



**BOSCH**

Invented for life

Driven by  
**PRECISION**



**Accurate and efficient  
calibration with Bosch**

Advanced Driver Assistance System (ADAS)

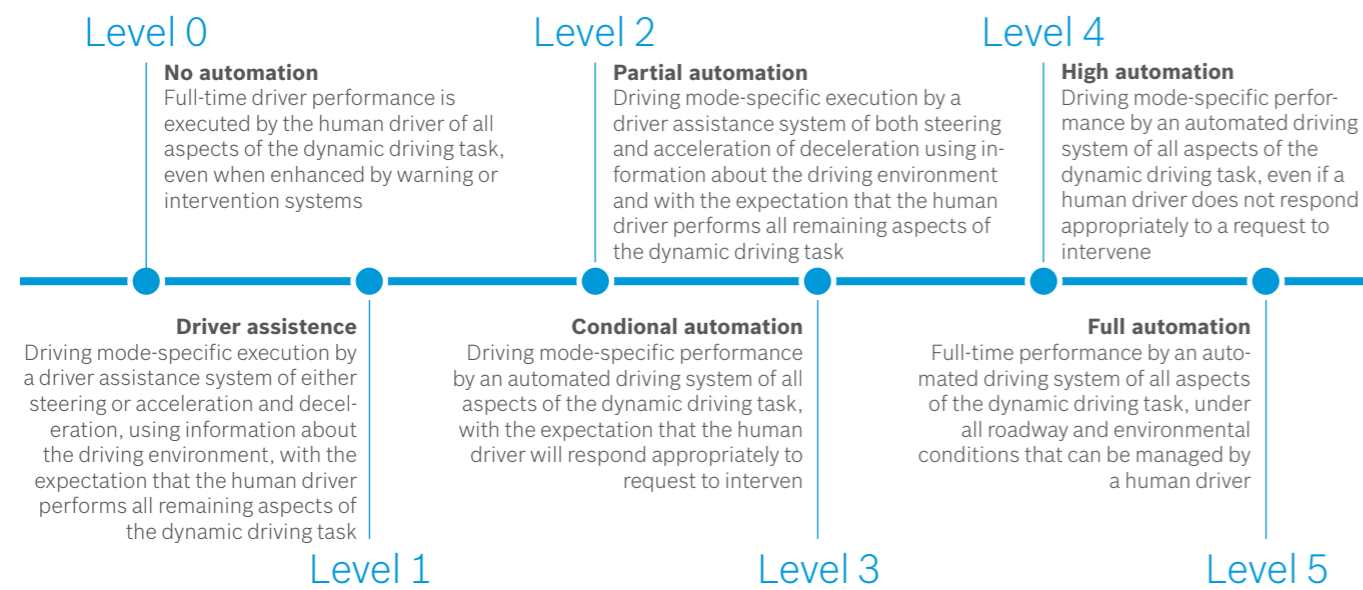
# Complete Camera Calibration

## as a key factor for safe driving

### Advanced Driver Assistance Systems

Advanced Driver Assistance Systems (ADAS) are vehicle technologies that provide safer driving experiences for the vehicle, driver, passenger, and the surrounding environment. ADAS technologies are paving the road to autonomous vehicles which can run full time with only maintenance stops. ADAS' primary goal is to reduce accidents and save lives.

### ADAS Technologies are commonly referred to in levels of automation:



### There are two main types of ADAS calibration:

Static and Dynamic. While most vehicles will require one or the other, some vehicles may require both. Here is a quick breakdown of the differences between Dynamic and Static calibrations:

#### Dynamic Calibration:

- ▶ Pre-determined service drive of 5 to 30 miles at set speed intervals
- ▶ Initiated through a diagnostic scan tool
- ▶ In some cases, may require a pre-alignment or static calibration before the dynamic calibration process
- ▶ Difficult during inclement weather and poses a liability for shops sending technicians to drive customer vehicles outside of the shop environment

