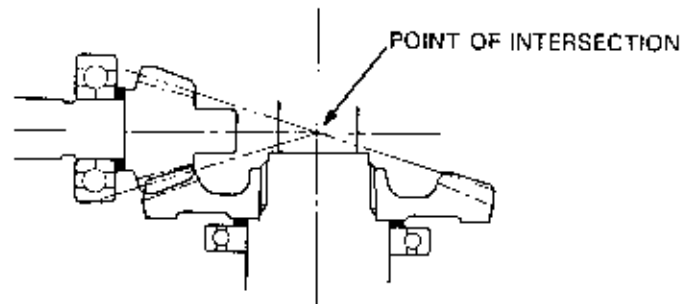


# 15. FINAL DRIVE/OUTPUT SHAFT

SERVICE INFORMATION	15-1	OUTPUT SHAFT	15-2
TROUBLESHOOTING	15-1	FINAL DRIVE	15-5
SYSTEM DESCRIPTION	15-2		

## SERVICE INFORMATION

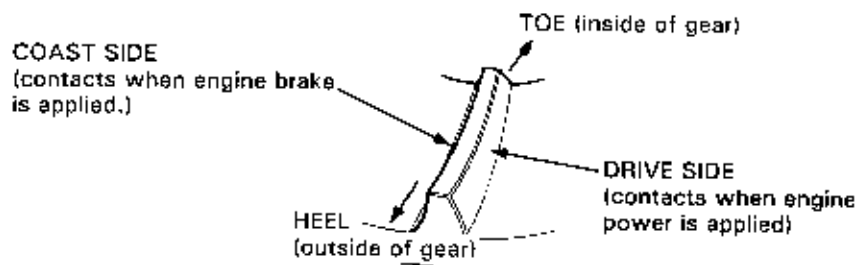
- Perform the gear contact pattern and backlash inspection and adjust the shim whenever you replace the bearings, gears or gear case. The extension lines from the gear engagement surfaces should intersect at one point.



- Check the ring gear-to-gear case cover stopper pin clearance on the final gear case. Adjust if it is out of specification.
- Replace the final drive shaft, side gear case output shaft, and the ring and pinion gears of the final gear case as a set.
- Protect the gear case with a shop towel while holding it in vise. Do not clamp it too tight as it could damage the gear case.
- When tightening the lock nut with a lock nut wrench, actual torque on the lock nut is greater than the reading by the length of the lock nut wrench.

Refer to the Medel Specific manual for specified torque. Do not overtighten the lock nut.

- Description of the tooth:



## TROUBLESHOOTING

### Excessive noise in final drive

- Worn or damaged ring gear and driven flange
- Damaged driven flange or wheel hub
- Worn or damaged pinion gear and/or pinion joint splines
- Excessive backlash between pinion and ring gears.
- Low oil level

### Excessive noise in side gear

- Worn or damaged output shaft and final drive shaft gears
- Worn or damaged side gear case bearing
- Incorrect adjustment shim

### Excessive rear wheel backlash

- Worn drive shaft splines
- Excessive backlash between ring gear and pinion gear
- Worn driven flange and ring gear splines
- Excessive play in final drive case bearings
- Worn drive shaft, universal joint and/or pinion joint splines
- Excessive play or worn universal joint bearing.

### Oil leak at final gear case

- Clogged breather hole
- Too much oil
- Faulty oil seal(s)

## FINAL DRIVE/OUTPUT SHAFT

### SYSTEM DESCRIPTION

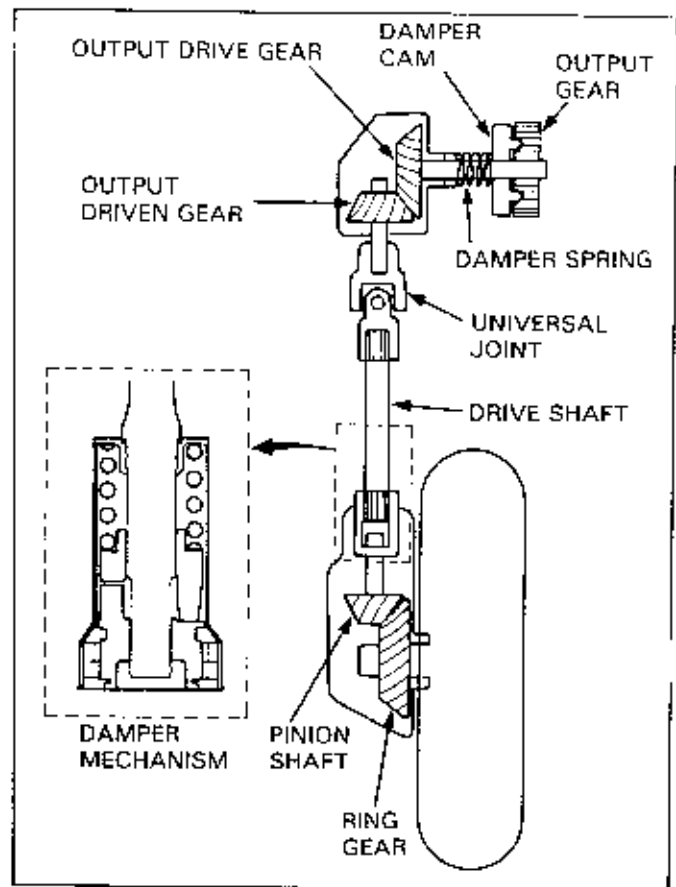
Power from the engine is transmitted to the rear wheel as follows:

Countershaft (or output drive shaft) → output driven shaft → drive shaft → pinion gear → ring gear → rear wheel.

To prevent harsh or jerky acceleration or deceleration a damper spring is placed in the drive line. The spring absorbs sudden applications of torque and provides smooth starts and stops.

The damper mechanism is attached to either the output gear case or drive shaft.

Unlike the drive chain, the system requires only periodic final gear oil change for maintenance.



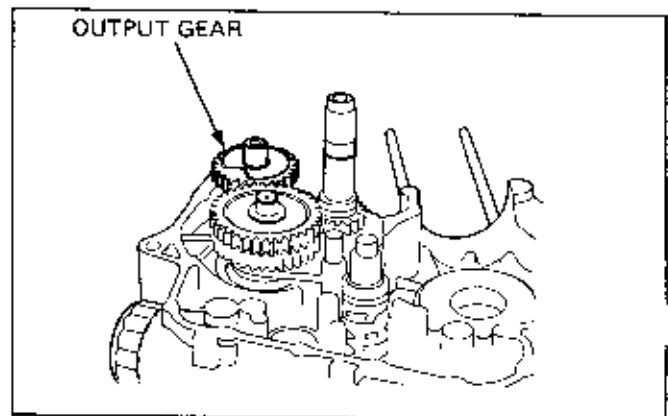
### OUTPUT SHAFT

#### REMOVAL

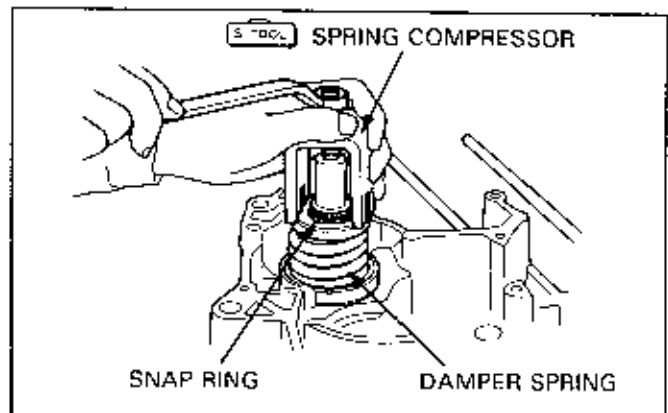
##### NOTE

- When a damper spring is installed to the output gear, remove the side gear case only after the damper spring has been removed. Follow the steps below.
- Refer to the Model Specific manual for output shaft removal.

Remove the output gear.



Using the damper spring compressor, compress the damper spring and remove the snap ring. Remove the damper spring compressor and then take out the damper cam and damper spring.



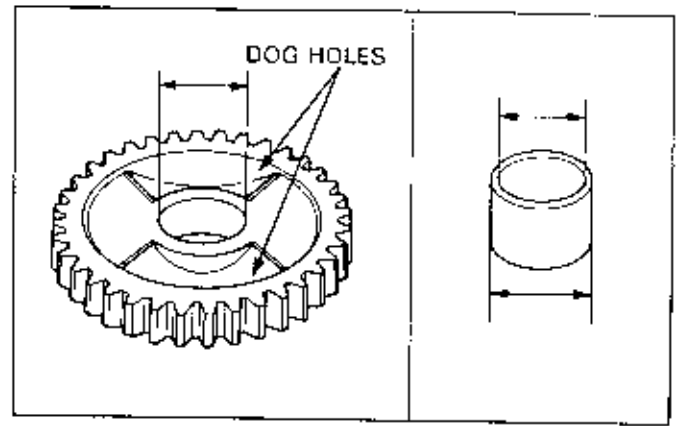
**INSPECTION**

Check the gear for damage or excessive wear, and the gear dog holes for damage; replace as necessary.

Measure the gear I.D.; replace if the service limit is exceeded.

Check the bushing for wear or damage.

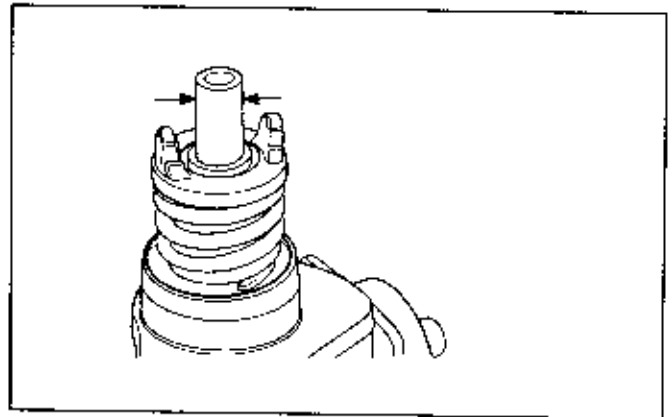
Measure the bushing I.D. and O.D.; replace if the service limit is exceeded.



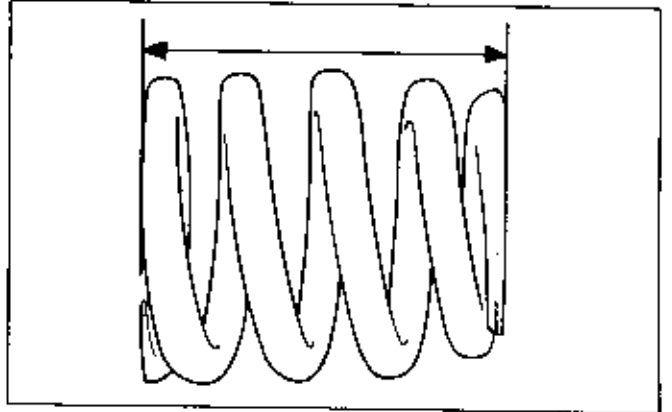
Calculate the gear-to-bushing clearance; replace the component if the service limit is exceeded.

Measure the O.D. of the countershaft or output drive shaft at the sliding area. Replace the shaft if the service limit is exceeded.

Calculate the shaft-to-bushing clearance. If the service limit is exceeded, determine if a new bushing would bring the clearance within tolerance. If so, replace the bushing. If the clearance still exceeds the service limit with new bushing, replace the shaft.



Measure the damper spring free length. Replace the spring if the free length exceeds the service limit.



**BACKLASH INSPECTION**

Clamp the output gear case in a vise that has soft jaws or use a shop towel.

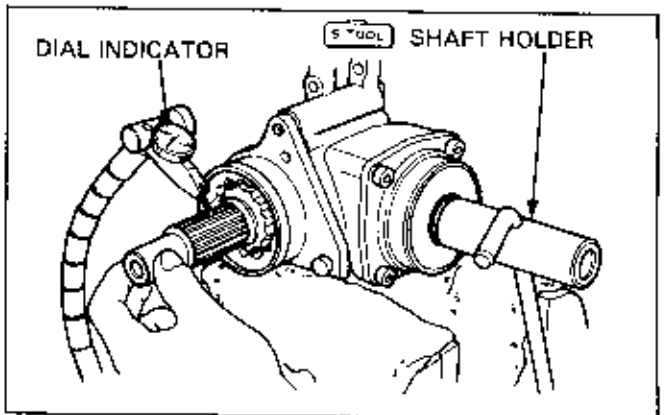
Set a horizontal type dial indicator on the countershaft or output drive shaft as shown.

Hold the driven gear with the shaft holder and rotate the countershaft or output drive shaft by hand until gear slack is taken up.

Turn the countershaft or output drive shaft back and forth to read the backlash.

Remove the dial indicator. Turn the countershaft or output drive shaft 120° and measure backlash. Repeat this procedure once more.

Compare the difference of the three measurements.

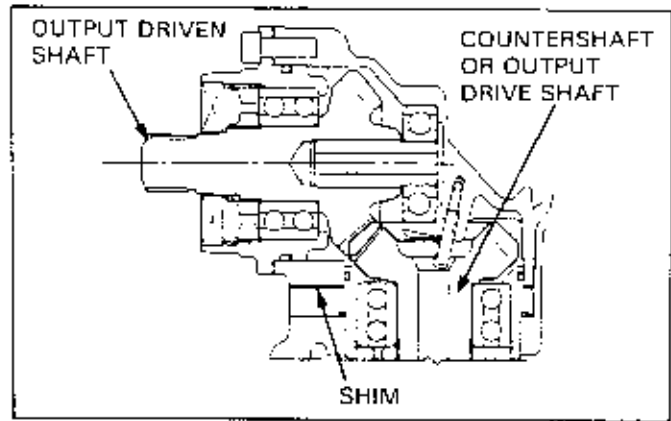


## FINAL DRIVE/OUTPUT SHAFT

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

If backlash is excessive, replace the countershaft or output drive shaft adjustment shim with a thinner one.

If the backlash is too small, replace the countershaft or output drive shaft shim with a thicker one.



### Gear tooth contact pattern check

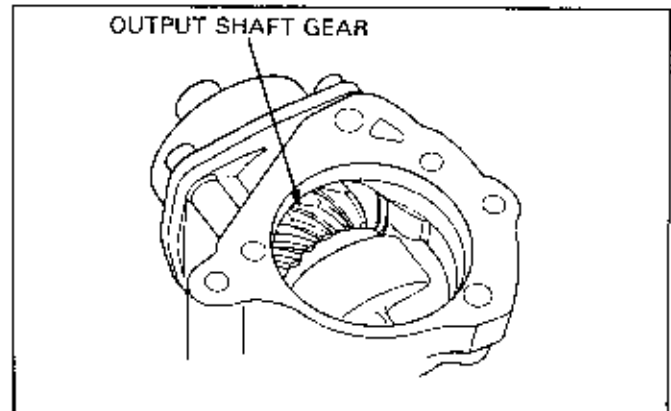
Remove the countershaft or output drive shaft from the side gear case.

Apply Prussian Blue to the output drive gear teeth.

Install the countershaft or output drive shaft and the shim.

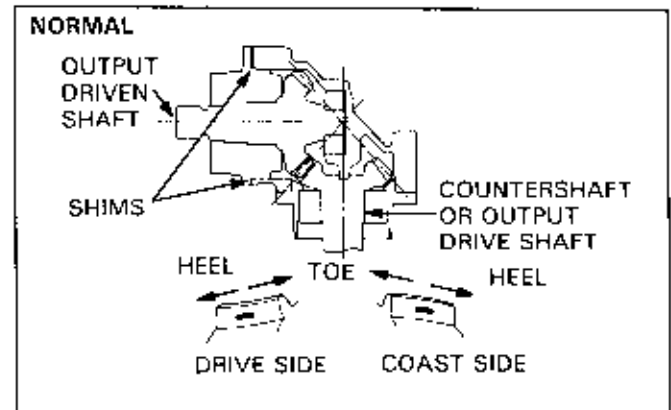
Rotate the drive shaft several times in the normal direction of rotation.

Remove the shaft and check the gear tooth contact pattern.

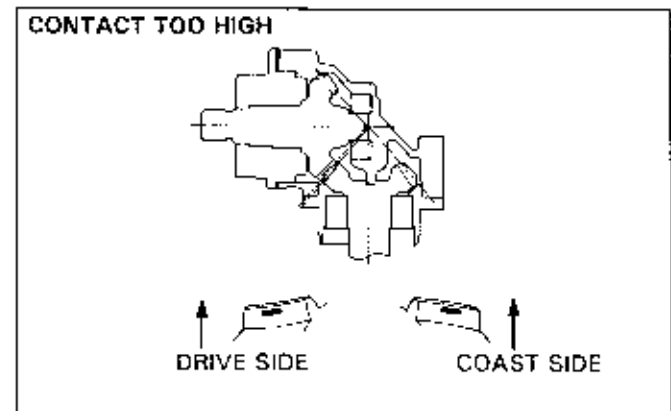


Contact is normal if Prussian Blue is transferred to the approximate center of each tooth and slightly to the side.

