

K-Motronic Engine Management System - Diagnosis using Blink Codes

Procedure

Initiate an 'on-board' diagnostic check to reveal any of the listed fault codes that have been stored within the K-Motronic PCME.

- 1.) Ensure that the usual workshop precautions are carried out, and the gear range selector lever is in the Park position.
- 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 TRIP reset and warning CANCEL buttons located on a small panel adjacent to the steering column (see

illustration B).

Also depress the K-Motronic diagnostic button situated adjacent to the fuseboard (see

illustration C).

All three buttons should be depressed simultaneously for a minimum of 10 seconds.

- 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 D 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 transmitted via the 'CHECK ENGINE' warning panel, the title of the system at fault will be displayed on the dot matrix (see

illustration A).

The blink code will continue to be repeated (with initiation periods identifying blink code commencement), until the diagnostic button is again depressed for 10 seconds.

This procedure must be repeated until all stored blink codes have been extracted from the K-Motronic PCME.

- 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.

The message 'NO MORE FAULT CODES' will be displayed on the dot matrix.

- 7.) If there are no faults stored, the blink code 4.4.4.4. will register on the 'CHECK ENGINE' warning panel.

The message 'NO FAULTS STORED' will be displayed on the dot matrix.

- 8.) To reset the K-Motronic ECU after fault extraction and/or rectification, isolate the vehicle battery for more than 4 seconds.

Note:
The engine management system fitted to 1992 model year cars can also be interrogated using the Mastercheck test equipment (refer to Chapter A for details).

