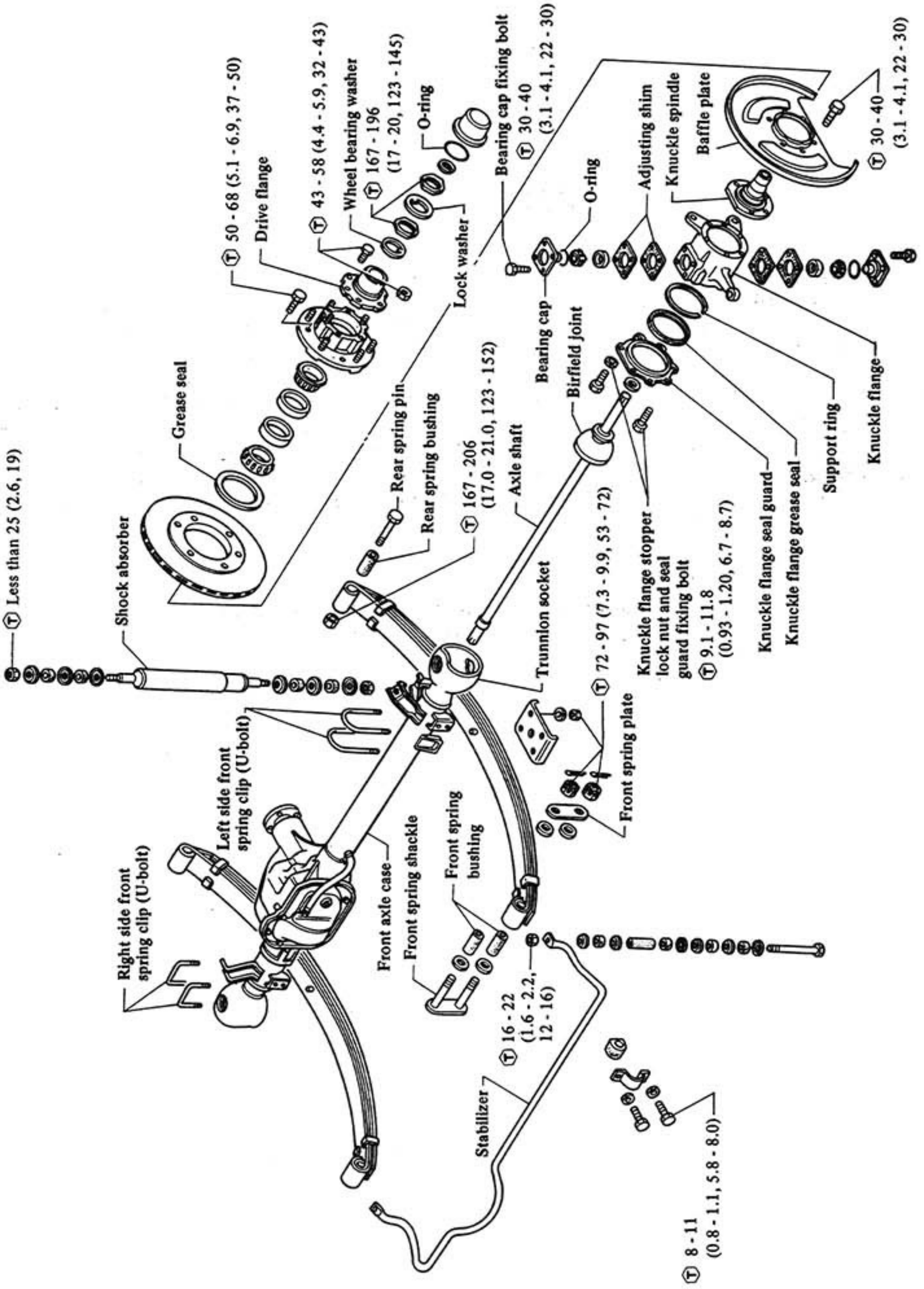
FRONT AXLE & FRONT SUSPENSION

CONTENTS

Refer to Section MA (Front Axle and Front Suspension) for:

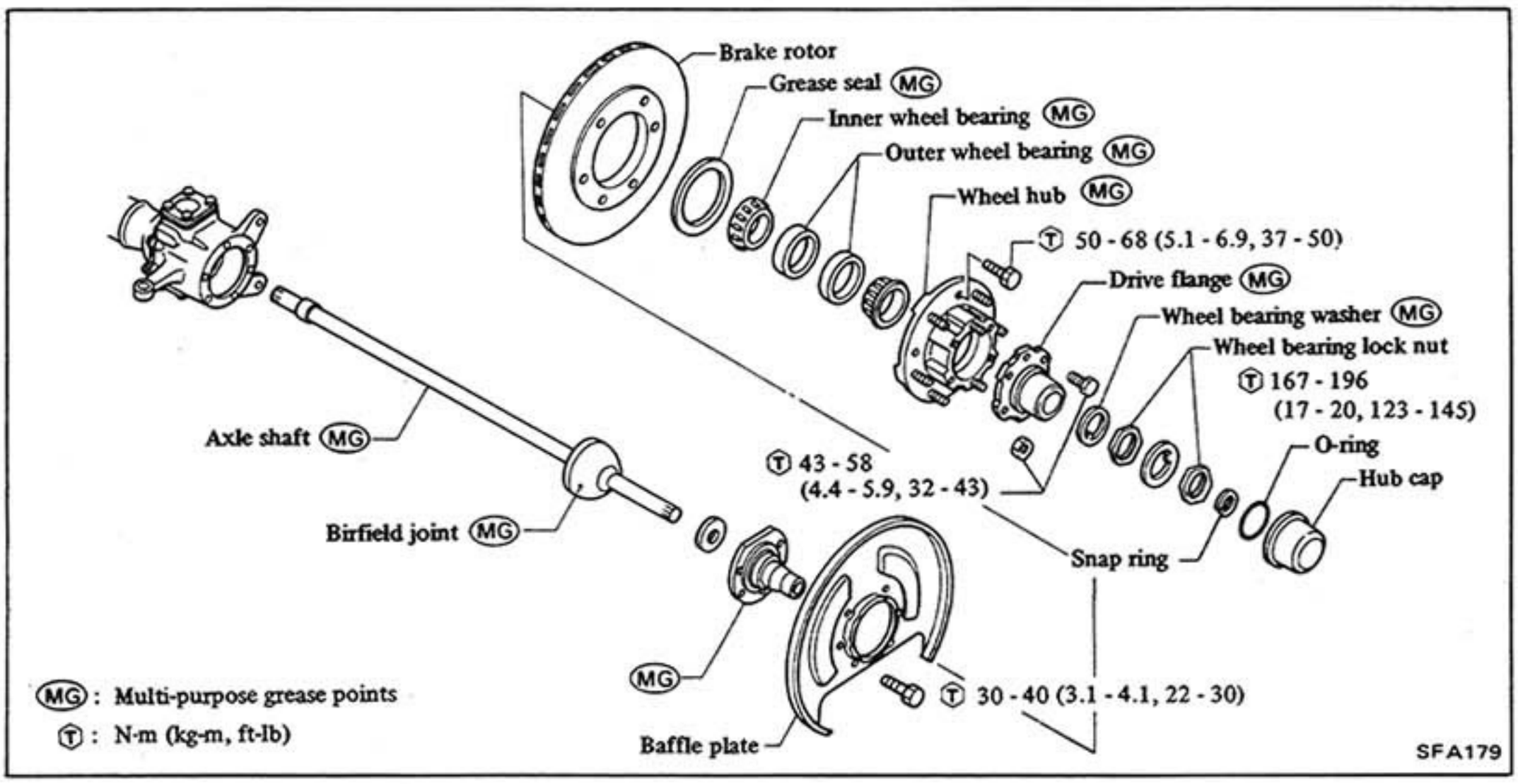
- ADJUSTING WHEEL BEARING PRELOAD
- CHECKING WHEEL ALIGNMENT

FRONT AXLE AND FRONT SUSPENSION SYSTEM



SFA178

FRONT AXLE

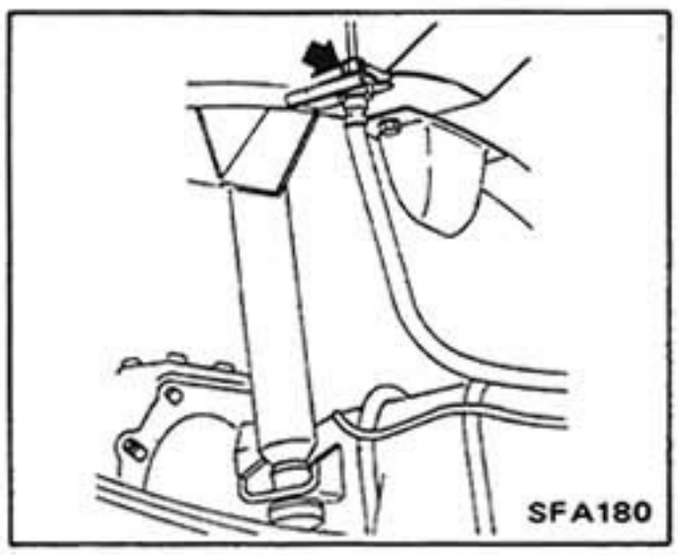


FRONT AXLE ASSEMBLY

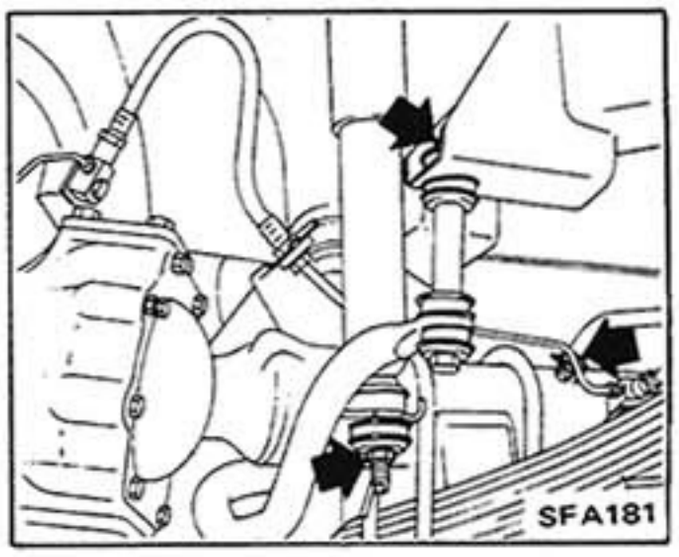
REMOVAL

1. Block rear wheels with chocks and raise front of vehicle, then **support it with safety stands. Refer to Section GI for lifting points and towing.**
2. Remove wheel and tire assembly.
3. Disconnect propeller shaft.
   Refer to Section PD for disconnecting propeller shaft.
4. Disconnect brake tube.

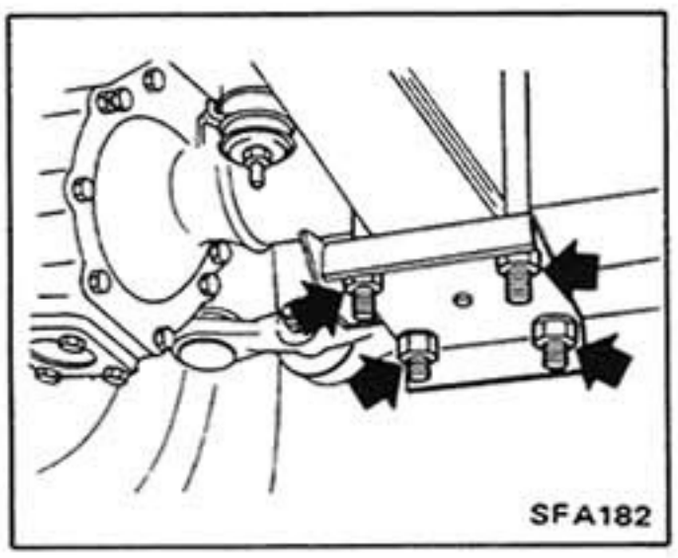
CATUION:
When removing or installing brake tubes, use Tool GG94310000.



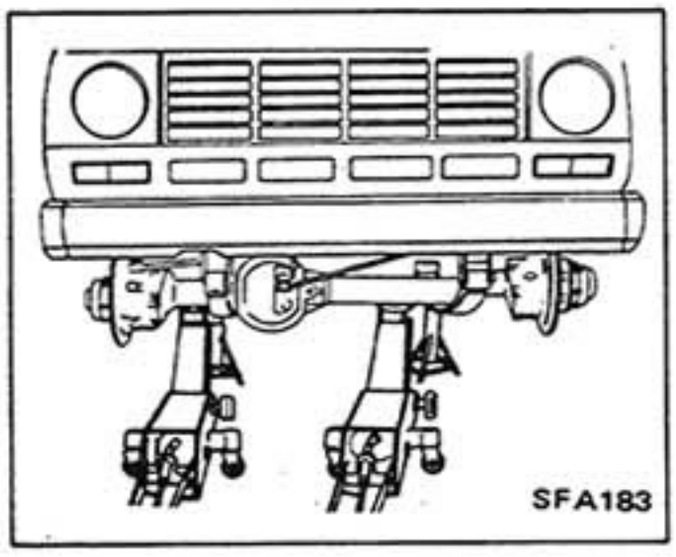
5. Jack up front suspension.
   Do not raise differential carrier.
6. Disconnect shock absorber lower ends and remove the stablizer bar connecting bolts. Remove air breather tube from engine compartment.