If the pattern is not correct, remove the output driven shaft and replace the shaft adjustment shim.

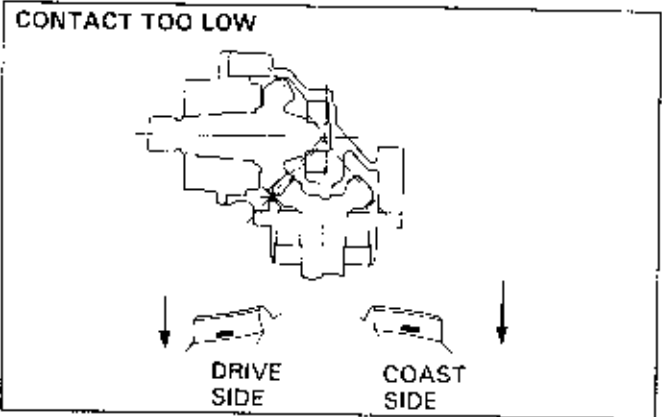


Replace the shim with a thinner one if the contact pattern is too high.



Replace the output shaft adjustment shim with a thicker one if the contact is too low.

Refer to the **Model Specific** manual for information of shim thickness.

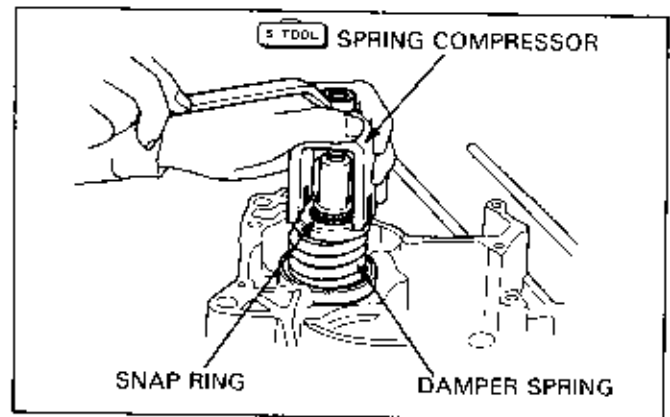


## INSTALLATION

Refer to the **Model Specific** manual for side gear case installation.

If the damper spring has been removed, install it according to the following procedure.

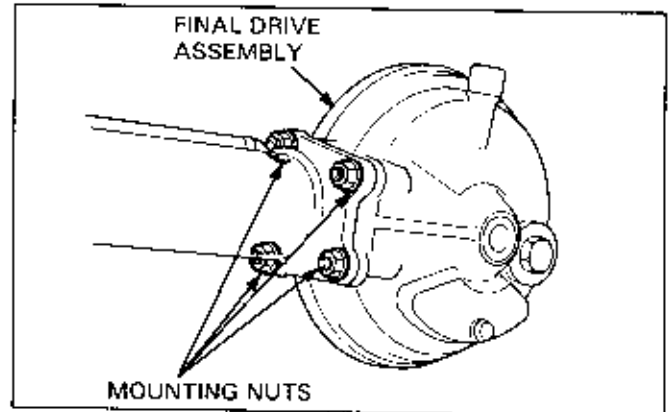
Place the damper spring and damper cam over the shaft. Install the damper spring compressor and compress the spring, then install the snap ring securely.



## FINAL DRIVE

### REMOVAL

Drain the final gear oil and remove the rear wheel. Remove the mounting nuts, and remove the final drive assembly.



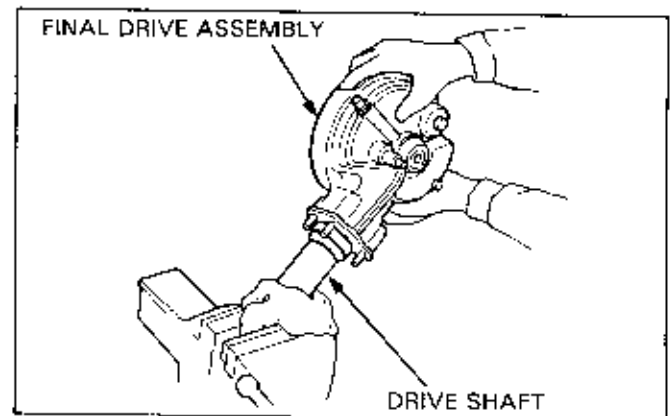
### DRIVE SHAFT REMOVAL

#### With Damper Case:

Hold the drive shaft in a vise with soft jaws and separate the final gear case from the drive shaft.

#### CAUTION

- Clamping the damper case section of the final drive assembly in a vise can damage it.

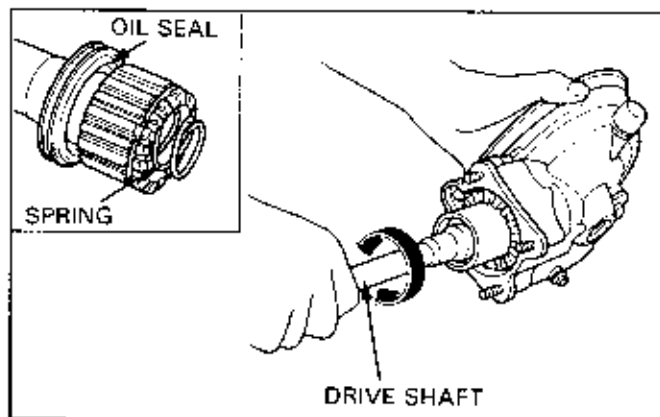


## FINAL DRIVE/OUTPUT SHAFT

### Without Damper Case:

Separate the drive shaft from the final gear case by gently turning the drive shaft and pulling.

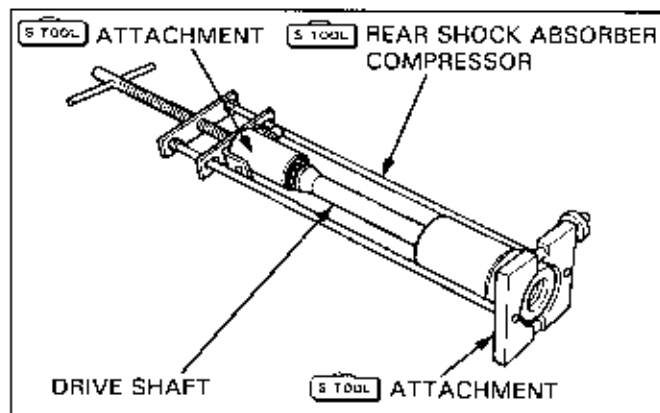
Remove the spring and oil seal.



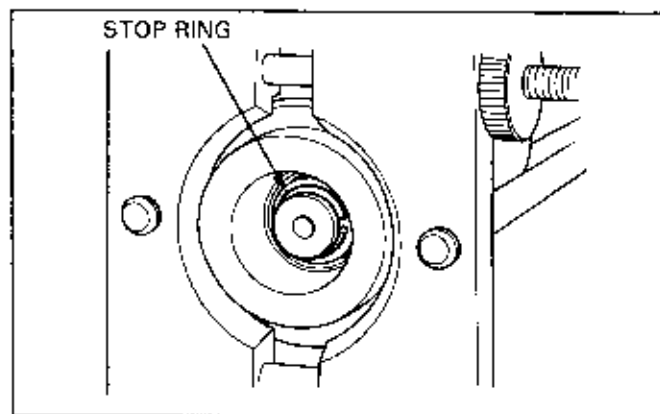
### DRIVE SHAFT/DAMPER DISASSEMBLY

Drain the oil from the damper case.

Set the drive shaft in the shock absorber compressor with the proper attachments.

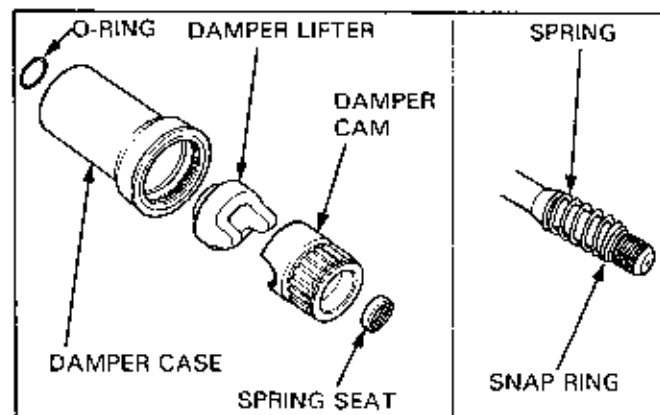


Compress the damper spring and remove the stop ring.  
Remove the tool.

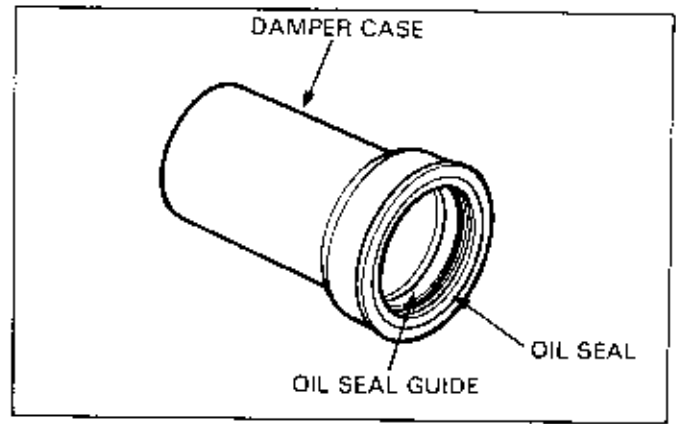


Remove the following:

- spring seat
- damper cam
- damper lifter
- damper case
- O-ring
- snap ring
- spring

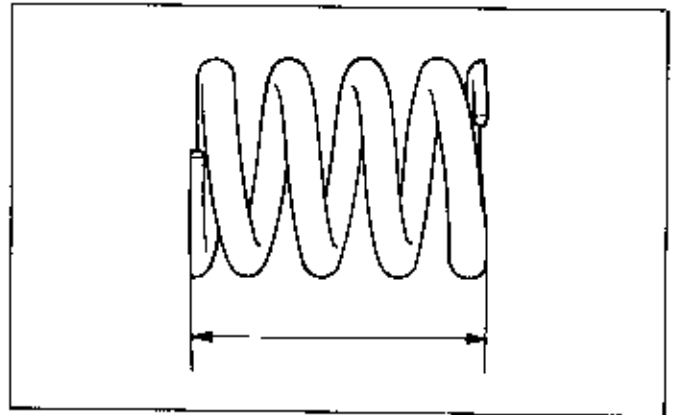


Remove the oil seal, oil seal guide and damper spring from the damper case.



### DRIVE SHAFT INSPECTION

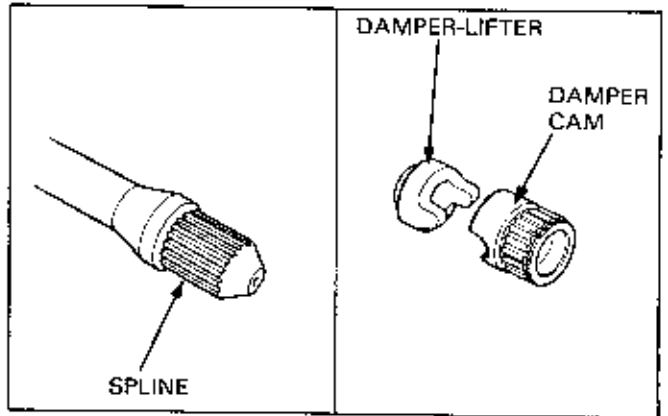
Measure the damper spring free length; replace the spring if the free length exceeds the service limit.



Check the splines of the drive shaft for damage or wear; replace as necessary.

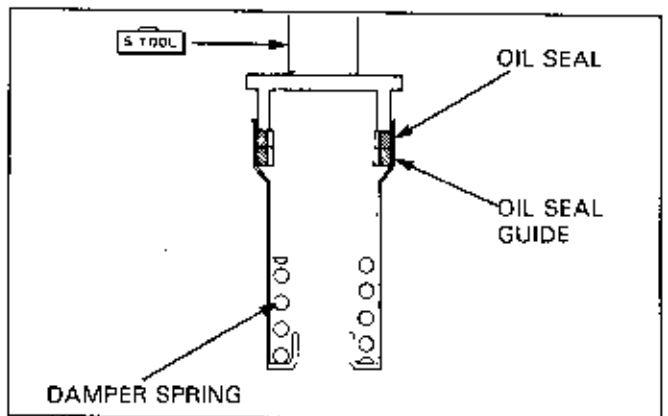
If the splines are damaged, check the universal joint splines also.

Check the damper cam and lifter for damage; replace as necessary.



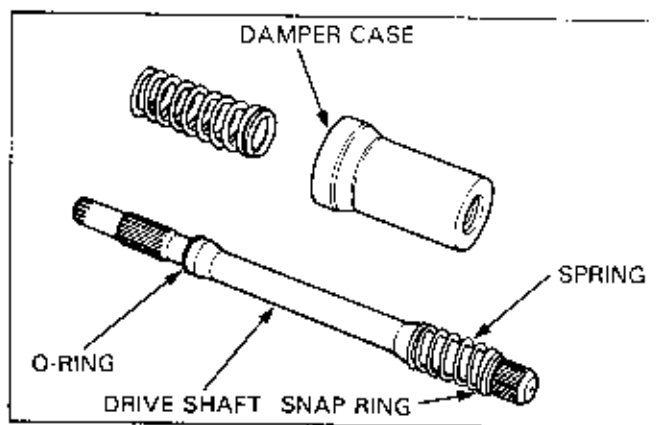
### DAMPER CASE ASSEMBLY

Install the spring in the damper case.  
Install the oil seal guide and a new oil seal using the special tool.

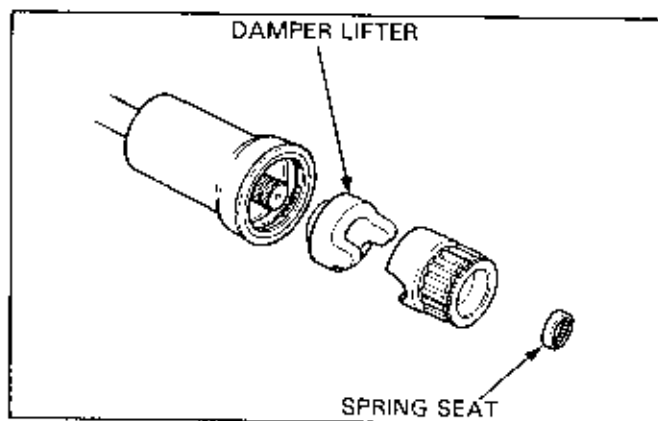


## FINAL DRIVE/OUTPUT SHAFT

Install a new O-ring onto the drive shaft.  
Install the spring and secure the snap ring.  
Insert the drive shaft into the damper case.



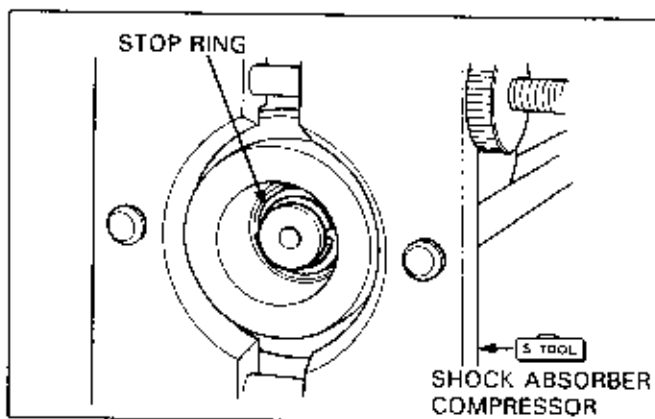
Install the damper lifter, damper cam and spring seat.



Set the drive shaft in the shock absorber compressor and compress the spring.

Set the stop ring securely into the groove on the drive shaft.

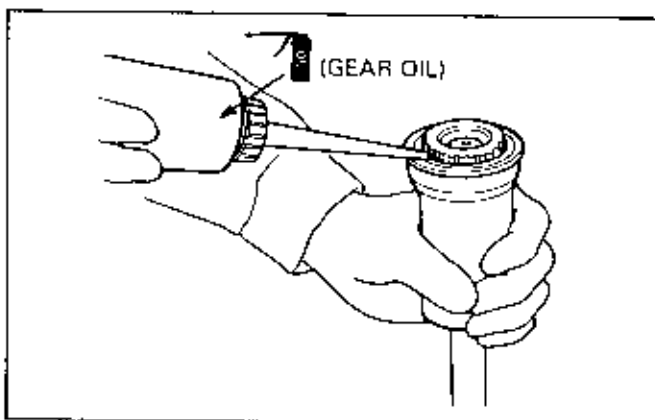
Remove the tools.



## DRIVE SHAFT INSTALLATION

**With Damper Case:**

Fill the damper case with the recommended type and amount of gear oil.



