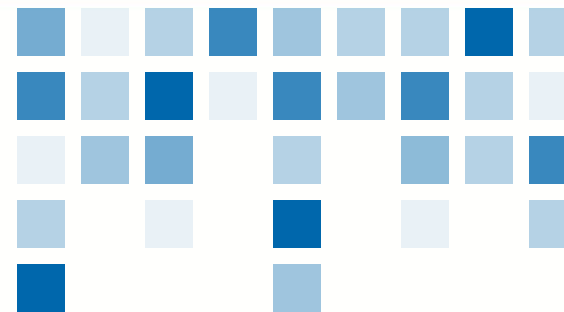
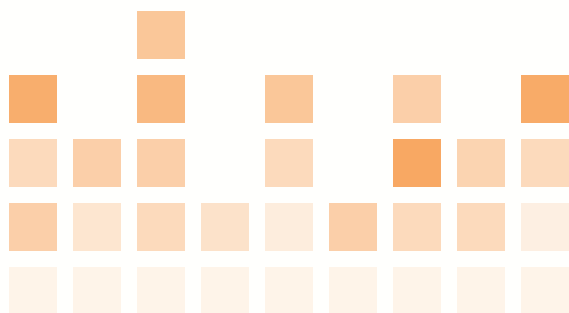




SHACMAN 汽车电器知识培训

F2000-F3000

陕汽进出口公司服务部培训科



第十四课 蓄电池及电源系统

1. 供电电源系统概述

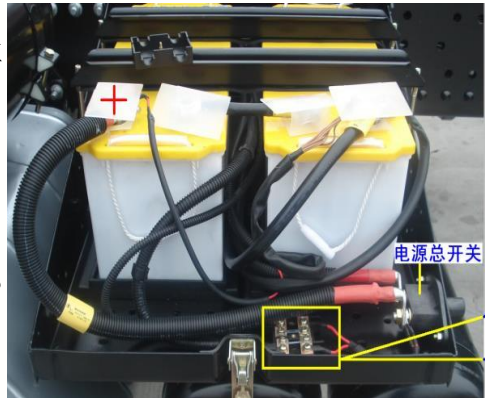
供电电源系统主要包括蓄电池组、整体式交流发电机、总电源控制开关和钥匙开关等电器设备。整车电器系统电能的来源主要有以下两个方面：

①由车辆发动机通过皮带驱动发电机工作，将产生的机械能转化为电能形式，经蓄电池充电，再转化为化学能形式贮存起来；

②由蓄电池将贮存的化学能转化为电能，供给起动机及整车电器设备。

2. 蓄电池：

陕汽重卡一般使用的蓄电池容量是135、165 、 180AH。180AH指的蓄电池在满电状态下，用1A的电路放电能放多少小时，比如能放电20小时，它的容量就是20AH，能放180小时它的容量就是180AH的蓄电池。



Overview of Power Supply System

The power supply system mainly includes the battery pack, integrated alternator, main power control switch, and ignition switch, among other electrical devices. The sources of electrical energy for the vehicle's electrical system mainly come from the following two aspects:

① The vehicle engine drives the alternator through a belt, converting mechanical energy into electrical energy, which is then used to charge the battery and stored in chemical form.

② The stored chemical energy in the battery is converted into electrical energy to supply power to the starter motor and other vehicle electrical devices.

Battery:

The batteries commonly used in SHACMAN Trucks have capacities of 135, 165, and 180AH. The rating of 180AH indicates how many hours a 1A circuit can discharge from the battery when it is fully charged. For example, if it can discharge for 20 hours, its capacity is 20AH, and if it can discharge for 180 hours, its capacity is 180AH.



蓄电池作用：在发动机正常工作时，用电设备所需的电能主要有发电机来提供，在其它情况时则由蓄电池供给。蓄电池的主要功用是：

（1）起动发动机时，向起动系及仪表供电；（2）当发电机电压低于蓄电池的电压时，用电设备所需电能由蓄电池供给；（3）当发电机正常工作时，蓄电池将剩余电能转化为化学能储存起来；（4）当发电机过载时，协助发电机向用电设备供电。

在上述的诸多功用中，起动发动机是蓄电池最主要的功用。

蓄电池维护与使用：

为使蓄电池经常处于良好的技术状况，对蓄电池因严格按照保养制度进行检查和保养，同时正确的使用都可有效地减少故障的发生和延长使用寿命。

1、清洁、检查蓄电池

（1）取下蓄电池箱座架上的防尘罩，检查蓄电池的固定情况，固定框架应无松动现象。

Function of the Battery: During normal engine operation, the electrical energy required by electrical devices is mainly provided by the alternator. In other situations, it is supplied by the battery. The main functions of the battery are as follows:

(1) Providing power to the starter system and instruments when starting the engine. 2) Supplying electrical energy to electrical devices from the battery when the alternator voltage is lower than the battery voltage. 3) Storing excess electrical energy as chemical energy when the alternator is operating normally. 4) Assisting the alternator in supplying power to electrical devices when it is overloaded.

Among these functions, starting the engine is the primary function of the battery.

Maintenance and Use of the Battery:

To keep the battery in good technical condition, it should be regularly inspected and maintained according to maintenance procedures, and proper usage can effectively reduce faults and extend its lifespan.

Cleaning and Inspection of the Battery:

(1) Remove the dust cover from the battery box bracket and check the battery's fixation. The fixing frame should be free from looseness.



- (2) 蓄电池盖和密封胶应无开裂、损坏、极柱及夹头应无烧损，壳体应无泄漏，否则应将蓄电池从车上拆下予以修复或更换。
- (3) 检查电线夹头是否松动，否则应予以拧紧。
- (4) 堵塞加液盖上的通气孔，拧紧加液孔盖，用温水刷洗蓄电池外部的灰尘泥污，然后用水或碱水擦净蓄电池的上部和极柱、夹头，必要时将夹头拆下，用纱布清洁极柱及夹头上的氧化物。
- (5) 擦干蓄电池外部，疏通加液盖通气孔，拧紧加液孔盖，在极柱和夹头间应涂一薄层工业凡士林或润滑脂。

2、检查电解液液面高度

- (1) 用内径4~6mm，长约150mm的玻璃量管，垂直插入加液孔内，直抵极板的上边缘为止，然后用拇指压紧上管口，将玻璃管取出，管中电解液柱的高度，即为蓄电池内电解液液面高出极板的高度，应为10~15mm。
- (2) 液面过低时，应补加蒸馏水，严禁加入自来水、河水或稀硫酸等。

(2) The battery cover and sealing should be free from cracks, damage, and the terminals and clamps should not be burnt. The shell should not leak. Otherwise, the battery should be removed from the vehicle for repair or replacement. (3) Check if the wire clamps are loose, and tighten them if necessary. (4) Block the vent holes on the liquid filling cap, tighten the liquid filling cap, brush off the dust and dirt on the external surface of the battery with warm water, then wipe the upper part of the battery, terminals and clamps with water or alkaline water. If necessary, remove the clamps and clean the oxide on the terminals and clamps with gauze. (5) Dry the external surface of the battery, clear the vent holes on the liquid filling cap, tighten the liquid filling cap, and apply a thin layer of industrial Vaseline or lubricating grease between the terminals and clamps.

