



# Technical Service Bulletin

No.LA418-  
004  
14  
July 2006

**Subject/Concern:** Discovery 3/LR3 - Diagnostic Aid for Multiple Diagnostic Trouble Codes

**Models:**

Discovery 3 / LR3 | | VIN- range: 5A300394 Onwards

**Markets:** All

**Section:** 418-00

**Summary:**

A customer may report a concern that multiple warning lamps and messages are being cascaded on the message center i.e. ABS, followed by DSC, then air suspension, transmission etc. Investigation using diagnostic equipment reveals many diagnostic trouble codes (DTCs) stored in different control modules, including codes with 'P', 'C' and 'U' prefixes. In some cases in excess of fifty DTCs have been recorded, making the start point for diagnosis difficult to establish and the first DTC logged not necessarily correcting the issue.

**Cause:** The complex nature of the vehicle can cause a cascade effect with a fault code logging in more than one control module. DTCs with the 'U' prefix can cascade around the vehicle control modules as invalid data, lost communication or control area network (CAN) bus faults as can be logged by each module. A fault which is local to a system and only applicable to that system is classed as a 'hard fault' (e.g. engine sensor 'P' prefix codes and suspension sensor 'C' prefix codes). A hard fault which will result in data for engine torque, engine speed, road speed etc. being invalid will then cascade around the vehicle systems as 'U' codes. The other systems then switch to default mode as designed. For example, the Dynamic Stability Control system (DSC) requires an engine torque signal to control engine power during DSC activity and so will log a fault within the DSC control module when the cascaded 'U' code is seen. The root cause for illumination of, for instance, an ABS/DSC warning lamp can lead the technician to investigate the ABS control module first. It may not be obvious that the root cause is within the engine control module. For example, a diesel exhaust gas recirculation (EGR) fault (a hard fault local to the engine), results in the engine control module being unable to calculate 'engine torque'. This torque will be transmitted on the CAN as invalid data and will cause the ABS, DSC and air suspension to enter default mode and illuminate amber warnings because they all need engine torque data to function fully.

**Action:** Should a customer express concern regarding the above, refer to the Diagnostic Procedure detailed in this bulletin to help establish the root cause of the logged DTCs.

## Diagnostic Procedure

**Procedure to follow if many 'P' and 'C' codes are present also with 'U' network codes.**

**NOTE:** Most 'P', 'C' and 'B' prefixed DTCs are 'hard faults' which can be rectified, but a small number are

due to errors in other systems. Most 'U' codes are due to errors originating from other systems, but a small number are hard faults which can be rectified.

**NOTE:** In instances where only 'P' or 'C' codes are stored (no 'U' codes), check for other TSB information issued for the particular DTC or symptom.

**NOTE:** Do not begin working on the rectification of any DTCs, especially 'U' prefixed codes, without following this procedure.

- 1 . **Read the DTCs from ALL control modules** and list in groups of 'P', 'C', 'B' and 'U' prefixes.
- 2 . Review the 'P' and/or 'C' DTCs against the list on Table 1.
  - 1 . If a 'P' or 'C' DTC **is not listed** in Table 1 this is a 'hard fault' with the relative system and needs to be rectified first. In most cases, this will usually be the root cause of the DTC logging cascade. Diagnose the problem as directed by the diagnostic equipment or using TSB information relevant to code present, clear all other logged codes, and test the vehicle to confirm the repair. If this action rectifies the complaint, no further action is required.
  - 2 . If the 'P' or 'C' DTC **is listed in** Table 1, it is unlikely to be a 'hard fault' with the related system. Ignore these codes for the time being.
- 3 . Review the 'B' DTCs for instrument pack (IPK), supplementary restraint system (SRS) and the headlamps against the list in Table 1.
  - 1 . If a 'B' DTC **is not listed** in Table 1 this is a 'hard fault' with the relative system and needs to be rectified first. In most cases, this will usually be the root cause of the DTC logging cascade. Diagnose the problem as directed by the diagnostic equipment or using TSB information relevant to code present, clear all other logged codes, and test the vehicle to confirm the repair. If this action rectifies the complaint, no further action is required.
  - 2 . If the 'B' DTC **is listed in** Table 1, it is unlikely to be a 'hard fault' with the related system. Ignore these codes for the time being.
- 4 . Review the 'U' codes against the list in Table 1.
  - 1 . If a 'U' DTC **is listed in** Table 1 this is a 'hard fault' with the relative system and needs to be rectified first. In most cases, this will usually be the root cause of the DTC logging cascade. Diagnose the problem as directed by the diagnostic equipment or using TSB information relevant to code present, clear all other logged codes, and test the vehicle to confirm the repair. If this action rectifies the complaint, no further action is required.