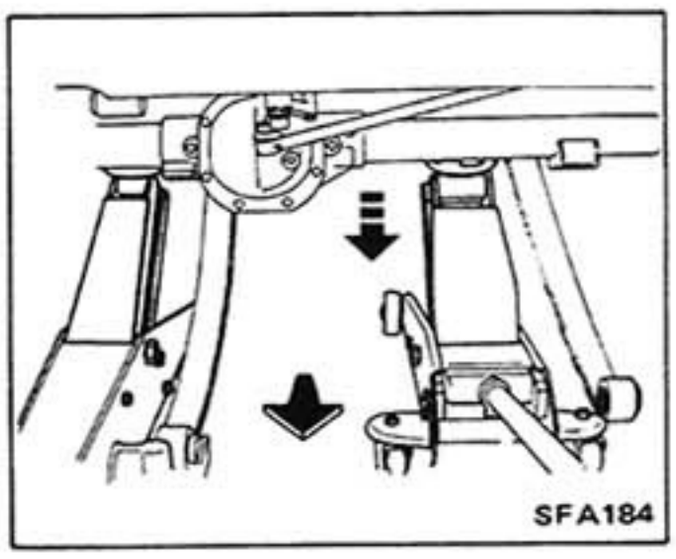
7. Disconnect tie rod ends.
   Refer to Section ST for disconnecting tie rod ends.
8. Remove U-bolts.



9. Support axle case with two jacks and remove front shackle pins, then lower leaf springs.



10. Slowly lower jacks, then pull axle case with jacks towards front of the vehicle.



INSPECTION

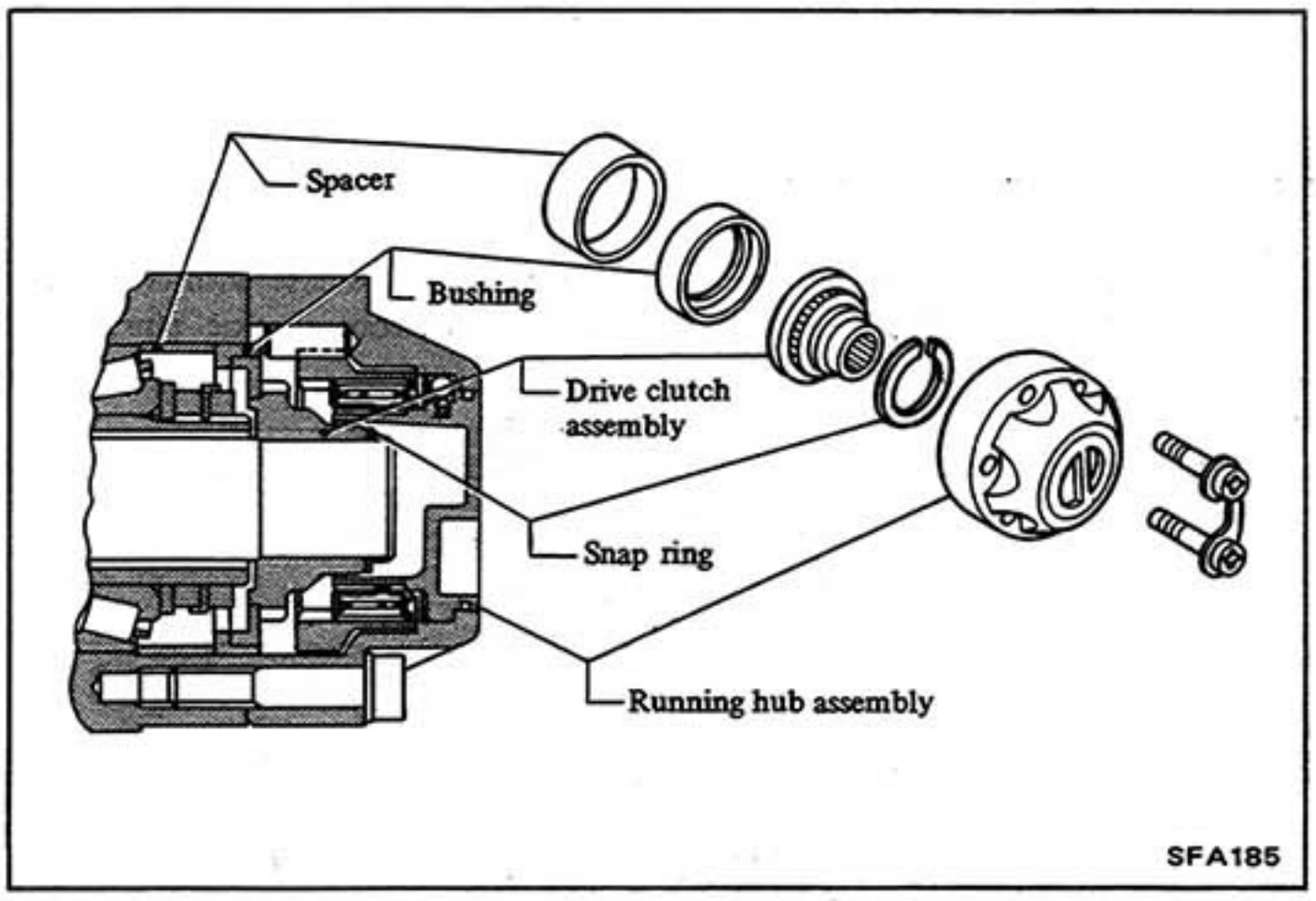
Check axle case for yield, deformation or cracks and replace if necessary.

INSTALLATION

Install front axle assembly in the reverse order of removal.

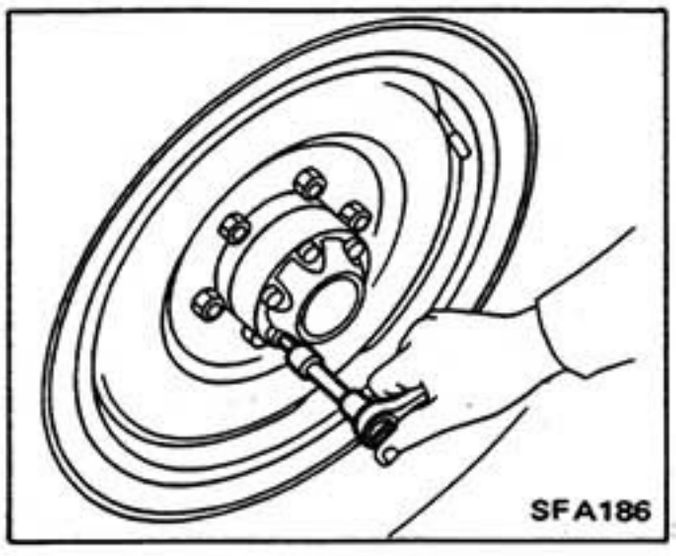
Ⓣ : U-bolt
72 - 97 N·m
(7.3 - 9.9 kg-m, 53 - 72 ft-lb)
Shock absorber lower end
Less than 25 N·m
(2.6 kg-m, 19 ft-lb)
Brake tube flare nut
15 - 18 N·m
(1.5 - 1.8 kg-m, 11 - 13 ft-lb)
Propeller shaft to companion flange
78 - 88 N·m
(8 - 9 kg-m, 58 - 65 ft-lb)
Spring shackle
72 - 97 N·m
(7.3 - 9.9 kg-m, 53 - 72 ft-lb)

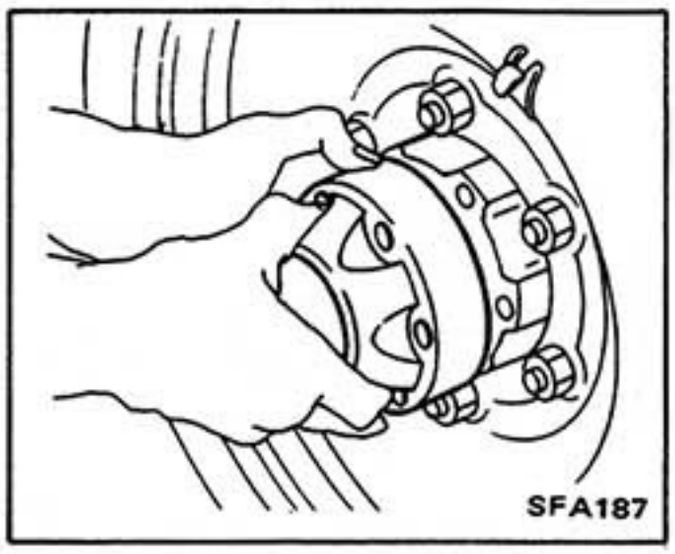
FREE-RUNNING HUB



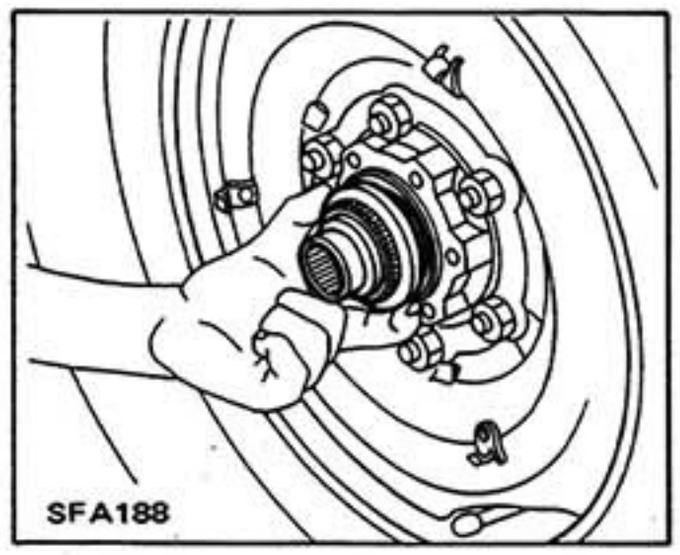
REMOVAL

1. **Using torx wrench socket,** remove free-running hub fixing bolts.
2. Remove free-running hub assembly.

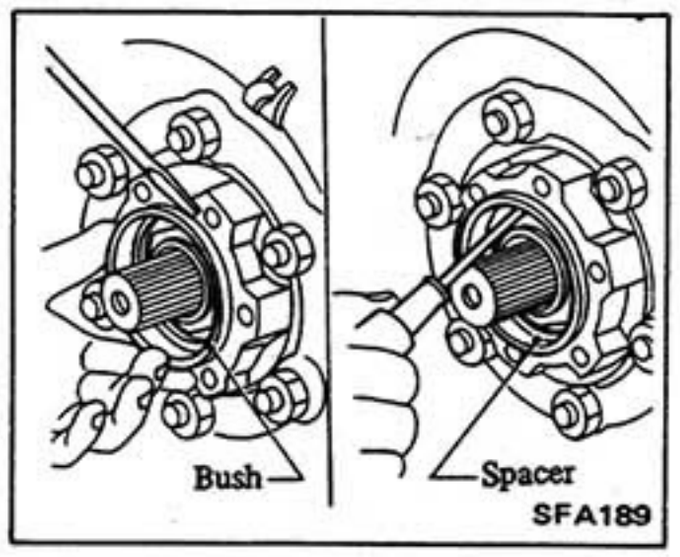




3. Remove snap ring and take off drive clutch.



4. Take out bushing and spacer from wheel hub.



INSTALLATION

Install free-running hub in the reverse order of removal.

When installing snap ring, refer to Axle Shaft for installing snap ring.

Ⓣ : Free-running hub fixing bolt
54 - 59 N·m
(5.5 - 6.0 kg-m, 40 - 43 ft-lb)

AXLE SHAFT AND WHEEL HUB

REMOVAL

1. Block rear wheels with chocks and raise front of vehicle, and then **support it with safety stands. Refer to Section GI for lifting points and towing.**
2. Remove wheel and tire assembly.

With free-running hub model:

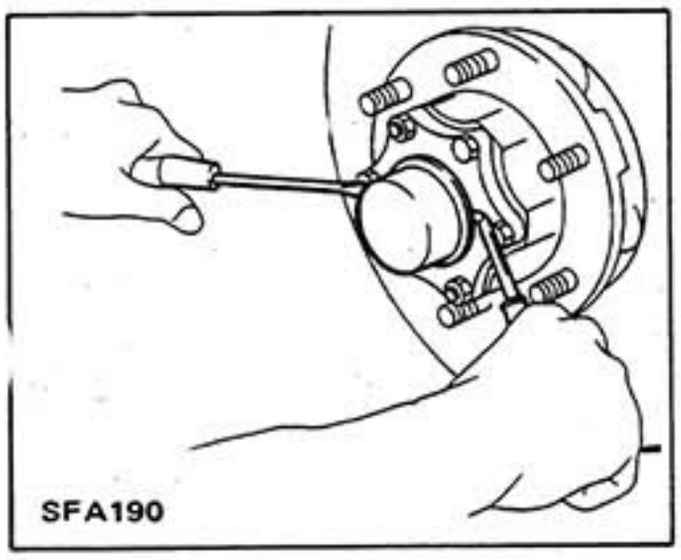
Remove free-running hub assembly. Refer to Free-running Hub for removal.

3. Remove brake caliper assembly (Disc brake model) or brake drum (Drum brake model).

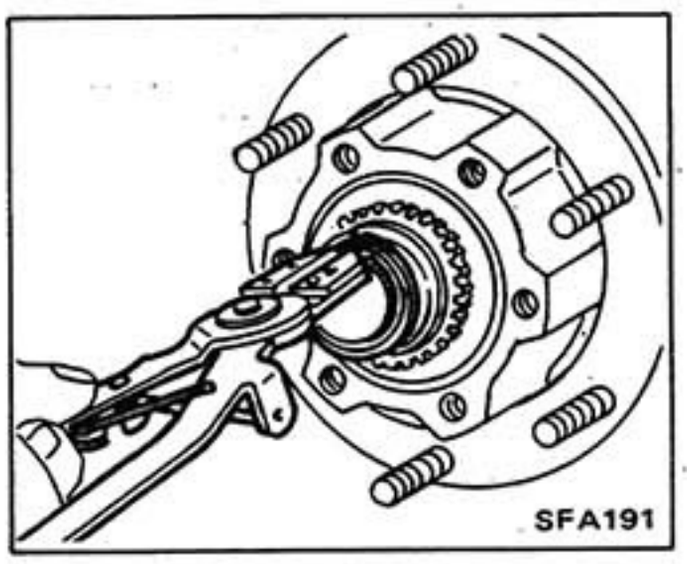
Refer to Service Brake (Section BR) for removal.

4. Remove wheel hub and wheel bearing.

(1) Work off hub cap with O-ring.