2. Check the electrolyte level (1) Use a glass measuring tube with an inner diameter of 4-6mm and a length of about 150mm. Insert it vertically into the filling hole until it reaches the upper edge of the plate. Then press the upper end of the tube with your thumb, remove the glass tube, and measure the height of the electrolyte column in the tube, which is the height of the electrolyte level above the plate inside the battery, should be 10-15mm. (2) When the liquid level is low, distilled water should be added. Adding tap water, river water, or dilute sulfuric acid is strictly prohibited.



3、汽车启动时测量端电压或根据启动现象判断蓄电池放电程度

在发动机阻力正常的情况下，启动发动机的同时（起动机技术状态良好），测量蓄电池的端电压，对于24V 车辆，其端电压高于18V，说明蓄电池存电比较足。在汽车上连续几次使用起动机，若都能驱动发动机快速旋转，说明蓄电池存电充足；若发动机旋转无力或不能旋转，则说明蓄电池放电过多或有故障。夜间开灯使用起动机时，起动机旋转有力，灯光稍许变暗，则说明蓄电池存电充足；若起动机旋转无力、灯光暗淡，则说明蓄电池放电过多；若不能带动发动机、灯光暗淡、变红甚至熄火，说明蓄电池放电过多过严重硫化。

4、正确使用

（1）安装蓄电池时其负极必须接为搭铁。

（2）当需要拆卸极柱的夹头且较困难拆时，可用沸水冲洗氧化物，过适当的时间后，再拆卸时就较容易，或用拆卸极柱夹头的拉器拉下夹头，严禁硬敲、硬砸，这样极易造成活性物质脱落；安装时也严禁硬敲、硬砸装入夹头。

When starting the vehicle, measure the terminal voltage of the battery or judge the degree of discharge based on the starting phenomenon.

Under normal engine resistance conditions, while starting the engine (when the starter is in good technical condition), measure the terminal voltage of the battery. For 24V vehicles, if the terminal voltage is higher than 18V, it indicates that the battery is sufficiently charged. If the starter can drive the engine to rotate rapidly continuously for several times, it indicates that the battery is sufficiently charged; if the engine rotates weakly or cannot rotate, it indicates that the battery is discharged too much or faulty. When using the starter with lights on at night, if the starter rotates powerfully and the lights dim slightly, it indicates that the battery is sufficiently charged; if the starter rotates weakly and the lights are dim, it indicates that the battery is discharged too much; if the starter cannot drive the engine, the lights are dim, turn red, or even go out, it indicates that the battery is discharged too much and severely sulfated.

Proper usage

(1) When installing the battery, the negative pole must be connected to the grounding.

(2) When it is difficult to remove the clamp of the terminal and it is difficult to dismantle, you can wash off the oxide with boiling water. After an appropriate time, it will be easier to remove. Or use a puller to pull down the clamp of the terminal. It is strictly forbidden to hit or smash hard, as this may cause the active material to fall off. When installing, it is also strictly forbidden to hit or smash hard to install the terminal clamp.



(3) 防过充、充电电流过大，防过度放电，尤其冬季首次起动起动时间长，连续起动时间远远少于15秒，起动间隔时间远远超过60秒。寒冷地区车辆的起动常采用摇转曲轴、加注适当温度的热水、预热发动机、保温装置等措施，来减轻蓄电池的负荷。

(4) 发动机运转时严禁脱开蓄电池上的引线。

(5) 严禁用刮火的方法来试其存电充足与否。

蓄电池正极电缆的连接：将电源连接线一端连接到蓄电池正极，另一端连接到电源总开关输入端，再将正极电缆（总开关至起动机）一端连接电源总开关输出端，另一端连接到起动机30接线柱。WP10发动机使用70平方毫米的电缆线，WP12发动机使用95平方毫米的电缆线。

将蓄电池连接线（81.25417.6708）连接到两蓄电池之间。

蓄电池负极电缆的连接：起动机线束的负极线直接从蓄电池负极到变速箱搭铁点。

3. Prevent overcharging and excessive charging current, and prevent excessive discharge, especially during the first start in winter. starting time should be much less than 15 seconds, and the interval between starts should be much longer than 60 seconds. In cold regions, vehicle starting often involves measures such as cranking the crankshaft, adding hot water at appropriate temperatures, preheating the engine, and using insulation devices to reduce the battery's load.

4. It is strictly forbidden to disconnect the battery cables while the engine is running.

5. It is strictly forbidden to test the battery's charge by sparking.

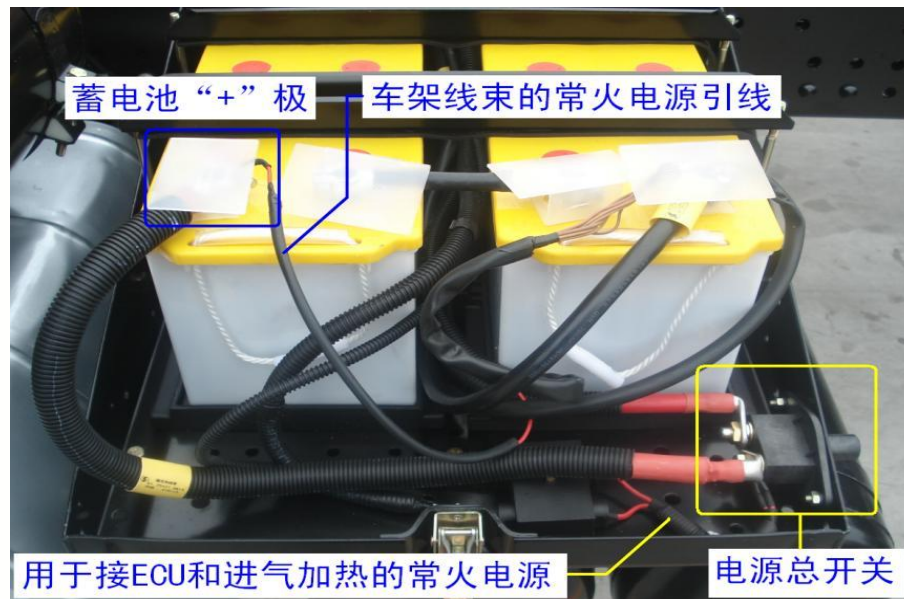
Battery positive cable connection: Connect one end of the power cable to the positive terminal of the battery and the other end to the input terminal of the main power switch. Then connect one end of the positive cable (from the main switch to the starter) to the output terminal of the main power switch and the other end to the 30 terminal of the starter. Use a 70-square-millimeter cable for the WP10 engine and a 95-square-millimeter cable for the WP12 engine. Connect the battery connection cable (81.25417.6708) between the two batteries.

