Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Electrical Sound Enhancement

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.2

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Version Date: October 27, 2017

FORD CONFIDENTIAL

Revision History

Date	Ver	Notes
April 8, 2016	**1.0**	**Draft Release**
June 13, 2016	**1.1**	**Release**
	ESE-FRD-REQ-093362/C-Electrical Sound Enhancement	sberg15: updated structure to BOA4.0 feature based structure. No content change!
	ESE-FUR-REQ-166857/B-ESE CAN input signals (BoA4.0)	2016-05-24 OKIRSTEI: "MD-REQ-166843/A-EngineTorqueOut_Qf","MD-REQ-166844/A-EngineTorqueOut_St" removed, not available on NON-HYBRIDS; 2016-05-31 OKIRSTEI: added DriveMode2_St to follow the new strategy, DirveMode_St removed; 2016-06-02 OKIRSTEI: MD-REQ-223030/A-VehicleSpeed_St added, MD-REQ-223031/A-VehicleLongitudialAcceleration_St added; 2016-06-06 OKIRSTEI: added MD-REQ-224894-ExhaustMode_St
	REQ-114748/D-Byte 1 - Bodystyle	"2016-06-01 OKIRSTE: added 0x3B
	REQ-114751/D-Byte 4 - Steering Wheel Position	2016-05-25 OKIRSTEI: added 0xFF = ANY to allow undependet SWP EQs
October 27, 2017	**1.2**	**Release**
	ESE-REQ-205832/B-ESE Boundary View (BoA4.0)	2017-01-16 OKIRSTEI: added RCM with Vehicle_Longitunal Accelaration, added Accelatration Server and its connection to the AudioDSP , added signal name to diagram
	REQ-128322/C-E01B - Control Module Calibration Data #2 (ANC/ESE)	2017-05-03 KJACK174: add "& ESE/ANC = activated" to associated configuration
	REQ-114769/C-C100 - LostCom 0x167, 0x204, 0x3B2 (CRANK) (Engine)+	2016-10-25 OKIRSTEI: added Signal Reference for 0x167, added 0x3B2-Ignition_Status, added 0x204-EngAout_N_Actl and 0x167-TrnAin_Tq_Actl for ESE & ANC
	REQ-114769/D-C100 - LostCom 0x167, 0x204 (CRANK) (Engine)	2017-05-22 KJACK174: remove 0x3B2 as it is now part of DTC C142
	ESE-IR-REQ-018086/C-ROUTINE 0x601C "Transfer Function Test tone" (TcSE ROIN-293182)	2017-04-20 KJACK174: updated Maximum Routine Run Time from 30000(ms) to 65000 (ms)
	REQ-203862/B-ESE Error Status (DID EE00)	2016-06-23 OKIRSTEI: added "Selected ANC profile incompatible reported by ANC component"; 2016-09-15 OKIRSTEI: Byte 0 renamed to Init/Runtine Status, add "0x03 ANC hard clip resolved" to Byte 0
	ESE-IR-REQ-018081/E-DID EE02 "ESE Profile Data" (TcSE ROIN-298086)	2017-05-23 KJACK174: Clarified Data Type for ESE Profile Name to ASCII; Changed CCC to DE06 for parameter "Active ESE Profile."
	REQ-115749/B-ECU Software #3 Part Number (DID F121) (Dirana3 firmware)	2016-09-01 OKIRSTEI: renamed to Dirana3 Firmware, Hifi2 core now in Part Number #5
	REQ-127205/C-ECU Cal-Config #2 Part Number (DID F16B) ESE profile	2017-04-20 KJACK174: add DTC link information
	MD-REQ-223031/B-VehicleLongitudialAcceleration_St	2016-08-16 OKIRSTEI: correct MAX value, -41.890 to +41.890
	REQ-114731/D-DE06 - DSP Config	2016-06-23 OKIRSTEI: added 32 bytes for SelectableDriveModes
	REQ-114747/C-Byte 0 - Carline+	2016-10-06 OKIRSTEI: removed "other value are rejected"
	REQ-114747/D-Byte 0 - Carline	2016-12-08 OKIRSTEI: added D0=BX726, D1=CX482, "All not listed values shall also be accepted."
	REQ-114748/E-Byte 1 - Bodystyle+	2016-09-30 OKIRSTEI: added 0xF1, 0xF2, 0xF3 for C519 4dr, 5dr & Wagon with Pano Roof; 2016-10-06 OKIRSTEI: removed "all other values reject"
	REQ-114748/F-Byte 1 - Bodystyle+	2016-12-08 OKIRSTEI: added "All not listed values shall also be accepted."
	REQ-114748/G-Byte 1 - Bodystyle	2017-04-20 KJACK174: added 0x0A Shuttle Bus M1 CA-LP
	REQ-114749/C-Byte 2 - Speaker Config	2017-05-05 OKIRSTEI: added 0xFF ANY as wildcard: to allow e.g. 4 Front and 6 (4Front+2Rear) to use same EQ
	REQ-114750/D-Byte 3 - Branding	2017-05-04 OKIRSTEI: added 0xFF ANY as wildcard to allow using same Sound EQ but different ESE profiles for e.g. ST or Vignale

REQ-114752/D-Byte 5 - EQ Special Modes+	2016-12-08 OKIRSTEI: renamed "Flashed EQ File used" to "Force flashed file, DTC will not be set", added DTC will be set on missmatch; 2016-12-09 OKIRSTEI: added linked DTC information, added DTC will never be set where applicable
REQ-114752/E-Byte 5 - EQ Special Modes	2017-04-19 KJACK174: correct typo E10A to E01A (4x)
REQ-114753/F-Byte 6 - Engine+	2016-07-26 OKIRSTEI: added 0xA1 1.5L DV NEO TC DI DSL C (EN-BE); 2016-08-19 OKIRSTEI: added 0xA2 2.0L TIVCT GTDI T/C (ST275 only); 2016-08-23 OKIRSTEI: added 0xA3 2.3L DOHC DISI T/C GAS (RS370 engine)
REQ-114753/G-Byte 6 - Engine+	2016-11-08 OKIRSTEI: 0x3A removed EN-YY, add 0xDA for 1.0L 12V DI TC I3 GAS FOX B <140PS> EN-YY , add 0xDB for 1.1L FOX 12V TI-VCT I3 GAS B <85PS> EN-XY, add 0xDC for 1.1L FOX 12V TI-VCT I3 GAS <70PS> EN-XP; 2016-12-08 OKIRSTEI: added "All not listed values shall also be accepted."
REQ-114753/H-Byte 6 - Engine	2017-05-05 OKIRSTEI: MFC corrected 0x64 2.3L 4V TIVCT DI TC 350 PS GAS EN-YU ---> EN-YV; Add Engine 0x11 EN-N3 "2.3L 4V TIVCT DI TC 270 HP GAS<2.3L GTDI 280 PS Gasoline>" ST , 0xDF EN-BC "2.0L CR TC DSL PANTHER D<2.0L Panther190PS>" ST Diesel , 0xDD EN-M0 "1.0L TC GAS NEW FOX C" to DE06 0x7D EN-S7 - 2.5L DOHC PFI 4 CYL GAS 0xD7 EN-Y2 1.5L DRAGON I3 TIVCT PFI GAS C <Dragon I3 1.5L PFI 120 PS> --> 0x4B EN-Y2 1.5L DRAGON I3 PFI GAS C (see CCC list 21)
REQ-114754/E-Byte 7 - Gearbox+	2016-09-23 OKIRSTEI: added 0x13 9 SPD AUTO TRANS 9F35 (TR-EZ)
REQ-114754/F-Byte 7 - Gearbox+	2016-11-08 OKIRSTEI: add 0xD0 5 SPD MAN TRANS GETRAG-5MX65 EN-EV; 2016-12-08 OKIRSTEI: added "All not listed values shall also be accepted."
REQ-114754/G-Byte 7 - Gearbox	2017-05-05 OKIRSTEI: improve value naming: 0x01 6 SPD MAN TRANS - VOLVO M66, 0x06 5SPD MAN TR/AX VOLVO M56, 0x07 5 SPD MAN TRANS A EAO MTX75, 0x10 6 SP MAN TRANS - MMT6 3 SHAFT / 6 SPD MAN TR/AX - MMT6, 0x11 5 SPD MAN TRANS A EAO B5/IB5; Add Transmission:TR-GM 0x73 "8 SPD AUTOMATIC TRANS 8F35", TR-PA 0x74 "AUTO TRANS - 8F40" , move: TR-E7 0x71 8 SPD AUTOMATIC TRANS 8F24 ---> TR-E7 0x14 "8 SPD AUTOMATIC TRANS 8F24" (see CCC list 21)
REQ-227101/A-Byte 8 - SelDrvMde1	Initial Version
REQ-227102/A-Byte 9 - SelDrvMde2	Initial Version
REQ-227103/A-Byte 10 - SelDrvMde3	Initial Version
REQ-227104/A-Byte 11 - SelDrvMde4	Initial Version
REQ-227105/A-Byte 12 - SelDrvMde5	Initial Version
REQ-227106/A-Byte 13 - SelDrvMde6	Initial Version
REQ-227107/A-Byte 14 - SelDrvMde7	Initial Version
REQ-227108/A-Byte 15 - SelDrvMde8	Initial Version
REQ-227118/A-Byte 16 - SelDrvMde9	Initial Version
REQ-227117/A-Byte 17 - SelDrvMde10	Initial Version
REQ-227116/A-Byte 18 - SelDrvMde11	Initial Version
REQ-227115/A-Byte 19 - SelDrvMde12	Initial Version
REQ-227114/A-Byte 20 - SelDrvMde13	Initial Version
REQ-227113/A-Byte 21 - SelDrvMde14	Initial Version
REQ-227112/A-Byte 22 - SelDrvMde15	Initial Version
REQ-227110/A-Byte 23 - SelDrvMde16	Initial Version
REQ-227135/A-Byte 24 - SelDrvMde17	Initial Version
REQ-227134/A-Byte 25 - SelDrvMde18	Initial Version
REQ-227133/A-Byte 26 - SelDrvMde19	Initial Version
REQ-227132/A-Byte 27 - SelDrvMde20	Initial Version

REQ-227131/A-Byte 28 - SelDrvMde21	Initial Version
REQ-227130/A-Byte 29 - SelDrvMde22	Initial Version
REQ-227129/A-Byte 30 - SelDrvMde23	Initial Version
REQ-227128/A-Byte 31 - SelDrvMde24	Initial Version
REQ-227127/A-Byte 32 - SelDrvMde25	Initial Version
REQ-227126/A-Byte 33 - SelDrvMde26	Initial Version
REQ-227125/A-Byte 34 - SelDrvMde27	Initial Version
REQ-227124/A-Byte 35 - SelDrvMde28	Initial Version
REQ-227123/A-Byte 36 - SelDrvMde29	Initial Version
REQ-227122/A-Byte 37 - SelDrvMde30	Initial Version
REQ-227121/A-Byte 38 - SelDrvMde31	Initial Version
REQ-123454/B-Byte 7 - ANC	2016-08-11 OKIRSTEI: added clarification of state when unconfigured, DTC reference added; 2016-09-30 OKIRSTEI: added heading for Bit7-5 "ANC - General", Microphone X renamed to ANC Microphone X
ESE-FUN-REQ-092666/B-ESE/ANC VBF-Structure	OKIRSTEI: update structure to reflect real usage: VBF-blocks usage, Profile/Config Database seperated from Profile data, as the profile data needs to be loaded in the Algorithm without any additional headers, Num Channels (nOut) removed

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1 Purpose of this section

Main use cases in the context of

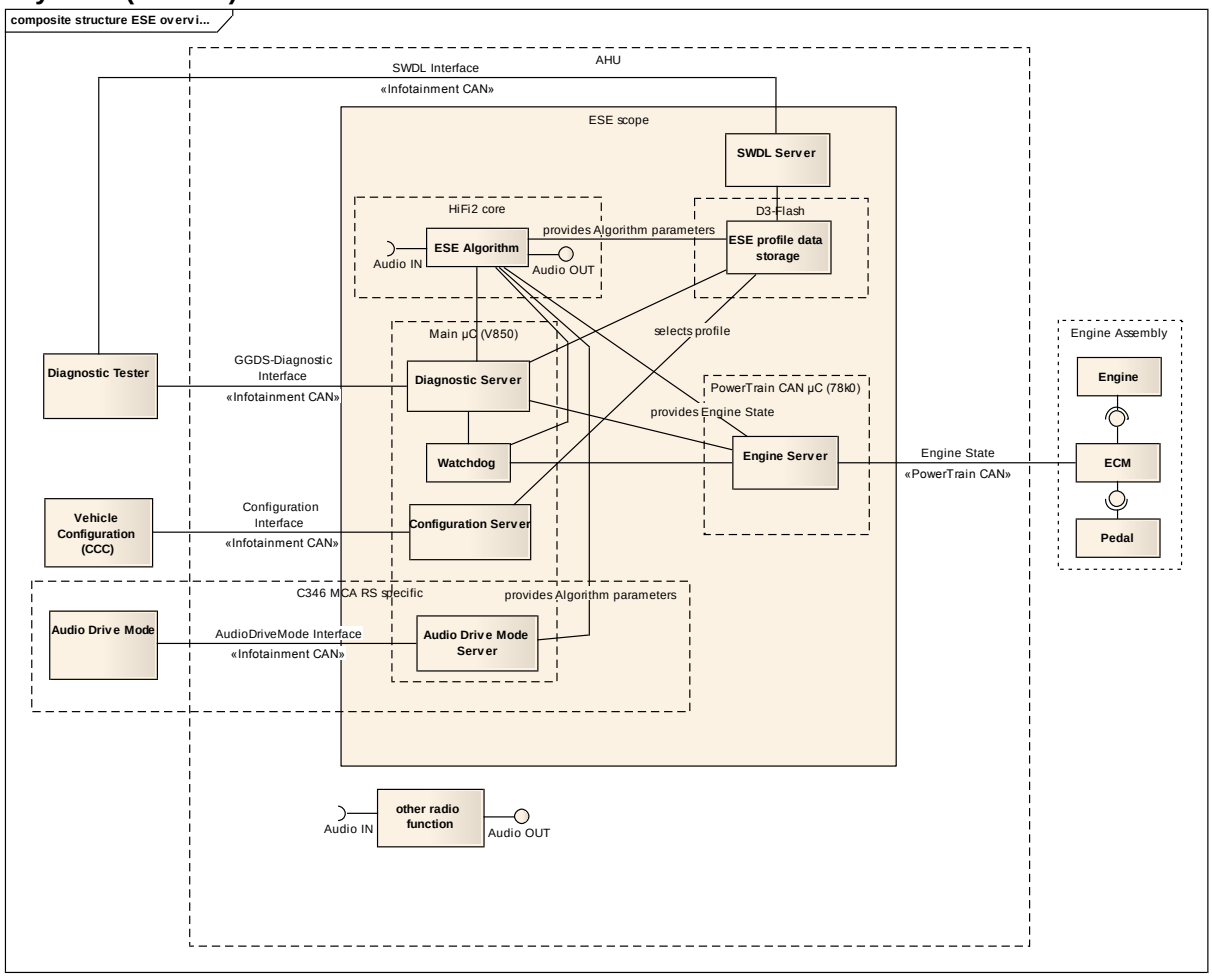
- ESE profile selection
- ESE profile handling
- ESE profile diagnostics
- ESE diagnostic interface

