SECTION : 413-01 Instrument Cluster

VEHICLE APPLICATION : 2008.0 Falcon

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DESCRIPTION AND OPERATION

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DESCRIPTION AND OPERATION

Refer to Wiring Diagrams Section 413-01, for schematic and connector information.

1. General Description

The instrument cluster is used to communicate information on the operation, performance and state of the vehicle to the driver. There are three functional types of clusters, low series, high series and FPV of which there are a total of 7 unique variants spread among the falcon program.

The content included in all instrument clusters regardless of version is:

- Speedometer
- Tachometer
- Fuel gauge
- Temperature gauge
- Telltales
- Return to zero feature when ignition is off for all gauges
- Information, set-ups and warnings/messages with full dot matrix LCD display.

The FPV clusters include an additional 2 gauges, Oil temperature and Oil pressure for V8's and Oil temperature and Turbo boost for Six's

The clusters also have one LCD graphics module (multi function display), which displays other functions and warnings as well as the odometer and tripmeters.

The instrument cluster also contains switches as a part of the assembly. The switch buttons are contained within the bezel which is an additional moulding attached to the front of the instrument cluster lens. The bezel also acts as a seal between the instrument cluster and the instrument panel. The instrument cluster switches control the trip odometer and the multi-function display.

Differentiation between the series includes additional gauges, Dial and Bezel features, Dial and Bezel colours, illumination colours and series level telltales and warnings.

The instrument cluster uses a CAN interface to communicate with other electronic modules within the vehicle as well as for its diagnostics. It also acts as a communications gateway between modules that have either a mid speed or high speed CAN bus

2. Mechanical Description

XT/G6 Variant
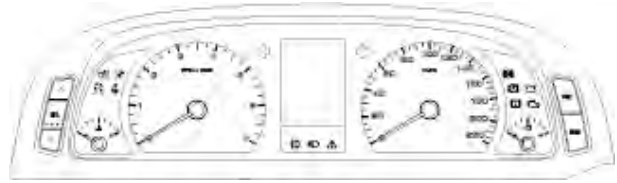
XR Variant
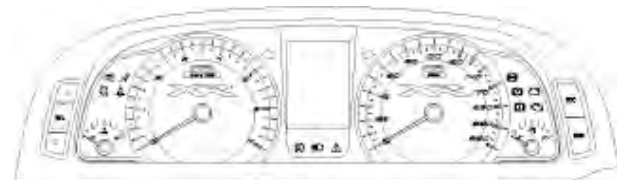
G6E Variant

2.1   Cluster Mounting

The Instrument cluster is connected electrically to the vehicle wiring harness via plugs that fit into sockets in the back of the Instrument cluster.

Fitment of the Instrument cluster to the IP is via clips at the top of the Bezel and screws at the bottom through mounting lugs that are located on each side of the steering column.

2.2   Cluster switches

The instrument cluster houses the following switches:

- Odometer/Trip Odometer select and Trip Odometer reset
- Menu
- SEL
- Up arrow
- Down arrow

2.3 LEDs Glossary

Symbol	Warning
⚠	General Warning
(ABS)	ABS Warning
⊡	Alternator Fail
(!)	Brake Fail Low Brake Fluid EBD Fault
🚗	DSC
≢D	Fog Lamp
⬅ ➡	Turn Indicators Hazard Lights
≡D	High Beam
⊂⊃	MIL
(P)	Park Brake
🧍	Airbag
🧍	Front Seatbelt
🔒	Security
⚙	TCS

3. Subsystem Architecture

The Instrumentation Subsystem communicates with numerous other vehicle subsystems / modules. This communication is accomplished through direct hardwiring or through CAN. The cluster utilizes Hi speed FNOS CAN and Mid speed FNOS CAN. The cluster acts as a gateway between the two. The Instrumentation Subsystem interface strategy is shown in Table 2.

3.1 Instrumentation Subsystem Interface Strategy

Subsystem Name	Interface Strategy (HW/ HS-MS CAN)
Audio / NAV /	MS CAN
Body-Lighting /BEM	HW / MS CAN
Body-Security	MS CAN
ABS / TCS	HS CAN
Climate Control	MS CAN
TCM (Transmission)	HS CAN
Fuel Sender	HW
Oil Pressure Switch	HS CAN
Power Supply	HW
Powertrain	HS CAN
Restraints / AirBag	MS/HS CAN
BEM	MS CAN
PAM	MS CAN
PATS	HS CAN
RCM	HS CAN
Remote Central Information Display	MS CAN

4. Cluster Input/Output Requirements

4.1   Hardwire Interface

4.1.1   20 Pin Connector
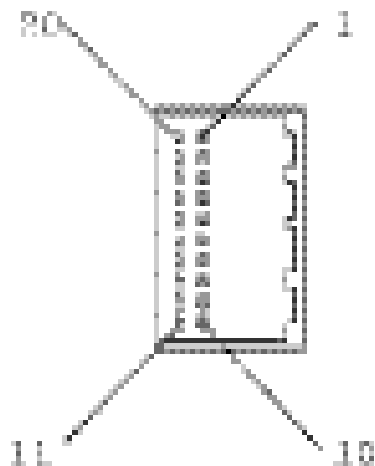
Pin	Description	In/ Out	Signal Type	Active High/ Low	Nominal Current @ 13.5V	Maximum Current @ 16V	Voltage Thresholds
1	Ground – power	I	Ground	-	-	-	-
2	HS CAN-	I/O	CAN	-	-	-	-
3	HS CAN+	I/O	CAN	-	-	-	-
4	(FNOS) MS CAN-	I/O	CAN	-	-	-	-
5	(FNOS) MS CAN+	I/O	CAN	-	-	-	-
6	Fuel Sender	I	Analogue	-	8-15mA	-	-
7	Fuel Sender Return	O	Ground	-	-	-	-
8	Fuel cutoff switch	I	HW/Digital	LOW	8.5mA	10.2mA	3V
9	High beam	I	HW/Digital	HIGH	9mA	10.6 mA	7V
10	Park lamps on	I	HW/Digital	HIGH	9mA	10.6 mA	7V
11	Auto headlamps	I	HW/Digital	LOW	8.5mA	10.2 mA	3V
12	Park Brake	I	HW/Digital	LOW	8.5mA	10.2 mA	3V
13	N/C	-	-	-	-	-	-
14	Front Fog Lamp	I	HW/Digital	HIGH	9mA	10.6 mA	7V
15	Ignition	I	Power	-			
16	Battery	I	Power	-			
17	Brake Fail	O	HW/Digital	LOW	4.3mA	5.1 mA	-
18	Brake Fail Monitor	I	Analogue	-	8.5mA	10.2 mA	-
19	N/C			-	-		-
20	Transmission Not In Park	I	Analogue	HIGH	8.3mA	10 mA	-

4.1.2   8 Pin Connector
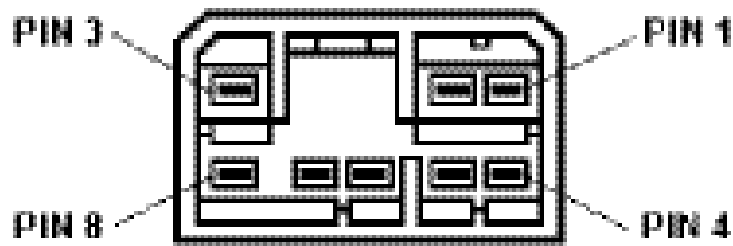
Pin	Description	In/ Out	Signal Type	Active High/ Low	Nominal Current @ 13.5V	Maximum Current @ 16V	Voltage Thresholds
1							
2	Left indicator switch	I	HW/Digital	HIGH	45.7mA	54.2 mA	7V
3	Indicator Supply	I	Power	-	7A	9.6A	-
4	Left indicator output	O	Analogue	HIGH	3.5A	4.8A	-
5	Right indicator switch	I	HW/Digital	HIGH	45.7mA	54.2mA	7V
6	Switch illumination level	O	Hardwire PWM	-	2.3A	2.77A	-
7							
8	Right indicator output	O	Analogue	HIGH	3.5A	4.8A	-

4.2   CAN Interface

4.2.1   CAN TX Data

This section outlines the messages transmitted by the instrument cluster via CAN.

Mid-Speed CAN

ID	Transmit Data	CAN Label	Check
128	High Beam Status	HighBeamStatus	y
	Fog Lamp Status	FogLampStatus	y
	Park and low beam status	ParkAndLowBeamStatus	y
	Auto headlamps switch status	AutoHeadlampSwitchStatus	y
	Display illumination level	IllumLevelDisplay	y
	Buttons illumination level	IllumLevelSwitches	y
	Left and right turn indicators	TurnStalkSwitchStatus	y
	Rear seatbelt minder enabled/disabled	RearBeltminderStatus	y
330	Park brake on	ParkBrakeOn_MS	y
340	Fuel cutoff status	RCM_STAT_DPLY_ENABLD_RCRD_MS	y
728	IC diagnostics TX	IC_DiagSig_Tx	y

High-Speed CAN

ID	Transmit Data	CAN Label	Check
128	High Beam Status	HighBeamStatus	y
	Fog Lamp Status	FogLampStatus	y
	Park and low beam status	ParkAndLowBeamStatus	y
	Auto headlamps switch status	AutoHeadlampSwitchStatus	y
	Display illumination level	IllumLevelDisplay	y
	Buttons illumination level	IllumLevelSwitches	y
	Left and right turn indicators	TurnStalkSwitchStatus	y
	Rear seatbelt minder enabled/disabled	RearBeltminderStatus	y
350	RIL status	RIL_STAT	y
	Seatbelt status	SEATBELT_INDCTR_STAT	y
	Seatbelt warning chime status	RSTRNT_SEATBLTWRNCHME_STAT	y
437	Fuel level	DampedFuelLevel	y
	Instantaneous fuel value	InstFuelValue	y
	Fuel sender fail	FuelSenderFail	y
	Park brake on	ParkBrakeOn_HS	y
	Maximum litres	MaxLitres	y
453	Odometer value	ODO	y
	Odometer overflow flag	ODO_Overflow	y

Login Tracking Code

4.2.2 CAN RX Data

This section outlines the messages received by the instrument cluster via CAN.

Mid-Speed CAN

ID	TX Module	Recieve Data	CAN Label	Check
2E6	ACM		AudioTunedFrequency	y
			AudioTunerBandPreset	y
			AudioFMFrequencyStep	y
		Defines if RDS is available to display	RDS_PSN_State	y
2F2	ACM		AudioCurrentMediaMode	y
2F9	ACM		MP3_Folder	y
			MP3_Track	y
307	FDM		HazardSwitch	y
			IllumBatsaverRequest_MS	y
309	ACM		AudioRDS_PSName_1-_8	y
30D	ACM		CD_TrackNumber	y
		Defines if single or 6 CD	CD_Type	y
			CD_PlayingNow	y
360	PAM	Sonar park failed	ParkFailed	y
		Sonar park disabled	ParkInhibited	y
		Sonar park disabled	ParkDisturbed	y
		Sonar park disabled	ParkDisabled	y
403	BEM	Front right door	RFD_Ajar	Y
		Front left door	LFD_Ajar	Y
		Rear right door	RRD_Ajar	Y
		Rear left door	LRD_Ajar	Y
		Boot	BootTailgateAjar	y
			Head_lamp_fail	y
			HazardOnRequest	y
			Priority_key_1 and Priority_key_2	y
		Security light.	SmartShieldLED_Request	y
		Day/Night illumination mode	IllumMode	y
			BonnetAjar	y
		Right front door locked	RFD_Locked	y
406	BEM		SeatbeltStatusRearLeft	y
			SeatbeltStatusRearCentre	y
			SeatbeltStatusRearRight	y
720	Tester_MS	IC diagnostics RX	IC_DiagSig_Rx	y

High-Speed CAN

ID	TX Module	Recieve Data	CAN Label	Check
200	PCM	Crank Status	CrankStatusPCM_HS	y
207	PCM	Engine RPM	Engine_RPM_HS	y
		Vehicle speed	VehicleSpeed_HS	y
210	ABS_TC_VDC		EBD_Failed	y
			ABS_Failed	y
			TCS_DisabledByUser	y
			TCS_Event	y
			TCS_Failed	y
		DSC Disabled By User	VDC_DisabledByUser	y
		DSC Event	VDC_Event	y
		DSC Failed	VDC_Failed	y
230	PCM		TransGearPosition_HS	y
		Transmission overheat	TransOverheat	y
		Transmission fault	TransFault	y
		Transmission Mode	TransMode	y
340	RCM	RIL status	RIL_RQST	y
		Seatbelt warning request	SEATBLT_INDCTR_RQST	y
		Seatbelt chime request	SEATBLT_CHIME_RQST	y
		Seatbelt mode (enabled/disabled)	BLTMNDR_PRGRM_CONFRM_RQST	y
		Fuel cutoff	RCM_STAT_DPLY_ENABLD_RCRD_HS	y
425	PCM	Cruise	Cruise	y
		Cruise target speed	CruiseTargetSetSpeed	y
			TurboBoostPressure	
			InstantEconomyMode	y
			InstantEconomy	y
427	PCM	Coolant temperature	EngineCoolantTemperature	y
		Odometer count	ODO_Count	y
		Alternator failure	ALT_FAILURE_STAT	y
		Low oil pressure	OilPressureWarning	y
		Engine overheat	EngineOverheat	y
			ETC_Warning	y
			ImmobLamp	y
			MIL_Lamp	y
			FuelPulse	y
			DTC_Logging_HS	y
			EngineOilPressure	y
44D	PCM		EngineOilTemperature	y
640	PCM	Manual transmission	ManualTrans	y
6F6	PCM		ImmobTransfer_PCM_1 to ImmobTransfer_PCM_8	y

5. Cluster Functions

Function	XT	G6	XR	G6E	G6ET	FPV I6	FPV V8	FPV V8 L3
Digital Speedometer	X	X	X	X	X	X	X	X
Speedometer 220	X	X		X	X			
Speedometer 260			X			X	X	X
Tachometer 7000	X	X	X	X	X			
Tachometer 8000						X	X	X
Fuel	X	X	X	X	X	X	X	X
Temperature	X	X	X	X	X	X	X	X
Oil Temperature						X	X	X
Oil Pressure							X	X
Turbo Boost						X		
Trip odometer	X	X	X	X	X	X	X	X
Average Economy	X	X	X	X	X	X	X	X
Average Speed	X	X	X	X	X	X	X	X
Distance to Destination	X	X	X	X	X	X	X	X
Fuel Used	X	X	X	X	X	X	X	X
Instantaneous economy	X	X	X	X	X	X	X	X
Range	X	X	X	X	X	X	X	X
Travel time	X	X	X	X	X	X	X	X
ABS	X	X	X	X	X	X	X	X
Alternator Fail	X	X	X	X	X	X	X	X
Auto Headlamps On	X	X	X	X	X	X	X	X
Headlamp Failure	X	X	X	X	X	X	X	X
Park Lights On	X	X	X	X	X	X	X	X
Brake Fail	X	X	X	X	X	X	X	X
Button Press Confirmation	X	X	X	X	X	X	X	X
Cruise Control ON	X	X	X	X	X	X	X	X
Cruise Control Set	X	X	X	X	X	X	X	X
Door/Boot/Bonnet Ajar	X	X	X	X	X	X	X	X
DSC			X	X	X	X	DSC	X
Engine Temperature Warning	X	X	X	X	X	X	X	X
ETC Warning	X	X	X	X	X	X	X	X
Fog Lamp	X	X	X	X	X	X	X	X
Fuel Cutoff Switch	X	X	X	X	X	X	X	X
Fuel Sender Fault	X	X	X	X	X	X	X	X
Hazard Lights Warning	X	X	X	X	X	X	X	X
Hazard Lights On Request	X	X	X	X	X	X	X	X
High Beam	X	X	X	X	X	X	X	X
Low Fuel	X	X	X	X	X	X	X	X
MIL Indicator	X	X	X	X	X	X	X	X
Oil Pressure Warning	X	X	X	X	X	X	X	X

Function	XT	G6	XR	G6E	G6ET	FPV I6	FPV V8	FPV V8 L3
Overspeed	X	X	X	X	X	X	X	X
Park Brake	X	X	X	X	X	X	X	X
PRNDL	X	X	X	X	X	X	X	X
Restraint Indicator Lamp Warning	X	X	X	X	X	X	X	X
Seat Belt Minder (Rear)							X*	
Seat Belt Warning (Front)	X	X	X	X	X	X	X	X
Security	X	X	X	X	X	X	X	X
Sonar Parking Disabled	X	X	X	X	X	X	X	X
Sonar Parking Fault	X	X	X	X	X	X	X	X
System Fault	X	X	X	X	X	X	X	X
Traction Control	X	X	X	X	X	X	X	X
Transmission Fail	X	X	X	X	X	X	X	X
Transmission Not In Park	X	X	X	X	X	X	X	X
Transmission Overheat	X	X	X	X	X	X	X	X
Transmission Shift Alarm						X	X	X
Turn Indicator Lamp Failure	X	X	X	X	X	X	X	X
Turn Indicator Left On	X	X	X	X	X	X	X	X
Turn Indicators Left and Right	X	X	X	X	X	X	X	X

* GT-P only

6. Configurable options

Ford diagnostic tool configurable options

The following is a list of features and warnings that are configurable:

- Column shift Automatic
- ABS
- EBD
- TCS
- DSC
- Police mode
- Fuel mapping
- Petrol
- LPG
- Rear seatbelt minder
- Transmission Shift Alarm

7. Gauges

► Damping of gauges is electronically controlled by software

7.1   Speedometer Gauge

### 7.1.1   Function

Displays vehicle speed

7.1.2   Input

| Input	CAN
Source	PCM (0x207)
CAN Data Label	VehicleSpeed_HS

7.1.3   Appearance

► There are 2 sets of gauge graphics for the speedometer.
    1   Metric units from 0-220 km/h (increments 5 kph).
    2   Metric units from 0-260 km/h (increments 5 kph).
► The graphics are linear from the minimum indication through to 100km/h and then 100 to full scale deflection.
► Speedometer graduations are configured so that '100' is aligned to the 12 o'clock position.

(220 km/hr Version) Speedometer Indication
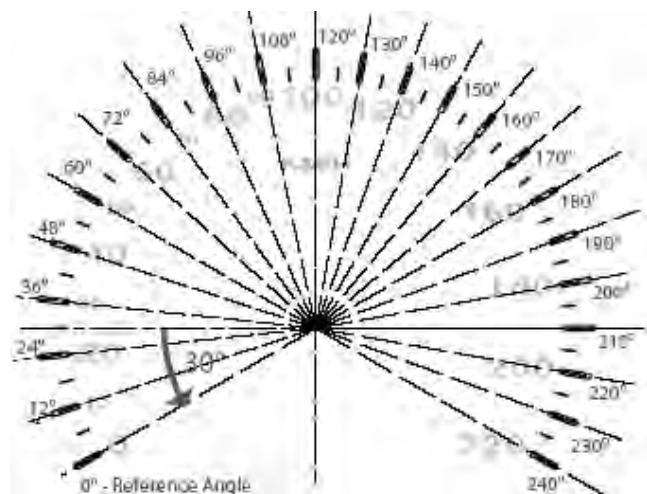
(260 km/hr Version) Speedometer Indication
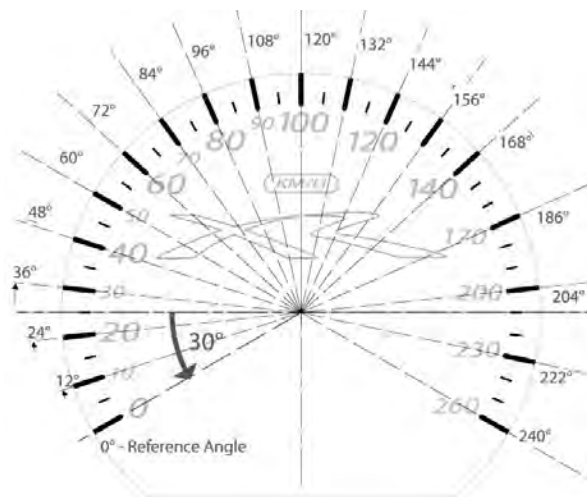
7.1.4   Failsafe

If the cluster cannot display the speedometer value when operating outside of the cluster operating voltage range, it will hold the last valid speed indication for 1 second. After 1 second, it will go to the zero position.

If the Vehicle Speed message VehicleSpeed_HS is missing or invalid for up to 2 seconds, the speedometer shall maintain the current speed based on the last message received. The speedometer shall display 0 and the System Fault warning is activated when the Vehicle Speed message is absent or invalid for more than 2 seconds. The speedometer will recover immediately on receipt of the Vehicle Speed message with valid data.

If EEPROM data corruption is detected (invalid checksum) the speedometer gauge shall display 0.

When the gauge is displaying 0 due to failsafe, the digital speedometer will display hyphens.

