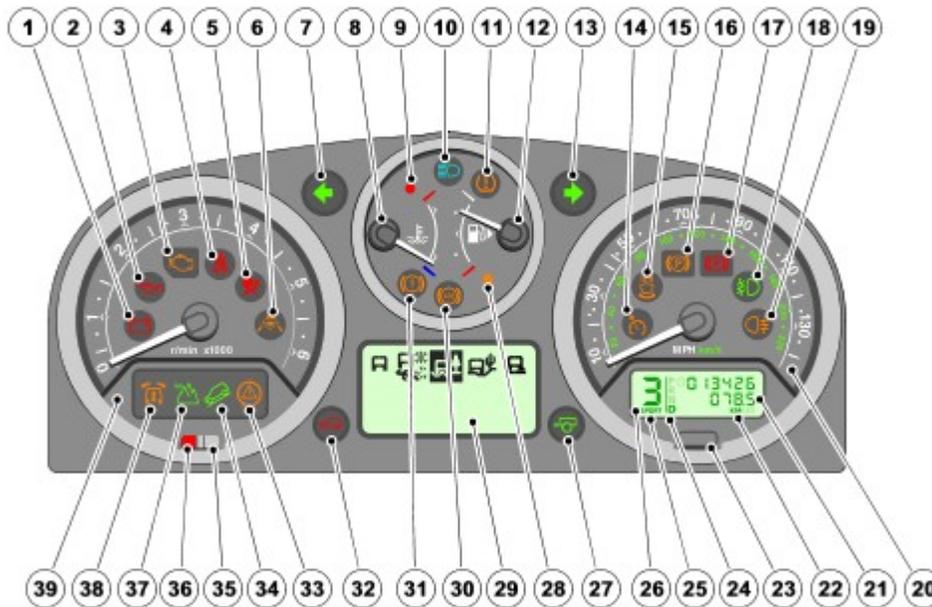


Instrument Cluster

Instrument Cluster - High Line

NOTE :

UK Right hand drive petrol shown



E48540

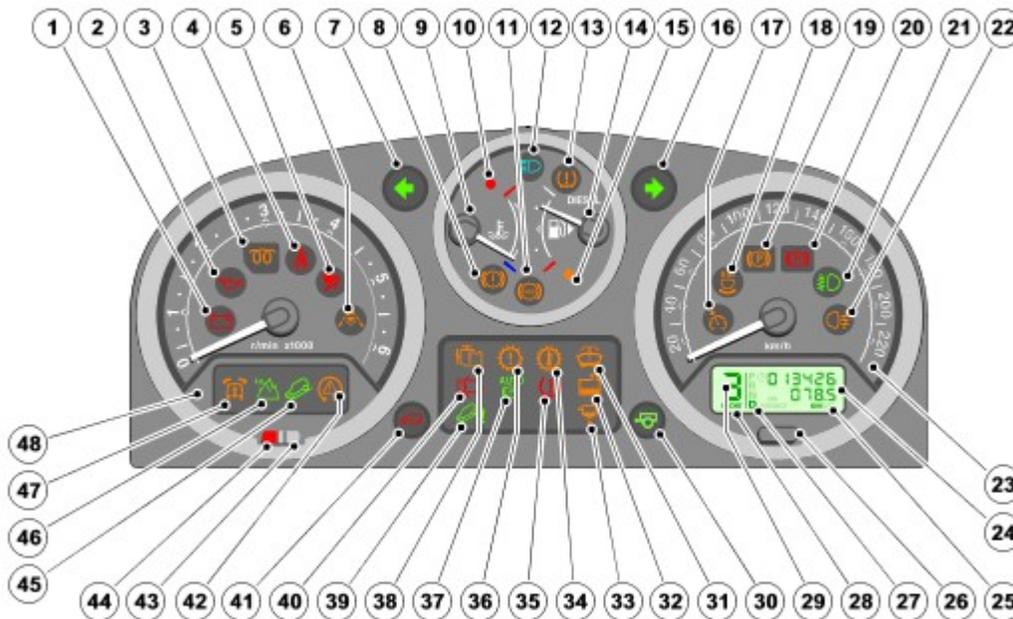
Item	Part Number	Description
1	-	Ignition/No charge warning indicator
2	-	Low oil pressure warning indicator
3	-	Malfunction Indicator Lamp (MIL)
4	-	Seat belt warning indicator
5	-	SRS warning indicator
6	-	Adaptive Cruise Control (ACC) indicator (if fitted)
7	-	Left turn signal indicator
8	-	Coolant temperature gage
9	-	High coolant temperature warning indicator
10	-	High beam indicator
11	-	Tyre pressure monitoring system indicator (if fitted)
12	-	Fuel level gage
13	-	Right turn signal indicator
14	-	Cruise control indicator
15	-	Adaptive front lighting system indicator (if fitted)
16	-	Park brake fault indicator
17	-	Park brake warning indicator
18	-	Front fog lamp indicator
19	-	Rear fog lamp indicator

20	-	Speedometer
21	-	Odometer
22	-	Trip meter display
23	-	Trip reset button
24	-	Selector lever position (automatic transmission only)
25	-	CommandShift™/Sport mode indicator
26	-	CommandShift™ gear position (automatic transmission only)
27	-	Trailer indicator
28	-	Low fuel indicator
29	-	Message center
30	-	ABS indicator
31	-	Brake warning indicator (pad wear/low fluid/EBA/EBD)
32	-	Auxiliary heating indicator (non-functional - bulb check only)
33	-	DSC/Traction control indicator
34	-	HDC active indicator
35	-	Ambient light sensor
36	-	Alarm indicator
37	-	Transfer box low range indicator
38	-	Air suspension warning indicator (if fitted)
39	-	Tachometer

Instrument Cluster - Low Line

NOTE :

