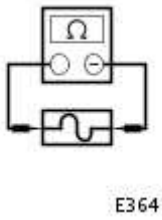
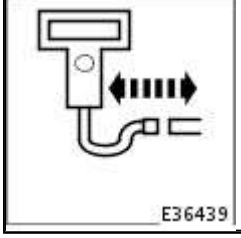
Engine - Engine
Diagnosis and Testing

Special Tool(s)	
 E36420	Digital multimeter
 E36439	Generic scan tool

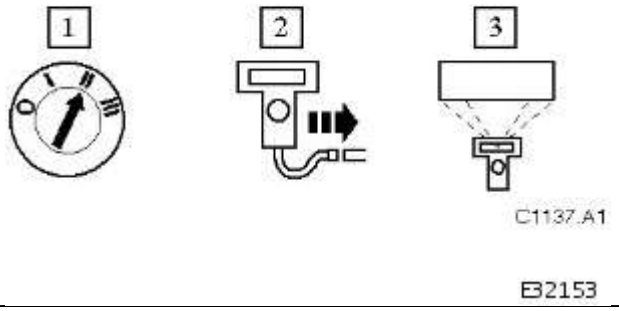
Symptom Chart

Symptom Chart

Symptom	Possible Sources	Action
DTC P1392 VVT solenoid A circuit low input	* Solenoid coil open circuit * Harness open circuit or blown fuse * Connector pins(s) bent, loose or corroded	* GO to **Pinpoint Test A**
DTC P1397 VVT solenoid B circuit low input	* Solenoid coil open circuit * Harness open circuit or blown fuse * Connector pins(s) bent, loose or corroded	* GO to **Pinpoint Test A**
DTC P1393 VVT solenoid A circuit high input	* Solenoid coil short circuit * Harness short circuit * Connector pins(s) bent, loose or corroded	* GO to **Pinpoint Test B**
DTC P1398 VVT solenoid B circuit high input	* Solenoid coil short circuit * Harness short circuit * Connector pins(s) bent, loose or corroded	* GO to **Pinpoint Test B**
DTC P1396 VVT solenoid B malfunction	* Oil pressure failure * VVT solenoid sticking * Connector pins(s) bent, loose or corroded * Crankshaft position sensor failure * ECM failure	* GO to **Pinpoint Test C**

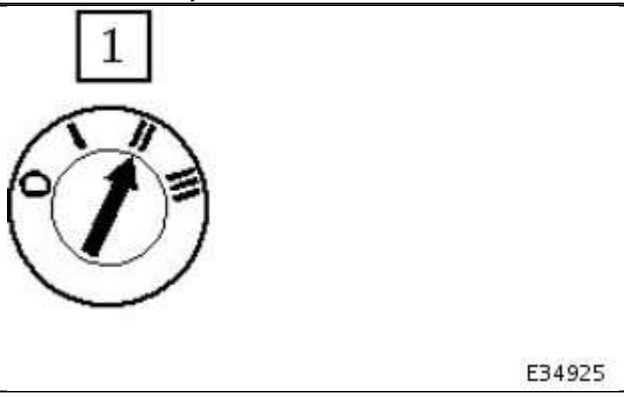
Pinpoint test A: P1392 (P1397) VVT solenoid circuit low input

PINPOINT TEST A : P1392 (P1397) VVT SOLENOID CIRCUIT LOW INPUT	
• NOTE: References in brackets are for Bank B (2)	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: RETRIEVE DTCS	
• NOTE: Battery and or ECM disconnection prior to scanning will erase all data, ensure that the correct DTC is present.	



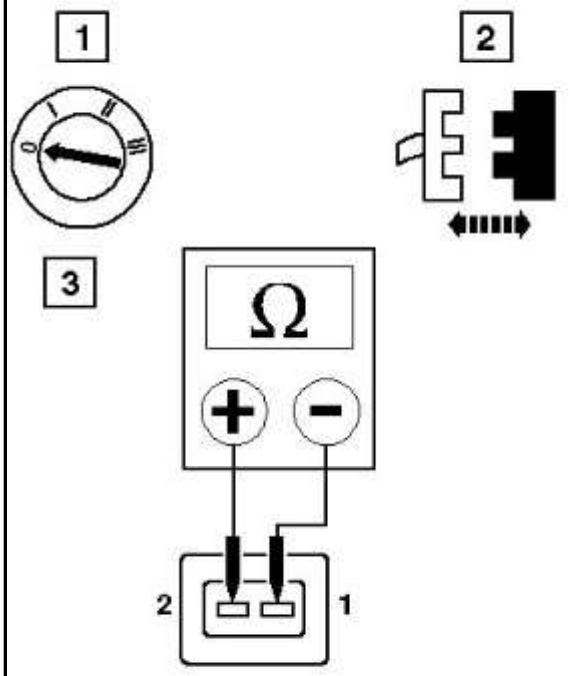
	1 Connect the scan tool
	Have the DTC(s) and freeze frame data been recorded? **Yes** GO to **A2**