7.1.5   Digital Speedometer

The digital speedometer displays the vehicle speed in digital format. It is updated every 0.5 seconds. The speed used is the same as the one displayed in the speedometer gauge i.e. offset included. The maximum displayed digital speed is the same as the maximum value of the speedometer gauge.

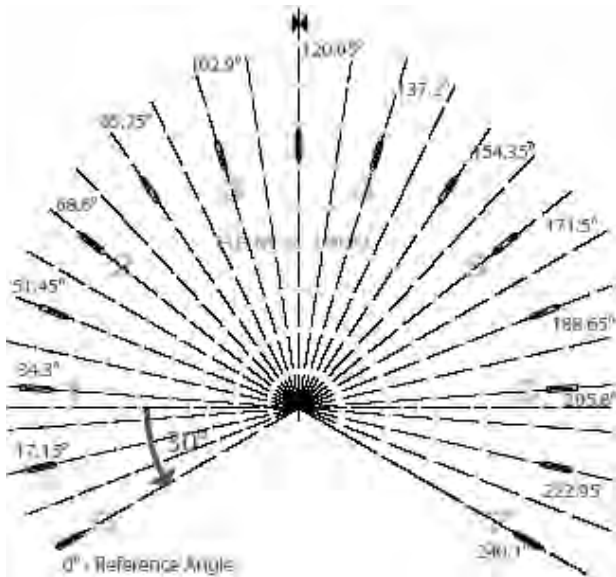### 7.2   Tachometer Gauge

7.2.1   Function

Displays engine speed.

7.2.2   Input

Input	CAN
Source	PCM (0x207)
CAN Data Label	Engine_RPM_HS

7.2.3   Appearance

The graphics are linear from the minimum indication through the maximum indication spanning the entire sweep of the gauge. Tachometer is to be available in 7000 and 8000 RPM ranges.

7.2.4   Failsafe

If the cluster cannot display the correct tachometer value when operating outside of the cluster operating voltage range, it will hold the last valid speed indication for 1 second. After 1 second, it will go to the zero position.

If the Tachometer message Engine_RPM_HS is missing or invalid for up to 2 seconds, the tachometer shall maintain the current RPM based on the last message received. The tachometer shall display 0 and the System Fault warning is activated when the Tachometer message is absent or invalid for more than 2 seconds. The tachometer will recover immediately on receipt of the Tachometer message with valid data.

If EEPROM data corruption is detected (invalid checksum) the speedometer gauge shall display 0.
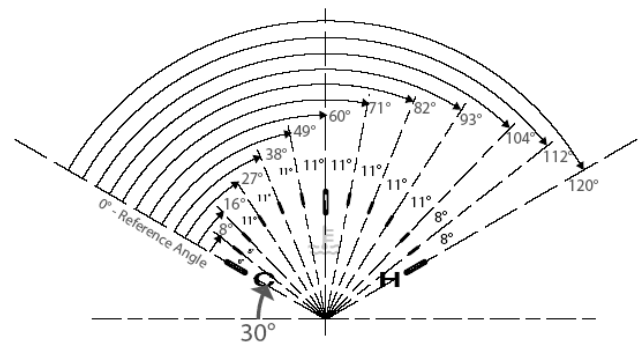
7.3   Engine Temperature Gauge

7.3.1   Function

Displays engine coolant temperature.

7.3.2   Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	EngineCoolantTemperature

7.3.3   Appearance

7.3.4 Calibration

Flat response gauge calibration is indicated in the table below.

Engine Coolant Fluid Temperature (°C)	Pointer Indication Angle - degrees	Graphics	Production calibration points
<40	0 ± 3	C	
-20.27	8 ± 3		
-0.53	16 ± 3		
26.6	27 ± 3		
53.73	38 ± 3		
90	49 ± 3		
108	60 ± 3	1/2	X
111.81	71 ± 3		
115.62	82 ± 3		
119.42	93 ± 3		
123.23	104 ± 3		
126	112 ± 3		X
130	120 ± 3	H	

7.3.5 Failsafe

Gauge operation outside of normal operating voltage range shall either hold position or return to rest position if the cluster is unable to continue displaying accurately.

Regular diagnostics provided are DTCs for invalid data and for missing message. If missing message or invalid data for more than 5 seconds, the System Fault warning is activated and the gauge will indicate H in the graphics.

7.4 Fuel Level Gauge

7.4.1 Function

Displays fuel level.

The system uses a combination of sender data and actual fuel used data from the PCM to provide an accurate Fuel gauge

7.4.2 Input

Sender Input Value

Input Type	Hardwired
Source	Switch
Description	Raw input data from the fuel sender

Fuel Consumption

Input	CAN
Source	PCM (0x427)
CAN Data Label	FuelPulse
Description	Is the fuel used

Vehicle Speed

Input	CAN
Source	PCM (0x207)
CAN Data Label	VehicleSpeed_HS

7.4.3 Appearance

Fuel Grounding Concept

In order to avoid errors due to ground shifts caused by high currents in the vehicle, a signal ground and a power ground are provided as inputs to the Instrument cluster. The signal ground returned directly from the fuel sender. This wire is not connected to any other modules or to the car body. The power ground is connected to the body of the car and is only connected to the signal ground internal to the instrument cluster.

7.4.4 Calibration

The graphics are per the table below along with indication accuracy's for a given nominal input resistance.

Fuel Gauge characteristics

Indication	Resistance	Fuel volume (ltrs)	Pointer Indication Angle (degrees)	Calibration point
E	900.5	0	0 ± 3	
			8 ± 3	
	742	8.44	15 ± 3	X
	732	9	16 ± 3	
1/4	612	17	27 ± 3	
	497	26	38 ± 3	
			49 ± 3	
1/2	409	34	60 ± 3	
	343	40	72 ± 3	
			84 ± 3	
3/4	202	48	96 ± 3	
			108 ± 3	
Full	76	60	120 ± 3	X
Overfull	41	68	125 ± 3	

7.4.5 Low Fuel Warning

See Low Fuel Warning section.

7.4.6 Failsafe

See Fuel System Fault Warning

Invalid Operating Voltage

The fuel gauge shall not indicate erroneously outside the operating voltage range of the cluster. Gauge operation outside of normal operating voltage range shall use the Fuel Consumption only to calculate the Final Fuel Value.

Hardwired Input

Gauge pointer shall maintain previous position if sender input is below short circuit threshold or above open circuit threshold continuously for less than 33 seconds. The gauge shall recover a normal reading if no open or circuit fault is detected for 33 seconds. If an open or short circuit is detected at key on the gauge shall return to its previous position at key off. The status of the hardwired input is constantly output via CAN.

CAN Input

If the CAN message is missing or invalid data is received for more than 33 seconds continuously, the Damped Sender Value only is used to calculate the Final Fuel Value. The Final Fuel Value is linearly damped towards the Damped Sender Value. For less than 33 seconds no action is taken.

If EEPROM data corruption is detected (invalid checksum) or both the hardwired input and CAN input are invalid the fuel gauge shall display 0.

7.4.7 Output

Transmit via CAN the following data:
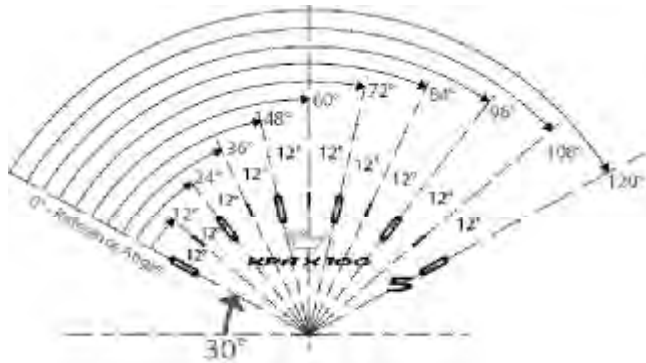
CAN Data Label	Description
InstFuelValue	Instantaneous fuel level value.
DampedFuelLevel	Damped fuel level value.
MaxLitres	Maximum tank litres.
FuelSenderFail	Status of fuel hardwired input

7.5   Oil Pressure

7.5.1   Function

Displays oil pressure.

7.5.4   Performance

►   The pointer shall move smoothly and continuously over the entire sweep of the gauge.

►   The temperature gauge has a response time of 2.5 seconds or less from the key off rest position to the maximum indication possible upon cluster power on. The gauge response during RUN is filtered such that the time lag from input signal change to output signal change does not exceed 3 seconds. Pointer returns to rest position smoothly and continuously at key off in concert with other pointers within 2.5 seconds.

7.5.5   Calibration

Oil Pressure (Bar)	EngineOilPressure	Pointer Indication Angle - degrees	Production calibration points
0.0	0.0	0 ± 3	
0.5	1.4	12 ± 3	
1.0	2.8	24 ± 3	
1.5	4.2	36 ± 3	
2.0	5.6	48 ± 3	
2.5	7.0	60 ± 3	X
3.0	8.4	72 ± 3	
3.5	9.8	84 ± 3	
4.0	11.2	96 ± 3	
4.5	12.6	108 ± 3	
5	14.0	120 ± 3	X

7.5.6   Failsafe

Gauge operation outside of normal operating voltage range either holds position or returns to rest position if the cluster is unable to continue displaying accurately.

Regular diagnostics provided are DTCs for missing message. If missing message or invalid data for more than 5 seconds, the System Fault warning is activated and the gauge will indicate 5kPa in the graphics.
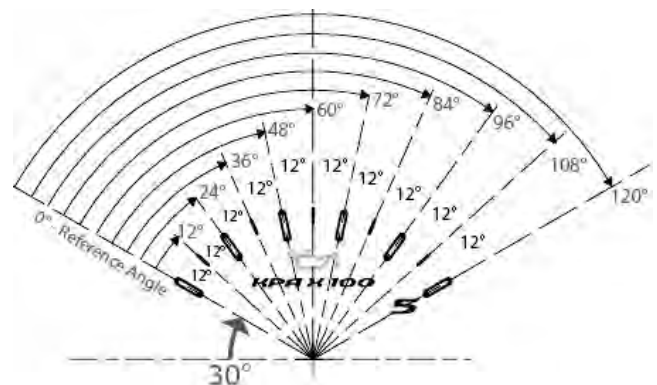
7.6   Oil Temperature

7.6.1   Function

Displays oil temperature.

7.6.2   Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	EngineOilTemperature

7.6.3   Appearance

7.6.4 Performance

► The pointer moves smoothly and continuously over the entire sweep of the gauge.
► The temperature gauge has a response time of 2.5 seconds or less from the key off rest position to the maximum indication possible upon cluster power on. The gauge response during RUN is filtered such that the time lag from input signal change to output signal change does not exceed 10 seconds. Pointer returns to rest position smoothly and continuously at key off in concert with other pointers within 2.5 seconds.
► Temperature gauge pointer movement doesl not exceed 20 degrees per second at key on.

7.6.5 Calibration

Oil Temperature (°C)	Pointer Indication Angle - degrees	Production calibration points
<=50	0 ± 3	
60	12 ± 3	
70	24 ± 3	
80	36 ± 3	
90	48 ± 3	
100	60 ± 3	X
110	72 ± 3	
120	84 ± 3	
130	96 ± 3	
140	108 ± 3	X
>=150	120 ± 3	

7.6.6 Failsafe

Gauge operation outside of normal operating voltage range either holds position or returns to rest position if the cluster is unable to continue displaying accurately.

Regular diagnostics provided are DTCs for missing message. If missing message or invalid data for more than 5 seconds, the System Fault warning is activated and the gauge will indicate 150°C in the graphics.
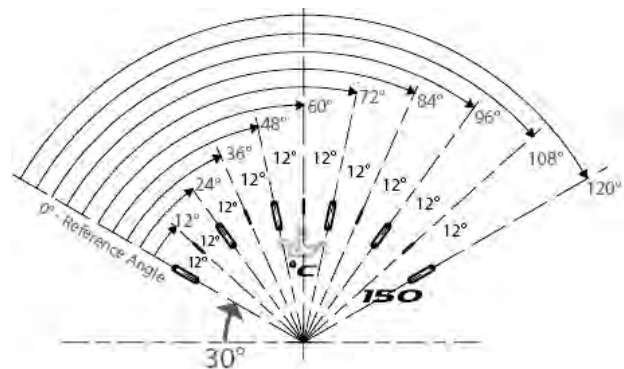
7.7 Turbo Boost

7.7.1 Function

Displays turbo boost.

7.7.2 Input

Input	CAN
Source	PCM (0x425)
CAN Data Label	TurboBoostPressure

7.7.3 Appearance

7.7.4 Performance

► The pointer moves smoothly and continuously over the entire sweep of the gauge.
► The temperature gauge has a response time of 2.5 seconds or less from the key off rest position to the maximum indication possible upon cluster power on. The gauge response during RUN is filtered such that the time lag from input signal change to output signal change does not exceed 1 second. Pointer returns to rest position smoothly and continuously at key off in concert with other pointers within 2.5 seconds.

7.7.5 Calibration

Turbo Boost (Bar)	Pointer Indication Angle - degrees	Production calibration points
0.0	0 ± 3	
0.1	12 ± 3	
0.2	24 ± 3	X
0.3	36 ± 3	
0.4	48 ± 3	
0.5	60 ± 3	
0.6	72 ± 3	
0.7	84 ± 3	
0.8	96 ± 3	X
0.9	108 ± 3	
>=1.0	120 ± 3	

7.7.6 Failsafe

Gauge operation outside of normal operating voltage range either holds position or returns to rest position if the cluster is unable to continue displaying accurately.

Regular diagnostics provided are DTCs for missing message. If missing message or invalid data for more than 5 seconds, the System Fault warning is activated and the gauge will indicate 1kPa in the graphics.

8. Odometer

8.1 Main Odometer

8.1.1 Function

To display distance travelled to the driver.

This is in a dedicated zone of the dot matrix display.

8.1.2 Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	ODO_Count

8.1.3 Appearance

TOTAL distance is accumulated and displays a range of values from 1 to 1,999,999 kms.

8.1.4 Accuracy

Under continuous battery operation, the accumulated distance is accurate to ±0.1% of the CAN message ODO_Count data. On a battery reset the ODO value will be truncated and 500 meters will be added to the ODO value i.e. 104.6Km will become 104.5. This indicates that the accuracy of the ODO after a battery reset is ±500meters.

8.1.5 Failsafe

Display the last odometer value if CAN message is missing or invalid. DTC is also set (see diagnostics section). When CAN message is received with valid data, continue to operate normally.

Display "Error" and blanks to the right within 1 second of detecting corrupted EEPROM.

8.1.6 Output

Transmit via CAN the following data:

CAN Data Label	Description
ODO	Current odometer value
ODO_Overflow	When the odometer reaches the maximum value, an overflow flag is set.

8.2   Trip Odometer

8.2.1   Function

To display elapsed distance travelled since last reset. There are 2 trip odometers, A and B

8.2.2   Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	ODO_Count

8.2.3   Accuracy

The Trip odometer is accurate to within +/-0.1% of the CAN message data. On a battery reset the trip odometer value will be truncated i.e. 104.6Km will become 104.0.

8.2.4   Failsafe

Display last trip odometer value if CAN message is missing or invalid for >= 2 seconds. DTC is also set (see diagnostics section). Continue to operate normally when CAN message is received with valid data.

9. Warnings

9.1   General Warning Chime

This is the default warning chime used when a warning is active unless otherwise specified.

Tone sequence	Frequency	Decay	Duration
4 beeps	1300Hz	-	250ms on 250ms off

All other chimes/warnings as per details listed in the relevant chime section

Login Tracking Code

9.2   Warning Priority List

The 'ignition' column describes if the availability of the warning depending on ignition status.

Priority	Popup	Popup	Chime	Ignition
1	Overspeed	X	X	On
2	Transmission Shift Alarm	X	On	
3	Hazard Lights	X	On/Off	
4	Internal Security	Off		
4	Smart Shield Request	X		Off
4	Immobilisation Lamp	X	X	On
5	Turn Indicators Left and Right	X	On	
6	Brake Fail	X	X	On
7	Sonar Parking Fault	X	X	On
8	Sonar Parking Disabled	X	X	On
9	Seat Belt Warning (Front)	X	X	On
10	Seat Belt Minder (Rear)	X	X	On
11	Door/Boot/Bonnet Ajar	X	X	On
12	Park Brake	X	X	On
13	Fuel Cutoff Switch	X	X	On
14	MIL Indicator	On		
15	ETC Warning	X	X	On
16	Engine Temperature Warning	X	X	On
17	Oil Pressure Warning	X	X	On
18	Transmission Fail	X	X	On
19	Alternator Fail	X	X	On
20	ABS	X	X	On
21	Traction Control		X	X
22	DSC	X	X	On
23	HDC	X	X	On
24	RIL	X	X	On
25	Transmission Overheat	X	X	On
26	Low Fuel	X	X	On
27	Turn Indicator Lamp Failure	X	X	On
28	Turn Indicator Left On	X	X	On
29	Transmission Not In Park	X	X	Off
30	Park Lights On	X	X	Off
31	Headlamp Failure	X	X	On
32	Fuel Sender Fault	X	X	On
33	System Fault warning	X	X	On
34	Performance	X		On
35	Rest Reminder	X		On
29	Button Press Confirmation	X	On	

Login Tracking Code

9.3   Driver Warning Indicators

► Popup means the warning will be displayed in the MFD for a defined period or until it is acknowledged by an 'ENTER' button press.

► For some warnings the general warning symbol will be displayed for as long as the warning condition is true.

► Popup chimes cannot be interrupted by another warning.

► Secondary message is the same as the primary message unless stated otherwise.

► If more than one popup is active, they cycle through with a 5 second timeout and a minimum active time of 1 second. Chimes do not repeat.

► When warnings are activated simultaneously, they are displayed in order of priority.

► Popups can be acknowledged, but a minimum active time for all popups is 1 second. Once acknowledged, the popup and the chime are deactivated.

► Popups are not acknowledgeable during ignition off.

9.3.1   General Warning

Output

LED

Symbol	⚠ Safety Alert Symbol
Colour	Dual colour: red and yellow
Display/Status	Permanent and flash (300ms on 200ms off)

Process

A triangle LED warning is activated by various warnings as described in the following sections. Some warnings require the general LED to be yellow or red depending on the type of warning they are. If both red and yellow warnings are active, red takes precedence.

Warnings listed below display a flashing general LED, all others display a permanent general LED. Flashing LED takes precedence over permanent LED.

► Brake System Fault
► Fuel System Fault
► System Fault warning

9.3.2   ABS Warning Light

The warning light illuminates to indicate an ABS system failure.

Input

Input Type	CAN
Source	ABS (0x210)
CAN Data Label	ABS_Failed

Output

CHIME
This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	ABS symbol & "ABS FAULT"
Warning List Name	ABS FAULT

LED

Symbol	(ABS) ABS symbol
Colour	Yellow
Display/Status	Permanent

General Warning

Details   See General Warning

Colour   Yellow

Process
This warning is only active when:
- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- EEPROM_ABS is enabled, and
- ABS_Failed is set, warning is active.

Failsafe
If the CAN message is missing for more than 5 seconds (not received or error in message):

► ABS_Failed is considered to be inactive.
► The ABS LED is turned on.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.3 Alternator Fail Warning

The warning light illuminates to indicate that there is a charging system or alternator fault.

Input
Alternator Fail

Input Type	CAN
Source	PCM (0x427)
CAN Data Label	ALT_FAILURE_STAT

Engine RPM

Input	CAN
Source	PCM (0x207)
CAN Data Label	Engine_RPM_HS

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	🔋 Popup with 5 minute timeout
Popup and Menu Contents	Battery symbol & "CHARGE FAIL"
Warning List Name	CHARGE FAIL

LED

Symbol	🔋 Battery symbol
Colour	Red
Display/Status	Permanent

General Warning

Details	See General Warning
Colour	Red

Process

ALT_FAILURE_STAT	Engine Running	Output
Not set	-	All off
Set	-	LED on
Set	Yes	All output activated

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► ALT_FAILURE_STAT is considered to be inactive.
► The Alternator LED is turned on.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.4 Auto Headlamps/Lamps & Park Lights Warning

Input

Park Lamps On

Input Type	Hardwired
Connector	20-Pin
Pin Number	10

Autohead Lamps

Input Type	Hardwired
Connector	20-Pin
Pin Number	11

Ignition

Input Type	Hardwired
Connector	20-Pin
Pin Number	15

Headlamp CAN error flag

Input Type	CAN
Source	BEM (403)
CAN Data Label	Head_lamp_fail

Driver Door Ajar

Input Type	CAN
Source	BEM (403)
CAN Data Label	RFD_Ajar

Right Front Door Locked

Input Type	CAN
Source	BEM (403)
CAN Data Label	RFD_Locked

Process

	Park Lamps		AutoHead Lamps		Ignition		Driver Door Ajar	Key Pos	Switch Position Description (Lights)	Warning Output
	HW	Logic	HW	Logic	HW	Logic				
1.0	Supply	Hi	GND	Low	Supply	Hi	-	IGN ON	Park Lamps On (Manual)	Park lights on
2.0	Open	Low	GND	Low	Supply	Hi	-	IGN ON	Park Lamps Off (Manual)	None
3.0	Supply	Hi	Open	Hi	Supply	Hi	-	IGN ON	Auto Head Lamps with sun sensor "dark"	Auto headlamps on
4.0	Open	Low	Open	Hi	Supply	Hi	-	IGN ON	Auto Head Lamps with sun sensor "light"	None
5.0	Supply	Hi	GND	Low	Open	Low	Clr	IGN OFF	Park Lamps On (Manual)	Park lights on
5.1	Supply	Hi	GND	Low	Open	Low	Set	IGN OFF	Park Lamps On (Manual)	*Without manual override: Park lights left on With manual override: Park lights on
6.0	Open	Low	GND	Low	Open	Low	-	IGN OFF	Park Lamps Off (Manual)	None
7.0	Supply	Hi	Open	Hi	Open	Low	-	IGN OFF	Auto Head Lamps with sun sensor "dark"	Auto headlamps on
8.0	Open	Low	Open	Hi	Open	Low	-	IGN OFF	Auto Head Lamps with sun sensor "light"	None

*Warning only activated when the switch lights position is in park lamps on, ignition goes from on to off and door ajar. That is, manual override occurs when during ignition off the switch position goes from park lamps off to on.