ROW Left hand drive diesel shown



E48541

Item	Part Number	Description
1	-	Ignition/No charge warning indicator

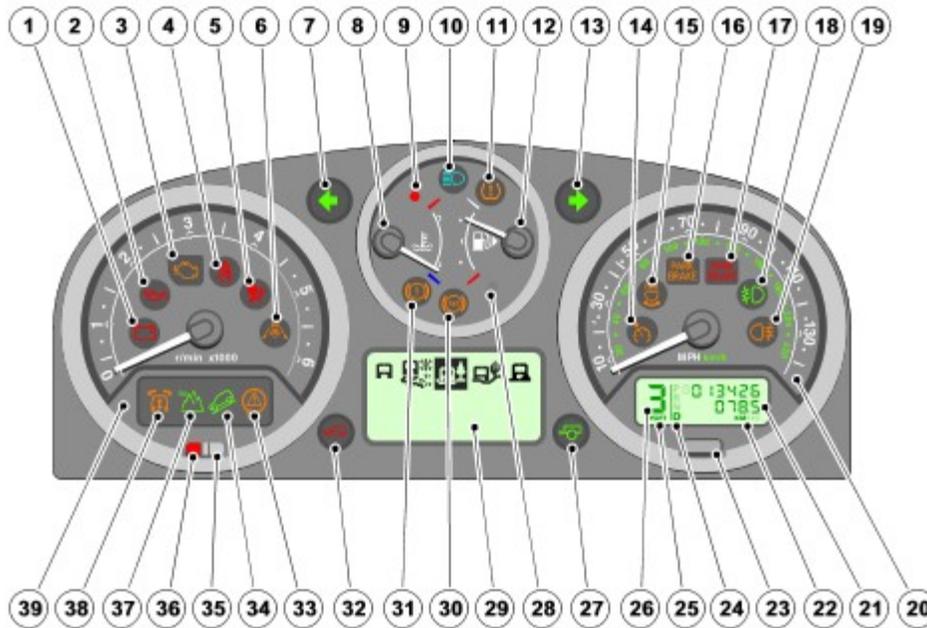
2	-	Low oil pressure warning indicator
3	-	Glow plug indicator
4	-	Seat belt warning indicator
5	-	SRS warning indicator
6	-	Not used
7	-	Left turn signal indicator
8	-	Brake warning indicator (pad wear/low fluid/EBA/EBD)
9	-	Coolant temperature gage
10	-	High coolant temperature warning indicator
11	-	ABS indicator
12	-	High beam indicator
13	-	Tyre pressure monitoring system indicator (if fitted)
14	-	Fuel level gage
15	-	Low fuel level indicator
16	-	Right turn signal indicator
17	-	Cruise control indicator
18	-	Adaptive front lighting system indicator (if fitted)
19	-	Park brake fault indicator
20	-	Park brake warning indicator
21	-	Front fog lamp indicator
22	-	Rear fog lamp indicator
23	-	Speedometer
24	-	Odometer
25	-	Trip meter display
26	-	Trip reset button
27	-	Selector lever position (automatic transmission only)
28	-	CommandShift™/Sport mode indicator
29	-	CommandShift™ gear position (automatic transmission only)
30	-	Trailer indicator
31	-	Low washer fluid indicator
32	-	Low coolant indicator
33	-	Water in fuel indicator - non-functional
34	-	Driveline overheat indicator
35	-	Tyre pressure warning
36	-	Driveline fault warning indicator
37	-	Park brake city mode indicator - non-functional
38	-	Engine management system fault indicator
39	-	HDC fault warning indicator
40	-	Door open warning indicator
41	-	Auxiliary heating indicator (non-functional - bulb check only)
42	-	DSC/traction control indicator
43	-	Ambient light sensor
44	-	Alarm indicator
45	-	HDC active indicator
46	-	Transfer box low range indicator
47	-	Air suspension warning indicator (if fitted)

48	-	Tachometer
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Instrument Cluster - NAS

NOTE :

High line shown



E48542

Item	Part Number	Description
1	-	Ignition/No charge warning indicator
2	-	Low oil pressure warning indicator
3	-	Malfunction Indicator Lamp (MIL)
4	-	Seat belt warning indicator
5	-	SRS warning indicator
6	-	Adaptive Cruise Control (ACC) indicator (if fitted)
7	-	Left turn signal indicator
8	-	Coolant temperature gage
9	-	High coolant temperature warning indicator
10	-	High beam indicator
11	-	Tyre pressure monitoring system indicator (if fitted)
12	-	Fuel level gage
13	-	Right turn signal indicator
14	-	Cruise control indicator
15	-	Adaptive front lighting system indicator (if fitted)
16	-	Park brake fault indicator
17	-	Park brake warning indicator
18	-	Front fog lamp indicator
19	-	Rear fog lamp indicator
20	-	Speedometer

21	-	Odometer
22	-	Trip meter display
23	-	Trip reset button
24	-	Selector lever position (automatic transmission only)
25	-	CommandShift™/Sport mode indicator
26	-	CommandShift™ gear position (automatic transmission only)
27	-	Trailer indicator
28	-	Low fuel indicator
29	-	Message center
30	-	ABS indicator
31	-	Brake warning indicator (pad wear/low fluid/EBA/EBD)
32	-	Auxiliary heating (non-functional - bulb check only)
33	-	DSC/traction control indicator
34	-	HDC active indicator
35	-	Ambient light sensor
36	-	Alarm indicator
37	-	Transfer box low range indicator
38	-	Air suspension warning indicator
39	-	Tachometer

WARNING INDICATORS

The warning indicators are located in various positions in the instrument cluster. The warning indicators can be split into two groups; self controlled and externally controlled.

Self controlled warning indicators are dependent on software logic within the instrument pack for activation. The pack software controls the indicator check illumination at ignition on and all indicators whose operation is controlled by the instrument cluster, the low fuel level warning indicator for example.