A2: CHECK FUSE / RELAY



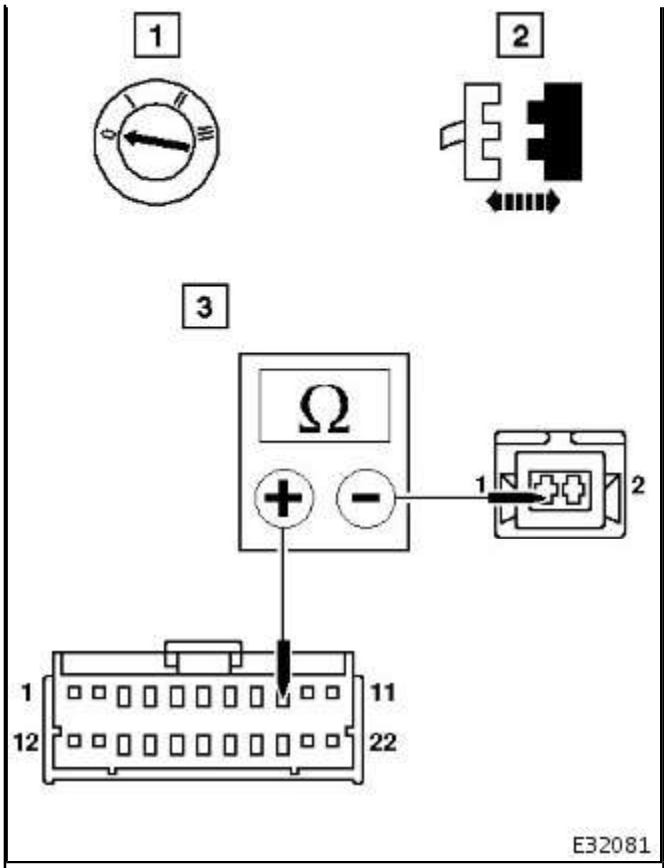
	1 Check that fuse F12 is good and that EMS control relay is energized
	OK? **Yes** GO to **A3** **No** Rectify as required

A3: CHECK VVT COIL RESISTANCE



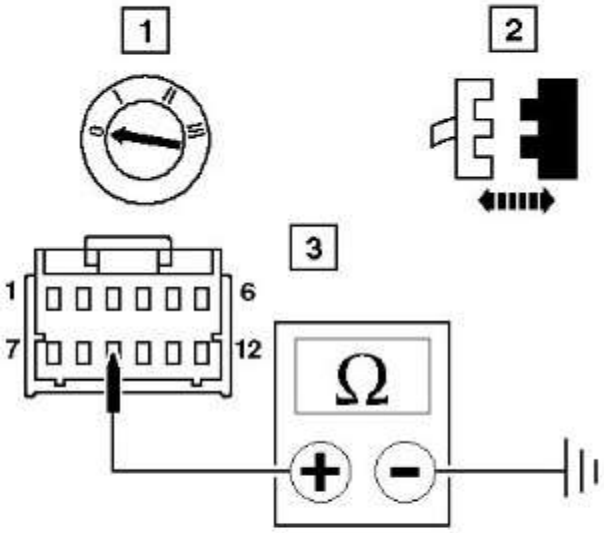
E32080

	1 With VVT connector PI031 - A bank or (PI032 - B bank) disconnected, measure the resistance between the pins 1 and 2 at the VVT actuator Is the resistance less than 5 OHM or greater than 20 OHM? **Yes** Renew the VVT solenoid and test the system for normal operation. **No** GO to **A4**
A4: CHECK HARNESS CONTINUITY	



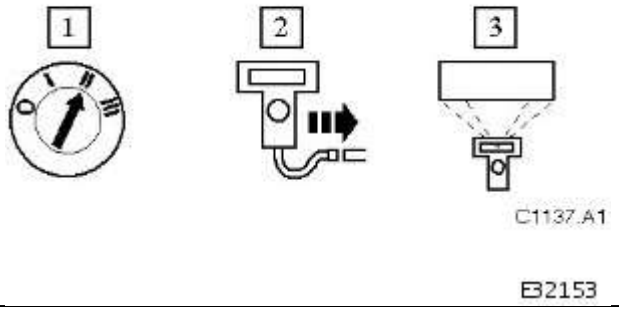
	1 With EM015 and PI031 (PI032) disconnected, measure the resistance between EM015/009 (EM015/008) and PI031/001 (PI032/001)
	Is the resistance < 0.5 OHM? **Yes** GO to **A5** **No** Inspect harness / connectors EM015, PI031 (PI032), PI001/016 (PI001/027) for corrosion, damage, bent or pushed back pins and repair as required. Test the system for normal operation.

