



东风乘用车

# 转向控制系统



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# Electric Power Steering



- 1、熟悉E70转向控制系统的组成及各部件的功用
- 2、熟悉E70转向控制系统的工作原理
- 3、能对E70转向控制系统进行电路的故障诊断与排除
- 4、掌握E70转向控制器的拆装更换方法及注意事项

# Objectives



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1. Familiar with the composition of E70 EPS and functions of its components
2. Familiar with the working principle of the E70 EPS
3. Troubleshoot the E70 EPS
4. Master the removal and refitting and replacement methods and precautions of the E70 EPS

# 一、E70转向控制系统概述



采用先进的电动EPS助力转向，转向更轻便、更稳定、更精准、助力耗能更低相对于液压助力，电动助力能够降低多达2.5%的整车油耗

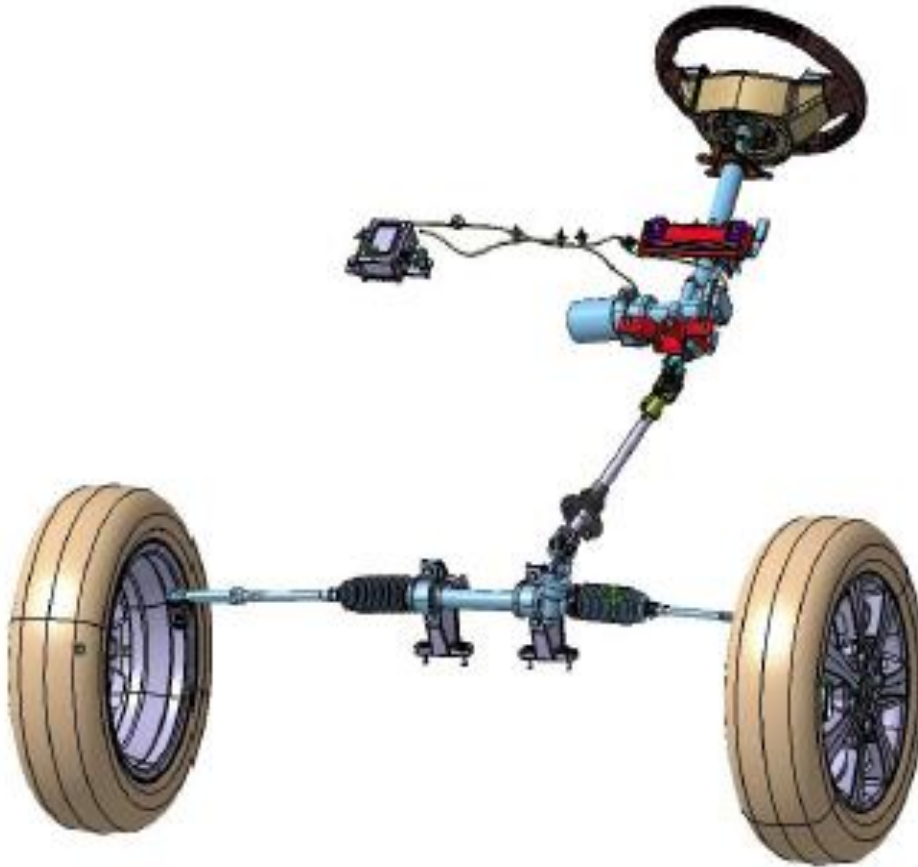


# I. Overview of E70 EPS



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With the advanced EPS applied, steering is easier, more stable, more precise, and lower power consumption. Compared with the HPS, the EPS can reduce vehicle fuel consumption by up to 2.5%.

