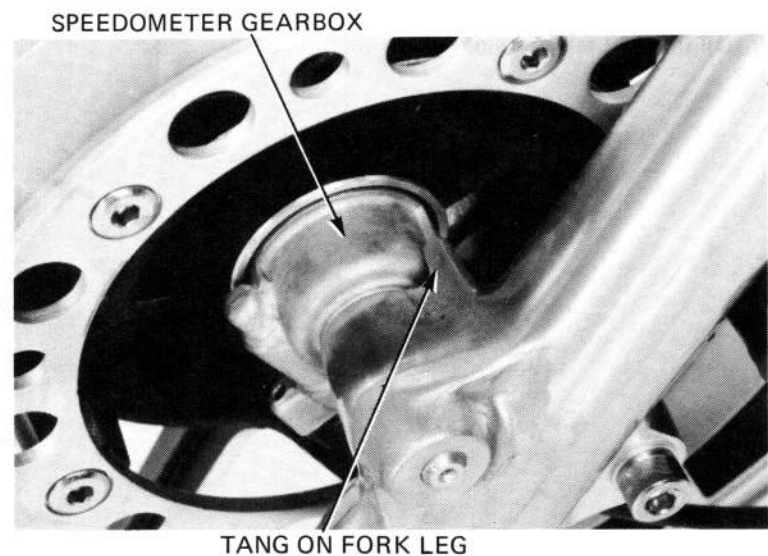
Fit the calipers over the discs, taking care not to damage the brake pads. Install the caliper mounting bolts.

TORQUE: 30–40 N·m (3.0–4.0 kg·m, 22–29 ft·lb)

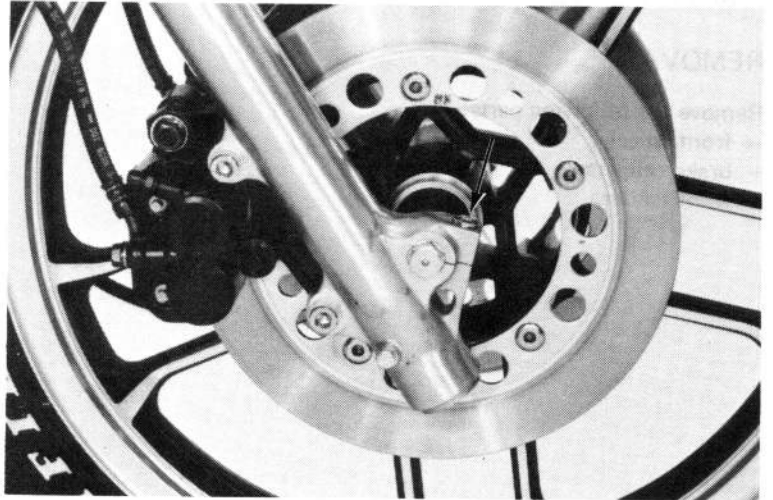
Align the speedometer gearbox with the tang on the left fork leg as shown.

Tighten the axle to the specified torque.

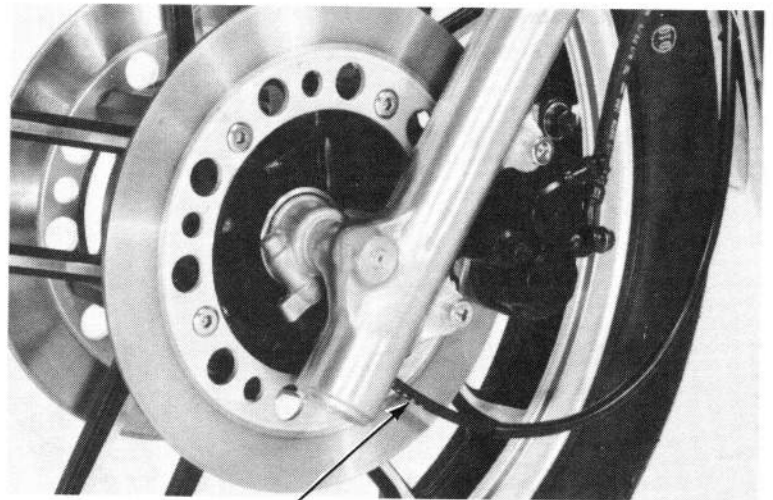
TORQUE: 55–65 N·m (5.5–6.5 kg·m, 40–47 ft·lb)



Tighten the axle pinch bolt to the specified torque.
TORQUE: 18–28 N·m (1.8–2.8 kg-m, 13–20 ft-lb)



Install the speedometer cable into the speedometer gearbox and tighten the set screw.



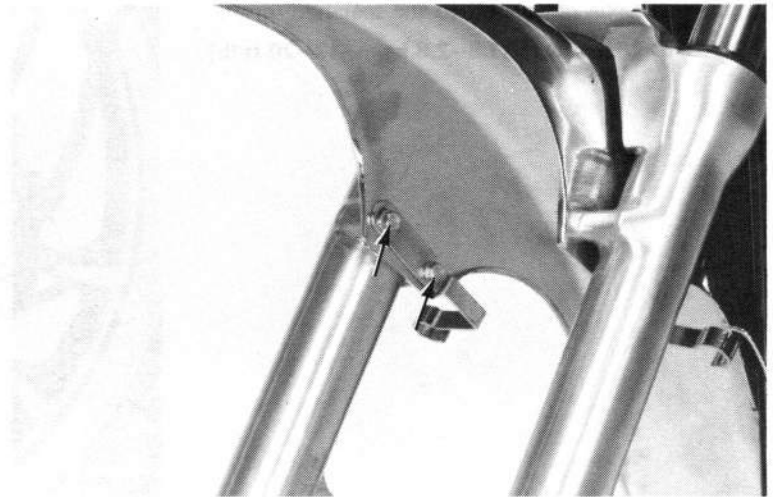
SPEEDOMETER CABLE

FRONT FORKS

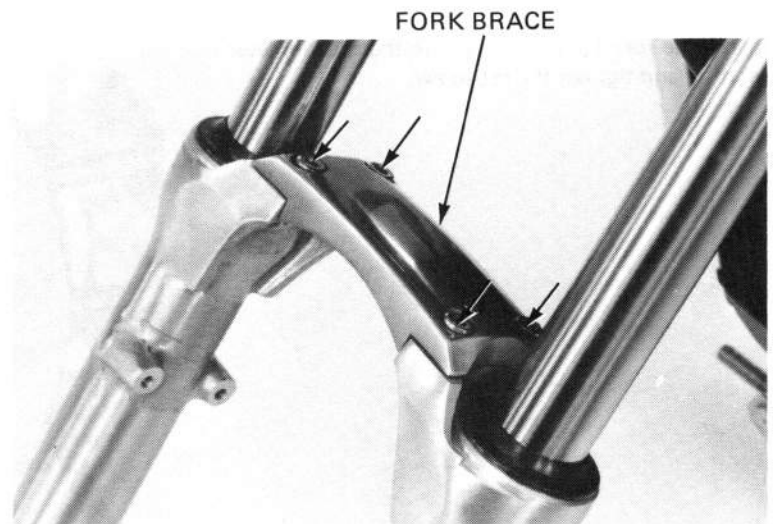
REMOVAL

Remove the following parts:

- front wheel.
- brake calipers.
- front fender.



Remove the fork brace.



Loosen the fork upper and lower pinch bolts and remove the front fork tube.



DISASSEMBLY

Depress the air valve and release front fork air pressure.

CAUTION:

- *If air pressure is not released before disassembling, the fork tube cap may become a projectile.*
- *The cap is also under spring pressure. Use care when removing and wear eye and face protection.*

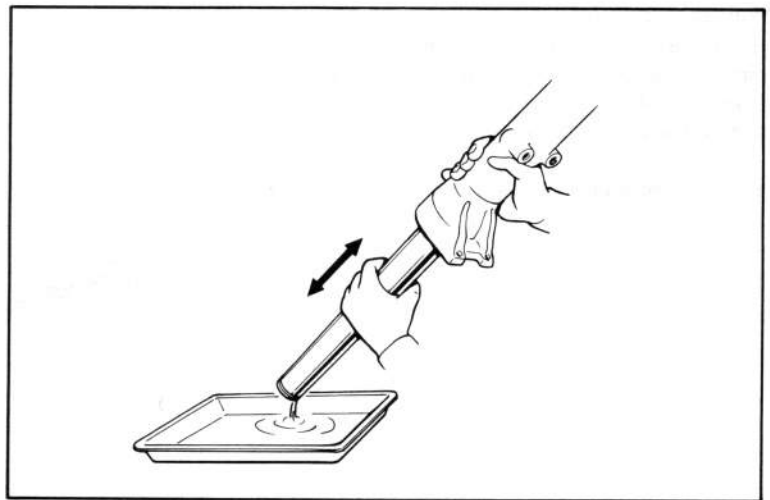
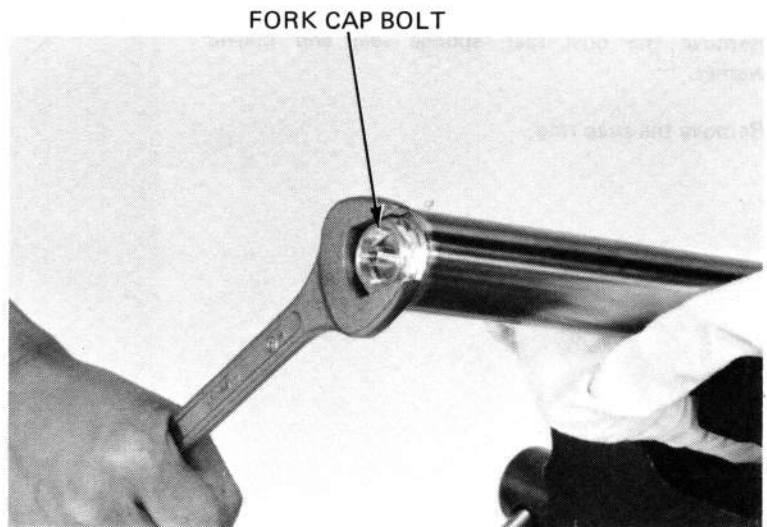
Hold the fork tube in a vise, with soft jaws or a shop towel and remove the fork tube cap.

CAUTION:

- *Be careful not to damage the fork tube's sliding surface.*

Remove the fork spring, spacer and washer.

Pour out the fork fluid by pumping the fork up and down several times.



HEX WRENCH, 6 mm 07917-3230000
OR COMMERCIALY AVAILABLE

Hold the fork slider in a vise with soft jaws or a shop towel.

Remove the socket bolt with a hex wrench.

NOTE:

- *Temporarily install the spring and fork bolt if difficulty is encountered in removing the bolt.*

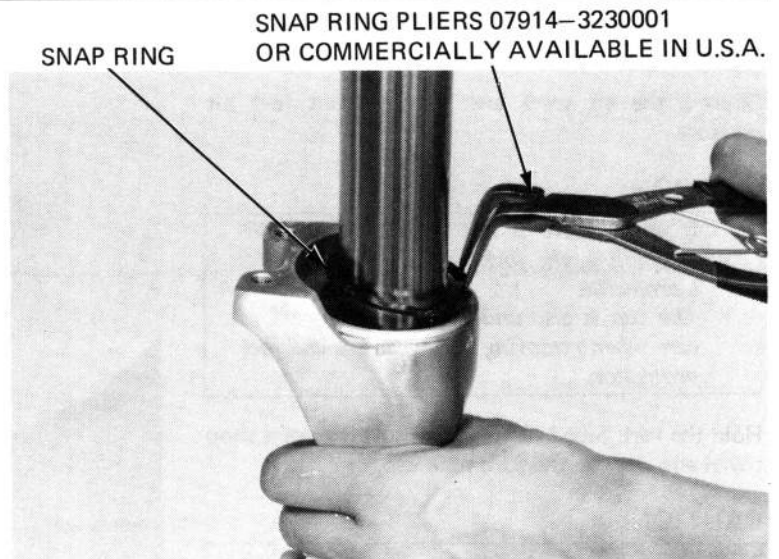
The piston and rebound spring can be removed from the right fork.



FRONT WHEEL/SUSPENSION

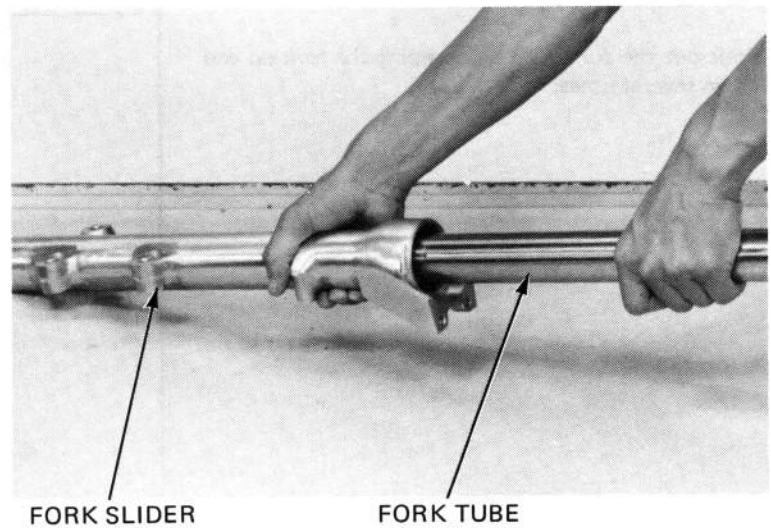
Remove the dust seal, sponge seal and plastic washer.

Remove the snap ring.



Pull the fork tube out until resistance from the slider bushing is felt. Then move it in and out, tapping the bushing lightly until the fork tube separates from the slider. The slider bushing will be forced out by the fork tube bushing.

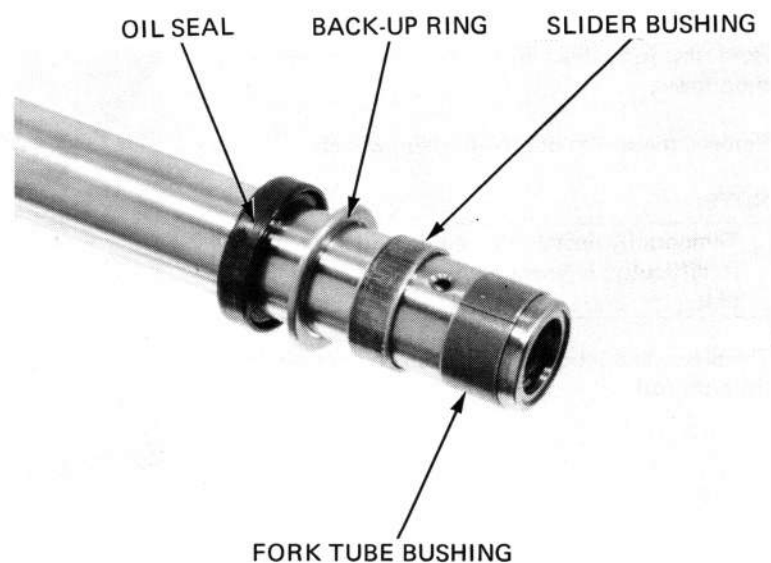
Remove the oil lock piece from inside the slider.



Remove the oil seal, back-up ring and slider bushing from the fork tube.

NOTE:

Do not remove the fork tube bushing unless it is necessary to replace it with a new one. See bushing inspection, page 15-24.



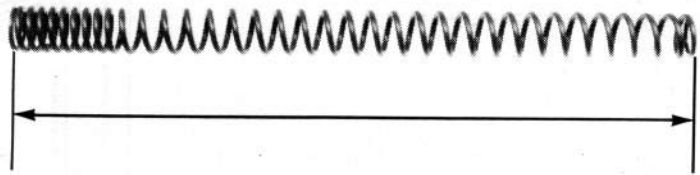
INSPECTION

FORK SPRING FREE LENGTH

Measure the fork spring free length.

SERVICE LIMIT: 465.6 mm (18.3 in)

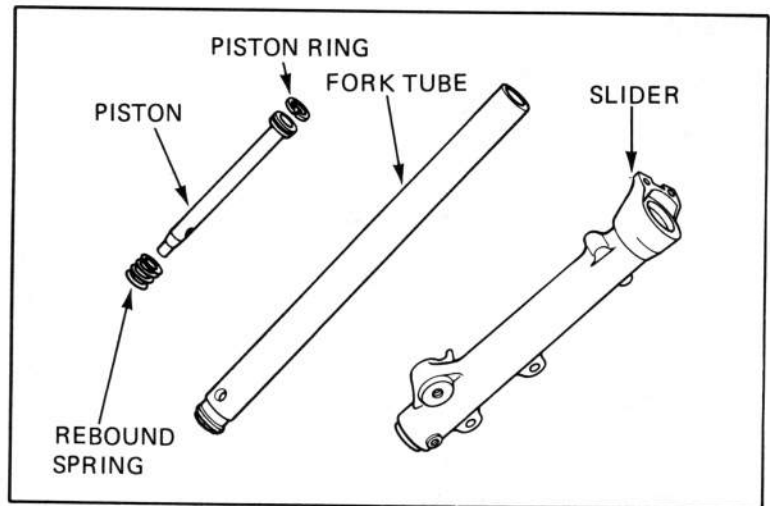
Replace the spring if it is shorter than the service limit.



FORK TUBE/FORK SLIDER/PISTON

Check the fork tube, fork slider and piston for score marks, scratches, or excessive or abnormal wear. Replace any components which are worn or damaged.

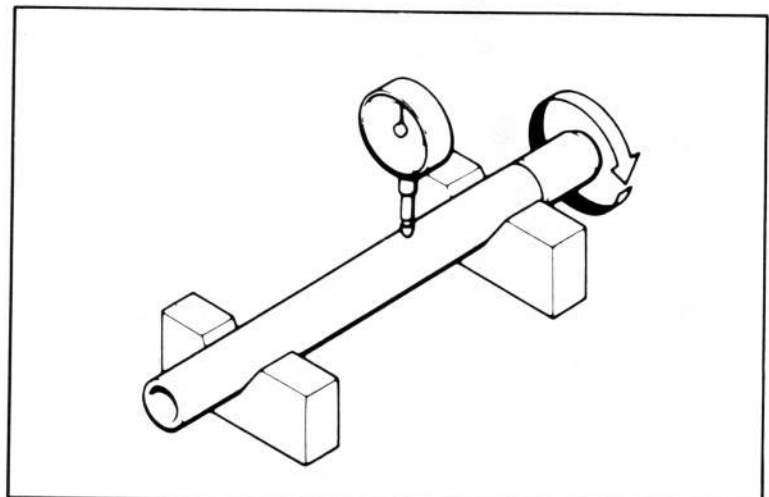
Check the fork piston ring for wear or damage.
Check the rebound spring for fatigue or damage.



FORK TUBE

Set the fork tube in V blocks and read the runout. Use 1/2 the total indicator reading to determine the actual runout.

SERVICE LIMIT: 0.20 mm (0.008 in)

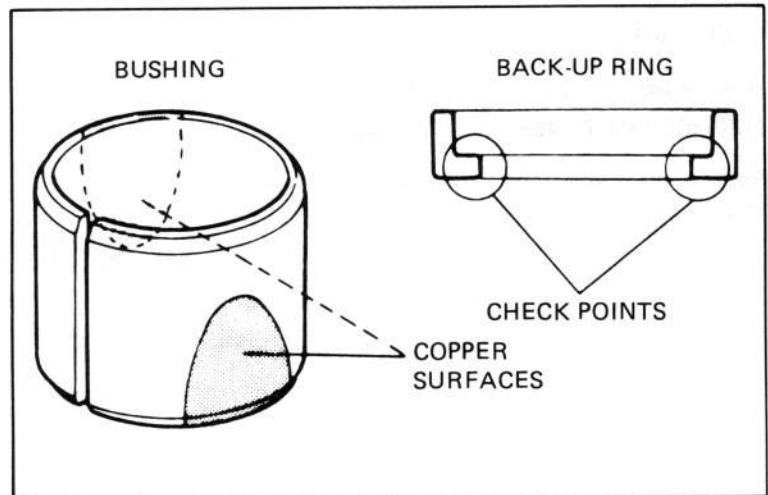


FRONT WHEEL/SUSPENSION

BUSHING/BACK-UP RING

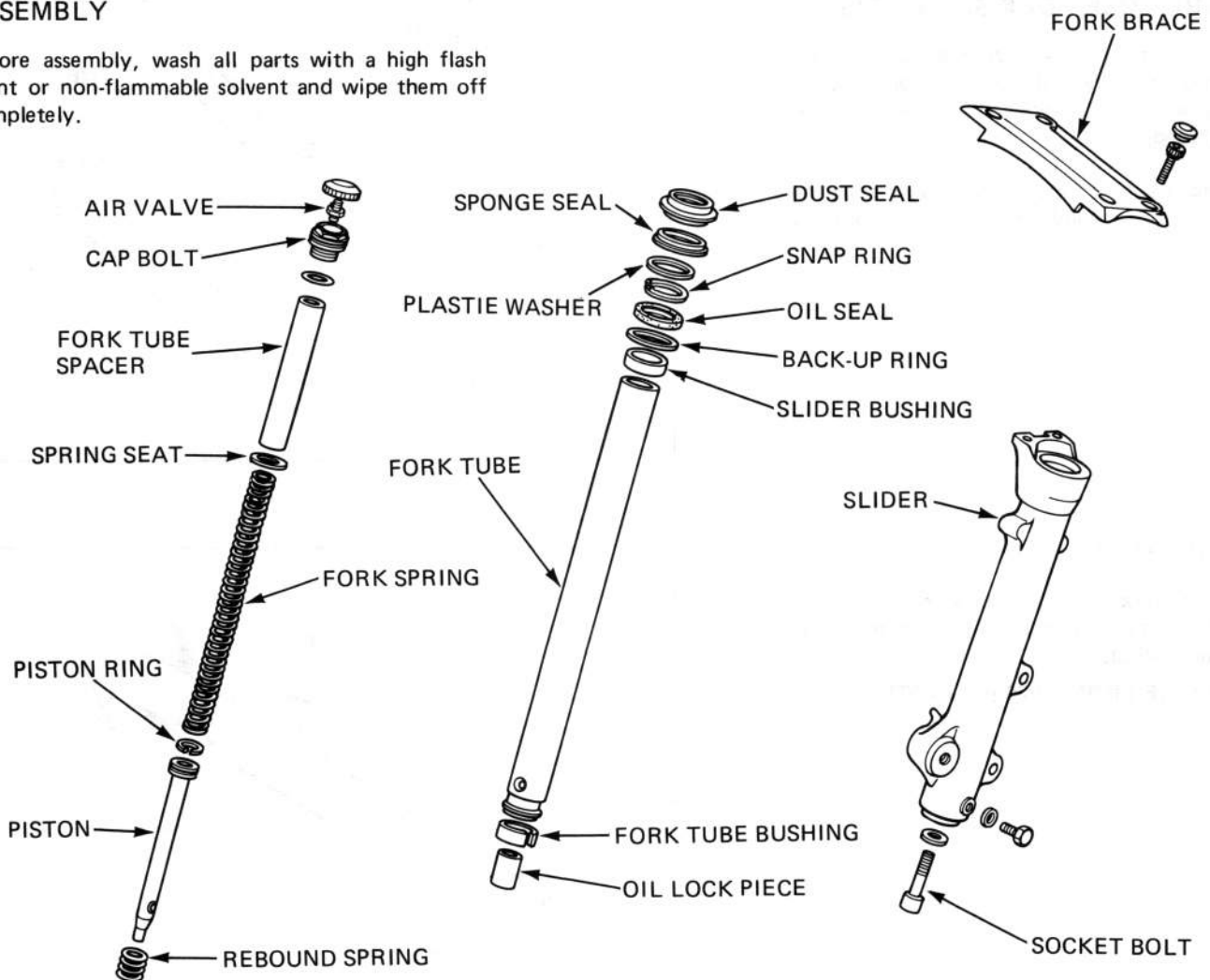
Visually inspect the slider and fork tube bushings. Replace the bushings if there is excessive scoring or scratching, or if the teflon is worn so that the copper surface appears on more than 3/4 of the entire surface.

Check the back-up ring; replace it if there is any distortion at the points shown.



ASSEMBLY

Before assembly, wash all parts with a high flash point or non-flammable solvent and wipe them off completely.



Insert the rebound spring and piston into the fork tube.

Place the oil lock piece on the end of the piston and insert the fork tube into the slider.

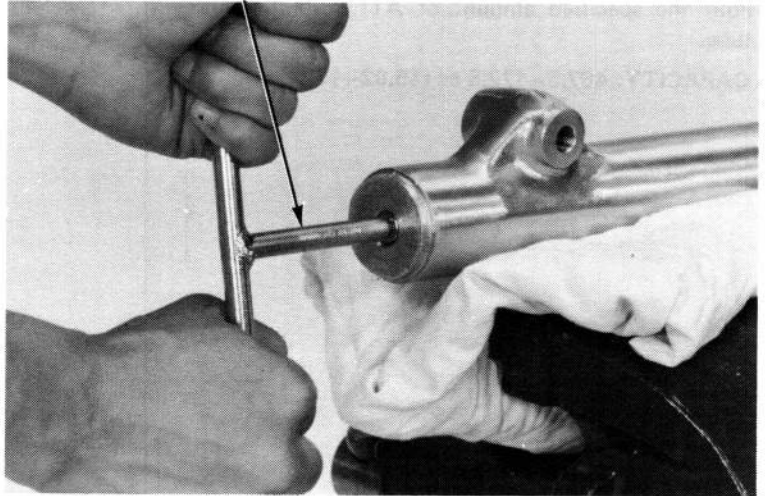
Place the fork slider in a vise with soft jaws or a shop towel. Apply a locking agent to the socket bolt and thread it into the piston. Tighten with a 6 mm hex wrench.

NOTE:

Temporarily install the fork spring and fork cap bolt to tighten the socket bolt.

TORQUE: 15–25 N·m (1.5–2.5 kg·m, 11–18 ft·lb)

HEX WRENCH, 6 mm 07917–3230000
OR COMMERCIALLY AVAILABLE IN U.S.A.

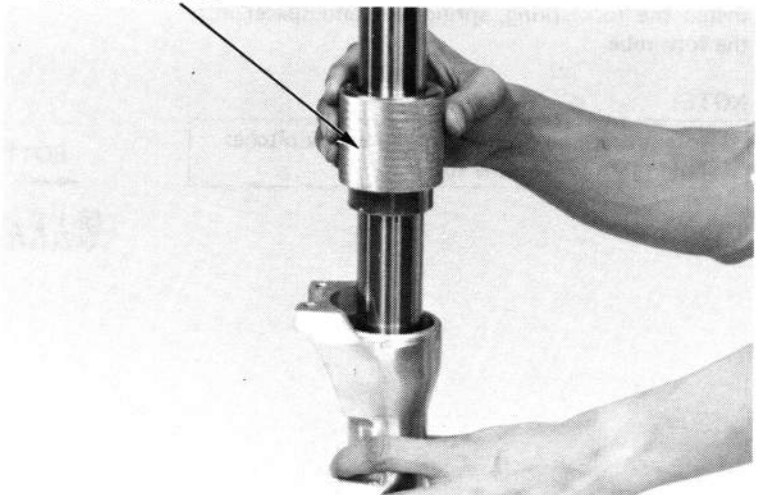


Place the slider bushing over the fork tube and rest it on the slider. Put the back-up ring and an old bushing or equivalent tool on top.

Drive the bushing into place with the seal driver and remove the old bushing or equivalent tool.

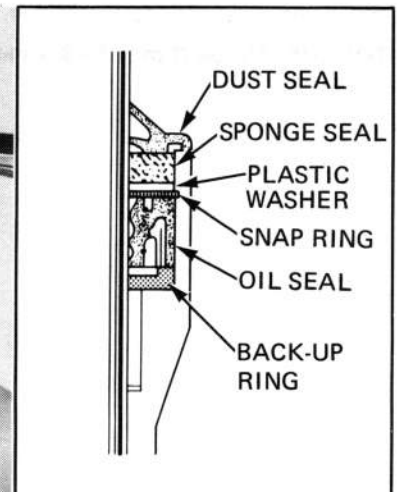
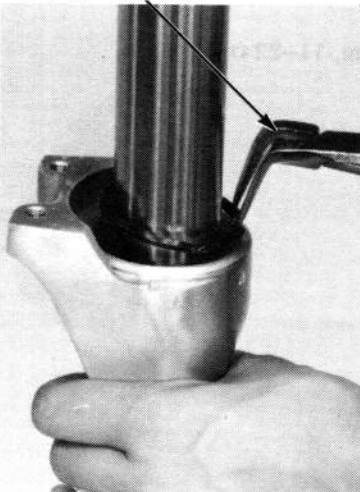
Coat a new oil seal with ATF and install it with the seal markings facing up. Drive the seal in with the seal driver.

FORK SEAL DRIVER
07947–4630100



Install the snap ring with its radiused edge facing down and install the plastic washer, sponge and dust seals.

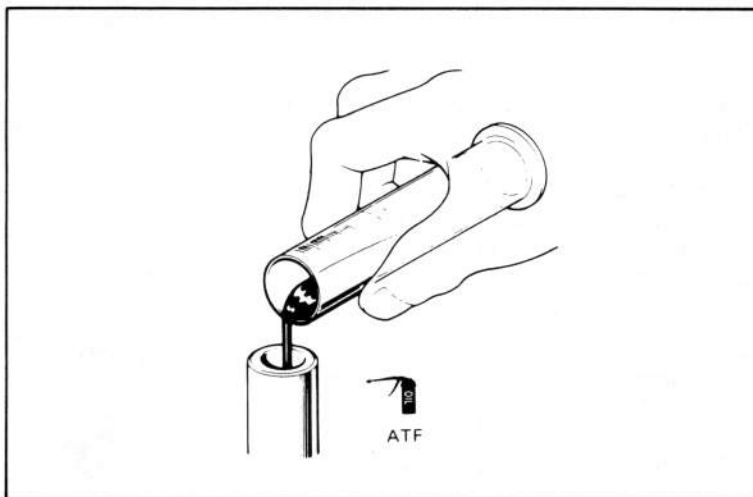
SNAP RING PLIERS
07914–3230001



FRONT WHEEL/SUSPENSION

Pour the specified amount of ATF into the fork tube.

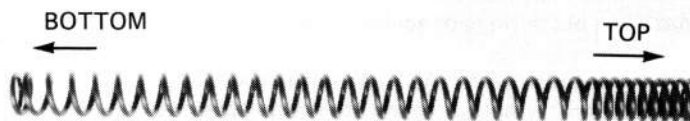
CAPACITY: 467.5–472.5 cc (15.82–15.99 ozs)



Install the fork spring, spring seat and spacer into the fork tube.

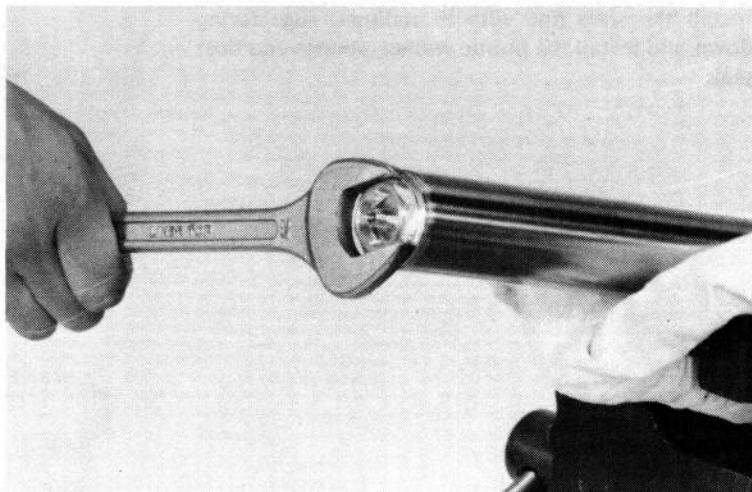
NOTE:

Note the spring direction, the narrow pitches should face toward the top.



Install and torque the fork tube cap.

TORQUE: 15–30 N·m (1.5–3.0 kg·m, 11–22 ft·lb)



FRONT FORK INSTALLATION

Install the front forks.

Tighten the bottom pinch bolts.

TORQUE: 45–55 N·m (4.5–5.5 kg-m, 33–40 ft-lb)

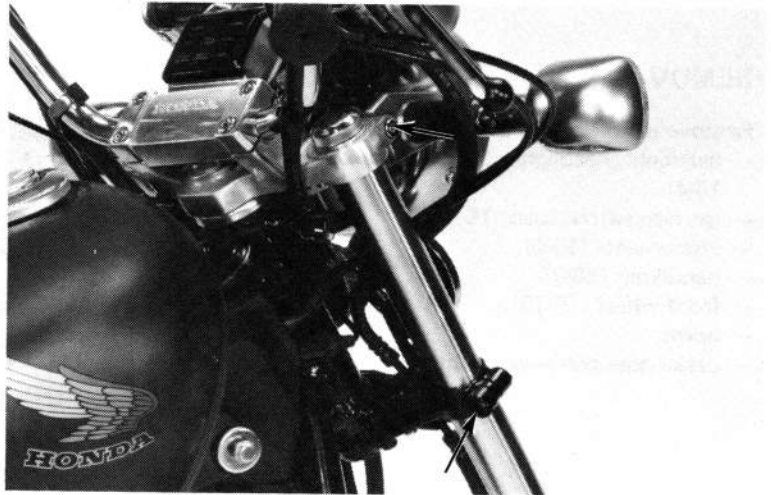
Tighten the top pinch bolts.

TORQUE: 9–13 N·m (0.9–1.3 kg-m, 7–8 ft-lb)

Loosely install the front fork brace.

NOTE:

Do not install the fork brace before torquing the front fork pinch bolts.



Install the removed parts in the reverse order of removal.

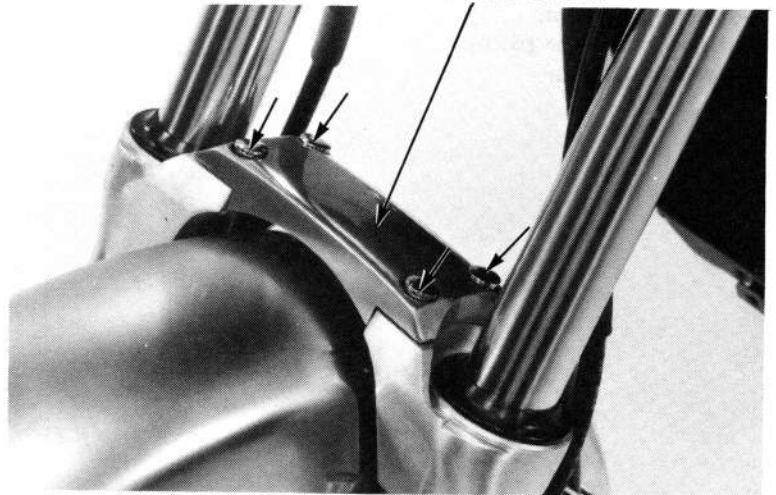
- front fender.
- brake calipers.
- front wheel.

Tighten the front fork brace to the specified torque.

TORQUE: 18–28 N·m (1.8–2.8 kg-m, 13–20 ft-lb)

Install the bolt caps.

FRONT FORK BRACE

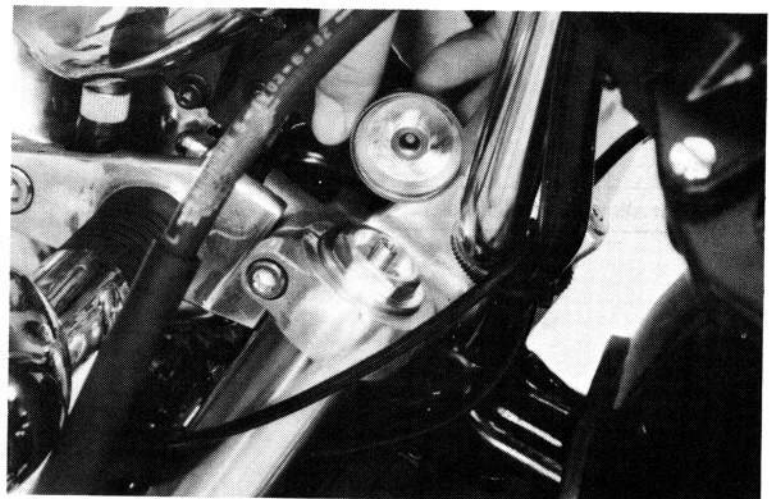


Fill the fork tubes with air to 0–40 kPa (0–4.0 kg/cm², 0–6 psi).

CAUTION:

- Use only a hand operated air pump to fill the fork tubes. Do not use compressed air.
- Maximum pressure is 300 kPa (3 kg/cm², 43 psi). Do not exceed this or fork tube component damage may occur.

With the front brake applied, pump the front forks up and down several times. Place the motorcycle on its center stand. Check the air pressure and adjust if necessary.

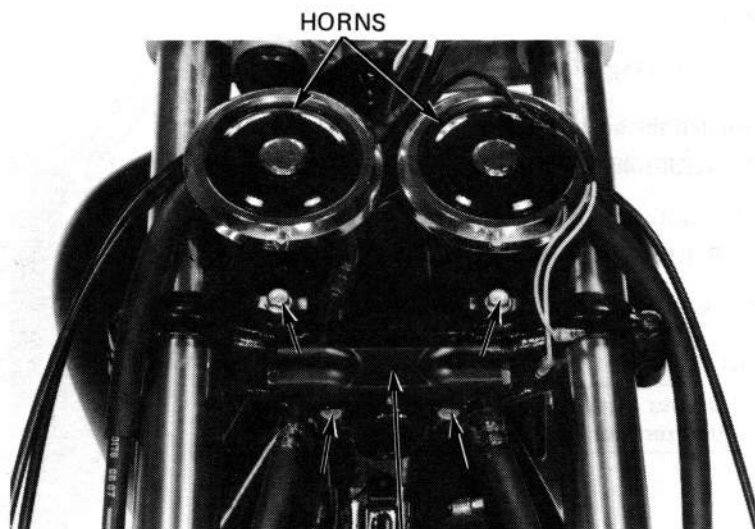


STEERING STEM

REMOVAL

Remove the following components.

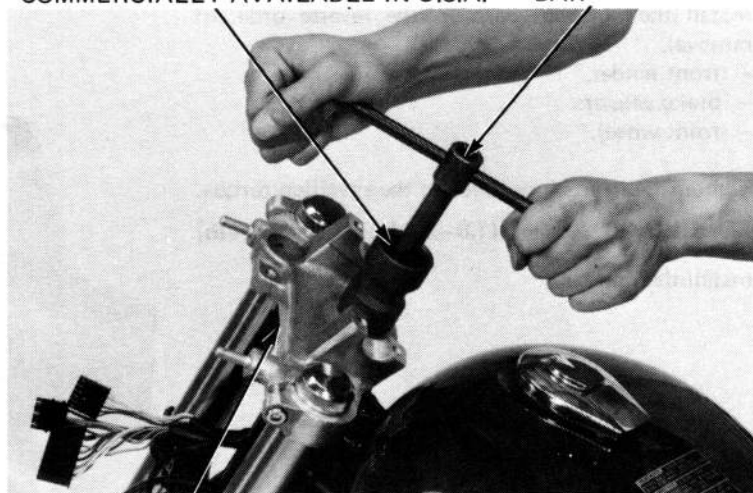
- headlight, headlight case and brackets (page 15-3, 15-4).
- ignition switch (page 15-4).
- instruments (15-6).
- handlebar (15-9).
- front wheel (15-13).
- horns.
- brake hose three-way joint.



