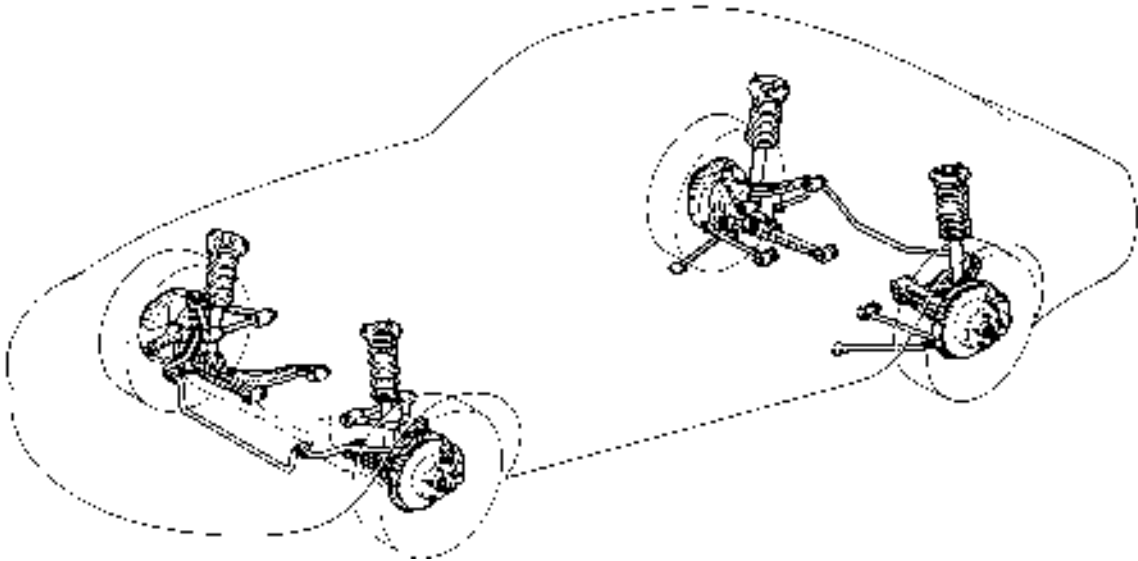


SUSPENSION

■ DESCRIPTION

The suspension is double wishbone type at both the front and the rear. Optimal suspension geometry and wheel alignment are achieved through analysis of component design, materials and characteristics to provide a high level of controllability and riding comfort.



► Specifications ◀

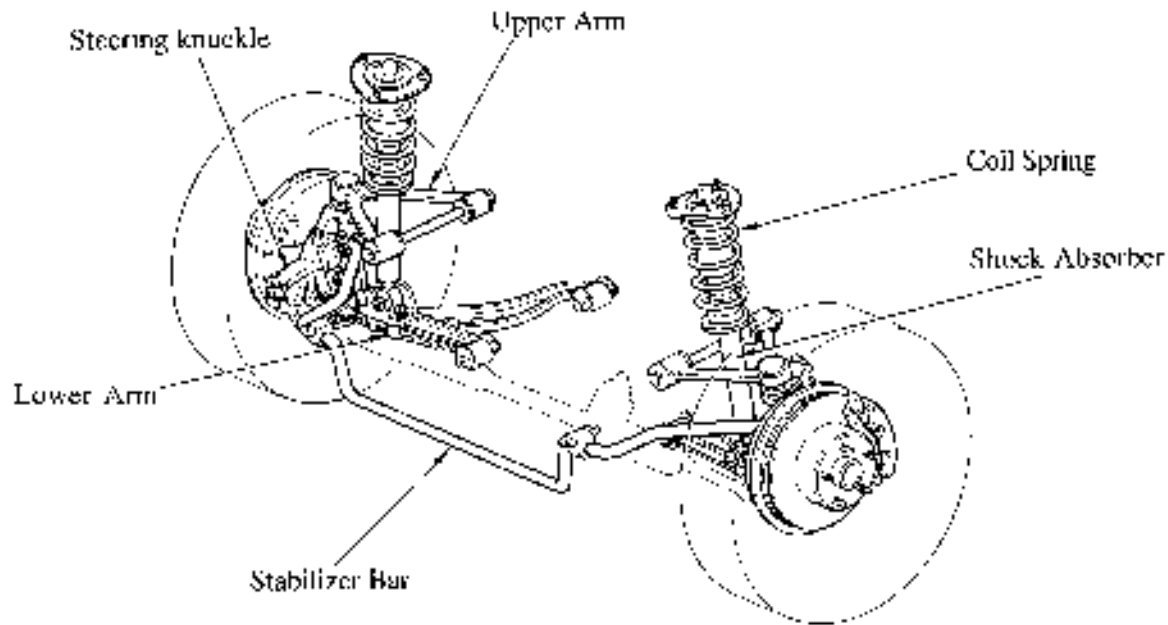
Suspension		Front	Rear
Item			
Tread	(mm [in.])	1520 [59.84]	1525 [60.04]
Caster*	(degrees)	3° 15′	0°
Camber*	(degrees)	−15′	−1° 30′
Toe-In*	(mm [in.])	0 [0]	5 [0.20]
King Pin Inclination*	(degrees)	9° 15′	—
Stabilizer Bar Diameter	(mm [in.])	30.0 [1.182]	24.2 (0.953)

* Values given are for the standard vehicle height.