Battery negative cable connection: The negative cable from the starter harness goes directly from the negative terminal of the battery to the grounding point on the transmission.



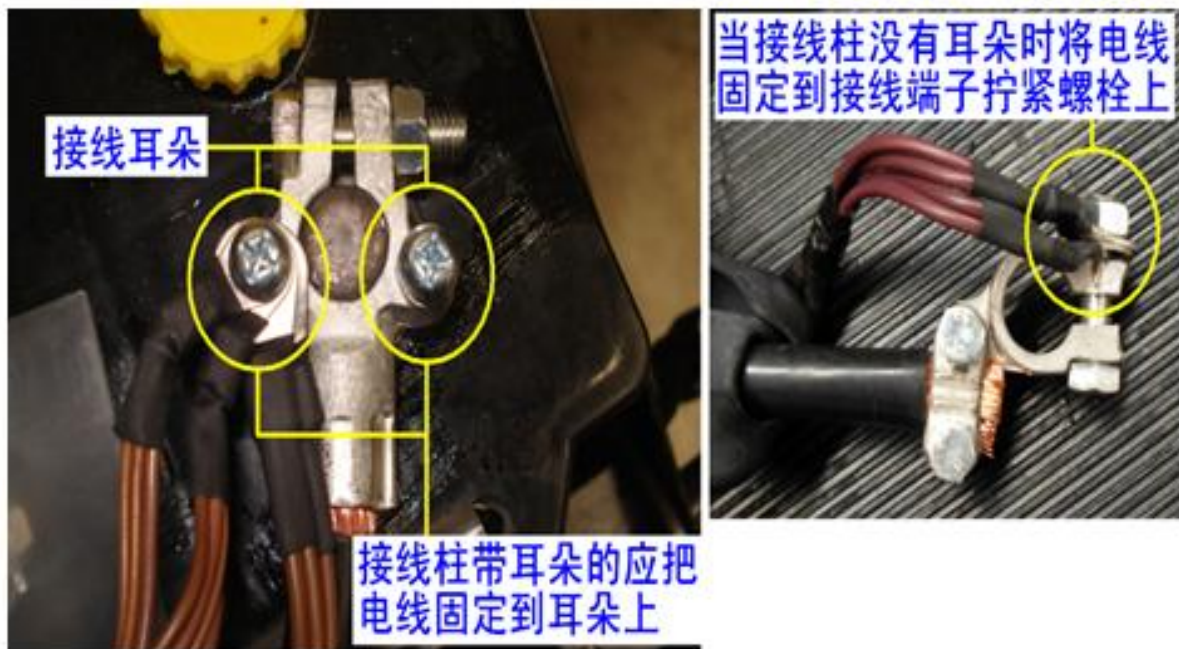
康明斯车型负极电缆的连接：将蓄电池负极至起动机负极电缆一端连接到蓄电池负极，另一端连接到起动机31接线柱并将其上附带的搭铁线固定到左纵梁搭铁点上。将起动机搭铁电线一端连接起动机31接线柱，另一端连接发动机飞轮壳搭铁点。

Connecting the negative battery cable for Cummins models: Connect one end of the negative battery to starter negative cable to the negative terminal of the battery and the other end to the starter's terminal 31. Attach the grounding wire from this connection to the grounding point on the left side frame. Connect one end of the starter grounding wire to the starter's terminal 31, and the other end to the grounding point on the engine flywheel housing.



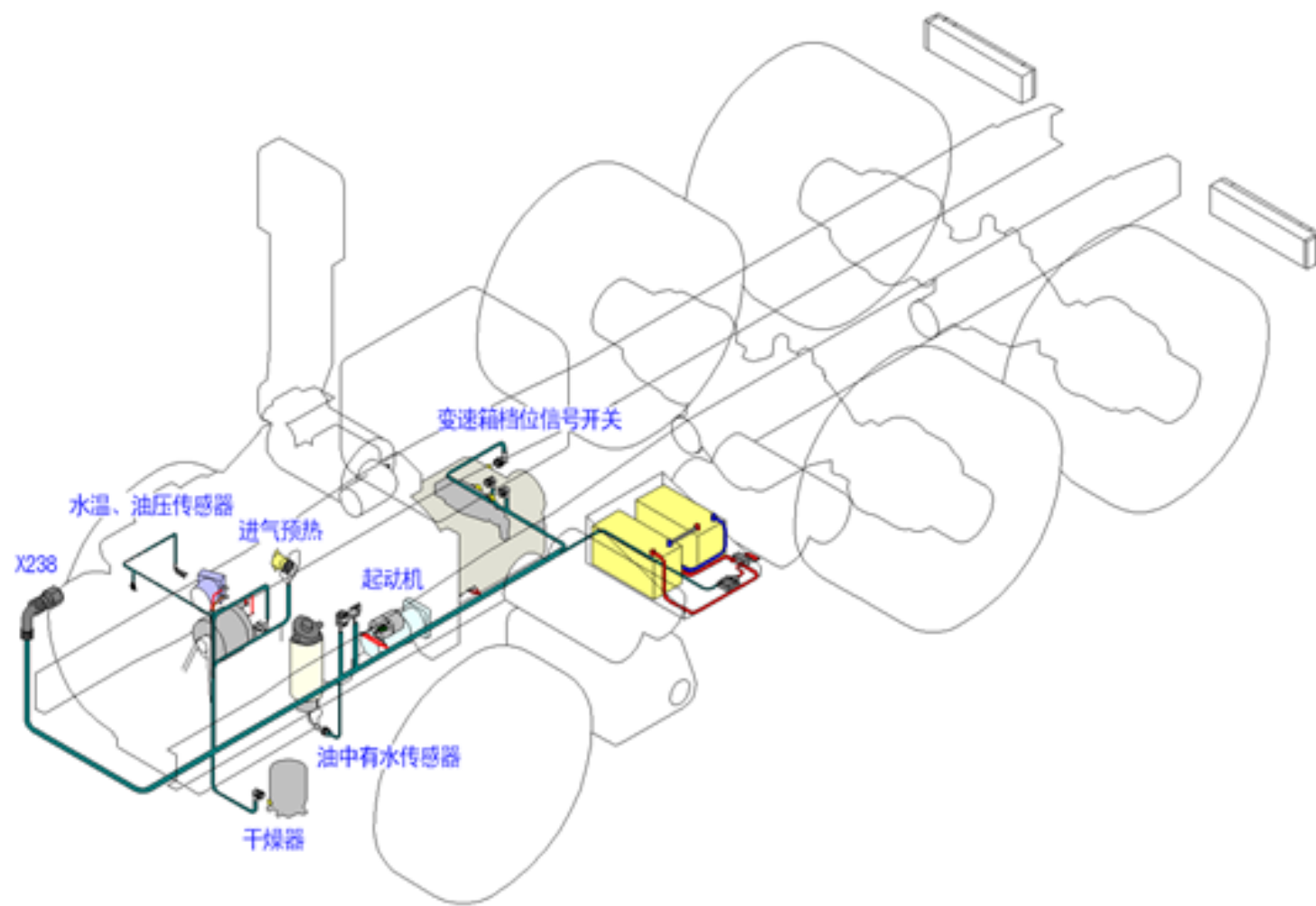
注意：如果蓄电池接线柱上带有专门用于外接电线的耳朵的话，应把电线接到耳朵上（见左图），如果接线柱没有耳朵，则应把电线接到接线柱拧紧螺栓上（见右图）。