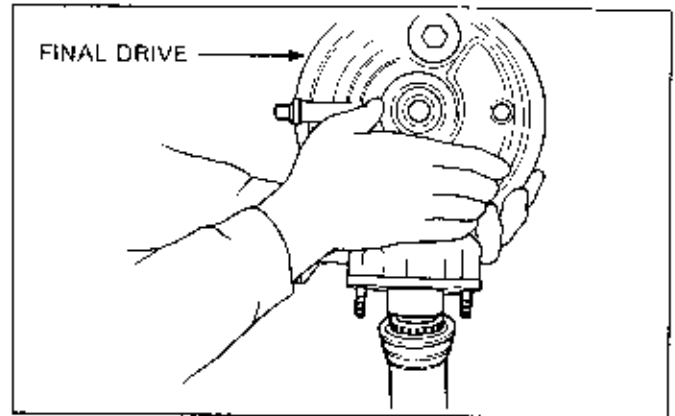


Hold the drive shaft upright to avoid spilling the damper case oil.

Carefully position the gear case on the shaft.

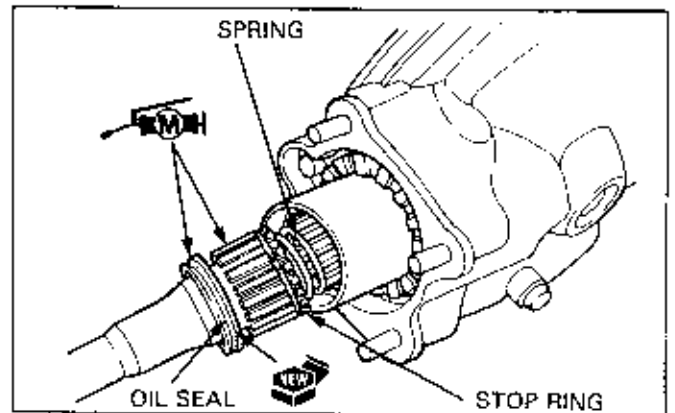
**CAUTION**

- Avoid damaging the damper case oil seal during assembly.



**Without Damper Case:**

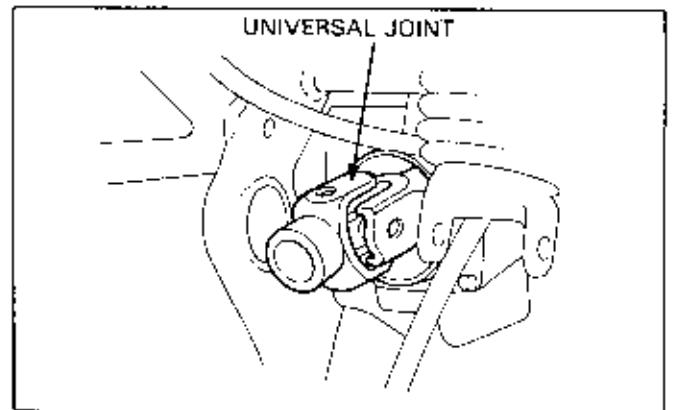
Install a new oil seal, stop ring and the spring. Then install the shaft on the final drive assembly.



**UNIVERSAL JOINT INSPECTION**

Remove the spring arm (see the Model Specific manual).

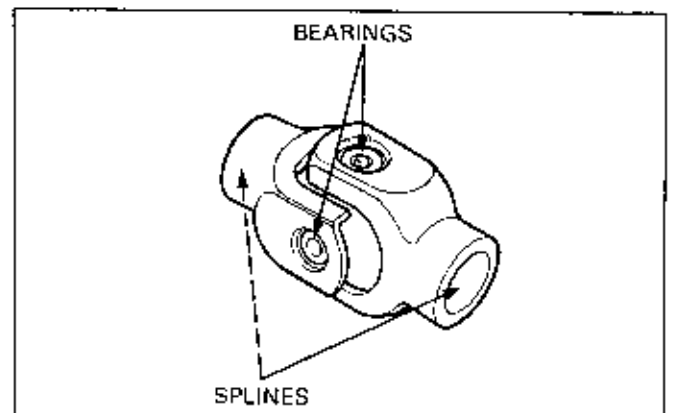
Remove the universal joint from the output shaft.



Check that the universal joint moves smoothly without binding or noise.

Check the splines for wear or damage and replace if necessary.

Install the universal joint on the output shaft, then install the swing arm.



# 16. WHEELS/TIRES

SERVICE INFORMATION	16-1	TIRE REMOVAL	16-11
TROUBLESHOOTING	16-1	TIRE INSTALLATION	16-14
WHEEL REMOVAL/INSTALLATION	16-2	WHEEL BALANCING	16-17
WHEEL BEARING REPLACEMENT	16-8	ATV WHEEL/TIRE	16-17
BASIC TIRE INFORMATION	16-9		

## SERVICE INFORMATION

- Support the motorcycle on its center stand and/or with a jack or other suitable support under the engine or frame when servicing the front wheel. Be certain that the motorcycle is secure before proceeding.
- In case the motorcycle, scooter or ATV is equipped with tubeless tires, valves, and wheel rims, use only tires marked "TUBELESS" and tubeless valves on rims marked "TUBELESS TIRE APPLICABLE." Never mount tires designed for use on automobiles.

### ⚠ WARNING

- Any attempt to mount passenger car tires on a motorcycle rim may cause the tire bead to separate from the rim with enough explosive force to cause serious injury or death.

## TROUBLESHOOTING

### Hard steering

- Steering head bearing adjustment nut too tight
- Faulty steering head bearings
- Damaged steering head bearings
- Insufficient tire pressure\*
- Faulty tire\*

### Front wheel wobbling

- Bent rim\*
- Worn front wheel bearings\*
- 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 bearing
- Bent frame
- Worn wheel bearing\*
- Worn swing arm pivot

### Wheel turns hard

- Misadjusted brake
- Faulty wheel bearing\*
- Faulty speedometer gear\*

\*These items are addressed in this section. All other items are addressed in the Front or Rear Suspension, or Brake Section.

## WHEEL REMOVAL/INSTALLATION

### FRONT WHEEL

**⚠ WARNING**

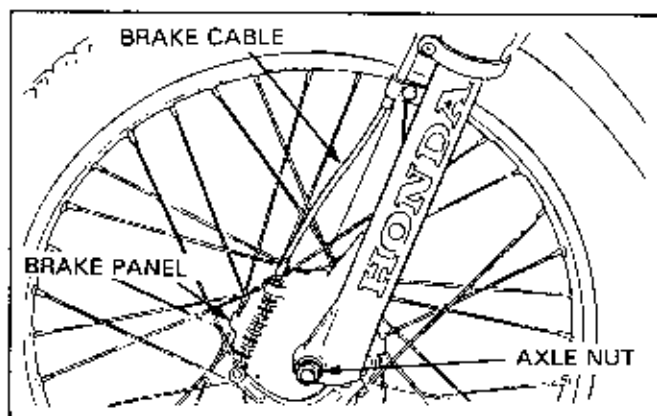
- Grease on the brake linings will reduce stopping power. Keep grease off the brake linings. Wipe excess grease off the cam and anchor pin.
  - Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner or alternate method approved by OSHA, designed to minimize the hazard caused by airborne asbestos fibers.
- Support the vehicle securely under the engine to raise the front wheel.
  - The speedometer cable and front brake cable must be disconnected.
  - On vehicles with hydraulic disc brakes, if the wheel cannot be removed with brake caliper(s) installed on the front fork(s), remove the wheel after the brake caliper has been removed with the caliper bracket attached.
  - After installing, check that the wheel turns smoothly and without play.

### AXLE NUT TYPE

**Removal:**

Remove the axle nut.

Pull the axle shaft from the fork legs while holding the wheel, then remove the wheel.



**Installation**

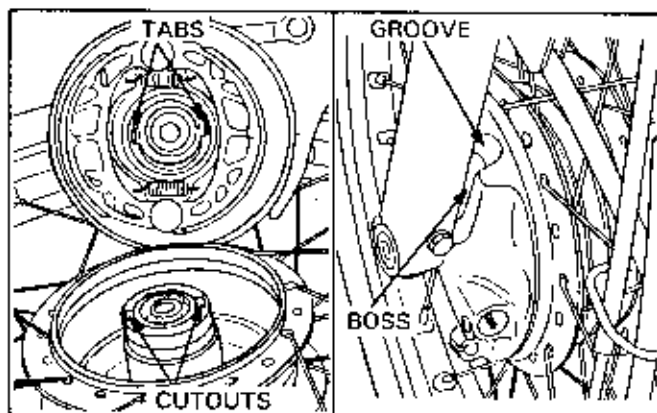
**Drum brake:** Align the speedometer gearbox retainer tabs with the cutouts and install the brake drum on the wheel hub.

Install the side collar.

Coat the axle shaft with a small amount of grease.

Place the wheel between the fork legs while aligning the boss of the fork leg with the groove of the brake panel. Insert the axle through the fork legs.

Turn the front wheel so that the speedometer gear retainer will engage properly with the wheel hub.

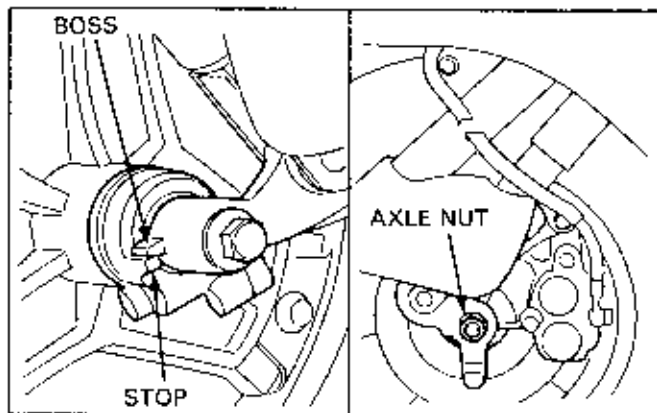


**Hydraulic disc brake:** Align the stop of the speedometer gearbox with the boss of the fork leg.

Set the wheel so that the brake disc is positioned between the brake pads. Use care not to damage the brake pads. Install the axle shaft.

Tighten the axle nut to the specified torque. (Refer to the Model Specific manual.)

Connect the cables.



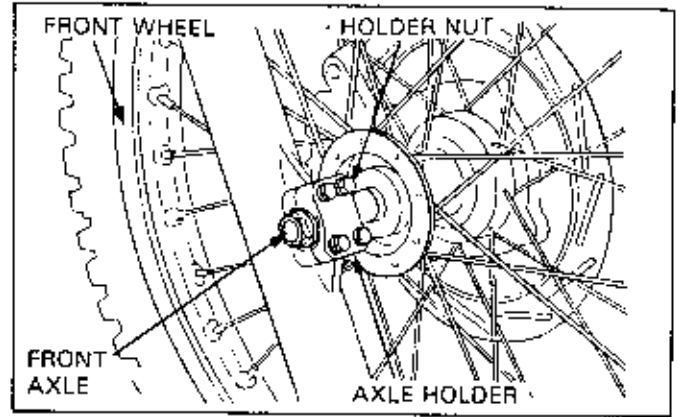
**SINGLE HOLDER TYPE**

**Removal:**

Loosen the axle shaft holder nuts.

Loosen the axle shaft while holding the wheel. Remove the axle shaft.

Remove the wheel.



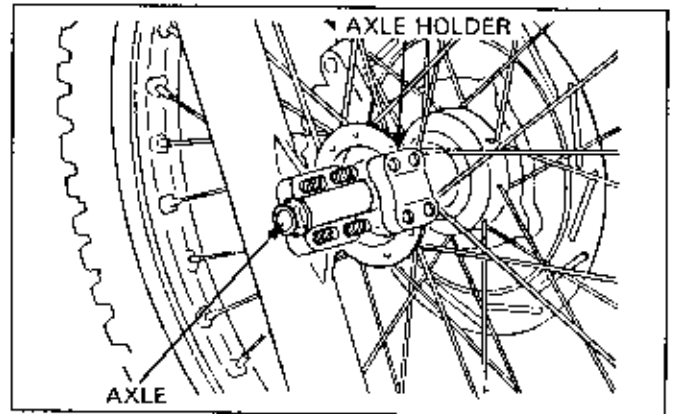
**Installation**

Hydraulic brake:

Place the front wheel between the fork legs while slipping the disc between the pads. Take care not to damage the pads. Set the wheel into the place and insert the axle shaft through the wheel.

Loosely install the axle holder with its UP mark toward up and tighten the axle shaft to the specified torque.

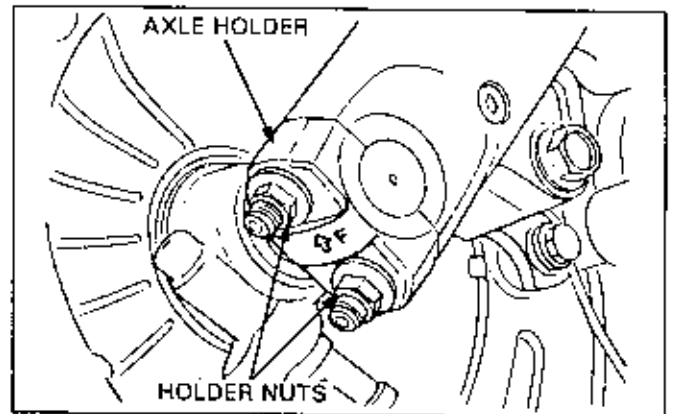
With the front brake applied, pump the front suspension up and down several times; then tighten the holder nuts to specified torque.



**NOTE**

- Holder nut should be tightened:  
 On vertically split type: upper first, then lower nut.  
 On horizontally split type: front first, then rear nut.

Reconnect the cables.



**DOUBLE HOLDER TYPE**

**Removal**

Remove both side holders and then remove the front wheel.

**Disassembly**

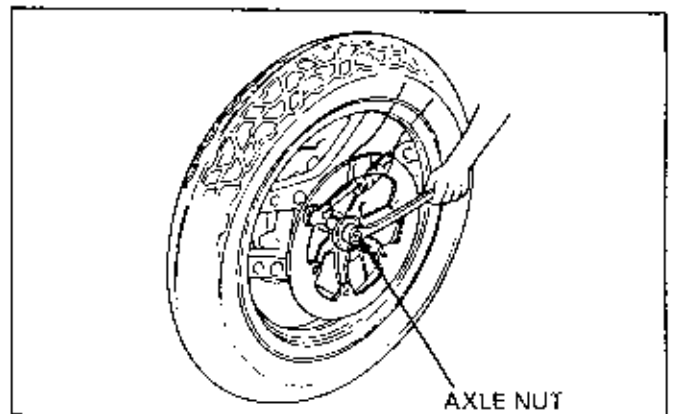
Remove the axle nut from the axle, then remove the axle shaft, collar and speedometer gear.

**Assembly**

Install the side collar and speedometer gear box onto the wheel hub.

Coat the axle shaft with small amount of grease and install the axle shaft.

Tighten the axle nut to the specified torque.



## WHEELS/TIRES

### Installation

Place the front wheel between the fork legs.

Set the brake disc between the brake pads carefully. Do not damage the pads.

Slowly lower the front of the vehicle until the fork legs are aligned with the axle.

Install the axle holders with the allow pointing forward and align the speedometer gear box boss with the fork leg stop.

Tighten the upper nuts or forward nuts first; then the lower or rear nuts.

Reconnect the cables.

### PINCH BOLT TYPE

#### Removal

Loosen the axle pinch bolts on the axle bolt side and remove the axle bolt.

Loosen the axle pinch bolts on the opposite side and remove the axle shaft while holding the wheel. Remove the front wheel.

#### Installation

Place the front wheel between the fork legs and work the brake disc between the pads. Be careful not to damage the pads.

Install the axle. Tighten the axle bolt to the specified torque. Align the speedometer gear box stop with the fork leg stop.