■ FRONT SUSPENSION

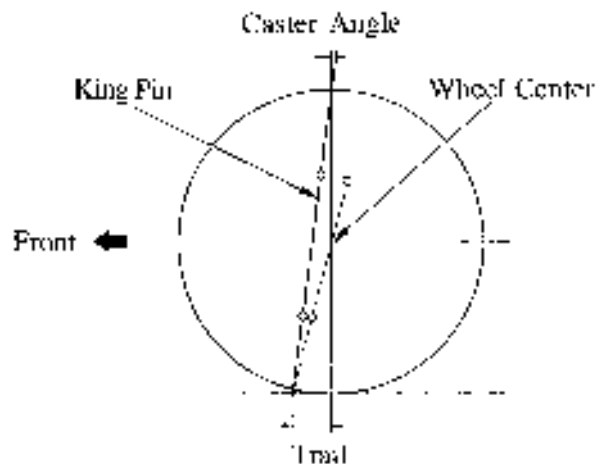
1. General

A double wishbone type independent suspension is used. It permits a greater design freedom and ideal wheel alignment selection. The result is outstanding directional stability at high speeds, and cornering and braking stability. Suspension friction is also reduced in each portion of the suspension components for good vehicle controllability, stability and riding comfort.

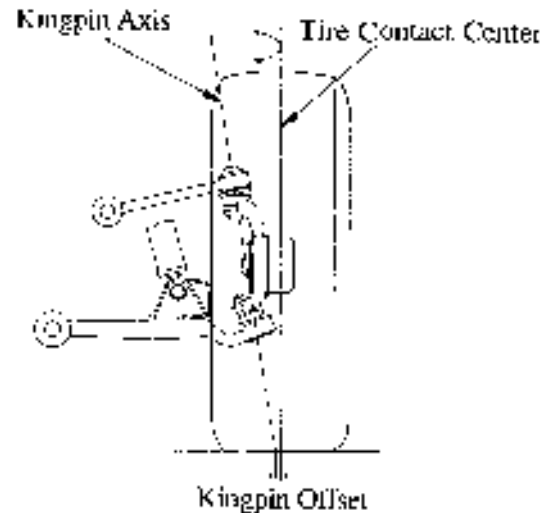


2. Geometry

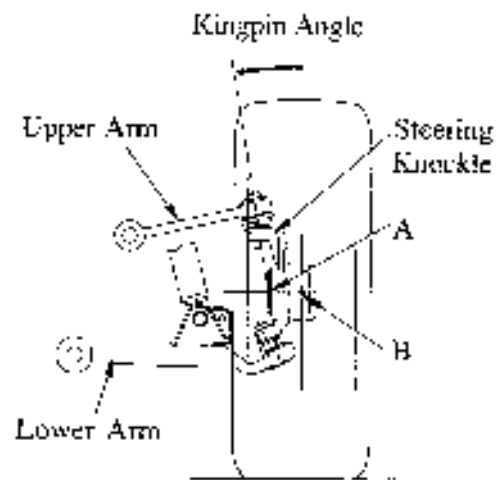
By making the caster angle smaller, high level cornering performance has been provided. In addition, by selecting the optimum caster trail values, steering response during high speed travel is provided and steering force and steering holding force are optimized.



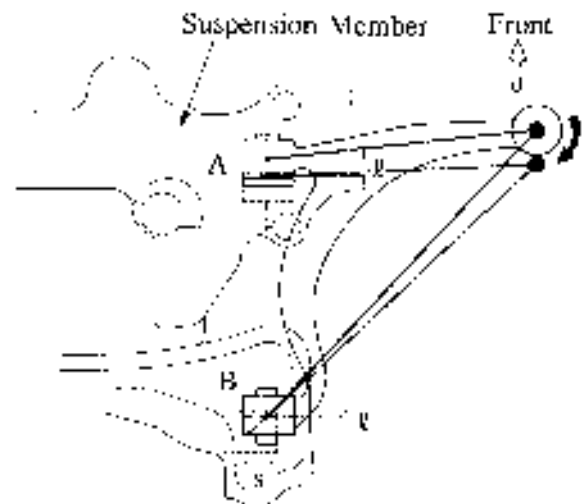
- A small kingpin offset is used and the moment which occurs around the kingpin axis is made small in order to increase vehicle stability and reduce steering effort when braking or riding over bumps.



- By using the most appropriate steering knuckle shape and position of the upper arm, the kingpin angle has been reduced and the distance between A and B in the diagrams below is shortened to provide more stable directional stability.



- In order to reduce the noise and shock generated when the vehicle rides over a bump, the lower arms are given sufficient compliance in the front and rear directions. When driving over a bump, the load input from the wheels is received by the lower arm. In this way, the lower arms move backward. Point A of the lower arms then stops at the suspension member and point B rotates to the right about point A. This movement causes noise and shock attempting to enter the interior to enter from point A. Since point A is further from the interior than point B, the noise and shock reaching the passengers is reduced.



x : Amount of movement in the lengthwise direction

y : Amount of movement in the lateral direction

- Anti-dive geometry

Optimal positioning of the upper arm and lower arm limits the changes of the vehicle body in the front and rear direction during braking.