BRAKE HOSE THREE-WAY JOINT

LOCK NUT WRENCH, 30 x 32 mm
COMMERCIALY AVAILABLE IN U.S.A. EXTENSION BAR

- steering stem nut.
- front forks (page 15-20).
- fork top bridge.



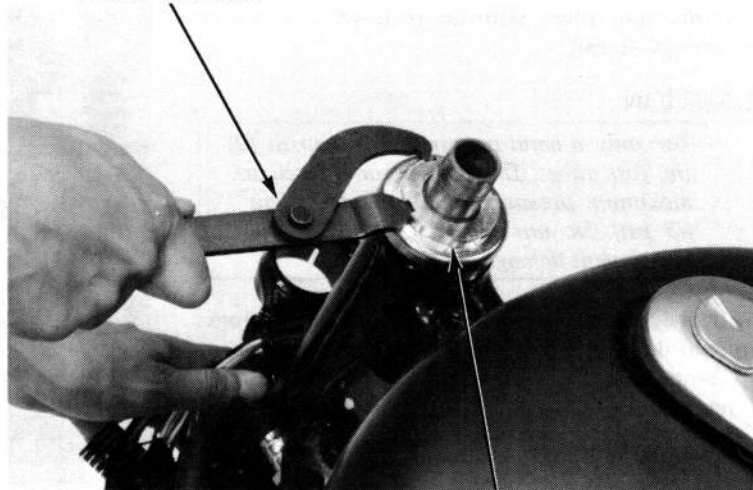
FORK TOP BRIDGE
PIN SPANNER
07702-0010000

Remove the bearing adjustment nut.

Remove the steering stem, top cone race and steel balls.

NOTE:

Do not allow the steel balls to fall.

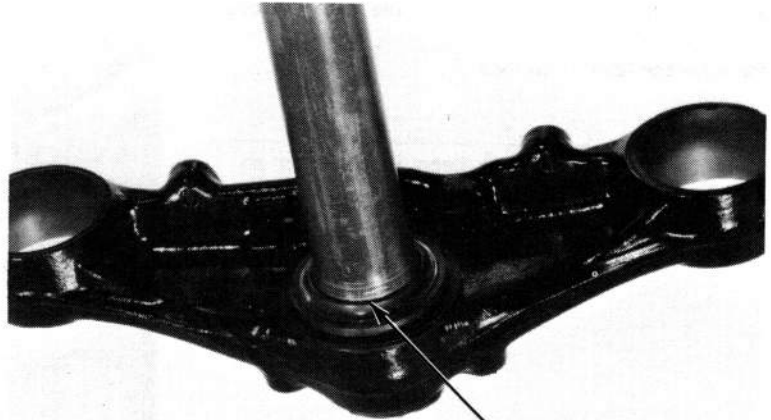


BEARING ADJUSTMENT NUT

BOTTOM CONE RACE REPLACEMENT

Inspect the bottom cone race for wear or damage and replace if necessary.

Remove the bottom cone race with a hammer and a drift.

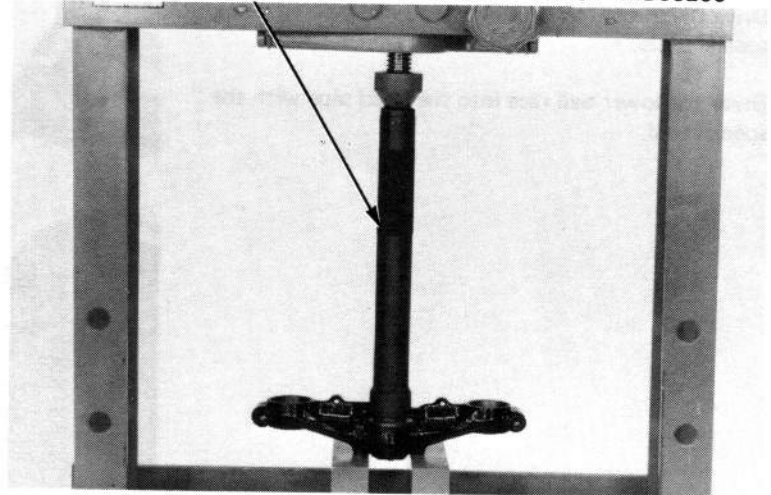


BOTTOM CONE RACE

Install a new washer and dust seal and drive a new bottom cone race into place.

STEERING STEM DRIVER

07946-MB00000 OR 07946-3710100 AND 07964-MB00200



BALL RACE REPLACEMENT

Inspect the top and bottom ball races and replace if worn or damaged.

Remove the upper ball race with the special tool.

NOTE:

Remove the sliding guide from the bearing race remover.

BEARING RACE REMOVER/
INSTALLER 07946-3710400



FRONT WHEEL/SUSPENSION

Reinstall the sliding guide onto the race remover.

Remove the lower ball race.

NOTE:

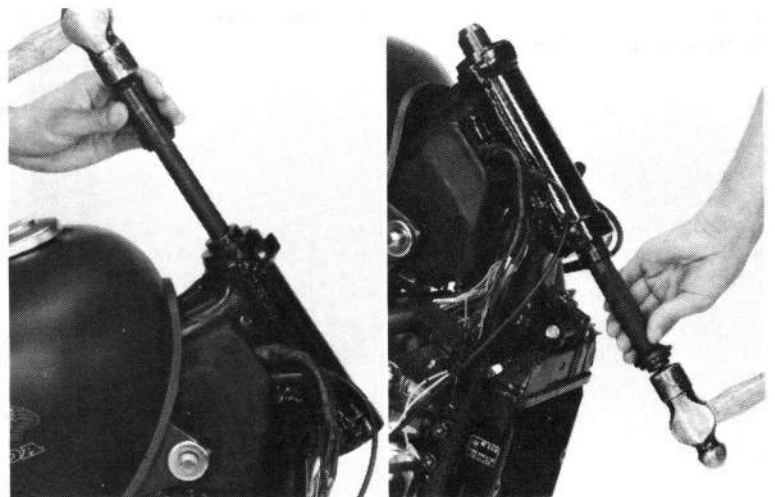
If the motorcycle has been involved in an accident, examine the area around the steering head for cracks.



BEARING RACE REMOVER/INSTALLER
07946-3710400

Drive the upper ball race into the head pipe with the special tools.

Drive the lower ball race into the head pipe with the special tool.

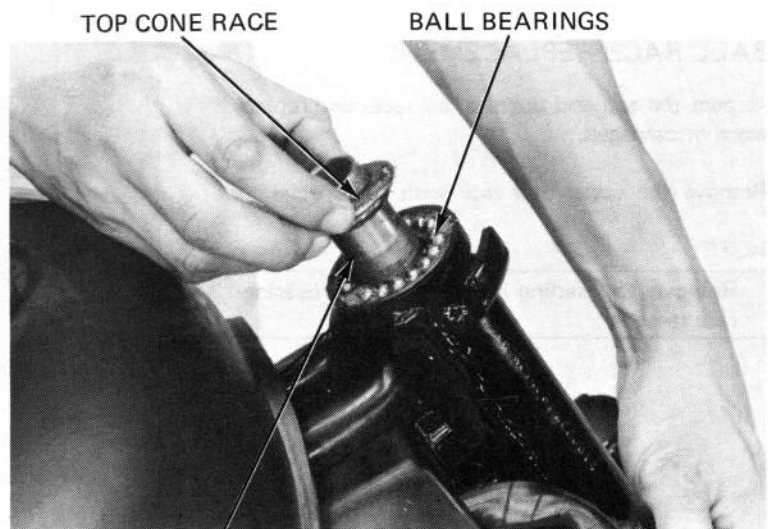


INSTALLATION

Apply grease to the top ball race and install 18 ball bearings.

Apply grease to the bottom ball race and install 19 ball bearings.

Insert the steering stem into the steering head pipe and install the top cone race.



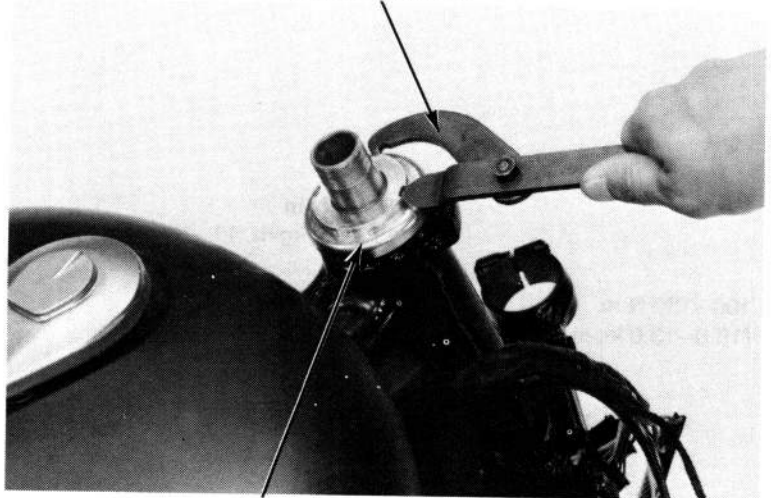
STEERING STEM

FRONT WHEEL/SUSPENSION

Install the bearing adjustment nut and tighten it snug against the top cone race. Then, back it off 1/8 turn.

Make sure that there is no vertical movement and that the stem rotates freely.

PIN SPANNER
07702-0010000



BEARING ADJUSTMENT NUT
LOCK NUT WRENCH, 30 x 32 mm
COMMERCIALY AVAILABLE IN U.S.A.

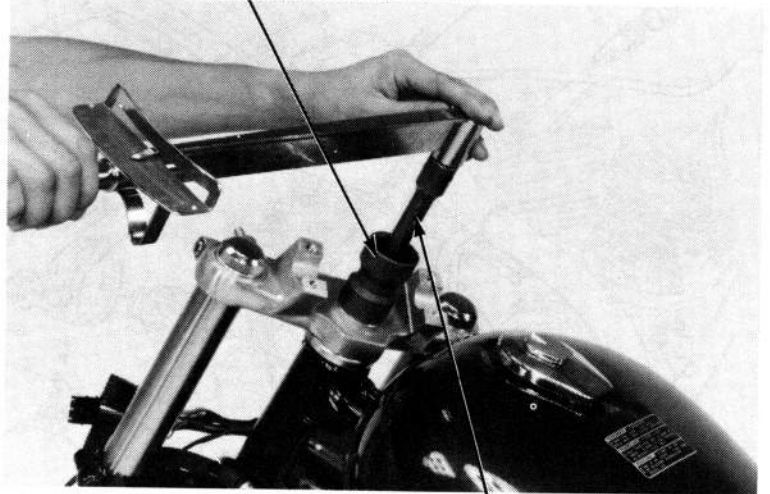
Install the fork top bridge and stem nut.

Temporarily install the front forks and tighten the stem nut.

TORQUE:

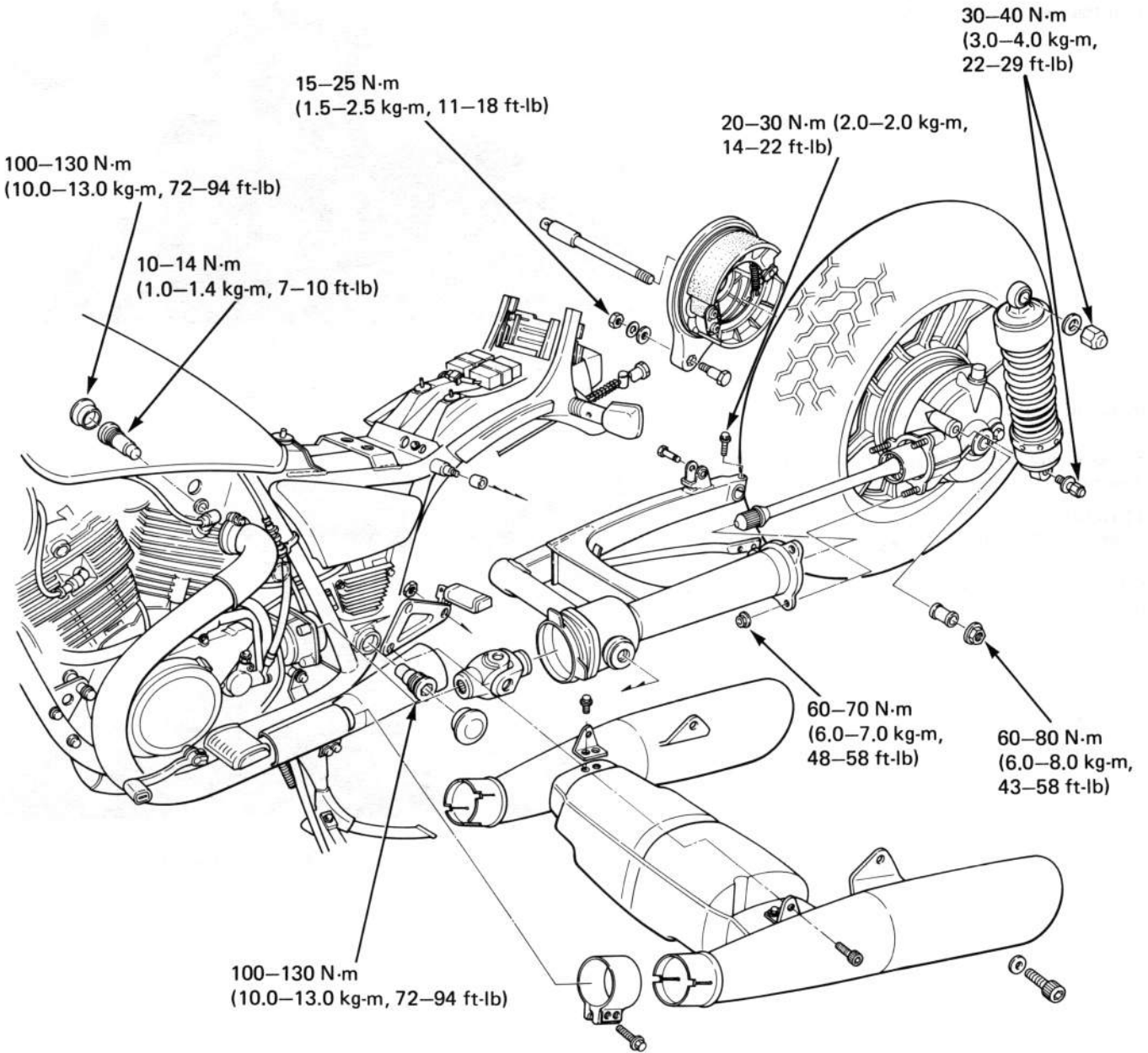
80–120 N·m (8.0–12.0 kg·m, 58–87 ft·lb)

Install the removed parts in the reverse order of removal.



EXTENSION BAR
COMMERCIALY AVAILABLE IN U.S.A.

REAR WHEEL/SUSPENSION/BRAKE



16. REAR WHEEL/SUSPENSION/BRAKE

SERVICE INFORMATION	16-1	REAR BRAKE PANEL	16-10
TROUBLESHOOTING	16-2	SHOCK ABSORBER	16-10
REAR WHEEL	16-3	SWINGARM	16-13

SERVICE INFORMATION

GENERAL

- The rear wheel uses a tubeless tire. For tubeless tire repairs, refer to the Tubeless Tire Manual.
- Never ride on the rim.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Axle runout		—	0.2 mm (0.01 in)
Rear wheel rim runout	Radial	—	2.0 mm (0.08 in)
	Axial	—	2.0 mm (0.08 in)
Wheel bearing play		—	0.03 mm (0.001 in)
Shock absorber spring free length		223.8 mm (8.81 in)	211 mm (8.3 in)
Brake drum I.D.		160.0–160.3 mm (6.30–6.31 in)	161 mm (6.34 in)
Rear brake lining thickness		4.9–5.0 mm (0.19–0.20 in)	2.0 mm (0.08 in)

TORQUE VALUES

Rear axle nut	60–80 N·m (6.0–8.0 kg-m, 43–58 ft-lb)
Brake torque link bolt	15–25 N·m (1.5–2.5 kg-m, 11–18 ft-lb)
Axle pinch bolt	20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)
Brake arm	24–30 N·m (2.4–3.0 kg-m, 17–22 ft-lb)
Shock absorber mount bolt	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Final driven flange	50–60 N·m (5.0–6.0 kg-m, 36–43 ft-lb)
Swingarm left pivot bolt	100–130 N·m (10.0–13.0 kg-m, 72–94 ft-lb)
Swingarm right pivot bolt	10–14 N·m (1.0–1.4 kg-m, 7–10 ft-lb)
Swingarm pivot lock nut	100–130 N·m (10.0–13.0 kg-m, 72–94 ft-lb)

TOOLS

Special

Shock absorber compressor attachment	07959-MB10000	
Swingarm pivot lock nut wrench	07908-ME90000	
Socket bit, 10 mm	07917-3710000	Commercially available in U.S.A.
Swingarm bearing remover	07936-4150000	or 07936-3710500
Slide hammer handle	07936-3710100	

Common

Driver	07749-0010000
Attachment, 42 x 47 mm	07746-0010300
Pilot, 17 mm	07746-0040400
Attachment, 32 x 35 mm	07746-0010100
Shock absorber compressor	07959-3290001
Wheel bearing remover collet, 17 mm	07746-0050500
Wheel bearing remover expander	07746-0050100
Remover weight	07741-0010201 or 07936-3710200

TROUBLESHOOTING

Oscillation

1. Bent rim.
2. Loose wheel bearings.
3. Faulty tire.
4. Loose axle.
5. Tire pressure incorrect.
6. Swingarm bearings worn.
7. Worn tires.

Soft suspension

- Weak spring(s).

Hard suspension

- Bent shock absorber.

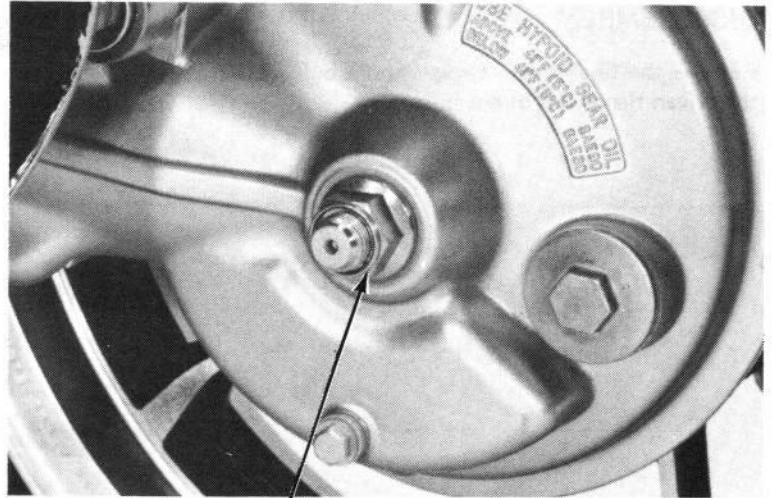
Suspension noise

1. Shock case binding.
2. Loose fasteners.

REAR WHEEL

REMOVAL

Place the motorcycle on its center stand and loosen the axle nut.

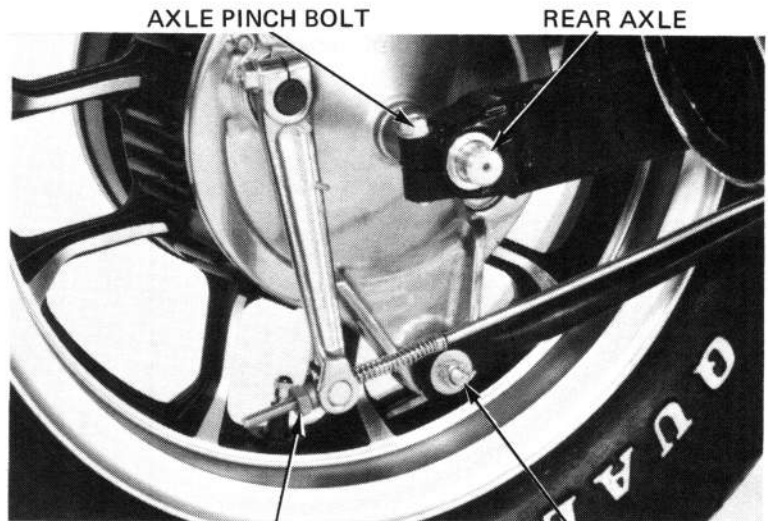


AXLE NUT

Remove the brake torque link bolt and disconnect the torque link.

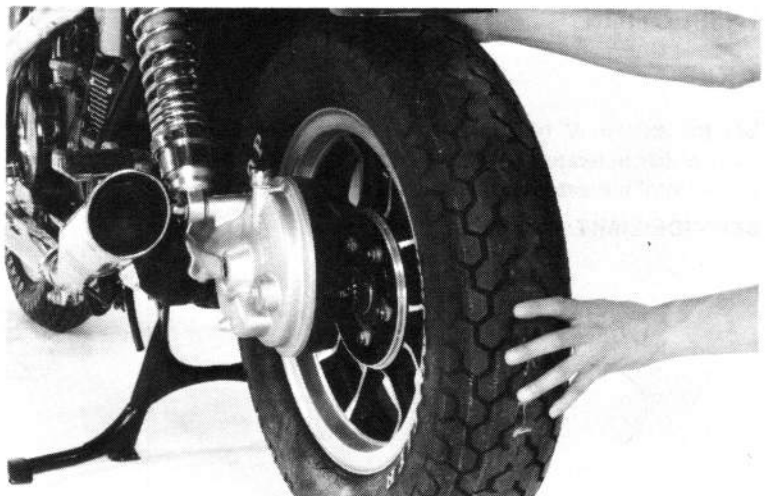
Remove the brake adjusting nut and the brake rod.

Loosen the axle pinch bolt and remove the rear axle.



BRAKE ADJUSTING NUT TORQUE LINK BOLT

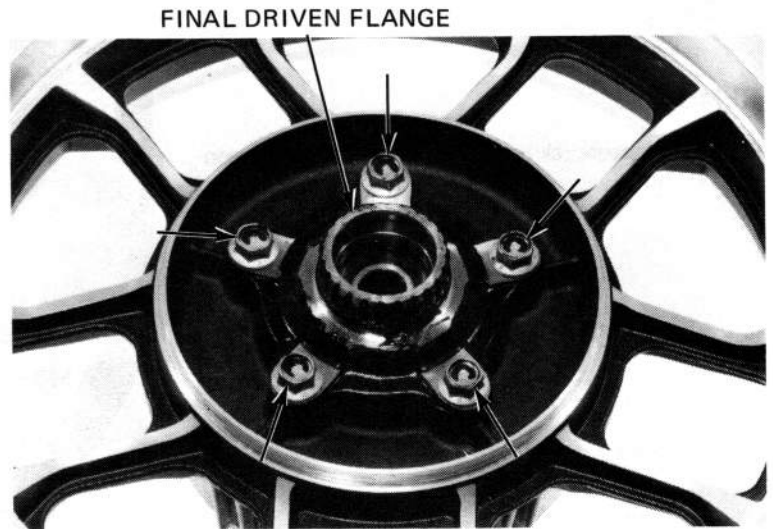
Move the wheel to the right to separate it from the final drive gear case and remove the rear wheel.



REAR WHEEL/SUSPENSION/BRAKE

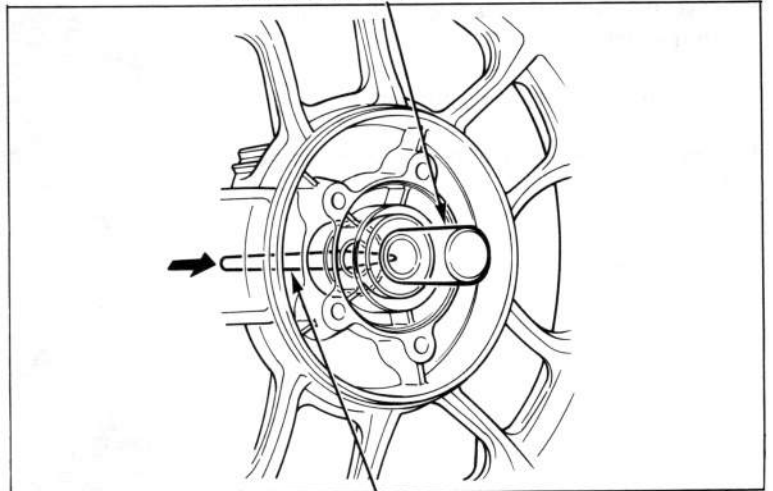
DISASSEMBLY

Remove the final driven flange mount bolts and lift the driven flange out of the hub.



Remove the wheel bearings and distance collar with the special tool.

WHEEL BEARING REMOVER COLLET, 17 mm
07746-0050500



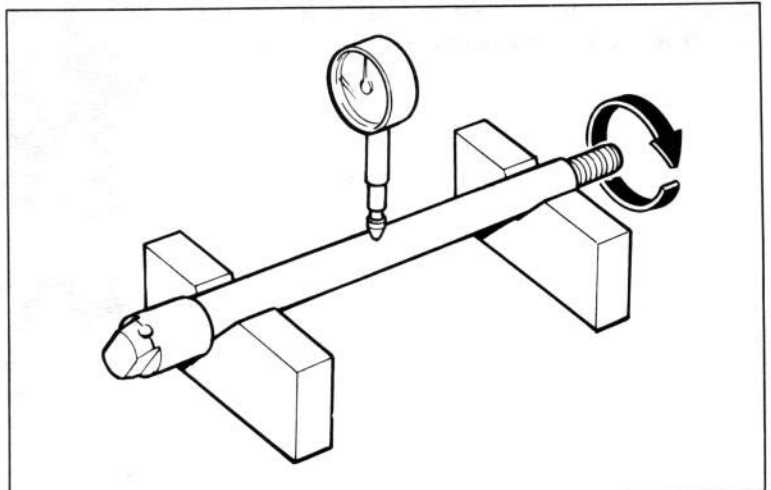
WHEEL BEARING REMOVER EXPANDER
07746-0050100
(COMMERCIALLY AVAILABLE IN U.S.A.)

INSPECTION

AXLE

Set the axle in V blocks and read the axle runout with a dial indicator. The actual axle runout is 1/2 of the total indicator reading.

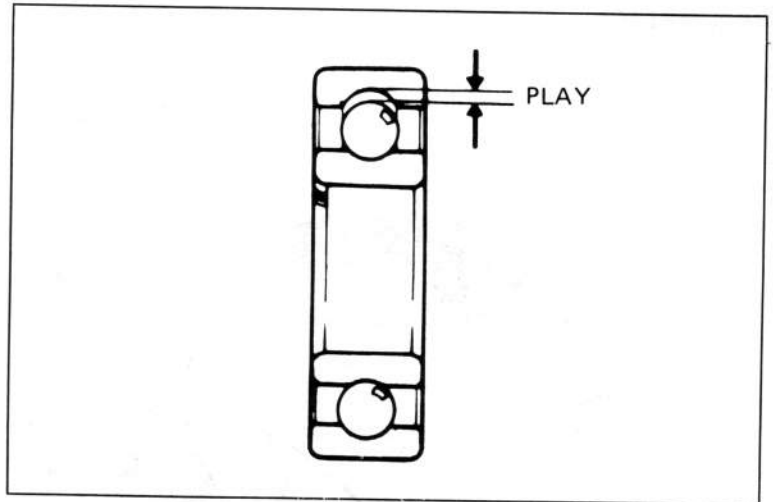
SERVICE LIMIT: 0.2 mm (0.01 in)



WHEEL BEARINGS

Place the wheel in a truing stand and check the wheel bearing play by rotating the wheel by hand. Replace the bearings with new ones if they are noisy or have excessive play.

SERVICE LIMIT: 0.03 mm (0.001 in)



WHEEL RIM RUNOUT

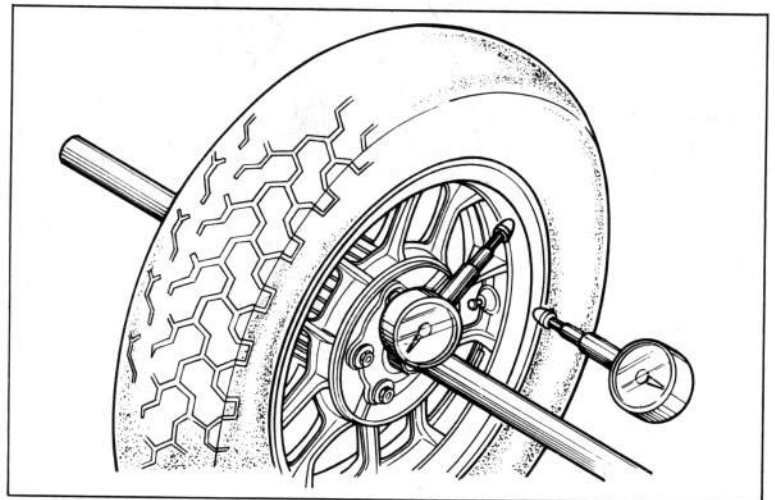
Check the rim for runout by placing the wheel in a truing stand. Spin the wheel slowly, and read the runout using a dial indicator.

SERVICE LIMITS:

RADIAL RUNOUT: 2.0 mm (0.08 in)

AXIAL RUNOUT: 2.0 mm (0.08 in)

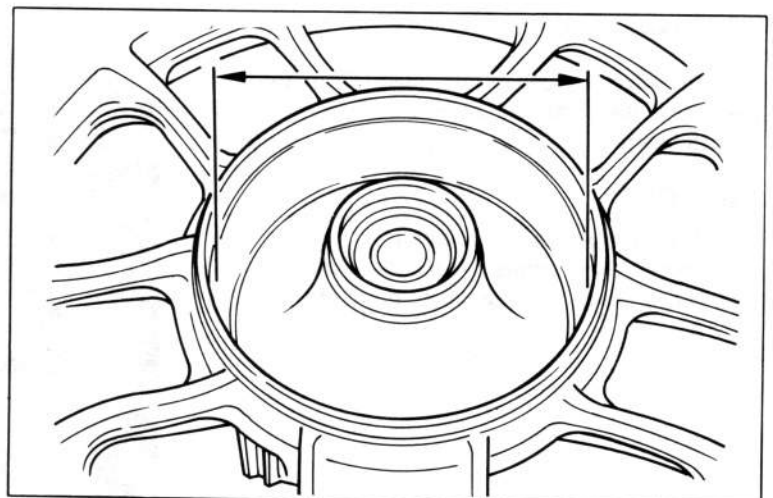
The wheel cannot be serviced and must be replaced if the above limits are exceeded.



BRAKE DRUM I.D.

Measure the brake drum I.D.

SERVICE LIMIT: 161 mm (6.34 in)



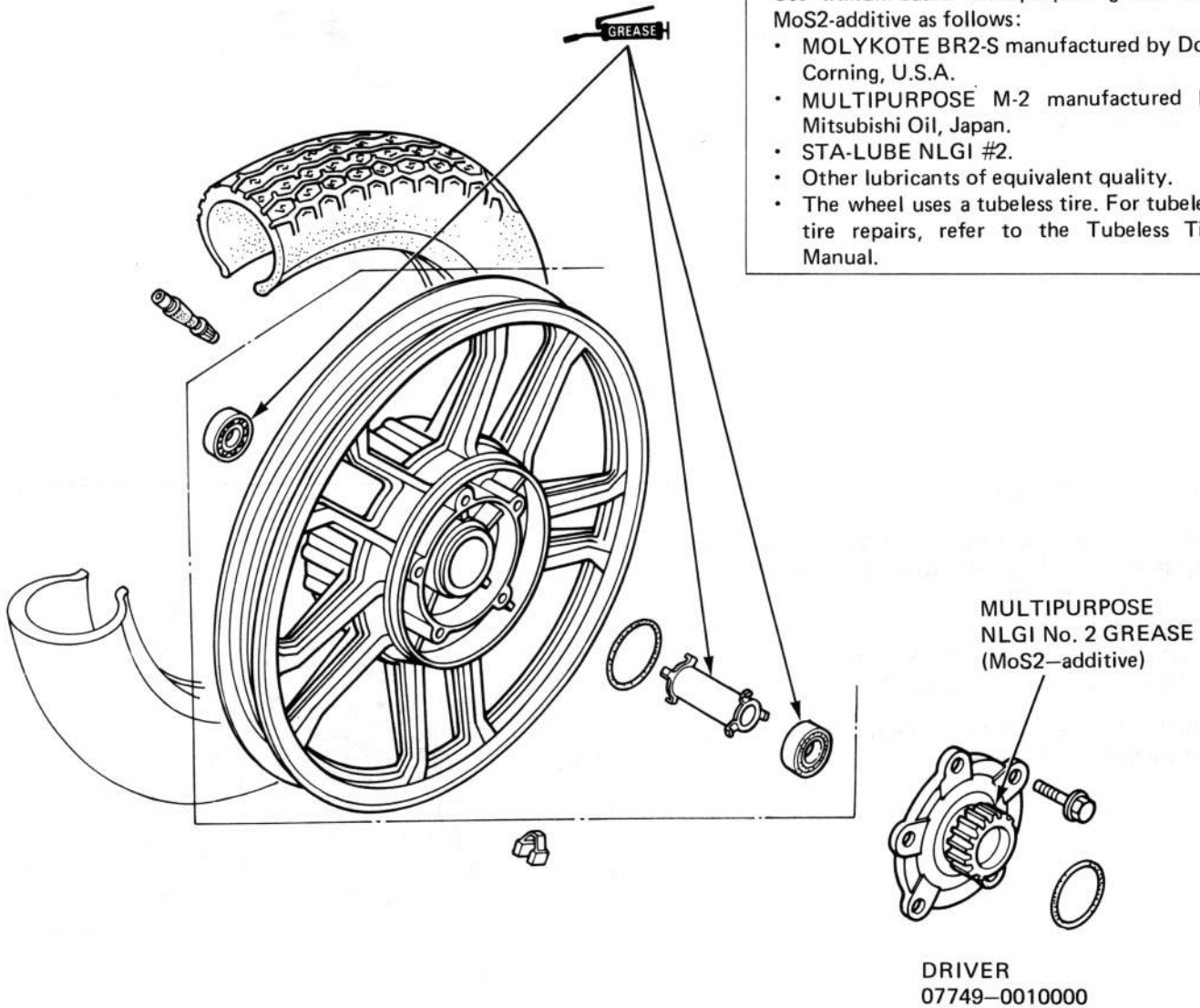
REAR WHEEL/SUSPENSION/BRAKE

ASSEMBLY

NOTE:

Use lithium-based Multipurpose grease with MoS2-additive as follows:

- MOLYKOTE BR2-S manufactured by Dow Corning, U.S.A.
- MULTIPURPOSE M-2 manufactured by Mitsubishi Oil, Japan.
- STA-LUBE NLGI #2.
- Other lubricants of equivalent quality.
- The wheel uses a tubeless tire. For tubeless tire repairs, refer to the Tubeless Tire Manual.



Pack all bearing cavities with grease.

Press the distance collar into place from the left side. Drive the right ball bearing in first, then the left ball bearing.

CAUTION:

- Drive the bearings in squarely.
- Install the bearings with the sealed end facing out, making sure they are fully seated.

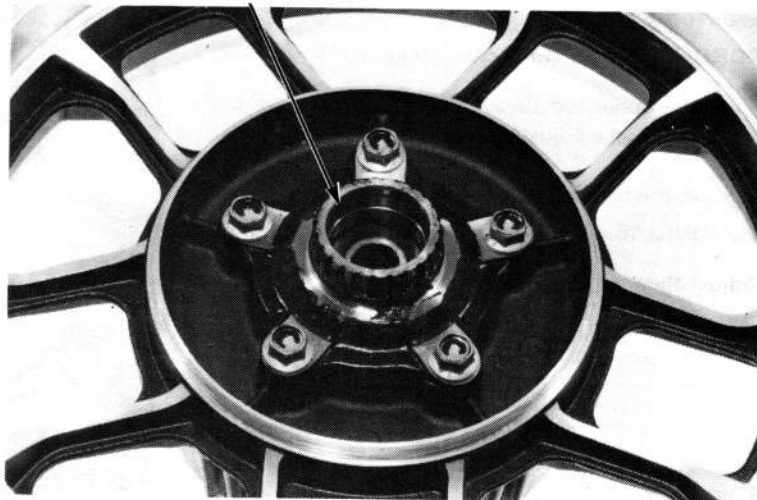


ATTACHMENT, 42 x 47 mm 07746-0010300
PILOT, 17 mm 07746-0040400

Install the final driven flange onto the rear wheel. Apply LOCTYTE® to the bolt threads and tighten the bolts to the specified torque.

TORQUE: 50–60 N·m (5.0–6.0 kg·m, 36–43 ft·lb)

FINAL DRIVEN FLANGE



INSTALLATION

Apply Multipurpose NLGI No. 2 grease (MoS2-additive) to the final driven flange and ring gear engagement splines.

Loosen the final gear case attaching nuts to ease axle installation and to assure proper driven flange alignment.

Engage the rear wheel with the final drive case, making sure the splines are correctly aligned.



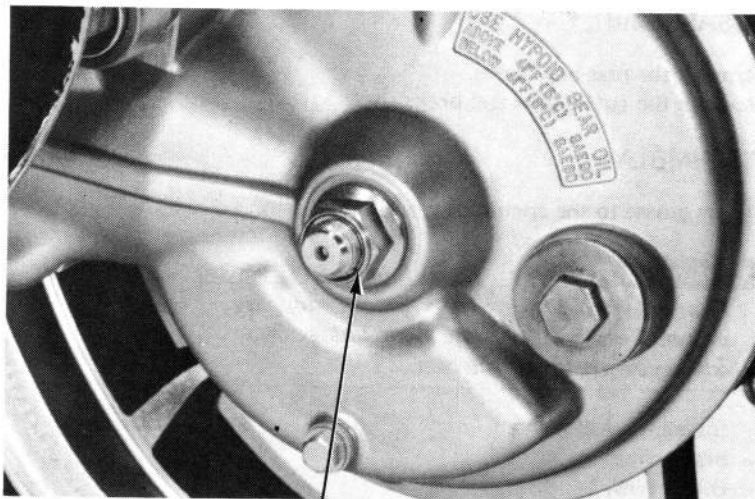
Insert the rear axle through the swingarm, side collar, brake panel, hub and final drive gear.

Tighten the axle nut.

TORQUE: 60–80 N·m (6.0–8.0 kg·m, 43–58 ft·lb)

Tighten the final gear case attaching nuts.

TORQUE: 60–70 N·m (6.0–7.0 kg·m, 43–51 ft·lb)



AXLE NUT

REAR WHEEL/SUSPENSION/BRAKE

Tighten the axle pinch bolt.

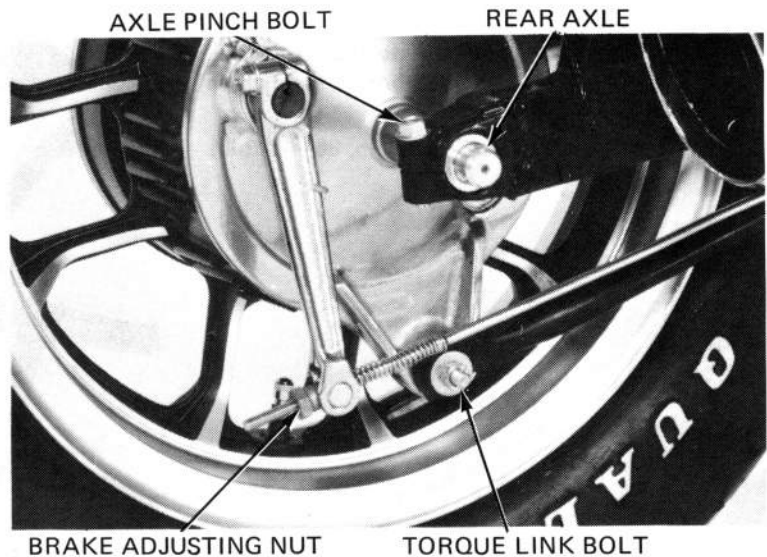
TORQUE: 20–30 N·m (2.0–3.0 kg·m, 14–22 ft·lb)

Place the brake rod through the brake arm pin and install the brake adjusting nut.

