This Addendum **applies only to vehicles participating in the 2024 Formula SAE-A AV demonstration.**
It defines Revisions and Clarifications versus the Driverless Vehicle sections of the European Formula FS-Rules_2024_v1.1 (hereinafter referred to as the "**EFS Rules**") and the 2024 Formula Student Germany V1 Handbook, for the December 2024 Formula SAE-A AV demonstration.

Overview
In 2024, the FSAE-A Autonomous Vehicle (AV) class will be run as a demonstration event, with limited, non-scored static and dynamic events. The event will be held at Calder Park Raceway, between the 5th to 8th of December 2024, alongside the IC and EV class competitions.

Further details as to the timing and locations of the AV scrutineering, static events and dynamic events will be released in the 2024 Competition Handbook. Where registered AV teams have any questions or concerns regarding the timing or logistics of the 2024 demonstration they are invited to submit clarifications to the organising committee via formulasae@sae-a.com.au .

AV Teams should interpret all references to Driverless Vehicles (DVs) in the EFS Rules as synonymous with Autonomous Vehicles (AVs). Wherever it is not clear as to application of the rules to a proposed vehicle design, or where a radically new concept is proposed for a vehicle, the team should submit the concept to the FSAE-A Rules Committee in advance for clarification and not rely only on the team interpretation of the rules, as they may not have been drafted with this proposed new concept in mind.

The FSAE-A competition features IC/EV categories alongside AV demonstrations, leading to overlap when teams participate in both EV/IC and AV events. Teams can choose to enter with a dedicated AV vehicle or opt for a dual-purpose vehicle in the IC/EV competition. When a team enters a single car into two categories, it's referred to as a "Dual Purpose" vehicle. To streamline processes and avoid Technical Inspection delays, aligning with the EFS approach, decoupling AV components before EV/IC dynamic events is not permitted as it would require the vehicle to be re-scrutineered for which there is no capacity. Teams should design vehicles and systems to accommodate dual-purpose use while ensuring compliance with rules regarding driver presence and AV component integration.

Accordingly, removal of AV safety-critical components such as steering or braking systems or other major functional components are prohibited before EV/ICE dynamic events for Dual Purpose vehicles. However, teams may seek permission to remove non-safety critical components, like cameras, computer modules, RADARs, LIDARs, or other sensors. Teams must provide a document outlining the items to be removed and safe removal process, without compromising EV/IC systems, prior to the competition to the FSAE-A Rules Committee. Additionally, this process must be demonstrated during AV scrutineering.

The Driverless Vehicle Rules as defined in the EFS are adopted for the FSAE-A Event except as revised, amended or deleted per the detail clauses of this Autonomous Vehicle Addendum.

The sections of the EFS Rules that are not Driverless Vehicle related do not apply and all vehicles participating in FSAE-A must refer to the *International 2024 Formula SAE-I Rules* and the *Local Addendum to Formula SAE 2024 rules* (hereinafter referred to as the "Local Addendum") for the December 2024 Formula SAE-A competition. These cover all the rules requirements for the base vehicle design, construction and operation other than for any Autonomous systems and Autonomous operation of the vehicle.

Please read all rules carefully

Document Submission

All electronic document submissions must be uploaded by the Team Leader in accordance with the procedures and timing outlined in the *Local Addendum to Formula SAE 2024 and Appendix PDA-1 of that Addendum.* It is also attached to this Addendum. Submissions will only be accessible by SAE-A event organisers, judges and nominated persons.

Vehicle Eligibility

Teams may enter AVs that have been developed from vehicles previously entered in the FSAE-A competition, however, to be eligible to participate in the dynamic events all vehicles must comply with the requirements of Clause GR7.3.2 of the Local Addendum.
If there are significant potential issues in ensuring compliance for a 2021, 2022 or 2023 vehicle with the 2024 rules and the Local Addendum or this AV Addendum, teams should submit early Rules Queries relating to the issues to the Rules Committee for potential solutions to be achieved.

Rules Enquiries

If you have any questions regarding interpretation of the competition rules or procedures, please follow the steps outlined in the *Local Addendum to Formula SAE 2024 Rules* to submit a clarification.

Resources

Document templates, forms and guidelines are available from the SAE Australasia websites, including documents required for the 2024 AV demonstration.
https://www.saea.com.au/rules-documents-templates

The following changes refer to the sections of 2024 EFS Rules sections covering Driverless (Autonomous) Vehicles.