In all other states there is no display or buzzer produced by the instrument cluster.

General Output

Transmit inputs state via CAN (constant output):

Transmit Data	Data Label
Auto headlamps state	AutoHeadlampSwitchStatus
Park lamps state	ParkAndLowBeamStatus

Auto Headlamps On Output

CHIME

N/A

LCD

Display	Permanent
Popup and Menu Contents	n/a
Warning List Name	n/a
Static Warning	⚞A⚟ Lamp symbol

LED

N/A

General Warning

N/A

Headlamp Failure Output

CHIME

This warning uses the General Warning Chime.

LCD

| Display	Popup with 5s timeout
Popup and Menu Contents	Lamp out symbol & "HEADLAMP FAULT"
Warning List Name	AUTOHL FAIL
Static Warning	Lamp out symbol

LED

N/A

General Warning

Details	See General Warning
Colour	Yellow

Park Lights Left On Output

CHIME

Tone sequence	3 beeps repeated at 2s intervals for 20s.
Duration	300ms on, pause for 200ms between beeps.

LCD

Display	Popup with 1 minute timeout
Popup and Menu Contents	Lamp symbol (A.13) and "HEADLAMPS ON"
Static Warning	Lamp symbol (A.13)

LED

N/A

General Warning

N/A

Park Lights On Output

CHIME

N/A

LCD

Display	Permanent
Popup and Menu Contents	N/A
Static Warning	Lamp symbol

LED

N/A

General Warning

N/A

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► RFD_Ajar is considered to be open.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.5 Brake Fail Warning

The warning light illuminates to indicate that the brake fluid is low, the brake fluid switch is not connected or that there is a fault with the EBD (electronic brake distribution) unit.

Low Fluid & Brake Switch Fault Warning

9.3.5.1.1 Input

Brake Fail Monitor

Input Type	Hardwired
Connector	20-Pin
Pin Number	18

Brake Fail

Output Type	Hardwired
Connector	20-Pin
Pin Number	17

9.3.5.1.2 Output 1

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	Brake fail symbol & "BRAKE FAULT"
Warning List Name	BRAKE FLUID

LED

Symbol	(!) Brake fail symbol
Colour	Red
Display/Status	Permanent

General Warning

Details	See General Warning
Colour	Red

9.3.5.1.3 Output 2

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	(!) Brake fail symbol & "BRAKE FAULT"
Warning List Name	BRAKE FAIL
Static Warning	n/a

LED

Symbol	(!) Brake fail symbol
Colour	Red
Display/Status	Permanent

General Warning

Details	See General Warning
Colour	Red

9.3.5.1.4 Process

Brake fail monitor and brake fail signals provide 3 input states:

Brake Fail Monitor Input	Description	Output
Ignition voltage / 2 ≈ 6v	Normal operation	No Output
Ignition ≈ 12v	Open circuit	Output 2 (brake fail warning)
Switch closed (~0v)	Short circuit	Output 1 (low fluid level)

EBD Fault Warning

9.3.5.1.5 Input

Input Type	CAN
Source	ABS (0x210)
CAN Data Label	EBD_Failed

Login Tracking Code

9.3.5.1.6 Output

CHIME

This warning uses the <u>General Warning Chime</u>.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	(!) Brake fail symbol (B.01) & "EBD FAULT"
Warning List Name	EBD FAULT

LED

Symbol	(!) Brake fail symbol (B.01)
Colour	Red
Display/Status	Permanent

General Warning

Details	See <u>General Warning</u>
Colour	Red

9.3.5.1.7 Process

This warning is only active (General Output with warning list name 3) when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- EEPROM_BrakeLED is enabled, and
- EBD_Failed is set, warning is active.

9.3.5.1.8 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► EBD_Failed is considered to be inactive.
► The EBD Fault LED is turned on.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.6 Button Press Confirmation

Input

Input Type   Internal

Output: Single

CHIME

Tone sequence 1 beep

Duration   50ms

Output: Double

CHIME

Tone sequence	2 beeps
Duration	50ms on, 100ms off, 50ms on

Process

Nominated button press. See <u>MMI section</u> for a description of the buttons that generate this output. When a single chime is required use 'output: single' and when a double chime is required use 'output: double'.

9.3.7 Cruise Control ON

This warning illuminates to indicate that the cruise control is on and gets its input from CAN via the PCM.

Input

Cruise Active

Input Type	CAN
Source	PCM (0x425)
CAN Data Label	Cruise

Cruise Speed

Input Type	CAN
Source	PCM (0x425)
CAN Data Label	CruiseTargetSetSpeed

Output

CHIME

N/A

LCD

Display	Permanent
Popup and Menu Contents	"CRUISE ___ xx" ___ = blank space for the word "SET" xx = cruise speed (not displayed if CruiseTargetSetSpeed is 0km/hr)

LED

N/A

General Warning

N/A

Process

When the Cruise data label is set to 'active', the warning is active: the word "CRUISE" is displayed; the cruise speed is displayed unless its value is 0km/hr (not displayed for column shift transmission variants).

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Cruise CAN signal is considered to be inactive.
► There is no cruise display.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.8 Cruise Control Set

This warning illuminates to indicate that the cruise control is set.

Input

Cruise Set

Input Type	CAN
Source	PCM (0x425)
CAN Data Label	Cruise

Cruise Speed

Input Type	CAN
Source	PCM (0x425)
CAN Data Label	CruiseTargetSetSpeed

Output

CHIME

N/A

LCD

Display	Permanent
Popup and Menu Contents	"CRUISE SET xx" xx = cruise speed (not displayed if CruiseTargetSetSpeed is 0km/hr)

LED

N/A

General Warning

N/A

Process

If the Cruise signal is set to 'set', the warning is active. The cruise speed is displayed unless its value is 0km/hr (not displayed for column shift transmission variants).

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► CruiseTargetSetSpeed CAN signal is considered to be inactive.
► There is no cruise display.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.9 Door/Boot/Bonnet Ajar Warning

This warning illuminates to indicate that one or more of the doors is open. The visual warnings contain individual displays for each door, the boot and the bonnet (if alarm is fitted).

Input

Input Type	CAN
Source	BEM (0x403)
CAN Data Label	RFD_Ajar, LFD_Ajar, RRD_Ajar, LRD_Ajar, BootTailgateAjar, BonnetAjar

Output

CHIME

Tone sequence	3 beeps
Duration	400ms on, pause for 300ms between beeps

LCD

Display	Popup with 1 minute timeout
Popup and Menu Contents	Door ajar symbol (K.908) & "AJAR"
	Note: When the bonnet is ajar, the word "BONNET" is displayed next to the bonnet symbol. Similarly, with the boot: "BOOT"

LED

N/A

General Warning

N/A

Door/Bonnet Ajar

	Description	Timeout	Popup	Chime
1	Door ajar flag set with RPM > 350.	5s	√	
2	Door ajar flag set with Speed > 10Km/hr.	1m	√	√
3	After (2) recur every one minute.	1m	√	√

Boot Ajar

	Description	Timeout	Popup	Chime
1	Boot ajar flag set with RPM > 350.	5s	√	
2	Boot ajar flag set with Speed > 10Km/hr. Only occurs the first time after ignition cycle.	1m	√	√
3	After (2) recur every one minute. Stop recurring when 1 popup has been acknowledged.	1m	√	√
4	Boot ajar flag set with Speed transition to > 10Km/hr. Only after (3) has been acknowledged.	5s	√	

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signals are considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.10 Dynamic Stability Control (where fitted)

This warning illuminates to indicate the DSC status.

DSC On/Off Status

9.3.10.1.1 Input

Input Type	CAN
Source	VDC (0x210)
CAN Data Label	VDC_DisabledByUser

9.3.10.1.2 Output 1

CHIME

N/A

LCD

Display	Popup with 2s timeout
Popup and Menu Contents	DSC symbol (J.14) & "DSC ON"

LED

N/A

General Warning

N/A

9.3.10.1.3 Output 2

CHIME

N/A

LCD

Display	Popup with 2s timeout
Popup and Menu Contents	DSC symbol (J.14) & "DSC OFF"

LED

Symbol	DSC symbol (J.14)
Colour	Yellow
Display/ Status	Permanent

General Warning

N/A

9.3.10.1.4 Process

VDC_DisabledByUser State	Output
NO	Output 1
YES	Output 2

9.3.10.1.5 Failsafe

EEPROM_ DSC	VDC_ DisabledByUser State	Output
Enabled	NO	Output 1 only if transition from YES to NO
Enabled	YES	Output 2
Disabled	-	No output

The process of this warning is affected by the vehicle cranking signal (CrankStatusPCM_HS, see section 9.4).

9.3.10.1.6 Failsafe

Failsafe is only applicable if:

► EEPROM_DSC is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

If the CAN message is missing for more than 5 seconds (not received or error in message):

► VDC_DisabledByUser CAN signal is considered to be inactive.
► The DCS LED is turned on.
► The System Fault warning is activated.
► A DTC is logged.

DSC Event

9.3.10.1.7 Input

Input Type	CAN
Source	VDC (0x210)
CAN Data Label	VDC_Event
Wakeup	No

9.3.10.1.8 Output

CHIME

N/A

LCD

N/A

LED

Symbol	DSC symbol (J.14)
Colour	Yellow
Display/Status	Indicator flashes at a rate of 2 ± 1 Hz at 50 ± 5% duty cycle for the duration of the event.

General Warning

N/A

9.3.10.1.9 Process

This warning is only active when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), AND
- EEPROM_DSC is enabled, AND
- VDC_Event or TCS_Event are set.

9.3.10.1.10 Failsafe

Failsafe is only applicable if:

► EEPROM_DSC is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

If the 0x210 CAN message is missing for more than 5 seconds (not received or error in message):

► VDC_Event and TCS_Event CAN signals are considered to be inactive.
► The DCS LED is turned on.
► The System Fault warning is activated.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

DSC Fault

9.3.10.1.11 Input

Input Type	CAN
Source	VDC (0x210)
CAN Data Label	VDC_Failed

9.3.10.1.12 Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with a 5 minute timeout
Popup and Menu Contents	DSC symbol (J.14) & " DSC FAULT "
Warning List Name	DSC FAULT

LED

Symbol	DSC symbol (J.14)
Colour	Yellow
Display/Status	Permanent

General Warning

N/A

9.3.10.1.13 Process

This warning is only active when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- EEPROM_DSC is enabled, and
- VDC_Failed is set, warning is active.

9.3.10.1.14 Failsafe

Failsafe is only applicable if:

► EEPROM_DSC is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

If the CAN message is missing for more than 5 seconds (not received or error in message):

► VDC_Failed CAN signal is considered to be inactive.
► The DCS LED is turned on.
► The System Fault warning is activated.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

Login Tracking Code

9.3.11 Engine Temperature Warning

This warning illuminates to indicate that the coolant temperature gauge pointer has entered the RED zone.

Input

Input Type	CAN
Source	PCM (0x427)
CAN Data Label	EngineOverheat

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with a 5 minute timeout
Popup and Menu Contents	⬛ Engine Coolant Temp symbol (F.03) & "HIGH ENGINE TEMPERATURE"
Warning List Name	ENGINE TEMP

LED

N/A

General Warning

Details	See General Warning
Colour	Red

Process

When EngineOverheat is set, warning is active.

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► EngineOverheat CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.12 ETC Warning

This warning illuminates to indicate a failure of the electronic throttle control.

Input

Input Type	CAN
Source	PCM (0x427)
CAN Data Label	ETC_Warning

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with a 5 minute timeout
Popup and Menu Contents	**ETC** ETC symbol & "ETC FAULT"
Warning List Name	ETC FAULT

LED

N/A

General Warning

Details	See General Warning
Colour	Yellow

Process

When ETC_Warning is set to 'telltale_on', warning is active.

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► ETC_Warning CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.13 Fog Lamp Warning (where fitted)

This warning illuminates to indicate that the fog light switch is on. It will only illuminate if the headlamps are on (controlled external to the cluster).

Input

Front Fog Lamp

Input Type	Hardwired
Connector	20-Pin
Pin Number	14

Output

CAN	
CAN Output Label	FogLampStatus

CHIME

N/A

LCD

N/A

LED

Symbol	(Front Fog Lamp Symbol A.05)
Colour	Green
Display/Status	Permanent

General Warning

N/A

Process

When hardwired input switches to battery supply the warning is active. The status of the hardwired input is constantly transmitted over CAN.

9.3.14 Fuel Cutoff switch (Inertia)

This warning illuminates to indicate that the fuel cutoff inertia switch has been activated.

Input

Fuel cutoff switch

Input Type	Hardwired
Connector	20-Pin
Pin	8

Input Type	CAN
Source	RCM (0x340)
CAN Data Label	RCM_STAT_DPLY_ENABLD_RCRD_HS

Output

CAN

CAN Data Label	(0x340) RCM_STAT_DPLY_ENABLD_RCRD_MS

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with a 5 minute timeout
Popup and Menu Contents	Fuel cutoff symbol (G.08) & "FUEL CUTOFF SWITCH"
Warning List Name	FUEL CUT

LED

N/A

General Warning

Details	See General Warning
Colour	Yellow

Process

When hardwired input switches to ground the warning is active.

When hardwired input switches to ground or the input CAN signal is active, the CAN output signal value is active as follows:

- This output signal is transmitted active on event and 2 periodic messages when the hardwired input is switched to ground.
- This output signal is transmitted active for 2 periodic messages when the input CAN signal is active.

Failsafe

At any moment if the hardwired input is active, the fuel cutoff warning is activated, even if CAN failsafe is being executed (both fuel cutoff and system fault warning are active).

If the CAN message is missing for more than 5 seconds (not received or error in message):

► CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

9.3.15 Fuel System Fault Warning

Input

Fuel Sender Input Value

Input Type	Hardwired
Connector	20-Pin
Pin Number	6 & 7
Description	Raw input data from the fuel sender

Fuel Consumption

Input	CAN
Source	PCM (0x427)
CAN Data Label	FuelPulse
Description	Is the fuel used

Output

CAN

CAN Data Label	FuelSenderFail

CHIME

See System Fault warning.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	Fuel symbol (G.01)& "FUEL SYSTEM FAULT"
Warning List Name	FUEL FAIL
Static Warning	Fuel symbol (G.01)

LED

N/A

General Warning

Details	See General Warning.
Colour	Red

Process

See section for fuel level algorithm details.

If the sender input is below short circuit threshold or above open circuit threshold continuously for more than 33 seconds, the warning is activated. Once activated, the warning will be deactivated if the sender input is valid for 33 seconds continuously.

9.3.16 Hazard Lights and Turn Indicators

The table below indicates the priority in which the light indicators operate in case more than one case occurs at the same time.

Priority	Warning
1	Hazard Warning
2	Hazard Lights Request
3	Turn Indicator Lamp Failure
4	Turn Indicator Left On
5	Turn Indicators Left and Right

Lamp failure does not modify the operation of the hazard lights:

► Hazard Lights Request
► Hazard Warning

Hazard Warning

9.3.16.1.1 Input

Input	CAN
Source	FDM (0x307)
CAN Data Label	HazardSwitch

9.3.16.1.2 Output

CHIME

Tone sequence	Tick Tock

LCD

N/A

LED

Symbol	⬅ ➡ Turn signal symbol (A.16) (Both LEDs active)
Colour	Green
Display/Status	1.25Hz with 50% duty cycle for normal operation.
	For failure mode see section.

General Warning

N/A

9.3.16.1.3 Process

When a transition from unset to set is detected in the HazardSwitch signal regardless of ignition status, the warning is toggled, i.e. turned on if it was off, turned off if it was on. Set to unset transition has no consequence.

LEDs must be activated regardless of higher priority warnings.

Hazards chime is activated when other warning chimes are completed.

LEDs and chime should be synchronised.

Hazard switch function (ON/OFF) should be remembered across ignition cycles.

Ignition off Behaviour:

► Upon a wake up, the instrument cluster must start NM communication as normal. It will read HazardSwitch and if set to '1', hold NM sleep indication to '0' and activate hazard function. Set internal cluster hazard flag to 'ON'.
► When HazardSwitch goes to '0', maintain hazard function (ON) and NM function.
► On subsequent hazard switch activation (CAN HazardSwitch '1'), turn the hazard function OFF immediately. Set NM sleep indicator to '1' (assuming no other cluster function requires the bus). Set internal cluster hazard flag to 'OFF'.
► When HazardSwitch goes to '0', maintain hazard function (OFF).

IC Reset Behaviour:

► Micro reset of cluster, normal power up initialisation, plus NM init. Read CAN hazard switch, turn hazard function on, only when CAN hazard switch is set to '1'. (No memory for power state fail).

9.3.16.1.4 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Hazard warning is turned off.
► HazardSwitch CAN signal is considered to be inactive.
► The System Fault warning is activated.

If CAN signal is active or warning is on, and CAN fail occurs, maintain last signal value and warning state until 5s is reached for failsafe action.

Sticky hazard button is considered to be CAN HazardSwitch set for more than 1 minute (ignition ON or OFF). In this case, the hazards function is turned OFF.

Hazard status flag has to be maintained below 9 Volts and down to a micro reset voltage.

Hazard Lights Request

9.3.16.1.5 Input

Input	CAN
Source	BEM (0x403)
CAN Data Label	HazardOnRequest

9.3.16.1.6 Output

CHIME

N/A

LCD

N/A

LED

Symbol	⬅ ➡ Turn signal symbol (A.16) (Both LEDs active)
Colour	Green
Display/Status	Permanent

General Warning

N/A

9.3.16.1.7 Process

A CAN message from the BEM will activate both indicators simultaneously. If the CAN Hazard Request flag is set, both the left and right indicator LEDs are turned on. In the event that the ignition is switched off, the BEM will send a wakeup message. This warning will not be activated if other warnings with higher priority occur.

9.3.16.1.8 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► HazardOnRequest CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

Turn Indicators Left and Right

9.3.16.1.9 Input

Left indicator switch

Input Type	Hardwired
Connector	8-Pin
Pin Number	2

Right indicator switch

Input Type	Hardwired
Connector	8-Pin
Pin Number	5

9.3.16.1.10 Output

CAN

CAN Output Label	TurnStalkSwitchStatus

CHIME

Tone sequence Tick Tock

LCD

N/A

LED

Symbol	⬅ ➡ Turn signal symbol (A.16)
Colour	Green
Display/Status	1.25Hz with 50% duty cycle

General Warning

N/A

9.3.16.1.11 Process

The instrument cluster controls the activation of the left and right external indicator lamps as well as the indicator jewel. This warning is activated when the Left/Right hardwired signal switches to battery supply. LED and chime are synchronised. This warning will not be activated if other warnings with higher priority occur.

Turn Indicator Lamp Failure Warning

9.3.16.1.12 Input

Input Type	Internal

9.3.16.1.13 Output
CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with a 5 minute timeout
Popup and Menu Contents	INDICATOR BULB FAILURE
Warning List Name	BULB FAIL
Static Warning	☀ Lamp out symbol (A.14)

LED

Symbol	⬅ ➡ Turn signal symbol (A.16) (Both LEDs active)
Colour	Green
Display/Status	2.5Hz with 50% duty cycle when in failure mode

General Warning

Details	See General Warning
Colour	Yellow

9.3.16.1.14 Process

Each output is capable of sourcing ~90 watts. The duty cycle of the warning is nominally 50% and the normal flash frequency is 1.25 Hz. Each output is capable of sourcing 1 x 5 Watt and 4 x 21 Watt external globes. This allows for a 5 Watt side globe, a 21 Watt front globe, a 21 Watt rear globe, a 21 Watt trailer globe and an additional 21 Watt globe.

