

ADAS calibration

mega macs and CSC-Tool –

patrons of modern safety



The Situation. The Task.

Our Solutions.

ADAS is short for advanced driver assistance systems. While these systems stand for greatly improved safety and ride quality in modern vehicles, they also represent a considerable challenge for workshops of all types and sizes.

DRIVER ASSISTANCE SYSTEMS – A MATTER OF COURSE

In 2021, new holders of a driver's license might find it hard to imagine a car without electric windows, Bluetooth interface, ABS, ESC or an emergency brake assistant. It would probably be just as hard as imagining life without a smartphone. Due to the important role these systems have played in improving road safety and a general desire of users for more comfort, driver assistance systems have become a given – and their number in new vehicles has sky-rocketed.

The emergency brake assistant and the lane change assistant, which are now required by law for almost all vehicle segments including trucks, are perfect examples for this development. As a matter of course, driver assistance systems play an ever-increasing role when it comes to service and repair – or when there is glass damage. The development of ADAS touches all vehicle segments and it does not stop at your workshop gate.

SENSORS ARE TEAM PLAYERS

All systems installed in a vehicle must function correctly, after all, drivers rely on them. 50 years ago, drivers relied on the fog light. If it was defective, it was simply replaced, and that was it. Today, an impact on the radar sensor can have serious consequences. At the worst, it could cause a major chain reaction in a number of assistance systems. They work as a team and access and share the data of different sensors including camera, radar, LiDAR and ultrasound sensors. If a single sensor fails or malfunctions and sends implausible data, several systems may be affected at the same time. Often, they must be calibrated after certain repairs have been carried out. Even dismantling components which have built-in sensors (for example the bumper cover) may require a calibration of the system.

The same is true when a windscreen is replaced. The optical data supplied by the camera(s) are used by the cruise control, the emergency brake assistant, the lane keeping assistant, the traffic sign recognition and the adaptive high beam. Thus, after replacing the windscreen and calibrating relevant driver assistance systems, you might still have to do a basic setting of the headlights.

KNOW-HOW, ROUTINE AND EFFICIENT TOOLS

Very early on, Hella Gutmann developed a calibration system which works in tandem with the mega macs diagnostic series. Over time, the CSC-Tool (Camera & Sensor Calibration Tool) has grown into an impressive modular system.

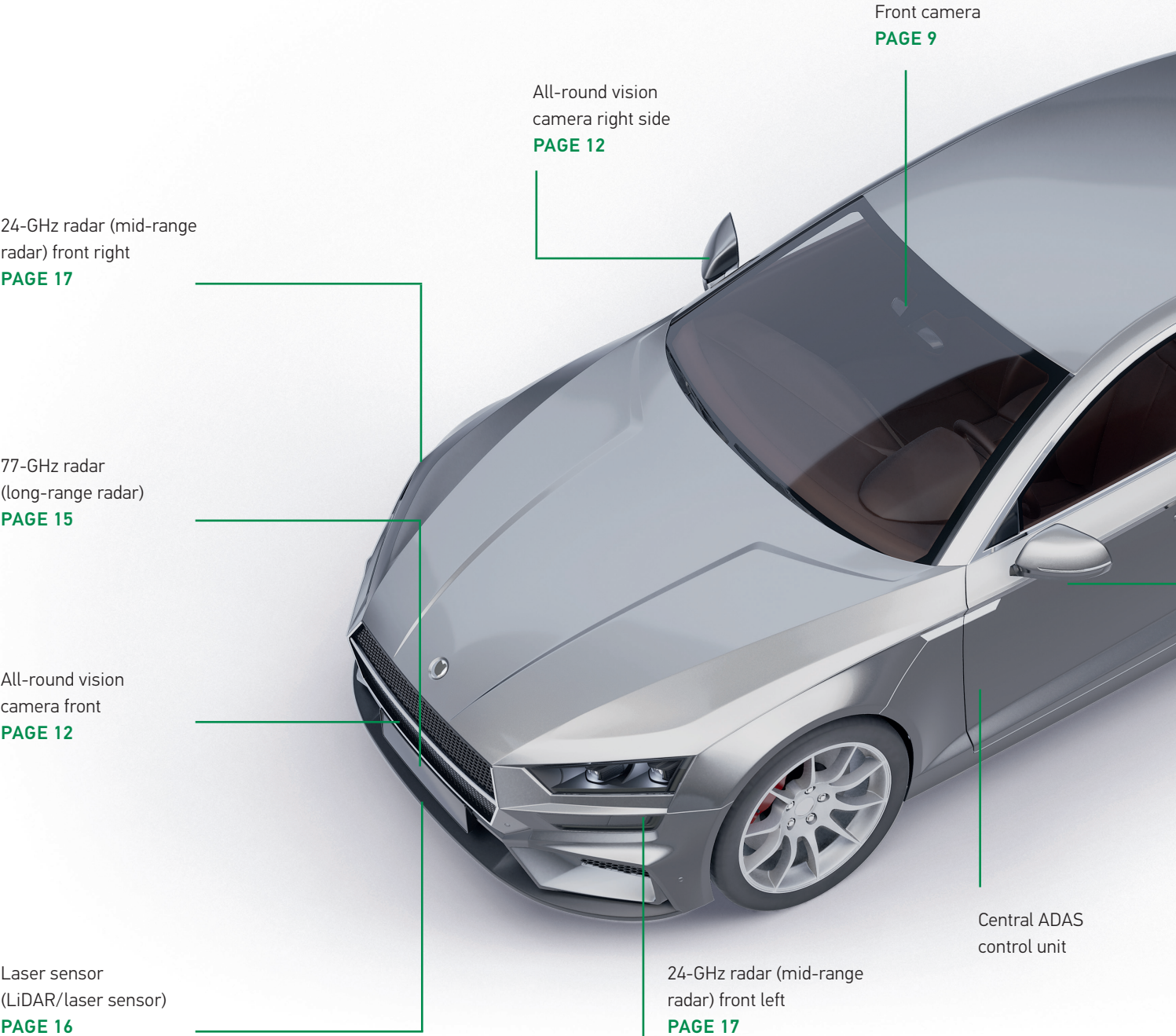
Users of a current mega macs can choose between the tried, tested and optimized second edition CSC-Tool SE, the portable CSC-Tool Mobile or the CSC-Tool Digital. Numerous accessories offer solutions for almost every requirement. From calibrating the front cameras of the 26 most popular brands in Europe to all-round vision cameras, rear cameras as well as radar and LiDAR sensors.

