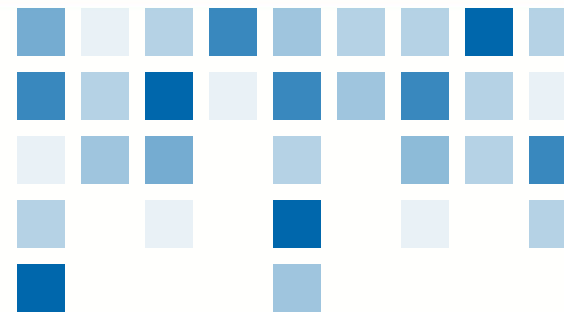
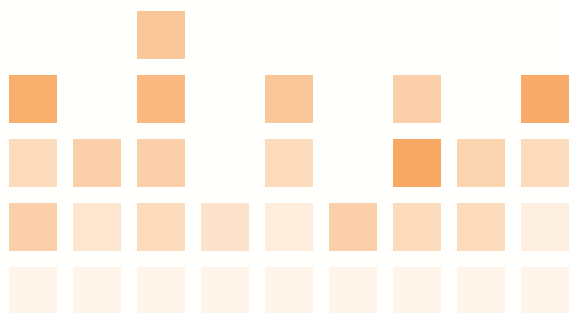




SHACMAN 汽车电器知识培训

F2000-F3000

陕汽进出口公司服务部培训科



第四十课 阅读电路图3

1. F—代表保险丝（熔断器）：

保险丝是陕汽重卡常用电器元件，应用于所有SHACMAN车型。

配置在电器装置板A100上面的普通保险丝见下图。通常以“F字母加三位数学”表示，如F120、F199等。绝大部分保险丝都集成在中央电器装置板上。

还有在保险丝的旁边有一个带圆圈的数字，见下面的红色部分，如“①、②、③、④”等，圆圈中的数字代表此保险丝在电器装置板A100上面的位置标记。

另外，保险丝的额定电流规格，在它的下方用“数字加A字母表示”，A表示电流值的单位是安培。

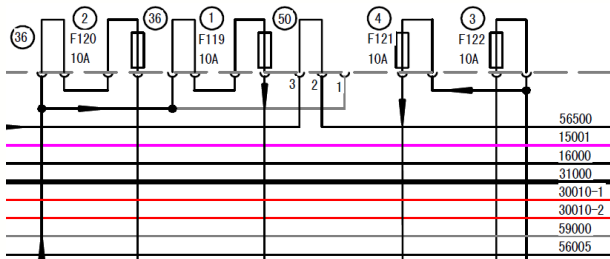
F—Represents Fuses

Fuses are common electrical components used in all SHACMAN models, including heavy-duty trucks. They are designated on the central electrical device board A100.

Fuse Representation: Fuses are represented by the letter "F" followed by a three-digit number, such as F120 or F199. Most fuses are integrated into the central electrical device board (A100). **Position Markings:** Next to each fuse, there is a number within a circle (e.g., "①, ②, ③, ④"), indicating the fuse's position on the electrical device board A100. This can be seen in the red section of the diagram.

Current Rating:

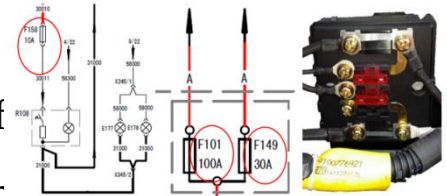
The rated current of each fuse is indicated below it using a number followed by the letter "A," where "A" stands for amperes, the unit of electric current.



配置在电器装置板A100右侧外挂的普通保险丝见下左图。通常也是以“F字母加三位数学”表示，如F158（点烟器保险丝）。

此类外挂的保险丝在电器装置板A100上面无位置标记，通常是一个塑料的保险丝座，保险丝座依靠特制的卡扣与电器装置板侧面的凹槽咬合，实现简单的固定。而且此类保险丝座还可以与另外的保险丝座侧面的凹槽咬合，多个保险丝座连接成为一体。在保险丝座的侧面印制有“F158”此类标记，用于区分不同的外挂保险丝。当然也可以通过保险丝座连接的电线五位编码，查图分辨它是什么保险丝。

The external fuses mounted on the right side of the electrical device board A100 are depicted in the diagram on the left. These fuses are typically labeled using the format "F" followed by a three-digit number, such as F158 (the fuse for the cigarette lighter).