TRIP



MILES

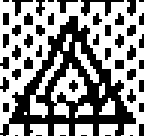
P R N D I L

BRAKE LEVEL
MINERAL OIL

BRAKE
PRESSURE

PARK

STOP



DOE

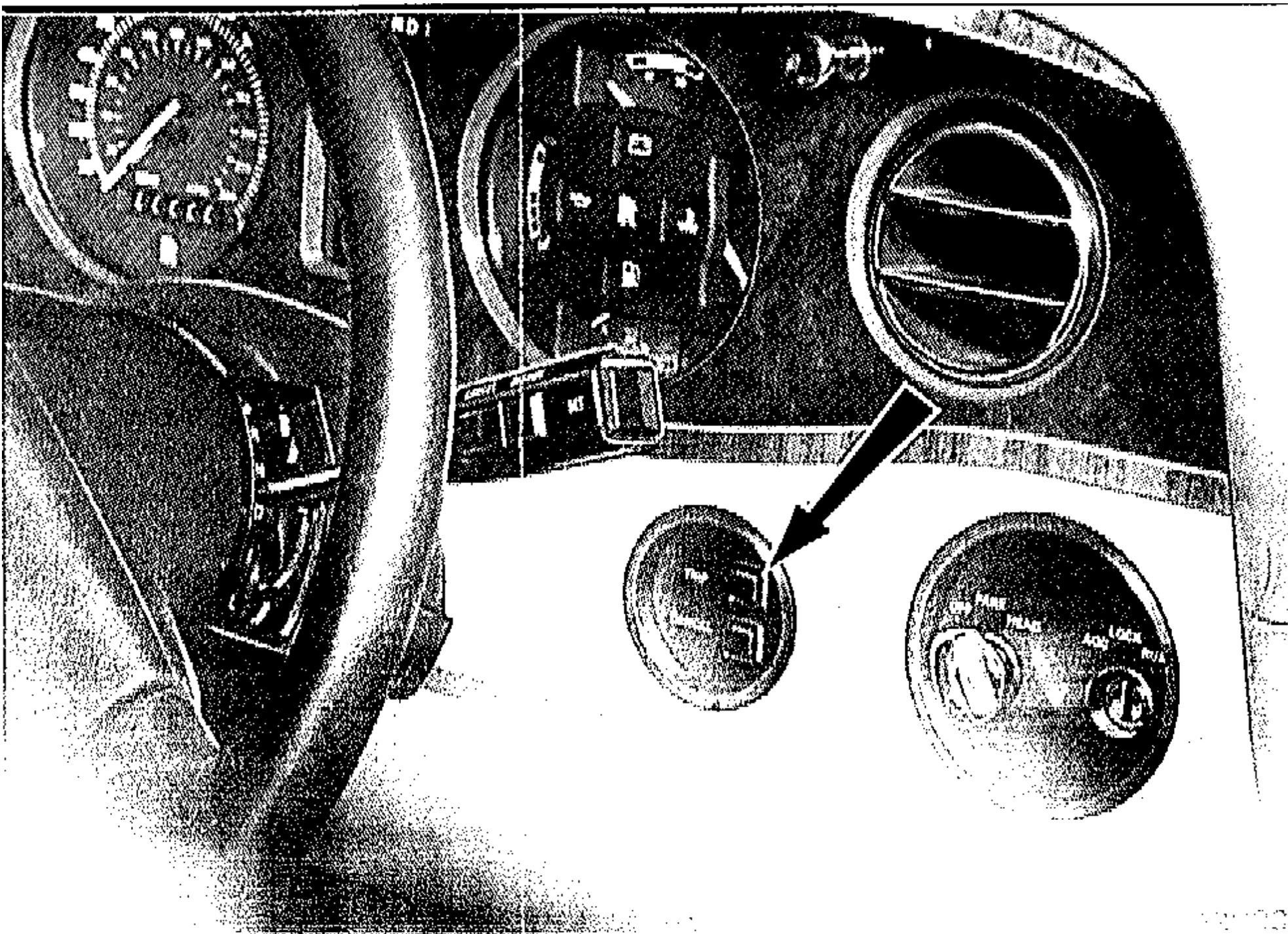


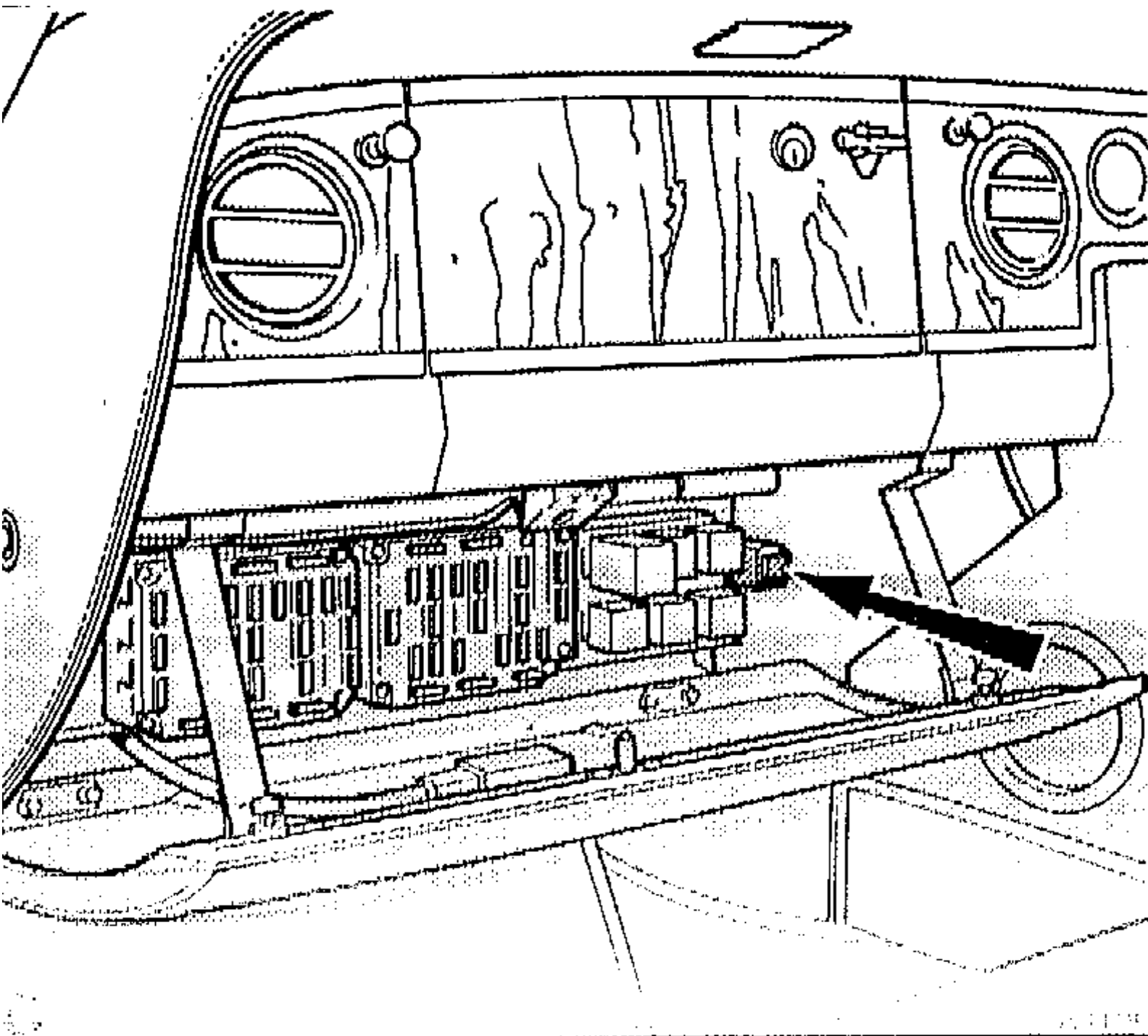
ABS



CHECK ENGINE

COOLANT
TEMP
SIGNAL





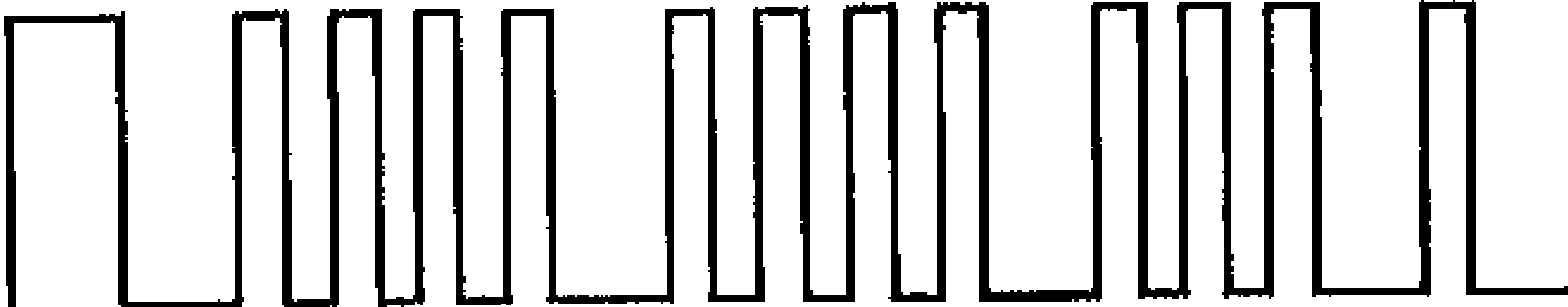
LAMP ON

4.

4.

3.

1.



LAMP OFF

Fault codes

(refer to table:

B2-35 Fuel injection system - electrical test programme - fault diagnosis chart Sheet 1 of 2

Warning:

When carrying out this test programme always ensure that the following conditions apply

Warning:

1. The usual workshop safety precautions are carried out

Warning:

2. The battery is in good condition

Warning:

3. Any cables or connections disconnected for a test must be re-made before proceeding to the next operation

Warning:

4. Always ensure that any faults are corrected before moving on to the next test

see Fig. B2-35

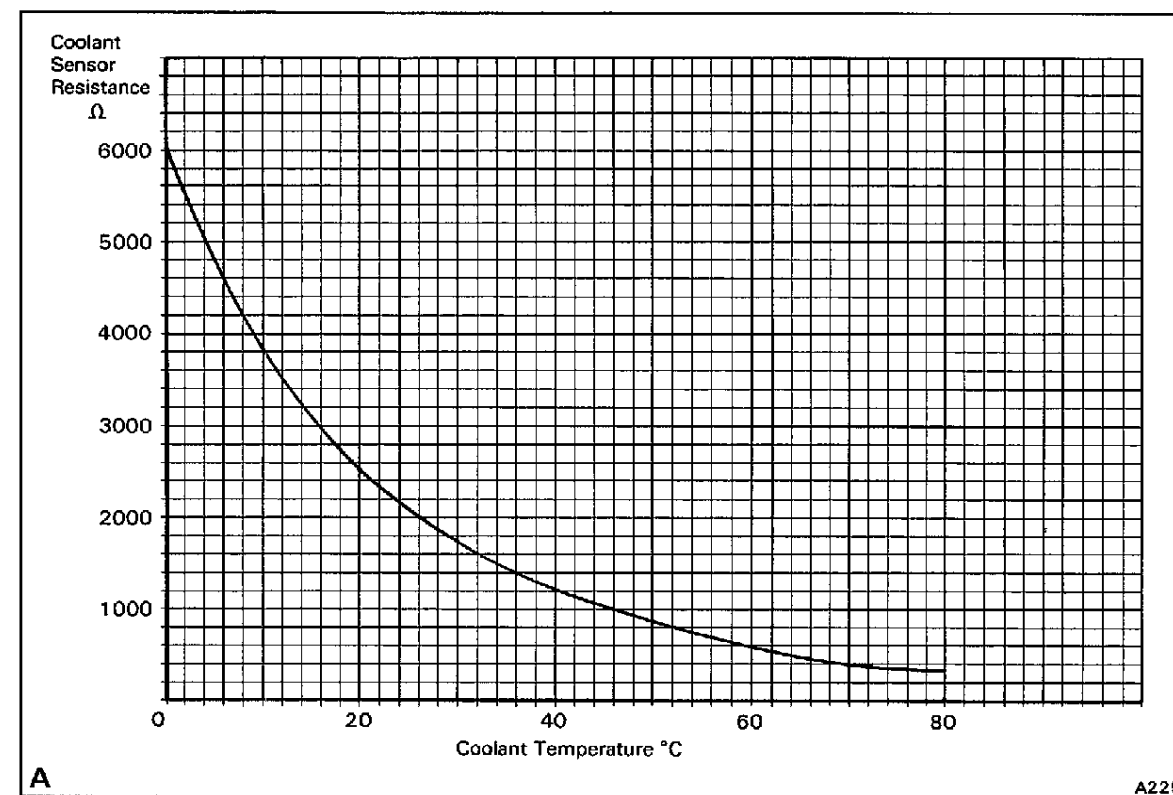
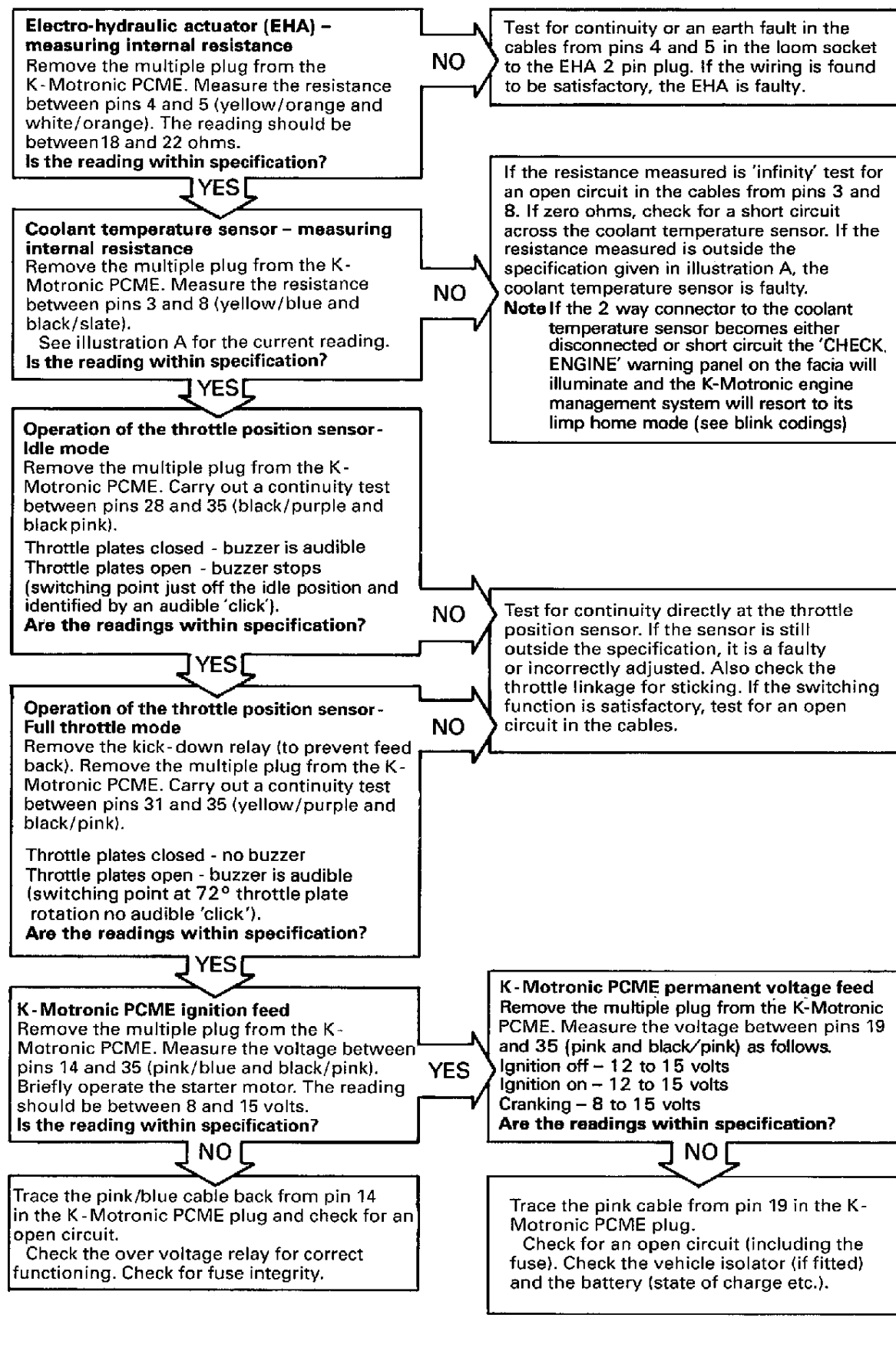
B2-35 Fuel injection system - electrical test programme - fault diagnosis chart Sheet 2 of 2

