Recommended Practice

RP 547 **VMRS Various**

GUIDELINES FOR ADVANCED DRIVER ASSISTANCE SYSTEM (ADAS) NOMENCLATURE

PREFACE

The following Recommended Practice is subject to the Disclaimer at the front of TMC's *Recommended Maintenance Practices Manual*. Users are urged to read the Disclaimer before considering adoption of any portion of this Recommended Practice.

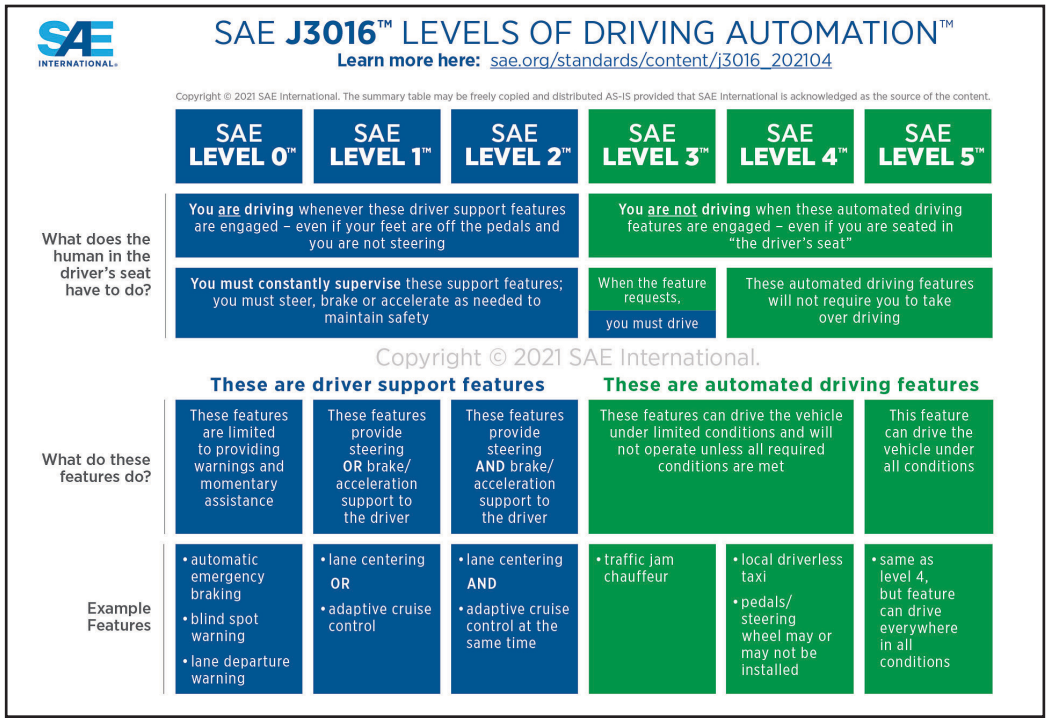
PURPOSE AND SCOPE

This Recommended Practice (RP) provides a glossary of terms for Advanced Driver Assistance System (ADAS) technologies available for installation in commercial vehicles. It is designed to help fleet personnel identify and cross-reference terminology associated with various technologies and their functions as well as harmonize ADAS terms for vehicle specifications and fleet maintenance.

This RP also helps fleet managers, drivers and technicians understand and reduce potential confusion regarding the purposes and functions of various ADAS technologies as part of the overall levels of driving automation (See **Figure 1**).

GENERAL INFORMATION

A wide variety of ADAS technologies and functions are available through various system suppliers and original equipment manufacturers (OEMs). Accordingly, it is important to always consult the ADAS manufacturer and/or vehicle manufacturer for their specific guidelines when servicing ADAS equipped vehicles. It is also critical to follow the warranty processes as specified by the ADAS and/or vehicle manufacturer.



Source: SAE International, Warrendale, Pa.