Note: If the battery terminal has a dedicated lug for external wires, connect the wires to the lug (see left image). If the terminal does not have a lug, connect the wires to the terminal tightening bolt (see right image).



电线在蓄电池接线柱连接方法





发动机、变速箱底盘线束（WP12 发动机）



3. 起动机线束:

起动机线束用于给起动机工作提供主电源，因起动机功率很大（5-8KW），所以接起动机的电缆线也是全车电路线径最大的，其中WP10发动机使用70平方毫米的电缆线，WP12发动机使用95平方毫米的电缆线。起动机主电源也是全车电路的总电源路径。起动机线束敷设如图所示。

Starter Wiring Harness:

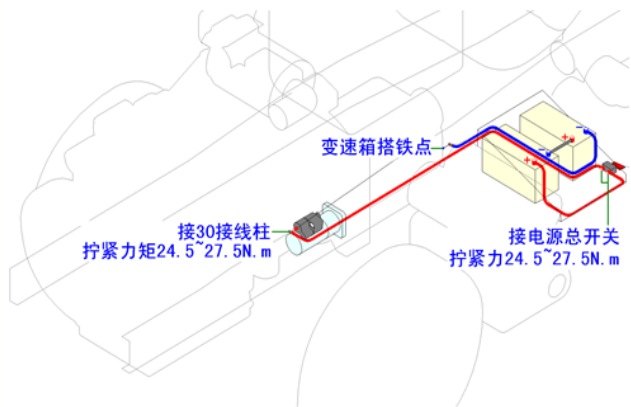
The starter wiring harness is used to provide the main power supply for the starter motor. Since the starter motor has a very high power requirement (5-8KW), the cables connected to the starter are the largest in diameter in the vehicle's electrical system. For the WP10 engine, a 70 square millimeter cable is used, while the WP12 engine uses a 95 square millimeter cable. The main power supply for the starter is also the primary power path for the entire vehicle's electrical circuit. The layout of the starter wiring harness is shown in the diagram.

（常规车型）起动机线束的正极线首先从蓄电池正极开始到电源总开关进线端，再从电源总开关出线端 到起动机30端接线柱。

常规车型）起动机线束的负极线直接从蓄电池负极到变速箱搭铁点。

(For standard vehicle models) The positive cable of the starter wiring harness first runs from the positive terminal of the battery to the input terminal of the main power switch, then from the output terminal of the main power switch to the 30 terminal post of the starter.

(For standard vehicle models) The negative cable of the starter wiring harness runs directly from the negative terminal of the battery to the ground point on the transmission.



起动机线束接线示意图（WP12 发动机）



起动机线束接线的注意事项:

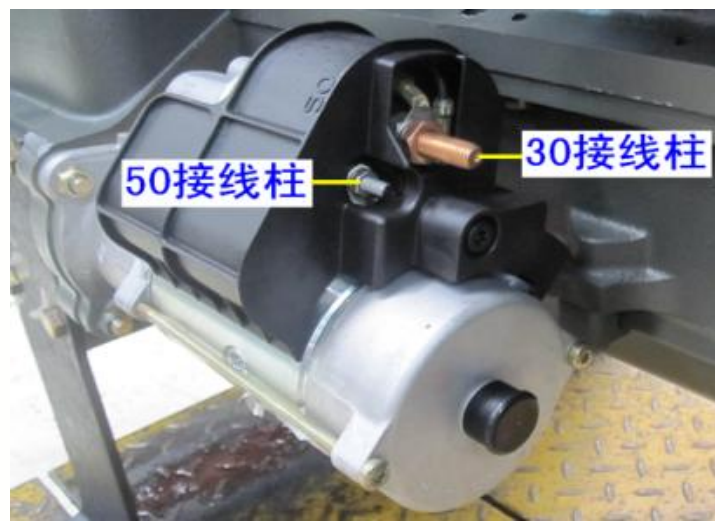
●关于接线柱的拧紧力矩: 起动机30接线柱, 电源总开关接线柱均为M10螺栓, 其基底均为绝缘材料, 机械强度相对(车架、蓄电池箱等)较低, 所以其接线螺母的拧紧力矩不可参经常规标准件的拧紧力矩, 在这里对其明确要求为24.5N·m—27.5N·m。

注意: 拧紧力矩过大会导致接线柱基底壳体破损, 导致电源总开关故障或起动机故障。

Wiring precautions for the starter harness:

•Regarding the tightening torque of the terminal posts: The terminal posts on the starter (30 terminal post) and the main power switch are both M10 bolts with insulating material bases, which have relatively lower mechanical strength compared to the chassis, battery box, etc. Therefore, the tightening torque of the terminal nuts should not follow the conventional standard parts tightening torque. The specified torque requirement here is 24.5 N·m to 27.5 N·m.

