

PART 2. CONVENTIONAL STEERING

SPECIFICATIONS

Type	Rack and pinion
Steering angle:	
1979-1984 and Utility models —	
Inner wheel	36.5 deg
Outer wheel	35.0 deg
1985-1987 Sedan and Station Wagon models —	
Inner wheel	39.0 deg
Outer wheel	35.0 deg
Steering wheel free play	0-25 mm
Non-adjustable column steering shaft standard overall length:	
1979-1984 models	857.9 mm
1985-1987 models	861.7 mm
Tilt adjustable column steering shaft standard overall length:	
1982-1984 models	644.9 ± 1 mm
1985-1987 models	517.2 ± 1 mm
Maximum rack bend:	
1979-1984 and Utility models	0.1 mm
1985-1987 Sedan and Station Wagon models	0.2 mm
Pinion rotating torque:	
1979-1985 models	1.1-1.5 Nm
1986-1987 models	0.9-1.4 Nm
Steering gear lubricant	Subaru steering grease

TORQUE WRENCH SETTINGS

Steering gear mounting bolts:	
1979-1984 and Utility models	54 Nm
1985-1987 Sedan and Station Wagon models	71 Nm
Intermediate shaft:	
Universal joint clamp bolt	26 Nm
Rubber coupling bolts	20 Nm
Rack pad adjusting screw locknut:	
1979-1982 models	59 Nm
1983-1987 models	49 Nm
Inner tie rod ball joint to rack	78 Nm
Outer tie rod end locknut	88 Nm
Outer tie rod end to steering arm nut	29 Nm

1. DESCRIPTION

The steering gear is of the rack and pinion type and is mounted on the underside of the front suspension crossmember.

The rack is supported by a bush at one end and a spring loaded pad at the pinion end. The spring loaded pad is adjusted by an adjusting screw and locknut.

The pinion rotates in a ball bearing with an oil seal to retain the lubricant and prevent the entry of water and dirt.

The ends of the steering gear are sealed by

corrugated rubber boots clamped at one end to the steering gear housing and at the other end to the tie rod. The boots expand and contract with the movement of the rack.

No replenishment of lubricant is necessary in service unless the lubricant leaks out by damage to or failure of the rubber boots or the pinion oil seal.

The variable ratio rack and pinion steering gear has different tooth profiles on the end of the rack to the tooth profiles in the middle of the rack. This alters the contact point on the pinion teeth which alters the mechanical advantage and velocity ratio of the rack and pinion.

To facilitate removal of the steering gear or the steering column assembly an intermediate shaft is installed between the steering gear and the steering shaft.

The steering column is a collapsible type designed to absorb secondary impact in the event of a severe front end collision.

2. STEERING GEAR ASSEMBLY

Special Equipment Required:

To Dismantle and Assemble — Suitable press and press plates

To Measure Pinion Rotating Torque — Suitable torque gauge

To Check Rack Runout — Suitable dial gauge and 'vee' blocks

TO REMOVE

- (1) Disconnect the negative battery terminal.
- (2) Raise the front of the vehicle, support it on chassis stands and remove the front wheels.
- (3) Disconnect the outer tie rod ends from the steering arms.

NOTE: Disconnect each ball joint stud by placing a suitable dolly or hammer against one side of the steering arm eye and striking the opposite side with a hammer.

- (4) Remove the clamp bolt from the intermediate shaft lower universal joint or pinion flange.

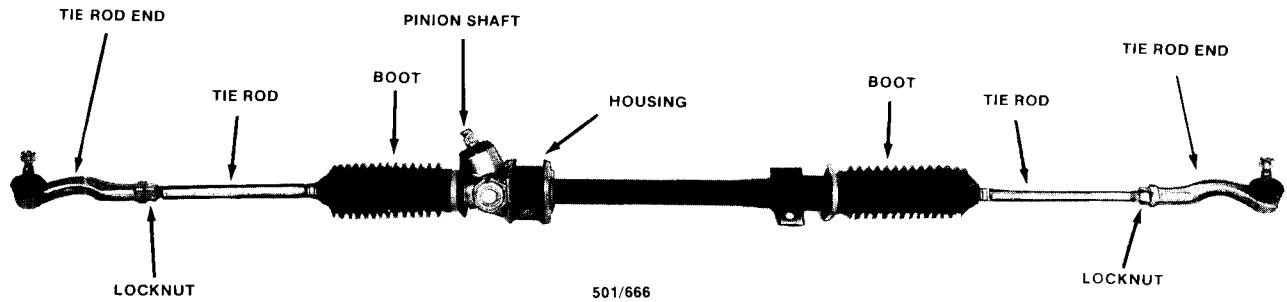
NOTE: Suitably mark the components of the intermediate shaft to aid assembly.