Externally controlled indicators are supplied with current from another system controlling module or illuminated by the instrument cluster on receipt of a bus message from another subsystem module.

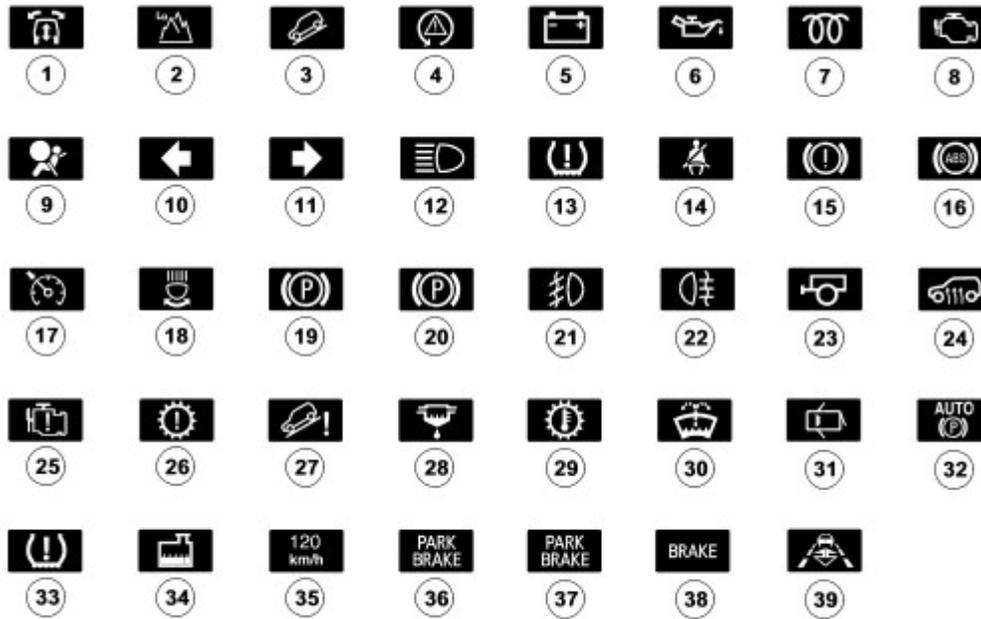
Some indicators are activated by an external subsystem module but the instrument cluster contains the control logic. These indicators are shown in the following table as being both self and externally controlled.

The following table shows the available indicators and indicates if they are subject to an indicator check at ignition on and if they are self or externally controlled.

Indicator	Illumination Color	Bulb Check	Self Controlled (S)/Externally Controlled (E)
Ignition/No charge	Red	No	E
Low oil pressure	Red	No	E
Glow plug active	Amber	* No (will illuminate at ignition on to show glow plugs active)	E
MIL	Amber	* Yes	E
Seat belt	Red	No	E
SRS	Red	* Yes	E
Adaptive cruise control (if fitted)	Amber	No	E
Transfer box low range	Green	No	E
Air suspension	Amber / Red	Yes	E
HDC active	Green	No	E

HDC fault	Amber	Yes	E
DSC / Traction control	Amber	Yes	E
Left turn signal	Green	No	E
Right turn signal	Green	No	E
Trailer	Green	No	E
High engine coolant temperature	RED	Yes	S
High beam	Blue	No	E
ABS failure	Amber	* Yes	E
Low fuel level	Amber	Yes	S
Cruise control	Amber	No	E
Park Brake City mode	Non-functional	-	-
Park brake fault	Amber	Yes	E
Park brake warning	Red	No	E
Front fog lamps	Green	No	E
Rear fog lamps	Amber	No	E
Alarm	Red	No	E
EMS Fault	Amber	Yes	E
Driveline fault	Amber / Red	Yes	E
Driveline overheat	Amber	Yes	E
Low washer fluid	Amber	Yes	E
Door open	Red	No	E
Auxiliary heater (non-functional - bulb check only)	Red	Yes	E
Tyre pressure monitoring	Amber	Yes	E
Low coolant level	Amber	No	E
Overspeed	Amber	No	E
Water in fuel	Non-functional	-	-
Tyre pressure warning	Amber	Yes	E
Brake warning	Amber / Red	Yes	E
Adaptive front lighting	Amber	Yes	E
* = Bulb check performed by subsystem module, not instrument cluster			

Warning Indicator Functionality



E48543

Item	Part Number	Description
1	-	Air suspension
2	-	Transfer box low range
3	-	HDC active
4	-	DSC/Traction control
5	-	Ignition/No charge
6	-	Low oil pressure
7	-	Glow plugs active (diesel models only)
8	-	Malfunction Indicator Lamp (petrol models only)
9	-	SRS warning
10	-	Left turn indicator
11	-	Right turn indicator
12	-	High beam
13	-	Tyre pressure monitoring system
14	-	Seat belt warning
15	-	Brake warning
16	-	ABS
17	-	Cruise control
18	-	Adaptive front lighting system
19	-	Park brake fault (all except NAS)
20	-	Park brake warning (all except NAS)
21	-	Front fog lamps
22	-	Rear fog lamps
23	-	Trailer
24	-	Auxiliary heating (non-functional - bulb check only)
25	-	Engine management system fault
26	-	Driveline fault
27	-	HDC fault

28	-	Water in fuel (non-functional)
29	-	Driveline overheat
30	-	Low washer fluid
31	-	Door open
32	-	Park brake city mode (non-functional)
33	-	Tyre pressure warning
34	-	Low coolant
35	-	Overspeed warning (Gulf only)
36	-	Park brake fault (NAS only)
37	-	Park brake warning (NAS only)
38	-	Brake warning (NAS only)
39	-	Adaptive Cruise Control (ACC) (if fitted)

The functionality for each of the above warning indicators is described below. Some warning indicators are accompanied by a chime from the instrument pack when they are illuminated and also a message in the message center on high line instrument clusters. Some indicators are only available on the low line instrument cluster, with the indicators being replaced with messages on the high line instrument cluster.

