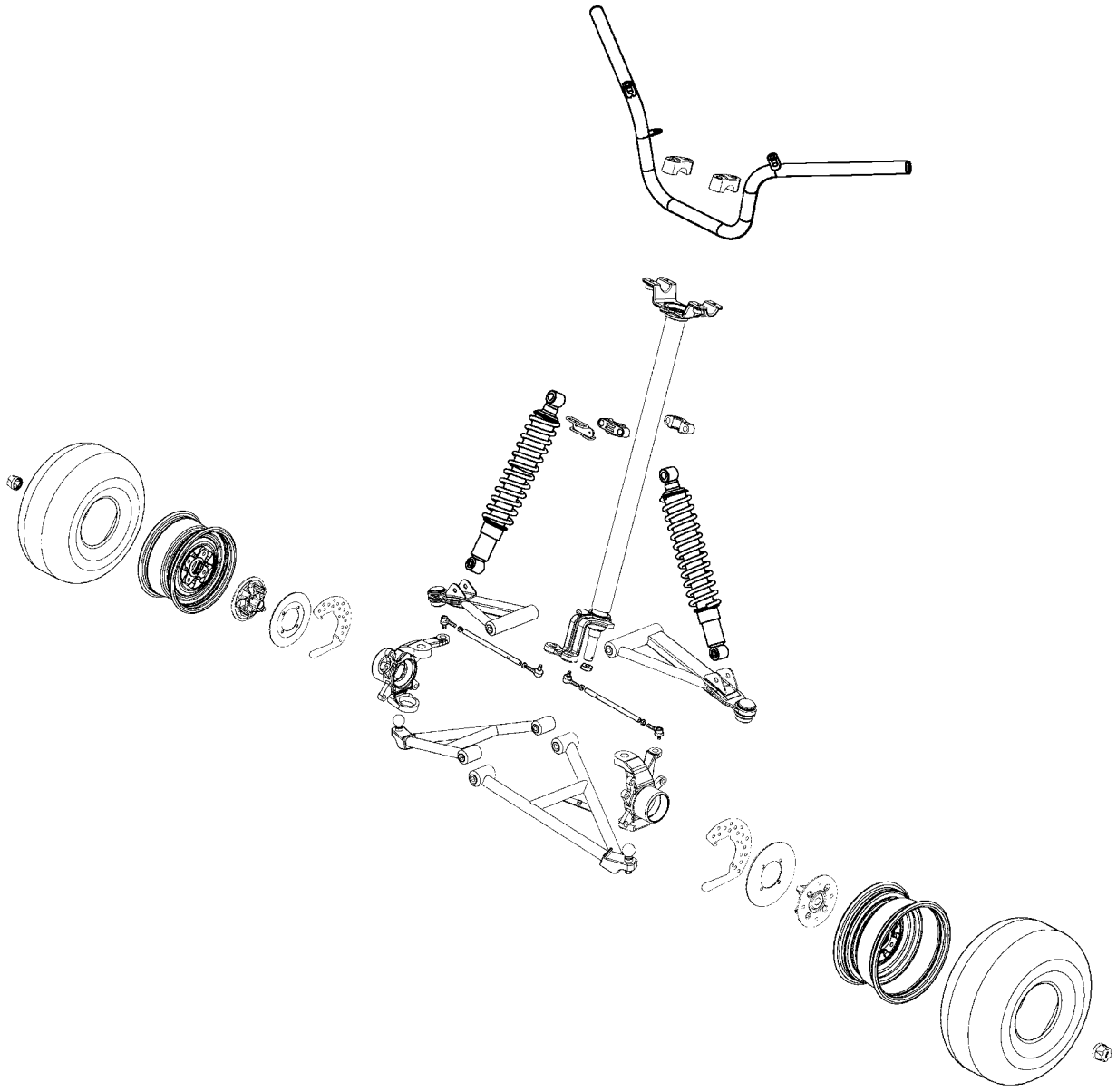
FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM



SERVICE INFORMATION

GENERAL INSTRUCTIONS

- Jack the machine front wheel off the ground and be careful to prevent the machine from falling down.
- During servicing, keep oil or grease off the brake disk
- Inspect the brake system before riding.

SPECIFICATIONS

Unit: mm (in)

Item		Standard	Service Limit
Front wheel rim run out	Radial	—	2 (0.08)
	Axial	—	2 (0.08)
Tie rod length		379.75±0.25 (15.19±0.01)	—
Rod-end (tie rod) angle		180°	—

TORQUE VALUES

Steering column nut	7 kgf-m (70 N-m, 50 lbf-ft)	
Front swing arm nut	4.5 kgf-m (45 N-m, 32 lbf-ft)	
Front wheel nut	6.5 kgf-m (65 N-m, 46 lbf-ft)	
Front wheel hub nut	7 kgf-m (70 N-m, 50 lbf-ft)	Castle nut
Knuckle ball joint nut	3 kgf-m (30 N-m, 22 lbf-ft)	Castle nut
Tie-rod ball joint nut	2.1 kgf-m (21 N-m, 16 lbf-ft)	Castle nut
Tie-rod adjusting nut	3.5 kgf-m (35 N-m, 25.5 lbf-ft)	
Front shock absorber mount bolt	4 kgf-m (40 N-m, 29 lbf-ft)	
Handlebar holder bolt	2.5 kgf-m (25 N-m, 18 lbf-ft)	
Steering bracket	2.2 kgf-m (22 N-m, 16 lbf-ft)	

SPECIAL TOOLS

Oil seal and bearing driver	A120E00014
Ball join remover	A120F00012

TROUBLESHOOTING

Hard steering (heavy)
- Insufficient tire pressure

Steers to one side or does not track straight
- Uneven front shock absorbers
- Bent front arm
- Bent steering knuckle

Front shock absorber noise
- Slider bending
- Loose arm fasteners
- Lack of lubrication

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

Soft front shock absorber
- Weak shock springs
- Insufficient damper oil

FRONT WHEEL REMOVAL/INSPECTION/ INSTALLATION

REMOVAL

Place the machine on a level place.
Remove four nuts from front wheel.

Elevate the front wheels by placing a suitable stand under the frame.

✳ Support the machine securely so there is no danger of it falling over.

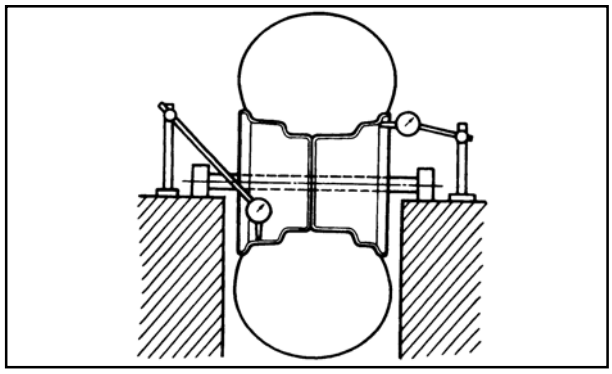
Remove the wheel and wheel hub nut cap together.


Wheel Hub Nut Cap

INSPECTION

Measure the wheel run out.
Replace wheel or check bearing play if out of specification

Rim run out limits:
Vertical: 2 mm (0.08 in)
Lateral: 2 mm (0.08 in)

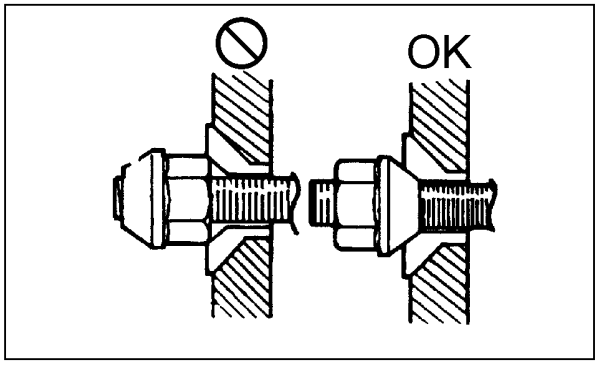


INSTALLATION

When reinstalling a wheel, tighten the wheel nuts in a crisscross (rather than a circular) pattern.