- (5) Remove the exhaust engine pipe as described in the Engine section and remove the crossmember plate.

- (6) Remove the steering gear mounting bolts from the suspension crossmember.

- (7) Lower the steering gear until it is clear of the intermediate shaft.

- (8) Rotate the steering gear rearward and withdraw the steering gear out from the right hand side of the vehicle.



View of the steering gear assembly removed from the vehicle.

TO DISMANTLE

(1) Carefully hold the steering gear in a vice, using suitable protection on the vice jaws.

(2) Using a suitable spanner on the flats provided on the tie rod, hold the tie rod, loosen the locknut and remove the outer tie rod end and the locknut from the tie rod.

(3) Remove the rubber boot retaining clips and slide the rubber boot from the tie rod.

(4) Carefully straighten the lock washer tab, hold the rack with a suitable spanner and loosen the inner tie rod ball joint. Remove the tie rod from the end of the rack, discard the lock washer.

Repeat items (2), (3) and (4) for the opposite end of the assembly.

(5) Loosen the rack pad adjusting screw locknut and remove the adjusting screw, spring and pad. Discard the 'O' ring on the adjusting screw.

(6) Where fitted, remove the dust cover from the top of the pinion and, using a suitable screwdriver, carefully prise the pinion oil seal out of the steering gear housing, discard the oil seal.

(7) Remove the pinion retaining snap ring and withdraw the pinion assembly from the steering gear housing.

(8) Slide the rack out of the pinion end of the steering gear housing.

(9) On constant ratio steering gear, renew the pinion bearing as follows:

(a) Remove the pinion bearing retaining snap ring.

(b) Support the pinion bearing inner race on suitable press plates and pressing on the end of the pinion, remove and discard the pinion bearing and where applicable the pinion oil seal.

(c) Reverse the components in the press, instal a new pinion bearing, oil seal and bearing retaining snap ring.

NOTE: The pinion bearing on variable ratio steering gear cannot be renewed separately.

(10) Using a suitable screwdriver, remove the rack bush retainer and carefully push the rack bush out of the steering gear housing using the rack or a suitable soft punch to push on the bush. Discard the bush and the retainer.

TO CLEAN AND INSPECT

(1) Wash all the components except the inner and outer tie rod ends in suitable cleaning solvent and dry thoroughly.

(2) Inspect all the components for wear, deterioration and damage. Renew all unserviceable components.

(3) Check the runout at the centre of the rack using 'vee' blocks and a dial gauge. Renew the rack if the runout exceeds Specifications.

TO ASSEMBLE

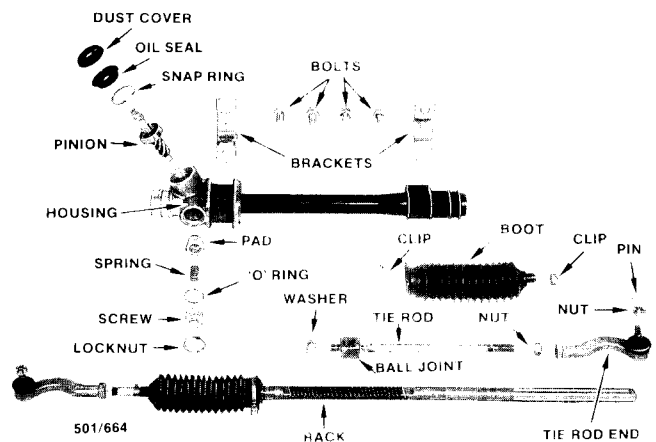
(1) Push a new rack bush into the end of the steering gear housing until the bush is inside the retainer location and instal a new retainer to secure the bush.

