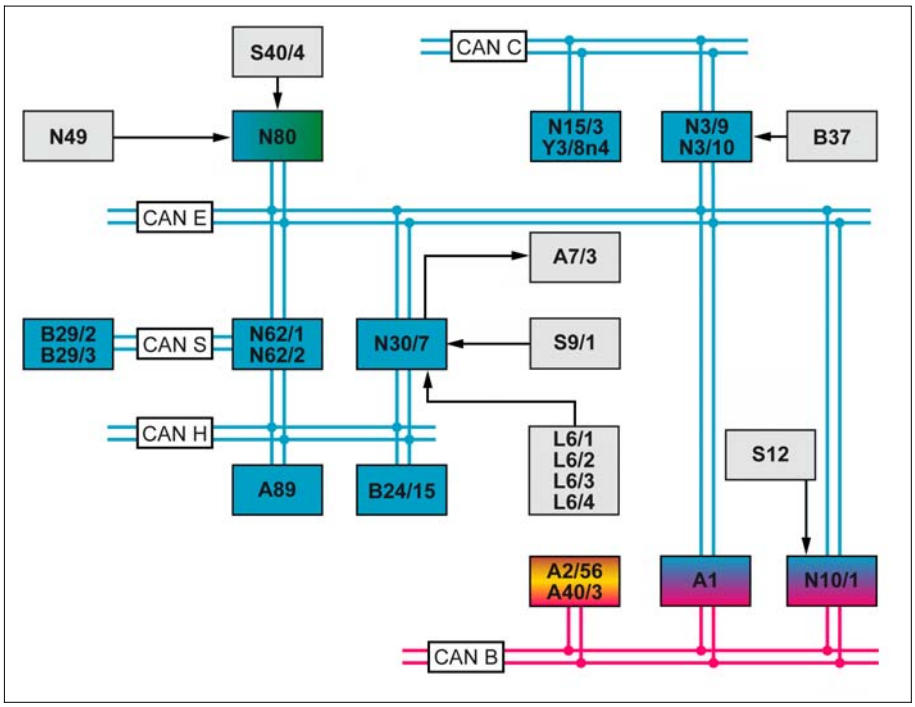
MODEL 207
up to model year 2014
with CODE 233 (DISTRONIC PLUS)



P30.30-2363-76

A1 *Instrument cluster*
A1e59 *DISTRONIC warning lamp*
A1h1 *Warning buzzer*
A1p13 *Multifunction display*
A2/56 *Radio with Auto- Pilot System (for code (511) Audio 50 APS incl. DVD changer or code (525) MB Audio 50 APS radio)*
A7/3 *Traction system hydraulic unit*
A40/3 *COMAND controller unit (with code (512) COMAND APS incl. DVD changer or code (527) COMAND APS with single DVD drive (with navigation))*
A89 *DISTRONIC electric controller unit*
B24/15 *Yaw rate sensor for lateral and longitudinal acceleration*
B29/2 *DISTRONIC sensor (DTR) / left front bumper*
B29/3 *DISTRONIC sensor (DTR) / right front bumper*
B37 *Accelerator pedal sensor*
L6/1 *Left front axle rpm sensor*
L6/2 *Right front axle rpm sensor*
L6/3 *Left rear axle rpm sensor*
L6/4 *Right rear axle rpm sensor*
N3/9 *CDI control unit (with diesel engine)*
N3/10 *ME-SFI [ME] control unit (with gasoline engine)*
N10/1 *Front SAM control unit with fuse and relay module*
N15/3 *Electronic transmission control control unit (transmission 722.6)*
N30/7 *Premium Electronic Stability Program control unit*
N49 *Steering angle sensor*
N62/1 *Radar sensors control unit (up to 31.5.11)*
N62/2 *Video and radar sensor system control unit (as of 1.6.11)*
N80 *Steering column tube module control unit*
S9/1 *Brake light switch*
S12 *Parking brake indicator switch*
S40/4 *Cruise control lever*
S40/4r1 *DISTRONIC control*
S40/4s1 *Resume from memory switch*
S40/4s2 *Decelerate and set switch*
S40/4s3 *Accelerate and set switch*
S40/4s4 *OFF switch*
S40/4s6 *SPEEDTRONIC switch (without code (494) USA version)*
S40/4v1 *SPEEDTRONIC light-emitting diode (without code (494) USA version)*
Y3/8n4 *Fully integrated transmission control unit (transmission 722.9)*
CAN B *Interior CAN*
CAN C *Drive train CAN*
CAN E *Chassis CAN*
CAN H *Vehicle dynamics CAN*
CAN S *Sensor CAN*

- No undervoltage or overvoltage
- Engine running or drivetrain operational
- "ADTR_AVL" (Advanced DISTRONIC PLUS) programmed in the front SAM control unit
- Radar sensor system not switched off (manual or automatic)
- Long range radar soiling and function test completed successfully
- Electronic Stability Program (ESP®) not switched to passive mode
- No active ESP® intervention recognized
- Vehicle is not in backward movement
- Gear range "D" engaged
- Parking brake not operated

The standstill coordinator function is described in detail in the separate function description "Adaptive Brake (ABR) function".

points

The units and values given in the following text for the speed must be assigned to the possible national versions. The details in "miles per hour (mph)" refer to vehicles with a miles indicator.

The DISTRONIC PLUS automatically regulates the speed and the distance to the vehicle driving immediately ahead in a vehicle speed range of v = 0 to 200 km/h and from v = 200 to 0 km/h (v = 0 to 120 mph and from v = 120 to 0 mph) according to the request from the driver.

The PRE-SAFE brake function permanently determines the potential danger of a rear-end collision occurring and initiates appropriate measures to mitigate the effects of a collision in critical situations.

