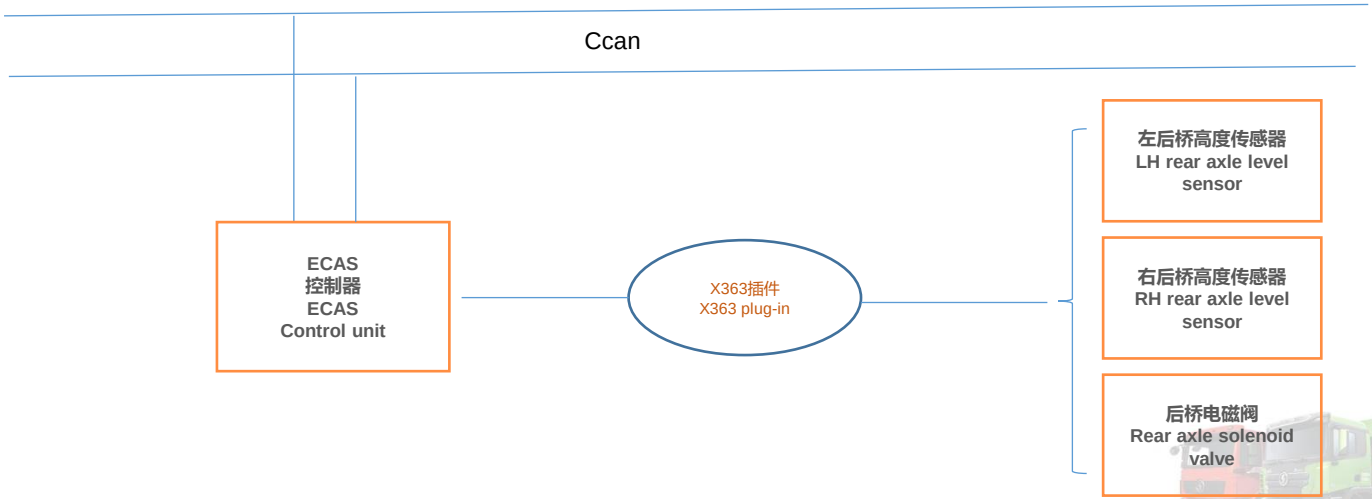
ECAS系统介绍
Introduction to ECAS

2023年4月
April 2023

ECAS系统
ECAS

一、架构原理
I. Architecture principle

架构：此部分主要介绍主要控制器所在网络，并点出涉及的其他交互控制器或开关。
Architecture: this section mainly introduces the network for the main control unit, and points out other interaction control units or switches that are involved.
ECAS位于Ccan，速率250kb，接收高度传感器信号，参考标准高度设置，根据需要控制电磁阀实现车身高度控制。是一种实现上电停车、低速、中速、高速下的上升键、下降键、复位键、停止键触发以调整悬架高度的调整。还有左右悬架高度差自动调整、悬架高度自动保持功能
ECAS is located in Ccan, with a rate of 250 kb. It receives signals of the level sensor by referring to the standard height setup, and controls the solenoid valve to achieve controlling of vehicle height according to requirements. It is an adjustment for suspension height to realize power-on parking, UP key for low, medium and high speed, DOWN key, reset button, and STOP key triggering. There are also functions of automatic LH / RH suspension height difference adjustment and automatic suspension height maintenance.