Tighten the brake torque link bolt.

TORQUE: 15–25 N·m (1.5–2.5 kg·m, 11–18 ft·lb)

Adjust the rear brake (page 3-18).



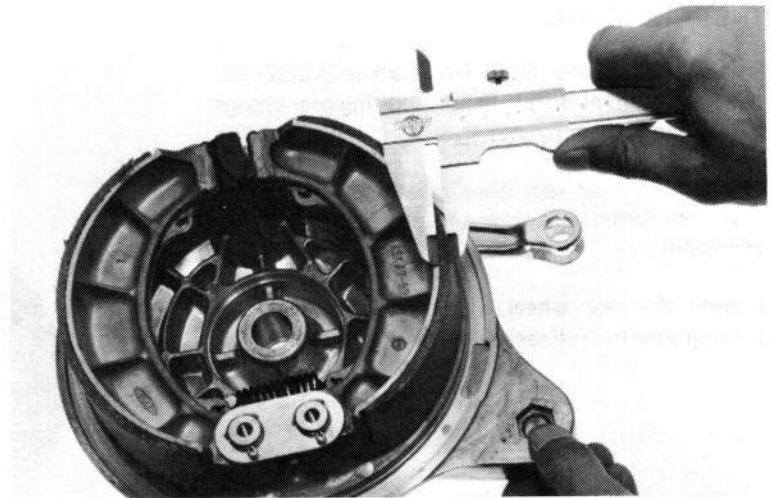
REAR BRAKE PANEL

LINING THICKNESS INSPECTION

Measure the rear brake lining thickness.

SERVICE LIMIT: 2.0 mm (0.08 in)

Replace the brake shoes if thinner than the service limit.



DISASSEMBLY

Remove the rear brake arm.
Remove the cotter pins and brake shoes.

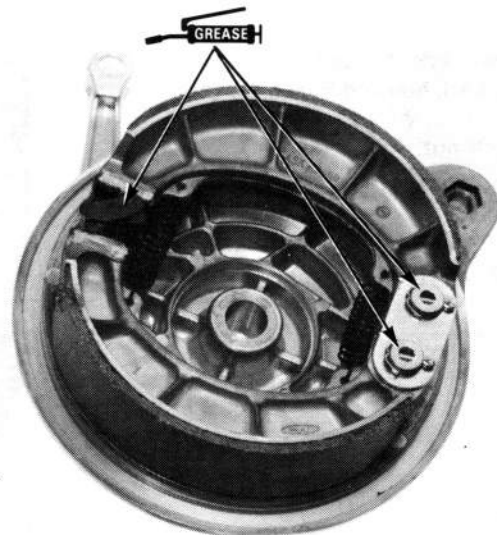
ASSEMBLY

Apply grease to the anchor pins and brake cam.

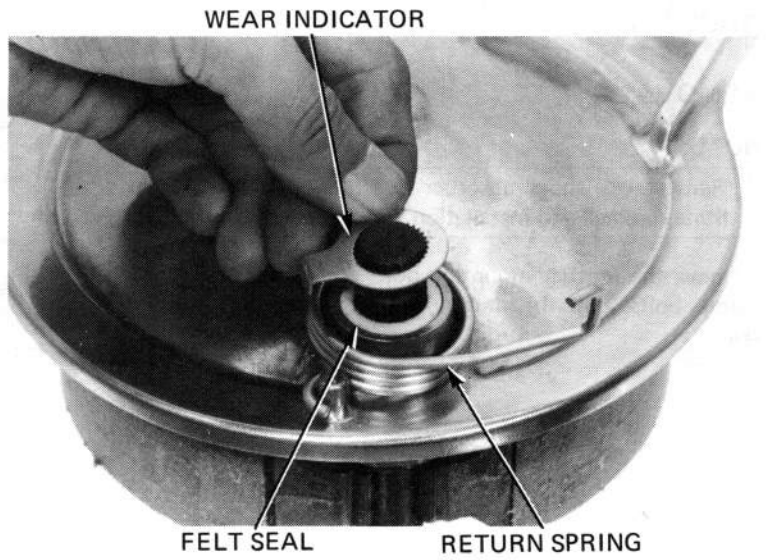
WARNING

Contaminated brake linings reduce stopping power. Keep grease off the brake linings. Wipe any excess grease off the cam.

- Install the following.
- brake shoes.
- cotter pins.

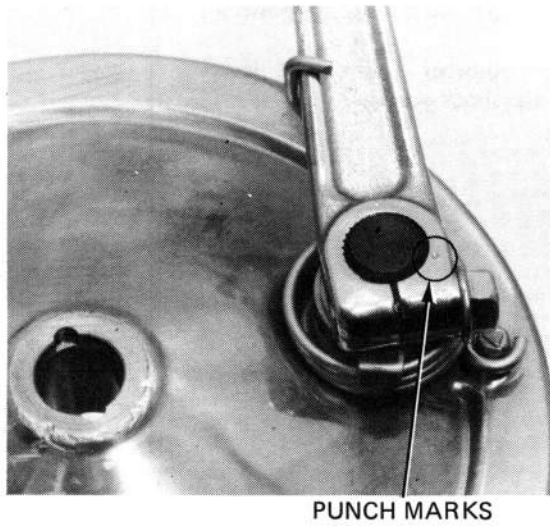


Install the felt seal, return spring and wear indicator.



Install the brake arm, aligning the punch marks and tighten the brake arm bolt.

TORQUE: 24–30 N·m (2.4–3.0 kg-m, 17–22 ft-lb)



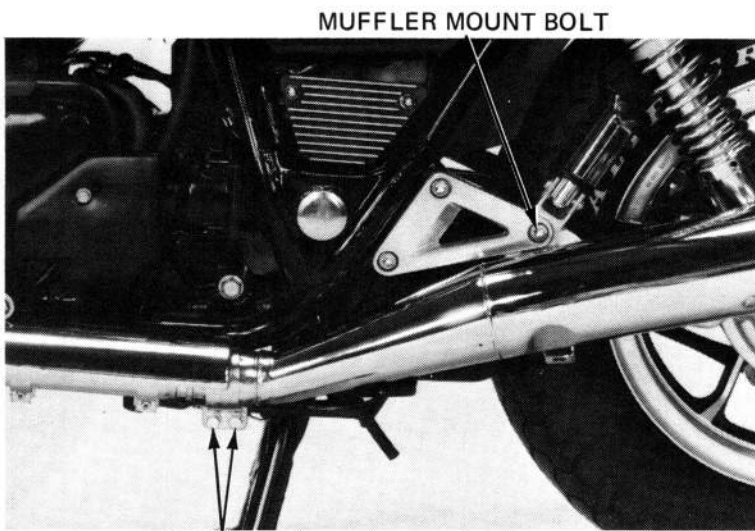
SHOCK ABSORBER

REMOVAL

NOTE:

Remove one shock absorber at a time to facilitate removal and installation.

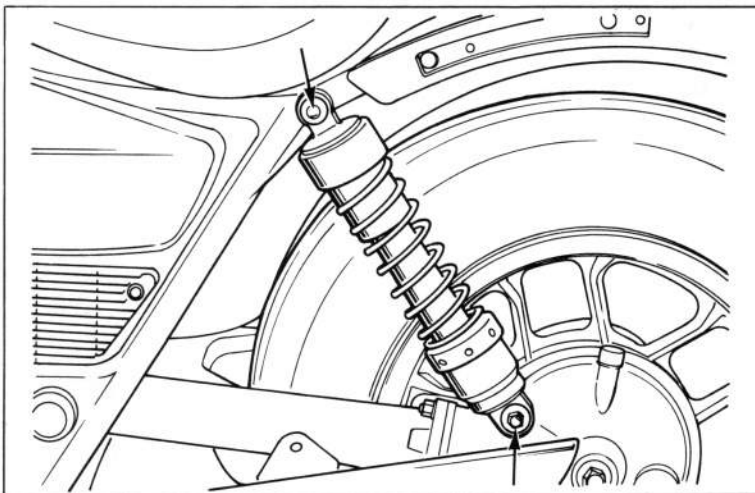
Remove the muffler mounting bolts and loosen the clamp bolts. Pull the muffler slightly toward the rear.



CALMP BOLTS

Adjust the shock absorber to the softest position.

Remove the shock absorber upper and lower mounts and remove the shock absorber.



DISASSEMBLY

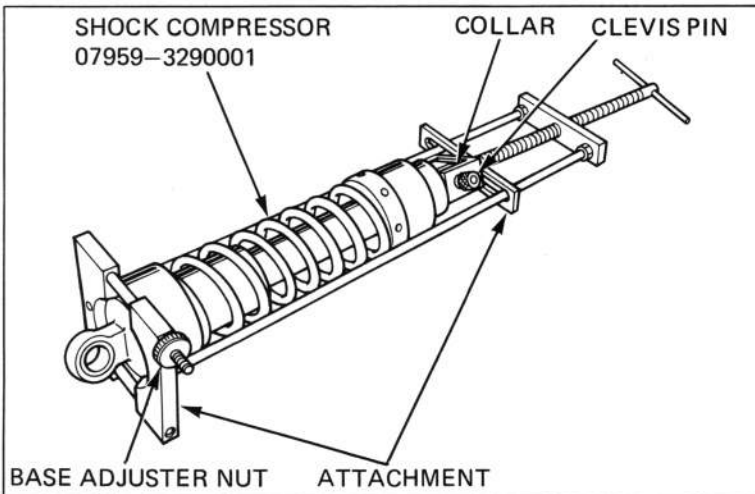
Replace base and guide of shock compressor, P/N 07959-3290001 with attachments, 07959-MB10000.

Place the collar P/N 52486-463-0000 or equivalent in the shock's bottom joint before putting the shock in the compressor.

Set the shock in the compressor as shown and compress the spring 30 mm by turning the compressor handle.

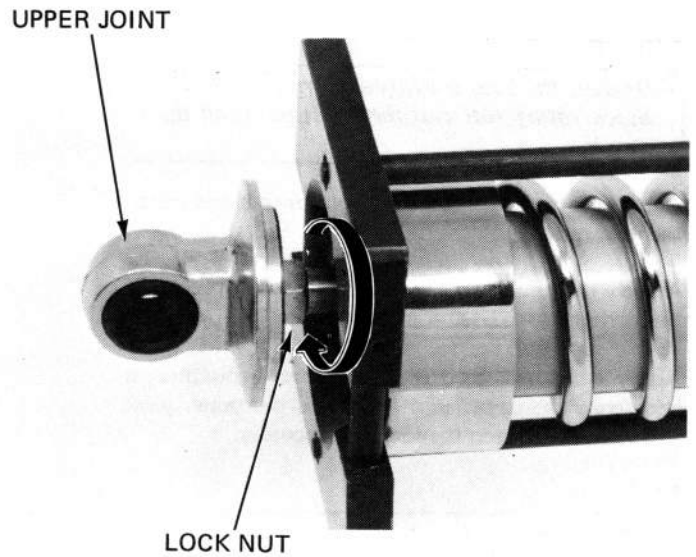
CAUTION:

Be sure the base is adjusted correctly for the shock spring seat and the clevis pin is all the way in.



place the upper joint in a vise and pull the shock rod out.

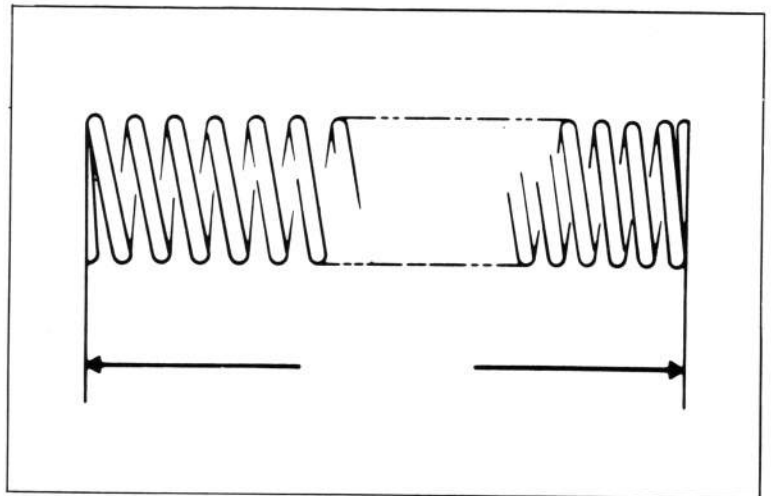
Separate the upper joint rotating the lock nut in the direction shown and remove the compressor.



SPRING FREE LENGTH

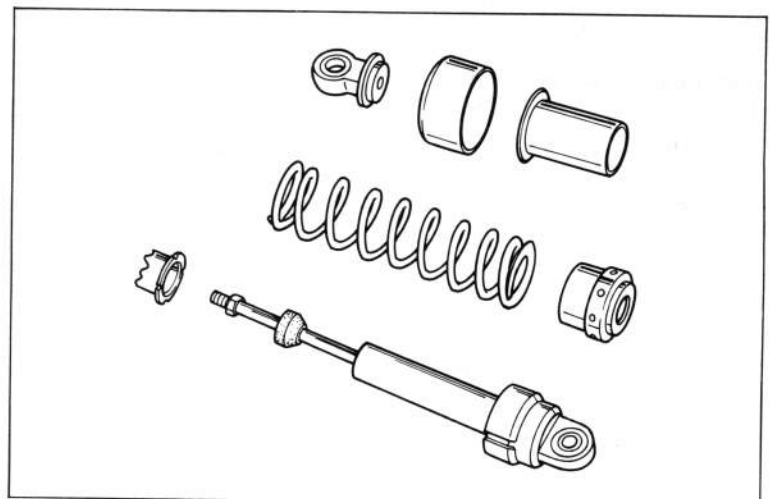
Measure the rear shock absorber spring free length.

SERVICE LIMIT: 211 mm (8.3 in)



ASSEMBLY

Place the spring adjuster, the spring lower seat, spring upper seat and stopper rubber on the damper.



REAR WHEEL/SUSPENSION/BRAKE

CAUTION:

Be sure the base is adjusted correctly for the shock spring seat and the clevis pin is all the way in.

Apply a locking agent to the rod threads and install the lock nut.

Attach the shock absorber compressor, screwing in the compressor's base adjuster nut.

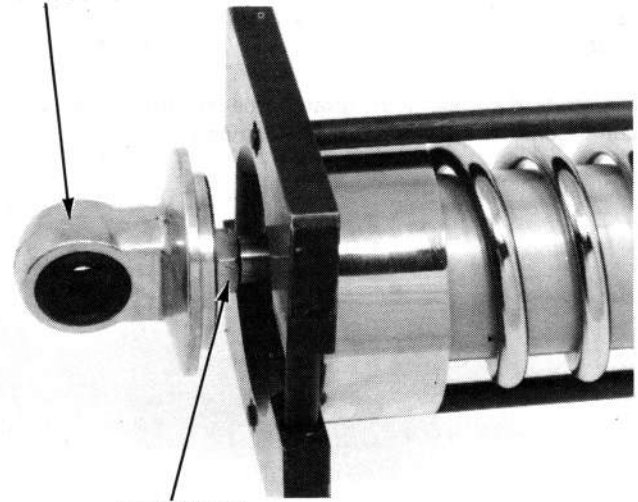
Apply a locking agent to the damper rod threads and screw the upper joint on. Hold the upper joint in a vise and tighten the lock nut securely.

NOTE:

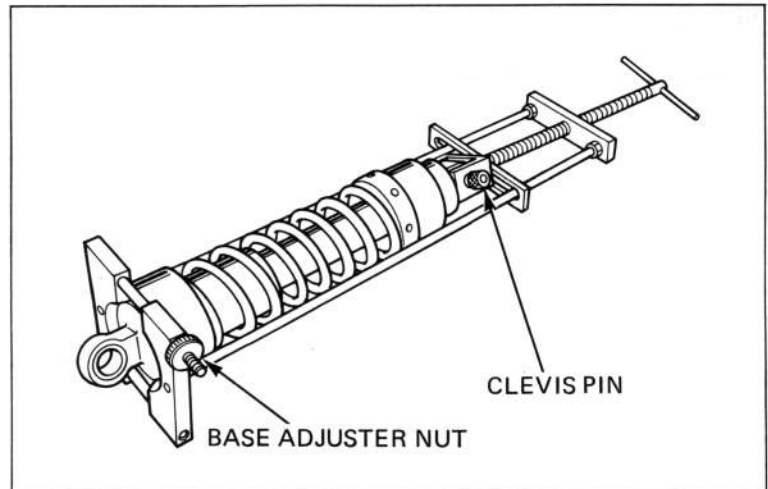
Check that the lock nut is seated against the rod's bottom thread.

Align the spring seat with the upper joint while releasing the compressor.

UPPER JOINT



LOCK NUT



BASE ADJUSTER NUT

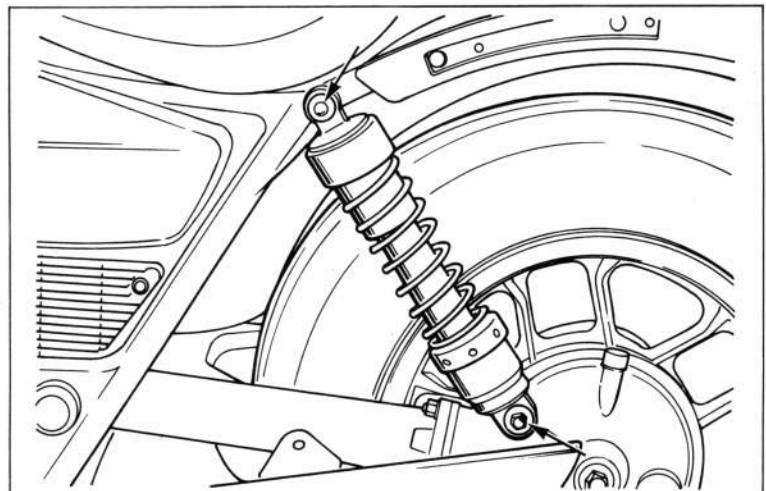
CLEVIS PIN

INSTALLATION

Install the shock absorber onto the frame.
Tighten the upper and lower mounts.

TORQUE: 30–40 N·m (3.0–4.0 kg·m, 22–29 ft·lb)

Tighten the exhaust muffler mount and clamp bolts.

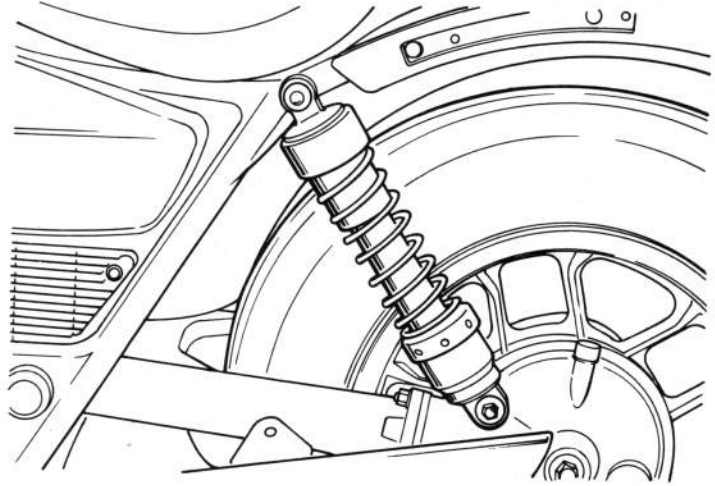


SWINGARM

REMOVAL

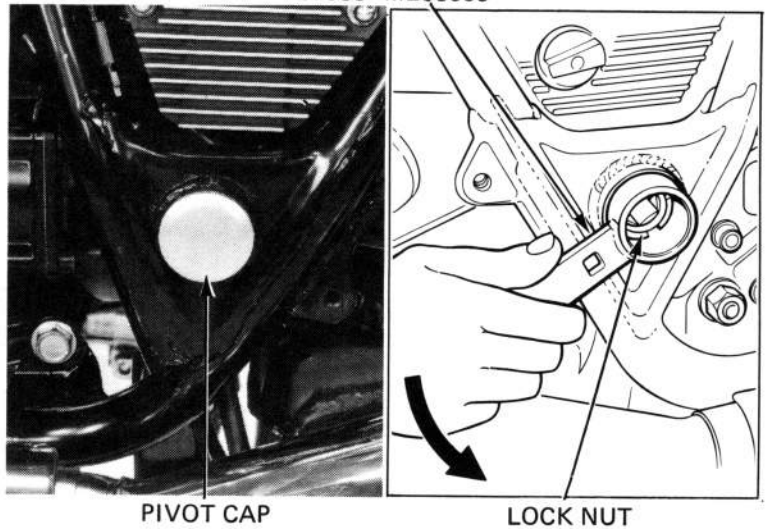
Remove the rear wheel (page 16-3) and the final drive gear case (page 14-3).

Remove the rear shock absorbers (page 16-10).



SWINGARM PIVOT LOCK NUT WRENCH
07908-ME90000

Remove the swingarm pivot caps and loosen the right pivot bolt lock nut.



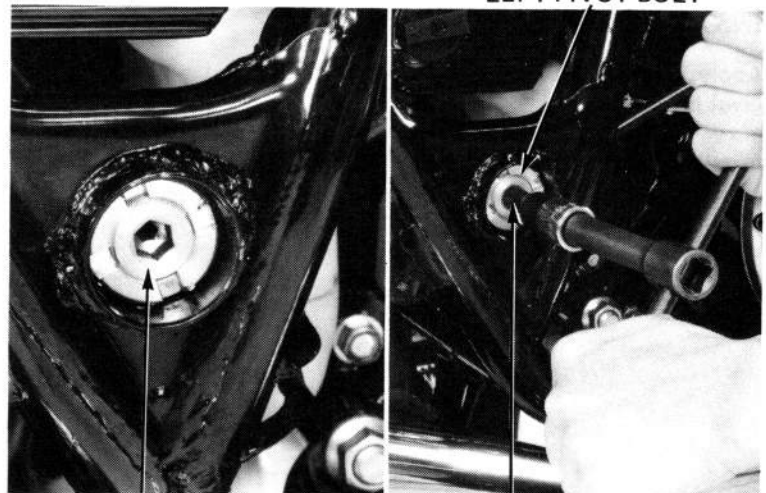
PIVOT CAP

LOCK NUT

Remove the right pivot bolt, using the 10 mm socket bit.

Remove the left pivot bolt and remove the swingarm.

Remove the boot from the swingarm.



LEFT PIVOT BOLT

RIGHT PIVOT BOLT

SOCKET BIT, 10 mm 07917-3710000
COMMERCIALY AVAILABLE IN U.S.A.

REAR WHEEL/SUSPENSION/BRAKE

PIVOT BEARING REPLACEMENT

Punch or drill a 13 mm (1/2 in) hole into each grease retainer.

Remove the attachment from the special tool, 07936-3710500. Slide the shaft through the hole and install a 29 mm (O.D.) washer or equivalent attachment onto the shaft.

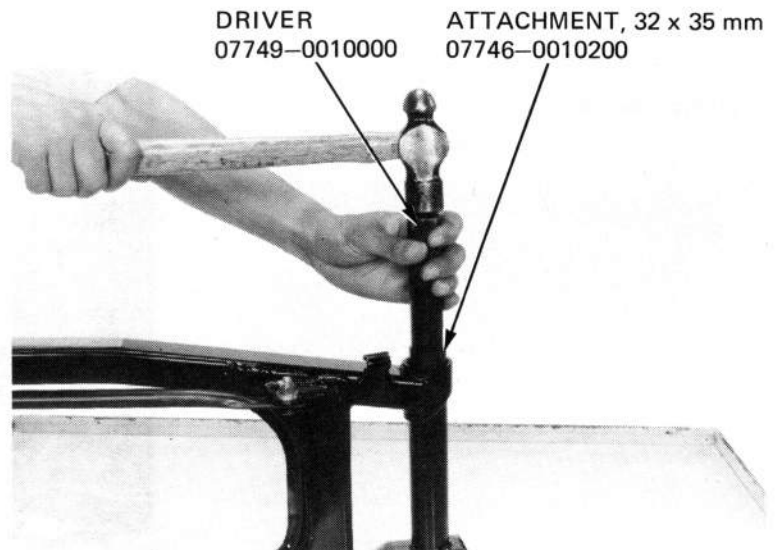
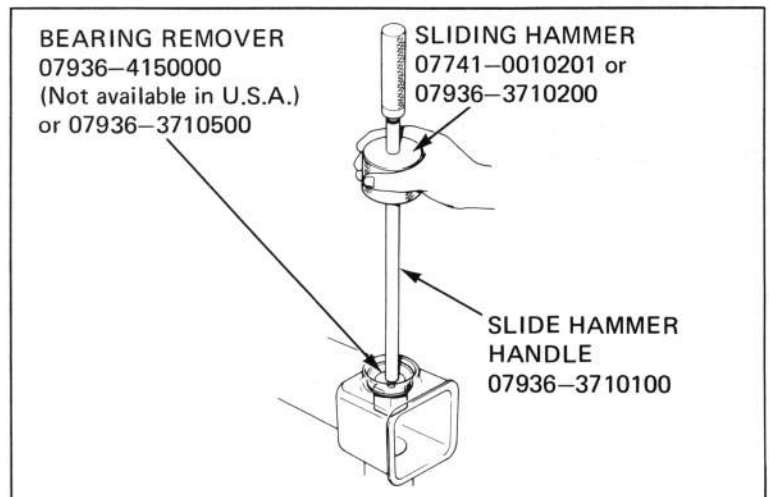
Install the slide hammer and handle remove the race.

Repeat for the other side.

NOTE:

Replace the bearing inner and outer races as a set. Replace the grease retainer plate whenever it is removed.

Install new grease retainer plates and drive new bearing outer races into the swingarm pivot.

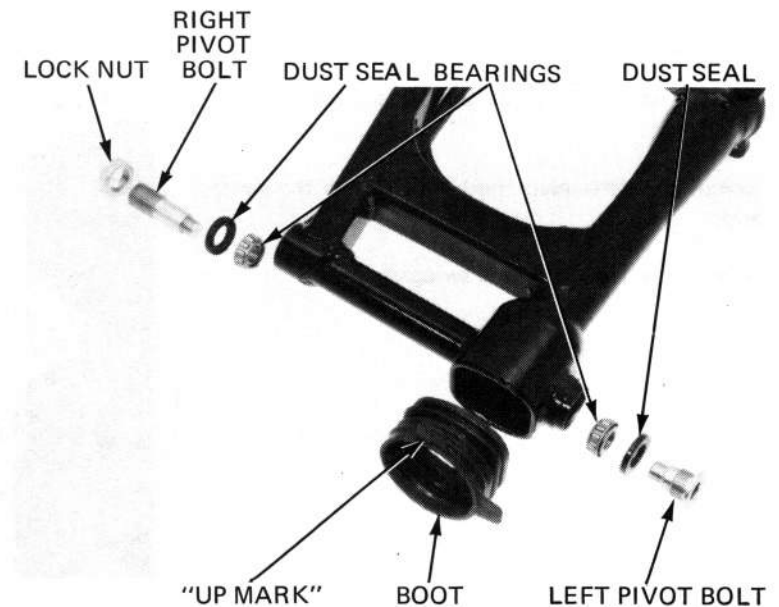


INSTALLATION

Apply grease to the pivot bearings dust seals and pivot bolt tips.

Install the bearings and dust seals.

Install the swingarm boot with its "UP" mark up.

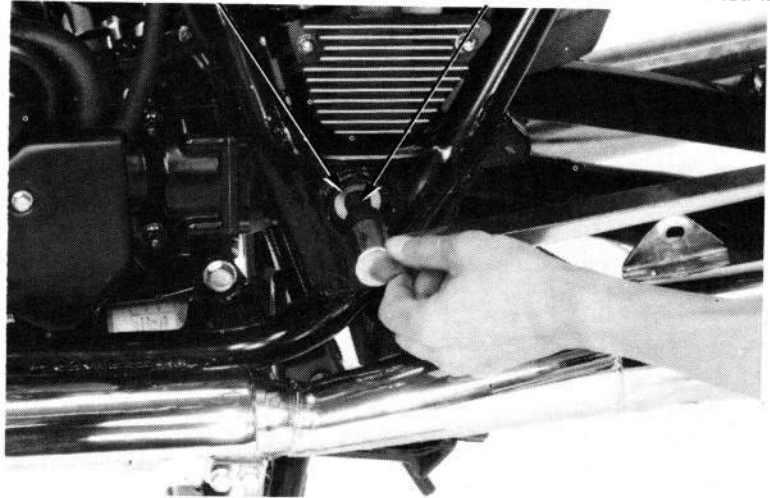


Install the swingarm and pivot bolts.

Tighten the left pivot bolt to the specified torque.

TORQUE: 100–130 N·m
(10.0–13.0 kg·m, 72–94 ft·lb)

LEFT PIVOT BOLT SOCKET BIT, 14 mm
COMMERCIALY AVAILABLE IN U.S.A.

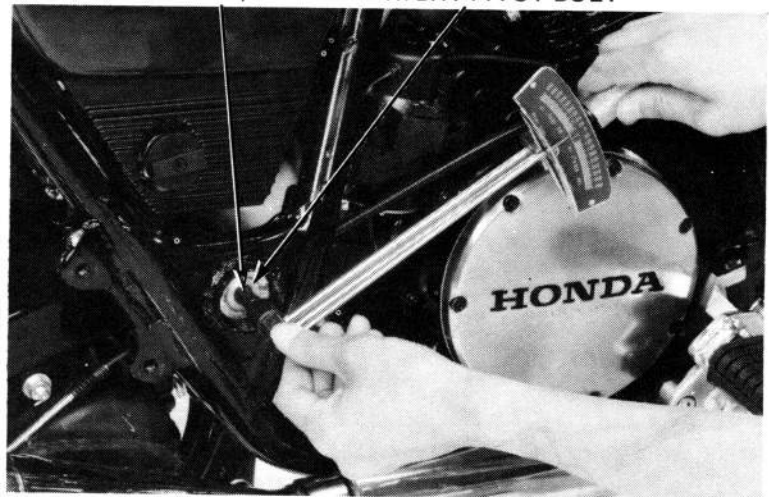


Tighten the right pivot bolt to 20 N·m (2.0 kg·m, 14 ft·lb), loosen it and retighten to the specified torque.

TORQUE: 10–14 N·m
(1.0–1.4 kg·m, 7–10 ft·lb)

Move the swingarm up and down several times. Retighten the right pivot bolt to the specified torque.

RIGHT PIVOT BOLT SOCKET BIT, 10 mm

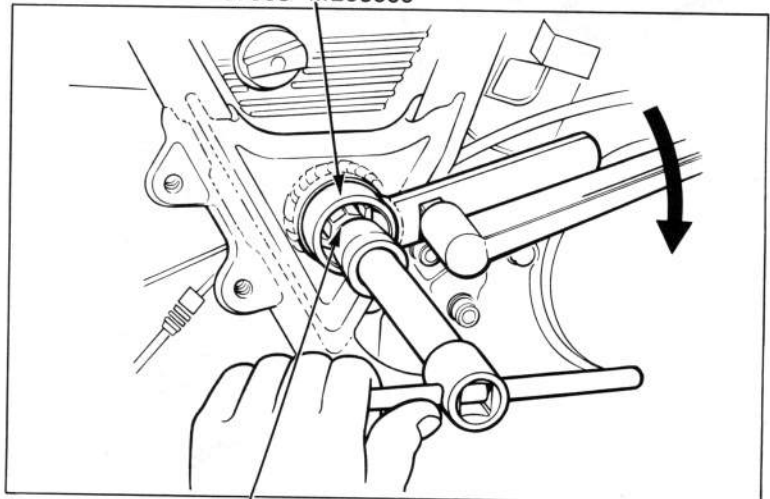


Tighten the lock nut while holding the right pivot bolt.

TORQUE: 100–130 N·m
(10.0–13.0 kg·m, 72–94 ft·lb)

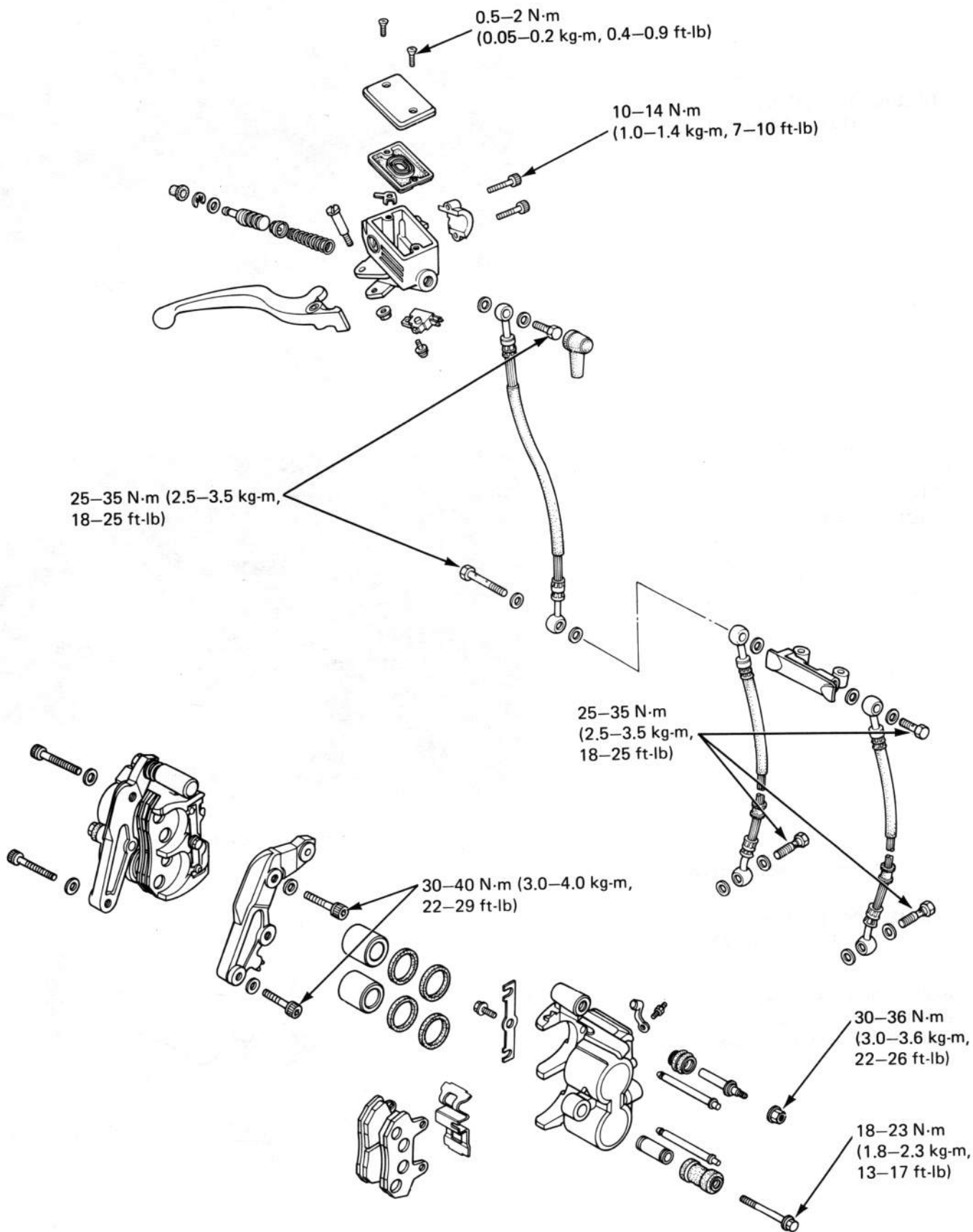
Install the final gear (page 14-17).
Install the rear wheel (page 16-7).
Install the shock absorbers (page 16-12).

SWINGARM LOCK NUT WRENCH
07908-ME90000



SOCKET BIT, 10 mm
COMMERCIALY AVAILABLE IN U.S.A.

HYDRAULIC BRAKE



17. HYDRAULIC BRAKE

SERVICE INFORMATION	17-1
TROUBLESHOOTING	17-2
BRAKE FLUID REPLACEMENT/AIR BLEEDING	17-3
BRAKE PAD/DISC	17-5
MASTER CYLINDER	17-7
BRAKE CALIPERS	17-10

SERVICE INFORMATION

GENERAL

- The brake calipers can be removed without disconnecting the hydraulic system.
- Bleed the hydraulic system if it is disassembled or if the brake feels spongy.
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling brake fluid on painted surfaces or instrument lenses, as severe damage can result.
- Always check brake operation before riding the motorcycle.

SPECIFICATIONS

	STANDARD	SERVICE LIMIT
Front disc thickness	4.8–5.2 mm (0.19–0.20 in)	4.0 mm (0.16 in)
Front disc runout	—	0.3 mm (0.012 in)
Front master cylinder I.D.	15.870–15.913 mm (0.6248–0.6265 in)	15.93 mm (0.627 in)
Front master piston O.D.	15.827–15.854 mm (0.6231–0.6242 in)	15.82 mm (0.623 in)
Front caliper piston O.D.	30.148–30.280 mm (1.1901–1.1921 in)	30.29 mm (1.193 in)
Front caliper cylinder I.D.	30.230–30.280 mm (1.1902–1.2913 in)	30.14 mm (1.187 in)

17

TORQUE VALUES

Brake hose bolt	25–35 N·m (2.5–3.5 kg-m, 18–25 ft-lb)
Front brake caliper bracket	30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)
Front brake caliper bolt	18–23 N·m (1.8–2.3 kg-m, 13–17 ft-lb)
Front brake caliper pivot bolt	30–36 N·m (3.0–3.6 kg-m, 22–26 ft-lb)

TOOL

Special Snap ring pliers	07914–3230001
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HYDRAULIC BRAKE

TROUBLESHOOTING

Brake lever soft or spongy

1. Air bubbles in hydraulic system.
2. Low fluid level.
3. Hydraulic system leaking.

Brake lever too hard

1. Sticking piston(s)
2. Clogged hydraulic system.
3. Pads glazed or worn excessively.

Brakes drag

1. Hydraulic system sticking.
2. Sticking piston(s)
3. Incorrect rear brake pedal adjustment.

Brakes grab or pull to one side

1. Pads contaminated.
2. One side of front brake faulty.
3. Disc or wheel misaligned.

Brake chatter or squeal

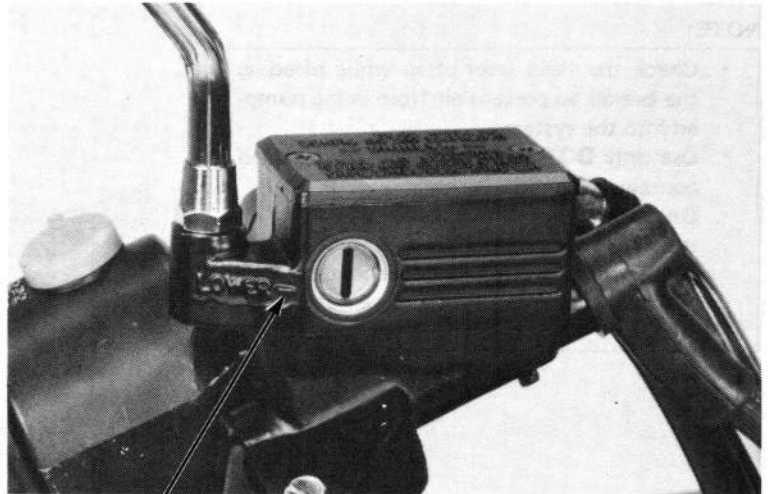
1. Pads contaminated.
2. Excessive disc runout.
3. Caliper installed incorrectly.
4. Disc or wheel misaligned.

