



Research & Vehicle Technology "Infotainment Systems Product Development"

Feature – Bezel Diagnostics

APIM Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.8
UNCONTROLLED COPY IF PRINTED

Version Date: September 3, 2020

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 10,="" 2013="" oct=""> Added requirement for when AAM module present</jmyslin2>
December 10, 2014	1.2		
		EQ-016476/B-Bezel (TcSE ROIN-291321-1)	<jmyslin2 hans-christian="" zubert=""> Update Bezel Diagnostics SPSS to include LIN ICP part number interface</jmyslin2>
		Q-103696/A-LIN ICP Part	<jmsylin2> New Bezel Diagnostic requirement when have a LINICP for</jmsylin2>
	Number duri	ng Bezel Diagnostics	displaying part numbers
June 4, 2015	1.3		
		Q-115757/A-Request and HWPN (PCB)	hzubert - modified SupplierID and FunctionID in example to wildcard values.
		Q-115758/A-Request and	hzubert - modified SupplierID and FunctionID in example to wildcard values.
	Response of		
		EQ-164015/A-Bezel - I2C over LVDS+	<jason hans-christian="" myslinski="" zubert=""> New Bezel Diagnostics function for I2C over LVDS</jason>
	Diagnosites	12C 0Vel EVDS+	1200001 EVD0
May 7, 2018	1.4		
may1,2010		EQ-273205/A-Bezel	<pre><jmyslin2> Initial release of SOA / Ethernet Bezel Diagnostics. New function</jmyslin2></pre>
		SOA (Ethernet)	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-In	terface Requirements - SOA	473234/A-Interface Requirements - SOA Bezel Diagnostics
	Bezel Diagnostics		·
	MD-REQ-27	5119/F- IDiagnosticData	<pre><jmyslin2> Logical API MD for TCU SOA Bezel Diagnostics</jmyslin2></pre>
	MD-REQ-27	5359/F-	
		IDiagnosticData	
	MD-REQ-27	7459/A-Bezel_Diagnostic.Rq	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update</jmyslin2>
	MD-REQ-27	7675/A-AHU_Bezel_Diag.St+	<jmyslin2> Put interface table description in MD form. Not requirement content</jmyslin2>
			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</jmyslin2>
	MD-REQ-27	7747/A-EFP_Bezel_Diag.St+	<pre><jmyslin2> Put interface table description in MD form. Not requirement content</jmyslin2></pre>
	WB 850 07	00.40/A	change and only a clarification and formatting update
	MD-REQ-278 AHU_Bezel_	~	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update</jmyslin2>
		8042/B-AHU_Bezel_Diag_Data	<pre></pre> <pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><p< td=""></p<></pre>
	MD-REQ-27	8043/A-DSP_Bezel_Diag_Data	<jmyslin2> Put interface table description in MD form. Not requirement content</jmyslin2>
	MD BEO 27	8044/A-EFP Bezel Diag Data	change and only a clarification and formatting update <pre></pre> <pre> <pre></pre> <pre></pre> <pre></pre> <pre></pre> <pre></pre> <p< td=""></p<></pre>
	WID-REQ-27	0044/A-EFF_bezei_blag_bala	change and only a clarification and formatting update
			<pre><jmyslin2> created MD</jmyslin2></pre>
	MD-REQ-276458/B-Vehicle_Speed.St		<pre><jmyslin2> MD clarification</jmyslin2></pre>
MD-REQ-276459/A-Vehicle_Speed_QF		6459/A-Vehicle_Speed_QF	<pre><jmyslin2> created MD</jmyslin2></pre>
		EQ-016450/B-Bezel	<jmyslin2> No update, revision number accidently revised with no changes</jmyslin2>
Diagnostic Session Entry Conditions (TcSE ROIN-291280-1)		0-1)	
	IFS-MMI2C-SR-REQ-140624/B-0x31 Core Assembly FPN+		" <joravec4></joravec4>
	IFS-MMI2C- Assembly FP	SR-REQ-140624/C-0x31 Core 'N	<hzubert> Generalized wording</hzubert>
		SR-REQ-140625/B-0x32	" <joravec4></joravec4>
	IFS-MMI2C-	SR-REQ-140625/C-0x32	<hzubert> Generalized wording</hzubert>
	Delivery Asse	embly FPN	

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Vehicle speed above 5kph during speaker jmyslin2: removed voltages from the pre-condition walk around (TcSE ROIN-291076-1)		DIAG-UC-REQ-016458 – Vehicle speed above	/B-Bezel Dia 5kph durings	gnostics speaker	jmyslin2: removed voltages from the pre-condition	
FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8 FORD MOTOR COMPANY CONFIDENTIAL SEP 3, 2020 The information contained in this document is Proprietary to Ford Motor Company. Page 3 of 71		cs APIM SPSS v1.8		FORD		Page 3 of 71



DIAG-UC-REC-016459-Bezel Diagnostics Speaker Walk Anound Completed (T-SER ROIN-29107-1) [without of Completed (T-SER ROIN-192652-2) [without of Completed (T-S		
Around Completed (TeSE ROIN-29107-1) IDAG-SREQ-015697/C-Module controlling the Speaker Walk-Around function (TeSE ROIN-29105-7) IDAG-SREQ-0156476-Bezel Diagnosis impainz: removed voltages from the pre-condition Impainzed but menut (TeSE ROIN-29107-8) IDAG-UC-REQ-0156456-Bezel Diagnosis impainzed removed voltages from the pre-condition Impainzed	DIAG-UC-REQ-016459/B-Bezel Diagnostics	installing Outron and a classical frame the same and diving
DIAGS-RREQ-015667/C-Module controlling the Speaker Walk-Around function (TGSE ROIN-12955-2) [myslin2- updated to include DSP AMP variant 2 (unction (TGSE ROIN-12955-2) [myslin2- updated to include DSP AMP variant 2 (unction (TGSE ROIN-12955-2) [myslin2- under the pre-condition process of the pre-condition		jmysin2: removed voltages from the pre-condition
controlling the Speaker Walk-Around function (rise RolNi-129552.) DIAG-UC-REC-016461/B-Bazel Diagnostics - Main Menur (rise RolNi-129652.) DIAG-UC-REC-016463/C-Bazel Diagnostics - Module Specific Sub menur (rise RolNi-291071-1) DIAG-UC-REC-016463/C-Bazel Diagnostics - Diagnostics - Component Part Numbers Imyslin 2: removed voltages from the pre-condition Imyslin 2: removed voltages from the pr		
function (TcSE ROIN-129625-2) IDAG-U-CRE O101461(F) Bezel Diagnostics — Main Menu (TcSE ROIN-291070-1) IDAG-U-CRE O101462(F) Bezel Diagnostics — Module Specific Sub menu (TcSE ROIN-291071-1) IDAG-U-CRE O101464(F) Bezel Diagnostics — Module Specific Sub menu (TcSE ROIN-291071-1) IDAG-U-CRE O101464(F) Bezel Diagnostics — Module Specific Sub menu (TcSE ROIN-291071-1) IDAG-U-CRE O101464(F) Bezel Diagnostics — SANS ESIN (TcSE ROIN-291073-1) IDAG-U-CRE O101464(F) Bezel Diagnostics — SANS ESIN (TcSE ROIN-291073-1) IDAG-U-CRE O101464(F) Bezel Diagnostics — SANS ESIN (TcSE ROIN-291073-1) IDAG-U-CRE O101464(F) Bezel Diagnostics — NAM/FM Signal Strength (TcSE ROIN-291074-1) IDAG-U-CRE O101464(F) Bezel Diagnostics — NAM/FM Signal Strength (TcSE ROIN-291074-1) IDAG-U-CRE O101464(F) Bezel Diagnostics Impairie: New SOA Ethernet Bezel Diagnostics function replacing the previousversion. The previousversion was never implemented previousversion. The previousversion was never implemented impairie: New Molfor SOA Bezel Diagnostics MD-REO_395962(A-TcuViewDicReq impairie): New Molfor SOA Bezel Diagnostics MD-REO_395963(A-TcuViewDicReq impairie): New SOA Bezel Diagnostics MD MD-REO_395968(A-TcuViewDicReq impairie): New SOA Bezel Diagnostic MD MD-REO_39598(A-TcuViewDicReq impairie): New SOA Bezel Diagnostics MD MD-REO_39598(A-TcuViewDicReq impairie): New SOA Bezel Diagnostics MD MD-REO_39598(A-TcuViewDicReq impairie): N		<jmyslin2> updated to include DSP AMP variant 2</jmyslin2>
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MD-REQ-396908/A- CellularCtrIGerCurrentTechResp MD-REQ-396916/A-CellularCtrITechInd MD-REQ-396917/A- CellularCtrIServingCellNasStatusReq MD-REQ-396918/A- CellularCtrIServingCellNasStatusResp MD-REQ-396918/A- CellularCtrIServingCellNasStatusResp MD-REQ-396919/A- CellularCtrIServingCellNasStatusInd MD-REQ-396919/A- CellularCtrIServingCellNasStatusInd MD-REQ-396920/A- CellularCtrIServingCellNasStatusInd MD-REQ-396920/A- CellularCtrIServingCellNasStatusInd MD-REQ-396920/A- CellularCtrIServingCellIdResp MD-REQ-396921/A- CellularCtrIServingCellIdResp MD-REQ-396924/A- CellularCtrIServingCellIdInd MD-REQ-396924/A- CellularCtrIServingCellImeisVReq MD-REQ-396924/A- CellularCtrIServingCellImeisVReq MD-REQ-396925/A- CellularCtrIServingCellImeisVRexp MD-REQ-396925/A- CellularCtrIServingCellImeisVRexp MD-REQ-396959/A-TcuPdpApnStateReq MD-REQ-396959/A-TcuPdpApnStateReq MD-REQ-396950/A- CellularCtrIServingCellImeisVRexp MD-REQ-396950/A- CellularCtrIServingCellImeisVRexp MD-REQ-396950/A- CellularCtrIServingCellImeisVRexp MD-REQ-396950/A- CellularCtrIServingCellImeisVRexp MD-REQ-396950/A- CellularCtrIServingCellImeisVRexp MD-REQ-396950/A-TcuPdpApnStateReq MD-REQ-396950/A-TcuPdpApnStateReq MD-REQ-396950/A-TcuPdpApnStateReq MD-REQ-396950/A-TcuPdpApnStateReq MD-REQ-396950/A-TcuPdpApnStateReq MD-REQ-396950/A-TcuPdpApnStateReq MD-REQ-396050/A- CellularCtrIServingCellImeisVRexp MD-REQ	MD-REQ-396528/A-	imuding. New Pozel Diagnostics MD
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MD-REQ-396923/A- CellularCtrlServingCellIdInd MD-REQ-396924/A- CellularCtrlServingCellImeiSvReq MD-REQ-396925/A- CellularCtrlServingCellImeiSvResp MD-REQ-396925/A- CellularCtrlServingCellImeiSvResp MD-REQ-396957/A-TcuPdpApnStateReq MD-REQ-396959/A-TcuPdpApnStateResp MD-REQ-396959/A-TcuPdpApnStateResp MD-REQ-396960/A-TcuPdpApnStateInd MD-REQ-396960/A-TcuPdpApnStateInd MD-REQ-396960/A-TcuPdpApnStateInd MD-REQ-396050/A- EcgSpcmCmDidReadResp MD-REQ-396050/A- EcgSpcmCmDidReadResp MD-REQ-396055/A- EcgSpcmCmDidReadResp MD-REQ-396055/A- EcgSpcmCmDidReadResp MD-REQ-396055/A- EcgSpcmCmDidRefreshInd MD-REQ-396050/A- EcgSpcmCmDidRefreshInd MD-REQ-396050/A- EcgSpcmCmDidRefreshInd MD-REQ-396060/A-EcgVdmDtcGetReq imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A- EcgVdmDtcGetResp imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A- EcgVdmDtcGetResp imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A- EcgVdmDtcBroadcastResp imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396066/A-SysStatsResp imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396066/A-FciGenericService imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396066/A-FciGenericService imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService imyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService imyslin2: New MD for SOA Bezel Diagnostics		jmyslin2: New SOA Bezel Diagnostics MD
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MD-REQ-396924Å- CellularCttlServingCellImeiSvReq MD-REQ-396925/A- CellularCttlServingCellImeiSvResp MD-REQ-396957/A-TcuPdpApnStateReq MD-REQ-396957/A-TcuPdpApnStateReq MD-REQ-396959/A-TcuPdpApnStateRsp MD-REQ-396960/A-TcuPdpApnStateInd MD-REQ-396960/A-TcuPdpApnStateInd MD-REQ-396060/A-TcuPdpApnStateInd MD-REQ-396050/A- EcgSpcmCmDidReadReq MD-REQ-396051/A- EcgSpcmCmDidReadResp MD-REQ-396051/A- EcgSpcmCmDidReadResp MD-REQ-396052/A- EcgSpcmCmDidRefreshInd MD-REQ-396059/A-EcgVdmDtcGetReq MD-REQ-396060/A-EcgVdmDtcGetResp MD-REQ-396061/A- EcgVdmDtcBroadcastResp MD-REQ-396061/A- EcgVdmDtcBroadcastResp MD-REQ-396061/A- EcgVdmDtcBroadcastResp MD-REQ-396064/A-SysStatsReq MD-REQ-396066/A-SysStatsResp MD-REQ-396066/A-FciGenericService MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		jmyslin2: New SOA Bezel DiagnosticsMD
MD-REQ-396925/A- CellularCtrlServingCellImeiSvResp MD-REQ-396957/A-TcuPdpApnStateReq jmyslin2: New SOA Bezel Diagnostics MD MD-REQ-396959/A-TcuPdpApnStateRsp jmyslin2: New SOA Bezel Diagnostic Requirement MD-REQ-396960/A-TcuPdpApnStateInd jmyslin2: New SOA Bezel Diagnostic MD requirement MD-REQ-396050/A- EcgSpcmCmDidReadReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396051/A- EcgSpcmCmDidReadResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396052/A- EcgSpcmCmDidRefreshInd jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396066/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396066/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		imydin 2: New SOA Rezel Disaportics MD
CellularCtrlServingCellImeiSvResp jmyslin2: New SOA Bezel Diagnostics MD MD-REQ-396957/A-TcuPdpApnStateReq jmyslin2: New SOA Bezel Diagnostics MD MD-REQ-396959/A-TcuPdpApnStateRsp jmyslin2: New SOA Bezel Diagnostic Requirement MD-REQ-396960/A-TcuPdpApnStateInd jmyslin2: New SOA Bezel Diagnostic MD requirement MD-REQ-396050/A- EcgSpcmCmDidReadReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396051/A- EcgSpcmCmDidReadResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396052/A- EcgSpcmCmDidRefreshInd jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396066/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		JIII YSIII Z. NEW SOM DEZEI DIAYIIOSIIOSIVID
MD-REQ-396957/A-TcuPdpApnStateReq jmyslin2: New SOA Bezel DiagnosticsMD MD-REQ-396959/A-TcuPdpApnStateRsp jmyslin2: New SOA Bezel Diagnostic Requirement MD-REQ-396960/A-TcuPdpApnStateInd jmyslin2: New SOA Bezel Diagnostic MD requirement MD-REQ-396050/A- EcgSpcmCmDidReadReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396051/A- EcgSpcmCmDidReadResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396052/A- EcgSpcmCmDidRefreshInd jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396066/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		imyslin2: New SOA Bezel Diagnostics MD
MD-REQ-396959/A-TcuPdpApnStateRsp jmyslin2: New SOA Bezel Diagnostic Requirement MD-REQ-396960/A-TcuPdpApnStateInd jmyslin2: New SOA Bezel Diagnostic MD requirement MD-REQ-396050/A- EcgSpcmCmDidReadReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396051/A- EcgSpcmCmDidReadResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396052/A- EcgSpcmCmDidRefreshInd jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		
MD-REQ-396060/A-TcuPdpApnStateInd jmyslin2: New SOA Bezel Diagnostic MD requirement MD-REQ-396050/A- EcgSpcmCmDidReadReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396051/A- EcgSpcmCmDidReadResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396052/A- EcgSpcmCmDidRefreshInd jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		
MD-REQ-396050/A- EcgSpcmCmDidReadReq MD-REQ-396051/A- EcgSpcmCmDidReadResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396052/A- EcgSpcmCmDidRefreshInd jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		
EcgSpcmCmDidReadReq MD-REQ-396051/A- EcgSpcmCmDidReadResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396052/A- EcgSpcmCmDidRefreshInd jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics jmyslin2: New MD for SOA Bezel Diagnostics jmyslin2: New MD for SOA Bezel Diagnostics	MD-REQ-396960/A-TcuPdpApnStateInd	jmyslin2: New SOA Bezel Diagnostic MD requirement
MD-REQ-396051/A- EcgSpcmCmDidReadResp Jimyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396059/A-EcgVdmDtcGetReq Jimyslin2: New MD for SOA Bezel Diagnostics Jimyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp Jimyslin2: New MD for SOA Bezel Diagnostics Jimyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp Jimyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp Jimyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp Jimyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService Jimyslin2: New MD for SOA Bezel Diagnostics		imvslin2: New MD for SOA Bezel Diagnostics
EcgSpcmCmDidReadResp		,, a
MD-REQ-396052/A- EcgSpcmCmDidRefreshInd MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		jmyslin2: New MD for SOA Bezel Diagnostics
EcgSpcmCmDidRefreshInd MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics jmyslin2: New MD for SOA Bezel Diagnostics jmyslin2: New MD for SOA Bezel Diagnostics		
MD-REQ-396059/A-EcgVdmDtcGetReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		jmyslin2: New MD for SOA Bezel Diagnostics
MD-REQ-396060/A-EcgVdmDtcGetResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		imyslin2: New MD for SOA Bezel Diagnostics
MD-REQ-396061/A- EcgVdmDtcBroadcastResp jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		
EcgVdmDtcBroadcastResp		
MD-REQ-396064/A-SysStatsReq jmyslin2: New MD for SOA Bezel Diagnostics MD-REQ-396065/A-SysStatsResp jmyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		jmyslin2: New MD for SOA Bezel Diagnostics
MD-REQ-396065/A-SysStatsResp jmyslin2: new MD for SOA Bezel Diagnostics MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics		imyslin2: New MD for SOA Bezel Diagnostics
MD-REQ-396086/A-FciGenericService jmyslin2: New MD for SOA Bezel Diagnostics	· ·	
, ,	, ,	
MID-KEQ-390091/A-Broadcasinfolinessage Jmyslin2: New SOA MID for Bezel Diagnostics		· ·
	INID-KEQ-396091/A-BroadcasInfolviessage	JIMYSIINZ: New SOA MID TOT BEZEI DIAGNOSTICS



