

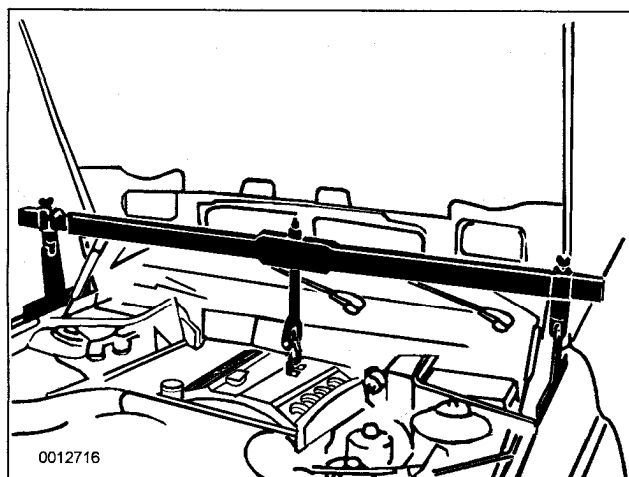


Fig. 16. Support equipment used to support engine from above.

3. Working beneath car, remove left and right nuts from engine mounts.
4. Remove control arm bushing carrier from body. Refer to Fig. 9.
5. Remove control arm ball joint from crossmember. Separate joint with a plastic hammer. Suspend control arm from chassis using stiff wire.

WARNING —

Do not allow the control arm to hang from the ball joint. This can damage the ball joint.

6. Unbolt steering rack from subframe. See **320 Steering and Wheel Alignment**. Suspend steering rack from chassis using stiff wire. Using a transmission jack or equivalent, support crossmember from below.
7. Remove reinforcing brace below oil pan, where applicable.
8. Unbolt crossmember from body on both sides. See Fig. 17.
9. Slowly lower crossmember, making sure all electrical leads, suspension components and heat shields are clear during removal.

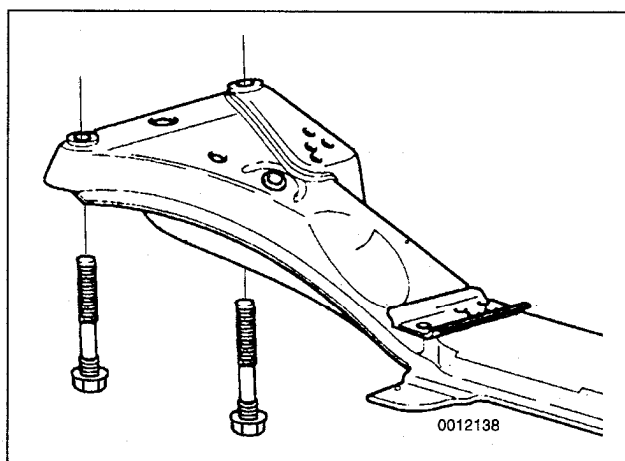


Fig. 17. Right side crossmember-to body mounting bolts.

10. Installation is reverse of removal, noting the following:
 - Make sure all bolts, bolt holes, and mating surfaces are clean to ensure proper tightening and alignment. Use new self-locking nuts or bolts, where applicable.
 - **On vehicles produced up 9-92 only:**
 - Remove paint from contact surfaces before installing crossmember.
 - Install 4 new toothed lock washers between subframe and chassis (install new washers regardless of whether washers were originally fitted).
 - Replace all 4 mounting bolts.
 - Lubricate suspension crossmember bolts with LM48 paste or equivalent anti-seize compound before installing.
 - Lower engine onto engine mounts, allowing it to settle fully before tightening engine mount bolts.
 - When the job is completed have front end professionally aligned.

Tightening Torques

- Subframe crossmember to body

M12-8.8 bolts	77 Nm (56 ft-lb)
M12-10.9 bolts	110 Nm (81 ft-lb)
M12-12.9 bolts	105 Nm (77 ft-lb)
- Steering gear to subframe crossmember (M10-10.9 self-locking bolts) 42 Nm (31 ft-lb)
- Control arm ball joint to subframe crossmember 85 Nm (62 ft-lb)
- Control arm bushing carrier to body 47 Nm (34 ft-lb)



SUBFRAME CROSSMEMBER

14. Install a new grease cap, using Loctite® 638 sealant or equivalent. Install wheel and lower car.

Tightening Torque

- Brake rotor to wheel hub 16 Nm (12 ft-lb)
- Collar nut to stub axle 290 Nm (214 ft-lb)
- Brake caliper to steering arm 110 Nm (81 ft-lb)
- Road wheel to hub 100±10 Nm (74±7 ft-lb)

STABILIZER BAR

Stabilizer bar, removing and installing

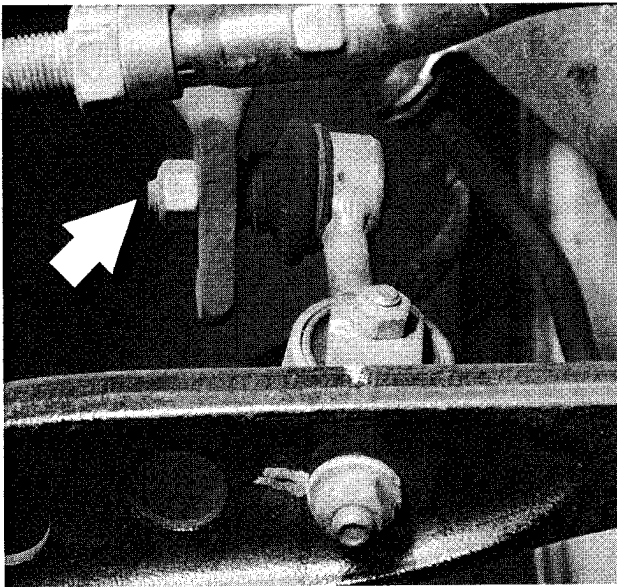
Stabilizer bar link arrangements differ slightly among models. In most models the links attach to the control arms near the outboard end. On M3 models the links attach to the strut assemblies.

