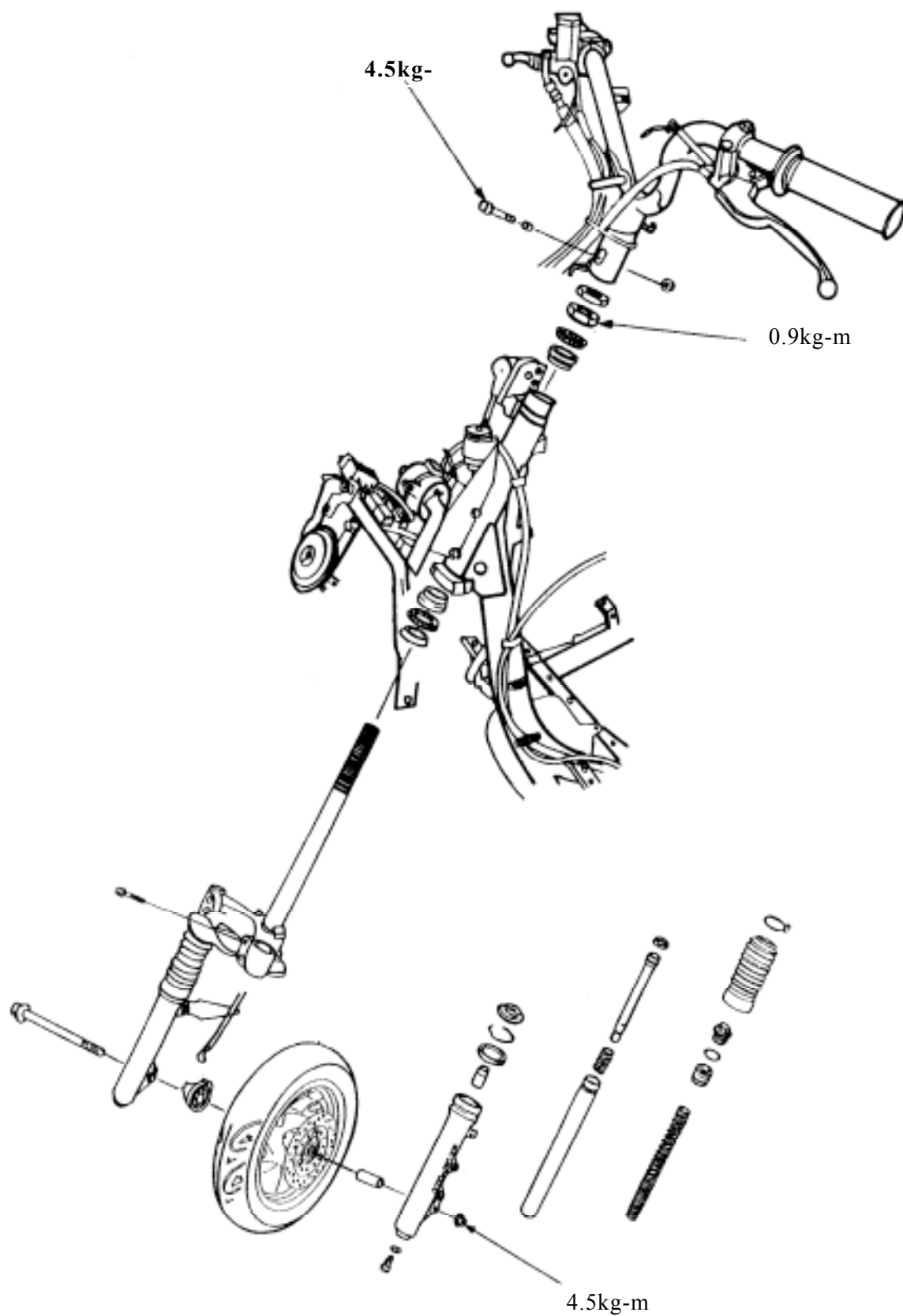


## 12. FRONT WHEEL/Front BRAKE/ FRONT SUSPENSION

---



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

SERVICE INFORMATION.....	12-1	HYDRAULIC BRAKE .....	12-10
TROUBLESHOOTING .....	12-2	FRONT SHOCK ABSORBER .....	12-16
FRONT WHEEL.....	12-3	STEERING HANDLEBAR .....	12-19
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HYDRAULIC BRAKE DRAWING .....	12-9		

### SERVICE INFORMATION

#### GENERAL INSTRUCTIONS

- Remove the motorcycle frame covers before removing the front wheel. Jack the motorcycle front wheel off the ground and be careful to prevent the motorcycle from falling down.
- During servicing, keep oil or grease off the brake drum and brake linings.
- Contaminated brake disk or brake pads reduce stopping power. Clean the contaminated brake disk with high-performance brake degreaser and replace the brake pads.
- Do not use brake fluid for cleaning.
- Bleed air from the brake system if the brake system is removed or the brake is soft.
- Do not allow any foreign matters to enter the brake system when filling it with brake fluid.
- Brake fluid will damage painted surfaces and plastic parts. When servicing the brake system, use shop towels to cover and protect rubber, plastic parts and coated surfaces. Wipe off any spilled brake fluid with a clean shop towel.
- Inspect the brake system before riding.

#### SPECIFICATIONS

Item		Standard (mm)	Service Limit (mm)
Axle shaft runout		□	0.2
Front wheel rim runout	Radial	□	2.0
	Axial	□	2.0
Front brake drum I.D.		110	111
Front brake lining thickness		4.0	2.0
Front shock absorber spring free length		259	251
Brake disk thickness		3.5_ 3.8	3.0
Brake disk runout		□	0.30
Brake master cylinder I.D.		12.700_ 12.743	12.75
Brake master cylinder piston O.D.		12.657_ 12.684	12.64
Brake caliper piston O.D.		30.148_ 30.198	30.140
Brake caliper cylinder I.D.		30.230_ 30.280	30.29

#### TORQUE VALUES

Steering stem bolt	4.0_	5.0kg-m	Brake caliper bleed valve	0.6kg-m
Steering stem lock nut	8.0_	12.0kg-m	Brake fluid tube bolt	2.5_ 3.5kg-m
Steering top cone race	0.5_	1.3kg-m	Brake pad pin bolt	1.5_ 2.0kg-m
Front shock absorber bolt	2.0_	2.5kg-m	brake caliper bolt	2.9_ 3.5kg-m
Front axle nut	6.0kg-m		Brake master cylinder bolt	1.0_ 1.4kg-m

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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### SPECIAL TOOLS

Lock nut wrench  
Lock nut wrench  
Outer driver, 28x30mm  
Rear shock absorber attachment  
Shock absorber compressor  
Ball race remover  
Pliers (close)

Driver handle A  
Outer driver, 37x40mm  
Pilot, 10mm  
Bearing remover  
Bearing remover head, 10mm  
Damper compressor

### TROUBLESHOOTING

#### Hard steering (heavy)

- Excessively tightened steering stem top cone race
- Broken steering balls
- Insufficient tire pressure

#### Steers to one side or does not track straight

- Uneven front shock absorbers
- Bent front fork
- Bent front axle or uneven tire

#### Poor brake performance

- Incorrectly adjusted brake
- Worn brake linings
- Contaminated brake lining surface
- Worn brake shoes at cam contacting area
- Worn brake drum
- Poorly connected brake arm

#### Poor brake performance (Disk Brake)

- Air in brake system
- Deteriorated brake fluid
- Contaminated brake pads and brake disk
- Worn brake pads
- Worn brake master cylinder piston oil seal
- Clogged brake fluid line
- Deformed brake disk
- Unevenly worn brake caliper

#### Front wheel wobbling

- Bent rim
- Excessive wheel bearing play
- Bent spoke plate
- Faulty tire
- Improperly tightened axle nut

#### Soft front shock absorber

- Weak shock springs
- Insufficient damper oil

#### Front shock absorber noise

- Slider bending
- Loose fork fasteners
- Lack of lubrication

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

---

### FRONT WHEEL

#### REMOVAL

Jack the motorcycle front wheel off the ground.  
Remove the speedometer cable set screw and disconnect the speedometer cable.  
Remove the front brake cable.



