ELECTRONIC CAR?

FUTURE

In autonomous vehicles

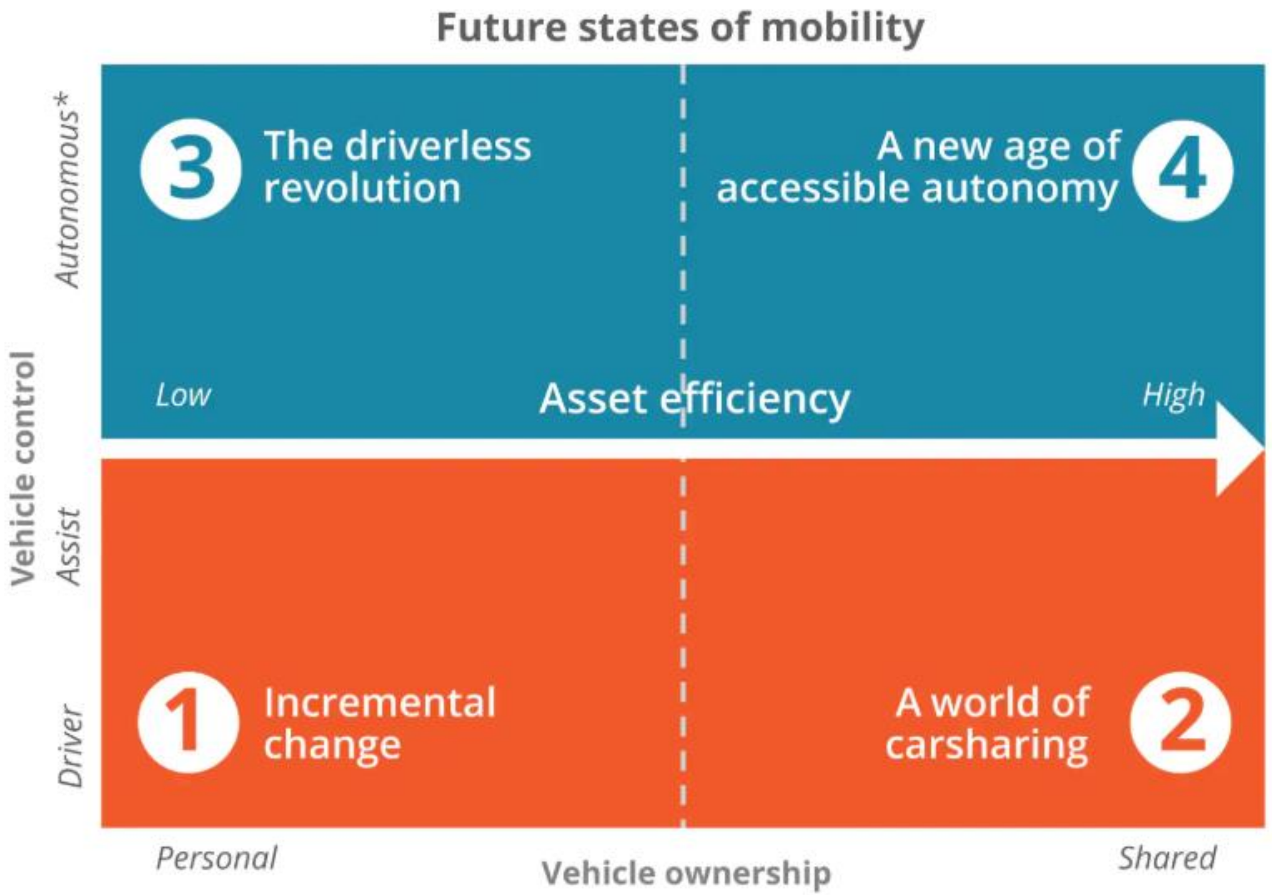
Forces of change: The future of mobility

By Scott Corwin, Derek M. Pankratz

Figure 1. Four potential future states

Extent to which autonomous vehicle technologies become pervasive:

- Depends upon several key factors as catalysts or deterrents—e.g., technology, regulation, social acceptance
- Vehicle technologies will increasingly become "smart"; the human-machine interface shifts toward greater machine control



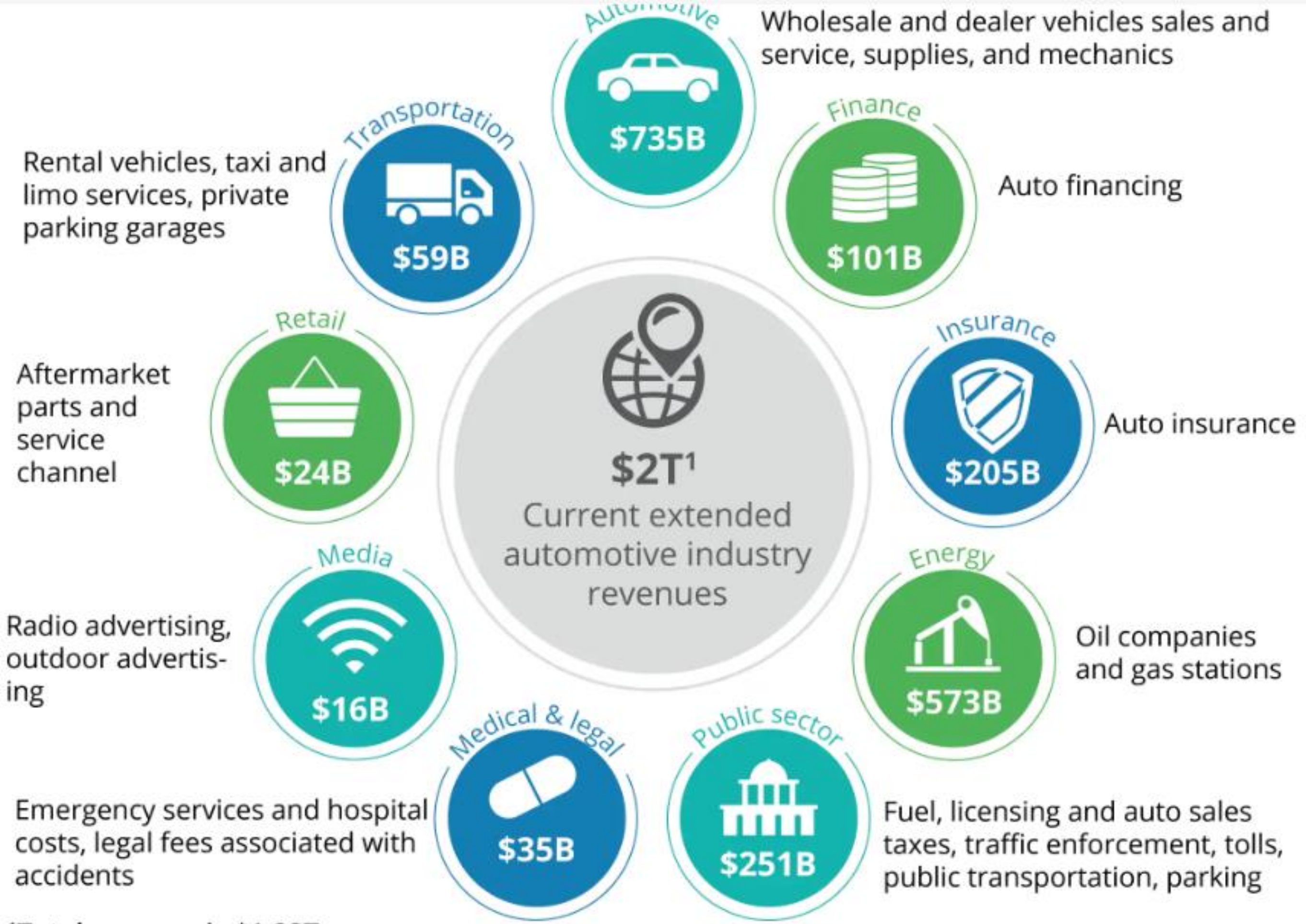
Extent to which vehicles are personally owned or shared:

- Depends upon personal preferences and economics
- Higher degree of shared ownership increases system-wide asset efficiency

INDUSTRY

Forces of change: The future of mobility

By Scott Corwin, Derek M. Pankratz



[1]Total revenue is $1.99T.

Source: Deloitte analysis based on IBISWorld Industry Reports, IHS, DOT, US Census, EIA, Auto News, TechCrunch. Current revenue represents 2014 figures (or earlier if 2014 data not available) in the United States.

Deloitte Insights | deloitte.com/insights

AUTONOMOUS
Farming

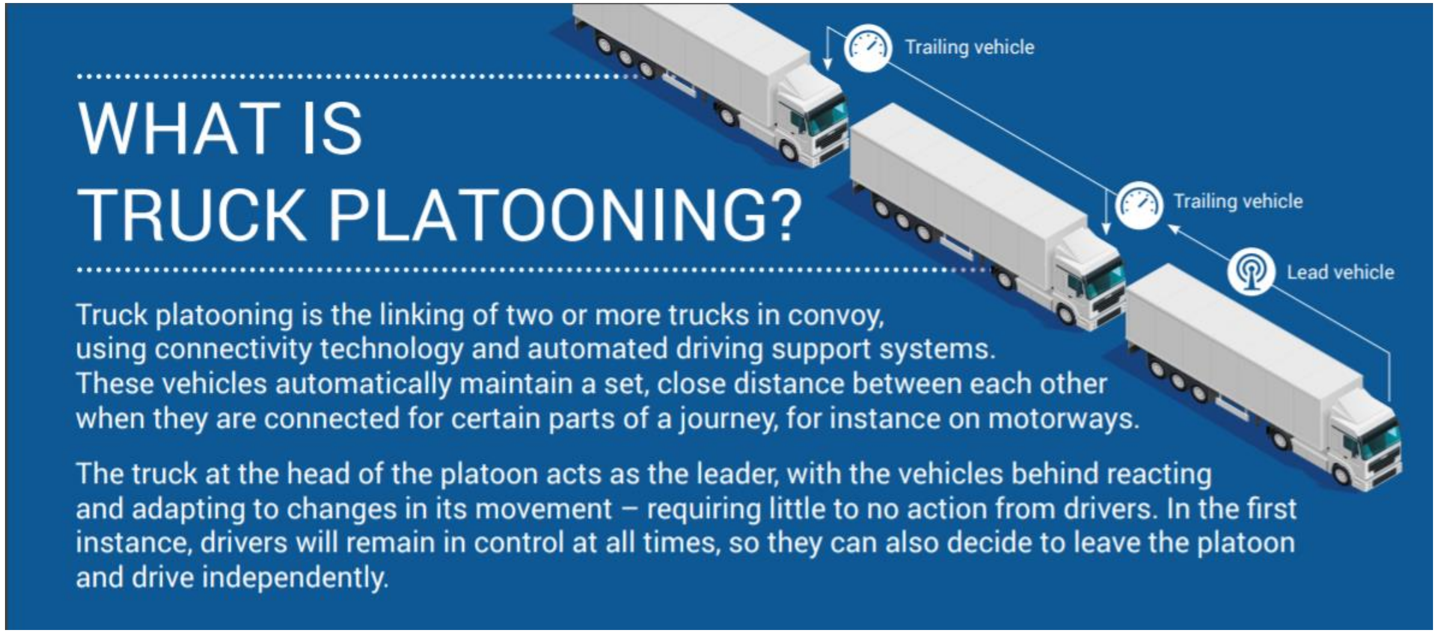
AUTONOMOUS

Air transport

Air Bus A 320

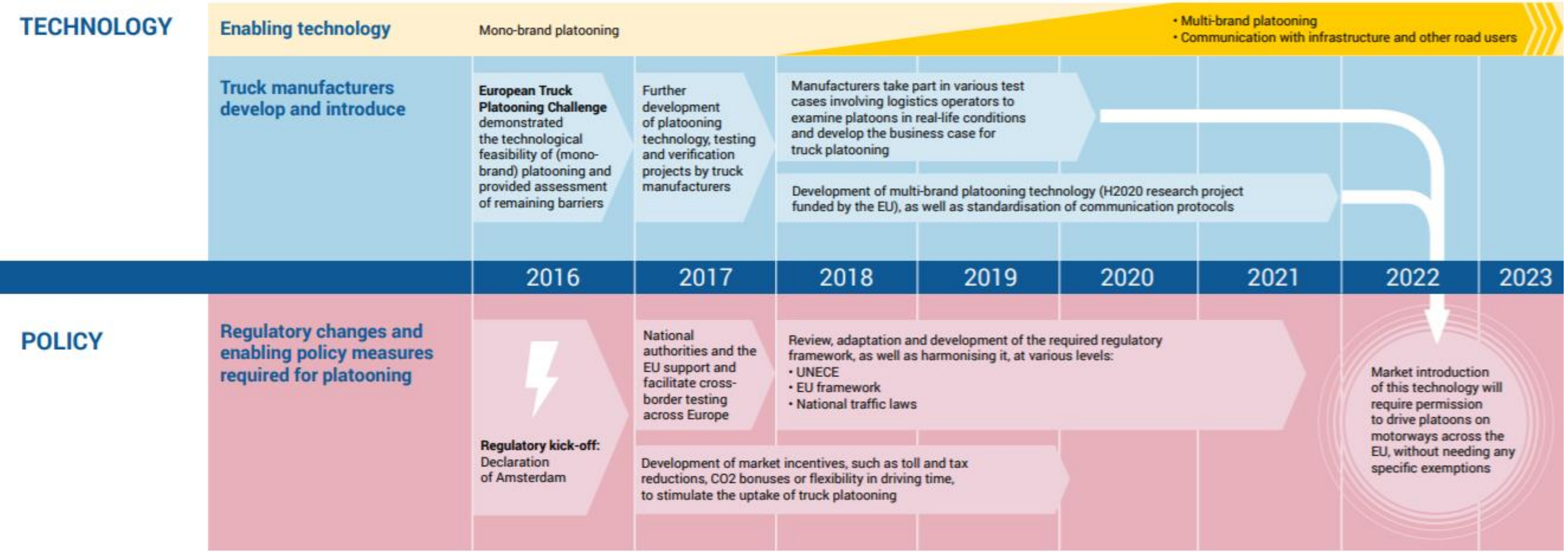
AUTONOMOUS

Truck Platooning



EU ROADMAP FOR TRUCK PLATOONING

This roadmap provides an overview of the steps that are necessary to implement multi-brand platooning (up to SAE level 2) before 2025. It shows when, and under which conditions, truck platooning can be introduced according to Europe's truck manufacturers, provided that certain conditions are met – some of which are beyond the control of the truck industry.



