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SHACMAN



OPERATION AND MAINTENANCE MANUAL FOR SHACMAN M3000&H3000

M3000&H3000 使用说明书



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一、车辆的编号 Numbering of Vehicle

用户在申请赔偿，订购备件或与维修部门联系时必须准确、完整地注明车辆的编号。

车辆的编号应填入：

User must accurately and completely specify the numbers of vehicle when compensation is claimed, spare parts are ordered, and the maintenance department is contacted.

The following numbers of vehicle shall be filled in:

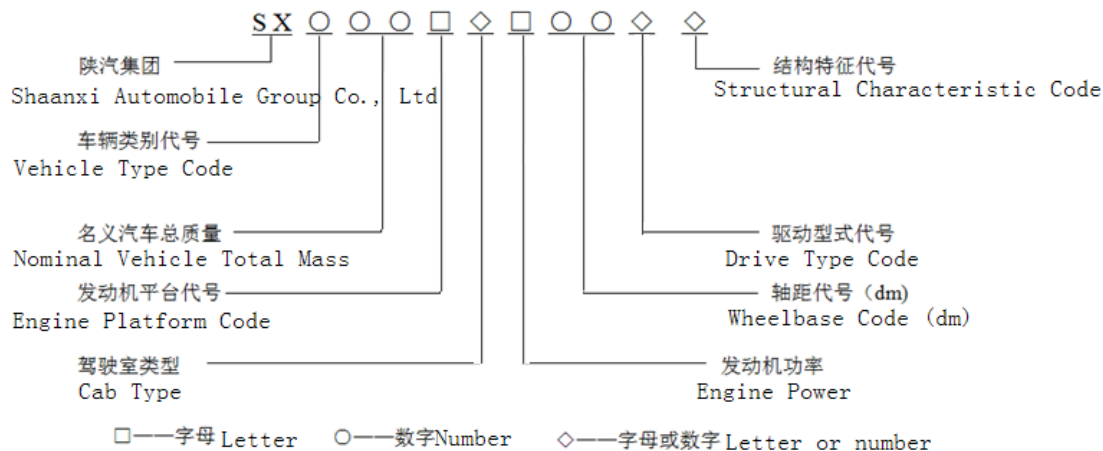
车 型 号 Vehicle Type No:_____

车辆识别代号 VIN:_____

发 动 机 号 Engine No.:_____

出 厂 日 期 Date of Delivery:_____

(一) 车型号 Vehicle type



【1】编号形式 Number form

举例: SX1317ML456 SX4257GN324

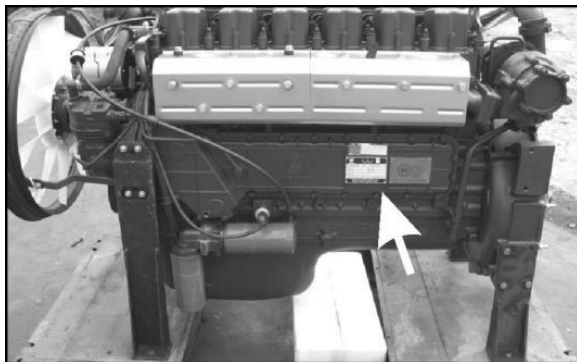
For example: SX1317ML456 SX4257GN324

【2】整车铭牌及陕汽重卡电子标签位置

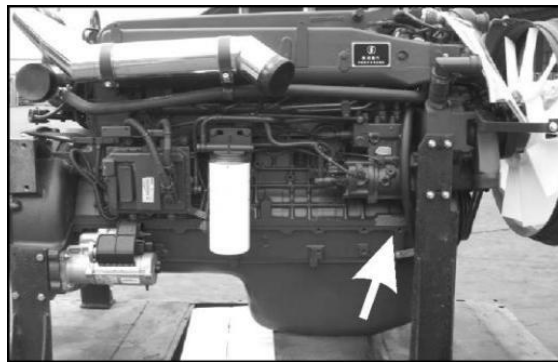
Positions of Name Plate and electronic nameplate of Shanqi heavy-duty truck



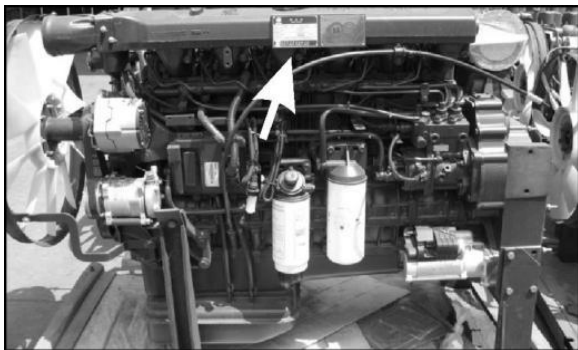
(二) 发动机铭牌及钢号 Engine nameplate and cylinder number



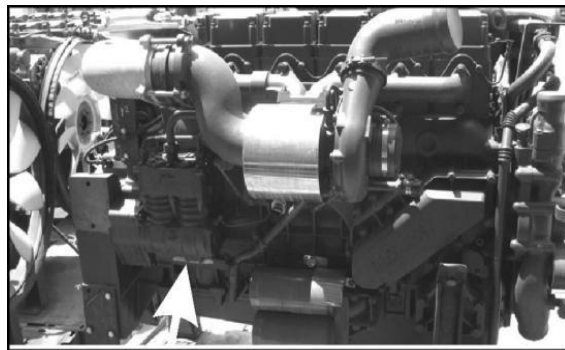
WP10 发动机铭牌位置
WP10 Engine nameplate



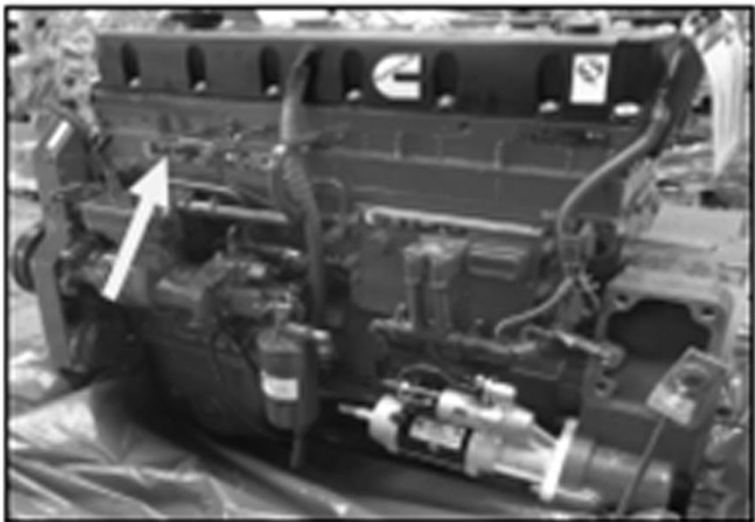
WP10 发动机钢号位置
WP10 Engine cylinder number



WP12 发动机铭牌位置
WP12 Engine nameplate



WP12 发动机钢号位置
WP12 Engine cylinder number



ISM 发动机铭牌位置
ISM engine nameplate



ISM 发动机缸体号位置
ISM engine cylinder number



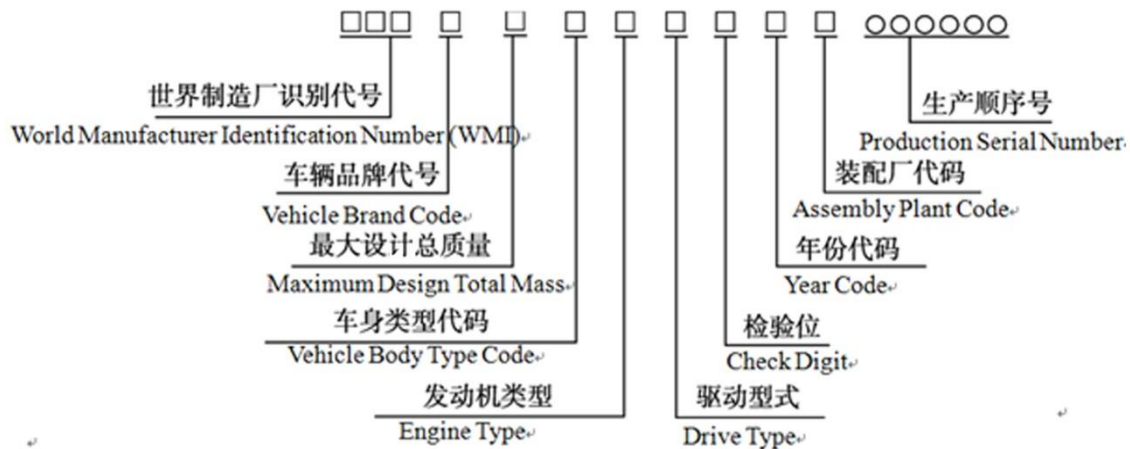
WP7 发动机铭牌位置
WP7 engine nameplate



WP7 发动机缸体号位置
WP7 engine cylinder number

(三) 车辆识别代号 Vehicle identification number

【1】编号形式: Numbering type:



【2】打印位置：Mark Position:

车辆识别代号打印在车架右纵梁腹面外侧（前轴中心线部位）。

Vehicle identification code is stamped on the right rearward face at the external side of the right frame (in the center line part of front axle).



二、车辆的使用 **The use of vehicles**

(一) 驾驶室及主要机构（装置） Cab and main mechanisms (Devices)

1. 车门打开与锁止: Open and lock door

从车外将钥匙插入锁孔内，旋转钥匙（司机侧车门逆时针旋转，乘客侧车门顺时针旋转），听到咔哒声后，拔出钥匙用力向外拉，即可打开车门（反之门锁锁上）。

Insert the key to lockhole outside cab and rotate the key (rotate the key counter-clockwisely for driver's door, and rotate the key clockwisely for passenger's door), after heard a sound of “click”, pull out the key and pull the door outwards forcibly, the door will be opened (otherwise, the door will be locked).

在车内时，将锁钮向门护板内推，车门将反锁上；将锁钮向门护板外推，再拉门把手柄并向外推即可打开车门。

When in the vehicle, push the lock button inwards the door guard, the door will be locked. and push the lock button outwards the door guard, the door will be unlocked.



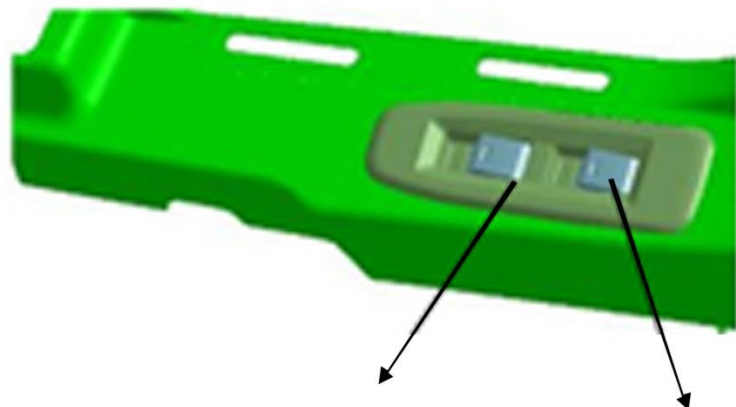
注意 Caution

切勿在车门关闭好之前行驶车辆，否则将有意外事故的危險。

Never drive the vehicle before doors are properly closed, and otherwise the danger of unexpected accident would happen!

2.车门玻璃的操作说明:

The operation instructions on door glass



左门玻璃升降开关
Left door glass lift switch

右门玻璃升降开关
Right door glass lift switch



本车门安装电动玻璃升降器，右车门开关可控制左右车门的玻璃升降。

Electric glass lifter is assembled with this door, it can control the glass elevation for both the left and right doors by the switch on the right door.

在电源接通后，按下开关的上部，车门玻璃下降，抬起开关的上部，车门玻璃上升，松手后开关自动复位，玻璃处于停止状态。

After power switched on, press the upper part of the switch to lower the door glass, and raise the upper part of the switch to lift the door glass. The switch will automatically reset when released hand, and then the glass is in stop position.

注意：Caution

将玻璃升降到位后，应立即松开按钮开关，否则会降低升降器寿命或损坏升降器，锁门时请将玻璃升到位。

After the glass is properly lifted or lowered, the button switch shall be released immediately, and otherwise the service life of the lifter may be shortened or the lifter may be damaged. Please lift the glass to the designated position when door is locked.

3.座椅调节及安全帶 Seat adjustment and seat belt

1) 座椅的调节 Seat adjustment



空气主座椅
Air main seat



副座椅
Sub-seat



液压主座椅
Hydraulic main seat

座椅调节功能如下： Seat adjustment functions are as follows

- (1) 前后位置调节 Front and rear position adjustment
- (2) 前端高度调节 Front height adjustment

(3) 后端高度调节 Rear height adjustment

(4) 靠背角度调节 Backrest angle adjustment

(5) 腰托调节（仅空气座椅） Lumbar support adjustment (air seat only)

(6) 刚度调节（仅液压座椅） Stiffness adjustment (only hydraulic seat)

前后位置调节 Front and rear position adjustment

向上扳动手柄 1，将座椅前后位置调至所需位置，然后松开手柄即可锁止座椅。

Move the handle 1 upward to adjust the front and rear position of the seat to the desired position, and then release the handle to lock the seat.

高度位置调节 Height adjustment

向上扳动手柄 2，将前端高度调至所需位置，然后松开手柄即可锁止座椅。

Move the handle 2 upward to adjust the height of the front end to the desired position, and then release the handle to lock the seat.

向上扳动手柄 3，将后端高度调至所需位置，然后松开手柄即可锁止座椅。

Move the handle 3 upwards to adjust the height of the rear end to the desired position, and then release the handle to lock the seat.

靠背角度调节 Backrest angle adjustment

向上扳动手柄 4，利用身体背部力量将座椅靠背调至所需位置，然后松开手柄即可锁止座椅。

Pull the handle 4 upwards, use the strength of the body's back to adjust the seat back to the desired position, and then release the handle to lock the seat.

刚度调节 Stiffness adjustment

根据司机的体重，旋转旋钮 2 可调节座椅刚度，使乘坐舒适。体重参考指标在旋钮刻度上显示。

According to the driver's weight, the seat stiffness can be adjusted by turning the knob 2 to make the ride comfortable. The weight reference indicator is displayed on the knob scale.

腰托调节 Lumbar support adjustment

旋转手柄 5，调节腰部舒适的位置。

Rotate the handle 5 to adjust the comfortable position of the waist.

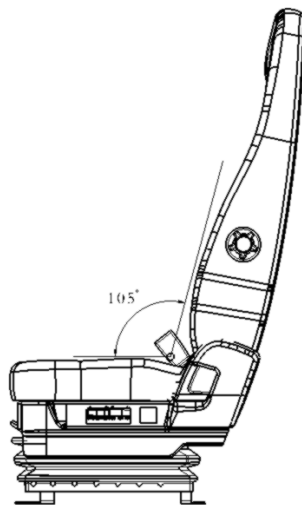
刚度调节 Stiffness adjustment

根据司机的体重，旋转旋钮 6 可调节座椅刚度，使乘坐舒适。体重参考指标在旋钮刻度上显示。

According to the weight of the driver, the seat stiffness can be adjusted by rotating the knob 6 to make the ride comfortable. The weight reference index is displayed on the knob scale.

特殊说明

Special Instructions



1、在调节该座椅前请先观察减振锁止机构是否处于解锁状态。

1、 Before adjusting the seat, please observe whether the damping and locking mechanism is in the unlocked state.

2、请您在确保驾驶安全的情况下调整座椅。

2、Please adjust the seat while ensuring driving safety.

3、在您前后调整、角度调整时，应将手柄扳到位，以保证机构完全分离后，再进行调整。

3、When you adjust the front and back, and adjust the angle, you should pull the handle in place to ensure that the mechanism is completely separated before adjusting.

4、调整完毕后，各手柄自然回位，确保各部位锁止机构可靠。

4、After adjustment, the handles return naturally to ensure the reliability of the locking mechanism of each part.

5、气囊悬浮式驾驶员座椅可选装带右扶手式座椅。

5、The airbag suspension driver seat can be optionally equipped with a right armrest seat.

6、座椅靠背的正常使用角度为 105 °。测量座垫深时座椅靠背角角度为 105 °。

6、The normal use angle of the seat back is 105° . When measuring the seat cushion depth, the seat back angle is 105° .

2) 安全带 Seat belts

驾驶员与副驾驶座椅均配有安全带，为确保行车安全请系好安全带。使用时将安全带缓缓地拉出，使安全带位于肩与颈根之间（但不要在上衣袋中放有钢笔、眼镜等坚硬易碎物品，以防意外发生），将安全带通过胸部的适当位置，拉住锁扣将扣闩压入锁卡内，把锁舌插入锁扣后，听到“咔”一声响，确认锁住后，调整安全带直至感到舒适为止；发动机启动后，驾驶员如未系好安全带，仪表处会出现图像警报，同时伴随有声音警报（如未配置安全带佩戴提醒功能则不适用）。解除时按下锁扣上的红色按钮，握压扣闩，将安全带缓缓放回即可。

The driver and co-pilot seats are equipped with seat belts, please wear seat belts to ensure driving safety. When using, slowly pull out the seat belt so that the seat belt is between the shoulder and the neck (but do not put pens, glasses and other hard and fragile items in the upper pocket to prevent accidents), and pass the seat belt through the chest Pull the lock buckle to press the buckle into the lock card. After inserting the lock tongue into the lock buckle, you hear a "click" sound. After confirming the lock, adjust the seat belt until you feel comfortable; after the engine starts, If the driver does not wear a seat belt, an image alert will appear on the instrument, accompanied by an audio alert (not applicable if the seat belt reminder function is not configured). When releasing, press the red button on the buckle, hold the buckle latch, and slowly put the seat belt back.



1-锁扣 2- 锁舌
1-Lock 2-Bolt

安全带注意事项: Precautions for seat belts:

1、确保安全带不被缠绕，不与坚硬的棱边摩擦，防止化学物品的污染。

1、 Make sure that the seat belt is not entangled or rubbed against hard edges to prevent chemical contamination.

2、安全带仅限一人使用。严禁大人、小孩共用一条安全带。

2、 The seat belt can only be used by one person. It is strictly forbidden for adults and children to share a seat belt.

3、安全带任何部件失效及损坏，整个安全带都必须更换。

3、 If any part of the seat belt fails or is damaged, the entire seat belt must be replaced.

4、如果卷收器发卡应更换安全带。

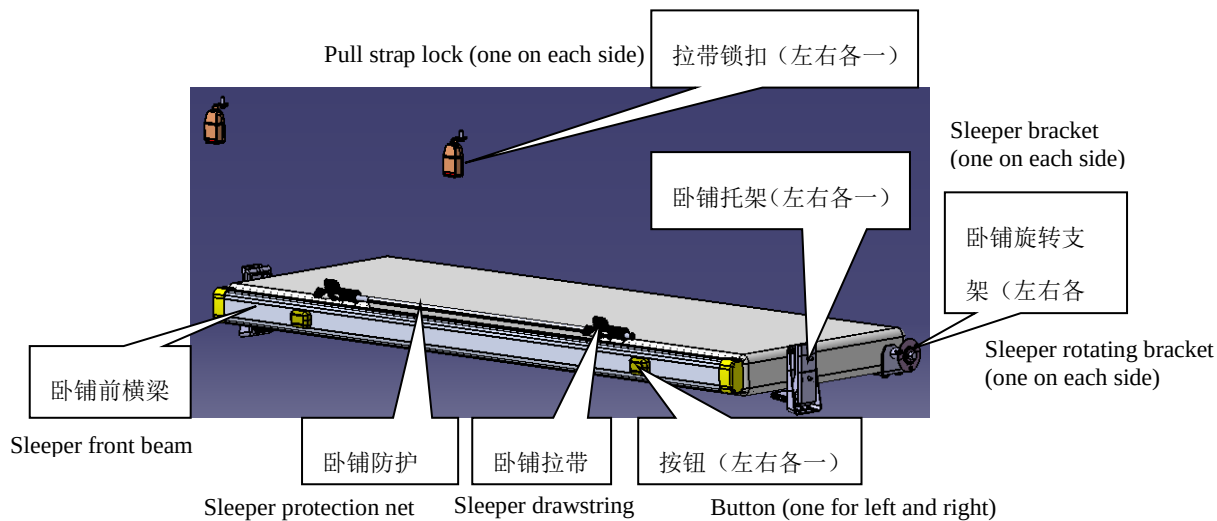
4、 If the retractor is issued a card, the seat belt should be replaced.

5、一定要根据使用者的身体条件调整好安全带长度，否则容易造成危险。

5、 The length of the seat belt must be adjusted according to the user's physical condition, otherwise it is easy to cause danger.

4.卧铺 Sleeper

1) 上卧铺使用说明: Instructions for upper sleeper:



上卧铺翻转与放下，操作步骤如下：

Turn over and lower the upper sleeper, the operation steps are as follows:

连接卧铺拉带：打开卧铺拉带的卡扣，一只手按住卧铺按钮，另一只手按住拉带锁扣“PRESS”按钮，用力往上扣，直到听见“咔哒”的锁紧声，确认稳固后即可松手（两侧拉带操作方法相同）；

Connect the sleeper strap: open the buckle of the sleeper strap, hold down the sleeper button with one hand, and press the “PRESS” button of the strap lock with the other hand, and buckle it up until you hear a "click" lock sound , After confirming that it is stable, you can let go (the method of pulling the strap on both sides is the same);

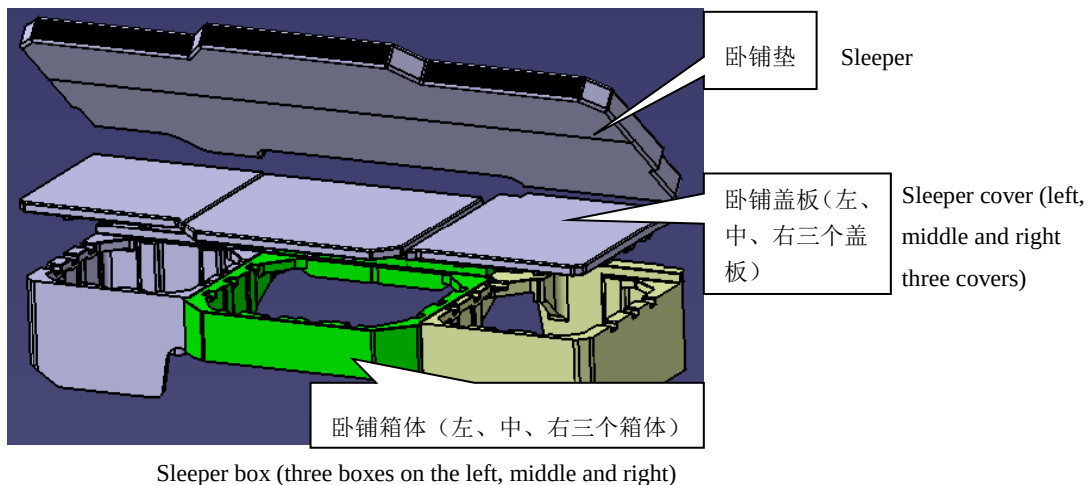
翻起上卧铺：卧铺水平状态下，两手同时托起卧铺前横梁即可向上翻转卧铺至需要的高度；放下上卧铺：将卧铺向下翻转前，需先打开驾驶室两侧的卧铺托架，然后同时按住卧铺横梁上两只按钮直至翻转水平后松开。

Turning up the upper berth: When the berth is level, hold the front beam of the berth with both hands at the same time to flip the berth up to the required height; lower the upper berth: before turning the berth down, open the sleeper brackets on both sides of the cab. Then press and hold the two buttons on the sleeper beam at the same time until it is turned horizontally and released.

防护网的操作: Operation of the protective net:

原始状态防护网是收进卷筒里的, 首先打开防护网支撑杆两端连在卧铺拉带上的卡扣, 然后拉起防护网至需要的高度, 锁紧卡扣即可。

The original protective net is retracted into the reel. First, open the buckles on the sleeper straps at both ends of the protective net support rod, then pull the protective net to the required height and lock the buckles.



2) 下卧铺使用说明: Instructions for use of the lower sleeper:

下卧铺使用操作步骤: 翻起卧铺垫直接打开卧铺盖板即可, 放下卧铺盖板时直接将盖板放至箱体上, 确保卧铺盖板与卧铺箱体搭接牢靠。

Operation steps for lower sleeper: turn up the sleeper and directly open the sleeper cover. When lowering the sleeper cover, directly put the cover on the box to ensure that the sleeper cover and the sleeper box are firmly overlapped.

卧铺使用注意事项: Precautions for sleeper use:

翻转上卧铺时需确保两侧拉带插入拉带锁扣内锁紧;

When turning the upper sleeper, make sure that the pull straps on both sides are inserted into the pull strap locks and locked;

上卧铺仅供驻车状态下使用, 行驶过程中请勿使用上卧铺;

The upper sleeping berth is only for use in the parking state, please do not use the upper sleeping berth during driving;

使用上卧铺时必须将防护网拉起足够高度, 并确保锁止, 防止人从上面滚落;

When using the upper sleeper, the protective net must be pulled up to a sufficient height and locked to prevent people from falling from above;

上下卧铺均可采用湿毛巾擦拭，使驾驶室保持干净；

The upper and lower sleepers can be wiped with wet towels to keep the cab clean;

下卧铺采用板垫分离结构，卧铺垫的包覆面料可拆开拉链放置洗衣机中清洗；

The lower sleeper adopts a separate structure of the board and pad, and the covering fabric of the sleeper pad can be removed and placed in the washing machine for washing;

若您使用的是金属材质的下卧铺箱体，使用时将卧铺盖板翻起即可，收起时直接放下卧铺盖板即可；

If you are using a metal lower sleeper box, just flip up the sleeper cover when using it, and put down the sleeper cover directly when storing it;

禁止在卧铺上吸烟，以免引发火灾；

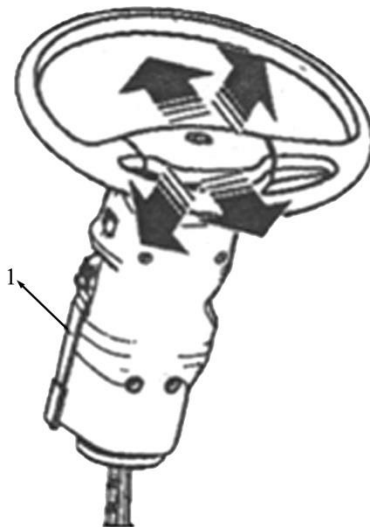
It is forbidden to smoke in the sleeper to avoid fire;

卧铺垫内芯为聚氨酯材料，可以用水清洗，但清洗后可能存在一定的变形和褶皱。

The inner core of the sleeping mat is made of polyurethane, which can be washed with water, but there may be some deformation and wrinkles after washing.

5.方向盘的调节:

Adjustment of steering wheel



1-转向柱调整手柄锁止位置

1- Steering column adjustment handle lock position

车辆只有在停车时，才可进行方向盘的调节。高度调节时，将转向柱调整手柄由锁止位置向上抬起，方向盘可进行上下 0~75mm 的调整；倾斜角度调节（0°~8°）时，同样将转向柱调整手柄由锁止位置，进行前后调整，前后可进行 8° 的调节，直至调整到舒适的位置后，再将调整手柄回复至锁止位置。

Steering wheel may only be adjusted when vehicle parking. In the process of height adjustment, lift the adjusting handle of steering column up from locking position. The adjustment range is between 0 and 75mm. When adjusting tilt angle (0 °~ 8 °), adjust the handle of steering column forward and backward from locking position. The adjustment range is between 0 °~8 °. And pull the handle back to locking position after your adjustment.

6.驾驶室空气悬浮装置

Air suspension equipment of cab

牵引车和载货车驾驶室采用空气悬浮装置以提高乘坐舒适性，根据用户要求在适当范围内调整；自卸车和专用车采用液压减振装置不可调。

Cabs for tractors and trucks adopt air suspensions to increase the traveling comfort, and it can be adjusted according to the requirements of customers; the hydraulic suspensions adopted by dumpers and special vehicle should not be adjusted.

驾驶室空气悬浮装置调整如下：

The adjustment of air suspensions of cab can be seen as follow:

1、前悬置高度阀 Front suspension height valve

①老高度阀 DZ13241440070：高度阀按图中尺寸 55 ± 5 进行安装，以保证气弹簧的安装矩（即上吊耳中心到支座下支撑中心面）在 290 ± 5 。

Old height valve DZ13241440070: The height valve is installed according to the size 55 ± 5 in the figure to ensure that the installation moment of the gas spring (that is, the center of the upper ear to the center surface of the lower support) is 290 ± 5 .

②新高度阀 DZ15221440034：高度阀按图中尺寸 128 ± 5 进行安装，以保证气弹簧的安装矩（即上吊耳中心到支座下支撑中心面）在 290 ± 5 。

New height valve DZ15221440034: The height valve is installed according to the size 128 ± 5 in the figure to ensure that the installation moment of the gas spring (that is, the center of the upper lug to the center surface of the lower support) is 290 ± 5 .

2、后悬置高度阀 Rear suspension height valve

①老高度阀 DZ13241440070：高度阀按图中尺寸 100 ± 5 （即调节杆两端螺栓中心距）进行安装，以

保证气弹簧的安装矩在 270 ± 5 范围内。

Old height valve DZ13241440070: The height valve is installed according to the size of 100 ± 5 in the figure (that is, the center distance of the bolts at both ends of the adjusting rod) to ensure that the installation torque of the gas spring is within the range of 270 ± 5 .

②新高度阀 DZ15221440036 等：高度阀按图中尺寸 157 ± 5 （即调节杆两端螺栓中心距）进行安装，以保证气弹簧的安装矩在 245 ± 5 范围内。

New height valve DZ15221440036, etc.: The height valve is installed according to the size 157 ± 5 in the figure (that is, the center distance of the bolts at both ends of the adjusting rod) to ensure that the installation torque of the gas spring is within the range of 245 ± 5 .

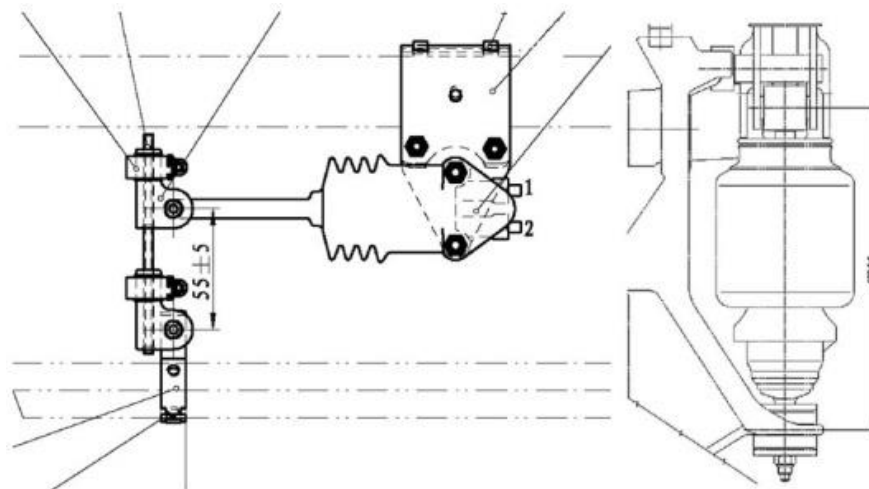
注意事项：Precautions

1、储气筒中必须确保 0.8MPa 以上气压才可保证气囊正常工作。

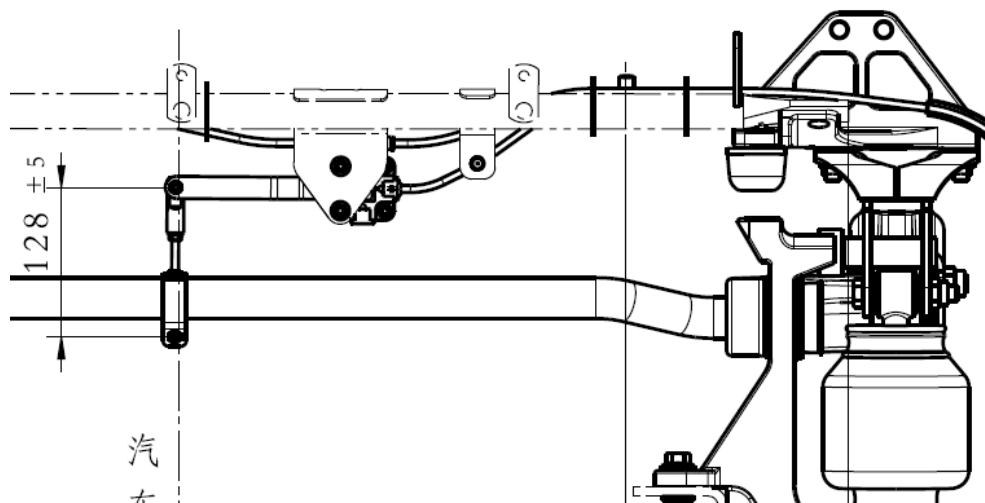
It is necessary to ensure that the air pressure above 0.8MPa in the air reservoir can ensure the normal operation of the airbag.

2、用户可根据情况适当调整，但不得超出规定范围。

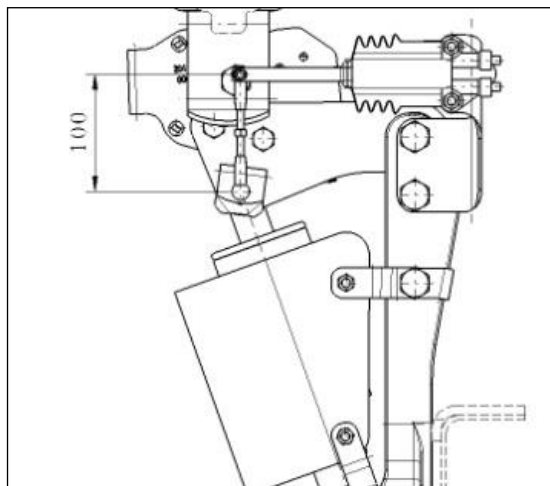
The user can make appropriate adjustments according to the situation, but shall not exceed the specified range.



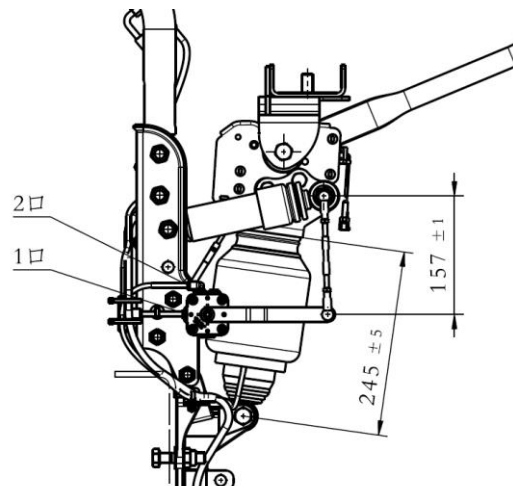
前悬置--老高度阀
Front mount-old height valve



前悬置--新高度阀
Front mount-new height valve



后悬置--老高度阀
Rear suspension-old height valve



后悬置--新高度阀
Rear suspension-new height valve

7.排气制动手柄:

Exhaust brake handle



排气制动手柄
Exhaust brake handle

安装在转向管柱右侧。打开排气制动开关(向上拨动), 车辆可用发动机消耗的能量作辅助制动。在冰雪、泥泞路面上使用排气制动可减少侧滑; 下长坡时, 使用排气制动, 可以减少使用主制动的次数, 减少轮胎及车轮制动器的磨损与发热, 延长其寿命, 降低油耗, 提高行车安全性。排气制动时, 档位越低效果越佳。

The handle is installed on the right side of the steering column. Open the exhaust brake switch (pull it upward) to brake vehicle with the energy generated by the engine. While on an icy or muddy road, using exhaust brake can reduce the chance of side sliding. When driving down a long slope, using exhaust brake can shorten the times in operating main brake, decrease abrasion and heat on tyres and wheel brakes, prolong their service life but reduce fuel consumption and improve vehicle safety. When using exhaust brake, the lower the gear shift is, the better the effects will be.



使用方法： Application methods:

1.将开关操纵杆向前拨到接通位置，排气制动指示灯点亮。当把脚从加速踏板和离合器踏板挪开，排气制动起作用。踏下加速踏板或离合器踏板，排气制动自动被解除，排气制动指示灯熄灭。当踩下加速踏板或离合器踏板中的任何一个时，排气制动都将不起作用。

Pull the switch lever forward to ON position, the indicator lamp of exhaust brake will light up. The exhaust brake will get to work after move your foot away from the accelerator pedal and the clutch pedal. And it will be invalid after you step down one of the two pedal, and the indicator lamp will go out. When you step down the accelerator pedal or the clutch pedal, exhaust brake will not work.

2.当车辆挂档行驶时，踩下制动踏板，此时即使不接通排气制动开关，排气制动也起作用。当踩下加速踏板或离合器踏板中的任何一个时，排气制动自动被解除。

When vehicle running, step down brake pedal, the exhaust brake will get to work even if its switch is not turned on. When you step down the accelerator pedal or the clutch pedal, exhaust brake will not work.

3.将开关操纵杆向后拨到关闭位置后，排气制动指示灯熄灭，排气制动就停止工作。

After pushing the switch lever backward to closed position, the indicator lamp will go out, and the exhaust brake will stop work.

8.风档清洗储液罐:

Windshield cleaning liquid storage tank



风挡清洗储液罐加注口安装在驾驶室前围下端右侧。添加洗涤液时，需在整车在静止/水平状态下。拧开洗涤器盖，加入洗涤液，装入洗涤液高度不得超过规定的高度。

The filler of windshield cleaning liquid storage tank is mounted on the right side of front wall of cab. The cleaning liquid should be added when the vehicle is parking/ in horizontal state. Unscrew washer cover to fill up cleaning liquid. The height of cleaning liquid should not exceed prescribed height.

9.组合仪表: Combination instrument

概述: Overview

陕汽 MV 电控组合仪表是一款专为陕汽新 M3000 电控发动机开发的高档电子式全步进电机组组合仪表。电控组合仪表能通过液晶菜单选择匹配 LNG、CNG、燃油车国三、国四（潍柴、康明斯）等多种发动机，车速表参数 K 值通过按键可调。

Shaanxi Automobile MV electronic control combination instrument is a high-end electronic full stepping motor combination instrument specially developed for Shaanxi Automobile's new M3000 electronic control engine. The electronically controlled combination instrument can be selected to match LNG, CNG, fuel vehicles National III, National IV (Weichai, Cummins) and other engines through the LCD menu, and the speedometer parameter K value can be adjusted by pressing the button.

9.1 仪表组成 Instrument composition

9.1.1 主要由四个表头、1 个液晶组成:

Mainly composed of four meter heads and 1 liquid crystal:

车速表和转速表为指针表。油量表（LNG 表、CNG 表与油量表共用同一表头）和水温表通过 8 个 LED 灯进行指示。

The speedometer and tachometer are pointer tables. The fuel meter (LNG meter, CNG meter and fuel meter share the same head) and water temperature meter are indicated by 8 LED lights.

气压 1、气压 1、里程数、机油压力、电压表、尿素液位、LNG 气量值和 CNG 气量值、车辆行驶信号等通过液晶显示。

Air pressure 1, air pressure 1, mileage, oil pressure, voltmeter, urea level, LNG gas volume value and CNG gas volume value, vehicle driving signal, etc. are displayed on the LCD.

9.1.2 LCD 显示: LCD display:

柴油机型: 显示油压表、电压表、尿素液位、短里程 (Ttip) /总里程 (ODO)、当前油耗、综合油耗、发动机累计油耗、发动机工作时间、巡航车速、档位信息、故障码等。

Diesel engine models: display oil pressure gauge, voltmeter, urea level, short mileage (Ttip)/total mileage (ODO), current fuel consumption, comprehensive fuel consumption, engine cumulative fuel consumption, engine working time, cruising speed, gear information, fault code Wait.

LNG 车型: 显示机油压力、气压表、电压表、短里程 (Ttip) /总里程 (ODO)、LNG 总气量值、LNG 各气瓶气量值、百公里气耗、发动机当前工作时间、档位信息、故障码等。

LNG models: display oil pressure, barometer, voltmeter, short mileage (Ttip)/total mileage (ODO), total LNG gas value, gas value of each LNG cylinder, gas consumption per 100 kilometers, current engine working

time, gear information , Fault codes, etc.

CNG 车型：显示机油压力、气压表、电压表、短里程（Ttip）/总里程（ODO）、CNG 气量值、发动机当前工作时间、档位信息、故障码等。

CNG models: display oil pressure, barometer, voltmeter, short mileage (Ttip)/total mileage (ODO), CNG gas volume value, current engine working time, gear information, fault codes, etc.

9.2 指示灯说明

名 称	符 号	颜 色
主车左转向指示灯 Main vehicle left turn indicator light		绿色 Green
挂车左转向指示灯 Trailer left turn indicator light		绿色 Green
远光灯 High beam		蓝色 Blue
前雾灯 Before the fog lamps		绿色 Green
后雾灯 After the fog lamps		黄色 Yellow
紧急停车灯 Emergency stop light	STOP	红色 Red
驻车制动指示灯 Parking brake indicator light		红色 Red

名 称	符 号	颜 色
EDC 诊断指示灯 EDC diagnostic indicator light		红色 Red
挂车右转向指示灯 Trailer right turn indicator light		绿色 Green
主车右转向指示灯 Main car right turn indicator		绿色 Green
主车 ABS 指示灯 ABS indicator light for main car		黄色 Yellow
挂车 ABS 指示灯 Trailer ABS indicator light		黄色 Yellow
OBD 报警灯 OBD alarm lamp		黄色 Yellow
蓄电池充电指示灯 Battery charging indicator		红色 Red
巡航状态指示灯 Cruise status indicator light		绿色 Green
安全带未系指示灯 The seat belt is not indicated		红色 Red
机油压力低指示灯 Low oil pressure indicator		红色 Red
制动气压低指示灯 Low brake pressure indicator light		红色 Red
进气预热指示灯 Intake preheating indicator light		黄色 Yellow
冷却液温度高指示灯 High coolant temperature indicator lamp		红色 Red

名 称	符 号	颜 色
排气制动指示灯 Exhaust brake indicator light		黄色 Yellow
燃油油量低指示灯 Low fuel oil indicator		黄色 Yellow
维修指示灯 Maintenance indicator light		黄色 Yellow
变速箱低档指示灯 Gearbox low light		绿色 Green
ASR 指示灯 Asr indicator		黄色 Yellow
ESP 工作灯 ESP working lamp		黄色 Yellow
驾驶室翻转指示灯 Cab turn over indicator light		红色 Red
车厢举升指示灯 Car lift indicator light		红色 Red
冷却液位低指示灯 Low cooling liquid level indicator light		红色 Red
EDC 维修指示灯 EDC maintenance indicator light		黄色 Yellow
尿素液位低指示灯 Low urea level indicator lamp		黄色 Yellow
胎压报警指示灯 Tire pressure alarm indicator light		黄色 Yellow
盘式制动器磨损指示灯 Disc brake wear indicator light		黄色 Yellow

名 称	符 号	颜 色
变速箱故障指示灯 Gearbox failure indicator light		红色 Red
轴差速锁工作指示灯 Axle differential lock working indicator light		黄色 Yellow
ECAS 故障指示灯 ECAS fault indicator light		红色 Red
ECAS 工作指示灯 ECAS indicator light		黄色 Yellow
缓速器工作指示灯 Retarder working indicator light		绿色 Green
轮差速锁工作指示灯 Wheel differential lock working indicator light		黄色 Yellow
浮动桥指示灯 Floating bridge indicator light		绿色 Green
变速箱油温高指示灯 Gearbox oil temperature indicator light		红色 Red
停车取力指示灯 Stop and take force indicator light		黄色 Yellow
空滤器阻塞指示灯 The air filter blocks the indicator light		黄色 Yellow
行车取力指示灯 Driving force indicator light		黄色 Yellow
主驾侧门开关状态信号 Main drive side door switch state signal		黄色 Yellow
副驾侧门开关状态信号 Passenger side door switch status signal		黄色 Yellow

名 称	符 号	颜 色
坡道辅助提示指示灯 Ramp auxiliary indicator light		黄色 Yellow
ACC 巡航指示灯 ACC cruise indicator light		绿色 Green
ACC 巡航故障指示灯 ACC cruise failure indicator light		黄色 Yellow
碰撞报警指示灯 Collision alarm lamp		黄色/红色 Yellow/Red
疲劳驾驶提示指示灯 Fatigue driving indicator light		黄色 Yellow
EBS 红灯 EBS red light	EBS	红色 Red
EBS 黄灯 EBS yellow light	EBS	黄色 Yellow
柴油粒子过滤器指示灯 Diesel particle filter indicator light		黄色 Yellow
柴油粒子过滤器再生禁止指示灯 Diesel particle filter regeneration bar indicator		黄色 Yellow
NCD 指示灯 The NCD light	NCD	黄色 Yellow

9.3 指示说明 Instructions

9.3.1 转速表 Tachometer

仪表采集发动机 ECU 的 CAN 信号，处理计算后驱动指针指示。

The instrument collects the CAN signal of the engine ECU, processes the calculation and drives the pointer to indicate.

1) 当指针从低转速到高转速运行过程中，指针指示在经济区域时，LED 灯从经济区域起点到当前指示位置依次点亮；

When the pointer is running from a low speed to a high speed, and the pointer indicates in the economic zone, the LED lights will light up in turn from the start of the economic zone to the current indication position;

2) 当指针从高转速到低转速运行过程中，指针指示在经济区域时，LED 灯从经济区域终点到当前指示位置依次熄灭；

When the pointer is running from a high speed to a low speed, and the pointer indicates in the economic zone, the LED lights turn off from the end of the economic zone to the current indication position;

3) 当车速 $\geq 10\text{km/h}$ (当车速 $\leq 5\text{km/h}$ 时，退出条件)时、转速连续 5s 低于经济区域起点时，经济区域起点的指示灯闪烁（周期：2s，1s 亮、1s 灭）；4) 车速 $\geq 10\text{km/h}$ (当车速 $\leq 5\text{km/h}$ 时，退出条件)时，转速

连续 5s 高于经济区域终点时，经济区域终点位置的指示灯闪烁（周期：2s，1s 亮、1s 灭）。



9.3.2 车速表 The speed table

车速表的车速信号来自安装于变速箱输出轴处的车速传感器，输出为频率信号，其输出信号频率与变速箱输出轴转速有关，车速取决于变速箱输出轴的转速、驱动桥速比、轮胎直径这几个参数。如果仪表连续 5s 没有收到车速信号，车速表指针回零，里程不累计。

The speed signal of the speedometer comes from the speed sensor installed at the output shaft of the gearbox.

The output is a frequency signal, and the output signal frequency is related to the speed of the output shaft of the gearbox. The speed depends on the speed of the output shaft of the gearbox, the speed ratio of the drive axle and the diameter of the tire. If the instrument has not received the speed signal for 5 consecutive years, the speedometer pointer will return to zero and the mileage will not be accumulated.



9.3.3 水温表 water-thermometer

水温表用来显示发动机冷却液温度。当水温大于等于水温报警点值时，水温过高指示灯点亮，STOP指示灯同时点亮，蜂鸣器一直报警。

A water temperature gauge is used to show engine coolant temperature. When the water temperature is greater than or equal to the value of the water temperature alarm point, the indicator light is on when the water temperature is too high, and the STOP indicator light is on at the same time, and the buzzer always alarms.



9.3.4 油量表 Fuel Gauge

柴油车型：燃油表用来指示油箱内柴油液面位置；当油量 $\leq 10\%$ 时，油量低报警灯常亮，蜂鸣器报警 5s，直到油量 $\geq 15\%$ （对应阻值为 $62.7\ \Omega$ ）时指示灯熄灭；在“柴油”模式下，若仪表连续 5s 没有接收到油量信号，油量低指示灯常亮，指针指示在零位，蜂鸣器报警 5s。

Diesel vehicle: fuel gauge is used to indicate the position of diesel liquid level in the tank; When oil is 10% or less, low oil alarm lamp is normally on, buzzer alarm 5 s, until the oil is 15% or more (corresponding to the value of $62.7\ \Omega$) lights put out; In "diesel" mode, if the meter has not received the oil signal for five consecutive years, the low oil indicator light is always on, the pointer indicates at zero, and the buzzer alarms for five years.



LNG 车型：油量表用来指示剩余液量位置；

当装一个气瓶时， $10\% \leq \text{液量值} \leq 20\%$ ，液量指示灯亮，蜂鸣器报警 5s，直到液量 $\geq 23\%$ ，液量指示灯熄灭。液量值 $< 10\%$ 时，液量指示灯亮，蜂鸣器报警 5s。

LNG vehicle: the oil gauge is used to indicate the position of the remaining liquid quantity; When filling a cylinder, 10% or less liquid value $\leq 20\%$, liquid level indicator light on, buzzer alarm 5s, until the liquid level $\geq 23\%$, liquid level indicator light off. When the liquid quantity is less than 10% , the liquid quantity indicator light is on and the buzzer alarm 5s.

CNG 车型：当 $2\text{Mpa} \leq \text{气瓶压力值} \leq 4\text{Mpa}$ ，气量指示灯亮，蜂鸣器报警 5s，直到气压值 $\geq 4.5\text{Mpa}$ 时，指示灯熄灭。气瓶压力值 $< 2\text{Mpa}$ 时，气量指示灯亮，蜂鸣器报警 5s。若仪表连续 5s 没有收到气瓶压力信号，气量指针指示零，气量指示灯常亮，蜂鸣器报警 5s。

CNG vehicles: When $2\text{Mpa} \leq \text{cylinder pressure value} \leq 4\text{Mpa}$, air indicator light on, buzzer alarm 5s, until the air pressure value $\geq 4.5\text{Mpa}$, the indicator light off. When the cylinder pressure value is less than 2Mpa , the air indicator light is on and the buzzer alarm is 5s. If the meter does not receive the cylinder pressure signal for 5 consecutive years, the air indicator indicates zero, the air indicator light is always on, and the buzzer will alarm for 5 consecutive years.

9.3.5 气压表 air pressure gauge

当气压 $\leq 5.5\text{bar}$ ，制动系统故障指示灯常亮，STOP 紧急停车报警灯同时点亮，蜂鸣器响 5s。

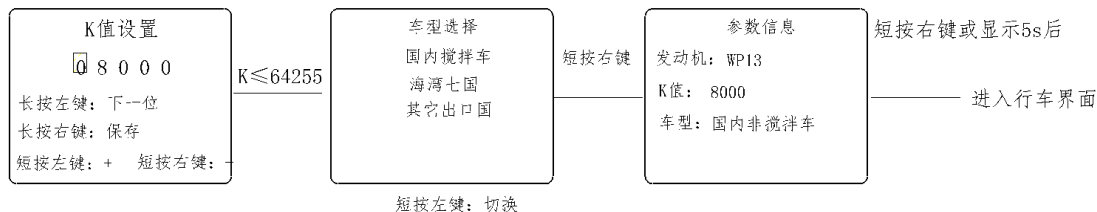
When the air pressure is less than or equal to 5.5bar, the fault indicator light of the braking system is always on, the STOP emergency STOP alarm light is on at the same time, and the buzzer rings for 5s.

9.4 按键操作说明 Key Operation Instructions

9.4.1 工程模式参数设置 Project mode parameter setting

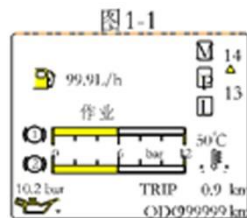
先按住左边按钮不放，然后上 ON 档电，左按钮超过 2s 以上松开仪表液晶显示屏进入“排放选择”、“发动机状态选择”、“K 值”、“车型选择”参数设置界面，短按左按键可以切换界面显示：

First hold down the left button, and then switch ON the power. When the left button exceeds 2S, release the LCD screen of the meter and enter the parameter setting interface of "Emission Selection", "Engine Status Selection", "K Value" and "Model Selection". Short press the left button to switch the interface display:

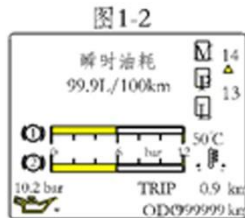


9.4.2 液晶界面切换

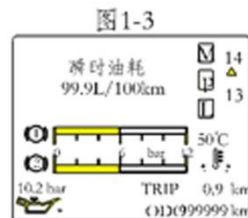
以柴油车型为例说明液晶界面操作：



柴油车主界面
(泵车信号有效)

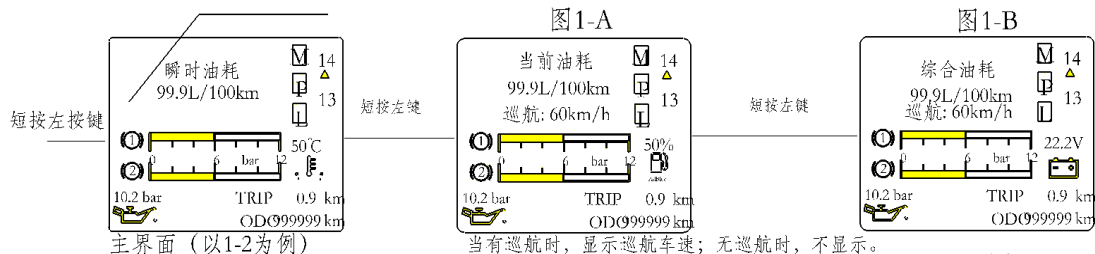


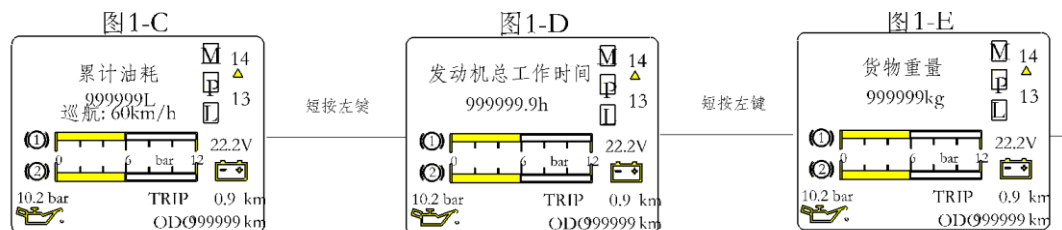
柴油车主界面
(泵车信号无效)



柴油车主界面无尿素液位

有尿素液位显示尿素液位图 5-1 或图 5-2，无尿素液位显示图 5-3





4.3、当仪表连续 2s 检测到水温高信号有效时，水温过高指示灯亮，STOP 指示灯亮，蜂鸣器一直响，报警波形见波形 1-2。

When effective high water temperature signals are detected continuously for 2s, the high water temperature indicator lamp can light up, and STOP indicator is alight, the buzzer is ringing. The alarm waveform see 1-2.

4.4、上 ON 档电，进气预热、油压过低、变速箱故障、变速箱油温过高、OBD 报警、EDC 维修、EDC 诊断、EDC 停机、油量（气量、液量）指示、制动系统故障指示灯进行自检，没有故障 3s 后熄灭。

When “ON” power-on, air intake preheating, low oil pressure, transmission fault, too high oil temperature of transmission, OBD alarm, EDC maintenance, EDC diagnosis, EDC stop, oil volume(gas volume, liquid volume) indicating and brake system fault indicator lamps do self-inspection, and the lamps will go out without fault.

4.5、油压过低报警灯点亮后，如仪表连续 5s 没有接收到 CAN 信号，该报警灯保持前一状态。

After low oil pressure alarm lamp lighting up, the lamp will keep in previous state if instrument receive no CAN signal continuously within 5s.

4.6、当轴差速锁、轮差速锁指示灯亮时，蜂鸣器响，报警波形如波形 1-1。

When the indicator lamps of inter-axial and inter-wheel differential lock lighting up, the buzzer is ringing. The alarm waveform see 1-1.

4.7、当车厢举升、驾驶室锁止指示灯亮时，STOP 指示灯点亮，蜂鸣器一直响，报警波形见波形 1-2。

When the boxcar lifting and cab locking indicator lamp is alight, the STOP indicator lamp will light up and the buzzer is ringing. The alarm waveform see 1-2.

4.8、当离合器报警、冷却液位过低、空滤堵塞、电池充电、OBD 报警、EDC 诊断、ECAS 故障、制动器磨损报警、尿素液位指示灯亮时，车辆故障指示灯亮。

When the clutch alarm, low coolant level, air filter clogging, battery charging, OBD alarm, EDC diagnosis, ECAS fault, brake wear alarm and urea liquid level indicator lamps is alight, the vehicle fault indicator lamp will light up.

4.9、当制动器磨损报警灯亮时，蜂鸣器报警 5s，报警波形见波形 1-2。

When the brake wear alarm is alight, the buzzer will alarm for 5s. the alarm waveform see 1-2.

4.10、当车速 $\geq 5\text{km/h}$ 时，若驻车制动亮，蜂鸣器一直响，报警波形见波形 1-1。

When the speed more than or equal to 5 km/h, the buzzer will ring if the parking brake lamp light up. The alarm waveform see 1-1.

4.11、上“ON”档后，若安全带未系，指示灯闪烁 6 次，蜂鸣器鸣叫 6 次；若无车速，指示灯常亮，蜂鸣器停止鸣叫。若有车速(车速 $\geq 5\text{km/h}$)30 秒后，安全带未系，指示灯闪烁 6 次，蜂鸣器鸣叫 6 次，之后若一直有车速，则每隔 30 秒，指示灯闪烁 6 次，蜂鸣器鸣叫 6 次，期间安全带未系，10 分钟后蜂鸣器停止鸣叫，指示灯由闪烁变为常亮。若途中系过安全带再解开，或停车（怠速）过，或点火开关断开后重新上 ON 档，则报警功能重新开启，安全带指示灯闪烁频率和蜂鸣器报警波形如波形 1-3。

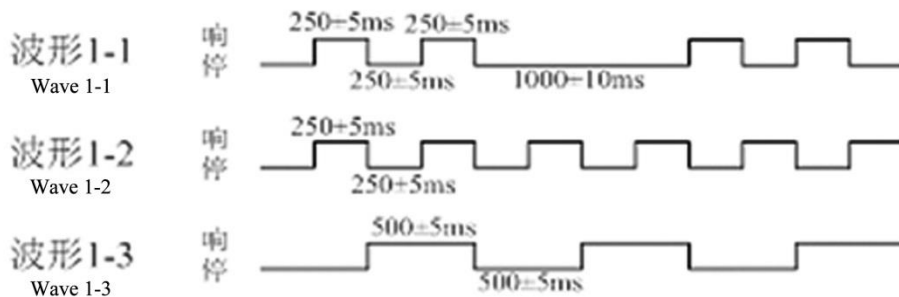
When “ON” power-on, the indicator lamp will flash for 6 times and buzzer ring for 6 times if seat belt is not fastened. If the vehicle has no speed, the indicator lamp is lighting up, and the buzzer stop to ring. If the vehicle has speed (the speed is more than or equal to 5 km/h) for 30s, the indicator lamp will flash for 6 times and buzzer ring for 6 times if seat belt is not fastened. After that, if the vehicle always has speed, the indicator lamp will flash for 6 times and buzzer ring for 6 times for every 30s if seat belt is not fastened. And 10min later, the buzzer stop to ring, and the lamp will be constantly alight. If the seat belt has been unfastened during vehicle running, or if the vehicle has been parked(drive of idle speed), or restart ignition switch after it turned off, the alarm function will be reactivated. The flicker frequency of seat belt indicator lamp and the waveform of buzzer alarm see 1-3.

4.12、若仪表连续 5s 没有收到任何 CAN 信号，仪表液晶显示“车辆网络故障”(长按左键大于 2s 或超过 10s 无动作自动跳转到主界面)，STOP 指示灯亮，蜂鸣器报警 5s，报警波形见波形 1-2。

If the instrument receive no CAN signal for 5s, "vehicle network fault" (long press the left key greater than 2s or do no operation more than 10s, it will automatically jump to main interface) will be displayed on liquid crystal display (LCD), the STOP indicator light up and the buzzer alarm ring for 5s. The alarm wave form see 1-2.

4.13、蜂鸣器报警的波形及优先级如下：

The priority and waveform of buzzer alarm is as follows:



蜂鸣器报警的优先级：波形 1-2>波形 1-1>波形 1-3

Priority of buzzer alarm: Wave 1-2> Wave 1-1> Wave 1-3

五、指针说明：

Pointer explanation

1、转速表：

Tachometer



1.1、经济区域划分：

Economy range division

1000r/min-1400r/min 为绿色区；

1000r/min-1400r/min is the green area;

1400r/min-1600r/min 为绿色弧线区；

1400r/min-1600r/min is the green arc area;

1600r/min-1900r/min 为红色弧线区；

1600r/min-1900r/min red arc area;

1900r/min-3000r/min 为红色区。

1900r/min-3000r/min is the red zone.

1.2、指示误差：

Indication error

1.3、工作原理：

Operating principle

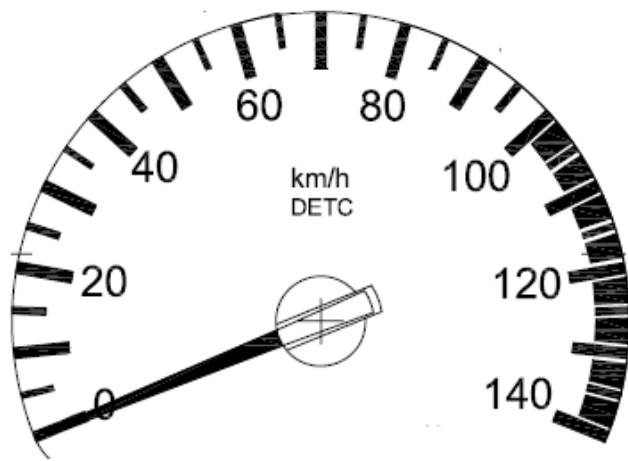
仪表采集发动机 ECU 的 CAN 信号，处理计算后驱动指针指示；如果转速 $>3000\text{rpm}$ ，指针指示在前

一位置。如果仪表连续 5s 没有收到转速信号，转速表指针回零。

The CAN signal of engine ECU is collected by instrument, and after it is calculated, it will drive pointer to indicate. If rotating speed is more than 3000rpm, the pointer indicates to the previous position. If the instrument receives no rotating speed signal for 5s, tachometer pointer will be back to zero.

2、车速表:

Speedometer



2.1 指示误差:

Indication error

2.2 工作原理:

Operating principle

车速表的车速信号来自安装于变速箱输出法兰处的车速传感器，输出为频率信号，其输出信号频率与变速箱输出轴转速有关，车速取决于变速箱输出轴的转速、驱动桥速比、轮胎直径这几个参数。如果车速 > 140km/h，指针指示在前一位置。如果仪表连续 5s 没有收到车速信号，车速表指针回零，里程不累计。

Speed signal comes from the speedometer sensor, which is installed at output flange of transmission. The frequency signal is output signal, which is related to the rotation speed of output shaft of transmission. The vehicle speed depends on the rotation speed of output shaft of transmission, the ratio of drive axle and the diameter of tyre. If the vehicle speed is more than 140 km/h, the pointer points to previous position. If the speedometer receives no speed signal for 5s, the pointer of meter will be back to zero, and the mileage will not be accumulated.

备注：车速参数需根据车型具体参数通过按键进行调节。

Note: the speed parameters need to be adjusted according to the specific parameters of vehicle by button.

3、电池电压表: Battery voltmeter:



电压表表示蓄电池当前的电压。当发电机未工作时电压一般为 24V 左右，电压过低表明蓄电池电量不足。在发电机开始工作后，整车电路电压应稳定在 28V 左右，若低于 24V 则表明发电机的电压调节器可能损坏，应及时维修，否则过高的电压会对车辆电器系统造成破坏。

The voltmeter is used to indicate the current battery voltage. The voltage of is generally 24V when generator is not working. Too low voltage shows the battery is lack of electric quantity. After the generator start to work, the circuit voltage of complete vehicle should be about 28V. The voltage adjuster of generator may be damaged if the voltage is less than 24V, it should be repaired timely, otherwise, too high voltage will cause the damage of electrical system of vehicle.

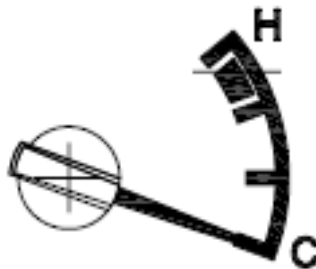
4、油压表: Oil pressure gauge:



油压表用来显示发动机机油压力。仪表采集发动机 ECU 传递来的油压 CAN 信号，经仪表 MCU 计算处理后在液晶里显示；当仪表连续 5s 没有收到油压信号时，油压表回零，油压过低指示灯常亮，STOP 报警灯同时点亮，蜂鸣器响 5s。蜂鸣器报警波形见波形 1-2。对于所有类型的发动机：机油压力 $\leq 0.7\text{bar}$ ，油压过低报警灯常亮，STOP 紧急停车报警灯同时被点亮，蜂鸣器报警 5s。需做回差，直到油压 $\geq 0.9\text{bar}$ 指示灯熄灭。油压低时应停机检修，否则继续运转将会造成发动机的损坏。

Oil pressure gauge is used to display the engine oil pressure. The oil pressure CAN signal of engine's ECU is collected by the gauge, it can be displayed on LCD after calculated and processed by MCU. When the gauge receiving no oil pressure signal for 5s, the oil pressure gauge will be back to zero, the too low oil pressure indicator lamp normally lights up, STOP alarm lamp lights up at the same time, and the buzzer is ringing for 5s. The buzzer alarm waveform see 1-2. For all diesel engines: When the oil pressure is less than or equal to 0.7bar , the too low oil pressure alarm lamp is normally on, the STOP emergency parking alarm lamp lights up at the same time, and the buzzer is ringing all the time. Need to do return difference. When the oil pressure is more than or equal to 0.9bar , the indicator lamp go out. If the oil pressure is too low, you should stop drive and inspect vehicle, otherwise, the engine may be damaged.