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一、架构原理
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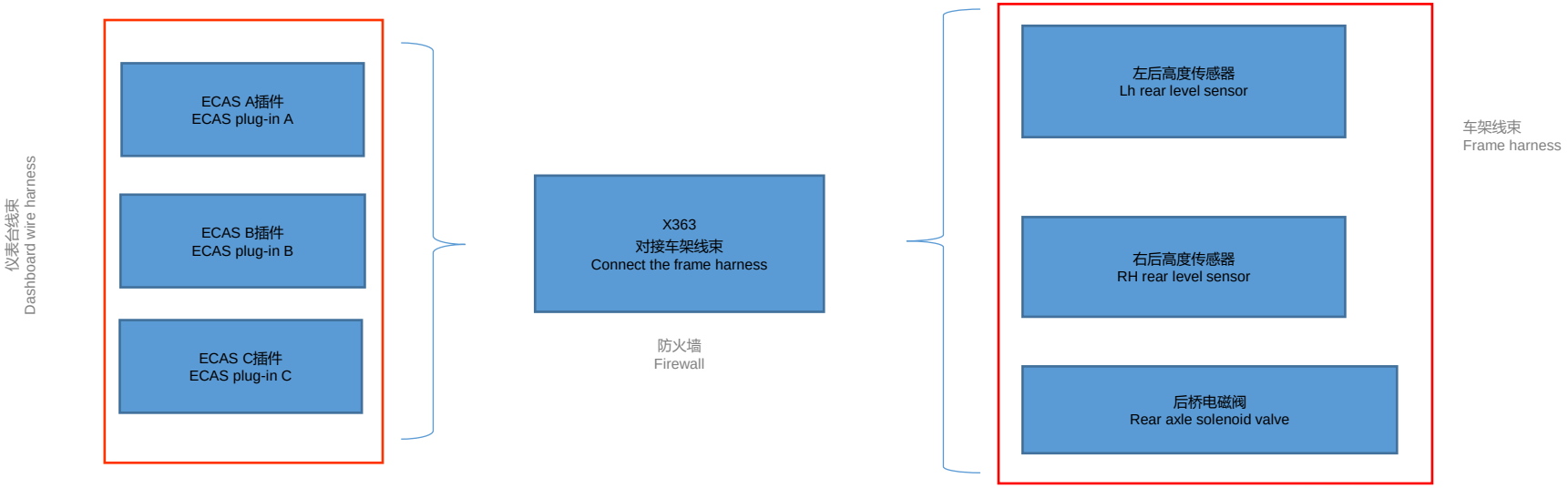
线束结构：线束拓扑、接插器对接、各线束重点或特殊功能，例如继电器、保险、卡接等。
Wire harness structure: wire harness topology, connector docking, key points or special functions of each wire harness, such as relay, fuse, clip, etc.



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一、架构原理
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功能定义：重点子健系统介绍、管脚定义。
Function definition: introduction of key subsystems, pin definition.

