DATSUN 280Z
MODEL S30 SERIES

SECTION ST

STEERING SYSTEM

ST

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NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

STEERING SYSTEM

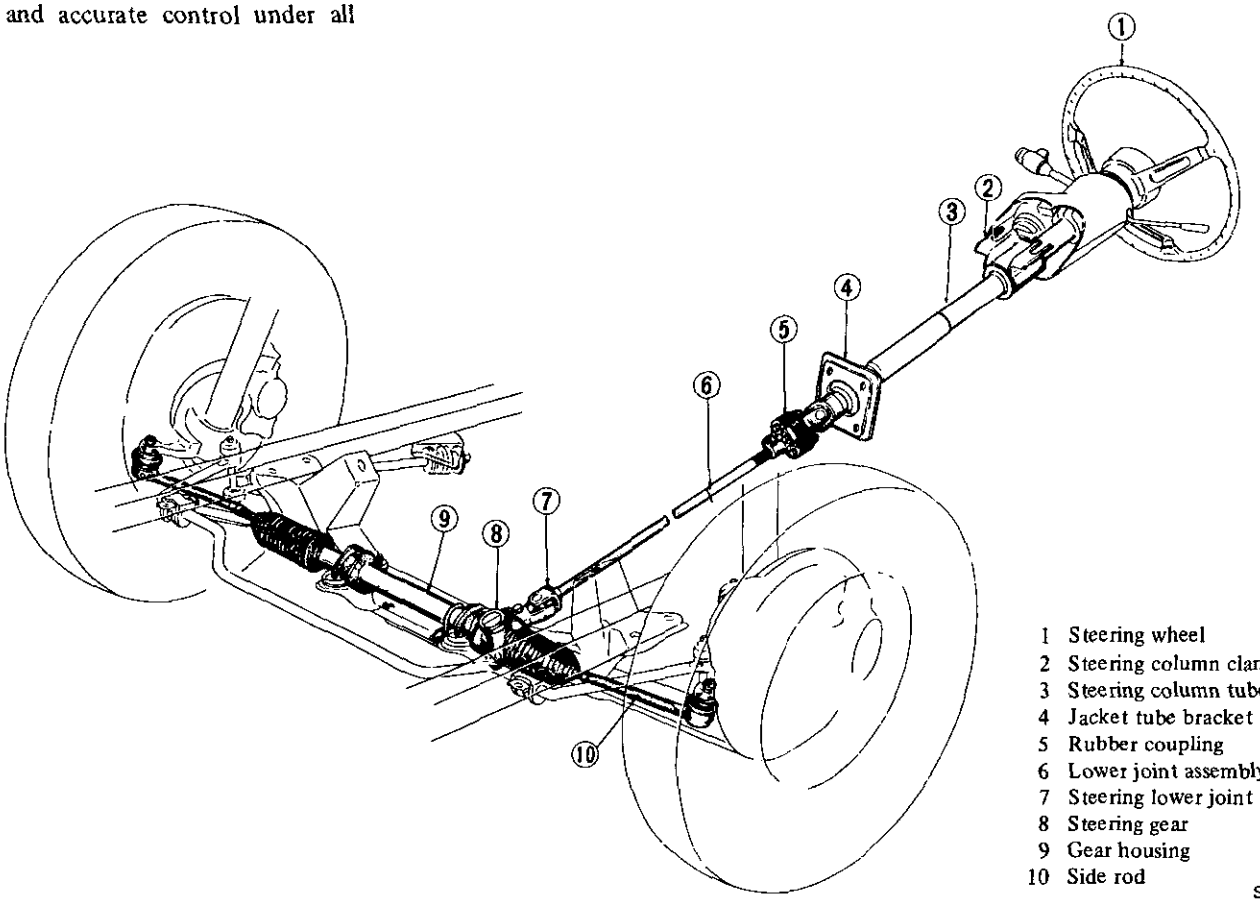
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DESCRIPTION

The steering assembly is direct-acting rack-and-pinion type with a gear ratio of 18.0 : 1, providing sharp, light, and accurate control under all conditions.

It consists of a rack bar and toothed pinion, both working in the plain bearings of the housing. Backlash is held to 0 mm (0 in) by the retainer and the retainer spring.



1 Steering wheel
2 Steering column clamp
3 Steering column tube
4 Jacket tube bracket
5 Rubber coupling
6 Lower joint assembly
7 Steering lower joint
8 Steering gear
9 Gear housing
10 Side rod

ST429

Fig.ST-1 Structural view of steering system

The steering wheel is a cone type which exhibits excellent safety characteristics. Between the steering wheel and gear assembly, a rubber coupling is used to prevent the transmission of vibrations from the road surface, insuring excellent handling and safety. Two universal joints are used between the gear assembly and steering wheel to give the most suitable steering wheel position and angle.

These joints require no lubrication and have an excellent service life.

The collapsible steering column is a steel ball type, which collapses upon

impact. Thus, if the car should be involved in a head-on collision that throws the driver forward, the steering column will absorb the energy of his forward movement and greatly reduce the possibility of his being injured.

The gear housing is located in front of the front suspension, and a ball joint with excellent sealing and long durability is used on the knuckle arm end of the steering linkage.

As mentioned above, this steering assembly is of simple construction. Shim adjustment or selective assembly of parts, essential in the case of conventional assemblies, is not necessary. Thus, servicing is very convenient and structural strength is more than adequate.

The oil level in the gear housing should be checked and corrected at recommended maintenance intervals. Apply the recommended multipurpose grease to idler side joint and ball joints in the steering linkage at recommended maintenance intervals.

STEERING WHEEL

REMOVAL

1. Disconnect battery ground cable.
2. Remove horn pad by depressing it and turning counterclockwise.
3. Remove steering wheel nut.
4. Using the Steering Wheel Puller ST27180001, install puller anchor screws into threaded holes provided in steering wheel. Turn center bolt of the special tool clockwise to remove steering wheel. See Figure ST-2.

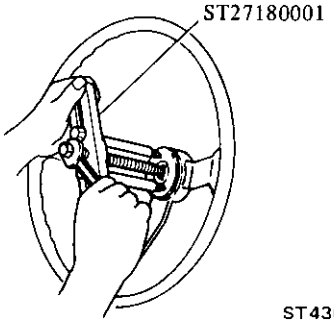


Fig. ST-2 Removing steering wheel

Notes:

a. Do not strike the end of the steering column shaft with a hammer. This will damage bearing.

b. Be careful not to damage cancel pole.

INSTALLATION

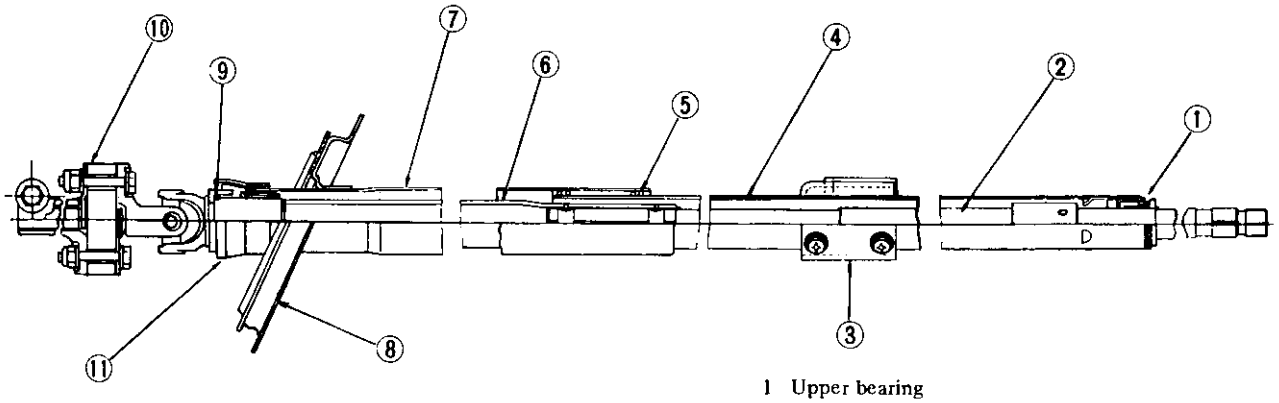
Install the steering wheel in the reverse order of removal. Observe the following instructions.

