

PEPS一键启动系统 PEPS

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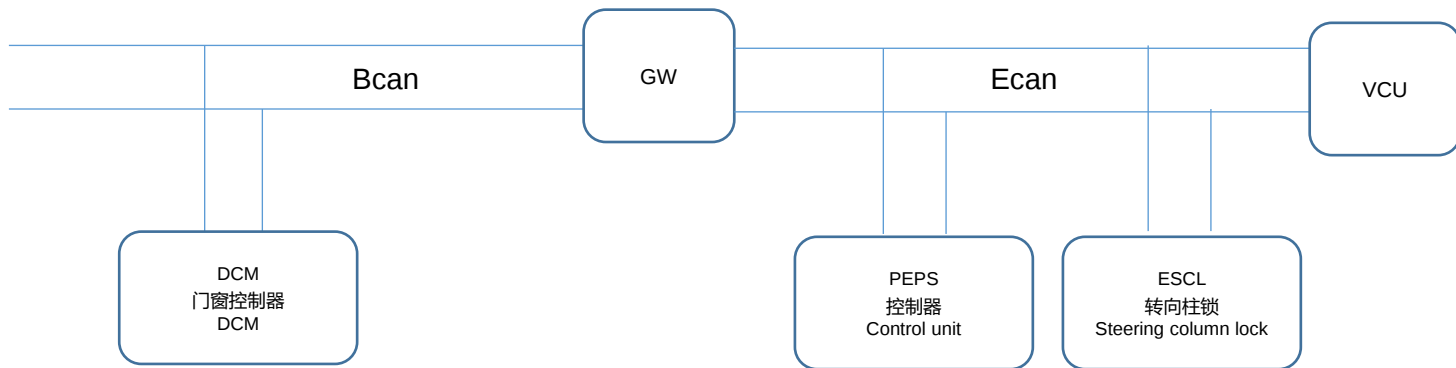
PEPS一键启动系统
PEPS

一、架构原理

I. Architecture principle

PEPS系统，主要负责车辆上电、防盗、启动等信号的发起识别，著作啊组成包括自身的PEPS控制器、遥控器、天线、微动开关等。其核心控制器PEPS控制器位于Ecan，主要与VCU和ESCL进行交互认证，并与DCM进行交互。

The PEPS system is mainly responsible for start identification of signals such as power-on, anti-theft, and start-up of the vehicle. It is composed of self-contained PEPS control unit, remote control, antenna, microswitch, etc. The core control unit, the PEPS control unit, is located in Ecan, which mainly performs interactive authentication of VCU and ESCL, and interacts with DCM.



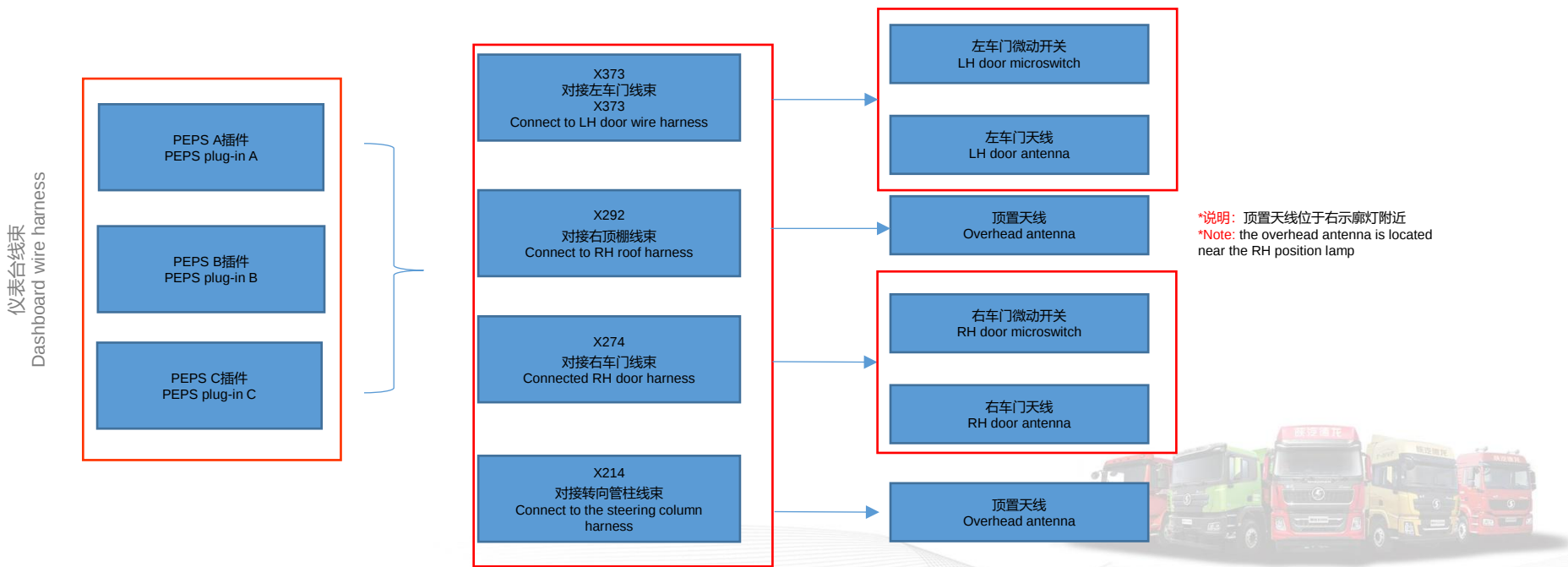
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PEPS