Screw Front Brake Cable

Remove the front axle nut and pull out the axle.  
Remove the front wheel.  
Remove the front brake panel.



Axle Shaft

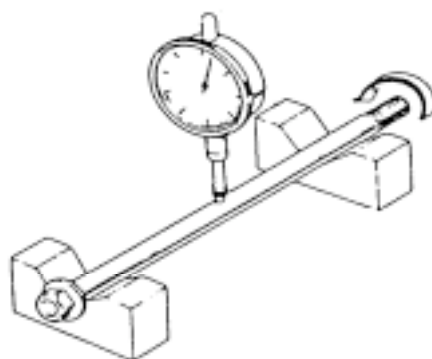
Axle Nut

#### INSPECTION

##### AXLE RUNOUT

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

**Service Limit:** 0.2mm replace if over



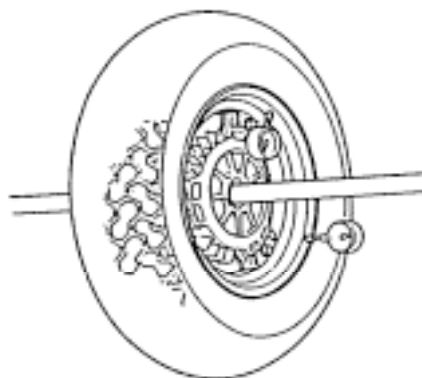
##### WHEEL RIM

Check the wheel rim runout.

##### **Service Limits:**

**Radial:** 2.0mm replace if over

**Axial:** 2.0mm replace if over



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

### FRONT WHEEL BEARING

Remove the side collar and dust seal.

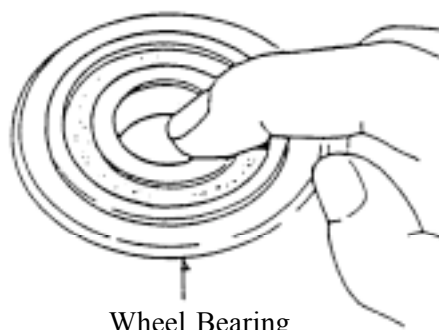
Side Collar



Dust Seal

Turn the inner race of each bearing with your finger to see if they turn smoothly and quietly. Also check if the outer race fits tightly in the hub.

Replace the bearings if the races do not turn smoothly, quietly, or if they fit loosely in the hub.



Wheel Bearing

### BEARING REPLACEMENT

Remove the front wheel bearings and distance collar.

**Special**

Bearing Remover

Bearing Remover Head, 12mm

Pack all bearing cavities with grease.

Drive in the left bearing.

Install the distance collar.

Drive in the right bearing.

\*

- Do not allow the bearings to tilt while driving them in.
- Drive in the bearing squarely with the sealed end facing out.

**Special**

Outer driver, 32x35mm

Driver handle A

Pilot, 12mm

Bearing Remover



Bearing Remover Head

Driver Handle A



Pilot

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

---

Apply grease to a new dust seal lip and install the dust seal.  
Install the side collar.

Side Collar



Dust Seal

### INSTALLATION

Apply grease to the brake panel dust seal lip.  
Apply grease to the speedometer gear engaging and sliding parts.  
Install the brake panel by aligning the speedometer retaining pawls with the hub cutouts.

- \* If not aligned, the retaining pawl will be deformed when the axle nut is tightened. After installing the axle, turn the wheel to make sure that the speedometer drive shaft rotates freely.

Pawls



Cutouts

Apply a thin coat of grease to the axle shaft.  
Install the front wheel by aligning the brake panel groove with the front fork tab.  
Insert the axle shaft.  
Connect the speedometer cable and secure it with the screw.



Axle Shaft

Install and tighten the axle nut.

**Torque:** 6.0kg-m

Install the front brake cable and adjust the front brake lever free play. (⇒3-8)



Axle Nut



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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### FRONT BRAKE

Remove the front wheel. (⇒ 12-3)  
Remove the front brake panel.

#### INSPECTION

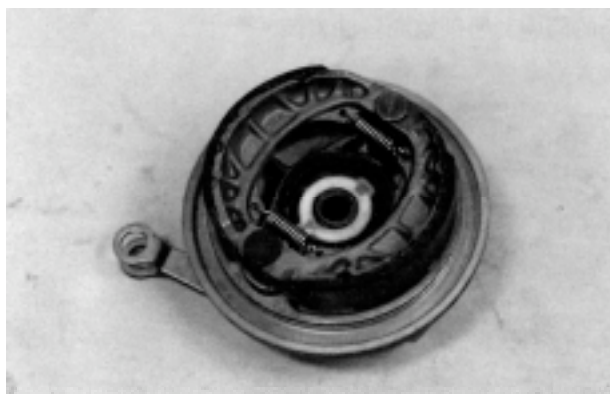
Measure the brake drum I.D.

**Service Limit:** 111mm replace if over

Remove the brake shoes and springs, and  
replace the brake shoes.

\* Keep oil or grease off the brake linings.

Inspect the brake panel dust seal for damage  
and replace if necessary.

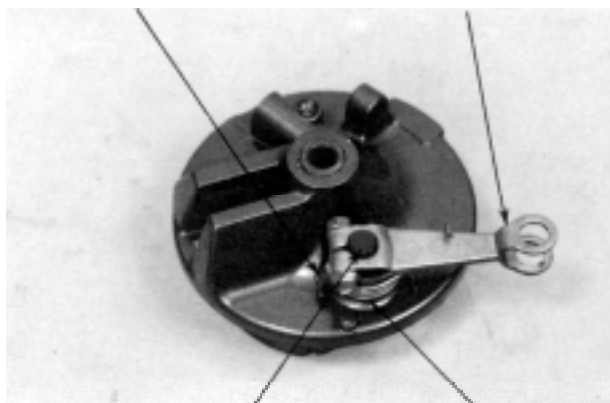


### BRAKE PANEL DISASSEMBLY

Remove the brake shoes.  
Remove the brake arm and return spring.  
Remove the wear indicator plate and felt seal.  
Remove the brake cam.  
Remove the speedometer gear and brake panel collar.