BRAKE FLUID REPLACEMENT/ AIR BLEEDING

Check the fluid level with the fluid reservoir parallel to the ground.

CAUTION:

- *Install the diaphragm on the reservoir when operating the brake lever. Failure to do so will allow brake fluid to squirt out of the reservoir during brake operation.*
- *Avoid spilling fluid on painted surfaces. Place a rag over the fuel tank whenever the system is serviced.*



LOWER LEVEL

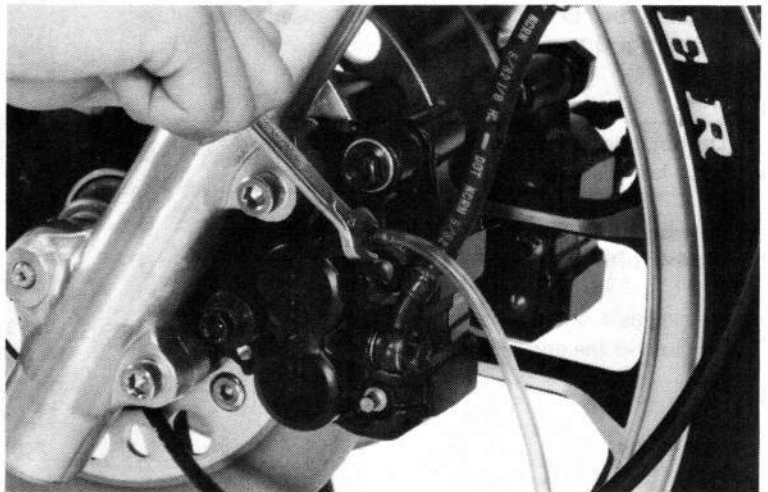
BRAKE FLUID DRAINING

Connect a bleed hose to the bleed valve.

Loosen the caliper bleed valve and pump the brake lever. Stop operating the lever when fluid stops flowing out of the bleed valve.

WARNING

A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.



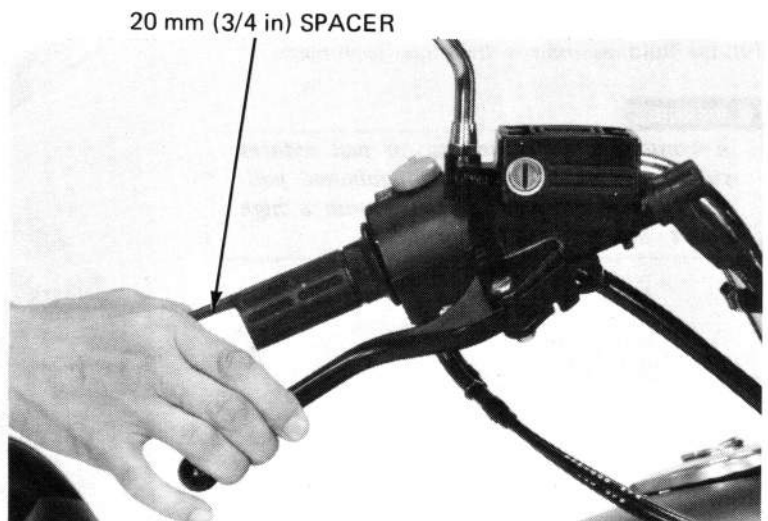
BRAKE FLUID FILLING

NOTE:

Do not mix different types of fluid since they are not compatible.

Close the bleed valve, fill the reservoir, and install the diaphragm.

To prevent piston overtravel and brake fluid seepage, keep a 20 mm (3/4 in) spacer between the handlebar grip and lever when bleeding the front brake system. Pump up the system pressure with the lever until there are no air bubbles in the fluid flowing out of the reservoir small hole and lever resistance is felt.



HYDRAULIC BRAKE

AIR BLEEDING

NOTE:

- Check the fluid level often while bleeding the brakes to prevent air from being pumped into the system.
- Use only **DOT 3 brake fluid** from a sealed container.
- Do not mix brake fluid types and never reuse the contaminated fluid which has been pumped out during brake bleeding, because this will impair the efficiency of the brake system.



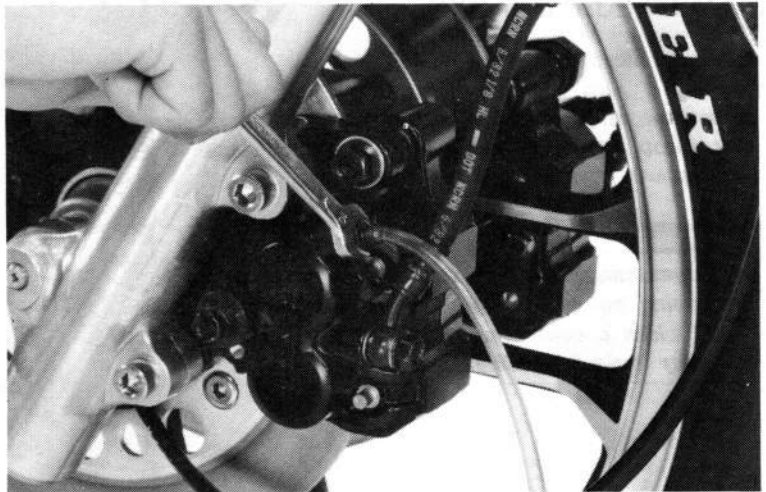
- 1) Squeeze the brake lever, open the bleed valve 1/2 turn and then close the valve.

NOTE:

Do not release the brake lever until the bleed valve has been closed.

- 2) Release the brake lever slowly and wait several seconds after it reaches the end of its travel.

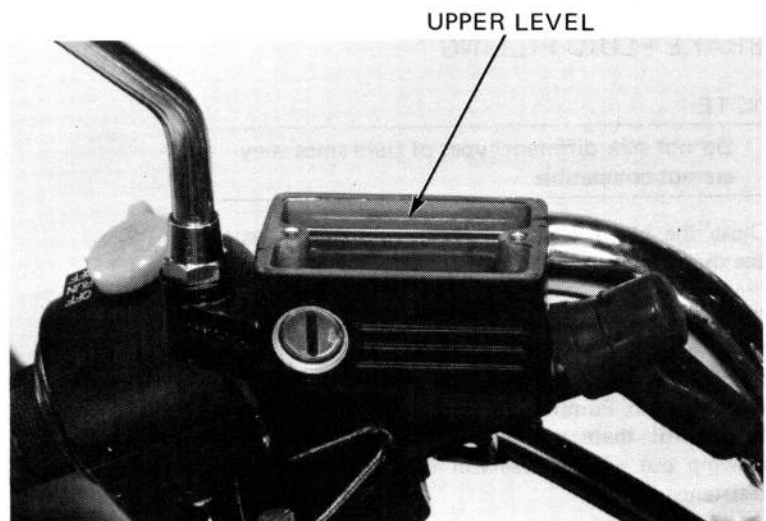
Repeat steps 1 and 2 until bubbles cease to appear in the fluid at the end of the hose.



Fill the fluid reservoir to the upper level mark.

WARNING

A contaminated brake disc or pad reduces stopping power. Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.



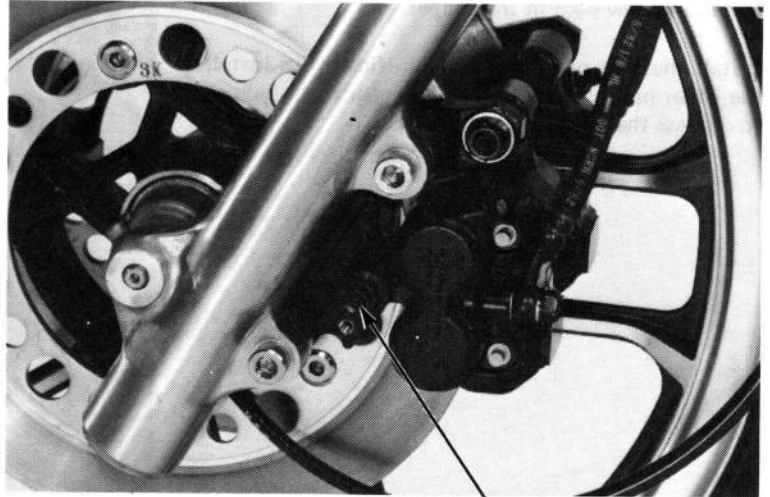
BRAKE PAD/DISC

PAD REPLACEMENT

NOTE:

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

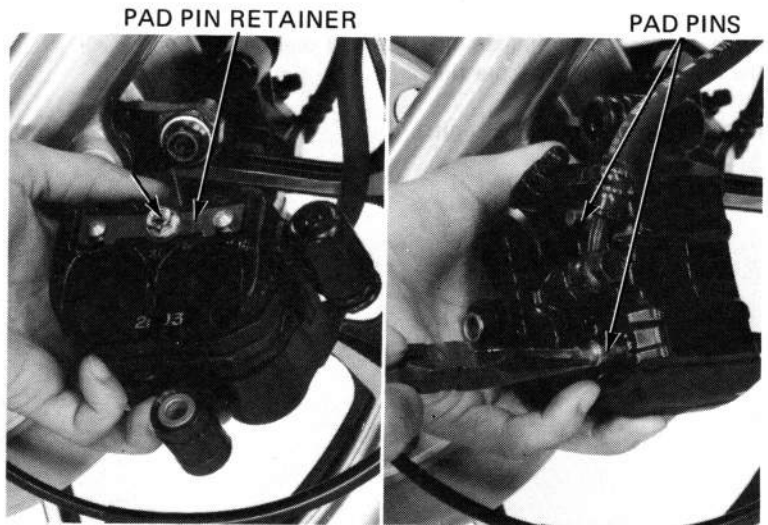
Remove the caliper bolt.
Pivot the caliper up out of the way.



CALIPER BOLT

Remove the pad pin retainer and pull the pad pins out of the caliper.

Remove the brake pads.

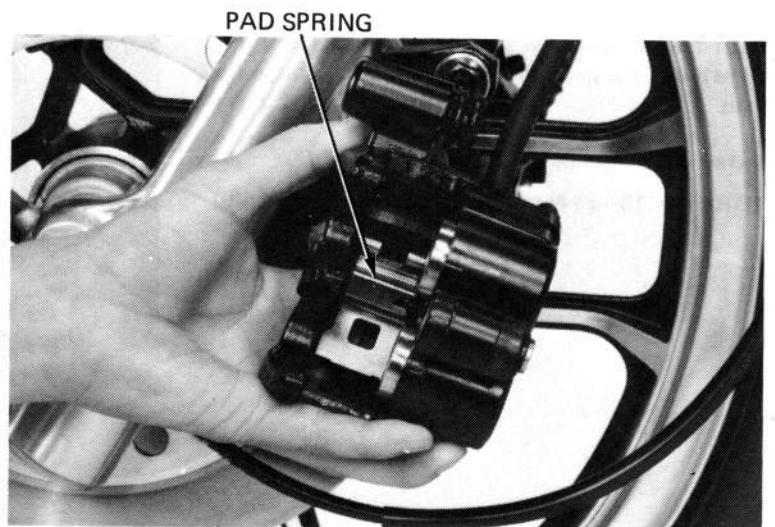


PAD PIN RETAINER

PAD PINS

Position the pad spring in the caliper as shown.

Push the caliper pistons in all the way.

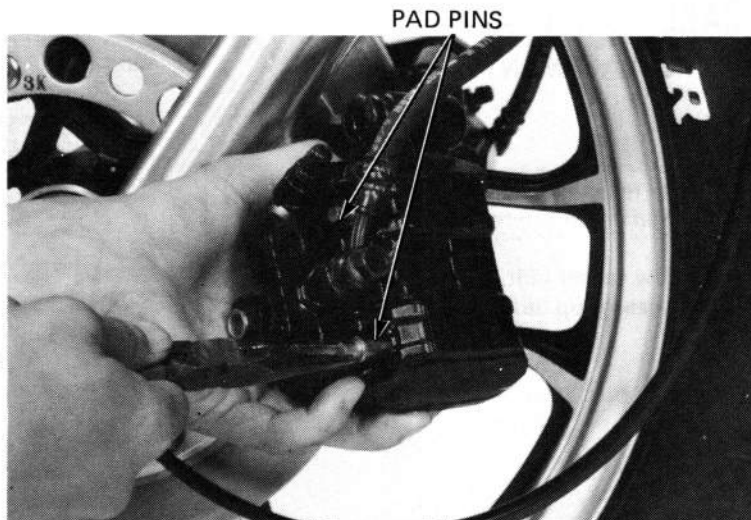


PAD SPRING

HYDRAULIC BRAKE

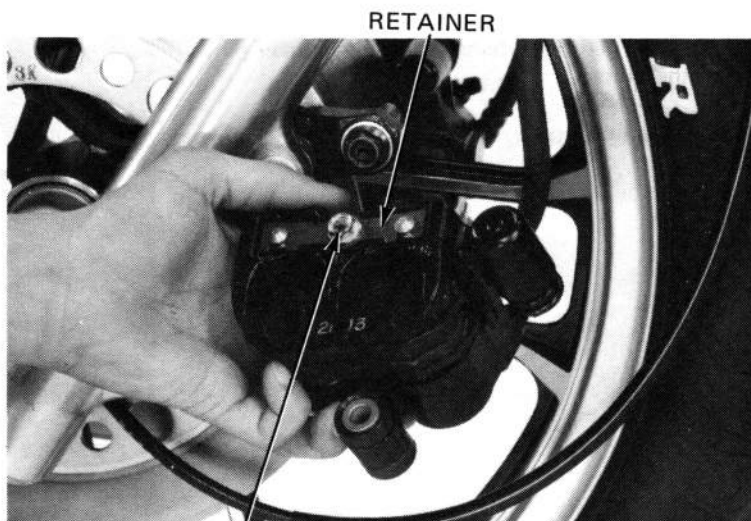
Install the new pads in the caliper.

Install the pad pins, one pad pin first, then install the other pin by pushing the pads against the caliper to depress the pad spring.



Place the pad pin retainer over the pad pins. Push the retainer down to secure the pins.

Install the pad pin retainer bolt.

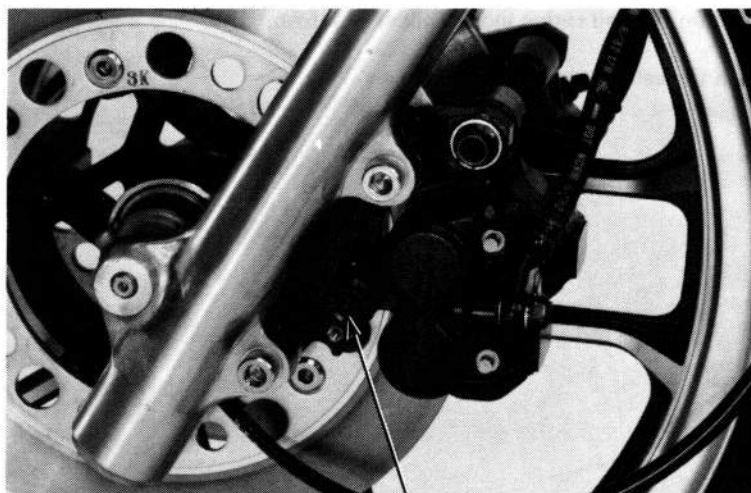


PAD PIN RETAINER BOLT

Pivot the caliper down so the brake disc is positioned between the pads, making sure not to damage the pads.

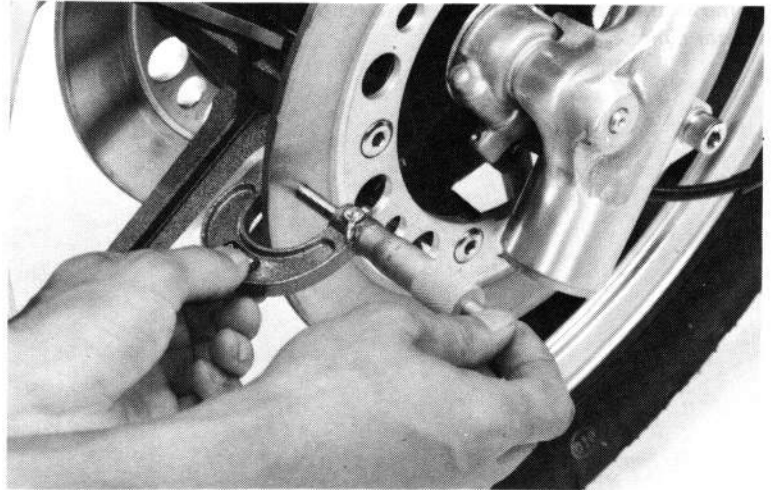
Install the caliper bolt and tighten it.

TORQUE: 18–23 N.m (1.8–2.3 kg-m, 13–17 ft-lb)



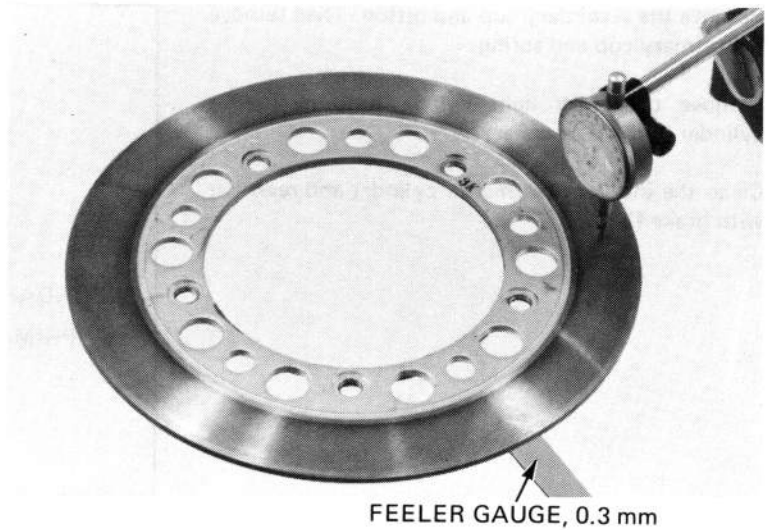
DISC THICKNESS

Measure the thickness of each disc.
SERVICE LIMIT: 4.0 mm (0.16 in)



BRAKE DISC WARPAGE

Measure the brake disc for warpage with a feeler gauge on a surface plate.
SERVICE LIMIT: 0.30 mm (0.012 in)



MASTER CYLINDER

DISASSEMBLY

Drain brake fluid from the hydraulic system.

Remove the brake lever and rear view mirror from the master cylinder. Disconnect the brake hose.

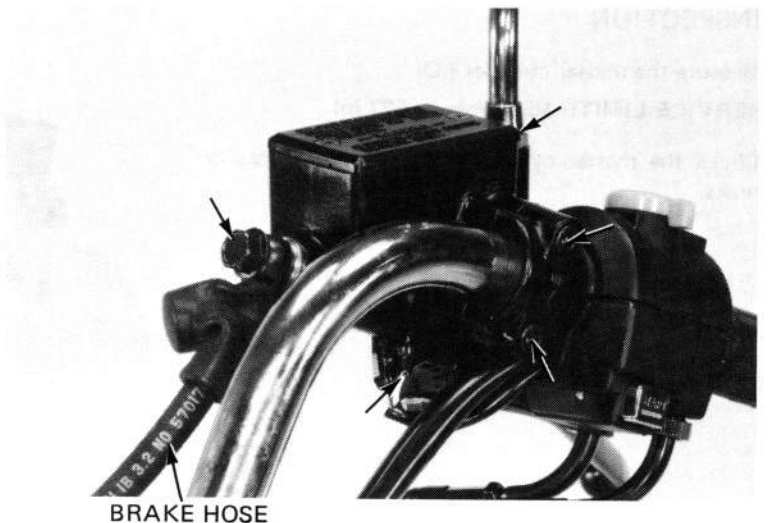
CAUTION:

*Avoid spilling brake fluid on painted surfaces.
Place a rag over the fuel tank whenever the
brake system is serviced.*

NOTE:

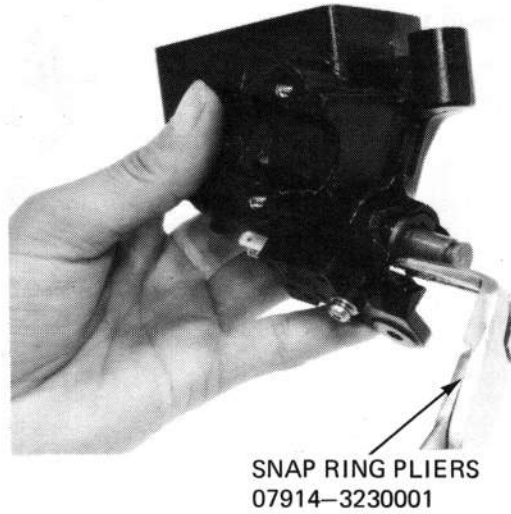
*When removing the oil hose bolt, cover the
end of the hose to prevent contamination.
Secure the hose to prevent fluid from leaking
out.*

Remove the master cylinder.



HYDRAULIC BRAKE

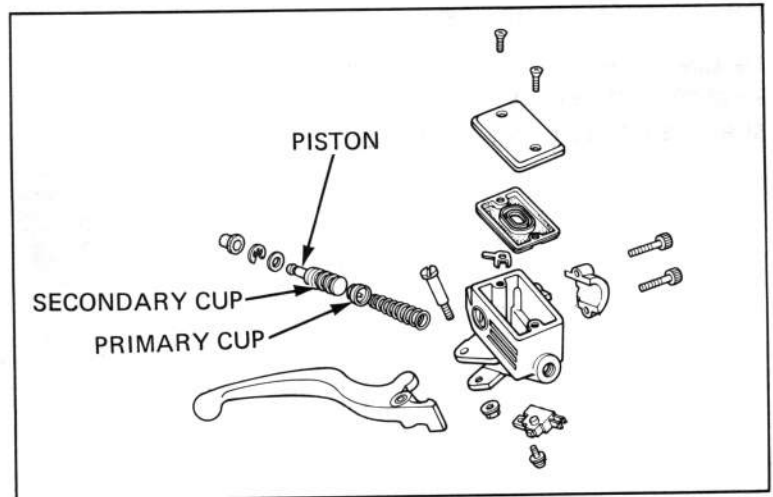
Remove the piston boot and the circlip from the master cylinder body.



Remove the secondary cup and piston. Then remove the primary cup and spring.

Remove the brake light switch from the master cylinder body, if necessary.

Clean the inside of the master cylinder and reservoir with brake fluid.

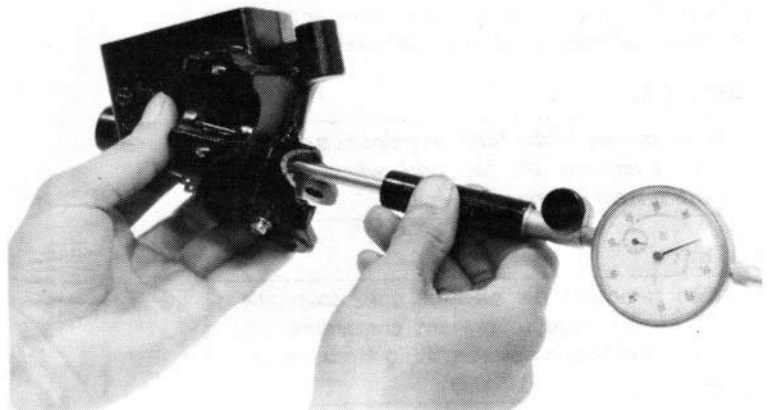


INSPECTION

Measure the master cylinder I.D.

SERVICE LIMIT: 15.93 mm (0.627 in)

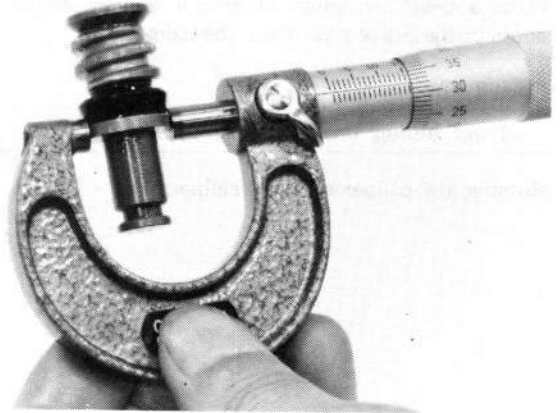
Check the master cylinder for scores, scratches or nicks.



Measure the master piston O.D.

SERVICE LIMIT: 15.82 mm (0.623 in)

Check the primary and secondary cups for damage before assembly.



ASSEMBLY

CAUTION:

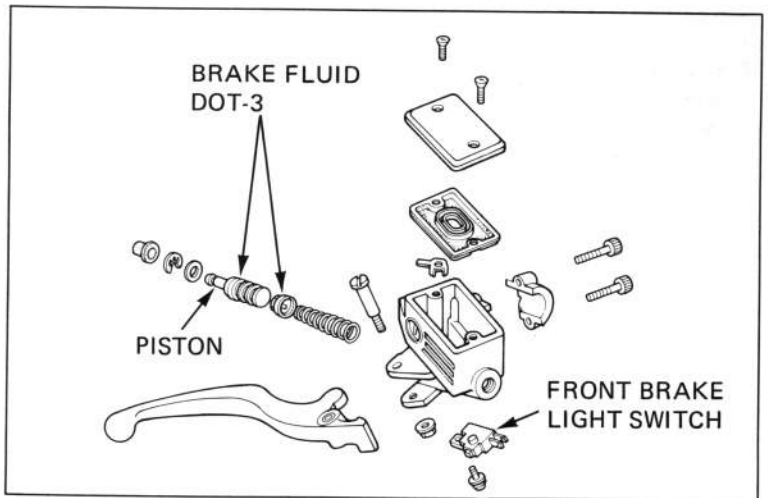
Handle the master cylinder piston, cylinder and spring as a set.

Assemble the master cylinder. Coat all parts with clean brake fluid before assembly. Install the spring and primary cup together.

Dip the piston cup in brake fluid before assembly.

CAUTION:

When installing the cups, do not allow the lips to turn inside out. Be certain the circlip is seated firmly in the groove.

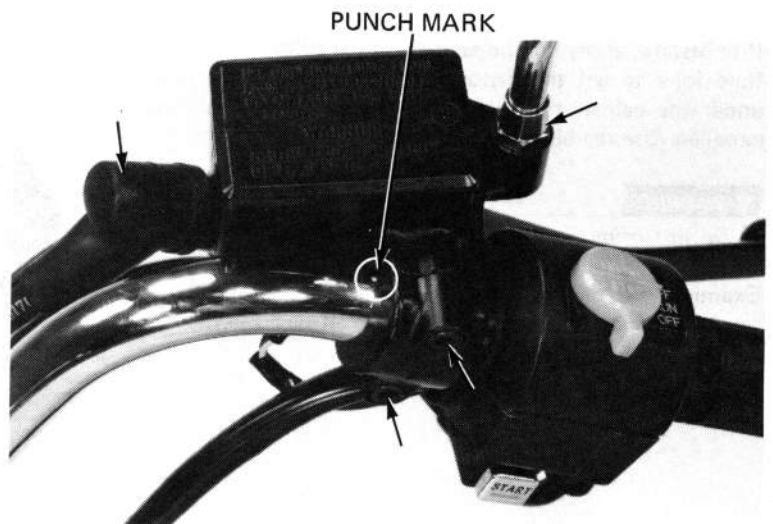


Install the piston clip and boot.

Place the master cylinder on the handlebar and install the holder with the two mounting bolts. Tighten the top bolt first. Install the oil hose with the bolt and its two sealing washers.

Install the brake lever.

Fill the reservoir to the upper level and bleed the brake system according to page 17-4.



HYDRAULIC BRAKE

BRAKE CALIPERS

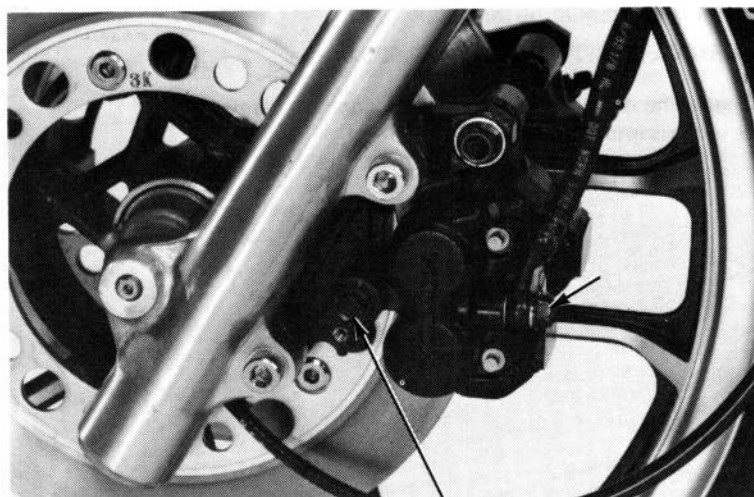
REMOVAL

Place a clean container under the caliper and disconnect the brake hose from the caliper.

CAUTION:

Avoid spilling brake fluid on painted surfaces.

Remove the caliper bolt and caliper.

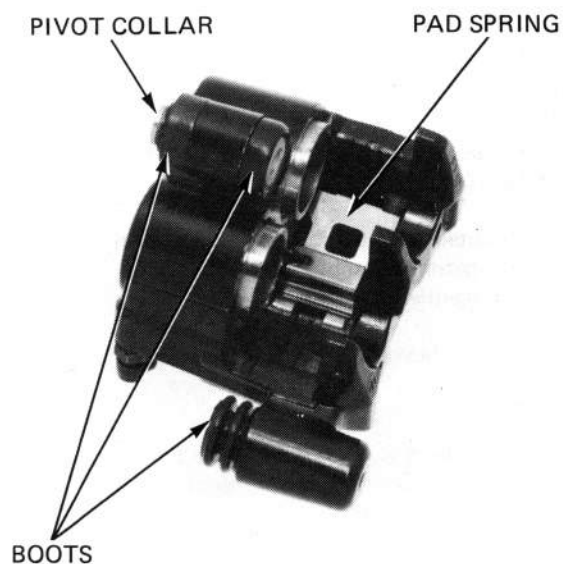


CALIPER BOLT

DISASSEMBLY

Remove the following:

- pads and pad spring.
- caliper pivot collar and boots.
- pistons from the caliper.

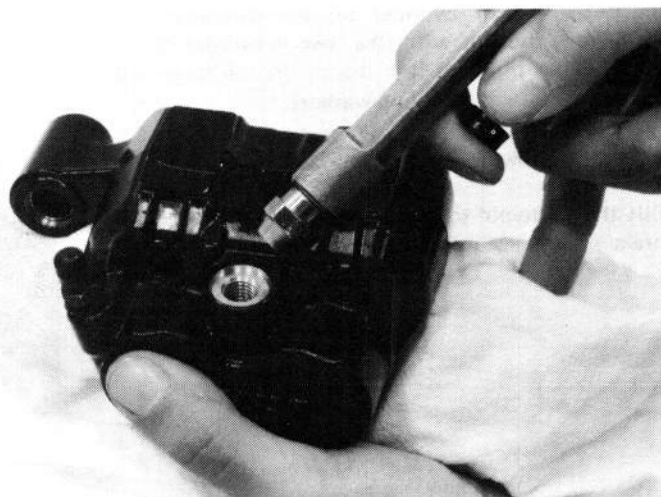


If necessary, apply compressed air to the caliper fluid inlet to get the piston out. Place a shop rag under the caliper to cushion the piston when it is expelled. Use the air in short spurts.

WARNING

Do not bring the nozzle too close to the inlet.

Examine the pistons and cylinders for scoring, scratches or other damage and replace if necessary.

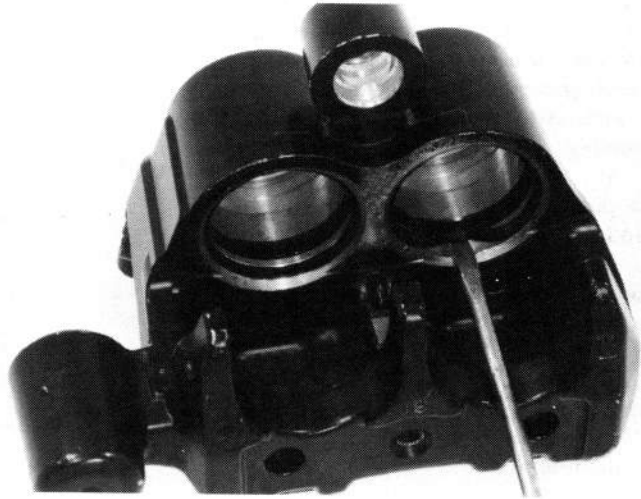


Push the piston seals in, lift them out and discard them.

Clean the oil seal grooves with brake fluid.

CAUTION:

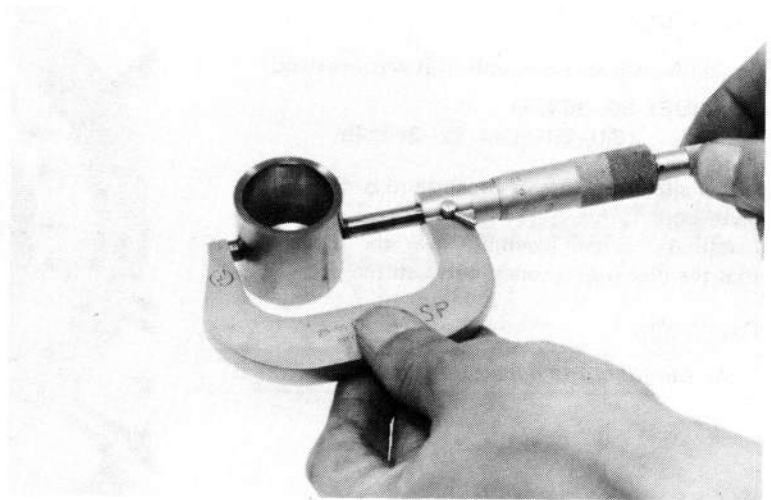
Be careful not to damage the piston sliding surfaces when removing the seals.



PISTON INSPECTION

Check the pistons for scoring, scratches or other faults. Measure the piston diameter with a micrometer.

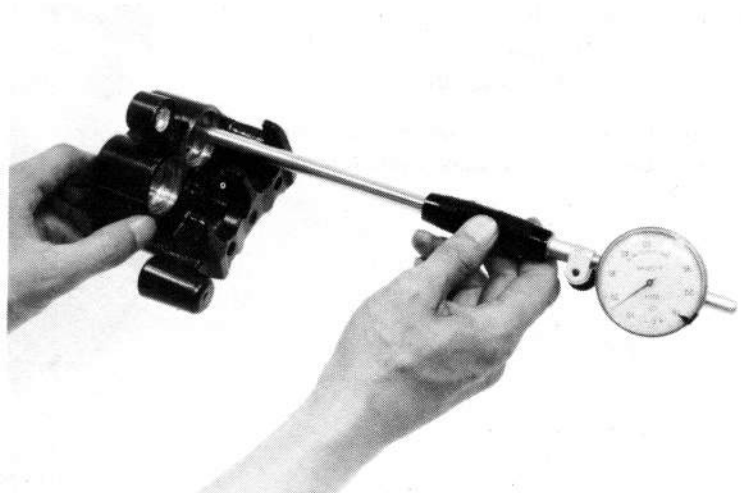
SERVICE LIMIT: 30.14 mm (1.187 in)



CYLINDER INSPECTION

Check the caliper cylinder bore for scoring, scratches or other faults. Measure the caliper cylinder bore.

SERVICE LIMIT: 30.29 mm (1.193 in)



HYDRAULIC BRAKE

ASSEMBLY

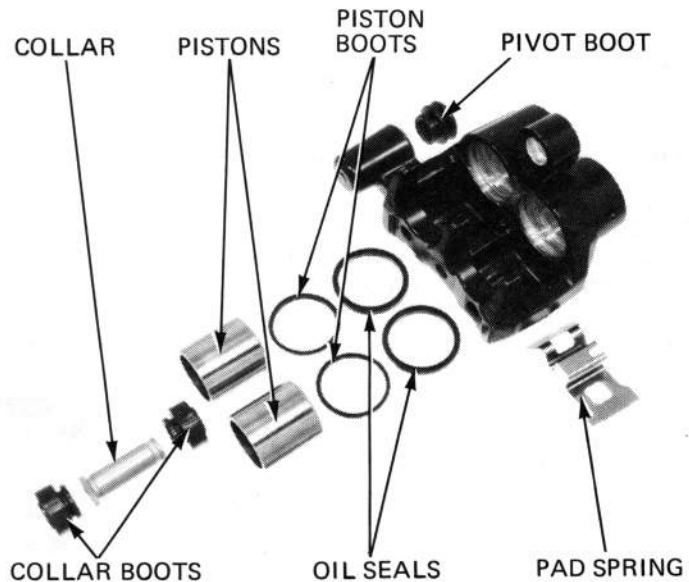
If the piston boots are hardened or deteriorated, replace them with new ones. The piston seals must be replaced with new ones whenever they are removed. Coat the seals with silicone grease or brake fluid before assembly.

Install the pistons with the dished ends toward the pads. Then install the piston boots.

Install the collar boots and collar making sure that the boots are seated in the collar and caliper grooves properly.

Install the pad spring and pads.

Install the pivot boot.



INSTALLATION

Install the caliper pivot bolt, if it was removed.

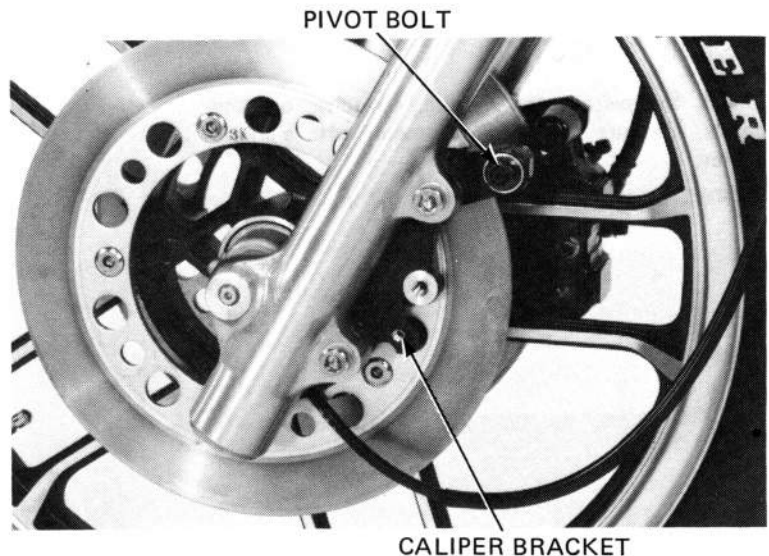
TORQUE: 30–36 N·m
(3.0–3.6 kg·m, 22–26 ft·lb)

Apply silicone grease or brake fluid to the caliper pivot bolt.