一、架构原理

I. Architecture principle

线束结构：PEPS控制器位于仪表台线束，在本线束与VCU对接、在与左车门线束、右车门线束、右顶棚线束、转向管柱线束对接，实现全功能。

Wire harness structure: The PEPS control unit is located in the dashboard harness, which connects to the VCU, the LH door wire harness, RH door harness, RH roof harness, and steering column wire harness, so as to achieve full functionality.



PEPS—一键启动系统 PEPS

一、架构原理

I. Architecture principle

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

连接器1 Connector 1		PIN 12	制动信号 (预留) Brake signal (reserved)	VDL
PIN 1	SSB故障指示灯GND SSB key backlight indication lamp GND	PIN1 13	手刹信号 (预留) Handbrake signal (reserved)	VDL
PIN 2	N/A	PIN 14	N/A	
PIN 3	N/A	PIN 15	ACC反馈检测 ACC feedback detection	IDH
PIN 4	副驾DHS开关地 Co-driver DHS switch ground	PIN 16	ACC输出 ACC output	ODH
PIN 5	主驾DHS开关地 Main driver DHS switch ground	PIN 17	N/A	
PIN 6	MMO天线低 MMO antenna low	PIN 18	IGN2输出 IGN2 output	ODH
PIN 7	顶部天线低 (预留) Top antenna low (reserved)	PIN 19	IGN1 反馈检测 IGN1 feedback detection	IDH
PIN 8	左门天线低 LH door antenna low	PIN 20	IGN1输出 IGN1 output	ODH
PIN 9	右门天线低 RH door antenna low	连接器3 Connector 3		
PIN 10	N/A	PIN 1	ECU地 ECU GND	GND
PIN 11	N/A	PIN 2	ECU地 ECU GND	GND
PIN 12	门开关 (预留) Door switch (reserved)	PIN 3	N/A	
PIN 13	门开关 (预留) Door switch (reserved)	PIN 4	N/A	
PIN 14	主驾DHS开关 Main driver DHS switch	PIN 5	CAN_H	
PIN 15	副驾DHS开关 Co-driver DHS switch	PIN 6	KL30反馈检测 KL30 feedback detection	IDH
PIN 16	MMO天线高 MMO antenna high	PIN 7	N/A	
PIN 17	顶部天线高 (预留) Top antenna high (reserved)	PIN 8	SSB红色背光灯 SSB red backlight breathing lamp	ODH
PIN 18	左门天线高 LH door antenna high	PIN 9	ECU供电1 ECU power supply 1	
PIN 19	右门天线高 RH door antenna high	PIN 10	ECU 供电2 ECU power supply 2	
PIN 20	N/A	PIN 11	N/A	
连接器2 Connector 2		PIN 12	N/A	
PIN 1	N/A	PIN 13	CAN_L	
PIN 2	制动信号1 Brake signal 1	PIN 14	N/A	
PIN 3	N/A	PIN 15	N/A	
PIN 4	N/A	PIN 16	N/A	
PIN 5	SSB开关2接地 SSB switch 2 key ground	PIN 17	START 输出 START output	ODH
PIN 6	SSB-ACC指示灯 SSB-ACC indication lamp	PIN 18	K2 反馈检测 K2 feedback detection	IDH
PIN 7	SSB-IGN指示灯 SSB-IGN indication lamp	PIN 19	N/A	
PIN 8	SSB开关1接地 SSB switch 1 key ground	PIN 20	SSB冰蓝背光灯 SSB ice blue backlight breathing lamp	ODH
PIN 9	SSB开关1 SSB switch 1	备注: Note:		
PIN 10	SSB开关1 SSB switch 1	输入: I; 输出: O; 高有效: H; 低有效: L; 地: ground; valid;		
PIN 11	Keyin高置BCM Keyin walle-up BCM	A模拟量: D数字量; PW占空比; A analog quantity; D digital quantity; PW duty cycle.		

