COLLISION INDUSTRY
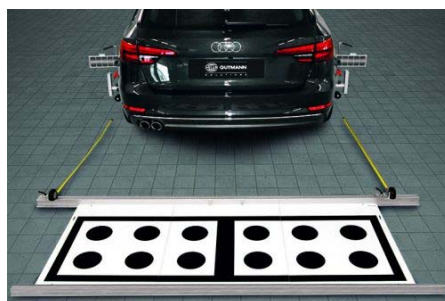**C O N F E R E N C E**

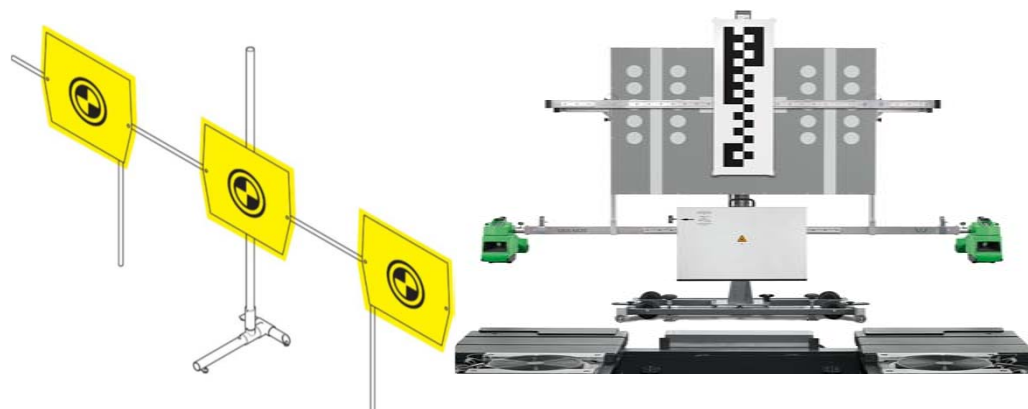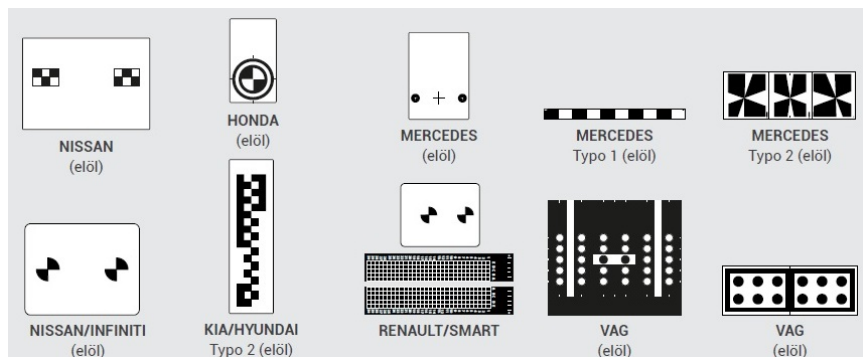# ADAS Calibrations Workflow
The Value of a Standardized Industry Process

Presented by: Emerging Technologies Committee
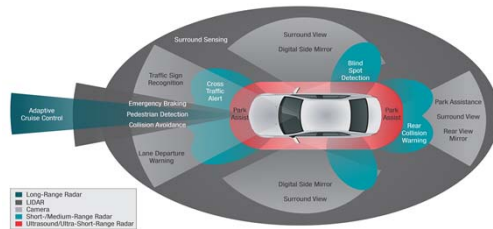
Chuck Olsen
Darrell Amberson
Gene Lopez

NISSAN (elöl)	HONDA (elöl)	MERCEDES (elöl)	MERCEDES Typo 1 (elöl)	MERCEDES Typo 2 (elöl)
NISSAN/INFINITI (elöl)	KIA/HYUNDAI Typo 2 (elöl)	RENAULT/SMART	VAG (elöl)	VAG (elöl)
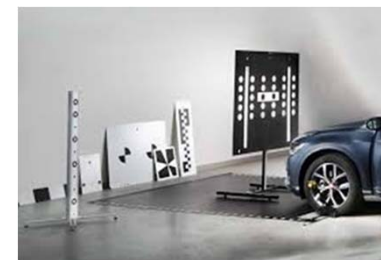
ADAS Calibrations Workflow

The CALIBRATION workflow was developed by the CIECA Calibration Committee to provide an overview of the process that is supported by the messages developed and updated in the Business Message Suite (BMS) and Codes.