(2) Smear suitable grease on the inside of the rack bush and the inside of the steering gear pinion housing.

(3) Smear suitable grease on the rack teeth and sliding surfaces and slide the rack into the steering gear housing from the pinion end of the housing being careful not to damage the rack bush.

(4) Smear suitable grease on the bearing and teeth of the pinion and slide the pinion assembly into the steering gear housing.

(5) Instal a new pinion retaining snap ring. Turn



Dismantled view of a variable ratio steering gear assembly.

the snap ring in the groove to verify correct installation.

(6) Instal a new pinion oil seal into the steering gear housing until the seal contacts the bearing retaining snap ring. In this position the outer face of a plain seal on 1986–1987 models, will be level with the face of the pinion housing and for 1979–1985 models the gap between the flange of a flanged seal and the face of the pinion housing, will be 0.9 mm or less.

(7) Apply a liberal amount of suitable grease to the pad and inside the housing and instal the rack pad and spring into the steering gear housing.

(8) Instal a new 'O' ring to the adjusting screw and instal the adjusting screw and locknut to the steering gear housing.

(9) Screw the rack pad adjusting screw into the steering gear housing until the turning effort noticeably increases and screw the adjusting screw back 15 deg. Hold the adjusting screw in this position and tighten the locknut to the specified torque.

(10) Turn the pinion and check for smooth and uniform rotational effort, over the full travel of the rack. If necessary, repeat the adjustment described in operation (9).

(11) Turn the pinion until the rack is in the centre position with equal amounts of the rack protruding from each end of the steering gear housing.

(12) Suitably mark the pinion, the oil seal and the steering gear housing with quick drying paint to indicate the centre position of the rack.

(13) Instal the lock washers and the tie rods to the rack. Hold the rack with a suitable spanner and tighten the inner tie rod ball joints to the specified torque.

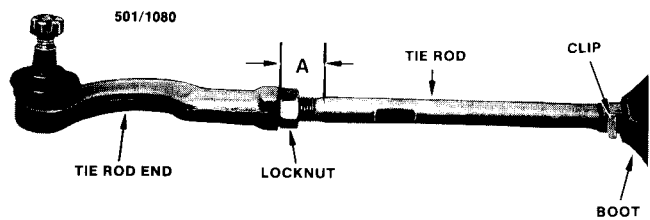
(14) Support the inner tie rod ball joints to avoid damage to the rack and bend the lock washers over the flats on the inner tie rod ball joints.

NOTE: Lock washers on variable ratio steering gear are staked into the cutaways on the face of the inner tie rod ball joints using a suitable blunt pointed punch.

(15) Position the rack at the end of its travel at each end of the steering gear housing and coat the rack with suitable grease. Return the rack to the centre position.

(16) Fill the corrugations inside the steering gear rubber boots with suitable grease over approximately half the length of the boots and instal the boots to the steering gear ensuring that the ends of the boots are correctly positioned and that the boots can be rotated smoothly after installation. Secure the ends of the boots with the retaining clips.

(17) Instal the outer tie rod end locknut to the position where the outer face of the nut is 23 mm from the shoulder at the inside end of the threaded portion of the tie rod. Instal the outer tie rod end until it abuts the locknut. Repeat the above procedure for the other tie rod end.



View of the outer tie rod end, dimension A = 23 mm.

NOTE: The outer tie rod ends are stamped LH and RH for identification and should not be interchanged..

(18) Using a suitable torque gauge, measure the pinion rotating torque. If necessary, adjust the rack pad adjusting screw as previously described to obtain the specified torque when the steering gear is within 30 mm of the rack centre position.

TO INSTAL

(1) Being careful to avoid damage to the rubber boots, slide the steering gear assembly into the crossmember from the right hand side of the vehicle.

(2) Rotate the steering gear assembly and insert the pinion into the intermediate shaft lower universal joint or pinion flange, aligning the marks made during removal.