Ford Motor Company

Subsystem Part Specific Specification Engineering Specification

MD-REQ-396090/A-BroadcastMessage	jmyslin2: New SOA MD for Bezel Diagnostics
DIAG-SR-REQ-273206/B-Security protections and Bezel Diagnostics - SOA	jmyslin2: updated requirement with feedbackfrom the software team
DIAG-SR-REQ-395973/A-TCU DID data	jmyslin2: New requirement for SOA Bezel Diagnostics
DIAG-SR-REQ-396965/A-TCU DTC data needed for bezel diagnostics	jmyslin2: New SOA Bezel Diagnostics requirement
DIAG-SR-REQ-396940/A-TCU cellular control data needed for bezel diagnostics	jmyslin2: New SOA Bezel Diagnostic requirement
DIAG-SR-REQ-396961/A-TCU DCM (Data Connection Manager) data needed for bezel diagnostics	jmyslin2: new Bezel Diagnostic requirement
DIAG-SR-REQ-396056/A-ECG DID data	jmyslin2: New requirement for SOA Bezel Diagnostics
DIAG-SR-REQ-396063/A-ECG DTC Data	jmyslin2: New requirement for SOA bezel diagnostics
DIAG-SR-REQ-396066/A-ECG System Statistics	jmyslin2: new SOA Bezel Diagnostic requirement
DIAG-SR-REQ-396094/A-ECG SDN Connection	jmyslin2: New SOA Bezel Diagnostic requirement



Table of Contents

R	EVISION F	HISTORY	2
1	ARCHI	IITECTURAL DESIGN - CAN	9
	1.1	DIAG-CLD-REQ-015050/A-Bezel Diagnostic Client (TcSE ROIN-202564-1)	9
		DIAG-CLD-REQ-016469/A-Bezel Diagnostic Server (TcSE ROIN-202563-1)	
		DIAG-CLD-REQ-311960/A-Bezel Diagnostic Server - AHU (APIM V2)	9
	1.4 1.4.1	Interface Requirements - CAN	10 10
2	ARCHI	IITECTURAL DESIGN - LIN	15
	2.1	DIAGv2-CLD-REQ-117487/A-LIN Bezel Diagnostic Client	15
		DIAGv2-CLD-REQ-117488/A-LIN Bezel Diagnostic Server	
	2.3 2.3.1	LIN Serial Number Interface	15 15
	2.4 1 2.4.1 2.4.2	= 1. · · · · · · · = · · · · · · · · · · ·	18 18 18
3	ARCHI	IITECTURAL DESIGN - I2C OVER LVDS	19
	3.1	DIAG-CLD-REQ-163996/A-I2C Bezel Diagnostic Client	19
	3.2	DIAG-CLD-REQ-163997/A-I2C Bezel Diagnostic Server	19
4	ARCHI	IITECTURAL DESIGN - SOA_ETHERNET	20
		DIAG-CLD-REQ-278463/A-Bezel Diagnostic Client - SOA	
		DIAG-CLD-REQ-278390/A-Bezel Diagnostic Server - SOA (ECG)	
		DIAG-CLD-REQ-273355/A-Bezel Diagnostic Server - SOA (TCU)	
	4.4	Interface Requirements - SOA Bezel Diagnostics	20
5	GENE	RAL REQUIREMENTS	21
		DIAG-SR-REQ-103696/A-LIN ICP Part Number during Bezel Diagnostics	
•			
6		TIONAL DEFINITION	22
	ROIN-29 6.1.1 ROIN-	DIAG-FUN-REQ-016449/A-Bezel Diagnostic Get All Background Diagnostic Request during Initialization (Tc 291276-1) DIAG-SR-REQ-015054/B-Bezel Diagnostic Client Get All Background Diagnostic Request initialization (Tc I-129499-1)	22 SE 22
	6.1.3	E ROIN-129516-1)	22 est
	6.1.4 6.1.5		22 (TcSE
	6.2.1 6.2.2	DIAG-UC-REQ-016452/B-Bezel Diagnostics - Cannot enter Bezel Diagnostics (TcSE ROIN-291320-1)	24 24
	FILE: BEZ	ZEL DIAGNOSTICS APIM SPSS v1.8 FORD MOTOR COMPANY CONFIDENTIAL Page 6 of 71 Sep 3, 2020 The information contained in this document is Proprietary to Ford Motor Company.	