Furthermore, there is a distance warning function contained therein which advises the driver about a vehicle driving immediately ahead which is too close. An optical and acoustic warning is issued before any possible collisions with vehicles or stationary obstacles on the vehicle's own lane.

If the driver reacts to the warning with emergency braking, he is supported by the function Brake Assist System (BAS) PLUS. The required brake servo assistance is calculated dependent on the situation. This means that the brakes are automatically applied as intensively as required (max. approx. a = 10 m/s²). In doing this the threat of a collision can be reduced or at least the severity of the accident can be reduced.

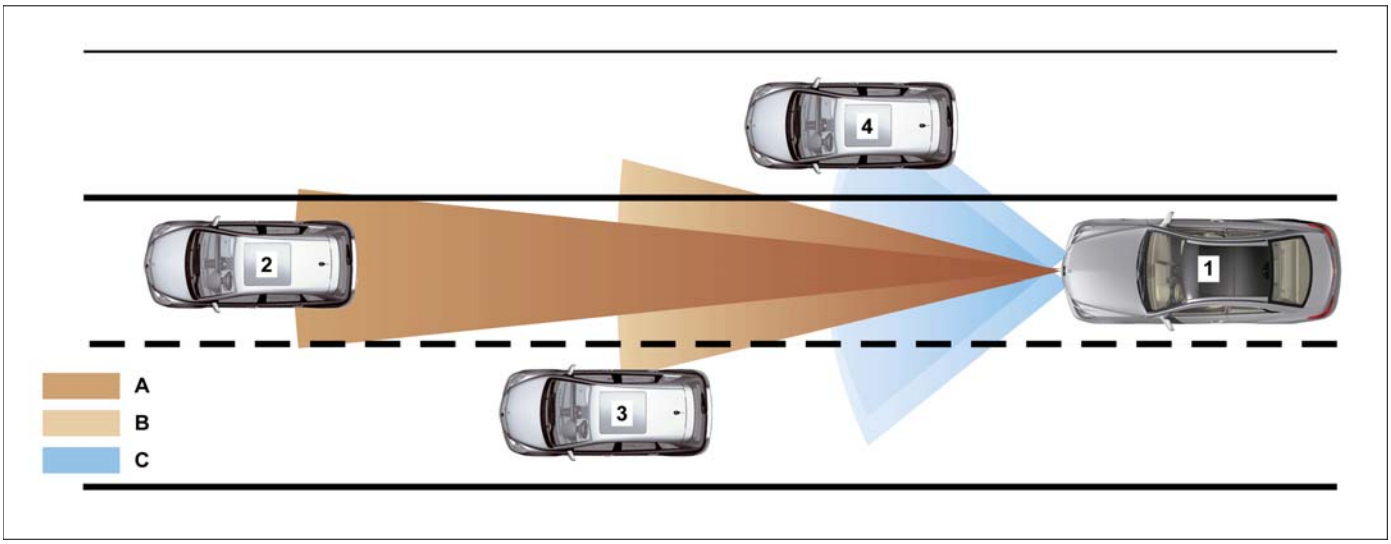
If the driver does not react to the warning, the PRE-SAFE brake function brakes vehicle autonomously and can then mitigate the effects of a possible collision.

The PRE-SAFE brake feature also supports the PRE-SAFE safety concept. The function PRE-SAFE is described in detail in the separate function description "PRE-SAFE function".

The following partial functions of the DISTRONIC PLUS are described in the separate function description "CC (TPM) function:

- Cruise control
- Variable SPEEDTRONIC (without code (494) USA version)
- Permanent limiter

The following graphical representations show the principle of operation of the functions DISTRONIC PLUS incl. BAS PLUS and PRE-SAFE brake.



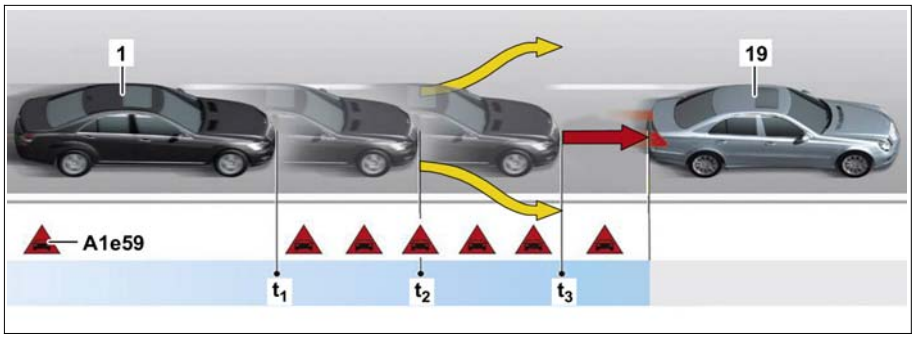
P30.30-2362-78

Detection area of the radar sensor system

1 Vehicle (equipped with DISTRONIC PLUS)
2 Vehicle driving immediately ahead (target object) detected by the long range radar sensor system
3 Vehicle driving immediately ahead in traffic, detected by the mid-range radar of the long range radar sensors
4 Stationary vehicle on the driving lane edge, detected by the short range radar sensors

A Long range radar
B Center detection range of the long range radar
C Short range radar

Illustration of the principle of the functions BAS PLUS and PRE-SAFE brake, shown on model 221

