AUSTRALIAN AUTOMOTIVE
AFTERMARKET ASSOCIATION

ADAS -
INDUSTRY CODE OF CONDUCT

The AAAA ADAS industry code outlines best practices and guidelines for the service, repair, and maintenance of vehicles equipped with advanced driver assistance systems (ADAS), ensuring safety, quality, and compliance with evolving technologies.

AUSTRALIAN AUTOMOTIVE
AFTERMARKET ASSOCIATION

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FOR FURTHER INFORMATION

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Driving Standards. Shaping the Future.

AUSTRALIAN AUTOMOTIVE AFTERMARKET ASSOCIATION

About the AAAA

The **Australian Automotive Aftermarket Association (AAAA)** is the national industry body representing the independent automotive service and repair sector. Our members include mechanical workshops, parts suppliers, tool and equipment manufacturers, distributors, training organisations, and service providers—united by a shared commitment to excellence, innovation, and customer safety.

The AAAA plays a unique and trusted role in bringing together businesses from across the supply chain to respond to emerging technologies and regulatory challenges. We do this by facilitating collaboration, driving research, advocating for fair and open competition, and supporting best practice across the industry.

Why We Lead on Industry Codes

Vehicle technology is changing rapidly, and it is critical that our industry evolves with it. The AAAA develops voluntary codes of conduct to help the sector stay ahead—providing practical, industry-led guidance that is shaped by the people who do the work every day.

This **ADAS Service and Repair Code of Conduct** is the result of extensive consultation with experts from across the automotive industry. It reflects our belief that the independent sector is ready, willing, and capable of setting its own standards—ones that are grounded in real-world experience and aligned with community expectations for safety, quality, and professionalism.

Our commitment is simple: to ensure that the automotive aftermarket remains skilled, trusted, and future ready.

Preface

Today's modern vehicles are equipped with an ever-increasing number of advanced driver assistance systems – commonly referred to as ADAS.

The next generation of vehicles will take driver assistance and self-driving capability to an entirely new level, as they become more autonomous. These advanced systems must function correctly, which requires periodic calibration throughout the entire service life of the vehicle. Vehicles will inevitably require replacement parts, mechanical adjustments, and repairs due to accidents. Each of these instances could necessitate a calibration of the ADAS systems to ensure continued safe operation.

An increasing number of driver assistance systems are mandated under Australian Legislation[1] and an even greater number are being introduced by individual vehicle manufacturers as either standard features or optional extras.

Many workshops are not yet fully familiar with the breadth of automated assistance systems and the correct methodologies required for their calibration. This document aims to bridge that gap by providing guidance on understanding the different levels of vehicle autonomy, their corresponding technologies, and functions, and ultimately, the correct methods for testing, repairing, and calibrating these systems.

As automation increases, the ability to diagnose and repair ADAS components will require new expertise. Increased technical training, specialist tools, and new repair protocols will be essential. Additionally, workshops must be able to provide clear, verifiable evidence that ADAS repairs and calibrations have been performed correctly. This ensures that these safety systems operate as intended.

Craig Baills
Chair – AAAA ADAS Technical Working Group
Chair – Automotive Repairers Council of Australia (ARCA)

AAAA remains committed to supporting its members and ensuring access to the necessary diagnostic capabilities, technical tools, equipment, and training required for ADAS repairs. As vehicle technology advances exponentially, AAAA and its members will continue working to empower both authorised and independent workshops to professionally service modern and future vehicles with the latest equipment and technical expertise.

For all workshops and technicians, this document will serve as an essential guide for understanding the evolving design, diagnosis, repair, and calibration requirements of current and future advanced driver assistance systems.

1. Autonomous Emergency Braking (AEB) was introduced into Australia's Australian Design Rules (ADRs) through ADR 98/00, which was first announced in November 2021. This regulation mandates that all newly introduced vehicle models must be equipped with AEB systems from March 1, 2023. Furthermore, the requirement was extended to all new vehicles on sale in Australia from March 1, 2025.

Development of the ADAS Industry Code

To ensure the safe and consistent service and repair of vehicles equipped with Advanced Driver Assistance Systems (ADAS), the Australian Automotive Aftermarket Association (AAAA), through its Automotive Repairers Council of Australia (ARCA), convened the **ADAS Service and Repair Technical Working Group (ADAS S&R TWG)**. This group was tasked with developing an **Industry Code of Conduct** that provides practical guidance for integrating ADAS validation into routine vehicle servicing and repair.

Purpose and Scope

The ADAS S&R TWG was established to draft and oversee the creation of an Industry Code of Conduct addressing the why, when, and how of ADAS validation in professional workshops. With the mandatory implementation of **Australian Design Rule 98 (Autonomous Emergency Braking)** from 2025 and the anticipated **Automated Vehicle Safety Law** by 2026, the need for a consistent industry-led response was both urgent and essential.

This Code is a voluntary guideline developed to promote safe and consistent service and repair of vehicles equipped with ADAS. It does not replace or override any applicable laws, regulations, standards, or vehicle manufacturer requirements, including but not limited to the Australian Design Rules (ADRs), state-based road safety legislation, and consumer protection laws. Compliance with this Code does not guarantee compliance with legal obligations, and users should seek independent advice where required.

The Working Group's key responsibilities included:

- Drafting a comprehensive Code of Conduct for ADAS-related services, repair, and maintenance.
- Defining appropriate ADAS validation protocols for real-world workshop environments, including both static and dynamic calibration methods.
- Identifying existing gaps in skills, tools, and processes.
- Ensuring the Code aligns with regulatory requirements and industry best practices.
- Supporting implementation through the provision of guidelines, training, and resources.
- To deliver a living document that can adapt to the ongoing changes of ADAS technologies.

Membership and Operation

The ADAS S&R TWG comprised a diverse group of industry experts, including workshop operators, parts and diagnostics suppliers, windscreen repairers, tyre and service chains, and AAAA representatives. Members were selected for their technical expertise and commitment to shaping a practical and future-focused Code.

Members of the Working Group:

- **Craig Baills** – ARCA Chair, Highfields Mechanical & HiMech Auto Solutions
- **Lesley Yates** – Australian Automotive Aftermarket Association
- **Marcel Fabris** – Bridgestone Australia
- **Matthew Douglass** – CoolDrive Auto Parts
- **Rob Mildenhall** – National Windscreens
- **Scott Donnelly** – Drive Group
- **Thomas Hatch** – mycar

Members of the Expert Review Panel:

- **David Erickson** – Bosch Australia
- **Jason Trewin** – I-CAR Australia
- **Glareh Kayhoor** – HELLA
- **Michael Murph**y – Rapid Tune
- **Gavin Cribb** – Kangan Institute
- **Coby Guinness** – Autel Australia

Meetings were conducted both in person and virtually. Action items and outcomes were documented and shared, and decisions were made by quorum.

A Living Code

This Industry Code of Conduct is intended to be a living document. ADAS technology is evolving rapidly, and it is essential that the Code keeps pace with new vehicle systems, tools, and service procedures.

To maintain its relevance and integrity, the ADAS S&R TWG will reconvene at six-monthly intervals to review and, where necessary, update the Code in response to emerging developments and industry feedback.

We welcome feedback and suggestions. If you would like to contribute to future revisions or raise concerns about the content of the Code, please contact us at **advocacy@aaaa.com.au.**

ADAS Readiness: Why It Matters

Paying attention to ADAS is fundamental for independent repairers seeking to uphold customer safety, maintain regulatory compliance, and capitalise on emerging business opportunities in a rapidly evolving automotive landscape.

Independent automotive repairers should pay close attention to ADAS for several key reasons:

Increased Vehicle Complexity: Modern vehicles are increasingly equipped with ADAS technologies, such as lane-keeping assistance, adaptive cruise control, and autonomous emergency braking. These systems require specialised knowledge, tools, and procedures for repair and calibration. Independent repairers need to stay up to date to handle these systems effectively and safely.

Market Demand and Competitiveness: As ADAS-equipped vehicles become more common, customers will depend on their trusted independent repairer to be able to service and maintain these systems.

OEM service providers are often unable to schedule or provide calibration services without lengthy delays, necessitating an independent aftermarket solution.

Service providers equipped to handle ADAS will be better positioned to meet customer needs and stay competitive.

Calibration and Safety: Many ADAS features rely on sensors and cameras that need to be calibrated after repairs or replacements. Failure to calibrate these systems correctly can lead to malfunctioning safety features, compromising safety and potentially resulting in liability for repairers. Understanding and offering ADAS calibration services will help independent repairers build trust with their customers.

Regulatory Requirements: Governments around the world, including Australia, are mandating the inclusion of ADAS features in on-road mobility sectors. Repairers who are skilled & trained about ADAS will be better prepared to comply with new industry standards and government regulations.

