X5000、X6000电控系统故障
X5000 and X6000 electronic control system faults

快速排查方案
Quick troubleshooting method

Troubleshooting method of electronic control system
SHACMAN

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一、背景介绍
I. Background introduction

2022年我公司X5000、X6000系列产品出口已突破2千台，并且有替代X3000的趋势，X5000 、X6000系列产品属于CAN总线电控构架，其控制原理与传统的保险、继电器、装置板电器系统完全不同，这也就导致了市场上维修这种类型产品的力量尚且薄弱。
In 2022, the export of our company's X5000 and X6000 series products exceeded 2,000, showing a tendency to replace the X3000. The X5000 and X6000 series products belong to the CAN bus electronic control architecture, and their control principles are completely different from traditional electrical system of fuse, relay, and device board electrical systems, which leads to weak maintenance capabilities for this type of product in the market.

由于产品价格和技术完善周期等原因，以GW网关、BCM车身控制器、CPD装置板、DCM门窗控制器、VCU整车控制器为核心的整车电控系统稳定性较差，有些内部数据研究院还在完善中，这也导致了数据错乱造成的显示器黑屏、无法启动、无法上电、AMT无法挂挡等“假故障”时常发生。
Due to reasons such as product prices and technology improvement cycles, the stability of the vehicle electronic control system which mainly involves the GW gateway, BCM body controller, CPD device board, DCM door and window controller, and VCU vehicle controller, is relatively poor. For some internal data, the research institute is still in the process of analysis and improvement, which also leads to the frequent occurrence of "false faults" such as black screens on the display, failure to start, failure to power on, and AMT failure to engage gears caused by data confusion.

第二部分
Part II



快速检修“三板斧”
方法和原理讲解

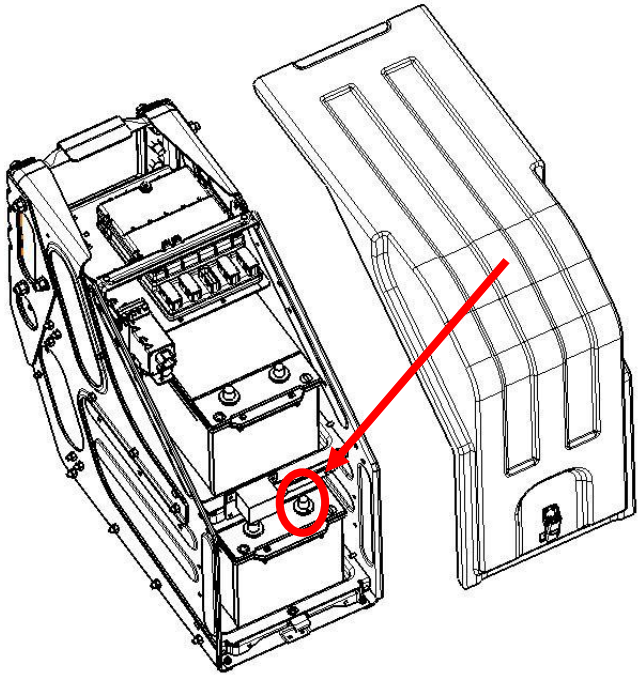
Three tips for quick troubleshooting
Methods and principles

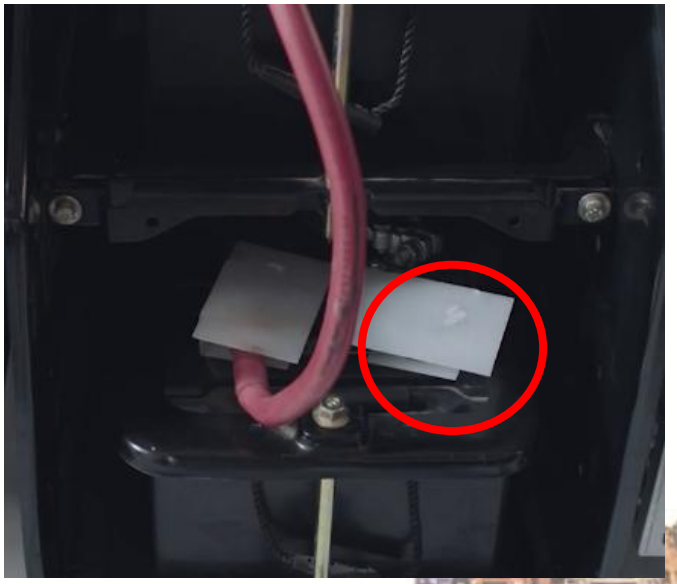
二、“三板斧”方法及讲解
2. There tips and their details

一板斧，系统重启
Tip 1, system restarting

1、方法：车辆熄火，关闭电源总开关，拆下负极大线，等待5分钟后系统将完全下电，再安装负极大线后打开电源总开关。
1. Method: Turn off the vehicle, switch off the master power switch, remove the negative pole wire, wait for 5 minutes and then the system will be completely powered off, and then turn on the master power switch after installing the negative pole wire.

2、原理：X5000、X6000系列平台电器系统主要依靠众多的电控模块进行工作，电控模块为了保证随时读写的特性，即便在待机情况下也不会清空运行内存，这就导致临时资料中的碎片积累，运行内存行呢下降，完成一次系统重启可以有效的清空系统运行内存，恢复模块性能，可以解决60%的电控系统故障，例如：黑屏、各种ECU离线等。
2. Principle: The electrical systems of the X5000 and X6000 series platforms mainly rely on numerous electronic control modules for operation. In order to ensure read-write characteristics at any time, the electronic control modules will not empty the operating memory even in standby mode, which leads to the accumulation of fragments in temporary data and a decrease in operating memory. Completing a system restart can effectively clear the system's operating memory, restore module performance, and solve 60% of electrical control system faults, for example, black screen, various ECU offline, etc.



