Component/System	Fault Code	Monitor Strategy Description	Malfumation Critoria	Threshold Value	Secondary Parameters	Enable Conditions	Time Reg'd	MIL Illum
MCP A Phase Current	Code	Monitor Strategy Description	Malfunction Criteria	value	raiailleters	Conditions	req u	illulii
Diagnostics:								
Drive Motor "A" Phase U-V-W	P0BFD	I <del>-</del> 1						On a Trin
Correlation	PUBFD	To detect electrical failure of phase current sensor.	Sum of 3 phase currents	> 75 A	Main Relay	Closed	0	One Trip
Correlation		Serisor.	Sum of 3 phase currents	> 75 A	Wakeup Signal	On	8 ms	
Drive Motor "A" Phase U-V-W	P0C01	To detect 3 Phase over current and to			Wakeup Oignai	OII		On a Trin
Current Sensor Overcurrent	PUCUI	protect IGBT.	U, V, or W Phase current sensor		Wakeup Signal	On	0	One Trip
Drive Motor "A" Phase U-V-W	DOOOF	protect IGB1.	C, V, OI W I Hase current sensor	> 680 A	wakeup Oignai	OII	2ms	On a Tain
Circuit/Open	P0C05	Drive Motor "A" Invalid Current	Motor Current	< 9 A	Wakeup Signal	On	17ms	One Trip
Drive Motor "A" Phase U Current	DODEZ		Wotor Guirent	\ J A	wakeup Oignai	OII	171113	T Tain
Sensor Circuit Low	P0BE7	Circuit Low monitor to detect the failure of						Two Trips
Sensor Circuit Low		U-phase current sensor circuit below valid	U Phase current sensor output at	700 4	M/=1 Ci1	0	0.4	
		range	highside	< -700 A	Wakeup Signal PWMOutputEnable	On FALSE	21ms	_
	20250				FWWOutputEnable	FALSE		<del></del> -
Drive Motor "A" Phase U Current	P0BE8	Circuit High monitor to detect the failure of						Two Trips
Sensor Circuit High		U-phase current sensor circuit above valid	U Phase current sensor output at		N/ 1 0: 1			
		range	highside	> 700 A	Wakeup Signal PWMOutputEnable	On FALSE	21ms	4
					PWWOutputEnable	FALSE		
Drive Motor "A" Phase U Current	P0BE6							Two Trips
Sensor Offset Out-of Range		Offset Circuit monitor to detect the failure of	U Phase offset current output at					
		U-phase offset current above valid range	highside	>30 A	Wakeup Signal	On	208ms	
					Power Stage	OPEN		
					P0BE7/P0BE8	NOT ACTIVE		
Drive Motor "A" Phase V Current	P0BEB	Circuit Low monitor to detect the failure of						Two Trips
Sensor Circuit Low		V-phase current sensor circuit below valid	V Phase current sensor output at		Wakeup Signal			
		range	highside	< -700 A		On	21ms	
					PWMOutputEnable	FALSE		
Drive Motor "A" Phase V Current	P0BEC	Circuit High monitor to detect the failure of						Two Trips
Sensor Circuit High Voltage		V-phase current sensor circuit above valid	V Phase current sensor output					
		range	current at highside	> 700 A	Wakeup Signal	On	21ms	
					PWMOutputEnable	FALSE		
Drive Motor "A" Phase V Current	P0BEA							Two Trips
Sensor Offset Out-of Range		Offset Circuit monitor to detect the failure of	V Phase offset current output at					
		U-phase offset current above valid range	highside	>30 A	Wakeup Signal	On	208ms	
					Power Stage	OPEN		
					P0BEB/P0BEC	NOT ACTIVE		
Drive Motor "A" Phase W Current	P0BEF	Circuit Low monitor to detect the failure of						Two Trips
Sensor Circuit Low		W-phase current sensor circuit below valid	W Phase current sensor output at		Wakeup Signal			
		range	highside	< -700 A		On	21ms	
					PWMOutputEnable	FALSE		
Drive Motor "A" Phase W Current	P0BF0	Circuit High monitor to detect the failure of						Two Trips
Sensor Circuit High		W-phase current sensor circuit above valid	W Phase current sensor output at		Wakeup Signal			
		range	highside	> 700 A		On	21ms	
					PWMOutputEnable	FALSE		7
Drive Motor "A" Phase W Current	P0BEE							Two Trips
Sensor Offset Out-of Range		Offset Circuit monitor to detect the failure of	W Phase offset current output at					
		U-phase offset current above valid range	highside	>30 A	Wakeup Signal	On	208ms	