Figure 1

TMC encourages standardization of ADAS terms throughout industry wherever feasible. This RP provides a glossary of terms for various ADAS technologies. The information herein is presented as a table, listing system names, acronyms, their definitions, as well as alternative names and acronyms. In order to identify the most common/preferred term, the definition is shown next to that term, with less common terms showing a cross reference to the preferred terminology.

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
360˚ View		*See: Bird's Eye View Camera*	
ACC Stop & Go	ACCS&G	*See: Adaptive Cruise Control System*	
Active Blind Spot Assist		*See: Blind Spot Assist*	
Active Lane Change Assist	ALCA	*See: Blind Spot Assist*	
Adaptive Cruise Control System	ACC	Assists with acceleration and/or braking to maintain a driver selected speed and following distance between subject vehicle and the vehicle in front. Advanced ACC systems with stop and go features can come to a complete stop and accelerate back to the specified speed without driver intervention. This system still requires an alert driver to take in their surroundings, as it only controls speed and the distance between the subject vehicle and the vehicle in front.	Intelligent Speed Assist (ISA) Dynamic Cruise Control (DCC) ACC Stop & Go (ACC S&G)
Adaptive Headlamps		Actively responds to changing conditions. Their goal is to provide drivers with better visibility and more time to react to conditions ahead. Encompasses several different features, most common of which is curve-adaptive headlights. These headlights have bulbs that pivot in accordance with the vehicle's direction of travel, and sometimes speed.	
Advanced Driver Assistance Systems	ADAS	Electronic systems that assist drivers in driving and parking functions. ADAS technologies are developed to automate, adapt, and enhance vehicle systems for safety and better driving.	Driver Assist System (DAS)
Advanced Emergency Braking System	AEBS	Detects potential forward collisions using sensors and activates the braking system to decelerate the vehicle to avoid or mitigate a collision.	Autonomous Emergency Braking (AEB) Automatic Emergency Braking (AEB)
Antilock Braking System	ABS	Safety anti-skid braking system which operates by preventing the wheels from locking up during braking, thereby maintaining traction with the road surface and allowing the driver to maintain more control over the vehicle.	
Around View Monitor		*See: Bird's Eye View Camera*	
Autonomous Emergency Braking		*See: Advanced Emergency Braking System*	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Automatic Emergency Braking	AEB	*See: Advanced Emergency Braking System*	
Autonomous Level 0	AL0	Vehicles with Autonomous Level 0 systems refers to vehicles that depend on full-time performance by the human driver of all aspects of the dynamic driving task, even when "enhanced by warning or intervention systems". An example would be the emergency braking system—since it technically doesn't "drive" the vehicle, it does not qualify as automation.	Autonomous Driving 0 (AD0)
Autonomous Level 1	AL1	Vehicles with Autonomous Level 1 systems refers to systems that allow the vehicle and driver to share control of the vehicle. The system depends on full-time performance by the human driver of all aspects of the dynamic driving task, even when "enhanced by warning or intervention systems". The driving mode-specific execution by a driver assistance system of "either steering or acceleration/deceleration" using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task. Adaptive cruise control, which controls speed and distance compared to the vehicle in front is a good example, as the driver still must take care of steering.	Autonomous Driving 1 (AD1)
Autonomous Level 2	AL2	Vehicles with Autonomous Level 2 systems refers to systems where driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task. The driver must be able to intervene if any part of the system fails. Level 2 is also referred to as "hands-off". However, the driver is always required to keep their hands on the wheel and must stay alert to road conditions.	Autonomous Driving 2 (AD2)
Autonomous Level 3	AL3	Vehicles with Autonomous Level 3 refers to driving systems where the driving mode-specific performance of all aspects of the dynamic driving task is controlled by an automated driving system, with the expectation that the driver must remain alert, ready to intervene and take control if the system is unable to execute the task. Level 3 vehicles have "environmental detection" capabilities using multiple sensors and can make informed decisions for themselves, such as accelerating past a slow-moving vehicle.	Autonomous Driving 3 (AD3)

