

Thatcham Research

Advanced Driver Assistance Systems (ADAS) in Repair

Code of Practice

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Draft

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1.0 Foreword

- 1.1 Modern vehicles on UK roads are fitted with a wide range of Advanced Driver Assistance Systems (ADAS). As the capability of the features of ADAS become more automated in nature, controlling safety critical systems such as braking and steering, their proper and effective function becomes ever more safety critical. The function of ADAS features rely on sensors that continuously and accurately monitor the environment around the vehicle making these sensors a safety critical aspect of any repair process.
- 1.2 Examples of these ADAS features include:
- 1.2.1 Autonomous Emergency Braking (AEB)
 - 1.2.2 Adaptive Cruise Control (ACC)
 - 1.2.3 Lane Keep Assistance (LKA)
 - 1.2.4 Remote Active Park Assist (RAPA)
 - 1.2.5 Adaptive Headlamps (ALS)
 - 1.2.6 Head Up Display (HUD).
- 1.3 Thatcham Research recognise the safety benefits of these features when enabled and have sought to develop a Code of Practice to ensure such features remain effective following any form of repair process. This document sets out the Thatcham Research position on current “best practice” for repair, with clear reference to:
- 1.3.1 the industry’s specification for vehicle damage repair processes (BS10125);
 - 1.3.2 the identification of sensors which enable ADAS features; and
 - 1.3.3 the potential inspection, calibration and realignment requirements of these sensors and their related components.
- 1.4 This Code of Practice should be considered for scenarios such as, but not limited to:
- 1.4.1 repairing, removing and refitting, aligning or replacing parts within close proximity of ADAS sensors;
 - 1.4.2 making any geometry changes or changes to the vehicles’ suspension or ride height; and
 - 1.4.3 realigning, replacing or refitting any ADAS sensors or associated vehicle parts within close proximity of a sensor.
- 1.5 With calibration requirements varying from vehicle-to-vehicle, it is essential that the Manufacturer’s technical specifications are met to reinstate the correct function of these ADAS features so that the safety and functionality of the vehicle is not compromised.
- 1.6 This document sets out to provide a Code of Practice to support those engaged in repair operations in their endeavour to return vehicles to their full pre-accident/Pre-repair condition ensuring full and safe functionality.
- 1.7 Note; this Code of Practice is not intended to replace the training and expertise that is required from repairers in order to provide safe and effective repairs. Repairers should use their expertise to ensure that any information, process, procedure or specification used in the repair of a vehicle is fit for purpose and all repair instructions and guidance are followed correctly.
- 1.8 Thatcham Research shall not be liable for any loss or damage incurred in relation to this Code of Practice (including as a result of negligence) save for in respect of death or personal injury or any other losses which cannot be excluded or limited by law.

2.0 Position

2.1 In all situations where ADAS sensors, parts within the close proximity of the ADAS sensors or vehicle geometry are included within the repair procedure, inspection, calibration and realignment requirements must be considered and where specified, must be completed post repair to confirm the sensors are functioning within the Manufacturer's technical specification.

3.0 Scope

3.1 To set out a "Code of Practice" to assist repairers when repairing vehicles fitted with ADAS sensors, so that vehicles are restored to full and safe functionality prior to customer return. A repairer should:

- 3.1.1 In all cases identify the presence, or not, of ADAS on a vehicle and ensure it is recorded;
- 3.1.2 In all cases, where ADAS is present, ensure repair procedures clearly identify if inspection, calibration and realignment are required and why;
- 3.1.3 In all cases, unless clearly directed by the owner/driver of the vehicle to do otherwise, complete all inspection, calibration and realignment activities as detailed within the repair procedures;
- 3.1.4 In all cases, ensure inspection, calibration and realignment is carried out by a competent person;
- 3.1.5 In all cases, ensure the calibration results confirm that the sensors are functioning within the Manufacturer's technical specification;
- 3.1.6 In all cases, provide fully verifiable and auditable records.

4.0 Terms and Definitions

4.1 **Windscreen** – Predominantly referring to but not exclusively limited to the front windscreen.

4.2 **ADAS** – Advanced Driver Assistance Systems.

4.3 **Static Calibration** – The calibration of ADAS sensors by use of specialist calibration equipment which may include: aiming targets, wheel alignment equipment and/or diagnostic tools. The process is carried out without driving the vehicle.