Component/System	Fault Code	Monitor Strategy Description	Moléunation Critaria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Component/System	Code	Monitor Strategy Description	Malfunction Criteria	value		OPEN	Req a	illum
					Power Stage P0BEF/P0BF0	NOT ACTIVE		
MCP A IGBT Diagnostics								
Drive Motor "A" Inverter	P0A78			OVERDRIVEN				One Trip
Performance			Phase A, B, or C High or Low Side	(Status Fault				
	D000D	Detects IGBT Saturation Faults	Devices	Bit)	Wakeup Signal	On	1042ms	0 -
Drive Motor "A" Inverter Power Supply Circuit/Open	P0C0B			FAILED (Status		Initialization		One Trip
Supply Siledili Open		Detects IGBT Bias Faults	Phase A, B, or C Power Supply	Fault Bit)	Inverter State	Complete	1 fail	
MCP A High Voltage (HV)				·				
Diagnostics:								
Drive Motor "A" Hybrid Battery	P1AEE	To detect over voltage and to protect TPIM						One Trip
System Voltage High		Vdc Circuit	HV readings	> 475V	WakeUp Signal	On	0.4ms	
Drive Motor "A" Control Module	P1AE8	Circuit Low monitor to detect the failure of						Two Trips
Hybrid Battery Voltage Sense Circuit Low Voltage		HV output voltage sensor circuit below valid range	HV Sensor Voltage	<0V	Inverter State	Initialization Complete	4.40	
Drive Motor "A" Control Module	P1AE9	Circuit High monitor to detect the failure of	11V Selisor Voltage	<b>400</b>	inverter State	Complete	146ms	Two Trips
Hybrid Battery Voltage Sense	FIALS	HV output voltage sensor circuit above valid				Initialization		Two mps
Circuit High Voltage		range	HV Sensor Voltage	>564V	Inverter State	Complete	104ms	
Drive Motor "A" Control Module	P1AEC	To check correlation of HV_MCP with	ABS(MCP HV voltage - HV			-		One Trip
Hybrid Battery System Voltage		HV_Midpack and HV_Battery Voltages.	Battery voltage)	>= 34 V	Valid HV CAN Msg	TRUE	187ms	
			OR					
			ABS(MCP HV voltage - MidPack					
			voltage)	>= 90 V				
Drive Motor "A" HV Interlock	P1B05	To detect into de els circuit en es	LIN/ lots de als Otatos Diagrats la cost	TOUT	Malada Oimad	0	004	Special Type
(HVIL) Break Detected		To detect interlock circuit open.	HV Interlock Status Discrete Input	TRUE	WakeUp Signal HV CAN Msq Rx	On TRUE	304ms	
					HV CAIN WISY KX	TRUE		+
					BPCM Sourcing MCP HVIL			
					Status	TRUE		
Drive Motor "A" Control Module	P1AF0				No HV Clamp Fault or	ĺ		Non-MIL
Hybrid Battery Voltage System					MidPack Sensor OOR			
Isolation Fault		Isolation Lost between Battery Pack and	Isolation Ratio (MidPack Voltage /	< 0.27 OR	Faults: P1AEE, P1AF4, and			
		Chassis	HV Battery Voltage)	>1.85	P1AF5	NOT ACTIVE	5208ms	
					AND HV Sensor Voltage	> 50V		
Drive Motor "A" Control Module	P1AF4	Circuit Low monitor to detect the failure of			nv Sensor voltage	> 0U V		Two Trips
Hybrid Battery Voltage Isolation	1 171 4	HV MidPack voltage sensor circuit below				Initialization		1 WO THPS
Sensor Circuit Low		valid range	MidPack Voltage	<0V	Inverter State	Complete	729ms	
Drive Motor "A" Control Module	P1AF5	Circuit High monitor to detect the failure of						Two Trips
Hybrid Battery Voltage Isolation		HV MidPack voltage sensor circuit above	L			Initialization		
Sensor Circuit High		valid range	MidPack Voltage	>564V	Inverter State	Complete	521ms	