1. Raise car and remove both front wheels.

WARNING—

Make sure that the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

2. Remove stabilizer bar connecting link from stabilizer bar on left and right sides. See Fig. 15.



0012120

Fig. 15. Disconnect stabilizer bar connecting link at bar (arrow). (318i model shown. M3 stabilizer link attaches to strut.)

3. Remove two stabilizer bar bushing brackets on left and right sides. Remove bar.
4. Installation is reverse of removal. Use new self-locking nuts on connecting links.
 - On M3 models: When attaching stabilizer link to strut or to bar, use a thin wrench to hold flats on link parallel to strut.

NOTE—

Installation of the stabilizer bar is easiest with the car level (front wheels at the same height), and as near to normal ride height as possible.

Tightening Torques

- Stabilizer bar bushing brackets to subframe crossmember 22 Nm (16 ft-lb)
- Stabilizer bar link bracket to control arm 42 Nm (31 ft-lb)
- Stabilizer bar link to stabilizer bar (M10) 42 Nm (31 ft-lb)
- Stabilizer bar link to strut or bar (M3) . 59 Nm (44 ft-lb)

SUBFRAME CROSSMEMBER

The subframe crossmember provides rigid mounting points for the engine, suspension, and steering components. The crossmember is not normally subject to wear and should only be replaced if structurally damaged.

Removing the subframe crossmember requires engine lifting equipment to support the weight of the engine from above so that the subframe can be removed from below.

WARNING—

Removal or replacement of the subframe crossmember may affect suspension and steering geometry, including front wheel alignment. Make appropriate matching marks during removal and have the front end aligned once repairs are complete.

Subframe crossmember, removing and installing

1. Using engine support equipment, raise engine until weight of engine is supported. See **110 Engine Removal and Installation**. See Fig. 16.
2. Raise car and remove front wheels.

WARNING—

Make sure that the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

FRONT WHEEL BEARINGS

The front wheel bearings are permanently sealed and require no maintenance. The bearing is integral with the wheel hub and pressed onto the steering arm stub axle.

Special press tools are required to replace the front wheel bearings. Read the procedure through before beginning the job.

Front wheel bearing, replacing

1. Raise car and remove wheel.

WARNING—

Make sure that the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

2. Pry off dust cap from center of wheel hub. Bend back staked part of wheel hub (axle) collar nut. See Fig. 13.

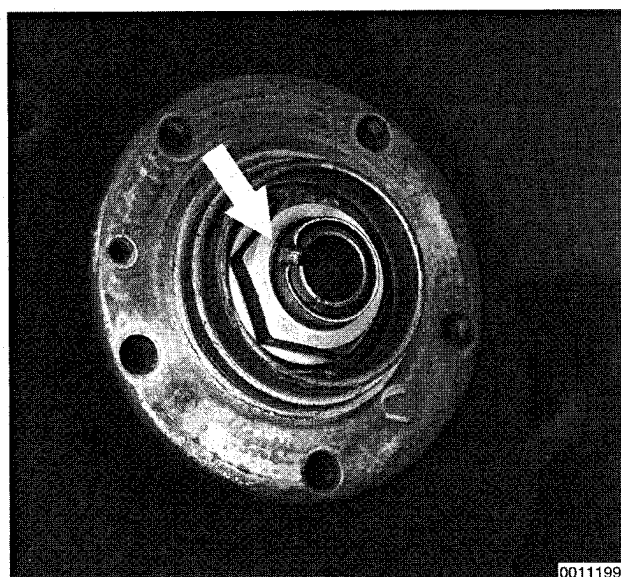


Fig. 13. Staked part of wheel hub collar nut to be bent back (arrow).

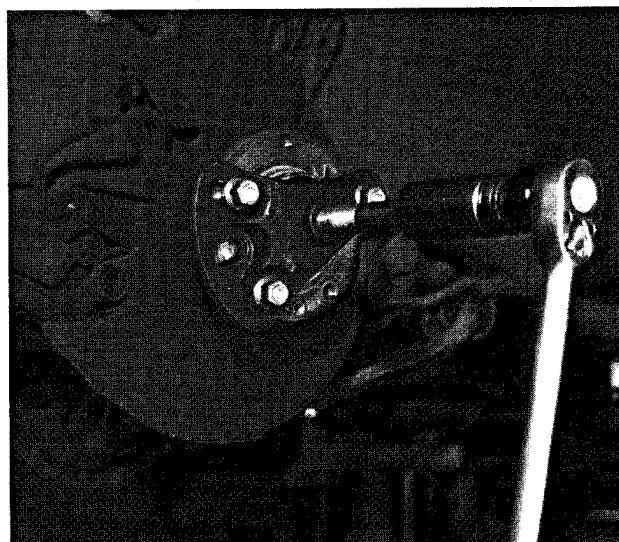
3. Remount wheel and lug bolts.
4. Lower car to ground. With an assistant applying brakes, loosen collar nut. Do not remove completely.