• **Problem**: The repair community currently has no standard process to approach and document vehicle calibrations to ensure safe repairs. Meanwhile, ADAS-equipped vehicles requiring calibrations have doubled in the last 5 years and will become standard on most vehicles by model year 2022.
•
• **Solution:** Create a workflow to identify steps and documentation methods for vehicle calibrations to assist the industry in performing complete, safe, and quality repairs to vehicles with complex ADAS systems.

Benefits Identified by the CIECA Calibration Committee

Enable a more accurate, consistent, efficient and transparent process for calibration

Enable processes and procedures that assure vehicle safety by setting the vehicle to the OEM's prescribed calibration settings

Improve the level of documentation standards regarding calibration processes

Identify third-party resources for calibration services that employ OEM procedures

Enable calibration data to flow through multiple providers and document the process

The calibration data includes the final confirmation that the calibration was done accurately and to the OEM specifications

Increased repair facility's confidence and accountability through verification of proper answerable data

Reduce the risk and potential liability of various entities—including repair facilities, insurers, and vehicle manufacturers—with respect to calibration procedures and confirmation
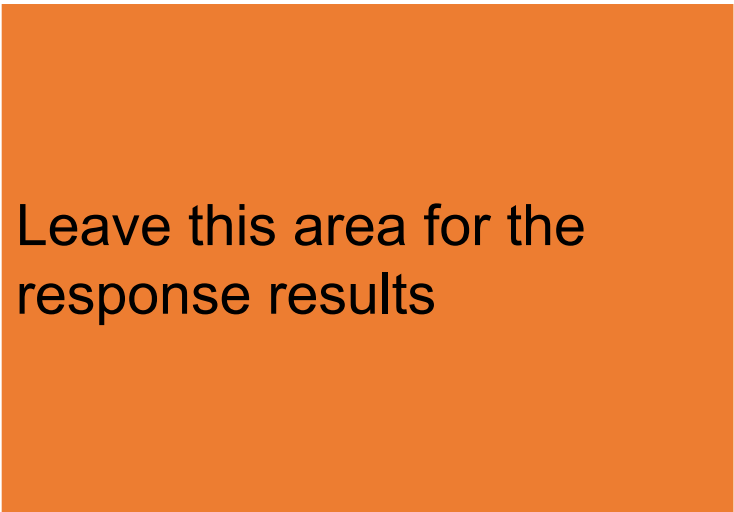
Industry Segments

The service being implemented with this guide includes the sending and/or receiving of Calibration information. Industry segments impacted by this Implementation Guide include:

- **Repair Facilities:** Any company whose business concern is to repair and calibrate damaged vehicles. Repair facilities include, but are not limited to: dealerships, mechanical providers, collision centers, calibration centers; to perform calibration according to procedures (sublet)
- **OEM Vehicle Manufacturers:** These are the originators of all necessary proprietary technical information, establishing calibration procedures and documentation. Certification, warranty and other programs may include required communication
- **Information Technology Providers:** Any entity that develops and/or maintains software applications or services related to the repair and calibration of ADAS and other vehicle calibration features
- **Tier One Providers:** These are companies with whom the OEM manufacturers contract to provide the calibration procedures. It is recognized the OEM Vehicle Manufacturer's procedures have priority on calibration procedures over the Tier One Providers.
- **Calibration Companies:** Those who offer calibration services for repair facilities, including on-site and off-site companies (this includes the sublet calibration providers)
- **Insurance Companies:** Property and Casualty insurers in one or multiple lines of business who act on behalf of their policy holder and impacted parties for the settlement of the loss for the vehicle repair including necessary electronic and physical calibration features
- **Third Party Administrators (TPA):** The companies whose main business is to administer the repair process life cycle for insurance carriers and repair facilities and others, including appraisers
- **Other Entities:** Other parties that are not directly providing loss settlement, vehicle repair or calibration tasks

Audience Response Question:

Agree/Disagree/Abstain question: A standard "best practices" process to address all ADAS related calibration procedures will benefit my operation.
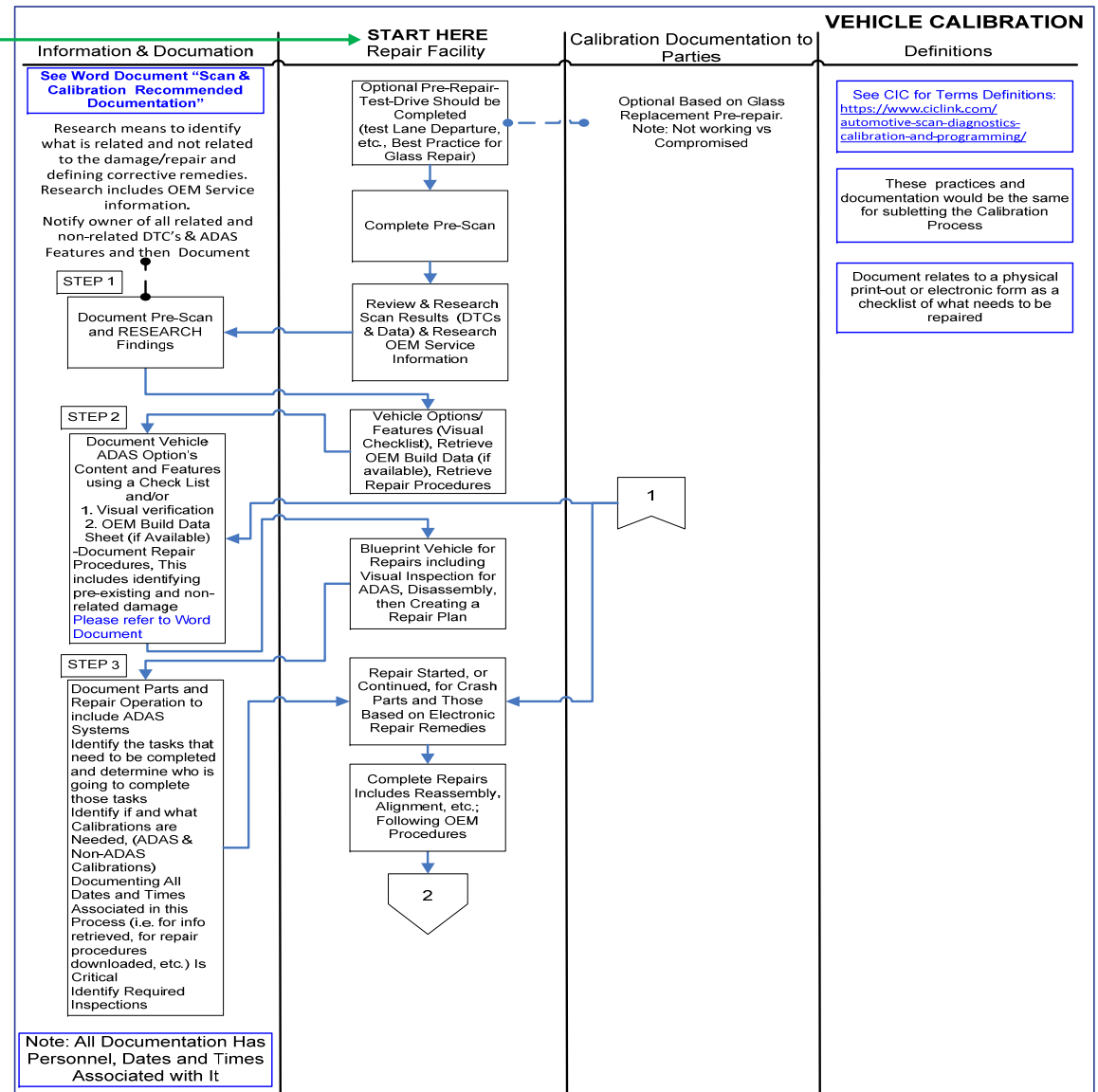
1. Agree
2. Disagree
3. Abstain

