

FRONT SUSPENSION

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DESCRIPTION AND OPERATION

SUSPENSION DESCRIPTION

GT

The GT uses a maintenance-free independent front wheel suspension and features unequal length control arms and a transverse three-leaf spring. The entire front suspension is attached to the front cross member and can be removed as a unit if so desired.

The engines installed in the GT are not supported by mounting brackets but rest on a separate cross member. The front suspension cross member is reinforced in the area of the attachment to the frame. A one-part damper plate is installed between cross member and frame.

Ball joints are employed in the conventional manner to provide pivoting joints between the control arms and steering knuckles. Upward movement of the control arms is limited by two large rubber bumpers attached to the cross member.

Road shock is dampened by the double direct acting shock absorbers and a transverse double or triple steel band spring. In addition, the shock absorber limits downward travel of the control arms.

All moving parts, including ball joints, have no need for lubrication as they have been pre-lubricated for the life of the vehicle.

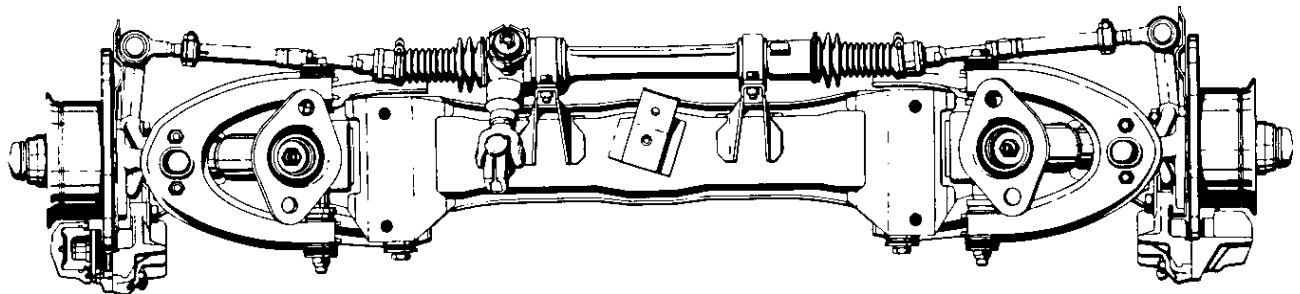
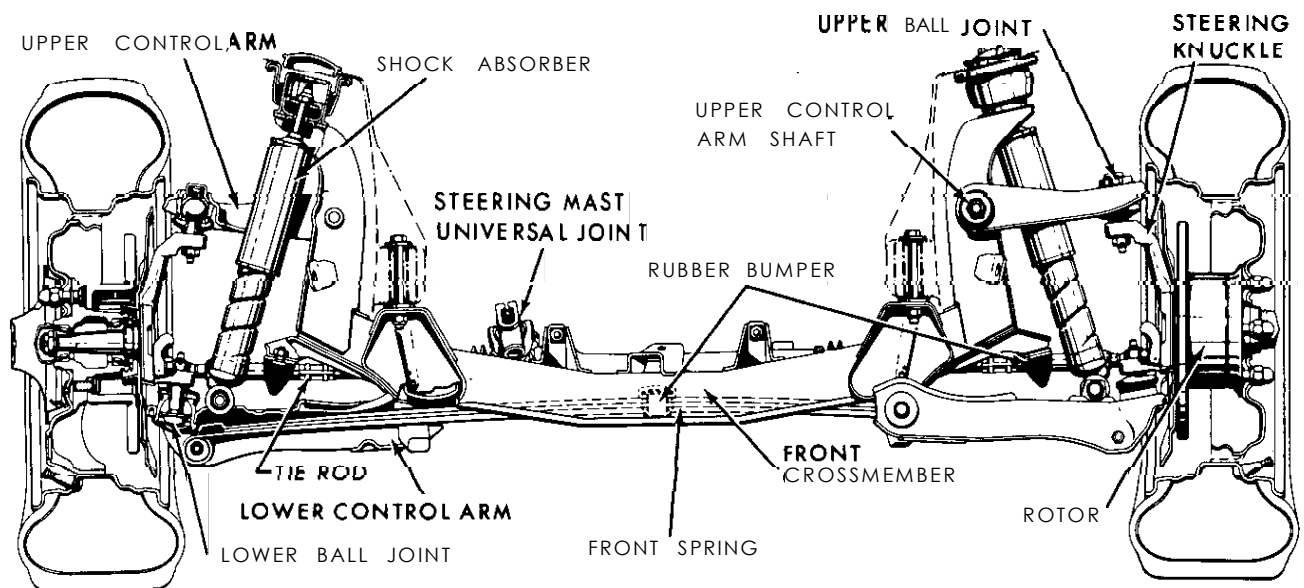
For distinguishing the individual front suspension cross members, a red label with black letters is stuck onto the front side of the shock absorber support. See Figure 3A-3.

Opel 1900. Manta

The front wheel suspension has coil springs and control arms of different length.

The stabilizer is designed to act as a tie strut. The end is supported in a rubber bushing which is located in a piece of tubing welded into the longer control arm.

To minimize brake torque, the horizontal shafts of

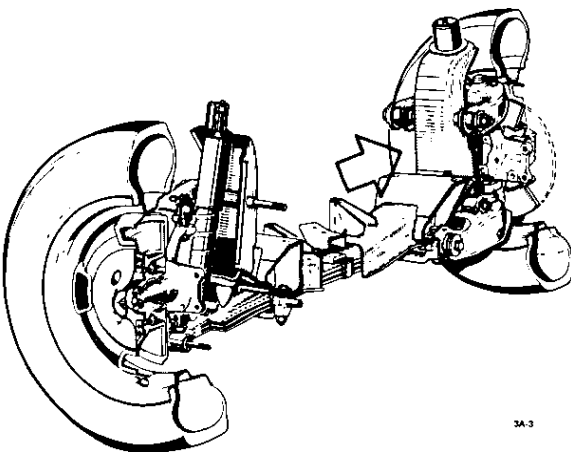


3A-2

Figure 3A-2 GT Front Suspension (Disc Brakes)

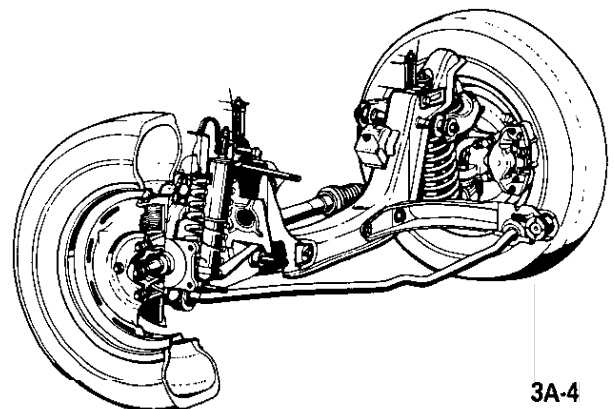
the upper and lower control arm are not in parallel (anti- dive).

The lower control arm is connected to the steering knuckle with a ball joint.



3A-3

Figure 3A-3 Cross Member Marking



3A-4

Figure 3A-4 Front Suspension • Opel 1900 Manta

The two cross-members to body supports are attached to the horizontal part of the cross-member with two bolts. The *outer bolt* serves simultaneously as support for the lower control arm. As the bolt is inserted from the front, the cross-member to body support can be removed without the lower control arm. The *inner bolt* attaches simultaneously to the steering.

The stabilizer is U-shaped and supported in rubber bushings in the two cross-members to body supports.

The complete front suspension is attached to the underbody in four places.

The engine damper blocks are bolted to the inside of the inclined parts of the cross-member.