A5: CHECK HARNESS (GROUND) CONTINUITY

 E32082	
	1 With EM014 disconnected, measure the resistance between EM014/009 and ground EM016L
	Is the resistance < 0.5 OHM? **Yes** Reconnect EM014, EM015, PI031 or (PI032) GO to **A6** **No** Inspect harness / connector EM014, ground stud and splice EMS37 for corrosion, damage, bent or pushed back pins and repair as required. Test the system for normal operation.
A6: END	
	1 Perform appropriate service drive cycle and check for the presence of DTC.
	Has the fault code cleared? **Yes** STOP **No** Contact Jaguar Service

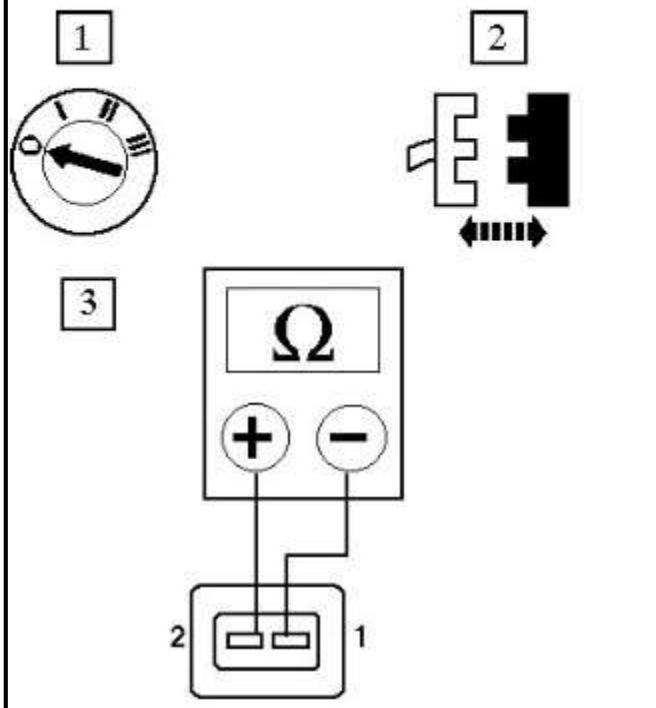
Pinpoint test B: P1393 (P1398) VVT solenoid circuit high input

PINPOINT TEST B : P1393 (P1398) VVT SOLENOID CIRCUIT HIGH INPUT	
• NOTE: References in brackets are for Bank B (2)	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: RETRIEVE DTCS	
• NOTE: Battery and or ECM disconnection prior to scanning will erase all data, ensure that the correct DTC is present.	



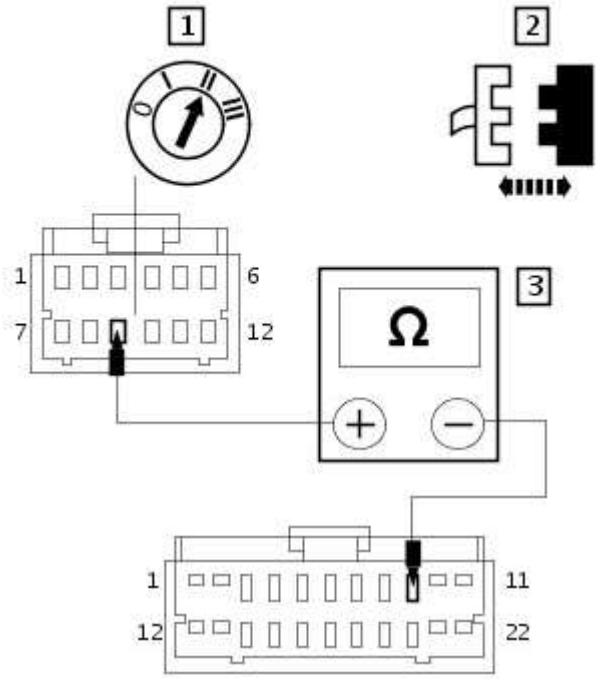
	1 Connect the scan tool
	Have the DTC(s) and freeze frame data been recorded? **Yes** GO to **B2**

B2: CHECK VVT COIL CONTINUITY



	1 With VVT connector PI031 - A bank or (PI032 - B bank) disconnected, measure the resistance between the pins 1 and 2 at the VVT actuator
	Is the resistance >20 OHM? **Yes** Renew the VVT solenoid and test the system for normal operation. **No** GO to **B3**