Since suspension movements occur in a stroke centered around the virtual center, the position of the virtual center is important. The front virtual center O_f is located where the line drawn from the center of the upper arm ball joint, running parallel with the two body installation points of the upper arm, intersects with the line which is an extension of the line through the front and rear installation positions of the lower arm. The virtual center is relative, so it moves up and down together with the suspension stroke.

Due to load shifting during braking, the load distribution on the front and rear wheels changes.

The load bearing on the front wheels increases and the load bearing on the rear wheels decreases.

As a result, the front end of the vehicle dives and the rear end rises. If we think of the body's posture as constant, the amount of load shifting (ΔW) is the sum of the respective forces ΔW at the point A where each of the tires comes in contact with the ground. In the front, these forces are directed upward, causing the tires to move toward the body, while in the rear these forces are directed downward, pushing the tires away from the body.

During braking, braking force B_f acting on the front tire ground contact point A can be resolved into force B_{f1} which acts along a line from the virtual center O_f and the ground contact point A and force B_{f2} , which acts perpendicular to the ground at contact point A . At this time, the downward force B_{f2} combines with the upward force ΔW , greatly increasing the amount of front dive.

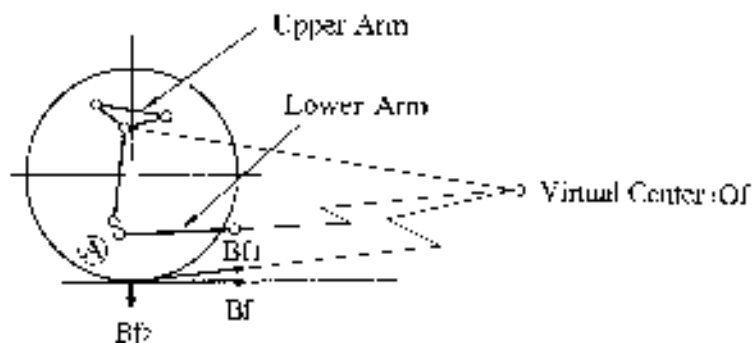
In the SC400, optimization of the mounting position of lower arm and the tilt of the upper arms reduces force B_{f2} and thus reduces nose dive.



During Braking

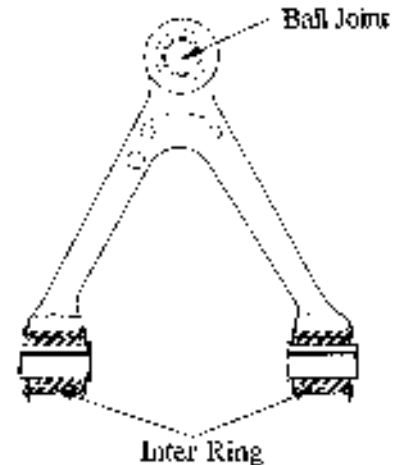


If the Body's Posture
is Constant



3. Upper Arm

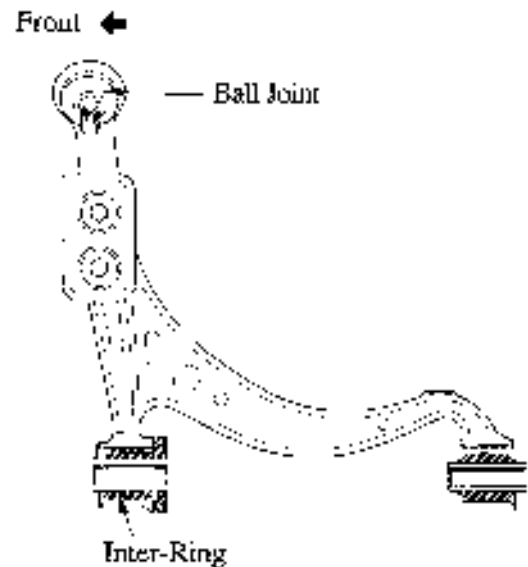
- The upper arms have an A-shaped design with high lateral rigidity. They are made of forged aluminum to reduce the unsprung weight.
- Inter-rings are installed in the inside of the upper arm bushings. These rings have hard characteristics in the vehicle's left and right directions and soft characteristics in the vehicle's front and rear directions to improve the vehicle's steering stability and riding comfort.



4. Lower Arm

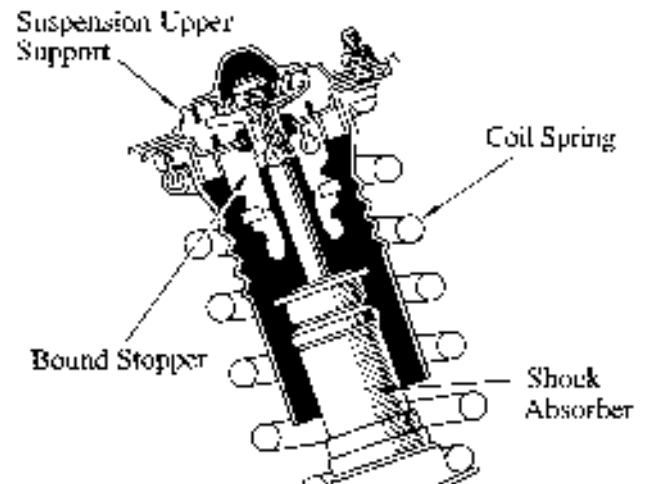
- The lower arms have a highly rigid L-shaped design and forged steel is used.
- Inter-rings are installed in the front sides of the upper arm bushings. Their characteristics are the same as those of the upper arm bushings.