The front wheel bearings are roller bearings.

All front suspension joints are maintenance-free.

MAINTENANCE AND ADJUSTMENTS

FRONT WHEEL BEARING ADJUSTMENT

1. If wheel has not previously been removed from the car, remove grease cap, cotter pin, and spindle nut. Discard cotter pin.
2. Torque spindle nut to 18 lb.ft. while rotating wheel. This will allow the bearings to settle.
3. Back off spindle nut 1/4 turn. If slot and cotter pin hole are staggered, further back off nut 1/12 turn, **but do not tighten**, until next slot in nut is in alignment with hole in spindle. Install **new** cotter pin. A properly adjusted wheel bearing has a small amount of end play and a loose nut when adjusted in the above manner.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF FRONT SUSPENSION

(COMPLETE ASSEMBLY)

Removal GT

1. Prior to raising front end of car, apply parking brake and block rear wheels.
2. Raise front end of car with a jack. It is recommended that a wood block be placed between the

jack and the front cross member to prevent damage to the cross member.

3. Support front end of car by placing floor stands under jacking brackets.
4. Support engine-transmission assembly in uppermost position with jack stand at rear of engine, or an alternate method would be to use Engine Holding Fixture, Tool J-23375. See Figure 3A-5.

Install tool by removing upper engine mount nut and installing fixture. Replace nut and tighten. The engine will now be supported by the tool between the frame rails.



Figure 3A-5 Engine Holding Fixture Installed

5. Loosen steering mast at the lower universal joint and take out clamp bolt. Loosen clamp at the upper universal joint and lift steering mast upwards until it is free at the lower universal joint. See Figure 3A-6.
6. Disconnect brake lines at brake hose.
7. Disconnect shock absorber at upper mounting. It is necessary to remove air cleaner. See Figure 3A-24.
8. Disconnect engine mounts at cross member.
9. Remove front suspension cross member attaching nuts and lower the cross member.

Removal Opel 1900 - Manta

1. Prior to raising front end of car, apply parking brake and block rear wheels.

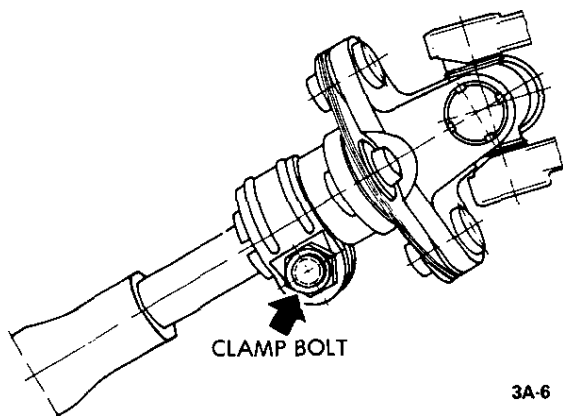


Figure 3A-6 GT Steering Mast Joint

2. Install Hooks J-23697 before jacking up car to assure proper loading of suspension bushings and mounts. See Figure 3A-7.
3. Raise front of vehicle and support with stands.
4. Remove front wheels.
5. Remove guard plate. See Figure 3A-8.
6. Remove brake line retainers on both sides. The brake system remains closed. Unscrew brake calipers and suspend them in wheel house.

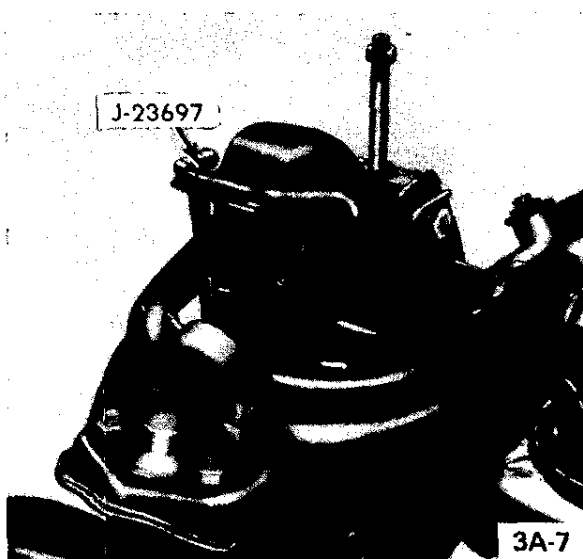


Figure 3A-7 Installing Hooks J-23697

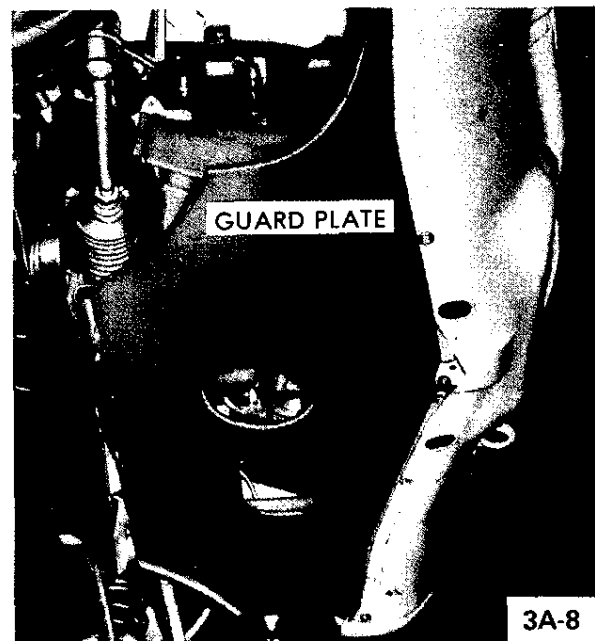


Figure 3A-8 Removing Guard Plate

7. Suspend engine with a suitable engine lifter, similar to the one shown in Figure 3A-9.
8. Unscrew lower steering mast clamp bolt out of pinion flange. See Figure 3A-10.
9. Unscrew front left and right engine mount from damper block.
10. On top and in the rear, unscrew front suspension

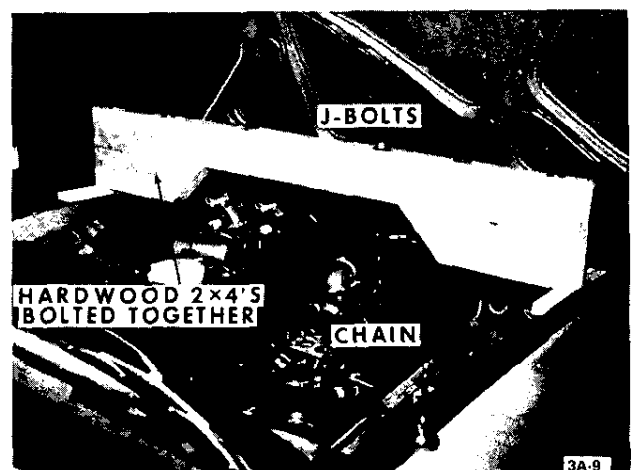


Figure 3A-9 Suitable Engine Lifter

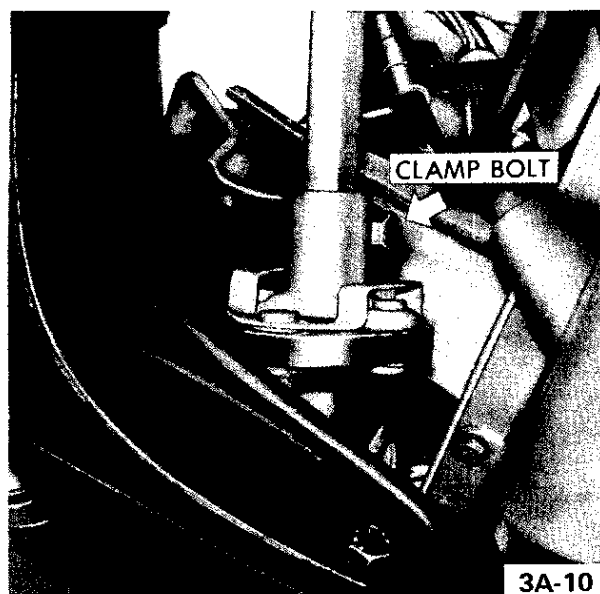


Figure 3A-10 Steering Mast Clamp Bolt

assembly at the cross member to body support from frame and let it down onto jack. See Figure 3A-11.