#### NOTE

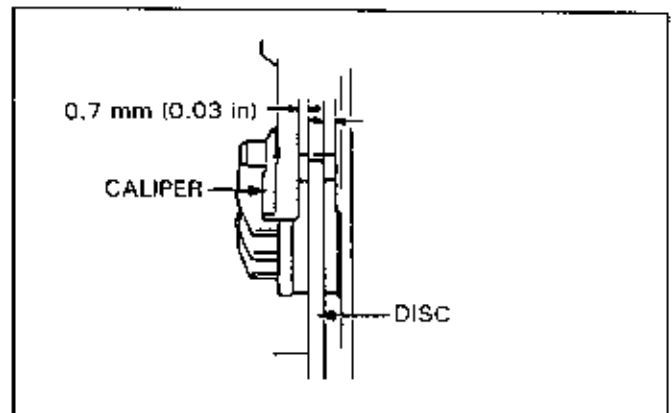
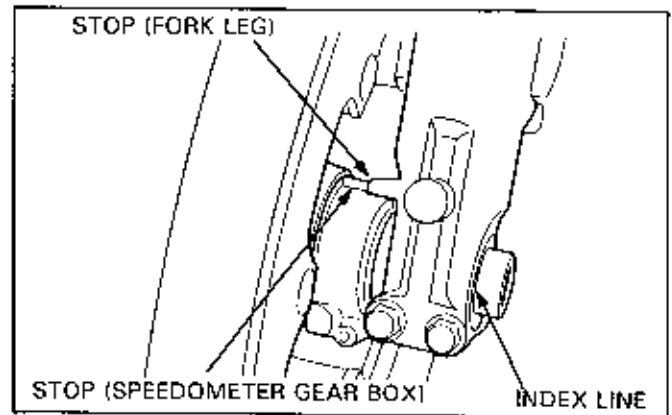
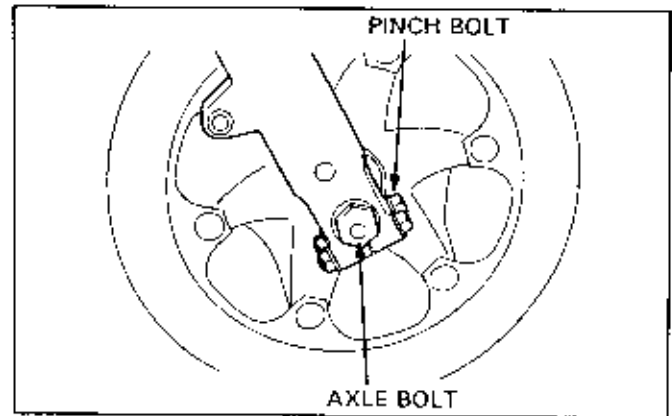
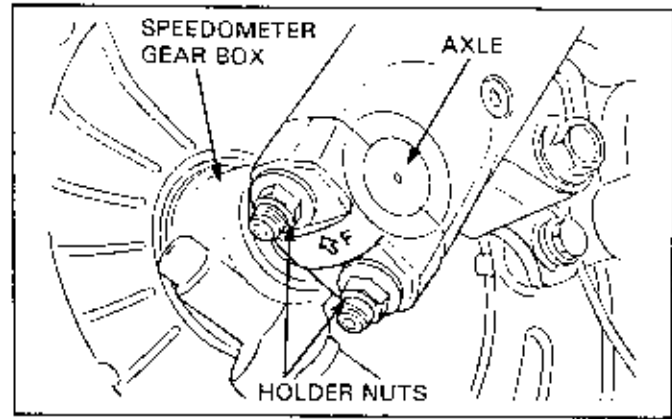
- Make sure that the index line on the axle aligns with the fork leg surface.

Tighten all the pinch bolts to the specified torque.

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

Check the clearance between the brake disc and the caliper bracket on each side after installation. The clearance should be at least 0.7 mm (0.03 in).

If the clearance is not 0.7 mm (0.03 in) or more, loosen the holder nut or pinch bolt at the axle shaft side and adjust the clearance. Then tighten the holder nuts or pinch bolt to the specified torque.



## REAR WHEEL

**▲WARNING**

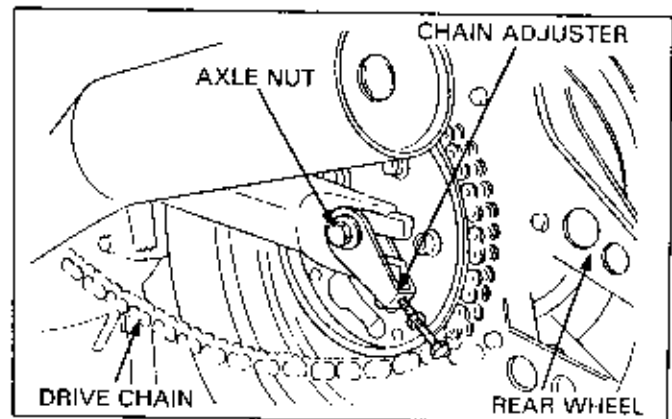
- Grease on the brake linings will reduce stopping power. Keep grease off the brake linings. Wipe excess grease off the cam and anchor pin.
- Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies. Use an OSHA-approved vacuum cleaner or alternate method approved by OSHA, designed to minimize the hazard caused by airborne asbestos fibers.
- Support the vehicle securely with the rear wheel off the ground.
- Remove the muffler and/or other parts necessary to gain access to the wheel.
- For drum brakes, disconnect the brake rod or cable and brake torque rod from the brake panel.
- For hydraulic disc brakes, it may be necessary to remove the brake caliper. Refer to the Model Specific manual.
- Note the side collar position and direction so they can be installed properly.
- After installing, make sure that the rear wheel turns smoothly, without excessive free play.

## CHAIN DRIVEN TYPE

**Removal**

Loosen the axle nut and drive chain adjusters.

Move the rear wheel forward, and disengage the drive chain from the driven sprocket.

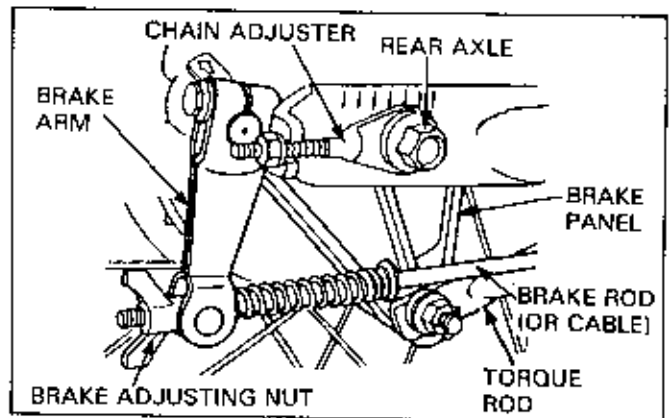


For mechanical drum brakes, remove the rear brake adjusting nut and depress the pedal to disconnect the brake rod (or cable) from the brake arm. If the brake panel is mounted with the brake torque rod, disconnect the torque rod from the brake panel by removing the torque rod mounting nut.

Remove the axle nut and rear axle.

For hydraulic disc brakes, move the caliper assembly away from the disc to avoid interference.

Remove the rear wheel.

**Installation**

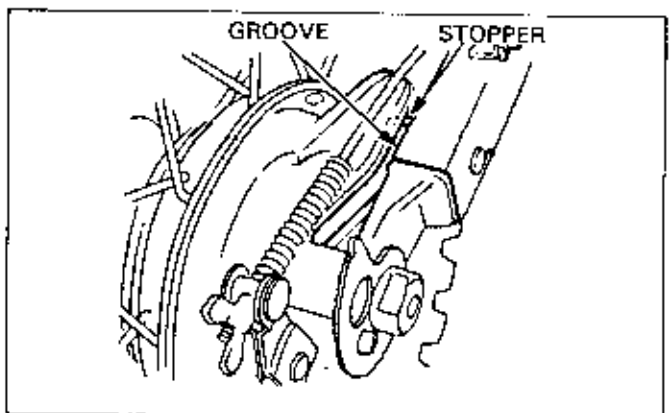
For drum brakes, install the brake panel and side collar on the wheel hub.

**NOTE**

- Note the proper direction of the axle side collar.

Place the rear wheel into the swingarm, while laying the drive chain between the sprocket and wheel hub.

In case that the swingarm on the brake panel is not mounted with the brake torque rod, insert the stopper on the swingarm into the groove of the brake panel when installing the wheel into the swingarm.



## WHEELS/TIRES

For hydraulic disc brakes, install the rear wheel by working the brake disc between the brake pads. Be careful not to damage the pads.

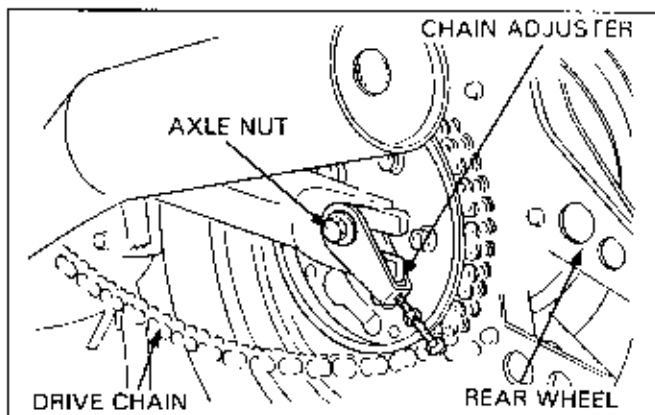
Set the rear wheel in the place. Install the rear axle with chain adjuster.

### NOTE

- Note the proper direction of the chain adjuster.

Install the chain adjuster and axle nut to the opposite side of the wheel.

Fit the drive chain over the driven sprocket.



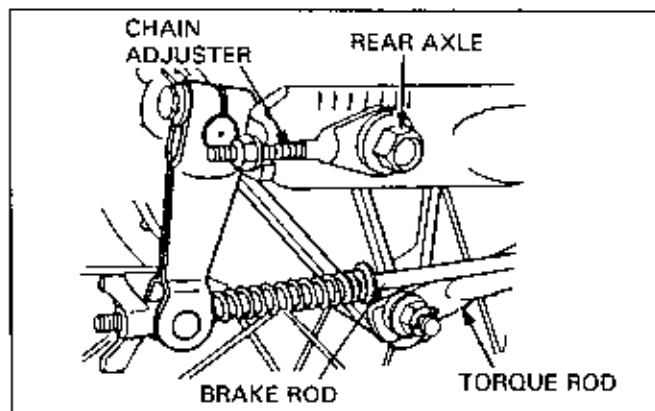
For mechanical drum brakes, connect the brake rod (or cable) to the brake arm and install the adjusting nut loosely. In case that the brake panel is mounted with brake torque rod, connect the torque rod to the brake panel and tighten the torque rod nut to the specified torque.

Adjust the drive chain slack.

Tighten the rear axle nut to the specified torque.

Secure the axle nut and torque rod nut with a new cotter pin if required.

For mechanical drum brakes, adjust the rear brake pedal free play.



## SHAFT DRIVEN TYPE

### Removal

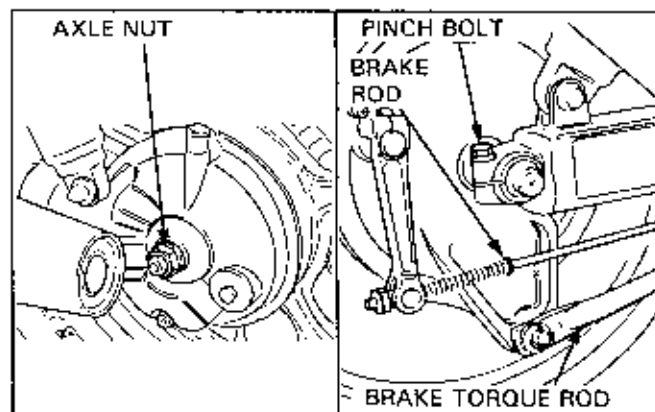
For drum brakes, disconnect the brake rod (or cable) and torque rod from the brake panel.

Remove the axle nut and loosen the axle pinch bolt.

Remove the rear axle.

For hydraulic disc brakes, move the caliper assembly away from the disc to avoid interference.

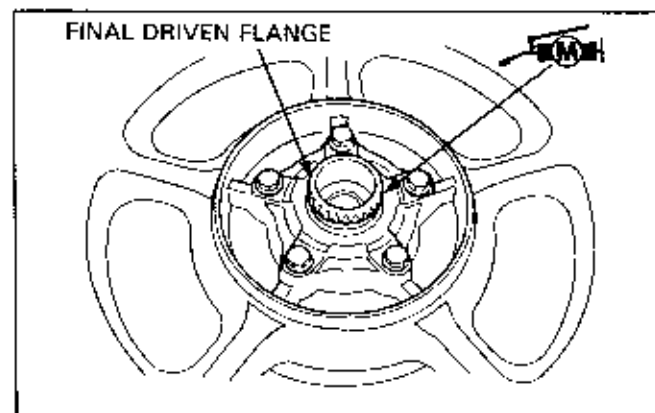
Remove the side collar and pull the rear wheel from the final drive gear. Remove the rear wheel.



### Installation

Coat the driven flange with molybdenum disulfide grease. Install the brake drum onto the wheel hub.

Place the rear wheel into the swing arm.



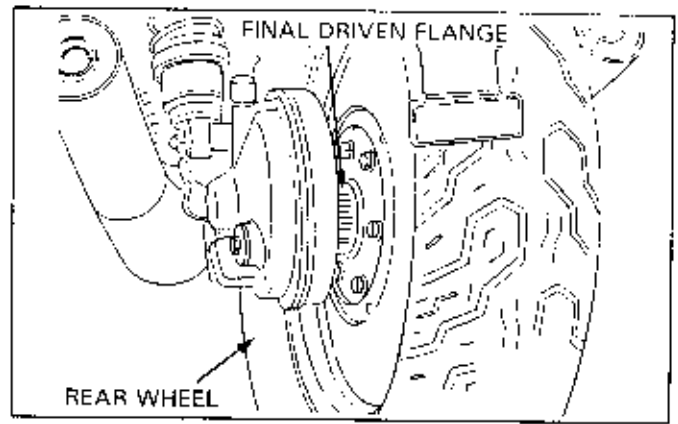
For the hydraulic disc brakes, work the brake disc between the brake pads. Be careful not to damage the pads.

Align the splines of the final driven flange with the splines of ring gear and push the rear wheel onto the final drive gear.

Install the side collar.

**NOTE**

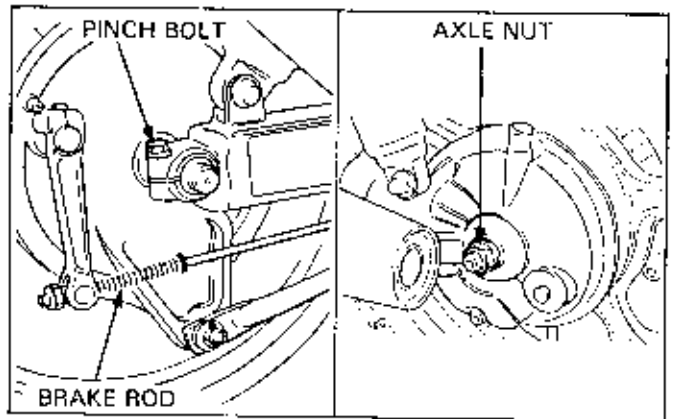
- Note the proper direction of the wheel side collar.



Set the rear wheel in place and install the axle. For mechanical drum brakes, connect the brake rod (or cable) to the brake arm and install the adjusting nut loosely. Connect the torque rod to the brake panel and tighten the torque rod nut to the specified torque.

Tighten the axle nut first then tighten the axle pinch bolt to the specified torque.

For mechanical drum brakes, adjust the rear brake pedal free play.



**UNIT SWING TYPE**

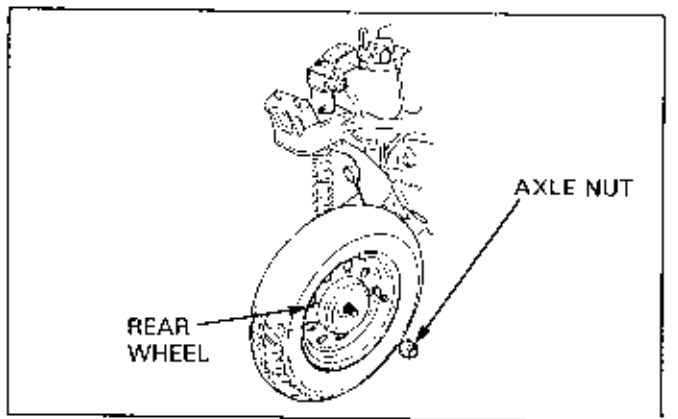
**Removal**

Remove the frame covers and exhaust muffler if necessary. Apply rear brake and loosen the axle nut.

**NOTE**

- If the rear axle spins with the axle nut, apply torque to the wrench allowing the scooter to tilt rearward and the rear wheel to contact the ground.

Remove the axle nut and rear wheel.



**Installation**

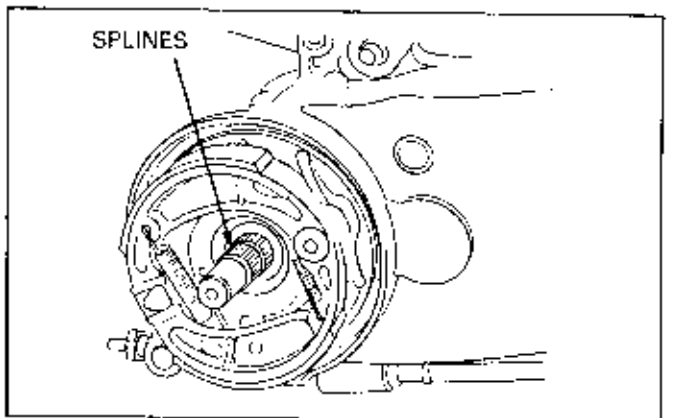
Install the rear wheel by aligning the splines of the wheel hub with the final drive shaft splines.

Apply the rear brake and tighten the rear axle nut to the specified torque.

**NOTE**

- If the rear axle spins with the axle nut, apply torque to the wrench allowing the scooter to tilt rearward and the rear wheel to contact the ground.

Install the removed parts.