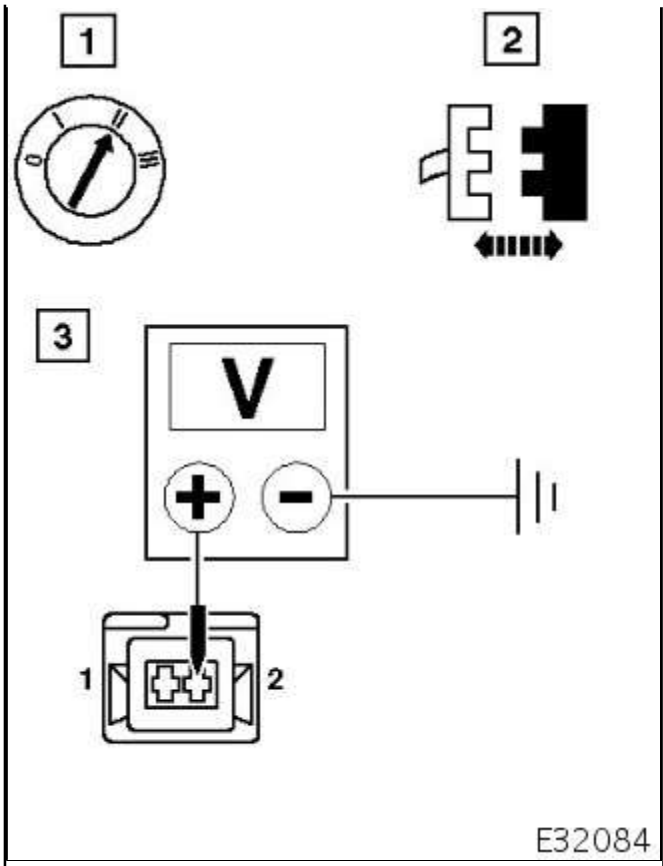
B3: CHECK SHORT TO B+



E32085

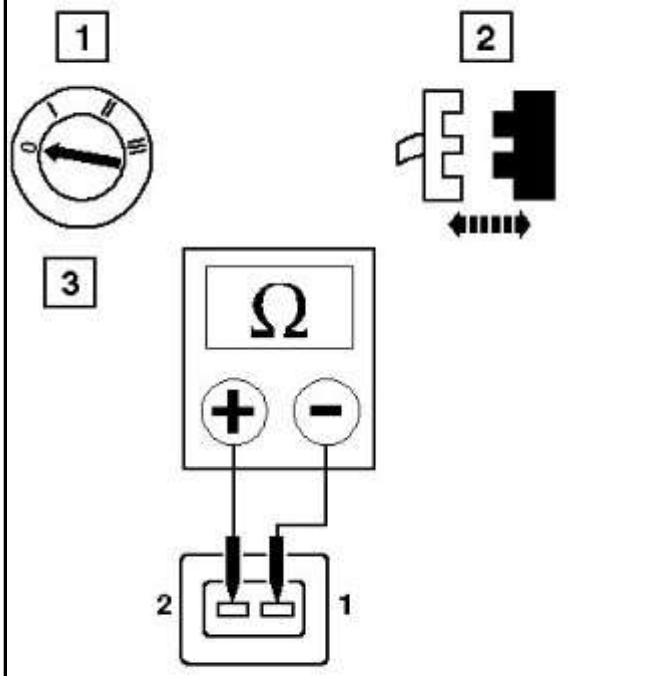
	1 Remove fuse F12
	2 With EM015, EM014, PI031 or (PI032) disconnected, measure the voltage between EM015/009 (EM015/008) and EM014/009
	0 V? **Yes** Reconnect EM015 and EM014 and replace fuse F12 GO to **B4** **No** Inspect EM015, PI031 or (PI032) for bent / pushed back pins or locate and repair the harness / connector PI001/016 or (PI001/027) Test the system for normal operation.

B4: CHECK B+ AT VVT SOLENOID



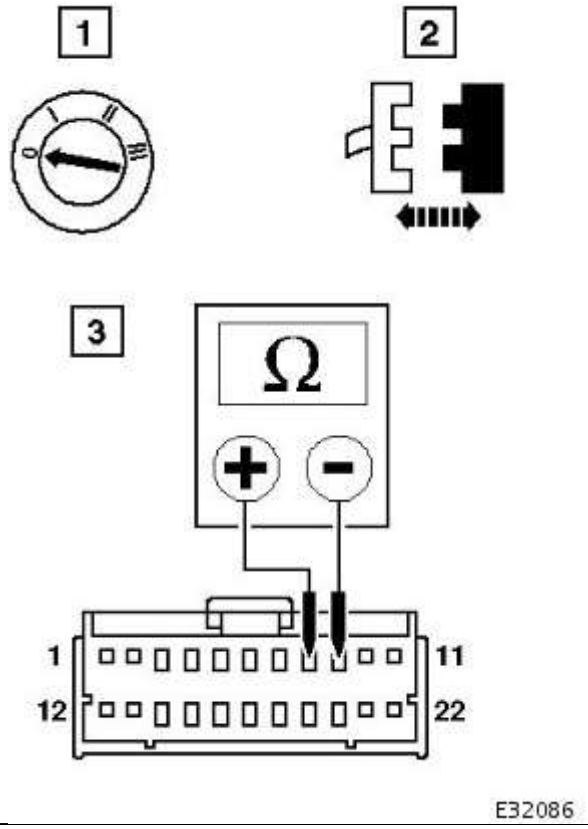
	1 Measure the voltage between PI031/002 (PI032/002) and ground EM016L
	B+ ? **Yes** GO to **B5** **No** Inspect EM020/010, PI001, PI031 (PI032) for bent / pushed back pins or locate and repair harness / splice PIS06.