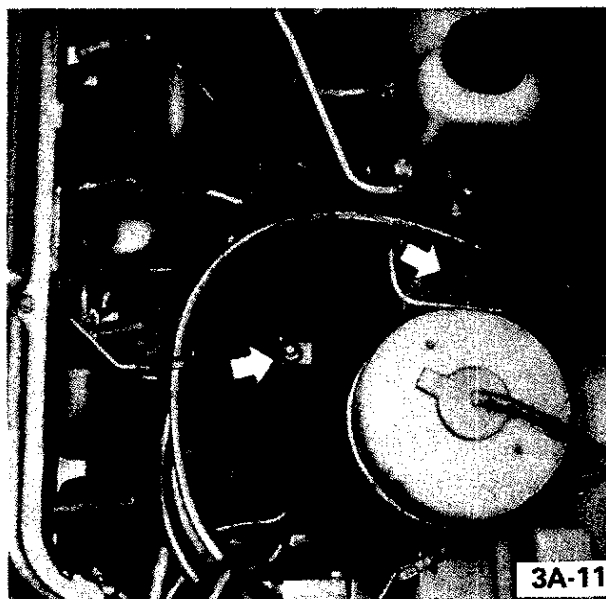


Figure 3A-11

Installation GT

CAUTION: Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part or lesser quality or substitute design.

Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Support front suspension and cross member on jack and raise into position.
2. Attach cross member to front frame rail. Torque to 36 lb.ft.
3. Install engine mounting nuts. Remove engine support.
4. Install shock absorber mounting bolts and install air cleaner.
5. Connect brakes hoses and bleed brakes as outlined in Group 5.
6. Install radiator mounting bolt in support cross member.
7. Push steering column downwards until a 1/8" clearance is obtained between steering wheel hub and switch cover.
8. With steering wheel in centered position and front wheels straight ahead, tighten the clamp bolt at the lower universal joint to 22 lbs.ft. and the clamp at the upper universal joint to 14 lbs.ft. See Figure 3A-6.
9. Install mast guide sleeve stop bolt. Always install new lock plate. See Figure 3A-7.
10. Remove front support stands and lower vehicle.

Installation Opel 1900 · Manta

1. With jack, lift up front suspension assembly so that the individual attaching points coincide. At the same time, insert lower steering mast into pinion flange. See Figure 3A-12.
2. In the rear bolt cross member to body support. Torque to 58 ft.lbs. When doing this with a suitable tool, counterhold damper bushing which is installed in a certain position, to prevent it from turning. For this purpose, detach heat deflector plate on right vehicle side.
3. Torque front suspension assembly to frame attachment to 47 ft.lbs.
4. Torque lower steering mast to pinion flange attachment clamp bolt to 22 ft.lbs.
5. Reinstall both brake calipers. Torque to 72 ft.lbs. Install brake line retainer.
6. On both sides install upper control arm ball joint. Torque bolts to 29 ft.lbs.

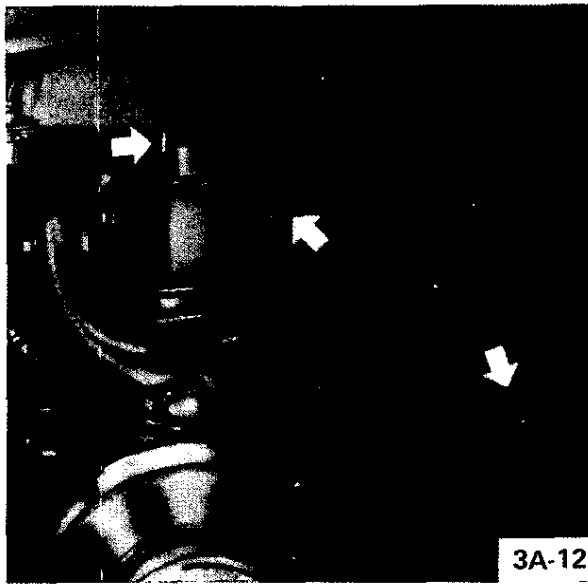


Figure 3A-12 Front Suspension Attaching Points

Always use new self-locking nuts.

7. Reinstall guard plate.
8. Crosswise torque wheel nuts to 65 ft.lbs.

UPPER BALL JOINT REMOVAL AND INSTALLATION

Removal

1. Place jack under spring eye and raise car. Remove wheel from car.
2. Remove cotter pin and castle nut from upper ball joint stud. Discard cotter pin.
3. Press ball stud from steering knuckle using puller J-21687, and remove two (2) bolts attaching ball joint to upper control arm. See Figure 3A-13.
4. If dust cap on upper ball joint is torn or missing, the ball joint should be replaced.

Installation

CAUTION: Fasteners are important attaching parts in that they could *affect* the *performance* of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an *equivalent part* if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified *during reassembly* to assure proper retention of these parts.

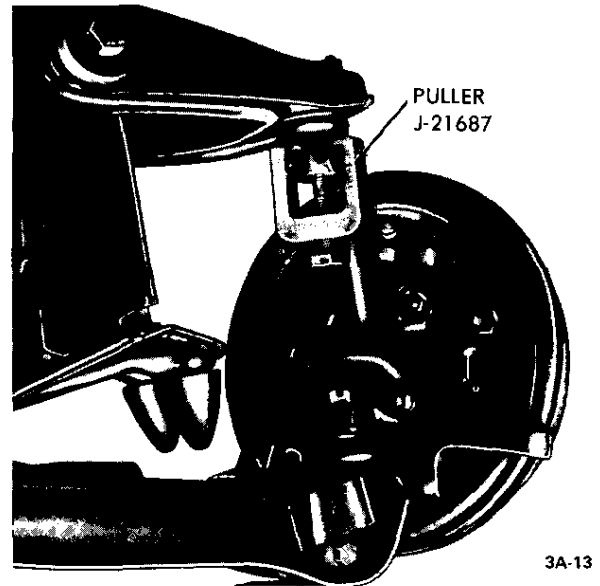


Figure 3A-13 Upper Ball Joint

1. Install upper control arm ball joint with the off center holes in flange showing towards the steering knuckle spindle.
2. Install two (2) bolts attaching ball joint to upper control arm. Torque nuts to 29 lb.ft.
3. Install upper ball joint stud in steering knuckle and torque castle nut to 29 lb.ft. on GT and 40 lb.ft. on Opel 1900 • Manta.
4. Install new cotter pin, and replace wheel.
5. Always check caster and camber after installing new ball joints.

LOWER BALL JOINT REMOVAL AND INSTALLATION

New lower ball joints have an axial play of up to .020 inch. The maximum permissible axial play of older ball joints is .080 inch. At an axial play of more than .080 inch, the lower ball joint must be replaced. If the dust cap is torn, loose, or missing, the lower ball joint must also be replaced. See Figure 3A-14.

The lower ball joints are checked for wear by using Checking Gauge J-23402 for the GT, and using Checking Gauge J-23745 for the Opel 1900 • Manta. See Figure 3A-15.