A1 – ADMINISTRATIVE REGULATIONS

EFS Rule	Page	Changes and Clarifications
A1	**10-11**	**Competition Overview** The 2024 FSAE-A Autonomous Vehicle (AV) class will be run as a demonstration, with limited, non-scored static and dynamic events. This will be independent of both IC and EV competitions.
A4.1.1	**13**	**Teams per University** Teams who intend to participate in the 2024 AV demonstration must inform SAE-A of their intention to register as detailed in the *Local Addendum to Formula SAE 2024 rules* and may enter a maximum of 3 vehicles with one entry in each of the IC, EV competition and AV demonstration.
A4.1.2	**13**	In 2024, some teams may have an IC and/or EV entry in addition to an AV. For the purposes of the AV demonstration, team members involved with vehicles competing in the IC or EV classes may also be nominated as a member of the AV team. A student may thus be an AV/IC or AV/EV team member.

A5 – DOCUMENTATION AND DEADLINES

EFS Rule	Page	Changes and Clarifications
A5.1.1	**15**	**Required Documents and Forms** Replace EFS Rule and add Teams entering 2024 Formula SAE-A AV demonstration must upload the required documents per the Local Addendum to the designated submission site as defined in Appendix A-1 of this Addendum and including the unique to AV submissions:- Autonomous Systems Form: AV Operation Diagram; AV Wiring Diagram; AV Schematic Diagram; AV Mechanical Parts; AV Hydraulic/Pneumatic Systems; Autonomous Systems Design Report; EV-AV Conversion Process (as required) ; AV technical Inspection Check List.
A5.3	**15**	**Late or Non-Submission** Failure to meet the deadlines for any of the specified documentation may result in exclusion of the respective vehicle from the AV demonstration.
		Correction Requests

A5.4	**16**	Delete EFS words and Add: For the purposes of the demonstration, officials may require corrections to be made in certain documentation. The return time for the corrected documents will be determined on a case by case basis, and will be communicated to teams. Failure to make the appropriate corrections in time may exclude the respective vehicle from the AV demonstration.
A5.5	**16**	Delete A 5.5
A5.6.1	**16**	Delete EFS words and Add: The Vehicle Status Video (VSV) is required and submission of the VSV shall be made no later than 2 weeks prior to the commencement of the 2024 FSAE-A competition. The video shall content sequences detailed in A5.6.2.
A5.7	**17**	**SES Approval** Delete EFS Words. A separate SESA form is not required. Submit the SES as defined in the *International 2024 Formula SAE-I Rules* and the *Local Addendum to Formula SAE 2024 rules.*

A6 – GENERAL RULES

EFS Rule	Page	Changes and Clarifications
A6.1 – 6.13	**18-22**	The EFS Rule A6.7.4, Page 19, is retained. Delete all other EFS A6 rules and comply with the requirements defined in the *International 2024 Formula SAE-I Rules* and the *Local Addendum to Formula SAE 2024 rules.*

DV – DRIVERLESS VEHICLES

EFS Rule	Page	Changes and Clarifications
T14.2	**66**	**Data Logger** Delete EFS Clauses and Add: An AV Data Logger (AV-DL) will be provided by the officials and will be attached to the vehicle in order to proceed with the AV technical inspection.

T14.3.1	**66**	**Remote Emergency System (RES)** Every vehicle must be equipped with a standard RES, The RES that has to be used for FSAE-A competition is a GF2000i-codec/T53R98 combination from Gross-Funk GmbH11. • SIL3 (EN61508) certified • EMV certified • communication in 430 MHz to 440 MHz band • increased signal strength of 88 mW • 12 V to 24 V supply voltage (0.26 A @12 V) • 450 g, 173 mm × 113 mm × 35 mm • IP20 (receiver) / IP65 (sender)
T14.11.1	**69**	**Autonomous Missions** Delete EFS words and Add: The 2024 FSAE-A AV Demonstration will only include Trackdrive, EBS Test, Inspection and Manual driving. The AS must at least implement the following missions: - Trackdrive - EBS test - Inspection - Manual Driving

IN – TECHNICAL INSPECTION

EFS Rule	Page	Changes and Clarifications
IN1	**100**	**General Rules** At the FSAE-A Event, vehicles must first successfully complete the relevant prerequisite mechanical, EV and/or ICE technical inspections prior to the Autonomous Vehicle Technical Inspection, which will be carried out per the AV Technical Inspection Checklist 2024 (Refer to SAE-A website). As per the EFS Rules, each vehicle must pass Autonomous System Inspection and EBS Test before it may participate in any driverless dynamic event.

