VF505_V3_R7_P520MY

Functional Description

520MY

INDEX

1 Parallel & Perpendicular and Pull Out Advanced Parking Assistance [VF505_V3_R7]

1.1 Vehicle Function Data

1.1.1 Vehicle Function Area

Driving Assistance

1.1.2 Vehicle Function Group

Parking Assistance

1.1.3 Vehicle Function Owner

Laura D'Alessandro

1.2 Revision Notes

Date	Author	Description

2016/03/17	Lucia Dascola	First release
		Carry-Over document from: N.A.
		Derived document from: VF505_V3_R10_P520
		
		UPDATE DESCRIPTION
		• Impacted Component: ICS
		 • 1) Paragraph: Functional Diagram
		  • Changes:
		  -Replaced ASBM with ICS
		  -Added ICS_OperationalModeSts Signal in ICS input
		  -Replaced LIN signals with B-Can signals:
		   • BCM_INFO.InternalLightSts with STATUS_B_BCM2.InternalLightSts
		   • ASB_BCM_FEEDBACK.PAMRequestSts with CENTERSTACK1.PAMRequestSts
		   • ASB_BCM_FEEDBACK.APARequestSts with CENTERSTACK1.APARequestSts
		   • BCM_INFO.PAMLedControlSts with STATUS_PAM.PAM_LedControlSts
		   • BCM_INFO.APALedControlSts with STATUS_PAM.SPM_LedControlSts
		
		 • 2) Paragraph: Functional Requirements:
		  • Changes:
		  -Replaced paragraph ASBM requirements with ICS requirements
		  -Modified PAM - LED Management paragraph
		
		 • 3) Paragraph: Configuration Parameter Table
		  • Changes:
		  -Added DTC_ICS
		  -Removed PROXI Parameter ASBM_LIN_Module
		  -Replaced ASBM with ICS
		
		 • 4) Paragraph: Diagnosis and Recovery
		  • Changes:
		  -Modified ID 300.0
		  -Added ID 301.0
		
		• Impacted Component: BCM
		 • 1) Paragraph: Functional Requirements:
		  • Changes:
		  -Removed BCM requirements Paragraph
		  -Added ICS Gateway signals in Gateway Management paragraph
		
		 • 2) Paragraph: Configuration Parameter Table
		  • Changes:
		  -Added PROXI Parameter CAN Node 50 (ICS)

2016/11/08	Lucia Dascola	CR10662 • Impacted Component: PAM • 1) Paragraph: Functional Requirement • Changes: -Added Signals in Broadcast: SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM, STATUS_PAM.SPM_LedControlSts • 2) Paragraph: Functional Requirement • Changes: -Added Engine_Running, NOT_Engine_Running, ESS_Actice _Present, NOT_ESS_Active_Present variabls -Updated State Diagram -Updated PAM State Management paragraph -Updated IDLE paragraph -Updated Stop & Start Interaction -Added Front & Rear Parking Assistance Interaction paragraph • 3) Paragraph: Diagnostic Requirement • Changes: -Updated PAM Diagnostic Requirement
2017/02/27	Francesco Vernacchia	CR10997: Updated ICS requirements including agreed RAR items **PAM activation - ICS requirements paragaph** LED behavior for all ignition working conditions **added**
2017/07/27	Francesco Vernacchia	CR11486: **Functional Requirements** State machine changed: • Engine Running condition substituted with Ignition Pre Off. • conditions to pass from AUTOMATIC_SYS_OFF to SEEK state added S&S requirements revised to include NAFTA variant **Diagnosis and recovery description** CAN Node 24 check added on ID 300,301 **Configuration Parameters Table** CAN Node 24 added on ICS
2017/12/12	Lucia Maggio	CR 11882: VF owner changed **Functional Diagram** Added signal STATUS_PAM.SPMControlSts in broadcast on B-CAN

2019/04/15	Laura D'Alessandro	CR 13071 VF owner changed UPDATE DESCRIPTION • Impacted Component: PAM 1) Paragraph: Configuration Parameters Table Changes: - Added the REVERSE_FILTER parameter 2) Paragraph: Configuration Parameters Table - PAM Requirements Changes: - Added the filter condition on the C1_IGW1.ShiftLeverPosition signal, when it becomes equal to "No_Selection_Active_Or_Available" for the ATX, DDTC and MTA GearBox types.
2019/08/02	Francesco Vernacchia	CR 13599: Requirements to comply with ECE 79 regulation Added SPS USER DISABLED CHIME.V1 indication Added new HMI code enumeration to trigger indication SPS USER DISABLED CHIME

This document is based on template "VF Template 9.2"

1.3 Introduction

Semiautomatic Parking System consist of non-contact sensors and steering control which assist the driver in parking his vehicle. The system is defined as "semi-automatic" since the driver maintains the control of the longitudinal movement of the vehicle.
The assistance consists of searching a suitable parking area, getting information on the area around the vehicle (environmental map), calculating the trajectory either to enter the parking area or to exit from it. During the parking manoeuvre the driver is informed on the presence of relevant obstacles within
a defined detection range.

1.4   Functional Diagram
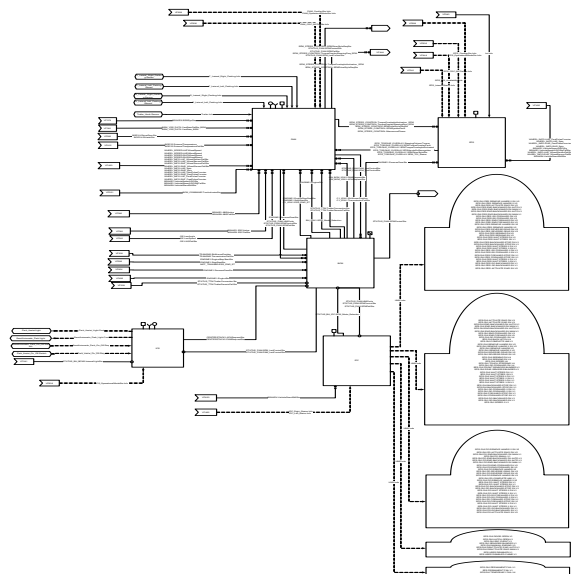
1.5   External Interfaces

1.5.1   External Inputs

VF051
VF241
VF380
VF381
VF400
VF404
VF406
VF412
VF444
VF506
VF606
VF608
VF040
VF528
VF092
VF200
VF379
VF041
VF465

1.5.2   External Outputs

VF444

1.6   Control Unit

1.6.1   ECU

EPS

Logic
PAM
Actuation
Logic
Sense
BCM
Gateway
IPC
Logic
ICS
Actuation
Logic
Sense

1.6.2 EMCU

1.6.3 External Device

1.6.4 Additional Component

IPC
Logic

1.7 I/O

F_Lateral_Left_Parking.Sensor
F_Lateral_Right_Parking.Sensor
R_Lateral_Left_Parking.Sensor
R_Lateral_Right_Parking.Sensor
SemiAutomatic_Park.Light
SemiAutomatic_Park_On_Off.Switch
Trailer_Hook.Sensor
Park_Assist.Light
Park_Assist_On_Off.Switch

1.8 Signal

1.8.1 Hardwire

F_Lateral_Left_Parking.Info
F_Lateral_Right_Parking.Info
R_Lateral_Left_Parking.Info
R_Lateral_Right_Parking.Info
Trailer.Info
Int.Info

1.8.2 Internal

SPS_TOI_Availability.Info
EPS_CRC_MCFailSts.Info
EPS_CmdIgnSts.Info
EPS_OperationalModeSts.Info
PAM_CmdIgnSts.Info
PAM_OperationalModeSts.Info
PAM_CRC_MCFailSts.Info
Park_Assist_Light.Cmd

SemiAutomatic_Park_On_Off.Req
SemiAutomatic_Park_Light.Cmd
HMICode
Park_Assist_On_Off.Req
EPS_InternalStatus.Info
IPC_Left_Status.Info
IPC_Right_Status.Info
ICS_OperationalModeSts.Info

1.8.3 B/BH-CAN

STATUS_PAM.HMICode
This signal indicates the request to display HMI content on the screen
STATUS_PAM.SPMControlSts
This signal indicates the activation state of the SPM module.
STATUS_PAM.SPMFailSts
This signal indicates if the SPM is in a faulted condition.
STATUS_BH_IPC.SPM_Mode_Selection
It indicates the Semiautomatic Parking Mode selected by the driver by IPC menu
STATUS_TTM.TrailerConnectionSts
Connection status of TTM
STATUS_TTM.TrailerGenericFailSts
Status of Fail of TTM
CENTERSTACK1.APARequestSts
PPA pressed
CENTERSTACK1.PAMRequestSts
PTS Off pressed
STATUS_BH_BCM2.InternalLightSts
Used to give information about backlight mode selected (Day or Night).
STATUS_PAM.PAM_LedControlSts
This signal indicates the request to illuminate the PAM LED status indicator
STATUS_PAM.SPM_LedControlSts
This signal indicates the request to illuminate the SPM LED status indicator

1.8.4 C-CAN

1.8.5 LIN

1.8.6 C-CAN1

ENGINE1.ReverseGearSts
Used to give information about Reverse Gear status
ENGINE1.EngineStopStartSts
ENGINE1.EngineSts
ENGINE1.StopStartSts
MOT_TRANSM3.ESS_ENG_ST
BRAKE4.VehicleStandStillSts
This signal indicates if the car is in stand still condition
TRANSM2.ShiftLeverPosition
This signal indicates the executed shift lever position.
TRANSM2.TransmissionFailSts

1.8.7 C-CAN2

BCM_COMMAND.TurnIndicatorSts
The signal is used to indicate the turn indicator position.

BODY2.ExternalTemperature

BODY2.ExternalTemperatureFailSts

BRAKE1.ABSActive

This signal is set to Active when the ABS functionality is active.

BRAKE1.ESCActive

This signal is set to Active when the brake intervention by ESC is active.

BRAKE8.ESCFailSts

ENGINE1.EngineStopStartSts

ENGINE1.EngineSts

ENGINE1.StopStartSts

EPS_TORQUE_OVERLAY.EPSHandsOnRecognition

It indicates that the driver has placed the hands on the steering wheel during the semiautomatic parking maneuver.

EPS_TORQUE_OVERLAY.SPMDriveStyleSts

It indicates if the steering boost curve needed by semi-automated parking system has been loaded

EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault

This signal indicates a fault of the SPM torque overlay interface.

EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated

Flag used to feedback to the SPM controller that the Torque Overlay interface has been successfully activated

EPS_TORQUE_OVERLAY.SteeringColumnTorque

Steering column torque signal provided by EPS torque sensor, counterclockwise positive [Nm]

GE.LWSFailSts

This signal indicates steering angle export function failure status.

GE.LwsAngle

This signal indicates the steering angle value, counterclockwise positive.

GE.LwsSpeed

This signal indicates the steering speed value, counterclockwise positive.

SPM_STEER_CONTROL.ManoeuvrePhase

It indicates the vehicle movement estimated by SPM during semiautomatic parking manoeuvre.

SPM_STEER_CONTROL.SPMDriveStyleReqSts

This signal is sent by the SPM with the aim to show the acknowledgment of the specific boost curve selected by the EPS for SPM.

SPM_STEER_CONTROL.SPMSystemFault

This signal indicates the fail status of the SPM

STATUS_PAM.HMICode

This signal indicates the request to display HMI content on the screen

STATUS_PAM.SPMControlSts

This signal indicates the activation state of the SPM module.

WHEEL_INFO.LHF_WheelSensorFailSts

This signal indicates the fail status of LHF sensor

WHEEL_INFO.LHR_FastPulseCounter

This signal is the left rear wheel pulse counter.

WHEEL_INFO.LHR_Spin

This signal indicates the left hand rear wheel status

WHEEL_INFO.LHR_WheelSensorFailSts

This signal indicates the fail status of LHR sensor

WHEEL_INFO.RHF_WheelSensorFailSts

This signal indicates the fail status of RHF sensor

WHEEL_INFO.RHR_FastPulseCounter

This signal is the right rear wheel pulse counter.

WHEEL_INFO.RHR_Spin

This signal indicates the right hand rear wheel status

WHEEL_INFO.RHR_WheelSensorFailSts

This signal indicates the fail status of RHR sensor

WHEEL_SPEED.LHFWheelSpeed

This is the value of the left front wheel speed

WHEEL_SPEED.LHRWheelSpeed

This is the value of the left rear wheel speed
WHEEL_SPEED.RHFWheelSpeed
This is the value of the right front wheel speed
WHEEL_SPEED.RHRWheelSpeed
This is the value of the right rear wheel speed
ENGINE1.ReverseGearSts
Used to give information about Reverse Gear status
STATUS_PAM.SPM_LedControlSts
This signal indicates the request to illuminate the SPM LED status indicator
SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM
This signal is sent by the SPM with the aim of activate the torque overlay interface with the Electric Power Steering Module.
BRAKE1.VehicleSpeedVSOSig
It is the average vehicle speed calculated.
BRAKE1.VehicleSpeedVSOSigFailSts
It is the average vehicle speed fail status.
SPM_STEER_CONTROL.TorqueOverlaySteeringReq_SPM
This signal indicates the value of the torque requested by the SPM torque overlay.
STATUS_PAM.SPMFailSts
This signal indicates if the SPM is in a faulted condition.
C1_IGW1.ESS_ENG_ST
ESS Engine State
BH_IGW1.SPM_Mode_Selection
It indicates the Semiautomatic Parking Mode selected by the driver by IPC menu
EPS_TORQUE_OVERLAY.SPM_TOI_Status
It indicates the current active state of SPM TOI state machine of EPS
BRAKE4.VehicleStandStillSts
This signal indicates if the car is in stand still condition
LIN_BCM_IGW1.APARequestSts
It indicates the pressure of Advanced Park Assist pushbutton
LIN_BCM_IGW1.PAMRequestSts
It indicates the pressure of Park Assist pushbutton
STATUS_PAM.PAM_LedControlSts
This signal indicates the request to illuminate the PAM LED status indicator
WHEEL_INFO.LHF_FastPulseCounter
This signal is the left front wheel pulse counter.
WHEEL_INFO.RHF_FastPulseCounter
This signal is the right front wheel pulse counter.
BSM_YRS_DATA.YawRateFailSts_BSM
This signal indicates the Status of Yaw Rate Signal
BSM_YRS_DATA.YawRate_BSM
This signal indicates the Yaw Rate Value
STATUS_TTM.TrailerConnectionSts
Connection status of TTM
STATUS_TTM.TrailerGenericFailSts
Status of Fail of TTM
BODY4.DriverDoorSts
This signal indicates the driver door status
BODY4.RHatchSts
BRAKE8.BSMSysSts
This signal is used by BSM to indicate its mode
C1_IGW1.ShiftLeverPosition
This signal indicates the executed shift lever position.
C1_IGW1.TransmissionFailSts
This signal indicates if the TCM currently detects the failure or not (for TCM)
BRAKE8.ABSFailSts

1.9 Indication

SPS GUI MANUAL ENDING.V3
Allocated on IPC
SPS GUI PERMANENT FAIL.V1
Allocated on IPC
SPS GUI COMPLETE HMI.V1
Allocated on IPC
SPS GUI PO SMALL.V1
Allocated on IPC
SPS GUI SPEED 2.V1
Allocated on IPC
SPS GUI SPEED.V4
Allocated on IPC
SPS GUI TEMPORARY FAIL.V4
Allocated on IPC
SPS GUI TOUCH STEERING.V4
Allocated on IPC
SPS PERMANENT FAIL.V1
Allocated on IPC
SPS USER DISABLED.V1
Allocated on IPC
SPS GUI BACK HITCH.V4
Allocated on IPC
SPS GUI FRONT SENSORS BLINDED.V1
Allocated on IPC
SPS GUI REAR SENSORS BLINDED.V1
Allocated on IPC
SPS GUI PO COMPLETE HMI.V1
Allocated on IPC
SPS GUI ACTIVATE RWG DX.V3
Allocated on IPC
SPS GUI ACTIVATE RWG SX.V3
Allocated on IPC
SPS GUI BACKWARD STOP DX.V1
Allocated on IPC
SPS GUI BACKWARD STOP SX.V1
Allocated on IPC
SPS GUI DEACTIVATE RWG AUTO.V1
Allocated on IPC
SPS GUI DEACTIVATE RWG MAN.V1
Allocated on IPC
SPS GUI DOOR OPEN.V1
Allocated on IPC
SPS GUI END BACKWARD DX AUTO.V1
Allocated on IPC
SPS GUI END BACKWARD DX MAN.V1
Allocated on IPC
SPS GUI END BACKWARD SX AUTO.V1
Allocated on IPC
SPS GUI END BACKWARD SX MAN.V1
Allocated on IPC
SPS GUI END FORWARD DX.V3
Allocated on IPC
SPS GUI END FORWARD SX.V3
Allocated on IPC