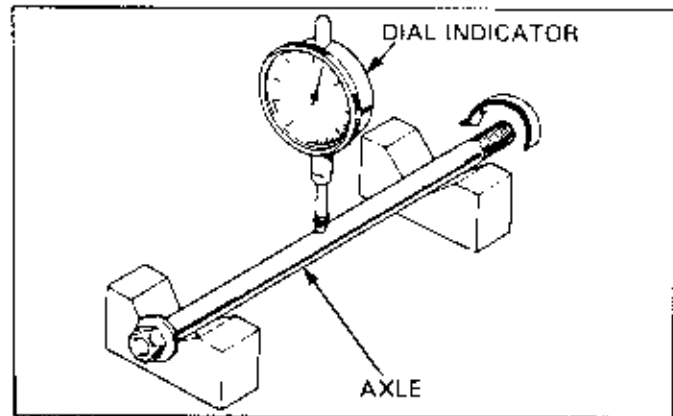


## WHEELS/TIRES

### AXLE INSPECTION

Set the axle in V-blocks, rotate the axle and measure the runout using a dial indicator.

The actual runout is 1/2 of the total indicator reading; replace if the service limit is exceeded. (Check the Model Specific manual for the actual service limit.)



### WHEEL BEARING REPLACEMENT

#### NOTE

- Disc brake type: Be sure to remove the brake discs before removing the wheel bearings.
- Refer to page 1-16 for the table of bearing remover/driver size.

#### REMOVAL

Remove the wheel.

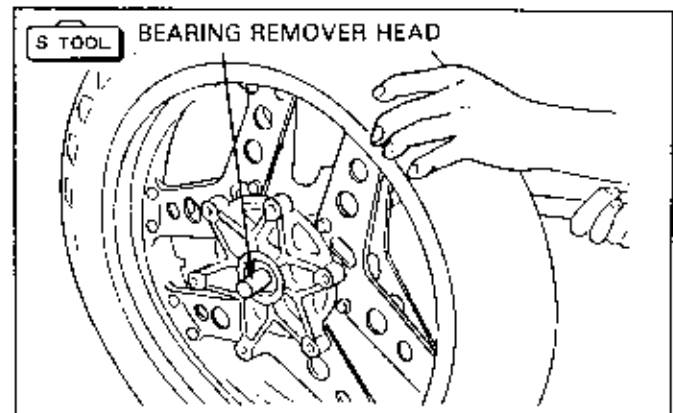
Remove the dust seal, side collar and brake drum and remove the speedometer gearbox retainer.

Rear wheel:

Chain drive type: Remove the driven sprocket.

Shaft drive type: Remove the driven flange.

Remove the right and left wheel bearings with the bearing remover shaft and remover head.



#### INSTALLATION

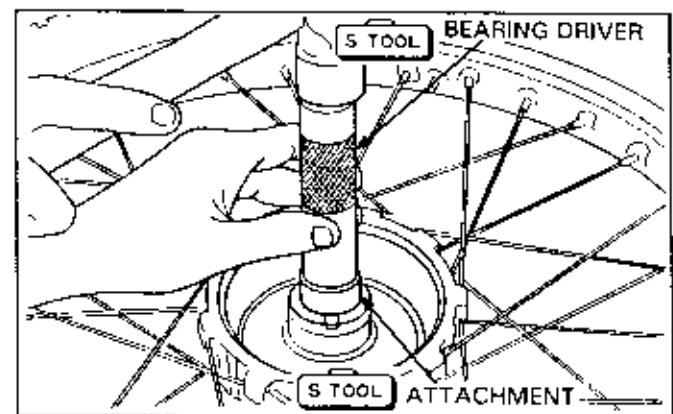
#### NOTE

- Right and left bearings have a specific installation order. Refer to the Model Specific manual for which bearing to install first.

Drive in a new bearing.

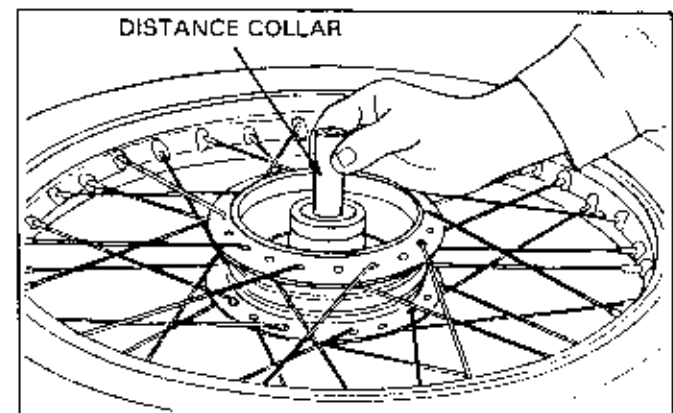
Check the distance collar for its proper installation direction and install.

Install the other bearing.



#### NOTE

- Replace right and left bearings in pairs. Do not re-use old bearings.
- One side sealed type bearing: Install the bearing with its sealing face toward the outside.
- Both sides sealed type bearing: Install the bearing with its stamped size mark toward the outside.



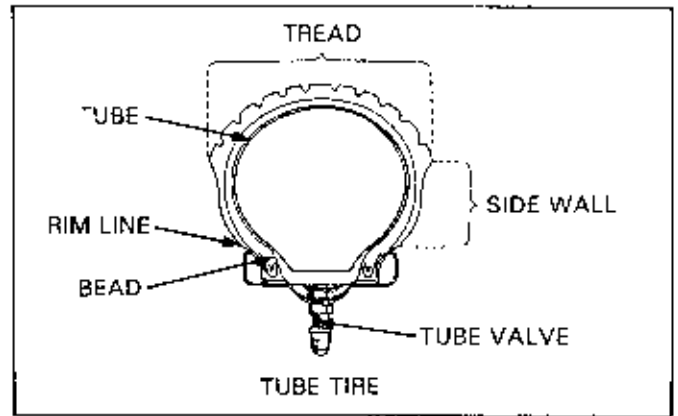
## BASIC TIRE INFORMATION

### CAUTION

- Be careful not to damage the rim area when using tire mounting tools.

### <TUBE-TIRE>

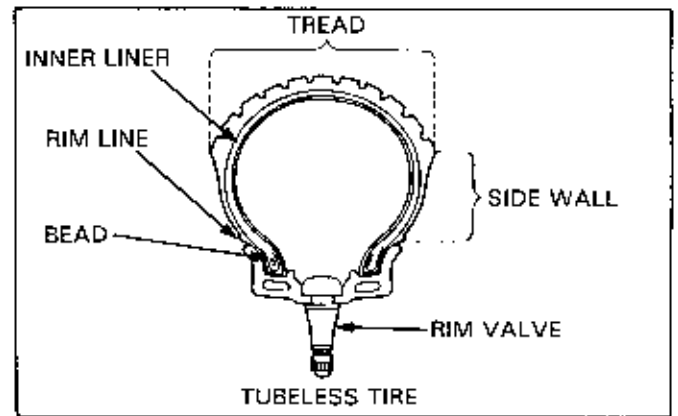
This type uses an air-filled tube within the tire's casing. Therefore, air in the tire leaks out instantly when a nail or other sharp objects penetrates the tire and tube.



### <TUBELESS TIRE>

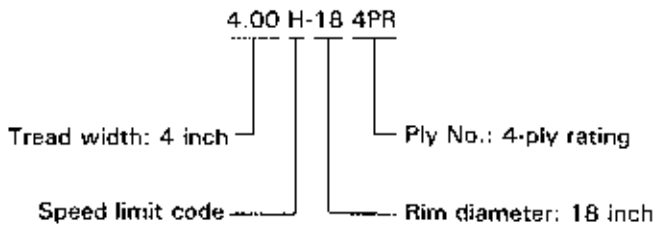
Tubeless tires have a rubber layer (inner liner), which prevents air from filtering through, glued to the inside. This acts in place of a tube. It also has a special bead area, which, together with the specialized rim, makes a tube unnecessary.

This inner liner is sufficient in thickness and does not stretch like a tube. Even when a nail penetrates the tire, the hole does not get any bigger. Instead, it closes around the nail, preventing air from leaking out.



### TIRE CODE

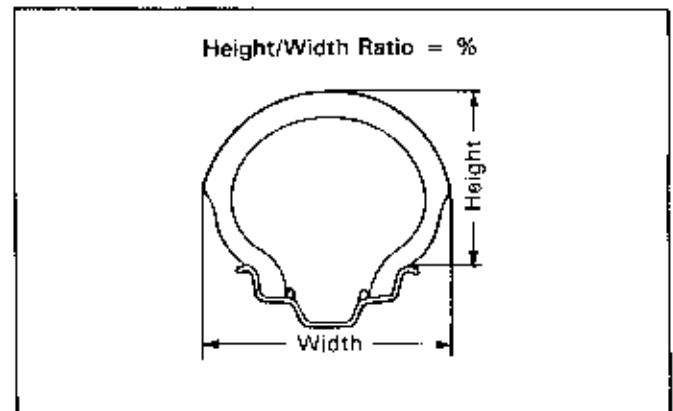
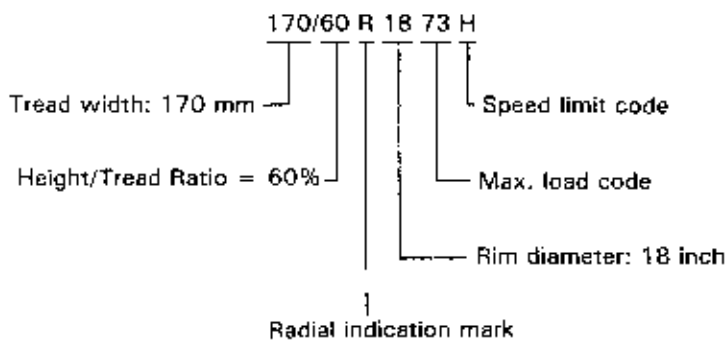
[Inch indication]



### Speed limit code:

- [J] ... 100 km/h max.
- [N] ... 140 km/h max.
- [P] ... 150 km/h max.
- [S] ... 180 km/h max.
- [H] ... 210 km/h max.
- [V] ... 210 km/h min.

[Metric indication]



## WHEELS/TIRES

### Tubeless tire

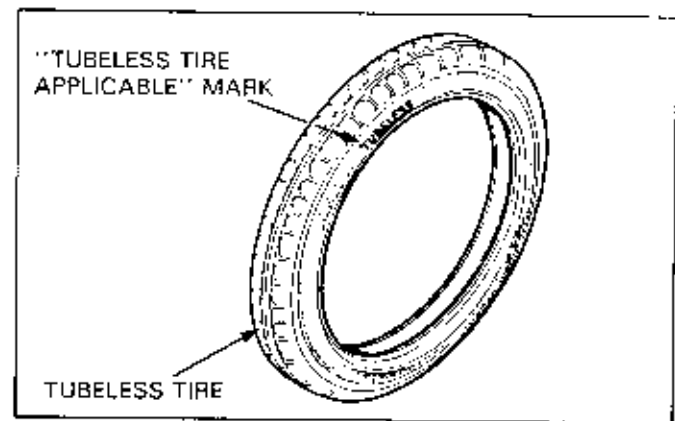
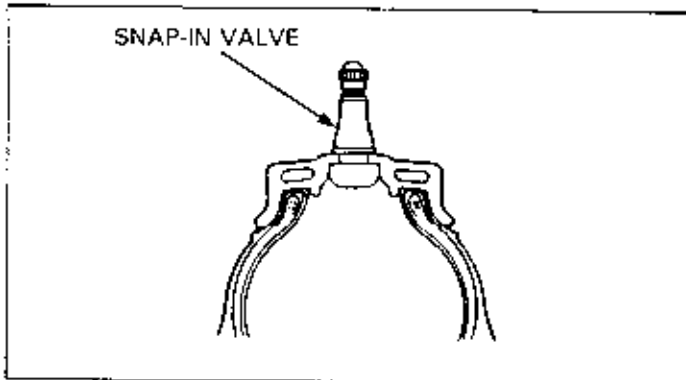
#### ⚠ WARNING

- Any attempt to mount passenger car tires on a motorcycle rim may cause the tire bead to separate from the rim with enough explosive force to cause serious injury or death.

Tubeless tires have "TUBELESS" stamped on their side walls. Tubeless tire rims have "TUBELESS TIRE APPLICABLE" stamped on them. Each rim valve has (Snap-in valve: TR412 or TR413) on it. The rim and tire mating areas and rim valves are different from tube-types in construction.

Replace the tire if it is punctured or its side wall is damaged.

Use care to protect the sealing surfaces when handling and storing tubeless tires and rims.



	Tubeless tire rim	Tube tire rim
Identification	 "TUBELESS TIRE APPLICABLE" stamped	"TUBELESS TIRE APPLICABLE" not stamped
Rim valve hole diameter	11.5 mm	8.5 mm

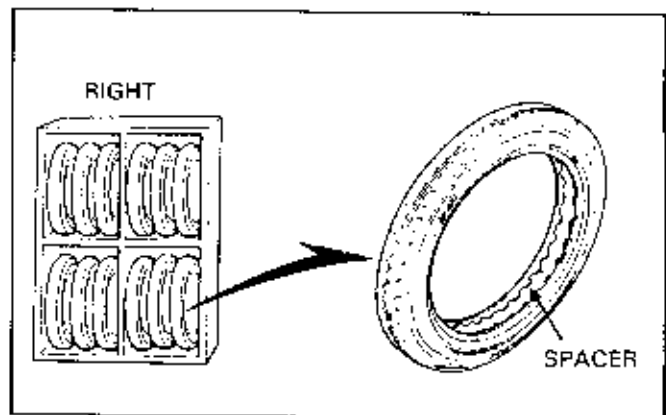
### Storage

Store tubeless tires upright with a spacer or thick paper placed between the tire beads.

If the bead-to-bead clearance is narrower than the rim width, it is difficult to install the tire onto the rim.

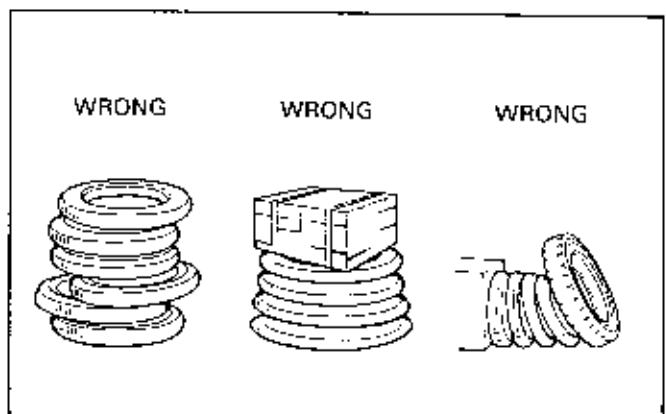
Do not stack or lean tires against each other.

To store the tire that is to be re-used, adjust the air pressure to 1/2 of the recommended pressure. Be sure that the valve cap is securely installed.



Do not store the tubeless tires or rims in these areas:

- Where the ozone is produced (near motor, battery charger)
- Hot area (near heater, steam pipe etc.)
- Where oil or grease is stored.
- In direct sunlight
- Wet or humid area



## TIRE REMOVAL

Refer to page 16-17 for ATV's wheel/tire servicing.  
Remove the wheel.

### NOTE

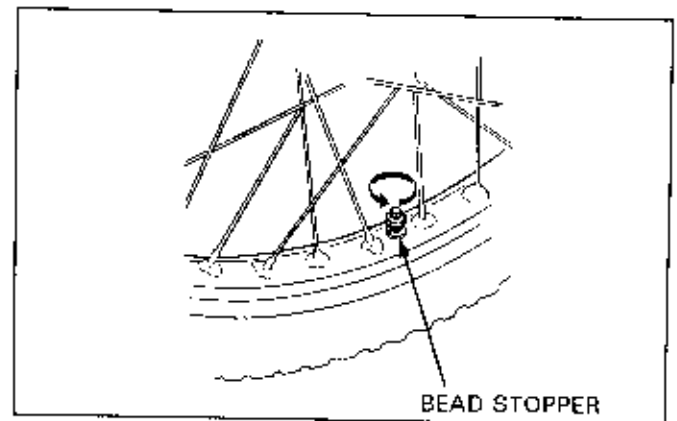
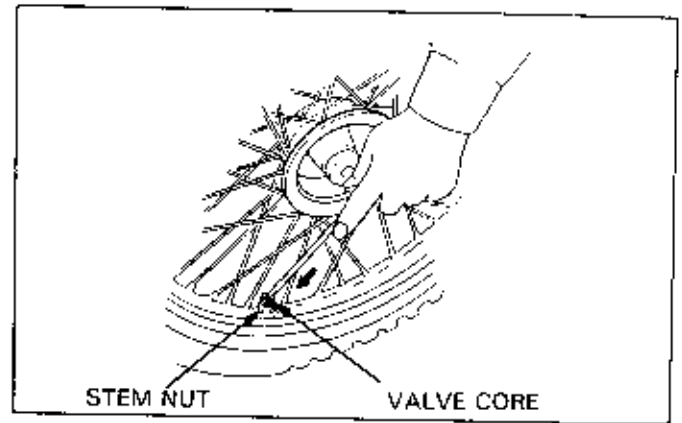
- **Single brake disc type:** To prevent damage to the disc, place the wheel on the level surface with the disc facing up.
- **Double brake disc type:** Remove one disc first, then place the wheel on the level surface with the other disc facing up.

