

1991 Mazda MX-5 Miata

SUSPENSION - FRONT 1990-91 SUSPENSION Front

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DESCRIPTION

An independent front suspension with MacPherson struts is used on all models except Miata. Miata uses a double wishbone design with coil over shock absorbers. See **Fig. 1**. Strut assemblies mount between steering knuckle and upper fender panels. Strut assemblies consist of inner shock absorbers and coil springs surrounding outside of strut tube housing.

The steering knuckle is connected to lower control arm and strut. Lower control arm pivots at crossmember and is connected by ball joint to steering knuckle. All models are equipped with a stabilizer bar which attaches to each lower control arm and frame. See **Fig. 1 - Fig. 5**. Some models may also be equipped with Auto Adjust Suspension (AAS). For more information on this system, see ELECTRONIC SUSPENSION article in the SUSPENSION section.

ADJUSTMENTS & INSPECTION

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

See WHEEL ALIGNMENT SPECIFICATIONS AND PROCEDURES article in the WHEEL ALIGNMENT section.

WHEEL BEARING

Miata, Protege & 323

Raise and support vehicle. Remove wheel assembly. Remove and wire aside brake caliper. Remove rotor. Install a dial indicator against wheel hub and measure axial movement. Axial movement should be .002" (.05 mm) maximum. If specification is exceeded, check and adjust lock nut torque or replace bearing on Protege and 323 or hub and bearing assembly on Miata.

MPV & 929

Raise and support vehicle. Remove wheel assembly. Remove and wire aside brake caliper. Install a dial indicator against wheel hub and measure axial movement. Maximum axial movement should be .002" (.05 mm). If specification is exceeded, check and adjust lock nut torque or replace bearing on MPV 4WD and 929 or hub and bearing assembly on MPV 2WD.

RX7

1. Raise and support vehicle. Remove wheel assembly. Remove and wire aside brake caliper. Install a dial indicator against hub and measure axial movement. Axial movement should be zero. If specification is exceeded, adjust preload or replace wheel bearing.
2. To adjust preload, remove grease cap, cotter pin and set cover. Loosen lock nut. Tighten to 14-22 ft. lbs.

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(20-29 N.m). Turn wheel hub a few times to seat bearings. Loosen lock nut slightly until it can be turned by hand.

3. Attach spring scale to hub bolt, and measure preload. Note value. Tighten lock nut until preload is .09-2.2 lbs. (.4-1.0 kg) more than amount measured in step 2).

MX-6 & 626

Raise and support vehicle. Remove wheel assembly. Remove and wire aside brake caliper. Install a dial indicator against wheel hub and measure axial movement. Axial movement should not exceed .008" (.2 mm). If specification is exceeded, replace wheel bearing.

BALL JOINT CHECKING

Remove lower control arm. Rotate ball joint stud 3-4 times. Install Preload Attachment (49 0180 510B) to ball joint stud. Measure ball joint preload using spring scale. Preload for all models except Miata, MPV 2WD and 929 is 4.4-7.7 lbs. (2.0-3.5 kg). Preload for Miata is 1.1-3.3 lbs. (.5-1.5 kg). Preload for MPV 2WD is 39.6 lbs. (18. kg) or less. Preload for 929 is 1.1-2.6 lbs. (.5-1.2 kg).

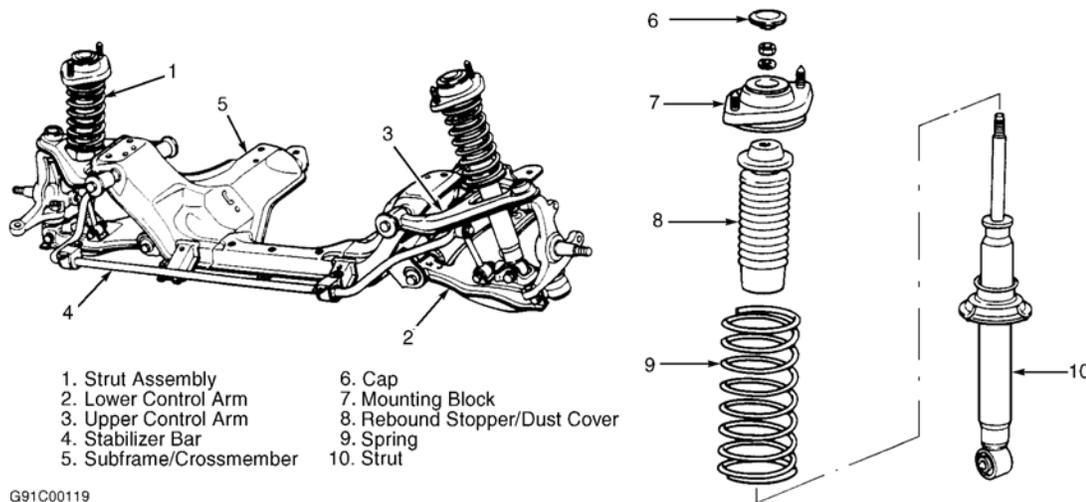


Fig. 1: Exploded View of Front Suspension (Miata)
Courtesy of MAZDA MOTORS CORP.