Torque: 6.5 kgf-m (65 N-m, 46 lbf-ft)

✳ Be sure the tapered side of the wheel nuts face the wheel rim.



FRONT WHEEL HUB REMOVAL/INSPECTION/ INSTALLATION

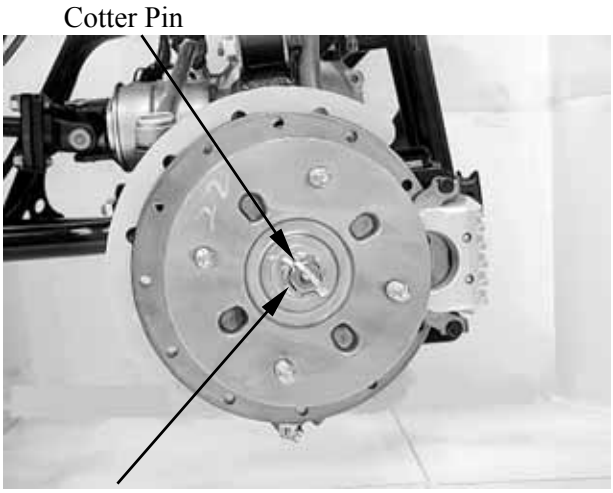
REMOVAL

Place the machine on a level place.
Remove the front wheel (refer to the "**FRONT WHEEL REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter)
Elevate the front wheels by placing a suitable stand under the frame.

✳ **Support the machine securely so there is no danger of it falling over.**

Remove the cotter pin.

Apply the front brake and then remove nut, washer and front wheel hub.



INSPECTION

Check the wheel hub for cracks or deamage.
Check the wheel hub splines for wear or damage.

INSTALLATION

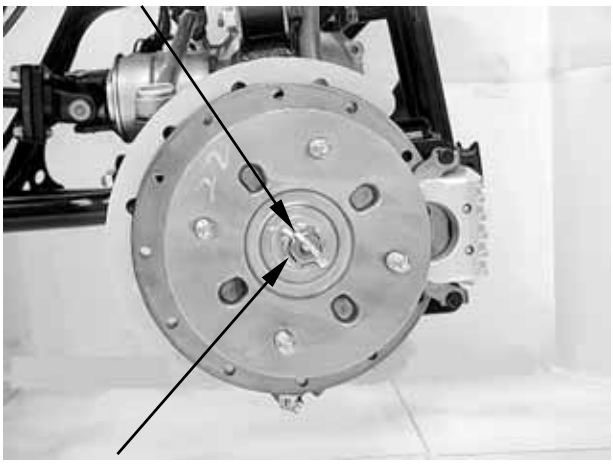
Install the wheel hub, washer and nut.

✳ Apply grease onto the wheel hub splines.

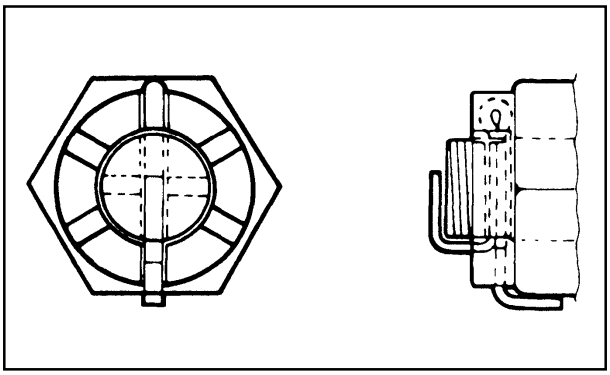
Apply the front brake and then tighten the nut to the specified torque.

Torque: 7 kgf-m (70 N-m, 50 lbf-ft)

Install the cotter pin and band ends of cotter pin.



✳
- Do not apply oil to the seat of the nut.
- Do not loosen the wheel hub nut after torque tightening. If the wheel hub nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the wheel hub nut.

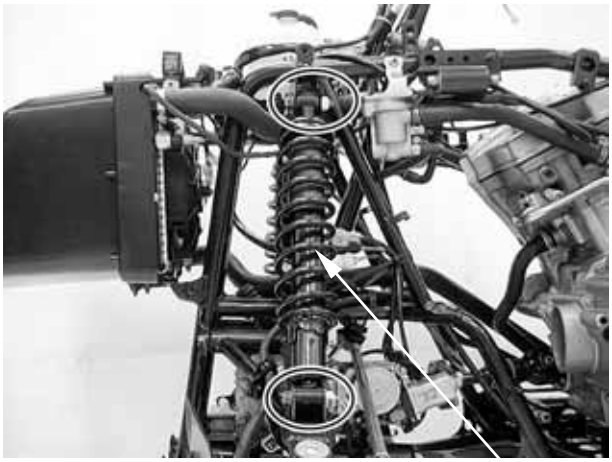


✳ Always use a new cotter pin.

FRONT SHOCK ABSORBER REMOVAL/INSPECTIION/ INSTALLATION

REMOVAL

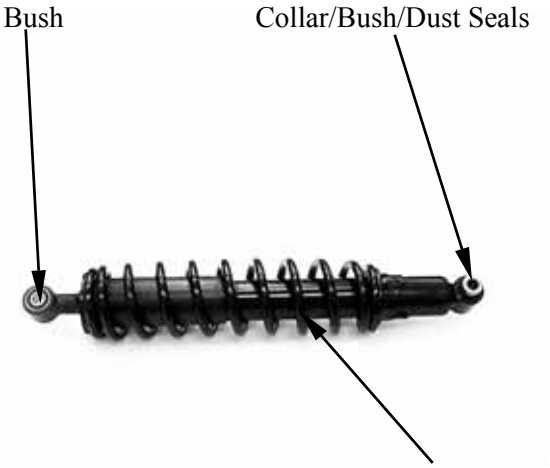
Remove the front shock absorber upper mount and lower mount bolts/nuts, then remove the front shock absorber.



Shock Absorber

INSPECTION

Inspect the shock absorber rod.
Bends/damage →Replace the shock absorber assembly.
Inspect the shock absorber.
Oil leaks →Replace the shock absorber assembly.
Inspect the spring of the shock absorber by move the spring up and down.
Fatigue →Replace the shock absorber assembly.
Inspect bushes, collar and dust seals.
Wear/damage →Replace.

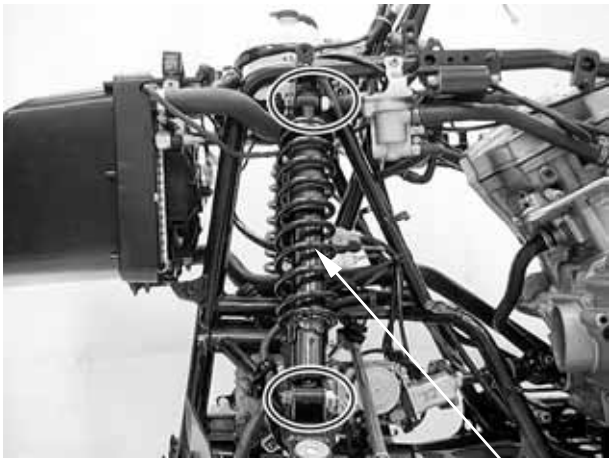


Shock Absorber

INSTALLATION

Apply the grease onto the bushes, then install the shock absorber and tighten the upper mount and lower mount bolts/nuts to the specified torque.

Torque: 4 kgf-m (40 N-m, 29 lbf-ft)



Shock Absorber

STEERING KNUCKLE REMOVAL/INSPECTION/ INSTALLATION

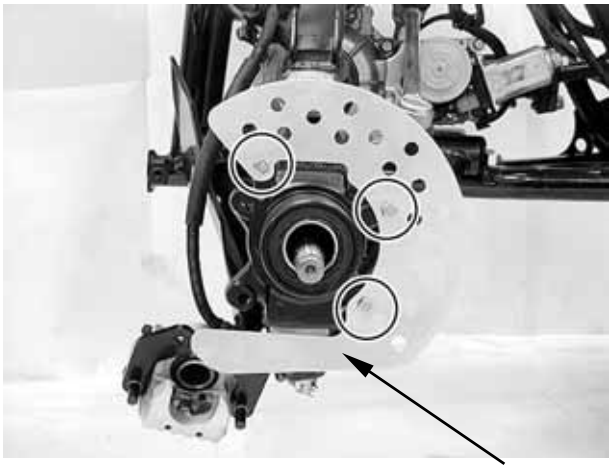
REMOVAL

Elevate the front wheels by placing a suitable stand under the frame.