6.2. 6.2.		
6.3 6.3.		. 26
	069-1)	. 27 - . 27
6.4.3 (TcS 6.4.3	SE ROIN-291075-1)	. 27
ROII 6.4.4 (TcS	4 DIAG-UC-REQ-016459/B-Bezel Diagnostics – Internal Bezel Diagnostics Speaker Walk Around Completed SE ROIN-291077-1)	. 28 . 28
6.4.5 1295 6.4.6	523-2)	
6.4. 6.4.	DIAG-SR-REQ-015067/C-Module controlling the Speaker Walk-Around function (TcSE ROIN-129525-2) BDIAG-SR-REQ-015068/A-Cancelling Speaker Walk-Around because vehicle in motion (TcSE ROIN-129526-1	. 29)29
6.5 6.5.		. 30
6.5. 6.5.	 DIAG-UC-REQ-016463/C-Bezel Diagnostics – Component Part Numbers (TcSE ROIN-291072-1) DIAG-UC-REQ-016464/B-Bezel Diagnostics – SDARS ESN (TcSE ROIN-291073-1) 	. 30 . 31
6.5.6 6.5.	DIAG-SR-REQ-015070/A-Signals to enter a Bezel Diagnostic session (TcSE ROIN-129527-1)	. 31 -1)
	529-1)	. 31
6.5. 6.5. 6.5.	DIAG-SR-REQ-015074/A-Signal to cancel a Bezel Diagnostic session (TcSE ROIN-129531-1)	. 32
6.5. 6.5. 6.5.	DIAG-SR-REQ-015076/A-Bezel Diagnostic Default Session (TcSE ROIN-129533-1)	. 32 . 32
6.6 6.6.	DIAG-FUN-REQ-115753/A-Bezel Diagnostics LIN Extended Part Number Readout	
6.6.2 6.6.2	2 DIAG-SR-REQ-115755/A-Coding of PCI	. 34
6.7 6.7. 6.7.		. 37
6.7. 6.7.	3 ECU Software Part Number	. 38 . 39
6.7.5 6.8	DIAGv2-FUN-REQ-395945/A-Bezel Diagnostics - SOA (Ethernet) - Variant 2	. 42
6.8. 6.8. 6.8.	DIAG-CLD-REQ-278390/A-Bezel Diagnostic Server - SOA (ECG)	. 42
6.8. 6.8.	4 Physical Mapping of Classes	. 42 . 42
6.8. 6.8.	7 General Requirements	66
6.8.	8 Requirements	. 67

	Ford	Ford Motor Company	Subsystem Part Specific Specification Engineering Specification
•	APPENDIX: REFE	RENCE DOCUMENTS	71



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 walkaround test. The following table outlines the text that shall be transmitted when the associated output channel is tested.

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

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 9 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	r age e er r r



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 Interface Requirements - CAN

1.4.1 DIAG-IIR-REQ-015049/B-Bezel Diagnostics Interface Requirements (TcSE ROIN-129515-3)

1.4.1.1 MD-REQ-277459/B-Bezel Diagnostic.Rg

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,
				AAM or DSP AMP variant
				<u>2</u>
		EFP		
		cont.		
		Reserved	0xF	
	Diagnostic_Operation_Rq	Inactive	0x0	
		Get All Background	0x1	
		Diagnostic Request		
		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	

Page 10 of 71	FORD MOTOR COMPANY CONFIDENTIAL	FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8
1 ago 10 0/ / 1	The information contained in this document is Proprietary to Ford Motor Company.	
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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/C-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	0x1	
		Request		
		Software Part Number	0x2	
		Hardware Part Number	0x3	

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 11 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	, ago 11 6, 11

Ford	Ford Motor Company			Engineering Specification
		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 24 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 24 char + 1 EOS)
- 2. Hardware Part Number (max 24 char + 1 EOS)
- 3. Calibration Part Number (max 24 char + 1 EOS)
- 4. SDARS ESN Number (max 24 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/B-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	0x1	
		Request		
		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 24 characters + 1 EOS for
				any Bezel Diagnostic
				Operation

Notes:

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 12 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	, ago o,



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 24 char + 1 EOS)
- 2. Hardware Part Number (max 24 char + 1 EOS)
- 3. Calibration Part Number (max 24 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/B-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	0x1	
		Request		
		Software Part Number	0x2	
		Hardware Part Number	0x3	
		Calibration Part Number	0x4	
		Reserved	0x5 –	
			0xF	
	Bezel Diagnostic Data	N/A	N/A	Max 24 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 24 char + 1 EOS)
- 2. Hardware Part Number (max 24 char + 1 EOS)
- 3. Calibration Part Number (max 24 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

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 13 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	7 ago 10 0/ / 1
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Logical Signal Name	Literals	Value	Description
Vehicle_Speed.St	See info-CAN database for	See info-CAN database for	
	signal details	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	



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

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 Linkand Physical Layer for further information (Chapter "Ford Standard Error Reporting")
SerialNumber00 (ICPSrNrDigit00)	Method for transferring 1 st digit of the year 2014	0x0: not used 0x1: 1 0x2: 2 0x3 – 0xF: not used
	•	•
SerialNumber01 (ICPSrNrDigit01)	Method for transferring 2 nd digit of the ye.g. "0" of year 2014	0x0: 0 0x1: 1 0x2: 2 0x3: 3 ear 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used
		0x0:0
SerialNumber02 (ICPSrNrDigit02)	Method for transferring 3 rd digit of the ye.g. "1" of year 2014	0x1:1
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Ford	Ford Motor	Company		Subsystem Par En	t Specific Specification gineering Specification
				0x8: 8 0x9: 9 0xA – 0xF: not used	
SerialNumber03 (ICPSr	NrDigit03)	Method for trans e.g. "4" of year 2	gerring 4 th digit of the 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 (ICPSr	NrDigit04)		aferring 1 st digit of the month	0x0: 0 0x1: 1 0x2 – 0xF: not used	
SerialNumber05 (ICPSr	NrDigit05)		aferring 2 nd digitof the month n 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 (ICPSr	NrDigit06)	Method for trans	eferring 1 st digit of the day	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4 – 0xF: not used	
SerialNumber07 (ICPSr	NrDigit07)	Method for trans e.g. "5" of day 0	aferring 2 nd digit of the day 5	0x0: 0 0x1: 1 0x2: 2 0x3: 3 0x4: 4 0x5: 5 0x6: 6 0x7: 7 0x8: 8 0x9: 9 0xA – 0xF: not used	
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Page 17 of 71



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
--	--	--

2.4.2 DIAG-IIR-REQ-115764/A-LIN SlaveRespXx



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

See SOA / Ethernet function for SOA Bezel Diagnostic MD's



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 "<u>DIAG-FUN-REQ-115753-Bezel Diagnostics LIN Extended Part Number Readout</u>"

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

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 <u>DIAG-SR-REQ-015055/A-Bezel Diagnostic Client storing Bezel Diagnostic Background Diagnostic Request data</u> (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 <u>DIAG-SR-REQ-015056/A-Bezel Diagnostic Server response during a Get All Background Diagnostic request (TcSE ROIN-205229-1)</u>

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 (HMIAudioMode turns ON) and the Bezel Diagnostic Client then requests the bezel diagnostic data

	FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 22 of 71
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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

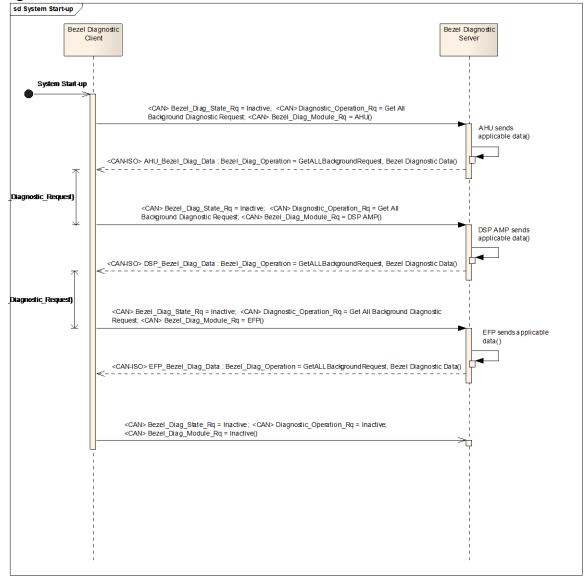
Pre-condition

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/C-Bezel Diagnostics – Enter Bezel Diagnostics (TcSE ROIN-291319-1)

Actors	User		
Pre-conditions	Infotainment System Powered On		
	There is an Active Media Source (AM/FM, CD, SDARS, USB)		
	A phone call is not active		
	No other higher priority feature preventing bezel diagnostics from being		
	entered.		
Scenario	User presses two designated buttons as defined by the HMI		
Description			
Post-conditions	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.		
List of Exception	E1–DIAG-GUC-291320-1-Bezel Diagnostics – Cannot enter Bezel		
Use Cases	Diagnostics		
Interfaces	G-HMI (Graphic HMI)		
	CBI (Center Stack Button Interface – Touch/Non Touch)		
	Audio OUT		
Notes	Note for the pre-condition, the Bezel Diagnostic Client could choose to have		
	"There is an Active Media Source (AM/FM, CD, SDARS, USB)" as a pre-		
	condition for entering Bezel Diagnostics. That is up to the Bezel Diagnostic		
	Client team.		

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

Linked Elements

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

Actors	User
Pre-conditions	Infotainment System Powered On
	There is an Active Phone Call
Scenario	User presses two designated buttons as defined by the HMI
Description	
Post-conditions	Bezel Diagnostics is NOT entered.
List of Exception	
Use Cases	
Interfaces	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.

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 24 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	9



Subsystem Part Specific Specification Engineering Specification

• 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 <u>DIAG-SR-REQ-015061/B-Bezel Diagnostic entered in Single Play (TcSE ROIN-129520-1)</u>

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 audi
	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/D-Bezel Diagnostics - Exit Bezel Diagnostics (TcSE ROIN-291079-1)

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

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

Bezel Diagnostics shall be exited by the Bezel Diagonstic 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/B-Bezel Diagnostics – Entry Bezel Diagnostic and Speaker Walkaround (TcSE ROIN-291069-1)

Actors	User
Pre-conditions	Infotainment System Powered On
	Vehicle Speed is below 5KPH.
Scenario	User presses two designated buttons as defined by the HMI and the display
Description	switches to Speaker Walkaround screen.
Post-conditions	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.
	The speaker harnes are displayed which are playing the addio.
	Display goes to main Bezel Diagnostics screen if no operator interaction or
	End Test is selected via HMI.
	End foot to delocted vid film.
List of Exception	E1- DIAG-GUC-291076-1-Bezel Diagnostics – Vehicle speed above 5kph
Use Cases	during speaker walk around
Interfaces	G-HMI (Graphic HMI)
	CBI (Center Stack Button Interface – Touch/Non Touch)
	Audio OUT

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

User
Infotainment System Powered On Vehicle Speed is below 5KPH.
Bezel Diagnostic is active
User selects speaker walk-around in the component bezel diagnostics
submenu.
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.
E1-DIAG-GUC-291076-1-Bezel Diagnostics – Vehicle speed above 5kph
during speaker walk around
G-HMI (Graphic HMI)
CBI (Center Stack Button Interface – Touch/Non Touch)
Audio OUT

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 27 of 71
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6.4.3 DIAG-UC-REQ-016458/B-Bezel Diagnostics – Vehicle speed above 5kph during speaker walk around (TcSE ROIN-291076-1)

Linked Elements

DIAG-UC-REQ-016451/C-Bezel Diagnostics – Enter Bezel Diagnostics (TcSE ROIN-291319-1)
DIAG-UC-REQ-016452/B-Bezel Diagnostics – Cannot enter Bezel Diagnostics (TcSE ROIN-291320-1)
DIAG-UC-REQ-016457/B-Bezel Diagnostics – Speaker Walk Around – Entry from within Bezel Diagnostics (TcSE ROIN-291075-1)
DIAG-UC-REQ-016456/B-Bezel Diagnostics – Entry Bezel Diagnostic and Speaker Walkaround (TcSE ROIN-291069-1)

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

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

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

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

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

If the vehicle <u>speed</u> is <u>not in Park, not in Neutral, or in Neutral but</u> 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.

	FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 28 of 71
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After the speaker walk-around test has ended the Chimes shall return to the Infotainment System.

