Figure B4-36

'On-board' fault diagnosis codings

'On-board' diagnostic check

This procedure should be followed if

a) The 'Check Engine' warning panel situated on the facia, illuminates during normal engine operation.

b) A routine 'on-board' diagnostic check is required.

Note There are four possible faults in the K-Motronic engine management system that are not externally registered by the illumination of the 'Check Engine' warning panel. These faults will however, be revealed by a blink code during an 'on-board' diagnostic check.

Procedure

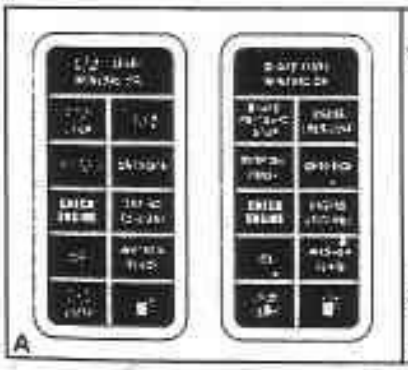
Initiate an 'on-board' diagnostic check to reveal any of the listed fault codes that have been stored within the K-Motronic ECU buffer RAM (random-access memory).

1. Ensure that the usual workshop precautions are carried out.
2. Turn the ignition key to the RUN position on the switchbox, so that the 'Check Engine' warning panel illuminates (see illustration A).
3. Depress the 'on-board' diagnostic button (see illustration B) for a minimum of 4 seconds and then release.
4. Monitor the blink code on the 'Check Engine' warning panel, after the initial period of 2.5 seconds lamp on and 2.5 seconds lamp off. Refer to illustration C for an example of the initial period of 'Check Engine' warning panel operation, followed by the blink code 4.4.3.1.
5. Once a blink code has been initiated, it will keep repeating the information (with initiation periods identifying blink code commencement), until the 'on-board' diagnostic button is depressed for another 4 seconds period.

   This procedure must be repeated until all stored blink codes have been extracted from the K-Motronic ECU buffer RAM.
6. If there are no more fault codes stored, the condition is identified by the unique code 1.1.1.1. Warning panel on/off periods for this code are of 2.5 seconds duration.
7. To reset the buffer RAM following fault extraction and/or rectification, isolate the vehicle battery using the master switch located in the vehicle luggage compartment (see illustration D). To ensure complete K-Motronic ECU buffer RAM reset, the battery should be switched off for at least 4 seconds.
8. If there are no faults stored, then the blink code 4.4.4.4. will register on the 'Check Engine' facia warning panel.

Fault codes

Blink code	'Check Engine' panel illuminated	Fault description
2.3.1.2.	Yes	Coolant temperature se operating range
2.2.3.2.	Yes	Incorrect air flow signal
2.1.2.1.	No	Idle switch fault. Idle co recognised
2.1.2.3.	Yes	Full load switch fault Full load control maps r
2.1.1.3.	Yes	Engine speed sensor an the ECU defective. Air s mechanism or fuel distri stuck
4.4.3.1.	No	Idle speed actuator cont or short circuit
2.3.4.2.	Yes	Lambda sensor and/or
2.3.4.1.	Yes	Lambda control outside
2.3.4.3.	No	Basic idle mixture stren mixture control unit set
2.3.4.4.	No	Basic idle mixture stren mixture control unit set
4.3.1.2.	Yes	Engine reference senso connection to the ECU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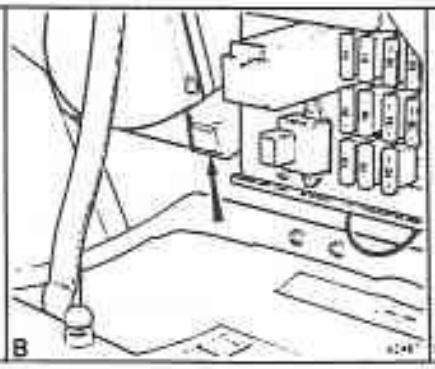
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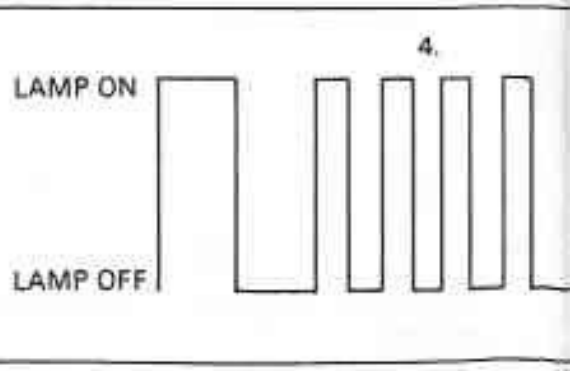
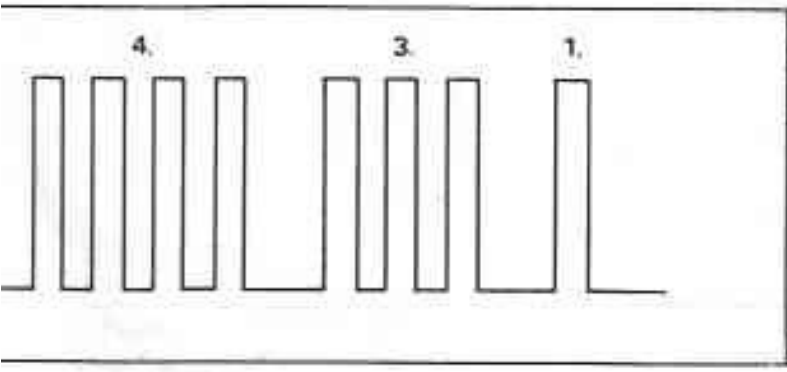