20 INDUSTRIES AUTONOMOUS VEHICLES WILL DISRUPT BY 2025

AUTO REPAIRS

FEWER ACCIDENTS MEANS FEWER TRIPS TO REPAIR SHOP. FURTHERMORE CONNECTED AND MACHINE LEARNING AUTOMOBILES WILL BE MORE LIKE COMPUTERS WHERE ONLINE SUPPORT, HACKS AND TIPS WILL MAKE TRADITIONAL PLAYERS GRADUALLY EXTINCT. THERE IS, HOWEVER, ENOUGH ROOM FOR STARTUPS.

AUTO PARTS

SMART DRIVING AND MACHINE LEARNED SOFTWARE SUCH AS BRAKE-ASSISTS WILL FURTHER ELIMINATE TOOLS&HANDS HELP AS ELECTRONICS CONTROL UPTO 50% OF MANUFACTURING COSTS BY 2030, ACC TO PWC REPORT. ALSO THE AREA OF MANUFACTURERS WILL INCREASINGLY BE CROWDED BY TECH VENDORS (HARDWARE AND SOFTWARE)

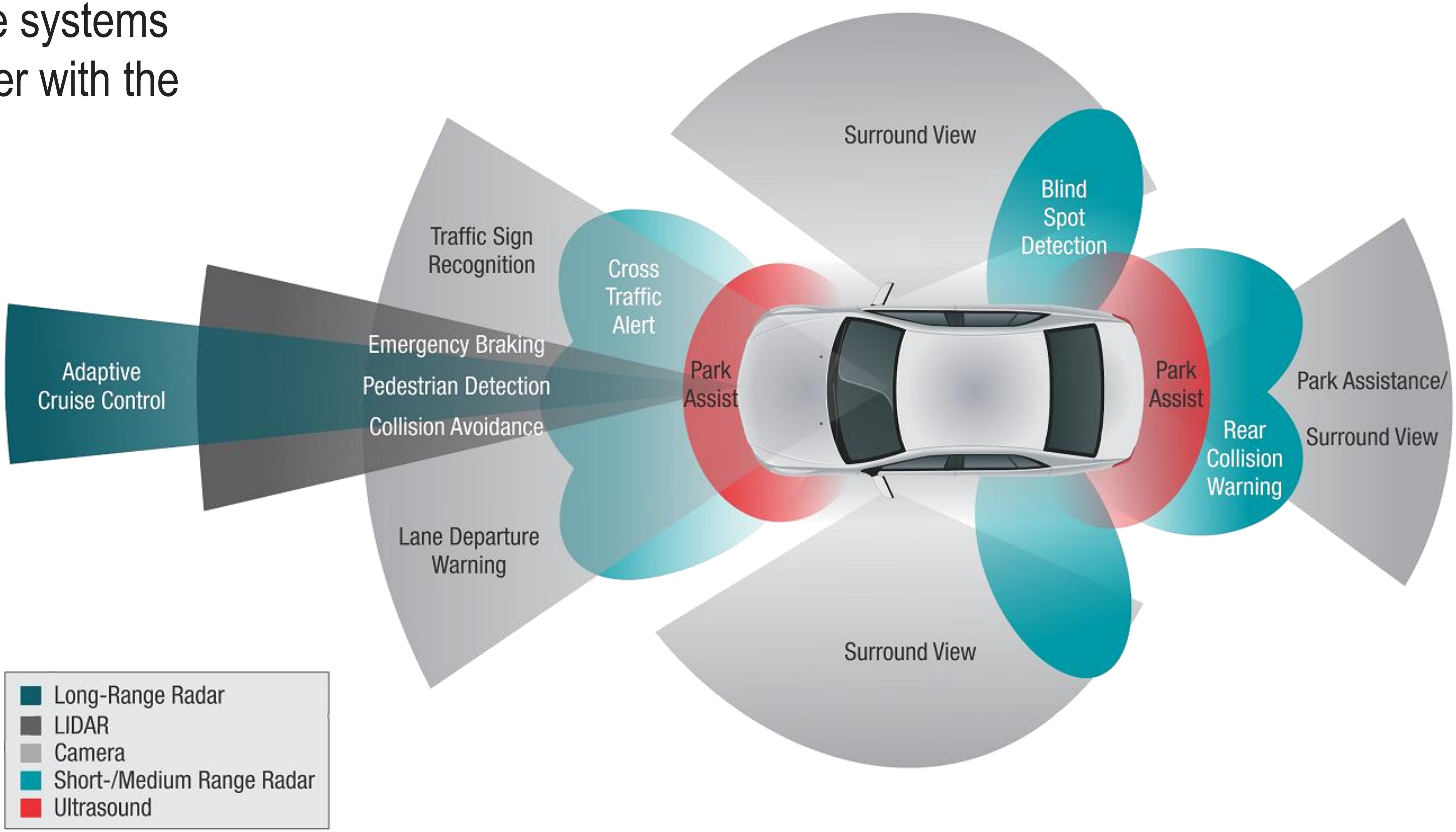
AUTO DEALERSHIPS

DEALERSHIPS ARE ALREADY DECLINING AND WITH NEWER MODELS SUCH AS SUBSCRIPTION AND USAGE MODELS PROMPTING MORE CONSUMERS TO RENT VS MAKE A WHOLESALE PURCHASE.

OIL CHANGE & CAR WASHES

WITH MAINTENANCE BECOMING A SOFTWARE AFFAIR, THESE TOO WILL VANISH WITH THE GAS STATIONS OVER TIME.

ADVANCED DRIVER-ASSISTANCE SYSTEMS, or **ADAS**, are systems designed to help the driver with the driving process.



CURRENT KEY ACTIVE SAFETY SYSTEMS INCLUDE:

ADAS FEATURES IN AUTOMOBILE INDUSTRY

Blind Spot Detection (BSD)
Majorly based on RADAR sensors. However it can be built on LiDAR, Camera and Ultrasonic sensor

Forward / Rear Collision Warning System (FCW & RCW)
Majorly based on RADAR and LiDAR sensors

Autonomous Emergency Braking (AEB)
Majorly based on RADAR and LiDAR sensors

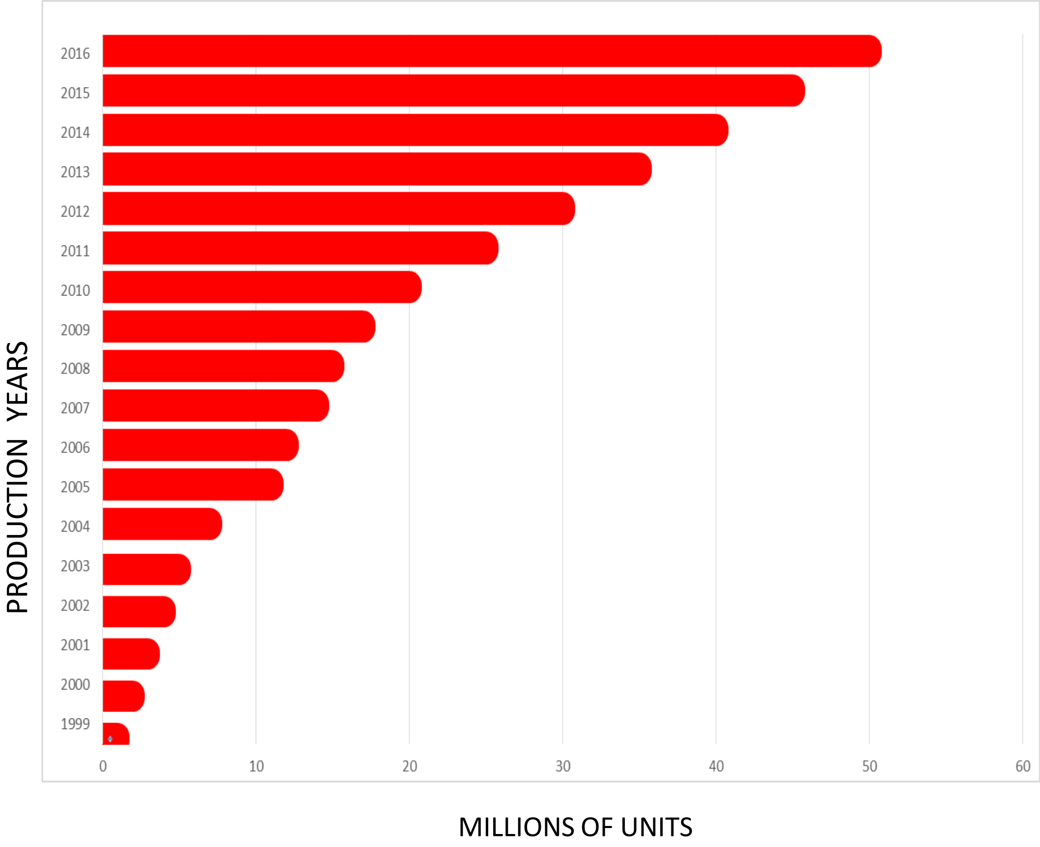
Intelligent Parking Assistance (IPA)
It is based on Camera and Ultrasonic sensor sensors

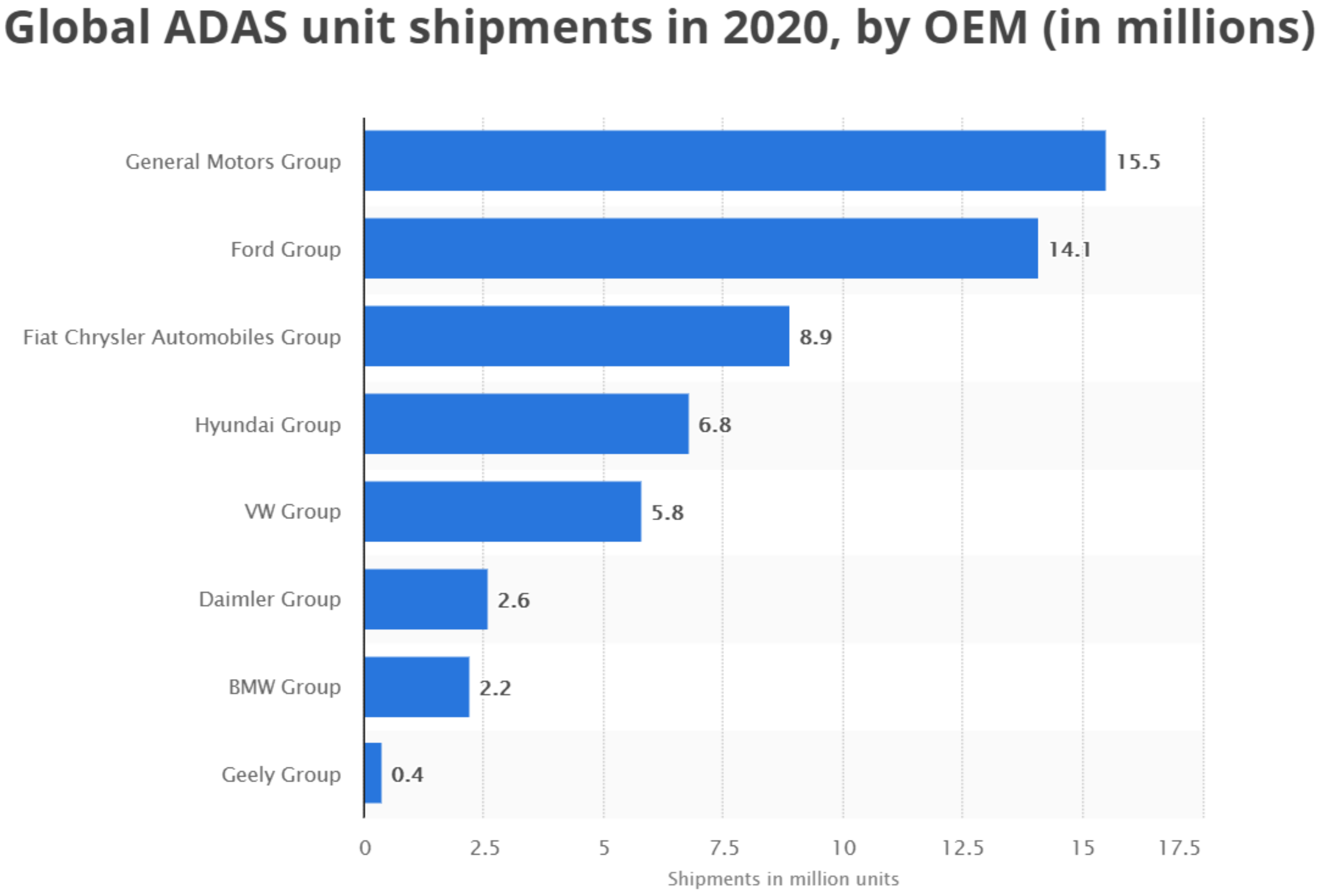
Adaptive Cruise Control (ACC)
Majorly based on RADAR and LiDAR sensors

Cross Traffic Alert (CTA)
Normally based on RADAR sensors. However it can be build on LiDAR and Camera sensors

Lane Change Assist (LCA)
It is build on Camera and LiDAR sensors

MORE VEHICLES WITH MORE SAFETY SYSTEMS





Source: https://www.statista.com/statistics/430012/global-shipments-of-advanced-driver-assistance-systems-by-oem/

1

Driver Assistance

Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.