These externally mounted fuses on the electrical device board A100 do not have specific positional markings. They are usually housed in plastic fuse holders, which securely attach to the side grooves of the electrical device board using a specialized locking mechanism. Additionally, these fuse holders can interlock with other holders by aligning their side grooves, creating a unified assembly.

The side of each fuse holder is imprinted with identifiers like "F158," distinguishing between different externally mounted fuses. Alternatively, the specific type of fuse can be determined by examining the five-digit wire code connected to the fuse holder.



2. G—代表蓄电池和发电机。

配置在电瓶箱的保险丝见上中图。通常保险丝座以“F字母加三位数字”表示，如F101（进气加热保险丝）F149（ECU电源保险丝）。见F-2000新原理图，第1页。电瓶箱的保险丝大电流采用易熔片，小电流采用普通塑料片式保险。

例如G100、G101是蓄电池，G102是发电机。蓄电池和发电机是重卡的电源。

从左图中看到，G100、G101蓄电池互相串联，组成24V直流电源，此电源通过S149电瓶总开关，先连接到了M100起动机30端，又连接到了G102发电机的B+端。

图中，G100、G101蓄电池通过X101变速箱搭铁点，和X102左纵梁搭铁点搭铁。G102发电机通过31端外壳搭铁。

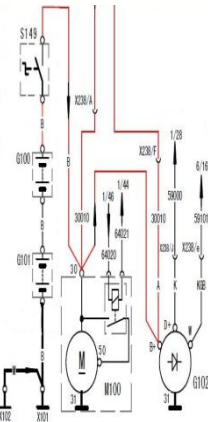
G— Represents Battery and Generator.

The fuses installed in the battery box are depicted in the diagram above. Typically, fuse holders are labeled using the format "F" followed by a three-digit number, such as F101 (intake heating fuse) or F149 (ECU power supply fuse). Refer to the F-2000 new schematic diagram, page 1. High-current fuses in the battery box use blade-type fuses, while low-current fuses use standard plastic blade fuses.

For example, G100 and G101 represent batteries, while G102 represents the generator. Batteries and generators serve as the power source for heavy-duty trucks.

As observed in the left diagram, batteries G100 and G101 are connected in series to form a 24V DC power supply. This power supply is first connected to terminal 30 of starter motor M100 via switch S149 on the battery master switch, and then to terminal B+ of generator G102.

In the diagram, batteries G100 and G101 are grounded via grounding points X101 on the gearbox and X102 on the left longitudinal beam. Generator G102 is grounded via its housing at terminal 31.



3. H—代表指示灯、报警灯和电喇叭。

- H100是电瓶充电灯 H108是气压报警灯 H109是油压报警灯 H110是水温报警灯
H111是中央报警灯（STOP）灯 H117是驻车制动信号灯 H118是牵引车转向信号灯
H119是挂车转向信号灯 H129是远光信号灯 H130是翻斗回位信号灯
H131是离合器磨损报警灯 H147是空滤堵塞报警信号灯 H149是驾驶室锁止信号灯

这些信号灯和报警灯都集成在组合仪表的信号灯板内部。

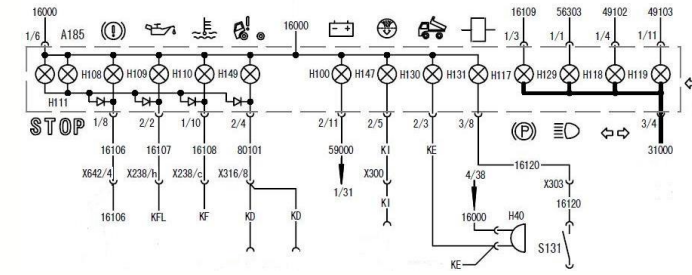
在上图中，H40是翻斗回位报警蜂鸣器，此蜂鸣器是电声器件，早期车型安装在开关板，占用一个翘板开关位置，现在新式的CAN总线仪表，把蜂鸣器集成在组合仪表的内部。

H— Represents Indicators, Warning Lights, and Horns.

H100 is the Battery Charging Indicator. H108 is the Air Pressure Warning Light. H109 is the Oil Pressure Warning Light. H110 is the Water Temperature Warning Light. H111 is the Central Warning (STOP) Light. H117 is the Parking Brake Signal Light. H118 is the Tractor Steering Signal Light. H119 is the Trailer Steering Signal Light. H129 is the High Beam Signal Light. H130 is the Dump Truck Return Signal Light. H131 is the Clutch Wear Warning Light. H147 is the Air Filter Blockage Warning Signal Light. H149 is the Cabin Lock Signal Light.