无钥匙启动按钮脚定义 Pin definition of passive start key				
PIN 号 Pin number	描述 Description	工作电压V Operating voltage V	电压范围V Voltage range V	工作电流mA Operating current mA
PIN 1	SSB开关1 SSB switch 1	5	4.5-5.5	5
PIN 2	SSB开关1地GND SSB switch 1 GND			5
PIN 3	SSB开关2 SSB switch 2	5	4.5-5.5	5
PIN 4	SSB开关2地GND SSB switch 2 ground GND			5
PIN 5	SSB-ACC指示灯 SSB-ACC indication lamp	12	9-16	Max15
PIN 6	SSB-IGN指示灯 SSB-IGN indication lamp	12	9-16	Max15
PIN 7	冰蓝背光灯 Ice blue backlight breathing lamp	12	9-16	Max15
PIN 8	背光灯指示地GND Backlit indicator lamp GND			
PIN 9	红色背光灯 Red backlight breathing light	12	9-16	Max15
PIN 10	N/A			

控制器管脚定义
Definition of control pin



PEPS一键启动系统 PEPS

一、架构原理

I. Architecture principle

系统原理示意图及ESCL转向柱锁管脚定义

System schematic diagram and ESCL steering column lock pin definition

系统原理示意图
System schematic diagram

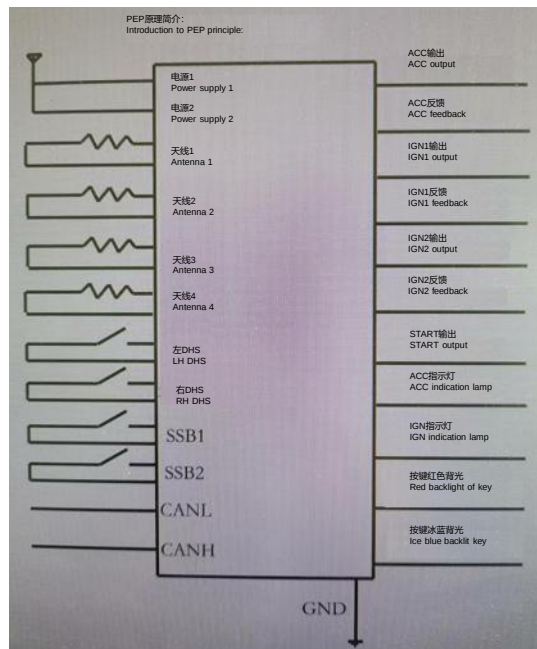


表2 针脚定义
Table 2. Pin definition

PIN	Definition
1	CAN_HIGH
2	NA
3	VBATT
4	CAN_LOW
5	NA
6	GND

E SCL管脚定义
E SCL pin definition



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

系统组成及部件介绍

Introduction to system composition and components

主要有ECU、ESCL、SSB（启动按钮）、ANT（天线）、DHS（门控微动开关）、FOB（钥匙）。

It mainly includes ECU, ESCL, SSB (start button), ANT (antenna), DHS (door control microswitch), FOB (key).

控制器ECU有三个插件，主要连接4组天线、2组门控微动开关、一个启动按钮、整车信号。

There are 3 plug-ins for the ECU control unit, which mainly connect to 4 groups of antennas, 2 groups of door control microswitches, one start button, and vehicle signals.

门侧天线仅与DHS配合使用，用于监测钥匙是否在开关一侧，不用按遥控也能检测。

The door side antenna is only used in conjunction with the DHS for monitoring whether the key is on the switch side, without being tested by pressing the remote control.

中控台天线用于监测钥匙是否在车内，不用按遥控也能检测。

The central console antenna is used for monitoring whether the key is in the vehicle, without testing by pressing the remote control.