控制器管脚定义
Definition of control pin

引脚 Pin	描述 Description	类型 Type	注释 Note
	X1驾驶舱插头 X1 cab plug		
1	CAN LOW	输入/输出 Input / output	
2	HF-GND CAN	HF地 HF GND	
3	CAN HIGH	输入/输出 Input / output	
4	提升轴开关 Lifting shaft switch	输入 Input	
5	正常高度I/II/III开关 Normal height I/II/III switch	输入 Input	
6	牵引辅助开关 Traction assistive switch	输入 Input	
7	+UB电池 +UB battery	电源 Power supply	
8	遥控器，时钟 Remote control, clock	输出 Output	
9	诊断K线 K-line diagnosis	输入/输出 Input / output	
10	+UB点火 +UB ignition	输入 Input	
11	遥控器，数据 Remote control, data	输入/输出 Input / output	
12	地 Ground	地 Ground	
13	+UB遥控器 +UB remote control	输出 Output	
14	警告灯 Warning light	输入 Input	
15	遥控器，地 Remote control, grounding	地 Ground	
16	未用 Unused	-	
17	轴荷开关 Axle load switch	输入 Input	
18	未用 Unused	-	
	X2底盘插头 X2 chassis plug-in		
1	压力传感器，+UB Pressure sensor, +UB	输出 Output	
2	压力传感器，后轴右 Pressure sensor, RH of the rear axle	输入 Input	
17	**轴荷开关 Axle load switch**	**输入 Input**	
18	未用 Unused	-	
	X2底盘插头 X2 chassis plug-in		
1	压力传感器，+UB Pressure sensor, +UB	输出 Output	
2	压力传感器，后轴右 Pressure sensor, RH of the rear axle	输入 Input	
3	压力传感器，前轴（右） Pressure sensor, front axle (RH)	输入 Input	
4	电磁阀，+UB Solenoid valve, +UB	输出 Output	
5	高度传感器，后轴左 Level sensor, LH of the rear axle	输入 Input	
6	压力传感器，后轴右 Pressure sensor, RH of the rear axle	输入 Input	
7	传感器地 Sensor grounding	地 Ground	
8	高度传感器，后轴左 Level sensor, LH of the rear axle	输入 Input	
9	高度传感器，前轴（右） Level sensor, front axle (RH)	输入 Input	
110	电磁阀，后轴左 Solenoid valve, LH of the rear axle	输出 Output	
11	电磁阀，中心302 Solenoid valve, center 302	输出 Output	
12	电磁阀，后轴右 Solenoid valve, RH of the rear axle	输出 Output	
13	电池阀，后轴右 Battery valve, RH of the rear axle	输出 Output	
14	电磁阀，提升轴（下降） Solenoid valve, lifting shaft (descend)	输出 Output	
15	电磁阀前轴（右） Front axle of the solenoid valve (RH)	输出 Output	
	X3扩展描述 X3 extended description		
1	电磁阀提升气囊 Solenoid valve lifting airbag	输出 Output	
2	未用 Unused	-	
3	压力传感器 提升轴左 Pressure sensor lifting shaft LH	输入 Input	
4	压力传感器 提升轴右 Pressure sensor lifting shaft RH	输入 Input	
5	压力传感器 提升XX Pressure sensor lifted by XX	输入 Input	
6	载荷转移灯 Load transfer light	输出 Output	
7	比例控制/录像牵引辅助开关 Proportion control / video traction assistive switch	输入 Input	
8	安全指示灯 Safety indication lamp	输出 Output	
9	提升轴灯 Lifting shaft light	输出 Output	

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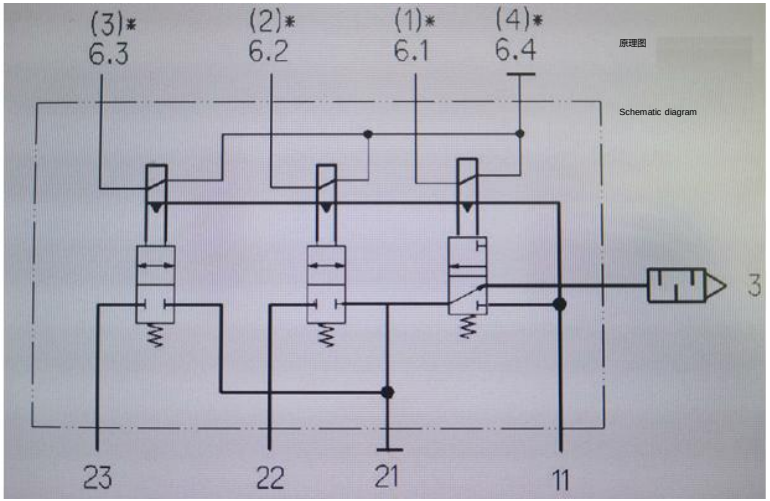
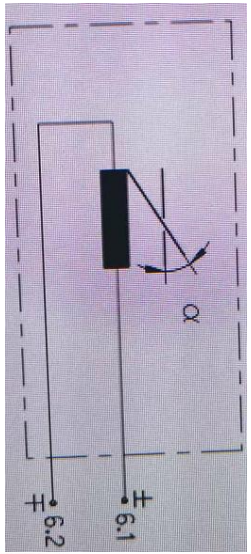


针脚号 Pin number	标识符 Identifier	注释 Note
1	+UB	KL.15
2	GROUND MASSE	KL.31
3	CLOCK TAKT	时钟信号 Clock signal
4	DATA DATEN	数据信号 Data signal
5	空 Null	空 Null
6	空 Null	空 Null
7	空 Null	空 Null
8	空 Null	空 Null
9	空 Null	空 Null



