



**Research & Vehicle Technology**  
**“Infotainment Systems Product Development”**

**Feature – Bezel Diagnostics**

**APIM Infotainment Subsystem Part Specific  
Specification (SPSS)**

Version 1.7

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Version Date: February 13, 2019

**FORD CONFIDENTIAL**



## Revision History

Date	Version	Notes	
May 30, 2013	1.0	Initial Release	
October 15, 2013	1.1		
	DIAG-GREQ-304169-1-AAM module		<jmyslin2 Oct 10, 2013> Added requirement for when AAM module present
December 10, 2014	1.2		
	DIAG-FRD-REQ-016476/B-Bezel Diagnostics (TcSE ROIN-291321-1)		<jmyslin2 / Hans-Christian Zubert> Update Bezel Diagnostics SPSS to include LIN ICP part number interface
	DIAG-SR-REQ-103696/A-LIN ICP Part Number during Bezel Diagnostics		<jmsylin2> New Bezel Diagnostic requirement when have a LIN ICP for displaying part numbers
June 4, 2015	1.3		
	DIAG-SR-REQ-115757/A-Request and Response of HWPN (PCB)		hzubert - modified SupplierID and FunctionID in example to wildcard values.
	DIAG-SR-REQ-115758/A-Request and Response of SWPN		hzubert - modified SupplierID and FunctionID in example to wildcard values.
	DIAG-FUN-REQ-164015/A-Bezel Diagnostics - I2C over LVDS+		<Jason Myslinski / Hans-Christian Zubert> New Bezel Diagnostics function for I2C over LVDS
May 7, 2018	1.4		
	DIAG-FUN-REQ-273205/A-Bezel Diagnostics - SOA (Ethernet)		<jmyslin2> Initial release of SOA / Ethernet Bezel Diagnostics. New function for FNV2 SYNC, TCU and ECG Bezel Diagnostics over SOA / Ethernet. All requirements in this function are new for this initial release of SOA Bezel Diagnostics.
	473234/A-Interface Requirements - SOA Bezel Diagnostics		473234/A-Interface Requirements - SOA Bezel Diagnostics
	MD-REQ-275119/F-getTcuBezelDiagnosticData		<jmyslin2> Logical API MD for TCU SOA Bezel Diagnostics
	MD-REQ-275359/F-getEcgBezelDiagnosticData		<jmyslin2> Logical API MD for ECG SOA Bezel Diagnostics
	MD-REQ-277459/A-Bezel_Diagnostic.Rq		<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-277675/A-AHU_Bezel_Diag.St+		<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-277746/A-DSP_Bezel_Diag.St+		<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-277747/A-EFP_Bezel_Diag.St+		<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-278042/A-AHU_Bezel_Diag_Data+		<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-278042/B-AHU_Bezel_Diag_Data		<jmyslin2> Grammar update only. No content change
	MD-REQ-278043/A-DSP_Bezel_Diag_Data		<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-278044/A-EFP_Bezel_Diag_Data		<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-276458/A-Vehicle_Speed.St+		<jmyslin2> created MD
	MD-REQ-276458/B-Vehicle_Speed.St		<jmyslin2> MD clarification
	MD-REQ-276459/A-Vehicle_Speed_QF		<jmyslin2> created MD
	DIAG-FUN-REQ-016450/B-Bezel Diagnostic Session Entry Conditions (TcSE ROIN-291280-1)		<jmyslin2> No update, revision number accidently revised with no changes
	IFS-MMI2C-SR-REQ-140624/B-0x31 Core Assembly FPN+		"<joravec4>
	IFS-MMI2C-SR-REQ-140624/C-0x31 Core Assembly FPN		<hzubert> Generalized wording
	IFS-MMI2C-SR-REQ-140625/B-0x32 Delivery Assembly FPN+		"<joravec4>
	IFS-MMI2C-SR-REQ-140625/C-0x32 Delivery Assembly FPN		<hzubert> Generalized wording



IFS-MMI2C-SR-REQ-140626/B-0x33 Software FPN+	"<joravec4>
IFS-MMI2C-SR-REQ-140626/C-0x33 Software FPN	<hzubert> Generalized wording
IFS-MMI2C-SR-REQ-140627/B-0x34 Serial Number+	"<joravec4>
IFS-MMI2C-SR-REQ-140627/C-0x34 Serial Number	<hzubert> Generalized wording
IFS-MMI2C-SR-REQ-140628/B-0x35 Main Calibration Data FPN+	"<joravec4>
IFS-MMI2C-SR-REQ-140628/C-0x35 Main Calibration Data FPN	<hzubert> Generalized wording

September 7, 2018

1.5

DIAG-CLD-REQ-311960/A-Bezel Diagnostic Server - AHU (APIM V2)	<jmyslin2> Requirements apply only to SYNC 4.1 when AHU functionality is integrated into SYNC
DIAG-FUR-REQ-311961/A-Diagnostics - integrated AHU functionality (APIM v2)	<jmyslin2> Applies to SYNC 4.1 when AHU functionality is integrated into SYNC.
481093/B-Bezel Diagnostics Interface Requirements - SOA	<jmyslin2> added class descriptions, no content change
STR-055943/C-Appendix: Reference Documents (TcSE ROIN-291330)	<jmyslin2> added a couple additional references. No content change

January 31, 2019

1.6

DIAG-UC-REQ-016451/B-Bezel Diagnostics – Enter Bezel Diagnostics (TcSE ROIN-291319-1)	<jmyslin2> Updated use case to move pre-condition that a media source is active to enter bezel diagnostics
DIAG-UC-REQ-016452/B-Bezel Diagnostics – Cannot enter Bezel Diagnostics (TcSE ROIN-291320-1)	<jmyslin2> updated to remove requirement on active media source
DIAG-SR-REQ-015060/B-Entry Conditions for user initiated bezel diagnostic session (TcSE ROIN-129519-2)	<jmyslin2> Per a request by the Bezel Diagnostics Client team I updated the requirement to include flexibility so a Media Source does not always have to be active to enter bezel diagnostics

February 13, 2019

1.7

DIAG-UC-REQ-016454/C-Bezel Diagnostics – Exit Bezel Diagnostics (TcSE ROIN-291079-1)	<jmyslin2> Updated to include higher priority feature in use case
DIAG-SR-REQ-015063/C-Exit Conditions for Bezel Diagnostics (TcSE ROIN-129521-3)	<jmyslin2> updated to include higher priority feature
DIAG-UC-REQ-016454/C-Bezel Diagnostics – Exit Bezel Diagnostics (TcSE ROIN-291079-1)	<jmyslin2> Updated to include higher priority feature in use case



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# 1 Architectural Design - CAN

All Infotainment components shall support module diagnostics as defined in the Global Diagnostic Specification (Part I) and Infotainment Diagnostic Specification (IDS). This section only covers Bezel Diagnostics.

## Definitions:

Bezel Diagnostic Default Session: Bezel Diagnostic display for selecting specific component Bezel Diagnostic tests.

### 1.1 DIAG-CLD-REQ-015050/A-Bezel Diagnostic Client (TcSE ROIN-202564-1)

The Bezel Diagnostic Client is the interface and control for the Bezel Diagnostic function

### 1.2 DIAG-CLD-REQ-016469/A-Bezel Diagnostic Server (TcSE ROIN-202563-1)

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation

### 1.3 DIAG-CLD-REQ-311960/A-Bezel Diagnostic Server - AHU (APIM V2)

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation

#### 1.3.1 DIAG-FUR-REQ-311961/A-Diagnostics - integrated AHU functionality (APIM v2)

#### AHU Diagnostics

The AHU shall support the following diagnostic routines when requested:

1. Speaker Walk Around
2. Signal Strength
3. Software Part Number
4. Hardware Part Number
5. Calibration Part Number
6. SDARS ESN

#### Speaker Walk Around

This function shall execute vehicle speaker walk around test utilizing an internally generated 1-KHz tones on the main, ~~a~~ center image channels, and ~~a 60-Hz tone on the~~ subwoofer channels. Refer to the applicable Infotainment Diagnostic Specification for the frequencies of the tones used to test each channel.

Speaker walk around test sequence LF, RF, RR, LR, Aux1 (if applicable), Aux2 (if applicable) for 1.5 seconds each and shall display the speaker being tested on the display. The volume shall be defaulted to volume step 9-8 and the volume knob shall adjust the volume in speaker walk around.

The AHU shall transmit the name of each speaker to the proper display device(s) as its being tested during the speaker walk-around test. The following table outlines the text that shall be transmitted when the associated output channel is tested.

<u>Channel Under Test</u>	<u>Display Text</u>
<u>LF Door</u>	<u>LF DOOR</u>
<u>LF Tweeter</u>	<u>LF TWEETER</u>
<u>RF Door</u>	<u>RF DOOR</u>
<u>RF Tweeter</u>	<u>RF TWEETER</u>
<u>RR Door</u>	<u>RR DOOR</u>
<u>LR Door</u>	<u>LR DOOR</u>
<u>Aux 1</u>	<u>AUX 1</u>
<u>Aux 2</u>	<u>AUX 2</u>



**Signal Strength**

This function shall enable the viewing of the AHU signal strength via the vehicle display. The display shall be updated every 5 seconds with the 5 second average. The range is 0 to 255 in the units dBuv.

The AHU shall display the current station's radio signal strength.

**Software Part Number**

This function shall enable the viewing AHU software part number via the vehicle display.

**Hardware Part Number**

This function shall enable the viewing AHU hardware part number via the vehicle display.

**Calibration Part Number**

This function shall enable the viewing AHU calibration part number via the vehicle display.

**SDARS ESN**

This function shall enable the viewing AHU SDARS ESN via the vehicle display.

**1.4 Bezel Diagnostics Interface Requirements****1.4.1 DIAG-IIR-REQ-015049/B-Bezel Diagnostics Interface Requirements (TcSE ROIN-129515-3)****1.4.1.1 MD-REQ-277459/A-Bezel\_Diagnostic.Rq**

**Message Type:** Request

Request signal from the Diagnostic Client to the Diagnostic Server indicating if Bezel Diagnostics is active and what function to perform

Logical Signal Name		Literals	Value	Description
Bezel_Diagnostic.Rq	Bezel_Diag_State_Rq	Inactive	0x0	
		Active	0x1	
	Bezel_Diag_Module_Rq	Inactive	0x0	
		AHU	0x1	
		DSP AMP	0x2	Note: could be DSP AMP or AAM
		EFP		
		cont.	...	
		Reserved	0xF	
	Diagnostic_Operation_Rq	Inactive	0x0	
		Get All Background Diagnostic Request	0x1	
		Software Part Number	0x2	
		Hardware Part Number	0x3	
		Calibration Part Number	0x4	
		Speaker Walk-Around	0x5	
		SDARS ESN number	0x6	
		Signal Strength	0x7	
		Cont.	...	
		Reserved	0xF	



**1.4.1.2 MD-REQ-277675/B-AHU\_Bezel\_Diag.St****Message Type:** Status/Response

Signal from the Bezel Diagnostic Server to the Bezel Diagnostic Client indicating what function is active

Logical Signal Name	Literals	Value	Description
AHU_Bezel_Diag.St	Inactive / No Data Exists	0x0	
	Software Part Number	0x1	
	Hardware Part Number	0x2	
	Calibration Part Number	0x3	
	Speaker Walk-Around	0x4	
	SDARS ESN Number	0x5	
	Signal Strength	0x6	

**1.4.1.3 MD-REQ-277746/B-DSP\_Bezel\_Diag.St****Message Type:** Status/Response

Signal from the Bezel Diagnostic Server to the Bezel Diagnostic Client indicating what function is active

Logical Signal Name	Literals	Value	Description
DSP_Bezel_Diag.St	Inactive / No Data Exists	0x0	
	Software Part Number	0x1	
	Hardware Part Number	0x2	
	Calibration Part Number	0x3	
	Speaker Walk-Around	0x4	

**1.4.1.4 MD-REQ-277747/B-EFP\_Bezel\_Diag.St****Message Type:** Status/Response

Signal from the Bezel Diagnostic Server to the Bezel Diagnostic Client indicating what function is active