B5: CHECK HARNESS SHORT TO GROUND



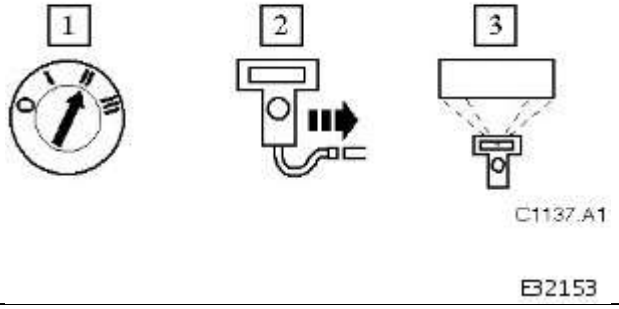
	1 With EM015 and EM014 disconnected, measure the insulation resistance between EM015/009 (EM015/008) and ground EM014/009
	Is the resistance > 10 MOHM? **Yes** Do not reconnect GO to **B6** **No** Inspect EM015, and EM014 for corrosion, bent / pushed back pins or locate and repair the harness / connector. Test the system for normal operation.

B6: CHECK HARNESS SHORT CORE TO CORE

	
	1 With EM015, EM014 PI031 and PI032 disconnected, measure the insulation resistance between EM015/009 and EM015/008
	Is the resistance > 10 MOHM? **Yes** Reconnect all connectors GO to **B7** **No** Inspect EM015 and PI031 (PI032) for corrosion, bent / pushed back pins or locate and repair the harness / connector PI001/016 (PI001/027). Test the system for normal operation.
B7: END	
	1 Perform appropriate service drive cycle and check for the presence of DTC
	Has the fault code cleared? **Yes** STOP **No** Contact Jaguar Service

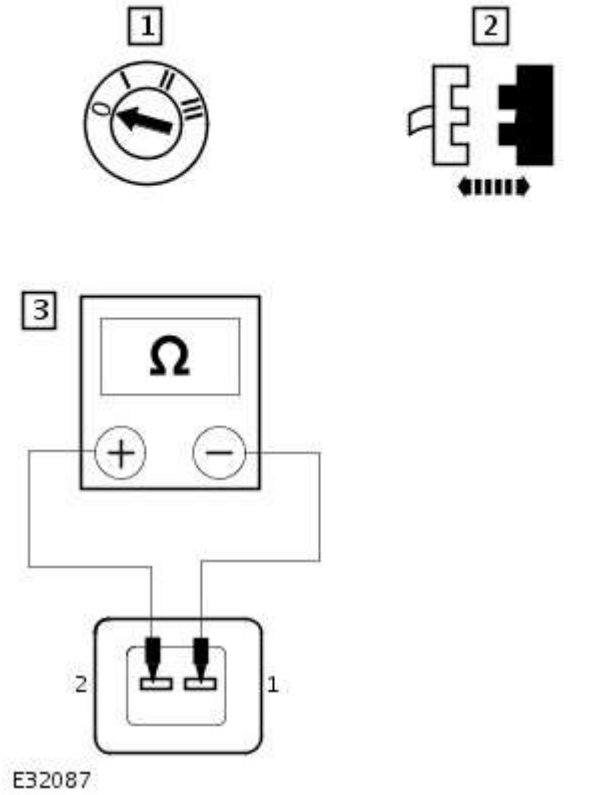
Pinpoint test C: P1396 VVT solenoid malfunction

PINPOINT TEST C : P1396 VVT SOLENOID MALFUNCTION	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
C1: RETRIEVE DTCS	
• NOTE: Battery and or ECM disconnection prior to scanning will erase all data, ensure that the correct DTC is present.	



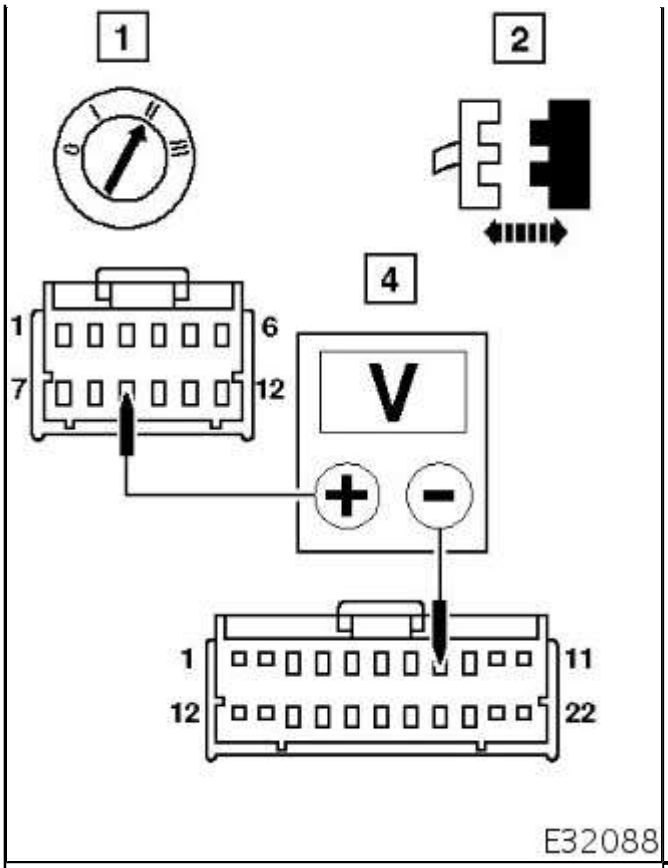
	1 Connect the scan tool
	Have the DTC(s) and freeze frame data been recorded? **Yes** GO to **C2**