SFA190

(2) Remove snap ring and drive flange.

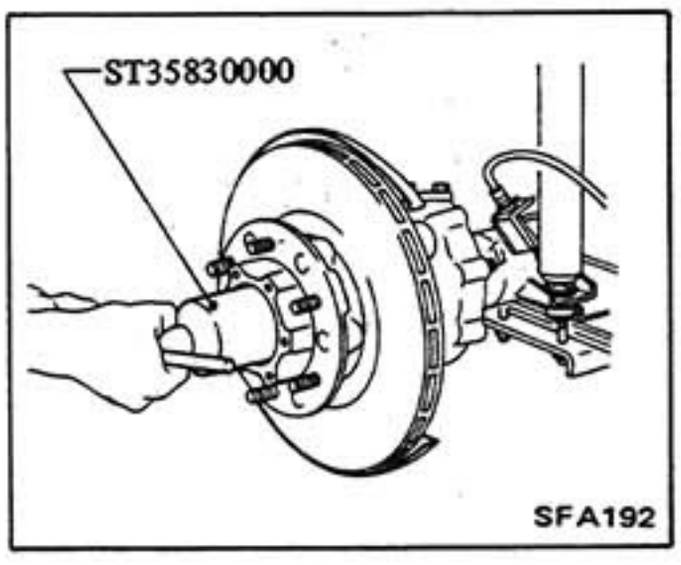

SFA191

With free-running hub model:

After removing snap ring, remove drive clutch, bushing and spacer.

Refer to Free-running Hub for removal.

(3) Straighten lock washer and then, **using Tool**, remove wheel bearing lock nut and wheel bearing washer.

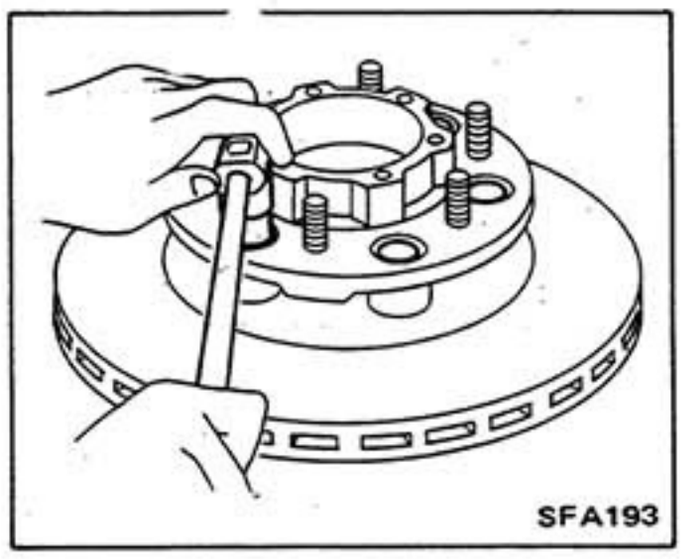


SFA192

(4) Remove wheel hub with disc brake rotor (Disc brake model) or front wheel hub assembly (Drum brake model).

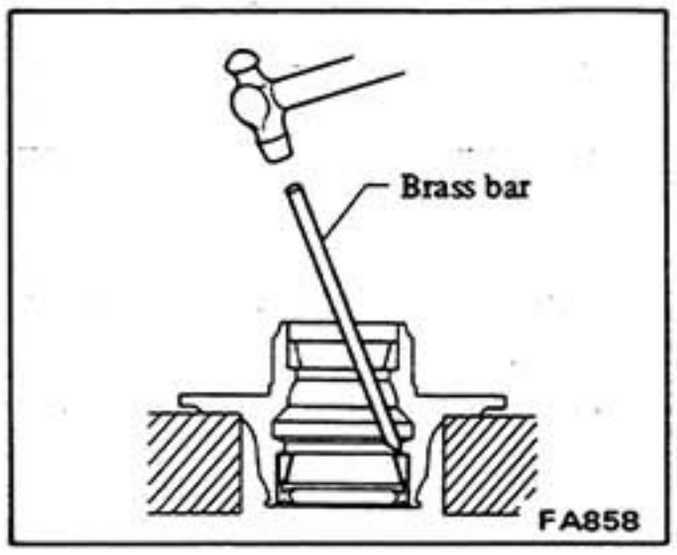
(5) Separate outside wheel bearing inner race.

(6) Separate brake disc to hub (Disc brake model only).


SFA193

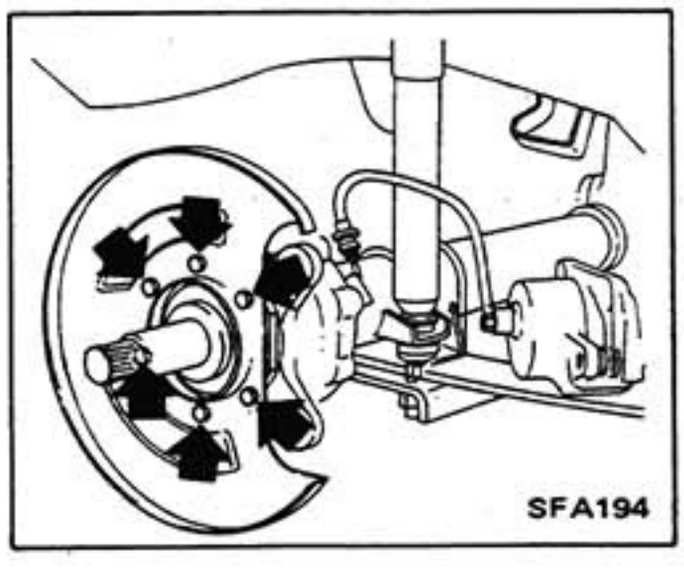
(7) Remove inside wheel bearing outer race, grease seal and outside wheel bearing outer race.

CAUTION:
Be careful not to drop wheel bearing.
Grease seal must not be reused.



FA858

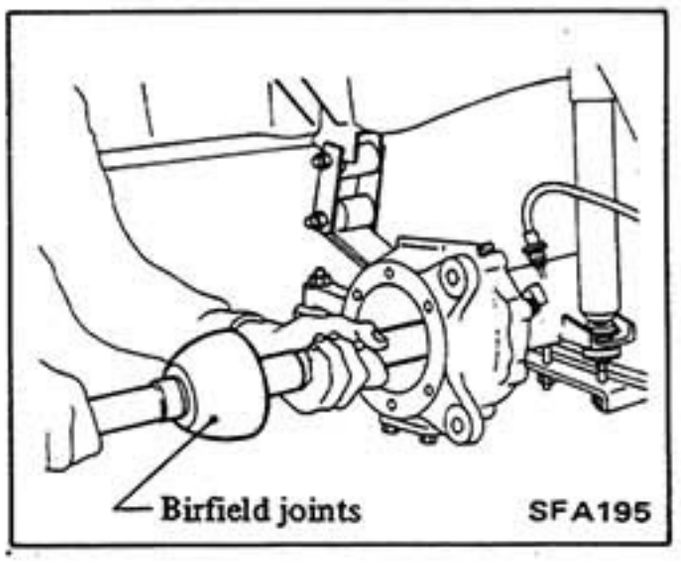
5. Remove baffle plate and draw out knuckle spindle.


SFA194

Drum brake model:

Remove baffle plate with wheel cylinder and shoes.

6. Draw out axle shaft.



SFA195

CAUTION:
Birfield joints can not be disassembled.

INSPECTION

Thoroughly clean parts and dry with compressed air.

Wheel bearing

When race, cage and roller surfaces make noise or are cracked, pitted, worn, rough, or out-of-round, replace bearing assembly.

Wheel hub

Check wheel hub for cracks by means of a magnetic exploration or dyeing test, replace if necessary.

Knuckle spindle

Also check wheel hub, replace if cracks or damage is found.

Grease seal

If grease leakage is detected during removal, replace grease seal.

Replace grease seal at every disassembly even if it appears good.

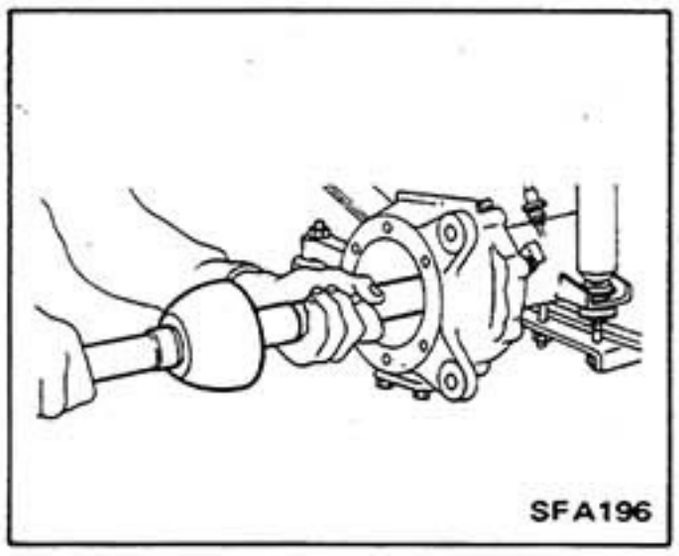
Birfield joints and shaft

Replace Birfield joint assembly if its outer or inner shaft is bent or has worn splines; if assembly is cracked or excessively worn; if joint is clattering or chattering or noisy. Small nicks or scratches can be removed with a fine stone.

INSTALLATION

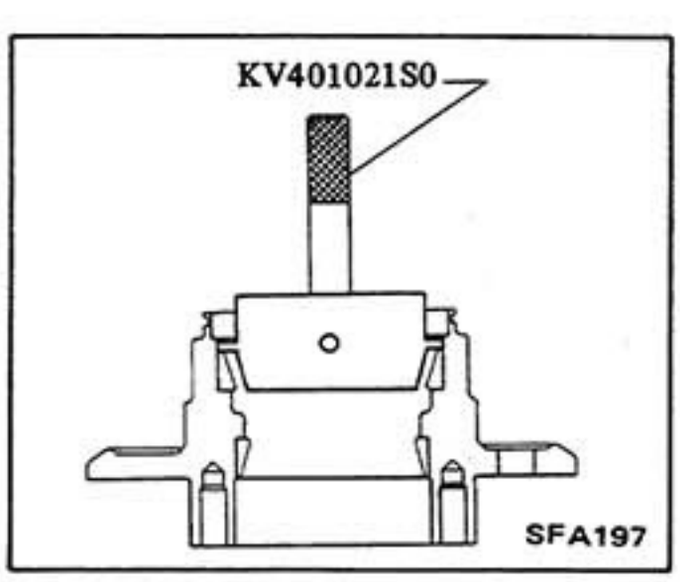
Install front axle in the reverse order of removal, noting the following:

1. Install axle shaft. Apply grease to joints and seal surface and line up spline of differential gear and axle shaft, then assemble.


SFA196

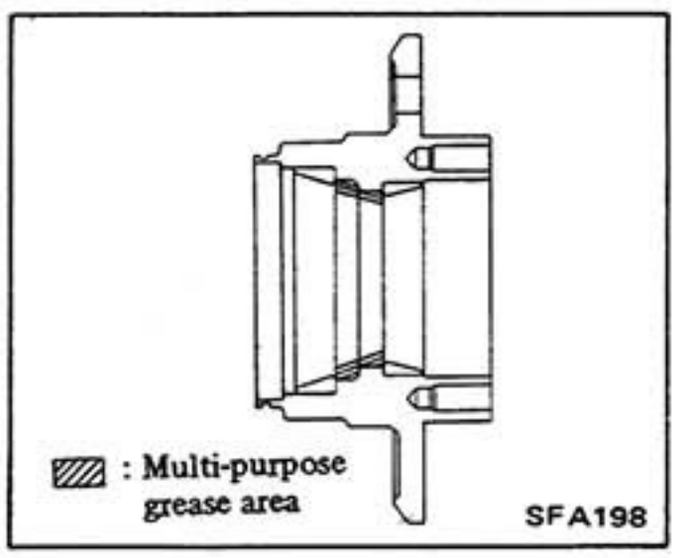
2. Pack knuckle spindle groove with grease, then install it with baffle plate.
3. Install front wheel hub and wheel bearings.

(1) Install bearing outer race **using Tool.**



SFA197

(2) Pack hub with recommended multi-purpose grease.

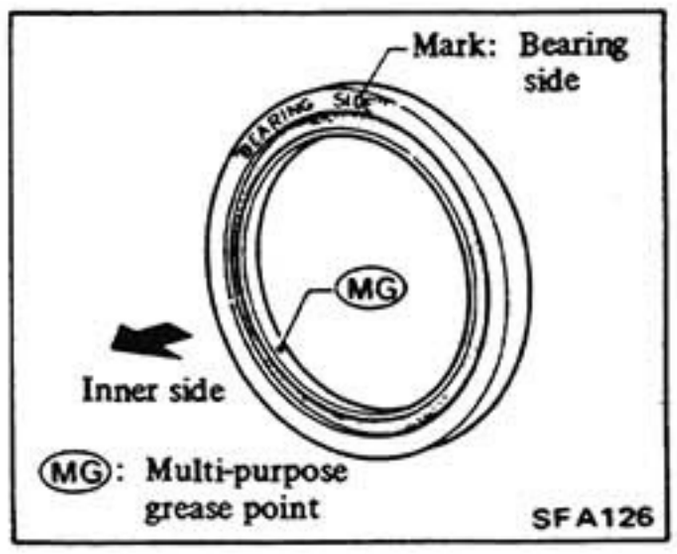


SFA198

(3) Coat each bearing **with recommended multi-purpose grease.**

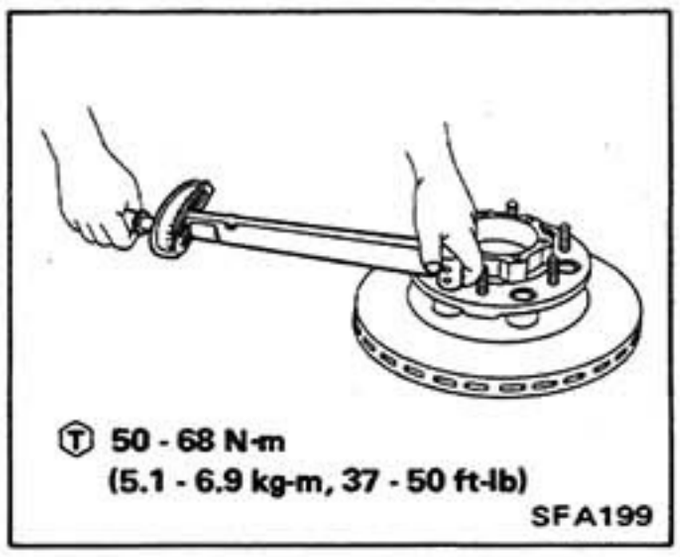
FA262

(4) Place inner bearing in hub and install a new grease seal, **coating sealing lips with recommended multi-purpose grease.**



SFA126

(5) Fix brake rotor to hub (Disc brake model only).