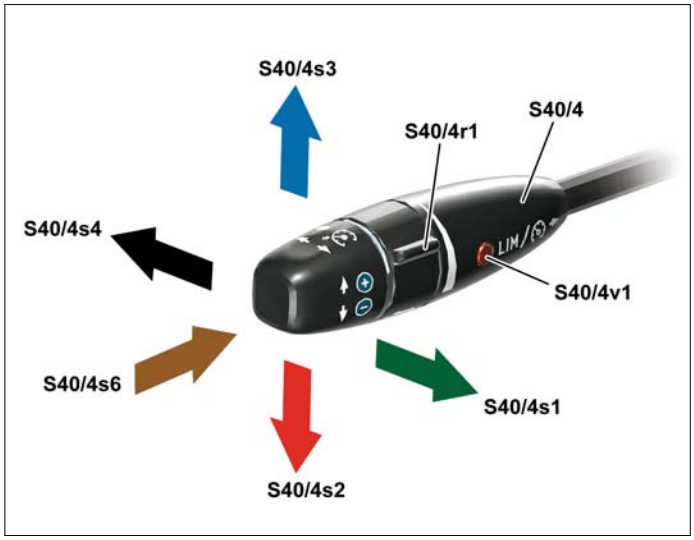


P30.30-2358-74

A1e59	*DISTRONIC warning lamp*
1	*System vehicle equipped with DISTRONIC PLUS including BAS PLUS and PRE-SAFE brake*
19	*Stationary or a significantly slower vehicle in own lane*
t_1	*Approx. t = 2.6 s before possible accident; output of visual and acoustic warning messages, activation of BAS PLUS*
t_2	*About t = 1.6 s before a possible accident; automatic partial braking by the PRE-SAFE brake; possibly also evasive maneuvers by the driver or hazard braking are performed by the driver and supported by BAS PLUS*
t_3	*Approx.t = 0.6 s until the accident, automatic emergency braking by PRE-SAFE brake*

Operation of the DISTRONIC PLUS takes place over the cruise control lever.

Design of the cruise control lever

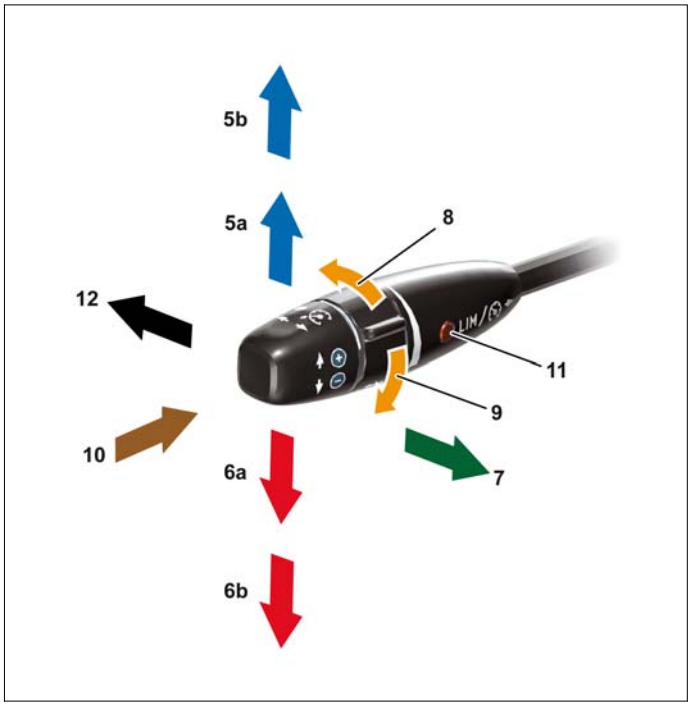


P30.20-2170-81

S40/4	*Cruise control lever*
S40/4r1	*DISTRONIC control*
S40/4s1	*Resume from memory switch*
S40/4s2	*Decelerate and set switch*
S40/4s3	*Accelerate and set switch*
S40/4s4	*OFF switch*
S40/4s6	*SPEEDTRONIC switch (without code (494) USA version)*
S40/4v1	*SPEEDTRONIC light-emitting diode (without code (494) USA version)*

Operation over the CRUISE CONTROL lever, vehicles without code (494) USA version

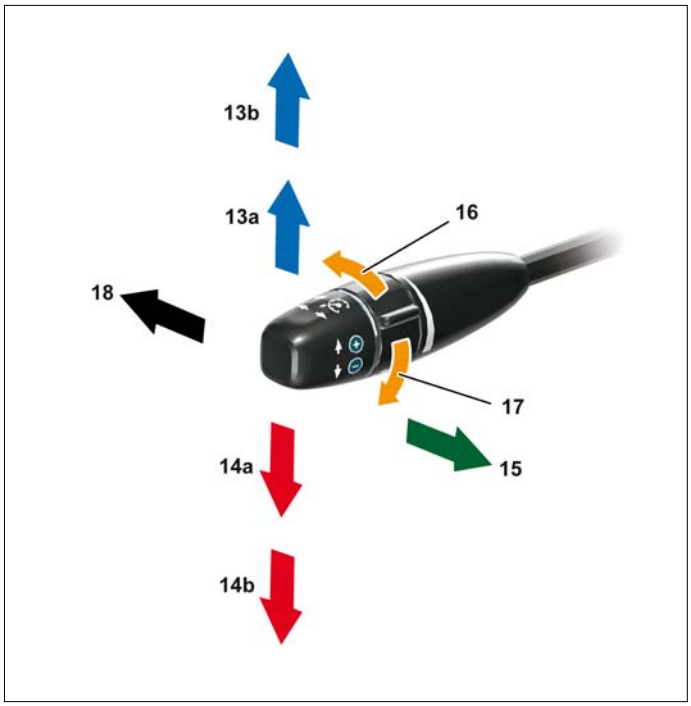
5a Accelerate and save in 1 km/h increments
5b Accelerate and save in 10 km/h increments
6a Decelerate and save in 1 km/h increments
6b Decelerate and save in 10 km/h increments
7 Switching on of the DISTRONIC PLUS or variable SPEEDTRONIC
8 Reducing the specified distance for the DISTRONIC PLUS
9 Increasing the specified distance for the DISTRONIC PLUS
10 Selection option between DISTRONIC PLUS and variable SPEEDTRONIC
11 SPEEDTRONIC light-emitting diode (lights up in the position variable SPEEDTRONIC)
12 Switching off the DISTRONIC PLUS or variable SPEEDTRONIC