4.4 **Dynamic Calibration** – The calibration of ADAS sensors by means of driving the vehicle on the road following the VM's prescribed method,

4.5 **Self-Calibrating** – The automatic calibration of ADAS sensors without the need for specialist equipment or a prescribed driving profile.

4.6 **Diagnostic Tool** – A tool used to interface with, diagnose, and potentially reprogram or initialise vehicle control modules.

4.7 **Calibration Equipment** – The equipment used in conjunction with a diagnostic tool to meet the manufacturers' calibration specifications.

4.8 **Customer** – The owner/ driver/ keeper of a vehicle, or the owner's agent authorised to instruct repairs.

4.9 **Repairer** – The business contracted to undertake the repair work on behalf of the customer/work provider.

4.9.1 Sensor – A device that monitors the environment around the vehicle. Typically, a camera, ultrasonic, RADAR or LIDAR unit.

4.9.2 Competent Person - An individual proven through relevant and up to date, industry recognised, certified assessments or training programmes with assessed outcomes.

4.9.3 Calibration – The act of measuring sensor line of sight determining whether the sensor/s in question are function to the vehicle manufacturers technical specification

4.9.4 Manufacturers technical specification – The angles of alignment including the operating tolerances of the sensors that are to be confirmed through calibration.

5.0 Code of Practice for managing repairs affecting ADAS

5.0.1 The processes and controls established in this Code of Practice should be followed when:

- repairing, removing and refitting, aligning or replacing parts within close proximity of ADAS sensors;
- making any geometry changes or changes to the vehicles' suspension or ride height;
- realigning, replacing or refitting any ADAS sensors or associated vehicle part; and
- carrying out any other repair tasks which may interfere with the function of the ADAS features on the vehicle.

5.0.2 Repairers should utilise researched repair methods and their own experience and expertise in undertaking work, exercising the required duty of care to ensure the features are functioning through inspection, calibration and realignment of the sensors to Manufacturers technical specification.

5.0.3 Where there are no vehicle-specific instructions on the viability of repair on windscreens, bumpers, grilles or other body panels in front of or in close proximity of an ADAS sensor, the repairer is required to consider the “best practice” approach to ensure the vehicle is restored to full and safe functionality.

5.0.4 Where ADAS sensors, components of the ADAS or components within close proximity of the ADAS sensors are included within the repair specification, then inspection, calibration and realignment to confirm the ADAS sensors are functioning within the Manufacturers technical specification should be conducted

5.0.5 inspection, calibration and realignment should only be carried out by competent persons, using equipment that will produce, auditable and verifiable evidence of a successful calibration.

5.0.6 Where a business does not have the capability to carry out inspection, calibration and realignment of a specific vehicle, or a specific sensor on a vehicle, then this work should only be outsourced to 3rd parties who can meet this Code of Practice.

5.0.7 Where no repair guidance exists, and functionality cannot be proven through systemised calibration confirming performance to Manufacturers technical specification, then advice should be sought from the responsible VM.

5.0.8 The following guidance and the process flow chart in Annexe A is provided to assist repairers in meeting this Code of Practice.

5.1 Triage, Damage Assessment and Preparation

5.1.1 Before commencing with any repair procedures, effective assessment and preparation should be conducted to assess if the repairer has the capability to manage the full repair process.

- 5.1.2 Assess whether the vehicle has ADAS sensors fitted, which systems they are enabling, and clearly identify the locations of the sensors using the following methods:
- 5.1.3 Direct questioning of the vehicle owner.
- 5.1.4 Researching the vehicle model fitment information.
- 5.1.5 Use of 3rd party VIN or registration look up tools for fitment data.
- 5.1.6 Inspect the vehicle, refer to repair planning 5.2
- 5.1.7 Use Diagnostic Tools to check vehicle data to verify what ADAS sensors are fitted.
- 5.1.8 If no ADAS sensors are fitted to the vehicle, the vehicle can proceed through the normal repair procedures required bringing that vehicle back to pre-accident/pre-repair condition (record for audit purposes that no ADAS are fitted and no inspection, calibration and realignment is required).
- 5.1.9 Where ADAS sensors have been identified, confirm what sensors are on the vehicle being repaired (record for audit purposes).