NOTE—

The wheel hub collar nut is tightened to a torque of 290 Nm (214 ft-lb). Make sure the car is firmly on the ground.

5. Raise car and remove wheel.

6. Remove ABS wheel speed sensor. Refer to Fig. 3.
7. Remove brake caliper assembly and brake rotor as described in **340 Brakes**. Leave brake hose connected to caliper. Suspend caliper assembly from chassis using stiff wire.
8. Remove wheel hub collar nut.
9. Remove wheel hub with integral wheel bearing from steering arm using a puller. See Fig. 14.



0011200

Fig. 14. Wheel hub with integral wheel bearing being removed using a puller.

NOTE—

If bearing inner race stays on steering arm, remove splash guard and use two-jaw puller to remove race.

10. Install splash guard and new dust shield behind bearing. Press new wheel hub/bearing assembly on using appropriate press tools.

NOTE—

When pressing the wheel hub/bearing on, apply force only to the bearing inner race.

11. Install new collar nut. Do not tighten nut to its final torque at this time.
 - Install brake rotor and brake caliper. See **340 Brakes**.
 - Mount wheel and lug bolts. Lower car to ground to gain leverage.
12. With an assistant applying brakes, tighten collar nut and then stake nut to axle.
13. Raise car and remove wheel.

6. Installation is reverse of removal.

- Make sure control arm ball joint taper bore is clean and free of any corrosion.
- Press new ball joint into position, making sure to align ball joint guide with mark made earlier.
- Verify that locking clip on new ball joint faces towards center of vehicle.

Tightening Torques

- Control arm ball joint to steering arm. 65 Nm (48 ft-lb)
- Stabilizer bar link to control arm (M8) 42 Nm (31 ft-lb)
- Road wheel to hub. 100±10 Nm (74±7 ft-lb)

Control arm bushing, replacing

Control arm bushings should always be replaced in pairs and the two bushings and bushing carriers should have the same markings, indicating same manufacturer.

1. Raise car.

WARNING—

Make sure that the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

2. Unbolt control arm bushing carrier from body.

3. Mark installed position of bushing to control arm. See Fig. 11.

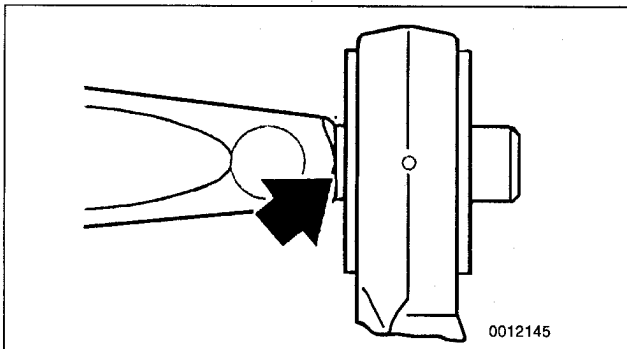


Fig. 11. Before removing bushing from control arm, mark installed position of old bushing to control arm. Install new bushing in same position.

4. Using appropriate press tools, pull control arm bushing assembly off control arm.

5. Coat end of control arm with BMW special lubricant part no. 81 22 9 407 284.

NOTE—

The kerosene-like special lubricant is used only as an aid in installing the bushing to the control arm stub. Work must be carried out in as short a time as possible. Within 30 minutes the control arm bushing will be "glued" in position on the control arm.

CAUTION—

BMW part numbers are provided for reference only and are subject to change. Always rely on an authorized BMW dealer parts department for the most up-to-date information.

6. Press new rubber control arm bushing assembly onto the end of control arm to proper depth (as marked).

NOTE—

Be sure to reinstall the bushing carrier to the control arm correctly. The carrier has centering bores on side. This side must face up towards body. See Fig. 12.

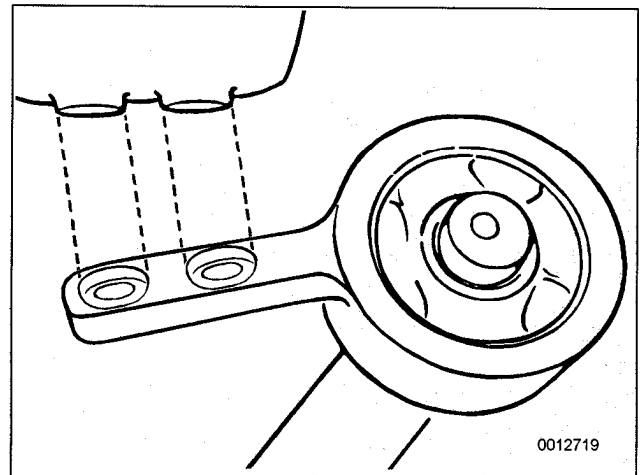


Fig. 12. Control arm bushing carrier centering bores must face up.

7. Immediately bolt control arm bushing carrier to body, torque bolts and lower car to ground.

Tightening Torques

- Control arm bushing carrier to body. . 47 Nm (34 ft-lb)

8. With car lowered to ground and loaded as described earlier, bounce suspension a few times, then leave car undisturbed for a minimum of 30 minutes.

CAUTION—

Failure to follow the above procedure may impair the car's handling and stability.