P30.20-2174-82

Operation over the CRUISE CONTROL lever, vehicles with code (494) USA version

13a Accelerate and save in 1 mph/h increments
13b Accelerate and save in 5 mph/h increments
14a Decelerate and save in 1 mph/h increments
14b Decelerate and save in 5 mph/h increments
15 Switching on of the DISTRONIC PLUS or switching on of the CC
16 Reducing the specified distance for the DISTRONIC PLUS
17 Increasing the specified distance for the DISTRONIC PLUS
18 Switching off of DISTRONIC PLUS



P30.20-2173-82

The distance to the vehicle driving immediately ahead is displayed in the multifunction display for t = 5 s after actuation of the CC lever. Through selection of the operating level "DISTRONIC PLUS" in the menu "Assistance" the distance graphic is shown permanently. Display of the distance graphic can be switched on or off independently of the activity of the automatic distance control. The distance to the vehicle driving immediately ahead can be set over the DISTRONIC control in seven stages between t = 1.0 and 2.0 s. If, for example, a distance of t = 2.0 s is set, the vehicle driving immediately ahead will be followed at a temporal distance of t = 2.0 s.

The control takes place by the radar sensors control unit or the video and radar sensor system control unit. The radar sensors control unit or the video and radar sensor system control unit intervenes actively in the engine timing as well as in the brake system to realize the functions. The acoustic warnings are emitted by the warning buzzer in the IC. The optical note and warning messages are issued over the multifunction display.

The radar sensors control unit or the video and radar sensor system control unit evaluates the input factors and transmits appropriate requests for controlling of the functions DISTRONIC PLUS, BAS PLUS and PRE-SAFE brake via the following CAN:

- Chassis CAN
- Vehicle dynamics CAN
- Sensor CAN

The radar sensors control unit or the video and radar sensor system control unit evaluates the following input factors:

- Operating condition of engine/drivetrain (function requirements)
- System status of DISTRONIC PLUS (function requirements)
- Engaged gear range/stage (for transmission 722) (function requirements)
- Status of parking brake (function requirements)
- Engine drive torque
- Braking torque
- Acceleration/yaw rate
- Vehicle speed/acceleration (vehicle not in reverse or skidding movement)
- Object recognition in the short range
- Object recognition in the long range
- Driver request via the cruise control lever
- Driver request to overtake (setting the flasher)
- Global Positioning System (GPS) signals
- Steering wheel angle
- Brake pedal position
- Accelerator pedal position

Operating condition for engine/drivetrain:

The CDI control unit or the ME-SFI [ME] control unit sends the "engine running" signal or the "drivetrain operational" signal via the chassis CAN to the radar sensors control unit or the video and radar sensor system control unit.

System status of DISTRONIC PLUS

The following functions can be selected over the menu settings in the IC:

- Distance graphic ON/OFF
- Close range radar sensor array Off/On
- PRE-SAFE brake ON/OFF

The IC transmits the corresponding status via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

Engaged gear range/stage (for transmission 722):

The electronic transmission control control unit (for transmission 722.6) or the fully integrated transmission control unit (for transmission 722.9) transmits information about the engaged gear range and the stage via the drive train CAN, CDI control unit or ME-SFI [ME] control unit and the chassis CAN to the radar sensors control unit or the video and radar sensor system control unit.

Parking brake status

The status of the parking brake is detected by the parking brake indicator switch. The front SAM control unit directly reads in the status of the parking brake indicator switch and transmits this via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

Engine drive torque:

The CDI control unit or ME-SFI [ME] control unit sends information about the currently available engine drive torque via the chassis CAN to the Electronic Stability Program control unit which evaluates this appropriately and transmits it via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

Braking torque:

Information about the currently applied braking torque is transmitted by the Electronic Stability Program control unit via the chassis CAN the radar sensors control unit or to the video and radar sensor system control unit.

Acceleration/yaw rate:

The acceleration/yaw rate is detected by the yaw rate sensor for lateral and longitudinal acceleration. The yaw rate sensor for lateral and longitudinal acceleration sensor transmits the values for acceleration and the yaw rate via the dynamics CAN, Electronic Stability Program control unit and chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

i On safety and comfort grounds the maximum (positive) acceleration of the automatic distance control is limited to about a = 2.5 m/s². It behaves in reverse proportion to the vehicle speed. This means that smaller accelerations are permitted for an increasing vehicle speed.

Vehicle speed/acceleration:

The vehicle speed is calculated on the basis of the wheel speeds. The acceleration is defined over the increase in rpm and the direction of travel over the wheel rotation direction. The wheel speeds and the wheel rotation directions are recorded by the rpm sensors. The Electronic Stability Program control unit directly reads in the signals from the rpm sensors and sends them via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

Object recognition in the short range:

The short range radar sensor array works in the front bumper in the 24 GHz frequency range for a maximum range of s = 30 m and are integrated in the following components:

- DISTRONIC sensor (DTR) / left front bumper
- DISTRONIC sensor (DTR) / right front bumper

The detection angle of the short range radar sensors is a maximum of $\measuredangle$ = 130°. A precise angle can be determined within a detection zone of $\measuredangle$ = 60° and up to $\measuredangle$ = 130° only after detection of the objects. The DISTRONIC sensors communicate via the sensor CAN with the radar sensors control unit or the video and radar sensor system control unit.

