17. BRAKES

TROUBLESHOOTING

⚠WARNING

- **Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies. In the United States, use an OSHA-approved vacuum cleaner or alternate method approved by OSHA, designed to minimize the hazard caused by airborne asbestos fibers.**

HYDRAULIC DISC BRAKE

Brake lever/pedal soft or spongy
- Air bubbles in the hydraulic system
- Leaking hydraulic system
- Contaminated brake pad/disc
- Worn caliper piston seal
- Worn master cylinder piston seal
- Worn brake pad
- Contaminated caliper
- Caliper not sliding properly
- Worn brake pad/disc
- Low fluid level
- Clogged fluid passage
- Warped/deformed brake disc
- Sticking/worn caliper piston
- Sticking/worn master cylinder piston
- Worn brake disc
- Contaminated master cylinder
- Bent brake lever/pedal

Brake lever/pedal hard
- Clogged/restricted brake system
- Sticking/worn caliper piston
- Caliper not sliding properly
- Clogged/restricted fluid passage
- Worn caliper piston seal
- Sticking/worn master cylinder piston
- Bent brake lever/pedal

Brakes grab or pull to one side
- Contaminated brake pad/disc
- Misaligned wheel
- Clogged/restricted brake hose
- Warped/deformed brake disc
- Caliper not sliding properly
- Clogged/restricted brake hose joint

Brakes drag
- Contaminated brake pad/disc
- Misaligned wheel
- Worn brake pad/disc
- Warped/deformed brake disc
- Caliper not sliding properly

MECHANICAL DRUM BRAKE

Poor brake performance
- Improperly adjusted brake
- Worn brake linings
- Worn brake drum
- Worn brake cam
- Improperly installed brake linings
- Brake cable sticking/needs lubrication
- Contaminated brake linings
- Contaminated brake drum
- Worn brake shoes at cam contact areas
- Improper engagement between brake arm and camshaft serrations

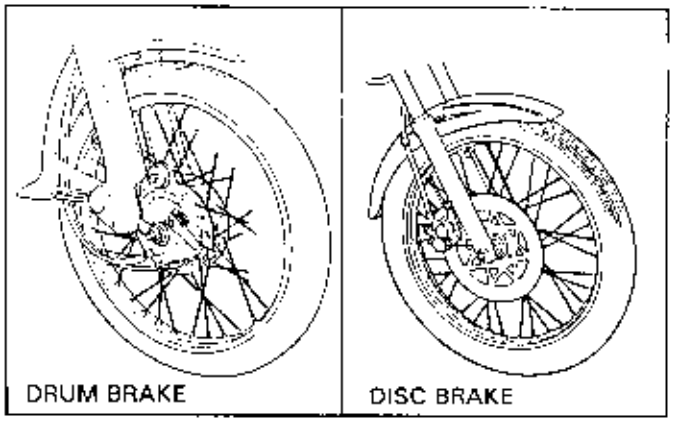
Brake lever hard or slow to return
- Worn/broken return spring
- Improperly adjusted brake
- Sticking brake drum due to contamination
- Worn brake shoes at cam contact areas
- Brake cable sticking/needs lubrication
- Worn brake cam
- Improperly installed brake linings

Brake squeaks
- Worn brake linings
- Worn brake drum
- Contaminated brake linings
- Contaminated brake drum

BRAKE SYSTEM DESCRIPTIONS

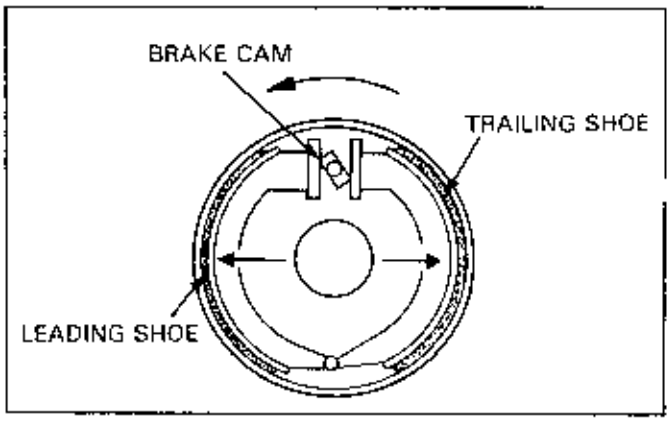
Braking systems on motorcycles, like virtually all braking systems, dissipate the vehicles kinetic energy by transforming it into heat energy-known as friction heat.

Two basic types of braking systems are used on Honda motorcycles and scooters; the drum-type and the disc type. Both the drum and the disc rotate together with the wheel. Each is slowed by the friction of either shoes or pads that press against them.



MECHANICAL DRUM BRAKE

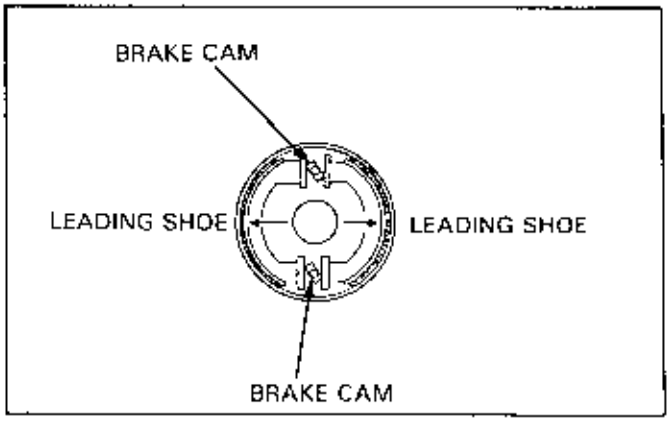
Single Leading Shoe Type
(Or, Leading-Trailing Shoe Type)
Force applied against the brake lever or pedal activates a cable or rod attached to the brake mechanism. A threaded adjuster on the end of the brake actuating cable or rod offers one of two adjustments to control the precise brake actuation point. The adjuster acts against a pivot on the end of the brake arm, which is clamped onto and turns a brake activating cam.



As shown in the illustration to the right, this cam transfers a rotating force from the outside of the drum, through the protective brake panel to the inside of the drum. Here the cam spreads one end of two crescent-shaped shoes. The other end of the shoes pivot against a common pin set into the brake panel. Both shoes press against the inside surface of the drum, creating friction and slowing the rotation of the wheel. The first shoe to act upon the drum beyond the cam, in relation to the rotating direction of the drum, is called the leading shoe. The second shoe, arcing out against the drum from the common pivot pin, is called the trailing shoe.

Due to its position within the system, the leading shoe creates more force against the drum than that which is applied to it. This increased force capability is called a self-energizing effect. In contrast, the trailing shoe, again, because of its position within the system based on the rotating direction of the drum, is pushed back by the rotating drum and creates less force than that which is applied to it.

Dual Leading Shoe Type
Dual leading shoe brakes differ from single leading shoe types in that they use two shoe-activating cams, each at opposite ends of the brake panel, to simultaneously press the shoes against the drum (see illustration at the right). Because both shoes are leading in relation to the rotating direction of the drum and therefore operate against the drum in same way, the effective braking force is noticably greater than a similarly sized single leading shoe unit with an identical amount of actuating force applied to the brake lever or pedal.



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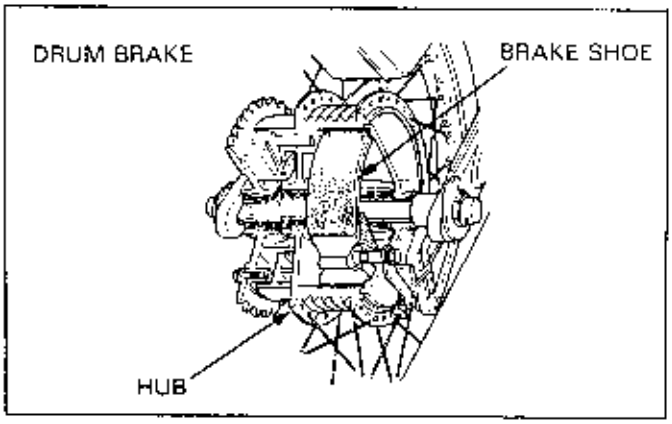
It is vital for brake systems to quickly dissipate the heat that is generated by the friction of the braking action so their stopping force remains consistent. Since drum brakes contain almost all of the brake components within the wheel hub, it is important that these brake components be made of materials that conduct heat rapidly. It is just as important that the brake is of the proper size for the anticipated requirements of the vehicle.



In order to enhance heat conductivity while providing acceptable wear resistance on the inner surface of the brake drum, the drum itself is made of cast iron. The remainder of the drum/hub is made of aluminum alloy with cooling fins cast into the outer circumference; again for heat conductivity and dispersion, but also for reduced unsprung weight. To speed conductivity, the cast iron drum is captured within the aluminum hub and cannot be removed.

The drum thickness is relatively thin, which further aids heat conductivity, and must not be machined in a brake lathe. If the drum surface is severely damaged, the hub must be replaced.

HYDRAULIC BRAKES

Brake Fluid

The designations DOT 3 and DOT 4 specify the brake fluid's ability to withstand heat without boiling. The greater the number, the higher the boiling point. It is necessary for the brake fluid to have a high boiling point so that the fluid does not boil within the brake line due to the high temperature of the brake discs and components. Boiling brake fluid leads to a drastic loss of braking force due to the air bubbles that form within the brake lines.

Never mix DOT 3 and DOT 4 brake fluid within a system. It is important to add only the same DOT number and even the same brand of brake fluid when adding fluid. If you are unsure of the type within the system, drain the system and refill it with DOT 4; systems designed for DOT 3 can use DOT 4. But DOT 4 systems must never be filled with DOT 3. DOT 4 systems generate greater heat and thereby require the higher boiling point characteristic of DOT 4.

Avoid mixing different brands of brake fluid. Improper mixing such as this may lead to chemical decomposition and contamination.

It is also important to use only fresh brake fluid from a sealed container. Once a new container of brake fluid is opened, be sure to reseal it tightly and plan on discarding the fluid after six months. This is because brake fluid left in the container tends to absorb moisture from the air; it is hydroscopic. Moisture can form even within a sealed brake system because of this particular property. Moisture in the brake fluid contaminates the brake system and lowers the boiling point of the fluid. It also corrodes the brake cylinders and pistons, which eventually causes seal damage and leakage.
For this reason you should note the date on the container that it was first opened for later reference.

Never reuse brake fluid due to the possibility of contamination from dust or moisture absorption.

If the brake fluid in a system shows any visual signs of contamination, it should be replaced — even if the recommended replacement interval has not passed.

You must be careful when handling brake fluid because it can quickly damage many painted or plastic surfaces on contact. In certain plastics, structural damage can occur if brake fluid penetrates the material's surface. The only general exception is the components of the brake system that are designed to be resistant to the effects of brake fluid. Brake fluid that is spilled on a motorcycle should be washed away with water immediately.

Before removing the reservoir cover, turn the handlebar until the reservoir is level.
Place a rag over painted, plastic or rubber parts whenever the system is serviced.

CAUTION

- **Spilled fluid will damage painted, plastic or rubber parts.**

Refill with the same type of fluid from an unopened container. Do not allow foreign material to enter the system when refilling the reservoir.

⚠WARNING

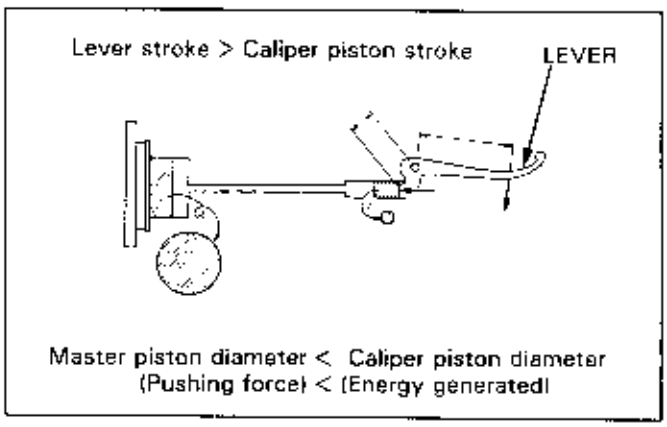
- **Using the wrong fluid can cause loss of braking efficiency.**
- **Contaminated fluid can clog the system, causing a loss of braking ability.**

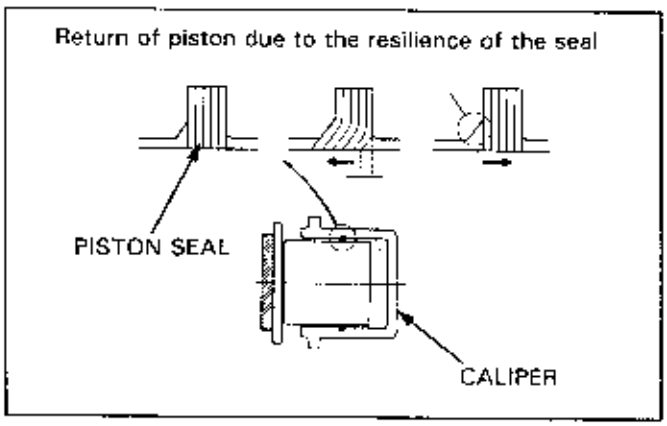
Pressure applied against the brake lever or pedal moves the piston within the master cylinder unit. Hydraulic fluid pressure is then transmitted through the brake line to the caliper where it presses against one or more caliper pistons.
Because hydraulic fluid cannot compress, the caliper piston(s) move at the same instant as does the master piston in the master cylinder.

The rise in hydraulic pressure that takes place between the master cylinder and the caliper because of the differences in the diameter of these parts is most significant. During development, these sizes are juggled to achieve best braking force and "feel". The leverage ratio offered by the design of the lever or pedal acting upon the master piston also helps to increase in force to be transmitted to the caliper pistons compared to the force initially applied.

The caliper pistons are in direct contact with the back side of the brake pads. Anti-squeal shims are normally used between the piston and pad. As these pads press against opposite sides of the disc, the rotation of the wheel is slowed.

When the brake lever is released, hydraulic pressure decreases and the pads cease to press against the disc. Unlike drum brake systems where a spring retracts the shoes from the drum surface, on disc brake systems, the resilience of the caliper piston seals retracts the pads from the disc and automatically self-adjust for wear.





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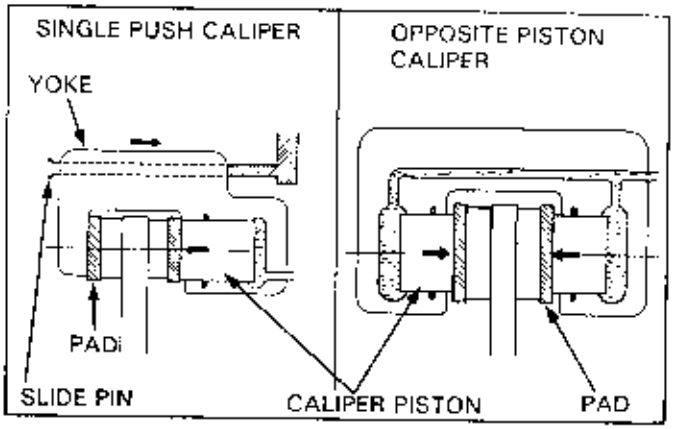
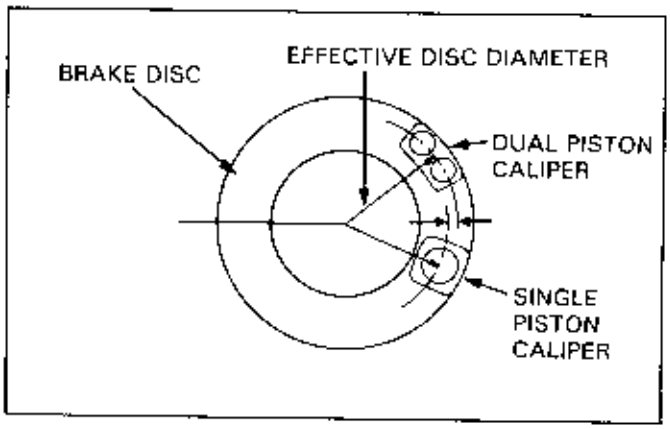
In single push type calipers, both pads press against the brake disc through a reaction of the sliding caliper yoke. Calipers of this type with single piston are more common on earlier Hondas. More current models use a single push type, but with dual pistons (both on the same side).

Opposite piston calipers are most often used for road racing motorcycles today. They do offer some improvement in performance, but at great increase in cost and complexity. In this type, pistons facing each other on opposite sides press the pads against the disc.

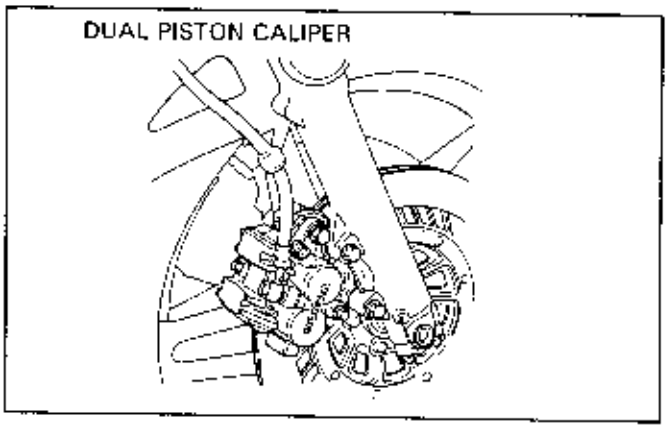


The amount of braking force available depends on the magnitude of force pressing the pads against the discs, the size of the contact area between the brake pads and discs, the distance between the center of the wheel and the center of the brake pads, and on the outside diameter of the tire.

Rectangular brake pads were introduced to increase the area of the pad against the disc. But it was found that these pads do not press against the disc uniformly, so the braking force is not as effective as it could be. Hence, the dual piston caliper was introduced so that a large braking force and uniform pressure against the brake pads is ensured. Some dual piston calipers have different piston sizes to further balance the braking force across the pad — the trailing piston being larger than the leading piston.



As previously touched on, increasing the area of contact between the brake pads and disc increases the braking force. This increased contact means increased heat energy. The increased heat energy requires greater capability for heat dissipation.



With the exception of in-board disc brakes and the GL1500 front brakes, all brake discs are exposed. To protect them from rust, the discs are made of stainless steel alloy.

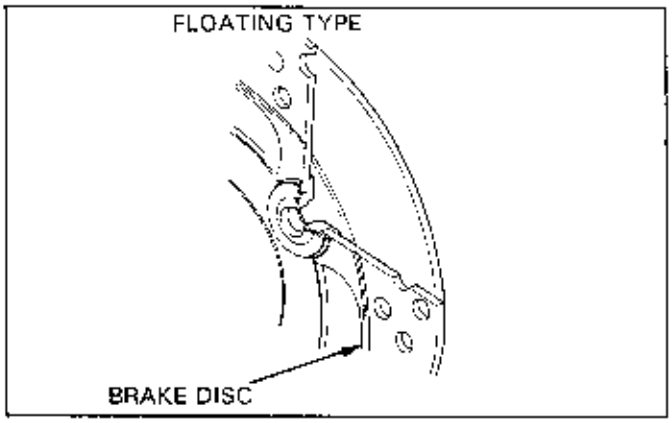
Because the material the discs can be made of is limited, the discs can only be made so thin in order to reduce unsprung weight before thermal distortion of the disc becomes a problem.

As the temperature of the brake disc rises, the disc expands. Because the disc is bolted to the wheel, its expansion is limited and some degree of distortion occurs.

The VTR250, with its in-board front disc, uses a plain cast iron disc since rust is not a problem. The design of the GL1500 front brake with its covered discs and calipers, transfers much of its heat to the cast, hollow wheel.

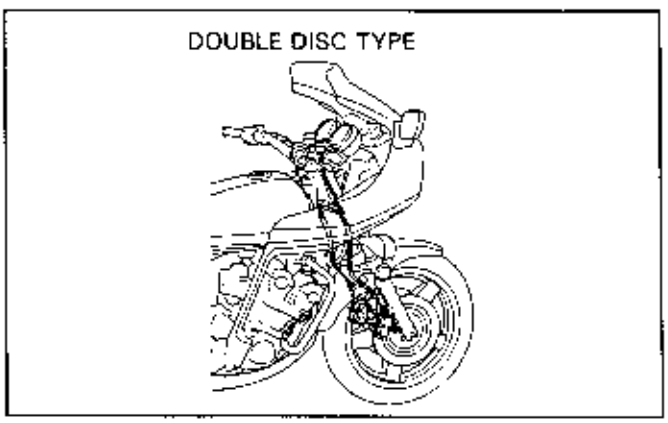
To cope with the extreme heat typically generated in competition road racing, floating type discs have been developed. In this system, a floating disc is installed by means of spring washers and rivets or clevis pins with an aluminum carrier between the disc and the wheel. In this manner, deviations in radial directions are permitted, distortion is prevented and weight is reduced.

In addition to the design basics already stated, discs are commonly drilled or grooved to remove dust or dirt from the disc surface, thereby preventing what are known as sympathetic vibrations. Contrary to popular beliefs, holes drilled in the disc do not significantly aid cooling. These holes are perpendicular to the flow of air so little additional cooling occurs.



Among the many combinations of materials used to make brake pads are: wear resistant resin, metallic mixtures, and sintered metal. These materials are combined in brake pad manufacturing according to the design requirements of the particular application. Asbestos was dropped from use in pad manufacturing by Honda beginning around 1985-86.

Just as disc brakes are used where greater than typical drum brake stopping force is required, dual disc brakes (a disc on both sides of a single wheel) are used where an even greater braking capability or a smaller diameter front wheel is required.



GENERAL INFORMATION FOR SERVICE

- Do not allow dust, dirt, water or any foreign material to enter the system when refilling or replacing the brake fluid.
- To maintain proper sealing and initial fit, replace the parts specified for replacement at the time of service. Replace the required parts as a set, when specified, for the same reason.
- Clean the sliding surfaces of the brake pads and disc with brake cleaner. Replace the pads if they are contaminated with oil or grease, as this significantly reduces braking force.
- The brake calipers can be removed from the motorcycle and the pads can be replaced without disconnecting the hydraulic system.

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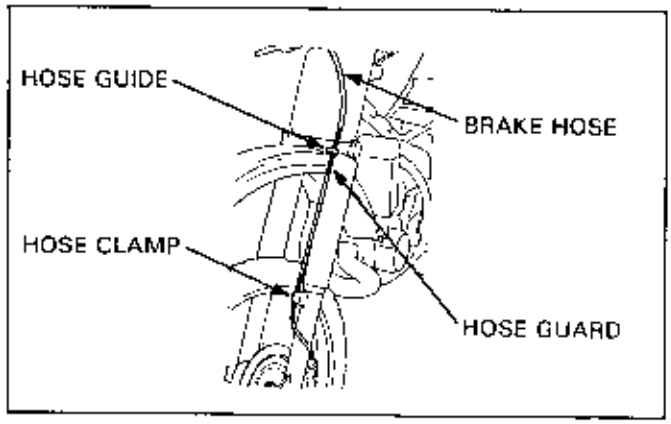
- Bleed the hydraulic system if it has been disassembled or if the brake feels spongy.
- If brake pads or shoes have been overheated (glazed), they must be replaced. Overheating changes the composition of the friction material and merely wire brushing or sanding the friction surface cannot change this fact.
- Always replace hydraulic line/hose sealing washers with new ones when reassembling. These sealing washers are made of aluminum alloy for effective sealing and are distorted once they are used.