6.4.7 DIAG-SR-REQ-015067/C-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 <u>/ DSP AMP variant 2</u> on the vehicle at the same time then the DSP AMP <u>/ DSP AMP variant 2</u> 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 <u>DIAG-SR-REQ-015068/A-Cancelling Speaker Walk-Around because vehicle in motion (TcSE ROIN-129526-1)</u>
During the speaker walk-around test (or any test that requires audio) if the vehicle <u>speed becomes</u> 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 <u>DIAG-GREQ-129533-1-Bezel Diagnostic Default Session</u> 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/B-Bezel Diagnostics – Main Menu (TcSE ROIN-291070-1)

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

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

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

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

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

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 30 of 71
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6.5.4 DIAG-UC-REQ-016464/B-Bezel Diagnostics - SDARS ESN (TcSE ROIN-291073-1)

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

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

Actors	User			
Pre-conditions	Infotainment System Powered On			
	Bezel Diagnostics is Active			
	Current audio mode is AM or FM.			
Scenario	Signal Strength Menu selected by user			
Description				
Post-conditions	Display value of signal strength in unit dBuV.			
List of Exception				
Use Cases				
Interfaces	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 <u>DIAG-SR-REQ-015071/A-Signals to identify what Bezel Diagnostic operation to perform (TcSE ROIN-129528-1)</u>

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

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.

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 31 of 71
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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 Rg = Inactive, and
- 3. Bezel_Diag_Module_Rq = Inactive

6.5.13 <u>DIAG-REQ-015077/A-AAM module (TcSE ROIN-304169-1)</u>

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

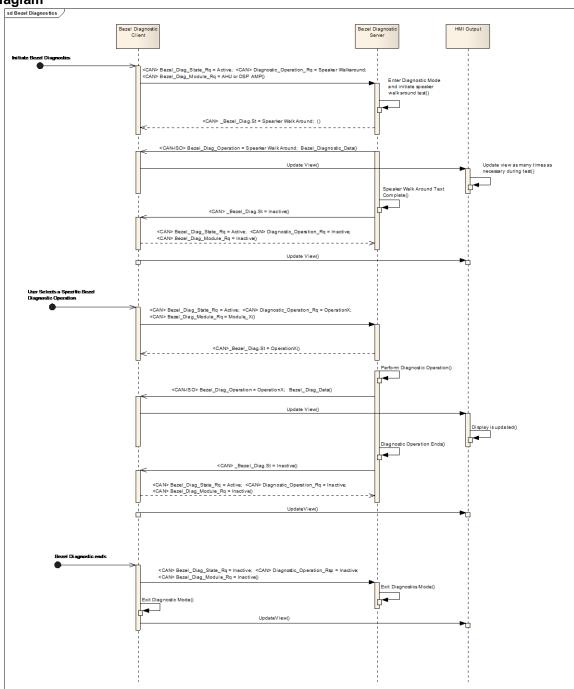
Bezel Diagnostics is not active

Post-condition

Bezel Diagnostics session ends and return to normal operation



Sequence Diagram





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.

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

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

Example for request frame of HWPN

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 1st Frame is of type FF with the protected ID 0x7D and looks like this:

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

Example for 1st response frame of HWPN

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

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

Example for 2nd response frame of HWPN

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

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

Example for 3rd response frame of HWPN

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

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

Example for 3rd response frame of HWPN

6.6.3.2 <u>DIAG-SR-REQ-115758/A-Request and Response of SWPN</u>

The following is an example for the SF request of a SWPN (software part number) of the master.

Protected ID-Field has 0x3C:

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

Example for request frame of SWPN

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 35 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	, ago oo o, , .

^{*}Supplier ID is supplier dependent but wildcards shall be used.

^{*}Function ID is supplier dependent but wildcards shall be used.



^{*}Supplier 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 1st Frame is of type FF with the protected ID 0x7D and looks like this:

| SlaveRespB |
|------------|------------|------------|------------|------------|------------|------------|------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 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 2nd Frame is also of type CF with the protected ID 0x7D and looks like this:

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

Example for 4th response frame of SWPN

^{*}Function ID is supplier dependent but wildcards shall be used.



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 I²C Slave Core Assembly message provides a mechanism to transmit a Ford Part Number back to the I²C Master.

Subaddress: 0x31 Access: Read-Only

Default: n/a

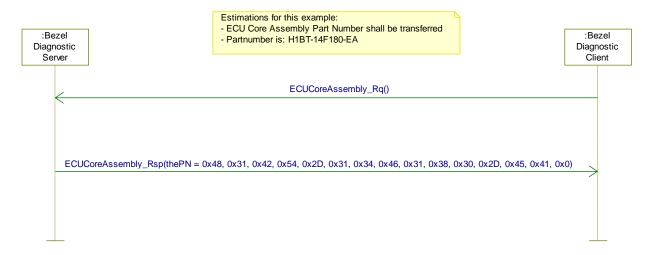
	7	6	5	4	3	2	1	0
[0]			C	ore Assemb	oly character[0]		
[24]			C	ore Assembl	ly character[2	24]		

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

The I²C 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 I2C Slave is not released with this kind of Ford Part Number, the I2C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I^2 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 I²C Master.

Subaddress: 0x32 Access: Read-Only

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 37 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	. age or or .

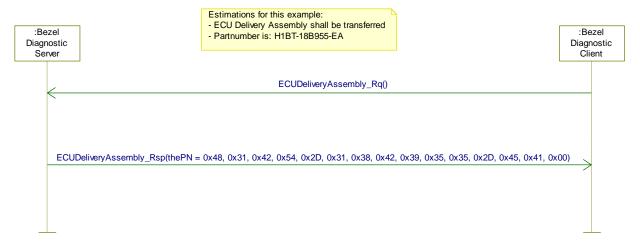
Ford		Ford Motor Company					Subsystem Part Specific Specif Engineering Specif		
Default: n/a									
	7	6	5	4	3	2	1	0	
[0]	Delivery Assembly FPN character[0]								
[24]			Deli	very Assembly	/ FPN charad	ter[24]			

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

The I²C 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^2C Slave is not released with this kind of Ford Part Number, the I^2C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I^2C 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 <u>IFS-MMI2C-SR-REQ-140626/C-0x33 Software FPN</u>

The Software Part Number message provides a mechanism to transmit a Ford Part Number back to the I²C Master.

Subaddress: 0x33 Access: Read-Only

Default: n/a

	7	6	5	4	3	2	1	0
[0]			S	Software FP1	N character[0)]		
[24]			S	oftware FPN	l character[2	4]		

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

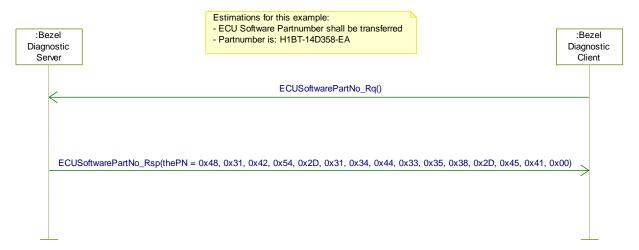
The I²C Master shall read a maximum of 25 bytes, be robust to receiving non-ASCII bytes, and be robust to receiving non-NULL terminated data.

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 38 of 71
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If the I^2C Slave is not released with this kind of Ford Part Number, the I^2C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I^2C 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

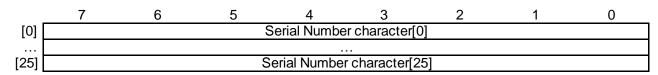


6.7.4 ECU Serial Number

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 I²C Master.

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



- Serial Number:

Null-terminated string.

Maximum length 24 characters plus NULL.

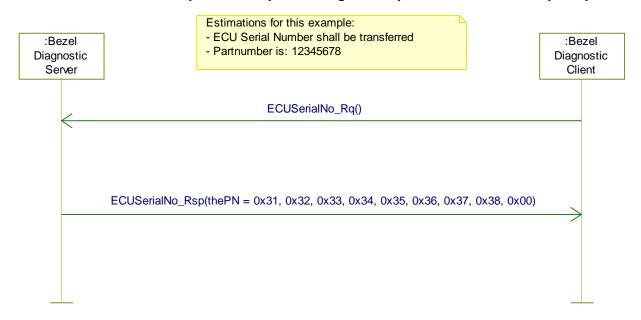
Note: This specification contains no functional requirement about the format of the serial number.

The I²C 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^2C Slave contains no serial number, the I^2C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I^2C 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

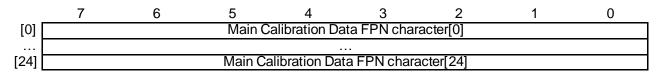


6.7.5 ECU Main Calibration Data Number

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 I²C Master.

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



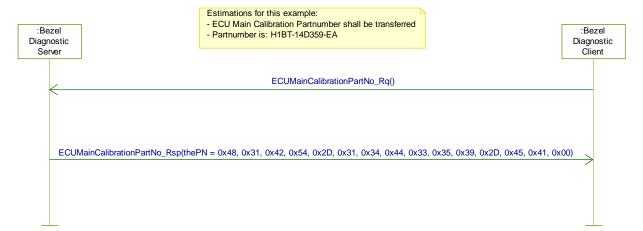
 Main Calibration Data FPN: Released (or prototype) Ford Part Number Null-terminated string. No example provided.
 Maximum length 24 characters plus NULL.

The I²C 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^2C Slave is not released with this kind of Ford Part Number, the I^2C Slave shall indicate that the subaddress is unsupported as described in REQ-140565. In this case the I^2C 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 DIAGv2-FUN-REQ-395945/A-Bezel Diagnostics - SOA (Ethernet) - Variant 2

6.8.1 DIAG-CLD-REQ-278463/A-Bezel Diagnostic Client - SOA

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

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

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

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

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

6.8.4 Physical Mapping of Classes

The table below shows how the logical classes may be mapped to physical modules for the SOA Bezel Diagnostics feature. The table below covers the lead program.

At the time the specification was written the below table was the latest. If there are additional modules deployed to the class descriptions or the vehicle architecture changed since the spec was written and released, then the applicable implementation guide class description would cover those modules. If there is a conflict between the implementation guide and the table below the implementation guide takes precedent.

Logical Class	Physical Module (ECU)
Bezel Diagnostic Client- SOA	APIM
Bezel Diagnostic Server – SOA (ECG)	ECG
Bezel Diagnostic Server – SOA (TCU)	TCU

6.8.5 Interface Requirements

6.8.5.1 Disclaimer

For any conflict between the SOA MD's for the Topic, Command ID and IDL files as called out in the MD's and the GPB, the GPB shall always take precedence.

6.8.5.2 Interface Requirements - TCU

6.8.5.2.1 TCU DID MD's

6.8.5.2.1.1 MD-REQ-395947/A-SpcmDIDReadReq

This API is used by the Bezel Diagnostic Client to request DID information from the TCU Bezel Diagnostic Server.

API Name	SpcmDidReadReq
Operation	Request
Method Type	
QoS Level	0 (default)
Retained	No
_	
Command ID	SPCM_DID_READ_REQ (0x0)
IDL File(s)	tcu_spcm_soa.proto, tcu_spcm_common.proto

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 42 of 71
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Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
Repeated	did_address	Int32	-	0x00000000 - 0xFFFFFFF	Requested TCU DID address
Optional	requester	Enum	TCU_INTERNAL	0x0	If ECU not listed
			ECG_INTERNAL	0x1	then use
			ECG_FTCP	0x2	TCU_Internal (ex
			TCU_CAN	0x3	APIM uses TCU_Internal)

6.8.5.2.1.2 MD-REQ-395949/A-SpcmDIDReadResp

This API from the TCU Bezel Diagnostic Server is the response to the SpcmDIDReadReq

API Name	SpcmDidReadResp
Operation	Response
Method Type	One-Shot
QoS Level	0 (Default)
Retained	No
Command ID	SPCM_DID_READ_RESP (0x1)
IDL File(s)	tcu_spcm_soa.proto, tcu_spcm_common.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	response_status	Enum	-	-	Response to initial request
			Success	0x00	
			Wait	0x01	
			Fail-Param Does Not Exist	0x02	
			Fail-Param Read Only	0x03	
			Fail-Param Out Of Range	0x04	
			Fail-Param Size Incorrect	0x05	
			Fail-Unknown Command Type	0x06	
			Fail-TCU Internal Error	0x07	
			Fail-Command Already In Progress	0x08	
			Fail-Command Not Permitted	0x09	
			Fail-Internal Memory Error	0x0A	
			Fail-Invalid Config Data	0x0B	
			Fail-Part2No Mismatch	0x0C	
			Fail-Invalid Apply Type Combo	0x0D	
			Fail-Access Denied	0x0E	

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 43 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	3.