Removal GT

1. Raise car and support at rear of front frame rails.
2. Remove front wheel.

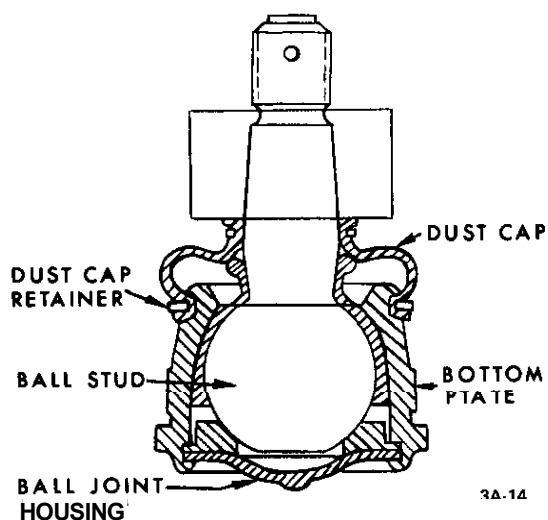


Figure 3A-14 Lower Ball Joint

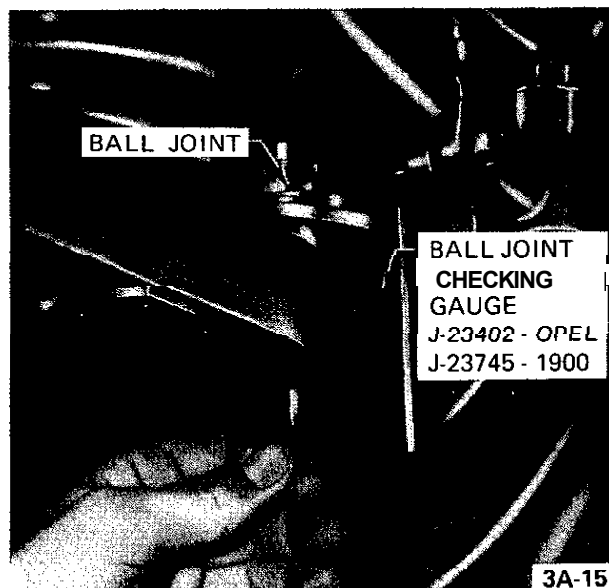


Figure 3A-15 Ball Joint Checking Gauge Installed

3. Remove cotter pin from castle nut on ball joint stud and back off castle nut two (2) turns. Hit ball stud a sharp blow to break it loose. DO NOT REMOVE NUT.

4. Install spring compressor (J-21689) and compress spring until a distance of 3-1/8" is achieved between spring compressor and lower spring leaf. See Figure 3A-16.

5. Disconnect shock absorber to lower control arm

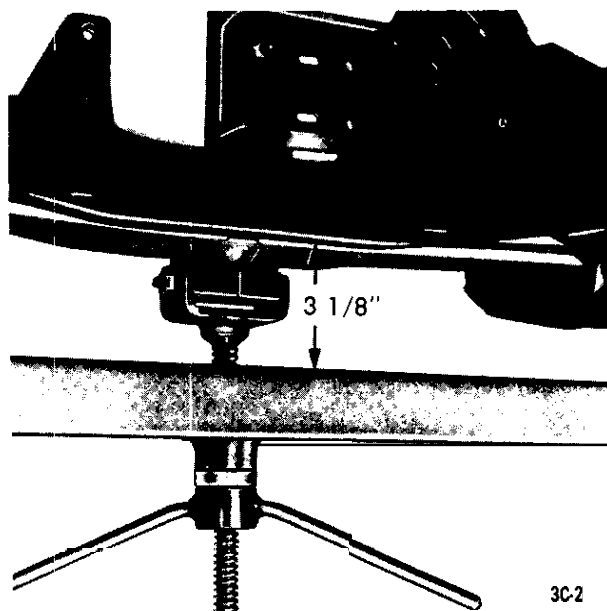


Figure 3A-16 Spring Compressor

attachment bolt and swing shock absorber out of the way.

6. Remove castle nut from ball joint stud. Prior to the removal of the lower ball joint from the control arm, note the position of the locating notch, shown in Figure 3A-17, in the rim of the ball joint housing. Scribe or mark the control arm to facilitate alignment of the replacement ball joint during installation.

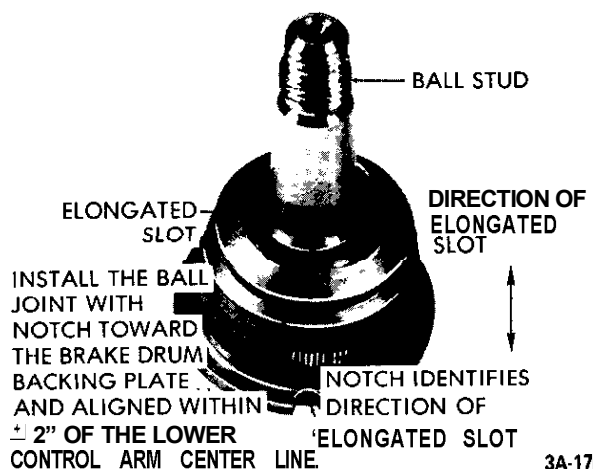


Figure 3A-17 Lower Ball Joint Notch • GT

7. Pry off dust cap retainer and remove dust cap being careful not to damage it.

8. Press ball stud out of lower control arm.

Removal Opel 1900 - Manta

Before raising vehicle, install Hooks J-23697 on respective vehicle side to cross member and upper control arm. See Figure 3A-7.

1. Raise car and support at rear of front frame rails.
2. Remove front wheel.
3. At the lower control arm ball joint, remove castle nut cotter pin and slacken back nut so that the thread can no longer be damaged.
4. With a suitable drift, detach ball joint from steering knuckle. With jack, lift up lower control arm, unscrew castle nut and remove Hooks J-23697.
5. Unscrew upper control arm ball joint and suspend front wheel hub and brake caliper in wheel house. Do not turn upper control arm ball joint flange, as this would result in a change of camber.
6. Remove defective lower control arm ball joint using Tools J-9519 and Receiver J-23754.
2. Install dust cap on lower ball joint and fill with chassis lubricant. Attach dust cap retainer.
3. Press ball joint into steering knuckle. Use J-9519-3 as installer **and** J-21690 as a supporting sleeve.
4. Install castle nut on ball joint stud and torque to 40 lb.ft. Install new cotter pin.
5. Reconnect shock absorber to lower control arm and torque to 30 lb.ft.
6. Remove spring compressor.
7. Install front wheel, and lower the car.
8. Always check caster and camber after ball joint replacement.

Installation GT

CAUTION: Fasteners are important attachingparts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part *number* or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. When pressing the ball joint in place, make certain the locating notch in the lower rim of the ball joint matches the alignment reference mark placed on the lower control arm prior to removal. The notch in the ball joint bottom plate, identifying the direction of the elongated slot, must point towards the brake drum backing plate. See Figure 3A-17. Alignment must be within 2 degrees of lower control arm centerline. If proper positioning of the ball joint is not accomplished, the result is a limitation of the necessary ball stud movement. If ball stud movement is limited, an interference between the ball stud and housing is created, and binding or even fracture may occur. Replacement ball joints may or may not have marking notch as shown in Figure 3A-20. If it does not have a marking notch, the joint is completely symmetrical and may be installed in any position. When pressing in ball joint do not press on bottom plate, but on ball joint housing only.

Installation Opel 1900 - Manta

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1. Drive new ball joint into lower control arm using Tools J-9519 as installer and J-23755 as a supporting sleeve. Do not strike onto ball joint **bottom**.