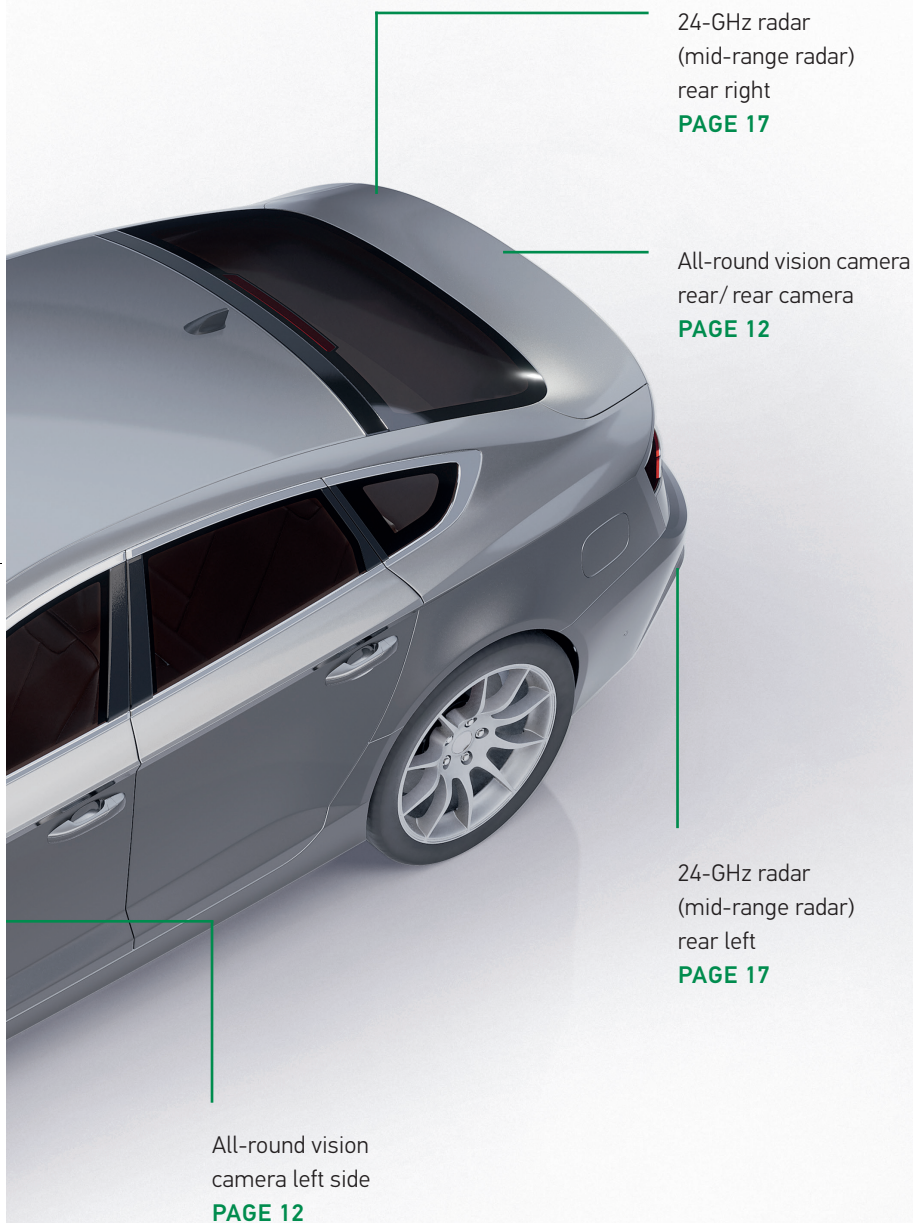
Before calibrating any driver assistance system on a vehicle, the toe must be correctly adjusted. If the toe angle is not within the tolerance range specified by the manufacturer, you must abandon the calibration and adjust the toe before you do anything else. With the Wheel Alignment Kit, you can plan ahead and even calibrate vehicles with faulty wheel alignment. Thanks to this option, the vehicle is back on the road in no time.