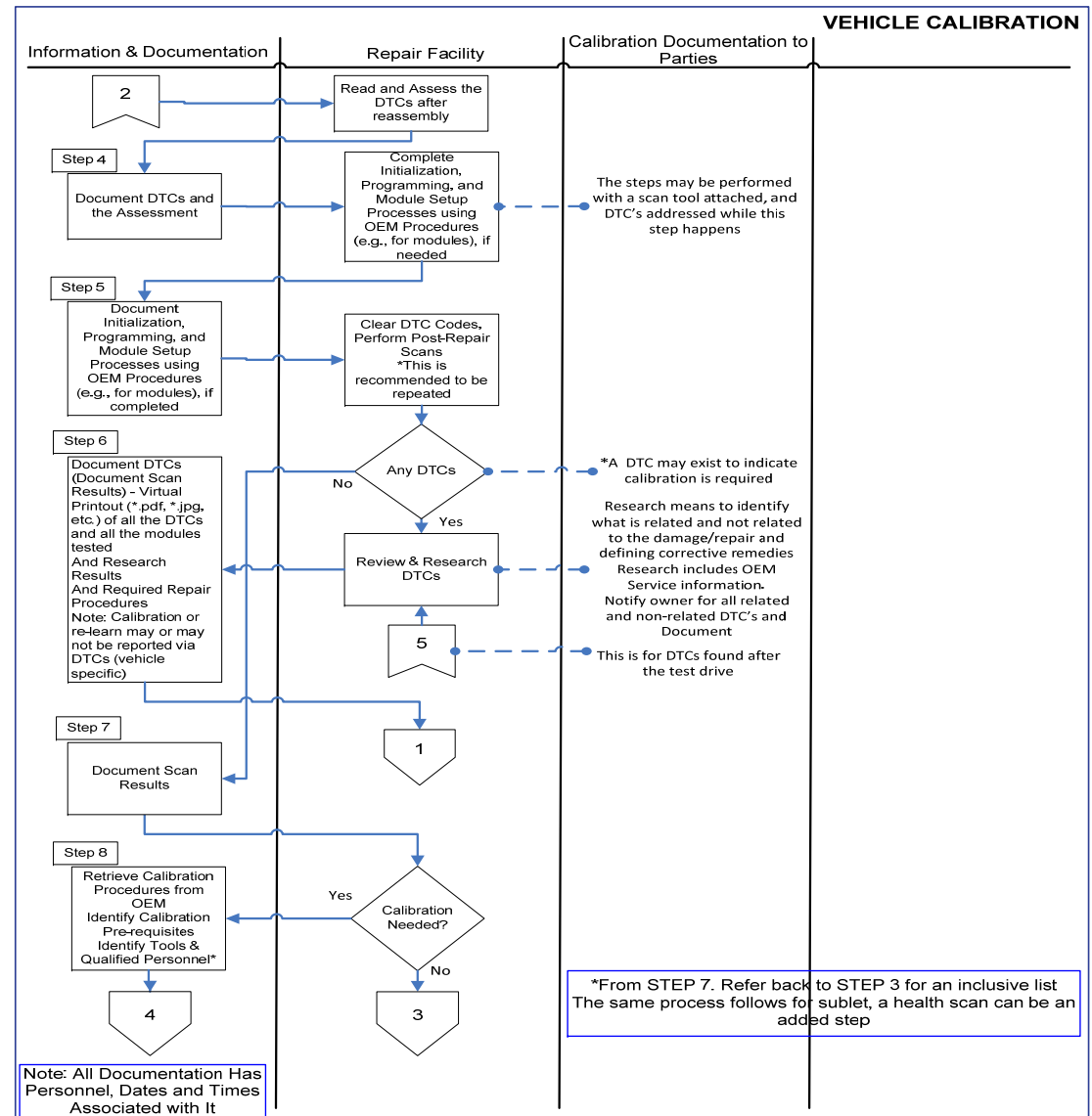Leave this area for the response results

Workflow page 1

- **STEP 2 –**
  - Document Vehicle ADAS Option's Content and Features using a Check List and/or
    - Visual verification
    - OEM Build Data Sheet (if Available)
    - Document Repair Procedures (If OEM Procedures are Available)
    - This includes identifying pre-existing and non-related damage
  - This is critical information that is not easily captured.

- **STEP 3 –**
  - Document Parts and Repair Operation to include ADAS Systems
  - Identify the tasks that need to be completed and determine who is going to complete the work
  - Identify if and what Calibrations are Needed, (ADAS & Non-ADAS Calibrations)
  - Documenting All Dates and Times Associated in this Process (i.e. for info retrieved, for repair procedures downloaded, etc.) Is Critical
  - Identify Required Inspections

