

#### **Starting off control logic with manual transmission in road gear (low range not engaged)**

A starting off logic is integrated in the ETS control module to prevent the engine stalling due to brake intervention when starting off. Depending on the vehicle speed a mean minimum drive speed theoretical minimum engine speed) is specified which depends on the current ETS brake control pressure.

If the mean drive speed drops below the specified mean minimum drive speed, the pressure in the brake caliper is reduced.

This control characteristic is varied between **5 and 30 km/h** on vehicles with manual transmission, depending on the brake control pressure, mean drive speed and vehicle speed.

#### **Temperature monitoring**

Due to the double load of the brake and ETS control there is the risk of brake overheating with misuse. For this reason the brake lining temperature is calculated continuously in the control module for each wheel individually and when a calculated lining temperature is reached at the respective brake no further ETS control is permitted until the temperature has dropped again to a set value. If ETS control is prevented by temperature monitoring, the ETS MIL comes on for as long as the ETS control would be effective, but for **at least 7 seconds**. The excessive temperature is also recorded in the fault memory.

#### **Temperature calculation**

Brake lining temperature is calculated separately for each wheel. It is determined without a temperature sensor. The following inputs are evaluated to calculate brake lining temperature:

- Vehicle speed
- Brake operation
- Calculated brake pressure from ETS control logic

#### **After run mode after "Ignition off"**

This operating mode ensures the voltage supply of the ETS control module even after "ignition off". As a result the brake lining temperatures continue to be calculated and cannot be reset by "Ignition Off Ignition On". The temperature calculation is continued after the ignition is switched off until a calculated temperature of **70°** is reached, but for **30 minutes at the most**. The voltage supply to the ETS control module is then switched off.

#### **Safety circuit**

The task of the safety circuit is to recognize defective components in the control module and faults in the electric cable system. After "ignition on" and exceeding a speed of **7 km/h** for the first time system tests are carried out which recognize faults in the solenoid valves, the high-pressure/return pump and speed sensors. In addition constant monitoring is also carried out during an ABS or ETS control operation. If a fault is recognized, the system is switched off and this is displayed to the driver by the ETS or ABS MIL (A1e35 or A1e17) coming on. A fault code is also stored in the control module. The safety circuit also constantly monitors battery voltage. When the voltage drops **below 10.5 V** the system is also switched off until the voltage is in the specified range again.

#### **Additional functions**

Wheel speed and speed status signal outputs

Wheel speed output: For systems which require a wheel speed signal the ETS control module supplies the current wheel speed of each wheel.

Speed status signal output For systems which require information on the current vehicle status (vehicle stationary, vehicle driving, speed sensor defective), the ETS control module supplies the speed status signal.

#### **Malfunction indicator lamp actuation**

The signals from the brake pad wear contacts, from the brake fluid level switch and the parking brake are registered. They are passed on to the instrument cluster via the CAN data bus together with the signals for the ABS and ETS MIL, the ETS warning lamp, brake pad wear indicator and low brake fluid level/parking brake/brake booster pressure indicator lamps.

#### **Location of ASR V Control Module**