CHAPTER 25

Front Suspension and Service

FIGURE 25.1 Most early vehicles used single straight axles.

FIGURE 25.2 Typical kingpin used with a solid axle.
FIGURE 25.3 Twin I-beam front suspension. Rubber bushings are used to support the I-beams to the frame and help isolate road noise.

FIGURE 25.4 The rubber radius rod bushing absorbs road shocks and helps isolate road noise.

FIGURE 25.5 The upper control arm is shorter than the lower control arm on a short/long-arm (SLA) suspension.
FIGURE 25.6 A typical SLA-front suspension using coil springs.

FIGURE 25.7 An SLA-type suspension with the coil spring placed on top of the upper control arm.

FIGURE 25.8 A torsion bar SLA suspension can use either the lower or the upper control arm.
FIGURE 25.9 An SLA-type suspension that uses a coil-over-shock assembly.

FIGURE 25.10 A typical MacPherson strut showing all of the components of the assembly. A strut includes the shock and the spring in one structural assembly.

FIGURE 25.11 The modified strut front suspension is similar to a MacPherson strut suspension except that the coil spring is seated on the lower control arm and is not part of the strut assembly.
FIGURE 25.12 The HiPer Strut (left) compared to the traditional MacPherson strut (right).

FIGURE 25.13 Multilink front suspension design varies depending on the vehicle manufacturer.

FIGURE 25.14 A leaking strut. Either a cartridge insert or the entire strut will require replacement.
FIGURE 25.15 This front coil spring looks as if it has been heated with a torch in an attempt to lower the ride height of the vehicle.

FIGURE 25.16 It is easy to see that this worn control arm bushing need to be replaced. The new bushing is shown next to the original.

FIGURE 25.17 Grease fitting projecting down from the surrounding area of a ball joint. The ball joint should be replaced when the area around the grease fitting is flush or recessed.
FIGURE 25.18 Indicator ball joints should be checked with the weight of the vehicle on the ground.

FIGURE 25.19 Typical dial indicator used to measure the suspension component movement.

FIGURE 25.20 If the spring is attached to the lower control arm as in this SLA suspension, the jack should be placed under the lower control arm as shown.
FIGURE 25.21 The jack should be placed under the lower control arm of this modified MacPherson-type suspension.

FIGURE 25.22 If the spring is attached to the upper control arm, the jack should be placed under the frame to check for ball joint wear.

FIGURE 25.23 A special tool or a block of wood should be inserted between the frame and the upper control arm before lifting the vehicle off the ground.
FIGURE 25.24 The jacking point is under the frame for checking the play of a lower ball joint used with a MacPherson.

FIGURE 25.25 This worn and rusty ball joint was found by moving the wheel and looking for movement in the joint.

FIGURE 25.26 Taper breaker tool being used to separate the upper ball joint from the steering knuckle.
FIGURE 25.27 A pinch bolt attaches the steering knuckle to the ball joint. Remove the pinch bolt by turning the nut, not the bolt.

FIGURE 25.28 If the pinch bolt is overtightened, the steering knuckle can be deformed.

FIGURE 25.29 By drilling into the rivet, the holding force is released.
FIGURE 25.30 The head of the rivet can be removed by using a large-diameter drill bit as shown.

FIGURE 25.31 A punch and a hammer being used to remove a rivet after the head has been removed.

FIGURE 25.32 Press-in ball joints are best removed using a large C-clamp press, as shown.
FIGURE 25.33 Typical kingpin assembly.

FIGURE 25.34 Driving a kingpin out with a hammer.

FIGURE 25.35 A kingpin being removed showing the worn bushing.
FIGURE 25.36 Most shock absorbers used on the front suspension can be removed from underneath the vehicle after removing the attaching bolts or nuts.

FIGURE 25.37 Removing the upper strut mounting bolts.

FIGURE 25.38 A brake hydraulic hose is often attached to the strut housing.
FIGURE 25.39 Use a strut spring compressor fixture to compress the spring on a MacPherson strut before removing the strut retaining nut.

FIGURE 25.40 Removing the strut rod nut. The strut shaft is being helped with one wrench while the nut is being removed with the other wrench.

FIGURE 25.41 Typical MacPherson strut showing the various components.
FIGURE 25.42 After installing the replacement strut cartridge, reinstall the spring and upper bearing assembly after compressing the spring.

FIGURE 25.43 Before final assembly, make sure the marks you made are aligned.

FIGURE 25.44 The strut on a modified MacPherson strut assembly can be replaced by removing the upper mounting nuts.
FIGURE 25.45  Stabilizer bar links should be replaced as a pair.

FIGURE 25.46  A strut rod as viewed from the front of the vehicle.

FIGURE 25.47  Typical strut rod bushing with rubber on both sides of the frame to help isolate noise, vibration, and harshness from being transferred to the passengers.
FIGURE 25.48 Notice that if the front coil springs are sagging, the resulting angle of the lower control arm causes the wheels to move from side to side as the suspension moves up and down.

FIGURE 25.49 Spring compressing tool in place to hold the spring as the ball joint is separated.

FIGURE 25.50 The steering knuckle has been disconnected from the lower ball joint.
FIGURE 25.51 A rubber mallet is being used to support the upper control arm as the lower control is being lowered using a floor jack.

FIGURE 25.52 Spring insulators are installed between the spring seat and the coil spring to reduce noise.

FIGURE 25.53 The holes in the lower arm are not only used to allow water to drain from the spring seat, but also used as a gauge to show the service technician that the coil spring is correctly seated.
FIGURE 25.54 By rotating the adjusting bolt, the vehicle can be raised or lowered.

FIGURE 25.55 An adapter and a press or large clamp are used to remove the old bushing from the control arm and to install a new bushing.

The tools needed to replace a front strut assembly include several sockets and a ball-peen hammer, plus a strut compressor.
After safely hoisting the vehicle to elbow height and removing the wheel covers, remove the front tire/wheel assembly.

Remove the two strut retaining nuts.

Before using a hammer to drive the retaining bolts from the steering knuckle, thread the nut into the bolt backwards to prevent causing damage to the threads.
Remove the retaining bolts and separate the strut from the steering knuckle.

Lower the vehicle and remove the upper strut retaining fasteners.

Hold the strut while removing the last upper retaining nut and then remove the strut assembly.
After the strut has been removed from the vehicle, install the assembly into a strut compressor.

Position the jaws of the compressor under the bearing assembly as per the vehicle manufacturer’s instructions.

Turn the compressor wheel until all tension of the spring has been relieved from the upper bearing assembly.
Remove the strut retaining nut.

Remove the strut assembly.

Before installing the replacement strut, check the upper bearing by exerting a downward force on the bearing while rotating and check for roughness.
Install the strut from underneath the spring Compressor fixture.

Install the strut retaining nut. Most vehicle manufacturers specify that the strut retaining nut be replaced and the old one discarded.

Before loosening the tension, check that the coil spring is correctly located at both the top and the bottom, then release the tension on the spring.
Remove the strut assembly from the compressor and back of the vehicle and install the upper fasteners.

Attach the lower strut to the steering knuckle using the original hardened bolts and nuts.

Using a torque wrench, torque all fasteners to factory specifications.
Install the tire/wheel assembly, lower the vehicle, and torque the lug nuts to factory specifications. Align the vehicle before returning it to the customer.