The rear side is given soft characteristics for both the front and rear, and the left and right directions to achieve adequate compliance.



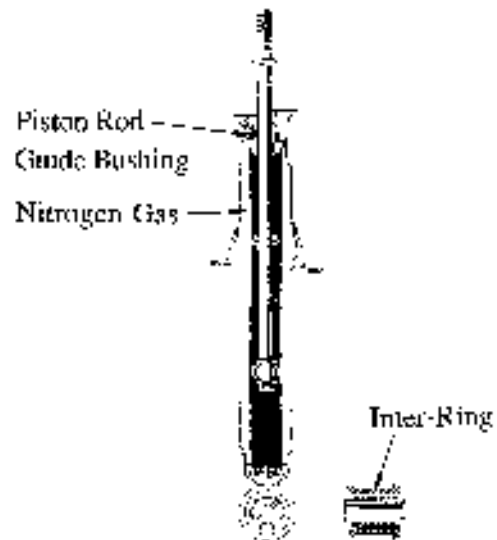
5. Suspension Upper Support

- The suspension upper support separately bears force from the shock absorber (A), the coil spring (B) and the bound stopper (C), thus uprating riding comfort and reducing noise and vibration.



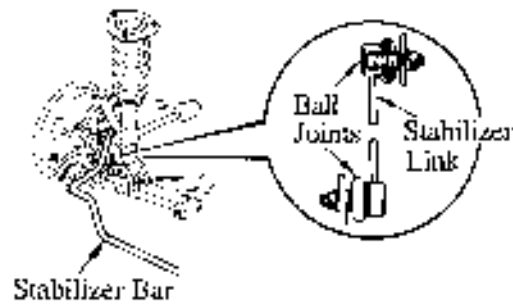
6. Shock Absorber

- The shock absorber contains a low-pressure nitrogen gas with good damping characteristics.
- The piston rod guide bushing has been given a Teflon coating to reduce friction.
- Bushings with inter-rings on the inside are used at the points where the bottom ends of the shock absorbers are mounted to improve the damper effect.



7. Stabilizer Bar

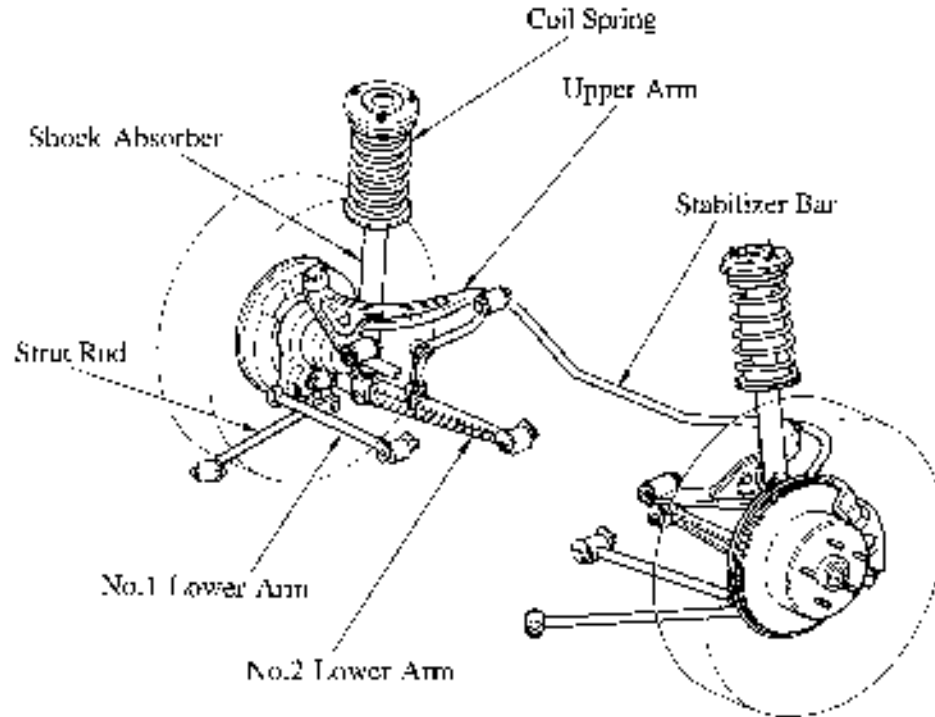
- A hollow stabilizer bar is used to reduce weight. Ball joints are used for the joints between the stabilizer bar and stabilizer link and the lower arm and stabilizer link. These work effectively to improve the roll feeling during minute rolls.