S – STATIC EVENTS

EFS Rule	Page	Changes and Clarifications
S1	**109**	**Business Plan Presentation Event** In 2024, the AV demonstration will be a non-scored competition. AV teams are not required to submit a business plan.
S2	**110**	**Cost and Manufacturing Event**

		In 2024, there will be no cost event for the AV demonstration. As such, any document submissions that relate exclusively to the Cost Event will not be required. For Dual Purpose EV/AV or IC/AV the Cost Event will allow for elimination of the costs relating to unique AV operation components when competing in the EV segment of the competition.
S3	**115**	**Engineering Design Event** In 2024, FSAE-A will be running an A.V Static Design Lite event which will be focused only on autonomous systems, functionality and safety. Teams are not required to submit an EDR, and instead are required to submit an Autonomous Vehicle Design Report (AVDR). For further details the AV Design Report and Static Design Event Details document will be available on the SAE-A website. There will be no formal scoring portion at the event excluding all S3.3, S3.4, S3.5 and S3.6.

D – DYNAMIC EVENTS

FS Rule	Page	Changes and Clarifications
D1	**118**	**General** Delete all EFS clauses and Add Note for FSAE-A 2024 AV Competition; The 2024 FSAE-A competition will have two dynamic events for AVs that have successfully completed the technical inspection process. Successful completion of the EBS test will enable the AV to participate in the autonomous Trackdrive demonstration. Refer to the *2024 FSAE-A Competition Handbook* for latest Event Timing
D2.3	**119**	**Driving Under Power** Ignore all EFS D1 and D2 clauses except for Clause D2.3.8 which will apply at the FSAE-A Competition.
D2.4	**120**	**Practice Track** The availability of a unique AV practice track will not be available for the 2024 competition.

D2.5	**120**	**Cones and Markings** Delete EFS words and Add; The markings of all dynamic track drive event and EBS test will have the following characteristics: - The track is marked with cones. - The left borders of the track are marked with small blue cones. - The right borders of the track are marked with small yellow cones. - Exit and entry lanes are marked with small orange cones. - Large orange cones will be placed at the start/finish lines. - The maximum distance between two cones in driving direction is 5 m. In corners, the distance between the cones may be smaller for a better indication. **The cones used at the competition are equal to the cones listed in Table D2.4 in Appendix A-3 below.** - The start, finish and timekeeping lines as well as keep out zones around the timekeeping equipment **may** be marked with paint. - Trackdrive, track limit lines on either side of the track and entry/exit lanes may be marked with paint. - There are no track limit lines for Emergency Brake System (EBS)-test. - The lines may not be perfectly and continuously drawn. - There may be further markings, to those mentioned above, that are not part of the track (e.g. markings, including cone position markings, lines from other events or different coloured surfaces, etc.) on or close to the track which will not be removed by the officials. - There may be (stacked) spare cones standing at the trackside at a distinguishable distance. - No special artificial landmarks are provided by officials. The team must not place additional landmarks on the track or inside the dynamic area. - No map data is provided by the officials.
D4	**122**	**Skidpad Event** Delete D4. The 2024 AV Demonstration Event will not include a skidpad event.
D5	**125**	**Acceleration Event** Delete D5.

		The 2024 AV Demonstration Event will not include an acceleration event.
D6	**127**	**Autocross Event** Delete D6. The 2024 AV Demonstration Event will not include an autocross event.
D7	**128**	**Endurance and Efficiency** Delete D7 The 2024 AV Demonstration Event will not include an endurance event, however this is replaced with the AV Trackdrive.
D8.1	**133**	**Trackdrive and Efficiency Event** Delete EFS Words and Add; The main dynamic event in the 2024 AV Demonstration will be the Trackdrive event. The Trackdrive will occur at Calder Park Raceway, and the exact location of the track will be published in the *2024 FSAE-A Competition Handbook.* In general, the trackdrive layout will have the following features: - Straights: No longer than 100m - Constant Turns: Up to 50m diameter - Hairpin Turns: Minimum of 9m outside diameter (of the turn) - Miscellaneous: Chicanes, multiple turns, decreasing radius turns, etc. - The minimum track width is 3m
D8.2 **D8.2.1**	**133** **133**	**Trackdrive Procedure** Delete EFS word and Add: The starting order will be based on the order of completion of all technical inspection events and the VSV.
D8.4	**134**	**Trackdrive Scoring** Track drive will be for demonstration purposes no official timing or scoring will be formally released.

APPENDIX PDA - 1
Action Deadlines for 2024 Formula SAE Australasia

All submissions must be uploaded via the online Formula SAE-A 2024 Document Submissions Google Form by 5:00 PM (Melbourne local time) on the defined date. Teams should check and allow for time zone and Summer/Standard/Winter time differences.

The US Rules for late receipt apply, except where otherwise noted earlier in this Addendum. Forms and templates and details of their required format can be downloaded from the SAE-A website at www.saea.com.au.

All electronic submissions are to be uploaded by the Team Leader to the online Formula SAE-A 2024 Document Submissions Google Form at https://docs.google.com/forms/d/e/1FAIpQLScxnR495KHAcnVqu5m1CMl2DztZt32y-oXLackMsVinSOPQUA/viewform using a University or official team email address. The Team Leader email addresses must be unique for Universities with multiple entries. An email acknowledging receipt will be provided by the Google Forms site. Use the included edit link to submit subsequent documents.