SFA199

(6) Sparingly apply recommended multi-purpose grease to each part.

- **Threaded portion of spindle.**
- **Bearing washer to bearing contacting face.**

(7) Put hub assembly on spindle and then install washer and wheel bearing lock nut.

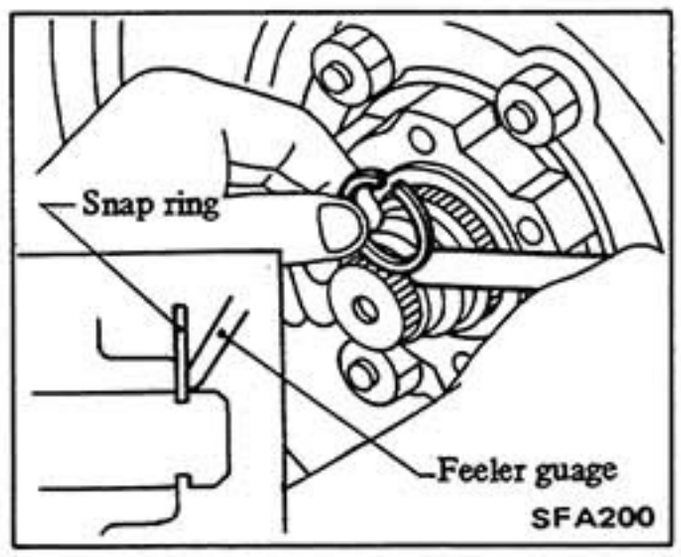
(8) Install wheel bearing lock washer and other wheel bearing lock nut.

Refer to Section MA for adjustment of wheel bearing pre-load.

T : Wheel bearing lock nut
167 - 196 N·m
(17 - 20 kg-m, 123 - 145 ft-lb)

4. Pack drive flange groove with grease, apply grease to drive flange hub cap surface, then install flange. Place snap ring in axle shaft groove. Choose snap ring so that the gap between groove and snap ring is 0.1 to 0.2 mm (0.004 to 0.008 in).

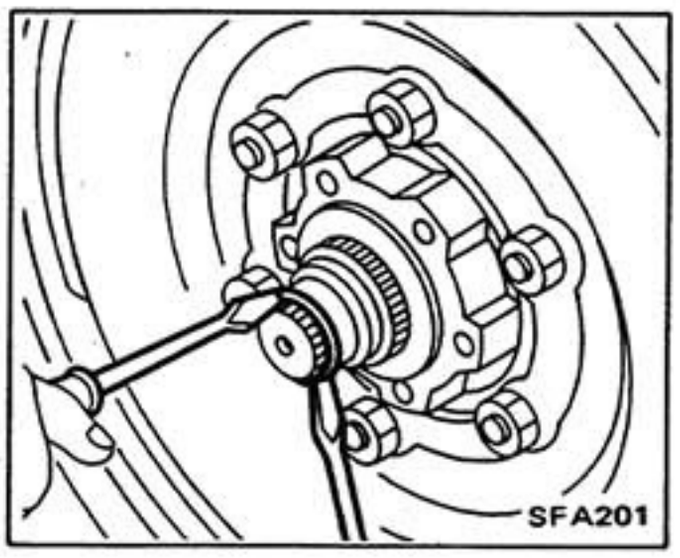
Refer to S.D.S. for selection of snap ring.



SFA200

T : Drive flange fixing bolt
43 - 58 N·m
(4.4 - 5.9 kg-m, 32 - 43 ft-lb)

CAUTION:
When placing snap ring in groove, support groove with screwdriver so that axle shaft will not slide.


SFA201

5. Install brake caliper assembly (Disc brake model) or brake drum (Drum brake model).

Refer to Service Brake (Section BR) for installation.

With free-running hub model:
(1) After installation of spacer and bushing to hub, place drive clutch in position and install snap ring.

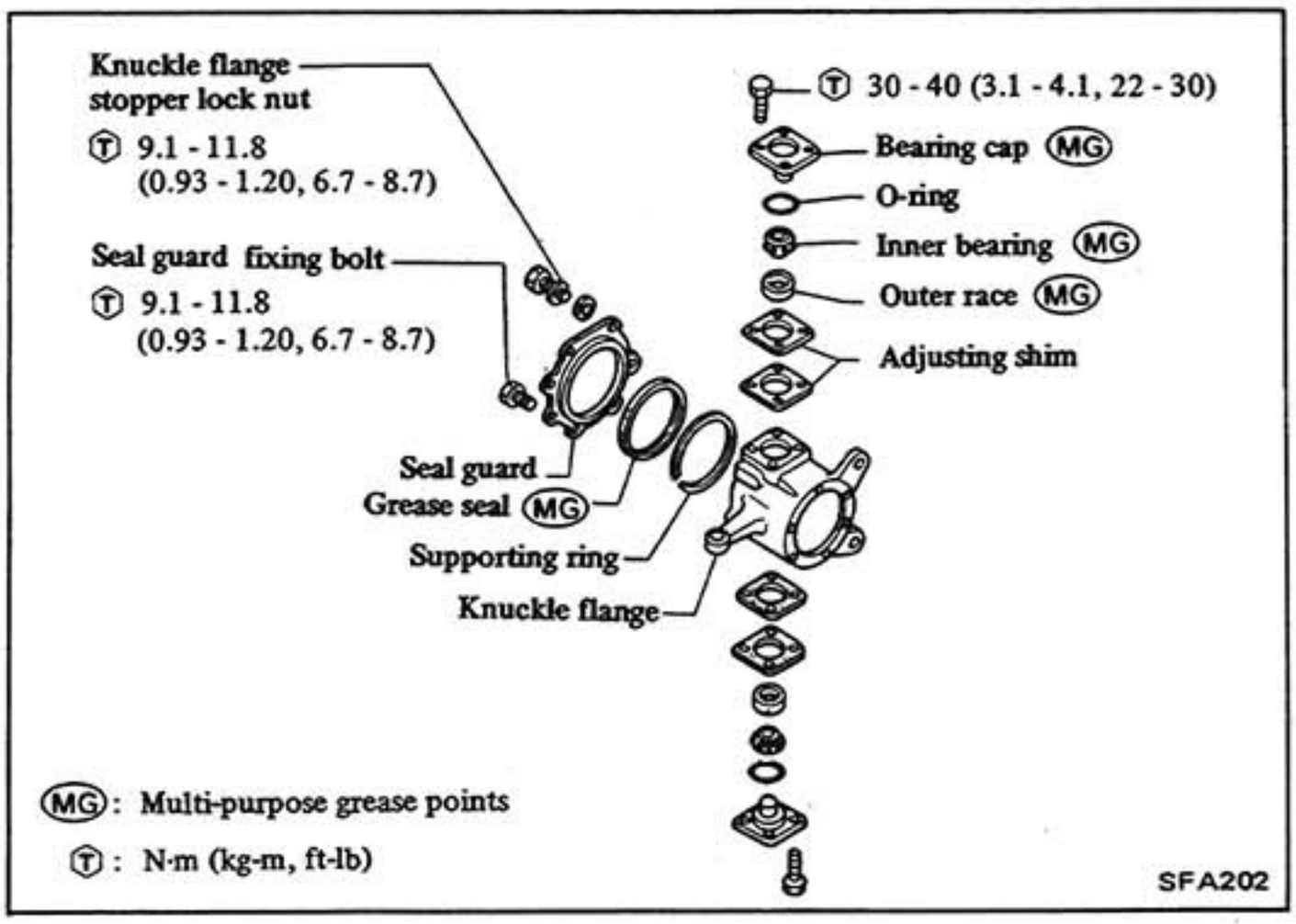
Refer to Axle Shaft for installing snap ring.

(2) Install free-running hub assembly.

Ⓣ : Free-running hub fixing bolt
54 - 59 N·m
(5.5 - 6.0 kg-m, 40 - 43 ft-lb)

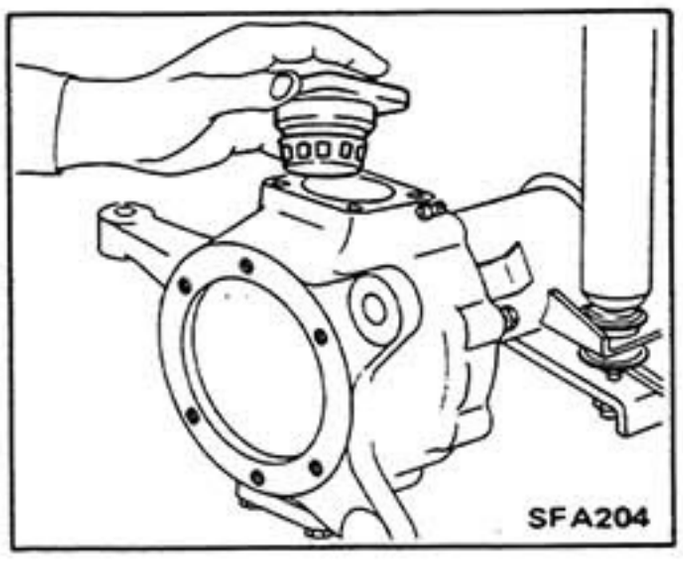
6. Install wheel and tire.

KNUCKLE FLANGE

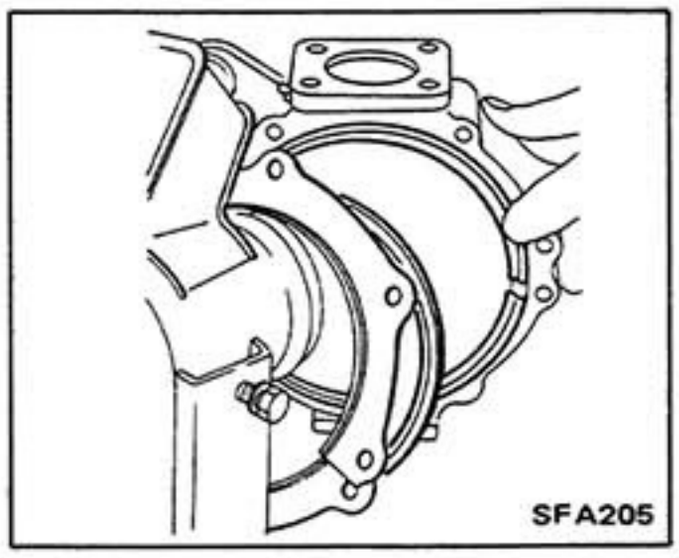


REMOVAL

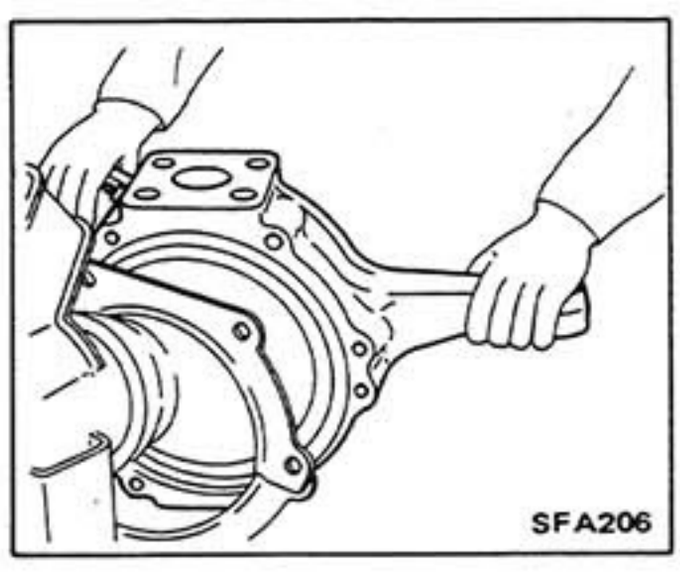
1. Draw out axle shaft.
Refer to Axle Shaft for removal.
2. Disconnect tie rod ends.
Refer to Section ST for disconnecting tie rod ends.
3. Remove upper and lower bearing caps with inner bearing and O-ring.



4. Remove seal guard fixing bolts, then separate seal guard and grease seals from knuckle flange.



5. Remove knuckle flange, grease seal guard and grease seals from axle case.



6. Remove bearing outer race from trunnion socket.

INSPECTION

Knuckle flange bearing cap

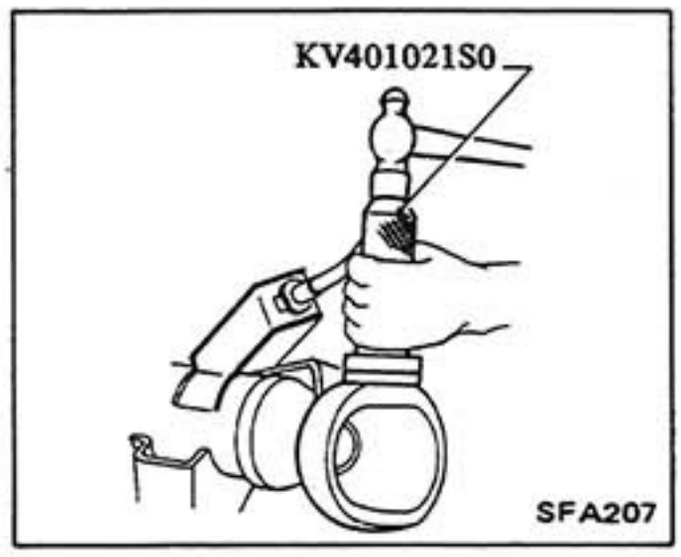
Replace knuckle flange bearing if it is worn, pitted or corroded.