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Autonomous Level 4	AL4	Vehicles with Autonomous Level 4 refers to driving systems where the driving mode-specific performance of all aspects of the dynamic driving task is controlled by an automated driving system even if a human driver does not respond appropriately to a request to intervene, the vehicle can pull over safely by guiding system. The key difference between Level 3 and Level 4 automation is that Level 4 vehicles can intervene if things go wrong or there is a system failure. In this sense, these vehicles do not require human interaction in most circumstances. However, a human still has the option to manually override. Level 4 vehicles can operate in self-driving mode. But until legislation and infrastructure evolves, they can only do so within a limited area as defined by local, regional and federal legislation.	Autonomous Driving 4 (AD4)
Autonomous Level 5		Vehicles with Autonomous Level 5 refers to driving systems where the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver. Level 5 vehicles do not require human attention—the "dynamic driving task" is eliminated. They will be free from geofencing, able to go anywhere and do anything that an experienced human driver can do. Fully autonomous vehicles are undergoing testing in several pockets of the world, but none are yet available to the general public.	Autonomous Driving 5 (AD5)
Autonomous Driving 0	AD0	*See: Autonomous Level 0*	
Autonomous Driving 1	AD1	*See: Autonomous Level 1*	
Autonomous Driving 2	AD2	*See: Autonomous Level 2*	
Autonomous Driving 3	AD3	*See: Autonomous Level 3*	
Autonomous Driving 4	AD4	*See: Autonomous Level 4*	
Autonomous Driving 5	AD5	*See: Autonomous Level 5*	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Automatic Traction Control	ATC	System that helps prevent traction loss in vehicles and prevent vehicle turnover on sharp curves and turns. ATC systems monitor wheel speeds and if the wheel speed and traction does not match, the TC unit activates and applies brakes to the corresponding wheels to control slip of the wheels. By limiting tire slip, or when the force on a tire exceeds the tire's traction, this limits power delivery and helps the driver with improved traction and drive stability of the vehicle.	
Autocruise		*See: Cruise Control*	
Auto Wiper		*See: Rain Sensor*	
Backup Camera		Provides real-time video information regarding the location of your vehicle and its surroundings. This camera offers driver's aid when backing up by providing a viewpoint that is typically a blind spot in traditional vehicles. When the driver puts the vehicle in reverse, the cameras automatically turns on.	
Bird's Eye View Camera		Improves a driver's visibility by offering a 360-degree viewing system using multiple cameras. This system can accurately provide 3D peripheral images of the vehicle's surroundings through video display outputted to the driver. Currently, commercial systems can only provide 2D images of the driver's surroundings.	Surround View Camera 360° View Surround Vision Around View Monitor
Blind Spot Assist	BSA	Can be designed to work with active steering and actively prevent lane change when an obstacle is detected in the adjacent lane. When the system detects a vehicle in the defined blind spot of a driver and if the driver ignores the BSM warning and the vehicle comes dangerously close in the adjacent lane, the active blind spot assist system will intervene, applying braking force to the wheels on the opposite side of the vehicle via the ESC system creating a yaw movement which counteracts the collision course. The system deactivates as soon as driver steers against the effects of the braking intervention or the vehicle accelerates.	Active Blind Spot Assist Active Lane Change Assist (ALCA)