**If a problem remains.**

- 5 . **NOTE:** Ensure a full DTC listing is available.

If a problem remains with the vehicle or the DTC cannot be analysed by this TSB, contact the Land Rover dealer technical assistance helpline for further help.

**Table 1**

**NOTE:** This table indicates the following DTC data, applicable to Land Rover Discovery 3/LR3 and Range Rover Sport: P, C and B codes which are **NOT** necessarily hard faults, and U codes which **ARE** hard faults

Control Module Containing DTC	DTC	DTC Description	Cascaded DTC Log -Invalid data (Yes or No)	Cascaded DTC Log - Lost comms (Yes or No)	Problem is Local to this System OR Cascaded (Yes or No)	Fault is Local to this System (Yes or No)	Help Category (below)
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					No)	
Gasoline Engine Control Module	C003100	Wheel speed signal	Y	Y		C
(ECM)	C003400	Wheel speed signal	Y	Y		C
	C003700	Wheel speed signal	Y	Y		C
	C003A00	Wheel speed signal	Y	Y		C
	C129600	Wheel speed signal	Y	Y		C
	C129700	Wheel speed signal	Y	Y		C
	C129800	Wheel speed signal	Y	Y		C
	C129900	Wheel speed signal	Y	Y		C
	P050000	Invalid ABS data	Y	Y		A
	P050162	Vehicle speed	Y			A
	P050164	Vehicle speed	Y			A
	P050429	Brake switch plausibility			Y	
	P050464	Brake switch plausibility			Y	
	P051300	Incorrect security key	Y			A
	P061000	CCF data mismatch			Y	
	P063000	VIN data mismatch			Y	
	P063305	Security Target ID Transfer Process Failed	Y	Y		C
	P070000	TCM MIL request	Y			A
	P277200	4WD switch low cct			Y	D
Diesel Engine Control Module	P1259	immobilizer signal error - ECM ID transfer failed	Y			A
(ECM)	P1602	immobilizer comms error - timeout occurred		Y		B
	P1621	immobilizer - challenge does not match			Y	
	P1622	immobilizer - key status unknown			Y	

	P1934	Vehicle speed signal	Y				A
	P1935	Brake switch / sensor signal	Y	Y			C
	P1936	Clutch switch / sensor signal	Y				A
	P193A	Diagnostic tool problem	Y				A
Slip Control System	C1A0088	CAN Bus off			Y		
(SCS/ABS/DSC)	C1B0027	SAS fault - check SAS	Y				A
	C1B0029	SAS fault - check SAS	Y				A
	C1B0061	SAS fault - check SAS	Y				A
	C1B0064	SAS fault - check SAS	Y				A
	C1B0092	SAS fault - check SAS	Y				A
	C1B0092	SAS fault - check SAS	Y				A
Transmission Control Module	P012100	Throttle pedal pos sensor A cct - Plausibility			Y		
(TCM)	P050000	wheel speed from CAN	Y	Y			C
	P050100	Plausibility with wheel speed from CAN	Y				A
	P072164	Output shaft speed sensor - Plausibility			Y		D
	U010387	Lost comms with gear shifter				Y	
	U040462	Invalid data from gear shifter				Y	
	U040464	Invalid data from gear shifter				Y	
	U040486	Invalid data from gear shifter				Y	
Rear Differential Control Module	U1A1449	CAN initiation failure				Y	
(RDCM)							
Air Suspension	U1A1449	CAN initiation				Y	