1. Apply grease to sliding portions.
2. Install steering wheel to column shaft in a straight ahead position after facing the punch mark on the top of upper column shaft and tighten steering wheel nut to specified torque.

Tightening torque:
5 to 7 kg-m (36 to 51 ft-lb)

Note: After installing steering wheel, turn it clockwise or counterclockwise and check for catch or drag. Also check horn operation.

STEERING COLUMN (Collapsible type)



1 Upper bearing
2 Upper jacket shaft
3 Steering column clamp
4 Upper jacket tube
5 Steel ball
6 Lower jacket shaft
7 Lower jacket tube
8 Jacket tube bracket
9 Steering column spring
10 Rubber coupling
11 Column dust cover

Fig. ST-3 Sectional view of collapsible type steering

INSTRUCTIONS FOR HANDLING COLLAPSIBLE STEERING COLUMN

1. Never in any case should an undue stress be applied to the steering column in an axial direction.
2. When installing, do not apply bending force to the steering column.

REMOVAL

1. Disconnect steering column assembly from lower joint shaft at rubber coupling by removing bolt. See Figure ST-4.

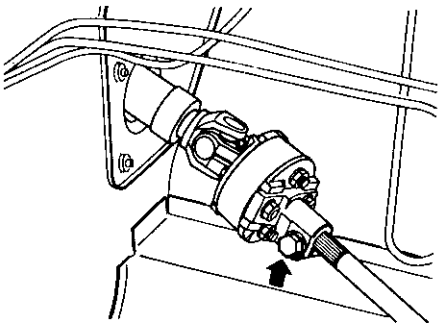


Fig. ST-4 Removing rubber coupling bolt

2. Remove steering wheel. Refer to Steering Wheel.
3. By loosening screws, remove steering column shell covers.
4. Remove turn signal switch assembly and combined light switch assembly by loosening screws.
5. Remove bolts securing jacket tube bracket to dash panel. See Figure ST-5.

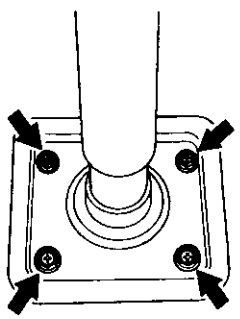


Fig. ST-5 Removing jacket tube bracket securing bolts

6. Supporting steering column at the top portion, remove two column clamp securing bolts. See Figure ST-6.

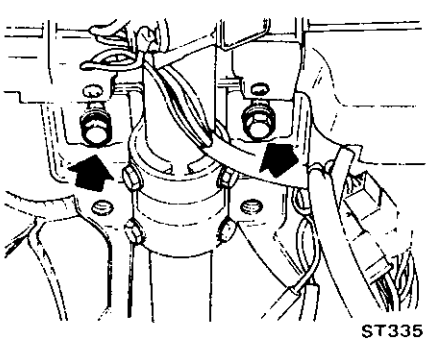


Fig. ST-6 Removing column clamp securing bolts

7. Draw out steering column assembly from the interior side. See Figure ST-7.

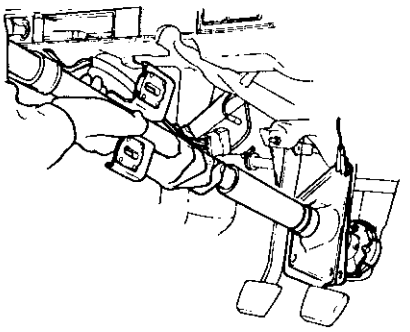


Fig. ST-7 Drawing out steering column assembly

8. By loosening nut securing lower joint to pinion gear, take lower joint assembly out. See Figure ST-8.

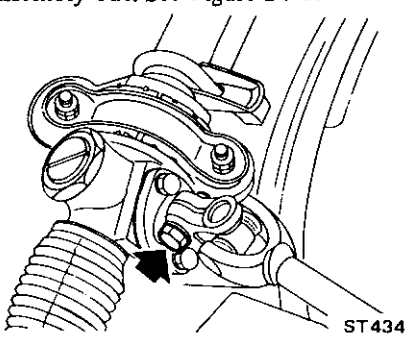


Fig. ST-8 Loosening nut securing lower joint to pinion gear

When an accident (collision) occurs and the car, especially its front unit, is damaged, conduct an inspection in accordance with the following instructions.

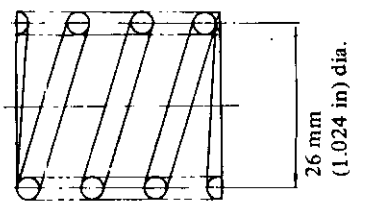
Inspect steering system particularly carefully because it is a very important unit for driving. The collapsible type steering should not be disassembled; if necessary, replace it as an assembly.

INSPECTION

1. When steering wheel cannot be rotated smoothly but steering gear, steering linkage and suspension system are normal, check the steering system for the following matters and replace faulty parts.

(1) Check column bearings for damage or unsmoothness. If required, lubricate with recommended multipurpose grease or replace with a new one as steering column assembly.
(2) Check jacket tube for deformation or breakage, and replace if necessary.
(3) Check column shaft spring, and replace if damaged or weakened.

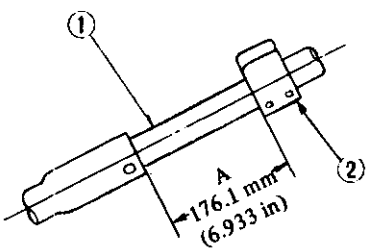
Wire diameter	3.5 mm (0.138 in)
Free length	27.3 mm (1.075 in)
Load x length	30 kg (66 lb) x 15 mm (0.59 in)



2. If the car has been involved in a light collision, check the following parts and replace if necessary.

(1) Jacket tube

Measure the dimension A as shown in Figure ST-9. Standard installed dimension is 176.1 mm (6.933 in). When jacket tube is crushed, dimension A becomes smaller.



1 Jacket tube
2 Column clamp
ST192

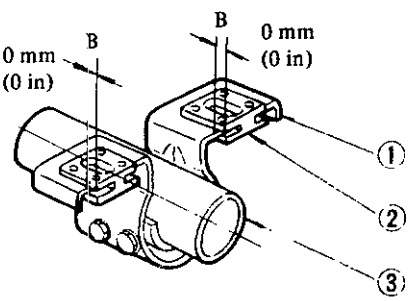
Fig. ST-9 Standard dimension between column clamp and the top end of lower jacket tube

(2) Column clamp

Measure dimension B as shown in Figure ST-10.

Standard B dimension is 0 mm (0 in).

When jacket tube is crushed, dimension B becomes larger.



