

TECHNICAL SERVICE BULLETIN No.JTB00017/2006 20 December 2006

Circulate to:	Service Manager	Parts Manager	Warranty Administrator	Service Reception	Technicians

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Subject/Concern:	Additional Diagnostics for Instrument Cluster
Model:	
The New XK	VIN Range: B00001 Onwards
Markets:	All
Section:	413-01 - Instrument Cluster
Summary	
This Bulletin has been issued for information only for additional diagnostics for instrument cluster (IC) concerns.	
Cause: Components returned under Warranty with no fault found (NFF).	
Action: Should a customer express concern, Follow the Diagnostic Procedures outlined below.	

Diagnostic Procedure

Instrument Cluster Diagnostics using the Instrument Cluster Engineering Test Mode (ETM) and Integrated Diagnostic System (IDS).

The IC contains a self-diagnostic mode known as ETM. This can be used to show the status of the IC inputs as well as a number of other useful features.

When in the ETM, the Message Centre displays internal data that can be cycled through. All functions except the message centre display will continue to operate normally unless otherwise noted.

Note: This document is to be used in conjunction with the IC ETM (see relevant section within this document) and the Integrated Diagnostic System (IDS) facility; this does not supersede or replace the IDS facility.

Go directly to the 'Area of Issue' that indicates the customer concern(s) and perform the actions described within the relevant section(s):

Area of issue	Diagnostic Ref. No.	Actions	Notes
Warning lights	A-1	Perform cluster ETM test 3.	When this test is ended the warning lamps currently required to be 'ON' will remain illuminated.
Multiple warning lights 'ON'	B-1	Check with IDS for DTCs related to identified vehicle system(s).	.
.	B-2	Check cluster battery and ignition wiring - refer to circuit diagrams.	Specifically check continuity of Standard Corporate Protocol (SCP) and Controller Area Network (CAN) lines.
.	B-3	Check cluster grounds.	.
.	B-4	Check fuses in battery junction box.	.
.	B-5	Check for harness traps in fascia.	.
.	B-6	Perform cluster ETM test 3.	Frost/ice warning illuminated in mixed red and amber; therefore colour differs from other warning lamps. When this test is ended, warning lamps currently required to be 'ON' will remain illuminated.
.	B-7	Check for open circuit/shorts in wiring to related warning lamp trigger (module, sensor, switch).	.
Specific warning lamp 'ON'	C-1	Check with IDS for DTCs related to identified vehicle system.	.
.	C-2	Check for open circuit/shorts in wiring related to warning lamp circuit (module, sensor, switch) where appropriate.	.