Remove the valve cap and bleed air by pressing the valve core.

Remove the valve core after bleeding air completely.

Remove the valve stem nut and push the valve stem lightly.

If a bead stopper is installed, loosen the lock nut and push the bead stopper down.

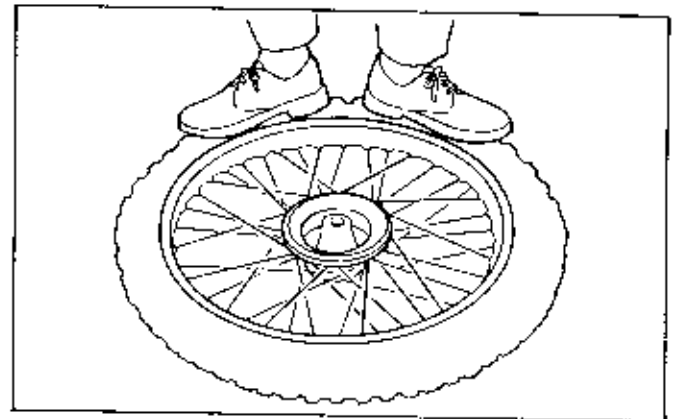


Collapse in the bead with a tire bead breaker.

If no tire bead breaker is available, step on the side wall to collapse the bead.

### NOTE

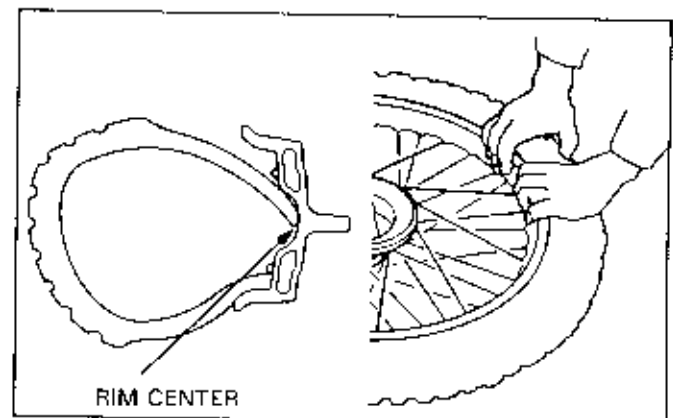
- Do not step on the rim.



Collapse the bead into the rim center and slide the tire out of position.

### NOTE

- Tire can be easily removed once the beads are collapsed completely.



## WHEELS/TIRES

Apply a mild detergent solution to the rim and tire mating surfaces.

Be sure that the bead is completely collapsed. In case of the tube type tire, insert the tire lever from the opposite side of the valve and raise the bead over the rim. On tubeless tires, insert the tire lever from the valve side and raise the bead over the rim.

Always use a rim protector when using tire levers.

### CAUTION

- To avoid damaging the rim when using the tire lever, always use rim protectors.

### NOTE

- Be sure to use motorcycle tire levers.
- Do not apply the mild detergent solution to the rim and tire mating surfaces of low pressure tire. Apply water only.

Insert another tire lever at 30–50 mm (1 to 2 in) from the first tire lever and remove the tire from the rim, little by little.

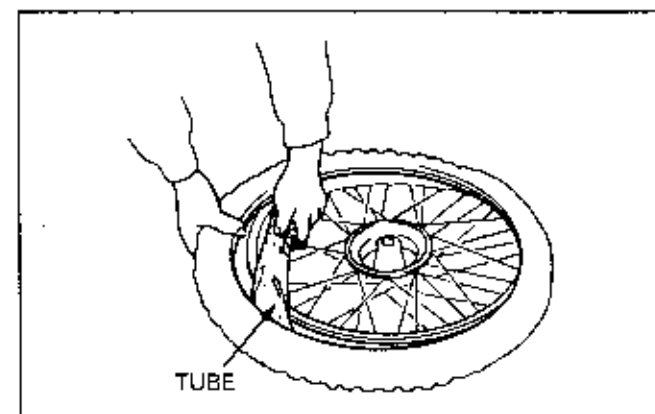
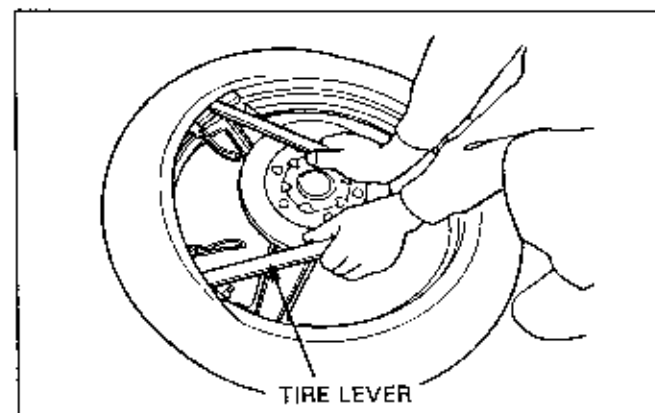
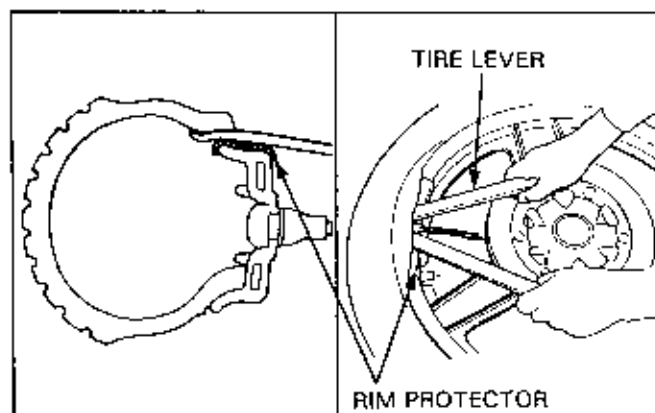
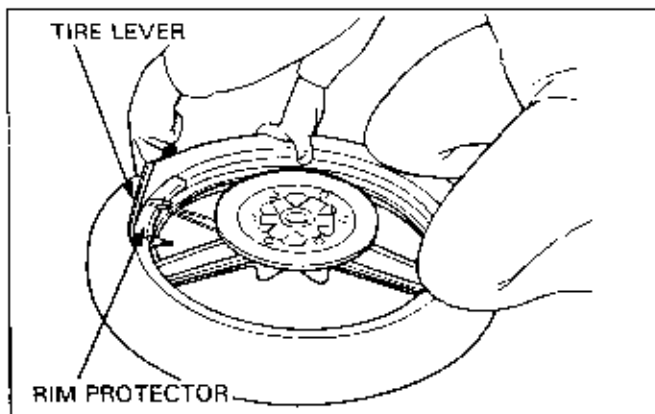
### NOTE

- Do not try to remove the bead too much at one time.
- Do not pry against or scratch the bead stopper area with the tire lever.

Repeat the above procedures until half of bead is removed. Then remove the remaining bead by hand.

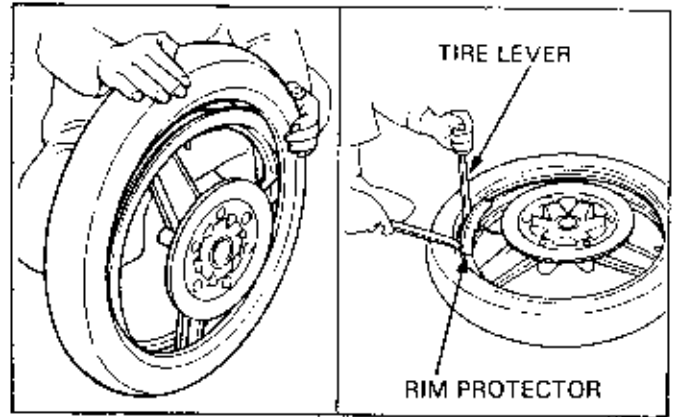
### Tube-type tire only

Press the valve into the tire completely and remove the tube from the tire.



Remove one side of bead using same procedures as the tubeless tire.

Remove the tire from the rim.



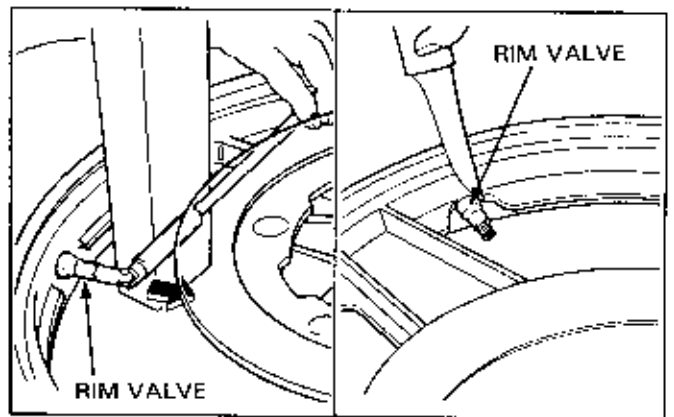
### RIM VALVE REPLACEMENT (TUBELESS TIRE ONLY)

Cut off the rim valve at its base.

Apply mild detergent solution to a replacement rim valve and insert it from inside of the rim.

#### NOTE

- Be sure to use the recommended rim valve.
- Do not damage the valve hole.
- Replace the rim valve whenever installing a tubeless tire.



### WHEEL CENTER ADJUSTMENT (SPOKE WHEEL ONLY)

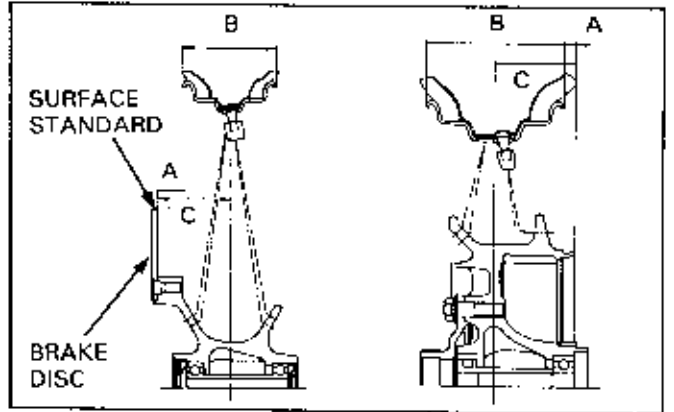
The wheel center adjustment is necessary when the spoke wheel has been rebuilt.

The distance indicated is as follows:

- A: Between the rim side and standard surface
- B: Rim width (measurement)
- C: Between the rim center and standard surface

#### NOTE

- Refer to the Model Specific manual for standard surface and specific values of C on each model.



Measure the distance B (rim width), and make the following calculations.

$$A = C - B/2$$

Example: (B: 76.2 mm, C: 56.5 mm)

$$A = 56.5 - 76.2/2 = 18.4$$

Adjust the rim position and distance A by tightening the spokes to specified torque in 2 or 3 progressive steps.

Inspect and adjust the wheel rim runout.

## TIRE INSTALLATION

Refer to page 16-17 for ATV's wheel tire servicing.

For a tube type tire, check the rim band and rim lock to be sure they are installed properly.

### WARNING

- Any attempt to mount passenger car tires on a motorcycle rim may cause the tire bead to separate from the rim with enough explosive force to cause serious injury or death.

### CAUTION

- Always change rims which have been bent or have cracks, as they may cause air leakage.
- Always change the rim if there are any flaws over 0.5 mm in depth and 1.0 mm in width on the surface touching the bead.

Check the tire for overall condition and use a mild detergent solution on the bead.

Use only water as a lubricant when removing or mounting tires.

Soap or other tire lubricants may leave a slippery residue that can cause the tire to shift on the rim.

### WARNING

- A tire that shifts on the rim may lead to a sudden loss of air pressure while riding and an accident could occur.

### NOTE

- Be sure to use motorcycle tire levers.
- Do not use the detergent solution on low pressure tires. Use water only.

If the tire has an light mark (yellow paint mark), install the tire with this mark aligned with the valve.

If the tire has an arrow mark, install the tire with the mark pointing in the direction of rotation.

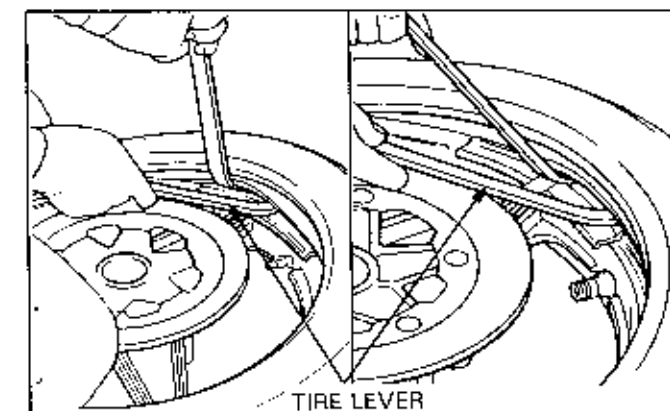
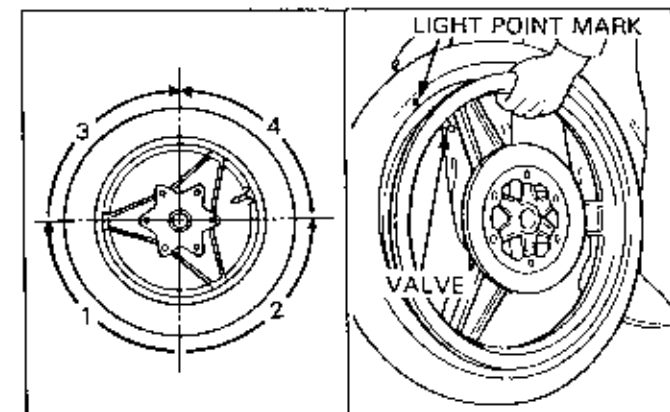
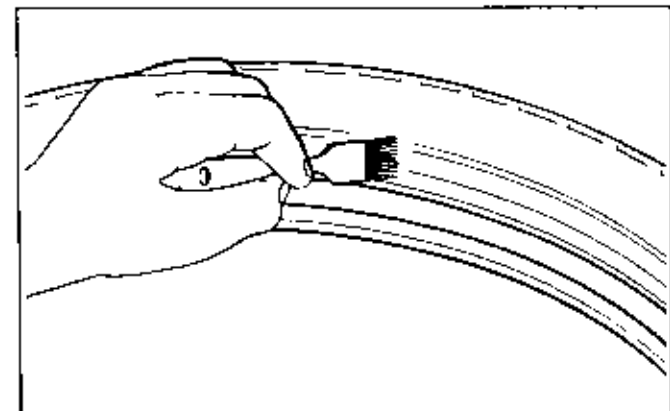
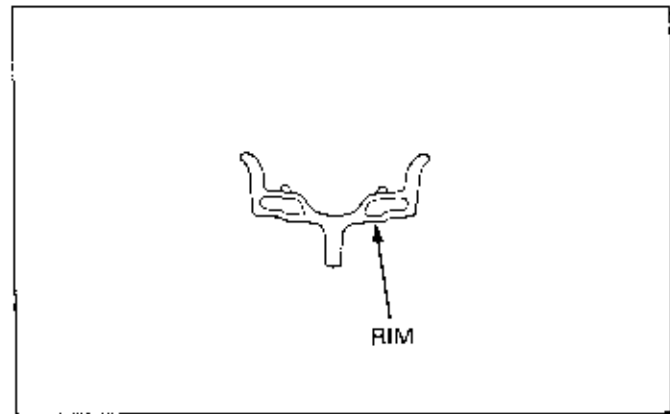
Stand the tire upright, hold it with one hand and, starting from the opposite side to the valve, install one side of the tire on the rim as much as you can by hand.

Be sure to assemble in the sequence shown.

Place the wheel on the level surface and install the remaining portion of the tire using two tire levers.

### NOTE

- For easy assembly, apply a mild detergent solution to the tire and rim mating surfaces.
- Do not use the detergent solution on the tire and rim mating surfaces of the low pressure tires. Use water only.



**Tube-type only**

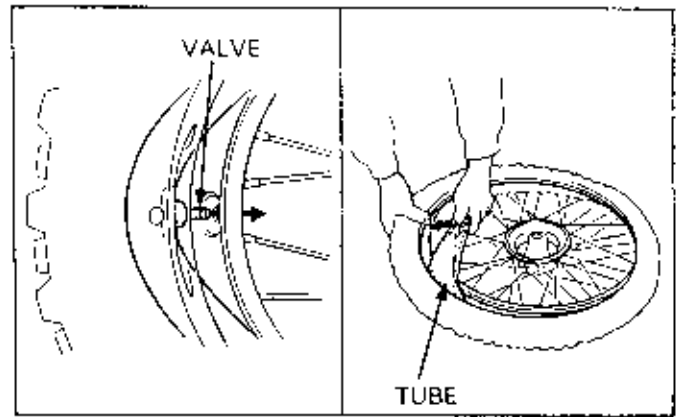
Inflate the tube with a small amount of air.