1 Column clamp
2 Block
3 Jacket tube
ST193

Fig. ST-10 Standard dimension B

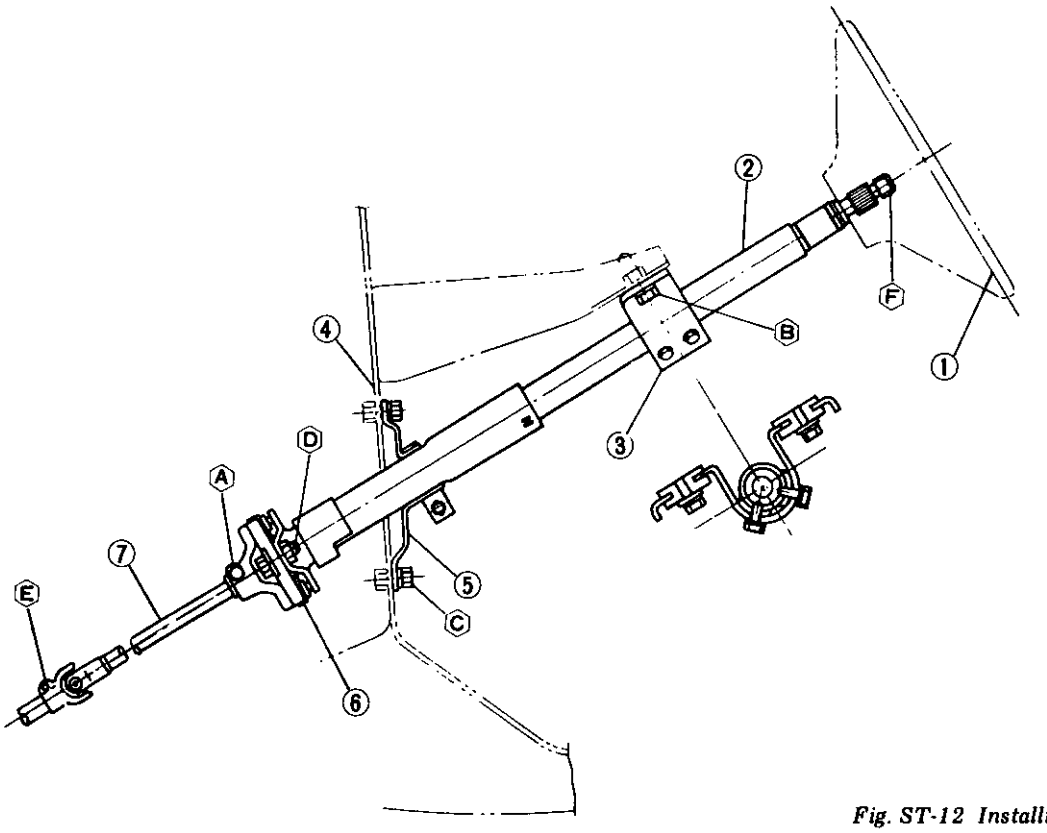


Fig. ST-12 Installing steering column assembly

(3) Steering wheel

Check steering wheel for axial play.

When steering jacket shaft is crushed, axial play occurs. See Figure ST-11.

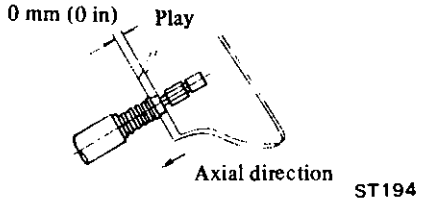


Fig. ST-11 Inspecting steering wheel for axial play

INSTALLATION

Install steering column in the reverse order of removal. Observe the following instructions. See Figure ST-12.

1. Install lower joint assembly after installing steering column assembly.
2. Set the wheels in a straight ahead position.
3. Line up the slits of universal joints with the punched mark located on the top end of upper steering shaft. See Figure ST-13.

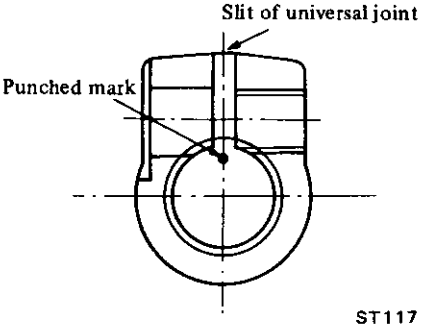


Fig. ST-13 Lining up slit with punched mark

Note: Make sure that no undue stress is applied to rubber coupling.

4. Tighten bolts and nuts correctly and securely.

For tightening torque, see Figure ST-12.

5. After installation, make sure that steering wheel turns smoothly.

STEERING LOCK

To make tamper-proof, self-shear type screws are used, and their heads are sheared off when installed so that the steering lock system cannot be removed easily.

REMOVAL

1. Break two self-shear type screws with a drill or other proper tool.
2. Remove two screws and dismount steering lock from the steering jacket tube. See Figure ST-14.

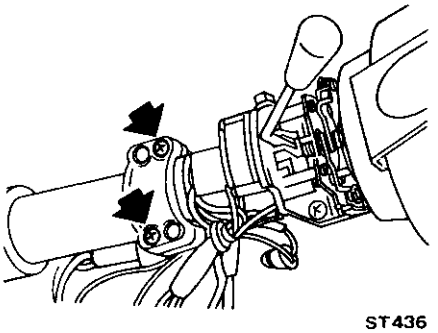
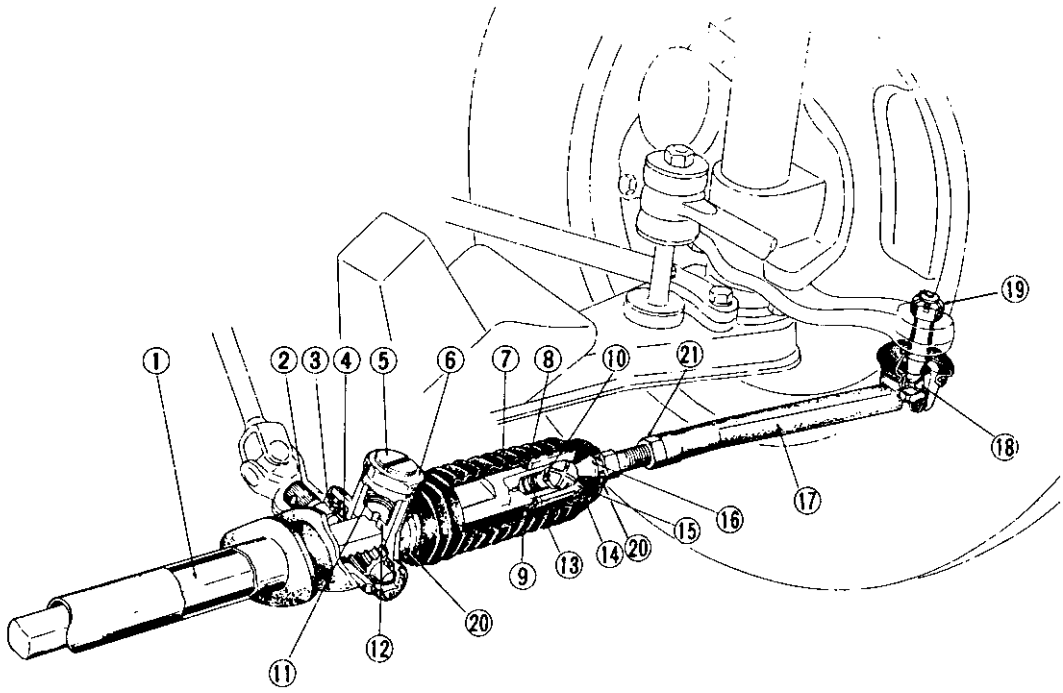


Fig. ST-14 Removing steering lock securing screws

INSTALLATION

1. Align steering lock hole in jacket tube with the mating portion of steering lock.
2. Install self-shear type screws and cut off their heads.