310-6 FRONT SUSPENSION

3. Working at steering arm, remove control arm ball joint nut. See Fig. 8. Press ball joint out of steering arm.

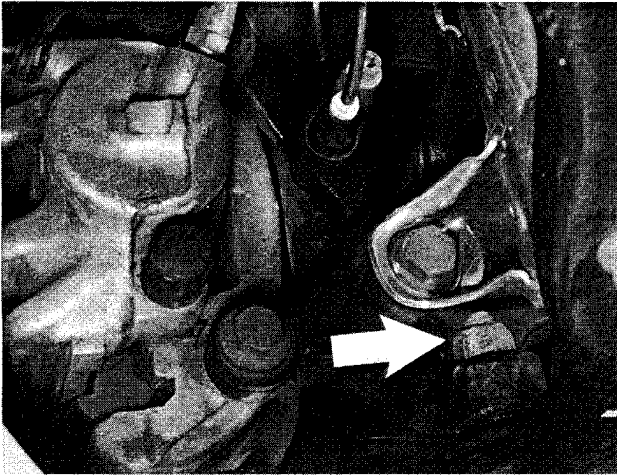


Fig. 8. Control arm ball joint nut at steering arm (arrow).

4. Remove control arm to subframe crossmember ball joint nut. Separate ball joint from crossmember. Working at other end of control arm, remove bolts attaching control arm bushing carrier to body. See Fig. 9.



Fig. 9. Control arm bushing carrier bolts (arrows).

5. Installation is reverse of removal. Make sure all thread bores, bolts, nuts and mating surfaces are clean. Use new self-locking nuts or bolts, where applicable.

WARNING—

- Do not reuse self-locking nuts or bolts. They are designed to be used only once and may fail if re-used.
- Bolts and nuts coated with a locking compound from the factory should not be reinstalled. Always replace "micro-encapsulated" fasteners such as the steering arm-to-strut bolts.

CONTROL ARMS

Tightening Torques

- Control arm ball joint to subframe crossmember 85 Nm (62 ft-lb)
- Control arm ball joint to steering arm . 65 Nm (48 ft-lb)
- Control arm bushing carrier to body . . 47 Nm (34 ft-lb)
- Stabilizer bar link to control arm (M8). 42 Nm (31 ft-lb)
- Road wheel to hub 100±10 Nm (74±7 ft-lb)

Outer control arm ball joint, replacing (except M3 models)

On all models except M3s, the outer ball joint is available as a replacement part. The ball joint can be replaced with the control arm installed.

Special tools are required to replace the ball joint. Read the procedure through before beginning the job.

1. Disconnect stabilizer bar link from control arm as described later in this repair group.

NOTE—

On M3 models, the stabilizer bar link attaches to the strut. It is not necessary to disconnect the stabilizer bar link on M3 models for this repair procedure.

2. Loosen nut for ball joint until it contacts steering arm.
3. Using a suitable ball joint tool, separate joint from steering arm. Remove ball joint mounting nut and pull ball joint out of steering arm.
4. Mark position of ball joint guide to control arm. See Fig. 10.

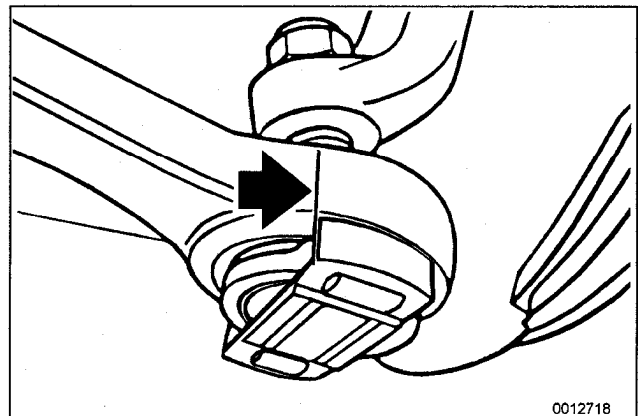


Fig. 10. Mark installed position of ball joint guide to control arm (arrow).

5. Move suspension strut out of way and press ball joint out of control arm.

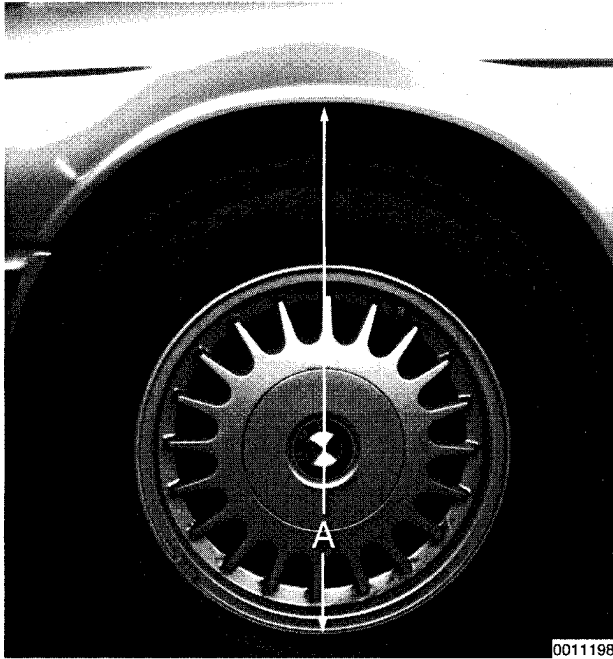


Fig. 6. Ride height measurement (A) is taken from center of wheel arch to bottom of wheel rim.