Take ADAS calibration by the horns and secure your future!

Cameras and sensors – informants for ADAS

Not long ago, people knew very little about driver assistance systems and even less on how to operate them. Today, we use these systems daily without even thinking twice about it. However, there are always new vehicles which surprise users with new systems. The basis for this is an ever-increasing interconnectedness.





Many driver assistance systems rely on all-round vision. Common driver assistance systems are cruise control, traffic jam assistant, emergency brake assistant, lane keeping and lane change assist, parking assist and active parking assist, trailer backup assist, high beam assist and traffic sign recognition. The interconnection between these systems leads to new ever more sophisticated systems.

Depending on the task and the distance to the objects in the detection range, ultrasound, video and infrared cameras as well as LiDAR and radar sensors are used. None of the sensors can do everything, but none can be dispensed with either. The image processing system, for example, only recognizes objects in real time but cannot measure distances. The radar sensor doesn't recognize colour, but it recognizes objects and their distance to the vehicle – even if they are very fast moving. The LiDAR sensor provides a fast and broad scan of the surrounding area.

However, not every driver assistance system in a vehicle has its own sensor system. The different systems work as a team. Due to the vast amount of data collected by the sensors, vehicle engineers have started to bundle this influx in a central ADAS control unit. It processes signals in almost real time and creates a complete image of the vehicle surroundings. At the same time, it is the central interface for all existing ADAS and the platform for many new driver assistance systems, which can be activated according to the respective requirement.

This development places greater responsibility on workshops because basic settings and calibrations of driver assistance systems have become an indispensable part of vehicle maintenance and repair.

The Camera & Sensor Calibration Tool

The calibration of camera, radar and LiDAR based systems has also resulted in increased expectations. Your mega macs is ready to meet them. All you need is a CSC-Tool, and you can start. And the best: Being part of a modular system, the CSC-Tool grows with you.

NEW VEHICLES REQUIRE NEW TOOLS – AN ONGOING PROCESS.

The evolution of the CSC-Tool is a perfect example for this development. Since the beginning of 2014, the Camera & Sensor Calibration Tool is – in synergy with the mega macs – the pioneer for calibrating video cameras behind the windshield.

Since then, countless extensions have been added, for example for calibrating radar sensors, all-round vision sensors, rear cameras as well as LiDAR sensors (scanners) in Audi models. At the same time, the list of vehicles covered has increased by developing

numerous new CSC-Tool modules with the corresponding user guides in the mega macs software. Thus, the CSC-Tool has proved its worth a thousand times over.

Today, the CSC-Tool SE is already in its second generation and is fully developed in terms of both quality and function. The well-conceived tool is a pleasure to work with: powerful locking mechanisms, smooth sliding carriages, scales and level gauges exactly where you need them. For many workshops working on a limited number of brands, the CSC-Tool SE together with the mega macs is the perfect solution.



START WITH THE BASIC TOOL AND GAIN PROFICIENCY

The delivery contents of the CSC-Tool SE include the base support with the cross member and the front camera reference panel for brands of the Volkswagen Group. To position the CSC-Tool correctly in relation to the vehicle's thrust line, two wheel clamp modules with line lasers are also required. You can choose between the "wheel clamp module SE" (standard) and the "wheel clamp module WA". Reference panels for 26 further brands are

also available and can be purchased individually or as a set. With this standard equipment and your mega macs you can start calibrating front camera systems and gain confidence.

The CSC-Tool SE is part of a modular system. Hence, you can add other modules as you go along – for example for radar calibrations.



Correct positioning is the be-all and end-all of every calibration

Even the slightest deviation of a sensor will result – at some hundred metres distance – in a significant offset of the detection range. With the wheel clamp modules SE, the exact alignment of the calibration device to the thrust line is easy.



CAREFUL PREPARATION IS EVERYTHING.

Electronic processes are incredibly fast and calibrating a sensor only takes a few seconds at the most. A simple click on your mega macs and the control unit compares the image provided by the camera with the reference data. The new position is saved. The procedure is similar for calibrating modern 77-GHz radar sensors, although the measuring field is different. However, regardless of whether you are dealing with a camera, radar or LiDAR sensor, the preparation is vital. The exact positioning of CSC-Tool or the rear reference panel in relation to the thrust line are part of it.

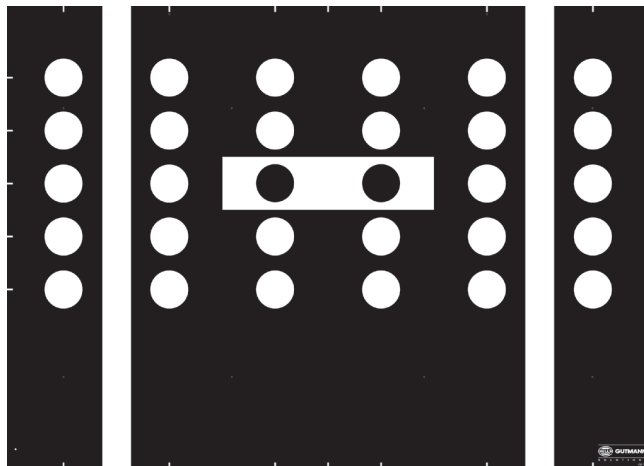
The positioning is done with the help of two wheel clamp modules equipped with line lasers which are positioned to the left and right of the rear axle. With these values you can determine whether the CSC-Tool is correctly aligned or whether further adjustments are necessary.