STEERING GEAR AND LINKAGE



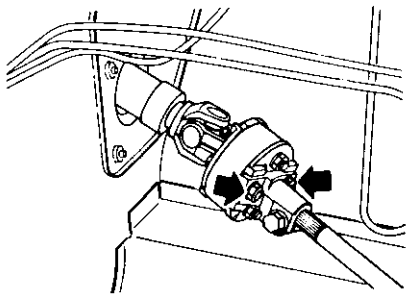
1 Rack
2 Pinion
3 Oil seal
4 Pinion bearing
5 Retainer adjust screw
6 Adjust lock nut
7 Gear boot
8 Side rod lock nut
9 Lock nut spacer
10 Side rod spring seat
11 Retainer spring
12 Retainer
13 Side rod inner spring
14 Dust cover clamp
15 Side rod inner socket
16 Ball stud
17 Side rod
18 Side rod ball stud
19 Side rod ball stud nut
20 Gear boot clamp
21 Steering stopper nut

ST437

Fig. ST-15 Cross-section of rack-and-pinion and side rod assembly

REMOVAL

1. Jack up the front of car and support it with suitable safety stands.
2. Remove front wheels.
3. Disconnect lower joint from steering column at rubber coupling by loosening bolts securing lower joint assembly. See Figure ST-16.

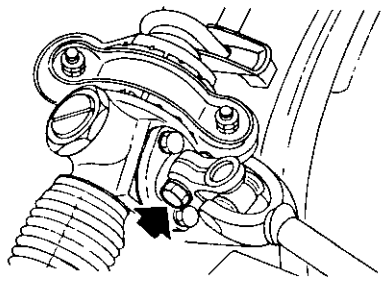


Tightening torque:
1.7 to 2.0 kg-m
(12 to 14 ft-lb)

ST432

Fig. ST-16 Loosening bolts securing lower joint assembly

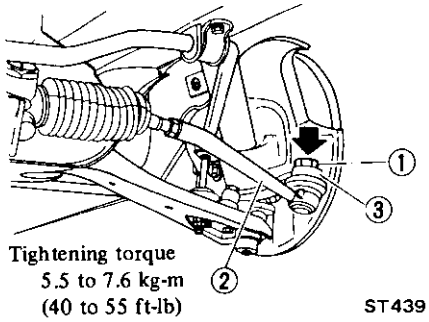
4. Loosen bolt securing lower joint assembly to pinion, and then remove lower joint assembly from engine compartment. See Figure ST-17.



ST434

Tightening torque:
4 to 5 kg-m
(29 to 36 ft-lb)

Fig. ST-17 Disconnecting lower joint from pinion



Tightening torque
5.5 to 7.6 kg-m
(40 to 55 ft-lb)

ST439

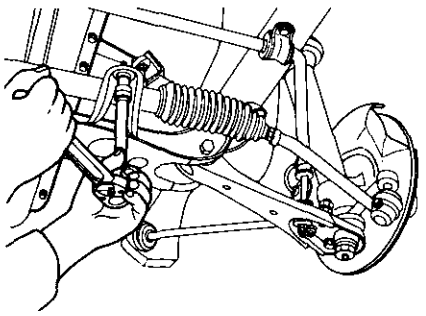
1 Side rod outer ball stud nut
2 Side rod
3 Knuckle arm

Fig. ST-18 Removing outer ball stud nut

5. Remove splash board.
6. Remove cotter pins and nuts fastening side rod ball studs to knuckle arms. See Figure ST-18.
7. To detach side rod ball studs from knuckle arms, insert Steering Ball Joint Puller ST27850000 between them and separate by striking the top of this tool with a hammer.

If this operation must be done without this tool, strike knuckle arm boss with a copper hammer backing up the opposite side of it with a large hammer and ball stud will be free from knuckle arm. Do not strike the ball stud head, the ball socket of side rod and side rod with a hammer in this operation.

7. Remove bolts securing steering gear housing to suspension member. See Figure ST-19.



Tightening torque:
Bolt to welded nut
2.6 to 3.0 kg-m
(19 to 22 ft-lb)
Lock nut
3.1 to 3.5 kg-m
(22 to 25 ft-lb)

ST440

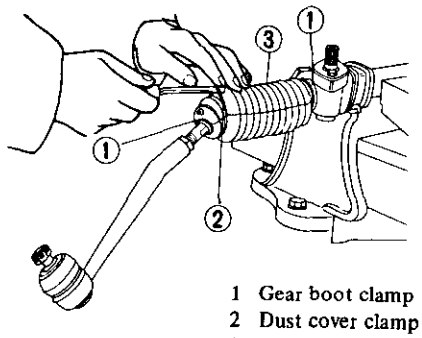
Fig. ST-19 Removing bolts securing housing to suspension member

8. Remove steering gear and linkage assembly.

Note: Raise the assembly a little and draw it out transversely.

DISASSEMBLY

1. Clamp the rack-and-pinion assembly in a vise using patches on steering gear housing to avoid scarring.
2. Remove dust cover clamp and boot clamp from steering gear boot. (Both left and right) See Figure ST-20.



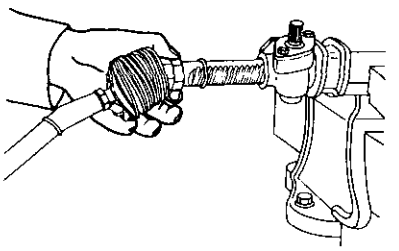
1 Gear boot clamp
2 Dust cover clamp
3 Gear boot

ST441

Fig. ST-20 Removing clamps

3. Loosen side lock nut and inner socket assembly.
4. Remove side rod assembly from rack. See Figure ST-21.

Note: Do not disassemble side rod assembly.

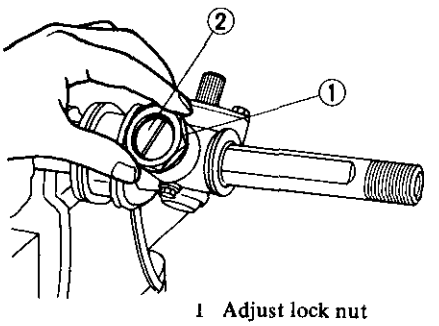


ST442

Fig. ST-21 Disconnecting side rod assembly

5. Remove side rod spring seat and side rod inner spring.
6. Loosen adjust lock nut and remove retainer adjust screw.

And then take retainer spring and steering gear retainer out. See Figure ST-22.

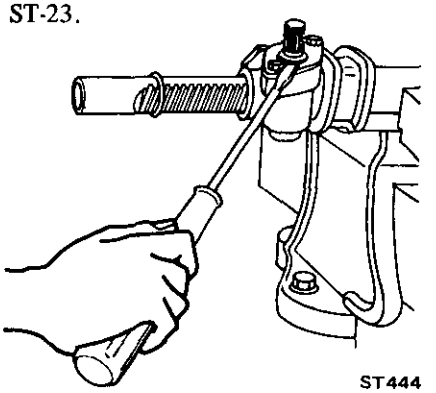


1 Adjust lock nut
2 Retainer adjust screw

ST443

Fig. ST-22 Removing adjust lock nut

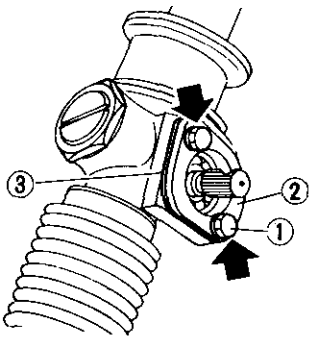
7. Remove oil seal. See Figure ST-23.