Logical Signal Name	Literals	Value	Description
EFP_Bezel_Diag.St	Inactive / No Data Exists	0x0	
	Software Part Number	0x1	
	Hardware Part Number	0x2	
	Calibration Part Number	0x3	

**1.4.1.5 MD-REQ-278042/B-AHU\_Bezel\_Diag\_Data****Message Type:** Response

A Transport Protocol Bezel Diagnostic response from the AHU Diagnostic Server to the Diagnostic Client with the information for display on the HMI output

Logical Signal Name	Literals	Value	Description
AHU_Bezel_Diag_Data	Bezel_Diag_Operation	Inactive	0x0
		Get All Background Request	0x1
		Software Part Number	0x2
		Hardware Part Number	0x3



		Calibration Part Number	0x4	
		Speaker Walk-Around	0x5	
		SDARS ESN Number	0x6	
		Signal Strength	0x7	
		Reserved	0x8 – 0xF	
	Bezel Diagnostic Data	N/A	N/A	Max 16 characters + 1 EOS for any Bezel Diagnostic Operation

**Notes:**

See TP SPSS to map AHU\_Bezel\_Diag\_Data to a CAN message

When Bezel\_Diag\_Operation = 0x1 Get All Background Request then the following diagnostic operation data will be sent in this order:

1. Software Part Number (max 16 char + 1 EOS)
2. Hardware Part Number (max 16 char + 1 EOS)
3. Calibration Part Number (max 16 char + 1 EOS)
4. SDARS ESN Number (max 16 char + 1 EOS)

When Bezel\_Diag\_Operation = 0x2 then the ASCII data will be for the Software Part Number

When Bezel\_Diag\_Operation = 0x3 then the ASCII data will be for the Hardware Part Number

When Bezel\_Diag\_Operation = 0x4 then the ASCII data will be for the Calibration Part Number

When Bezel\_Diag\_Operation = 0x5 then the ASCII data will be for the Speaker Walk-Around test

When Bezel\_Diag\_Operation = 0x6 then the ASCII data will be for the SDARS ESN Number

When Bezel\_Diag\_Operation = 0x7 then the ASCII data will be for the radio signal strength test

**1.4.1.6 MD-REQ-278043/A-DSP\_Bezel\_Diag\_Data**

**Message Type:** Response

A Transport Protocol Bezel Diagnostic response from the DSP Diagnostic Server to the Diagnostic Client with the information for display on the HMI output

Logical Signal Name		Literals	Value	Description
DSP_Bezel_Diag_Data	Bezel_Diag_Operation	Inactive	0x0	
		Get All Background Request	0x1	
		Software Part Number	0x2	
		Hardware Part Number	0x3	
		Calibration Part Number	0x4	
		Speaker Walk-Around	0x5	
		Reserved	0x6 – 0xF	
	Bezel Diagnostic Data	N/A	N/A	Max 16 characters + 1 EOS for any Bezel Diagnostic Operation

**Notes:**

See TP SPSS to map DSP\_Bezel\_Diag\_Data to a CAN message

When Bezel\_Diag\_Operation = 0x1 Get All Background Request then the following diagnostic operation data will be sent in this order:

1. Software Part Number (max 16 char + 1 EOS)
2. Hardware Part Number (max 16 char + 1 EOS)
3. Calibration Part Number (max 16 char + 1 EOS)

When Bezel\_Diag\_Operation = 0x2 then the ASCII data will be for the Software Part Number

When Bezel\_Diag\_Operation = 0x3 then the ASCII data will be for the Hardware Part Number

When Bezel\_Diag\_Operation = 0x4 then the ASCII data will be for the Calibration Part Number

When Bezel\_Diag\_Operation = 0x5 then the ASCII data will be for the Speaker Walk-Around test

**1.4.1.7 MD-REQ-278044/A-EFP\_Bezel\_Diag\_Data**

**Message Type:** Response

A Transport Protocol Bezel Diagnostic response from the EFP Diagnostic Server to the Diagnostic Client with the information for display on the HMI output

Logical Signal Name		Literals	Value	Description
EFP_Bezel_Diag_Data	Bezel_Diag_Operation	Inactive	0x0	
		Get All Background Request	0x1	
		Software Part Number	0x2	
		Hardware Part Number	0x3	
		Calibration Part Number	0x4	
		Reserved	0x5 – 0xF	
	Bezel Diagnostic Data	N/A	N/A	Max 16 characters + 1 EOS for any Bezel Diagnostic Operation

**Notes:**

See TP SPSS to map EFP\_Bezel\_Diag\_Data to a CAN message

When Bezel\_Diag\_Operation = 0x1 Get All Background Request then the following diagnostic operation data will be sent in this order:

1. Software Part Number (max 16 char + 1 EOS)
2. Hardware Part Number (max 16 char + 1 EOS)
3. Calibration Part Number (max 16 char + 1 EOS)

When Bezel\_Diag\_Operation = 0x2 then the ASCII data will be for the Software Part Number

When Bezel\_Diag\_Operation = 0x3 then the ASCII data will be for the Hardware Part Number

When Bezel\_Diag\_Operation = 0x4 then the ASCII data will be for the Calibration Part Number

**1.4.1.8 MD-REQ-276458/B-Vehicle\_Speed.St**

**Message Type:** Status



Signal with the current status of the Vehicle Speed

Logical Signal Name	Literals	Value	Description
Vehicle_Speed.St	See info-CAN database for signal details	See info-CAN database for signal details	

#### 1.4.1.9 MD-REQ-276459/A-Vehicle\_Speed\_QF

Message Type: Status

Signal with the Vehicle Speed Quality Factor

Logical Signal Name	Literals	Value	Description
Vehicle_Speed_QF	Faulty	0x0	
	No_Data_Exists	0x1	
	Not_Within_Specifications	0x2	
	OK	0x3	

## 1.5 Bezel Diagnostics Interface Requirements - SOA

### 1.5.1 DIAG-CLD-REQ-273355/A-Bezel Diagnostic Server - SOA (TCU)

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation

### 1.5.2 DIAG-CLD-REQ-278463/A-Bezel Diagnostic Client - SOA

The Bezel Diagnostic Client is the interface and control for the Bezel Diagnostic function

### 1.5.3 DIAG-CLD-REQ-278390/A-Bezel Diagnostic Server - SOA (ECG)

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation

### 1.5.4 MD-REQ-275119/F-getTcuBezelDiagnosticData

This logical API is used to get the TCU Bezel Diagnostics data during a bezel diagnostic session.

	<b>Subscr. Type</b>	OnChange			
	<b>QoS Level</b>	0			
	<b>Retained</b>	No			
<b>R/O</b>	<b>Name</b>	<b>Type</b>	<b>Literals</b>	<b>Value</b>	<b>Description</b>
<b>Request</b>					
<b>Response</b>					
R	TcuProvisioningStatus	Enum			Show TCU provisioning status



			NoDataExists / Invalid	0x0	
			Factory Mode	0x1	
			Unprovisioned	0x2	
			Provisioned	0x3	
R	TcuServingCellInfoRat	Enum			Show network technology that is being used for connecting
			NoDataExists	0x0	
			LTE	0x1	
			UMTS	0x2	
			GSM	0x3	
			No Service	0x4	
R	tcuServingCellInfoNasStatus	String	-	50 chars	Show TCU registration status with circuit switched and packet switch include error codes where applicable
R	tcuServingCellInfoCellID	String	-	22 chars	Show the unique number used to identify base station that TCU is connected to
R	tcuVmcuSoftwareNumber	String	-	20 chars	Show the CAN VMCU SW version
R	tcuModemSoftwareNumber	String	-	20 chars	Show the modem SW version
R	tcuHardwarePartNumber	String	-	20 chars	Show the modem hardware part number
R	tcuEsn	String	-	20 chars	Show the Electronic Serial Number for the TCU
R	tcuIccId	String	-	20 chars	Show the unique serial number that represents the SIM
R	tcuIimeiSv	String	-	20 chars	Show the International Mobile Equipment Identity software version. It's usually unique to identify the modem
R	tcuPdpStateC&cApn	String	-	20 chars	Show command and control APN status (Active or Inactive) with error code where applicable
R	tcuPdpStateWhsApn	String	-	20 chars	Show Wireless hotspot APN status (Active or Inactive) with error code where applicable
R	tcuAdditionalInfo	String	-	1200 chars	Show any additional info that is not included in the other data/primitives in this MD and TCU decides that needs to be displayed.
R	tcuConfigurationStatus	String	-	3000 chars	Show the architecture type, Sync version, Radio version, and other systems within the vehicle that the TCU has.
R	tcuViewDtcs	String	-	4800 chars	Show a list of TCU DTCs and their functions.



O	ErrorCode	Enum			To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
				...	
				0xFFFF	

### 1.5.5 MD-REQ-275359/F-getEcgBezelDiagnosticData

This logical API is used to get the ECG Bezel Diagnostic data during a bezel diagnostic session

	<b>Subscr. Type</b>	OnChange			
	<b>QoS Level</b>	0			
	<b>Retained</b>	No			
<b>R/O</b>	<b>Name</b>	<b>Type</b>	<b>Literals</b>	<b>Value</b>	<b>Description</b>
<b>Request</b>					
<b>Response</b>					
R	EcgProvisioningStatus	Enum			
			NoDataExists	0x0	No entry from ECG
			Factory	0x1	Provisioning process has not started- ECG not configured
			Unprovisioned	0x2	ECG is configured and about to start provisioning process
			Waiting for ECG provisioning response	0x3	ECG has sent the first provisioning message and waiting for cloud ACK
			Waiting for TCU provisioning response	0x4	ECG has send the second provisioning alert and waiting for cloud ACK
			Waiting for Home URL	0x5	ECG has received all ACKs and waiting for to receive Home URL
			Connecting to Home URL	0x6	ECG is connecting to Home URL
			Waiting for Auth	0x7	ECG is waiting to be authorized (ECG, TCU provisioned and OK to be released)
			Authorized	0x8	ECG is customer authorized
R	ecgESN	String	-	10 chars	ECG Electronic Serial Number



R	ecgHardwarePartNumber	String	-	20 chars	ECG Hardware Assembly number
R	ecgApSoftwarePartNumber	String	-	20 chars	ECG Application Processor Part Number
R	ecgVmcuConfigPartNumber	String	-	20 chars	ECG CAN Processor Part Number
R	ecgAPConfigPartNumber	String	-	20 chars	ECG Application Processor Configuration Number
R	ecgVmcuSoftwarePartNumber	String	-	20 chars	ECG CAN processor Configuration Number
R	ecgApplicationPartNumber	String	-	1000 chars	List of all installed applications on the ECG
R	ecgConnectionStatus	String	-	20 chars	ECG-SDN connection status
R	ecgProcessorUsage	String	-	6 chars	% usage of AP processor
R	ecgFlashMemoryUsage	String	-	6 chars	% usage of flash memory
	ErrorCode	Enum			To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
				...	
				0xFFFF	





## 2 Architectural Design - LIN

### 2.1 DIAGv2-CLD-REQ-117487/A-LIN Bezel Diagnostic Client

The Bezel Diagnostic Client is the interface and control for the Bezel Diagnostic function

### 2.2 DIAGv2-CLD-REQ-117488/A-LIN Bezel Diagnostic Server

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation

### 2.3 LIN Serial Number Interface

This interface shall be used in parallel and equivalent to LIN part number readout described in LIN Data Link and Physical Layer specification.

Each digit of the serial number is transferred in hex format in one signal and is not ASCII coded.