5.2 Repair planning

5.2.1 Prior to repair a full repair specification with all inspection, calibration and realignment requirements should be created by;

- 5.2.2 Conducting a pre-repair scan along with visual inspection of steering wheel, instrument panel and other areas looking for controls for ADAS functionality that would indicate fitment.
- 5.2.3 Where ADAS have been identified, confirm what sensors are on the vehicle in question (record for audit purposes).
- 5.2.4 Inspecting the damaged area and consider the most appropriate method of repair or replacement.
- 5.2.5 Sourcing repair methods to support determination of the most appropriate repair procedure, taking note of any restrictions determined within the repair methods and manufacturer technical data.
- 5.2.6 Determining which ADAS sensors have been affected or will be affected by the repair process (record for audit purposes).
- 5.2.7 Identifying which ADAS sensors require which type of inspection, calibration and realignment, i.e. static, dynamic or self-calibrating or combination of these by reviewing the technical specification within repair methods
 - 5.2.8 *Note:- for dynamic calibration; if this procedure is conducted on the public highway then full safety and legal obligations should be considered to protect technicians and other road users.*
- 5.2.9 Determining the businesses capability to deal with the specified requirements.
- 5.2.9.1 Confirm the capabilities of any calibration equipment held to ensure the business is able to calibrate the full vehicle system.

Note:- equipment suppliers will need to ensure that lists are available, detailing capability at a vehicle make and model level including the date at which the coverage of the vehicle was introduced on the calibration equipment and which sensors are covered.

5.2.9.2 For vehicles outside a business's calibration coverage or capabilities then they will need to identify sub-contractors capable of undertaking the calibration service in accordance with this Code of Practice.

5.2.9.3 Developing and finalising the full repair specification and confirming it includes all necessary operations to repair the vehicle to its full pre-accident/pre-repair safety and performance standards.

5.3 Calibration

5.3.1 All inspection, calibration and realignment activities should be completed by currently competent persons. Competence should be proven through relevant and up to date, industry recognised, certified assessments or training programmes with assessed outcomes.

During and following successful inspection, calibration and realignment the following information should be captured and retained for records and if required shared with the work provider / customer:

- 5.3.2 name and address of the repairer
- 5.3.3 name and address of 3rd party contracted to complete the inspection, calibration and realignment if outsourced
- 5.3.4 vehicle make and model
- 5.3.5 vehicle registration
- 5.3.6 vehicle Identification Number (VIN)
- 5.3.7 vehicle Mileage
- 5.3.8 date of calibration
- 5.3.9 name or reference and means of proof of competent person
- 5.3.9.1 equipment used to calibrate the vehicle systems
- 5.3.9.2 Auditable and verifiable evidence of the calibration result confirming functionality of the sensor within the Manufacturers technical specification

6.0 Expected Requirements on industry

6.1 Vehicle Manufacturers

6.1.1 When developing and making vehicles available to the market that have or could have ADAS features available VM's should:

- 6.1.2 provide access to vehicle data that easily identifies if ADAS sensors are fitted.
- 6.1.3 provide clear consistent advice on which repair scenarios would result in inspection, calibration and realignment being required.
- 6.1.4 provide inspection, calibration and realignment procedures which are auditable and verifiable showing that ADAS sensors are functioning to Manufacturers technical specification
- 6.1.5 provide or support training with assessed outcomes that provide a proof of a competent person.
- 6.1.6 provide appropriate technical specification details to enable inspection, calibration and realignment to be carried out effectively.

6.2 Equipment Suppliers

6.2.1 When developing equipment and / or software to support calibration of ADAS sensors those equipment suppliers should ensure:

- 6.2.2 equipment used to calibrate must provide auditable and verifiable evidence of successful calibration, confirming function of the sensor within the Manufacturers technical specification
- 6.2.3 that capabilities of calibration equipment, at a vehicle make and model level including which sensors can be calibrated by the equipment, are maintained and available to users of the equipment.
- 6.2.4 provide inspection, calibration and realignment repair procedures for all vehicles covered
- 6.2.5 verifiable records of calibrations conducted are retained and made available for audit purposes through the software.

6.3 Work Providers

6.3.1 Must be confident of the service supplier's ability to manage the complete repair process including calibration where this is required and therefore should:

- 6.3.2 Identify capabilities within their existing network.
- 6.3.3 Establish if ADAS is included on a vehicle at triage wherever possible.
- 6.3.4 Direct work according to the capability of the network.