Use caution when handling and installing brake lines and hoses. When installing front brake lines, be sure that there is no possibility of damage or stress to the lines or hoses when the fork pivots fully in either direction or when the suspension compresses or extends. In the rear, allow proper clearance so that the lines or hoses do not rub against the tire, frame or swingarm, and so they are not caught between the coils of the spring when the suspension compresses.

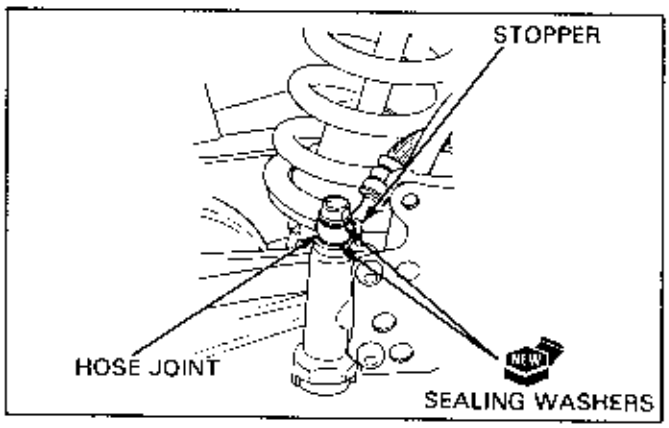


All brake lines or hoses should be installed using the clamps provided. Each clamp should be positioned around the rubber hose guards to prevent any damage to the lines and hoses.

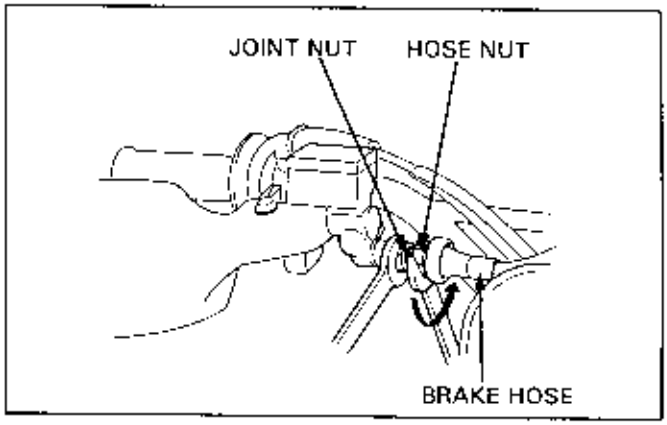
Eyelet-type line and hose joints:
Use new sealing washers whenever eyelet-type joints are reinstalled. Be sure the hose bolt fluid passage is free from clogging prior to installation.

Note the position of the stopper that aids in positioning the eyelet at the proper angle when installing the hose onto the master cylinder. If only one stopper is provided, press the hose end against the stopper while tightening the bolt. If two stoppers are provided, install the hose between the stoppers so that the hose will not move when the bolt is tightened.

If the sealing washer includes a stopper with collapsible claws, be sure to note the direction these claws face so the new washer can be installed in the same position.

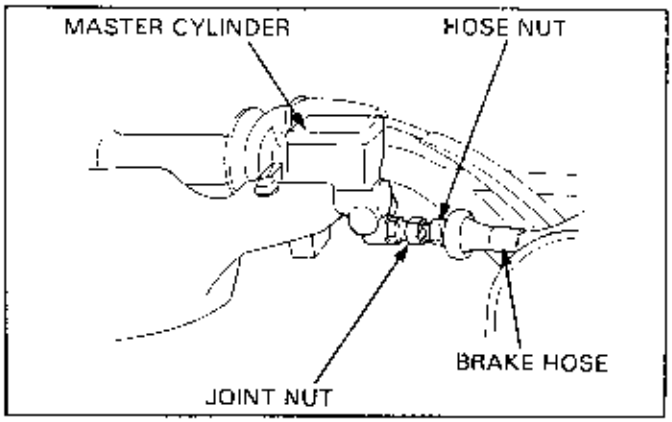


Hose Joints:
Removal
Remove the hose by loosening the joint nut while holding the hose nut stationary. This method prevents the hose from being twisted or kinked.



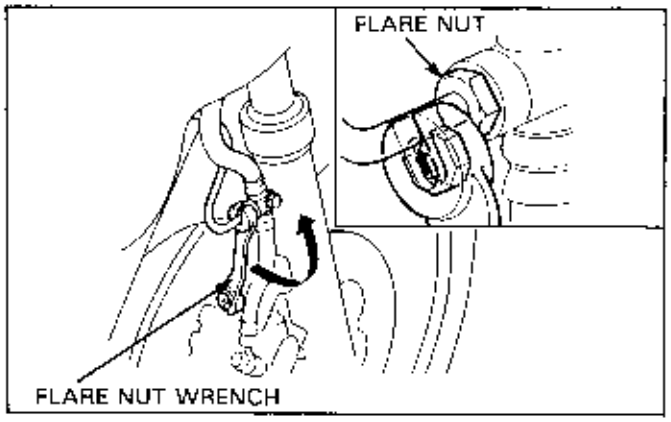
Installation
First install the hose joint onto the master cylinder with a new sealing washer and tighten it to the specified torque if it was removed.

Then, while holding the hose nut, tighten the joint nut to the specified torque.

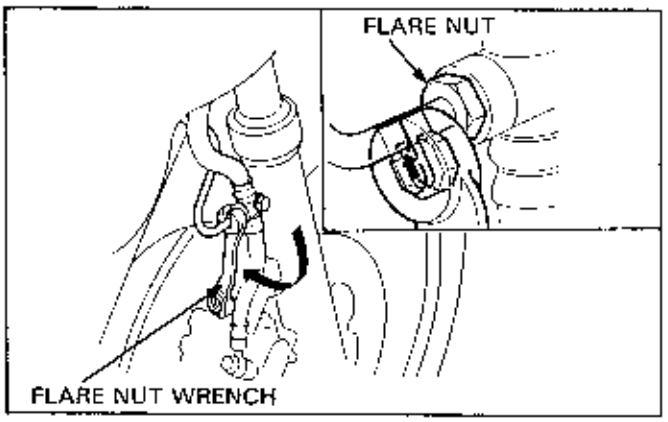


Metal Brake Lines:

Removal
If the metal brake line is equipped with nuts as illustrated, always loosen the flare nuts first, using a flare nut wrench, so that the hose may be easily maneuvered. Remove the metal line using care not to bent it.



Installation
Always tighten brake line nuts first by hand. Then, confirm that the connections are free from play and tighten to the specified torque using a flare nut wrench.



HYDRAULIC DISC BRAKES

BRAKE FLUID REPLACEMENT

Before removing the reservoir cover, turn the handlebar until the reservoir is level.
Place a rag over painted, plastic or rubber parts whenever the system is serviced.

CAUTION

- **Spilling fluid on painted, plastic or rubber parts will damage them.**

Remove the master cylinder cover and diaphragm.

Discard contaminated pads and clean a contaminated disc with a high quality brake degreasing agent.

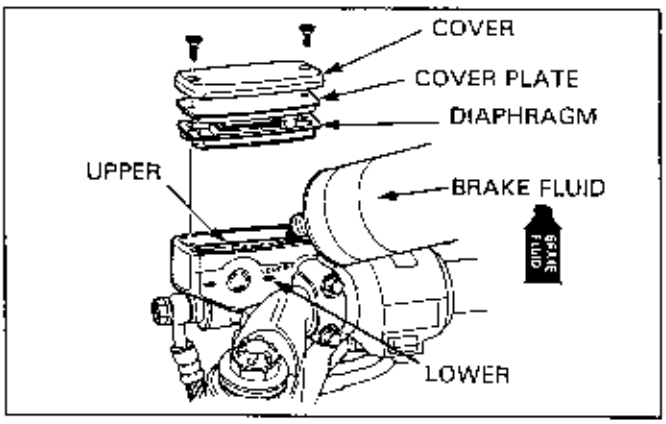
⚠ WARNING

- **A contaminated brake disc or pad reduces stopping ability.**

Refill with the same type of fluid.

⚠ WARNING

- **Mixing incompatible fluids will impair braking efficiency.**
- **Foreign materials can clog the system, causing a reduction or complete loss of braking ability.**



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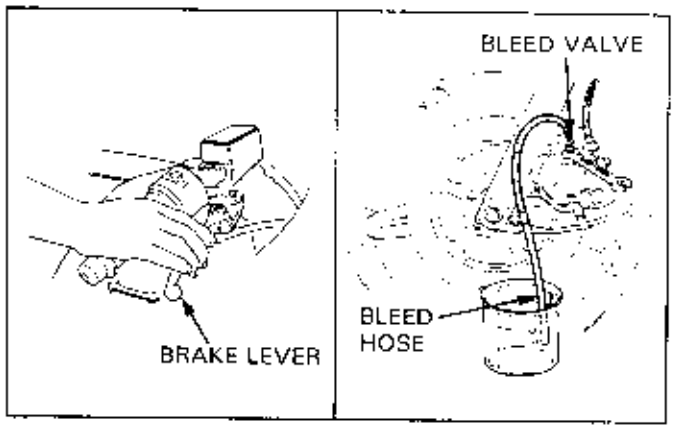
Connect a bleed hose to the bleed valve.

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

Close the bleed valve and fill the master cylinder with the specified brake fluid. Refer to the Model Specific manual.

CAUTION

- **Reusing drained fluids can impair braking efficiency.**



Connect a commercially available Brake Bleeder to the bleed valve.

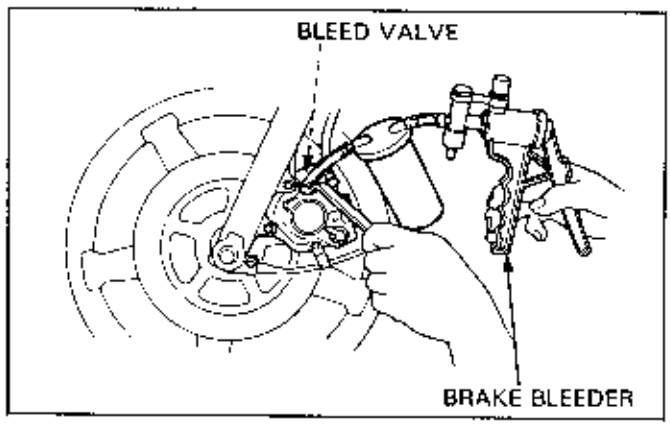
NOTE

- When using a brake bleeder, follow the manufacturer's operating instructions.

Pump the brake bleeder and loosen the bleed valve.

Add fluid when the fluid level in the master cylinder is low.

Repeat the above procedures until no air bubbles appear in the plastic hose.

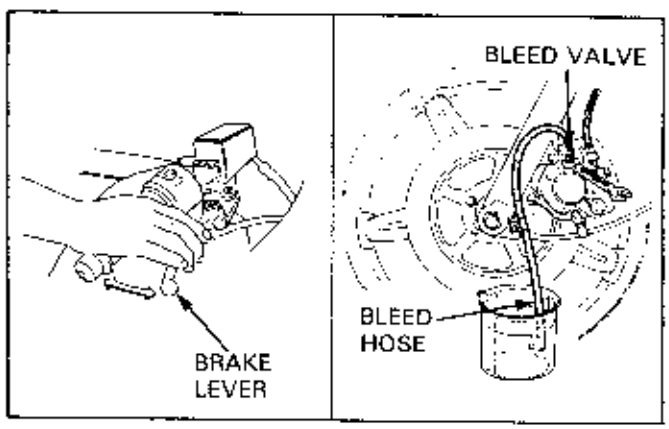


NOTE

- Check the fluid level often while bleeding the brakes to prevent air from being pumped into the system.
- Use only specified brake fluid from a sealed container.
- If air is entering the bleeder from around the bleed valve threads, seal the threads with teflon tape.

If the brake bleeder is not available, perform the following procedure.

Connect the transparent bleeder hose to the bleed valve and place the other end of the hose in a container.
Loosen the bleed valve 1/4 turn and pump the brake lever or pedal until there are no air bubbles in the bleed hose and lever or pedal resistance is felt.



After filling the system, close the bleed valve and inspect the system for air bubbles by operating the brake lever or pedal. If it feels spongy, bleed the system as follows.

AIR BLEEDING

1. Squeeze the brake lever, then open the bleed valve 1/4 turn and close the valve.

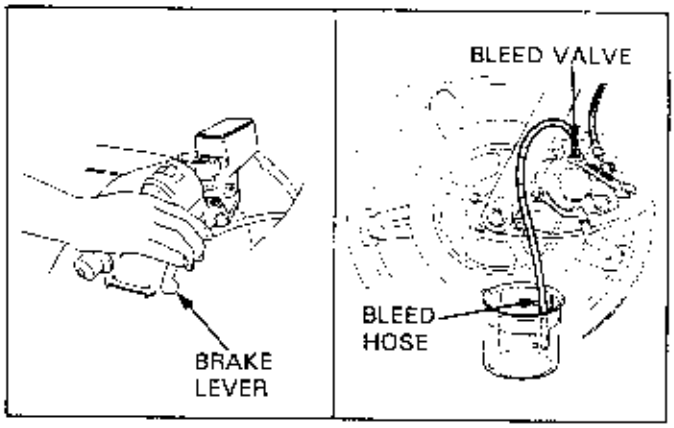
NOTE

- Do not release the brake lever or pedal until the bleed valve has been closed.
- Check the brake fluid level often while bleeding the system to prevent air from being pumped into the system.

2. Release the brake lever slowly and wait several seconds after it reaches the end of its travel.
3. Repeat the above steps 1 and 2 until bubbles cease to appear in the fluid at the end of the hose.

Tighten the bleed valve.
Be sure that the brake fluid is up to the upper level of the master cylinder and refill if necessary.

Reinstall the master cylinder cover.



BRAKE PAD REPLACEMENT

Removal

There are two types of the brake pads;
Type A: pad pin is secured by the retainer plate.
Type B: pad pin is secured by the pad pin plug.

Type A: Loosen the pad pin retainer bolt.
Type B: Remove the pad pin plug and loosen the pad pin.

Refer to the Model Specific manual for the caliper removal/installation.

NOTE

- Remove the pads without removing the bracket from the caliper. If the pads cannot be removed, remove the bracket.

Push the piston all the way in to allow the installation of new brake pads.

Type A: Remove the pad pin retainer bolt and the pad pin retainer.

Before removing the pads, mark them so you can reinstall them in their original positions if they are to be reused, thereby assuring even disc pressure.

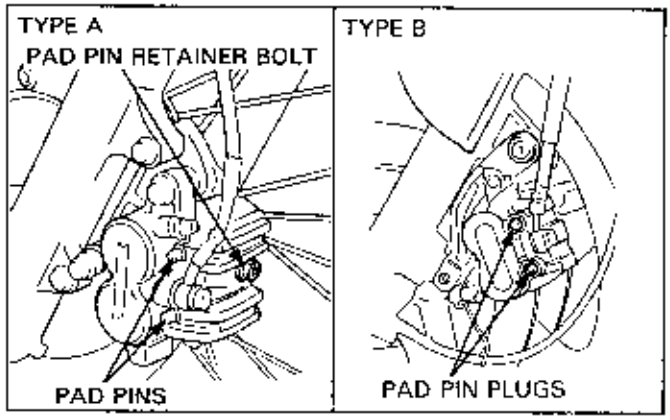
⚠WARNING

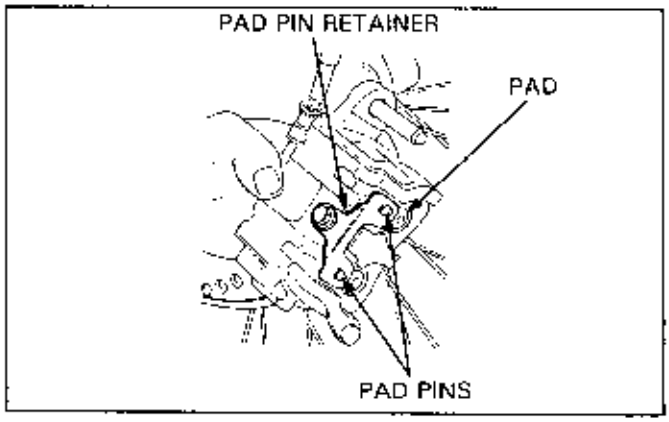
- **Always reinstall the brake pads in their original positions to prevent loss of braking efficiency.**

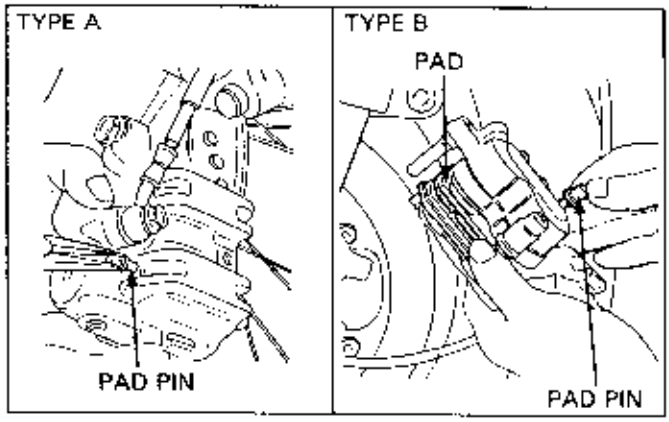
Type A: Pull out the pad pins and remove the pads.
Type B: Loosen the pad pins and remove the pins and pads.

NOTE

- Pad pins can be easily removed by pressing the pads in the caliper.
- Install the pad shim, if there is one, in the original position.







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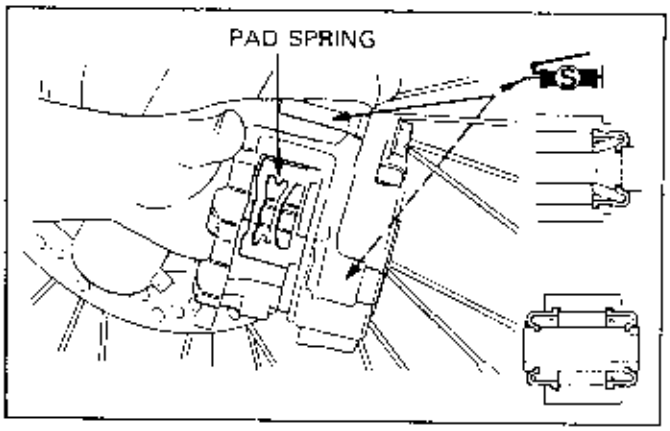
Installation

Press in the piston(s) to install the new pads.

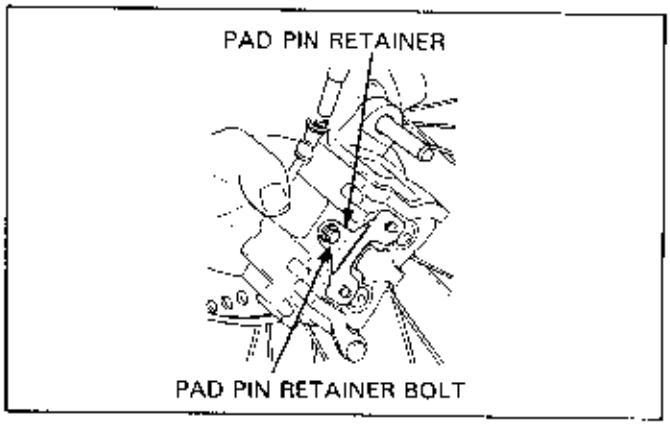
If the caliper and bracket are separate, apply silicone grease to the caliper pivot bolt boot, pin bolt, collar bore and insert the caliper into the bracket.

Set the boot lip in the pin bolt groove securely.

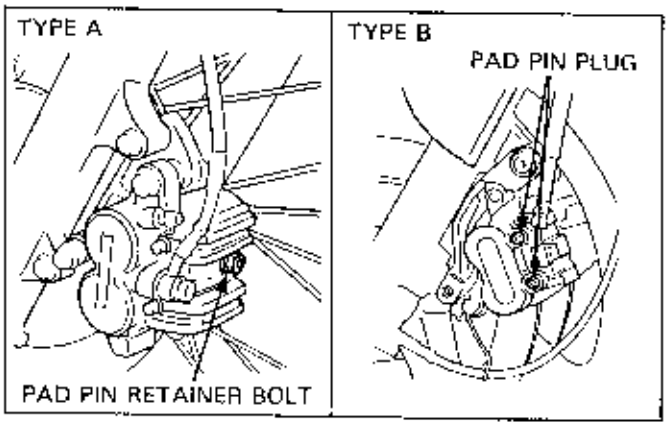


Install the new pad, align the holes in the pad and retainer and install the pad pin. Note the installation direction of the pad.

Type A: Install the retainer by aligning its hole with the pad pin groove and loosely tighten the bolt.

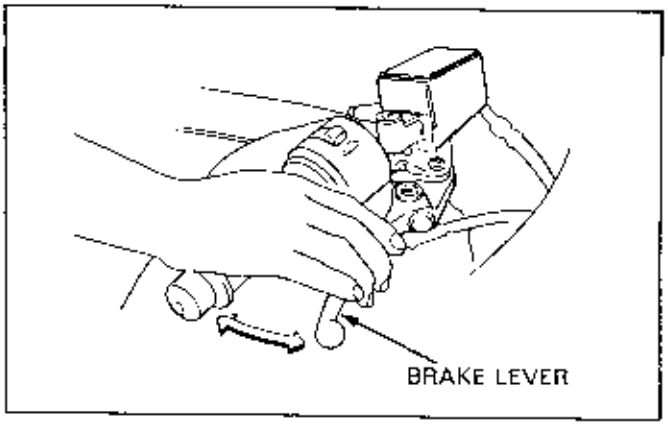


Install the caliper. (Refer to the Model Specific manual.)
Type A: Tighten the pad pin retainer bolt to the specified torque.
Type B: Tighten the pad pin to the specified torque and install the pad pin plug.

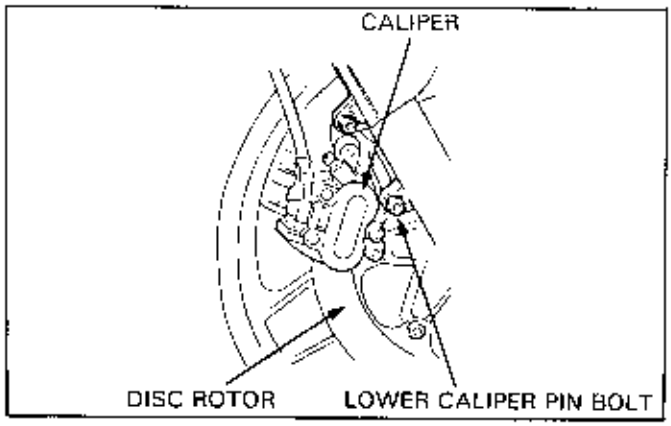


Apply the brake lever to force the caliper piston out of the caliper.