Wear Indicator Plate

Brake Arm

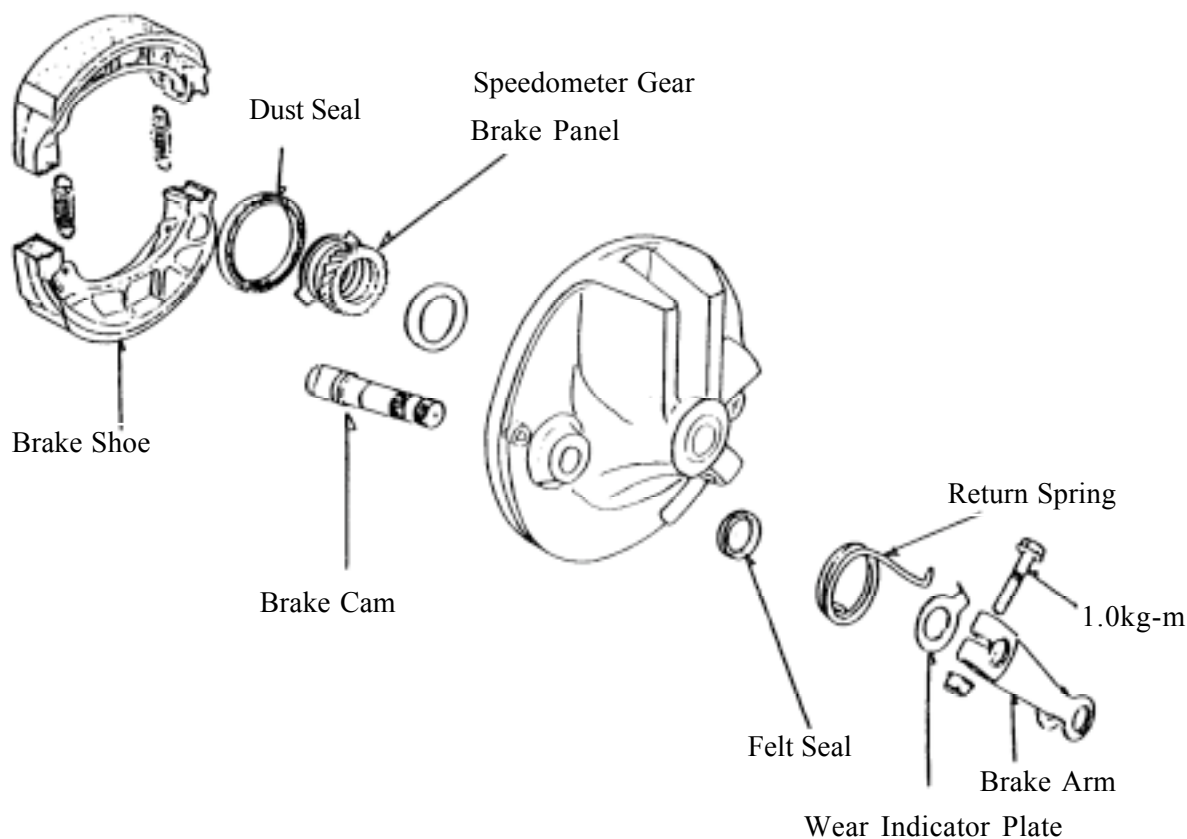


Brake Cam

Return Spring

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

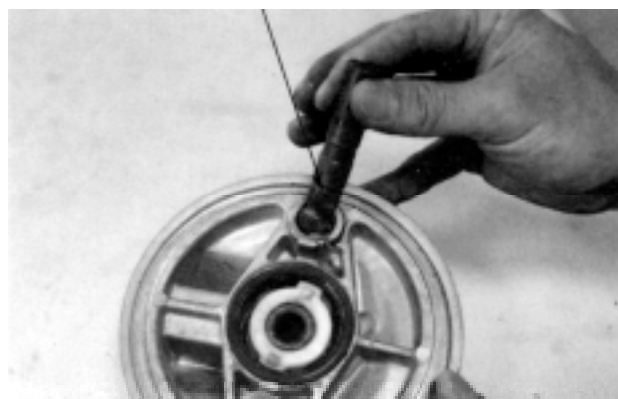
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### ASSEMBLY

Apply grease to the anchor pin and brake cam.

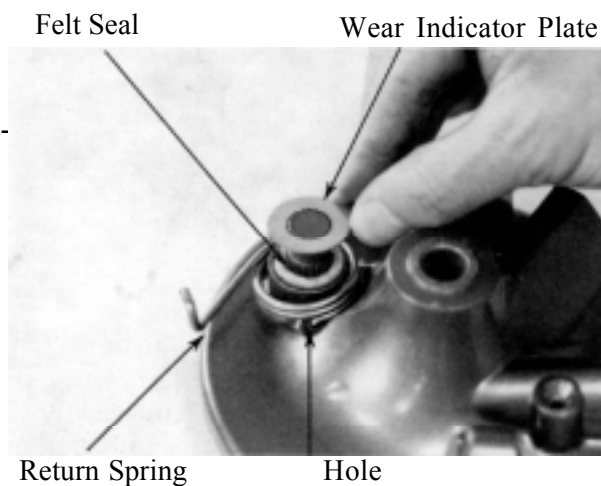
Install the brake cam.



Install the return spring by aligning the spring hook end with the hole in the brake panel.

Apply engine oil to the felt seal and install it to the brake panel.

Install the wear indicator plate on the brake cam by aligning the tooth on the plate with the groove on the brake cam.





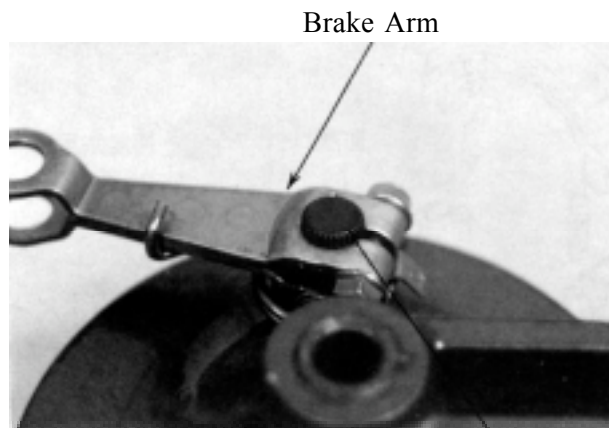
## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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Install the brake arm on the brake cam by aligning the punch marks on the brake arm and brake cam.

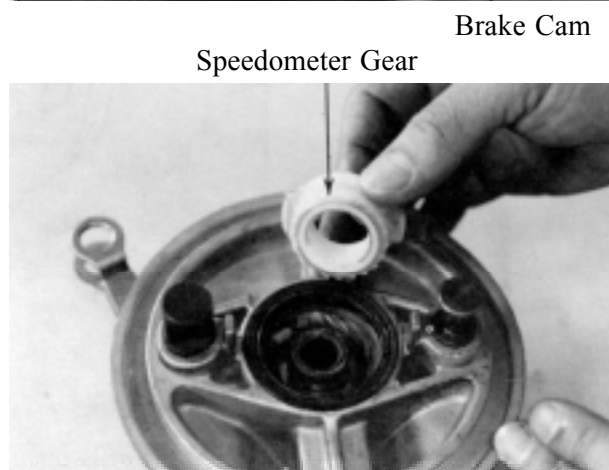
Install and tighten the brake arm bolt.

**Torque:** 1.0kg-m



Apply grease to the brake panel collar and install it into the brake panel.

Apply grease to the speedometer gear and then install it into the brake panel.



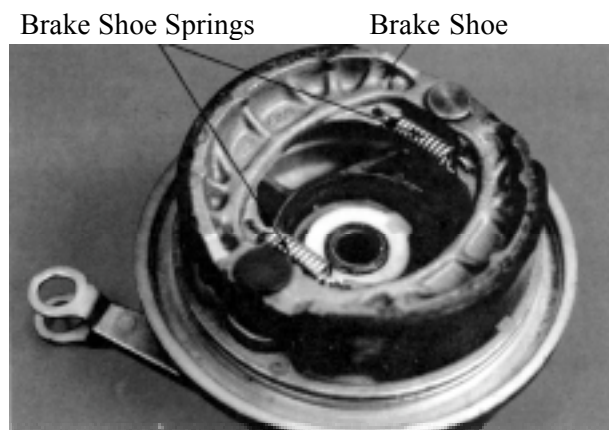
Install the brake shoe springs to the brake shoes and then install the brake shoes into the brake panel.