■ REAR SUSPENSION

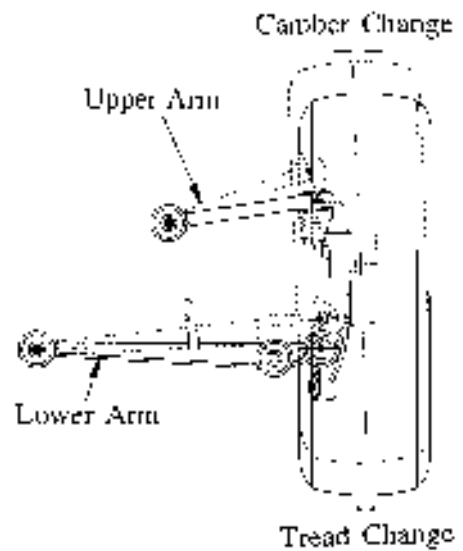
1. General

The rear suspension is the same double wishbone type as the front. The H-shaped aluminum upper arm is combined with two unequal-length, non-parallel lower arms and a strut rod.

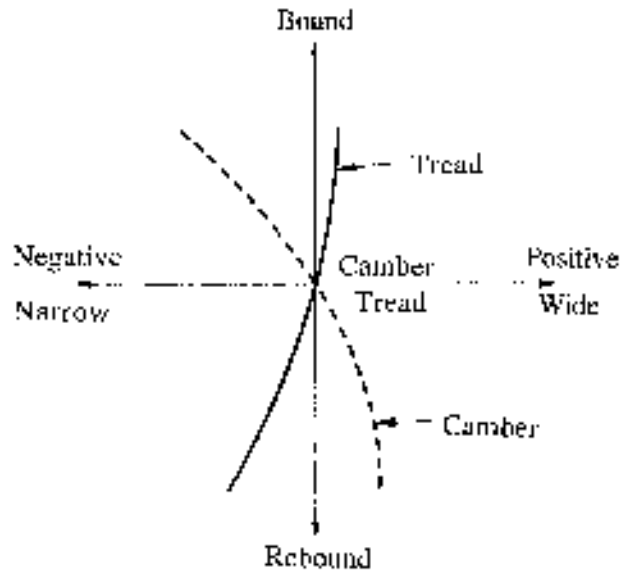
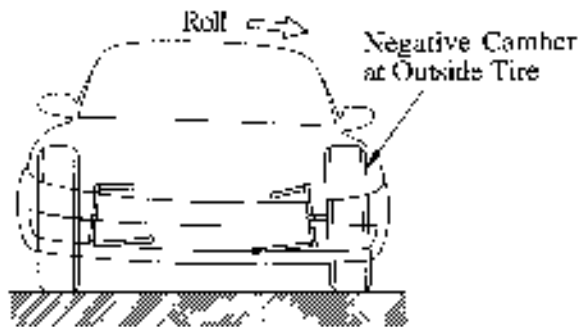


2. Geometry

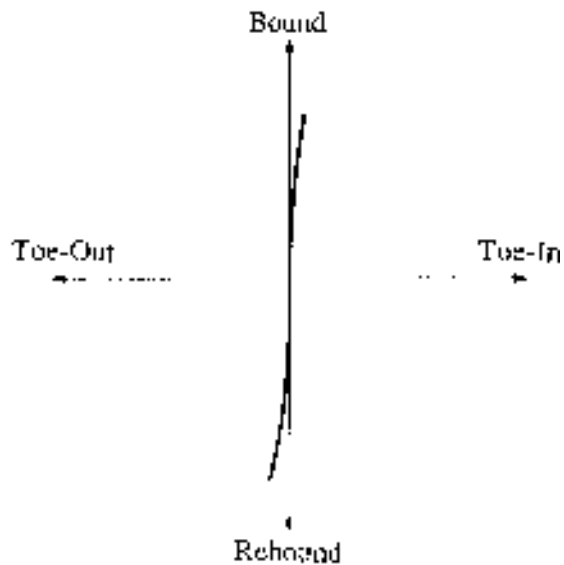
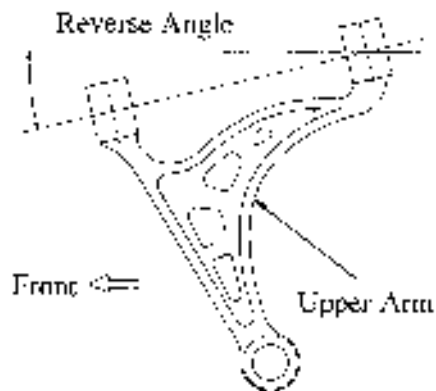
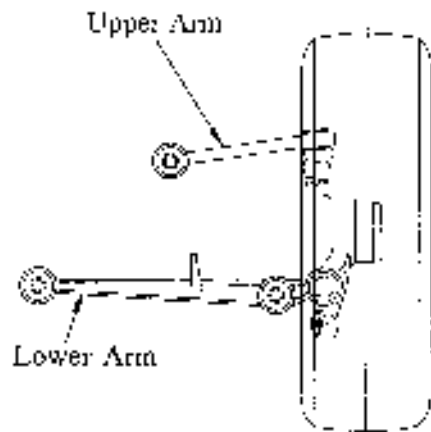
- The combination of long lower arm and short upper arm provides optimal camber and tread changes during bound and rebound.