Area of issue	Diagnostic Ref. No.	Actions	Notes
.	C-3	Perform cluster ETM test 3.	Frost/ice warning illuminated in mixed red and amber; therefore colour differs from other warning lamps. When this test is ended, warning lamps currently required to be 'ON' will remain illuminated.
.	C-4	Check the specific vehicle system indicated by the warning lamp illuminated?	What is the warning lamp telling me? Does this check out with the DTC logged by the system indicating the fault?
Fuel gauge operation	D-1	Perform ETM test 21 to establish if fuel level input to cluster is out of range or invalid.	0 - 9 = short circuit; gauge will show empty. 10 - 254 = normal range. 255 = open circuit; gauge will show empty. --- = missing signal; gauge will show empty.
.	D-2	Check gauge function versus ETM test 21.	0 = empty, 254 = full. 255 = invalid; gauge will show empty.
.	D-3	Check for open circuit/shorts in wiring between the Fuel Delivery Module, Jet Pump Module and Rear Electronic Module (REM).	.
Fuel gauge reading	E-1	Check gauge position versus ETM test 21.	0 = empty to 254 = full (255 invalid; gauge will show empty). Other values percentage of above range i.e. 127 = half.
.	E-2	Calculate percentage fuel level from figure obtained from ETM test 21 and compare to IDS vehicle fuel percentage test.	ETM fuel level percentage can be calculated as follows: Value from ETM test 26 ÷ 254 x 100 = % shown on gauge.
.	E-3	Monitor value of ETM tests 21 (during test drive) to establish if input drops out of range.	0 - 9 = short circuit; gauge will show empty. 10 - 254 = normal range. 255 = open circuit; gauge will show empty. --- = missing signal; gauge will show empty.
.	E-4	Monitor 'FUEL LEVEL' in IDS data logger (during test drive) to correlate gauge position to vehicle reported fuel level.	Gauge function is damped so will not follow rapidly changing Fuel Delivery Module values.
Speedometer operation	H-1	Monitor ETM test 19 (during test drive) check to establish if vehicle speed input to cluster is out of range or invalid.	Display speed input in 1/10 mile/h, no decimal point shown, and is compensated for tire size etc. Displays ---- or INV if message is not received or if received data is invalid.
Speedometer reading	I-1	During test drive compare speedometer position to ETM test 19, displayed value.	ETM displayed speed figure will be approx 3% higher than speed indicated by speedometer. Allowed tolerance – minus nothing/+ 10% + 2.5 mile/h.
.	I-2	Monitor ETM test 19 (during test drive) to establish if vehicle speed input to cluster drops out of range or is invalid.	Displays ---- if message is not received or if received data is invalid for two seconds or more.
.	I-3	Check that installed wheels and tires are standard Jaguar fitment. Confirm wheel size in IDS, 'ADD REMOVE ACCESSORY' section.	Non standard wheels and tires may lead to speed indication inaccuracies. Incorrectly set wheel size will result in speed indication inaccuracies. Trip and odometer distance accumulation will also be incorrect.
Tachometer operation	J-1	Perform ETM test 20 to establish if vehicle rpm input to cluster out of range or invalid.	Displays ---- or INV if message is not received or if received data is invalid.
Tachometer reading	K-1	Check tachometer position versus ETM test 20, displayed value.	Tachometer accuracy +/- 100 rpm.
.	K-2	Monitor 'ENGINE RPM' in IDS data logger at constant engine rpm to compare tachometer indicated engine rpm to engine rpm reported by Engine Control Module (ECM).	Tachometer accuracy +/- 100 rpm.
.	K-3	Monitor ETM test 20, (during test drive) to establish if input to cluster drops out of range or is invalid.	Displays ---- or INV if message is not received or if received data is invalid.
Gauge judder	L-1	Perform ETM test 2, to prove out smooth gauge operation.	.

Area of issue	Diagnostic Ref. No.	Actions	Notes
Gauge noise	M-1	Perform vehicle road test. Gauges should not be audible during operation in drive cycle.	.
.	M-2	Benchmark noise against known good vehicle.	.
Trip (fuel) computer	N-1	Check for consistent display (during test drive) of valid 'Rolling Odometer' count in ETM test 34.	Displays ---- , INV or 255 if message is not received, or if received data is invalid.
.	N-2	Check that installed wheels and tires are standard Jaguar fit. Confirm fitted wheel size in IDS, 'ADD REMOVE ACCESSORY' section.	Non standard wheels and tires or incorrectly set wheel size may lead to Odometer increment inaccuracies. This will impact the distance accumulators, which in turn affects the rolling average, fuel economy and range values. Trip distance accumulation will also be incorrect.
.	N-3	Consider noting odometer value and resetting fuel computer system. Advise customer to conduct brim-to-brim fuel tank test. Use collected information to determine if system accurate.	.
Column adjust	O-1	Check with IDS for DTCs related to powered column system.	.
	O-2	Check cluster battery supply voltage and ground resistance. Check for loose connections.	.
	O-3	Check power column motors supply voltage.	.
	O-4	Check power column switch for physical damage.	.
Passive Anti-Theft System (PATS) indicator	P-1	Check for three second prove out when vehicle start button is pressed.	.
.	P-2	Check for loose connections/wiring continuity.	.
.	P-3	Check ignition switch for physical damage.	.
Cluster illumination	Q-1	Check for loose connections/wiring continuity.	.
.	Q-2	Perform ETM test 22, to verify that illumination input values vary with illumination control (dimmer) adjustments.	.
.	Q-3	Check dimmer switch operation.	.
.	Q-4	Check for loose connections/wiring continuity.	.
Cluster backlight operation	R-1	Is the backlight on other components inoperative.	.
.	R-2	Perform ETM test 22, to verify that illumination input values vary with illumination control (dimmer) adjustments.	.
.	R-3	Check dimmer switch operation.	.
.	R-4	Check for loose connections/wiring continuity.	.
Chime/tone operation	S-1	Check vehicle configuration.	.
.	S-2	Utilize lights ON, ignition OFF, door open warning to verify chime operation.	.
.	S-4	Check appropriate sensing circuit.	.
Continuous chime/tone	T-1	Check appropriate sensing circuit.	.
Unexpected chime operation	U-1	Check vehicle configuration.	.
Message centre LCD illumination	V-1	Is the backlight 'ON' and other components dim?	.
.	V-2	Does the lighting level of other components change when dimmer adjusted?	.