ST444

Fig. ST-23 Removing oil seal

8. Remove bolts, housing cover and pinion adjust shim. See Figure ST-24.

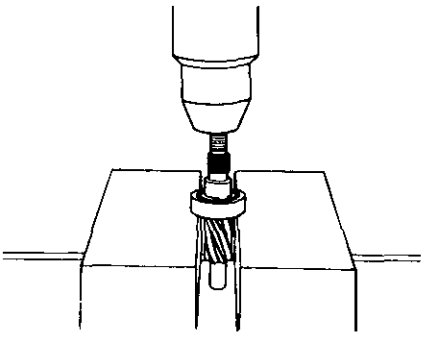


1 Bolt
2 Housing cover
3 Pinion adjust shim

ST444

Fig. ST-24 Removing bolts and housing cover

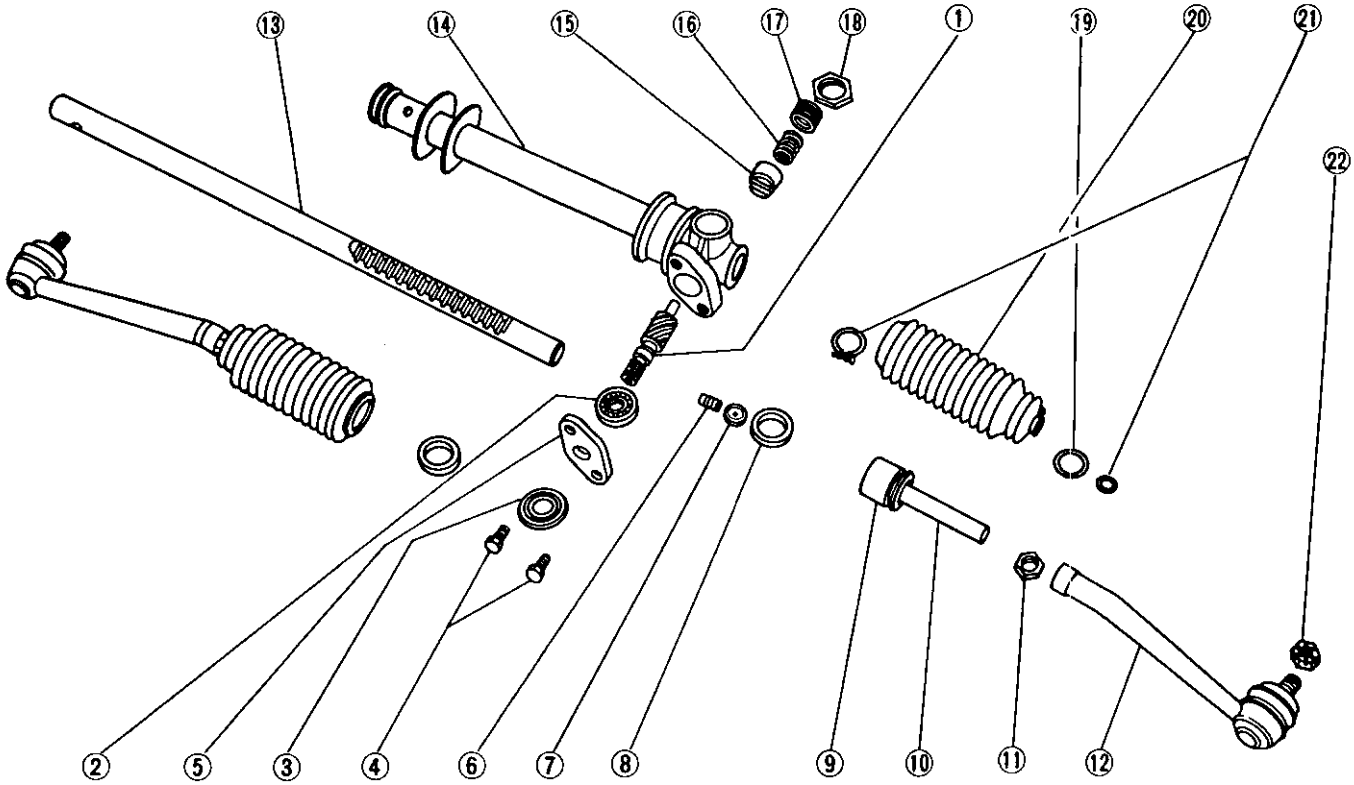
9. Draw steering pinion assembly out.
10 Draw rack out from gear housing.
11. Pry off pinion lower bearing located at the bottom of gear housing.
12. Press pinion bearing out of pinion shaft. See Figure ST-25.



ST445

Fig. ST-25 Pressing pinion bearing out of pinion shaft

13. Draw rack out of gear housing.



1 Pinion
2 Pinion bearing
3 Oil seal
4 Housing cover bolt
5 Housing cover
6 Side rod spring
7 Spring seat
8 Side rod lock nut
9 Inner socket assembly
10 Inner socket assembly
11 Steering stopper nut
12 Side rod
13 Rack
14 Steering gear housing
15 Retainer
16 Retainer spring
17 Retainer adjust screw
18 Lock nut
19 Dust cover clamp
20 Boot
21 Boot clamp
22 Outer ball stud nut
23 Pinion lower bearing

ST446

Fig. ST-26 Rack-and-pinion and side rod components

INSPECTION

Thoroughly clean all parts in cleaning solvent, and blow dry with compressed air, if available.

Rack

Thoroughly examine all parts; components showing signs of wear must be replaced.

Fractures, hollows, or roughness in the surfaces of the rack indicates unserviceability.

Pinion

Thoroughly examine all parts; components showing signs of damage, cracking, or wear must be replaced. A damaged bearing or oil seal must be replaced.

Side rod ball and spring seat

Components showing signs of damage or wear must be replaced.

Side rod outer ball joint

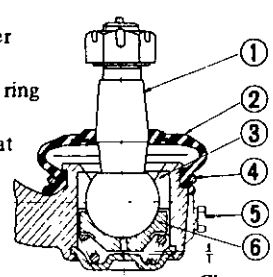
Measure the swinging torque and axial play. When values are not within the specified range, replace. See Figure ST-27.

Side rod outer ball joint

Swinging torque:
0.8 to 1.5 kg-m
(5.8 to 10.8 ft-lb)

Axial play:
0.1 to 0.5 mm
(0.0039 to 0.0197 in)

1 Ball stud
2 Dust cover
3 Ball seat
4 Urethane ring
5 Plug
6 Spring seat

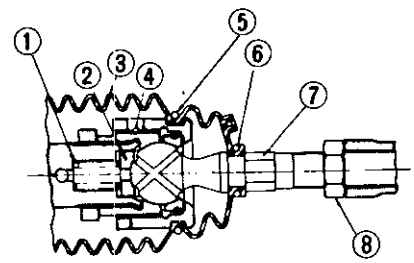


Clearance
0.1 to 0.5 (0.0039 to 0.0197)

ST179

Fig. ST-27 Cross-section of outer ball joint

Side rod inner ball joint



ST447

1 Side rod spring
2 Spring seat
3 Boot
4 Welded
5 Dust cover clamp
6 Boot clamp
7 Side rod ball
8 Stopper nut

Fig. ST-28 Side rod inner ball joint

Check inner ball joint for play. If ball stud is worn and play in axial direction is excessive or joint is hard to swing, replace as a complete unit. See Figure ST-28.

Side rod inner ball joint

Swinging torque:
0 to 0.5 kg-m
(0 to 3.6 ft-lb)

Axial play:
0 to 0.05 mm
(0 to 0.0020 in)

Pinion bearing and inner bearing

Inspect bearings to see that they roll freely and are free from cracked, pitted, or worn balls, rollers and races. Replace if they are faulty.

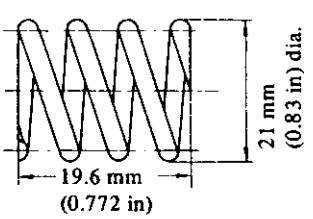
Oil seal

If grease leakage is detected during assembly, replace.

Replace oil seal every disassembly even if it appears serviceable.