These signal lights and warning lights are all integrated into the signal lamp board of the combination instrument panel.

In the diagram above, H40 is the Dump Truck Return Warning Buzzer. This buzzer is an electro-acoustic device, and in earlier vehicle models, it was installed on the switchboard, occupying one switch position. In modern CAN bus instrument clusters, the buzzer is integrated into the combination instrument panel.

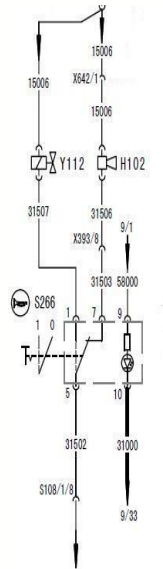


在右图中H102是电喇叭，此电喇叭是电声器件，安装在前面罩下方。电喇叭的电源是由电器装置板A100的23号位置F107保险丝提供的钥匙电15001，经过电器装置板A100的后面的79/4位置由15006线输出传递到H102电喇叭和Y112气喇叭。

通过H102电喇叭的电路由31506线传递到S226喇叭转换开关的7号位置，通过Y112气喇叭的电路由31507线传递到S226喇叭转换开关的1号位置，由S226喇叭转换开关选择工作状态之后，从S226喇叭转换开关的5号位置输出，传递到方向盘上的S103喇叭按钮，按压S103喇叭按钮此处搭铁，电路接通，相应的电气喇叭鸣响发声。

In the right diagram, H102 is the horn, which is an electro-acoustic device installed below the front grille. The power supply for the horn comes from the key electrical system (15001) provided by the F107 fuse at position 23 on the A100 electrical control unit. This power is output through the 15006 wire at position 79/4 on the rear of the A100 electrical control unit to the horn (H102) and the air horn (Y112).

The circuit from the H102 horn is transmitted through the 31506 wire to position 7 of the S226 horn changeover switch. Similarly, the circuit from the Y112 air horn is transmitted through the 31507 wire to position 1 of the S226 horn changeover switch. After selecting the working mode with the S226 horn changeover switch, the output is transmitted from position 5 of the S226 horn changeover switch to the S103 horn button on the steering wheel. When the S103 horn button is pressed and makes contact, the circuit is completed, and the respective horn emits sound.

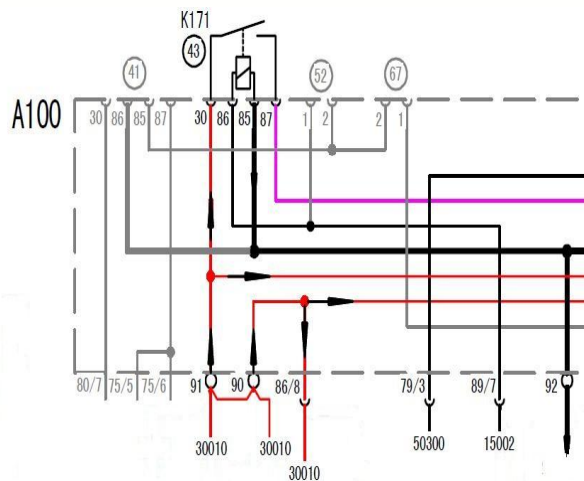


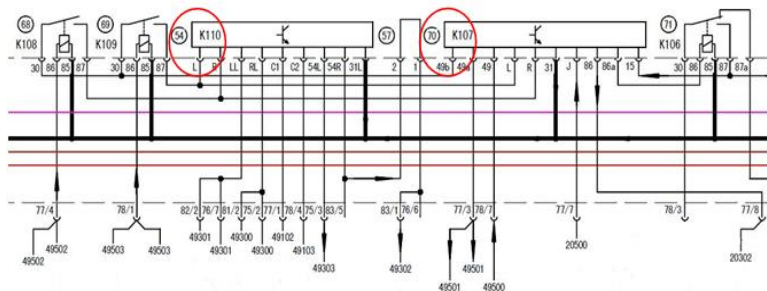
4.K—代表继电器；

在上图中K171是负载继电器，此继电器安装在A100电器装置板的43号位置，在K171下边有“带圆圈的43”标记，代表电器装置板的43号位置，它是电器装置板的位置标记。

K—Represents relays:

In the above diagram, K171 is a load relay, which is installed at position 43 on the A100 electrical control unit. Below K171, there is a marking "with circle 43", representing position 43 of the electrical control unit, which serves as a location marker for the electrical control unit.