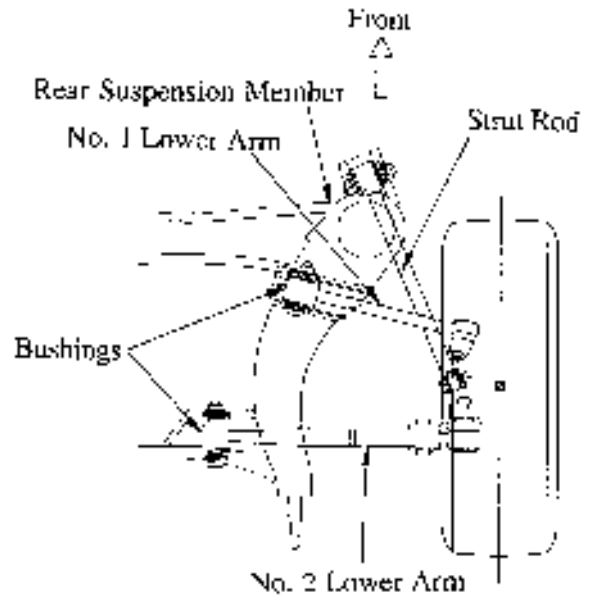
- During cornering, the tire on the outer curve has large negative camber for increased cornering performance.
- By lengthening the lower arm, tread change is kept small, and straight-line stability and riding comfort are increased.



- Through a combination of a long lower arm and a comparatively short upper arm with a sweep back angle, the change in the toe-in in the normal use range is controlled. This provides excellent directional stability on a rough road, etc.

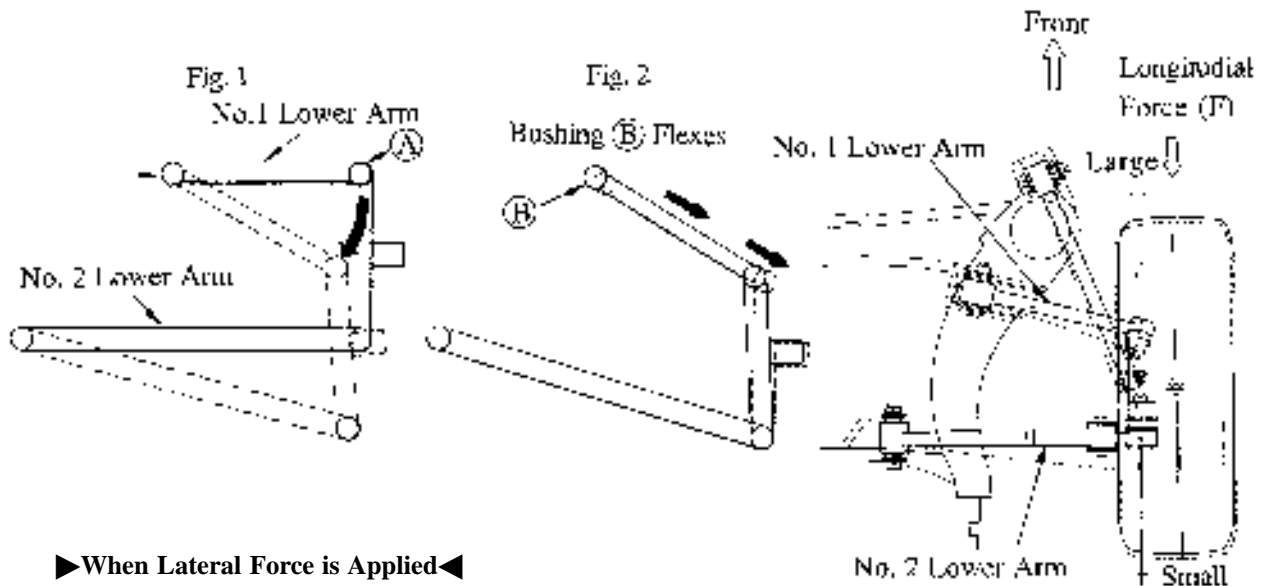


- Optimal length and positioning of the arms and optimal bushing characteristics limit the toe-in change due to cornering and braking force to give good compliance steer characteristics.