1. Air Suspension Indicator

The air suspension indicator is illuminated by the instrument cluster software on receipt of a CAN signal from the air suspension control module. The air suspension control module outputs a number of different signals relating to the air suspension system operation. The instrument cluster interprets the signals and can illuminate the indicator in either an amber or red colour as appropriate. Some signals also include requests for chimes from the instrument cluster to alert the driver.

2. Transfer Box Low Range Indicator

The transfer box low range indicator is illuminated by the instrument cluster software on receipt of CAN signals from the transfer box control module. When a range change from high to low range is in progress, the low range indicator flashes in an green color. When the range change is complete, the low range indicator remains permanently illuminated until high range is selected.

The transfer box control module also requests a single chime from the instrument cluster to alert the driver that the requested range change is complete. On high line instrument clusters, the range change information is also displayed in the message center.

3. Hill Descent Control (HDC) Active Indicator

The HDC active indicator is illuminated by the instrument cluster software on receipt of CAN signals from the ABS module. The indicator is illuminated in a green color when HDC is active and the vehicle speed is below a predetermined threshold. If the vehicle speed is faster than the threshold limit, the HDC indicator will flash until the vehicle speed is reduced. On high line instrument clusters a supporting message will also be displayed in the message center. For additional information, refer to [Anti-Lock Control - Traction Control](#) (206-09A Anti-Lock Control - Traction Control)

If the use of HDC causes the brake discs to exceed their pre-determined temperature, the HDC system initiates a 'fade out'. The HDC indicator flashes during 'fade out' and on high line instrument clusters a supporting message is displayed in the message center. When the brake discs have cooled sufficiently, HDC is reactivated and the HDC indicator is permanently illuminated.

4. Dynamic Stability Control (DSC)/Traction Control Indicator

The DSC/traction control indicator is illuminated by the instrument cluster software on receipt of CAN signals from the ABS module. The indicator is illuminated in an amber color for 3 seconds for a bulb check when the ignition is switched on. If no faults exist, the indicator is extinguished after the bulb check period.

When DSC is active, the indicator flashes to inform the driver that the system is regulating engine output and braking forces. If the indicator remains illuminated after the bulb check period or illuminates when driving, the DSC system has a fault or DSC has been deselected by the driver using the DSC switch on the fascia.

5. Ignition/No Charge Indicator

The ignition/no charge indicator is controlled by the instrument cluster software and illuminated by CAN signals from the Engine Control Module (ECM). The indicator illuminates in a red color when the ignition is moved to position II and is extinguished when the engine is started.

If the indicator remains illuminated after the engine has started or illuminates when driving, the alternator charge output has failed.

6. Low Oil Pressure Indicator

The low oil pressure indicator is hardwired directly to the instrument cluster. The indicator is illuminated in a red color when the ignition is moved to position II. When the engine is started and the oil pressure increases the low oil pressure indicator should extinguish. If the indicator remains illuminated or illuminates when driving the vehicle should be stopped at the earliest opportunity and the engine switched off until the fault is rectified.

7. Glow Plugs Active Indicator (Diesel models only)

The glow plugs active indicator is illuminated by the instrument cluster software on receipt of a CAN message from the Engine Control Module (ECM). The indicator is located in the same position as the MIL on petrol models. The indicator illuminates in an amber color when the ignition is moved to position II. The indicator illumination period varies with engine temperature and in some cases will not illuminate when the engine temperature is high. The indicator is controlled by CAN signals from the ECM which equate to the time which the glow plugs are energised to pre-heat the combustion chambers. For additional information, refer to [Glow Plug System](#) (303-07C Glow Plug System). When the glow plug heating time is complete, the indicator is extinguished indicating to the driver that the engine can now be started.

8. Malfunction Indicator Lamp (MIL)

The MIL is controlled by the instrument cluster software on receipt of CAN signals from the ECM. The indicator is illuminated for a bulb check by the ECM when the ignition is moved to position II. The lamp is extinguished when the engine starts.

If the MIL remains illuminated after the engine is started or illuminates while driving, a fault is present and must be investigated at the earliest opportunity. Illumination of the MIL indicates that there is an On-Board Diagnostic (OBD) fault which will cause excessive emissions output. This may relate to either an engine management system fault or a transmission fault.

9. Supplementary Restraint System (SRS) Warning Indicator

The SRS warning indicator is controlled by the restraints control module which transmits CAN signals to the instrument cluster. The warning indicator is illuminated for 6 seconds for a bulb check by the restraints control module when the ignition is moved to position II. If a fault is detected in the SRS the restraints control module illuminates the warning indicator in a red color until the fault is rectified.

The instrument cluster also performs a check of the indicator LED functionality. Failure of the indicator LED is transmitted to the driver in the form of a '5R5' (SRS) message which is displayed in the trip meter display.

10 and 11. Left and Right Turn Indicators

The turn indicators are controlled by the instrument cluster software on receipt of CAN signals on the medium speed CAN bus from the Central Junction Box (CJB). When the turn signal indicator switch is operated, the CJB transmits a signal to the instrument cluster to operate the applicable turn indicator. The instrument cluster software controls the flash rate of the indicator which flashes in a green color. During normal turn signal indicator operation the indicator flashes slowly, accompanied simultaneously by a sound from the instrument cluster sounder. If a fault exists, the instrument cluster responds to a fault message from the CJB and flashes the indicator at double speed.

The hazard warning indicators are also controlled by the CJB and the instrument cluster software and operate in the same manner as the turn signal indicators. The hazard warning indicators can operate with the ignition switched off, therefore, the CAN signal from the CJB to the instrument cluster to operate the left and right hand turn signal indicators will also 'wake-up' the instrument cluster.