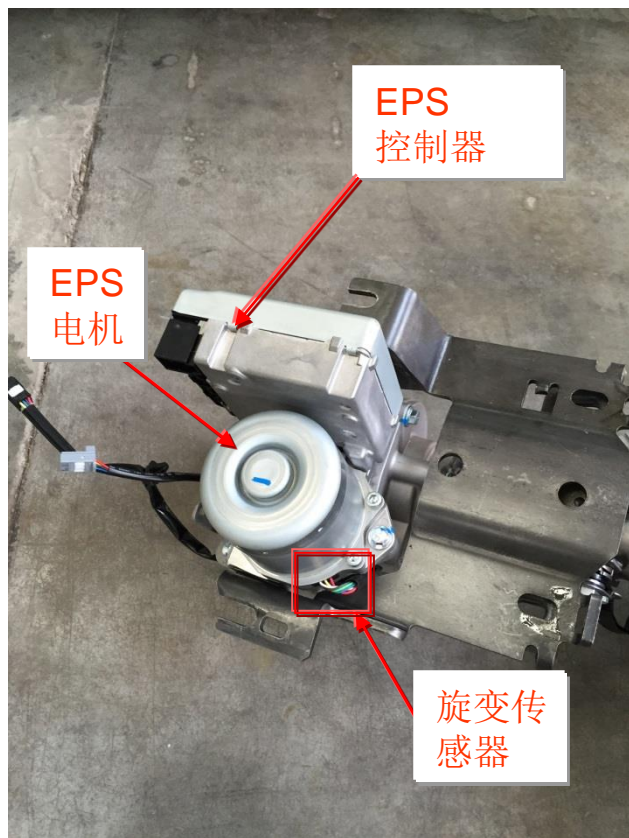


# 一、E70转向控制系统概述



电动助力转向系统 ( Electric Power Steering , 缩写EPS ) 是一种直接依靠电机提供辅助扭矩的动力转向系统.

EPS 主要由**扭矩传感器**、**电机 ( 内置旋变传感器 )**、和**电子控制单元 ( ECU )** 等组成。



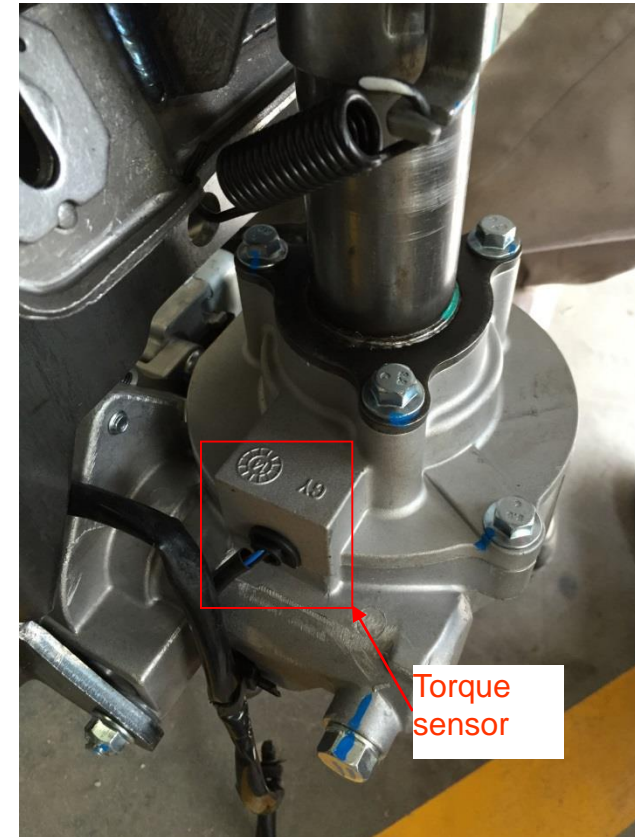
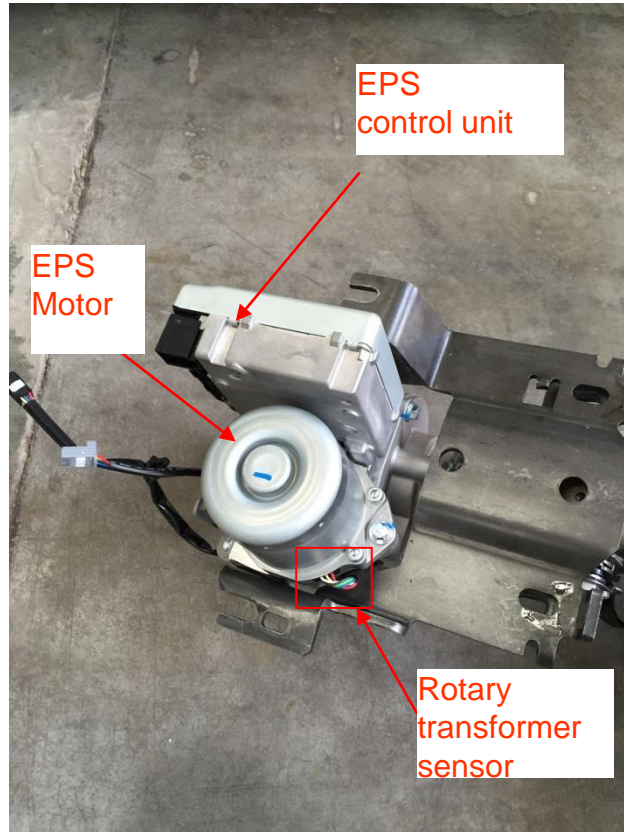


# I. Overview of E70 EPS



- Electric Power Steering (EPS) is a power steering system of which the auxiliary torque is directly provided by the motor.