The ball joint is maintenance-free. It is supplied as an assembly only and cannot be disassembled further.

2. On new lower control arm ball joint, make sure that the marking groove in the housing bottom in alignment with the axis of the lower control arm. Permissible deviation: minus 2 degrees to plus 2 degrees.

This is required, to obtain the maximum freedom of movement of the ball stud in the housing. See Figure 3A-18.

3. Attach steering knuckle together with front wheel hub and brake caliper to lower control arm ball joint. Torque castle nut to 54 ft.lbs.
4. Attach ball joint to upper control arm and torque to 29 ft.lbs. Always use new self-locking nuts.
5. Install wheel and tighten nuts to a torque of 65 ft.lbs.
6. Lower car and check caster and camber.

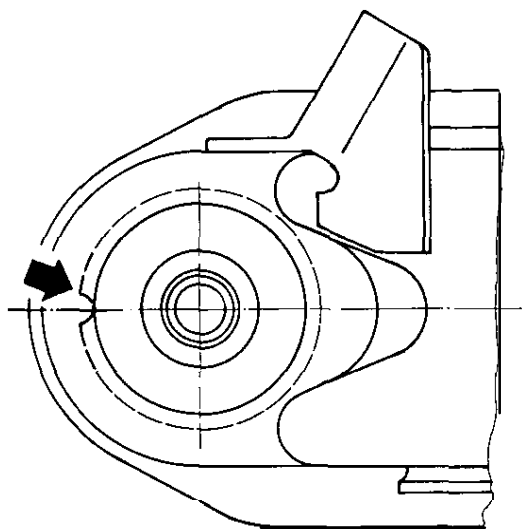


Figure 3A-18 Lower Ball Joint Notch Opel 1900 . Manta

UPPER CONTROL ARM REMOVAL AND INSTALLATION

Removal GT

1. Raise car and support at rear of front frame rails.
2. Remove front wheel.
3. Install spring compressor and compress spring until there is 3-1/8" between compressor and lower spring leaf.
4. Remove cotter pin and castle nut from upper ball joint stud. Discard cotter pin.
5. Use tie rod remover J-21687 remove ball joint from steering knuckle. 6. Support brake drum to relieve tension on brake hose.
7. Remove hex nut from upper control arm shaft. Remove shaft and washers from shock absorber support. Do not damage threads on control arm shaft.
8. Remove control arm from car. Do not lose inner toothed washers. Note size and location of toothed washers.

Removal Opel 1900 . Manta

1. Raise car and support at rear of front frame rails.
2. Remove front wheel
3. Unscrew upper control arm to cross member self-locking attaching nut.

4. Unscrew ball joint from upper control arm. Do not turn upper control arm ball joint flange, as this would result in a change of camber.

5. Support front wheel hub so that brake hose is not stressed.

6. Pull out upper control shaft to cross member attaching bolt and remove control arm. Shims have to be reinstalled in their original location to maintain the proper caster setting.

Installation GT

CAUTION: Fasteners are important attaching parts in that they could affect the the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part or lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

If rubber bushings on control arms are worn, arms must be replaced.

1. Slide rubber rings over bushings. Slide rings over inner sleeves of bushings. Place control arm in position on shock absorber support, installing toothed washers in their *original* positions. See Figure 3A-19.
2. From front to rear, install control arm shaft. If necessary, align washers and control arm bushings with a small drift prior to installing control arm shaft. See Figure 3A-19.
3. Tighten hex nut on control arm shaft finger tight.
4. Increase tension on spring compressor in order to relieve tension on control arm shaft. Then torque hex nut on control arm shaft to 33 lb.ft.
5. Press ball joint stud into steering knuckle and torque castle nut to 29 lb.ft. Install new cotter pin.
6. Remove spring compressor and lower car.
7. Check front end alignment.

Installation Opel 1900 - Manta

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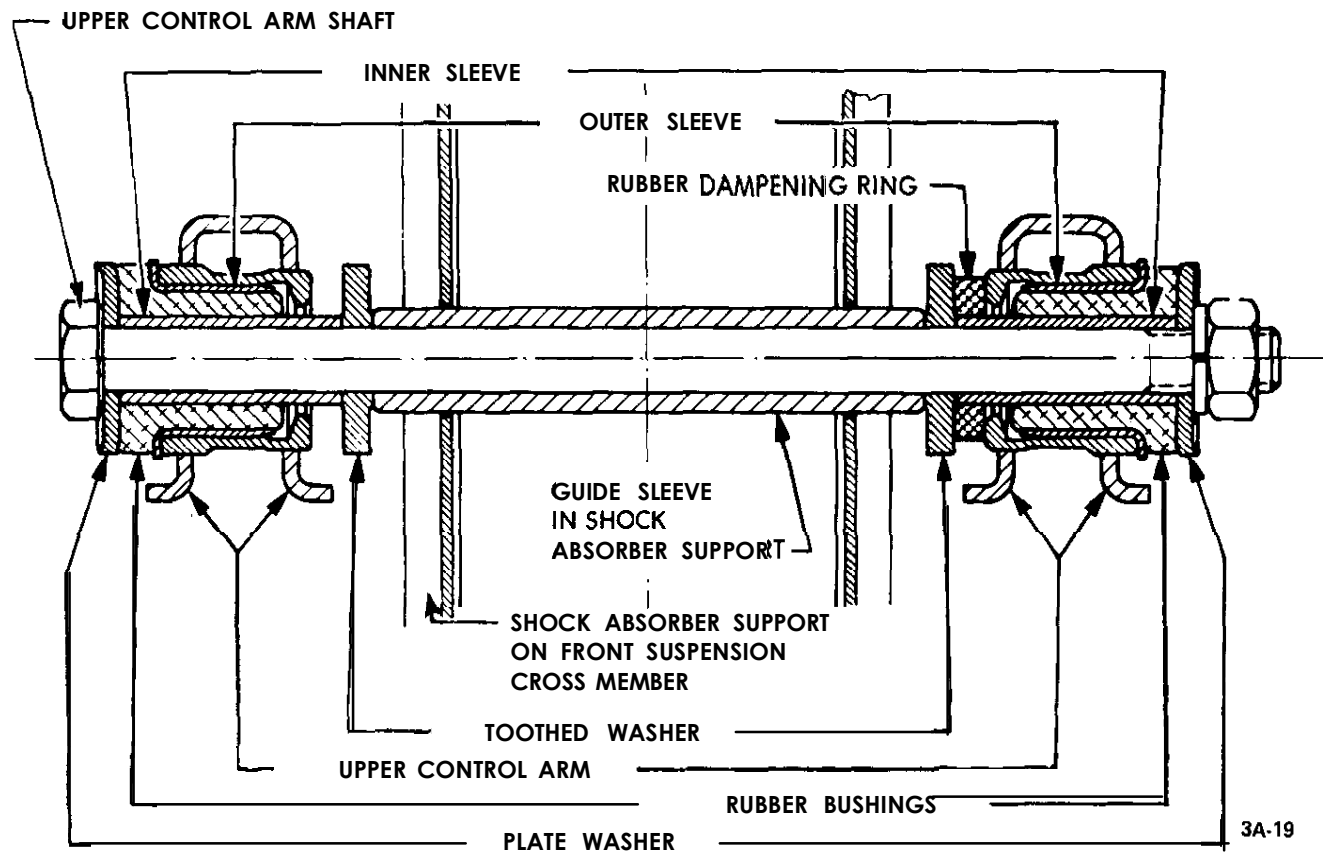


Figure 3A-19 Upper Control Arm Shaft and Bushings

placement part of lesser quality or substitute design. Torque *valves* must be used as specified during *reassembly* to assure proper retention of these parts.