5、水温表：Water temperature gauge



水温表用来显示发动机冷却液温度。仪表采集发动机 ECU 的 CAN 信号，处理计算后驱动指针指示；当仪表连续 5s 没有接收到水温信号时，水温表指示在最大值，水温报警灯亮，STOP 同时被点亮，蜂鸣器响 5s。报警波形见波形 1-2。对于柴油类型的发动机：水温 $\geq 100^{\circ}\text{C}$ ，水温过高指示灯常亮，STOP 紧急停车报警灯同时被点亮，蜂鸣器一直报警。需做回差，当水温 $\leq 97^{\circ}\text{C}$ ，指示灯熄灭。对于气体类型的发动机：水温 $\geq 98^{\circ}\text{C}$ ，水温过高指示灯常亮，STOP 紧急停车报警灯同时被点亮，蜂鸣器一直报警。需做回差，当水温 $\leq 95^{\circ}\text{C}$ ，指示灯熄灭。

Water thermometer is used for displaying the engine coolant temperature. ECU CAN signal of engine is collected by instrument, it can drive pointer indicator after calculated. When the instrument receiving no water

temperature signal for 5s, water temperature meter indicates the maximum value, the water temperature alarm lamp lights up, STOP lights up at the same time, the buzzer is ringing for 5s. The alarm waveform see 1-2. For diesel engine: When water temperature is less than or equal to 100°C , the excess water temperature lamp is normally on, the STOP emergency parking alarm lamp lights up at the same time, and the buzzer is ringing all the time. Need to do return difference. When the water temperature is less than or equal to 97°C , the indicator lamp go out. For gas engine: When water temperature is less than or equal to 98°C , the excess water temperature lamp is normally on, the STOP emergency parking alarm lamp lights up at the same time, and the buzzer is ringing all the time. Need to do return difference. When the water temperature is less than or equal to 95°C , the indicator lamp go out.

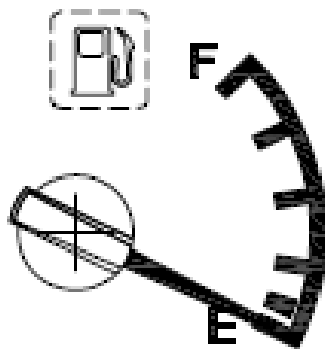
6、油量（气量）表：Fuel gauge (gas meter) :

6.1、柴油车型：燃油表用来指示油箱内柴油液面位置；

For vehicles with diesel engine: the fuel gauge is used to indicate the diesel oil level inside fuel tank;

当油量 $\leq 10\%$ (对应阻值为 65.8Ω) 时，油量低报警灯常亮，蜂鸣器报警 5s，直到油量 $\geq 15\%$ （对应阻值为 62.7Ω ）时指示灯熄灭；在“柴油”模式下，若仪表连续 5s 没有接收到油量信号，油量低指示灯常亮，指针指示在零位，蜂鸣器报警 5s，蜂鸣器报警波形见波形 1-2。

When water temperature is less than or equal to 10%, the low fuel volume alarm lamp is normally on and the buzzer is ringing all the time, and the lamp will go out until the fuel volume is more than or equal to 15% (the corresponding resistance value is 62.7Ω). Under diesel mode, if the gauge receives no fuel volume signal for 5s, the low fuel volume indicator lamp lights up and the pointer points to zero, the buzzer alarms for 5s, the buzzer alarm waveform see 1-2.



6.2、LNG 车型：油量表用来指示剩余液量位置；

For vehicles with LNG engine: the meter is used to indicate the residual liquid volume;

当装一个气瓶时， $10\% \leq \text{液量值} \leq 20\%$ ，液量指示灯亮，蜂鸣器报警 5s，直到液量 $\geq 23\%$ ，液量指示灯熄灭。液量值 $< 10\%$ 时，液量指示灯亮，蜂鸣器报警 5s。

If assembled with one cylinder, when the fluid volume is more than or equal to 10% but less than or equal to 20%, the fluid volume indicator lamp lights up and the buzzer alarms for 5s, and the lamp will go out until the liquid volume is more than or equal to 23%. When the fluid volume is less than 10%, the fluid volume indicator lamp lights up and the buzzer alarms for 5s

当装多个气瓶时，此表头指示液量总量的百分比。当其中一个气瓶的液量值 $\leq 20\%$ 时，液量指示灯闪烁 5s，蜂鸣器报警 5s，当 $< 10\%$ 时，液量指示灯闪烁 5s，蜂鸣器报警 5s。当 $10\% \leq$ 气瓶液量总和 $\leq 20\%$ 时，液量指示灯常亮，蜂鸣器报警 5s，直到液量总和 $\geq 23\%$ 时，指示灯熄灭。当气瓶液量总和 $< 10\%$ 时，液量指示灯亮，蜂鸣器报警 5s。如果计算出的 LNG 液量比例 $> 100\%$ ，则燃油表指针指示在前一位置。在“LNG”模式下，若仪表连续 5s 没有接收到任何一个气瓶液量信号，液量指针指示零，液量指示灯常亮，蜂鸣器报警 5s，蜂鸣器报警波形见波形 1-2。

If assembled with multiple cylinders, the meter indicates the percentage of total liquid volume. When the liquid volume of one cylinder is less than or equal to 20%, the indicator lamp flashes for 5s and the buzzer alarms for 5s. When the liquid volume is less than 10%, the indicator lamp flashes for 5s and the buzzer alarms for 5s. When total liquid volume of all cylinders is more than or equal to 10% but less than or equal to 20%, the indicator lamp normally lights up and the buzzer alarms for 5s, and the lamp will go out until the total liquid volume is more than or equal to 23%. When the total fluid volume is less than 10%, the indicator lamp normally

lights up and the buzzer alarms for 5s.If the calculated LNG liquid volume percentage is more than 100%, the pointer of LNG meter points to the previous position.In "LNG" mode, if the meter receives no liquid volume signal of any cylinder for 5s, the pointer points to zero, the fluid volume indicator lamp normally lights up and the buzzer alarms 5s. The buzzer alarm waveform see 1-2.

6.3、CNG 车型：气量表用来指示气瓶气压位置；

For vehicles assembled with CNG engine: the gas volume meter is used to indicate the pressure position of cylinder;

0.25V~3.25V 表示 0~20Mpa，线性关系。如果电压>3.25V（气压>20Mpa），指针指示在满量程。

0.25V~3.25V indicates 0~20Mpa, linear relationship.If the voltage is more than 3.25V (air pressure is more than 20Mpa), the pointer points to full scale.

当 $2\text{Mpa} \leq \text{气瓶压力值} \leq 4\text{Mpa}$ 时，气量指示灯亮，蜂鸣器响 5s，直到气瓶压力值 $\geq 4.5\text{Mpa}$ 时指示灯熄灭。

When the cylinder's pressure is more than or equal to 2Mpa but less than or equal to 4Mpa,the gas volume indicator lamp normally lights up and the buzzer rings for 5s, and the lamp will go out when the pressure is more than or equal to 4.5Mpa.

气瓶压力值 $<2\text{Mpa}$ 时，气量指示灯亮，蜂鸣器报警 5s。在“CNG”模式下，如果计算出的 CNG 气量比例 $>100\%$ ，则气量表指针指示在前一位置。若仪表连续 5s 没有收到气瓶压力信号，气量指针指示零，气量指示灯常亮，蜂鸣器报警 5s。在“CNG”模式下，若仪表上 ON 档后连续 5s 没有接收到气瓶压力信号，气量指示灯亮，蜂鸣器响 5 秒。蜂鸣器的报警波形见波形 1-2。

When the cylinder's pressure is less than 2Mpa , the gas volume indicator lamp normally lights up and the buzzer alarms for 5s. In "CNG" mode, if the calculated CNG gas volume percentage is more than 100% , the pointer of CNG meter points to the previous position. If the meter receives no cylinder's pressure signal for 5s, the pointer points to zero, the gas volume indicator lamp normally lights up and the buzzer alarms 5s. In "CNG" mode, if the meter receives no cylinder's pressure signal after ignition key switched on 5s, the pointer points to zero, the gas volume indicator lamp normally lights up and the buzzer alarms 5s. The buzzer alarm waveform see 1-2.

7、尿素表（仅国四车型有）：

Urea gauge (only for vehicles assemble with China IV engine)



尿素表用来显示尿素箱的尿素液位。仪表采集发动机 ECU 传递来的的尿素 CAN 信号，经仪表 MCU 计算处理后在液晶里显示，它采取数字及条码结合方式显示，数字为实时显示，而条码采取四舍五入方式显示。

It is used for displaying the liquid level of urea tank. The urea CAN signal collected by engine ECU, after it calculated and processed by MCU, it will display on LCD. It is displayed by figure and barcode, the figure is real-time displayed, and the barcode is rounding-off displayed.

当尿素液位 $\leq 13\%$ 时，尿素液位低指示灯常亮，同时车辆故障指示灯亮，蜂鸣器报警 5s。需做回差处理，直到液位 $\geq 18\%$ ，尿素液位低指示灯熄灭，车辆故障指示灯熄灭。

When urea level is 13% or less, low-level lamp is normally on, vehicle fault indicator lamp is alight at the same time, and the buzzer is ringing for 5s. Need to do return difference. The low urea level indicator lamp and the vehicle fault indicator lamp will go out until the level is more than or equal to 18%.

当出现非法值（大于 100%）时，则尿素液位显示前一状态。

When an invalid value (greater than 100%) produced, the previous urea level will be displayed.

若仪表上钥匙电后接收到尿素液位信号，之后如连续 5s 没有接收到尿素液位信号，指示符的 LED 灯（蓝色）点亮，尿素液位低指示灯点亮，同时车辆故障指示灯点亮，蜂鸣器报警 5s。退钥匙电不保存状态。蜂鸣器报警波形见波形 1-2。

After ignition key switched on, the urea gauge receives no urea level signal for 5s, the LED lamp (blue) lights up, too low urea level indicator lamp lights up, failure indicator lamp of vehicle lights up at the same time, and the buzzer alarm for 5s. The current state will not be stored when ignition key switched off. The buzzer alarm waveform see 1-2.



8、气压表: Barometer

当气压 $>12\text{bar}$ ，气压表指针指示在前一位置。当气压 $\leq 5.5\text{bar}$ ，制动系统故障指示灯常亮，仪表指针指示当前采样信号点位置，STOP 紧急停车报警灯同时被点亮，蜂鸣器响 5s，报警波形见波形 1-2。需做回差，当气压 $\geq 6\text{bar}$ 时，制动系统故障指示灯、STOP 指示灯灭。如果仪表连续 3s 没有收到信号，气压表指针回零，制动系统故障指示灯、STOP 紧急停车报警灯同时被点亮，蜂鸣器响 5s，报警波形见波形 1-2。

The pointer will point to previous position when air pressure more than 12bar. The failure indicator lamp will be always alight when the air pressure less than or equal to 5.5bar, and the pointer shows current collected signal position, the STOP emergency parking alarm lamp lights up at the same time, and the buzzer rings for 5s. The alarm waveform see 1-2. Need to do return difference. The brake system failure indicator lamp and the STOP indicator lamp will go out when the air pressure more than or equal to 6bar. If the barometer receives no signal for 3s, the pointer will be back to zero, and the brake system failure indicator lamp and STOP emergency parking alarm lamp will light up at the same time, and the buzzer ring for 5s. The alarm waveform see 1-2.

9.5、技术要求: Technical specifications:

9.5.1、工作电压: 18~32V, 标称 24V;

Working voltage: 18~32V, nominal voltage: 24V;

9.5.2、工作温度：-30~+70℃，储存温度：-40~+85℃

Working temperature: -30~+70℃, storage temperature: -40~+85℃

9.5.3、仪表正面面板为黑色，刻度盘底色为黑色，刻度线、符号、文字的颜色为白色。仪表指针为红色、针帽为黑色。刻度盘红色为报警区域，夜间照明也为红色，其余夜间照明为白色。

The color of the front panel of instrument is black. The bottom color of index dial is black. The color of scale line, symbols and text are white. The color of the pointer of instrument is red, and the color of needle cap is black. The red area on index dial is warning area. The night lighting is also red, the rest of the night lighting is white.

电压表：18V-24V 为红色区。

Voltmeter: 18V-24V is red area.

机油压力表：0bar-0.7bar 为红色区。

Oil engine pressure meter: 0bar-0.7bar is red area.

水温表：98℃-120℃为红色区。

Water temperature: 98℃-120℃ is red area.

油量（液量、气量）表：0-1/8 为红色区。

Oil (liquid volume, gas volume) meter: 0-1/8 is red area.

气压表 1、2：0bar-6bar 为红色区。

Barometer 1, 2: 0bar-6bar is red area.

9.5.4、冷却液温度高报警点：

High coolant temperature alarm set point:

柴油发动机的冷却液位报警点是100℃，气体机的冷却液位报警点是98℃。

The coolant level alarm point of diesel engine is 100℃. The coolant level alarm point of gas engine is 98 ℃. 机

油压力报警点：70kPa(0.7bar)。

Engine oil pressure alarm point: 70 kPa(0.7bar).

9.5.5、励磁电流（蓄电池充放电电流）：约为 150mA；常电模式下，仪表进入低功耗模式，其静态工作电流≤3mA。

Excitation current (the charging and discharging current of battery) : it is about 150mA; under constant electric mode, the instrument gets into low power mode, its static working current is less than or equal to 3mA.

9.5.6、执行标准：Executive standard:

QC/T 727-2007 《汽车、摩托车用仪表》

<instrment for automobile and motorcycle>

GB 4094-1999 《汽车操纵件、指示器及信号装置的标志》

<Motor vehicles—Symbols for controls, indicators and tell-tales>

QC/T 413-2002 《汽车电气设备基本条件》

< The basic conditions of electrical equipment of vehicle >

9.5.7、组合仪表材料燃烧特性技术要求应符合 GB8410-2006 中的等级 B。

The technical requirements for materials combustion characteristic of combination instrument shall be in line with the grade B in GB8410-2006.

9.5.8、仪表插接器及线束端适配插接器均为 AMP 公司产品，具体型号如下：

The instrument plug-in connectors and harness plug-in connectors are all produced by AMP company, and the specific models are as follows:

	插座型号 Socket type	对应整车护套 Corresponding to the vehicle sheath	对应整车护套插片 Corresponding to the vehicle sheath inserts
28 芯	174979-2	174046-2	173681-1
		174045-2	
36 芯	175977-2	175966-2	
		175967-2	
20 芯	174977-2	174047-2	173681-1

9.6、维修与保养

Repair and maintenance

仪表三包里程：12 月或 5 万公里，先到为准。

The after-sales mileage of instrument: 12 months or 50000 km, whichever occurs first.

注：仪表进水进气进液、整车长时间过电压（>36V）、串电瓶起动、整车线束未脱开仪表的情况下违规电焊、整车其他部件短路或起火引起仪表损坏、人为增大整车原标配保险丝的熔断电流和延缓动作时间以及其它人为损坏等情况引起仪表损坏的，不纳入三包。

Note: the following situations are not included in after-sales service: the water, air or liquid get into instrument, long time over voltage(>36V) of complete vehicle, series battery starting, illegal welding when

complete vehicle harness connected with instrument, instrument damage caused by short circuit or fire of other components of the complete vehicle, artificially increase the fusing current and delay movement time of original standard fuse of complete vehicle, and other instrument faults caused by man-made damage.

9.7、液晶屏 LCD 信息查看及左右调节钮操作说明：

LCD screen information viewing and instructions on the left and right adjusting knob:

9.7.1 发动机状态选择

Engine condition selection

先按住左边按钮不放，然后点火锁电源 A15、电瓶电源 A33 上电，左按钮超过 2s 以上松开仪表液晶显示屏进入“发动机状态选择”显示界面，如图 1 所示：

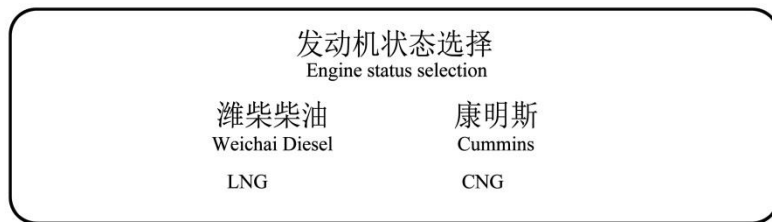


图 1-1 Picture 1-1

Press and hold the left button, the ignition lock power A15 and battery power A33 will be switched on. Release the left button after it is pressed more than 2s, the LCD screen will enter into "engine condition selection" interface, as shown in figure 1:

在该界面下，短按左键（ $\leq 2s$ ，下同），“潍柴柴油”、“康明斯”、“LNG”、“CNG”依次闪烁。当需要选择的状态闪烁时，短按右键（ $\leq 2s$ ，下同），该状态被保存，界面跳转到里程表 K 值设置界面，如图 1-2 所示，同时左边第一位数字开始闪烁（周期：1s）。短按左键，左第一位停止闪烁，左第二位闪烁，依次类推。若在上述闪烁状态下，左键右旋，数字从 0-9 递增；左键左旋，数字从 9-0 递减。在 K 值设置过程中，短按右键，所有数字均停止闪烁，该数字被保存，2s 后液晶显示“参数设置完毕”，如图 1-3，3s 后仪表自动重启，同时液晶显示图 1-4,3s 后显示正常的主界面。K 值的范围为 4476-34302。仪表出厂默认为潍柴柴油发动机，K 值默认为 8000。

Under the interface, short press the left key (less than or equal to 2s, hereinafter inclusive), "Weichai diesel", "Cummins", "LNG", "CNG" flash in turn. When the desired status flashing, short press the right button (less than or equal to 2s, hereinafter inclusive), the status will be saved, and the interface will jump to the K value interface for odometer, as shown in figure 1- 2, at the same time, the first digit on the left side begin to flash (cycle: 1s). Short press the left button, the left first digit stop flashing, the left second digit begin to flash and so on. In the above state, if rotate the left key to the right, the digit

will increase from 0 to 9. If rotate the key to the left, the digit will decrease from 9 to 0. In the process of K setting, short press the right key, all digital machine will stop flashing, and the digits will be saved, “parameter setting finished” will be displayed on LCD after 2s, as shown in figure 1-3. The instrument will be restarted automatically after 3s, the LCD displaying as shown in figure 1-4, and the normal main interface will be displayed on LCD after 3s. The range of K value is between 4476 to 34302. The factory default parameters are Weichai diesel engines’s, the defaulted K value is 8000.

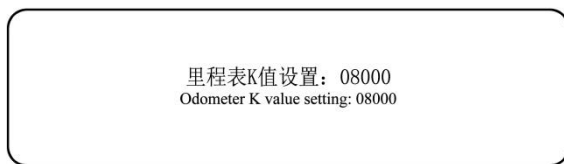


图 1-2 Picture 1-2

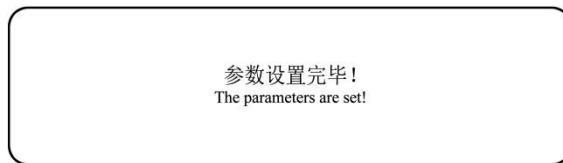


图 1-3 Picture 1-3



图 1-4 Picture 1-4

9.7.2、仪表直接上电后界面说明

9.7.2.1.天然气车型 CNG 界面布局:

The layout for compressed natural gas (CNG) vehicles:

当 $2\text{Mpa} \leq \text{气瓶压力值} \leq 4\text{Mpa}$ 时, 液晶显示“气瓶气压低, 请及时加气”(如图 4-2), 5s 后跳转到主界面 4-A, 同时液晶上气量图标闪烁。当气瓶压力值 $< 2\text{Mpa}$ 时, 液晶一直显示“气瓶气压低, 请停车加气”(如图 4-3), 在此界面下, 长按左按键 ($> 2\text{s}$), 退出报警模式, 跳转到主界面 4-A, 同时气量图标闪烁。

When the pressure value of cylinder is more than or equal to 2Mpa but less than or equal to 4Mpa, the information of "low gas pressure of cylinder, please add gas timely" will be displayed on LCD, as shown in figure 4-2, and switch to main interface of multiple cylinders 5 seconds later, as shown in figure 4-A, and the total gas volume icon flash. When the pressure value of cylinder is less than 2Mpa, the information of "low gas pressure of cylinder, please park vehicle and add gas " (as shown in figure 4-3). In the interface, long press left adjusting bar to quit alarm mode, jump to the main interface, as shown in figure 4-A, and the total gas volume icon will flash.

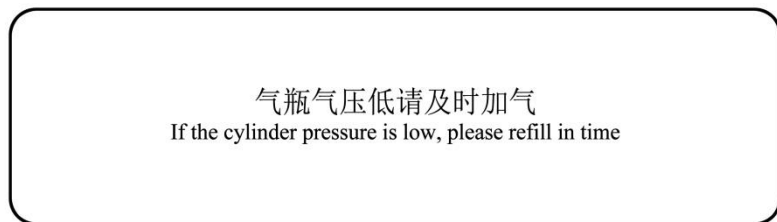


图 4-2 在此界面下显示 5S 后自动跳转到主界面 4-A，气量图标闪烁
Picture 4-2 After displaying 5S in this interface, it will automatically jump to the main interface 4-A, and the gas volume icon will flash

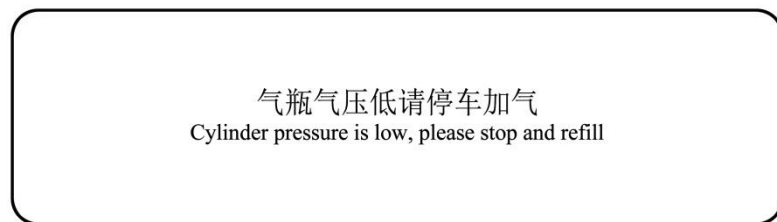


图 4-3 在此界面下，长按左调节杆 (>2S)，退出报警模式，跳转到主界面 4-A，气量图标闪烁
Picture 4-3 In this interface, long press the left adjustment lever (>2S) to exit the alarm mode and jump to the main interface 4-A, the gas volume icon flashes

在 CNG 模式下，上 ON 档后，仪表连续 5s 没有收到气量信号，液晶一直显示“气瓶连接失败”（如图 3-5），长按左按键，退出报警模式，跳转到主界面，气量图标闪烁，气量值显示“--”（如图 4-4）。

Under CNG mode, after instrument switched on, if the instrument receives no liquid volume signal for 5s, the information of “fail to connect with cylinder” will displayed on LCD (as shown in figure 3-5), long press the left button to quit alarm mode. And then the main interface will be displayed, the gas volume icon flashes, the gas volume value indicates as “--”(as shown in figure 4-4).



9.7.2.2、燃油车型界面布局：

Interface layout for fuel vehicles:

国四仪表的主界面如图 5 所示，国三仪表的主界面如图 5-1 所示。

The main interface for China IV vehicles is as shown in figure 5, and the main interface for China III vehicles is as shown in figure 5-1.

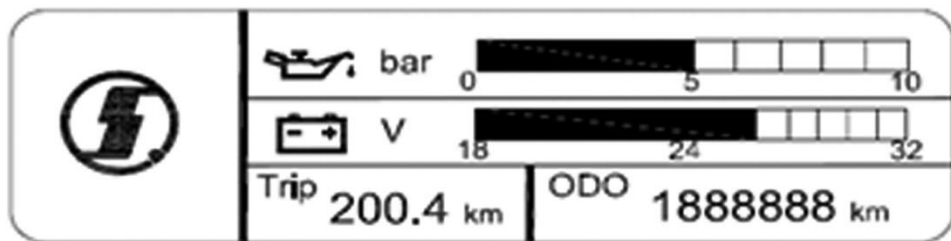


图 5-1 燃油车液晶主界面 B（非国四仪表）

Figure 5-1 The main LCD interface B of a fuel vehicle (non-country four instrument)

短按左键，主界面跳到此界面，如图 5-2 所示。

Short press the left key, jump from the main interface to the interface, as shown in figure 5-2.

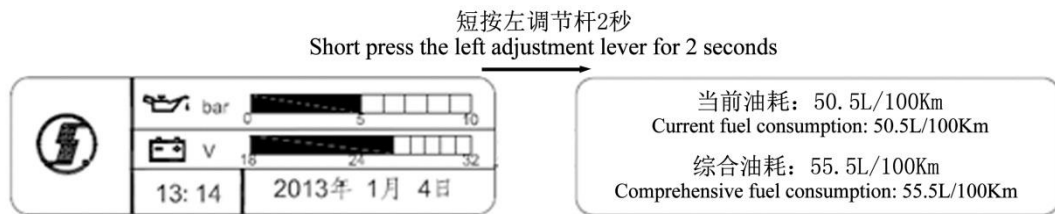


图 5-2 Figure 5-2

图 5-3 Figure 5-3

9.7.2.3、时钟日期调整说明

Clock and date adjustment

(1) 在时钟日期界面，长按左键，“分”信息开始闪烁，再短按一下左键，“时”信息开始闪烁，“分”信息停止闪烁；再短按一下左键，“月”信息开始闪烁，“时”信息停止闪烁；再短按一下左键，“日”信息开始闪烁，“月”信息停止闪烁；再短按一下左键，“年”信息开始闪烁，“日”信息停止闪烁；再短按一下左键，所有数字均停止闪烁。在上述闪烁状态下，左键右旋，数字递增；左键左旋，数字递减。

In the date and clock interface, long press the left key, "minute" start to flash, and short press the left key again, "hour" start flashing, the "minute" stop to flash. Short press the left key again, "month" start to flash, "hour" stop to flash. Short press the left key again, "day" start to flash, "month" stop to flash. Short press the left key again, "year" start to flash, "day" stop to flash. And short press the left key again, all digits stop to flash. In the above flashing state, rotate the left key to the right, the digit will increase. Rotate the left key to the left, the digit will decrease.

(2) 在调整过程中，如突然断常电，不保存调整时的时间及日期。

In the process of adjustment, all the adjusted time and date will not be saved for suddenly poweroff.

(3)日期上限值为 2035.12.31。

The upper limit value for the date is 2035.12.31.

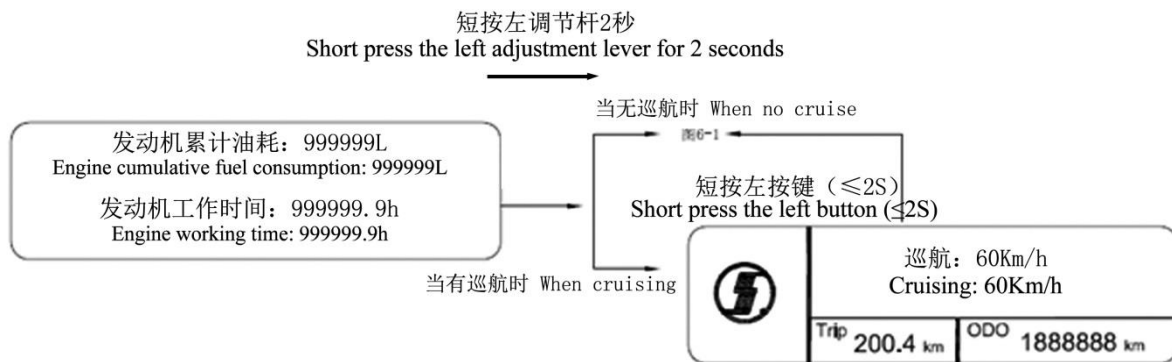


图 5-4 Figure 5-4

图 5-5 Figure 5-5



图6-2 “语言”二级菜单 Figure 6-2 "Language" secondary menu

短按左调节杆 (≤ 2 秒)
Short press the left
adjustment lever (≤ 2 seconds)

“简体中文”、“English”、“俄语”、“法语”、“葡萄牙语”、“西班牙语”依次闪烁。在闪烁的状态短按左调节杆 (≤ 2 秒)，则保存设置，并返回到图6-1界面

"Simplified Chinese", "English", "Russian", "French", "Portuguese" and "Spanish" flash in sequence. Flashing Short press the left adjustment lever (≤ 2 seconds) in the status, then the settings will be saved and the interface will return to Figure 6-1

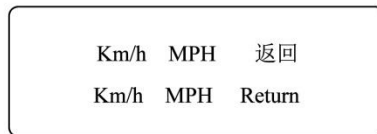


图6-3 “单位”二级菜单
Figure 6-3 "Unit" secondary menu

短按左调节杆 (≤ 2 秒)
Short press the left adjustment
lever (≤ 2 seconds)

“Km/h”、“MPH”、“返回”依次闪烁。在闪烁的状态短按左调节杆 (≤ 2 秒) 则保存设置，并返回到图6-1界面

"Km/h", "MPH" and "Return" flash in sequence. Flashing Short press the left adjustment lever (≤ 2 seconds) to save the setting and return to the interface of Figure 6-1

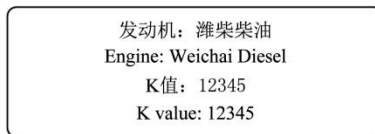


图6-4 Figure 6-4

分别有康明斯、LNG、CNG，5秒后回到主菜单6-1
There are Cummins, LNG, CNG respectively, return to the main menu 6-1 after 5 seconds



图6-5 Figure 6-5

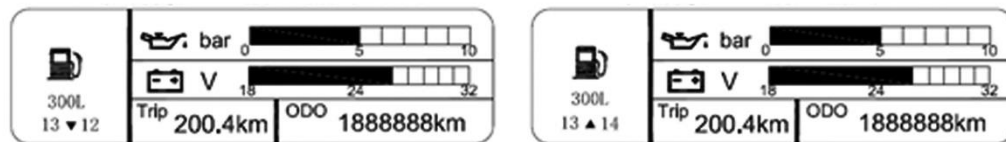
“恢复出厂设置”定义，单位Km/h，语言为简体中文，5秒则转到主菜单6-1
"Restore factory settings" definition, unit Km/h, The language is simplified Chinese, 5 seconds to go to the main menu 6-1

当有 R 或 N 或前进挡档时，界面如下（以 LNG 为例）：

If there is R, N or forward gear, the interface (take LNG for example) is as follows:

当有自动变速箱时，LNG型液晶的主界面如下图所示：

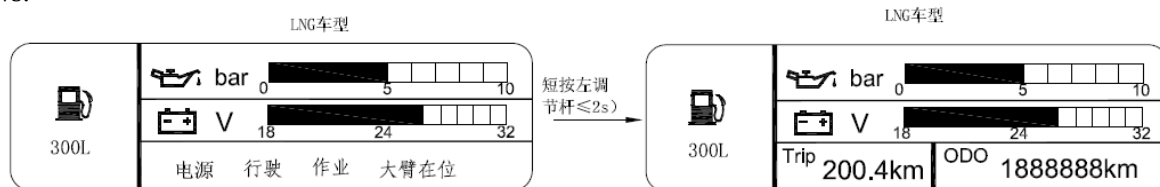
When there is an automatic gearbox, the main interface of the LNG LCD is as shown in the figure below:



（13 为当前档位，12 为目标档位）（13 is the current gear, 12 is the target gear）

当有“作业”、“电源”、“行驶”、“大臂在位”时，主界面如下（以 LNG 为例）：

If there is a "operation", "power", "driving", "big arm in place", the interface (take LNG for example) is as follows:

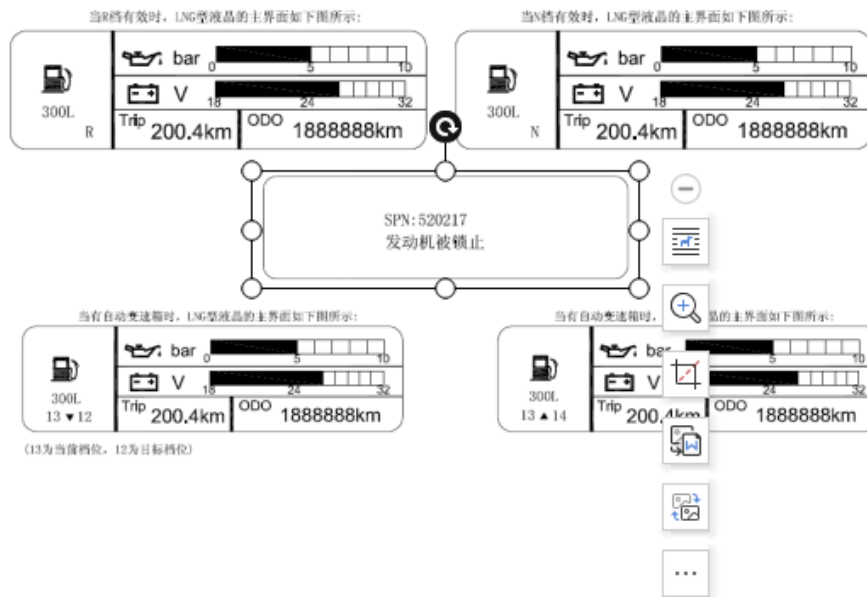


注：其他车型时，液晶显示同 LNG 车型。

Note: for other vehicles, the liquid crystal display is the same as LNG vehicles'.

当仪表收到“锁车”信号时，液晶一直“仪表被锁止，”如下图所示。

When received the lock signal, "instrument is locked" will always displayed on LCD, as shown in the following figure.



当仪表收到锁发动机的故障码时，液晶显示“发动机被锁止”，长按左键或者超过 10s 无操作自动跳到故障前界面。

When the instrument received the fault codes of lock engine, "engine locked" will displayed on LCD, long press the left key or without any operation more than 10s, automatically jump to the previous interface before the error.

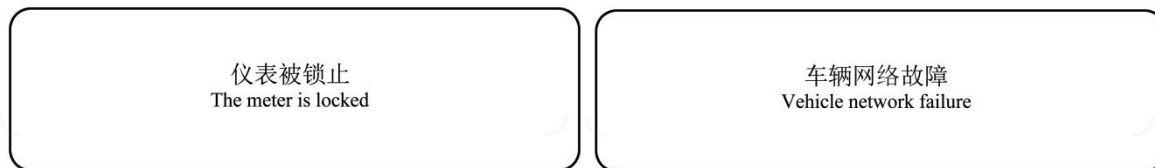


当仪表连续 5s 没有收到任何 CAN 信号时，液晶显示“车辆网络故障”，长按左键或者超过 10s 无操作自动跳到主界面。

When the instrument receives no CAN signal for 5s, "vehicle network fault" will displayed on LCD, long press the left key or without any operation more than 10s, automatically jump to the previous interface before the error.

当仪表收到“锁车”信号后，液晶显示如图

When the instrument receives the "lock car" signal, the LCD will display as shown in the figure



9.8、仪表常见故障维修：

Common fault maintenance of instrument:

原则：根据电气原理图的定义予以检测和维修故障。

Principle: inspect and repair it according to the definition of the electrical schematic diagram.

9.8.1、上电后仪表无显示或指示：

There is no display or indication after switched on:

9.8.1.1、检查仪表线束是否正确接入：A15：点火电源；A33：电瓶电源；

Check whether the wiring harness of instrument is connected correctly: A15: ignition power supply; A33: battery power supply;

9.8.1.2、检查 A15、A33 电源是否过低 ($<16V$) 或长时间过高 ($>36V$), 并检查整车其它电器是否有烧坏情况;

Check whether the voltage of power supply A15 and A33 is too low ($< 16V$) or too high for a long time ($> 36V$), and check whether there is other electrical appliance damage of complete vehicle;

9.8.1.3、检查整车仪表保险丝是否熔断;

Check whether there is fuse of the vehicle instrument is burned-out;

9.8.2、上电后指针不运转或指示不准确:

Check whether the pointer operates or indicates inaccurate:

9.8.2.1、检查各表头信号是否正确接入仪表, 信号是否满足表 3 的要求。包括传感器的地线当作信号线接入, 信号线当作地线搭铁等等;

Check whether the header s' signals are properly connected to the instrument, whether the signal meet the requirements of table 3. Including the ground wire of sensor serves as a signal access, and signal lines serves as ground bonding, etc.

9.8.2.2、检查传感器地 A31 是否可靠接地 (搭铁), 与“仪表电源-”A16 是否同电位 (同电位: 相当于共点)。若 A31 电位 $<$ A16 电位, 则信号值与示值成反比的油量表会比正常情况偏高、信号值与示值成正

比的 CNG 气量表、气压表会比正常情况偏低。

Check whether the sensor A31 is reliably grounding (bonding), whether it has the same potential with "instrument power -" A16 (the same potential: equal to concurrent). If A31 potential is less than A16 potential, the fuel gauge (the signal value is inversely proportional to the indicating value) will be higher than normal value, and the CNG gas meter, the barometer (the signal value is proportional to the indicating value) will be lower than normal value.

9.8.3、当整车出现：在开大灯、雨刮、暖风、空调、门窗等电气时，若出现指针抖动或漂移现象，应检查相应的传感器或电源地线与电瓶、大梁、驾驶室等处搭铁线是否可靠搭铁或有线束漏接。

For complete vehicle: when headlamp, wiper, heater, air conditioning, door and window is switched on, if the pointer oscillates or drifts, check whether the earthing of corresponding sensor or power supply ground wire and battery, girders and cab, etc. is reliable, and whether there is disconnected wire harness.

9.8.4、转速表不准，需要用发动机诊断工具确认发动机 ECU 外发的转速信号是否与仪表显示一致。

Tachometer inaccurate: using the engine diagnostic tool to ensure whether the output rotating speed signal is the same with it displayed on LCD.

9.8.5、车速表、里程数不准，首先应整车是否换过配置（车桥、轮胎、变速箱等），仪表 K 值是否与

设计要求仪表标定的参数一致并咨询陕汽服务中心仪表 K 值。并依据维修手册修改 K 值。

Speedometer and mileage inaccurate: first check whether the configurations of complete vehicle have been changed (axle, tyres, transmission, etc.), the K value of instrument is consistent with the calibration instrument parameters of design requirements, and refer to the K value of the service center of Shanqi. And then modify the K value according to the maintenance manual.

注：出厂默认值：车速里程表每公里脉冲数 K 值为 8000。整车出厂时，陕汽会根据整车配置在此基础上进行了修改。里程表每公里脉冲数 K 值不可随意更改，否则引起仪表指示不准。

Note: the factory default value: pulse number K value per kilometer for speedometer is 8000. When complete vehicle delivery, the K value will be modified by Shanqi according to the configuration of complete vehicle. pulse number K value per kilometer for odometer does not be changed randomly, otherwise it will cause instrument inaccuracy.

车速表不工作，除检查信号线、地线外，还应检查仪表 A35 是否输出 11.4V 电源给车速传感器。检查仪表指针是否松动或与刻度盘卡死，检查传感器的线束连接是否正确。

Speedometer does not work: in addition to check the signal wire, ground wire, check whether the instrument A35 output power supply of 11.4 V for speed sensor. Check whether the pointer is loose or the dial is jammed, and check whether the sensor wire is corrected accurately.

9.8.6、点火钥匙断电后，指针不回零：

After the ignition key powered off, the pointer does not return to zero:

9.8.6.1、检查常电（电瓶电）A33 是否接入仪表，是否断开或过低（ $<16V$ ）。

Check whether constant power supply (battery power supply) A33 is connected to the instrument, and whether it is disconnected or its voltage is too low ($< 16V$).

9.8.6.2、检查指针是否松动或与刻度盘卡死。

Check whether the pointer is loose or the dial is jammed.

9.8.7、指针指示跳抖：

Pointer oscillating:

9.8.7.1、检查信号和传感器地线，信号值是否满足设计定义。

Check the earth wire of signal and sensor, whether the signal value conforms to the design definition.

9.8.7.2、检查指针是否松动或与刻度盘磨擦，电机是否损坏。

Check whether the pointer is loose or dial is grinding and whether the motor is damaged.

9.8.8、液晶显示断码、乱码：

Broken codes or illegible characters displayed on LCD:

液晶插座虚焊、短路、不清洁，液晶排线未可靠插到位。

The socket of LCD is inaccuracy soldering, short-circuited or unclean. The wires of LCD does not reliably in place.

9.8.9、里程不记忆： Mileage does not stored:

9.8.9.1、确认 A33 电瓶电源是否始终接入仪表，且并未断开；

Confirm whether A33 battery power is always connected to the instrument and never disconnected;

9.8.9.2、确认每次上电或行车耗时超过 10s（上电行车，再熄火，再上电看里程是否记忆等操作不得<10s）；

Confirm each power-on or running time is more than 10s (switch on ignition key and drive vehicle, switch the key off, switch on ignition key again, check whether the mileage has been stored, the operation shall be less than 10s);

9.8.9.3、同时断 A15 点火和 A33 电瓶电源，本次行驶的里程数据可能不记忆。

因此，要求关掉 A15 点火电源后，等指针完全回到零位，液晶熄灭后，再关掉总电源开关。

Cut off A15 ignition and A33 battery power supply at the same time, the mileage data may not be saved. Therefore, after cutting-off A15 ignition, the main power supply should not be switched off until the pointer completely returns to zero and LCD is turned off.

9.8.10、报警灯不亮或常亮:

Alarm lamp not alight or normally alight

9.8.10.1、检查整车接线和信号线是否正确。

Check whether the wiring and the signal lines of complete vehicle are correct.

9.8.10.2、检查整车电源是否长时间过高 ($>36V$), 造成电路长时间过电压。

Check whether the vehicle power supply is too high for a long time ($> 36V$), which will cause overvoltage of circuit for a long time.

9.8.11、报警灯微亮:

Warning lamp is shimmering:

检查整车接线和信号线是否正确, 是否有漏电、串电现象。

Check whether the vehicle wiring and the signal lines are correct, if there is electric leakage and series-wound phenomenon.

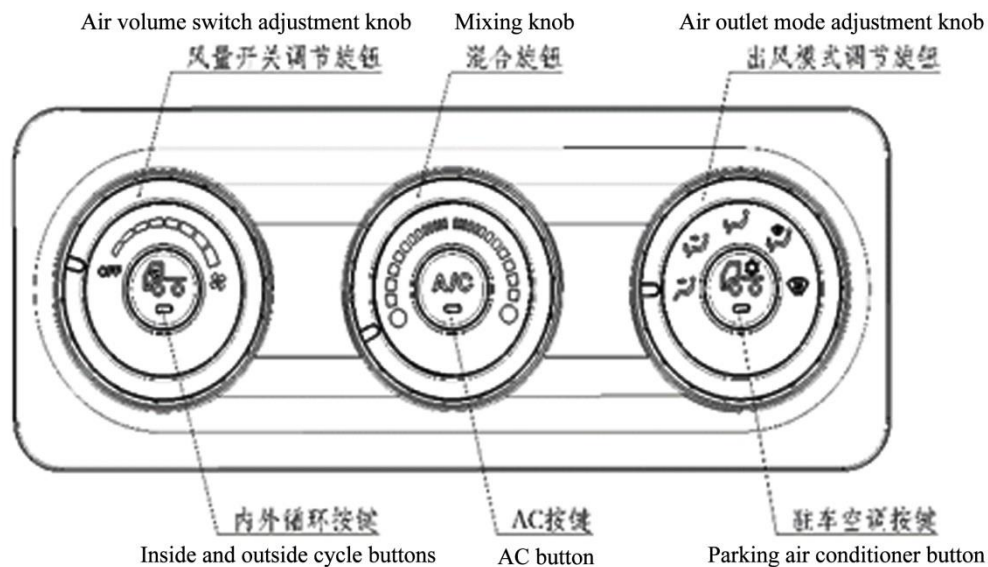
16 空气调节系统使用操作

Air conditioning system operation

16.1 空调系统技术参数 Air conditioning system parameters

1	制冷量 Refrigerating capacity	6KW
2	制热量 Heating capacity	8.0KW
3	送风量 Delivery air volume	650m ³ /h (100Pa)
4	电压 Voltage	24V DC
5	总耗电功率 Total power consumption power	≤450W
6	制冷剂 Refrigerant	R134a

16.2、空调控制器操作方法 Air conditioning controller operation method



空调控制器控制面板示意
The schematic diagram of control panel of air-conditioning

16.2.1、控制按钮功能 Control button function

混合旋钮：调节空调制热量、制冷量大小。

Mixing knob: adjust the heating and cooling capacity of the air conditioner.

风量开关调节旋钮：调节风机出风量。

Air volume adjustment knob: it is used for adjusting the air volume of fan.

出风模式调节旋钮：调节空调的工作模式。

The air mode adjustment knob: it is used for adjusting the work mode of air conditioning.

A/C 按键：灯亮表示压缩机启动，制冷系统处于工作状态。

A/C button: the lamp lighting-up shows the compressor starts and the refrigeration system is in working condition.

内/外循环按键：开机后默认内循环，按下此键后绿色指示灯亮则进入外循环。

Internal/external loop button: default to internal loop after powered-on, it will start to external loop after pressing this button and the green lamp lighted-up.

背景光：当驾驶员打开小灯控制开关时，面板背景光 LED 全部点亮。

Background light: when the small lamp is switched on, the LED on the panel will be all alight.

驻车空调按键（选装）：按下后指示灯点亮，表示驻车空调开启，再次按下关闭驻车空调。

Parking air conditioner button (optional): When pressed, the indicator light will light up, indicating that the parking air conditioner is on, press it again to turn off the parking air conditioner.

16.2.2、使用说明 Instruction

①制冷 Refrigeration

制冷系统首次使用，将水阀温度调节旋钮调至蓝色全冷位置（即水阀关闭状态），发动机启动后将风量开关开至高档，运行 5 分钟，然后按下 A/C 按键（指示灯亮），此时，制冷系统开始工作，车厢内温度开始下降，用户可根据需要调整风量大小和温度大小，使驾驶室保持舒适的温度。空调持续制冷时，当空调蒸发器表面温度下降至 2.5 摄氏度时，为防止蒸发器结冰，压缩机会自动停止工作。蒸发器表面温度达到 5 摄氏度时，压缩机会自动开始工作。

For the first using of refrigeration system, adjust the temperature control knob of water valve to blue full cold position (i.e., water valve closed position), put air volume switch to high-grade after engine starting, 5 minutes later, press A/C key (the indicator lamp lights up), at this moment, the refrigeration system begins to operate, the inner temperature begins to reduce. The user can adjust the air volume and temperature to make the cab in comfortable temperature. In the process of air conditioning refrigeration, when the surface temperature of

air conditioning evaporator drops to 2.5℃, the compressor will stop working automatically to prevent evaporator freezing. When the surface temperature reaches to 5℃, the compressor will start to work automatically.

调整风口角度，可改变冷风吹出的角度和方向；调节风量开关，可获得 1,2,3,4 四个档次的风量；转动出风模式调节旋钮，可依次实现“吹面-->吹面吹脚-->吹脚-->吹脚除霜-->除霜”5 种模式；当风量开关旋钮处于 1~4 档时，允许压缩机启动。此状态下若按动一次 A/C 键可开启压缩机，空调制冷，再按动一次则可关闭压缩机，如此循环；当风量开关处于 O 档时，不允许开启压缩机，此时按动 A/C 键无效。

Change the angle and direction of cold air blowing by adjusting the angle of ventilation duct. There are four classes of air volume, adjust it by the air flow switch. Rotate the adjusting knob to change air blowing mode in turn, “blowing face-->blowing face and foot-->blowing foot-->blowing foot and defrosting--> defrosting”. The compressor is allowed to start when air volume switch knob is in 1~4 range. Under the condition, if pressing A/C key once can turn on the compressor, air conditioning refrigerates, and pressing the key again can shut down the compressor, and so on. When air volume switched in 0 range, the compressor is not allowed to turn on, press A/C button is invalid at this time.

注意：制冷时，请保证水阀处于关闭状态。

Note: when refrigerating, please make sure that the water valve is closed.

②制热 Heating

冬季采暖时，首先使 A/C 按键处于关闭状态（指示灯灭），在发动机启动后，将水阀温度调节旋钮调至红色区域（水阀打开），开启风量开关，空调开始制热。

Heating in winter: firstly make A/C button in closed state(indicator lamp is not alight), after the engine starting, adjust the temperature control knob of water valve to the red area (water valve opens), and then turn on air volume switch, the air conditioning will start to heat.

调整风口角度，可改变热风吹出的角度和方向；调节风量开关，可获得 1,2,3,4 四个档次的风量；转动出风模式调节旋钮，可依次实现“吹面-->吹面吹脚-->吹脚-->吹脚除霜-->除霜”5 种模式。

Change the angle and direction of heated air blowing by adjusting the angle of ventilation duct. There are four classes of air volume, adjust it by the air flow switch. Rotate the adjusting knob to change air blowing mode in turn, “blowing face-->blowing face and foot-->blowing foot-->blowing foot and defrosting--> defrosting”.



16.3、注意事项

Attention matters:

16.3.1、对于整个空调系统，请勿随意拆卸，防止制冷剂泄露。

Please do not disassemble the whole air conditioning system to prevent the refrigerant fluid from leaking.

16.3.2、定期检查皮带的松紧度，防止过松过紧。

Regularly check the degree of tightness of belt, to prevent it is too loose or too tight.

16.3.3、定期清洗冷凝器表面积垢，防止制冷效果下降。

Regularly clean the surface scalefilm of condenser to prevent the influence on refrigeration.

16.3.4、更换零部件时，应按下表规定，补充同型号冷冻油。

When replacing parts, please fill in the same type of freezing oil according to the following table:

更换部件名称 Name of replaced parts	补充冷冻油数量 (CC) Filled frozen oil volume (CC)
冷凝器 Condenser	40-50
蒸发器 Evaporator	40-50
制冷循环胶管 Refrigeration cycle hose	10-20
干燥-贮液器 Dry - receiver	15-25

16.3.5、非专业人员，请勿拆卸修理空调系统。

It is forbidden for non-professional workers to disassemble and repair the air conditioning system.

16.4 驻车空调（选装功能）

16.4 Parking air conditioner (optional function)

驻车空调工作条件：手制动信号有效、发动机未启动、钥匙电源有效、空调风量档位不为 0、蒸发器未结冰。

Parking air conditioner working conditions: the hand brake signal is valid, the engine is not started, the key power is valid, the air volume of the air conditioner is not 0, and the evaporator is not icing.

a) 按下驻车空调按键，按键指示灯点亮，驻车空调开启；

a) Press the parking air conditioner button, the button indicator will light up, and the parking air conditioner will turn on;

b) 驻车空调开启后强制吹面模式，内循环，水阀全关；

b) After the parking air conditioner is turned on, the forced surface blowing mode, internal circulation, and the water valve are fully closed;

c) 蒸发器表面温度下降至2.5℃时，为防止蒸发器结冰，驻车空调自动停止工作；

c) When the surface temperature of the evaporator drops to 2.5℃, in order to prevent the evaporator from freezing, the parking air conditioner will automatically stop working;

d) 蓄电池欠电压时，为保证车辆启动，驻车空调自动停止工作；

d) When the battery is under-voltage, the parking air conditioner will automatically stop working to ensure the vehicle starts;

e) 高压开关断开时，强制关闭驻车空调压缩机。

e) When the high voltage switch is off, the parking air conditioner compressor is forced to shut down.

17. 点火钥匙开关的使用如图，

The use of the ignition key switch, as shown in figure



ACC 位表示发动机处于熄火状态，电源给收录机供电；

ACC position, which indicates engine is in flameout state, the radio is powered on;

LOCK 位表示车辆处于此位置时，按下锁钮可拔出钥匙，此时方向盘锁住，不按锁钮钥匙不能拔出。

LOCK position, press lock knob to pull out the key, at this moment, the steering wheel is locked. The key should not be pulled out only when the lock knob is pressed;

ON 位表示当钥匙拧到此位置时，灯光总开关、燃油防盗报警器、ECU、仪表灯电器件工作；

ON position, when rotate the ignition key to the position, the master lighting switch, burglar alarm for fuel, ECU and electric parts of instrument get to work;

START 位表示起动发动机的位置。

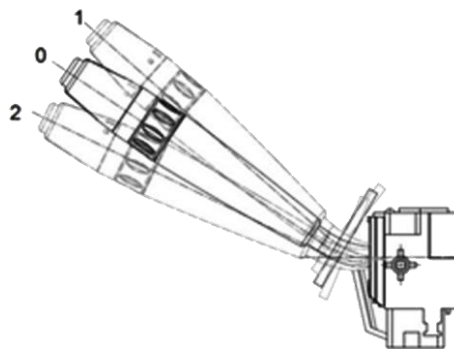
START position, which indicates engine starting position.

注意：行车时切勿关闭点火钥匙开关。

Note: do not switch off the ignition key during driving.

18 组合开关的使用

Operation of combination switch



在使用组合开关之前先接通点火钥匙开关。

Turn on the ignition switch first before using the combination switches.

1 如图, ①把开关手柄移动到位置 0, 接通前照灯近光。

As shown in figure, ① operate switch handle to Position 0, and turn on lower beam of headlamps

②把开关手柄经过压力点位置 1 推到位置 2, 这时前大灯远光指示灯 10 发光, 接通前照灯远光。

Push switch handle to position 1, when the headlamp high beam indication lamp 10 is lighted, high beam of headlamps is turned on.

③再次移动开关手柄经过压力点位置 1 到位置 2, 这时标有前大灯远光的指示灯 10 熄灭, 断开前照灯远光 (前照灯近光仍接通)。

Push switch handle to position 1 and position 2, when the headlamp high beam indication lamp 10 is lighted, switch off high beam(the low beam is still alight).

④把开关手柄轻轻推至位置 1, 这时标有前照灯近光指示灯 10 点亮。

Gently push the switch to position 1, the marked indicator lamp 10 of low beam will light up

2.转向灯的使用 Use of direction indicator lamps



主车左转向指示灯； the left steering indicator lamp of main vehicle



主车右转向指示灯； the right steering indicator lamp of main vehicle



挂车左转向指示灯； the left steering indicator lamp of trailer



挂车右转向指示灯； the right steering indicator lamp of trailer

①当转向指示灯开关接通时，标有牵引车转向指示灯的绿色指示灯 8 开始闪烁。如果牵引车带有挂车，则标有挂车转向指示灯的绿色指示灯 11 也开始闪烁。转向指示灯具有自动复位功能。

When direction indicator lamp switch is turned on, the green detector lamp 8 marked with tractor 1 direction indicator lamp will start blinking. If the tractor works with a trailer, the green detector lamp 11 marked with trailer direction indicator lamp will also start blinking. The direction indicators feature in automatic reset function.

如果指示灯  和  只闪烁一次，则说明转向指示灯发生了故障，请检查更换灯泡。

If indicators  and  only blinked once, it means that failures might happen to the direction indicator lamps. Please check and replace bulbs if necessary.

②向前推动开关手柄，直到开关手柄经过压力点到达位置 1，右转向灯持续闪烁。

Push the switch handle forward, until the handle passes pressure point and reach Position 1, and the right steering lamp keeps blinking.

③向后拉动开关手柄，直到开关手柄经过压力点到达位置 2，左转向灯持续闪烁。当车辆直线行驶后，手柄自动弹回到位置 O。

Pull the switch handle backward, until the handle passes pressure point and reach position 2, and the left steering lamp keeps blinking. When the vehicle moves in straight line, the handle will automatically be rebounded to position 0.

④向前方/后方推动，拉动开关手柄至压力点并保持在该位置，松手后，开关手柄将自动弹回位置 O。转向灯短时闪烁。

Push the handle forward / backward, and pull it to the pressure point and keep it at the position. Release your hand, and the handle will automatically be rebounded to position 0. The steering lamp will blink momentarily.

3.风档玻璃刮水器的使用 Use of windscreen wiper

按所指方向转动开关手柄，使开关手柄的箭头①处于位“INT”，“OFF”，“LO”或“HI”。

Windscreen wiper should be operated through rotating the switch handle, so that its arrow ① can point to

positions of “INT”, “OFF”, “LO” or “HI”.

处于位置“OFF”时，关闭风挡玻璃刮水器。

If the arrow points to “OFF”, turn off the windscreen wiper.

②处于位置“INT”时，风挡玻璃刮水器间歇刮水，间歇刮水时间约为 10 秒钟。

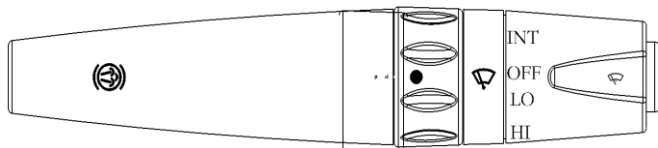
If the arrow points to “INT”, the wiper will be in intermittent wiping condition, and its wiping period will be about 10 seconds.

③处于位置“LO”时，刮水器电机低速刮动；处于位置“HI”时，刮水器电机高速刮动。

If the arrow points to "LO", the wiper will be in slow wiping condition; If the arrow points to "HI", the wiper will be in quick wiping condition.

④断开刮水器，转动开关手柄，使其上的箭头①转至位置“OFF”。或者关掉点火钥匙开关。

Switch off the wiper, rotate the handle to make arrow ① point to “OFF”. Or turn off ignition key.



4.风窗玻璃清洗器的使用： Use of Windshield Washer:

1、下组合开关的按钮（最长时间为 0.9 秒），则出现一个喷淋刮水循环。

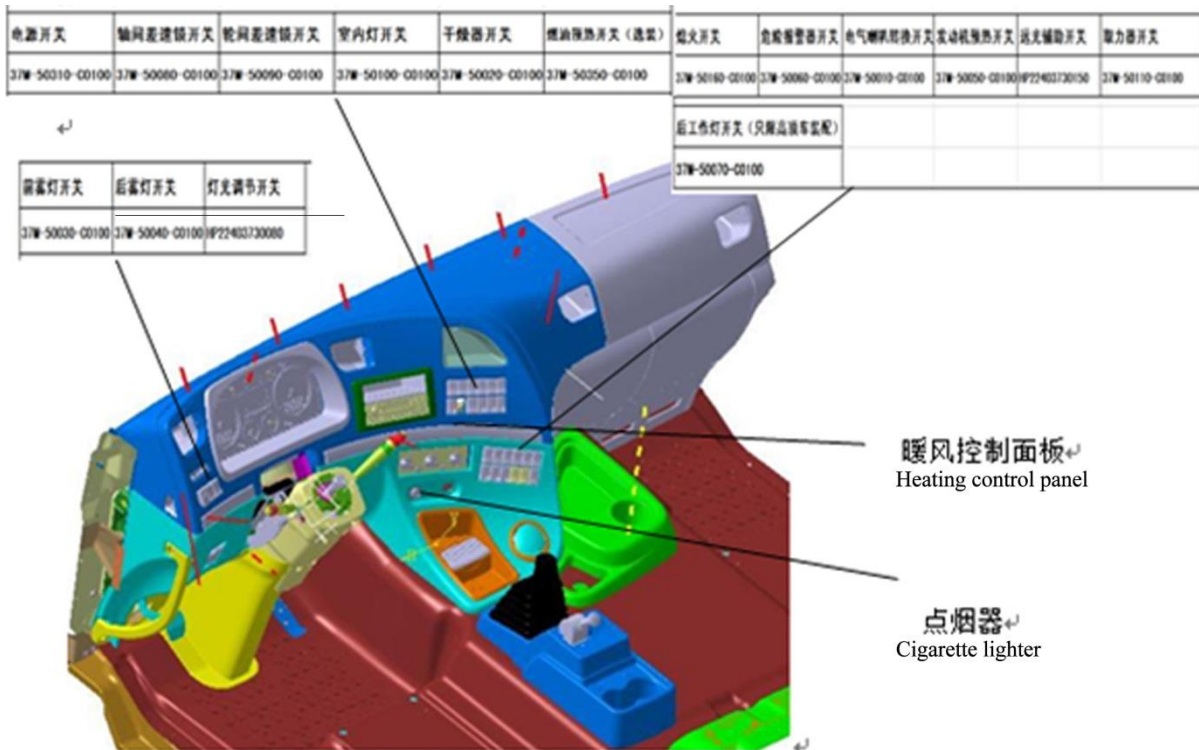
Press the button of combination switch (the longest period can be 0.9s), and a spraying / wiping cycle can be started.

2、按压按钮时间更长一些（超过 0.9 秒，最长时间为 6.5 秒），只要该按钮处于受压状态，喷淋/刮水循环就持续下去，紧接着就是另外一个 2 到 4 次的刮水循环。

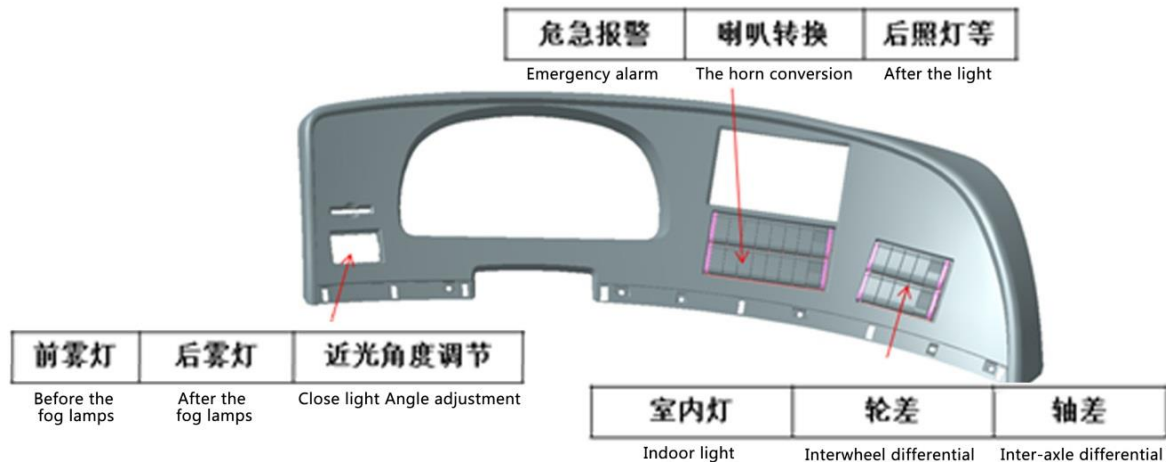
Press pushbutton for a longer period (longer than 0.9s, and the maximum period can be 6.5s). As long as the pushbutton is in its depressed condition, the spraying / wiping cycle will continue. Immediately, another 2 to 4 times of wiping cycle will be started.

注意：定期检查刮水片是否集满灰尘或已损坏。在有霜冻的天气环境下，在起动车辆之前，请检查刮水片是否与风挡玻璃冻在了一起。

Caution: Please consider of verifying whether the wiper blade has been dusty or damaged in period. Before starting the engine in frost weather, it is best to check whether the wiper blade has been frozen with windscreen.



10.仪表板:instrument panel



1) 车身翘板开关的使用

Use of rocker switch

2) 收放机的使用 Uage of radio

该款收放机带 MP3 主机、USB 接口等功能。

The radio has the functions of MP3 host, USB interface, and so on.

功能: Function:

a.FM/AM 手动搜索调谐 (TUNE); FM/AM 自动搜索调谐;

Functions: a. F M/AM manual search tune

(TUNE);FM/AM automatic search tune;

b.收音存储功能; FM/AM 波段转换;

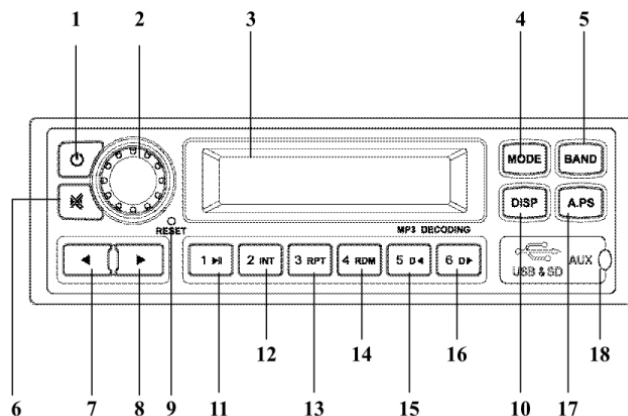
[FM1 FM2 FM3]×6 自动/手动存储;

[AM1 AM2]×6 自动/手动存储; 收音静音预览
(Mute) 等。

Radio storage function; FM/AM wave band
conversion; [FM1 FM2 FM3] × 6 automatic/manual
storage; [AM1 AM2] × 6 automatic/manual storage;
Radio mute preview (Mute), etc.

c.支持外接 U 盘, 播放 mp3 格式;

Support external U disk, mp3 format;



收音操作： Radio operation:

——存储电台：

Storage broadcasting stations

1.按照您选择的顺序，最多可设置存储 18 个 FM 电台（FM1、FM2、FM3 各 6 个）和 12 个 AM 电台（AM1、AM2 各 6 个）。

According to the order of your choice, it can set up and storage 18 FM broadcasting stations (six stations for FM1, FM2 and FM3 respectively) and 12 AM broadcasting stations (six stations for AM1 and AM2 respectively).

2.在收音状态时，反复按面板上的“BAND”键选择波段。收音初始状态为 FM1，每按一次，波段按照 FM1~FM2~FM3~AM1~AM2 循环变化。

When radio working, repeatedly press the "BAND" button on the panel to select band. The initial state of radio is FM1, each time you press the button, the band will change in the order from FM1, FM2, FM3, AM1 to AM2 circularly.

3.在收音状态时，长按面板上的“►”或“◄”键，可以在动搜索到下一个或上一个清晰的电台。短按面板上的“►”或“◄”键，可以手动步进到下一个或上一个清晰的电台。当收到电台后，按住任意一个数字键并保持 2s，可将该电台存储到该数字键上。若该键上已存储电台，将被替换。

When radio working, long press "►" or "◄" button on the panel to search the next or last station. Short press "►" or "◄" button on the panel to manually enter into the next or last station. After searching station, hold an arbitrary number key and keep for 2s, the station can be stored on the number key. If a station has been stored on the key, it will be replaced.

4.在 FM 收音状态时，长按“A.PS”键收音机将自动扫描并存储该波段信号最强的 18 个电台。存储完毕后，将依次浏览所存储电台。

In the state of FM radio, long press " A.PS " button, the radio will automatically search and store the strongest 18 stations. After the storage, all stored stations will be browsed in turn.

在 AM 收音状态重复上述操作，可以存储该波段信号最强的 12 个电台。

Repeat the above operation to search and store the strongest 12 stations in the band.

——收听所存储的电台：Listening to the stored stations:

1.按面板上的“BAND”键选择波段，再按数字键选择所存储的电台；

Press the "BAND" button on the panel to select band, and then press the number key to choose the stored station;

2.在收音状态时，短按“A.PS”键收音机将浏览该波段所存储的电台。若要收听所浏览的电台，按一下所显示电台的数字键即可。

In the state of radio, short press " A.PS " button to browse stored stations in the band. If you want to listen to the radio browsed, click on the number key displayed.