Install the caliper assembly over the brake disc so that the disc is positioned between the pads.

CAUTION:

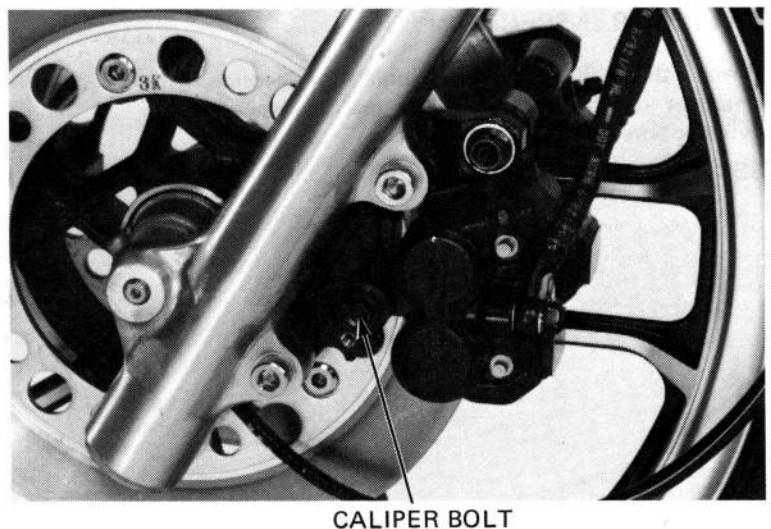
Be careful not to damage the pads.



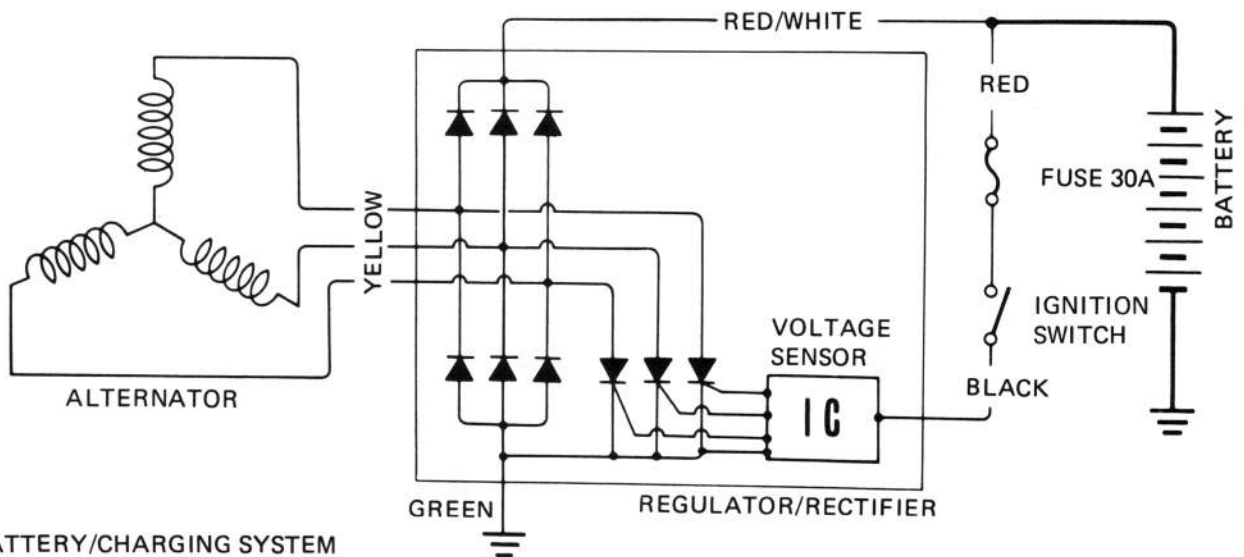
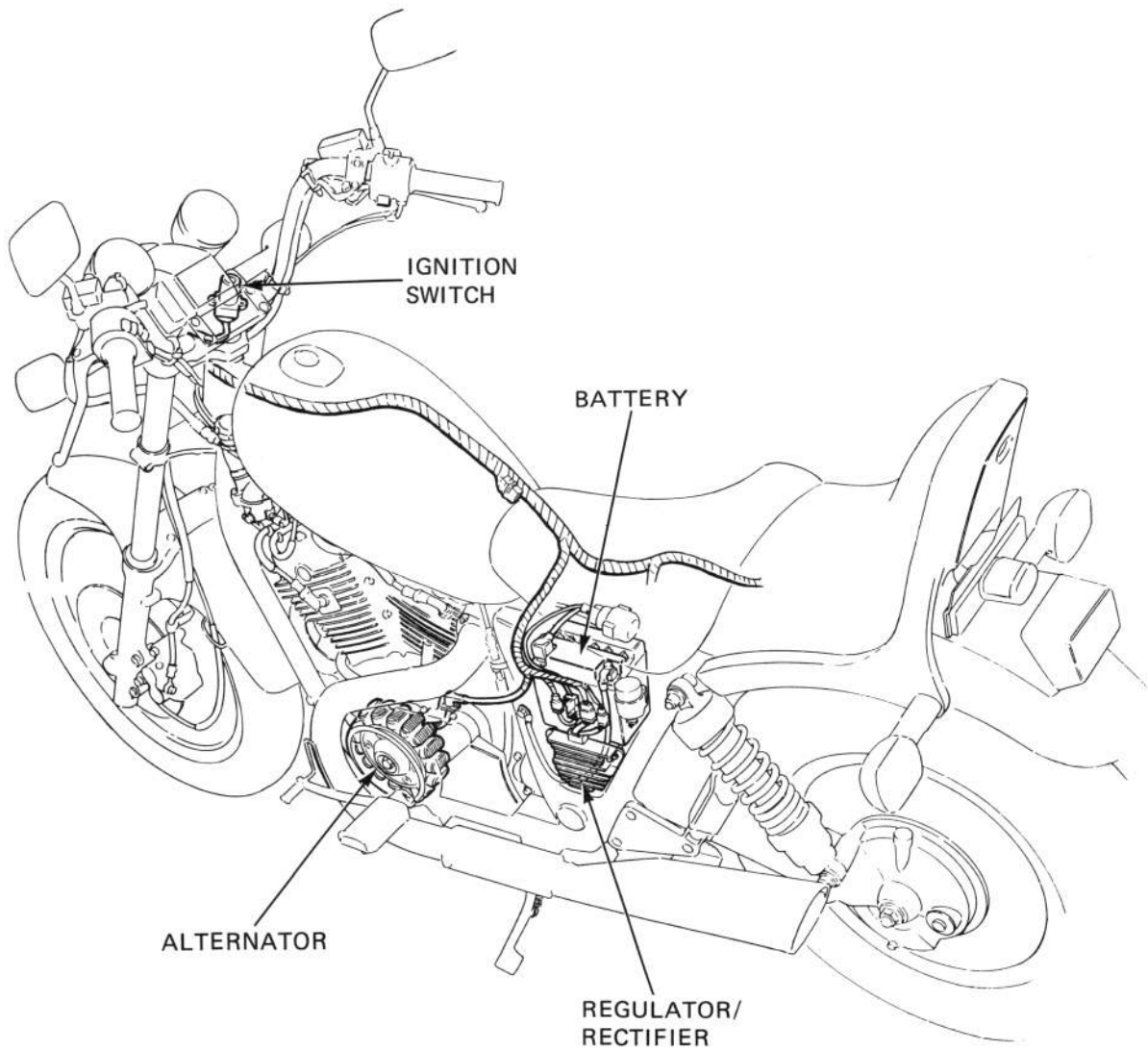
Install the caliper bolt.

TORQUE: 18–23 N·m
(1.8–2.3 kg·m, 13–17 ft·lb)

Connect the brake hose and fill the brake fluid reservoir. Bleed the front brake system (page 17-4).



BATTERY/CHARGING SYSTEM



BATTERY/CHARGING SYSTEM

18. BATTERY / CHARGING SYSTEM

SERVICE INFORMATION	18-1
TROUBLESHOOTING	18-2
BATTERY	18-3
CHARGING SYSTEM	18-4

SERVICE INFORMATION

GENERAL

- Battery fluid level should be checked regularly. Fill with distilled water when necessary.
- Quick charge a battery, only in an emergency. Slow-charging is preferred.
- Remove the battery from the motorcycle for charging. If the battery must be charged on the motorcycle, disconnect the battery cables.

WARNING

Do not smoke, and keep flames away from a charging battery. The gas produced by a battery will explode if flames or sparks are brought near.

- All charging system components can be tested on the motorcycle.
- Alternator removal is in Section 8.

SPECIFICATIONS

Battery	Capacity	12V 16AH	
	Specific gravity	1.280/20°C (68°F)	
	Charging rate	1.4 amperes maximum	
Alternator Capacity	1,000 rpm	5,000 rpm	
	11.8A min. (No. load)	25.6A min. (No load)	
Voltage regulator	Transistorized non-adjustable regulator		

BATTERY/CHARGING SYSTEM

TROUBLESHOOTING

No power – key turned on:

1. Dead battery.
 - Low fluid level.
 - Low specific gravity.
 - Charging system failure.
2. Disconnected battery cable.
3. Main fuse burned out.
4. Faulty ignition switch.

Low power – key turned on:

1. Weak battery.
 - Low fluid level.
 - Low specific gravity.
 - Charging system failure.
2. Loose battery connection.

Low power – engine running:

1. Battery undercharged.
 - Low fluid level.
 - One or more dead cells.
2. Charging system failure.

Intermittent power:

1. Loose battery connection.
2. Loose charging system connection.
3. Loose starting system connection.
4. Loose connection or short circuit in ignition system.
5. Loose connection or short circuit in lighting system.

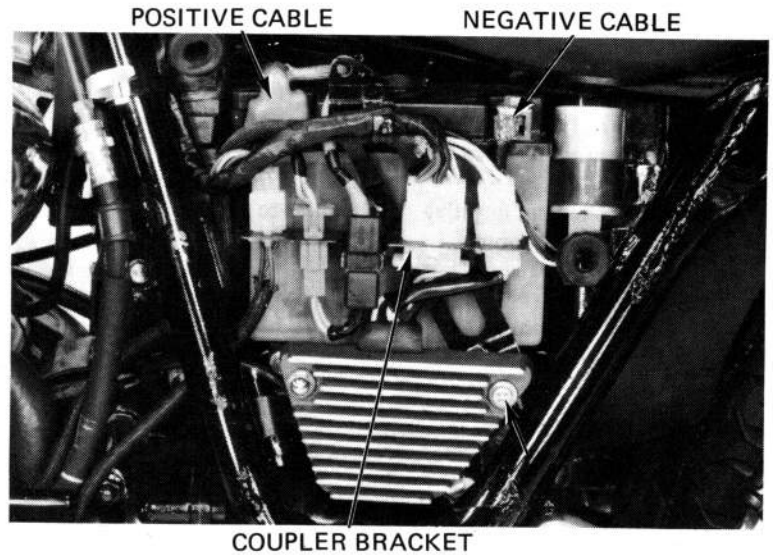
Charging system failure:

1. Loose, broken or shorted wire or connection.
2. Faulty voltage regulator/rectifier.
3. Faulty alternator.

BATTERY

REMOVAL

- Remove the left side cover.
- Remove the regulator/rectifier mount screw.
- Disconnect the ground cable at the battery terminal.
- Open the coupler bracket, then disconnect the positive cable.
- Remove the battery.



TESTING SPECIFIC GRAVITY

Test each cell with a hydrometer.

SPECIFIC GRAVITY: 1.270–1.290 (20°C, 68°F)

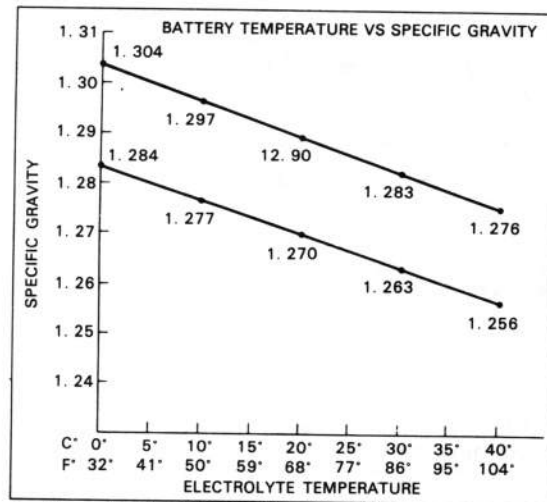
1.270–1.290	Fully charged
Below 1.260	Undercharged

NOTES:

- The battery must be recharged if the specific gravity is below 1.230.
- The specific gravity varies with the temperature as shown in the accompanying table.
- Replace the battery if sulfation is evident or if the space below the cell plates is filled with sediment.

WARNING

*The battery contains sulfuric acid. Avoid contact with skin, eyes, or clothing.
Antidote: Flush with water and get prompt medical attention.*



Specific gravity changes by 0.007 for every 10°C.

BATTERY/CHARGING SYSTEM

CHARGING

Remove the battery cell caps. Fill the battery cells with distilled water to the upper level line, if necessary.

Connect the charger positive (+) cable to the battery positive (+) terminal.

Connect the charger negative (-) cable to the battery negative (-) terminal.

Charging current: 1.6 amperes max.

Charge the battery until specific gravity is 1.270–1.290 at 20°C (68°F).

WARNING

- Before charging a battery, remove the cap from each cell.
- Keep flames and sparks away from a charging battery.
- Turn power ON/OFF at the charger, not at the battery terminals to prevent sparks.
- Discontinue charging if the electrolyte temperature exceeds 45°C (113°F).

CAUTION:

- Quick-charging should only be done in an emergency; slow-charging is preferred.
- Route the breather tube as shown on the battery caution label.

After installing the battery, coat the terminals with clean grease.

CHARGING SYSTEM

CURRENT TEST

NOTE:

Be sure the battery is in good condition before performing this test.

Warm up the engine.

Remove the frame right side cover.

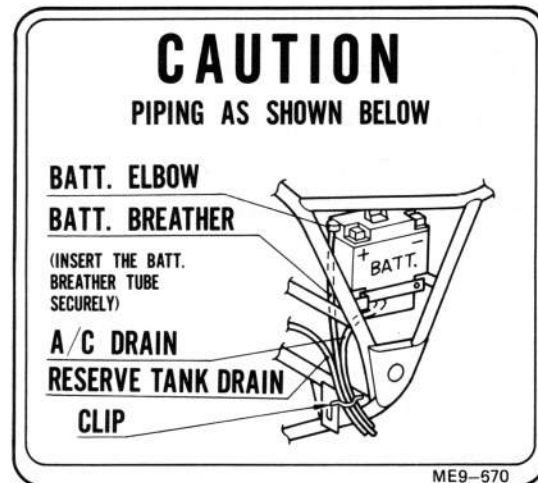
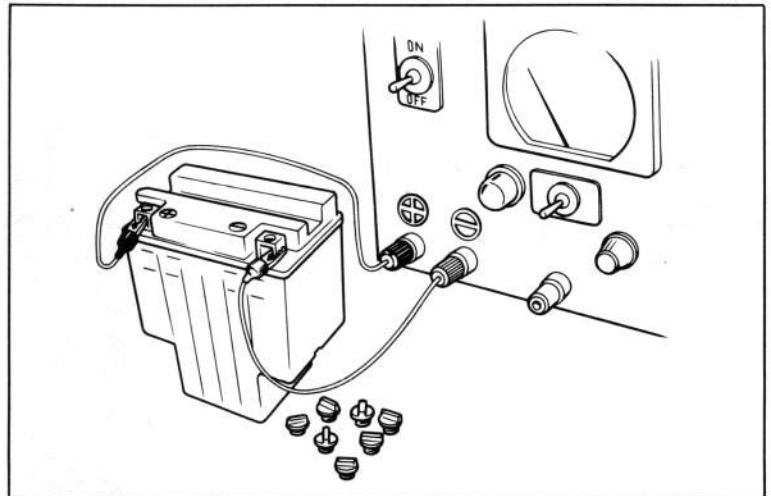
Disconnect the black wire at the regulator/rectifier coupler and disconnect the headlight.

Disconnect the battery positive cable at the battery terminal and connect an ammeter between the battery cable and terminal.

Allow the engine to idle.

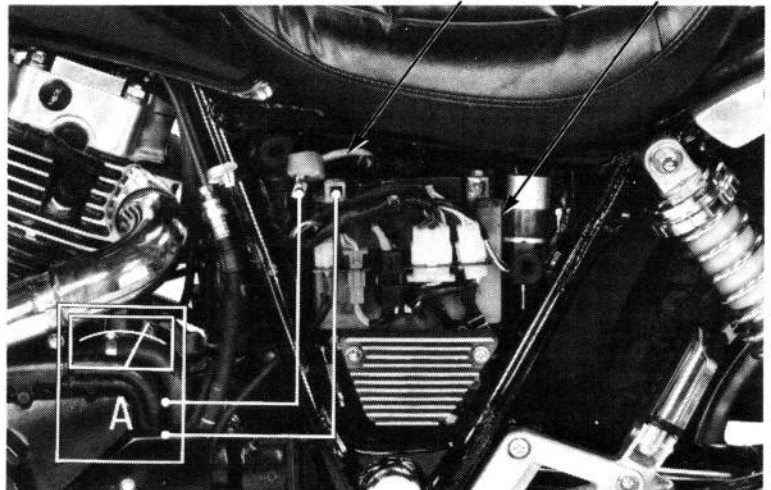
Increase engine speed slowly. Charging amperage should be a minimum of 11.8 at 1,000 rpm and should be a minimum of 25.6 amperes at 5,000 rpm.

Check the stator (page 18-5) and then the regulator/rectifier (page 18-5), if the charging specifications are not met.



BATTERY POSITIVE
CABLE

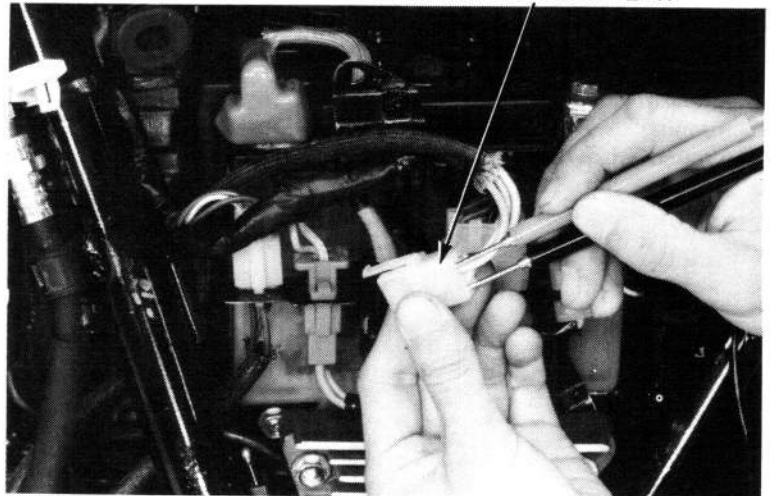
BATTERY



STATOR CONTINUITY TEST

Remove the left side cover.
 Disconnect the alternator coupler.
 Check for continuity between the leads, and between the leads and ground.
 Replace the stator if there is no continuity between the leads, or if there is continuity between the leads and ground.

ALTERNATOR COUPLER



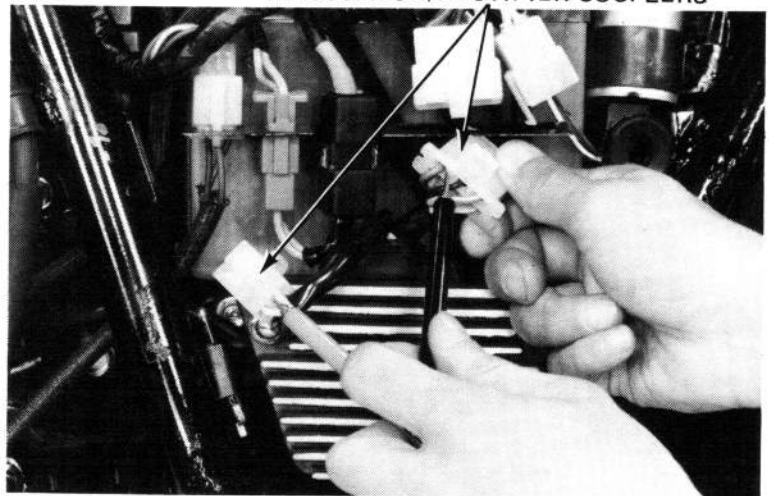
VOLTAGE REGULATOR/RECTIFIER TEST

Remove the left side cover.
 Disconnect the regulator/rectifier couplers.
 Check for continuity between the leads with an ohmmeter.

NOTE:

The test results shown are for a positive ground ohmmeter and the opposite results will be obtained when a negative ground ohmmeter is used.

REGULATOR/RECTIFIER COUPLERS

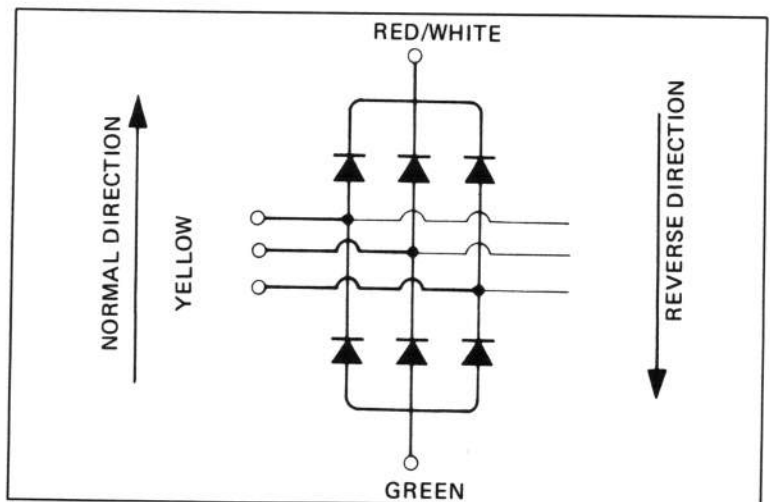


NORMAL DIRECTION: CONTINUITY

	⊕ probe	⊖ probe
I	YELLOW	GREEN
II	RED/WHITE	YELLOW

REVERSE DIRECTION: NO CONTINUITY

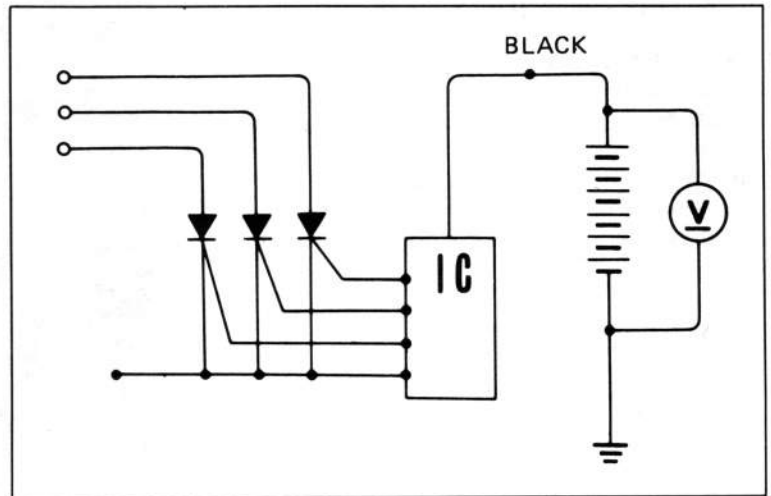
	⊕ probe	⊖ probe
I	GREEN	YELLOW
II	YELLOW	RED/WHITE



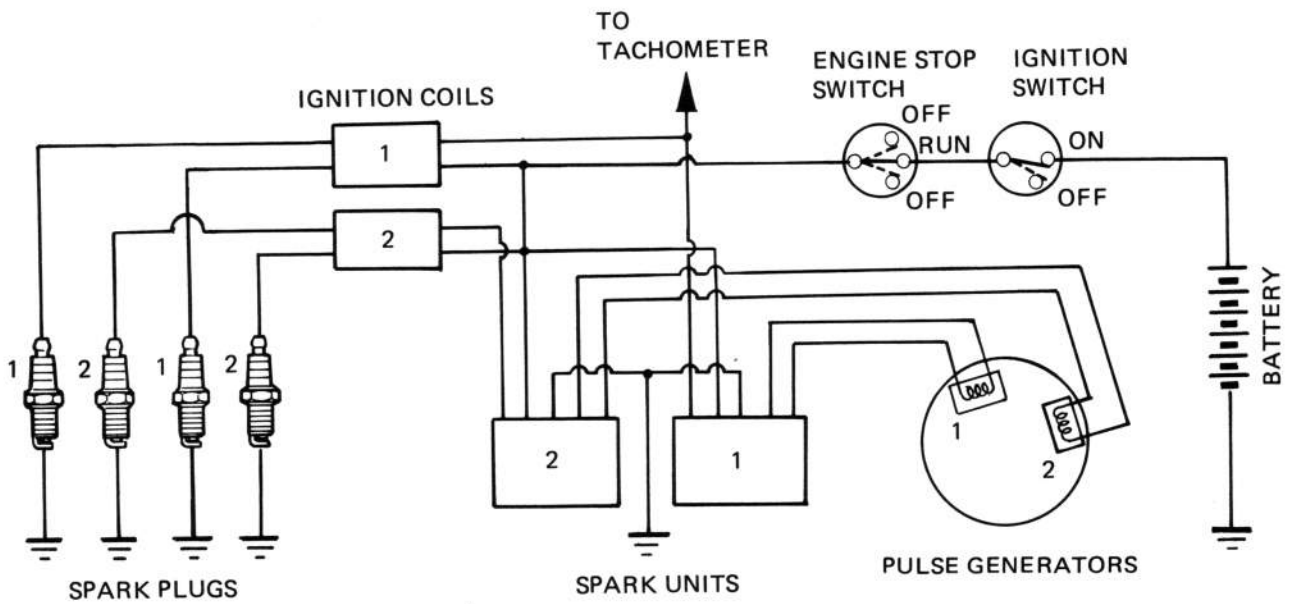
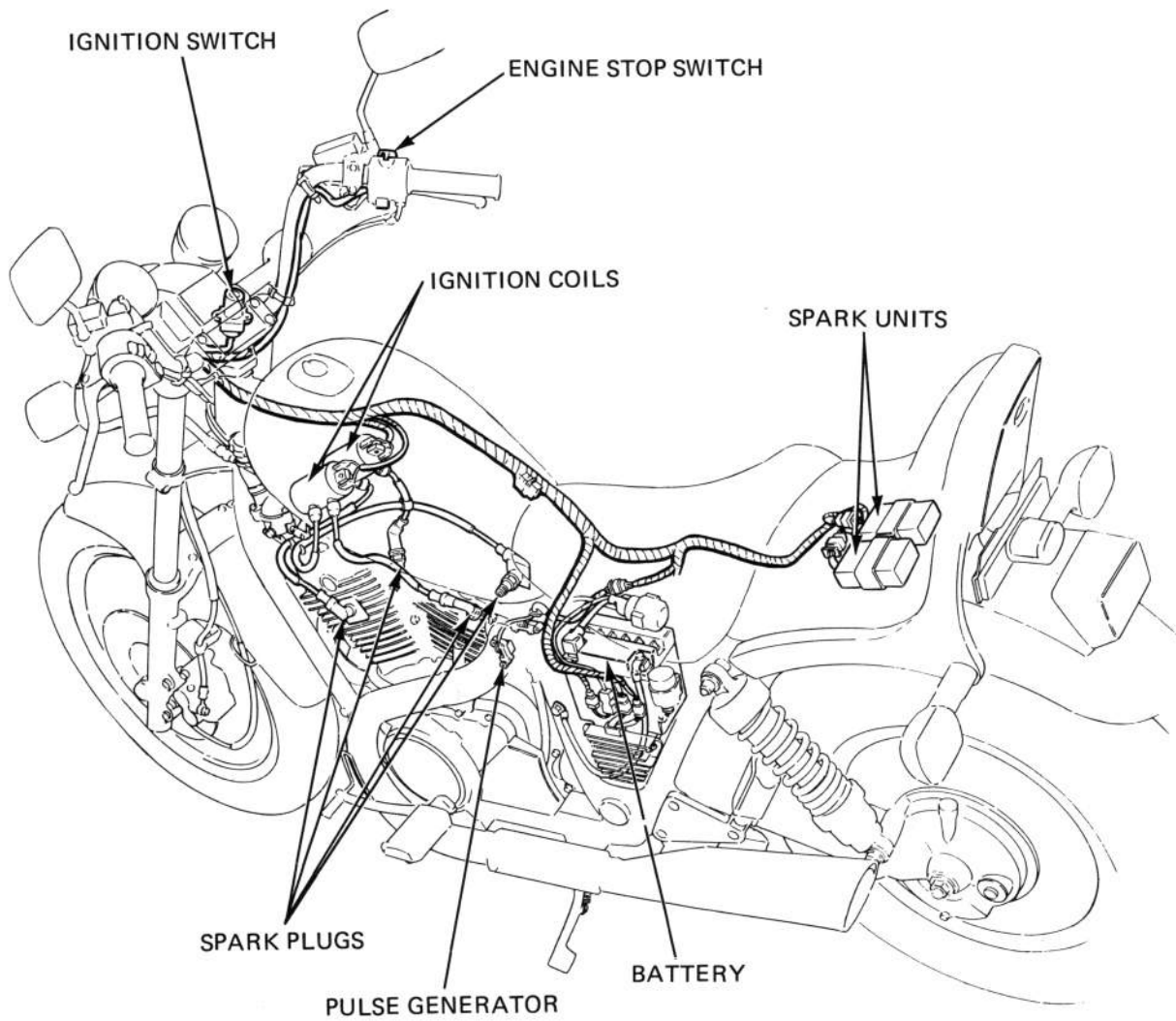
BATTERY/CHARGING SYSTEM

VOLTAGE REGULATOR PERFORMANCE TEST

Connect a voltmeter across the battery.
Check regulator performance with the engine running. The regulator must divert current to ground when battery voltage reaches 14.0 ~ 15.0 V.



IGNITION SYSTEM



19. IGNITION SYSTEM

SERVICE INFORMATION	19-1
TROUBLESHOOTING	19-2
IGNITION COIL	19-3
TRANSISTORIZED IGNITION SYSTEM	19-4

SERVICE INFORMATION

GENERAL

- A TRANSISTORIZED IGNITION SYSTEM is used and no adjustments can be made.

SPECIFICATIONS

		ND	NGK
Spark plug	Standard	X24EPR-U9	DPR8EA-9
	For cold climate below 5°C (41°F)	X22EPR-U9	DPR7EA-9
	For extended high speed driving	X27EPR-U9	DPR9EA-9
Spark plug gap		0.8–0.9 mm (0.031–0.035 in)	
Ignition timing	'83, '84:	At idle 5° BTDC	
	After '84:	At idle 10° BTDC	
	'83, '84:	Full advance 26° BTDC/3,500 rpm	
	After '84:	Full advance 26° BTDC/4,000 rpm	
Pulse air gap		0.3–0.9 mm (0.012–0.035 in)	

IGNITION SYSTEM

TROUBLESHOOTING

The ignition system has two sub-systems; one for the No. 1 cylinder and one for the No. 2 cylinder. Determine which sub-system is faulty, then proceed to the detailed tests below.

Engine cranks but will not start

1. Engine stop switch OFF.
2. No spark at plugs.
3. Faulty transistorized spark unit.
4. Faulty pulse generator.

No spark at plug

1. Engine stop switch OFF.
2. Poorly connected, broken or shorted wires.
 - Between ignition switch and engine stop switch.
 - Between spark unit and engine stop switch.
 - Between spark unit and ignition coil.
 - Between ignition coil and plug.
 - Between spark unit and pulse generator.
3. Faulty ignition coil.
4. Faulty ignition switch.
5. Faulty spark unit.
6. Faulty pulse generator.

Engine starts but runs poorly

1. Ignition primary circuit.
 - Faulty ignition coil.
 - Loose or bare wire.
 - Intermittent short circuit.
2. Secondary circuit.
 - Faulty plug.
 - Faulty spark plug wire.

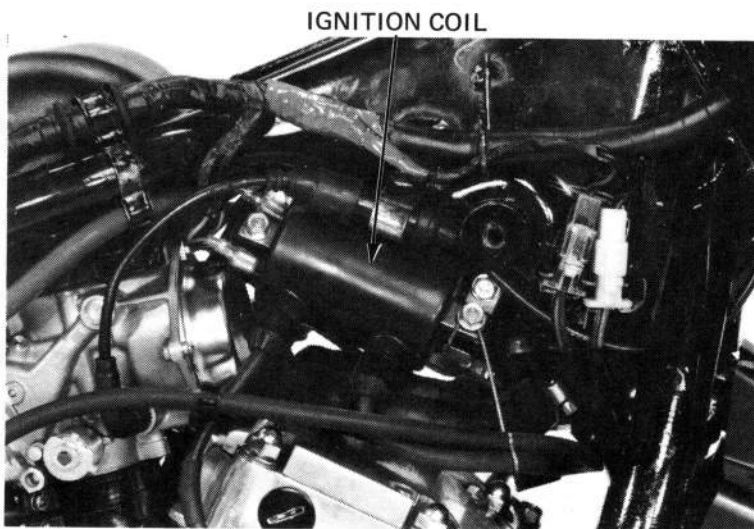
Timing advance incorrect

1. Faulty pulse generator.
2. Faulty spark unit.

IGNITION COIL

REMOVAL

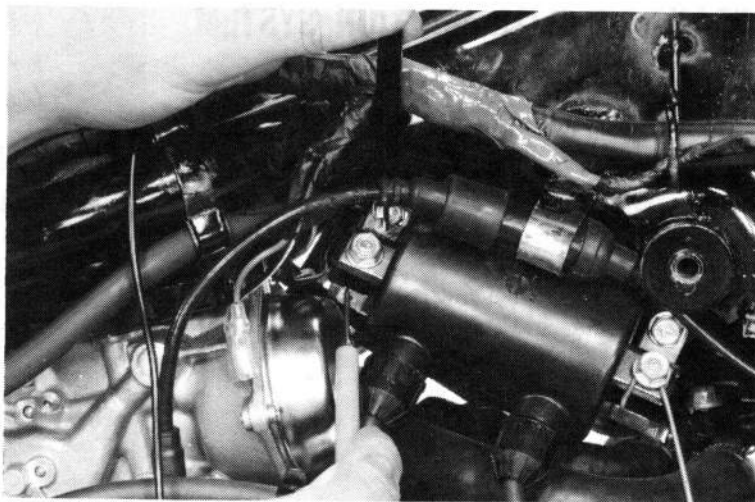
Remove the seat and, fuel tank and disconnect the ignition coil wire leads.
Remove the coils by removing the attaching bolts.



CONTINUITY TEST

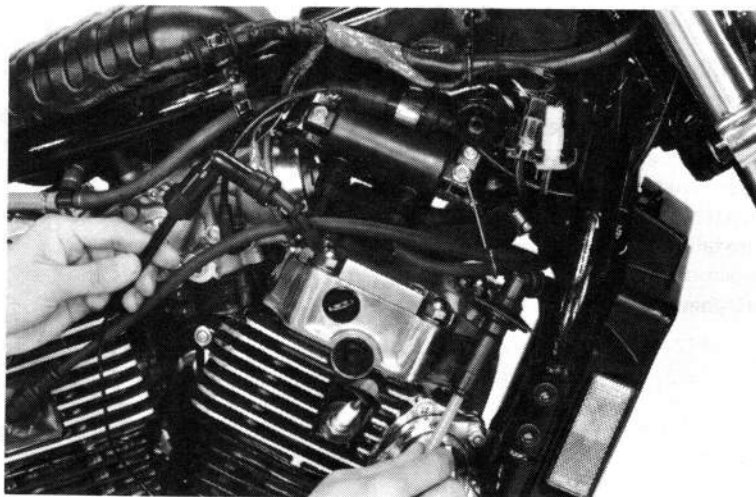
Measure the primary coil resistance.

RESISTANCE: 2.0 ohms



Measure the secondary coil resistance with the spark plug caps in place.

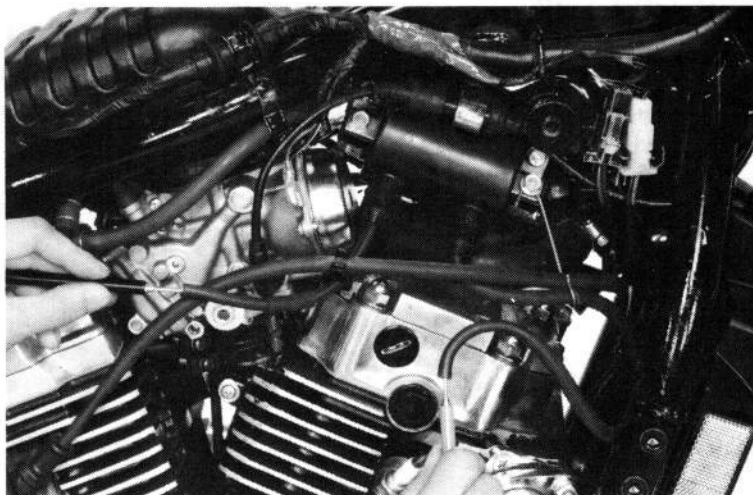
RESISTANCE: 29–40 k ohms



IGNITION SYSTEM

Remove the spark plug caps and measure the secondary coil resistance.

RESISTANCE 20.6–27.4 k ohms



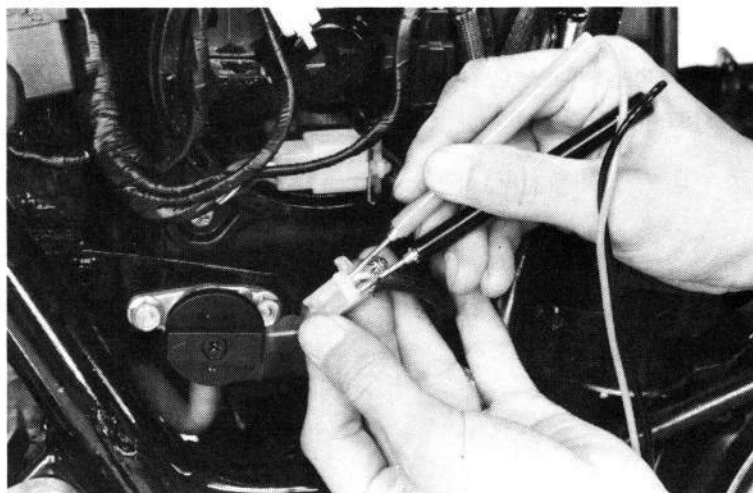
TRANSISTORIZED IGNITION SYSTEM

PULSE GENERATOR TEST

Remove the frame right side cover.
Disconnect the pulse generator coupler and measure the coil resistance.

RESISTANCE: 480 ohms \pm 10%

Between white and yellow leads (1 cylinder)
Between white and blue leads (2 cylinder)



PULSE GENERATOR REPLACEMENT

Remove the right crankcase cover and clutch assembly (section 7).