电磁阀管脚定义
Solenoid valve pin definition

遥控器管脚定义
Remote control pin definition

高度传感器
Level sensor

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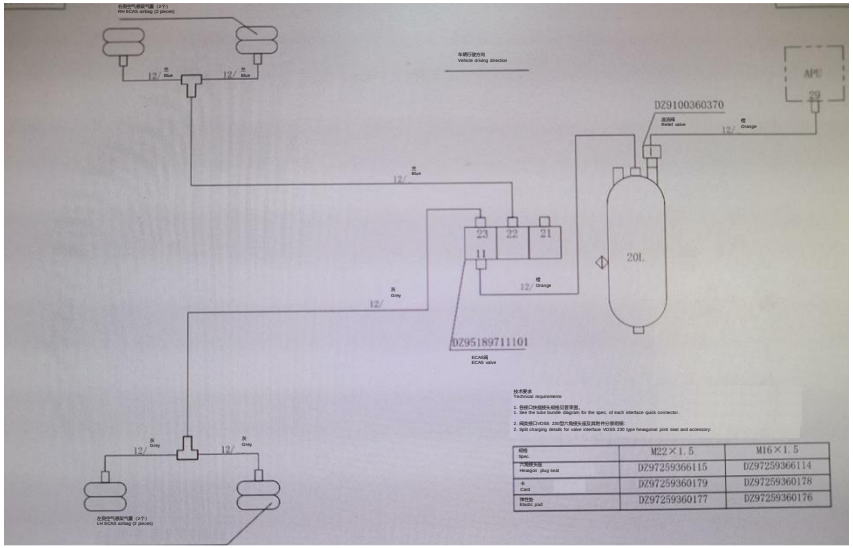
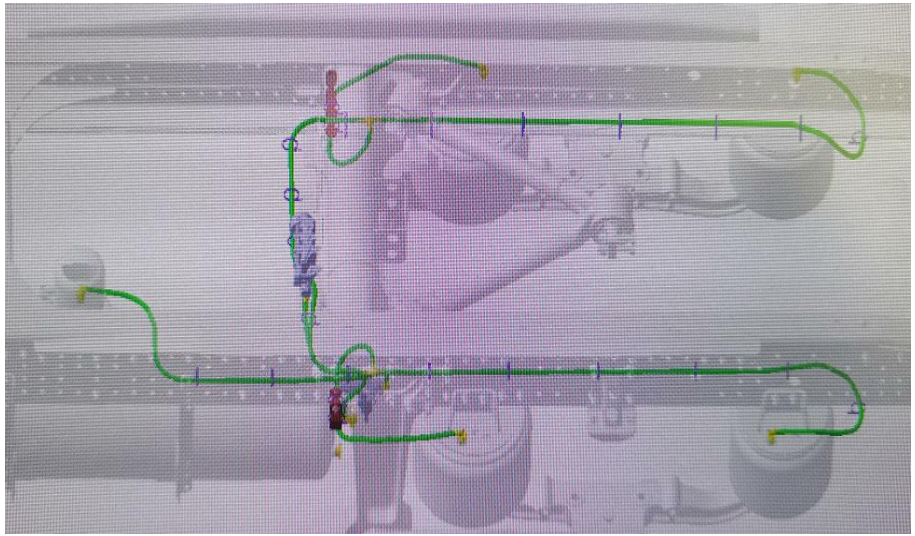