The EPS is primarily composed of torque sensor, motor (built-in rotary transformer sensor), and ECU, etc.





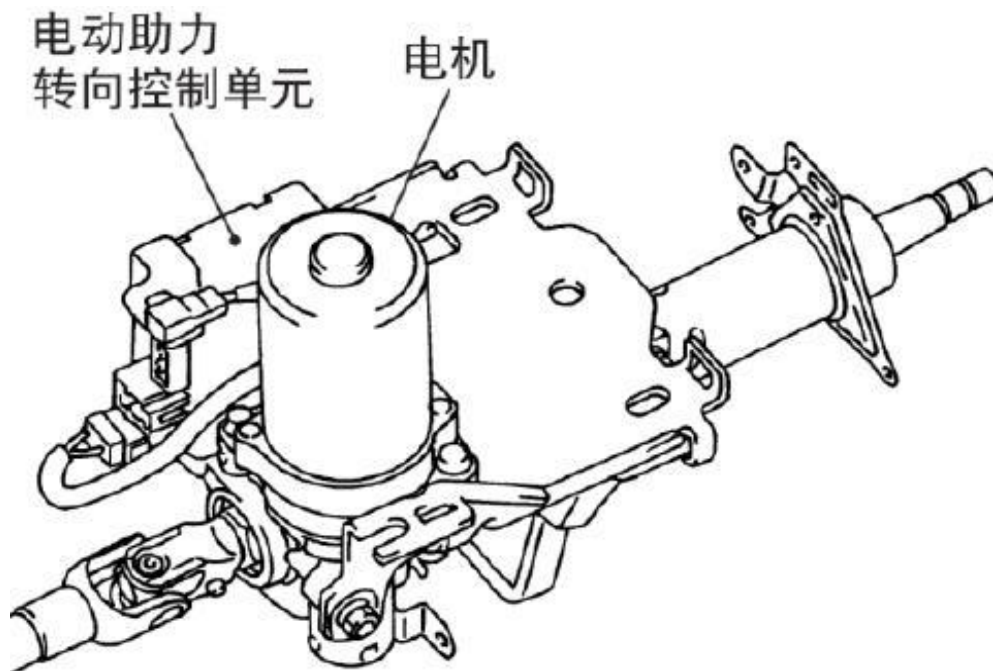
# 一、E70转向控制系统概述



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## EPS工作原理

EPS控制单元接收扭矩传感器的转向力矩信号与车速信号数据，并向电机输出符合条件的最佳助力力矩信号以满足当前的转向助力需求。



# I. Overview of E70 EPS



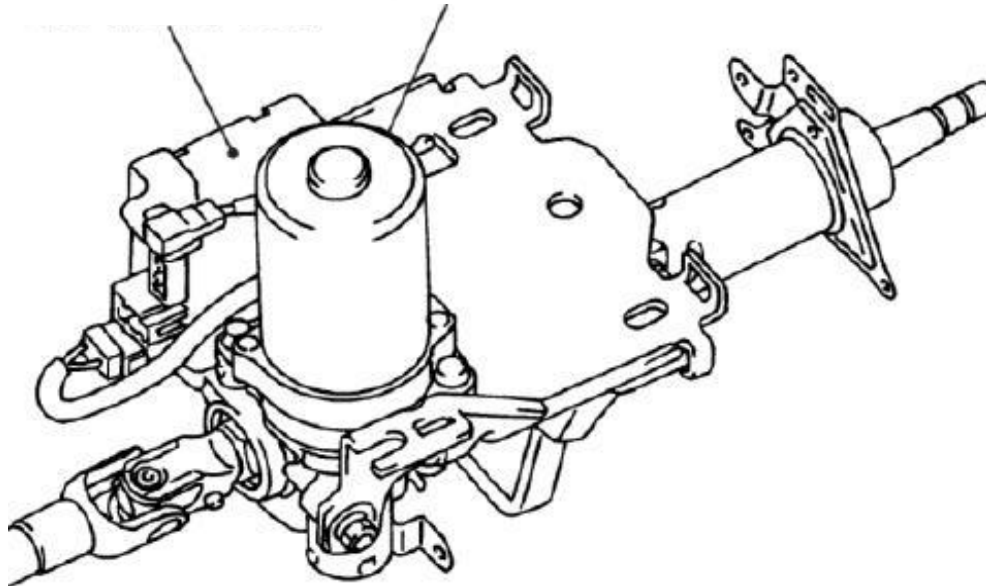
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## Working principle of EPS

The EPS control unit receives the steering torque signal from the torque sensor and the vehicle speed signal data, and outputs an optimum assist torque signal to the motor to meet the current steering assist demand.