	Fault			Threshold	Secondary	Enable	Time	MIL
Component/System	Code	Monitor Strategy Description	Malfunction Criteria	Value	Parameters	Conditions	Req'd	Illum
Drive Motor "A" Control Module Temperature Sensor Performance	P0A2B	Motor A Temperature Sensor In-Range Rationality Check	ABS(Motor Temp -Avg PIM Temp Avg)	> 22deg C	Ignition Off Time PIM Temp Average and Motor Temp Above Minimum Threshold	>=360 min	2084ms	Two Trips
					No PIM or Motor Temp OOR Faults: P0AEF, P0AF0, P0BD3, P0BD4, P0BDD, P0BDE, P0A2C and P0A2D.	NOT ACTIVE		
Drive Motor "A" Control Module Temperature Sensor Circuit Out of Range High	P0A2D	To detect temperature sensor Out of Range high (voltage).	Motor Temperature	< -40 deg C (near 5V)	Wakeup Signal When fault present at start of trip: Cumulative Motor Temp Warmup Time above Motor Temp Warmup Torque Threshold	ON >=1.5min >= 20 Nm	1042ms	Two Trips
Drive Motor "A" Control Module	P0A2C							Two Trips
Temperature Sensor Circuit Out of Range Low		To detect temperature sensor Out of Range low (voltage).	Motor Temperature	> 230 degC (near 0V)	WakeUp Signal	On	1042ms	
Drive Motor "A" Over Temperature	P0A2F	To detect a sustained motor overtemperature condition	Motor Temperature	>200 degC	Instanteous Motor Temp in Range: No OOR Faults; P0A2C, P0A2D	NOT ACTIVE	3.13 sec	Two Trips
CAN / SPI / SCI Bus Timeout								
Drive Motor "A" Control Module Lost Communication With SPI Bus	P1AFC	To detect loss of communication on the SPI bus with the HCP module SPI Diag Timeout	SPI Receive Timeout flag # Timeout Counts	TRUE 7	Inverter State	RUN	40 ms	One Trip
Drive Motor "A" Control Module Lost Communication With SCI Bus	P1AFD	To detect loss of communication on the SCI bus with Motor "B" Control Module SCI Diag Timeout	SCI_Rx_Timeout	TRUE	Wakeup Signal	On	2083ms	Two Trips
Motor Control Processor Voltage Diagnostics								
Sensor Reference Voltage "A" Circuit Low	P0642	Detects Sensor Voltage (5V) below an acceptable threshold.	Scaled 5V Supply Voltage	< 4.80V	Wakeup Signal	On	729 ms	One Trip
Sensor Reference Voltage "A" Circuit High	P0643	Detects Sensor Voltage (5V) above an acceptable threshold.	Scaled 5V Supply Voltage	> 5.20V	Wakeup Signal	On	729 ms	One Trip
Sensor Power Supply "A" Circuit Low	P06B1	Detects Sensor Power Supply (15V) below an acceptable threshold.	Scaled 15V Supply Voltage	< 12.0V	Wakeup Signal	On	365 ms	Two Trips
Sensor Power Supply "A" Circuit High	P06B2	Detects Sensor Power Supply (15V) above an acceptable threshold.	Scaled 15V Supply Voltage	> 18.0V	Wakeup Signal	On	1042 ms	Two Trips
Control Module Power Supply "A" Circuit Low	P1ADE	Detects Control Module Power Supply (12V) below an acceptable threshold.	Scaled 12V Supply Voltage	< 7.7V	Wakeup Signal	On	365 ms	Special Type C