2 Architectural Design

2.1 Static Views

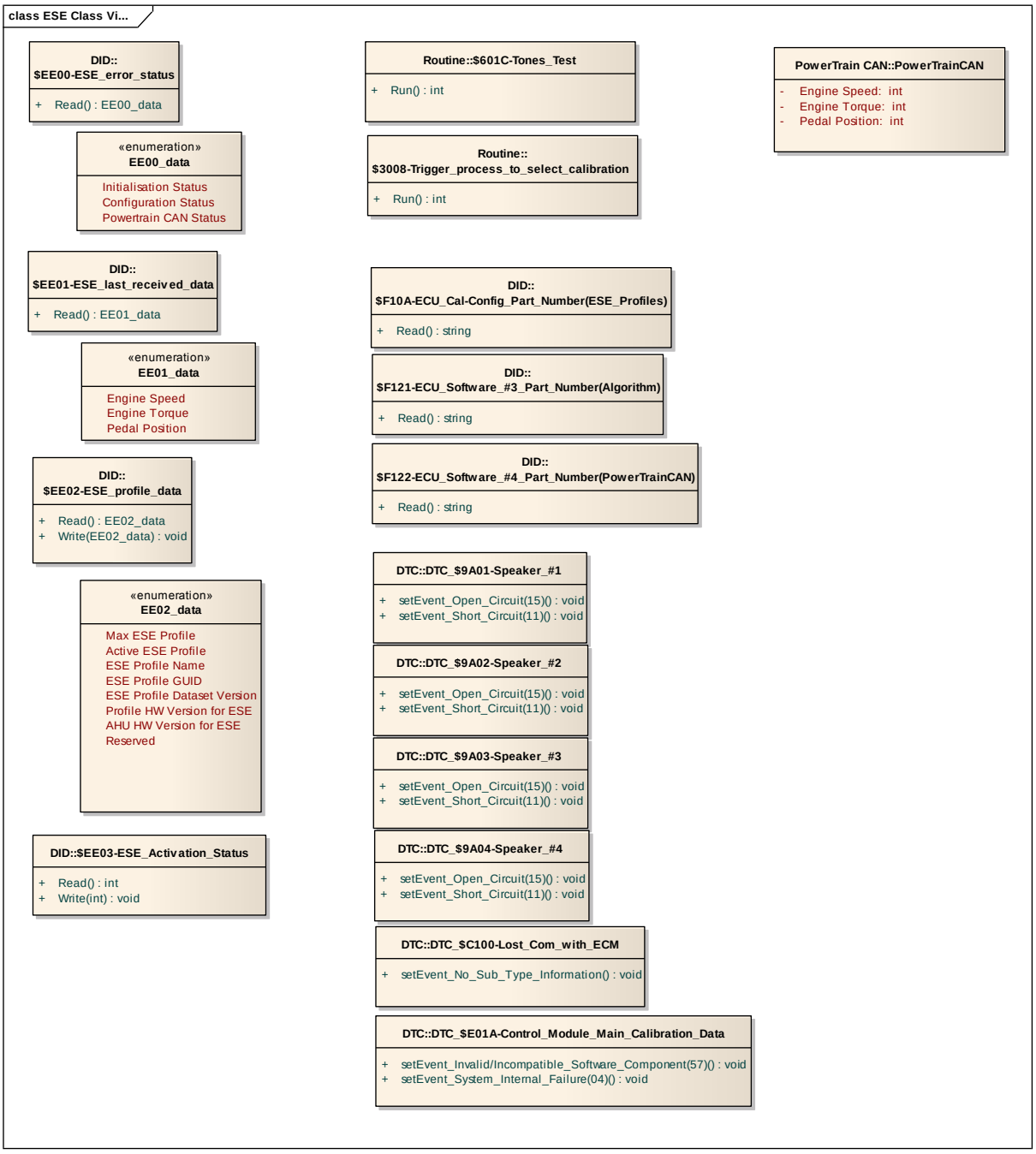
2.1.1 ESE-BD-REQ-092443/B-ESE Boundary View (C1MCA)

ESE Boundary View (C1MCA)



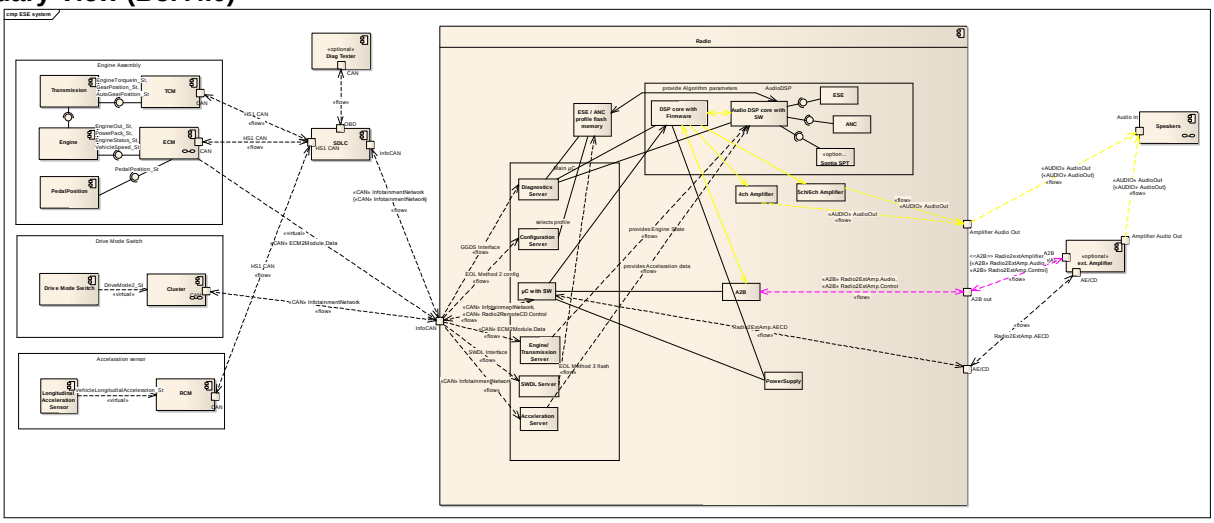
2.1.2 ESE-SV-REQ-092428/B-Class View

Class View



2.1.3 ESE-REQ-205832/B-ESE Boundary View (BoA4.0)

ESE Boundary View (BoA4.0)



2.2 Interface Requirements

2.2.1 Diagnostics

2.2.1.1 Fault Codes

2.2.1.1.1 REQ-128322/C-E01B - Control Module Calibration Data #2 (ANC/ESE)

DTC	Condition	DTC Trigger	Fault Action	Configuration Associated
E01B54 Missing Calibration	Key in Run. Voltage is between 10 and 16 volts.	ESE/ANC is missing configuration file or file is corrupted.	ESE/ANC functionality will be disabled.	ESE/ANC = present & ESE/ANC = activated
E01B57 Data Invalid/ Incompatible Software Component	Key in Run. Voltage is between 10 and 16 volts.	The installed ESE/ANC configuration is not compatible with config	ESE/ANC functionality will be disabled.	ESE/ANC = present & ESE/ANC = activated
E01B04 Data System Internal Failure	Key in Run. Voltage is between 10 and 16 volts.	Internal fault detected which prevents initializing ESE/ANC	ESE/ANC functionality will be disabled.	ESE/ANC = present & ESE/ANC = activated

2.2.1.1.2 REQ-114769/D-C100 - LostCom 0x167, 0x204 (CRANK) (Engine)

DTC	Condition	DTC Trigger	Fault Action	Configuration Associated
C10000	Last known Key in RUN. Voltage is between 10 and 16 volts. Last Known Ignition Stable Bit is Active.	Set when 0x167 is missing for more than five (5) seconds. (PwPackTq_D_Stat)	Radio will stop logging DTCs.	

C10000	Last known Key in RUN. Voltage is between 10 and 16 volts. Last Known Ignition Stable Bit is Active.	Set when 0x204 is missing for more than five (5) seconds. (EngAout_N_Actl)	ESE/ANC will be muted.	ESE present or ANC present
C10000	Last known Key in RUN. Voltage is between 10 and 16 volts. Last Known Ignition Stable Bit is Active.	Set when 0x167 is missing for more than five (5) seconds. (TrnAin_Tq_Actl)	ESE/ANC will be muted.	ESE present or ANC present

2.2.1.1.3 REQ-114761/B-9A01 - Left Front speaker

DTC	Condition	DTC Trigger	Fault Action	Configuration Associated
9A0111 – Short to Ground 9A0112 – Short to Battery 9A0113 – open 9A0101 – short across	Key in Run, ACC, or Delayed Acc. Voltage is between 10 and 16 volts.	ACM amp chip registers short to ground or short to battery.	ACM shuts down faulted Left Front speaker. Chimes will be unavailable in ACM.	Front Speaker = Internal Amp or Speaker1A2B = Speaker or Speaker and Tweeter

2.2.1.1.4 REQ-114762/B-9A02 - Right Front speaker

DTC	Condition	DTC Trigger	Fault Action	Configuration Associated
9A0211 – Short to Ground 9A0212 – Short to Battery 9A0213 – open 9A0201 – short across	Key in Run, ACC, or Delayed Acc. Voltage is between 10 and 16 volts.	ACM amp chip registers short to ground or short to battery.	ACM shuts down faulted Right Front speaker. Chimes will be unavailable in ACM.	Front Speaker = Internal Amp or Speaker2 A2B = Speaker or Speaker and Tweeter

2.2.1.1.5 REQ-114763/B-9A03 - Right Rear speaker

DTC	Condition	DTC Trigger	Fault Action	Configuration Associated
9A0311 – Short to Ground 9A0312 – Short to Battery	Key in Run, ACC, or Delayed Acc. Voltage is between 10 and 16 volts.	ACM amp chip registers short to ground or short to battery.	ACM shuts down faulted Right Rear speaker. Chimes will be unavailable in ACM.	Rear Speaker = Internal Amp or Speaker3 A2B = Speaker or Speaker and Tweeter

9A0313 – open 9A0301 – short across				

2.2.1.1.6 REQ-114764/B-9A04 - Left Rear speaker

DTC	Condition	DTC Trigger	Fault Action	Configuration Associated
9A0411 – Short to Ground 9A0412 – Short to Battery 9A0413 – open 9A0401 – short across	Key in Run, ACC, or Delayed Acc. Voltage is between 10 and 16 volts.	ACM amp chip registers short to ground or short to battery.	ACM shuts down faulted Left Rear speaker. Chimes will be unavailable in ACM.	Rear Speaker = Internal Amp or Speaker1 A2B = Speaker or Speaker and Tweeter

2.2.1.2 Routines

2.2.1.2.1 ESE-IR-REQ-092301/B-ROUTINE 0x3008 "Trigger process to select calibration"

Control Routine	0x3008
Control Routine Name	Trigger process to select calibration
Executable in Sessions	0x03
Security Levels Required to Run	0x03,
Routine Entry Criteria	ACU must be powered and in extended diag session. Level 3 security must be unlocked.
Routine Exit Criteria	Routine completes
Maximum Routine Run Time	200 (ms)
Can Restart While Running	no
Supported Sub Functions	0x01
Dependencies	ESE

This enables ESE and/or ANC feature, depends of module configuration.