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Blind Spot Monitoring	BSM	Blind spots are defined as areas behind or at the side of the vehicle that the driver cannot see from the driver's seat. A blind-spot monitoring system uses sensors that monitor the driver's blind spots and notify the driver if any obstacles come close to the vehicle by providing an audible, visual or haptic warning. Most BSM systems can be temporarily disabled for a short duration of time, when the driver activates the turn signal or by a switch or through the driver control panel while going through a construction zone. BSM sensors are available to be installed on the passenger side of the vehicle, to function and behave similar to the driver side BSM.	Blind Spot Warning (BSW) Passive Lane Change Assist (PLCA)
Blind Spot Warning	BSW	*See: Blind Spot Monitoring*	
Collision Avoidance System	CAS	*See: Collision Mitigation System*	
Collision Mitigation System	CMS	Active safety system that uses radar detectors, typically placed near the front of the vehicle, to determine the vehicle's vicinity to nearby obstacles and prevent or reduce the severity of a collision. Newer CMS systems use LiDARs and cameras in addition to radars and are able to detect more objects than just stationary and moving vehicles, including motor-cycles, bicycles and pedestrians. Settings within the system allow the vehicle speed and distance to be pre-set prior to activa-tion of the Collision Mitigation System.	Collision Avoidance System (CAS) Pre-Crash System
Cross Traffic Alert	CTA	*See: Front Cross Traffic Alert*	
Cross Traffic Braking		*See: Front Cross Traffic Braking*	
Crosswind Stabilization		Helps prevent a vehicle from overturning when strong winds hit its side by analyz-ing the vehicle's yaw rate, steering angle, lateral acceleration, and velocity sensors. This system distributes the wheel load in relation to the velocity and direction of the crosswind.	
Cruise Control	CC	Maintains a specific speed set by the driver. The vehicle can maintain the speed the driver sets until the driver hits the brake pedal, clutch pedal, or disengages the system. Newer vehicles have systems for Adaptive Cruise Control.	Autocruise
Driver Assist System	DAS	*See: Advanced Driver Assistance Systems*	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Driver Drowsiness Detection		Designed to monitor the alertness of the driver and aim to prevent collisions due to driver fatigue. The vehicle obtains information, such as facial patterns, steering movement, driving habits, turn signal use, and driving velocity, to determine if the driver's activities correspond with drowsy driving. If drowsy driving is suspected, the vehicle will typically sound off a loud alert and may provide a haptic warning to the driver. If no action is taken, the vehicle may react to the obstacle.	
Dynamic Cruise Control	DCC	*See: Adaptive Cruise Control System*	
Electronic Braking System	EBS	Provides electronic activation of all braking system components including retarder and engine brake. EBS still relies on compressed air for braking and is only controlling the air through valves.	
Electronically Controlled Air Suspension System	ECASS	Type of suspension on a vehicle that uses an onboard system of actuators to control the vertical movement of the vehicle's wheels relative to the chassis or vehicle body rather than the passive suspension provided by large springs where the movement is determined entirely by the road surface. Active suspensions use some type of actuator to raise and lower the chassis independently at each wheel.	
Electronic Stability Control	ESC	Electronic safety system that detect if a vehicle is skidding. By selectively applying the brakes in varying forces individually on each wheel it helps the driver regain control.	Electronic Stability Program (ESP) Stability Control Vehicle Stability Control (VSC) Vehicle Stability Enhancement (VSE)
Electronic Stability Program	ESP	*See: Electronic Stability Control*	
Event Data Recorder	EDR	Records and stores critical crash-related parameters and information shortly before, during and immediately after a collision. EDRs can have the ability to store the data onboard or can communicate with a cloud-based storage system using a telematics communication system.	
Forward Collision Warning	FCW	Monitors a vehicle's speed, the speed of the vehicle in front and the distance between the vehicles to detect a potential collision and to alert the driver to take evasive action. Object detection is system dependent with some systems able to detect stationary, moving, pedestrian and other objects and able to provide alerts to the driver.	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Front Cross Traffic Alert	FCTA	Uses two radar sensors in the front and/or sides of the vehicle to monitor if there are any oncoming vehicles at intersections, highway exits, or parking lots.	Cross Traffic Alert (CTA)