Normal loaded position

- Each front seat 68 Kg (150 lbs)
- Rear seat (center) 68 Kg (150 lbs)
- Trunk 21 Kg (46 lbs)
- Fuel tank full

Table a. Front Ride Height Specifications

Wheel size	318, 323, 325, 328 models	M3 models
15 inch		
std. suspension	576 mm (22.67 in)	555 mm (21.85 in)
sport suspension	561 mm (22.09 in)	530 mm (20.87 in)
16 inch		
std. suspension	589 mm (23.19 in)	570 mm (22.44 in)
sport suspension	574 mm (23.52 in)	545 mm (21.46 in)
17 inch		
std. suspension	604 mm (23.77 in)	585 mm (23.03 in)
sport suspension	589 mm (23.19 in)	560 mm (22.05 in)
Maximum variation between sides: 10 mm (0.4 in)		
Maximum deviation from specifications: 10 mm (0.4 in)		

CONTROL ARMS

On all models except M3s, the outer mounting bushing and the outer ball joint on the control arm are available as replacement parts. If the control arm center ball joint is worn, the complete control arm will need to be replaced. See Fig. 7.

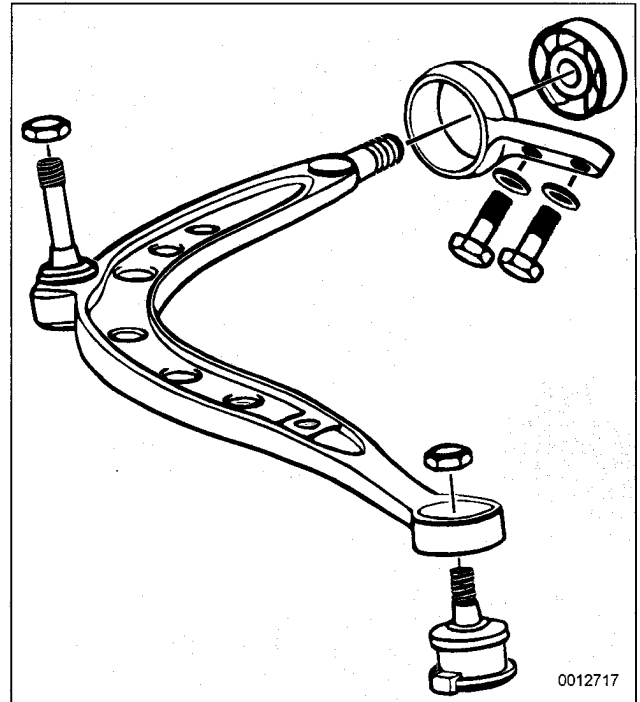


Fig. 7. Control arm. Outer ball joint and bushing are available as replacement parts (except M3). Center ball joint is integral with control arm.

Special press tools are required to remove the control arms and to replace the control arm bushings. Read the procedure through before beginning the job.

Control arm, removing and installing

1. Raise car and remove wheel.

WARNING—

Make sure that the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

2. Remove stabilizer bar link mounting nut and separate link from control arm as described later in this repair group.

NOTE—

On M3 models, the stabilizer bar link attaches to the strut.

310-4 FRONT SUSPENSION

Strut assembly, disassembling and assembling

NOTE—

Springs and/or struts should always be replaced in pairs.

Replacing the upper strut mount, spring and strut requires that the strut first be disassembled. For a guide to the parts during strut replacement, see Fig. 5.

WARNING—

Do not attempt to disassemble the struts without a spring compressor designed specifically for this job.

1. Remove strut assembly as described earlier. Place in secure support.
2. Using spring compressor, compress spring until spring force on upper mount is relieved.

WARNING—

Make sure the spring compressor grabs the spring fully and securely before compressing it.

3. Pry protective cover off top of strut assembly, then remove top (center) nut and washer while holding strut shaft stationary.
4. Remove upper strut mount and related components.
5. Release spring compressor carefully and evenly, allowing spring to expand slowly.

6. Assembly is reverse of disassembly, noting the following:

- Be sure upper spring pad is correctly installed to upper spring plate and spring end is correctly seated in upper and lower spring plates.
- Use a new self-locking top (center) nut. Tighten nut fully before releasing spring compressor.
- Have car professionally aligned when job is complete.

Tightening Torques

- Upper strut mount to strut shaft (self-locking nut) shaft with external hexagon 65 Nm (48 ft-lb) shaft with internal hexagon 44 Nm (32 ft-lb)
- Road wheel to hub 100±10 Nm (74 ±7 ft-lb)

Ride Height

Ride height is measured from the lower edge of the wheel arch to the bottom edge of the wheel rim. See Fig. 6.

If the ride height is outside the specification listed, new springs should be installed. Be sure to have the old spring code number on hand when ordering new spring.

NOTE—

The spring part number is stamped near the end of the spring coils.