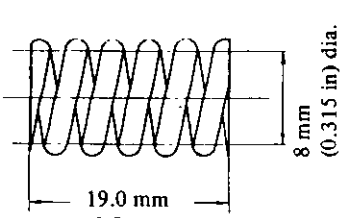
Retainer spring

Wire diameter	2.9 mm (0.114 in)
Free length	19.6 mm (0.772 in)
Load x length	20 kg (44 lb) x 16.3 mm (0.642 in)



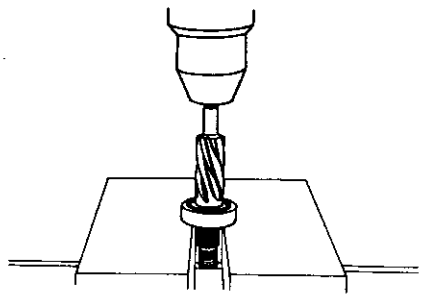
Side rod spring

Wire diameter	2.6 mm (0.102 in)
Free length	19.0 mm (0.748 in)
Load x length	40 kg (88 lb) x 17.0 mm (0.669 in)



ASSEMBLY AND ADJUSTMENT

1. Press bearing onto pinion gear. See Figure ST-29.



ST448

Fig. ST-29 Pressing bearing onto pinion gear

2. Clamp steering gear housing in a vise.
3. Thinly apply recommended multi-purpose grease to toothed faces and friction surfaces of rack.
4. Insert pinion lower bearing with seal of bearing upward, then insert pinion assembly into housing.
5. Tighten bolts of housing cover after selecting adequate pinion adjust shim to obtain specified rotary torque.

Tightening torque of nuts:
2.0 to 3.0 kg-m
(14 to 22 ft-lb)

Rotary torque of pinion:
3 to 6 kg-cm
(2.6 to 5.2 in-lb)

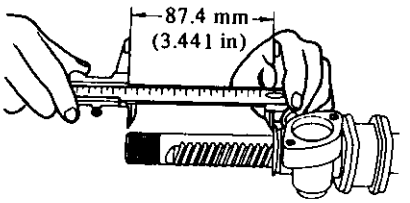
Pinion adjust shim oversize

Thickness mm (in)
0.05 (0.0020)
0.127 (0.0050)
0.25 (0.0098)
0.50 (0.0197)
1.00 (0.0394)

6. After this, remove bolts, housing cover, shim and pinion assembly.
7. Insert rack into tube from gear housing side.

Note: Pay attention to the direction of rack.

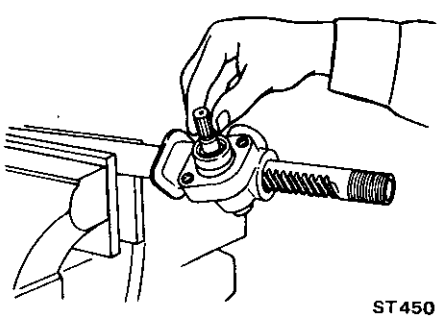
8. Make sure that rack protrudes by the same amount from both ends of housing. See Figure ST-30.



ST449

Fig. ST-30 Measuring protruding portion of rack

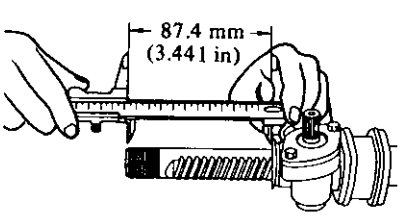
9. Apply a coating of recommended multi-purpose grease to pinion teeth and pinion bearing.
10. Properly mesh pinion with rack, and insert pinion assembly with the groove on the pinion serration part directed upward. See Figure ST-31.



ST450

Fig. ST-31 Inserting pinion assembly

11. Make sure again of the length protruding from both the left and right sides of housing. See Figure ST-32.



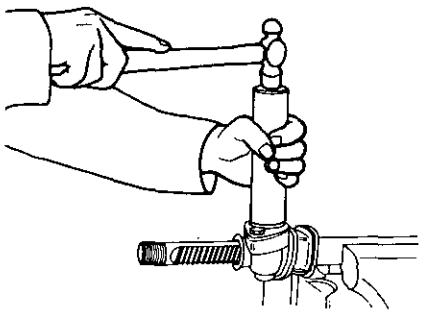
ST451

Fig. ST-32 Measuring protruding portion of rack

12. Tighten housing cover bolts.

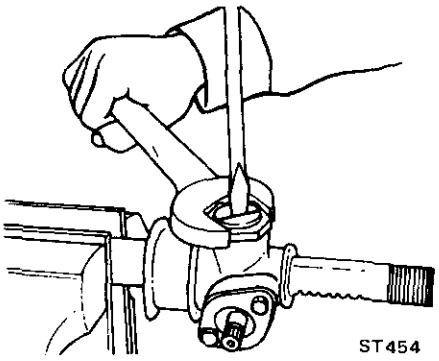
Tightening torque:
2.0 to 3.0 kg-m
(14 to 22 ft-lb)

13. Fit oil seal. See Figure ST-33.



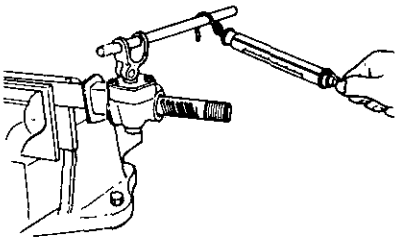
ST452

Fig. ST-33 Fitting oil seal



ST454

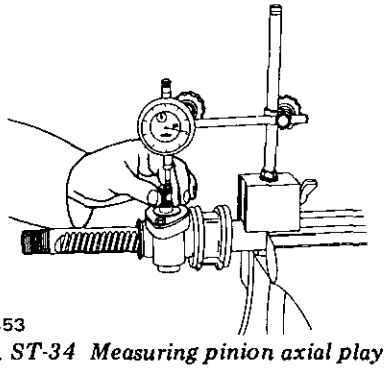
Fig. ST-35 Locking retainer lock nut



ST456

Fig. ST-37 Measuring pinion rotary torque

14. Make sure that pinion assembly rotates smoothly.
15. Measure pinion axial play. See Figure ST-34.



ST453

Fig. ST-34 Measuring pinion axial play

Pinion axial play:
0 to 0.3 mm
(0 to 0.0118 in)

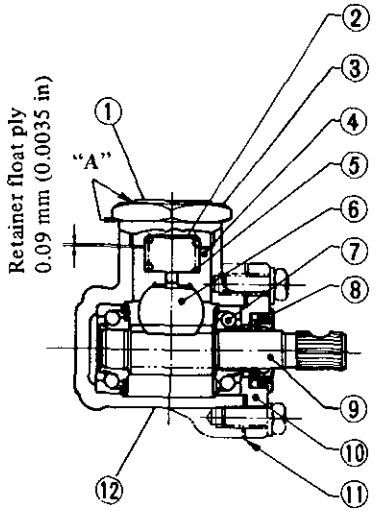
16. Apply an adequate amount of recommended multi-purpose grease to steering gear retainer.
17. Insert gear retainer and retainer spring into housing. Turn retainer adjusting screw in, and install adjusting lock nut.
18. Turn adjusting screw in until retainer is tight, then turn this screw round approximately 20 to 25 degrees. Tighten retainer lock nut after selecting adequate steering adjust shim to obtain specified rotary torque. See Figure ST-35.