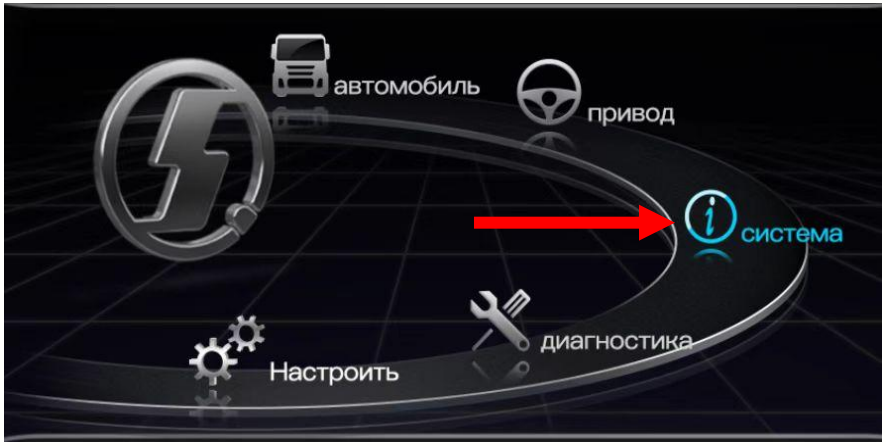


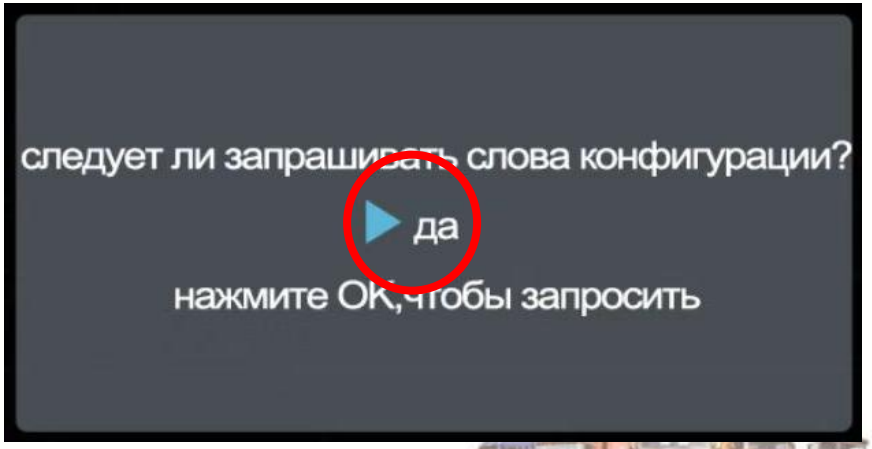
二、“三板斧”方法及讲解
2. There tips and their details

二板斧，电控模块重配置
Tip 2, re-configuration of ECU

1、方法：打开电源，整车上电后，在仪表配置选项，选择配置字下发，成功下发后完成电控模块重配置。
1. Method: Turn on the power to supply power to the entire vehicle. Under instrument configuration options, select the configuration bits and issue the command; after the command is implemented, the ECU re-configuration is completed.

2、原理：电控模块为了应对不同车型的需要，内部ROM集成了不同配置的应对逻辑，这些逻辑在使用中偶尔会出现调用不准确，长期积累下电控模块会因调用故障出现自我关闭，进行一次电控模块重配置可以有效的完成ROM 配置恢复，可以解决10%的电控系统故障，例如：PEPS不启动、怀挡失效等。
2. Principle: In order to meet the needs of different car models, the internal ROM of the ECU integrates response logic of different configurations. The logic module may occasionally be inaccurately called during use. After long-term accumulation, the electronic control module will self-shut down due to calling failures. Performing an ECU reconfiguration can effectively complete the ROM configuration recovery, and can solve 10% of electronic control system faults, such as PEPS not starting, cloumn shifter failure, etc.



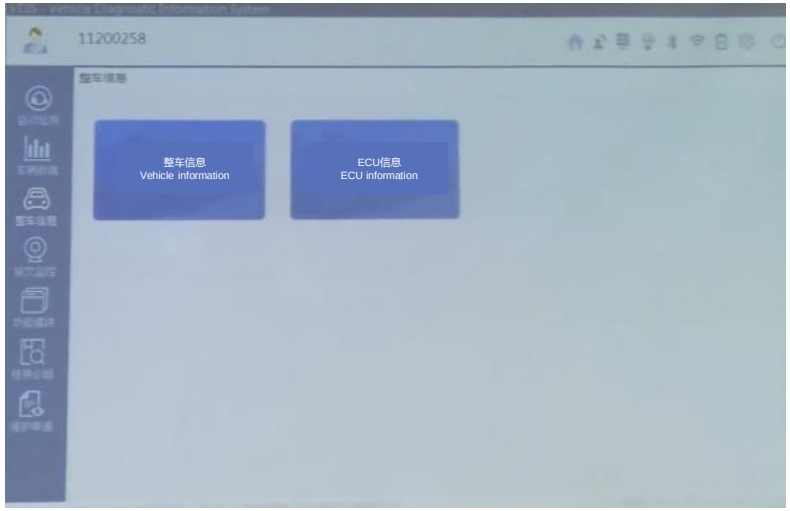


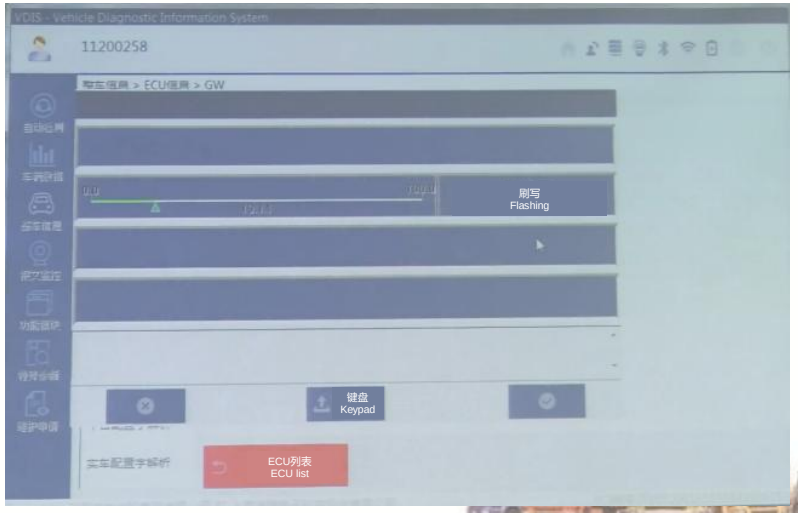
二、“三板斧”方法及讲解
2. There tips and their details