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			Fail-Config Item Mismatch	0x0F	
			Fail-Already In Same State	0x10	
repeated	did_read_data	SpcmDidDat a	-	-	
optional	SpcmDidData : did_address	Int32	-	0x00000000 - 0xFFFFFFF	DID address
optional	SpcmDidData : did_config_data	String	-	-	DID Data

6.8.5.2.1.3 MD-REQ-395972/A-SpcmDidUpdateInd

This API is used to receive updated DID information from the TCU. The TCU publishes all DID updates via this API.

API Name	SpcmDIDUpdateInd
Operation	Broadcast (OnChange)
Method Type	
QoS Level	0 (Default)
Retained	Yes
Topic	SERVICES/INDICATION/TCU/SPCM
Command ID	SPCM_DID_UPDATE_IND (0x100)
IDL File(s)	tcu_spcm_soa.proto, tcu_spcm_common.proto
Required/	Type

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
repeated	did_update_list	SpcmDidData	-	-	
optional	SpcmDidData : did_address	Int32	-	0x00000000 - 0xFFFFFFF	DID address
optional	SpcmDidData : did_config_data	String	-	-	DID Data

6.8.5.2.2 TCU DTC MD's

6.8.5.2.2.1 MD-REQ-396962/A-TcuViewDtcReq

This API is used by the Bezel Diagnostic Client to request Diagnostic Trouble Code (DTC) information from the TCU Bezel Diagnostic Server.

API Name	TcuViewDtcReq
Operation	
Method Type	One-Shot
QoS Level	0 (default)
Retained	No
Topic	
	TVDM_VIEW_DTC_REQ (1001)
IDL File(s)	SoaTvdm.proto, tvdm_info.proto

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 44 of 71
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Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	Tcu_view_dtc	bool	-	-	Unsure what the intended purpose of this field was. TCU Bezel Diagnostics Server ignores it.
optional	apiVersion	enum	-	-	Specify API version. Unused now since there is only one version

Note that both fields are ignored by the TCU Bezel Diagnostics Server. Sending the TcuViewDtcReq will always result in a TcuViewDtcResp message.

6.8.5.2.2.2 MD-REQ-396963/A-TcuViewDtcResp

This API from the TCU Bezel Diagnostic Server is the response to the TcuViewDtcReq

API Name	TcuViewDtcResp
Operation	Response
J.	
QoS Level	0 (Default)
Retained	No
Topic	SERVICES/RESPONSE/TCU/TVDM
	TVDM_VIEW_DTC_RSP (1002)
IDL File(s)	SoaTvdm.proto, tvdm_info.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
repeated	active_dtc_list	TcuViewDtcI nfo	-	-	List of active DTCs on the TCU
repeated	confirmed_dtc_lis t	TcuViewDtcI nfo	-	-	List of confirmed DTCs on the TCU
optional	TcuViewDtcInfo: dtc_number	Int32	-	-	DTC code
optional	TcuViewDtcInfo: dtc_desc	String	-	-	Description of the matching DTC code
repeated	TcuViewDtcInfo: dtcDescription	enum	•	-	Pass or fail status of the enum
			DTC_PASS	0x1	
			DTC_FAIL	0x2	
optional	_apiVersion	enum	-	-	Specify API version. Unused now since there is

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SEP 3, 2020
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Page 45 of 71

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_							_
			1			only one	
			<u> </u>			version	

6.8.5.2.2.3 MD-REQ-396964/A-TcuViewDtcInd

This API is used to receive updated DTC information from the TCU. The TCU publishes all DTC updates via this API.

API Name	TcuViewDtcInd
	Broadcast (OnChange)
Method Type	One-Shot
QoS Level	0 (Default)
Retained	
	SERVICES/DATA/TCU/TVDM
	TVDM_DTC_UPDATE_IND (1202)
IDL File(s)	SoaTvdm.proto, tvdm_info.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
repeated	updated_dtc_list	TcuViewDtcInf o	-	-	List of confirmed DTCs on the TCU
optional	TcuViewDtcInfo: dtc_number	Int32	-	-	DTC code
optional	TcuViewDtcInfo: dtc_desc	String	-	-	Description of the matching DTC code
repeated	TcuViewDtcInfo: dtcDescription	enum	-	-	Pass or fail status of the enum
			DTC_PASS	0x1	
			DTC_FAIL	0x2	
optional	apiVersion	enum	-	-	Specify API version. Unused now since there is only one version

6.8.5.2.3 TCU Cellular Controls MD's

6.8.5.2.3.1 MD-REQ-396528/A-CellularCtrlGetCurrentTechReq

This API is used by the Bezel Diagnostic Client to request cellular technology information from the TCU Bezel Diagnostic Server.

	API Name CellularCtrlGetCurrentTechReq					
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C	peration	Request				
Met	hod Type	One-Shot				
Q	oS Level	0 (defa	ault)			
	Retained	No				
	Topic	SERV	/ICES/RE	EQUEST/TCU/CELLUL	ARCTRL	
Con	Command ID GET_CURRENT_TECH_REQ (0)					
IDL File(s) SoaCellula			ellularctl.	.proto, CommonCellularctrl.proto, cellularctrl_info.proto		
Required/	Required/ Type					
Optional/	Name			Literals	Value	Description
Repeated	Repeated Rep					
optional	optionalapi_version		enum	-	-	Specify API version. Unused
						now since there is only one
						version

6.8.5.2.3.2 MD-REQ-396908/A-CellularCtrlGetCurrentTechResp

This API from the TCU Bezel Diagnostic Server is the response to the CellularCtrlGetCurrentTechReq

API Name	CellularCtrlGetCurrentTechResp
Operation	Response
Method Type	One-Shot
QoS Level	0 (Default)
Retained	No
Topic	SERVICES/RESPONSE/TCU/TCUMAIND
Command ID	GET_CURRENT_TECH_RESP (1)
IDL File(s)	SoaCellularctl.proto, CommonCellularctrl.proto, cellularctrl_info.proto

Required/		Туре			
Optional/	Name		Literals	Value	Description
Repeated					
optional	response_status	enum	-	-	Success status of the request
			CELLULARCTRL	0x0	
			_RESP_SUCCE		
			SS		
			CELLULARCTRL	0x1	
			_RESP_FAILED		
optional	rat	enum	-	-	The radio access technology
					being used by the TCU
			NO_NW	0x0	
			GSM	0x1	
			GPRS	0x2	
			EDGE	0x3	
			UMTS	0x4	
			HSPA_P	0x5	
			LTE	0x6	
optional	api_version	enum	-	-	Specify API version. Unused
					now since there is only one
					version

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 47 of 71
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6.8.5.2.3.3 MD-REQ-396916/A-CellularCtrlTechInd

This API is used to receive updated cellular technology information from the TCU. The TCU publishes all cellular technology updates via this API.

API Name	CellularCtrlTechInd
Operation	Broadcast (OnChange)
Method Type	One-Shot
QoS Level	0 (Default)
Retained	Yes
Topic	SERVICES/DATA/CELLULARCTRL
	TECH_IND (200)
IDL File(s)	SoaCellularctl.proto, CommonCellularctrl.proto, cellularctrl_info.proto

Required/ Optional/	Name	Туре	Literals	Value	Description
Repeated					
optional	rat	enum	-	-	The radio access technology being used by the TCU
			NO_NW	0x0	
			GSM	0x1	
			GPRS	0x2	
			EDGE	0x3	
			UMTS	0x4	
			HSPA_P	0x5	
			LTE	0x6	
optional	api_version	enum	-	-	Specify API version. Unused now since there is only one version

6.8.5.2.3.4 MD-REQ-396917/A-CellularCtrlServingCellNasStatusReq

This API is used by the Bezel Diagnostic Client to request NAS status from the TCU Bezel Diagnostic Server.

API Name	CellularCtrlServingCellNasStatusReq
Operation	Request
Method Type	
QoS Level	0 (default)
Retained	No
Topic	
Command ID	SERVING_CELL_INFO_NAS_STATUS_REQ(2)
IDL File(s)	SoaCellularctl.proto, CommonCellularctrl.proto, cellularctrl_info.proto

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 48 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	7 ago 40 0/ / 1
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Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	api_version	enum	-	1	Specify API version. Unused now since there is only one version

6.8.5.2.3.5 MD-REQ-396918/A-CellularCtrlServingCellNasStatusResp

This API from the TCU Bezel Diagnostic Server is the response to the CellularCtrlServingCellNasStatusReq

API Name Cell			CtrlServingCell	NasStatusResp		
C	peration	Respon	se			
Met	hod Type	One-Sh	ot			
Q	oS Level	0 (Defai	ult)			
	Retained	No				
	Topic	SERVI	CES/RESPONS	SE/TCU/TCUMAIND		
Con	nmand ID	SERVI	NG_CELL_INFO	O_NAS_STATUS_R	ESP (3)	
II	DL File(s)	SoaCel	lularctl.proto, C	CommonCellularctrl.p	roto, cellul	arctrl_info.proto
Required/			Туре			
Optional/	Name			Literals	Value	Description
Repeated						
optional	response	_status	enum	-	-	Success status of the request
				CELLULARCTRL _RESP_SUCCE	0x0	
			SS			
			CELLULARCTRL _RESP_FAILED	0x1		
optional	optional nas_status		string	-	-	The NAS status of the TCU
optional	api_ver	sion	enum	-	-	Specify API version. Unused now since there is only one

6.8.5.2.3.6 MD-REQ-396919/A-CellularCtrlServingCellNasStatusInd

This API is used to receive updated NAS status information from the TCU. The TCU publishes all NAS status updates via this API.

version

API Name	CellularCtrlServingCellNasStatusInd
Operation	Broadcast (OnChange)
Method Type	
QoS Level	0 (Default)
Retained	Yes
Topic	SERVICES/DATA/CELLULARCTRL
Command ID	SERVING_CELL_INFO_NAS_STATUS_IND (201)
IDL File(s)	SoaCellularctl.proto, CommonCellularctrl.proto, cellularctrl_info.proto

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 49 of 71
SED 3 2020	The information contained in this document is Proprietary to Ford Motor Company.	7 ago 10 07 7 1
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Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	nas_status	string	-	-	The NAS status of the TCU
optional	api_version	enum	-	-	Specify API version. Unused now since there is only one version

6.8.5.2.3.7 MD-REQ-396920/A-CellularCtrlServingCellIdReq

This API is used by the Bezel Diagnostic Client to request the serving cell tower ID from the TCU Bezel Diagnostic Server.