12. High Beam Indicator

The high beam indicator is controlled by the instrument cluster software on receipt of CAN signals on the medium speed CAN bus from the Central Junction Box (CJB). When the high beam switch is moved to the high beam or headlight flash position, the CJB transmits a CAN message to the instrument cluster to illuminate the high beam indicator in a blue color.

13. Tyre Pressure Monitoring System (TPMS) Indicator

The Tyre Pressure Monitoring System (TPMS) indicator is controlled by the instrument cluster software on receipt of CAN signals from the TPMS module. The indicator is illuminated in an amber color for a 3 second bulb check by the TPMS module when the ignition is moved to position II. If the indicator remains illuminated after the engine is started or illuminates when driving, the TPMS has developed a fault. The tyre pressures should be monitored manually until the fault is rectified.

14. Safety Belt Warning Indicator

The safety belt warning indicator is controlled by the restraints control module and the instrument cluster software on receipt of CAN signals from the restraints control module.

The indicator is illuminated in a red color when the ignition is moved to position II. The illumination will remain on until the safety belt buckle is latched in position. If the safety belt of an occupied front seat is not fastened, when the vehicle speed exceeds 8 km/h (5 mph) the indicator will flash and repetitive chime will emit for 10 seconds from the instrument cluster. This will be repeated every 30 seconds until the safety belt is fastened, the vehicle speed is reduced below 5 km/h (3 mph) or the ignition switch is moved to the off position.

On NAS vehicles, the indicator will remain permanently illuminated until the safety belt is fastened, the vehicle speed is reduced below 5 km/h (3 mph) or the ignition switch is moved to the off position.

15 and 38. Brake Warning Indicator

This indicator is controlled by CAN signals from the ABS module for Electronic Brake Assist (EBA) and Electronic Brake Distribution (EBD) faults. Brake pad wear or low brake fluid indications are controlled by the instrument cluster with the pad wear sensors and the fluid level sensor hard wired into the instrument cluster.

The indicator can be illuminated in an amber or red colour depending on the fault. The indicator is illuminated for a bulb check when the ignition is switched on. The indicator is illuminated in an amber colour for 1.5 seconds and red colour for a further 1.5 seconds. If no faults exist, the indicator is extinguished after the bulb check period.

The brake warning indicator functions are assigned priority. Fault conditions which require a red illumination have priority over amber illuminated faults.

Brake Pad Wear

- The front left hand inboard brake pad and the rear right hand inboard brake pad are fitted with wear sensors. The pads are wired in series to the instrument cluster which continuously monitors the circuit. When one or both pads wear to their allowed limit (approximately 75% worn) the sensor circuit is broken and is detected by the instrument cluster software. The instrument cluster illuminates the brake warning indicator in a red colour and on high line instrument cluster a message 'CHECK BRAKE PADS' is displayed in the message center. When the pad(s) are replaced, the instrument cluster senses the completed circuit and withdraws the indicator illumination and message display (if applicable) when the ignition is switched on to position II.

EBA/EBD Warning

- If a failure of the EBA or EBD functions occur, the ABS module transmits a CAN signal which is received by the instrument cluster. The instrument cluster software illuminates the brake warning indicator in an amber color for minor EBA/EBD faults and in a red color for major EBA/EBD faults. The indicator will remain illuminated for as long as the fault exists.

Low Brake Fluid

- The brake fluid reservoir is fitted with a sensor which is connected directly to the instrument cluster. When the ignition is switched on to position II the fluid level is checked. To prevent incorrect warnings when the vehicle is moving, the sensor is monitored once every 25 seconds. If a low fluid situation occurs, the instrument cluster illuminates the brake warning indicator in a red color and on high line instrument clusters also displays the message 'CHECK BRAKE FLUID' in the message center. Illumination of the indicator for low fluid level is also accompanied by a chime from the instrument cluster.

16. Anti-lock Brake System (ABS) Indicator

The ABS indicator is controlled by the ABS module which transmits a CAN signal to the instrument cluster. The indicator is illuminated in an amber color for 3 seconds for a bulb check by the ABS module when the ignition is moved to position II. If the indicator remains illuminated or illuminates when driving, an ABS fault has occurred and the ABS function will not

be available.

During the bulb check, if the indicator comes on for 0.5 second, then goes off for 0.5 second and is then illuminated for the remaining 2 seconds of the bulb check, this indicates that faults are stored in the ABS module memory.

If the indicator was illuminated due to a sensor fault, the indicator will remain illuminated at the next ignition cycle, even if the fault is rectified. When the vehicle is driven above a speed of 20 km/h (12.5 mph) the indicator will be extinguished. This allows the ABS module to perform a thorough check of the system and to establish that the output from the replaced sensor is correct.

17. Cruise Control Indicator

The cruise control indicator is controlled by the ECM and the instrument cluster on receipt of CAN signals from the ECM. When the cruise control is selected on, the indicator is illuminated providing that cruise has been resumed and is not within 8 km/h (5 mph) of the set speed or cruise is on and the vehicle speed is within 8 km/h (5 mph).

18. Adaptive Front Lighting System (AFS) Indicator

The AFS indicator is controlled by the AFS control module and the instrument cluster software on receipt of CAN signals from the control module. The indicator is illuminated in an amber color for a 3 second bulb check when the ignition is moved to position II.

The AFS indicator displays AFS system failures to the driver. If a failure occurs, the indicator will illuminate continuously until the fault is rectified.

19 and 36. Park Brake Fault Indicator

The park brake fault indicator is controlled by the instrument cluster software on receipt of CAN signals from the Electronic Park Brake (EPB) control module. The indicator is illuminated in an amber color for 3 second for a bulb check when the ignition is moved to position II. If a fault occurs in the EPB system occurs, the EPB control module requests illumination of the indicator which remains illuminated until the fault is rectified.