SPS GUI ESC EVENT.V1
Allocated on IPC
SPS GUI FORWARD STOP DX.V1
Allocated on IPC
SPS GUI FORWARD STOP SX.V1
Allocated on IPC
SPS GUI GO BACKWARD DX.V1
Allocated on IPC
SPS GUI GO BACKWARD SX.V1
Allocated on IPC
SPS GUI GO FORWARD 2 DX.V1
Allocated on IPC
SPS GUI GO FORWARD 2 SX.V1
Allocated on IPC
SPS GUI GO FORWARD DX.V4
Allocated on IPC
SPS GUI GO FORWARD SX.V4
Allocated on IPC
SPS GUI HATCH OPEN.V1
Allocated on IPC
SPS GUI PER ACTIVATE RWG DX.V2
Allocated on IPC
SPS GUI PER BACKWARD STOP DX.V1
Allocated on IPC
SPS GUI PER BACKWARD STOP SX.V1
Allocated on IPC
SPS GUI PER END BACKWARD DX AUTO.V1
Allocated on IPC
SPS GUI PER END BACKWARD DX MAN.V1
Allocated on IPC
SPS GUI PER END BACKWARD SX AUTO.V1
Allocated on IPC
SPS GUI PER END BACKWARD SX MAN.V1
Allocated on IPC
SPS GUI PER END FORWARD DX.V2
Allocated on IPC
SPS GUI PER END FORWARD SX.V2
Allocated on IPC
SPS GUI PER FORWARD STOP DX.V1
Allocated on IPC
SPS GUI PER FORWARD STOP SX.V1
Allocated on IPC
SPS GUI PER GO BACKWARD DX.V1
Allocated on IPC
SPS GUI PER GO BACKWARD SX.V1
Allocated on IPC
SPS GUI PER GO FORWARD 2 DX.V1
Allocated on IPC
SPS GUI PER GO FORWARD 2 SX.V1
Allocated on IPC
SPS GUI PER GO FORWARD DX.V2
Allocated on IPC
SPS GUI PER GO FORWARD SX.V2
Allocated on IPC
SPS GUI PER REMOVE HANDS 2 SX.V2
Allocated on IPC

SPS GUI PER REMOVE HANDS 2.V2
Allocated on IPC
SPS GUI PER REMOVE HANDS SX.V2
Allocated on IPC
SPS GUI PER REMOVE HANDS.V2
Allocated on IPC
SPS GUI PER REVERSE GEAR DX.V2
Allocated on IPC
SPS GUI PER REVERSE GEAR SX.V2
Allocated on IPC
SPS GUI PER SEEKING DX.V2
Allocated on IPC
SPS GUI PER SEEKING SX.V2
Allocated on IPC
SPS GUI PER WAIT STEER 2 DX.V1
Allocated on IPC
SPS GUI PER WAIT STEER 2 SX.V1
Allocated on IPC
SPS GUI PER WAIT STEER 3 DX.V1
Allocated on IPC
SPS GUI PER WAIT STEER 3 SX.V1
Allocated on IPC
SPS GUI PER WAIT STEER DX.V1
Allocated on IPC
SPS GUI PER WAIT STEER SX.V1
Allocated on IPC
SPS GUI PO ACTIVATE RWG DX.V2
Allocated on IPC
SPS GUI PO ACTIVATE RWG SX.V2
Allocated on IPC
SPS GUI PO BACKWARD STOP DX.V1
Allocated on IPC
SPS GUI PO BACKWARD STOP SX.V1
Allocated on IPC
SPS GUI PO END BACKWARD DX AUTO.V1
Allocated on IPC
SPS GUI PO END BACKWARD DX MAN.V1
Allocated on IPC
SPS GUI PO END BACKWARD SX AUTO.V1
Allocated on IPC
SPS GUI PO END BACKWARD SX MAN.V1
Allocated on IPC
SPS GUI PO END FORWARD DX.V2
Allocated on IPC
SPS GUI PO END FORWARD SX.V2
Allocated on IPC
SPS GUI PO FORWARD STOP DX.V1
Allocated on IPC
SPS GUI PO FORWARD STOP SX.V1
Allocated on IPC
SPS GUI PO GO BACKWARD DX.V1
Allocated on IPC
SPS GUI PO GO BACKWARD SX.V1
Allocated on IPC
SPS GUI PO GO FORWARD 2 DX.V1
Allocated on IPC

SPS GUI PO GO FORWARD 2 SX.V1
Allocated on IPC
SPS GUI PO REMOVE HANDS 2.V2
Allocated on IPC
SPS GUI PO REMOVE HANDS SX.V2
Allocated on IPC
SPS GUI PO REMOVE HANDS.V2
Allocated on IPC
SPS GUI PO REVERSE GEAR DX.V2
Allocated on IPC
SPS GUI PO REVERSE GEAR SX.V2
Allocated on IPC
SPS GUI PO WAIT STEER 2 DX.V1
Allocated on IPC
SPS GUI PO WAIT STEER 2 SX.V1
Allocated on IPC
SPS GUI PO WAIT STEER 3 DX.V1
Allocated on IPC
SPS GUI PO WAIT STEER 3 SX.V1
Allocated on IPC
SPS GUI PO WAIT STEER DX.V1
Allocated on IPC
SPS GUI PO WAIT STEER SX.V1
Allocated on IPC
SPS GUI REMOVE HANDS 2 SX.V2
Allocated on IPC
SPS GUI REMOVE HANDS 2.V5
Allocated on IPC
SPS GUI REMOVE HANDS SX.V2
Allocated on IPC
SPS GUI REMOVE HANDS.V5
Allocated on IPC
SPS GUI REVERSE GEAR DX.V5
Allocated on IPC
SPS GUI REVERSE GEAR SX.V5
Allocated on IPC
SPS GUI SEEKING DX.V4
Allocated on IPC
SPS GUI SEEKING SX.V4
Allocated on IPC
SPS GUI SENSORS BLINDED.V1
Allocated on IPC
SPS GUI WAIT STEER 2 DX.V1
Allocated on IPC
SPS GUI WAIT STEER 2 SX.V1
Allocated on IPC
SPS GUI WAIT STEER 3 DX.V1
Allocated on IPC
SPS GUI WAIT STEER 3 SX.V1
Allocated on IPC
SPS GUI WAIT STEER DX.V1
Allocated on IPC
SPS GUI WAIT STEER SX.V1
Allocated on IPC
SPS GUI PO REMOVE HANDS 2 SX.V2
Allocated on IPC

SPS GUI PER ACTIVATE RWG SX.V2
Allocated on IPC
SPS USER DISABLED CHIME.V1
Allocated on IPC

1.10 Working Conditions

1.10.1 Ignition Working Conditions Table

Ignition Working Conditions	Active Sub Function Names	Reference Paragraphs
Ignition Off	None	None
Ignition ACC	None	None
Ignition On	Semi-automatic Parking System Management	Semi-automatic Parking System Management
Ignition Pre Start	None	None
Ignition Start	None	None
Ignition Cranking	None	None
Ignition On Engine On	Semi-automatic Parking System Management	Semi-automatic Parking System Management
Ignition Pre ACC	None	None
Ignition Pre Off	None	None

1.10.2 Functional Working Conditions Table

Functional Working Conditions	Functional Requirements	Reference Paragraphs
Temporization After Ignition Off	None	N.A.
Automatic Cranking (S&S)	Yes	Stop&Start Interaction
Automatic Stop (S&S)	Yes	Stop&Start Interaction
Low Battery	None	N.A.
Plant/Emission Mode	None	N.A.
Logistic Mode	None	N.A.

1.11 Functional Requirements

1.11.1 Semiautomatic Parking System Management

Figure 2

Figure 1

TERMIN

WAIT

Engine_Running
AND **Timeout1**

SPS_FAULT

NotRecoverableFault
AND **SPS push-button**

RecoverableFault
AND **SPS push-button**

NotRecoverableFault

NOT **(RecoverableFault**
OR **NotRecoverableFault)**

SPS_RecoverableFault

Timeout6

AUTOMATIC_SYS_

SPS push-button
OR **v>v_SA_ON**
OR **(Man_complete ==1**
AND **Wheels_reposition==1)**
OR **(Man_complete ==1**
AND Wheels_reposition==0)
OR **Abort_Condition2**
OR **(Xv > XINI_MAX)**
OR **Timeout5**

RecoverableFault

SA_SPS
PARKING_side frozen

EPS_READY

NOT **Standstill**
AND **Steering_Active**

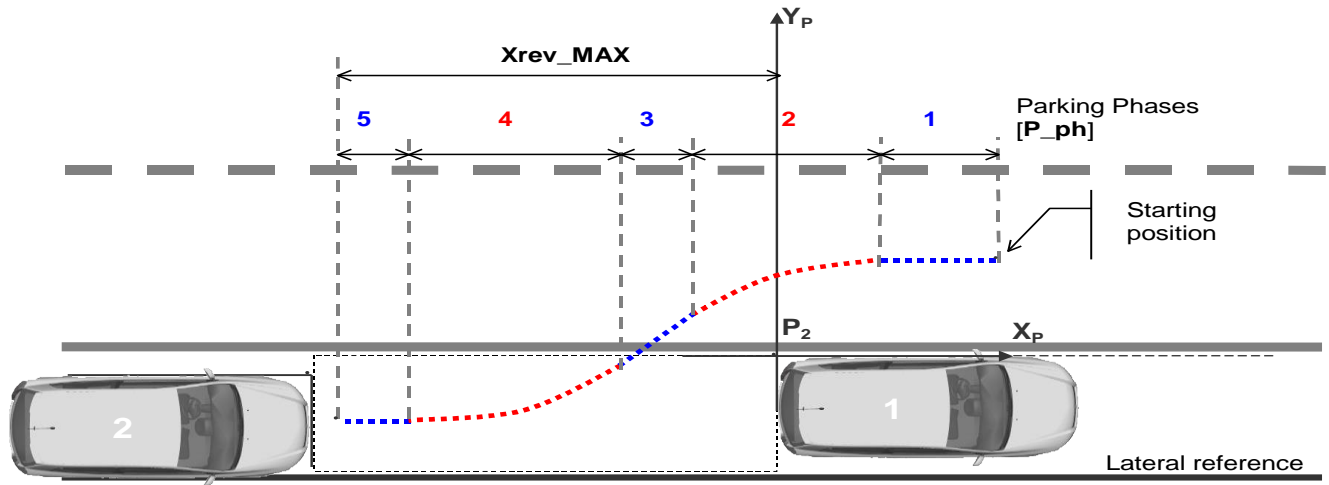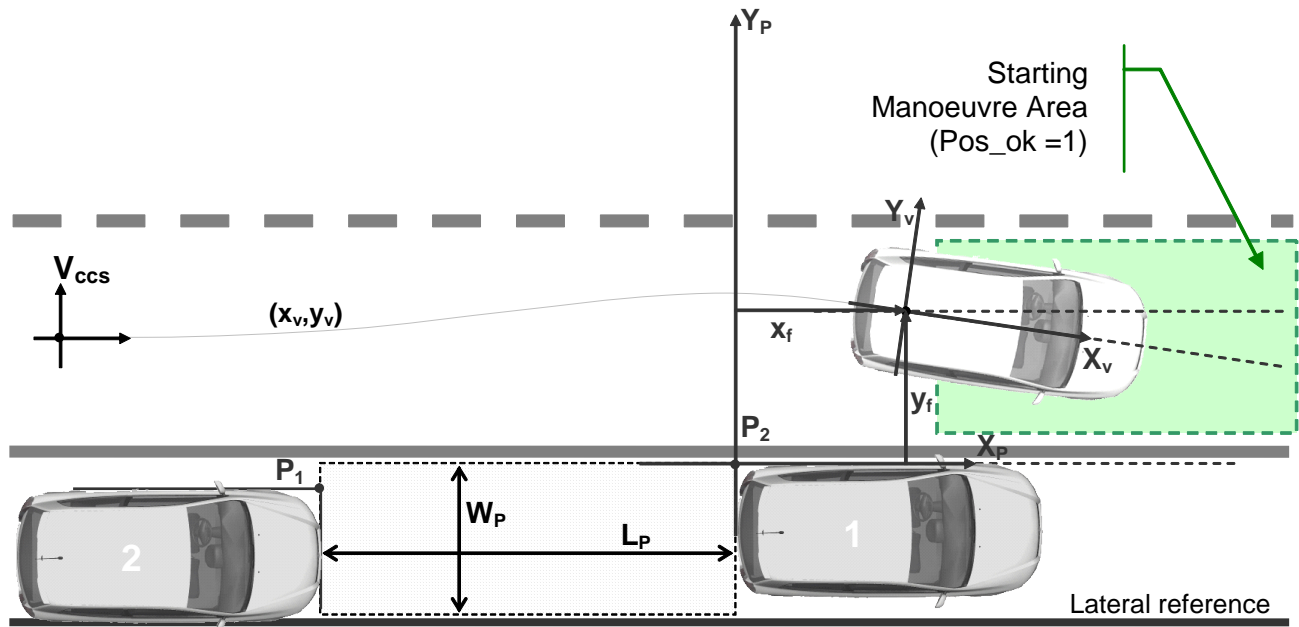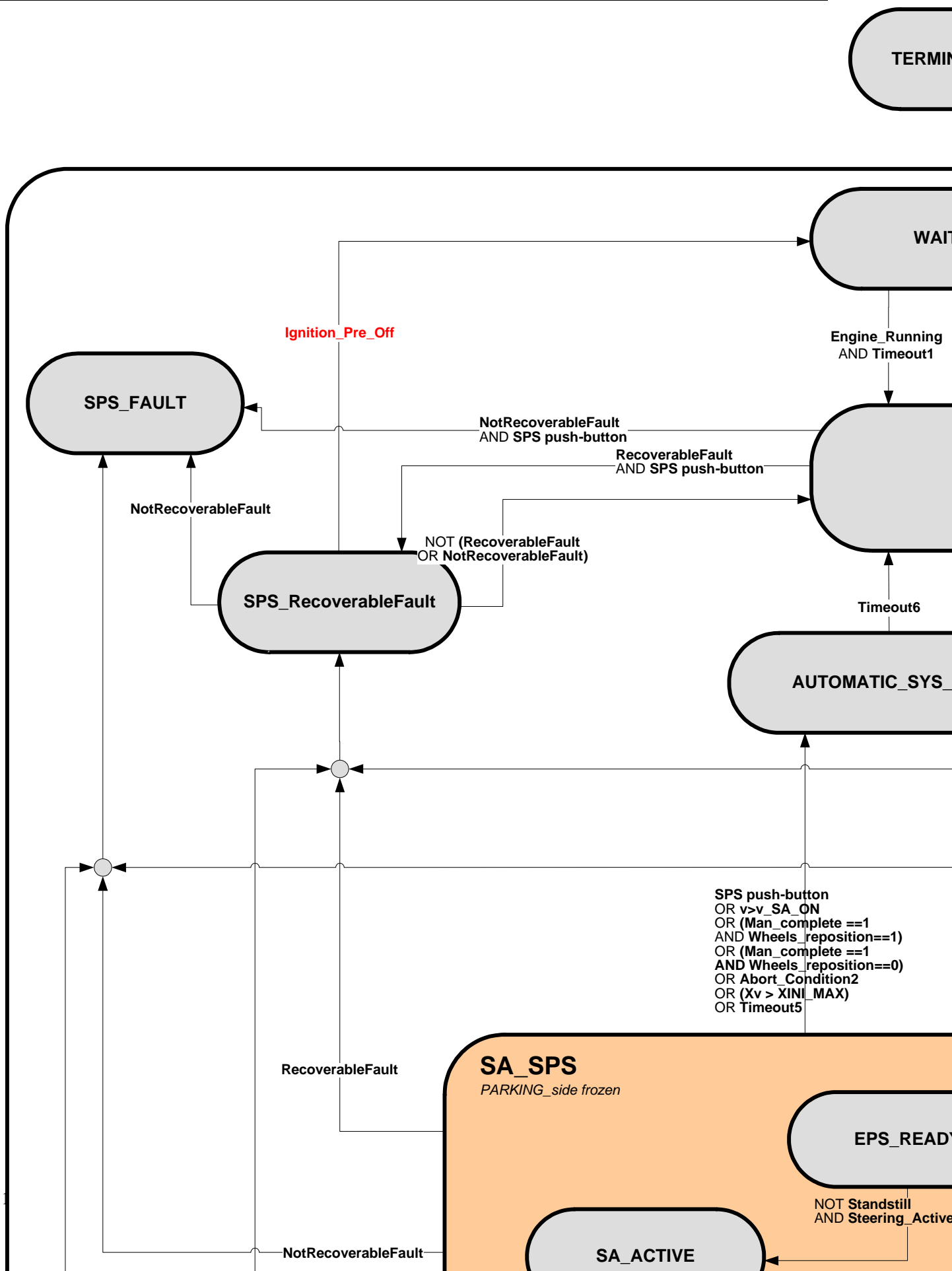**NotRecoverableFault**   **SA_ACTIVE**

Ignition_Pre_Off

1.11.1.1 Variable defintions

For further information concerning the HMI states transition see the document entitled "SPS - HMI System Diagram"

LOGICAL CONDITIONS:

- **Steer_COM_ok** = the EPS has activated the torque overlay interface
- **Boost_Map_ok** = the EPS has selected the appropriate Boost Curve
- **Diagnosis Ready** = the Diagnosis SW module is operative
- **PARKING_side** = side of SEEK/ Manoeuvre selected by stalk driver's actions. On the basis of this information Pos_Ok and PS_exist are updated.
- **StandStill**: StandStill condition is verified when the vehicle is standstill, this condition is verified using the signal (BRAKE4.VehicleStandStillSts).
- **Timeout1:** started when Engine is running.
    Timeout1 == 1 if during the WAIT_ENGINE status the timer is greater than **TimeThreshold1**.
- **Timeout2:** started when entering system state SEEK.
    Timeout2 == 1 if the timer is greater than **TimeThreshold2**.
- **Timeout3:** started when PS_exists changes from == 0 to == 1. It is set to 0 if PS_exists == 0.
    Timeout3 == 1 if the timer is greater than **TimeThreshold3**.
- **Timeout4:** started when entering system status EPS_COM_REQ.
    Timeout4 == 1 if the timer is greater than **TimeThreshold4**.
- **Timeout5:** started when entering system status SA_SPS.
    Timeout5 == 1 if the timer is greater than **TimeThreshold5**.
- **Timeout6:** started when entering system status AUTOMATIC_SYS_OFF.
    Timeout6 == 1 if the timer is greater than **TimeThreshold6**.
- **Timeout7** is refeared to transitions in the HMI System Diagram; **Timeout7 == 1** if the timer is greater than **TimeThreshold7**
- **Path_Tracking_Error == 1:** if the displacement between the center of the vehicle rear axle and the planned path is greater than PTE_MAX
- **Backward_Man_complete == 1** : the vehicle has completed the backward manoeuvre of the parking strategy; this condition is reached if
    [(P_ph>=4) AND (RWG off)] OR [Xv < Xrev_MAX]
- **HMI_Status:** it is the status of the SPS HMI state diagram

PS_exist

This signal assumes the '1' logic value when a free slot has been detected. The minimum dimension of this slot has to respect the condition defined in performance specifications.