(3) Instal the steering gear mounting clamps and tighten the mounting bolts to the specified torque ensuring that the clamp on the pinion end of the steering gear assembly is tightened first. Instal the crossmember plate and tighten the retaining bolts securely.

(4) Instal the intermediate shaft lower clamp bolt and tighten to the specified torque.

(5) Connect the outer tie rod ends to the steering arms and tighten the retaining nuts to the specified torque.

(6) Adjust the toe in/out as described in the Front Suspension section.

3. NON-ADJUSTABLE STEERING COLUMN

TO REMOVE AND INSTAL

(1) Disconnect the negative battery terminal.

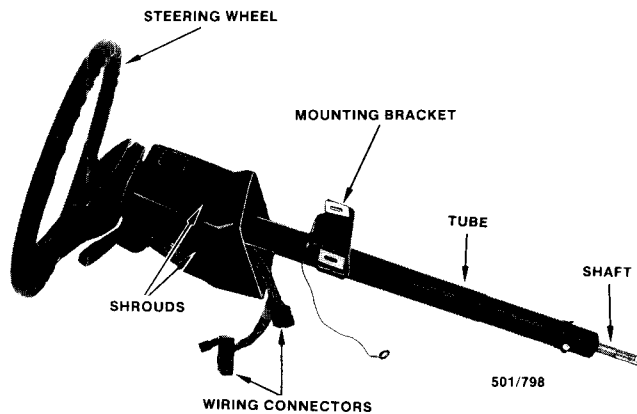
(2) Suitably mark the components and remove the intermediate shaft upper universal joint clamp bolt.

(3) Working inside the vehicle, remove the retaining screws and withdraw the lower section of the instrument panel below the steering column.

(4) Disconnect the wiring to the steering column ignition and combination switches.

(5) Remove the steering column mounting bolts from below the instrument panel, noting the position of the earth wire.

(6) Slide the steering column assembly out of the floor panel and withdraw the steering column from the vehicle.



View of the non-adjustable steering column removed from the vehicle.

Installation is a reversal of the removal procedure with attention to the following points:

- (1) Tighten all bolts to the specified torque.
- (2) Road test the vehicle and check for satisfactory steering performance.

TO DISMANTLE AND ASSEMBLE

- (1) Remove the steering wheel and combination switch as described in the Electrical System section.
- (2) Remove the screws retaining the upper and lower steering column shrouds and withdraw the shrouds from the steering column.
- (3) Remove the retaining screw and withdraw the horn contact from the steering column.
- (4) Remove the steering column upper seal and bearing retaining snap ring.
- (5) Remove the steering column lower bearing retaining bolts and slide the steering shaft and bearing assembly out of the bottom of the steering column.

(6) On 1979–1984 and all Utility models remove the snap ring and slide the lower bearing, seal and washer off the steering shaft.

On 1985–1987 Sedan and Station Wagon models remove the steering column lower seal and bearing retaining snap ring. Remove the washers and spring and remove the lower bearing assembly from the steering shaft.

(7) Inspect the components of the steering column for wear and damage and measure the overall length of the steering shaft. Renew all worn and damaged components, renew the steering shaft if the overall length is not within Specifications.

Assembly is a reversal of the dismantling procedure with attention to the following points:

(1) On 1985–1987 Sedan and Station Wagon models lubricate and instal the lower bearing assembly onto the steering shaft.