2.2.1.2.2 ESE-IR-REQ-018086/C-ROUTINE 0x601C "Transfer Function Test tone" (TcSE ROIN-293182)

Control Routine	0x601C
Control Routine Name	Tones Test
Control Routine Description	Generates ESE calibration tones.
Executable in Sessions	0x03
Security Levels Required to Run	
Routine Entry Criteria	ACU must be powered and switched on or in Idle Mode (HMI switched off, CAN active). Notes: The radio can be switched on/off by writing with service 2E to PID $7215.
Routine Exit Criteria	Tones Test Completes. Receipt of RoutineControl with RoutineControlType = StopRoutine. Switch Radio Off
Maximum Routine Run Time	65000 (ms)
Can Restart While Running	no
Supported Sub Functions	0x01 0x02 0x03
Dependencies	ESE

Routine continues until completed as signaled by MBBM library.

2.2.1.3 Identifiers

2.2.1.3.1 REQ-128316/A-Engine RPM (F40C)

DID Number (Hex)	DID Description	DID Short Name	DID Size (Bytes)	Datatype
F40C	Engine RPM		2	Unsigned Numeric

DID Number (Hex)	Parameter Number	Parameter Description	Size (Bits)	Resolution	Offset	Minimum	Maximum	Units
F40C	0	Engine RPM	16	0.25	0	0	16383.75	Rpm

2.2.1.3.2 REQ-128317/A-Absolute Throttle Position (F411)

DID Number (Hex)	DID Description	DID Short Name	DID Size (Bytes)	Datatype
F411	Absolute Throttle Position		1	Unsigned Numeric

DID Number (Hex)	Parameter Number	Parameter Description	Size (Bits)	Resolution	Offset	Minimum	Maximum	Units
F411	0	Absolute Throttle Position	8	0.392156862745	0	0	100	%

2.2.1.3.3 REQ-203862/B-ESE Error Status (DID EE00)

Core DataIdentifier Information

DataIdentifier Value	0xEE00
DataIdentifier Name	ESE Error Status
DataIdentifier Size (bytes)	3
DataIdentifier Type	packeted
Dependencies	ESE
DataIdentifier Comments	If DTC E01B04 is set, the cause is shown in "Initialisation Status" OR in "Powertrain CAN status", if there is an internal error. If DTC E01B57 is set, the cause is shown in "Configuration Status" If DTC C100 is set, the cause is shown in "Powertrain CAN status". Error status may be shown if DTCs are not set, e.g. if ESE is not activated, or if ESE is muted due to a resolved CAN error this drive cycle.

Read Information (Service 0x22 - ReadDataByIdentifier)

Readable in Sessions	0x01,0x03

DataIdentifier Format Information

Byte	Parameter	Description/Format	R/W
0	Init/Runtime Status	0x00 No Initialisation Error 0x01 Internal DSP Error 0x02 Internal ESE Algorithm Error 0x03 ANC hard clip resolved	R
1	Configuration Status	0x00 No ESE Configuration Error 0x01 No ESE Profiles Installed 0x02 ESE Profile Manually Selected 0x03 No ESE Profiles compatible with Vehicle Configuration 0x04 Selected ESE profile has CRC error 0x05 Selected ESE profile has wrong data version 0x06 Selected ESE profile has wrong HW/SW Version 0x07 Selected ANC profile incompatible reported by ANC component	R
2	Powertrain CAN Status	0x00 No CAN Error 0x01 Internal CAN error detected 0x02 Excessive missed messages 0x03 Resolved External CAN Error, but ESE still muted until conditions to unmute ESE are satisfied.	R

2.2.1.3.4 ESE-IR-REQ-092308/B-DID EE01 "ESE Last Received Data"

Core DataIdentifier Information

DataIdentifier Value	0xEE01
DataIdentifier Name	ESE Last Received Data
DataIdentifier Size (bytes)	6
DataIdentifier Type	packeted
DataIdentifier Comments	Reports the raw values most recently received on powertrain CAN Engine speed is in steps of 2 RPM Torque has +500NM Offset Pedal position 0x0 = 0%, 0x3FF = 102.3%

Read Information (Service 0x22 - ReadDataByIdentifier)

Readable in Sessions	0x01,0x03

DataIdentifier Format Information

Byte	Parameter	Description/Format					R/W
0-1	Engine Speed	Offset 0	Resolution 2	Units RPM	Min Scaled Value 0	Max Scaled Value 131070	R
2-3	Engine Torque	Offset -500	Resolution 1	Units NM	Min Scaled Value -500	Max Scaled Value 65035	R
4-5	Pedal Position	Offset 0	Resolution 0.1 (1/10)	Units %	Min Scaled Value 0	Max Scaled Value 6553.5	R

Note: This date is linked to the received frames on the PowerTrain CAN.

2.2.1.3.5 ESE-IR-REQ-018081/E-DID EE02 "ESE Profile Data" (TcSE ROIN-298086)

Core DataIdentifier Information

DataIdentifier Value	0xEE02

DataIdentifier Name	ESE Profile Data
DataIdentifier Size (bytes)	53
DataIdentifier Type	packeted
DataIdentifier Comments	DID EE02 reports active ESE configuration data and allows manual override. Only Active ESE profile parameter is writeable, to manually select a profile number or mute for development/test purposes. restart required to apply change in profile or mute. Change is persistant across cold starts. ESE configuration info is shown even when ESE is not activated.

Read Information (Service 0x22 - ReadDataByIdentifier)

Readable in Sessions	0x01,0x03

Write Information (Service 0x2E - WriteDataByIdentifier)

Writeable in Sessions	0x03
Security Levels Required to Write	0x03

DataIdentifier Format Information

Byte	Parameter	Description/Format	R/W
0	Max ESE Profile	Amount of profile found in the flashed Profile file.	R
1	Active ESE Profile	Write 0x01...max - manually select profile. Write 0x00 - mute Write 0xFF - Restore DE06 selection	R/W
2-17	ESE Profile Name	ESE sound design project name (ASCII)	R
18-37	ESE Profile GUID	GUID of ESE sound design project name	R
38-41	ESE Profile Dataset Version		R
42	Profile HW Version for ESE	Property of the active profile	R
43	AHU HW Version for ESE	Property of the AHU. Add this value to STP measurement data	R
44-52	Reserved		R

2.2.1.3.6 REQ-203863/A-ESE activation status (DID EE03)

Core DataIdentifier Information

DataIdentifier Value	0xEE03
DataIdentifier Name	ESE Activation Status
DataIdentifier Size (bytes)	1
DataIdentifier Type	State Encoded
Dependencies	ESE
DataIdentifier Comments	This DID reports activation status of the ESE feature and allows deactivation of the feature. Activation is supported,but it is recommended to use the Activation Routine 3008.

Read Information (Service 0x22 - ReadDataByIdentifier)

Readable in Sessions	0x01,0x03

Write Information (Service 0x2E - WriteDataByIdentifier)

Writeable in Sessions	0x03
Security Levels Required to Write	0x03

DataIdentifier Format Information

Byte	Parameter	Description/Format	R/W
0	ESE Activation Status	0x00 - Deactivated 0x01 - Activated	R/W

(Write is Security Level 3 protected)

If activation does fail DTC 0xE01B "Control Module Main Calibration Data" ALIAS "ESE calibration DTC" is raised.

2.2.1.3.7 REQ-115749/B-ECU Software #3 Part Number (DID F121) (Dirana3 firmware)

PID Number (Hex)	PID Description	PID Short Name	PID Size (Bytes)	Type
F121	ECU Software #3 Part Number		24	ASCII

2.2.1.3.8 REQ-127205/C-ECU Cal-Config #2 Part Number (DID F16B) ESE profile

PID Number (Hex)	PID Description	PID Short Name	PID Size (Bytes)	Type
F16B	ECU Cal-Config #2 Part Number		24	ASCII

Configuration Part Number stored in the standalone configuration file.

The following DTCs

REQ-128322-E01B - Control Module Calibration Data #2 (ANC/ESE)

are linked to this Cal-Config.

2.2.2 Powertrain CAN

2.2.3 Infotainment CAN

Infotainment CAN

2.2.3.1 ESE-FUR-REQ-166857/B-ESE CAN input signals (BoA4.0)

2.2.3.1.1 MD-REQ-166834/A-EngineStatus_St

Message Type: Status

This method is used to indicate the Engine Status.

Name	Literals	Values	Description
int Status	-	-	-
	EngOff	0x0	
	EngOn	0x1	
	EngAutoStopped	0x2	
	NotUsed	0x3	

2.2.3.1.2 MD-REQ-166835/A-PowerPack_St

Message Type: Status

This method is used to indicate the Power Pack Status.

Name	Literals	Values	Description
int Status	-	-	-
	Off Tq Not Available	0x0	
	On Tq Not Available	0x1	
	Strt In Prg No Tq	0x2	
	On Tq Available	0x3	

2.2.3.1.3 MD-REQ-166836/A-EngineTorqueIn_St

Message Type: Status

This method is used to indicate the Nm.

Name	Literals	Resolution	Values	Description
int Status	-	1		
	-500 ..		0x000 ..	Min (physic) Offset ..
	1547		0x7FF	Max (physic) Offset

2.2.3.1.4 MD-REQ-166837/A-EngineTorqueIn_Qf

Message Type: Quality Factor

This method is used to indicate the quality factor of the EngineTorque signal.

Name	Literals	Values	Description
int Status	-	-	
	Fault	0x00	
	No_Data_Exists	0x01	
	Not_Wothin_Specifications	0x02	
	OK	0x03	

2.2.3.1.5 MD-REQ-166839/A-GearPosition_St

Message Type: Status

This method is used to transmit the information from TCM about which gear is going to be engaged (target gear) by the automatic gear box. Variability point: used only in automatic transmission.

Name	Literals	Values	Description
int Status	-	-	
	Neutral	0x00	
	First	0x01	
	Second	0x02	
	Third	0x03	
	Fourth	0x04	
	Fifth	0x05	
	Sixth	0x06	
	Seventh	0x07	
	Eighth	0x08	
	Ninth	0x09	
	Tenth	0xA	
	Undefined_3	0xB	
	Undefined_4	0xC	
	Undefined_5	0xD	
	Reverse	0xE	
	Unknown	0xF	

2.2.3.1.6 MD-REQ-166860/A-AutoGearPosition_St

Message Type: Status

This method is used to transmit the auto gear position status

Name	Literals	Values	Description
int Status	-	-	
	Park	0x00	
	Reverse	0x01	
	Neutral	0x02	
	Drive	0x03	
	Sport_DriveSport	0x04	
	Low	0x05	
	First	0x06	
	Second	0x07	
	Third	0x08	
	Fourth	0x09	
	Fifth	0xA	
	Sixth	0xB	
	Undefined_Treat_as_Fault	0xC	
	Undefined_Treat_as_Fault1	0xD	
	Unknown_Position	0xE	
	Fault	0xF	

2.2.3.1.7 MD-REQ-166840/A-PedalPosition_Qf

Message Type: Quality Factor

This method is used to indicate the quality factor of the PedalPosition signal.

Name	Literals	Values	Description
int Status	-	-	-
	Fault	0x00	
	No_Data_Exists	0x01	
	Not_Within_Specifications	0x02	
	OK	0x03	

2.2.3.1.8 MD-REQ-166841/A-PedalPosition_St

Message Type: Status

This method is used to indicate

Name	Literals	Resolution	Values	Description
int Status	%	0,1		The pedal position is given in %.
	0		0x000	Min (physic) Offset
	..		..	..
	102,3		0x3FF	Max (physic) Offset

2.2.3.1.9 MD-REQ-166842/A-EngineOut_St

Message Type: Status

This method is used to indicate rotations per minute (RPM).

Name	Literals	Resolution	Values	Description
int Status	0	2	0x0000	Min (physic) Offset
	..		..	..
	16382		0x1FFF	Max (physic) Offset

2.2.3.1.10 MD-REQ-222870/A-DriveMode2_St

Message Type: Status

This method is used to indicate the Drive Mode 2 status.

Name	Literals	Values	Description
int Status	-	-	
	SelDrvMde01	0x0	
	SelDrvMde02	0x1	
	SelDrvMde03	0x2	
	SelDrvMde04	0x3	
	SelDrvMde05	0x4	
	SelDrvMde06	0x5	
	SelDrvMde07	0x6	
	SelDrvMde08	0x7	
	SelDrvMde09	0x8	
	SelDrvMde10	0x9	
	SelDrvMde11	0xA	
	SelDrvMde12	0xB	
	SelDrvMde13	0xC	
	SelDrvMde14	0xD	
	SelDrvMde15	0xE	
	SelDrvMde16	0xF	
	SelDrvMde17	0x10	
	SelDrvMde18	0x11	
	SelDrvMde19	0x12	
	SelDrvMde20	0x13	
	SelDrvMde21	0x14	
	SelDrvMde22	0x15	
	SelDrvMde23	0x16	
	SelDrvMde24	0x17	
	SelDrvMde25	0x18	
	SelDrvMde26	0x19	
	SelDrvMde27	0x1A	
	SelDrvMde28	0x1B	
	SelDrvMde29	0x1C	
	SelDrvMde30	0x1D	
	SelDrvMde31	0x1E	
	Faulty	0x1F	

2.2.3.1.11 MD-REQ-223030/A-VehicleSpeed_St

Message Type: Status

This method is used to indicate vehicle speed (kph).

Name	Literals	Resolution	Values	Description
int Status		0.01		
	0.00 ..		0x0000 ..	Min (physic) ..
	655.35		0xFFFF	Max (physic)

2.2.3.1.12 MD-REQ-223031/B-VehicleLongitudialAcceleration_St

Message Type: Status

This method is used to indicate longitudinal acceleration in m/s².