Pos_ok

This signal assumes the '1' logic value when the vehicle is situated in a correct position.

Man_complete

The signal assumes '1' logic value when the vehicle is entered the slot and acceptance criteria See performance specifications.

Wheels_reposition

The signal goes to the '1' logic value when the vehicle has completed the manoeuvre (Park_complete == 1) and the wheels have been repositioned, if required according to manoeuvre strategy.

Abort_Condition_1:
- Trailer attached
- BODY4.RHatchSts = Open
- BODY4.DriverDoorSts = Open
- ESP_intervention
- ABS_intervention

Abort_Condition_2

It's composed of the following conditions:
- Abort_Condition_1

  • Path_Tracking_Error if no alternative reference manoeuvres are possible
  • errata gear insertion if no alternative reference manoeuvres are possible
  • errata zone of stop / restart if no alternative reference manoeuvres are possible

Engine_Running:
It is composed of the PAM_OperationalModeSts.Info signal enumerations.
- Valid signal enumeration(s) for this state transition include:
  • Ignition_On_EngOn

NOT_Engine_Running:
It is composed of the PAM_OperationalModeSts.Info signal enumerations.
- Valid signal enumeration(s) for this state transition include:
  • Ignition_Off
  • Ignition_Cranking
  • SNA

ESS_Active_Present:
When Stop_And_Start_Type is equal to "CG Type", then following requirements shall be followed:
It is composed of the C1_IGW1.ESS_ENG_ST signal enumerations.
- Valid signal enumeration(s) for this state transition include:
    o ENS Stopped / ENS_STOPPED
    o ENS Request Start / ENS_RQ_ST
    o ENS Running / ENS_RUN
    o ENS Stop Pending / ENS_STOP_PEND
    o ENS Start protection / ENS_ST_PRTCT
    o ENS Start inhibit / ENS_ST_INH
    o ENS disabled / ENS_DSBL
    o ENS_IHB_LATCH
    o ENS Starting / ENS_Starting

When Stop_And_Start_Type is equal to "FGA Type", then following requirements shall be followed:
It is composed of the ENGINE1.EngineStopStartSts, ENGINE.StopStartSts signal and
PAM_OperationalModeSts.Info internal signal enumerations.

NOT_ESS_Active_Present:
It is composed of the C1_IGW1.ESS_ENG_ST signal enumerations.
- Valid signal enumeration(s) for this state transition include:
    o SNA
Ignition_Pre_Off:
It is composed of the PAM_OperationalModeSts.Info internal signal enumerations.
valid Signal enumeration(s) for this state include:
o Ignition_Pre_Off

1.11.1.2 PAM State management

When the vehicle switches from key-off to key-on the SPS is not active. The SPS is activated whenever the Engine
is Running and the driver press the push-button.
The PSD is always active (for right and left sides) at Key On AND (Engine Running OR ESS_Active_Present) with
speed below v_PSD_ON even if the driver has not pressed the SPS push-button.
The SPS shall remain not active until:
  • (BODY4.DriverDoorSts == Closed) AND (BODY4.RHatchSts == Closed)
The SPS shall remain not active until the driver manually activates it by pressing the SPS function activation /
deactivation pushbutton (SPSCmd).
When the system is on the PAM drives the led according to the table in chapter "Indication management".

1.11.1.2.1   TERMINAL15_OFF

The system is not active when the Key is Off.

1.11.1.2.2   WAIT_ENGINE

In this state the PAM is waiting for the full initialization of all the subsystems involved in the function.
For the EPS communication, PAM shall not activate the Torque Overlay Interface until
EPS_TORQUE_OVERLAY.SteeringColumnTorque will be ≠ SteeringColumnTorque_Invalid
The system moves to Idle, "TimeThreshold1" seconds after the cranking.

1.11.1.2.3   SPS_FAULT

The system changes the status into SPS_FAULT in case of fault condition (e.g. Sensors, ECU fault…). See "PAM - Diagnostic Requirements" document.

1.11.1.2.4   IDLE

The PPPA diagnosis module shall be active after entering the IDLE state and the
SemiAutomatic_Park_On_Off.Switch has been pressed (i.e. HMICode is not SPS_GUI_IDLE_HMI).
In this status the system is ready to start (no fault condition are present, diagnosis is ready and (Engine Running OR ESS_Active_Present)).
The HMI algorithm is always turned off.
Below a certain range of speed (**v<v_PSD_OFF**) the parking slot measurement algorithm (PSD) is active during forward movement (both lateral sensors are measuring) also if the status led is Off.
 When SPS push button is pressed in case of fault condition present the system changes into SPS_FAULT status.

1.11.1.2.5   SEEK

If the car is moving forward (no reverse gear engaged), the vehicle speed is below v_PSD_ON and the driver pushes the SPS button, the system moves from the IDLE status to the SEEK Status.

In this phase the outputs of PSD algorithm are used in order to evaluate state transitions and HMI output.
Search sides behaviour:
  * If the driver activates the turn lights from his side, the system will look for a useful parking slot from the driver side.
  * If the driver activates the turn lights from passenger side, the system will look for a useful parking slot from the passenger side.

For the Pull Out manouvre is mandatory that the dirver activated the turn indicator.
In the following a figure with description:
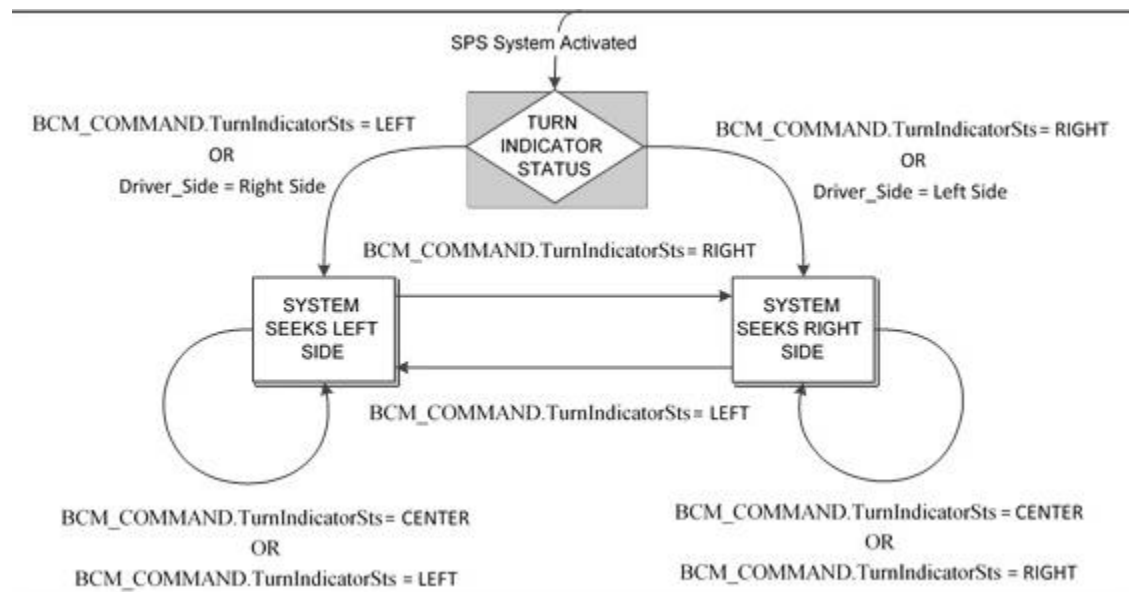
The driver side will be set via PROXI (see table on paragraph 1.12.2.1 Configuration parameters table).
A **Debounce time** of 150ms for TurnIndicatorSts detection has to be implemented by PAM.
During this state the HMI algorithm is running and the function status is provided to the driver through the dashboard.

1.11.1.2.5.1 SEEK ACTIVE

During SEEK_ACTIVE status the PSD algorithm is running. The system stays SEEK_ACTIVE status if operative conditions are present and no failures are detected and the vehicle is standstill or forward moving .

1.11.1.2.5.2 *SEEK IDLE*

During SEEK_IDLE status the PSD algorithm is stopped. The system changes to SEEK_IDLE status if, starting from SEEK_ACTIVE, the car is moving backward (e.g. due to a certain ramp).

1.11.1.2.6   SEEK_BCKGND

During SEEK_BCKGND is performed the seeking phase without providing HMI to the driver.

1.11.1.2.7   EPS_COM_REQ

During EPS_COM_REQ status, the reverse gear is engaged and the PAM sends to the EPS the request of Torque Interface Activation ("TorqueOverlayIntActivation").
After this action the PAM waits for confirmation from EPS ("PAMTorqueOverlayIntActivated").
Then the EPS will start the Boost Curves switching process.
In case of Reverse Gear disengagement, after a maximum delay of 40ms the PAM set
SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM to 0.

1.11.1.2.7.1 PAM requirements

When PAM is in **EPS_COM_REQ** State and the following conditions occurs:
- Ps_Exist == 1
- RWG ON

 then shall send to EPS SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM to "Active" AND
SPM_STEER_CONTROL.SPMDriveStyleReqSts to "Not Active".
When PAM receives:
- EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated == "True"

    AND
- EPS_TORQUE_OVERLAY.SPMDriveStyleSts == "Active"

then PAM shall:
- set SPM_STEER_CONTROL.SPMDriveStyleReqSts = "Active" within SPM_BOOST_SETTING (40ms)

In case of Reverse Gear disengagement, after a maximum delay of 40ms PAM shall set
SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM to "Not Active".
Steering column torque to be applied shall be set using the signal
SPM_STEER_CONTROL.TorqueOverlaySteeringReq.

1.11.1.2.8   SA_SPS

During this status the SPS manages the steering wheel angle by Torque Overlay Interface: the steering control and the strategies to perform the parking manoeuvre are activated. The Manual Steering wheel movement algorithm is performed.

1.11.1.2.8.1 PAM requirements

PAM shall keep SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM to "Active" as long as these conditions are verified:

- Parking_complete (TBC) == "False"
- Standstill == "False" AND Vehicle_motion == "Forward" AND ReverseGearSts "Inserted" for a time equal to TCheckStandStill
- Standstill == "False" AND Vehicle_motion == "Backward" AND ReverseGearSts "Not Inserted" for a time equal to TCheckStandStill
- EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault == "False"
- SPM_STEER_CONTROL.SPMSystemFault == "False"
- EPS_TORQUE_OVERLAY.SPM_TOI_Status == "Active"

1.11.1.2.8.2 Multiple manoeuvres management

Upon TOI activation, PAM shall set SPM_STEER_CONTROL.ManoeuvrePhase to "Backward".

For all the time PAM is in SA_SPS state, it shall set SPM_STEER_CONTROL.ManoeuvrePhase to "Forward" or "Backward" according to the vehicle movement allowed to the driver.

Conditions to determine the state to be set in SPM_STEER_CONTROL.ManoeuvrePhase uses at least one of the following ones:

- "continous tone reached " condition
- Reverse Gear engaged / not engaged
- Spin signals
- Standstill condtion

DELTAY CHECK:

PAM shall monitor vehicle position during parking manoeuvre and check lateral displacement of the vehicle. If DeltaY value is above DELTAY threshold, then PAM shall deactivate the TOI setting SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM and SPM_STEER_CONTROL.SPMDriveStyleReqSts to zero.

The SPS continues to check that all condition are satisfied, if not PAM should ramp its torque to 0Nm at a rate greater than or equal to (max Torque Slew rate value: TBD) Nm/s.

1.11.1.2.8.3 *SPS_READY*

This status is an initialization phase (vehicle in standstill condition). During this phase the EPS is ready to start the steering movement: the steering wheel angle reference is equal to the steering angle measure ("GE.LwsAngle").

1.11.1.2.8.4 *SA_ACTIVE*

The system changes its status from EPS_READY to SA_ACTIVE if the vehicle is not in standstill condition and the operative conditions are present. During this phase the SPS is performing the steering wheel control: the steering wheel angle reference is provided by the parking manoeuvre algorithm.

1.11.1.2.9   AUTOMATIC_SYS_OFF

The system is automatically deactivated for several reasons (e.g. ESP intervention, no Parking Proximity, TimeThreshold4). This status is required in order to manage the EPS and HMI interfaces during the system shut down phase.

1.11.1.2.9.1 SPS Deactivation

When active, the SPS function is deactivated by the driver when pressing the SPS function activation / deactivation pushbutton or UPA push button (only during Seek Phase).

The SPS function shall be automatically deactivated during the Research Phase (see SPS state diagram) if:

- the vehicle speed exceeds the maximum allowed speed in Research Phase
- the rear gear is engaged or backward motion is detected, and no available parking slot has been detected
- if the signal "BODY4.DriverDoorSts" is equal to "Open"
- if the signal "BODY4.RHatchSts" is equal to "Open"
- Abortcondition_1
- the Research phase is longer than TimeThreshold2

The SPS function shall be automatically deactivated during the Manoeuvre Phase (see SPS state diagram) if:

- the driver performs an uncorrected action or wants to abort the parking manoeuvre (e.g. applying a torque to the steering wheel)
- the vehicle speed exceeds the maximum allowed speed in Manoeuvre Phase
- if the signal "BODY4.DriverDoorSts" is equal to "Open"
- if the signal "BODY4.RHatchSts" is equal to "Open"
- the manoeuvre has been completed
- Abortcondition_2
- the Manoeuvre Phase is longer than TimeThreshold5

The manual steering wheel action is recognised by the EPS that communicates to PAM the occurrence of this action trough the Can signal EPS_TORQUE_OVERLAY.EPSHandsOnRecognition. PAM informs the driver by the specific HMI indication.

1.11.1.3 EPS State management

1.11.1.3.1   EPS variables and conditions

1.11.1.3.1.1 Torque Limitation Check

EPS shall check at each step the following conditions

- SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM = ACTIVE

- The SPM_STEER_CONTROL.TorqueOverlaySteeringReq_SPM value doesn't exceed the max value Fhmax

- The variation between two consecutive SPM_STEER_CONTROL. TorqueOverlaySteeringReq_SPM values isn't greater than Rhmax

The Torque Limitation check is PASSED if all the conditions above are TRUE.
The Torque Limitation check is NOT PASSED if at least one of the conditions is NOT TRUE

1.11.1.3.1.2 Hands on Check

The SPM TOI must check at each step the following conditions:
- Torque applied by driver via EPS_TORQUE_OVERLAY.SteeringColumnTorque above TORQUE_DRIVER continously for TORQUE_DRIVER_QTIME

then EPS shall:
- set **EPS_TORQUE_OVERLAY.EPSHandsOnRecognition to TRUE**

When PAM receives "EPS_TORQUE_OVERLAY.EPSHandsOnRecognition" set to TRUE, then PAM shall slew the TOI to EPS at 0 Nm with a Rampdown within Tfilter3.