1. On installation of the upper control arm, make sure that damper bushing with the rubber shoulder on both sides is always located in the rear.

2. Attach upper control arm to cross member and torque to **40 lb.ft.** Always use new self-locking hex nut. The upper control arm must be tightened in horizontal position only. This applies also to all other attaching joints in connection with rubber damper bushings in the control arms of the front suspension so that the rubber parts under load are in an almost twist-free condition. This position exists, if the hooks J-23697 are used.

3. Attach ball joint to upper control arm and torque to **29 lb.ft.**

4. Install wheel and torque nuts to **65 lb.ft.** Lower car.

LOWER CONTROL ARM REMOVAL AND INSTALLATION

Removal GT

1. Raise car and support at rear of front frame rails.

2. Remove front wheel.

3. Remove cotter pin from castle nut on ball joint stud and back off castle nut two (2) turns. Hit ball stud a sharp blow to break it loose. **DO NOT REMOVE NUT.**

4. Install spring compressor (J-21689) and compress spring until a distance of **3-1/8 inches** is achieved between spring compressor and lower spring leaf.

5. Disconnect and compress shock absorber.

6. Support rail of spring compressor with a jack. Remove lower control arm from frame cross member. Nuts may have to be removed with a punch. See Figure 3A-20. Discard the lock nuts.

7. Remove lower ball joint stud nut. Slightly lower

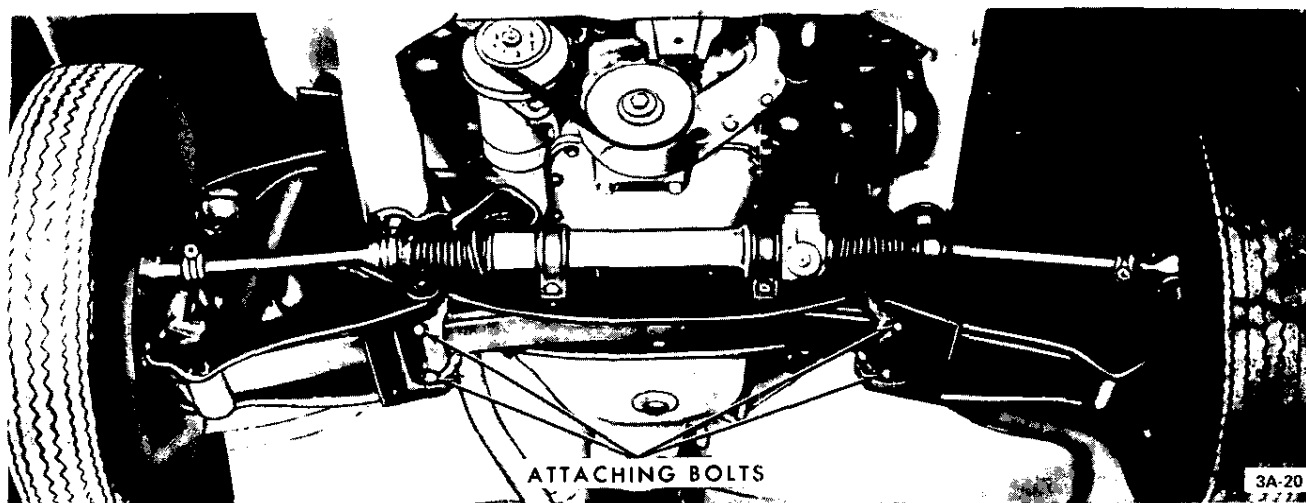


Figure 3A-20 Lower Control Arm Attachment

jack so that spring and lower control arm assembly is removed from the front cross member and steering knuckle.

8. Lower jack, spring compressor, and front spring with control arm assembly. Remove lower control arm to spring nuts.

9. Release spring compressor and remove control arm attaching bolts and control arm.

Removal Opel 1900 - Manta

1. Prior to raising car, install upper control arm hooks J-23697.

2. Raise car and support with stands. Hoist should be left in the raised position to maintain pressure on lower control arm.

3. Remove front wheel.

4. Detach both stabilizer supports from cross member to body support.

5. In lower control arm, remove self-locking hex head bolt from stabilizer support and remove washer.

6. Using a pry bar, pry stabilizer bar out of lower control arm support.

7. Remove shock absorber.

8. At lower control arm ball joint, remove castle nut cotter pin and remove nut.

9. With suitable drift, detach lower control arm ball joint from steering knuckle.

10. Loosen nut that retains lower control to front cross member.

11. Slowly lower hoist to release spring tension.

12. **Swing lower control arm downwards and remove front spring.**

13. Remove nut that retains lower control arm to front cross member and remove lower control arm.

Installation GT

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1. Attach lower control arm to front spring eye. Torque bolts to 18 lb.ft.

2. Install spring compressor and with a jack raise spring compressor with spring and control arm assembly into position for pressing ball joint into steering knuckle.

3. Press ball joint into steering knuckle. Use J-9519-3 as installer and J-21690 as a supporting sleeve.

4. Install castle nut on ball joint stud and torque to 54 lb.ft. Install new cotter pin.

5. Attach lower control arm to frame cross member using new lock nuts.

6. Reconnect shock absorber to lower control arm and torque to 30 lb.ft.
7. Remove spring compressor.
8. Install front wheel, and lower the car.
9. Check front end alignment.

Installation Opel 1900 Manta

CAUTION: Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expenses. They must be replaced with one of the same part number or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Loosely attach lower control arm to front cross member.
2. Properly seat spring between lower control arm and cross member.
3. Raise jack and place lower control into position.
4. Attach lower control ball joint to steering knuckle and torque nut to 54 lb.ft.
5. Tighten lower control arm to cross member bolt to 43 lb.ft.
6. Attach stabilizer bar to lower control arm and torque to 87 lb.ft.
7. Attach stabilizer bar to cross member to body support.
8. Install shock absorber and torque lower attaching nut and bolt to 30 lb.ft.
9. Install nuts on upper shock absorber attaching studs. Tighten nuts until a distance from top of nut to stud is approximately 1/2 inch.
10. Install front wheels and tighten nuts to 65 lb.ft.
11. Remove stands and lower car.

STEERING KNUCKLE REMOVAL AND INSTALLATION

Removal GT

1. Raise car and support with stands.
2. Remove wheel nuts. Remove wheel assembly.

3. Remove two (2) bolts holding caliper to steering knuckle. See Figure 3A-21. Hang caliper on a wire from the upper control arm as shown in Figure 3A-22.



Figure 3A-2 1 Caliper Attachment

4. Remove spindle grease cap. Remove cotter pin and spindle nut. Remove wheel hub with disc.
5. Install J-21689 spring compressor and compress spring until 3-1/8" clearance is obtained between spring compressor and lower spring leaf.
6. Remove upper ball joint using tie rod remover, J-21687.
7. Remove shock absorber at lower attachment *only*.
8. Remove lower ball joint using J-21687 remover and remove steering knuckle. Remove dust shield from steering knuckle.

