



**Mercedes-Benz**

Driving Dynamics Systems: ASD, ASR and 4MATIC™





# Overview

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This guide describes ASD, ASR and 4MATIC™ driving dynamics systems. They have been created by Mercedes-Benz to augment control of the car in less-than-ideal road conditions by efficiently distributing engine torque and enhancing traction.

Electronically and hydraulically controlled, these systems function automatically; you do not have to activate *anything*. And they are designed to function only when needed—when marginal surface conditions cause some loss of traction. It is important to remember, however, that these systems are not intended for off-road use.

The engineers of Mercedes-Benz have spent years refining these systems. Not only do they react automatically, they react almost instantly—far faster than any person ever could.

We urge you to turn to the section that describes the system in your Mercedes-Benz, and read it carefully.

Three highly advanced drivetrain systems that react automatically to provide increased traction coupled with sure, stable handling.

Please note: The engineers of Mercedes-Benz have done everything that current technology allows to provide you with the most sophisticated driving systems available today. However, no system, no matter how sophisticated, can repeal the laws of physics or overcome careless driving actions. Please make it your responsibility to operate your car in a safe and prudent manner at all times.

## ASD Automatic Locking Differential

When one of an automobile's driven wheels starts to slip, its torque is energy wasted. This can be problematic when you need to start or accelerate on a wet, slick or gravel-covered surface.

The Mercedes-Benz ASD system was created chiefly to improve start-up and low-speed accelerative traction. The ASD system detects wheelslip in one of the driven wheels and alerts the driver via a lamp located in the speedometer.

In addition, up to a speed of about 19

the ASD system is far more advanced.

With ASD, the locking action of the differential can be up to 100 percent. When traction improves, the ASD system disengages—automatically and virtually instantly—and the automobile returns to its normal drive mode, with motive power equally distributed between the two driven wheels.

To ensure that braking will never be impeded, the ASD system is designed to disengage the instant you apply the brake

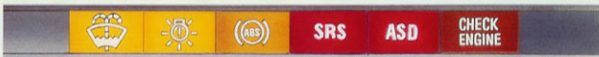
pedal. Full braking stability is always retained, and the ABS Antilock Braking System remains fully functional.

When the speed is above 19 mph, ASD will no longer lock the differential. At higher speeds, a fully or substantially

An automatic, computer-controlled locking differential for four-cylinder, manual-shift and diesel models.

locked differential may impede cornering. But the system's basic limited-slip function—up to 35 percent—remains available.

To warn you of slippery conditions at any speed, the monitor lamp mounted in the speedometer will illuminate whenever acceleration causes rear-wheelslip, reminding you to adapt your driving style to the prevailing conditions.



mph, ASD will instantly shift much of the slipping wheel's unused torque to the other driven wheel. It does this by means of a locking differential. Although this concept is in some ways comparable to the conventional mechanical limited-slip differential,



**Maintenance requirements:** Your ASD system should be maintained and serviced only by an authorized Mercedes-Benz service professional. For recommended service of the ASD system, see your Owner's Manual.



Please note: When the indicator light is on, traction has diminished. Modify your driving behavior.

## ASR Mercedes-Benz Automatic Slip Control

Slick pavement, gravel and tight cornering are but a few of the causes of wheelslip. Automatically controlling such wheelslip

the engine is throttled back until the slippage no longer occurs. Should this not be enough to correct the situation, the slipping

conditions. And should you move abruptly from the brake to the accelerator, the same computer monitors power distribution to help reduce slippage.

If you apply the brakes, the ASR system will immediately disengage and full ABS antilock braking function will be retained in each wheel.

A limited amount of driven wheelslip is advantageous when using snow chains, due to their unique traction characteristics. An ASR "snow chain" rocker switch in the center console can be activated

when snow chains are installed, to permit a higher—but limited—degree of wheelslip. This switch is effective only at speeds below 24 mph; it will automatically

during acceleration throughout a car's operating range is the function of ASR.

### At speeds under approximately 24 mph:

If one driven wheel slips, its brake is applied until traction is regained. Should the slippage continue, the braking is accompanied by a throttling back of the engine until wheelslip disappears.

### At speeds above approximately 24 mph:

The above sequence is reversed. If the sensors detect slippage in one driven wheel,

wheel is braked until traction is regained. This is also how the ASR system responds when slippage is detected in both driven wheels, regardless of the vehicle's speed.

### Through curves at speeds between 12 mph and 75 mph:

The ASR system monitors the sharpness of the curve and, when necessary, will throttle back the engine to achieve the proper degree of traction.

The ASR system incorporates an accelerator that evaluates conditions and reduces engine rpm when necessary—regardless of pedal position. This aims to maximize tire-to-road adhesion, even in difficult driving



An automatic, computer-controlled antislip acceleration system for six- and eight-cylinder gasoline-engine models with automatic transmissions.

**Maintenance requirements:** Your ASR system should be maintained and serviced only by an authorized Mercedes-Benz service professional. See your Owner's Manual for the recommended maintenance schedule.



**Please note:** When the indicator light is on, traction has diminished. Modify your driving behavior.

disengage at higher speeds.

The ASR system has a function monitor lamp in the speedometer to indicate when the system is engaged. It will remain illuminated as long as the system is actively controlling wheelslip, and you should adapt your driving style accordingly to suit the road conditions.