Increased Repair Complexity: As ADAS-equipped vehicles require more precise and technical work, repairers with the training, knowledge and capabilities will be better prepared for the future. ADAS systems can add complexity to repairs, but this also presents an opportunity for independent repairers to offer specialised services.

ADAS Complexity

ADAS is complex! A big part of that complexity arises from the variety of technologies it uses. These systems rely on multiple sensors, cameras, radar, LiDAR, and software, all of which interact in different ways with the vehicles other systems and technologies. Here's a breakdown these ADAS complexities:

Diverse Sensor Technologies: ADAS uses a combination of sensor technologies, including:

- **Cameras:** Object classification! Often used for lane departure warning, traffic sign recognition, and collision avoidance. Cameras can be sensitive to environmental factors like dirt, weather, windscreen cracks, or lighting conditions, making calibration and maintenance critical.
- **Radar:** Detection and ranging! Typically used for adaptive cruise control and collision avoidance, radar works well in various weather conditions but has its own calibration requirements and limitations in terms of range and resolution.
- **Ultrasonic Sensors:** Used for parking assist systems, these sensors work in close-range environments but can be affected by obstacles, dirt, and other factors.
- **LiDAR:** Object detection ranging and classification. Less common in consumer vehicles but increasingly used for more advanced systems, like autonomous driving. LiDAR requires precise alignment and calibration.
- **Infrared Sensors:** Used for night vision and some driver monitoring systems, infrared sensors are sensitive to temperature and alignment.

Sensor Fusion: ADAS systems often use sensor fusion, where data from multiple sensors are combined to make real-time decisions. For example, a collision warning system may combine data from cameras, radar, and ultrasonic sensors to determine the best course of action. Each sensor must be properly calibrated to ensure accurate fusion, which adds complexity for repairers.

Calibration Procedures: It is highly likely that ADAS features and components will require calibration after repairs or component replacement. Calibration can be static or dynamic, depending on the system. Static calibration often requires the vehicle to be positioned in a controlled environment, while dynamic calibration involves driving the vehicle in specific conditions to calibrate sensors. These procedures can be time-consuming and require specialised equipment.

Interconnected Systems: ADAS systems rely heavily on software to operate correctly, process sensor data and make decisions. Software updates are often required to improve system functionality, address errors, or enhance performance. Some systems require a properly programmed and configured ADAS component to be integrated to the vehicles Interconnected ADAS system. Repairers must ensure that there is access to licensed OEM diagnostic software to ensure that up-to-date software downloads and/or configuration of ADAS modules, for new module configuration and/or software updates, is applied correctly. Repairers must understand how to apply them to maintain system functionality.

Varying Manufacturer Standards: Different manufacturers may use proprietary technologies or different approaches to ADAS. The calibration tools and procedures for a Toyota's pre-collision system might be different from those for a Ford or BMW. Repairers need to be familiar with the specific requirements of each make and model, which can make the learning curve steep and time-consuming.

Impact on Vehicle Safety: The safety implications of ADAS make this complexity even more significant. If an ADAS system is not properly calibrated, it could result in systems failing to function as intended, which could compromise the safety of the vehicle occupants and others on the road.

All these factors make ADAS systems a complex and evolving area of automotive repair. Independent repairers who want to stay competitive need to continuously invest in training, tools, and knowledge to address the growing range of ADAS technologies and meet customer expectations.

Malfunctions

One of the challenges with ADAS is that if a feature isn't calibrated correctly , the system may not trigger any warning lights or messages on the vehicles instrument cluster. This creates a repair challenge because:

An improperly calibrated sensor or misaligned camera may cause an ADAS feature, such as lane-keeping assistance or autonomous emergency braking, to malfunction or operate erratically without providing any visible indication to the driver. Since the system might still appear operational on the dashboard, the driver could remain unaware of the issue.

When ADAS Calibration Is Required

Knowing when to check the ADAS calibration is critical for ensuring the safety and functionality of the system.

If any sensors or cameras used by ADAS are removed, replaced or repaired, calibration is required to ensure accurate detection of the surroundings.

Here are several scenarios when ADAS calibration should be conducted:

1. After Vehicle Repair or Component Replacement

Windshield Replacement: Many ADAS features rely on cameras mounted on the windshield (lane-keeping assist, forward collision warning, autonomous emergency braking). If the windshield is replaced, it can affect the alignment and the viewing perception of these cameras, requiring calibration. These cameras are increasingly operating together with radars mounted in the grill or bumpers.

2. Steering or Suspension Work:

When a vehicle's steering or suspension components are adjusted - impacting wheel alignment geometry or ride height - the positioning of ADAS sensors and cameras relative to the road can be affected. Some OEMs require ADAS calibration following any wheel alignment adjustments. Additionally, they may specify a wheel alignment check as a prerequisite to the ADAS calibration process.

3. Airbag Deployment

After an airbag deployment, some ADAS systems (like collision avoidance) may need calibration because they work in conjunction with sensors that can be impacted during a crash.

4. Following Accidents or Collisions

- Impact to ADAS Components: Even if an accident doesn't directly involve structural damage, a minor collision can cause misalignment of sensors or cameras. This misalignment might not always trigger a dashboard warning light but could affect how well ADAS systems function, making calibration important.
- Front-End Damage: Impact to the front of the vehicle (where many of the sensors are located) may Cause misalignment to critical systems, requiring a check and potential calibration of radar, cameras, or ultrasonic sensors.

5. When ADAS Features Are Not Functioning Properly

- Sensor Malfunctions or Errors: If a driver notices that certain ADAS features (e.g., adaptive cruise control or lane-keeping assist) are not responding as expected, it may be due to improper calibration. In such cases, checking the calibration is required.
- Inconsistent Performance: If ADAS features such as adaptive cruise control, AEB or lane keep assist behave erratically, is overly sensitive, unresponsive, or activating without warning, it may indicate a calibration check is needed. Since these systems often do not trigger dashboard alerts or fault codes, technicians must interrogate ADAS modules and perform calibration checks whenever performance issues arise, even in the absence of visible warnings.

6. Following Certain Modifications or Aftermarket Part Installation

- Aftermarket Additions: Adding specific aftermarket parts, like bull bars, additional driving lights, larger tyres or lifted suspension may affect the sensors and cameras and checking the calibration may be required.
- Reprogramming or Software Updates: ADAS systems may require calibration after software updates or vehicle setting changes, even without part replacement.

7. After Routine Maintenance

Wheel Alignment: While a basic wheel alignment may not always require ADAS calibration, certain adjustments can affect the positioning of sensors in relation to the vehicle's steering geometry and the road. Calibration may be necessary if the alignment impacts critical parameters such as the thrust angle. It is essential to consult the vehicle manufacturer's service information to determine whether ADAS calibration is required following alignment work.

8. When Required by Manufacturer or Regulatory Standards

- Manufacturer Guidelines:

  Always refer to the manufacturer's guidelines for specific recommendations on when to calibrate ADAS systems. They may have requirements for regular calibration checks based on time or mileage intervals.

9. At Routine Service Intervals (If specified)

- Some vehicle manufacturers may recommend checking ADAS calibration at certain intervals, as part of a vehicle's regular maintenance. Even if no repairs have been performed, a system check is often wise to ensure the system is functioning properly.

In summary, a proactive approach is the best strategy. If there's any suspicion that ADAS functions may have been affected by repair, modification, or accident, it's always best to check the calibration to ensure the vehicle is operating safely.

Identifying a Vehicle with ADAS Cameras and Sensors

- Multifunction Forward Facing Camera: Captures and processes the images to detect lane markers, lights, vehicles, pedestrians, objects and traffic signs: Typically mounted in the central position above the front bumper, or behind the windscreen, performing functions such as adaptive cruise control, lane keep assist and lane departure warnings
- Rear Camera: Usually positioned centrally to the rear of the vehicle and used for park assist and surround view.
- Side Cameras: Installed in the external rear-view mirrors, these cameras support blind spot monitoring and surround view.
- Radar Sensors: Typically embedded in the bumper or grille, radar sensors enable functions such as adaptive cruise control and emergency braking.