	Fault		<u> </u>	Threshold	Secondary	Enable	Time	MIL
Component/System	Code	Monitor Strategy Description	Malfunction Criteria	Value	Parameters	Conditions	Req'd	Illum
Control Module Power Supply "A"	P1ADF	Detects Control Module Power Supply (12V)						Special Type
Circuit High		above an acceptable threshold.	Scaled 12V Supply Voltage	> 18.0V	Wakeup Signal	On	1042 ms	С
Control Module System Voltage	P1B09	Detects Control Module Power Supply (12V)						Non-MIL
"A" Unstable (Interrupt Fault)		intermittently below an acceptable threshold.	System Status Relay	POWER LOSS		L	104ms	
MCD A Controller Facility		triresnoid.	System Status Relay	State	Wakeup Signal	On	104ms	
MCP A Controller Faults  Drive Motor "A" Control Module	P0A1B		Land Barrier Britain					On a Trin
Internal Performance	PUATB	ALU calculation error, Register Overflow, or	ALU HWIO Fault OR					One Trip
internal i chomanec		Watchdog Timer Fault	Stack Address Overrun	TRUE	For all: Wakeup Signal	On	10.4ms	
		Training Time Taun	Julian Vilauroso Gronan	INOL	. o. a ranoup oigna.	†	110.41113	
					For Watchdog Fault Only:			
					No power-on resets or low			
			OR		voltage interrupt faults			
			EEPROM not completely written at		during powerdown; P1B09			
			Powerdown (Watchdog timer fault)	TRUE	AND P1B13	NOT ACTIVE		
Drive Motor "A" Control Module	P1A50							One Trip
Random Access Memory (RAM)		To detect an error in the MCP A RAM write area.	RAM check value	Outside RAM	W 1 0: 1	On	40.4	
Drive Mater HAH Or other I Mandada	D4 A 5 4	To detect an error in the MCP A ROM using	KAIVI CHECK Value	Address Range	wakeup Signal	OII	10.4ms	O T-:-
Drive Motor "A" Control Module Read Only Memory (ROM)	P1A51	a checksum calculation	FlashCellError	TRUE	Wakeup Signal	On	10.4ms	One Trip
Drive Motor "A" Control Module	P1ADC	Detects mismatch between Flash and	i identedia.	IKUE	Wakeup Signal	011	10.41115	One Trip
EEPROM Error	I IADO	EEPROM Power Off Levels	EEpromCellStatus	TRUE	Wakeup Signal	On	10.4ms	One mp
Drive Motor "A" Control Module	P1AFA			11102	Transup Oignai		10.11110	One Trip
Programmable Logic Device Not		Detects if PLD was not successfully						
Programmed		programmed during initialization	PLDFault	TRUE	Wakeup Signal	On	10.4ms	
Drive Motor "A" Control Module	P1B13							Two Trips
Performance - Programmable		Detects Power On Reset (POR) during						
Logic Device		WatchDog Timer Test	POR Fault Flag	TRUE	Wakeup Signal	On	10.4ms	
MCP A Not Programmed								
Drive Motor "A" Control Module	P1A4F	Drive Motor "A" Control Module	0 17 17 17 17 1					One Trip
Not Programmed		Programmed with Test Code, or Motor B calibration (via Cal ID)	Calibration contains Test code identifier or Motor B Identifier	TDUE		A I	40.4	
Motor A Inverter Temperature		Calibration (via Cal ID)	identifier of Motor B identifier	TRUE		Always	10.4ms	
Sensors								
Drive Motor Inverter Temperature	P0AEE	Phase U Temperature Sensor In-Range						Two Trips
Sensor A Circuit	,	Rationality Check	ABS(PIM Temp A - PIM Temp Avg)	>15 deg C	Ignition Off Time	>=360 min	2084ms	
Range/Performance					PIM Temp Average and			
					Motor Temp	> -18 degC		
					PIM or Motor Temp OOR			
					Faults; P0AEF, P0AF0,			
					P0BD3, P0BD4, P0BDD, P0BDE, P0A2C and P0A2D.	NOT ACTIVE		
Delica Matan Incomé	D0 4 5 0	T 1		40 1 0	FUDDE, PUAZO ANO PUAZD.	INUT ACTIVE		T T '
Drive Motor Inverter Temperature Sensor A Circuit High	P0AF0	To detect inverter Phase U temperature	PIM Temp A Temperature	< -40 deg C (near 5V)	Makaun Signal	ON	1042	Two Trips
Ochou A Olicuit High	I	sensor Out of Range high (voltage).	Finit rettip A rettiperature	(near 5V)	Wakeup Signal	ON	1042ms	I