#### Static Calibration:

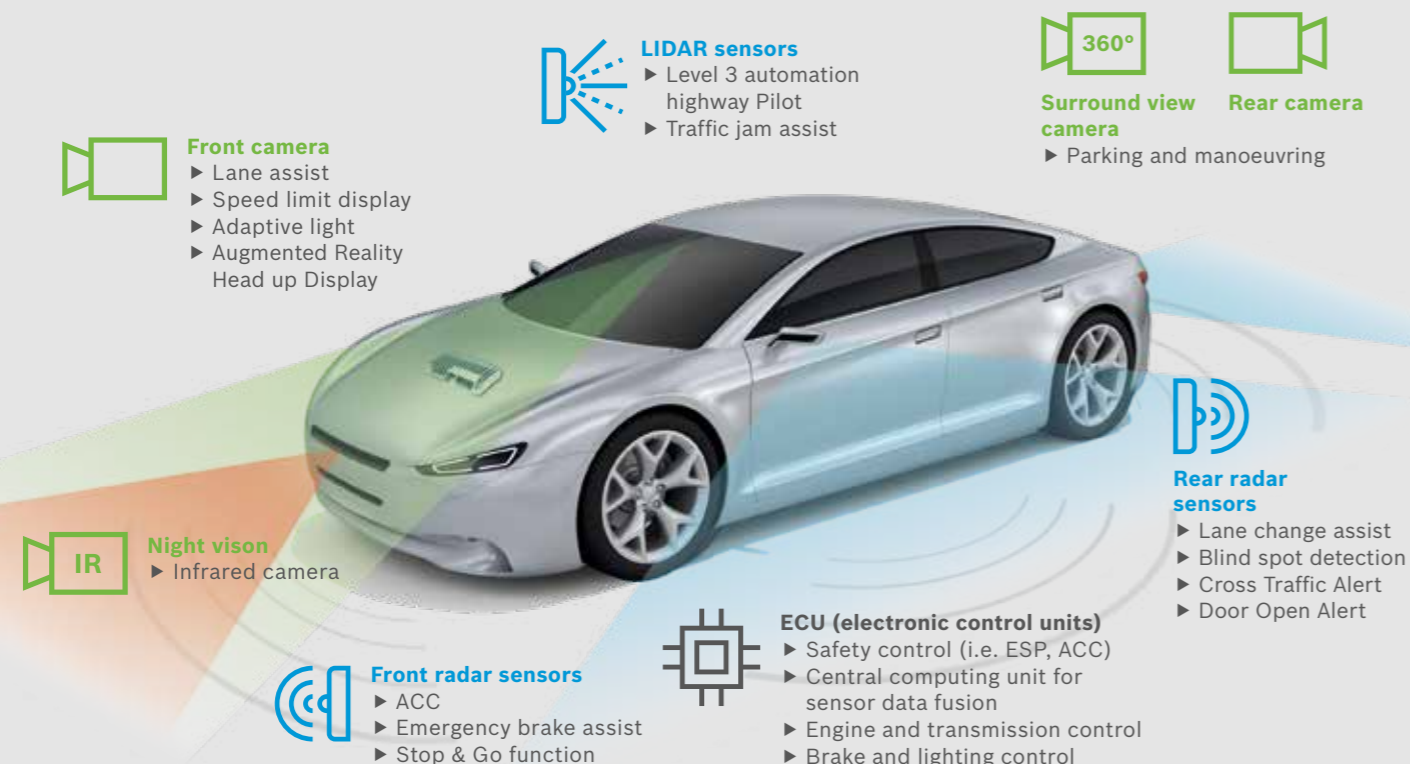
- ▶ Placement of targets or radar reflectors at predetermined locations in a static shop environment
- ▶ Initiated through a diagnostic scan tool
- ▶ Requires fixture and targets in addition to scan tool



## Importance of Accuracy and Precision

### Precise recalibration is critical

Through our engineering expertise and extensive testing, gain confidence in precise measurements and trust that your customers' vehicles are recalibrated within the tightest tolerances to the strictest standards, correctly the first time



### Which use case requires ADAS services or sensor calibration?

Accident repair	Wheel Alignment	Service	Tuning	Minor repairs	Trouble-shooting	Windscreen exchange	Sensor replacement



# Calibrate Sensors and Cameras

precisely and efficiently with Bosch

SCT 415/417

► Camera target



DAS 3000

- LIDAR target
- Front radar target
- Night Vision target
- Front camera target

Data base for Target Setup instructions



Bosch ADAS Positioning Software

## Diagnostics

- Data import/export
- ADAS repair information
- ADAS calibration
- Pre/post scan