三板斧，电控模块刷写
Tip 3, electronic control module flashing

1、方法：在确定某一模块存在故障，且前两板斧无效的情况下，使用VDI设备对模块进行程序刷写，是在不更换零部件情况下的最后手段；打开电源，整车上电后，接入VDI设备，是用笔记本电脑登陆账号，按模块刷写流程进行刷写操作，成功后需要下发配置字完成电控模块重配置。
1. Method: When it is determined that a certain module is faulty and the first two tips are invalid, using VDI equipment to program the module is the last resort without replacing parts. Then, turn on the switch to power the whole vehicle, to access the VDI device, use a laptop to log in to the account, and perform the flashing operation according to the module flashing process. After it succeed, you need to issue the configuration bits to complete the ECU reconfiguration.

2、原理：电控模块在长期使用中，因特殊原因（突然断电、丢包、逻辑错误等）运行软件会出现一些逻辑错误，重新进行软件刷写就相当于计算机的重做系统，相当于把电控模块恢复到了初始状态，可以解决20%的电控系统故障，如果软件刷写仍不能解决当前故障，那就只能选择更换了。
2. Principle: During long-term use of the electronic control module, some logical errors will occur when running the software due to special reasons (sudden power outage, packet loss, logic errors, etc.). Re-flashing the software is equivalent to redoing the computer system, which is equivalent to restoring the electronic control module to its initial state can solve 20% of electronic control system failures. If the current failure cannot be solved by software flashing, then the only option is to replace it.





第三部分
Part III

模块（ECU）
Module (ECU)

刷写流程
Flashing process

三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

刷写条件：电瓶电压超过24V，钥匙上电状态，车速为0，档位为空挡，手刹拉起；
Flashing conditions: battery voltage exceeds 24V, power on with the key, vehicle speed is 0, gear is in neutral position, and handbrake is on;

注意事项：个别模块特殊（GW网关、BCM车身控制器、CPD装置板等），控制整车30电，在刷写的时候整车会断30电，诊断接口没电，有两个解决办法：
Note: Some modules are special (GW gateway, BCM body controller, CPD device board, etc.), which control 30% of the entire vehicle's power. During flashing, the entire vehicle will lose 30% of power, and the diagnostic interface will have no power. To those problems, there are two solutions:

1、蓝牙头外接电源（USB线）；
1. External power supply vie Bluetooth connector (USB cable);

2、装置板上的 30接线柱和B+接线柱，在刷程序时候短接一下，临时给30供电
2. The 30 terminal and the B+ terminal on the device board can be short-circuited when flashing the program, so as to temporarily supply power to the 30 terminal

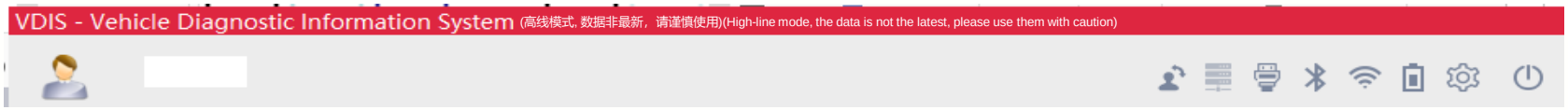
软件标识
Software identification

三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

在线模式：正常使用下的模式，此时系统处于联网状态
Online mode: under the mode of normal use, the system is connected to the Internet

离线模式：网络异常，在该模式期间系统无法正常登陆，车辆数据、软件包都无法更新，请寻找可以联网的地区使用。

Offline mode: The network is abnormal. During this mode, the system cannot log in normally, and the vehicle data and software packages cannot be updated. Please find an area where the Internet can be used.