Level 1 An advanced driver assistance system (ADAS) on the vehicle can sometimes assist the human driver with either steering or braking/accelerating, but not both simultaneously.

2

Partial Automation

Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.

Level 2 An advanced driver assistance system (ADAS) on the vehicle can itself actually control both steering and braking/accelerating simultaneously under some circumstances. The human driver must continue to pay full attention ("monitor the driving environment") at all times and perform the rest of the driving task.

3

Conditional Automation

Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.

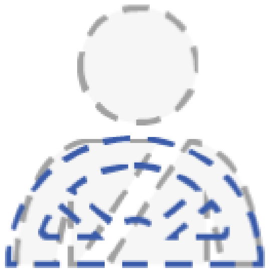
Level 3 An Automated Driving System (ADS) on the vehicle can itself perform all aspects of the driving task under some circumstances. In those circumstances, the human driver must be ready to take back control at any time when the ADS requests the human driver to do so. In all other circumstances, the human driver performs the driving task.

4

High Automation

The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.

Level 4 An Automated Driving System (ADS) on the vehicle can itself perform all driving tasks and monitor the driving environment – essentially, do all the driving – in certain circumstances. The human need not pay attention in those circumstances.



5

Full Automation

The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.

Level 5 An Automated Driving System (ADS) on the vehicle can do all the driving in all circumstances. The human occupants are just passengers and need never be involved in driving.

ADVANCED ALIGNMENT

TERMINOLOGY	EXAMPLE
RESET : restart a program and subroutines or a mechanical device	A GIF plug in | a breaker
RELEARN : re-assign a set of instructions to an electronic component based on circumstances and dynamic activity	A steering angle sensor | a LDW sensor |
CALIBRATION : Set the parameters of a device based on the known precise location of another device	An autonomous cruise control radar or lidar

STATIC

Less common

Static calibrations require:

- Additional space
- Specialized equipment
- May require a drive cycle to confirm the calibration

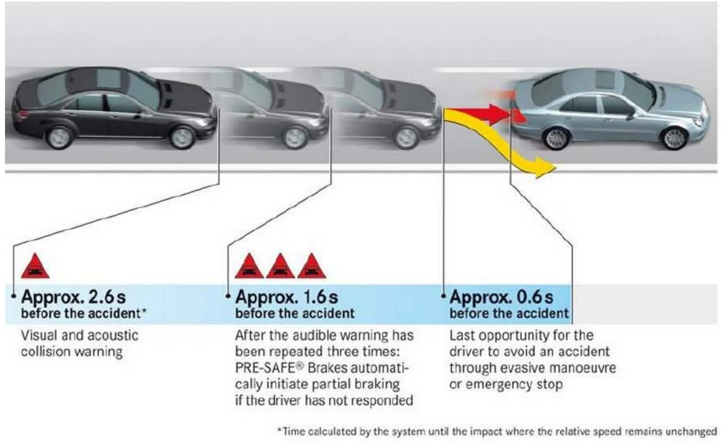
DYNAMIC

Most common

Dynamic calibrations require:

- A drive cycle
- A scan tool
- In some cases, specialized tools

Systems that intervene on behalf of the driver



1

Auto braking | Monitors | Notifies | Reacts by applying the brakes

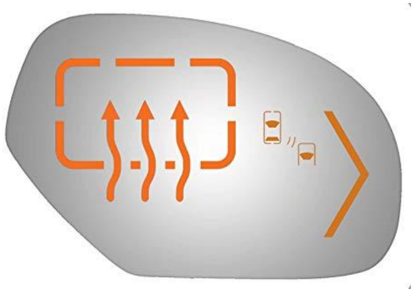
- Is dependent in the straight ahead direction of the vehicle
- The sensors are forward looking

Systems that inform the driver

2

Blind spot | Monitors | Notifies the driver (turns a light on, sounds a chime, vibrate the seat and or steering wheel

- Is not dependent on the straight ahead direction of the vehicle
- The sensors are not forward looking



STATIC SYSTEM

- Fixed calibration set at vehicle factory
- Sensor does not change calibration unless physically altered or damaged
- Changes in vehicle thrust line / alignment, affect system calibration – correcting thrust line will correct the calibration
- Generally requires a diagnostic tool and target(s) or special calibration tool

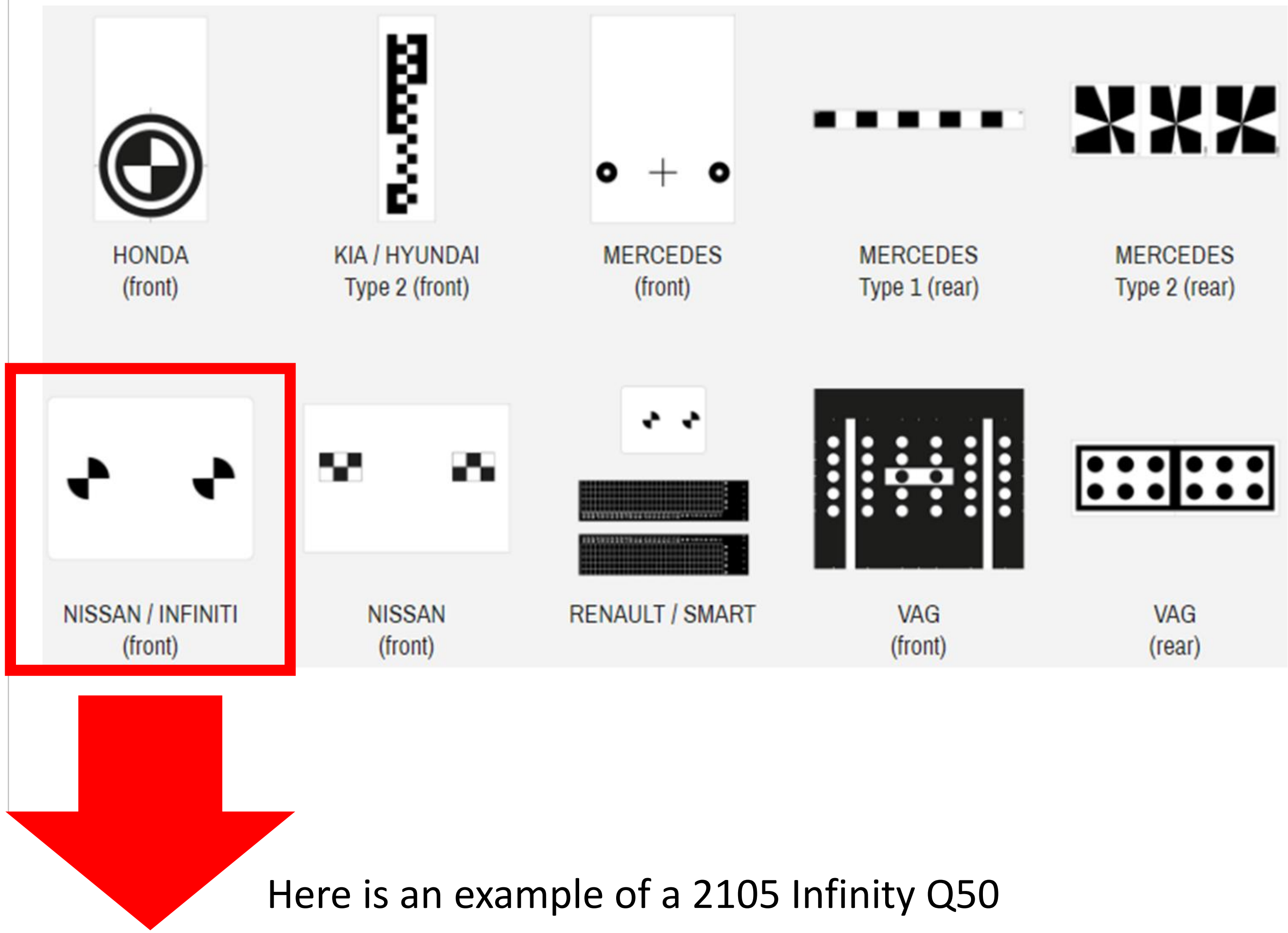
ADAPTIVE SYSTEMS

- Sensors automatically adjusts calibration to accommodate for changes in vehicle thrust line (learns the new position)
- Automatic calibration requires certain drive cycle parameters to be met
- System calibration and validation must be performed when vehicle alignment is changed
- Generally does not require target or special tools

STATIC

Static calibrations require:

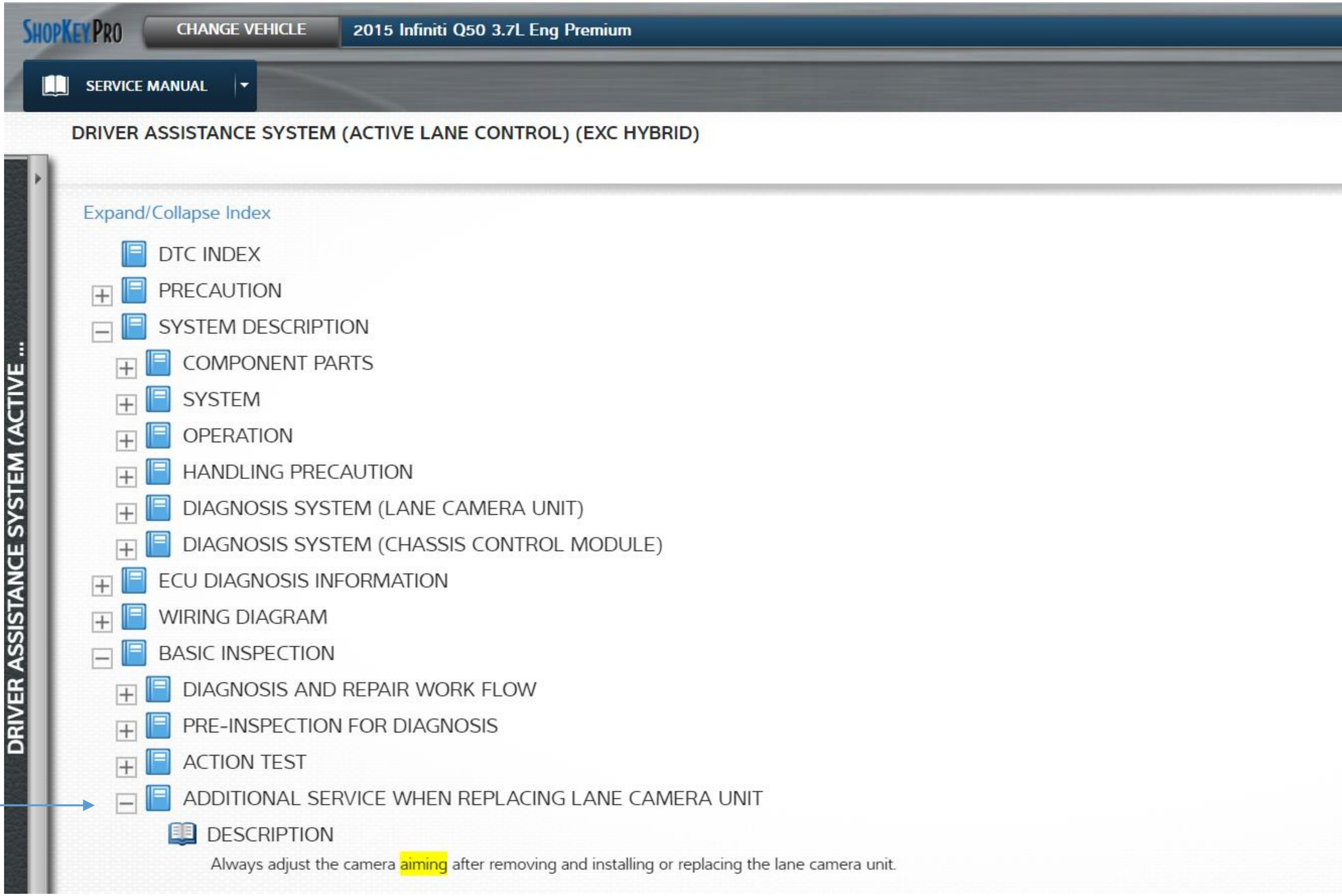
- Additional space
- Specialized equipment
- May require a drive cycle to confirm the calibration
- Often requires a target



Here is an example of a 2105 Infinity Q50

INFINITY Q50

SERVICE INFORMATION WHEN REPLACING A CAMERA



INFINITY Q50

PRINT THE TARGETS

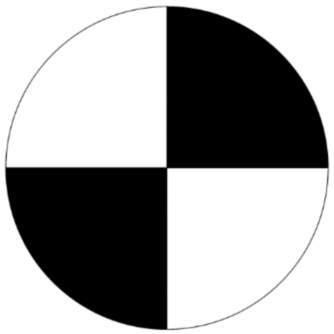
SHOPKEYPRO CHANGE VEHICLE 2015 Infiniti Q50 3.7L Eng Premium

WORK PROCEDURE (TARGET MARK SAMPLE)

WORK PROCEDURE (TARGET MARK SAMPLE)

NOTE: *Print this illustration so that the diameter of the circle is 200 mm (7.87 in).*

Fig 1: Target Mark Sample



Courtesy of NISSAN NORTH AMERICA, INC.

View Full-Screen

ASSEMBLE THE JIG

3. **PREPARATION OF AIMING ADJUSTMENT JIG**

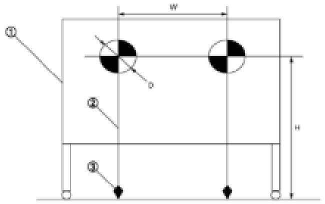
Prepare the aiming adjustment jig according to the following procedure and the figure.

1. Print out the target mark attached in this service information. Refer to WORK PROCEDURE (TARGET MARK SAMPLE) .
2. Stick a printed target mark on the board with a scotch tape or a piece of double-sided tape.