升降窗、开关门需要按下钥匙，由PEPS控制器内部的IMMO基站监测。

It is required to press the key for lifting windows and switching doors, which is monitored by the IMMO base station inside the PEPS control unit.

顶置天线也可以用于钥匙检测，当中控天线监测不到钥匙时，可以将遥控器贴近顶置天线，尝试上电启动，此时适用于中控天线损坏的情况。

The overhead antenna can also be used for key detection. When the central control antenna cannot detect the key, attach the remote control close to the overhead antenna and try to power on and start. This is suitable for the damaged central control antenna.



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PEPS

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启动按钮SSB：仅与ECU交互，SSB具有三种功能：提供开关档位、显示当前电源状态、显示呼吸灯。

Start button SSB: it only interacts with ECU. SSB has three functions: providing switch position, displaying current power supply state, and displaying breathing light.

需要ECU提供输入信号地（开关档位地、背景光地）、背景灯控制信号，输出SSB的开关档位信号。

The ECU is required to provide input signal ground (switch position ground, background light ground), background light control signal, and switch position signal for SSB output.

输出开关档位状态为5V，其他接收灯光显示接收信号要求12V。

The state of the output switch position is 5 V, and other receiving lights show the receiving signal requirements of 12 V.

PEPS的ECU：

PEPS ECU：

插件1主要连接DHS微动开关、4个天线，这类信号都是一地一信号，地由控制器提供。

Plug-in 1 mainly connects to the DHS microswitch and 4 antennas. This kind of signal is one ground for one signal, with the ground being provided by the control unit.

插件2主要是SSB连接，另外输出Keyin信号、ACC电信号、ON电信号，并检测ACC反馈、ON电反馈。

Plug-in 2 is mainly used for SSB connection, and also outputs Keyin signal, ACC power signal, ON signal, and detects ACC feedback and ON feedback.

插件3主要是对系统供电供地、连接CAN线、检测30电反馈、输出SSB两种呼吸灯、输出启动信号硬线（给VCU和GW）。

Plug-in 3 is mainly used for power supply and grounding to the system, connecting the CAN bus, detecting 30 voltage feedback, outputting SSB for two breathing lights, and outputting hardwire for start signals (for VCU and GW).



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

钥匙确认

Confirmation of key

车辆在上电前，需要检测车辆遥控器是否车辆已匹配的合法钥匙，避免车辆被非法钥匙启动。

Before power-on of the vehicle, it is necessary to check whether the vehicle remote control has been matched with a legal key in case of illegal key start of the vehicle.

钥匙的确认是通过认证过程实现，具体流程如下：

Confirmation of the key is achieved through the certification process, with the specific process as follows:

- 钥匙在范围内。

The key is within the range.

- 一键启动信号有效。

Valid signal for the start / stop button.

- 钥匙在范围内，是PEPS驱动天线寻找钥匙，确认钥匙在范围内。

The PEPS drive antenna searches for the key and confirms that it is in scope.

过程中，需要确认周围无干扰源或干扰源较弱，尤其是中控台处不能放置可能产生干扰的物品。

In the process, it is necessary to confirm there are no interfering sources or weaker interfering sources in the surroundings, especially the items that may cause interference, which cannot be placed on the central console.

钥匙寻找确认过程，需要确保遥控器纽扣电池电量充足。

The key search and confirmation process must ensure the electrical voltage of the button battery in the remote control is sufficient.

- 钥匙确认在车内后，控制器与遥控钥匙进确认，保证合法性后，可以进行后续功能进行。

After the remote key is confirmed in the vehicle, confirm by testing it with the control unit. After ensuring the legality, subsequent functions can be performed.



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

转向柱解锁

Unlock the steering column

车辆在上电前，使用合法钥匙对转向柱锁进行解锁。

Before power-on of the vehicle, unlock the steering column lock with a legal key.

具体流程如下：

The specific process is as follows:

- 钥匙电OFF。
Key power OFF.
- SSB开关即启动按钮被按下；
The SSB switch, i.e. the start button, is pressed;
- 按照电源切换条件，在ESCL认证成功前不会上ACC及ON；且ESCL认证后才会解锁ESCL管柱。
According to the switching conditions for power supply, ACC and ON will not be turned on until the ESCL authentication is successful; and only after the ESCL is certified will the ESCL column be unlocked.
- 需要注意的是，PEPS和ESCL是两个独立的控制器，他们之间的交互是通过总线确认的，再此之前需要确认两者Pin码是否一致。
It should be noted that PEPS and ESCL are two independent control units, the interaction between which is confirmed through the bus. Before that, it is necessary to confirm consistency of the two pin codes.