Your mega macs will guide you step by step through the procedure. It knows the correct distance and height measurements, all other requirements and which CSC-Tool module to use. Therefore, you can take your time and decide when you are ready to continue.



Every manufacturer is different

The calibration of long-range front cameras is realized by comparing the reference data stored in the ECU with the image data provided by the camera(s). Unfortunately, almost all manufacturers use different image data, i.e. reference panels.

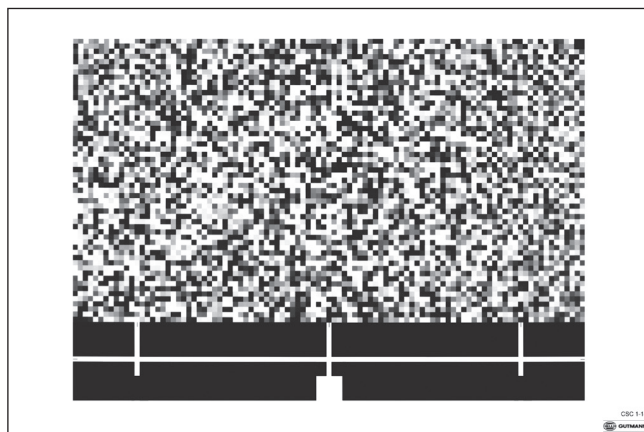
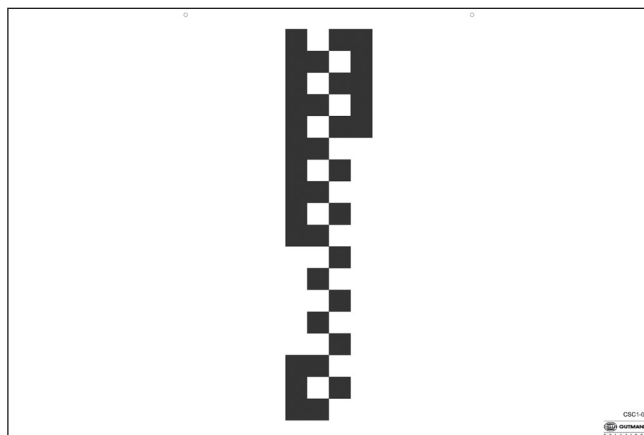


MANUFACTURER-SPECIFIC REFERENCE PANELS FOR FRONT CAMERAS

Every image processing system requires the correct reference panels which correspond to the specifications of the manufacturer and the model. Black squares on a white background, white dots and lines on a black background, back bars and fields resembling QR-codes or combinations of all of these. The great variety in reference panels from one manufacturer to another speaks for the ingenuity of the programmers. However, everything must match. Even the dimensions are prescribed by the manufacturers.

The reference panels for the CSC-Tool SE fulfil manufacturers' specifications to the letter. In addition to the reference panel for brands of the Volkswagen Group, which is already included in the basic delivery contents, you can add further reference panels to your CSC-Tool SE, in accordance with your requirements and the vehicle brands which dominate in your workshop. Of course, you can just order all the reference panels at once. Currently we offer 20 different reference panels for 26 brands/models.

Your mega macs knows exactly which reference panel to use for which vehicle. It provides this information before you start the calibration procedure.



Many rear and all-round vision camera systems also require calibration

Instead of supplying long-range, high-resolution images, the small cameras in the rear, the exterior mirrors and in the lower front part of the vehicle provide reliable, seamless representations of the immediate surroundings.

MAKING THE INVISIBLE VISIBLE – AND WITHOUT GAPS PLEASE.

There are very few new vehicles which do not at least have a rear camera to assist the driver in manoeuvring. A video camera, usually located in the recessed grip of the liftgate, makes it possible. However, the all-round vision obtained by several small video cameras offers far more assistance functions.

A typical all-round vision camera system consists of four cameras with a wide detection angle. The pictures they deliver are used to assemble a seamless all-round representation of the vehicle surroundings. This provides the data required by systems like the crossing traffic assist, the parking assist, the exit warning, the lane change assistant and the traffic jam assistant. When calibrating these cameras, the exact positioning of the tool in relation to the vehicle is vital.



UNIVERSAL REAR CAM KIT I – BASIC PROFILE AND REAR CAM KIT II – SIDE

In the **Rear Cam Kit I – Basic Profile**, we have combined a universal frame made from aluminium profiles and interchangeable reference panels. With this system, you can presently calibrate the rear cameras of vehicles from Mercedes-Benz, Nissan and brands of the Volkswagen Group. Moreover, the vertical reference panels of the optional **Rear Cam Kit I – Addition Profile** can be attached to the aluminium frame. It is required for calibrating the all-round vision cameras of certain models of the Volkswagen Group.