Professional Licensed ADAS Equipment

Refers to a tool, diagnostic device, calibration system, or software used in the service, repair, or validation of ADAS-equipped vehicles that meets the following criteria:

1. **Designed for Automotive Workshop Use:**
   Specifically manufactured and intended for use by trained technicians in a professional automotive vehicle repair, service, collision, or glazing environment.
2. **Compliant with Manufacturer Requirements:**
   Capable of performing static or dynamic ADAS calibration and validation in accordance with Original Equipment Manufacturer (OEM) specifications, where such specifications are available.
3. **Regularly Updated and Maintained:**
   Supported by ongoing updates (e.g. software or target database revisions) from the equipment provider to reflect changes in vehicle models and ADAS technologies.
4. **Traceable and Documentable Outputs:**
   Able to provide verifiable results or reports that demonstrate the successful calibration or diagnostic outcomes—suitable for inclusion in repair records or for insurer/certifier review.
5. **Not Consumer-Grade or Improvised:**
   Excludes tools or devices marketed for hobbyist or consumer use, smartphone-based apps without vehicle integration, or improvised solutions lacking proven reliability and safety validation.

ADAS: Inspection, Diagnosis, Calibration and Verification

Checking ADAS functionality requires a combination of visual inspections, diagnostic tools and equipment, and sometimes on-road testing.

1. **Preliminary Visual Inspection**

- **Inspect Sensors and Cameras:** The technician first inspects the ADAS sensors, cameras, and radar modules for any obvious damage, dirt, or obstructions. These components are often located on the front of the vehicle (bumpers, windshields, and rearview mirrors).
- **Clean Sensors:** Dirt, snow, or road debris can obstruct sensors and cameras, causing them to malfunction. A technician should clean the surfaces of these components to ensure they are clear of obstructions.
- **Check Mounting Positions:** Verify that all cameras and sensors are securely mounted and haven't been knocked out of alignment during repairs or collisions.

2. **Connect Diagnostic Equipment – Pre Scan**

- **Use ADAS Calibration Tools:** Specialised diagnostic tools are required to check the calibration of ADAS systems. These tools can interface the vehicle's onboard computer system to access sensor data and check for errors or misalignments.
- Carry out Pre Scan procedures before interrogating all vehicle systems prior to the completion of any works
- **Diagnostic Tools:** A Technician may use the Vehicle Manufacturers Licensed Diagnostic Tool or a Professional After Market Diagnostic Tool with ADAS capabilities to check for fault codes or system errors related to ADAS components.
- Additional tools that check the position and alignment of sensors and cameras may also be required including camera calibration rig or radar alignment tools.

3. **Sensor Calibration**

- **Static Calibration:** This involves the vehicle being positioned in a controlled environment where specific calibration targets are placed in front of the sensors. Static calibration is typically used for cameras, radar sensors, or other systems that require a fixed reference point. This may also require the use of side calibration mats for side cameras.
- The vehicle is placed at a specified distance, recommended by the manufacturer, from the calibration target, and the system is calibrated using diagnostic tools.
- ADAS equipment is typically aligned to the vehicle using one of two methods: either by referencing the vehicle's centreline (identified by two or more central points), or by referencing the vehicle's thrust angle. The thrust angle is the angle of a line drawn perpendicular to the rear axles centreline relative to the vehicle's centreline. When aligning to the thrust angle, the ADAS equipment is typically attached to the rear axle, and the calibration jig is aligned to this angle.
- **Dynamic Calibration:** For some ADAS systems (especially radar and more complex camera-based systems), dynamic calibration involves driving the vehicle in specific conditions, such as:
  - Driving on roads with the necessary targets (i.e. road signs, white lines) that the ADAS system needs to recognise
  - Maintaining a specific speed.
  - Activating specific ADAS features (e.g., adaptive cruise control) to check their functionality.
  - **Parking Sensors or Surround View Systems:** Ensure that parking sensors and cameras are providing accurate information relevant to the proximity of objects being detected.

4. **Verify System Alignment Using Test Drive**

- **System Calibration After Road Test:** After static or dynamic calibration or adjustments, a road test maybe required to ensure that all ADAS features are working as intended. The procedures detailed in the Diagnostic Tool or OEM procedures/methods details what is correct to complete a dynamic calibration and safe to return to the customer.

  It is not necessary to perform any tests other than that stated by the vehicle manufacturer to complete and pass or fail the dynamic learn. If it's a static calibration, it is pass or fail.

5. **Check for Diagnostic Trouble Codes (DTCs) - Post Scan**

   Scan for Fault Codes: After completing the calibration and testing, the Technician will re-scan the vehicle's diagnostic system using a Licensed Vehicle Manufacturers Diagnostics Tool or Licensed Professional Aftermarket Diagnostic Tool to ensure no fault codes are present.

   If any fault codes remain, it may indicate a problem with the ADAS sensors or systems that still needs to be addressed.

ADAS: Inspection, Diagnosis, Calibration and Verification

6. Document and Report Findings

- Documentation: The Technician will document the calibration procedures, any fault codes detected, and any adjustments made. This ensures a record of the calibration process, which can be important for warranty and liability purposes or in case of future repairs. Documentation should include verification that the calibration was completed successfully to OEM requirements.
- Customer Notification: If issues are found, the Technician will inform the customer of the necessary repairs or calibrations and recommend follow-up steps.

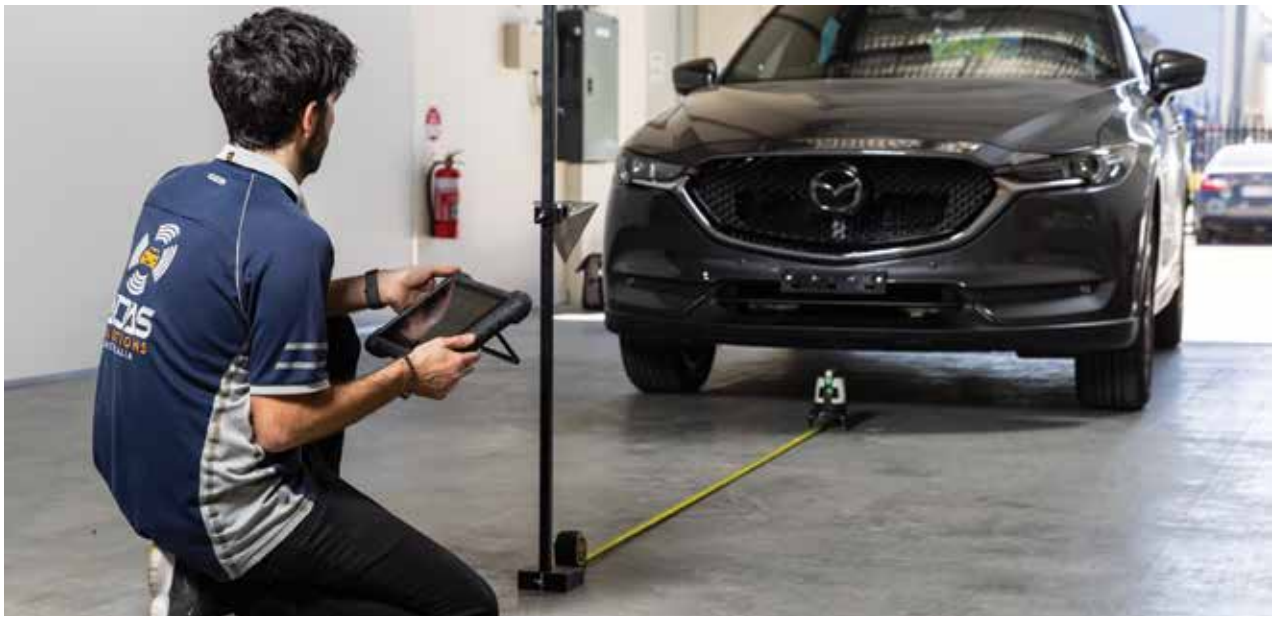
7. Tools and Equipment

- **Battery Support:** Connect a battery support unit to ensure the vehicle voltage remains at an optimum level as an under-voltage occurrence could cause a calibration failure or at worst case damage to a control module.
- **ADAS Calibration Tools:** These include devices for static and dynamic calibration, like laser alignment systems or computer-controlled rigs.
- **Professional Aftermarket Diagnostic Tools:** For reading fault codes and verifying that the ADAS systems are communicating correctly with the vehicle's computer.
- **ADAS Alignment Rigs:** Used for precise alignment of radar, cameras, and sensors in relation to the vehicle.

  Additionally, some vehicle brands require authorised access to the vehicle systems to conduct repairs or calibrations due to the implementation of a Secure Gateway Module within the vehicles electronic architecture. In this case it is necessary to register the technician and tooling with the vehicle manufacturer, to be authorised to access the ADAS systems.