ESI[tronic] 2.0 Online

Bosch Connected Repair

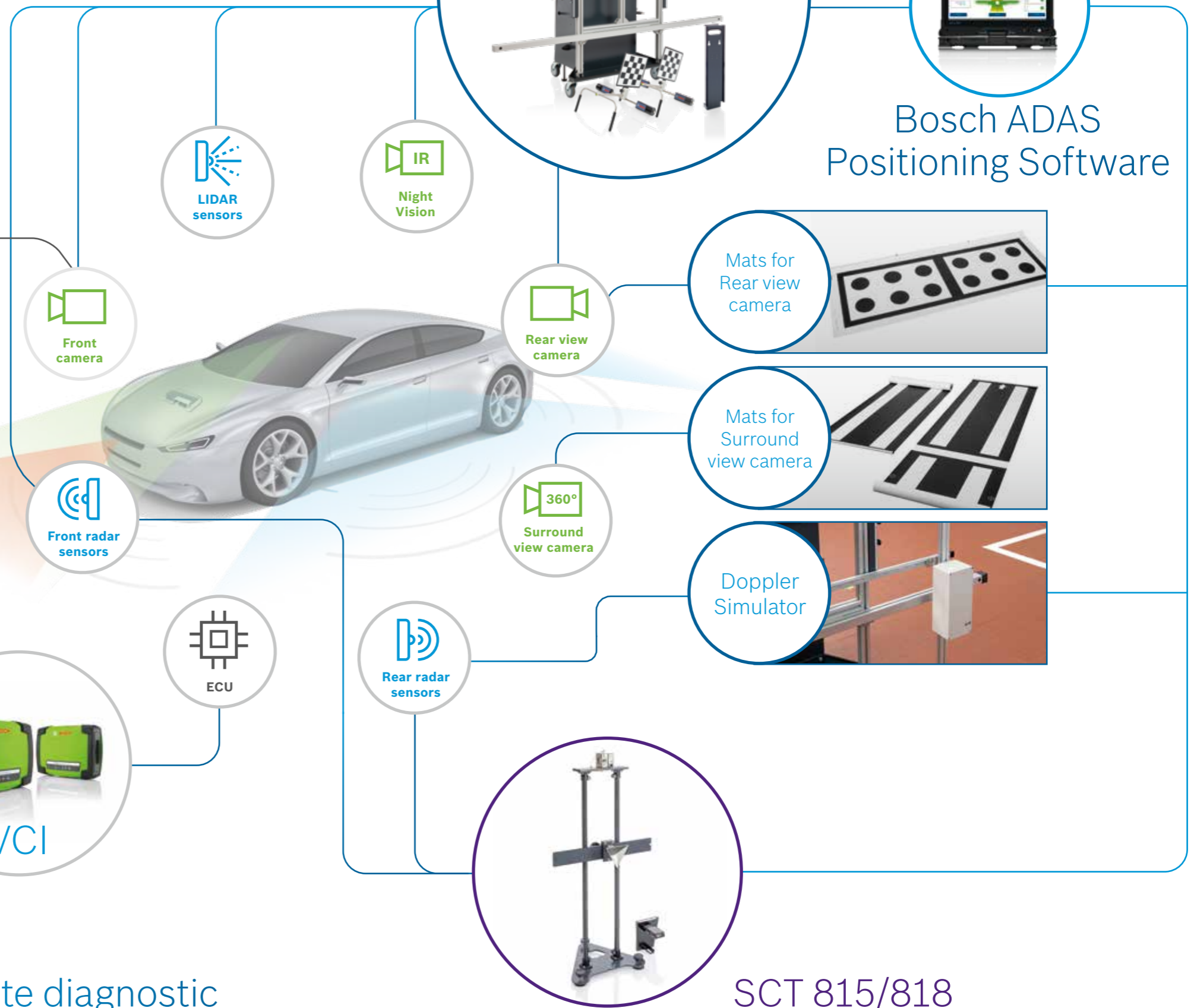


VCI



Remote diagnostic

Note:  
Icons green = Cameras  
Icons blue = Sensors



## Step 1

Plug in VCI and start automatic vehicle identification



## Step 2

Complete pre-scan diagnostics report



## Step 3

Select ADAS system to calibrate



## Step 4

Prepare for computed centre line measurement  
Follow vehicle specific setup instruction



## Step 5

Position the calibration device



## Step 6

Place targets



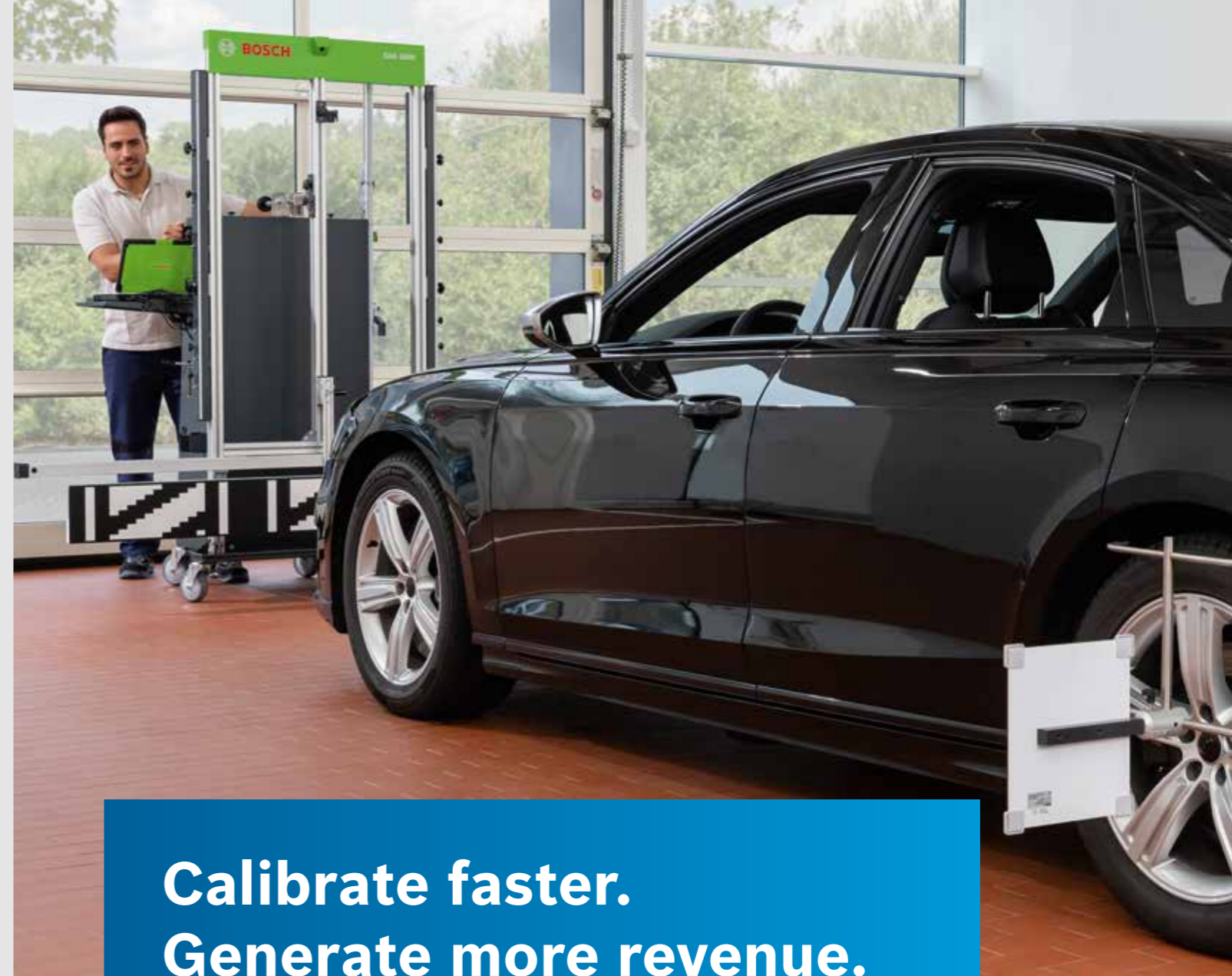
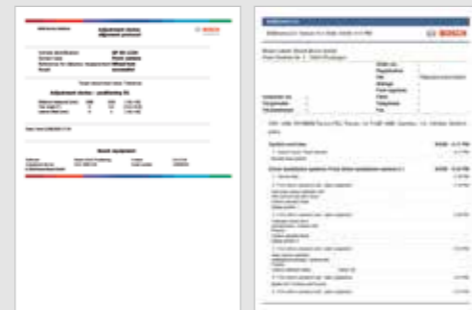
## Step 7