Rotate the wheel by hand and check for the brake operation.



BRAKE CALIPER



Removal

Refer to the Model Specific manual for the brake caliper removal/installation.

Pump the brake lever to force the caliper piston out of the caliper.

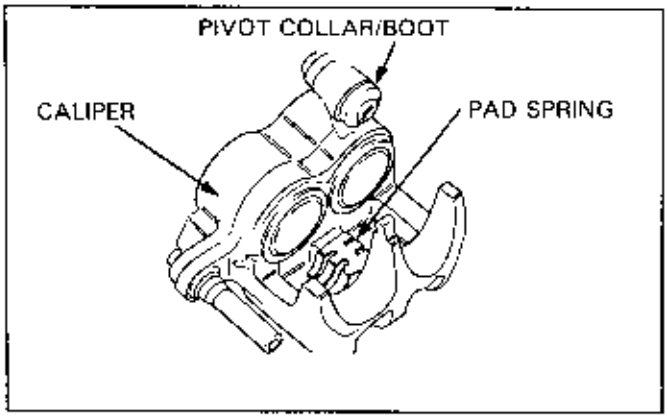
Place a clean container under the caliper and disconnect the brake hose from the caliper.

Clean the removed parts with fresh brake fluid.
Avoid spilling brake fluid on painted surfaces.

CAUTION

- **Spilled brake fluid will damage painted, plastic or rubber parts.**

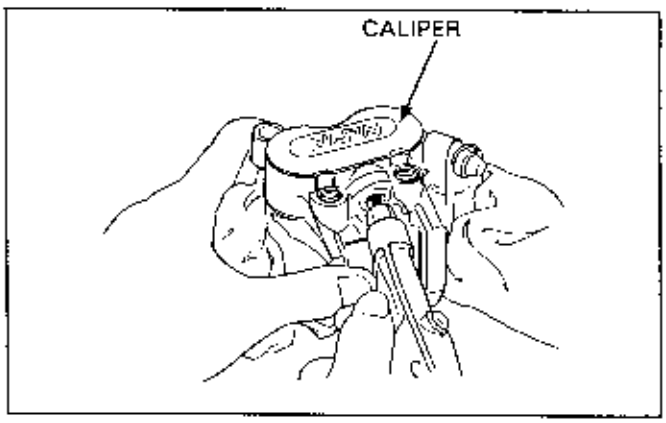
Remove the brake caliper assembly and the pads from the caliper.



Disassembly

Remove the following:
— caliper bracket
— pad spring
— pivot collar
— boot

Remove the piston.
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 low pressure air in short spurts.

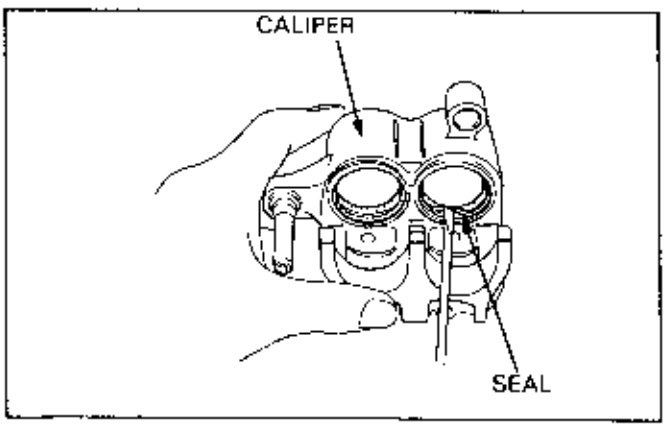


CAUTION

- **Be careful not to damage the caliper cylinder bore when removing the seals.**

Push the piston seal and dust seal in and remove them.

Clean the caliper, especially the brake piston seal grooves, with fresh brake fluid.



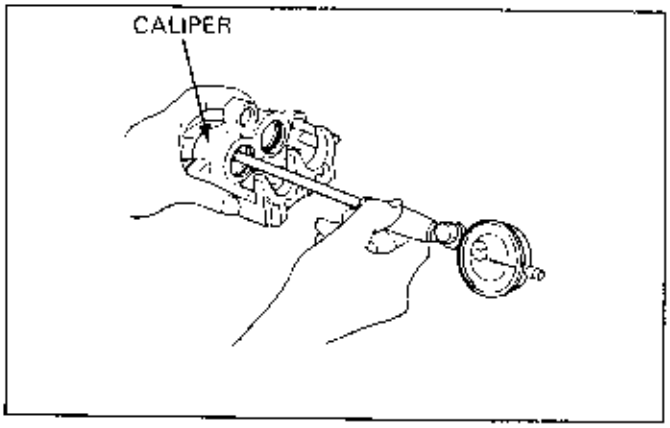
Date of Issue: Sep., 1988

Caliper cylinder Inspection
Check the caliper cylinder bore for scoring, scratches or other damage.

Measure the caliper cylinder I.D. in X and Y axis at several points.

Replace the caliper cylinder if the largest measurement is beyond the specified service limit.

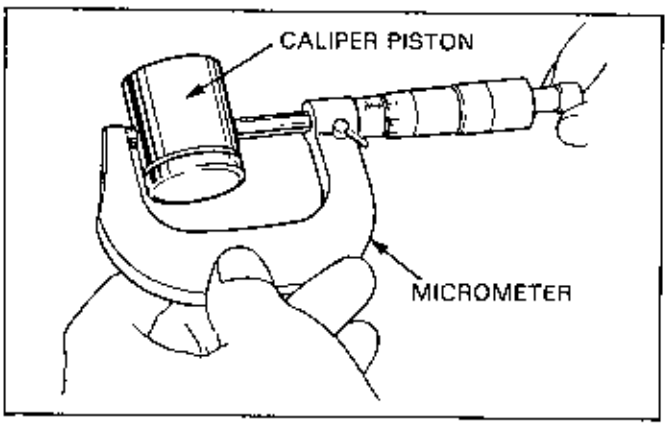
Refer to the Model Specific manual for the service limit.



Caliper Piston Inspection
Measure the caliper piston O.D. in X and Y axis at several points.

Replace the caliper piston if the smallest measurement is less than the specified service limit.

Refer to the Model Specific manual for the service limit.



Assembly

NOTE

- Make sure that each part is free from dust or dirt before reassembly.
- Replace the dust seals and piston seals as a set whenever they are removed.

Coat the new dust seals and piston seals with the recommended brake fluid and install them in the caliper cylinder grooves properly.

Coat the caliper piston with fresh brake fluid and install it in the caliper.

There are two types of caliper pistons; resin pistons mounted on light-weight motorcycles and metal pistons, on heavy-weight motorcycles. Note the installation direction as it is different according to the type of the piston.

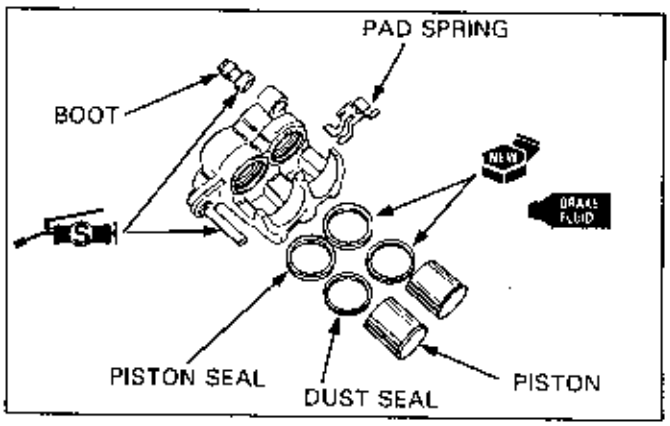
Resin piston: Install with the concaved side away from the pad.
Metal piston: Install with the opening toward the pad.

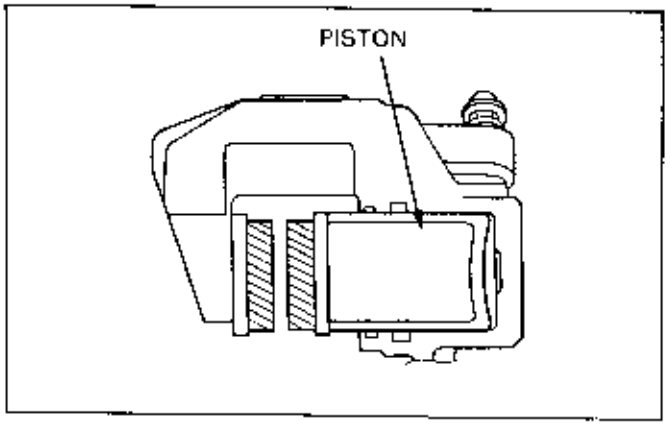
Install the pad spring in the caliper.

Refer to the Model specific manual for the installation direction of the spring.

Install the pad (page 17-10).

Install the caliper. (Refer to the Model Specific manual.)

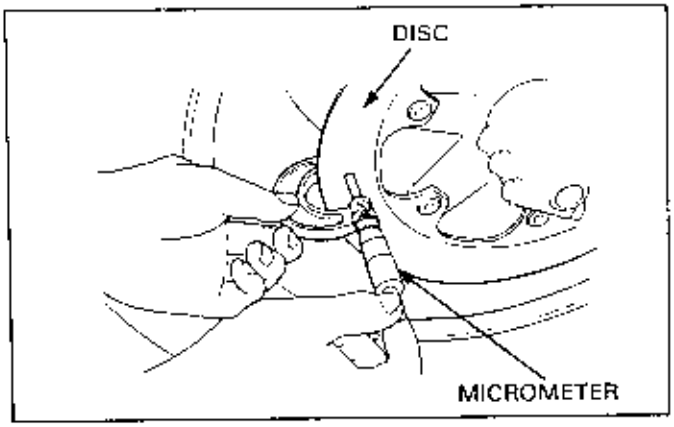




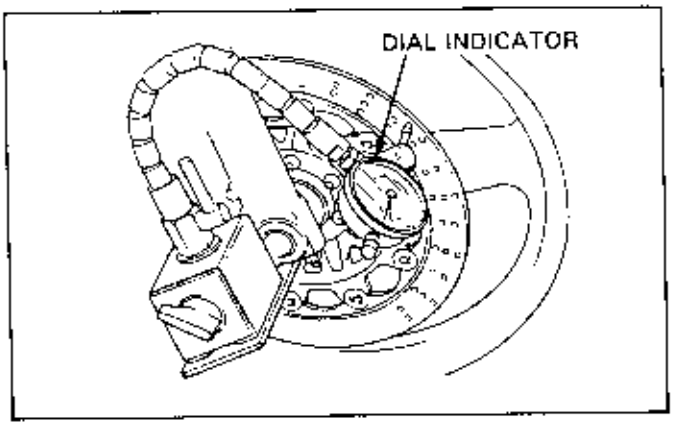
BRAKE DISC INSPECTION

Visually inspect the discs for damage or cracks.

Measure the brake disc thickness at the several points and replace if the smallest measurement is less than the specified service limit.
Refer to the Model Specific manual for the service limit.
Check the disc to see if the service limit is stamped on it.



Check the brake disc for warpage.
Inspect the wheel bearings for excessive play. If the warpage exceeds the specification.
Replace the brake disc if the wheel bearings are normal.



MASTER CYLINDER

Disassembly

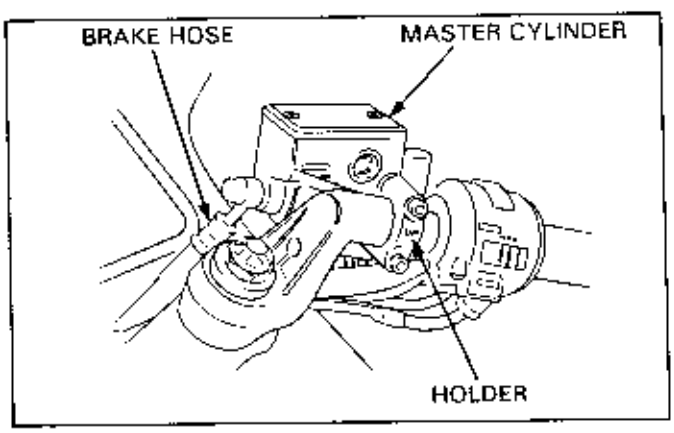
CAUTION

- **Do not allow foreign materials to enter the master cylinder.**

NOTE

- Replace the master piston, spring, cups and snap ring as a set whenever they are disassembled.

Disconnect the wire from the brake light switch.
Drain the brake fluid (page 17-9).
Remove the brake lever from the master cylinder.
Disconnect the brake hose.
Remove the master cylinder holder and the master cylinder.



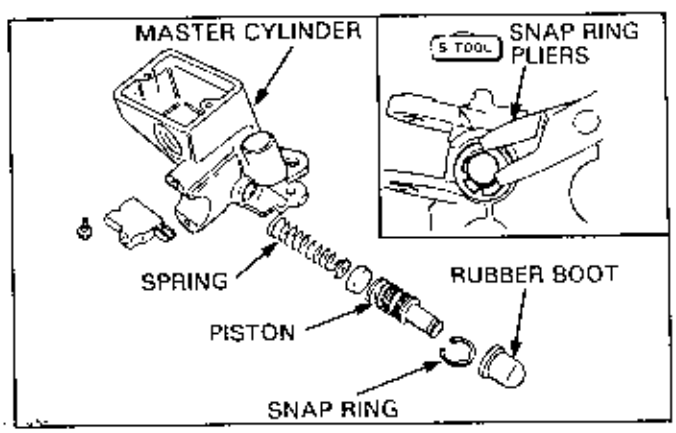
Remove the rubber boot.

Remove the snap ring.

5 TOOL
SNAP RING PLIERS **07914—3230001**

Remove the piston and spring.

Clean the master cylinder with the recommended brake fluid.



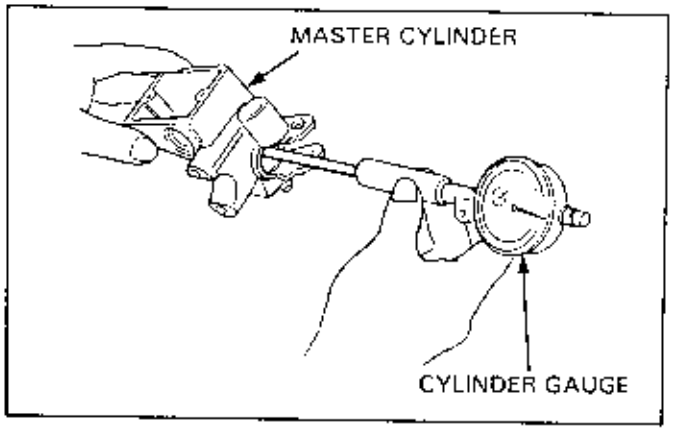
Date of Issue: Sep., 1988

Master Cylinder Inspection
Check the master cylinder for scores, scratches or nicks and replace if necessary.

Measure the master cylinder I.D. in X and Y axis at several points.

Replace the master cylinder if the largest measurement is over the specified service limit.

Refer to the Model Specific manual for the service limit.

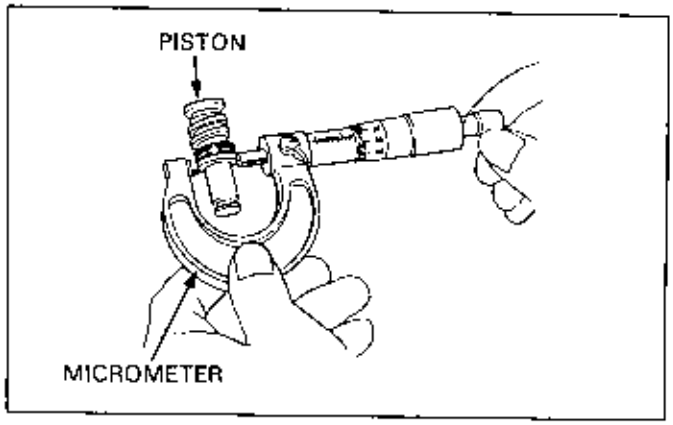


Master Piston Inspection
Measure the piston O.D. at the saveral points on the secondary cup side and replace it if the smallest measurement is less than the specified service limit.

Refer to the Model Specific manual for the service limit.

NOTE

- Replace the master cylinder, if it leaks with a new piston installed.



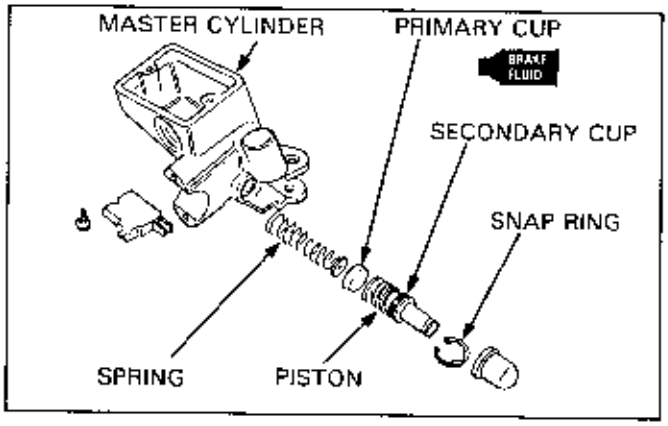
Assembly

NOTE

- Replace the piston, spring, cups and snap ring as a set.
- Be sure that each part is free from dust or dirt before reassembly.

Coat the piston cup with the fresh brake fluid and install it on the piston.
Install the spring with its larger diameter and toward the master cylinder.

Install the primary cup with its concaved side toward the inner side of the master cylinder.



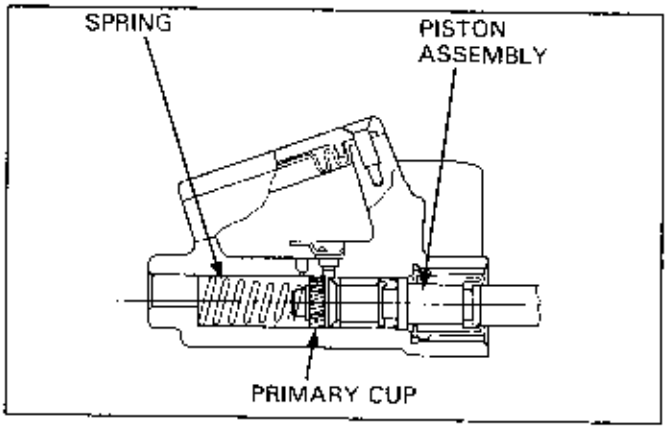
Install the snap ring.

5 TOOL

SNAP RING PLIERS **07914—3230001**

CAUTION

- **When installing the cups, do not allow the lips to turn inside out. (Refer to the drawing.)**
- **Note the installation direction of the snap ring.**
- **Be certain that the snap ring is seated firmly in the groove.**

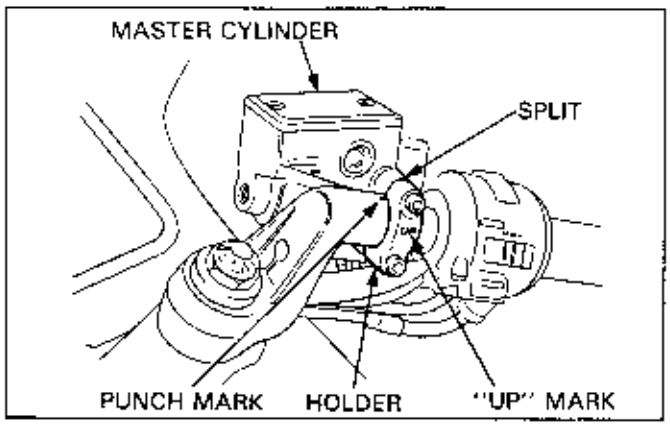


Install the rubber boot in the groove properly.

Place the master cylinder on the handlebar and install the holder and holder bolts with the holer's "UP" mark facing up.

Align the split between the holder and master cylinder with the punch mark on the handlebar.

Tighten the upper holder bolt to the specified torque first, then tighten the lower bolt to the same torque.



Install the brake lever and connect the wire to the brake light switch.

Connect the brake hose with two new sealing washers. Be careful not to twist the brake hose.

Tighten the brake hose bolt to the specified torque.

Make sure that the brake hose is routed properly.

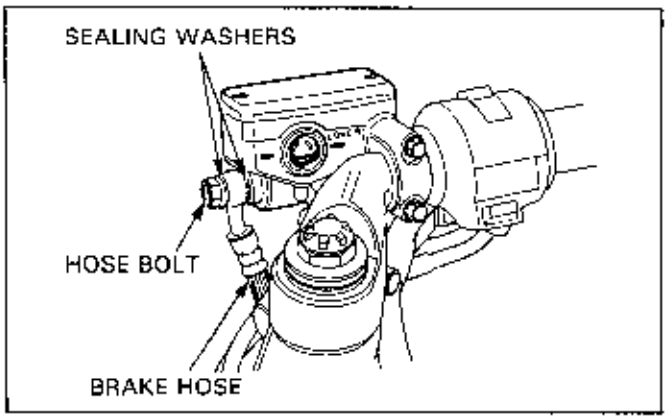
Route all cables, hoses, and lines carefully to avoid kinking or pinching.

CAUTION

- **Improper routing may damage cables, hoses, and lines.**

⚠WARNING

- **Kinked or pinched brake cables, hoses, or lines may cause a loss of braking ability.**



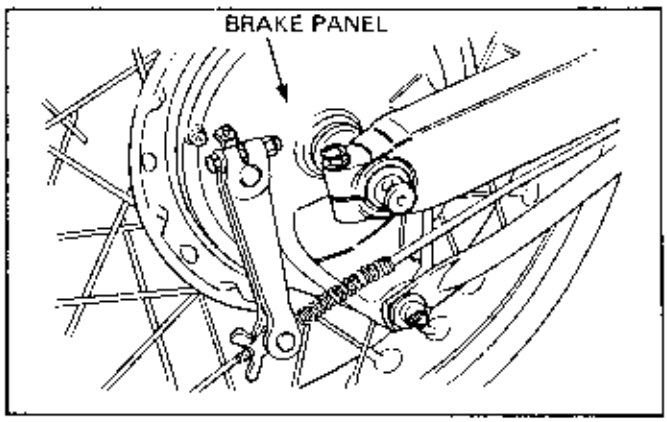
Fill the system with specified grade of fluid and bleed the air from the system (Refer to page 17-10).

MECHANICAL DRUM BRAKES

Use an OSHA-approved vacuum cleaner or alternate method approved by OSHA, designed to minimize the hazard caused by airborne asbestos fibers.

⚠WARNING

- **Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies.**
- **Grease on the brake linings will reduce stopping ability.**



Remove the wheel.
Remove the brake panel from the wheel hub.

INSPECTION

Brake Drum I.D.