——音响调节：

Sound adjustment:

重复按压音量电位器，收放机将按下列次序循环进行音响模式选择：BAS～TRE～BAL～VOL。

Repeatedly press the volume potentiometer, the radio will circularly choose acoustic modes in the order:
BAS ~ TRE ~ BAL ~ VOL.

1.音量模式（VOL）

Volume mode（VOL）

顺时针或逆时针旋转音量电位器，可调节音量大小。音量电平可在 0～63 之间任意调节。

Clockwise or counterclockwise rotate the volume potentiometer to adjust volume. The volume level can be randomly adjusted between 0 ~ 63.

2.低音模式（BAS）

Bass mode (BAS)

顺时针或逆时针旋转音量电位器，可调节低音大小，低音电平可在-14～+14 之间任意调节。

Clockwise or counterclockwise rotate the volume potentiometer to adjust bass. The bass level can be randomly adjusted between - 14 ~ + 14.

3.高音模式 (TRE)

Treble mode (TRE)

顺时针或逆时针旋转音量电位器，可调节高音大小，低音电平可在-14~+14 之间任意调节。

Clockwise or counterclockwise rotate the volume potentiometer to adjust treble. The treble level can be randomly adjusted between - 14 ~ + 14.

4.左右平衡模式 (BAL)

Balance mode (BAL)

顺时针或逆时针旋转音量电位器，可调节左右声道音量大小，其电平大小可在 L15~R15 之间任意调节。

Clockwise or counterclockwise rotate the volume potentiometer to adjust the volume of left and right channel. The level can be adjusted between L15 ~ R15.

USB/SD 卡操作：

USB/SD card operation:

注意：支持 mp3 格式的音频文件；

Note: it supports the audio files of mp3 format.

支持 32M~4G 的以闪存为介质的存储器。

It supports the flash memory storage medium of 32M to 4G.

——播放 USB/SD 卡 Play USB/SD card

1、按面板上的电源开关键，打开主机电源。

Press the power supply switch on the panel to turn on the host.

2、将 U 盘/SD 卡插入 U 盘/SD 卡转接口，显示屏即显示“USB/SD”开始搜索，搜索完毕后自动播放。

Insert U disk/SD card into U disk/SD card interface, "USB/SD" searching will be displayed on screen, and it will automatically play after searching.

3.在播放过程中将显示：曲目号已播放时间

During playing, it will display track number and past track time.

4.在 U 盘/SD 播放状态时，按“1 ■”键为暂停功能，再按一下恢复播放。

In the U disk/SD card play state, if you want to pause, please press “1 ■” button, and resume playback by repressing the button.

5.在 U 盘/SD 播放状态时，拔出 USB/SD 推出 USB 播放状态，进入收音模式。

In the U disk/SD card play state, pull out the USB/SD to quit USB play state, and then it will enter into radio mode.

——曲目浏览播放

SCAN PLAY

在 U 盘/SD 播放状态时，按“2INT”键进入曲目浏览，播放每首曲目的前 10s，再次按下该键取消该功能。全曲目浏览完毕后，从第一首曲目正常播放。

In the U disk/SD card play state, press "2 INT " button to enter the track browsing, play each music for 10s, and press the button again to cancel play. After browsing all music, it will play from the first track.

——曲目重复播放 Music repeat

在 U 盘/SD 播放状态时，按“3RPT”键，重复播放当前曲目，再次按下该键取消该功能。

In the U disk/SD card play state, press "3 RPT " to repeat the current track, and press the button again to cancel repeat function.

——曲目随机播放 RANDOM PLAY

在 U 盘/SD 播放状态时，按“4RDM”键进入随机播放模式，再次按下该键取消该功能并进入顺序播放。

In the U disk/SD card play state, press "4RDM" to enter into random play mode, and press the key again to cancel random function and play in order.

——寻找指定曲目 Looking for specified track

在 U 盘/SD 播放状态时，短按“▶”键选取下一首曲目，短按“◀”键选取上一首曲目。

In the U disk/SD card play state, short press "▶" key to select next track, short press "◀" to select previous track.

——寻找曲目中的指定位置

Looking for specified position in the tracks

在 U 盘/SD 播放状态时，长按“▶”或“◀”键，歌曲将快进或快退。

In the U disk/SD card play state, long press "▶" or "◀", the song will advance or retreat quickly.

当找到所要位置时，再按“1 ⏮”键即可从当前位置继续播放。

When the position found, you can play from current position by pressing "1 ⏮" button.

——选择要读取的文件夹

Selecting the folder to read

播放 U 盘/SD 卡时，短按预置键 5 和预置键 6 可直接进行文件夹选择操作，收放机将从所选择文件夹的第一首曲目开始按顺序播放。

In the U disk/SD card play state, short press preset key 5 and 6 to select folders, the player will start play from the first track inside the selected folder in sequence.

其他功能：

Other features:

——静音功能（MUTE）

Mute function

1、收音或放音状态时，按静音键，可以使音量保持在静音状态，显示屏显示“MUTE”。

In the radio or playback state, press the MUTE key to make it in mute state, “MUTE” will be displayed on display screen.

2、若要恢复收音或放音状态，再按该键或改变音量大小即可。

Pressing the key again or changing the volume will restore the radio or playback state.

——时钟设定（DISP）

Clock setting

1.在开机状态时，短按“DISP”键显示时钟，5 秒内若不按该键自动回到正常状态；再次按下该键也可回到正常状态。

When power on, short press "DISP" key to display clock, if the button doesn't be pressed for 5s, it will automatically return to normal state. Press the key again to return to normal state.

2.长按“DISP”键，时钟为闪烁状态时，按“►”和“◄”键调节时钟；再按“DISP”键，分钟为闪烁状态时，按“►”和“◄”键调节分钟。设定完成后，再按“DISP”键结束。

Long press "DISP" key, the clock begin to flash, press "►" and "◄" to adjust clock. Then press "DISP" again, the minutes will flash, and press "►" and "◄" to adjust the minutes. After your setting, then press "DISP" key to end.

备注：

Remark:

时钟调整后，不按任何键，5 秒后自动返回正常状态，并保存时钟设置。

After clock adjusted, if there is no key pressed, it will automatically return to normal status after 5s, and save the clock setting.

——收音、USB/SD 卡、音频输入转换（MODE）

Radio, USB/SD card, audio input conversion (MODE)

在收放机正常工作状态下，连续按“MODE”键即可以在收音、USB/SD 卡、音频输入之间切换播放。若未插入 USB/SD 卡，连续按下“MODE”键，只在收音和音频输入间转换；若同时插入 USB、SD 卡，连续按下“MODE”键，收放机按收音～USB 播放～SD 卡播放～音频输入进行转换。

Under normal working state of the radio, continuously press "MODE" key to convert between radio, USB/SD card and audio. If there is no USB/SD card inserted, continuously press the "MODE" button, it will convert only between radio and audio. If there are USB and SD card inserted at the same time, continuously press the "MODE" button, it will switch in the sequence from radio, USB, SD card to audio.

若只插入 USB、SD 卡中的一个设备，连续按下“MODE”键，收放机接收音～USB 播放/SD 卡播放～音频输入进行转换。

If there is only USB or SD card inserted, continuously press the "MODE" button, it will switch between radio, USB/SD card and audio.

——系统复位

(RESET)

当机器出现非正常状态而不能工作时，按下该键系统恢复初始状态，若仍不能正常工作，请将机器送维修服务站维修。

When the radio is in abnormal state and can't work, press the "RESET" key to restore the initial state. If it still cannot work, please send it to maintenance service station.

11.车内照明控制

Interior lighting control

11.1 前顶灯 阅读灯 The front ceiling reading lamp

如图，按下开关接通前顶灯阅读灯电路。

As shown in figure, press the switch to turn it on.



1.2 顶灯 Ceiling lamp

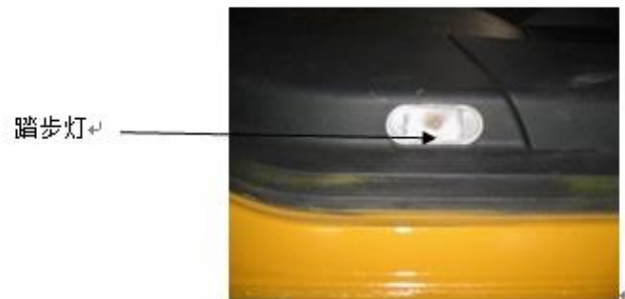


按下仪表台上的照明灯开关，接通顶灯电路。

Press the lighting switch on instrument to turn on the ceiling lamp.



11.3 踏步灯 Step lamp



安装在车门上。打开车门，接通踏步灯电路；关闭车门，断开踏步灯电路。

The lamp is installed on the door. The lamp will be alight when door is opening, and the lamp will be extinguished when door is closing.

12.附件系统: Attachment system:

中烟灰箱: Ash tray

使用点烟器和烟灰盒时，沿箭头方向向下，在中间标示处轻按约 2 秒钟，待锁扣与锁环分离，放开后中烟灰箱自动弹开。关闭时，同样沿箭头方向关闭中烟灰箱，在中间标志处向下轻按中烟灰箱约 2 秒钟，待锁扣与锁环接触好后，即可以关闭中烟灰箱。

If you want to use the cigarette lighter and ash tray, downwards along the direction of arrow, lightly press the middle mark for about 2s, after the lock and lock ring separated, the ash tray will automatically bounce off after you stop pressing. When the ash tray closing, close it along the direction of arrow, lightly press the middle mark for about 2s, after the lock and lock ring engaged, the ash tray is closed.

烟灰盒: Ashtray:

若要进行清洁，首先打开盖子，沿图中箭头所示方向拉出整个烟灰盒即可。

If you want to clean ashtray, firstly open the cover, pull it out completely along the direction of the arrow

indicated in figure.

注意：在离开车辆之前，为安全起见一定要将烟灰盒关上。

Note: before leaving the vehicle, as a safety precaution, the ashtray must be closed.

点烟器： Cigarette lighter.

要用点烟器时，将点烟器直接按入，松手后等待 18 秒钟，点烟器前部的电阻丝烧红后会自动弹出，回到原来的位置，此时可以拔出点烟。用完后，放入原来的位置。

If you want to use cigarette lighter, press the cigarette lighter directly, 18 seconds later, the cigarette lighter will automatically pop up after the front resistance wire burnt red and back to its original position, at this time, you can pull it out. After use, put it in the original position.

警告：绝对不能让点烟器长时间处于接通状态，如果长时间不能自动弹出，一定要人为拔出。

Warning: never let the cigarette lighter in the connected state for a long time, if it cannot be automatically bounded for a long time, pull it out manually.

遮阳板: Visor:

使用遮阳板时，只需将遮阳板上端向下扳动，确认稳固后松手即可。收起时，向上扳动遮阳板确认稳固后即可。

Put down the visor: pull the upper end of the visor downwards, and release it if it is solid. Pack up the visor: pull it upwards and confirm whether it is solid.

窗帘: Curtain:

1.挂窗帘时，将窗帘的吊环依次挂入在相应导轨上的吊钩上，然后沿导轨方向均匀展开，窗帘之间用尼龙搭扣搭接，侧围、后围窗帘下端的金属按扣卡在护板上的塑料卡扣上。

Curtain hanging: hang the jump ring of curtain into the hook of corresponding guide rail in turn, and then spread the curtain evenly along the guide direction. The curtain connect with each other by nylon fastener. For the curtain of side and rear wall, make the metal snap-fastener at lower end of curtain into the plastic snap on backplate.

2. 收拢窗帘时，先将尼龙搭扣解开，然后沿导轨方向均匀收拢，再用搭扣捆束窗帘。

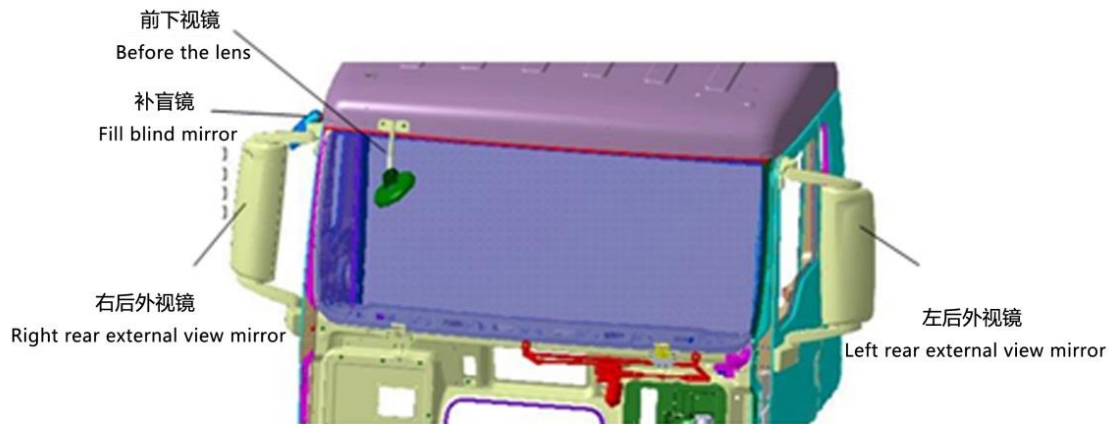
Curtain folding-up: loosen the nylon fastener, evenly fold it up along the guide direction, and then bundle it by fastener.



后视镜及前下视镜: Rearview mirror and front down view mirror:

驾驶室车门左右侧均安装有外后视镜，前下视镜及侧下视镜只安装在右侧。驾驶员可调节后视镜及下视镜以达到最佳的后视及下视效果。

External rearview mirrors are installed on both sides of door. The front and side down view mirrors are only installed on the right side of door. All the mirrors can be adjusted in order to achieve the best visual effect.



(二) 行车前的准备 Preparation before driving

驾驶前的准备工作主要包括：每次行驶前的例行检查和发动机的起动两方面。

Preparation work before drive includes the following two aspects: routine inspection before each drive and starting engine.

1、每次行车前的例行检查：

Routine inspection before each drive

①抓住散热器面罩左右两侧并向上拉即可打开散热器面罩，向下压即可并闭散热器面罩。

Hold both the left and right sides of radiator cover. Pull it upward, and the radiator cover can be opened.

Press it downward, and the radiator cover can be closed.

②机油加注口 Oil filling port

③新鲜空气过滤器 Fresh air filter

④冷却液加注口 Cooling fluid filling port

⑤发动机机油尺 Engine oil dipstick

⑥离合器液压油储液罐 Clutch hydraulic oil storage tank



(1) 将电源总开关扳至接通位置。

Turn on main power switch

(2) 检查驾驶室是否锁住，若驾驶室未锁住，则驾驶室锁止警告灯点亮。

Inspect whether the cab has been locked. If not, the signal lamp of cab lock will be on immediately.

(3) 检查冷却液面，加注冷却液。

Check for liquid coolant level, and add liquid coolant if necessary.

每日进行冷却液面检查，车辆应停放平坦场地，发动机冷却时，冷却液液面不能低于膨胀箱的最低液面刻度线。

Perform daily level inspection for coolant. The vehicle should be parked on a flat ground. When the engine is cold, the coolant level should not be less than the lowest level of expansion vessel.

从膨胀箱的加注口加注冷却液。找出冷却液损耗的原因并解决之。

Add coolant from the filler port of expansion vessel. Find consumption reasons of coolant and resolve the problems.

如果冷却液大量损耗而导致系统过热，不要立即添加冷的冷却液。温度上的较大差异会损坏发动机。

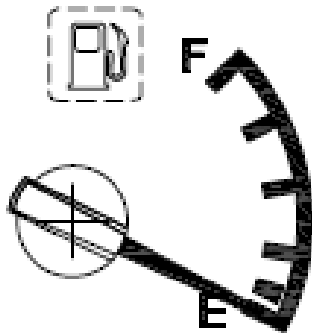
If the system overheats due to too much consumption of coolant, it is not allowed to add cold coolant immediately. Bigger temperature difference might damage the engine.

(4) 检查燃油量

Check for fuel volume

接合电源总开关，打开驾驶室內的电源钥匙开关，从燃油表上检查燃油量，若指示不准，则需检查燃油表和传感器，见图。

Switch off main power switch and turn on power key switch inside the cab. Check for fuel volume on the fuel gauge. If the indication is not accurate, fuel gauge and transducers should be verified, see the figure.



切勿将燃油用完，否则，您必须将燃油系统中的气体排出。

Do not use up the fuel, otherwise, you should exhaust the air in fuel system.

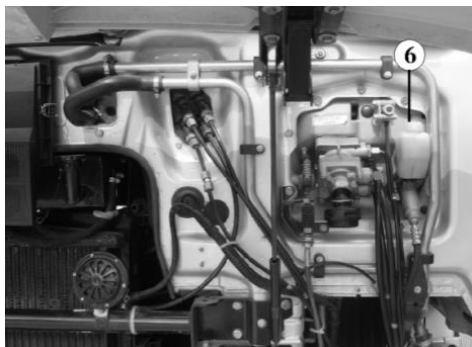
(5) 检查发动机机油量 Check for engine oil volume

汽车停放在水平地面上，发动机停机半小时后，打开驾驶室前面罩，拉出油标尺，机油液面应在油标尺的上、下刻度线之间（上下刻度之间油量约为 3L）。若液面低于下刻线，需从加油口处加入规定型号的发动机机油，加到规定位置后将机油口盖盖严。

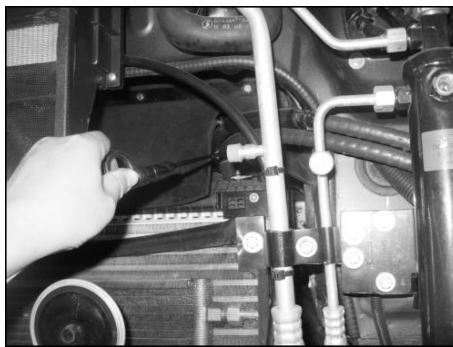
Park the vehicle on a flat ground. After engine stops for half an hour, open the front cover, and pull out the oil scale, and the oil level should be between its upper limit and lower limit (the oil volume between the two limits is about 3L). If the oil level is lower than the lower line, it is necessary to add specified type engine oil through oil filler port, and close the oil filler cap tightly until the required level is reached.

注意:在打开机油口或抽出机油尺时不能起动发动机，机油型号：机油选用 CF-4 15W/40。

Caution :The engine can't be started when opening the oil filler port or pulling out the oil scale, oil type: 15W/40 grade diesel engine oil.



如图打开驾驶室前面罩
Open the radiator grille

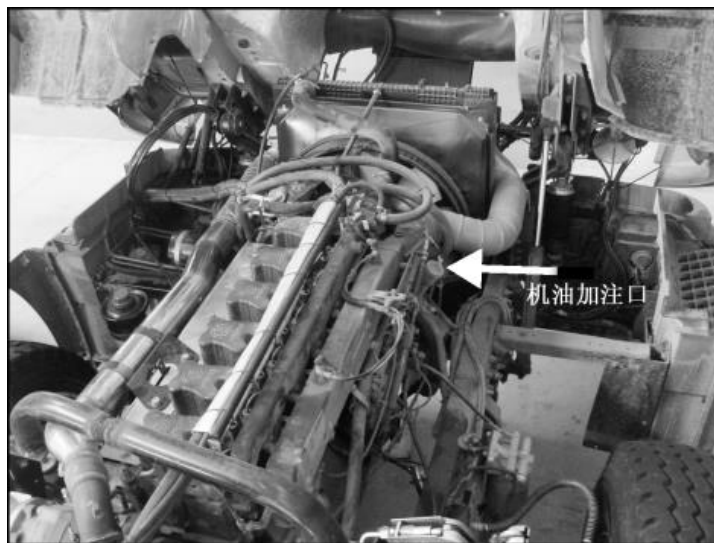


如图拉出机油尺
pull out the oil scale

6) 加注机油 Fill in the engine oil

机油加注要将驾驶室翻起后加注，打开机油口盖，加入符合规定型号机油，WP10 发动机机油加注口在缸体的右侧,加注完毕后旋紧机油加注口盖。

Fill in the engine oil after tilting the cab, open the engine oil cover, the oil filling port of WP10 engine is on the right side of the cylinder body, the oil filling port of WP10 engine is at the fifth cylinder cover, fill in the stated type of engine oil, and screw up the cover after filling.



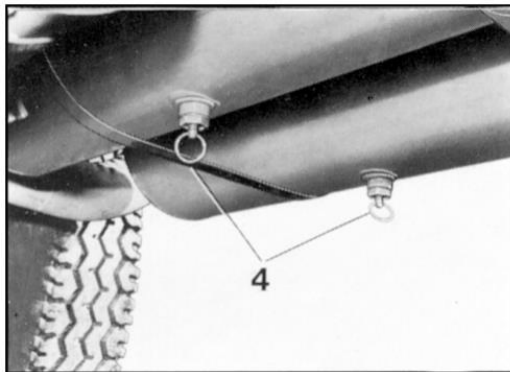
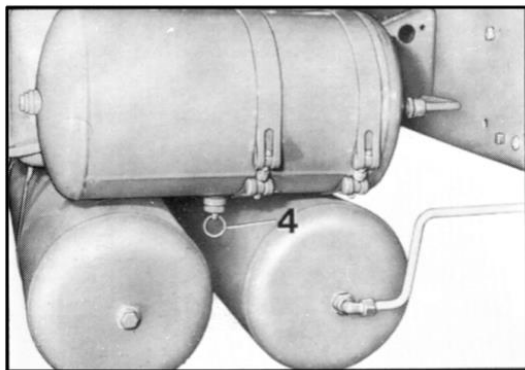
机油加注口
Oil filler

(7) 排除制动系储气筒中的水。

Drain water out of the air reservoir in braking system.

将排水阀 4 拉下或推上即可排除凝聚在储气筒中的水。

Pull drain valve 4 downward, or push it upward, and the water condensed in the air reservoir can be drain out.



(8) 检查离合器总泵上储液罐内制动液的液面高度应位于“MAX”与“MIN”刻线之间。若液面太低，请通过加注口加注制动液使液面达到合适的高度，见图。

Total pump liquid tank liquid level height should be between “MAX” and “MIN”. If the level is too low, please add brake fluid through the filler port, so that the level can be suitable. If the level is too low, please add brake fluid through the filler port, so that the level can be suitable, see the figure.



（9）检查轮胎气压，必要时可用轮胎充气接头或装在贮气筒上的充气接头充气。

Check the pressure in tyres. When necessary inflate through tyre inflation inlet or gas charging connection.

（10）检查整个电路系统工作情况。

Check for working conditions of the complete electric circuit system.

（11）检查润滑油、冷却液及气路的泄漏情况。

Check leakage of oil, coolant and air circuits.

(12) 检查空气滤清器 Check air filter

在寒冬及多尘条件下使用时，应每天倒空和清理集尘杯（集尘杯套脱落及损坏时密封性差，滤清效果变坏）。否则，会造成发动机、增压器的早期磨损。

In cold winter or dusty conditions, dust collector should be emptied and cleaned everyday (if the dust collector sleeve drops off or is damaged, air tightness will become worse, and the filtration effectiveness will go worse.) Otherwise, earlier wear might be resulted in on the engine and booster.



(13) 检查驾驶室是否锁住。行驶中驾驶室必须锁止。驾驶室未锁止时，驾驶室锁止警告灯点亮，此时应锁止驾驶室。

Check whether the cab has been locked. The cab should be locked in driving condition. If the cab is not locked, the cab lock signal lamp should be lighted, in case of which the cab should be locked.

(14) 检查转向油罐的油液液面高度，驻车状态在发动机运转的情况下，液面高度应在油尺上下刻线(或在油罐观测孔上下沿)之间，即不应低于油尺 Min 刻线(或油罐观测孔下沿)，否则应翻转驾驶室通过加注口①补充油液。

Check oil level of steering oil tank. When vehicle is in parking and engine is in operating state, the liquid level height should be between the upper and lower scale (or between the the upper and lower edge of the observation well of oil tank), that is not lower than the Min. scale of dipstick (or not less than observation well of oil tank), otherwise, add oil from filling port. ① after cab tilted.

2、电源开关的操作:

Operation of power switch

(1) 电源总开关

Main power switch

将蓄电池箱体外侧手柄按顺时针方向旋转至水平位置即接通整车电源。电源总开关钥匙手柄设计为不能拔出，请勿用力拔，以免造成损坏。

Rotate the outside handle of the battery case in clockwise direction, until the handle is in its horizontal position, and the power supply for complete vehicle can be switched on. The power master switch key handle can't be pulled out, do not pull it hard to avoid damaging.



注意：发动机运转过程中，不得关断电源总开关！

Do not switch off the main power switch when engine is running !

(2) 钥匙开关 Key switch

钥匙开关具有发动机启动与熄火功能。

The key switch features in starting & shutdown engine.

“0”为 ACC 位表示发动机处于熄火状态，电源给收录机供电；

“0” is ACC position, which indicates engine is in flameout state, the radio is powered on;

“R”为 LOCK 位表示插入或拔出钥匙位置，发动机处于熄火状态；

"R" is LOCK position, which indicates plug in or pull out the key and shutdown the engine;

“1”为 ON 位表示点火开关接通电源,行车期间钥匙的位置；

"1" is ON position, which indicates the ignition key powered on, it is the key position in driving condition;

“2”为 START 位表示起动发动机的位置。

"2" is START position, which indicates engine starting position.

发动机启动后松开钥匙，钥匙自动回弹到位置“ON”。

Release the key after starting the engine, and the key should automatically be rebound to position ON.

汽车用铅酸蓄电池使用注意事项：

Cautions for lead-acid battery

警告：严禁反接电极，否则会损坏车辆电器设备！

Warning: it is strictly prohibited to connect the electrode in reverse, otherwise it will damage the vehicle electrical equipment!

【电池维护】

Battery Maintenance

提醒注意电池的合理维护可以更好的发挥电池性能及延长使用寿命。

To pay attention to the proper maintenance of battery, which can make battery function better and extend its service life.

1. 定期检查液面，如低于下标线（电池正面 Min 标线），请用蒸馏水或纯水补充至上标线，绝不可添加硫酸液。

Check liquid level regularly, if it is lower than the bottom line (Min. line on the top side of battery), add distilled water or pure water to reach the top marking line, but never add sulfuric acid solution.

2. 电池若长期不用，请从车上拆下，保持电池为完全充足电状态，每月补充电一次。

If the battery is not used for long period, remove it from the vehicle, and keep the battery in fully charged state, and make a supplementary charge every month.

3. 避免大电流长时间充电。

Avoid large current charging for a long time.

4. 若充电时电池液温高于 45℃，应立即停止充电，待液温下降后再进行充电。

If the battery liquid temperature is higher than 45 °C during charging, stop charging immediately, and do not charge until the liquid temperature drops.

【注意事项】

Cautions

1. 电池使用和充电时会产生爆炸气体，电池要远离明火，避免正负极端子接触短路及端子与接线松动。

The battery will produce explosive gas during charging, so keep the battery away from fire, and avoid contact short circuit of positive and negative terminals and loose connection.

2. 电池充电应在良好通风处，电池充电前应松开液口栓，防止气体产生爆炸。

The battery charging should be done in well-ventilated place, release the liquid outlet bolt before charging to prevent gas explosion.

3. 电池内含有硫酸液，在电池充电或者电池旁工作，注意个人保护，请使用防护眼镜及橡胶手套，避免硫酸液接触眼睛、皮肤和衣服，一旦接触，请立即用大量清水冲洗，严重时马上就医治疗。

There is sulfuric acid solution contained in battery, so pay attention to personal protection when charging the

battery or working next to the battery, use protective glasses and rubber gloves to prevent sulfuric acid liquid from contacting with eyes, skin and clothes, once contact with it, flush with plenty of water immediately, and seek a medical treatment if it is serious.

3、发动机的起动： Start engine

(1) 起动前发动机电控系统自检

Self-checking of electronic control system before engine starting

将钥匙插入方向/起动锁的锁孔内，旋转钥匙开关置于通电“ON”位置（见图），发动机 ECU 电源接通，仪表板信号灯总成中的三个报警灯都应立即点亮（发动机电控系统进行自检），欧三系统无 OBD 报警信号灯）。

Plug the key into the hole of direction/ start lock, rotate the key switch to the on-position “ON”, the ECU power of engine is on, and two warning lamps of signal lamps assy. in panel should be lighted immediately (electronic control system is self-checking. The EUROIII system has no OBD alarm signal).

如果两个报警灯（冷起动信号灯、EDC 故障诊断灯）持续两秒钟后全部熄灭（自检完成），说明发动机电控系统一切正常，发动机可以起动。

If the two warning lamps (cold start signal lamp and EDC fault diagnosis lamp) go out after 2s (self-checking is over), which means the electronic control system of engine is normal, the engine can be started.

信号灯工作状态见表 2-1。Signal lamps' working condition sees table 2-1.

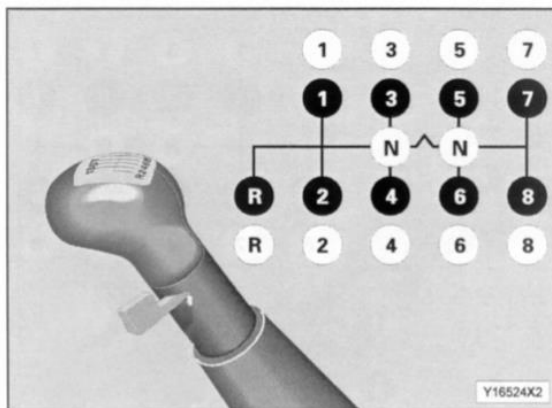
表 2-1 电控系统信号灯工作状态表

Table 2-1: signal lamps' working condition of electronic control system

信号灯名称 Name of signal lamp	信号灯符号 Symbol of signal lamp	工作状态 Working condition
黄色报警灯 Yellow alarm lamp (冷起动信号灯) (Cold start signal lamp)		用于进气加热装置工作状态指示 For indicating the operating status of air intake heating device
红色报警灯 (EDC 故障诊断灯) Red alarm lamp (EDC failure diagnosis lamp)		发动机一般故障 General fault of engine
红色报警灯 (EDC 停机灯) Red alarm lamp (EDC halt lamp)		发动机严重故障 Major fault of engine
黄色报警灯 Yellow alarm lamp (OBD 报警信号灯) (OBD alarm signal lamp)		后处理系统故障 Fault in aftertreatment system
蓝色报警灯 Blue alarm lamp (油中有水报警信号灯) (Water in oil alarm lamp)		用于粗滤器中积水过多报警 For alarming more water in coarse strainer

将变速杆放在空档位置，转动钥匙至“START”的位置(见图)，此时起动机应开始工作，发动机启动后，起动机将自动停止。若首次起动失败，应放开钥匙使其回弹位置“ON”处，间隔 2 分钟后重复上述步骤，发动机起动后应迅速松开点火钥匙。

Set the shift lever into neutral position, and turn the key to position “START” (as shown in the figure) , at this time, the starter should start to work and then stop automatically after the engine is started. If the first starting fails, release the key to let it rebound to position “ON”, repeat the steps above after 2min, and the ignition key should be released soon after the engine is started.



注意：Cautions

1.变速器上装有空档开关，空档开关的信号输入电控单元（ECU），由电控单元（ECU）控制起动继电器，若变速器操纵杆未处于空档位置，发动机将不能起动。

There is neutral position-protect switch in transmission, the signal of neutral position switch is input into ECU, which controls the starting of relay, if the control lever of transmission is not in neutral position, the engine can't be started

2.若首次起动不成功，应将点火钥匙开关回旋至“ON”位置，然后再次起动,否则发动机不能起动！

If the first starting fails, turn the ignition key switch back to position “ON”, then restart the engine, otherwise the engine can't be started!

3.发动机电控单元（ECU）预留了一种起动失效备用模式，当车辆变速器上的空档开关或连接线路出现故障时，将点火钥匙开关从“ON”的位置旋转至“START”的位置，持续 3 秒以上，发动机电控单元（ECU）才接通起动继电器,发动机仍可正常起动！

There is a starting failure standby mode for ECU of engine, when there is failure in neutral position switch of transmission or connecting lines, rotate the ignition key switch from position “ON” to position “START”, after lasting for 3s, the ECU can connect the relay, and then the engine can be normally started!

注意：起动失效备用模式在车辆紧急情况下使用，为安全起见，一般情况下,不推荐用户使用！

Starting failure standby mode can be chosen during the emergency condition, for safety, normally it is recommended!

因发动机起动后，机油压力表应立即显示压力，机油压力指示灯应熄灭。发动机冷起动时，机油压力表将显示较高的油压(4.8 巴)，一旦发动机已被加热后并在额定转速下运转时，机油压力表将显示约为 3.5 巴的压力，在怠速时最小油压可降至 1.8 巴，这时不会因此损坏发动机。

After the engine is started, the oil gauge should immediately indicate pressure, and the oil gauge indication lamp should be off. When the engine is cold started, the oil gauge should indicate a higher oil pressure (4.8 bars). Once the engine has been hot and running in its normal revolution speed, the oil gauge should indicate about 3.5 bars. The lowest oil pressure can reach 1.8 bars at idle speed, when the engine will not be damaged.

若机油压力表显示的发动机油压太低，立刻关闭发动机!找出原因，查看机油油位高度，然后调整，使它达到要求的高度。

If the gauge indicated engine oil pressure is too low, shutdown the engine immediately. Find reasons and check oil level, after which perform regulation, so that the oil can reach required level

因发动机具有增压器，操作时一定要注意。

Since the engine is equipped with a booster, the following cautions should be considered.

1. 发动机启动时应怠速运转 3~5 分钟，不得猛轰油门，要待机油压力和油温正常之后方可施加负荷（特别是冷天启动），否则易使增压器轴承、密封环因缺油而早期磨损。

After engine started, it should operate at idle speed for 3 ~ 5 minutes. Do not step down throttle fiercely. You can apply load after it has normal oil pressure and oil temperature (especially start in cold season), otherwise, the turbocharger bearing and seal ring may be early worn due to short of oil.



2. 发动机熄火时，必须怠速 3~5 分钟，待增压器转速降低之后方可熄火。特别应注意熄火前不要猛轰油门，因为猛轰油门会因柴油机转速骤然提高而使增压器达到较高的转速，此时突然熄火，机油泵立即停止供油，而增压器转子却因惯性还在继续高速旋转，由此因缺油而很快将转子轴，轴承和密封环烧损。

When engine stalling, it must operate at idle speed for 3~5 minutes and it should be stalled until turbocharger speed reduced. Especially don't step down throttle fiercely before engine stall. Fiercely stepping-down throttle may lead higher rotating speed of supercharger, if suddenly shut down the engine, the engine oil is stopped to supply immediately, however, the rotor of the turbocharger still rotates at high speed, the rotor will soon lack of oil, which will cause bearing and seal ring damage.

3.长期停机的柴油机重新启动之前，一定要先将增压器予润滑，这可以通过拆卸增压器进油管，从进油口倒入适量干净润滑油来实现，否则会因初次启动缺油而早期磨损。

Before start a longtime stopped diesel engine, you must lubricate supercharger firstly. Remove the inlet tube of the supercharger, fill in clean lubricating oil from the inlet. Otherwise, it will lead to early wear.

4、发动机的熄火 Engine stalled

如果需要发动机熄火时,只须将钥匙开关从位置“ON”处，回转至“LOCK”位,电控单元（ECU）停止供电，发动机熄火。

Rotate the ignition key from "ON" position to "LOCK" position, the engine will be stalled. And then, the electronic control unit (ECU) will stop power supply and the engine will stall.

（三）开前面罩 Open the radiator grille

面罩开闭 Radiator grille opening and closing

前面罩开启 Radiator grille opening

1. 在驾驶室仪表台下方司机侧，向上扣动面罩锁拉手。

The handle of radiator grille lock locates under the instrument at codriver's side, pull it upwards to open the radiator grille.

2. 在驾驶室外，向外翻开前面罩。Pull the radiator grille upwards.

前面罩关闭 Radiator grille closing

向下拉动面罩待面罩下落到适当高度，在面罩下部用力关闭面罩，使面罩锁扣住锁销。面罩锁紧后，其与两侧外侧板应无翘曲现象。

Pull the radiator grille downward to appropriate height, forcibly close it to lock it up. After it locked up, there should be no warping phenomenon on both sides of the lateral plate.



(四) 起步与换档 Start and shift

1 起步 Start

发动机启动之后，气压表指针位于红色区域，表示气路系统气压太低，同时图中的报警灯点亮。只有贮气筒压力大于 5.5 巴，报警灯熄灭时，车辆才能起步。（如果挂车中的贮气筒压力太低，则报警灯也会灯亮，不能起步），起步时，将手刹柄向上放到位即可起步，同时检测灯熄灭。

After the engine is started, air gauges should be in the red region, indicating that pressure of the pneumatic system is too low, at the same time of which the warning lamp shown in figure should be lighted. The vehicle cannot be started until the air tank pressure is higher than 5.5 bars, and warning lamp is off. (If air tank pressure in the trailer is too low, the warning lamp will also be lighted, and the vehicle cannot be started.) The vehicle can be started if only the hand brake handle is pulled down to the position. Meanwhile, the detector lamp should be off.



停车时将手刹柄下拉到位，检测灯点亮。

Pull the hand brake handle up to the position to stop the vehicle, and the detector lamp should be lighted.

2 变速器的档位

Transmission shift position

变速杆及变速器档位见图，当变速器处于低档区时，指示灯  点亮。实际车辆档位。高低档区切换未采用变速杆上的扳把（→），而是将变速杆左（低档区）右（高档区）推拉。

Shift bar and transmission shift positions are shown as figure. When the transmission is in Low range, the detector lamp 1 will be lighted. Actual vehicle shifts can be referenced as figure. High range shift operation should be fulfilled not with the handle （→） on the shift bar, but through pushing the shift bar in the left (Low range) to the right (High range) direction.

双 H 操纵的高低档转换是将变速杆左（低档区）右（高档区）推拉，以实现高低档切换。

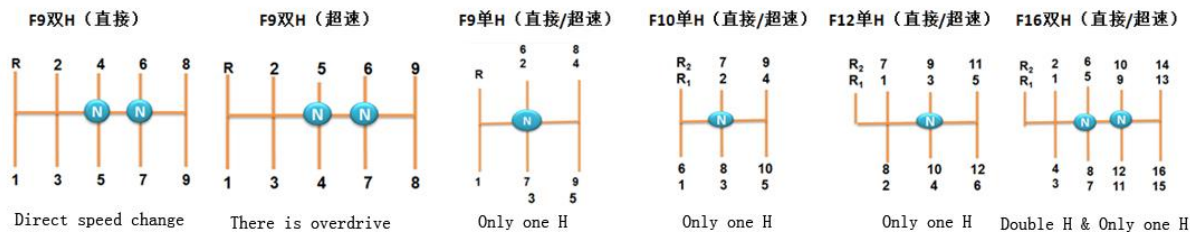
In order to realize the high and low switching, the high and low-gears transformation dual-H control push the shift lever from the left (low gears) to the right (high gears).

如该车型采用单 H 操纵，通过手柄球下方的拨片来实现高低档转换（向上为高档、向下为低档）。

In order to realize the high and low switching, the high and low-gears transformation dual-H control push the shift lever from the left (low gears) to the right (high gears).

3 变速器的换档操纵及注意事项:

Shift operation of transmission and cautions:



(1) 双"H"换档方式

Dual"H"shift mode

9 档和 16 档采用的是"双 H"换档机构, 一种用于组合式变速器的操纵方便的换档机构, (如图) 当变速器从低档段 (1-4 档) 向高档段 (5-8 档) 或从高档段向低档段换档时, 可以用变速杆直接操纵, 不需要同时操纵变速杆和副变速器档位段选择开关, 因而换档迅速、方便。双 H 操纵的变速杆有两个空档位置, 低档段位于 4、5 档通道的中间位置, 高档段时位于 6、7 档通道的中间位置。当从低档段换入高档段时, 需用一个冲击力向右推动变速杆以克服变速器内的档位自锁力, 这时副变速器即自动从低档段换入高档段, 反之亦然。

Nine-gears and sixteen-gears transmission adopts Dual"H" shift system, which is a kind of convenient shift

mechanism for composite transmission, (shown as figure). Directly handle the shift lever, so that the transmission can be shifted from low range (1st shift – 4th shift) to high range (5th shift –8th shift), or from high range to low range, without necessity of simultaneously handling the shift lever and shift selector of auxiliary transmission. Therefore, the shift operation is smooth and convenient. There are two neutral positions on a Dual-H shift lever: low range neutral gear is between 4th shift and 5th shift; high range neutral gear is between 6th shift and 7th shift. When shifting from a low range gear into a high range gear, an impact force is needed to push the shift lever to the right, in order to overcome the range self-lock force inside the transmission. After that, the auxiliary transmission will automatically shift from low range to high range, vice versa.

(2) 单"H"换档方式

Single"H"shift mode

12 档全同步器系列变速器基本操纵机构为单"H"换档机构, 其中 R1、2、3、4、5、6 档在低档区, R2、7、8、9、10、11、12 档在高档区, 低档区空档位置在 3、4 档, 高档区空档位置在 9、10 档。当从低档段换入高档段时, 拨动手柄球上的预选阀到高档位置即可, 反之亦然。

12-gears synchronizer series transmission are basically of single"H" shift mechanism, in which R1, 2, 3, 4, 5, and 6 gear are in low-gears, R2, 7, 8, 9, 10, 11, 12 gear are in high-gears. The neutral position of low gears is at 3rd and 4th gear, and the neutral position of high gears is at 9th and 10th gear. When shifting gear from low-gears

to high-gears, stir the primary valve on the handle ball to high-gears position, and vice versa.

变速器（品牌，型号） Transmission (brand, model)	全程同步，带手动操作 The entire synchronization, with manual operation			
档位和速比 Gear and speed ratio	Fast	Fast	Fast	Fast
	12JSD160T	12JSD160TA	16JSD180T	16JSD180TA
	12JSD180T	12JSD180TA	16JSD200T	16JSD200TA
	12JSD200T	12JSD200TA	16JSD240T	16JSD240TA
1	15.53	12,10	17.04	14.03
2	12.08	9,41	14.03	11.64
3	9.39	7,31	11.66	9.60
4	7.33	5,71	9.60	7.97
5	5.73	4,46	8.04	6.62
6	4.46	3,48	6.62	5.49
7	3.48	2,71	5.53	4.55

变速器（品牌，型号） Transmission (brand, model)	全程同步，带手动操作 The entire synchronization, with manual operation			
档位和速比 Gear and speed ratio	Fast	Fast	Fast	Fast
	12JSD160T	12JSD160TA	16JSD180T	16JSD180TA
	12JSD180T	12JSD180TA	16JSD200T	16JSD200TA
	12JSD200T	12JSD200TA	16JSD240T	16JSD240TA
8	2.71	2,11	4.55	3.78
9	2.10	1,64	3.74	3.08
10	1.64	1,28	3.08	2.56
11	1.28	1,00	2.56	2.11
12	1.00	0.78	2.11	1.75
13			1.77	1.45

变速器（品牌，型号） Transmission (brand, model)	全程同步，带手动操作 The entire synchronization, with manual operation			
档位和速比 Gear and speed ratio	Fast	Fast	Fast	Fast
	12JSD160T	12JSD160TA	16JSD180T	16JSD180TA
	12JSD180T	12JSD180TA	16JSD200T	16JSD200TA
	12JSD200T	12JSD200TA	16JSD240T	16JSD240TA
14			1.45	1.21
15			1.21	1.00
16			1.00	0.83
3.X.1	14.86	11.56	16.30	13.42
3.X. 2	3.33	2.59	13.42	11.13

（3）伸缩拉杆操纵系统使用说明：

Telescopic rod control system instructions:

伸缩拉杆变速器操纵是一种新型的变速器操纵装置，具有密封性好、换档轻便、防脱档、掉档、可靠

性高的优点。它的操纵器是直接固定在驾驶室上，与软轴类似，密封性好。操纵器中设计有橡胶嵌件，能有效吸收变速杆的振动和噪音，使驾驶室内部更安静更干净。从而提高操纵的舒适性。伸缩拉杆操纵系统能使手柄球处的选、换档力降低约 50% 左右，换档十分轻便，有效缓解驾驶员的工作强度，更加人性化。操纵器具有缓冲结构，能防止车辆在恶劣路面上行驶时脱档、掉档等问题。可靠性大大提高。整个操纵系统属于柔性连接，所以在手柄球处会有 50 的自由旷量，属于正常现象。

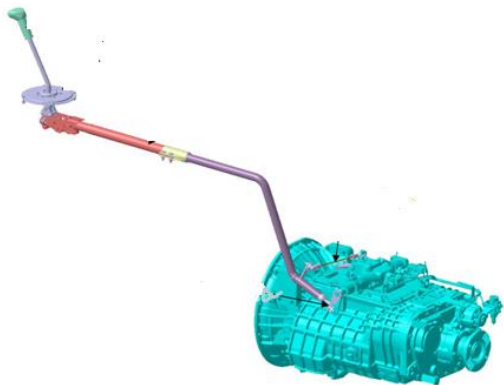
Telescopic shaft transmission control is a new type of transmission control device, which has the advantages of good sealing, effortless shifting, preventing for spontaneous out-of-gear and high reliability. The manipulator is directly fixed on cab. It is similar to soft shaft with good sealing. Manipulator is designed in the rubber insert, which can effectively absorb the vibration and noise of gear lever, so as to make the cab quieter, cleaner and more comfortable. The middle power assembly and multi-link structure can reduce the gear-selecting and gear-shifting force for about 50%, which make gear-shifting more portable and effectively relieve the driver's working intensity. The control instrument has buffer structure, which can prevent vehicle for spontaneous out-of-gear when traveling on bad road. The reliability is improved greatly. The whole control system belongs to the flexible connection, so there should have 50 free amount at handle ball, which is normal.

1.结构简介

Structure introduction

伸缩拉杆的使用同一般硬杆一样，都是通过操纵手柄球实现选、换档操作。

As the usage of the common hard rod, they select-gear and shift-gear by operating handle ball.



2.伸缩拉杆的开启

The opening of telescopic rod

和驾驶室升降一样，伸缩拉杆的开锁油缸与驾驶室的举升油缸是同一个高压油管路，在打起驾驶室的时候，伸缩拉杆的开锁油缸也同时开启，伸缩拉杆随着驾驶室的升高逐渐伸长，从而方便车辆的检修。

It is the same as the lifting of cab. The unlocking oil cylinder of telescopic rod and the lifting oil cylinder of cab use the same high pressure pipe line. When the cab lifted, the unlocking oil cylinder of telescopic rod will open at the same time. The telescopic rod will increase along with the cab lifting, which is convenient for the maintenance of vehicles.

3.换挡操纵使用说明

Shift control and use instructions

当驾驶室落下时，驾驶员坐在驾驶内座椅上，用手向前轻推变速杆手柄球，听到“咯噔”一声，伸缩拉杆总成前端的锁扣即锁止。此时可进行选、换挡动作。伸缩拉杆总成锁扣为手动锁止，当驾驶室翻起和落下后，需进行此操作。

When cab lowering, the driver sitting on the seat, gently push the ball handle of gear shift lever forwards, the lock catch on the front of telescopic rod assembly will be locked after hearing a "click". At this moment, gear selecting and shifting operation can be done. The lock catch of the telescopic rod assembly is manual-controlled, and it should be locked after cab lifting and lowering.

为了防止伸缩拉杆操纵系统在颠簸路面上出现脱挡、掉挡的现象，操纵器总成下端在设计中，单向预留有 5mm 自由间隙，由杠杆比放大后，反应在手柄球处，换挡时单向会有 25mm 自由间隙，即旷量。为正常现象，不影响选、换挡使用。

When driving on bumpy road, in order to prevent the telescopic rod control system from appearing off-gear phenomenon, for the design of the bottom of manipulator assembly, there should reserve an one-way free clearance of 5mm after the lever ratio enlarged, it will react at the ball handle, and there should have an one-way free clearance of 25mm when gear shifting that is clearance. It is normal phenomenon, and it will not affect gear selecting and shifting.

（五）制动系 Brake system

车辆的制动系有：行车制动（脚制动）、辅助制动（排气制动）、应急和驻车制动（手制动），以及挂车制动（选用装置）共 4 套制动装置。

Brake system includes the following types of devices in total: service brake (foot brake), auxiliary brake (exhaust brake), emergency and parking brake (hand brake), and trailer brake (optional brake).

1) 行车制动 Service brake

踏板操纵，双回路气压制动。工作压力为 1MPa（10bar），调压阀切断压力为 1MPa（10bar）。第一回路作用在后桥（或双后桥）车轮上，第二回路作用在前桥车轮上，一旦两个回路中有一个储气筒压力降到 0.55MPa（5.5 bar）以下，储气筒压力指示灯即亮，这时应立即停车并找出压力泄漏的原因。

It is a paddle-operated dual-circuit pneumatic brake. Its working pressure is 1MPa (10bar) , and its governor break-off pressure is 1MPa (10bar) . The first circuit effects on the rear axle wheels (or wheels on dual rear axle). The second circuit effects on the front axle wheels. Once air-reserve tank pressure of a circuit goes down below 0.55MPa (5.5bars), the indication lamp of the air brake reservoir pressure will be lighted. In this condition, the vehicle should be stopped immediately and reasons of the pressure leakage should be located.

在短时间内，连续多次进行全制动，也可能导致压力降到 0.55MPa (5.5 bar) 以下。

Multiple full braking in a short time might also result in pressure being decreased to lower than 0.55MPa (5.5bars).

泄漏检查：在发动机熄火，接上手制动后压力降在 2h 内最多为 0.05MPa (0.5 bar) 或者在 30min 内最多为 0.01MPa (0.1 bar)。

Leakage inspection: when engine is in flameout condition and after the hand brake is engaged, the pressure drop in two hours should be 0.05MPa (0.5bars), or 0.01MPa (0.1bars) in 30min at most.

制动系统反应时间 braking system reaction time

a.主车制动反应时间：踩下制动踏板到最不利的制动气室响应时间不大于 0.6s。

a.Brake reaction time for tractor: Depressing the brake pedal to the most unfavorable brake chamber response time is no more than 0.6s.

b.具有牵引功能的主车制动反应时间：从踩下制动踏板到主挂间气压控制管路接头延长管路末端的响应时间应小于等于 0.4s。

b. Braking response of the host vehicle with traction function: The response time from the brake pedal to the end of the main hang-out pressure control line connector extension line should be less than or equal to 0.4 s.

c.具有牵引功能汽车的挂车制动反应时间：从主挂间气压控制管路接头处到最不利的制动气室响应时间小于等于 0.4s。

c. Trailer braking reaction time for vehicles with traction function: The response time from the main hang-out pressure control line joint to the most unfavourable brake air chamber is less than or equal to 0.4 s.

2) 辅助制动 Auxiliary brake

辅助制动装置有发动机排气辅助制动装置、液力缓速器。

The auxiliary brake device includes engine exhaust auxiliary brake device and hydraulic retarder.

1、由驾驶室内安装在驾驶员左前方地板上的按钮阀操纵，此时行驶的车辆可利用发动机消耗的能量作辅助制动。下长坡时，一定要用排气制动；会车、通过较差路段等可用排气制动提前减速。

使用排气制动，可以减少使用主制动的次数，减少轮胎及车轮制动器的磨损与发热，延长其寿命，降低油耗，提高行车安全性。

1、 It is operated by the button valve installed in the driver's left front ground ban in the cab. At this time, the vehicle can make use of the energy consumed by the engine

Auxiliary braking. When going down a long slope, exhaust brake must be used; The exhaust brake can be used to decelerate ahead of time when meeting a car or passing a poor road section.

The use of exhaust brake, can reduce the number of use of the main brake, reduce tire and wheel brake wear and heat, prolong its life, reduce fuel consumption, improve driving safety.

使用排气制动时应该注意：

Attention should be paid when using exhaust brake:

1、 发动机转速不得高于 2000 转/分。

1、 Engine speed shall not be higher than 2000 RPM.

2、 变速器档位低时， 排气制动效率较高。

2、 When the transmission gear is low, the exhaust braking efficiency is higher.

3、 严禁车辆空档滑行， 空档时无辅助制动作用。

3、 The vehicle is strictly prohibited from gliding in neutral, and there is no auxiliary braking effect in neutral.

4、雨雪、湿滑等恶劣路况时，慎用排气制动，以免引起侧滑、甩尾等事故发生。

4、Exhaust brake should be used with caution in bad road conditions such as rain, snow and wet slippery, so as to avoid side slip and tail slinging accidents.

5、踩下离合或油门踏板会使排气制动失效或退出工作，可能会影响驾驶，请谨慎操作。

5、Pressing down the clutch or accelerator pedal will cause exhaust brake failure or exit from work, which may affect driving. Please operate with caution

2) 尤顺制动:

Yushun Brake:

车辆在行驶过程中，如果是在下长坡或者在城市路面上需要减速的时候都可以使用尤顺 制动功能。

尤顺制动系统共有两个档位：第一档位，3 个缸制动，产生 75%的发动机制动功率。第二档位，6 个缸制动，产生 100%的发动机制动功率。司机可根据实际情况选择“高”位、“低”位。

假如行驶在平整开阔路面上，车辆轻载，不需要较大的制动力时，则将制动挡位开关置于“低”位；假如你发现你仍在行驶使用行车制动器，那么把挡位开关置于较高挡位，直至你不需要使用行车制动器时为止。

当你的汽车重载而且是下坡，路面干燥，而且具有好的牵引力，则制动挡位开关应置于“高”位。

当遇到紧急情况时，同时踩下主制动踏板（即卡车的脚制动），此时制动功率会叠加，制动效果会更好。

The vehicle in the process of driving, if it is in the next long slope or on the city road need to slow down when can use Yushun brake function.

Yushun braking system has two gears: the first gear, three cylinders braking, generating 75% of the engine braking power. The second gear, 6 cylinders braking, produces 100% engine braking power. Drivers can choose the "high" and "low" positions according to the actual situation.

If driving on the flat open road, the vehicle light load, do not need a larger braking force, the brake switch is placed in the "low" position; If you find that you are still using the road brake, put the switch in higher gear until you no longer need to use the road brake.

When your car is heavy and downhill, the road is dry and has good traction, the brake switch should be placed in the "high" position.

In case of emergency, press the main brake pedal (i.e. the foot brake of the truck) at the same time, and the braking power will be superimposed, and the braking effect will be better.

尤顺制动工作条件:

Working conditions of Yushun brake:

1、机油温度：使用尤顺前确保发动机机油温度 $>85^{\circ}\text{C}$ 。

1、Oil temperature: ensure the engine oil temperature $> 85^{\circ}\text{C}$ before using Yushun.

2、转速范围：通常情况下尤顺工作转速范围 1100~2100rpm；勿使发动机转速低于 1000rpm，制动将自动解除，避免发动机转速超过 2100rpm，以免损坏发动机。

同时需要满足 离合器踏板松开、变速箱在档（非空档）、制动系统总开关闭合。

2、Rotational speed range: Under normal circumstances, Yushun's working speed range is 1100~2100RPM;Do not make the engine speed lower than 1000rpm, the brake will be automatically released, avoid engine speed more than 2100rpm, so as not to damage the engine.

At the same time, the clutch pedal should be released, the gearbox should be in gear (not neutral), and the brake system's main switch should be closed.

使用尤顺制动时应该注意：

Attention should be paid when using Youshun brake:

1、尤顺制动系统是辅助制动装置的一种，主要用于重载连续下长坡道时的辅助制动。

1、Youshun braking system is a kind of auxiliary braking device, which is mainly used for auxiliary braking when heavy load continuously descends long slopes.

2、可同时使用行车制动，但不能代替行车制动用于紧急制动，也不能用于驻车制动。

2、The service brake can be used at the same time, but it cannot be used instead of the service brake for

emergency braking, nor can it be used for the parking brake.

3、禁止超速使用尤顺制动系统，如果柴油机转速已经接近或达到允许使用的最高值，则必须使用行车制动来降低车速。

3、 It is forbidden to use the Youshun brake system for overspeed. If the diesel engine speed is close to or reaches the maximum allowable value, the service brake must be used to reduce the vehicle speed.

3) JACOB 制动:

当发动机转速大于 900 rpm，车速大于 0km/h 时，打开发动机制动开关后，只要松开离合器踏板和油门踏板，发动机制动即开始工作，驾驶员可以根据需要选择制动挡位（有 50%和 100%两挡可选）。

当驾驶员踩下离合器踏板或油门踏板时，发动机制动将立即解除；而驾驶员松开离合器踏板和油门踏板后，发动机制动又开始工作。

当踩下制动踏板时，发动机制动仍然保持制动效果。在发动机制动和行车制动的共同作用下，车辆可以获得更大的制动力。

3) Jacob Brake:

When the engine speed is greater than 900 RPM and the speed is greater than 0km/h, the engine brake starts to work as long as the clutch pedal and throttle pedal are released after the engine brake switch is

opened. The driver can choose the brake gear (50% and 100% are optional) according to the need.

When the driver presses the clutch pedal or the accelerator pedal, the engine brake will be released immediately; After the driver releases the clutch and gas pedal, the engine brakes start working again.

When the brake pedal is pressed down, the engine brake still maintains the brake effect. Under the combined action of engine braking and service braking, the vehicle can obtain more braking force.

使用 JACOB 制动注意事项:

Matters needing attention when using JACOB brake:

(1) JACOB 制动是辅助制动装置的一种，主要用于重载连续下长坡道时的辅助制动。

(1) Jacob brake is a kind of auxiliary brake device, which is mainly used for auxiliary braking under heavy load and continuous long slope.

(2) 可同时使用行车制动，但不能代替行车制动用于紧急制动，也不能用于驻车制动。

(2) can be used at the same time, but can not replace the driving brake for emergency braking, also can not be used for parking braking.

(3) JACOB 制动工作时，选择合理档位保持发动机转速在 1600~1900 rpm，勿使发动机转速低于 1000 rpm，否则制动将自动解除，避免发动机转速超过 2100rpm，以免损坏发动机。

(3) When Jacob is braking, select a reasonable gear to keep the engine speed between 1600 and 1900 RPM,

and do not make the engine speed lower than 1000 RPM, otherwise the braking will be automatically released to avoid the engine speed exceeding 2100rpm, so as to avoid damaging the engine.



图示手柄落下者为挂车独立制动手阀。

The independent brake hand valve of trailer is as shown in figure.

5 ABS 电控系统（选用装置） ABS electrical system（optional device）

5.1 ABS 工作 ABS operation

打开钥匙开关，如系统无故障，ABS 指示灯自检 3s 内熄灭；如系统有故障，指示灯将点亮，在对 ABS 系统修理和诊断后，车速大于 7km/h 时灯灭，对电磁阀进行自检，4S/4M 四通道 ABS 自检顺序为：右前-左后-左前-右后，共四声。

Switch on the key switch, if the system is trouble-free, ABS lamp will go out within 3s, if the system is in trouble, the indicator lamp will light up. After repair and diagnostic on ABS system, the lamp will go out when the speed is greater than 7 km/h. And then, solenoid valve will do self-inspection, the self-checking order of ABS with 4S / 4M four-channel is: right front - left rear- left front - right rear, totally four tones.

当车速大于 40km/h 时，踩下制动踏板，实施紧急制动，然后观察制动痕迹，如果无制动长距离拖痕说明 ABS 制动起作用，功能正常。

When the speed is greater than 40 km/h, depress the brake pedal to carry out emergency brake, and then observe the braking traces, if there is no braking long distance drag mark, which shows the ABS is effective.

5.2 自诊断功能

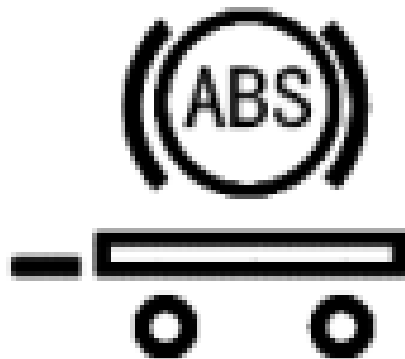
Self-diagnosis function

ABS 具有故障自诊断的功能，当检测出电控系统故障，系统能产生对应的故障代码并输出，仪表上对应的指示灯点亮，当挂车 ABS 系统有故障时，相应的挂车 ABS 指示灯会点亮报警。

ABS has self-diagnosis function. When the fault is found in electronic control system, the system can generate and output a corresponding fault code, and the corresponding indicator lamp on the meter is alight. When trailer's ABS system is in fault, the corresponding indicator lamp of trailer's ABS will light up.



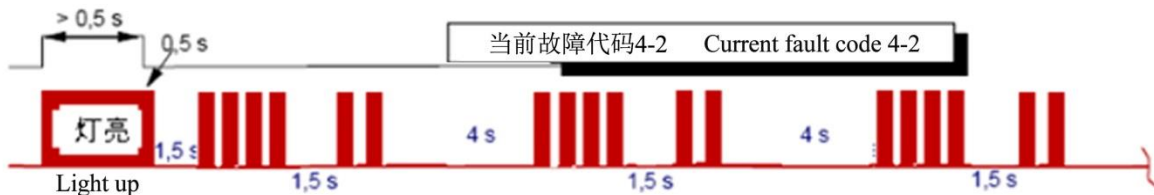
主车 ABS 指示灯（红色）
ABS indicator lamp of main vehicle (red)



挂车 ABS 指示灯（红色）
ABS indicator lamp of trailer (red)

如车辆匹配 CAN 仪表，在仪表液晶屏上能显示故障代码，故障码形式为 SPN+FMI。如匹配普通仪表时，会以闪码形式报出故障码，具体操作为：打开钥匙开关，按下开关板处的诊断开关，1.5S 后指示灯会闪，数闪的次数确定闪码。一个闪码代表一个故障，一个闪码分两组，第一组可以闪 1-8 次，第二组可以闪 1-6 次，每个码间隔 1.5s，每组之间间隔 4s。

If a vehicle matching with CAN instrument, the fault code will be displayed on the instrument LCD screen, the fault code form is SPN + FMI. If a vehicle matching with ordinary instrument, the fault code will be reported as flash code. The specific operation is: switch on the key switch, press the diagnosis switch, the lamp will flash after 1.5s, and determine the flash code according to the number of flashing times. A flash code represents a failure. A flash code is divided into two groups, the first group may flash for 1-8 times and the second group can flash for 1-6 times, the interval between each code is 1.5s and the interval between each group is 4s.

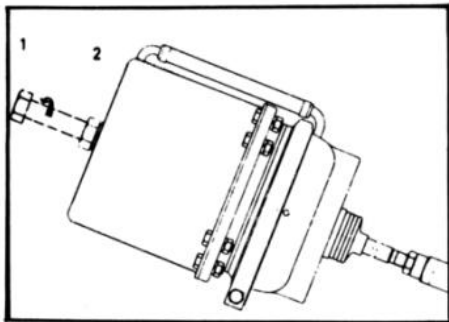


6.制动系使用注意事项 Operation cautions of brake system

(1) 弹簧制动缸的紧急松开 Emergency release of spring brake cylinder

当连接弹簧制动缸的管路因泄漏而造成自行制动时，只要将缸上的螺栓 6 拧出到松开位置 1，即可将制动器松开。在松开弹簧制动缸之前应先挂上 1 档，并检查脚制动是否正常。

If pipeline connection spring brake cylinder results in self-brake because of leakage, the brake can be released if only screwing off bolt 6 on the cylinder to position 1. Before releasing the spring brake cylinder, set the transmission into shift 1, and check whether foot brake can work normally.



1. 松开位置
Release position



2 正常行驶位置
Normal driving position

当在有坡度的路面上松开弹簧制动缸时，必须将车轮塞住，防止滑坡。

When releasing the spring brake cylinder on slope roads, the wheels should be wedged in order to prevent slipping.

(2) 制动管路的维护

Maintenance of braking pipeline

在制动用塑料管附近进行焊接、切割和钻孔时必须遵守下列规定：

The following regulations should be obeyed in welding, cutting or drilling near the plastic brake pipeline.

a. 管路中的压力要预先放掉。

Release the pressure out of the pipeline in advance.

b. 应将管子盖住以免受到火星、火焰及灼热切屑的损伤。

Cover the pipeline, lest that sparks, flames or scorching scraps might damage the pipeline.

c. 无压力管子允许受热的最高温度为 130℃，持续时间为 1 小时。

As for the unpressurized pipelines, their maximum allowable heating temperature is 130℃ and the duration is not longer than 1 hour.

注意：环境温度低于0℃时，应在每次收工熄火前将整车气压打至排气（已处于排气状态请忽略），之后熄火，以防打气泵管路结冰。

Notice: When the ambient temperature is lower than 0 ℃, the air pressure of the whole vehicle shall be turned to exhaust before each shutdown (Already in exhaust state, please ignore) , and then the ignition shall be turned off to prevent the air pump pipeline from freezing.

(六) 挂车的对接 Joining of the trailer

1.对接前应先做到:

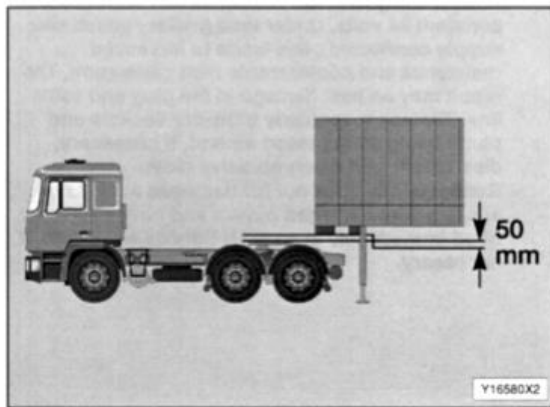
The following items should be performed before jointing:

松开鞍座上的紧固装置

Loosen the fastening device on fifth wheel.

检查半挂车连接盘和中心销钉是否比鞍座的顶端至少低 50 毫米，如有必要，调整到合适高度。

Check whether semi-trailer joint flange and central pine are at least 50mm lower than the fifth wheel top. Adjust it into its suitable height in necessary.



牵引车缓慢倒车移向半挂车（鞍座连接将自动锁止）

Slowly reverse the tractor to the semi-trailer (saddle joint should be latched automatically).

紧固手柄，或检查插式锁

Fasten the handle or check the latched lock.