Key Considerations:

- **Manufacturer Specifications:** Calibration and checks should always follow the vehicle manufacturer's specifications, as different manufacturers may have different requirements for sensor alignment or software calibration.
- **Regular Maintenance:** ADAS systems should be checked regularly, especially after any repair work, alignment, windshield replacement, or accidents.
- **Accuracy and Safety:** Proper calibration is critical for the safe operation of ADAS systems. If any system is out of alignment or improperly calibrated, it may not function correctly, potentially leading to accidents or system malfunctions.
- **ADAS Equipment:** All ADAS calibration or validation must be carried out using professional and licensed ADAS equipment*, meaning tools that are purpose-built for workshop use, supported by regular updates, and capable of meeting manufacturer procedures and safety standards. Consumer-grade or improvised tools must not be used.
- **Meets Recognised Quality or Safety Standards:** Due diligence is required when choosing the equipment. Our recommendation is to choose products manufactured by companies that meet or exceed OEM requirements giving both end users and their customers, that the vehicles have been calibrated to OEM specifications for ADAS servicing maintenance.



ADAS Protocol

Workshop / ADAS Calibration Site Requirements

Workshop Preparation

Independent workshops or repair agents performing ADAS calibrations should adhere to manufacturer guidelines. The key requirements include:

1. Service Information and Calibration Requirements

- Access to OEM technical service bulletins or industry-approved ADAS calibration guides.
- Calibration requirements search tool to determine the correct calibration method for each vehicle make and model.
- Reliable internet services and connections necessary for programming or updates to software

2. Essential Tools for ADAS Sensor Calibration

- OEM Diagnostic tools capable of performing full ADAS calibrations.
- Aftermarket Diagnostic tools with validated ADAS calibration capabilities (note - one specific brand may not cover all vehicle models).
- Specialised calibration equipment, including:
  - A main-frame alignment system for target positioning.
  - Manufacturer-specific ADAS targets for various safety systems. Including front, rear and side targets or mats.
  - Alignment tools, such as distance lasers, radar trihedral, plumb bobs, CCD sensors, and leveling tools.

3. Facility Requirements

- A large, level floor area (i.e. concrete), indoors with adequate lighting promoting a suitable environment for accurate and uninterrupted calibration.
- A clutter-free environment to prevent interference with radar & camera calibrations.
- A wheel alignment bay and wheel alignment equipment, as some ADAS calibrations may require a properly aligned thrust line.

Mobile Calibrations.

- All static calibrations must be performed indoors, in a controlled environment that meets OEM requirements. Outdoor or uncontrolled environments are not acceptable.
- The Calibration must be carried using professional level specialised diagnostic equipment.
- The calibration area must have a level, solid, concrete floor. Surfaces must be clean, dry, and free of debris or irregularities that could affect calibration equipment setup.
- The calibration area must have consistent, controlled lighting. Natural lighting, reflections, and shadows must be minimized to avoid interference with sensor accuracy.
- The calibration environment must have adequate open space to allow for proper placement of calibration targets and equipment, free from visual obstructions.
- The area must be clear of large metal objects (such as steel columns, equipment, or vehicles) that could interfere with sensor calibration.
- Outdoor or uncontrolled environments are not acceptable for static calibrations.

Testing and Diagnosing of ADAS

Identifying ADAS Components

- The first step in diagnosing ADAS issues is to correctly identify the ADAS components present in the vehicle. A gateway or global diagnostic check allows technicians to identify the presence of ADAS-related systems in a vehicle.

Reviewing Manufacturer Specifications

- Using OEM technical documentation to identify ADAS features in the specific makes and models.
- Checking VIN-based build data to confirm installed ADAS systems.

Performing a Global Diagnostic Check – Pre Scan

Using a Licensed Diagnostic tool to retrieve system information.

Identifying active ADAS functions, including:

- Adaptive Cruise Control
- Traffic Sign Recognition
- Lane Departure Warning
- Autonomous Emergency Braking
- Blind Spot Detection
- Surround View Camera Systems
- Rear and Front Cross Traffic Alert
- Parking Sensors

Locating Sensors and Cameras

Determining the position of radars, cameras, LiDAR, and ultrasonic sensors.

Assessing whether sensors are clean, undamaged, and securely mounted. Including bumper bars and logos/badges mounted in front of sensors.

Pre & Post Scanning

A pre-repair scan ensures that any ADAS-related errors or faults are identified before repairs begin and can identify underlying issues relevant to the ADAS calibration procedures.

Scanning for Diagnostic Trouble Codes (DTCs) Pre Scan

- Use a Licensed Vehicle Manufacturer or Professional aftermarket Diagnostic Tool to retrieve system information.
- Differentiate between historical, pending, and active fault codes.
- Documenting Findings: Record all retrieved Diagnostic Trouble Codes DTCs, including key cycles, freeze-frame data, and system status.
- Checking for fault codes related to calibration or alignment.
- Identifying Calibration Needs: Confirming what systems require calibration due to repair procedures.
- Determine the appropriate calibration method (static vs. dynamic) based on manufacturer guidelines.

Scanning for Diagnostic Trouble Codes (DTCs) Post Scan

The post-repair scan, also known as a post-scan, is performed after repairs are completed. It ensures that:

- All DTCs from the pre-repair scan have been cleared or addressed.
- No new faults have emerged during the repair process.
- All ADAS sensors and cameras have been restored to manufacturer specifications.

Repairing ADAS systems

Calibration Methods

There are two primary types of ADAS calibration: static calibration and dynamic calibration. The correct procedure depends on the manufacturer's specifications.

1. Static (In-Shop) Calibration

- ¬ Performed in a controlled workshop environment.
- ¬ Begins with aligning the vehicle thrust line using measuring tools.
- ¬ Special calibration targets are positioned at precise locations relative to the ADAS sensors.
- ¬ OEM or aftermarket Diagnostic tools initiate the calibration process.
- ¬ Once the system confirms successful alignment, the vehicle is ready for a road test.

2. Dynamic (On-Road) Calibration

- ¬ Requires driving the vehicle in real-world conditions.
- ¬ The Diagnostic tool initiates calibration, and the vehicle must maintain a specified speed for a designated duration.
- ¬ Typically used for camera-based ADAS systems.
- ¬ Calibration may require clear lane markings, low traffic conditions, and good weather visibility.

Some ADAS systems require a combination of both static and dynamic calibration. For example, radar sensors often require static calibration in the workshop followed by a dynamic verification on the road.

3. Visual and Functional Inspections

Beyond scanning for errors during pre-scan processes, a visual and functional inspection of ADAS components is necessary.

Checking Camera and Sensor Integrity

- ¬ Ensuring that sensors and cameras are clean and free of obstructions, including making sure badges and logos that often cover radars as part of vehicle design are clean, undamaged and unobstructed.
- ¬ Checking for misalignment, bent or loose mounting brackets.
- ¬ Checking windscreens for cracks or defects interfering with cameras or sensors.
- ¬ Confirming that protective covers (if applicable) are removed.
- ¬ Verifying Power and Connectivity
- ¬ Checking for damaged wiring, disconnected connectors, or blown fuses.
- ¬ Ensuring that all sensors receive the correct power supply and communication signals.

4. Performing a Road Test (if required)

- ¬ Testing dynamic ADAS functions, such as lane-keeping assist and adaptive cruise control.
- ¬ Observing warning lights, audible alerts, and system behaviour.
- ¬ Ensuring that ADAS interventions, such as automatic braking or lane correction, occur as expected whilst adhering to road rules and driving standards.

5. Pre-Calibration Vehicle Preparation

- ¬ Ensuring correct tyre pressure and uniform tyre wear.
- ¬ Checking that vehicle ride height meets OEM specifications.
- ¬ Cleaning the windshield, radar sensors, and cameras.
- ¬ Ensuring that the vehicle's power supply is stable and consistent utilising a voltage stabiliser (above 12V / 24V as per the vehicles requirements) as per OEM instructions to prevent voltage interruptions during calibration

6. Interpreting Fault Codes and Manufacturer Data

Once Diagnostic Trouble Codes (DTC) are retrieved, correct interpretation is key to proper diagnosis.

7. Determining Root Causes of Fault Codes

- ¬ Identifying whether faults stem from sensor misalignment, hardware failure, fitment issues or software issues.
- ¬ Checking manufacturer service bulletins for known ADAS calibration updates.
- ¬ Cross-Referencing with Manufacturer Procedures
- ¬ Using OEM documentation to verify fault conditions.

8. Post-Repair Calibration/Initialisation (PRC/I)

- ¬ Calibration will be necessary after:
  - Replacing, reinstalling, or repairing ADAS components
  - Replacing, reinstalling, or repairing body components that have a direct relationship with ADAS components (i.e. bumper bars, windscreens)
  - Any work that disturbs sensor mounting locations.
  - Some but not all Suspension or wheel alignment adjustments as specified by the manufacturer.
- ¬ PRC/I ensures the ADAS system, and the vehicle is calibrated to its OEM operating conditions.
- ¬ Special tools or a test drive under OEM-specified conditions may be required.

