# FACTS

# ESP
## BRAKE STABILITY PROGRAM

ESP is a electronically operated brake stabilization program (included in the EBS-control unit) ESP is a rapidly reacting system, thanks to the electronic signal transference.

The ESP function (Electronic Stability Program) is integrated to the EBS-system and the regulation of the stabilizing brake function is performed electronically. With help of a number of sensors like the steering wheel angle sensor, speed sensors on each wheel, axle load, number of engine revolution and throttle level (requested engine torque) or brakes (requested brake action). The ESP program calculates if the vehicle is heading into a curve with to high speed or is going to get a slide.

The brake stabilization program analyzes and evaluates incoming signals and, based on this information determines with help of the EBS control unit how the modulators are to regulate the brake pressure for each axle and wheel. The ESP brake stabilization program means a minimised risk of getting a slide or overturning the vehicle.

The brake disc is mounted on the hub via a patented spline-like joint allowing the disc to expand symmetrical.

ESP brake stabilization minimizes the risk of getting a skid or overturning the vehicle.

### CUSTOMER BENEFITS

- Electronically control system reacts quickly, which reduces the braking distance.
- The brake forces are distributed more evenly which increases stability.
- Brake stabilization gives a minimised risk of sliding or rolling over the vehicle.



VOLVO

# ESP BRAKE STABILITY PROGRAM

### ESP brake stability program

ESP (Electronic Stability Program) gives brake stability with opportunity to divide the brake action between the axles/wheels. The system is available for B12B/BLE and B12M. With a few simple words you can say that ESP senses how the driver wants the vehicle to act. After this procedure it senses how the vehicle acts. If these parameters are unlike the system corrects by braking one or several wheels.

### Advanced measurement with a great number of parameters

The main parameters that sense the driver's measurements are:
Steering angle (a sensor which is placed in the guiding column that measure turning of the steering wheel).
Requested engine torque and Requested brake action.
The main parameters that sense how the vehicle acts:
Side force – the force that makes the vehicle kept on the road in a curve (lateral acceleration).
Angle of yaw speed – how fast the bus turns around its centre of gravity, which occurs when turning and changing direction.
Wheel speed – how fast the vehicle moves and if any wheel get locked.

### Reduced engine torque and brakes the wheels individually

ESP sends a signal to the engine control unit which reduces the engine torque ESP controls the brake action individually on each wheel.

During certain situations the system also brakes the trailers wheels and thereby provides stability both laterally and longitudinally.

ESP senses when the bus is travelling to fast, e.g. during a evasive action

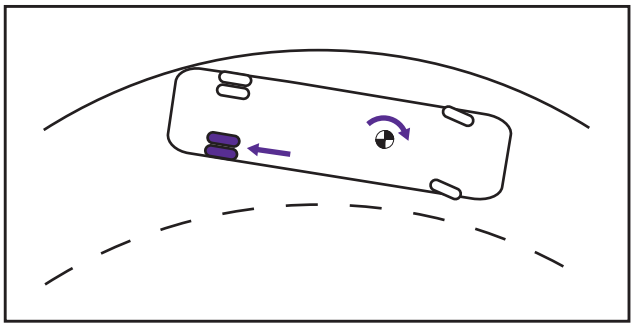
### Minimised roll-over risk

When the sensor for lateral acceleration indicates that limit value for rolling over is foreseen, ESP decreases the engine throttle (requested engine torque). If it is necessary ESP engages the wheel brakes to reduce the speed and the buses lateral forces will decrease to an acceptable level.

If this is not enough ESP sets in the second step, which will occur if the system sense that one or several wheels are locked – an indication that the wheel is going to lift. The wheel brakes are activated in a more powerful way which is braking the entire bus. In this way the speed is reduced and the side forces are levelled to avoid from rolling over.

### Slide due to understeering

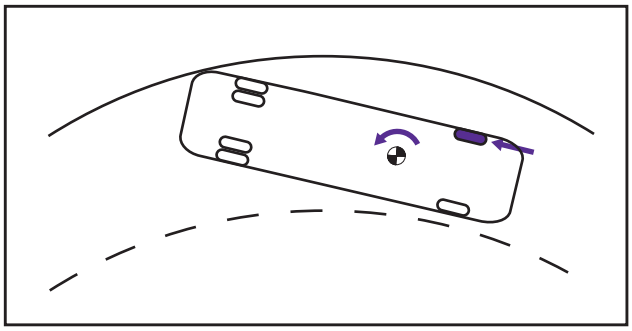
When a bus is understeered in a curve it tends to continue moving straight ahead. The outer front wheel loose traction. ESP senses that the steering angle do not correspond with the lateral forces and the angle of yaw speed. The system acts to counteract the under steering by braking the wheel with the best traction (in this case the inner rear wheel). This action makes the vehicle on track through the curve again.



ESP brakes the inner rear wheel and the traction is back and the bus is on track through the curve.

### Slide due to oversteering

When a bus is oversteered in a curve the rear wheels loose traction and the rear end gets a slide. ESP senses that the angle of yaw speed do not correspond with the steering angle and the lateral forces. The system acts to counteract the slide. By braking the outer front wheel (which normally has the best traction during cases like this) it counteracts the slide and the rear wheels get traction again.



ESP brakes the outer front wheel this counteracts the slide and the rear wheels get traction again.