Table a lists front suspension ride height specifications. These specifications apply to a car in a normally loaded position. When checking ride height or installing suspension components that require the car to be "normally loaded," load the car as follows:

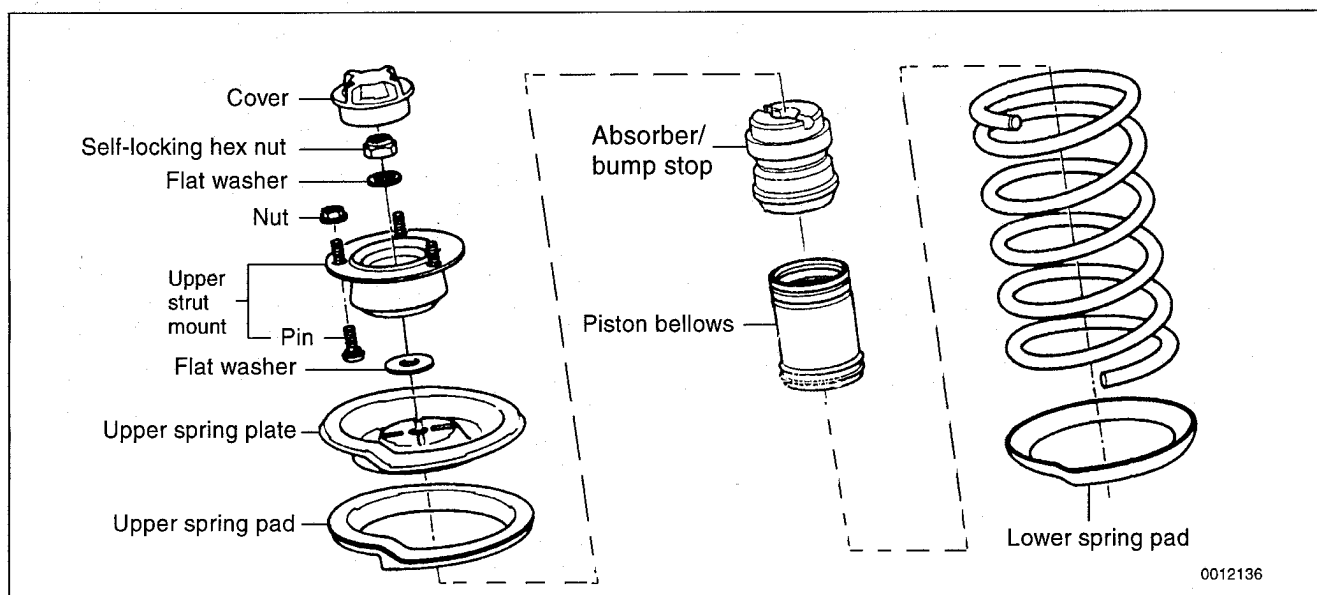


Fig. 5. Front spring, spring plate and related parts.

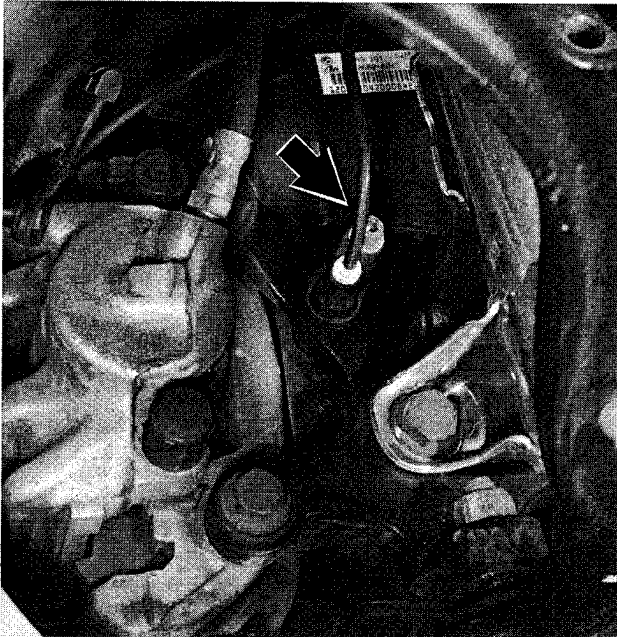


Fig. 3. ABS wheel speed sensor mounting bolt (arrow).

NOTE —

Note flats on stabilizer bar link ball joint for placement of open end wrench.

6. Unbolt splash shield and steering arm from strut. Suspend steering arm assembly from chassis using stiff wire. See Fig. 4.

CAUTION —

The steering arm ball joint can be damaged if the arm is allowed to hang unsupported.

7. Support strut assembly from below. From above, remove three strut mounting nuts on strut tower.

CAUTION —

Do not remove center strut retaining nut.

8. Lower strut assembly from car.

NOTE —

Store the removed strut assembly upright. Do not allow it to lie horizontally or upside-down for any length of time. If incorrect storage has occurred, place the strut assembly upright with the rod fully extended for at least 24 hours.