C2: CHECK VVT COIL CONTINUITY



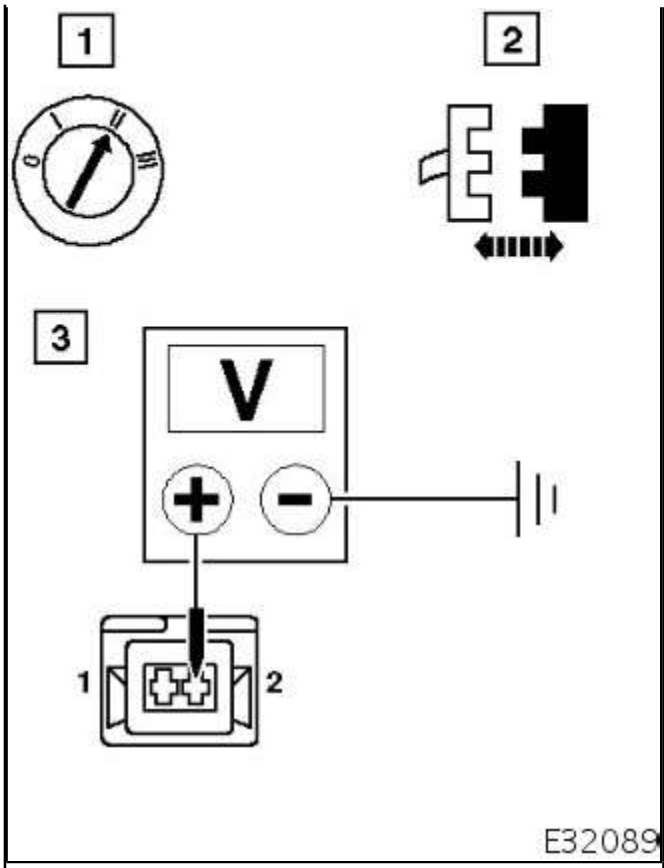
	1 With VVT connector PI032 disconnected, measure the resistance between the pins 1 and 2 at the VVT actuator
	Is the resistance >20 OHM? **Yes** Renew the VVT solenoid and test the system for normal operation. **No** GO to **C3**

C3: CHECK SHORT TO B+



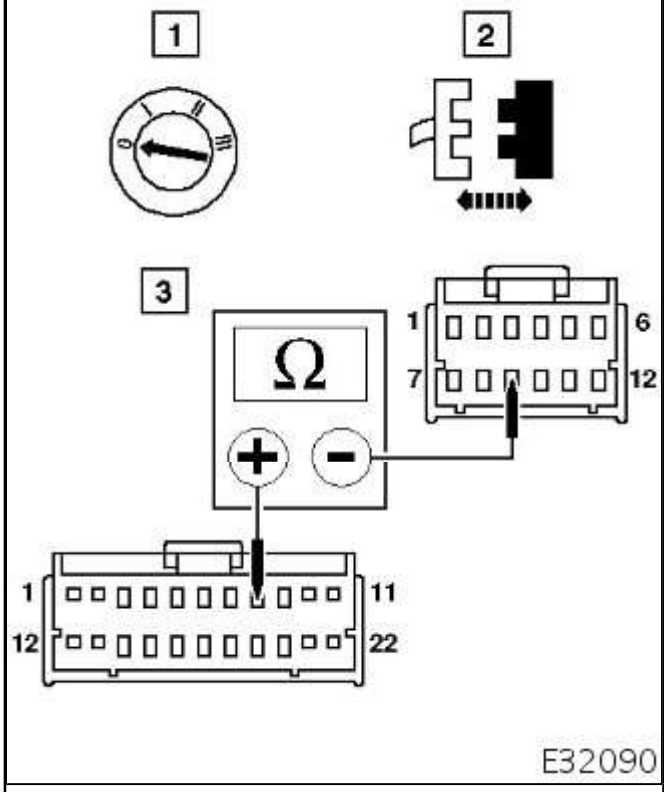
	1 Remove fuse F12
	2 With EM015, EM014, PI031 and PI032 disconnected, measure the voltage between EM015/008 and EM014/009
	0 V? **Yes** Reconnect EM015 and EM014 and replace fuse F12 GO to **C4** **No** Inspect EM015, PI001 or PI032 for bent / pushed back pins or locate and repair the harness / connector. Test the system for normal operation.