see Fig. B2-39

B2-39 Fuel distributor removed

Blink code	'Check Engine' panel illuminated	Dot matrix message	Fault description	System method of recognition	Limp home facility
2.3.1.2.	Yes	COOLANT TEMP SIGNAL	Coolant temperature sensor output outside operating range	Coolant temperature less than -46°C (-50.8°F) or more than $+186^{\circ}\text{C}$ ($+366.8^{\circ}\text{F}$)	K-Motronic PCME provides EHA with mA compensation equivalent to $+80^{\circ}\text{C}$ (176°F) coolant temperature for all operational modes other than starting which is set to $+20^{\circ}\text{C}$ (68°F)
2.2.3.2.	Yes	AIR FLOW SIGNAL	Incorrect air flow signal	Volumetric air flow rate outside pressure upper and lower threshold limits (i.e. less than $5\text{ m}^3/\text{hr}$ or more than $1020\text{ m}^3/\text{hr}$)	Ignition and fuelling switched to full load map or idle map respectively
2.1.2.1.	No	IDLE MODE SWITCH	Idle switch fault, idle control maps not recognised	Idle switch closed. Air flow greater than $166\text{ m}^3/\text{hr}$ with switch closed for more than 0.3 seconds	Ignition and fuelling switched to part load map
2.1.2.3.	Yes	FULL LOAD SWITCH	Full load switch fault Full load control maps not recognised	Full load switch closed but PCME recognises part load engine operation for more than 0.3 seconds	Ignition and fuelling switched to part load map
2.1.1.3.	Yes	ENGINE SPEED SENSOR	Engine speed sensor and/or connection to the PCME defective. Air sensor plate mechanism or fuel distributor plunger stuck	Ignition switched on, volumetric air flow rate more than $5\text{ m}^3/\text{hr}$ but no engine speed signal	None
4.4.3.1.	No	IDLE SPEED CONTROL	Idle speed actuator connecting plug open or short circuit	End stage within K-Motronic PCME	Engine idle speed may drift from the controlled $580 \pm 20\text{ rev/min}$. Normal engine operation under all conditions except idle mode
2.3.4.2.	Yes	LAMBDA SENSOR FAILURE	Lambda sensor and/or connection failure	End stage within K-Motronic PCME	System resorts to open-loop engine operation
2.3.4.1.	Yes	LAMBDA OUTSIDE LIMITS	Lambda control outside threshold limits	EHA current is less than -14 mA or more than $+21\text{ mA}$ 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
2.3.4.3.	No	MIXTURE CONTROL LEAN	Basic idle mixture strength adjustment on mixture control unit set 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 $+21\text{ mA}$ is exceeded
2.3.4.4.	No	MIXTURE CONTROL RICH	Basic idle mixture strength adjustment on mixture control unit set 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
4.3.1.2.	Yes	SPARK TIMING SENSOR	Engine reference sensor and/or its connection to the PCME defective	Synchronisation lost	Dependent upon PCME data update prior to engine reference sensor failure