#### 2.3.1 DIAG-SR-REQ-117486/A-LIN Serial Number Interface

LINStatus (ICPLINStatus)	Method for error reporting	See LIN Data Link and Physical Layer for further information (Chapter "Ford Standard Error Reporting")
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SerialNumber00 (ICPSrNrDigit00)	Method for transferring 1 <sup>st</sup> digit of the year e.g. "2" of year 2014	0x0: not used 0x1: 1 0x2: 2 0x3 – 0xF: not used
---------------------------------	--	--

SerialNumber01 (ICPSrNrDigit01)	Method for transferring 2 <sup>nd</sup> digit of the year e.g. "0" of year 2014	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used
---------------------------------	--	---

SerialNumber02 (ICPSrNrDigit02)	Method for transferring 3 <sup>rd</sup> digit of the year e.g. "1" of year 2014	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7
---------------------------------	--	--



		0x8: 8 0x9: 9 0xA – 0xF: not used
SerialNumber03 (ICPSrNrDigit03)	Method for transferring 4 <sup>th</sup> digit of the year e.g. "4" of year 2014	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used
SerialNumber04 (ICPSrNrDigit04)	Method for transferring 1 <sup>st</sup> digit of the month e.g. "1" of month December (->12)	0x0: 0 0x1: 1 0x2 – 0xF: not used
SerialNumber05 (ICPSrNrDigit05)	Method for transferring 2 <sup>nd</sup> digit of the month e.g. "2" of month December (->12)	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used
SerialNumber06 (ICPSrNrDigit06)	Method for transferring 1 <sup>st</sup> digit of the day e.g. "0" of day 05	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4 – 0xF: not used
SerialNumber07 (ICPSrNrDigit07)	Method for transferring 2 <sup>nd</sup> digit of the day e.g. "5" of day 05	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used



SerialNumber08 (ICPSrNrDigit08)	Method for transferring 1 <sup>st</sup> digit of the hour e.g. "1" of time 13:40:52	0x0: 0 0x1: 1 0x2: 2 0x3 – 0xF: not used
SerialNumber09 (ICPSrNrDigit09)	Method for transferring 2 <sup>nd</sup> digit of the hour e.g. "3" of time 13:40:52	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used
SerialNumber10 (ICPSrNrDigit10)	Method for transferring 1 <sup>st</sup> digit of the minute e.g. "4" of time 13:40:52	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6 – 0xF: not used
SerialNumber11 (ICPSrNrDigit11)	Method for transferring 2 <sup>nd</sup> digit of the minute e.g. "0" of time 13:40:52	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used
SerialNumber12 (ICPSrNrDigit12)	Method for transferring 1 <sup>st</sup> digit of the second e.g. "5" of time 13:40:52	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6 – 0xF: not used
SerialNumber13 (ICPSrNrDigit13)	Method for transferring 2 <sup>nd</sup> digit of the second e.g. "2" of time 13:40:52	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used



## 2.4 LIN Extended Part Numbers Interface

### 2.4.1 DIAG-IIR-REQ-115763/A-LIN MasterReqXx

MasterReqXx (MasterReqXx)  Ex. MasterReqB0, MasterReqB1,...	Method for transferring data like hardware part number and software part number.	See "DIAG-FUN-REQ-115753/A-Bezel Diagnostics LIN Extended Part Number Readout" in this specification
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### 2.4.2 DIAG-IIR-REQ-115764/A-LIN SlaveRespXx

SlaveRespXx (SlaveRespXx)  Ex. SlaveRespB0, SlaveRespB1,...	Method for transferring data like hardware part number and software part number.	See "DIAG-FUN-REQ-115753/A-Bezel Diagnostics LIN Extended Part Number Readout" in this specification
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### 3 Architectural Design - I2C over LVDS

#### 3.1 DIAG-CLD-REQ-163996/A-I2C Bezel Diagnostic Client

The Bezel Diagnostic Client is the interface and control for the Bezel Diagnostic function and is located in the I2C Master.

#### 3.2 DIAG-CLD-REQ-163997/A-I2C Bezel Diagnostic Server

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation and is located in the I2C Slave.



## 4 Architectural Design - SOA\_Ethernet

### 4.1 DIAG-CLD-REQ-278463/A-Bezel Diagnostic Client - SOA

The Bezel Diagnostic Client is the interface and control for the Bezel Diagnostic function

### 4.2 DIAG-CLD-REQ-278390/A-Bezel Diagnostic Server - SOA (ECG)

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation

### 4.3 DIAG-CLD-REQ-273355/A-Bezel Diagnostic Server - SOA (TCU)

The Bezel Diagnostic Server is responsible for performing the requested Bezel Diagnostic operation

## 4.4 Interface Requirements - SOA Bezel Diagnostics

### 4.4.1 MD-REQ-275119/F-getTcuBezelDiagnosticData

This logical API is used to get the TCU Bezel Diagnostics data during a bezel diagnostic session.

Request					
	Subscr. Type	OnChange			
	QoS Level	0			
	Retained	No			
R/O	Name	Type	Literals	Value	Description
Request					
Response					
R	TcuProvisioningStatus	Enum			Show TCU provisioning status
			NoDataExists / Invalid	0x0	
			Factory Mode	0x1	
			Unprovisioned	0x2	
			Provisioned	0x3	
R	TcuServingCellInfoRat	Enum			Show network technology that is being used for connecting
			NoDataExists	0x0	
			LTE	0x1	
			UMTS	0x2	
			GSM	0x3	
			No Service	0x4	
R	tcuServingCellInfoNasStatus	String	-	50 chars	Show TCU registration status with circuit switched and packet switch include error codes where applicable
R	tcuServingCellInfoCellID	String	-	22 chars	Show the unique number used to identify base station that TCU is connected to



R	tcuVmcuSoftwareNumber	String	-	20 chars	Show the CAN VMCU SW version
R	tcuModemSoftwareNumber	String	-	20 chars	Show the modem SW version
R	tcuHardwarePartNumber	String	-	20 chars	Show the modem hardware part number
R	tcuEsn	String	-	20 chars	Show the Electronic Serial Number for the TCU
R	tcuIccId	String	-	20 chars	Show the unique serial number that represents the SIM
R	tcuImeiSv	String	-	20 chars	Show the International Mobile Equipment Identity software version. It's usually unique to identify the modem
R	tcuPdpStateC&cApn	String	-	20 chars	Show command and control APN status (Active or Inactive) with error code where applicable
R	tcuPdpStateWhsApn	String	-	20 chars	Show Wireless hotspot APN status (Active or Inactive) with error code where applicable
R	tcuAdditionalInfo	String	-	1200 chars	Show any additional info that is not included in the other data/primitives in this MD and TCU decides that needs to be displayed.
R	tcuConfigurationStatus	String	-	3000 chars	Show the architecture type, Sync version, Radio version, and other systems within the vehicle that the TCU has.
R	tcuViewDtcs	String	-	4800 chars	Show a list of TCU DTCs and their functions.
O	ErrorCode	Enum			To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
				...	
				0xFFFF	

#### 4.4.2 MD-REQ-275359/F-getEcgBezelDiagnosticData

This logical API is used to get the ECG Bezel Diagnostic data during a bezel diagnostic session

	<b>Subscr. Type</b>	OnChange
	<b>QoS Level</b>	0
	<b>Retained</b>	No





R/O	Name	Type	Literals	Value	Description
<b>Request</b>					
<b>Response</b>					
R	EcgProvisioningStatus	Enum			
			NoDataExists	0x0	No entry from ECG
			Factory	0x1	Provisioning process has not started- ECG not configured
			Unprovisioned	0x2	ECG is configured and about to start provisioning process
			Waiting for ECG provisioning response	0x3	ECG has sent the first provisioning message and waiting for cloud ACK
			Waiting for TCU provisioning response	0x4	ECG has send the second provisioning alert and waiting for cloud ACK
			Waiting for Home URL	0x5	ECG has received all ACKs and waiting for to receive Home URL
			Connecting to Home URL	0x6	ECG is connecting to Home URL
			Waiting for Auth	0x7	ECG is waiting to be authorized (ECG, TCU provisioned and OK to be released)
			Authorized	0x8	ECG is customer authorized
R	ecgESN	String	-	10 chars	ECG Electronic Serial Number
R	ecgHardwarePartNumber	String	-	20 chars	ECG Hardware Assembly number
R	ecgApSoftwarePartNumber	String	-	20 chars	ECG Application Processor Part Number
R	ecgVmcuConfigPartNumber	String	-	20 chars	ECG CAN Processor Part Number
R	ecgAPConfigPartNumber	String	-	20 chars	ECG Application Processor Configuration Number
R	ecgVmcuSoftwarePartNumber	String	-	20 chars	ECG CAN processor Configuration Number
R	ecgApplicationPartNumber	String	-	1000 chars	List of all installed applications on the ECG
R	ecgConnectionStatus	String	-	20 chars	ECG-SDN connection status
R	ecgProcessorUsage	String	-	6 chars	% usage of AP processor
R	ecgFlashMemoryUsage	String	-	6 chars	% usage of flash memory



	ErrorCode	Enum			To indicate a feature specific error code (see IVI-SOA-FUR-REQ-277456)
			No Error	0x000	
			Response Time Error	0x001	
			Cancel Time Error	0x002	
				...	
				0xFFFF	



## 5 General Requirements

### 5.1 DIAG-SR-REQ-103696/A-LIN ICP Part Number during Bezel Diagnostics

ICP Assembly, Hardware, Software and Serial Number part number(s) are sent over LIN to the Bezel Diagnostics Client.

If ICP button panel is LIN based then:

- the LIN protocol supports sending the Assembly part number and the Serial Number using SAE standard (See “LIN Data Link and Physical Layer” spec), and
- sending the Software and Hardware part number as described in this Bezel Diagnostics SPSS function “DIAG-FUN-REQ-115753-Bezel Diagnostics LIN Extended Part Number Readout”

The Bezel Diagnostic Client shall display the LIN ICP part numbers when showing the ICP part number(s) screen in bezel diagnostics (can use the EFP part number HMI screen if needed).

If the Bezel Diagnostic HMI just has 3 slots that displays the Software Part Number, Hardware Part Number and Calibration Part Number then the following ICP LIN part numbers shall be used for those Bezel Diagnostics HMI display:

1. Software Part Number HMI displays ICP Software part number
2. Hardware Part Number HMI displays the ICP Hardware part number
3. Calibration Part Number HMI displays the ICP Assembly part number

Note: it is preferred if all 4 part numbers could be shown in bezel diagnostics HMI but if not the 3 above shall be used.



## 6 Functional Definition

### 6.1 DIAG-FUN-REQ-016449/A-Bezel Diagnostic Get All Background Diagnostic Request during Initialization (TcSE ROIN-291276-1)

#### 6.1.1 DIAG-SR-REQ-015054/B-Bezel Diagnostic Client Get All Background Diagnostic Request initialization (TcSE ROIN-129499-1)

Upon system start-up the Bezel Diagnostic Client shall set the signal `_Bezel_Diagnostic.Rq : Diagnostic_Operation.Rq == "Get All Background Diagnostic Request"` and request from the Bezel Diagnostic Servers the following information:

1. Software Part Number
2. Hardware Part Number
3. Calibration Part Number
4. SDARS ESN Number (applicable only to SDARS server)

**Note:**

user initiated Bezel Diagnostic events shall take priority over non-user activated events. For example at start-up if the user initiates a speaker walk-around event with `Bezel_Diag_State_Rq = Active` then the Bezel Diagnostic Client wouldn't initiate a request for "Get All Background Diagnostic Request" while speaker walk-around was occurring.

#### 6.1.2 DIAG-SR-REQ-015055/A-Bezel Diagnostic Client storing Bezel Diagnostic Background Diagnostic Request data (TcSE ROIN-129516-1)

Upon the Bezel Diagnostic Client receiving the diagnostic information (TP data) the Bezel Diagnostic Client shall store this information to be displayed during a Bezel Diagnostics session.

#### 6.1.3 DIAG-SR-REQ-015056/A-Bezel Diagnostic Server response during a Get All Background Diagnostic request (TcSE ROIN-205229-1)

The Bezel Diagnostic Servers will provide the "Get All Background Diagnostic Request" data when `_Bezel_Diagnostic.Rq : Diagnostic_Operation.Rq == "Get All Background Diagnostic Request"`.

The `_Bezel_Diag.St` periodic signal from the Bezel Diagnostic Servers remain set as inactive during a Get All Background Diagnostic Request.

The Bezel Diagnostic Client can send a Get All Background Diagnostic Request whether `Bezel_Diag_State_Rq = Active` or Inactive.