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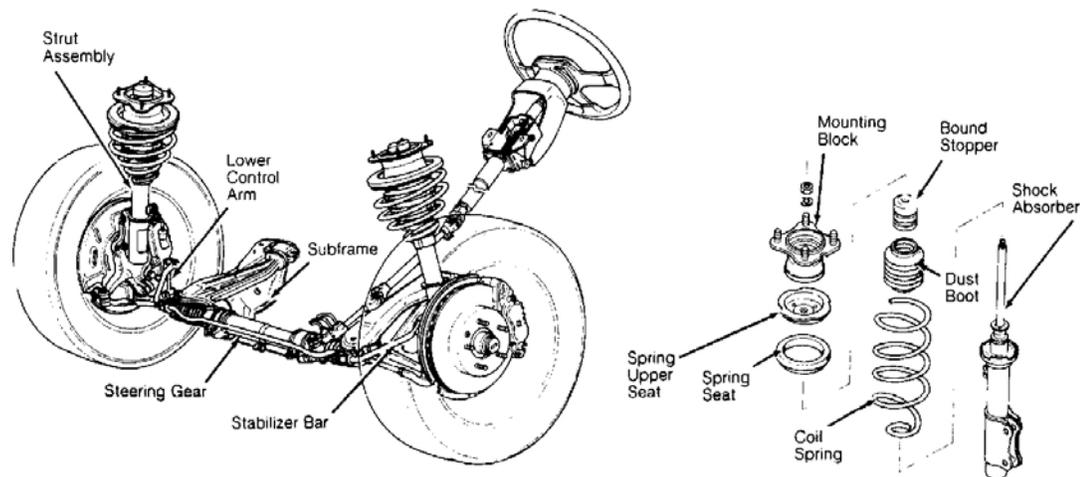
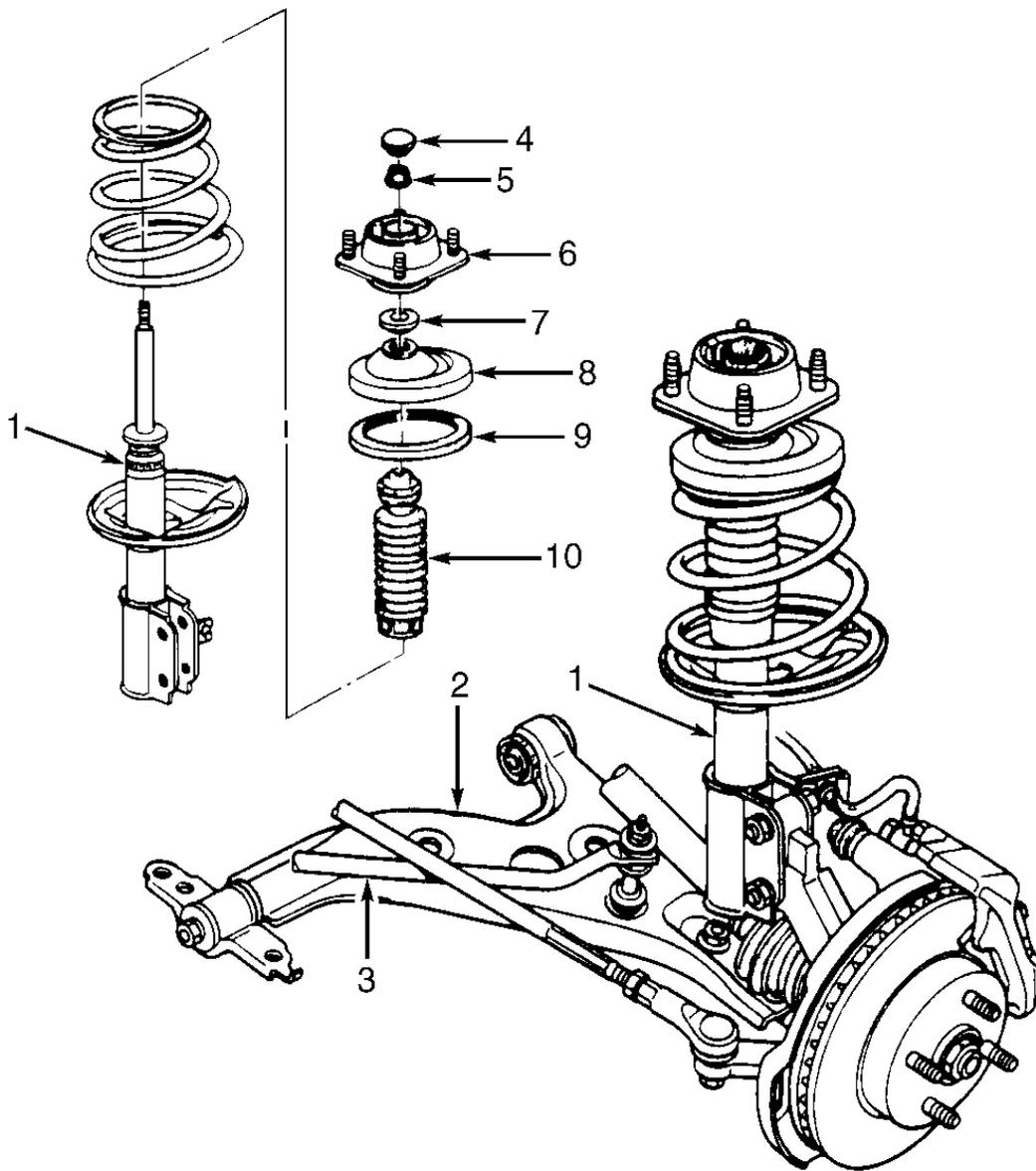