✳ Support the machine securely so there is no danger of it falling over.

Remove the front wheel hub (refer to the "**FRONT WHEEL HUB REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter)

Remove the three bolts and brake disc protection plate.



Plate

Remove the cotter pin and nut from the tie-rod end.

Remove the cotter pin and nut from the upper arm end.

Remove the cotter pin and nut from the steering knuckle end.


Steering Knuckle

Release the tie-rod ball joint/upper arm ball joint off the knuckle, using the special tool according to the following instructions.

Special tool:

Ball join remover A120F00012

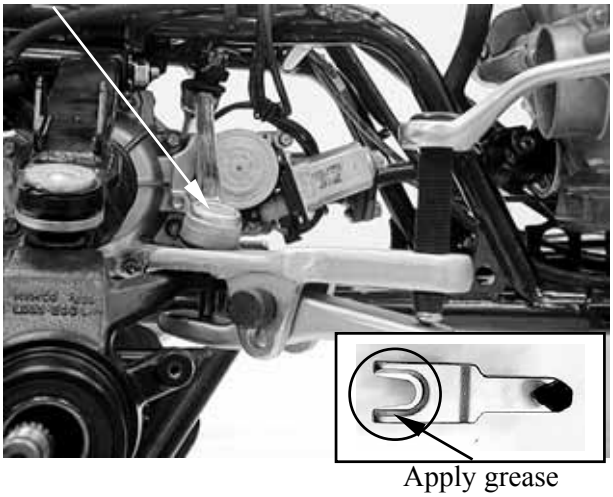
Apply grease to the ball joint remover at the point shown.

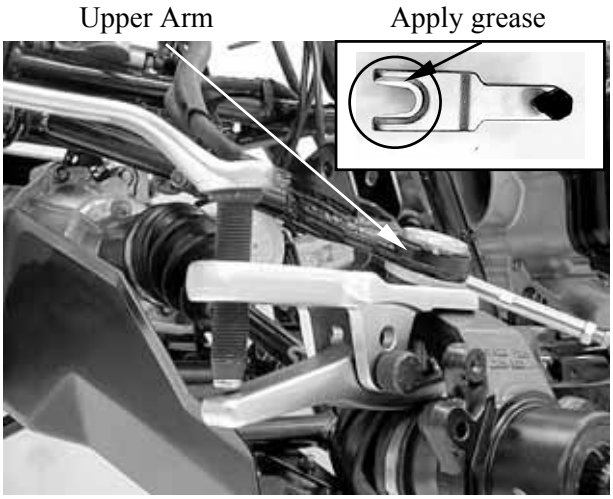
This will ease installation of the tool and prevent damage to the pressure bolt threads.

Insert the jaws carefully, making sure that you do not damage the ball joint boot.

Adjust the jaw spacing by turning the pressure bolt.

Tighten the pressure bolt with a wrench





Release the ball joints of the steering knuckle, using the special tool according to the following instructions.

Special tool: Ball join remover F012

Apply grease to the ball joint remover at the point shown.

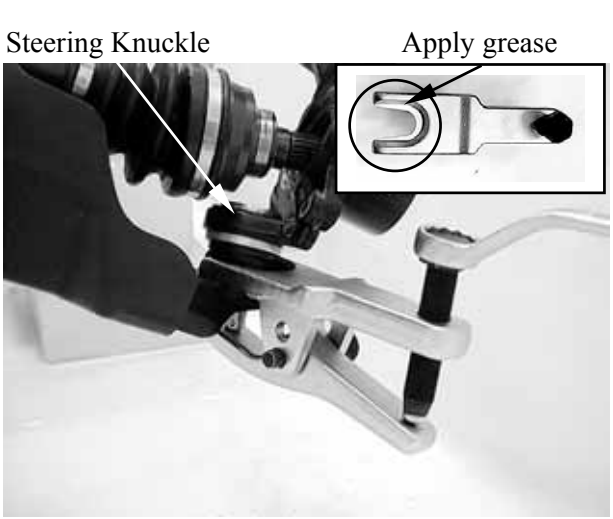
This will ease installation of the tool and prevent damage to the pressure bolt threads.

Insert the jaws carefully, making sure that you do not damage the ball joint boot.

Adjust the jaw spacing by turning the pressure bolt.

Tighten the pressure bolt with a wrench until the ball joint stud pops loose.

Remove the knuckle from the upper and lower arms



INSPECTION

Inspect the knuckle end boot for wear or damage.

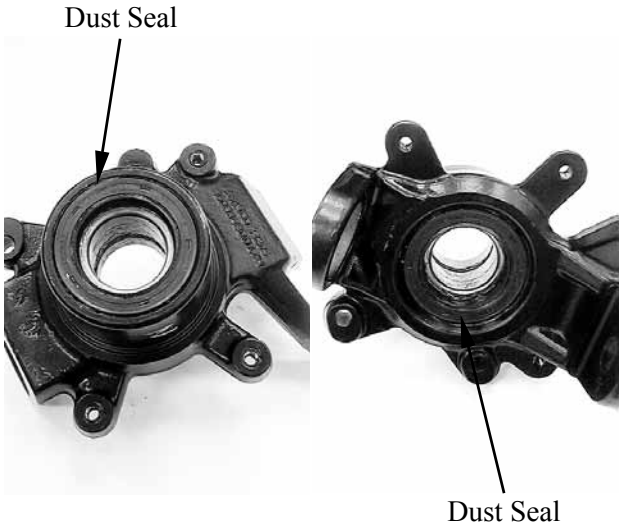
If any damages are found, replace the knuckle end with a new one.

Inspect the brake disc protection plate for damage.

If any damages are found, replace the brake disc protection plate with a new one.

Inspect the dust seal lips for wear or damage.

If any damages are found, replace the dust seal with a new one.



INSTALLATION

Apply lightweight lithium-soap base grease to the bearings of the steering knuckle and lips of the dust seal before install the steering knuckle.

Install the steering knuckle onto the upper and lower front arms and tighten the nuts to the specified torque.

Torque: 3 kgf-m (30 N-m, 22 lbf-ft)

Install the all cotter pins and band ends of cotter pins.

✳ Always use a new cotter pin.

Install the tie-rod onto the steering knuckle and tighten the nut to the specified torque.

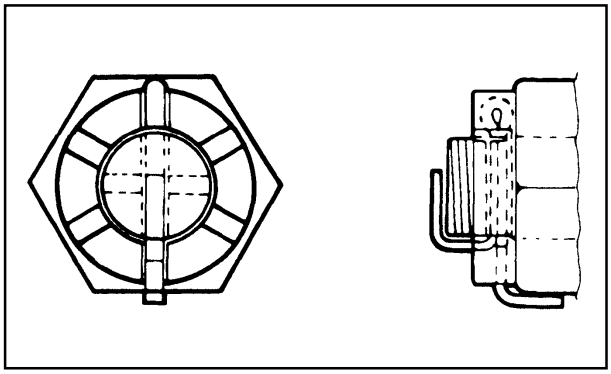
Torque: 2.1 kgf-m (21 N-m, 16 lbf-ft)

Install the cotter pin and band end of cotter pin.

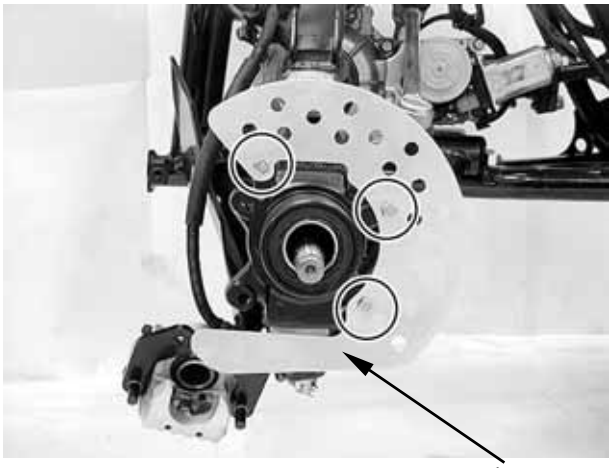
✳ Always use a new cotter pin.