1.11.1.3.1.3 Vehicle Operative Condition

EPS shall check at every step the following conditions:
- EPS_OperationalModeSts.Info is set to "Ignition_On" OR "Ignition_Pre_Start" OR "Ignition_Start" OR "Ignition_Cranking" OR "Ignition_On_Engine_On"
- BRAKE1.VehicleSpeedVSOSigFailSts is equal to Fail_not_present

- ENGINE1 message received correctly

- WHEEL_INFO message received correctly

- BRAKE1 message received correctly
    - BRAKE4 message received correctly

- SPM_STEER_CONTROL message received correctly
- EPS_CRC_MCFailSts.Info != "BRAKE1_CRC_Fail" OR "BRAKE1_MC_Fail" OR "ENGINE1_CRC_Fail" OR "ENGINE1_MC_Fail" OR "SPM_STEER_CONTROL_CRC_Fail" OR "SPM_STEER_CONTROL_MC_Fail" OR "WHEEL_INFO_CRC_Fail" OR "WHEEL_INFO_MC_Fail".
- WHEEL_INFO.xHRFastPulseCounter is not set to "SNA"
- WHEEL_INFO.xHR_WheelSensorFailSts is not set to "Fail_Present"
- WHEEL_INFO.xHR_Spin is not set to "SNA"

The **Vehicle Operative Condition** is PASSED when all the following conditions are TRUE continously for T_DIAG_2.
The **Vehicle Operative Condition** is NOT PASSED when at least one of the following conditions are NOT TRUE.

1.11.1.3.1.4 Internal Operative Condition

EPS shall check at every step the following conditions:

- EPS_InternalStatus.Info not in recovery (due to Over Temperature, Over Voltage, Under Voltage, Recoverable Fault..)
- EPS_InternalStatus.Info not in permanent fault
- EPS_InternalStatus.Info doesn't indicate the assist capability<90% (the state machine of assistance capability is indicated in VF241)
- SPM_TOI_Availability.Info is not BUSY

The **Internal Operative Condition** is PASSED when each condition above is TRUE
The **Internal Operative Condition** is NOT PASSED when at least one of the previous conditions above is FALSE

1.11.1.3.1.5 Reverse Gear Disengagement Condition

Conditon to be checked by EPS in "TOI Active" when SPM_STEER_CONTROL.ManoeuvrePhase is equal to "Backward"
SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM = ACTIVE
AND
BRAKE4.VehiclesStandStillSts = "False"
AND
SPM_STEER_CONTROL.ManoveuvrePhase is set "Backward"
AND
ENGINE1.ReverseGearSts is set to "Not_Inserted"
continuously for TBackCheck
If it is TRUE then EPS shall
- EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault to TRUE

Reverse Gear Disengagement Condition is set to **NOT PASSED.**
else **Reverse Gear Disengagement Condition** is set to **PASSED.**

1.11.1.3.1.6 IWSS Computed Spin table

EPS shall calculate the "IWSS Computed Spin" parameter as is dependent from WHEEL_INFO.RHRSpin and WHEEL_INFO.LHRSpin computation as defined in the following table

IWSS Computed Spin

	WHEEL_INFO.LHRSpin			
	0 (Standstill)	**1 (Fwd)**	**2 (Bwd)**	**3 (Invalid)**
WHEEL_INFO.RHRSpin **0 (standstill)**	0 (Standstill)	1 (Fwd)	2 (Bwd)	0 (standstill)

1 (Fwd) 1 (Fwd) 1 (Fwd) 1 (Fwd) 1 (Fwd)

2 (Bwd) 2 (Bwd) 1 (Fwd) 2 (Bwd) 2 (Bwd)

3 (Invalid)   0 (Standstill)   1 (Fwd) 2 (Bwd) 3 (Invalid)

1.11.1.3.2   Initialization

After initialisation is performed, starting state of "SPS management" is "**TOI OFF**".
When INT.Info is equal to active, then:
- TOI shall go in OFF Status (T1) transition
    - The transition from OFF status to another state will be done only after that a period "Toff" is expired from when the CAN communication is started"

1.11.1.3.3   SPM TOI OFF Status

When EPS is in "TOI OFF", it shall set the signals in the following way:
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault** to **False**
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated** to **False**
- **EPS_TORQUE_OVERLAY.SPM_TOI_Status to Off**

(T2) From "TOI **OFF",** EPS shall go to "**TOI Recoverable**" if the following conditions are met:
- Proxi has been programmed on EPS AND Semi_Automatic_Parking_System is set to Present
- CFG_DATA_CODE_REQUEST is received AND CONFIGURATION CODE is compared and matches
- EPS_OperationalModeSts.Info is set to " Ignition_On" OR "Ignition_Pre_Start" OR "Ignition_Start" OR "Ignition_Cranking" OR "Ignition_On_Engine_On"

1.11.1.3.4   SPM TOI Recoverable Status

When EPS is in "TOI Recoverable", it shall set the signals in the following way:
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault** to **False**
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated** to **False**
    - **EPS_TORQUE_OVERLAY.SPM_TOI_Status to "Recoverable"**

and a timer Trecoverable is started
(T12) From "TOI **Recoverable",** EPS shall go to "**TOI OFF**" if the following conditions are met:
- EPS_OperationalModeSts.Info == "Ignition_Pre_Off" OR "Ignition_Off"

(T3) From "TOI **Recoverable",** EPS shall go to "**TOI Inactive**" if all the following conditions are met:
- Vehicle Operative Conditions Check is PASSED
- Internal Operative Conditions Check is PASSED
- TRecoverable timer is expired

(T8) From "TOI **Recoverable",** EPS shall go to "**TOI Fault**" if at least one of the following conditions are met:
- EPS_InternalStatus.Info is set to permanent fault
- SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM = Active for 100ms
- SPM_STEER_CONTROL.SPMSystemFault is set to "True" for 20ms
- (SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM = Not_Active OR SPM_STEER_CONTROL.SPMDriveStyleReqSts ! = 0)

    AND
- SPM_STEER_CONTROL.TorqueOverlaySteeringReq_SPM different from 0 for two consecutive samples

1.11.1.3.5   SPM TOI INACTIVE Status

(T4) From "TOI **Inactive",** EPS shall go to "**TOI Recoverable**" if one of the following conditions is met:
- Vehicle Operative Conditions Check is NOT PASSED
- Internal Operative Conditions Check is NOT PASSED

(T5) From "TOI **Inactive",** EPS shall go to "**TOI Active**" if all the following conditions are met:
- Vehicle Operative Conditions Check is PASSED
- Internal Operative Conditions Check is PASSED
- SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM is set to "Active"
- SPM_STEER_CONTROL.SPMSystemFault is set to "False"
- Torque Limitation Check is PASSED
- SPM_STEER_CONTROL. SPMDriveStyleReqSts set to "NotActive"

(T9) From "TOI **Inactive",** EPS shall go to "**TOI Fault**" if one the following conditions is met:
- EPS_InternalStatus.Info is set to permanent fault
- SPM_STEER_CONTROL.SPMSystemFault is set to "True" for 20ms
- (SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM = Not_Active OR SPM_STEER_CONTROL.SPMDriveStyleReqSts ! = 0)

AND
- SPM_STEER_CONTROL.TorqueOverlaySteeringReq_SPM different from 0 for two consecutive samples.

When EPS is in "TOI Inactive", it shall set the signals in the following way:
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault** to **False**
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated** to **False**
    - **EPS_TORQUE_OVERLAY.SPM_TOI_Status to "Inactive"**

1.11.1.3.6   SPM TOI ACTIVE Status

When EPS is in "TOI Active", it shall start Handshake Procedure and it shall set the signals in the following way:
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault** to **False**
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated** to **False**
    - **EPS_TORQUE_OVERLAY.SPM_TOI_Status to "Active"**

During this status the EPS will select the proper boost curve for SPM.

(T6) From "TOI **Active",** EPS shall go to "**TOI Inactive**" if one of the following conditions is met:
- SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM = Not_Active AND SPM_STEER_CONTROL.TorqueOverlaySteeringReq_SPM = 0
- **Torque Limitation Check** is PASSED

(T7) From "TOI **Active",** EPS shall go to "**TOI Recoverable**" if one of the following conditions is met:
- Vehicle Operative Conditions Check is NOT PASSED
- Internal Operative Conditions Check is NOT PASSED

(T10) From "TOI **Active",** EPS shall go to "**TOI Fault**" if all the following conditions are met:
- Handshake procedure is NOT PASSED
- The EPS_TORQUE_OVERLAY.EPSHandsOnRecognition is set to **"TRUE"** continuously for Tfilter3 and
- SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM is still set to "ACTIVE"
- Torque Limitation Check is NOT PASSED
- (SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM = Not_Active OR SPM_STEER_CONTROL.SPMDriveStyleReqSts ! = 0) AND _STEER_CONTROL.TorqueOverlaySteeringReq_SPM != 0 for two consecutive samples
- SPM_STEER_CONTROL.SPMSystemFault is set to "True" for 20ms
- EPS_InternalStatus.Info is set to permanent fault
- Excessive Vehicle Speed Check is set to NOT PASSED
- Reverse Gear Disengagement Condition is set to NOT PASSED
- Actual Vehicle Longitudinal Movement and SPM Computed Movement Mismatch Check is set to NOT PASSED
- BSM and IWSS Vehicle Speed Signal Mismatch Check is set to NOT PASSED

1.11.1.3.7   SPM TOI FAULT Status

When EPS is in "TOI Fault", it shall set the signals in the following way:
- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault** to **True**

- **EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated** to **False**
  - **EPS_TORQUE_OVERLAY.SPM_TOI_Status to "Fault"**

(T11) From "TOI **Fault**", EPS shall go to "**TOI OFF**" if all the following conditions are met:

- EPS_OperationalModeSts.Info == "Ignition_Pre_Off" OR "Ignition Off"

1.11.1.3.8   Handshake procedure

When EPS receives:

- transition SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM to "Active"

AND

- SPM_STEER_CONTROL.SPMDriveStyleReqSts to 0

then it shall:

- set EPS_TORQUE_OVERLAY.SPMTorqueOverlayIntActivated to "True"
- start EPS_HANDSHAKE_Tfilter timer

Within EPS_HANDSHAKE_Tfilter EPS shall set EPS_TORQUE_OVERLAY.SPMDriveStyleSts to "Semi_Automatic"; as soon as EPS_TORQUE_OVERLAY.SPMDriveStyleSts is set to "Semi_Automatic" a timer EPS_HANDSHAKE_Tcheck shall start. If within EPS_HANDSHAKE_Tcheck EPS receives SPM_STEER_CONTROL. SPMDriveStyleReqSts set to "Active", then:

- Handshake Procedure is PASSED

Elseif EPS_HANDSHAKE_Tcheck is elapsed and EPS doesn't receive SPM_STEER_CONTROL. SPMDriveStyleReqSts set to "Active", then:

- Handshake Procedure is NOT PASSED

During the time EPS_HANDSHAKE_Tfilter+EPS_HANDSHAKE_Tcheck EPS shall check the following conditions:

- ENGINE1.ReverseGearSts is set to "Inserted"
- SPM_STEER_CONTROL.TorqueOverlay.SteeringReq_SPM is equal to 0
- BRAKE4.VehicleStandstillSts == True

If at least one is not verified AND SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM is set to "Active" continuously for EPS_HANDSHAKE_Tcheck2, then:

- Handshake Procedure is NOT PASSED

1.11.1.4 Stop&Start Interaction

The PAM ECU has to be operative during S&S cranking phase.
Start&Stop functionality will be disabled during PAM activity (STATUS_PAM.SPMControlSts has to be set to 1 only after activation through SemiAutomatic_Park_On_Off.Switch; during SEEK_BCKGND the S&S functionality is enabled).
If the S&S functionality is in an auto stop event and then STATUS_PAM.SPMControlSts is set NOT equal to Not_Active, then the engine will perform a warm crank and the engine will restart. Reference VF506 for specific requirements related to APA and S&S interaction
PAM shall work in conjunction with the Stop&Start-Feature as described by the following specification:

- PAM sets STATUS_PAM.SPMContolSts to 1 only when activated by push-button to prevent S&S getting active, or to perform a warm crank when the APA feature is activated by the customer during a S&S auto stop event.
- When S&S getting active, the PAM shall remain in its current state, and shall NOT discard slot data.
- After Engine_Running again, the PAM shall continue to remain in its current state if the respective conditions are valid again:

1) A S&S-Cycle is not starting a power-on start-up routine of the PAM-ECU

2) During S&S-Cycle (Engine_Off -> Engine_Running) no diagnosis is active, no failure flags are raised. If a failure is occurring right before the diagnosis is switched off, the debouncing time of this failure will be reset when state goes to diagnosis is active again.

[[ENGINE1.EngineStopStartSts] <> Engine_Not_in_Stop] AND [[ENGINE1.StopStartSts] <> OFF]

Initial State

S1

Out=DIAG_ON

S2

Out=DIAG_OFF

[[ENGINE1.EngineStopStartSts] = Engine_Not_in_Stop] AND [[ENGINE1.EngineSts] = EngineOn]
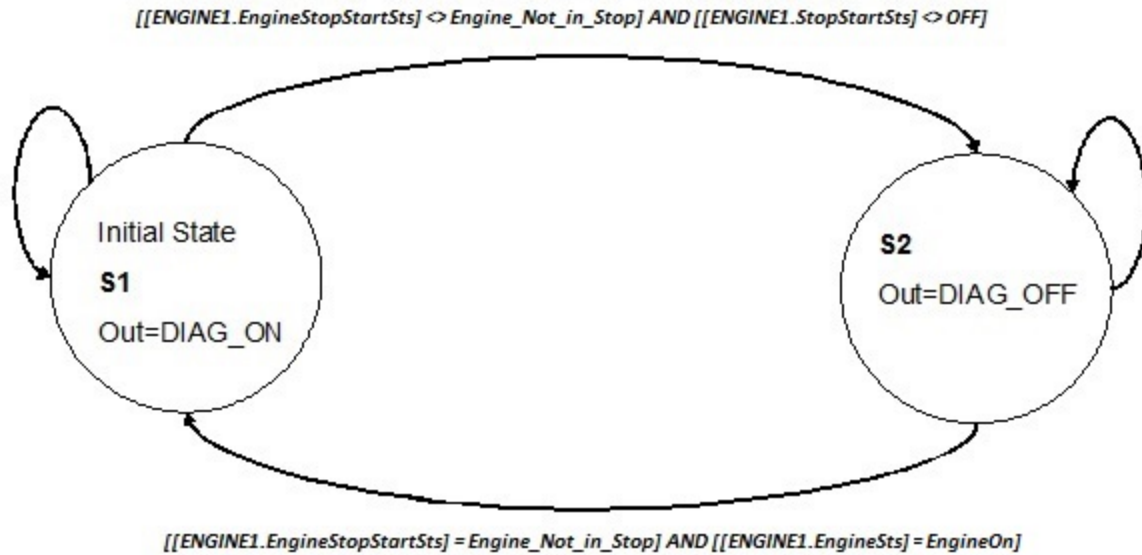
1.11.1.5 Trailer

When PAM receives Trailer.Info set to "Present"

- Trailer.Info equal to "Present"
- STATUS_TTM.TrailerConnectionSts equal to "Connected"

then PAM shall:

- disable the system
- set STATUS_PAM.HMICode to "SPS_GUI_BACK_HITCH" according to HMI diagram

until the signal STATUS_TTM.TrailerConnectionSts switches to "Not_Connected".

1.11.2 Feature selection

1.11.2.1 PAM requirements

When user pushed the SemiAutomatic_Park_On_Off.Switch and receive feature selection from IPC, then it shall set internally a variable in order to activate the feature.
When PAM receives LIN_BCM_IGW1.APARequestSts is equal to "Pressed", then PAM shall set STATUS_PAM.SPMControlSts to Active_ParallelParking (Default option).
PAM shall set a signal in STATUS_PAM to store the feature selected.
When PAM receives BH_IGW1.SPM_Mode_Selection, then PAM shall set STATUS_PAM.SPMControlSts according to the following rules:

BH_IGW1.SPM_Mode_Selection	STATUS_PAM.SPMControlSts
Parallel Mode	Active_ParallelParking
Perpendicular Mode	Active_PerpendicularParking
Pull Out Mode	Active_OutParking

1.11.2.2 IPC requirements

When IPC receives STATUS_PAM.HMICode equal to these value: 2 OR 3 OR 8 OR 9 OR 14 OR 30 OR 31 OR 32 OR 33 OR 42 OR 43 OR 44 OR 45 OR 55, the IPC should change the selected features in according to the parking manouvre chosen by the customer through the SWC.
IF the Configuration Parameter PULLOUT is equal to "Absent" value
THEN

StandStill condition is equal to "False"
IF the Configuration Parameter PULLOUT is equal to "Present" value
THEN
StandStill condition follows the actual value of BRAKE4.VehicleStandStillSts signal.
IF StandStill condition is equal to "False" for IPC_PULLOUT_TIMEOUT, IPC shall display two dots:
-Parallel Parking
- Perpendicular Parking
IF StandStill condition is equal to "Present", IPC shall display three dots:
-Parallel Parking
- Perpendicular Parking
-Pullout
When IPC receives the type of parking manouvre in according to the HMI specification, then IPC shall set the signal STATUS_BH_IPC.SPM_Mode_Selection according to the following rules:

Selected feature	STATUS_BH_IPC.SPM_Mode_Selection
Parallel	Parallel Mode
Perpendicular	Perpendicular Mode
Pull_Out	Pull Out Mode

When IPC receives STATUS_PAM.SPMControlSts equal to "Not Active", then IPC shall set
STATUS_BH_IPC.SPM_Mode_Selection to "None".
Refer to IPC specification for further details about feature selection procedure.