连接压缩空气管路和电缆

Connect compressed air line and cables

将半挂车的支承柱提升到行车位置

Suspend the support post of semi-trailer to its drive position.

注意！Cautions:

当牵引车带上半挂车之后，请务必检查挂钩的锁止手柄或插式锁是否正确锁止。

After the tractor has carried the semi-trailer, it is a must to check whether the locking handle or latched lock on hanger can function correctly or not.

连接压缩空气管路

Connect compressed air line.

请确认这些管路和电缆被正确连接，并且可以轻微地自由移动以抵消牵引车一半挂车总成的运动，管路和电缆不能被拉紧，也不能被缠绕和磨破。

See that the pipelines and cables have been correctly connected, and can be moved freely and slightly, so

that to counteract the movement of the tractor-semi trailer assembly. The pipelines and cables can neither be tensioned, nor be wound or worn to damage.

首先连接制动管路接头（黄色）①

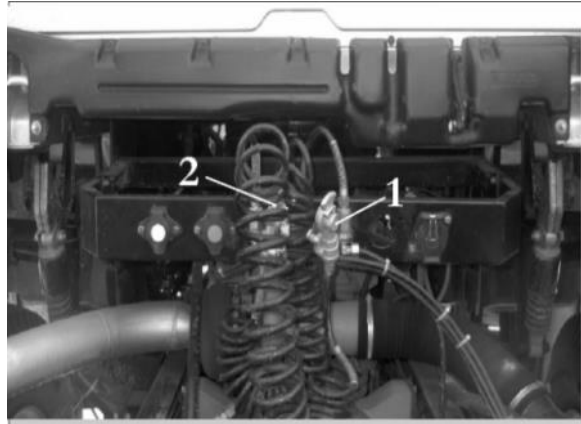
First of all, connect the braking line fittings (yellow) ①

然后连接贮气筒管路（红色）②

Then, connect air storage reservoir tubes (red) ②

检查连接装置

Check connection devices



2 挂车的摘除 Remove trailer

摘除挂车前应先做到：Before removing a trailer, the following procedures should be performed firstly:

防止半挂车滑溜

Stop the semi-trailer from slipping

检查路面是否坚实

Check whether the road is compact or not

首先检查半挂车支承柱是否能负载，然后拉伸支承柱，直到载荷从牵引车悬架转移到支承柱。不要伸得太长，否则会将半挂车从鞍座上顶开。当心鞍座被楔住。

Firstly, check whether the semi-trailer support post can burden load or not, after which stretch the support post, until the load is transmitted onto it from tow car suspension. The support post should be stretched too long. Otherwise, the semi-trailer might be pushed off the fifth wheel. Caution that the fifth wheel might be wedged.

断开压缩空气管路

Disconnect the compressed air line.

注意——小心事故和伤害！

Caution: Take care of accidents and injure!

请务必遵照下面所描述的顺序来断开连接头。否则半挂车制动器将松开，导致半挂车可能滑溜。

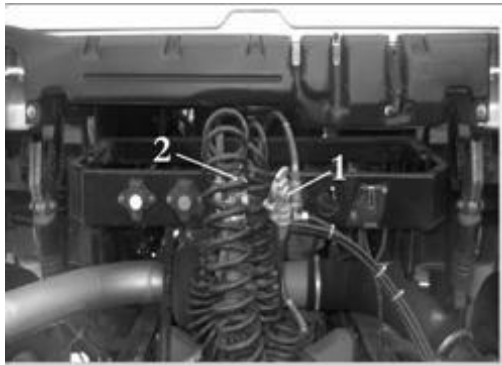
Be sure to disconnect connectors in the following sequence. Otherwise, the semi-trailer might slip because of its brake being released.

首先断开贮气筒管路（红色）②半挂车被制动。

First of all, disconnect air storage reservoir tubes (red) ② with the semi-trailer in braking status.

然后将制动管路接头断开（黄色）①

Then, disconnect the braking line fittings (yellow) ①



3 鞍座的操作 Fifth wheel operation

抬升锁定器①

Lift locking mechanism①

向前（→）旋转手柄②把它拉出来并固定在极板边缘的凹槽中

Turn handle ② forward and pull it out, and fix it into the groove on the edge of pole plate.

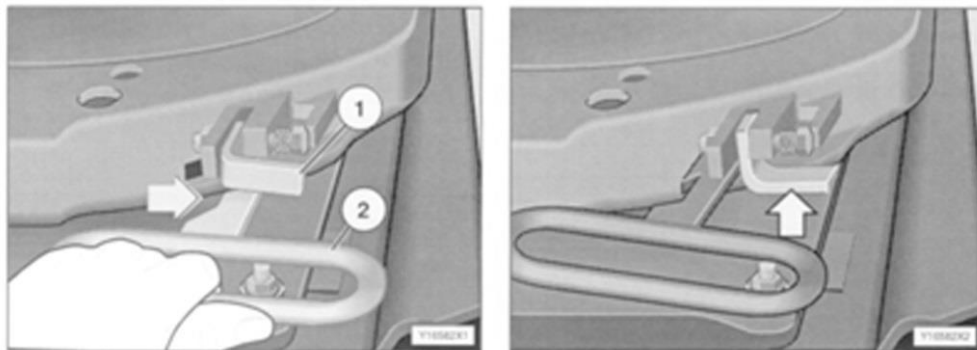
挂上挂车后检查 Inspection after trailer removing

确保下锁定器（→）已经位于锁定位置（落下位置）此时，锁合牢固。

Perform inspection in order to ensure lower locking mechanism in its latched position (fallen position). Then, lock it firmly.

如果下锁定器未能降低到其锁定位置，则鞍座没有正确连接。当心事故！重复这个挂接过程。

If the lower locking mechanism cannot go down into its latched position, the fifth wheel has not been connected correctly. Take care of accidents! Repeat the procedure.



注意！ Caution:

半挂车和牵引车之间的距离有严格限制！

There is strict restriction in distance between a semi-trailer and a tractor!

牵引车挂车的机动性是有限制的！

There is also restriction in mobility of tractor trailer!

当行驶在水洼，斜坡和泥泞路面时，会对牵引车和半挂车造成严重的损坏。

Serious damage might be caused when the vehicle is running on puddle road, slopes or sloughy roads.

(七) 车辆的拖拽牵引、专用车使用 Vehicle towing and trailing

1. 牵引车

Tractor

拖拽牵引时，卡车在其前端安装牵引钩，牵引钩在牌照座的下面。

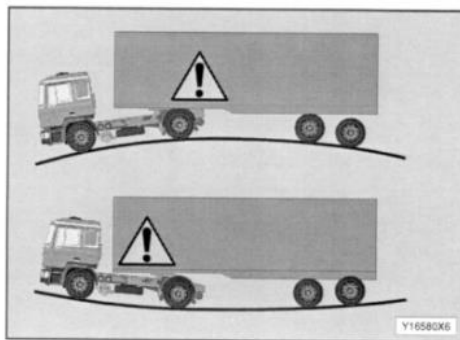
When the vehicle is to be trailed, a towing hook is mounted below the license plate support in the front of truck.

当牵引车辆时，请将其牌照座折叠起来。

In trailing operation, the license plate support should be folded.

当卡车被向前拖拽时，牵引钩上的负荷不可超过该车净重量的一半，即大约为 10 吨，当车辆受到陷阻或抛锚需要将其拉出泥潭或牵引时，须先将车辆卸载。如果由于技术或实际的条件的限制不可能卸载时，那么将车辆拉出时应在车辆上选用尽可能多的牵引点。

When the truck is towed forward, load onto the towing hook should be higher than on half of net weight of vehicle, which is about 10 tons. If the vehicle is tramped or shutdown and needs to be drawn out of a mire or trailed, the vehicle should be unloaded first. If it is impossible to unload the vehicle because of technical or actual limitations, towing points should be selected as many as possible on the vehicle in trailing procedure.



牵引时，以下几方面很重要：

In trailing operation, the following several items are very important:

脱开传动轴啮合来中断传动系。在全轮驱动车辆里，前传动轴啮合也需脱开

Disengage drive shaft meshing to interrupt the driving system. In an all-wheel driven vehicle, its front drive shaft axle should also be disengaged.

为了给制动系提供压缩空气和提供动力转向。可能需要运转发动机

It is possibly necessary to run the engine in order to supply compressed air for brake system and power steering.

请使用牵引杆，而不要使用软缆索

Please don't use flexible cable but drawbar.

合上电源主开关

Connect main power switch.

启动点火开关

Turn on ignition switch.

如果车辆有转向/起动锁。将钥匙旋到行车位"2"一旦勿将其拔出

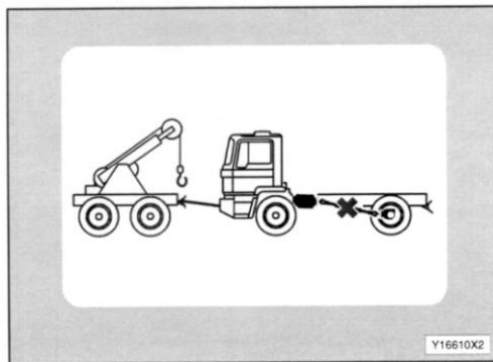
If your vehicle is equipped with a steering/starting lock, turn the key to drive position 2 but don't draw it out.

将变速箱置于空档

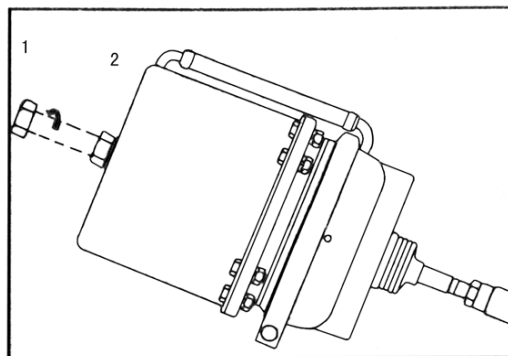
Set the transmission in neutral position.

如果在保险杠后装有压缩空气管路接头（选用装置），请将其与牵引车的压缩空气系统相连

If (optional) fittings of compressed air tubes are mounted behind collision bumper, they are best to be connected with compressed air system of the trailer.



位置 1 松开
Position 1: release



位置 2 正常行驶
Position 2: normal driving

当发动机不能运转，被牵引车辆无气源时，将（中）后桥制动气室弹簧储能制动解除。（此时完全没有制动）

If the engine cannot be operated, and no air supply can be provided for the trailer, please follow the Figure to release the energy storage spring brake in (medium) rear axle brake chambers. (Here, the brake is not done completely.)

拖拽牵引速度不可大于 40 公里/小时。

Trailing speed should not be higher than 40 km/h.

如果车辆陷住，拖拽时起牵引作用的车不要左右摇摆，也不要斜着拉，特别是不要斜向一侧

If the vehicle is tramped, the tractor should neither swag in trailing operation, nor draw the trailer in the sidewise direction. The latter point should especially be avoided.

如果转向系损坏，抬起前轴。

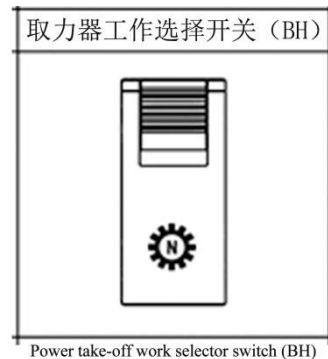
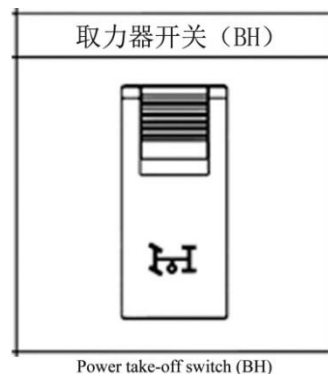
If steering system is damaged, raise the front axle.

如图所示 As shown in figure

2、专用车 Special vehicle

2.1、取力器(QH50/QH70 等取力器)工作

PTO operating (QH50 / QH70 PTO)



1) 停车取力

Power take-off when vehicle parking

停车取力时,首先将变速器操纵杆放在低档区的空档位置,按下取力器开关(不操作取力器选择开关),此时常断电磁阀闭合,变速箱副箱处于空档位置,根据需要将变速器挂入合适档位,此时取力器工作,而车辆处于停驶状态。

Power take-off when vehicle parking: push the gear shift lever in the neutral position of low gears, press the switch of PTO (do not press the selection switch of PTO), at the moment, the constant turned-off solenoid valve is closed and the auxiliary transmission is in neutral position. Engage the transmission to desired gear, PTO begins to work. The vehicle is in parking state.

2) 行车取力

Power take-off when vehicle running

行车取力时,首先使车辆处于低档区缓慢行驶,此时先按下取力器工作选择开关,再按下取力器开关,取力器处于挂档工作状态,根据需要将变速器挂入合适档位,此时取力器工作,而车辆处于行驶状态。

Power take-off when vehicle running: keep the vehicle slowly running in low gears, press the operating

selection switch of PTO, and then press the switch of PTO, in this moment, the PTO is operating in driving condition. Engage the transmission to desired gear, PTO begins to work. The vehicle is in driving state.

远程油门控制器操作说明 Controller instructions on remote accelerator

1 远程油门结构形式 The configuration of remote accelerator

摇臂式远程油门如图 1 所示。旋钮式远程油门控制器如图 2 所示。

The lever-type remote accelerator is as shown in figure 1. The knob-type remote control throttle is as shown in figure

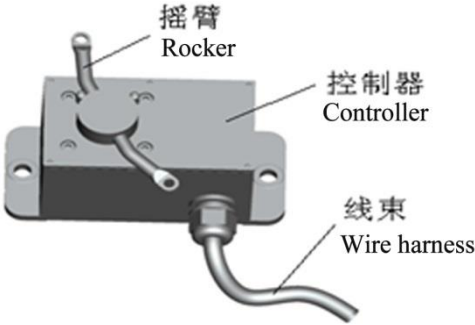


图 1 摇臂式远程油门控制器
Rocker arm remote throttle controller

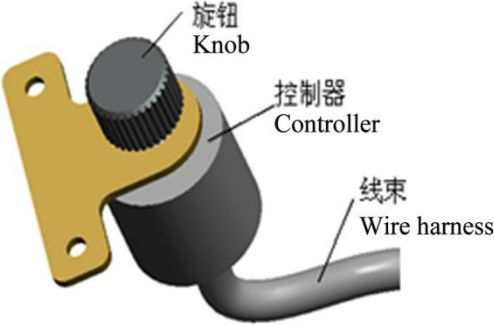


图 2 旋钮式远程油门控制器
Knob type remote throttle controller

2.2.2、远程油门控制器操作说明

Controller instructions on remote accelerator

远程油门控制器一般随二类底盘发送，放入驾驶室内，需上装生产厂家对其重新安装固定，详见《远程油门安装规范》。

Remote throttle controller generally assembles with the second class chassis. It is located inside cab, and it will be installed and fixed by assembly plants. For details see “the installation specification of remote accelerator”.

在安装固定好远程油门控制器后，将远程油门控制器的线束插接器连接于分线盒内预留的远程油门接口上，该分线盒一般在车架右纵梁尾部。

After the installation of fixation of remote throttle controller, connect the harness plug-in connectors of remote throttle controller with the reserved interface for remote accelerator inside the junction box. The junction box generally locates at the tail end of right longitudinal beam for frame.

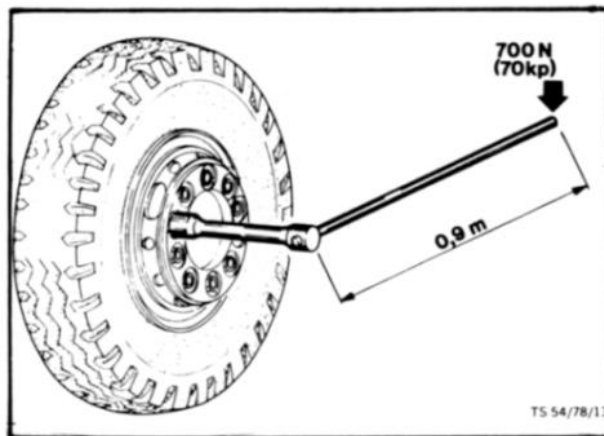
驾驶室仪表台上有远程油门转换开关，如图 3 所示，可使用远程油门转换开关在脚油门和远程油门之间转换。

There is a transfer switch for remote throttle on instrment, as shown in figure 3. It is used for switch transferring between the foot accelerator and remote accelerator.

注：专用车其他部分使用说明请以参照上装厂家相关手册。

Note: special for the rest of the instructions please refer to our reference jacket factory handbook.

(八) 车轮的更换 Wheel replacement



注意事项:

Cautions:

(1) 更换车轮时应注意不要碰伤车轮螺栓上的螺纹。

Don't damage threads on wheel bolts when replacing wheels.

(2) 制动鼓和轮辋配合面上不能粘上油漆、润滑脂和其它污染物。

Paint, grease and other contaminants should not stick to the mating surfaces of the brake drum and the rim.

(3) 车轮螺母的压紧面应清洁，没有脏物或油污。

Clamping surface of wheel nuts should be clean without dirt or oil fouling.

(4) 在装车轮以前，应先将与车轮定位孔及轮边减速壳上相配的外圆擦干净。

Before installing the wheel, clean the outer circle that matches the wheel positioning hole and the wheel side reduction shell.

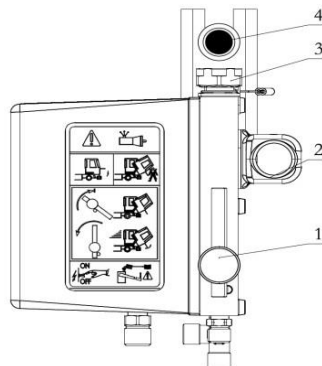
(5) 所有的车轮螺母的螺纹都是右螺纹。装上车轮，在车轮悬空的条件下按对角交叉顺序拧紧螺母，然后放下车轮，对于钢制轮辋以 550-650Nm (55-65 公斤米) 的力矩拧紧螺母；铝合金轮辋以 610-680Nm (61-68 公斤米) 的力矩拧紧螺母。

The threads of all wheel nuts are right-hand threads. Install the wheel, tighten the nuts diagonally and crosswisely with the wheel suspended, and then lower the wheel. For the steel rim, tighten the nut with a torque of 550-650Nm (55-65 kg m); for the aluminum rim, tighten the nut with a torque of 610-680Nm (Tighten the nut with a torque of 61-68 kg m).

(6) 每次重装轮胎后，必须在行驶 50 公里后复紧一次轮胎螺母。

After each tire is reinstalled, the tire nuts must be tightened after driving 50 kilometers.

(九) 驾驶室的翻转操作 Cab tilting operation



翻转油泵安装示意图

Schematic diagram of the installation of the oil pump

(1) 驾驶室翻转前应将车辆停在平坦地面上，不影响其它车辆通行（若需要，请在翻转场地周围设立警告标识）；

Before the cab is turned over, the vehicle should be parked on a flat ground without affecting the passage of other vehicles (if necessary, please set up warning signs around the turning site)

(2) 车辆使用驻车制动，并将变速杆置于空挡，关闭发动机以及所有工作设备，关闭好车门。

Use the parking brake on the vehicle, place the gear lever in neutral, turn off the engine and all working equipment, and close the doors.

(3) 翻转前将驾驶室内未固定的物品固定或取出。

Fix or take out the unfixed items in the cab before turning.

(4) 翻转前打开前面罩，确保驾驶室翻转前方和后方区域禁止站人。

Open the front cover before turning over to ensure that no people are allowed to stand in the front and rear areas of the cab.

9.2 翻转操作

驾驶室翻起：将翻转油泵的转换手柄①扳到上升位置（电动时打开驾驶室内仪表板上的电动翻转开关 ），摇动翻转摇臂②进行驾驶室翻转操作（若为电动翻转需持续按下翻转按钮④），直至驾驶室完全翻转。每次驾驶室举升必须超过止点（驾驶室重心翻过翻转点后自由下落止状态）。

Turn over the cab: Move the switch handle ① of the turning oil pump to the up position (turn on the electric turning switch on the instrument panel in the cab when it is electric), and shake the turning rocker ② to perform the turning operation of the cab (if it is electric turning, keep pressing Turn the button ④) until the cab is completely turned. Every time the cab is lifted, it must exceed the dead point (the cab's center of gravity turns over the overturning point and then it falls freely).

驾驶室降落：将翻转油泵的转换手柄①扳到回落位置，摇动翻转摇臂②使驾驶室回落（若为电动翻转需持续按下翻转开关④使驾驶室回落），直至驾驶室锁座轴套落入锁止，并继续摇动，直到手柄上感到有明显增加的力为止（电动翻转时，直至驾驶室仪表台上锁止信号灯灭，关闭驾驶室内部翻转举升开关）。

Lowering the cab: Pull the switch handle of the oil pump ① to the back position, and shake the flip rocker ② to lower the cab (if it is an electric flip, keep pressing the flip switch ④ to make the cab fall), until the cab is locked on the shaft sleeve Drop into the lock and continue to shake until the handle feels a significant increase in force (when it is turned over by electric power, until the lock signal light on the dashboard of the cab is off, turn off the tilt and lift switch in the cab).

9.3 翻转时注意事项

（1）翻转前需将驾驶室内部的未固定物品取出或固定，并打开前面罩。

Before turning over, remove or fix the unfixed objects in the cab and open the front cover.

（2）翻转时不得有人站在驾驶室前方。

No one should stand in front of the cab when turning over.

（3）驾驶室完全翻起后，方可进入驾驶室下部进行检查、维修等作业。

After the cab is completely turned up, you can enter the lower part of the cab for inspection and maintenance.

(4) 驾驶室回落完成后需确保翻转转换开关处于下降位置。

After the driver's cab is lowered, make sure that the rollover switch is in the lowered position.

(5) 为确保油泵正常工作，每 3 个月打开螺塞③检查油泵的液面。若液压油过少时，应及时补充。

To ensure the normal operation of the oil pump, open the screw plug ③ to check the liquid level of the oil pump every 3 months. If the hydraulic oil is too little, it should be added in time.

(6) 加油前必须检查液压油是否清洁，符合要求方可加注。

Before refueling, you must check whether the hydraulic oil is clean and meet the requirements before refueling.

9.4 液压油加注

(1) 日常检查油泵油量不足时，应及时对翻转系统进行加注液压油操作，具体方法如下：

When the oil volume of the oil pump is insufficient in the daily inspection, the turnover system should be filled with hydraulic oil in time. The specific method is as follows:

(2) 打开螺塞③，缓慢加入规定的液压油，加注液面应在加注孔的底部边缘。

Open the screw plug ③, slowly add the specified hydraulic oil, the filling level should be at the bottom edge of the filling hole.

(3) 缓慢将驾驶室翻起，同时继续加注油液。

Slowly turn the cab up while continuing to fill the oil.

(4) 将驾驶室放下，同时让多余的油溢出。

Put down the cab while allowing excess oil to overflow.

(5) 再用油泵将驾驶室翻起并在落回原位后检查和补充油面。

Then use the oil pump to turn the cab up and check and replenish the oil level after falling back to the original position.

(6) 最后拧紧螺塞③。

Finally, tighten the screw plug③.

(十) 新车走合 New car move

走合里程规定为 2000-4000km（公里）。走合前对车辆进行例行检查，保证车辆处于正常工作状态。

The running-in mileage is specified as 2000-4000km. Routine inspection shall be conducted for the vehicle, to ensure that vehicle is under normal working condition.

走合注意事项：Running-in cautions:

1.冷发动机刚起动后不要马上加速，只有在达到正常使用温度后，才能提高发动机转速。

It is best not to speed up immediately soon after cold engines are started. The engine speed cannot be increased until it has been in its normal operation temperature.

2.走合期应在平坦良好的路面上行驶。

Vehicles in running-in period should be operated on complanate and favourable roads.

3.应及时换档，平稳地接合离合器，避免突然加速和紧急制动。

It is best to shift in time, and stably engage clutch, in order to avoid sudden acceleration an emergency brake.

4.上坡前及时换入低档，不要让发动机在很低转速下工作。

Shift into low gears in time before climbing slopes, when engines are not allowed to work in very low speed.

5.新车最初 3000km 不得拖带挂车，车载质量不得超过额定车载质量的 70%。

In preliminary 3000km, a new vehicle is not allowed to work with its trailer, and the vehicle-loaded mass should not be higher than 70% of its normal vehicle-loaded mass.

6.检查和控制发动机的机油压力和冷却液的正常温度。经常注意变速器、前后桥、轮毂及制动鼓的温度，如有严重发热，应找出原因，立即调整或修理。

Check and control oil pressure of engine and normal temperature of coolant. Frequent inspection should be done to temperature of transmission, front and rear axles, hubs and brake drums. If acute clarification is found, its

reasons should be clarified, and regulation or maintenance should be done immediately.

7.在最初 50 公里行驶和每次更换车轮后须以规定的力矩将车轮螺母拧紧。

After the first 50 km operation and each time of wheel replacement, wheel nuts should be screwed as specifications.

8.在走合期满后，须将喷油泵上的限位块拆除，走合期内严禁拆除限位块。走合完毕后，按汽车的保养规定的"第一次检查"的内容进行检查与保养。

After running-in period is expired, limiting stopper on injection pump should be removed. It is prohibited to remove the limiting stopper in running-in period. After running-in is completed, inspection and maintenance should be done to the vehicles as contents of "First-time Inspection" in maintenance specifications.

(十一) 发动机电控系统 Electronic control system of engine

(1)、发动机电控系统简介：

Brief introduction for electronic control system of engine

WP 系列电控发动机均采用了 BOSCH 公司柴油发动机电子控制高压共轨技术，发动机电子控制单元 (ECU)可根据输入的压力、温度、转速、油门踏板位置等各类电信号，对发动机的喷油量与正时进行自动控制，达到减少排放、降低油耗的目的。国四发动机在国三发动机的基础上进行了进一步优化，增加了后

处理系统及 OBD 功能。

WP series China III engine has introduced the electronic-control high-pressure common-rail technology for diesel engine of BOSCH Company. For the purpose of emission and fuel consumption reduction, electronic control unit (ECU) can automatically control injection quantity and timing of engine according to all kinds of electric signal such as input pressure, temperature, rotating speed, the position of throttle pedal, and so on. The China IV engine is optimized on the basis of China III engine, it has the aftertreatment system and OBD functions.

WP 系列电控发动机电控系统具有稳定的系统处理能力、多层次的系统保护和纠错能力，保证了发动机的可靠性和安全性，发动机电子控制单元(ECU)还具有系统故障自检、自诊断和故障输出功能，便于对发动机电控系统的维修。

The electronic control system for WP series China III engine has capacities of stable system processing, multilevel system protection and error correction, which can ensure reliability and security of engine. The electronic control unit (ECU) also has capacities of system fault self-detection, self-diagnosis and fault output, which is convenient to maintenance for the electronic control system of engine.

对注意事项前内容增加 ISM 发动机，增加内容或描述：

康明斯 ISM 系列发动机是由发动机本体装配的电子控制模块（ECM）根据发动机上传感器感应的信

号，进行自动、综合控制的电控发动机。该发动机不仅具有先进的自动控制功能，而且还具有系统内故障检测、自诊断的功能。

Add ISM engine to the content before the precautions, add content or description: Cummins ISM series engine is an electronic control engine that is equipped with an electronic control module (ECM) on the engine body for automatic and comprehensive control according to the signal sensed by the sensor on the engine. The engine not only has advanced automatic control functions, but also has the functions of fault detection and self-diagnosis in the system.

注意事项: Cautions:

1. 发动机出厂时已按试验规范严格进行了出公司的试验，用户不得随意调整电控单元（ECU）内的数据，改变柴油机功率和配置；

The engine has been strictly carried out delivery test according to test specification before ex factory. Costumers are not allowed to randomly adjust data within electronic control unit (ECU) and change power and configuration of diesel engine.

2. 整车电气系统各部件的检修必须由专业电气人员进行；

The inspection and repair for all components of complete vehicles' electrical system must be carried out by professional electrical personnel.

3.电控系统各部件的检修必须由潍柴维修站的专业人员进行；

The inspection and repair for all components of electronic control system must be carried out by professional of Weichai maintenance station.

4.电控单元（ECU）、共轨油泵和喷油器为精密部件，用户不得自行拆解；

Because of electronic control unit (ECU), common-rail oil pump and injector are precise components, so customers are not allowed to self-disassemble them.

5.整车进行焊接操作时，必须切断整车与电控单元（ECU）的电路连接；

The circuit connection between complete vehicle and electronic control unit (ECU) must be cut off when the complete vehicle is in welding operation.

6.插拔电控单元（ECU）插接器时，务必切断电控单元（ECU）的电源，以免损坏电控单元或其他部件；

The power supply of electronic control unit (ECU) must be cut off when connector of the electronic control unit (ECU) is plugged in or pulled out to prevent damage of the electronic control unit (ECU) and other components.

7.在进行电控单元（ECU）供电电源连接时，务必确认好电源的正、负极，以免损坏电控单元。

When connect power supply of electronic control unit (ECU), whose positive and negative electrode must be confirmed to prevent damage of the electronic control unit.

二、整车发动机专用电气设备：

Special electrical installation for engine of complete vehicle

(1) 信号灯：Signal lamp

组合仪表中央的信号灯总成部分中有四个发动机专用报警信号灯（名称、符号、功能见下表）。

There are four special alarm signal lamps for engine inside signal assembly on the center of combination instrument (for the names, symbols and functions see the following table)

表 11-1 Table 11-1:

信号灯名称 Name of signal lamp	信号灯符号 Symbol of signal lamp	功 能 Function
黄色报警灯（报警信号灯） Yellow alarm lamp(alarm signal lamp)		未定义 Undefined
黄色报警灯 Yellow alarm lamp （冷起动信号灯）(Cold start signal lamp)		用于进气加热装置工作状态指示 For indicating the operating status of air intake heating device
红色报警灯（EDC 故障诊断灯） Red alarm lamp (EDC failure diagnosis lamp) EDC—电控柴油发动机 EDC-electric control diesel engine		用于电控系统故障指示和故障代码输出。 For output fault the indication code and fault code of electronic control system.
蓝色报警灯（油水混合信号灯）蓝色报警灯 Blue alarm lamp（油中有水报警信号灯）(Water in oil alarm lamp)		用于粗滤器中积水过多报警 For alarming more water in coarse strainer

(2) 诊断接口:

Diagnostic interface:

诊断接口是一个使用发动机专用标定、诊断工具（如：诊断仪）进行数据输入、故障信息输出的专用接口，诊断接口位于驾驶室内保险盒附近，由驾驶室线束自带。

Diagnostic interface is a special interface used to data inputting and fault information outputting by special engine calibration and diagnostic tools (such as: diagnostic instrument). The diagnostic interface is installed inside the cab near fuse box, it is integrated with cab harness.

(3) 整车 VIN 码读取 Vehicle VIN code reading

使用市场上可获取的通用诊断设备，在驾驶室内副驾驶员侧连接整车 OBD 接口，打开车辆 15+电源，根据通用诊断设备提示读取车辆 VIN 码

Use general diagnostic equipment available on the market, connect the OBD interface of the vehicle on the co-driver side in the cab, turn on the vehicle 15+ power supply, and read the vehicle VIN code according to the general diagnostic equipment prompts.

三、发动机起动操作步骤:

Operating procedures for engine start

(1) 起动发动机前电控系统自检:

Before engine starts, control system will do self-inspection

操作步骤: 钥匙插入方向盘锁孔内转动钥匙至“ON”位置, 电控单元 (ECU) 电源接通, 系统上电自检。

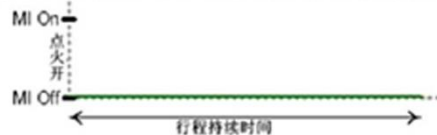
Operating procedures: insert key to locking hole on steering wheel, rotate key to "ON" position (as shown in Figure 45) for connecting power supply of electronic control unit (ECU), the system will do self-inspection.

信号灯总成中冷起动灯 (黄色)、EDC 故障诊断灯 (红色)、OBD 指示灯 (黄色、国四) 均点亮, 如果前两个信号灯在 1~2 秒钟后熄灭 (如果信号灯均不亮, 须检查电控系统电源或信号灯连接线路), 表示发动机电控系统正常 (国四系统 OBD 指示灯在发动机运行 10s 后熄灭)。国VI发动机 OBD 灯自检受 ECU 控制, 具体如下所示:

The cold start lamp (yellow) and EDC fault diagnosis lamp (red) in signal lamp assembly are both alight, if they go out after 1 ~ 2 s (if they are not alight, power supply of the electronic control system or connect circuit of the signal lamp must be inspected), it indicates electronic control system of engine is normal. The OBD indicator lamp of China IV engine will go out after the engine operating for 10s. The self-checking of the OBD lamp of the national VI engine is controlled by the ECU, as follows:

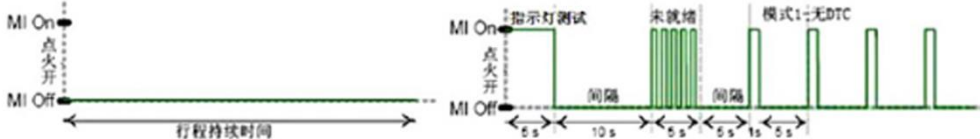
钥匙上电发动机启动
Key power on engine start

a) MI运行，无故障报告，所有监测部件准备就绪完成

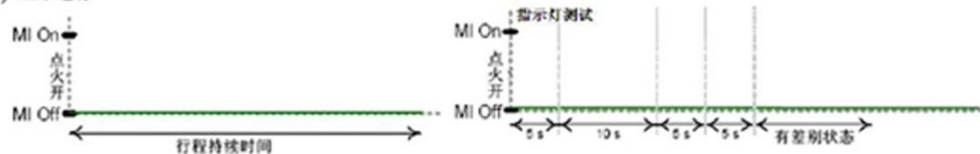


钥匙上电发动机未启动
The engine does not start when the key is powered on

b) MI运行，无故障报告，至少一个监测部件准备就绪未完成



c) MI未运行



如果冷起动灯（黄色）未熄灭，表明发动机进气加热装置开始工作（详细说明见进气加热的使用）；

If the cold start lamp (yellow) does not go out, it shows air inlet heating device has been operating (detailed specification refers to the usage of air inlet heating).

如果油水混合灯（蓝色）点亮，表明粗滤器中积水过多，需进行放水处理；

If the oil-water mixing lamp (blue) is alight, it indicates there is too much water inside coarse filter and require to water drain.

如果 EDC 故障诊断灯（红色）熄灭后又点亮，表明发动机电控系统或整车匹配电气设备存在故障，须对电控系统和整车匹配电气设备进行检修（详细说明见电控系统故障检查）。

If the EDC fault diagnosis lamp (red) lightens again after the lamp goes out, it shows there is something wrong with electronic control system of engine or matching electrical device of complete vehicle, which must be inspected and repaired (detailed specification refers to fault inspection of electronic control system).

报警灯全部熄灭后，按发动机使用、保养手册中的要求进行燃油油位，电源电压，冷却液液位等方面的检查，检查合格后方可起动发动机。

After all alarm lamp go out, inspect fuel level, supply voltage, coolant level, etc. in accordance with the requirements of engine operation and maintenance instruction, and start engine if they are qualified.

(2) 巡航功能使用

Usage of cruise function

由于电控发动机可以精确的控制喷油时间和喷油量，所以可根据工况的改变自动调整发动机的转速以达到巡航的目的。

For the purpose of cruise, electronic control engine can automatically adjust rotating speed according to different operating conditions because of the engine can precisely control fuel injection time and volume.

使用巡航必须先满足以下条件：

The using of cruise function must meet the following conditions in advance:

发动机转速范围：1200rpm~1900rpm

Engine speed range: 1200rpm~1900rpm

巡航工作时最小启动车速：25km/h

Minimum start speed when cruise is operating: 25km/h

巡航工作时最大启动车速：90km/h

Maximum start speed when cruise is operating: 90km/h

操作步骤：Operating procedures:

a、上电，起动发动机，此时巡航处于可被激活状态；

Power on, start engine, here, cruise could be activated.

b、当满足巡航激活的条件后（档位、车速、转速）按下巡航加开关激活巡航，则将当前车速设为巡航车速，巡航处于保持状态；

Press down “increase switch” of cruise to activate cruise after all conditions (such as gear, speed and rotating speed) meet the requirements of cruise activation, thus, current speed will be set up as cruise speed, and the cruise is in freeze mode.

c、当巡航打开时，可以通过巡航加、减开关调整巡航车速：

When cruise is operating, cruise speed could be adjusted by “increase or decrease switch”:

加速：长按巡航加，巡航设定点的转速会增加，同时车辆速度也会随之增加；

Speed up: long-time press “increase switch” to increase rotating speed, at the same time, vehicle speed also increases.

减速：长按巡航减，巡航设定点的转速会减小，同时车辆速度也会随之减小；

Speed down: long-time press “decrease switch” to decrease rotating speed, at the same time, vehicle speed also decreases.

点加：短按巡航加，巡航设定点的速度会根据标定值（2km/h）增加，同时车辆速度也会随之增加；

Click up: short-time press “increase switch” to increase the speed of cruise set point according to nominal value (2km/h), at the same time, vehicle speed also increases.

点减：短按巡航减，巡航设定点的速度会根据标定值（2km/h）减小，同时车辆速度也会随之减小。

Click down: short-time press “decrease switch” to decrease the speed of cruise set point according to nominal value (2km/h), at the same time, vehicle speed also decreases.

d、如果需要完全退出巡航，可点动巡航关闭开关以关闭巡航。如果采用巡航关断开关退出巡航,则不可使用恢复键恢复，只有再次按下巡航加或巡航减开关才能进入新的巡航状态。

Click on “cruise off-switch” to shut down and completely stop cruise. The cruise can not be restored by “restore switch” if stop cruise by “cruise shutdown switch”, and a new cruise state can be started only by repressing “increase switch” or “decrease switch”.

巡航过程中，踩下离合、制动、排气制动都可以退出巡航。

During cruise, the cruise can be stopped by step down clutch, brake and exhaust brake.

巡航退出后，可直接按巡航恢复键恢复刚刚设定的巡航速度，前提是按恢复键的时候仍满足巡航激活条件。

After cruise stop, directly press “restore switch” can restore the former cruising speed provided that activating conditions are met when pressing the key.

使用油门踏板也可退出巡航。巡航过程中如果踩下油门，ECU 会对巡航扭矩和踏板扭矩进行比较，取最大的数值，以满足巡航过程中的超车，松开油门踏板后，巡航会自动恢复。

Cruise can also be stopped by step down throttle pedal. During cruise, if step down the throttle pedal, ECU will compare cruise torque with pedal torque to get maximum speed to meet the requirements of overtaking, and the cruise will be automatically restored after releasing the pedal.

注意事项:

Cautions

a、使用巡航有一定的局限性。当遇到较长、较大的坡度或路况较差时，不推荐使用巡航。否则若由于加速度或减速度太大退出巡航，则巡航被锁定，本次驾驶循环不能再次进入巡航，ECU 必须断电重启后才可以恢复巡航功能。

Cruise has a certain limitation. The using of cruise is not recommended when a vehicle drive over a longer and larger slope or bad road. Otherwise, the cruise will be stopped and locked up because of too large acceleration or deceleration. Besides, the cruise can not be restarted in this driving cycle, and ECU must be shut down and restarted to restore cruise function.

b、巡航功能的实现条件比较苛刻，所以当巡航功能不能激活的时候，首先要检查开关状态是否正常。

例如：如果离合开关损坏，这时 ECU 收到的信号就是 1，ECU 就认为离合已经被踩下，所以巡航功能就不会被激活。其他的几个开关也是一样。

The realization of cruise function must meet hard conditions. You'd better check whether switch is in normal condition when cruise function can not be activated. For example, if clutch is damaged, ECU will consider the clutch is stepped down when receiving signal 1, therefore, the cruise function can not be activated. It is the same as other switches.

Woodward 系统发动机巡航的使用

The use of Woodward system engine cruise

巡航功能在特定应用环境下可以替代驾驶员对脚踏板的控制，实现 ECU 对整车车速的稳定控制，一定程度上减轻驾驶疲劳，提高驾驶舒适性。使用巡航必须先满足以下条件：

The cruise function can replace the driver's control of the pedal in a specific application environment, realize the ECU's stable control of the vehicle speed, reduce driving fatigue to a certain extent, and improve driving comfort. The following conditions must be met to use cruise:

发动机转速 $\geq 900\text{rpm}$ Engine speed $\geq 900\text{rpm}$

点加/减速: 2Km/h Point acceleration/deceleration: 2Km/h

加/减速时: 1.5Km/h During acceleration/deceleration: 1.5Km/h

巡航工作时车速范围: 30~120Km/h Vehicle speed range when cruising: 30~120Km/h

操作步骤: Steps:

1. 发动机运行时, 在满足以下所有条件的状态下, 巡航功能进入待机状态:

When the engine is running, the cruise function enters the standby state when all the following conditions are met:

操作巡航激活开关(CRUISE ENABLE)处于闭合 (ON) 状态;

Operate the cruise activation switch (CRUISE ENABLE) to be in the closed (ON) state;

系统当前钥匙循环没有与制动, 离合, 空档及车速信号相关的故障;

The current key cycle of the system has no faults related to braking, clutching, neutral gear and vehicle speed signals;

制动信号处于 OFF 状态; The brake signal is in OFF state;

离合信号处于 OFF 状态; The clutch signal is in OFF state;

实际车速高于设置的最低允许巡航车速。The actual vehicle speed is higher than the set minimum

allowable cruising speed.

2. 在此条件下，松开油门点动巡航减速开关（CRUISE DOWN）即可激活巡航控制模式，系统将以当前车速作为巡航控制目标车速；

Under this condition, the cruise control mode can be activated by releasing the accelerator jog switch (CRUISE DOWN), and the system will use the current vehicle speed as the cruise control target vehicle speed;

3. 进入巡航控制模式后，可以通过点动巡航加速开关（CRUISE UP）或巡航减速开关（CRUISE DOWN）提高或降低巡航设定转速。

After entering the cruise control mode, you can increase or decrease the cruise setting speed by inching the cruise acceleration switch (CRUISE UP) or cruise deceleration switch (CRUISE DOWN).

4. 点动巡航取消开关（CRUISE CANCEL）可以退出巡航控制功能，同时巡航控制过程中一旦第 2 项中的任一条件不满足也将导致巡航控制退出。使用油门踏板也可退出巡航，在巡航时油门踏板扭矩大于巡航扭矩，并且持续时间超过 5S，发动机将退出巡航。

Jog the cruise cancel switch (CRUISE CANCEL) to exit the cruise control function, and during the cruise control process, if any of the conditions in item 2 is not met, it will also cause the cruise control to exit. The accelerator pedal can also be used to exit the cruise. When the accelerator pedal torque is greater than the cruise torque and the duration exceeds 5S, the engine will exit the cruise.

5. 如需关闭巡航功能可操作巡航激活开关(CRUISE ENABLE)处于断开 (OFF) 状态, 巡航功能激活状态可通过仪表巡航指示灯指示。

To turn off the cruise function, operate the cruise activation switch (CRUISE ENABLE) to be in the OFF state, and the cruise function activation status can be indicated by the cruise indicator on the instrument.

备注: woodward 系统发动机车辆在巡航时排气制动不激活, 因此操作排气制动不能退出巡航。

Remarks: The exhaust brake is not activated when the woodward system engine vehicle is cruising, so operating the exhaust brake cannot exit the cruise.

潍柴 BOSCH 系统天然气发动机巡航的使用

Use of Weichai BOSCH system natural gas engine cruise

当满足一定条件后 (档位、车速、转速), 可使用巡航加(set+)或巡航减(set-)激活巡航, 巡航处于保持(hold)状态; 此时, 可以调整巡航车速:

When certain conditions (gear position, vehicle speed, rotation speed) are met, cruise plus (set+) or cruise minus (set-) can be used to activate cruise, and cruise is in a hold state; at this time, the cruise speed can be adjusted:

加速(acc): 长按巡航加(set+), 巡航设定点的转速会增加, 同时车辆速度也会随之增加;

Acceleration (acc): Long press cruise plus (set+), the speed of the cruise set point will increase, and the

vehicle speed will increase accordingly;

减速(dec): 长按巡航减(set-), 巡航设定点的转速会减小, 同时车辆速度也会随之减小;

Deceleration (dec): Long press the cruise minus (set-), the speed of the cruise set point will decrease, and the vehicle speed will decrease accordingly;

点加(tip up): 短按巡航加(set+), 巡航设定点的速度会根据标定值增加, 同时车辆速度也会随之增加;

Short press cruise plus (set+), the cruise set point speed will increase according to the calibration value, and the vehicle speed will increase accordingly;

点减(tip down): 短按巡航减(set-), 巡航设定点的速度会根据标定值减小, 同时车辆速度也会随之减小。

Short press cruise minus (set-), the cruise set point speed will decrease according to the calibration value, and the vehicle speed will also decrease accordingly.

巡航工作时 (使用+/-键激活) When cruising (use +/- key to activate)

发动机工作范围: 700rpm~2400rpm Engine working range: 700rpm~2400rpm

点加/减速: 2km/h Point acceleration/deceleration: 2km/h

长按加/减速时: 1.5km/h/s Long press acceleration/deceleration: 1.5km/h/s

巡航工作时最小启动车速：26km/h Minimum starting speed when cruising: 26km/h

巡航工作时最大启动车速：100km/h Maximum starting speed when cruising: 100km/h

巡航工作时车速范围：20km/h~120km/h Vehicle speed range when cruising: 20km/h~120km/h

巡航关闭的方式：Ways to close the cruise:

a、踩下制动踏板（所以要求制动踏板采用两个开关） Step on the brake pedal (so two switches are required for the brake pedal)

b、按下巡航 Off 开关 Press the cruise Off switch

c、踩下离合开关 Depress the clutch switch

d、踩下排气制动开关 Depress the exhaust brake switch

下面的错误可使巡航失效：The following errors can invalidate the cruise:

a、巡航控制开关错误 b)制动开关错误 c)加速踏板错误 d)离合器开关错误 e)发动机转速监测错误 f)车速传感器错误 g)增压压力传感器错误

a、 Cruise control switch error b) Brake switch error c) Accelerator pedal error d) Clutch switch error e) Engine speed monitoring error f) Vehicle speed sensor error g) Booster pressure sensor error

其他说明：other instructions:

a、使用巡航有一定的局限性。当遇到较长、较大的坡度或路况较差时，不推荐使用巡航。否则若由于加速度或减速度太大退出巡航，则巡航被锁定，本次驾驶循环不能再次进入巡航，ECU 必须断电重启（Reset）后才可以恢复巡航功能。

a、There are certain limitations to using cruise. When encountering a long, large slope or poor road conditions, cruise is not recommended. Otherwise, if you exit the cruise due to excessive acceleration or deceleration, the cruise will be locked, and you cannot enter the cruise again in this driving cycle. The ECU must be powered off and restarted (Reset) before the cruise function can be restored.

b、如果需要完全退出巡航，可使用关闭键(off)关闭巡航。如果使用关闭键退出巡航,则不可使用恢复键(resume)，仍可使用巡航加(set+)或巡航减(set-)进入新的巡航。

b、If you need to completely exit the cruise, you can use the off key (off) to close the cruise. If you use the close key to exit the cruise, you cannot use the resume key (resume), and you can still use cruise plus (set+) or cruise minus (set-) to enter a new cruise.

c、使用单个独立开关控制巡航功能时，巡航激活开关使用常开常闭式开关，巡航设置/减速开关，恢复/加速开关及巡航取消开关则需要使用点触式开关。

c、When using a single independent switch to control the cruise function, the cruise activation switch uses a normally open normally closed switch, and the cruise setting/deceleration switch, the recovery/acceleration switch and the cruise cancel switch need to use touch switches.

潍柴自主 ECU 系统天然气发动机巡航的使用

Use of Weichai's own ECU system for natural gas engine cruise

1) 上电 Power-on

巡航处于可被激活状态(NEUTR); The cruise can be activated (NEUTR)

2) 巡航激活 Cruise activation

当满足一定条件后（档位、车速、转速），可使用巡航加(set+)或巡航减(set-)激活巡航，巡航处于保持(hold)状态；此时，可以调整巡航车速：

When certain conditions (gear position, vehicle speed, rotation speed) are met, cruise plus (set+) or cruise minus (set-) can be used to activate cruise, and cruise is in a hold state; at this time, the cruise speed can be adjusted:

加速(acc): 长按巡航加(set+), 巡航设定点的转速会增加，同时车辆速度也会随之增加；

Acceleration (acc): Long press cruise plus (set+), the speed of the cruise set point will increase, and the

vehicle speed will increase accordingly;

减速(dec): 长按巡航减(set-), 巡航设定点的转速会减小, 同时车辆速度也会随之减小;

Deceleration (dec): Long press the cruise minus (set-), the speed of the cruise set point will decrease, and the vehicle speed will decrease accordingly;

点加(tip up): 短按巡航加(set+), 巡航设定点的速度会根据标定值增加, 同时车辆速度也会随之增加;

Tip up: Short press the cruise plus (set+), the cruise set point speed will increase according to the calibration value, and the vehicle speed will increase accordingly;

点减(tip down): 短按巡航减(set-), 巡航设定点的速度会根据标定值减小, 同时车辆速度也会随之减小。

Tip down: Short press the cruise down (set-), the cruise set point speed will decrease according to the calibration value, and the vehicle speed will also decrease accordingly.

3) 巡航工作时 (使用+/-键激活) When cruising (use +/- key to activate)

发动机工作范围: 700rpm~2400rpm Engine working range: 700rpm~2400rpm

点加/减速: 2km/h

Point acceleration/deceleration: 2km/h

长按加/减速时: 1.5km/h/s

Long press acceleration/deceleration: 1.5km/h/s

巡航工作时最小启动车速: 26km/h

Minimum starting speed when cruising: 26km/h

巡航工作时最大启动车速: 100km/h

Maximum starting speed when cruising: 100km/h

巡航工作时车速范围: 20km/h~120km/h Vehicle speed range when cruising: 20km/h~120km/h

上面的参数均可根据主机厂要求标定!

The above parameters can be calibrated according to the requirements of the OEM!

● 巡航关闭的方式: The way to close the cruise:

a) 踩下制动踏板 (所以要求制动踏板采用两个开关)

a) Depress the brake pedal (so two switches are required for the brake pedal) b) Press the cruise Off switch c) Depress the clutch switch d) Depress the exhaust brake switch

b) 按下巡航 Off 开关 Press the Cruise off switch

c) 踩下离合开关 Press the clutch switch

d)踩下排气制动开关 Press the exhaust brake switch

- 下面的错误可使巡航失效: The following errors can invalidate the cruise:

a) 巡航控制开关错误 b)制动开关错误 c)加速踏板错误 d)离合器开关错误 e)发动机转速监测错误
f)车速传感器错误 g)增压压力传感器错误

a) Cruise control switch error b) Brake switch error c) Accelerator pedal error d) Clutch switch error e)

Engine speed monitoring error f) Vehicle speed sensor error g) Booster pressure sensor error

- 其他说明 Other instructions

(3) 排气制动使用:

Usage of exhaust brake:

排气制动是一种发动机辅助制动装置,排气制动起作用时发动机停止喷油,驾驶员在下长坡时使用,可节省燃料并降低车速,降低制动鼓温度,提高行车制动安全性。

Exhaust brake is an auxiliary brake of engine. The engine will stop fuel injecting when the exhaust brake is operating. The exhaust brake is used when a vehicle driving over long slope to reduce fuel consumption and speed, decrease the temperature of brake drum, and improve the service safety of vehicle.

工作条件: Operating conditions:

由于排气制动的工作受电控单元（ECU）的控制，排气制动起作用时，潍柴 BOSCH 系统发动机转速须在 800rpm 以上，康明斯发动机转速须在 900rpm 以上，woodward 系统发动机转速须在 1100rpm 以上，BOSCH 天然气系统发动机转速须在 800rpm 以上，潍柴自主 WISE11ECU 统天然气发动机转速须在 800rpm 以上避免下坡时发动机熄火。

Since the exhaust brake is controlled by the electronic control unit (ECU), when the exhaust brake is active, the engine speed of Weichai BOSCH system must be above 800rpm, Cummins engine speed must be above 900rpm, and woodward system engine speed must be below Above 1100rpm, BOSCH natural gas system engine speed must be above 800rpm, Weichai independent WISE11ECU system natural gas engine speed must be above 800rpm to avoid engine stalling when going downhill.

检查步骤:

Inspecting procedures

- a) 钥匙开关通电，起动发动机；
- a) Power on key switch and start engine;
- b) 打开排气制动开关；
- b) Turn on exhaust brake switch

当发动机满足排气制动的条件时(转速), 打开排气制动开关, 排气制动蝶阀打开, 排气制动起作用。

When engine meets the condition (rotating speed) of using exhaust brake, step down exhaust brake button to open butterfly valve of the exhaust brake, which will come into operation.

注 意:

Cautions:

a)不能踩着油门测试排气制动, 踩下油门踏板会使排气制动失效!

a) Do not test exhaust brake when throttle pedal is stepping down, because the exhaust brake will be out of work when the pedal is stepping down.

b)排气制动在低转速时效果不明显。

b) The effect of exhaust brake is not obvious in low rotating speed.

(4)空调请求开关的使用 Use of air conditioning request switch

在需要打开空调时, 应先按下该开关, 电控单元 (ECU) 接收空调需要打开的信息, 柴油发动机怠速提升至 700rpm, Woodward 系统发动机怠速提升至 730rpm, BOSCH 天然气系统发动机怠速提升 100rpm, 潍柴自主 ECU 系统天然气发动机怠速提升 100rpm, 一般情况下, 再打开空调的制冷开关, 空调系统即开始工作。

When you need to turn on the air conditioner, you should first press the switch. The electronic control unit (ECU) receives the information that the air conditioner needs to be turned on. The idle speed of the diesel engine is increased to 700rpm, the idle speed of the Woodward system engine is increased to 730rpm, and the idle speed of the BOSCH natural gas system engine is increased by 100rpm. The idling speed of the natural gas engine of Diesel' s autonomous ECU system is increased by 100 rpm. Under normal circumstances, the air conditioning system will start to work when the refrigeration switch of the air conditioner is turned on.

(5)最高车速限制功能 Maximum speed limit function

限速功能由发动机 ECU 控制实现，该功能启用后，发动机 ECU 会实时监控当前车速，当车速接近设定值时，ECU 会根据当前车速、档位等信息计算出一个车辆限制扭矩，该限制扭矩值将被转化为发动机的最大允许扭矩，若车速超过目标值该限制扭矩将减小直到为 0，以达到限制车速的目的。

The speed limit function is controlled by the engine ECU. After this function is enabled, the engine ECU will monitor the current vehicle speed in real time. When the vehicle speed is close to the set value, the ECU will calculate a vehicle limit torque based on the current vehicle speed, gear position and other information. The value will be converted into the maximum allowable torque of the engine. If the vehicle speed exceeds the target value, the limit torque will be reduced to 0 to achieve the purpose of limiting the vehicle speed.

注意事项：发动机 ECU 限速功能车速限制的极限为发动机停止喷油或喷气，如因外力导致车辆仍继续加速（如车辆下长坡），该功能是不能绝对限制实际车速的。这时建议司机引入主动制动以配合车辆减速。

Note: The speed limit of the engine ECU speed limit function is that the engine stops fuel injection or air injection. If the vehicle continues to accelerate due to external forces (such as the vehicle down a long slope), this function cannot absolutely limit the actual vehicle speed. At this time, it is recommended that the driver introduce active braking to cooperate with the vehicle deceleration.

(6) 故障诊断: Troubleshooting:

电控单元（ECU）具有故障自诊断的功能，一旦检测出电控系统故障，系统就会产生对应的故障代码并存入内存，依照故障的严重等级，使故障诊断灯点亮，并自动进入不同程度的失效保护模式。正常状态下，诊断灯常亮表示比较严重的故障，需及时进行排查。

The electronic control unit (ECU) has the function of fault self-diagnosis. Once a fault of the electronic control system is detected, the system will generate a corresponding fault code and store it in the memory. According to the severity level of the fault, the fault diagnosis lamp will be lit and entered automatically Different levels of fail-safe modes. Under normal conditions, the diagnostic light is always on to indicate a serious fault, which needs to be checked in time.

诊断灯不亮但有故障码可能为历史故障或当前级别较低的故障，不会影响车辆的正常驾驶。大部分情况下，失效保护模式仍能维持发动机以低功率的方式带故障运行（“跛行回家”），此时，发动机的转速、输出扭矩将受到限制。少数极其严重的故障，失效保护模式会使发动机停止喷油并熄火。

If the diagnostic light is not on but there is a fault code, it may be a historical fault or a fault with a lower current level, which will not affect the normal driving of the vehicle. In most cases, the fail-safe mode can still maintain the engine running at low power with failure ("limping home"). At this time, the engine speed and output torque will be limited. For a few extremely serious faults, the fail-safe mode will stop the engine from fuel injection and stall.

故障码的读取：Fault code reading

a、通过专业的故障诊断仪读取；

a、Read through a professional fault diagnosis instrument;

b、通过发动机故障信号灯的闪码读取。

b、Read the flash code of the engine failure signal light.

4.发动机缸内制动功能（JACBO制动与尤顺制动）

Inner-cylinder brake function (JACBO brake and Youshun brake)

缸内制动时发动机吸收动能起到辅助制动作用。长下坡时使用缸内制动，可以减少使用行车制动的次数，减少轮胎及车轮制动器的磨损与发热，延长其寿命，提供行车安全。缸内制动时，档位越低效果越好。

The engine absorbs kinetic energy during braking in the cylinder to assist the braking. For long downhill slopes, the use of inner-cylinder braking can reduce the number of service brakes used, reduce tire and wheel brake wear and heat, extend life, and provide driving safety. When braking in the cylinder, the lower the gear, the better.

工作条件:

Working conditions:

- a、潍柴柴油发动机转速须在 800rpm 以上，康明斯发动机转速须在 900rpm 以上；
- a、Weichai diesel engine speed must be above 800rpm, Cummins engine speed must be above 900rpm;
- b、油门踏板未踩下；
- b、The accelerator pedal is not depressed;
- c、缸内制动开关接通。
- c、The cylinder brake switch is on.

使用方法: Instructions:

a、满足缸内制动使用条件后，将开关操作手柄（两级制动档位）拨到一档接通位置，缸内制动一级制动工作；

a、After satisfying the conditions for brake use in the cylinder, switch the operating handle (two-stage brake position) to the one-position engaged position, and the brake in the cylinder is braked at one stage;

b、在一档操作手柄的基础上拨到二档接通位置，缸内制动两档同时工作；

b、In the first gear operation handle based on the second gear switch position, the cylinder brake two files at the same time work;

c、将缸内制动开关操作手柄拨到断开位置，缸内制动退出工作；

c、Set the cylinder brake switch operating handle to the open position and the cylinder brakes to work.

注意事项：Precautions:

a、不能踩着油门测试缸内制动，踩下油门踏板会使缸内制动失效！

a、You cannot step on the throttle test cylinder brake, press the accelerator pedal will lead to cylinder brake failure.

b、缸内制动在低转速时效果不明显。

b、Inner-cylinder braking is not effective at low speeds.

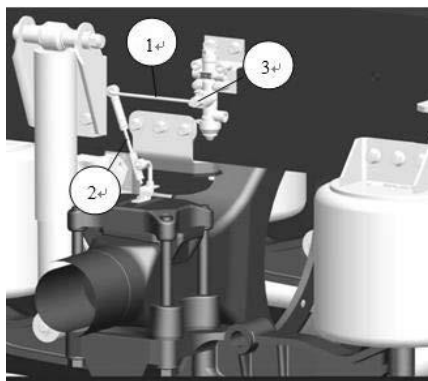
c、当缸内制动工作时，踩下油门踏板，缸内制动会退出工作，当再次松开油门踏板时，如果潍柴柴

油发动机转速大于800rpm 时，康明斯发动机转速大于900rpm 缸内制动会再次起作用，可能会影响驾驶。

c、When the brake in the cylinder is working, pressing down the accelerator pedal will cause the brake in the cylinder to retreat. When the accelerator pedal is released again, if the diesel engine speed of Weichai is greater than 800 rpm, the speed of the Cummins engine is greater than 900 rpm, inner-cylinder brake will work again which may affect driving.

d、雨雪、湿滑等恶劣路况时，慎用排气制动，以免引起侧滑、甩尾等事故发生。

d、Under rain, snow, slippery and other bad road conditions, use exhaust brake with caution, so as to avoid accidents such as side slip and tail flick.



(5) 进气加热装置的使用:

Usage of air intake heater:

电控单元 (ECU) 根据发动机上的温度传感器来感应环境温度, 通过驱动进气加热继电器控制进气加热栅格的工作, 加热发动机进气, 便于发动机冷起动。

Electronic control unit (ECU) induces ambient temperature according to temperature sensor on engine, and controls air intake heating grill by driving air intake relay to heat engine air intake so as to cold start the engine.

进气加热工作条件:

Air intake heating working conditions:

环境温度在 0℃ 以下

Ambient temperature should be below 0 °C.

操作步骤:

Operating procedures:

a、打开钥匙开关

a、Switch on ignition key

b、冷起动信号灯亮, 电控单元 (ECU) 根据感应的环境温度, 自动控制各个过程 (预加热、加热、

后续加热)的时间。

b、When cold start signal lamp is alight, electronic control unit (ECU) will automatically control the time of each process (preheating, heating and subsequent heating) according to induced ambient temperature.

c、预加热: 如果温度条件符合, 则进行预加热, 冷起动灯持续点亮, 否则冷起动灯熄灭;

c、Preheating: carry out preheating if temperature condition is met, cold start lamp will be flashing, otherwise, the lamp is not alight.

d、预加热结束后, 冷起动灯闪烁 3 次, 提示驾驶员预加热已完成;

d、After preheating, the cold start lamp will flash for three times to indicate driver the preheating has finished.

e、冷起动灯熄灭后, 驾驶员可以起动发动机;

e、Driver can start engine after the cold start lamp goes out

f、起动发动机后, 仍然有一个后续加热的过程, 该过程冷起动灯不亮。

f、After engine starts, there is still a subsequent heating process, in which cold start lamp is not alight.

注 意:

Cautions:

a、根据环境温度的不同，电控单元（ECU）会自动控制加热的时间，一般预加热在 1min 之内，后加热时间略长，通常在 2min(-10℃时)。

a、Electronic control unit (ECU) will automatically control heating time according to different ambient temperature. Generally, preheating time is within 1 minute, and subsequent heating time is about 2 minutes (when the temperature is -10℃).

b、若在冷起动灯点亮或闪烁过程中起动发动机，则加热过程中断。

b、Heating process is interrupted if start engine when cold start lamp is alight or flashing.

（7）空调请求开关的使用：

Usage of request switch for air conditioner

在需要打开空调时，应先按下该开关，电控单元（ECU）接收空调需要打开的信息，控制发动机怠速提升至 700rpm，一般情况下，再打开空调的制冷开关，空调系统即开始工作。

Please first press “request switch” when turn on air conditioner. When it receives the information of turning on the air conditioner, electronic control unit (ECU) will increase idle speed to 700rpm, and then turn on “cooling switch” of the air conditioner, generally, which will come into operation.

说明：开空调请求开关也可作为怠速提升装置！

Explanation: idle speed can also be increased when turn on “request switch” of air conditioner.

(8) 故障诊断:

Fault diagnosis

电控单元 (ECU) 具有故障自诊断的功能, 一旦检测出电控系统故障, 系统就会产生对应的故障代码并存入内存, 依照故障的严重等级, 使故障诊断灯点亮, 并自动进入不同程度的失效保护模式。

For its fault self-diagnosis function, once electronic control unit (ECU) detects there is something wrong with electronic control system, the system will generate a fault code and store it in memory, and lighten fault diagnosis lamp according to the fault severity, and automatically activate different failure protection mode.

正常状态下, 诊断灯常亮表示比较严重的故障, 需及时进行排查。

In normal condition, it shows the system has gotten into severe fault if the diagnosis lamp is always alight and need to be inspected in time.

诊断灯不亮但有故障码可能为历史故障或当前级别较低的故障, 不会影响车辆的正常驾驶。

If the system generates a fault code but the diagnosis lamp is not alight, it indicates the system fault is a former fault or a lower-grade fault, which will not affect normal running of vehicle.

大部分情况下, 失效保护模式仍能维持发动机以低功率的方式带故障运行 (“跛行回家”), 此时, 发动机的转速将受到限制。

In most cases, engine will operate with fault (Limp Home) at low speed under failure protection mode, and its rotating speed will be limited.

少数极其严重的故障，失效保护模式会使发动机停止喷油并熄火。

When a few extreme severe faults occurred, failure protection mode will stop fuel injection and operation of engine.

故障码的读取：Fault code reading:

a、通过专业的故障诊断仪读取；

a、Read fault code by professional fault diagnosis instrument;

b、通过发动机故障信号灯的闪码读取。

b、Read the flash code of the fault signal lamp of engine.

请注意：如果诊断请求开关一直导通时，故障诊断灯将常亮！

Note: if the diagnosis request switch is always turned on, the fault diagnosis lamp will be alight constantly!

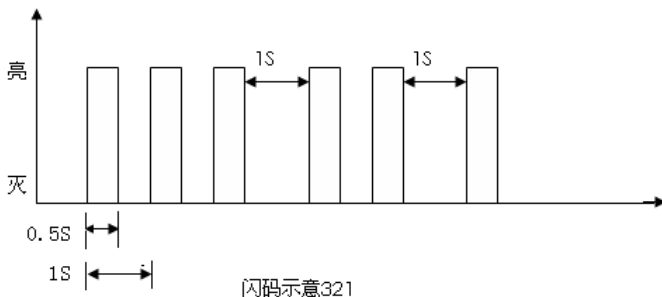
每个闪码由 3 位数组成，位与位之间间隔 1 秒。例如：闪码 321，诊断信号灯的工作程序如下图所示：

Each flash code consists of three digits with an interval of 1s. For example: flash code 321, the work program of diagnosis signal lamp is as shown in the figure below:

将读出的闪码对照闪码表（详见发动机使用说明书）查找具体的故障说明，进而排除故障。如果是一

些复杂的故障或发动机电控系统内部故障，则请联系当地服务站人员帮助解决，不可私自拆卸发动机以及相关部件。

Compare the read flash code with code table (for details see the engine specification) to find specific fault specification. If there is complex fault or the internal fault of electric control system of engine, please contact local service station. Do not disassemble the engine and related parts.