EPS control unit

Motor



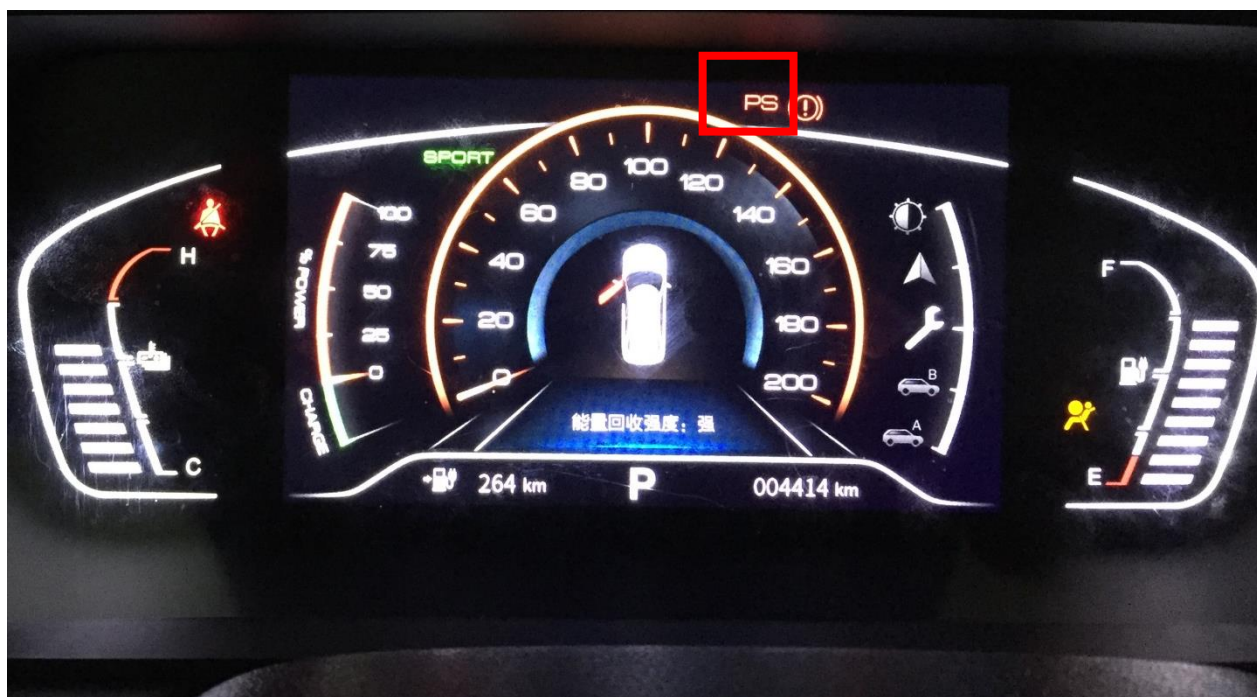
# 一、E70转向控制系统概述



## EPS警告灯

当点火开关打到ON档时，EPS系统进行自检，此警告灯会点亮，车辆启动READY后会熄灭。

当EPS系统发生故障时常亮，并进入机械转向状态



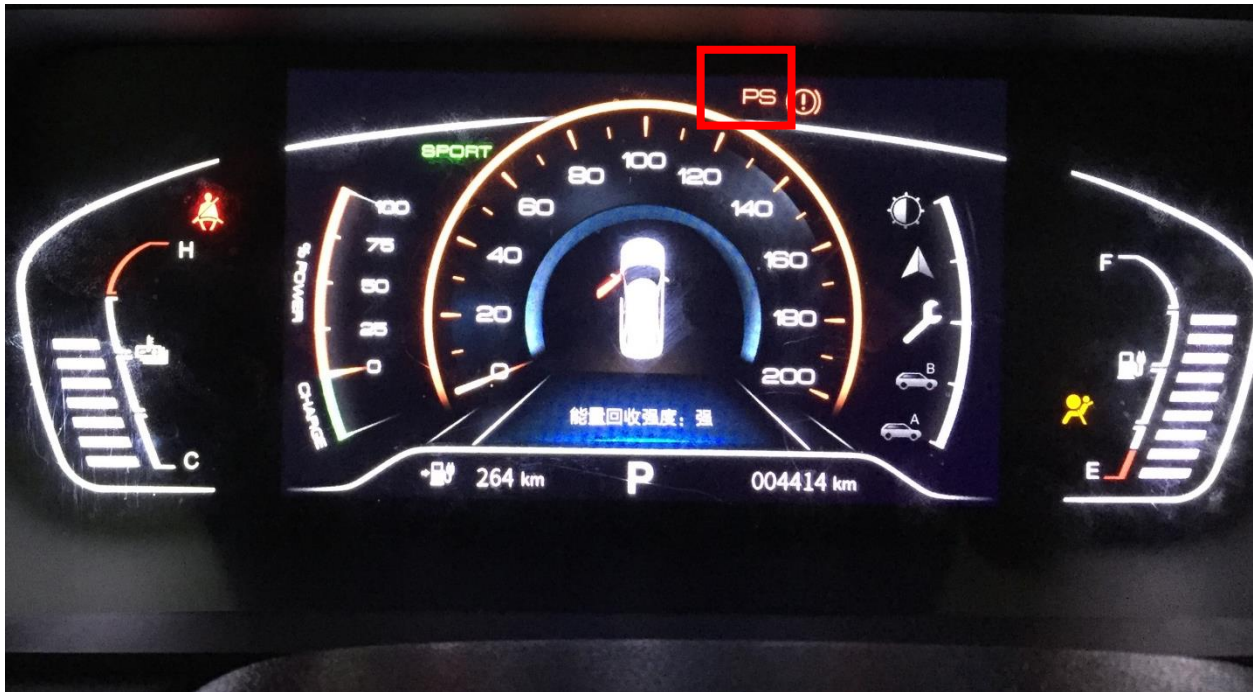
# I. Overview of E70 EPS



## EPS warning lamp

When the ignition switch is turned to "ON", the EPS will perform a self-test. This warning lamp will come on and go out when the vehicle starts READY.

It will be always on when EPS fails, and the mechanical steering will be activated.