With the **Rear Cam Kit II – Side** and the respective reference mats, you can calibrate the all-round vision camera systems of brands of the Volkswagen Group and Mazda. In concurrence with the wheel clamp modules of the CSC-Tool, markings facilitate the correct alignment in relation to the vehicle. The hard-wearing mats can be rolled up and stored.

Both kits can only be used in connection with the mega macs.

THE CALIBRATION PROCEDURE DIFFERS FROM ONE MANUFACTURER TO ANOTHER.

During calibration, all the relevant cameras are controlled and calibrated so that any blind spots in the 360°-image are eliminated. The reference mats required for calibrating all-round vision and rear cameras vary according to the manufacturer. They are rolled out and placed horizontally beside the vehicle or horizontally/vertically behind the vehicle.

They are available in two sets. Your mega macs knows which kit and which reference mat is required for a particular vehicle and how to position it.

In the video "360° calibration for all assistance systems", you will learn more about the numerous extensions and accessories.



A man with grey hair, wearing a dark polo shirt and dark trousers, is kneeling in a workshop. He is using a yellow tape measure to measure the front grille of a dark-colored car. The tape measure is extended vertically, and he is holding the yellow casing with his right hand and the metal blade with his left hand. The background is a blurred workshop environment. The entire image has a green color overlay.

Precise distance and speed measurements

Based on contactless measurements and by measuring the difference in speed between vehicles, radar and LiDAR sensors provide driver assistance systems with vital information. Unless of course – a sensor doesn't know what it's measuring But this is entirely up to you.

CALIBRATE ALWAYS – ADJUST ONLY SOMETIMES

Radar sensors don't provide colour images. They are specialized in measuring distance. And they have become so good at it that they are able to measure even fast moving objects. This task can only be carried out by a sensor which is perfectly calibrated for this type of measurement. There is a growing necessity for system calibrations with reference to the thrust angle, for example after post-accident repairs, suspension modifications or after simply loosening the lock carrier.

In contrast to older sensor generations, modern long-range radar sensors can often no longer be adjusted mechanically. Small deviations are compensated by the control unit during calibration. Your mega macs knows the manufacturer's specifications which apply to the vehicle you are working on.

77-GHz radar and LiDAR sensors (laser scanners) are used for medium to long-range scanning of the area in front of the vehicle and provide high-resolution images even up to 250 metres. LiDAR sensors are also used for short-distance scanning. To fulfill these functions, manufacturers frequently place a 77-GHz radar sensor just behind the radar-permeable brand emblem. This – or just below – is also the spot where Audi places their high-frequency laser sensors. There is a trend to mount 77-GHz sensors further down and in pairs left and right of the fog lights.

THE RADAR KIT I EVO, ALWAYS INDISPENSABLE.

Whether you are dealing with long-range radar or laser sensors, whether high or low: With the universal system holder of the **Radar KIT I EVO**, you can calibrate the front radar and LiDAR sensors of almost every manufacturer. It can be attached to the CSC-Tool (any model) in a few easy steps and serves as a vertical sliding carriage for the radar reflector called "angular adjustment plate EVO" (included in the kit) or for the optical reference panel for the LiDAR sensor (optional). Thanks to a clever mechanism on the sliding carriage, you can position and lock the reference panel in a jiffy.

THE SECRET OF THE ANGULAR ADJUSTMENT PLATE

The measuring range of a radar sensor depends on the model and is determined by the system control unit. A common procedure consists in reflecting the signal emitted by the radar sensor on a reflector positioned in front of the vehicle and sending it back to the radar. Ideally, the reflected signal is received at the centre of the radar sensor. The reflector has different positioning angles (90° and two reference angles) which is why it is called **angular adjustment plate**. Thanks to this clever tool, you are equipped to work on a large number of brands. However, the exception proves the rule: For front and rear radar sensors on various models of Toyota, Honda and Mazda, the optional **Radar Kit III** with its two conical radar reflectors is used.



ACCESSORIES FOR DIFFERENT SENSOR MODELS

Front radar sensors were first introduced almost 20 years ago as a costly special equipment in luxury cars. Since then, different generations of sensors as well as different sensor types have been developed, all of which could be used in the different models of one single brand. Keeping pace with these developments, the modular system of the CSC-Tool has continuously expanded and can offer a multitude of solutions via different accessories. As always, you can find out from your mega macs which accessories might be required before you start working.