Confirm and calibrate!



## Step 8

Complete post-scan diagnostics report



**Calibrate faster.  
Generate more revenue.  
Grow your business ...  
and Repeat.**

The superior ADAS workflow can guide you from set-up through calibration in **half the time** compared to manual processes



# The superior ADAS workflow, only from Bosch

Leverage the guided interactive calibration for the most precise and efficient set-up

## Simplified Set up Process:

Communized OE procedures to simplify set-up and calibration processes

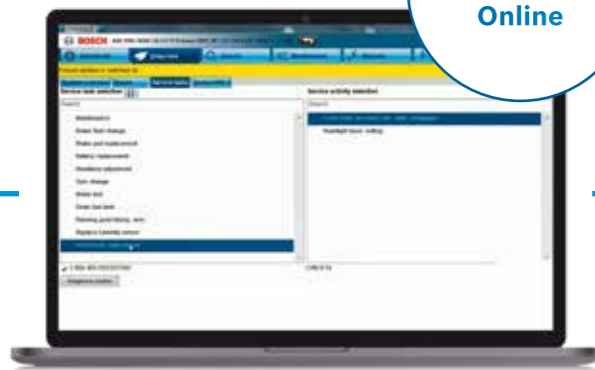
## Speed and Efficiency:

Saves shops time and money by getting customer vehicles calibrated faster and with the confidence that it's done right

### Start Diagnostic routine

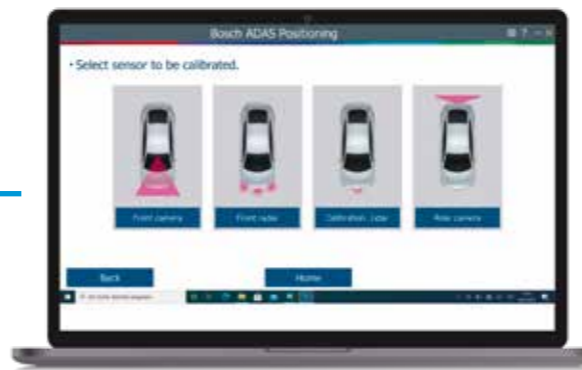
Rapid vehicle identification with system list and error codes. Automatically stored for result protocol

ESI[tronic] 2.0 Online



### ADAS Sensor selection

Pre-Defined Workflows to meet all vehicle specific pre-conditioning and ECU parameter setting for re-calibration process



### Guided Target Setup

ADAS tool placement with vehicle specific setup information like target type / position / height, reference for distance measurement



### Result Protocol

Complete documentation stored in cloud or file share.

- ▶ Pre/post scan
- ▶ Sensor re-calibration status
- ▶ Tool/Target placement

Bosch Connected Repair



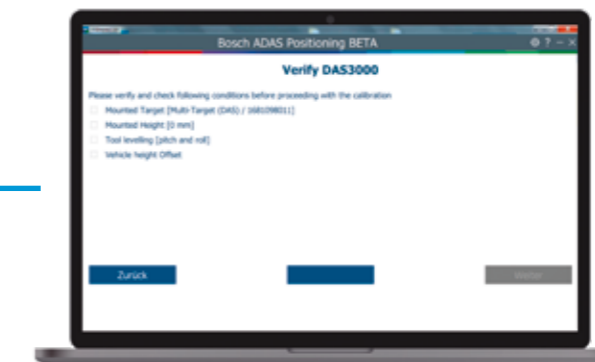
### Start Sensor Recalibration

Diagnostic workflow runs calibration routine and displays result status with quality assessment



### Verification

Check box list proofs all pre-sets derived from OEM specifications. i.e. height setting, target board type and roll/pitch angle levelling



# DAS 3000: the new universal computer based calibration and adjustment device for ADAS



Front camera



Front radar sensors



LIDAR sensors (Extension)



Rear view camera (Extension)

VOLKSWAGEN GROUP | BMW | ALFA ROMEO | All Makes with appropriate Targets



Picture shows DAS 3000 Scope of delivery

## The best evolution of DAS 3000 ever:

- ▶ New positioning software for more efficient processes and intuitive operation by
  - ▶ Revised navigation including user instructions and user friendly screen displays
  - ▶ Visualization of the current position as well as the target position by graphical animations
  - ▶ Digital values like distance, yaw angle and lateral displacement display
- ▶ New wheel clamps for attachment in seconds and maximum accuracy
- ▶ New bumper plate for precise distance measurement to the bumper
- ▶ Printout which documents the correct alignment of the calibration device together with the operator/workshop data

DAS 3000 video



<https://bit.ly/38edG3V>

## Front radar and Front camera system: DAS 3000

Computer based calibration device with fully digital distance measurement and alignment towards the driving axle.