### INSTALLATION

Install the brake panel onto the front wheel.  
(⇒ 12-5)

Install the front wheel. (⇒ 12-5)

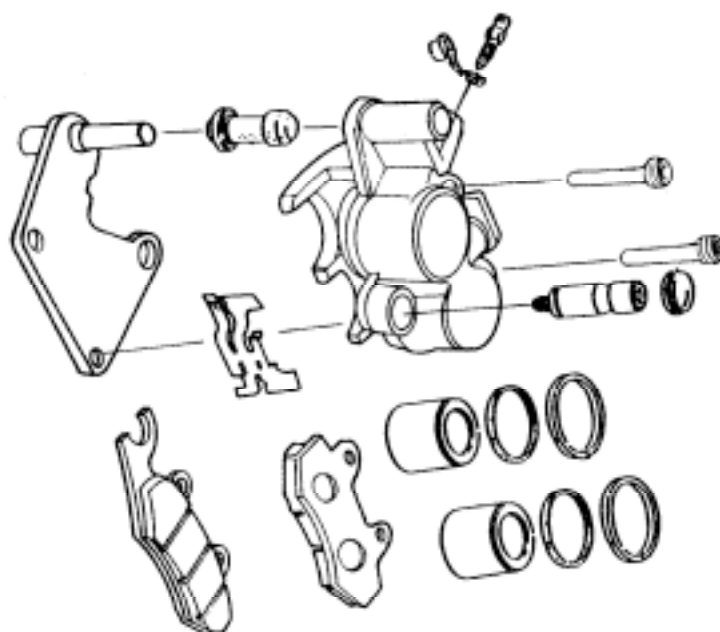
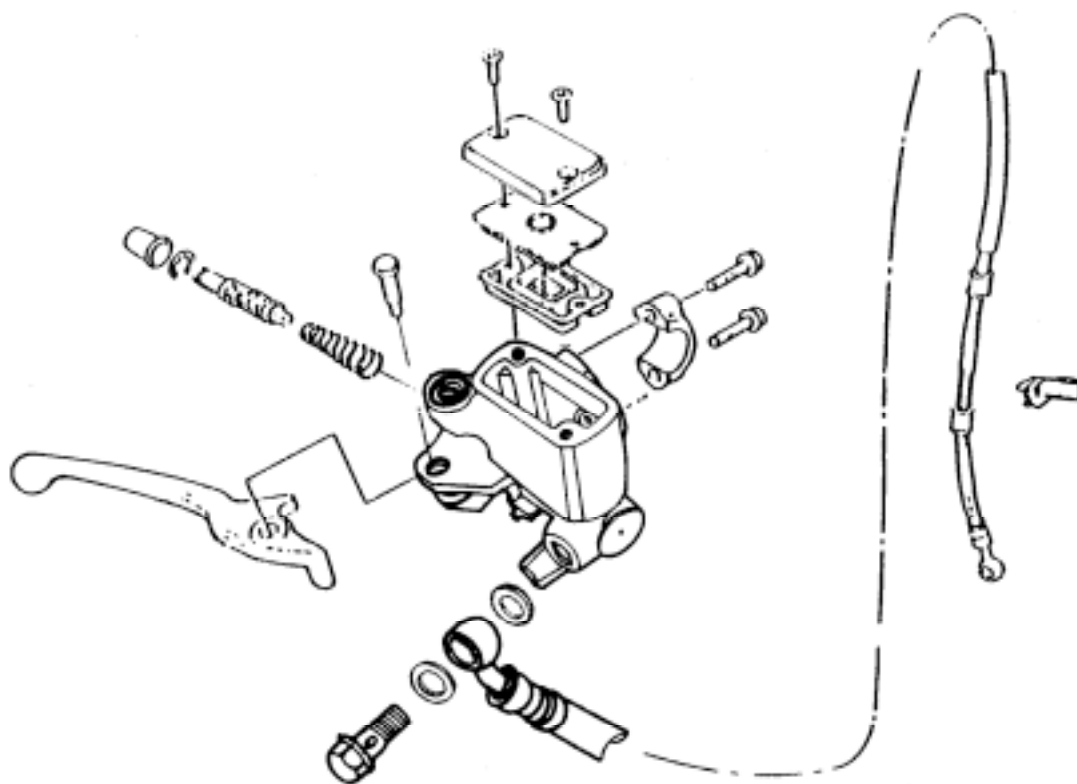
Adjust the front brake lever free play.



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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### HYDRAULIC BRAKE DRAWING



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

### HYDRAULIC BRAKE (FRONT BRAKE)

#### BRAKE FLUID REPLACEMENT/AIR BLEEDING

Check the brake fluid level on level ground.

\*

- When operating the brake lever, the brake reservoir cap must be tightened securely to avoid splash of brake fluid.
- When servicing the brake system, use shop towels to cover plastic parts and coated surfaces to avoid damage caused by splash of brake fluid.

#### BRAKE FLUID BLEEDING

In order to avoid spilling brake fluid, connect a transparent hose to the bleed valve.



##### Warning

Spilled brake fluid on brake pads or brake disk reduces stopping power. Clean the brake pads and brake disk with a high-performance brake degreaser.

Fully apply the brake lever and then loosen the brake caliper bleed valve to drain the brake fluid until there is no air bubbles in the brake fluid. Then, tighten the bleed valve. Repeat these steps until the brake system is free of air.

#### BRAKE FLUID REFILLING

Add DOT-3 brake fluid to the brake reservoir.

\*

- When bleeding, be careful not to allow air in the brake reservoir flowing into the brake system.
- When using a brake bleeder, follow the manufacturer's instructions.
- Never use dirty or unspecified brake fluid or mix different brake fluids because it will damage the brake system.

Make sure to bleed air from the brake system.

#### BRAKE PAD/DISK REPLACEMENT

\*

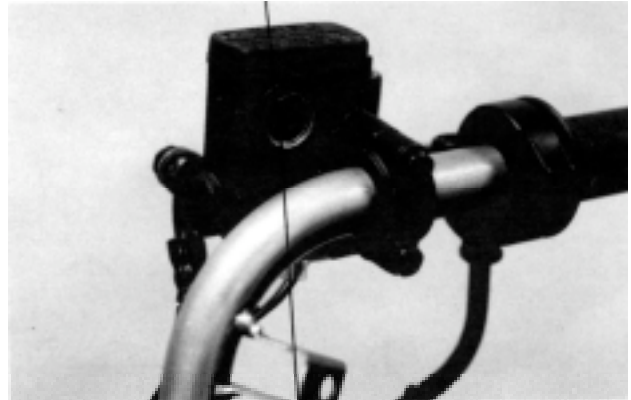
The brake pads must be replaced as a set to ensure the balance of the brake disk.

Remove the two bolts attaching the brake caliper.

Remove the brake caliper.

Remove the brake pad pin to remove the brake pads.