✳
- Do not apply oil to the seat of the nuts.
- Do not loosen the nuts after torque tightening. If the nuts groove is not aligned with the cotter pins hole, align groove with the hole by tightening up on the nuts.

Steering Knuckle



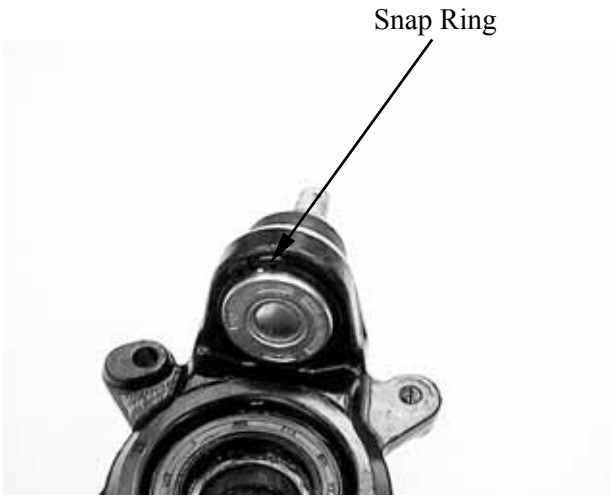
Install the brake disc protection plate and then tighten the three bolts securely.



STEERING KNUCKLE DISASSEMBLY/ASSEMBLY

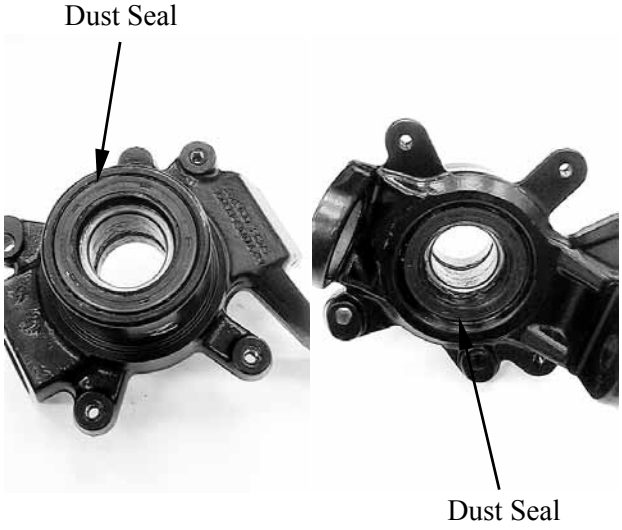
DISASSEMBLY

Remove the steering knuckle (refer to the "**STEERING KNUCKLE REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter)



Remove the knuckle end by using the appropriate collar.

Remove the dust seals.

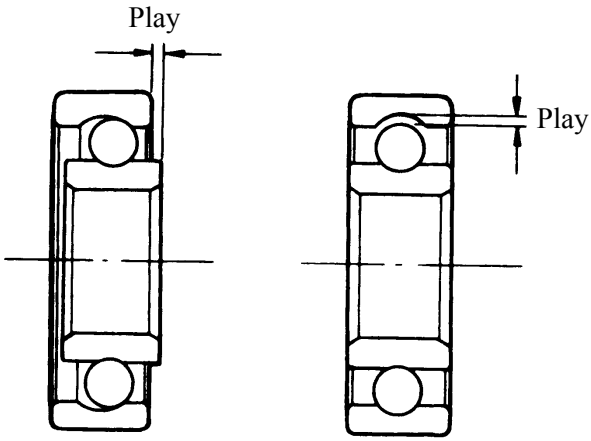


Inspect the inner race play of the bearing by hand while it is in the steering knuckle.

Rotate the inner race by hand to inspect for abnormal noise and smooth rotation.

If there is anything unusual, replace the bearing with a new one.

✳ Make sure to check bearing in the same manner.



Remove the bearings using the appropriate bar, then remove the spacer.

ASSEMBLY

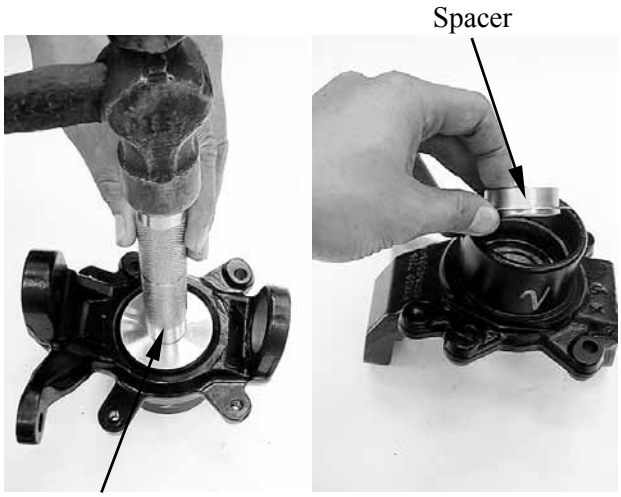
Apply lightweight lithium-soap base grease to the new bearings of the steering knuckle and lips of the new dust seal before install them.

Install the new inner bearing by using the special tool.

Special tool:
Oil seal and bearing driver A120E00014

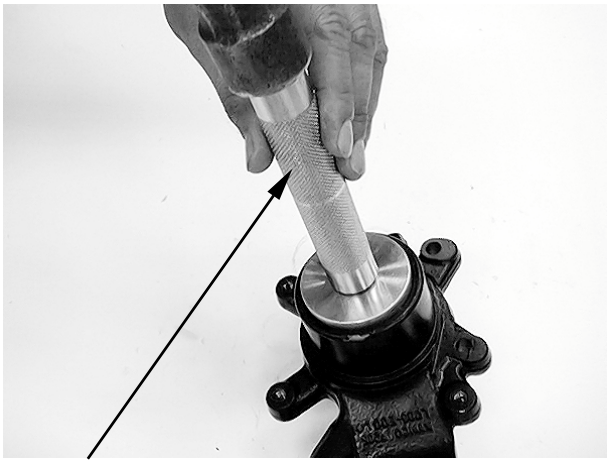
Install the spacer into the steering knuckle.

✳ Make sure the long side of the spacer faces the outer bearing



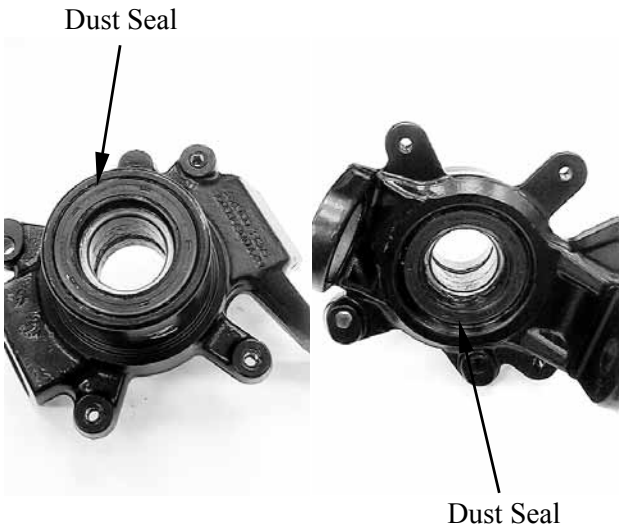
Install the new outer bearing by using the special tool.