Fig. 2: Exploded View of Front Suspension (RX7)
Courtesy of MAZDA MOTORS CORP.

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- | | |
|----------------------|--------------------------------|
| 1. Strut Assembly | 6. Mounting Block |
| 2. Lower Control Arm | 7. Thrust Bearing |
| 3. Stabilizer Bar | 8. Upper Spring Seat |
| 4. Cap | 9. Rubber Spring Seat |
| 5. Lock Nut | 10. Rebound Stopper/Dust Cover |

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Fig. 3: Exploded View of Front Suspension (Protege & 323)
Courtesy of MAZDA MOTORS CORP.

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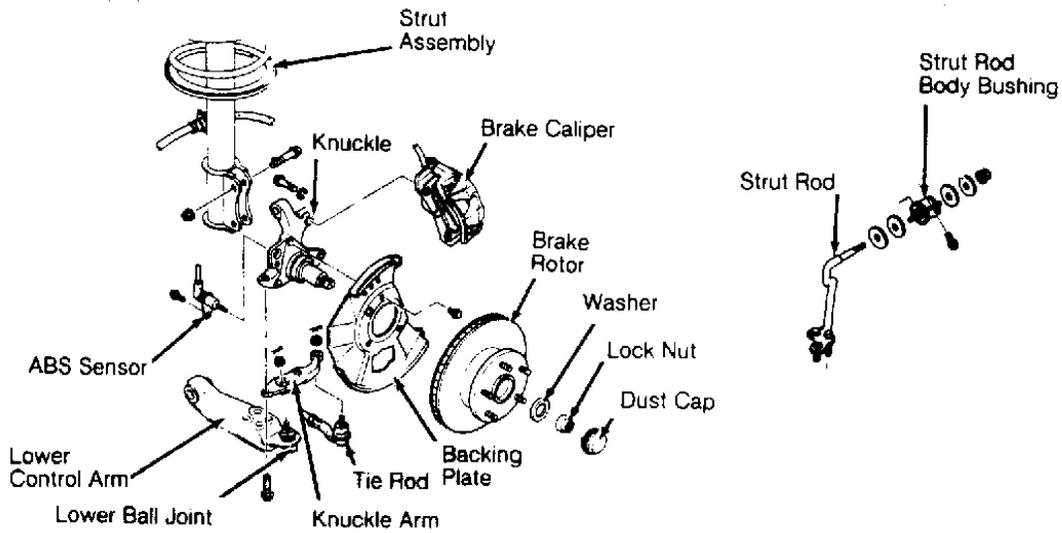


Fig. 4: Exploded View of Front Suspension (MPV & 929)
Courtesy of MAZDA MOTORS CORP.

