

- Diagnostic Fault Codes in the vehicle repair process - Thatcham's Approach

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### Introduction

Thatcham MIRRC Helpline customers, repairers and insurers frequently ask for Thatcham's opinion on how to deal with Electronic Fault Codes within the Body Repair Industry. This is a very complex issue with an almost infinite number of scenarios and solutions.

This guidance document is intended to help repairers and insurers gain background information to, and understand the viewpoints taken in, current Thatcham processes and in-house working practices. It may vary from the opinion of individual insurance engineers and repairers, therefore discussion between the parties is recommended.

Also under review at present is a 'best practice' guidance of how we treat fault codes before **and** after a repair, in conjunction with the accreditation of suitable equipment.

### What are fault codes?

All modern vehicles have Electronic Control Modules (ECM), alternatively known as Electronic Control Units (ECU), which monitor electronic sensors and in turn, via actuators, control component systems.

As these systems have developed, self-diagnosis functionality has been introduced to warn the driver or repairer that a fault has occurred within the system.

The ECM will monitor all of the system sensors and actuators, comparing the data or voltage to a pre-defined acceptable range of operating parameters.

If the data falls outside these parameters, depending on how important the sensor or actuator signal is to the system then a fault code is stored within the ECM, and a warning light may be illuminated within the instrument display.

These fault codes can only be read and/or deleted by using specialist diagnostic equipment that interfaces with the relevant systems via a diagnostic connector.

Note: Manufacturers use different protocol (language) and not all ECMs provide diagnostic communication. The number of ECMs fitted to a vehicle will vary depending upon the complexity and number of electronic systems fitted.

A simple ABS circuit diagram showing typical diagnostic components is seen in **Figure 1**.

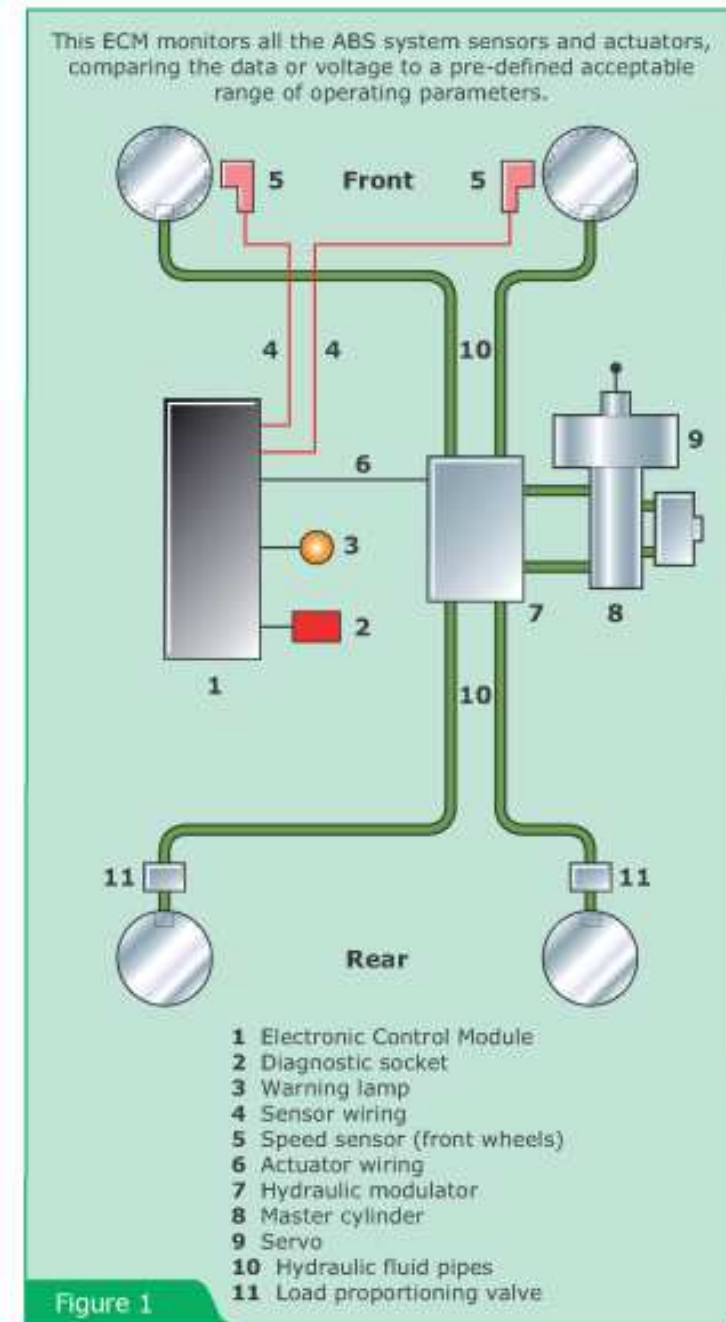


Figure 1

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### How do these fault codes affect accident repairs?