Name	Literals	Resolution	Values	Description
int Status	-	0.01		
	-40.00 .. +41.89		0x000 .. 0x1FFD	Min (physic) + Offset .. Max (physic) + Offset
	NoDataExists		0x1FFE	NoDataExists
	Faulty		0x1FFF	Faulty

Offset = -40.00

2.2.3.1.13 MD-REQ-224894/A-ExhaustMode_St

Message Type: Status

This method is used to indicate the exhaust status.

Name	Literals	Values	Description
int Status	-	-	-
	Null	0x0	
	LoudExhaust	0x1	
	QuietExhaust	0x2	
	Faulty	0x3	

2.2.4 Vehicle Configuration

Vehicle Configuration

2.2.4.1 REQ-114731/D-DE06 - DSP Config

Byte	DE06 – DSP Config	
0	Carline	
1	Body Style	
2	Speaker config	
3	Branding	
4	SWP	
5	EQ Special Modes	
6	Engine	
7	Gearbox	
8	SelDrvMde1=(0x0)	This shall be used to directly feed in the mapping table between SelDrvMode CAN signal to Sub-Profile of the ESE-Dataset. Each of these bytes is defining which of the 4 sub-profile is chosen.
9	SelDrvMde2=(0x1)	
10	SelDrvMde3=(0x2)	
11	SelDrvMde4=(0x3)	
12	SelDrvMde5=(0x4)	
13	SelDrvMde6=(0x5)	
14	SelDrvMde7=(0x6)	
15	SelDrvMde8=(0x7)	
16	SelDrvMde9=(0x8)	
17	SelDrvMde10=(0x9)	
18	SelDrvMde11=(0xA)	
19	SelDrvMde12=(0xB)	

20	SelDrvMde13=(0xC)	
21	SelDrvMde14=(0xD)	
22	SelDrvMde15=(0xE)	
23	SelDrvMde16=(0xF)	
24	SelDrvMde17=(0x10)	
25	SelDrvMde18=(0x11)	
26	SelDrvMde19=(0x12)	
27	SelDrvMde20=(0x13)	
28	SelDrvMde21=(0x14)	
29	SelDrvMde22=(0x15)	
30	SelDrvMde23=(0x16)	
31	SelDrvMde24=(0x17)	
32	SelDrvMde25=(0x18)	
33	SelDrvMde26=(0x19)	
34	SelDrvMde27=(0x1A)	
35	SelDrvMde28=(0x1B)	
36	SelDrvMde29=(0x1C)	
37	SelDrvMde30=(0x1D)	
38	SelDrvMde31=(0x1E)	
39	SelDrvMde-Faulty=(0x1F)	
40…49	Reserved	

This shall be used to validate the Sound EQ - and ESE/ANC profiles - header information against the local config. If more that on profile is available in flashed data, this will be used to select it. The first one will be selected (top – down), if none is found the DTC is set.

For reference see:

- AHU-SWR-REQ-093326-Generic Global EQ Tool
- Ford General Global EQ Tool File Structure Spec (SWR-REQ-128741-Generic Configuration File Structure)

2.2.4.1.1 REQ-114747/D-Byte 0 - Carline

DE06 byte 0	Meaning	Effect (all variants)
0x00	Unconfigured	Default - Flat EQ.
0x01	**B479**	
0x02	**C519**	
0x03	**B500**	
0x0A	**C520 MCA** / C489	
0x0B	**B515 MCA** "Ford EcoSport"	
0x0C	B460	
0x17	B299 "Ford Fiesta"	
0x18	B232 "Ford Fusion"	
0x32	C344 "Ford C-Max"	
0x45	C346 "Ford Focus"	
0x64	**V363 MCA** 'Ford Transit'	
0x66	**V362 MCA** 'Ford Transit'	
0x72	**V408 MCA**	
0xD0	**BX726**	

0xD1	**CX482**	
0xE0	**B562 MCA**	

All not listed values shall also be accepted.

2.2.4.1.2 REQ-114748/G-Byte 1 - Bodystyle

DE06 byte 1	**Meaning**	**Effect (all variants)**	**MFC**
0x00	Unconfigured	Default - Flat EQ.	
0x01	Single CAB		CA-BB
0x02	Double CAB		CA-BF
0x03	Bus M2		CA-KA
0x04	Kombi M1		CA-KD
0x05	Kombi van M1		CA-KG
0x09	Bus M1 Lrf		CA-LM
0x0A	Shuttle Bus M1		CA-LP
0x10	Regular cargo van		CA-VA
0x11	4 door sedan		BS-FA, BS-FC
0x12	4 door station wagon		BS-FF
0x13	5 door sedan		BS-HA, BS-HC
0x16	3 door sedan		BS-DA, BS-DD
0x17	Convertible		BS-BH
0x18	Coupe		BS-BJ
0x19	Kombi N1		CA-KF
0x21	Kombi Van N1		CA-KI
0x23	Double Cab In Van		CA-XA
0x29	Compact MAV		BS-UA
0x30	Grand MAV		BS-UD
0x31	Back to Back Cab		CA-AP
0x32	Cutaway		CA-CD
0x35	SPORT UTILITY VEHICLE		BS-SA, CA-WE
0x37	SWB VAN		BS-AE
0x38	LWB VAN		BS-AF
0x39	SWB KOMBI		BS-AG, BS-AR
0x3A	LWB KOMBI		BS-AH, BS-AS
0x3B	5 DOOR UAV - HEAVY PLATFORM		BS-VG
0x3C	Skeletal Chassis		CA-CA
0x3D	SWB DOUBLE CAB IN VAN		BS-AK
0x3E	LWB DOUBLE CAB IN VAN		BS-AL
0x41	4 DOOR KOMBI		BS-VE, BS-AM, BS-AP
0x43	4 DOOR KOMBI N1		BS-NB, BS-AN, BS-AQ
0xF1	4 door sedan PANOROOF		
0xF2	4 door station wagon PANOROOF		

0xF3	5 door sedan PANOROOF		
0xFF	ANY		

All not listed values shall also be accepted.

2.2.4.1.3 REQ-114749/C-Byte 2 - Speaker Config

DE06 byte 2	Meaning	Effect (all variants)	MFC
0x00	Unconfigured	Default - Flat EQ.	
0x01	2 Speakers	Used for EQ selection	IDBAB
0x02	6 Speakers	Used for EQ selection	IDBAD
0x03	8 Speakers		
0x04	4 Speakers	Used for EQ selection	IDBAC, IDBAY
0x05	10 Speakers		IDBAT
0x06	12 Speakers		
0x07	Less Speakers		IDBAA
0x08	4 Speakers Front Only	Used for EQ selection	IDBAW, IDBA3
0x09	9 Speakers		IDBAG, IDBA7
0x0A	9 RADIO SPEAKERS LOW		
0x0B	7 Speakers	Used for EQ selection	IDBAL
0x10	11 High Speakers (High Speaker Set)		
0x11	11 High Speakers (8 Channel Audiophile)		
0x12	13 High Speakers (8 Channel Audiophile LMV)		
0x13	4 front speaker & 2 coaxial rear speaker		IDBA5
0x14	10 High Series Speakers with Subwoofer		IDBA6
0x15	9 Speakers ST		IDBBB
0xFF	ANY		
Other	All other values	Other values are rejected at write; no relevant EQ	

2.2.4.1.4 REQ-114750/D-Byte 3 - Branding

DE06 byte 3	Meaning	Effect
0x00	unconfigured	Default - Flat EQ
0x01	Ford Type 1	Used for EQ selection
0x02	Ford Type 2	
0x03	Ford Type 3	
0x04	Ford Type 4	
0x05	Ford Type 5	
0x06	Ford 2Ohm	
0x07	SONY	
0x08	SONY 2Ohm	
0x09	Lincoln	
0x0A..0xFE	reserved	
0xFF	ANY	Ignore this parameter

2.2.4.1.5 REQ-114751/D-Byte 4 - Steering Wheel Position

DE06 byte 4	Meaning	Effect
0x00	unconfigured	Default - Flat EQ
0x01	LHD	Used for EQ selection
0x02	RHD	Used for EQ selection
0x03..0xFE	reserved	
0xFF	ANY	Used for EQ selection

2.2.4.1.6 REQ-114752/E-Byte 5 - EQ Special Modes

The AHU shall support a DID to override EQ configuration to select a special output mode

DE06 byte 5	Meaning	Effect
0x00	Not configured	Default – Flat EQ
0x01	No Special Mode	Use either a single EQ file or a mutli EQ file which is flashed to the unit and validate the DE06 other parameters against the value in the EQ file. Set DTC E01A-57 (incompatible) on missmatch
0x02	Flat EQ	Flat EQ is selected, DTC E01A-57 (incompatible) will never be set. DTC E01A-54 (missing) will never be set.
0x05	Force flashed file mode	No DE06 checking against EQ File. DTC E01A-57 (incompatible) will never be set.

The following DTCs

REQ-114781-E01A - Calibration (Configuration) file (Sound EQ/APB)

are linked to this configuration.

2.2.4.1.7 REQ-114753/H-Byte 6 - Engine

DE06 byte 6	Meaning	Effect (all variants)	MFC
0x00	Unconfigured		
0xFF	any	Don't care	
0x0C	2.0L GDI		EN-MG, EN-U4, EN-XQ
0x11	2.3L 4V TIVCT DI TC 270 HP GAS<2.3L GTDI 280 PS Gasoline>		EN-N3
0x21	1.5L 16V DI TC SIGMA B		EN-BN
0x25	Sigma 1.6L I4 Ti-VCT 123PS		EN-PN, EN-RV
0x3A	1,0L GTDI Fox 120PS Not for Volvo		EN-M1, EN-B7
0x3B	1,0L GTDI Fox 105PS Not for Volvo		EN-M2, EN-B3
0x3C	1.5L 16V DI TC SIGMA		EN-M8
0x3D	1.5L 16V DI TC SIGMA A		EN-M9
0x4B	1.5L DRAGON I3 TIVCT PFI GAS C <Dragon I3 1.5L PFI 120 PS>		EN-Y2
0x64	2.3L 4V TIVCT DI TC 350 PS GAS		EN-YV

0x6F	1.0L 12V DI TC I3 GAS 95PS FOX		EN-SF
0x7D	2.5L DOHC PFI 4 CYL GAS		EN-S7
0x7E	PSA 2.0L DOHC CR DSL 150PS MID <DW10>		EN-T7
0x7F	PSA 2.0L DOHC CR DSL 180PS MID <DW10>		EN-T8
0x8D	2.0L TIVCT GTDI T/C (ST only)		EN-R9
0x92	1.6L Sigma TI-VCT 105PS, 85PS		EN-IQ, EN-XT
0x94	1.6L DV6C 95PS		EN-T3
0x9A	1.5L SOHC DI TC DSL DV5FC		EN-XW
0x9B	1.5L SOHC DI TC DSL DV5F A		EN-XX, EN-AB
0x9C	1.5L SOHC DI TC DSL DV5FD A		EN-XU, EN-AE
0x9D	1.5L SOHC DI TC DSL DV5FD B		EN-XV
0x9E	1.5L DV NEO TC DI DSL A <1.5L DV Neo 120 PS>		EN-ZT
0x9F	1.5L DV NEO TC DI DSL B <1.5L DV Neo 95 PS>		EN-Z2
0xA1	1.5L DV NEO TC DI DSL C		EN-BE
0xA2	2.0L TIVCT GTDI T/C (ST275 only)		
0xA3	2.3L DOHC DISI T/C GAS (RS370 engine)		EN-QT
0xB0	1.6L PFI N/A 115PS SIGMA FFV		EN-MU
0xD0	2.0L CR TC DSL PANTHER <2.0L Panther 150 PS>		EN-YL
0xD1	2.0L CR TC DSL PANTHER B <2.0L Panther 180 PS>		EN-YM
0xD2	2.0L CR TC DSL PANTHER C		EN-YN
0xD3	1.5L DRAGON I3 DI TC GAS A <Dragon I3 1.5L GTDI 150 PS>		EN-YZ
0xD4	1.5L DRAGON I3 DI TC GAS B <Dragon I3 1.5L GTDI 180 PS>		EN-Y1
0xD5	1.5L DRAGON I3 DI TC E100 A <Dragon I3 1.5L GTDI E100 180 PS>		EN-Y6
0xD6	1.5L DRGN MILLR I3 DI TC GAS A <Dragon 1.5L GTDI Miller 160 PS>		EN-AM
0xD7	RESERVED – do not use anymore, no it is 0x4B		
0xD8	1.5L DRAGON I3 TIVCT PFI GAS B <Dragon I3 1.5L PFI 105 PS>		EN-YD
0xD9	1.5L DV NEO ECO TC DI DSL <1.5L DV Neo 95 PS><Econetic>		EN-Y9
0xDA	1.0L 12V DI TC I3 GAS FOX B <140PS>		EN-YY
0xDB	1.1L FOX 12V TI-VCT I3 GAS B <85PS>		EN-XY
0xDC	1.1L FOX 12V TI-VCT I3 GAS <70PS>		EN-XP
0xDD	1.0L TC GAS NEW FOX C		EN-M0
0xDF	2.0L CR TC DSL PANTHER D<2.0L Panther190PS>		EN-BC

All not listed values shall also be accepted.