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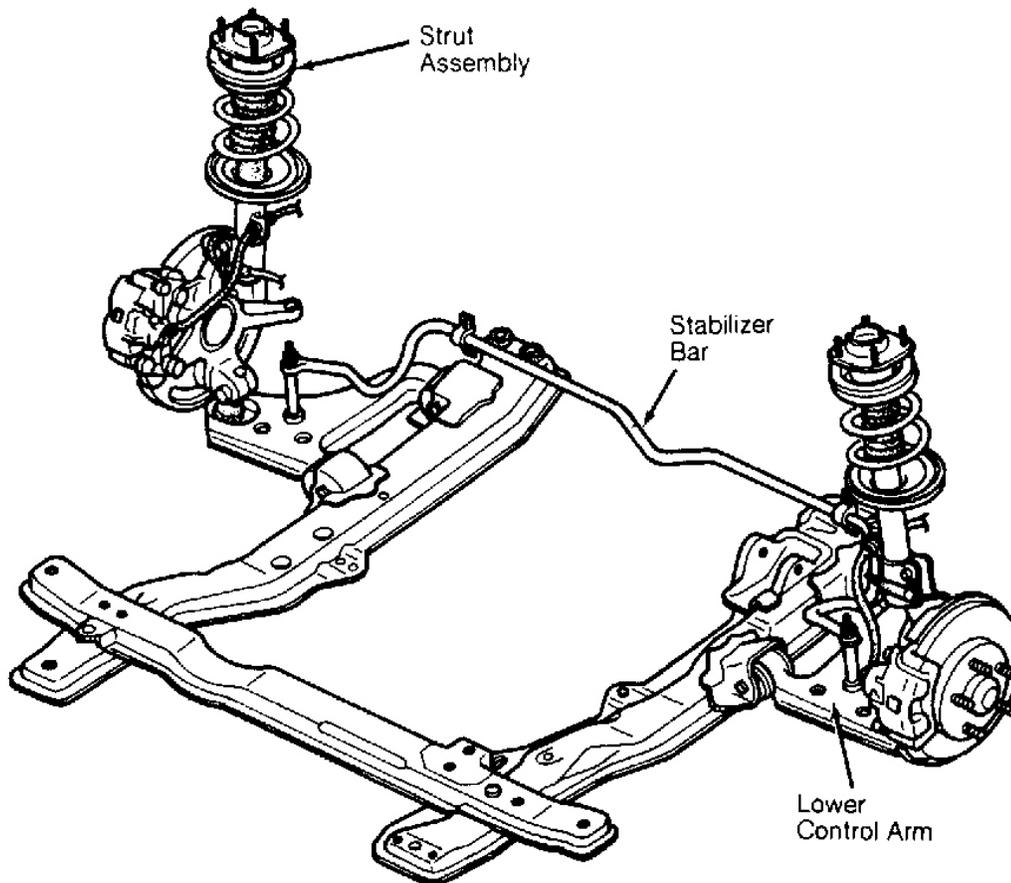


Fig. 5: Identifying Front Suspension Components (MX-6 & 626)

Courtesy of MAZDA MOTORS CORP.

REMOVAL & INSTALLATION

NOTE: Refer to Fig. 1 - Fig. 5 during removal and installation.

WHEEL BEARING

NOTE: On Miata & MPV 2WD, replace hub and bearing assembly as a unit.

Removal (Miata & MPV 2WD)

Raise and support vehicle. Remove wheel assembly. Remove and wire aside brake caliper. Remove grease cap and lock nut. Remove brake rotor. Remove hub and bearing assembly.

Removal (MPV 4WD)

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1. Raise and support vehicle. Remove wheel assembly. Remove axle lock nut. Remove cotter pin, and disconnect tie rod from steering knuckle. Remove and wire aside brake caliper.
2. Separate lower control arm from ball joint. Remove bolt attaching ball joint to steering knuckle. Remove bolts retaining steering knuckle to strut assembly. Separate hub and knuckle from drive shaft. Remove wheel hub and rotor from knuckle. Remove bearings and oil seals.

Removal (MX-6 & 626)

1. Raise and support vehicle. Remove wheel assembly. Disconnect tie rod end from steering knuckle. Disconnect stabilizer bar from lower control arm. Remove axle lock nut.
2. Disconnect brake line from strut assembly. Remove and wire aside brake caliper. Remove wheel speed sensor. Remove bolt attaching ball joint to steering knuckle. Remove bolts attaching steering knuckle to strut assembly. Remove steering knuckle.
3. Remove wheel hub from knuckle using Puller Set (49-G033-1A1). Remove snap ring. Remove wheel bearing from steering knuckle using Remover (49-G033-106).