20 and 37. Park Brake Warning Indicator

The park brake warning indicator is controlled by the instrument cluster software on receipt of CAN signals from the Electronic Park Brake (EPB) control module. The indicator is illuminated in a red color when the park brake is applied. If the ignition is moved to the off position, the indicator remains illuminated for 3 minutes. If a fault occurs which prevents park brake application the indicator flashes and the park brake fault indicator is also illuminated.

21. Front Fog Lamps Indicator

The front fog lamp indicator is controlled by the CJB which illuminates the indicator via a hardwired connection to the instrument cluster. The indicator is illuminated in a green color at all times when the front fog lamps are selected on and the ignition is in position II.

22. Rear Fog Lamps Indicator

The rear fog lamp indicator is controlled by the CJB which illuminates the indicator via a hardwired connection to the instrument cluster. The indicator is illuminated in an amber color at all times when the rear fog lamps are selected on and the ignition is in position II.

23. Trailer Indicator

The trailer indicator is controlled by the instrument cluster software on receipt of CAN signals on the medium speed CAN bus from the Central Junction Box (CJB). When a trailer is connected to the vehicle electrical system and the turn signal indicator switch is operated, the CJB transmits a signal to the instrument cluster to operate the trailer indicator. The instrument cluster software controls the flash rate of the indicator which flashes in a green color. The trailer indicator flashes slowly, accompanied simultaneously by a sound from the instrument cluster sounder, at the same rate as the turn signal indicators.

24. Auxiliary Heating Indicator

The auxiliary heater indicator is only illuminated for a bulb check for 3 seconds when the ignition is moved to position II.

25. Engine Management System (EMS) Fault Indicator

The EMS fault indicator is only available on low line instrument clusters. The indicator is controlled by the ECM and the instrument cluster software on receipt of CAN signals from the ECM. The indicator is illuminated in an amber color for

bulb check when the ignition is moved to position II. The lamp is extinguished when the engine starts. Engine management faults which do not affect emissions will permanently illuminate the EMS fault indicator. The indicator will only extinguish when the fault has been rectified.

Reduced engine performance or limp home operation is also signalled to the driver by the EMS fault indicator.

26. Driveline Fault Indicator

The Driveline fault indicator is controlled by transfer box control module, rear differential control module and the transmission control module and the instrument cluster software. The indicator is illuminated by the instrument cluster on receipt of a CAN signal of either of the controlling modules. The instrument cluster interprets the signals and can illuminate the indicator in either an amber or red colour as appropriate for faults relating to either the transfer box, rear differential or the automatic transmission. Amber illumination signifies a minor fault which should be rectified when convenient, Red illumination signifies a major fault which should be rectified at the earliest opportunity.

27. Hill Descent Control (HDC) Fault Indicator

The HDC fault indicator is only available on low line instrument clusters; on high line instrument cluster fault information is displayed by appropriate messages in the message center. The HDC fault indicator is illuminated by the instrument cluster software on receipt of CAN signals from the ABS module. The indicator is illuminated in an amber color when a HDC fault is present. The indicator is illuminated in an amber color for a 3 second bulb check when the ignition is moved to position II. If a fault occurs in the HDC system, the amber indicator is illuminated For additional information, refer to [Anti-Lock Control - Traction Control](#) (206-09A Anti-Lock Control - Traction Control)

During the bulb check, if the indicator comes on for 0.5 second, then goes off for 0.5 second and is then illuminated for the remaining 2 seconds of the bulb check, this indicates that faults are stored in the ABS module memory.

If the indicator was illuminated due to a sensor fault, the indicator will remain illuminated at the next ignition cycle, even if the fault is rectified. When the vehicle is driven above a speed of 20 km/h (12.5 mph) the indicator will be extinguished. This allows the ABS module to perform a thorough check of the system and to establish that the output from the replaced sensor is correct.

If the use of HDC causes the brake discs to exceed their pre-determined temperature, the HDC system initiates a 'fade out'. The HDC fault indicator flashes during 'fade out'. When the brake discs have cooled sufficiently, HDC is reactivated and the HDC fault indicator is extinguished.

28. Water In Fuel Indicator

This indicator is non-functional.

29. Driveline Overheat Indicator

The driveline overheat indicator is controlled by the instrument cluster software on receipt of CAN signals from the transfer box control module, rear differential control module or the transmission control module for the automatic transmission. The indicator is illuminated in an amber color for a 3 second bulb check when the ignition is moved to position II. When one or more of the control modules sense that the controlled component has reached its over temperature threshold, the applicable control module(s) transmits a CAN signal to the instrument cluster which illuminates the indicator for as long as the over temperature condition exists.

30. Low Washer Fluid Indicator

The low washer fluid indicator is only available on low line instrument clusters; on high line instrument cluster the level information is displayed by appropriate messages in the message center. The low washer fluid indicator is controlled by the instrument cluster. The washer fluid level sensor is hardwired into the instrument cluster which monitors the sensor output. The indicator is illuminated in an amber color for 3 seconds when the ignition is moved to position II. When the fluid in the washer reservoir falls to a predetermined level, the instrument cluster senses the signals from the sensor and illuminates the indicator and emits a single warning chime to alert the driver. The instrument cluster monitors the level sensor signals every 15 seconds to prevent incorrect warnings occurring due to fluid movement. When the reservoir is replenished the indicator is extinguished.

31. Door Open Indicator

The door open indicator is controlled by the instrument cluster on receipt of CAN signals from the Central Junction Box (CJB). The indicator is illuminated in a red color if any of the front or rear passenger doors, the driver's door, the bonnet or the tail gate are left open with the ignition switch in position II.

32. Park Brake City Mode Indicator

This indicator is non-functional.