There is a current sense to detect if any of the globes are open circuit (assuming 47 watt load in the circuit). In order to detect when a globe is open circuit, it is assumed that 1 x 5 Watt and 2 x 21 Watt globes are in the circuit. In the event that it is detected that one of the 21 Watt globes is open circuit for 3 consecutive flashes, the indicators will flash with a frequency of nominally 2.5 ± 0.5Hz for both the indicator or hazard switch warnings. There is no indication if one of the 5 Watt globes is open circuit. If the open circuit globe returns to its normal circuit state, the standard flash rate will resume after 3 flashes. If a trailer is fitted, or additional globes have been added to the circuit, the globe out detection may not be activated.

Popup is activated (only once after ignition on) simultaneously with the indicators flash rate increase.

Bulb out detection is only performed when the turn indicators are used, not with hazard lights.

Turn Indicator Left On

9.3.16.1.15 Input

Input Type	Internal

9.3.16.1.16 Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5s timeout
Popup and Menu Contents	⬅ ➡ Turn signal symbol (A.16) & "INDICATOR ON"

LED

Symbol	⬅ ➡ Turn signal symbol (A.16)
Colour	Green
Display/Status	1.25Hz with 50% duty cycle

General Warning

N/A

9.3.16.1.17 Process

Warning is activated if turn indicator is on for > 3.2km. This warning will not be activated if other warnings with higher priority occur. The LED(s) continue operating normally as specified in the Turn Indicators Left and Right section.

9.3.17 High Beam

This warning illuminates to indicate the high beam headlamps are selected.

Input

High beam

Input Type	Hardwired
Connector	20-Pin
Pin Number	9

Output

CAN

CAN Output Label	HighBeamStatus

CHIME

N/A

LCD

N/A

LED

Symbol	≡🞇 (High beam symbol A.01)
Colour	Blue
Display/Status	Permanent

General Warning

N/A

Process

When hardwired input switches to battery supply the warning is active. The status of the hardwired input is constantly transmitted over CAN.

9.3.18 Low Fuel Warning

For details see sections <u>Fuel Level Gauge</u> and <u>Range Trip Function</u>.

Input

Input Type	Internal

Output

CHIME

Tone sequence	5 beeps repeated at 1s intervals.
Duration	300 ms on, pause for 100 ms between

LCD

Display	Static flashes synchronised with the chime. Popup with 5s timeout
Popup and Menu Contents	RANGE xx km
Static Warning	Fuel symbol (G.01)

LED

N/A

General Warning

N/A

Process

Popup and chime at ranges 80, 40, 20, 0. Permanent symbol from range 80, once the symbol warning has been activated at 80Km a hysteresis value of 90Km is used to deactivate the symbol.

9.3.19 MIL Indicator

This warning illuminates to indicate that there is an engine system malfunction that could affect vehicle emissions.

Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	MIL_Lamp

Output

CHIME

N/A

LCD

N/A

LED

Symbol	MIL symbol (F.01)
Colour	Yellow
Display/Status	Permanent

General Warning

N/A

Process

When MIL_Lamp is set, warning is active.

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► MIL_Lamp CAN signal is considered to be inactive.
► The MIL LED is turned on.
► The <u>System Fault warning</u> is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.20 Oil Pressure Warning

This warning illuminates to indicate that the oil pressure is low.

Input

Oil Pressure

Input	CAN
Source	PCM (0x427)
CAN Data Label	OilPressureWarning

Engine RPM

Input	CAN
Source	PCM (0x207)
CAN Data Label	Engine_RPM_HS

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	Oil pressure symbol (F.04) & "LOW OIL PRESSURE"
Warning List Name	LOW OIL

LED

N/A

General Warning

Details	See General Warning
Colour	Red

Process

If engine is running (RPM >= 350) for more than 5 seconds, and oil pressure CAN flag is set then warning is active.

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► OilPressureWarning CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.21 Overspeed Warning

For overspeed functionality see section Overspeed.

Input

Overspeed value

Input Type	Internal

Vehicle speed

Input	CAN
Source	PCM (0x207)
CAN Data Label	VehicleSpeed_HS

Output

CHIME

Tone sequence	3 running tones
Duration	300ms for each frequency

LCD

Display	Popup with 2 seconds timeout.
Popup and Menu Contents	& **"xx km/hr"** xx = CruiseTargetSetSpeed
Static Warning	

.

LED

N/A

General Warning

N/A

Process

Overspeed is activated by the user via the LCD menu. When it is activated the OS symbol is permanently on as a static warning.

When the vehicle speed is > the overspeed threshold the warning is activated:

► LCD popup will be displayed for 2 seconds.
► Once chime completes the static warning OS symbol flashes on event (500ms on 500ms off).

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Overspeed is deactivated (turned off).
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.22   Park Brake

The warning illuminates to indicate that the park brake is on. Its input is hardwired from the brake mechanism.

Input

Park brake

Input Type	Hardwired
Connector	20-Pin
Pin Number	12

Vehicle speed

Input	CAN
Source	PCM (0x207)
CAN Data Label	VehicleSpeed_HS

Output

CAN

CAN Output Label	ParkBrakeOn_MS / ParkBrakeOn_HS

CHIME

Tone sequence	Continuous for 20 seconds
Duration	500ms on, 500ms off

LCD

Display	Popup with 30s timeout.
Popup and Menu Contents	(P) Park brake symbol (B.02) & "PARK BRAKE ON"

LED

Symbol	(P) Park brake symbol (B.02)
Colour	Red
Display/Status	Permanent

General Warning

N/A

Process

Chime and popup: signal switch to GND and Vehicle speed > 10KPH.

LED: signal switch to GND.

CAN output is a direct representation of the hardwired input status.

Failsafe

LED will be active according to hardwired input.

If the CAN message is missing for more than 5 seconds (not received or error in message):

►   Input CAN signal is considered to be inactive.
►   The System Fault warning is activated.
►   A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.23   Restraint Indicator Lamp (RIL)

Input

9.3.23.1.1   Input

Input	CAN
Source	RCM (0x340)
CAN Data Label	RIL_RQST

9.3.23.1.2 General Output

The status of the 'RIL_RQST' is transmitted from the Instrument Cluster to the RCM with the message 0x350 'RIL_STAT' to indicate OFF, ON, PLANT or FAULT. For OFF, ON and PLANT, this is a mirror of the 'RIL_RQST' input. FAULT mode is indicated if there was detected an internal hardware fault during the proveout phase.

RIL_STAT Status	Description
Off	RIL_RQST is "OFF"
On	RIL_RQST "ON"
Plant Mode	RIL_RQST "PLANT MODE"
Fault	RIL fault (lamp failure)

9.3.23.1.3 Process

When the proveout is completed different actions are taken depending on the status of RIL_RQST (when off '0x0' no action):

RIL_RQST Status	RIL Fault	Output
Off	-	No action
On	No	Primary Warning: Output 1
Plant Mode	No	Primary Warning: Output 2
Plant Mode	Yes	Secondary Warning
On	Yes	Secondary Warning

Failsafe

RIL lamp fault is detected by reading a feedback input while the lamp is turned on. No detection can be performed while the lamp is off. The default state of the lamp during reset is on.

When the lamp is on the feedback input will indicate the state of the lamp as shown below:

Feedback Input	Lamp State
(Battery – (~1V) – 1.8~2.5V) / 4	Lamp operating correctly
Low ('0')	Fault – Open circuit
(Battery – (~1V)) / 4	Fault – Short circuit

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► RIL LED is activated
► The System Fault warning is activated.
► A DTC is logged.

Primary Warning: Airbag Warning

9.3.23.1.4 Output 1: Request On

CHIME

N/A

LCD

Display	Popup with 5 minute timeout. After the popup is instigated, another popup is prohibited for 120s.
Popup and Menu Contents	Airbag System Malfunction Symbol (K.02) & "AIRBAG FAULT"
Warning List Name	AIRBAG FAIL

LED

Symbol	🧑‍🦼
Colour	Yellow
Display/Status	Permanent

General Warning

Details	See General Warning
Colour	Yellow

9.3.23.1.5 Output 2: Plant Mode

CHIME

N/A

LCD

N/A

LED

Symbol	🧑‍🦼
Colour	Yellow
Display/Status	Flash with 5 Hz frequency. Lamp On Time = t FLASH ON = 100 +/- 0.05 milli-second Lamp Off Time between successive On = t FLASH OFF = 100 +/- 0.05 mill-second

General Warning

N/A

Secondary Warning: Fault Handling

CHIME

N/A

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	Airbag System Malfunction Symbol (K.02) & "AIRBAG LAMP FAULT"
Warning List Name	AIRBAG LAMP
Warning List Message	GOTO A FORD DEALER

LED

N/A (LED not working)

General Warning

Details	See General Warning
Colour	Red

9.3.24   Seatbelt Warning

Seatbelt Orion (Front)

9.3.24.1.1 Input

Input	CAN
Source	RCM (0x340)
CAN Data Label	SEATBLT_INDCTR_RQST, SEATBLT_CHIME_RQST

9.3.24.1.2 Output

CAN 1 (0x350)

RSTRNT_SEATBLTWRNCHME_STAT: On/Off as per SEATBLT_CHIME_RQST "On / Off"

CAN 2 (0x350)

SEATBELT_INDCTR_STAT: On/Off as per SEATBLT_INDCTR_RQST "On / Off"

CHIME

Tone sequence	See process section
Duration	Ton = 0.5s
	Toff = 0.5s

LCD

Display	Popup with 5s timeout
Popup and Menu Contents	Seat Belt symbol (K.01) & "FASTEN FRONT SEAT BELT"

LED

Symbol	(Seat Belt symbol K.01)
Colour	Red
Display/Status	Controlled by RCM, see process section

General Warning

N/A

9.3.24.1.3 Process

The belt-minder functionality is performed by the RCM.

The graph below refers to: SOUND (SEATBLT_CHIME_RQST) and LIGHT (SEATBLT_INDCTR_RQST). During Tactive all other popups and chimes are not allowed.

If another warning is active it may delay the popup and skip some chimes. If Toff is longer than 1 second, *Tactive* is assumed to be finished.
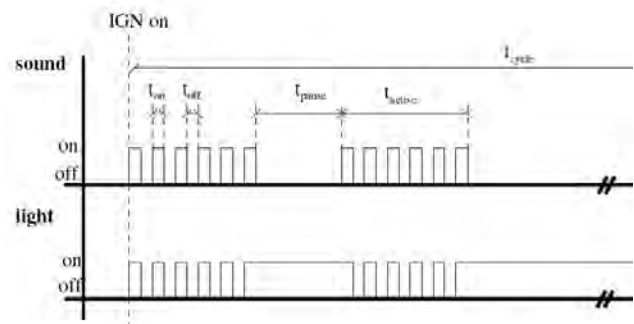
CHIME

This output is only allowed if the SeatbeltChime feature is enabled. It's controlled by SEATBLT_CHIME_RQST (ON / OFF).

LCD

Popup is activated the first time SEATBLT_CHIME_RQST is ON. No acknowledgement allowed.

The popup recurs if *Tpause* is more than 12 seconds.

LED

The LED is controlled by SEATBLT_INDCTR_RQST (ON / OFF).

9.3.24.1.4 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► The Seatbelt LED is turned on.
► The System Fault warning is activated.
► A DTC is logged.

If CAN fail occurs, maintain last LED state until 5s is reached for failsafe action. Popup and chime deactivated together (SEATBLT_CHIME_RQST defaults to OFF).

Seatbelt Minder (Rear) (where fitted)

9.3.24.1.5 Input

Seatbelt Status

Input	CAN
Source	BEM (0x406)
CAN Data Label	SeatbeltStatusRearLeft, SeatbeltStatusRearCentre, SeatbeltStatusRearRight

Driver Door Ajar

Input	CAN
Source	BEM (0x403)
CAN Data Label	RRD_Ajar LRD_Ajar

EEPROM Inputs

Name	Description
Seatbelt Minder Enabled	Enables the rear seatbelt minder warning, i.e. if disabled, functionality is removed from MMI display.
Long Term Rear Belt Minder	The rear seatbelt minder functionality is available but long term disabled, i.e. rear seatbelt functionality is displayed in the MMI as disabled.

9.3.24.1.6 Output

CAN

CAN Output Label   RearBeltminderStatus

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 30s timeout
Popup and Menu Contents	Rear Belts In Use Seatbelt symbol clarifying that it is a rear belt warning and one of the text below depending on input flags. 1) NONE 2) LEFT 3) RIGHT 4) CENTRE 5) LEFT & RIGHT 6) LEFT & CENTRE 7) RIGHT & CENTRE 8) ALL

LED

N/A

General Warning

N/A

9.3.24.1.7 Process

The following process only takes place if both EEPROM inputs are enabled.

1. The driver will be reminded by a text notice on the cluster message centre about the number of used belts.
2. The text message system is displayed at the start of a journey when the following actions occur:
   a) ignition is cycled from Off to On, after more than 30 minutes of ignition off &
   b) rear doors have been opened within 30 minutes of the start of journey &
   c) forward gear is selected &
   d) vehicle motion is greater than 10km/h.
3. Vehicle motion is considered to be engine start & forward motion > 10 km/h.
4. The system is capable of monitoring changes of door status as follows:
   a) If the ignition is turned off the rear door status will continue to be monitored. The status will be stored by the cluster for a maximum of 30 minutes.
5. The system is capable of continually monitoring changes of rear seat belt buckle status from ignition on.
6. If ignition is turned off the rear seat belt usage status will be stored for 30 minutes. Status notice of rear seatbelt usage will be presented if the system is enabled within 30 minutes (ignition is turned on) & a change in status has been detected.
7. A journey is completed when the ignition is off more than 30 minutes.
8. It is possible to acknowledge the text reminder by pressing the "ENTER"-button on the cluster.
9. Text notice is displayed on the message centre to remind the driver about the number of used seatbelts in rear seat according to the LCD table in the output section.
10. The driver must make the decision if an occupant is unbelted or not. Occupants are not detected.
11. Increased use of belts during forward motion is considered as belted passengers. Decreased use of belts is considered as unbelted passengers.
12. If the rear doors are operated while ignition is on, it is considered that an occupant could have entered the rear seat.
13. After the text message has been on for a minimum of 30 seconds the reminder will self cancel.

Short Term Disable Process

The short term disabled is chosen (enabled/disabled) via the sub-content menu in the MMI. Once it is disabled there are two ways of re-enabling it:

► Enabled via the MMI sub-content menu, or
► The ignition is turned off for more than 30 minutes.

CAN Output

Outputs the status of the permanent rear seat belt minder flag i.e. permanent enabled or disabled. This information is stored in the EEPROM (EEPROM_ RearbeltEnabled).

Popup and Chime Behaviour

The chime is only activated when a rear belt popup is not already active.

Every change in the rear belt input signals while the popup is activate will cause:

► the popup timeout to be reset
► the chime is not retriggered
► the popup reflects the change in buckle status

9.3.24.1.8 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signals are considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.25 Security

This indicates the status of the security system. It can be requested by peripheral modules or internal to the IC.

Internal Security

9.3.25.1.1 Input

Input	Internal

9.3.25.1.2 Output

CHIME

N/A

LCD

N/A

LED

Symbol	Security Symbol (L.07)
Colour	Red
Display/Status	See process section.

General Warning

N/A

9.3.25.1.3 Process

Ignition	Action
OFF	LED flash, 100ms on every 3s: Within 15 seconds of the ignition being switched off, this warning is activated until the ignition is turned on.
ON	LED on for 3 seconds when the ignition is first switched on.

Smart Shield Request

9.3.25.1.4 Input

Input	CAN
Source	BEM (0x403)
CAN Data Label	SmartShieldLED_Request

9.3.25.1.5 Output

CHIME

N/A

LCD

Display	Popup with 30s timeout
Popup and Menu Contents	Security Symbol (L.07) & "KEY IN IGNITION"

LED

N/A

General Warning

N/A

9.3.25.1.6 Process

When SmartShieldLED_Request is set, warning is active. (IGN off and key in IGN)

9.3.25.1.7 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

Immobilisation Lamp

9.3.25.1.8 Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	ImmobLamp

9.3.25.1.9 Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5s timeout
Popup and Menu Contents	Security Symbol (L.07) & "VEHICLE IMMOBILISED"
Warning List Name	IMMOBILISED

LED

N/A

General Warning

Details	See General Warning
Colour	Red

9.3.25.1.10 Process

When ImmobLamp is set to 'on', warning is active.

9.3.25.1.11 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.26 Sonar Parking Disabled (where fitted)

Input

Sonar Disabled

Input	CAN
Source	PAM (0x360)
CAN Data Label	ParkInhibited, ParkDisturbed, ParkDisabled

Transmission Gear Position Input

Input	CAN
Source	PCM (0x230)
CAN Data Label	TransGearPosition_HS
Description	Indicates the current gear position of the vehicle

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 30s timeout
Popup and Menu Contents	P⏸⚠ Parking Aid (J.11) & "RSS INACTIVE"
Warning List Name	RSS INACTIVE

LED

N/A

General Warning

Details	See General Warning
Colour	Yellow

LCD & Chime:

The warning is activated if all of the following conditions are met:

1. EEPROM_RSS is enabled
2. Vehicle not cranking (CrankStatusPCM_HS, see section 9.4)
3. ParkFailed is not set
4. any of the sonar park disabled CAN signals are active
5. transmission gear position is in reverse for at least 600ms
6. either:
   - is the first warning activation after ignition on, or
   - it has been 5 minutes since the last warning activation.

Item 6 is reset if all of the sonar park disabled CAN signals are inactive at the same time.

General Warning & warning list entry:

It is turned on when the popup warning is activated and stays on until:

   - ignition off, or
   - all of the sonar park disabled CAN signals are inactive at the same time

Failsafe

Failsafe is only applicable if:

► EEPROM_RSS is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

► This warning is activated (no chime).
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.27 Sonar Parking Fault (where fitted)

Input

Input	CAN
Source	PAM (0x360)
CAN Data Label	ParkFailed

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	**P》△** Parking Aid (J.11) & "RSS FAULT"
Warning List Name	RSS FAULT

LED

N/A

General Warning

Details	See General Warning
Colour	Yellow

Process

This warning is only active when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- EEPROM_RSS is enabled, and
- ParkFailed is set, warning is active.

Failsafe

Failsafe is only applicable if:

► EEPROM_RSS is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

If the CAN message is missing for more than 5 seconds (not received or error in message):

► This warning is activated (no chime).
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.28 System Fault Warning

9.3.28.1 Input

CAN Communication Failure Input

Input Type	CAN
Source	<u>MS-CAN:</u> 0x2E6, 0x2F2, 0x2F9, 0x307, 0x309, 0x30D, 0x360, 0x403, 0x406 <u>HS-CAN:</u> 0x207, 0x210, 0x230, 0x340, 0x425, 0x427, 0x44D, 0x640

DTC Logging Enabled

Input Type	CAN
Source	PCM (0x427)
CAN Data Label	DTC_Logging_HS

9.3.28.2 Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	⚠ Safety Alert Symbol (Z.903) & "SYSTEM COMMS FAULT"
Warning List Name	COMMS FAIL
Warning List Message	Seek Ford dealer assistance

LED

N/A

General Warning

Details	See General Warning
Colour	Red

9.3.28.3 Process

When any of the listed CAN messages are not received for 5 seconds (after VECTOR timeout, which is different for each message) and the DTC_Logging_ HS signal is set, this warning is activated.

9.3.28.4 Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► DTC_Logging_HS CAN signal is considered to be set.
► The <u>System Fault warning</u> is activated.

For the first 5 seconds of missing the DTC_Logging_HS signal, maintain last signal value until 5s is reached for failsafe action.

9.3.29 Traction Control (where fitted)

This warning illuminates to indicate the TC status.

TCS On/Off Status

9.3.29.1.1 Input

Input	CAN
Source	TCS (0x210)
CAN Data Label	TCS_DisabledByUser

9.3.29.1.2 Output 1

CHIME

N/A

LCD

Display	Popup with 2s timeout
Popup and Menu Contents	& " TRACTION CONTROL ON"

LED

N/A

General Warning

N/A

9.3.29.1.3 Output 2

CHIME

N/A

LCD

Display	Popup with 2s timeout
Popup and Menu Contents	& " TRACTION CONTROL OFF"

LED

Symbol	
Colour	Yellow
Display/Status	Permanent

General Warning

N/A

9.3.29.1.4 Process

EEPROM_TCS	TCS_DisabledByUser State	Output
Enabled	NO	Output 1 only if transition from YES to NO
Enabled	YES	Output 2
Disabled	-	No output

The process of this warning is affected by the vehicle cranking signal (CrankStatusPCM_HS, see section 9.4).

9.3.29.1.5 Failsafe

Failsafe is only applicable if:

► EEPROM_TCS is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

<u>Based on the above:</u>

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► The TCS LED is turned on.
► The <u>System Fault warning</u> is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

TCS Event

9.3.29.1.6 Input

Input	CAN
Source	TCS (0x210)
CAN Data Label	TCS_Event

9.3.29.1.7 Output

CHIME

N/A

LCD

N/A

LED

Symbol	⚙️
Colour	Yellow
Display/Status	Indicator flashes at a rate of 2 ± 1 Hz at 50 ± 5% duty cycle for the duration of the event.