### Scope of delivery:

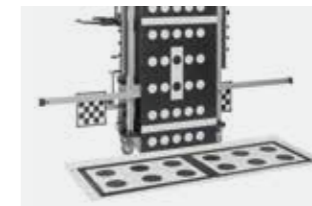
- ▶ Trolley and calibration device
- ▶ Multi target board (front Camera and front radar VW group)
- ▶ Precision measurement bar for installation of vehicle specific target boards
- ▶ Integrated dual-camera set
- ▶ New positioning software version with an intuitive user interface for the efficient alignment
- ▶ New universal wheel clamps
- ▶ New bumper plate for the fast and precise distance measurement



Above floor lifts: Offset pre-set system for quicker height setting and program routine for permanent yaw angle display



Designed for attaching LIDAR sensor calibration board and providing software routine positioning specific



Designed for rear camera units calibration with software routine positioning specific



Very ergonomic and comfortable maneuvering thanks to lateral handles and turning knob for pitch angle adjustment and Radar 3-point calibration tilting



Multi-Target-Shop: Calibration targets for the all vehicle manufacturers



Integrated Multi-Target-Shop container for individual storage and immediate reach



Precision measurement bar for magnetic mounting of target boards and rapid roll angle adjustment



Universal wheel clamps with a circular spirit level for a perfect centring on the wheel. Even on extreme softline rims with sizes from 14" – 24"

## Your benefits:

- ▶ Perfect measurement accuracy according to the highest OEM specifications
- ▶ Fast and efficient calibration using a camera based alignment method (no wheel aligner needed)
- ▶ Around 50% faster compared to conventional laser-based systems thanks to the intuitive user guidance and calibration routines
- ▶ The Multi target board enables both camera and radar calibration with just one board (VW group)
- ▶ Multi-brand compatible with vehicle-specific calibration targets (optionally available)
- ▶ Everything in one place through an integrated storage box (optional accessory)

# Rear and Surround View Cameras Calibration Mats

Brand specific equipment for the proper calibration of the Rear and Surround View cameras according to the OEM specifications implemented by Bosch routines and workflows.

## Near Range Camera Systems for Volkswagen group

 Surround view camera

VOLKSWAGEN GROUP

Calibration set for 360° Cameras Generation 2:  
(CTA 500-1)



**Main Features:**

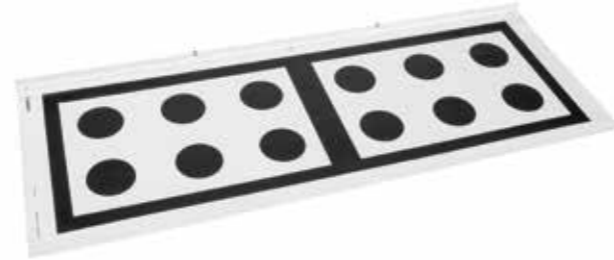
- ▶ Set made by 2 floor mats (8,115 x 806 mm)
- ▶ Robust material with plasticizers (750 g/m<sup>2</sup>) for safer calibration due to proper waves-free flatness of the mats
- ▶ Lateral clamping bars for easier rolling/enrolling
- ▶ Cylindrical storage bag for professional packaging

**Alignment method:** manual with tape measure

 Rear view camera

VOLKSWAGEN GROUP

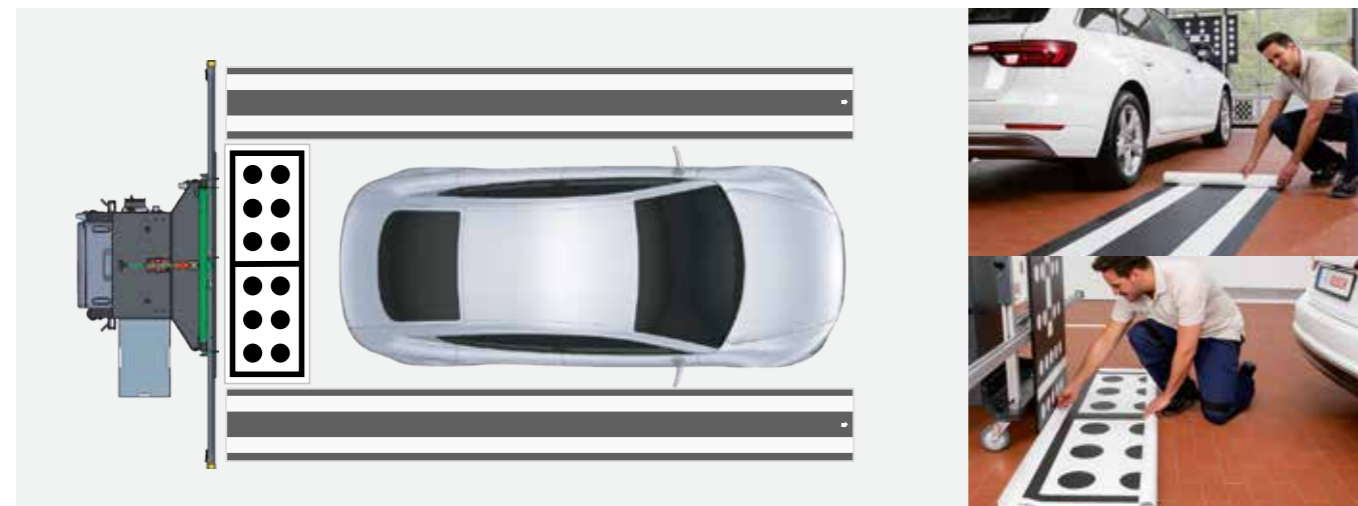
Calibration set for Rear Camera:  
(CTA 501-1)