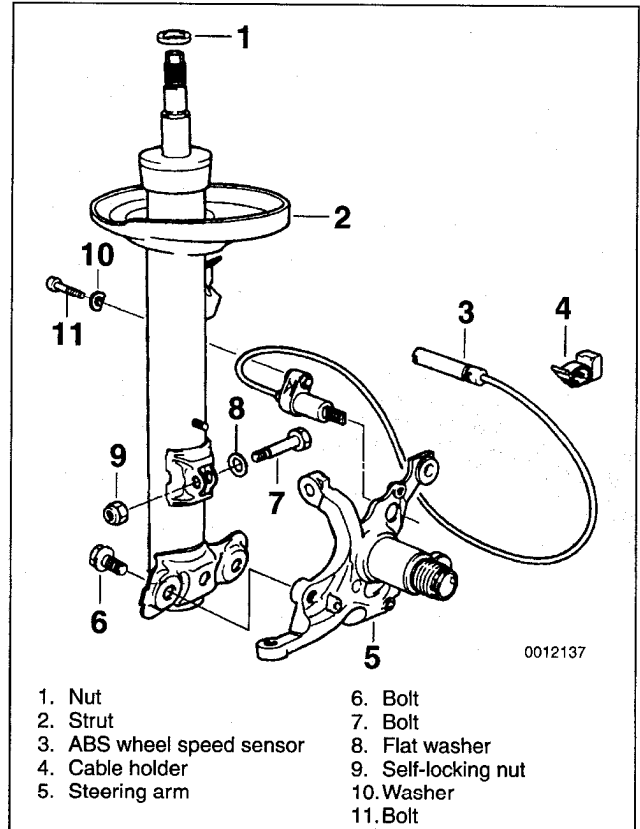


Fig. 4. Strut and steering arm assembly.

9. Installation is reverse of removal. Be sure to use new self-locking nuts and bolts.

- Use new steering arm mounting bolts, or clean bolts and use Locktite® 270 or equivalent thread-locking compound.
- On M3 models: When attaching stabilizer link to strut, use a thin wrench to hold flats on link parallel to strut.
- Have car professionally aligned when job is complete.

Tightening Torques

- Brake caliper to steering arm 110 Nm (81 ft-lb)
- Road wheel to hub 100±10 Nm (74 ±7 ft-lb)
- Stabilizer bar link to strut (M3) 59 Nm (44 ft-lb)
- Steering arm to strut housing
- (encapsulated bolts-always replace) 107 Nm (78 ft-lb)
- Strut assembly to strut tower (self-locking nuts) 24 Nm (16 ft-lb)

WARNING—

- Physical safety could be impaired if procedures described here are undertaken without the proper service tools and equipment. Be sure to have the right tools on hand before beginning any job.
- Do not reuse self-locking nuts or bolts. They are designed to be used only once and may fail if re-used. Always replace self-locking fasteners any time they are loosened or removed.
- Do not install bolts and nuts coated with undercoating wax, as the correct tightening torque cannot be assured. Always clean the threads with solvent before installation, or install new parts.
- Do not attempt to weld or straighten any suspension components. Replace damaged parts.

SHOCK ABSORBERS AND SPRINGS

The complete front strut assembly is shown in Fig. 2. Most strut assembly components are available as replacement parts.

NOTE—

Struts and/or springs should always be replaced in pairs.

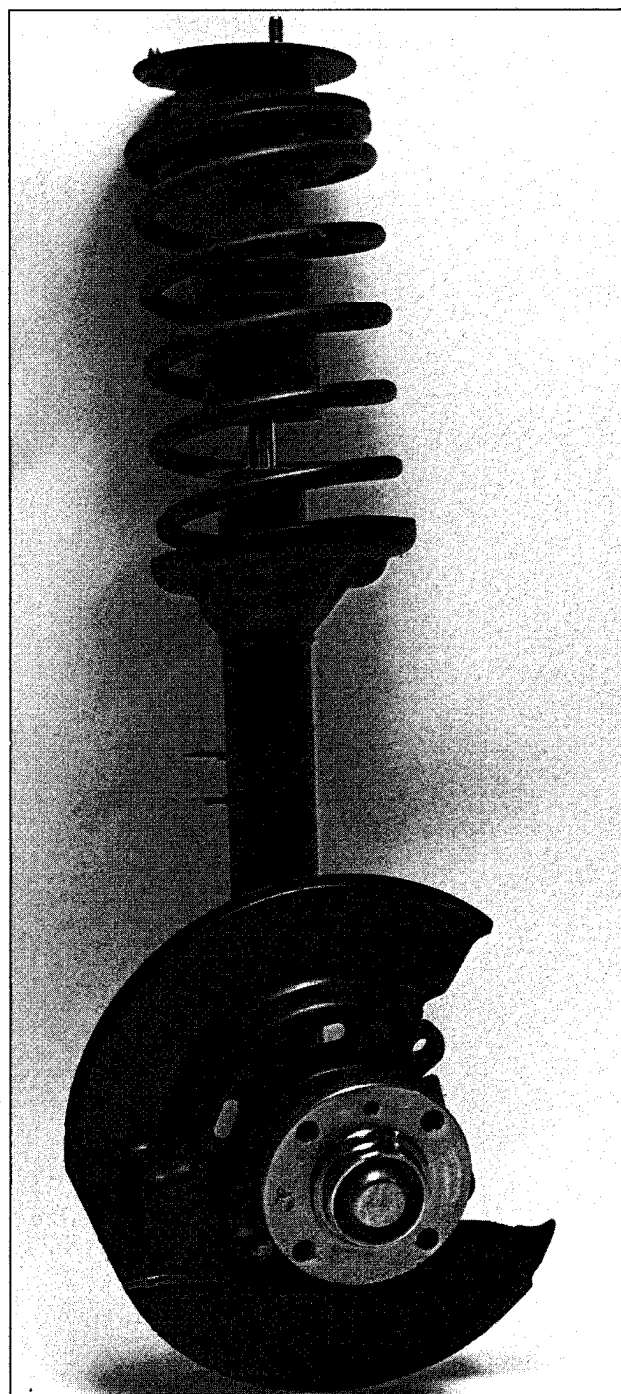
Strut assembly, removing and installing

1. Raise car and remove front wheel.

WARNING—

Make sure that the car is firmly supported on jack stands designed for the purpose. Place the jack stands beneath a structural chassis point. Do not place jack stands under suspension parts.