Upper Limit



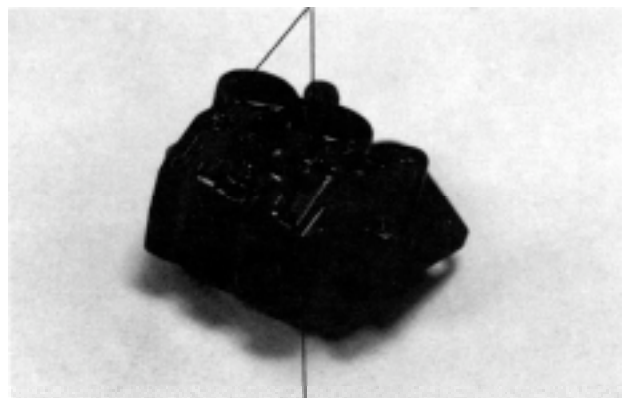
Lower Limit

Bleed Valve



Front Brake Caliper

Brake Pad Pins



Front Brake Caliper

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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Install the brake pads in the reverse order of removal.

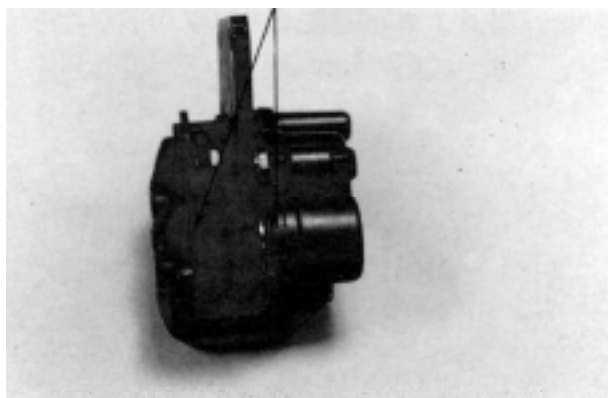
Tighten the brake pad pin bolt.

**Torque:** 1.5\_ 2.0kg-m

**\***

Keep grease or oil off the brake pads to avoid brake failure.

Brake Pads



### BRAKE DISK

Measure the brake disk thickness.

**Service Limit:** 3.0mm

Measure the brake disk runout.

**Service Limit:** 0.3mm



### BRAKE MASTER CYLINDER

#### REMOVAL

First drain the brake fluid from the hydraulic brake system.

**\***

- When servicing the brake system, use shop towels to cover rubber and plastic parts and coated surfaces to avoid being contaminated by brake fluid.
- When removing the brake fluid tube bolt, be sure to plug the tube end to avoid brake fluid leakage.

Master Cylinder

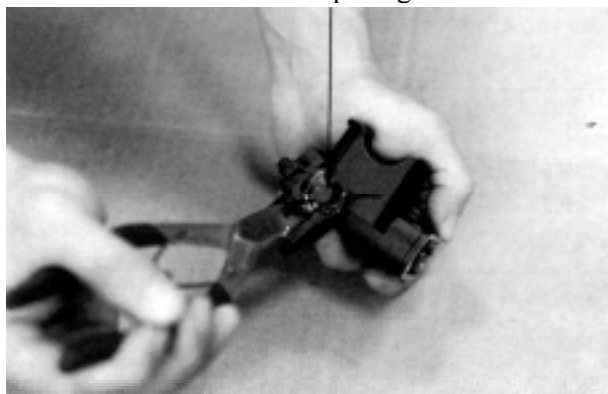
Bolts



### DISASSEMBLY

Remove the piston rubber cover and snap ring from the brake master cylinder.

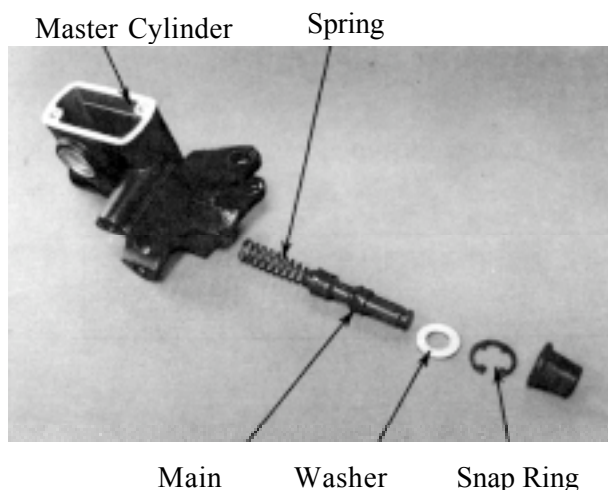
Snap Ring





## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

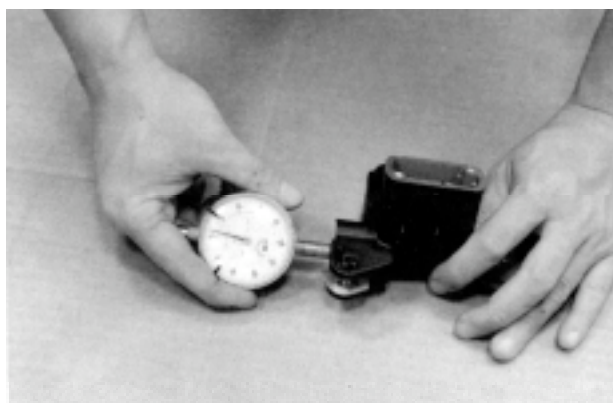
Remove the washer, main piston and spring from the brake master cylinder.  
Clean the inside of the master cylinder and brake reservoir with brake fluid.



### INSPECTION

Measure the brake master cylinder I.D.  
Inspect the master cylinder for scratches or cracks.

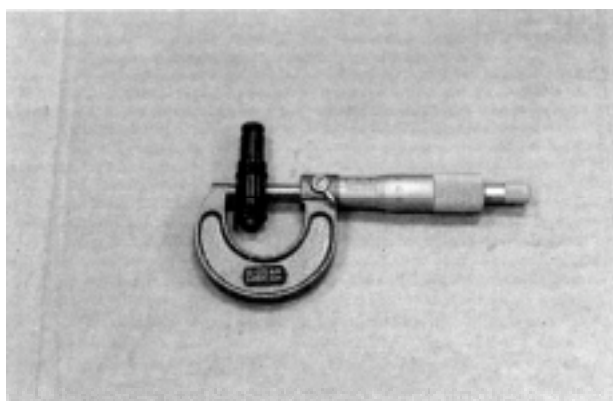
**Service Limit:** 12.75mm



Measure the brake master cylinder piston O.D.

**Service Limit:** 12.6mm

Before assembly, inspect the 1st and 2nd rubber cups for wear or damage.



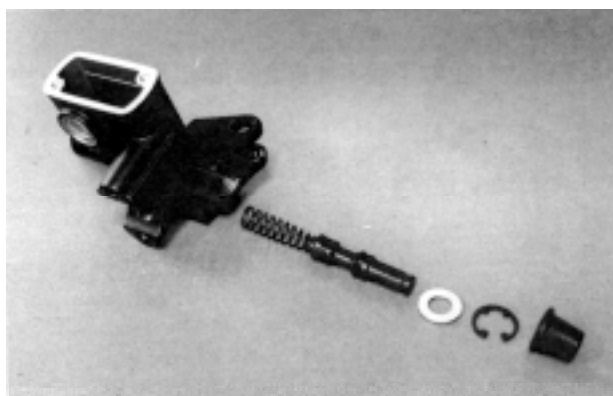
### ASSEMBLY

Before assembly, apply brake fluid to all removed parts.  
Install the spring together with the 1st rubber cup.

\*

- During assembly, the main piston and spring must be installed as a unit without exchange.
- When assembling the piston, soak the cups in brake fluid for a while.
- Install the cups with the cup lips facing the correct direction.