CAUTION:

- *Be sure to measure dimensions correctly and make adjustment jig because the system may not operate normally.*
- *Use the board that peripheral area of the target is monochrome such as a white-board.*
- *Notice that the cross of the target is horizontal and vertical.*
- *Notice that the target board is vertical on the ground.*

Fig 1: Identifying Camera Aiming Adjustment Jig



Courtesy of NISSAN NORTH AMERICA, INC.

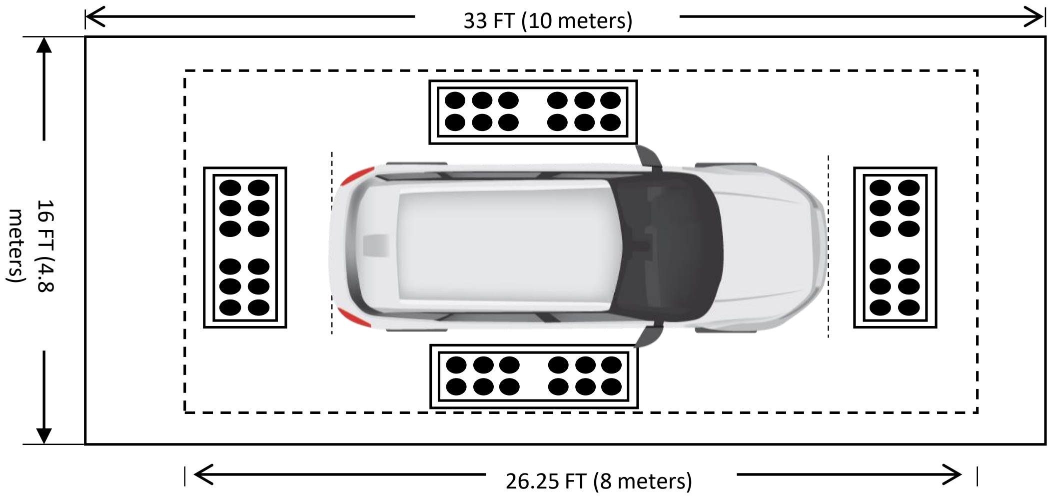
View Full-Screen

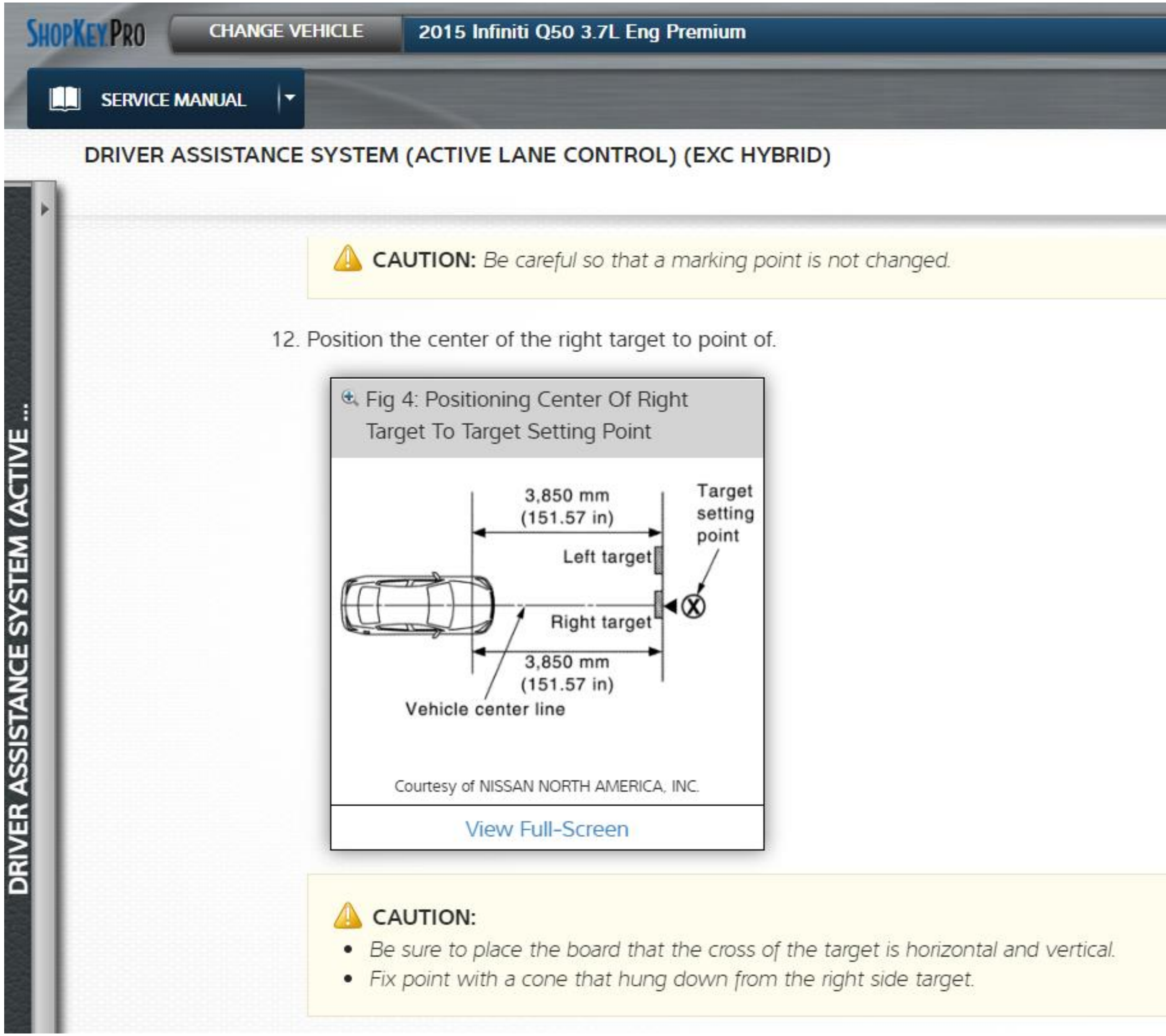
Information available in ShopkeyPro information system

ADAS AREA

Additional space required for ADAS system calibration

This can require additional space in front of the bay as large as 33 feet (10 meters) by 16 feet (5 meters) and demand various clear, level spaces within that rectangle.





DYNAMIC

Dynamic calibrations require:

- A drive cycle
- A scan tool
- In some cases, specialized tools

SHOPKEY PRO | CHANGE VEHICLE | 2015 Chevrolet Colorado 3.6L Eng Z71 | RECALLS/CAMPAIGNS | Contact Us | Settings | Logout

SERVICE MANUAL | SNAP ON EQUIPMENT

LANE DEPARTURE

Navigate easier – Try 1Search Plus | Print

Calibration

The calibration process for the front view camera system is necessary when a front view camera module is replaced by a new one. This process shall not be required when only replacing the windshield and the front view camera module has been mounted again properly. This process shall be completed within 3-5 minutes when the correct driving conditions are met. If conditions are not met, the front view camera module shall continuously run the service point calibration until successfully completed. This process shall work across ignition cycles and shall not be required to be re-initialized at start up. If the Lane Departure Warning Switch is pressed during calibration, the indictor will flash momentarily and then stay out - this is normal operation.

During this time the Lane Departure Warning amber indicator will illuminate.

To calibrate the front camera, operate the vehicle in the following conditions until the calibration is complete:

NOTE: *If the front view camera module calibration is not completed during the current ignition cycle, it will restart in next ignition cycle. "Service Front Camera" will be displayed until successful calibration and DTC B1008 4B may be active. When Lane Departure Warning is on, the indicator is green if Lane Departure Warning is available to warn of a lane departure. If the vehicle crosses a detected lane marking*

TION SYSTEM

CALIBRATION PROCEDURE

Using a scan tool to invoke the calibration procedure

SHOPKEY PRO | CHANGE VEHICLE | 2015 Chevrolet Colorado 3.6L Eng Z71 | RECALLS/CAM

SERVICE MANUAL

OBJECT DETECTION SYSTEM

Calibration Procedure

1. Apply the parking brake.
2. Place the transmission in Park (if applicable)
3. Install scan tool
4. Navigate to the module diagnostics menu
5. Select Frontview Camera Module
6. Select Configuration/ Reset Functions menu Item
7. Select the Frontview Camera Learn procedure and follow the directions displayed on the screen.
8. Drive the vehicle to complete calibration.

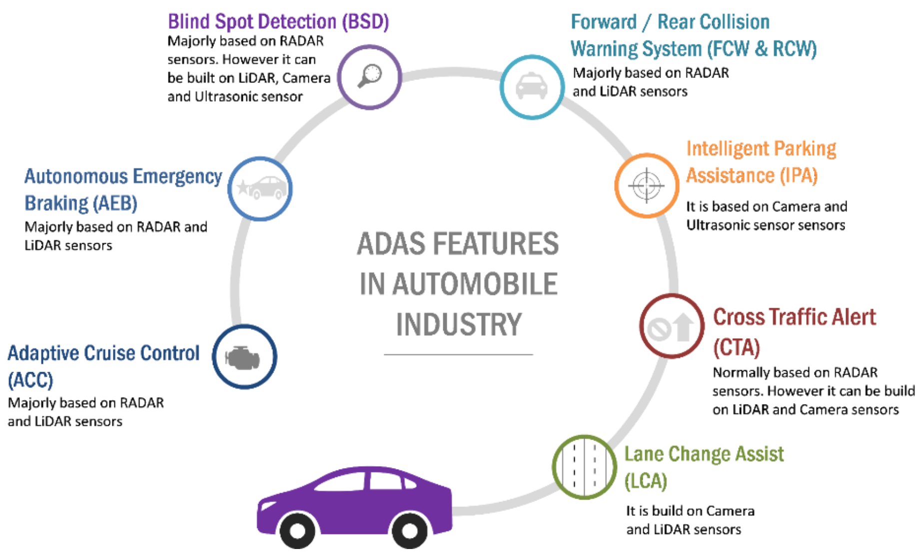
Once the procedure is complete, the amber indicator will turn off. Shortly after the green ready to assist light should turn on as long as all conditions are met for normal operation. The system is then ready to assist.

SYSTEM

ADAS COVERAGE

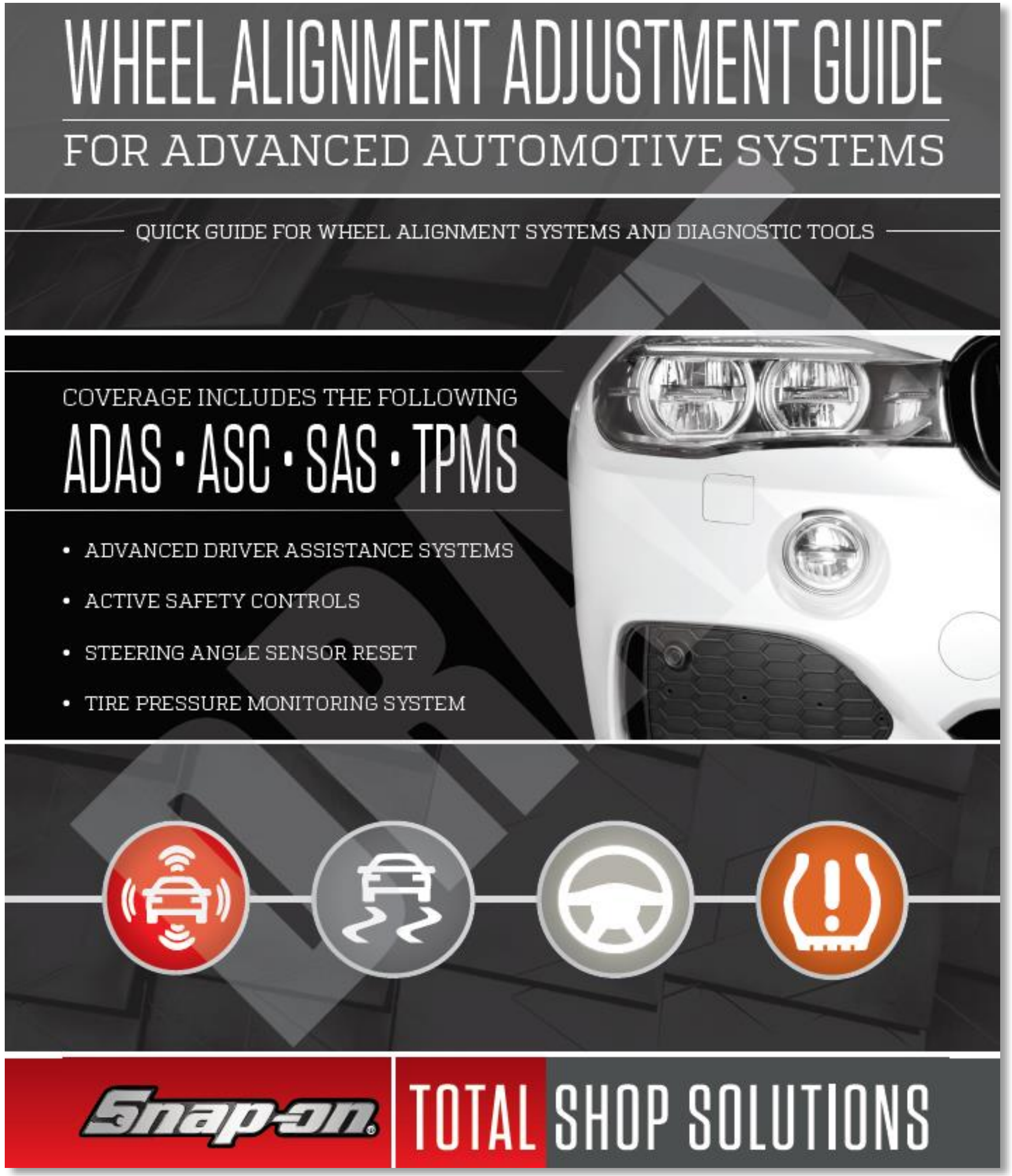
How do you know?