VEHICLE CALIBRATION

Information & Documation	START HERE — Repair Facility	Calibration Documentation to Parties	Definitions
See Word Document "Scan & Calibration Recommended Documentation"	Optional Pre-Repair-Test-Drive Should be Completed (test Lane Departure, etc., Best Practice for Glass Repair)	Optional Based on Glass Replacement Pre-repair. Note: Not working vs Compromised	See CIC for Terms Definitions: https://www.ciclink.com/automotive-scan-diagnostics-calibration-and-programming/
Research means to identify what is related and not related to the damage/repair and defining corrective remedies. Research includes OEM Service information. Notify owner of all related and non-related DTC's & ADAS Features and then Document	Complete Pre-Scan		These practices and documentation would be the same for subletting the Calibration Process
STEP 1 — Document Pre-Scan and RESEARCH Findings	Review & Research Scan Results (DTCs & Data) & Research OEM Service Information		Document relates to a physical print-out or electronic form as a checklist of what needs to be repaired
STEP 2 — Document Vehicle ADAS Option's Content and Features using a Check List and/or 1. Visual verification 2. OEM Build Data Sheet (if Available) -Document Repair Procedures, This includes identifying pre-existing and non-related damage *Please refer to Word Document*	Vehicle Options/Features (Visual Checklist), Retrieve OEM Build Data (if available), Retrieve Repair Procedures	1	
	Blueprint Vehicle for Repairs including Visual Inspection for ADAS, Disassembly, then Creating a Repair Plan		
STEP 3 — Document Parts and Repair Operation to include ADAS Systems Identify the tasks that need to be completed and determine who is going to complete those tasks Identify if and what Calibrations are Needed, (ADAS & Non-ADAS Calibrations) Documenting All Dates and Times Associated in this Process (i.e. for info retrieved, for repair procedures downloaded, etc.) Is Critical Identify Required Inspections	Repair Started, or Continued, for Crash Parts and Those Based on Electronic Repair Remedies		
	Complete Repairs Includes Reassembly, Alignment, etc.; Following OEM Procedures		
	2		
Note: All Documentation Has Personnel, Dates and Times Associated with It			

Workflow page 2

- **STEP 4 –**
  - Document DTCs and the Assessment

- **STEP 5 –**
  - Document Initialization, Programming, and Module Setup Processes using OEM Procedures (e.g., for modules), if needed

- **STEP 6 –**
  - Document DTCs (Document Scan Results) - Virtual Printout (*.pdf, *.jpg, etc.) of all the DTCs and all the modules tested
  - Research Results
  - Document Required Repair Procedures
  - Note: Calibration or re-learn may or may not be reported via DTCs (vehicle specific)

- **STEP 7 –**
  - Document Scan Results (see above)

- **STEP 8 –**
  - Retrieve Calibration Procedures from OEM
  - Identify Calibration Prerequisites
  - Identify Tools & Qualified Personnel
    - Refer back to STEP 3 for an inclusive list
  - For Sublet, please see bullet at the end of this document

VEHICLE CALIBRATION

| Information & Documentation | Repair Facility | Calibration Documentation to Parties | |

2

Read and Assess the DTCs after reassembly

Step 4 — Document DTCs and the Assessment

Complete Initialization, Programming, and Module Setup Processes using OEM Procedures (e.g., for modules), if needed

The steps may be performed with a scan tool attached, and DTC's addressed while this step happens

Step 5 — Document Initialization, Programming, and Module Setup Processes using OEM Procedures (e.g., for modules), if completed

Clear DTC Codes, Perform Post-Repair Scans *This is recommended to be repeated

Step 6 — Document DTCs (Document Scan Results) - Virtual Printout (*.pdf, *.jpg, etc.) of all the DTCs and all the modules tested And Research Results And Required Repair Procedures Note: Calibration or re-learn may or may not be reported via DTCs (vehicle specific)

Any DTCs — No / Yes

*A DTC may exist to indicate calibration is required

Research means to identify what is related and not related to the damage/repair and defining corrective remedies. Research includes OEM Service information. Notify owner for all related and non-related DTC's and Document

Review & Research DTCs

5 — This is for DTCs found after the test drive

1

Step 7 — Document Scan Results

Step 8 — Retrieve Calibration Procedures from OEM Identify Calibration Pre-requisites Identify Tools & Qualified Personnel*

Calibration Needed? — Yes / No

4

3

Note: All Documentation Has Personnel, Dates and Times Associated with It

*From STEP 7. Refer back to STEP 3 for an inclusive list. The same process follows for sublet, a health scan can be an added step