在上图中K110是转向灯控制继电器，K107是雨刮、闪光间歇控制继电器，K110继电器安装在A100电器装置板的54号位置，K107继电器安装在A100电器装置板的70号位置，此处有“带圆圈的54”和“带圆圈的70”标记，代表电器装置板的54号和70号位置，是电器装置板的位置标记。

In the diagram, K110 is the turn signal control relay, and K107 is the windshield wiper and flasher intermittent control relay. K110 relay is installed at position 54 on the A100 electrical control unit, while K107 relay is installed at position 70 on the A100 electrical control unit. Here, there are markings "with circle 54" and "with circle 70", representing positions 54 and 70 of the electrical control unit, serving as location markers for the electrical control unit.

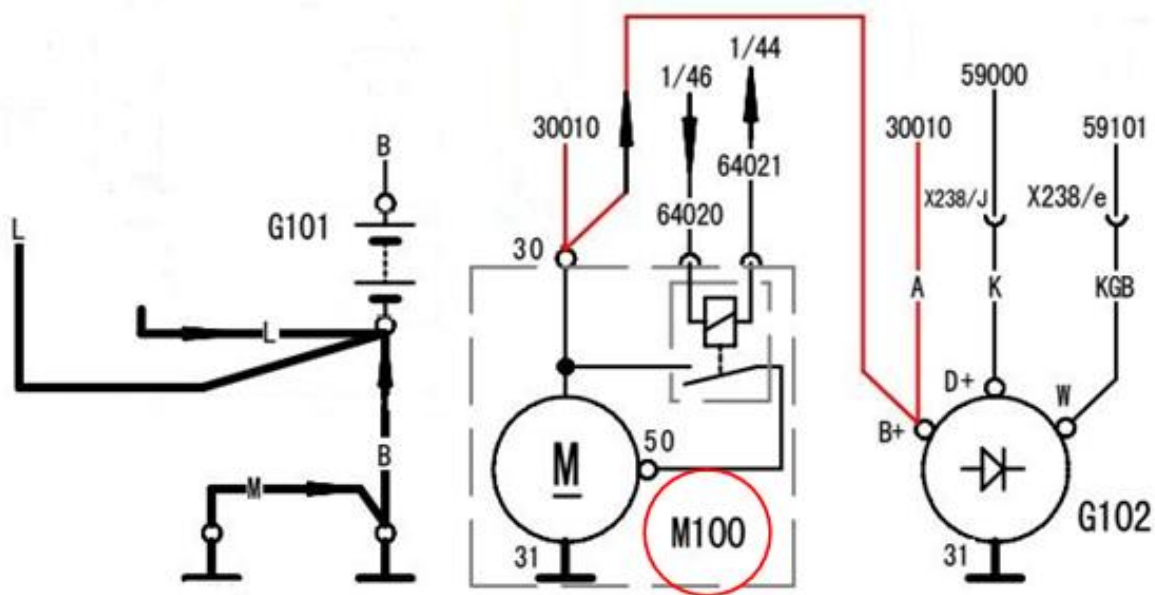
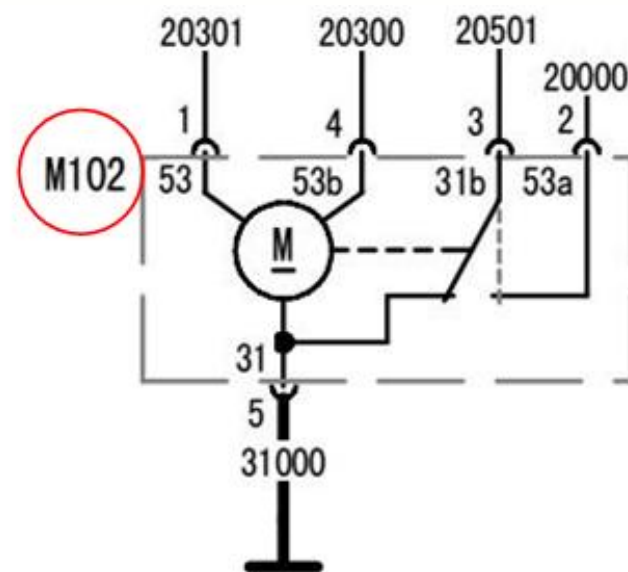


5. M—代表电机

例如M100是启动电机，M102是雨刮电机。

M—represents motors.