ADVANCED DRIVER ASSIST SYSTEMS GUIDE BOOK



= OVER 4000 VEHICLES

- Make
- Model
- Sub-model
- Platform ID



ADAS

Advanced
Driver
Assist
Systems

THE ELECTRONIC CAR

HOFMANN

COMPREHENSIVE COVERAGE

BMW

Snap-on® Total Shop Solutions
www.tss-snapon.com

	MODEL	YEARS				
6 SERIES	E64	2008	SAS	ASC	ADAS	TPMS
	E64	2009		ASC	ADAS	TPMS
	E63/E64	2010		ASC	ADAS	TPMS
	E63/E64	2011	SAS	ASC	ADAS	TPMS
	F06	2013 - 2014		ASC	ADAS	TPMS
	F06	2015		ASC	ADAS	TPMS
	F12	2016	SAS	ASC	ADAS	TPMS
	F12/F13	2011		ASC	ADAS	TPMS
	F12/F13	2012		ASC	ADAS	TPMS
	F12/F13	2013		ASC	ADAS	TPMS
	F12/F13	2014		ASC	ADAS	TPMS
	F12/F13	2015		ASC	ADAS	TPMS
	F13	2016	SAS	ASC	ADAS	TPMS
7 SERIES	G11/G12	2016		ASC	ADAS	TPMS
	E32	1992 - 1994		ASC		
	E38	1994 - 2000		ASC	ADAS	
	E65	2002 - 2003	SAS	ASC	ADAS	TPMS
	E65	2004 - 2008	SAS	ASC	ADAS	TPMS
	E65	2009		ASC	ADAS	TPMS

	MODEL	YEARS				
7 SERIES	F01	2008		ASC		TPMS
	F01	2009		ASC	ADAS	TPMS
	F01	2008		ASC		TPMS
	F01	2009		ASC	ADAS	TPMS
	F01/F02	2010 - 2013		ASC	ADAS	TPMS
	F01/F02	2014		ASC	ADAS	TPMS
	F01/F02/F04	2015		ASC	ADAS	TPMS
I SERIES	I01	2014		ASC	ADAS	TPMS
	I01	2015	SAS	ASC		TPMS
	I01	2016		ASC	ADAS	TPMS
	I12	2014		ASC	ADAS	TPMS
	I12	2015	SAS	ASC		TPMS
	I12	2016		ASC	ADAS	TPMS
8	E31	1992 - 1997		ASC		
X1	E84	2010 - 2012	SAS	ASC	ADAS	TPMS
	E84	2013	SAS	ASC	ADAS	TPMS
	E84	2014	SAS	ASC	ADAS	TPMS
	E84	2015	SAS	ASC	ADAS	TPMS
	F48	2016	SAS	ASC	ADAS	TPMS

VEHICLE SPECIFIC

Coverage example

MERCEDES-BENZ

Snap-on® Total Shop Solutions
www.tss-snapon.com

MODEL	YEARS				
190 CLASS	1992 - 1996				
A CLASS 169	2012 - 2014		ASC		
A CLASS 176	2015	SAS	ASC	ADAS	TPMS
B CLASS 242	2014		ASC		
B CLASS 242	2015		ASC		
B CLASS 242	2016		ASC		
B CLASS 245	2006 - 2010		ASC		
B CLASS 245	2011 - 2012		ASC		
B CLASS 245	2013		ASC		
B CLASS 246	2013	SAS	ASC	ADAS	TPMS
B CLASS 246	2014	SAS	ASC	ADAS	TPMS
B CLASS 246	2015	SAS	ASC	ADAS	TPMS
C CLASS 202	1993 - 1997		ASC		
C CLASS 202	1998 - 2000		ASC		
C CLASS 203	2000				
C CLASS 203	2001 - 2002		ASC		

MODEL	YEARS				
C CLASS 204	2007		ASC	ADAS	
C CLASS 204	2008 - 2009		ASC	ADAS	TPMS
C CLASS 204	2010		ASC	ADAS	TPMS
C CLASS 204	2011		ASC	ADAS	TPMS
C CLASS 204	2012	SAS	ASC	ADAS	TPMS
C CLASS 204	2013	SAS	ASC	ADAS	TPMS
C CLASS 204	2014	SAS	ASC	ADAS	TPMS
C CLASS 204	2015	SAS	ASC	ADAS	TPMS
C CLASS 204	2016	SAS	ASC	ADAS	TPMS
C CLASS 205	2015	SAS	ASC	ADAS	TPMS
C CLASS 205	2016	SAS	ASC	ADAS	TPMS
CL CLASS 215	1999			ADAS	
CL CLASS 215	2000 - 2006		ASC	ADAS	TPMS
CL CLASS 216	2007	SAS	ASC	ADAS	TPMS
CL CLASS 216	2008 - 2010	SAS	ASC	ADAS	TPMS
CL CLASS 216	2011 - 2012	SAS	ASC	ADAS	TPMS

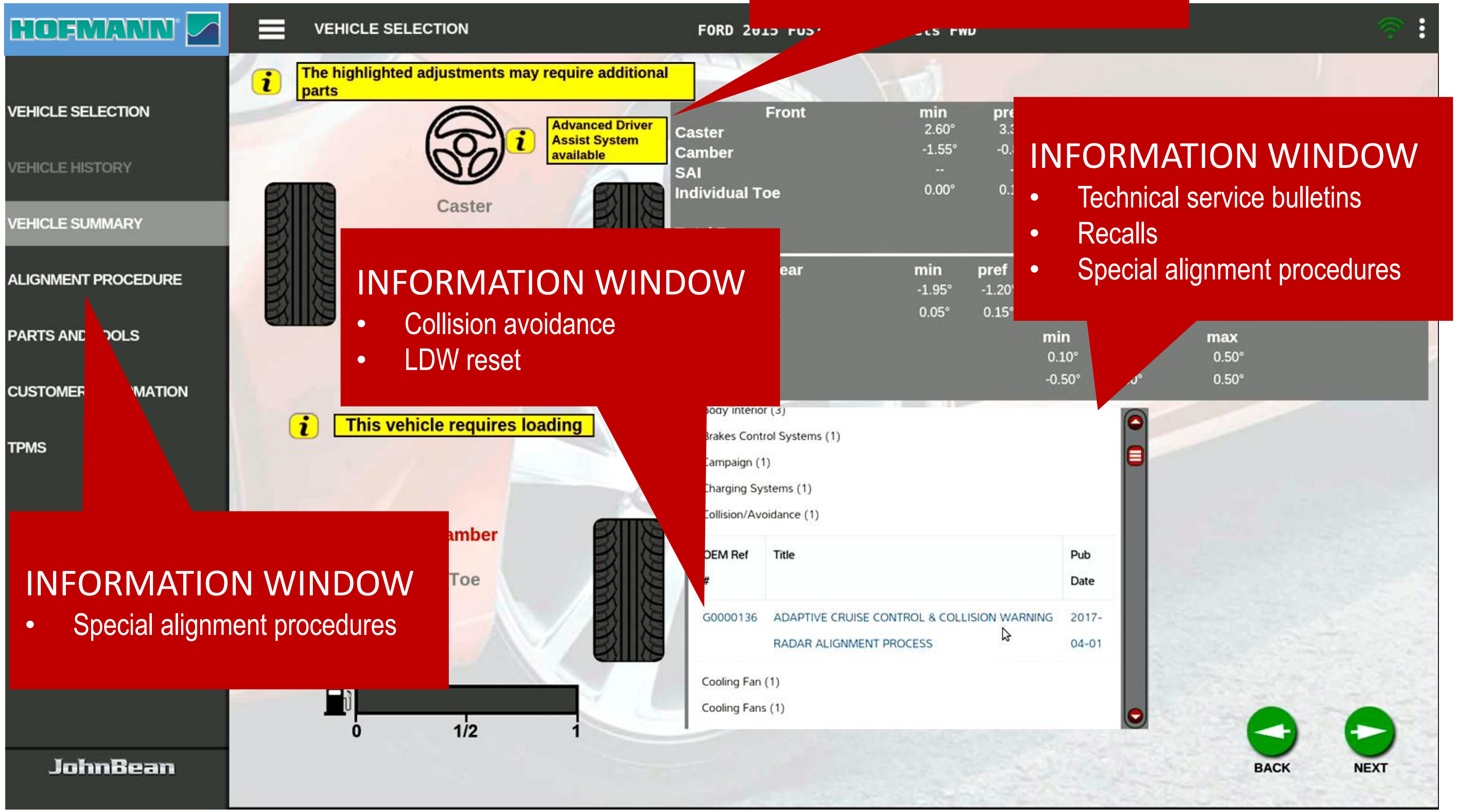
SNAP-ON SCAN TOOLS DO HAVE COVERAGE FOR MB VEHICLES

THE TECHNICIAN NEEDS TO KNOW A LOT MORE ABOUT THE VEHICLE TODAY THAN HE DID 10 YEARS AGO

ADAS (Vehicle Specific OEM information)

ADAS Procedures

- ADAS vehicle specific systems notification
- The information window contains OEM vehicle specific information on ADAS procedures



INFORMATION WINDOW
- ADAS systems notification

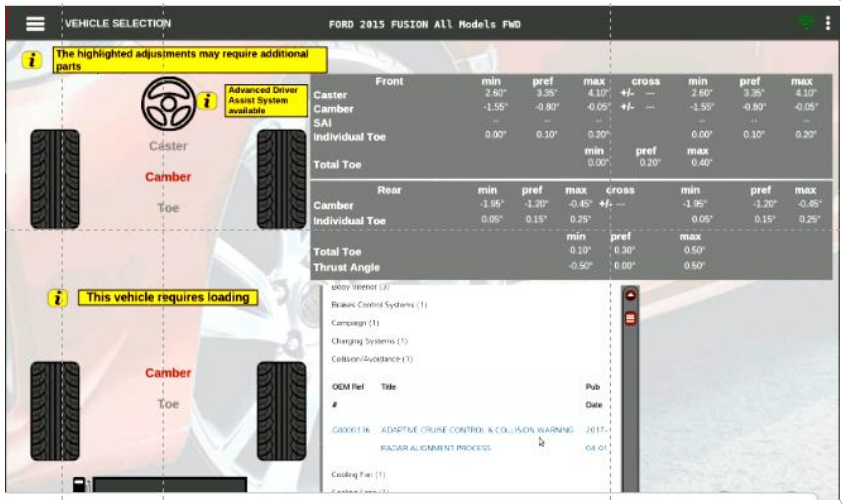
INFORMATION WINDOW
- Technical service bulletins
- Recalls
- Special alignment procedures

INFORMATION WINDOW
- Collision avoidance
- LDW reset

INFORMATION WINDOW
- Special alignment procedures

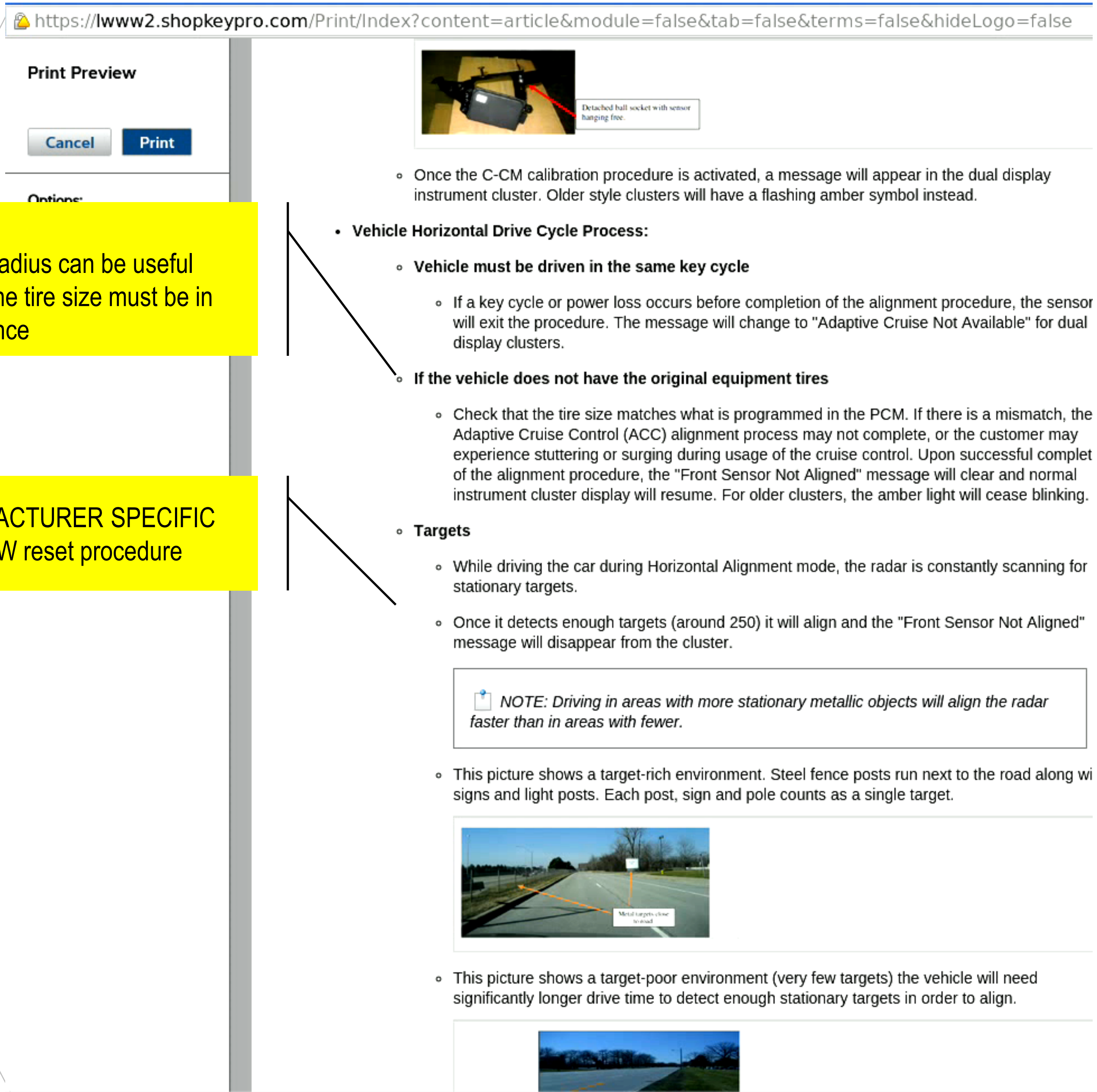
ADAS

Vehicle Specific OEM information | ShopkeyPro



NOTE:
Rolling radius can be useful here. The tire size must be in compliance

MANUFACTURER SPECIFIC
- LDW reset procedure


https://lwww2.shopkeypro.com/Print/Index?content=article&module=false&tab=false&terms=false&hideLogo=false

Print Preview

Cancel Print

Options:

Detached ball socket with sensor hanging free.