Knuckle flange

Replace knuckle flange if it i cracked. If studs on knuckle flange ar bent, broken or damaged, replac them.

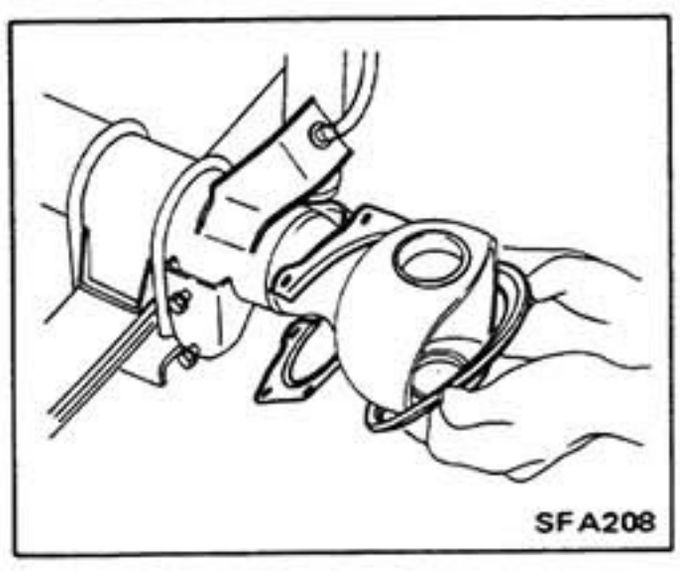
INSTALLATION

1. **Using Tool**, place bearing outer race in trunnion socket.



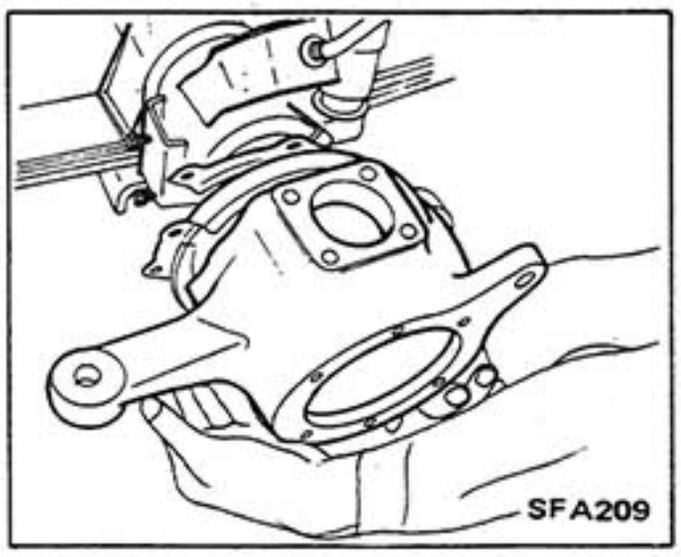
2. Place grease seal guard and grease seal in axle case.

Grease lip area and circumference seals in axle case.



3. Apply recommended grease around trunnion socket spherical area, then place knuckle flange in trunnion socket.

Renew grease compounded with molybdenum disulfide, exercising care not to allow dirt and dust to get inside.


SFA209

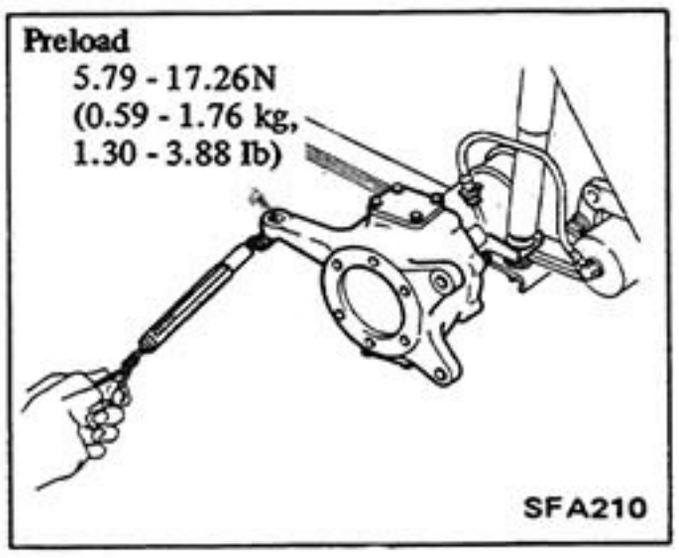
4. Pack bearing cap groove with recommended grease, and install bearing cap with inner race and O-ring.

Ⓣ : **Bearing cap bolt**
30 - 40 N·m
(3.1 - 4.1 kg-m, 22 - 30 ft-lb)

5. Install grease seal guard and grease seals.
6. Measure knuckle flange bearing preload.

Adjust bearing cap shim so that knuckle flange can rotate smoothly with a spring balancer.

CAUTION:
Use same thickness of shims at upper and lower portions of bearing cap.

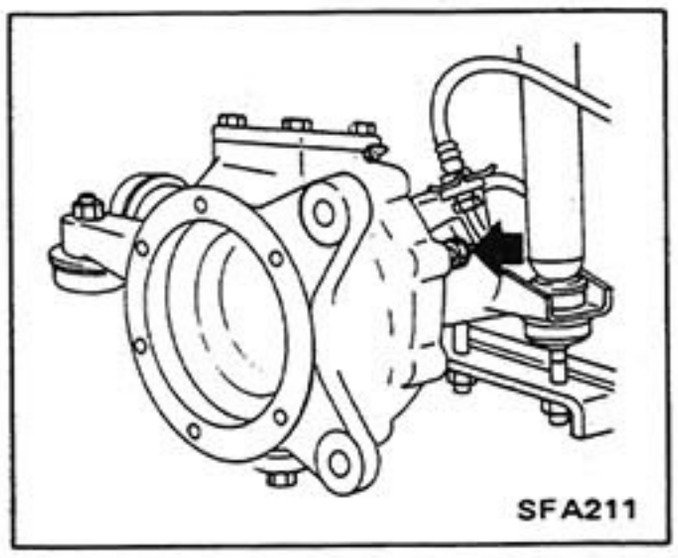


SFA210

Ⓣ : **Seal guard fixing bolt**
9.1 - 11.8 N·m
(0.93 - 1.2 kg-m, 6.7 - 8.7 ft-lb)

Knuckle flange stopper bolt
9.1 - 11.8 N·m
(0.93 - 1.2 kg-m, 6.7 - 8.7 ft-lb)

CAUTION:
Install knuckle flange stopper bolt and nut on stopper side of axle case.
After installing tie rod, adjust it to specified steering angle using turning radius gauge, then tighten with lock nut.

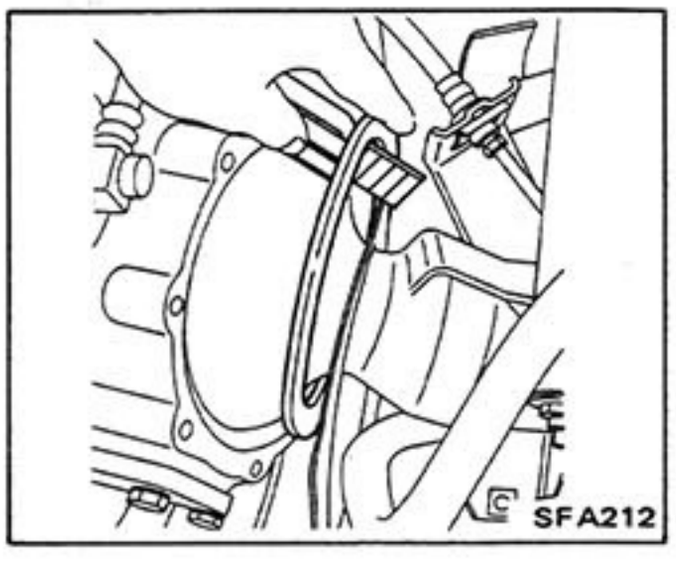

SFA211

KNUCKLE FLANGE GREASE SEAL

To replace only knuckle flange grease seal, proceed as follows:

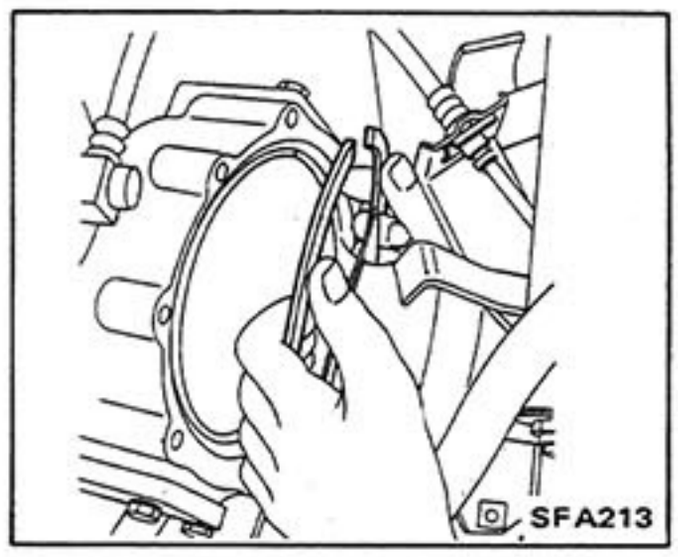
REMOVAL

1. Turn steering wheel to both the extreme right and left, and remove grease seal guard from knuckle flange.
2. Extract grease seal and remove it by cutting it from axle case.


SFA212

INSTALLATION

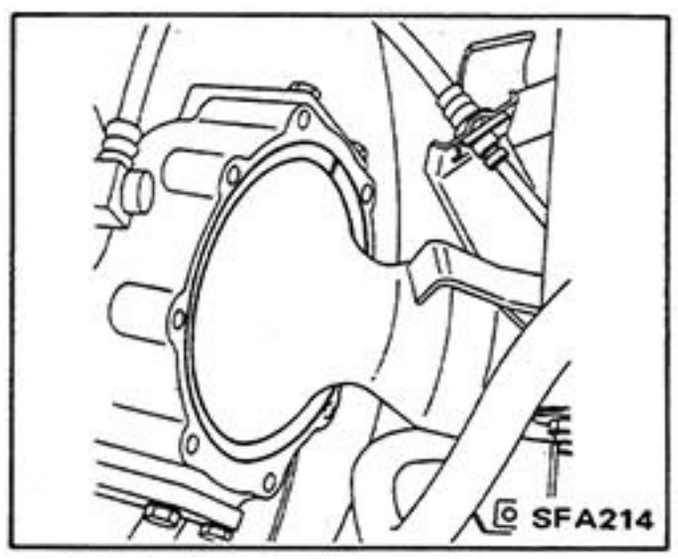
1. Cut off a part of new grease seal and fill lip portion with grease. Then insert grease seal into axle case.


SFA213

CAUTION:
Cut grease seal so that cut surface is straight.

2. Apply adhesive to cut surface of grease seal.

Install grease seal so that its cut surface is above knuckle flange.

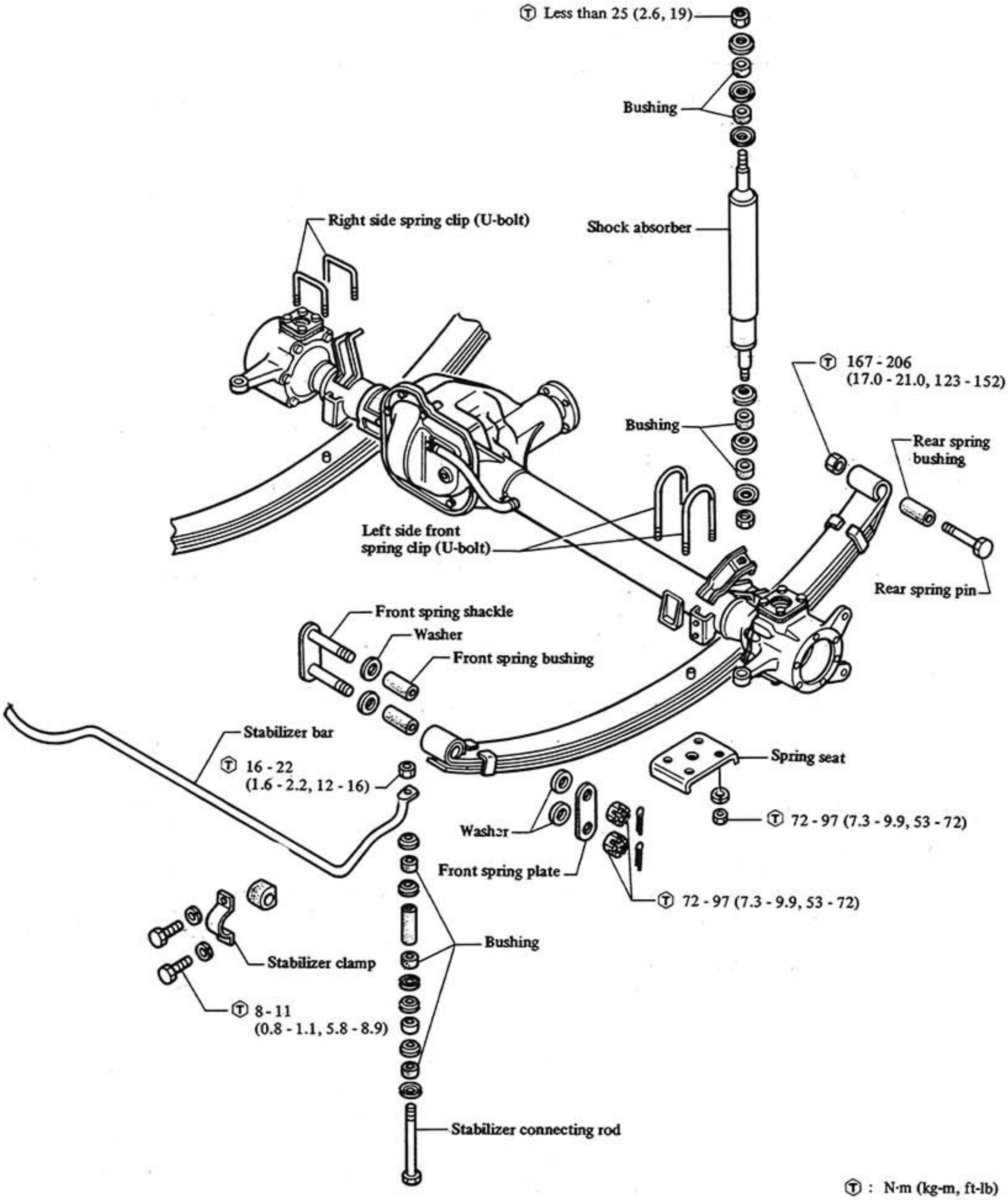

SFA214

CAUTION:
Be sure not to allow adhesive to protrude beyond cut surface of grease seal.