Special tool:
Oil seal and bearing driver A120E00014

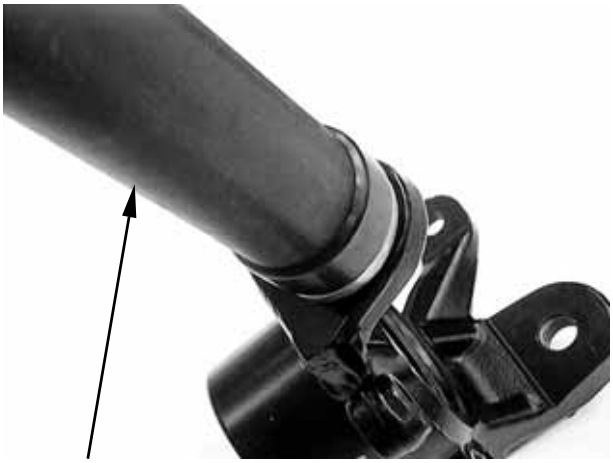


Install the new dust seals by using the special tool.

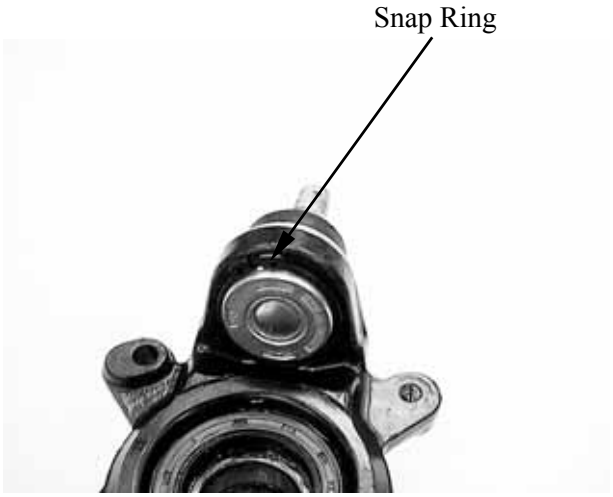
Special tool:
Oil seal and bearing driver A120E00014



Install the steering knuckle end by using a appropriate pipe.



Install the snap ring.



FRONT ARMS INSPECTION/REMOVAL/ INSTALLATION

INSPECTION

Remove the brake disc protection plate (refer to the "**STEERING KNUCKLE REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter)

Remove the front shock absorber (refer to the "**FRONT SHOCK ABSORBER REMOVAL/INSPECTIION/ INSTALLATION**" section in this chapter).

Steering Knuckle

Remove the cotter pin and nut from the upper arm end.

Remove the cotter pin and nut from the steering knuckle end.

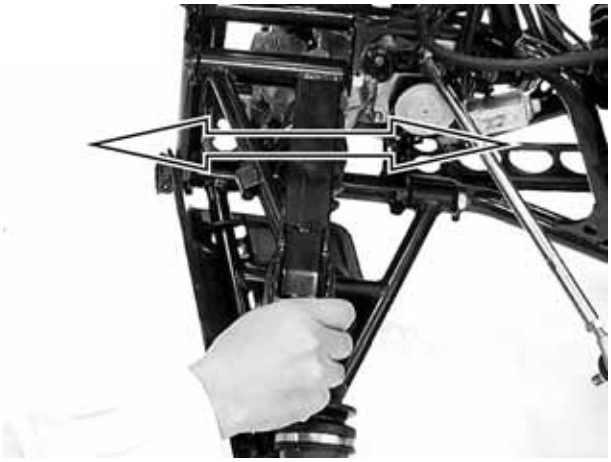
Remove the upper arm and steering knuckle ends (refer to the "**STEERING KNUCKLE REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter).

Check the front upper arm bracket of the frame.

If bent, cracked or damaged, repair or replace the frame.

Check the tightening torque of the front upper arm securing nut.

Torque: 4.5 kgf-m (45 N-m, 32 lbf-ft)



Check the front upper arm side play by moving it from side to side.

If side play noticeable, replace the inner bushes as a set.

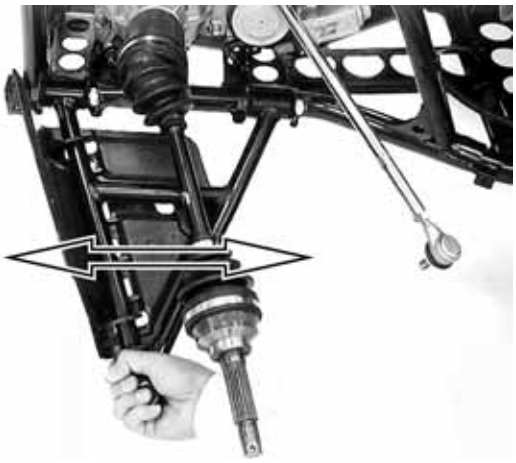
Check the front upper arm vertical movement by moving it up and down. If vertical movement is tight, binding or roughs, replace the inner bushes as a set.

Check the front lower arm bracket of the frame.

If bent, cracked or damaged, repair or replace the frame.

Check the tightening torque of the front lower arm securing nuts.

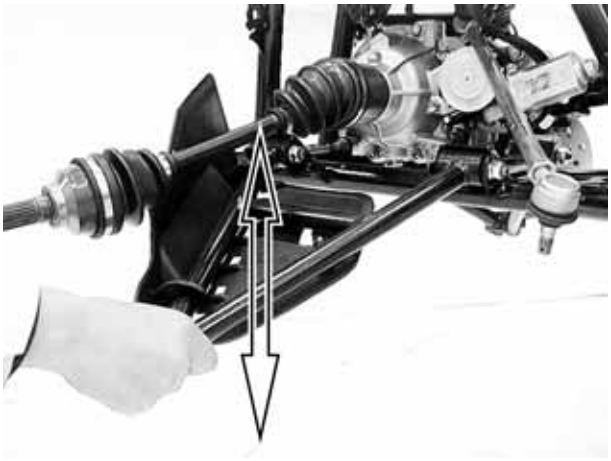
Torque: 4.5 kgf-m (45 N-m, 32 lbf-ft)



Check the front lower arm side play by moving it from side to side.

If side play noticeable, replace the inner bushes as a set.

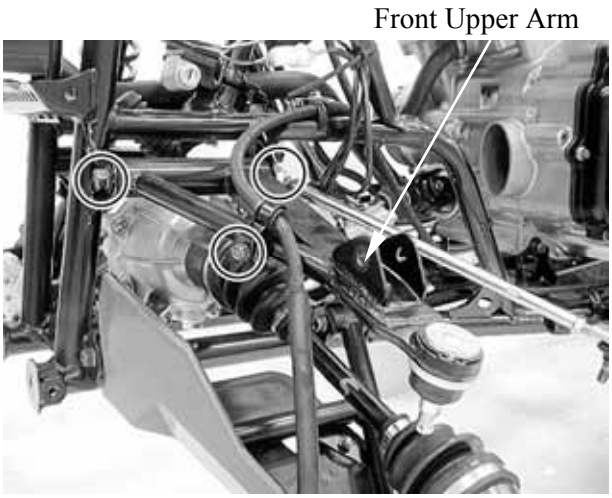
Check the front lower arm vertical movement by moving it up and down. If vertical movement is tight, binding or roughs, replace the inner bushes as a set.



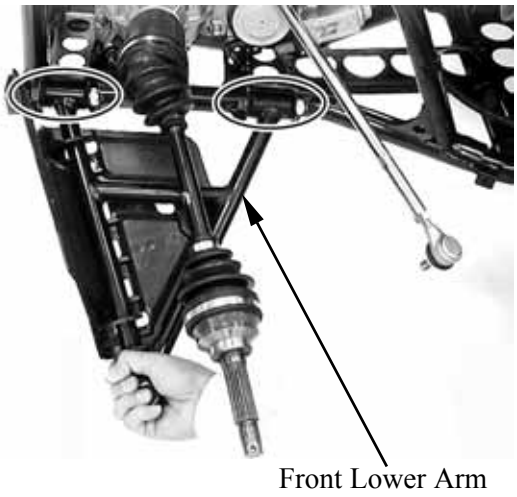
REMOVAL

Remove the bolt on the hose clamp and then remove the brake hose from front upper arm.

Remove the mounting bolt/nut from the front upper arm, then remove the front upper arm.



Remove the mounting two bolts/nuts from the front lower arm, then remove the front lower arm.



INSTALLATION

* Apply the grease onto the bushes.

Install the front lower arm/front upper arm and bolts onto the frame.
Install and tighten the nuts to the specified torque.