气路原理图
Air circuit schematic diagram



气路安装图
Air circuit installation diagram

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二、功能逻辑
II. Functional logic

系统功能
System functions

序号 S/N	名称 Description	描述 Description
1	电子高度控制 Electronic height control	自学习到的参数进行高度调整 Height adjustment of the adaptation parameters
2	遥控控制 Remote control	通过遥控器控制悬架高度变化。 Control changes in suspension height via the remote control.
3	制动应用 Brake application	制动过程中，高度修正、调整都会终止。 During the brake process, height correction and adjustment will be terminated.
4	正常高度 Normal height	依据速度和遥控信号，激活存储的正常高度作为当前高度 According to the speed and remote control signal, the normal height of activation storage will be treated as the current height
5	载荷分配 Load distribution 气压比例 Air pressure proportion 轴荷控制 Axle load control	依据 气压比例、最佳驱动进行载荷分配控制 Control the load distribution based on air pressure proportion and optimal drive
6	提升轴控制 Lift axis control	单独开关控制，请求控制提升轴 Separate switch control, requesting to control the lifting shaft
7	牵引辅助 Traction assistance	通过参数设置几种不同的牵引辅助模式 Several different traction assist modes can be set via parameters

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二、功能逻辑
II. Functional logic

1、电子高度控制
1. Electronic height control

包括上上升键、下降键、复位键、停止键、左右悬架高度差自动调整（悬架高度自动保持）功能。
Including up key, down key, reset button, stop key, LH/RH suspension height difference automatic adjustment (automatic suspension height maintenance) function.

上升键：ON电有效、车速小于30km/h，长按上升键。会对左右气囊充气，采集高度传感器。
Up key: valid ON power, with the vehicle speed lower than 30 km/h. Press and hold the UP key, inflate the LH/RH airbags and collect the level sensor.

下降键：ON电有效、车速小于30km/h，长按下降键。会对左右气囊放气，采集高度传感器。
Down key: with valid ON power and the vehicle speed lower than 30 km/h, press and hold the down key, so that the LH / RH airbags will be deflated, and data of the level sensor will be collected.

复位键：ON电有效、车速小于30km/h，点击复位键，如果此时悬架位置高于正常高度，会对左右气囊放气，直至达到正常悬架高度。采集高度传感器。
Reset button: with valid ON power and the vehicle speed lower than 30 km/h, click the reset button. If the suspension position is higher than the normal height at this time, the LH / RH airbags will be deflated until the normal suspension height is achieved. Collect data of the level sensor.

停止键：在上述复位键操作时，当悬架下降还未到正常高度时，点击停止键，左右气囊停止放气，如果再次点击复位键，会继续执行下降，所以停止键相当于下降键复位停止。
Stop button: during operation of the above reset button and the suspension has not dropped to the normal height, click the stop button, so that the LH / RH airbags will stop deflation. If you click the reset button again, the suspension will continue to descend. Hence the STOP key is equivalent to the DOWN key reset stop.

2、左右高度差自动调整，也叫高度自动保持功能：
2. Automatic adjustment of LH / RH height difference is also called automatic height maintenance function:

ON电有效，如果悬架左右高度偏离正常高度且左右存在高度差，ECAS会自动调整气囊直至悬架到正常高度且高度差在阈值之内。
With valid ON power, if the LH / RH heights of the suspension deviate from the normal height and there is a difference inbetween, ECAS will automatically adjust the airbag until the suspension reaches the normal height and the height difference falls within the threshold.

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二、功能逻辑
II. Functional logic

3、正常高度一二三
3. Normal height I, II, III

ON电有效，点击正常高度一二三开关（又称高度记忆开关），左右气囊会做充气或放气动作，直到悬架达到正常高度一二三的选定项。
With valid ON power, click the normal height switches I, II and III (also known as the height memory switch), the LH / RH airbags will inflate or deflate until the suspension reaches the options for normal height I, II and III.

4、提升轴控制：将提升轴提升或下放
4. Lifting shaft control: lift or lower the lifting shaft

ON电有效，车速小于30km/h，点击提升轴开关，会提升气囊动作，直到提升完成或放下。
With valid ON power and the vehicle speed lower than 30 km/h, click the lifting shaft switch, so that the airbag will be lifted until the lifting is completed or put down.

5、牵引辅助：协助完成载荷转移
5. Traction assistance: assisting the completion of load transfer

ON电有效，车速小于30km/h，点击牵引辅助开关，会根据载荷分布情况调整载荷更多处的气囊充气，或更少载荷处放气，实现载荷转移。
With valid ON power and the vehicle speed lower than 30 km/h, click the traction auxiliary switch and adjust to inflate airbag at the place with more load or deflate at the place with less load, according to the load distribution, so as to realize load transfer.