Due to legal requirements on the 24 GHz radar system (short range radar, bandwidth: f = 5 GHz) in Western Europe, the short range radar sensor system is automatically switched off in certain protected areas around radioastronomy stations.

i This is switched off automatically in countries in which the 24 GHz radar sensor system is not approved.

i The short range radar system can also be switched off and on again manually over the menu "Vehicle settings" in the IC. To do this the IC transmits the appropriate request via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit. The radar sensors control unit or the video and radar sensor system control unit transmits the appropriate request via the sensor CAN to the DISTRONIC sensors (DTR) on the front bumper.

Object recognition in the long range:

The long range radar operates in the 77 GHz frequency range and is integrated in the DISTRONIC controller unit. With its detection angle of $\measuredangle$ = 18° the long range radar covers the front area of the vehicle at a length of s = 60 up to 200 m. The range s = 0 m to s = 60 m in front of the vehicle is detected for an angle of $\measuredangle$ = 60°.

The DISTRONIC controller unit performs a soiling and function test to ensure proper operation after each engine start. The function test requires an object in the detection area of the long range radar that is used as a reference value. The DISTRONIC PLUS cannot be activated if a malfunction is established or if there are no objects (reference value) in the detection range of the long range radar sensor. The DISTRONIC controller unit communicates via the dynamics CAN with the radar sensors control unit or to the video and radar sensor system control unit.

Driver request via the cruise control lever:

The driver request over the CC lever are directly read in by the steering column tube module control unit. The steering column tube module control unit transmits the control signals from the CC lever via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

The driver request "Overtake":

The steering column tube module control unit directly reads in the switch position of combination switch and transmits this via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

GPS signals:

Current global positioning system coordinates are sent continuously by the navigation system of the radio with autopilot system (for code (511) Audio 50 APS incl. DVD changer or code (525) MB Audio 50 APS radio) or the COMAND controller unit (for code (512) COMAND APS incl. DVD changer or code (527) COMAND APS with single DVD drive (with navigation)) via the interior CAN, the front SAM control unit and the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

Steering wheel angle:

The steering wheel angle is recorded by the steering angle sensor. The steering column tube module control unit directly reads in the signals from the steering angle sensor and transmits these via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

Accelerator pedal position:

Operation of the accelerator pedal is registered by the accelerator pedal sensor. The CDI control unit or ME-SFI [ME] control unit directly reads in the signals from the accelerator pedal sensor and transmits these via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

Brake pedal position:

Operation of the brake pedal is registered by the brake lights switch. The Electronic Stability Program control unit directly reads in the status of the brake lights switch and transmits these via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit.

The radar sensors control unit or to the video and radar sensor system control unit delivers the following initial parameters (requests):

- Increase/reduce engine torque
- Engage targeted gear (back or upshift), limit stage (for transmission 722)
- Increase/reduce the braking torque
- Switch short range radar system on/off automatically
- Emit warning tones, system messages or warnings

Raise/reduce engine torque:

The radar sensors control unit or the video and radar sensor system control unit transmits the request "increase /reduce engine torque " via the suspension CAN to the Electronic Stability Program control unit.

The Electronic Stability Program control unit evaluates this request as well as further driving dynamics requests internally and transmits them via the chassis CAN to the CDI control unit or the ME-SFI [ME] control unit. The CDI control unit or the ME-SFI [ME] control unit implements this request.

Engage targeted gear (back or upshift), limit stage (for transmission 722)

The radar sensors control unit or the video and radar sensor system control unit transmits the request "Engage targeted gear, limit stage " via the suspension CAN to the Electronic Stability Program control unit. The Electronic Stability Program control unit evaluates this request as well as further driving dynamics requests internally and transmits them, according to their relevance, via the chassis CAN, the CDI control unit or the ME-SFI [ME] control unit and drive train CAN to the electronic transmission control control unit (transmission 722.6) or the fully integrated transmission control unit (transmission 722.9).

This request is, however, to be understood as a switching recommendation. Downshifting or upshifting of the A/T takes place autonomously by the electronic transmission control control unit (for transmission 722.6) or the fully integrated transmission control unit (for transmission 722.9), dependent on the current operating condition.

Raise/reduce braking torque:

The radar sensors control unit or the video and radar sensor system control unit transmits the request "increase /reduce engine torque " via the suspension CAN to the Electronic Stability Program control unit. The Electronic Stability Program control unit evaluates this request and as well as further driving dynamics requests internally and actuates the traction system hydraulic unit accordingly. The traction system hydraulic unit reacts by increasing or reducing the braking torque.

Switch short range radar system on/off automatically

The radar sensors control unit or to the video and radar sensor system control unit switches the short range radar off within the protection zones around radio astronomy stations and on again outside of these. The radar sensors control unit or the video and radar sensor system control unit transmits the appropriate request via the sensor CAN to the DISTRONIC sensors (DTR) on the front bumper.

Emit warning tones, system messages or warnings

The radar sensors control unit or the video and radar sensor system control unit transmits the request "emit warning tones, system messages or warnings" via the chassis CAN to the IC, which directly actuates the multifunction display and the warning buzzer. System and warning messages are displayed in the multifunction display. Warning tones are generated by the warning buzzer.

The DISTRONIC PLUS includes the following partial functions:

- **Function sequence for DISTRONIC PLUS**
- **Function sequence for PRE-SAFE brake and BAS PLUS**

Additional function requirements for DISTRONIC PLUS

- DISTRONIC PLUS in menu "Driver assist" on the IC switched on
- Target object (vehicle moving immediately ahead) detected
- Cruise control lever in DISTRONIC PLUS position (SPEEDTRONIC light-emitting diode Off)

i If the SPEEDTRONIC LED (without code (494) USA version) lights up, the DISTRONIC PLUS is deactivated and the variable SPEEDTRONIC (without Code (494) USA version) preselected.