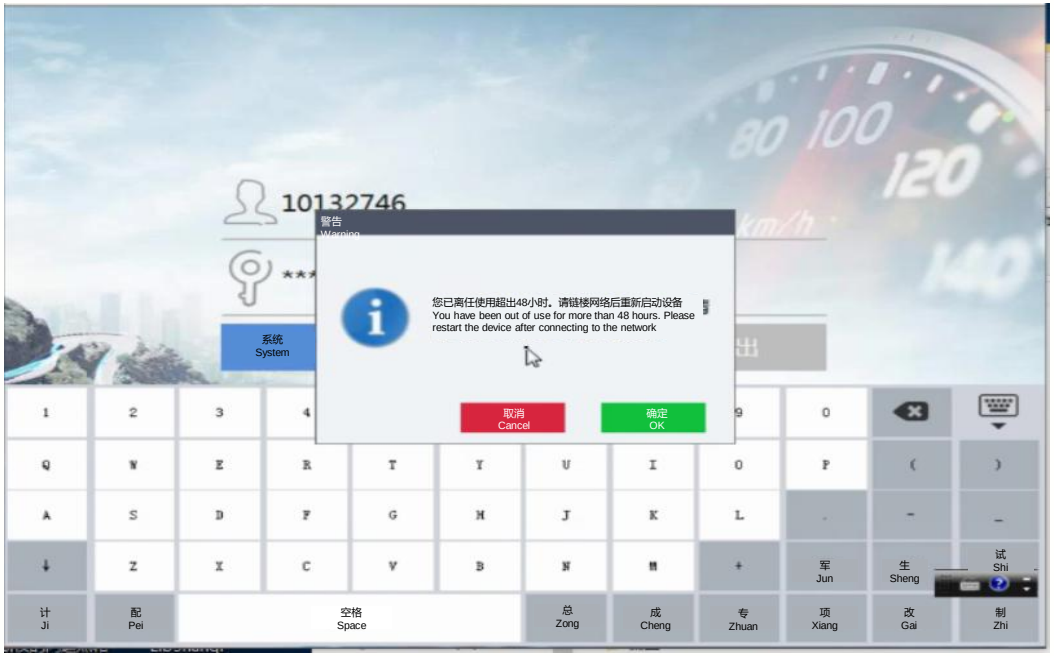


三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

- 首先笔记本必须连接上网络
  First, the laptop must be connected to the network

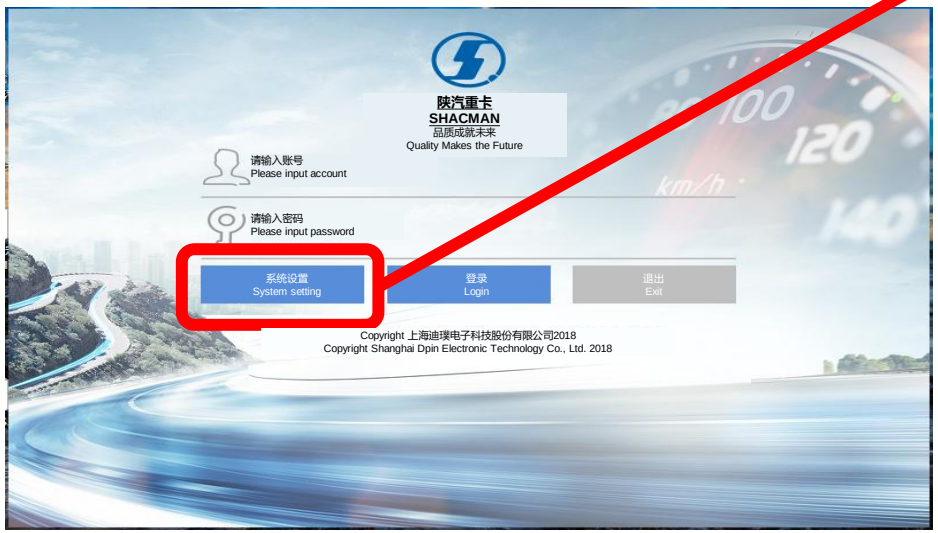
- 打开蓝牙功能，与VDI蓝牙配对（蓝牙编号：DEP-VDI-18-04-0_）,配对密码为1234
  Turn on the Bluetooth function and pair with VDI Bluetooth (Bluetooth number: DEP-VDI-18-04-0_), and the pairing password is 1234

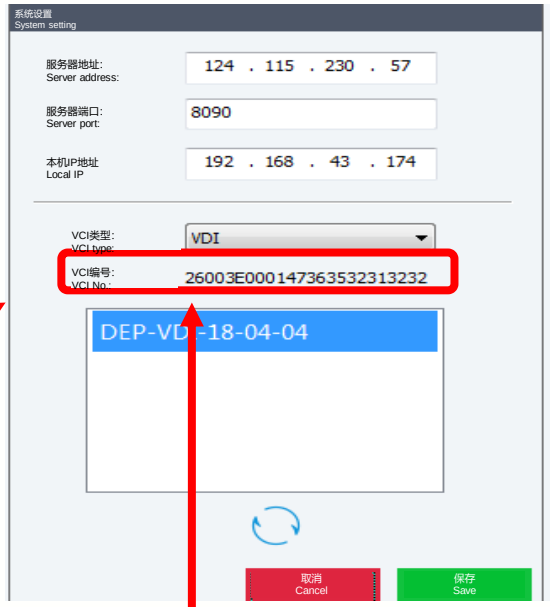
- 把OBD蓝牙接头插入车上OBD口，蓝牙头上灯闪烁表明物理连接正常（需要通过OBD接口给蓝牙头供电）
  Plug the OBD Bluetooth connector into the OBD port on the car, the light on the Bluetooth head will flash to indicate that the physical connection is normal (the Bluetooth head needs to be powered through the OBD interface)



三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

- 点击“系统设置”
  Click "System settings"
- 服务器IP：数据管理平台地址(124.115.230.58)
  Server IP: Data management platform address (124.115.230.58)
- 端口号：默认为8090
  Port No.: 8090 (default)
- 本地地址：自动获取设备的IP
  Local IP address: automatically obtaining
- VCI类型：VDI(蓝牙头)
  VCI type: VDI (Bluetooth head)
- VCI编号：软件会自动获取
  VCI No.: automatically obtaining
- 点击保存，退出设置
  Click "Save" to exit the settings





编号出现后说明信号连接建立正常
The number appears, indicating the signal connection is established normally

三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

1.填写同户名和密码（原始密码与用户名一致），选择登录按钮；
1. Fill in the same user name and password (the original password is the same as the user name), and click the login button;