Push the tube into the tire.

Insert the valve through the valve hole and loosely install the nut.

Install the tube so that it is aligned with the concave portion of the rim center.

Be sure that the tube is not twisted and the valve stem is straight.



Install the other side of the bead while holding the assembled portion of the bead with your knee to prevent it from coming off.

**NOTE**

- Before using the levers, be sure that the bead on the opposite side is positioned in the center of the rim.

Install the bead a little at a time, using care not to damage the tube or wheel with the tire levers.

After 1/2 of the bead has been installed, insert the two tire levers at a distance of 30–40 mm (1 to 2 in) to install it. Repeat this procedure until 3/4 of the bead has been installed.

**NOTE**

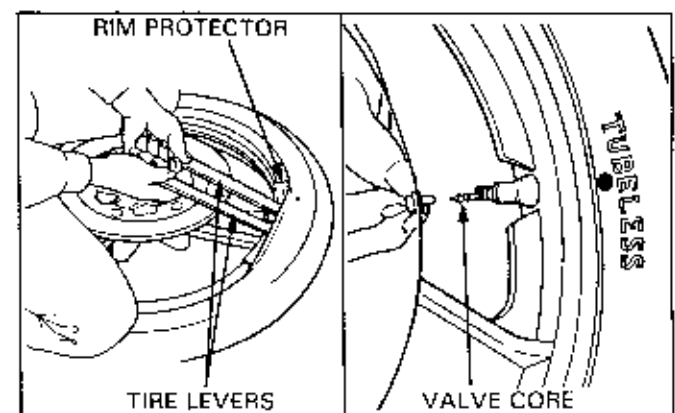
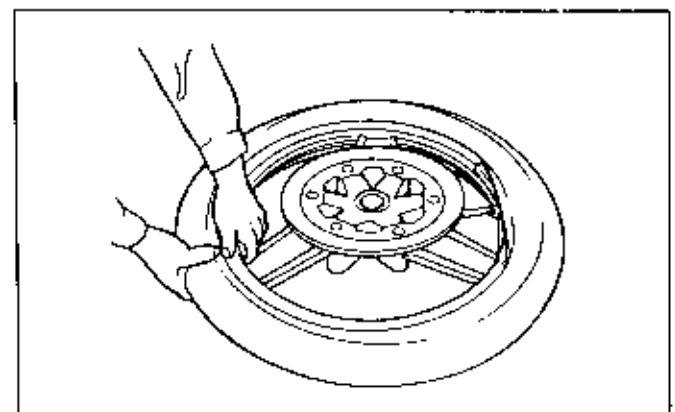
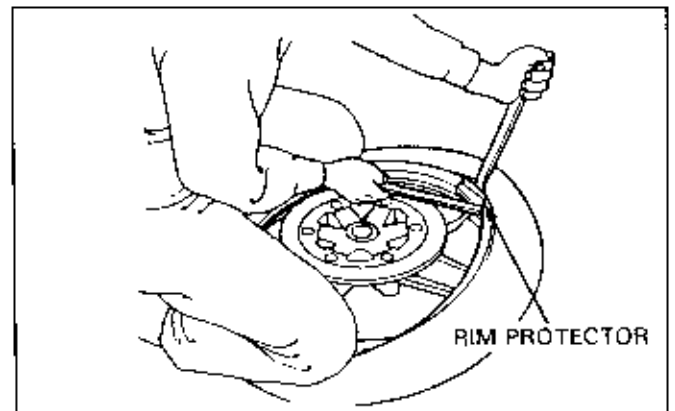
- Hold one tire lever upright to remove the other lever.

After 3/4 of the bead has been installed, check the bead on the opposite side. Be sure it is still in the center of the rim.

**NOTE**

- The last portion of the bead is more difficult to install. The rim and bead may be damaged if the bead on the opposite side of the point where you are working is not in the rim center.

When the remaining bead is only 50–60 mm (2 to 2.5 in), pull the two levers up and over.





## WHEELS/TIRES

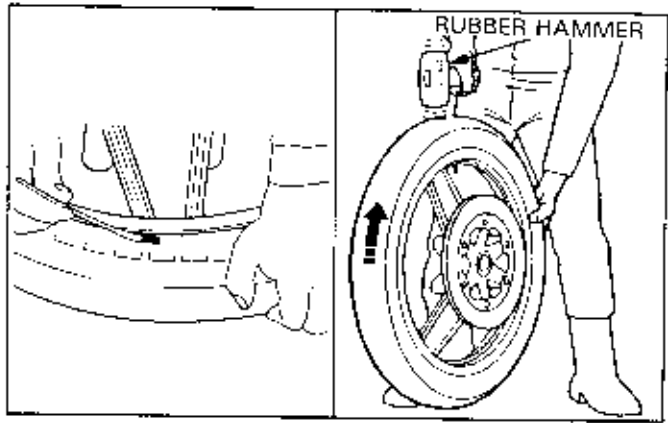
Apply a mild detergent solution to the bead again.

### ⚠ WARNING

- Use only water as a lubricant when removing or mounting tires.  
Soap or other tire lubricants may leave a slippery residue which can cause the tire to shift on the rim.

Tap on the tire tread surface with a rubber hammer so that the tire and rim fit evenly around the circumference.

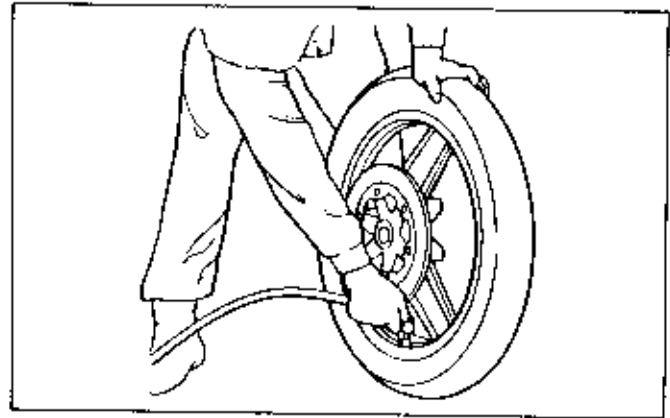
Be sure that the tire center and rim center are aligned.



Inflate the tire to 1.5 times the standard recommended pressure to seat the bead on the rim.

### ⚠ WARNING

- Use the tire pressures specified in the Model Specific manual or on the tire label. Overinflation may cause a tire to burst with sufficient force to result in serious injury or death.



### NOTE

- For tubeless tires, you may hear a loud sound as the bead seats onto the rim. This is normal.
- For tubeless tires, if air leaks out from between the rim and bead, let the wheel stand with the valve at the bottom and put air in while pushing down on the tire.

Check that the tire bead seats on the tire rim securely and the rim line of the tire is concentric with the rim.

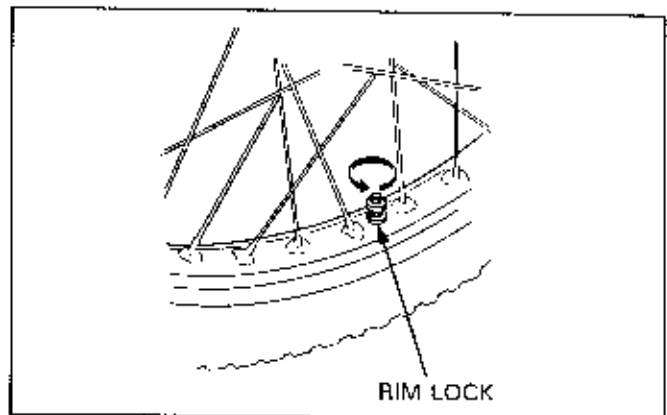
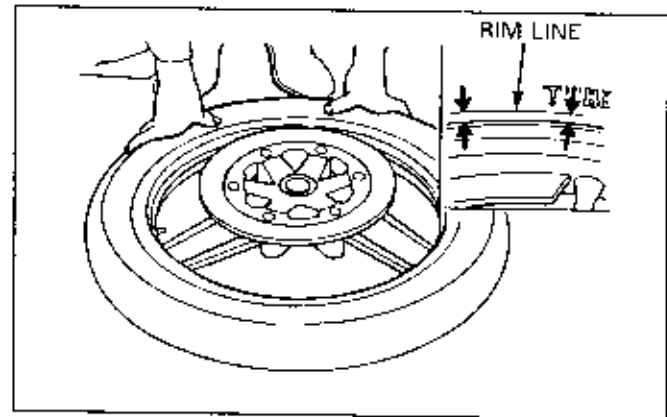
Adjust the tire pressure to the specified pressure.

Check the wheel balance.

Tighten the rim lock nut to specified torque if available.

On the tube type tire, tighten the valve stem nut.

Install the wheel.

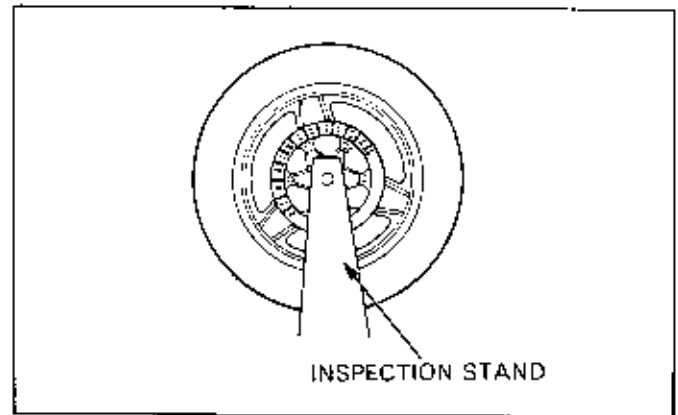


## WHEEL BALANCING

Refer to the Model Specific manual to verify whether or not the model being serviced requires wheel balancing. The manual will specify the type of weights required, if necessary.

### ⚠ WARNING

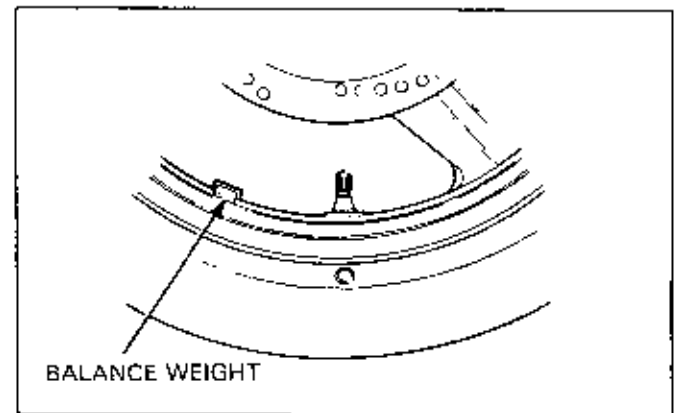
- Wheel balance directly affects the stability, handling and overall safety of the motorcycle. Carefully check balance before reinstalling the wheel.



Mount the wheel, tire and brake disc assembly in an inspection stand.

Spin the wheel, allow it to stop, and mark the lowest (heaviest) part of the wheel with chalk. Do this two or three times to verify the heaviest area. If the wheel is balanced, it will not stop consistently in the same position.

To balance the wheel, install wheel weights on the lightest side of the rim, the side opposite the chalk marks. Add just enough weight so the wheel will no longer stop in the same position when it is spun.



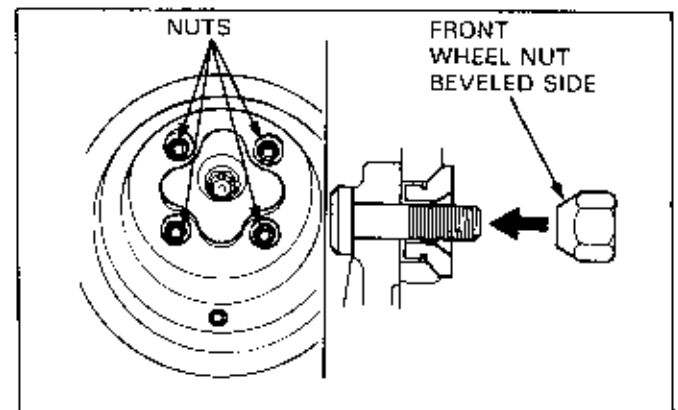
## ATV WHEEL/TIRE

### REMOVAL/INSTALLATION

Loosen the wheel nuts.

Raise the rear wheels off the ground with a jack or block under the engine.

Remove the wheel nuts and wheel.

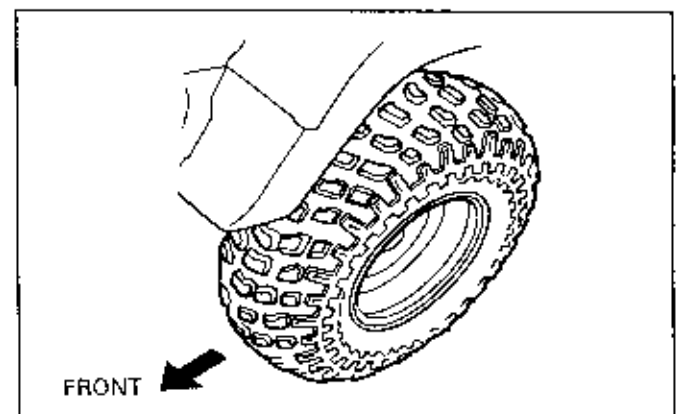


Install the wheel in its original position.

### NOTE

- Do not interchange the right and left tires. If the tire has arrow mark, install the wheel with the arrow mark pointing in the direction of rotation.

Install the wheel nuts with the beveled sides facing inward and tighten to the specified torque.



## WHEELS/TIRES

### TIRE REMOVAL (U.S.A. ONLY)

#### NOTE

- This service requires the Universal Bead Breaker (GN-AH-958-BB1) available in U.S.A. only.
- Remove and install tires from the rim side opposite the valve stem.

Remove the core from the valve stem.

A tire bead tool is required for tire removal.

Use a Coats 220 Tire Changer or equivalent to remove the tire from the rim. If a tire changer is not available, rim protectors and tire irons may be used.

#### CAUTION

- Take care to avoid damaging the bead seating area of the rim.

Install the proper size blade for the rim you are working on onto the breaker arm assembly.

#### CAUTION

- Use of an improper size tire tool may result in damage to the rim, tire, or tool.

Place the proper size adapter onto the threaded shaft and then put the wheel over the threaded shaft and adapter.

Lube the bead area with water, pressing down on the tire sidewall/bead area in several places to allow the water to run into and around the bead. Also lube the area where the breaker arm will contact the sidewall of the tire.

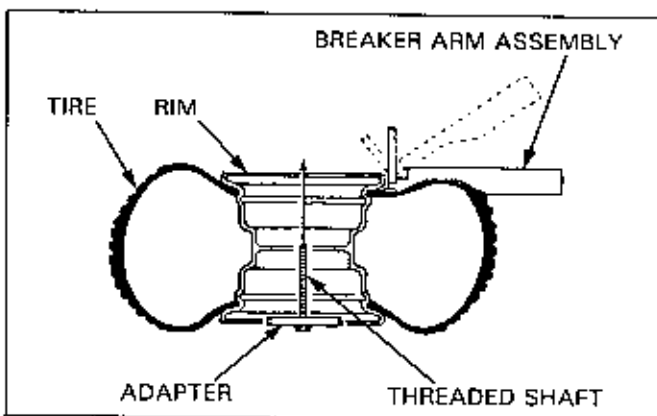
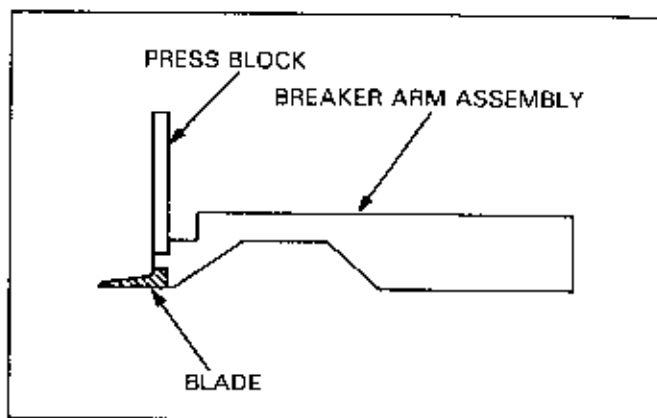
Use only water as a lubricant when removing or mounting tires.

Soap or other tire lubricants may leave a slippery residue that can cause the tire to shift on the rim.

#### WARNING

- A tire that shifts on the rim may lead to a sudden loss of air pressure while riding and an accident could occur.