2.2.4.1.8 REQ-114754/G-Byte 7 - Gearbox

DE06 byte 7	Meaning	Effect (all variants)	MFC
0x00	Unconfigured		
0xFF	any	Don't care	
0x01	Manual 6-speed FWD 6 SPD MAN TRANS - VOLVO M66		TR-VS
0x02	Manual 6-speed AWD		TR-VU
0x03	Automatic 6-speed FWD		TR-A8
0x04	Automatic 6-speed AWD		TR-A9
0x05	Continuous variable gearbox CFT23		TR-WE
0x06	Manual 5-speed 5SPD MAN TR/AX VOLVO M56		TR-SL
0x07	Manual 5-speed FWD 5 SPD MAN TRANS A EAO MTX75		TR-RP
0x08	Powershift, 6-speed, FWD		TR-A6
0x09	6 SPD AUTO TRANS DCPS		TR-CW, TR-CQ, TR-EK
0x0A	1 SPD AUTO TRANS		TR-WA
0x0B	6 SPD AUTO TRANS 6F MID-RANGE (6F35)		TR-W6
0x0C	Automatic 8-speed FWD		
0x0D	Automatic 8-speed AWD		
0x0E	HF35		TR-EJ
0x0F	6 SPD AUTO TRANS 6F15		TR-W7
0x10	Manual, 6-speed, FWD 6 SP MAN TRANS - MMT6 3 SHAFT 6 SPD MAN TR/AX - MMT6		TR-VT, TR-VY
0x11	Manual, 5-speed, FWD 5 SPD MAN TRANS A EAO B5/IB5		TR-RN
0x12	6 SPD AUTO TRANS 6F55		TR-CG
0x13	9 SPD AUTO TRANS 9F35		TR-EZ
0x14	8 SPD AUTOMATIC TRANS 8F24		TR-E7
0x30	6 SPD MAN TRANS-MT82		TR-AX
0x31	6 SP MAN TRANS-VMT6		TR-A7
0x32	5 SPD MAN TRANS VXT75		TR-RV
0x33	5 SPD MAN TRANS EAO MT75		TR-RG
0x34	Cft26 Cvt Auto Transaxle Zf		TR-WF
0x35	Automatic 6-speed Aisin F21		TR-VA, RE-EE
0x36	CVT Auto Transaxle, FWD		TR-CJ

0x37	IB5 ASM 5-Speed Auto Shift Manual Transmission		TR-TK
0x38	FN Auto 4-Speed Automatic Transmission		TR-D2, TR-CE
0x39	FN Auto 5-Speed Automatic Transmission		TR-CX
0x40	G4E Auto 4-Speed Automatic Transmission		TR-CY
0x44	B6, Manual, 6-speed, FWD		TR-BT
0x47	6 SPD AUTO TRANS-HP26(not for Volvo)		TR-VQ
0x48	6 SPD AUTO TRANS-HP28(not for Volvo)		TR-CF
0x49	6R80 Gearbox, type		TR-C3
0x50	5 SPD MANUAL TRANS GFT - IB5		TR-BW
0x51	5 SPD MAN TRANS GETRAG-B5A		TR-CH
0x52	6 SPD MAN TRANS GETRAG-6MX65		TR-EW
0x70	6 SPD MAN TRANS GFT B6 PLUS		TR-E8
0x71	RESERVED – do not use anymore, now 0x14		
0x72	9 SPD AUTO TRANS 9F40		TR-EY
0x73	8 SPD AUTOMATIC TRANS 8F35		TR-GM
0x74	AUTO TRANS - 8F40		TR-PA
0xD0	5 SPD MAN TRANS GETRAG-5MX65		EN-EV

All not listed values shall also be accepted.

2.2.4.1.9 REQ-227101/A-Byte 8 - SelDrvMde1

DE06 byte 8	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.10 REQ-227102/A-Byte 9 - SelDrvMde2

DE06 byte 9	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.11 REQ-227103/A-Byte 10 - SelDrvMde3

DE06 byte 10	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.12 REQ-227104/A-Byte 11 - SelDrvMde4

DE06 byte 11	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.13 REQ-227105/A-Byte 12 - SelDrvMde5

DE06 byte 12	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.14 REQ-227106/A-Byte 13 - SelDrvMde6

DE06 byte 13	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.15 REQ-227107/A-Byte 14 - SelDrvMde7

DE06 byte 14	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.16 REQ-227108/A-Byte 15 - SelDrvMde8

DE06 byte 15	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.17 REQ-227118/A-Byte 16 - SelDrvMde9

DE06 byte 16	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.18 REQ-227117/A-Byte 17 - SelDrvMde10

DE06 byte 17	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.19 REQ-227116/A-Byte 18 - SelDrvMde11

DE06 byte 18	Meaning	Effect

0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.20 REQ-227115/A-Byte 19 - SelDrvMde12

DE06 byte 19	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.21 REQ-227114/A-Byte 20 - SelDrvMde13

DE06 byte 20	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.22 REQ-227113/A-Byte 21 - SelDrvMde14

DE06 byte 21	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.23 REQ-227112/A-Byte 22 - SelDrvMde15

DE06 byte 22	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	

0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.24 REQ-227110/A-Byte 23 - SelDrvMde16

DE06 byte 23	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.25 REQ-227135/A-Byte 24 - SelDrvMde17

DE06 byte 24	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.26 REQ-227134/A-Byte 25 - SelDrvMde18

DE06 byte 25	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.27 REQ-227133/A-Byte 26 - SelDrvMde19

DE06 byte 26	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	

0x04..0xFF	reserved	Not allowed

2.2.4.1.28 REQ-227132/A-Byte 27 - SelDrvMde20

DE06 byte 27	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.29 REQ-227131/A-Byte 28 - SelDrvMde21

DE06 byte 28	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.30 REQ-227130/A-Byte 29 - SelDrvMde22

DE06 byte 29	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.31 REQ-227129/A-Byte 30 - SelDrvMde23

DE06 byte 30	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.32 REQ-227128/A-Byte 31 - SelDrvMde24

DE06 byte 31	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.33 REQ-227127/A-Byte 32 - SelDrvMde25

DE06 byte 32	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.34 REQ-227126/A-Byte 33 - SelDrvMde26

DE06 byte 33	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.35 REQ-227125/A-Byte 34 - SelDrvMde27

DE06 byte 34	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.36 REQ-227124/A-Byte 35 - SelDrvMde28

DE06 byte 35	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.37 REQ-227123/A-Byte 36 - SelDrvMde29

DE06 byte 36	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.38 REQ-227122/A-Byte 37 - SelDrvMde30

DE06 byte 37	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.39 REQ-227121/A-Byte 38 - SelDrvMde31

DE06 byte 38	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.1.40 REQ-227120/A-Byte 39 - SelDrvMde-Faulty

DE06 byte 39	Meaning	Effect
0x00	Sub-Profile 0	Default
0x01	Sub-Profile 1	
0x02	Sub-Profile 2	
0x03	Sub-Profile 3	
0x04..0xFF	reserved	Not allowed

2.2.4.2 REQ-166872/A-DE08 - Hardware

2.2.4.2.1 REQ-123454/B-Byte 7 - ANC

DE08 Byte 7	Meaning	Effect
ANC - General		
0x?0	not configured	
0x?1	Not Present	set DTC if hardware present
0x?2	ANC/ESE Present	Enable ESE/ANC.
0x?3	ESE Only	Enable ESE. Disable ANC.
0x?4	ANC giveaway	Set no DTC if hardware present. Disable ESE/ANC.
0x?5-0x?F	Reserved	
Bit4	ANC Microphone 1	0 – Not Present 1 – Present
Bit5	ANC Microphone 2	0 – Not Present 1 – Present
Bit6	ANC Microphone 3	0 – Not Present 1 – Present
Bit7	Reserved	

The Feature is default OFF if Hardware is available until it is configured ON or OFF.

The following DTCs

REQ-115742-9D79 - Microphone Input
REQ-115743-917A - Backup Microphone
REQ-115744-93F5 - Microphone 3

are linked to this configuration.

3 General Requirements

4 Functional Definition

4.1 ESE-FUN-REQ-018060/C-ESE General (TcSE ROIN-292993)

4.1.1 Requirements

4.1.1.1 ESE-FUR-REQ-018061/A-ESE algorithm (TcSE ROIN-293166)

The ESE algorithm shall run indepent to anything on the ACM.
(e.g. Loos of ESE function shall not cause a function loss or degradation of other ACM functions.)

4.1.1.2 ESE-FUR-REQ-018062/B-ESE watchdog (TcSE ROIN-293167)

Standard recovery strategy shall be applied.
The ESE algorithm shall continuously be monitored by a watchdog and deactivated if a fault is detected.

4.1.1.3 ESE-FUR-REQ-018063/A-ESE fault detection (TcSE ROIN-293168)

It shall be possible to automatically diagnose the following faults and set one or more DTCs on the infotainment HS CAN:
• Signals not received on Powertrain CAN (DTC: 0xC100 Lost connection with ECM)
• Signals not received at algorithm
• Problem with ESE core/card (e.g. initialization problem)
• ESE configuration/data-set problem (invalid calibration file, incompatible vehicle parameters) (DTC 0xE01A "Control Module Main Calibration Data")
• Speaker short or open circuit detected at run time (constraints may apply, depending on speaker type and audio output)

4.1.1.4 ESE-FUR-REQ-018064/A-ESE audio path (TcSE ROIN-293170)

ESE audio, generated by the ESE algorithm, will be separate from and not affected by any audio processing steps which are applied to non-ESE audio; such as volume, fader, balance, tone, vehicle EQ.

4.1.1.5 ESE-FUR-REQ-018065/A-ESE crank behaviour (TcSE ROIN-293171)

ESE-enabled ACMs shall mute during crank. Therefore, there will be no ESE during crank.
There shall be no change to the high/low voltage thresholds. Therefore, ESE will be muted at below 9.5V and above 16.2V.

4.1.1.6 ESE-FUR-REQ-018066/A-ESE power modes (TcSE ROIN-293172)

It shall be no change to power modes, startup and shutdown triggers. Powertrain HS-CAN will not trigger wake/sleep; this will be controlled solely by infotainment CAN. ESE shall not be affected by vehicle operating mode signals. Torque and rpm signal values will be sufficient to determine whether the engine is running.

4.1.1.7 ESE-FUR-REQ-018067/A-ESE startup time (TcSE ROIN-293173)

It is anticipated that the ESE sound will be ready no later than 1 second following a reset, LVI and power up condition. ESE error handling, ESE reconfiguration and other audio functions will be initialised separately.

4.1.1.8 ESE-FUR-REQ-018068/A-Loading ESE Configuration Data (TcSE ROIN-293175)

On startup, the AHU will identify the ESE configuration data, within the installed calibration file, which is compatible with the received vehicle configuration.
On subsequent start-ups, the last-used ESE configuration data will be loaded, to optimise start-up time
To apply updated ESE configuration (e.g. changed vehicle body style), a reset will be required.
Note: ESE configuration dataset will be in VBF format, by using the Ford-provided hex to VBF converter.

4.1.1.9 ESE-FUR-REQ-018069/A-Default ESE Configuration (TcSE ROIN-293176)

It is assumed that there will be no default ESE configuration.
In the absence of an ESE calibration file, or a compatible ESE configuration, ESE will be disabled.

4.1.1.10 ESE-REQ-018070/A-Volume Limiter not applied (TcSE ROIN-298090)

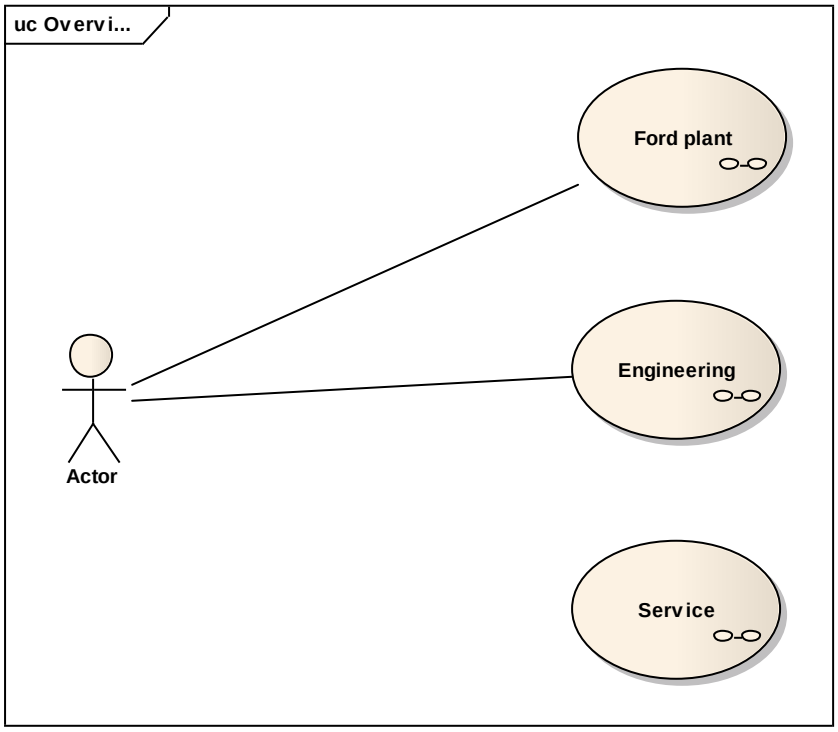
Volume Limiter shall not be applied to ESE sound.

4.1.1.11 ESE-FUR-REQ-092636/A-Audio Drive Mode

Audio Drive Mode information shall be routed to the ESE Algorithm to select different look-up tables.