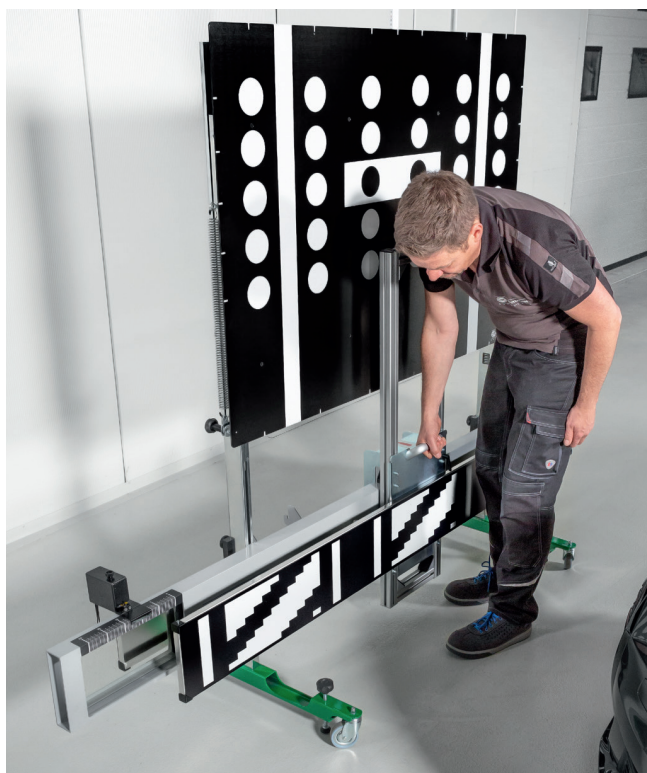
FOR RADAR SENSORS WITH OR WITHOUT MIRROR

Not all radar systems permit the use of their own signal to carry out the calibration and/or adjustment prescribed by the manufacturer. In this case you need an accessory with integrated laser like the **magnet laser**. The laser, which is equipped with scales, adheres to the angular adjustment plate thanks to its electro-magnet. You then point the laser on the small mirror on the radar sensor and read the result on the scales of the magnet laser. You are guided step by step through the procedure by the mega macs. This procedure also works with a sensor without mirror. This applies to some models of Mercedes-Benz. You can solve the problem by using the **Radar Kit II**: A patented vacuum bell with a centering ring for positioning the mirror.

CALIBRATING THE LASER SENSOR

Apart from image processing and radar, LiDAR (light detection and ranging) technology is said to play an important role in autonomous and semi-autonomous assistance systems. But these systems are not yet widely used. However, the sensors also need calibrating. And with the mega macs and the CSC-Tool, you are prepared to work on these sensors – thanks to the vertical system mount of the Kit Radar I EVO and the **corresponding reference panel**.

The functional principle of a LiDAR sensor, aka laser sensor, aka laser scanner (Audi) is similar to that of a radar sensor. But instead of radar waves, the sensor sends out light waves, which are then reflected on the objects they hit. As with radar, the time of flight (TOF) provides information about the distance. However, in contrast to the spherical expansion of radar waves, light waves focus on one point. Thus, when scanning a large area (145°) in front of the vehicle, a laser scanner (Audi) sends out many individual waves in several layers assuming a fan-like shape. The reflecting signals are received and processed by multispectral cameras. This type of image processing is also used for the calibration procedure. Thus, the reference panel, which is wider than a vehicle, looks more like a reference panel for front camera calibration than a reflector for radar.



All-round measurements – a concealed operation

Since 2002, HELLA alone has produced more than 30 million 24-GHz radar sensors. The sensors measure speed, angle and distance. However, most drivers are oblivious to their existence – until an error occurs.

In addition to the information provided by the all-round surveillance systems, the algorithms of new driver assistance systems such as exit warning, parking assist and crossing traffic assist increasingly incorporate distance-related data. Currently, 24-GHz radar sensors are predominantly used for close-range surveillance. With a range of up to 75 metres, they provide important data on speed, angle and distance for blind spot detection and lane change assistant.

24-GHz sensors are usually mounted in various locations, usually in the lower regions on the sides of the vehicle. Since both the emitted waves and the reflected waves can pass through synthetic materials, they are usually mounted out of view behind bumpers, aprons, or lateral parts made from plastic. However, this might not always work, for instance when a bumper was covered with too much filler or with metallic paint.

IS THE RADAR EMITTING?

IF SO, HOW STRONG IS THE SIGNAL?

There is a growing demand for testing and calibrating 24-GHz sensors. For this purpose, we have developed the **radar reflector CSC 4-06**. Just like the radar sensor, the electronic device uses the Doppler effect for both testing and calibrating. To position the device correctly in front of the sensor, you will use elements of the **Rear Cam Kit I Basic and Addition** and simply follow the instruction on your mega macs.



Testing and adjustment tools

CALIBRATION OF CAMERAS AND RADAR SENSORS

ITEM NO.	ARTICLE	DESCRIPTION
8PD 015 269-101	CSC-Tool SE	<p>Camera & Sensor Calibration Tool</p> <p>The CSC-Tool SE consists of a base support, the new cross member with integrated mirrors and the reference panel VAG. Infinitely variable and spring-supported height adjustment of the calibration beam is possible.</p> <p>Scope of delivery:</p> <p>Base support incl. cross member, VAG reference panel, Measuring rod (2000 mm), Mounting kit</p> <p>Required for this</p> <p>Wheel clamp module (set) with line laser (8PZ 015 269-131)</p>
8PZ 015 269-131	Wheel clamp module SE	Wheel clamp module (set) with line laser
8PZ 010 624-001	CSC-Tool Mobile	<p>Camera & Sensor Calibration Tool Mobile</p> <p>Scope of delivery: Mobile base frame, insertable upper frame, calibration beam with extendable mirrors, rod for height measurement (1800 mm), fastening set, wheel clamp module with line laser (2 pcs.), socket spanner, transport box</p>