Function sequence for DISTRONIC PLUS

The description of the DISTRONIC PLUS function takes place, as an example, in the following chronological sequence:

- **Activate DISTRONIC PLUS and drive off automatically**
- **Automatic distance control**
- **Change of driving lane (Overtake)**
- **Automatic speed control**
- **Passing through a radio astronomy protection zone**
- **Passing over roundabouts, T intersections and freeway exit lane**
- **Going back into a lane/person in the front regulation**
- **Automated stopping**

The sequence can vary depending on the driver requests and the current traffic situation.

Activate DISTRONIC PLUS and drive off automatically

The DISTRONIC PLUS can only be activated when stationary if there was also a stationary vehicle detected over the radar sensor system. This is displayed by the distance graphic in the multifunction display. If the vehicle starts off , the driver can press the accelerator pedal to confirm the automatic drive off function or alternatively actuate the "Resume from memory" switch on the CC lever. The brake pedal must not be pressed during this time.

The vehicle subsequently starts off automatically, accelerates and follows the vehicle driving immediately ahead at the programmed distance up to the maximum speed to be set.

Technical implementation

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Input factors:

- Acceleration/yaw rate
- Vehicle speed/acceleration
- Object recognition
- Driver request via the cruise control lever
- Brake pedal position
- Accelerator pedal position

Initial parameters:

- Increase engine torque
- Engage targeted gear (back or upshift), limit stage (for transmission 722)
- Emit warning tones, system messages or warnings

i Through selection of the operating level "DISTRONIC PLUS" in the menu "Assistant" in the IC, the distance graphic is shown permanently. Display of the distance graphic can be activated or deactivated independently of the activity of the automatic distance control function.

View for an activated DISTRONIC PLUS and the vehicle detected driving immediately ahead, shown on a multifunction display up to 31.5.11

D Speed of vehicle immediately ahead
E Own speed
F Target speed
G Vehicle moving immediately ahead (target object)
H Own vehicle
I Target distance (white line)

P30.30-2341-71

Automatic distance control

The automatic distance control can only be activated while driving if a vehicle driving immediately ahead was detected.

If the vehicle driving immediately ahead brakes or accelerates, the DISTRONIC PLUS instigates the following measures for maintain the clearance:

- Increase/reduce engine torque
- Increase/reduce the braking torque

The driver must press on the brake pedal is sees that the instigated measures are not adequate to avoid any possible collision. If the vehicle driving immediately ahead accelerates again, the engine torque is increased and the vehicle also accelerates.

The driver also has the option to accelerate the vehicle (e.g. to overtake a vehicle).

The automatic acceleration is put out of action for as long as the driver uses the accelerator pedal. The multifunction display shows the message "DISTRONIC passive".

If the automatic distance control requires a higher acceleration than the driver prescribes, the driver request is overlaid by the request for automatic distance control.

Technical implementation

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Input factors:

- Engine drive torque
- Acceleration/yaw rate
- Vehicle speed/acceleration
- Object recognition
- Driver request via the cruise control lever
- Accelerator pedal position

Initial parameters:

- Increase/reduce engine torque
- Engage targeted gear (back or upshift), limit stage (for transmission 722)
- Increase/reduce the braking torque

Change of driving lane (Overtake)

For overtaking above a speed of v = 60 km/h (45 mph) the vehicle is also accelerated automatically. To this the driver must initiate the overtaking maneuver by setting the flasher.

In as far as the automatic distance control is activated, the radar sensors control unit or video and radar sensor system control unit recognizes the intention of the driver to overtake and accelerates the vehicle while taking account of the distance to the vehicle driving immediately ahead. The vehicle then accelerates up to set maximum speed (automatic speed control) after the overtaking maneuver in as far as there was no vehicle driving immediately ahead detected as a target object.

If a vehicle driving immediately ahead is subsequently detected as a target object the automatic speed control function changes over again into the automatic distance control function.

The overtaking maneuver is broken off in the following situations:

- Risk of collision with the current target object
- A risk of a collision with a vehicle which is located in the left blind spot, detected by the Active Blind Spot Assist (for code (237) Active Blind Spot Assist)

Technical implementation

Input factors:

- Engine drive torque
- Acceleration/yaw rate
- Vehicle speed/acceleration
- Object recognition
- The driver request "Overtake":

Initial parameters:

- Increase engine torque
- Engage targeted gear (back or upshift), limit stage (for transmission 722)

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Automatic speed control

If the vehicle is in active distance control and the vehicle driving immediately ahead accelerates above v = 200 km/h (v = 120 mph) or removes itself from the detection area of the radar sensor system, the automatic distance control switches over into the automatic speed control.

i Automatic speed control is described in detail in the separate "Cruise control (CC) Function" subfunction.

Technical implementation

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Input factors:

- Engine drive torque
- Acceleration/yaw rate
- Vehicle speed/acceleration
- Driver request via the cruise control lever
- Accelerator pedal position
- Brake pedal position

Initial parameters:

- Increase/reduce engine torque
- Engage targeted gear (back or upshift), limit stage (for transmission 722)
- Increase/reduce the braking torque

Passing through a radio astronomy protection zone

Due to legal requirements on the 24 GHz radar system (short range radar, bandwidth: f = 5 GHz) in Western Europe, the short range radar sensor system is automatically switched off in certain protected areas around radioastronomy stations.

When DISTRONIC PLUS is active, the message "Radar sensor system automatically switched off, see operator's manual" is shown on the multifunction display of the instrument cluster.

When the vehicle leaves the protected area, the short range radar sensor system is switched on again automatically. For an activated DISTRONIC PLUS the message "DISTRONIC PLUS available again " is issued.

i The short range radar system can also be switched off and on again manually over the menu "Vehicle settings" in the IC. To do this the IC transmits the appropriate request via the chassis CAN to the radar sensors control unit or to the video and radar sensor system control unit. The radar sensors control unit or the video and radar sensor system control unit transmits the appropriate request via the sensor CAN to the DISTRONIC sensors (DTR) on the front bumper. If one seeks to manually switch on the short range radar sensors within a protected area, the message "Radar sensor system switched off automatically" is displayed in the multifunction display.