Removal (Protege, 323 & 929)

1. Raise and support vehicle. Remove wheel assembly. Remove axle lock nut. Remove cotter pin, and disconnect tie rod from steering knuckle. Remove and wire aside brake caliper. Separate lower control arm from ball joint. Remove bolts retaining steering knuckle to strut assembly.
2. On Protege and 323, separate hub and knuckle from drive shaft. Remove wheel hub and rotor from knuckle. Place alignment marks on rotor and wheel hub. Separate and remove dust cover. Remove bearings, oil seals, bearing outer races and spacer.
3. On 929, remove hub and rotor. Remove grease seal, sensor ring and circlip. Press bearing from hub assembly. DO NOT reuse old bearing once pressed from hub.

Removal (RX7)

Raise and support vehicle. Remove wheel assembly. Remove and wire aside brake caliper. Remove grease cap, cotter pin, nut lock and spindle nut. Remove washer and outer wheel bearing. Remove hub and rotor assembly. Remove wheel speed sensor ring. Remove inner oil seal and wheel bearing.

NOTE: If bearings need to be replaced on RX7, also replace hub.

Inspection (All Models)

Wash all disassembled parts before inspection. Check for damage, excessive wear and signs of bearing seizure. Inspect steering knuckle and hub for cracks, scoring and rust. Check for damaged dust cover and poor fit with steering knuckle.

Installation (All Models)

To install, reverse removal procedure. Adjust wheel bearing preload. See WHEEL BEARING under **ADJUSTMENTS & INSPECTION** .

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LOWER CONTROL ARM

Removal

Raise and support vehicle. Remove wheel assembly. Remove engine splash shield (if equipped). Remove stabilizer bar from lower control arm. Remove strut rod (if equipped). Remove ball joint clamp bolt or pivot nut, and separate ball joint from steering knuckle. Remove lower control arm pivot bolts. Remove lower control arm.

Inspection

Check lower control arm for damage or cracks. Check bushings for deterioration and excessive wear. Check ball joint for excessive wear. Examine dust boot for damage. Replace parts as necessary.

NOTE: Lower control arm bushings are not replaceable on MPV 2WD models. Replace control arm assembly if bushings are worn or damaged.

Bushing Replacement (Miata)

Cut or press old bushing from control arm. Coat new bushing with paraffin-based oil. Press new bushing into control arm. To install, reverse removal procedure.

Bushing Replacement (MPV 4WD)

Cut away bushing inner collar. Using a vise and Remover/Installer (49-G033-102 and 49-FO27-009), push out front bushing. Press out rear bushing using a press and Remover/Installer (49-U034-202 and 49-GO26-103). To install front bushing, apply soapy water to bushing and use remover/installer to press in. To install rear bushing, align arrows on bushing with marks on lower arm and use remover/installer to press in.

Bushing Replacement (MX-6 & 626)

Cut away bushing inner collar. Using a vise and Remover/Installer (49-GO34-2A0), push out bushing. To install, apply soapy water to bushing and use remover/installer to press in. Always install bushing from outer side of arm. Press in bushing until collar contacts arm.

Bushing Replacement (Protege & 323)

Using a vise and Remover/Installer Set (49-BO34-2A0), push out bushing. To install, apply soapy water to bushing and use remover/installer to press in. Always install bushing from outer side of arm. Press in bushing until collar contacts arm.

Bushing Replacement (929)

Cut away bushing outer collar. Using a vise and Remover/Installer (49-HO34-202 and 49-HO34-201), remove bushing from control arm. To install, reverse removal procedure.

Bushing Replacement (RX7)

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Push out front bushing using a press and Remover (49-G030-627A). To remove rear bushing, install Bearing Puller (49-0710-520) on bushing. DO NOT overtighten bearing puller nuts or lower arm will be distorted and damaged. Press to push out rear bushing using Remover (49-G030-627A). To install both bushings, use remover and Support Block (49-0823-146).

Installation (All Models)

To install, reverse removal procedure. Tighten lower control arm pivot bolts to specification with vehicle resting on ground and suspension unloaded. See **TORQUE SPECIFICATIONS** .

