GROUP 2—FRONT SUSPENSION

SECTION 0—INDEX

SERVICE BULLETIN REFERENCE

DATE	NUMBER	SUBJECT	CHANGES

SECTION 1—SERVICE DIAGNOSIS—FRONT SUSPENSION.

Condition	Possible Cause	Correction
STEERING HEAVY	(a) Tyre inflation pressure low.	(a) Adjust to specifications.
	(b) Front wheel alignment out of adjustment.	(b) Check and readjust.
	(c) Lower arm ball joint stuck.	(c) Replace or lubricate.
	(d) Lubrication insufficient.	(d) Lubricate.
VEHICLE PULLS TO ONE SIDE	(a) Cross member deformed.	(a) Correct or replace.
	(b) L.H. and R.H. wheel bases uneven.	(b) Correct cross member attachment etc.
	(c) Wheel bearing worn or loose.	(c) Adjust or replace.
EXCESSIVE 'PLAY' AT STEERING WHEEL	(a) Ball joint damaged or play excessive.	(a) Replace.
	(b) Lower arm and strut bar deformed.	(b) Correct or replace.
	(c) Lower arm shaft and strut bar loose.	(c) Retighten.
	(d) Lower arm bushing and strut bar damaged or play excessive.	(d) Replace.
VEHICLE 'WANDERS' ON STRAIGHT ROADS	(a) Front spring broken or deteriorated.	(a) Replace.
	(b) Shock absorbers defective.	(b) Correct or replace.
	(c) Lower arm and strut bar deformed.	(c) Correct or replace.
	(d) Lower arm shaft and strut bar loose.	(d) Retighten.
	(e) Lower arm and strut bar bushings damaged.	(e) Replace.
	(f) Strut assembly body loose.	(f) Retighten.
	(g) Lower arm ball joint worn.	(g) Replace.
POOR VEHICLE 'RIDE'	(a) Spring broken or deteriorated.	(a) Replace.
	(b) Shock absorbers defective.	(b) Correct or replace.
	(c) Tyre inflation pressure excessive.	(c) Adjust to specifications.
BODY INCLINED	(a) Spring broken or deteriorated.	(a) Replace.
EXCESS BODY ROLL	(a) Stabilizer broken or deteriorated.	(a) Replace.
	(b) Shock absorber defective.	(b) Correct or replace.
NOISE	(a) Spring broken.	(a) Replace.
	(b) Shock absorber defective.	(b) Replace.
	(c) Lubrication insufficient.	(c) Lubricate.
	(d) Parts loose or worn.	(d) Retighten or replace.

SECTION 2—FRONT SUSPENSION

SPECIFICATIONS

	Sedan 1,6 Litre	1,85/2,00/2,6 Litre	Wagon 1,85/2,00/2,6 Litre	Two Door 2,00 Litre
Suspension System	McPherson Strut	<——	<——	<——
Wheel alignment				
Camber	1½° ± ½° (positive)	<——	<——	1¼ ± ½° (positive)
Caster	2 2/3° ± ½° (positive)	<——	<——	<——
Wheelbase range	2505 to 2525 mm (98.6 to 99.4")	<——	<——	<——
King pin inclination angle	8 5/12°	<——	<——	<——
Toe-in				
—Measured at centre of tyre tread	4 - 6 mm	<——	<——	<——
—Measured at wheel rim	2 - 3 mm	<——	<——	<——
Steering angle				
—outer wheel max. difference 1°	29 to 32°	<——	<——	<——
—inner wheel max. difference 2°	34 to 37°	<——	<——	<——
Coil Spring				
Overall length	357,5 mm (14.07")	372,5 mm (14.66")	367 mm (14.45")	372,5 mm (14.66')
Effective number of coils	5.88	5.50	<——	<——
Total number of coils	7.38	7.00	7.50	<——
Outside coil diameter	142,5 ± 1,5 mm (5.61 ± 0.06")	<——	142,8 ± 0,5 mm (5.62 ± 0.02")	142,5 ± 1,5 mm (5.61 ± 0.06")
Wire diameter	12,5 mm (0.49")	<——	12,8 mm (0.53")	12,5 mm (0.49")
Check load (nominal)	2412 N @ 229 mm (542.7 lb @ 9")	2736 N @ 229 mm (615.6 lb @ 9")	2893 N @ 229 mm (648.9 lb @ 9")	
Colour code				
—low tolerance	Blue	White	Red	<——
—mid tolerance	—	—	Yellow	<——
—high tolerance	Yellow	Green	White	<——
Rate	18,73 ± 0,57 N/mm (107.04 ± 3.26 lbs/in.)	19,02 ± 0,57 N/mm (108.69 ± 3.26 lbs/in.)	21,00 ± 0.63 N/mm (119.91 ± 3.59 lbs/in)	19,03 ± 1,27 N/mm (108.76 ± 7.26 lbs/ins)
Shock absorber				
Type	Hydraulic, cylindrical, double acting	<——	<——	<——
Maximum length	644 mm (25.35")	<——	<——	<——
Minimum length	442 mm (17.40")	<——	<——	<——
Stroke	202 mm (7.95")	<——	<——	<——
Piston rod diameter	22 mm (0.87")	<——	<——	<——
Cylinder bore	32 mm (1.26")	<——	<——	<——
For front shock absorber application — refer to chart page 2-2-13				
Stabilizer bar diameter	22 mm (0.87")	<——	<——	<——

SPECIAL TOOLS

E2M10	Compressor Coil Spring
E2M10B	Wrench Strut Oil Seal & Front Spring Installation (Imported Strut)
E2M10C	Wrench Locking Ring (Local Strut)
E2M10A	Guide Strut Oil Seal (22 mm)
E2237	Remover Balljoint Tie Rod Ends
E2M5	Remover Steering Knuckle Arm
CT1131A & CT1131B	Balljoint Remover & Replacer

TORQUE SPECIFICATIONS

	Nm	lb/ft	lb/in
Tie rod turn buckle locking nut	46-54	36-40	
Strut bar adjusting nut and locking nut	73-82	54-61	
Locking nut on steering angle adjusting bolt	19	14.5	
Crossmember retaining bolt	39-46	29-36	
Piston rod locking ring (local strut)	108-150	80-110	
Strut spring seal/insulator to piston rod nut	39-46	29-36	
Strut assembly to wheelhouse nut	9,5-15		85-130
Strut assembly to knuckle arm bolts	39-46	29-36	
Knuckle arm to balljoint nut	70-75	52-55	
Lower arm shaft flange tightening bolt	8-11		70-105
Lower arm shaft tightening nut	58-69	43-51	
Tie rod end to knuckle arm nut	39-46	29-36	
Strut bar bracket fixture	34-43	25-32	
Strut bar to lower arm	46-58	36-43	
Stabilizer to lower arm	24-34	18-25	
Stabilizer bushing installing bolt	8-11		70-105

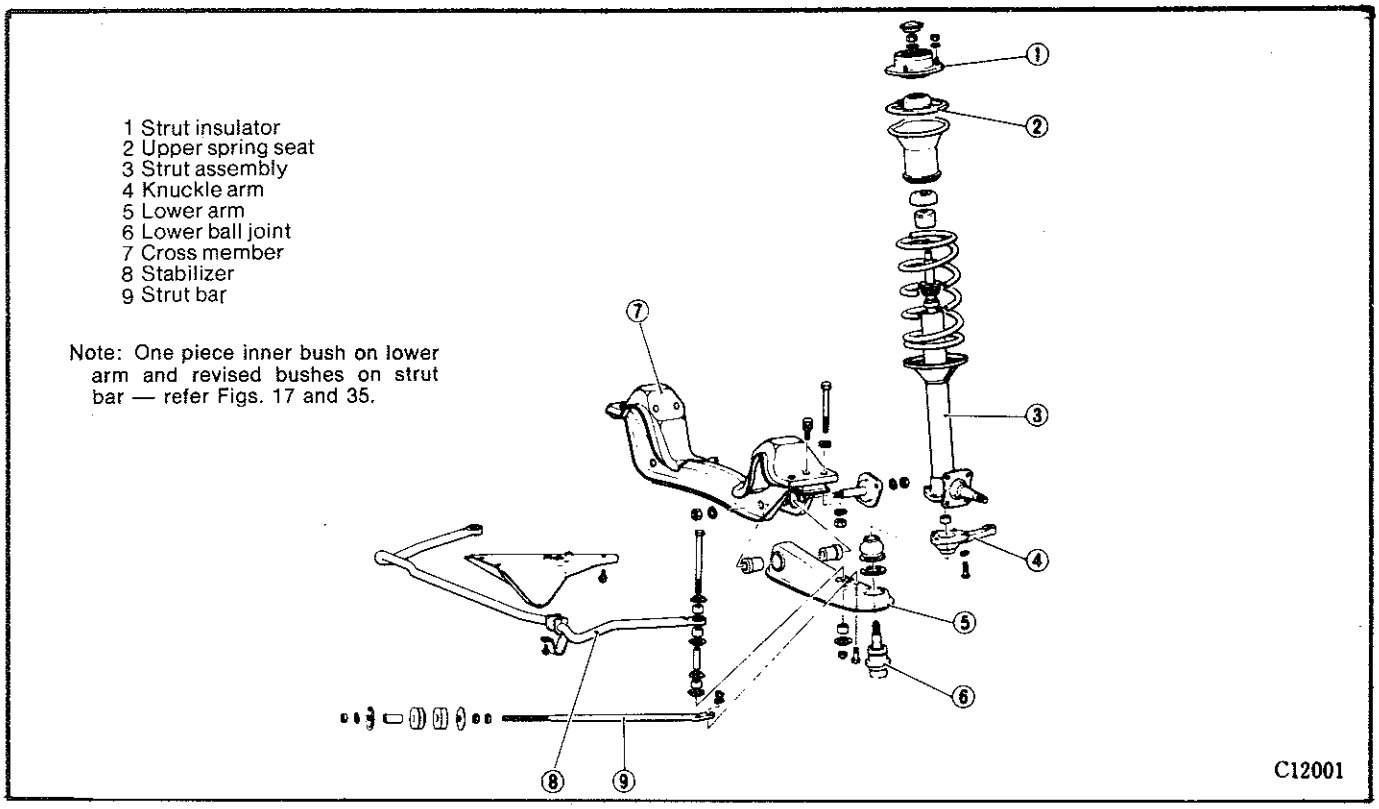


Fig. 1—Exploded view front suspension.