1.11.3 Front & Rear Parking Assistance Interaction

1.11.3.1 PAM Requirements

- The Front and Rear Parking Assistance system shall only provide audible alerts when the SPS system is active. (Reference VF179)
- If the Front and Rear Parking Assistance system is defeated, and the driver activates the SPS system via the SemiAutomatic_Park_On_Off.Switch, then the Front and Rear Parking Assistance system shall automatically be enabled to provide audible alerts during the maneuver. (Reference VF179)
- The Front and Rear Parking Assistance system shall revert back to its previous defeated state once the SPS maneuver has been completed. (Reference VF179)
- The Park_Assist.Light indicator shall revert back to its previous defeated state once the SPS maneuver has been completed. (Reference VF179)
- If the Front and Rear Parking Assistance system is defeated (i.e., Park_Assist.Light indicator = ON), then the PAM shall indicate that the system has been automatically, and temporarily, enabled during the activation of the SPS system (i.e., Park_Assist.Light indicator = OFF and SemiAutomatic_Park.Light indicator = ON). (Reference VF179)
- If the Front and Rear Parking Assistance system is defeated, and then automatically and temporarily enabled during the activation of the SPS system, the PAM shall not request/display HMI Indications indicating the ON/OFF status of the Front & Rear Parking Assistance.

1.12 Indication Management

1.12.1 IPC Indication strategy

The IPC receives the HMICode signal with the aim of:
- Informing the driver with text messages and/or visual icons on the actions that the driver shall perform during the semi-automatic parking manoeuvre (STATUS_PAM.HMICode)
- Informing the driver in case of system failure

The IPC has to ignore the value of STATUS_PAM.SPMControlSts if the PAM send codes that are not included in this table the indication has to be considered as IDLE (HMICode: 00000).

STATUS_PAM.HMI Code	HMICode associated label	Description	IPC Indication (see version used in functional diagram)
0	SPS_GUI_IDLE_HMI	Active Screen	
2	SPS_GUI_SEEKING_R	The SPS is active and it is seeking a parking slot on the right side of the street	SPS GUI SEEKING DX
3	SPS_GUI_SEEKING_L	The SPS is active and it is seeking a parking slot on the left side of the street	SPS GUI SEEKING SX
4	SPS_GUI_DEACTIVATE_RWG_MAN		SPS_GUI_DEACTIVATE_RWG_MAN
5	SPS_GUI_PO_END_BACKWARD_MAN_R		SPS GUI PO END BACKWARD DX MAN
6	SPS_GUI_PO_END_BACKWARD_MAN_L		SPS GUI PO END BACKWARD SX MAN
7	SPS_GUI_END_BACKWARD_MAN_L		SPS GUI END BACKWARD SX MAN
8	SPS_GUI_GO_FORWARD_R	The vehicle stopped too early on the right. To adjust the position the user need to move forward	SPS GUI GO FORWARD DX
9	SPS_GUI_GO_FORWARD_L	The vehicle stopped too early on the left. To adjust the position the user need to move forward	SPS GUI GO FORWARD SX

10	SPS_GUI_REVERSE_GEAR_R	The slot on the right is Ok. To start the manoeuvre insert the reverse gear	SPS GUI REVERSE GEAR DX
11	SPS_GUI_END_BACKWARD_MAN_R		SPS GUI END BACKWARD DX MAN
12	SPS_GUI_REVERSE_GEAR_L	The slot on the left is Ok. To start the manoeuvre insert the reverse gear	SPS GUI REVERSE GEAR SX
13	SPS_GUI_PER_GO_BACKWARD_L		SPS GUI PER GO BACKWARD SX
14	SPS_GUI_REMOVE_HANDS_R	Before starting the manoeuvre, take the hands off of the steering wheel	SPS GUI REMOVE HANDS
15	SPS_GUI_SPEED	The vehicle speed is too high	SPS GUI SPEED
16	SPS_GUI_SPEED2	The vehicle speed is too high	SPS GUI SPEED 2
17	SPS_GUI_TEMPORARY_FAIL	Temporary fault. Wait few minutes	SPS GUI TEMPORARY FAIL
18	SPS_GUI_REMOVE_HANDS2_R		SPS GUI REMOVE HANDS 2
19	SPS_GUI_TOUCH_STEERING	The steering wheel has been touched	SPS GUI TOUCH STEERING
20	SPS_GUI_PER_END_BACKWARD_AUTO_R		SPS GUI PER END BACKWARD DX AUTO
22	SPS_GUI_MANUAL_ENDING	The SPS is shutting down, the manoeuvre has to be completed manually	SPS GUI MANUAL ENDING

23	SPS_GUI_BACK_HITCH	The vehicle has a back-hitch and the SPS can not switch on	SPS GUI BACK HITCH
25	SPS_GUI_PO_END_BACKWARD_AUTO_L		SPS GUI PO END BACKWARD SX AUTO
26	SPS_GUI_END_FORWARD_R	The forward movement is ended and the driver is asked to start the backward movement	SPS GUI END FORWARD DX
27	SPS_GUI_END_FORWARD_L	The forward movement is ended and the driver is asked to start the backward movement	SPS GUI END FORWARD SX
28	SPS_GUI_ACTIVATE_RWG_R	The driver is asked to engage the reverse gear again	SPS GUI ACTIVATE RWG DX
29	SPS_GUI_ACTIVATE_RWG_L	The driver is asked to engage the reverse gear again	SPS GUI ACTIVATE RWG SX
30	SPS_GUI_PER_SEEKING_R	The SPS is active and it is seeking a perpendicular parking slot on the right side of the street	SPS GUI PER SEEKING DX

31	SPS_GUI_PER_SEEKING_L	The SPS is active and it is seeking a perpendicular parking slot on the left side of the street	SPS GUI PER SEEKING SX
32	SPS_GUI_PER_GO_FORWARD_R	The vehicle stopped too early on the right. To adjust the position the user need to move forward	SPS GUI PER GO FORWARD DX
33	SPS_GUI_PER_GO_FORWARD_L	The vehicle stopped too early on the left. To adjust the position the user need to move forward	SPS GUI PER GO FORWARD SX
34	SPS_GUI_PER_REVERSE_GEAR_R	The slot on the right is Ok and the vehicle position is Ok. To start the maneuver insert the reverse gear	SPS GUI PER REVERSE GEAR DX
35	SPS_GUI_PER_REVERSE_GEAR_L	The slot on the right is Ok and the vehicle position is Ok. To start the maneuver insert the reverse gear	SPS GUI PER REVERSE GEAR SX

38	SPS_GUI_PER_END_FORWARD_R	The forward movement is ended and the driver is asked to start the backward movement	SPS GUI PER END FORWARD DX
39	SPS_GUI_PER_END_FORWARD_L	The driver is asked to engage the reverse gear	SPS GUI PER END FORWARD SX
40	SPS_GUI_PER_ACTIVATE_RWG_R	The driver is asked to engage the reverse gear	SPS GUI PER ACTIVATE RWG DX
41	SPS_GUI_PER_ACTIVATE_RWG_L	Before starting the maneuver, the driver is asked to take the hands off of the steering wheel	SPS GUI PER ACTIVATE RWG SX
42	SPS_GUI_PER_REMOVE_HANDS_R	Before starting the maneuver, the driver is asked to take the hands off of the steering wheel	SPS GUI PER REMOVE HANDS
43	SPS_GUI_PER_REMOVE_HANDS_L	The driver is asked to engage the reverse gear to start pull out	SPS GUI PER REMOVE HANDS SX
44	SPS_GUI_PO_REVERSE_GEAR_R	The driver is asked to engage the reverse gear to start pull out	SPS GUI PO REVERSE GEAR DX

45	SPS_GUI_PO_REVERSE_GEAR_L	The driver is asked to engage the reverse gear to start pull out	SPS GUI PO REVERSE GEAR SX
46	SPS_GUI_PO_ACTIVATE_RWG_R	The driver is asked to engage the reverse gear	SPS GUI PO ACTIVATE RWG DX
47	SPS_GUI_PO_ACTIVATE_RWG_L	The driver is asked to engage the reverse gear	SPS GUI PO ACTIVATE RWG SX
50	SPS_GUI_PO_END_FORWARD_R	The forward movement is ended and the driver is asked to start the backward movement	SPS GUI PO END FORWARD DX
51	SPS_GUI_PO_END_FORWARD_L	The forward movement is ended and the driver is asked to start the backward movement	SPS GUI PO END FORWARD SX
52	SPS_GUI_PO_REMOVE_HANDS_R	The driver is asked to remove the hands from steering wheel	SPS GUI PO REMOVE HANDS
53	SPS_GUI_PO_REMOVE_HANDS_L	The driver is asked to remove the hands from steering wheel	SPS GUI PO REMOVE HANDS SX

54	SPS_GUI_PO_SMALL	The parking slot is too small to perform a pull out maneuver	SPS GUI PO SMALL
55	SPS_GUI_REMOVE_HANDS_L	The driver is asked to remove the hands from steering wheel	SPS GUI REMOVE HANDS SX
56	SPS_GUI_COMPLETE_HMI	Parking maneuver completed	SPS GUI COMPLETE HMI
57	SPS_GUI_PER_GO_BACKWARD_R		SPS GUI PER GO BACKWARD DX
58	SPS_GUI_PO_REMOVE_HANDS2_R	The SPS is temporary unavailable	SPS GUI PO REMOVE HANDS 2
59	SPS_PERMANENT_FAIL	The SPS is unavailable	SPS PERMANENT FAIL
60	SPS_USER_DISABLED	The driver pushes the button of SPS turning it off	SPS USER DISABLED
61	SPS_GUI_FRONT_SENSORS_BLINDED	Front parking sensors are blinded, SPS unavailable	SPS GUI FRONT SENSORS BLINDED
62	SPS_GUI_REAR_SENSORS_BLINDED	Rear parking sensors are blinded, SPS unavailable	SPS GUI REAR SENSORS BLINDED
63	SPS_GUI_REMOVE_HANDS2_L		SPS GUI REMOVE HANDS 2 SX
64	SPS_GUI_PER_REMOVE_HANDS2_R		SPS GUI PER REMOVE HANDS 2
65	SPS_GUI_PER_REMOVE_HANDS2_L		SPS GUI PER REMOVE HANDS 2 SX
66	SPS_GUI_PO_COMPLETE_HMI		SPS GUI PO COMPLETE HMI
67	SPS_GUI_PO_REMOVE_HANDS2_L		SPS GUI PO REMOVE HANDS 2 SX

68	SPS_GUI_SENSORS_BLINDED		SPS GUI SENSORS BLINDED
69	SPS_GUI_PERMANENT_FAIL - (Not available)		SPS GUI PERMANENT FAIL
70	SPS_GUI_WAIT_STEER_R		SPS GUI WAIT STEER DX
71	SPS_GUI_WAIT_STEER_L		SPS GUI WAIT STEER SX
72	SPS_GUI_BACKWARD_STOP_R		SPS GUI BACKWARD STOP DX
73	SPS_GUI_BACKWARD_STOP_L		SPS GUI BACKWARD STOP SX
74	SPS_GUI_WAIT_STEER2_R		SPS GUI WAIT STEER 2 DX
75	SPS_GUI_WAIT_STEER2_L		SPS GUI WAIT STEER 2 SX
76	SPS_GUI_WAIT_STEER3_R		SPS GUI WAIT STEER 3 DX
77	SPS_GUI_WAIT_STEER3_L		SPS GUI WAIT STEER 3 SX
78	SPS_GUI_PER_WAIT_STEER_R		SPS GUI PER WAIT STEER DX
79	SPS_GUI_PER_WAIT_STEER_L		SPS GUI PER WAIT STEER SX
80	SPS_GUI_PER_WAIT_STEER2_R		SPS GUI PER WAIT STEER 2 DX
81	SPS_GUI_PER_WAIT_STEER2_L		SPS GUI PER WAIT STEER 2 SX
82	SPS_GUI_PER_WAIT_STEER3_R		SPS GUI PER WAIT STEER 3 DX
83	SPS_GUI_PER_WAIT_STEER3_L		SPS GUI PER WAIT STEER 3 SX
84	SPS_GUI_GO_FORWARD2_R		SPS GUI GO FORWARD 2 DX
85	SPS_GUI_GO_FORWARD2_L		SPS GUI GO FORWARD 2 SX
86	SPS_GUI_FORWARD_STOP_R		SPS GUI FORWARD STOP DX
87	SPS_GUI_FORWARD_STOP_L		SPS GUI FORWARD STOP SX
88	SPS_GUI_GO_BACKWARD_R		SPS GUI GO BACKWARD DX
89	SPS_GUI_GO_BACKWARD_L		SPS GUI GO BACKWARD SX
90	SPS_GUI_DOOR_OPEN	The SPS is unavailable because of an open door	SPS GUI DOOR OPEN
91	SPS_GUI_HATCH_OPEN	The SPS is unavailable because of the open hatch	SPS GUI HATCH OPEN
92	SPS_GUI_ESC_EVENT	The SPS is unavailable because of an ESC intervention	SPS GUI ESC EVENT
93	SPS_GUI_PO_WAIT_STEER_R		SPS GUI PO WAIT STEER DX
94	SPS_GUI_PO_WAIT_STEER_L		SPS GUI PO WAIT STEER SX
95	SPS_GUI_PO_BACKWARD_STOP_R		SPS GUI PO BACKWARD STOP DX
96	SPS_GUI_PO_BACKWARD_STOP_L		SPS GUI PO BACKWARD STOP SX

97	SPS_GUI_PO_WAIT_STEER2_R		SPS GUI PO WAIT STEER 2 DX
98	SPS_GUI_PO_WAIT_STEER2_L		SPS GUI PO WAIT STEER 2 SX
99	SPS_GUI_PO_GO_FORWARD2_R		SPS GUI PO GO FORWARD 2 DX
100	SPS_GUI_PO_GO_FORWARD2_L		SPS GUI PO GO FORWARD 2 SX
101	SPS_GUI_PO_FORWARD_STOP_R		SPS GUI PO FORWARD STOP DX
102	SPS_GUI_PO_FORWARD_STOP_L		SPS GUI PO FORWARD STOP SX
103	SPS_GUI_PO_WAIT_STEER3_R		SPS GUI PO WAIT STEER 3 DX
104	SPS_GUI_PO_WAIT_STEER3_L		SPS GUI PO WAIT STEER 3 SX
105	SPS_GUI_PO_GO_BACKWARD_R		SPS GUI PO GO BACKWARD DX
106	SPS_GUI_PO_GO_BACKWARD_L		SPS GUI PO GO BACKWARD SX
107	SPS_GUI_PER_END_BACKWARD_MAN_R		SPS GUI PER END BACKWARD MAN DX
108	SPS_GUI_PER_END_BACKWARD_MAN _L		SPS GUI PER END BACKWARD MAN SX
109	SPS_GUI_PER_BACKWARD_STOP_R		SPS GUI PER BACKWARD STOP DX
110	SPS_GUI_PER_BACKWARD_STOP_L		SPS GUI PER BACKWARD STOP SX
111	SPS_GUI_PER_GO_FORWARD2_R		SPS GUI PER GO FORWARD 2 DX
112	SPS_GUI_PER_GO_FORWARD2_L		SPS GUI PER GO FORWARD 2 SX
113	SPS_GUI_PER_FORWARD_STOP_R		SPS GUI PER FORWARD STOP DX
114	SPS_GUI_PER_FORWARD_STOP_L		SPS GUI PER FORWARD STOP SX
115	SPS_GUI_DEACTIVATE_RWG_AUTO		SPS GUI DEACTIVATE RWG AUTO
116	SPS_GUI_END_BACKWARD_AUTO_R		SPS GUI END BACKWARD DX AUTO
117	SPS_GUI_END_BACKWARD_AUTO_L		SPS GUI END BACKWARD SX AUTO
118	SPS_GUI_PER_END_BACKWARD_AUTO_L		SPS GUI PER END BACKWARD SX AUTO
119	SPS_GUI_PO_END_BACKWARD_AUTO_R		SPS GUI PO END BACKWARD DX AUTO

120	SPS_USER_DISABLED_CHIME	The SPS is unavailable due to driver disabling action during maneuvering	SPS USER DISABLED CHIME

1.12.2 IPC internal signal

The IPC internal signal have to be setting in according to the rules below:
- The (IPC) internal signal named HMICode follow the STATUS_PAM.HMICode CAN signal.