<i>F</i>	API Name	CellularCtrlSe	CellularCtrlServingCellIdReq						
	Operation	Request							
Met	hod Type	One-Shot							
C	oS Level	0 (default)	0 (default)						
	Retained	No							
	Topic	SERVICES/REQUEST/TCU/CELLULARCTRL							
Con	nmand ID	SERVING_CE	LL_ID_REQ (4)						
I	DL File(s)	SoaCellularct	.proto, CommonCellula	arctrl.proto, ce	llularctrl_info.proto				
Required/		Туре							
Optional/	Name		Literals	Value	Description				
Repeated									
optional	api_ver	sion enum	-	-	Specify API version. Unused now since there is only one				

6.8.5.2.3.8 MD-REQ-396921/A-CellularCtrlServingCellIdResp

This API from the TCU Bezel Diagnostic Server is the response to the CellularCtrlServingCellIdReq

API Name CellularCtrlServingCellIdResp								
C	Operation	Respon	Response					
Met	hod Type	One-Sh	ot					
Q	oS Level	0 (Defau	ult)					
	Retained	No						
	Topic			SE/TCU/TCUMAIND				
	nmand ID		NG_CELL_ID_I	· /				
[II	DL File(s)	SoaCel	lularctl.proto, C	commonCellularctrl.p	roto, cellu	larctrl_info.proto		
Required/			Туре					
Optional/	Name			Literals	Value	Description		
Repeated								
optional	response	_status	enum	-	-	Success status of the request		
				CELLULARCTRL _RESP_SUCCE SS	0x0			

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 50 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	, ago oo o, , ,
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			CELLULARCTRL _RESP_FAILED	0x1	
optional	cell_id	string	-	•	The serving cell tower ID of the tower the TCU is connected to
optional	api_version	enum	-	-	Specify API version. Unused now since there is only one version

6.8.5.2.3.9 MD-REQ-396923/A-CellularCtrlServingCellIdInd

This API is used to receive updated NAS status information from the TCU. The TCU publishes all NAS status updates via this API.

Į P	API Name	e CellularCtrlServingCellIdInd				
C	peration	Broado	cast (OnChange)			
Met	hod Type	One-S	hot			
Q	oS Level	0 (Defa	ault)			
	Retained	Yes				
	Topic	SERV	ICES/DATA/CELI	LULARCTRL		
Con	nmand ID	SERV	ING_CELL_ID_IN	ID (202)		
II.	DL File(s)	SoaCe	ellularctl.proto, Co	mmonCellularctr	l.proto, cellula	rctrl_info.proto
Required/			Туре			
Optional/	Name			Literals	Value	Description
Repeated						·
optional	cell_id		string	-	-	The serving cell tower ID of
			_			the tower the TCU is
						connected to
optional	optionalapi_version		enum	-	-	Specify API version. Unused
	. –					now since there is only one
						version

6.8.5.2.3.10 MD-REQ-396924/A-CellularCtrlServingCelllmeiSvReq

This API is used by the Bezel Diagnostic Client to request the International Mobile Equipment Identity Software Version (IMEI SV) from the TCU Bezel Diagnostic Server.

Α	Name	CellularCtrlS	CellularCtrlServingCellImeiSvReq					
C	peration	Request	Request					
Met	hod Type	One-Shot	One-Shot					
Q	oS Level	0 (default)						
	Retained	No						
	Topic	SERVICES/	SERVICES/REQUEST/TCU/CELLULARCTRL					
Con	nmand ID	IMEI_SV_RE	EQ (6)					
II	DL File(s)	SoaCellularctl.proto, CommonCellularctrl.proto, cellularctrl_info.proto						
Required/	Required/							
Optional/	Optional/ Name		Literals	Value	Description			
Repeated								
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FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8 Sep 3, 2020 FORD MOTOR COMPANY CONFIDENTIAL

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optional	api_version	enum -	-	Specify API version. Unused now since there is only one version	

6.8.5.2.3.11 MD-REQ-396925/A-CellularCtrlServingCellImeiSvResp

This API from the TCU Bezel Diagnostic Server is the response to the CellularCtrlServingCellImeiSvReq

P	API Name	Cellular	CellularCtrlServingCellImeiSvResp						
C	peration	Respon	se						
Met	hod Type	One-Sh	ot						
Q	oS Level	0 (Defau	ult)						
	Retained	No							
	Topic	SERVI	CES/RESPONS	SE/TCU/TCUMAIND					
Con	nmand ID	IMEI_S	V_RESP (7)						
l l	DL File(s)	SoaCel	SoaCellularctl.proto, CommonCellularctrl.proto, cellularctrl_info.proto						
Required/			Туре						
Optional/	Name			Literals	Value	Description			
Repeated									
optional	response	_status	enum	-	-	Success status of the request			
				CELLULARCTRL _RESP_SUCCE SS	0x0				

CELLULARCTRL

RESP_FAILED

0x1

The IMEI SV of the TCU

version

Specify API version. Unused

now since there is only one

Note that there is no broadcast message for the IMEI SV. That is because it can only change when the software updates which would cause a reboot.

6.8.5.2.4 TCU DCM (Data Connection Manager) MD's

api_version

string

enum

optional

optional

imei

6.8.5.2.4.1 MD-REQ-396957/A-TcuPdpApnStateReq

This API is used by the Bezel Diagnostic Client to request Data Connection Manager (DCM) information from the TCU Bezel Diagnostic Server.

API Name	TcuPdpApnStateReq
Operation	Request
Method Type	One-Shot
QoS Level	0 (default)
Retained	No
Topic	SERVICES/REQUEST/TCU/DCM
Command ID	TCU_PDP_APN_STATE_REQ(1001)

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 52 of 71
		Page 32 01 1 1
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I	IDL File(s) SoaDcm.proto, dcm_info.proto						
Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description		
optional	ann type	enum			Specifies the APN type you		
Οριιοπαι	apn_type	enum	-		are requesting information for		
			CNC_APN	0x1			
			MHS_APN	0x2			
optional	api_version	enum	-	-	Specify API version. Unused now since there is only one version		

6.8.5.2.4.2 MD-REQ-396959/A-TcuPdpApnStateRsp

This API from the TCU Bezel Diagnostic Server is the response to the TcuPdpApnStateReq

API Name	TcuPdpApnStateRsp
Operation	Response
Method Type	One-Shot
QoS Level	0 (Default)
Retained	No
	SERVICES/RESPONSE/TCU/DCM
	TCU_PDP_APN_STATE_RSP (1002)
IDL File(s)	SoaTvdm.proto, tvdm_info.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	apn_type	enum	-	-	Specifies the APN type in the response
			CNC_APN	0x1	
			MHS_APN	0x2	
optional	pdp_state	String	-	-	String specifying the state of the apn
optional	apiVersion	enum	-	-	Specify API version. Unused now since there is only one version

6.8.5.2.4.3 MD-REQ-396960/A-TcuPdpApnStateInd

This API is used to receive updated DCM information from the TCU. The TCU publishes all DCM updates via this API.

	TcuPdpApnStateInd
Operation	Broadcast (OnChange)
Method Type	One-Shot
QoS Level	0 (Default)
Retained	Yes

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 53 of 71
		rage 33 or r
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Topic	SERVICES/DATA/TCU/DCM
Command ID	TCU_PDP_APN_STATE_IND (1201)
IDL File(s)	SoaTvdm.proto, tvdm_info.proto

Required/		Туре			
Optional/	Name		Literals	Value	Description
Repeated					
optional	apn_type	enum	-	-	Specifies the
					APN type in the
					response
			CNC_APN	0x1	
			MHS_APN	0x2	
optional	pdp_state	String	-	-	String
					specifying the
					state of the apn
optional	apiVersion	enum	-	-	Specify API
					version.
					Unused now
					since there is
					only one
					version



6.8.5.3 Interface Requirements - ECG

6.8.5.3.1 ECG DID MD's

6.8.5.3.1.1 MD-REQ-396050/A-EcgSpcmCmDidReadReq

This API is used by the Bezel Diagnostic Client to request DID information from the ECG Bezel Diagnostic Server.

API Name	EcgSpcmCmDidReadReq
Operation	Request
Method Type	
QoS Level	0 (default)
Retained	No
Topic	SERVICES/REQUEST/ECG/SPCM/CM/DID_READ
Command ID	ECG_SPCM_CM_DID_READ_REQ (0x0)
IDL File(s)	ecg_spcm_cm.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
Repeated	DidAddress	Int32	-	0x00000000 - 0xFFFFFFF	Requested ECG DID address

6.8.5.3.1.2 MD-REQ-396051/A-EcgSpcmCmDidReadResp

This API from the ECG Bezel Diagnostic Server is the response to the EcgSpcmCmDidReadReq

API Name	EcgSpcmCmDidReadResp
Operation	Response
Method Type	One-Shot
QoS Level	0 (Default)
Retained	
	N/A – Supplied by request
Command ID	ECG_SPCM_CM_DID_READ_RESP (0x1)
IDL File(s)	ecg_spcm_cm.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	responseStatus	Enum	-	-	Response to initial request
			Success	0x00	
			Error Internal	0x01	
			Error Access Permission	0x02	
			Error Invalid Parameter	0x03	
			Error Not Initialized	0x04	
repeated	ResponseData	EcgSpcmC mDidData	-	-	
optional	EcgSpcmCmDid Data: Address	Int32	-	0x00000000 - 0xFFFFFFF	DID address
F: BEZEL DIAGNO	STICS APIM SPSS v1.8	l F	ORD MOTOR COMPANY CONFID	ENTIAL	Page 55 of 7°

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Page 55 of 71

Ford	Ford Motor Company			Sub	osystem Part Specific Specifica Engineering Specifica	
optional	EcgSpcmCmDid Data: Data	String	-	-	DID Data	

6.8.5.3.1.3 MD-REQ-396052/A-EcgSpcmCmDidRefreshInd

This API is used to receive updated DID information from the ECG. The ECG publishes all DID updates via this API.

-	API Name	EcaSp	cmCmDidRefres	hInd			
	peration	0 1	cast (OnChange)				
	hod Type	One-S	1 0 /				
C	oS Level	0 (Defa	ault)				
	Retained	Yes					
	Topic			:/SPCM/CM/DID_REFRI			
	nmand ID			REFRESH_IND (0x100)		
II	IDL File(s) ecg_s			cg_spcm_cm.proto			
Required/			Туре				
Optional/	Name			Literals	Value	Description	
Repeated							
repeated	refreshLis	st	EcgSpcmCmD	-	-		
			idData				
optional	otional EcgSpcmCmDid		Int32	-	0x00000000 -	DID address	
	Data: Address				0xFFFFFFF		
	EcgSpcmCmDid		0.1				
optional	EcgSpcm	nCmDid	String	-	-	DID Data	

6.8.5.3.2 ECG DTC MD's

6.8.5.3.2.1 MD-REQ-396059/A-EcgVdmDtcGetReq

This API is used by the Bezel Diagnostic Client to request Diagnostic Trouble Code (DTC) information from the ECG Bezel Diagnostic Server.

P	API Name	EcgVdmDto	cGetReq		
	peration	Request			
Met	hod Type	One-Shot			
Q	oS Level	0 (default)			
	Retained	No			
	Topic	SERVICES	/REQUEST/ECG/VDM/DTC_0	GET	
Con	nmand ID	ECG_VDM	_DTC_GET_REQ (0x2)		
II	DL File(s)	ecg_vdm.proto			
Required/ Ty					
Optional/ Name			Literals	Value	Description
Repeated					
Optional	dtcCode	String	-	-	Requested ECG DTC. Blank

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 56 of 71
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		represents a request
		for all DTCs.