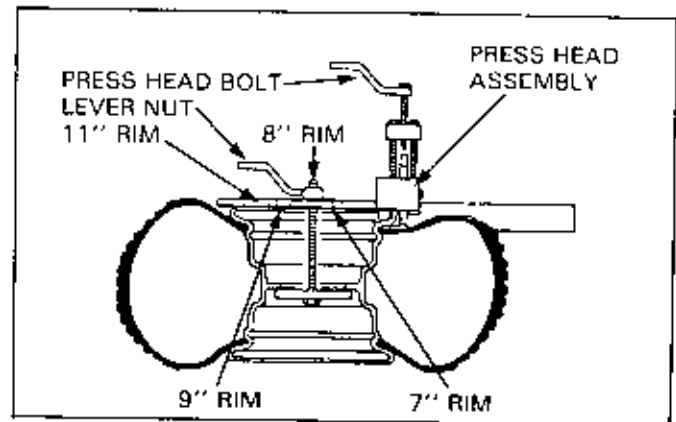
While holding the breaker arm assembly at an approximate 45° position, insert the blade of the breaker arm between the tire and rim. Push the breaker arm inward and downward until it is in the horizontal position with its press block in contact with the rim.



With the breaker arm in the horizontal position, place the breaker press head assembly over the breaker arm press block. Make sure the press head bolt is backed out all the way and then position the nylon buttons on the press head against the inside edge of the rim.

Insert the threaded shaft through the appropriate hole in the breaker press head assembly and then tighten the lever nut until both ends of the breaker press head assembly are in firm contact with the rim.

Tighten the press head bolt until the reference mark on the press block is aligned with the top edge of the press head.

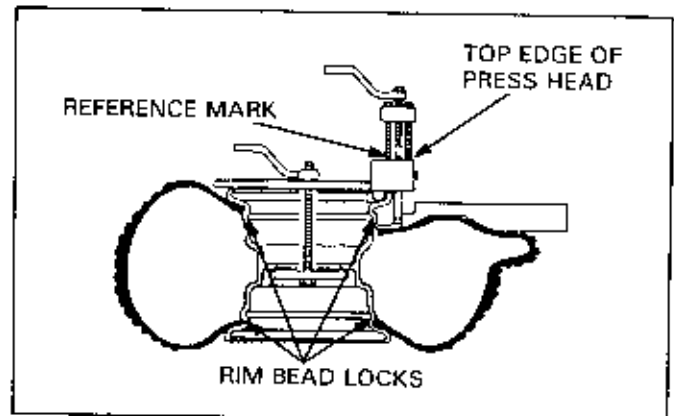


If the rest of the bead cannot be pushed down into the center of the rim by hand, loosen the press head bolt and the lever nut. Rotate the breaker arm assembly and breaker press head assembly 1/8 to 1/4 of the circumference of the rim. Tighten the lever nut and then tighten the press head bolt as described.

Repeat this procedure as necessary until the remainder of the bead can be pushed down into the center of the rim.

Assemble the Universal Bead Breaker on the other side of the wheel and break the bead following the same procedures.

Remove the tire from the rim using a tire changer machine or tire irons and rim protectors.

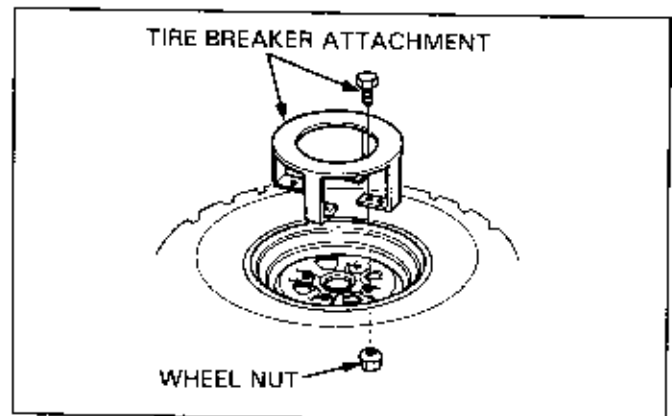


Remove tire from rim that has the smallest shoulder area to simplify removal.

### REMOVAL (EXCEPT U.S.A.)

#### NOTE

- Applying water, soapy water, oil, or other lubricants to the tire, rim or tire tool when removing the tire may cause the tire breaker arm to slip off the tire so that the bead cannot be broken.
- Follow the breaker manufacturer's instructions.

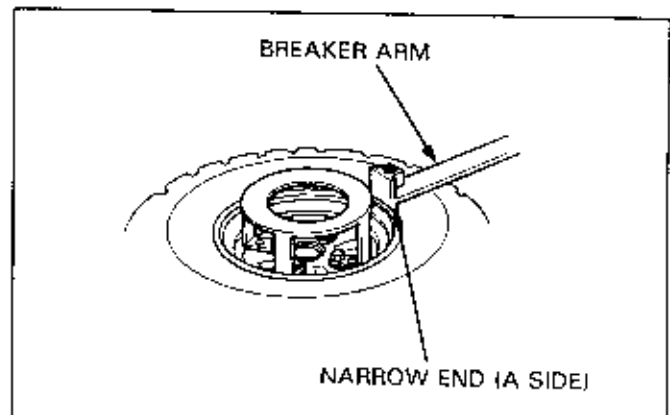


#### CAUTION

- Excessive lapping pressure may deform or damage the seat.
- Do not damage the bead seating area of the rim.

Install the tire breaker attachment on the rim with the wheel nuts and tighten the nuts securely.

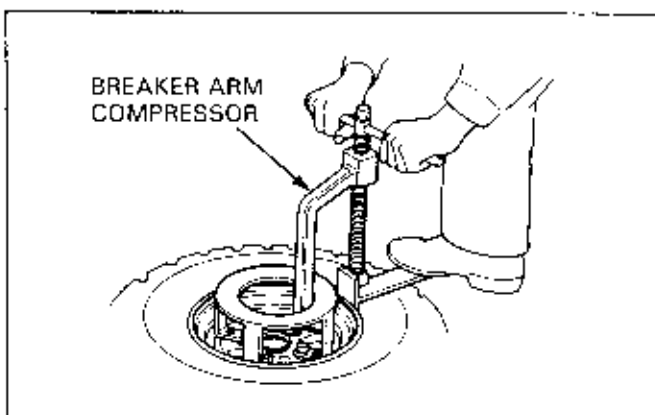
Insert the narrow end (A side) of the breaker arm between the tire and the rim.



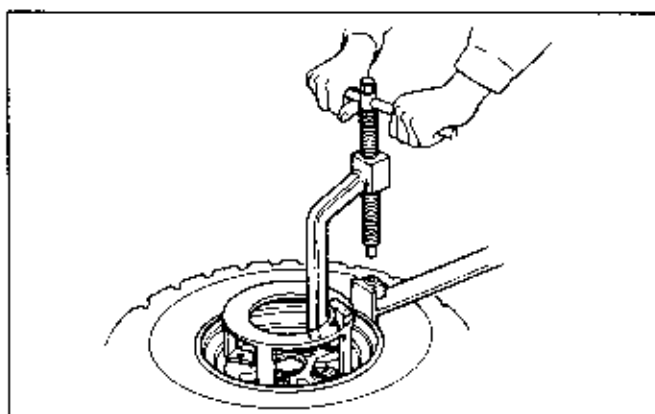
## WHEELS/TIRES

Position the breaker arm compressor on the tire breaker attachment as shown.

Keep the breaker arm horizontal and align the end of the compressor bolt with the breaker arm hole.



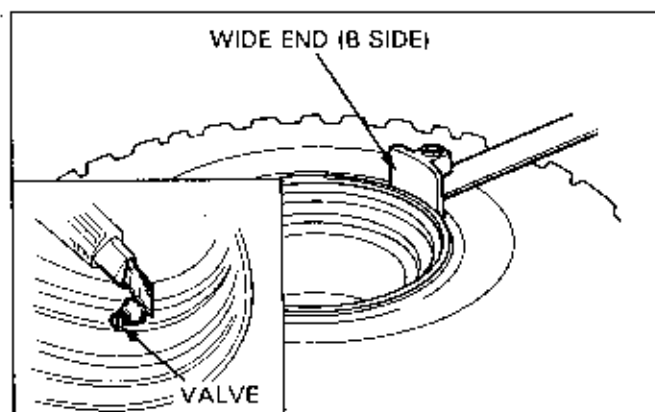
Screw in the breaker arm compressor bolt while pushing the breaker arm on the tire with your foot to break the bead from the rim.



### NOTE

- Do not break the bead all at once. Remove and reposition the compressor and arm 1/8 of the circumference of the rim. Tighten the compressor bolt. Break the bead by repeating this procedure 3–4 times.

If the bead breaking is difficult with the narrow end (A side) of the breaker arm, use the wide end (B side) of the arm and repeat the procedure in the previous step.



After removing the tire from the rim, cut the valve off at the bottom, being careful not to damage the rim.

### NOTE

- Be sure to replace the valve with a new one whenever the tire is removed from the rim.

## TIRE REPAIR

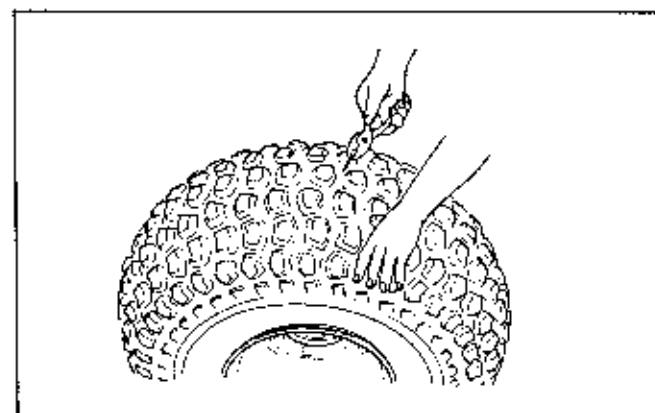
### NOTE

- Use the manufacturer's instructions for the tire repair kit you are using. If your kit does not have instructions, use the procedures provided here.

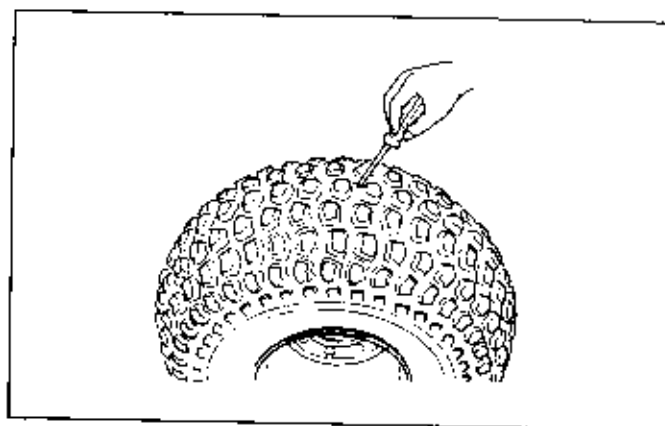
Check the tire for the puncturing objects. Chalk mark the punctured area and remove the object.

Inspect and measure the injury. Tire repairs for injuries larger than 15 mm (5/8 in) should be a section repair. Section repairs should be done by a professional tire repair shop.

If the injury is smaller than 15 mm (5/8 in), proceed with the repair as described here.



Install a rubber plug into the hole as follows:  
Apply cement to a plug inserting needle and work the needle into the hole to clean and lubricate it. Do this three times. Do not let the cement dry.



Insert and center a rubber plug through the eye of the inserting needle.

Apply cement to the rubber plug.

Push the inserting needle with plug into the hole until the plug is slightly above the tire. Twist the needle and remove it from the tire; the plug will stay in the tire.

#### NOTE

- Be careful not to push the plug all the way into the tire.

Trim the plug 6 mm (1/4 in) above the tire surface.

Repeat the above procedure if the puncture is large.

Do not use more than two plugs per hole.

Allow the repair to dry. Drying time will vary with air temperature. Refer to the tire repair kit manufacturer's recommendations.

Inflate the tire and test the seal by dabbing a small amount of cement around the plug. Escaping air will cause a bubble in the cement. If there is leakage, remove the tire (page 16-17) and apply a cold patch to the inside of the tire as described.

If a plug has been inserted, trim it even with the inner tire surface.

Temporarily place a rubber patch that is at least twice the size of the puncture over the injury. Make a mark around the patch, slightly larger than the patch itself.

Remove the patch.

Roughen the area marked inside the tire with a tire buffer or a wire brush. Clean the rubber dust from the buffed area.

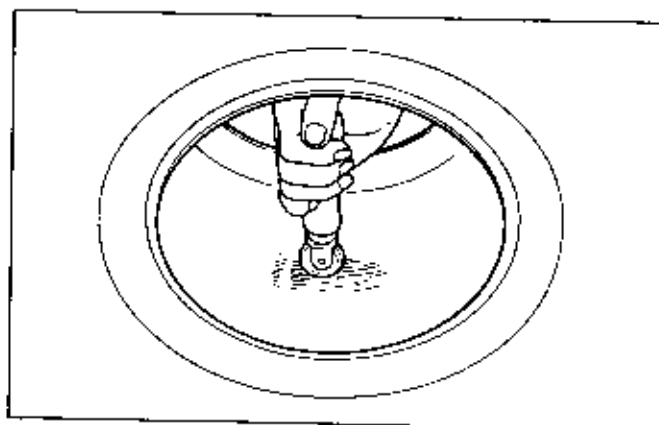
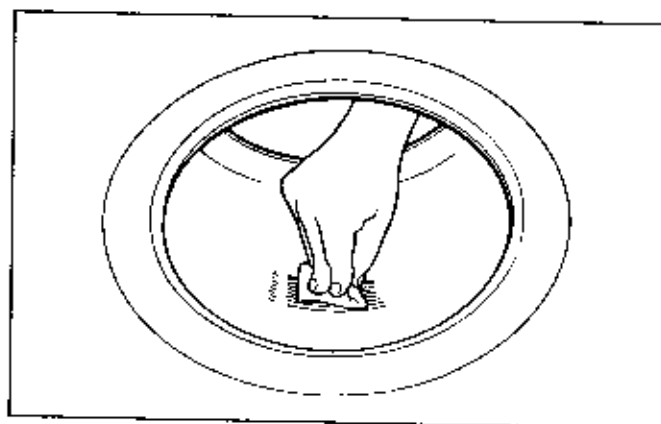
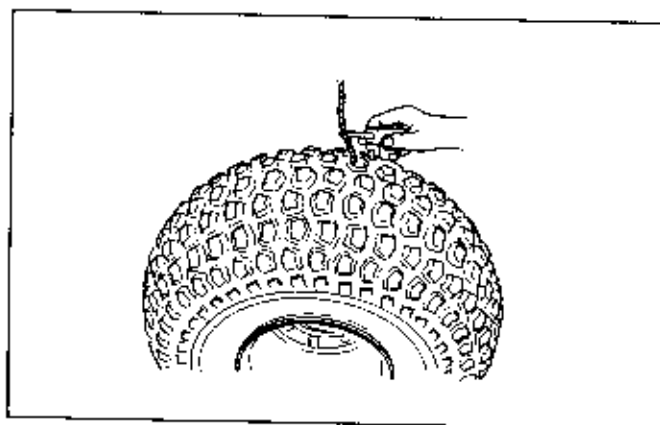
Apply cement over the area marked and allow it to dry.

Remove the lining from the patch and center it over the injury.

Press the patch against the injury using a special roller.

#### NOTE

- Allow cement to dry until tacky before applying patch.
- Do not touch the cement with dirty or greasy hands.



## WHEELS/TIRES

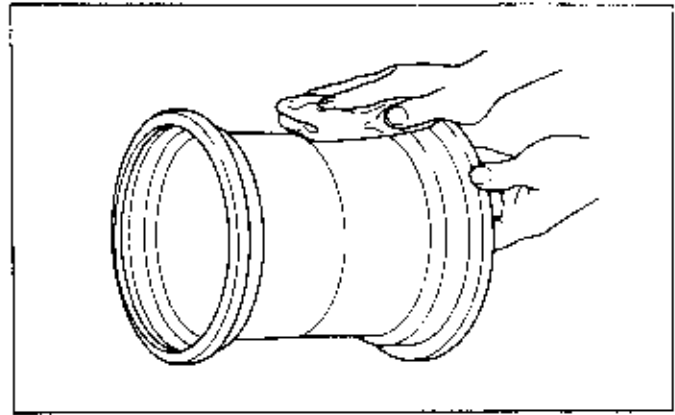
### ASSEMBLY

Clean the rim bead seat and flanges.  
Apply clean water to the rim flanges, bead seat and base.

Install the tire on the rim, where the rim shoulder width is the narrowest, to simplify installation.

#### ⚠ WARNING

- Use only water as a lubricant when mounting tires. Soap or other tire lubricants may leave a slippery residue that can cause the tire to shift on the rim resulting in a sudden loss of air pressure while riding.



Install the valve core in the valve stem.  
Install the tire and inflate it to seat the tire bead.

#### ⚠ WARNING

- The maximum pressure for seating the tire bead is indicated on the side wall. Do not inflate the tire beyond this pressure. The tire could burst with sufficient force to cause severe injury.

#### NOTE

- If the tire has arrow mark, install the tire with the mark pointing in the direction of rotation.
- Do not interchange the right and left tires.

Deflate the tire. Wait 1 hour and inflate the tire to the specified pressure.

Check for air leaks and install the valve cap.

The ATVs are equipped with tubeless tires, valves, and wheel rims. Use only tires marked "TUBELESS" and tubeless valves on rims marked "TUBELESS TIRE APPLICABLE." Never mount tires designed for use on automobiles on an original rim.