UPPER CONTROL ARM

Removal (Miata)

Raise and support vehicle. Remove wheel assembly. Remove engine splash shield. Remove ball joint pivot nut. Use Puller (49-0118-850C) to separate ball joint from steering knuckle. Remove upper control arm pivot bolts. Remove upper control arm.

Inspection

Check upper control arm for damage or cracks. Check bushings for deterioration and excessive wear. Check ball joint for excessive wear. Examine dust boot for damage. Replace parts as necessary.

Bushing Replacement

Using a chisel, remove old bushing from control arm. Coat new bushing with grease. Press new bushing into control arm.

Installation

To install, reverse removal procedure. Tighten upper control arm pivot bolts to specification with vehicle resting on ground and suspension unloaded.

SHOCK ABSORBER

Removal (Miata)

Raise and support vehicle. Remove wheel assembly. Remove engine splash shield. Remove stabilizer link bolt. Separate upper ball joint from steering knuckle. Loosen lower control arm pivot bolts. Remove shock absorber upper mount nuts and lower bolt. Move lower control arm just enough to remove shock absorber. Be careful not to damage brake line.

Disassembly

Clamp upper mount in vise. Loosen lock nut 2 turns only. Compress coil spring using coil spring compressor. Remove lock nut and remaining components. Slowly release compressor tension.

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Inspection

Check for damage, oil leakage and abnormal noise. Check rubber parts for deterioration or damage. Inspect coil spring for signs of fatigue or damage. Replace parts as needed.

Reassembly

Clamp shock absorber in vise. Install coil spring and components in reverse order of disassembly. Ensure coil spring is well seated in upper and lower spring seats.

Installation

To install, reverse removal procedure. Final tighten all bolts with vehicle resting on ground and suspension unloaded. See appropriate See SPECIFICATIONS & PROCEDURES article in the WHEEL ALIGNMENT section for checks and adjustments.

STRUT ASSEMBLY

NOTE: Prior to removing strut-to-steering knuckle bolts, make an alignment mark for reassembly reference. Note position of mounting mark on top of strut assembly before removing strut.

Removal

1. Raise and support vehicle. Remove wheel assembly. Disconnect brake line from strut assembly. Remove bolts attaching steering knuckle arm to strut assembly.
2. Disconnect harness connector from actuator (if equipped). Remove bolts, actuator and actuator mounting bracket from upper mounting block. Remove nuts attaching upper strut assembly to body panel. Remove strut assembly.

Disassembly

Clamp strut in vise. Compress coil spring using coil spring compressor. Remove piston lock nut. Slowly release compressor tension. Remove components. Remove coil spring. Remove strut from vise.

Inspection

Check strut tube for cracks, damage, oil leakage and abnormal noise. Check rubber parts for deterioration or damage. Inspect coil spring for signs of fatigue or damage. Check actuator control rod of strut assembly for smooth rotation (if equipped). Replace parts as needed.

Reassembly

Clamp strut in vise. Install coil spring and components in reverse order of disassembly. Ensure that coil spring is well seated in upper and lower spring seats. On MX-6 and 626, ensure upper spring seat positioning hole faces inside of vehicle.

Installation

To install, reverse removal procedure. Place identification mark of mounting block in its original position. See **Fig. 6** or **Fig. 7** . See appropriate See SPECIFICATIONS & PROCEDURES article in the WHEEL ALIGNMENT section for checks and adjustments.