Install the main piston, spring and snap ring.  
Install the rubber cover.  
Install the brake lever.



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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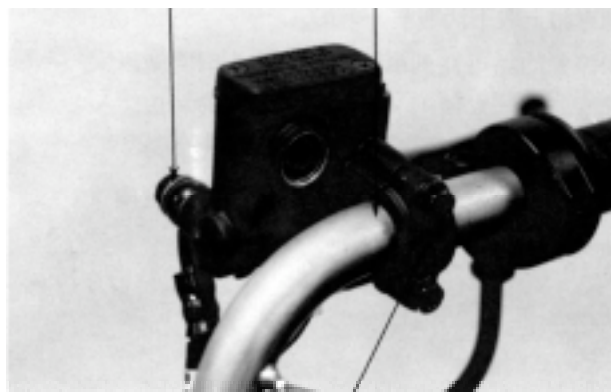
Place the brake master cylinder on the handlebar and install the holder with the “up” mark facing up. Also align the punch mark with the holder joint seam.

First tighten the upper bolt and then tighten the lower bolt.

**Torque:** 1.0\_ 1.4kg-m

Fluid Tube Bolt

Punch Mark



“Up” Mark

Install the brake fluid tube with the attaching bolt and two sealing washers.

Install the handlebar covers. (⇒2-4)

Connect the front and rear stop switch wire connectors.

Fill the brake reservoir with recommended brake fluid to the upper limit and bleed air according to the method stated in page 12-10.

### BRAKE CALIPER (FRONT)

#### REMOVAL

Remove the brake caliper and brake pad springs. (⇒12-11)

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

\*

Do not spill brake fluid on any coated surfaces.

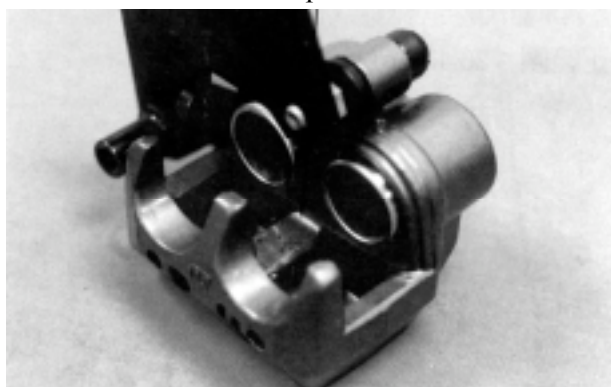


Bolt

Brake Caliper Seat

#### DISASSEMBLY

Remove the brake caliper seat from the brake caliper.



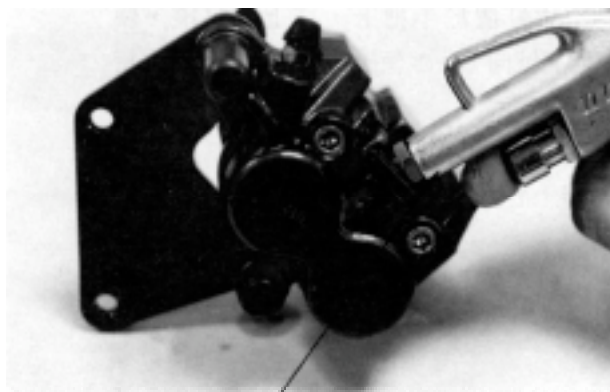


## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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Remove the pistons from the brake caliper.  
If necessary, use compressed air to squeeze out the pistons through the brake fluid inlet opening and place a shop towel under the caliper to avoid contamination caused by the removed pistons.

Check each piston cylinder for scratches or wear and replace if necessary.



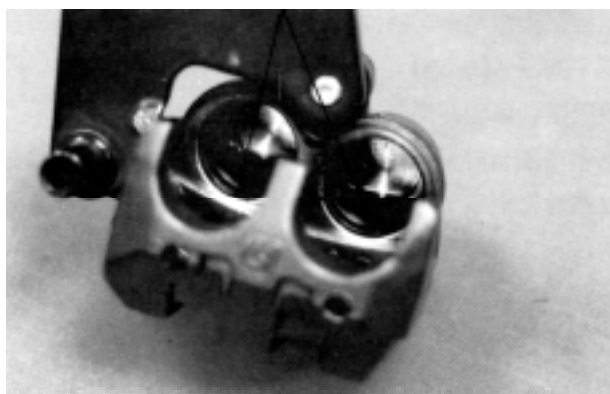
Compressed Air  
Piston Oil Seals

Push the piston oil seals outward to remove them.

Clean each oil seal groove with brake fluid.

\*

Be careful not to damage the piston surface.



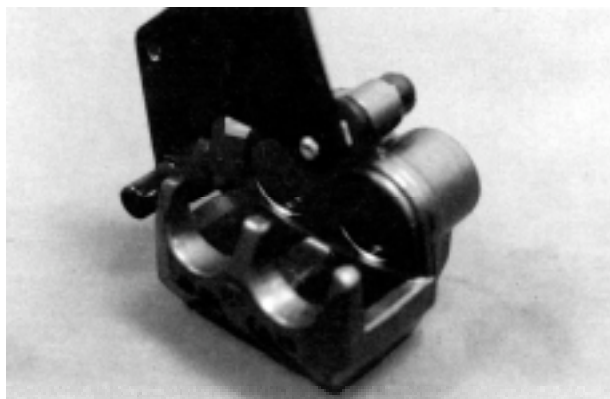
Check each piston for scratches or wear.  
Measure each piston O.D. with a micrometer gauge.

**Service Limit:** 26.90mm



Check each caliper cylinder for scratches or wear and measure the cylinder bore.

**Service Limit:** 25.45mm



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

---

### ASSEMBLY

Clean all removed parts.

Apply silicon grease to the pistons and oil seals. Lubricate the brake caliper cylinder inside wall with brake fluid.

Install the brake caliper piston with grooved side facing out.

**\***

Install the piston with its outer end protruding 3\_ 5mm beyond the brake caliper cylinder.

Wipe off excessive brake fluid with a clean shop towel. Apply silicon grease to the brake caliper seat pin and caliper inside. Install the brake caliper seat.

### INSTALLATION

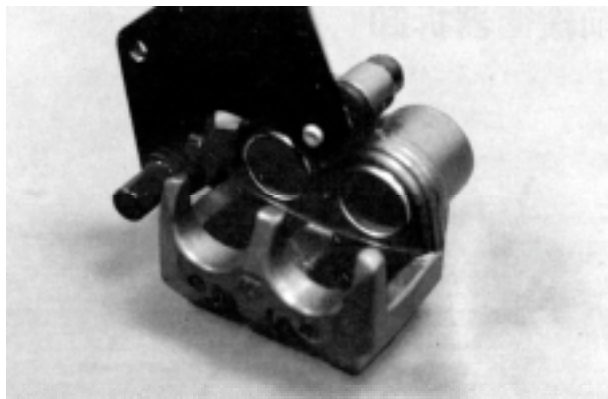
Install the brake caliper and tighten the two bolts.

**Torque:** 2.9\_ 3.5kg-m

Connect the brake fluid tube to the brake caliper and tighten the fluid tube bolt.