Area of issue	Diagnostic Ref. No.	Actions	Notes
.	V-3	Perform ETM test 22, to verify that illumination input values vary with illumination control (dimmer) adjustments.	.
Message centre display issue	W-1	Perform ETS test 5 to 9, to prove out LED display function.	.
Message centre missing lines	X-1	Perform ETS test 5 to 9, to prove out LED display function.	.
Message centre incorrect message	Y-1	What is the message?	.
.	Y-2	Check for open circuit/shorts in wiring to related warning light trigger (module, sensor, switch).	.
Cluster/connectivity	Z-1	Check cluster battery and ignition wiring.	.
.	Z-2	Check cluster grounds.	.
.	Z-3	Disconnect/reconnect cluster.	.
.	Z-4	Attempt to enter ETM to prove cluster response to inputs.	.
No crank	AA-1	Check with IDS for presence of related DTCs.	.
.	AA-2	Is there a Passive Anti-Theft System (PATS) flash code?	.
.	AA-3	Does the vehicle crank with the other passive key?	.
.	AA-4	Ensure only one key is in the vehicle, try both keys in the Starter Control Unit (SCU).	If this test starts the vehicle this tends to indicate an issue with the keyless vehicle module.
.	AA-5	Tried new key?	.
.	AA-6	Check battery voltage.	.
.	AA-7	Diagnose non-start condition with IDS.	.
.	AA-8	Attempt PATS key erase and re-learn.	Ensure keys are erased from current cluster if replacing cluster.
Crank but no-start	AB-1	Diagnose non-start condition with IDS.	Not usually caused by cluster issue.
Incorrect configuration	AC-1	Attempt to configure cluster.	.
.	AC-2	Ensure battery voltage is maintained above 12.1 volts if cluster re-configured.	.

Diagnostic Procedure

Instrument Cluster Self-Diagnostic ETM

To place the cluster in ETM, perform the following:

1. Press and hold the stalk trip cycle button for more than five seconds but less than eight seconds, whilst briefly pressing the vehicle START button. There is no display to initially indicate that the cluster has entered ETM. If ETM has successfully been entered then 'ENGINEERING TEST MODE' will be displayed in the Message Centre when the stalk trip button is released.
2. To navigate forward through the instrument cluster Self-Diagnostic Mode tests, press the stalk trip cycle button.
3. Each push of the stalk trip cycle button will advance one step through the ETM sequence. It is not possible to move backward through the test sequence.
4. To exit Self-Diagnostic Mode, press the stalk trip cycle button for more than three seconds.
5. The Self-Diagnostic Mode is also deactivated when the ignition switch is turned to the 'OFF' position, or low battery voltage is detected.
6. If the Self-Diagnostic Mode cannot be accessed repeat the above paying particular care to the sequence timing.
7. The ETM text is not language configurable and will be displayed in English.