•**Note:** Excessive tightening torque can cause damage to the base housing of the terminal posts, leading to main power switch failure or starter failure.

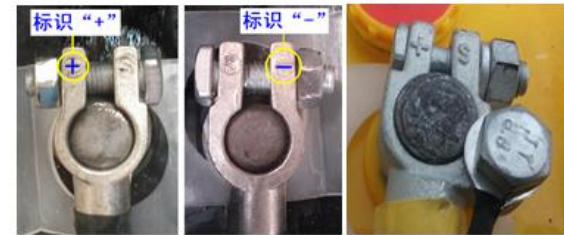


●关于蓄电池接线端子的接线：蓄电池接线端子上均有表示其接线极性的符号“+”、“-”（如图1-113所示），其尺寸是不同的，“+”接线柱孔径较大，“-”接线柱孔径较小，用正常安装方式无法将“-”接线柱安装到蓄电池正极上。另外接线柱开孔内表面为锥面，上小下大，判断其上下面的方法除了观察孔径变化外还可以通过其上的标示来判断，接线端子有“+”、“-”标识的一面在上。

蓄电池接线柱需涂抹凡士林，主要功能为防锈，接线柱生锈会导致电路电阻增加，影响电器设备的工作，另一方面在维护时也很难摘除蓄电池的接线端子。

● Regarding the Battery Terminal Wiring: Battery terminals are marked with polarity symbols “+” and “-” (as shown in Figure 1-113). The sizes of the terminals are different: the “+” terminal post hole is larger, and the “-” terminal post hole is smaller. With the correct installation method, it is impossible to fit the “-” terminal post onto the positive terminal of the battery. Additionally, the hole on the terminal post has a conical shape, with the diameter decreasing from top to bottom. Besides observing the change in diameter, the top and bottom can also be determined by the markings; the side of the terminal with the “+” or “-” symbol should face up.

Applying Vaseline to Battery Terminals: It is essential to apply a thin layer of Vaseline to the battery terminals. The primary function of this is to prevent rust. Rust on the terminals can increase circuit resistance, affecting the performance of electrical equipment. Additionally, rusted terminals can make it difficult to remove the battery terminals during maintenance.



按照接线端子的标识接线并且标识在上面即不会接错

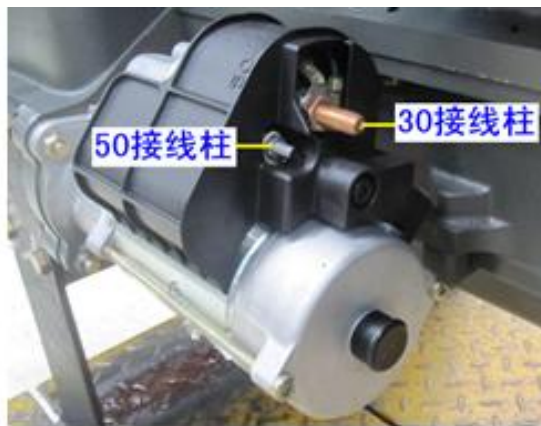


4. 起动机接线方法及要求

● 潍柴EGR发动机起动机接线柱：潍柴EGR发动机的起动机均靠壳体搭铁，所以其主电源接线柱只有一个，就是30接线柱。其起动控制方式有两种，一种是起动信号端控制，将起动信号线（黑红黄）接到起动机50端对起动机进行控制。

4. Starter Wiring Methods and Requirements

Weichai EGR Engine Starter Terminals: Weichai EGR engine starters are grounded through the casing, so they have only one main power terminal, which is the 30 terminal. There are two methods for starter control: Starter Signal End Control: the first is that connect the starter signal wire (black-red-yellow) to the 50 terminal on the starter to control the starter.

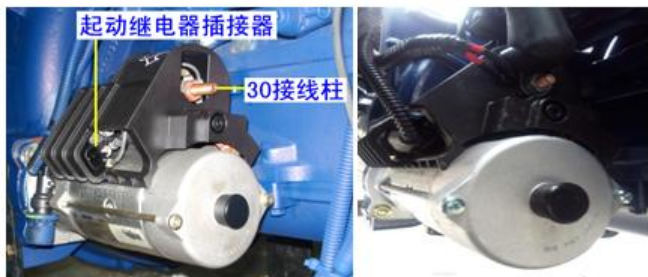


（EGR 发动机）通过 50 接线柱控制起动的起动机



● **潍柴国三国四发动机起动机接线柱：**另一种是潍柴国三国四发动机起动信号为双端控制，起动机内置的起动继电器两个控制端子通过插接器起动控制电路连接，如图所示，这种方式主要用于WP国三国四车型。

Weichai Euro III and IV Engine Starter Terminals: Another method is that the starter signal for Weichai Euro III and IV engines is controlled at both ends. The starter contains a built-in starter relay with two control terminals, which are connected to the starter control circuit through a connector, as shown in the diagram. This method is mainly used for Euro III and IV models.



(潍柴国三国四发动机) 通过插接器控制起动的起动机

潍柴发动机起动机接线柱的拧紧力矩要求：

30端接线柱接线螺母（M10）拧紧力矩为 $24 \pm 4 \text{ N} \cdot \text{m}$

（综合考虑取值为： $24.5 \text{ N} \cdot \text{m}$ — $27.5 \text{ N} \cdot \text{m}$ ）

50端（M6）拧紧力矩为 $2.4 \text{ N} \cdot \text{m} \pm 3.0 \text{ N} \cdot \text{m}$

Tightening torque requirements for Weichai engine starter motor terminal:

The tightening torque for the nut of terminal 30 (M10) should be $24 \pm 4 \text{ N} \cdot \text{m}$.

(The comprehensive range is: $24.5 \text{ N} \cdot \text{m}$ — $27.5 \text{ N} \cdot \text{m}$)

The tightening torque for terminal 50 (M6) should be $2.4 \text{ N} \cdot \text{m} \pm 3.0 \text{ N} \cdot \text{m}$.