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

上电过程

Power-on process

再确认钥匙合法性以后，解锁转向柱锁，即可正常上电，具体流程如下：

After re-confirming legality of the key, unlock the steering column lock for normal power-on. The specific process is as follows:

- 首次按下SSB（启动）按钮。

Press the SSB (Start) button for the first time.

PEPS输出硬线（Keyin）信号给到网关，网关发送报文给BCM，BCM在驱动电磁电源总开关上30电源。

PEPS outputs a hardwire (Keyin) signal to the gateway, which sends a message to the BCM. BCM then supplies 30 voltage for the drive electromagnetic master power switch.

PEPS控制器输出硬线（ACC电源），给到中央电器装置板K1继电器控制端，实现ACC电源上电，多媒体点亮屏幕。

The PEPS control unit outputs a hardwire (ACC power supply) to the K1 relay control terminal of the central electric panel, supplies power for the ACC power supply, and the multimedia lights up the screen.

PEPS同时接收ACC电源反馈，点亮背景灯，橙黄色。

PEPS also receives ACC power feedback and lights up the background light in orange yellow at the same time.

二次按下SSB（启动）按钮。

Press the SSB (Start) button for the second time.

PEPS控制器输出硬线（ON电源），给到中央电器装置板K2继电器控制端，实现ON电源上电，仪表点亮屏幕。

The PEPS control unit outputs a hardwire (ON power supply) to the K2 relay control terminal of the central electric panel, supplies power for the ON power supply, and the IC lights up the screen.

PEPS同时接收ON电源反馈，点亮背景灯，绿色。

PEPS simultaneously receives ON power feedback and lights up the background light in green.

- 上ON电源后，踩制动同时，按下SSB（启动）按钮。

After turning on the ON power, apply the brake and press the SSB (start) button at the same time.



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

上电过程

Power-on process

车辆上ON电源后，需要进一步启动或下电，具体流程如下：

After the vehicle is powered on with ON power, further start or power-off is required, with specific process shown as follows:

- 在ON电源下，踩下制动同时按下SSB（启动）按钮。

With ON power, apply the brake while pressing the SSB (start) button.

PEPS输出硬线（Start启动）信号给到网关和VCU，VCU综合启动条件，发送报文给发动机实现启动。

PEPS outputs a hardwire (start) signal to the gateway and VCU. VCU will synthesize the start conditions and send a message to the engine for start.

- 在ON电源下，未踩下制动，按下SSB（启动）按钮。

With the power ON, do not apply the brake, and press the SSB (start) button.

PEPS控制器直接判断下电，此时仪表及多媒体屏均下电，黑屏。（该现象可以反映制动信号状态）

The PEPS control unit directly judges the power-off, when the IC and the multimedia screen are both powered off with blank screen. (This phenomenon can reflect the brake signal status)

- 在已经启动的情况下，按下SSB（启动）按钮。

When the vehicle is already started, press the SSB (start) button.

PEPS控制器根据车速情况，车速 < 3kph时可以执行下电熄火动作。

According to the vehicle speed, the PEPS control unit can perform power-off and flameout actions when the vehicle speed is < 3 kph.

车速是车辆能否下电的因素之一。

The vehicle speed is one of the factors that determine power-off of the vehicle.



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

遥控开闭门锁

Open and close the door lock with a remote control

PEPS系统可以负责车门锁开闭、车窗玻璃升降的指令下发，前提是控制器的pin码一致，PEPS负责控制，DCM控制负责驱动执行电机执行，具体流程如下：

The PEPS system shall be responsible for opening and closing of the door lock and sending commands for window lifting, provided that PIN codes of the control unit are consistent, PEPS is responsible for control, and DCM control is responsible for drive execution and motor execution. The specific process is as follows:

- 车门锁控制：

Door lock control:

开关门锁：要求DCM与PEPS的pin一致且交互成功、车辆下电、开/闭锁信号有效（按下遥控器射频信号）。

Switch door lock: it requests pins of DCM and PEPS to be consistent with successful interaction, the vehicle is powered off, and the open / lockout signal is valid (press the remote control RF signal).