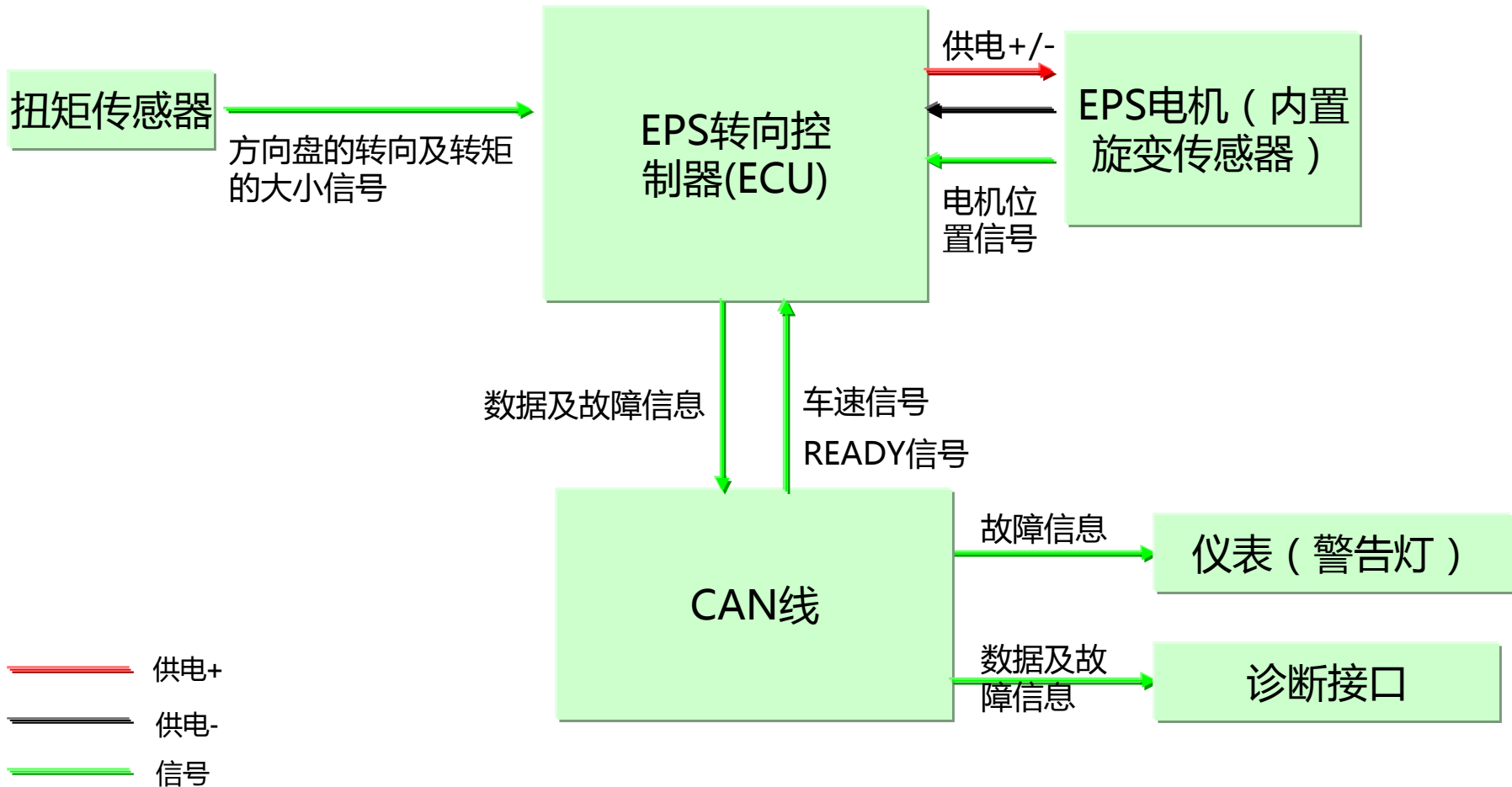


## 二、E70转向控制系统工作原理及电路图



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### 控制的基本原理及电路图分析

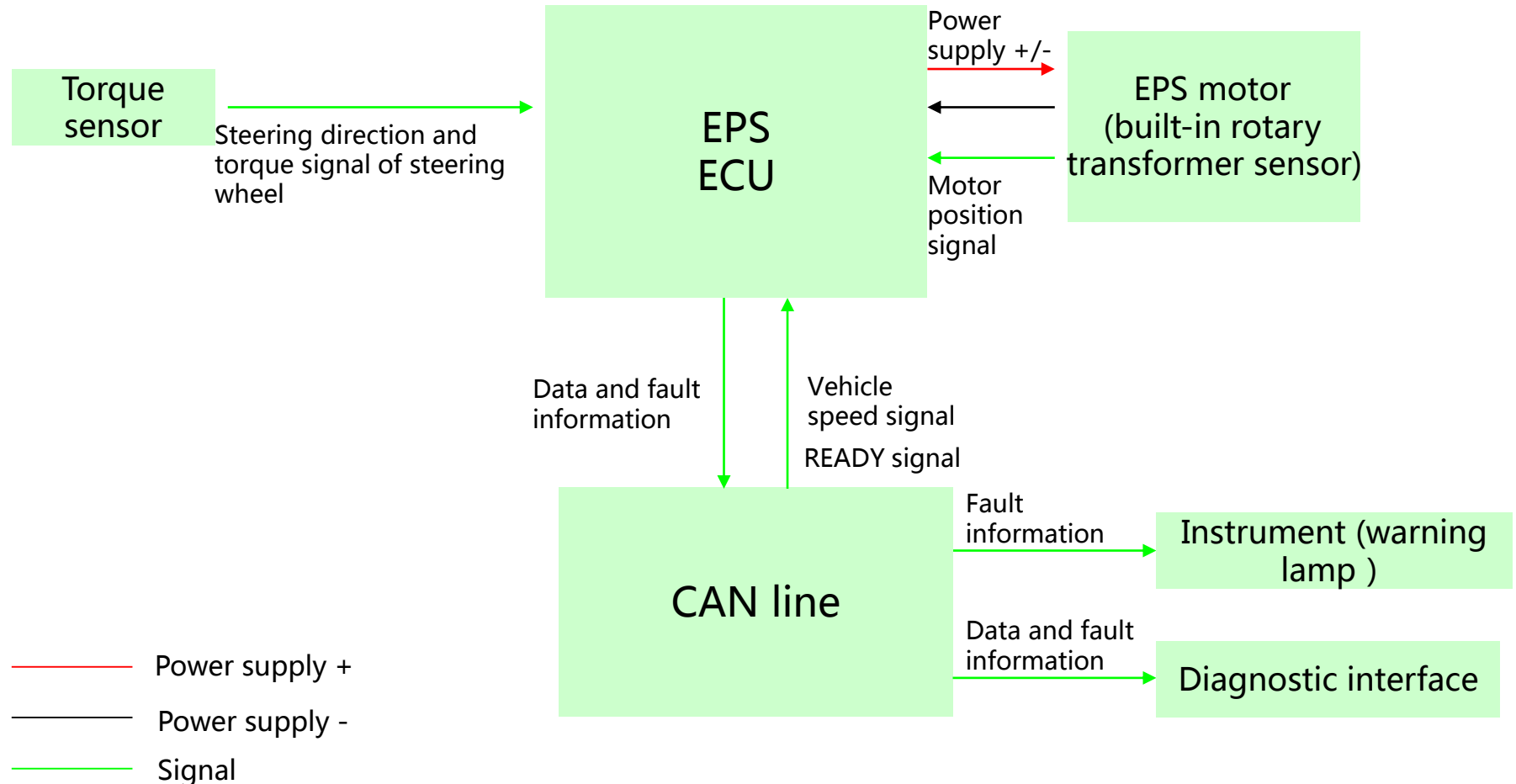


## II. Working principle and circuit diagram of E70 EPS



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### Analysis of working principle and circuit diagram of EPS