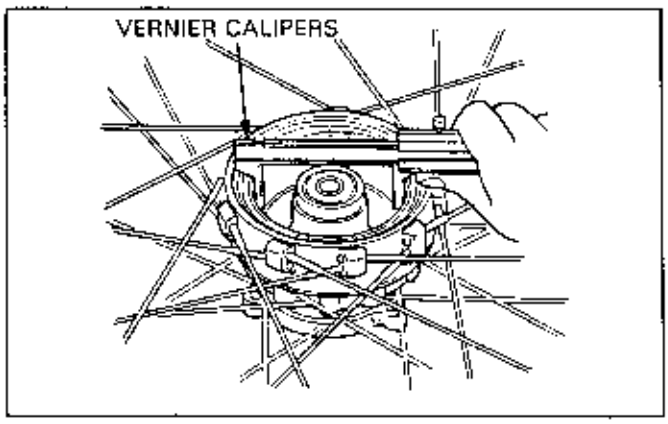
Check the brake drum for wear or damage. Replace the wheel hub if necessary.

Measure the brake drum I.D. at the lining surface in a several points and take the largest measurement.

Refer to the Model Specific manual for the service limit or refer to the wheel hub if the service limit is stamped on it.

NOTE

- If the brake drum is rusted, clean with # 120 emery paper.
- Be sure to use the inside vernier calipers to measure the brake drum I.D because the drum have a wear ridge.



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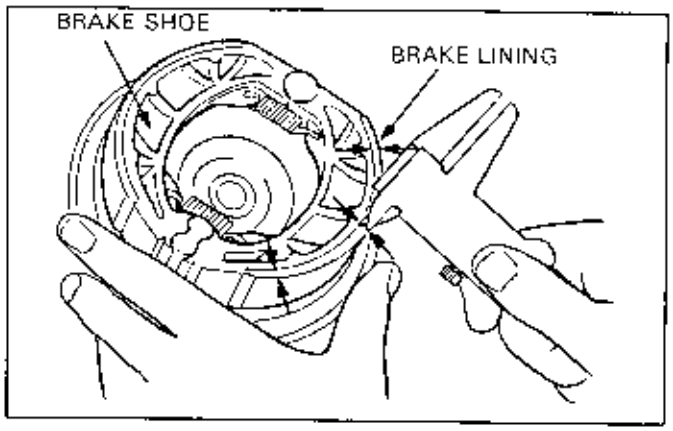
Brake Lining Thickness
Measure the brake lining thickness at 3 points (both ends and center).

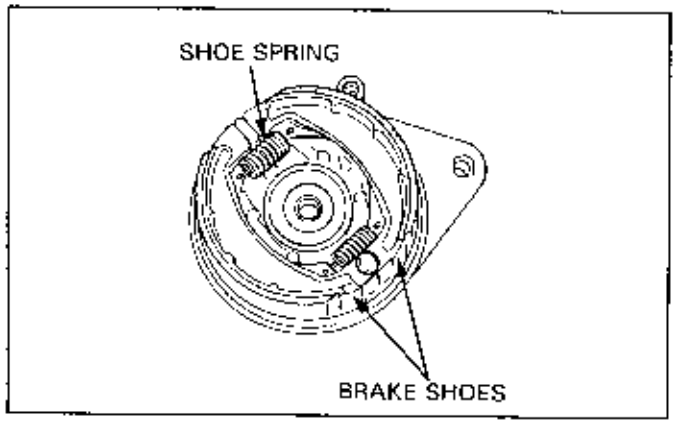
Replace the brake shoes in pairs if the smallest measurement is less than the service limit or if they are contaminated with grease.



DISASSEMBLY

NOTE

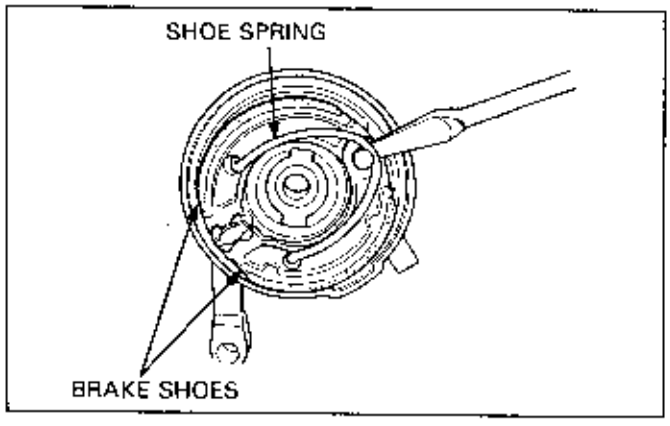
- Replace the brake shoes in pairs.
- When the brake shoes are reused, mark on the side of each brake shoe before disassembly so that they can be installed in their original positions.



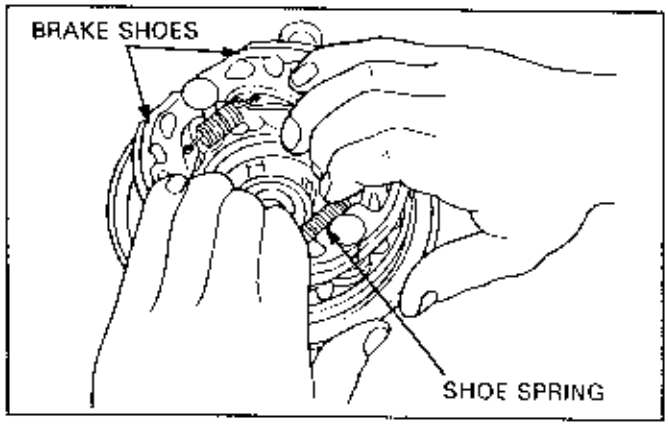
U-Spring Type
Move the brake arm and expand the brake shoes.

Remove the shoe spring from the anchor pin with a screwdriver.

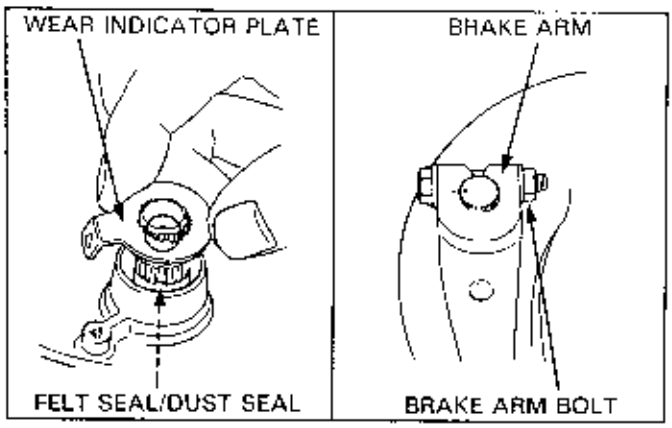
Remove the brake shoes.



Coil Spring Type
Pull the brake shoes away from the anchors and remove the shoes.



Remove the following from the brake panel.
— brake arm
— wear indicator plate
— felt seal/dust seal
— brake cam



ASSEMBLY

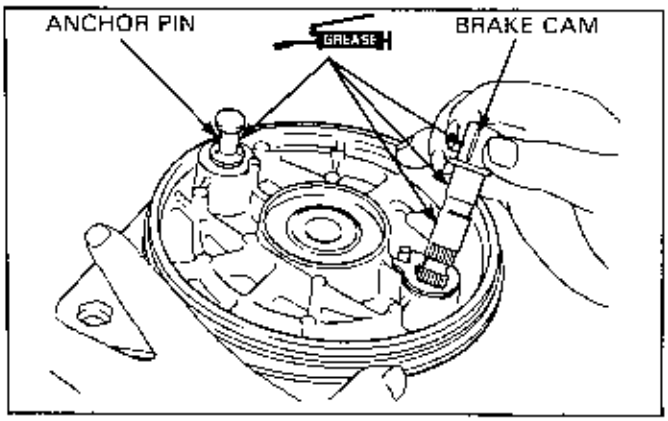
Apply a small amount of grease to the brake cam and anchor pin.

Install the brake cam in the brake panel.

Keep grease off the brake linings.
Wipe excess grease off the cam and anchor pin.

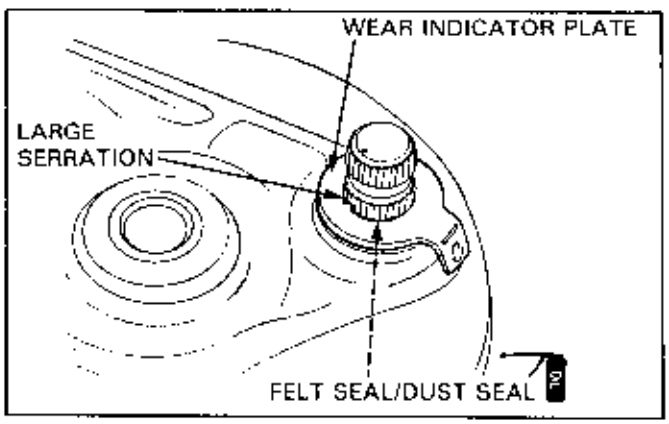
⚠WARNING

- **Grease on the brake linings will reduce stopping ability and may cause brake failure.**



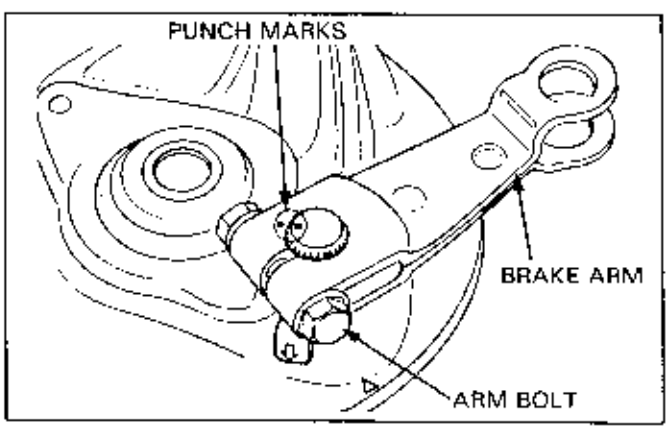
Felt seal: Apply a small amount of engine oil to the felt and install the felt seal on the brake panel.
Dust seal: Apply a small amount of grease to the dust seal lip and install.

Install the wear indicator plate by aligning its large serration with the large serration of the brake cam.



Install the brake arm on the brake cam while aligning the punch marks.

Tighten the arm bolt and nut to the specified torque.



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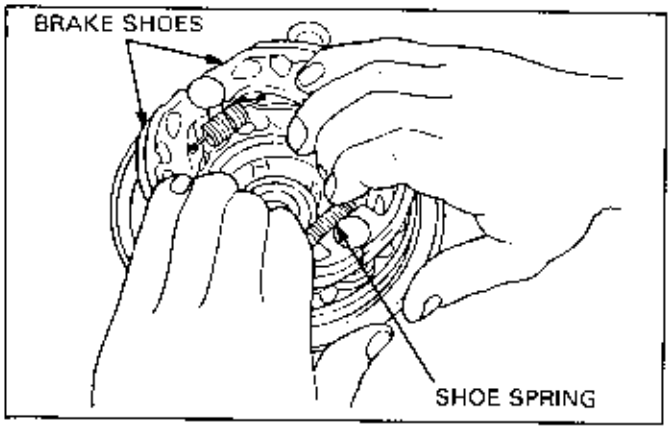
NOTE

- Install the brake shoes according to the mark on the side of each brake shoe.

Keep grease off the brake linings.
If the brake drum and linings are contaminated with grease, clean the brake drum with brake cleaner and replace both brake shoes.

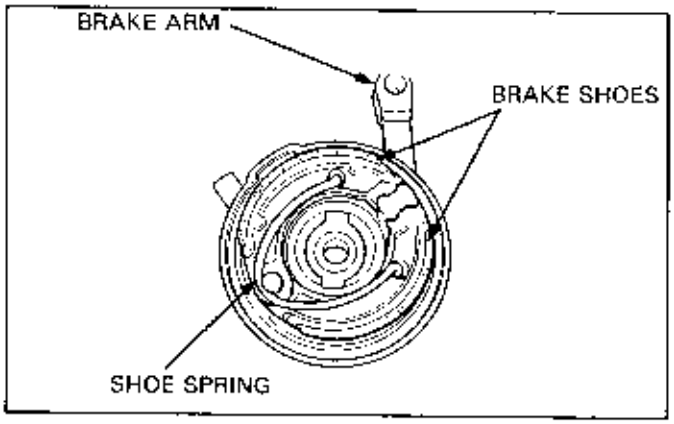
⚠ WARNING

- **Grease on the brake linings will reduce stopping ability.**



Coil spring type:
Install the shoe springs on the brake shoes.

Install a brake shoe on the brake panel, then install the other shoe with care that the shoe springs are in position.



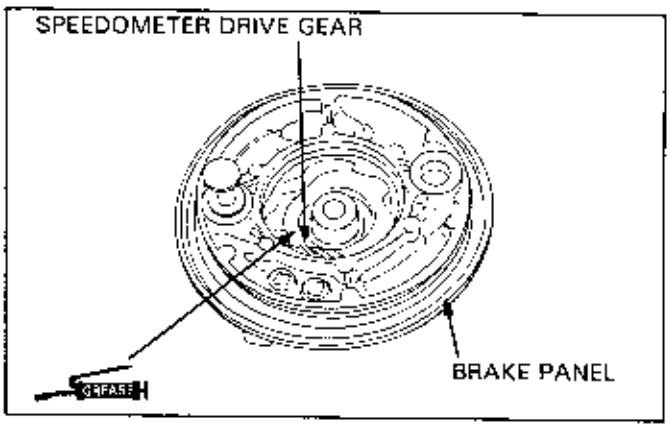
U-spring type:
Install the brake shoes on the brake panel and expand the brake shoes by moving the brake arm.

Install the shoe spring on the brake shoes and secure it on the anchor pin.

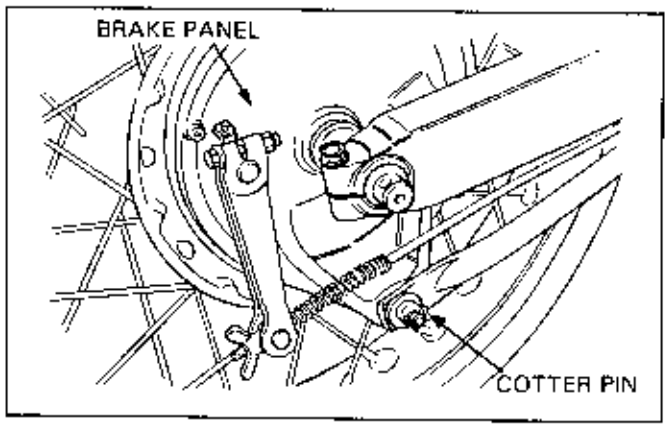
Install the brake panel on the wheel hub.

Install the wheel.

Front wheel: Check the Model Specific manual for the porper installation procedures.



Rear wheel: Check the Model Specific manual for the proper installation procedures.



18. FRONT SUSPENSION

SERVICE INFORMATION

⚠ WARNING

- **Riding on damaged rims or spokes impairs safe operation of the vehicle.**

- When servicing the front wheel, support the motorcycle securely with a jack or other support under the engine.
- Refer to the section 17 for brake system information.

TROUBLESHOOTING

Hard steering
- Steering head bearing adjustment nut too tight
- Faulty steering head bearigs
- Damaged steering head bearings
- Insufficient tire pressure
- Faulty tire

Steers to one side or does not track straight
- Unevenly adjusted right and left shock absorbers
- Bent fork
- Bent front axle; wheel installed incorrectly
- Faulty steering head bearings
- Bent frame
- Worn wheel bearing
- Worn swing arm pivot components.

Front wheel wobbling
- Bent rim
- Worn front wheel bearings
- Faulty tire

Wheel turns hard
- Brake misadjusted
- Faulty wheel bearing
- Faulty speedometer gear

Soft suspension
- Weak fork springs

Telescopic type:
- Insufficient fluid in fork
- Low fluid level in fork
- Faulty anti-dive system

Hard suspension
- Bent fork components
- Bent damper rod (bottom link type)

Telescopic type:
- Incorrect fluid weight
- Bent fork tubes
- Clogged fluid passage

Front suspension noisy
- Worn slider or guide bushings (bottom link type)
- Insufficient fluid in fork
- Loose fork fasteners
- Lack of grease in speedometer gearbox

SYSTEM DESCRIPTIONS

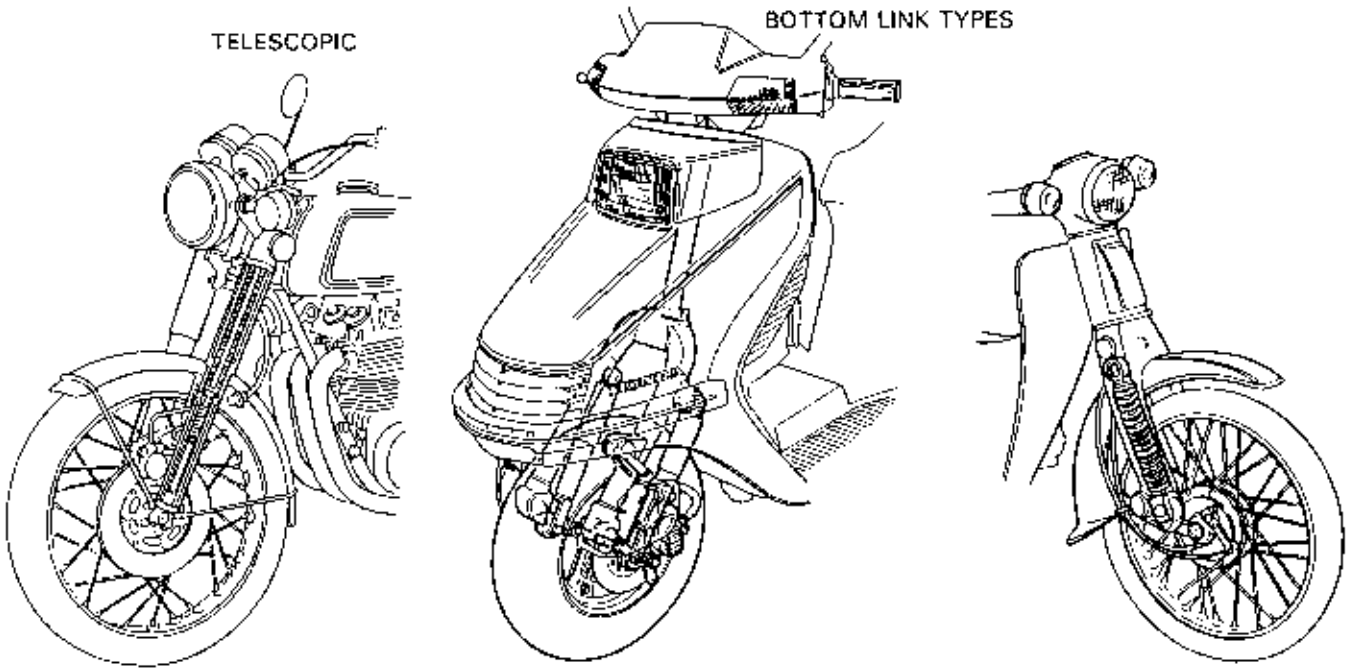
Telescopic and pivoting link-type front suspension systems are by far the most widely used types on motorcycles and scooters.

Telescopic front suspension systems are made up of a pair of upper fork tubes and lower fork sliders that telescope into one another. Within the set of tubes on either side is a spring and an oil damping system. Some systems utilize a cartridge damper within the fork sliders.

Basically, the oil controls the natural tendency of the spring to continue to rebound in ever decreasing amounts in both directions once acted upon by outside forces. Forcing the oil in each fork leg through a series of small holes, in effect, separates the rider/bike combination from both the unwanted characteristics of the spring and from height variations in the riding surface.

Pivoting link front suspension connects the axle to the fork by means of a pivoting link extending from the ends of the axle to the upper front portion of the fork. Between the pivot points on the fork and the axle are eyelets to which the spring/damper units are attached. The top of each 'shock absorber' is attached to the fork, up near the lower steering head bearing.

This design is divided into two basic categories. The trailing link design has the axle supported by links and 'shock absorbers' that 'trail' from the leading edge of the lower portion of the fork. Leading link type front suspension has the links pivoting toward the front and the 'shock absorbers' mounted to the leading edge of the fork.



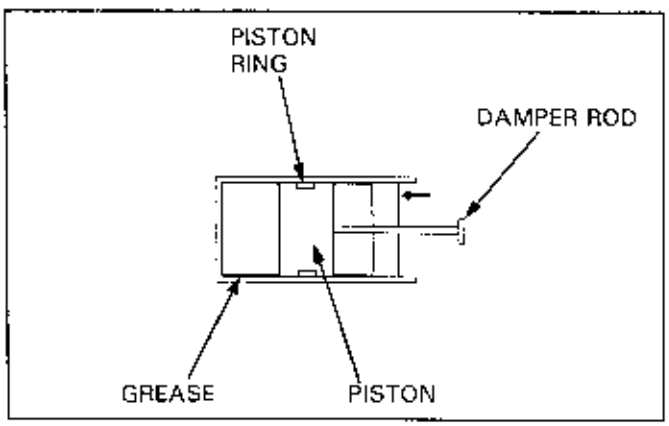
TRAILING LINK
Axle is at the rear of the link.

LEADING LINK
Axle is on the front of the link.

BASIC DAMPER OPERATION

Friction Damper Operating Principles

By far the simplest form of damper is the friction type. Instead of using oil to dampen the movement of the spring and suspension, the friction type uses only the friction of a single nonmetallic piston ring on the top of the damper rod pressing against the greased damper inner cylinder wall. This design is used primarily on only the smallest and simplest of vehicles.



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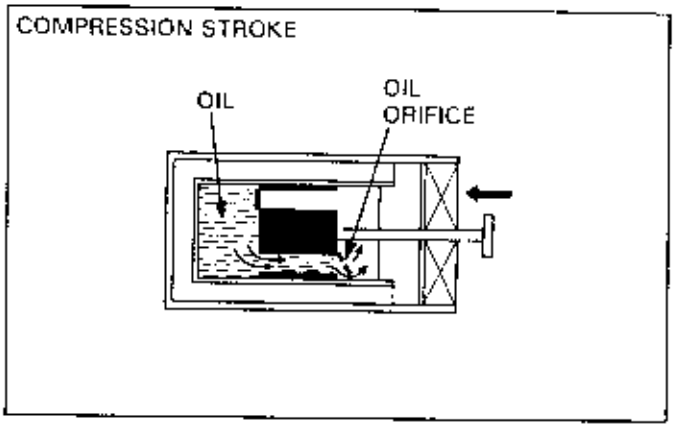
Oil Damper Operating Principles

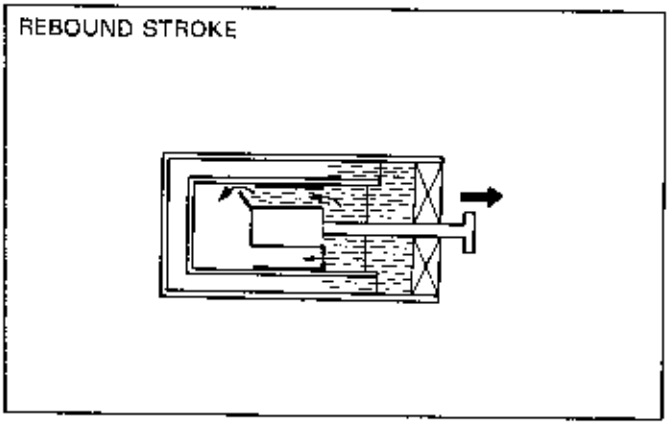
The primary function of suspension dampers is to control the natural rebound energy of the suspension springs so that traction and ride comfort is maintained.