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三、ECAS标定
III. ECAS calibration

进入整车信息-ECU信息-ECAS控制器，然后准备标定，标定流程如下：
Enter vehicle information - ECU information - ECAS control unit, and then prepare for calibration. The calibration process is as follows:

① 点击标定，进入标定界面，点击连接按钮，当出现“连接成功，可以标定”时，再开始标定；；
Click calibration to enter the calibration interface. Click the connection button, and start calibration when "Connection is successful for calibration" appears;

② 选择后桥的左右（ECAS标定只能标定后桥），然后点击开始标定；
Select LH / RH of the rear axle (ECAS calibration can only calibrate the rear axle), and then click to start calibration;

③ ECAS标定需要两人完成，一人通过点击充气（气囊升高）或排气（气囊降低）调整气囊的高度，另一人需测量气囊的高度，当满足 **气囊上表面距地面高度 = 200（常规情况） + 轮胎直径*0.5** 时，点击保存正常高度，输入正常高度值200，点击确定；
Two people are required to complete the ECAS calibration. One person adjusts the airbag height by clicking inflate (airbag rising) or exhaust (airbag lowering), and the other person is required to measure the airbag height when the height of the airbag upper surface from the ground = 200 (normal situation) + tire diameter * 0.5. Click to save the normal height, input the normal level value 200, and click OK;

④ 然后一人继续点击充气或排气调整高度，另一人需测量气囊的高度，当满足 **气囊上表面距地面高度 = 260 （常规情况） + 轮胎直径*0.5**时，点击保存上限高度，输入最大高度值260，点击确定；
Then one person continues to click inflate or exhaust to adjust the height, and the other person is required to measure the airbag height. When the height of the airbag upper surface from the ground = 260 (normal situation) + tire diameter * 0.5, click to save the upper limit height, input the maximum level value of 260, and click OK;

⑤ 然后一人继续点击充气或排气调整高度，另一人需测量气囊的高度，当满足 **气囊上表面距地面高度 = 140 （常规情况） + 轮胎直径*0.5**时，点击保存下限高度，点击获取参数值，输入下限高度值140；
Then one person continues to click inflate or exhaust to adjust the height, and the other person is required to measure the airbag height. When the height from the airbag upper surface from the ground = 140 (normal situation) + tire diameter * 0.5, click to save the lower limit height, click to obtain the parameter value, and input the lower limit height value 140;

⑥ 然后点击高度标定，等待出现“已成功完成高度标定”。
Then click level calibration and wait for "Level calibration completed successfully" to appear.

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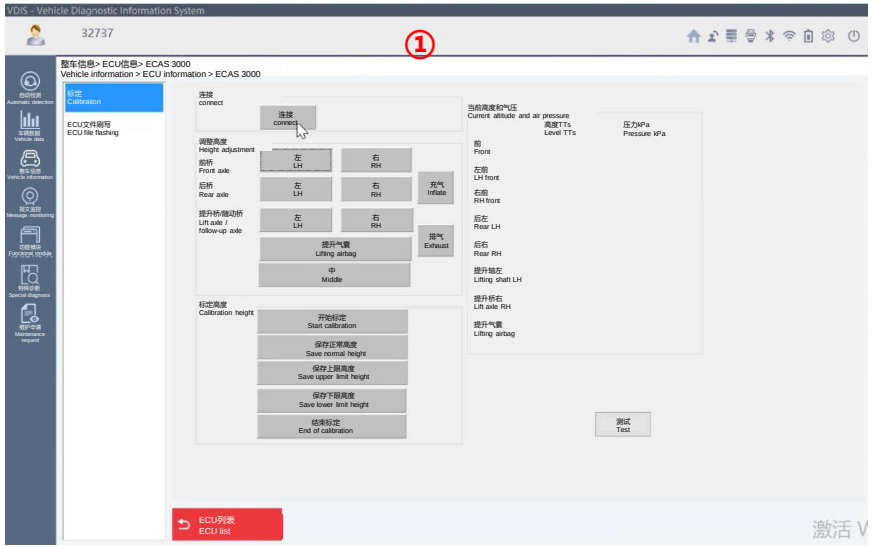
三、ECAS标定
III. ECAS calibration