C

	System method of recognition	Limp home facility
ısor output outside	Coolant temperatures less than –46°C (–50.8°F) or more than + 186°C (+ 366.8°F)	K-Motronic ECU provides EHA with mA compensation equivalent to + 80°C (176°F) coolant temperature for all operational modes other than starting which is set to + 20°C (68°F)
	Volumetric air flow rate outside pressure upper and lower threshold limits (i.e. less than 5m³/hr or more than 1200 m³/hr)	Ignition and fuelling switched to full load map
ntrol maps not	Idle switch closed. Air flow greater than 166m³/hr with switch closed for more than 0.3 seconds	Ignition and fuelling switched to part load map
ot recognised	Full load switch closed but ECU recognises part load engine operation for more than 0.3 seconds	Ignition and fuelling switched to part load map
d/or connection to ensor plate butor plunger	Ignition switched on, volumetric air flow rate more than 5m³hr but no engine speed signal	None
ıecting plug open	End stage within K-Motronic ECU	Engine idle speed may drift from 580 ± 20 rev/min. Normal engine operation under all conditions except idle mode
connection failure	End stage within K-Motronic ECU	Resort to 'open loop' engine operation
threshold limits	EHA current is less than – 14 mA or more than + 21 mA for more than 2 minutes	Once threshold limits are exceeded, further compensation/correction is not available and engine control system effectively resorts to 'open loop'
ıth adjustment on to its lean limit	Adaptive Lambda pre-control increases EHA current more than 10 mA	Engine management system will continue to compensate until threshold limit of + 21 mA is exceeded
ıth adjustment on to its rich limit	Adaptive Lambda pre-control reduces EHA current more than – 5 mA	Engine management system will continue to compensate until threshold limit of – 14 mA is exceeded
and/or its lefective	Synchronisation lost	Dependent upon ECU data update prior to engine reference sensor failure



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should not sound.
9. With the throttles fully open the mutli-meter buzzer should sound.
10. The switching point should be at approximately 72° of throttle plate rotation.

Fuel injection and ignition system maps
1. With the engine switched off, disconnect the three way electrical plug to the throttle position switch (see fig. B4-37).
2. Connect a digital multi-meter in 'series' with the electro-hydraulic actuator (EHA), using the adapter RH 9893 (see fig. B4-38).
3. Set the multi-meter to read milliamps.

Idle
4. Bridge the black/pink and the blue/purple connection on the ECU side of the throttle position switch connector (see fig. B4-37). The engine will now be governed by the 'idle map' engine management parameters.
5. Fit a stroboscope to the engine in accordance with the manufacturer's instructions.
6. Turn the ignition key from the LOCK to the RUN position and check for the K-Motronic ECU 'stand current' of 100 mA ± 2mA.
7. Start and run the engine until normal operating temperature is attained.
8. With the engine running at idle speed and the coolant temperature stabilized above 80°C (176°F), check that the ignition timing is 6° ± 1° btdc at an idle speed of 580 ± 20 rev/min. At the same time the basic compensation current to the EHA should read a stable 0 ± 1.0mA on the multi-meter.