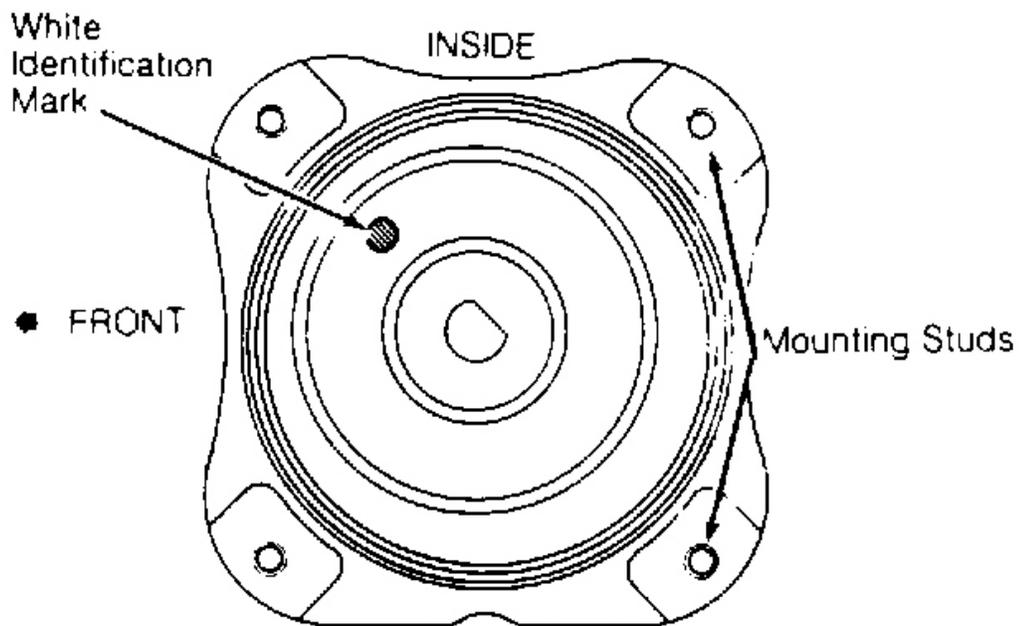


Fig. 6: Positioning Strut for Installation (MPV, RX7 & 929)
Courtesy of MAZDA MOTORS CORP.

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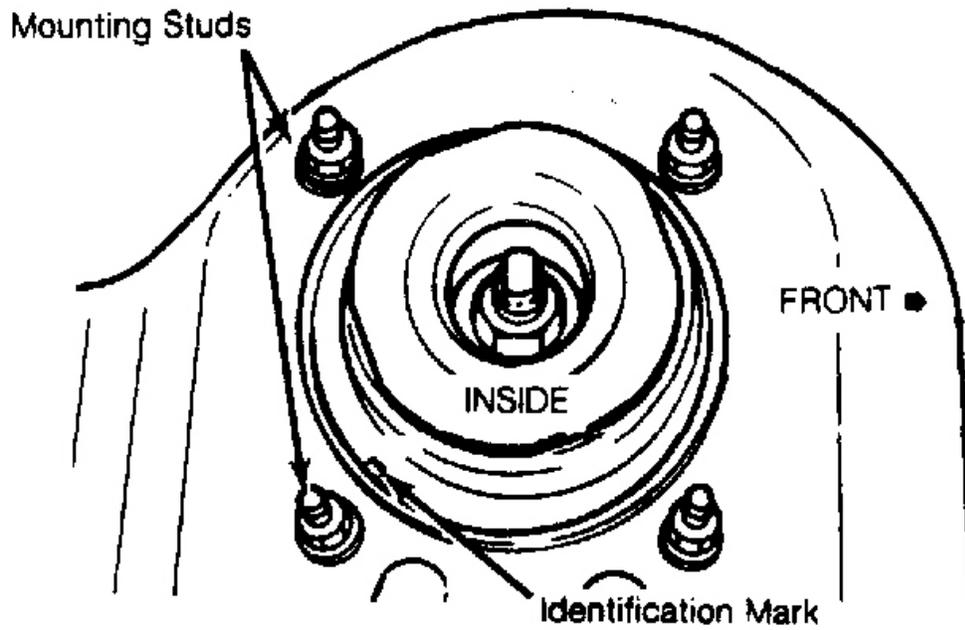


Fig. 7: Positioning Strut for Installation (MX-6, Protege, 323 & 626)
Courtesy of MAZDA MOTORS CORP.

STABILIZER BAR

Removal & Installation

1. Raise and support vehicle. Remove engine splash shield (if equipped). Remove mounting hardware and stabilizer bar. Note position of frame bushing seam. Inspect all components for wear, bends or damage.
2. Install frame bushing so it aligns with painted line on stabilizer bar. Install and partially tighten remaining components. Final tighten all bolts with vehicle resting on ground and suspension unloaded.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Miata	
Brake Caliper Bracket Bolts	36-51 (49-69)
Drive Axle Lock Nut	123-159 (167-216)
Lower Ball Joint-To-Knuckle Nut	43-57 (58-77)
Lower Ball Joint-To-Lower Control Arm Nut	54-69 (73-93)