C4: CHECK B+ AT VVT SOLENOID



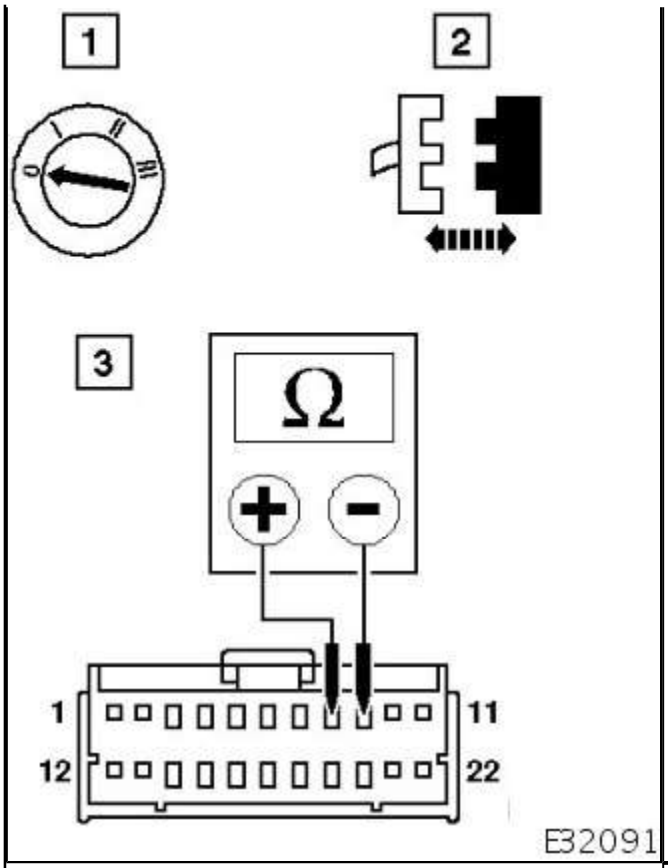
	1 Measure the voltage between PI032/002 and ground EM016L
	B+ ? **Yes** GO to **C5** **No** Inspect EM020/010 PI031 (PI032) for bent / pushed back pins or locate and repair harness / splice PIS06. Check fuse F12 is good and EMS control RELAY 1 energized. Test the system for normal operation.

C5: CHECK HARNESS SHORT TO GROUND



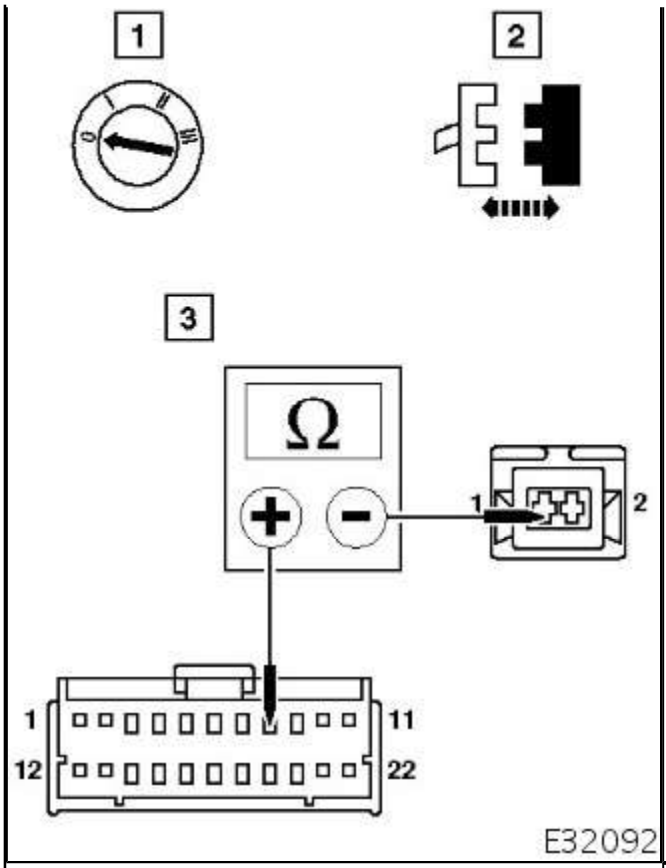
	1 With EM015 and EM014 disconnected, measure the insulation resistance between EM015/008 and ground EM014/009
	Is the resistance > 10 MOHM? **Yes** Do not reconnect GO to **C6** **No** Inspect EM015, and EM014 for corrosion, bent / pushed back pins or locate and repair the harness / connector. Test the system for normal operation.