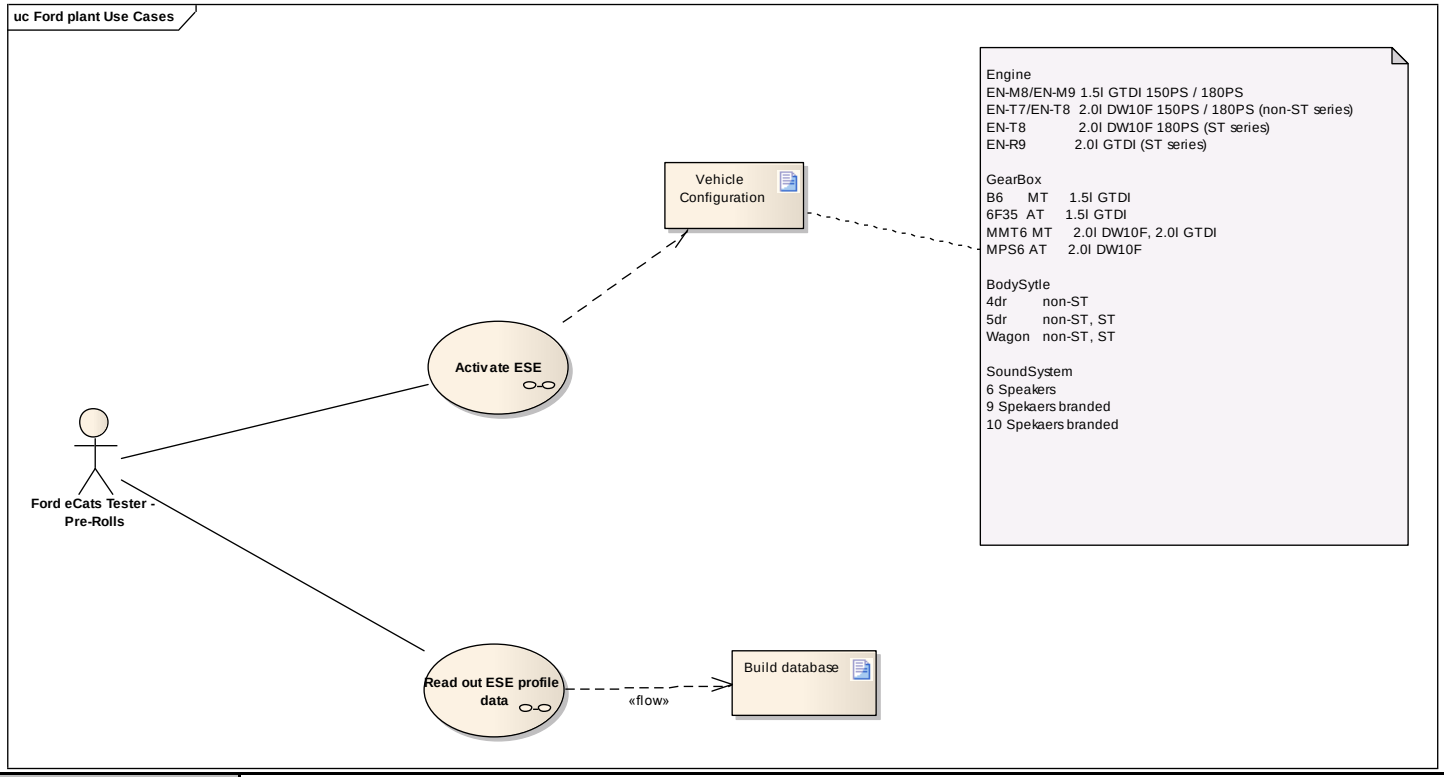
4.1.2 Use Cases

4.1.2.1 ESE-UC-REQ-092333/B-Overview



Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

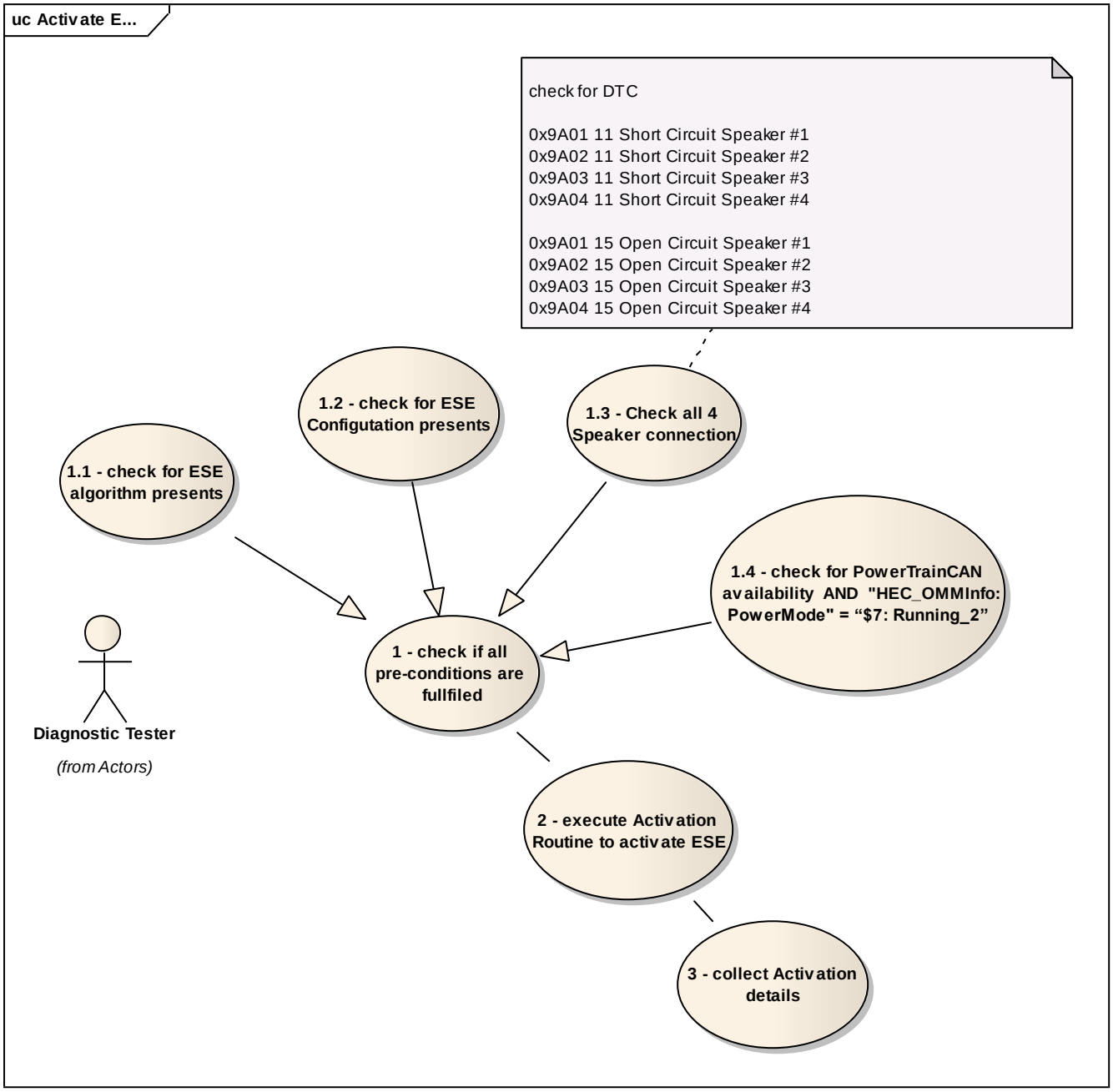
4.1.2.2 ESE-UC-REQ-092302/B-FORD plant Use Cases



Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

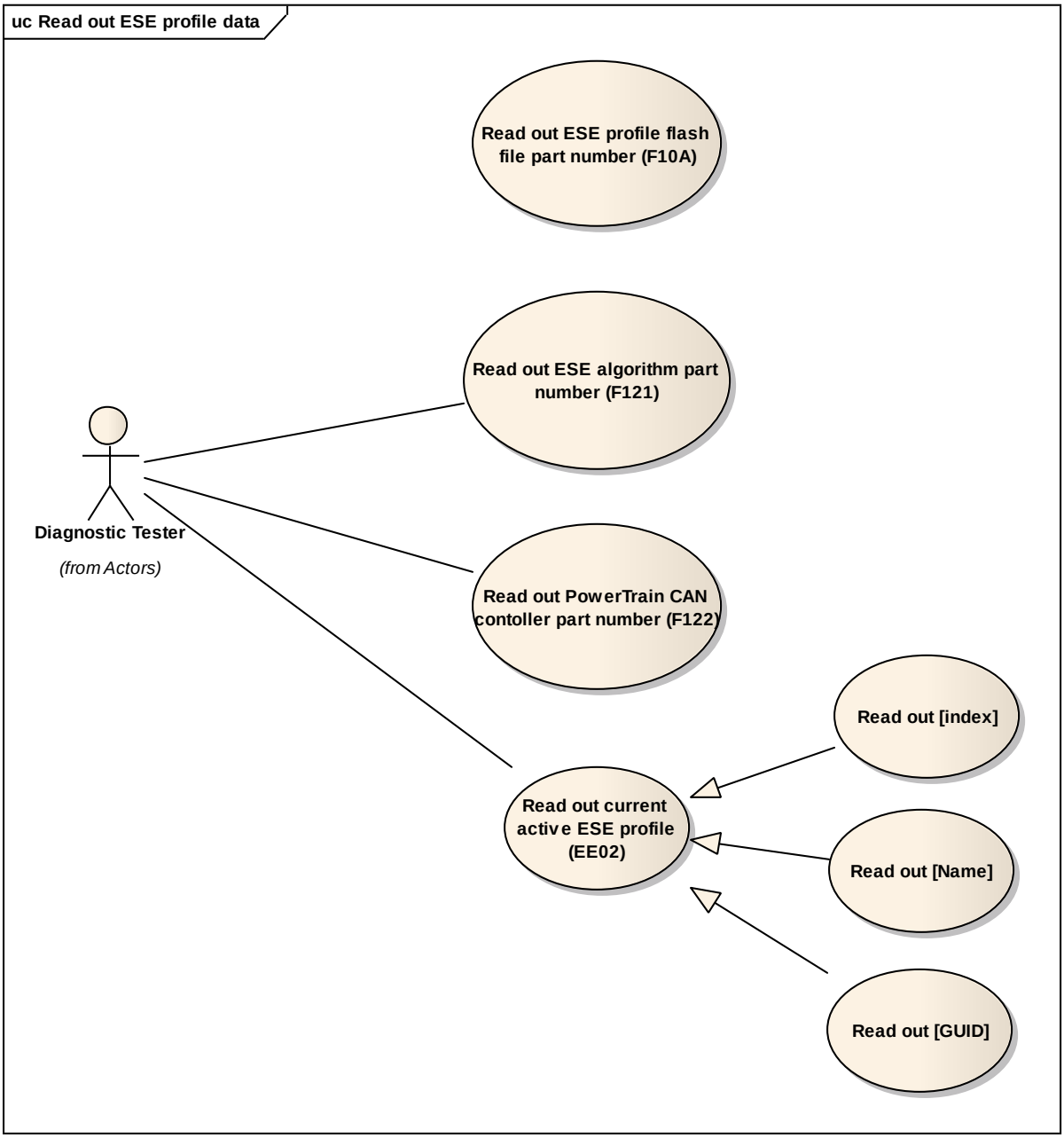
4.1.2.2.1 ESE-UC-REQ-092304/C-Activate ESE

Linked Elements
ACT-167515/B-Activation Flow
ESE-ACT-REQ-092423/B-Activation Flow



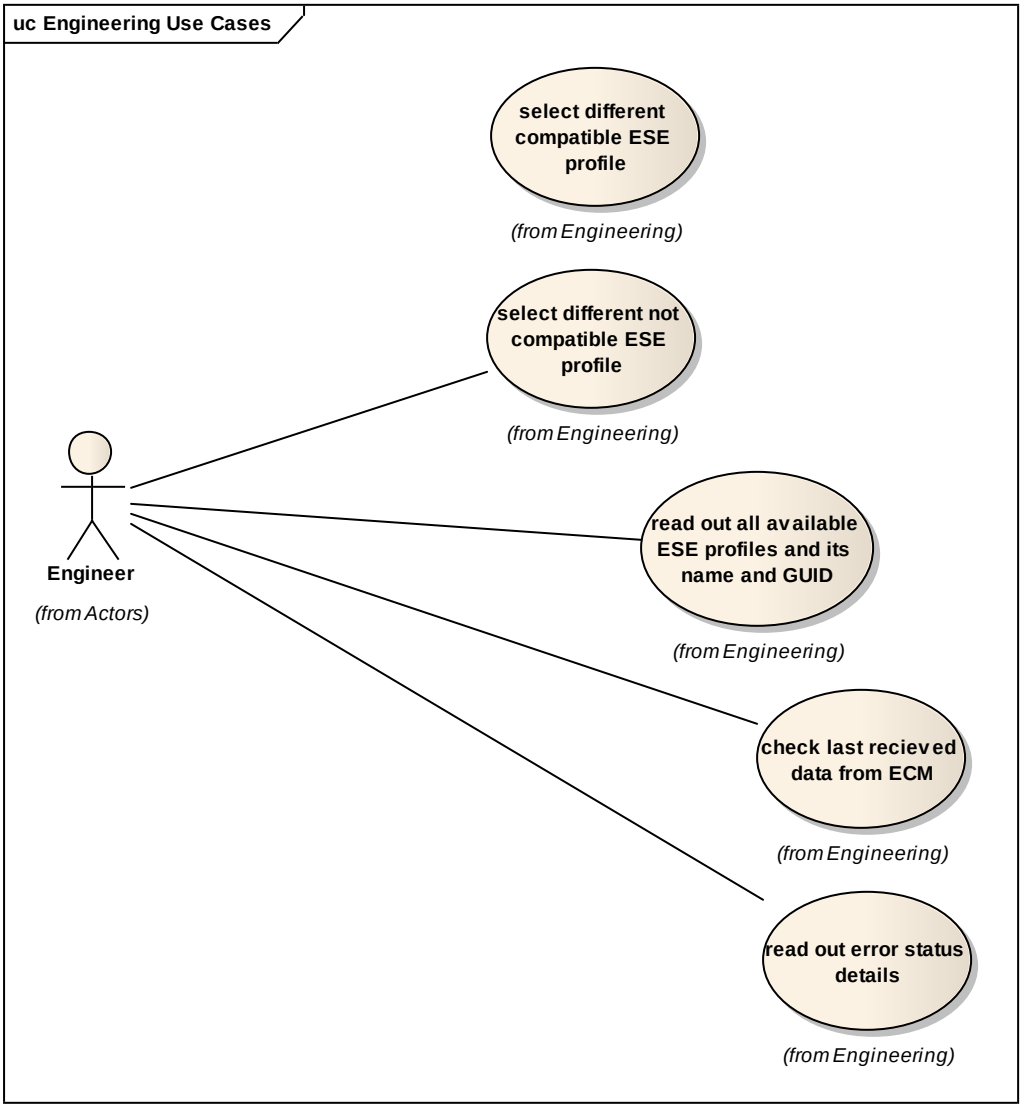
Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.2.2 ESE-UC-REQ-092305/B-Read Out ESE profile data



Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.3 ESE-UC-REQ-092303/C-FORD Engineering Use Cases



Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.3.1 ESE-UC-REQ-092327/B-measure Transfer Function

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	

List of Exception Use Cases	
Interfaces	

4.1.2.3.2 ESE-UC-REQ-092328/B-select different compatible ESE profile

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.3.3 ESE-UC-REQ-092329/B-select different not compatible ESE profile

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.3.4 ESE-UC-REQ-092330/B-read out all available ESE profiles and its name and GUID

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.3.5 ESE-UC-REQ-092331/B-check last recieved data from ECM

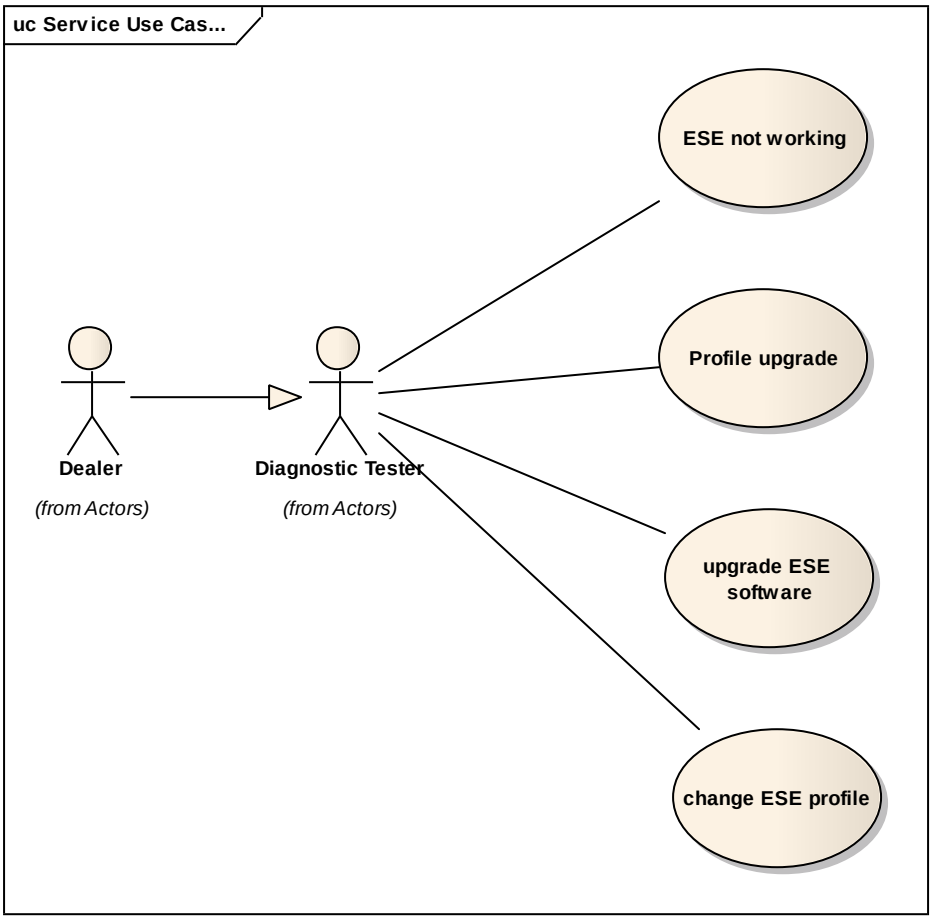
Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	

Interfaces	

4.1.2.3.6 ESE-UC-REQ-092332/B-read out error status details

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.4 ESE-UC-REQ-092307/C-Service Use Cases



Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.4.1 ESE-UC-REQ-092323/B-ESE not working

Linked Elements
ACT-167516/B-ESE not working correctly
ESE-ACT-REQ-092424/B-ESE not working correctly

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.4.2 ESE-UC-REQ-092324/B-Profile upgrade

Linked Elements
ESE-ACT-REQ-092425/B-ESE profile upgrade

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.4.3 ESE-UC-REQ-092325/B-upgrade ESE software

Actors	
Pre-conditions	
Scenario Description	
Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.2.4.4 ESE-UC-REQ-092326/B-change ESE profile

Linked Elements
ESE-ACT-REQ-092426/B-change ESE profile
ACT-167518/B-change ESE profile

Actors	
Pre-conditions	
Scenario Description	

Post-conditions	
List of Exception Use Cases	
Interfaces	

4.1.3 State Machines

4.1.4 Sequence Diagrams

4.2 ESE-FUN-REQ-093365/A-ESE BoA4.0 specifics

ESE CGEA1.3 specifics

4.2.1 Requirements

Requirements

4.2.1.1 ESE-REQ-093366/A-ESE CGEA1.3 specifics

ESE Algorithm configuration:
Number of used channel = 4
Additional protected channel = 2