#### 6.1.4 DIAG-TMR-REQ-015057/B-T\_Diagnostic\_Request (TcSE ROIN-129518-1)

Name	Description	Units	Range	Resolution	Default
T_Diagnostic_Request	While getting the bezel diagnostic background data T_Diagnostic_Request is the max time from the Bezel Diagnostic Client receiving previous bezel diagnostic data from one Bezel Diagnostic Server until the Bezel Diagnostic Client request data from the next Bezel Diagnostic Server.  Note: Use the default value	msec	0-1000	5	75

#### 6.1.5 DIAG-SD-REQ-015058/A-Bezel Diagnostics - Get All Background Diagnostic Request during Initialization (TcSE ROIN-129508-1)

##### Scenarios

##### Scenario

The Infotainment System starts up (HMI Audio Mode turns ON) and the Bezel Diagnostic Client then requests the bezel diagnostic data

**Note:**

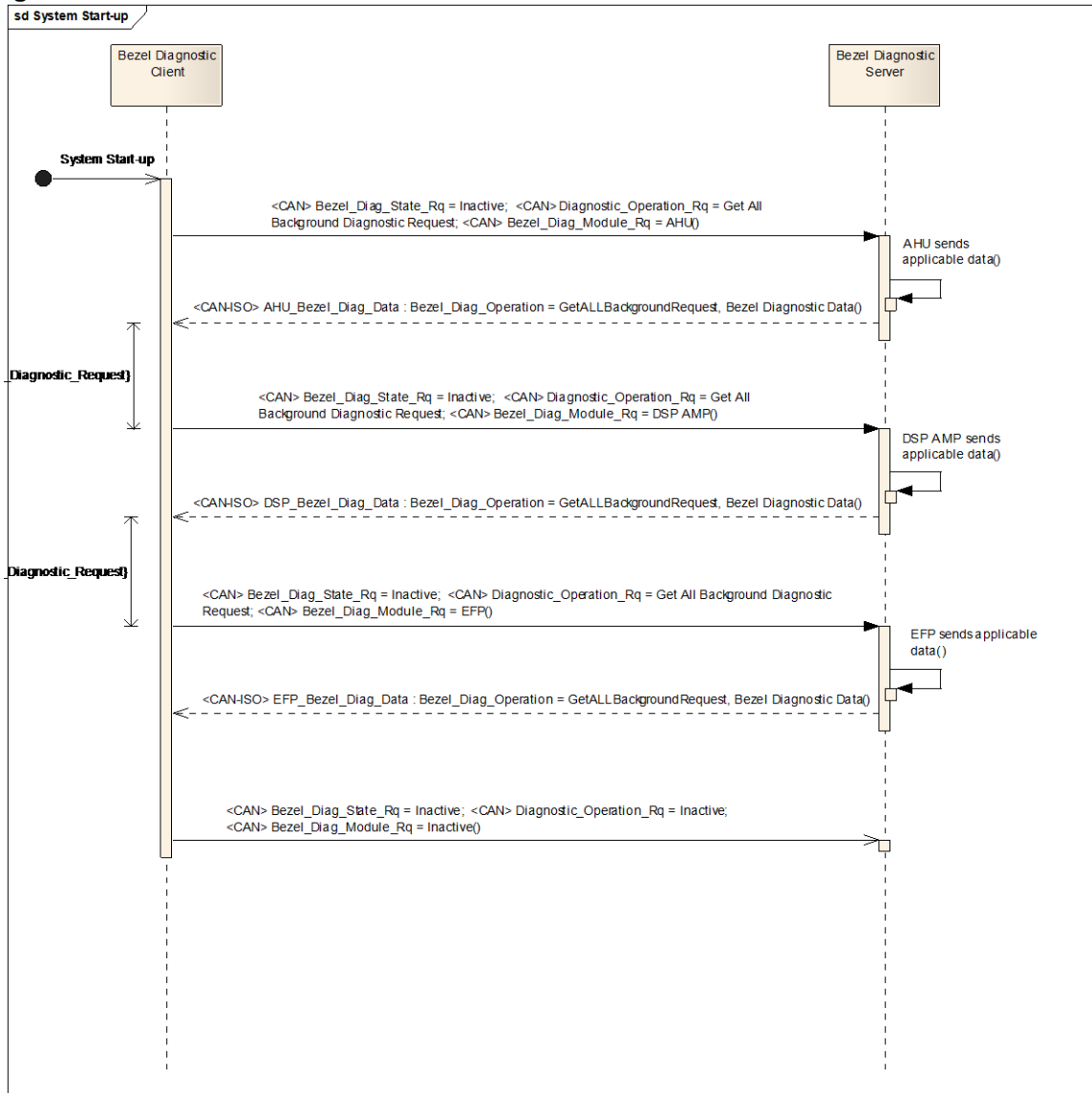
When a Get All Background Request is sent while a Bezel Diagnostic session is not active (such as system start-up) the Bezel\_Diag\_State\_Rq equals Inactive.

**Constraints****Pre-condition**

Infotainment System is OFF

**Post-condition**

Diagnostic Client has the Bezel Diagnostic ASCII data saved

**Sequence Diagram**



## 6.2 DIAG-FUN-REQ-016450/B-Bezel Diagnostic Session Entry Conditions (TcSE ROIN-291280-1)

There may be further Bezel Diagnostic Entry Conditions restrictions defined in the Use Cases, Functional Requirements and HMI for each specific diagnostic operation then what is defined below. At a minimum the following shall be met:

### 6.2.1 DIAG-UC-REQ-016451/B-Bezel Diagnostics – Enter Bezel Diagnostics (TcSE ROIN-291319-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On <del>There is an Active Media Source (AM/FM, CD, SDARS, USB...)</del> A phone call is not active <u>No other higher priority feature preventing bezel diagnostics from being entered</u>
<b>Scenario Description</b>	User presses two designated buttons as defined by the HMI
<b>Post-conditions</b>	Bezel Diagnostics is entered.  Bezel diagnostics will start speaker walk-around and if conditions not met for speaker walk-around then will enter the main bezel diagnostics screen.
<b>List of Exception Use Cases</b>	E1–DIAG-GUC-291320-1-Bezel Diagnostics – Cannot enter Bezel Diagnostics
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch) Audio OUT

### 6.2.2 DIAG-UC-REQ-016452/B-Bezel Diagnostics – Cannot enter Bezel Diagnostics (TcSE ROIN-291320-1)

#### Linked Elements

DIAG-UC-REQ-016451/B-Bezel Diagnostics – Enter Bezel Diagnostics (TcSE ROIN-291319-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On There is an Active Phone Call
<b>Scenario Description</b>	User presses two designated buttons as defined by the HMI
<b>Post-conditions</b>	Bezel Diagnostics is NOT entered.
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch) Audio OUT

### 6.2.3 DIAG-SR-REQ-015060/B-Entry Conditions for user initiated bezel diagnostic session (TcSE ROIN-129519-2)

Bezel Diagnostics can only be entered by the Bezel Diagnostic Client when the user selects <Bezel Diagnostics> via HMI and there is no Phone call or other higher priority features that are active.

- An example of higher priority feature could be Rear View Camera or any other feature the Bezel Diagnostic Client team determines is higher priority.



If no priority table for “other higher priority features” the Bezel Diagnostic Client could limit entering Bezel Diagnostic to while there is an Active Media Audio Source (ie AM/FM, CD, SDARS, Aux...) or Audio Off condition (empty audio stack). At a minimum Bezel Diagnostics shall be able to be entered whenever there is an Active Media Audio Source.

#### 6.2.4 DIAG-SR-REQ-015061/B-Bezel Diagnostic entered in Single Play (TcSE ROIN-129520-1)

A Bezel Diagnostic session can only be entered by the Bezel Diagnostic Client when the infotainment system is in Single Play.

- Note: dual play might not even be supported by the infotainment system (ie dual play for bezel diagnostics is an audio source out of the front speakers and another rear audio source out of the rear speakers at the same time).





### 6.3 DIAG-FUN-REQ-016453/A-Bezel Diagnostic Session Exit Conditions (TcSE ROIN-291277-1)

#### 6.3.1 DIAG-UC-REQ-016454/C-Bezel Diagnostics – Exit Bezel Diagnostics (TcSE ROIN-291079-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostics is Active
<b>Scenario Description</b>	Exit Bezel Diagnostics is selected by: <ul style="list-style-type: none"><li>-- Pressing the power button.</li><li>-- Pressing the &lt;Exit Bezel Diagnostics&gt; HMI button</li><li>-- The ignition status changes</li><li>-- <u>There is a higher priority feature active (ex place a phone call)</u></li></ul>
<b>Post-conditions</b>	Bezel Diagnostics is exited
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

#### 6.3.2 DIAG-SR-REQ-015063/C-Exit Conditions for Bezel Diagnostics (TcSE ROIN-129521-3)

Bezel Diagnostics shall be exited by the Bezel Diagnostic Client when the user selects <Exit Bezel Diagnostics> via the HMI, when the ignition status changes, power button press, there is a higher priority feature active (ex phone call), there is a battery disconnect or there is a Diagnostic reset via Linked based Diagnostics.



## 6.4 DIAG-FUN-REQ-016455/A-Bezel Diagnostic Speaker Walk-Around (TcSE ROIN-291278-1)

### 6.4.1 DIAG-UC-REQ-016456/A-Bezel Diagnostics – Entry Bezel Diagnostic and Speaker Walkaround (TcSE ROIN-291069-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Vehicle Speed is below 5KPH. Battery voltage between 10 and 16 volts.
<b>Scenario Description</b>	User presses two designated buttons as defined by the HMI and the display switches to Speaker Walkaround screen.
<b>Post-conditions</b>	Infotainment system speakers plays a tone for a defined period of time (covered in IDS functional specification) in a clockwise transition starting with the Driver's seat to individual speakers.  The speaker names are displayed which are playing the audio.  Display goes to main Bezel Diagnostics screen if no operator interaction or End Test is selected via HMI.
<b>List of Exception Use Cases</b>	E1- <a href="#">DIAG-GUC-291076-1-Bezel Diagnostics – Vehicle speed above 5kph during speaker walk around</a>
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch) Audio OUT

### 6.4.2 DIAG-UC-REQ-016457/A-Bezel Diagnostics – Speaker Walk Around – Entry from within Bezel Diagnostics (TcSE ROIN-291075-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Vehicle Speed is below 5KPH. Battery voltage between 10 and 16 volts. Bezel Diagnostic is active
<b>Scenario Description</b>	User selects speaker walk-around in the component bezel diagnostics submenu.
<b>Post-conditions</b>	Infotainment system speakers plays a tone for a defined period (covered in the IDS functional specification) in a clockwise transition starting with the Driver's seat to individual speakers.  The speaker names are displayed which are playing the audio.
<b>List of Exception Use Cases</b>	E1- <a href="#">DIAG-GUC-291076-1-Bezel Diagnostics – Vehicle speed above 5kph during speaker walk around</a>
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch) Audio OUT



#### 6.4.3 DIAG-UC-REQ-016458/A-Bezel Diagnostics – Vehicle speed above 5kph during speaker walk around (TcSE ROIN-291076-1)

**Linked Elements**

DIAG-UC-REQ-016456/A-Bezel Diagnostics – Entry Bezel Diagnostic and Speaker Walkaround (TcSE ROIN-291069-1)

DIAG-UC-REQ-016457/A-Bezel Diagnostics – Speaker Walk Around – Entry from within Bezel Diagnostics (TcSE ROIN-291075-1)

DIAG-UC-REQ-016451/B-Bezel Diagnostics – Enter Bezel Diagnostics (TcSE ROIN-291319-1)

DIAG-UC-REQ-016452/B-Bezel Diagnostics – Cannot enter Bezel Diagnostics (TcSE ROIN-291320-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Speaker Walkaround Active Vehicle speed is less than 5kph. Infotainment System Powered On Battery voltage between 10 and 16 volts.
<b>Scenario Description</b>	Vehicle speed increases above 5kph.
<b>Post-conditions</b>	Speaker Walkaround is exited
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

#### 6.4.4 DIAG-UC-REQ-016459/A-Bezel Diagnostics – Internal Bezel Diagnostics Speaker Walk Around Completed (TcSE ROIN-291077-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Speaker Walkaround Active Vehicle speed is less than 5kph. Infotainment System Powered On Battery voltage between 10 and 16 volts.
<b>Scenario Description</b>	User selects HMI to end speaker walkaround. Speaker Walkaround is exited
<b>Post-conditions</b>	Enter Bezel Diagnostic Component Submenu.
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

#### 6.4.5 DIAG-SR-REQ-015065/A-Speaker Walk-Around initiation at entry of Bezel Diagnostic session (TcSE ROIN-129523-2)

Speaker Walk-Around shall be the initial test requested by the Bezel Diagnostic Client when entering Bezel Diagnostics as long as the vehicle **speed** is **in-park-or-neutral** below 5kph. After the Speaker Walk-Around test is completed the Bezel Diagnostic Default Session shall be entered.