1.12.3 PAM Pushbutton and Led Management

1.12.3.1 PAM activation

1.12.3.1.1   ICS requirements

ICS acquires the internal signal SemiAutomatic_Park_On_Off.Req and it manages internal signal SemiAutomatic_Park_Light.Cmd
In Ignition Off and Ignition_Pre Off, ICS shall set Park_Assist_Light.Cmd to OFF.
In Ignition Pre Start, Start, Cranking, Ignition_ON and Ignition_On_Engine_On, ICS shall set SemiAutomatic_Park_Light.Cmd according to the last valid state received through the signal STATUS_PAM.SPM_LedControlSts.
If SemiAutomatic_Park_Light.Cmd is equal to "Continuos" OR "Blinking" value and STATUS_B_BCM2.InternalLightSts is equal to "Not_Active" value, then ICS shall:
- drive SemiAutomatic_Park.Light in "DAY" mode, according to the "*Technical Esthetic Finalized Specification*".

If SemiAutomatic_Park_Light.Cmd is equal to "Continuos" OR "Blinking" value and STATUS_B_BCM2.InternalLightSts is equal to "Active" value, then ICS shall:
- drive SemiAutomatic_Park.Light in "NIGHT" mode, according to the "*Technical Esthetic Finalized Specification*"

When SemiAutomatic_Park_On_Off.Switch is pressed) and the signal SemiAutomatic_Park_On_Off.Req goes from "Not_Pressed" to "Pressed", then ICS shall:
- set CENTERSTACK1.APARequestSts to "Pressed".

When SemiAutomatic_Park_On_Off.Switch is released) and the signal SemiAutomatic_Park_On_Off.Req goes from "Pressed" to "Not_Pressed", then ICS shall:
- set CENTERSTACK1.APARequestSts to "Not_Pressed".

When ICS receives STATUS_PAM.SPM_LedControlSts equal to "OFF" OR "Continuos light" OR "Blinking light", then ICS shall:
- set SemiAutomatic_Park_Light.Cmd respectively to "OFF" OR "Continuos light" OR "Blinking light".

When SemiAutomatic_Park_Light.Cmd to "Blinking light", then ICS shall blink with a duty cycle equal to PAM_LED_BLINK_DUTY and a frequency of PAM_LED_BLINK_FREQ.
ICS shall apply a debounce filter during switch pressure. See CTS specifications of ICS for details.
ICS acquires the internal signal Park_Assist_On_Off.Req and it manages internal signal Park_Assist_Light.Cmd.
For further information on Park_Assist_On_Off.Switch requirements, refer to VF179_V7

1.12.3.1.2   Gateway Management

BCM shall perform the indirect gateway from BH - CAN to C2 - CAN network of the following signal:
- "CENTERSTACK1.PAMRequestSts" To "LIN_BCM_IGW1.PAMRequestSts "
- "CENTERSTACK1.APARequestSts" To "LIN_BCM_IGW1.APARequestSts "

BCM shall perform the direct gateway from C2 - CAN to BH - CAN network of the following signal:
- "STATUS_PAM.SPM_LedControlSts" To "STATUS_PAM.SPM_LedControlSts"
- "STATUS_PAM.PAM_LedControlSts" To "STATUS_PAM.PAM_LedControlSts"

BCM shall perform the gateway from BH - CAN to C2 - CAN network of the following signal:
- "STATUS_BH_IPC.SPM_Mode_Selection" To "BH_IGW1.SPM_Mode_Selection"
- "STATUS_TTM.TrailerConnectionSts" To "STATUS_TTM.TrailerConnectionSts"
- "STATUS_TTM.TrailerGenericFailSts" To "STATUS_TTM.TrailerGenericFailSts"

BCM shall perform the gateway from C1 - CAN to C2 - CAN network of the following signal:
- "ENGINE1.ReverseGearSts" To "ENGINE1.ReverseGearSts"
- "ENGINE1.EngineSts" To "ENGINE1.EngineSts"
- "ENGINE1.StopStartSts" To "ENGINE1.StopStartSts"
- "ENGINE1.EngineStopStartSts" To "ENGINE1.EngineStopStartSts"
- "MOT_TRANSM3.ESS_ENG_ST" To "C1_IGW1.ESS_ENG_ST"
- "TRANSM2.ShiftLeverPosition" To "C1_IGW1.ShiftLeverPosition"
- "TRANSM2.TransmissionFailSts" To "C1_IGW1.TransmissionFailSts"

BCM shall perform the gateway from C2 - CAN to BH - CAN network of the following signal:
- "STATUS_PAM.HMICode" To "STATUS_PAM.HMICode"
- "STATUS_PAM.SPMControlSts" To "STATUS_PAM.SPMControlSts"
- "STATUS_PAM.SPMFailSts" To "STATUS_PAM.SPMFailSts"

1.12.3.1.3   PAM requirements

For details on Led Management refer to SPS HMI System Diagram.
PAM shall detect pushbutton activation through the signal LIN_BCM_IGW1.APARequestSts.
PAM shall drive status LEDs on pushbutton using the signals STATUS_PAM.SPM_LedControlSts and
STATUS_PAM.PAM_LedControlSts.

1.12.3.1.4   PAM - LED Management

The APA shall request blinking activation of the APA Activation / Deactivation Switch LED indicator when the
APA Activation Switch is pressed and the system is faulted.
PAM shall perform the APA - LED strategy according to the rules below:

Semi-Automatic Parking Assistance System State	APA - LED Indicator Status	APA LED Indicator Status when APA On / Off Defeat Switch Pressed
SPM system not in fault	STATUS_PAM.SPM_LedControlSts = Off	STATUS_PAM.SPM_LedControlSts = Continuous light
SPM system in fault	STATUS_PAM.SPM_LedControlSts = Off	STATUS_PAM.SPM_LedControlSts = Blinking light, for PAM_LED_BLINK_TIME, and then STATUS_PAM.SPM_LedControlSts = Off

When happens a fault on the Semi-Parking Assistance System, the STATUS_PAM.SPM_LedControlSts signal goes
to "Off".

1.12.4 PAM Buzzer Management

The PAM sends the HMICode signal to the IPC with the aim of request an acoustical signalling.
See **Finalized Dashboard Specification** for IPC Buzzer signal.

1.13 Diagnosis and Recovery

1.13.1 Diagnosis Table

ID	Component / Signal / Message Name	Diagnosis Type	Functional Recovery	DTC Stored	Detect Condition	Fault Signal
1.0	Sensors	OC - SC	PAM	PAM	Ignition_On Ignition_On_ Engine_On	STATUS_PAM.SPMFailSts SPM_STEER_CONTROL.SPMSystemFault
2.0	PAM	Node Mute	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
3.0	PAM	Node Bus Off	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
4.0	PAM	Internal Fail	PAM	PAM	Ignition_On Ignition_On_ Engine_On	STATUS_PAM.SPMFailSts SPM_STEER_CONTROL.SPMSystemFault
5.0	BCM_COMMAND	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
6.0	BODY2	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
7.0	BH_IGW1	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
8.0	C1_IGW1	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
9.0	ENGINE1	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
10.0	BCM_COMMAND.TurnIndicatorSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
11.0	SPM_STEER_CONTROL	Missing Message	EPS	EPS	Ignition_On Ignition_On_ Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
12.0	SPM_STEER_CONTROL.TorqueOverlaySteeringReq	Plausibility	EPS	EPS	Ignition_On Ignition_On_ Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
13.0	SPM_STEER_CONTROL.SPMSystemFault	Plausibility	EPS	EPS	Ignition_On Ignition_On_ Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
14.0	EPS_CRC_MCFailSts.Info	Plausibility	EPS	EPS	Ignition_On Ignition_On_ Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault

15.0	WHEEL_INFO.LHRSpin WHEEL_INFO.RHRSpin WHEEL_INFO.LHRFastPulseCounterFailSts WHEEL_INFO.RHRFastPulseCounterFailSts	Plausibility	EPS	EPS	Ignition_On Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
16.0	**BSM and IWSS Vehicle Speed Signal Mismatch Check** BRAKE1.VehicleSpeedVSOSigComputed Speed	Plausibility	EPS	EPS	Ignition_On Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
17.0	SPM STEER CONTROL.TorqueOverlayIntActivation_SPM SPM STEER CONTROL.SPMTorqueOverlaySteeringReq	Plausibility	EPS	EPS	Ignition_On Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
18.0	PAM_CRC_MCFailSts.Info	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
19.0	BODY4	Missing Message	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
20.0	EPS_TORQUE_OVERLAY.EPSHandsOnRecognition SPM STEER CONTROL.TorqueOverlayIntActivation_SPM	Plausibility	EPS	EPS	Ignition_On Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
21.0	EPS	Internal Fail	EPS	EPS	Ignition_On Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
22.0	LIN_BCM_IGW1	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	STATUS_PAM.SPMFailSts
23.0	**Actual Vehicle Longitudinal Movement and SPM Computed Movement Mismatch Check**	Plausibility	EPS	EPS	Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
24.0	**Reverse Gear Disengagement Condition**	Plausibility	EPS	EPS	Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
25.0	**Excessive Vehicle Speed Check**	Plausibility	EPS	EPS	Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
26.0	**IWSS Signal Validity Check and Wheel Spin Signal Processing**	Plausibility	EPS	EPS	Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault
27.0	SPM STEER CONTROL.TorqueOverlayIntActivation_SPM	Plausibility	EPS	EPS	Ignition_On_Engine_On	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault

28.0	EPS_OperationalModeSts.Info	Plausibility	EPS	EPS	Ignition_On Ignition_Pre_ Start Ignition_Start Ignition_Cran king Ignition_On_ Engine_On Ignition_Pre_ Off Ignition_Off	GE.ElectricSteeringFailSts
29.0	STATUS_TTM	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
30.0	EPS_TORQUE_OVERLAY	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
31.0	GE	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
32.0	BRAKE1	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
33.0	BRAKE4	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
34.0	BRAKE8	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
35.0	WHEEL_SPEED	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
36.0	WHEEL_INFO	Missing Message	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
39.0	**Condition F1**	Plausibility	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None
40.0	**Condition F2**	Plausibility	PAM	PAM	Ignition_On Ignition_On_ Engine_On	None

41.0	WHEEL_INFO.LHR_Spin WHEEL_INFO.RHR_Spin WHEEL_INFO.LHR_FastPulse Counter WHEEL_INFO.RHR_FastPulse Counter WHEEL_INFO.LHF_FastPulse Counter WHEEL_INFO.RHF_FastPulse Counter WHEEL_INFO.LHR_WheelSensorFailSts WHEEL_INFO.RHR_WheelSensorFailSts WHEEL_INFO.LHF_WheelSensorFailSts WHEEL_INFO.RHR_WheelSensorFailSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
42.0	STATUS_TTM.TrailerGenericFailSts STATUS_TTM.TrailerConnectionSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
43.0	BRAKE8.BSMSysSts BRAKE8.ESCFailSts BRAKE8.ABSFailSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
44.0	C1_IGW1.TransmissionFailSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	STATUS_PAM.SPMFailSts SPM_STEER_CONTROL.SPMSystemFault
45.0	BRAKE1.VehicleSpeedVSOSig BRAKE1.VehicleSpeedVSOSigFailSts	Plausibilty	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
46.0	BODY2.ExternalTemperature BODY2.ExternalTemperatureFailSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
47.0	ENGINE1.ReverseGearSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
48.0	BRAKE4.VehicleStandStillSts	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
49.0	C1_IGW1.ESS_ENG_ST	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
50.0	WHEEL_SPEED.RHRWheelSpeed WHEEL_SPEED.LHRWheelSpeed WHEEL_SPEED.RHFWheelSpeed WHEEL_SPEED.LHFWheelSpeed	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	None
51.0	C1_IGW1.ShiftLeverPosition	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	STATUS_PAM.SPMFailSts SPM_STEER_CONTROL.SPMSystemFault

52.0	EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault	Plausibility	PAM	PAM	Ignition_On Ignition_On_Engine_On	STATUS_PAM.SPMFailSts SPM_STEER_CONTROL.SPMSystemFault
300.0	STATUS_PAM	Missing Message	ICS	ICS	Ignition_On Ignition_On_Engine_On	None
301.0	STATUS_PAM.SPM_LedControlSts	Plausibility	ICS	ICS	Ignition_On Ignition_On_Engine_On	None

1.13.2 Diagnosis Table and Recovery Description

1.13.3 PAM Diagnostic Requirements

When the SPS system is not available for internal fault on EPS the functionality shall be deactivated and shall be communicated to PAM the fault using the signal **EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault**.

In case of systems equipped with diagnosis capabilities, the supplier developed functions shall be compliant with the company standards.

Following requirements have to be considered as sub-set diagnosis requirements (usually correlated to the system functionality).

Any other specific diagnosis requirement is included in the "Finalized Diagnosis Requirements" document for the system itself.

The list of recoveries is reported in the table below:

RECOVERY LABEL	*PAM STATE ASSOCIATED*	*DESCRIPTION*	*CONDITION TO SET RECOVERY*
R1	UPA_OFF	disable parking assistance as long as error is present	
R2	**NotRecoverableFault**	**disable parking slot measurement and automatic parking until Key Off, shut down TOI**	- SPS defect - SPS system error - CAN communication not reversible failures
R3	**RecoverableFault**	**disable parking slot measurement and automatic parking as long as error is present, shut down TOI**	- ESP/ABS deactivated - BSM failure - EPS failure - CAN communication reversible failures - Direction lights selector failure - (RWG on) and (RHR/LHRSpin Invalid/Not Available condition) * - (RWG on) and (WHEEL_INFO.LHR/RHRFastPulseCounter == SNA 1) **
R4	LED_OFF	switch off LED and execute cyclic check, if error is present	

The sensors and wiring are tested continuously when the system is active and (the Engine is Running or ESS_Active_Present)

If even a single sensor fails, the SPS must be disabled. The SPS system must be turned off automatically.

The UPA system diagnosis and recovery strategies have to be considered independent.

In case of a sensor failure, PAM shall act accordingly with the recovery defined in the table below:

Failure type	Fault symptom	Recovery
lateral sensor	Internal failure / electrical error	R1, R2, R3
front/rear sensor	Internal failure / electrical error	R1, R2, R3

Other recovery strategies *will be included in the CDD file (complete DTC description table).*

Diagnostic Initialization and disabling

The strategy outlined below protects against the flagging of false faults during the following conditions:

Power up: A minimum time of 1 second will be available before diagnostics could begin. This 1 second minimum delay with battery voltage between (10V - 16V) after ignition ON allows both components to be up and running.

Power Down: Disable all diagnostics when ignition OFF is sensed.

Cranking: Enable diagnostics only when battery voltage is >9V continuously for 1s. Within this voltage range, no ECUs are in danger of resetting.

PAM enables the diagnosis signals monitoring for SPS subsystems (BSM, EPS, PAM), "TimeThreshold1" seconds after the cranking.

General rules for STATUS_PAM.SPMFailSts. SPM_STEER_CONTROL.SPMSystemFault management.

FailSts on network signals from BSM, BCM, ECM, EPS shall set a DTC but shall not set neither SPM_STEER_CONTROL.SPMSystemFault nor the STATUS_PAM.SPMFailSts.

These faults shall trigger recovery R3 (**SPS_RecoverableFault**).

STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY FAIL" (dependent on the SPM status).

Node absent for PAM shall cause the IPC to give a warning to the driver.

This fault shall trigger recovery R3 (**SPS_RecoverableFault**) and STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY FAIL".

PAM shall unset this DTC if the signal is received again for one time.

In case of hands-on recognition or EPS temporary deactivation (due to thermal limiting of EPS, alternator not charging while a torque overlay is requested, a too low or too high battery voltage is detected or a CAN fault is detected) the PAM will ramp down the Torque request and will set both SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM and SPM_STEER_CONTROL.SPMDriveStyleReqSts to zero.

1.13.3.1 ID 1.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", as soon as PAM detects a failure in one of the following devices for the period indicated in "PAM - Diagnostic Requirements" document:

- **R_Bumper_Inner_Left_Parking.Sensor**
- **R_Bumper_Inner_Right_Parking.Sensor**
- **R_Bumper_Outer_Left_Parking.Sensor**
- **R_Bumper_Outer_Right_Parking.Sensor**
- **R_Lateral_Right_Parking.Sensor**
- **R_Lateral_Left_Parking.Sensor**
- **F_Bumper_Inner_Left_Parking.Sensor**
- **F_Bumper_Inner_Right_Parking.Sensor**
- **F_Bumper_Outer_Left_Parking.Sensor**
- **F_Bumper_Outer_Right_Parking.Sensor**
- **F_Lateral_Right_Parking.Sensor**
- **F_Lateral_Left_Parking.Sensor**

then PAM shall peform the following actions:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- set STATUS_PAM.SPMFailSts to "True" (not during the SPM manouvre)
- set SPM_STEER_CONTROL.SPMSystemFault to "True" (during the SPM manouvre)
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

1.13.3.2 ID 2.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", if PAM is in condition of Node Mute, then PAM shall:
- deactivate the system
- set DTC in according to "PAM - Diagnostic Requirements" document

1.13.3.3 ID 3.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", if PAM is in condition of Node Bus Off, then PAM shall:
- deactivate the system
- set DTC in according to "PAM - Diagnostic Requirements" document

1.13.3.4 ID 4.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects an internal failure, then PAM shall:
- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- set STATUS_PAM.SPMFailSts to "True" (not during the SPM manouvre)
- set SPM_STEER_CONTROL.SPMSystemFault to "True" (during the SPM manouvre)
- STATUS_PAM.HMICode shall be set to "SPS_PERMANENT_FAIL"
- perform recovery R2 (**SPS_NotRecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

1.13.3.5 ID 5.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "BCM_COMMAND" for a time equal to MSG_TIMEOUT_A, then PAM shall:
- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.6 ID 6.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "BODY2" for a time equal to MSG_TIMEOUT_A, then PAM shall:
- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.7 ID 7.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "BH_IGW1" for a time equal to MSG_TIMEOUT_A, then PAM shall:
- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.8 ID 8.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "C1_IGW1" for a time equal to MSG_TIMEOUT_A, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.9 ID 9.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "ENGINE1" for a time equal to MSG_TIMEOUT_A, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.10   ID 10.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:

- BCM_COMMAND.TurnIndicatorSts equal to "SNA"
- then PAM shall:
  - deactivate the system
  - set STATUS_PAM.SPMControlSts to "Not_Active"
  - STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
  - perform recovery R3 (**SPS_RecoverableFault**)
  - set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore.