Classification:
Functional importance class = A

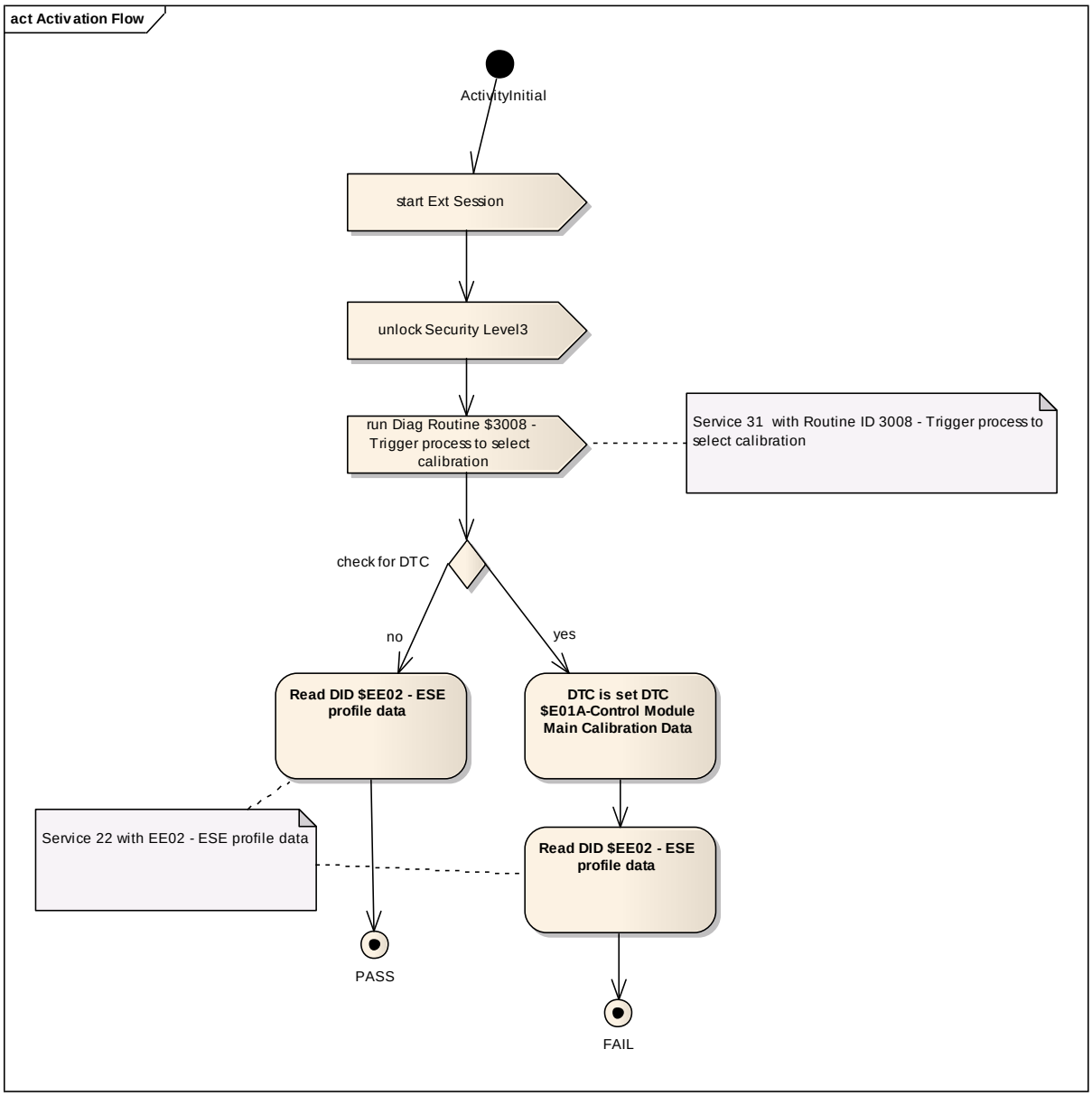
4.2.2 Sequence Diagrams

Sequence Diagrams

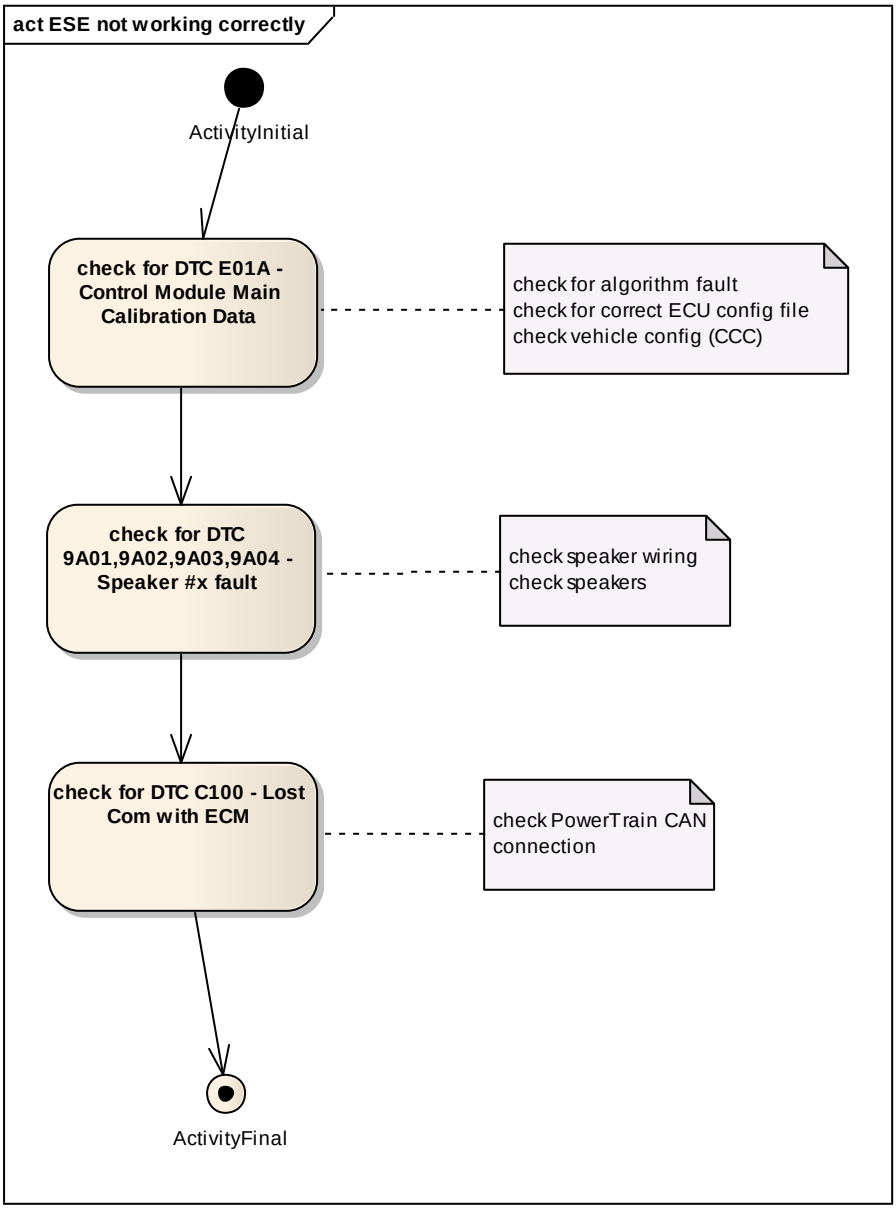
4.2.3 State Machines

State Machines

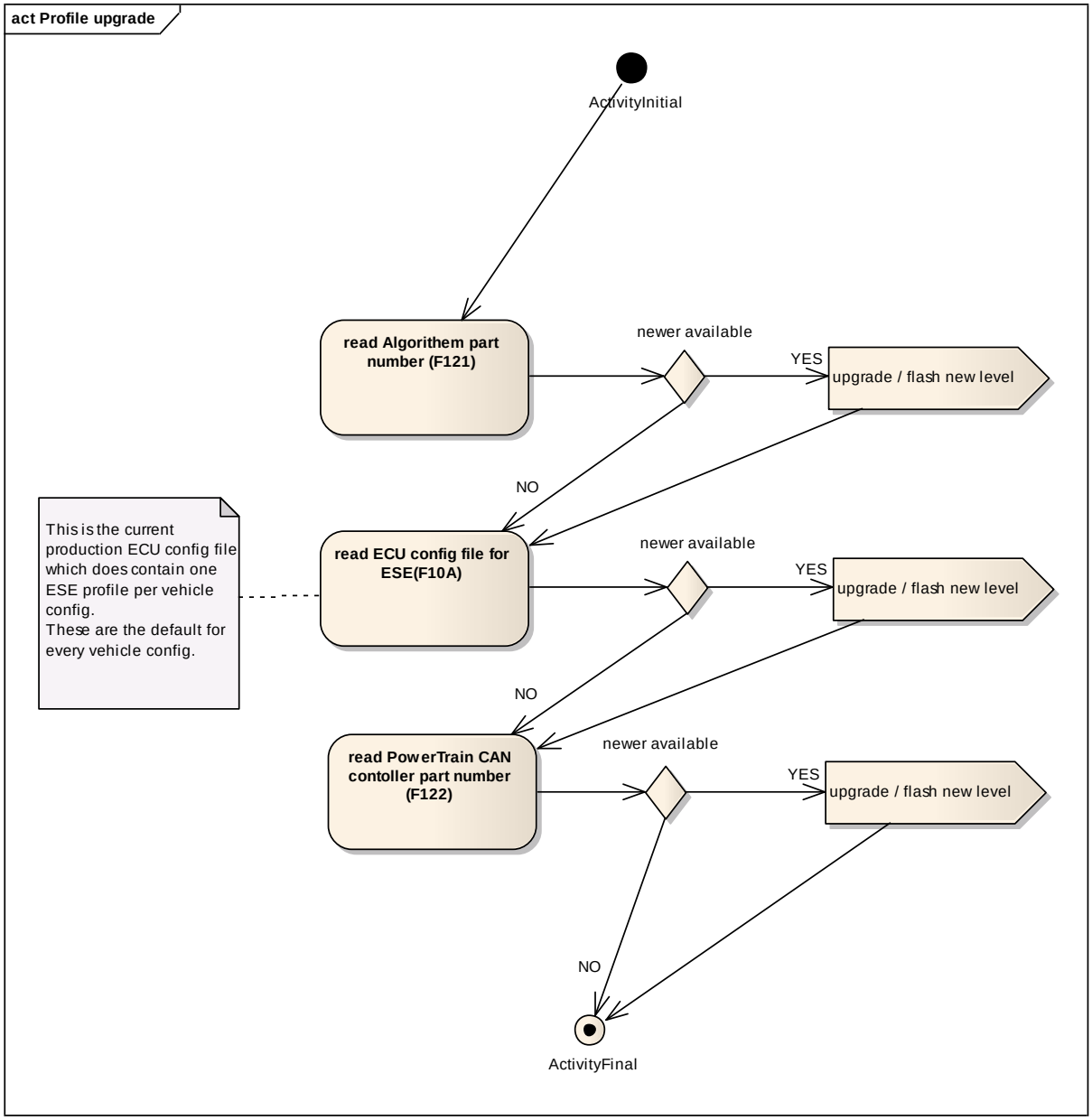
Activation Flow



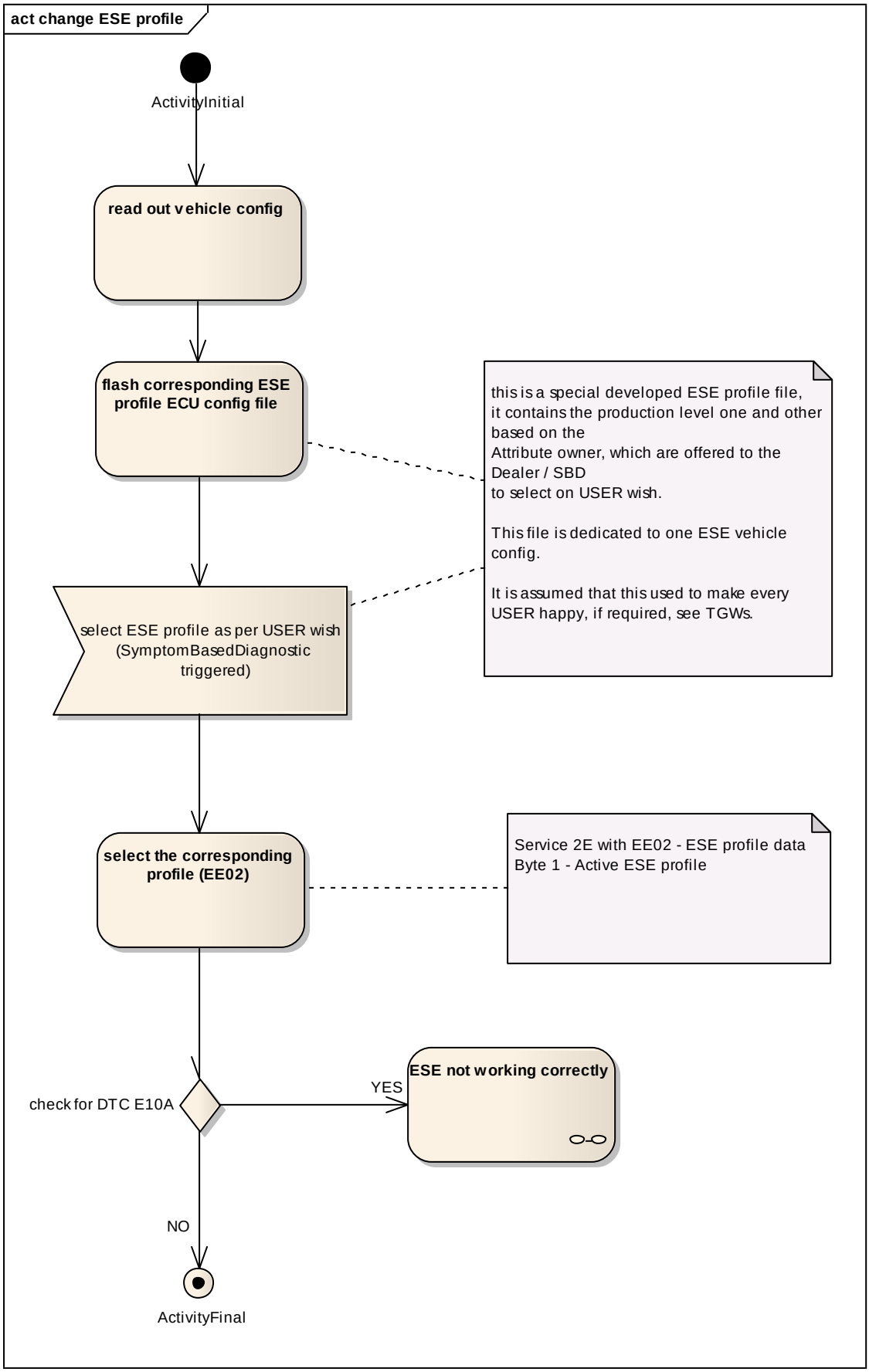
ESE not working correctly



ESE profile upgrade



change ESE profile



4.2.4 Use Cases

Use Cases

4.3 ESE-FUN-REQ-018073/A-ESE Diagnostics (TcSE ROIN-292967)

4.3.1 Use Cases

4.3.2 Requirements

4.3.2.1 ESE-IR-REQ-018074/C-Enabling/Disabling ESE (TcSE ROIN-293174)

ESE will be disabled by default. A unit shall enabled by successfully running the ESE Activation ROUTINE 0x3008 “Trigger process to select calibration” via diagnostics.
The status could be read via diagnostics DID EE03 "ESE Activate status".

4.3.2.2 ESE-IR-REQ-018075/B-ESE Configuration Diagnostics (TcSE ROIN-293177)

The installed ESE Calibration File part number will be reported via DID ID F10A “ECU Cal-Config Part Number” (24 Byte ASCII).
It shall be possible to report via diagnostics the details of each ESE configuration data set included in the calibration file. (DID EE02)

4.3.2.3 ESE-IR-REQ-018076/A-ESE Reflash and Diagnostics (TcSE ROIN-293178)

SWDL will only be supported via infotainment CAN.
The Algorithm shall be indepented of the ESE calibration/data set and the main ACM(host micro) application.
The installed Dirana3/HiFi2 core File part number will be reported via DID ID F121 “ECU Software #3 Part Number” (24 Byte ASCII) with included the ESE Algorithm.

4.3.2.4 ESE-IR-REQ-018077/A-ESE Transfer Function Measurement (TcSE ROIN-293179)

The ACM shall be able to pass the request to play the Transfer Function Test tone to the ESE Algorithm.
This will be started by using diagnostic routine 0x601C "Transfer Function Test tone".

4.3.3 State Machines

4.3.4 Sequence Diagrams

4.4 ESE-FUN-REQ-092666/B-ESE/ANC VBF-Structure

The ESE profiles VBF shall be arranged:

File Structure

Name	Size	Type	VBF Block
VBF Part Num	24	Ascii	1
Number of ESE Profiles (n)	1	Int	1
Profile Info Array	n	Profile INFO	1
Profile Data Array	n	Profile DATA	2..n+1

Profile INFO Structure

Name	Size	Type

Profile Index	1	Int	1
Title	16	Ascii	1
GUID	36	Ascii	1
Dataset Ver (dataSetVersion)	4	Hex	1
AHU (HW) Ver (hwRevision)	1	Hex	1
Num CCC Sets linked to Profile	1	Int	1
Num Params in CCC PARAM array *	1	Int	1
CCC PARAM array		CCC PARAM	1

* Num Params in CCC PARAM array	This is fixed to 7, with the order of DE06:Byte 0 DE06:Byte 1 DE06:Byte 2 DE06:Byte 3 DE06:Byte 4 DE06:Byte 6 DE06:Byte 7

Profile DATA Structure

Name	Size	Type	
Müller-BBM m|klang RAW data		Hex	2..n+1

Every Profile will have its own VBF block.

CCC PARAM Structure

Name	Size	Type	
Param ID 0x00	1	Hex	1
Param VAL DE06:Byte 0 – Carline	1	Hex	1
Param ID 0x01	1	Hex	1
Param VAL DE06:Byte 1 – Bodystyle	1	Hex	1
Param ID 0x02	1	Hex	1
Param VAL DE06:Byte 2 – Speaker System	1	Hex	1
Param ID 0x03	1	Hex	1
Param VAL DE06:Byte 3 – Speaker Branding	1	Hex	1
Param ID 0x04	1	Hex	1
Param VAL DE06:Byte 4 – SWP	1	Hex	1
Param ID 0x06	1	Hex	1
Param VAL DE06:Byte 6 – Engine	1	Hex	1

Param ID 0x07	1	Hex	1
Param VAL DE06:Byte 7 – Gearbox	1	Hex	1

4.5 ESE-FUN-REQ-092665/A-ESE/ANC VBF-Builder

Supplier shall provide a "VBF tool" which converts one or more ESE/ANC datasets into a single File in VBF format. The VBF file can be used to flash the dataset(s) to the AHU via CAN, and will include additional information required by the AHU to interpret data and store it in Dirana 3 External Flash memory.

The tool shall be designed to run on windows XP and Windows 7 OS.

Tool GUI design to be finalized & agreed prior to development.

CCC parameters shall be selectable via GUI, and the options available (parameters, values, names) will be configurable via a program data file (e.g. INI, XML).

To create a Release ESE/ANC Calibration VBF, the user must:
a. Select ESE profile images (image details e.g. GUID will be loaded and displayed)
b. Select valid CCC values for each ESE/ANC profile image
c. Enter VBF Part number
d. Export to VBF
The tool will not be able to load or edit existing ESE/ANC profile VBF files.
The tool shall be able to SAVE and LOAD a project file, containing all vehicle configurations and ESE/ANC profiles and their connections.

The tool shall also allow exchanging an already connected ESE/ANC profile with a new one, without losing the vehicle configuration connections.

The tool shall also allow exchanging an already vehicle configuration connected with a new one, without losing the ESE/ANC profile connections.

The tool shall support as well a basic consistency check, to issue a warning if a NO vehicle config is connected to one or more of the ESE/ANC profiles.

The tool shall create a VBF file, where the payload includes
a. VBF header (includes user-configurable part number, and content information added as comments)
b. Single or Multiple ESE/ANC dataset images (as exported from MKlang)
c. Information and CCC parameters for each ESE/ANC dataset image
d. Any additional data as required by the SBL to successfully flash the images

5 Appendix: Reference Documents

Reference #	Document Title
1	
2	
3	
4	
5	