An oil damper controls the spring action by forcing oil to flow through a specific set of holes in the damper piston as the combined spring/damper compresses or extends. The resistance of the movement of the damper piston created by the oil within the damper controls the force of the spring. By varying the path the oil is forced to take on the compression and rebound strokes, the desired damping rates can be achieved.

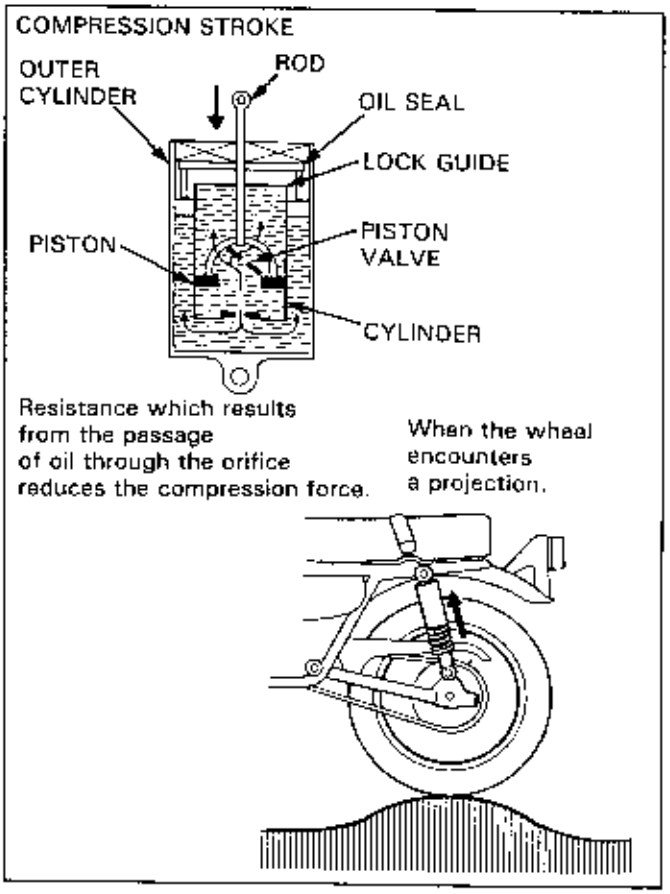


On the compression stroke, oil is forced through several large capacity damping orifices so that the wheel can respond quickly to terrain changes. Since the wheel is free to move quickly, the average ride height of the machine is not disturbed.

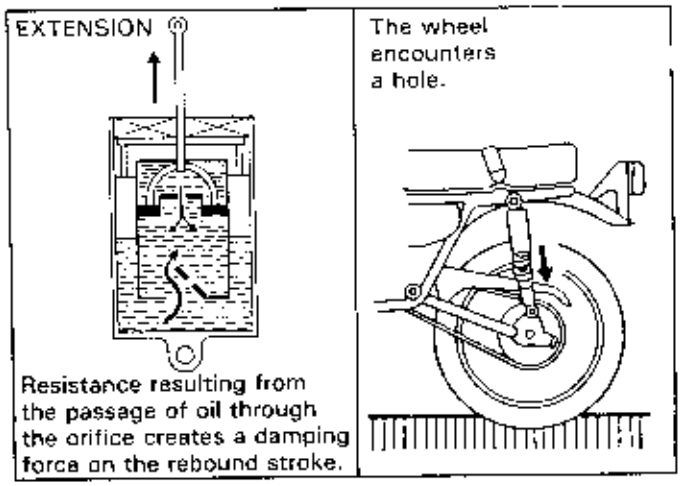
On the rebound stroke, the force of the compressed springs is slowed by forcing the damper oil through fewer and or smaller damping holes. The proper damping characteristics allow the suspension to extend quickly enough to meet the next bump, but not so quickly that the motorcycle bounces from one bump to the next.



In the illustration to the right the compression stroke within a double wall damper is described. As the damper body is forced up against the spring and damper piston, oil is forced through the piston valve with little resistance. The primary resistance to this compression is the damper spring. The oil that passes through the piston merely flows to the upper side of the piston. At the same time, some oil is also allowed to flow out of the bottom valve. The quantity of oil that flows out of the cylinder bottom valve is equivalent to the amount drawn into the top. The combined resistance to flow through each of these valves is the compression damping.



The rebound stroke is illustrated in this drawing. Once the wheel has overcome the bump, the spring forces the damper rod to force the piston back through the damper. Here, oil flows with little resistance into the cylinder, but there is considerable resistance caused by damping valve in the piston.

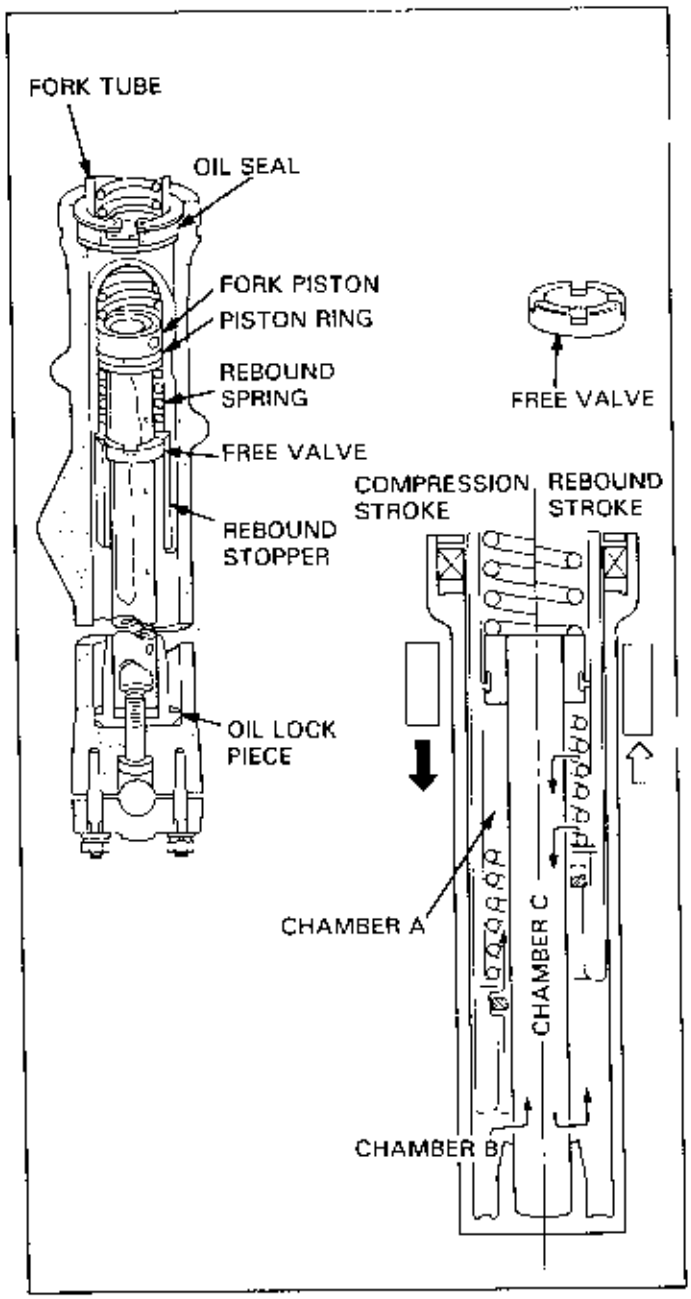


Telescopic Fork:
The telescopic fork serves as a skeletal member of the vehicle framework, a means for turning the vehicle and as the front suspension.
When the fork sliders move telescopically on the compression stroke, oil in Chamber B flows through the orifice in the fork tube into Chamber C, while the oil in Chamber B pushes past the free valve and up into Chamber A. The resistance in this oil flow absorbs shock on compression.

As the fork nears full compression, the tapered oil lock piece comes into play to hydraulically prevent the fork from bottoming.

On the rebound stroke, oil in Chamber A flows through the orifice in the top of the fork piston into Chamber C. Here the resulting resistance serves as a damping force and the tendency of the spring to rebound quickly is controlled.

The rebound spring absorbs the shock of the fork legs extending outward. Oil in Chamber C flows through the orifice in the bottom of the fork piston into Chamber B at this time.



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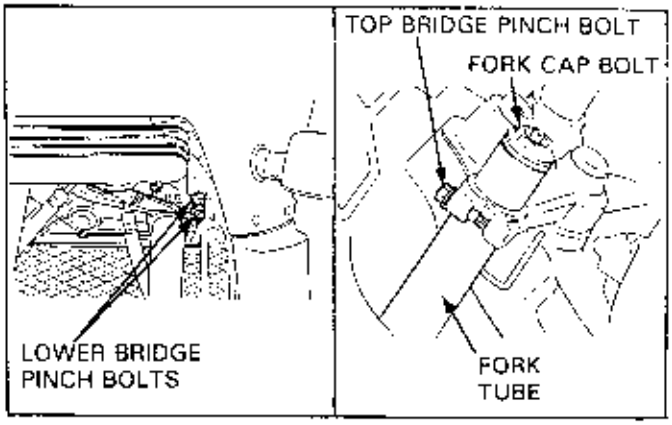
FORK

REMOVAL

Remove the following:
- Handlebar(s).
- Front wheel.
- Front fender.
- Front brake caliper(s) and bracket(s).
- Fork brace.

Loosen the fork pinch bolts.



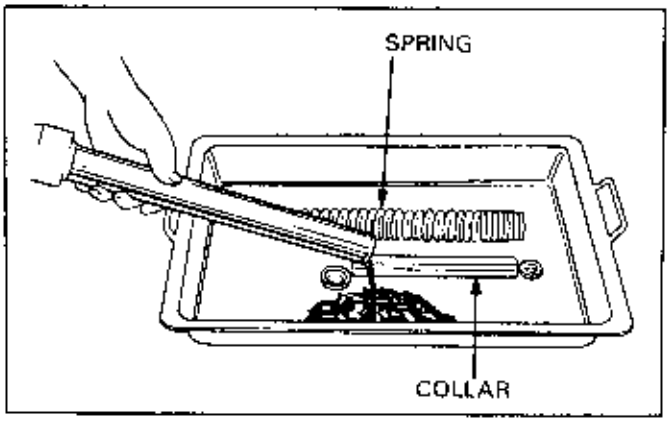
Pull each fork leg out of the fork bridges by twisting while pulling them down.

Press the air valve core to release air pressure from the fork.

NOTE

If the fork legs are to be disassembled:
- Break the socket bolts in the bottom of the fork sliders loose, but do not unscrew them (oil will leak out).

To loosen the fork cap bolts:
- Because the clamping action of the pinch bolt(s) can distort the fork tubes slightly and prevent the caps from loosening, it is sometimes better to reposition the legs in the clamps so that the caps are 2 to 3 inches above the clamps, as shown in the first illustration on this page, prior to loosening them.

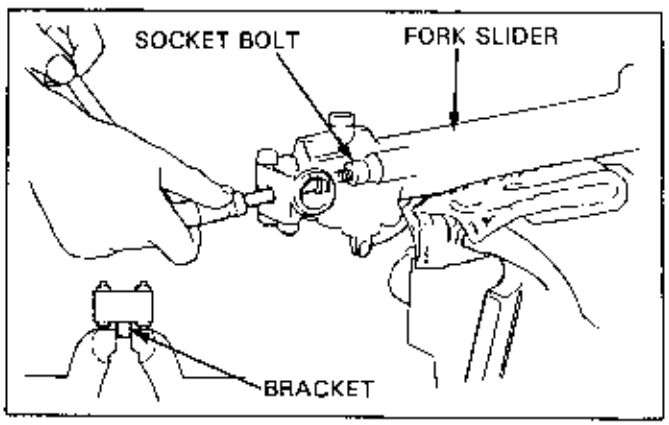


DISASSEMBLY

Remove the following:
- Fork boot (if used on the particular model)
- Fork cap bolt. (see note above)
- Spring seat.
- Collar.
- Fork spring.

Drain the fork oil by pumping the fork up and down several times.

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

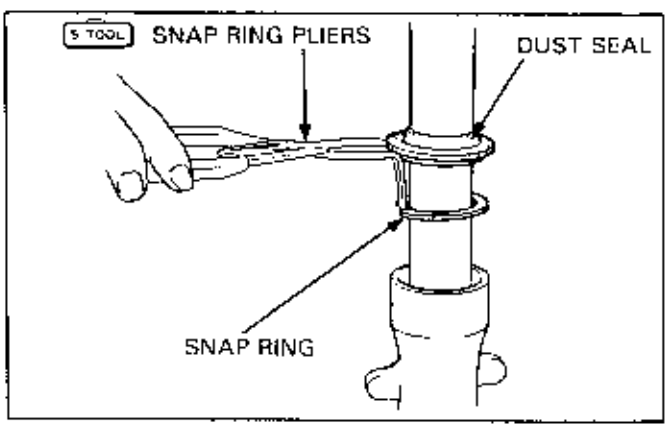


Remove the socket bolt with a hex wrench.

NOTE

- Temporarily install the fork spring and fork cap bolt to loosen the socket bolt.

Remove dust seal, washer, and snap ring.



S TOOL

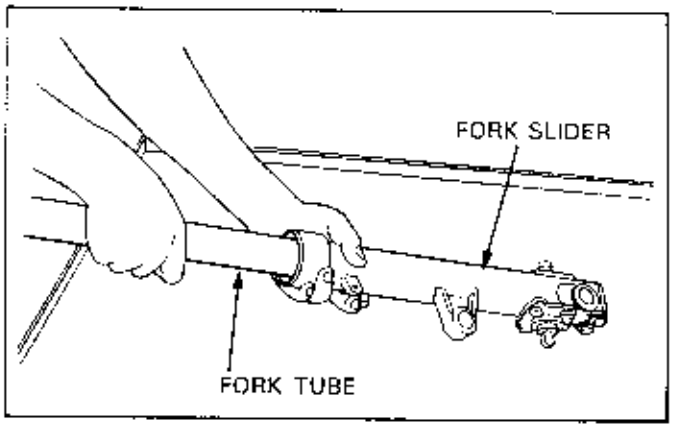
SNAP RING PLIERS **07914—3230001**

Pull the fork tube out from the fork slider.

NOTE

- If the type of fork being disassembled has a guide bushing installed, remove the fork tube as follows:

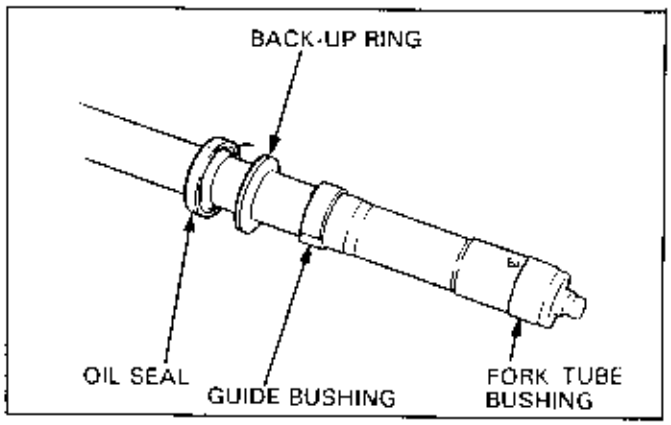
Pull the fork tube out until resistance from the slider bushing is felt. Then move it in and out, tapping the bushing lightly until the fork tube separates from the slider. The slider bushing will be forced out by the fork tube bushing.



Remove the following:
- Oil seal.
- Back-up ring.
- Fork tube bushing.
- Guide bushing, if installed.
- Rebound spring, if possible.

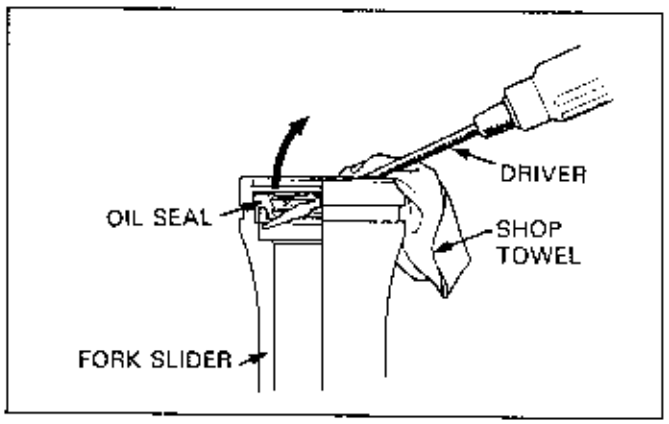
NOTE

- Do not remove the fork tube bushings unless it is necessary to replace them with new ones.



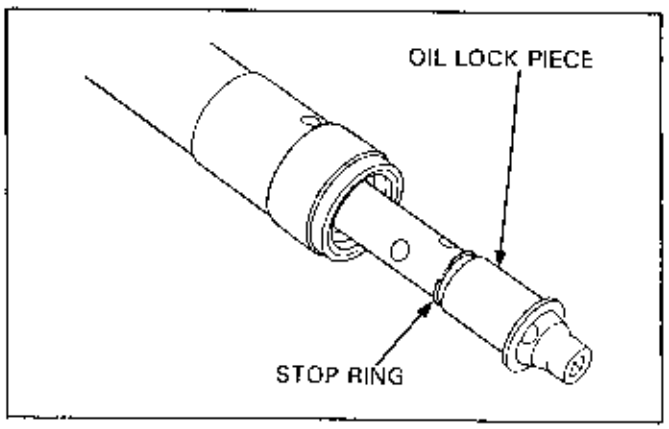
NOTE

- On the fork type that has no guide bushing; the fork tube might come out of the fork slider and the oil seal may remain in the slider. Remove the oil seal with care not to damage the sliding surface of the slider.



Remove the following:
- Oil lock piece from the fork slider.
- Stop ring from the fork piston.

Clean all disassembled parts.



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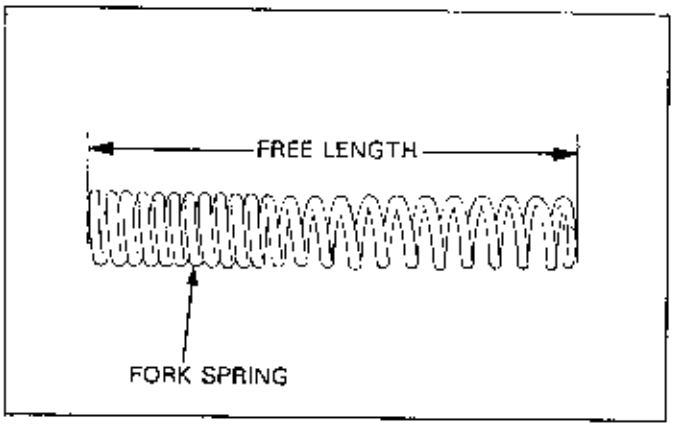
INSPECTION

Measure the fork spring free length by placing the spring on a flat surface. Replace the spring if it is shorter than the service limit.

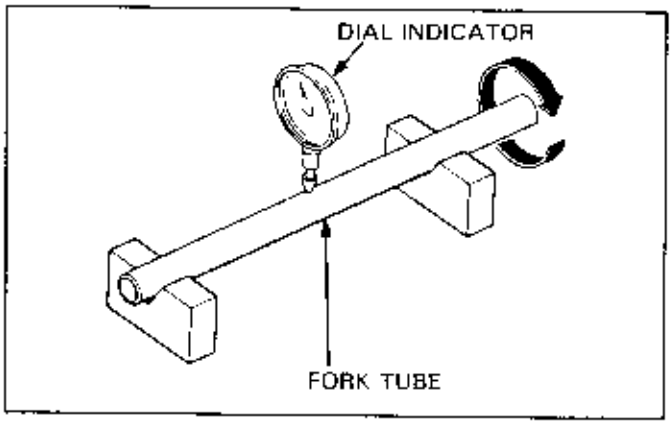


Set the fork tube in V-blocks and measure the fork tube runout by rotating it with a dial indicator mounted against it.

The actual runout is 1/2 of the total indicator reading, replace if the service limit is exceeded, or there are scratches or nicks that will allow fork oil to leak past the seals.

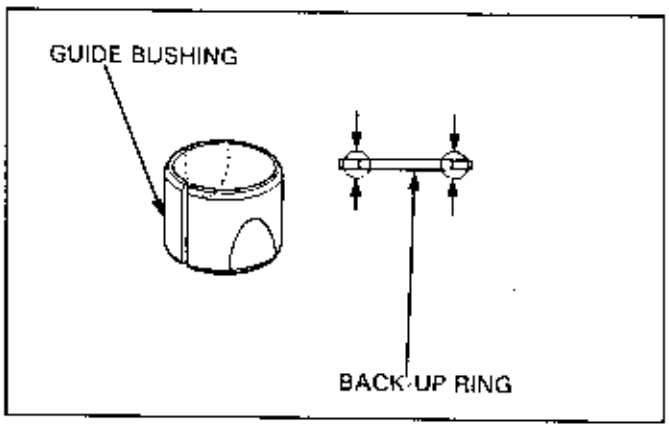
NOTE

- Do not reuse the fork tube if it cannot be perfectly straightened with minimal effort.

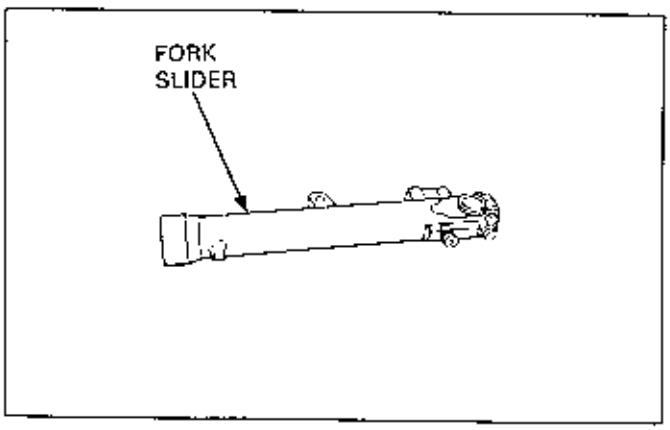


Visually inspect the slider and fork tube bushings. Replace the bushings if there is excessive scoring or scratching, or if the teflon is worn so that the copper surface appears on more than 3/4 of the entire surface.

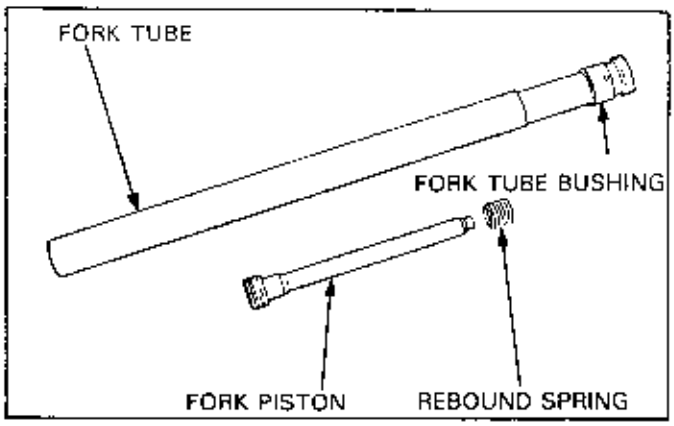
Check the back-up ring: replace it if there is any distortion at the points shown.