Front Cross Traffic Braking	FCTB	Uses FCTA in combination with the vehicle's braking system to prevent a collision with there are any oncoming vehicles and the driver has not taken evasive action to mitigate a collision.	Cross Traffic Braking
Geofencing		A virtual perimeter for a real-world geographic area. A geofence could be dynamically generated—as in a radius around a point location, or a geofence can be a predefined set of boundaries (such as yards, ports, parking lots, or neighborhood boundaries). The use of a geofence is called Geofencing.	
Head-Up Display	HUD	Safely displays essential system information to a driver at a vantage point that does not require the driver to look down or away from the road. Currently, majority of the auto-HUD systems on the market display system information on a windshield using LCDs.	
High Beam Assist	HBA	Automatically switches headlights to low beam from high beam and back, when it detects a vehicle ahead. Frequent usage of high beams allows for earlier detection of pedestrians, bicyclists and other obstacles.	
Hill-Start Assist	HSA	Helps prevent a vehicle from rolling backward down an incline when starting again from a stopped position. This feature holds the brake pressure while the driver transitions between the brake pedal and the gas pedal. In vehicles equipped with manual transmissions, this feature holds the brake pressure while the driver transitions between the brake pedal, the clutch, and the gas pedal.	Hill-Start Control Hill Holder
Hill-Start Control		*See: Hill Start Assist*	
Hill Descent Control	HDC	Helps drivers maintain a safe speed when driving down a hill or other decline. When the system is activated, and the vehicle speed is reduced below the feature's activation threshold, the vehicle draws on traction control and anti-lock braking system to minimize tire slip by pulsing the braking system and controlling each wheel independently to maintain traction down the descent.	
Hill Holder		*See: Hill-Start Assist*	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Intelligent Speed Adaptation	ISA	Helps drivers comply to the speed limit. The vehicle, using a camera, takes in information of the vehicle's position and notifies the driver when the speed limit is exceeded. This is achieved by either analysis of the camera input of the speed limit or by using a map based GPS system. Some ISA systems allow the vehicle to adjust its speed to adhere to the relative speed limit. Other ISA systems only warn the driver when the vehicles is going over the speed limit and leaves it up to the driver to enforce the speed limit or not.	Intelligent Speed Advice (ISA)
Intelligent Speed Advice		*See: Intelligent Speed Adaptation*	
Intelligent Speed Assist	ISA	*See: Adaptive Cruise Control System*	
Lane Change Assist	LCA	Helps the driver through a safe completion of a lane change by using sensors to scan the vehicle's surroundings and monitor the driver's blind spots. Most LCA systems use a windshield mounted camera to detect lane markings on the road. If a driver intends to make a lane change without using a turn indicator, the system will alert the driver by an audio, visual or haptic alert. If the driver does not react and the vehicle begins to leave its lane, the system will automatically bring back the vehicle into its original lane using active steering.	
Lane Centering	LC	Assists the driver in keeping the vehicle centered in a lane. A lane-centering system may autonomously take over the steering when it determines the driver is at risk of deterring from the lane. This system uses cameras to monitor lane markings to stay within a safe distance between both sides of the lane by performing constant steering correction.	
Lane Departure Warning	LDW	Designed to alert the driver when the vehicle begins to move out of a lane without using a turn signal. LDW systems use cameras to monitor lane markings to determine if the driver unintentionally begins to drift. This system does not take control of the vehicle to help redirect the vehicle back into the safety zone but instead sends an audio or visual alert to the driver.	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Lane Keeping Assist	LKA	LKA provides lateral control driver assistance that automatically intervene to hinder a lane departure if the driver either fails to signal intent to change lanes (i.e., via turn signal activation) or fails to initiate corrective action to prevent the lane departure. It does not include lane centering (LCA).	
Passive Lane Change Assist	PLCA	*See: Blind Spot Monitoring*	
Pedestrian Detection		*See: Vulnerable Road User Detection*	
Pre-Crash System		*See: Collision Mitigation System*	