Table Attachment 1

ETM Test/No.	RH Message Centre Display	Gauge/Indicator/Display Tested	Range	Description
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ETM Test/No.	RH Message Centre Display	Gauge/Indicator/Display Tested	Range	Description
1 - Self-diagnostic entry	ENGINEERING TEST MODE	.	Not Applicable (N/A)	Establishes Self-Diagnostic mode.
2 - Gauge sweep	GAUGE SWEEP	Tachometer, speedometer. Gauges display current values after test.	N/A	All gauges go through a full up and down pointer sweep smoothness check.
3 - Warning lamp LEDs	TELLTALE TEST	All internally controlled lamps/LEDs regardless of software configuration.	N/A	Illuminates all the LED warning indicators that are controlled by the instrument cluster. When this test is exited current vehicle warning lamps will remain illuminated.
4 - Version information	PROGRAM VERSION. ROM: XXXX. NVM: XXXX. REV: XXXX. DATE: XXXX.	Instrument cluster Read Only Memory (ROM). ROM level (Most Significant Bit) and type (Least Significant Bit) as stored in Non Volatile Memory (NVM). Electrically Erasable Programmable Read Only Memory (EEPROM) level.	N/A	Displays the instrument cluster ROM level or ROM checksum fault. Displays Hexadecimal coding of ROM level or checksum fault. Displays Hexadecimal coding of EEPROM level or checksum fault.
5 - Message Centre display	LED display in RED	Message centre LED display.	N/A	Activates all pixels of LED display in RED.
6 - Message Centre display	LED display in BLUE	Message centre LED display.	N/A	Activates all pixels of LED display in BLUE.
7 - Message Centre display	LED display in GREEN	Message centre LED display.	N/A	Activates all pixels of LED display in GREEN.
8 - Message Centre display	LED display in WHITE	Message centre LED display.	N/A	Activates all pixels of LED display in WHITE.
9 - Message Centre display	LED display in 256 colours	Message centre LED display.	N/A	Activates all pixels of LED display in 256 colour test palette.
10 - Digital I/O	DIGITAL I/O. A: XXXX. B: XXXX. C: XXXX. D: XXXX. E: XXXX. F: XXXX. G: XXXX. H: XXXX	Cluster configuration settings.	N/A	Displays Hexadecimal coding of cluster configuration settings ports A to H. Not required.
11 - Analogue Inputs	ANALOG INPUTS. 0 RATIO: XXX. 1 RATIO: XXX. 2 RATIO: XXX. 3 RATIO: XXX.	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 0 – 3. Not required. 0 – Main beam/flash to pass. 1 – Master light switch. 2 – Joystick switch. 3 – DI Hazard.
12 - Analogue Inputs	ANALOG INPUTS. 4 RATIO: XXX. 5 RATIO: XXX. 6 RATIO: XXX. 7 RATIO: XXX.	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 4 – 7. Not required. 4 – Auto lamp sensor. 5 – Battery in. 6 – Pedal position. 7 – Pedal/column select.
13 - Analogue Inputs	ANALOG INPUTS. 8 RATIO: XXX. 9 RATIO: XXX. 10 RATIO: XXX. 11 RATIO: XXX.	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 8 – 11. Not required. 8 – Rake position. 9 – Reach position. 10 – Auxiliary sensor. 11 – Column disable.
14 - Analogue Inputs	ANALOG INPUTS. 12 RATIO: XXX. 13 RATIO: XXX. 14 RATIO: XXX. 15 RATIO: XXX.	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 12 – 15. Not required. 12 – Spare dig 4. 13 – Airbag LED. 14 – Battery 2. 15 – Cold cathode florescent lamp open.
15 - Analogue Inputs	ANALOG INPUTS. 16 RATIO: XXX. 17 RATIO: XXX. 18 RATIO: XXX. 19 RATIO: XXX.	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 16 – 19. Not required. 16 – Fog lights. 17 – Flick wipe. 18 – Intermitant wipe switch. 19 – exit delay.
16 - Analogue Inputs	ANALOG INPUTS. 20 RATIO: XXX. 21 RATIO: XXX. 22 RATIO: XXX. 23	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 20 – 23. Not required. 20 – Wash wipe. 21 – Trip cycle. 22 – Dimmer sensor. 23 – Master wipe switch.