Removal Opel 1900 Manta

1. Raise car and support with stands.
2. Detach brake caliper and steering arm from steering knuckle.
3. Remove castle nut cotter pin, unscrew nut and pull steering knuckle off upper control arm ball joint.
4. Unscrew brake caliper and suspend it in wheel house.
5. Remove front wheel hub.
6. Unscrew steering arm and brake cover plate from

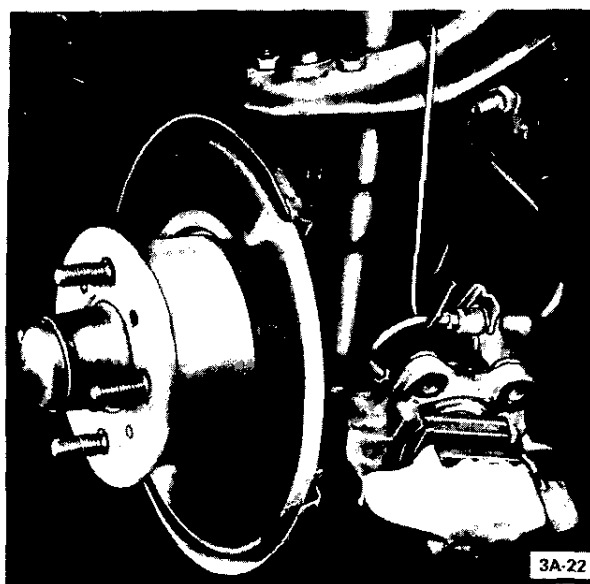


Figure 3A-22 Caliper Removed and Hung by Wire

steering knuckle. Swing steering arm and tie rod to the side.

7. Remove castle nut cotter pin, unscrew nut and pull steering knuckle off lower control arm ball joint.

Installation GT

CAUTION: Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Always replace paper gasket when installing dust shield on steering knuckle. Lightly coat both surfaces of paper gasket with chassis lubricant before installation and torque attaching bolts to 47 lb.ft.

2. Install lower ball joint in steering knuckle. Torque castle nut to 54 lb.ft. Install new cotter pin.

3. Attach shock absorber at lower end. Torque bolts to 30 lbs. ft.

4. Install upper ball joint. Torque castle nut to 29 lb.ft. Install new cotter pin.

5. Remove spring compressor.

6. Install hub and disc on spindle and tighten spindle nut as stated under MAINTENANCE AND ADJUSTMENTS in this section.

7. Install caliper on steering knuckle and torque bolts to 72 lb.ft. See Figure 3A-21.

8. Install wheel and torque wheel nuts to 65 lb.ft.

Installation Opel 1900 • Manta

CAUTION: Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with equivalent parts, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Attach steering knuckle to lower control arm ball joint. Torque castle nut to 54 lb.ft.

2. Attach brake cover plate and steering arm to steering knuckle. If required, install new paper gasket between cover plate and steering knuckle. Care for proper seat of T-head bolts. See Figure 3A-23.



Figure 3A-23 Attaching Brake Cover Plate

3. Install front wheel hub and brake caliper.

4. Attach steering knuckle to upper control arm ball joint. Torque castle nut to 40 lb.ft.

5. Steering arm to steering knuckle - 58 lb.ft.

6. Brake caliper to steering knuckle - 72 lb.ft.

7. Adjust front wheel bearing clearance.

8. Remove stands and lower car

SHOCK ABSORBER REMOVAL AND INSTALLATION

Removal Opel 1900 - Manta

1. Raise car and support with stands.
2. Remove upper attaching nuts from shock absorber.
3. Remove lower attaching nut, lockwasher, and bolt.
4. Compress shock absorber and remove from car.

Removal GT

1. Remove air cleaner. See Figure 3A-24.



Figure 3A-24 Removal of Air Cleaner

2. Remove plastic cover over shock absorber upper attachment.
3. Raise car and support with stands.
4. Remove upper attaching nuts from shock absorber.
5. Remove lower attaching nut, lockwasher, and bolt.
6. Compress shock absorber and remove from car.

Installation Opel 1900 - Manta

1. Inspect shock absorber for damage and seal leaks.

Always replace the upper and lower rubber grommets when replacing a shock absorber.

2. Install the lower grommet retainer and grommets on shock absorber. Compress shock absorber and place in position.
3. Install lower attaching bolt and nut. Torque to 30 lb.ft.
4. Install nuts on upper attaching studs. Tighten nuts until distance from top of nut to stud is approximately 1/2 inch. See Figure 3A-25.
5. Install plastic cover.

Installation GT

1. Inspect shock absorber for damage and seal leaks. Always replace the upper and lower rubber grommets when replacing a shock absorber.
2. Install the lower grommet retainer and grommets on shock absorber. Compress shock absorber and place in position.
3. Install lower attaching bolt and nut. Torque to 30 lb. ft.
4. Install nuts on upper attaching studs. Tighten nuts until distance from top of nut to stud is approximately 1/2 inch. See Figure 3A-25.
5. Install plastic cover.
6. Install air cleaner.

FRONT SPRING REMOVAL AND INSTALLATION

Removal (GT)

1. Raise car and support at rear of front frame rails with stands.
2. Remove front wheels.
3. Remove cotter pin from castle nut on lower ball joint studs and back off castle nut two (2) turns. Hit ball stud a sharp blow to break it loose. **Do not remove nut.**
4. Install J-21689 spring compressor and compress the spring until 3-1/8" clearance is obtained between spring and compressor.
5. Disconnect both shock absorbers at their lower attachment. Compress both shock absorbers.
6. Support the rail of J-21689 Spring Compressor with a jack. Remove lower control arm to cross member attaching nuts and bolts.