For example, M100 is the starter motor, and M102 is the windshield wiper motor.



6、Q—代表钥匙开关；

钥匙开关是陕汽重卡重要电器元件，应用于所有SHACMAN车型。

钥匙开关配置在转向柱右侧面，以“Q101”表示。

电器原理图当中只有“Q101”这一个大写字母Q代码的电器元件。

F2000/F3000车型的钥匙开关有5个档位，8个接线柱。

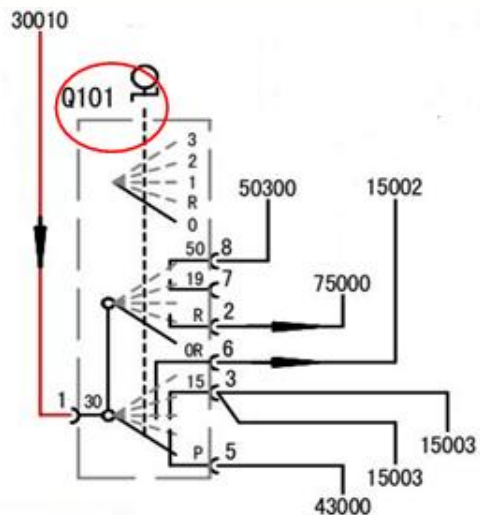
Q—stands for ignition switch;

The ignition switch is a crucial electrical component in SHACMAN heavy-duty trucks, utilized across all models.

Positioned on the right side of the steering column, it is denoted as "Q101."

Within the electrical schematic diagram, there is only one electrical component designated with the uppercase letter Q.

The ignition switch in F2000/F3000 models features five gear positions and eight terminals.

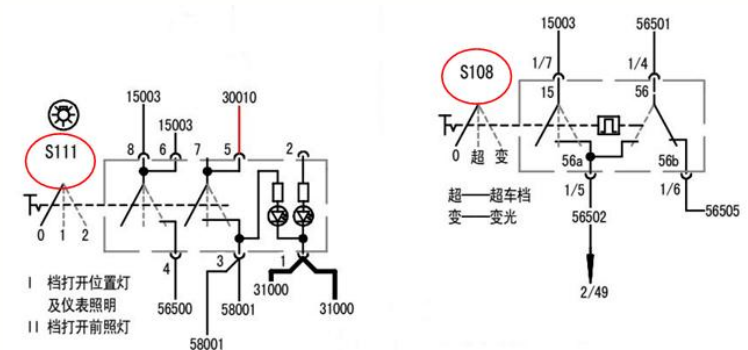


7、S—代表各类开关；

例如S111是灯光开关，S108是组合开关。其实汽车电器的开关种类较多，配置的部位也是各不相同，都是以“大写字母S+三位数字”表示。

S—stands for various switches.

For instance, S111 represents the headlight switch, and S108 denotes the combination switch. In reality, automobiles feature a variety of electrical switches, each located in different positions and identified by the format "uppercase letter S + three digits" in the electrical schematics.

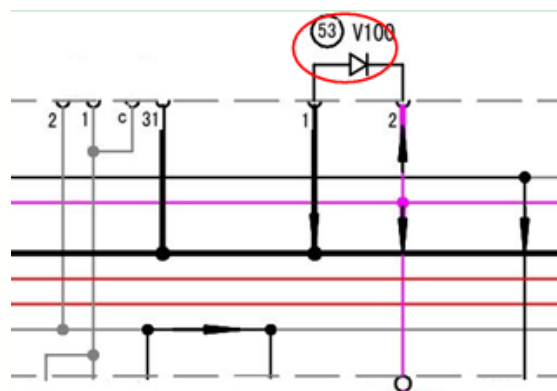


8、V—代表二极管；

例如V100是抗干扰二极管。此处V100二极管，用于对T15钥匙电的输出线路抗干扰和对负载进行保护。

V - represents a diode;

For example, V100 denotes an interference-resistant diode. In this context, the V100 diode is used to protect against interference in the output circuit of the T15 key electric and to safeguard the load.