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Reg'd	MIL Illum
		mount of the state	manufaction officeria		When fault present at start of trip: Cumulative PIM Temp Warmup Time above PIM Temp Warmup Torque Threshold	>=1.5min		
Drive Motor Inverter Temperature Sensor A Circuit Low	P0AEF	To detect inverter Phase U temperature		> 230 degC				Two Trips
Serisor A Circuit Low		sensor Out of Range low (voltage).	PIM Temp A Temperature	(near 0V)	WakeUp Signal	On	1042ms	
Drive Motor Inverter Temperature Sensor C Circuit Range/Performance	P0BD2	Phase V Temperature Sensor In-Range Rationality Check	ABS(PIM Temp B - PIM Temp Avg)	>15 deg C	Ignition Off Time PIM Temp Average and Motor Temp AND No PIM or Motor Temp OOR Faults; P0AEF, P0AF0, P0BD3, P0BD4,	>=360 min > -18 degC	2084ms	Two Trips
					POBDD, POBDE, POA2C and POA2D.	NOT ACTIVE		
Drive Motor Inverter Temperature Sensor C Circuit High	P0BD4	To detect inverter Phase V temperature sensor Out of Range high (voltage).	PIM Temp B Temperature	< -40 deg C (near 5V)	Wakeup Signal When fault present at start of trip: Cumulative PIM Temp Warmup Time	ON >=1.5min	1042ms	Two Trips
					above PIM Temp Warmup Torque Threshold	>= 20 Nm		
Drive Motor Inverter Temperature	P0BD3					-		Two Trips
Sensor C Circuit Low		To detect inverter Phase V temperature sensor Out of Range low (voltage).	PIM Temp B Temperature	> 230 degC (near 0V)	WakeUp Signal	On	1042ms	
Drive Motor Inverter Temperature Sensor E Circuit Range/Performance	P0BDC	Phase W Temperature Sensor In-Range Rationality Check	ABS(PIM Temp C - PIM Temp Avg)	>15 deg C	Ignition Off Time PIM Temp Average and Motor Temp	>=360 min > -18 degC	2084ms	Two Trips
					AND No PIM or Motor Temp OOR Faults; P0AEF, P0AF0, P0BD3, P0BD4, P0BDD, P0BDE, P0A2C and P0A2D.	NOT ACTIVE		
Drive Motor Inverter Temperature Sensor E Circuit High	P0BDE	To detect inverter Phase W temperature sensor Out of Range high (voltage).	PIM Temp C Temperature	< -40 deg C (near 5V)	Wakeup Signal When fault present at start of trip: Cumulative PIM Temp Warmup	ON >=1.5min	1042ms	Two Trips