GENERAL INFORMATION.

The front suspension consists of two vertically mounted independent McPherson strut assemblies and a centre crossmember with swinging lower arms pivoting in the crossmember.

The strut assemblies are secured at the upper end to the inner fender panel and the outer end to the lower arms. The struts are of tubular construction, each containing a direct acting hydraulically operated shock absorber unit. A spring mounted on the top end of the unit determines the amount of downward movement of the suspension while a stop tube in the strut limits the rebound.

Road shocks are absorbed by the coil spring in conjunction with the strut. The assembly pivots on a rubber mounted thrust bearing at the upper end and a ball joint at the lower end.

A stub axle for disc brake and hub mounting is integral with the lower end of the strut assembly.

The horizontal forces acting on the strut are controlled by strut bars between the lower arms and a bracket attached to the forward end of the front side rails.

A stabilizer bar attached to the side rails by rubber insulated brackets and the lower arms by link pins, reduces the rolling tendencies of the vehicle when cornering.

WHEEL ALIGNMENT

Inspection and Adjustment

When using a wheel alignment tester for inspection of the front wheel alignment, always position the car on a level portion of the floor and adjust the front wheels in the straight-ahead position. Prior to inspection make sure that the front suspension and steering system has been maintained to normal operating conditions and that wheels and tyres are free of defects and tyres inflated to specification.

Toe-in

Toe-in corrections can only be made by adjustment of the left tie rod. Turn the tie rod turn buckle in a forward direction to decrease toe-in.

Measure the difference in the length of the left and right tie rod assemblies. If it exceeds 5 mm (0.200"),

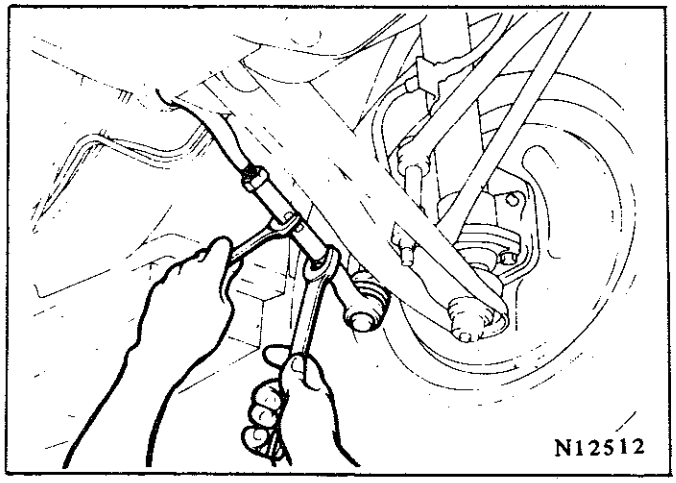


Fig. 2—Adjusting toe-in.

remove the right tie rod and reduce the difference to 5 mm (0.200") or less. Reset the toe-in.

If the steering wheel spokes are 'off-centre' after toe-in correction, set the front wheels in the straight ahead position and remove and reposition the steering wheel.

Camber

The steering knuckle is part of the strut assembly and is factory-adjusted to the specified camber and requires no adjustment.

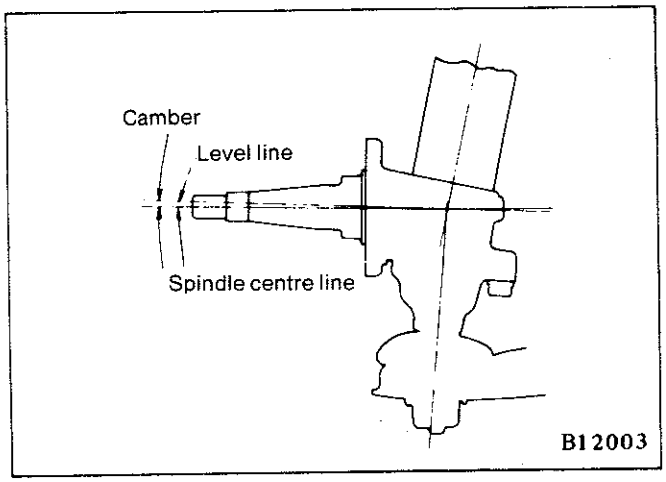


Fig. 3—Camber.

Caster

Caster, as a general rule, will not require adjustment. However, if minor corrections should be necessary, adjust the length of the strut bar as shown in Fig. 4. Shortening the strut bar from the standard dimension increases positive caster angle. The standard distance A in Fig. 4 is 78 mm (3.1 in.).

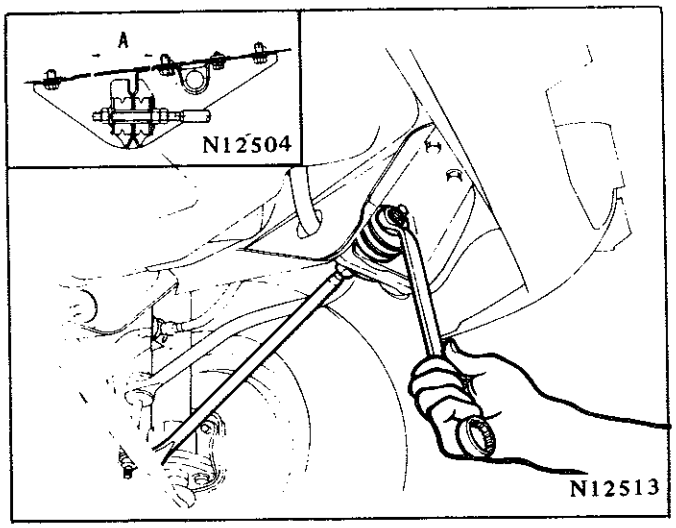


Fig. 4—Adjusting caster.

NOTE: Maintain right and left wheelbase within the specified range.

Steering Angle

Stopper bolts on the relay rod control the steering angle of the front wheels. With a force of 15 to 20kg (33 to 44lbs.) applied to the steering wheel, adjust the left stop for right steering angle and the right stop for the left steering angle—see specifications.

NOTE: Steering angles should never be adjusted beyond the specified dimensions.

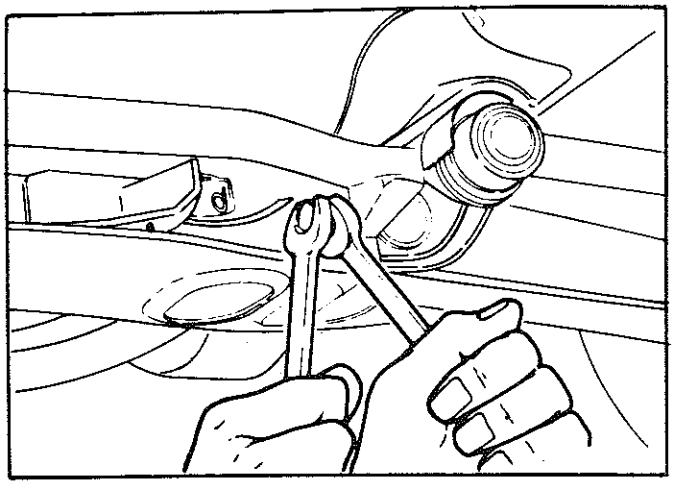


Fig. 5—Steering angle adjustment.

CROSS MEMBERS

Removal

(1) Support the front side frames on jack stands. After disconnecting the stabilizer and the strut bar, remove the strut assembly and the lower arm.

(2) Support the engine oil pan with wood blocks or the like applied under the bottom of the oil pan. Remove the engine front mount attaching bolts. Remove cross member body side frame locking bolts, and then take out the cross members.

Inspection

Make the following inspection. Repair or replace if defective.

(1) Cracks, breakage, bends, dents, and misalignment.

Installation

Install by reversing removal procedure noting the following.

(1) Securely install the cross members to the car body by tightening cross member mounting bolts to the specified torque.