- Once the C-CM calibration procedure is activated, a message will appear in the dual display instrument cluster. Older style clusters will have a flashing amber symbol instead.

- **Vehicle Horizontal Drive Cycle Process:**
  - **Vehicle must be driven in the same key cycle**
    - If a key cycle or power loss occurs before completion of the alignment procedure, the sensor will exit the procedure. The message will change to "Adaptive Cruise Not Available" for dual display clusters.
  - **If the vehicle does not have the original equipment tires**
    - Check that the tire size matches what is programmed in the PCM. If there is a mismatch, the Adaptive Cruise Control (ACC) alignment process may not complete, or the customer may experience stuttering or surging during usage of the cruise control. Upon successful complet of the alignment procedure, the "Front Sensor Not Aligned" message will clear and normal instrument cluster display will resume. For older clusters, the amber light will cease blinking.
  - **Targets**
    - While driving the car during Horizontal Alignment mode, the radar is constantly scanning for stationary targets.
    - Once it detects enough targets (around 250) it will align and the "Front Sensor Not Aligned" message will disappear from the cluster.

      NOTE: Driving in areas with more stationary metallic objects will align the radar faster than in areas with fewer.

    - This picture shows a target-rich environment. Steel fence posts run next to the road along wi signs and light posts. Each post, sign and pole counts as a single target.

      Metal targets close to road

    - This picture shows a target-poor environment (very few targets) the vehicle will need significantly longer drive time to detect enough stationary targets in order to align.

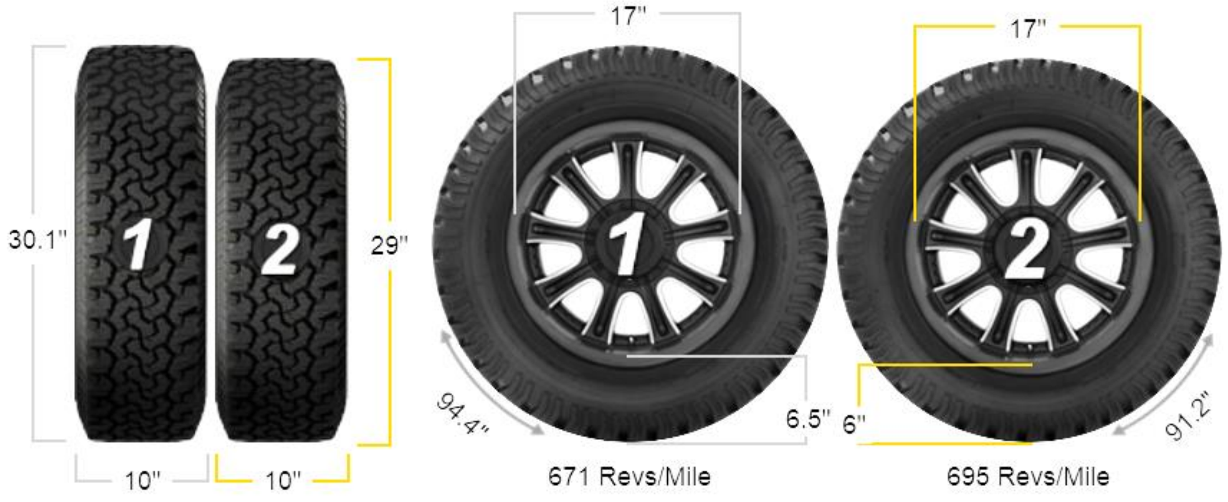
DIAGNOSTIC TOOL

- SYSTEM DATA AND PROCEDURES
- BI-DIRECTIONAL COMMUNICATION
- DRIVE CYCLE TEST
- ADAS RESET PROCEDURES
- ONE-TOUCH FULL VEHICLE CODE SCAN & CLEAR

ADVANCED FEATURES

ROLLING RADIUS

AWD (All Wheel Drive)



THE PROBLEM

Size does matter, here is the difference between the two tires.

- 1 is a 255 65 R17
- 2 is a 255 60 R17

The difference equates to 24 revolutions per mile

- DETECTS WEAR DIFFERENCES AS LOW AS 1%

Speedometer Error

(Set Size1 to OEM Size)

Reading	20 mph	30 mph	40 mph	50 mph	60 mph	70 mph	80 mph	90 mph
Actual	19.3	28.9	38.5	48.2	57.8	67.4	77.1	86.7

Negative effect on vehicle speed sensor Vehicle speed sensors are important to ADAS and ABS functionality.

ROLLING RADIUS

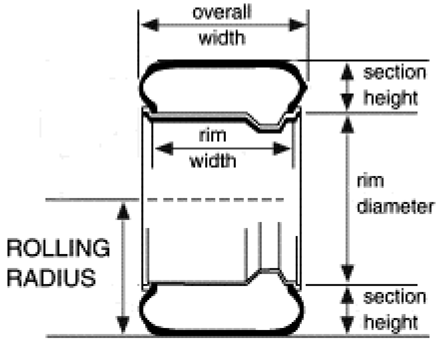
Patented and exclusive feature

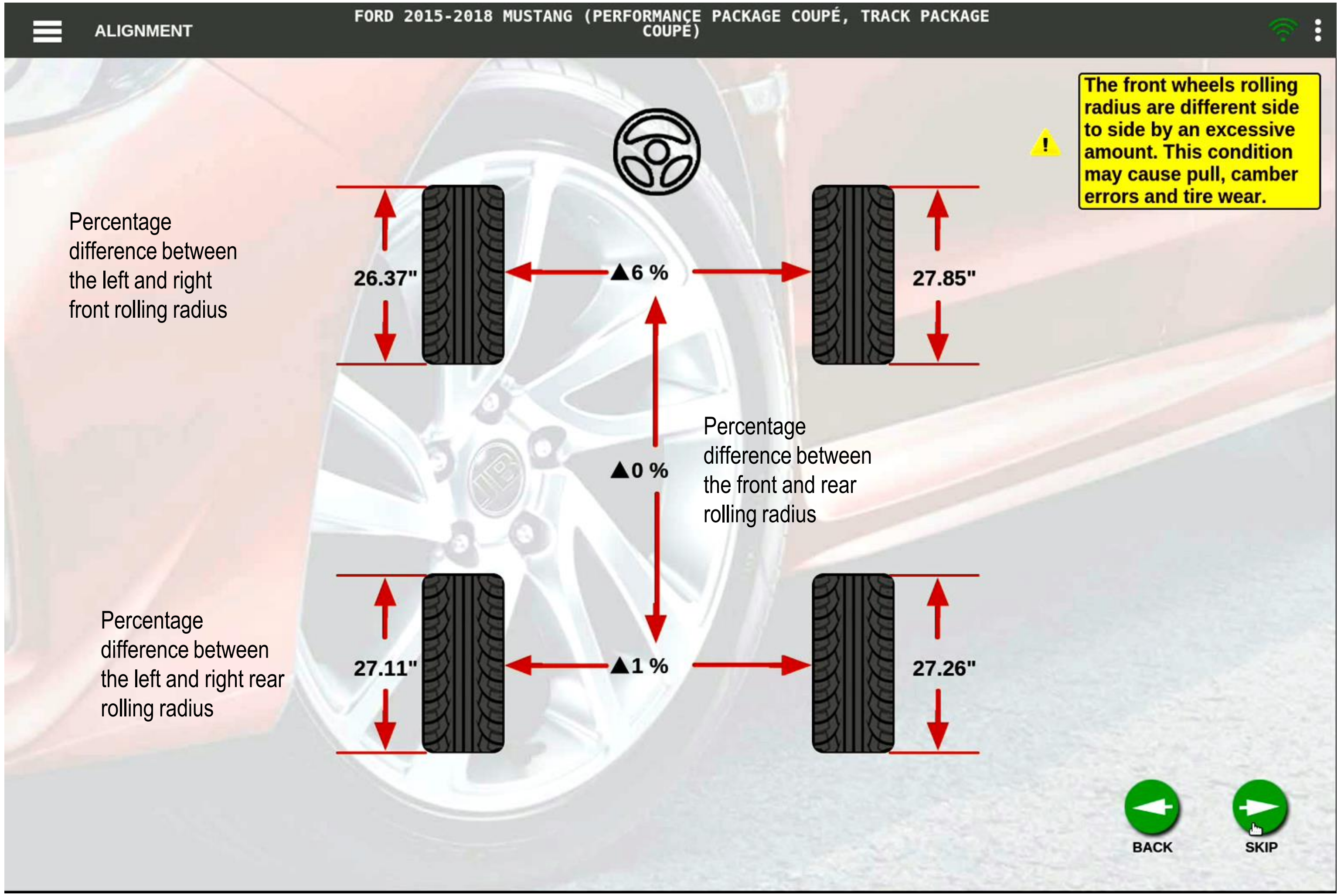
HOW IT WORKS

The alignment equipment measures the rolling radius of each tire during the compensation procedure

An error message will appear if the difference is too great

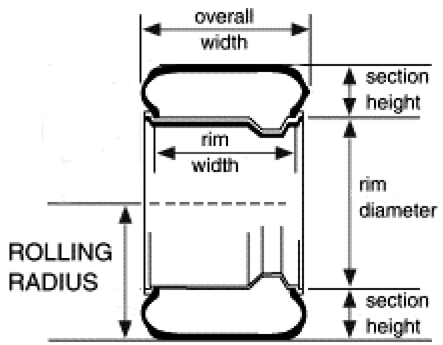
Although the tires might be "of the same size" the circumference is what really counts





WHAT IS THE SPEC FOR ROLLING RADIUS BIAS?

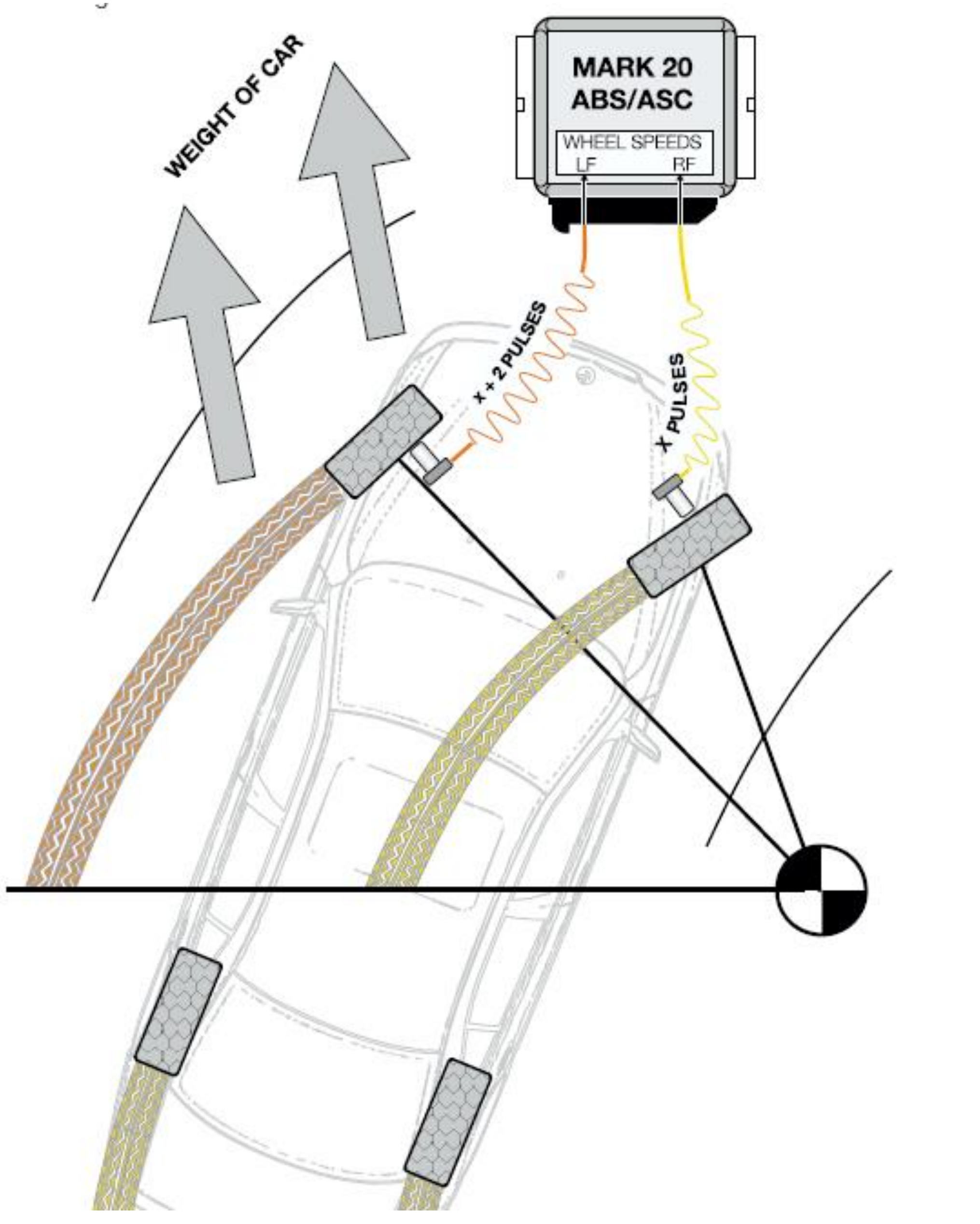
Here are some examples :



Audi	As published in their vehicle owner's manual, "rolling radius of all 4 tires must remain the same" or within 4/32-inch of each other in remaining tread depth.
Porsche	Cayenne within 30% of the other tire on the same axle's remaining tread wear.
Nissan	GT-R when replacing less than four (4) tires, each tire continuing in service must have at least 6/32 inch (5 mm) of remaining tread depth.
Subaru	Within 1/4-inch of tire circumference or about 2/32-inch of each other in remaining tread depth.