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Lower Control Arm-To-Frame	54-69 (73-93)
Lug Nuts	65-87 (88-118)
Stabilizer Bar Bolts (Frame)	13-19 (18-26)
Stabilizer Bar Link Bolts	27-40 (36-54)
Shock Absorber Assembly-To-Body Nuts	21-27 (29-36)
Shock Absorber Lower Bolt	54-69 (73-93)
Shock Absorber Lock Nut	23-34 (31-46)
Tie Rod-To-Knuckle Nut	21-32 (29-44)
Upper Ball Joint-To-Knuckle Nut	30-46 (41-62)
Upper Control Arm-To-Frame	87-102 (118-138)
MPV	
Ball Joint-To-Lower Control Arm Bolt (4WD)	75-101 (102-137)
Ball Joint-To-Lower Control Arm Nut (4WD)	94-127 (128-172)
Brake Caliper Bracket Bolts	65-80 (88-108)
Drive Axle Lock Nut	131-173 (177-235)
Lower Control Arm-To-Frame (2WD)	94-108 (127-146)
Lower Control Arm-To-Frame (4WD)	101-127 (137-172)
Lug Nuts	65-87 (88-118)
Stabilizer Bar Bolts (Frame) (2WD)	37-45 (50-61)
Stabilizer Bar Bolts (Frame) (4WD)	14-19 (19-26)
Strut Assembly Lock Nut	47-59 (64-80)
Strut Assembly-To-Body Nuts	21-27 (29-36)
Strut Assembly-To-Knuckle Bolt	69-86 (93-117)
Strut Rod Body Bushing Bolt	61-76 (83-103)
Strut Rod-To-Body Nut	108-127 (146-172)
Strut Rod-To-Lower Control Arm	76-92 (103-125)
Tie Rod-To-Knuckle Nut	44-58 (59-78)
MX-6 & 626	
Ball Joint-To-Steering Knuckle Nut	27-40 (36-54)
Brake Caliper Bracket Bolts	58-72 (78-98)
Drive Axle Lock Nut	173-235 (235-319)
Lower Control Arm-To-Frame	58-78 (78-106)
Lug Nuts	65-87 (88-118)
Stabilizer Bar Bolts (Frame)	27-40 (36-54)
Strut Assembly Lock Nut	47-59 (64-80)
Strut Assembly-To-Body Nuts	34-46 (46-63)
Strut Assembly-To-Knuckle Bolt	69-86 (93-117)
Tie Rod-To-Knuckle Nut	31-42 (42-57)
Wheel Speed Sensor Bolt	12-17 (16-23)
Protege & 323	
Ball Joint-To-Lower Control Arm Nut	69-86 (93-117)

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	32-44 (43-59)
Brake Caliper Bracket Bolts	29-36 (39-49)
Drive Axle Lock Nut	173-235 (235-319)
Lower Control Arm-To-Frame	
Front	69-86 (93-117)
Rear	69-94 (93-127)
"U" Bracket Bolts	69-86 (93-117)
Lug Nuts	65-87 (88-118)
Stabilizer Bar Bolts (Frame)	32-44 (43-59)
Strut Assembly Lock Nut	58-81 (79-110)
Strut Assembly-To-Body Nuts	21-30 (29-40)
Strut Assembly-To-Knuckle Bolt	69-93 (93-127)
Tie Rod-To-Knuckle Nut	31-42 (42-57)
RX7	
Ball Joint-To-Steering Knuckle Nut	27-40 (36-54)
Brake Caliper Bracket Bolts	58-72 (78-98)
Lower Control Arm-To-Frame	
Front	46-69 (63-93)
Rear	51-61 (69-83)
Lug Nuts	65-87 (88-118)
Stabilizer Bar Bolts (Frame)	13-19 (18-26)
Stabilizer Bar Link Bolts	27-40 (36-54)
Strut Assembly Lock Nut	47-59 (64-80)
Strut Assembly-To-Body Nuts	21-27 (29-36)
Strut Assembly-To-Knuckle Bolt	69-86 (93-117)
Tie Rod-To-Knuckle Nut	21-32 (29-44)
929	
Ball Joint-To-Steering Knuckle Nut	69-91 (94-123)
Brake Caliper Bracket Bolts	58-86 (78-117)
Drive Axle Lock Nut	72-130 (98-177)
Front Wheel Bearing Nut	72-130 (98-177)
Knuckle Arm-To-Knuckle	75-101 (102-137)
Lower Control Arm-To-Frame	55-69 (74-93)
Lug Nuts	65-87 (88-118)
Stabilizer Bar Bolts (Frame)	37-45 (50-61)
Strut Assembly Lock Nut	47-59 (64-80)
Strut Assembly-To-Body Nuts	25-32 (34-44)
Strut Assembly-To-Knuckle Bolt	69-86 (93-117)
Strut Rod Body Bushing Bolt	69-86 (93-117)
Strut Rod-To-Body Nut	64-86 (93-117)
Strut Rod-To-Lower Control Arm	76-92 (103-125)

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21-32 (29-44)