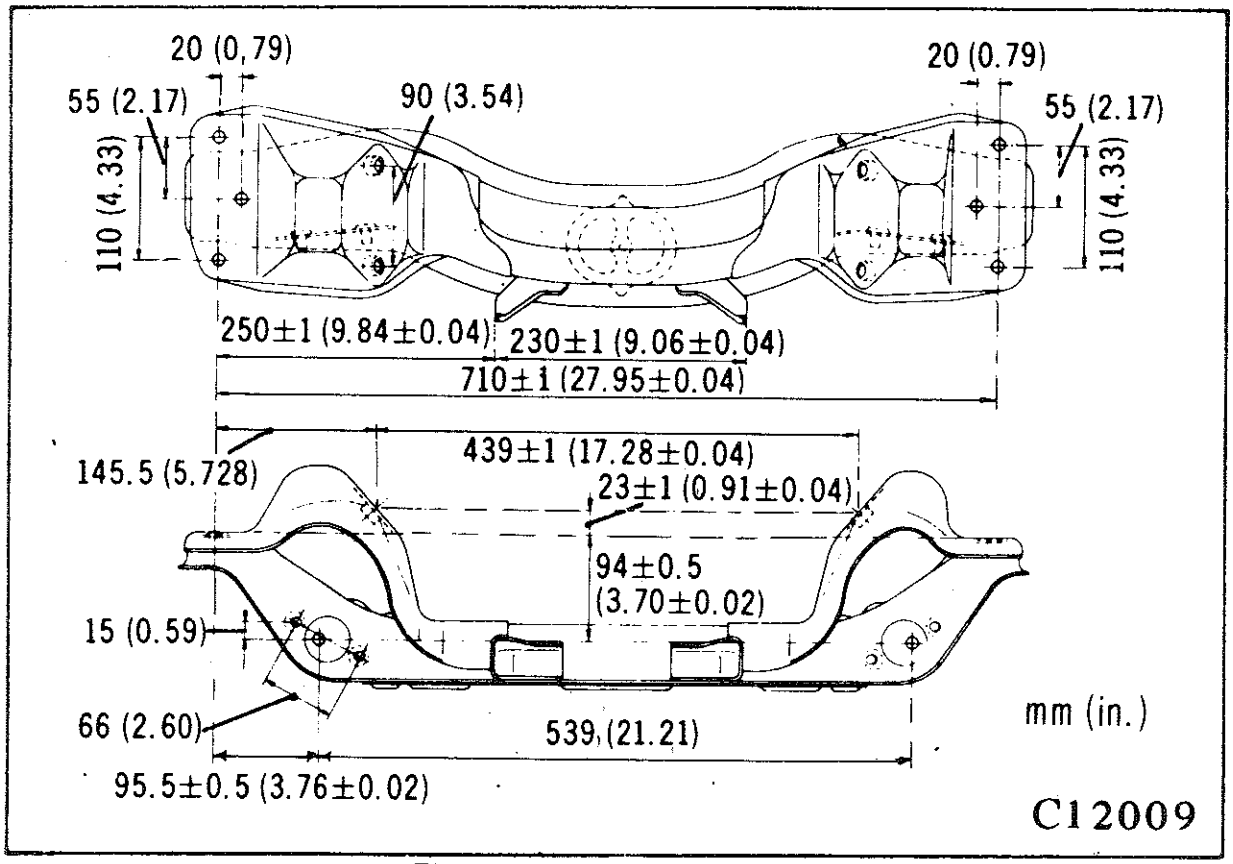


Fig. 6—Cross member alignment.

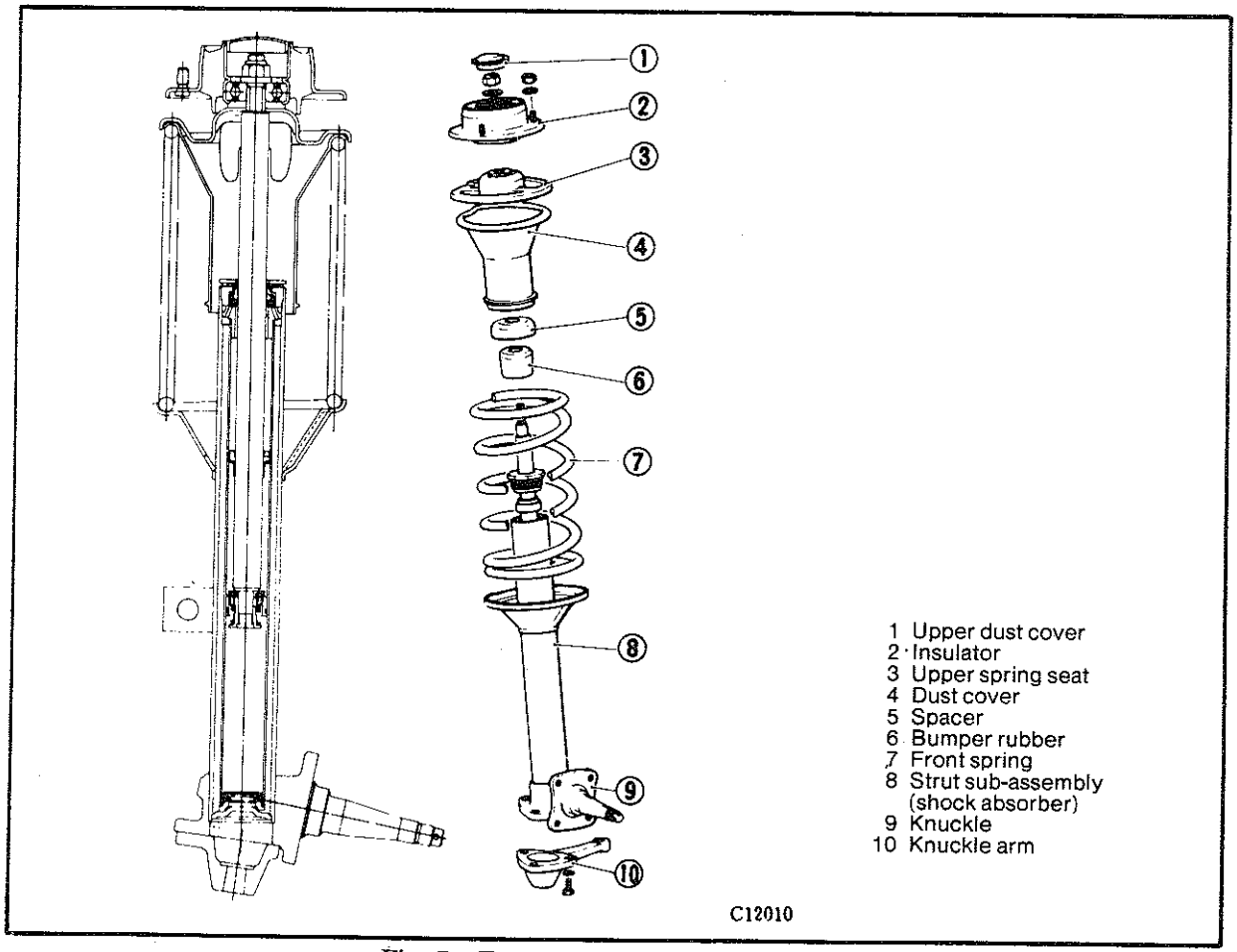


Fig. 7—Exploded view of strut assembly.

STRUT

Locally produced struts were introduced on four door models as a running change. They contain a sealed, replaceable cartridge and can be identified by a serial number tag on the outside diameter of the strut and a cadmium plated piston rod locking ring.

High kilometreage vehicles are subject to a gradual deterioration in the performance characteristics of the front strut assemblies. This doesn't lead to any significant problems while the struts operate as matched pairs. However, to maintain satisfactory ride and handling, it is recommended that when necessary, both struts be overhauled at the same time.

Removal

(1) Raise the front of the vehicle, remove the front wheel, disconnect the brake tube at the strut, remove the caliper assembly and remove the brake disc and hub assembly.

(2) Disconnect the strut assembly from the steering knuckle arm (3 bolts), disconnect the strut insulator attaching nuts from the body and remove the strut assembly.

Disassembly

(1) Securely hold the strut assembly in a vice and remove the upper dust cover. Remove the nuts coupling the insulator to the strut sub-assembly and remove the insulator, and then the spring.

NOTE: 1. Use special tool Spring Compressor (E2M 10) before removing the nuts so that nut threads will not be damaged while the nuts are being unscrewed.

2. The steering knuckle is welded to the strut sub-assembly and cannot be disassembled.

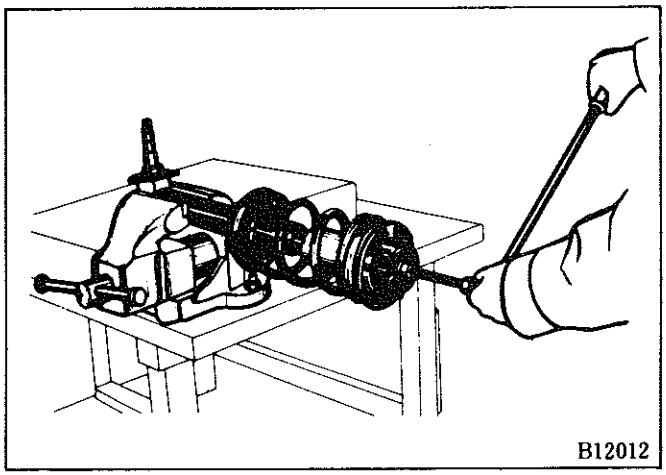


Fig. 8—Removing the coil spring

(2) When removing the piston rod insulator retaining nut, hold the spring seat and insulator assembly using special tool (E2M 10B).

(3) Check all disassembled parts for loss of tension, cracks, fracture, etc. and replace any defective part as necessary.

NOTE: The insulator ball bearing is built into the insulator assembly, if the ball bearing is found defective the whole insulator assembly should be replaced.

(4) If the check of strut sub-assembly (shock absorber) indicates oil leakage, disassemble it in the following manner and replace defective parts or the assembly as necessary. On locally produced struts the complete cartridge assembly should be replaced (the top seal is an integral part of the cartridge).