		failure					
	U200067	Compressor temp sensor				Y	
	U200701	Valve cct short to ground				Y	
	U200711	Valve cct short to ground when inactive				Y	
	U200719	Valve cct current too high				Y	
	U200767	Valve signal incorrect after event				Y	
Terrain Optimisation	U1A1449	CAN initiation failure				Y	
Electronic Park Brake	C1A5564	Ignition switch input circuit failure (plausibility)			Y		D
(EPB)	U1A1449	CAN initiation failure				Y	
	U200201	Switch general electrical failure				Y	
Dynamic Roll Control Module	U1A1449	CAN initiation failure				Y	
(DRCS)	U200798	Valve over temperature				Y	
Adaptive Headlamps	U1A1449	CAN initiation failure				Y	
(AFS)	U1A3887	Lost comms LH lamp				Y	
	U1A3987	Lost comms RH lamp				Y	
	U300000	ECU malfunction				Y	
	U300016	Voltage too low				Y	
	U300017	Voltage too high				Y	
	U300042	Memory failure				Y	
Adaptive Headlights	U1A1449	CAN initiation failure				Y	
(AFS/LCM)	U1A3887	Lost comms LH lamp				Y	
	U1A3987	Lost comms RH lamp				Y	
Restraints Control module	B00D268	Indicator faulty (Invalid data IPK)	Y				

(RCM)	B00D287	Indicator timeout (Lost comms IPK)		Y			
	B1A5514	Crash output SC to ground or open				Y	
	U1A0064	Private CAN config error/plausibility				Y	
	U1A0088	Private CAN bus fault				Y	
	U1A1455	CAN initiation failure				Y	
	U201A51	Data not programmed (F124)				Y	
	U201B4A	Incorrect component (F125)				Y	
	U201B51	Data not programmed (F125)				Y	
	U201C4A	Incorrect component (F126)				Y	
	U201C51	Data not programmed (F126)				Y	
Adaptive Cruise Control	U1A0088	Private CAN bus off				Y	
	U1A1449	CAN initiation failure				Y	
		Battery/ECU reset			Y		

**Help Text Category A - Invalid Data**

This type of diagnostic trouble code is caused when one or more control modules installed to the vehicle receives invalid data from another control module. Multiple electrical systems can be affected when a failure of this type occurs. For example; The electronic park brake, automatic transmission, engine management and center differential all rely on wheel speed information being correctly broadcast by the vehicle dynamics control module in order to function correctly. If invalid information is broadcast by the vehicle dynamics control module to the recipient modules listed above, an invalid data diagnostic trouble code will be stored in each given control module or modules. When this fault occurs it can in turn cause any of the recipient control modules to change behaviour and/or alter information being broadcast to other systems on the vehicle, i.e. cascading DTC logging.

As a result of this type of failure the customer will often report unexpected vehicle operation with regard to warning lamp, warning message or audible warning activity.

Invalid data transmitted by a control module is generally caused by an electrical/mechanical problem in that control system, e.g. a faulty wheel speed sensing circuit. In this example above; the following actions must be taken in order to fully investigate this failure:

- Perform a 'complete vehicle' diagnostic trouble code read (from ALL control modules)
- Review all stored diagnostic trouble codes in each control module attempting to establish a trend between failures, e.g. several control modules report invalid data received from one common control module as described above.
- Investigate and repair all permanent or intermittent diagnostic trouble codes in the order 'P', 'C', 'B' and 'U' unless the diagnostic equipment help text provided for any given fault instructs you to ignore the failure, or the help text refers to Invalid data and/or lost communications.
- If 'P', 'C', 'B' or 'U' diagnostic trouble code(s) have been investigated and repaired, perform a complete vehicle diagnostic trouble code clear. If any 'P', 'C', 'B' or 'U' diagnostic trouble code either logs or re-logs during the repair confirmation test repeat the steps above as necessary.

If no 'P', 'C', 'B' or 'U' diagnostic trouble codes are stored other than those previously instructed to ignore; the following action should be taken:

- If the customer has reported any problem with vehicle operation with regard to warning lamp, warning message or audible warning activity, please contact the Dealer technical support line for further advice.
- If there have been no customer complaints relating to the above conditions, perform a complete vehicle fault code clear.

### **Help Text Category B - Lost Communications**

This type of diagnostic trouble code is caused when one or more control modules installed to the vehicle does not receive data from another control module when expected. Multiple electrical systems can be affected when a failure of this type occurs for example;

Electronic park brake, automatic transmission, engine management and the center differential, all rely on wheel speed information being correctly broadcast by the vehicle dynamics control module in order to function correctly. If information broadcast by the vehicle dynamics control module does not reach any of the recipient modules listed above, a lost communications diagnostic trouble code will be stored in the given control module or modules. When this fault occurs it can in turn cause any of the recipient control modules to change behaviour and/or alter information being broadcast to other systems on the vehicle, e.g. cascading failure.