ACCESSORIES CSC-TOOL SE – FRONT CAMERA

ITEM NO.	ARTICLE	DESCRIPTION
8PZ 010 607-931	Reference panel VAG-Group (incl. in standard delivery content)	CSC 1-01
8PD 010 601-901	Reference panel Mercedes-Benz	CSC 1-02
8PZ 010 607-951	Reference panel Renault	CSC 1-03
8PZ 010 607-961	Reference panel Nissan, Mercedes-Benz	CSC 1-04
8PZ 010 607-971	Reference panel KIA/Hyundai, Opel, Peugeot/Citroën/DS Automobiles/ Fiat/Jeep	CSC 1-05
8PZ 010 607-981	Reference panel Honda	CSC 1-06
8PZ 010 607-991	Reference panel Mazda	CSC 1-07
8PZ 010 611-181	Reference panel Toyota/Lexus	CSC 1-08
8PZ 010 611-451	Reference panel Honda	CSC 1-09
8PZ 010 611-461	Reference panel Subaru	CSC 1-10
8PZ 010 611-471	Reference panel Toyota	CSC 1-11
8PZ 010 611-631	Reference panel Mazda	CSC 1-12
8PZ 010 611-641	Reference panel Toyota/Lexus	CSC 1-13
8PZ 010 611-651	Reference panel Toyota/Lexus	CSC 1-14
8PZ 010 611-831	Reference panel Honda	CSC 1-15
8PZ 010 611-841	Reference panel Fiat/Alfa Romeo	CSC 1-16
8PZ 010 611-881	Reference panel Mitsubishi	CSC 1-17
8PZ 010 611-911	Reference panel Suzuki	CSC 1-18
8PZ 010 611-921	Reference panel Suzuki	CSC 1-19
8PZ 010 611-931	Reference panel Hyundai	CSC 1-20

ACCESSORIES CSC-TOOL MOBILE – FRONT CAMERA

ITEM NO.	ARTICLE	DESCRIPTION
8PZ 010 624-011	Reference panel VAG-Group	CSC M-01
8PZ 010 624-021	Reference panel Mercedes-Benz	CSC M-02
8PZ 010 624-031	Reference panel Renault	CSC M-03
8PZ 010 624-041	Reference panel Nissan, Mercedes-Benz	CSC M-04
8PZ 010 624-051	Reference panel KIA/Hyundai, Opel, Peugeot/Citroën/ DS Automobiles/Fiat/Jeep	CSC M-05
8PZ 010 624-061	Reference panel Honda	CSC M-06
8PZ 010 624-071	Reference panel Mazda	CSC M-07
8PZ 010 624-081	Reference panel Toyota/Lexus	CSC M-08
8PZ 010 624-091	Reference panel Honda	CSC M-09
8PZ 010 624-101	Reference panel Subaru	CSC M-10
8PZ 010 624-111	Reference panel Toyota	CSC M-11
8PZ 010 624-121	Reference panel Mazda	CSC M-12
8PZ 010 624-131	Reference panel Toyota/Lexus	CSC M-13
8PZ 010 624-141	Reference panel Toyota/Lexus	CSC M-14
8PZ 010 624-151	Reference panel Honda	CSC M-15
8PZ 010 624-161	Reference panel Fiat/Alfa Romeo	CSC M-16
8PZ 010 624-171	Reference panel Mitsubishi	CSC M-17
8PZ 010 624-181	Reference panel Suzuki	CSC M-18
8PZ 010 624-191	Reference panel Suzuki	CSC M-19
8PZ 010 624-201	Reference panel Hyundai	CSC M-20

ACCESSORIES CSC-TOOL SE AND CSC-TOOL MOBILE – FRONT CAMERA, RADAR AND LASER

ITEM NO.	ARTICLE	DESCRIPTION
8PZ 010 611-981	Radar Kit I EVO	1x System mount, 1x Angular adjustment plate EVO CSC 4-01
8PZ 010 624-941	Angular adjustment plate EVO	CSC 4-01 EVO (Requirement: item no. 8PZ 010 624-951)
8PZ 010 624-951	System mount	1x System mount
8PZ 010 611-251	Radar Kit II	Basic delivery content: Case, Mirror adjustment device with vacuum bell, Centering ring for vehicles as from 2004, Centering ring for E-Class, Manual vacuum pump, Adjustment tool, Vaseline (CSC 4-03) Manufacturer: Mercedes-Benz (Requirements: CSC 4-01/CSC 4-01 EVO and CSC 4-02)
8PZ 015 269-051	Radar Kit III	1x Radar Reflector CSC 4-04, 1x Radar Reflector CSC 4-05, 1x Base incl. glass-fiber reinforced plastic rod, 1x Laser module, 1x manual (Requirement: Rear Cam Kit I - Basic Profile, CSC-Tool Wheel Clamp module, Positioning aid for Radar Reflector)
8PZ 015 269-061	Positioning aid for Radar Reflector CSC 4-07	Extension for Radar Kit III
8PZ 015 269-001	Positioning aid for Radar Reflector	1x Radar Reflector CSC 4-06, 1x power adapter, 1x manual (Requirement: Rear Cam I Basic Profile, Rear Cam I Basic Target-Kit / CSC 2-01, Rear Cam I Addition Profile)
8PZ 015 269-041	Positioning aid for Radar Reflector	1x Positioning aid for Radar Reflector (Requirement: Rear Cam I Basic Profile, Radar Reflector CSC 4-04 / CSC 4-05)
8PZ 010 611-321	Magnetic Laser	1x Magnetic Laser (CSC 4-02), 1x Case (Requirement: CSC 4-01/CSC 4-01 EVO)
8PZ 010 624-961	Reference panel Laser Sensor	Reference panel CSC 5-01 (Requirement: item no. 8PZ 010 624-951)