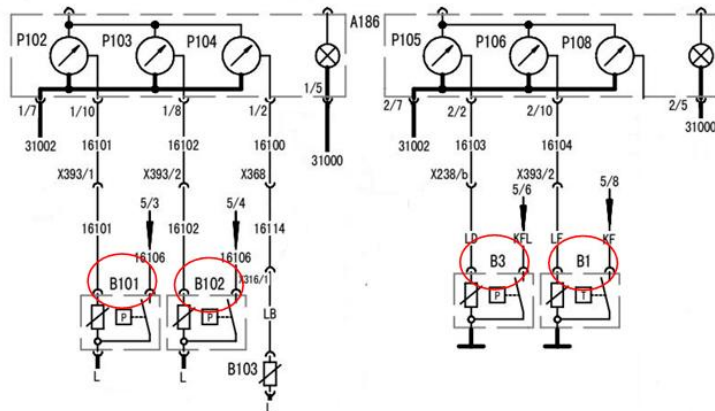


9、B—代表传感器或是传感开关;

例如B1是水温传感器，B3是机油压力传感器，B101是前制动低气压警告开关，B102是后制动低气压警告开关。

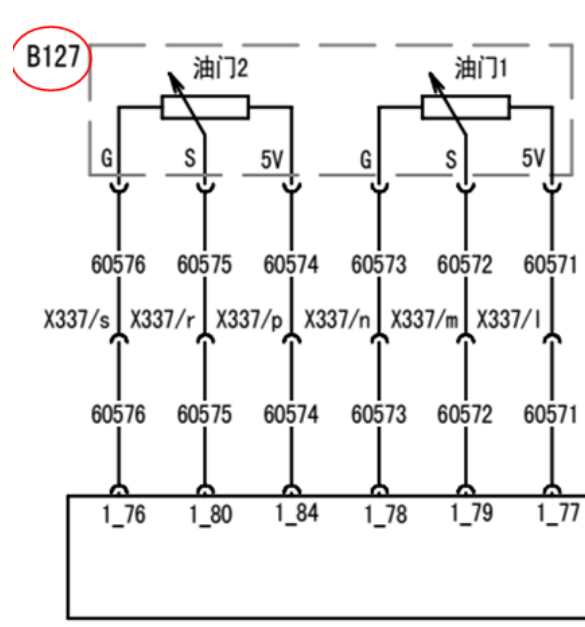
B - represents a sensor or sensor switch;

For example, B1 is the water temperature sensor, B3 is the engine oil pressure sensor, B101 is the front brake low air pressure warning switch, and B102 is the rear brake low air pressure warning switch



B127是电控油门踏板，它实际上也是一个传感器，检测的是驾驶员踩踏油门踏板的动作信号，此信号控制发动机从而执行驾驶员的驾驶意图，如怠速，加速，减速，保持最大油门，恒速等等。

B127 is the electronic throttle pedal, which functions as a sensor detecting the driver's action on the throttle pedal. This signal controls the engine to execute the driver's driving intentions, such as idling, accelerating, decelerating, maintaining maximum throttle, cruise control, etc.



10. R—特定的电器元件；

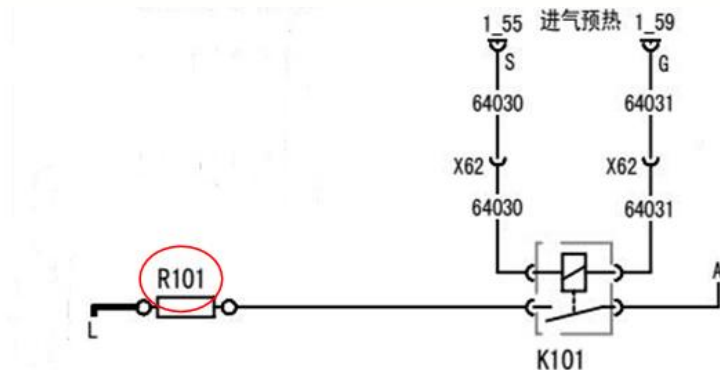
通常车辆的加热型、或电阻型负载使用“大写字母R+数字”表示。

例如R101是进气加热格栅，R12是空气干燥器的加热器，R108是点烟器等等。

R - Specific electrical components;

Typically, heating or resistance-type loads in vehicles are denoted by "uppercase letter R + number".

For example, R101 is the intake heating grille, R12 is the air dryer heater, R108 is the cigarette lighter, and so on.