Tightening torque:
4 to 6 kg-m (29 to 43 ft-lb)

Steering adjust shim oversize

Thickness mm (in)
0.25 (0.0098)
0.50 (0.0197)
1.00 (0.0394)

19. After this, apply suitable liquid sealant around lock nut at "A". See Figure ST-36.



1	Adjust screw	7	Pinion bearing
2	Steering adjust shim	8	Oil seal
3	Lock nut	9	Pinion
4	Retainer	10	Housing cover
5	Retainer spring	11	Pinion adjust shim
6	Rack	12	Steering gear housing

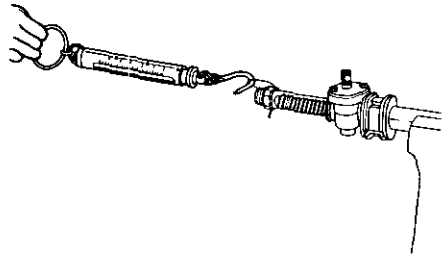
ST455

Fig. ST-36 Area to which liquid sealant is applied

20. Upon completion of gear assembly measure the torque required to keep pinion and rack in motion. Readjust retainer adjusting screw as necessary to obtain proper torque shown in the following chart. See Figures ST-37 and ST-38.

Pinion (rotary torque):
0 to 20 kg-cm
(0 to 17 in-lb)
Rack (force to pull):
14 to 17 kg
(31 to 37 lb)

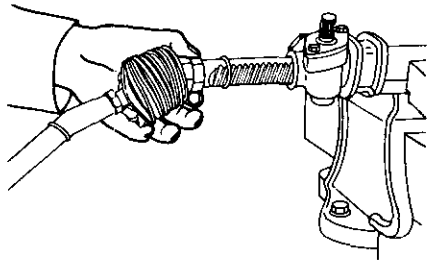
Note: Both parts should move smoothly over their entire travel.



ST457

Fig. ST-38 Measuring rack force to pull

21. Fit boot on side rod assembly, and boot clamp (rubber) and dust cover on boot.
22. Thread lock nut spacer and lock nut over the threaded portion of rack.
23. Apply an adequate amount of recommended grease to the sliding surfaces of side rod inner socket and spring seat.
24. Fit side rod assembly to rack end together with inner spring and spring seat. See Figure ST-39.



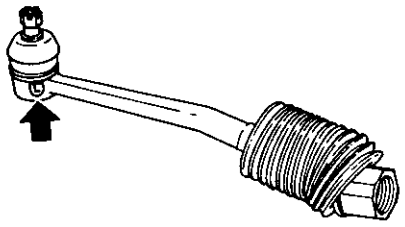
ST442

Fig. ST-39 Fitting side rod assembly to rack

Notes:

a. Make sure that boot is carefully positioned toward the ball stud end.

b. Side rod assembly for the left side has an L-mark. (No mark is used for the right side.) See Figure ST-40.

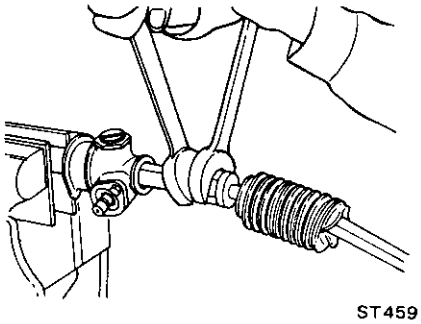


ST458

Fig. ST-40 L-mark

25. Screw inner socket portion until ball seat reaches the rack end, and then tighten lock nut securely. See Figure ST-41.

Tightening torque:
8 to 10 kg-m
(58 to 72 ft-lb)

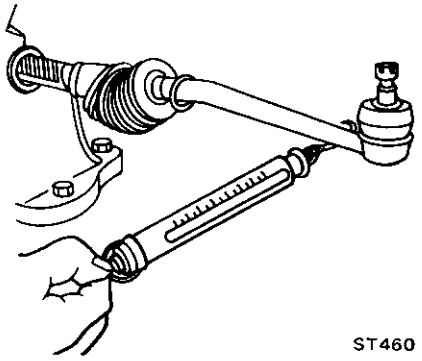


ST459

Fig. ST-41 Tightening lock nut

26. Upon completion of side rod assembly, measure swinging torque and axial play of inner ball joint. See Figure ST-42.

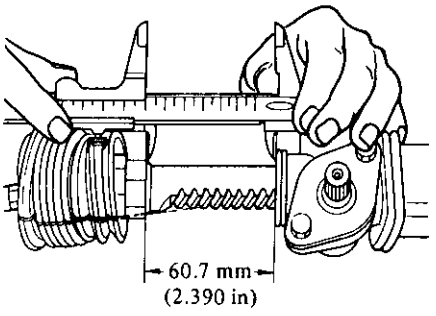
Swinging torque:
0 to 0.5 kg-m
(0 to 3.6 ft-lb)
Axial play:
0 to 0.05 mm
(0 to 0.0020 in)



ST460

Fig. ST-42 Measuring swinging torque

27. Measure rack stroke. See Figure ST-43.



ST461

Fig. ST-43 Measuring rack stroke

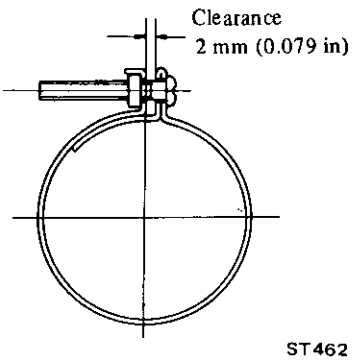
Rack stroke:
60.7 mm (2.390 in)

28. Fit boot, boot clamp (rubber) and dust cover clamp, install a grease nipple at both ends of rack, and apply recommended multi-purpose grease to each joint.

Note: Lubrication of the rack ends is made so that a small quantity of new grease appears at the boot grease outlet hole.
Do not apply an excessive amount of grease.

29. Fit spacer to outer side until it reaches stopper nut.

Install boot to gear housing, then tighten inside boot clamp securely. See Figure ST-44.



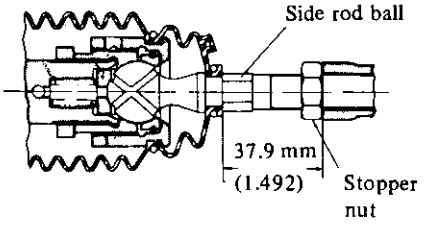
ST462

Fig. ST-44 Tightening boot clamp

Note: Boot should be neither too inflated nor too elongated.

30. Adjust the side rod length both left and right, and tighten steering stopper nuts. See Figure ST-45.

Tightening torque:
8 to 10 kg-m
(58 to 72 ft-lb)



ST447

Fig. ST-45 Adjusting side rod length

INSTALLATION

Install steering linkage in the reverse order of removal.

Observe the followings:

1. For tightening torque, refer to Removal.
2. Check wheel alignment, and if necessary adjust.

See Section FA.

SERVICE DATA AND SPECIFICATIONS

SPECIFICATIONS

Steering gear type		Rack-and-pinion type
Turns of steering wheel (lock to lock)		3.1 (2+2 seats) 2.6
Steering gear ratio		15.8 : 1
Turning angle of front wheel		
—inside	degree	36°18′ to 37°18′ (2 + 2 seats)
—outside	degree	34°24′ to 36°24′ 33°54′ to 34°54′ 32°6′ to 34°6′
Minimum turning radius	m (ft)	4.8 (15.7)
Steering wheel free play	mm (in)	20 to 30 (0.79 to 1.18)
Rack stroke	mm (in)	60.7 (2.390)

SERVICE DATA

Standard clearance between clamp and lower jacket	mm (in)	176.1 (6.933)
Side rod outer ball joint		
Swinging torque	kg-m (ft-lb)	0.8 to 1.5 (5.8 to 10.8)
Side rod inner ball joint		
Swinging torque	kg-m (ft-lb)	0 to 0.5 (0 to 3.6)
Rock force to pull	kg (lb)	14 to 17 (31 to 37)
Side rod length	mm (in)	37.9 (1.492)
Pinion adjust shim oversize:		
Thickness	mm (in)	0.05 (0.0020) 0.127 (0.0050) 0.25 (0.0098) 0.50 (0.0197) 1.00 (0.0394)
Steering adjust shim oversize:		
Thickness	mm (in)	0.25 (0.0098) 0.50 (0.0197) 1.00 (0.0394)