Workflow page 3

STEP 9 –

Document Calibration Procedures from OEM and that Pre-requisites were Met

    Ensure and document all calibration process pre-requisites have been met, e.g., full fuel tank, check tire pressure, alignment

    If the vehicle was altered, e.g. larger/high performance tires or modified ride heights, it may not be possible to perform a proper calibration

    However, some OEMs may have limited procedures for related alterations

        If altered, document and advise the owner/driver that the alteration can cause the inability for some ADAS systems to operate correctly and proper calibrations to be performed successfully

STEP 10 –

Document Completed Proper Calibration Process via

    Retrieved OEM Calibration Processes Steps Followed, Photos, Videos & Other Documentation (e.g., screen shots) to Provide Evidence It Was Performed Correctly

    Again, Personnel, Dates and Times Associated with Each Step

Insurance Companies and OEMs may require pictures supporting calibrations

STEP 11 –

Repair facility should have an agreement with the personnel performing the test drive and receive adequate documentation to prove it completed correctly

Document Personnel and Date & Time of Test Drive and Results

STEP 12 –

Review ADAS Features with Owner, Document and Inform Owner ADAS Systems set to OEM Specifications

---

VEHICLE CALIBRATION

Information & Documation	Repair Facility	Calibration Documentation to Parties	Tasks

Step 9

Document Calibration Procedures from OEM and that Pre-requisites were Met ← Ensure all Calibration Pre-requisite are Met ← **4**

Note: Multiple calibrations might be necessary, Follow the OEM Procedures
Typically the scan tool is required. it would remain connected to confirm calibration is completed
This may include a road test to confirm the calibration is accurate and completed
Note: on glass replacement the adhesive specifications may require it to adequately cure (time to reach crash test quality) to prevent slippage and throw off calibration (airbag uses glass as backstop)

Note: Insurance Companies and OEMs may require pictures supporting calibrations

Step 10

Document Completed Calibration Processes, Steps Followed, Pics, & Videos Taken ← All (Dynamic and Static) Calibrations are Completed in this step — Perform the Calibrations as needed per OEM Procedures

3

Test Drive Vehicle by Qualified Personnel

Step 11

Document the Personnel, the related agreement and Time of Test Drive and Results

4 ← No ← Test Drive OK

Yes ↓

Complete Final Scan

Calibration Error e.g., camera error appear, engine fault codes showing up later This is only for crash related DTCs ← DTCs/ Calibration Error Found → Yes → DTC – 5 Cal - 4

No ↓

QC & Detail Vehicle → Message to Validate Proper Calibration: Carrier, Vehicle Manufacture → This would include everything from beginning to end, and includes the steps taken (these may be in the OEM Procedures)

Step 12

Review ADAS Features with Owner, Document and Inform Owner ADAS Systems set to OEM Specifications ← Deliver Vehicle, Inform Owner of ADAS is on. END

Note: All Documentation Has Personnel, Dates and Times Associated with It

ADAS Calibrations Workflow-Next Steps

- Enhance usability of workflow in both electronic and printable formats
- Combine supporting documentation with workflow into a single electronic product
- This feature will add the function of clicking on a step to view "Matching Workflow Documentation"
- Present updated product features as finished product during CIC-SEMA session in November 2020
- Create an animated video to describe workflow process and promote a standard ADAS calibration workflow with documentation
- Keep workflow consistent with CIECA-developed Business Message Suite (BMS) and Codes.

CIC Wiki-Glossary
Automotive Scan, Diagnostics, Calibration and Programming

Presented by: Emerging Technologies Committee

Chuck Olsen

Emerging Technologies Glossary Updates; Definitions

- CIC WIKI www.ciclink.com/wiki-glossary/

www.ciclink.com/automotive-scan-diagnostics-calibration-and-programming/

Advanced Scan, Diagnostics, Calibration and Programming

Current Definitions, Automotive Scan, Diagnostics, Calibration and Programming

- **ADAS CALIBRATION:** A post-repair process that can have three different methods of interaction: (1) Static, (2) Dynamic and (3) Combination Static/Dynamic. Static calibrations are performed in a repair facility with OEM provided setup procedures, normally requiring a special target and often a scan tool to initiate the calibration sequencing. Dynamic calibrations are performed during a manufacturer-specified road test, requiring the vehicle sees a series of objects to learn in real-time. Combination Static/Dynamic calibrations require both fixed targeting and road tests to complete. It is crucial that the technician performing the calibration refers to OEM service information for targeting and calibration procedures.