Check the fork sliders for internal scratches, dents that are visible from both the inside and outside, or abnormal wear. Replace if necessary.



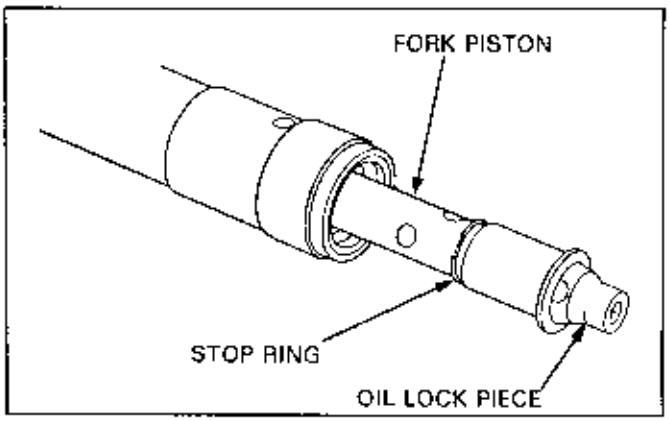
Check the fork piston and other components for damage, cracks, straightness or abnormal wear. Replace if necessary.



ASSEMBLY

Insert the fork piston into the fork tube.

Install the following:
- stop ring onto the fork piston.
- rebound spring onto the fork piston (if the rebound spring has been removed).
- oil lock piece.



Replace the dust seal with a new one whenever it is removed.

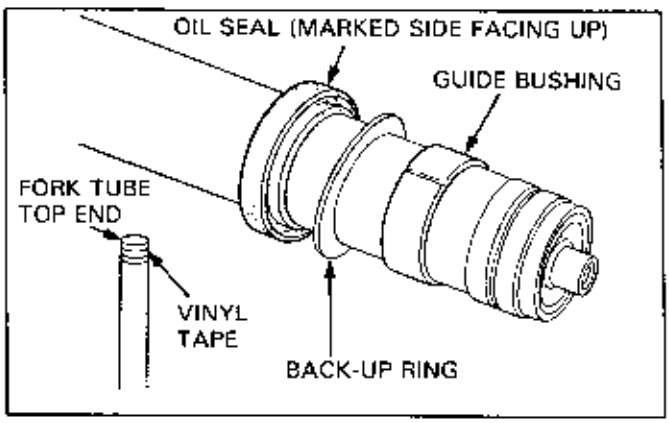
Insert the fork tube into the fork slider.

Install the back-up ring and a new oil seal.

Install the guide bushing if it has been removed.

NOTE

- Inspect the fork tube sliding surfaces for damage, whenever the oil seal is replaced due to oil leaks.
- Wrap vinyl tape around the fork tube top end to avoid damaging the oil seal during the oil seal installation.
- Apply fork oil to the oil seal lip.
- Inspect the oil seal with the marked side facing up.

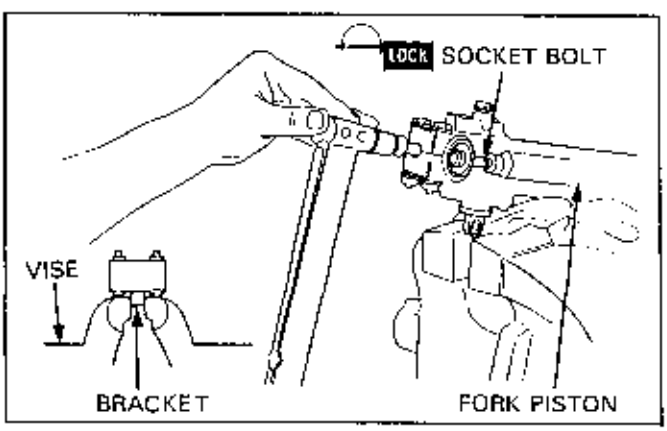


Place the fork slider in a vise, with soft jaws or a shop towel, by the brake bracket or caliper bracket as shown. Be careful not to distort the slider by clamping it in a vise incorrectly.

Apply a locking agent to the socket bolt and thread it into the piston. Tighten the bolt with a 6 mm hex wrench.

NOTE

- Temporarily install the fork spring and fork cap bolt so that the piston is held in place when the socket bolt is tightened.



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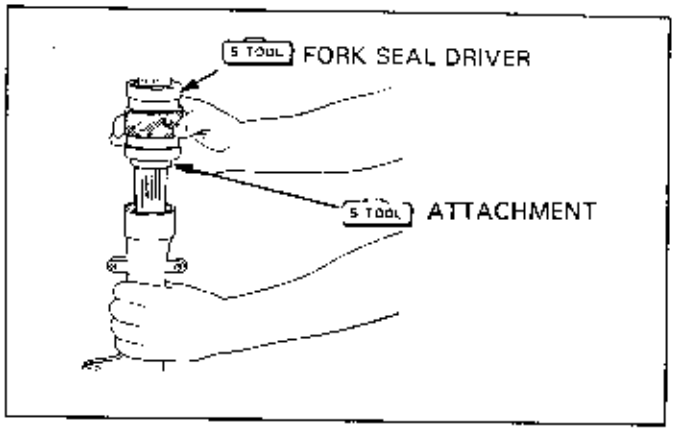
Place the slider bushing over the fork tube and rest it on the slider. Put the back-up ring and an old bushing or equivalent tool on top.

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.



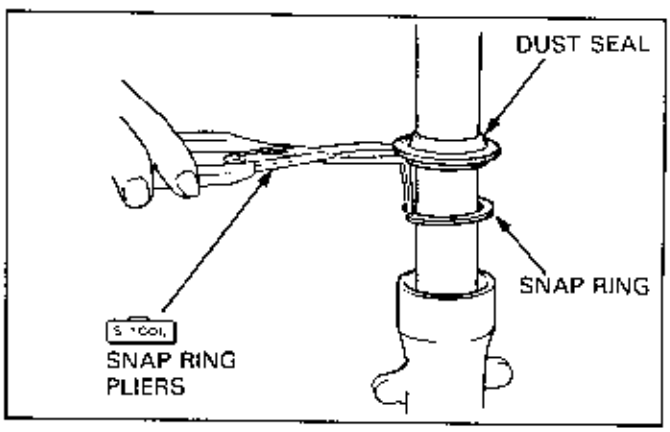
Install the snap ring with its radiused edge facing down.

Seat the snap ring firmly in the groove.

⚠ WARNING

- **Failure to firmly seat the snap ring may cause the fork assembly to come apart unexpectedly and lead to a serious injury.**

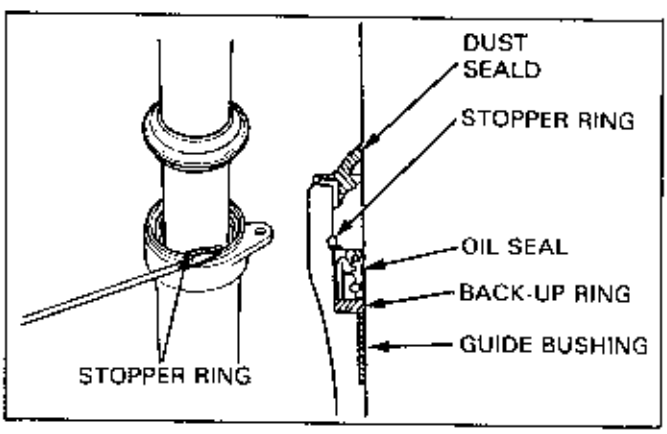
S TOOL
SNAP RING PLIERS **07914—3230001**



NOTE

- In case of stopper ring, using a small screwdriver install the stopper ring into the groove taking care not to damage the fork tube.

Install the dust seal using the fork seal driver.

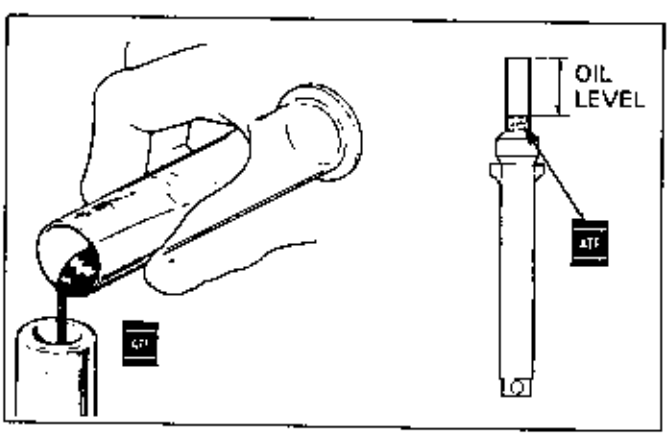


Pour the specified amount of ATF into the fork tube.

Pump the fork tube several times to remove trapped air from the lower portion of the tube.

Compress the fork leg fully and measure the oil level from the top of the tube.

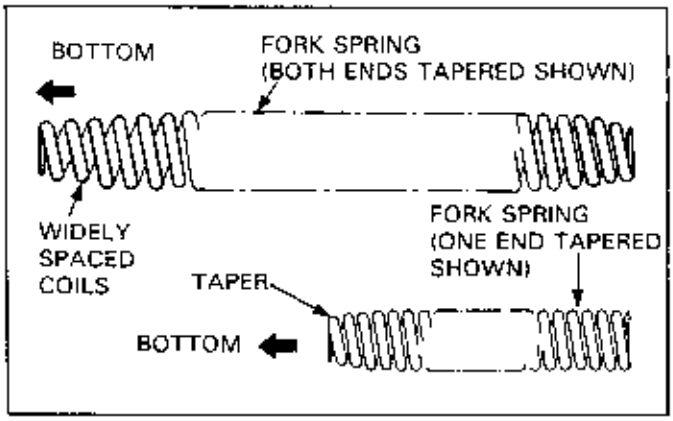
Wipe the oil off of the spring thoroughly using a clean, lint free shop towel.



Pull the fork tube up and insert the spring.

NOTE

- Most fork springs are designed to be installed with a specific end toward the top and bottom.
- One end tapered; install the spring with the tapered end toward down. Both sides tapered; spring may be installed with either end down.
- If the coils on only one end are tapered, this end should be at the bottom. If the coils at both ends are tapered and the distance between each of the coils is the same (straight wound spring), either way is acceptable. However, a spring with the coils on both ends tapered and the coils are closer together at one end (progressive wound spring), the widely spaced coils should be at the bottom.



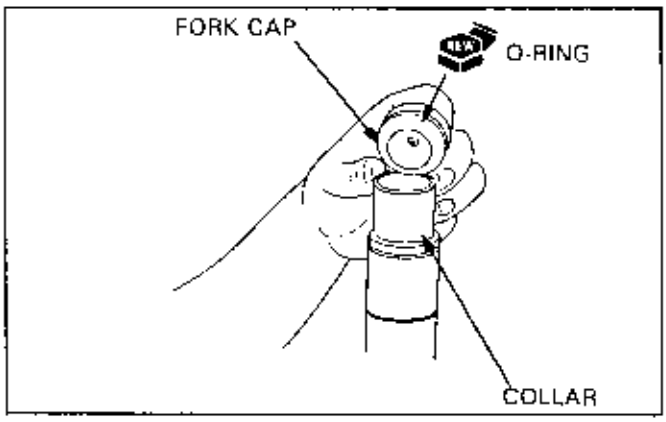
Reassemble the removed parts (spring, collar, etc.).

Install a new O-ring into the fork cap groove.

Screw the fork cap into the fork tube.

NOTE

- Tighten the fork cap to the specified torque after installing into the fork bridges and tightening the stem side pinch bolts.



INSTALLATION

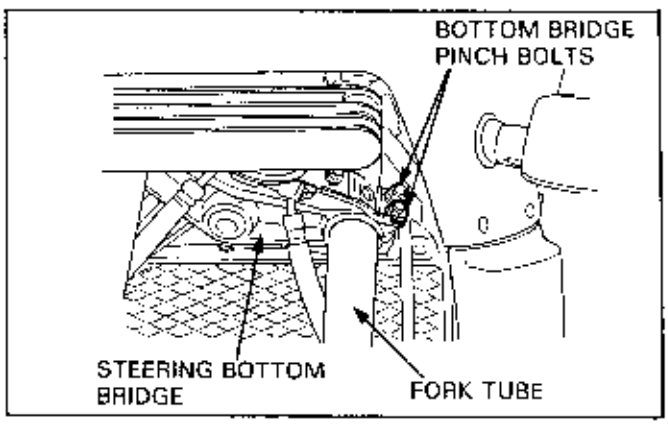
Install the fork boot (if the particular model uses one).

Install the fork legs through the fork bridges by twisting while pushing them upward.

Position the legs in the clamps as specified in the Model Specific manual.

NOTE

- Make sure that the cables and wire harnesses are routed correctly.

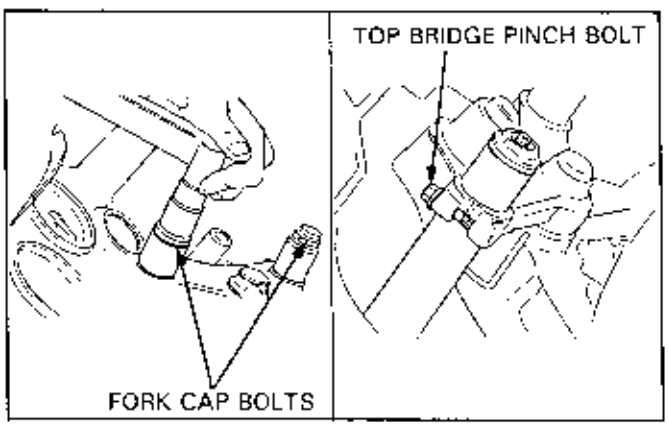


Tighten the fork bridge pinch bolts to the specified torque.

Tighten the fork caps to the specified torque.

Install the removed parts in the reverse order of removal (Refer to the Model Specific manual).

With the front brake applid, compress the fork up and down several times to check for proper fork operation.



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HANDLEBAR(S)

ONE-PIECE, TUBULAR TYPE

Removal

Remove the following:

- Rear view mirror(s).
- Handlebar switches.
- Throttle cable.
- Brake and clutch lever brackets.

Prevent contaminants or any foreign material from entering the system when filling the reservoir.

⚠ WARNING

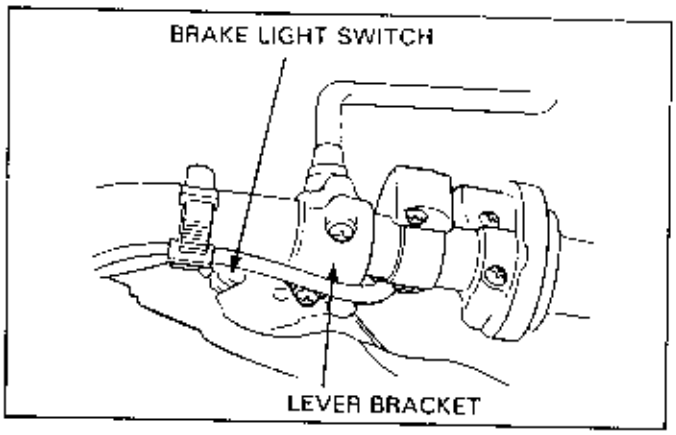
- **Contaminants in the system may cause a reduction or loss of braking ability.**

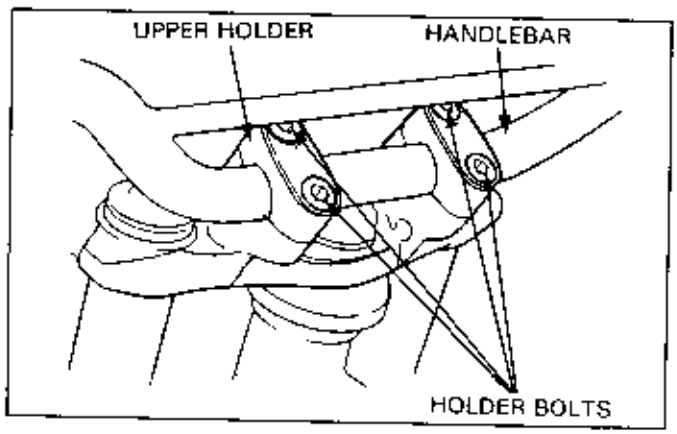
Avoid spilling the fluid on painted, plastic, or rubber parts. Place a rag over these parts whenever the system is serviced.

CAUTION

- **Spilled brake fluid will damage painted, plastic, or rubber parts.**

- Holder bolts.
- Handlebar upper holders.
- Handlebar.





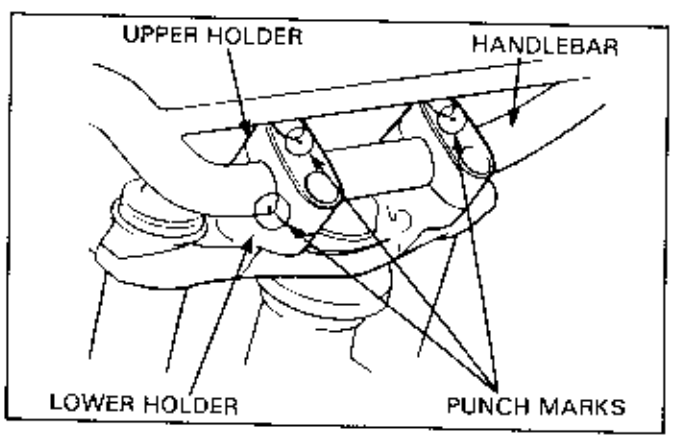
Installation

Place the handlebar onto the lower holders, aligning the punch mark on the handlebar with the upper surface of the lower holders.

Install the upper holders with the punch marks facing forward.

Tighten the front bolts first, then the rear, to the specified torque.

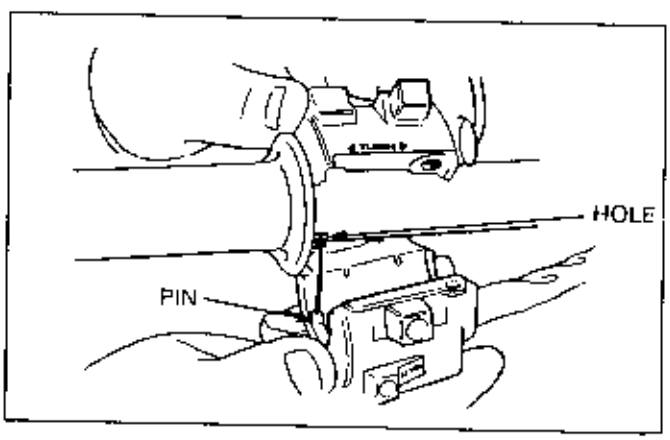
Refer to the Model Specific manual for the proper torque value.



Connect the choke cable to the choke lever.

Install the left handlebar switch, aligning the pin with the hole in the handlebar.

Tighten the forward screw first, then the rear screw.

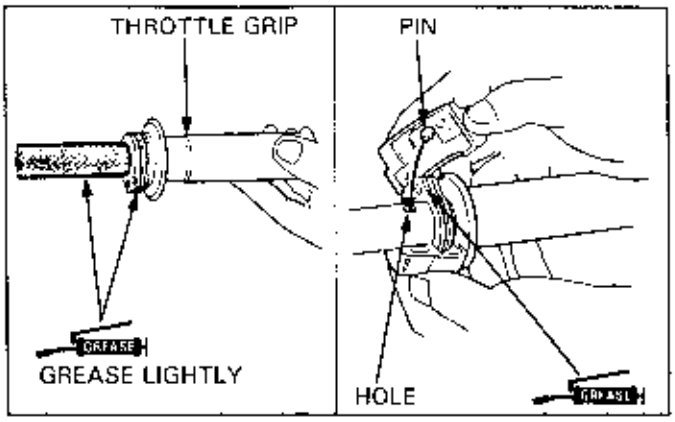


Apply a light coating of grease to the throttle cable ends and throttle grip sliding surface.

Connect the throttle cable to the throttle grip and install the grip to the handlebar.

Install the right handlebar switch, aligning the pin with the hole in the handlebar.

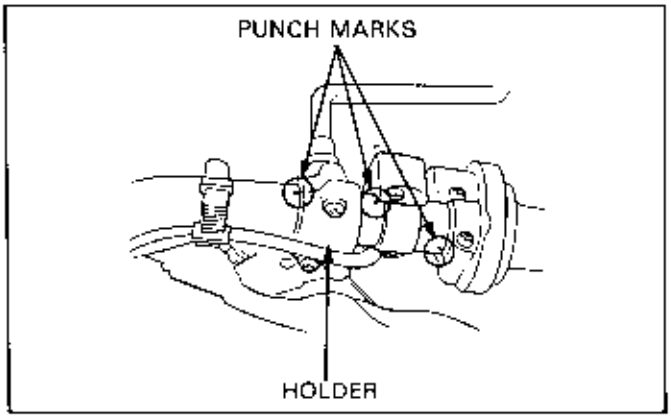
Tighten the forward screw first, then the rear screw. Check that the throttle grip moves smoothly and adjust the throttle grip free play.



Install the brake lever and clutch lever brackets, aligning the punch marks with:
- cable type: slit in the bracket.
- hydraulic type: master cylinder and set the holder with the holder punch mark facing up.

Tighten the upper bolt first, then the lower bolts.

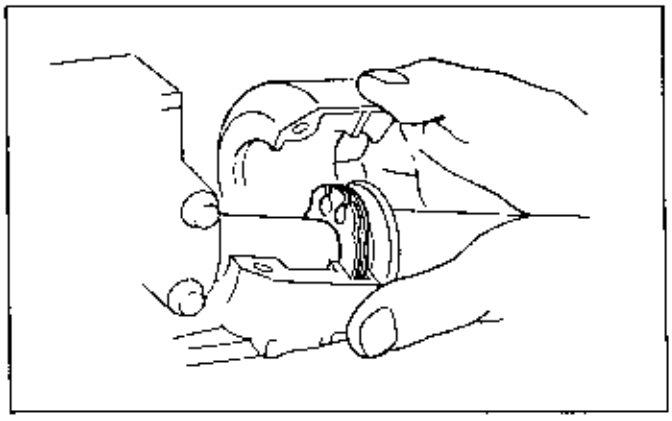
Route switch wires properly and secure them with bands.



TWO-PIECE, CLAMP-ON TYPE

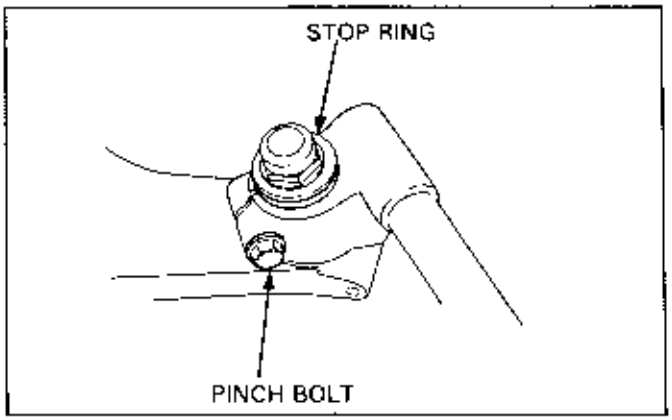
Removal

Remove the following:
- Both handlebar switches
- Throttle grip
- Master cylinder(s) or lever bracket(s)



Remove the stop ring.