**Main Features:**

- ▶ Set made by floor mat (1,970 x 742 mm) and L-shaped metal frame for proper alignment and setup by DAS 3000
- ▶ Robust material with plasticizers (750 g/m<sup>2</sup>) for safer calibration due to proper waves-free flatness of the mat
- ▶ Cylindrical storage bag for professional packaging
- ▶ Alignment by DAS 3000 routine and software workflow specific for a guided, quick and easy positioning

**Alignment method:** Computed with DAS 3000

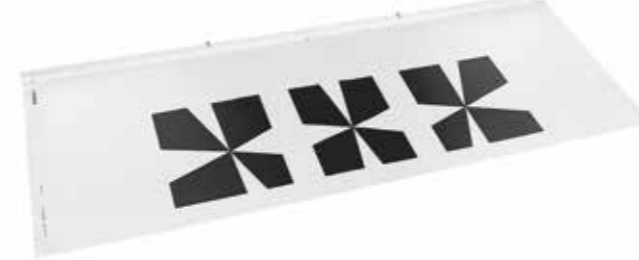


## Near Range Camera Systems for Mercedes-Benz

 Surround view camera

MERCEDES-BENZ

Calibration set for Rear Camera:  
(CTA 511-1)



**Main Features:**

- ▶ Set made by floor mat (1,970 x 742 mm) and L-shaped metal frame for proper alignment and setup by DAS 3000
- ▶ Robust material with plasticizers (750 g/m<sup>2</sup>) for safer calibration due to proper waves-free flatness of the mat
- ▶ Cylindrical storage bag for professional packaging
- ▶ Alignment by DAS 3000 routine and software workflow specific for a guided, quick and easy positioning

**Alignment method:** Computed with DAS 3000



 Surround view camera

MERCEDES-BENZ

Calibration set for 360° Cameras:  
(CTA 510-1)





# Rear and Surround View Cameras

## Calibration Mats

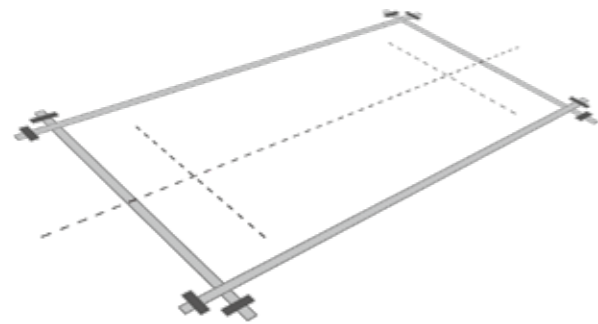
Brand specific equipment for the proper calibration of the Rear and Surround View cameras according to the OEM specifications implemented by Bosch routines and workflows.

### Near Range Camera Systems for Nissan

 Surround view camera

NISSAN


Calibration set for 360° Cameras:



**Main Features:**

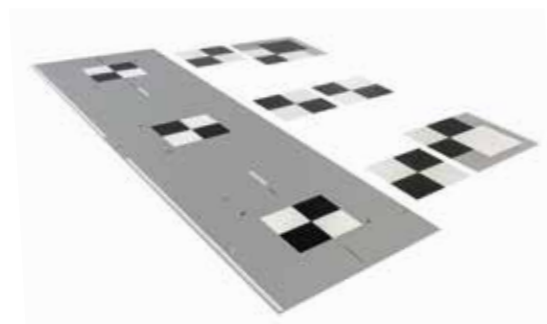
- ▶ Draw a reference frame around the vehicle by using customary-colored tapes with adhesive tapes on floor
- ▶ ESI[tronic] 2.0 Online workflows and Bosch setup instructions to ensure successful calibration

**Alignment method:** manual with tape measure

 Rear view camera

NISSAN

Calibration set for Rear Camera:



**Main Features:**

- ▶ Calibration mat (4,000 x 1,000mm) with imprinted targets (200 x 200 mm) for X-Trail, 2 lay flat bar
- ▶ Additional targets (trailers) for Pulsar and Qashqai/Juke
- ▶ Robust material with plasticizers (750 g/m<sup>2</sup>) for safer calibration due to proper waves-free flatness of the mat
- ▶ Cylindrical storage bag for professional packaging
- ▶ ESI[tronic] 2.0 Online workflows available