11. Y—代表电磁阀；

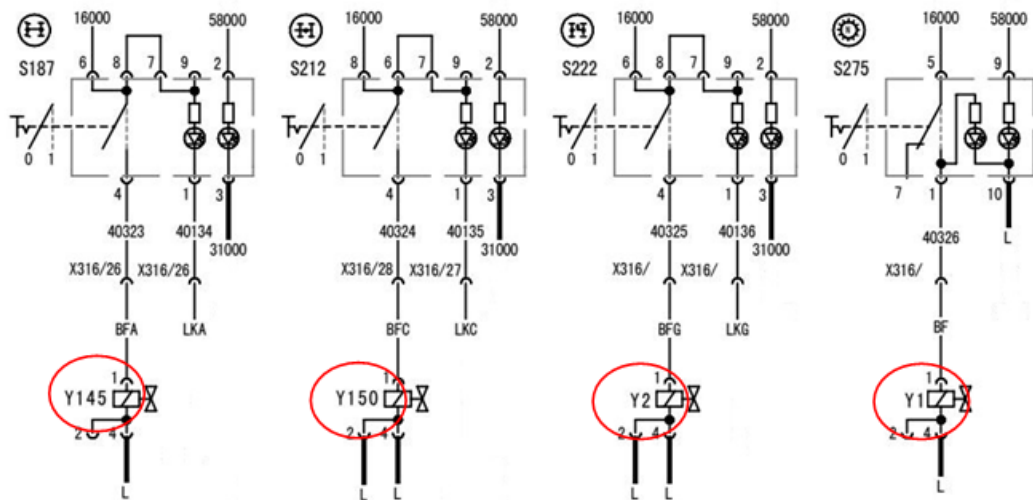
通常车辆的气控电磁阀使用“大写字母Y+数字”表示。

例如Y145是轮间差速锁电磁阀，Y150是桥间差速锁电磁阀。

Y - Represents solenoid valves;

Typically, pneumatic solenoid valves in vehicles are denoted by "uppercase letter Y + number".

For example, Y145 is the inter-wheel differential lock solenoid valve, and Y150 is the inter-axle differential lock solenoid valve.

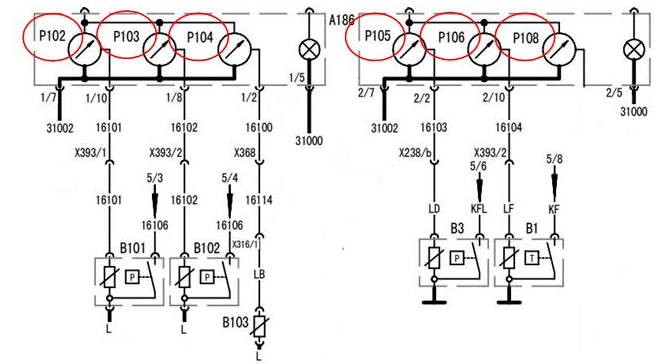


12. P—代表仪表；

通常车辆的各个仪表使用“大写字母P+数字”表示。

例如P100是车速里程表，P101是发动机转速表，P102是前轮制动气压表，P103是后轮制动气压表，P104是燃油油量表，P105是（发动机）机油压力表，P106是（发动机）水温表，P108是整车电压表。

P stands for "Panel." Typically, various gauges in a vehicle are represented using "capital letter P + number" format. For example, P100 is the speedometer, P101 is the tachometer, P102 is the front brake pressure gauge, P103 is the rear brake pressure gauge, P104 is the fuel gauge, P105 is the (engine) oil pressure gauge, P106 is the (engine) coolant temperature gauge, and P108 is the vehicle voltage gauge.



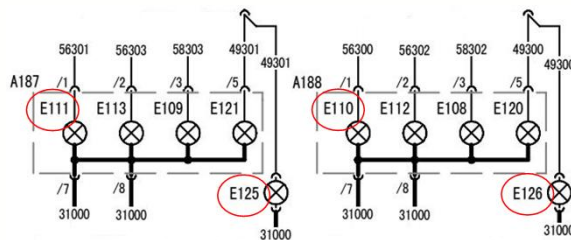
13. E—代表照明灯；

通常车辆的各个照明灯使用“大写字母E+数字”表示。

例如E110是右近光灯，E111是左近光灯，E125是左转向灯（上车踏板处），E126是右转向灯（上车踏板处）等等。

E stands for "Electrics."

Typically, various lighting fixtures in a vehicle are represented using the format "capital letter E + number." For example, E110 is the right low beam headlight, E111 is the left low beam headlight, E125 is the left turn signal light (on the driver's side fender), E126 is the right turn signal light (on the passenger's side fender), and so on.