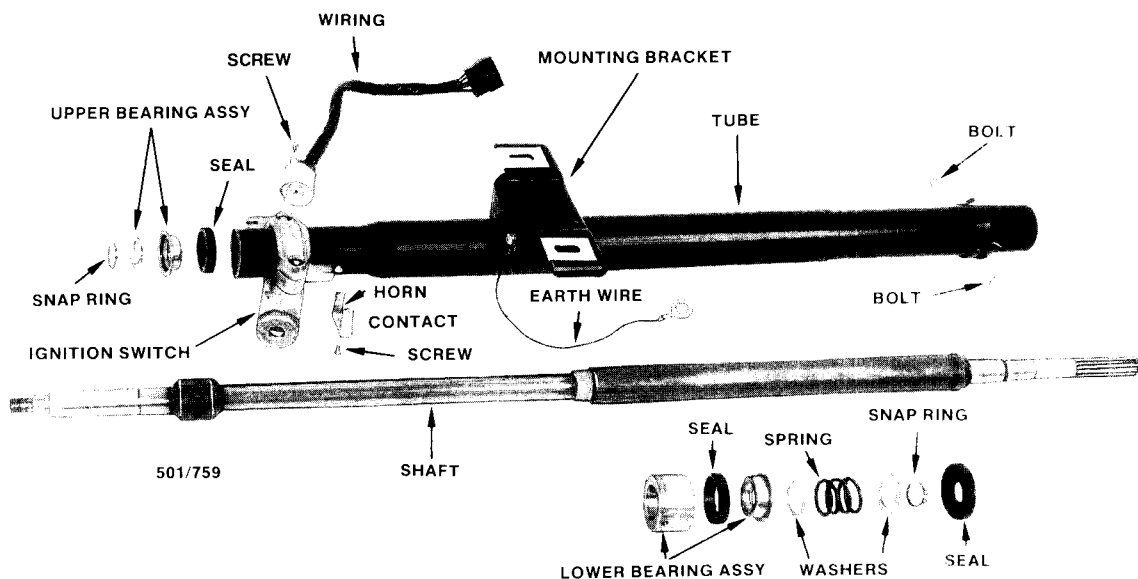
Smear suitable grease on the upper and lower bearing surfaces and the horn contact area of the steering shaft.

(2) On 1979–1984 and all Utility models slide the lower bearing, 'O' ring and washer onto the steering shaft and instal the bearing retaining snap ring to the steering shaft.

On 1985–1987 Sedan and Station Wagon models instal the washers and spring, the bearing retaining snap ring and the steering column lower seal.

(3) Instal the steering shaft and bearing assembly through the bottom of the steering column. Ensure that the slot in the bearing housing is aligned with the welded seam of the steering column tube.

(4) On 1985–1987 Sedan and Station Wagon models stand the steering column upright, resting on the lower end of the steering shaft and using a suitable tube to contact the upper bearing retaining snap ring push the snap ring into the groove adjacent to the



Dismantled view of the non-adjustable steering column, 1986 model shown.

upper bearing. Do not apply excess force during this procedure.

Instal a new steering column upper seal.

(5) Instal the horn contact and tighten the retaining screw securely. Ensure that the contact face is rubbing squarely and firmly on the steering shaft.

(6) Instal the upper and lower steering column shrouds and tighten the retaining screws securely.

(7) Instal the combination switch and steering wheel as described in the Electrical System section, ensure that clearance exists between the steering wheel and the steering column shrouds. Loosen the retaining screws and relocate the shrouds if binding occurs.

4. TILT ADJUSTABLE STEERING COLUMN

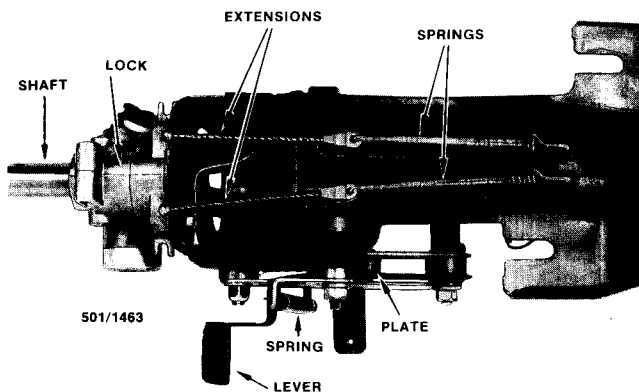
TO REMOVE AND INSTAL

The removal and installation procedures for the tilt adjustable steering column are the same as for the non-adjustable steering column. Refer to the previous centre heading for details of the removal and installation procedures.

TO DISMANTLE AND ASSEMBLE

1979–1984 Models

(1) Remove the steering wheel as detailed in the Electrical System section.