**Alignment method:** manual with tape measure



### Near Range Camera Systems for Mitsubishi

 Surround view camera

MITSUBISHI

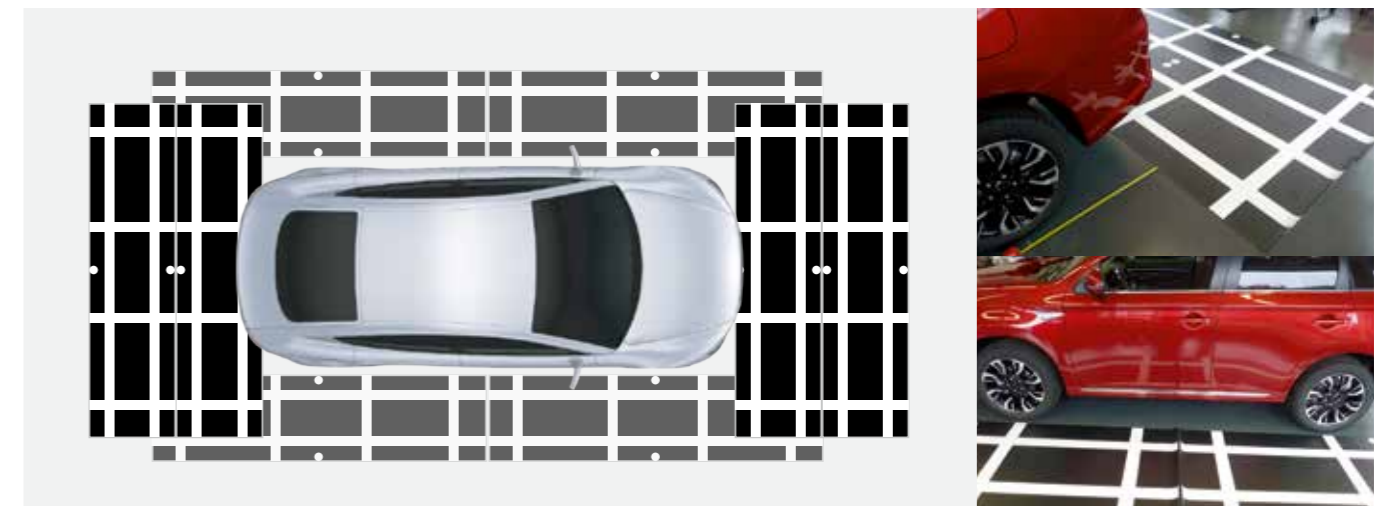
Calibration set for 360° Cameras:



**Main Features:**

- ▶ 2 Calibration mats (2,000 x 1,000 mm) with imprinted pattern
- ▶ Robust material with plasticizers (750 g/m<sup>2</sup>) for safer calibration due to proper waves-free flatness of the mat
- ▶ Cylindrical storage bag for professional packaging
- ▶ ESI[tronic] 2.0 Online workflows available

**Alignment method:** manual with tape measure





# SCT 815/818: Corner reflector target and carrier for calibration of radar sensors



TOYOTA | LEXUS | MAZDA | HONDA | SUBARU | KIA | HYUNDAI | MITSUBISHI



Picture shows SCT 815 Scope of delivery

### Main Features:

- ▶ Universal corner reflector target which is matching with all sensor types and OEM service concepts in scope
- ▶ Flexible height adjustment of corner reflector module (100 – 900 mm)
- ▶ Typical distances between radar sensor and corner reflector are 2.5 – 5 m
- ▶ GLM120 Laser for precise distance and height setting
- ▶ Green line laser for rapid alignment towards vehicle centre line or other reference points



Target with transverse displacement: accurate offset scale gives guidance

### Scope of Delivery:

SCT 81x is an integral part of the calibration process for the majority of Korean and Japanese vehicles.

#### SCT 815:

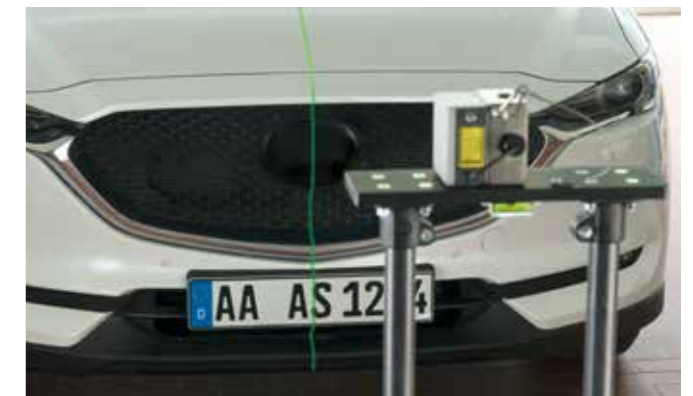
- ▶ Carrier with corner reflector target
- ▶ Dual lasers for set-up:
  - ▶ GLM 120 laser for distance /height adjustment
  - ▶ Green line laser for alignment to vehicle centre line

#### SCT 818:

- ▶ Carrier with corner reflector target
- ▶ Stereo camera with USB cable for computer vision positioning
- ▶ GLM 120 laser for height adjustment



Digital height adjustment to floor by laser. Digital laser distance measurement referring to radar sensor