(5) Before disassembly, thoroughly remove dirt from the outside walls of the strut sub-assembly. Use care not to permit dirt into the cylinder or the fluid during the disassembly work.

(6) Securely hold the strut sub-assembly vertically and using special tool (E2M 10B imported strut or E2M 10C local), remove the shock absorber seal assembly/locking ring. On imported strut assemblies push the piston rod to its lowest position while carrying out this work (Fig. 9), (the piston rod on the local production strut will extend fully when released).

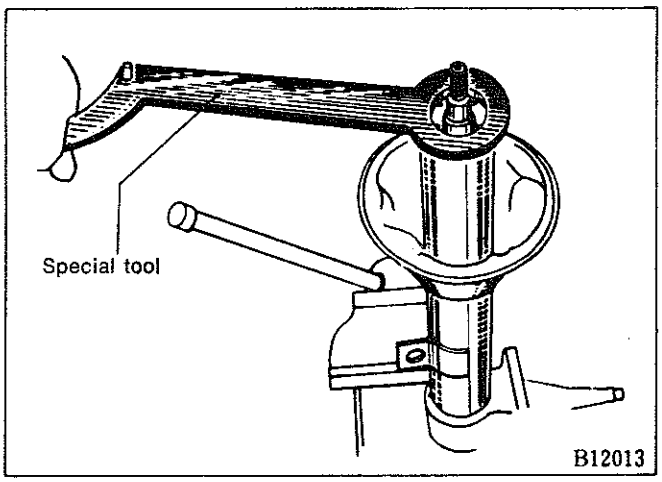


Fig. 9—Removing shock absorber seal assembly/locking ring

(7) On imported and 2,6 litre strut assemblies, drain off the fluid and using a small screwdriver remove the square section "O" ring (Fig. 10). Slowly draw the piston rod assembly and guide out of the strut housing and remove the guide from the piston rod.

On local struts remove the cartridge assembly from the strut housing (the lubricating fluid is sealed in the cartridge).

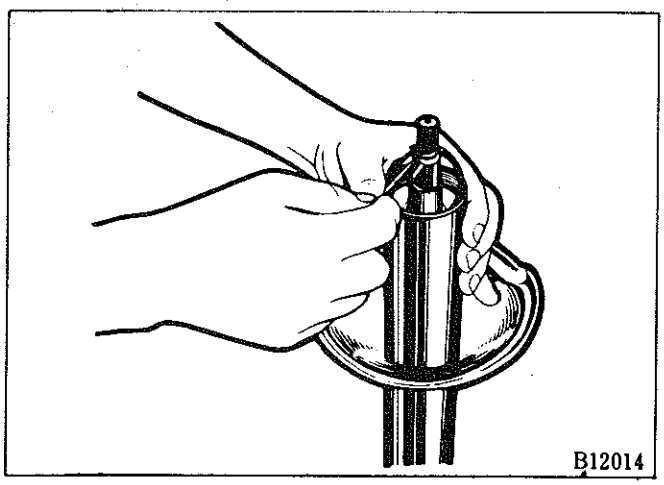


Fig. 10—Removing the "O" ring (imported and 2,6 litre strut)

(8) Except for non-metal parts, rinse all disassembled parts in petrol and dry using compressed air. Clean all non-metal parts using compressed air and carry out inspection. Replace any defective parts.

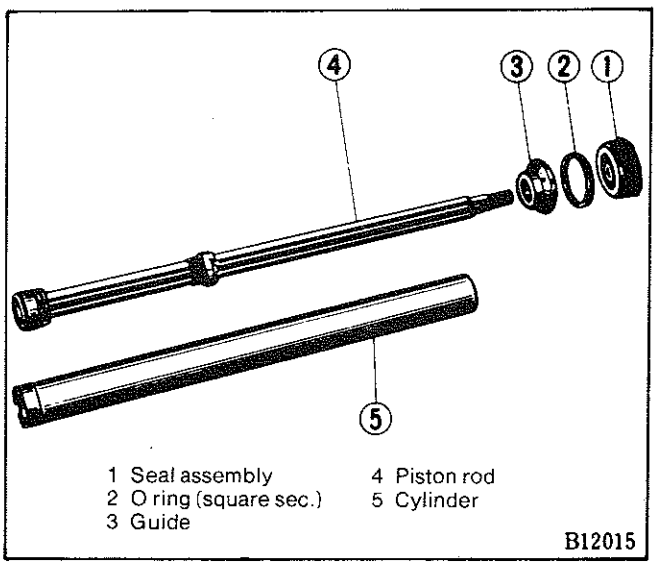


Fig. 11—Shock Absorber Components (imported and 2,6 litre strut)

NOTE: Seal assemblies and "O" rings (square section) are available as service replacement parts for imported and 2,6 litre struts. Replacement cartridges (containing an oil seal) are available in kit form for service repair of both local and imported struts. If a cartridge kit is used on an imported strut, both struts should be overhauled to maintain satisfactory ride and handling.

Inspection

If oil leakage is found, replace the seal assembly or cartridge and check for flaws, bends or fractures of the piston rod. These defects can lead to oil leakage.

The maximum allowable piston rod bend is 0,2 mm (0.008 in.), the minimum diameter of the piston rod should not exceed 21,95 mm (0.864 in.) i.e. 0,05 mm (0.002 in.) wear.

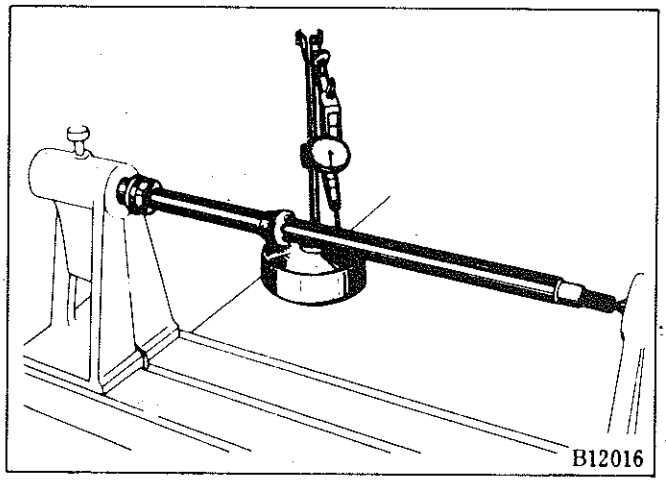


Fig. 12—Inspecting piston rod bend (imported and 2,6 litre strut)

Reassembly (Local Production Strut)

(1) Apply a film of shock absorber fluid to the inside diameter of the shock absorber (to prevent corrosion).

(2) Insert the cartridge assembly into the shock absorber, install the locking ring and tighten to the specified torque.

(3) Proceed to step (8) below.

Reassembly (Imported and 2,6 litre Strut)

Reassemble using the following procedure and special care to prevent entry of impurities into the cylinder.

(1) Apply fluid to the sliding surfaces of the shock absorber cylinder and the piston.

(2) Carefully insert the piston rod in the cylinder. Compress the piston ring carefully with the fingers as it slides into the cylinder.

(3) Assemble the cylinder and piston assembly with the strut outer shell.

(4) Fill the shock absorber with fresh shock absorber fluid. Since air inside the cylinder must be expelled while putting in the fluid, it may take a little time to complete the filling. Slowly move the piston rod until a quantity of 350 ml (12.3 fl. oz.) of fluid is used.

NOTE: The above amount of fluid should be used when the shock absorber is dry. Therefore, the amount should be adjusted considering the amount of fluid coated on the cylinder walls at the time of reassembly.

(5) With the guide flange locating at the top, insert the piston rod until the guide flange contacts the shock absorber cylinder end.

(6) Install the "O" ring between the guide and the strut outer cylinder. Use care to seat the "O" ring free from deflection.

NOTE: The "O" ring should always be replaced when the shock absorber has been disassembled.

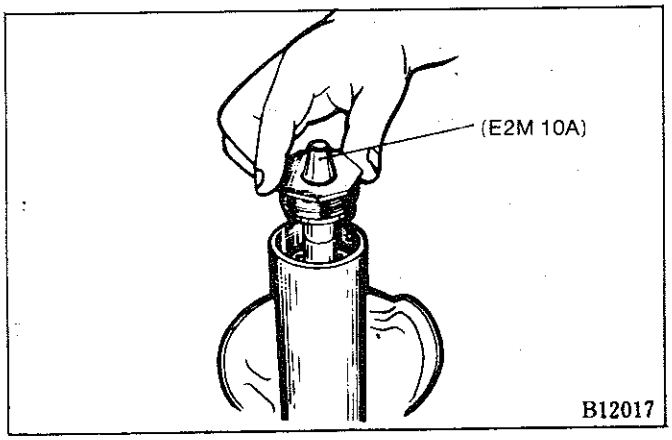


Fig. 13—Installing the Seal Assembly

(7) Cover the piston rod end with the special tool Oil Seal Guide (E2M 10A). Slide in the seal after applying sufficient amount of oil to the seal lip; and using the special tool Spanner (E2M 10B) tighten the seal assembly until the seal nut edge contracts the strut outer cylinder.

NOTE: Always replace the seal assembly when the shock absorber has been disassembled.

(8) Install special tool Spring Compressor (E2M 10) on the coil spring to compress the spring as shown in Fig. 14 and after having fully compressed the spring, install it on the strut sub-assembly.