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					Time above PIM Temp Warmup Torque Threshold	>= 20 Nm		
Drive Motor Inverter Temperature Sensor E Circuit Low	P0BDD	To detect inverter Phase W temperature sensor Out of Range low (voltage).	PIM Temp C Temperature	> 230 degC (near 0V)	WakeUp Signal	On	1042ms	Two Trips
Drive Motor "A" Inverter Phase U Over Temperature	P0C11	To detect an in-range overtemperature condition that can potentially damage inverter	Sensor output exceeds fault threshold, and does not decrease below reset threshold		PIM Temp A In Range: P0AEF or P0AF0	NOT ACTIVE	5208ms	Two Trips
Drive Motor "A" Inverter Phase V Over Temperature	P0C12	To detect an in-range overtemperature condition that can potentially damage inverter	Sensor output exceeds fault threshold, and does not decrease below reset threshold		PIM Temp B In Range: P0BD3 or P0BD4	NOT ACTIVE	5208ms	Two Trips
Drive Motor "A" Inverter Phase W Over Temperature	P0C13	To detect an in-range overtemperature condition that can potentially damage inverter	Sensor output exceeds fault threshold, and does not decrease below reset threshold		PIM Temp C In Range: P0BDD or P0BDE	NOT ACTIVE	5208ms	Two Trips
Motor A Resolver Sensors - Discrete								
Drive Motor "A" Position Sensor Circuit	P0A3F	To detect Loss of Signal or converter error ( line open, short) in the Motor Resolver circuit	R/D converter error (loss of signal) Sample Counts	>70 cts	Resolver Initialization Delay	500ms	146 ms	One Trip
Drive Motor "A" Position Sensor Circuit Range/Performance	P0A40	To detect a Degradation of Signal fault in the angle data read by the Motor Resolver circuit.	R/D converter error (degradation of signal) Sample Counts	>70 cts	Resolver Initialization Delay	500ms	146 ms	One Trip
Drive Motor "A" Position Sensor Circuit Loss of Tracking	P1B03	To detect a Loss of Tracking fault in the Motor Resolver circuit.	R/D converter error (loss of tracking) Sample Counts	>70 cts	Resolver Initialization Delay	500ms	146 ms	One Trip
Drive Motor "A" Position Sensor Circuit Overspeed	P1B0D	To detect when Motor A has exceeded operational maximum speed	ABS(Motor speed) initially AND then ABS(Motor Speed)	>11500 rpm >10000 rpm	Wakeup Signal	On	104 ms	One Trip
Drive Motor "A" Position Sensor Learn Incorrect	P1B0F	To detect an unvalidated Resolver Offset Learn (OL) Value	Offset Learn DIDN'T complete because: ABS(Motor RPM)	>50	Key Off	TRUE	10.4ms	Non-MIL
			OR Filtered DC Voltage ALLPhase Curr Max-Min Delta	< 192 V <15 A	Wakeup Signl ABS(Motor RPM)	ON < 20		
			For Time Period OR Offset Learn Completes AND ABS(Offset Correction Angle)	> 5 ms	Valid Stored Offset	TRUE		-