2. Unbolt brake caliper assembly, keeping brake hose connected. Detach brake hose from strut assembly. Suspend brake caliper from chassis using stiff wire. Remove brake rotor. See **340 Brakes**.



0011191

Fig. 2. Front strut assembly with steering arm, front hub, front spring and strut upper mount.

3. Remove ABS wheel speed sensor. See Fig. 3.
4. Disconnect ABS sensor wire harness and brake pad wear sensor wire harness (left side only) from strut housing.
5. On M3 models: Disconnect stabilizer bar link from strut.

SHOCK ABSORBERS AND SPRINGS

310 Front Suspension

GENERAL	310-1
SHOCK ABSORBERS AND SPRINGS ...	310-2
Strut assembly, removing and installing	310-2
Strut assembly, disassembling and assembling	310-4
Ride Height	310-4
CONTROL ARMS	310-5
Control arm, removing and installing	310-5
Outer control arm ball joint, replacing (except M3 models)	310-6
Control arm bushing, replacing	310-7

FRONT WHEEL BEARINGS	310-8
Front wheel bearing, replacing	310-8
STABILIZER BAR	310-9
Stabilizer bar, removing and installing	310-9
SUBFRAME CROSSMEMBER	310-9
Subframe crossmember, removing and installing	310-9

Table

a. Front Ride Height Specifications	310-5
---	-------

GENERAL

The E36 front suspension is shown in Fig. 1. For a general description of the front suspension and components, see **300 Suspension, Steering and Brakes-General**.

Special service tools are required for most of the work described in this repair group. Read the procedures through before beginning any job.

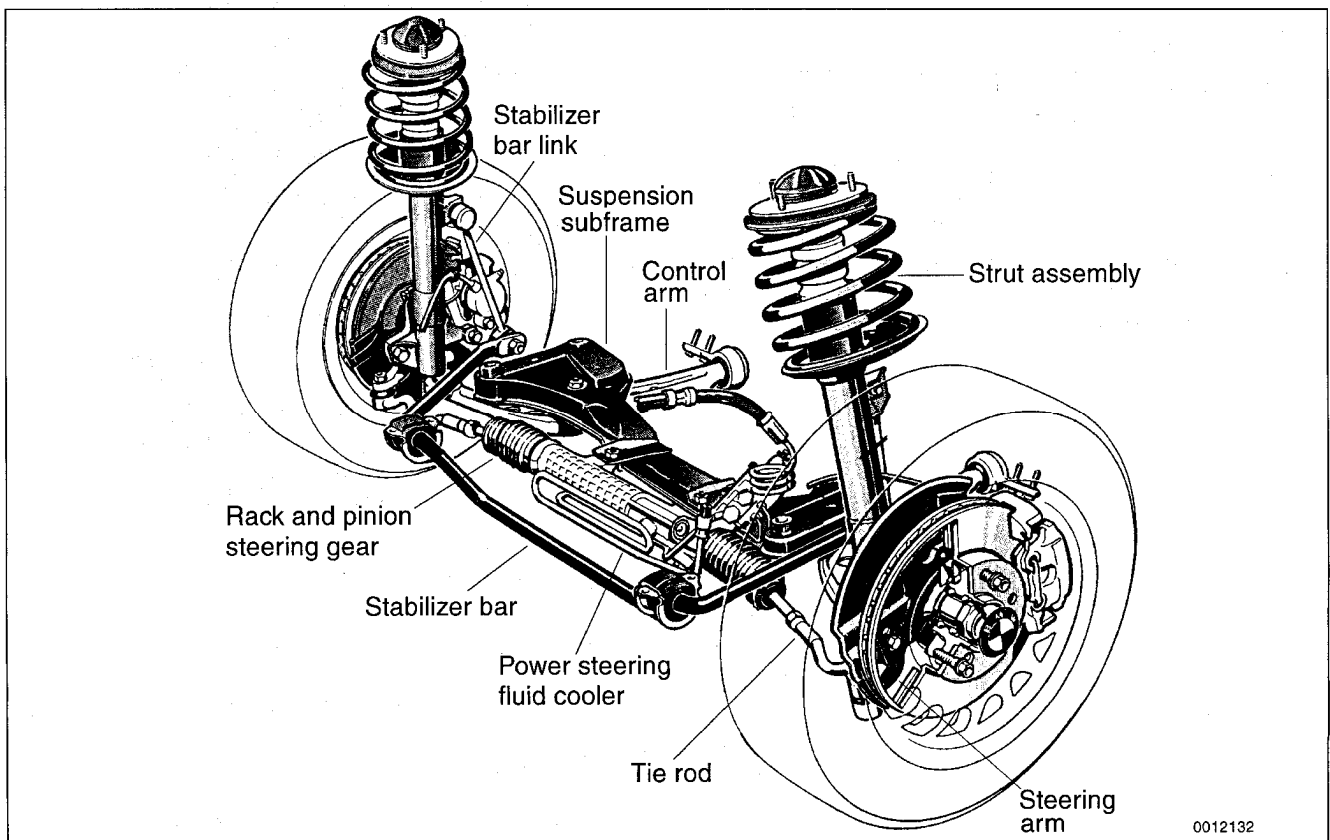


Fig. 1. BMW E36 front suspension. (M3 suspension shown. Others are similar.)

GENERAL