9. Post Repair Certification and Validation

- ¬ Post repair scanning and validation of repair is necessary to ensure that fault codes have been cleared, and pre-scan faults relevant to ADAS rectified
- ¬ The supply of Calibration certificates post repair is necessary to supply to the consumer, insurance provider or agent to prove validation and accuracy of repair as well as time / date / place the repair occurred

Collision Repairs

ADAS Sensor Calibration

ADAS sensor calibration is required whenever a sensor, radar or ADAS components alignment is disrupted due to vehicle collisions or damage, including cosmetic and minor collisions.

This can occur due to various factors, including:

- ¬ windshield replacement
- ¬ Suspension / steering repairs
- ¬ The removal and replacement of a sensor or its mounting bracket.
- ¬ Side mirror / camera replacement
- ¬ Replacement of SRS components (ie Airbags), impacting the windshield.
- ¬ Minor & Structural repairs involving removal and repainting of sensors
- ¬ Replacement of taillights that house sensors or radars
- ¬ Replacement of headlights that include adaptive headlight technologies

Modern collision repairs frequently involve sensor replacements and calibrations. To ensure accuracy, automakers recommend that service providers conduct a pre-repair diagnostic scan before any repairs begin and a post-repair scan after completing the job. This ensures that all system issues have been resolved, calibration has been successfully completed, and vehicle control systems are functioning correctly.

ADAS sensor calibration is a precision process that is often complex and time-consuming. Some sensors require static calibration in a workshop, while others necessitate dynamic calibration during a road test. Many require a combination of both.

- ¬ Follow manufacturer guidelines and processes for the removal and replacement of all components during repairs.
- ¬ Ensure that manufacturer power disconnection and reconnection procedures are adhered to when disconnecting power supply units
- ¬ Stay informed of any manufacturer safety warnings or guidelines relevant to the disconnection, removal, storage or replacement and reconnection of any ADAS components

Surround-View Camera and Steering Angle Calibration

With many modern vehicles being equipped with 360 degree or surround view cameras it is important to ensure the correct operation and calibration of these components post repair

Surround-View Camera Calibration

- ¬ Necessary after replacing a camera, grille, door mirror, bumper cover, or other mounting components that impact the location and mounting of these cameras
- ¬ Typically performed indoors using large, patterned mats positioned around the vehicle.
- ¬ Some systems require an additional dynamic road test after static calibration.

Steering Angle Sensor Calibration

- ¬ Required after airbag deployment, structural repairs, or wheel alignments.
- ¬ The calibration process involves centring the steering wheel and using a diagnostic equipment to initiate and reset the steering angle sensor to zero degrees.

Repairing and Recalibrating ADAS After a Frontal Collision

A frontal collision is among the most severe types of crashes, often impacting multiple ADAS components. Proper repairs and calibrations are crucial to restoring system functionality.

Key ADAS Systems Affected in a Front-End Collision:

Adaptive Cruise Control

- Uses radar sensors to maintain a safe distance from other vehicles.
- Radar sensors are typically mounted in the front bumper or behind the grille.
- After a front-end collision, the radar sensor may need replacement and calibration.

Forward-Collision Warning (FCW)

- These systems detect objects in front of the vehicle and apply the brakes automatically.
- Radar sensors or front cameras may be displaced or damaged in a crash.
- The suspension and braking system should also be inspected.

Lane-Keeping Assist

- Utilises a camera mounted near the windshield to track lane markings.
- If the windshield is replaced, the camera must be calibrated.
- Depending on the manufacturer's specifications, calibration may require:
  - o Static calibration (using pattern boards and reflectors).
  - o Dynamic calibration (test-driving the vehicle to allow the system to self-align).

Since frontal collisions impact multiple ADAS systems, thorough post-repair scanning and calibration are necessary to restore safe vehicle operation.

Best Practices for Windscreen Replacement

Replacing & Refitting Automotive Glass for Vehicles Equipped with Windscreen-Mounted multifunction forward facing cameras

Front-facing cameras are frequently mounted behind the windshield, and many ADAS functions rely on them for safe operation, the most important of these being Autonomous Emergency Braking. If the windshield is replaced, ADAS calibration is required to ensure accuracy of the camera and radars in the case of multiple component systems.

Best Practices for Windscreen Replacement:

1. Confirm ADAS Features

- ¬ Identify whether the vehicle is equipped with front-facing ADAS cameras.
- ¬ Determine which systems require calibration after windscreen replacement.

2. Customer Awareness

- ¬ Inform the customer that their vehicle is fitted with safety systems which are designed to assist the driver in both normal driving modes and pre-collision avoidance. These systems rely on the use of numerous specialised sensors and cameras that often require calibration to operate properly.
  - ADAS functions may not operate correctly until calibration is completed.
  - Insurers may require proof of calibration after windshield replacement.
  - If calibration is not performed, they assume responsibility for any safety failures and should sign a waiver accepting this responsibility. This practise should be avoided.

3. Scheduling the Job

- ¬ Vehicles requiring static calibration must be serviced in a controlled environment, indoors, with flat floors, controlled lighting, and the required space for the calibration.
- ¬ Dynamic calibration requires a test drive on public roads to complete the process.
- ¬ If immediate calibration is not possible, an alternative appointment should be scheduled and the repair delayed to this time. Vehicles should never be returned without the calibration being completed.

4. Performing Calibration

- ¬ Our recommendation of good practice is to connect a Battery Support Unit (BSU) to stabilise the vehicles electrical system.
- ¬ Conduct an environmental scan as advised in this Code and specifically, avoid direct sunlight and excessively bright lights as this may decrease the cameras' ability to clearly identify the target.
- ¬ Conduct a pre-inspection using a diagnostic tool. (Pre-Scan).
- ¬ Should any DTCs exist that are ADAS related and relevant to the windscreen mounted camera, the customer should be informed immediately.
- ¬ Upload a copy of the pre-scan report to the job file.
- ¬ Ensure the vehicle meets all manufacturer requirements (e.g., full fuel tank, correct tyre pressure). Only perform calibration after the adhesive system reaches its minimum drive-away time (MDAT).
- ¬ In the case of a static calibration, ensure the calibration area is clear of metal objects and there is sufficient space for the positioning of targets as described by the OEM instructions.
- ¬ Conduct the calibration in accordance with the OEM instructions and the prompts in the software on the diagnostic tool.
- ¬ For vehicles requiring dynamic calibration of the camera and radars, connect the Diagnostic tool and conduct the calibration as laid out in the OEM instructions.
- ¬ Ensure all ADAS systems are operating correctly and not only the ACC.
- ¬ Conduct a Post Scan ensuring that all DTC's are clear and upload the report to the job file.

5. Providing Documentation

- ¬ Print the calibration certificate and provide it to the customer.
- ¬ Retain a copy of all the calibration reports for workshop records.

Mobile Paint / Touch Up / Bumper Repairers

Certain ADAS radar sensors are embedded in vehicle bumpers, particularly for:

- Blind Spot Detection
- Lane Change Assist
- Adaptive Cruise Control
- Parking Assist Functions

Guidelines for Bumper Repairs / Mobile Paint repairs

- Paint Thickness Restrictions
  - If manufacturer specifications cannot be found, the maximum paint coat thickness near ADAS modules should not exceed 150 µm.
  - Triple painting or excessive smoothing near radar modules is not permitted.
  - A plastic repair must not be performed within 25 cm of the radar sensor.
- Pre-Calibration Check
  - Before refinishing a bumper, scan the ADAS module to ensure it is functioning and any faults are recorded.
  - Ensure that prior repairs have not caused misalignment.
- Reinstallation and Calibration
  - If a radar sensor is removed, follow manufacturer guidelines for refitment and calibration.
  - Conduct a post-repair scan to confirm that all affected systems are calibrated correctly.

Mobile paint and bumper repairers need to fully understand the importance of repairs relevant to ADAS systems. Correctly identifying ADAS systems and carrying out repairs requires a systematic approach involving:

- Thorough diagnostic scanning before and after repairs.
- Correct identification of affected components.
- Proper calibration of cameras, radar sensors, and related hardware.
- Strict adherence to OEM guidelines for safety and accuracy.

By following these procedures, Mobile paint and bumper repairers can ensure that ADAS systems function as designed, protecting both the vehicle occupants and other road users after repairs.

Mobile ADAS Service providers

Mobile ADAS Service providers have a unique set of challenges with mobile ADAS calibration.

To ensure accuracy, it is recommended that mobile service providers conduct a pre-repair diagnostic scan before any repairs begin and a post-repair scan after completing the job. This ensures that all system issues have been resolved, calibration has been successfully completed, and vehicle control systems are functioning correctly.