General Warning

N/A

9.3.29.1.8 Process

This warning is only active when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- EEPROM_TCS is enabled, and
- TCS_Event is set, warning is active.

9.3.29.1.9 Failsafe

Failsafe is only applicable if:

► EEPROM_TCS is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► The TCS LED is turned on.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

TCS Fault

9.3.29.1.10 Input

Input	CAN
Source	TCS (0x210)
CAN Data Label	TCS_Failed

9.3.29.1.11 Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with a 5 minute timeout
Popup and Menu Contents	⚙️ & "TRACTION CONTROL FAULT"
Warning List Name	TCS FAIL

LED

Symbol	⚙️
Colour	Yellow
Display/Status	Permanent

General Warning

N/A

9.3.29.1.12 Process

This warning is only active when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- EEPROM_TCS is enabled, and
- TCS_Failed is set, warning is active.

9.3.29.1.13 Failsafe

Failsafe is only applicable if:

► EEPROM_TCS is enabled, and
► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► The TCS LED is turned on.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.30 Transmission Fail Warning

This warning illuminates to indicate that the automatic transmission has a fault.

Input

Input	CAN
Source	PCM (0x230)
CAN Data Label	TransFault

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	⚙️Transmission symbol (H.05) & "TRANSMISSION FAULT"
Warning List Name	TRANS FAIL

LED

N/A

General Warning

Details	See General Warning
Colour	Yellow

Process

This warning is only active when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- TransFault is set, warning is active.

Failsafe

Failsafe is only applicable if:

► Vehicle not cranking (CrankStatusPCM_HS, see section 9.4).

Based on the above:

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.31 Transmission Not In Park Warning

Input

Transmission Not In Park

Input Type	Hardwired
Connector	20-Pin
Pin Number	20

Driver Door Ajar

Input Type	CAN
Source	BEM (0x403)
CAN Data Label	RFD_Ajar

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 15 minute timeout if ignition is off and transmission not in park
Popup and Menu Contents	**P** Park symbol (H.01) & "TRANSMISSION NOT IN PARK"

LED

N/A

General Warning

Details	See General Warning
Colour	Red

Process

This warning can only be activated if ManualTrans is not set.

Conditions:

► Driver door ajar flag is set
► Ignition off
► If the driver door ajar flag is set with ignition off then start 12 minute timer. If the hardwired input is not in park (see tables below) during this time the warning is active. The warning must stop at the end of the time and no further activation occurs until a key cycle or driver door ajar flag reset.

Transmission input for column-shift variants:

Resistor (ohms)	Gear Position
0	PARK
>0	OTHER

Transmission input for non column-shift variants:

Resistor (ohms)	Gear Position
422	PARK
1800	DRIVE
OPEN	OTHER

If ManualTrans is configured then diagnostics PID always reads gear position as OTHER.

Below 9.0 volts DRIVE detect state PID always reads as OTHER. In power fail PID always reads as OTHER.

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action. If CAN signal is never received, assume it is inactive

9.3.32 Transmission Overheat Warning

Input

Input	CAN
Source	PCM (0x230)
CAN Data Label	TransOverheat

Output

CHIME

This warning uses the General Warning Chime.

LCD

Display	Popup with 5 minute timeout
Popup and Menu Contents	Transmission temperature symbol (H.07) & "TRANSMISSION OVERHEAT"
Warning List Name	TRANS TEMP

LED

N/A

General Warning

Details	See General Warning
Colour	Yellow

Process

This warning is only active when:

- Vehicle not cranking (CrankStatusPCM_HS, see section 9.4), and
- TransOverheat is set, warning is active.

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message):

► Input CAN signal is considered to be inactive.
► The System Fault warning is activated.
► A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.33 Transmission Shift Alarm (where fitted)

Input

Input	CAN
Source	PCM (0x207)
CAN Data Label	Engine_RPM_HS

Output

CHIME

Tone sequence	10 beeps
Duration	50ms on and 25ms off, repeat 10 times

LCD

N/A

LED

N/A

General Warning

N/A

Process

If EEPROM_RPM is set to ON then this warning is available.

An audible chime for maximum vehicle performance will be sounded when a preset RPM threshold is reached. A hysteresis offset is included to stop it from faults re-triggering. These parameters - RPM threshold and hysteresis offset, plus number of chimes is EEPROM configurable.

At the SVDO plant, the clusters will have the EEPROM preset with the following values:

EEPROM Label	Default Value for V8	Default Value for I6T	Others
EEPROM_RPM	Enabled	Enabled	Disabled
EEPROM_RPMThreshold	6250 RPM	6000 RPM	0
EEPROM_RPMChimes	10	10	0
EEPROM_RPMHysteresis	200 RPM	200 RPM	0

Failsafe

If the CAN message is missing for more than 5 seconds (not received or error in message) or EEPROM corruption:

►   Input CAN signal is considered to be inactive.
►   The shift alarm functionality is disabled.
►   The <u>System Fault warning</u> is activated.
►   A DTC is logged.

If CAN signal is active (warning is on) and CAN fail occurs, maintain last signal value until 5s is reached for failsafe action.

9.3.34 Performance Mode Warning

9.3.34.1 Input

Transmission Mode Input

Input	CAN
Source	PCM (0x230)
CAN Data Label	TransMode

9.3.34.2 Output

CHIME

N/A

LCD

Display	Popup with 2 second timeout
Popup and Menu Contents	"PERFORMANCE MODE" in the symbol section

LED

N/A

General Warning

N/A

9.3.34.3 Process

When TransMode input is in "performance" this warning is activated. See section 11 for more information

9.3.35   Rest Reminder Warning

9.3.35.1 Input

Input	Internal

9.3.35.2 Output

CHIME

This warning uses the <u>General Warning Chime</u>.

LCD

Display	Popup with 10 seconds timeout
Popup and Menu Contents	ℹ️ Information (N.910) & "REST REMINDER xx HRS" xx = number of hours set via MMI

LED

N/A

General Warning

N/A

9.3.35.3 Process

See rest reminder section 20.

9.4   Crank Status Warning Prevention

9.4.1   Input

Crank Status

Input Type	CAN
Source	PCM (0x200)
CAN Data Label	CrankStatusPCM_HS

9.4.2   Process

The CrankStatusPCM_HS signal indicates the crank status.

CrankStatus PCM_HS	Description	Warnings Behaviour*
"NoAction" for 2 seconds	Vehicle is not cranking	Work normally
Any other state	Vehicle is cranking	► Warning last input signal is maintained (even if CAN msg is missing).
		► Warning failsafe is not applicable. ► System Fault warning is not triggered due to this warning.
Failsafe (see next section)	Vehicle is not cranking	Work normally

* Refers to the behaviour of each individual warning that uses the CrankStatusPCM_HS as part of its process.

These conditions apply to all the following warnings:

►   HS – 0x210 ABS_TC_VDC – all signals
►   HS – 0x230 PCM – all signals
►   MS – 0x360 PAM – all signals

9.4.3   Failsafe

If the 0x200 CAN message is missing (or errors) for more than 5 seconds, maintain last signal value for the first 5 seconds and then:

►   Assume CrankStatusPCM_HS is in "NoAction" state, vehicle is not cranking.
►   The <u>System Fault warning</u> is activated.

10. Trip Functions

The instrument cluster calculates trip functions for:

► Average Economy
► Average Speed
► Distance to Destination
► Fuel Used
► Instantaneous Economy
► Overspeed
► Range
► Trip Time

10.1 Average Economy

10.1.1 Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	ODO_Count

Input	CAN
Source	PCM (0x427)
CAN Data Label	FuelPulse

10.1.2 Process

The instrument cluster calculates the current average economy in litres/100km

10.1.3 Failsafe

If CAN missing message or invalid data for more than 5 seconds, the last valid calculated value is held.

10.2 Average Speed

10.2.1 Input

Input	CAN
Source	PCM (0x207)
CAN Data Label	Engine_RPM_HS

Input	CAN
Source	PCM (0x427)
CAN Data Label	ODO_Count

10.2.2 Process

The instrument cluster calculates the current average speed in km/hr

Following a reset, until 30 seconds has elapsed and 200 metres is travelled, the instantaneous speed is displayed. It will not continue calculating if the tachometer value is less than 350 RPM.

10.2.3 Failsafe

If the odometer CAN message is missing or has invalid data for more than 5 seconds, the last valid calculated value is held.

10.3 Distance to Destination

10.3.1 Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	ODO_Count

10.3.2 Process

It's a programmable km value set prior to the start of a trip. This value is decremented according to the odometer data. When the destination is reached the value 0 is held in the display until a new destination is entered.

10.3.3 Failsafe

If CAN missing message or invalid data for more than 5 seconds, the last valid calculated value is held.

10.4 Fuel Used

10.4.1 Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	FuelPulse

10.4.2 Process

Actual fuel used since the last reset. Calculate the total fuel used according to the fuel pulses received from the PCM module via CAN.

10.4.3 Failsafe

If CAN missing message or invalid data for more than 5 seconds, the last valid calculated value is held.

10.5 Instantaneous Economy

10.5.1 Input

Input	CAN
Source	PCM (0x425)
CAN Data Label	InstantEconomyMode
Description	Instantaneous economy mode (L/100km or L/hr)

Input	CAN
Source	PCM (0x425)
CAN Data Label	InstantEconomy
Description	Instantaneous economy value

10.5.2 Process

The instantaneous economy is calculated in the PCM. The IC receives the instantaneous economy value via CAN every 100ms. The value received will be clipped at 99.9L/100km at the cluster display.

10.5.3 Failsafe

If CAN missing message or invalid data for more than 5 seconds, dashes are displayed on the LCD.

10.6 Overspeed

The overspeed function is accessed via the Overspeed menu item. When the overspeed function is activated, the overspeed threshold is displayed in the large middle display area of the LCD and the Ⓢ symbol is displayed permanently in the static warnings display area.

If the overspeed function is deactivated, 'OFF' is displayed, in place of the overspeed threshold value and the Ⓢ symbol is turned off.

If the overspeed function has been activated and the indicated speed is greater than the overspeed value, then the overspeed warning is activated. There is a hysteresis value of 2Km so that the overspeed warning will not be deactivated until the indicated speed is at least 2Km km/hr less than the overspeed threshold. This value is configurable.

See the Overspeed Warning section.

Upon an ignition cycle, the previous overspeed value and the On/Off mode will be retained. A minimum overspeed value of 40Km/hr is accepted.

10.7 Range

10.7.1 Input

Input	CAN
Source	PCM (0x427)
CAN Data Label	ODO_Count

Input	CAN
Source	PCM (0x427)
CAN Data Label	FuelPulse

10.7.2 Process

Unlike other indications on the instrument cluster, Range is not a measurement but a prediction of the distance that the car will travel before running out of fuel. It is calculated from the measured level of fuel in the fuel tank and an economy value based on the historical driving patterns of the vehicle.

When the ignition is first turned on, the range value will not be displayed until completion of the ignition on fuel calculations. This can take up to 10 seconds (display dashes on the LCD during this time).

During an ignition on refill detected, the range will change synchronously with the fuel gauge.

For low range warning see the Low Fuel Warning section.

10.7.3 Failsafe

If CAN missing message or invalid data for more than 5 seconds, the last valid calculated value is held.

10.8 Travel Time

10.8.1 Input

Input	CAN
Source	PCM (0x207)
CAN Data Label	Engine_RPM_HS

10.8.2 Process

The travel time is the total travel time since the last reset. It will not increment if the tachometer value is less than 350 RPM. A maximum time of 999 hours and 59 minutes is available. Once the maximum time is reached, it rolls back to zero.

10.8.3 Failsafe

If CAN missing message or invalid data for more than 5 seconds, continue calculating time.

11. Performance and Adaptive

Floor shift Performance   Column shift Performance
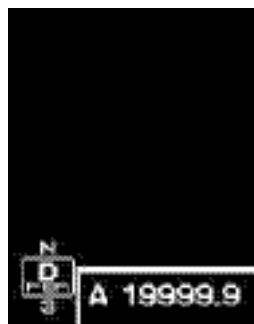
11.1   Input

Transmission Mode Input

Input	CAN
Source	PCM (0x230)
CAN Data Label	TransMode
Description	Indicates the gear status: adaptive or performance

Transmission Gear Position Input

Input	CAN
Source	PCM (0x230)
CAN Data Label	TransGearPosition_HS
Description	Indicates the current gear position of the vehicle

Manual Transmission Input

Input	CAN
Source	PCM (0x640)
CAN Data Label	ManualTrans
Description	Removes the PRNDL display if it is a manual transmission

11.2   Output

11.2.1   Non-column Shift Transmission Variants

Permanent display of the PRND123456 on the bottom left box of the LCD and popups according to the table below:

Transmission Mode Input	Main Display
Performance	"Performance" message popup with 2s timeout
Any other state	Display only PRNDL "123456" and remove 2s popup above if active

11.2.2   Column Shift Transmission Variants

Permanent display of three transmission states "PRND321" maintaining relative position to each other is displayed in the bottom left box of the LCD. Highlight is the current state:
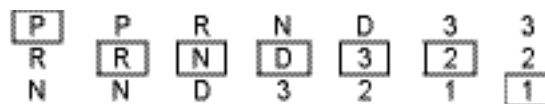
Transmission Mode Input	Display
Performance	Permanent "PERF", adjacent to the PRNDL display
Any other state	No special message

11.2.3   Manual Transmission

For these variants no PRNDL is displayed.

11.3   Failsafe

If CAN message 0x230 from PCM is missing or invalid data for more than 5 seconds, do not display the PRNDL or popups, and the System Fault warning is activated.

If CAN message is missing for ManualTrans, revert to automatic mode.

12. Police mode

Police mode is configurable using the Ford diagnostic tool and when activated will display POLICE after a battery reset. Digital Instantaneous Speed (DIS) will be the default on the LCD after a battery connection.

12.1   Speedometer

The speedometer is calibrated to nominally indicate a 2 km/hr offset more than the road speed. When Police mode is activated, the speedometer gauge has no offset to indicate the actual road speed. The normal tolerance of the speedometer will be maintained. The offset is a configurable value (see Odometer section).

12.2   Digital Speed Capture

Instantaneous vehicle speed is displayed in the large middle display area of the LCD with a title indicating that the DIS (digital instantaneous speed) is being displayed.

When the instantaneous vehicle speed is being displayed, a short press (i.e. less than 5 seconds) on the 'SEL' button will capture the current DIS, the current DIS displayed will be frozen and 'SC' will be displayed on the left of it. The speaker will beep once to acknowledge speed capture mode being instigated.

Instantaneous speed mode will be resumed if the 'SEL' button is pressed for more than 1.5 seconds. The speaker will beep twice to indicate that instantaneous speed mode is resumed.

12.3   Ford Diagnostic function

The Police mode selection is contained in EEPROM and can be enabled and disabled using a diagnostics command. A diagnostic command will calibrate the speedometer over the range of ±10%.

12.4   Police Mode Display

When the police mode is active, "POLICE" is displayed as part of the welcome screen.

13. Lane Change Turn Signal

Convenience flash mode consists of 3 on/off cycles on the indicator turn signal output when the switch is momentarily activated. This mode can be enabled/disabled by the user via the LCD menu: the default setting for this option after reset is active.

Turn Signal Switch Activation Mode	Activation Time (sec)	Activated By	Turn Signal Flash Mode
Momentary activate of LH or RH turn.	< 0.8	Release	Initiate 3 flash convenience mode.
Push & hold of LH or RH turn.	>= 0.8	Time	Initiate continuous flash mode until automatic cancel or switch lever is released. Synch cancel with flash timer.
LH and RH turn have been momentarily activated within close proximity of each other.	< 0.5	Time	Cancel convenience flash immediately without initiating the new indicator.
	>= 0.5	Time	Cancel indicator will operate as push and hold (above). Convenience mode will not be activated.

Login Tracking Code

14. Message Centre Display

14.1   MFD Screen Configuration

LCD is partitioned into 2 regions.

- Region 1 lower portion of display. Approx. 1/3 of display: ODO / Trip ODO
- Region 2 Upper region of display: Approx. 2/3 of display: Warnings/General information

14.1.1 Window Configuration

The contents of the LCD screen are arranged in windows. These windows in turn are arranged in one of the following configurations at any one time. They are as follows.

i.   Default screen
ii.   Menu screen
iii. Option screen
iv.   Popup screen
v.   Warning List Message screen

The display is partitioned into 2 regions.

- Region 1 lower portion of display. Approx. 1/3 of display: ODO / Trip ODO
- Region 2 Upper region of display: Approx. 2/3 of display: Warnings/General information

Default screen
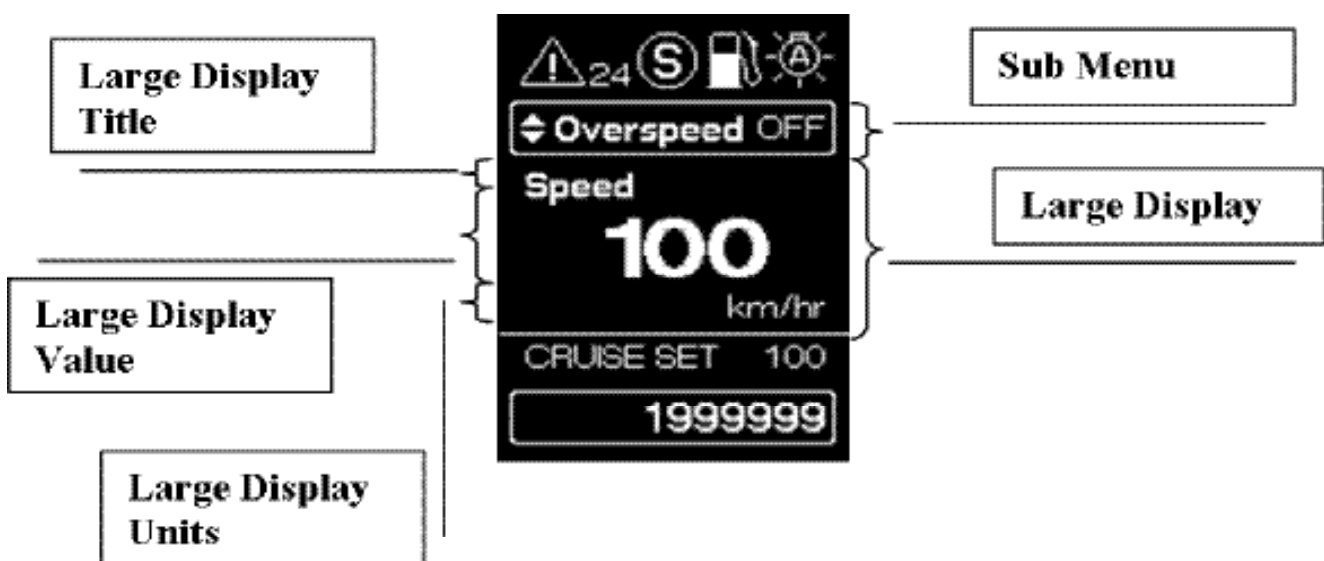
SUBMENU

The sub menu consists of the following items:

Speed.	Current vehicle speed
Overspeed	Displays Overspeed setting in km/hr or OFF
Range	Displays distance the car will travel before running out of fuel. This is a prediction based on previous driving style and is therefore to be taken only as an estimate
Fuel used	Displays the amount of fuel used since the last reset
Avg Fuel Econ	Displays the average economy since the last reset
Inst Fuel Econ	Displays the instantaneous economy
Average speed	Displays the average speed travelled since the last reset
Travel Time	Displays the travel time since the last reset. Only increments while the engine is running
Audio	Displays the current audio media as well as station, disc, track and folder information when available
Digital Speed Capture	In Police mode captures and displays the instantaneous speed when SEL is pressed

The submenu display is changed by pressing the up or down buttons. Pressing the SEL button brings the submenu item into the main menu and returns the main menu item into the submenu in its designated position.

LARGE DISPLAY

The "Large Display" displays the same information as the submenu but generally with more detail including display units or audio information.

CRUISE

The Cruise and Cruise Set are text messages situated above the ODO window and below the large display data. When cruise is active the target speed is displayed for all variants except the column shift.

WARNINGS

Static warnings are located at the top of the display and include the following:

General Warning

The general warning is situated in the top left corner and also shows the number of warnings active.

Overspeed

The overspeed warning is situated at the top middle-left and is displayed only when active.

Low Fuel Warning

Low fuel warning is situated at the top middle-right. This warning is displayed when range is 80km or less

Park Lamps On

Park Lamps On warning is situated at the top right and is displayed if the lamps are on

Auto Head Lamps

Auto head lamps warning is situated at the top right and is displayed if the lamp switch is in auto position

Pop-Up Warnings

Popup warnings are listed in section 9.2

i. In the event that more than one 'popup with press to clear' occurs, the highest priority warning will be displayed with corresponding chimes. When cleared by acknowledge, the display will change to the next highest priority with the corresponding chime.

ii. If a higher priority popup occurs while a lower priority popup is displayed, the higher priority will interrupt after the lower priority chime is completed.

iii. Unacknowledged 'press to clear' warnings will timeout.