Refer to the LOCAL ADDENDUM TO FORMULA SAE 2024 RULES for submission dates.

Appendix PDAV-2

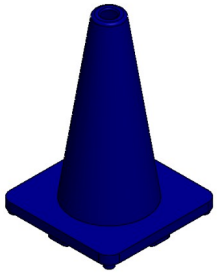
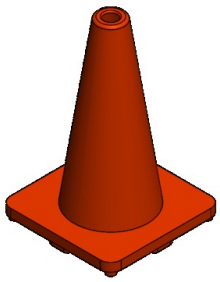
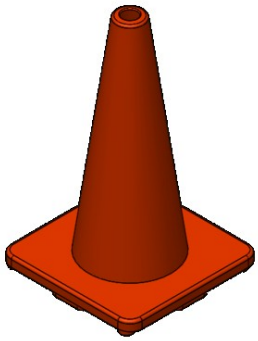
The Official FSAEA AV data logger (AV-DL) is designed and manufactured in Australia specifically for the Autonomous Vehicle class. The data logger will be used during technical inspection to ensure appropriate monitoring of safety-critical signals. Table DV1.3 outlines the message definition of general AV data that must be monitored and made available during technical inspection. Teams are to required provide their own interface cable to connect to AV-D. Further information regarding the interface is detailed in the AV Data Logger Technical Directive on the FSAE-A website.

The following CAN messages are to be sent to the FSAE-A AV Datalogger, it is critical that all messages are present and accurately reported. The CAN messages will be checked during the technical inspection process and the AV-DL will be retrieved after the AV Track Drive Demo. Each of the messages detailed in Table DV1.3 shall be generated at a 100mS interval. All signals are little-endian (Intel). Scale, if not defined, is 1. Messages 0x500 and 0x502 must be filled in any case. If some values are not directly available, they should be interpolated or calculated (i.e. target values). 0x501 depends on available sensor data, teams shall document details in the ASF.

Table DV 1.3; Message definition of logged general DV data

CAN-ID	Name	Length	Format	Unit	Scale
0x500	DV driving dynamics 1	8 B			
	Speed_actual	bit 0-7	unsigned	km/h	
	Speed_target	bit 8-15	unsigned	km/h	
	Steering_angle_actual	bit 16-23	signed	°	0.5
	Steering_angle_target	bit 24-31	signed	°	0.5
	Brake_hydr_actual	bit 32-39	unsigned	%	
	Brake_hydr_target	bit 40-47	unsigned	%	
	Motor_moment_actual	bit 48-55	signed	%	
	Motor_moment_target	bit 56-63	signed	%	
0x501	DV driving dynamics 2	6 B			
	Acceleration longitudinal	bit 0-15	signed	m/s^2	$\frac{1}{512}$
	Acceleration lateral	bit 16-31	signed	m/s^2	$\frac{1}{512}$
	Yaw rate	bit 32-47	signed	°/s	$\frac{1}{128}$
0x502	DV system status	5 B			
	AS_state_off		1		
	AS_state_ready		2		
	AS_state_driving	bit 0-2	3		
	AS_state_emergency_brake		4		
	AS_state_finish		5		
	EBS_state_unavailable		1		
	EBS_state_armed	bit 3-4	2		
	EBS_state_activated		3		
	AMI_state_acceleration		1		
	AMI_state_skidpad		2		
	AMI_state_trackdrive	bit 5-7	3		
	AMI_state_braketest		4		
	AMI_state_inspection		5		
	AMI_state_autocross		6		
	Steering_state	bit 8	bool		
	Service_brake_state_disengaged		1		
	Service_brake_state_engaged	bit 9-10	2		
	Service_brake_state_available		3		
	Lap_counter	bit 11-14	unsigned		
	Cones_count_actual	bit 15-22	unsigned		
	Cones_count_all	bit 23-39	unsigned		

Table DZ.3 - Cone Specifications for the 2024 AV Class Demonstration Event

Cone Type[1]	Dimensions	Picture
Small Blue Cone (Plain) https://grabcad.com/library/300mm-blue-road-cone-1	210mmx210mmx300mm	
Small Yellow Cone (Plain) https://grabcad.com/library/300mm-yellow-road-cone-1	210mmx210mmx300mm	
Small Orange Cone (Plain) https://grabcad.com/library/300mm-orange-road-cone-1	210mmx210mmx300mm	
Large Orange Cone (Plain) https://grabcad.com/library/450mm-orange-road-cone-2	270mmx270mmx450mm	

Cones are locally available from https://colouredtrafficcones.com.au/

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