**Torque:** 2.5\_ 3.5kg-m

Fill the brake reservoir with recommended brake fluid and bleed air from the brake system. (⇒12-10)



Fluid Tube Bolt



Fluid Tube Bolt

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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### FRONT SHOCK ABSORBER

#### REMOVAL

Remove the front cover. (⇒2-4)

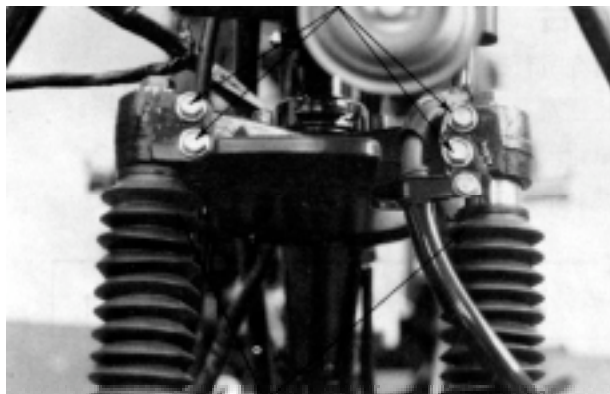
Remove the front inner fender.

Remove the front wheel. (⇒12-3)

Remove the front shock absorber upper mount bolts.

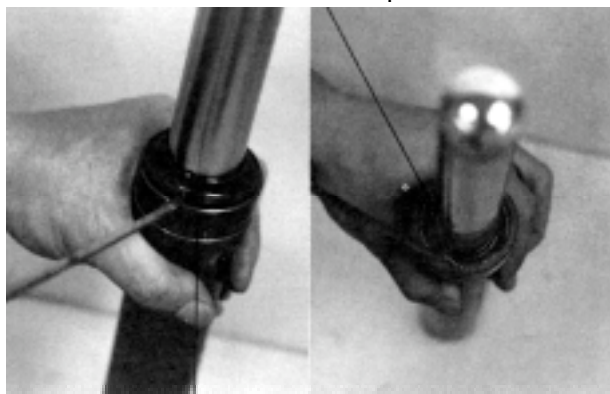
Loosen the lower mount bolts to remove the front shock absorbers.

Mount Bolts



Shock Absorbers

Circlip



#### DISASSEMBLY

Remove the dust boot.

Remove the circlip.

Dust Boot  
Washer/Bolt



Set the front shock absorber in a vise.

Remove the damper rod, hex bolt and copper washer.

Pull out the front shock absorber tube.

Front Shock Absorber

Set the front shock absorber tube in a vise.

Remove the lock bolt on the front shock absorber tube.

\*

- When holding the shock absorber tube, place a shop towel to protect it and do apply too much force .
- Place a container under the front shock absorber to drain the engine oil from it.



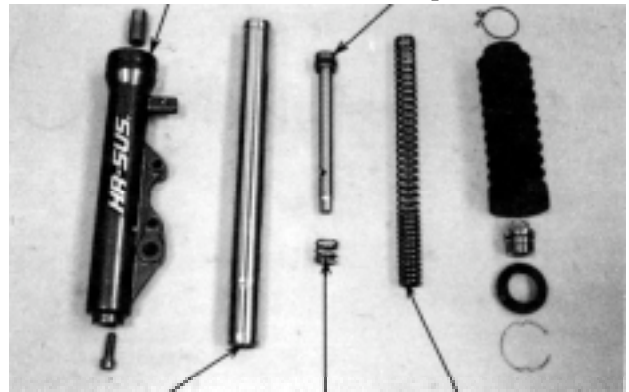
Shock Absorber Tube

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

Take out the front shock absorber spring, damper and damper spring.

Front Shock Absorber

Damper



Shock Absorber Tube

Damper  
Spring

Shock Absorber  
Spring

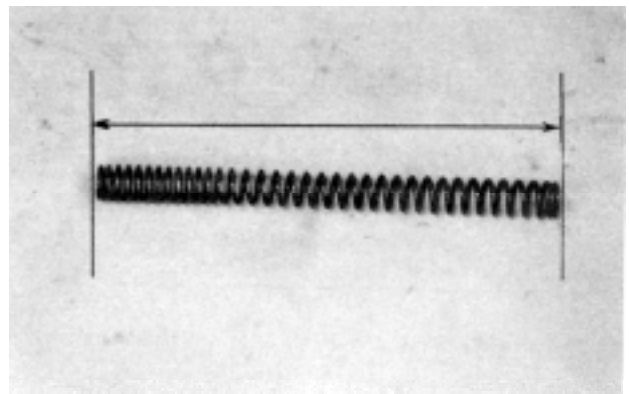
### INSPECTION

Inspect the following items and replace if necessary.

- Front shock absorber tube bending or damage
- Weak front shock absorber spring
- Damper and damper rod bending
- Oil seal damage or wear

Measure the front shock absorber spring free length.

**Service Limits:** Right : 251mm  
Left : 251mm



### ASSEMBLY

Install the damper spring onto the damper rod and then install them into the front shock absorber tube.

Install the shock absorber spring onto the front shock absorber tube and tighten the lock bolt on the top.

- \* Install the front shock absorber spring with the closely wound coils facing down.



Shock Absorber Tube



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

---

Set the front shock absorber in a vise.  
Insert the shock absorber tube into the shock absorber and tighten the hex bolt.  
(Apply locking agent to the washer and install it together with the hex bolt.)

**Torque:** 1.5\_ 3.0kg-m

Add engine oil into the front shock absorber.

**Specified Oil:** SS#8

**Oil Capacity:** 55±1cc

Install the circlip.  
Install the dust boot.

### INSTALLATION

Install the front shock absorbers onto the steering stem.  
Install and tighten the front shock absorber upper mount bolts.  
Tighten the lower mount bolts.

\* Align the upper mount bolt hole with the groove on the front fork.

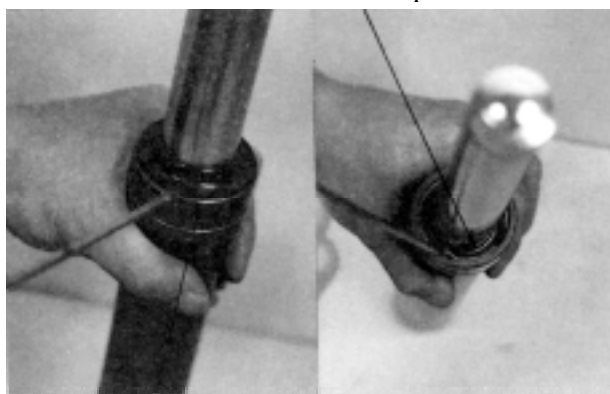
Install the front wheel. (⇒12-5)

Front Shock Absorber



Hex Bolt/Washer

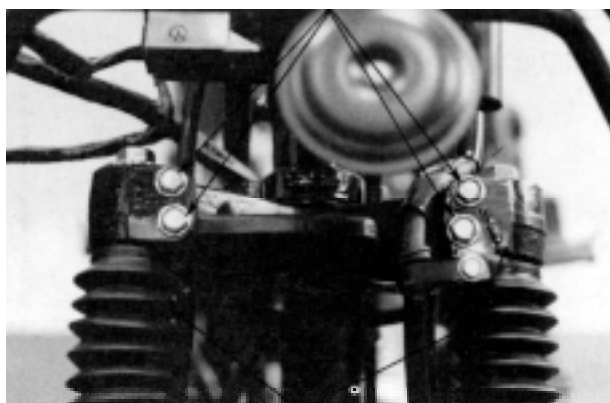
Circlip



Dust Boot

Pliers (close)

Mount Bolts



Front Shock Absorbers

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

---

### STEERING HANDLEBAR

#### REMOVAL

Remove the handlebar covers. (⇒2-4)  
Remove the rear brake lever holder bolt to remove the holder.  
Remove the front brake master cylinder holder bolts to remove the brake master cylinder.