Torque: 4.5 kgf-m (45 N-m, 32 lbf-ft)

FRONT ARMS DISASSEMBLY/INSPECTION/ ASSEMBLY

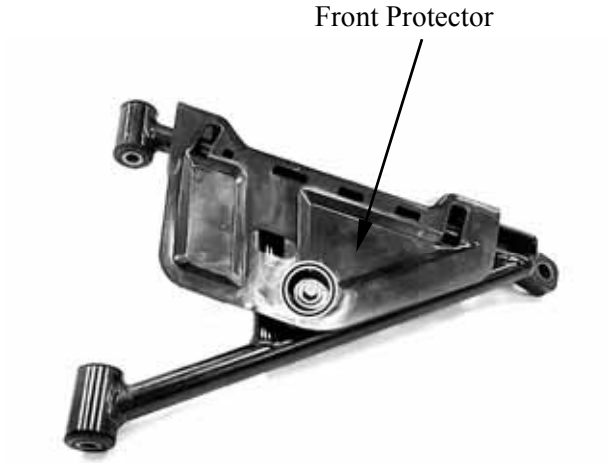
DISASSEMBLY

Upper arm

Remove the snap ring.
Remove the upper arm end by using a appropriate collar.

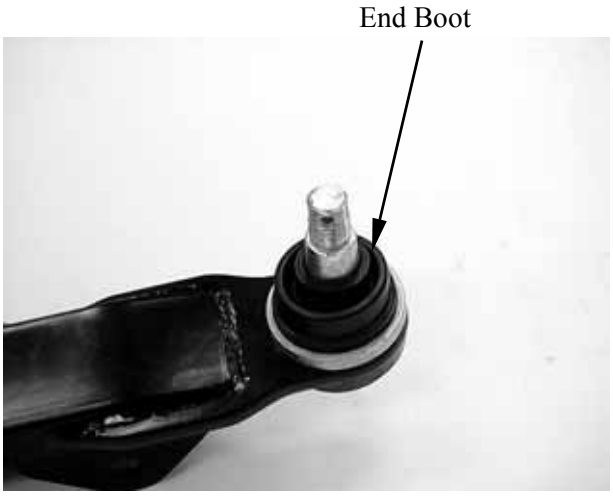
Lower arm

Remove the bolt and then remove the front protector.



INSPECTION

Inspect the upper arm end boot for wear or damage.
If any damages are found, replace the upper arm end with a new one.



Inspect the front upper arm.
Cracks/bends/damage →Replace.

✳ Do not attempt to straighten a bent arm, this may dangerously weaken the arm.

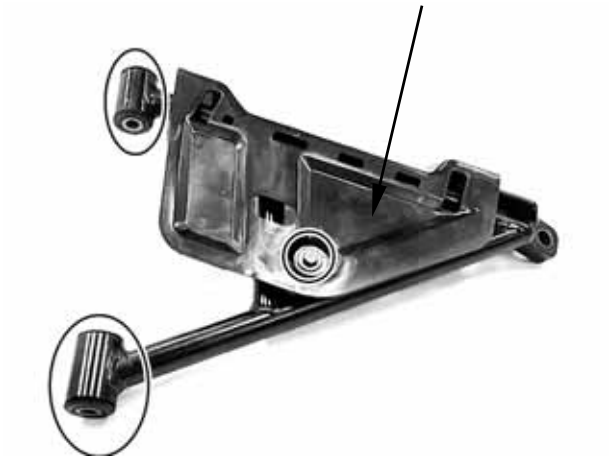
Inspect bushes.
Wear/damage →Replace.

Inspect the front lower arm.
Cracks/bends/damage →Replace.

✳ Do not attempt to straighten a bent arm, this may dangerously weaken the arm.

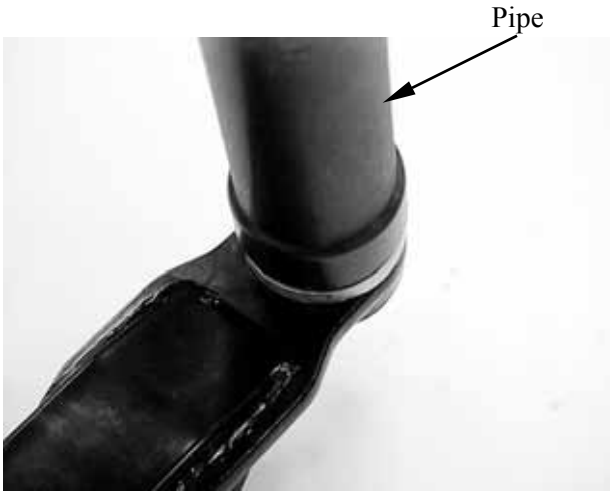
Inspect bushes.
Wear/damage →Replace.

Inspect the front protector for damage.
If any damages are found, replace the front protector with a new one.



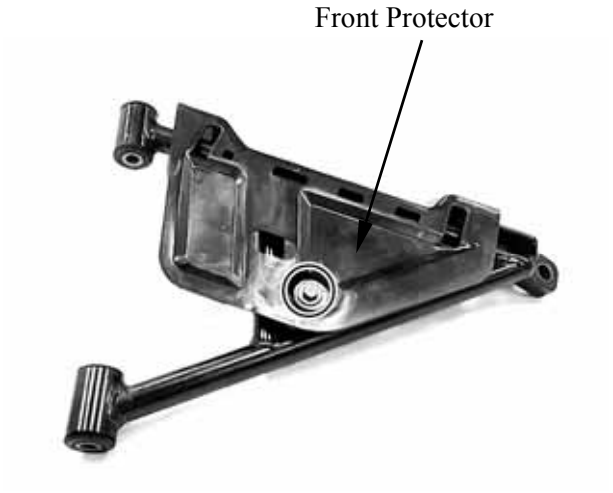
ASSEMBLY

Install the upper arm end by using a appropriate pipe.



Install the snap ring.

Install the front protector, then install and tighten the bolt securely.



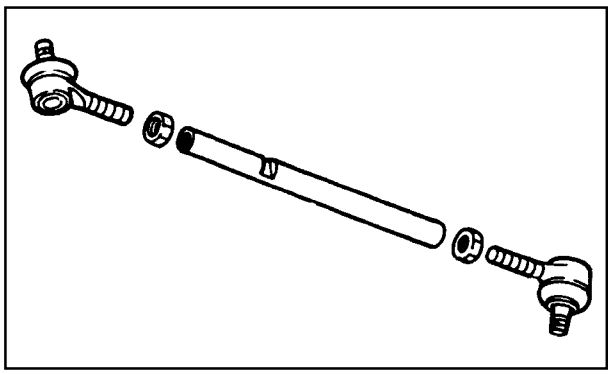
TIE-ROD REMOVAL/INSPECTION/ INSTALLATION

REMOVAL

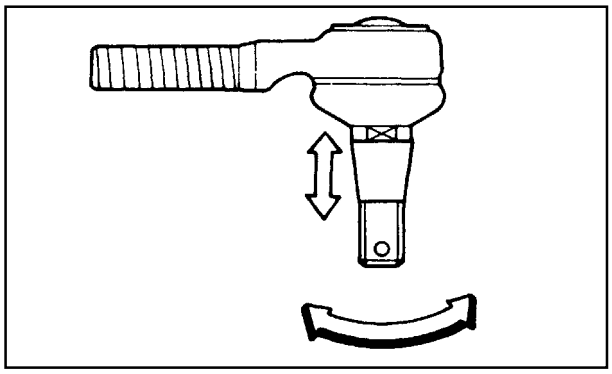
Remove the cotter pin and nut from tie-rod end steering knuckle side (refer to the "**STEERING KNUCKLE REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter).

Remove the cotter pin and nut from tie-rod end steering column side.