ADAS sensor calibration is a precision process that is often complex and time-consuming and requires specific environments to be completed correctly.

ADAS Calibration Environment

- All static calibrations must be performed indoors, in a controlled environment that meets OEM requirements. Outdoor or uncontrolled environments are not advised.
- The calibration area must have a level, solid, large floor area. Surfaces must be clean, dry, and free of debris or irregularities that could affect calibration equipment setup.
- The calibration area must have consistent, controlled lighting. Natural lighting, reflections, and shadows must be minimized to avoid interference with sensor accuracy.
- The calibration environment must have adequate open space to allow for proper placement of calibration targets and equipment, free from visual obstructions.
- The area must be clear of large metal objects (such as steel columns, shelving, equipment, or vehicles) that could interfere with sensor calibration.

Equipment

- The Calibration must be carried out using a Licensed Vehicle Manufacturer or Professional aftermarket Diagnostic Tool and ADAS equipment to retrieve system information and perform the calibration functions.
- Equipment must be regularly inspected and properly maintained to ensure any damage due to the constant transport from site to site does not impact the accuracy and effectiveness of the equipment during calibration

ADAS Validation and Recording

- It is imperative that proper validation processes are followed and recorded when undertaking mobile calibrations
- Site setup needs to be photographed and recorded prior to conducting any calibrations.
- It is recommended that each vehicle is photographed when performing the mobile calibration to validate and prove correct calibration procedures and environments are adhered to.
- Calibration certificates recording time, date and place are necessary to prove and validate correct calibration.

Tyre & Wheel Alignment Service & Repair

While not every wheel alignment will automatically necessitate an ADAS calibration, precise steering and suspension geometry is critical to the accurate functioning of ADAS systems.

There are two primary scenarios where calibration may be necessary following a wheel alignment:

1. Thrust Angle Change

If the alignment affects the thrust angle - the direction the rear wheels point relative to the vehicle's centreline - recalibration may be needed. This is particularly important for ADAS features that rely on steering angle input or directional accuracy, such as Lane Keeping Assist or Autonomous Emergency Braking.

2. OEM Specification Requirements

Some vehicle manufacturers mandate ADAS calibration after a wheel alignment procedure. It is essential to consult OEM service information to determine whether calibration is required for the specific make and model.

In addition, it is essential to ensure that tyre sizes are correctly matched across all four corners of the vehicle. Variations in rolling diameter can compromise the accuracy of certain ADAS sensors and control systems.

Summary of Key Steps

1. Educate and train yourself and your staff on ADAS systems.
2. Invest in diagnostic and calibration equipment and workshop facilities that meets the criteria for static calibrations
3. Create and document Standard Operating Procedures SOPs for ADAS diagnostics and calibration.
4. Train staff on the use of new tools and procedures.
5. Talk to your customers on the operation of their ADAS systems and ask if they have recognised any concerns with the performance of ADAS features.
6. Implement ADAS diagnostics and calibration as part of your regular service workflow.
7. Ensure compliance with manufacturer specifications and maintain detailed records.
8. Market ADAS services to customers and educate them on their importance.
9. Continuously improve your services and stay updated on new technology.

By following this guide, you can successfully integrate ADAS diagnostics and calibration into your automotive workshop's SOPs, offering customers enhanced safety and positioning your workshop as a leader in this increasingly critical area.

Core Competencies for ADAS Service, Repair and Validation

This Code of Conduct recognises that competence in working with Advanced Driver Assistance Systems (ADAS) is not defined solely by formal qualifications or accreditation. Instead, it is often demonstrated through the practical skills and applied knowledge required to safely and effectively service, repair, or validate ADAS-equipped vehicles across mechanical, collision, and glazing (windscreen) sectors.

Technicians working in any of these domains should understand how their work may affect the performance of ADAS features and ensure that system functionality is properly restored and validated.

The following outlines the core competencies expected of technicians and tradespeople involved in ADAS-related work:

Understanding of ADAS Technologies and Functions

- ¬ Knowledge of common ADAS features (e.g. lane keep assist, adaptive cruise control, autonomous emergency braking) and how these systems interact with vehicle subsystems.
- ¬ Awareness of the limitations and conditions of ADAS performance, including how repairs, replacements, or alignments may impact system accuracy.
- ¬ Understanding the role of ADAS in vehicle safety, crash avoidance, and compliance with regulatory requirements.
- ¬ Correctly accessing and interpreting manufacturers information on ADAS systems.

Practical Skills Relevant to Each Repair Segment

- ¬ Mechanical repair: Awareness of how suspension, steering, wheel alignment, and other systems affect ADAS operation and calibration.
- ¬ Collision repair: Understanding how panel repairs, structural changes, or refitting sensors can affect ADAS functionality and require recalibration or validation.
- ¬ Windscreen/glazing replacement: Competence in handling camera and sensor mounts embedded in windscreens and the importance of post-replacement validation or calibration.

ADAS Validation and Calibration Practices

- ¬ Proficiency in using calibration equipment and procedures—both static and dynamic—to restore ADAS performance to manufacturer specifications.
- ¬ Ability to assess workshop conditions and equipment suitability for accurate sensor alignment and system checks.
- ¬ Familiarity with manufacturer-specific calibration instructions and the ability to determine when ADAS features require revalidation.

Use of Diagnostic Tools and Software

- ¬ Skill in using diagnostic tools to assess ADAS system health, interpret fault codes, and confirm successful recalibration.
- ¬ Understanding of pass-through reprogramming tools and the use of both OEM and aftermarket diagnostic platforms.

Application of Standards, Regulations, and Industry Guidance

- ¬ Awareness of Australian Design Rules (ADRs), vehicle inspection requirements, and ADAS-related obligations under insurance, safety, or roadworthiness standards.
- ¬ Understanding of the shared responsibility between repairers, insurers, and certifiers to maintain ADAS functionality after any work is performed.

Communication and Documentation

- ¬ Ability to document ADAS-related work accurately, including system checks, calibration steps, and diagnostic tool results.
- ¬ Clear communication with vehicle owners regarding system limitations post-repair or replacement

Commitment to Ongoing Skills Development

- ¬ Active engagement in ongoing training, technology updates, and industry learning to remain current with ADAS tools, systems, and standards.

Out-Sourcing ADAS Calibration and Diagnostics to Specialist Service Providers

If managing ADAS diagnostics and calibration in-house seems too challenging, automotive workshops can partner with specialist service providers that focus on these advanced systems. Collaborating with an expert can help streamline the process, reduce overhead costs, and ensure high-quality results.

These companies specialise in the diagnosis, calibration, and maintenance of ADAS systems. They often have the required advanced tools and equipment for both static and dynamic calibrations.

1. **ADAS Calibration Centres:**

   Independent service centres that specialise in ADAS calibration. They offer mobile or in-shop services.

2. **OEM (Original Equipment Manufacturer) Partners**

   Some vehicle manufacturers have partnerships with specialised shops or mobile services to handle ADAS diagnostics and calibration, especially for high-end brands with complex systems.

3. **Mobile Calibration Services**

   There are mobile units that can come to your workshop to perform ADAS calibrations, making it easier for automotive repair workshops to offer these services.

   Mobile Calibration Technicians: Some companies send trained technicians with the necessary tools and equipment to perform calibrations on-site. this is a viable option as long as your shop has the space and environments conducive for safe and proper calibrations to be completed. Mobile calibration service providers have expertise in calibration and diagnostics and are specifically set up to travel to different workshops. Users of mobile calibration services need to ensure that these providers adhere to best practices as defined in this Code.

4. **Equipment and Tool Suppliers**

   Certain tool suppliers also offer full-service calibration packages, training, and ongoing support to help auto workshops integrate ADAS services and support workshops with ongoing training and guidance.

5. **Training and Certification Providers**

   Some companies offer both the tools, and the knowledge needed to manage ADAS systems. Partnering with a provider that also offers ongoing training, and certification can help your technicians stay up to date.

Benefits of Partnering with a Specialist:

Expertise: Specialist service providers are highly skilled and experienced in dealing with complex ADAS systems, reducing the risk of errors, and ensuring optimal performance.

Cost-Effectiveness: By outsourcing ADAS calibration, you avoid the upfront investment in expensive diagnostic tools and equipment. As long as your shop has the space and environments conducive for safe and proper calibrations to be completed

Timesaving: Your staff can focus on other aspects of the repair business while the ADAS specialists handle the diagnostics and calibration.

Consistency: Ensuring that ADAS services are performed to manufacturer specifications with every job, which can improve customer satisfaction and reduce the likelihood of comebacks.