	Fault			Threshold	Secondary	Enable	Time	MIL
Component/System	Code	Monitor Strategy Description	Malfunction Criteria	Value	Parameters	Conditions	Req'd	Illum
Drive Motor "A" Position Sensor	P0C17	To detect an unvalidated Resolver Offset	Offset Learn DIDN'T complete					Two Trips
Not Learned		Learn Value and No Stored Previously Valid						
		Value	ABS(Motor RPM)	>50	Wakeup Signal	ON	10.4ms	
			OR					
			Filtered DC Voltage	< 192 V	ABS(Motor RPM)	< 20		
			ALLPhase Curr Max-Min Delta	<15 A	Valid Stored Offset	FALSE		
			For Time Period	> 5 ms				
			OR					
			Offset Learn Completes					
			AND					
			ABS(Offset Correction Angle)	> 25 deg				
Drive Motor "A" Position Exceeded	P0C4E			Ĭ				Non-MIL
Learning Limit		To detect a Resolver Correction value	Offset Learn COMPLETES AND					
· ·		greater than an acceptable limit	ABS(Offset Correction Angle)	>25deg	Key Off	TRUE	10.4ms	
		3	3.,		Wakeup Signal	ON		
					ABS(Motor RPM)	< 20		
Motor A Resolver Sensors -					,			
Circuit								
Drive Motor "A" Position Sensor	P0C52	To detect Resolver Circuit S1/3 Out of	Resolver S13 Circuit Reference					One Trip
Circuit "A" Low	1 0032	Range Low	Voltage	< 0.5 v	Wakeup Signal	On	521ms	One mp
	DOCEO	To detect Resolver Circuit S1/3 Out of	Resolver S13 Circuit Reference	V 0.0 V	vvalcup digital	OII	0211110	On a Trin
Drive Motor "A" Position Sensor	P0C53	Range High	Voltage	> 3.0 v	Wakaup Signal	On	208ms	One Trip
Circuit "A" High		5 5	ŭ .	> 3.0 V	Wakeup Signal	OII	2001115	
Drive Motor "A" Position Sensor	P0C5C	To detect Resolver Circuit S2/4 Out of	Resolver S24 Circuit Reference	0.5	Malaana Ciaraal	0	504	One Trip
Circuit "B" Low		Range Low	Voltage	< 0.5 v	Wakeup Signal	On	521ms	
Drive Motor "A" Position Sensor	P0C5D	To detect Resolver Circuit S2/4 Out of	Resolver S24 Circuit Reference					One Trip
Circuit "B" High		Range High	Voltage	> 3.0 v	Wakeup Signal	On	208ms	
Motor A Crank Pulse Faults								
Drive Motor "A" Control Module	P1AC6							Two Trips
Crankshaft Position Sensor Circuit		Detects Lack of Response from 58X Crank						
		Sensor	Crank Synchronization	NO ACTIVITY	Wakeup Signal	On	2083ms	
Drive Motor "A" Control Module	P1AC7							Two Trips
Crankshaft Position Sensor		Detects Invalid 58X Crank Sensor Signal	CPC Signal	NOT VALID	Engine Movment Detected	> 5rpm	3125 ms	
Performance		-	_		OR Edges Seen	> 0		
Torque Security Faults		·						
Drive Motor A Torque Delivered	P0C19	Fail Case 1: Test of three phase current	The sum of three phase currents is	Current	Ignition switch	in crank or run	48 fail	One Trip
Performance		correlation	higher than current threshold	threshold: 75 A			counts out	
			during more than threshold time				of 60	
							sample	
							counts	
							Executes	-
							in a	
							111 a 2.08ms	
	I			I			loop	

	Fault			Threshold	Secondary	Enable	Time	MIL
mponent/System	Code	Monitor Strategy Description	Malfunction Criteria	Value	Parameters	Conditions	Req'd	Illun
				Time threshold: 100ms			Detects in 100ms	
		Fail Case 2: Static Variable test	Verify the calculated check sum (CRC) is not equal to previous saved check sum (CRC)		Ignition switch	in crank or run	2.08 ms loop	
		Fail Case 3: Monitor torque command by checking the SPI communication status	SPI rolling count fails to update more than threshold time	Threshold time: 90msec	Ignition switch	in crank or run	45 fail counts out of 50 sample counts Detects in 90ms 2.08 ms loop	
		Fail Case 4: Check the DC current flow direction with respect to torque command/motor speed	DC current fails to show correct sign and magnitude more than current threshold during more than threshold time	Current threshold:	MCP power stage	Active	96 fail counts out of 120 sample counts	
				10 A to 80 A (function of motor speed.);				
							Executes in a 2.08ms loop	
				Time threshold:				
				200 ms			Detects in 200ms	
		Fail Case 5: Check the secured motor torque achieved error with respect to torque command	The absolute error between calculated motor torque achieved and motor torque command is higher than torque threshold during more than threshold time	Torque threshold:	MCP power stage	Active	96 fail counts out of 120 sample counts	
				52 Nm			Executes in a 2.08ms loop	