Technical implementation

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Input factors:

- GPS signals

Initial parameters:

- Switch short range radar system on/off automatically
- Emit warning tones, system messages or warnings

Passing over roundabouts, T intersections and freeway exit lane

The DISTRONIC PLUS function uses navigation data to adapt the system behavior to the following situations:

- Entrance of the vehicle to and passage around a roundabout
- Entrance lane to a T intersection
- Driving on a freeway exit lane

This means that if the vehicle driving immediately ahead leaves the detection area of the radar sensor system in one of the above-mentioned traffic situations then the current speed is maintained:

- about t = 10 s before a roundabout or a T intersection
- about t = 12 s before a freeway exit lane and about t = 4 s after a freeway exit lane

If, after this, no vehicle is detected driving immediately ahead, the vehicle accelerates or decelerates to the established set speed.

i Since traffic situations are subject to alteration, the digital map data has to be regularly updated.

Technical implementation

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Input factors:

- Vehicle speed
- GPS signals

Initial parameters:

- Increase/reduce engine torque
- Engage targeted gear (downshift or upshift), limit stage
- Increase/reduce the braking torque

Going back into a lane/person in the front regulation

If the vehicle driving immediately ahead turns off and there is another vehicle in front, the system only switches over to the new target vehicle if it is moving. The system does not operate for stationary objects unless a preceding vehicle is tracked to a standstill.

If while driving a vehicle tuns in front within the safe distance to the vehicle driving immediately ahead, the distance to this new vehicle is regulated.

If the vehicle is in automatic speed control and a vehicle tuns onto the lane driven in this vehicle is registered as the vehicle driving immediately ahead.

If the distance to the moving in vehicle is below the value which was programmed, the DISTRONIC PLUS function brakes the vehicle. If the requested brake power is not adequate the driver must press the brake pedal.

i A negative acceleration (deceleration) over the traction system hydraulic unit is limited to 40% (about a = 4 m/s²) of the maximum possible brake power.

Input factors:

- Vehicle speed
- Object recognition
- Steering wheel angle
- Brake pedal position

Initial parameters:

- Increase/reduce engine torque
- Engage targeted gear (downshift or upshift), limit stage
- Increase/reduce the braking torque
- Emit warning tones, system messages or warnings

DISTRONIC PLUS is thereby deactivated. This process is signaled to the driver by outputting a notification tone over the warning buzzer and indication of a message in the multifunction display.
The driver can subsequently reactivate the DISTRONIC PLUS.
Technical implementation
To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Automated stopping
For an active DISTRONIC PLUS the vehicle will follow the vehicle driving immediately ahead to standstill. The service brake is activated if the vehicle is stationary (safety strategy standstill coordinator).
Securing the vehicle using the DISTRONIC PLUS does not replace securing the vehicle for parking.
Technical implementation
To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:
Input factors:

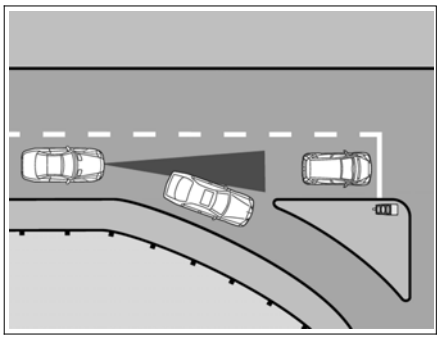
- Vehicle speed
- Object recognition

Initial parameters:

- Reduce engine torque
- Engage targeted gear (downshift or upshift), limit stage
- Raise braking torque

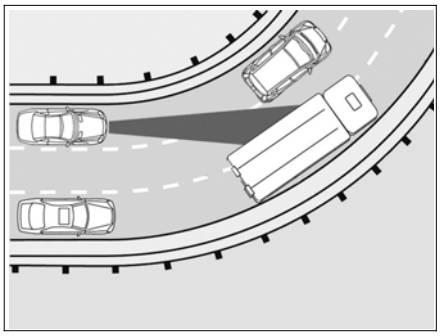
The following traffic situations show the limits of DISTRONIC PLUS:

Obstacles and stationary vehicles
The DISTRONIC PLUS does not brake for obstacles or stationary vehicles which were not previously registered as the target object. If, for example, the detected vehicle turns off and there is an obstacle or stationary vehicles behind it, no automatic intervention by the brake system occurs.



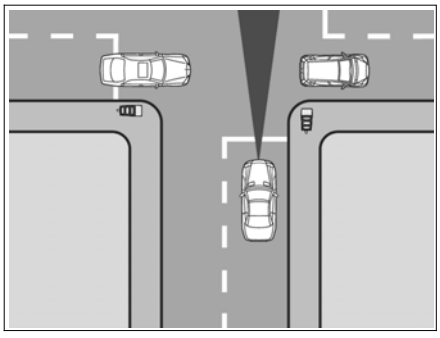
P54.70-2559-01

Curves, curved entrances and exits:
The DISTRONIC PLUS can only provides limited detection of vehicles in curves. The systems vehicle can then brake unexpectedly or late.



P54.70-2557-01

Vehicles moving across in front of one's own vehicle:
DISTRONIC PLUS may detect vehicles in cross traffic by mistake. For an activated distance control the vehicle can start off unintended, (e g. at a traffic light with cross-traffic).