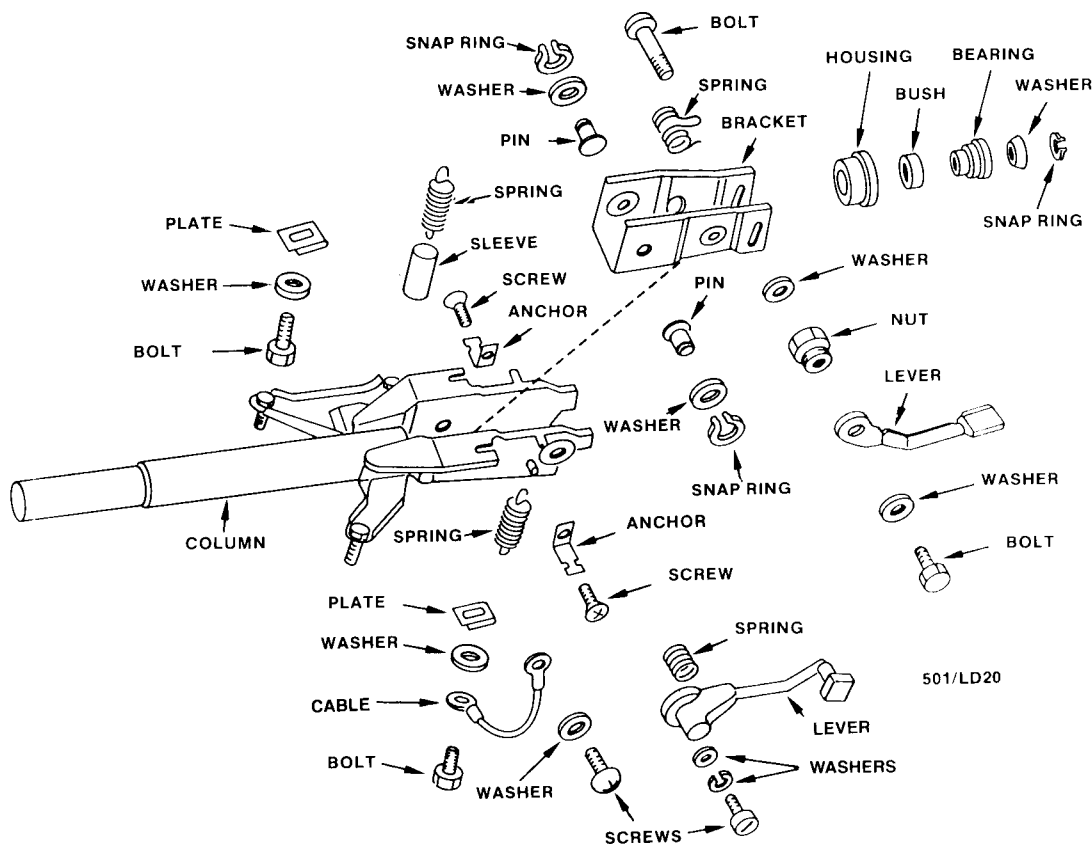


Installed view of the tilt adjustable steering column components, 1983 model shown.

(2) Remove the retaining screws and remove the steering column upper and lower shrouds.

(3) Move the steering column to the fully upward tilt position, disconnect the extensions and remove the extensions and the tension springs from the tilt mechanism.

(4) Suitably mark the universal joint and the lower steering shaft relationship, remove the universal joint clamp bolt and remove and dismantle the lower steering shaft using the procedure previously described to remove and dismantle the non-adjustable steering column steering shaft.



Dismantled view of the tilt adjustable steering column, 1986 model shown.

(5) Remove the steering lock retaining bolts and withdraw the steering lock, upper steering shaft and universal joint assembly from the tilt bracket.

(6) If necessary, remove the upper steering shaft and bearings from the steering lock as follows:

(a) Remove the snap ring from the top end of the upper steering shaft and slide the upper steering shaft out of the steering lock.

(b) Remove the washer, the needle roller bearing, the outer race and the circular spring from the bore of the steering lock using a suitable pointed tool.

(c) Remove the snap ring from the bore of the steering lock and remove the needle roller bearing, the outer race and the circular spring from the steering lock using a suitable pointed tool.