33. Tyre Pressure Warning Indicator

The tyre pressure warning indicator is only available on low instrument cluster, high line instrument clusters display warning messages in the message center. The Tyre Pressure Monitoring System (TPMS) indicator is controlled by the instrument cluster software on receipt of CAN signals from the TPMS module. The indicator is illuminated in a red color for a 3 second bulb check by the TPMS module when the ignition is moved to position II.

If the indicator remains illuminated after the engine is started or illuminates when driving, the vehicle should be stopped at the earliest opportunity and the tyre pressures checked.

34. Low Coolant Indicator

The low coolant indicator is controlled by the instrument cluster. The coolant level sensor is hardwired into the instrument cluster which monitors the sensor output. The indicator is illuminated in an amber color for 3 seconds when the ignition is moved to position II. When the coolant in the header tank falls to a predetermined level, the instrument cluster senses the signals from the low coolant sensor. The instrument cluster flashes the indicator for 5 seconds accompanied by an a chime and then illuminates the indicator. The indicator remains illuminated until the coolant level in the header tank is restored to its correct level. The instrument cluster monitors the level sensor signals every 15 seconds to prevent incorrect warnings due to fluid movement.

35. Overspeed Warning Indicator

The overspeed warning indicator is only available on low line instrument clusters; on high line instrument cluster the level information is displayed by appropriate messages in the message center. The overspeed warning indicator is controlled by the instrument cluster and the speed threshold is determined by the default setting. The instrument cluster receives vehicle speed information from the ABS module on the CAN. The instrument cluster software monitors the speed signal data and determines when the speed threshold has been exceeded. When an overspeed condition occurs, the indicator is illuminated permanently for as long as the overspeed condition occurs.

39. Adaptive Cruise Control (ACC) Indicator (if fitted)

The ACC indicator is controlled by the ACC module and the instrument cluster software. The indicator is illuminated when cruise control is active and another vehicle is detected by the radar system in front of the vehicle. The indicator is illuminated in an amber color to alert the driver that the ACC system is active and will automatically control the vehicle speed to maintain a set distance from the vehicle in front.

ANALOGUE INSTRUMENTS

The analogue instruments located in the instrument cluster are as follows:

- Speedometer
- Tachometer
- Fuel level gage
- Engine coolant temperature gage.

The speedometer, tachometer, fuel gauge and engine temperature gauge are each driven by an electronic stepper motor. The characteristics of this type of motor produce damping of the pointer needle. All of the gages return to their respective zero positions when the ignition is switched off.

Speedometer

The speedometer is driven by square wave signals derived from the wheel speed sensors and the ABS module. The wheel speeds are measured by the wheel speed sensors reading the rotational speed of the wheels from toothed targets on the hubs. The wheel speeds are passed from the sensors to the ABS module in the form of pulsed signals. The ABS module converts these signals into a speed output on the high speed CAN to the instrument cluster.

Three versions of the speedometer display are used. The three versions show the speed in kilometres per hour, the speed in miles per hour as the main display and kilometres per hour as a secondary display and Canadian variants show the kilometres per hour as the main display and miles per hours as the secondary display.

Tachometer

The tachometer is driven by an engine speed signal transmitted on the high speed CAN from the ECM. The signal is derived from the Crankshaft Position (CKP) sensor. The signal is received by the instrument cluster microprocessor and the output from the microprocessor drives the tachometer.

Two versions of the tachometer are used for petrol and diesel engine variants. The petrol engine variants use a display which has a maximum engine speed reading of 8000 rev/min. The diesel engine variants use a display which has a maximum engine speed reading of 6000 rev/min.

Fuel Level Gage

The fuel level gage displays the fuel tank contents. When the ignition is off, the pointer returns to the empty position.

The instrument pack is connected to two tank level sensors. One sensor is located at the front of the fuel tank and the other is located at the rear. Each sensor uses a float operated MAGnetic Passive Position Sensor (MAPPS) for measuring the fuel tank contents. For additional information, refer to [Fuel Tank and Lines](#) (310-01A Fuel Tank and Lines - 4.0L) For additional information, refer to [Fuel Tank and Lines](#) (310-01B Fuel Tank and Lines - 4.4L) For additional information, refer to [Fuel Tank and Lines](#) (310-01C Fuel Tank and Lines - 2.7L Diesel)

Each sensor is supplied with a reference current from the instrument cluster. The instrument cluster measures the returned output from each sensor which is proportional to the amount of fuel in the tank and the position of the float arm. The inclination of the vehicle, derived from a CAN message from the Electronic Park Brake (EPB) module, is also used to calculate the fuel tank contents. The instrument cluster uses the fuel level sensor signals and the EPB module inclination signals to accurately calculate the volume of fuel in the tank and display this on the fuel level gage. The instrument cluster monitors the signals and updates the fuel level gage pointer position at approximately 20 second intervals. This prevents the pointer moving continually due to fuel movement in the tank due to cornering or braking. When the ignition is off, the pointer needle returns to the empty position.

A warning lamp is incorporated into the fuel level gage and illuminates when the fuel tank volume is at or below 10 liters (2.19 Gallons) on petrol models and 18 liters (3.96 Gallons) on diesel models. This is accompanied by a chime from the instrument cluster to alert the driver to the low fuel condition. On vehicles with a high line instrument cluster the low fuel level is also displayed in the message center.

The fuel tank contents is converted into a CAN signal by the instrument cluster and transmitted on the CAN. This is used by the fuel fired booster heater to suspend operation on diesel variants.

The following table shows the fuel tank fuel quantity and the respective pointer positions.

Fuel Tank Quantity (Liters)	Needle Pointer Position
4.82	EMPTY
12.5	LOW FUEL (Low fuel indicator illuminated) 4.0L V6 and 4.4L V8 only
14	LOW FUEL (Low fuel indicator illuminated) TdV6 only
25.5	ONE QUARTER FULL
45.4	HALF FULL
66.1	THREE QUARTERS FULL
79.89	FULL

Engine Coolant Temperature Gage

The engine coolant temperature gage displays the engine coolant temperature to the driver. When the ignition is off the pointer needle returns to the cold position.