INSPECTION



Inspect the tie-rod.
Bend/damage → Replace



Check the tie-rod end movement.
Tie-rod end exists free play or turns roughly → Replace
Check the tapered surface of the tie-rod.
Pitting/wear/damage → Replace

Adjustment steps:

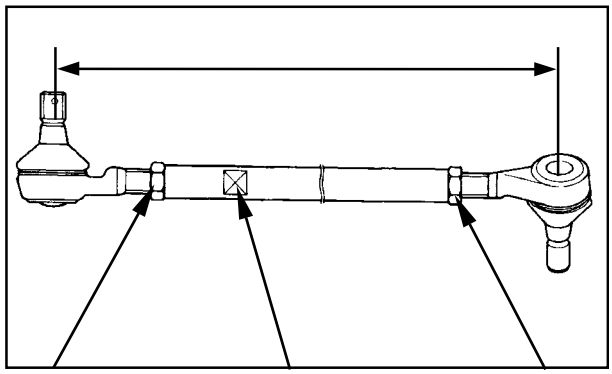
(The following procedures are done on both tie-rods, right and left.)

Loosen the lock nuts.

Adjust the tie-rod length by tuning both tie-rod ends.

Tie rod length:

379.75±0.25 mm (15.19±0.01 in)

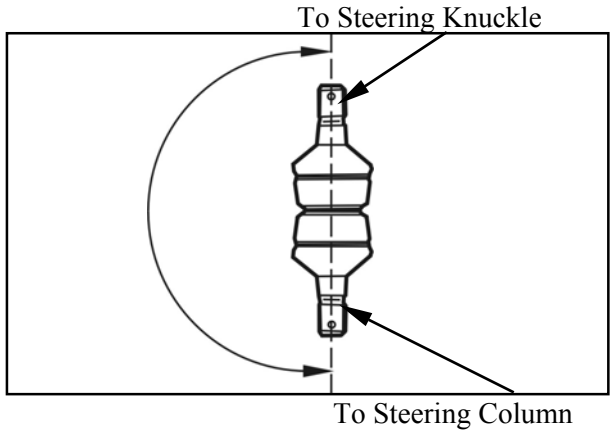


Set the rod-end (steering column side) in an angle where the indentation surface of the tie-rod is parallel to the rod-end shaft, and then tighten the lock nut.

Torque: 3.5 kgf-m (35 N-m, 25.5 lbf-ft)

Set the other rod-end (steering knuckle side) in an angle as shown (right-hand tie-rod and left-hand tie-rod), and then tighten the lock nut.

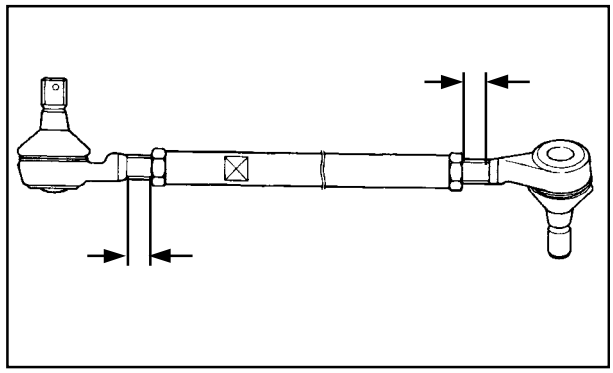
Rod-end (tie rod) angle: 180°



Torque: 3.5 kgf-m (35 N-m, 25.5 lbf-ft)

✳ After making adjustment on both tie rods be sure to mark them R and L for identification.

✳ The threads on both rod-end must be of the same length.



INSTALLATION

Install the tie-rod and onto the steering knuckle and steering column, then tighten the nuts.

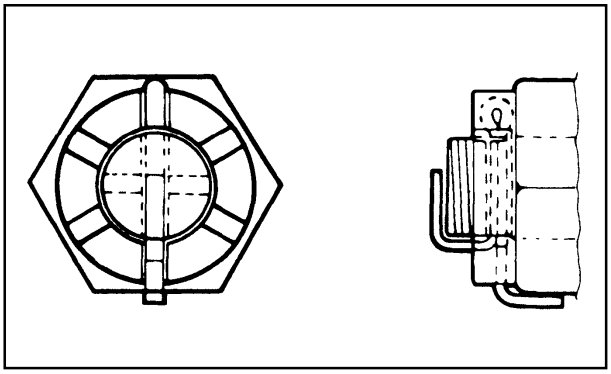
Torque:
Steering knuckle side:
2.1 kgf-m (21 N-m, 16 lbf-ft)
Steering column side:
2.1 kgf-m (21 N-m, 16 lbf-ft)

✳ Be sure that the rod-end on the indentation surface side is connected to the steering knuckle.

Install the all cotter pins and band ends of cotter pins.

✳ Always use a new cotter pin.

✳
- Do not apply oil to the seat of the nuts.
- Do not loosen the nuts after torque tightening. If the nuts groove is not aligned with the cotter pins hole, align groove with the hole by tightening up on the nuts.



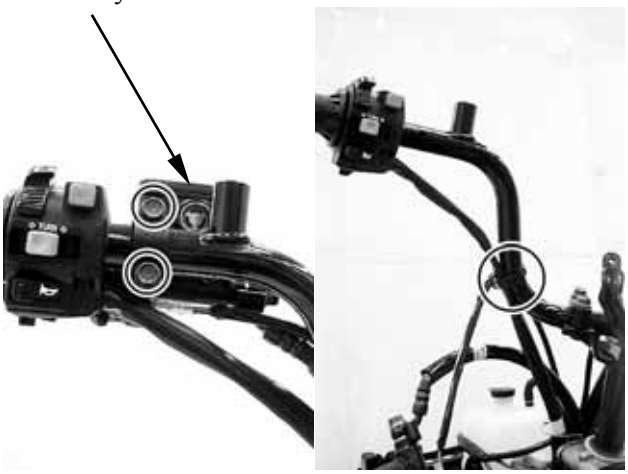
HANDLEBAR REMOVAL/INSPECTION/ INSTALLATION

REMOVAL

Remove the frame cover (refer to the "**FRAME COVERS**" section in the chapter 2).

Remove the two bolts and then remove left master cylinder from the handlebar.
Remove the band and then remove the brake light switch wire from the handlebar.

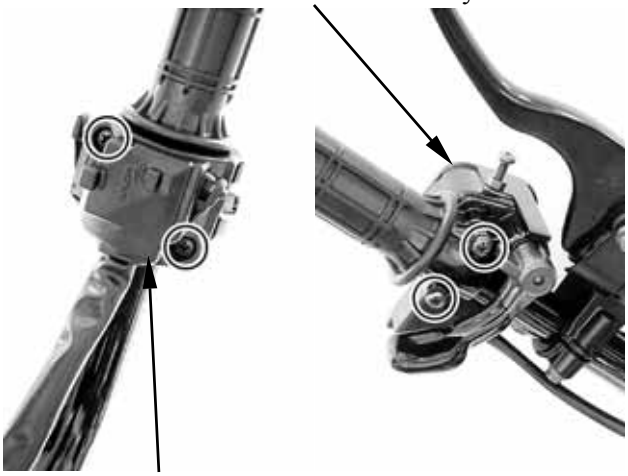
Master Cylinder



Remove the two screws and then remove the left handlebar switch from the handlebar.

Remove the two screws and then remove the throttle lever assembly.

Throttle Lever Assembly



Left Handlebar Switch

Remove the nut then remove the choke knob from the handlebar.

Remove the band and then remove the brake light wire and 2WD/4WD select switch wire from the handlebar.

Remove the two bolts and then remove the master right cylinder from the handlebar.

Choke Knob

Master Cylinder

Remove the four bolts, then remove the handlebar holders

Handlebar Holders

INSPECTION

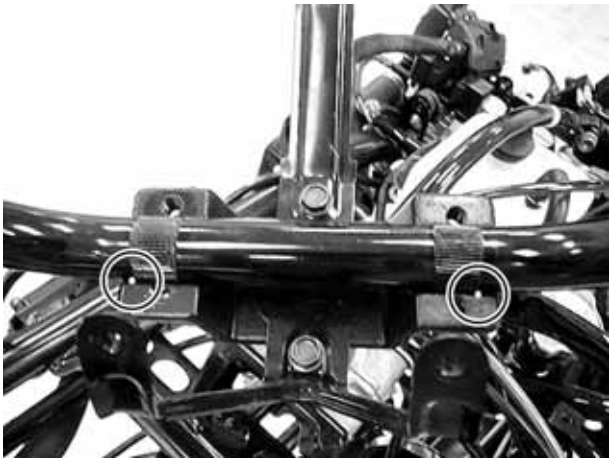
Inspect the handlebar.
Cracks/bends/damage →Replace.