K-Motronic fuel injection system electrical test programme



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Continued from sheet 1

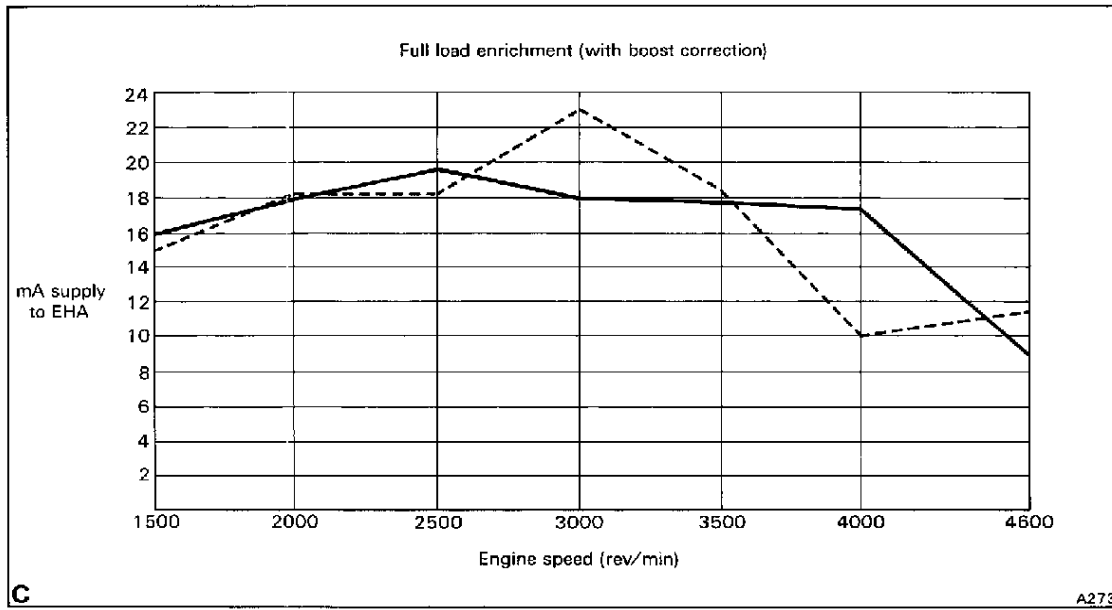
Stand current
Connect a digital multi-meter in series with the EHA using the special adapter RH 9893, switch on the ignition. Note that the stand current should remain constant at $100 \pm 2\text{mA}$ whilst the ignition is switched on. This should also result in an audible buzz as the fuel pump energizes for approximately 1 second
Is the reading within specification?

Starting, after start, and warm-up enrichment
Connect a digital multi-meter in series with the EHA using the special adapter RH 9893. Start the engine whilst observing the multi-meter reading. Consult the enrichment factors charts (fig. B2-28). Cross check the start, after start, and warm-up factors with the vehicle's coolant temperature
Note Refer to note regarding coolant temperatures at the bottom of figure B2-28
Are readings within specification?

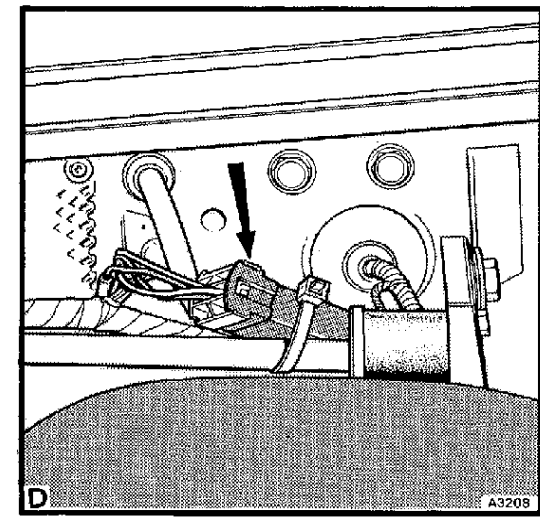
Stabilized engine operating conditions - hot idle
With the engine running at idle speed (580 ± 20 rev/min) and an engine coolant temperature of at least 80°C (176°F), check the supply of milliamps to the EHA (refer to fig. B2-36).
Is the reading within specification