(9) 远程油门使用

Usage of remote throttle

对于专用车，如果装有远程油门，可使用远程油门转换开关在脚油门和远程油门之间转换。

For special vehicle equipped with remote throttle, whose change-over switch can be used to convert between foot throttle and remote throttle.

断开远程油门转换开关时远程油门失效，脚油门有效；

When turn off remote throttle change-over switch, the remote throttle will be useless, but foot throttle will be effective.

按下远程油门转换开关时脚油门失效，远程油门有效。

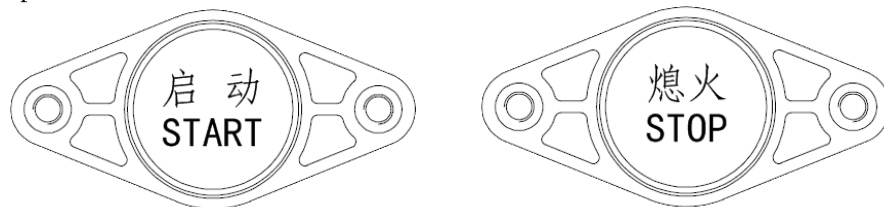
When press down remote throttle change-over switch, foot throttle will be useless, but the remote throttle will be effective.

（10）车下启动/熄火开关的使用：

Usage of start/stop switches outside vehicle:

为方便车下发动机的维修，发动机电控单元（ECU）具有车下启动/熄火的功能。

For the convenience of maintenance for an engine mounted under vehicle, engine electronic control unit (ECU) has a start/stop function outside vehicle.



使用车下启动、熄火开关可以在不使用钥匙开关的情况下启动或停止发动机，其前提条件是：

A vehicle can be started or stopped by “start/stop switch” outside the vehicle without using of key switch.

However, the following preconditions must be met:

ECU 要上电工作即钥匙开关要处于打开位置。

If ECU wants to power on, that is key switch must be in turning on position.

变速箱要处于空档位置。

Gearbox must be in neutral position.

车速传感器工作正常且车速为 0。

Speed sensor works normally and the speed is 0.

注意：Cautions

1、车下启动条件比较苛刻，并且不会开启紧急启动模式，所以在启动前请确保各开关、传感器及电气线路工作正常。

The outside start conditions are rigorous. And the emergency start mode can not be activate. Therefore, before starting, please ensure all switches, sensors and electric lines can work normally.

2、当该熄火开关按下时，发动机将不能起动！

When the turn-off switch pressed, the engine will not be started!

(11) 最高车速限制功能 Maximum speed limit function

限速功能由发动机 ECU 控制实现，该功能启用后，发动机 ECU 会实时监控当前车速，当车速接近设定值时，ECU 会根据当前车速、档位等信息计算出一个车辆限制扭矩，该限制扭矩值将被转化为发动机的最大允许扭矩，若车速超过目标值该限制扭矩将减小直到为 0，以达到限制车速的目的。

The speed limit function is controlled by the engine ECU. After this function is enabled, the engine ECU will monitor the current vehicle speed in real time. When the vehicle speed is close to the set value, the ECU will calculate a vehicle limit torque based on the current vehicle speed, gear position and other information. The value will be converted into the maximum allowable torque of the engine. If the vehicle speed exceeds the target value, the limit torque will be reduced to 0 to achieve the purpose of limiting the vehicle speed.

注意事项： Precautions:

发动机 ECU 限速功能车速限制的极限为发动机停止喷油，如因外力导致车辆仍继续加速（如车辆下长坡），该功能是不能绝对限制实际车速的。这时建议司机引入主动制动以配合车辆减速。

The speed limit of the engine ECU speed limit function is that the engine stops fuel injection. If the vehicle

continues to accelerate due to external forces (such as the vehicle goes down a long slope), this function cannot absolutely limit the actual vehicle speed. At this time, it is recommended that the driver introduce active braking to cooperate with the vehicle deceleration.

(12) 天行健智雅版 BD 车载终端使用说明

The instructions on Zhiya BD onboard terminal of Tianxingjian

天行健智雅版 BD 车载终端包括：车载智能终端和辅助显示屏两部分，车载智能终端配有单显小屏；车载终端安装在驾驶室高架箱上，显示屏安装在驾驶室仪表台上。

Zhiya BD onboard terminal of Tianxingjian including: onboard intelligent terminal (with an indenpent small screen) and auxiliary display screen. The onboard terminal is installed on the elevated box of cab, and the display screen is installed on instrument desk.

(十二) 双腔燃油供给系统/并联油箱使用说明

Dual-chamber fuel supply system / parallel fuel tank instructions

1.双腔燃油供给系统结构形式

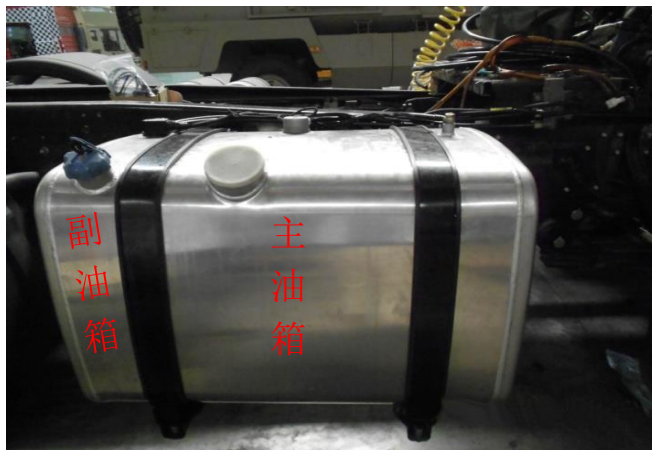
1. Dual-chamber fuel supply system structure

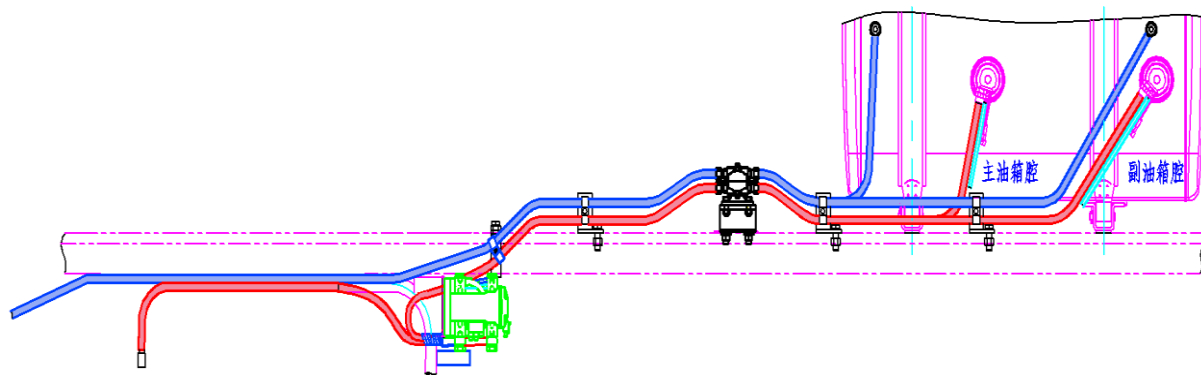
1.1 系统组成

1.1 System Composition

双腔燃油供给系统由双腔燃油箱、油量感应器、燃油管路、供油换向阀、燃油粗滤器等零部件组成。

The dual chamber fuel supply system consists of dual chamber fuel tanks, fuel sensors, fuel lines, oil supply reversing valves, and fuel strainers.





1.2 实现功能:

1.2 Functions to be achieved:

在寒区或冬季启动发动机时采用低牌号柴油，发动机启动后改用 0#等高牌号柴油，提高燃油燃烧率，降低油耗，节约成本。（注：所有匹配独立暖风功能的双腔或双油箱车型，独立暖风必须使用与环境匹配的低牌号柴油。）

Low-grade diesel is used to start the engine in cold regions or in winter. After the engine is started, it is

replaced with 0# high-grade diesel, which improves the fuel combustion rate, reduces fuel consumption, and saves costs. (Note: For all dual-chamber or dual-tank models that match the individual heater function, independent heaters must use low-grade diesel that matches the environment.)

1.3 系统原理:

1.3 System Principle:

对其中一个燃油箱隔板进行密封设计，把腔体分为两部分，可盛装不同牌号的燃油；主副油箱的供给管路采用电磁阀控制进行切换。

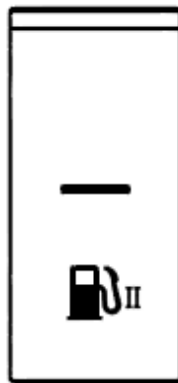
One of the fuel tank partitions is designed to be sealed. The chamber is divided into two parts and can hold different grades of fuel; the supply lines of the main and auxiliary fuel tanks are controlled by solenoid valves.

2.双腔油箱操作说明

2. Dual-chamber fuel tank operation instructions

双腔油箱切换开关在驾驶室仪表台上，如下图所示（注：各车型外形有所不同切换开关状态 I 为使用主油箱燃油的开关，状态 II 为使用副油箱燃油的开关）:

The dual-chamber tank change-over switch is located on the cab dashboard, as shown in the following figure (Note: Each model has a different shape. The changeover switch state I is the switch using the main tank fuel, and the state II is the switch using the auxiliary fuel tank):



开关默认状态为油箱 I，此时双腔油箱的主油箱工作,此时油量表显示的油量值为主油箱当前燃油量；当闭合此开关时，燃油切换阀工作，将油路由主油箱切换至副油箱,此时油量表的显示也自动切换为副油箱当前燃油量。

The default state of the switch is fuel tank I. At this time, the main fuel tank of the dual chamber oil tank works and the oil amount shown in the fuel gauge is the current fuel quantity of the main tank; when the switch is closed, the fuel switch valve works and the oil is routed to the main tank. Switch to the auxiliary fuel tank. Then, the display of the fuel gauge is automatically switched to the current fuel quantity of the auxiliary fuel tank.

注意:

Note:

1、切勿将油箱内的燃油用完，否则需要排空供给管路内的空气。再次加油时，应将切换开关恢复至 I 档。

1、Do not run out of fuel in the tank, otherwise you will need to empty the air in the supply line. When refueling, the diverter switch should be restored to I position.

2、如果在气温较高的使用环境下，适合主油箱内盛装柴油的牌号（如 0#柴油）要求时，主副油箱可盛装同牌号柴油，起到油箱增加容量的作用。一般情况下，应将切换开关置为 I 档（即使用主油箱内的燃油），此时油量表显示值为主油箱该时的燃油量，当油量表显示为零时，表明此时主油箱燃油基本用完，可以按下切换开关至 II 档，启用副油箱内的备用燃油，此时油量表显示也自动切换为副油箱当前燃油量。再次加油时，应将切换开关恢复至 I 档。

2、If the product is suitable for the use of diesel-containing grades (such as 0# diesel) in the main fuel tank under the high temperature environment, the main and auxiliary fuel tanks can be filled with the same grade of diesel fuel, which will increase the capacity of the fuel tank. Under normal circumstances, the diverter switch should be set to I position (ie, use the fuel in the main tank). At this time, the fuel gauge shows the value of the fuel in the main tank. When the oil gauge shows zero, it means that if the fuel in the main fuel tank is almost used

up, you can press the changeover switch to the II position to enable the reserve fuel in the auxiliary fuel tank. At this time, the fuel gauge display also automatically switches to the current fuel quantity of the auxiliary fuel tank. When refueling, the diverter switch should be restored to I position.

3、如果在气温较低的冬季或寒冷地带，主油箱可盛装稍高牌号的柴油，副油箱盛装与使用环境匹配的低牌号柴油，用于低温启动。启动发动机前，应将切换开关置为 II 档，采用副油箱的柴油启动发动机，待发动机完全预热，且主油箱内柴油流动性尚可的情况下，切换开关至 I 档，使用主油箱的柴油进行正常作业。注意：在准备停车前五分钟时，应将切换开关置为 II 档，使燃油管路内充满低牌号柴油，便于下次启动。

3、 If the temperature is low in winter or in cold areas, the main fuel tank can hold a slightly higher grade of diesel fuel, and the auxiliary fuel tank can contain low-grade diesel fuel that matches the use environment for low-temperature start-up. Before starting the engine, the diverter switch should be set to II position. The diesel engine of the auxiliary fuel tank is used to start the engine. When the engine is completely warmed up, and the diesel fluidity in the main fuel tank is still available, switch the switch to the I position and use the diesel fuel of the main tank. Perform normal operations. Note: The switch should be set to II when five minutes before the vehicle is ready to stop, so that the fuel line is filled with low-grade diesel to facilitate the next startup.

4、在双腔油箱在切换后，如发动机不能正常起动，须排出管路内部空气方能正常使用。在使用过程中，切勿将油箱内的燃油用完，否则需要排空供给管路内的空气。

4、After the double-chamber fuel tank is switched, if the engine cannot start normally, the internal air of the pipeline must be used normally. Do not run out of fuel in the tank during use, otherwise empty the air in the supply line.

3.并联油箱的使用

3. Use of parallel fuel tanks

并联油箱的使用与双腔油箱的使用方法相同。

The use of a parallel tank is the same as the use of a dual-chamber tank.

（十三）尿素系统的保养

Maintenance of urea system

1.尿素泵的保养

Maintenance of urea pump

（1）保养周期：

Maintenance cycle:

①正常保养：尿素泵内装配有主过滤器、入口过滤器和回流过滤器，主过滤器更换周期一般为 6 万公里或 6 个月。

①Normal maintenance: The urea pump is equipped with a main filter, inlet filter and return filter. The main filter replacement cycle is generally 60,000 kilometers or 6 months.

②特殊保养：如应用环境恶劣，对尿素水溶液污染较重，则需按实际情况更换。

②Special maintenance: If the application environment is harsh and the urea aqueous solution is heavily polluted, it must be replaced according to actual conditions.

更换前，需要对尿素泵外表面进行清洁，并在安装过程中严防滤芯区域被外界污染，过滤器该旋紧时使用 20N.m+5 N.m 的力矩。

Before the replacement, the outer surface of the urea pump needs to be cleaned, and the filter element area is prevented from being contaminated by the outside during the installation process. When the filter is tightened, a torque of 20 N.m+5 N.m is used.

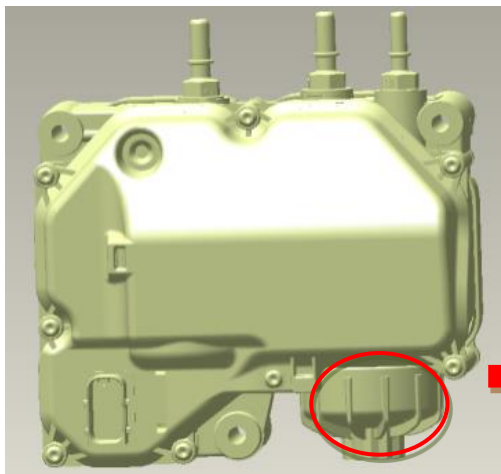


图 1 尿素泵
Urea pump



图 2 主滤芯
Main filter

(2) 保养方法：表 1 是 2.2 尿素泵的更换步骤，表 2 是 6.5 尿素泵的更换步骤。

(2) Maintenance method: Table 1 is the 2.2 urea pump replacement procedure, and Table 2 is the 6.5 urea pump replacement procedure.

表 1 2.2 尿素泵滤芯更换步骤:
2.2 Urea pump filter element replacement steps:

1. 旋开过滤器盖（扳手:27mm，DIN3124/SO2725-1）。 1. Unscrew the filter cover (wrench: 27mm, DIN 3124/SO2725-1).	
2. 取出平衡单元。 2. Remove the balance unit.	
3. 观察滤芯颜色，若为灰色，使用专用工具的灰色端，若为黑色，使用黑色端。将正确的工具伸入滤芯，直到听到“咔嚓”声，表明工具已安装到位。 3. Observe the color of the filter element. If it is gray, use the gray end of the special tool. If it is black, use the black end. Insert the correct tool into the filter element until you hear a “click” sound indicating that the tool is in place.	
4. 将滤芯拔出，必要时可利用工具的卡槽借其他工具帮助拔出。 4. Pull out the filter element. If necessary, use the tool slot to help remove the tool.	

尿素泵滤芯更换步骤: Urea pump filter element replacement steps:	
5.用清水清洗滤芯盖外表面。 5. Clean the outer surface of the filter cover with clean water.	
6.润滑 HCF 滤芯两端的 O 型圈，安装滤芯。（推荐使用 MobilVelocite NO.6，使用其他润滑油可能会带来失效的风险）。 6. Lubricate the O-rings on both ends of the HCF filter element and install the filter element. (It is recommended to use Mobil Velocite NO.6, while the use of other lubricants may bring about a real risk).	
7.旋紧过滤器盖，扭矩 20+5Nm，（扳手:27mm，DIN3124/SO2725-1） 7. Tighten the filter cover with a torque of 20+5Nm, (wrench: 27mm, DIN3124/SO2725-1)	
8.旋开过滤器盖（扳手:27mm，DIN3124/SO2725-1）。 8. Unscrew the filter cover (wrench: 27mm, DIN 3124/SO2725-1).	

6.5 尿素泵滤芯更换步骤:
6.5 Urea pump filter element replacement steps:

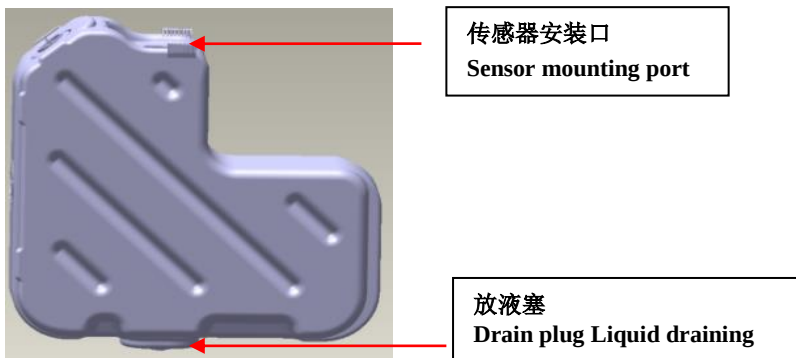
9.取出平衡单元。 9.Remove the balance unit.	
10.将正确的工具端伸入滤芯，直到听到“咔嚓”声，表明工具已安装到位。 10.Insert the correct tool end into the filter until you hear a "click" sound indicating that the tool is in place.	
11.将滤芯拔出，必要时可利用工具的卡槽借其他工具帮助拔出。 11.Pull out the filter element. If necessary, use the tool slot to help remove the tool.	
12.用水清洗滤芯腔外表面螺纹。 12.Clean the threads on the outer surface of the filter cartridge with water.	

2. 尿素箱总成保养

2. Urea box assembly maintenance

尿素箱的保养周期与尿素泵保养相同，在更换尿素泵主滤芯时需同步对尿素箱内部进行清洗，并检查尿素箱传感器底部滤网是否完好，如有破损应及时更换。

The maintenance cycle of the urea tank is the same as that of the urea pump. When replacing the main filter element of the urea pump, the inside of the urea tank must be cleaned synchronously and the bottom screen of the urea tank sensor should be checked for its integrity. If any, it should be promptly replaced.





尿素箱 Urea box



传感器 Sensor

滤网 Filtering screen

保养方法

Maintenance methdos

- ①用扳手拧下放液塞，放空尿素箱内部液体；
- ① Unscrew the drain plug with a wrench and empty the inside of the urea tank;
- ②拆出尿素液传感器检查底部滤网是否完好，用一定压力的清洁自来水对传感器深入尿素箱部分从上往下反复冲洗 2 遍以上；

②Remove the urea fluid sensor to check if the bottom filter is in good condition. Use clean tap water with a certain pressure to penetrate the sensor into the urea box and wash for over 2 times from the top down;

③用一定压力的清洁自来水对尿素箱放液塞进行进行冲洗两遍以上;

③Use a certain pressure of clean tap water to flush the urea tank drain plug more than twice;

④从尿素箱传感器安装孔处向尿素箱内部喷入 5L 以上的清水并使清水从放液塞全部流出后。反复清洗两次;

④Spray more than 5L of clean water from the urea tank sensor mounting hole to the inside of the urea tank and allow fresh water to flow from the flooding plug. After the water has been fully drained, clean the box for two times;

⑤重新拧紧尿素箱放液塞，装入传感器。

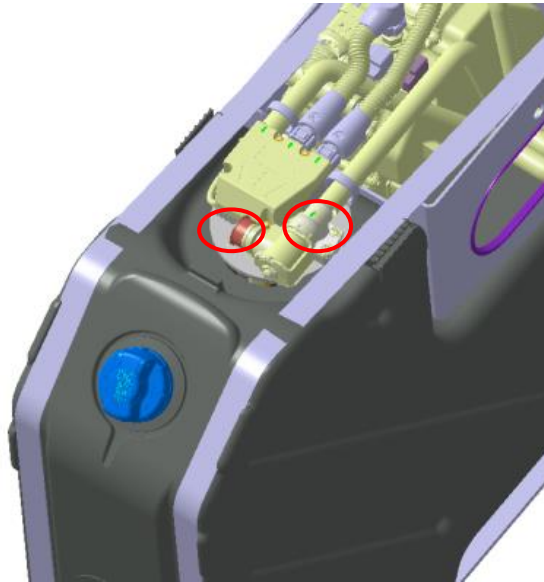
⑤ Retighten the urea tank drain plug and install the sensor.

3.尿素箱管路卡箍复紧

3. Re-tightening of urea tank pipe clamp

(1) 尿素箱的加热水管为橡胶软管，与尿素箱传感器连接为卡箍打紧连接。在长期的车辆运行中有松脱的可能。在每年气温低于 0℃ 后对红圈处的卡箍进行复紧一次。

(1) The heating water pipe of the urea tank is a rubber hose, which is connected with the urea tank sensor to clamp the connection. There is a possibility of loosening during long-term vehicle operation. When temperature is below 0 °C every year, the clamps at the red circles should be re-tightened for one time.



(十四)、天然气汽车专用部分使用与保养（部分图册以附件为准）

Use and maintenance of Natural gas vehicle (part contents are subject to attachments)

(1) 天然气发动机部分 natural gas engine

第一章 概述

Chapter 1 general

1 发动机功率和转速

Power and speed of engine

气体发动机功率范围为 191-247KW(260PS-336PS),(WP10NG)、43-280KW(330-380PS) (WP12NG), 额定转速为 2200r/min。

The power range of gas engine is 191-247KW(260PS-336PS),(WP10NG), 43-280KW(330-380PS) (WP12NG) and the rated speed is 2200r/min.

2 气体发动机主要结构特点

The main structural features of gas engine

一缸一盖，工作可靠，拆卸方便；框架式主轴承结构，整个机体刚度高，有利于整机的可靠性及使用寿命。全系列直列，通用程序高，便于整车配套。

The features are one cylinder for one cover, reliable at performance, and convenience in disassembling. The frame-type main bearing structure and high rigidity of the entire engine body are in favor of its reliability and service life. The whole series are in-line. The general program is high and convenient for entire vehicle.

第二章 燃气发动机的主要调整参数

Chapter 2 Main adjustment parameter of gas engine

1.冷态气门间隙 cold valve clearance:

①WP6: 进气门间隙 0.2mm ; 排气门间隙 0.3mm;

①WP6: The intake valve clearance is 0.2mm, and the exhaust valve clearance is 0.3mm.

②WP10、WP12: 进气门间隙 0.3mm ; 排气门间隙 0.4mm。

②WP10、WP12: The intake valve clearance is 0.3mm, and the exhaust valve clearance is 0.4mm.

2.火花塞电极间隙: 0.4~0.5mm;

The electrode clearance of spark plug is between 0.4mm and 0.5mm.

3.火花塞拧紧力矩: 20N.m~25N.m;

The tightening torque of spark plug is between 20N.m and 25N.m.

4.相位传感器与正时销: 1~1.5mm。

Phase sensor and timing pin is between 1mm and 1.5mm.

第三章：燃气发动机总体技术特点

Chapter 3: The general technical characteristics of gas engine

发动机除具备原柴油机优点外，增加以下特点：

Except the engine has the advantage of original diesel engine, add the following features:

1、采用电子节气门技术，改善了发动机的驾驶性能。

Adopt electronic throttle valve, and improve the drivability of engine.

2、燃料供给系统采用电控喷射技术保证任何工况下发动机良好的动力性、经济性和排放特性。

The fuel supply system adopts electronic control injection technology, and ensures better power performance, economy and emission performance of engine in any working condition.

3、选配适合于燃气发动机特性的水冷中间壳涡轮增压器，循环水对增压器的润滑冷却机油进行冷却，可有效地防止压力轴承处机油结炭，提高了增压器的可靠性。

Select water-cooling bearing housing turbocharger which is applicable for gas engine features. The lubricants shall be cooled by circulating water. It can be prevent the oil which is coked in pressure bearings and improves reliability of supercharger.

4、采用防喘振技术，发动机启动后真空罐形成负压，在发动机大负荷急松脚踏板时，在切断燃料供

给的同时，ECU 根据减速触发信号，使三通电磁阀工作，在真空罐形成负压的作用下打开放气阀，放掉节气门前部分空气，这样就消除了因节气门关闭而引起增压器喘震的可能性，提高了增压器的可靠性和经济性。

It is adopted by anti-surge technology. The vacuum tank has negative pressure after started engine. Loose the pedal quickly when the engine is in heavy load, and cut off fuel supply at the same time, ECU triggers the signal according to deceleration and make three-way magnetic valve works. Open vent valve and drain air of throttle valve. It can be eliminate surge possibility of supercharger which is caused by throttle closed and improves reliability and economy of supercharger.

5、采用电控高能点火系统，根据发动机转速、进气压力、进气温度等信号提供最佳点火时刻，在加速和减速工况时 ECU 也可以对点火提前角进行调整，来保证整机的综合性能。

It is adopted by electronic control high-energy ignition system. Provide the optimum ignition timing according to engine speed, intake pressure, intake temperature and etc. ECU is also adjusts the spark advance angle under the working conditions of acceleration and deceleration and ensures combination property of machine.

6、设计了满足气体燃料特性的燃气混合系统，可有效的组织稀薄稳定燃烧，提高热效率。

Design gas hybrid system and meet the gas fuel features. It can improves heating efficiency.

7、加速加浓功能使发动机在加速工况能获得相对多一些的燃料供给，确保加速瞬态时的强劲动力及稳态工况的良好经济性。

The function of acceleration enrichment can make engine acquires more fuel supply under the acceleration working condition, and ensure power performance at acceleration transient and better economy at steady-state condition.

8、进、排气门和气门座两对摩擦副选用适合燃气发动机工作特性的材料，保证其在高温下的耐磨性和良好的自润滑性。

The intake valve, exhaust valve and valve seat select materials which are applicable for gas engine working characteristics. It can ensure abrasive resistance and better self-lubrication at high temperature.

9、最高转速控制功能，确保行车安全性。

The maximum speed control function can ensure the driving safety.

10、采用高效的氧化型催化转化器，大大减少有害气体的排放。

Adopt efficient oxidizing catalytic converter and greatly reduce emissions of harmful gas.

11、配套性很强，ECU 能够给自动变速箱提供符合 SAE 标准的负荷信号，具有空调怠速控制功能。

ECU can provide load signal which is meets SAE standard for automatic gearbox, and it has control function of AC idle speed.

第四章：安全注意事项

Chapter 4: safety attentions

针对燃气发动机的特性，在发动机安装和维修时请注意以下安全事项：

According to the characteristics of gas engine, please pay attention to the following safety attentions when the engine is installed and repaired.

1、燃料系统的定期维护与修理应在有关资质部门认证的取得合格证书的专业的维修厂（场）进行。

The regular maintenance and repair of fuel system shall be carried out in professional repair factory which is obtained the certificates of qualification.

2、执行燃料系统维护和修理的机工，须经过专业培训，并取得培训合格证，其他人员不得擅自维修。

For maintenance and repair of fuel supply, the machinists shall be trained by professional training and obtained training certificates. The other person shall not repair fuel system without authorization.

3、维修场地严禁吸烟，场内应有防火消防措施。如气瓶已充气，车辆与周围明火距离不得小于 10 米。

The repair place shall be no smoking, and there shall be have fire fighting and prevention. If the gas cylinder has been inflated, the distance shall not be less than 10m between vehicle and surrounding fire.

4、维修车辆时，严禁敲击或碰撞瓶体、管路及各种阀体。

Do not knock or crash cylinder body, pipeline and all kinds of valves.

5、在车辆维护和故障排除过程中，如涉及燃气装置的管路接头、阀门、仪表、减压装置的拆装、调整等作业时，维修人员应首先断开蓄电池供电电路，关闭总气阀与瓶阀，待卸压后方可拆卸故障部位。

If some works shall be solved in the process of vehicle maintenance and troubleshooting, which are related to disassembly and adjustment of pipe joint, valve, instrument and pressure-relief device, the maintenance crews shall be cut off supply circuit of battery and close main air valve and cylinder valve first, then disassembled the trouble position after pressure relief.

6、禁止随意敲击、扭曲、挪动全车燃气管路。

Do not knock, distort and move the vehicle gas pipelines.

7、在维修好后，应采用气体检测仪或肥皂水进行泄露检验。

The leakage test shall be performed by adopted gas detector or soapy water after repaired.

8、在拆检管路和各种接头后，必须对管路进行吹管处理，防止燃气管路内进入沙尘。

After the inspection of pipeline and all kinds of joints, the pipeline shall be processed by blowing pipes and there shall be no dust in gas pipeline.

9、★在清洗车辆时，应特别注意避开发机电控系统部件，如火花塞、点火线圈、喷射阀等。严禁用水直接清洗发动机，可用干净的湿布清洁！

You should pay more attention to avoid components of engine electronic control system in process of

cleaning vehicle, such as spark plug, ignition coil and injection valve. The engine shall not clean by water directly, and you can use neat damp cloth to clean it.

10、CNG 车辆需要较长时间存放时，车用气瓶内压力不超过 2 MPa，但不低于 0.2 MPa，关闭瓶口阀，关闭全车电路，远离火源和易燃物质，存放客车的密闭空间，顶部应设有排风装置，并定期通风。LNG 车辆需要较长时间存放时，应停放于露天场地，LNG 储液瓶内的 LNG 体积不得大于 50L。关闭所有瓶口阀门，关闭全车电路并远离火源和易燃物质。贮存期超过一周应按使用保养说明书的中长期停驶注意事项要求处理。

The pressure of gas cylinder shall not more than 2 MPa and less than 0.2 MPa, if the CNG vehicle needs to storage in a long time. Close opening valve of gas cylinder and the whole circuits; keep away from fire and flammable substance. The top position is equipped with exhaust device and shall be ventilate regularly. The LNG vehicle shall be parked in the open area, if it needs to storage in a long time. The LNG volume shall not be more than 50L. Close all openings valve and the whole circuits; keep away from fire and flammable substance. If the storage period is more than one week, it shall be performed by operation and maintenance instructions which are refered to attentions of parking in a long time.

11、天然气车辆采用火车、轮船或汽车平板拖运时，CNG 车用气瓶内的储气压力不得高于 5MPa，LNG 储液瓶内的 LNG 体积不得大于 50L，运输过程中应将所有阀门关闭，关闭全车电路，车辆安放牢固。

The storage pressure of CNG vehicle gas cylinder shall not more than 5Mpa and the LNG volume shall not more than 50L, if the natural gas vehicles are transported by train, ship or car. Close all valves and circuits in process of transportation. The vehicles shall be placed fastened.

第五章：控制系统安装及注意事项

The chapter 5: Installation and attentions of control system

一、燃气管路 gas pipeline

1、所有管路连接之前应使用高压空气吹净管内的灰尘。

Use high-pressure air to blow up dust in pipeline before connected all pipelines.

2、连接管路不应有折瘪、磨蹭的地方。

There are no folded and scratch points in connecting pipeline.

二、电控系统 Electronic control system

1、线束 harness

1.1 为避免高温，线束不允许布置在排气管侧。

To avoid the high temperature, the harness shall not be arranged near the exhaust pipe.

1.2 每个接插件及导线的连接应能承受至少 20N 的拉力而不会松动甚至脱落。

Every connection of connector and wire shall be bear 20N tension force at least, and never too loose to fall off.

1.3 线束的温度等级应不低于 125℃，同时应具备良好的抗氧化能力。

The temperature rating of harness shall not less than 125℃, and it should have better antioxidant capacity.

1.4 线束的走向合理，利于日后的维修。

The route of harness is arranged rationally and convenient for repair and maintenance in someday.

1.5 应按照电器原理图要求将接地和接电瓶负极的线单独连接。

Connect the ground wire and negative wire of storage battery separately, according to the electrical schematic diagram.

第六章：发动机使用注意事项及操作程序

The chapter 6 : Attentions and operating procedure of engine

一、发动机使用注意事项

Attentions of engine operation

1、新车使用前应进行燃气管路、供气装置、电气部分检查，看是否有燃气密封不严，线路接触不可靠等，应及时排除。应特别注意电路部分连接是否有“松脱”现象，尤其是电磁阀的插片处；点火高压线是否插紧等。

Check the gas pipeline, air supply device and electrical parts before using the new vehicle. Inspect if the gas seal is lax and the wire contact is not reliable, and these problems shall be solved in time. Pay more attention to the circuit connections if there is loosening phenomenon, especially in the insertion piece of magnetic valve, and if the ignition wire is inserted firmly or not.

2、注意：检查蓄电池的电压是否足够，因发动机点火和电控系统需要足够电压，所以应特别注意。

Attention: Check the battery voltage if it is enough, as the engine ignition and electronic control system need enough voltage.

3、若连续起动 3 次不能成功，应重新仔细检查燃气部分和电路部分。

If there is a fail in starting three-times continuously, the gas and circuit parts shall be checked carefully again.

4、新车应进行必要的走合，才能投入使用。

The new vehicle can be used after necessary running-in.

5、要注意观察燃气存量，及时加气。加气时应遵守加气站的相关规定，由加气站操作人员操作；加气时应检查燃气系统的密封性。

Observe gas volume and supply gas in time. Comply with the relevant regulations when vehicle should be supplied the gas, and it shall be operated by operating person in gas station. Check the seal of gas system if gas is

supplied.

6、燃气汽车驾驶员应加强学习，尽量熟悉掌握燃气发动机的原理等相关知识。

The gas vehicle driver should learn and try to study relevant knowledge of engine principle.

7、对燃气发动机所使用的燃料，首先要求使用国家标准规定的车用 NG。

For the fuel that gas engine used, it shall use vehicle NG which is specified by national standard.

8、由于 NG 单燃料发动机燃烧产物与柴油机不同，因此要求 NG 单燃料发动机使用 NG 发动机专用机油。★型号： 15W/40CH-4 NG 发动机专用机油

The combustion products of NG single fuel engine and diesel engine is different, so the NG single fuel engine should use special fuel for NG engine. ★model: 15W/40CH-4 special fuel for NG engine.

9、注意：每年 10 月到第二年 2 月，所有天然气产品应使用陕汽天然气重卡冬季（-60℃）防冻液。

Note: from October of each year to February of the next year, all natural gas products shall use winter antifreezing solution （-60℃） of shanqi natural gas heavy truck.

1. 允许以高品质润滑油代替低品质油润油；

It is permitted that replace the low quality lubricating oil with high quality;

2. 磨合期结束，更换发动机机油；

When the run-in period is end, the engine oil shall be replaced;

3. 不管车辆使用与否，发动机润滑油每年应更换一次。

No matter the vehicle is use or not, the engine lubricating oil shall be replaced from year to year.

9、发动机中使用的减压器、热交换器需用发动机的冷却液（水）对 NG 进行加热，若用普通的水（硬水）作为发动机的冷却液（水），将很容易导致减压器的水腔内结满水垢和刚启动时出现“上霜”的现象。

The pressure reducer and heat exchanger that used in engine shall use cooling liquid (water) of engine to heat the NG. if the engine cooling liquid is common water (hard water), it will be make the inner part of pressure reducer incrusted and occurs “filled with frost” phenomenon when started.

二、日常操作程序

Daily operation procedures

为了保证行车安全，每天出车前,驾驶员应亲自作好车辆的检查工作，确保行车安全。

In order to ensure the driving safety, driver should inspect the vehicle before driving.

1. 每天行车之前必须检查气瓶与托架、供气装置与大梁之间固定是否牢固，燃气设备的状态完好，所有气管的连接处是否漏气，启动发动机前请检查各传感器接头是否有松动现象。

Check if the fixation between gas cylinder and brace, air-supply device and cross beam is reliable. Inspect if the state of gas equipment is in good and all joints of air pipe is leak or not. Please check each joint of sensors is loose or not before engine is started.

1.1 检查发动机机油油位

Check oil level of engine

检查机油油位是否位于标尺上下刻度线之间（最好在刻度线的 3/4 处），发动机停机十分钟后才能检查油位。

Check if the oil level is between upper scale mark and lower scale mark. (The best position is in 3/4 of scale mark. The oil level shall be checked after ten minutes that engine is stopped.

1.2 检查冷却液的液面

Check cooling liquid level

观察膨胀水箱外侧中部位置的水位标识，检查冷却液的水位。（膨胀水箱上无水位标识的，应打开水箱盖，但在水温较高时不要打开水箱及放水阀，以免烫伤）若过低应加足到膨胀水箱容积的 1/4-1/2，起动发动机怠速运行 3-5 分钟，使冷却系的空气排除，若水位下降，请补足。发动机运行 30000km 更换新的冷却液。

Observe water level marking which is in the central area and outside of expansion tank, and check cooling liquid level. (If there is no water level marking on the expansion tank, open tank lid. However, do not open tank and drain valve when the water temperature is higher. If the water temperature is too low, add it to 1/4 to 1/2 of expansion tank volume. Start engine and make the idle speed operate 3 to 5 minutes to exclude the air in cooling system. If the water level is drop, and add it. Replace new cooling liquid, after the engine is operated 30000km.

冷却液应每两年更换一次。

The cooling liquid shall be replaced every two years.

1.3 检查发动机皮带，风扇皮带及压缩机皮带的张紧度，若松弛请张紧，若有损伤，查明原因后请更换新品。

Check belt tension degree of engine, fan and compressor. If it is loose, please keep it tensioned. If there is any damage, please replace it after checked.

1.4 检查燃料的储存量，必要时添加。

Check storage volume of fuel, and add it if necessary.

1.5 检查蓄电池电压。

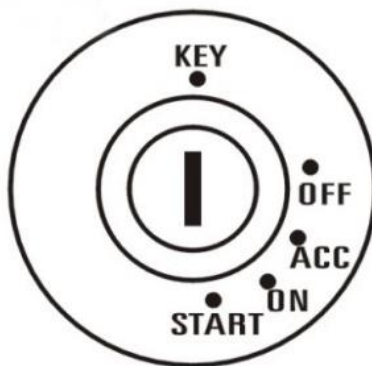
Check battery voltage

2. 启动发动机时先接通点火钥匙，停顿 3 秒后再启动发动机，保证燃气轨内能够充满燃气。

Turn on the ignition key firstly when the engine is started. Then start engine after paused for 3 seconds and ensure that the air track is filled with fuel gas.

★ 点火钥匙位置如图

The position of ignition key is as shown in figure.



KEY: 此位置为起动钥匙插入拔出位置

KEY: Insert position of start key.

OFF: 电源关闭位置 “off” postion of power supply.

ACC: 在此位置仪表电源被接通 instrument power supply is connected.

O N: 正常行驶位置 normal driving position

START: 发动机起动位置, 发动机起动后, 其钥匙自动弹回 “ON” 位置。

Start position of engine After the engine is started, the key will be back to “ON” position automatically.

特别注意!

Attentions:

a、发动机处于运转状态时, 不允许将钥匙拨到“S”位, 否则将造成起动机损坏, 只有在发动机完全停止后才能重新起动发动机。

Do not turn the key to “S” position when the engine is in operating condition. If not, the starter will be damaged. Start the engine again after it stopped completely.

b、当第一次起动发动机没有成功, 请等 30 秒后再进行第二次起动。

When the engine is not started successfully at first time, please start it again after waiting 30 seconds.

★检查发动机机油压力、水温是否正常。

Check if the engine oil pressure and water temperature is normal.

起动发动机到正常冷却水温时，其机油压力应符合发动机使用说明书的要求。机油压力应不低于怠速压力：怠速时 $\geq 0.1\text{Mpa}$ ，标定转速： $0.3\sim 0.6\text{Mpa}$ ，（起动时及熄火时运转 5 分钟其中一个重要原因是：增压器转子采用的是悬浮式轴承，运转 5 分钟后机油压力可升高到使轴承悬浮起来，以防轴承异常磨损，严重的可烧结损坏。

Start engine to the normal cooling water temperature, and the oil pressure shall meet requirements of engine operating instruction. The oil pressure shall not less than idling pressure: at idle $\geq 0.1\text{Mpa}$, rated speed $0.3\sim 0.6\text{Mpa}$, (The reason why it is operated for 5 minutes at starting and off time: The supercharger rotor is adopted suspension bearing. The oil pressure can reach to make the bearing suspended after operated 5 minutes, and prevent bearing from abnormal wearing.

特别注意！

发动机起动后，若机油压力不足报警灯发亮，或发动机机油压力始终处于下限应及时停车检查，故障排除后，车辆才能起步运行。

Attentions: If the oil pressure is not enough after the engine is started, the alarm light is lights up. If the engine oil pressure is at lower level all the time, please park the vehicle and check it in time. The vehicle can be driving after troubleshooting.

发动机起动后，严禁猛轰油门急速起步。

Do not step on throttle suddenly and start to drive quickly, after the engine is started.

发现故障，应立即停车检查。

Park the vehicle and check it in time when the malfunction is occurred.

发动机怠速严禁超过 10 分钟。

It is forbidden that the engine idling speed is beyond 10 minutes.

一般气温条件下，没有必要踩下加速器踏板，但在寒冷的天气或发动机为冷机状态下，发动机不能启动时，应稍微踏下加速器踏板。

It is not necessary to step on accelerator at general air temperature. However, the accelerator shall be stepped slightly at cold weather or the engine is in cooling state, when engine can not start.

★单燃料气体发动机在环境温度较低的情况下起动后短时间内可能发现排气管冒白烟或有水滴冒出，这属于正常现象，原因是天然气中 H 含量较多，故最终燃烧产物中 H₂O 较多，在低温时不能汽化，形成白烟或水滴。随着排温升高，白烟和水滴将消失。

After the single fuel gas engine is started, there may have phenomena that exhaust pipe has white smoke or water drop at lower environment temperature in short time, this is normal phenomenon. The reason is that the H

content of natural gas is high, and H₂O of combustion products is more. They can not vaporization at low temperature and forms white smoke or water drop. The white smoke and water drop will be disappearing with exhaust temperature increasing.

3、车辆运行 vehicle driving

正确的驾驶方法不但可以延长车辆的寿命，提高经济效益，同时对安全行车的影响也很大，在运行发动机时应遵循以下原则：

The correct driving techniques can not only prolonging the service life of vehicle, but also improving the economic efficiency. It has a greatly effect on safety driving. The following principles shall be complied when the engine is started:

★燃气发动机由于其燃料性质，发动机的加速性会比柴油机稍差一点。

The acceleration performance of gas engine is worse than diesel engine, because of the fuel properties.

车辆在加速过程中，要缓踩油门，避免急踩油门！燃气发动机有更多空气才能有更多的动力。

The throttle shall be stepped slightly if the vehicle is in acceleration process, do not step it quickly. For the gas engine, the more air, the more power.

4、发动机停机 engine stop

4.1 车辆运行后，发动机温度很高，此时，不要立即停熄发动机，需怠速运转 3-5 分钟，待各部分正

常冷却后，再停熄发动机。将点火钥匙转至“OFF”位。

The engine temperature is too high after driving the vehicle. Do not stop engine immediately at this moment, the engine shall be stopped after operated idling speed for 3 to 5 minutes and each part of vehicle cooling in normal state. Turn the ignition key to “OFF” position.

4.2 最后切断总电源开关。At last, turn off main power switch.

特别注意！如果发动机经过大负荷长时间运转，发动机在停机前要低速运转一段时间，以使发动机水温冷至正常，才能停熄发动机。我们的发动机是装有废气涡轮增压的发动机，因增压器转子属高速运转件，突然停车会造成转子轴承短时间的缺油冷却不良而烧蚀损坏。

Attentions: The engine shall operate at low speed for a while before stopped, if it is operated under heavy load for a long time. It can make water temperature of engine normal, and stop the engine. Our engine is equipped with exhaust gas supercharging. The supercharging rotor is high speed moving parts. If the vehicle stopped suddenly, it can make rotor bearing lacks of fuel and be damaged in a short time.

三、与发动机相关仪表 Instruments (related to engine)

1、转速表 tachometer

发动机转速表用于监控发动机的运行状况。单位：r/min。当发动机处于中小负荷时，发动机高于标

定转速，将要进行自我保护；当发动机处于大负荷，转速高于 2400 r/min 时，也将进行保护；此时发动机 ECU 发出指令，减小节气门开度，降低发动机输出功率。反映在车运行中的表现为窜动！

The engine tachometer is used for monitoring engine running state. Unit: r/min. If the engine is in small and medium load, and engine speed is higher than rated speed, it will be protect itself. If the engine is in large load, and the speed is higher than 2400 r/min, it will be also protect itself. The engine ECU gives instruction at the time, reduce air valve opening and decrease output power of engine. It will be occurs motion when the vehicle is driving.

2、车速里程表 speedometer

里程累计范围:0~999999.9 公里。用于测量汽车行走速度并累计行驶里程。

The mileage cumulative range: 0~999999.9 km. It is used for measuring driving speed of vehicle and accumulates miles.

3、机油压力表 oil pressure gauge

用于指示机油压力值，若机油压力低于正常压力则发动机机油压力报警灯亮，这时车不能起步，待报警灯熄灭后方可起步。

It is used for indicating oil pressure value. If oil pressure is lower than normal pressure, the alarm light of

engine oil pressure will be light up, and the vehicle will not start at the time. The vehicle can start again after the alarm light is not lights up.

注意：车正常行驶时，若机油压力指示灯亮，说明润滑系统油压不足，应立即停车检查，必要时驶入保养厂检查排除。

Note: If the oil pressure indicator is lights up when vehicle is driving under normal condition, it shows that oil pressure of lubricating system is not enough. You should park the vehicle and check it immediately, and drive into maintenance factory for inspection if necessary.

4、水温表 water temperature gauge

水温表指示发动机冷却液的温度，当点火开关置“ON”位置时，即显示发动机冷却液的温度。发动机运转时冷却液必须在 80℃到 95℃之间。

The water temperature gauge indicates engine coolant temperature. If ignition key is in “ON” position, it shows the engine coolant temperature. The coolant temperature shall be within the range between 80℃ and 95℃, if engine is opeared.

注意：如果水温高于 98℃，警灯亮，蜂鸣器响。

Note: If water temperature is beyond 98℃, the alarm light will be lights up and the buzzer sounds.

5、电压表 voltmeter

电压表指示蓄电池充放电的状态。电压表在发动机停止运转时，指针读数为蓄电池电压值；发电机运转时，指针读数为发电机输出的电压值。

The voltmeter indicates charging and discharging state of battery. The indicator reading of voltmeter is voltage value of battery, if engine is not operated. The indicator reading is output voltage value of alternator, if alternator is operated.

第七章：发动机保养

Chapter 7: Engine maintenance

一、常规保养说明 routine maintenance instructions

项 目 Item	保养周期 maintenance period	保养项目 maintenance items
日常维护 Daily maintenance	每日进行 Daily works	检查气瓶、电磁阀、压力调节器等部件安装支架的完好与紧固情况，紧固已松动的紧固件。 Check if mounting bracket of gas cylinder, magnetic valve, pressure regulator and other parts are in good condition and fastening. The loose fastener shall be tightened.

项 目 Item	保养周期 maintenance period	保养项目 maintenance items
日常维护 Daily maintenance	每日进行 Daily works	检查气量，接通全车电源，打开点火开关（不起动发动机），检查气量显示器指示的气量。 Check gas volume, and turn on power supply of complete vehicle. Turn on ignition key (not start engine), and check gas volume of indicator. 检查供气系统管路、接头组件等是否有泄露（可通过周围环境是否有燃气泄露异味进行判断）；对铰接式汽车，特别要重点检查铰接盘处的高压软管是否有擦伤痕迹，外表有无龟裂、老化等现象。如发现系统有泄露现象，驾驶员不应擅自解体，应及时通知专业维修厂家派员修理。 Check if the pipeline of air supply system and fittings are leakage. (It can be judged by surrounding that if there is any gas leakage). For the hinged type vehicle, please pay much attention to check if high pressure hose of hinge joints has scratch, and surface has crack and aging phenomena. If system has leakage, the driver should not disassemble it without authorization, and inform professionals to inspect it in time. 检查点火系统和发电机是否有漏电、跳火现象，如有应及时修理，检查线束和各传感器接插件是否松动。 Check if the ignition system and alternator are electric leakage. If there is any leakage, the harness and each sensor connectors shall be checked and repaired in time.

项 目 Item	保养周期 maintenance period	保养项目 maintenance items
一级维护 First class maintenace	5000-6000 千米 5000-6000 km	CNG 气瓶固定装置检查与紧固： Check and fasten the CNG gas cylinder fixed device. CNG 气瓶固定装置有无变形、损伤；紧固固定装置。 Check if the CNG gas cylinder fixed device have deformation and damage, and tighten the fixed device.
		CNG 气瓶阀门检查：Check the CNG gas cylinder valve. 1. 用漏气检测仪或检测液，检测多功能阀、充气阀是否有泄露，如有应及时处理。 Check if multifuction valve and inflation valve are leakage by using leak detector or detection liquid. If there is any leakage, solve the problems in time. 2. 检查出气手动阀，应开关灵活，管接头应无泄露。 Check manual valve of air out, the switch shall be flexible, and the pipe joints shall be no leakage. 3. 检查充气阀及管接头与管路卡箍，应无松动、无泄露。 Check inflation valve, pipe joints and pipeline clamp. They shall be no loose and leakage.
		系统各管路及接头检查：1.管体无损伤、龟裂现象；用检测仪或检测液检查无泄露。2.管接头及阀门连接牢固无松动、无泄露。 Check each pipeline of system and joints: 1. the pipe body has no damage, cracks. Check if they have any leakage by using detector and detection liquid. 2. The pipe joints and valve conntection shall be no loose and any leakage.

项 目 Item	保养周期 maintenance period	保养项目 maintenance items
一级维护 First class maintenace	5000-6000 千米 5000-6000 km	减压器检查与紧固: Check and fasten the pressure reducer 1.用检测仪或检测液检查减压器本体及接头有无泄露。 Check if the pressure reducer body and joints have any leakage by using detector and detection liquid. 2.检查装置支架有无松动, 并予以紧固。 Check if the mounting bracket is loose, and fastened it.
		减压器循环水管及接头检查: 1.检查温水管有无污垢堵塞, 2.如有 3.应予清除。4.检查水管有无老化、龟裂、破损及泄露, 5.必要时更换。6.检查管接头紧固情况, 7.必要时予以紧固。 Check the circulating pipe and joints of pressure reducer: 1. check if the water pipe have any dirt and be blocked. 2. If any 3. Clean it. 4. Check if the water pipe has aging, cracks, damage and leakage. 5. Replace it if necessary. 6. Check fastened condition of pipe joints. 7. Fastened it if necessary.
		电磁阀动作及安全检查: 1.检查各电磁阀动作是否正常、灵敏、可靠, 2.有无泄露, 3.电源插接口是否稳固、接触良好。4.检查并紧固电磁阀支架。 Magnetic valve motion and safty inspection: 1. check if each magnetic valve motion is normal, flexible and reliable. 2. If there is any leak. 3. Check if the power connection is fixed and the contaction is in good state. 4. check and fasten magnetic support.

项 目 Item	保养周期 maintenance period	保养项目 maintenance items
一级维护 First class maintenace	5000-6000 千米 5000-6000 km	电源系统：低压电路连接可靠，绝缘无损坏，接触良好，无短路、断路现象，保险盒的熔丝齐全、可靠，符合要求，无另搭接电线。 Power system: the low-voltage circuit connection is reliable, and insulation has any damage, the contaction is in good state. There are no short circuit and open circuit phenomena. The fuse is complete and reliable, and meets the requirements. There is no electric wire connected without permission.
		清洁、检查火花塞，检查高压线。 Clean and check ignition plug, and inspect high voltage wire.
二级维护 Second class maintenace	每 15000 千米 Every 15000 km	所有一级维护项目 All first class maintenance items CNG 过滤器清洁： Clean CNG filter: 1.检查过滤器，check filter 2.清洁过滤器与滤芯。Clean filter and element 3.装复后的过滤器及接头作泄露检查。 Check if the refitted filter and joints are leakage.

项 目 Item	保养周期 maintenance period	保养项目 maintenance items
二级维护 Second class maintenace	每 15000 千米 Every 15000 km	点火系统: Ignition system: 1.点火线圈绝缘无破坏、无漏电跳火现象, 2.支承紧固可靠。 1. The isolation of ignition coil has no damage and electric leakage phenomena, 2, the bearings are fastened and reliable. 3.火花塞间隙符合要求; 更换达 15000 千米使用里程的火花塞 (在没有更换长寿命火花塞前)。 The spark plug gap meet the requirements, and replace the spark plug if the mileage reach to 15000 km. (before not replacing the long life spark plug).
		清洗混合器: Clean mixer: 保持混合器喉管各气孔畅通。 Keep each air pole of mixer choke open.

二. 燃气系统维护的注意事项:

Attentions for gas system maintenance:

1. 燃料系统的定期维护与修理应在有关资质认证部门取得合格证书的专业的维修厂（场）进行。

The regular maintenance and repair of fuel system shall be carried out in professional repair factory which is obtained the certificates of qualification.

2. 执行燃料系统维护和修理的机工，须经过专业培训，并取得培训合格证，其他人员不得擅自维修。

For maintenance and repair of fuel supply, the machinists shall be trained by professional training and obtained training certificates. The other person shall not repair fuel system without authorization.

3. 维修场地严禁吸烟，场内应有防火消防措施。如气瓶已充气，车辆与周围明火距离不得小于 10 米。

The repair place shall be no smoking, and there shall be have fire fighting and prevention. If the gas cylinder has been inflated, the distance shall not be less than 10m between vehicle and surrounding fire.

4. 维修车辆时，严禁敲击或碰撞气瓶、减压阀、管线、钢瓶及各种阀体。

Do not knock or crash cylinder body, pipeline and all kinds of valves.

5. 在车辆维护和故障排除过程中，如涉及燃气装置的管路接头、阀门、仪表、减压装置的拆装、调整等作业时，维修人员应首先断开蓄电池供电电路，关闭总气阀与瓶阀，待卸压后方可拆卸故障部位。如

漏气或故障部位准确诊断困难,在保证车辆周围 10 米内无明火的前提下,允许开启总气阀进行带压检查。

漏气部位明确后,应立即关闭总气阀和全部钢瓶阀,待卸压后方可拆卸、维修。

If some works shall be solved in the process of vehicle maintenance and troubleshooting, which are related to disassembly and adjustment of pipe joint, valve, instrument and pressure-relief device, the maintenance crews shall be cut off supply circuit of battery and close main air valve and cylinder valve first, then disassembled the trouble position after pressure relief. If there is any difficulty in diagnosis of air leakage and trouble location, in the case that the surroundings of vehicle have no fire within 10m, it is permitted that open main air valve and checks it under pressure. After checked the leak location, close main air valve and all steel cylinder valve in time. Then disassembled and repaired after pressure relief.

6. 在排除供气系统故障时,必须关闭总气阀和全部钢瓶气阀,进行管路卸压,严禁在带压状态下进行修理作业。

Close main air valve and all steel cylinder valves, and release pressure of pipeline under the condition of removing the trouble of air supply system. Do not conduct repairing work under pressure.

7. 应严格检查卡套是否完好无损。高压管线、卡套接头只能更换新的,不允许重复使用。在维修好后,应采用气体检测仪或肥皂水进行泄露检验。

Check if the card sleeve has no damage. The high pressure line and card sleeve connections shall be replaced,

and do not reuse. After repaired, the leakage inspection shall be performed by using gas detector or soapy water.

8. 吹管处理：在拆检管路和各种接头后，必须对管路进行吹管处理。

Blowpipe treatment: the pipeline shall be performed by blowing treatment after removed and checked the pipelines and all kinds of joints.

CNG 天然气供气部分 CNG natural gas supply

一 CNG 车辆供气系统原理

The gas supply system principles of CNG vehicle

1 天然气车辆安全性概况

The security general of natural gas vehicle

1) 天然气在压缩、储运、减压、燃烧过程中,都是在严格密封的状态进行，不易泄漏；

The natural gas should be compressed, transported, decompressed and combusted under the condition of sealed state, it can ensure that there is no leak.

2) 天然气比空气轻（密度为空气密度的 55%），如有泄漏，在高压下很快散失，不易着火；

The natural gas is lighter than air (the density is 55% of air density). If there is any leakage, it can disappear quickly under high pressure and not easy to fire.

3) 天然气的着火点为 650~750℃, 比汽油高约 260℃, 爆炸极限为 4.7~15%, 比汽油的 1~6%高 2.5~4.7 倍, 与汽油相比不易发生燃烧和爆炸;

The ignition point of natural gas is between 650℃ and 750℃, compared with gasoline, it is higher about 260℃. The explosion limits is between 4.7% and 15%, it is higher 2.5~4.7 times than gasoline of 1~6%. Compared with gasoline, it is not easy to burn and explode.

4) 天然气的储气瓶经过物理实验、水压实验、冲击实验、爆破实验、坠落实验、火烧实验、枪击实验、渗透实验、运行实验, 装有防爆装置, 可以确保安全;

The natural gas cylinder has been performed by experiments of physical, water pressure, impact, blasting, drop, burn, shooting, penetration and operation. It is equipped with explosion-proof equipment and can ensure safety.

5) CNG 汽车的配件及改装均符合相关的国家标准, 可以确保安全及备件的供应;

The accessories and refit of CNG vehicle shall meet relevant national standard, and it can ensure security and spare part supply.

6) 车用天然气里一般都添加臭剂以提高对天然气泄漏的及早发现, 从而采取预防措施。

The natural gas for vehicle used is generally added deodorant to improve ability in finding the gas leakage, and can take precautionary measures in time.

世界上使用 CNG 汽车已有 40 多年的历史，而且现在世界上有约 200 多万辆 CNG 汽车在运营，均未发生过重大的天然气燃烧和钢瓶爆炸事故。事实证明只要规范操作，用天然气燃料的汽车比使用汽油车更安全。

The CNG vehicles have been used for more than 40 years in the world, and now there are more than about 2 million CNG vehicles in driving all over the world. The massive burns of natural gas and explosion accidents of steel cylinder have never happened. The facts proved that only operate it by specifications, and use natural gas vehicles are more secure than the gasoline vehicles.

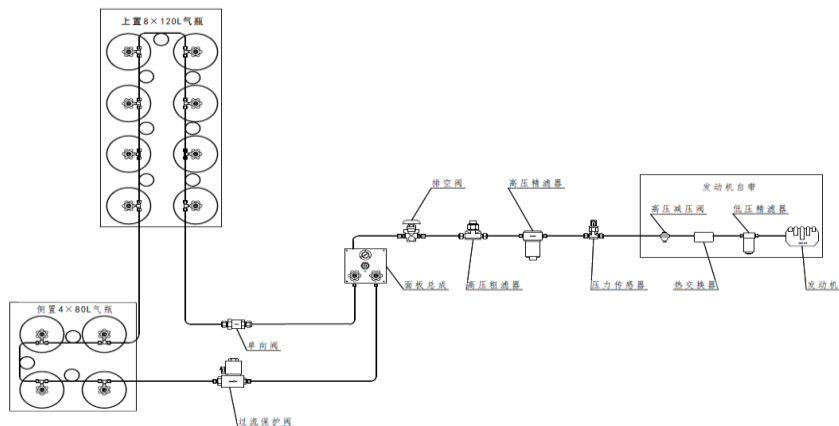
具体车型配置及安装原理图因设计需求可能与本说明书略有差异，请以实物为准。

Due to design requirements, the specific vehicle type configuration and installation schematic diagram may different from this specification, please in kind prevail.

敬请用户先仔细阅读并完全理解本手册的内容后再进行操作，否则可能发生危险。

Please read carefully and understand all contents of this manual, then operate it. If not, dangers may be happened.

2.天然气汽车燃气供给系统原理 Gas supply system principles for natural gas vehicle



图一：CNG燃料供给系统原理图

Figure 1: Principle diagram of CNG fuel supply system

说明：CNG 系统原理图因车型不同会有所差异，敬请用户以实际车型为准。

Note: Due to different vehicle type, the CNG system principle diagram may be different, please refer to actual vehicles.

3. 天然气供给系统组成

The natural gas supply system configuration

CNG燃料供给系统组成部分包括：储气瓶、高压管路、接头、CNG集成控制面板总成、压力表、气量显示器、手动截止阀、排空阀、高压电磁阀、过滤器、单向阀、过流保护阀、减压器、低压软管、循环水管、发动机控制系统等（具体配置视车型而定）。

The CNG fuel supply system configuration include:gas cylinder, high pressure pipeline, joints, CNG integration control panel assembly, pressure gauge, air volume indicator, manual stop valve, exhaust valve, high pressure magnetic valve, filter, check valve, overflowing protection valve, pressure reducer, low-pressure hose, circulating pipe, engine control system, etc.(The specific configuration is decided by vehicle type).

3.1 CNG集成控制面板总成 CNG integration control panel assembly



安装方法及功能说明:

Installation method and function description:

面板总成是将充气阀 (V3)、充气截止阀 (V1)、供气截止阀 (V2)及压力表集成在一张面板上, 实现天然气的充装、截断、排空等功能集成作用。

The panel assembly is integrated inflation valve (V3), inflation stop valve (V1), air supply stop valve (V2) and pressure guage into one panel to achieve filling, cut off, exhaust and other functions.

加气时打开 V1 截止阀, 加气结束关闭, 车辆行驶时打开 V2 截止阀, 车辆停运或检修时关闭。

Open V1 stop valve if add gas, and then close it. Open V2 stop valve if vehicle is on driving, and close it when vehicle is stop to drive or in repairing.

安装于面板支架上, 采用 4 只或 6 只 M6 螺栓固定, 安装时应将压力表搭铁线固定于面板支架上。

Installed on panel bracket, use 4 or 6 M6 bolt to fix, and fix bond strap of pressure gauge on panel bracket.

注: 面板总成因车型、使用地等的不同在技术参数、安装方式上会有所差异, 以实物为准。

Note: Due to different vehicle type and ground used, the panel assembly has some differences in technical parameters and installation methods. Please, in kind prevail.

3.1.1 手动截止阀 manual stop valve



安装方法及功能说明:

Installation method and function description:

转动手柄，顺时针方向为关闭，逆时针方向为开启。

Turn the handle, the clockwise direction is close and anti-clockwise direction is open.

完全开启后手柄转动的最大角度为 180°。

Open it completely, and the maximum angle of handle rotated is 180°.

当手柄处于关闭位置时，截断“T”型下方通道，左右两端为常通。

When handle is in close position, cut off “T” passage downward, and left and right ends are normal open.

当手柄处于开启位置时，三通道全部开启。

When handle is in open position, the three-way passages open completely.

当用作排气阀时，阀门处于常闭状态，仅在检修系统需要排空管路内气体时打开，检修完毕关闭。

When it is used as an exhaust valve, the valve is in close state. It is only opened in need of drain pipeline air in repairing system, and then closes it.

3.1.2 充气阀 inflation valve



插销式（新西兰标准）

pin type (New Zealand standards)



NGV1 (ISO 标准 ISO standards)



NGV2 (ISO 标准 ISO standards)

安装方法及功能说明:

Installation method and function descriptions:

实现车辆安全快速充气，内置单向阀，可拆卸。

Achieve air inflation of vehicle quickly, set check valve in inner parts and can be removed.

带防尘帽，防止灰尘、泥沙及其他固体物质等进入充气阀影响充气阀及 CNG 管路系统的使用寿命。

It is equipped with dust cap and can prevent dust, dirty and other solid substance from entering inflation valve, avoid influence service life of inflation valve and CNG pipeline system.

3.1.3 压力表 pressure guage



Installation method and function descriptions:

The pressure indication range: 0-40MPa.

It is used for indicating residual pressure of gas cylinder, and changes the pressure signal into electrical signal by photoelectric sensor, and sends to pressure indicator.

High-pressure coarse strainer



安装方法及功能说明:

Installation method and function descriptions:

用于过滤天然气中的固体杂质。过滤精度 10-50 μ m。

It is used for filtering solid impurity of natural gas. The filter fineness: 10-50 μ m.

滤芯每三万公里清洗，十万公里或 12 个月更换（先到为准），或根据当地气体质量确定更换周期。

Clean the filter element in every 30000 km, replace it during 100000km or 12 months. The replace period is decided by local gas quality.

安装时必须按照过滤器上标示的气流方向安装，“SS”端进气，“AC”端出气。

The filter shall be installed by airflow direction marking. “SS”end is used for air-in, and“AC”end is used for air-out.

3.3 高压精滤器

High-pressure fine filter



安装方法及功能说明:

Installation method and function descriptions:

用于过滤天然气中的杂质和油水等。外部过滤层精度: $10\mu\text{m}$, 内部过滤层精度: $0.3-0.6\mu\text{m}$ 。

It is used for filtering impurities and oil water of natural gas. The outer filter precision: $10\mu\text{m}$, The inner filter precision: $0.3-0.6\mu\text{m}$.

车辆运行 3000 公里或根据车辆使用地的天然气气质情况, 将盛油杯中的油水完全排除。

Drain the oil water from oil holder, if the vehicle runs 3000 km or according to the natural gas condition of ground that vehicle used.