Rain Sensor		Water-sensitive unit that automatically triggers electrical actions, such as starting the windshield wipers or the raising of open windows. This rain sensor can also take in the frequency of rain droplets that are detected to automatically trigger windshield wipers with an accurate speed for the corresponding rainfall.	Auto Wiper
Roll Stability Control	RSC	Active safety system which reduces the risk of rollover of a vehicle in some critical maneuvers such as severe cornering or an evasive maneuver. RSC works with the help of a gyro sensor in conjunction with the ESC system to help regain control of the vehicle. The gyro sensor continuously monitors the roll angle of the vehicle with respect to ground. If the observed roll angle of the vehicle exceeds its normal limit, then this system reduces the speed of the entire vehicle or specific wheels by applying brakes with the help of ESP.	
Rear Cross Traffic Alert	RCTA	Typically works in conjunction with the Blind Spot Monitoring system, warning the driver of approaching cross-traffic when reversing out of a parking spot.	
Rear Cross Traffic Braking	RCTB	Typically works in conjunction with the Blind Spot Monitoring system and the vehicle braking system, actively braking the vehicle when the system senses approaching cross-traffic when reversing out of a parking spot.	
Red Light Indicator	RLA	*See: Traffic Light Indicator*	
Sensors		Device that provides information/data for ADAS. ADAS relies on one or a combination of sensors in the vehicle – radars, cameras, LiDAR, ultrasonic, to gather information around a vehicle to realize the safety and comfort of the driver, accurately display and warn the driver of the surroundings.	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Stability Control		*See: Electronic Stability Control*	
Surround View Camera		*See: Bird's Eye View Camera*	
Surround Vision		*See: Bird's Eye View Camera*	
Traffic Sign Recognition	TSR	System that can recognize common traffic signs, such as a "stop" sign or a "turn ahead" sign, through image processing techniques. This system considers the sign's shape, such as hexagons and rectangles, and the color to classify what the sign is communicating to the driver. Most TSR systems currently use camera-based technology, a wide variety of factors can make the system less accurate. These include poor lighting conditions, extreme weather conditions, and partial obstruction of the sign. Some TSR systems provide speed intervention, when the vehicle is recognized to be travelling above the speed limit.	Traffic Sign Indication (TSI) Over Speed Alert (OSA)
Traffic Light Indicator	TLI	System able to recognize actual traffic light status (red, yellow, green), and inform and/or warn the driver in case needed.	Red Light Indicator (RLI)
Traffic Sign Indicator	TSI	*See: Traffic Sign Recognition*	
Tire Pressure Monitoring System	TPMS	Monitors the inflation pressure of tires to determine when the tire pressure is outside the normal inflation pressure range. A driver can monitor the tire pressure and is notified when there is a sudden drop through a pictogram display, gauge, or low-pressure warning signal.	
Vehicular Communications Systems	V2X	Comes in three forms: Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I), and Vehicle-to-Everything (V2X). V2V systems allow vehicles to exchange information with each other about their current position and upcoming hazards. V2I systems occur when the vehicle exchanges information with nearby infrastructure elements, such as street signs. V2X systems occur when the vehicle monitors its environment and takes in information about possible obstacles or pedestrians in its path.	Vehicle-to-Vehicle (V2V) Vehicle-to-Infrastructure (V2I) Vehicle-to-Everything (V2X)
Vehicle-to-Vehicle Communication	V2V	*See: Vehicular Communication Systems*	
Vehicle-to-Infrastructure Communication	V2I	*See: Vehicular Communication Systems*	
Vehicle-to-Everything Communication	V2X	*See: Vehicular Communication Systems*	

SYSTEM NAME	ACRONYM	DEFINITION	ALTERNATE NAME/ACRONYM
Vulnerable Road User Detection	VRUD	Pedestrian detection technologies that use a variety of sensors —cameras, radar, and other sensors—to allow vehicles to determine the vehicle's vicinity to nearby pedestrian, cyclists and motorcyclists and prevent or reduce the severity of a collision. The systems process that information and can respond, often faster than a human driver, when a collision appears imminent and activate the vehicle's automatic emergency braking system	Pedestrian Detection
Vehicle Stability Control	VSC	*See: Electronic Stability Control*	
Vehicle Stability Enhancement	VSE	*See: Electronic Stability Control*	
Wrong Way Driving Warning		Alerts drivers when it is detected that they are on the wrong side of the road. Vehicles with this system enacted can use sensors and cameras to identify the direction of oncoming traffic flow. In conjunction with lane detection services, this system can also notify drivers when they partially merge into the wrong side of the road.	