## 4MATIC All-Wheel-Drive Traction System

The Mercedes-Benz 4MATIC all-wheel-drive system available in the 1991 300E 4MATIC Sedan and the 300TE 4MATIC Station Wagon is a fully automatic, electronically and hydraulically controlled traction system designed to function only when it is needed—that is, when a road surface is slippery enough to cause some loss of traction.

In normal circumstances, the Mercedes-Benz 4MATIC system is not engaged. Power from the engine is channeled to the two rear wheels just as it would be in any current Mercedes-Benz passenger car without 4MATIC.

Should the 4MATIC system detect either an impending loss of traction or of driving stability—for example, during certain sharp turns—it responds by distributing power to the front wheels as well. This occurs automatically, instantly, and so smoothly it is unlikely that you will notice the transition.

It is important that the driver be fully aware of deteriorating traction conditions, even as 4MATIC is helping to provide the best possible traction under the circumstances. Thus, when the system engages, an indicator lamp—a yellow triangle outlined in black with a black exclamation point inside—glows prominently from the center of the speedometer. This indicator will also momentarily light when you turn the ignition to position two.

Viewed in its entirety, a vehicle fitted with the 4MATIC system has four levels of forward drivetrain engagement, beginning with simple rear-wheel drive. All-wheel drive engages in this order of escalating response:

1. All-wheel drive with torque split in a ratio of 35:65 front to rear.
2. All-wheel drive with torque split 50:50 front to rear.
3. All-wheel drive with torque split 50:50 front to rear and the rear differential locked.

This maximum level of engagement can occur only at fairly low forward speeds.

**Starting and accelerating:** When accelerating forward from a standing position, the 4MATIC system always engages the first level of all-wheel drive until a speed of approximately 12 mph is reached. The lamp will not illuminate in this instance. Under hard acceleration, or under acceleration where some wheelslip might occur—for example, driving up a steep incline—all-wheel drive remains engaged until the driver backs off the accelerator significantly.

**Cornering:** In a sharp turn, a sudden change in the steering angle or in a tire's adhesion to the road can cause a car to deviate from its intended path. In both cases, 4MATIC will engage either the first or the next level of all-wheel drive, helping the car “pull” itself through the turn by adding front-wheel tractive force.



**Computerized, fully  
automatic all-wheel drive  
for the 300 E and 300 TE.**

**Traction loss:** When the rear wheels begin to slip relative to the front wheels—as occurs on ice, snow, sand, gravel, mud, or when the wheels hydroplane—the first or the next level of all-wheel drive is engaged.

Once engaged, any level of all-wheel drive remains engaged until the condition which caused it diminishes significantly. The 4MATIC system is programmed to disengage in stages, on the theory that more than enough traction is preferable to less than enough.

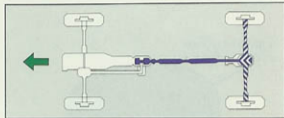
Note that rear-wheel drive is always engaged. Once disengaged, all-wheel drive is again instantly engaged should traction conditions worsen. If a cycle of engagements and disengagements occurs in a specified interval, the length of time all-

wheel drive is engaged is automatically prolonged.

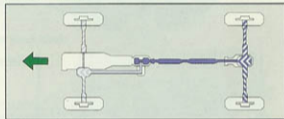
Above 30 mph, braking with 4MATIC engaged causes the system to instantly revert to rear-wheel drive. Below 30 mph, the system reverts to the first stage (35:65). Thus, antilock braking (ABS) effectiveness is maintained.

**Maintenance requirements:** Your 4MATIC system should be serviced only by trained technicians at your authorized Mercedes-Benz dealer. The recommended service intervals for 4MATIC system inspections and fluid changes duplicate those established for your automatic transmission. Please see your Owner's Manual.

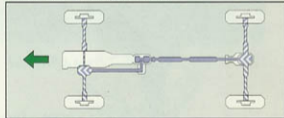
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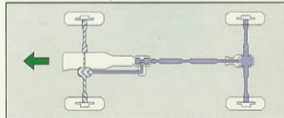
*Rear-wheel drive*



*All-wheel drive 35:65 front to rear*



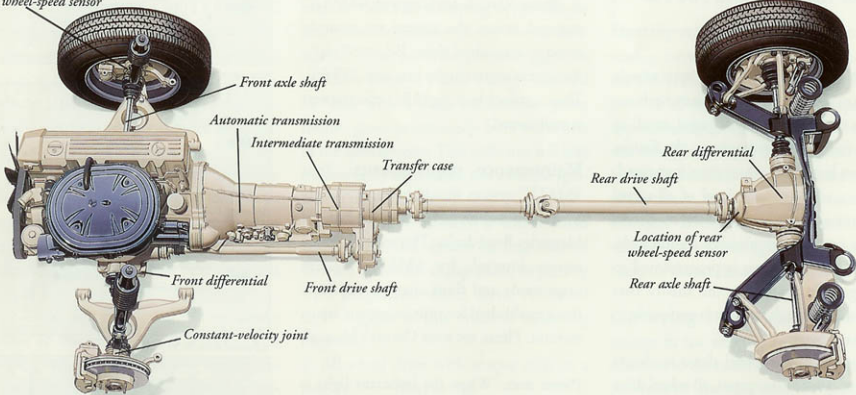
*All-wheel drive 50:50 front to rear*



*All-wheel drive 50:50 front to rear, locked rear differential*

# 4MATIC All-Wheel Drive

Location of front  
wheel-speed sensor





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