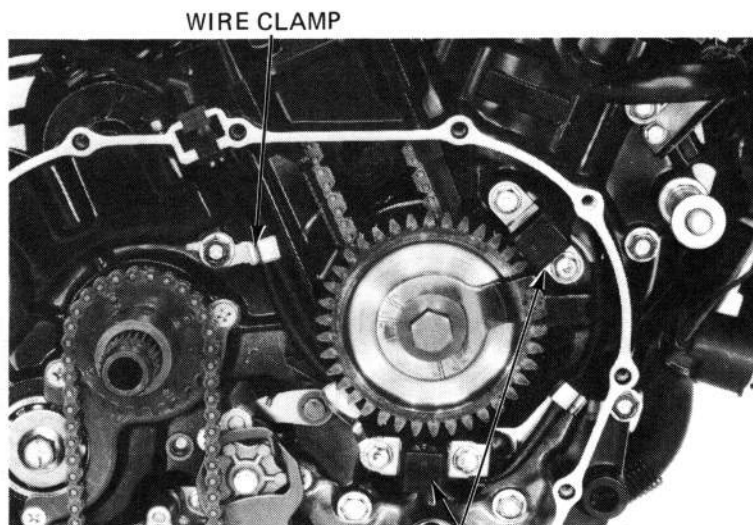
Remove the pulse generator mounting bolts and wire clamp.

Remove the pulse generators.

Install new pulse generators.

Install the clutch assembly and right side cover (section 7).

Recheck the ignition timing (page 3-8).



WIRE CLAMP

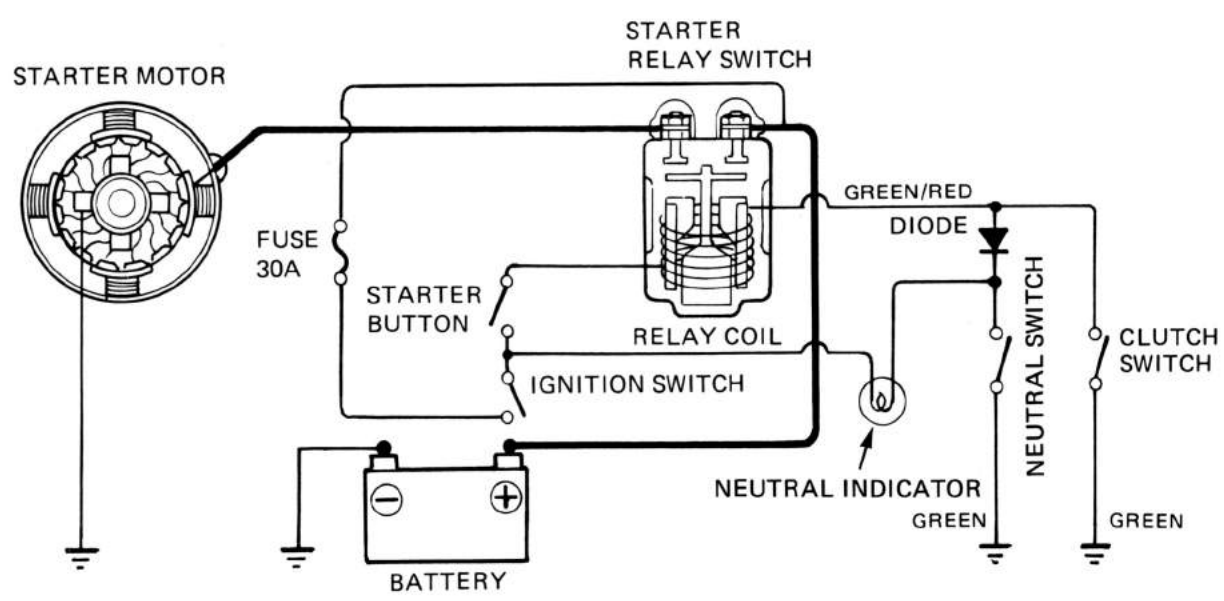
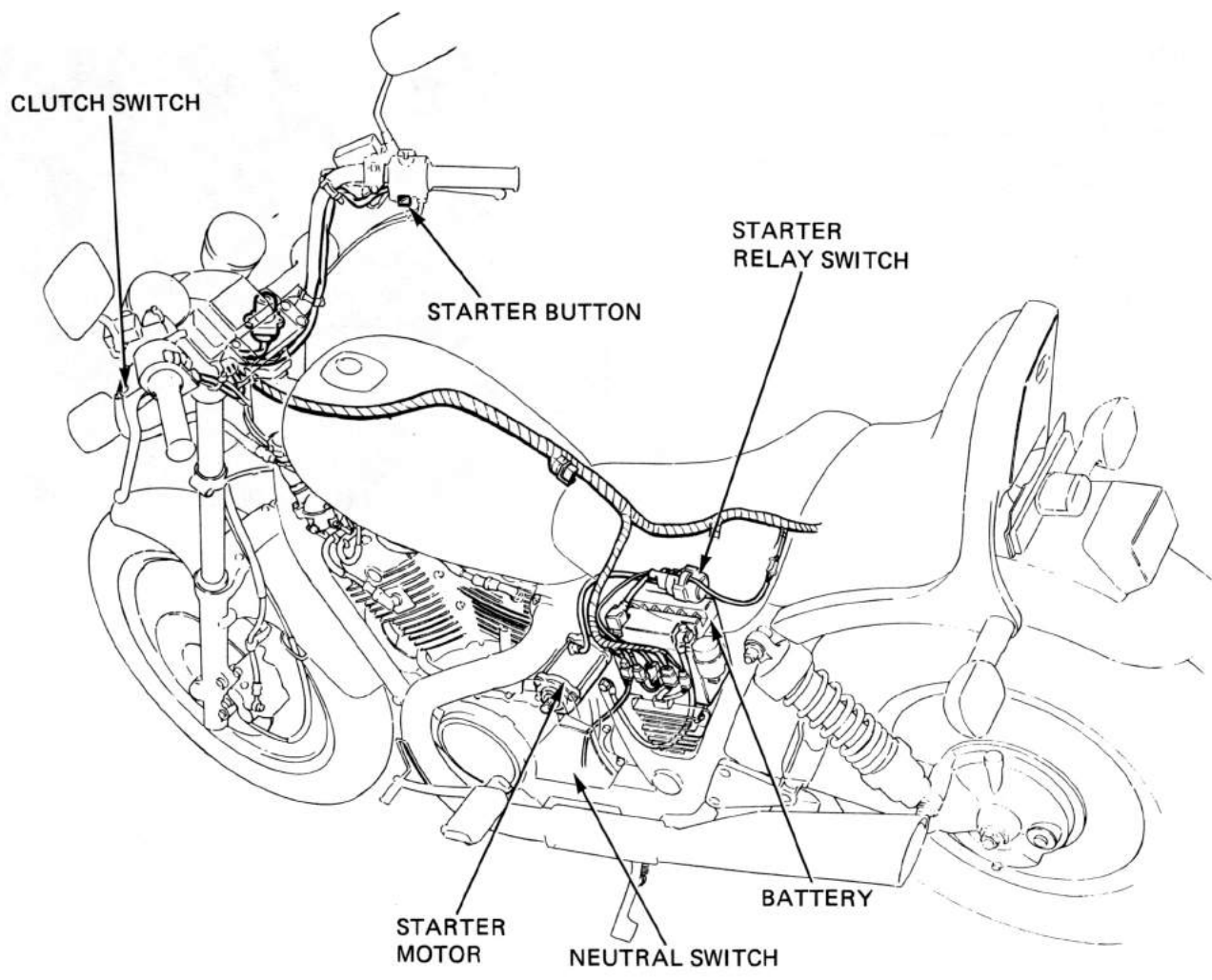
PULSE GENERATORS

SPARK UNIT

If the pulse generators, ignition coils and wiring are good, and the ignition timing is not within specification; replace the spark units with new ones and recheck the ignition timing.



ELECTRIC STARTER



20. ELECTRIC STARTER

SERVICE INFORMATION	20-1
TROUBLESHOOTING	20-1
STARTER MOTOR	20-2
STARTER RELAY SWITCH	20-5
CLUTCH DIODE	20-5

SERVICE INFORMATION

GENERAL

- The starter motor can be removed with the engine in the frame.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Starter motor	Brush spring tension	680-920 g (24.0-32.5 oz)	545 g (19.2 oz)
	Brush length	12.0-13.0 mm (0.47-0.51 in)	6.5 mm (0.26 in)

TROUBLESHOOTING

Starter motor will not turn

1. Battery discharged.
2. Faulty ignition switch.
3. Faulty starter switch.
4. Faulty neutral switch.
5. Faulty starter relay switch.
6. Loose or disconnected wire or cable.
7. Clutch diode open.

Starter motor turns engine slowly

1. Low specific gravity.
2. Excessive resistance in circuit.
3. Binding in starter motor.

Starter motor turns, but engine does not turn

1. Faulty starter clutch.
2. Faulty starter motor gears.
3. Faulty starter motor or idle gear.

Starter motor and engine turns, but engine does not start

1. Faulty ignition system.
2. Engine problems.
 - Low compression.
 - Fouled spark plugs.

ELECTRIC STARTER

STARTER MOTOR

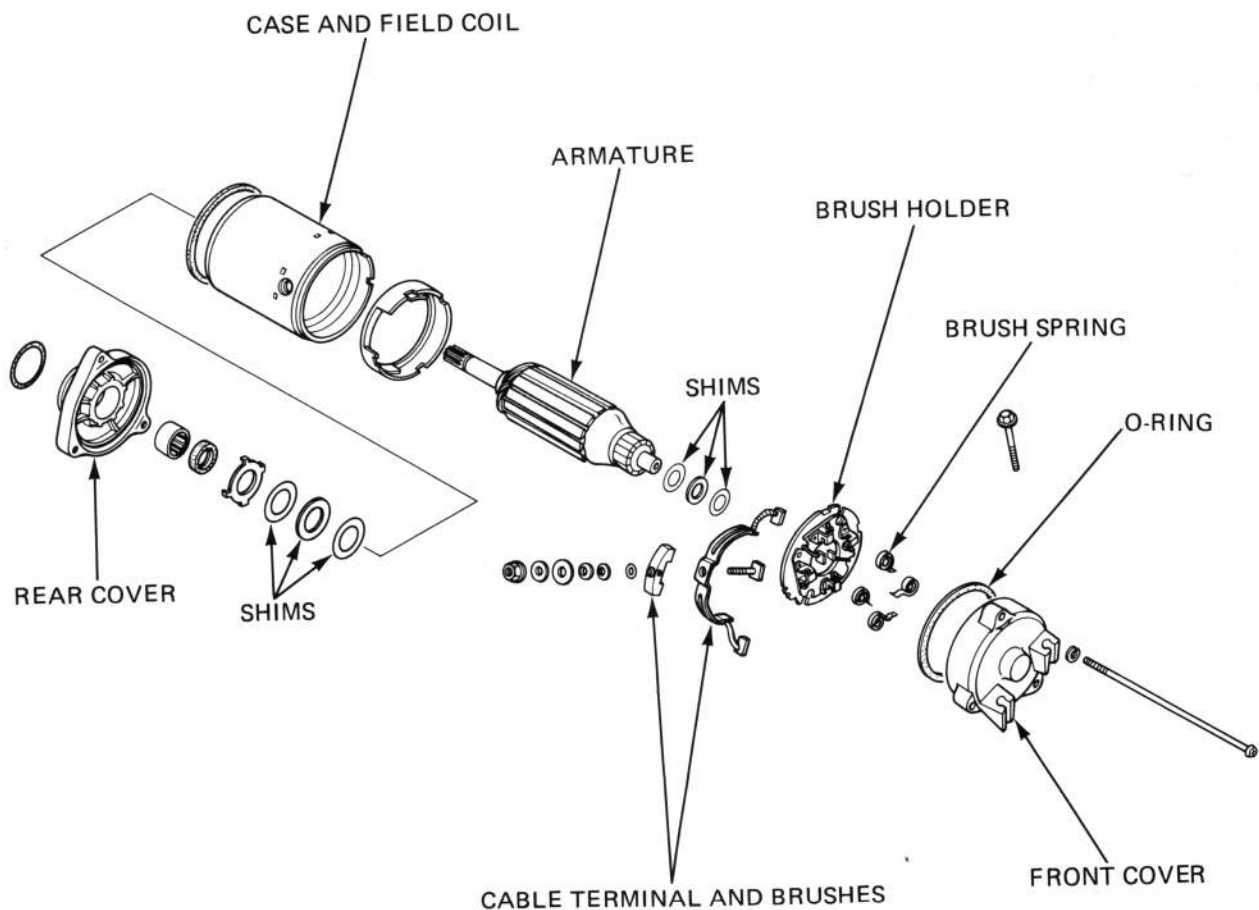
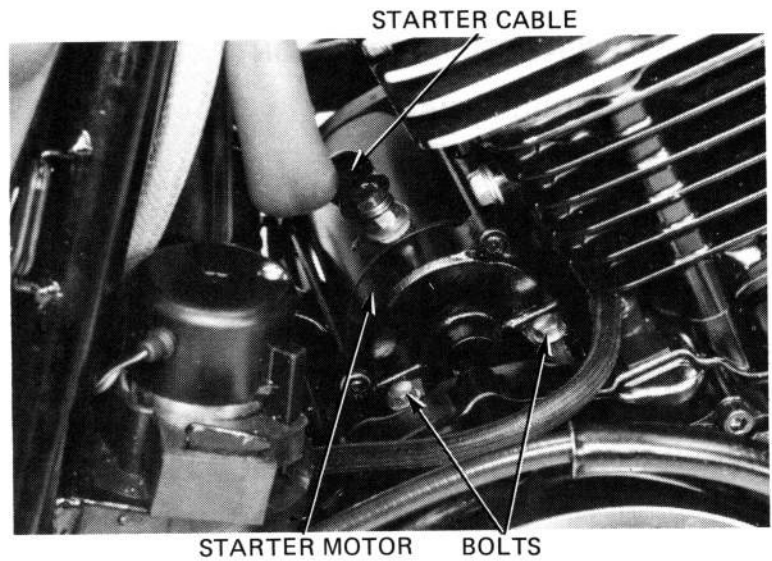
REMOVAL

WARNING

With the ignition switch OFF, remove the negative cable at the battery before servicing the starter motor.

Remove the alternator cover, flywheel and starter drive gear (section 8).

Disconnect the starter motor cable at the motor. Remove the starter motor mounting bolts, and starter motor.



BRUSH INSPECTION

Remove the starter motor case screws.

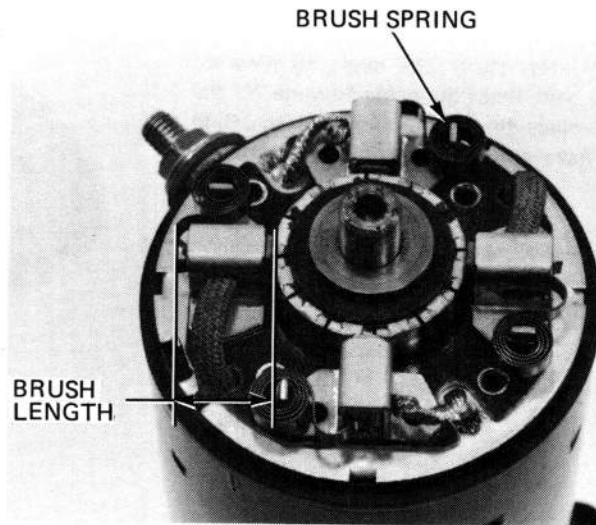
Inspect the brushes and measure the brush length.

Measure brush spring tension with a spring scale.

SERVICE LIMITS:

Brush length: 6.5 mm (0.26 in)

Brush spring tension: 545 g (19.2 oz)



COMMUTATOR INSPECTION

Remove the starter motor case.

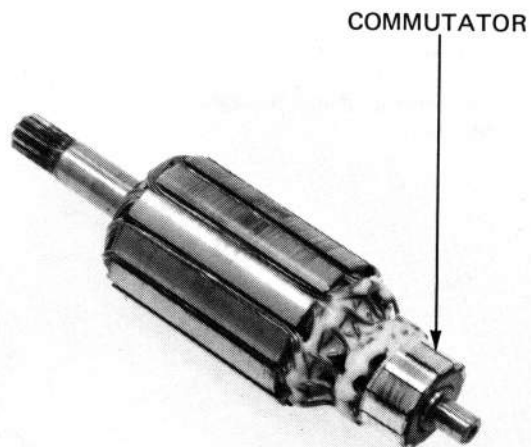
NOTE:

Record the location and number of thrust washers.

Inspect the commutator bars for discoloration. Bars discolored in pairs indicate grounded armature coils.

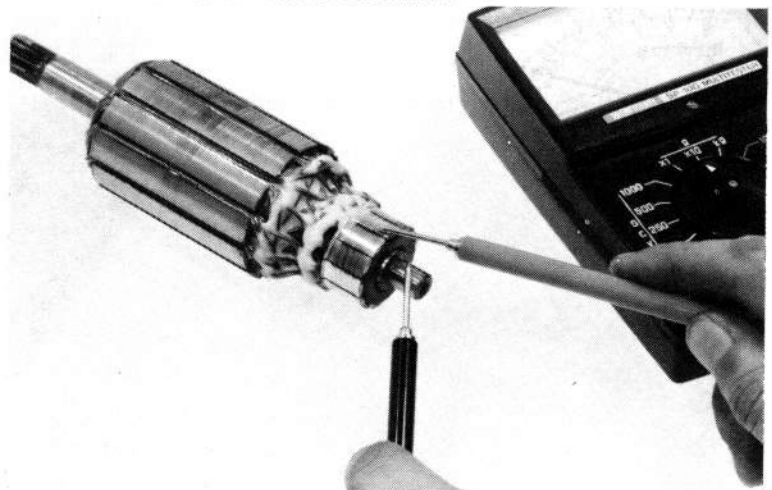
NOTE:

Do not use emery or sand paper on the commutator.



Check for continuity between pairs of commutator bars. Also, make a resistance check between individual commutator bars and the armature shaft. There should be no continuity.

CONTINUITY BETWEEN COMMUTATOR BAR PAIRS: NORMAL



NO CONTINUITY BETWEEN COMMUTATOR BARS AND ARMATURE SHAFT: NORMAL

ELECTRIC STARTER

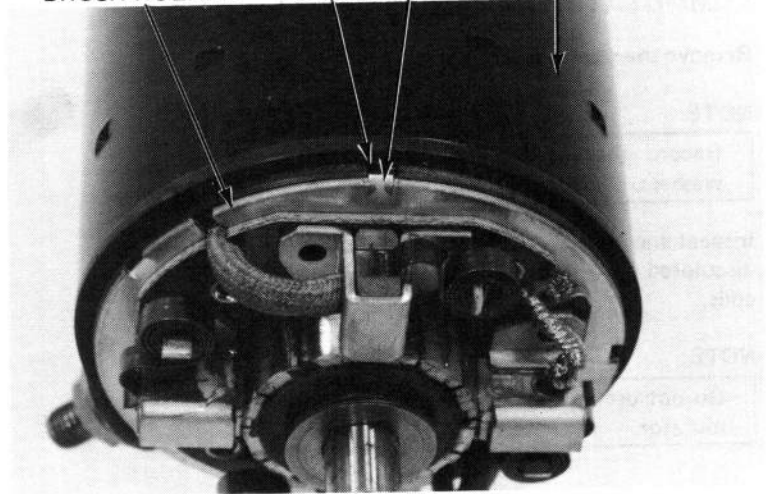
FIELD COIL INSPECTION

Check for continuity from the cable terminal to the motor case and from the cable terminal to the brush wire. Replace the starter motor if the field coil does not have continuity or if it is shorted to the motor case.

NO CONTINUITY BETWEEN
CABLE TERMINAL AND MOTOR CASE: NORMAL



CONTINUITY BETWEEN
CABLE TERMINAL AND BRUSH WIRE (INSULATED): NORMAL
BRUSH HOLDER NOTCH PIN CASE

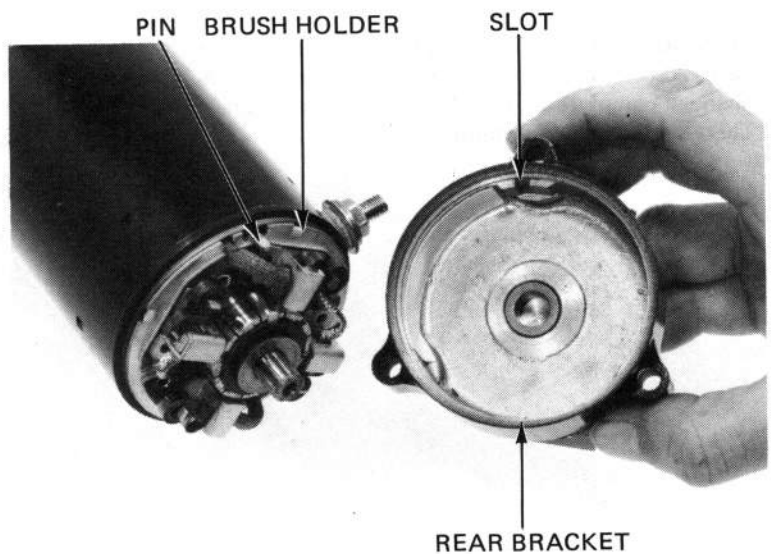


ASSEMBLY/INSTALLATION

Assemble the starter motor. Align the case notch with the brush holder pin.

Install the rear cover aligning its slot with the brush holder pin.

Install the starter motor in the reverse order of removal.



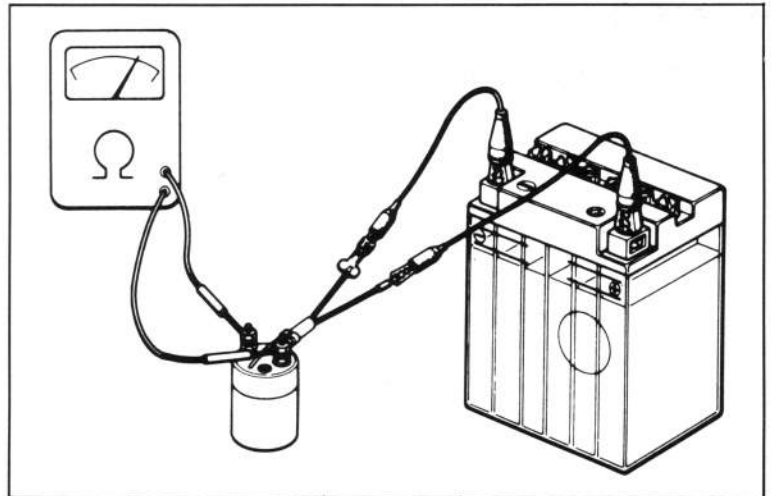
STARTER RELAY SWITCH

INSPECTION

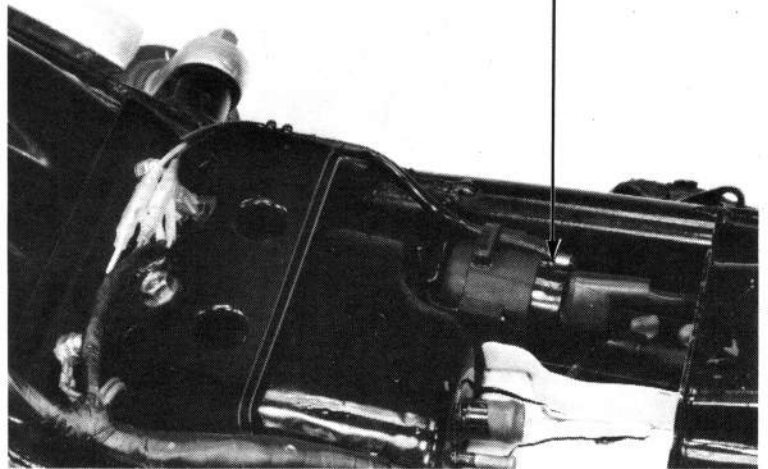
Depress the starter switch button with the ignition ON. The coil is normal if the starter relay switch clicks.

Connect an ohmmeter to the starter relay switch terminals.

Connect a 12 V battery to the switch cable terminals. The switch is normal if there is continuity.



STARTER RELAY SWITCH

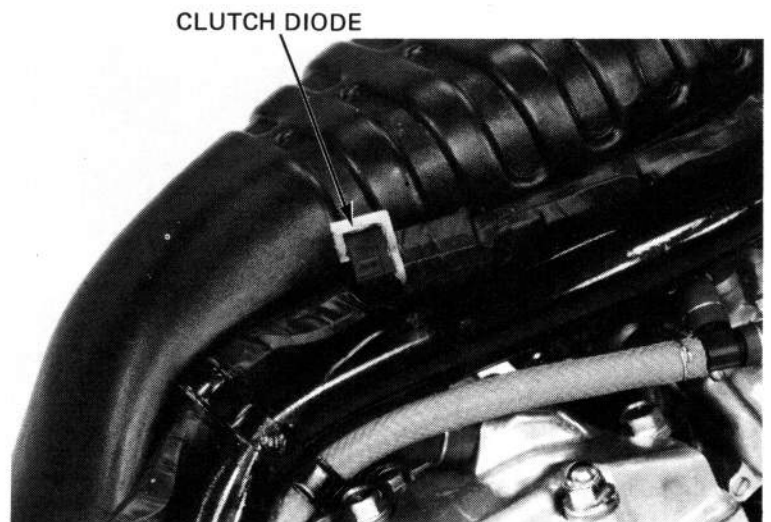


CLUTCH DIODE

REMOVAL

Remove the fuel tank.

Remove the clutch diode from the wire harness.

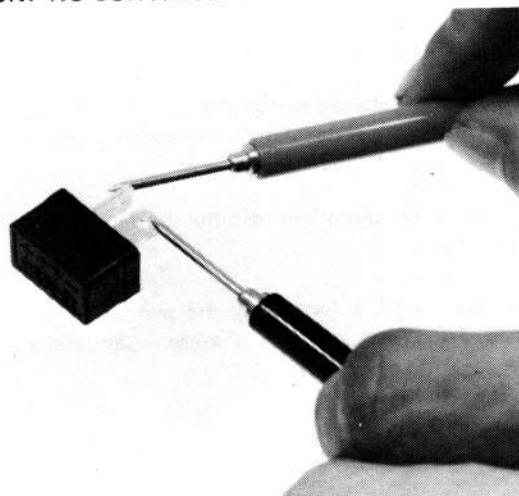


ELECTRIC STARTER

NORMAL DIRECTION: CONTINUITY
REVERSE DIRECTION: NO CONTINUITY

INSPECTION

Check for continuity with an ohmmeter.



21. SWITCHES

SERVICE INFORMATION	21-1	IGNITION SWITCH	21-5
OIL PRESSURE SWITCH	21-2	FUEL PUMP	21-6
BRAKE LIGHT SWITCH	21-2	THERMOSTATIC SWITCH	21-7
NEUTRAL/OD SWITCHES	21-3	TEMPERATURE SENSOR	21-7
CLUTCH SWITCH	21-3	TEMPERATURE GAUGE	21-9
HANDLEBAR SWITCHES	21-4	TACHOMETER	21-9

SERVICE INFORMATION

GENERAL

- Some wires have different colored bands around them near the connector. These are connected to other wires which correspond with the band color.
- All plastic plugs have locking tabs that must be released before disconnecting, and must be aligned when reconnecting.
- The following color codes used are indicated throughout this section and on the wiring diagram.

B = Blue
Bk = Black
Br = Brown

G = Green
Gr = Grey
LB = Light Blue

LG = Light Green
O = Orange
P = Pink

R = Red
W = White
Y = Yellow

- To isolate an electrical failure, check the continuity of the electrical path through the part. A continuity check can usually be made without removing the part from the motorcycle. Simply disconnect the wires and connect a continuity tester or volt-ohmmeter to the terminals or connections.
- A continuity tester is useful when checking to find out whether or not there is an electrical connection between the two points. An ohmmeter is needed to measure the resistance of a circuit, such as when there is a specific coil resistance involved, or when checking for high resistance caused by corroded connections.

SWITCHES

OIL PRESSURE SWITCH

Drain the engine oil.

Disconnect the oil pressure switch lead and remove the switch.

Check for continuity while applying pressure to the switch.

Replace the switch if necessary.

Apply a liquid sealant to the switch threads before installing the switch.

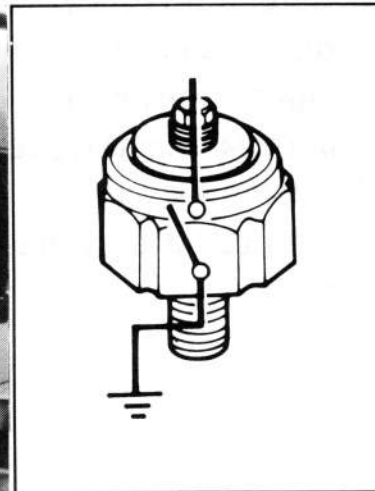
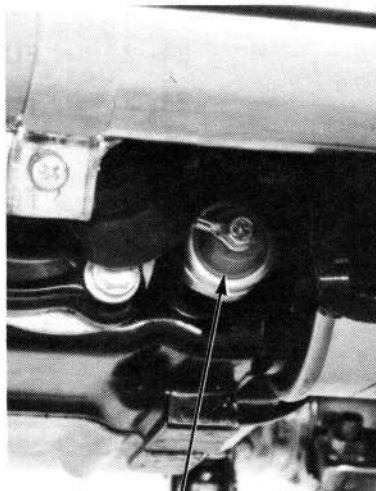
Screw the switch in the crankcase and leave two threads from the bottom. Then tighten it to the specified torque.

TORQUE: 15–20 N·m (1.5–2.0 kg·m, 11–14 ft·lb)

NOTE:

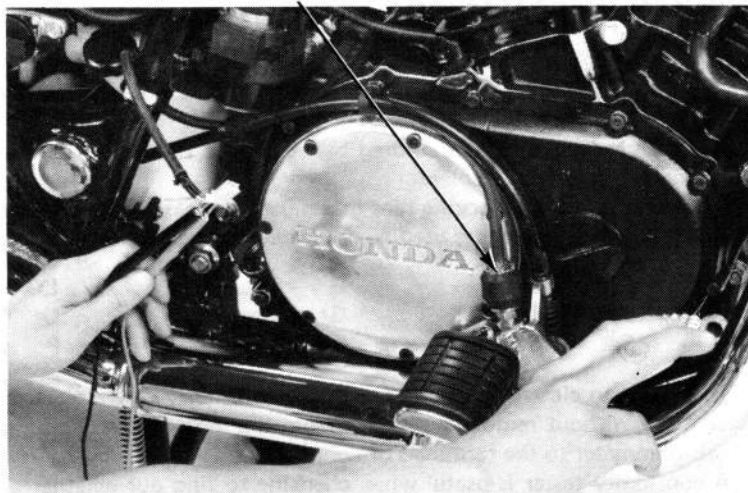
Do not overtighten the switch to prevent the crankcase from damage.

CONTINUITY: BELOW
 $0.3 \pm 0.1 \text{ kg/cm}^2$ ($4.3 \pm 1.4 \text{ psi}$)

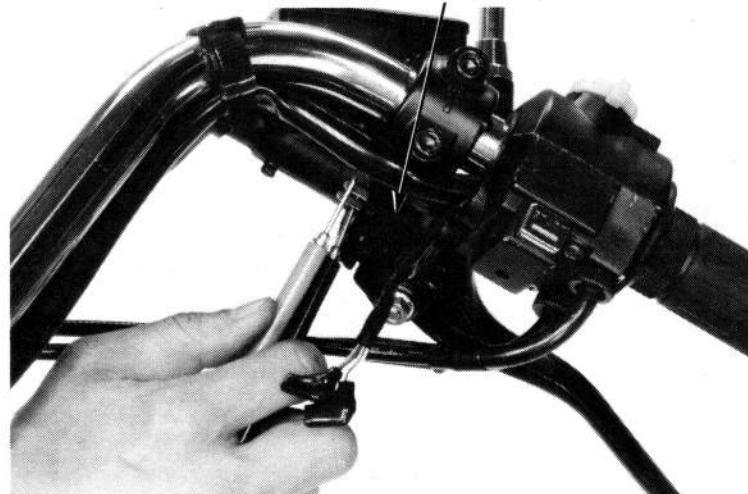


OIL PRESSURE SWITCH

REAR BRAKE LIGHT SWITCH



FRONT BRAKE LIGHT SWITCH



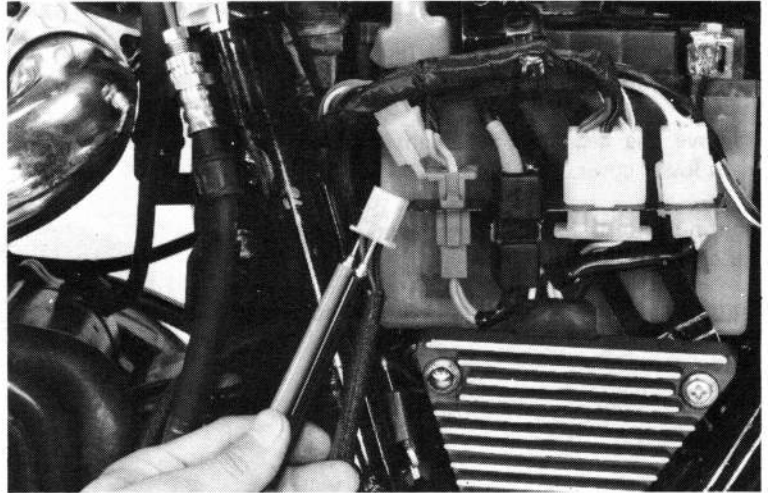
Check the front brake light switch for continuity with the front brake applied.

Replace the switches if necessary.

NEUTRAL/OD SWITCHES

Remove the left side cover and disconnect the neutral/OD switch coupler.

Color code	Lg/R	G/O
Position		
1st		
N	○-----○	○-----○
2nd		
3rd		
4th		
5th		
OD		○-----○

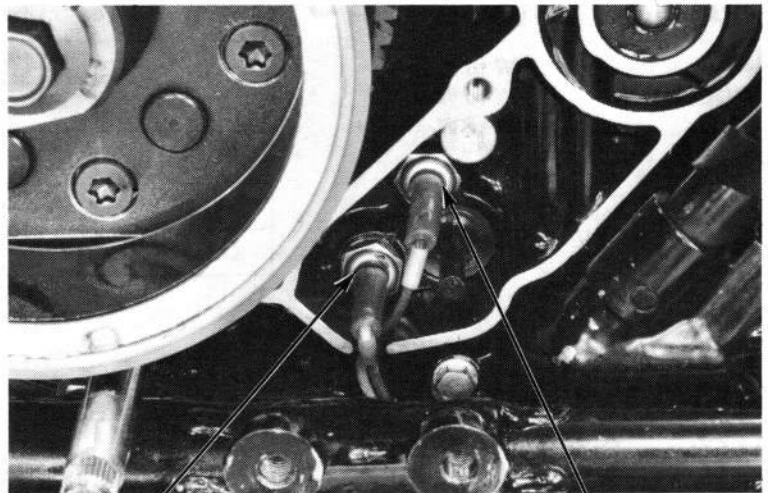


REMOVAL/INSTALLATION

Remove the alternator cover (page 8-2).
Disconnect the wire from the switch and remove the switch.

Install the neutral and OD switches in the reverse order of removal.

TORQUE: 10–14 N·m (1.0–1.4 kg·m, 7–10 ft·lb)

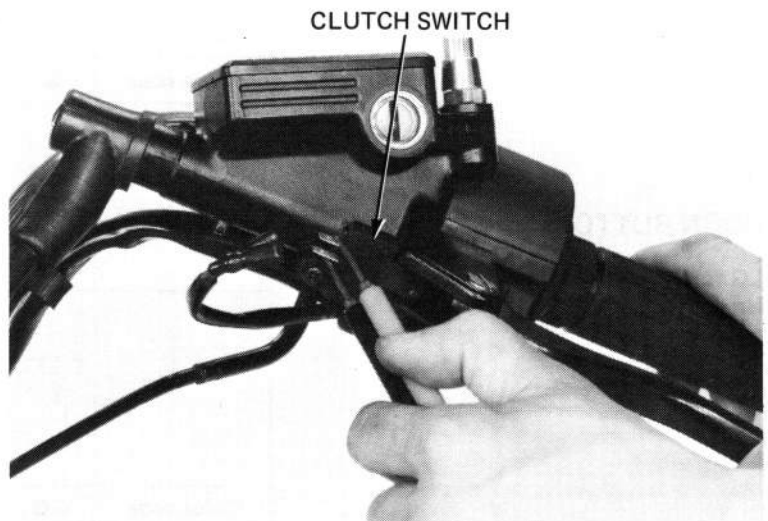


NEUTRAL SWITCH

OD SWITCH

CLUTCH SWITCH

Check continuity of the clutch lever (safety) switch with the clutch released and applied. Replace if necessary.



CLUTCH APPLIED: CONTINUITY
CLUTCH RELEASED: NO CONTINUITY

SWITCHES

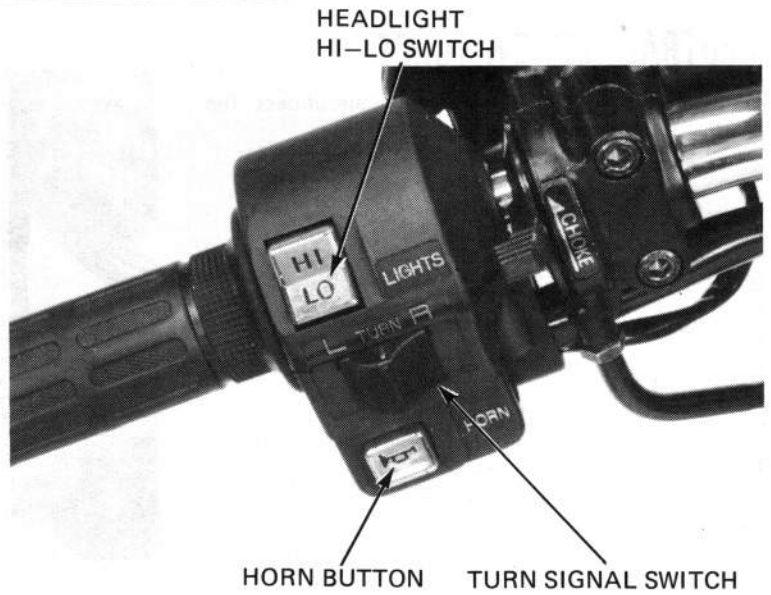
HANDLEBAR SWITCHES

The handlebar cluster switches (lights, turn signals, horn, etc.) must be replaced as assemblies.

Remove the headlight, headlight case and instrument lower cover.

Continuity tests for the components of the handlebar cluster switches follow:

Continuity should exist between the color coded wires in each chart.