1.13.3.11   ID 18.0 Description

In "Ignition_On" and "Ignition_On_Engine_On", PAM receives internal signal **PAM_CRC_MCFailSts.Info** set to one of the following conditions:

- **ENGINE1_CRC_Fail**
- **BCM_COMMAND_CRC_Fail**
- **BRAKE1_CRC_Fail**
- **EPS_TORQUE_OVERLAY_CRC_Fail**
- **BSM_YRS_DATA_CRC_Fail**
- **WHEEL_INFO_CRC_Fail**
- **WHEEL_SPEED_CRC_Fail**
- **GE_CRC_Fail**

for a time greater or equal of "T_DIAG_CRC", then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set a specific DTC in according to "PAM - Diagnostic Requirements" document

In "Ignition_On" and "Ignition_On_Engine_On", PAM receives internal signal **PAM_CRC_MCFailSts.Info** set to one of the following conditions:

- **ENGINE1_MC_Fail**
- **BCM_COMMAND_MC_Fail**

- **BRAKE1_MC_Fail**
- **EPS_TORQUE_OVERLAY_MC_Fail**
- **BSM_YRS_DATA_MC_Fail**
- **WHEEL_INFO_MC_Fail**
- **WHEEL_SPEED_MC_Fail**
- **GE_MC_Fail**

for a time greater or equal of "T_DIAG_MC", then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set a specific DTC in according to "PAM - Diagnostic Requirements" document

1.13.3.12   ID 19.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "BODY4" for a time equal to MSG_TIMEOUT_A, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore.

1.13.3.13   ID 22.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects that LIN_BCM_IGW1.APARequestSts doesn't switch from "Pressed" to "Not Pressed" within PAM_STUCK_TIMEOUT, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- set STATUS_PAM.SPMFailSts to "True"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore.

1.13.3.14   ID 29.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "STATUS_TTM" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- set DTC as long as Missing Message occurs
- take STATUS_TTM at last valid value read
- if at next key-on this fault persist, PAM shall follow the I/O Trailer
- if at next key-on the fault is not more present, PAM shall deactivate the DTC

1.13.3.15   ID 30.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "EPS_TORQUE_OVERLAY" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.16   ID 31.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "GE" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.17   ID 32.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "BRAKE1" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.18   ID 33.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "BRAKE4" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.19   ID 34.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "BRAKE8" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.20   ID 35.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "WHEEL_SPEED" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.21   ID 36.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM detects Missing Message of "WHEEL_INFO" for a time equal to MSG_TIMEOUT_B, then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.22   ID 39.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM is in ACTIVE state, if PAM detects that condition below is not true for 40 ms:

- GE.LwsAngle != "SNA"

AND

- GE.LWSFailSts == "Fail Not Present"

AND

- GE.LwsSpeed != "SNA"

AND

- EPS_TORQUE_OVERLAY.SPM_TOI_Status != "Fault"

AND

- no EPS_TORQUE_OVERLAY Messagecounter fault is recognized

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when the PAM receives the message again continuously for HEALING_TIMEOUT.

1.13.3.23   ID 40.0 and ID 41.0 Description

In "Ignition_On" or "Ignition_On_Engine_On" when PAM is in ACTIVE state, if PAM detects that condition below is not true for 40 ms

- BRAKE8.ESCFailSts == " Fail Not Present"

AND

- WHEEL_INFO.RHR_FastPulseCounter != "SNA"

AND

- WHEEL_INFO.LHR_FastPulseCounter != "SNA"

AND

- WHEEL_INFO.LHF_FastPulseCounter != "SNA"

AND

- WHEEL_INFO.RHF_FastPulseCounter != "SNA"

AND

- BRAKE1.VehicleSpeedVSOSigFailSts == "Fail Not Present"

AND

- WHEEL_INFO.RHR_Spin != "SNA"

AND

- WHEEL_INFO.LHR_Spin != "SNA"

AND

- WHEEL_INFO.LHR_WheelSensorFailSts == "Fail Not Present"

AND

- WHEEL_INFO.RHR_WheelSensorFailSts == "Fail Not Present"

AND

- WHEEL_INFO.LHF_WheelSensorFailSts == "Fail Not Present"

AND

- WHEEL_INFO.RHF_WheelSensorFailSts == "Fail Not Present"

then PAM shall:
- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC in according to "PAM - Diagnostic Requirements" document

This fault shall be lowered when both Spins will be set for a value different from "3" continuously for 1000ms.

1.13.3.24   ID 42.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:
- STATUS_TTM.TrailerGenericFailSts equal to "Fail Present"

OR

- STATUS_TTM.TrailerConnectionSts equal to "SNA"

OR

- STATUS_TTM.TrailerConnectionSts equal to "Not_Used"

then PAM shall:
- set DTC as long as STATUS_TTM.TrailerGenericFailSts is set to "Fail Present"
- take STATUS_TTM at last valid value read
- if at next key-on this fault persist, PAM shall follow the I/O Trailer
- if at next key-on the fault is not more present, PAM shall deactivate the DTC

1.13.3.25   ID 43.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:
- (BRAKE8.ESCFailSts equal to "Fail Present") AND (BRAKE8.BSMSysSts different from "Diagnosis mode")

OR

- (BRAKE8.ABSFailSts equal to "Fail Present") AND (BRAKE8.BSMSysSts different from "Diagnosis mode")

then PAM shall:
- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

1.13.3.26   ID 44.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:
- (C1_IGW1.TransmissionFailSts equal to "Fail Present") AND (Gear_Box_Type different from "MTX")

then PAM shall:
- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- set STATUS_PAM.SPMFailSts to "True" (not during the SPM manouvre)
- set SPM_STEER_CONTROL.SPMSystemFault to "True" (during the SPM manouvre)
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

1.13.3.27 ID 45.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:

- BRAKE1.VehicleSpeedVSOSig equal to "SNA"

OR

- BRAKE1.VehicleSpeedVSOSigFailSts equal to "Fail Present"

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore for HEALING_TIMEOUT.

1.13.3.28 ID 46.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:

- BODY2.ExternalTemperature equal to "SNA"

OR

- BODY2.ExternalTemperatureFailSts equal to "True"

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore for HEALING_TIMEOUT.

1.13.3.29 ID 47.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:

- ENGINE1.ReverseGearSts equal to "SNA"

OR

- ENGINE1.ReverseGearSts equal to "Not Used"

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore for HEALING_TIMEOUT.

1.13.3.30 ID 48.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when PAM receives:

- BRAKE4.VehicleStandStillSts equal to "SNA"

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore for HEALING_TIMEOUT.

1.13.3.31   ID 49.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", if (PROXI parameter Stop_And_Start is equal to "Present") AND (PROXI parameter Stop_And_Start_Type is equal to "CG Type"), when PAM receives:

- C1_IGW1.ESS_ENG_ST equal to "SNA"

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

The fault is devalidated when PAM doesn't detects this failure anymore for HEALING_TIMEOUT.

1.13.3.32   ID 50.0 Description

In "Ignition_On" or "Ignition_On_EngOn", when PAM receives:

- WHEEL_SPEED.RHRWheelSpeed == "SNA"

   OR
- WHEEL_SPEED.LHRWheelSpeed == "SNA"

   OR
- WHEEL_SPEED.RHFWheelSpeed == "SNA"

   OR
- WHEEL_SPEED.LHFWheelSpeed == "SNA"

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

1.13.3.33   ID 51.0 Description

In "Ignition_On" or "Ignition_On_EngOn", when PAM receives:

- (C1_IGW1.ShiftLeverPosition equal to "SNA") AND (Gear_Box_Type different from "MTX")

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- set STATUS_PAM.SPMFailSts to "True" (not during the SPM manouvre)
- set SPM_STEER_CONTROL.SPMSystemFault to "True" (during the SPM manouvre)
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

1.13.3.34   ID 52.0 Description

In "Ignition_On" or "Ignition_On_EngOn", when PAM receives:

- EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault equal to "True"

then PAM shall:

- deactivate the system
- set STATUS_PAM.SPMControlSts to "Not_Active"
- STATUS_PAM.HMICode shall be set to "SPS_GUI_TEMPORARY_FAIL"
- perform recovery R3 (**SPS_RecoverableFault**)
- set DTC as long as failure persists, in according to "PAM - Diagnostic Requirements" document

1.13.4 EPS Diagnostic Requirements

1.13.4.1 ID 11.0 Description

SPM_STEER_CONTROL Message Absent Fault
- If the SPM_STEER_CONTROL message is absent **for one** cycle and the SPS-TOI is active, then EPS shall apply the column torque commanded in the previous message.
- If the SPM_STEER_CONTROL message is absent **for two** consecutive cycles, then EPS shall:
- close TOI within a time EPS_TOI_Rampdown
- log a DTC
- raise EPS_TORQUE_OVERLAY.SPM_TOI_Sts to "Recoverable"

The message absent fault is condition latched

1.13.4.2 ID 12.0 Description

Torque Limitation Check of SPM_STEER_CONTROL.TorqueOverlaySteeringReq_SPMsignal
This diagnostic shall be performed in SPM TOI ACTIVE state.
When Torque Limitation Check is NOT PASSED at first occurence, then EPS shall:
- no execute PAM steering request
- set DTC ignition latched

1.13.4.3 ID 13.0 Description

In "Ignition_On_Engine_On", when EPS receives:
- SPM_STEER_CONTROL.SPMSystemFault to "True" for 20ms
  AND
- SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM is still set "Active"

then EPS shall perform the following actions:
- set DTC ignition latched
- change TOI state as described in TOI state machine

1.13.4.4 ID 14.0 Description

In"Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **ENGINE1_CRC_Fail** for a time greater or equal of "Tcrc", then it shall:
- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **ENGINE1_MC_Fail** for a time greater or equal of "Tmc", then it shall:
- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **BCM_COMMAND_CRC_Fail** for a time greater or equal of "Tcrc", then it shall:
- If [**EPS_CRC_MCFailSts.Info** is set to (ENGINE1_CRC_Fail **OR** ENGINE1_MC_Fail) **OR** the EPS node doesn't receive the "ENGINE1" message], then:
    - set a specific DTC to present according to the "EPS Diagnostic Requirement" document.
    - vehicle operative condition is not passed
- If the EPS receives correctly the message "ENGINE1", then:
    - set a specific DTC to present according to the "EPS Diagnostic Requirement" document.

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **BCM_COMMAND_MC_Fail** for a time greater or equal of "Tmc", then it shall:
- If [**EPS_CRC_MCFailSts.Info** is set to (ENGINE1_CRC_Fail **OR** ENGINE1_MC_Fail) **OR** the EPS node doesn't receive the "ENGINE1" message], then:
    - set a specific DTC to present according to the "EPS Diagnostic Requirement" document.
    - vehicle operative condition is not passed
- If the EPS receives correctly the message "ENGINE1", then:

- set a specific DTC to present according to the "EPS Diagnostic Requirement" document.

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **BRAKE1_CRC_Fail** for a time greater or equal of "Tcrc", then it shall:

- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **BRAKE1_MC_Fail** for a time greater or equal of "Tmc", then it shall:

- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **SPM_STEER_CONTROL_MC_Fail** for a time greater or equal of "Tmc", then it shall:

- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **SPM_STEER_CONTROL_CRC_Fail** for a time greater or equal of "Tcrc", then it shall:

- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **WHEEL_INFO_MC_Fail** for a time greater or equal of "Tmc", then it shall:

- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

In "Ignition_On" and "Ignition_On_Engine_On", the EPS receives internal signal **EPS_CRC_MCFailSts.Info** set to **WHEEL_INFO_CRC_Fail** for a time greater or equal of "Tcrc", then it shall:

- set a specific DTC to present according to the"EPS Diagnostic Requirement" document.
- vehicle opertive condition is not passed

1.13.4.5 ID 16.0 Description

BSM and IWSS Vehicle Speed Signal Mismatch Check
This section shall be scheduled on the receipt of a new BRAKE1 message when PAM state is ACTIVE.
Default state of **BSM and IWSS Vehicle Speed Signal Mismatch Check** is PASSED.
EPS shall calculate vehicle speed from signals coming from BSM in an independent way with respect to the one sent by the BSM on CAN
IWSS COMPUTED SPEED =
(WHEEL_INFO.LHRFastPulseCounter- *previous*WHEEL_INFO.LHRFastPulseCounter +
WHEEL_INFO.RHRFastPulseCounter - *previous* WHEEL_INFO.RHRFastPulseCounter) *
WheelCircumference*3.6/ (100*WHEEL_TURN_PULSE_COUNT*2)
If there is a mismatch between the vehicle speed coming from BSM and that one calculated from EPS (as described above) according to the following formula:

- BRAKE1.VehicleSpeedVSOSig is lower than V_{msm1} **AND** IWSS COMPUTED SPEED is greater than V_{msm2} for T_Vspd_mismatch **OR**
- BRAKE1.VehicleSpeedVSOSig is lower than V_{msm3} **AND** IWSS COMPUTED SPEED is greater than V_{msm4} for T_Vspd_mismatch

If the check is true then EPS shall:

- a DTC shall be set
- **BSM and IWSS Vehicle Speed Signal Mismatch Check** is set to **NOT PASSED**
- EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault at TRUE for the remainder of the keyON cycle

1.13.4.6 ID 20.0 Description

In "Ignition_On_Engine_On", when EPS detects the following condition:

- EPS_TORQUE_OVERLAY.EPSHandsOnRecognition is set to "TRUE" continuously for Tfilter3
  AND
- SPM_STEER_CONTROL.TorqueOverlayIntActivation_SPM is still set "ACTIVE"

then EPS shall:

- close TOI within a time EPS_TOI_Rampdown

- set DTC ignition latched
- set fault signal according to the state machine

1.13.4.7 ID 21.0 Description

When EPS detects that EPSInternalFail.Info is faulted, then EPS shall perform the actions:
- change TOI state as described in TOI state machine
- set DTC as long as faults persists

1.13.4.8 ID 23.0 Description

Actual Vehicle Longitudinal Movement and SPM Computed Movement Mismatch Check
This section shall be scheduled on the receipt of a new WHEEL_INFO message when PAM state is ACTIVE.
The aim of the following checks is to compare the longitudinal movement estimated by PAM with reverse gear signal coming from the ECM, and the vehicle speed and wheel spin direction signals coming from the BSM
The first two checks involve the "Backward" manoeuvre phases and the last two checks the "Forward" manoeuvre phases.
IF
[SPM_STEER_CONTROL.ManoeuvrePhase is equal to "Backward" **AND**
(ENGINE1.ReverseGearSts is equal to "Inserted" AND BRAKE1.VehicleSpeedVSOSig > V_{rev} AND IWSS Computed Spin is NOT Backward)]
OR
[SPM_STEER_CONTROL.ManoeuvrePhase is equal to "Backward" **AND**
(ENGINE1.ReverseGearSts is equal to "NOT Inserted" AND BRAKE1.VehicleSpeedVSOSig > V_{rev})]
OR
 [SPM_STEER_CONTROL.ManoeuvrePhase is equal to "Forward" **AND**
(ENGINE1.ReverseGearSts is equal to "NOT Inserted" AND BRAKE1.VehicleSpeedVSOSig > V_{rev} AND IWSS Computed Spin is NOT Forward)]
OR
[SPM_STEER_CONTROL.ManoeuvrePhase is equal to "Forward" **AND**
(ENGINE1.ReverseGearSts is equal to "Inserted" AND BRAKE1.VehicleSpeedVSOSig > V_{rev})]

continuously for T_DIAG_1 then the deactivation conditions for SPS are met:

- set a DTC
- EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault at TRUE

1.13.4.9 ID 24.0 Description

In "Ignition_On_Engine_On", when EPS detects that **Reverse Gear Disengagement Condition** is **NOT PASSED**, then EPS shall:
- change TOI State according to TOI state machine
- set a DTC in according to "PAM - Diagnostic Requirements" document

1.13.4.10   ID 25.0 Description

Excessive Vehicle Speed Check
This section shall be scheduled on the receipt of a new BRAKE1 message when EPS state is ACTIVE.
Default state of **Excessive Vehicle Speed Check** is PASSED.
- BRAKE1.VehicleSpeedVSOSig is greater than V_{exc} for T_DIAG_25
If it's true, then EPS shall:
- set EPS_TORQUE_OVERLAY.SPMTorqueOverlayFault to TRUE

1.13.4.11   ID 27.0 Description

1.13.4.11.1 *INCORRECT PAM ACTIVATION in INACTIVE state*

When EPS checks that **Handshake procedure** is NOT PASSED, then EPS shall:

- set a DTC ignition latched

1.13.4.12   ID 28.0 Description

If during the whole ignition cycle, the EPS receives internal signal "EPS_OperationalModeSts.Info" set to "**SNA**" **OR** "different value respect that indicated in the Ignition Working Condition Table", then:
- if INT.Info is set to "Active", then:
  - if the BRAKE1.VehicleSpeedVSOSig is greater than $v_{recharge}$, then:
    - EPS shall continue to provide the assistance
    - set a specific DTC to present according to the"EPS Diagnostic Requirement" document
  - if the BRAKE1.VehicleSpeedVSOSig is lower or equal to $v_{recharge}$, then:
    - EPS shall not provide the assistance
    - set a specific DTC to present according to the"EPS Diagnostic Requirement" document
- else if INT.Info is set to "Not_Active" then
  - EPS shall jump into **SPM TOI OFF state**

1.13.5 ICS diagnostic requirements

1.13.5.1 ID 300.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when ICS detects that CAN Node 24 is set to Present AND doesn't receive STATUS_PAM message for the period DTC_ICS, then ICS shall:
- set DTC as long as Missing Message occurs, according to "ICS - Diagnostic Requirements" document
- set Park_Assist_Light.Cmd to the previous value as long as Missing Message occurs.