ADAS Calibration and Legal Considerations

ADAS calibration is critical to vehicle safety, but it also raises legal considerations for service providers and repairers. This section outlines potential liabilities and strategies to mitigate risks associated with ADAS calibration.

Potential Legal Liabilities

Technicians have several legal obligations when servicing vehicles equipped with ADAS, including:

- **Duty of Care:** Technicians owe a duty of care to their customers to provide services with reasonable care, skill, and diligence This duty may also extend to third parties who could reasonably be foreseen to be affected by the technician's work, including passengers and other road users. If a technician fails to identify, recommend or perform necessary calibration and a crash subsequently occurs due to the malfunction or misalignment of those systems, they may be exposed to liability in negligence. Whether such liability arises will depend on whether it was reasonably foreseeable that harm could result from the failure, and whether the technician's conduct fell below the standard expected of a reasonably competent technician in the same circumstances.
- **Australian Consumer Law (ACL):** Under the ACL, services must be rendered with due care and skill and be fit for any particular purpose made known by the consumer. A failure to identify or recommend calibration when reasonably required may amount to a breach of one or more off these statutory guarantees. This could entitle consumers to remedies including refunds and compensation.
- **Roadworthy Compliance:** Technicians conducting roadworthy inspections should be familiar with the applicable requirements in their jurisdiction and ensure that any ADAS issues affecting vehicle compliance are properly assessed, documented, and communicated. Failure to do so may result in warnings, suspension/cancellation of accreditation, fine/penalties, and other legal consequences.

Risk Mitigation Strategies

While liability cannot be eliminated, the following steps can help mitigate legal risks:

Identification of Calibration Needs:

- Use diagnostic tools to determine whether ADAS calibration is required.
- Follow industry best practices and manufacturer guidelines.

Pre-Service Discussions with Customers:

- Explain the necessity of calibration and its safety implications.
- If a customer declines calibration, the safest approach is to refuse the service.
- It is strongly recommended that the professional service provider does not conduct a repair if the customer declines calibration. Some providers use signed waivers to mitigate liability. An example of a waiver is provided in this Code. However, it is strongly recommended that service providers avoid over-reliance on waivers or indemnities, as these may not be enforceable in all circumstances.

During Service Protocols:

- If calibration requirements are identified mid-service, inform the customer immediately.
- Where the customer refuses calibration, provide clear written warnings about the risks.
- Recommend against driving the vehicle until calibration is completed.
- Maintain detailed records of all communications, recommendations, and customer acknowledgments.

Roadworthy Inspections:

- Ensure compliance with all legal and regulatory requirements.
- Customers cannot waive statutory roadworthy obligations, and Technicians must meet these standards.

By implementing these strategies, service providers and workshops can reduce their exposure to liability while ensuring customer safety and compliance with industry regulations.

IMPORTANT NOTICE REGARDING ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)

Vehicles fitted with Advanced Driver Assistance Systems (ADAS) may require calibration after repairs or replacement of related components.

By proceeding with this service, the customer acknowledges that.

They have been advised if an ADAS calibration is required.

Failure to calibrate may impair safety features including (AEB, lane assist etc.).

They accept responsibility if calibration is declined.

The provider is not liable for ADAS performance and associated performance issues if calibration is refused.

This disclaimer does not exclude rights under the **Australian Consumer Law.**

Appendix 1: Advanced Driver Assistance Systems (ADAS) Overview

Although driver assistance systems are available in many forms and levels of functionality, they share two core objectives: improving road safety and driver comfort.

Advanced sensors, including ultrasound, LiDAR, radar, and surround-view cameras, provide crucial data on vehicle surroundings. A central control unit processes this data and translates it into driver alerts or active interventions such as braking and steering adjustments.

With the increasing complexity of these systems, understanding their definitions and functionalities is essential. Below is a comprehensive list of ADAS technologies and their roles in modern vehicles.

Adaptive Front Lighting System (AFS)

AFS improves night-time visibility by adjusting the vehicle's headlamps based on steering input and vehicle speed. Some variations use auxiliary lamps to enhance illumination when turning, while advanced systems integrate LED or laser technology for intelligent light distribution.

Adaptive Chassis (AC)

Adaptive chassis technology adjusts suspension settings in response to road conditions, steering input, and braking dynamics. Some systems employ cameras and sensors to anticipate road irregularities and adjust damping characteristics accordingly.

Adaptive Cruise Control (ACC)

ACC maintains a safe following distance by automatically adjusting the vehicle's speed in response to surrounding traffic. Using radar and camera sensors, ACC can slow down or accelerate the vehicle as needed. Stop-and-go variants allow complete stops and automatic restarts in congested traffic.

Adaptive High Beam (AHB)

Also known as Glare-Free High Beam, this system adjusts headlamp intensity to optimize visibility without blinding other road users. Sensors detect oncoming vehicles and selectively dim parts of the beam while maintaining illumination in other areas.

Adaptive Steering (Active Steering)

This system adjusts steering responsiveness based on vehicle speed and driving conditions. Low-speed manoeuvres require minimal effort, while high-speed driving benefits from enhanced stability.

Anti-lock Braking System (ABS)

ABS prevents wheel lock-up during braking, improving vehicle control and stability. It modulates brake pressure to ensure optimal deceleration while allowing the driver to steer.

Automatic Crash Notification (eCall)

This system detects collisions and automatically transmits vehicle location and crash severity data to emergency services. Some systems allow two-way communication with first responders.

Autonomous Emergency Braking (AEB)

AEB is an Australian government mandated vehicle safety system designed to detect an imminent collision with another vehicle, pedestrian, cyclist, or obstacle — and automatically apply the brakes if the driver doesn't react in time.

If the system determines that a collision is likely and the driver doesn't respond to visual and/or audible warnings, the brakes are automatically applied to slow down or stop the car.

AEB has been shown to significantly reduce the risk of crashes, injuries, and fatalities.

In Australia, AEB (ADR 98/00) will be mandatory for all new vehicles from March 2025, under the Australian Design Rules.

Blind Spot Detection (BSD)

BSD uses radar sensors or cameras to monitor adjacent lanes. It warns the driver of approaching vehicles in their blind spot via dashboard alerts, side mirror indicators, or haptic feedback.

Emergency Brake Assist (EBA)

EBA detects emergency braking scenarios and increases brake pressure to reduce stopping distances. Some systems activate automatically if the driver fails to apply sufficient force.

Collision Avoidance System (CAS)

CAS combines forward-facing cameras, radar, and LiDAR to detect obstacles and potential collisions. The system issues warnings or engages automatic braking if necessary.

Cornering Brake Control (CBC)

CBC prevents over-braking on curves, reducing skidding risks by independently modulating brake force on each wheel.

Cross Traffic Alert (CTA)

CTA warns drivers of approaching traffic from the sides when reversing out of parking spaces. Some versions apply automatic braking to avoid collisions.

Distance Control System (DCS)

DCS monitors the vehicle's proximity to other objects, issuing warnings or modifying throttle input when necessary.

Driver Monitoring systems (DMS)

These systems aim to monitor the driver directly to determine whether they are fatigued. Typically, this is done through a driver facing infrared camera that is mounted either within the instrument cluster, on the steering column or on the dashboard.

DMS detects driver fatigue, distraction, or drowsiness by analysing steering behaviour, eye movement, and facial recognition data. Some systems issue alerts or suggest taking breaks.

Forward Collision Warning (FCW) & Automatic Emergency Braking (AEB)

FCW alerts the driver to an impending frontal collision, while AEB automatically applies brakes if a crash is imminent. Pedestrian and cyclist detection variants enhance safety for vulnerable road users.

Hill Hold Assist (HHA)

HHA prevents vehicles from rolling backward when starting on an incline by holding brake pressure momentarily after the driver releases the brake pedal.

Appendix 1: Advanced Driver Assistance Systems (ADAS) Overview

Intelligent Speed Assist (ISA)

ISA detects speed limit signs and provides driver alerts. Some versions automatically adjust vehicle speed to comply with road regulations.

Lane Change Assist (LCA)

LCA supports safe lane changes by monitoring rear and side traffic. If a potential collision risk is detected, the system provides warnings or steering corrections.

Lane Departure Warning (LDW) & Lane Keeping Assist (LKA)

LDW alerts the driver when unintended lane departure occurs. LKA actively steers the vehicle back into its lane if necessary.

Night Vision System (NVS)

NVS uses thermal imaging cameras to detect pedestrians, animals, or obstacles in low-light conditions, providing warnings to the driver.

Parking Assistance Systems

These systems use cameras, ultrasonic sensors, or radar to assist with parallel and perpendicular parking. Some versions offer fully automated parking, where the vehicle steers itself into a designated space.