	Fault			Threshold	Secondary	Enable	Time	MIL
Component/System	Code	Monitor Strategy Description	Malfunction Criteria	Value	Parameters	Conditions	Req'd	Illum
				Time threshold:				
				200 ms			Detects in 200ms	
		Fail Case 6: Check the Task1 reported	The absolute error between Task1	Torque	Ignition switch	in crank or run	96 fail	1
		motor torque achieved vs. torque command	reported motor torque achieved	threshold:	ignition ownon	in oranic or rain	counts out	
			and motor torque command is				of 120	
			higher than torque threshold during more than threshold time				sample counts	
			more than threshold time				Couris	
				52 Nm				ł
				02 Niii			Executes	
							in a	
							2.08ms	
							loop	
				Time threshold:				
				200 ms			Detects in	ł
				200 1113			200ms	
Drive Motor A Torque Delivered	P0C19	Fail Case 7: Check the secured calculated	The absolute error between	Torque	MCP power stage	Motor 3-phase	96 fail	One Trip
Performance		three phase short motor torque vs. the	secured calculated three phase	threshold:		short	counts out	
		reported task1 motor torque	short torque vs. Task1 reported motor torque is higher than torque				of 120 sample	
			threshold during more than				counts	
			threshold time					
				52 Nm				1
							Executes	
							in a 2.08ms	
							loop	
				Time threshold:				
				200 ms			Detects in	
		5 110 20 111		-	1100		200ms	
		Fail Case 8: Check the secured calculated three phase open motor torque vs. the	The absolute error between secured calculated three phase	Torque threshold:	MCP power stage	Motor 3-phase open	96 fail counts out	
		reported task1 motor torque	open torque vs. Task1 reported	unconord.		орен	of 120	
			motor torque is higher than torque				sample	
			threshold during more than				counts	
			threshold time					
				52 Nm			_	
							Executes in a	
							2.08ms	
		1	Ī			1	loop	

	Fault			Threshold	Secondary	Enable	Time	MIL
Component/System	Code	Monitor Strategy Description	Malfunction Criteria	Value	Parameters	Conditions	Req'd	Illum
				Time threshold:				
				200 ms			Detects in 200ms	
Drive Motor A Control Module	P1AFB	Fail Case 1: Detect the validity of the Seeds	The number of identical seed in	191 counts	Ignition switch	in crank or run		One Trip
Programmable Logic Device	PIAFD	sent by PLD	consecutive loops sent from PLD is	191 Counts	ignition switch	in crank or run	counts out	One mp
Security Code		,	higher than threshold				of 250	
							sample	
							counts	
							0.083 ms to 0.5 ms	
							(function	
							of motor	
							speed.);	
		Fail Case 2: Detect the validity of response	The number of bad response from	191 counts	Ignition switch	in crank or run	191 fail	
		by PLD when MCP sends repeated bad	PLD when MCP is sending bad key				counts out	
		keys to PLD	is higher than threshold				of 250	
							sample	
							counts 0.083 ms	
							to 0.5 ms	
							(function	
							of motor	
							speed.);	
Drive Motor "A" Control Module	P1AF8	Detect the duration MCP used to conduct	The number of Task 2 loops used	40 counts	Initialization	ON		One Trip
Shutdown Performance		shut down path verification after key-on initialization.	in shut down path verification is higher than threshold				counts out of 50	
		ililialization.	Tilgher than theshold				sample	
							counts	
							10 ms	
							loop	
Communication								
Diagnostics	114.075	Detects that CAN assist data asset in	Missad DDOM Massacras		Landella a societata	Divis	40	T D
Lost Communication With Battery Pack Control Module	U1875	Detects that CAN serial data communication has been lost with the BPCM on Bus A	INISSEG BPOM Messages		Ignition switch	Run	12 seconds	Type B
. as. como modulo		The section will the Brewn on Bus A					30001100	
Lost Communication With	U1876	Detects that CAN serial data communication	Missed ECM Messages		Ignition switch	Run	12	Туре В
ECM/PCM		has been lost with the ECM	_				seconds	

### APPENDIX

Inverter Temperature Sensor Mapping Grid	SAE

Component/System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Reg'd	MIL Illum
Drive Motor A		Phase U	PIM_A	А			14	1
		Phase V	PIM_B	С	1			
		Phase W	PIM_C	Е	1			
Drive Motor B		Phase U	PIM_A	В				
		Phase V	PIM_B	D				
		Phase W	PIM_C	F				

HWIO= Hardware Input/Output

OOR= Out of Range

IGBT= Insulated Gate Bipolar Transistors (Phase Current Controllers)

BPCM= Batt Pack Ctrl Module ALU= Arithmetic Logic Unit