满足以上条件PEPS控制器给DCM门窗控制器发送解锁、或闭锁命令，DCM负责驱动电机执行。

If the above conditions are satisfied, the PEPS control unit will send unlock or lockout commands to the DCM, which is responsible for executing the drive motor.

- 车门玻璃升降控制：

Door window lifting control:

下降玻璃：车辆下电状态，解锁（门开），然后长按遥控钥匙解锁键2S（按遥控器2S），PEPS下发指令降下玻璃。

Descending the window: when the vehicle is in the power-off status, unlock (door open), press and hold the remote key to unlock the button for 2 s (press the remote control for 2 s), and PEPS will send a command to lower the window.

上升玻璃：车辆下电状态，闭锁（门关），然后长按遥控钥匙闭锁键2S（按遥控器2S），PEPS下发指令升其玻璃。

Lifting the window: when the vehicle is in the power-off status, lockout (door closed), then press and hold the lock key on the remote key for 2 s (press the remote control for 2 s), and PEPS will send a command to lift the window.

注：升降玻璃和开门锁，条件比较相近，可以通过功能比较，判断车辆对应故障是控制系统还是执行系统的故障。

Note: the conditions for lifting the window and opening the door lock are relatively similar. By means of function comparison, it can be judged whether the corresponding fault of the vehicle is a fault of the control system or the execution system.



PEPS一键启动系统

PEPS

二、功能逻辑

II. Functional logic

无钥匙开闭门锁

Open and close the door lock without a key

PEPS系统可以在不适应遥控器钥匙的情况下，实现车门的开门或锁门。

The PEPS system can open or lock the door without adapting to the remote control key.

- 系统组成：由车门把手上的微动开关按钮、对应车门内的感应天线、PEPS控制器、DCM控制器，门锁电机组成。

System composition: it consists of the microswitch button on the door handle, the corresponding induction antenna inside the door, PEPS control unit, DCM control unit, and door lock motor.

- 操作方法：车辆下电情况下，随身携带遥控器，车门关闭状态，按下车门微动开关，系统降控制器车门自动开锁或闭锁。

Operation method: when the vehicle is powered off, and the door is in the closed status with a carry-on remote control, press the door microswitch, and the system will automatically unlock or lockout the door with the control unit.

- 工作原理：

Working principle:

车门内置的天线，在一定距离内寻找钥匙遥控器，在识别到钥匙的情况下，系统与遥控器进行合法认证；

The built-in antenna of the door searches for the key remote control within a certain distance, which shall be legally certified with the system once the antenna recognizes the key;

认证通过后，驾驶员再按下同侧微动开关后，微动开关将影响信号传递给PEPS控制器，控制器识别到需要开关门；

After the certification is passed, the driver presses the microswitch on the same side again, which transmits the influence signal to the PEPS control unit, so that it identifies the need to open and close the door;

再检测是否满足条件，条件满足后，再发送指令给DCM控制器，DCM控制器提供影响驱动门锁电机执行指令。

Check again for the conditions, and send commands to the DCM control unit after the conditions are satisfied. The DCM control unit provides commands that affect execution of the drive door lock motor.

注：如果功能异常，可以对比遥控器其他功能是否正常，其他功能正常时，需要进一步检查该系统硬线信号和PEPS故障码。

Note: if the function is abnormal, compare it with other functions of the remote control for normality. If other functions are normal, further check is needed for the hard line signal and the PEPS DTC of the system.



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

控制按钮指示灯说明

Instructions for the control button indication lamp

PEPS系统的启动按钮，有指示灯可供使用和维修参考。

The start button of the PEPS system shall be provided with the indication lamp for use and maintenance reference.

说明：此处将方块状的指示灯称为按键指示灯，有琥珀色和绿色

Note: the square-shaped indication lamp here is called the key indicator lamp, with amber and green colors.

此处将字母（START STOP）状灯的背景灯称为呼吸灯，有冰蓝色和红色，线性渐亮渐灭。

Here, the background lamp of the letter-shaped (START STOP) lamp is called breathing light, with ice blue and red colors and gradually linear on and off.