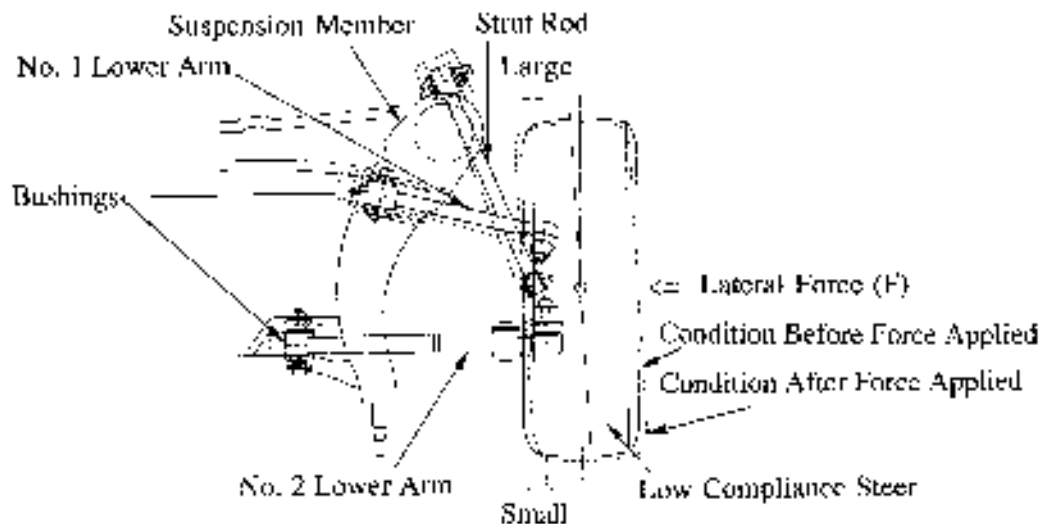
►When Longitudinal Force is Applied◀

The No. 1 lower arm is shorter than the No. 2 lower arm. Because of this, when longitudinal force bears on the tire during braking, etc., movement of the wheelside installation point **(A)** of the No. 1 lower arm to the inside (body side) is large [Fig. 1], but the force bearing on the lower arm causes the bushing **(B)** of the No. 1 lower arm to be pulled to the outer side (wheel side) [Fig. 2], so that compliance steer is maintained at almost zero.



►When Lateral Force is Applied◀

In addition to using optimal lower arm bushings, the wheel center is positioned at the center of the bushings of the rear suspension member to limit the toe-change due to lateral force, and keep compliance steer to almost zero.



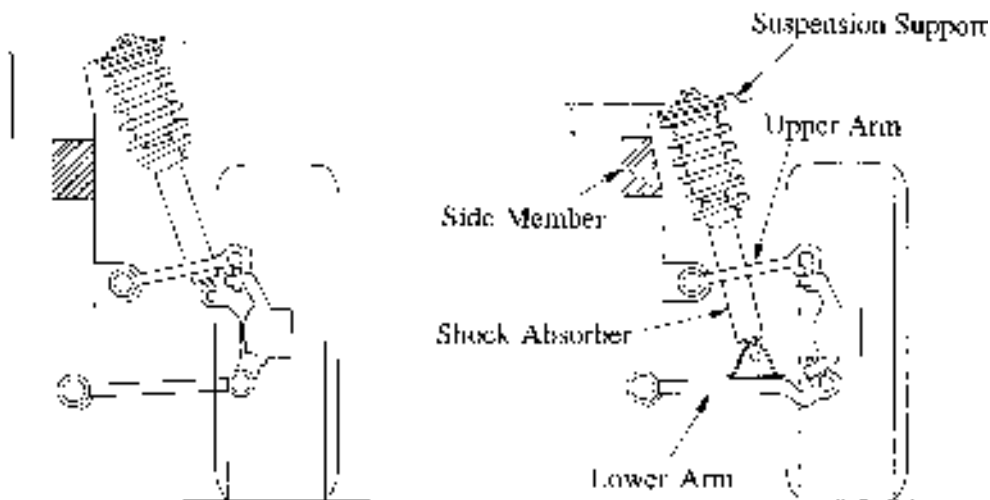
- Anti-lift and anti-squat geometry

As in the LS400, the lift during braking and the squat caused by the starting force are reduced by optimal positioning of the upper arm and strut rod.

For details, see New Car Features for the LS400 (Pub. No. NCF054U).

- The bottom end of the shock absorber is mounted on the lower arm to reduce road noise.

By mounting the bottom end of the shock absorber to the lower arm, the mounting position of the suspension upper support is lowered and is brought nearer to the side member. In this way, the rigidity of the suspension support mount can be increased and road noise can be reduced.