As a result of this type of failure the customer will often report unexpected vehicle operation with regard to warning lamp, warning message or audible warning activity.

The following actions must be taken in order to fully investigate this failure:

- Perform a 'complete vehicle' diagnostic trouble code read (from ALL control modules).
- Review all stored diagnostic trouble codes in each control module attempting to establish a trend between failures, e.g. several control modules report lost communications with one common control module as described above.
- Investigate and repair all permanent or intermittent diagnostic trouble codes in the order 'P', 'C', 'B' and 'U' unless the diagnostic equipment help text provided for any given fault instructs you to ignore the failure, or the help text refers to Invalid data and/or lost communications.
- If 'P', 'C', 'B' or 'U' diagnostic trouble code(s) have been investigated and repaired, perform a complete vehicle diagnostic trouble code clear. If any 'P', 'C', 'B' or 'U' diagnostic trouble code either logs or re-logs during the repair confirmation test repeat the steps above as necessary.

If no 'P', 'C', 'B' or 'U' diagnostic trouble codes are stored other than those previously instructed to ignore, the following action should be taken:

If the customer has reported any problem with vehicle operation with regard to warning lamp, warning message or audible warning activity, an intermittent fault may be present on the vehicle. Based upon the review of stored diagnostic trouble codes, please check the integrity of the following areas for each of the control modules identified by a lost communications diagnostic trouble code:

- Communications network harness and connector.
- Control module power supply harness and connector.
- Control module ground supply harness and connector.

If no faults are found during these checks please contact the Dealer technical support line for further advice.

If there have been no customers complaints relating to the above conditions, perform a complete vehicle fault code clear

### **Help Text Category C - Lost Communications or Invalid Data**

This type of diagnostic trouble code is caused when one or more control modules fitted to the vehicle does not receive data from another control module when expected, or the data received is invalid. Multiple electrical systems can be affected when a failure of this type occurs, for example:

Electronic park brake, automatic transmission, engine management and the center differential all rely on wheel speed information being correctly broadcast by the vehicle dynamics control module in order to function correctly. If invalid information is broadcast by the vehicle dynamics control module or the data broadcast is not received by the recipient modules listed above, an invalid data or lost communications diagnostic trouble code will be stored in the given control module or modules. When this fault occurs it can in turn cause any of the recipient control modules to change behaviour and/or alter information being broadcast to other systems on the vehicle, i.e. cascading failure.

As a result of this type of failure, the customer will often report unexpected vehicle operation with regard to warning lamp, warning message or audible warning activity.

Invalid data transmitted by a control module is generally caused by an electrical error in that control system, e.g. a faulty wheel speed sensing circuit in the example above.

The following actions must be taken in order to fully investigate this failure:

- Perform a 'complete vehicle' diagnostic trouble code read (from ALL control modules).
- Review all stored diagnostic trouble codes in each control module attempting to establish a trend between failures, e.g. several control modules report lost communications with one common control module as described above.
- Investigate and repair all permanent or intermittent diagnostic trouble codes in the order 'P', 'C', 'B' and 'U' unless the diagnostic equipment help text provided for any given fault instructs you to ignore the failure, or the help text refers to Invalid data and/or lost communications.
- If 'P', 'C', 'B' or 'U' diagnostic trouble code(s) have been investigated and repaired, perform a complete vehicle diagnostic trouble code clear. If any 'P', 'C', 'B' or 'U' diagnostic trouble code either logs or re-logs during the repair confirmation test repeat the steps above as necessary.

If no 'P', 'C', 'B' or 'U' diagnostic trouble codes are stored other than those previously



instructed to ignore, the following action should be taken:

If the customer has reported any problem with vehicle operation with regard to warning lamp, warning message or audible warning activity an intermittent fault may be present on the vehicle. Based upon the review of stored diagnostic trouble codes, please check the integrity of the following areas for each of the control modules identified by a lost communications diagnostic trouble code:

- Communications network harness and connector.
- Control module power supply harness and connector.
- Control module ground supply harness and connector.

If no faults are found during these checks please contact the Dealer technical support line for further advice.

If there have been no customers complaints relating to the above conditions perform a complete vehicle fault code clear

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