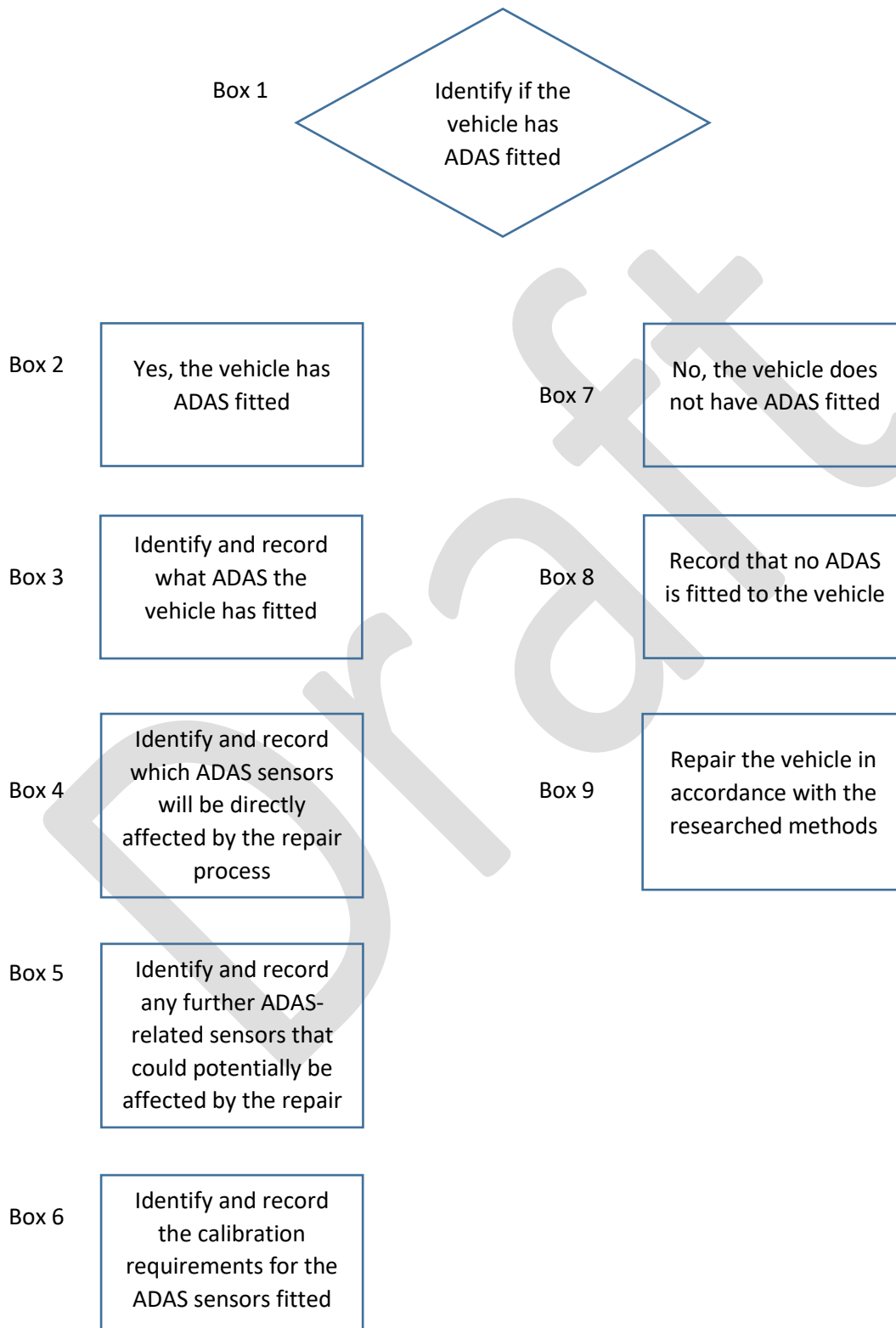
6.4 Repairing businesses

6.4.1 In accordance with Section 5 of this document, repairers should:

- 6.4.2 Assess for the presence of ADAS sensors recording the outcome clearly.
- 6.4.3 Research and seek guidance from relevant repair methods and inspection, calibration and realignment instructions.
- 6.4.4 Ensure all inspection, calibration and realignment activities are completed by a currently competent person(s).
- 6.4.5 Complete system inspection, calibration and realignment in accordance with the relevant repair method / instruction.
- 6.4.6 Be able to demonstrate that the calibration of all affected sensors has been completed and the results of the calibration confirms functionality of the sensor within the Manufacturers technical specification
- 6.4.7 Where no specific repair guidance exists, and functionality cannot be proven through systemised calibration, then advice should be sought from the Vehicle Manufacturer or its agents and appropriate action taken prior to vehicle release.

Annex A

Process Flow for the Calibration of ADAS sensors



Annex B