Menu Screen

Pressing the MENU button brings up a list of items. Use the up and down arrows to toggle through. Pressing SEL moves that item into the main screen and allows for adjusting or setting of that feature.

Set Dimming	Adjusts the intensity of the dial and display illumination. There are separate settings for day and night.
Set Overspeed	Press or press and hold up and down arrows to select the desired speed. Pressing SEL turns Overspeed On or Off.
Reset All	Press SEL puts all screen settings to the Factory default.
Set Dist to Dest	Press or press and hold up and down arrows to select the desired distance. The distance will then decrement as you travel. Press and hold SEL to reset distance to zero.
Reset All Trip	Press up and down to move through trip functions. Press SEL to reset the selected function.
Warnings	Displays a list of the current warnings. Press up and down to select desired warning. Some warnings allow a Press of SEL to alert the driver of the next steps to follow.
Settings	Press up and down to move through settings. Press SEL on the currently highlighted setting to adjust or turned On or Off.
Sub Content	Press up and down to move through sub content list. Press SEL on the currently highlighted item to enable or disable that item in the sub menu.

14.2 Ignition off Behaviour

14.2.1 Appearance

Park Lamps On static warning and the ODO/Trip areas are the only active ones in Ignition Off mode.

14.2.2 Wake Up

The following events turn the LCD display on.

Event	Screen Displayed
Transmission not in park	Popup
Park lights on	Popup
Door ajar	Ignition off
Security: Smart shield request	Popup
ODO button press	Ignition off

14.2.3 Pop-Up Warnings

The following pop-up warnings are available while the cluster is in ignition off state.

i.   Transmission not in park
ii.   Park lights on
iii.   Security: Smart shield request

14.2.4 Static Warnings

The only static warning that can be on while ignition is off is the Park Lamps On warning.

15. Dimming

Dimming of the vehicle interior is controlled through the instrument cluster which in turn is controlled by the daylight sensor when the park lamp switch is in ON or AUTO position. The daylight sensor and the instrument cluster operating state determines if the illumination is to be on or off and the instrument cluster sets the illumination intensity for each mode.

15.1   Input

Illumination Mode (Day/Night)

Input	CAN
Source	BEM (0x403)
CAN Data Label	IllumMode

Illumination Request

Input	CAN
Source	FDM (0x307)
CAN Data Label	IllumBatsaverRequest_MS

Park Lamps

Input Type	Hardwired
Source	Switch

Autohead Lamps

Input Type	Hardwired
Source	Switch

Ignition

Input Type	Hardwired
Source	Switch

15.2   External Dimming

The specification for the switches dimming output is –

Parameter	Specification
Maximum Output Power	25 W
Frequency	122 Hz
Driver	Low Side
Dimming	PWM

15.3   CAN/HW Output

Switch and display illumination level is transmitted:

Data Label	Output	Description
IllumLevelDisplay	CAN	External LCD illumination. Cluster will provide one set of day time (DAY) and one set of night time (NIGHT) dimming parameters for Ext Display illumination.
IllumLevelSwitches	CAN	External switch illumination.
See section	CAN	Auto headlamps and park lamps state.
Switch illumination level	HW	External switch illumination.

15.4   Failsafe

If the CAN message is missing for more than 5 seconds, the IllumMode CAN signal defaults to night mode.

16. Personalisation: Priority Key Function

The instrument cluster will remember the current settings when the vehicle is locked with a remote key. The settings stored when locked will be re-instated when the vehicle is unlocked with the same remote key. The Instrument cluster will store 2 remote key settings and a default setting for when the vehicle is locked or unlocked with a key.

16.1   Input

Input	CAN
Source	RCM (0x403)
CAN Data Label	Priority_key_1 and Priority_key_2

The cluster will remember and load settings depending on the FOB used. Configurable settings are:

Configurable Setting	Default Values
MDC display settings (i.e. menu configuration)	All sub content items are enabled
Illumination dimming levels (all vehicle)	
Overspeed settings	OFF at 40km/hr

16.2   Failsafe

If CAN message is missing or invalid data for more than 5 seconds use/maintain the value of the last Priority_key_n, i.e. 1, 2 or default.

17. Wakeup Specifications

17.1   Input

Right Front Door Locked

Input Type	CAN
Source	BEM (403)
CAN Data Label	RFD_Locked

17.2   Process

This section explains the wakeup strategy of the cluster. The table below shows the states that the cluster can be in and what hardware is enabled during each state. The warnings column lists the warning functionality that is available during that state. Before the cluster moves into state S1 from ignition on, it should stay awake in S3 for 1 minute (unless the car is locked).

Cluster states description

State	IGN	MS-CAN	HS-CAN	LCD	Warnings
S1	OFF				Security flashing
S2	OFF	√			Hazard Lights
					High beam
S3	OFF	√		√	Transmission not in park
					Park lights on
					Security: Smart Shield Request
					Hazard Lights
					High beam
S4	ON	√	√	√	All except security flash

The cluster enters different states depending on the wakeup inputs outlined in the table below. For instance, a hazard lights request triggers the cluster to enter S2. The higher states support the functions of lower states.

State transition inputs

State	IGN ON	Security		Hazard Lights	High Beam	Transmission not in park	Park Lights On	Door Ajar	Trip Button
		Flash	Req						
S1		√							
S2				√	√				
S3			√			√	√	√	√
S4	√								

The table below outlines the action the IC takes when a wakeup input is activated.

Wakeup Input	Action Description
Security flashing Security: Smart Shield Request	See Security Warning section
Hazard Lights: ► Hazard Warning ► Hazard Lights Request	See Hazard Lights Warning section
High Beam	See High Beam section
Transmission not in park	See Transmission Not in Park Warning section
Park Lights On	See Park Lights On section
Door Ajar	► With ignition off and the right front door ajar, IC displays the ignition off screen for 1 minute. Every right front door ajar resets the timer. Car lock turns off the LCD regardless of the time remaining for display on. ► Monitors rear door ajar for rear seatbelt minder function.
Trip Button	► Displays ignition off screen for 1 minute from button release. ► Scrolls through odometer, trip A and trip B. ► Car lock turns off the LCD regardless of the time remaining for display on. ► ODO is the default display. ► On wakeup the welcome screen is not displayed. ► On ignition on the ODO/TRIP display reverts to what was displayed before ignition off.

The welcome screen will be displayed only in the ignition off to on transition. It will not be displayed following an ignition off wakeup before displaying the ignition off screen.

18. Prove-out Specifications

The following lamps are turned on at ignition on for 3 ± 1 seconds:

►   General Warning LED (illuminate yellow for 1.5 seconds and red for 1.5 seconds)
►   ABS
►   Alternator
►   Brake
►   MIL
►   Security

The RIL LED indicator is turned on for 6 seconds and then off for 2 seconds when the ignition is first turned on. During this time, the Instrument Cluster will monitor the hardware to check for faults. If fault is detected log a DTC.

The seatbelt prove-out is defined in the seatbelt section. The Orion seatbelt prove-out is controlled externally, while the territory seatbelt prove-out is performed internally.

No popups and chimes are allowed during the short prove-out (3s) and the welcome screen is to be displayed during this time. LED-activation operate as normal.

19. Passive Anti-Theft System

The Instrument Cluster forms part of the vehicle security system and must be trained to the vehicle to enable the vehicle to run. Replacing the Cluster in the vehicle will cause the vehicle to be immobilised (popup warning and telltale on) and will require a PATS re-train of the vehicle.

Note: If BEM is replaced or key re-programming is performed then a Cluster re-train is required.

Process of re-training is as follows:

•   Connect IDS
•   Identify vehicle
•   Go to tool box tab, select BODY – SECURITY - PATS FUNCTION. Follow procedure
•   Select PCM / IC Parameter reset. Follow procedure
•   When requested access G Sevin website and follow process
•   If after completion of PCM / IC reset you do not hear the door locks cycle then turn Ignition key OFF then ON. Verify that the immobilisation jewel is not lit.
•   Vehicle should now be trained
•   If the process is unsuccessful re-perform the PCM / IC parameter reset

20. Rest Reminder Specifications

The rest reminder is configurable with the following options:

► 2 hours
► 3 hours
► 4 hours
► OFF

The default time after reset is 2 hours.

Every ignition cycle the timer is reset. When rest reminder is on and the required time is reached a popup is activated. Time is only increased when the engine is running.

Login Tracking Code

DIAGNOSIS AND TESTING

Instrument Cluster

Inspection and Verification

A visual inspection of the vehicle cluster unit and various electrical connections should be made prior to any detailed tests are performed.

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical or electrical damage.
   • Ensure that battery terminal connection is well made. If loose / corroded, clean and re-tighten.
   • Check general condition of cluster. Look for any physical signs of damage that might be cause of cluster problem.
   • Check condition of cluster related fuses.

Visual Inspection Chart

Mechanical	Electrical
* Damaged engine oil filter	* Fuse(s)
* Low engine oil level	* Central junction box (CJB) fuse F27 (10A)
* Engine coolant level	* CJB fuse F29 (10A)
* Damaged coolant thermostat	* Circuit
* Brake fluid level	* LED(s)
* Door adjustment	* Wiring harness
* Damaged transmission Park switch	* Loose or corroded connector(s)
	* Damaged instrument cluster

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4. Verify the following systems are working correctly by operating the system.

   • Charging
   • Fuel
   • Cooling
   • Turn signals
   • Headlamps
   • Transmission gear position

The continuous trouble codes should then be checked by using the IDS unit. See DTC list for explanation on codes that the cluster may return. Upon checking for previously set codes, the Self-Test diagnostic Mode should be entered.

Self Tests

Diagnostic Self Test Mode

The Diagnostics self test provides an automated means of testing the cluster functionality, allowing the operator to check for correct operation in one easy sequence. Faults detected by the cluster will be recorded in the form of DTC's, as detailed in the DTC section. It is important that for the duration of the test, the ignition is in the ON position, the Park Lamps are activated and that none of the buttons on the cluster are pressed. Prior to executing the self test, set continuous DTC's should be checked for and cleared. See DTC list for explanation on codes that the cluster may return.

Note: When entering Diagnostic mode Cluster warnings may be activated. This is not a fault condition.

1. To enter the instrument cluster self diagnostic mode, ensure that the Battery voltage is greater than 10 volts, then place the ignition in the ON position and select the Self test option on the IDS.
2. The self-test is deactivated after 5 seconds has elapsed. During the self test, the ignition should be in the ON position.

Any returned trouble codes should then be checked for using the IDS unit. Refer to the DTC list for further actions.

Tests performed during the self test (Duration 5 seconds).

Test Performed On:	Test Description
Cluster LCD, dial, External switch and LCD Illumination	All Illumination Initiates to Off. Illumination values are then progressively raised until the maximum value is reached. It cycles a Dot Matrix test pattern which includes all segments off, all on, chessboard display and inverted chessboard display NOTE: May not be noticeable in daylight conditions.
Speedometer, Tachometer, Temperature and Fuel gauge	All Gauges initiate to minimum values. They are then swept to their full scale deflection and back to minimum again.
Warning LEDs	All warning LEDs are set to be Off. Each warning LED is then activated one at a time, in a clockwise fashion. Left and Right indicators are turned on then off
Buzzer	Buzzer sweep cycle is sounded.

See DTC List for further details and information regarding DTC's.

Module Configuration

All new instrument clusters are defaulted with the following information:

* Odometer set to 0km
* Sedan petrol fuel map
* Police mode inc. Offset disabled
* Traction control fitted
* DSC enabled
* RPM shift alarm off
* Rear Belt minder disabled
* Long Term Rear Belt minder enabled
* Column Shift Auto not fitted
* Reverse Sensing system (RSS) disabled
* Seatbelt audible reminder enabled

The instrument cluster is a programmable module, which must be configured via the IDS. The IDS is used to select appropriate data for the vehicle i.e., if the cluster is replaced or any cluster options are to be modified.

Data Extraction from existing Cluster:

If a cluster is to be replaced with a new unit, depending on the condition of the existing cluster, the configuration data is read from the existing cluster and written to the new replacement cluster.

* Place key in the 'ON' position and select 'Programmable Module Installation' on the IDS
* Follow the text screens until successful
* Place key in OFF position and install the replacement instrument cluster - See 'Removal and Installation' for details
* Key in the ON position. Follow text screens until successful.

Once complete, verify correct operation.

Programmable Options:

Odometer:

The odometer can be programmed using the IDS unit by selecting 'Update Odometer Value' The Odometer value can be programmed to any value between 0km and 1,999,999km, providing the following conditions have been met:

* The new value is greater than the current value

Once programmed, the replacement clusters odometer will immediately be updated (+0/-1) and a permanent (un-erasable) DTC will be set. This programming will be allowed a maximum of 3 times.

Variant Information:

The Variant Information will be programmed as part of the configuration process using the IDS unit by selecting 'Update Variant Information' option. The technician will be prompted with a list of available options for the replacement cluster. The technician should then select the appropriate options and upload the data. The options for the cluster include:

• VIN number
• RSS (rear sonar system)
• Police speed offset
• Long term rear belt minder
• Column shift Auto
• Rear belt minder
• RPM shift alarm
• Police mode
• Traction Control fitted
• Seatbelt audible reminder
• Brake fail led CAN control
• ABS
• Dynamic Stability Control fitted

Functional Tests (using Diagnostic tool within the Data Logger function)

Gauge Test

This test will check for mechanical gauge problems within the cluster.

1. Select the gauge to test. The gauge is swept/pointed to a particular value, with user confirmation on gauge position. If the gauge fails, the input (e.g. fuel sender) is checked for validity and user prompted with further tests / pinpoint tests.

Button Test

This test will check for mechanical button problems within the cluster

1. Select button to test. Activate button and check status. The cluster buttons tested are:
   1. ODO Button
   2. MENU Button
   3. DOWN ARROW Button
   4. SEL Button
   5. UP ARROW button

Illumination Test

This test will check for illumination problems within the cluster

1. Each Illumination channel is driven to set Cluster Dial, switch and LCD levels.

The two modes are: PWM duty cycle #1 and PWM duty cycle #2

Multifunction Output Test — LCD / Warning LED / Buzzer

This test will check the following:

1. Working LCD segments within the cluster
   1. All segments enabled, test pattern A and test pattern B.
2. Software controllable Telltale LED's within the cluster
   1. All software controllable warning LED's enabled, then disabled. The LEDs controlled are:

   • General warning
   • ABS
   • Alternator
   • Brake fail
   • DSC
   • Fog lamp
   • High beam
   • MIL
   • Park brake
   • Air bag
   • Front seat belt
   • Security
   • TCS
   • Turn indicators

3. Buzzer operation within the cluster
   1. Buzzer sweep cycle engaged.

Input and Data Test

This test will check for hard wired inputs to the cluster

1. Select items to check from the following:
   1. Park Lights
   2. Park Brake
   3. Left Turn / Right Turn switch
   4. Auto lamp switch
   5. Transmission not in Park/Drive switch
   6. Fuel cutoff switch
   7. Brake fluid level switch

2. Tests on input status will be conducted. Refer to pin point tests for further diagnosis

Login Tracking Code

DTC Chart

Instrument Cluster Diagnostic Trouble Code (DTC) Index

Display	Description	Action
B1201	Fuel Sender Circuit Failure	Conduct Functional Test. Conduct Pinpoint Test: 'Fuel Gauge Circuit Test'
B1342	ECU is faulted / EE checksum failure	Internal data failure, disconnect power, wait 10 seconds and re-apply power. Run self test. If DTC is still present, Conduct Functional Test: Data Test. Replace Cluster
B1499	Lamp Turn Signal Left Circuit Failure	Bulb out detected on Left Turn Circuit. Check bulbs, then conduct Functional Test: Input and Data Test. Conduct Pinpoint Test: 'Turn Signal Input Test'
B1503	Lamp Turn Signal Right Circuit Failure	Bulb out detected on Left Turn Circuit. Check bulbs, then conduct Functional Test: Input and Data Test. Conduct Pinpoint Test: 'Turn Signal Input Test'
B1875	Turn Signal / Hazard Switch Signal Circuit Failure	Hazard button stuck on or Hazard request data continuously sent. Conduct Functional Test: ICC Hazard switch Test.
B2078	Driver airbag deactivation indicator lamp fault	LED fault. Conduct Multifunction Output Test.
B2477	Module configuration failure / Module not configured	Perform Cluster PMI using IDS.
B2680	Odometer Changed	Permanent DTC indicating that Odometer has been manually changed. – No Action Required
B2681	PRNDL Sender Failure	Invalid PRND data detected, Conduct Functional Test: Multifunction Output Test. Check PCM PRND data
B2895	ODO Switch Circuit Failure	Switch contact failure. Conduct Functional Test: Button Test
B2896	Odometer Data Failure	Internal odometer data failure, disconnect power, wait 10 seconds and re-apply power. Run self test. If DTC is still present, Conduct Functional Test: Pinpoint test Battery Voltage.
P062F	EEPROM error	Internal data error. Perform Cluster PMI using IDS
P1269	Immobilizer code not programmed	Code not written to EEPROM. Verify supply voltage is not below 12V. Using IDS perform PATS ICM & PCM reset.
C170A	'UP' arrow switch input circuit failure	Switch contact failure. Conduct Functional Test: Button Test
C170B	'SEL' input switch circuit failure	Switch contact failure. Conduct Functional Test: Button Test
C170C	'DOWN' arrow input switch circuit failure	Switch contact failure. Conduct Functional Test: Button Test
C170D	'MENU' input switch circuit failure	Switch contact failure. Conduct Functional Test: Button Test
C1187	Brake fluid level sensor input open circuit	No signal from switch. Conduct pin point test: Brake fail warning test
C1327	Brake fluid level low	Check fluid level. Conduct pin point test: Brake fail warning test
U0002	High speed CAN communication Bus performance	High speed CAN Communications fault. Use IDS to perform network test. Perform manual CAN bus check.
U0011	Mid speed CAN communication Bus performance	Mid speed CAN Communications fault. Use IDS to perform network test. Perform manual CAN bus check.

Display	Description	Action
U0073	Control module communication Bus A off HS CAN)	High speed CAN Communications fault. Use IDS to perform network test. Perform manual CAN bus check.
U0074	Control module communication Bus B off (MS CAN)	Mid speed CAN Communications fault. Use IDS to perform network test. Perform manual CAN bus check.
U0100	Lost communication with PCM	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U0121	Lost communication with ABS control module	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U0140	Lost communication with BEM	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U0151	Lost communication with RCM	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U0159	Lost communication with PAM	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U0164	Lost communication with HVAC control module	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U0184	Lost communication with ACM	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U0256	Lost communication with FDM	Missing message from external module detected. Use IDS to diagnose module and check module indicated for correct operation.
U2196	Invalid 'Engine RPM' data	PCM output data failure. Check PCM module. Conduct Functional Test: Gauge Test
U2197	Invalid 'Vehicle Speed' data	PCM output data failure. Check PCM module. Conduct Functional Test: Gauge Test
U2198	Invalid 'Fuel Pulse' data	PCM output data failure. Check PCM module. Conduct Functional Test: Gauge Test
U2199	Invalid 'Engine Coolant Temperature' data	PCM output data failure. Check PCM module. Conduct Functional Test: Gauge Test
U2200	Invalid 'ODO Count' data	PCM output data failure. Check PCM module. Conduct Functional Test: Input & Data Test.