How does the ESC computer determine the actual path ?

The wheel speed sensors provide the actual direction of the vehicle along with the yaw sensor



CODE SCAN (BLUEPRINTING THE VEHICLE)

Code scanning using a scan tool
Electromechanical power steering controller scan
Chrysler position statement on scan tool and scanning
EPMS controller data illustration

POSITION STATEMENT

Vehicle manufacturers are issuing position statements

ANY of the following conditions could trigger DTCs prior to or during collision repairs, which could result in improper vehicle performance:

- Vehicle is involved in an accident or collision, even though the damage may appear minor
- Vehicle has been in an accident with or without air bag deployment
- Voltage loss, including battery disconnects and hybrid battery disabling
- Significant vehicle disassembly including, but not limited to, bumpers, door handles, headlamps and mirrors
- Interior trim repair or removal
- Glass removal and replacement operations

Any repairs performed without using Mopar parts and not following published repair guidelines and procedures, may expose current or future vehicle owners and occupants to unnecessary risk.

If faults were stored in the DTC memory for any safety or security system, then these systems MUST be serviced according to the repair procedures in Service Information. After performing repairs, recheck the system to determine if any active or stored DTCs remain; if so, take appropriate service action to ensure proper function.

MOPAR.
At your service

SCAN TOOL POSITION STATEMENT

FCA US LLC vehicles, systems and components are engineered, tested and manufactured to help protect vehicle occupants. They are engineered to meet or exceed both government mandated and internal corporate requirements relative to durability, NVH (noise vibration and harshness) and vehicle safety. Use of the Mopar® wiTECH vehicle diagnostic tester (Mopar Scan Tool) is an important part of FCA US vehicle service and maintenance. This tool contains software that aftermarket tools may not contain and can assess whether any FCA US vehicle's safety and security systems contain active or stored Diagnostic Trouble Codes (DTCs).

Safety and security related systems, such as antilock brakes, supplemental restraint systems (SRS - air bags), occupant restraint controller (ORC), seat belts, active head restraints, forward facing camera and radar, blind spot monitoring, and other automated electronic driver assistance systems, MUST be tested for fault codes (DTCs) that could be active (current) or stored following a collision. Use of the Mopar wiTECH vehicle diagnostic tester is necessary before and after collision repair.

ANY of the following conditions could trigger DTCs prior to or during collision repairs, which could result in improper vehicle performance:

- Vehicle is involved in an accident or collision, even though the damage may appear minor
- Vehicle has been in an accident with or without air bag deployment
- Voltage loss, including battery disconnects and hybrid battery disabling
- Significant vehicle disassembly including, but not limited to, bumpers, door handles, headlamps and mirrors
- Interior trim repair or removal
- Glass removal and replacement operations

Any repairs performed without using Mopar parts and not following published repair guidelines and procedures, may expose current or future vehicle owners and occupants to unnecessary risk.

If faults were stored in the DTC memory for any safety or security system, then these systems MUST be serviced according to the repair procedures in Service Information. After performing repairs, recheck the system to determine if any active or stored DTCs remain; if so, take appropriate service action to ensure proper function.

SRS AIR BAG SQUIB STATUS

Multistage air bags with multiple initiators (squibs) MUST be checked to determine that all squibs were used during the deployment event. The Driver Air Bag (DAB) and Passenger Air Bag (PAB) are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver or passenger squib circuits (up to 3) to the initiators in the air bag inflators. Typically, all initiators are exhausted and all potentially hazardous chemicals are burned during an air bag deployment event.

However, it is possible for only one initiator to be exhausted; therefore, you MUST always confirm that all initiators have been cycled to minimize the risk of improper handling or disposal of potentially live pyrotechnic or hazardous materials. This procedure must be performed using the Mopar wiTECH diagnostic scan tool or at a company such as Collision Diagnostic Services that diagnostically remotely scans the vehicle using FCA US scan tools in conjunction with their patented asTech device, to verify the status of all air bag squibs, prior to removing deployed air bags from the vehicle for disposal.

- Service Information can be obtained at www.oem1stop.com
- Mopar wiTECH scan tools can be purchased from https://mopar.snapon.com

CHRYSLER DODGE FIAT Jeep RAM SRT

POSITION STATEMENT

Vehicle manufacturers are issuing position statements

MOPAR. At your service.

SCAN TOOL POSITION STATEMENT

FCA US LLC vehicles, systems and components are engineered, tested and manufactured to help protect vehicle occupants. They are engineered to meet or exceed both government mandated and internal corporate requirements relative to durability, NVH (noise vibration and harshness) and vehicle safety. Use of the Mopar® wiTECH vehicle diagnostic tester (Mopar Scan Tool) is an important part of FCA US vehicle service and maintenance. This tool contains software that aftermarket tools may not contain and can detect whether any FCA US vehicle's safety and security systems contain active or stored Diagnostic Trouble Codes (DTCs).

Safety and security related systems, such as antilock brakes, supplemental restraint systems (SRS - air bags), occupant restraint controller (ORC), seat belts, active head restraints, forward facing camera and radar, blind spot monitoring, and other automated electronic driver assistance systems, MUST be tested for fault codes (DTCs) that could be active (current) or stored following a collision. Use of the Mopar wiTECH vehicle diagnostic tester is necessary before and after collision repair.

ANY of the following conditions could trigger DTCs prior to or during collision repairs, which could result in improper vehicle performance:

- Vehicle is involved in an accident or collision, even though the damage may appear minor
- Vehicle has been in an accident with or without air bag deployment
- Voltage loss, including battery disconnects and hybrid battery disabling
- Significant vehicle disassembly including, but not limited to, bumpers, door handles, headlamps and mirrors
- Interior trim repair or removal
- Glass removal and replacement operations

Any repairs performed without using Mopar parts and not following published repair guidelines and procedures, may expose current or future vehicle owners and occupants to unnecessary risk.

If faults were stored in the DTC memory for any safety or security system, then these systems MUST be serviced according to the repair procedures in Service Information. After performing repairs, recheck the system to determine if any active or stored DTCs remain; if so, take appropriate service action to ensure proper function.

SRS AIR BAG SQUIB STATUS

Multistage air bags with multiple initiators (squibs) MUST be checked to determine that all squibs were used during the deployment event. The Driver Air Bag (DAB) and Passenger Air Bag (PAB) are deployed by electrical signals generated by the Occupant Restraint Controller (ORC) through the driver or passenger squib circuits (up to 3) to the initiators in the air bag inflators. Typically, all initiators are exhausted and all potentially hazardous chemicals are burned during an air bag deployment event.

However, it is possible for only one initiator to be exhausted; therefore, you MUST always confirm that all initiators have been cycled to minimize the risk of improper handling or disposal of potentially live pyrotechnic or hazardous materials. This procedure must be performed using the Mopar wiTECH diagnostic scan tool or at a company such as Collision Diagnostic Services that diagnostically remotely scans the vehicle using FCA US scan tools in conjunction with their patented asTech device, to verify the status of all air bag squibs, prior to removing deployed air bags from the vehicle for disposal.

- Service Information can be obtained at www.oem1stop.com
- Mopar wiTECH scan tools can be purchased from https://mopar.snapon.com

CHRYSLER DODGE FIAT Jeep RAM SRT

NISSAN
Innovation that excites

NISSAN
Collision Position Statement-
Pre- and Post-Repair Scanning
Reference: NPSB-16-604
Date: June, 20 2016

TO: COLLISION REPAIR INDUSTRY

POSITION STATEMENT: Pre- and Post-Repair System Scanning

FRANKLIN, TN- Nissan vehicles today have more technology and electrical components than ever before. Today, it is necessary in most repair situations for the vehicle to have a pre- and post- repair system scan so that the repairer is informed of any trouble codes present, even in cases where there are no identifier lights on the dash.

A pre-repair system scan can identify items up front that are malfunctioning on a vehicle. This helps the repair facility to fully understand the scope of the collision repair, even before starting. The post-repair system scan will confirm that trouble items have been properly repaired and systems are calibrated, helping to ensure our customers' safety and satisfaction.

It is the stance of Nissan North America, that **all** of our vehicles be scanned following a collision repair to help ensure the vehicles' systems are communicating properly with no trouble codes outstanding. It is also recommended that, where appropriate, a pre-repair scan also be completed for reasons mentioned above. The safety of our customers is our number one priority, and we believe these pre- and post-repair scans are more and more integral to a safe, quality repair. We ask the general repair industry to adhere to these strict guidelines going forward.

For additional information, please see service manual section "BCS".

Parts Warranty

Nissan North America's New Vehicle Limited Warranty, and Limited Warranty on replacement parts do not apply to any parts other than Genuine Nissan original equipment parts.

Nissan North America will not be responsible for any subsequent repair costs associated with a vehicle and/or part failure caused by the use of parts other than Genuine Nissan replacement parts.

For additional collision information: http://collision.nissanusa.com

---

American Honda Position Statement

HONDA

Issued: July 2016

SUBJECT: POST-COLLISION DIAGNOSTIC SCAN AND CALIBRATION REQUIREMENTS FOR HONDA AND ACURA VEHICLES

It is the position of American Honda that **all** vehicles involved in a collision* **must** have the following minimum diagnostic scans, inspections, and/or calibrations done to avoid improper repair:

- A preliminary diagnostic scan during the repair estimation phase to determine what Diagnostic Trouble Codes DTCs may be present, so proper repairs may be included. See Background On Scan Requirements paragraph for more information.
- A post repair diagnostic scan to confirm that no DTCs remain.
  - Any repair that requires disconnection of electrical components in order to perform the repair will require a post-repair diagnostic scan to confirm if the component is reconnected properly and functioning.
  - Damage that requires body parts replacement will always require a post-repair diagnostic scan.
- Some safety and driver assistive systems will require inspections, calibration, and/or aiming after collision or other body repairs. See page 2 for additional information.

*A collision is defined as damage that exceeds minor outer panel cosmetic distortion.

Background On Scan Requirements

Honda and Acura vehicles include numerous electronic control systems, including those that operate safety and driver assist systems. Most of these systems include onboard self-diagnostics that monitor the state of health and/or rationality of input and output circuits. When monitored circuit values fall outside predetermined thresholds, DTCs may be set in one or more electronic control unit (ECU).

The mechanical forces encountered in a collision can damage electrical circuits and components in ways that are not easily diagnosed with visual inspection methods.
Here are some other electronic control system self-diagnostic facts:

- The proliferation of electronic control systems has increased the number of potential DTCs beyond the point where a dashboard indicator can be installed and/or illuminated for every DTC. Dashboard indicators are intended for driver notification, not vehicle diagnostics.
- Therefore, the presence or absence of dashboard indicators/warning lights is **not** an acceptable method to determine if post collision diagnostic scans are necessary.
- Many DTCs **do not** illuminate **any** dashboard indicators, but an electronic control system may still operate improperly or be completely inoperative.
- Because of the complexities of serial data networking, dashboard indicators that do illuminate may appear unrelated to the actual vehicle problem.
- Some self-diagnostics require multiple failures, or other criteria such as a number of drive cycles, to be met before illuminating any indicators.
- Low battery voltage and/or repair procedures may inadvertently set multiple DTCs. Clear the DTCs and determine which ones reset after battery voltage is stabilized.

Industry Developed and Vetted Definitions

PRE-SCAN

Pre-Scan/Health Scan (Capturing Codes)
A step in the damage analysis/blueprinting process used to identify errors, faults, and/or damage related, and unrelated, to the collision. Pre-scanning is also done to capture diagnostic trouble codes (DTCs). A pre-scan is not possible if the 12-volt electrical system and vehicle communication networks are disabled or cannot be maintained throughout the scan. If a pre-scan is not possible because of vehicle damage, it should be done as soon as repair progress allows it to be done safely.

Industry Developed and Vetted Definitions (cont'd)

POST-SCAN

Post-Scan (Identifying/Clearing Codes)
A post-repair, quality control process used to ensure all vehicle system diagnostic trouble codes (DTCs), related and unrelated to the collision, and those set during the repair, have been identified and cleared. A test drive may be required prior to clearing some codes; some codes may only appear after certain driving distances, key cycles, or other enable criteria have been reached.

POST REPAIR CALIBRATION

Industry Developed and Vetted Definitions (cont'd)

Post-Repair Calibration/Initialization (PRC/I)
A required step following the removal, installation, and/or repair of many safety and driver convenience system parts. PRC/I may also be required if there is damage/trauma to the mounting location(s), R&I or R&R of the cameras/sensors/mounting locations, R&I or R&R of parts in front of, or behind, cameras and/or sensors, or R&R or R&I of closure/trim panels.

Access to OEM information is mandatory to determine if post-repair calibration is required. A scan tool that has been confirmed by the tool's provider to have the required initialization/calibration capabilities for the vehicle and model year involved, special tools, and/or a test drive following vehicle maker established parameters may also required.