- **CALIBRATION:** Calibration is a software "learn" or "re-learn" procedure for a vehicle system or component, typically performed with a scan tool using appropriate software. Examples could be ADAS radar, windshield/surround cameras, window regulators, brake pedal position, steering angle and HVAC actuators. Performing a calibration is not programming as those two terms are typically used in the automotive repair environment. A calibration needs to be performed whenever the OEM service information indicates it is necessary as part of a repair procedure, regardless of whether or not a component was replaced. In many cases, a battery disconnect can be enough to require calibrations to be performed. If a module or component was replaced, module programming may need to be done prior to the calibration procedure.

Recently Added Definitions

- **DIAGNOSTICS:** The process of determining problems associated with DTCs, scan data or symptoms identified to determine what repairs, calibrations or parts will be necessary for a complete and safe repair. Process may also include service information research, on-vehicle pin-point testing, and inspecting systems or components in damaged areas.

- **ROAD TEST BASIC/TEST DRIVE:** Performed by shop personnel to verify standard vehicle performance and condition, including – but not limited to, centered steering wheel, vibrations, pulling conditions, wind noise, rattles, engine performance, transmission shifting, etc.

- **DYNAMIC SYSTEMS VERIFICATION (DSV) ROAD TEST/TEST DRIVE:** Performed by trained and qualified shop personnel to identify and confirm performance of the vehicle systems (as described above) plus advanced vehicle features and systems including driver assistance and safety systems such as advanced cruise control and safety restraint systems.

- **DYNAMIC:** Driving the vehicle as defined by the OEM to meet specific criteria and conditions

- **SYSTEMS:** any part of the vehicle- safety systems, steering/suspension, body, accessories, optional equip and ADAS

- **VERIFICATION:** proving out proper driving & handling characteristics, wind noise, rattles, squeaks and the proper operation of any/all ADAS equipment on the vehicle regardless of whether the shop serviced that system or not.

CIC Wiki-Glossary new Definition/Edit Requests
www.ciclink.com/wiki-glossary/

Wiki Introduction

Glossary Pages

Wiki Introduction

General Automotive Terms

General Automotive Parts Definition

Frame / Unibody / Structural Terms

Automotive Scan Diagnostics, Calibration, and Programming

Insurance Terms

Computer Terms

Time Terms

Suggest an Edit or Addition

Wiki Introduction

CIC Wiki/Glossary
Jargon which describes the terms used in the collision repair industry in the United States.

This Wiki is maintained by the CIC Definitions Committee.
USE DISCLAIMER: The information contained is intended to be general industry terminology and not intended to be utilized in a legalistic manner. Neither the Collision Industry Conference (CIC), the CIC Definitions Committee, nor its contributors shall be held liable for any improper or incorrect use of the information described and/or contained herein and assumes no responsibility for anyone's use of the information.

All additions and/or corrections should be reported using the form below.

Name -

John	Doe
First	Last

Email -

JohnDoe@email.com

Correction or Addition -

Enter your definition suggestion here for either a suggested update to an existing definition or a definition that is missing from current lists
Please designate Glossary page you are referring too
General, Parts, Frame, Scanning/calibration, etc.

Industry Terms to describe ADAS Features and Functions Classified
by SAE J3063

https://www.sae.org/binaries/content/assets/cm/content/miscellaneous/adas-nomenclature.pdf

CLEARING THE CONFUSION: Recommended Common Naming for
Advanced Driver Assistance Technologies

- **Advanced Driver Assistance Systems (ADAS)** have become increasingly prevalent on new vehicles, but the terminology used by automakers to describe them varies widely and so far has focused on marketing strategies.

- The common naming outlined is simple, specific and based on system functionality. The list is meant to aid in reducing driver confusion and define the functions of ADAS in a consistent manner. **This is critical to ensure that drivers are aware these systems are designed to assist, not replace an engaged driver.**

- The list is not meant to replace automaker proprietary system or package names, but rather help identify key functions within those packages and provide clarity to consumers. The list will be continually refined as we work with other stakeholders and as new systems are developed.

Industry Terms to describe ADAS Features and Functions
Classified by SAE J3063

COLLISION WARNING

- **Blind Spot Warning:** Detects vehicles in the blind spot while driving and notifies the driver to their presence. Some systems provide an additional warning if the driver activates the turn signal.