## 二、E70转向控制系统工作原理及电路图

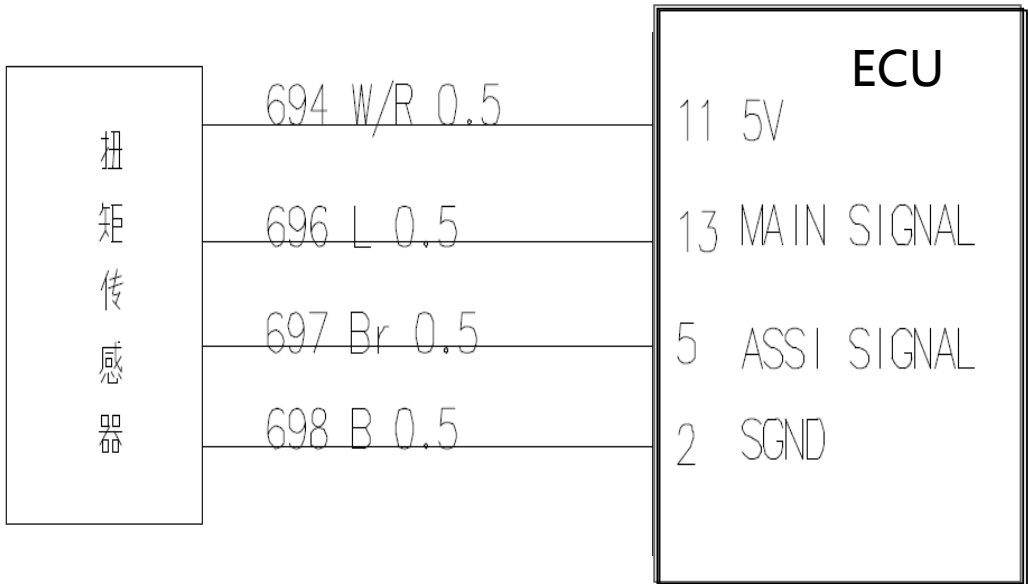


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### 扭矩传感器的工作原理及检测方法：

原理：金属电阻应变片式式扭矩传感器

检测：万用表测量电脑提供的5V电压及接地，工作时可使用诊断仪读取数据流





## II. Working principle and circuit diagram of E70 EPS

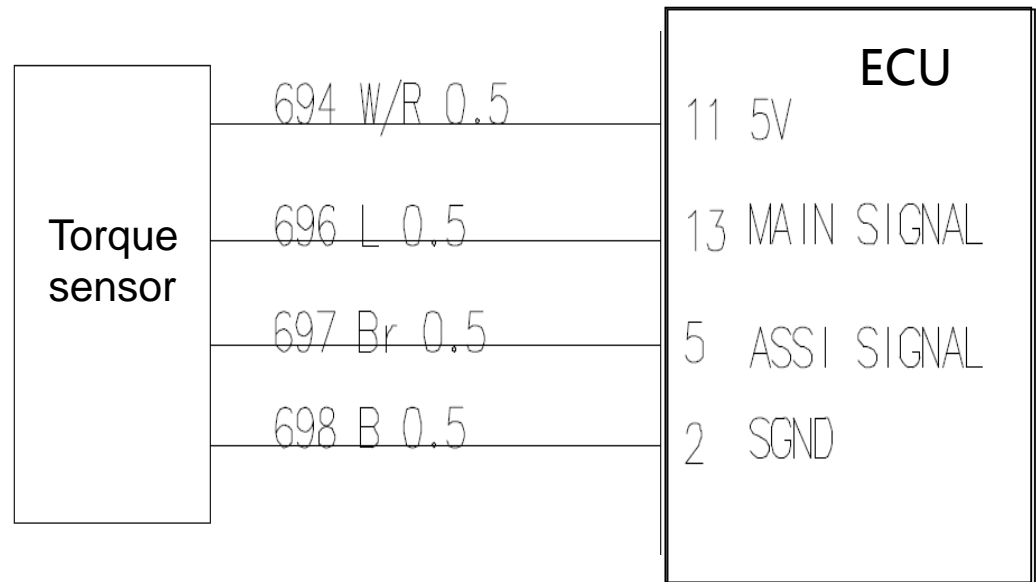
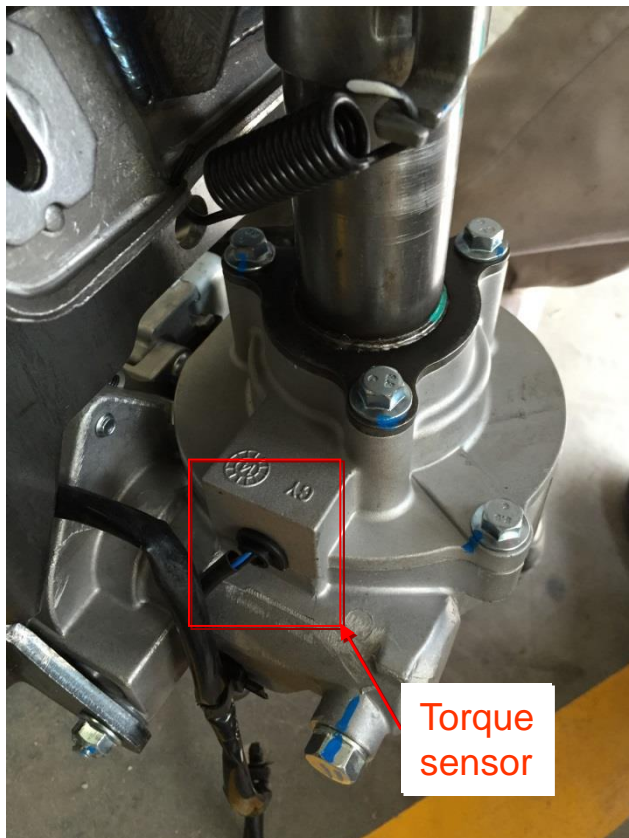


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### Working principle and detection method of torque sensor:

Principle: Metal resistance strain gauge torque sensor

Detection: The multimeter measures the 5 V voltage and grounding provided by the ECU, and the data stream can be read by the scan tool during operation.



### 三、E70转向控制系统维修注意事项



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进行故障诊断时检查或确认以下项目：

- 如果发生故障，根据客户送修时的故障状况，查看症状发生的可能原因，例如EPS 警告灯点亮等。
- 检查胎压和轮胎尺寸是否合适，检查方向盘和控制单元等规定零件是否为原装正品零件。
- 检查转向柱总成和转向机总成的连接是否正确( 有无螺栓松动、操纵杆和防尘罩以及密封剂损坏、润滑脂泄漏等现象)。
- 检查车轮定位调整是否正确。
- 检查各个连杆和悬架的安装状况是否正常。
- 检查蓄电池电压是否正常。
- 连接或脱开转向控制器线束接头之前，将起动开关转到“OFF”位置，并脱开蓄电池的负极电缆。因为即使起动开关已经转到“OFF”位置，蓄电池电压仍会作用于转向控制器。



### III. Precautions for service of E70 EPS

Check or confirm the following items during fault diagnosis:

- If a fault occurs, check possible causes of such fault as lighting up of EPS warning lamp, according to the condition of part sent for repair by the customer.
- Check whether tire pressure and dimension are appropriate and whether the specified parts, such as steering wheel and control unit, are original genuine ones.
- Check whether steering column and gear assemblies are properly connected (without bolt looseness, damages of control lever, dust cover and sealant, grease leakage, etc.)
- Check whether wheel alignment is proper.
- Check whether each connecting rod and suspension are properly installed.
- Check whether battery voltage is normal.
- Before connecting or disconnecting the steering ECU wire harness connector, turn the ignition switch to "OFF" and disconnect the battery negative cable. Even if the ignition switch has been turned to "OFF", the battery voltage will still enable the steering ECU.