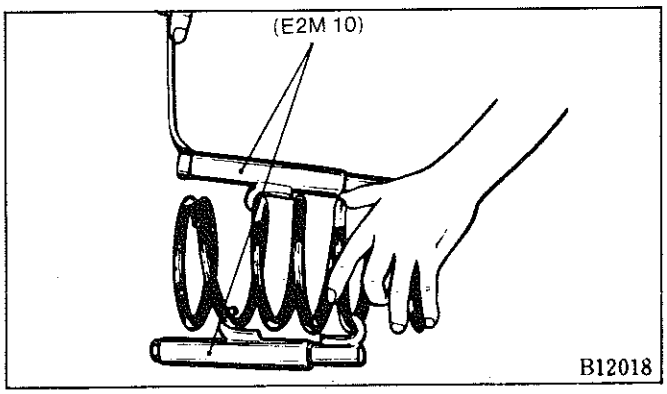


Fig. 14— Compressing the coil spring

(9) Extend the shock absorber piston rod fully and install a bumper rubber and a spacer.

(10) Align the D-shaped hole in the spring seat upper assembly with the flat on the piston rod, and install the insulator assembly. Install a **new** self-locking nut and tighten it temporarily. Ensure that the dust cover is correctly installed and conforms to the shape of the spring seat.

NOTE: Coil springs are colour coded for identification purposes. Any combination of springs can be used to maintain a satisfactory vehicle attitude, i.e. if the vehicle tilts more than 15 mm (0.6 in.) to either side, install a high tolerance spring on the low side. Refer to specifications.

(11) After having correctly seated the upper and lower ends of the coil springs in the grooves of the upper and lower spring seats, loosen the special tool Spring Compressor (E2M10).

(12) Using the special tool (E2M10B), fix the upper spring seat and tighten the self-locking nut to the specified torque.

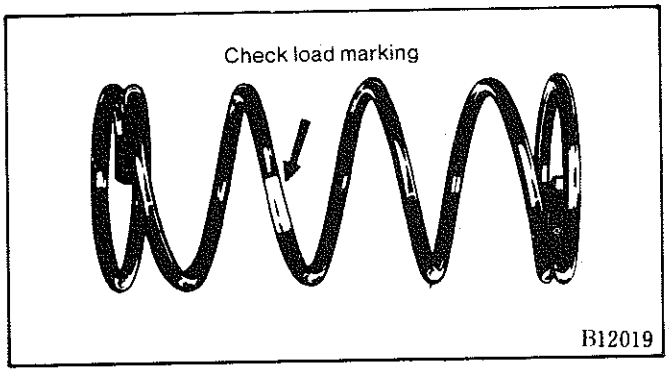


Fig. 15—Front coil spring identification

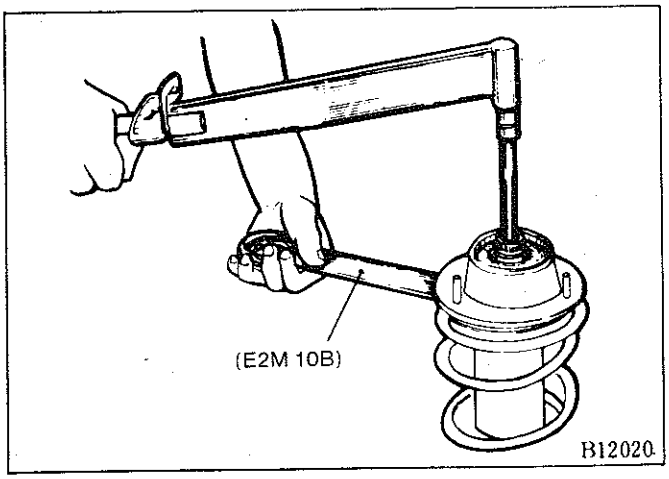


Fig. 16—Tightening the spring seat and insulator assembly

Installation

Install by reversing removal procedure noting the following:

(1) When installing the knuckle arm, apply a liquid sealer to the mounting surface before connection.

(2) Apply wheel bearing grease (NLGI No. 2) to the strut upper bearing, then install the dust cap. Be careful that no grease will come in contact with the strut insulator rubber.

(3) Bleed brakes as described in Group 5.

LOWER ARM

Removal

(1) Disconnect the stabilizer link and the strut bar from the lower arm.

(2) Using the special tool Steering Linkage Puller (E2237), disconnect the steering knuckle arm and the tie rod ball joint. (Fig. 18).

(3) Remove the bolts attaching the knuckle arm to the strut and separate the two components by tapping with a soft faced hammer.

(4) Disconnect the lower arm shaft, remove the shaft and lower arm from the crossmember.

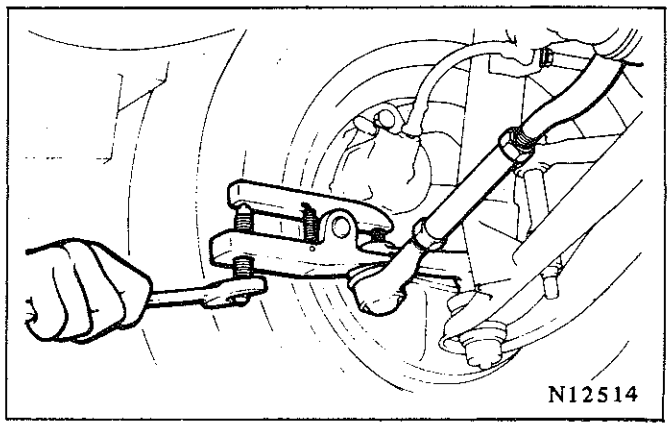


Fig. 18—Disconnecting the tie rod and knuckle arm

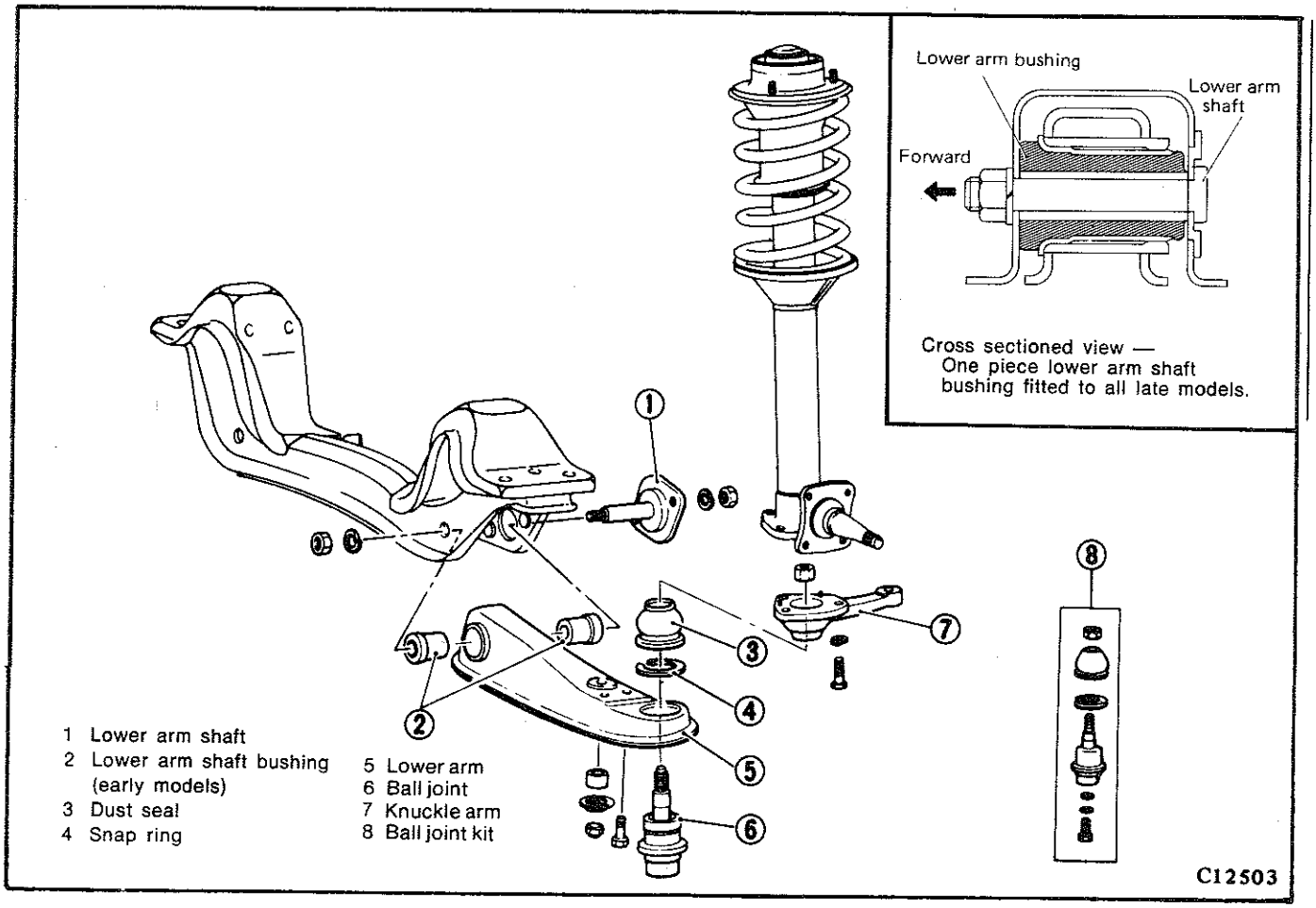


Fig. 17—Exploded view of lower arm

(5) Using the special tool Knuckle Arm Remover (E2M5), disconnect the knuckle arm and the lower arm ball joint.