C6: CHECK HARNESS SHORT CORE TO CORE



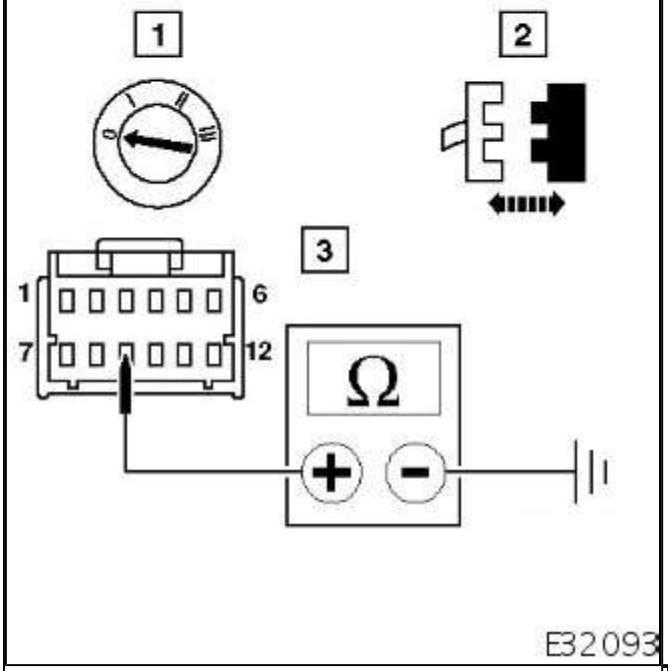
	1 With EM015, EM014, PI031 and PI032 disconnected, measure the insulation resistance between EM015/009 and EM015/008
	Is the resistance > 10 MOHM? **Yes** Reconnect all connectors GO to **C7** **No** Inspect EM015, PI031 and PI032 for corrosion, bent / pushed back pins or locate and repair the harness / connector PI001/016 or PI001/027. Test the system for normal operation.

C7: CHECK HARNESS CONTINUITY



	1 With EM015 and PI032 disconnected, measure the resistance between EM015/008 and PI032/001
	Is the resistance < 0.5 OHM? **Yes** GO to **C8** **No** Inspect harness / connectors EM015, PI032 and PI001/027 for corrosion, damage, bent or pushed back pins and repair as required. Test the system for normal operation.

C8: CHECK HARNESS (GROUND) CONTINUITY



	1 With EM014 disconnected, measure the resistance between EM014/009 and ground EM016L
	Is the resistance < 0.5 OHM? **Yes** Reconnect EM014, EM015, PI031 or (PI032) GO to **C10** **No** Inspect harness / connector EM014, ground stud and splice EMS037 for corrosion, damage, bent or pushed back pins and repair as required. Test the system for normal operation.
C9: CHECK MECHANICAL CONDITION	
	1 Remove the VVT(s) and ensure that there is no foreign matter blocking the oil passageway
	OK? **Yes** GO to **C10** **No** Rectify as required
C10: END	
	1 Perform appropriate service drive cycle and check for the presence of DTC.
	Has the fault code cleared? **Yes** STOP **No** Contact Jaguar Service

Engine - Valve Clearance Adjustment

General Procedures

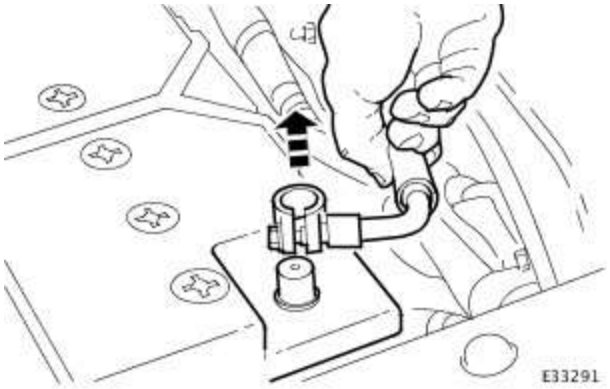
Special Tool(s)	
 E36404	Tappet adjustment 303-540
 E36428	Air gun, fan nozzle 303-590

1. Open the engine compartment and fit paintwork protection sheets. Open to the service position.

2. Carefully remove both engine covers, taking care not to damage the plastic fixings or the rubber inserts.

3. Disconnect the battery ground cable.

- Remove the battery cover.



4. Remove the cam cover from the 'A' bank and the 'B' bank; including the purge valve, the on-plug ignition coils and the air intake tube / air flow meter / air cleaner cover assembly. Refer to Operations 12.29.43 and 12.29.44.

5. Check, and note the valve clearances, as described earlier in this section.

6. Use a rag to wipe up as much oil as possible from the tappet wells.

7. Valve adjustment involves considerable repetition. A SUMMARY OF THE PROCEDURE follows:

1. Fit the adjusting tool base plate to one cylinder head.
2. Rotate the crankshaft to position four valves ready for adjustment.
3. Use the attachment part of the special tool to adjust two valve clearances. Transfer the attachment and adjust the other two valve clearances.
4. Remove the attachment part from the adjusting tool base plate.