车辆运行 10000 公里或根据车辆使用地的天然气气质情况需对过滤芯进行更换; 并同时更换壳体橡胶密封圈。

The filter element shall be replaced, if the vehicle runs 10000 km or according to the natural gas condition of ground that vehicle used. Replace rubber sealing washer of shell at the same time.

安装时必须按照过滤器上标示的气流方向安装, 箭头方向为气体从气瓶向发动机流动的方向。

The filter shall be installed by airflow direction marking. The arrow indicates that the gas flowing direction from gas cylinder to engine.

3.4 过流保护阀

Overflowing protection valve

3.4.1 手动复位过流保护阀（标配）

Manual reset overflowing protection valve (standard configuration)



安装方法及功能说明:

Installation method and function descriptions:

正常工作时复位阀芯处于常闭状态，当流过过流保护阀的流量大于其设定值（约 1.2Mpa）时，过流

保护阀将截断气流，从而防止管路中天然气持续大量泄漏。故障排除后，打开过流保护阀手柄，过流保护阀两端压力达到平衡后，关闭过流保护阀手柄。

The reset valve element is in close state under condition of normal work. When the flow that through the overflowing protection valve is more than the set value (about 1.2Mpa), the overflowing protection valve shall cut off gas flow, and prevent the natural gas of pipeline from leaking. After troubleshooting, open handle of overflowing protection valve and after two ends pressure of overflowing protection valve reach to its balance, and then close the handle.

安装时必须按过流保护阀体上标示的方向进行安装，箭头方向为气体从气瓶向发动机流动的方向。

The filter shall be installed by direction of overflowing protection valve marking. The arrow indicates that the gas flowing direction from gas cylinder to engine.

3.4.2 电磁复位过流保护阀（选装）

Magnetic reset overflowing protection valve (optional)



安装方法及功能说明:

Installation method and function descriptions:

工作电压 DC24V，电源采用翘板开关控制，正常工作时电源处于常闭状态，当流过过流保护阀的流量大于其设定值（约 1.2Mpa）时，过流保护阀将截断气流，从而防止管路中天然气持续大量泄漏。故障排除后接通电源使过流保护阀两端压力达到平衡后关闭电源。

The working voltage is DC24V. The power supply is adopted rocker switch and it is in close state under normal work. When the flow that through the overflowing protection valve is more than the set value (about 1.2Mpa), the overflowing protection valve shall cut off gas flow, and prevent the natural gas of pipeline from leaking. After troubleshooting, connect power and make two ends pressure of overflowing protection valve reach to its balance, and then close the power.

安装时必须按过流保护阀体上标示的方向进行安装，箭头方向为气体从气瓶向发动机流动的方向。

The filter shall be installed by airflow direction marking. The arrow indicates that the gas flowing direction from gas cylinder to engine.

3.5 单向阀 check valve



安装方法及功能说明:

Installation method and function descriptions:

管路系统采用双管路充气时，与过流保护阀配合使用。

The pipeline system is adopted by double pipe to inflate, and used in conjunction with overflowing protection valve.

加气时阀芯自动打开，加气结束时自动回位关闭。

The valve element is opened automatically, if there is any air inflated. Then it is back to its close position when the air inflation is in the end.

安装时必须按单向阀体上标示的气流方向安装，箭头方向为气流从充气阀流向气瓶方向。

The filter shall be installed by airflow direction marking. The arrow indicates that the gas flowing direction from inflating valve to gas cylinder.

3.6 锥扣接头/气瓶阀转换接头

Cone joint, gas cylinder adapter



锥扣接头 Cone joint



气瓶阀转换接头 gas cylinder adapter

安装方法及功能说明：

Installation method and function descriptions:

采用双卡套设计，安装前必须先进行预装。

It is adopted by double cutting sleeve design, and pre-assemblies are performed before installtion.

安装于气瓶阀门上，用于连接气瓶与气瓶及气瓶到面板总成之间的管路。

It is installed on gas cylinder valve, and used for connecting the pipeline between cylinder and cylinder, and cylinder to panel assembly.

3.7 三通接头 three-way joint



φ 8 三通接头 three-way joint φ 8 φ 10 三通接头 three-way joint φ 10 φ 12 三通接头 three-way joint φ 12

安装方法及功能说明:

Installation method and function descriptions:

用于管路中的多通路联接。

It is used for multi-way connection in pipeline.

安装前必须先进行预装。

Pre-assembles are performed before installtion.

3.8 等径直通接头

Equal radius straight-way joint



安装方法及功能说明：

Installation method and function descriptions:

当两零部件之间连接的钢管长度不足时，采用该部件过渡联接。

When the steel length which is connected between two components is not enough, use this component to connect.

采用双卡套设计，安装前必须先进行预装。

It is adopted by double cutting sleeve design, and pre-assembles are performed before installtion.

3.9 高压电磁阀 high-pressure magnetic valve



安装方法及功能说明:

Installation method and function descriptions:

工作电压 DC24V。

The working voltage is DC24V.

用于截断和开启管路中的高压气体，常闭式阀门，通电时开启。

It is used for cutting off and opening high pressure gas of pipeline, normally close valve, open it if there is charging.

安装时必须按照阀体上标示的气流方向安装，箭头方向为气体从气瓶向发动机流动的方向。

The filter shall be installed by airflow direction marking. The arrow indicates that the gas flowing direction from gas cylinder to engine.

3.10 高压减压器 high-pressure decompressor



安装方法及功能说明:

Installation method and function descriptions:

采用杠杆膜片式减压机构，通过两级减压，使高压气体减压至 7bar~9bar 的低压天然气。

It is adopted by depression mechanism of lever diagram type. Make high-pressure gas is reduced to range of low-pressure gas that between 7bar and 9bar by two-stage pressure reduction.

自带高压电磁阀，高压电磁阀工作电压 DC24V。

It is equipped with high-pressure magnetic valve, and its working voltage is DC24V.

采用发动机循环水对其加热，以防高压减压器零部件损坏。

It is adopted by circulating water of engine for warming. Prevent components and parts from damage.

高压减压器应安装在汽车（底盘）大梁上，高压减压器的安装位置应低于发动机散热器顶部。

The high-pressure decompressor shall be installed on vehicle cross beam (chassis), the installation position of high-pressure decompressor shall be below the top of engine radiator.

二 CNG 车辆供气系统操作规范

Operation specification of CNG vehicle air supply system

1. 车辆起动、驾驶 start and drive

CNG 车辆与常见燃油（汽油和柴油）车辆驾驶规则无太大区别，车辆起动前，驾驶员只需打开位于卡车右侧气瓶组前端管路上的手动截阀（使手柄与管线平行），即可按汽油或柴油车辆的驾驶操作规程进行起动驾驶。

The driving regulations between CNG vehicle and common fuel (gasoline and diesel) are not much difference. Before vehicle is started, the driver just needs to open manual stop valve which is on front pipeline of right gas cylinders (make handle is parallel with pipeline). Then, the vehicle can be started to drive as the driving regulations of gasoline and diesel vehicles.

2. 车辆在 CNG 加气站充气

Filling the vehicle with gas at gas station

警告：车辆充气必须充装符合 GB18047-2000 要求的车用压缩天然气。否则，可能造成车辆动力不足和发动机使用年限缩短和发动机使用年限缩短，更为严重的是可能损伤气瓶导致气瓶使用寿命缩短、甚至气瓶爆炸等不安全事故发生！

Warning: The vehicle shall be filled with CNG that meet the GB18047-2000 requirements. If not, it can leads to vehicles which are lack of power, and the service life of engine would be shortened. But even more serious is the fact that make gas cylinders damaged and lead to service life of cylinders are shortened, even insecurity accidents would happen, such as explosion of gas cylinders.

1) . CNG 车辆就位，人从车上下来，关闭整车电源。（打开操控面板室门）

The CNG vhicle is parked into place, and people get off. Close vehicle power supply. (Open the door of control panel).

加气时，取下充气阀 V3 上的防尘塞（帽），插入加气枪，打开充气截止阀 V1 进行加气。

Remove the dust plug of inflation valve V3 if add the gas, insert the air gun, open stop valve V1 and add the gas.

2) .开始充气，充到 20MPa，停止充气。

Start to fill gas and filled it to 20MPa, then stop filling.

3) .加气结束后，拔出加气枪，关闭充气截止阀 V1，插（盖）上防尘塞（帽）。

Pull out the air gun after stopped the filling. Close stop valve V1, and insert the dust plug.

4) .车辆驶离加气站区。

The vehicle is drove out of gas station.

5) .车辆运行时，必须打开供气截止阀 V2。车辆停运或检修时关闭。

When vehicle is driving, the air supply stop valve V2 should be opened. Close it if vehicle is stopped to drive and repaired.

6) .排空阀（V4）为常闭阀门，检修管路系统时使用（某些车型无排空阀）。

Exhaust valve (V4) is normal close valve, and use it if pipline system needs to repair. (Some vehicles are not equipped with exhaust valve).

注意：

Attentions:

a、充气过程中气瓶温度会升高，用手触摸感觉明显，但不烫手。这是由于充气时气体被压缩而释放出热量，为正常现象。

The cylinders temperature will increase if it is in the process of filling; the heat is obvious if use hand to touch it, but it isn't too hot. It is the normal phenomenon that the gas is compressed and releases the heat in the process of filling.

b、充完气的车辆（充气至 20MPa）放置 6 小时后，压力降低至 17~18MPa，是正常的，因系统温度下降所致。

It is normal phenomenon that the pressure is decreased to the range between 17 and 18 MPa after filled vehicle is placed for 6 hours (filled to 20 MPa). it is caused by reduction of system temperature.

c、加气时，应严格执行 CNG 加气站的操作规程，CNG 的充气压力不得高于 20MPa。

The operation specification of CNG gas station should be carried out strictly if filled the gas. The CNG filling pressure shall not more than 20 MPa.

d、若储气瓶组压力为零，则必须充装氮气置换储气系统内的 CNG 残气后，方可再次充装 CNG。

If the pressure of gas cylinders is 0, fill the nitrogen to replace CNG residual gas of storing gas system. Then fill CNG again.

e、在车辆充气过程中，必须关断车辆总电源，周边严禁烟火。

Turn off main power supply of vehicle if it is in the process of filling. The surroundings should be no fire.

3.车辆停驶 stop driving of vehicle

1) .CNG 车辆停驶超过三小时，则需驾驶员在离车时关掉位于右侧气瓶组前端固定在管路上的手动截止阀（使手柄呈垂直状）。

The stop driving of CNG vehicle is beyond 3 hours, the driver should close manual stop valve which is on front pipeline of right gas cylinders (make handle perpendicular).

2) .CNG 车辆停驶超过 24 小时，则需驾驶员除关闭位于右侧气瓶组前端固定在管路上的手动截止阀（使手柄呈垂直状）外，还需关闭全部气瓶阀门，以确保车辆的安全。

The stop driving of CNG vehicle is beyond 24 hours, the driver should not only close manual stop valve which is on front pipeline of right gas cylinders (make handle perpendicular) but also close all gas cylinder valves, and ensure security of vehicles.

4.供气系统定期保养及功能件检测

Regular maintenance of air supply system and function part inspection

4.1.供气系统每满一个月，要求进行一次系统例行保养。

The air supply system should be performed system routine maintenance every month.

4.2.特别注意：CNG 钢瓶每满三年进行一次气密和强度检测；复合材料瓶（钢内胆玻璃纤维缠绕瓶）每满三年进行检测，超过六年，则每满二年检测一次。

Attention: The CNG steel cylinder should be performed the gas-tight and strength test every three years. Composite material cylinder (steel liner glass fibre cylinder) should be inspected every three years. If it exceeds six years, the inspection should be performed every two years.

4.3.CNG 高压压力表每满一年校验一次。

The CNG high-pressure guage should be checked every a year.

4.4.其它件的定期检测请参照系统例行保养中的相关规定。

For regularly inspection of other parts, please refer to corresponding regulations of system routine maintenance.

5. CNG车辆紧急状态下的处理方法

The handing method of CNG vehicles in emergency condition

5.1.CNG车辆在行驶中发现燃气供给系统有损坏，CNG气体发生泄漏：

The gas supply system of CNG vehicle is damaged in driving, the CNG gas is leakage.

5.1.1.若嗅到或发现CNG气体发生泄漏时：

If you smell or find that CNG gas is leakage:

1) .应立即靠边停车关闭发动机、切断总电源、关闭CNG储气瓶手动截止阀、联系报修；

Stop the vehicle and close engine, cut off main power, and close manual stop valve of CNG gas cylinder, then request for repair.

2) .待专业人员到来检修无泄漏后，方可继续行驶；

The vehicle can be driving after the professionals checked and there is no leakage.

5.1.2.CNG高压管路破裂、CNG气瓶或系统中的高压配件脱落，在系统过流保护装置失效造成CNG 气体大量泄漏时：

If CNG high-pressure pipeline is broken, high-pressure parts or CNG gas cylinder is dropped, and overcurrent protection device of system is invalid caused a large number of CNG gas leakage:

1) .立即疏散车上及车辆附近人员；

Evacuate people that in vehicle or near from vehicle immediately.

2) .切断总电源;

Cut off main power supply.

3) .关闭CNG储气瓶手动截止阀;

Close manual stop valve of CNG gas cylinder.

4) .紧急报修;

It needs to repair in emergency condition.

5) .封闭现场, 禁止车辆、行人靠近, 严格控制并隔离火源, 待抢修车排除险情后, 方可移动车辆;

Close the scene, and no vehicle and people near the scene. Control it strictly and isolate the fire. The vehicle can be moved after recovery vehicle eliminated dangerous.

5.2.车辆行驶中, 发生火灾:

The fire is happened in driving of vehicle:

1) .立即疏散人员, 救护伤员;

Evacuate people and rescue the wounded.

2) .迅速切断总电源、关闭CNG储气瓶手动截止阀;

Cut off main power supply quickly, and close manual stop valve of CNG gas cylinder.

3) .迅速报警、同时用车上灭火器进行灭火；

Send alarms, and put out a fire by fire extinguisher at the same time.

5.3.发生撞车交通事故时：

If traffic accident is happened:

1) .立即关闭总电源、关闭 CNG 储气瓶手动截止阀；

Close main power supply immediately, and close manual stop valve of CNG gas cylinder;

2) .检查车辆特别是检查 CNG 燃气系统是否完好，确认无任何问题后，方可继续行驶。

Check the vehicle, especially check if the CNG gas system is in good condition, and the vehicle can be driving after checked that there is no any problem.

6.天然气汽车驾驶的相关要求及安全注意事项

The related driving requirements and safety cautions of natural gas vehicle

天然气汽车驾驶员，必须经过使用天然气汽车的技术培训，掌握天然气汽车日常安全检查知识，安全驾驶技术要点，并取得培训合格证后方可驾驶天然气汽车。

The natural gas vehicle can be driving after the driver who has been learned technical training, grasped daily safety inspection, safety driving technical points and acquired certification.

6.1 天然气汽车出车前的检查

The inspection before natural gas vehicle is driving

1) 检查气瓶与支架、燃气管路与支架固定是否牢固。

Check if the fixation between gas cylinder and brace, gas pipeline and brace is reliable.

2) 检查传感器接头是否松动，线束是否有脱落，是否有磨蹭、拉拽。

Check if the sensor connector is loose and the harness is drop, and if there is any rub lightly.

3) 检查燃气管路是否有磨损、裂纹

Check if gas pipeline has any wear and cracks.

4) 检查各橡胶水管是否有老化、裂纹、压瘪

Check if each rubber water pipe has aging and cracks.

5) 检查天然气的储量

Check natural gas reserves

检查气量显示与停车前观察到的气量指示值是否基本一致，确认 CNG 管路接头是否存在微漏气隐患。

Check if the gas volume display is basically same with the gas volume value before stopped the vehicle.

Confirm if the CNG pipe joint is in a hidden danger of air leakage.

6) 检查储气瓶和高、低压管路上有否泄漏

Check if the gas cylinder and high and low pressure pipeline are leakage

打开加气舱和气瓶舱，凭嗅觉闻一闻，必要时使用中性洗涤剂（或肥皂）泡沫水检查所有管路接头是否有泄漏。

Open gas filling tank and gas cylinder tank, smell it if necessary, use foam water of neutral detergent (or soap) to check if all pipe joints are leakage.

若有异味、漏气，应关闭储气瓶上的手动截止阀，通知天然气汽车专业维护人员进行维修。

If there are abnormal taste and leakage, close manual stop valve of gas cylinder, and inform professional of natural gas vehicle to repair.

7) 检查燃气表压力是否正常，CNG 车辆燃气压力需高于 3MPa

Check if the pressure of gas meter is normal, and the gas pressure of CNG vehicle should be above 3MPa.

6.2 天然气汽车的起动

Start of natural gas vehicle

当天然气汽车起动时，建议当点火钥匙在 ON 挡 3 秒后再起动发动机，由于天然气的特点，用压缩天然气作燃料时，汽车动力比用汽油或柴油时将略有下降，故汽车起步时，应适当提高发动机转速。每次起

步之前，宜怠速运行数分钟，将发动机水温提高到发动机所要求的水温再起步。

When start the natural gas vehicle, you'd better start the engine after ignition key in ON position for 3 seconds. Due to the features of natural gas, if use compressed natural gas as fuel, the the vehicle power would be reduced, which is compared with vehicle of using gasoline or diesel. So when the vehicle starts, increase engine speed properly. Before every starting, you'd better operate a few minutes at idle speed and increases the water temperature of engine to the water temperature that engine required, and then start the vehicle.

6.3 天然气汽车的运行

The running of natural gas vehicle

1) 运行中档位的选择

The gears selection in running

天然气汽车运行中，应注意档位的选择，要尽量避免高档低速行驶。

Pay attention to gears selection in running for natural gas vehicle, avoid that use high gears in low speed running.

长期运行时发动机水温应保持在发动机使用说明书中要求的范围内为宜。水温过低易造成高压减压器冰堵、密封阀片损坏及使耗气量增加。

The water temperature of engine should keep in the range of operation instructions required. Lower water temperature can cause ice block of high pressure regulator, seal valve piece damaged and make gas consumption increased.

2) 行驶过程中操作注意事项

Operation attentions in driving

运行过程中，若在驾驶室内对有低压指示表的汽车，应注意低压表的指示情况。平稳运行时低压表的指针应无剧烈波动。如发现异常波动，应立即停车排除故障后方可运行，如故障不能排除，则应关闭高压截止阀，通知专业维修人员进行维修。

If the vehicle has a low pressure indicator in cab which is in the process of driving, pay attention to the display condition of low pressure indicator. The pointer of low pressure indicator shall not fluctuate wildly in even running. If there is abnormal fluctuation, stop the vehicle and remove the troubles, and then it can be started to drive. If the troubles can not remove, close high-pressure stop valve, and inform professionals to repair.

驾驶天然气汽车时，最好不要急加油门，禁止高档低速防止造成回火放炮，引起不必要的机件损坏。

You'd better not increase speed in quick if you drive the natural gas vehicle. Do not use high gears to drive in low speed, prevent backfire and cause parts damage.

在行驶中随时观察天然气量的变化情况，如变化太快，与行驶里程不符，应及时停车检查漏气情况。

Observe change of natural gas volume in driving; if the change is too fast, and not conformity with mileage, you should park the vehicle and check if there is leakage in time.

如安装有过流保护阀的车辆在运行途中或加气后突然停车导致车辆不能正常行驶，可能是因为过流保护阀起保护作用。此时应立即开启应急灯，打开手动复位手柄（安装电磁复位过流保护阀的车辆按下过流保护阀复位电源开关）10S 左右，等过流保护阀两端压力达到平衡后再关闭手动复位手柄（或电源），此时管路系统即可恢复正常。

If the vehicle which is equipped with overcurrent protection valve can not running in normal state and stopped suddenly in process of driving or after gas filled, it may be influenced by the overcurrent protection valve. Turn on emergency light in time, and open manual reset handle for about 10S (press power switch of overcurrent protection valve, if the vehicle is equipped with magnetic reset overcurrent protection valve). Close manual reset handle (or power supply) after two ends pressure of overcurrent protection valve reached to balance, then the pipeline system can be return to normal.

6.4 天然气汽车冬夏季驾驶注意事项

Driving attentions for natural gas vehicle in summer and winter

1) 冬季驾驶的特殊要求

The special requirements for driving in winter

冬季当气温下降到 10 度以下时，对于露天停放的天然汽车起动发动机后，让发动机在中、低速工况运转，当水温达到发动机规定温度时，方可上路行驶。

When air temperature is reduced to 10 °below, after started the engine of vehicle which is parked in the open air, keep engine operated in medium and low speed working condition. When water temperature reached to specified temperature of engine, the vehicle can be started to drive.

在行车途中，如果感到行车无力，应当检查减压器进出气口、供气管路接头是否结冰。如结冰，可用热水浇烫，切忌用火烤。

If the vehicle power is not enough in driving, please check air inlet and outlet of decompressor, and if the joints of air supply pipeline is frozen. If it is frozen, use hot water to pour, and do not use fire.

夏季驾驶的特殊要求

The special requirements for driving in summer

夏季当天气在高温时，必须注意水温表读数。

When air temperature is high in summer, the readings of water temperature gauge shall be noticed.

如果水温接近或达到发动机使用说明书中规定的上限时，应当检查发动机冷却系统工作是否正常。如不正常应首先排除冷却系统故障。

If the water temperature approached or reached to upper limit that engine operation instructions required, check if the cooling system of engine is normal. If it is not normal, eliminate cooling system malfunction firstly.

6.5 天然气汽车的停车

Parking of natural gas vehicle

1) 临时停车 temporary parking

临时停车，应尽量选择通风阴凉、远离火源和热源之处，并尽可能设置停车警示标志。

Select shady and ventilated place to park the vehicle in temporary, where is keep away from fire and heat source, and set parking warning mark as soon as possible.

停车时，发动机应熄火、关闭电源总开关。

The engine shall be flame-out and close main switch of power supply if parking the vehicle.

2) 夜间停车 parking in night

晚上停车，应尽量选择通风阴凉，远离火源和热源之处停车。

Select shady and ventilated place to park the vehicle in night, where is keep away from fire and heat source.

晚上停车前，应检查系统是否正常，有无漏气现象，储气瓶固定装置有无松动。

Check if the system is normal, fixed device of gas cylinder is loose, and there is leakage before parked the vehicle in night.

车停稳后，应关闭发动机和电器总开关，关闭气路总截止阀，查看并记录压力表压力读数或气量显示器指示值。（在第二天开车前，再次观察压力表读数或气量显示器指示值，评估管路接头是否存在漏气隐患）。

Turn off main switch of engine and electric appliance after parked the vehicle. Close main stop valve of air piping, check and record pressure readings of pressure gage or display value of gas volume indicator. (Before started the vehicle in next day, observe pressure readings of pressure gage or display value of gas volume indicator again, and evaluate if the pipeline joints are leakage.

1) 长期停车

Parking in long time

汽车长期停放时，除按车辆停放规定处理外，应尽量将天然气用完，一般压力降到 0.2——0.4MPa 即可，立即关闭气瓶阀。

Try to use up the natural gas if the vehicle is parked in long time. The general pressure is reduced to the range between 0.2 and 0.4MPa, close gas cylinder valve immediately.

断开电源，拆下蓄电池线，将车辆置于通风、防潮、防火、防晒的场所。

Disconnect power supply, and remove battery wire. Park the vehicle in ventilated, dampproof, fireproof and sunproof place.

汽车重新使用时，应确认高压管路完好，连接部位没有松动、泄漏，必要时进行储气瓶气体置换操作，方能再次加气使用。

Confirm if the high-pressure pipeline is in good condition, the connecting parts are loose and leak when vehicle is reused. Replace the gas of cylinders if necessary, then it can be used again.

天然气汽车行驶中出现故障的应急处理措施

The emergency processing measure of malfunction for natural gas vehicle in driving

7. 应急措施

Emergency processing measure

7.1 发生天然气泄漏的应急措施

Emergency processing measures for natural gas leakage

1) 如果发生轻微的天然气泄漏，应立即停车，关闭点火开关，将发动机熄火，开启应急灯，检查泄漏部位，并立即关闭储气瓶上的手动截止阀。

If there is slightly natural gas leakage, park the vehicle immediately. Turn off ignition switch, and make engine flame-out. Turn on emergency light, check the leakage parts and close manual stop valve of gas cylinder.

2) 如因高压天然气管破裂、卡套松脱造成天然气泄漏时，应立即靠边停车，开启应急灯，迅速关闭气路总截止阀和各气瓶截止阀，切断电源；同时疏散人员，隔离现场，隔离火源。待泄漏气体扩散，对供气系统进行检查，确保无着火隐患后，通知专业维修人员对供气系统进行检查和维修。

If the natural gas pipe is bursted by high pressure, or the natural gas is leaked by drop of cutting sleeve, pulled over the vehicle to the side of road immediately. Turn on emergency light, close main stop valve of air piping and stop valves of each gas cylinders, and cut off power supply. Evacuate people, isolate the scene and fire source. After the gas leak is spreaded, check the air supply system and ensure there is no hidden danger of fire, then inform professionals to check and repair the air supply system.

7.2 发生汽车自燃着火时的应急措施

Emergency processing measures for vehicle spontaneous combustion

1) 如果汽车发生自燃着火，应立即靠边停车，迅速关闭点火开关，切断电源，迅速关闭气路总截止阀和各气瓶阀；同时疏散人员，隔离现场。

If there is vehicle spontaneous combustion, park the vehicle to the side of road immediately, turn off ignition switch in quick, cut off power supply, close main stop valve of air piping and each gas cylinders. Evacuate people

and isolate the scene at the same time.

使用干粉灭火器进行灭火，并设法用水给储气瓶降温。

Use dry powder extinguisher to put out a fire, and try to use water to cool the temperature of gas cylinder.

如司机不能处理，应及时报警。

Give an alarm if the driver can not deal with the accident.

7.3 发生碰撞、着火时的应急措施

Emergency processing measures for crash and on fire

1) 如发生交通事故，应立即停车，开启应急灯，检查气路是否受损；如受损应关闭点火开关，切断电源，关闭气瓶阀，同时疏散人员，隔离现场，隔离火源，保护现场。

If the accidents have been happened, park the vehicle immediately, turn on emergency light and check if the air piping is damaged. If there is any damage, turn off ignition switch and cut off power supply, close gas cylinder, evacuate people, isolate the scene and fire scene, and protect scene.

2) 如着火，应立即停车，关闭点火开关和气瓶阀；同时疏散人员，隔离现场，保护现场，用干粉灭火器进行灭火。

If there is on fire, park the vehicle immediately, turn off ignition switch and close gas cylinder. Evacuate people, isolate and protect the scene. Use dry powder extinguisher to put out a fire

3) 如气瓶阀门无法关闭，应设法储气瓶降温。立即疏散人员，隔离火源，保护现场，严禁烟火，尽快报警，以便应急处理。

If gas cylinder valve can not close, try to cool the temperature of gas cylinders. Evacuate people, isolate the fire source and protect the scene. No fires and give an alarm to adopt emergency processing measures.

8、维护与保养

Repair and maintenance

8.1 CNG 汽车维修企业应具备的技术条件

The CNG vehicle maintenance and repair enterprise shall be equipped with the following basic technique conditions:

1) 进行 CNG 汽车维修的作业人员需经过专业培训，并经考核合格。

The CNG vehicle maintenance and repair people should have professional training and pass the examination.

2) 具备维修 CNG 汽车专用装置特殊要求所需的维修、检测、诊断仪器设备，包括气密性及压力检查等手段。

It should be equipped with maintenance, inspection, diagnosis instrument equipment that special equipment of CNG vehicle required, including inspection of gas tightness and pressure.

3) 设有气密性检查、卸压操作的专用场地和存放专用装置的库房。

Set special site of gas tightness inspection and pressure relief operation, and storehouse that stored special equipment.

4) CNG 汽车维修作业车间通风良好，在有泄漏可能的场所应明示防明火、防静电的标志；

The CNG vehicle maintenance work shop has good ventilation, set fire proof and antistatic markings in possible leakage place.

5) 有可行有效的消防安全管理措施和必备的设备、消防人员等。

It should be equipped with effective safety management of the fire control, necessary equipments and firefighters.

6) 维修作业过程中所涉及的 CNG 专用装置应符合标准；气瓶的运输、储存、经销和使用应符合有关部门的规定。

The CNG special equipment that related in process of maintenance work shall be meet standards, the transportation, store, sell and use of gas cylinder shall be meet related department regulations.

8.2 维护作业的安全要求

The safety requirements of maintenance work

1) CNG 汽车维护作业前, 应首先进行 CNG 专用装置的气密性检查, 如有泄漏应先排除故障, 在确认系统密封良好后再进行维护作业。

Before carried out the maintenance work of CNG vehicle, inspect gas tightness of CNG special equipment. If there is any leakage, remove troubles firstly, confirm the system is in a good and seal condition, then carry out the maintenance work.

2) 维护作业中应先进行涉及 CNG 使用的检查、维护等作业, 然后关闭储气瓶截止阀并使管路内的 CNG 耗尽, 再进行其他项目的维护。

The inspection and maintenance work that related to using of CNG should be carried out firstly in process of maintenance work. Close stop valve of gas cylinder and make CNG of pipeline used up, then carry out other maintenance items.

3) 当需要进行焊割等有明火的作业时, 应拆掉蓄电池及重要总成的电控元件。应安全拆卸气瓶并放入专用库房妥善保管; 或在专用的符合安全防护要求的场地将 CNG 供气系统(包括储气瓶)卸压, 确保供气系统内无 CNG。

Remove electronic control components of battery and important assembly, if it is need to carry out welding and open fire works. Remove gas cylinder and put it to special store room to keep, or release the pressure of CNG air supply system (including gas cylinders) in the site that meet the safety protection requirements.

4) 如需在气瓶附近打磨或切割时，应先将其拆掉或有效隔离。应由具备认可资格的单位、人员从事气瓶维护与检测，不得在气瓶上进行挖补、焊割等作业。

If it is need to polish or cut near the gas cylinder, remove it firstly or isolate it effectively. The maintenance and repair works should be carried out by unit and people that are acquired qualification. Do not amend and weld on gas cylinders.

5) CNG 汽车如发生漏气，应立即关闭电源和储气瓶截止阀，然后在专用场地进行处理。如果高压管路破裂或脱落导致气体大量泄漏而无法关闭储气瓶截止阀时，应立即将现场进行隔离，不允许人、车入内，隔离火源，待天然气散尽后再作处理。

If the leakage is happened for CNG vehicles, turn off power supply and close stop valve of gas cylinder, and then process it in special site. If a large amount of air leakage is caused by high-pressure pipeline that is broken or dropped, and the stop valve of gas cylinder could not closed, isolate the scene and no entry of vehicle and people, isolate the fire source, and process it after the natural gas is spreaded out.

6) 如发生火情，除立即关闭电源和储气瓶截止阀外，应隔离现场，立即采取有效的灭火与救援措施。

If there is on fire, turn off power supply and close stop valve of gas cylinder, isolate the scene and adopt effective fire-fighting and rescue measures.

8.3CNG 汽车维护、检测作业内容与技术要求

The maintenance and inspection works and technical requirements of CNG vehicles

8.3.1 日常维护 daily maintenance

1) 驾驶员应在出车前、行车中和收车后重点观查 CNG 专用装置有无泄漏和异常情况。

The driver should check if the CNG special equipment is leakage and in abnormal condition in process of starting, driving, and parking.

2) 检视 CNG 专用装置各功能部件、系统的工作状态及其连接和密封, 要求状态正常且无松动、泄漏、损坏。气瓶及固定支架固定牢固、无损坏, 必要时更换; CNG 管路不得与其他部件擦碰。

Check each functional part, working condition of system, connection and seal of CNG special equipment, there should be in normal state and not have loose, leak and damage. The fixed brace and gas cylinder should be fixed firmly and have no damage, replace it if necessary. The CNG pipeline should not rub and crash with other parts.

3) 检查 CNG 储气量, 降至规定值以下时应立即加充 CNG。

Check CNG gas volume, and fill the CNG immediately after reduced to below of specified value.

4) 行车中, 应随时观察车辆各系统工作状况, 当发现 CNG 专用装置有过热、过冷、异味等异常现象时, 应立即关闭 CNG 储气瓶截止阀, 并及时送 CNG 汽车维修企业进行维修。

Observe each system working condition of vehicle in driving. If the CNG special equipment is overheating, undercooling and has abnormal taste, close stop valve of CNG gas cylinder immediately, and send it to CNG vehicle maintenance and repair enterprise in time.

5) 行车 15—30 天需对高压精滤器排污处理。排污前关闭气瓶组阀门, 打开面板 V2 阀门, 启动发动机待其自动熄火。

If the vehicle has been run for 15 to 30 days, the high pressure fine filter should be processed. Close valves of gas cylinder before processed and open V2 valve of panel, start engine and wait it flame-out automatically.

8.3.2 CNG 系统维护、检测作业项目、作业内容和技术要求见下表。

The maintenance and inspection items, working contents and technical requirements of CNG system is as follows:

序号 NO.	项目 Items	作业内容 working contents	技术要求 technical requirements
1	储气装置 Gas storing device	CNG 气瓶及固定支架 CNG gas cylinder and fixed brace	1) 气瓶检定审验有效。 The verification of gas cylinder is valid. 2) 气瓶表面应无严重划伤、凹凸、裂纹等缺陷。 The surface of gas cylinder shall no scratches and cracks. 3) 固定支架及扎带完好、无裂纹，固定牢固，垫层完好、无损坏，气瓶应固定可靠，无窜动和旋动现象。 The fixed brace and ribbon should be in good condition and not have cracks. The under layer should be good and have no damage. The gas cylinder should be fixed firmly, and have no rotation. 4) 对框架进行检查对螺栓紧固件进行拧紧力矩重新校核，周期为： Check the frame and tighten torque of bolt fastener, the period is: 车辆行驶总里程为 3000 公里时，对气瓶框架进行保养检查，保养项目有：1 检查框架

序号 NO.	项目 Items	作业内容 working contents	技术要求 technical requirements
1	储气装置 Gas storing device	CNG 气瓶及固定支架 CNG gas cylinder and fixed brace	本身有无明显缺陷、裂纹；2 校核各处螺栓紧固件拧紧力矩。车辆行驶总里程为 8000 公里时，进行第二次保养。车辆行驶总里程为 18000 公里时，进行第三次保养检查。之后每过 10000 公里进行一次保养检查。 When vehicle is run for 3000km, the gas cylinder frame should be checked and maintained. The maintenance items are: 1. check if the frame has obvious defect and cracks. 2. Check the tightening torque of each bolt fasteners. When vehicle is run for 8000km, the second maintenance should be carried out. When vehicle is run for 18000km, the third maintenance should be carried out. The maintenance should be carried out after run for every 10000km. 具体校核力矩见下表一 the specific torque is as follows:

序号 NO.	项目 Items	作业内容 working contents	技术要求 technical requirements
2	CNG 管路及卡箍 CNG pipeline and clamp	1) 检查紧固管线及接头; Check fastening lines and joints 2) 检查各连接部位有无泄漏。 Check if each connecting parts are leakage.	1) 高压管线及接头应无擦伤及其他损伤。 The high-pressure lines and joints shall be no scratched and other damage. 2) 接头紧固良好, 无漏气现象。保压 5 分钟后, 涂检漏液至少观察 1 分钟, 无气泡出现。 The joints are tightened in good condition and have no leakage. Keep the pressure for 5 minutes, paint leakage liquid and observe one minute at least and there are no bubbles. 3) 软管无老化、油垢、裂纹, 连接可靠, 与其他部件无摩擦。 The hose has no aging, oily dirt, and cracks. The connection is reliable and have no rub with other parts

序号 NO.	项目 Items	作业内容 working contents	技术要求 technical requirements
3	截止阀、充气阀、 组合阀等各类控制阀 及相关仪表等 Stop valve, inflation valve, combined valve, other control valves and related instruments	检查密封和工作性能 Check seal and working performance	1) 各种阀密封良好、开闭性能灵活有效， 相关仪表工作正常、安装牢固可靠。 The seal of each valve is good, and the opening and closing performance is flexible and effective. The work of related instruments is normal and the installation is reliable.
4	加气口 Air intake	1) 检查加气口的安装 及紧固情况； check installation and tightening condition of air intake 2) 检查单向阀。 Inspect check valve	1) 加气口固定牢固、清洁。The air intake is fixed firmly and clean. 2) 加气口、单向阀工作可靠无漏气现象， 防尘盖/防尘塞可靠有效。 The work of air intake and check valve is reliable and have no leakage, and the dust cover and plug are reliable

序号 NO.	项目 Items	作业内容 working contents	技术要求 technical requirements
5	压力传感器、压力表 Pressure sensor, pressure gage	性能检查 performance inspection	1) 显示准确。Display it correctly. 2) 与进气座/压力表接头连接处处无泄漏。 The connecting parts between air inlet holder and pressure gage have no leakage.
6	高压粗滤器 High pressure strainer	清洁或更换滤芯 Clean or replace the filter element	1) 三万公里用汽油浸泡、清洗滤芯并用 压缩空气吹干; 每十万公里或 12 个月更换 (以 先到为准)。 30,000 kilometers soak with gasoline, clean the filter element and blow dry with compressed air; replace every 100,000 kilometers or 12 months (whichever comes first).
7	高压精滤器 High pressure fine filter	排污、清洁或更换滤芯 Drain, clean or replace the filter element	1) 3000 公里排污, 10000 公里更换滤芯。 The sewage is discharged for 3000 kilometers and the filter element is replaced for 10000 kilometers. 2) 清洁, 工作良好。Clean and working well.

位置position	螺母类型 nut type	拧紧力矩(N·m) tightening torque
气瓶框架 gas cylinder frame	M6-8.8	10 ±1
	M8×1-8.8	23 ±2.5
	M10×1-8.8	45 ±4.5
	M12×1.5-8.8	75 ±7.5
	M14×1.5-8.8	135 ±13.5
	M16×1.5-8.8	200 ±20
	施必牢螺母M14-10 Spiralock nuts	150 ±15
	施必牢螺母Spiralock nuts M16-10	220 ±20
	施必牢螺母Spiralock nuts M18-10	300 ±30
气瓶管路 Gas cylinder pipeline	M6	6 ±0.5
	M8	12 ±1
	3/4"-16UNF	18 ±1.5
	7/8"-16UNF	22 ±2

表一 table 1

9 安全注意事项 safety precautions

1) CNG 汽车在维修时，15 米以内应无火源。

There is no fire within 15m, if CNG vehicle is repairing.

2) 天然气管路所有零部件禁止焊接。

All components of natural gas pipeline should not be welded.

3) 天然气汽车在维修时禁止带压操作。

Do not operate it with pressure when natural gas vehicle is repairing.

三. CNG车辆的使用和保养

The use and maintenance of CNG vehicle

1.时间要求: The time requirements:

供气（管路）系统要求CNG车辆运行半年后，即进行一次CNG燃气供给系统的例行保养工作，今后每运行满一个月，须进行一次系统的例行保养工作。

The air supply (pipeline) system should be carried out routine maintenance work of CNG gas supply system after CNG vehicle is run for half year. The routine maintenance work of system should be carried out after the vehicle is run for one month.

天然气发动机要求按发动机维护及保养时间间隔表进行（见下表）：

The requirements of natural gas engine shall be implemented by the interval table of engine repair and maintenance (see the table below):

日常维护或加气时 Daily maintenance or air filling	每 10000 公/250 小时 或 3 个月 Every 10000km/250 hours or 3 months	每 19000 公里/ 500 小 时或 6 个月 Every 19000km/500 hours or 6 months	每 38000 公里/1000 小时 或 1 年 Every38000km/1000 hours or 1 year	每 77000 公里/2000 小时或 2 年 Every77000km/2000 hours or 2 years
检查/更换 check/replace				
●发动机运行报告 The operation report of engine ●机油液面 oil level ●冷却液液面 the cooling liquid level ●传动胶带 driving belt ●冷却风扇 cooling fan ●泄漏 leakage	●机油和机油滤清器 oil and oil filter ●冷却液滤清器 cooling liquid filter - 检查或更换火花塞 check or replace spark plug - 检查或更换点火线 Check or replace ignition wire	●燃气滤清器 gas filter		●防冻液 antifreezing solution

附件紧固情况 tightening condition of accessories	调 整 adjustment			
●附件紧固情况 tightening condition of accessories ●检查天然气供给系统 Check natural gas supply system ●检查电气控制系统 Check electrical control system			●气门间隙 valve clearance	
	检 查 inspection			
	●进气系统 air-inlet system ●空气滤清器 air filter ●进气中冷器 air-inlet intercooler	●冷却液（防冻液浓度、添加剂浓度） Cooling liquid(antifreezing solution concentration, additive concentration)	●风扇毂 fan hub ●检查胶带松紧状况 check tightening condition of rubber belt ●检查胶带张紧轮轴承 Check tensioning wheel bearing of rubber belt	●检查减振器 check damper ●空气压缩机 air compressor ●清洗冷却系统 Clean cooling system

a.手动截止阀：检查手动截止阀的手柄是否灵活，牢固，发现问题立即予以修复或更换。

Manual stop valve: check if the handle of manual stop valve is flexible and firm. Repair and replace it immediately if you find the problem.

b.CNG高压过滤器：卸下排污螺栓，进行排污；更换密封垫后再拧紧排污螺栓。

CNG high-pressure filter: remove bolt and process it, tighten the bolt after replaced seal washer.

c.高压电磁阀功能检查：检查电磁阀工作是否正常，发现问题立即予以修复或更换。

Functional inspection of high-pressure magnetic valve: check if the magnetic valve work is normal, repair and replace it immediately if you find the problem.

d.剩余气量传感器：检查功能，发现问题，立即维修或更换。

The remaining gas volume sensor: check function and find problem, repair and replace it immediately.

e.操控面板：清洁控制面板外表面，检查压力表硅油液面是否过半、球阀手柄是否灵活、充气嘴是否有微漏（渗漏）现象，充气嘴护套或插销上的密封环是否破损，发现问题立即予以维修或更换。

Control panel: clean surface of control panel, check if silicone oil level of pressure gage is over half, the ball valve handle is flexible, the charging connector is leakage, the sheath of charging connector or seal ring of bolt are damage, repair and replace it immediately if you find the problem.

f.气瓶口密封检测：用检漏仪检测或肥皂水刷漏，发现泄漏，首先进行修复；不可修复的则更换气瓶。

Seal inspection of gas cylinder port: use leak detector or soapy water to check, repair it firstly if you find the leakage, and replace the gas cylinder if it could not repair.

g.系统电器件功能检查：发现功能缺陷，立即予以修复或更换。

Functional inspection of system electric device: if you find functional defect, repair and replace it immediately.

h.每四万公里须更换下列件：

Replace the following parts if vehicle is run for every 40000km:

(1) .电磁阀的阀芯、阀芯密封垫、阀杆密封圈。

Replace valve element of magnetic valve, seal washer of valve element, and seal ring of valve rod.

(2) .一级减压器滤芯。

Filter element of first-class decompressor

(3) .高压过滤器滤芯。

Filter element of high-pressure filter

(4) .充气阀阀芯。

Valve element of inflation valve

2.天然气发动机例行保养工作内容 维护保养所需工具

The routine maintenance working contents for natural gas engine

The required tools in repair and maintenance

发动机维护保养所需的基本工具

The required basic tools in engine repair and maintenance

序号No.	套筒 sleeve	扳手 spanner	其他工具 other tools
1	16 mm	24 mm	滤清器扳手 filter spanner
2		18mm	扭矩扳手 torque spanner
3		17mm	螺钉旋具 screwdriver
4		14 mm	火花塞套筒 spark plug sleeve
5		13mm	易燃气体探测器 inflammable gas detector
6		10mm	气门间隙塞尺 filler gauge of valve clearance

3. 检查和保养项目

Inspection and maintenance items

1) 每日检查项目 Daily inspection items

在起动发动机之前，检查机油油位和冷却液液面，查看：是否有泄漏、是否有松动或损坏部件，特别是燃气系统、电气系统和进排气系统，皮带是否磨损或损坏，发动机是否有任何变化，燃气是否逸出或泄漏（通过气味判断）。

Before started the engine, check oil level and cooling liquid level. Check if there is any leak, and the components are loose or damage, especially check the gas system, electric system, air intake and exhaust system. Check if the belt is wear or damage, and the engine has any change. Inspect if there is any leakage (judged by smell) .

2) 下列情况应向维修部门进行汇报：

Give a report to maintenance department, if under the following conditions:

- 机油油压低 The oil pressure is low.
- 功率低 The power is low.
- 功率增加或波动 The power is increased or fluctuated.

- 冷却液或机油温度异常 The cooling liquid or oil temperature is abnormal.

- 发动机异常噪音 Engine has abnormal noise.

- 排烟、冷却液、燃气或机油消耗过大 The consumption of discharging smoke, cooling liquid, gas or fuel is too large.

- 任何冷却液、燃气、排气或机油的泄漏 Any leakage of cooling liquid, gas, exhaust or fuel

- 燃气气味 Fuel smell

- 油门反应不正常、无控制或无反应 The throttle response is not normal, and no control or response.

3) 检查机油油面 Check oil level

- 检查油面高度需在发动机停车(至少 5 分钟)后进行,使机油有充分的时间流回油底壳。当油面低于油尺上“L”(低油面)记号或高于“H”(高油面)记号时,绝不允许开动发动机。

The oil level should be checked after engine is stopped (5minutes at least), and make engine oil have enough time to reflow the oil pan. When the oil level is lower than “L” (low oil level) mark or higher than “H” (high oil level) mark in dipstick, do not start the engine.

- 油尺低位至高位(“L”至“H”)的油量差约为 3.8 升。

The oil volume difference from lower level to higher level in dispatch is about 3.8L.

4) .检查冷却液面 Check cooling liquid level

- 打开散热器或膨胀水箱的加水口盖或液面检查口闷头检查冷却液面。

Open filler cap of radiator or expansion tank, and check cooling liquid level.

警告：需等发动机内冷却液温度降至 50 ℃ 以下时，方可拧开散热器加水口盖或液面检查口闷头。发动机刚停车就立即拧开，带压力的高温水和蒸气会喷出伤人！需慢慢地拧开加水口盖或冷却液检查口闷头以使冷却系统逐渐减压。

Warning: the filler cap of radiator or choke plug of liquid level should be opened after coolant temperature of engine reduced to 50 ℃ below. The high-temperature water with pressure and steam could hurt people if open it immediately when the engine is just stopped. It should be opened slowly and make cooling system reduced pressure gradually.

- 防冻液应和水混合好后注入发动机。若直接注入发动机，会引起发动机过热。

The antifreezing solution should be mixed with water, and then add them to engine. If add it to engine directly, it may cause overheat of engine.

警告：若发动机冷却液中不加 DCA4 添加剂，缸套会产生穴蚀，将严重影响缸套使用寿命。若发动机出气孔和放水孔锈蚀堵塞，会出现气阻，使发动机过热，造成冬天水放不掉引起机体冻裂等严重事故。

Warning: if the cooling liquid of engine has no DCA4 annexing agent, the cylinder liner could be in cavitation erosion and the service life of cylinder liner would be shorten. If air outlet and plug-hole of engine are blocked, it may cause air resistance and make engine overheating, and make frost crack of engine body happened.

- 注入冷却液时，应注意排除冷却液道中的空气。

Eliminate the air of cooling liquid, if added it.

• 必须慢慢地灌注冷却液以防止产生气阻，须等 2 至 3 分钟以便让空气能充分地排出冷却液注入冷却系统应注满至散热器或膨胀水箱加水口或液面检查口的底面为止。

Add cooling liquid slowly and prevent the air resistance produced. Wait about 2 or 3 minutes to eliminate the air. Add the cooling liquid to the underface of filler cap or level inspection port of radiator or expansion tank.

4. 检查天然气供气系统 Echeck air supply system of natural gas

要求每天都要检查天然气供气系统有无泄漏、供气系统（减压器、热交换器和调温器）加热水是否正常循环。燃气供气系统包括高压储气瓶、手动切断阀、高压燃气过滤器、高压截止阀、减压器、热交换器、燃气调温器、燃气计量阀和混合器。燃气计量阀和混合器装在发动机上，其它零部件装在支架或者车辆底

盘上。当有燃气气味逸出时应进行泄漏检查。使用高表面张力的液体来检测燃气的接头是否密封良好，如果发现泄漏，不要使用过大的扭矩，先按要求放气，再拆下接头检查 O 型圈，如果需要的话进行更换。

Check if the air supply system of natural gas is leakage, and if the air supply system is in normal cycle after added hot water (decompressor, heat exchanger and thermolator). The air supply include high-pressure gas cylinder, manual stop valve, high-pressure gas filter, high-pressure stop valve, decompressor, heat exchanger, thermolator, gas scale valve and mixer. The gas scale valve and mixer are installed on engine, and other parts are installed on brace and chassis of vehicle. The leak test shall be carried out if there is any gas leak. Use high surface tension liquid to check if gas joint is in good seal condition. Do not use overlarge torqueses if there is any leakage, exhaust first as required, then remove the joint and check O-type ring. If necessary, replace it.

1) .高压燃气滤清器 燃气的质量对发动机的性能影响较大，在一些极端的情况下，燃气的质量甚至会引起发动机的损坏。

High-pressure gas filter: the gas quality has a larger impact on engine performance. In the extreme condition, the gas quality even may cause the damage of engine.

高压燃气滤清器至少滤掉 95%的 0.3~0.6 微米范围内的浮质，这将会减少颗粒和油污染的可能性。

注意: 燃气中硫化氢的含量不得超过**30ppm**, 长期使用含硫化物较高的燃气, 将导致热交换器和调温器的腐蚀损坏。

The high-pressure filter can filtrate 95% of aerosol in range between 0.3 and 0.6. It may reduce possibility of particle and oil dirt. Attention: the sulfuretted hydrogen content should not exceed 30ppm in fuel gas. Use the fuel gas which is included sulfur compound for a long time, it may cause corrosion damage of heat exchanger and thermolator.

燃气中润滑油的平均含量至少为 70ppm。长期使用润滑油含量低于该限值的燃气，将导致燃气喷射阀的早期磨损。燃气滤清器的更换周期根据气质情况而定，但最多不超过 6 个月。

The average content of lubricating oil is 70ppm in fuel gas at least. Use the fuel gas which lubricating oil content is lower than its limiting value for a long time, it may cause premature wear of fuel gas injection valve. The replace period of gas filter is decided by gas quality condition, but it would better not exceed 6 months.

2) .减压器 decompressor

减压器将天然气的压力从气瓶的存储压力减至 6~9bar。天然气压力的降低会产生体积膨胀，温度降低。当发动机全负荷运行时，在临近减压器出口的地方可以达到-75℃低温。减压器与热交换器之间的管路应该具备承受此温度的能力。发动机的冷却液应该一直供给减压器，对其进行加热，防止冻结。减压器需要一根与进气系统相连的平衡管，能提高燃气喷射系统的反应速度。平衡管两端的连接都必须能够承受

3bar 以上的压力。平衡管的接头不能旋转或从减压器上取下，这样会使杂物进入减压器，引起膜片的过早损坏。在接头旁边贴有一块不干胶，上面写有“no rotation”（不能旋转）。在减压器中装有一个卸压装置，它可以保护低压管路及部件。卸压装置在压力达到 $13.8 \pm 2.75\text{bar}$ 时打开，压力降回到 11bar 左右时关闭。必须保证 PRD 出气通畅。强烈建议 PRD 的通风管被引到车外，最好是车的上方。

The decompressor make the pressure of natural gas reduced to the range between 6 and 9bar from stored pressure of gas cylinder. The decrease of natural gas pressure may generate volume expansion, and decrease temperature. When engine is operated in full load condition, the low temperature can reaches to -75°C in outlet position near the decompressor. The pipeline between decompressor and heat exchanger should have ability of bearing temperature. The cooling liquid of engine should be supplied for decompressor all the time, warm it and prevent its freezing. The decompressor needs a balance tube which is connected with air intake system, and can increase response speed of fuel gas injection system. The two ends connection of balance tube should bear pressure above 3bar. The balance tube joint could not rotate or take it from decompressor, it may cause other things entered into decompressor and make diaphragm damaged. There is an adhesive sticker near the joint, and “no rotation”is written on above. The pressure relief device is installed on decompressor, and it can protect low-pressure pipeline and parts. Open the pressure relief device when the pressure is reaches to the range of $13.8 \pm 2.75\text{bar}$; close it when pressure is reduced to about 11bar. Keep air out of PRD open. It is suggested that the vent pipe of PRD is better lead to out of vehicle, and the best position is on above of vehicle.

3) .热交换器 heat exchanger

热交换器用来提高减压后天然气的温度，这样可以避免由于温度低于 -40°C 而引起的低压截止阀橡胶密封件和燃气计量阀的损坏，同时防止燃气中的水份结冰而阻塞喷射器。

注意：发动机冷却液的冰点应该至少比当地可能达到的最低气温低 20°C 。如果冷却液在热交换器内发生冻结，那么热交换器会损坏。

The heat exchanger is used for increasing natural gas temperature after the pressure is reduced. It can avoid damage of rubber seal of stop valve and fuel gas scale valve, due to the the temperature is lower than -40°C . It is also prevent water freezing in fuel gas and blocking injector. Attention: the freezing point of engine cooling liquid should be lower 20°C than it reaches the minimum air temperature at local. If cooling liquid is freezing in heat exchanger, and the heat exchanger may be damaged.

4) .调温器 thermolator

调温器通过感应燃气的温度控制供给热交换器的冷却液流量，从而控制燃气温度，使其满足燃气计量阀的温度要求，同时控制燃气密度满足燃气计量阀最大燃气供应量。调温器上的燃气管路没有流向要求，而冷却液的流向是有要求的，在安装或更换调温器时，要注意冷却液的流向，虽然两端的接头是一样的，但上面有进水和出水标记。

The thermolator controls coolant flow which is supplied for heat exchanger by reaction of gas temperature. Thus, control the gas temperature and make it meet temperature requirements of fuel gas scale valve, and control fuel gas density to meet the maximum fuel gas supply of scale valve at the same time. The gas pipeline of thermolator has no flow direction requirements, but the flow direction of cooling liquid has. When installed or replaced thermolator, pay attention to the flow direction of cooling liquid. Although the two ends of joints are the same, there are inflow and outflow markings on it.

5.检查电气控制系统 check electrical control system

要求每天都要检查电气控制系统线路连接是否可靠、电气线路有无破损及高压点火线是否松动。电气线路未可靠连接的情况下不要起动发动机。氧传感器对某些类型的污染物很敏感, 包括: 硅、聚四氟乙烯、过量的发动机机油等, 这些污染物会缩短氧传感器的寿命。在任何进气部件中均不能使用聚四氟乙烯或以聚四氟乙烯为基础的产品。在初始的发动机磨合期间, 或在增压器或发动机维修后, 从排气系统中拆下传感器, 直到发动机烧完所有内部机油后再装上。发动机运转过程中不能断开氧传感器连线, 否则氧传感器会被污染。

Check if the connection of electrical control system is reliable, the electrical circuits have damage, and high-pressure ignition wire is loose. Do not start the engine if the electrical circuits are not in condition of reliable

connection. Oxygen sensor is very sensitive to some contaminants. Such as: silicon, polytetrafluoroethylene, and excess engine oil. This kind of contaminants could shorten the service life of oxygen sensor. Do not use polytetrafluoroethylene or any product which is based on polytetrafluoroethylene in air intake parts. In running-in period of initial engine, or the period after the supercharger or engine is repaired, remove the sensor from exhaust system and till the engine burned all oil, and then install it. Do not disconnect oxygen sensor wire in process of engine operation, if not, the oxygen sensor would be contaminated.

发动机保养、机油控制、燃气质量和其它一些因素都能影响氧传感器使用寿命。警告：电源线路连接松动会损坏电控单元，每天应仔细检查电瓶电源线和机体接地线是否可靠连接。

The engine maintenance, oil control, fuel gas quality and other factors may affect the service life of oxygen sensor. Warning: the loose connection of power circuits could damage the electronic control unit; check if power circuits of storage battery and ground lead of engine body are reliable connection in everyday.

警告：发动机线束部分和火花塞部分禁止用水冲洗，若发现线束部分有水，请立即用冷风吹干，然后才能起动发动机。

Warning: do not use water to wash harness and spark plug parts of engine. If there is water in harness parts, please blow it by cold air immediately, and then the engine could be started.

警告：发动机工作过程中不要接触高压点火线。

Warning: do not contact high voltage ignition wire in working process of engine.

6. 检查或更换高压点火线 check or replace high voltage ignition wire

- 目视检查高压点火线是否有腐蚀生锈，断裂痕迹，磨损裸露或烧灼现象，必要时更换高压点火线。

Check if the high voltage ignition wire is in corrosion, cracks, wear or burn. If necessary, replace high voltage ignition wire.

- 拆下高压点火线。Remove high voltage ignition wire
- **注意：**为防止高压点火线损坏，更换过程中，不要拉动线路。

Attention: do not pull circuits in process of replacing, and prevent high voltage ignition wire damaging.

- 先拆下线圈末端（A），再卸下火花塞末端（B）。

Remove end of coil （A）, and then remove end of spark plug （B）.

- **注：**一次只更换一个火花塞高压线，以防线路混乱。

Attention: replace one high voltage wire of spark plug at a time, avoid the circuits are in disorder.

- 从线圈和火花塞上拆卸导线向上拉动时，要前后移动。

Remove wires from coils and spark plug, pull it upward and move forward or backward.

- 安装高压点火线。

Install high voltage ignition wire.

- 在火花塞导线套管内部和外部都加滴少量绝缘润滑脂。稳固地将套管向下推，直至听到“啪”的一声并且感觉到套管已装在火花塞上。安装好线圈端子。

Add a bit of isolation lubricating grease to inside and outside of ignition plug wire bushing. Push the bushing downward till bang sound can be heard, and feel that the bushing has been installed on sparking plug. Install coil ends.

7.检查或更换火花塞 check or replace sparking plug

- 拆卸：在发动机停机状态下，先将导线从线圈接线端拆除，然后再从火花塞末端拆除。

Disassemble: remove wires from coil terminals in stopped state of engine, and then remove from ends of sparking plug.

- 用火花塞套筒（16mm）和加长杆、棘轮将火花塞逆时针拧松，但火花塞不要完全脱离基座螺纹。

Unscrew ignition plug in anticlockwise direction by using ignition plug bushing (16mm), extension bar and ratchet wheel, but the ignition plug should not separated from base thread completely.

注意：将火花塞套筒中的橡胶垫片拆除，防止火花塞粘有脏物或油污。

Attention: remove rubber washer of ignition plug bushing and prevent dirt or oil dirty on ignition plug.

- 将一个内径为 3/8 英寸的软管套在火花塞尾端并继续逆时针旋转，直到火花塞完全脱离。用软管将火花塞从安装座上取出，千万小心不要将火花塞脱落。将火花塞按其被取出的发动机缸号作上标记或配上标签。

Use a hose which inner diameter is 3/8 inch to cover the ends of sparking plug and continue to rotate at anti-clockwise direction, till the sparking plug is separated completely. Use hose to take out sparking plug from mounting base; do not make the sparking plug dropped. Mark the sparking plug or covered it with label by engine number.

- 外观检查火花塞电极是否腐蚀、损坏或烧焦，检查火花塞间隙是否正确。

Check if the electrodes of sparking plug are in corrosion, damaged or burned. Inspect if the sparking plug clearance is correct.

- 安装：用塞尺调整火花塞间隙至 $0.35 \pm 0.05\text{mm}$ ，检查火花塞套筒确保不带有脏物和油污。

Installation: adjust sparking plug clearance to the range of $0.35 \pm 0.05\text{mm}$ by using feeler. Check sparking plug bushing and ensure it without dirt and oil dirt.

注意：火花塞的寿命很大程度取决于火花塞的清洁度。脏物，油污和留下的指纹都可能影响火花塞根部与火花塞瓷料的密封强度。不要触摸火花塞瓷料部位，如必要可用不起毛的棉布和酒精擦洗干净。

Attention: the service life of ignition plug is depended by cleanliness of ceramic insulator in large extent. The dirt, oil dirt, and fingerprint left may affect seal intensity between root and porcelain of ignition plug. Do not touch porcelain parts of ignition plug. If necessary, you can use cotton cloth and ethyl alcohol to clean it.

注意：机械固定过紧能够损坏火花塞和气缸盖。

Attention: the fixation of machine is too tight, and it may damage the ignition plug and cylinder cover.

•将火花塞安装在气缸盖上，确保火花塞绝缘瓷料清洁干净，使用加长的磁性火花塞套筒。先手动将火花塞平滑旋入，以免毁坏螺纹，然后顺时针将火花塞拧紧。

Install ignition plug on cylinder cover, and ensure that the ceramic insulator is clean. Use extended and magnetic ignition plug bushing. Screw ignition plug in smoothness state by hand, and avoid thread damaged, and then tighten ignition plug at clockwise direction.

- 用扭矩扳手来完成火花塞安装 use torque spanner to install ignition plug
- 扭矩 torque: 20N.m~25N.m
- 火花塞间隙 ignition plug clearance : $0.35 \pm 0.05\text{mm}$

8. 高压天然气滤清器排污

Drain contamination of high-pressure natural gas filter

- 放掉燃气滤清器中的污渍。 Drain contaminations of fuel gas filter

9. 更换燃气滤清器 replace fuel gas filter

- 车上燃气滤清器的更换周期根据气质情况而定，但最多不超过 6 个月。

The replace period of fuel gas filter is depended on gas quality, but it could not exceed 6 months at most.

- 拆卸：(燃气管路的布置根据汽车的结构而有所不同，插图只提供正确的操作程序)

Disassemble: (the arrangement of gas pipeline is different by vehicle structure; the figure is just providing the right operational procedures.

- 关闭气瓶供气阀门 close air supply valve of gas cylinder
- 分别拆卸螺母(1)，贮油杯(2)，滤芯挡圈(3)和滤芯 (4)。

Remove nut(1), grease cup (2), retainer ring of filter element (3) and filter element (4) separately.

注意：易燃、禁止吸烟，内部物质有压力。

Attention: it is inflammable. No smoke. The inner substance has pressure.

- 安装一个新的滤清器(4)。然后安装滤清器挡圈(3)，贮油杯 (2) 和螺母 (1)。

Install a new filter (4), and then install retainer ring of filter (3), grease cup (2) and nut (1) .

注意：确保 O 型密封圈放在滤清器头部合适的位置。

Attention: it is ensure that O-type seal ring should put on head position of filter in a proper place.

- 重新将气瓶供气开关打开。用一个天然气检测器（也可用起泡剂或肥皂水），检查所有的连接处是否泄漏。

Open the air supply switch of gas cylinder again. Use one natural gas detector (use foaming agent or soapy water) to check if all joints are leakage.

四. CNG 车辆燃气部分基本故障与排除

The basic troubleshooting of fuel gas parts for CNG vehicle

1.天然气供给（管路）系统常见故障及排除方法

Common troubles and troubleshooting for natural gas supply（pipeline）system

1.1.故障类型：★发动机不着车故障原因判别方法：

Failure type: ★the engine could not start to drive, the failure cause and judging method is as follows:

a、首先查看 CNG 操控面板上的压力表，指针若为零时(确认气瓶组内应该有气)；假如上述方法排除不了故障，请先打开电源开关，再缓慢逐渐打开CNG高压过滤器排污口，查看CNG出气压力；

Check pressure gage in CNG control panel. If the pointer is 0 (confirm that the gas cylinder has air) ; if the

method could not eliminate failure, please turn on power switch, and open drain outlet of CNG high-pressure filter slowly, check CNG air out pressure.

b、听不到嘶嘶有力的出气声，则是CNG供气系统故障

If the hissing sound could not be heard, the CNG air supply system is failure.

c、能听到嘶嘶有力的出气声则请发动机单位检查发动机。故障处理方式：

If the hissing sound could be heard, check the engine. The troubleshooting methods are as follows:

c、请驾驶员反复开、闭驾驶室仪表板上的电源开关4~6次，每次间隔3~5秒，观察操控面板上的压力表指针，若读数正常，即可启动发动机；

Turn on and off the power switch of instrument panel in cab for 4 to 6 times by driver. Interval 3 to 5 seconds every time, and observe pointer of pressure gage on control panel. If readings are normal, engine can be started.

d、清洗过滤芯或向陕重汽服务站或燃气管路供应商报修；

Clean filter element or request shanqi service station or fuel gas pipeline supplier for repair.

e、向CNG发动机单位生产厂家服务站报修。

Request service station of CNG engine manufacturer for repair.

1.2.故障类型：发动机容易灭火故障原因判别方法：

Failure type: ★the engine is flame-out easy, the failure cause and judging method is as follows:

检查供气系统有无堵塞现象 故障处理方式：自行处理，或燃气管路供应商报修。

Check if the air supply system has block. The solving method: solve it by oneself, or request gas pipeline supplier for repair.

1.3.故障类型：加气站加气时，加不进气故障原因判别方法：

Failure type: it could not added gas. The failure cause and judging method is as follows:

a、检查充气球阀手柄是否打开；

Check if ball valve handle of air inflation is open.

b、检查气瓶阀是否打开；

Check if gas cylinder valve is open.

c、充气阀、球阀或压力表故障。故障处理方式：

The air inflation valve, ball valve or pressure gages are failure, the solving method:

d、自行排除；Solve it by oneself

e、更换或向燃气管路供应商报修；

Replace or request gas pipeline supplier for repair.

1.4.故障类型：充气阀漏气 故障原因判别方法：阀芯胶圈失效；故障处理方式：更换充气阀或向燃气管路供应商报修；

Failure type: the inflation valve is leakage. The failure cause and judging method is as follows: the valve element rubber ring is invalid. The solving method: replace inflation valve or request gas pipeline supplier for repair.

1.5.故障类型：压力表漏油

Failure type: the pressure gage is leakage.

1.故障原因判别方法：表体密封失效（液面低于 1/3 须更换压力表）；

故障处理方式：更换或向燃气管路供应商报修。

The failure cause and judging method: the surface seal is invalid (the level is lower of 1/3, pressure gage should be replaced). The solving method: replace or request gas pipeline supplier for repair.

1.天然气发动机部分常见故障及排除方法：见发动机故障码描述及排除说明。

The common troubleshooting of natural engine parts: see fault code description and troubleshooting specification of engine.