ETM Test/No.	RH Message Centre Display	Gauge/Indicator/Display Tested	Range	Description
	RATIO: XXX.			
17 - Analogue Inputs	ANALOG INPUTS. 24 RATIO: XXX. 25 RATIO: XXX. 26 RATIO: XXX. 27 RATIO: XXX.	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 24 – 27. Not required. 24 – Spare analogue. 25 – Passenger seatbelt. 26 – Display therm. 27 – Board temp reference.
18 - Analogue Inputs	ANALOG INPUTS. 28 RATIO: XXX. 29 RATIO: XXX. 30 RATIO: XXX. 31 RATIO: XXX.	Cluster inputs.	N/A	Displays Hexadecimal coding of inputs 28 – 31. Not required. 28 – Board temp. 29 – Unused. 30 – Unused. 31 – Unused.
19 - Speedometer	SPEEDOMETER. RAW: MPH: HMH: DRIVER:	Speedometer.	.	Displays present received speedometer input values, speedometer will indicate present road speed.
20 - Tachometer	TACHOMETER. RAW: ACTUAL: DRIVER:	Tachometer.	.	Displays present received tachometer input values, tachometer will indicate present engine rpm.
21 - Displays present received tachometer input values, tachometer will indicate present engine rpm.	FUEL SYSTEM. RAW X LH X RH. FILTERED X LH X RH. PERCENT X LH.	Fuel indication system.	.	Displays present received fuel level analog/digital inputs in decimal, fuel gauge will indicate present filtered level.
22 - Illumination	ILLUMINATION. LCD: GAUGE: AMBIENT: NAT LIGHT:	Cluster illumination.	.	Displays present received illumination input values.
23 - Battery voltage	BATT VOLTS. LOCAL: VEHICLE: RAW: A/D COUNT:	Battery voltage.	.	Displays present received battery input voltage values. If message not received or invalid display will be '- -'.
24 - Rolling counts	ROLLING COUNTS. ODO: FUEL:	Odometer and fuel gauge.	0 - 255	Displays present received odometer and fuel level input values in decimal, value is a rolling count. If either message not received or invalid respective display will be '- -'.
25 - VAPS	MODULE STATUS. Variable Assisted Power Steering (VAPS). CURRENT: COMMAND: STATUS:	VAP Status.	.	CURRENT is displayed in milliampere (mA). COMMAND is last command sent to VAPS chip. STATUS is last status returned from VAPS chip.
26 - Module status	MODULE STATUS. IGN. Active damping control module, Adaptive speed control module, Adaptive damping Control Module	Provides status of connected Controller Area Network (CAN) modules.	CONNECTED. WAITING. MISSING. FAULTY.	CONNECTED=Communication OK. WAITING=Communication not received, not an issue. MISSING=Communication never received. FAULTY=Communication error.
27 - Module status	MODULE STATUS. Electronic Park Brake Module (EPB), L gate Module, Pedestrian protection system module, Rear Control Module (RCM)	Provides status of connected Controller Area Network (CAN) modules.	CONNECTED. WAITING. MISSING. FAULTY.	CONNECTED=Communication OK. WAITING=Communication not received, not an issue. MISSING=Communication never received. FAULTY=Communication error.
28 - Module status	MODULE STATUS. Transmission Control Module (TCM), Engine Control Module (ECM), Convertible top control module, Air conditioning control module	Provides status of connected Controller Area Network (CAN) modules.	CONNECTED. WAITING. MISSING. FAULTY.	CONNECTED=Communication OK. WAITING=Communication not received, not an issue. MISSING=Communication never received. FAULTY=Communication error.

ETM Test/No.	RH Message Centre Display	Gauge/Indicator/Display Tested	Range	Description
29 - Module status	MODULE STATUS. Driver door control module, Passenger door control module, Keyless Vehicle Module (KVM), Driver Seat Module (DSM)	Provides status of connected Controller Area Network (CAN) modules.	CONNECTED. WAITING. MISSING. FAULTY.	CONNECTED=Communication OK. WAITING=Communication not received, not an issue. MISSING=Communication never received. FAULTY=Communication error.
30 - Module status	MODULE STATUS. Information and entertainment control module. Integrated control panel, Auxiliary junction box, Central junction box	Provides status of connected Controller Area Network (CAN) modules.	CONNECTED. WAITING. MISSING. FAULTY.	CONNECTED=Communication OK. WAITING=Communication not received, not an issue. MISSING=Communication never received. FAULTY=Communication error.
31 -Module status	MODULE STATUS. Passenger seat module, Tire Pressure Monitoring System (TPMS), Adaptive Front Lighting System (AFS) control module, Passive Anti-Theft System (PATS)	Provides status of connected Controller Area Network (CAN) modules.	CONNECTED. WAITING. MISSING. FAULTY.	CONNECTED=Communication OK. WAITING=Communication not received, not an issue. MISSING=Communication never received. FAULTY=Communication error.
32 - Back to test 2	GAUGE SWEEP	Tachometer and speedometer.	N/A	Repeats display cycle from test 2.