(7) Remove the tilt lever return spring from the tilt mechanism.

(8) Remove the nuts and washers and remove the plate from the side of the tilt lever. Note the installed position and remove the spacer from the tilt lever shaft.

(9) Remove the pawl and the tilt lever from the tilt lever shaft.

(10) Remove the snap ring, washers and the pivot pin from the left hand side of the tilt bracket.

(11) Remove the pivot bolt and bush from the right hand side of the tilt bracket.

(12) Remove the tilt bracket from the steering column.

(13) Inspect the components of the steering column for wear and damage and measure the overall length of the steering shaft. Renew all worn and damaged components, renew the steering shaft if the overall length is not to Specifications.

Assembly is a reversal of the dismantling procedure with attention to the following points:

(1) Tighten all nuts and bolts securely.

(2) Lubricate the moving parts with suitable grease before assembly.

(3) Ensure that the tilt mechanism operates correctly before installing the steering column in the vehicle.

1985-1987 Models

(1) Remove the steering wheel as described in the Electrical section.

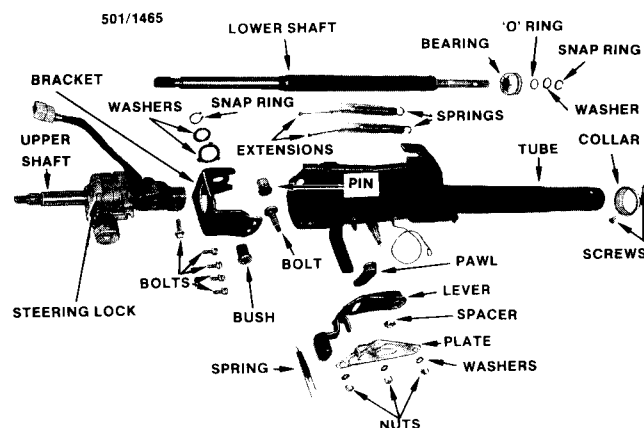
(2) Remove the retaining screws and remove the steering column upper and lower shrouds.

(3) Moving the tilt lever, loosen the adjusting nut located adjacent to the tilt lever.

(4) Remove the tilt lever retaining bolt and washer and remove the tilt lever from the tilt mechanism.

(5) Remove the tilt lever adjusting nut, washer and adjusting bolt from the tilt mechanism.

(6) Remove the universal joint clamp bolt and slide the upper column and steering shaft assembly out of the tilt mechanism. If it is necessary to dismantle the upper column assembly, proceed as follows:



Dismantled view of the tilt adjustable steering column, 1983 model shown.

(a) Remove the snap ring from the upper steering shaft adjacent to the upper bearing.

(b) Remove the snap ring from the lower bearing end of the shaft and remove the washers and spring from the lower bearing.

(c) Using a suitable screwdriver remove the lower bearing and the bush from the lower end of the upper steering column.

(d) Slide the upper steering shaft out of the lower end of the upper steering column and remove the upper bearing from the upper steering column.

(7) Remove the steering column lower bearing retaining bolt and slide the steering shaft and bearing assembly out of the bottom of the steering column.

(8) Remove the steering column lower seal and bearing retaining snap ring. Remove the washers and spring remove the lower bearing assembly from the steering shaft.

(9) Move the steering column to the fully upward tilt position and remove the release lever retaining screws. Remove the retaining plate and the release lever noting the positions of the release lever spring and the locking pin and spring.

(10) Remove the tension springs from the sides of the tilt bracket.

(11) Using a suitable spanner, remove the tension spring anchors from the sides of the tilt bracket.

(12) Remove the snap rings and washers from the tilt bracket pivot pins and remove the pivot pins from the tilt bracket.

(13) Withdraw the tilt bracket from the steering column.

(14) Inspect the components of the steering column for wear and damage and measure the overall length of the steering shaft. Renew all worn and damaged components, renew the steering shaft if the overall length is not to Specifications.

Assembly is a reversal of the dismantling procedure with attention to the following points:

(1) Lubricate the moving parts with suitable grease before assembly.