TIGHTENING TORQUE

Column shaft		
Steering wheel nut	kg-m (ft-lb)	5 to 7 (36 to 51)
Column clamp bolt	kg-m (ft-lb)	0.8 to 1.1 (6 to 8)
Rubber coupling securing bolt	kg-m (ft-lb)	1.7 to 2.0 (12 to 14)
Lower joint to rubber coupling bolt	kg-m (ft-lb)	2.3 to 2.7 (17 to 20)
Lower joint to pinion gear bolt	kg-m (ft-lb)	4 to 5 (29 to 36)
Steering gear and linkage		
Nut securing side rod ball stud to knuckle arm	kg-m (ft-lb)	5.5 to 7.6 (40 to 55)
Side rod stopper nut	kg-m (ft-lb)	8 to 10 (58 to 72)
Side rod lock nut	kg-m (ft-lb)	8 to 10 (58 to 72)
Gear housing cover bolt	kg-m (ft-lb)	2 to 3 (14 to 22)
Retainer lock nut	kg-m (ft-lb)	4 to 6 (29 to 43)
Side rod inner socket lock nut	kg-m (ft-lb)	8 to 10 (58 to 72)

TROUBLE DIAGNOSES AND CORRECTIONS

Troubles in the Front Axle and Front Suspension are discussed at this point, because they are generally associated with steering troubles.

1. Vibration, shock and shimmying of steering wheel

Vibration: Too much backlash of the steering gear, wear of linkage parts or the rubber coupling, and vibration of front wheels are, in many cases, transmitted to the steering wheel. This is very noticeable when traveling over rough roads.

Shock: When the front wheels are traveling over bumpy roads, shock is transmitted to the steering wheel. This is also very noticeable when traveling over rough roads.

Shimmying: This is abnormal vibration of the front suspension group and the entire steering linkage, and occurs when a specific speed is attained.

Possible causes	Corrective action
Improper tire pressure or insufficient tightening of wheel nuts.	Adjust or tighten.
Difference in height of right and left tire treads.	Replace tires.
Incorrect adjustment or wear of front wheel bearing.	Adjust or replace.
Collapsing or twisting of front spring.	Replace.
Incorrect brake (binding) adjustment.	Adjust.
Incorrect adjustment of brakes (binding).	Readjust.
Wear of rubber bushings for fitting transverse link and compression rod.	Replace.
Deformation of steering linkage and suspension link.	Replace.

Possible causes	Corrective action
Excessive clearance of side rod inner or outer ball joint.	Replace.
Loose side rod lock nut.	Tighten more.
Car level unbalance.	Correct the unbalance.

2. Wandering of car in one direction

When driving with hands off the steering wheel over a flat road, the car gently pulls to one side of the road.

Note: Faulty rear suspension may also be the cause of this tendency. Refer to information concerning the rear suspension.

Possible causes	Corrective action
Improper tire pressure.	Adjust.
Unbalance or deformation of load wheel.	Correct the unbalance or replace.
Uneven tire wear or insufficient tightening.	Replace or tighten.
Faulty wheel alignment.	Adjust.
Wear of bushings for fitting transverse link and compression rod.	Replace.
Loose steering post clamp.	Retighten.
Wear of steering column bearing.	Replace steering column assembly.
Breakage or collapsing of steering column shaft spring.	Replace.
Loose rubber coupling bolts or wear of rubber coupling.	Retighten or replace.
Excessive serration play.	Replace.
Wear of lower joint journal.	Replace.
Insufficient tightening of steering gear housing.	Retighten.
Wear of suspension ball joint.	Replace.
Improper adjustment of retainer. (Too much backlash)	Adjust.
Malfunction of shock absorber (inside strut) or loose bolts.	Replace or tighten.
Car level unbalance.	Correct the unbalance.

3. Instability of car

Possible causes	Corrective action
Improper tire pressure.	Adjust.
Wear of rubber bushings for fitting transverse link and compression rod.	Replace.
Incorrect wheel alignment.	Adjust.
Wear or deformation of steering linkage and suspension link.	Replace.
Worn mounting rubber.	Replace.
Loose gear housing bolt.	Retighten.
Loose side rod lock nut.	Retighten.
Excessive play of side rod inner or outer ball joint.	Replace.
Incorrect adjustment of retainer.	Readjust.
Deformation and unbalance of wheel.	Correct or replace.

4. Steering wheel resistance

(Sequence of checking)

Jack up the front of the car, detach the lower joint upper part and operate the steering wheel. If resistance is low, check the steering gear, steering linkage, suspension and accelerator groups. If high, check the steering column.

Possible causes	Corrective action
Improper tire pressure.	Adjust.
Insufficient grease or impurities in gear housing.	Replenish grease or replace gear housing.
Insufficient grease, impurities in steering linkage, or abnormal wear.	Replenish grease or replace the part.
Stiffness, damage, or insufficient grease in suspension ball joint.	Replace.
Wear or incorrect adjustment of wheel bearing.	Replace or adjust.
Seizing of housing bushing.	Replace with gear housing.
Wear or damage of rack-and-pinion or bearing.	Replace.
Incorrect adjustment of retainer.	Readjust.
Tight retainer.	Adjust.
Deformation of steering linkage.	Replace.

Possible cause	Corrective action
Incorrect wheel alignment.	Adjust.
Damage of bearing at upper end of strut.	Replace.
Damage or stiffness of piston or rod of shock absorber (in the strut).	Replace.
Interference of steering column with turn signal switch.	Adjust.
Damage, seizing, or stiffness of steering column bearing.	Replace with steering column jacket.

5. Excessive steering wheel play

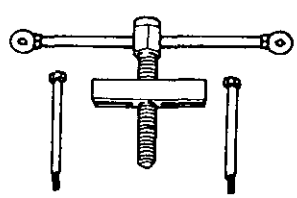
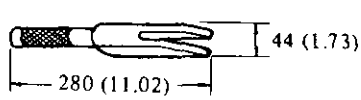
Possible causes	Corrective action
Incorrect adjustment of retainer.	Adjust.
Wear of steering linkage.	Replace.
Improper fitting of gear housing.	Tighten.
Worn mounting rubber.	Replace.
Incorrect adjustment of wheel bearing.	Adjust.
Wear of bushings for fitting transverse link and tension rod.	Replace.
Loose rubber coupling bolts.	Retighten.
Wear of rubber coupling.	Replace.
Loose lower joint bolts.	Retighten.

6. Noises

Possible causes	Corrective action
Improper tire pressure.	Adjust.
Insufficient grease for suspension ball joint and steering linkage, or breakage.	Replenish grease, or replace.
Loose bolts of steering gear housing, linkage, and suspension groups.	Retighten.
Faulty shock absorber (inside strut).	Replace.
Faulty wheel bearing.	Replace.

Possible cause	Corrective action
Wear of steering linkage and rack-and-pinion.	Replace.
Wear of bushings for fitting transverse link and compression rod.	Replace.
Breakage or collapsing of coil spring.	Replace.
Loose nuts (holding strut mounting insulator).	Retighten.
Wear of housing bushing.	Replace housing gear assembly.
Excessive thrust play of pinion.	Adjust or replace.
Loose retainer part.	Replace retainer spring or tighten lock nut.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1.	ST27180001 Steering wheel puller	This tool is used to drive out steering wheel. **Caution: Do not hammer on steering column shaft.**  SE116	S30 B210 B110 610 710 C130 C110 230	Fig. ST-2
2.	ST27850000 Steering ball joint puller	This tool is placed between knuckle arm and steering ball joint to facilitate the disengagement of ball-joint section. **Caution: Do not hammer on bolts.**  SE089	All models	Page ST-6

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