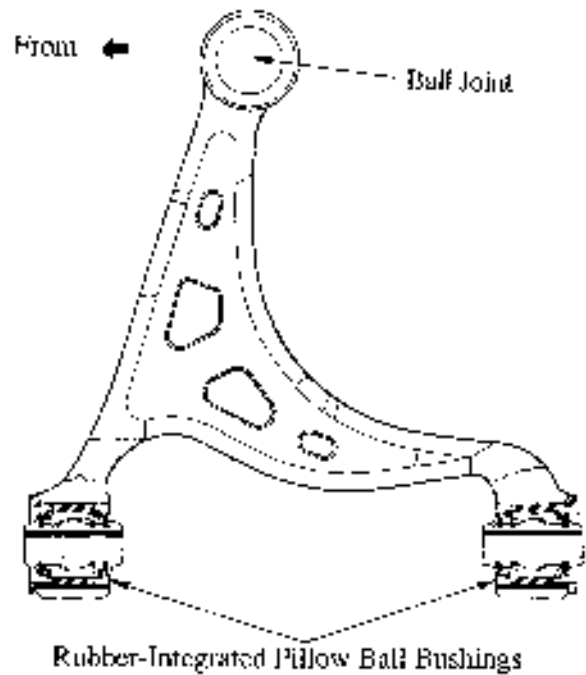


SC400

General

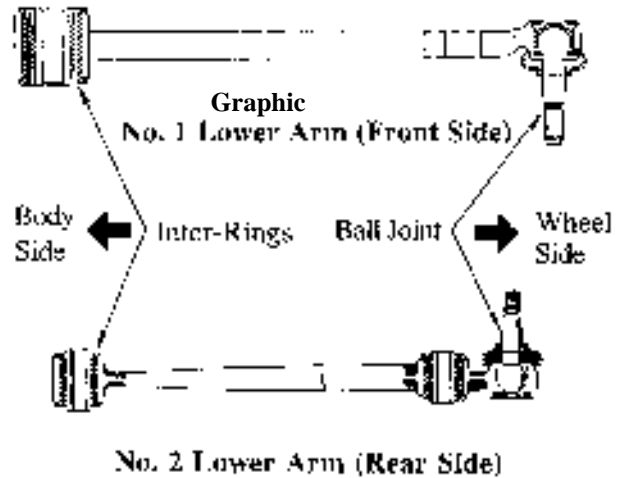
3. Upper Arm

The upper arm is an A-shaped forged aluminum arm with a high lateral rigidity. It has rubber-integrated pillow ball bushings on both the front and rear sides to reduce torsional torque as well as enhancing riding comfort.



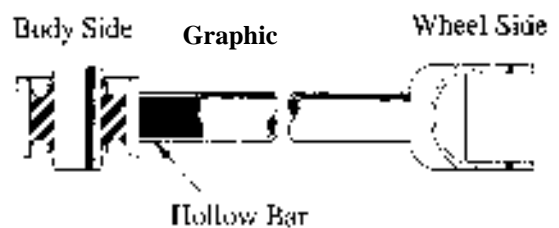
4. Lower Arms

No. 1 lower arm is a hollow bar and No. 2 lower arm is made of forged steel, maintaining lateral rigidity and reducing weight. Both No. 1 and No. 2 lower arms on the body side use bushings with a steel inter-ring. The other end (wheel side) of the No. 1 and No. 2 lower arms has a ball joint. This design helps reduce both torsional and pinching torques without affecting lateral rigidity. It also enhances turning performance of the vehicle without sacrificing riding comfort.



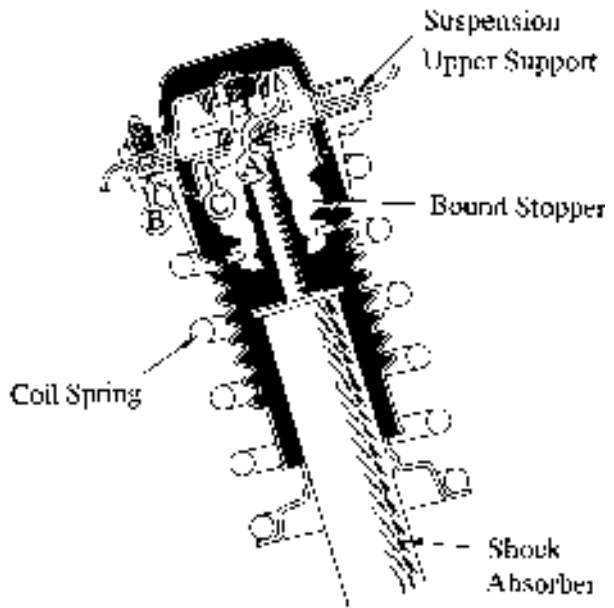
5. Strut Rod

A hollow bar type strut bar is used, reducing the unsprung weight. Large capacity bushings are used on both the body and wheel sides of the strut rod, maintaining sufficient compliance.



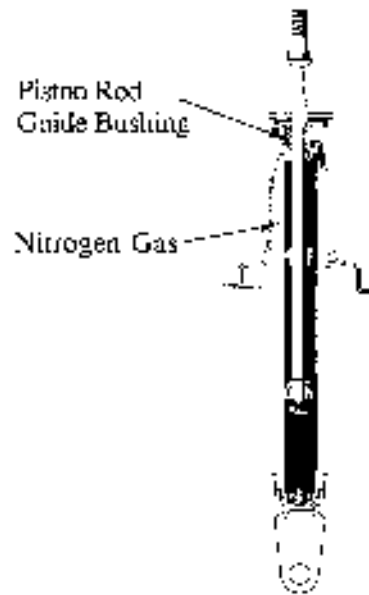
6. Suspension Upper Support (For Coil Spring Suspensions)

The suspension upper support is the same as that of the front and separately bears force from the shock absorber **A**, the coil spring **B** and the bound stopper **C**. This design helps upgrade riding comfort and reduce noise and vibration.



7. Shock Absorber

- The basic construction and operation are the same as those of the front shock absorbers. The bottom side of the shock absorbers is mounted on the No. 2 lower arm.
- The mount includes the same bushing with inter-ring as is used in the front shock absorbers, but the bushing is mounted on the No. 2 lower arm.



8. Stabilizer Bar

The stabilizer bar is a hollow bar and the stabilizer link is made of plastics to reduce weight. The stabilizer link is the ball joint type as in the front to reduce the suspension friction and increase link rigidity. As a result, it performs effectively even for slight rolling and maintains stable roll feeling.