In "Ignition_On" or "Ignition_On_Engine_On", as soon as ICS doesn't detect this failure anymore, then ICS shall heal the DTC according to "ICS - Diagnostic Requirements" document

1.13.5.2 ID 301.0 Description

In "Ignition_On" or "Ignition_On_Engine_On", when ICS detects that CAN Node 24 is set to Present AND when ICS receives STATUS_PAM.SPM_LedControlSts equal to "SNA" for the period DTC_ICS, then ICS shall:
- set DTC as long as failure persists according to "ICS - Diagnostic Requirements" document
- set Park_Assist_Light.Cmd to the previous value until ICS receives a valid value different from "SNA"

In "Ignition_On" or "Ignition_On_Engine_On", as soon as ICS doesn't detect this failure anymore, then ICS shall heal the DTC according to "ICS - Diagnostic Requirements" document

1.14 Configuration Parameters

1.14.1 Configuration Parameters Table

ID	Parameter Name	First Trial Value	Range Value	Resolution	Unit	Component	Implementation	XCP Availability	Impact	Parameter Description

1	T1	**	**	**	**	IPC	SUPPLIER _EOL_2	N.A.	N.A.	T plausibility of FAULT indications. See IPC specs for parameter definition. (HMICode n° 59 ,61 ,62 ,68)
9 0 2	Tyre_Size	**	**	**	**	PAM EPS	PROXI	N.A.	N.A.	The parameter indicates the average mean value beetwen possible tyres types
9 0 3	Driver_Side	**	**	**	**	PAM	PROXI	N.A.	N.A.	The parameter indicates where the driver side is placed
9 0 0	CAN node 24 (PAM)	**	**	**	**	IPC ICS	PROXI	N.A.	N.A.	It indicates if the node is present or not. See PROXI document for parameter definition.
9 0 1	Semi_Automatic_Par king_System	**	**	**	**	IPC	PROXI	N.A.	N.A.	Necessary to indicate if Semiautom atic parking is present or not.See PROXI document for parameter definition.

904	Stop_And_Start	**	**	**	**	PAM	PROXI	N.A.	Diagnosis	Configuration parameter needed to enable specific S&S strategies.See PROXI document for parameter definition.
905	Stop_And_Start_Type	**	**	**	**	PAM	PROXI	N.A.	Diagnosis	Configuration parameter needed to enable specific logics for each S&S variant. See PROXI document for parameter definition.
906	Vehicle_Line_Configuration	**	**	**	**	PAM	PROXI	N.A.	Diagnosis	Configuration parameter needed to select proper parameter set for each vehicle model
907	CAN Node 50 (ICS)	**	**	**	**	BCM	PROXI	N.A.	Diagnosis	Configuration parameter needed to enable communication with ICS

9 0 8	Steering_Ratio_Rack_Pinion_Type	**	**	**	**	PAM	PROXI	N.A.	N.A.	The parameter indicates the type steering ratio available and selects the proper calibration set
9 0 9	CAN Node 63 TTM	**	**	**	**	PAM	PROXI	N.A.	N.A.	The parameter indicates absence/presence of TTM
9 1 0	Gear_Box_Type	**	**	**	**	PAM IPC	PROXI	N.A.	N.A.	This is the parameter that the PAM and IPC shall be used to know if it is present manual or automatic transmission.
9 1 1	PAM_STUCK_TIMEOUT	5	[0;10]	1	s	PAM	SUPPLIER_EOL_2	No	N.A.	
2	IPC_PULLOUT_TIMEOUT	**	**	**	**	IPC	SUPPLIER_EOL_2	N.A.	N.A.	Filter time to disable pull out selection
3	MSG_TIMEOUT_A	4	[0;10]	0.5	s	PAM	SUPPLIER_EOL_2	No	N.A.	
4	MSG_TIMEOUT_B	2.5	[0;10]	0.5	s	PAM	SUPPLIER_EOL_2	No	N.A.	
5	HEALING_TIMEOUT	2.5	[0;10]	0.5	s	PAM	SUPPLIER_EOL_2	No	N.A.	
6	WAIT_TIME	300	[0;1000]	100	ms	BCM	SUPPLIER_EOL_2	No	N.A.	
1 0	PAM_LED_BLINK_DUTY	50	[0;100]	50	%	ICS	DEFINE	No	N.A.	Duty cycle of LED blinking
1 1	PAM_LED_BLINK_FREQ	2	[0;10]	2	Hz	ICS	SUPPLIER_EOL_2	No	N.A.	Frequency of LED blinking
1 2	PAM_LED_BLINK_TIME	5	[0;10]	1	s	PAM	SUPPLIER_EOL_2	No	N.A.	Time of LED blinking

13	PULLOUT	**	**	**	**	IPC	SUPPLIER_EOL_2	No	N.A.	The parameter indicates the presence or absence of the Pullout feature. Refer to IPC specification for further information.
31	DTC_ICS	2500	[0 ÷ 5000]	100	ms	ICS	SUPPLIER_EOL_2	No	N.A.	Time used to detect faults on ICS
1011	**v_UPA_ON**	15	[0;30]	1	km/h	PAM	DEFINE	No	N.A.	Vehicle speed threshold parameter
1022	**v_UPA_OFF**	18	[0;30]	1	km/h	PAM	DEFINE	No	N.A.	Vehicle speed threshold parameter
1033	**v_PSD_ON**	27	[0;30]	1	km/h	PAM	DEFINE	No	N.A.	Vehicle speed threshold parameter
1044	**v_PSD_OFF**	30	[0;30]	1	km/h	PAM	DEFINE	No	N.A.	Vehicle speed threshold parameter
1055	**v_ACC1**	-3	[0;30]	1	km/h	PAM	DEFINE	No	N.A.	Vehicle speed threshold parameter
1066	**v_ACC2**	3	[0;30]	1	km/h	PAM	DEFINE	No	N.A.	Vehicle speed threshold parameter
1099	**Xrev_MAX**	10	[0;30]	1	m	PAM	DEFINE	No	N.A.	Maximum lenght allowed to go in a backward move

111	**PTE_MAX**	0.3	[0;10]	0.1	m	PAM	DEFINE	No	N.A.	Displacement between the center of the vehicle rear axle and the planned path
114	**TimeThreshold1**	1	[0;10]	1	s	PAM	DEFINE	No	N.A.	Timeout threshold parameter
115	**TimeThreshold2**	600	[0;1000]	1	s	PAM	DEFINE	No	N.A.	Timeout threshold parameter
116	**TimeThreshold3**	120	[0;1000]	1	s	PAM	DEFINE	No	N.A.	Timeout threshold parameter
117	**TimeThreshold4**	8	[0;10]	1	s	PAM	DEFINE	No	N.A.	Timeout threshold parameter
118	**TimeThreshold5**	180	[0;1000]	1	s	PAM	DEFINE	No	N.A.	Timeout threshold parameter
119	**TimeThreshold6**	5	[0;10]	1	s	PAM	DEFINE	No	N.A.	Timeout threshold parameter
120	**TimeThreshold7**	3	[0;10]	1	s	PAM	DEFINE	No	N.A.	The value is related to HMI System Diagram
121	v_SA1_ON	5	[0;10]	0.1	km/h	PAM	DEFINE	No	N.A.	Speed threshold parameter
122	v_SA1_OFF	7	[0;10]	0.1	km/h	PAM	DEFINE	No	N.A.	Speed threshold parameter
300	TORQUE_DRIVER	3,5	[-5;5]	0,1	Nm	EPS	SUPPLIER_EOL_2	No	Yes	Torque threshold for hands on recognition
301	TORQUE_DRIVER_QTIME	100	[0;150]	10	ms	EPS	SUPPLIER_EOL_2	No	Yes	Qualification time for hands on check
302	Rhmax	200	[0;500]	10	Nm/s	EPS	SUPPLIER_EOL_2	No	Yes	Slew rate threshold
303	Fhmax	5	[0;5]	0,1	N	EPS	SUPPLIER_EOL_2	No	Yes	Torque threshold

304	WHEEL_TURN_PULSE_COUNT	96	[0;100]	1	-	EPS	DEFINE	No	N.A.	Number of tooths per wheel revolution
305	EPS_HANDSHAKE_Tfilter	50	[0;100]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
306	EPS_HANDSHAKE_Tcheck	40	[0;100]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
307	EPS_HANDSHAKE_Tcheck2	40	[0;100]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
308	$V_{recharge}$	6	[0;10]	1	km/h	EPS	SUPPLIER_EOL_2	No	Diagnosis	This is the vehicle speed threshold to use for giving assistance in case of "Recharge Status" information missing.
309	V_{msm1}	8	[0;10]	1	km/h	EPS	SUPPLIER_EOL_2	No	Diagnosis	
310	V_{msm2}	12	[0;12]	1	km/h	EPS	SUPPLIER_EOL_2	No	Diagnosis	
311	V_{msm3}	5	[0;10]	1	km/h	EPS	SUPPLIER_EOL_2	No	Diagnosis	
312	V_{msm4}	6	[0;10]	1	km/h	EPS	SUPPLIER_EOL_2	No	Diagnosis	
313	V_{rev}	5	[0;10]	1	km/h	EPS	SUPPLIER_EOL_2	No	Diagnosis	
314	V_{exc}	8	[0;10]	1	km/h	EPS	SUPPLIER_EOL_2	No	Diagnosis	
315	Tfilter3	100	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
316	T_Vspd_mismatch	300	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
317	TBackCheck	1000	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	

318	EPS_TOI_Rampdown	1000	[0;1000]	0.1	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
319	Tmc	40	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
320	Tcrc	40	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
321	T_DIAG_1	40	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
322	T_DIAG_2	40	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
323	T_DIAG_25	40	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
324	Trecoverable	40	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	Diagnosis	
325	Toff	1	[0;10]	1	s	EPS	SUPPLIER_EOL_2	No	N.A.	This is the time that TOI shall wait to exit OFF state
326	TCheckStandStill	800	[0;1000]	10	ms	EPS	SUPPLIER_EOL_2	No	N.A.	
327	T_DIAG_CRC	40	[0;1000]	10	ms	PAM	SUPPLIER_EOL_2	No	Diagnosis	
328	T_DIAG_MC	40	[0;1000]	10	ms	PAM	SUPPLIER_EOL_2	No	Diagnosis	
329	TReverseGear	400	[0;1000]	10	ms	PAM	SUPPLIER_EOL_2	No	N.A.	
330	REVERSE_FILTER	300	[0;1000]	10	ms	PAM	SUPPLIER_EOL_2	No	N.A.	Filter time used to filter out any spikes on the ShiftLever Position signal

The symbol "**" means: "See column Parameter Description".

1.14.2 Configuration Parameters Table Description

1.14.2.1 PAM requirements

1.14.2.1.1   ID 902 Description

PAM shall use this parameter to calculate WheelCircumference internal variable.

1.14.2.1.2   *ID 903 Description*

When PAM receives Driver_Size with a valid enumeration, then PAM shall adjust internal algorithms to perform the proper trajectory planning during parking manoeuvres.

1.14.2.1.3   *ID 904 Description*

When PAM receives Stop_And_Start to "Present", then PAM shall enable S&S and monitoring strategies as described in *ID 905 Description*
When PAM receives Stop_And_Start to "Not Present", then PAM shall disable S&S and monitoring strategies as described in *ID 905 Description*

1.14.2.1.4   *ID 905 Description*

When PAM receives Stop_And_Start_Type to "FGA Type", then PAM shall:
enable S&S and monitoring strategies of the following signals
- ENGINE1.EngineStopStartSts
- ENGINE1.StopStartSts

disable S&S and monitoring strategies of the following signals
- C1_IGW1.ESS_ENG_ST

When PAM receives Stop_And_Start_Type to "CG Type", then PAM shall:
disable S&S and monitoring strategies of the following signals
- ENGINE1.EngineStopStartSts
- ENGINE1.StopStartSts

enable S&S and monitoring strategies of the following signals
- C1_IGW1.ESS_ENG_ST

1.14.2.1.5   *ID 909 Description*

When PAM receives CAN Node TTM set to "Present", then PAM shall enable logics and monitoring of STATUS_TTM message
When PAM receives CAN Node TTM set to "Not Present", then PAM shall disable logics and monitoring of STATUS_TTM message

1.14.2.1.6   *ID 910 Description*

When PAM receives Gear_Box_Type set to "MTX", then PAM shall:
- set the RWG variable to "ENGINE1.ReverseGearSts"
- when (ENGINE1.ReverseGearSts == "Inserted"), then PAM consider valid, the signal named ENGINE1.ReverseGearSts, immediately

When PAM receives Gear_Box_Type set to "ATX", then PAM shall:
- set the RWG variable to "C1_IGW1.ShiftLeverPosition"
- when (C1_IGW1.ShiftLeverPosition == R), then PAM consider valid, the signal named C1_IGW1.ShiftLeverPosition, only after a time equal to TReverseGear
- IF the signal C1_IGW1.ShiftLeverPosition becomes equal to "No_Selection_Active_Or_Available" for less than REVERSE_FILTER,
  THEN
  PAM shall consider the last known value as valid.

When PAM receives Gear_Box_Type set to "MTA", then PAM shall:
- set the RWG variable to "C1_IGW1.ShiftLeverPosition"
- when (C1_IGW1.ShiftLeverPosition == R), then PAM consider valid, the signal named C1_IGW1.ShiftLeverPosition, only after a time equal to TReverseGear

- IF the signal C1_IGW1.ShiftLeverPosition becomes equal to "No_Selection_Active_Or_Available" for less than REVERSE_FILTER,
THEN
PAM shall consider the last known value as valid.

When PAM receives Gear_Box_Type set to "DDTC", then PAM shall:
- set the RWG variable to "C1_IGW1.ShiftLeverPosition"
- when (C1_IGW1.ShiftLeverPosition == R), then PAM consider valid, the signal named C1_IGW1.ShiftLeverPosition, only after a time equal to TReverseGear
- IF the signal C1_IGW1.ShiftLeverPosition becomes equal to "No_Selection_Active_Or_Available" for less than REVERSE_FILTER,
THEN
PAM shall consider the last known value as valid.

1.14.2.2 EPS requirements

1.14.2.2.1   ID 902 Description

When EPS receives Tyre_Size with a valid value, then EPS shall adjust WheelCircumference internal variable.

1.15 Wake Up Stay Active

1.15.1 Wake Up and Stay Active Event Table

ID	Signal Name	Event Type	Component Awoken / Waking up	Wake up Type	Waking Up Functionality
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

1.15.2 Wake Up and Stay Active Event Table Description

Not Applicable.

1.16 Acronyms and Glossary

P_ph:	Parking Phase - (See figure 2)
PSD:	Parking Slot Detection
PSM:	Parking Slot Measurement
RWG:	Reverse Gear
SA:	Steering Active
SPS:	Semiautomatic Parking System
UPA:	Ultrasonic Parking Aid (Rear&Front Parking Aid)
Vspd:	BRAKE1.VehicleSpeedVSOSig

1.17 Reference Documents

IPC - System Technical Specification
PAM - System Technical Specification
PAM - Diagnostic Requirement
EPS - System Technical Specification