PID Chart

Parameter Name	Description	Data Type
CCNT	Number of Continuous Trouble Codes Set	DTC(s)
SELTESTDTC	Number of Trouble Codes Set due to Diagnostic Test	DTC(s)
VBATT_VAL	System Battery Voltage Value	Volts
LCD_ILLUM	LCD Illumination Level	% duty cycle on time
PWM_ILLU	Button Illumination PWM value	% duty cycle on time
PWM_ILLUM_BUTTONS	Button Illumination PWM value	% duty cycle on time
PWM_DUTY1	PWM Duty Cycle #1. Switch's	% duty cycle on time
PWM_DUTY2	PWM Duty Cycle #2 . Dials	% duty cycle on time
EXTLAMPSW	Twilight sensor state	* Day (false)
* Night (true)		
ODO_M	Odometer	Kilometers
TRIP_MET	Vehicle Trip Odometer – Metric	Kilometers
TRIPB_MET	Vehicle Trip Odometer – B – Metric	Kilometers
DIST_2_DEST	Distance to destination	Kilometers
FUEL_ECON	Instantaneous Fuel Economy – Metric	l/100km or l/hr
AVG_FUEL	Average Fuel Economy – Metric	l/100km or l/hr
VEH_SPD	Average Vehicle Speed	Kilometers / hour
VSS	True vehicle speed	Kilometers / hour
TRIP_CMP	Trip Computer Range	Kilometers
FUEL_LVL	Fuel Level Input	% FULL
FUEL_CONSUM	Fuel used value	Litres
SPD_IND	Speedometer Gauge Indicator Control **Activating this PID may enable the following warnings: Overspeed, Park Brake, Rear seat belt.**	KPH
TACH_IND	Tachometer Gauge Indicator Control **Activating this PID may enable the following warnings: Alternator, Oil Pressure, Trans shift alarm, increase to travel time.**	RPM
TEMP_IND	Engine Temperature Gauge Pointer Place – Degrees C.	% of full scale
FUEL_SNDR	Fuel Sender	Ohms
BODY_TYPE	Vehicle body type for fuel table	* Unknown * Sedan * Wagon * Utility * LWB * 4WD * Coupe * Van

Parameter Name	Description	Data Type
FUEL_TYPE_ORION	Type of fuel used	* Unknown
		* Petrol
		* Methanol
		* Ethanol
		* Diesel
		* LPG
		* CNG
		* Propane
		* Battery/Electric
TEMP_GA	Temperature Gauge	% MAX
TURBO_GAUGE_ST	Turbo boost pressure	KPA
OIL_GAUGE_PP	Engine oil pressure	KPA
EOT_M	Engine oil temperature	Degrees C
CLU_STAT	ECU Operating States	Default / Std. Diag Mode
TRANSGEAR	Gear selected **Activating this PID may enable the following warning: Sonar warning when in set to reverse**	* Unknown
		* Reverse
		* Forward Drive
		* Forward Drive 2
		* Forward Drive 3
		* Forward Drive 4
		* Forward Drive 5
		* Forward Drive 6
		* Park
		* Drive "D"
		* Neutral
		* Invalid Data
GEAR_LTM	Park or Drive status	* Park
		* Drive "D
		* All other states
FUEL_MODE	Fuel Economy Display Mode	* Litres per 100km
		* Litres per hr
LCD_DSPL	LCD Segment Display	* On
		* Off
PARKBRAK	Park Brake Applied Warning Lamp	ON/OFF
BRAKE FLUID	Brake hardware input state **Activating this PID may enable the following warning: Brake Fail**	* Normal operation
		* Open circuit
		* Low fluid
TONE_REQ	Tone request – Airbag fault warning	ACTIVE/NON ACTIVE
P_LMP_SW	Park Lamps Switch	ACTIVE/NON ACTIVE
HAZ_SW	Hazard switch	ACTIVE/NON ACTIVE

Parameter Name	Description	Data Type
RT_SWITCH	Right Turn Switch	ACTIVE/NON ACTIVE
LT_SWITCH	Left Turn Switch	ACTIVE/NON ACTIVE
AUTOLMPSW	Autolamp ON Switch	ACTIVE/NON ACTIVE
HBEAMSW	High beam switch	ACTIVE/NON ACTIVE
FOG_SW	Fog lamp switch	ACTIVE/NON ACTIVE
SBLTMP	Seat Belt Lamp Driver Output State	ACTIVE/NON ACTIVE
LRSBELT	Left rear belt fastened	ACTIVE/NON ACTIVE
CRSBELT	Centre rear belt fastened	ACTIVE/NON ACTIVE
RRSBELT	Right rear belt fastened	ACTIVE/NON ACTIVE
MENU_BUT	Menu Switch	ACTIVE/NON ACTIVE
TRIP_ODO_BUT	ODO switch	ACTIVE/NON ACTIVE
CENTRE_BUT	SEL switch	ACTIVE/NON ACTIVE
UP_ARROW_BUT	Up arrow switch	ACTIVE/NON ACTIVE
DOWN_ARROW_BUT	Down arrow switch	ACTIVE/NON ACTIVE
LMPONWRN	Lamp ON	ACTIVE/NON ACTIVE
AUD_WARN	Audible warning ON	ACTIVE/NON ACTIVE
LHS_CURNT	* Left Hand Side Indicator Current Draw	Amps.
RHS_CURNT	* Right Hand Side Indicator Current Draw	Amps.
BRAKE_FLUID	Brake fluid level status	* Normal Operation * Open circuit * Low fluid
VIN_CURRNT	Current VIN	17 characters
VIN_ORIG	Original VIN	17 characters
IC_AU_DY	Software version number - Day	$01-$1F
IC_AU_MO	Software version number - Month	$1-$C
IC_AU_YR	Software version number - Year	(1900)$00 – (2155)$FF
IC_AU_SN	Software revision level	$1-$F
PARTAU#IC	Base Part Number	
PISUAU#IC	Part identification suffix	
PIPRUA#IC	Part identification prefix	

* Output current value only valid whilst globes are being driven.

CAN Data Information

The CAN interface facilitates the information transfer between the electronic modules in the vehicle and provides a means for diagnostics interrogation.

In normal operating conditions, with ignition activated, the cluster will receive and transmit the following information.

Cluster CAN Transmission Data Mid-Speed

Park lamps on
Auto Headlamps switch on
High Beam on
Fog lamps on
Left and Right indicators on
Park brake on
Display Illumination level
Button Illumination level
Rear seatbelt minder enabled
Fuel cutoff status
Instrument Cluster diagnostics Tx

Cluster CAN Transmission Data High-Speed

Park lamps on
Auto Headlamps switch on
High Beam on
Fog lamps on
Left and Right indicators on
Display illumination level
Button illumination level
Rear seatbelt minder enabled
RIL status
Seat belt status
Seat belt warning chime status
Fuel level
Instantaneous fuel level
Fuel sender fail
Park brake on
Maximum litres
Odometer value
Odometer overflow flag
Cluster Imobilizer

Login Tracking Code

Cluster CAN Receive Data Mid-Speed

Tx Module	
Front Display Module (FDM) 307	Hazard switch
	Illumination battery saver request
Body Electrics Module (BEM) 403	Front right door
	Front left door
	Rear right door
	Rear left door
	Boot lid door
	Bonnet
	Headlamp fail
	Hazard flash request
	Security warning on
	Day Night illumination mode
	Right front door locked
	Priority key 1/2
Body Electrics Module (BEM) 406	Seat belt status rear left
Audio Control Module (ACM) 2E6, 2F2, 2F9, 309, 30D	Seat belt status rear centre
	Seat belt status rear right
	Audio tuned frequency
	Audio tuner band preset
	Audio FM frequency step
	Audio current media
	MP3 folder
	MP3 track
	Audio RDS PS name
	Audio RDS PSN state
	CD track number
	CD type
	CD playing now
Park Aid Module (PAM) 360	Sonar Park failed
	Sonar Park inhibited
	Sonar Park disturbed
	Sonar Park disabled

Login Tracking Code

Cluster CAN Receive Data High-Speed

Tx Module	
Powertrain Control Module (PCM) 207, 230, 425, 427, 44D, 640, 6F6	Engine RPM
	Vehicle speed
	Transmission gear position
	Transmission overheat
	Transmission fault
	Transmission mode
	Cruise
	Cruise target speed
	Turbo boost pressure
	Instant economy mode
	Instant economy
	Coolant temperature
	Odometer count
	Alternator failure
	Low Oil pressure warning
	Engine overheat
	ETC warning
	Immobilisation lamp
	MIL telltale warning
	Fuel pulse
	DTC logging
	Oil pressure
	Oil temperature
	Manual transmission
	Immobilisation transfer
Brake System (TCS DSC) 210	EBD failed
	ABS failed
	TCS disabled by user
	TCS event
	TCS failed
	DSC disabled by user
	DSC event
	DSC failed
	HDC disabled by user
	HDC event
	HDC failed
Restraint Control Module (BEM)	RIL status
	Seat belt warning request
	Seat belt chime request
	Fuel cutoff request

Symptom Chart

Condition	Possible Sources	Action
ABS Warning Telltale always activated / inoperative and "ABS FAULT" is displayed	*ABS module *Instrument cluster.	* check ABS/TCS/DSC module.
ABS Warning Telltale always activated and "SYSTEM COMMS FAULT" is displayed	*ABS module *CAN circuit	* check ABS/TCS/DSC module. * Conduct Pinpoint test on HS bus circuit.
Alternator Warning Indicator always activated / inoperative and "CHARGE FAIL" is displayed	*PCM *Instrument cluster. *Alternator	* check PCM module. * check Alternator
Alternator Warning Indicator always activated and " SYSTEM COMMS FAULT " is displayed	*PCM module *CAN circuit	* check PCM module. * Conduct Pinpoint Test on HS bus circuit.
Autolamps always activated / inoperative	*BEM *CAN circuit *Instrument cluster.	* Conduct Functional Test: Input & Data Test. * check BEM
Audio Illumination inoperative with ignition OFF	*CAN circuit *Twilight sensor. *BEM. *ICC. *Instrument cluster.	* Check ICC * Check BEM.
Brake Fail Warning Indicator always activated / inoperative and "BRAKE FLUID" is displayed	*Brake fluid switch *Instrument cluster. *Circuit.	* Check brake switch circuit for short circuit. *Check brake fluid switch for short circuit
Brake Fail Warning Indicator always activated / inoperative and "BRAKE FAIL" is displayed	*Circuit. *Instrument cluster.	* Check brake switch circuit for open circuit. * Check brake switch connector for open circuit
Brake Fail Warning Indicator always activated/ inoperative and "EBD FAULT" is displayed	*ABS module *Instrument cluster.	* check ABS/TCS/DSC module.
Brake Fail Warning Indicator always activated and "SYSTEM COMMS FAULT" is displayed	*ABS module *CAN circuit	* check ABS/TCS/DSC module. * Conduct Pinpoint test on HS bus circuit.
Cruise Control Indication always on / inoperative	*PCM. *Instrument cluster.	* Conduct Diagnostic self test * Check PCM module
Cruise Control Indication inoperative and "SYSTEM COMMS FAULT" is displayed	*PCM. *CAN circuit	* check PCM module. * Conduct Pinpoint test on HS bus circuit.
Dimming Functionality inoperative	*Instrument cluster.	* Conduct Diagnostic self test
Door/Boot/Bonnet Ajar Indicator always on	*BEM. *Instrument cluster.	* check BEM module.
Door/Boot/Bonnet Ajar Indicator inoperative and "SYSTEM COMMS FAULT" is displayed	*BEM. *Circuit / CAN.	* check BEM module. * Conduct Pinpoint test on MS bus circuit.

Condition	Possible Sources	Action
DSC Warning always activated / inoperative and "DSC FAULT" is displayed	* DSC module. * Instrument cluster.	* check DSC module
DSC Warning always activated and " SYSTEM COMMS FAULT " is displayed	* DSC module * CAN circuit	* check DSC module. * Conduct Pinpoint test on HS bus circuit.
Engine temperature warning "HIGH ENGINE TEMPERATURE' is displayed	* PCM. * Instrument cluster.	* check PCM module.
"ETC FAULT" warning always activated	* PCM. * Instrument cluster.	* check PCM module.
Fog Lights Indicator always on / inoperative	* Circuit. * Switch. * Instrument cluster.	* Conduct Pinpoint Test 'Fog Lights Input Test'
Fuel gauge indication incorrect and "FUEL SYSTEM FAULT" is displayed	* Circuit / CAN - fuel used. * Fuel sender assembly out of range. * Instrument cluster.	* Conduct Functional Test: Gauge Test. * Conduct Pinpoint Test 'Fuel Gauge Circuit Test'. * Check PCM module
"FUEL CUTOFF SWITCH" warning Always Activated	* Circuit. * Fuel Cut Off Unit. * Instrument cluster.	* Conduct Pinpoint Test 'Fuel Cut Off Test'.
Hazards always activated / inoperative	* Circuit / CAN. * Instrument cluster. * ICC.	* Check ICC module * Conduct Pinpoint test on MS bus circuit.
"HEADLAMP FAIL" warning always activated	* BEM. * Instrument cluster.	* Check BEM module
High beam indicator is inoperative	* Circuit. * Switch. * Instrument cluster.	* Conduct Pinpoint Test 'High Beam Indicator Test'.
"HIGH ENGINE TEMPERATURE" warning always activated	* PCM. * Instrument cluster.	* Check PCM module
Illumination always on / inoperative (Park Lights Input)	* Circuit. * Switch. * Instrument cluster.	* Conduct Functional Test: Input & Data Test. * Conduct Pinpoint Test 'Park Lamps Input Test'.
Indicator Left / Right Turn Signal always activated / inoperative	* Circuit. * Switch. * Instrument cluster.	* Conduct Functional Test: Input and Data Test. * Conduct Pinpoint Test 'Turn Signal Indicator Test'.
MIL warning always activated / inoperative	* PCM. * Instrument cluster.	* Conduct Diagnostic self test * Check PCM
"LOW OIL PRESSURE" Warning always activated	* PCM. * Instrument cluster.	* Check PCM
Odometer / Trip Odometer not incrementing	* Circuit / CAN. * Instrument cluster.	* Conduct Functional Test Input & Data Test.

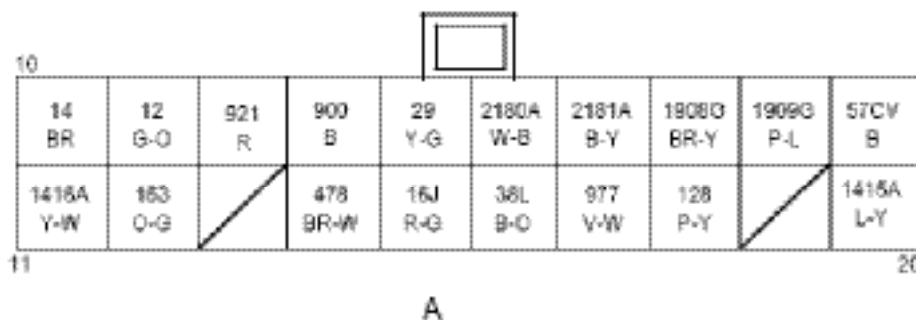| Condition	Possible Sources	Action
Odometer / Trip Odometer Reset Switch inoperative	* Circuit. * Instrument cluster Switch * Instrument cluster.	* Conduct Functional Test: Button Test.
Odometer Error (Error is displayed on odometer)	* Circuit. * Instrument cluster.	* Conduct Functional Test: Input & Data Test.
Oil pressure gauge inoperative/indication incorrect	* PCM. * Instrument cluster.	* Conduct Functional Test: Gauge Test * Check PCM module
Oil temperature gauge inoperative/indication incorrect	* PCM. * Instrument cluster.	* Conduct Functional Test: Gauge Test * Check PCM module
Park Brake Warning always on / inoperative and "PARK BRAKE ON" displayed	* Circuit. * Switch. * Instrument cluster.	* Conduct Functional Test: Multifunction Output Test. * Conduct Pinpoint Test 'Park Brake Test'.
PRNDL Indication inoperative	* Circuit / CAN. * PCM. * Instrument cluster.	* Conduct Functional Test: Multifunction Output Test.
Restraints Indicator Warning (RIL) inoperative and "AIRBAG LAMP FAULT" displayed	* Instrument cluster.	* Conduct Functional Test: Multifunction Output Test.
Restraints Indicator Warning (RIL) on and "AIRBAG FAULT" displayed	* RCM. * Instrument cluster.	* Check RCM Module
"RSS INACTIVE" warning always active	* PAM. * Instrument cluster.	* Check PAM module
"RSS FAULT" warning always active	* PAM. * Instrument cluster.	* Check PAM module
Seatbelt (front) indicator always on / inoperative and warning message is incorrect or inoperative	* BEM. * Instrument cluster.	* Conduct Diagnostic self test * Check BEM module
Seatbelt (rear) warning message is incorrect or inoperative	* BEM. * Instrument cluster.	* Conduct Diagnostic self test * Check BEM module
Security Indicator always on / inoperative	* PCM / BEM. * Instrument cluster.	* Conduct Functional Test: Multifunction Output Test.
Speedometer is inoperative/indication incorrect	* Circuit / CAN. * Vehicle speed sensor. * PCM * Instrument cluster.	* Conduct Functional Test: Gauge Test. * Check PCM Module
"SYSTEM COMMS FAULT" warning always active	* Interface module * MS or HS CAN bus fault. * Instrument cluster.	* Check interface module relating to the active warning * Conduct Pinpoint test on HS bus circuit. * Conduct Pinpoint test on MS bus circuit.

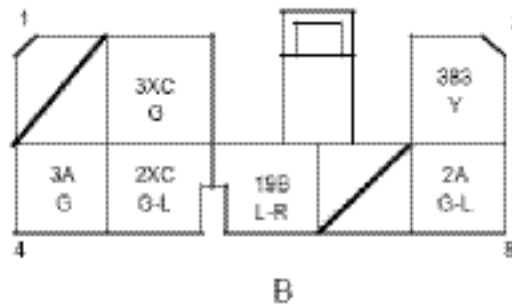| Condition	Possible Sources	Action
Tachometer is inoperative/indication incorrect	* Circuit / CAN. * PCM. * Instrument cluster.	* Conduct Functional Test: Gauge Test. * Check PCM Module
TCS Warning always activated / inoperative and "TCS FAULT" is displayed	* TCS module. * Instrument cluster.	* Check TCS module
TCS Warning always activated and " SYSTEM COMMS FAULT " is displayed	* TCS module * CAN circuit	* Check TCS module. * Conduct Pinpoint test on HS bus circuit.
"TRANSMISSION FAULT" Warning always activated	* PCM. * Instrument cluster.	* Check PCM module
"TRANSMISSION OVERHEAT" Warning always activated	* PCM. * Instrument cluster.	* Check PCM module
"TRANSMISSION NOT IN PARK" Warning always activated / inoperative	* PRNDL module. * Park switch. * Instrument cluster.	* Conduct Pinpoint test "Park switch test". * Check PCM module
Temperature gauge inoperative/indication incorrect	* PCM. * Instrument cluster.	* Conduct Functional Test: Gauge Test * Check PCM module
Turbo boost gauge inoperative/indication incorrect	* PCM. * Instrument cluster.	* Conduct Functional Test: Gauge Test * Check PCM module

Connector Circuit Reference

Connector A - C171

10									1
14 BR	12 G-O	921 R	900 B	29 Y-G	2180A W-B	2181A B-Y	1908G BR-Y	1909G P-L	57CV B
1416A Y-W	163 O-G	/	478 BR-W	16J R-G	38L B-O	977 V-W	128 P-Y	/	1416A L-Y
11									20

A

Pin Number(s)	Circuit Designation/ Description	Normal Condition/Measurement
1A	Ground	0 Voltage, Less than 5 ohms to chassis Ground
2A	HS CAN low	Serial CAN Communications. Less than 5 ohms between the instrument cluster and diagnostic connector / surrounding CAN controlled modules.
3A	HS CAN high	Serial CAN Communications. Less than 5 ohms between the instrument cluster and diagnostic connector / surrounding CAN controlled modules.
4A	MS CAN low	Serial CAN Communications. Less than 5 ohms between the instrument cluster and diagnostic connector / surrounding CAN controlled modules.
5A	MS CAN high	Serial CAN Communications. Less than 5 ohms between the instrument cluster and diagnostic connector / surrounding CAN controlled modules.
6A	Fuel sender input	0 – 10 volts depending on fuel level, Variable resistance between the instrument cluster and fuel ground return pin, from 50 to 995 ohms, depending on the fuel tank and fuel level. Less than 5 ohms between the instrument cluster and fuel sender connector pin.
7A	Fuel ground return	0 voltage, Less than 5 ohms between the Instrument Cluster and fuel sender connector pin.
8A	Fuel Cut Off	Greater than 10 Volts, Less than 5 ohms between the Instrument Cluster and Fuel Cut Off Switch. Greater than 10,000 ohms between the instrument cluster and ground.
9A	High beam	0 Voltage with High Beam Multifunction Switch in the OFF position and greater than 10 volts in the ON turn position. Less than 5 ohms between the instrument cluster and the multifunction switch. Greater than 10,000 ohms between the instrument cluster and ground.
10A	Park lights on	0 Voltage with Park Lamps Multifunction Switch in the OFF position and greater than 10 volts in the ON turn position. Less than 5 ohms between the instrument cluster and the multifunction switch. Greater than 10,000 ohms between the instrument cluster and ground.
11A	Auto headlamps	0 Voltage with Auto Headlamps Multifunction Switch in the OFF position and greater than 10 volts in the ON turn position. Less than 5 ohms between the instrument cluster and the multifunction switch. Greater than 10,000 ohms between the instrument cluster and ground.
12A	Park brake	0 Volts with Park brake engaged, Less than 5 ohms between the Instrument Cluster and Park Brake. Greater than 10,000 ohms between the Park Brake and ground with Park brake off.
13A	N/C	
14A	Fog Lights	0 Voltage with the Fog Lights switch in the OFF position, Greater than 10 volts with the Fog Lights switch in the ON position. Less than 5 ohms between the instrument cluster and the Fog Lamps switch. Greater than 10,000 ohms between the instrument cluster and ground.