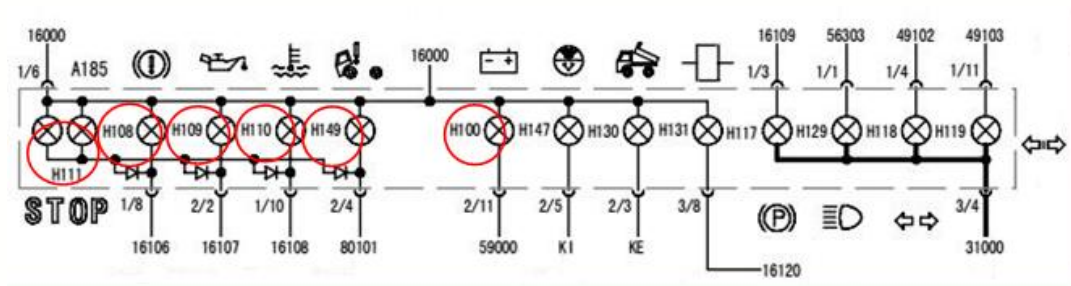
14. H—代表（仪表板）信号灯；

通常车辆的各个仪表板信号灯使用“大写字母H+数字”表示。

H111是中央报警STOP灯 H100是电瓶充电灯 H108是气压报警灯

H109是油压报警灯 H110是水温报警灯 H149是驾驶室锁止报警灯等

H stands for "Indicator" (specifically on the dashboard). Typically, various indicator lights on a vehicle's dashboard are represented using the format "capital letter H + number." For example, H111 is the central STOP warning light, H100 is the battery charging light, H108 is the air pressure warning light, H109 is the oil pressure warning light, H110 is the coolant temperature warning light, H149 is the cabin lock warning light, and so on.

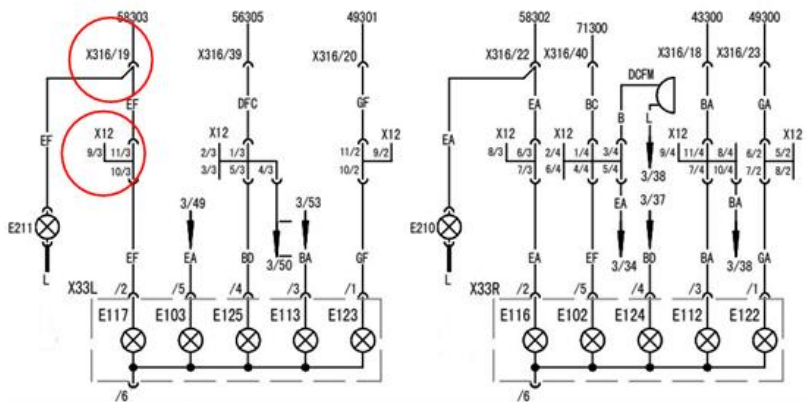


15. X—代表插接器

通常车辆的各个插接器使用“大写字母X+数字”表示。

例如“X316/19”是代表标识为“X316”的44孔插接器的第19个针脚，“X12/9/3”是代表后尾灯分线盒“X12”的第9竖行插接器的第3个针脚

X stands for "Connector." Typically, various connectors in a vehicle are represented using the format "capital letter X + number." For example, "X316/19" represents the 19th pin of the 44-pin connector labeled as "X316," and "X12/9/3" represents the 3rd pin of the 9th column of the connector box labeled "X12" for the rear taillight.



“X238/A”是代表“X238”插接器标识为“A”的针脚，“X238/J”是代表“X238”35孔插接器标识为“J”的针脚。

注意：电路图中各插接器各针脚号或各针脚的标识与插接器实物上的针脚号或针脚标识一一对应。

其他没有指明的电器原理图符号含义，可以从图中下方中文注释列表查询，依据此电路图解释的就不难看懂电路图的基本原理。

"X238/A" represents pin labeled as "A" of the connector identified as "X238," while "X238/J" represents pin labeled as "J" of the 35-pin connector identified as "X238." Note: The pin numbers or identifications of each connector on the circuit diagram correspond one-to-one with the pin numbers or identifications on the physical connectors. For meanings of other electrical schematic symbols not specified, you can refer to the Chinese annotation list below the diagram, which makes understanding the basic principles of the circuit diagram not difficult.