- **Forward Collision Warning:** Detects a potential collision with a vehicle ahead and alerts the driver. Some systems also provide alerts for pedestrians or other objects.

- **Lane Departure Warning:** Monitors vehicle's position within the driving lane and alerts driver as the vehicle approaches or crosses lane markers.

- **Parking Collision Warning:** Detects objects close to the vehicle during parking maneuvers and notifies the driver.

- **Rear Cross Traffic Warning:** Detects vehicles approaching from the side at the rear of the vehicle while in reverse gear and alerts the driver. Some systems also warn for pedestrians or other objects.

https://www.sae.org/binaries/content/assets/cm/content/miscellaneous/adas-nomenclature.pdf

Industry Terms to describe ADAS Features and Functions
Classified by SAE J3063

COLLISION INTERVENTION

Automatic Emergency Braking: Detects potential collisions with a vehicle ahead, provides forward collision warning, and automatically brakes to avoid a collision or lessen the severity of impact. Some systems also detect pedestrians or other objects.

Automatic Emergency Steering: Detects potential collisions with a vehicle ahead and automatically steers to avoid or lessen the severity of impact. Some systems also detect pedestrians or other objects.

Reverse Automatic Emergency Braking: Detects potential collisions while in reverse gear and automatically brakes to avoid or lessen the severity of impact. Some systems also detect pedestrians or other objects.

https://www.sae.org/binaries/content/assets/cm/content/miscellaneous/adas-nomenclature.pdf

Industry Terms to describe ADAS Features and Functions
Classified by SAE J3063

PARKING ASSISTANCE

Backup Camera: Displays the area behind the vehicle when in reverse gear.

Surround View Camera: Displays the immediate surroundings of some or all sides of the vehicle while stopped or during low speed maneuvers.

Active Parking Assistance: Assists with steering and potentially other functions during parking maneuvers. Driver may be required to accelerate, brake, and/or select gear position. Some systems are capable of parallel and/or perpendicular parking. The driver must constantly supervise this support feature and maintain responsibility for parking.

Remote Parking Assistance: Without the driver being physically present inside the vehicle, provides steering, braking, accelerating and/or gear selection while moving a vehicle into or out of a parking space. The driver must constantly supervise this support feature and maintain responsibility for parking.

Trailer Assistance: Assists the driver with visual guidance while backing towards a trailer or during backing maneuvers with a trailer attached. Some systems may provide additional images while driving or backing with a trailer. Some systems may provide steering assistance during backing maneuvers.

https://www.sae.org/binaries/content/assets/cm/content/miscellaneous/adas-nomenclature.pdf

Industry Terms to describe ADAS Features and Functions
Classified by SAE J3063

DRIVING CONTROL ASSISTANCE

Adaptive Cruise Control: Cruise control that also assists with acceleration and/or braking to maintain a driver selected gap to the vehicle in front. Some systems can come to a stop and continue while others cannot.

Lane Keeping Assistance: Provides steering support to assist the driver in preventing the vehicle from departing the lane. Some systems also assist to keep the vehicle centered within the lane.

Active Driving Assistance: Provides steering and brake/acceleration support to the driver at the same time. The driver must constantly supervise this support feature and maintain responsibility for driving.

https://www.sae.org/binaries/content/assets/cm/content/miscellaneous/adas-nomenclature.pdf

Industry Terms to describe ADAS Features and Functions
Classified by SAE J3063

OTHER DRIVER ASSISTANCE SYSTEMS

Automatic High Beams: Switches between high and low beam headlamps automatically based on lighting and traffic.

Driver Monitoring: Observes driver actions to estimate if they are not engaged in the task of driving. Some systems may monitor eye movement and/or head position.

Head-Up Display: Projects information relevant to driving into the driver's forward line of sight.

Night Vision: Improves forward visibility at night by projecting enhanced images on instrument cluster or head-up display.

https://www.sae.org/binaries/content/assets/cm/content/miscellaneous/adas-nomenclature.pdf

Panel Discussion Q&A

Moderator :

❖ **Jeff Peevy – CIC Chairman**

Panelists:
➢**Darrell Amberson - LaMettry's Collision and Glass**
➢**Chuck Olsen - AirPro Diagnostics**
➢**Gene Lopez - Seidner's Collision Centers**
➢**Charley Quirt - CIECA**