HEADLIGHT HI-LOW SWITCH

HI: B/W to B
MIDDLE (N): B/W to W to B
LO: B/W to W

Headlight Hi-Low Switch

	HL	Hi	Lo
Hi	○ — ○		
(N)	○ — ○ — ○		
Lo	○ —		○
Color code	B/W	B	W

TURN SIGNAL SWITCH

LEFT: Gr to O, Br/W to LB/W
OFF: Br/W to LB/W and O/W
RIGHT: Gr to LB, Br/W to O/W

Turn Signal Switch

	W	L	R	TL	PR	PL
LEFT	○ — ○			○ — ○		
OFF				○ — ○ — ○		
RIGHT	○ —		○	○ —		○
Color code	Gr	O	LB	Br/W	LB/W	O/W

HORN BUTTON

LG to W/G with button depressed
 No continuity with button released

Horn Button

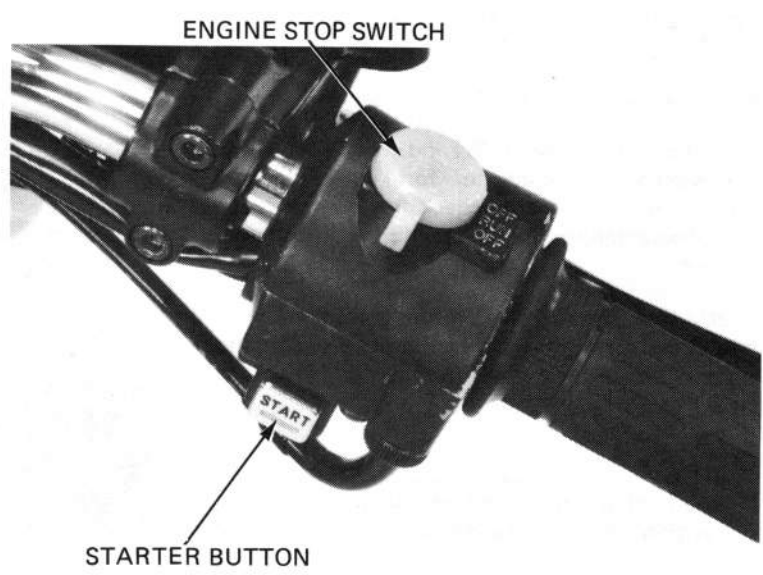
	Ho	E
Color code	LG	W/G

STARTER BUTTON

Bk to Y/R with button pushed in.
Bk/R to B/W with button out.

Starter Button

	BAT ₂	ST	BAT ₅	HL
OUT			○—○	○
START	○—○			
Color code	Bk	Y/R	Bk/R	B/W



ENGINE STOP SWITCH

RUN: Bk to Bk/W
OFF: No continuity

Engine Stop Switch

	BAT ₂	IG
OFF		
RUN	○—○	○
OFF		
Color code	Bk	Bk/W

IGNITION SWITCH

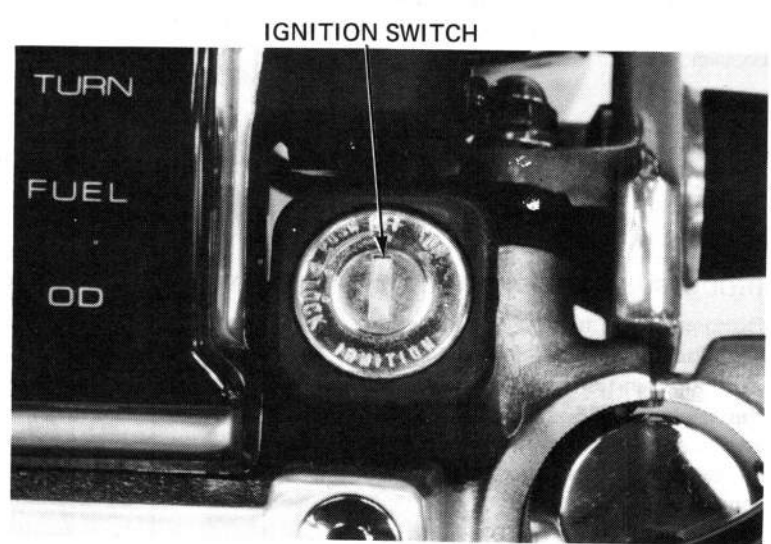
Remove the headlight, headlight case and instrument lower cover and disconnect the ignition switch coupler.

Check continuity of terminals on the ignition switch coupler in each switch position.

SWITCH POSITION

LOCK: No continuity
OFF: No continuity
ON: R to Bk, Br/W to Br – continuity
PARK: Br to R – continuity

Terminal Position	PA	BAT ₁	IG	TL ₁	TL ₂
ON		○—○	○—○	○—○	
OFF					
P	○—○				
LOCK					
Color code	Br	R	Bk	Br/W	Br



SWITCHES

LOW FUEL WARNING LIGHT

Place the motorcycle on its center stand.

Turn the ignition switch ON and check that the low fuel warning light comes on for 1 to 4 seconds. If the light does not go on, check for a blown fuse or bulb, loose connection or open circuit in the wire harness.

Check that the low fuel warning light comes on within 60 seconds after the ignition switch has been turned ON with the amount of fuel in the fuel tank below 1.7 liters (0.45 US gal).

NOTE

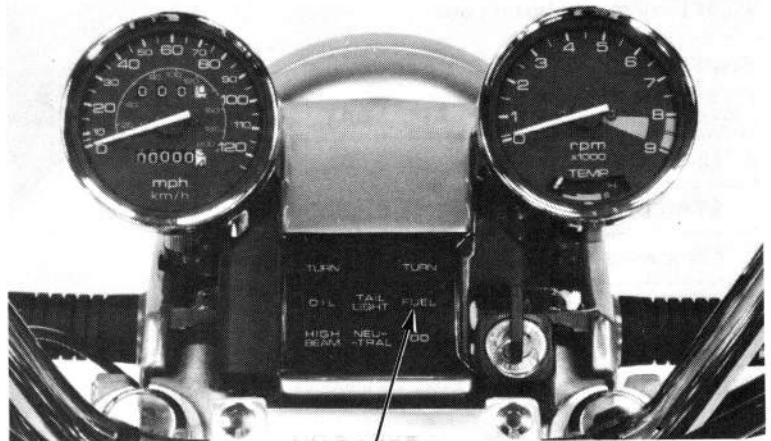
The light will not go on immediately after the ignition switch is turned ON.

If the light does not go on within 60 seconds, replace the sensor.

Check that the low fuel warning light will not light when the ignition switch is turned ON when the amount of fuel in the fuel tank is more than 6.5 liters (1.72 US gal).

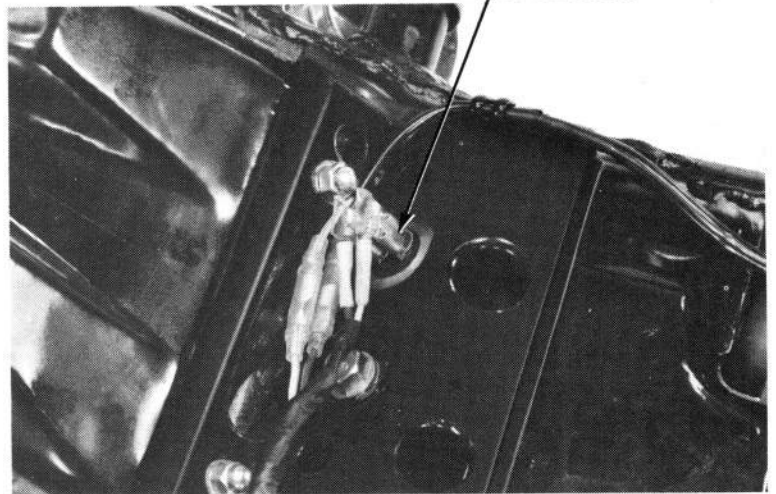
If the warning light goes on, check for a short circuit in the wire harness or coupler.

Replace the fuel reserve sensor if shorts are not found.



LOW FUEL WARNING LIGHT

FUEL RESERVE SENSOR

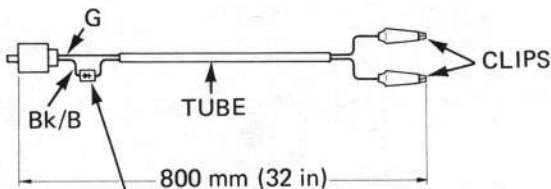


FUEL PUMP

WARNING

Do not allow flames or sparks near gasoline.

Fabricate the special test wire harness as shown and connect it between the battery and the fuel pump coupler.



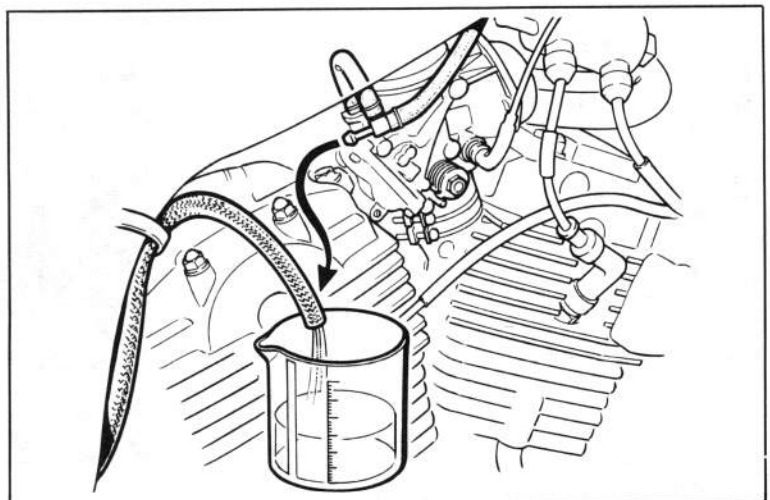
DIODE (SHINDENGEN SIR 20 OR EQUIVALENT)

Disconnect the fuel tube at the carburetor and hold a graduated beaker under the tube.

Turn the ignition switch on and let fuel flow into the beaker for 5 seconds, then turn the ignition switch off. Multiply the amount in the beaker by 12 to determine the fuel pump flow capacity per minute.

FUEL PUMP FLOW CAPACITY:

614 cc (22 oz) \pm 10%/minute

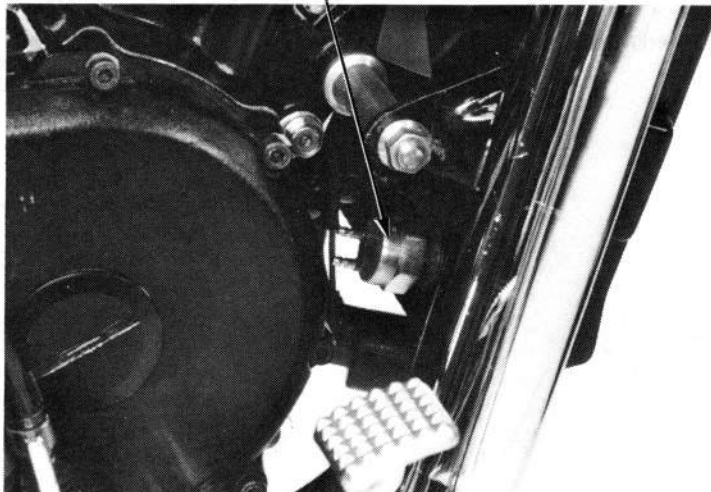


THERMOSTATIC SWITCH

The cooling fan motor is actuated by the thermostatic switch located in the left tank of the radiator.

Run the engine until coolant temperature reaches 80–102°C (176–216°F). The fan motor should start running. The fan motor should stop when the coolant temperature drops to 93–97°C (200–207°F).

THERMOSTATIC SWITCH

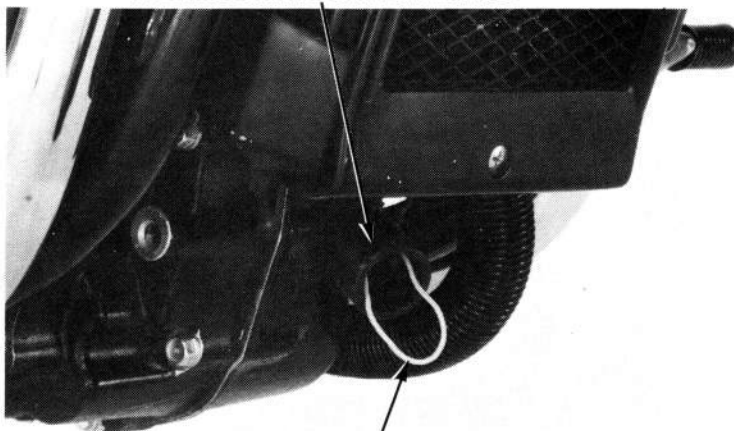


If the fan motor does not start, disconnect the black and green leads from the thermostatic switch and short them together with a jumper wire as shown.

Turn the ignition switch on. The cooling fan motor should start running. If it starts, replace the fan thermostatic switch and retest.

If it does not start, check for battery voltage from the black lead (positive) to the black/blue lead (negative) of the fan motor coupler. If there is no voltage, check for a blown or faulty fuse, loose terminals or connectors, or an open circuit.

THERMOSTATIC SWITCH LEADS

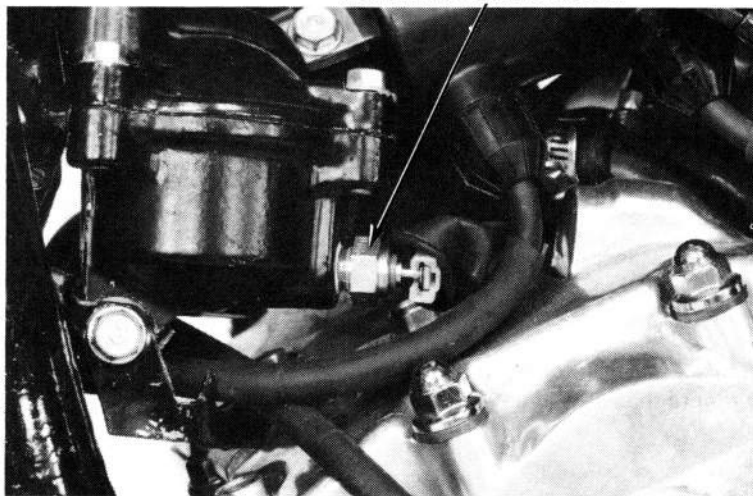


JUMPER WIRE

TEMPERATURE SENSOR

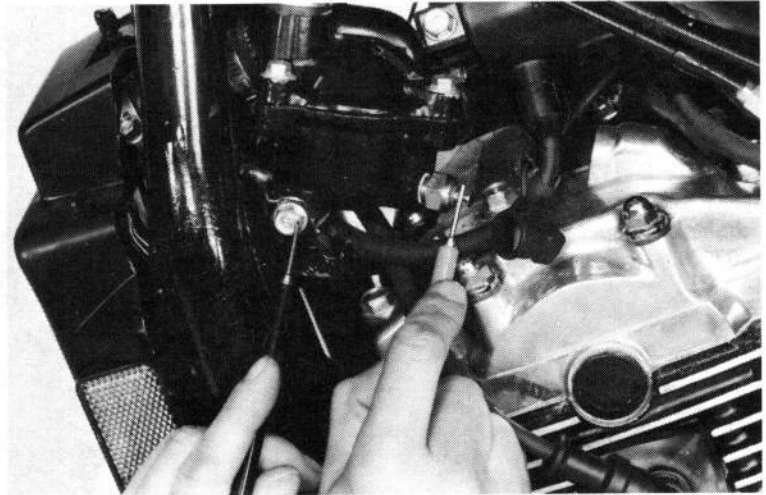
TEMPERATURE SENSOR

Disconnect the green/blue wire from the temperature sensor.

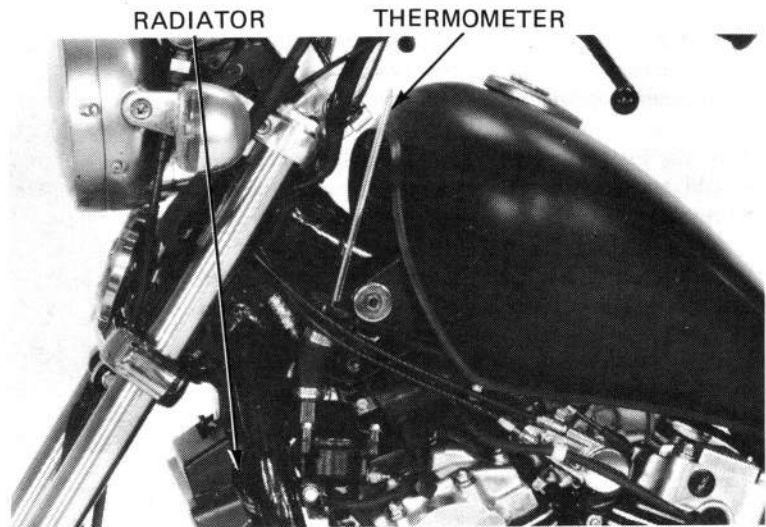


SWITCHES

With the engine cold, use an ohmmeter to measure resistance between the temperature sensor terminal and the engine.



Check the temperature of the coolant.



Run the engine and measure the change in resistance of the sensor with the engine at the operating temperatures in the chart.

Temperature	60°C (140°F)	85°C (185°F)	110°C (230°F)	120°C (248°F)
Resistance (Ohms)	104.0	43.9	20.3	16.1

Replace the sensor if it is out of specifications by more than 10% at any temperature listed.

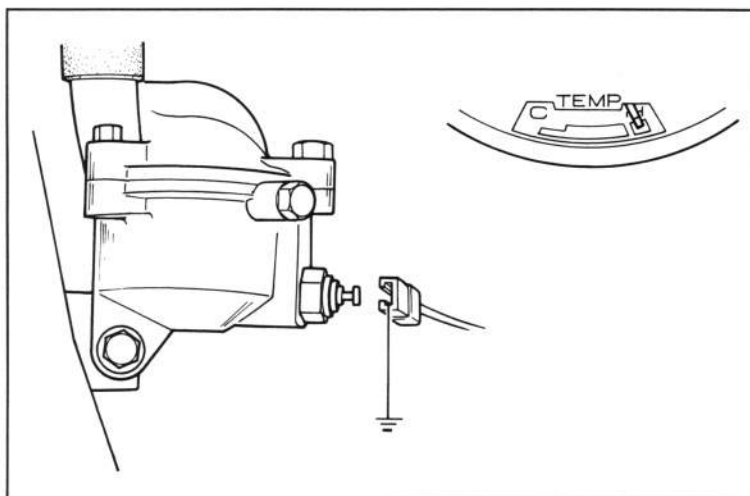
TEMPERATURE GAUGE

Disconnect the wire from the temperature sensor and short it to ground.

Turn the ignition switch to ON. The temperature gauge needle should move all the way to the right.

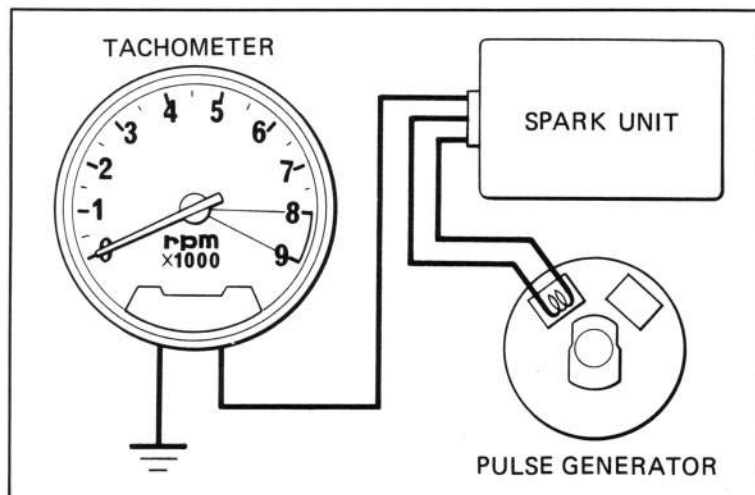
CAUTION

Do not leave the temperature sensor wire grounded for longer than a few seconds or the temperature gauge will be damaged.



TACHOMETER

If the tachometer does not indicate properly, check and repair the No. 1 cylinder ignition system.

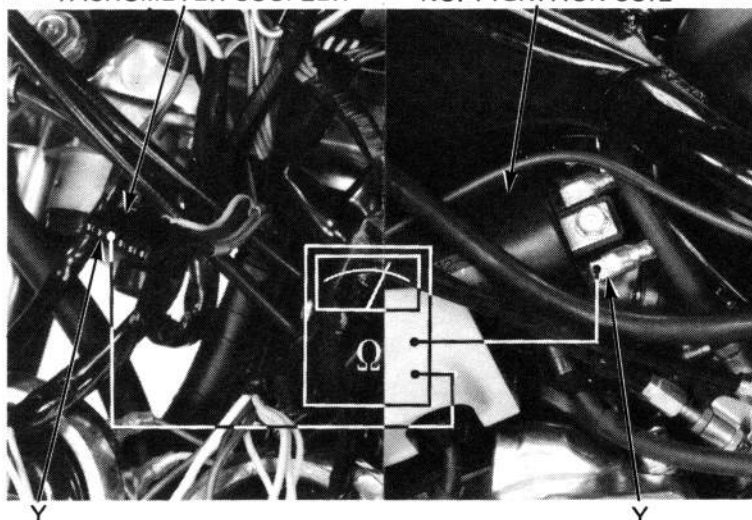


If the problem still appears, check continuity between the yellow wire terminal of the wire harness tachometer coupler and the yellow wire terminal of the No. 1 cylinder ignition coil and repair the circuit if necessary.

If there is continuity, replace the tachometer with a new one.

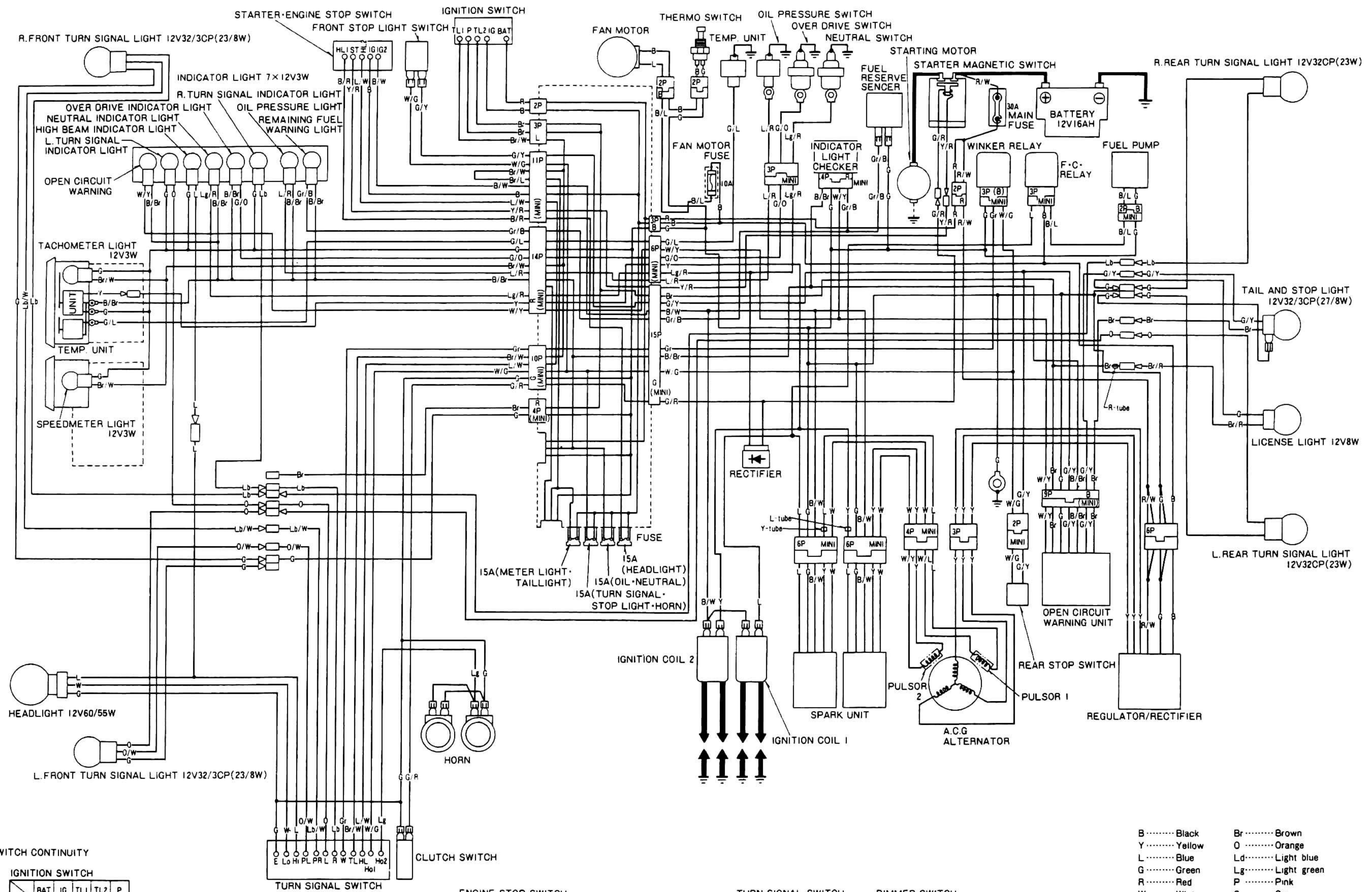
WIRE HARNESS
TACHOMETER COUPLER

NO. 1 IGNITION COIL



22. WIRING DIAGRAM

'83:



SWITCH CONTINUITY

IGNITION SWITCH

	BAT	IG	TL1	TL2	P
ON	○	○	○		
OFF					
P					○
LOCK					

ENGINE STOP SWITCH

	IG	IG2
OFF		
RUN	○	
OFF		

STARTER SWITCH

	IG	ST	HL1	HL2
FREE				○
PUSH	○			

TURN SIGNAL SWITCH

	W	R	L	TL1	PR	PL
R	○					
N						
L						

DIMMER SWITCH

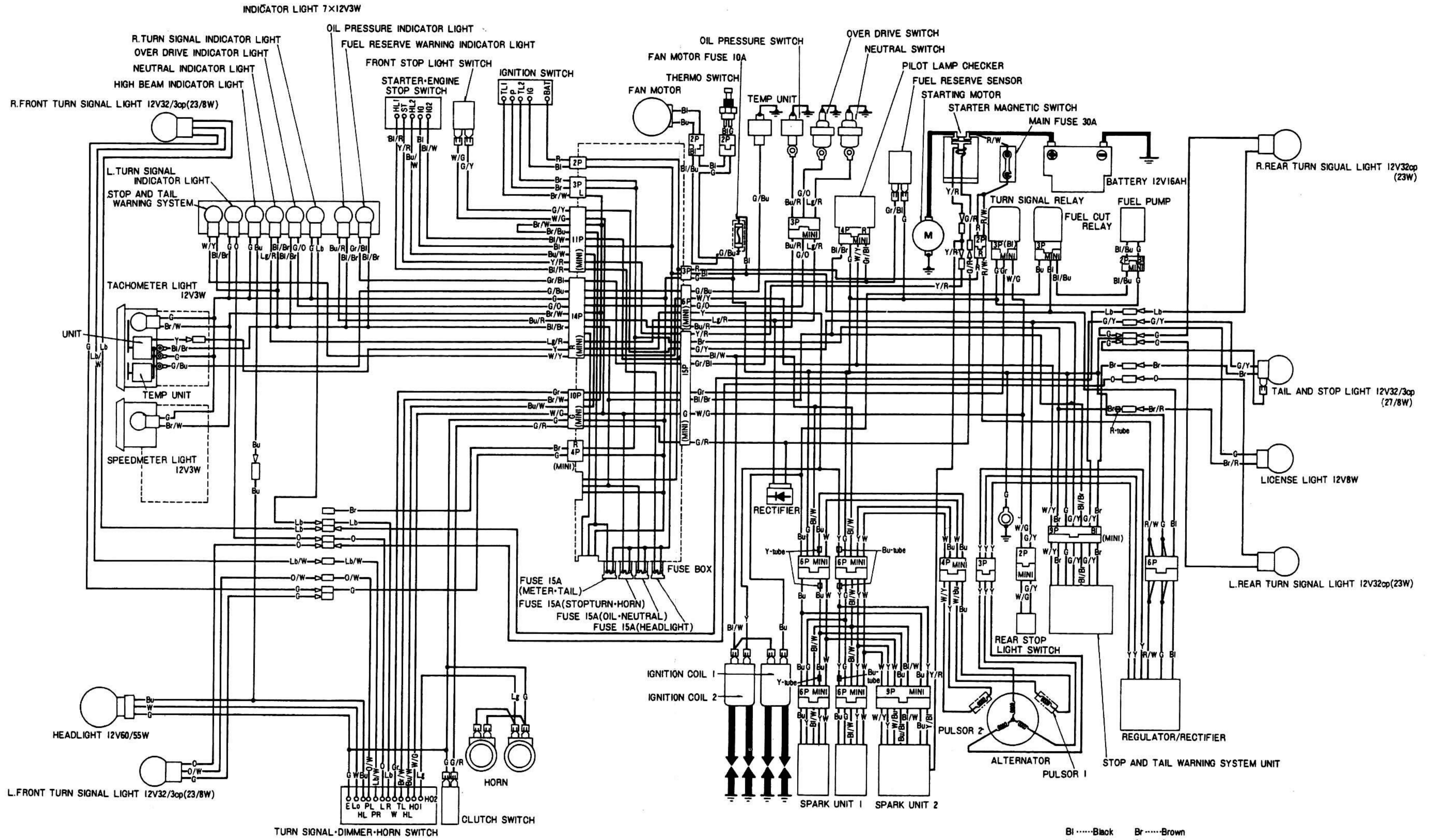
	HL	Lo	Hi
Lo	○		
(N)			
Hi			

HORN SWITCH

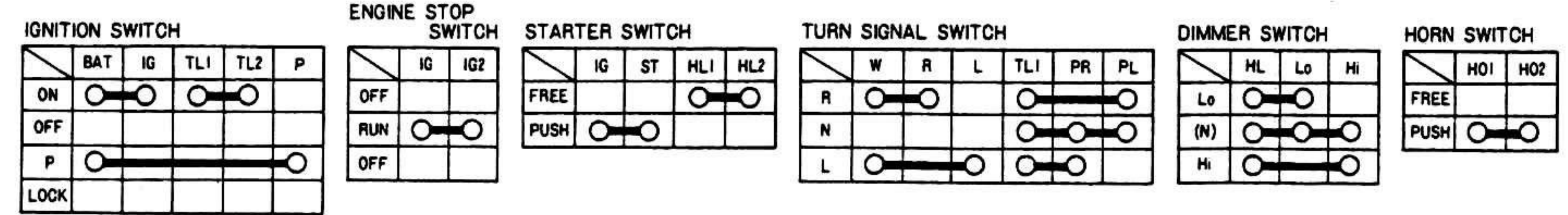
	Ho1	Ho2
FREE		
PUSH	○	

- B Black
- Y Yellow
- L Blue
- G Green
- P Red
- W White
- Br Brown
- O Orange
- Ld Light blue
- Lg Light green
- P Pink
- Gr Gray

'84:

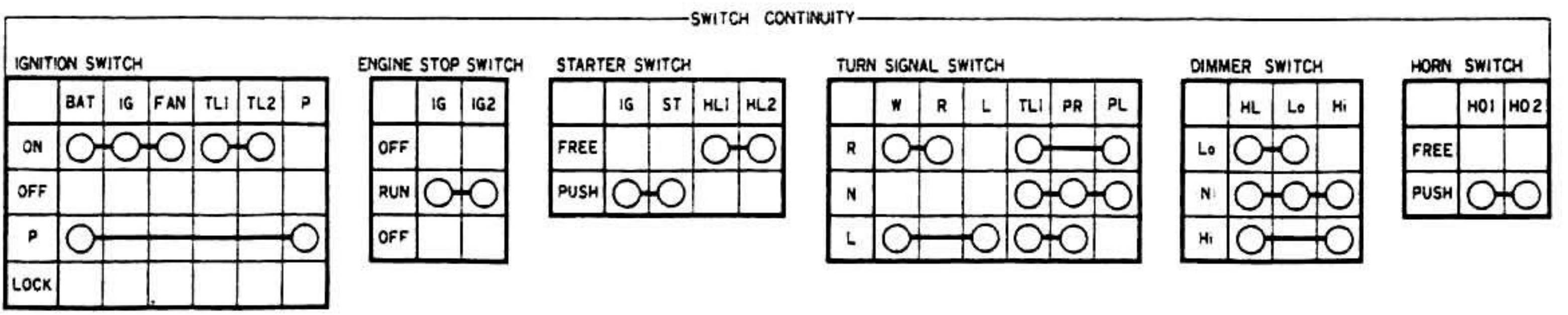
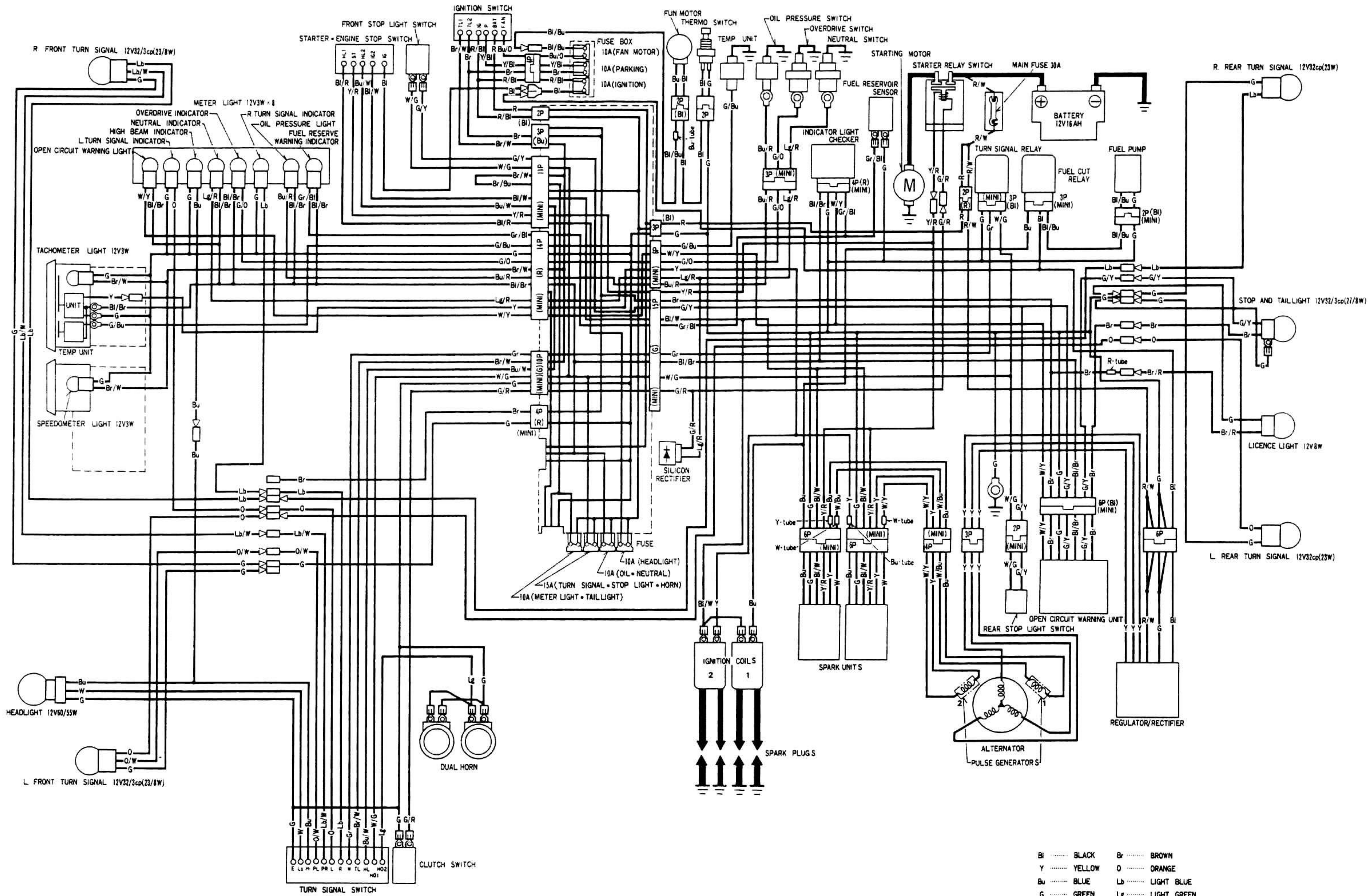


- BlBlack
- YYellow
- Bu.....Blue
- GGreen
- RRed
- WWhite
- BrBrown
- OOrange
- Lb.....Light Blue
- Lg.....Light Green
- PPink
- GrGrey



0030Z-ME9L-7700

After '84:



0030Z - ME9 - 7800

23. TECHNICAL FEATURES

THE HONDA V-TWIN ENGINE	23-2
OFF-SET DUAL-PIN CRANKSHAFT	23-3
HYDRAULIC VALVE ADJUSTER SYSTEM	23-4
3 VALVE/2 SPARK PLUGS	23-7
ONE-WAY CLUTCH SYSTEM	23-7

THE HONDA V-TWIN ENGINE

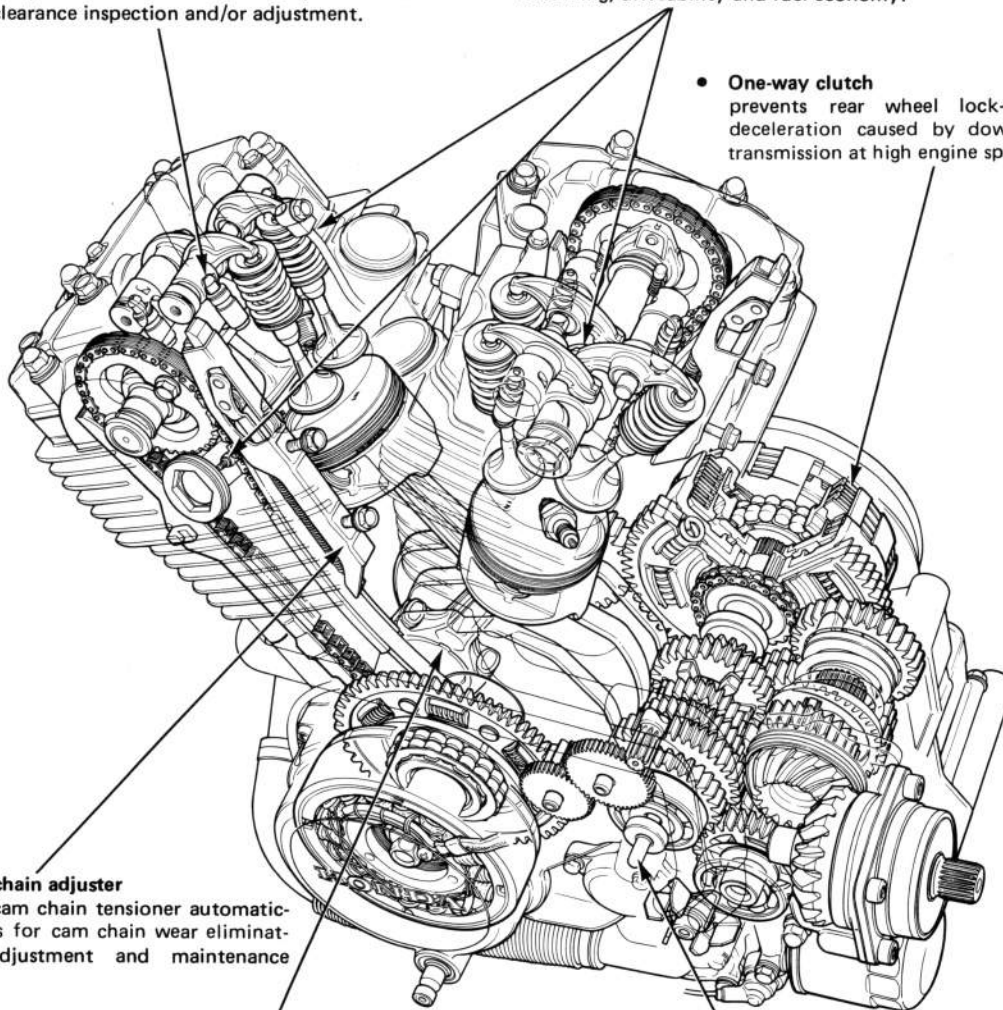
1983 shall be known as the year in motor history that Honda introduced their line of V-twin engines. Although the V-twin engine is not new to motocycling, Honda has refined the design more than any other manufacturer. With liquid cooling, hydraulic valve tappets, a one-way clutch that helps prevent rear wheel lock-up and an off-set crankshaft that is designed to virtually eliminate primary imbalance; Honda's V-twin engine can be considered a new design.