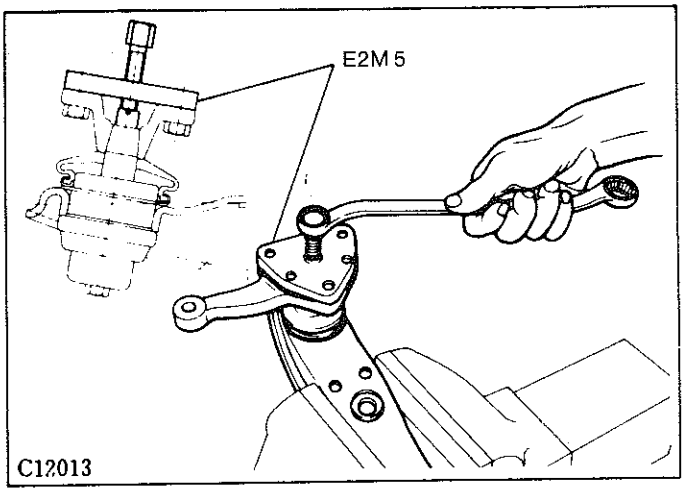


Fig. 19—Removing the knuckle arm.

Disassembly

(1) Remove the lower arm ball joint dust seal by prying up the dust seal ring evenly with a screwdriver.

(2) Subsequently remove the snap ring using Snap ring pliers.

NOTE: Reuse of the removed snap ring and dust seal is not advisable. Replace the snap ring and dust seal with new parts.

(3) Using the special tool Ball Joint Remover and Installer (CT 1131A, Ct1131B), press off the ball joint.

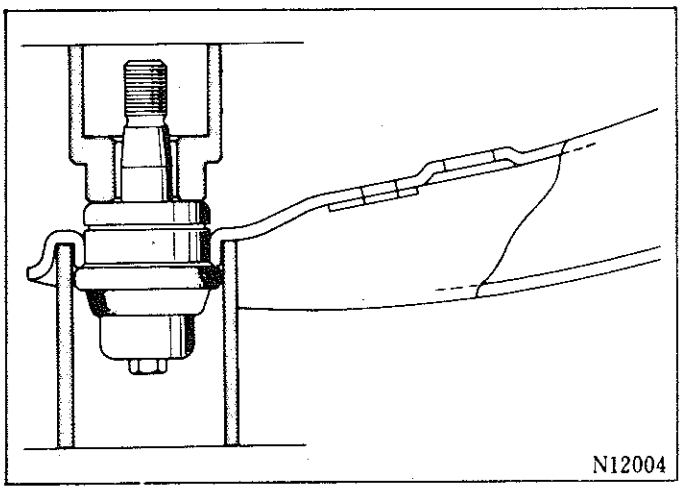


Fig. 20—Removing the ball joint.

Inspection

Make the following inspections and repair or replace any defective parts.

(1) Cracks, deterioration and wear of rubber bushings.

(2) Deformation and cracks of knuckle arm.

(3) Deformation, cracks and wear of lower arm.

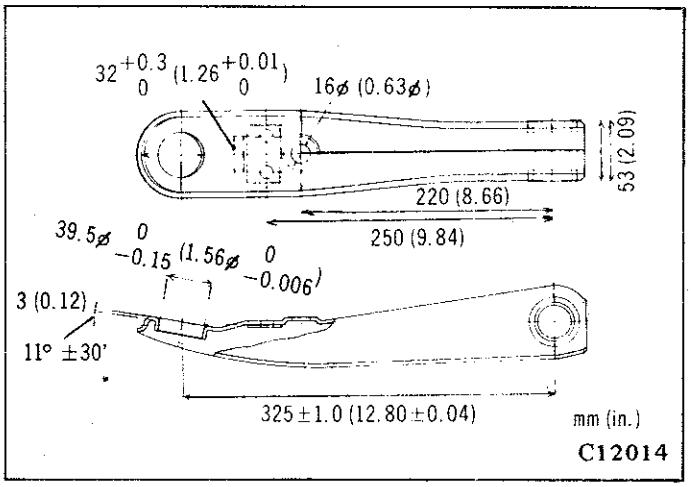


Fig. 21—Lower arm alignment.

(4) Deformation and cracks of lower arm shaft, and cracks in welds.

(5) Looseness of ball joints and turning torque.

The ball joint should not have any axial or diametral play. The torque required to start the ball joint in motion should be from 7,4 to 10,3 Nm (5.4 to 7.6 ft. lbs.).

(6) When reusing the ball joint, fill with multi-purpose grease NLGI No. 2 E.P.

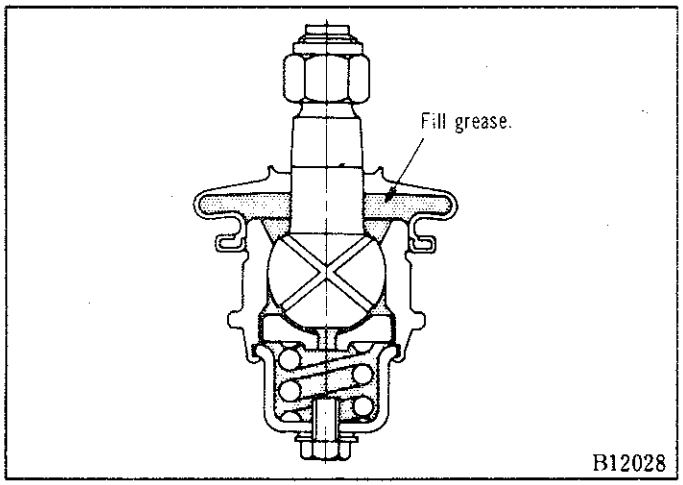


Fig. 22—Ball joint.

NOTE: The ball joint does not have a grease nipple. When lubricating, it will be necessary to replace the plug with a grease nipple.

(7) Later models are equipped with a one piece lower arm shaft bushing. Using special tools MB990828 and MB990434 (as shown in Fig. 23), press out the bushing.

NOTE: When a bushing is removed, always replace it with a new bushing.

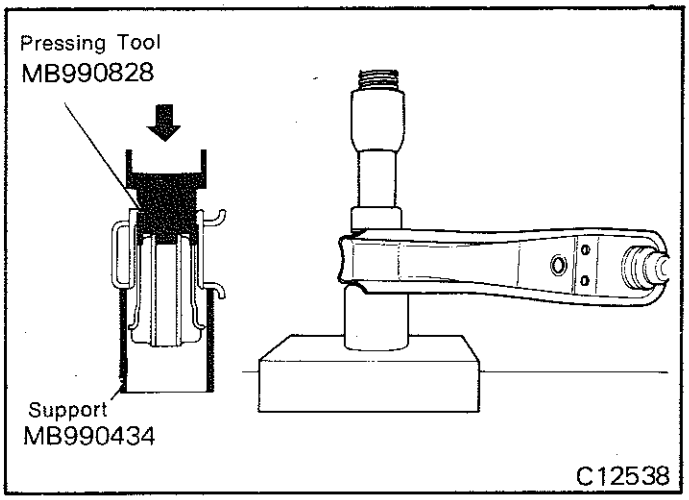


Fig. 23—Removing the lower arm bushing

Reassembly

(1) To install the ball joint, align the ball joint and lower arm mating marks and press the ball joint properly into the burred hole by using the special tool Ball Joint Remover and Installer (CT1131A, CT1131B).

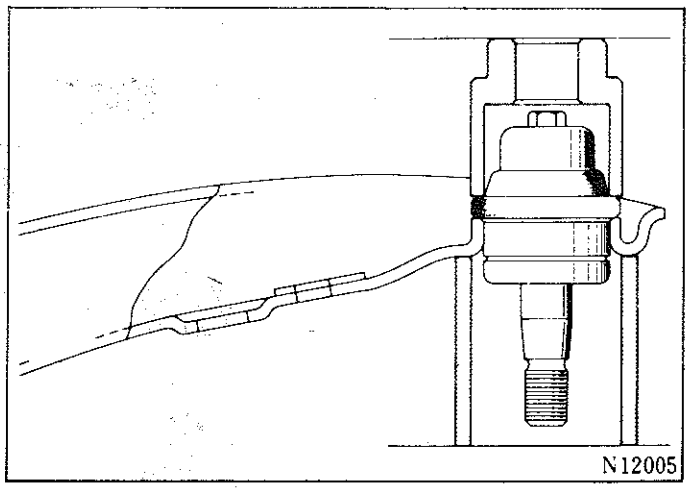


Fig. 24—Installing the ball joint

NOTE: Replace the lower arm or the ball joint if the standard ball joint installation pressure is not obtained. The initial pressure should be more than 700 kg (1550 lbs.) at an installation depth of 3 to 6 mm (0.118 to 0.236 in.) and a final pressure of 5000 kg. (11000 lbs.).

(2) Holding the snap ring with one hand, fit it into the snap ring groove in the ball joint case by using Snap ring pliers. Avoid opening the snap ring wider than required.

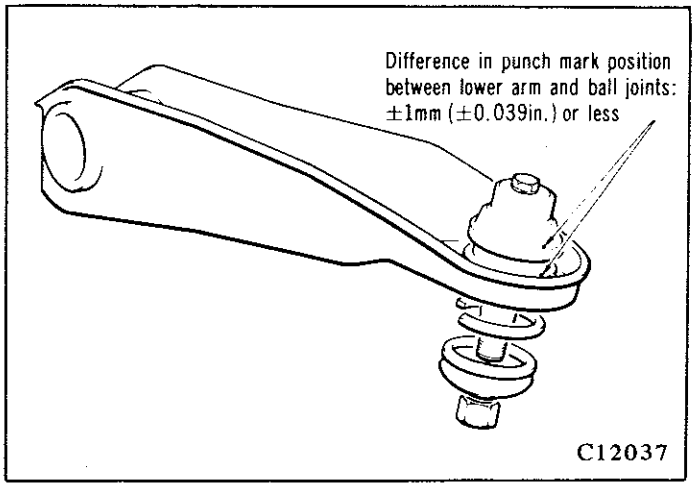


Fig. 25—Balljoint and lower arm aligning marks

(3) Subsequently, insert the snap ring into the snap ring groove in the ball joint by lightly tapping it through the special tool Ball Joint Remover and Installer (CT-1131A).