INSTALLATION

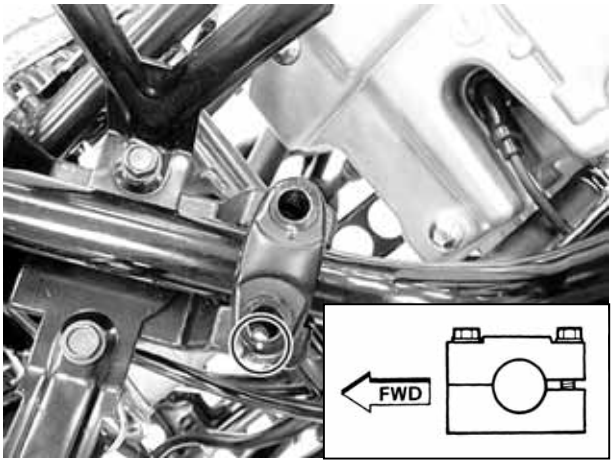
Install handlebar and handlebar holder, then tighten the four bolts.

Torque: 2.5 kgf-m (25 N-m, 18 lbf-ft)

✳ Align the mark on the handlebar with the lower handlebar holder surface.



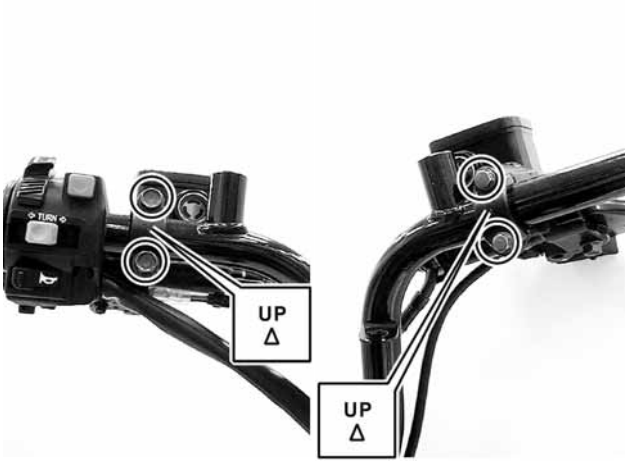
✳
- Be sure the handlebar holder mark face to front.
- First tighten the bolts on the front side of the handlebar holder, and then tighten the bolts on the rear side.



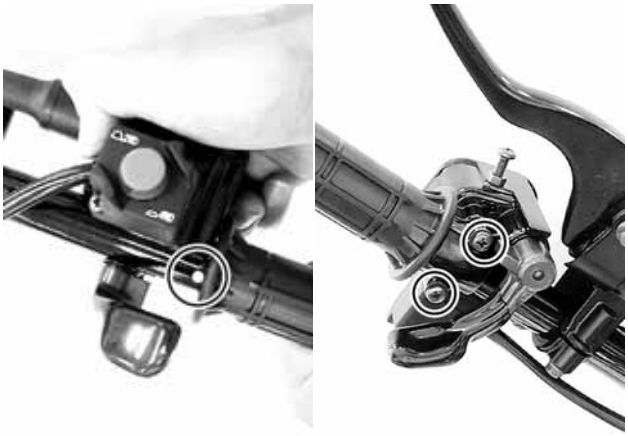
Install the handlebar switch by aligning the pin on the handlebar switch with the hole in the handlebar and then tighten the two screws securely.

Place the right and left brake master cylinder on the handlebar and install the master cylinder holder with the “UP” mark facing up, aligning the punch mark on the handlebar with the holder joint seam. First tighten the upper bolt and then tighten the lower blot.

Torque: 1.2 kgf-m (12 N-m, 8.6 lbf-ft)



Install the throttle assembly by aligning the upper holder lip with the mark in the handlebar and then install the lower holder and tighten the two screws securely.



STEERING COLUMN REMOVAL/INSPECTION/ INSTALLATION

REMOVAL

Remove frame covers (refer to the "**FRAME COVERS**" section in the chapter 2).

Remove the tie-rods (refer to the "**TIE-ROD REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter).

Remove the handlebar (refer to the "**HANDLEBAR REMOVAL/INSPECTION/ INSTALLATION**" section in this chapter).

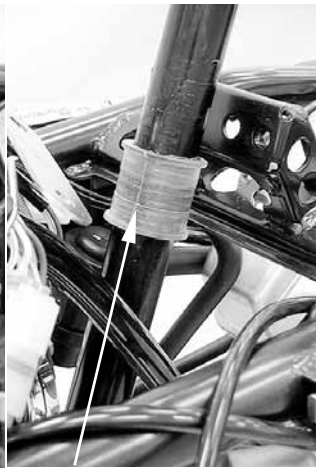
Remove the two bolts and remove the cable holder.

Remove the steering brackets and dust seal.

Cable Holder

Steering Bracket

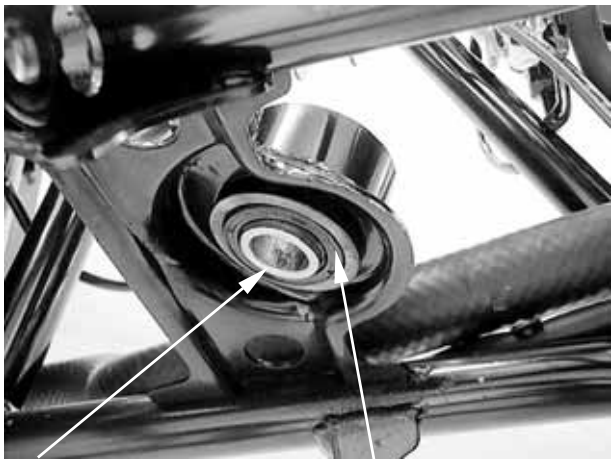
Steering Bracket



Dust Seal

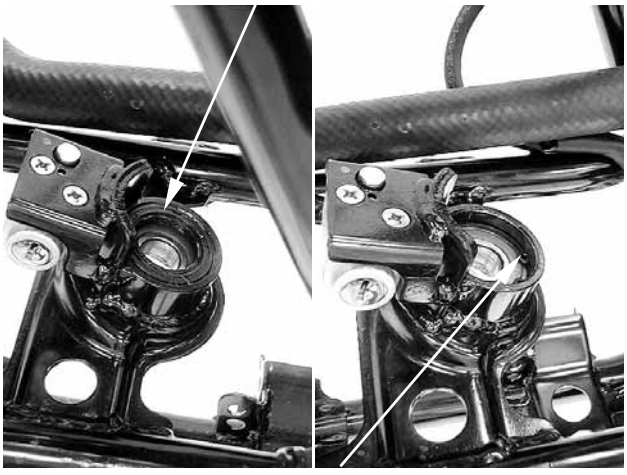
Remove the cotter pin and nut from the steering column under the frame body, then remove steering column.

Remove the collar and dust seal.



Collar Dust Seal

Remove the dust seal.
Remove the snap ring.



Dust Seal

Snap Ring

Replace the bearing by using the special tool.

Special tool:
Oil seal and bearing driver A120E00014

INSPECTION

Inspect the steering column.
Bends/damage →Replace.

✳ Do not attempt to straighten a bent steering column, this may dangerously weaken the steering column.

Inspect the steering brackets and oil seal.
Wear damage →Replace.

INSTALLATION

✳ Apply the grease onto the collar, dust seals, and bearing.

Install the steering column and collar, then tighten the nut under the frame body.

Torque: 7 kgf-m (70 N-m, 50 lbf-ft)

Install the cotter pin and band ends of cotter pin.

✳ Always use a new cotter pin.

Install the dust seal, steering brackets and cable holder.
Install and tighten the two bolts to the specified torque.

Torque: 2.2 kgf-m (22 N-m, 16 lbf-ft)

Steering Bracket

Cable Holder