3. Install grease seal guard on knuckle flange.

CAUTION:
After replacing grease seal, adjust steering wheel to specified turning angle with a turning radius gauge. Then tighten lock nut.

FRONT SUSPENSION



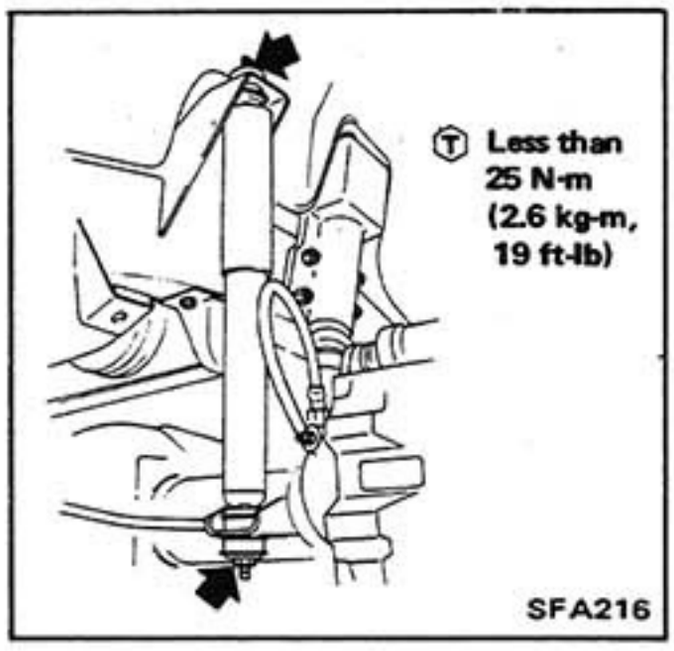
Ⓣ : N·m (kg-m, ft-lb)

SFA215

SHOCK ABSORBER

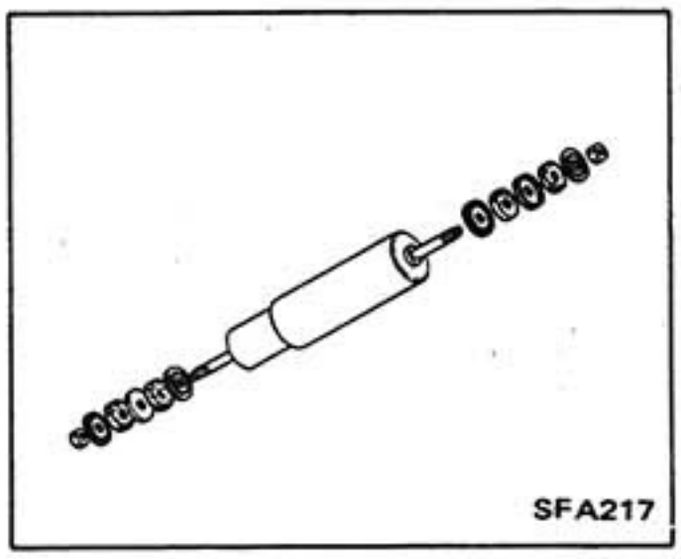
REMOVAL AND INSTALLATION

1. Disconnect both upper and lower sides fixing nuts.



2. Install shock absorber, observing the following note.

Do not allow oil or grease to come into contact with rubber parts.



INSPECTION

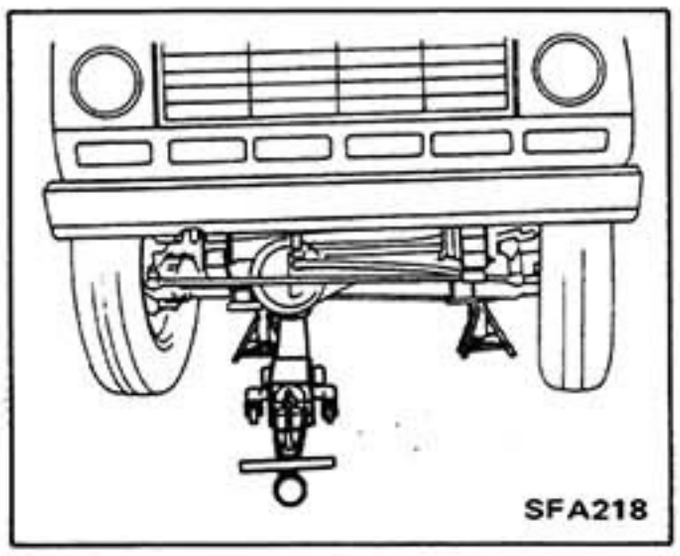
- Test shock absorber and compare **with specification given in S.D.S. Replace if necessary.**
- Check for oil leakage and cracks. Replace if necessary.
- Check piston rod for smooth operation. Replace if necessary.
- Check all rubber parts for wear, cracks, damage or deformation. Replace if necessary.

LEAF SPRING

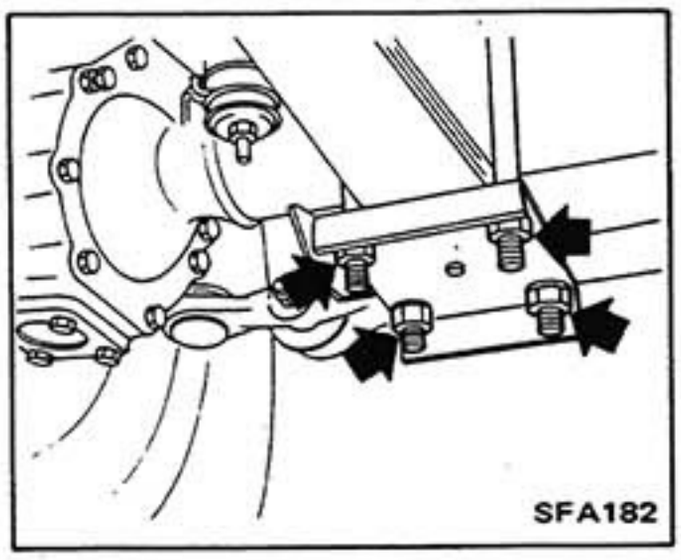
REMOVAL

1. Block rear wheels. Support under differential carrier with garage jack. Place stands.

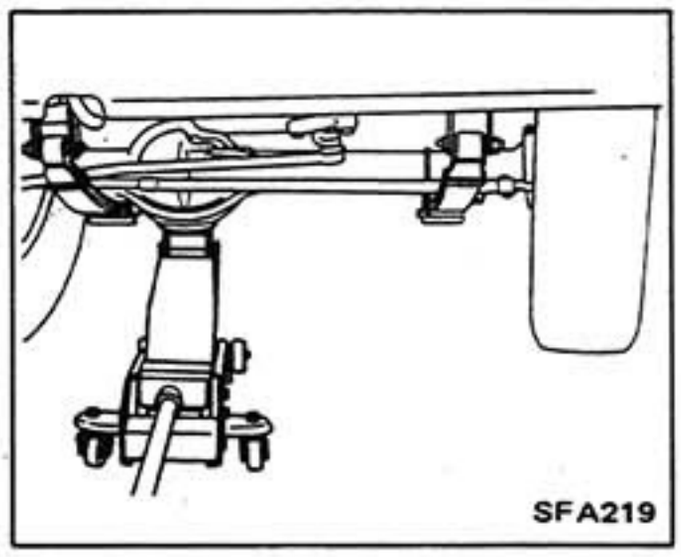
Do not raise differential carrier.



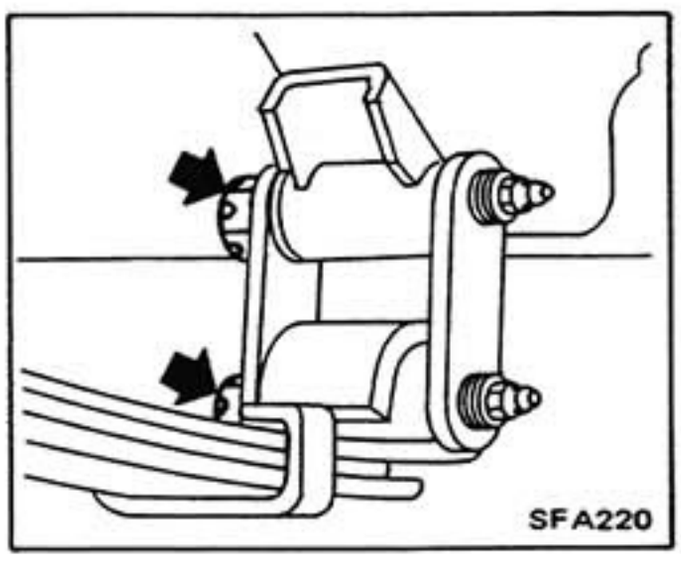
2. Remove U-bolts.

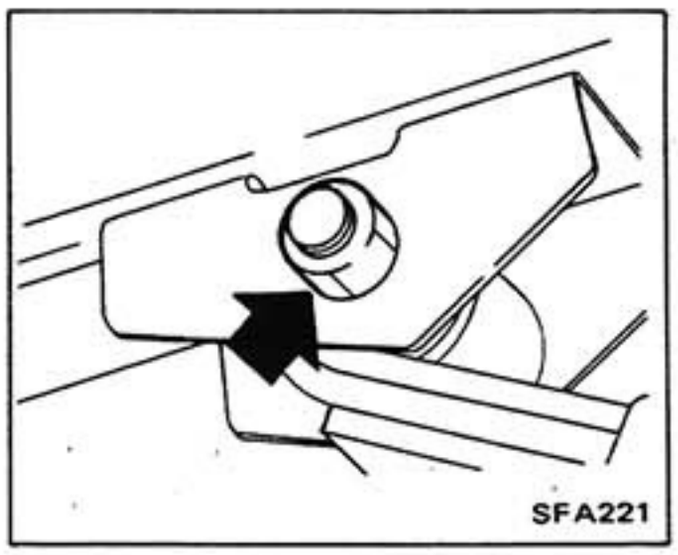


3. Raise jack positioned under differential carrier and front axle case from spring.

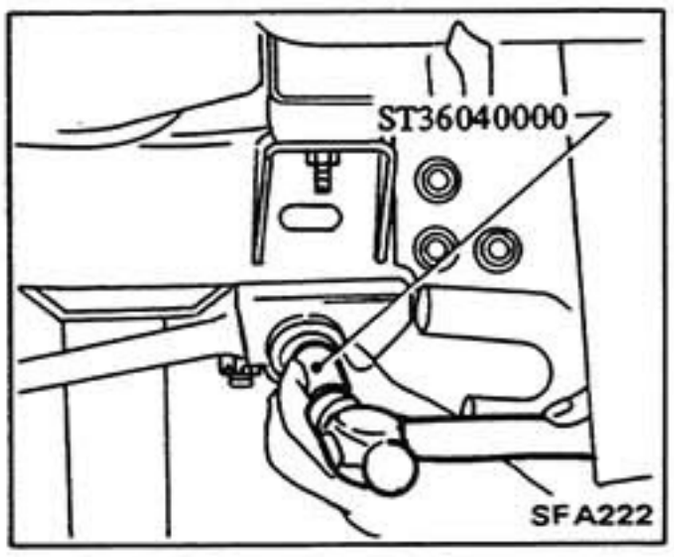


4. Disconnect front spring shackle and rear pin.

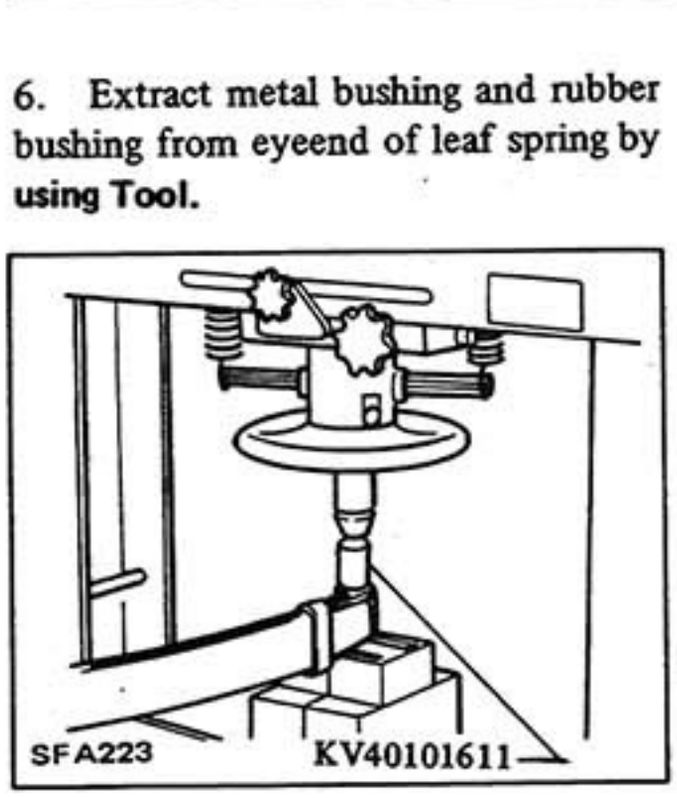


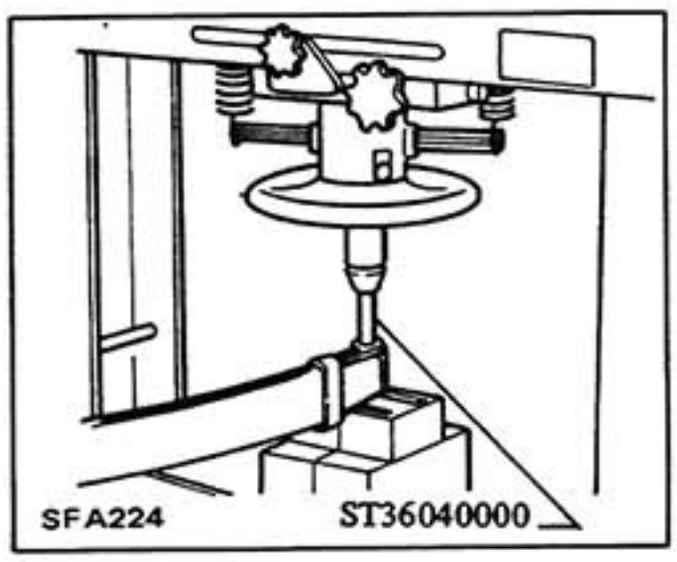


5. Extract metal bushing from frame by **using Tool.**



6. Extract metal bushing and rubber bushing from eyeend of leaf spring by **using Tool.**





CAUTION:
Be sure to install bushing straight.