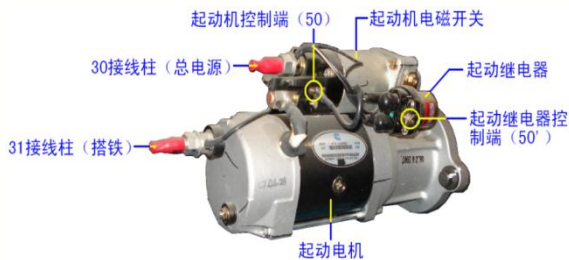


● 康明斯起动机接线柱：

康明斯起动机如图所示，上端为电磁开关，下方为起动电机，在电磁开关有30接线柱接总电源，旁边有一个小接线柱为50接线柱，接起动信号，为减小起动电流，一般都在起动机旁又增加一个起动继电器，所以我们的起动控制线就接起动继电器的控制端50端上，接线为黑红黄。

Cummins starter motor terminal:

The Cummins starter motor, as shown in the diagram, has an electromagnetic switch at the top and the starter motor below it. At the electromagnetic switch, there is a terminal labeled 30 for connecting to the main power supply, and next to it, there is a smaller terminal labeled 50 for connecting to the start signal. To reduce the starting current, a starter relay is generally added near the starter motor. Therefore, our starter control line is connected to the control terminal 50 of the starter relay, with wire colors being black, red, and yellow.



康明斯起动机外形图

在起动电机的后端盖处有搭铁接线柱31，直接接到蓄电池负极，另外此端还引出两根线，一根细线接车架左纵梁搭铁点，另一根接发动机飞轮壳搭铁点，保证车辆其他线路的搭铁。

At the rear end cover of the starter motor, there is a grounding terminal labeled as 31, directly connected to the negative terminal of the battery. Additionally, from this terminal, two wires are led out, one thin wire connected to the chassis left longitudinal beam grounding point, and the other connected to the engine flywheel housing grounding point, ensuring grounding for other circuits of the vehicle.

康明斯起动机接线柱的拧紧力矩：起动机30端、31端（M10）拧紧力矩为24.5—27.5N.m

注意：起动机30、31接线柱安装基底为胶木材质，受力过大将会导致接线柱基底打碎，会导致电路断路或合闸起动故障，所以此处接线紧固必须控制扭矩。

Tightening torque for the starter motor terminals 30 and 31 (M10) is 24.5—27.5 N.m.

Note: The mounting base of terminals 30 and 31 of the starter motor is made of rubber wood material. Excessive force applied can lead to the base of the terminals breaking, causing circuit interruption or engaging starting faults. Therefore, torque control must be exercised during the fastening of connections at these points.



● **康明斯起动机线束接线：**康明斯发动机的起动机接线如图所示。

正极电缆的连接：将电源连接线一端连接到蓄电池正极，另一端连接到电源总开关输入端，再将正极电缆（总开关至起动机）一端连接电源总开关输出端，另一端连接到起动机30接线柱。

将蓄电池连接线（81.25417.6708）连接到两蓄电池之间。

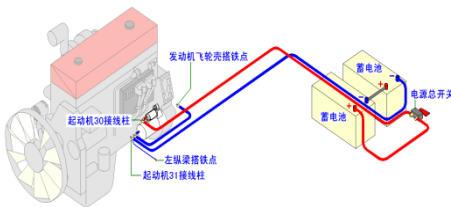
负极电缆的连接：将蓄电池负极至起动机负极电缆一端连接到蓄电池负极，另一端连接到起动机31接线柱并将其上附带的搭铁线固定到左纵梁搭铁点上。将起动机搭铁电线（DZ9100776919）一端连接起动机31接线柱，另一端连接发动机飞轮壳搭铁点。

Cummins Starter Motor Wiring: The wiring of the starter motor for Cummins engines is as shown in the diagram.

Connection of the positive cable: Connect one end of the power supply cable to the positive terminal of the battery, and the other end to the input terminal of the power supply switch. Then, connect one end of the positive cable (from the switch to the starter motor) to the output terminal of the power supply switch, and the other end to terminal 30 of the starter motor.

Connect the battery connection cable (81.25417.6708) between the two batteries.

Connection of the negative cable: Connect one end of the negative cable from the battery negative terminal to the starter motor negative terminal. Connect the other end to terminal 31 of the starter motor and securely fasten its accompanying grounding wire to the left longitudinal beam grounding point. Connect one end of the starter motor grounding wire (DZ9100776919) to terminal 31 of the starter motor, and the other end to the engine flywheel casing grounding point.



康明斯发动机起动机线束接线示意图



5. 发电机:

发电机接线为:

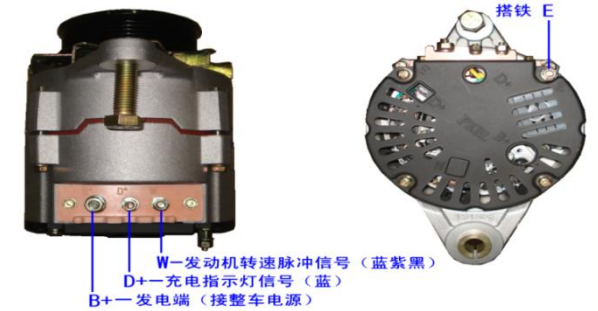
B+端接粗红线, 主要向整车电路提供电源并给蓄电池充电。

D+端接蓝线, 接充电指示灯 (), 当发电机未发电时此端电压为0, 充电指示灯点亮 (充电指示灯另一端为钥匙电源), 当发电机开始发电时, 此端为高电压, 充电指示灯熄灭。

W端接蓝紫黑线, 为向发动机转速表输出的转速脉冲信号。

E端接棕线, 为搭铁线。

注意, 发电机的“E”端子限于康明斯车型使用。



Generator:

The generator wiring is as follows:

The B+ terminal is connected to a thick red wire, mainly providing power to the entire vehicle circuit and charging the battery.

The D+ terminal is connected to a blue wire, which connects to the charging indicator light (). When the generator is not generating electricity, the voltage at this terminal is 0, and the charging indicator light is illuminated (the other end of the charging indicator light connects to the ignition power). When the generator starts generating electricity, this terminal has a high voltage, and the charging indicator light goes out.

The W terminal is connected to a blue-purple-black wire, providing a speed pulse signal output to the engine speedometer.

The E terminal is connected to a brown wire, serving as the ground wire.

Note that the "E" terminal of the generator is limited to use in Cummins models.