If the vehicle **speed** is **not in Park, not in Neutral, or in Neutral but** equal to or above 5kph when Bezel Diagnostics session is entered than the Bezel Diagnostic Client does not request from the Bezel Diagnostic Server the speaker walk-around test but instead the Bezel Diagnostic Default Session shall be entered.



#### 6.4.6 DIAG-SR-REQ-015066/A-Chime operation during Speaker Walk-Around (TcSE ROIN-129524-1)

Chimes are not operable during the speaker walk-around test when the infotainment system is the Chime Audio Source. The infotainment components shall not transfer control of the chimes back to the Cluster during speaker walk-around.

After the speaker walk-around test has ended the Chimes shall return to the Infotainment System.

#### 6.4.7 DIAG-SR-REQ-015067/B-Module controlling the Speaker Walk-Around function (TcSE ROIN-129525-2)

For the speaker walk-around test if there is both an AHU and DSP AMP on the vehicle at the same time then the DSP AMP shall perform the speaker walk around test.

For the speaker walk-around test if there is both an AHU and AAM (Audio Amp Module) on the vehicle at the same time then the AHU shall perform the speaker walk around test.

The Bezel Diagnostic Client shall request the proper module to perform the speaker walk-around operation.

#### 6.4.8 DIAG-SR-REQ-015068/A-Cancelling Speaker Walk-Around because vehicle in motion (TcSE ROIN-129526-1)

During the speaker walk-around test (or any test that requires audio) if the vehicle ~~speed becomes~~ is shifted out of park, or shifted out of Neutral, or in Neutral but the speed is greater than 5kph then the speaker walk-around session (or other diagnostic audio session) shall be ended by the Bezel Diagnostic Client.

The Bezel Diagnostic Client ends the test by changing the "Diagnostic\_Operation.Rq" signal so that it does not equal "Speaker Walk-Around". See requirement [DIAG-GREQ-129533-1-Bezel Diagnostic Default Session](#) for entering the Bezel Diagnostic Default Session.



## 6.5 DIAG-FUN-REQ-016460/A-Bezel Diagnostic Activation Events (TcSE ROIN-291279-1)

### 6.5.1 DIAG-UC-REQ-016461/A-Bezel Diagnostics – Main Menu (TcSE ROIN-291070-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered ON Battery voltage between 10 and 16 volts. Bezel Diagnostics is active
<b>Scenario Description</b>	Speaker Walkaround complete or exited, or Speaker Walkaround entry conditions not met when bezel diagnostics entered, or While in bezel diagnostic submenu exit out of the submenu
<b>Post-conditions</b>	Enter main menu of Bezel Diagnostics with all bezel diagnostic components listed as separate menu picks. (ex. APIM Diagnostics, Audio Diagnostics, EFP Diagnostics)
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

### 6.5.2 DIAG-UC-REQ-016462/A-Bezel Diagnostics – Module Specific Sub menu (TcSE ROIN-291071-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostics is active
<b>Scenario Description</b>	Module Component Diagnostic Submenu is selected by User.
<b>Post-conditions</b>	Module component submenu HMI is displayed (i.e. Part Numbers, SDARS ESN, Signal Strength, Speaker Walkaround)
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

### 6.5.3 DIAG-UC-REQ-016463/B-Bezel Diagnostics – Component Part Numbers (TcSE ROIN-291072-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostics is active
<b>Scenario Description</b>	Component Part Numbers Menu selected by User in Component Bezel Diag Submenu.
<b>Post-conditions</b>	HMI displays individual component Part Numbers.
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

**6.5.4 DIAG-UC-REQ-016464/A-Bezel Diagnostics – SDARS ESN (TcSE ROIN-291073-1)**

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostic is active
<b>Scenario Description</b>	The menu pick for displaying the SDARS ESN is selected by User
<b>Post-conditions</b>	HMI displays SDARS ESN
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

**6.5.5 DIAG-UC-REQ-016465/A-Bezel Diagnostics – AM/FM Signal Strength (TcSE ROIN-291074-1)**

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostics is Active Current audio mode is AM or FM.
<b>Scenario Description</b>	Signal Strength Menu selected by user
<b>Post-conditions</b>	Display value of signal strength in unit dBuV.
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

**6.5.6 DIAG-SR-REQ-015070/A-Signals to enter a Bezel Diagnostic session (TcSE ROIN-129527-1)**

When a Bezel Diagnostic Entry event occurs the Bezel Diagnostic Client shall tell Bezel Diagnostic Server(s) to enter Bezel Diagnostics mode with the signal 'Bezel\_Diag\_State\_Rq' equal to 'Active'. The default shall be set to 'Inactive' when not in Bezel Diagnostics.

**6.5.7 DIAG-SR-REQ-015071/A-Signals to identify what Bezel Diagnostic operation to perform (TcSE ROIN-129528-1)**

The Diagnostic Client Tx the Diagnostic\_Operation.Rq signal to the Diagnostic Server to identify the diagnostic operation is to be performed.

Note: if the Diagnostic Client has the user requested information stored from initialization then no request is necessary from the Diagnostic Server.

**6.5.8 DIAG-SR-REQ-015072/A-Identification of the module to perform the Bezel Diagnostic operation (TcSE ROIN-129529-1)**

The Bezel Diagnostic Client Tx the Bezel\_Diag\_Module\_Rq signal to the infotainment modules to identify the module that will be the Bezel Diagnostic Server performing the Diagnostic operation.

**6.5.9 DIAG-SR-REQ-015073/A-Initiation of Speaker Walk-Around (TcSE ROIN-129530-1)**

Upon entry into a Bezel Diagnostics session the Bezel Diagnostic Client shall set the signal Diagnostic\_Operation\_Rq equal to 'Speaker Walk-Around' if the speaker walk-around entry conditions are met. If the speaker walkaround entry conditions are not met then the Bezel Diagnostic Default Session shall be entered.

**6.5.10 DIAG-SR-REQ-015074/A-Signal to cancel a Bezel Diagnostic session (TcSE ROIN-129531-1)**

The Bezel Diagnostic Client can cancel the Bezel Diagnostic session at any time by setting the 'Bezel\_Diag\_State\_Rq' signal equal to 'Inactive'.

**6.5.11 DIAG-SR-REQ-015075/A-Bezel Diagnostic HMI Output (TcSE ROIN-129532-1)**

The Bezel Diagnostic Client shall update the HMI Output using the Transport Protocol (TP) data from the method "\_Bezel\_Diagnostic\_Data" sent from the Diagnostic Server(s).

**6.5.12 DIAG-SR-REQ-015076/A-Bezel Diagnostic Default Session (TcSE ROIN-129533-1)**

The Bezel Diagnostic Default Session shall be entered when the Diagnostic Client signals are set as follows:

1. Bezel\_Diag\_State\_Rq = Active, and
2. Diagnostic\_Operation\_Rq = Inactive, and
3. Bezel\_Diag\_Module\_Rq = Inactive

**6.5.13 DIAG-REQ-015077/A-AAM module (TcSE ROIN-304169-1)**

The AAM and DSP AMP are mutually exclusive but both support Bezel Diagnostics. The AAM uses some of the same CAN signals as the DSP AMP as defined in the CAN dB. The AAM bezel diagnostic information shall be displayed on the HMI output.

**6.5.14 Sequence Diagrams****6.5.14.1 DIAG-SD-REQ-015078/A-Bezel Diagnostics - Normal Operation (TcSE ROIN-129501-2)****Scenarios****Scenario**

User initiates a Bezel Diagnostics session

**Constraints****Pre-condition**

Bezel Diagnostics is not active

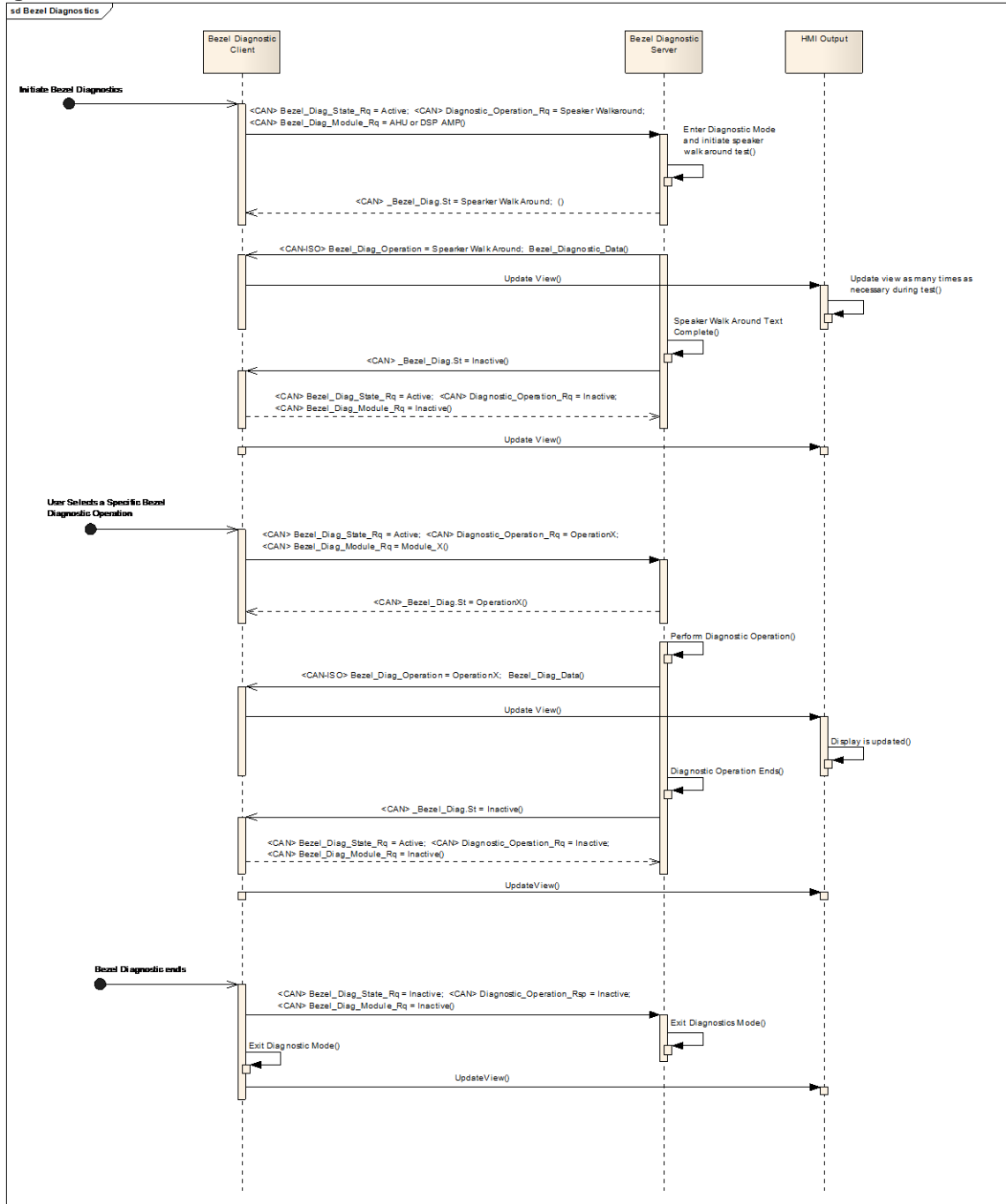
**Post-condition**

Bezel Diagnostics session ends and return to normal operation





## Sequence Diagram





## 6.6 DIAG-FUN-REQ-115753/A-Bezel Diagnostics LIN Extended Part Number Readout

### 6.6.1 DIAG-SR-REQ-115754/A-Signal Flow

Due to the fact that part number readout is not used very often on request and due to the need to reduce cycle timing for the states of the buttons an extra schedule table has been added. For activating this the Master has to switch the schedule table. While this is active no buttons, states or errors can be transmitted from the ICP to the Master but this will only occur for a short time while activating the diagnosis session on CAN.