Pin Number(s)	Circuit Designation/ Description	Normal Condition/Measurement
15A	Ignition	0 Voltage with key OFF, Greater than 10 volts with key ON. Greater than 10,000 ohms between instrument cluster and ground.
16A	Battery	Greater than 10 volts with key ON or OFF. Greater than 10,000 ohms between the instrument cluster and ground.
17A	Brake fail	6 volts with brake fluid switch connected. 0 volts when Brake fluid switch disconnected.
18A	Brake fail Monitor	6 volts with brake fluid switch connected. 12 volts when Brake fluid switch disconnected.
19A	N/C	
20A	Transmission not in Park	Column shift auto: 0 volts when in Park and 10 volts in any other gear position. Less than 5 ohms between the instrument cluster and the Park switch. Greater than 10,000 ohms between the Instrument Cluster and ground when not in Park. Floor shift auto: ~3.3 volts in Park, ~6.6 volts in Drive and 10 volts in any other gear position. Less than 5 ohms between the instrument cluster and the PRNDL Connector. Greater than 10,000 ohms between the Instrument Cluster and ground when not in Park or Drive.

Connector B - C171

Pin Number(s)	Circuit Designation/ Description	Normal Condition/Measurement
1B	N/C	
2B	Left indicator switch	0 Voltage with turn indicator in the OFF position and greater than 10 volts in the LH turn position. Less than 5 ohms between the instrument cluster and the multifunction switch. Greater than 10,000 ohms between the instrument cluster and ground.
3B	Indicators supply	Greater than 10 volts with key ON or OFF. Greater than 10,000 ohms between the instrument cluster and ground.
4B	Left indicator output	0 Voltage with turn indicator in the OFF position. Alternating between 0 and 10+ volts (from cluster) in the LH turn position. Less than 5 ohms between the instrument cluster and external indicator globes. Greater than 10,000 ohms between the instrument cluster and ground.
5B	Right indicator switch	0 Voltage with turn indicator in the OFF position and greater than 10 volts in the RH turn position. Less than 5 ohms between the instrument cluster and the multifunction switch. Greater than 10,000 ohms between the instrument cluster and ground.
6B	Illumination 25W output	Pulse width modulated signal switched to ground (from cluster) corresponding to the selected illumination level . Less than 5 ohms between the instrument cluster and illumination destination.
7B	N/C	
8B	Right indicator output	0 Voltage with turn indicator in the OFF position. Alternating between 0 and 10+ volts (from cluster) in the RH turn position. Less than 5 ohms between the instrument cluster and external indicator globes. Greater than 10,000 ohms between the instrument cluster and ground.

Pinpoint Tests

All Voltage tests to be carried out with Connector A and B fitted to Cluster.

All Resistance tests to be carried out with Connector A and B removed from Cluster

PINPOINT TEST A : VOLTAGE SUPPLY TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1 : TEST BATTERY VOLTAGE	
	1 Key in OFF position.
	2 Use a digital Multimeter, measure the voltage between the Battery (+) pole and ground.
	Is the voltage result obtained within a valid range (11.5 - 13v) ?
	Yes
	GO to A2 TEST BATTERY VOLTAGE SUPPLY TO THE CLUSTER.
	No
	Check battery / charging circuit. Continue once valid voltage is obtained.
A2 : TEST BATTERY VOLTAGE SUPPLY TO THE CLUSTER	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector A.
	3 Using a digital Multimeter, measure the voltage between Pin 16 of connector B (harness side)and ground.
	Is the voltage within a valid range (11.5 - 14.5v)?
	Yes
	GO to A3 TEST IGNITION VOLTAGE AT CLUSTER.
	No
	Check fuse / power HARNESS to cluster.
A3 : TEST IGNITION VOLTAGE AT CLUSTER	
	1 Key in ON position (Engine not running).
	2 Using a digital Multimeter, measure the voltage between connector A, pin 15 (harness side) and ground.
	Is the voltage within a valid range (11.5 - 13v)?
	Yes
	Disconnect, Check and Re-connect both cluster connectors.
	If fault is found repair and re-test instrument cluster.
	If still non-operational, contact service center for cluster replacement authorization.
	If granted, install a new Instrument Cluster. See Removal and Installation and Module Configuration for details.
	TEST the system for normal operation. If problem still exists, place the original cluster back to the vehicle.
	No
	Check fuse / power HARNESS to cluster.

PINPOINT TEST B : FUEL GAUGE CIRCUIT TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1 : CHECK FUEL GAUGE CIRCUIT	
	1 Key in OFF position.
	2 Disconnect Fuel Pump Module (Refer to Section 310-00).
	3 Key in ON position.
	4 Enter the Instrument cluster Fuel Sender Input Value (ohms) menu in the IDS.
	5 With Fuel Sender input in an open circuit state, Check that the fuel sender resistance indicated by the IDS is greater than 985 ohms. If it is less than 985 ohms, go to EDS section and check harness.
	6 On the harness side, short Fuel Sender pin to its ground pin.
	7 Is the resistance indicated by the WDS less than 10 ohms? If it is not less than 10 ohms, go to EDS section and check harness.
	8 Check fuel sender (Refer to Section 310-00), Investigate fuel sender module for normal operation.

PINPOINT TEST C : BRAKE FAIL WARNING TEST (Hardwired connection only)	
CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 : CHECK BRAKE FAIL VOLTAGE	
	1 Ensure all cluster connectors are securely fastened and place key in ON position.
	2 Using a digital Multimeter, measure the Voltage between Instrument cluster Connector A pin 18(harness side) and ground.
	Is the voltage ~ 6 volts
	Yes
	Check ABS module.
	No
	Disconnect brake fluid level connector C-34 and check voltage at cluster connector A pin 17. The voltage should be ~12 volts.
	If voltage is 0 then disconnect connector A and check pin 17 circuit for short to ground.
	If voltage is 12 volts then check connector A pin 17 to connector C-34 and connector A pin 18 to connector C-34 for open circuit.
	Check brake fluid level switch circuit

Login Tracking Code

PINPOINT TEST D : HIGH BEAM INDICATOR TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
D1 : CHECK FOR HIGH BEAM VOLTAGE	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector A.
	3 Key in ON position.
	4 Turn the Headlamp switch to HIGH beam position.
	5 Using a digital Multimeter, measure the voltage between the Instrument cluster Connector A, Pin 9 (harness side) and ground.
	Is the voltage greater than 10 volts?
	Yes
	Key in Off Position. Check and Re-connect Connector, Place Key in ON position. Place the headlamp switch to HIGH beam position. If still inoperative, Execute 'Voltage Supply' pinpoint test and re-test the system for normal operation.
	No
	REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST E : PARK BRAKE TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
E1 : CHECK PARK BRAKE INPUT RESISTANCE	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector A.
	3 Key in ON Position.
	4 Disengage Park Brake.
	5 Using a digital Multimeter, measure the resistance between Instrument cluster Connector A pin 12 (harness side) and ground. Take note of the resistance.
	Is there an open circuit?
	Yes
	Engage Park Brake. If the resistance less than 5 ohms, Key in OFF Position. Check and Re-connect Connector, Place Key in ON position. Check Park Brake Warning. If still not functioning, Execute 'Voltage Supply' pinpoint test and re-test the system for normal operation. Otherwise, Check harness connection in EDS section.
	No
	Check harness connection in EDS section.

PINPOINT TEST F : THE TURN SIGNAL INDICATOR TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
F1 : TEST FOR VOLTAGE AT INSTRUMENT CLUSTER INDICATOR INPUT	
NOTE: Prior to executing test, Visually check individual globes for operation. If non operational globe is found, replace and re-test.	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector B.
	3 Key in ON position.
	4 Using a digital Multimeter, measure the voltage between the Instrument cluster Connector B pin 3 (harness side) and ground.
	Is the voltage greater than 10 volts?
	Yes
	For Left Indicator, GO to F2. CHECK LEFT HAND TURN SIGNAL INPUT.
	For Right Indicator, GO to F4. CHECK RIGHT HAND TURN SIGNAL INPUT. (Note: Conduct both tests if required.)
	No
	Check Indicator supply fuse and HARNESS.
F2 : CHECK LEFT HAND TURN SIGNAL INPUT	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector B.
	3 Key in ON position.
	4 Using a digital Multimeter, measure the voltage between the Instrument cluster Connector B pin 2 (harness side) and ground.
	5 Place the turn signal switch in the Left hand Indicator position, then the Off Position.
	Is the voltage greater than 10 volts when in Left Position and 0v when in Off?
	Yes
	TEST FOR VOLTAGE AT INSTRUMENT CLUSTER INDICATOR OUTPUT.
	No
	Check Indicator lever and harness.
F3 : TEST FOR VOLTAGE AT INSTRUMENT CLUSTER INDICATOR OUTPUT	
	1 Ensure all cluster connectors are securely fastened and place key in ON position.
	2 Using a digital Multimeter, measure the voltage output to the left indicator bulbs harness. (Refer to EDS manual for details).
	3 Place the turn signal switch in the Left hand Indicator position.
	Does the voltage pulse to greater than 10 volts and then to 0v, In time with the flash indicator?
	Yes
	No fault found in the LEFT HAND TURN SIGNAL indicator circuit.
	No
	Check harnesses, if error remains, execute 'Voltage Supply' pinpoint test and re-test the system for normal operation.

	F4 : CHECK RIGHT HAND TURN SIGNAL INPUT
	NOTE: Prior to executing test, Visually check individual globes for operation. If non operational globe is found, replace and re-test.
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector B.
	3 Key in ON position.
	4 Using a digital Multimeter, measure the voltage between the Instrument cluster Connector B pin 5 (harness side) and ground.
	5 Place the turn signal switch in the Left hand Indicator position and then the Off position.
	Is the voltage greater than 10 volts when in Right Position and 0v when in Off?
	Yes
	TEST FOR VOLTAGE AT INSTRUMENT CLUSTER INDICATOR OUTPUT.
	No
	Check Indicator lever and harness.
	F5 : TEST FOR VOLTAGE AT INSTRUMENT CLUSTER INDICATOR OUTPUT
	1 Ensure all cluster connectors are securely connected and place key in ON position.
	2 Using a digital Multimeter, measure the voltage output to the right indicator bulbs harness. (Refer to EDS manual for details).
	3 Place the turn signal switch in the Right hand Indicator position.
	Does the voltage pulse to greater than 10 volts and then to 0v, In time with the flash indicator?
	Yes
	No fault found in the RIGHT HAND TURN SIGNAL indicator circuit.
	No
	Check harnesses, if error remains, execute 'Voltage Supply' pinpoint test and re-test the system for normal operation.

PINPOINT TEST G : AUTOLAMPS INDICATOR TEST	
CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 : TEST OPERATION OF AUTOLAMPS	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector A.
	3 Cover up the photo (light) sensor, see EDS section for details.
	4 Key in ON position.
	5 Using a digital Multimeter, measure the resistance between the Instrument cluster Connector A pin 11(harness side) and ground, Whilst activating and de-activating the Autolamps switch.
	With Autolamps de-activated, Is the resistance less than 5 ohms?
	Yes
	With Autolamps activated, Is there an open circuit? if yes, Execute 'Voltage Supply' pinpoint test and re-test the system for normal operation. Otherwise, Check HARNESS and Autolamps switch.
	No
	Check HARNESS and Autolamps switch.

PINPOINT TEST H : PARKLAMPS INPUT TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
H1 : TEST OPERATION OF PARKLAMPS HARNESS	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector A.
	3 Key in ON position.
	4 Activate the Park Lamps switch. Using a digital Multimeter, measure the voltage between the Instrument cluster Connector A, Pin 10 (harness side) and ground. Take note of this voltage.
	5 De-activate the Park Lamps switch. Using a digital Multimeter, measure the voltage between the Instrument cluster Connector A, Pin 10 (harness side) and ground. Take note of this voltage.
	With Park Lamps activated, Was the voltage greater than 10 volts and less than 1 volt with Park Lamps de-activated?
	Yes
	Execute 'Voltage Supply' pinpoint test and re-test the system for normal operation.
	No
	Check HARNESS and Autolamps switch.

PINPOINT TEST I : FOG LIGHTS INPUT TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
I1 : CHECK FOR FOG LIGHTS INPUT VOLTAGE	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector A.
	3 Key in ON position.
	4 Activate the Fog Lights switch. Using a digital Multimeter, measure the voltage between the Instrument cluster Connector A, Pin 4 (harness side) and ground. Take note of this voltage.
	5 De-activate the Fog Lights switch. Using a digital Multimeter, measure the voltage between the Instrument cluster Connector A, Pin 14 (harness side) and ground. Take note of this voltage.
	Is the voltage greater than 10 volts when the Fog Lamps are activated?
	Yes
	If the voltage less than 1 volt when the Fog Lamps are de-activated, Key in Off Position. Check and Re-connect Connector, Place Key in ON position. Check for Fog Lamp Functionality. If still inoperative, Execute 'Voltage Supply' pinpoint test and re-test the system for normal operation. Otherwise, REPAIR the circuit. TEST the system for normal operation.
	No
	REPAIR the circuit / Fog Light switch. TEST the system for normal operation.

PINPOINT TEST J : ILLUMINATION OUTPUT TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
J1 : TEST OPERATION OF CLUSTER ILLUMINATION OUTPUTS	
NOTE: Prior to executing test, Check fuses relating to the illumination circuit under test. If non operational fuse is found, replace and re-test.	
NOTE: The access points for testing the illumination outputs of the Cluster is assessable at the connector end of the CDU unit. Please refer to the Pin Point test section of the CDU for details.	
NOTE: The signal from the Cluster for the illumination is by means of Pulse Width Modulation (PWM) and to instigate this signal for the CDU, follows the steps below:	
	1 Key in ON position.
	2 Activate the Park Lights switch and cover the photo (light) sensor.
	3 Use IDS oscilloscope section to measure the PWM output from the Cluster at the CDU / Switch side of the harness. See EDS section for details.
	4 Change the brightness and observe the PWM waveform on the WDS.
	Is there any changes on the PWM output ?
	Yes
	Check illumination section of the CDU.
	No
	Check harness (Refer EDS section). If harness connectivity correct, Execute 'Voltage Supply' pinpoint test and re-test the system for normal operation.

PINPOINT TEST K : FUEL CUT OFF TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
K1 : OPEN CIRCUIT TEST	
	1 Key in OFF position.
	2 Disconnect harness from the Fuel Cutoff switch.
	3 Key in ON position.
	Is the Fuel Cutoff switch message off?
	Yes
	GO to K2
	No
	Check harness of the EDS section.
K2 : TEST CONT.	
	1 Short the Fuel Cutoff pin at the sender end of the connector to ground.
	Is the Fuel Cutoff switch message on when the pin is shorted to ground?
	Yes
	Circuit is working correctly.
	No
	Check harness of the EDS section and the Fuel Cutoff circuit.

PINPOINT TEST L : PARK SWITCH TEST	
CONDITIONS	**DETAILS/RESULTS/ACTIONS**
L1 : CHECK PARK SWITCH INPUT RESISTANCE	
	1 Key in OFF position.
	2 Disconnect Instrument cluster Connector A.
	3 Key in ON Position.
	4 Place transmission in Park
	5 Using a digital Multimeter, measure the resistance between Instrument cluster Connector A pin 20 (harness side) and ground. Take note of the resistance.
	Is there an open circuit?
	Yes
	Column shift Auto. Check and re-connect Connector to column shift Park switch. Check switch activation and switch contact resistance.
	Floor shift Auto. Check and re-connect Connector to PRNDL module. Check harness connections in EDS section.
	No
	Column shift Auto. Is resistance ~0 ohms – circuit is correct
	Floor shift Auto. Is resistance ~420 ohms – circuit is correct

Login Tracking Code
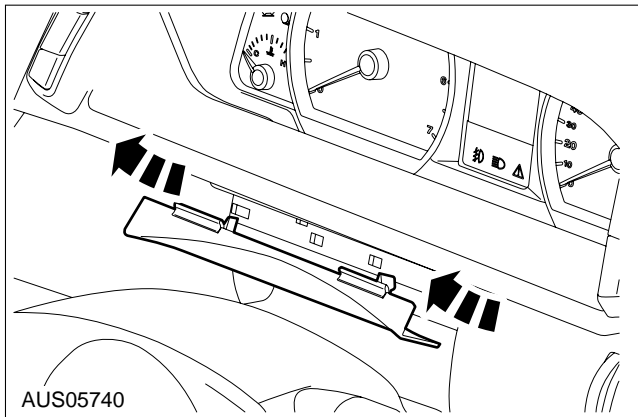
REMOVAL AND INSTALLATION
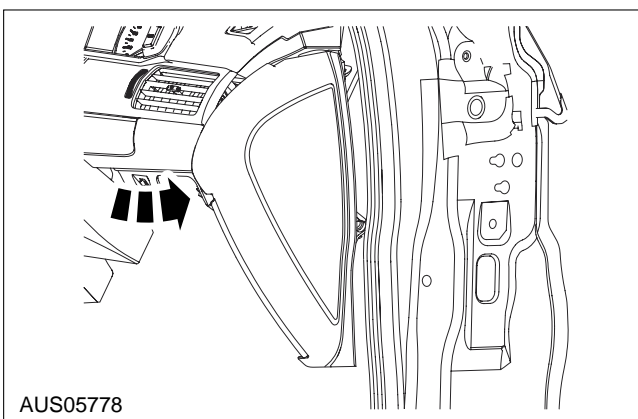
Instrument Cluster

Removal

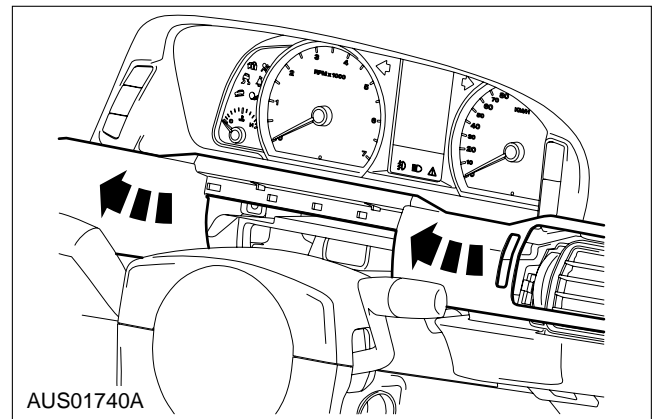1. Drop lever and move steering column down.

AUS01738
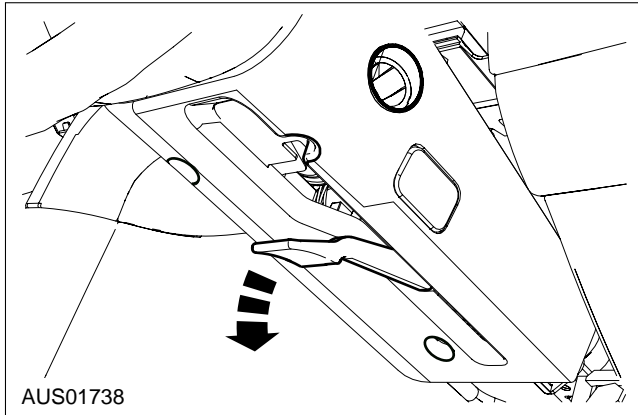
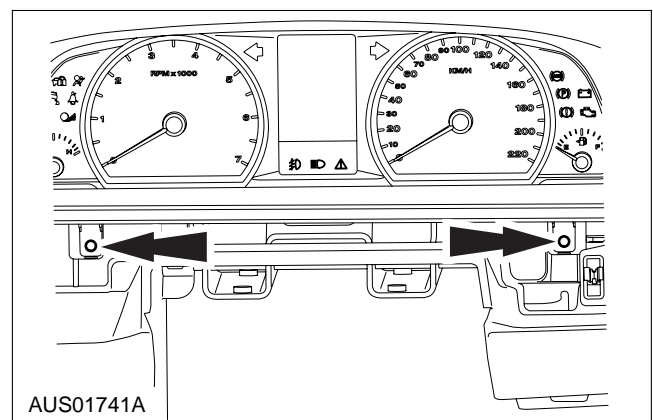2. Unclip centre finisher panel

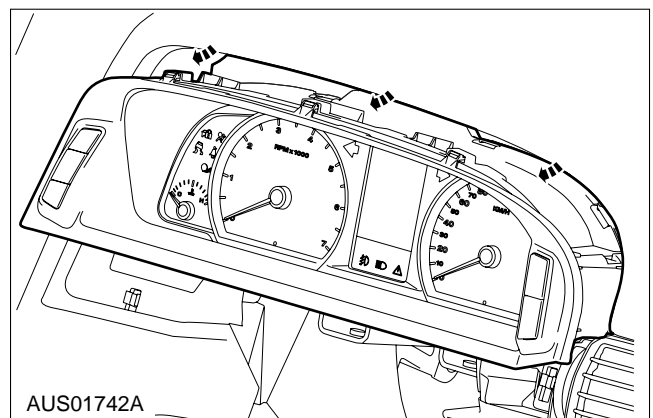AUS05740

3. Remove IP side cover to access side clip of spear

AUS05778

4. Unclip spear and carefully remove from underside of Cluster bezel

AUS01740A

5. Remove the two lower screws.

AUS01741A

6. Pull out button of Cluster and drop down to release bezel upper clips. Disconnect the two wiring connectors and carefully remove cluster unit.

AUS01742A

Installation

1. Reverse the Removal procedure.

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