(十五) ECAS 系统——适用于公路牵引/载货车

ECAS system - suitable for road tractors/ lorry trucks

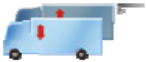
一、ECAS 系统简介:

I. Introduction to ECAS System:

ECAS 是 Electronic Control Air Suspension——电子控制空气悬挂系统的缩写。它由 ECU、组合电磁阀、高度传感器、仪表显示、开关等组成。工作原理为: 高度传感器安装在车架上, 通过摆杆与桥连接, 当车身与桥高度变化时, 高度传感器内产生感应电流, 电信号传到 ECU, ECU 将此高度变化与其内储存的设定高度进行比较, 给出信号控制电磁阀给气囊充气或排气, 从而实现车身高度恒定控制, 空气悬架的主要特性见表。

ECAS is the abbreviation of Electronic Control Air Suspension, electronically controlled air suspension system. It consists of ECU, combination solenoid valve, height sensor, meter display, switch and other components. The working principle is: the height sensor is mounted on the frame and is connected with the bridge through the swing bar. When the height of the vehicle body and the axle changes, an induced current is generated in the height sensor, and the electric signal is transmitted to the ECU. The ECU changes the height and its stored value, compares the height change with its set height and gives the signal to control solenoid valve to inflate or exhaust the airbag to achieve a constant height control of the vehicle. The main characteristics of the air suspension are shown in the table.

空气悬架主要特性项目 Air suspension main characteristic	功 能 Function	选 用 Option
 驾驶室减震功能 Cab damping function	驾驶室减震功能是将驾驶室与底盘分开 Cab vibration reduction function separates the cab from the chassis	
 底盘减震功能 Chassis damping function	改良的底盘减震功能能够提供对负载货物的很好保护 Improved chassis vibration reduction provides good protection of the loaded cargo.	●
 负载/空载高度记忆 Load/no-load height memory	在装载和卸载期间，车辆底盘将保持与装货台等高的恒定高度。 During loading and unloading, the vehicle chassis will maintain a constant height equal to the loading station.	●
 驾驶过程高度自动调整 Automatic height adjustment during driving	在车辆达到某个确定速度时将自动调整到正常高度 Automatically adjusted to normal altitude when the vehicle reaches a certain speed.	●

空气悬架主要特性项目 Air suspension main characteristic	功 能 Function	选 用 Option
 不同的驾驶高度调节 Different driving height adjustment	最多可设置 2 个不同的行驶高度 Up to 2 different ride heights can be set.	●
 轴荷检测 Axle load detection	实时检测每根车轴的负载以避免过载和罚款 Real-time detection of the load of each axle to avoid overloading and fines	
 驱动辅助 Drive assist	在轴荷允许的范围内最大限度进行驱动辅助控制 Maximize drive assist control within the allowable range of axle load.	●
 遥控功能 Remote control function	利用遥控器可使上升和下降的操作更加方便迅速 Use remote control to make rising and falling operations easier and faster.	●
 用户自定义开关控制 User-defined switch control	驾驶员可方便的通过仪表盘开关快速进行上升和下降操作 The driver can conveniently perform the ascending and descending operations through the dashboard switch.	

（十六）ADAS 系统 ADAS system

ADAS 系统主要实现车道偏离 LDW、前碰撞预警 FCW、行人碰撞预警 PCW、远近光切换 IHC 和交通标示符识别 TSR 等功能，可通过仪表软开关实现系统功能的手动开启和关闭，默认所有功能开启，灵敏度默认等级 2 级。仪表软开关操作见仪表使用说明。

The ADAS system mainly implements functions such as lane departure LDW, front collision warning FCW, pedestrian collision warning PCW, far and near light switching IHC, and traffic identifier recognition TSR. The system functions can be manually turned on and off through the instrument soft switch. All functions are turned on by default. The default sensitivity level is 2. For the soft switch operation of the instrument, please refer to the instructions of the instrument.



当发动机起动，ADAS 预警系统开启时，仪表提示“雷达和摄像头已就绪，ADAS 预警系统已开启”5s。当 ADAS 预警系统关闭时，液晶提示“ADAS 预警系统已关闭”5s。

When the engine starts and the ADAS early warning system is turned on, the instrument prompts "radar and camera are ready, and the ADAS early warning system is turned on" for 5 seconds. When the ADAS early warning system is closed, the LCD prompts "ADAS early warning system is closed" for 5s.



当 ADAS 系统外界物理故障，仪表显示黄色报警图标，同时文字提示“前摄像头故障” 5s，扬声器报警 2s。

When the external physical failure of the ADAS system occurs, the meter displays a yellow alarm icon, and the text prompts "front camera failure" for 5s, and the speaker alarms for 2s.



当车速 $\geq 60\text{km/h}$ 时，LDW 系统激活。车道线显示按实际检测情况进行显示，主界面如下：

When the vehicle speed is $\geq 60\text{km/h}$, the LDW system is activated. The lane line display is displayed according to the actual detection situation, and the main interface is as follows:



未检测到车道线 Lane line not detected



仅检测到右车道线 Only the right lane line detected



仅检测到左车道线 Only the left lane line detected



检测到双车道线 Two-lane line detected

当车道偏离系统激活，车辆偏离车道线，仪表主界面显示如下，偏离车道显示红色闪烁（0.5s 亮，0.5s 灭）；扬声器报警。

When the lane departure system is activated and the vehicle deviates from the lane line, the main interface of the meter is displayed as follows, and the deviated lane display flashes red (on for 0.5s, off for 0.5s); the speaker alarms.



当转向灯开启、或危急报警开关工作，车道偏离系统被抑制，偏离车道线时不报警，仅按实际检测的车道线进行显示：

When the turn signal is turned on or the emergency alarm switch works, the lane departure system is suppressed, and no alarm will be issued when deviating from the lane line, and only the actual detected lane line will be displayed:



当车速 ≥ 30 km/h，灯光在 auto 档，夜间智能远光灯控制系统激活时，仪表灯光蓝色指示灯点亮。

When the vehicle speed is ≥ 30 km/h, the light is in the auto gear, and the intelligent high beam control system at night is activated, the blue indicator light of the instrument light is on.



当车速 $\geq 5\text{km/h}$ ，识别到限速标识时，液晶显示限速值；仪表提示“本路段限速 XXkm/h ，请注意车速” 5s；当仪表车速超过限速值时，仪表提示“您已超速，请控制车速” 5s，扬声器报警 1s。

When the vehicle speed is greater than or equal to 5km/h and the speed limit sign is recognized, the LCD will display the speed limit value; the instrument prompts “the speed limit of this road section is XXkm/h , please pay attention to the speed” for 5s; when the instrument speed exceeds the speed limit value, the instrument prompts “you The speed has been exceeded, please control the speed for 5s, and the speaker will alarm for 1s.



当限速标识解除时，取消限速值显示，文字提示“本路段限速已解除”。

When the speed limit sign is lifted, the speed limit value display is cancelled, and the text prompts "the speed limit on this road section has been lifted".



当车速 $\geq 15\text{km/h}$ ，PCW 工作/FCW 工作，碰撞指示灯点亮（绿色）；

When the vehicle speed is $\geq 15\text{km/h}$, PCW work/FCW work, and the collision indicator light is on (green);



PCW/FCW 系统故障，碰撞指示灯点亮（黄色），同时文字提示“前摄像头/雷达故障”5s；扬声器报警 2s。

When the PCW/FCW system fails, the collision indicator lights up (yellow), and the text prompts "front camera/radar failure" for 5s; the speaker alarms for 2s.

当系统检测到有碰撞风险时，达到碰撞报警条件，PCW/FCW 报警：一级：报警黄灯闪烁（0.5s 亮，0.5s 灭），扬声器报警；二级：报警红灯闪烁（0.5s 亮，0.5s 灭），扬声器报警（声音更急促）；当刹车或离合踏板踩下时，系统抑制，报警提示终止。

When the system detects the risk of collision, it reaches the collision alarm condition, and the PCW/FCW alarm: first level: alarm yellow light flashes (0.5s on, 0.5s off), speaker alarm; second level: alarm red light flashes (0.5s on), 0.5s off), speaker alarm (the sound is more rapid); when the brake or clutch pedal is stepped on, the system suppresses and the alarm is terminated.



(十七) 坡道起步辅助系统 Hill start assist system

WABCO HSA

1.系统名称: 坡道起步辅助系统, WABCO 公司在 ABS 系统上英文名称 HSA(HillStartAid)。

System name: Hill Start Aid, WABCO's English name HSA (HillStartAid) on the ABS system.

2.系统功能: 主要通过放开制动踏板后, 驱动力作用之前这段空白时间, 保持制动压力很短一段时间来实现, 主要用于坡道上临时停车, 如堵车等。

System function: It is mainly achieved by keeping the brake pressure for a short period of time after the brake pedal is released and the blank time before the driving force is applied. It is mainly used for temporary parking on the slope, such as traffic jam.

3.系统适用的对象: 带有 ABS/EBS 坡起系统和自动变速箱的车型

The system is applicable to: models with ABS/EBS slope starting system and automatic transmission

4.工作原理: working principle:

坡道起步是为停驻坡道的车辆启动时提供的辅助功能, 当驾驶员通过开关打开此功时, 所有桥上会产生一个制动力, 具体值根据由车辆参数, 例如驾驶员需求、车辆质量、坡度大小等决定。

Ramp start is an auxiliary function provided for vehicles parked on a ramp when starting. When the driver

turns on this function through a switch, a braking force will be generated on all bridges. The specific value is based on the vehicle parameters, such as driver demand, vehicle The quality, slope size, etc. are determined.

系统工作的前提条件如下: The prerequisites for system work are as follows:

- 车辆处于启动状态; The vehicle is starting;
- 发动机转速大于 400rpm; The engine speed is greater than 400rpm;
- 可提供制动气压大于 6.5bar, 在安全气压之下, 系统不能正常工作;

It can provide brake air pressure greater than 6.5bar, under safe air pressure, the system cannot work normally;

- 驻车制动分离; The parking brake is separated;
- 车辆停止, 且 ABS 功能必须处于不工作状态;

The vehicle is stopped and the ABS function must be in a non-working state;

●只有相关的所有的车载系统功能正常时此系统才可以工作, 任何相关的参数出现故障时, 例如轮速信号错误或者压力传感器出错都会阻止此功能工作, 此种情况下若启动此系统功能, 则系统会发出报警信息(具体通过 HillHolderMode 状态裁决)。

This system can only work when all the relevant on-board system functions are normal. Any related parameter failure, such as a wheel speed signal error or a pressure sensor error, will prevent this function from working. In this case, if the system function is activated, then The system will send out an alarm message (specifically judged by the HillHolderMode status).

具体工作原理如图 1 所示，具体描述如下：

The specific working principle is shown in Figure 1, and the specific description is as follows:

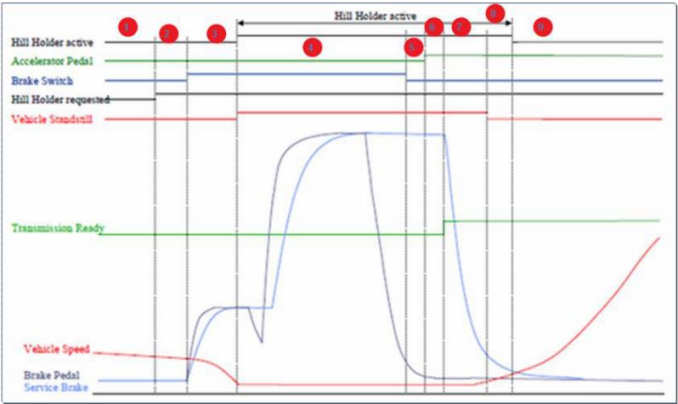


图 1HSA 工作逻辑图(启动后车辆行走)

Figure 1 HSA working logic diagram (vehicle walking after starting)

状态 1: 车辆在坡度上正常行驶，坡度大于 3%；

State 1: The vehicle is running normally on a slope with a slope greater than 3%;

状态 2: 驾驶员启动坡度辅助请求，并准备制动停车；

State 2: The driver initiates the gradient assistance request and prepares to brake to stop;

状态 3: 驾驶员制动使车辆在坡道停止，并启动驻车制动；

State 3: The driver brakes the vehicle to stop on the slope and activates the parking brake;

状态 4: 车辆停止，驻车制动系统处于正常工作状态，此时准备行车，是的 HSA 系统处于激活状态；

State 4: The vehicle is stopped and the parking brake system is in normal working state. At this time, it is ready to drive, and yes, the HSA system is active;

状态 5: 车辆停止，但是驻车制动系统关闭，驾驶员放开制动踏板，准备移动到加速踏板，此移动过程中会出现车辆动力短暂中断期，若没有制动力或者驱动力补偿下滑力，车辆则可能下滑，故此阶段 HSA 系统 由激活状态进入激活但短时间后会关闭的状态，使制动力延迟一段时间后自动关闭，这个时间需要具体标定，一般 2 秒左右；除 HSA 制动力。最后，HSA 进入不激活状态，即**状态 10**，完成整个系统的一个工作周期。

State 5: The vehicle is stopped, but the parking brake system is turned off. The driver releases the brake pedal and prepares to move to the accelerator pedal. During this movement, there will be a short interruption of vehicle power. If there is no braking force or driving force to compensate for the sliding force, The vehicle may slide down. Therefore, at this stage, the HSA system enters the activated state but will be turned off after a short time. The braking force will be automatically turned off after a delay. This time needs to be calibrated specifically, generally about 2 seconds; except for the HSA braking force. Finally, the HSA enters the inactive state, that is, state 10, completing a work cycle of the entire system.

状态 6: HSA 处于激活且警告状态，此时检测到驾驶员启动加速踏板的指令(加速踏板位置报文)和自动 变速箱准备好加速的报文，则 HSA 系统警告一小段时间结束状态；

State 6: HSA is in active and warning state. At this time, when the driver's command to activate the accelerator pedal (accelerator pedal position message) and the message that the automatic transmission is ready to accelerate are detected, the HSA system warns for a short period of time to end the state;

状态 7: HSA 系统制动力逐渐解除，自动变速箱工作，驱动力逐渐提高，车辆由停车状态准备驱动前进；

State 7: The braking force of the HSA system is gradually released, the automatic gearbox works, the driving force is gradually increased, and the vehicle is ready to drive forward from the parking state;

状态 8: 驱动力大于制动力, 车辆由停止状态起步前行, HSA 系统准备进入非激活状态;

State 8: The driving force is greater than the braking force, the vehicle starts from the stopped state and the HSA system is ready to enter the inactive state;

状态 9: 车辆启动成功, 进入正常行驶状态, HSA 系统进入非激活状态, 整个系统工作周期 另外, 在一些工况下, 例如持续堵车, 车辆可能准备启动前进而又没有前行, 如图 2 所示。其中在状态 7, 车辆加速踏板又回归不激活状态, 没有加速踏板行程, HSA 进入短暂的等待状态。若在等待状态中仍没有检测到加速踏板加速信息, 则进入状态 8, 进入警告驾驶员 HSA 的制动力即将消除的警告状态。随后则进入状态 9, 消除 HSA 制动力。最后, HSA 进入不激活状态, 即状态 10, 完成整个系统的一个工作周期。

State 9: The vehicle starts successfully, enters the normal driving state, the HSA system enters the inactive state, and the entire system work cycle. In addition, under some working conditions, such as continuous traffic jams, the vehicle may be ready to start and move forward, as shown in Figure 2. Show. Among them, in state 7, the vehicle accelerator pedal returns to the inactive state, there is no accelerator pedal stroke, and the HSA enters a short waiting state. If the accelerator pedal acceleration information is still not detected in the waiting state, enter state 8 and enter a warning state that warns the driver that the braking force of HSA is about to be eliminated. Then it enters state 9 to eliminate HSA braking force. Finally, the HSA enters the inactive state, that is, state 10, completing a work cycle of the entire system.

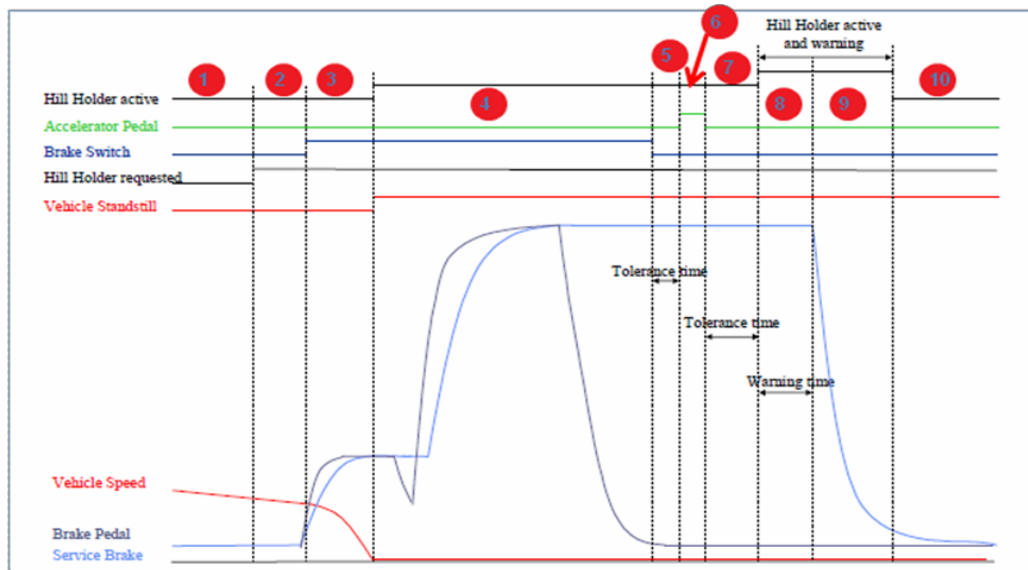


图.2 HSA 工作逻辑图(启动后车辆没有行走)

Fig. 2 HSA working logic diagram (the vehicle does not move after starting)

5.系统功能补充说明: Supplementary description of system functions:

● **警告!** 可能有这样的状况, HSA 不起作用, 可能发作细微滚动, 例如在较小的坡度(即小于 7%) 或者承载车辆或者拉动挂车时。HSA 不能替代启动行驶有关的活动。留意与其他车辆、人和物 品坚持间隔是驾驶员的义务, 最重要的是制动操作以确保在一切路况下平安操作车辆。为坚持平安控制您的车辆。行驶时一定要专心留意行驶时坚持平安控制您的车辆。未遵照这些正告会招致事故或者严重的人员伤害。

Warning! There may be situations where HSA does not work, and slight rolling may occur, such as when on a small slope (ie less than 7%) or when carrying a vehicle or pulling a trailer. HSA is not a substitute for activities related to starting driving. It is the driver's duty to pay attention to keeping the distance from other vehicles, people and objects. The most important thing is to operate the brakes to ensure the safe operation of the vehicle under all road conditions. To maintain safe control of your vehicle. When driving, be sure to pay attention to the safe control of your vehicle while driving. Failure to follow these warnings can result in accidents or serious personal injury.

● **警告!** 假如您对您的挂车运用挂车制动控制器, 您的挂车制动能够和车载 EBS 系统兼容。否则, 当释放制动踏板时, 可能没有足够的制动压力将车辆和挂车坚持在斜坡上。为了防止恢复加速时滚下斜坡, 在释放制动踏板前, 手动启动挂车制动或者施加更多的车辆制动压力。

Warning! If you use a trailer brake controller on your trailer, your trailer brake can be compatible with the on-board EBS system. Otherwise, when the brake pedal is released, there may not be enough brake pressure to hold the vehicle and trailer on the slope. To prevent rolling down the slope when regaining acceleration, manually activate the trailer brake or apply more vehicle braking pressure before releasing the brake pedal.

● **警告! HSA 并不是驻车制动器。当分开车辆时，一定要完整施加驻车制动器。同时，要肯定自动变速驱动桥在驻车档。未遵照这些正告会招致事故或者严重人员伤亡。**

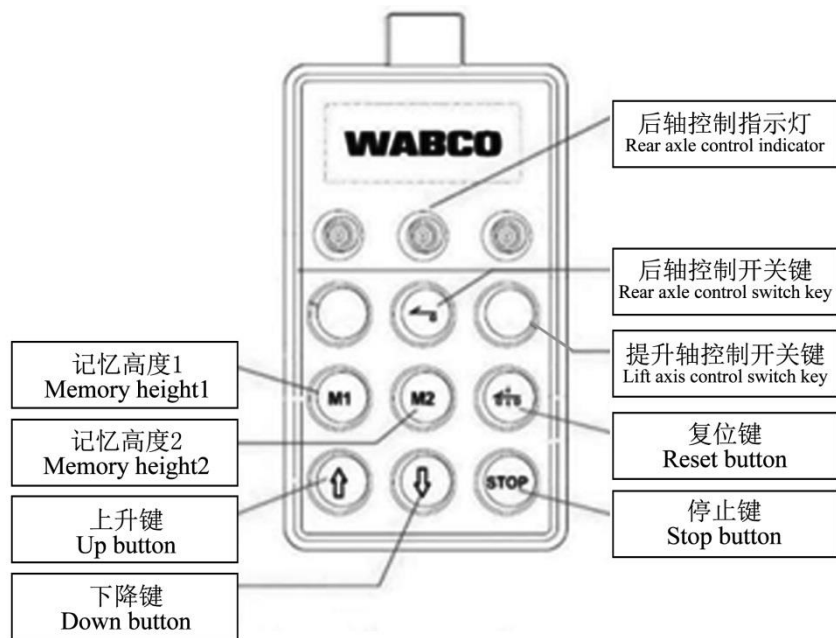
Warning! HSA is not a parking brake. When separating the vehicle, be sure to apply the parking brake completely. At the same time, make sure that the automatic transmission drive axle is in the parking position. Failure to follow these warnings can result in accidents or serious personal injury.

二、ECAS 系统的操作和功能

II. ECAS system operation and function

1、遥控器的操作和功能

1. Remote control operation and function



遥控器的界面如图所示

The interface of the remote control is shown in the figure

按动后轴控制开关键，将激活对车辆后轴的控制。可观察对应指示灯是否点亮来判断是否激活控制功能。

Pressing the rear axle control key will activate the control of the rear axle of the vehicle. Observe whether the corresponding indicator light is on to determine whether to activate the control function.

在指示灯点亮时，按动“上升键”或“下降键”可控制车轴悬架系统整体上升或下降。

When the indicator light is on, pressing the "up" or "down" key can control the overall axle suspension system to rise or fall.

记忆高度存储：将车辆调整到某一需要的高度后，按下“STOP”停止键，同时按下“M1”或“M2”记忆高度键，则车辆当前的高度将会存储为相应的记忆高度。

Memory height storage: After adjusting the vehicle to a desired height, press the "STOP" stop key and press the "M1" or "M2" memory height key. The current height of the vehicle will be stored as the corresponding memory height. .

使用记忆高度：按下“M1”或“M2”，则车辆会自动充放气达到上次存储在“M1”或“M2”的记忆高度。

Use memory height: Press “M1” or “M2”, the vehicle will automatically charge and bleed to the memory height last stored in “M1” or “M2”.

按动“复位”键，车辆将自动充放气恢复到正常行驶高度。

Press the "Reset" button, the vehicle will automatically return to normal driving height.

按动“停止”键，车辆将立即暂时停止当前的高度调节。

Press the "Stop" button and the vehicle will temporarily stop the current height adjustment.

注意：系统在车速超过某一限制后（一般为 30Km/h）将禁止使用遥控器进行上升/下降调整，但恢复正常高度除外。

Note: After the vehicle speed exceeds a certain limit (usually 30Km/h), the system will be prohibited from using the remote controller for rising/falling adjustment, except for normal height.

2、翘板开关操作和功能

2. Rocker switch operation and function

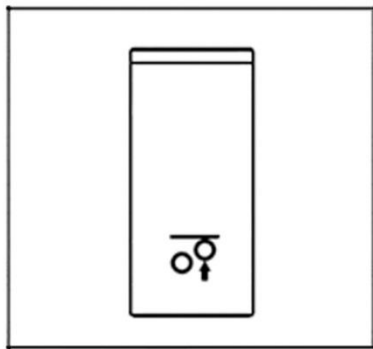
a、提升轴控制开关

a. Lifting axis control switch

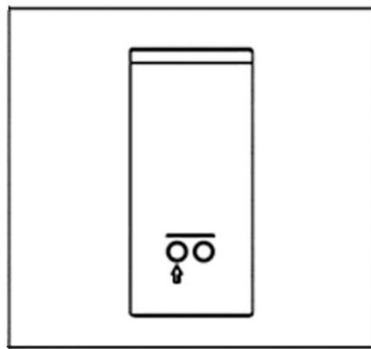
如果车辆匹配了提升轴控制开关，则可通过此开关控制提升轴的提升和降落。按压开关上方提升提升轴，按压开关下方落下提升轴。

If the vehicle is equipped with a lift shaft control switch, this switch can be used to control lifting and

landing of the lift shaft. Press the switch to lift the lifting shaft and press the switch to lower the lifting shaft.



提升轴升降控制开关
Lift shaft lift control switch



ECAS 提升驱动帮助功能开关 (BH)
ECAS lift drive help function switch (BH)

需要说明的是提升轴的位置只有两种状态：提起和落下。因此按动开关后，提升轴会自动持续地进行充放气至相应的位置。不可能通过开关将提升轴停留在中间位置。

It should be noted that there are only two states of the lift shaft: lifting and falling. Therefore, after the switch is pressed, the lifting shaft automatically continues to charge and deflate to the corresponding position. It is not possible to stop the lift shaft in the middle position with the switch.

通过仪表台上相应的指示灯^绿可以了解当前提升轴是否处于运动状态。

Through the corresponding indicator on the instrument panel, you can know whether the current lifting shaft is in motion.

b、驱动帮助开关

b. Drive help switch

如果车辆匹配了驱动帮助开关，则可通过此开关激活驱动帮助功能。按压开关上方激活驱动帮助，按压开关下方取消驱动帮助。

If the vehicle matches the drive assist switch, the drive assist function can be activated by this switch. Push the top of the switch to activate the drive help and press the bottom of the switch to cancel the drive help.

驱动帮助功能是电控空气悬架系统提供的特殊辅助功能。激活此功能后系统会将提升轴或随动轴上的承载载荷向驱动轴转移，直至驱动轴达到最大载荷。这样可以使驱动轴对地面的正压力达到最大，从而使车辆的驱动力达到最大。

The drive assist function is a special auxiliary function provided by the electronically controlled air suspension system. When this function is activated, the system shifts the load on the lift or follower shaft to the drive shaft until the drive shaft reaches the maximum load. This will maximize the positive pressure on the drive

shaft to the ground, thus maximizing the driving force of the vehicle.

通常在车速低于 30km/h 时（包括 0km/h）允许激活驱动帮助开关，在车速超过 30km/h 后驱动帮助功能将自动关闭。

Normally, when the vehicle speed is lower than 30km/h (including 0km/h), it is allowed to activate the driving assistance switch. After the vehicle speed exceeds 30km/h, the driving assistance function will be automatically closed.

注意：提升轴提升的上限位置为车架靠近提升轴位置下翼面的橡胶止挡块。

Note: The upper limit of lifting shaft t is the rubber stopper of the frame near the lower wing of the lifting shaft.

天然气发动机电控系统简介：Natural Gas Engine Electronic Control System:

（陕汽现有天然气发动机电控单元采用 Woodward 公司生产的 OH2、OH6 系统，BOSCH 公司的 EGC4 系统，潍柴自主 ECU 系统三者都具有自诊断功能，一旦检测出电控系统故障，系统会产生对应的故障代码并存入内存，依照故障的严重等级，使故障诊断灯点亮，并可进入不同程度的失效保护模式。

(Shaanxi Automobile' s current natural gas engine electronic control unit uses Woodward' s OH2, OH6 system, BOSCH' s EGC4 system, and Weichai' s autonomous ECU system. All three have self-diagnosis functions. Once the electronic control system fails, the system will generate The corresponding fault code is also

stored in the memory. According to the severity of the fault, the fault diagnosis lamp is lit, and different degrees of fail-safe mode can be entered.

Woodward 系统可实现怠速提升、远程油门控制、巡航功能、限速功能、排气制动、电磁离合器风扇控制、CAN 通讯等功能。OH2 系统诊断采用 RS-485 通讯口，诊断接口由发动机自带，通过 USB-485 接线与诊断软件连接。OH6 系统 ECU 集成安装在发动机本体上，整车有专门的诊断接口用于诊断和数据标定。

The Woodward system can realize functions such as idle speed increase, remote throttle control, cruise function, speed limit function, exhaust brake, electromagnetic clutch fan control, and CAN communication. OH2 system diagnosis adopts RS-485 communication port. The diagnosis interface is provided by the engine and is connected to the diagnosis software through a USB-485 cable. The OH6 system ECU is integrated and installed on the engine body, and the vehicle has a special diagnostic interface for diagnosis and data calibration.

潍柴 BOSCH 系统燃气发动机是由潍柴与 BOSCH 公司合作，针对国内市场联合开发的新一代稀燃天然气发动机产品。基于潍柴发动机的成熟平台匹配 BOSCH 高可靠性电子部件，为用户提供更高品质燃气动力产品。

Weichai BOSCH system gas engine is a new generation of lean-burn natural gas engine product jointly developed by Weichai and BOSCH for the domestic market. The mature platform based on Weichai engine

matches BOSCH high-reliability electronic components to provide users with higher quality gas power products.

EGC4 系统可实现怠速提升、巡航功能、PTO 功能、限速功能、电磁离合器风扇控制、多态开关调节、CAN 通讯和诊断等功能。EGC4 系统采用 1 路 CAN 进行整车通讯，单独的 1 路 CAN 进行诊断标定。EGC4 系统 ECU 集成安装在发动机本体上，整车有专门的诊断接口用于诊断和数据标定。)

The EGC4 system can realize functions such as idle speed increase, cruise function, PTO function, speed limit function, electromagnetic clutch fan control, multi-state switch adjustment, CAN communication and diagnosis. The EGC4 system uses 1 CAN for vehicle communication, and a single CAN for diagnosis and calibration. The EGC4 system ECU is integrated and installed on the engine body, and the vehicle has a special diagnostic interface for diagnosis and data calibration.)

潍柴自主 ECU WISE11 系统天然气发动机电控单元有 8 个线束插槽，4 个发动机端插槽，4 个整车端插槽，各有 168 个针脚。潍柴自主电控系统中传感器包括：燃气温度压力传感器、增压压力传感器、进气压力传感器、机油压力传感器、转速传感器、水温传感器、氧传感器。电控系统中的传感器对发动机正常运行起到非常重要的作用，整车厂在整车安装过程中要注意对各个传感器的保护。

Weichai's own ECU WISE11 system natural gas engine electronic control unit has 8 wiring harness slots, 4 engine end slots, 4 vehicle end slots, each with 168 pins. The sensors in Weichai's autonomous electronic control system include: gas temperature and pressure sensors, boost pressure sensors, intake pressure sensors, oil pressure

sensors, speed sensors, water temperature sensors, and oxygen sensors. The sensors in the electronic control system play a very important role in the normal operation of the engine. The vehicle manufacturer should pay attention to the protection of each sensor during the installation of the vehicle.

三、汽车的保养 **Vehicle maintenance**

(一) 保养类别 **Maintenance classification**

根据汽车的不同用途和使用条件, 以及预期的年行驶里程, 将汽车的保养制度分为三类。

According to the different working conditions and anticipated running mileage of the truck, the maintenance classification is separated into 3 types:

I 类: 使用条件恶劣(气候严寒或酷热, 含尘量高, 短距离运输, 越野使用)或汽车年行驶里程不到 2 万(公里)。

Class I: Bad working conditions (such as extremely hot or cold, dusty environment, short distance transport, off-road diving) or the annual mileage is less than 20, 000 km.

II 类: 短、中距离运输, 年行驶里程不到 6 万(公里)。

Class II: Short or medium distance transport. Annual mileage is no more than 60,000km.

III 类: 远距离运输, 年行驶里程超过 6 万(公里)。

Class III: Long distance transport. Annual mileage is over 60,000km.

(二)例行检查和保养的间隔里程 The interval mileage of routine inspection and maintenance

各类使用条件的汽车例行检查和保养的间隔里程见表 1

The interval mileage of routine inspection and maintenance for vehicles in various conditions, are as shown in table 1.

(三)总成换油间隔里程 Oil draining periods for assemblies

1.正常使用条件见表 2

Oil draining periods for assemblies in normal use conditions

2.在恶劣使用条件下的发动机换油间隔里程见表 3

Under the condition of bad use of engine oil change interval mileage are shown in table 3.

恶劣使用条件分三种情况: Bad conditions of use in three conditions:

(1)热带或寒带气候(温度经常高于+30℃或低于-10℃)

Tropical or frigid climate (the temperature often higher than + 30 °C or below 10 °C)

(2)使用含硫量 0.5-1.0%的燃油

Use the fuel with the sulfur content between 0.5% and 1.0%.

(3)使用含硫量 1.0-1.5%的燃油

Use the fuel with the sulfur content between 1.0% and 1.5%.

表 1 Table1

单位: 1000m(公里) unit: 1000m

类别 Category	例行检查 Routine inspection	一级保养 First-class maintenance	例行检查 Routine inspection	二级保养 Second-class maintenance	例行检查 Routine inspection	一级保养 First-class maintenance	例行检查 Routine inspection	三级保养 Third-class maintenance	例行检查 Routine inspection	一级保养 First-class maintenance	例行检查 Routine inspection	二级保养 Second-class maintenance	例行检查 Routine inspection	一级保养 First-class maintenance	例行检查 Routine inspection	四级保养 Fourth-class maintenance
I	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320
II	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160
	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320
	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480
	490	500	510	520	530	540	550	560	570	580	590	600	610	620	630	640
III	15	30	45	60	75	90	105	120	135	150	165	180	195	210	235	240
	255	270	285	300	315	330	345	360	375	390	405	420	435	450	465	480
	495	510	525	540	555	570	585	600	615	630	645	660	675	690	705	720
	735	750	765	780	795	810	825	840	855	870	885	900	915	930	945	960

表 2 table2

●换油标记 oil change mark

类 别 Category	发动机 Engine	变速器分动器 Transmission transfer case	前、后桥 Front and rear axle	附 注 Remarks
第一次检查 First-time inspection	●	●		行驶 2000-4000km After running 2000 to 4000km
例行检查 Routine inspection	●			
一级保养 First-class maintenance	●			前、后桥根据车型 进行换油里程选择 The oil change range of the front and rear axles is selected according to the model
二级保养 Second-class maintenance	●	●	●	
三级保养 Third-class maintenance	●	●	●	
四级保养 Fourth-class maintenance	●	●	●	

备注：前、后桥换油周期按车型区分：自卸车/专用车/复合版、加强版牵引及载货车免首油周期 3 万 km 或 1 年；轻量化牵引车及载货车免首保，换油周期 6 万 km 或 1 年。

Remarks: The oil change intervals of the front and rear axles are differentiated by models: dump trucks/special vehicles/composite version, enhanced traction and trucks, the first fuel-free period is 30,000 km or 1 year; lightweight tractors and trucks are free Guaranteed, the oil change interval is 60,000 km or 1 year.

表 3 Table 3

使用条件 Operating condition	类 别 category	增压发动机 Supercharged engine
恶劣条件 (1) Execrable condition (1)	I II III	每隔 5000km Every 5000km
恶劣条件 (2) Execrable condition (2)	I II III	5000km 5000km 10000km
恶劣条件 (3) Execrable condition (3)	I II III	5000km
恶劣条件 (1+2) Execrable condition (1+2)	I II III	5000km
恶劣条件 (1+3) Execrable condition (1+3)	I II III	2500km

(四)保养作业要点 Keys of maintenance operation

1 日常保养项目

Daily maintenance items:

(1)检查手制动和脚制动

Check hand brake and pedal brake;

(2)检查照明、信号系统及各种指示灯工作情况(机油压力、贮气筒压力、空滤器保养示灯、充电指示灯等)

Check working status of lighting and signal system and all kinds of indication lamps (such as oil pressure, air storage reservoir pressure, air filter service indication lamp, charging indication lamp and etc.);

(3)检查刮水器和风挡玻璃洗涤器清洗瓶的液面

Check wiper and liquid level of windscreen washer cylinder;

(4)检查轮胎气压与状态

Check tyre air pressure and status;

(5)检查发动机机油、冷却液和燃油液面

Check levels of engine oil, coolant and fuel;

(6)检查制动防冻液泵充液量和各种工作油、液的容量

Check volume of brake and anti-freezing fluid and capacity of all kinds of working oil and fluid;

(7)排除贮气筒中的水

Drain water out of air storage reservoir.

2 各级保养项目(表 4)

All levels maintenance items (table 4)

表 4-1●保养内容, 包括换油、检查、调整

Table 4-1 maintenance items include change oil, checks and adjustment.

发动机 Engine	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
更换发动机油（每年至少一次） Change engine oil (at least once per year)	●	●	●	●	●	●
更换机油滤清器或滤芯 Change oil filter or filter element	●	每次更换发动机油时 Every time when change engine oil				
检查调整气门间隙 Inspect and adjust the valve clearance	●		●	●	●	●
检查喷油咀开启压力 Inspect the opening pressure of oil nozzle					●	●
更换燃油滤清器或滤芯 Replace fuel filter or filter element			●	●	●	●
清洗燃油泵粗滤器 Clean fuel pump coarse filter			●	●	●	●

发动机 Engine	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
检查冷却液容量并加足 Inspect coolant volume and fill it up	●	●	●	●	●	●
更换冷却度 Replace coolant	每隔 24 个月 Every two years					
紧固冷却管路管夹 Fasten cooling tube clip	●					
紧固进气管路软管和凸缘连接件 Fasten intake pipe hose and flange connector	●		●	●	●	●
检查空滤器保养指示灯 Inspect indicator lamp for air filter maintenance			●	●	●	●
清洁空滤器的集尘杯 Clean the dust collector of air filter		●	●	●	●	●
清洁空滤器主滤芯 Clean main element of air filter	当指示灯亮时 When indicator lamp is on					
更换空滤器主滤芯 Replace main element of air filter	当主滤芯损坏时 When the main filter element is damaged					

表 4-2 Table4-2

发动机 Engine	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
更换发动机油（每年至少一次） Change engine oil (at least once per year)						
	●	●	●	●	●	●
更换机油滤清器或滤 Change oil filter or filter element						
	●	每次更换发动机油时 Every time when change engine oil				
检查调整气门间隙 Inspect and adjust the valve clearance						
	●		●	●	●	●
检查喷油咀开启压力 Inspect the opening pressure of oil nozzle						
					●	●
更换燃油滤清器或滤芯 Replace fuel filter or filter element						
			●	●	●	●
清洗燃油泵粗滤器 Clean fuel pump coarse filter						
			●	●	●	●
检查冷却液容量并加足 Inspect coolant volume and fill it up						
	●	●	●	●	●	●
更换冷却度 Replace coolant						
每隔 24 个月 Every two years						

发动机 Engine	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
紧固冷却管路管夹 Fasten cooling tube clip						
	●	●	●	●	●	●
紧固进气管路软管和凸缘连接件 Fasten intake pipe hose and flange connector						
	●		●	●	●	●
检查空滤器保养指示灯 Inspect indicator lamp for air filter maintenance						
			●	●	●	●
清洁空滤器的集尘杯 Clean the dust collector of air filter						
		●	●	●	●	●
清洁空滤器主滤芯 Clean main element of air filter						
	当指示灯亮时 When indicator lamp is on					
更换空滤器主滤芯 Replace main element of air filter						
	当主滤芯损坏时 When the main filter element is damaged					
更换空滤器安全滤芯 Replace the safety air filter element						
	清洗 5 次主滤芯以后 After the main filter element has been cleaned for five times					
检查紧固三角皮带 Inspect and fasten V-belt						
	●	●	●	●	●	●
检查增压器轴承间隙 Inspect the bearing clearance of booster						

发动机 Engine	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
					●	●
检查喷油泵 Inspect injection pump						
						●
检查调整离合器的行程和钢丝绳状况 inspect and adjust clutch travel and wires condition						
	●	●	●	●	●	●
调整怠速转速 Adjust idle speed						
	●					
变速器 Transmission						
检查变速器油面 Inspect transmission oil level						
			●			
更换变速器润滑油（每年至少一次） Change transmission lubricant (at least once per year)						
	●			●	●	●
清洗空气滤清器滤芯（富勒变速器） Clean air filter element (Fuller Transmission)						
				●	●	●
更换变速器通气装置 Replace ventilation device of transmission						
				●	●	●

表 4-3 Table4-3

前桥 Front axle	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
检查主减速器和轮边减速器油面 Check oil level of main reductor and wheel reductor						
			●			
更换主减速器和轮边减速器润滑油（根据车型选择换油里程，每年至少一次） Change lubricant of main reductor and wheel reductor (at least once per year)						
			●	●	●	●
清洁前驱动桥通气装置 Clean ventilation device of front drive axle						
			●	●	●	●
检查调整非驱动前桥滚锥轴承间隙 Inspect and adjust taper roller bearing clearance of non-driving front axle						
	第一次 2 级保养进行 Carrying out when implementing the second-class maintenance for the first time.					
更换轮毂润滑脂（非驱动前桥）隙 Change lubricant of wheel hub (non-driven front axle)						
					●	●
后桥 Rear axle						
检查主减速器和轮边减速器油面隙 Check oil level of main reductor and wheel reductor						
		●				

前桥 Front axle	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
更换主减速器和轮边减速器润滑油（根据车型选择换油里程，每年至少一次） Change lubricant of main reductor and wheel reductor (at least once per year)						
			●	●	●	●
清洁通气装置 Clean ventilation device						
			●	●	●	●
检查调整轮毂滚锥轴承间隙 Inspect and adjust taper roller bearing clearance						
	第一次 2 级保养时进行 Carrying out when implementing the second-class maintenance for the first time.					
检查平衡轴轴承油面更换平衡轴润滑油 Check balance shaft bearing oil level Replace balance shaft lubricating oil						
	●		●	●	●	●
传动轴 Transmission shaft						
重新紧固传动轴螺栓 Refasten bolt of transmission shaft						
	●					
目检传动轴的连接和磨损 Inspect the connection and abrasion of transmission shaft with eyes						
				●	●	●

表 4-4 Table4-4

驾驶室 Cab	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 third-class maintenance	四级保养 fourth-class maintenance
检查刮水器的动作 Inspect the operation of wiper.						
	●	●	●	●	●	●
重新紧固驾驶室锁紧手柄 Refasten cab lock handle						
	●			●	●	●
重新紧固发动机罩 Refasten engine hood						
	●					
检查驾驶室翻转手油泵油面 Inspect oil level of hand pump for tilt cab						
				●	●	●
检查举升柱塞的调整情况 Inspect the adjustment condition of lifting plunger						
	●		●	●	●	●

驾驶室 Cab	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 third-class maintenance	四级保养 fourth-class maintenance
底盘 Chassis						
检查牵引钩的固定和动作 Inspect fixation and operation of towing hook						
	●		●	●	●	●
重新紧固横梁螺栓 Refasten bolt of cross member						
	●					
紧固前、后钢板弹簧骑马螺栓和支架 Refasten U-bolt and bracket for front and rear leaf spring						
	●			●	●	●
检查备胎的固定机构 Inspect fixing device of spare tyre						
				●	●	●
检查调整钢板弹簧侧挡间隙 Inspect and adjust side fender clearance of leaf spring						
				●	●	●
检查车轮螺母的固定 Inspect the fixing of the wheel nuts						
	●			●	●	●
检查蓄电池的固定 Inspect the fixing of storage battery						
				●	●	●
检查燃油箱的固定 Inspect the fixing of fuel tank						
				●	●	●

表 4-5 Table4-5

制动系 Brake system	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 third-class maintenance	四级保养 fourth-class maintenance
贮气筒放水 Drain water for air tank						
	●	●	●	●	●	●
检查气压系统密封性（气压表检查） Inspect leak tightness for the air-pressure system (by air-pressure gauge)						
	●		●	●	●	●
清洗油水分离器中的调压阀滤网查）Clean regulator valve filter in oil water separator						
				●	●	●
检查制动摩擦片厚度，调整制动器间隙 Inspect the thickness brake friction disk, and adjust brake clearance						
				●	●	●
清洁车轮制动器 Clean wheel brake						
					●	●

制动系 Brake system	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级养 third-class maintenance	四级保养 fourth-class maintenance
检查制动管路和软管易擦伤的部位 Inspect the easy-abraded part in the brake pipeline and hose						
	●			●	●	●
检查制动室的功能 Inspect function of brake chamber						
			●	●	●	●
检查脚制动、手制动和排气制动的效能（在试车时进行） Inspect the efficiency of foot/hand/exhaust brake (implementation at the test run time)						
	●		●	●	●	●

表 4-6 Table4-6

电气 Electric	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 third-class maintenance	四级保养 fourth-class maintenance
检查电气系统（信号灯、前照灯、示宽灯、刮水器、暖风和通气装置）的工作情况 Inspect performance of electric system (signal lamp, headlamp, width lamp, wiper, heater, ventilator)						
	●	●	●	●	●	●
检查蓄电池电解液的液面和比重以及蓄电池各单元的电压 Inspect electrolyte level and proportion and unit voltage of storage battery						
	●		●	●	●	●
检查蓄电池接线柱的固定电极涂滑脂 Inspect consistent grease at electrode of battery post						
	●		●	●	●	●
检查电子转速表、转速的正确性滑脂- Inspect electronic tachometer and its correct rotating speed						
	●	●	●	●	●	●
转向系 Steering system						
更换转向机油系 Change steering oil						
	●					
检查转向油罐油面高度 Inspect the level of steering oil reservoir						
	●		●	●	●	●

电气 Electric	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 third-class maintenance	四级保养 fourth-class maintenance
更换转向油罐的油滤器 Replace oil filter of steering oil reservoir						
					●	●
检查转向系统的功能 Inspect performance of the steering system						
					●	●
检查转向杆件间隙 Inspect clearance of steering rod						
				●	●	●
检查转向杆件的螺栓、接头和锁紧件- Inspect bolt, tie-in and fastener of steering rod						
	●					
整年 Complete vehicle						
短途试车（包括制动试验） Short distance test run(include brake test)						
	●	●	●	●	●	●
目检泄漏状况括制动试验） Inspect leakage with eyes						
	●	●	●	●	●	●
检查、紧固车箱固定情况 Inspect and fasten truck bed						
	●	●	●	●	●	●

表 4-7 Table4-7

润滑 Lubrication	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
水泵 Water pump						
	●	●	●	●	●	●
离合器分离轴 Clutch release shaft						
	●	●	●	●	●	●
离合器踏板轴 Clutch pedal shaft						
	●	●	●	●	●	●
离合器分离轴承 Clutch release bearing						
	●	●	●	●	●	●
离合器摇臂 Clutch release rocker arm						
	●	每 4 周至少一次 At least once every 4 weeks				
万向节和传动轴中间支承 Universal joint and intermediate support of transmission shaft						
	●	●	●	●	●	●
转向主销前轴 Steering kingpin, front axle						
	●		●	●	●	●

润滑 Lubrication	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
钢板弹簧销 Leaf spring pin						
	●	每 4 周至少一次 At least once every 4 weeks				
更换斯太尔平衡轴润滑油（每半年至少一次） Replace steyr balance shaft lubricating oil (at least one time at every half a year						
	●		●	●	●	●
平衡悬架钢板弹簧档板（6×4、6×6 和 8×4）间隙检查 Balance suspension steel plate spring fender clearance inspection						
	●	●	●	●	●	●
减震器下支架 The lower bracket of shock absorber						
	●	●	●	●	●	●
变速器换挡杆支座 Transmission shift lever supporter						
	●	●	●	●	●	●
制动凸轮轴及制动臂 Brake cam-shaft and brake arm						
	●	●	●	●	●	●
牵引钩 Towing hook						
	●	●	●	●	●	●

润滑 Lubrication	第一次检查 First-time inspection	例行检查 Routine inspection	一级保养 First-class maintenance	二级保养 Second-class maintenance	三级保养 Third-class maintenance	四级保养 Fourth-class maintenance
鞍 座 Fifth wheel						
	●	●	●	●	●	●
驾驶室车门铰链 Cab door hinge						
			●	●	●	●
按计划对驾驶室重新进行防锈处理 Apply anti-rust treatment once again as per plan						
每隔 12 个月一次 Once every 1 year						

注：在工地使用的汽车每周一次，清洗后的汽车应给所有润滑点重新加润滑脂。

Note: carry out inspection or maintenance once every a week for vehicles in construction site, and add consistent grease to each lubricating hole for vehicles after cleaning.

名 称 Name	牌 号 Brand	总 成 Assembly	用量 (升) Dosage (L)
柴油夏季凝点<0℃冬季凝点<-20℃ Solidifying point of diesel oil in summer <0℃ Solidifying point in winter <-20℃	G B 2 5 2 优级品 0 号轻柴油 G B 2 5 2 excellent grade No.0 light diesel oil G B 2 5 2 优级品 — 2 0 号轻柴油 G B 2 5 2 excellent grade No.-20 light diesel oil	发动机 engine	按油箱容量 By tank capacity
发动机机油 Engine oil	冬季 CF-4 5W/30 winter CF-4 5W/30 夏季 CF-4 5W/40 Summer CF-4 5W/40	WP6 系列发动机 WP6 series engine WP7 系列发动机 WP7 series engine WP10 系列发动机 WP10 series engine WP12 系列发动机 WP12 series engine 康明斯系列发动机 Commins series engine	20 24 24 27 以油尺为准 Based on dipstick

名 称 Name	牌 号 Brand	总 成 Assembly	用量 (升) Dosage (L)
齿轮油 Gear oil	加注 GL-5 重负荷车辆齿轮油，粘度等级取决于环境温度： 1.85W-90-Q/SQ102114 适用温度（-12℃以上）； 2.80W-90-Q/SQ102114 适用温度（-26℃以上）； 3.75W-90-Q/SQ102114 适用温度（-40℃以上）；	STR 冲焊桥 Punching and welding axle	
		中桥主减速器 Middle axle main reducer	8.3
		后桥主减速器 Rear axle main reducer	6
		轮边减速器（每边） Wheel reducer (every side)	2
		STR 铸造桥 casting axle	
		中桥主减速器 Middle axle main reducer	12.3
		后桥主减速器 Rear axle main reducer	8.3
		轮边减速器（每边） Wheel reducer(every side)	2.8
		MAN 双级桥 Dual-classed axle	
		中桥主减速器 Middle axle main reducer	16
		后桥主减速器 Rear axle main reducer	13
		轮边减速器（每边） Wheel reducer(every side)	3.5

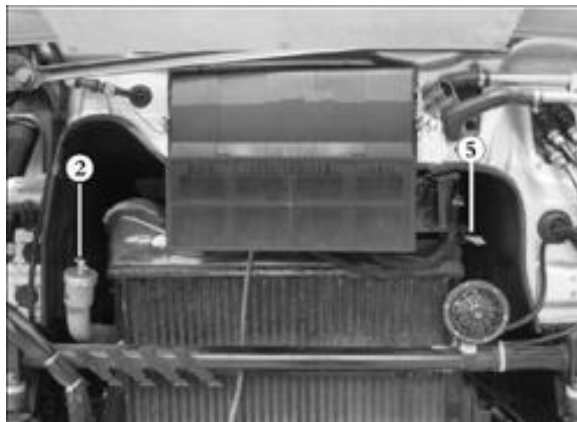
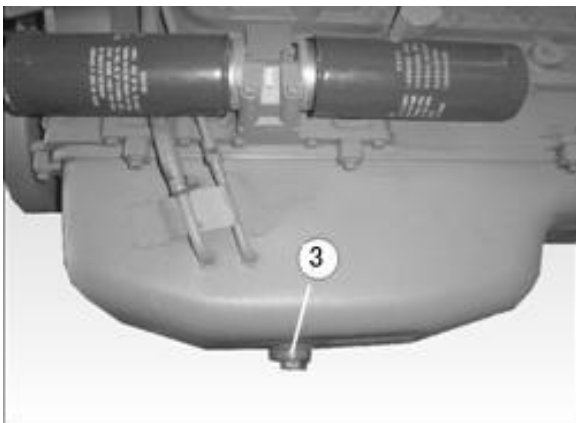
齿轮油 Gear oil	加注 GL-5 重负荷车辆齿轮油，粘度等级取决于环境温度： 1.85W-90-Q/SQ102114 适用温度（-12℃以上）； 2.80W-90-Q/SQ102114 适用温度（-26℃以上）； 3.75W-90-Q/SQ102114 适用温度（-40℃以上）；	TGX 桥 axle	
		中桥主减速器 Middle axle main reductor	13.5
		后桥主减速器 Rear axle main reductor	12
		轮边减速器（每边） Wheel reductor(every side)	3.5
		MAN 单级 HD425single-classed	
		中桥主减速器 Middle axle main reductor	14
		后桥主减速器 Rear axle main reductor	11.5
		轮边减速器（每边） Wheel reductor(every side)	1.1/单边，装轴承单元时不加油
		MAN 单级 HD469 single-classed	
		中桥主减速器 Middle axle main reductor	14
		后桥主减速器 Rear axle main reductor	11.5
		轮边减速器（每边） Wheel reductor(every side)	1.1/单边，装轴承单元时不加油

		MAN 单级 HD485 single-classed	
		主减速器 Main reductor	14.3
		轮边减速器（每边） Wheel reductor(every side)	1.1/单边，装轴承单元时不加油
液压油 Hydraulic oil	L-HV32 低温液压油 low-temperature hydraulic oil GB11118.1-94	转向助力装置 Steering power assisting device	3.7
		驾驶室翻转油 Cab tilting oil	0.34
长效防冻防蚀冷却液（冬夏季常年使用） Permanent anti-freezing anticorrosion coolant (it can be used all year round)		重负荷四季长效防冻防蚀却 Heavy-duty permanent anti-freezing anticorrosion coolant 冷却系 cooling system	40L
锂基润滑脂 Lithium base lubrication grease	2#锂基润滑脂 Lithium base lubrication grease （GB/T5671-2014）	前轴轮毂 Front shaft wheel hub	按需 as required
		底盘部分 Part of chassis	按需 as required
		水 泵 Pump	120 克 120g
		离合器分离装置 Clutch release device	按需 as required

(五)燃料、润滑油和加注量 Fuel, lubrication and filling volume

潍柴动力专用机油：Special engine oil for Weichai power

类 别 Category	专用标准号 special standard No.		推荐适应的主要机型及规格 Main recommended applicable engine type and specification
潍柴系列国三、国四排放 柴油机 Weichai series National III, IV emission diesel engine	WP—E3 (CF—4) III (CF—4) IV		蓝擎系列；超大吨位重卡； WP10 系 列发动机 Landking series: super tonnage heavy truck; WP10 series engine
重负荷车辆齿轮油 Heavy duty truck gear oil	GL—5		规格：85W/90 80W/90 Specification:85W/90 80W/90
	JFL318	JFL-336	JFL-345
适应选用最低气温 Lowest applicable optional temperature	-10℃	-26℃	-35℃



- 1 换发动机机油 Change engine oil
- 2 发动机机油加油口 Engine oil filling port
- 3 放油塞 Drain plug
- 5 油尺 Dipstick

更换发动机油时要在热状态时进行将旧油放出时应注意检查机油颜色是否正常和有无异物，以便发现故障隐患。待油放尽后拧紧清除杂物的放油螺栓，更换新机油滤清器芯，将新机油注入发动机到油尺上限。为防止在没有润滑油的情况下启动发动机，应使用排气制动器或使高压油泵处于断油位时按动起动按钮，空运转一会儿后，再启动发动机，并低速运转。检查机油滤清器有无渗漏，停机五分钟后，检查并补充机油油面到油尺上限。

Engine oil shall be changed in a hot status. While draining original engine oil, please inspect whether color of engine oil is normal and whether there is foreign substance in order to find out incipient faults. After draining oil completely, screw up the drain bolt which is used to eliminate foreign substance, change engine filter core, and fill new engine oil to the upper limit of oil dipstick. In order to avoid starting of engine without lubrication oil, you should use exhaust brake or press the starting button of high pressure oil pump when it is in position of fuel stop and make it run idly a short while, then start engine oil filter, and five minutes later after engine is stopped, inspect oil level and add engine oil to the upper limit of oil dipstick.

换机油滤芯

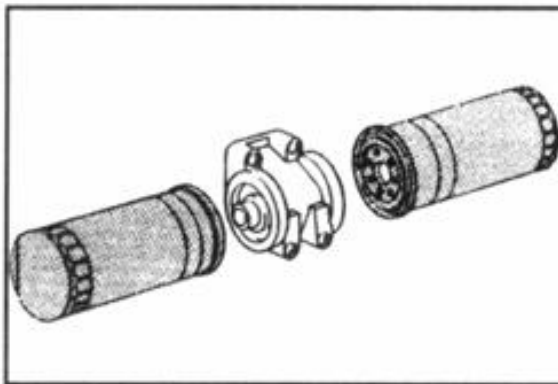
Replace oil filter element

两个关联的机油滤清器的滤芯要同时更换。在密封垫上涂上一层薄薄的油，并且只能用手固紧滤清器。

The element of two associated engine oil filters shall be changed at the same time. Coat a thin layer of oil on the seal, and the filter can be only tightened manually.

旋转式机油滤芯配件号：61000070005

The assembly number of rotary engine oil filter element: 61000070005.



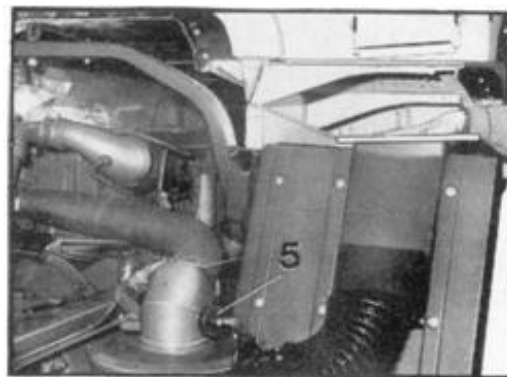
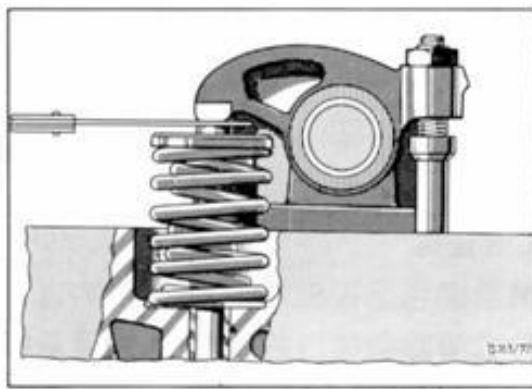
调整气门间隙

Adjusting air valve clearance

冷发动机的气门间隙

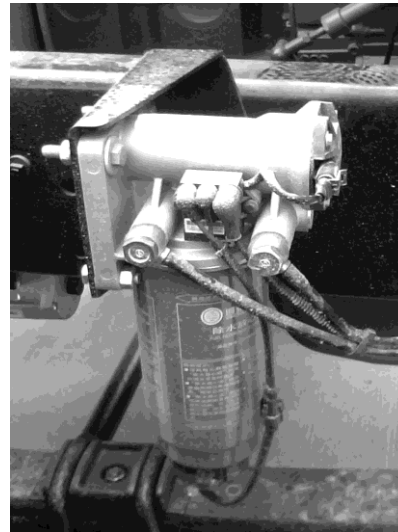
Air valve clearance for cold engine:

进气门：0.3 毫米 Inlet valve: 0.3mm 排气门：0.4 毫米 Outlet valve: 0.4mm



燃油滤清器应同时更换两个滤芯

Both filter elements should be replaced at the same time.



清洗燃油粗滤器每天打开排液塞，将杂质排出。

Clean fuel preliminary filter, open drain plug everyday and drain the impurities.

每次保养时，都要清洗滤芯。

Clean filter element in every maintenance.

空滤器保养指示灯检查

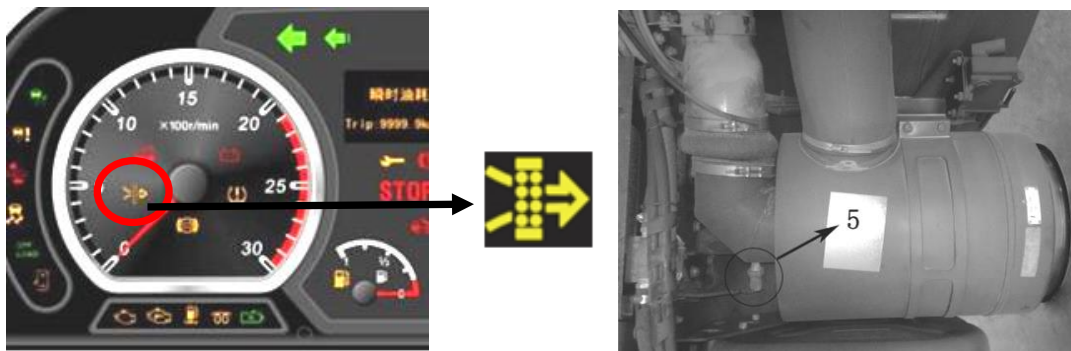
Inspect air filter maintenance indicator



将驾驶室翻转，在发动机运转情况下，短时间地盖住进气口，空滤器保养指示灯应立即亮。

Tilt cab, and cover inlet port for a short period of time while engine is running, in this case, the air filter maintenance indicator shall be lighted at once.

5-堵塞报警指示器 5- Clogging alarm indicator



注意：不能单纯依靠堵塞报警指示灯来判定空滤器是否阻塞，应根据使用情况不定期的拆盖检查。

Note: You cannot rely solely on the clogging alarm indicator to determine whether the air filter is blocked. Rather, it should be based on the use of irregular cover inspection.

空滤器的保养 Air filter maintenance

1、普通空滤器

1. Ordinary air filter

若空滤器阻塞报警灯点亮，应擦净集尘装置，清除滤芯上的尘土。

If the air filter obstructs the warning light, wipe the dust collection device and remove dust from the filter element.

扳动空滤器端盖卡扣或者拧动螺母，取下端盖，清理端盖内的尘土，并用干净抹布擦拭。注意：侧置抬高布置的空滤，需先翻转驾驶室。

Pull the air filter cover to buckle or twist the butterfly nut, remove the end cap, clean the dust inside the end cap, and wipe with a clean rag. Note: For air filters with side elevations, turn the cab first.



轻轻抽出主滤芯，用压力不高于 500kPa 的干燥压缩空气，沿斜角交叉方向吹净滤芯内、外表面。最好由内向外吹。并擦净密封端面。

Gently pull out the main filter element, dry compressed air with a pressure not higher than 500 kPa, and blow the net inside and outside surface of the filter element along the diagonal cross direction. It's best to blow from the inside out. Wipe the sealing end face.



严禁将滤芯的一端在汽车轮胎上轻敲，以抖掉里面的尘土。这种方法不能将灰尘清除干净。

It is forbidden to tap one end of the filter element on the car tire to shake off the dust inside. This method does not remove the dust.

将照明工具（如手机、手电筒灯）放入滤芯里，然后检查外表面有无裂缝、穿孔或其它损坏。

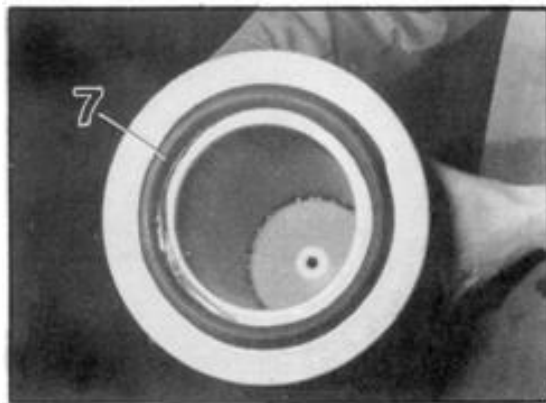
Place lighting tools (such as cell phones, flashlights) into the filter element and inspect the outer surface for cracks, perforations, or other damage.

注 意： 严禁使用有裂缝和穿孔的滤芯，否则将导致发动机异常磨损。

Note: It is forbidden to use cracked and perforated filter elements, otherwise it will cause abnormal engine wear.

检查密封圈 7。若密封圈已损坏或滤芯有任何其它的损坏时一定要更换。

Check the seal 7 . If the seal is damaged or if there is any other damage to the filter element, it must be replaced.



安全滤芯

Safety filter element

安全滤芯只能换不能清洗。在主滤芯每清理 5 次或损坏后，或每两年要更换一次安全滤芯。若在主滤芯刚清理后指示灯马上又亮，则应更换安全滤芯。

Safety filter can only be changed instead of cleaned. After each main filter element is cleaned 5 times or damaged, or once every two years, replace the safety filter element. If the indicator lights up immediately after the main filter element has been cleaned, the safety filter element should be replaced.



安装顺序

Installation sequence

①轻轻将安全滤芯插入空滤器壳里，径向密封结构的将密封圈装配到位调整好，轴向密封结构的用大六角螺母固紧。

①Gently insert the safety filter element into the air filter housing. The radial seal structure will be assembled with the seal ring in place. The axial seal structure is fastened with a large hex nut.

②轻轻将主滤芯插入空滤器壳里，径向密封结构的将密封圈装配到位调整好，轴向密封结构的用小六角螺母固紧。

②Gently insert the main filter element into the air filter housing. The radial seal structure will be assembled with the seal ring in position. The axial seal structure is tightened with a small hex nut.

③装上有排尘阀的盖子（其口一定要朝后或朝下），并扣好卡扣或者拧紧中心螺栓上的螺母。

③Install the cover with the dust valve (the mouth must be facing backwards or downwards) and fasten the nuts or nuts on the center bolt.

2、油浴式空滤器

2. Oil bath air filter

新车出厂前未加注机油，投入运营时务必先加注 4L 机油，机油黏度必须类似发动机同期用的机油。

The new vehicle has not been filled with oil before leaving the factory. When it is put into operation, it must be filled with 4L of oil. The viscosity of the oil must be similar to the oil used in the engine during the same period.

车辆运行 5000 公里或连续使用 80-150h，应拆下油底壳查看。

If the vehicle is running for 5,000 kilometers or continuously used for 80-150 hours, the oil pan should be removed and viewed.