P54.70-2562-01

Function sequence for BAS PLUS and PRE-SAFE brake
The BAS PLUS and the PRE-SAFE brake assesses the traffic situation in front of the vehicle.
In the following vehicle speed ranges the emergency braking of the driver with the BAS PLUS function is supported or the vehicle is decelerated automatically by the PRE-SAFE brake function in hazardous situations:

- Vehicle speed range for the PRE-SAFE brake:
  - v = 30 up to 200 km/h (v = 20 up to 120 mph) (up to 31.5.11)
  - v = 7 up to 200 km/h (v = 5 up to 120 mph) (as of 1.6.11)
- Vehicle speed range for BAS PLUS:
  - v = 30 up to 250 km/h (v = 5 up to 150 mph) (up to 31.5.11)
  - v = 7 up to 250 km/h (v = 5 up to 150 mph) (as of 1.6.11)

In the case of stationary obstacles the PRE-SAFE brake or the BAS PLUS is only activated if the vehicle's own vehicle speed is a maximum of v = 72 km/h (v = 45 mph).
If a stationary object is detected in the lane by both the short and long range radar sensor systems (the lane is determined, amongst other things, by the steering wheel angle and vehicle speed, etc.), the BAS PLUS or the PRE-SAFE brake are activated.
The description of the BAS PLUS and the PRE-SAFE brake functions is subdivided as follows:

- **PRE-SAFE brake**
- **BAS PLUS**

PRE-SAFE brake

The PRE-SAFE brake includes a distance warning function, which warns the driver of any moving or stationary obstacles in his/her lane.

The distance warning takes place in a vehicle speed range of v = 30 to 250 km/h (v = 5 to 150 mph) (up to 31.5.11) and v = 7 up to 250 km/h (v = 5 up to 150 mph) (as of 1.6.11).

In this case differentiation is made between a static distance warning and a collision critical distance warning.

Static distance warning:

The static distance warning is triggered by the radar sensors control unit or the video and radar sensor system control unit when the time interval between the system vehicle and vehicle in front is less than t = 0.8 s (e.g. in moving traffic). The radar sensors control unit or the video and radar sensor system control unit sends a request to do this to the optical warning device in the instrument cluster via the chassis CAN which then actuates the DISTRONIC warning lamp.

Collision critical distance warning:

If an obstacle within the detection range of the radar sensor system is classified as accident-critical (a collision will occur within t < 2.6 s), the radar sensors control unit or the video and radar sensor system control unit transmits the request to output the warning via the chassis CAN to the instrument cluster, which reacts by activating the DISTRONIC warning lamp and the warning buzzer (intermittent tone). The warning output is automatically switched off again when the situation is no longer critical and cannot be acknowledged during an active control.

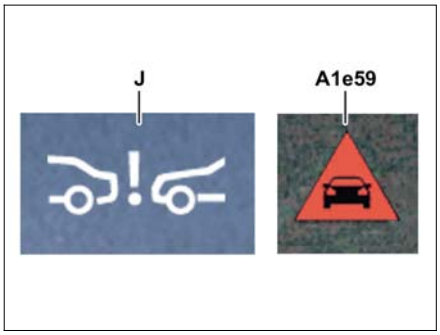
i The proximity warning system can be separately and independently activated by the automatic distance control function in the menu "PRE-SAFE brake" of the instrument cluster.

The distance warning is basically active for an active DISTRONIC PLUS. If the DISTRONIC PLUS is deactivated, actuation of the DISTRONIC warning lamp takes place by the function PRE-SAFE brake.

Visual warning message in instrument cluster when a safe distance is not maintained

A1e59 DISTRONIC warning lamp

J Distance warning readiness indicator



P30.30-2342-71

The radar sensors control unit or the video and radar sensor system control unit will initiate partial braking if the driver does not react to the optical and acoustic warning signals. To do this the radar sensors control unit or the video and radar sensor system control unit calculates a braking torque while taking account of the driving dynamics input factors, und transmits an appropriate request via the chassis CAN to the ESP control unit. The Electronic Stability Program control unit implements the request over the traction system hydraulic unit and brakes the vehicle. If the driver then reacts with an emergency braking maneuver, BAS PLUS provides support to help achieve optimum utilization of the braking distance to the obstacle

i Emergency braking is not triggered if the front passenger seat is occupied and the front passenger is not strapped in.

Technical implementation

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

Input factors:

- Vehicle speed
- Object recognition
- Steering wheel angle

Initial parameters:

- Increase/reduce the braking torque
- Emit warning tones, system messages or warnings

BAS PLUS

If the driver reacts in a dangerous situation with emergency braking (e.g. output of a collision-critical distance warning) he will be supported by the function BAS PLUS to use the braking distance to the obstacle in an optimal manner.

If there is no actuation or the intensity of actuation of the brake pedal by the driver reduces, the brake servo assistance is reduced to the driver braking level and the BAS PLUS function is deactivated. If the driver presses the accelerator pedal, BAS PLUS is also deactivated.

Technical implementation

The hazard braking is defined over the speed and the strength with which the brake pedal is actuated.

To do this the radar sensors control unit or in the video and radar sensor system control unit also uses the data from the radar sensor system and calculates the necessary brake servo assistance while taking account of the current clearance and the closing speed to the obstacle.

i Parallel to this the function PRE-SAFE integrated into the Electronic Stability Program control unit evaluates the current requested braking torque and instigates appropriate measures as necessary.

To do this the radar sensors control unit or the video and radar sensor system control unit receives or transmits the following information or requests:

- Vehicle speed
- Steering wheel angle
- Object recognition

Initial parameters:

- Increase/reduce the braking torque

	Electrical function schematic for DISTRONIC PLUS incl. BAS PLUS and PRE-SAFE brake		PE30.30-P-2055-97EAA
	Overview of system components for DISTRONIC PLUS including BAS PLUS and PRE-SAFEbrake		GF30.30-P-9993CA