Remove the pinch bolt and handlebar.



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Installation

Install the handlebar by aligning the boss with the top bridge slot.

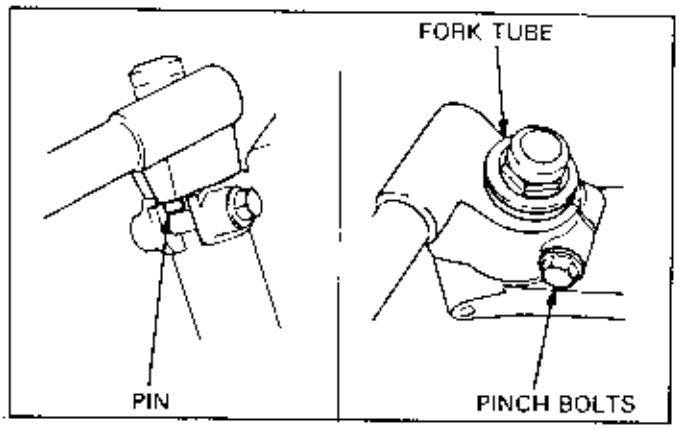
Install the stop ring into the groove of the fork tube.

Tighten the pinch bolts to the specified torque.

While turning the handlebar through its full range, check for smooth handlebar movement. Also check that there is no interference with cables or harnesses, especially throttle and brake cables, hoses, and lines.

⚠WARNING

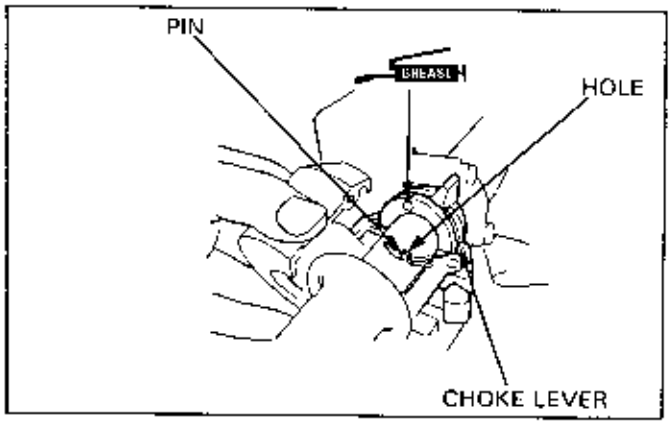
- **Handlebar interference can have an adverse effect on safe vehicle operation.**



Connect the choke cable to the choke lever.

Install the left handlebar switch, aligning the pin with the hole in the handlebar.

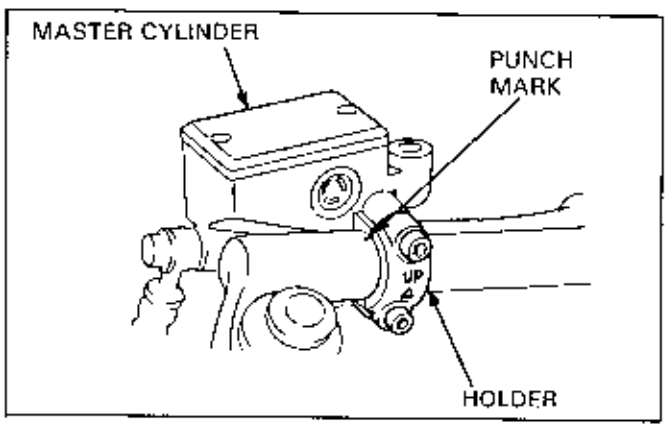
Tighten the forward screw first, then the rearward screw.



Install the brake lever and clutch lever brackets or both master cylinders by aligning the punch mark on the handlebar with the:

- On cable type: Slit of the lever bracket.
- On hydraulic type: Master cylinder and set the master cylinder holder with the "UP" mark facing up or punch mark facing forward or up.

Tighten the upper or forward bolt first, then tighten the lower or rearward bolt to same torque.



Apply grease to the cable ends and throttle grip sliding surface.

Connect the throttle cable to the grip and install the throttle grip.

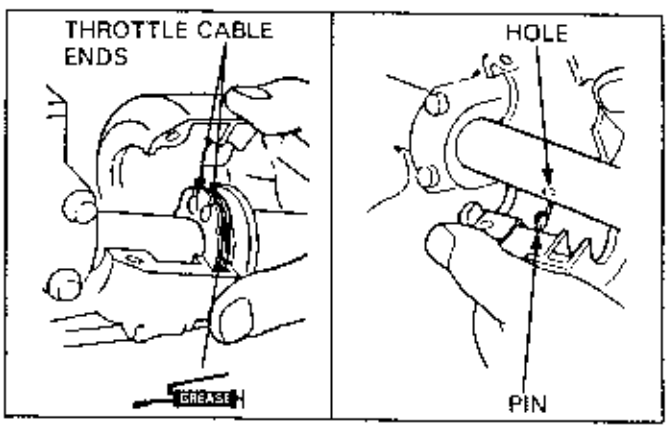
Set the right handlebar switch by aligning the pin with the hole of the handlebar.

Tighten the forward screw first, then the rearward screw.

Check that the throttle grip moves smoothly.

Route the wires properly and secure them with wire bands.

Adjust the throttle grip free play.

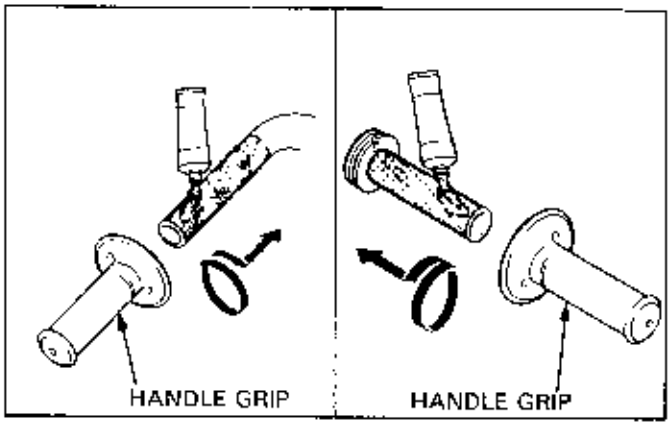


HANDLE GRIP INSTALLATION

If a choke lever is attached to handlebar, it must be installed onto the handlebar before you install the grip.

Apply Honda Bond A or Honda Hand Grip Cement (U.S.A. only) to the inside surfaces of the grips and to the clean surface of the left handlebar and throttle. Wait 3—6 minutes and install the grips. Rotate the grips for even application of the adhesive.

Apply sufficient but not excessive adhesive to the throttle. Excessive adhesive, forced into the interior bore of the drum, will restrict free drum movement on the handlebar.
Allow the adhesive to dry for at least an hour before using.



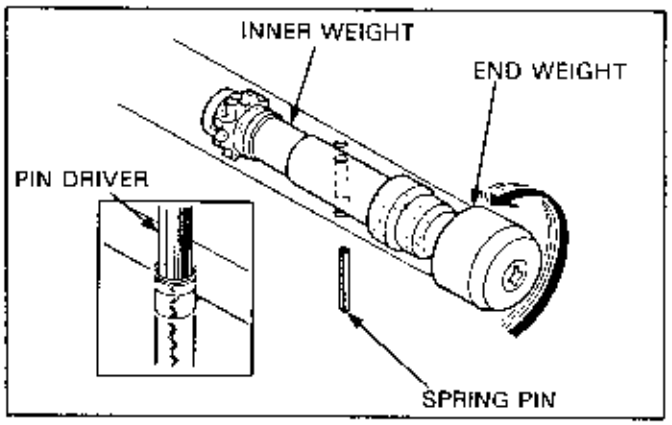
⚠ WARNING

- **Any restriction of the throttle can cause a loss of throttle control.**

HANDLEBAR WEIGHT REPLACEMENT

End-Type Weights:
Remove the mounting screw and weight.
Inner-Type Weights:
Remove the handlebar grip:

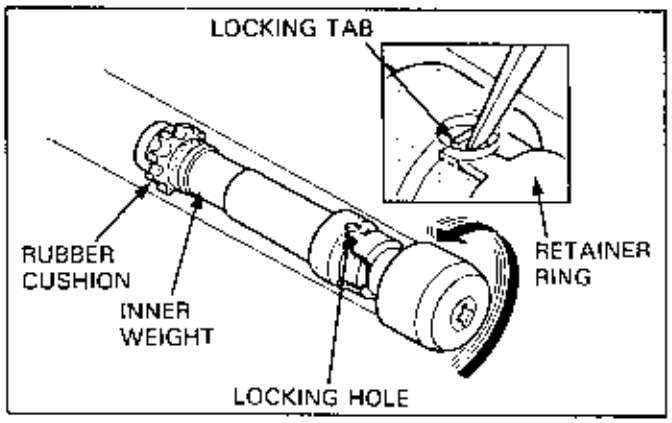
- Spring pin type:
  Drive out the spring pin using a pin driver
- Retainer ring type:
  Straighten the locking tab.



To remove, pull the weight while twisting it.

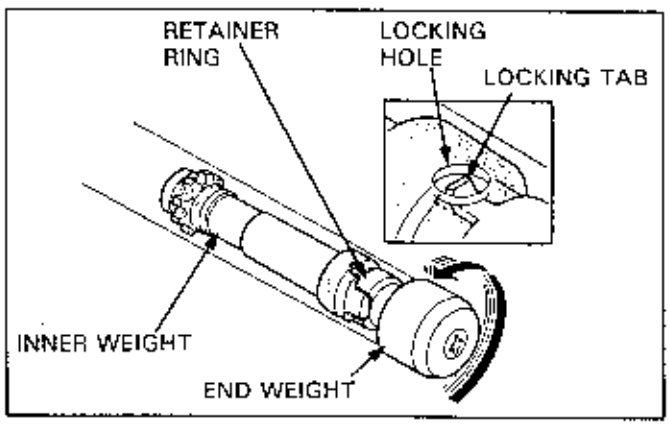
NOTE

- The inner weight is centered within the bar.



Install a new retainer ring to the inner weight and install the end weight, aligning the cutout.

Insert the weight into the handlebar, and turn it to ensure that the locking tab aligns with the hole.



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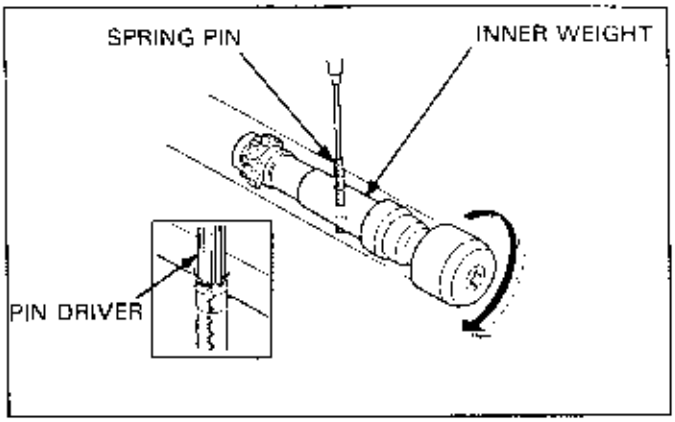
Insert the weight into the handlebar and align the spring pin holes by turning it.

Secure the weight with the spring pin using pin driver.



STEERING STEM

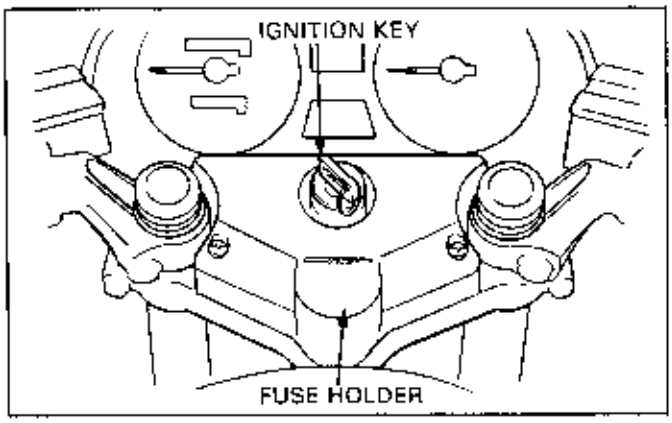
If the vehicle has been involved in a collision, the steering stem may be damaged.

REMOVAL

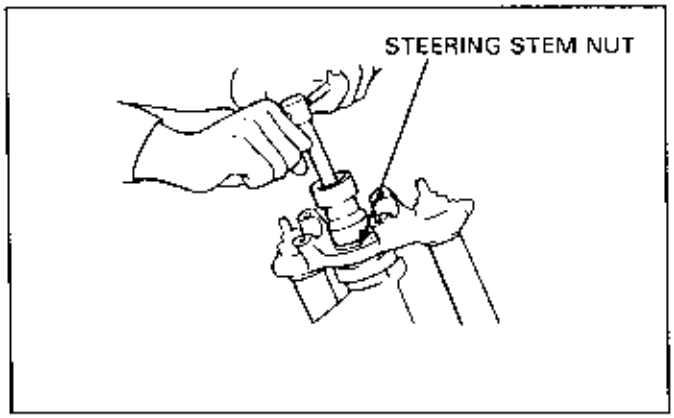
Telescopic Type:
Remove the handlebar.

Remove the ignition switch and/or fuse holder if either are attached to the top fork bridge.

Refer to the Model Specific Manual for specific procedures.

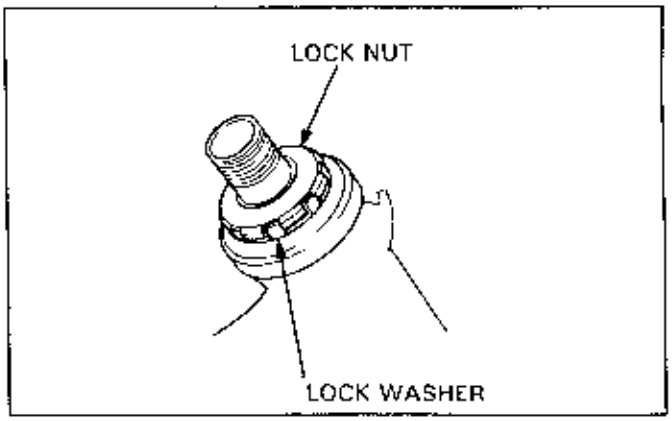


Remove the following:
- Stem nut and washer.
- Front wheel and fork.
- Fork top bridge.
- Horn and/or brake hose joint, if either are attached.

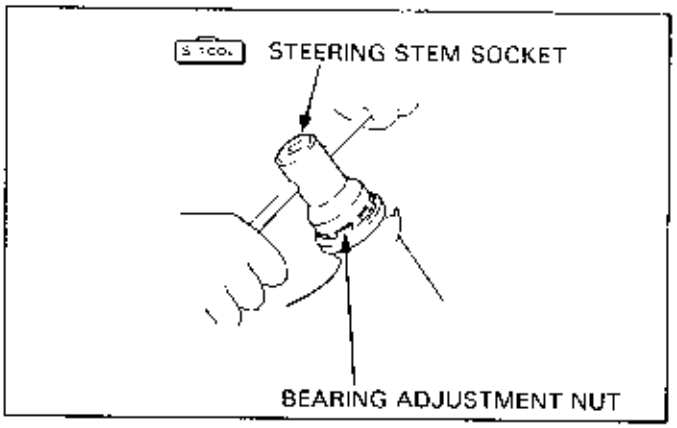


The lock washer tab must be bent down in order to remove the lock nut.

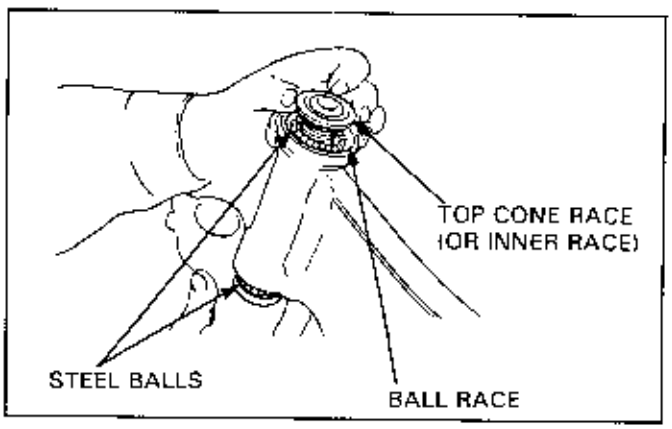
Remove the lock nut and lock washer.



Remove the bearing adjustment nut.



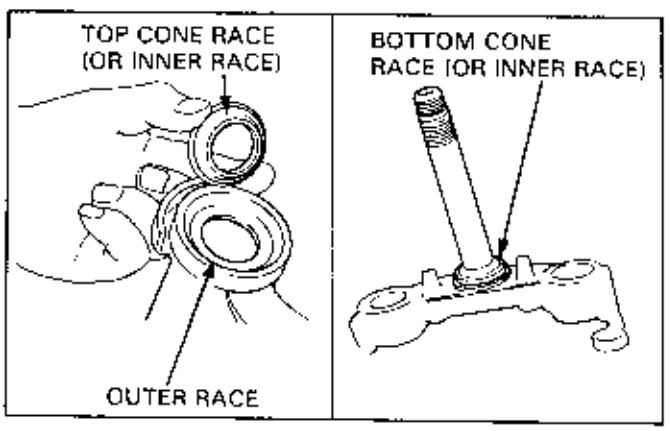
If the bearings are the loose-ball type, place a shop towel under the steering stem to catch the steel balls.



Remove the dust seal and top cone race, or inner race, while holding the steering stem with your other hand. Then remove the steering stem from the frame.

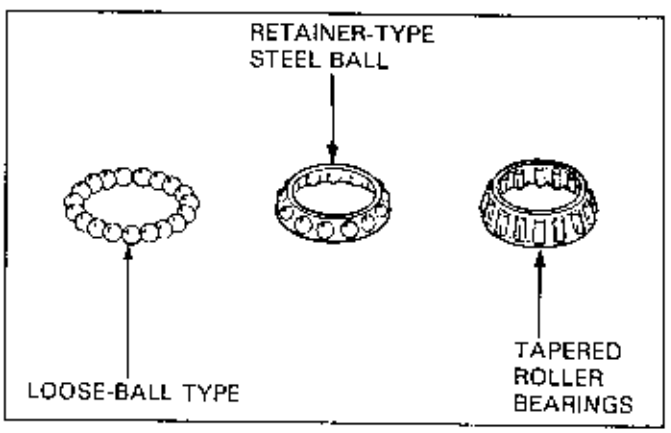
NOTE

- Where loose balls are used, be sure you have the correct number of balls to ensure none have been lost.
- Tapered roller bearings or retained-ball type bearings should be removed from the steering stem after the stem has been removed from the frame.



Inspection

Check all of the races and balls for damage or abnormal wear and replace as necessary.



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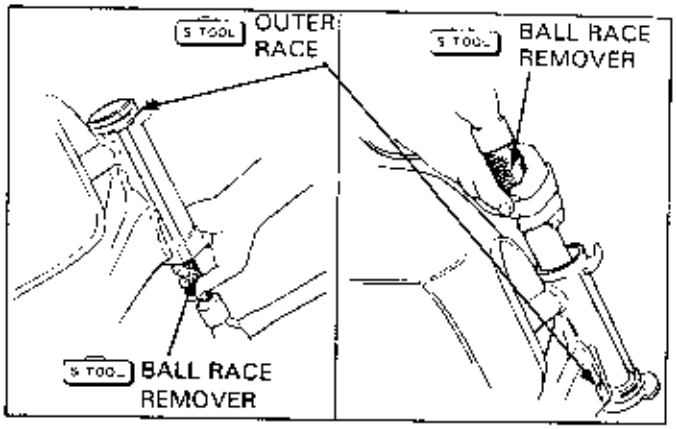
RACE REPLACEMENT

NOTE

- Bearings should be replaced as a set—inner and outer races.
- If the motorcycle has been involved in an accident, examine the area around the steering head for cracks.

Remove the races from the steering head using the ball race remover.

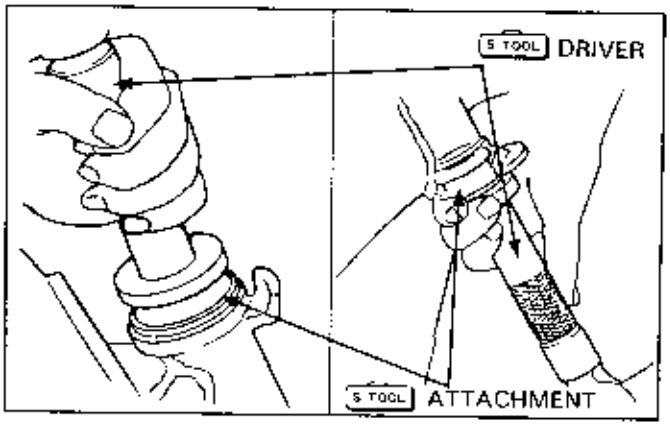
Refer to the Model Specific manual for specific tools.



Install new races into the steering head of the frame using the driver and attachment.

NOTE

- Drive the races in squarely, making sure that they are fully seated.

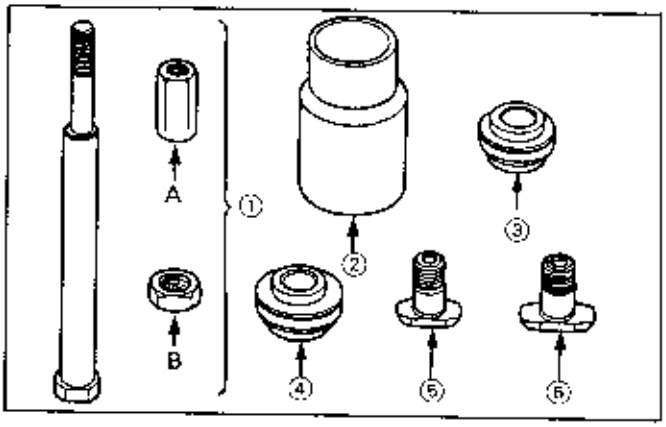


On aluminum frames: replace the races using the Ball Race Remover Set as described in the following procedure.