Note that Bezel Diagnostics never requests individual DTCs. Requests are always sent with a blank dtcCode meaning the request is for all DTCs

6.8.5.3.2.2 MD-REQ-396060/A-EcgVdmDtcGetResp

This API from the ECG Bezel Diagnostic Server is the response to the EcgVdmDtcGetReq

	EcgVdmDtcGetResp
Operation	Response
Method Type	
QoS Level	0 (Default)
Retained	No
Topic	N/A – Supplied by request
	N/A – Not required in response
IDL File(s)	ecg_vdm.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	responseStatus	Enum	-	-	Response to
				0.00	initial request
			Success	0x00	
			Failed	0x01	
			Download Request Error	0x02	
			Download Transfer Data Error	0x03	
			Download Transfer Exit Error	0x04	
			Download Busy Error	0x05	
			Download Checksum Error	0x06	
			ECU Request Timeout	0x07	
			Invalid NRC Length	0x08	
			External Tester Detected	0x09	
			Can Bus Not Available	0x0A	
			VMCU Software Error	0x0B	
			Denied Low Power	0x0C	
			ECU Not Responding	0x0D	
			ECU Not Present in Detected ECU List	0x0E	
			Resource Unavailable	0x0F	
			External Tester Detected On ECG	0x10	
repeated	dtcResponseDat a	EcgVdmDtc	-	-	
optional	EcgVdmDtc: dtcCode	String	-	-	DTC code

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 57 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	. aga ar ar r

į.	Ford	Ford Motor Company		Ford Motor Company				Engineering Specification		
	optional	EcgVdmDtc:	String	T _	T -	DTC status bits				
	οριιοπαι	dtcStatus	Stillig	-		DTC status bits				
	repeated	dtcDescription	String	-	-	Description of the matching DTC code				

6.8.5.3.2.3 MD-REQ-396061/A-EcgVdmDtcBroadcastResp

This API is used to receive updated DTC information from the ECG. The ECG publishes all DTC updates via this API.

-	API Name	EcgVo	lmDtcBroadcastR	Resp		
C	peration	Broado	cast (OnChange)			
Met	hod Type	One-S	hot			
C	oS Level	0 (Defa	ault)			
	Retained	Yes				
	Topic	SERV	ICES/REQUEST/	ECG/VDM/DTC_ONCH	ANGE	
Con	nmand ID	N/A – I	Not required in br	oadcast		
II	DL File(s)	ecg_vc	g_vdm.proto			
Required/			Type			
Optional/	Name			Literals	Value	Description
Repeated						
repeated	dtcRespo	nseDat	EcgVdmDtc	-	-	
	а					
optional	optional EcgVdmDtc:		String	-	-	DTC code
	dtcCode					
optional	EcgVdmDtc:		String	-	-	DTC status bits
	dtcStatus	;				

6.8.5.3.3 System Statistics MD's

6.8.5.3.3.1 MD-REQ-396064/A-SysStatsReq

This API is used by the Bezel Diagnostic Client to request system statistics information from the ECG Bezel Diagnostic Server.

API Name	SysStatsRe	eq				
Operation	Request					
Method Type	One-Shot					
QoS Level	0 (default)					
Retained	No					
Topic	SERVICES	/REQUEST/ECG/SPCM/SYSS	ΓAT			
Command ID	N/A					
IDL File(s)	ecg_spcm_	_common.proto				
Required/	Type					
Optional/ Name		Literals	Value	Description		
Repeated						

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8 SEP 3, 2020 FORD MOTOR COMPANY CONFIDENTIAL

Page 58 of 71

Subsy	stem Part Specific Specification
	Engineering Specification

Optional	clientCorrela	Int32	-	-	If set this value will
	tionId				also be set in the
					response message.
					This can be used to
					tie requests to their
					response messages.

Note that Bezel Diagnostics never uses clientCorrelationIds. Responses are simply assumed to be the latest values.

6.8.5.3.3.2 MD-REQ-396065/A-SysStatsResp

Ford

This API from the ECG Bezel Diagnostic Server is the response to the SysStatsReq

Ford Motor Company

API Name	SysStatsResp
Operation	Response
Method Type	One-Shot
QoS Level	0 (Default)
Retained	No
Topic	N/A – Supplied by request
Command ID	N/A – Not required in response
IDL File(s)	ecg_spcm_common.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	isRespValid	Int32	-	-	Used as bool to indicate if the response is valid
optional	clientCorrelationI d	Int32	-	-	Matches the value sent in the request if there was one.
optional	ecgCpuCore0ldle	Int32	-	-	Idle percentage for core 0
optional	ecgCpuCore1ldle	Int32	-	-	Idle percentage for core 1
optional	ecgCpuCore2ldle	Int32	-	-	Idle percentage for core 2
optional	ecgCpuCore3ldle	Int32	-	-	Idle percentage for core 3
optional	ecgCpuAllCoresA vgldle	Int32	-	-	Average idle percentage across all cores
optional	ecgRamMegabyt esTotal	Int32	-	-	Total Device Ram in Megabytes
optional	ecgRamMegabyt esAvailable	Int32	-	-	Available Device Ram in Megabytes

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 59 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	. a.g. co a

Ford	Ford Motor Co	mpany			Engineering Specific	
optional	cgDiskKilobytes otal	Int32	-	-	Total Device Flash in Kilobytes	
optional	cgDiskKilobytes sed	Int32	-	-	Used Device Flash in Kilobytes	

Bezel Diagnostics only displays three stats: Ram usage, Disk Usage, and Processor Usage. All 3 require some small processing before being displayed. Processor Usage is the inverted percentage of all cores average idle. Disk Usage is calculated as the disk used value over the disk available value converted to percent. Ram usage is calculated as the Ram total minus the Ram available to get the ram used, then that value over the Ram total converted to percent.

6.8.5.3.4 ECG SDN Connection MD's

6.8.5.3.4.1 MD-REQ-396086/A-FciGenericService

This API is used by the Bezel Diagnostic Client to request information about the connection to the Service Delivery Network (SDN) from the ECG Bezel Diagnostic Server.

API Name	FciGenericService
Operation	Request
Method Type	One-Shot
QoS Level	0 (default)
Retained	No
Topic	SERVICES/REQUEST/FNV/FCI/GENSERVICE
Command ID	SDN_CONNECT_STATUS (0x0)
IDL File(s)	fci_service.proto, fci_broadcast.proto, fci_info.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	serviceType	Enum	1	1	The service that this request is for
			SDN Connect	0x0	
			TCU SMS	0x1	
			Request Broadcast Info	0x2	
			Vehicle Status Update	0x3	
			Command Handle	0x4	
			Register		
optional	rpcResponse Required	bool	-	-	Set when you want a response to the message
optional	sdnConnMsg	SdnConnectMessage	-	1	Contains fields for sending SDN Connect messages
optional	tcuSmsMsg	TcuSmsMessage	-	-	Contains fields for sending TCU SMS messages

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 60 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	1 ago 00 01 1 1
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optional	reqBroadcastI	Enum	-	-	Select the
	nfoType				information to
					request
			Connection Status	0x0	
			Power State	0x1	
			All	0x2	
optional	vstatusUpdate	VehicleStatusUpdate	-	-	Contains fields for
	Msg	Message			sending vehicle
					status update
					messages
optional	cmdHandlerM	CmdHandlerRegister	-	-	Contains fields for
	sg	Message			command handle
					register messages
optional	api_version	Enum	-	-	Specify API version.
					Unused now since
					there is only one
					version

The additional fields found in SdnConnectMessage, TcuSmsMessage, VehicleStatusUpdateMessage, and CmdHandlerRegiserMessage have all been omitted since they are never used by Bezel Diagnostics. Bezel Diagnostics only requests broadcast information.

When Making this request the serviceType is set to request broadcast info (0x2), rpcResponseRequired is set to true, and reqBroadcastInfoType is set to Connection Status (0x0). All other fields are ignored as they are not used.

6.8.5.3.4.2 MD-REQ-396091/A-BroadcasInfoMessage

This API from the ECG Bezel Diagnostic Server is the response to the FciGenericService

API Name	BroadcasInfoMessage
Operation	Response
Method Type	
QoS Level	
Retained	No
	N/A – Supplied by request
	N/A – Not required in response
IDL File(s)	fci_service.proto, fci_broadcast.proto, fci_info.proto

Required/ Optional/ Repeated	Name	Туре	Literals	Value	Description
optional	reqBroadcastInfo	Enum	-	-	Indicates the
	Type				information in
					the response
			Connection Status	0x0	
			Power State	0x1	
			All	0x2	
optional	sdnConnStatusM	SdnConnStatusMe	-	-	Contains the
	sg	ssage			connection

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 61 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	7 ago 01 57 1



					status information
optional	SdnConnStatusM essage: ifType	Enum	-	-	Indicates the connection path to the
			Unknown	0x0	SDN
			TCU Cellular	0x0 0x1	
			TCU Wifi	0x1	
			SYNC Wifi	0x2	
			SYNC SDL	0x4	
optional	SdnConnStatusM essage: connStatus	Enum	-	-	Indicates the status of the connection
			Connected	0x0	
			Disconnected	0x1	
optional	powerStateMsg	PowerStateMessag e	-	-	Contains the power state information
optional	api_version	Enum	-	-	Specify API version. Unused now since there is only one version

The additional fields found in PowerStateMessage have been omitted since they are never used by Bezel Diagnostics. Bezel Diagnostics only requests the connection status.

6.8.5.3.4.3 MD-REQ-396090/A-BroadcastMessage

This API is used to receive changes in the SDN connection status from the ECG.

API Name Broade		castMessage				
C	peration	Broado	cast (OnChange)			
Met	hod Type	One-S	hot			
Q	oS Level	0 (Defa	ault)			
	Retained	Yes				
	Topic	SERV	ICES/DATA/FNV/	/FCI/BROADCAST		
Con	nmand ID	N/A – I	A – Not required in broadcast			
II	IDL File(s) fci_se		i_service.proto, fci_broadcast.proto, fci_info.proto			
Required/			Туре			
Optional/	Name			Literals	Value	Description
Repeated						
optional	timeStam	ıp	Uint32	-	-	Seconds since
					Jan 1 1970	
optional	broadcas	tType	Enum	-	-	Indicates the
						information in
						the broadcast

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 62 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	, ago o <u>z</u> o,



			Connection Status	0x0	
			Power State	0x1	
			All	0x2	
optional	sdnConnStatus Msg	SdnConnStatu sMessage	-	-	Contains the connection status information
optional	SdnConnStatus Message: ifType	Enum	-	-	Indicates the connection path to the SDN
			Unknown	0x0	
			TCU Cellular	0x1	
			TCU Wifi	0x2	
			SYNC Wifi	0x3	
			SYNC SDL	0x4	
optional	SdnConnStatus Message: connStatus	Enum	-	-	Indicates the status of the connection
			Connected	0x0	
			Disconnected	0x1	
optional	powerStateMsg	PowerStateMe ssage	-	-	Contains the power state information
optional	smsMsg	SmsMessage	-	-	Contains information for sending a broadcast SMS
optional	api_version	Enum	-	-	Specify API version. Unused now since there is only one version

The additional fields found in PowerStateMessage and SmsMessage have been omitted since they are never used by Bezel Diagnostics. Bezel Diagnostics only monitors the connection status.



6.8.6 Use Cases

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

Actors	User
Pre-conditions	Infotainment System Powered On
	There is an Active Media Source (AM/FM, CD, SDARS, USB)
	A phone call is not active
	No other higher priority feature preventing bezel diagnostics from being
	entered.
Scenario	User presses two designated buttons as defined by the HMI
Description	
Post-conditions	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.
List of Exception	E1-DIAG-GUC-291320-1-Bezel Diagnostics - Cannot enter Bezel
Use Cases	Diagnostics
Interfaces	G-HMI (Graphic HMI)
	CBI (Center Stack Button Interface – Touch/Non Touch)
	Audio OUT
Notes	Note for the pre-condition, the Bezel Diagnostic Client could choose to have
	"There is an Active Media Source (AM/FM, CD, SDARS, USB)" as a pre-
	condition for entering Bezel Diagnostics. That is up to the Bezel Diagnostic
	Client team.