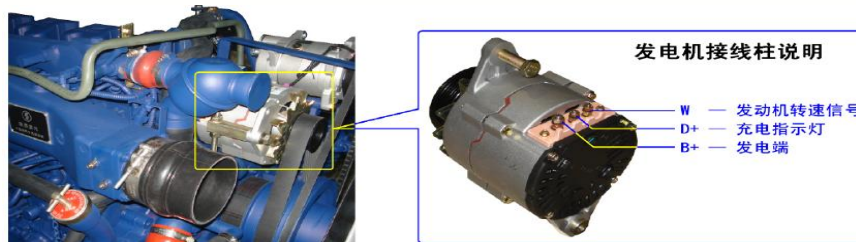


从下图可见，发电机G102除了“B+”电源接线柱之外，还有“D+”和“W”接线桩头。显然“D+”是发电机的输出火线，它通过充电指示灯H100的“16000”线、信号灯总成A185的“16000”线熔断器F108经A100内“15001”线连接至负载继电器K171的输出。当钥匙开关旋至“1”档时，负载继电器K171线圈通电、触点闭合，A100电器装置板内“15001”电源线得电。在发动机未启动前，该电源线经充电指示灯H100和发电机G102搭铁接地(发电机未旋转)，充电指示灯点亮。

当发动机启动旋转后，发电机发电，充电指示灯H100两侧等电位，指示灯熄灭，发电机电压高于蓄电池电压时，发电机通过接线柱“D+”和熔断器F108向蓄电池充电。如若发电机故障，导致完全不充电时，充电指示灯点亮以示警告。

From the diagram below, it can be seen that the generator G102 has terminals labeled "B+," "D+," and "W" in addition to the power supply terminal. Obviously, "D+" is the output line of the generator, which is connected to the charging indicator light H100 via the "16000" wire, the signal lamp assembly A185 via the "16000" wire, and the fuse F108, and then connected to the output of the load relay K171 through the "15001" wire inside A100. When the key switch is turned to the "1" position, the coil of the load relay K171 is energized, and its contacts are closed, providing power to the "15001" wire inside the A100 electrical device board. Before the engine starts, this power line is grounded through the charging indicator light H100 and the generator G102 (when the generator is not rotating), causing the charging indicator light to illuminate.

Once the engine starts rotating, the generator generates electricity, causing both sides of the charging indicator light H100 to have the same potential, and the indicator light goes out. When the voltage of the generator is higher than the battery voltage, the generator charges the battery through the "D+" terminal and the fuse F108. If the generator malfunctions and fails to charge at all, the charging indicator light will illuminate to indicate a warning.

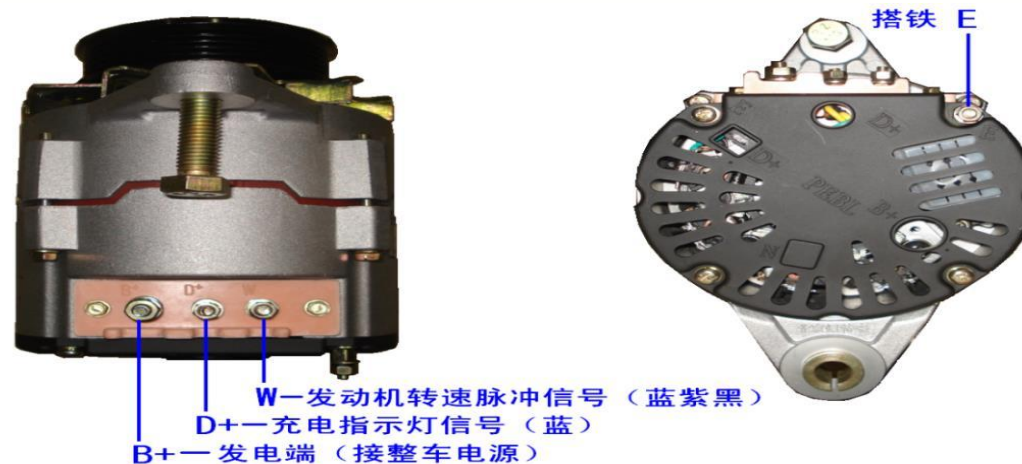


发电机的“W”接线桩头实际上是发电机的中性抽头，将它的脉冲信号经由1.5平方毫米的“59101”号线输入到发动机排气制动转速继电器K103和发动机转速表P101(2号针脚)及里程表P100(C/3针脚)，以便为继电器K103里程表P100和转速表P101提供发动机转速信号。

注意，发电机的“W”端子限于EGR车型使用。

The "W" terminal of the generator is actually the neutral tapping point of the generator. Its pulse signal is inputted through the "59101" wire with a diameter of 1.5 square millimeters into the engine exhaust brake speed relay K103, the engine speedometer P101 (pin 2), and the odometer P100 (pin C/3), providing the engine speed signal for the relay K103, odometer P100, and speedometer P101.

Please note that the "W" terminal of the generator is limited to EGR models.



WP10发动机发电机接线端



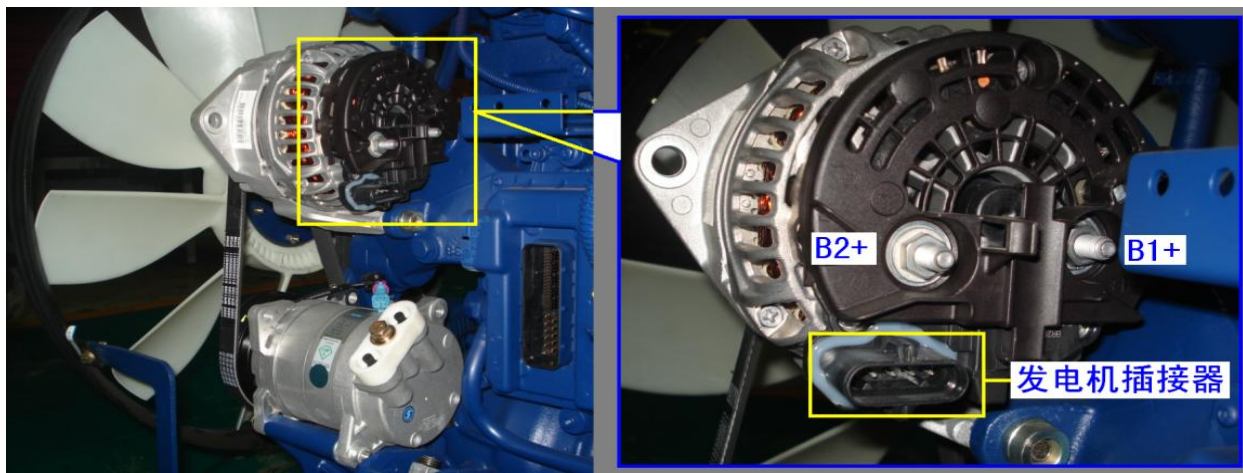
关于发电机接线的补充说明：WP国三车型的发动机转速信号取自发动机ECU，所以发电机的W端不接线。

部分发电机（康明斯）靠外壳搭铁，所以没有E端或E端不接线。WP12发动机用的发电机与常规发电机接线形式稍有区别，有两个B+端，接粗红线（电源线），其余端子集成到一个插座，通过插接器与线束连接。

Supplementary Note on Generator Wiring: For WP Euro III vehicles, the engine speed signal is obtained from the engine ECU, so the W terminal of the generator is not connected.