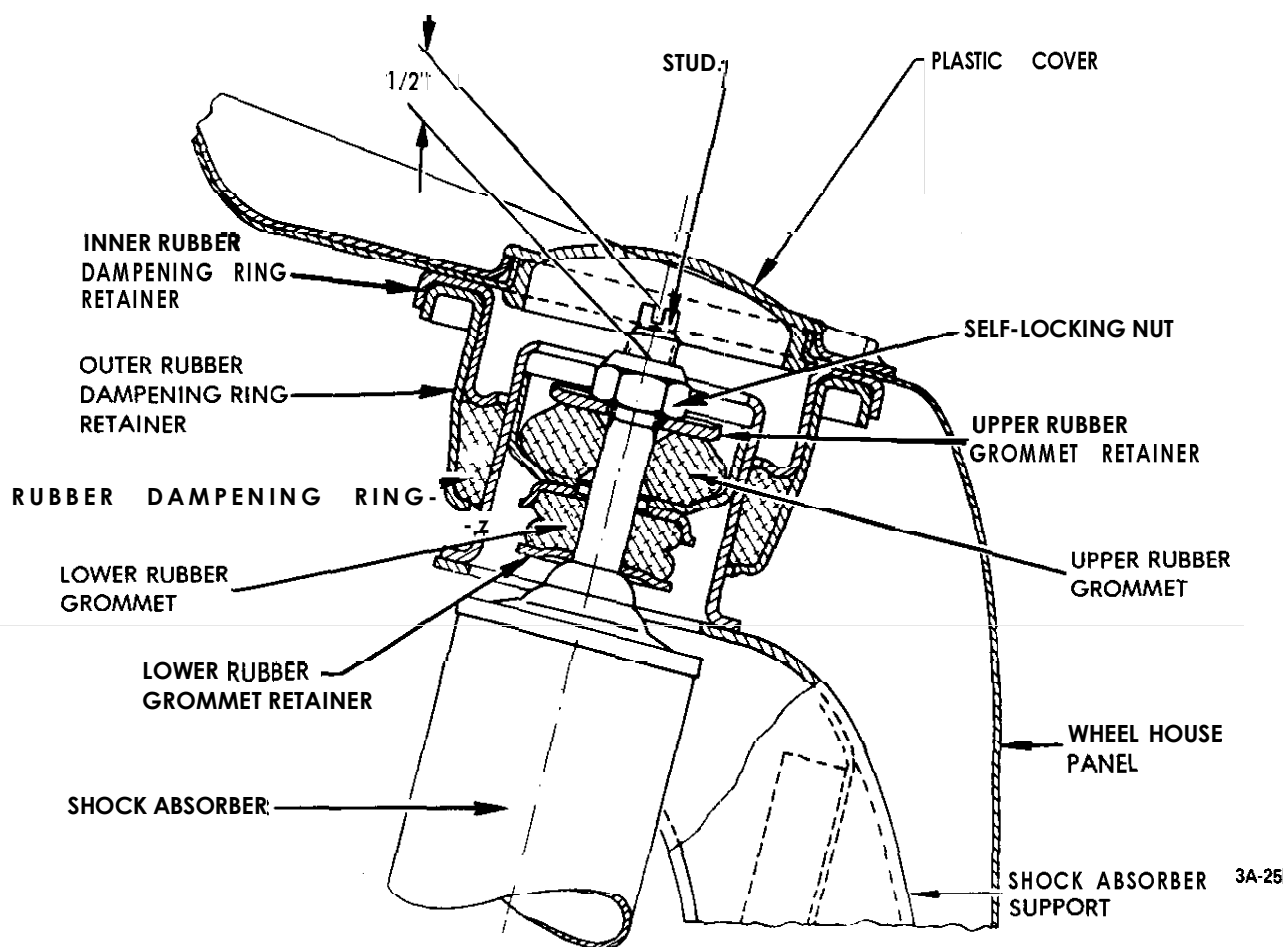


Figure 3A-25 Shock Absorber Upper Attachment

7. Remove lower ball joint stud nuts. Slightly lower jack so that the spring and lower control arm assembly is removed from the front cross member and steering knuckle.

8. Lower jack, spring compressor, and front spring and control arm assembly. Remove lower control arm to spring nuts.

9. Relieve tension on spring compressor and remove control arm attaching bolts and control arms.

Removal (Opel 1900 • Manta)

1. Prior to raising car, install upper control arm hooks J-23697.

2. Raise car and support with stands. Hoist should be left in the raised position to maintain pressure on lower control arm.

3. Remove front wheel.

4. Detach both stabilizer supports from cross member to body support.

5. Remove shock absorber.

6. At lower control arm ball joint, remove castle nut cotter pin and remove nut.

7. With suitable drift, detach lower control arm ball joint from steering knuckle.

8. Loosen nut that retains lower control to front cross member.

9. Slowly lower hoist to release spring tension.

10. Swing lower control arm downwards and remove front spring.

Installation (GT)

CAUTION: Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design.

Torque values must be used as specified during reassembly to assure proper retention of these parts.

1. Attach lower control arm to front spring eye. Torque bolts to 18 lb.ft.
2. Install spring compressor on spring and compress spring to appropriate length.
3. Raise jack with spring compressor, spring and control arm assembly into position under the car.
4. Install lower ball joints and torque nuts to 54 lb.ft. Install new cotter pin.
5. Attach lower control arms to frame cross member using new lock nuts.
6. Attach both shock absorbers. Torque bolts to 30 lb.ft.
7. Remove spring compressor.
8. Install front wheels.

On replacement of the damper bushings on the front springs, only the one-part damper bushing is installed for either the two-leaf or three-leaf spring. For proper location of the marking lugs, see Figure 3A-26.

Installation (Opel 1900. Manta)

CAUTION: *Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.*

1. Properly seat spring between lower control arm and cross member.
2. Raise jack and place lower control into position.

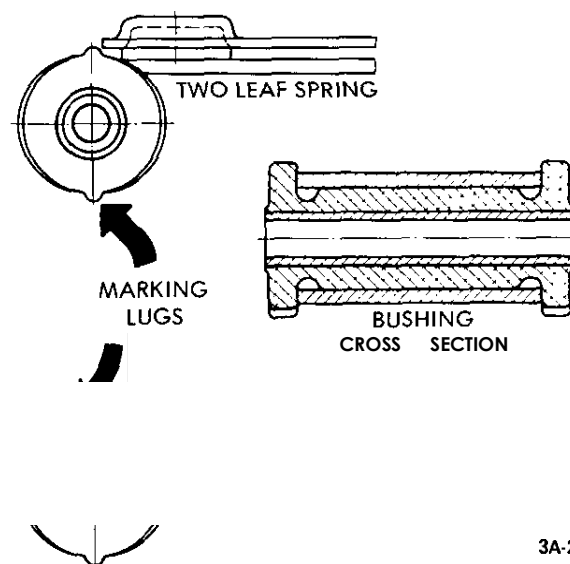


Fig. 3A-26 Front Spring Damper Bushing.

3. Attach lower control ball joint to steering knuckle and torque nut to 54 lb.ft.
4. Tighten lower control arm to cross member bolt to 43 lb.ft.
5. Attach stabilizer bar to cross member to body support.
6. Install shock absorber and torque lower attaching nut and bolt to 30 lb.ft.
7. Install nuts on upper shock absorber attaching studs. Tighten nuts until a distance from top of nut to stud is approximately 1/2 inch.
8. Install front wheels and tighten nuts to 65 lb.ft.
9. Remove stands and lower car.

SPECIFICATIONS

BOLT TORQUE AND FRONT END ALIGNMENT

SPECIFICATIONS

Torque Specifications

Use a reliable torque wrench to tighten all parts listed to insure proper tightness without straining or distorting parts. These specifications are for clean and lightly-lubricated threads only; dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Location	Torque Lb.Ft.
Front Suspension Crossmember to Front Frame	36
Clamp, Steering Mast to Steering Mast Flange (GT)	15
Clamp, Steering Mast to Steering Mast Flange (1900 • Manta)	22
Clamp, Upper Universal Joint (GT)	14
Clamp, Lower Universal Joint (GT)	22
Wheel Nuts	65
Lower Control Arm Shaft to Lower Control Arm	40
Lower Control Arm Ball Joint to Steering Knuckle	54
Upper Control Arm Ball Joint to Steering Knuckle (GT)	29
Upper Control Arm Ball Joint to Steering Knuckle (1 900 Manta)	40
Upper Control Arm Ball Joint to Upper Control Arm	29
Shock Absorber to Lower Control Arm	30
Steering Arm to Steering Knuckle (1900 • Manta)	58
Brake Backing Plate or Brake Disc Shield and Steering Arm to Steering Knuckle (GT)	
Hex Head Bolt M 10	47
Hex Head Bolt M 8	18
Brake Backing Plate to Steering Knuckle (1900 • Manta)	58
Brake Caliper to Steering Knuckle	72
Lower Control Arm to Front Spring Eye (GT)	18
Brake Disc to Front Wheel Hub	36
Upper Control Arm to Crossmember (1900 • Manta)	40
Lower Control Arm to Crossmember (1900 • Manta)	43
Steering Gear Housing to Front Suspension Crossmember (GT)	18
Steering Gear Housing to Front Suspension Crossmember (1900 • Manta)	30
Stabilizer Bar to Lower Control Arm (Opel 1900 • Manta)	87
Tie Rod Clamp Bolts (GT)	12
Castle Nut, Tie Rod to Steering Arm	29
Upper Control Arm Shaft to Shock Absorber Support and Upper Control Arm (GT)	33
Cross Member to Body Support Attachment	58
Front Suspension Assembly to Frame	47

Front End Alignment Specifications

Model	Caster'	Camber"	Toe-In" Min.-Max.	Outer Wheel When Inner Wheel at 20
1900	3 1/2-6 1/2	-1±1/2	1/8-3/ 16	19 1/4
GT	3±1	1±1/2	1/32-1/8	18 1/2

*Permissible deviation from left to right wheel • Max. 1'.