Remove the throttle seat screw.

Remove the throttle seat from the handlebar and disconnect the throttle cable from the throttle pipe.  
Remove the throttle pipe from the handlebar.

Remove the steering stem lock bolt, collar, nut and the handlebar.

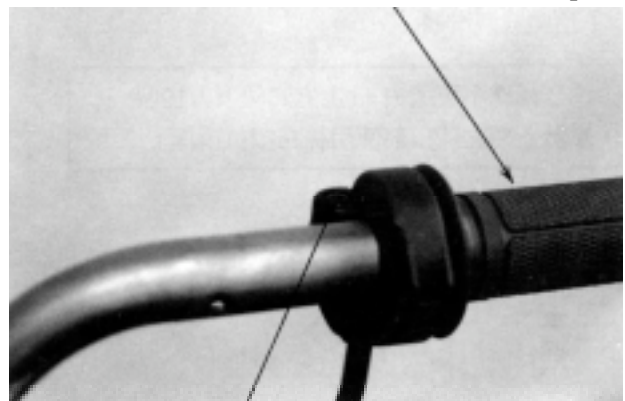
Rear Brake Lever

Brake Master Cylinder



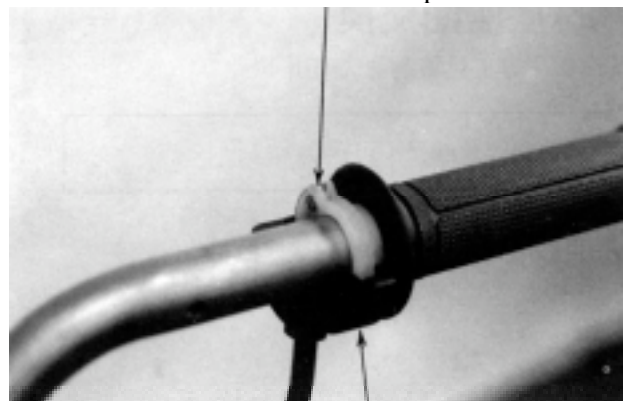
Bolt

Bolts  
Throttle Pipe



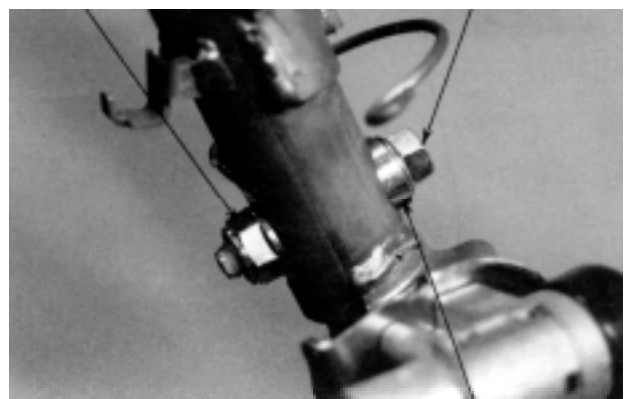
Screw

Throttle Pipe



Nut

Throttle Seat  
Bolt



Collar



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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### STEERING STEM

#### REMOVAL

Remove the steering stem lock nut.

**Special**

Steering Stem Lock Nut Wrench  
Lock Nut wrench

Steering Stem Lock Nut Wrench



Remove the top cone race.

\*

- Be careful not to lose the steel balls (26 on top race and 19 on bottom race).
- Clean the openings of frame covers with clean shop towels.

Remove the front fork.

Top Cone Race



### BOTTOM CONE RACE REPLACEMENT

Remove the bottom cone race using a chisel.

\*

- Be careful not to damage the steering stem and front fork.

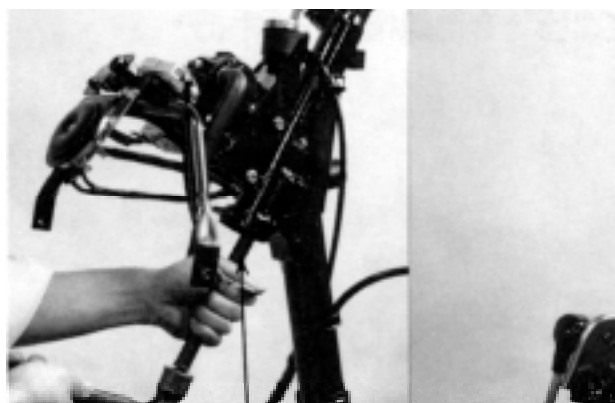
Drive a new bottom cone race into place with a proper driver.



Bottom Cone Race

### BALL RACE REPLACEMENT

Drive out the top and bottom ball races.



Ball Race Remover

## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

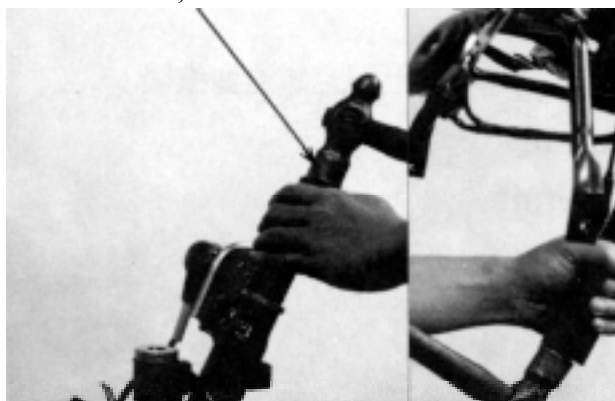
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Drive new top and bottom ball races into the steering head using the outer driver.

Special

Outer Driver 37x40mm

Outer Driver, 37x40mm



### INSTALLATION

Apply grease to the top and bottom ball races and install 26 steel balls on the top ball race and 19 steel balls on the bottom ball race. Apply grease to the ball races and install the front fork.



Apply grease to the top cone race and install it.

Tighten the top cone race and then turn the steering stem right and left several times to make steel balls contact each other closely.

\*

Check that the steering stem rotates freely without vertical play.

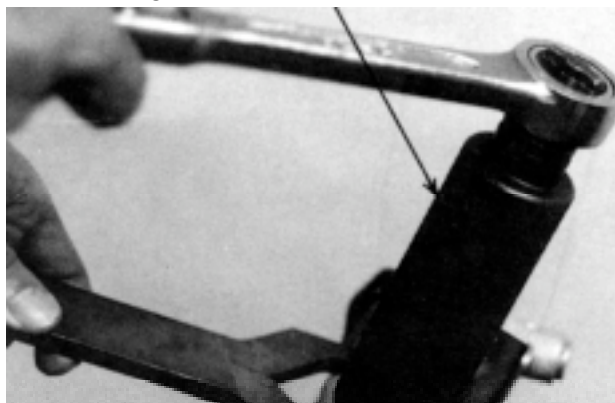


Top Cone Race  
Steering Stem Lock Nut Wrench

Install the steering stem lock nut and tighten it while holding the top cone race.

**Torque:** 8.0\_ 12.0kg-m

Install the front wheel. (⇒12-15)



## 12. FRONT WHEEL/FRONT BRAKE/ FRONT SUSPENSION

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### HANDLEBAR INSTALLATION

Install the handlebar onto the steering stem tube and then install and tighten the bolt.

**Torque:** 4.5kg-m

Install the front wheel. (⇒ 12-15)

Install the brake levers. (⇒ 12-19)

Install the handlebar covers. (⇒ 2-4)