Characteristics

- **Hydraulic valve adjuster system**
are used for the first time in a Honda engine. They eliminate the need for periodic valve clearance inspection and/or adjustment.

- **3 valves/2 spark plugs**
Per cylinder provides highly efficient engine breathing, driveability and fuel economy.

- **One-way clutch**
prevents rear wheel lock-up during rapid deceleration caused by down shifting of the transmission at high engine speed.



- **Automatic cam chain adjuster**
The automatic cam chain tensioner automatically compensates for cam chain wear eliminating periodic adjustment and maintenance services.

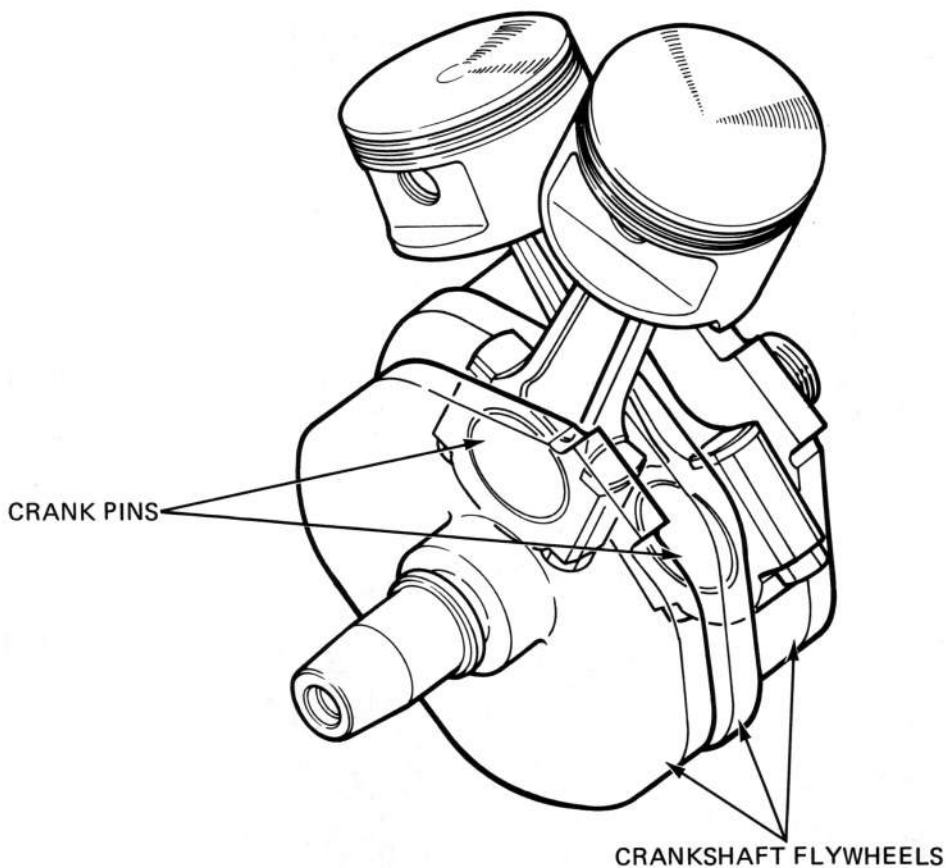
- **Off-set dual-pin crankshaft**
eliminates primary imbalance vibration.

- **Self-adjusted hydraulic clutch**
Hydraulically assisted, the clutch requires a lighter lever pull compared to cable operated motorcycle clutches. This system also provides a consistently smooth feeling when the clutch lever is pulled in and released. The hydraulic system automatically compensates for wear and the only maintenance check required is the hydraulic fluid reservoir level.

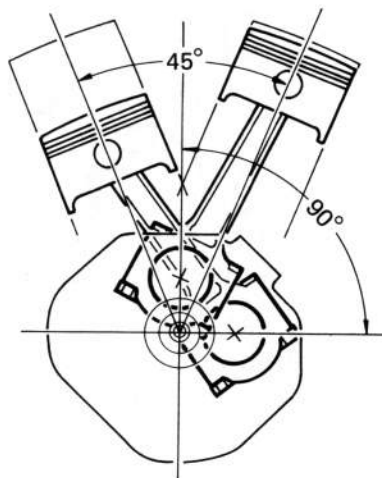
OFF-SET DUAL-PIN CRANKSHAFT

Unless its cylinders are 90° apart, the V-twin engine has an inherent primary imbalance. The imbalance or resulting vibration can be severe.

Honda engineers wanted the compactness of a narrow V-twin with its cylinders only 45° apart, but without the primary imbalance. They ruled out counter-balancers because they would not contribute to the goal of compactness and light weight. So the engineers decided to try off-setting the crankshaft pins. They successfully developed a mathematical formula to determine the amount of off-set needed for V-twin engines. The amount calculated for the VT750 just happens to be 90° . The off-set will be different for other sizes of Honda V-twins.



The front and rear crank pins are off-set 90° to each other. The connecting rods and pistons are inserted into the front and the rear cylinders which are 45° apart.



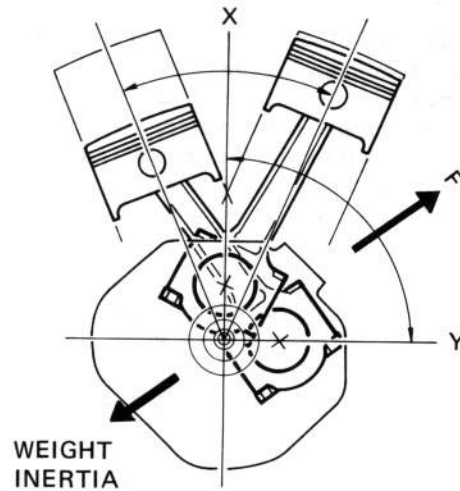
TECHNICAL FEATURES

The primary force of inertia on a single cylinder engine occurs in the direction of the cylinder.

This causes the vibration that some single cylinder engines are known for. When applied to the V-twin engine the following occurs;

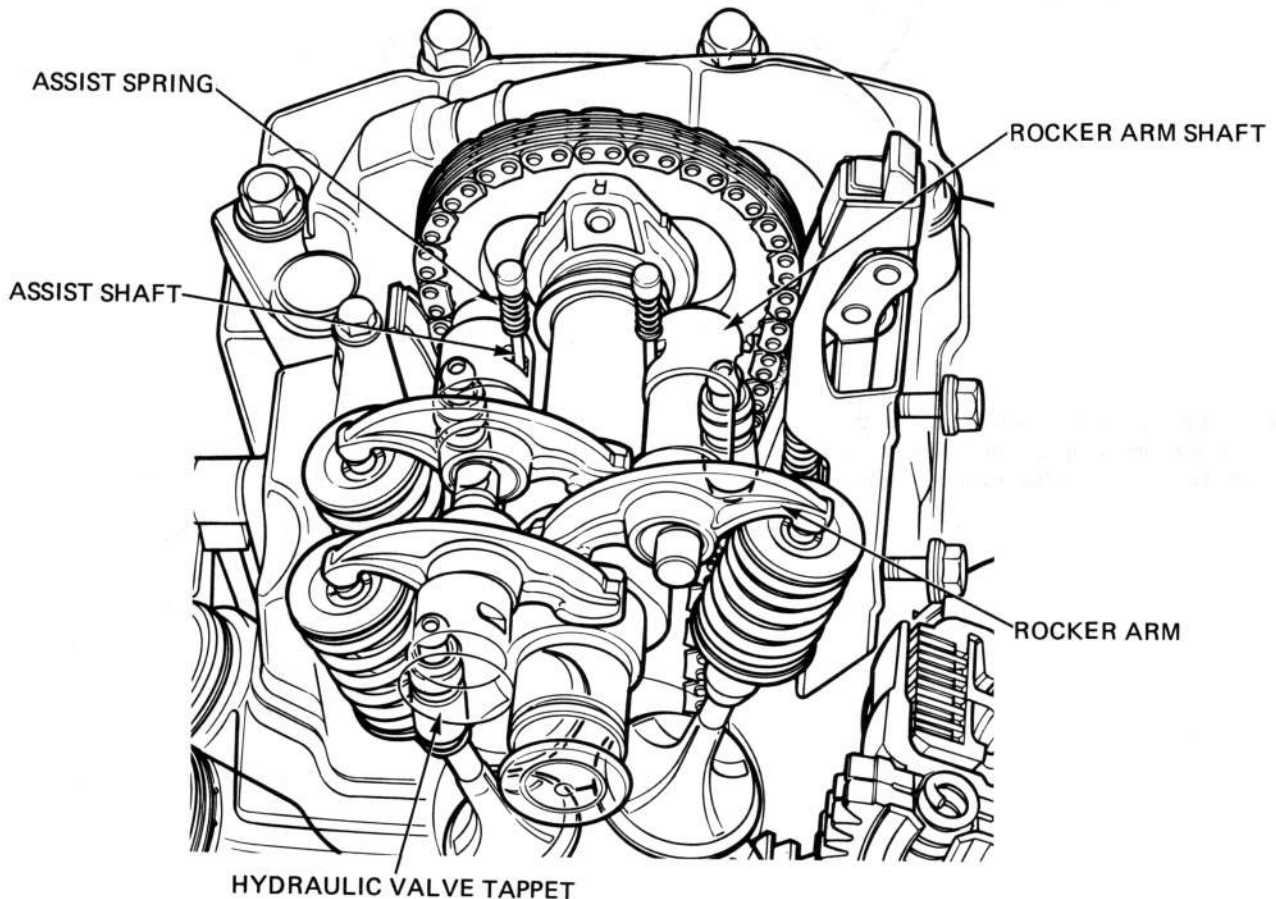
The primary force of inertia in directions X and Y combine to produce vector F. Vector F works in the direction between the front and rear crank pin centers.

To balance vector F, the crankshaft flywheels are precisely weighted in the opposite direction. The primary inertia produced by vector F and that of the flywheels oppose each other and cancel out overall primary vibration.



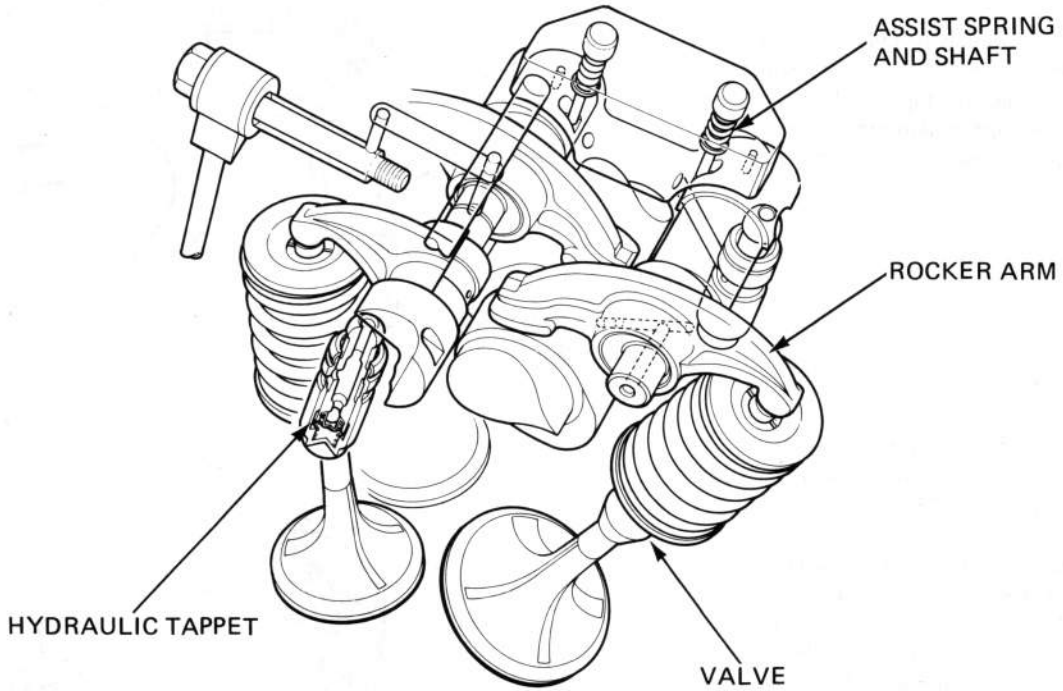
HYDRAULIC VALVE ADJUSTER SYSTEM

The engine is equipped with hydraulic valve tappets. This is the first time hydraulic tappets have been used in a Honda motorcycle engine. Hydraulic tappets do not require adjustment and help the engine to run quieter by keeping valve clearance at zero at all engine temperatures and engine speeds up to redline.

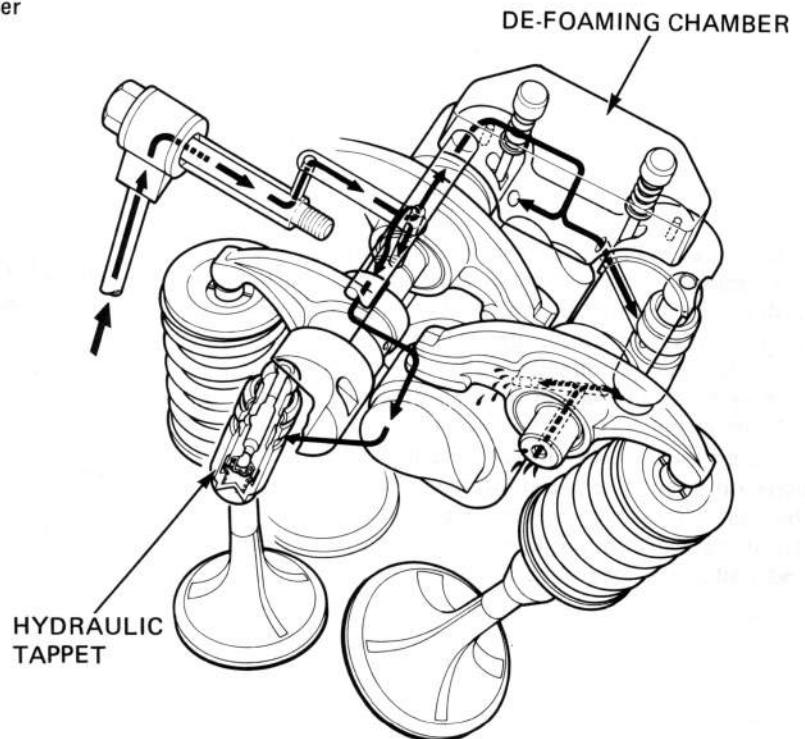


● **Construction**

A rocker arm is installed on an eccentric rocker arm shaft. An assist shaft and spring fit in a notch on top of the shaft. The hydraulic tappet fits in a notch in the bottom of the shaft. Together, they make the eccentric rocker arm shaft revolve to help maintain zero valve clearance.



The tappets are continuously supplied with air-bled oil from the de-foaming chamber in the cylinder head cover where oil pass through.

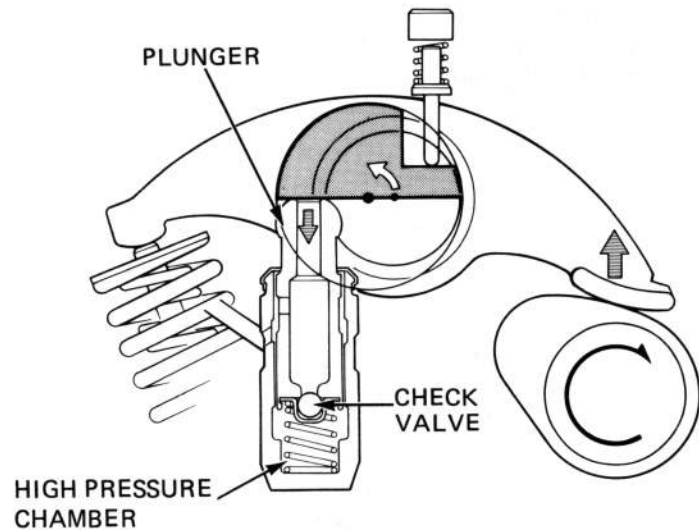


TECHNICAL FEATURES

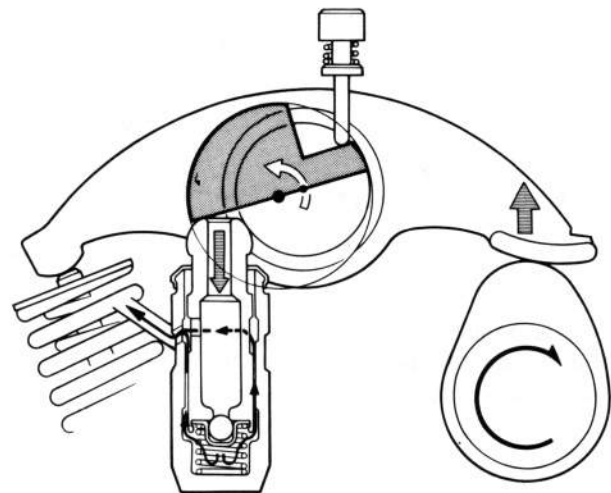
● Operation

When the camshaft lobe is not lifting the rocker arm, the tappet plunger is at rest. In this position its oil inlet hole aligns with the tappet body oil inlet hole. Oil enters the tappet reservoir through these holes.

As the camshaft turns and lifts the rocker arm to open the valve, the eccentric rocker arm shaft revolves. The shaft pushes the tappet plunger down and oil pressure in the tappet high pressure chamber increases causing the check valve to close.

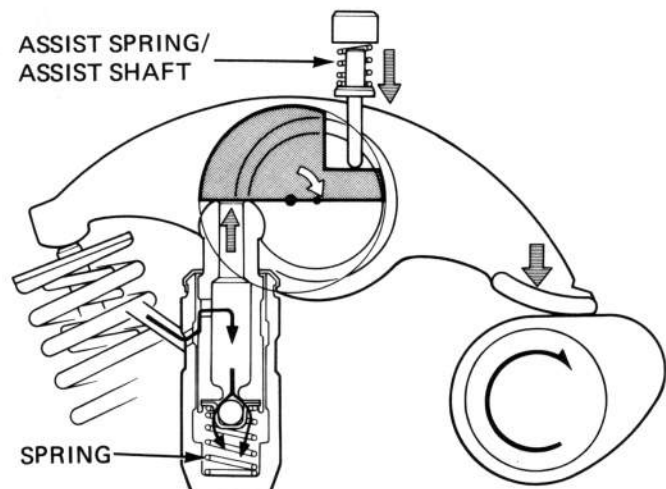


As the cam lobe nears maximum lift, oil pressure in the high pressure chamber increases rapidly (because the check valve is closed). The high oil pressure keeps the check valve against the plunger. At the same time the rocker arm is pushing against the tappet plunger. This causes a very small amount of oil to leak out of the high pressure chamber between the plunger and body. This allows the plunger to absorb the shock from the effects of the cam lobe reaching maximum lift.



After the cam lobe passes maximum lift, the engine valve springs force the engine valve to close and to push against the rocker arm which follows the cam profile. This also causes the eccentric rocker arm shaft to change direction allowing the tappet plunger to be pushed up by the spring in the high pressure chamber. Oil pressure decreases as a result, the check valve leaves its seat and the plunger and body oil inlet holes realign allowing oil to re-enter the reservoir and high pressure chamber.

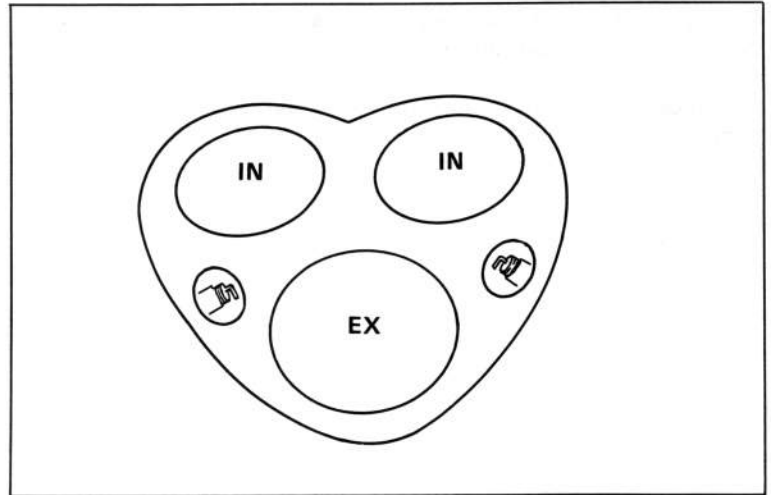
All of the above actions keep valve clearance at zero under all normal operating conditions.



3 VALVES/2 SPARK PLUGS

To have the appeal of a V-twin engine and also provide good low-speed driveability, plenty of engine torque and high fuel economy, a 3-valve/2 spark plug head design is used. There are 2 inlet valves of 31 mm diameter each and 1 exhaust valve with a diameter of 41 mm.

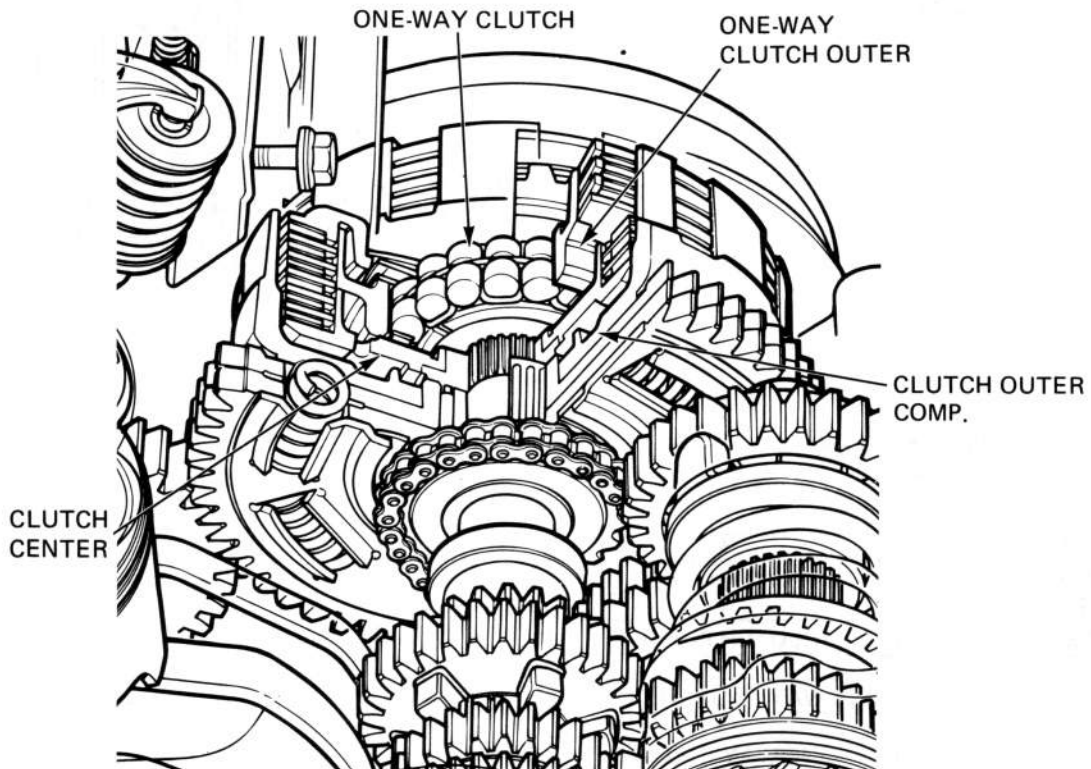
The spark plugs are located to provide the most rapid and complete combustion process: one on the left and one on the right side of the combustion chamber. This 2 spark plug design gives 30% better fuel economy and better driveability at low speeds when compared to a head with only one spark plug.



ONE-WAY CLUTCH SYSTEM

First time on a production motorcycle, this system has been proven on the race circuits of Europe in Hondas Gran Prix road racers.

Rear wheel lock up caused by rapid downshifting and the resulting high engine compression braking force; is prevented by the slippage of the one-way clutch.



● **Construction**

The one-way clutch is installed with the clutch center inside the clutch outer. Half the clutch plates are controlled by the one-way clutch. The one-way clutch allows those plates to slip when backloading force during deceleration might normally cause the rear wheel to lock-up.

Except for the one-way clutch, the primary driven gear/clutch assembly is a conventional design.

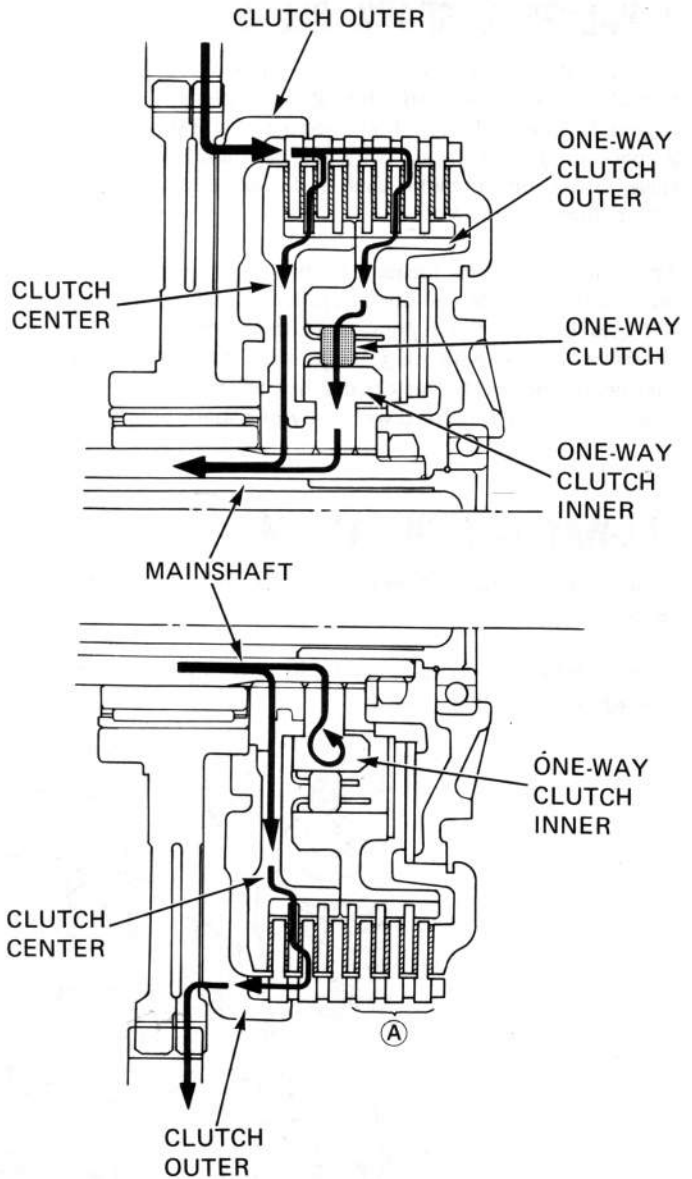
TECHNICAL FEATURES

● Operation

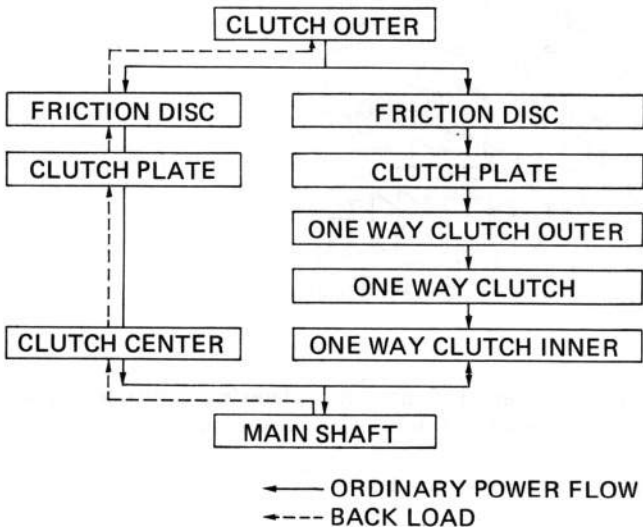
During acceleration, cruising and deceleration, power is transmitted through the clutch in the normal manner:

Clutch outer → friction disc → plate → one-way clutch → mainshaft.

When there is a backloading on the clutch caused by the rear wheel nearing lock-up, the one-way clutch (A) will slip just enough to prevent the wheel from locking: without losing the benefit of maximum engine compression braking.



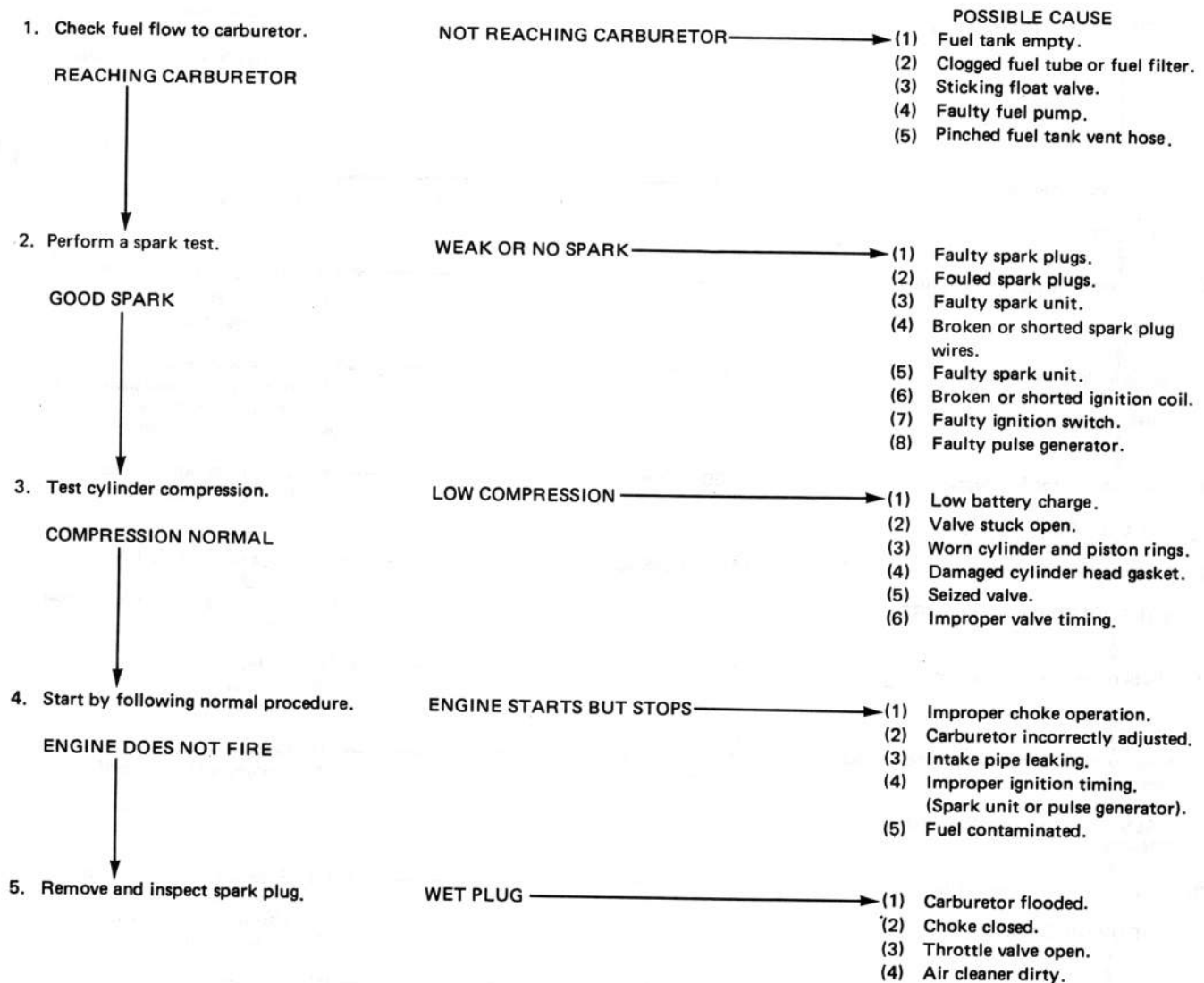
● POWER FLOW DIAGRAM



24. TROUBLESHOOTING

ENGINE DOES NOT START OR IS HARD TO START	24-1
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ENGINE DOES NOT START OR IS HARD TO START



TROUBLESHOOTING

ENGINE LACKS POWER

1. Raise wheels off ground and spin by hand.	WHEELS DO NOT SPIN FREELY	→	POSSIBLE CAUSE
WHEEL SPINS FREELY			(1) Brake dragging. (2) Worn or damaged wheel bearings. (3) Wheel bearing needs lubrication. (4) Final gear bearing damaged.
2. Check tire pressure.	PRESSURE LOW	→	(1) Punctured tire. (2) Faulty tire valve.
PRESSURE NORMAL			
3. Accelerate rapidly from low to second.	ENGINE SPEED CHANGED WHEN CLUTCH IS RELEASED	→	(1) Clutch slipping. (2) Worn clutch disc/plate. (3) Warped clutch disc/plate.
ENGINE SPEED LOWERED WHEN CLUTCH IS RELEASED			
4. Accelerate lightly.	ENGINE SPEED DOES NOT INCREASE	→	(1) Carburetor choke closed. (2) Clogged air cleaner. (3) Restricted fuel flow. (4) Clogged muffler. (5) Pinched fuel tank vent hose.
ENGINE SPEED INCREASES			
5. Check ignition timing.	INCORRECT	→	(1) Faulty spark unit. (2) Faulty pulse generator.
CORRECT			
6. Check hydraulic tappet conditions.	INCORRECT	→	(1) Clogged tappet oil holes. (2) Worn valve seat. (3) Damaged tappet.
CORRECT			
7. Test cylinder compression.	TOO LOW	→	(1) Valve stuck open. (2) Worn cylinder and piston rings. (3) Leaking head gasket. (4) Improper valve timing.
NORMAL			
8. Check carburetor for clogging.	CLOGGED	→	● Carburetor not serviced frequently enough.
NOT CLOGGED			
9. Remove spark plug.	FOULED OR DISCOLORED	→	(1) Plugs not serviced frequently enough. (2) Spark plug with incorrect heat range.
NOT FOULED OR DISCOLORED			
10. Check oil level and condition.	INCORRECT	→	(1) Oil level too high. (2) Oil level too low. (3) Contaminated oil.
CORRECT			
11. Remove cylinder head cover and inspect lubrication.	VALVE TRAIN NOT LUBRICATED PROPERLY	→	(1) Clogged oil passage. (2) Clogged oil control orifice.
VALVE TRAIN LUBRICATED PROPERLY			
12. Check for engine overheating.	OVERHEATING	→	(1) Excessive carbon build-up in combustion chamber. (2) Use of poor quality fuel. (3) Clutch slipping.
NOT OVERHEATING			
13. Accelerate or run at high speed.	ENGINE KNOCKS	→	(1) Worn piston and cylinder. (2) Wrong type of fuel. (3) Excessive carbon build-up in combustion chamber. (4) Ignition timing too advanced (Faulty spark unit).
ENGINE DOES NOT KNOCK			

POOR PERFORMANCE AT LOW AND IDLE SPEEDS

- | | | |
|-----------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Check ignition timing and hydraulic tappet condition.</p> <p>CORRECT</p> <p>↓</p> | <p>INCORRECT →</p> | <p>POSSIBLE CAUSE</p> <p>(1) Tappet holes clogged.
(2) Tappet damaged.
(3) Improper ignition timing.
(Faulty spark unit).</p> |
| <p>2. Check carburetor pilot screw adjustment.</p> <p>CORRECT</p> <p>↓</p> | <p>INCORRECT →</p> | <p>See Fuel System Section.</p> |
| <p>3. Check for leaking intake pipe.</p> <p>NO LEAK</p> <p>↓</p> | <p>LEAKING →</p> | <p>(1) Deteriorated insulator O-ring.
(2) Loose carburetor.</p> |
| <p>4. Perform spark test.</p> <p>GOOD SPARK</p> | <p>WEAK OR INTERMITTENT SPARK →</p> | <p>(1) Faulty, carbon or wet fouled spark plug.
(2) Faulty spark unit.
(3) Faulty ignition coil.</p> |

POOR PERFORMANCE AT HIGH SPEED

- | | | |
|-----------------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Check ignition timing.</p> <p>CORRECT</p> <p>↓</p> | <p>INCORRECT →</p> | <p>(1) Faulty spark unit.
(2) Faulty pulse generator.</p> |
| <p>2. Disconnect fuel tube at carburetor.</p> <p>FUEL FLOWS FREELY</p> <p>↓</p> | <p>FUEL FLOW RESTRICTED →</p> | <p>(1) Clogged fuel line.
(2) Clogged fuel tank breather hole.
(3) Clogged fuel valve.
(4) Faulty fuel pump.</p> |
| <p>3. Remove carburetor and check for clogged jets.</p> <p>NO CLOGGED JETS</p> <p>↓</p> | <p>CLOGGED →</p> | <p>Clean.</p> |
| <p>4. Check valve timing.</p> <p>CORRECT</p> <p>↓</p> | <p>INCORRECT →</p> | <p>Cam sprocket not installed properly.</p> |
| <p>5. Check valve spring tension.</p> <p>NOT WEAKENED</p> | <p>WEAK →</p> | <p>Faulty spring.</p> |

POOR HANDLING → Check tire pressure

- | | |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. If steering is heavy. →</p> | <p>(1) Steering stem adjustment nut too tight.
(2) Damaged steering head bearings.</p> |
| <p>2. If either wheel is wobbling. →</p> | <p>(1) Excessive wheel bearing play.
(2) Bent rim.
(3) Improperly installed wheel hub.
(4) Swingarm pivot bearing excessively worn.
(5) Bent frame.
(6) Swingarm pivot adjusting bolt too tight.</p> |
| <p>3. If the motorcycle pulls to one side. →</p> | <p>(1) Faulty shock absorber.
(2) Front and rear wheels not aligned.
(3) Bent front fork.
(4) Bent swingarm.</p> |

TROUBLESHOOTING

HYDRAULIC TAPPET

NOISEY TAPPET

1. Check for low oil level.
Ride for five minutes with the engine speed over 3,000 rpm.
Check oil level and condition.

CORRECT

2. Check oil pressure.

NOT CLOGGED

3. Remove cylinder head cover and oil hole caps and check lubrication.

CORRECT

4. Remove hydraulic tappet and check.

CORRECT

INCORRECT → (1) Contaminated oil.
(2) Contaminated oil filter.

TOO LOW → (1) Clogged oil passage.
(2) Clogged oil control orifice.
(3) Oil level too low.

NOT LUBRICATED PROPERLY → (1) Clogged oil pipe.
(2) Faulty O-ring.
(3) Faulty oil hole cap.

INCORRECT → (1) Plunger sticking.
(2) Faulty tappet.
(3) Faulty one way valve.

ENGINE LACKS POWER

1. Turn the engine for a few seconds with the starter.

ENGINE DOES NOT START

2. Check oil pressure.

CORRECT

3. Remove tappet and check

ENGINE STARTS → (1) Bubbly engine oil with over rev up.

TOO LOW → (1) Oil level too low.
(2) Clogged oil passage.
(3) Contaminated oil.
(4) Contaminated oil filter.

INCORRECT → (1) Faulty tappet (Replace).