(4) After installing the snap ring, make certain that the snap ring is tightly fitted in the ball joint snap ring groove. If the snap ring is loose, replace the snap ring.

(5) Apply liquid sealer to the inside of the dust seal metal ring, and then press the metal ring into the snap ring surface wtih a hammer or a press-through the special tool Ball Joint Remover (CT-1131B).

NOTE: Always fit a new seal if the old seal has been removed. Place approx. 12 ml (0.7 cu. in.) of Muti-purpose grease NLGI No. 2 in the dust seal.

(6) On later models with a one piece lower arm shaft bushing, press the bushing into place in the lower arm shaft using special tools MB990828 and MB990434 (as shown in Fig. 26). Prevent deformation of the arm while pressing the bush into place by positioning two bolts and nuts of suitable size between the sides of the arm as shown in Fig. 27.

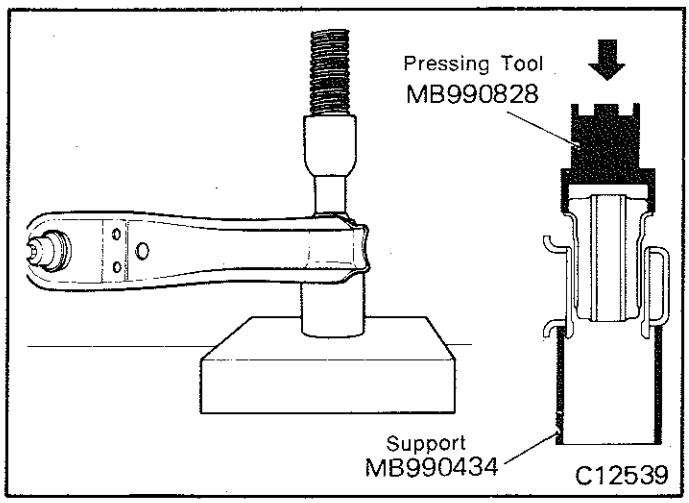


Fig. 26—Press fitting the lower arm bushing

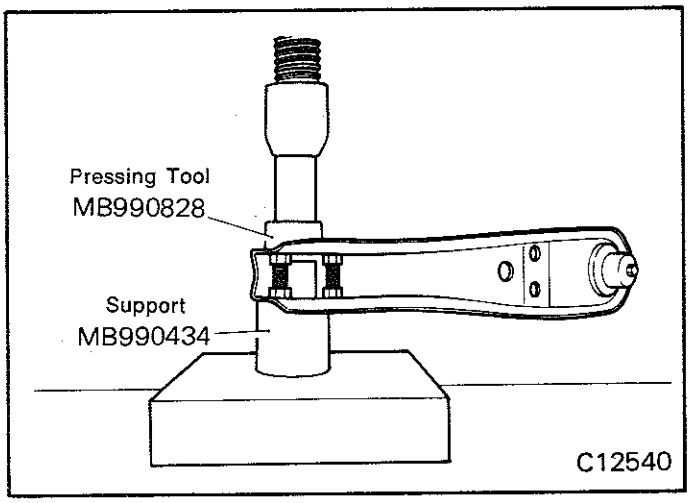


Fig. 27—Supporting bolts between sides of lower arm

Installation

Install by reversing removal procedure noting the following:

(1) The nut attaching ball joint to knuckle arm is of a self-locking type. Always use a new nut.

(2) When connecting the strut assembly to the knuckle arm, apply a liquid sealer to the flange surface.

(3) Temporarily tighten the lower arm shaft lock nut. After the front wheels are lowered to the ground, tighten the knuckle arm to ball joint nut, the lower arm shaft flange bolt and the lower arm shaft tightening nut to the specified torque.

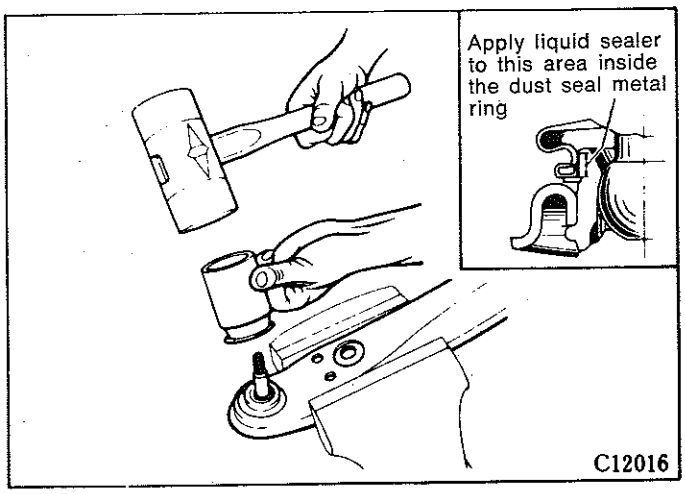


Fig. 28—Installing the dust seal

(4) When connecting the tie-rod end to the knuckle arm, tighten the nut to specifications, insert the cotter pin and spread it as shown in Fig. 29.

(5) Install the stabilizer and strut bar.

(6) Install the brake assembly and wheel.

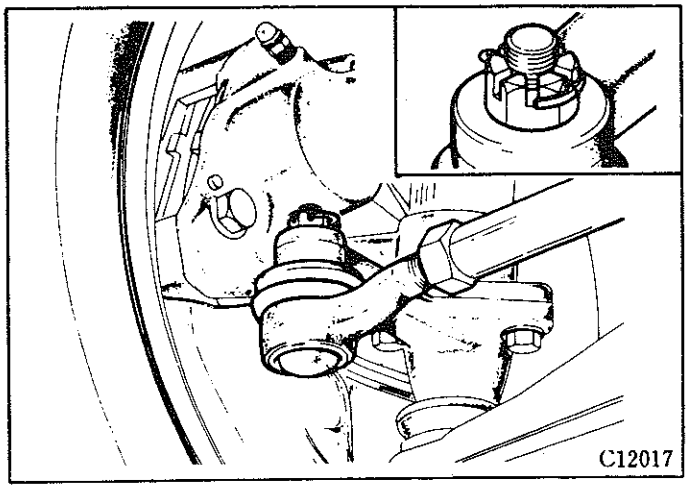


Fig. 29—Installing the tie-rod end to knuckle arm

STABILIZER AND STRUT BAR

Removal

(1) Disconnect the stabilizer and the strut bar from the lower arm.

(2) Remove the strut bar bracket from the body.

(3) Remove the stabilizer and the strut bar from the strut bar bracket.