To see an overview of how the schedule tables are defined see actual LDF-File.

If the Master requests a part number it sends this request in a SF with the ID-Field 0x3C, the NAD 0x10, the PCI 0x06; the SID 0xB2 followed by an Identifier dependent on the number (e.g. software number) it wants to have. This is followed by the Supplier and the Function IDs. These are determined by the consortium for LIN 2.x and for the ICP have to be set to 0x3B for the supplier ID LSB and to 0x00 for the MSB. The Function ID must be set to 0x08 for the LSB and 0x00 for the MSB.

If User-Defined information is requested the slave must respond in multi-frame format.

The answer frames always begin with 0x7D as ID-Field.

If the frame contains User-Defined information the first frame is of type FF followed by frames of type CF.

Frame type FF begins with a NAD of 0x10, followed by the PCI of 0x10, as only data length lower than 256 bytes is needed for this time. The next byte shows the lower 8 bytes of the length of all bytes to transfer including the RSID. The RSID itself also has a value of 0xF2. At least the first four bytes of the requested number will be coded in ASCII.

After the FF Frame only frames of type CF will follow. These begin with a NAD of 0x10, too. The next byte is the PCI. This includes a frame counter, too. So the first CF has a value of 0x21, the second 0x22 and so on. The last six bytes are only data bytes. This means the characters of the requested part numbers can be found coded in ASCII.

The total number of frames depends on the count of characters that should be transferred. Usually it will be one FF Frame followed by one or two CF-Frames.

Additional information for clarification:

The Service Identifier (SID) specifies the request that shall be performed by the slave node addressed. Here it is every time 0xB2 (Read by Identifier) as defined in the LIN consortium spec. Means we are using only 0xB2 for SID.

The Response Service Identifier (RSID) specifies the contents of the response. The RSID for a positive response is always SID + 0x40. This means we are using only 0xF2 for RSID.

### 6.6.2 DIAG-SR-REQ-115755/A-Coding of PCI

The PCI contains data described below. Examples can be found later in this document.

Type	PCI Type				Additional information			
	B7	B6	B5	B4	B3	B2	B1	B0
SF	0	0	0	0	Length			
FF	0	0	0	1	Length/256			
CF	0	0	1	0	Frame counter			

#### Structure of the PCI byte

### 6.6.3 Examples

In the following requirements are examples for each type of request with an example of an answer from the slave.

#### 6.6.3.1 DIAG-SR-REQ-115757/A-Request and Response of HWPN (PCB)

This is an example for the SF request of a HWPN (hardware part number) of the master.

Protected ID-Field has 0x3C:

MasterReq B0	MasterReq B1	MasterReq B2	MasterReq B3	MasterReqB4	MasterReqB5	MasterReqB6	MasterReqB7
-----------------	-----------------	-----------------	-----------------	-------------	-------------	-------------	-------------



NAD	PCI	SID	Identifier	Supplier ID LSB	Supplier ID MSB	Function ID LSB	Function ID MSB
0x10	0x06	0xB2	0x21	0xFF*	0x7F*	0xFF*	0xFF*

Example for request frame of HWPB

\*Supplier ID is supplier dependent but wildcards shall be used.

\*Function ID is supplier dependent but wildcards shall be used.

Related to this an ICP with the hardware number "F1ET-14F571-HA001" (no EOS!) will response with following answer (data of part number is ASCII coded):

The 1<sup>st</sup> Frame is of type FF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	LEN	RSID	D1	D2	D3	D4
0x10	0x10	0x12	0xF2	0x46	0x31	0x45	0x54

Example for 1st response frame of HWPB

The 2<sup>nd</sup> Frame is of type CF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	D1	D2	D3	D4	D5	D6
0x10	0x21	0x2D	0x31	0x34	0x46	0x35	0x37

Example for 2nd response frame of HWPB

The 3<sup>rd</sup> Frame is also of type CF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	D1	D2	D3	D4	D5	D6
0x10	0x22	0x31	0x2D	0x48	0x41	0x30	0x30

Example for 3rd response frame of HWPB

The 4<sup>th</sup> Frame is also of type CF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	D1	D2	D3	D4	D5	D6
0x10	0x23	0x31	0x00	0x00	0x00	0x00	0x00

Example for 3rd response frame of HWPB

#### 6.6.3.2 DIAG-SR-REQ-115758/A-Request and Response of SWPB

The following is an example for the SF request of a SWPB (software part number) of the master.  
Protected ID-Field has 0x3C:

MasterReq B0	MasterReq B1	MasterReq B2	MasterReq B3	MasterReqB 4	MasterReqB5	MasterReqB6	MasterReqB7
NAD	PCI	SID	Identifier	Supplier ID LSB	Supplier ID MSB	Function ID LSB	Function ID MSB
0x10	0x06	0xB2	0x22	0xFF*	0x7F*	0xFF*	0xFF*

Example for request frame of SWPB



\*Supplier ID is supplier dependent but wildcards shall be used.

\*Function ID is supplier dependent but wildcards shall be used.

Related to this an ICP with the software number "F1ET-14F565-HA001" (no EOS!) will response with following answer (data of part number is ASCII coded):

The 1<sup>st</sup> Frame is of type FF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	LEN	RSID	D1	D2	D3	D4
0x10	0x10	0x12	0xF2	0x46	0x31	0x45	0x54

Example for 1st response frame of SWPN

The 2<sup>nd</sup> Frame is also of type CF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	D1	D2	D3	D4	D5	D6
0x10	0x21	0x2D	0x31	0x34	0x46	0x35	0x36

Example for 2nd response frame of SWPN

The 3rd Frame is also of type CF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	D1	D2	D3	D4	D5	D6
0x10	0x22	0x35	0x2D	0x48	0x41	0x30	0x30

Example for 3rd response frame of SWPN

The 4th Frame is also of type CF with the protected ID 0x7D and looks like this:

SlaveRespB 0	SlaveRespB 1	SlaveRespB 2	SlaveRespB 3	SlaveRespB 4	SlaveRespB 5	SlaveRespB 6	SlaveRespB 7
NAD	PCI	D1	D2	D3	D4	D5	D6
0x10	0x23	0x31	0x00	0x00	0x00	0x00	0x00

Example for 4th response frame of SWPN



## 6.7 DIAG-FUN-REQ-164015/B-Bezel Diagnostics - I2C over LVDS

### 6.7.1 ECU Core Assembly Number

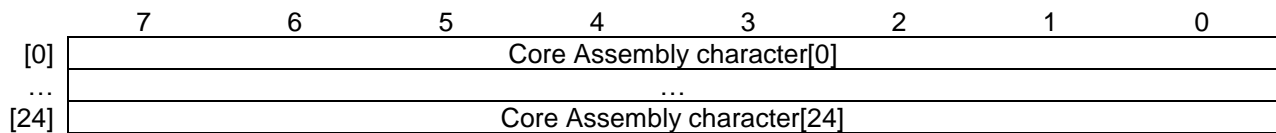
#### 6.7.1.1 *IFS-MMI2C-SR-REQ-140624/C-0x31 Core Assembly FPN*

The I<sup>2</sup>C Slave Core Assembly message provides a mechanism to transmit a Ford Part Number back to the I<sup>2</sup>C Master.

Subaddress: 0x31

Access: Read-Only

Default: n/a



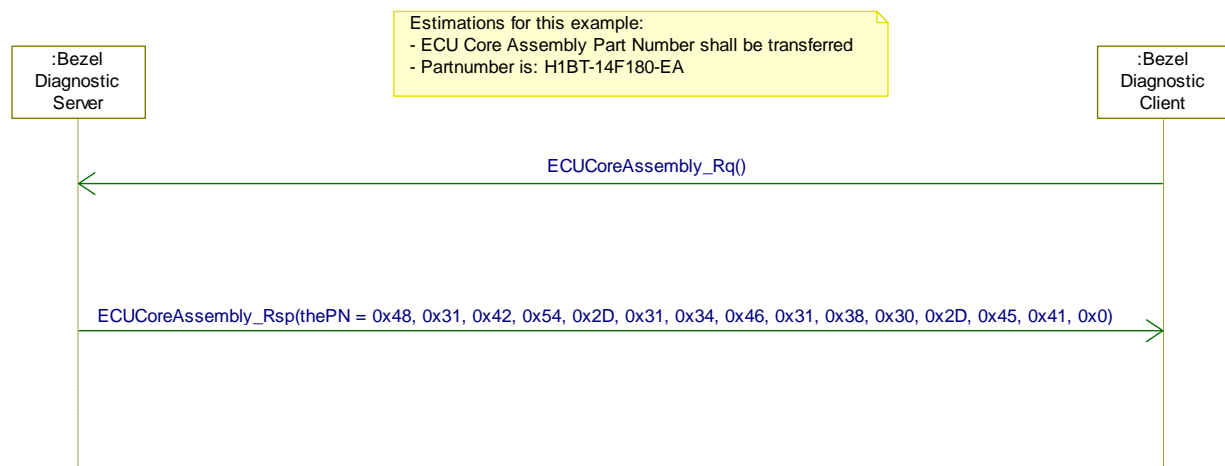
- Core Assembly: Released (or prototype) Ford Part Number  
Null-terminated string. For example "H1BT-14F180-FA".  
Maximum length 24 characters plus NULL.

The I<sup>2</sup>C Master shall read a maximum of 25 bytes, be robust to receiving non-ASCII bytes, and be robust to receiving non-NULL terminated data.

If the I<sup>2</sup>C Slave is not released with this kind of Ford Part Number, the I<sup>2</sup>C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I<sup>2</sup>C Slave would leave SDA undriven resulting in Data = 0xFF.

#### 6.7.1.2 *DIAG-SD-REQ-164017/B-Sequence example showing a core assembly part number readout in principle*

Reference requirement TBD



### 6.7.2 ECU Delivery Assembly Number

#### 6.7.2.1 *IFS-MMI2C-SR-REQ-140625/C-0x32 Delivery Assembly FPN*

The Delivery Assembly message provides a mechanism to transmit a Ford Part Number back to the I<sup>2</sup>C Master.

Subaddress: 0x32

Access: Read-Only



Default: n/a

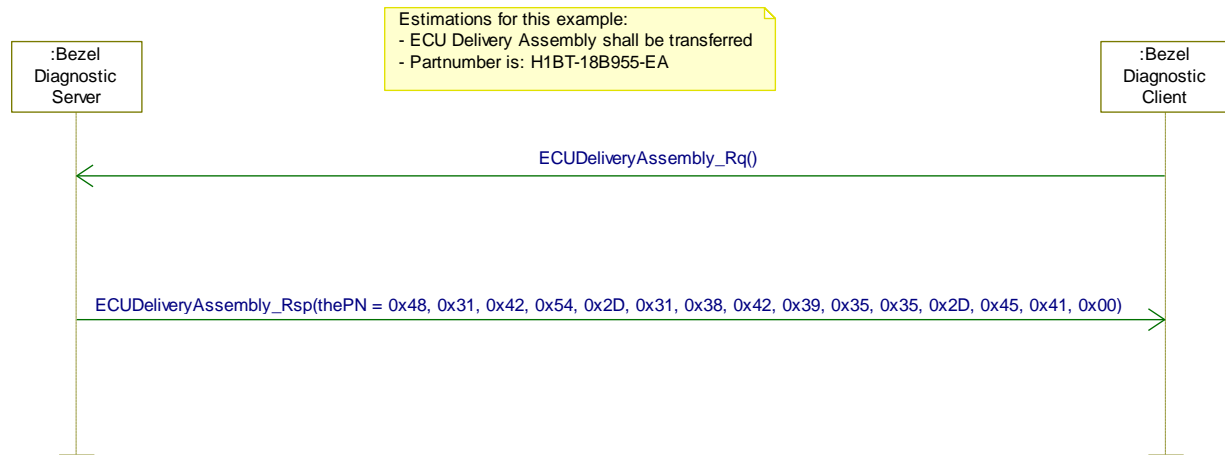
	7	6	5	4	3	2	1	0
[0]	Delivery Assembly FPN character[0]							
...	...							
[24]	Delivery Assembly FPN character[24]							

- Delivery Assembly FPN: Released (or prototype) Ford Part Number  
Null-terminated string. . For example "H1BT-18B955-FA"  
Maximum length 24 characters plus NULL.