Testing and adjustment tools

ACCESSORIES REARVIEW CAMERAS

ITEM NO.	ARTICLE	DESCRIPTION
8PZ 010 611-601	Rear Cam Kit I - Basic Profile	2× Base support (2 pieces), 2× Slide, 2× Tape measure with holder, 4× Mounting bolts, 2× Stabilizing plate (Requirement: Item no. 8PZ 010 611-691 or 8PZ 010 611-971)
8PZ 010 611-691	Rear Cam Kit I - Basic Reference panel set (VAG, Mercedes Benz)	1x VAG reference panel, 1x Mercedes Benz reference panel (CSC 2-01, 2-02) Requirement: Item no. 8PZ 010 611-601)
8PZ 010 611-971	Rear Cam Kit I - Basic Reference panel set (Nissan)	3x Nissan reference panel (CSC 2-03, 2-04, 2-05) (Requirement: Item no. 8PZ 010 611-601)

ACCESSORIES ALL-ROUND VISION CAMERAS

ITEM NO.	ARTICLE	DESCRIPTION
8PZ 010 611-611	Rear Cam Kit I - Addition Profile	2× Reference panel fastening profile, 2× Mounting set for reference panel (Requirement: Item no. 8PZ 010 611-601 and 8PZ 010 611-681)
8PZ 010 611-681	Rear Cam Kit I - Addition reference panel set (VAG)	2x VAG reference panel, (CSC 3-01) (Requirement: Item no. 8PZ 010 611-601, 8PZ 010 611-691 and 8PZ 010 611-611)
8PZ 010 611-621	Rear Cam Kit II - Side VAG reference mat set	2× VAG reference mat CSC 3-02, 4× End rail
8PZ 010 624-931	Rear Cam Kit II - Side Mazda reference mat set	2× Mazda reference mat CSC 3-03, 4× End rail
8PZ 010 624-881	Rear Cam Kit II - Side Opel reference mat	1× Opel reference mat, 2× End rail

VARIOUS ACCESSORIES CSC-TOOL

ITEM NO.	ARTICLE	DESCRIPTION
8PD 010 611-991	Front Camera Levelling Aid	Calibration front camera Volvo
8PD 010 624-991	Front Radar Levelling Aid	Calibration radar sensor Volvo
8PZ 015 269-921	Front Camera Calibration Aid	Calibration front camera KIA / Hyundai
301509	Tape measure holder with tape measure	2x Tape measure, 2x Tape measure holder
8PZ 010 611-411	Wheel Clamp Module Control	1x Wheel Clamp Module Control
8PZ 010 611-381	Protective cover for CSC-Tool	(for CSC-Tool SE only)
8PZ 010 611-231	Mounting set	2x Fixing screw, 2x fixing magnet, 2x fixing washer
8PZ 010 611-901	Measuring rod holder	1x Measuring rod holder (for CSC-Tool Mobile only)
8PZ 010 624-701	Triplex storage box	1x Triplex storage box for 10 mobile reference panels (for CSC-Tool Mobile only)
8PZ 010 624-971	CSC-Tool Mobile Lock Detent Pawl	Lock Detent Pawl (for CSC-Tool Mobile only)
8PZ 010 624-891	System Adapter VAS 6430/6	serves for mounting the original VAG night-vision calibration tool VAS 6430/6 to the Hella Gutmann system mount (Requirement: System Adapter item no. 8PZ 010 624-951)

Calibration to go

The transportable CSC-Tool Mobile – the ideal companion for mobile service providers or workshop associations.

Upon a special request made by international key account customers and car glass specialists, Hella Gutmann has developed a portable ADAS calibration tool – the CSC-Tool Mobile. This portable tool opens new possibilities for mobile service providers, businesses with several sites and for workshop associations. When folded, the CSC-Tool Mobile fits easily into a station wagon or in a small van. The CSC-Tool Mobile comes in a robust wooden box. The box fits neatly into a vehicle and serves as a safe and practical transport box.

The CSC-Tool Mobile offers the same precision as the stationary CSC-Tool SE. But it is much lighter and can be assembled and disassembled by one person in a few easy steps. It consists of three basic elements: a base frame, a top frame, and a horizontal cross member.

The various modules of the CSC-Tool are used for thrust angle alignment and most calibrations. The large-format reference panels for front camera calibration are an exception. These panels were modified for the CSC-Tool Mobile to save space and can now be partly folded.



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