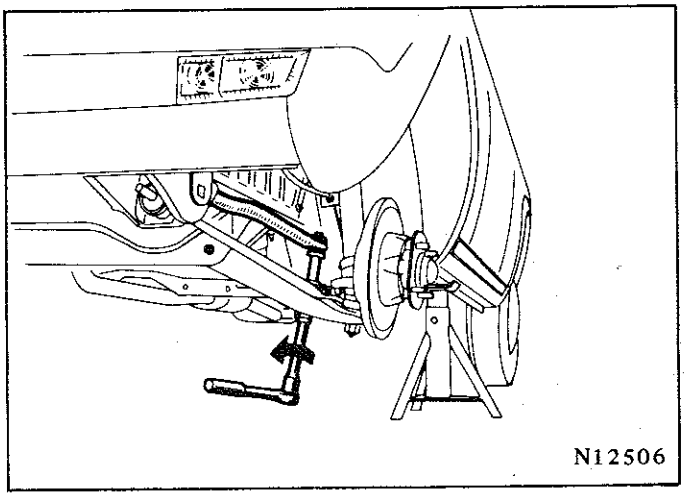


Fig. 30—Removing the stabilizer bar

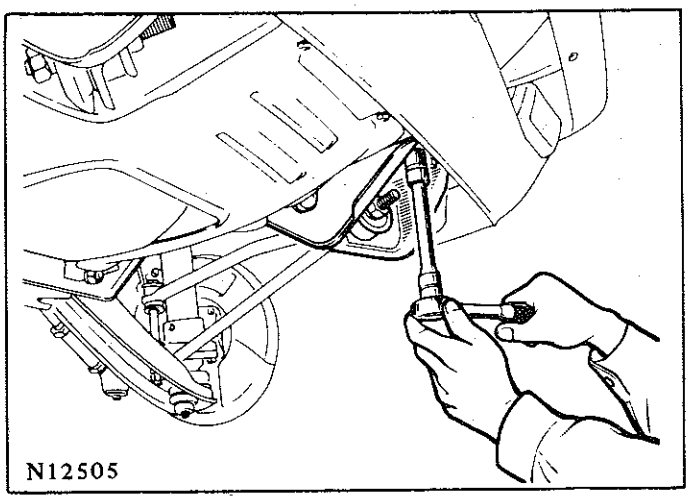
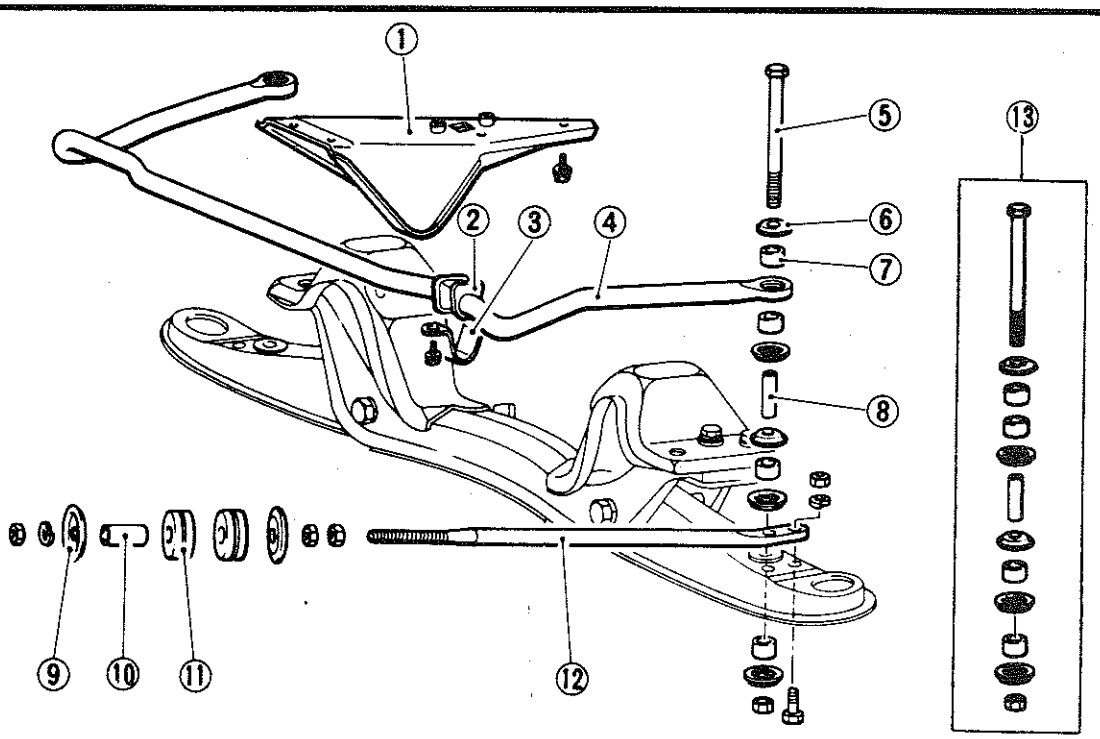


Fig. 31—Removing the strut bar bracket



1 Strut bar bracket	5 Bolt	9 Plate seat*
2 Stabilizer bushing	6 Plate seat	10 Collar
3 Stabilizer bracket	7 Cushion rubber	11 Strut bar bushing*
4 Stabilizer	8 Collar	12 Strut bar
* '78 model — for '79 model Two Door refer Fig. 35		13 Stabilizer link kit

Fig. 32—Exploded view of strut bar and stabilizer bar

Inspection

Make the following inspections and repair or replace defective parts.

(1) Place the stabilizer on a level surface and check it for deformation (permanent strain). Replace if excessively deformed.

(2) Check the threaded portion and the strut bar lower arm fitting area of the strut bar for cracks and bends. The maximum allowable bend of the bar is 3 mm. (0.120 in.)

(3) Check the strut bar bushing for cracks, deterioration and deformation.

Installation

Install by reversing removal procedure noting the following:

(1) When installing the strut bar to the bracket, set the distance A (between the strut bar end and the lock nut end) to 78 mm (3.1 in.).

(2) Strut bar bushing of the front side differs in shape from that of the rear side. Install the strut bar bushing that has the centre projection surface to the front side as shown in Fig. 35.

NOTE: That the direction of the plate seat varies between the '78 and '79 models (see Fig. 35).

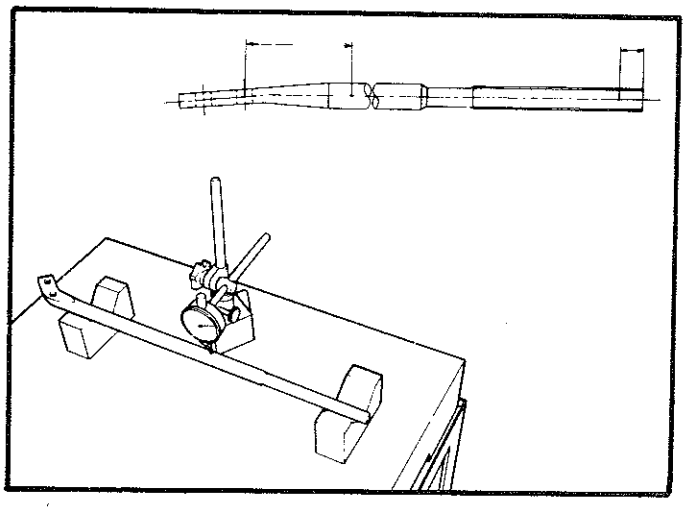


Fig. 33—Checking for a bent strut bar

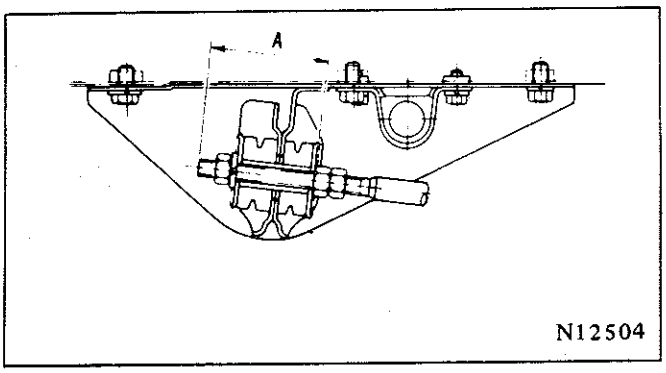


Fig. 34—Installing the strut bar

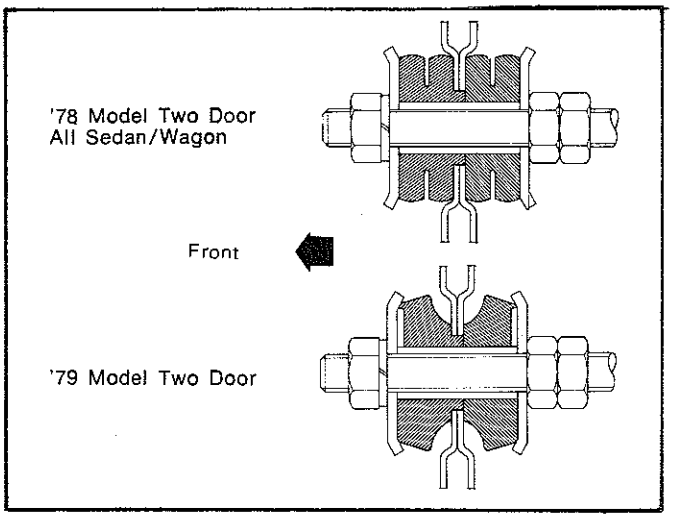


Fig. 35—Installing the rubber bushing

(3) When installing both ends of the stabilizer, tighten the lock nut, so that the standard dimension may be maintained between the nut and the end of the bolt (see Fig. 36).

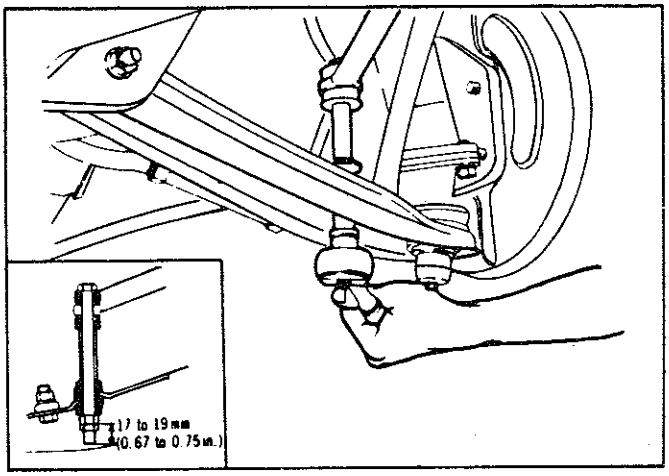


Fig. 36—Installing the stabilizer

(4) Tighten the parts securely to the specified torque.

NOTE: Make certain that the stabilizer is installed in the centre of the bracket hole.

CHART — FRONT SHOCK ABSORBER APPLICATION

Application	V.I.C.	Shock Absorber Part Number	Shock Absorber Colour Code
Sedan — 1,6/1,85 and 2,0 ℓ	Up to JC08	MB002020	Black
	After JC08	4062040	Dark Blue
	Up to KL11	4155090	Red/Brown
	After KL11	4158144	Dark Blue
Sedan — 2,6 ℓ	Up to KI28	4155091	Red/Brown
	After KI28	4155412	Dark Green
Wagon — 1,85/2,0 ℓ	Up to KI28	MB001671	Light Brown
	After KI28 and Up to KL11	4155917	Light Brown
	After KL11	4158144	Dark Blue
Wagon — 2,6 ℓ		4155412	Dark Green
Two Door — 2,0 ℓ		MB002077	Black

GROUP 3 — REAR AXLE

SECTION 0 — INDEX

SERVICE BULLETIN REFERENCE

DATE	NUMBER	SUBJECT	CHANGES