S TOOL

Ball race remover set (includes (1) thru. (6)) 07946—KM90001

(1) Driver shaft	07946—KM90300
(2) Base	07946—KM90600
(3) Attachment A, 47 mm	07946—KM90100
(4) Attachment B, 55 mm	07946—KM90200
(5) Remover A, 47 mm	07946—KM90401
(6) Remover B, 55 mm	07946—KM90500



Top Race Removal

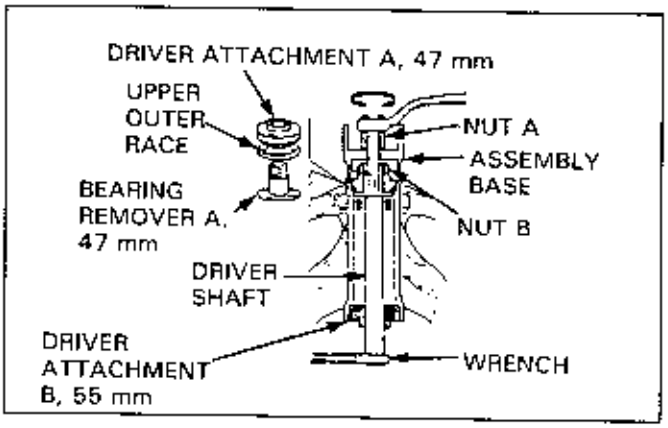
Install remover tool A into the steering head and place attachment A onto remover A and secure it with nut B.

Install attachment B onto the Driver shaft and install them through attachment A.

Install the base noting the proper installing direction and screw in nut A.

Set attachment B into the bottom of the steering head.

Hold the driver shaft with a wrench and tighten nut A to remove the upper race.



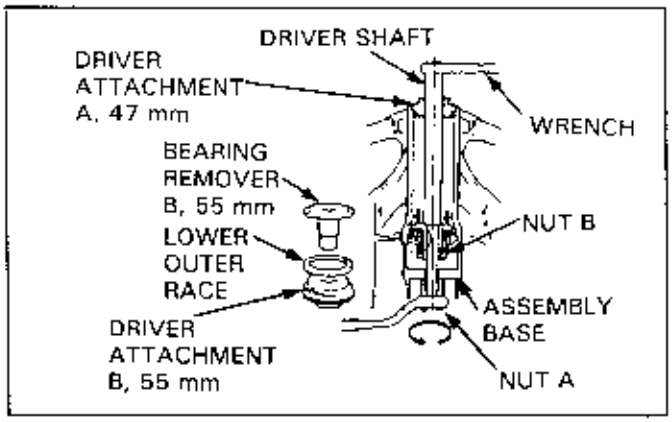
Bottom Race Removal

Set remover B into the steering head, place attachment B onto remover B, and secure it with nut B.

Install attachment A onto the top of the steering head.

Install the remover shaft through attachments A and B and set the base with the big end toward the head pipe and screw in nut A.

Remove the bottom race in the same manner as the top race.



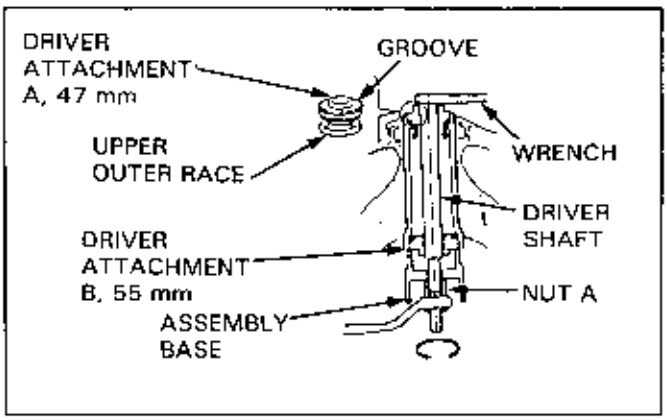
Top Race Installation

Install a new top race and attachment A onto the top of the steering head.

Install the driver shaft, attachment and base with the small side of the base toward the steering head as shown.

Tighten nut A.

Hold the driver shaft to prevent the new race from turning, and install the top race by turning nut A gradually until the groove of attachment A aligns with the top end of the head pipe.

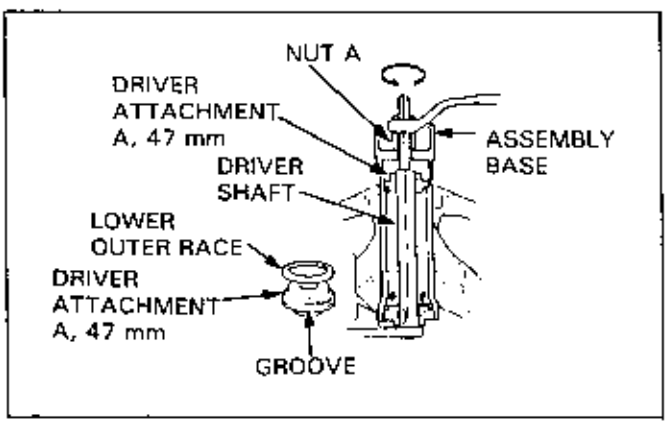


Bottom Race Installation

Install a new bottom race and attachment B onto the driver shaft, and install them into the steering head.

Set attachment A and base on the top of the steering head and tighten nut A.

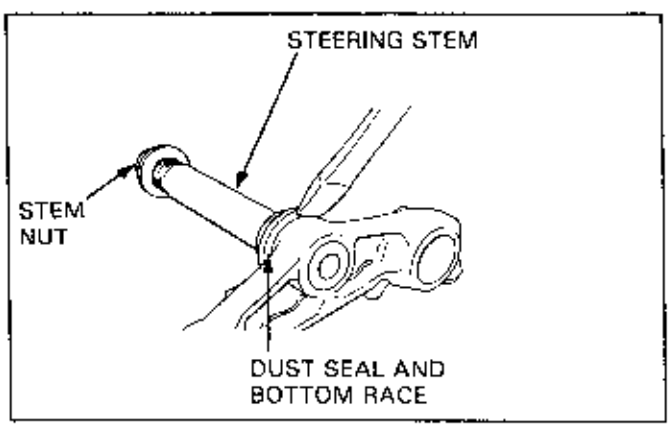
Hold the driver shaft securely and install the bottom race into the steering head by turning nut A gradually until the groove of the attachment aligns with the bottom of the steering head.



Steering Stem Bottom Race Replacement

Temporarily install the steering stem nut onto the steering stem to prevent damage to the threads.

Remove the bottom race and dust seal using a drift, and discard them.



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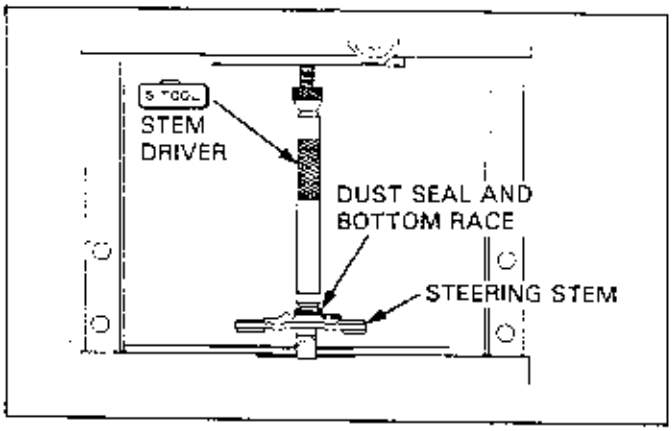
Install a new dust seal and bottom race onto the steering stem.

Press in the bottom race using the steering stem driver and a hydraulic press.



STEERING STEM INSTALLATION

Loose-Ball Type

Apply grease to the top and bottom cone races. Install the steel balls onto the top and bottom races making sure you have the correct amount.

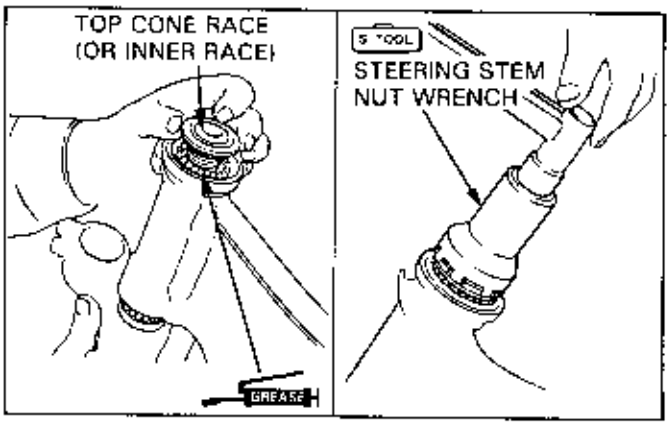
Insert the steering stem, taking care not to dislodge the steel balls from the grease.

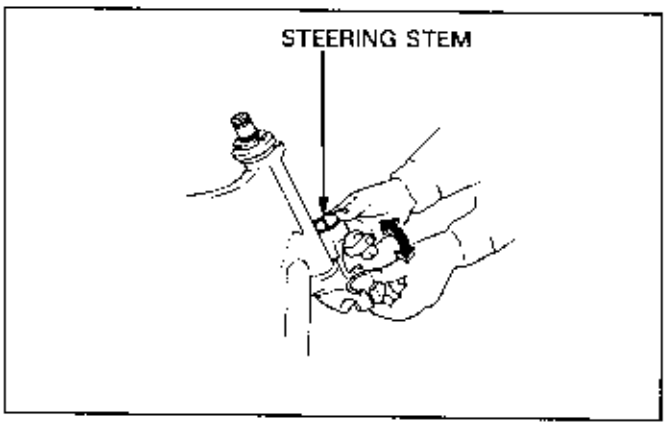
Hold the steering stem in the place and install the top race and bearing adjustment nut.

Tighten the bearing adjustment nut to the proper torque: Refer to the Model Specific manual for this specification.

Move the steering stem right and left, lock-to-lock, several times to seat the bearings.

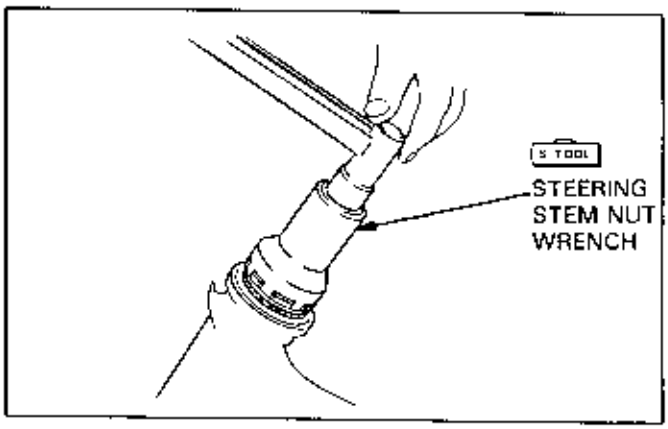
Make sure that the steering stem moves smoothly, without play or binding; then loosen the bearing adjuster nut.





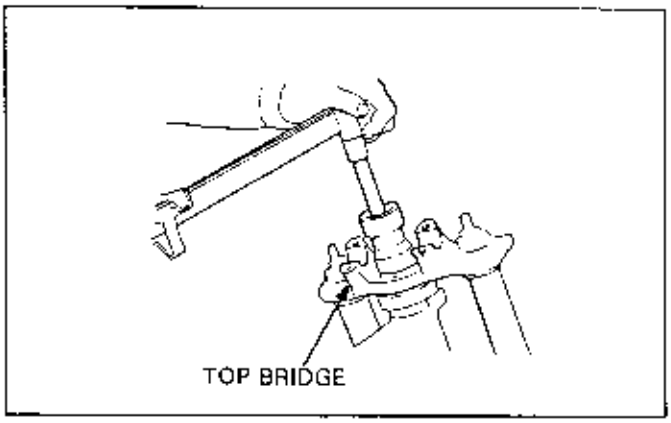
Retighten the bearing adjustment nut to 15 N·m (1.5 kg-m, 10 ft-lb), then loosen the adjustment nut 1/8 turn.

Recheck that the steering stem moves smoothly without play or binding.



Reinstall the top bridge and fork legs temporarily.

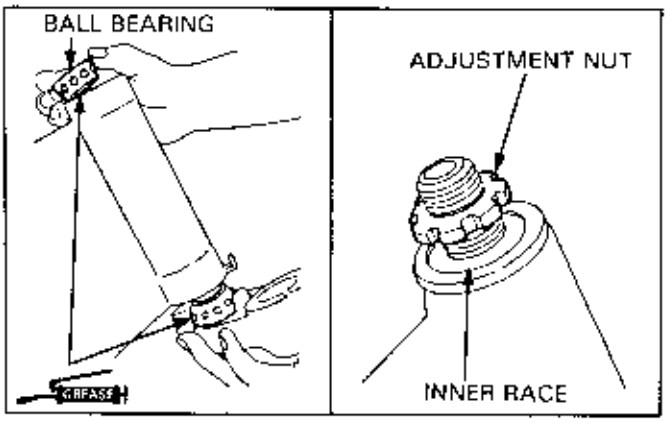
Tighten the stem nut to the specified torque.



Retainer-Type Ball Bearings
Apply grease to both the top and bottom bearings.

Place the lower bearing onto the steering stem with the retainer facing downward.

Insert the steering stem into the steering head and install the upper bearing into the steering head race.



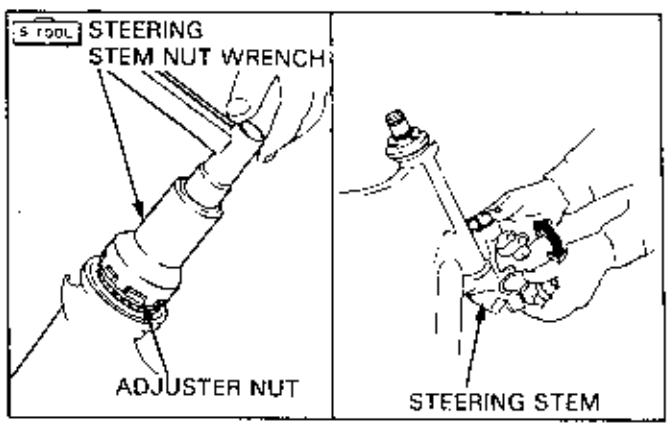
While holding the steering stem with one hand, install the top race and bearing adjustment nut onto the stem.

Tighten the bearing adjustment nut to 25 N·m (2.5 kg-m, 18 ft-lb).

Move the steering stem right and left, lock-to-lock, several times to seat the bearings.

Make sure that the steering stem moves smoothly, without play or binding; then loosen the nut.

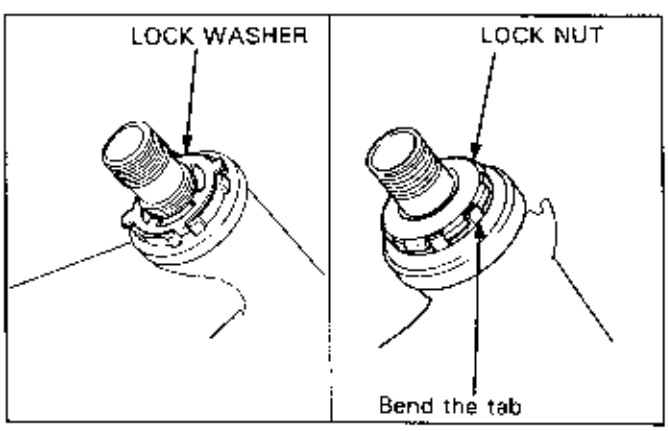
Retighten the adjuster nut to 25 N·m (2.5 kg-m, 18 ft-lb).



Install a new lock washer by aligning the tabs with the grooves in the adjustment nut.

Screw the lock nut all the way in with the your fingers. Hold the bearing adjustment nut and further tighten the lock nut; enough to align the grooves with the tabs of the lock washer.

Bend the lock washer tabs up into the groove of the lock nut.



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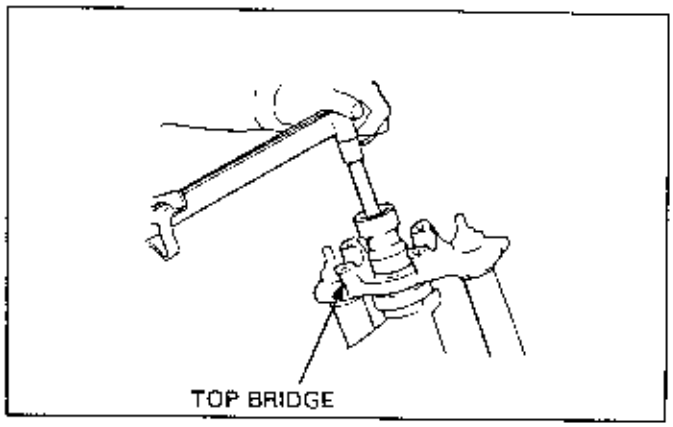
Install the top bridge and temporarily install the fork legs.

Tighten the stem nut to the specified torque.

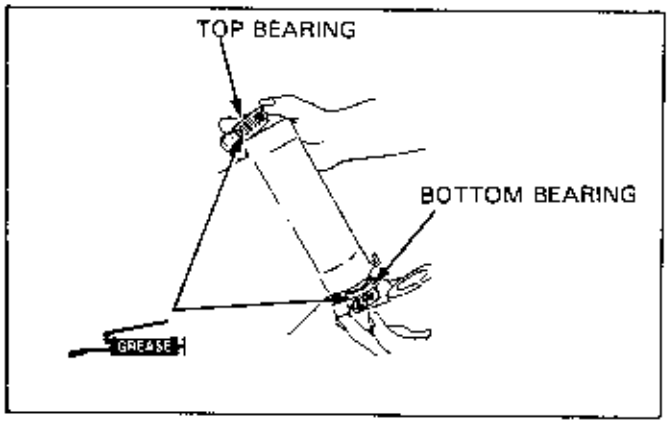
Check the steering head bearing preload (page 18-22).

Reinstall the removed parts.



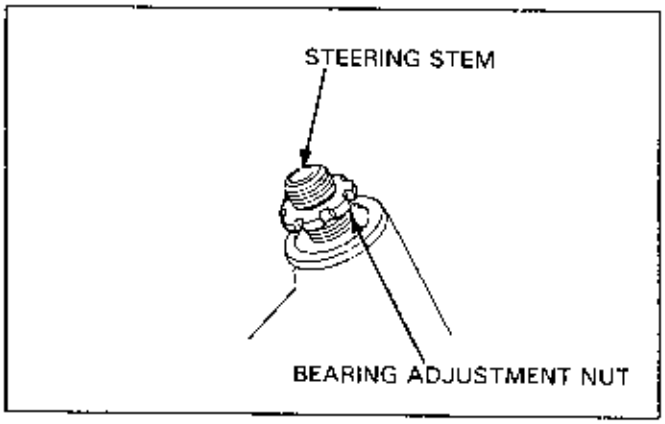
Tapered Roller Bearing Type
Apply grease to the top and bottom bearings.
Install the bottom bearing onto the steering stem with the retainer toward the bottom.

Insert the steering stem into the steering head; then install the top bearing and dust seal (if a seal is used on the particular model).



Install bearing adjustment nut while holding the steering stem.

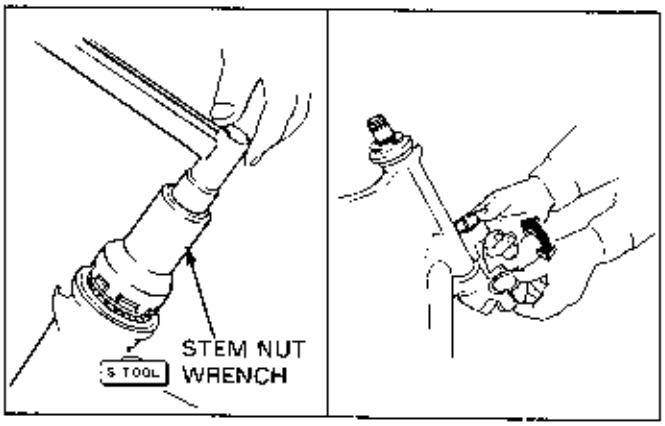
Tighten the adjustment nut to 11 N·m (1.1 kg-m, 8 ft-lb).



Move the steering stem right and left, lock-to-lock, several times to seat the bearings.

Make sure that the steering stem moves smoothly, without play or binding.

Retighten the adjustment nut to 11 N·m (1.1 kg-m, 8 ft-lb).

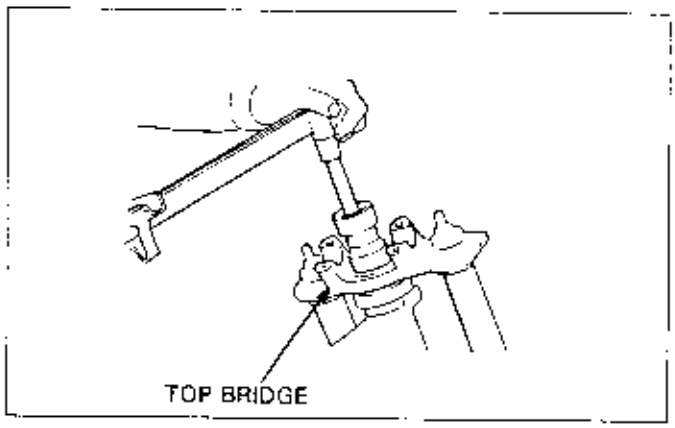


Install the top bridge and temporarily install the fork legs.

Tighten the steering stem nut to the specified torque.

Check the steering head bearing preload.

Reinstall the remaining removed parts.



STEERING HEAD BEARING PRELOAD MEASUREMENT

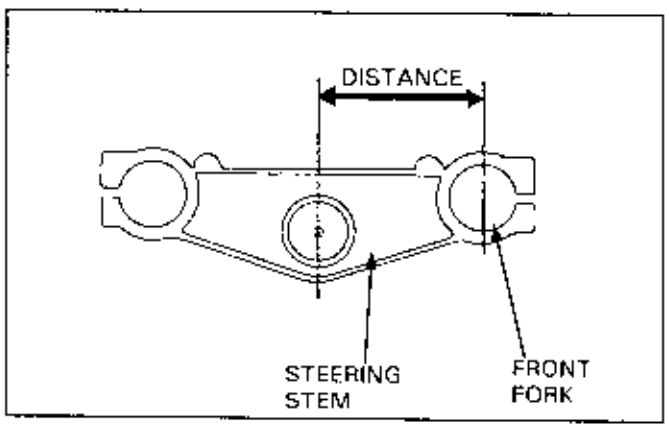
Steering head bearings (applicable to on-road models over 125 cc) that are too loose or too tight may cause handling problems.

After the steering stem and bearings have been reassembled, make sure that the steering head bearings are installed correctly by measuring the preload.

An average measurement is given here, refer to the Model Specific manual for the correct preload specification.

$$\text{Measurement (Reading on spring scale) } \underset{\text{kg (lb)}}{\_\_\_\_} = \frac{\text{PRELOAD (kg-m, in-lb)}}{\text{DISTANCE (between stem and fork tube centers) (cm, in)}}$$

Example:
Distance: 7.5 cm (3.0 in)
Preload: 15 kg-cm (13.0 in-lb)
Measurement should be 2.0 kg (4.3 lb) in the spring scale.



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MEASUREMENT

Place a jack or stand under the engine and raise the front wheel off the ground.

Set the steering stem in the straight ahead position.

Hook the spring scale to the fork tube between the top and bottom bridges.

Pull the spring scale keeping the scale at a right angle to the steering stem.

Read the scale at the point where the steering stem just starts to move.

Compare this with the specification in the Model Specific manual.

Adjust as necessary.