Pedestrian & Cyclist Detection

Using advanced cameras and sensors, this system identifies pedestrians and cyclists near the vehicle and triggers warnings or emergency braking if necessary.

Rear Cross Traffic Alert (RCTA)

RCTA detects approaching vehicles when reversing and warns the driver via visual or audible alerts.

Speed Limit Recognition

This system reads speed limit signs and displays the information on the driver's dashboard.

Surround View Monitor (SVM)

SVM provides a 360-degree bird's-eye view of the vehicle using multiple cameras, assisting in tight parking situations.

Traffic Jam Assist (TJA)

TJA combines Adaptive Cruise Control and Lane Keeping Assist to enable semi-autonomous driving in heavy traffic.

Trailer Backup Assist

This system allows drivers to control trailer movement using a dashboard knob or a smartphone app, simplifying reversing with trailers.

Vehicle Recognition

Using AI-powered cameras and sensors, this system identifies and tracks other vehicles on the road to enhance collision avoidance.

Voice Control

Voice recognition systems allow drivers to control navigation, climate settings, and infotainment through spoken commands.

This appendix serves as a reference guide for understanding the functionalities of modern ADAS technologies. Proper diagnosis, repair, and calibration of these systems are crucial for maintaining vehicle safety and performance.

Understanding Different Manufacturer Systems and Definitions

Systems are often divided into convenience and safety systems.

Safety

These are in-vehicle systems designed to improve road safety by assisting in crash avoidance, reducing crash severity, and providing protection during and after a crash.

Active Safety Systems

These systems play a preventive role in mitigating crashes and accidents by providing early warnings and assisting the driver in vehicle control. Also known as "Primary Safety Systems," examples include:

- Anti-Lock Braking Systems (ABS)
- Electronic Stability Control (ESC)
- Autonomous Emergency Braking (AEB)

Additional Resources:

Additional resources including can be found on the AAAA Website: https://www.aaaa.com.au/

Appendix 2: A Checklist - Step by Step Guide

Introduce ADAS diagnostics and calibration into your workshop's regular standard operating procedures (SOPs): A step-by-step guide to help you implement this process effectively:

Step 1: Understand the Basics of ADAS and Its Importance

- Educate Yourself and Your Team: Ensure you and your staff have a solid understanding of ADAS and its various components (cameras, radar, sensors, etc.). This knowledge is essential for diagnostics and calibration. You can do this through:
  - Online training courses.
  - Manufacturer-specific training programs.
  - Industry workshops or seminars.
- Understand Legal and Safety Implications: Familiarise yourself with local laws, safety regulations, and manufacturer guidelines regarding ADAS calibration, as failure to properly calibrate could lead to legal and liability issues.

Step 2: Invest in the Necessary Tools and Equipment

- ADAS Diagnostic Tools:

  Professional Licensed Diagnostic Vehicle specific tools with ADAS calibration capability: To retrieve fault codes and monitor the status of ADAS systems.
  - ADAS Calibration Equipment:
  - Static Calibration Tools: These might include camera calibration targets, target boards, target mats, laser alignment systems or camera calibration rigs for front / side & rear cameras to correctly align these sensors
  - Dynamic Calibration Equipment: Specialist Diagnostic equipment or laptop with appropriate OEM Licensed software connected will be needed to conduct a dynamic calibration. The route selected for conducting the dynamic calibration must contain the specific conditions such as lane markings, barriers and road speed signs over a reasonable distance to allow the sensors to recognise the parameters need to complete the calibration.
  - Computer Software: Some systems require specific diagnostic software that interfaces with your diagnostic equipment and vehicle's computer systems.
  - Calibration Targets: Target boards and mats used for static calibration in front of the vehicle, 360 camera and cross-traffic radar systems
  - ADAS Alignment Rigs: For precise alignment of sensors and cameras.

Step 3: Create or Revise Standard Operating Procedures (SOPs)

- Define ADAS Services: Establish what ADAS services your workshop will offer. This could include:
  - Diagnostics of ADAS components.
  - Wiring repairs, initialisation and programming of radar and camera modules.
  - Calibration (static and dynamic).
  - Regular maintenance of ADAS features.
- Set Calibration Protocols:
  - Establish a clear understanding of the protocols for when calibration should be performed.
  - Outline specific steps for conducting diagnostics and calibration, including safety protocols and step-by-step procedures for each type of ADAS feature (lane-keeping assist, adaptive cruise control, AEB, etc.).
- Documenting the Process:
  - Ensure that the process is well-documented, including the diagnostic and calibration procedures, tools used, and checks to be performed at each step. Make sure these SOPs are available to all technicians and staff.

Step 4: Train Your Staff

Diagnosis of ADAS systems requires understanding of the network of components and systems fitted to vehicles and as such, your staff should be appropriately trained in the use of diagnostic and calibration equipment.

- Technical Training: Your technicians will need to be trained on how to use the diagnostic and calibration tools effectively.
- This could be achieved through:
  - Training from manufacturers of the ADAS diagnostic equipment.
  - Online courses or workshops from recognised training providers that provide OEM centric repair methods
  - Record and keep evidence of training and qualifications for ADAS
- On-the-Job Training: Have experienced technicians guide newer staff through real-world calibration processes to ensure hands-on experience with the tools and procedures.
- Stay Updated: ADAS technology evolves rapidly, so encourage your staff to keep up to date with new systems, tools, and software.

Step 5: Implement ADAS Diagnostics in Your Workflow

- Add ADAS Diagnostics to Your Service Menu: Include ADAS diagnostics and calibration as part of your regular service offerings. Ensure customers are aware that you now offer these services, either through marketing or in-store communication.
- Set Up a Dedicated ADAS Work Area: Depending on the size of your workshop, you may need to set up a dedicated area for ADAS calibration that allows for precise measurements and safe, controlled environments. Or ensure you have a dedicated area for a mobile calibration service to perform calibrations
- Start with Low-Volume Calibration: Initially, start by offering ADAS diagnostics and calibration to a smaller number of customers to test and refine your processes before scaling it to a higher volume.

Step 6: Adopt a Structured ADAS Testing and Calibration Routine

- Vehicle Inspection: Whenever a vehicle comes in for any repair or maintenance work, perform an initial inspection of the ADAS components (sensors, cameras, etc.) for cleanliness, alignment, and damage. This should be part of your regular intake procedure.
- Diagnostic Check: Use your diagnostic tools to read any fault codes related to the ADAS. If errors are found, investigate the root cause and address the problem.
- Calibration: If needed, perform calibration based on manufacturer specifications. This could involve:
  - Wheel alignment: As best industry practice, a complete wheel alignment check is recommended on any vehicle before initiating ADAS calibration, regardless of the alignment method used

Appendix 2: A Checklist - Step by Step Guide

  - Static calibration: Positioning the vehicle at specific distances from calibration targets and aligning sensors/cameras using specialised tools.
- Dynamic calibration: Performing a road test to recalibrate radar, cameras, or sensors under real-world conditions.

- Final Verification: Confirm repairs with a post repair diagnostic scan. After calibration, test ADAS features like lane-keeping assist, adaptive cruise control, AEB, etc., to ensure they are functioning correctly. This might require a test drive to confirm that the vehicle responds to the systems as expected. Road test the vehicle as per rules. After road test, verify and confirm through the diagnostic equipment that the systems are operational post repair, and repairs and calibration are successful

Step 7: Ensure Compliance and Quality Control

- Follow Manufacturer Specifications: Always follow the vehicle manufacturer's calibration requirements for each make and model. Ensure your team knows how to access these specifications, either through data or manufacturer databases .
- Document Calibration Procedures: Keep detailed records of calibration work completed on each vehicle, including the date, equipment used, and the technician who performed the work. This documentation is vital for both legal compliance and customer satisfaction.
- Verify Calibration: After performing any calibration, always perform a final verification to confirm that the ADAS features work correctly under real-world conditions. You may want to have a secondary technician verify the calibration results before returning the vehicle to the customer.

Step 8: Market ADAS Services

- Customer Education: Educate your customers about the importance of ADAS calibration and diagnostics for their vehicle's safety. Provide information on why it's important to have their ADAS systems checked regularly, especially after repairs, accidents, or windshield replacements.

Step 9: Continuously Improve and Update

- Stay Updated with New Technology: As ADAS technology evolves, it's essential to stay current with new systems, tools, and calibration methods. Regularly review manufacturer updates and attend training sessions to ensure your workshop remains competitive.
- Customer Feedback: Gather customer feedback on your ADAS services to improve the customer experience. Monitor your success rate with calibration jobs to ensure you're meeting quality standards.
- Monitor Regulatory Changes: Ensure that your ADAS services comply with any local or regional regulations regarding calibration and diagnostics.


ADAS

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