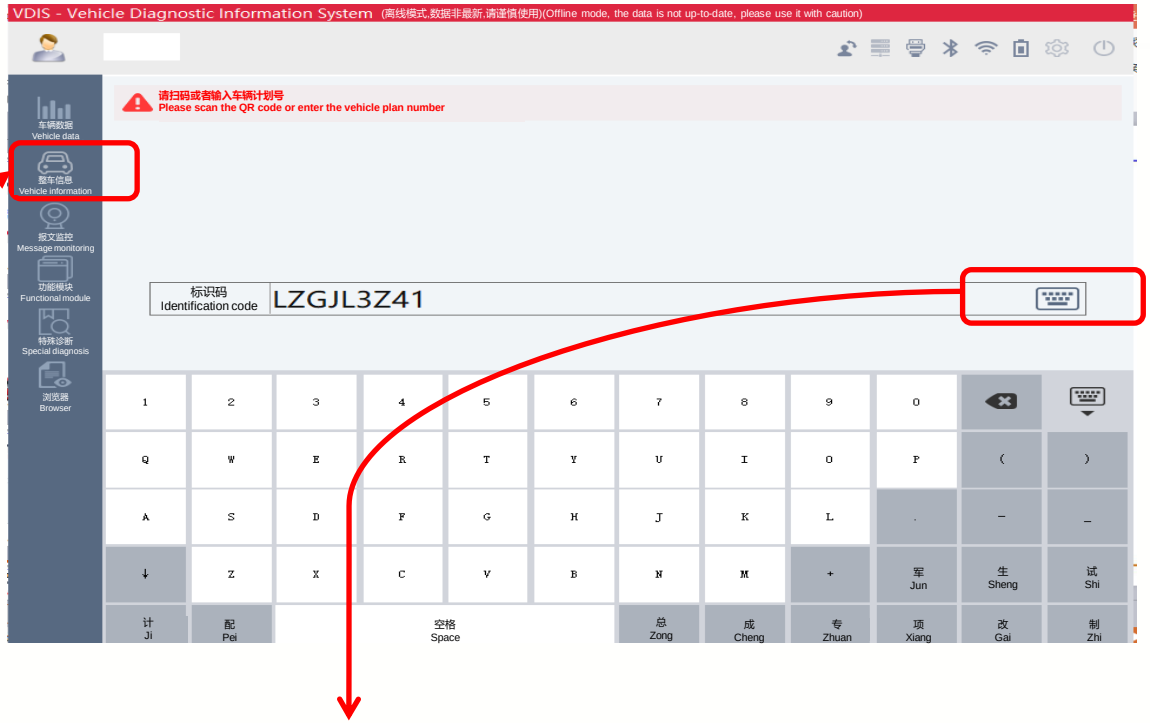
点击退出，软件关闭
Click the Exit and the software will close

三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

此处输入VIN有两种方式：
There are two ways to input the VIN here:

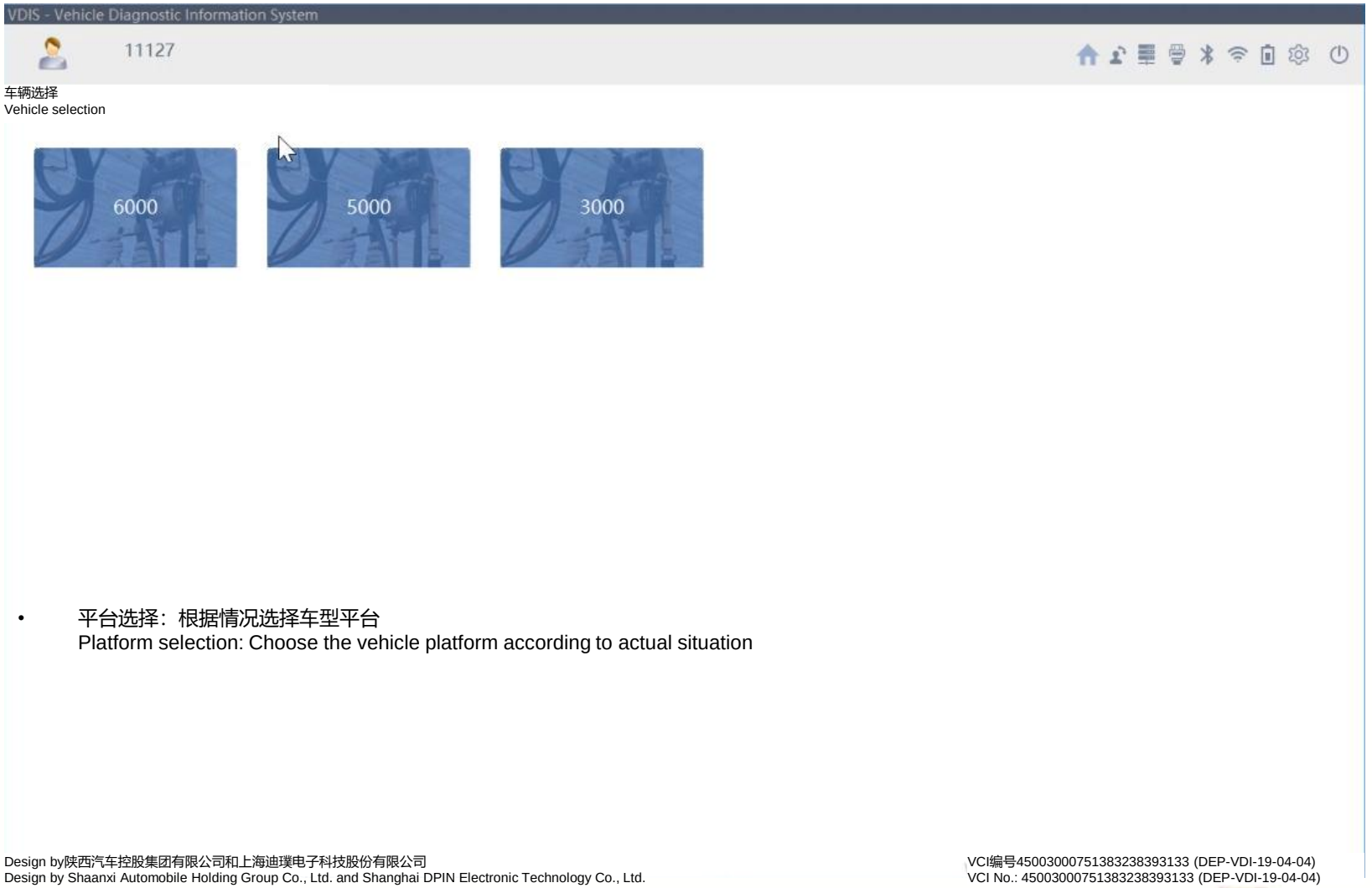
1.自动获取
1. Automatically obtaining

2.手动输入
2. Manual input



注：先使用自动获取，如果获取失败，进行手动输入
Note: Automatically obtain first; if it fails, enter VIN manually.