(2) Instal the bearing washers with the tapered side facing the bearings.

(3) Tighten the tilt lever adjusting nut to a torque of 10 Nm and position the tilt lever to touch the stop before tightening the tilt lever retaining bolt.

(4) Ensure that the tilt mechanism operates correctly before installing the steering column in the vehicle.

5. INTERMEDIATE SHAFT

TO REMOVE AND INSTAL

Rubber Coupling Model

(1) Raise the front of the vehicle and support it on chassis stands.

(2) Suitably mark the relationship of the intermediate shaft upper universal joint to the steering shaft and the steering gear to the steering gear pinion flange.

(3) Remove the clamp bolt retaining the steering gear pinion flange to the steering gear.

(4) Remove the steering gear mounting bolts and lower the steering gear slightly to clear the intermediate shaft.

(5) Remove the intermediate shaft upper universal joint clamp bolt and withdraw the intermediate shaft assembly from the vehicle.

(6) Inspect the rubber coupling for wear and deterioration, the universal joints for wear and rough rotation and the spline for wear and damage. Renew all unserviceable parts.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Instal the intermediate shaft upper universal joint and the steering gear pinion flange to the marks made on removal.

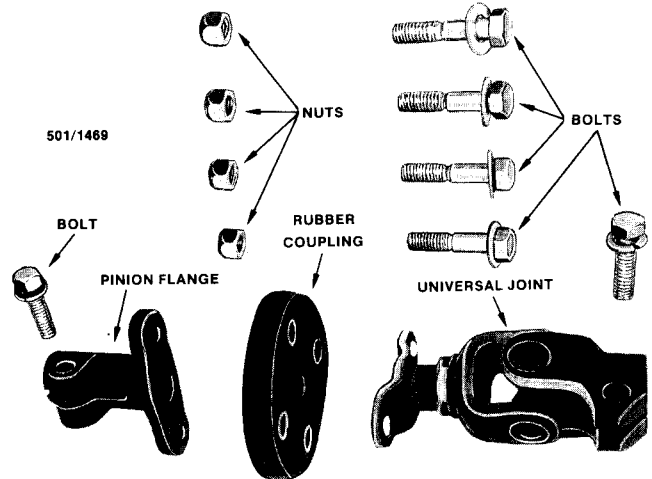
(2) Tighten all bolts to the specified torque.

(3) Road test the vehicle and check for satisfactory steering performance.

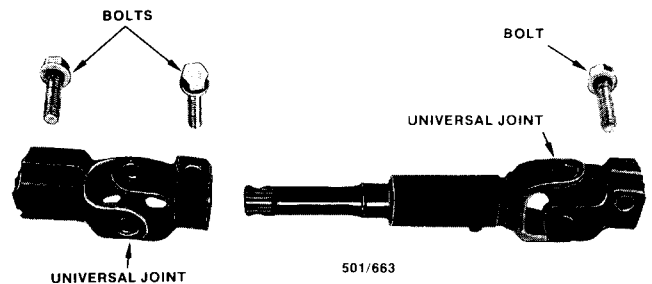
Double Universal Joint Model

(1) Suitably mark the relationship of the intermediate shaft upper universal joint to the steering shaft and the intermediate shaft lower universal joint to the steering gear pinion.

(2) Remove the intermediate shaft upper and lower universal joint clamp bolts, slide the intermedi-



Dismantled view of the rubber coupling type intermediate shaft assembly, 1983 model shown.



Dismantled view of the double universal joint type intermediate shaft assembly, 1986 model shown.

ate shaft up the steering shaft until the intermediate shaft lower universal joint is clear of the steering gear pinion.

(3) Slide the intermediate shaft off the steering shaft and withdraw the intermediate shaft from the vehicle.

(4) Inspect the universal joints for wear and rough rotation and the splines for wear and damage. Renew all unserviceable parts.

Installation is a reversal of the removal procedure with attention to the following points:

(1) Instal the intermediate shaft universal joints to the marks made on removal.

(2) Tighten all bolts to the specified torque.

(3) Road test the vehicle and check for satisfactory steering performance.