Note On cars fitted with catalytic converters the ignition timing should be 8° ± 1° btdc and the basic compensation current to the EHA should be oscillating about a median of zero milliamps.

Part load
9. Remove the bridge cable from the black/pink and the blue/purple connections on the ECU side of the throttle position switch connector (see fig. B4-37).
10. Leave the connector plug and socket disconnected. This ensures that the engine is governed by the 'part load' engine managment system parameters.
11. Set the engine speed to 2000 ± 20 rev/min.
12. Ensure that the engine if still fully warmed-up and check that the ignition timing is 14° ± 1° btdc. At the same time the basic compensation current to the EHA should read −2 ± 2mA.

Note On cars fitted with catalytic converters the ignition timing should be 27° ± 1° btdc and the basic compensation current to the EHA should be oscillating about a median of zero milliamps. Deviation should be approximately ± 3 milliamps.

13. Stop the engine, remove the test equipment, and connect the throttle position switch connector.
14. If the fuel injection and ignition control system maps do not conform to the specification, refer to the appropriate fault diagnosis charts.

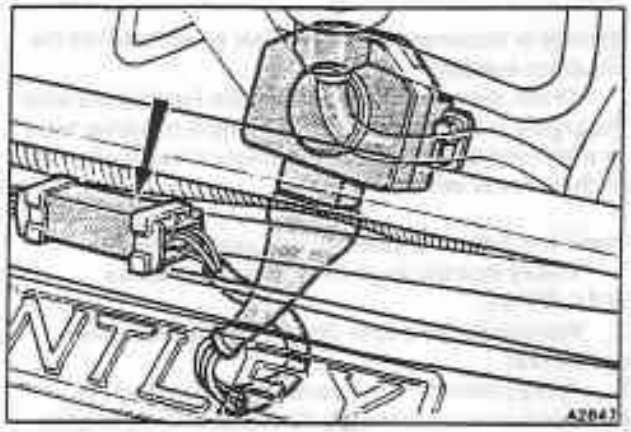

Fig. B4-37 Throttle position switch electrical connection

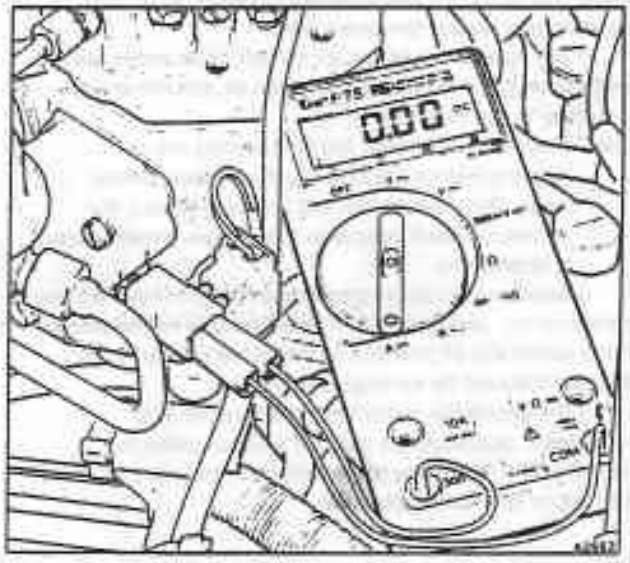

Fig. B4-38 Multi-meter connected in 'series' with the EHA

Diagnosing and correcting faults
The workshop procedure number given before the title of the operation refers to the fault diagnosis chart for the basic KE3 - Jetronic fuel injection system given in figure B4-34.

Before carrying out any tests, ensure that the battery is in a fully charged condition.

It should be noted that all components of the system (except the fuel injectors and cold start injector) can be tested on the vehicle.

Procedure 1 Fuel pump and/or pre-pump not operating correctly
For information relating to these components refer to Chapter C.

Procedure 2 Induction system air leaks
Visually check all vacuum hoses, pipes, and clips for

damage or looseness that may allow an air leak into the induction system.

Check the entire induction system for air leaks with the engine running. Use a suitable length of rubber hose as a listening tube. The leak will often be heard as a high pitched hiss or whistle.

Procedure 3 Metering control unit lever sticking

1 Ensure that the engine temperature is above 20°C (68°F).

2. Remove the air intake elbow from the inlet to the control unit.

3. Apply pressure to the control piston in the fuel distributor for approximately 10 seconds (refer to page B4-22). Switch off the power to the fuel pumps.