6.8.6.2 DIAG-UC-REQ-016454/D-Bezel Diagnostics – Exit Bezel Diagnostics (TcSE ROIN-291079-1)

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

6.8.6.3 DIAG-UC-REQ-016461/B-Bezel Diagnostics – Main Menu (TcSE ROIN-291070-1)

	Actors	User		
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SEP 3, 2020
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Page 64 of 71



D 1141	
Pre-conditions	Infotainment System Powered ON
	Bezel Diagnostics is active
Scenario	Speaker Walkaround complete or exited, or
Description	Speaker Walkaround entry conditions not met when bezel diagnostics entered, or
	While in bezel diagnostic submenu exit out of the submenu
Post-conditions	Enter main menu of Bezel Diagnostics with all bezel diagnostic components listed as separate menu picks. (ex. APIM Diagnostics, Audio Diagnostics, EFP Diagnostics)
List of Exception	
Use Cases	
Interfaces	G-HMI (Graphic HMI)
	CBI (Center Stack Button Interface – Touch/Non Touch)

6.8.6.4 DIAG-UC-REQ-016462/B-Bezel Diagnostics – Module Specific Sub menu (TcSE ROIN-291071-1)

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

6.8.6.5 DIA G-UC-REQ-016463/C-Bezel Diagnostics - Component Part Numbers (TcSE ROIN-291072-1)

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

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 65 of 71
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6.8.7 General Requirements

6.8.7.1 DIAG-SR-REQ-273206/B-Security protections and Bezel Diagnostics - SOA

There are no security protections preventing a user from entering Bezel Diagnostics (i.e. press and hold a button combination to access bezel diagnostics mode). Once inside the bezel diagnostics menu there are some items that will not be displayed if the users SYNC has a secure software load on it and does not have the 'sync_ap_debug' token. Those items are the TCU and ECG DTCs, as well as the home and provisioning URLs for the ECG. If the token check fails the menu will display "Diagnostics Data Unavailable" for those items.

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8 SEP 3, 2020



6.8.8 Requirements

6.8.8.1 Requirements TCU

6.8.8.1.1 TCU DID requirements

6.8.8.1.1.1 <u>DIAG-SR-REQ-395973/A-TCU DID data</u>

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call using SpcmDIDReadReq to the TCU Bezel Diagnostic Server for the data in the table below. This would be a single request with all the DID's. This data will all be returned in a SpcmDIDReadResp message. The string config data would use 7-bit ASCII.

If any of the DID values change, they will be broadcasted in a SpcmDidUpdateInd message and updated in the Bezel Diagnostics menu.

The DIDs requested are listed in this table below

Requested Data	DID	Config data	Description
	Address		
TCU Provisioning Status	0xD021	Factory Mode (0x30)	Show TCU provisioning
		Unprovisioned Mode (0x31)	status (authorization state)
		Provisioned Mode (0x32)	
TCU VMCU Software Version	0xFD14	String	Show the CAN VMCU SW
Number			version
TCU Hardware part number	0xF111	String	Show the modem SW
			version
TCU ESN	0xF17F	String	Show the modem hardware
			part number
TCU ICCID	0x41AE	String	Show the Electronic Serial
			Number for the TCU
TCU AP SW Number	0xFD12	String	Show the unique serial
			number that represents the SIM
TCU AP Part Number	0xF120	String	Show the AP software part
100 At 1 at Number	0X1 120		number
TCU AP Bootloader SW Number	0xFD13	String	Show the AP bootloader
			software number
TCU AP Bootloader Part Number	0x8068	String	Show the AP bootloader
			part number
TCU VMCU Part Number	0xF188	String	Show the VMCU part
			number
TCU VMCU Bootloader SW	0xFD15	String	Show the VMCU bootloader
Version Number			software version number
TCU VMCU Bootloader Part	0xD027	String	Show the VMCU bootloader
Number			part number
TCU Modem Part Number	0xF121	String	Show the TCU modem part
			number

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 67 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	r ago or or r
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6.8.8.1.2 TCU DTC Data

6.8.8.1.2.1 <u>DIAG-SR-REQ-396965/A-TCU DTC data needed for bezel diagnostics</u>

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call using TcuViewDtcReq to the TCU Bezel Diagnostic Server for the current status of all Diagnostic Trouble Codes (DTCs). This would be a single request for all the DTCs. The string config data would use 7-bit ASCII.

The DTCs are returned already split into active and confirmed DTC lists. It is possible for a DTC to be both active and confirmed, so a DTC may appear in both lists. These lists are not stored in SYNC and will be re-requested each time bezel diagnostics is opened.

Whenever any DTC status changes that information will be sent in a TcuViewDtclnd. The lists will be updated with any new active or confirmed DTCs.

DTCs are one of the Bezel Diagnostics items that are hidden when security requirements are not met. If the SYNC is running secure software and the 'sync_ap_debug' token is not present, the DTC list will not be displayed and the Bezel Diagnostics menu will instead show 'Diagnostics Data Unavailable'

6.8.8.1.3 TCU Cellular Controls

6.8.8.1.3.1 <u>DIAG-SR-REQ-396940/A-TCU cellular control data needed for bezel diagnostics</u>

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make four API calls: CellularCtrlGetCurrentTechReq, CellularCtrlServingCellNasStatusReq, CellularCtrlServingCellIdReq, and CellularCtrlServingCellImeiSvReq. There are no fields that need to be set in these requests. The TCU Bezel Diagnostics Server will respond with the corresponding response messages: CellularCtrlGetCurrentTechResp, CellularCtrlServingCellNasStatusResp, CellularCtrlServingCellIdResp, and CellularCtrlServingCellImeiSvResp. Each response contains a single string or enum that will be displayed in the Bezel Diagnostics menu, along with a response status and api version for internal use only.

Whenever the RAT, NAS Status, or serving cell tower ID changes that information will be sent in a CellularCtrlTechInd, CellularCtrlServingCellIdInd broadcast message. The corresponding value is then updated in Bezel Diagnostics. Note that the IMEI SV cannot change while the device is running so there is no broadcast message for that field.

6.8.8.1.4 TCU DCM (Data Connection Manager)

6.8.8.1.4.1 DIAG-SR-REQ-396961/A-TCU DCM (Data Connection Manager) data needed for bezel diagnostics

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make two API calls using TcuPdpApnStateReq to the TCU Bezel Diagnostic Server, one for each APN type. Each call will set a different APN type in the apn_type field. The TCU Bezel Diagnostics Server will respond with two TcuPdpApnStateRsp messages, one for each APN type. The Bezel Diagnostics Menu will display the PDP state string.

Whenever any DCM status changes that information will be sent in a TcuPdpApnStateInd. The PDP state for the APN will be updated to the new state in Bezel Diagnostics.



6.8.8.2 Requirements ECG

6.8.8.2.1 ECG DID Requirements

6.8.8.2.1.1 <u>DIAG-SR-REQ-396056/A-ECG DID data</u>

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call using EcgSpcmCmDidReadReq to the ECG Bezel Diagnostic Server for the data in the table below. This would be a single request with all the DIDs listed in the repeated DidAddress field. The string config data would use 7-bit ASCII. If any DID values change, they will be broadcasted in an EcgSpcmCmDidRefreshInd message and updated in the Bezel Diagnostics menu.

Home and provisioning URLs are two of the Bezel Diagnostics items that are hidden when security requirements are not met. If the SYNC is running secure software and the 'sync_ap_debug' token is not present, the URLs will not be displayed, and the Bezel Diagnostics menu will instead show 'Diagnostics Data Unavailable'

The DIDs requested are listed in this table below

Requested Data	DID	Config data	Description
	Address		
ECG Provisioning Status	0xD021	Factory Mode Default (0x20)	Show ECG provisioning
		Unprovisioned Mode (0x21)	status (authorization state)
	1	Waiting for ECG Response (0x22)	, .
'		Waiting for TCU Response (0x23)	
'		Waiting for Home URL (0x24)	
'		Connecting to Home URL (0x25)	
'		Provisioned Mode (0x26)	
ECG Hardware Part Number	0xF111	String	Show the Hardware Part
			Number
ECG VMCU Software Number	0xFD14	String	Show the VMCU software
	<u> </u>		version
ECG VMCU Configuration Part	0xF188	String	Show the VMCU
Number			configuration part number
500 (MOLED # 1 0 #	- ED45	Christia	Charrish a VMCI I ha atlandar
ECG VMCU Bootloader Software	0xFD15	String	Show the VMCU bootloader software version
Number			
ECG VMCU Bootloader Part	0xD027	String	Show the VMCU bootloader
Number	<u> </u>		part number
ECG AP Software Number	0xFD12	String	Show the AP software part
CCC AD Configuration Number	050000	Ctring	number Show the AP configuration
ECG AP Configuration Number	0x8033	String	number
ECG AP Bootloader Software	0xFD13	String	Show the AP bootloader
Number		Cilling	software number
ECG AP Bootloader Part	0x8068	String	Show the AP bootloader part
Number			number
ECG ESN	0xF17F	String	Show the Electronic Serial
	l		Number
ECG Application Part Numbers	0x8060	String	Show the part numbers for
			the applications on the ECG
ECG Application Part Numbers 2	0x8061	String	Show the part numbers for
	 	<u> </u>	the applications on the ECG
ECG Provisioning URL	0xD01E	String	Show the URL the ECG
			connects to for provisioning

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 69 of 71
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Ford	Ford Motor Company		Subsystem Part Specific Specification Engineering Specification
ECG Home URL	0xFD24	String	Show the URL the ECG connects to after it is provisioned

6.8.8.2.2 ECG DTC data

6.8.8.2.2.1 DIAG-SR-REQ-396063/A-ECG DTC Data

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call using EcgVdmDtcGetReq to the ECG Bezel Diagnostic Server for the current status of all Diagnostic Trouble Codes (DTCs). This would be a single request for all the DTCs which is done by leaving the dtcCode field blank. The string config data would use 7 bit ASCII.

The status bits are analyzed to form two lists of all active and confirmed DTCs. If the first bit is set they are placed in the active DTC list and if the fourth bit is set they are placed in the confirmed DTC list. It is possible for both bits to be set in which case the DTC will appear in both lists. These lists are not stored in SYNC and will be re-requested each time bezel diagnostics is opened.

Whenever any DTC status changes that information will be sent in an EcgVdmDtcBroadcastResp. The lists will be updated with any new active or confirmed DTCs.

DTCs are one of the Bezel Diagnostics items that are hidden when security requirements are not met. If the SYNC is running secure software and the 'sync_ap_debug' token is not present, the DTC list will not be displayed and the Bezel Diagnostics menu will instead show 'Diagnostics Data Unavailable'

6.8.8.2.3 ECG System Statistics

6.8.8.2.3.1 DIAG-SR-REQ-396066/A-ECG System Statistics

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call using SysStatsReq to the ECG Bezel Diagnostic Server for the current system statistics. This would be a single request leaving the clientCorrelationId field blank. These values are returned in SysStatsResp.

These values are constantly changing so there is no broadcast message for them. Bezel Diagnostics simply re-requests the system stats every 5 seconds with another SysStatsReq message.

6.8.8.2.4 ECG SDN Connection

6.8.8.2.4.1 DIAG-SR-REQ-396094/A-ECG SDN Connection

When Bezel Diagnostics is activated the Bezel Diagnostic Client shall make the API call using FciGenericService to the ECG Bezel Diagnostic Server for the current Service Delivery Network (SDN) connection status. When Making this request the serviceType is set to request broadcast info (0x2), rpcResponseRequired is set to true, and reqBroadcastInfoType is set to Connection Status (0x0). All other fields are ignored as they are not used.

Responses come back as BroadcasInfoMessage messages. The only field Bezel Diagnostics reports is the connStatus enum within the sdnConnStatusMsg portion of the BroadcasInfoMessage.

Whenever the SDN connection status changes that information will be sent in a BroadcastMessage. Again, the only field Bezel Diagnostics reports is the connection status enum within the SDN connection status message.

FILE: BEZEL DIAGNOSTICS APIM SPSS v1.8	FORD MOTOR COMPANY CONFIDENTIAL	Page 70 of 71
SEP 3, 2020	The information contained in this document is Proprietary to Ford Motor Company.	, ago 10 0, 1 .



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
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