The engine coolant temperature sensor is connected to the ECM which monitors the sensor signals and converts the signals into a value for the engine coolant temperature. This information is transmitted on the high speed CAN for use by the instrument cluster and other systems. For additional information, refer to [Electronic Engine Controls](#) (303-14A Electronic Engine Controls - 4.0L)

For additional information, refer to [Electronic Engine Controls](#) (303-14B Electronic Engine Controls - 4.4L)

For additional information, refer to [Electronic Engine Controls](#) (303-14C Electronic Engine Controls - 2.7L Diesel)

The engine coolant temperature gage is the same on all pack variants. The gage has a blue segment for low

temperatures and a red segment for excessively high temperatures. For normal operating temperatures the gage needle pointer is positioned centrally in the gage display zone. The needle pointer position translates to the following approximate temperatures.

Engine Coolant Temperature °C (°F)	Needle Pointer Position
Ignition off	Park position
40 (104)	Cold (Blue segment)
75 - 115 (167 - 239)	Normal
120 (248)	Start of hot (Red segment)
125 (257)	End of hot

AMBIENT LIGHT SENSOR

An ambient light sensor is located in the instrument cluster, adjacent to the alarm indicator. The ambient light sensor is a phototransistor which measures the available ambient light.

The phototransistor measures the ambient light (lux) level and passes a signal value for the available light level to the instrument cluster microprocessor. The instrument cluster software adjusts the display brightness of the message center and information display LCD's accordingly to ensure that the displays are clearly visible during day and night time driving.

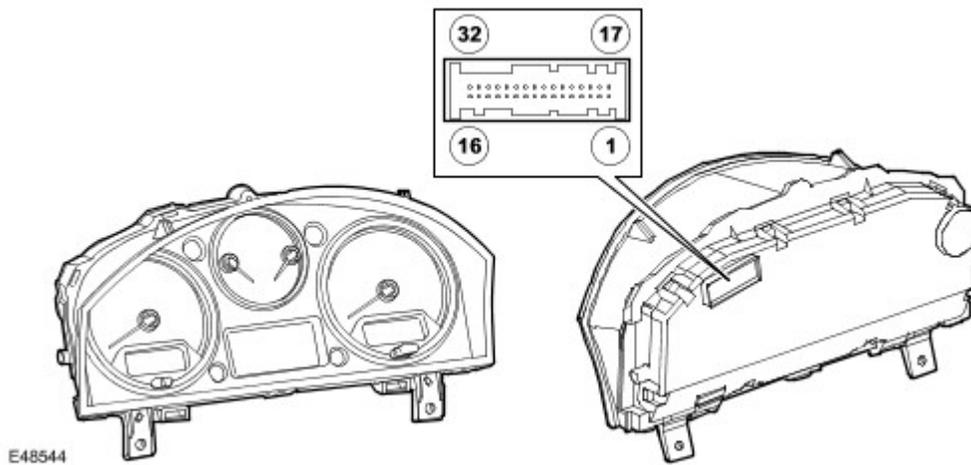
MESSAGE CENTER

Refer to Information and Message Center section for details.

INPUTS AND OUTPUTS

A single electrical harness connector provides all inputs and outputs to and from the instrument cluster.

Instrument cluster Harness Connector C0230



Pin No.	Description	Input/Output
1	High Speed CAN + Positive	Input/Output
2	High Speed CAN - Negative	Input/Output
3	Low oil pressure sensor	Input
4	Low washer fluid level sensor	Input
5	Dimmer switch input - PWM illumination control	Input
6	Seat occupancy status	Input

7	Alarm LED indicator	Input
8	Park brake - direct drive to indicator	Input
9	Brake pad wear sensors	Input
10	Not used	-
11	Not used	-
12	Fuel tank level sensor 1	Input
13	Fuel tank level sensor ground	Input
14	Ground	Input
15	Power supply - Ignition switch position II	Input
16	Power supply - 12V Permanent	Input
17	Medium Speed CAN + Positive	Input/Output
18	Medium Speed CAN - Negative	Input/Output
19	Low engine coolant level sensor	Input
20	Rear fog lamp active	Input
21	Brake fluid level sensor	Input
22	Trip computer button	Input
23	Not used	Input
24	Front fog lamp active	Input
25	Park brake LED indicator	Input
26	Not used	-
27	Fuel tank level sensor 2	Input
28	Not used	-
29	Not used	-
30	Not used	-
31	Power supply - Ground	Input
32	Power supply - Ground	Input

DIAGNOSTICS

Car Configuration File

The Car Configuration File (CCF) contains all relevant data about the specification and market condition of the applicable vehicle, immobilisation codes and driver personal settings. This information is retained in the Central Junction Box (CJB), the Engine Control Module (ECM) and the instrument cluster enabling each system module to detect which systems and components are fitted to the vehicle. The information is continuously transferred between the three system modules to ensure that the data is constantly backed-up between the modules.



CAUTION : When a new instrument cluster is to be installed, T4 must be connected to the vehicle and the instrument cluster renewal procedure followed to replace the cluster. This will ensure that vehicle coding data is correctly installed in the new instrument cluster. T4 will also record the current service interval data and restore the settings in the new instrument cluster.

When a new instrument cluster is installed, T4 is used to transfer the CCF data from the CJB to the replacement cluster. Vehicle coding data such as engine type, market etc is retrieved and used to update the replacement instrument cluster.

The CCF will also need to be updated using T4 if the vehicle is modified in service from its original factory specification. This can include fitting non-standard wheels and/or tyres, optional accessory dealer fit components with an electrical interface, i.e. park distance control.

CUSTOMER PERSONALISATION

Refer to Information and Message Center section for details. For additional information, refer to [Information and Message Center](#) (413-08 Information and Message Center)