4. Press the air sensor plate slowly downwards to its maximum open position. The resistance to this movement should be uniform over the whole range of travel. Allow the air sensor plate to return to its rest position and repeat the operation.

If the resistance to the air sensor plate movement is uniform over the whole range of travel, the metering unit lever is not sticking.

Note Always ensure that the fuel pumps are not running before depressing the airflow sensor plate. Otherwise, fuel will be sprayed into the engine on each occasion the airflow sensor plate is depressed.

5. Should the resistance to sensor plate movement be greater in the rest position, it could be due to the plate being either out of position or distorted due to impact damage (caused by an engine misfire).

6. If the condition described in Operation 5 is confirmed, depressurize the fuel system (refer to page B4-27). Press the plate fully downwards and allow it to return to the rest position.

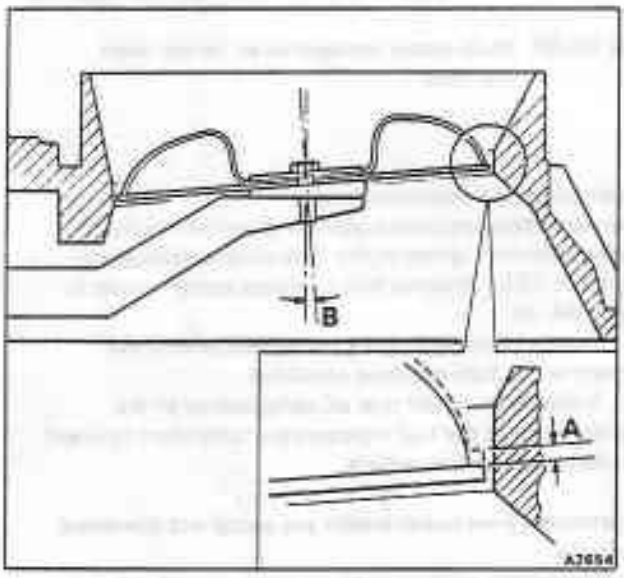

Fig. B4-39 Air flow sensor plate position
A 1,0mm (0.40in) free play with fuel system pressurized
B Sensor plate inclination 4.5°

7. Should a resistance be confirmed in Operation 6, remove the air sensor plate and repeat the operation. If this alleviates the resistance, the air sensor plate is fouling the sides of the air funnel and should be centralized (refer to Procedure 4) or the air funnel may be deformed in some way.

8. If there is still a resistance to the movement of the lever, it could be due to contamination within the fuel distributor barrel or occasional binding in the lever mechanism.

9. Contamination within the fuel distributor can be checked by separating the fuel distributor from the control unit for visual inspection.

Do not attempt to remove the control piston.

Remove the retaining screws situated on top of the fuel distributor. Lift off the fuel distributor (resistance will be felt due to the rubber sealing ring).

10. Examine the distributor for contamination.

11. Fit the fuel distributor by reversing the dismantling procedure. Ensure that the rubber sealing ring is in good condition and is lubricated with suitable grease.

Ensure that the retaining screws are evenly tightened.

12. If a resistance is still noticeable, a new assembly should be fitted.

13. After fitting the fuel distributor check the idle mixture strength.

Procedure 4 Positioning the air flow sensor plate

1. Remove the air inlet ducting from above the sensor plate.

2. Check that the sensor plate does not look deformed or damaged, particularly around its outside edge. Also ensure that the sensor plate will pass through the parallel section of the air funnel without fouling.

3. If necessary, loosen the plate securing bolt.

4. Insert the guide ring RH 9609 whilst retaining the sensor plate in the zero movement position. This will prevent the sensor plate from being forced downwards as the centring guide ring is being installed.

5. With the centring guide ring in position, tighten the retaining bolt to 5Nm (0,50kgf m to 0,55kgf m, 44 lbf in to 48 lbf in). Carefully remove the centring guide ring.

6. Apply pressure to the control piston in the fuel distributor for approximately 10 seconds (refer to page B4-42).

7. The air sensor plate should be positioned as shown in figure B4-39, with the plate not protruding above or below the parallel section of the air funnel.

8. If the air sensor plate is too high, carefully tap the guide pin lower (see fig. B4-40), using a mandrel and a small hammer.

Note This adjustment must be made very carefully, ensuring that the pin is not driven too low. Repeated adjustment can loosen the guide pin. Serious damage to the engine could result if the pin should fall out.

Procedure 5 Checking the operation of the idle speed actuator

It is important that the test equipment used to check the idle speed meets the following specification.