For some generators (like those from Cummins), which rely on the casing for grounding, there is no E terminal or the E terminal is left unconnected.

The generator used in WP12 engines has a slightly different wiring configuration from conventional generators. It has two B+ terminals, which are connected to the thick red wire (power line). The remaining terminals are integrated into a socket, which is connected to the wiring harness via a connector.



WP12发动机发电机接线端

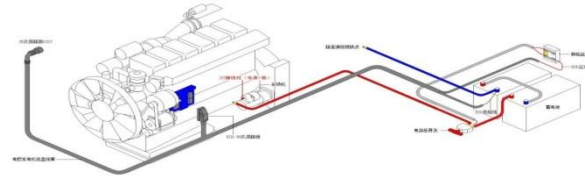


6. 整车电源的连接路径：

当电源总开关S4闭合时，启动机“30”端接线柱通电，由此与“30”接线柱连接的线路均接通电源。

Connection Path of Vehicle Power Supply:

When the main power switch S4 is closed, the starter motor's "30" terminal connection post is energized, thereby energizing all circuits connected to the "30" terminal connection post.



首先是一根6平方毫米的红(A)线由启动机30端接至发电机B+的接线端子，然后再由一根6平方毫米的红(A)线由发电机B+的接线端子接至驾驶室前端的35孔插接器X238的F孔位。还有一根6平方毫米的红(A)线由启动机30端接至接至驾驶室前端的35孔插接器X238的A孔位。

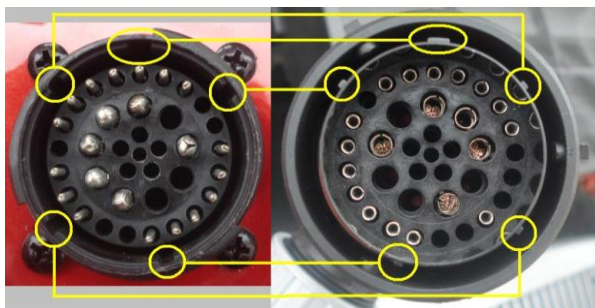
First, a 6 square millimeter red (A) wire is connected from the starter motor's 30 terminal to the generator's B+ terminal connection post. Then, another 6 square millimeter red (A) wire is connected from the generator's B+ terminal connection post to the F slot of the 35-pin connector X238 at the front end of the cabin. Additionally, a 6 square millimeter red (A) wire is connected from the starter motor's 30 terminal to the A slot of the 35-pin connector X238 at the front end of the cabin.



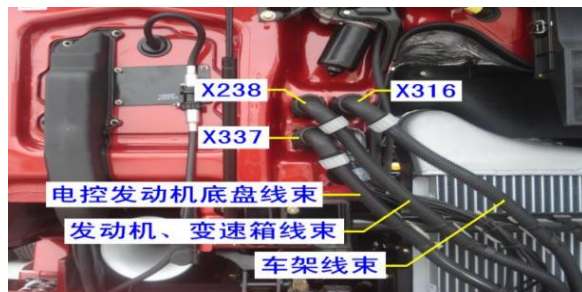
发动机底盘线束最前端为35孔插接器X238，它与驾驶室前端的驾驶室-底盘接口对接。插接器插接时注意对准插头和插座的定位标记。

The front end of the engine chassis harness terminates in a 35-pin connector X238, which interfaces with the cabin-chassis interface at the front end of the cabin.

When connecting the connector, ensure alignment with the positioning marks on both the plug and the socket.



X238插接器的定位标记



连接驾驶室线束总成的35孔插接器X238的“A”号接线柱的一根6平方毫米的白色线30010把整车电源直接连至电器装置板A100的“91”号接线柱，插接器X238的“F”号接线柱的一根6平方毫米的白色线30010把整车电源直接连至电器装置板A100的“90”号接线柱，从而使驾驶室电源线接通。凡与“30010”电源线连接的电器元件均接通电源。

A 6-square millimeter white wire, labeled as 30010, from pin "A" of the 35-pin connector X238, directly connects the vehicle's power supply to terminal "91" of the electrical device panel A100. Another 6-square millimeter white wire, also labeled as 30010, from pin "F" of the connector X238, directly connects the vehicle's power supply to terminal "90" of the electrical device panel A100, thereby enabling the cabin power line. All electrical components connected to the "30010" power line receive power.



例如钥匙开关Q101、驻车灯继电器K116、雾灯和开关照明灯继电器K115、燃油滤清器加热熔断器F156、电控空气悬挂控制熔断器F164、主车ABS熔断器F160、主车ABS电磁阀熔断器F161。

从下图上我们可以看出，事实上电器装置板A100的“90”和“91”接线柱用一个连接片直接相连接，这就保证了整车（驾驶室）的电源是由两根“30010-1”和“30010-2”电源线连接的可靠性。

For example, the key switch Q101, parking light relay K116, fog light and switch lighting relay K115, fuel filter heating fuse F156, electronic air suspension control fuse F164, main vehicle ABS fuse F160, and main vehicle ABS solenoid valve fuse F161.

From the diagram below, it can be observed that in fact, terminals "90" and "91" of the electrical device panel A100 are directly connected by a connecting piece. This ensures the reliability of the vehicle (cabin) power supply, which is connected by two "30010-1" and "30010-2" power lines.



从上面的叙述我们可以得到一个结论：当电源总开关S4闭合通电之后，启动马达、钥匙开关、驻车灯、雾灯、驾驶室照明灯、驾驶室的门控照明灯、燃油滤清器的加热器(选装)、电控空气悬挂装置、ABS制动防抱死系统、火焰预热装置、前照灯变光开关等均可投入工作，换句话说：上述这些用电设备是不需要打开钥匙开关就可直接工作的设备。

From the above description, we can draw a conclusion: When the power switch S4 is closed and powered, the starter motor, key switch, parking lights, fog lights, cabin lighting, door-controlled cabin lighting, fuel filter heater (optional), electronic air suspension system, ABS anti-lock braking system, flame preheating device, and headlight dimmer switch can all be put into operation. In other words, these electrical devices mentioned above can operate directly without turning on the key switch.