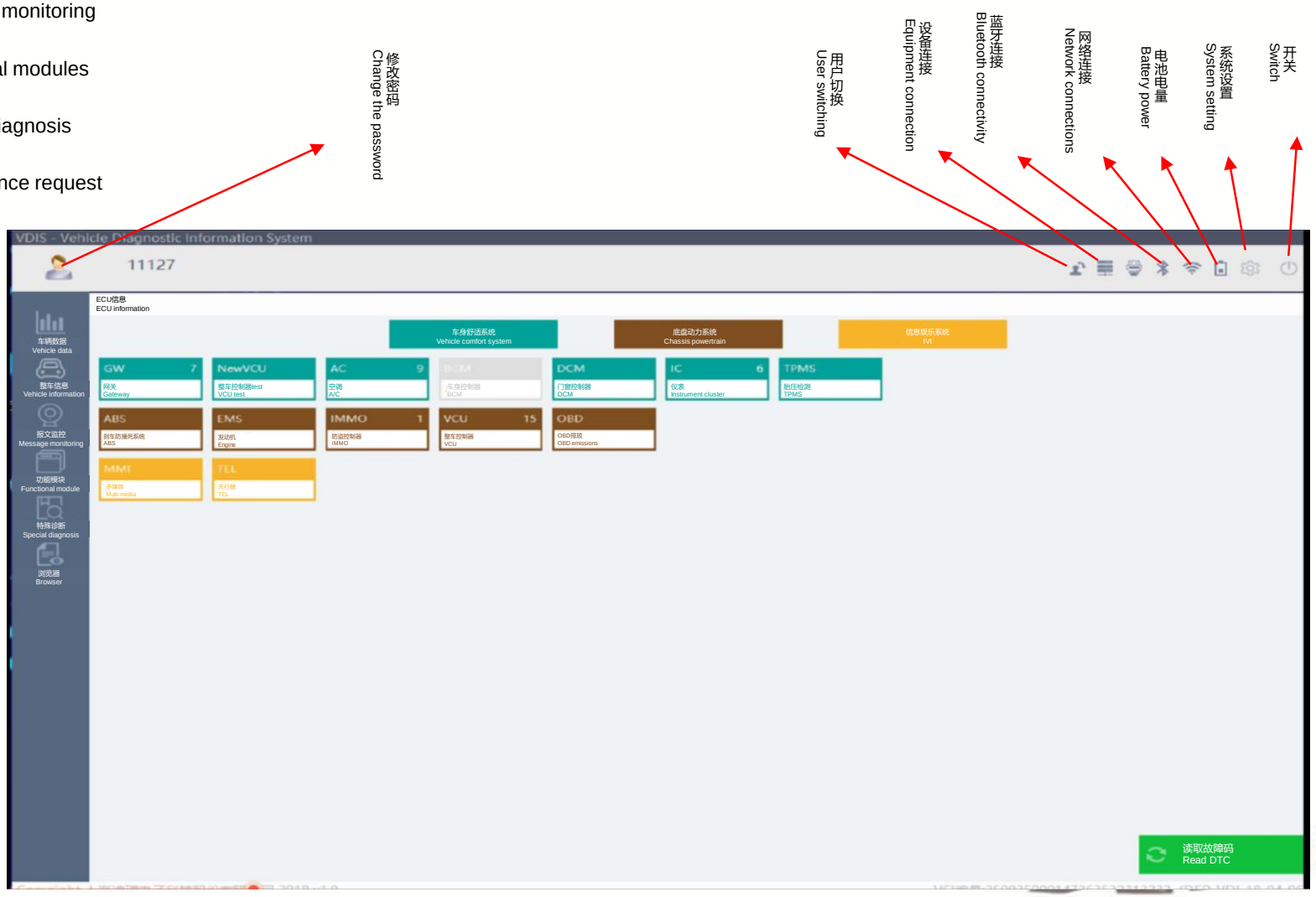
三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process



- 平台选择：根据情况选择车型平台
  Platform selection: Choose the vehicle platform according to actual situation

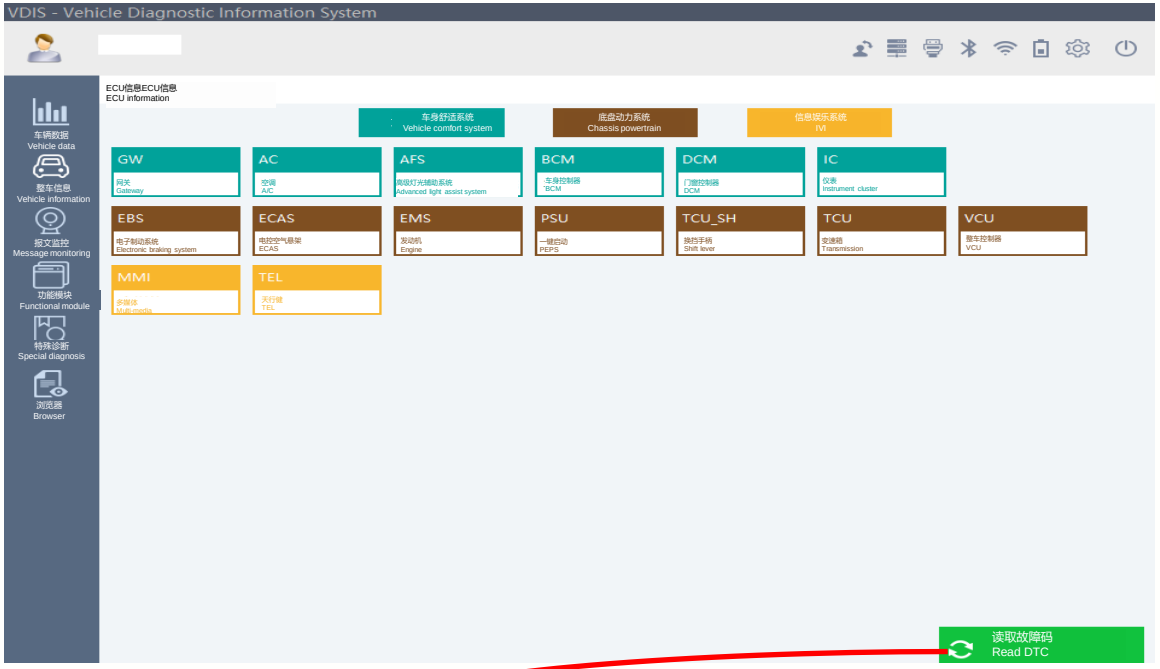
三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