进入整车信息-ECU信息-ECAS控制器，然后准备标定，标定流程如下：

Enter vehicle information - ECU information - ECAS control unit, and then prepare for calibration. The calibration process is as follows:

注：常规情况正常高度值为200，如遇特殊车辆按技术文件操作执行，并输入实际标定的高度值。

Note: in common circumstances, the normal level value is 200. As for special vehicles, follow the technical documentation and input the level value of actual calibration.



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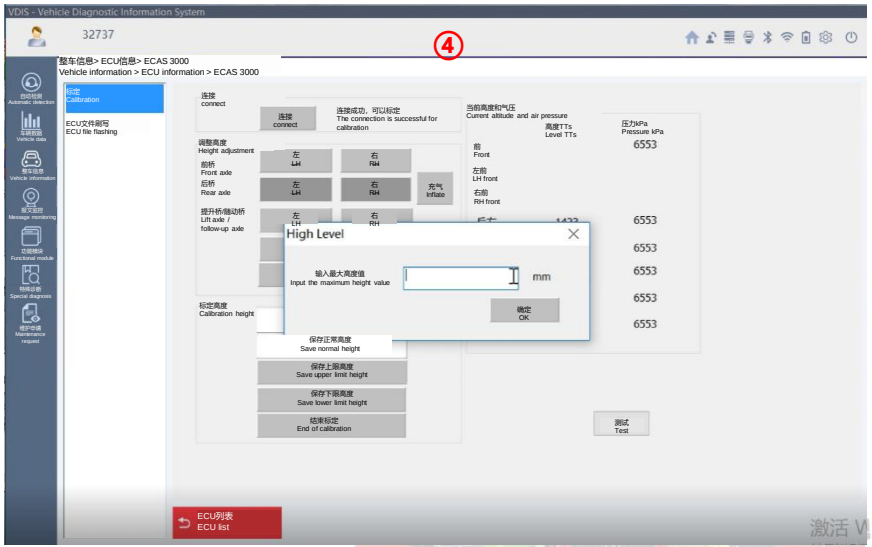

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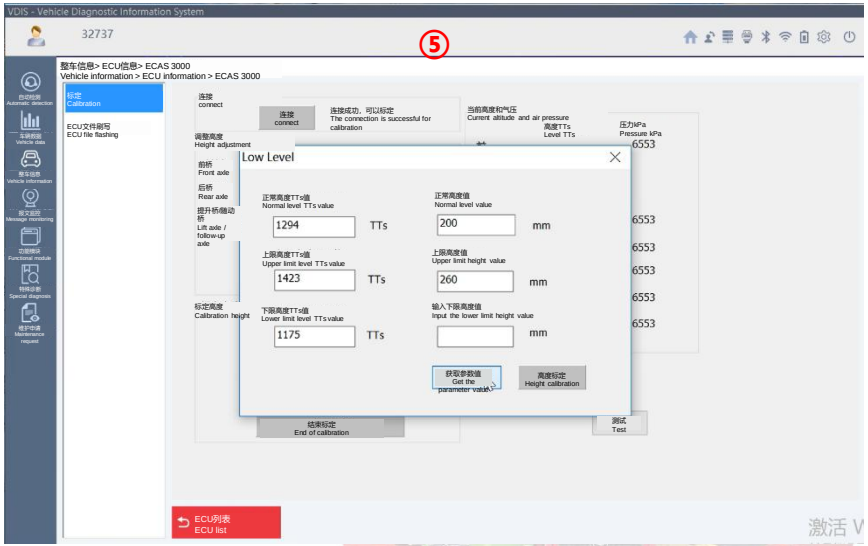

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