NO
If the reading is outside the specification (and all preceding tests in the programme have been successfully carried out), the K-Motronic PCME is faulty.
If no reading is obtained, check for an open or short circuit in the leads from pins 4 and 5 (yellow/orange and white/orange) on the K-Motronic PCME to the EHA
Rectify leads and/or replace the K-Motronic PCME

YES (Turbocharged)
YES (Naturally aspirated)
To complete this test programme check the idle mixture strength and the operation of the idle speed actuator. Refer to the appropriate pages of Chapter B.



The mA values on graphs B and C are nominal and should only be used as a guideline for transient measurements. Valid for ambient air temperatures of up to 25°C (77°F).
— Turbocharged cars fitted with catalytic converters
- - - Turbocharged cars not fitted with catalytic converters



Full load enrichment (without boost correction)
Due to plausibility constraints within the K-Motronic PCME, if loss of full load enrichment is suspected it must be checked during actual vehicle operation. Fit an analogue mA meter such that the meter reading can be observed by a front seat passenger. Using extension leads and the adapter RH 9893 connect the meter in series with the EHA. Disconnect the K-Motronic air pressure transducer (APT) see illustration D. Complete a full throttle standing start acceleration and monitor the mA to the EHA, along with engine speed indicated by the vehicle tachometer. Cross check the results of the test against the appropriate full load mA map, see illustration B.
Is the range of values within specification?

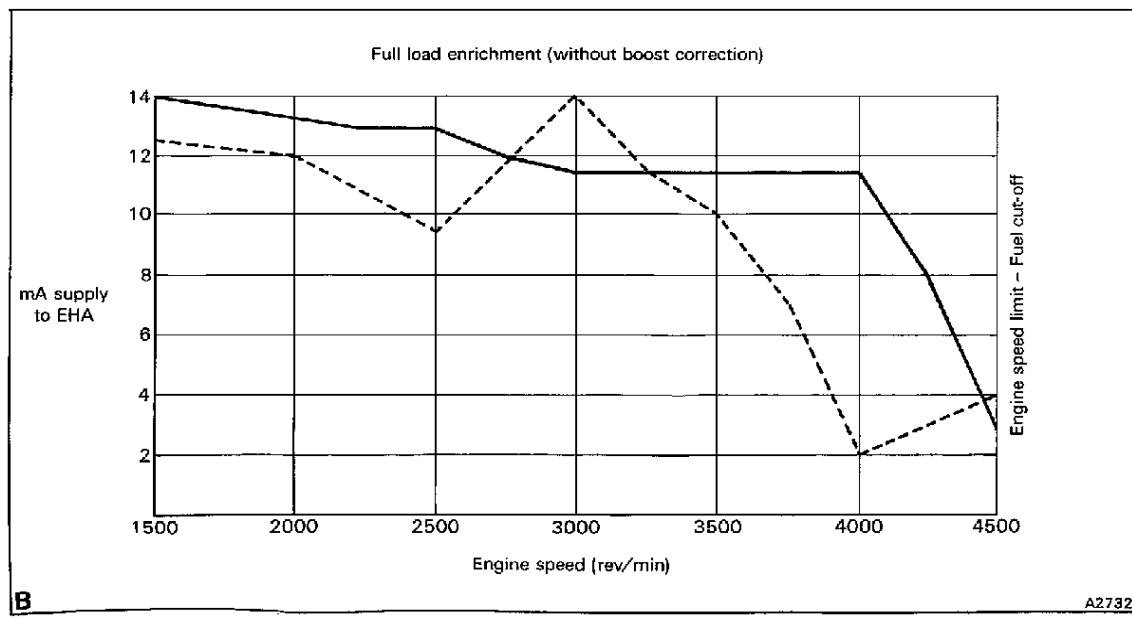
Full load enrichment (with boost correction)
Ensure that the K-Motronic air pressure transducer (APT) has been re-connected. Repeat the previous test. Characteristic curve should now include boost correction, see illustration C.
Is the range of values within specification?