- 1.整车信息
  1. Vehicle information
- 2.报文监控
  2. Message monitoring
- 3.功能模块
  3. Functional modules
- 4.特殊诊断
  4. Special diagnosis
- 5.维护申请
  5. Maintenance request



三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

- 1.输入计划号/VIN码
  1. Enter the plan No./VIN
- 2.点击确认，软件会根据输入的号码获取该车安装的所有控制器，并显示到右侧屏幕上
  2. Click "OK", the software will obtain the information of all control units installed in the car based on the input number and display them on the right screen.
- 3.点击想要检测的控制器
  3. Click the control unit you want to detect
- 4.如果控制器不在线，会呈现灰色,如 DCM,LDWS,TMS等
  4. If the control unit is not online, it will be in gray, such as DCM, LDWS, TMS, etc.
- 5.点击读取故障，软件会自动读取该车有所控制的故障码，并将结果显示到相对应的控制器的右上角，如：GW,AC,CPD等
  5. Click "Read fault", the software will automatically read the fault codes of the vehicle, and display the results in the upper right corner of the corresponding controller, such as: GW, AC, CPD, etc.
- 6.右下角的读故障码为连续读取整车所有故障码
  6. The DTC in the lower right corner is to continuously show all the fault codes of the whole vehicle



三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

1.点击对应模块后，右侧界面会出现一列菜单
1. After clicking the corresponding module, a list of menus will appear on the right interface

2.基本信息：读取控制的相关标识符左侧是名称，右侧是具体的值
2. Basic information: The left side of the relevant identifier of the read control shows the name, and the right side shows the specific value

3.当前故障
3. Current fault

4.历史故障
4. Historical faults

5.清除故障码
5. DTC

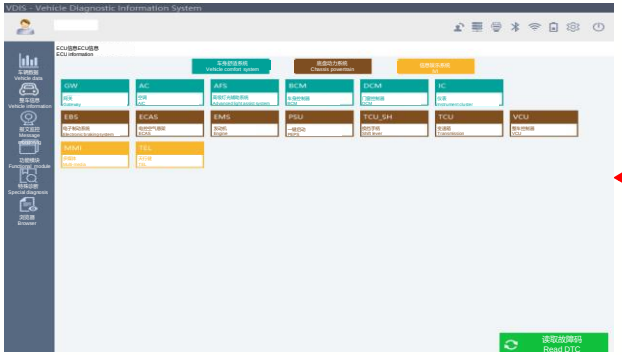
6.控制器标识:读取控制的标识符信 息值
6. Sign: read the identifier information value of the control

7.执行器测试
7. Actuator test

8.例程控制
8. Routine control

9.ECU刷写
9. ECU flashing

10.写参数
10. Parameter writing



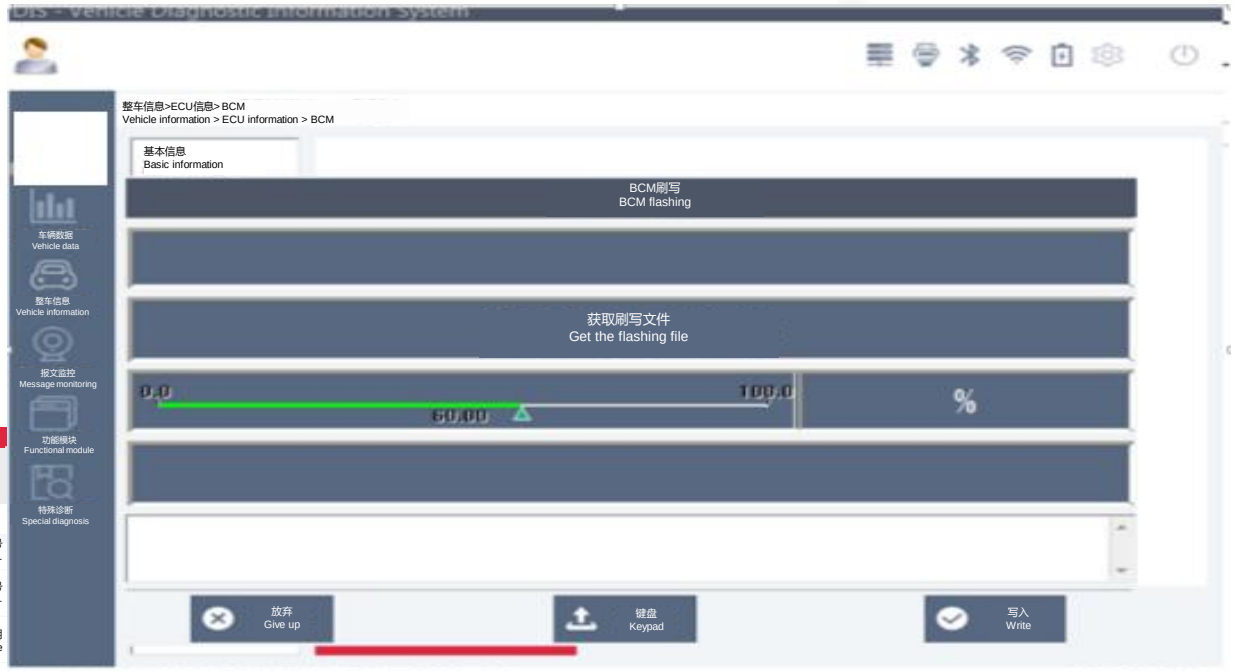
三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

模块刷写注意事项：
Precautions for module flashing:

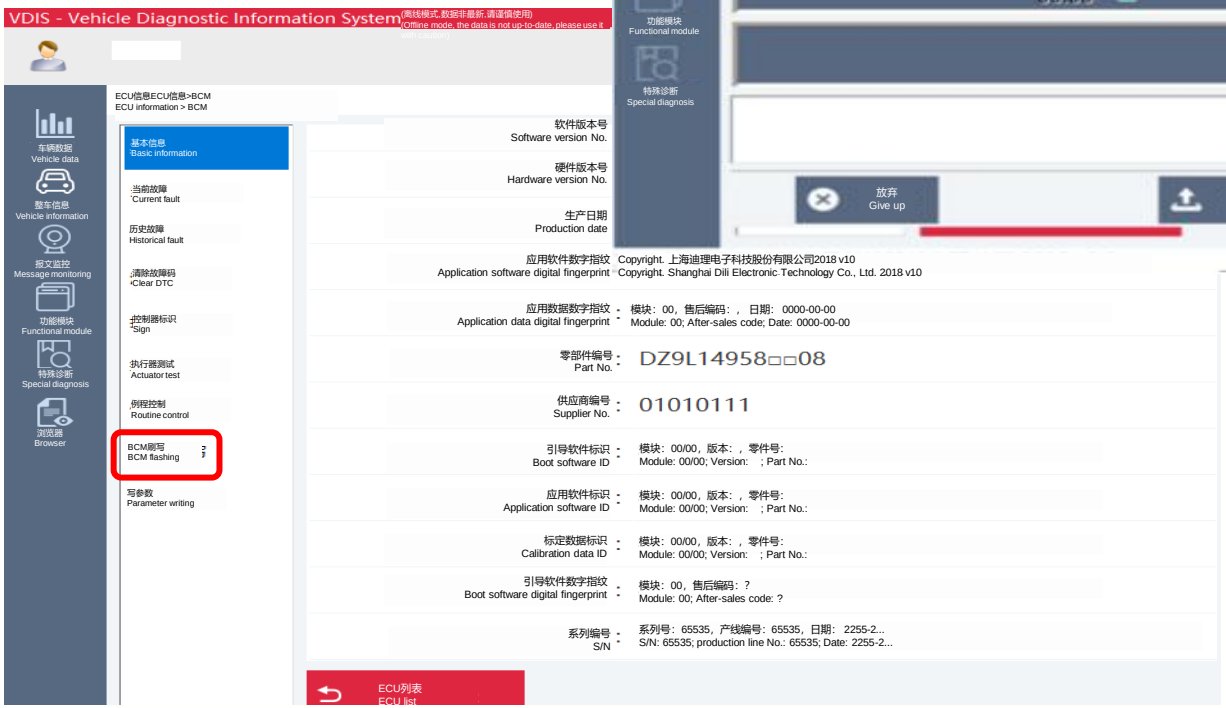
1、系统必须在线
1. The system must be online

2、刷写前不要进行其他项目
2. Do not carry out other operations before flashing

3、进入过其他项目后，需要重新进入系统再进行刷写
3. After entering other items, you need to re-enter the system before flashing

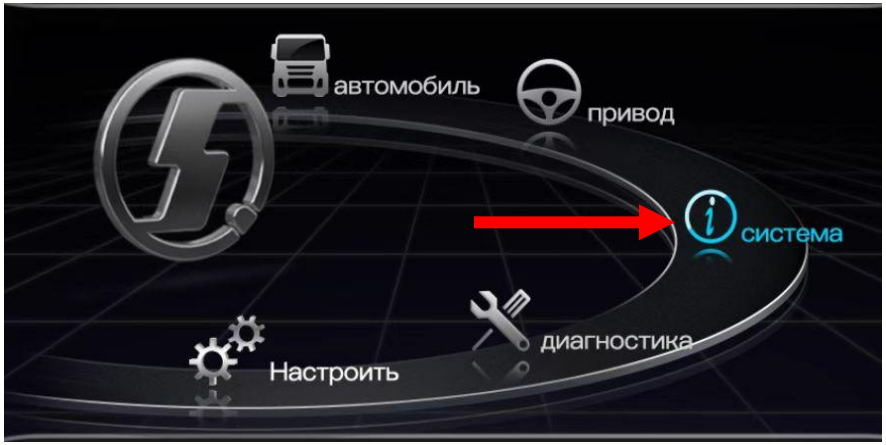


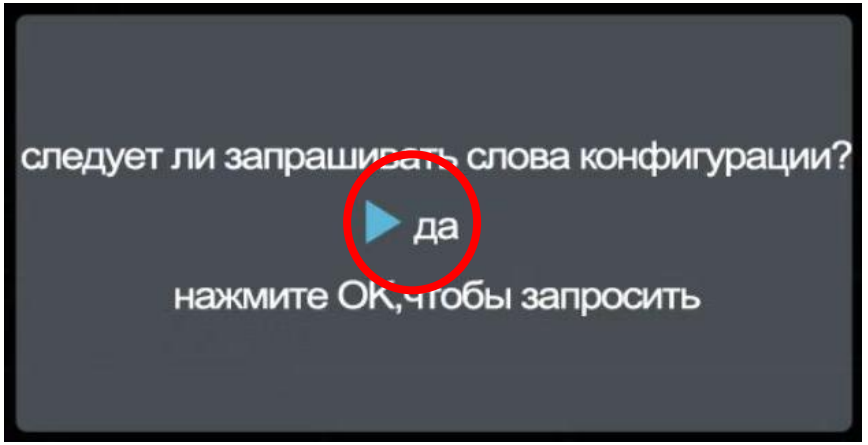
VCI编号：未连接。
VCI No.: not connected.



三、电控模块（ECU）刷写流程
III. Electronic control module (ECU) flashing process

模块刷写成功后，应进行一次配置字下发。
After the module is successfully flashed, the configuration bits should be issued once.





结语
Epilogue

我们将继续以“客户满意”为宗旨，传承陕汽“贴心服务”理念，不断的提高产品售后服务质量，让客户放心用车，使客户真真切切感受到陕汽专业化的服务，保障车辆出勤率，为客户创造更大价值！

We will continue to take "customer satisfaction" as our purpose, inherit Shaanxi Automobile's "intimate service" concept, continuously improve the quality of product after-sales service, so that customers can use the car with confidence, truly experience Shaanxi Automobile's professional service and guarantee the vehicle available rate. We will create greater value for customers!

The End