The I<sup>2</sup>C Master shall read a maximum of 25 bytes, be robust to receiving non-ASCII bytes, and be robust to receiving non-NULL terminated data.

If the I<sup>2</sup>C Slave is not released with this kind of Ford Part Number, the I<sup>2</sup>C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I<sup>2</sup>C Slave would leave SDA undriven resulting in Data = 0xFF.

### 6.7.2.2 DIAG-SD-REQ-164016/A-Sequence example for showing delivery assembly part number readout in principle



### 6.7.3 ECU Software Part Number

#### 6.7.3.1 IFS-MMI2C-SR-REQ-140626/C-0x33 Software FPN

The Software Part Number message provides a mechanism to transmit a Ford Part Number back to the I<sup>2</sup>C Master.

Subaddress: 0x33  
Access: Read-Only  
Default: n/a

	7	6	5	4	3	2	1	0
[0]	Software FPN character[0]							
...	...							
[24]	Software FPN character[24]							

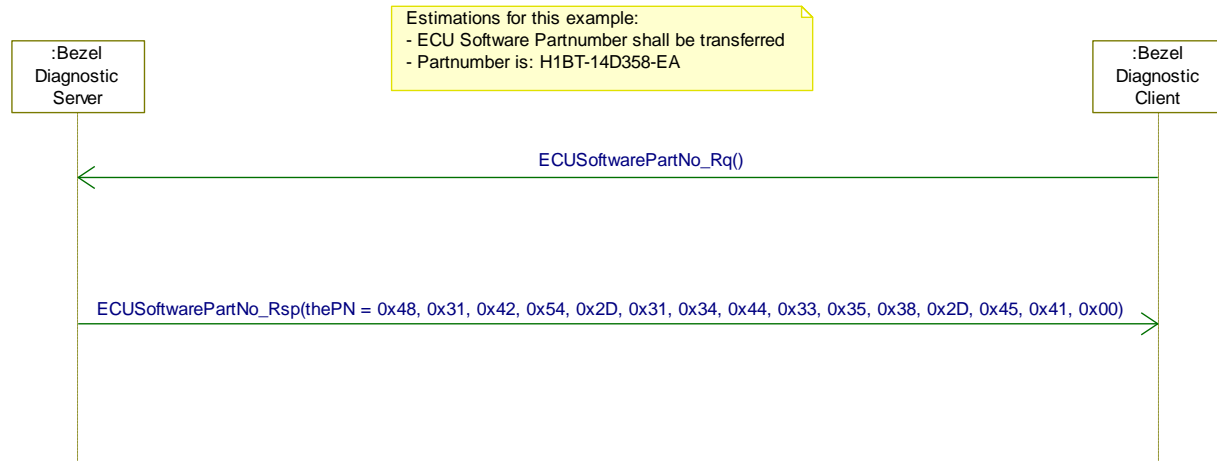
- Software FPN: Released (or prototype) Ford Part Number  
Null-terminated string. For example "H1BT-14D358-FA"  
Maximum length 24 characters plus NULL.

The I<sup>2</sup>C Master shall read a maximum of 25 bytes, be robust to receiving non-ASCII bytes, and be robust to receiving non-NULL terminated data.



If the I<sup>2</sup>C Slave is not released with this kind of Ford Part Number, the I<sup>2</sup>C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I<sup>2</sup>C Slave would leave SDA undriven resulting in Data = 0xFF.

### 6.7.3.2 DIAG-SD-REQ-164018/A-Sequence example showing a software part number readout in principle



## 6.7.4 ECU Serial Number

### 6.7.4.1 IFS-MMI2C-SR-REQ-140627/C-0x34 Serial Number

The Serial Number message provides a mechanism to transmit an electronic serial number back to the I<sup>2</sup>C Master.

Subaddress: 0x34  
Access: Read-Only  
Default Value: n/a

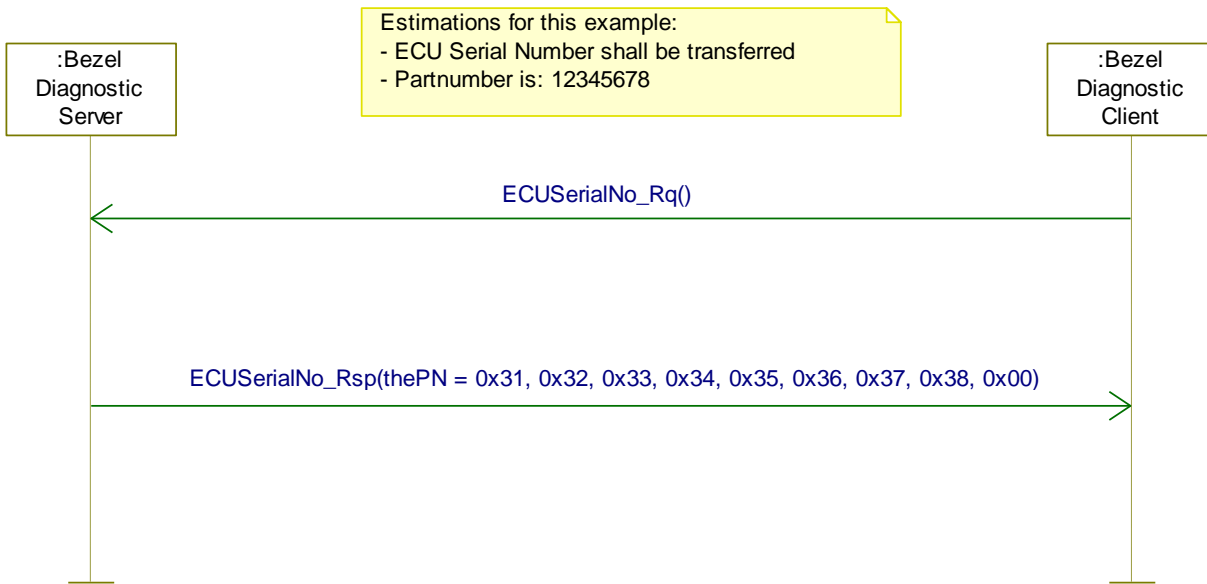
	7	6	5	4	3	2	1	0
[0]	Serial Number character[0]							
...	...							
[25]	Serial Number character[25]							

- Serial Number:  
Null-terminated string.  
Maximum length 24 characters plus NULL.

**Note:** This specification contains no functional requirement about the format of the serial number.

The I<sup>2</sup>C Master shall read a maximum of 25 bytes, be robust to receiving non-ASCII bytes, and be robust to receiving non-NULL terminated data.

If the I<sup>2</sup>C Slave contains no serial number, the I<sup>2</sup>C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I<sup>2</sup>C Slave would leave SDA undriven resulting in Data = 0xFF.

**6.7.4.2 DIAG-SD-REQ-164019/A-Sequence example showing a serial part number readout in principle****6.7.5 ECU Main Calibration Data Number****6.7.5.1 IFS-MMI2C-SR-REQ-140628/C-0x35 Main Calibration Data FPN**

The Main Calibration Data message provides a mechanism to transmit a Ford Part Number back to the I<sup>2</sup>C Master.

Subaddress: 0x35  
Access: Read-Only  
Default Value: n/a

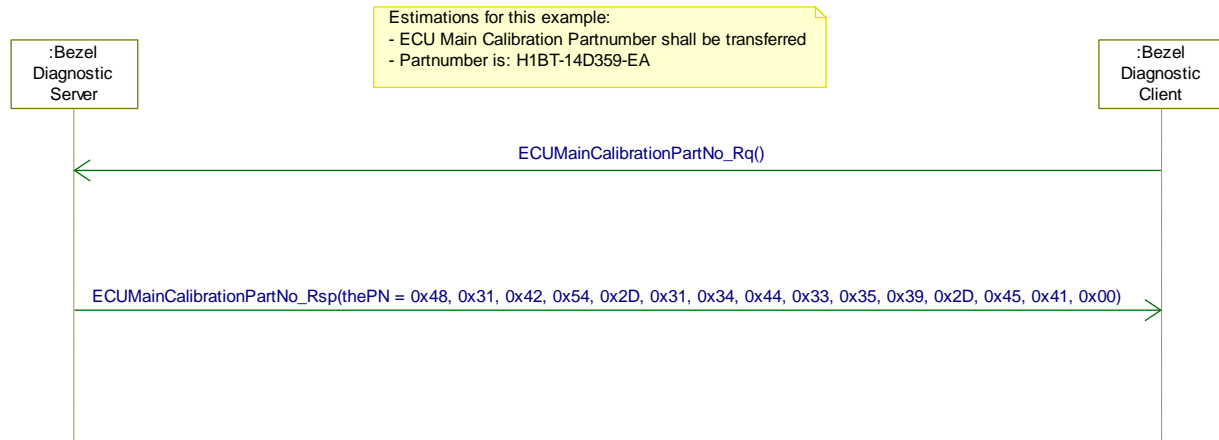
	7	6	5	4	3	2	1	0
[0]	Main Calibration Data FPN character[0]							
...	...							
[24]	Main Calibration Data FPN character[24]							

- Main Calibration Data FPN: Released (or prototype) Ford Part Number  
Null-terminated string. No example provided.  
Maximum length 24 characters plus NULL.

The I<sup>2</sup>C Master shall read a maximum of 25 bytes, be robust to receiving non-ASCII bytes, and be robust to receiving non-NULL terminated data.

If the I<sup>2</sup>C Slave is not released with this kind of Ford Part Number, the I<sup>2</sup>C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I<sup>2</sup>C Slave would leave SDA undriven resulting in Data = 0xFF.



**6.7.5.2 DIAG-SD-REQ-164293/A-Sequence example showing ECU main calibration data number in principle**



## 6.8 DIAG-FUN-REQ-273205/A-Bezel Diagnostics - SOA (Ethernet)

Note: for details of the Bezel Diagnostic Client entering and exiting bezel diagnostic reference the CAN based bezel diagnostics SPSS feature/section.

### 6.8.1 Disclaimer

Note what is in this release of the SOA Bezel Diagnostics SPSS between the TCU, ECG and SYNC is not necessarily what the SOA Platform team is going to implement in the final product. The API table has everything that needs to be sent over Ethernet between the ECG/TCU and SYNC and the requirements have additional information that needs to be included. This current version is not testable by ISDV.

- For example, the TCU (or ECG) API table in this SPSS may be broken down into multiple API's in the final implementation so that they can be used for different services and not limited to Bezel Diagnostics.

Once the final version is complete, then working with the SOA Platform team the SPSS will be updated so that this SPSS will reflect what was actually implemented and can then be tested by ISDV. This disclaimer will be removed in the final completed version that reflects the actual implementation.