NO
Disconnect the multiple plug from the K-Motronic PCME. Check for throttle position switch integrity, black/pink - pin 35, yellow/purple - pin 31, and blue/purple - pin 28. Also check the operation of the throttle position sensor by using the accelerator pedal to operate the linkage. Ensure full load and idle map actuation.
Trace both the blue/purple and the yellow/purple leads beyond the K-Motronic engine management system for possible failure modes refer to either TSD 5002 or TSD 5136.
Is a failure confirmed?

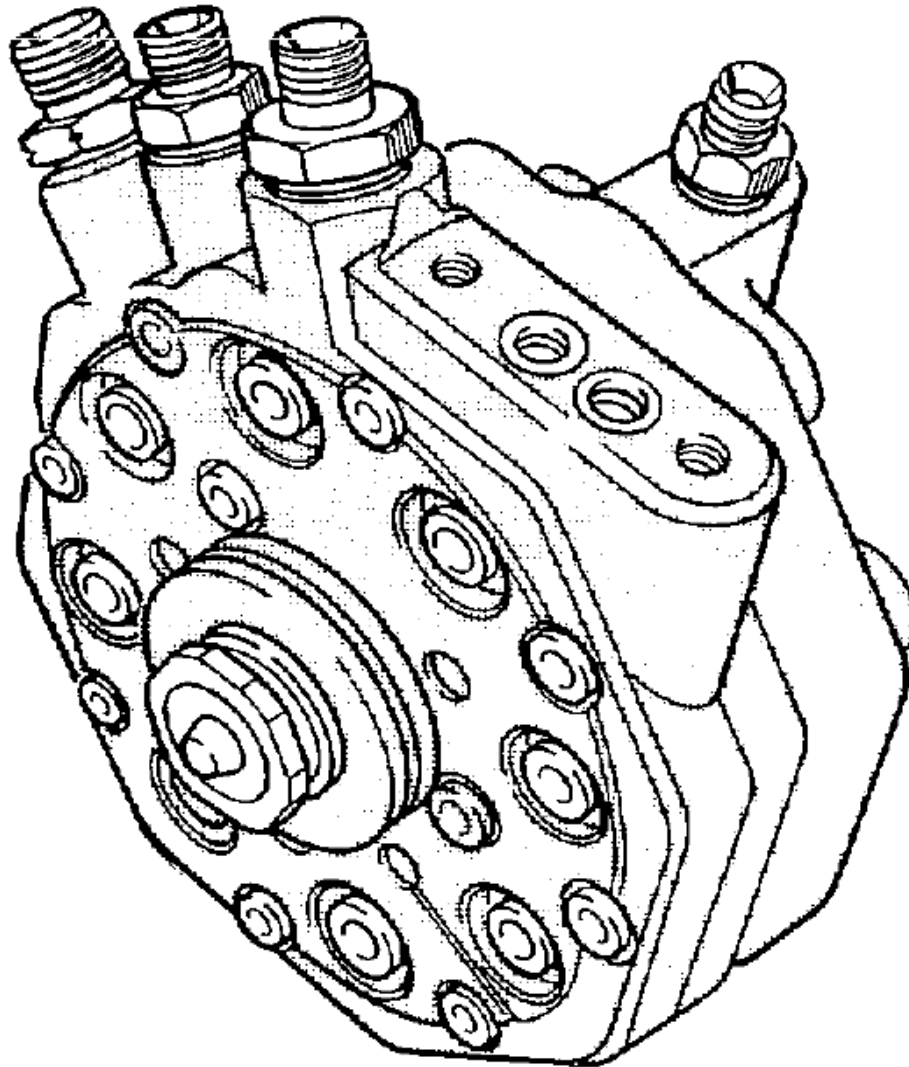
NO
Check for continuity of cables from the air pressure transducer to the K-Motronic PCME (with both plugs disconnected)
APT Cable colour K-Motronic PCME
Pin 1 black/pink Pin 35
Pin 2 green/slate Pin 6
Pin 3 purple/brown Pin 21
Are they continuous?

NO
Check the boost control system
Refer to the appropriate flow chart in Chapter D.
Does the system function correctly?

YES
To complete this test programme check the idle mixture strength and the operation of the idle speed actuator. Refer to the appropriate pages of Chapter B.



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Fuel Distributor - Removed