- **按键指示灯：**四种状态：OFF关闭状态、琥珀色、绿色、绿色闪烁

Key indicator lamp: four statuses: OFF, amber, green, green flashing

休眠、或者Keyin有效但电源OFF：OFF

Sleep, or valid Keyin but the power supply is OFF: OFF

电源为ACC电：琥珀色/橙黄色

The power supply is ACC power: amber / orange yellow

电源为ON/EnginON/Stsr电时：绿色

When the power supply is ON / EnginON / Stsr power: green



PEPS一键启动系统
PEPS

二、功能逻辑

II. Functional logic

控制按钮指示灯说明

Instructions for the control button indication lamp

呼吸灯颜色变化：四种状态：OFF、红色闪5S、冰蓝常亮、冰蓝闪5min。

Color change of the breathing light: four statuses: OFF, red flashing 5 s, ice blue constantly on, ice blue flashing 5 min.

休眠、遥控门解锁信号：OFF。

Sleep, remote control door unlock signal: OFF.

Keyin无效且任一车门开启信号：冰蓝色灯闪烁一轮5min（车门状态从关闭变为开启时）。).

Keyin is invalid with the open signal of any door: one round of ice blue light flashing for 5 minutes (when the door status changes from close to open).

钥匙或ESCL认证通过，上ACC或ON电：冰蓝色常亮。

The key or ESCL authentication has passed, turn on the ACC or ON power: ice blue is constantly on.

钥匙、VCU、ESCL认证失败，或者ESCL解锁失败，红色闪烁5S。

Key, VCU and ESCL authentication failed, or ESCL unlock failed, with red flashing for 5 seconds.

钥匙、VCU、ESCL认证失败，红色闪烁5S后：如果认证前是OFF就恢复至OFF，原为冰蓝恢复冰蓝色。

Key, VCU and ESCL authentication failed, after 5 seconds of red flashing: if it were OFF before authentication, restore to OFF, and to ice blue if it were originally ice blue.

钥匙认证和ESCL认证通过，切换到OFF：冰蓝色保持5min。

As key authentication and ESCL authentication are passed, switch to OFF: keep ice blue for 5 minutes.

发动机启动后，进入Engine ON，指示灯熄灭。

After the engine starts, enter Engine ON, and the indication lamp will go out.

熄火到OFF：冰蓝色常亮。

From flameout to OFF: ice blue is constantly on.

Keyin信号无效后：冰蓝色背景灯渐灭，时间3S。

After the Keyin signal is invalid: the ice blue background light gradually fades out for 3 seconds.



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控制在仪表的显示

Control display on the IC

● 仪表播报PEPS相关提示的处理方法如下:

Solutions for the relative prompts to IC broadcast PEPS are as follows:

未找到钥匙: 在OFF/ACC/ON/Start均可能产生, 需要重新触发找钥匙, 下电、锁门、远离车门等待5min。

Key not found: it may occur in OFF / ACC / ON / Start statuses, which requires re-triggering to find the key, power off, lock the door, leave away from the door and wait for 5 minutes.

如果反复均不能找到, 查看遥控器电池电量或更换新电池验证。

If the key cannot be found with repeated searching, check the battery level of the remote control or replace a new battery for verification.

查看周边环境和车内环境是否存在干扰源, 排除干扰源后再行测试。

Check for interfering sources in the surrounding environment and inside the vehicle, and retest after removing the interfering sources.

使用陕汽诊断仪VDI读取PEPS控制器故障 (短接K1和K2继电器后读取), 查看是否存在相关故障。.

Read faults of PEPS control unit by using Shaanxi Automobile Diagnostic Unit VDI (read after short circuiting the K1 and K2 relays), and check for relevant faults.

一键启动按键卡滞: 按键持续有效30S, 判断故障;

PEPS key is stuck: press the key constantly for 30 valid seconds and judge the fault;

根据控制器管脚定义, 测量线束电压, 检查线束。

According to the pin definition of control pin, measure the wire harness voltage and check the wire harness.

转向柱锁定失败: 检查PEPS的线束, 电源、地线、Can线是否正常。

Steering column lockup failed: check for the normal status of PEPS wire harness, power supply, ground wire, and CAN bus.

检查PEPS机械是否损坏。

Check the PEPS machinery for damage.

检查ESCL的pin是否与PEPS的一致。

Check the pin of ESCL for consistence with that of PEPS.

PEPS发出锁定请求, 但是ESCL回复锁定失败, 需要使用专用设备记录查看总线交互报文。

Although PEPS sends a lock request, the lockup response of ESCL fails. It is necessary to view the bus interaction message by using a special equipment record.