INSPECTION

Clean all rust and dirt from spring leaves, using a wire brush if necessary.

1. Examine spring leaves for fractures or cracks.
2. Check rear bracket and pin, shackle, U-bolts and spring seat for wear, cracks, straightness or damaged threads. If faulty parts are found, replace with new ones.
3. Inspect all rubber parts for wear, damage, separation or deformation. Replace them if necessary.

INSTALLATION

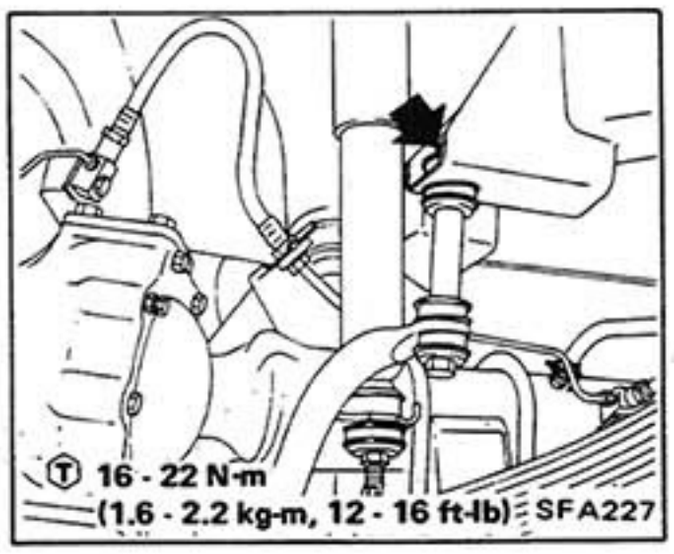
Install leaf spring in the reverse order of removal.

a. Using press, be sure to install bushing straight.

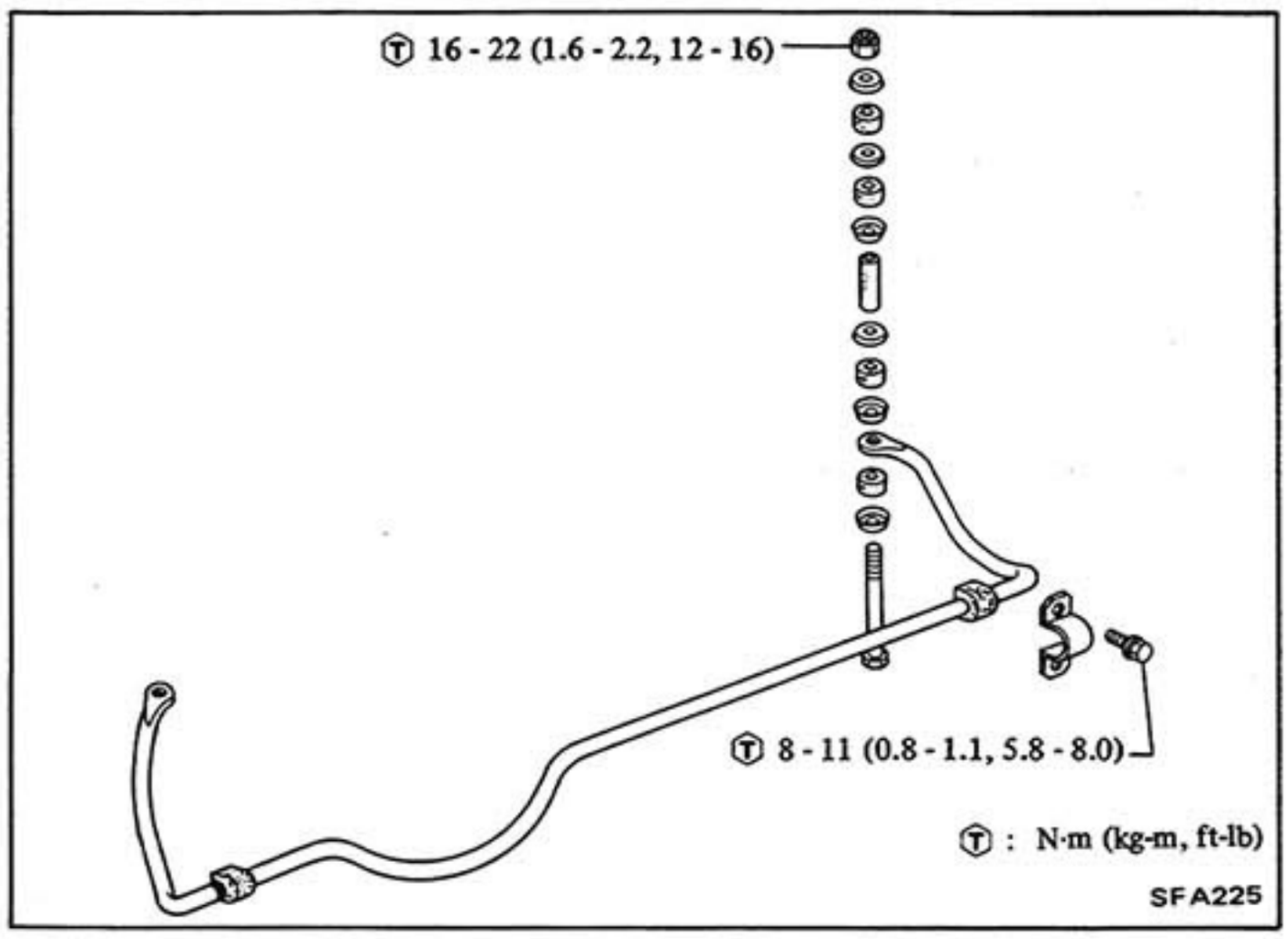
b. Vehicle weight must be on front wheels when tightening rear pin, shackle and shock absorber in order to clamp rubber bushings in neutral or unloaded position.

c. After tightening spring shackle nut to specified torque, turn shackle nut back 45 to 90 degrees. Align shackle bolt hole and insert pin.

Ⓣ : Spring rear pin nut
167 - 206 N·m
(17.0 - 21.0 kg-m,
123 - 152 ft-lb)
Spring shackle nut
72 - 97 N·m
(7.3 - 9.9 kg-m,
53 - 72 ft-lb)
U-bolt nut
72 - 97 N·m
(7.3 - 9.9 kg-m,
53 - 72 ft-lb)

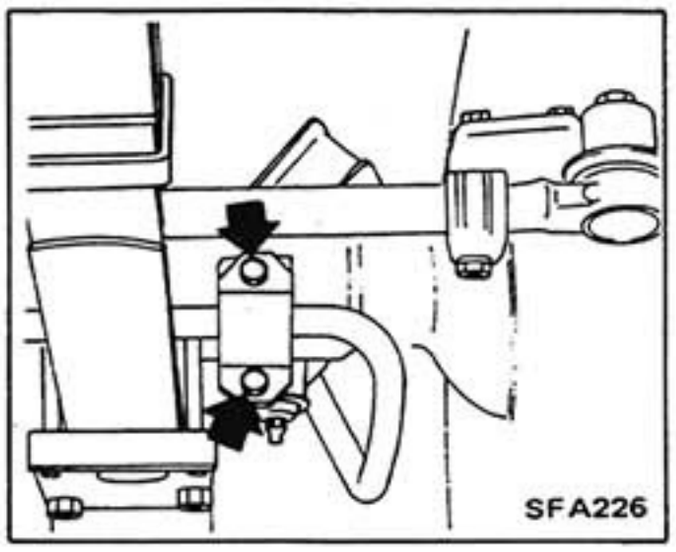


STABILIZER BAR

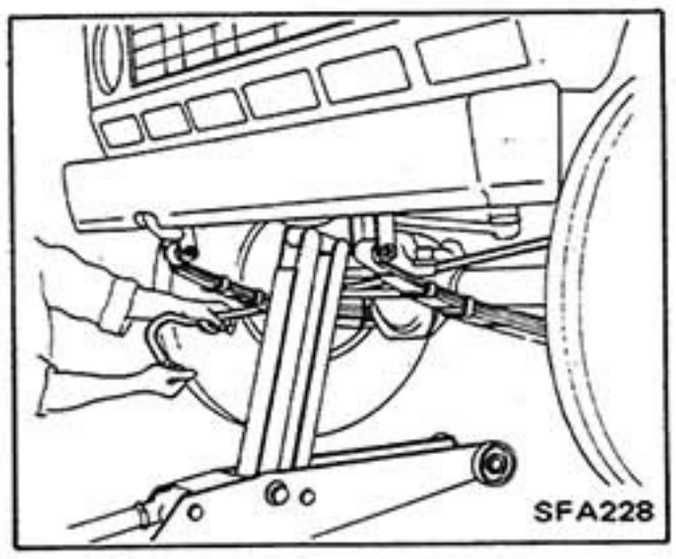


REMOVAL

1. Turn steering wheel to either side.
2. Remove stabilizer bar fixing bolts.



3. Jack up front body frame and take out stabilizer bar.



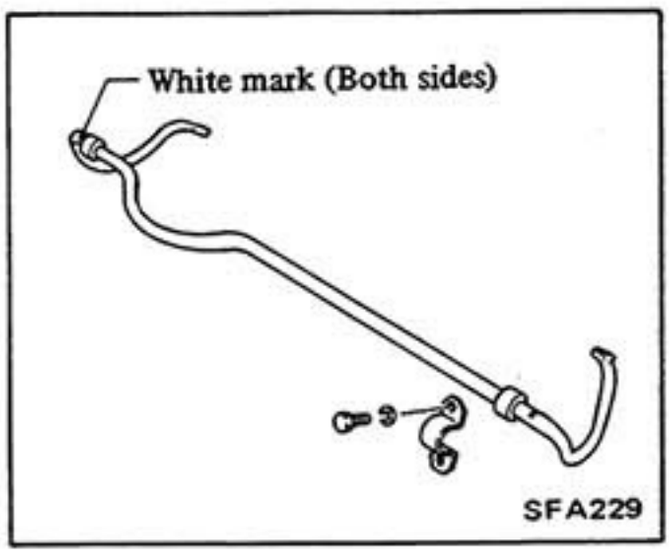
INSPECTION

1. Check stabilizer for twist and deformation.
   Replace if necessary.
2. Check each rubber bushing for cracks, wear, and deterioration. Replace if necessary.

INSTALLATION

Install stabilizer bar in the reverse order of removal, noting the following:

If correctly installed: white mark painted on stabilizer bushing seat can be seen from both sides of vehicle.



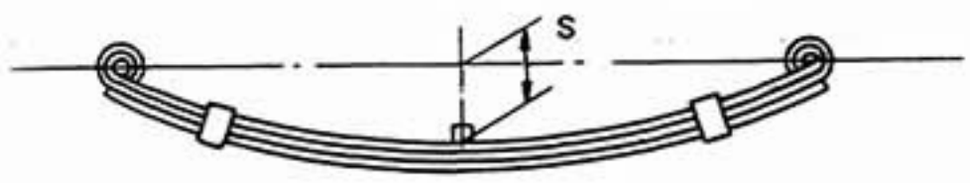
SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

LEAF SPRING

Item \ Model		160 series				61 series
		Light duty model		Heavy duty model		
Suspension type		Parallel semi-elliptic leaf spring				
Axle type		Full floating Birfield joint type				
Leaf spring	Part No.	54010-C6001*	54010-C6060 (For Middle East)	54010-C6200*	54010-C6260 (For Middle East)	54010-C6260 (All areas)
	Length x width x thickness - number of leaves mm (in)	1,100 x 60 x 9 - 3 (43.31 x 2.36 x 0.35 - 3)	1,100 x 60 x 6 - 6 (43.31 x 2.36 x 0.24 - 6)	1,100 x 60 x 9 - 3 (43.31 x 2.36 x 0.35 - 3)	1,100 x 60 x 6 - 7 (43.31 x 2.36 x 0.24 - 7)	
	Free camber "S" mm (in)	136 (5.35)	138.5 (5.45)	125.5 (4.94)	128.5 (5.06)	
	Laden camber mm/N (mm/kg, in/lb)	72/2,942 (72/300, 2.83/662)				
	Spring constant N/mm (kg/mm, lb/in)	45.80 (4.67, 261.5)	44.13 (4.50, 252.0)	55.02 (5.61, 314.2)	52.17 (5.32, 297.9)	