## 6.8.2 Use Cases

### 6.8.2.1 DIAG-UC-REQ-016451/B-Bezel Diagnostics – Enter Bezel Diagnostics (TcSE ROIN-291319-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On <del>There is an Active Media Source (AM/FM, CD, SDARS, USB...)</del> A phone call is not active <del>No other higher priority feature preventing bezel diagnostics from being entered</del>
<b>Scenario Description</b>	User presses two designated buttons as defined by the HMI
<b>Post-conditions</b>	Bezel Diagnostics is entered.  Bezel diagnostics will start speaker walk-around and if conditions not met for speaker walk-around then will enter the main bezel diagnostics screen.
<b>List of Exception Use Cases</b>	E1–DIAG-GUC-291320-1-Bezel Diagnostics – Cannot enter Bezel Diagnostics
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch) Audio OUT

### 6.8.2.2 DIAG-UC-REQ-016454/C-Bezel Diagnostics – Exit Bezel Diagnostics (TcSE ROIN-291079-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostics is Active
<b>Scenario Description</b>	Exit Bezel Diagnostics is selected by: -- Pressing the power button. -- Pressing the <Exit Bezel Diagnostics> HMI button -- The ignition status changes <del>-- There is a higher priority feature active (ex place a phone call)</del>
<b>Post-conditions</b>	Bezel Diagnostics is exited
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

### 6.8.2.3 DIAG-UC-REQ-016461/A-Bezel Diagnostics – Main Menu (TcSE ROIN-291070-1)

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered ON Battery voltage between 10 and 16 volts. Bezel Diagnostics is active



<b>Scenario Description</b>	Speaker Walkaround complete or exited, or Speaker Walkaround entry conditions not met when bezel diagnostics entered, or While in bezel diagnostic submenu exit out of the submenu
<b>Post-conditions</b>	Enter main menu of Bezel Diagnostics with all bezel diagnostic components listed as separate menu picks. (ex. APIM Diagnostics, Audio Diagnostics, EFP Diagnostics)
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

**6.8.2.4 DIAG-UC-REQ-016462/A-Bezel Diagnostics – Module Specific Sub menu (TcSE ROIN-291071-1)**

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostics is active
<b>Scenario Description</b>	Module Component Diagnostic Submenu is selected by User.
<b>Post-conditions</b>	Module component submenu HMI is displayed (i.e. Part Numbers, SDARS ESN, Signal Strength, Speaker Walkaround)
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)

**6.8.2.5 DIAG-UC-REQ-016463/B-Bezel Diagnostics – Component Part Numbers (TcSE ROIN-291072-1)**

<b>Actors</b>	User
<b>Pre-conditions</b>	Infotainment System Powered On Battery voltage between 10 and 16 volts. Bezel Diagnostics is active
<b>Scenario Description</b>	Component Part Numbers Menu selected by User in Component Bezel Diag Submenu.
<b>Post-conditions</b>	HMI displays individual component Part Numbers.
<b>List of Exception Use Cases</b>	
<b>Interfaces</b>	G-HMI (Graphic HMI) CBI (Center Stack Button Interface – Touch/Non Touch)



### 6.8.3 General Requirements

#### 6.8.3.1 DIAG-SR-REQ-273206/A-Security protections and Bezel Diagnostics - SOA

There are no security protections for Bezel Diagnostics (ie press and hold a button combination to access bezel diagnostics mode) and anything with security implications shall not use Bezel Diagnostics.

#### 6.8.3.2 DIAG-SR-REQ-292123/A-Sting data transmission - SOA

A SOA string of data for Bezel Diagnostics shall contain UTF-8 encoded ASCII text.

### 6.8.4 Requirements TCU

#### 6.8.4.1 DIAG-SR-REQ-278396/B-Bezel Diagnostics Activation Event - TCU SOA

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call "getTCUBezelDiagnosticData" to the TCU Bezel Diagnostic Server and the TCU Bezel Diagnostic Server shall send the current Bezel Diagnostic data/primitives within 75 msec of receiving the API call and then send the data/primitives OnChange after that.

The Bezel Diagnostics Client shall store the primitive data for the Bezel Diagnostic session.

The Bezel Diagnostic Client shall use the data/primitives call out in requirement "MD-REQ-275119-getTcuBezelDiagnosticData" to update the Bezel Diagnostics HMI.

#### 6.8.4.2 DIAG-SR-REQ-278397/A-Bezel Diagnostics Cancellation Event - TCU SOA

When Bezel Diagnostics is cancelled the Bezel Diagnostic Client shall cancel the getTcuBezelDiagnosticsData API call to end Bezel Diagnostics for the TCU.

#### 6.8.4.3 DIAG-FUR-REQ-292080/A-TCU NAS/Service Status

This requirement defines the data string that can be sent by the TCU for NAS/Service Status HMI. The Bezel Diagnostic Client will display whatever is sent by the TCU Bezel Diagnostic Server.

The TCU shall send one of the following:

1. No Service
2. Limited Service
3. CS: Registered, PS: Not Registered
4. CS: Not Registered, PS: Registered
5. CS and PS Registered

In addition to above, the TCU shall send GMM/MM/EMM reject code in parenthesis where applicable in case of No Service, Limited Service, or Not Registered. For example, the TCU shall send: CS: Registered, PS: Not-Registered (14); where 14 = GPRS services not allowed in this PLMN.

The finally display on HMI should be in the following format:

NAS/Service Status: (with only one of the below lines at a time)

1. No Service (error code)
2. Limited Service (error code)
3. CS: Registered, PS: Not Registered (error code)
4. CS: Not Registered (error code), PS: Registered
5. CS and PS Registered

#### 6.8.4.4 DIAG-FUR-REQ-292079/A-PDP State - C&C APN

This requirement defines the data string that can be sent by the TCU for PDP State – C&C APN HMI. The Bezel Diagnostic Client will display whatever is sent by the TCU Bezel Diagnostic Server.



The TCU shall send one of the following:

1. the word "Active", OR
2. "Inactive (error code)" with the reject error code in parenthesis where applicable in case of Inactive. For example, the TCU shall send "Inactive (33)"; where 33 = requested service option not subscribed.

#### 6.8.4.5 DIAG-FUR-REQ-292095/A-PDP State - WHS APN

This requirement defines the data string that can be sent by the TCU for PDP State – WHS APN HMI. The Bezel Diagnostic Client will display whatever is sent by the TCU Bezel Diagnostic Server.

The TCU shall send one of the following:

1. The word "active", OR
2. "Inactive (error code)" with the reject error code in parenthesis where applicable in case of Inactive. For example, the TCU shall send "Inactive (33)"; where 33 = requested service option not subscribed.

#### 6.8.4.6 DIAG-SR-REQ-292096/A-TCU Additional Information

The HMI for the data/primitive "tcuAdditionalInfo" shall be displayed on a page with up to 20 lines/rows. The TCU data can be up to 60 characters per row and the HMI team would determine how to display the characters if extend beyond the HMI screen (example an arrow to display additional text information not fitting on the screen or however HMI team decides to handle).

For each row the Bezel Diagnostic Client does not need to pre-display any hardcoded items in those rows. The TCU will send all the text needed to be displayed in each of these 20 rows.

##### How to send the data for each row:

When the TCU sends the data for each row the data to go on a particular row shall be separated by a comma used as a delimiter (the comma should not be displayed in the HMI when used as a delimiter). After the comma the new TCU data shall be displayed on the next row in the HMI.

If the comma needs to be used in the text for a particular row then then a "\" shall be used as an escape delimiter.

Example:

- TCU sends "data1\, data2,data3" would be displayed as:
  - Row 1) data1, data2
  - Row 2) data3
- TCU sends "Hello World, TCU data1\, TCU data2, dataForNextRow" would be displayed as:
  - Row 1) Hello World
  - Row 2) TCU data1, TCU data2
  - Row 3) dataForNextRow
- TCU sends "data1\\data2\,data3, dataForNextRow" would be displayed as:
  - Row 1) data1\data2,data3
  - Row 2) dataForNextRow

#### 6.8.4.7 DIAG-SR-REQ-292097/A-TCU Configuration Status

The HMI for the data/primitive "tcuConfigurationStatus" shall be displayed on a page with up to 50 lines/rows. The TCU data can be up to 60 characters per row and the HMI team would determine how to display the characters if extend beyond the HMI screen (example an arrow to display additional text information not fitting on the screen or however HMI team decides to handle).

For each row the Bezel Diagnostic Client does not need to pre-display any hardcoded items in those rows. The TCU will send all the text needed to be displayed in each of these 50 rows.

##### How to send the data for each row:



When the TCU sends the data for each row the data to go on a particular row shall be separated by a comma used as a delimiter (the comma should not be displayed in the HMI when used as a delimiter). After the comma the new TCU data shall be displayed on the next row in the HMI.

If the comma needs to be used in the text for a particular row then then a “\” shall be used as an escape delimiter.

Example:

- TCU sends “data1\, data2,data3” would be displayed as:
  - Row 1) data1, data2
  - Row 2) data3
- TCU sends “Hello World, TCU data1\, TCU data2, dataForNextRow” would be displayed as:
  - Row 1) Hello World
  - Row 2) TCU data1, TCU data2
  - Row 3) dataForNextRow
- TCU sends “data1\\data2\,data3, dataForNextRow” would be displayed as:
  - Row 1) data1\data2,data3
  - Row 2) dataForNextRow

#### 6.8.4.8 DIAG-SR-REQ-292098/A-TCU View DTC's

The HMI for the data/primitive “tcuViewDtcs” shall be displayed on a page with up to 80 lines/rows. The TCU data can be up to 60 characters per row and the HMI team would determine how to display the characters if extend beyond the HMI screen (example an arrow to display additional text information not fitting on the screen or however HMI team decides to handle).

For each row the Bezel Diagnostic Client does not need to pre-display any hardcoded items in those rows. The TCU will send all the text needed to be displayed in each of these 80 rows.

How to send the data for each row:

When the TCU sends the data for each row the data to go on a particular row shall be separated by a comma used as a delimiter (the comma should not be displayed in the HMI when used as a delimiter). After the comma the new TCU data shall be displayed on the next row in the HMI.

If the comma needs to be used in the text for a particular row then then a “\” shall be used as an escape delimiter.

Example:

- TCU sends “data1\, data2,data3” would be displayed as:
  - Row 1) data1, data2
  - Row 2) data3
- TCU sends “Hello World, TCU data1\, TCU data2, dataForNextRow” would be displayed as:
  - Row 1) Hello World
  - Row 2) TCU data1, TCU data2
  - Row 3) dataForNextRow
- TCU sends “data1\\data2\,data3, dataForNextRow” would be displayed as:
  - Row 1) data1\data2,data3
  - Row 2) dataForNextRow



## 6.8.5 Requirements ECG

### 6.8.5.1 DIAG-SR-REQ-278398/A-Bezel Diagnostics Activation Event - ECG SOA

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call “getECGBezelDiagnosticData” to the ECG Bezel Diagnostic Server and the ECG Bezel Diagnostic Server shall send the current Bezel Diagnostic data/primitives within 75 msec of receiving the API call and then send the data/primitives OnChange after that.

The Bezel Diagnostics Client shall store the primitive data for the Bezel Diagnostic session.

The Bezel Diagnostic Client shall use the data/primitives call out in requirement “MD-REQ-275359-getEcgBezelDiagnosticData” to update the Bezel Diagnostics HMI.

### 6.8.5.2 DIAG-SR-REQ-278399/A-Bezel Diagnostics Cancellation Event - ECG SOA

When Bezel Diagnostics is cancelled the Bezel Diagnostic Client shall cancel the getECGBezelDiagnosticData API call to end Bezel Diagnostics for the ECG.

### 6.8.5.3 DIAG-SR-REQ-282257/B-HMI for ecgApplicationPartNumber - ECG SOA

The HMI for the data/primitive “ecgApplicationPartNumber” will be broken up into as many as 50 rows (up to 50 application part numbers) with each row containing up to 20 characters for an individual part number.

When the ECG sends the part number data each part number shall be separated by a comma used as a delimiter (the comma should not be displayed in the HMI when used as a delimiter). After the comma the new part number shall be displayed on a new row in the HMI.

If the comma needs to be used in the text for a particular row then then a “\” shall be used as an escape delimiter.

Example:

- ECG sends “data1\, data2,data3” would be displayed as:
  - Row 1) data1, data2
  - Row 2) data3
- ECG sends “Hello World, TCU data1\, TCU data2, dataForNextRow” would be displayed as:
  - Row 1) Hello World
  - Row 2) TCU data1, TCU data2
  - Row 3) dataForNextRow
- ECG sends “data1\\data2\\,data3, dataForNextRow” would be displayed as:
  - Row 1) data1\data2,data3
  - Row 2) dataForNextRow





## 7 Appendix: Reference Documents

Reference #	Document Title
1	Reference APIM IDS (infotainment diagnostic spec) for additional ways to initiate speaker walk-around with the test tool
2	H39 Bezel Diagnostics HMI spec
3	A65 Button HMI spec – contains button combination for entering bezel diagnostics
4	
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14	