Green line laser: Line-up with vehicle badge and centre references

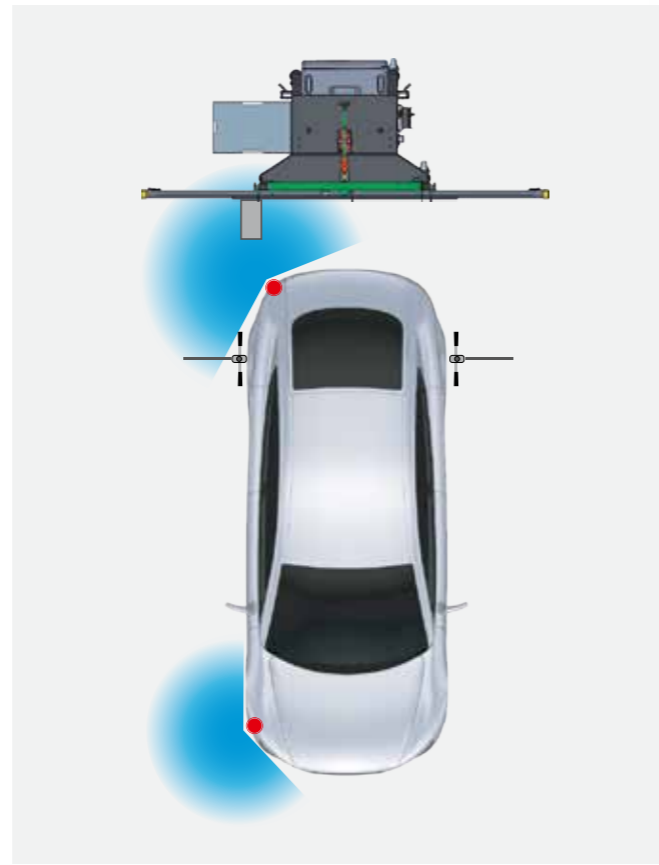
### Your benefits:

- ▶ Carrier with attached corner reflector target for Front and Rear Radar calibration
- ▶ Designed with fiberglass material to avoid false or improper radar calibration
- ▶ Fast and accurate setup supported by laser technology or computer vision positioning
- ▶ Carrier designed to connect future targets and alignment technologies
- ▶ Result protocol with Target placement data for Proof of Calibration

# CTA 105-1: Doppler Simulator for Rear and Side Radar calibration



VOLKSWAGEN GROUP | MAZDA



### Main Features:

- ▶ Doppler Simulator Module (Rotating Target) attached to quick coupling of DAS 3000 measurement bar
- ▶ Used for electronic calibration and functional testing of the angle measurement capability of vehicle radars
- ▶ Rapid and accurate placement supported by computer vision positioning
- ▶ Flexible height setting in a range from 700 – 1,000 mm
- ▶ Lateral displacement supported by the ruler of the measurement bar
- ▶ Power supply 24VDC / 1,5A

### Your benefits:

- ▶ Doppler simulator for Side and Rear Radar calibration to ensure a proper function of the lane change assist
- ▶ Quick coupling with DAS 3000 measurement bar
- ▶ Fast and accurate setup supported by computer vision positioning and DAS 3000 rulers
- ▶ Result protocol with Target placement data for Proof of Calibration

# SCT 415/417: Calibration Fixture for front Camera Service



ALL MAKES WITH APPROPRIATE TARGETS

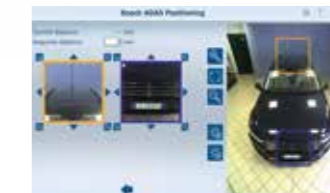


### SCT 415: Rapid setup procedure supported by laser technology

- ▶ Precision measurement bar with adjustable height and scale for multiple target board mounting
- ▶ Magnetic coupling of target boards
- ▶ Green centre line laser: line up with vehicle centre line
- ▶ Distance measurement with tape measures
- ▶ Height ruler with inch and millimeter scale
- ▶ Vehicle specific setup instructions
- ▶ Robust jig design for workshop environment

### SCT 417: Significant time savings during placement due to Bosch software workflows and computer vision

- ▶ Functions and design features like SCT 415
- ▶ Line up with vehicle centre line supported by new Bosch
- ▶ Software workflows and computer vision technology. Virtual centre line shall match with reference points on the vehicle like badges and antenna
- ▶ Distance measurement aid ensures rapid and accurate placement (conform with OEM requirements)



The Green centre line laser supports the placement procedure as user can line up with emblem, camera eye, antenna or floor marker

### Retrofitting of SCT 415 with SCT 17 kit:

- ▶ Raiser bar with camera
- ▶ HMI bracket for DCU 220/100 or any tablet PC
- ▶ Software (Android/ WIN)
- ▶ Distance measurement aid (post with target)

Bosch ADAS Positioning Software (BAP) provides workflows with best usability and traceability during the setup procedure

Adjustable HMI bracket provides best ergonomics

### Your benefits:

- ▶ Precision and flexibility for glass fitters
- ▶ Supports all calibration methods for front cameras
- ▶ Significant time savings during placement due to Bosch Laser Technology or computer vision positioning
- ▶ Result protocol with Target placement data for Proof of Calibration



# What drives you, drives us

Bosch technologies are used in most vehicles worldwide. People, and assuring their mobility, is what we are focused on.

Therefore, we have dedicated over 130 years of pioneering spirit and expertise in research and manufacturing to achieving this.

We provide the aftermarket and workshops worldwide with modern diagnostic and workshop equipment and a wide range of spare parts for passenger cars and commercial vehicles:

- ▶ Solutions for efficient and effective vehicle repairs
- ▶ Innovative workshop equipment and software
- ▶ One of the world's most comprehensive ranges of new and exchange parts
- ▶ Large network of wholesale customers, for quick and reliable parts supply
- ▶ Competent technical support
- ▶ Comprehensive educational and training offers
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