Fault codes are recorded when a sensor or actuator circuit within an electronically controlled system falls outside the operating parameters. This can have different origins, namely:

- An existing ('historical') situation.
- Accident damage to the vehicle.
- The repair process after an accident.

#### 'Historical' situation

A fault may have been present before the accident occurred, in any system that has the ability to store historical data, e.g. ABS, Body Electrics, SRS etc. It is difficult to prove that this type of undated fault was present before an accident, as it is often not discovered until the repair is completed.

The vehicle should be returned to the customer as fit-for-use, therefore if the repairer finds that a fault code is not the result of the accident or repair process, the customer should agree costs for this investigation.

Note: Fault codes can be present without a warning light being displayed.

#### Accident damage to the vehicle

A fault code may be stored due to sensor or component activity outside normal running conditions, e.g.:

- SRS component fired.
- ABS sensors detect different wheel speeds.
- Wiring damaged causing open or short circuit.
- Tyre pressure sensor reports low pressure.
- Physical damage to sensors or actuators.
- Battery voltage low.

This type of fault code should be identified and rectified as part of the accident repair process and costs.

Note: Fault codes can be present without a warning light being displayed.

Typical diagnostic equipment and sample codes are seen in **Figures 2, 3 and 4.**





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The repair process after an accident

1) Fault codes stored due to **unavoidable** normal working processes, e.g. when turning on ignition or starting the engine to:

- Operate seats, windows or sunroofs to enable component removal etc (where open circuits could be detected elsewhere within the vehicle resulting in a stored fault code). This may include the removal of bonnet, door, tailgate/bootlid, glazing or internal trim.
- Move the vehicle within the repair facility – it may be preferable in certain circumstances and after a risk assessment, to move it by driving, with known open circuits (therefore recording a fault code), rather than to push a heavy vehicle with the risk of personal injury to employees. This may concern electronic parking brakes and transmission interlocks which make it impossible to move without raising the locked wheels (manual overrides are usually provided).

This type of fault code must be erased before returning the vehicle to the customer and the cost should be agreed between the repairer and work provider, with the repairer clearly stating the considered risk which resulted in the fault code being recorded.

Note: Fault codes can be present without a warning light being displayed.

2) Fault codes stored due to **avoidable** activation of vehicle electrical circuits during the repair process. In many repair methods, best practice requires battery disconnection at the start of the repair and re-connection when the repair is complete apart from final checks and tests, in order to prevent accidental damage to the vehicle, or accidental personal injury, from happening during the repair. Examples are:

- When a cooling, air-conditioning, fuel or lubricating system has been opened.
- When working on the SRS system.
- When any suspension component has been disconnected or removed.
- When welding, to prevent electrical component damage (alternator also disconnected where appropriate).

Adhering to best practice in these cases will avoid accidental recording of a fault code. Any such fault code must be erased before returning the vehicle to the customer and the cost should be borne by the repairer, if the appropriate disconnection procedures were not observed.

Note: Fault codes can be present without a warning light being displayed.

Thatcham Methods and Times: see next sheet



Figure 3

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### Thatcham Methods and Times

Thatcham methods and times identify battery disconnection within the MET detail section of e-scribe, and the MET breakdown detail section within all TTS estimating systems.

In this case vehicle movements within the repair facility are considered to be with the vehicle immobilised, which is the normal procedure based on Thatcham's existing risk assessment. The relevant working processes thus defined will reduce the risk of personal injury during vehicle movements.

In this regard, vehicles with electronic parking brakes and transmission interlocks need special consideration, as it may be impossible to move them without raising the locked wheels (manual overrides are usually provided).

Costing of fault diagnosis-related work may follow one of two alternatives:

- A 'specialist' charge may be agreed between the repairer and customer or work provider.
- If the appropriate equipment is available to the repairer, Thatcham suggests a guide time of 0.5 hour for checking and clearing codes, but note that any resulting additional work would be subject to the hourly rate applicable.

### Important Note for Thatcham/BSI Kitemark Repairers

When sub-contracting any form of fault code diagnosis-related work, you must ensure that sub-contractors have the necessary process controls to comply with the requirements of PAS125. They may take this technical guidance as base data.



Figure 4