Post-repair calibration/initialization may also be referred to as aiming, health check, module setup, relearn, zero-point calibration, initiation, or calibration.

POST REPAIR CALIBRATION

Industry Developed and Vetted Definitions (cont'd)

Post-Repair Calibration/Initialization (PRC/I)
A required step following the removal, installation, and/or repair of many safety and driver convenience system parts. PRC/I may also be required if there is damage/trauma to the mounting location(s), R&I or R&R of the cameras/sensors/mounting locations, R&I or R&R of parts in front of, or behind, cameras and/or sensors, or R&R or R&I of closure/trim panels.

Access to OEM information is mandatory to determine if post-repair calibration is required. A scan tool that has been confirmed by the tool's provider to have the required initialization/calibration capabilities for the vehicle and model year involved, special tools, and/or a test drive following vehicle maker established parameters may also required.

Post-repair calibration/initialization may also be referred to as aiming, health check, module setup, relearn, zero-point calibration, initiation, or calibration.

Calibration and Aiming

POST REPAIR CALIBRATION

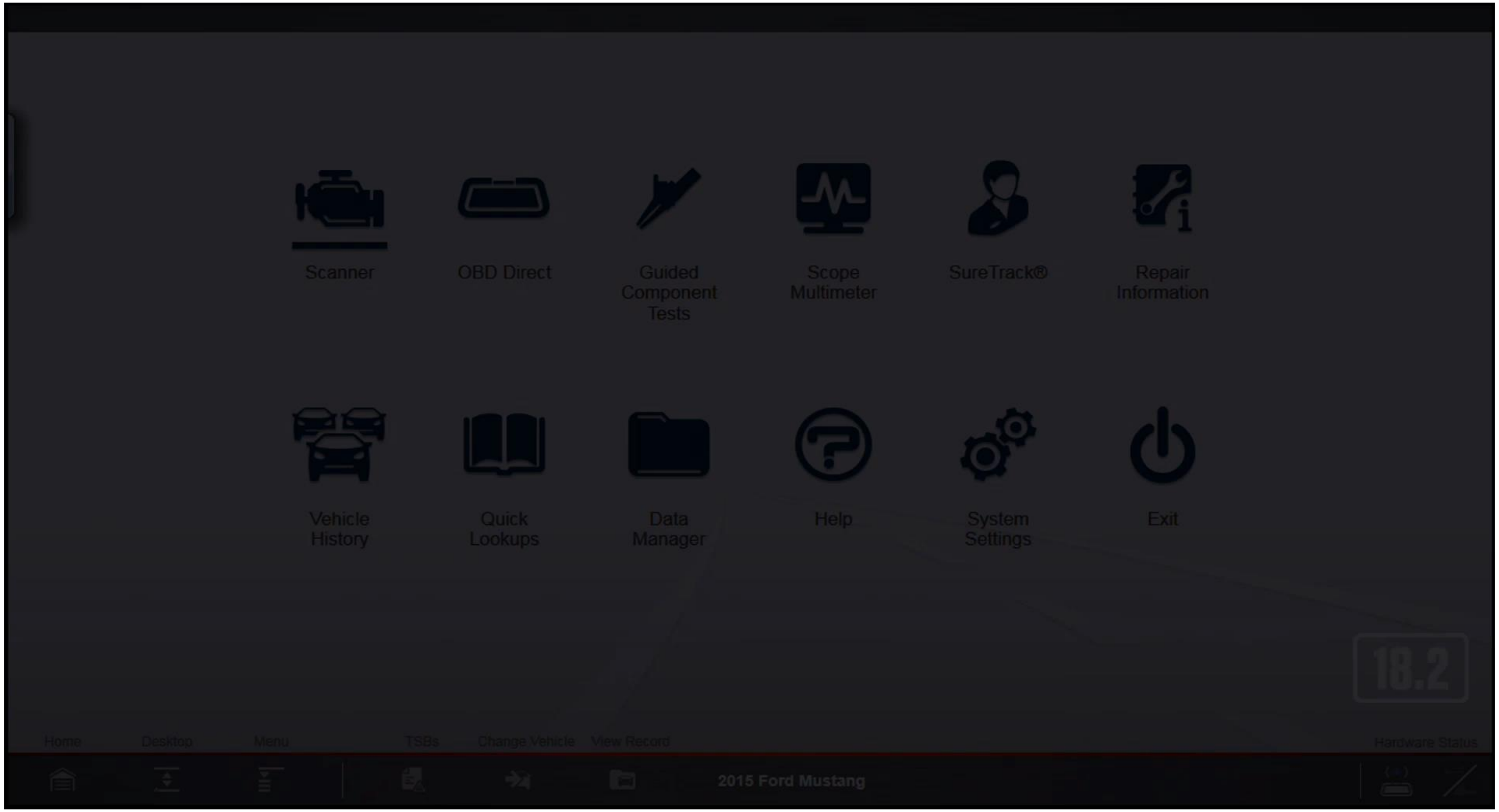
Calibration and Aiming (cont'd)

POST REPAIR CALIBRATION

POST REPAIR CALIBRATION

CODE SCANNING

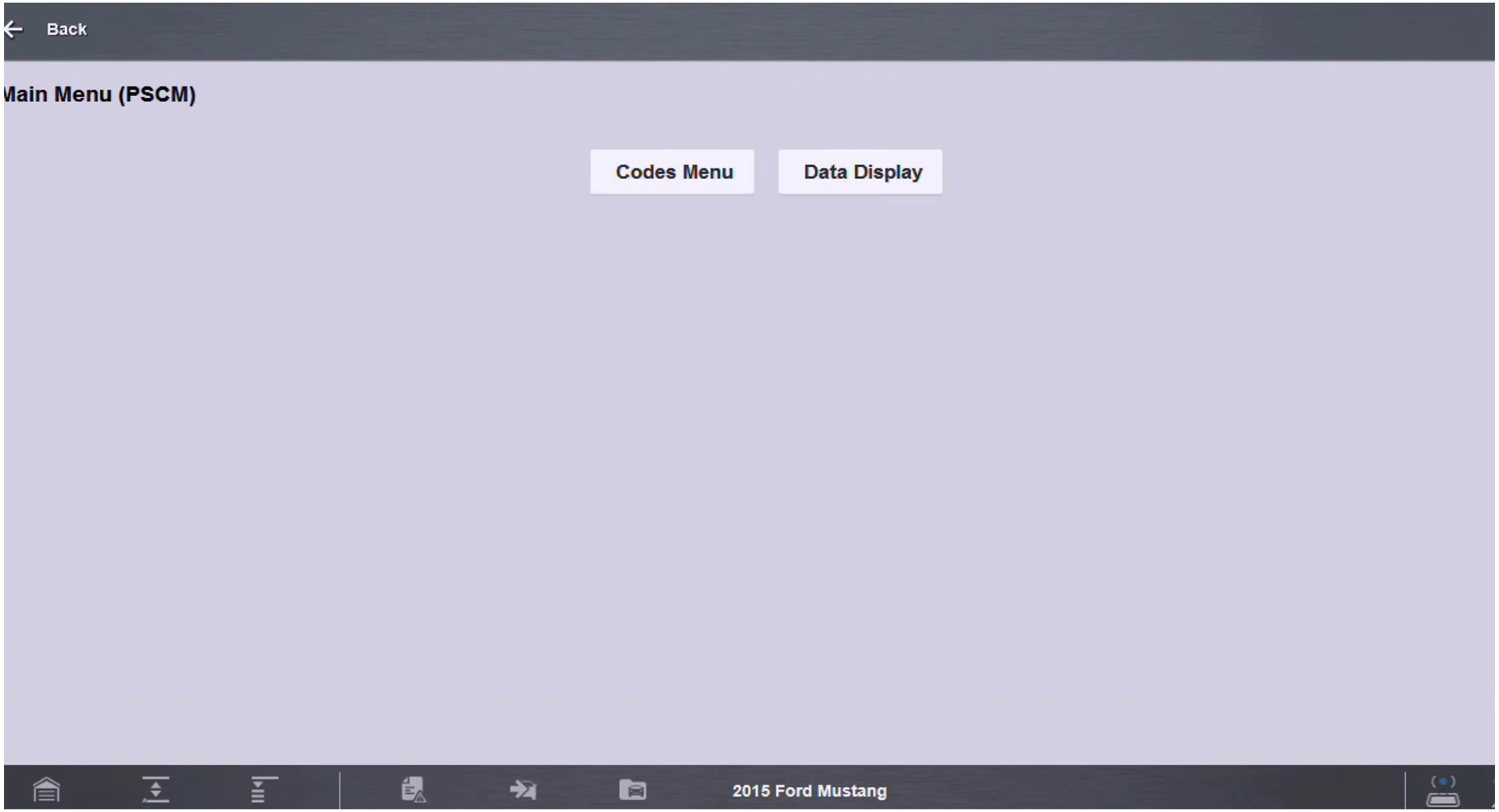
Automated process that interrogates all on-board computers and host controllers for current and historical codes as-well-as pending codes



ELCTROMECHANICAL POWER STEERING INTERFACE

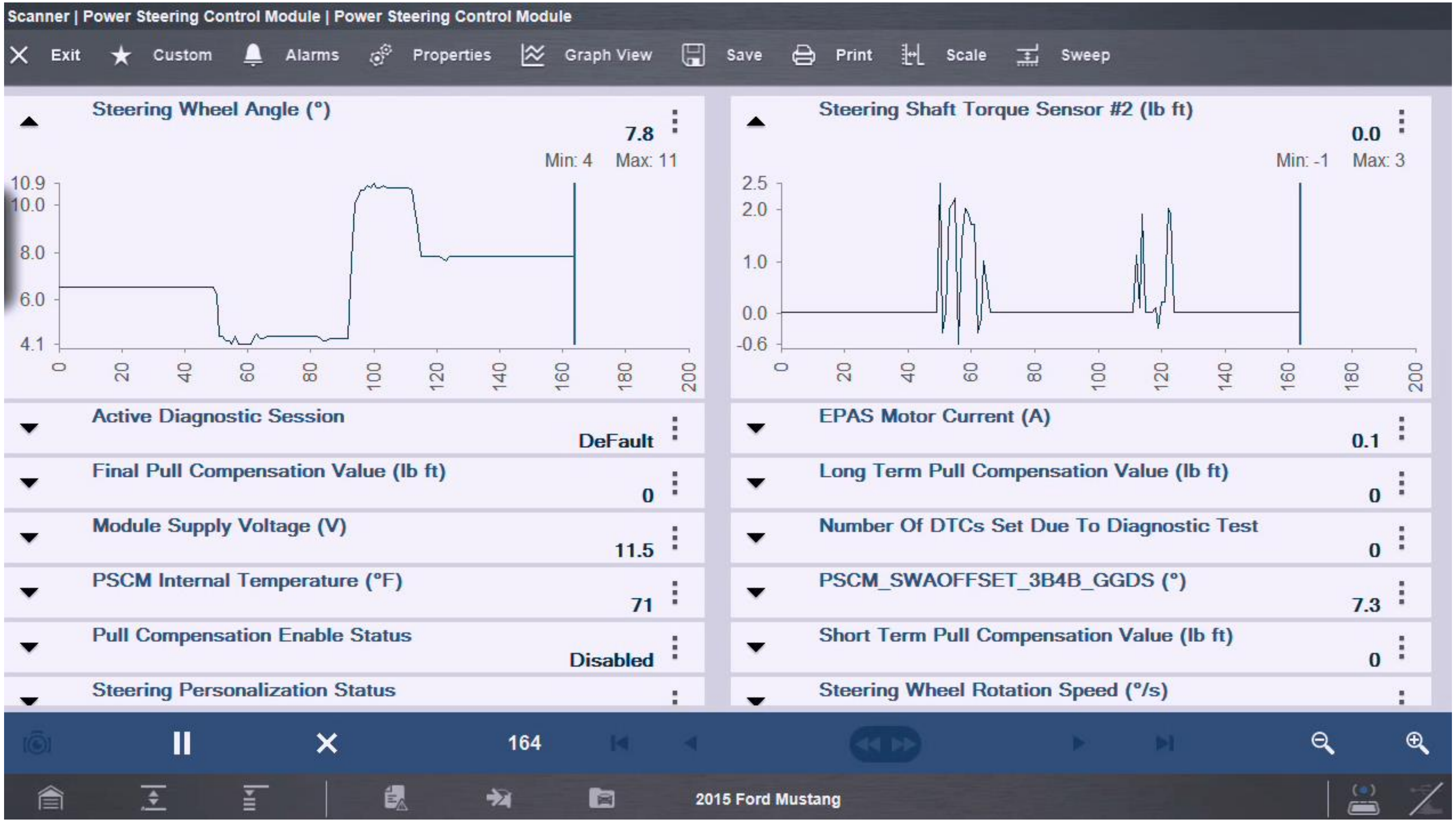
Behaviors normally associated with wheel alignment such as pulls, drifts, and other directional stability concerns may be caused by other systems

- Short term pull compensation
- Long term pull compensation



SHORT AND LONG TERM PULL COMPENSATION

Active pull, drift, road crown, and cross wind compensation



CONCLUSION

The automotive AI market reported that it is expected to be valued at $783 million in 2017 and expected to reach close to $1.1 billion by 2025, at a continuous annual growth rate of about 38.5%.

IHS Market predicted that the installation rate of AI-based systems of new vehicles would rise by 109% in 2025, compared to the adoption rate of 8% in 2015. AI-based systems will become a standard in new vehicles especially in these two categories:

Infotainment human-machine interface, including speech recognition and gesture recognition, eye tracking and driver monitoring, virtual assistance and natural language interfaces.

Advanced Driver Assistance Systems (ADAS) and autonomous vehicles, including camera-based machine vision systems, radar-based detection units, driver condition evaluation and sensor fusion engine control units (ECUs).