Except Middle East: Standard
For Middle East: Option



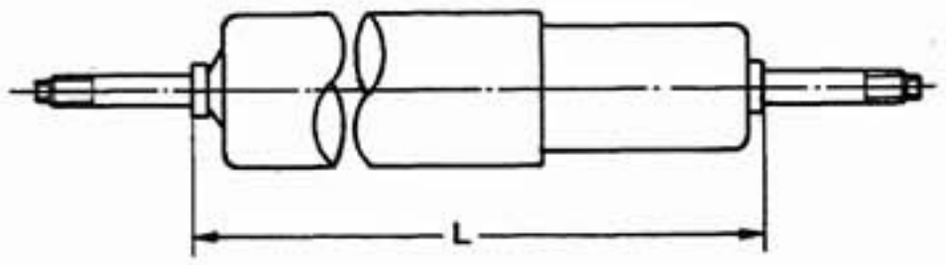
SFA230

STABILIZER BAR

Stabilizer bar Diameter	mm (in)	23 (0.91)

SHOCK ABSORBER

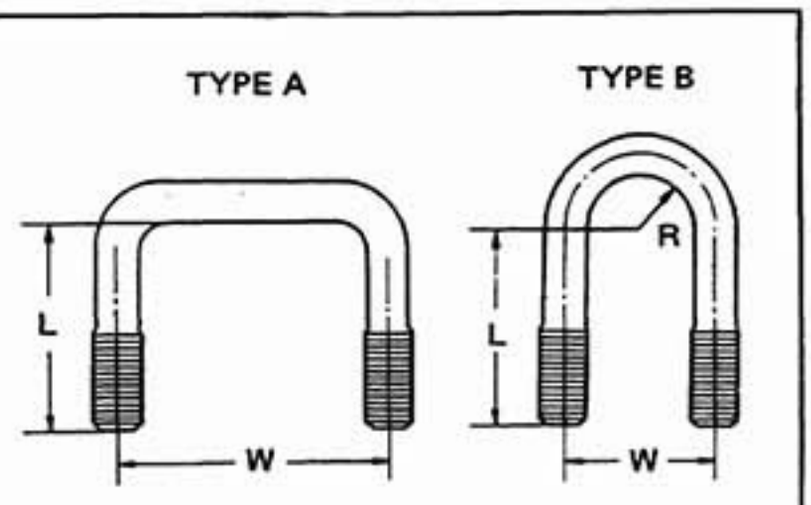
Shock absorber Maximum length "L"	mm (in)	405 (15.94)
Stroke	mm (in)	160 (6.30)
Damping force [0.3 m/sec. (1.0 ft/sec.)] N (kg, lb)	Expansion	2,158 (220, 485)
	Compression	834 (85, 187)



SFA231

U-BOLT

Item \ Model	160 series •	160 series For Middle East	61 series All areas
Type A R.H. Length(L) x width(W) mm (in) (Part No.)	73 x 73.5 (2.87 x 2.894) (54219-C6001)	84 x 73.5 (3.31 x 2.894) (54219-C6060)	
Type B L.H. Length(L) x width(W) mm (in) (Part No.)	120 x 89 (4.72 x 3.50) (55247-G7100)	125 x 85 (4.92 x 3.35) (55247-B9500)	



SFA232

* Except Middle East: Standard For Middle East: Option

INSPECTION AND ADJUSTMENT

WHEEL ALIGNMENT (Unladen *1)

Camber	degree	1°30′
Caster	degree	1°30′
Kingpin inclination	degree	7°30′
Toe-in	mm (in)	3 - 4 (0.12 - 0.16)
	degree *2	14′ - 19′
Front wheel turning angle (Full turn) degree	Inside	30°
	Outside	29°30′
Front wheel toe-out turn degree	Inside	20°
	Outside	19°50′

*1: Tankful of fuel, radiator coolant and engine oil full.
Spare tire, jack, hand tools, mats in designed position.
*2: On both sides

BEARING CAP SHIM

Thickness mm (in)	Part no.
0.075 (0.0030)	40606 44000
0.127 (0.0050)	40605 44000
0.254 (0.0100)	40604 44000
0.762 (0.0300)	40603 44000

FLANGE FREE PLAY SNAP RING

Thickness mm (in)	Part no.
1.1 (0.043)	39253 C6000
1.3 (0.051)	39253 C6001
1.5 (0.059)	39253 C6002
1.7 (0.067)	39253 C6003
1.9 (0.075)	39253 C6004
2.1 (0.083)	39253 C6005

TIGHTENING TORQUE

Unit	N·m	kg-m	ft-lb
Shock absorber lower end nut	Less than 25	Less than 2.6	Less than 19
Shock absorber upper end nut	Less than 25	Less than 2.6	Less than 19
Leaf spring U-bolt nut	72 - 97	7.3 - 9.9	53 - 72
Spring rear pin nut	167 - 206	17.0 - 21.0	123 - 152
Spring shackle	72 - 97	7.3 - 9.9	53 - 72
Back plate and knuckle spindle fixing bolt	30 - 40	3.1 - 4.1	22 - 30
Baffle plate and knuckle spindle fixing bolt	30 - 40	3.1 - 4.1	22 - 30
Wheel bearing lock nut	167 - 196	17 - 20	123 - 145
Wheel cylinder air breather	7 - 9	0.7 - 0.9	5.1 - 6.5
Free-running hub fixing bolt	54 - 59	5.5 - 6.0	40 - 43
Drain plug	39 - 59	4.0 - 6.0	29 - 43
Filler plug	39 - 59	4.0 - 6.0	29 - 43
Bumper rubber fixing bolt	16 - 22	1.6 - 2.2	12 - 16
Wheel nut	118 - 147	12 - 15	87 - 108
Propeller shaft to companion flange	78 - 88	8 - 9	58 - 65
Brake tube flare nut	15 - 18	1.5 - 1.8	11 - 13
Brake connector	8 - 11	0.8 - 1.1	5.8 - 8.0
Stabilizer bar to frame	16 - 22	1.6 - 2.2	12 - 16
Stabilizer bar to axle case	8 - 11	0.8 - 1.1	5.8 - 8.0
Wheel hub to disc brake rotor	50 - 68	5.1 - 6.9	37 - 50
Drive flange fixing bolt	43 - 58	4.4 - 5.9	32 - 43
Flange drive stud nut	43 - 58	4.4 - 5.9	32 - 43
Bearing cap bolt	30 - 40	3.1 - 4.1	22 - 30
Caliper bolt	108 - 147	11 - 15	80 - 108
Knuckle spindle fixing bolt	30 - 40	3.1 - 4.1	22 - 30
Seal guard fixing bolt	9.1 - 11.8	0.93 - 1.2	6.7 - 8.7
Knuckle flange stopper bolt nut	9.1 - 11.8	0.93 - 1.2	6.7 - 8.7
Tie rod slotted nut	46 - 54	4.7 - 5.5	34 - 40
Tie rod clip nut	25 - 28	2.5 - 2.9	18 - 21
Torque arrester fixing nut	16 - 22	1.6 - 2.2	12 - 16

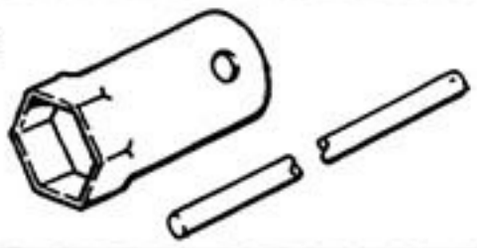
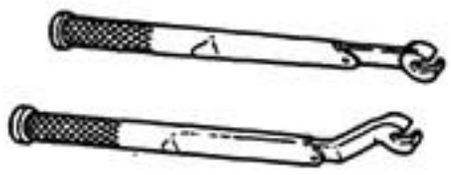
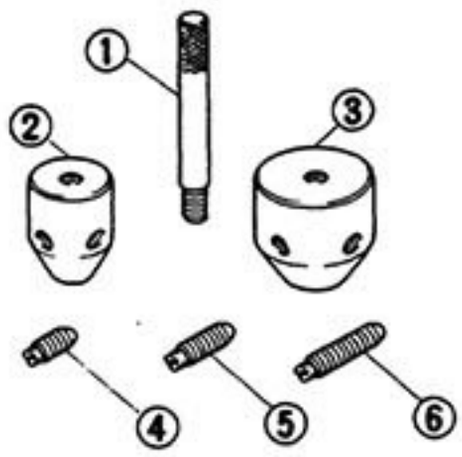
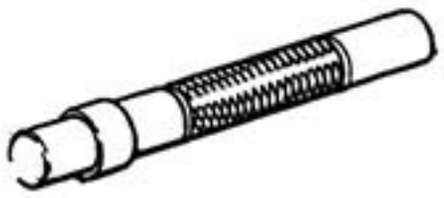
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Vibration, shock and shimmy of steering wheel. **Vibration:** Loose connection and wear of the each part of linkage cause vibration of front wheels and, steering wheel vibration. This is very noticeable when travelling on rough road. **Shock:** When the vehicle is travelling on bumpy roads, the play of the steering linkage is transmitted to the steering wheel. This is especially noticeable when travelling on rough road. **Shimmy:** Abnormal vibration of the front suspension system, the whole steering linkage and road wheel, which occurs at specific speeds.	Improper tire pressure.	Adjust.
	Imbalance and deformation of road wheel.	Correct the imbalance or replace.
	Unevenly worn tire or insufficient tightening of wheel nuts.	Replace or tighten.
	Improperly adjusted or worn front wheel bearing.	Adjust or tighten.
	Faulty wheel alignment.	Adjust.
	Insufficiently tightened steering gear housing.	Retighten.
	Wear of steering linkage.	Replace faulty parts.
	Worn suspension bushing.	Replace.
	Excessive backlash due to improper adjustment of the steering gear box.	Adjust correctly.
	Damaged idler arm.	Replace.
	Worn column bearing, weakened column bearing spring, or loose clamp.	Replace or retighten.
	Malfunction of shock absorber or loose installation bolts.	Replace or retighten.
	Worn or incorrectly adjusted wheel bearing.	Replace or adjust.
	Imbalance of vehicle level.	Adjust.
Vehicle pulls to right or left. When driving with hands off the steering wheel on a flat road, the vehicle gently swerves to right or left. **A faulty rear suspension may also be the cause of this problem and, therefore, see also Section RA.**	Improper tire pressure or insufficient tightening of wheel nuts.	Adjust or tighten.
	Difference in wear and tear of right and left tire treads.	Replace tires.
	Incorrect adjustment or abrasion of front wheel bearing.	Adjust or replace.
	Collapsed or twisted front spring.	Replace.
	Incorrect wheel alignment.	Adjust.
	Incorrect brake adjustment (binding).	Adjust.
	Deformed steering linkage and stabilizer bar.	Replace.
	Imbalance of vehicle level.	Adjust.
Instability of vehicle.	Improper tire pressure.	Adjust.
	Broken stabilizer bar.	Replace.
	Incorrect wheel alignment.	Adjust.
	Worn or deformed steering linkage.	Replace.
	Incorrect adjustment of steering gear. (Backlash and worm bearing preload)	Adjust.
	Deformed or unbalanced road wheel.	Correct or replace.
	Imbalance of vehicle level.	Adjust.

Condition	Probable cause	Corrective action
Stiff steering wheel. (Checking up procedure) Jack up front wheels, detach the steering gear arm and operate the steering wheel, and; If it is light, check steering linkage. and suspension parts. If it is heavy, check steering gear, steering linkage and steering column parts.	Improper tire pressure.	Adjust.
	Insufficient lubricants or mixing impurities in steering gear box or excessively worn steering linkage.	Replenish grease or replace the part.
	Stiff or damaged suspension, or lack of grease.	Replace or repair.
	Worn or damaged steering gear.	Replace.
	Incorrectly adjusted steering gear.	Adjust.
	Deformed steering linkage.	Replace.
	Incorrect wheel alignment.	Adjust.
	Interference of steering column with turn signal switch.	Replace.
Excessive steering wheel play.	Incorrectly adjusted steering gear housing.	Adjust backlash.
	Worn steering linkage.	Replace.
	Improperly fitted gear housing.	Retighten.
	Incorrectly adjusted wheel bearing.	Adjust.
Noises.	Improper tire pressure.	Adjust.
	Insufficient lubricating oil and grease for suspension bushings and steering linkage, or their breakage.	Replenish lubricating oil and grease, or replace.
	Loose steering gear bolts, linkage and suspension parts.	Retighten.
	Faulty shock absorber.	Replace.
	Faulty wheel bearing.	Replace.
	Worn steering linkage and steering gear.	Replace.
	Worn stabilizer bushings.	Replace.
	Broken stabilizer bar.	Replace.
	Loose stabilizer bar fixing bolts and nuts.	Retighten.
	Loose shock abosrber fixing.	Retighten.
Grating tire noise.	Improper tire pressure.	Adjust.
	Incorrect wheel alignment.	Adjust.
	Deformed suspension linkage.	Replace.
Jumping of disc wheel.	Improper tire pressure.	Adjust.
	Imbalanced road wheels.	Adjust.
	Faulty shock absorber.	Replace.
	Faulty tire.	Replace.
	Deformed wheel rim.	Replace.

Condition	Probable cause	Corrective action
Excessively or partially worn tire.	Improper tire pressure.	Adjust.
	Incorrect wheel alignment.	Adjust.
	Faulty wheel bearing.	Replace.
	Incorrect brake adjustment.	Adjust.
	Tires not rotated.	Rotate tires at recommended intervals.
	Rough and improper driving manner.	Drive more gently.
Oil leakage (includes grease)	Damaged or restricted air breather.	Clean or replace air breather.
	Damaged oil seal in front axle case or differential carrier.	Replace the damaged oil seal.
	Oil leakage from between the differential carrier and axle case.	Tighten to the specified torque, or replace gasket.

SPECIAL SERVICE TOOLS

Tool number	Tool name
ST35830000	Wheel bearing lock nut wrench 
GG94310000	Flare nut torque wrench 
KV401021S0 ① ST35325000 ② KV40102110 ③ KV40102120 ④ KV40102130 ⑤ KV40102140 ⑥ KV40102150	Bearing race drift Drift bar Drift (A) Drift (B) Screw (A) Screw (B) Screw (C) 
ST36040000	Spring pin bush replacer 
KV40101611	Adapter