当晃动底壳，机油不易流动时需清洗滤芯总成，更换机油。

When shaking the bottom case, the filter assembly must be cleaned and oil must be replaced when the oil is not easy to flow.

在特别恶劣的使用条件下，必须每天检查清洗并更换机油。

Under particularly harsh conditions of use, daily inspections must be performed to clean and change the oil.

滤芯应定期保养或更换，并保证密封良好，保养与更换滤芯的方法与普通空滤器相同。

The filter element should be regularly maintained or replaced, and the seal should be guaranteed. The method of maintenance and replacement of the filter element is the same as that of an ordinary air filter.

3、沙漠空滤器

3.Desert air filter



沙漠空滤器由壳体、旋风管粗滤器、主滤芯和安全滤芯等部件组成。

Desert air filter consists of shell, cyclone pipe strainer, main filter element and safety filter element.

每行驶一周：挤捏排尘袋排尘积灰，检查排尘袋的完好性。

Every week: squeeze the dust bag to remove dust and check the integrity of the dust bag.

粗滤器的保养

Precleaner maintenance

①按照主滤芯的保养方法拆下主滤芯，同时拆下安全滤芯，将出气口与发动机断开或用净物堵隔。

①Remove the main filter element according to the maintenance method of the main filter element, remove the safety filter element at the same time, and disconnect the gas outlet from the engine or block it with a net material.

②打开卡子取下下盖，清理表面积尘

② Open the clip and remove the lower cover to clean the surface area dust

③用压缩空气反复吹净各部位积尘；

③Repeatedly blowing compressed dust from various parts with compressed air;

④按照相反顺序安装各部件，并检查安装是否到位。

④Install the parts in the reverse order and check that the installation is in place.

滤芯应定期保养或更换，并保证密封良好，保养与更换滤芯的方法与普通空滤器相同。

The filter element should be regularly maintained or replaced, and the seal should be guaranteed. The method of maintenance and replacement of the filter element is the same as that of an ordinary air filter.

警告：用户使用滤芯时，应使用原厂生产的同型号滤芯；绝对不能使用不合格的滤芯，否则，会因此产生发动机非正常磨损。

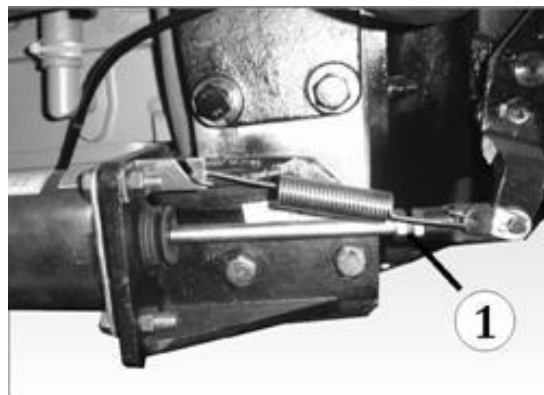
Warning: When using the filter element, users should use the same type of filter element produced by the original manufacturer; do not use the unqualified filter element, otherwise it will cause abnormal engine wear.

手动调整分离轴承间隙式的离合器调整。

Manual adjustment of clutch

在①处进行推杆长度的调整，保证离合器踏板自由行程在 22~29mm 之间。如果采用免调式离合器时，无需调整此处。

Adjust the length of push-rod at position ①, ensure the free pedal travel between 22cm and 29cm. If the clutch can not be adjusted, omit it.



变速器的维护保养

Transmission maintenance

保养间隔：新变速器 2000--5000 公里；公路环境每年或 10 万公里；越野环境：1000 小时；恶劣环境：500 小时。

Maintenance interval: every 2000-5000 km for new transmission; for highway transportation: every year or every 100,000 km; for off-road transportation: every 1000 hours; for harsh road conditions: every 500 hours.

保养内容：正确合理地操作使用变速器，定期进行维护保养，对于保证汽车安全可靠的行驶和延长变速器使用寿命十分重要，请遵循下面使用要求。

Maintenance contents: operating the transmission appropriately with regular maintenance is very important to ensure the safe and reliable driving of the vehicle and prolong the service life of the transmission. Please follow the following requirements.

1.正确的润滑油

1. Appropriate lubricant

选用正确的润滑油对变速器的维护保养时至关重要的，您必须严格遵守下述规定的维护保养里程：

Choosing the right lubricant is critical for the maintenance of the transmission, and you must also strictly observe the following maintenance mileage:

(1) 定期检查保持润滑油正确的液面水平。

(1) Check regularly to maintain the correct level of lubricant.

(2) 按照适宜的换油间隔来更换润滑油。

(2) Replace the oil at an appropriate oil change interval.

(3) 使用正确类型和级别的润滑油。

(3) Use the correct type and grade of lubricant.

(4) 从正规的供应商处购买润滑油。

(4) Buy lubricating oil from a standard and eligible supplier.

(5) 不得在同一变速器中混用发动机机油和齿轮油。切记不要在润滑油中混入添加剂和摩擦改良剂。

(5) Engine oil and gear oil must not be mixed in the same transmission. Remember not to mix additives and friction modifiers with lubricating oils.

2 润滑油牌号:

2 Lubricant oil brand:

85W/90 重负荷齿轮油

GL-585W/90 Heavy Duty Gear Oil GL-5

3 正确的油面高度

3 Correct oil level

油面高度由变速器壳体侧面的锥形油面观察孔进行检查，油面高度应与油面观察孔下沿平齐。过多的加油量将会导致变速器温度升高和漏油；过少的加油量将会导致零件润滑不良，严重着将会发生烧箱事故。

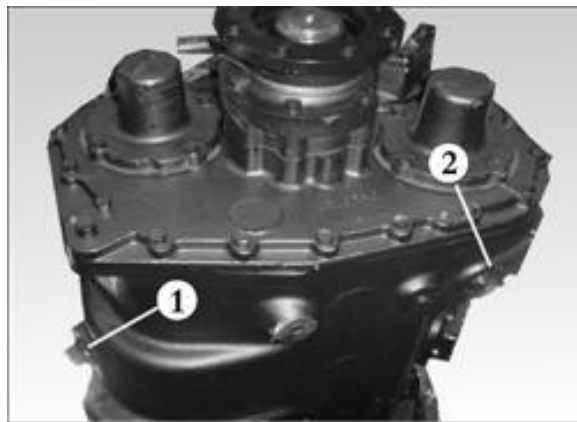
The oil level is checked by the conical oil level observation hole on the side of the transmission housing. The oil level should be flush with the lower edge of the oil level sight hole. Excessive refueling will cause the transmission temperature to rise and oil leaks; insufficient refueling will result in poor lubrication of the parts or even a burned case incident.

4 油面的检查

4 Oil level inspection

油面高度应定期进行检查。检查油面高度时汽车应水平的路面上。由于热油体积的膨胀，为了防止测量不准，行驶后的车辆不能立刻检查，只有在油面稳定和稍微冷一些时方可进行。

Oil level should be checked regularly. When checking the oil level, the vehicle should be level on the road surface. Due to the expansion of the volume of hot oil, in order to prevent inaccurate measurements, the vehicle cannot be checked immediately after driven, only when the oil level is stable and slightly cold instead.



5 润滑油的更换周期

5 Lubricant replacement cycle

变速器在更换润滑油时，要首先将变速器内原有的润滑油排放干净。

When replacing lubricant oil, it is necessary to first discharge the original lubricant in the transmission.

必须根据下表所列的润滑油更换周期，同时结合用着根据使用条件和工作环境所作出的判断，来综合考虑确定润滑油的更换。

The replacement of lubricant must be comprehensively considered in accordance with the lubricant replacement cycle listed in the table below, together with the judgments made based on the conditions of use and the work environment.

新变速器在行驶 2000--5000 公里时，必须更换润滑油。每行驶 10000 公里应检查润滑油的油面高度和泄露情况，随时进行补充。

Lubricant must be replaced for a new truck when it has runned for 2000--5000 km. The oil level and leakage of the lubricant oil should be checked every 10,000 km and replenished at any time necessary.

在大负荷工况下，在污染严重的环境中或者是在陡坡上持续工作时，应适当缩短换油周期。

Under heavily over-loading conditions, the oil change intervals should be appropriately shortened when working in a heavily polluted environment or on a steep slope.

使用条件 Using conditions	公路环境 Road	越野环境 Off-road	恶劣环境 Extremely harsh conditions
换油周期 Oil change cycle	每年或 10 万公里 Every year or 100,000 kilometers	每 1000 小时 Every 1000 hours	每 500 小时 Every 500 hours

6 工作温度

6 Operating temperature

变速器在连续工作期间的最高温度不得超过 120℃，最低不低于-40℃。工作温度如果超过 120℃，会使润滑油分解并缩短变速器寿命。

The maximum temperature of the transmission during continuous operation shall not exceed 120 ℃ and the minimum temperature shall not be lower than -40 ℃. If the operating temperature exceeds 120 ℃, the lubricant will decompose and the service life of the transmission will be shortened.

下列情况中的任何一种都能引起变速器的工作温度超过 120℃。

Any of the following conditions can cause the transmission to operate at temperatures exceeding 120 ℃.

a) 连续地在行驶速度小于 32km/h 的情况下工作。

a) Continuously operate at a speed of less than 32km/h.

b) 发动机转速高。

b) High engine speed.

c) 环境温度高。

c) High ambient temperature.

d) 涡流环绕着变速器。

d) Eddy currents surround the transmission.

e) 排气系统太靠近变速器。

e) The exhaust system is too close to the transmission.

f) 大功率超速运转。

f) High-power speeding.

在遇到上述情况时，可利用冷却元件使变速器工作温度保持在 120℃ 下。

In the above case, the cooling element can be used to maintain the transmission operating temperature at 120 °C.

7 工作倾角

7 working inclination angle

变速器在工作倾角超过 12° 时，润滑可能不充分。工作倾角等于变速器在底盘上的安装角加上坡角度。如果超过 12° 时，变速器应安装润滑油泵或冷却装置，以保证良好的润滑。

The transmission may not be sufficiently lubricated when the working inclination exceeds 12 °. The working inclination is equal to the installation angle of the transmission on the chassis plus the slope angle. If it exceeds

12 °, the transmission should be equipped with a lubricant pump or cooling device to ensure good lubrication.

8 拖行或滑行

8 Towing or taxiing

变速器在工作时，变速器的轴和齿轮不停的转动，可以为变速器提供充分的润滑。但当车辆在后轮着地传动系连接的情况下被拖行时，主箱的中间轴齿轮的主轴齿轮并不旋转。而主轴却被后轮带着高速旋转，这样将会因缺乏润滑而引起变速器的严重损坏。

When the transmission is in operation and the shaft and gears of the transmission are constantly rotating, it can provide sufficient lubrication for the transmission. However, when the vehicle is towed while the rear wheels are connected to the drive train, the main shaft gears of the countershaft gears do not rotate. However, the main shaft is rotated at a high speed by the rear wheels, which will cause serious damage to the transmission due to lack of lubrication.

为了防止这类现象的发生，应注意以下几点：

In order to prevent this kind of phenomenon from happening, you should pay attention to the following points:

切勿踩下离合器踏板使车辆空挡滑行。

Do not depress the clutch pedal to allow the vehicle to coast.

当车辆需要拖行时，可抽出半轴或脱开传动轴，也可以使驱动轮离地拖行。

When the vehicle needs to be towed, the axle shaft can be withdrawn or the drive shaft can be disengaged, or the drive wheel can be dragged off the ground.

9 注意事项

9 Precautions

1) 换挡时，离合器必须彻底分离，变速杆应挂档到位。

1) When shifting, the clutch must be completely separated and the shift lever should be in position.

2) 变速杆有高档和低档两个空档位时：即高档区的 5~6 档空挡位置。低档区的 3~4 档空挡位置。停车时，变速杆应置于低档区的空挡位置。

2) When the shift lever has two free positions of high-end and low-end: that means the 5 to 6-speed neutral position of the high-end area and 3 to 4-speed neutral position for low gear zone. When parking, the shift lever should be placed in the neutral position of the low range.

3) 车辆挂低档（爬行档）或倒档时，应先停车，再挂档，以避免损坏变速器内部的零件。挂倒档时，需使用较大的选档力以克服倒档锁的阻力。

3) When the vehicle is in a low gear (crawler gear) or reverse gear, it should be stopped first and then the gear should be engaged in order to avoid damage to parts inside the transmission. When hanging upside down,

you need to use a larger selection force to overcome the reverse lock resistance.

4) 当变速器从低档区向高档区（反之亦然）换挡时，不要跳档操纵，否则将影响副箱同步器的使用寿命。

4) When the transmission shifts from the low gear zone to the high gear zone (or vice versa), do not skip the gear, otherwise it will affect the service life of the sub-box synchronizer.

5) 禁止行换挡时，使用中间轴制动器。

5) Use intermediate shaft brakes when shifting is prohibited.

6) 车辆下坡时，禁止变换高低档位区。

6) When the vehicle is going downhill, it is prohibited to change the high and low gear zone.

7) 根据道路情况，采用 1 档或 2 档起步。

7) Start with 1st or 2nd gear depending on road conditions.

8) 车辆起步前，应首先解除制动。采用断气制动的车辆在接触制动阀后，必须待气压上升到解除需要的压力时，方可挂档起步。

8) Before starting the vehicle, the brake should be released first. After the vehicle adopting the air-braked brake contacts the brake valve, it must wait until the air pressure rises to release the required pressure before starting the transmission.

9) 使用中发现变速器有异响, 操作明显沉重等不正常现象应立即停车检查待排除故障后在继续行驶。

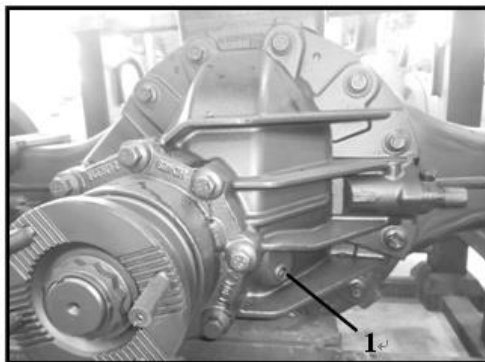
9) The use of abnormal noise found in the transmission, the operation is obviously heavy and other abnormal phenomena should immediately stop and check, continue to drive after troubleshooting.

10) “三包”期内的变速器不允许私自拆卸与装配。

10) The transmission within valid warranty period is not allowed to be dismantled and assembled.

检查后驱动桥的油面

Check oil level of rear drive axle



1-加油螺塞 Refuel screw plug

2-放油螺塞 (桥包底部) Drain screw plug (at the bottom of axle case)

1-加油螺塞

Refuel screw plug

2-放油螺塞（桥包底部）

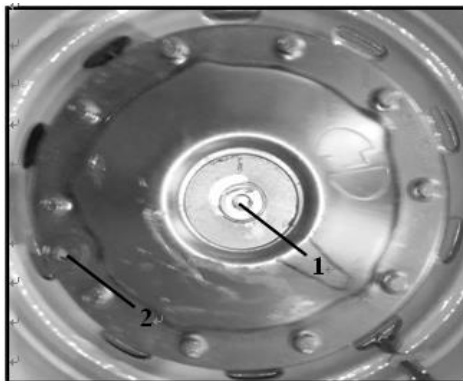
Drain screw plug (at the bottom of axle case)

3-油面

Oil level

检查中桥的油面 Check oil level of middle axle

轮边减速器 Wheel reductor



1-加油螺塞 1- Refuel screw plug

2-放油螺塞 2- Drain screw plug

3-油面 oil level

换油（热油时）Oil changing （when oil is warmed）

转动轮毂，使放油螺塞 2 转到下方。放出轮边减速器中的油，

然后仍在此位置上由 1 处加油。再将轮毂转到图示位置，让多余的油流出。

Drain oil in wheel reductor from position 2 and fill oil from position 1. then turn the hub to the diagram position and drain excessive fuel.

注意：轮边装配轮毂轴承单元时，不用加换润滑油，50 万公里免维护。

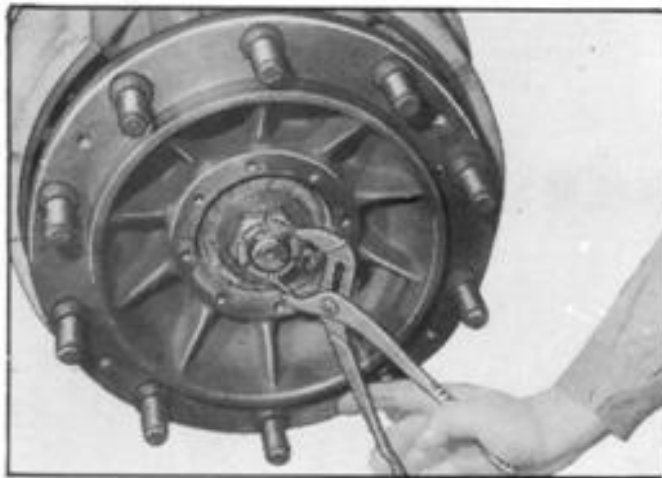
Note: Do not fill lubricant, if install the wheel hub bearing unit. Maintenance free for 500000km.

清洗桥的通气装置。

Clean the ventilation device of axle.

将所有的前、后驱动桥轮毂上的通气孔螺塞拧下，并用压缩空气吹净。

Unscrew the vent screw which is on the wheel hub of all front and rear drive axle, and blow up it by compressed air.



刚性前轴

Rigid front shaft

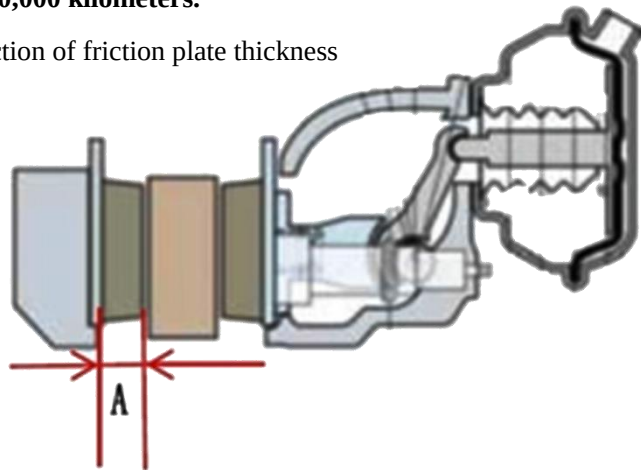
更换轮毂中的润滑脂。

Change lubricating grease in wheel hub.

注意：轮边装配轮毂轴承单元时，不用加换润滑油，50 万公里免维护。

Note: When assembling the wheel hub bearing unit, there is no need to change the lubricating oil, and it is maintenance-free for 500,000 kilometers.

摩擦片厚度检查 Inspection of friction plate thickness



摩擦片属于损耗件，使用过程中，厚度减薄会造成制动间隙加大，制动效果变差，影响行车安全。

Friction plate is an easily-wearing part. During use, thickness reduction will increase the braking gap and the braking effect will deteriorate, which will affect the safety of driving.

1.盘式制动器:

1. Disc brake:

要求摩擦片厚度不得小于 2mm，否则需要及时停车对制动摩擦片进行更换维修。

It is required that the thickness of the friction plate should not be less than 2mm. Otherwise, the brake pads need to be stopped and replaced in time.

2.鼓式制动器:

2. Drum brake:

要求摩擦片厚度不得小于 6mm。

The thickness of the friction plate must not be less than 6mm.



用户需定期检查制动摩擦片，先拔掉制动毂内侧检测窗口处的防尘塞，通过的制动间隙调整窗口观察制动蹄上摩擦片的状态，正常摩擦片有一个台肩，台肩高度为 6mm，当摩擦片磨损至与台肩高度一致或台肩消失，则此时必须马上更换摩擦片。

You need to check the brake linings on a regular basis. Pull out the dust plug at the detection window at the inner side of the brake hub first. Observe the condition of the friction lining on the brake caliper through the brake clearance adjustment window. The normal friction lining has a shoulder and a table. The shoulder height is 6mm. When the friction plate wears to the same height as the shoulder or the shoulder disappears, the friction plate must be replaced immediately.



制动间隙
检测窗口

Brake gap detection window

制动器的间隙调整

Brake clearance adjustment

1. 制动间隙手动调整臂

1. Manual adjustment arm for brake clearance

当蹄鼓间隙不满足 0.7~1.2mm 的要求时，就必须对制动间隙进行调整：

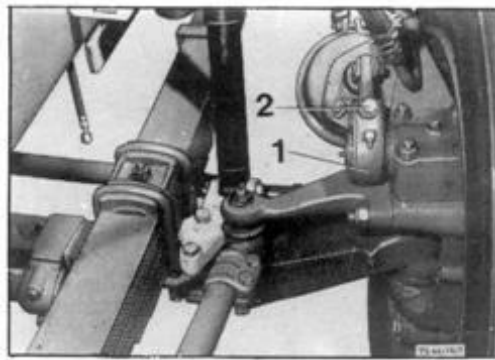
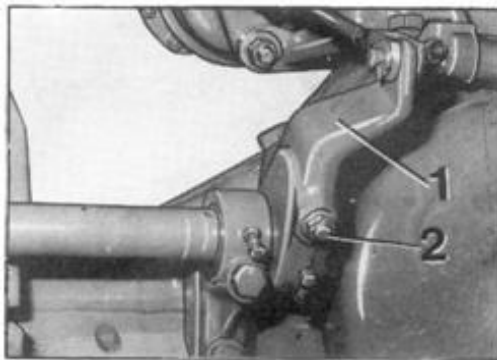
When the drum clearance does not meet the requirements of 0.7-1.2mm, the brake clearance must be adjusted:

驱动桥制动器间隙的调整方法：向里旋动间隙调节臂上的螺钉，直至车轮锁死，再把调节螺钉往后退，听到三次响声即可。

Drive axle brake clearance adjustment method: inward rotation in the clearance adjustment arm screw, until the wheel lock, and then step back the adjustment screw and hear three sounds.

前轴制动器间隙的调整方法：旋动蜗杆轴端六角螺栓 2，直至车轮锁死，再返旋，听到三次响声即可。

Front axle brake clearance adjustment method: Rotate the worm shaft end hexagon bolt 2 until the wheel locks and spins again, and you hear the sound for three times.



2.制动间隙自动调整臂

2. Brake clearance automatic adjustment arm

自调臂在正常情况下，用户无需手动调整制动间隙，只要定期进行日常维护保养、检查调整臂功能是否正常即可。如有问题，请及时更换。

For self-adjusting arm under normal conditions, the user does not need to manually adjust the braking gap, as long as the regular maintenance and regular inspection of the adjustment arm function can be. If there is a problem, please replace it in time.

注意事项:

Note:

1.因为自调臂的结构特点是其间隙为自动调整，故要求只有在安装、拆卸、检测时，才允许手动转动蜗杆六角头，否则，会严重影响调整臂使用寿命。

1. Because the structural characteristics of the self-aligning arm is that the clearance is automatically adjusted, it is required to manually rotate the worm's hex head only when it is installed, disassembled and tested. Otherwise, the service life of the adjusting arm will be seriously affected.

2.售后维修重新装配制动气室或调整臂时，必须严格按照正确的操作程序进行，安装有误将会导致制动间隙过小，必须重新按照正确步骤进行装配。否则会造成车辆出现制动发热、摩擦片异常磨损、左右制动力矩不平衡、调整臂易损坏等问题出现。

2. When re-assembling the brake air chamber or the adjusting arm during after-sales maintenance, it must be carried out in strict accordance with the correct operating procedure. An incorrect installation will result in a brake gap that is too small and must be assembled in accordance with the correct procedure. Otherwise, problems such as brake heat, abnormal wear of friction plates, imbalance of left and right brake torques, and easy adjustment of the adjusting arm may occur.

3.盘式制动器均为制动间隙自动调整装置，无需手动调整。

3. The disc brakes are automatic adjustment devices for the brake clearance and do not require manual adjustment.

液压转向系统检查油面

Check oil level of hydraulic steering system



在发动机停止运转的情况下，油面应高于图中刻度（最低油位刻线）以上 10~20mm（油罐带观测孔时液位应在观测孔上沿），在发动机运转的情况下，油面至少要达到刻度（油罐带观测孔时液位应不低于观测孔下沿）。液面不足时应立即加油，加油时，启动发动机并使其保持在低速稳定运转，随着向储油罐补充新油的同时，将方向从一个极端打到另一个极端反复进行，直到回油明显没有空气为止。熄灭发动机，将储油罐油面加至上述要求位置，将盖密封。

When engine is not operating, the oil level should be 1-2 cm above the mark III showed in the Figure, when engine is operating, the oil level should reach the mark III at least. If the oil level is not high enough, oil should be filled at once. In the process of oil filling, start engine and keep it run stably with a lower speed, and while filling new oil to oil reservoir, rotate steering wheel from one terminal to the other terminal repeatedly till there is no air in the returning oil. Switch off engine, fill oil till oil level of oil reservoir reaches at the required position, and seal the cap.

转向油罐

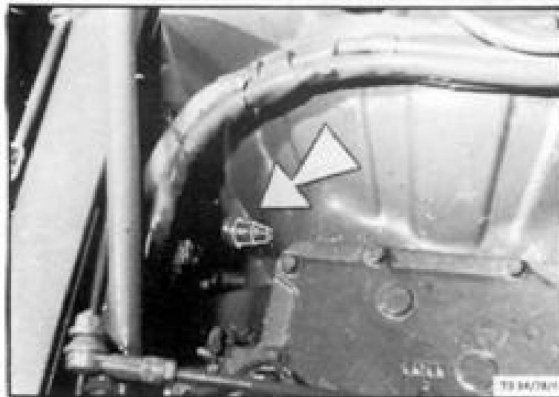
Steering oil reservoir

在更换油滤器时，不要让油滴到油罐之外，不要让油污杂物进入油罐，以免造成油路堵塞。

When replacing oil filter, oil shall not be dripped outside the oil reservoir, and oil stain is not allowed to come into oil reservoir in order to avoid blocking oil pipeline.

液压油滤芯配件号 61100080079。

Filter element number of hydraulic oil filter element: 61100080079.



水泵轴承润滑

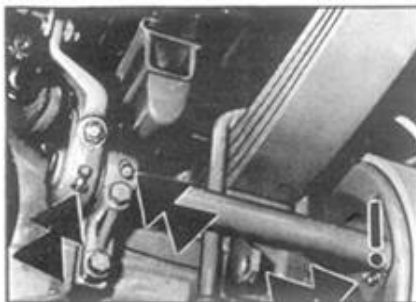
Lubrication of water pump bearing.

将水泵的润滑脂帽往下拧一圈润滑

Screw grease cap of water pump downward one circle.

润滑离合器分离轴承、润滑离合器分离轴右边及左边的轴承。

Lubrication of clutch release shaft Lubricate the bearings at right and left side of clutch release shaft.



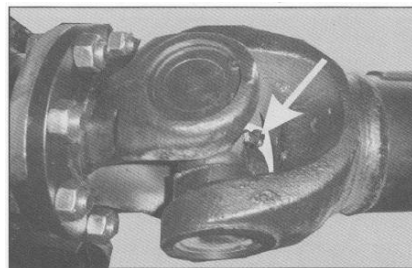
润滑转向节主销及制动臂制动凸轮轴
Lubricate the steering knuckle kingpin and
brake arm to brake the camshaft



转向油罐滤芯
Steering oil reservoir oil filter



装富勒变速器
Install with Fuller transmission.



润滑万向节
Lubrication of universal joint

(六)悬架系统关键部位紧固螺栓复紧保养要求

Maintenance requirements for tightening bolts at key parts of suspension system

车辆行驶前必须保证前、后钢板弹簧 U 形螺栓的真正拧紧，才能避免钢板弹簧的早期非正常损坏。

车辆行驶前必须保证悬架系统各个承载件固定螺栓完全拧紧，包括前后悬架板簧支架、U 型螺栓、推力杆、平衡轴支架、气囊托架、稳定杆支架、减振器支架等部位等部位，这样才可以提高整车运行可靠性及各个零部件使用寿命。

It is necessary to ensure that the U-shaped bolts of the front and rear leaf springs are actually tightened before the vehicle is driven, so as to avoid the early abnormal damage of the leaf springs. Before the vehicle runs, it must be ensured that the fixing bolts of the various load-bearing parts of the suspension system are completely tightened, including the front and rear suspension leaf spring brackets, U-bolts, thrust rods, balance shaft brackets, airbag brackets, stabilizer bar brackets, shock absorber brackets, etc. In this way, the reliability of the whole vehicle operation and the service life of various parts can be improved.

1) 新车磨合行驶 200km 及 500km 时，即应按规定之力矩，拧紧前后悬架系统关键点的螺栓及螺母，如板簧支架、U 型螺栓、推力杆、气囊托架、稳定杆支架、减振器支架等悬架关键部位。

1) When the new car runs 200km and 500km, the bolts and nuts of the key points of the front and rear suspension system should be tightened according to the specified torque, such as leaf spring bracket, U-bolt, thrust rod, airbag bracket, stabilizer bar bracket, reducer Key parts of the suspension such as vibrator bracket.

2) 新车磨合结束时(2500km~3000km 左右), 在承载状态下按规定力矩再次紧固关键点螺栓及螺母。

2) At the end of the running-in of the new car (about 2500km~3000km), tighten the bolts and nuts at key points according to the specified torque under the load condition.

3) 汽车投入正常使用后, 应在满载状态下, 每隔 200~300km 按规定力矩, 拧紧一次前后悬架关键部位的螺栓及螺母, 连续紧固 2~3 次, 以后趋于稳定, 可按常规保养进行维护。

3) After the car is put into normal use, the bolts and nuts of the key parts of the front and rear suspension should be tightened at the specified torque every 200-300km under full load, and the bolts and nuts of the key parts of the front and rear suspension should be tightened continuously for 2 to 3 times. Routine maintenance for maintenance.

四.灯泡一览表： Bulb lists:

灯具名称 Name of bulbs		灯泡型号 Type of bulbs	灯泡功率 Power of bulbs	单车数量 Quantity for single vehicle
近光灯 Dipped beam lamp		H1	70W	2
远光灯 Driving beam lamp		H7	70W	2
前位置灯 Front sidelight		W5W	5W	2
前雾灯 Front fog light		H3	70W	2
前转向灯 Front turn lamp		P21W	21W	2
侧转向灯 Side turn lamp		P21W	21W	2
示高灯 Height lamp		R10W	10W	2
后组合灯 Rear combination	转向灯 Turn lamp	P21W	21W	2
	位置灯 Position lamp	R5W	5W	2
	后示廓灯 Rear side indicator	R5W	5W	2
	制动灯 Brake lamp	P21W	21W	2
	倒车灯 Back-up	P21W	21W	2
	后雾灯 rear fog light	P21W	21W	2
侧位置灯 sidelights		R10W	10W	2
室内照明灯 Indoor floodlight		R10W、P21W	10W、21W	4
信号灯 Signal lamp		1. 2W-BAX10D	1. 2W	32

A101 控制单元 Control unit

火焰预热冷起动系统, 白烟减少装置

Cold starting system by flame preheating, white-smoke reduction device

A106 吹风机控制 Blower control 加热和空调 Heating and air conditioning

A156 右侧主视镜 Main sight glass on right

A157 左侧主视镜 Main sight glass on left

A251 左侧广角视镜 Wide-angle sight glass on left

A252 右侧广角视镜 Wide-angle sight glass on right

B100 火焰预热冷起动 Cold starting system by flame preheating

系统的温度传感器/白烟减少装置 Temperature sensor / white-smoke reduction device

B101 制动回路 I 储气筒压力传感器 Brake circuit I air tank pressure sensor

B102 制动回路 II 气筒压力传感器 Brake circuit II air tank pressure sensor

B103 燃油液位高度传感器 Fuel level height sensor

B104 油压传感器 Oil pressure sensor

B105 冷却液温度传感器 Liquid coolant temperature sensor

- B109 驻车制动开关检测灯 Parking brake switch inspection lamp
- B110 行驶记录仪传感器 Traveling data recorder sensor
- E102 左侧倒车灯 Backup lamp on left
- E103 右侧倒车灯 Backup lamp on right
- E108 右侧驻车灯 Parking lamp on right
- E109 左侧驻车灯 Parking lamp on left
- E110 前大灯近光, 右侧 Low beam light of head-light, right
- E111 前大灯近光, 左侧 Low beam light of head-light, left
- E112 前大灯远光, 右侧 High beam light of headlight, right
- E113 前大灯远光, 左侧 High beam light of headlight, left
- E114 车前信号灯, 右侧 Front signal lamp, right
- E115 车前信号灯, 左侧 Front signal lamp, left
- E116 车后信号灯, 右侧 Rear signal lamp, right
- E117 车后信号类, 左侧 Rear signal lamp, left
- E118 尾灯、左侧 Tail lamp, left

- E119 尾灯、右侧 Tail lamp, right
- E122 雾灯, 右侧 Fog lamp, right
- E123 雾灯, 左侧 Fog lamp, left
- E124 后雾灯, 右侧 Rear fog, right
- E125 后雾灯, 左侧 Rear fog, left
- E127 车内照明, 左侧 Inside lighting, left
- E128 车内照明, 右侧 Inside lighting, right
- E150 门灯, 右侧 Door lamp, right
- E162 门灯, 左侧 Door lamp, left
- E177 烟灰缸照明, 左侧 Ashtray lighting, left
- E178 烟灰缸照明, 右侧 Ashtray lighting, right
- E190 铺位照明 Berth lighting
- E204 铺位照明 Berth lighting
- F106 火焰预热冷起动系统的熔断保险丝 Fuse for cold starting system of flame pre-heating
- F107 保险丝, 气动喇叭, 空气干燥器 Fuse, air horn, air drier

- F108 保险丝, 监视器系统 (仪表显示, 检测灯) Fuse, monitor system (instruments display, inspection lamp)
- F109 保险丝, 制动灯, 倒车灯, 驻车制动 Fuse, brake lamp, backup lamp, parking brake
- F110 保险丝, 发动机熄火 Fuse, engine flameout
- F112 保险丝, 风挡清洗器和刮刷系统 Fuse, windshield cleaner, wiper system
- F113 保险丝, 转向指示灯 Fuse, direction indicator lamp
- F117 保险丝, 驻车灯和尾灯, 左侧 Fuse, parking lamp, tail lamp, left
- F118 保险丝, 驻车灯和尾灯, 右侧 Fuse, parking lamp, tail lamp, right (standby)
- F119 保险丝, 前大灯近光, 右侧 Fuse, Low beam light of headlight, right
- F120 保险丝, 前大灯近光, 左侧 Fuse, Low beam light of headlight, left
- F121 保险丝, 前大灯远光, 左侧 Fuse, high beam light of headlight, left
- F122 保险丝, 前大灯远光, 右侧 Fuse, high beam light of headlight, right
- F124 保险丝, 雾灯和后雾灯 Fuse, fog lamp and rear fog lamp
- F125 保险丝, 仪表板照明和开关照明 Fuse, dashboard lighting and switch lighting
- F128 保险丝, 车内照明, 阅读灯和门灯, 危险警告灯, 行车记录仪, 收音机 Fuse, inside lighting, reading lamp, door lamp, danger warning lamp, vehicle traveling data recorder, recorder

- F133 保险丝, 吹风机电动机, 加热与通风 Fuse, blower electric motor, heating and ventilation
- F153 保险丝, 变速箱控制单元 (备用) Fuse, gearbox control unit (standby)
- F156 保险丝, 燃油滤清器加热 (备用) Fuse, fuel filter heating (standby)
- F157 保险丝, 集中润滑系统 (备用) Fuse, centralized lubricating system (standby)
- F158 保险丝, 点烟器 Fuse, cigar lighter
- F160 保险丝, 挂车防抱死制动系统 (备用) Fuse, trailer anti-lock braking system (standby)
- F161 保险丝, 防抱死制动系统压 1 力控制阀 (备用) Fuse, anti-lock braking system pressure control valve (standby)
- F162 保险丝, 防抱死制动系统控制单元 (备用) Fuse, anti-lock braking system control unit (standby)
- F164 保险丝, 电控空气悬架 (备用) Fuse, electro pneumatic suspension (standby)
- F166 保险丝, 后视镜加热器 Fuse, rear view mirror heater
- F185 保险丝, 辅助加热器 Fuse, auxiliary heater
- G100 蓄电池 1 Battery I
- G101 蓄电池 2 Battery II
- G102 交流发电机 AC generator

- H100 交流发电机检测灯（充电检测） Inspection lamp of AC generator (check in charging)
- H101 火焰预热冷起动系统的检测灯 Inspection lamp for cold starting system by flame preheating
- H102 空气喇叭 Air horn
- H108 制动回路 I 和 II 的储气筒压力检测灯 Braking circuit I and II air tank pressure inspection lamp
- H109 机油压力的检测灯 Oil pressure inspection lamp
- H110 冷却液温度的检测灯 Liquid coolant temperature inspection lamp
- H111 中央警示灯 STOP Central warning light STOP
- H112 制动装置灯，左侧 Brake device light , left
- H113 制动装置灯，右侧 Brake device light , right
- H117 驻车制动检测灯 Parking brake inspection lamp
- H118 牵引车转向指示灯的检测灯 Inspection lamp of tractor direction indicator lamp
- H119 挂车转向指示灯的检测灯 Inspection lamp of trailer direction indicator lamp
- H120 车前转向指示灯，右侧的 Front direction indicator lamp, right
- H121 车前转向指示灯，左侧的 Front direction indicator lamp, left
- H122 车后转向指示灯，右侧的 Rear direction indicator lamp, right

- H123 车后转向指示灯, 左侧的 Rear direction indicator lamp, left
- H125 侧转向指示灯, 左侧的 Side direction indicator lamp, left
- H126 侧转向指示灯, 左侧的 Side direction indicator lamp, left
- H129 前大灯远光检测指示灯 Headlights/high beam light inspection indicator lamp
- H149 驾驶室锁的转向指示灯 Direction indicator lamp of cab lock
- H169 气动喇叭 2 (用于双音频喇叭) Air horn II (used in dual done multi frequency horn)
- K102 均断某些线路的继电器, 火焰预热塞 Relay for some circuits disconnection, glow plug
- K103 发动机启动的传感器极限值(1050 转/分)Sensor limit value for engine starting(1050 rotation per minute)
- K104 发动机熄火的延时继电器 Time delay relay for engine flameout
- K105 限速系统的限制阀传感器 Limiting valve sensor in speed limiting system
- K106 继电器, 刮水脉冲 Relay, water scraping pulse
- K107 转向指示器和间歇刮水传感器 Direction indicator and intermittent water scraping sensor
- K108 均断某些线路的电源继电器, 转向指示器, 右侧 Power relay for some circuits disconnection, direction indicator, right

K109 均断某些线路的电源继电器, 转向指示器, 左侧 Power relay for some circuits disconnection, direction indicator, left

K110 控制单元, 转向指示灯 Control unit, direction indicator lamp

K115 继电器, 接线柱 58 Relay, binding post 58

K116 驻车 and 尾灯继电器 Parking and tail lamp relay

K117 继电器, 雾灯 Relay, fog lamp

K118 继电器, 后雾灯 Relay, rear lamp

K119 继电器, 前大灯近光和远光 Relay, high and low beam light of headlight

K171 继电器, 用电器, 接线柱 15 Relay, electric appliances, terminal 15

M100 起动机电动机 Starter motor

M102 刮水器电动机 Water scraper motor

M103 风挡清洗器电动机 Windshield cleaner motor

M116 吹风机电动机

加热与通风 Blower-motor, headlights, low beam light adjuster, left

M117 伺服电动机, 前大灯近光调节器, 左侧 Actuating motor, headlights low beam light adjuster, left

- M118 伺服电动机, 前大灯近光调节器, 右侧 Actuating motor, headlights low beam light adjuster, right
- P100 行驶记录仪 Traveling data recorder
- P101 发动机转速计 Engine tachometer
- P102 仪表板显示, 制动回路 I 储气筒压力 Dashboard light, brake circuit I air tank pressure
- P103 仪表板显示, 制动回路 II 储气筒压力 Dashboard light, brake circuit II air tank pressure
- P104 仪表显示, 燃油油位 Dashboard light, fuel level
- P105 仪表显示, 燃油油位 Dashboard light, fuel level
- P106 仪表显示, 冷却液温度 Dashboard light, liquid coolant temperature
- Q101 转向锁 (点火开关锁) Steering lock (ignition switch lock)
- R100 火焰加热塞 1 Flame heating plug I
- R101 火焰加热塞 2 Flame heating plug II
- R106 变光开关, 仪表板照明 Dimmer switch, dashboard lighting
- R107 空气干燥器 Air drier
- R108 点烟器 Cigar lighter
- R109 电位器, 前大灯灯光调节器 Potentiometer, headlights' beam light adjuster

S103 气动喇叭按钮 Air horn button

S104 倒车灯开关 Back-up lamp switch

S105 发动机制动脚踏开关 Engine brake foot pedal switch

S106 后视镜加热开关 Rearview mirror heating switch

S108 转向柱组合开关（转向指示灯，风挡间歇清洗/刮水前大灯闪光灯）

Steering column combined switch（direction indicator lamp, headlight blinker for intermittent windscreen cleaning/wiping）

S109 危险警告灯开关 Danger warning light switch

S111 开关，灯 Switch, light

S113 雾灯、后雾灯开关 Fog lamp/rear fog lamp switch

S149 蓄电池总开关（机械操作） Master battery switch（mechanical operation）

S161 传感器开关，制动灯 Sensor switch, brake lamp

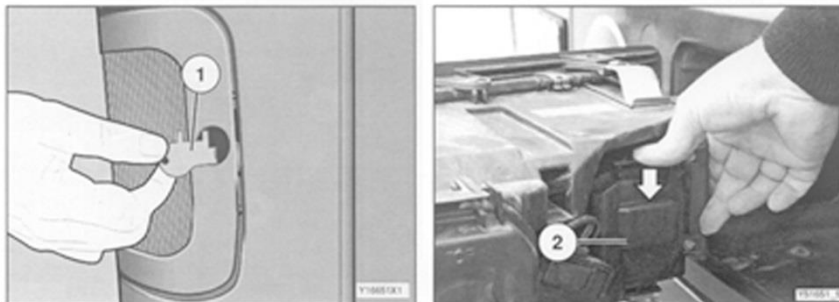
S174 开关，换挡显示 Switch, shift light

S178 开关，驾驶室锁 Switch, cab lock

S180 开关，半档显示 Switch, semi-gear light

S181 车门控制开关, 左侧 Door lock switch, left

S182 车门控制开关, 右侧 Door lock switch, right



S183 开关, 吹风机, 加热与通风 Switch, blower, heating and ventilation

S185 开关, 轮间差速锁检测灯 Switch, inter-wheel differential lock inspection lamp

S187 开关, 轮间差速检测灯 Switch, inter-wheel differential inspection lamp

S198 开关, 驾驶室锁, 右侧 Switch, cab lock, right

S199 开关, 驾驶室锁, 左侧 Switch, cab lock, left

V100 单向离合器二极管, 接线柱 1 15 One-way clutch diode, terminal 115

X129 跨接到中央电气系统 Connect to central electric system

X148 跨接到中央电气系统 Connect to central electric system

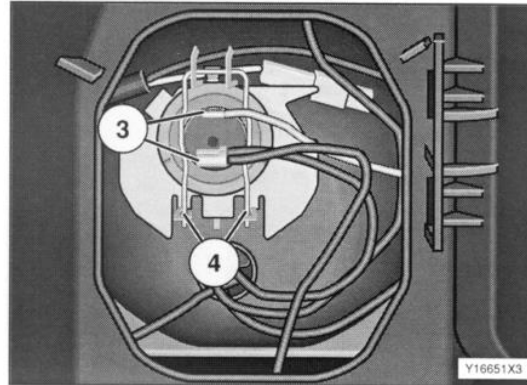
Y100 电磁阀，火焰预热冷起动系统 Magnet valve, cold starting system by flam pre-heating

Y102 电磁阀，关闭发动机发动机制动 Magnet valve, engine flameout and engine brake

Y103 电磁阀，限速系统 Magnet valve, speed limit system

Y145 电磁阀，轮间差速锁Magnet valve, inter-wheel differential lock

更换前大灯灯泡 Replace of headlight



使用专用钥匙（↑）向上拔弹片，即可打开大灯灯座。向前翻转前大灯灯座。按住锁止机构，并取下前大灯灯罩。

Use special key to pull up the leaf spring, and the headlamp holder can be opened. Tilt headlamp holder forward. Press locking latching mechanism and remove the lamshade of headlamp.

将线缆插头从灯座拔出。

Pull out the cable plug from lamp holder.

将电灯座的弹簧接头臆压在一起并向下折叠起来。

Press spring joint of light holder and folded it downward.

取下已坏的灯泡。

Take off the damaged bulb.

换上新卤素灯泡，将锁止凸舌卡在反光镜的凹槽里。

Replace it with a new halogen bulb. Fix the spring structure in groove.

将弹簧夹抬起

Lift the spring clip

一起压弹簧接头，使其卡住锁止凸舌

Press spring joint, and make it blocked.

将线缆插头插回灯座

Insert cable plug to holder

装回前大灯保护罩

Install protection cover of headlamps

盖上前大灯灯座

cover the headlamp holder.

检查前大灯的调整情况。如有必要，可再次调整

Check adjustment conditions of headlamp. If necessary, and adjusted it again.

说明：远光和近光的灯泡是相同的，因此如果没有多余的灯泡也可暂时用远光灯泡来代替近光灯泡。

Note: the bulbs of high beam and dipped beam are the same. If there is no excessive bulb, the dipped beam is replaced to use high beam bulb.

更换侧边灯灯泡

Replace the bulb of sidelights

按下灯座（→），旋转并取下灯座，将其从后部拿出

Press and rotate the lamp holder to take it off from back.

换上新灯泡

Mount a new bulb

以相反的顺序安装灯座

Mount the lamp holder in an opposite sequence

更换仪表或检测指示灯

Replace instruments or check indicator lights

按以下步骤更换出故障的仪表或指示灯

Replace the broken-down instruments or indicator light according to the following steps:

关闭蓄电池控制开关，或断开蓄电池

Turn off the control switch of the storage battery or disconnect the storage battery

拧下螺钉，从仪表板顶部取下仪表盖

Remove the bolt, and take off the instruments panel.

从仪表盘出故障部分取下螺钉

Remove the bolt from the place where fault has been checked out

向上振摇这部分仪表板，将其从后部提出来

Shake this part of the dashboard upward to pick it up from back.

排除故障

Remove of fault

按相反的顺序，重新安装这一部分

Re-mount this part in an opposite sequence.

前组合灯总成：

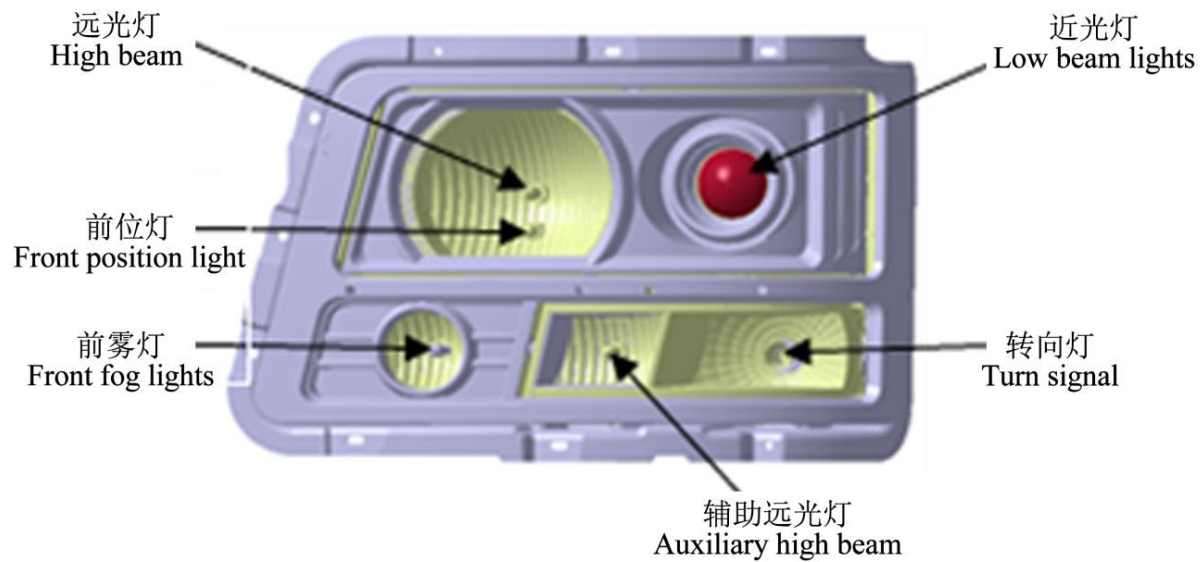
The front combination lamp assembly:

组成：远、近光灯、前位灯、转向灯、前雾灯、辅助远光灯、灯壳、装饰板等，前位灯位于远光灯的灯碗处。

It is composed of: high and low beam, front position lamp, steering indicator lamp, front fog lamp, auxiliary high beam, lamp housing and decorative plate, and so on. The front position lamp locates at the lamp bowl of high beam.

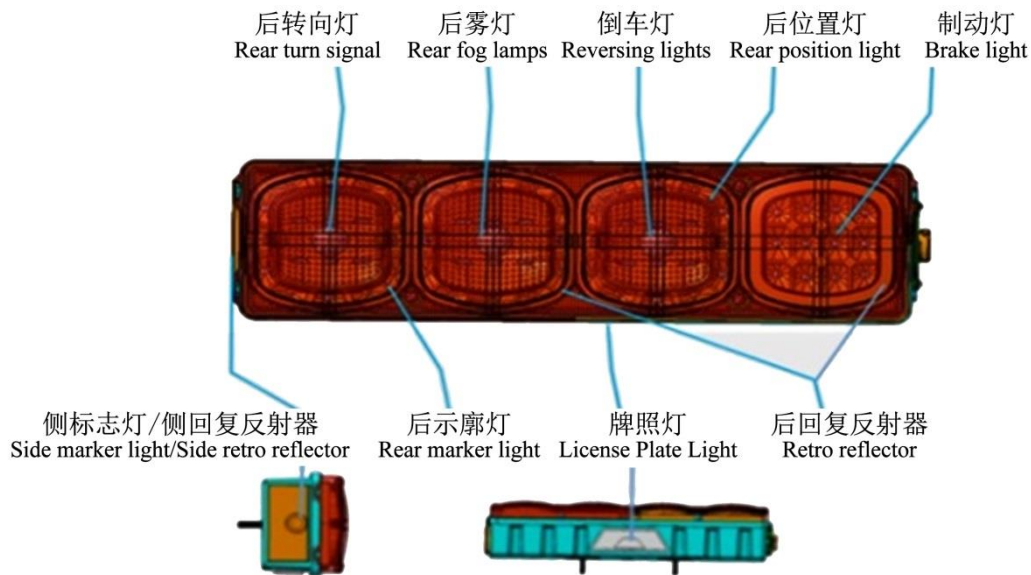
位置：安装在保险杠上，使用支架与保险杠连接。（右前组合灯与左前组合灯对称）

Location: it is installed on the bumper and connected with bumper by brackets. (the right front combination lamp is symmetric with the left one).



后组合尾灯:

组合尾灯安装在后轮挡泥板上方尾灯支架上(左右对称), 下图为左组合尾灯, 右组合尾灯在与左组合尾灯对称的上, 取消牌照灯功能。



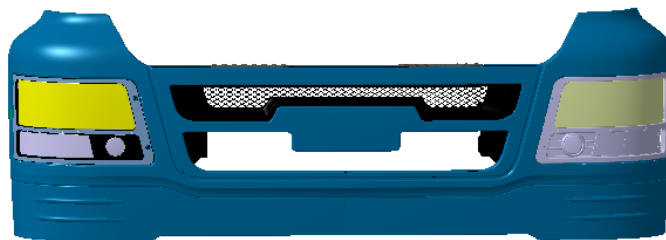
侧转向灯：Side steering indicator lamp

安装在上车踏板装饰板上 (左右对称), 当打开转向灯开关或危急报警开关时, 与前、后转向灯同步闪烁。

It is installed on the decorative plate of get-on pedal (the left and right lamps are symmetrical). When switched on steering indicator lamp or emergency alarm switch, it will flash along with the front and rear steering indicator lamp.



侧转向灯 Side turn lamp



示廓灯：（适用于除非洲版以外的车型） Outline marker lamp: (except for Africa type vehicles)

安装在遮阳罩上，左右各一个，当小灯开关打开时，示廓灯点亮。

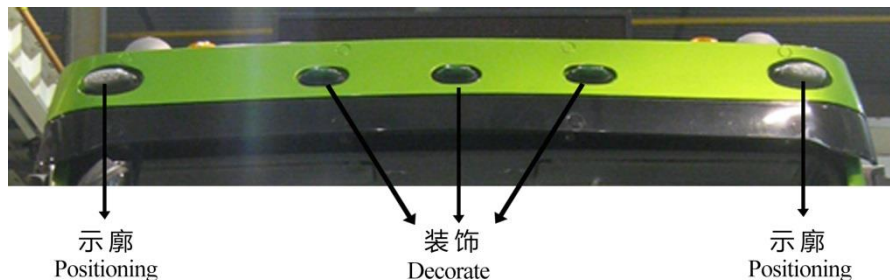
The lamps are installed on the sun visor, one on the left and one on the right. When the small lamp is switched on, the outline marker lamp will light up.

装饰灯：（适用于除非洲版以外的车型）

Decorative lamp: (except for Africa type vehicles)

安装在遮阳罩上中间位置，当小灯开关打开时，装饰灯点亮。

It is installed on the middle position of sun visor. When the small lamp is switched on, the decorative lamp will light up.



示廓灯：（适用于非洲版车型）

Outline marker lamps: (applicable to Africa vehicle type)

安装在驾驶室顶盖上方，左右各一个，当小灯开关打开时，示廓灯点亮。

The lamps are installed above cab roof, one on the left and one on the right. When the small lamp is switched on, the outline marker lamp will light up.



侧标志灯

Side marker lamp

安装在前轮翼子板上，左右各一个，当小灯开关打开时，示廓灯点亮。

The lamp is installed on the front fender, one on the left and one on the right. When the small lamp is switched on, the outline marker lamp will light up.

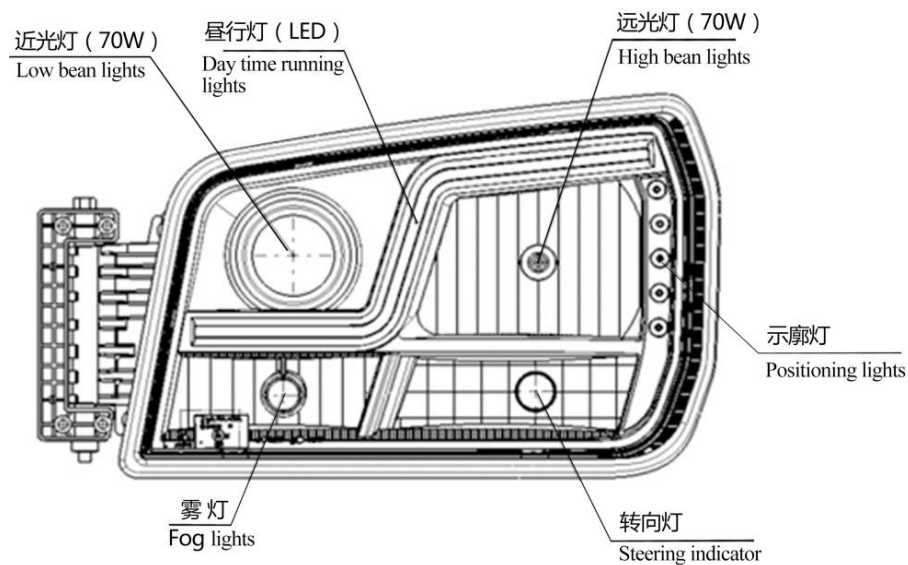


侧标志灯 Side marker lights

H3000 前照灯

(1) Cab and main institutions (devices)

Change the content: Add H3000 headlamps Light bulb list



前组合灯总成:

Front combination lamp assembly:

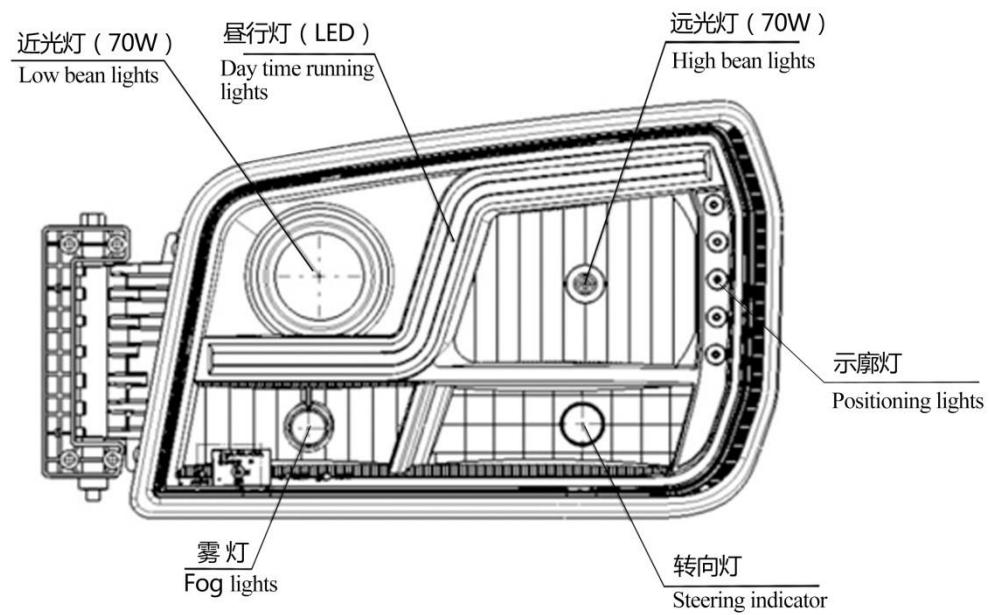
组成: 远、近光灯、前位灯、转向灯、前雾灯、昼间行驶灯。前位灯位于远光灯的边缘外侧。

Composition: Far, low beam, front position, turn signal, Front fog lights, daytime running lights. Front light is located in the outer edge of the high beam.

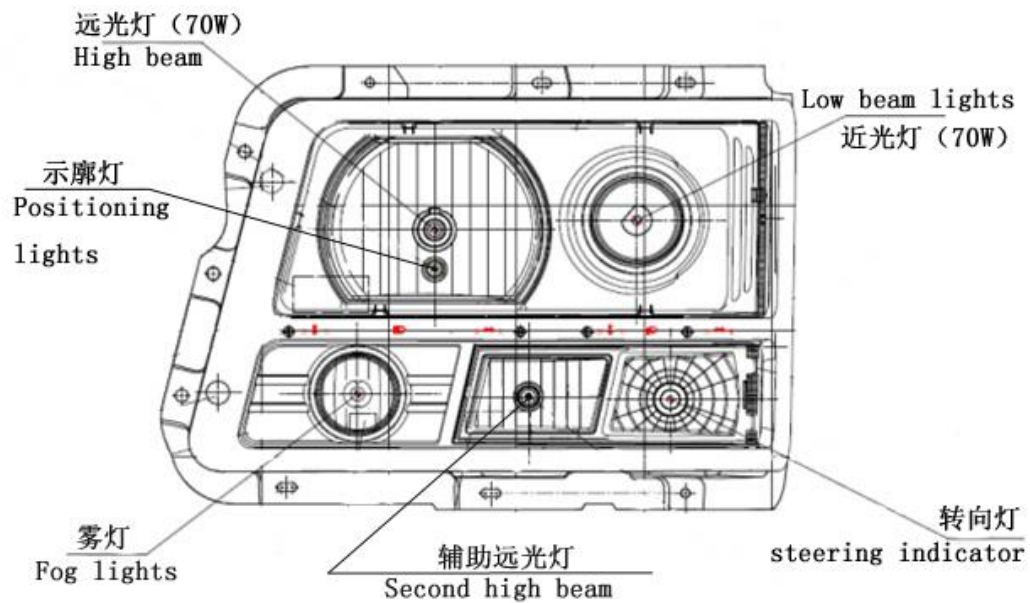


M3000 与 H3000 前照灯区别: M3000 有辅助远光, H3000 无辅助远光。前照灯安装结构布局 and 外观不一样。如下图

Differences between M3000 and H3000 headlamps: The M3000 has auxiliary high beam and the H3000 has no auxiliary high beam. Headlamp installation structure layout and appearance are not the same. As shown below:



H3000 大灯 H3000 Headlight



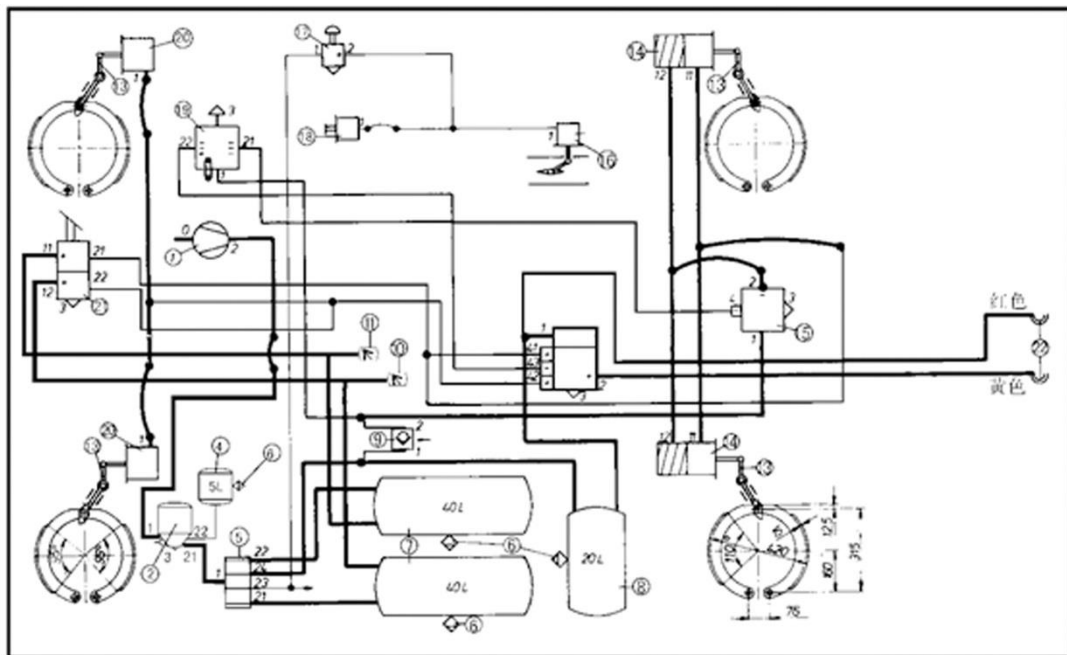
M3000 大灯 M3000 headlight

五、制动管路图 Schematic diagram for brake tube

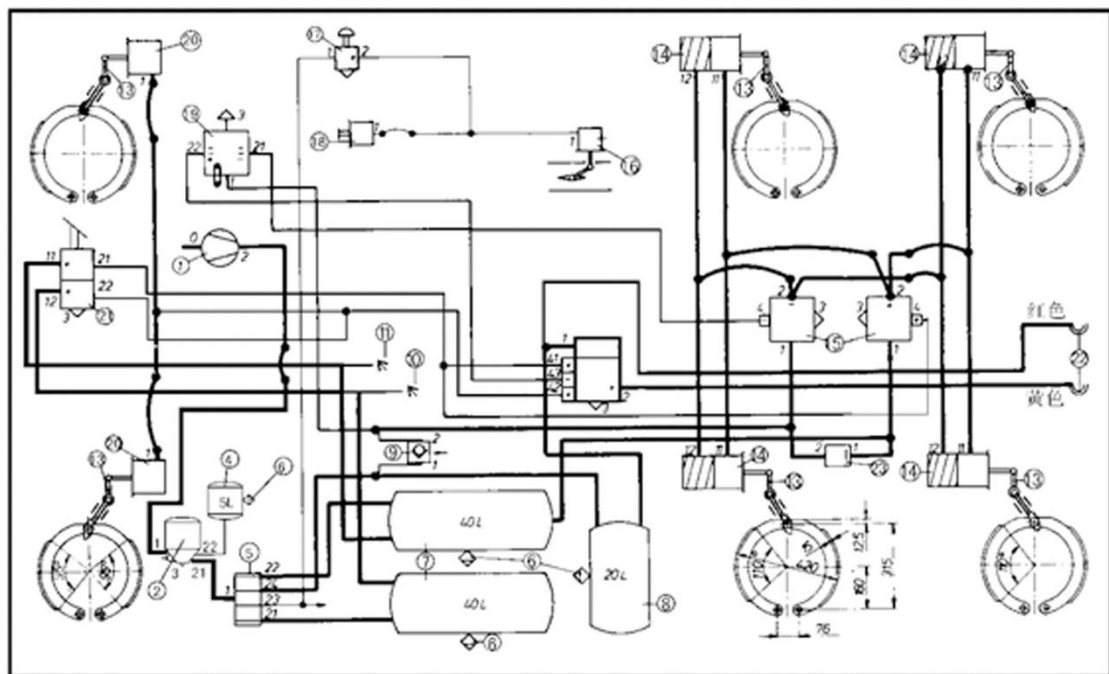
- 1 空压机 Air Compressor
- 2 带调压阀的空气干燥器 Air dryer with pressure regulator valve
- 4 反冲罐 Backwash tank
- 5 四回路保护阀 Four-loop protection valve
- 6 放水阀 Water drain valve
- 7 储气筒 Air cylinder
- 8 储气筒 Air cylinder
- 9 单向阀 Single check valve
- 10 前轮制动气压表 Air pressure gauge for front brake
- 11 (中) 后轮制动气压表 Air pressure gauge for (middle) rear brake
- 12 双管路挂车制动控制阀 Dual-pipeline trailer control valve
- 13 制动臂 Braking arm
- 14 复合式气制动室 Compound brake chamber
- 15 继动阀 Relay valve

- 16 工作缸 Working cylinder
- 17 排气制动操纵阀 Exhaust brake operating valve
- 18 工作缸 Working cylinder
- 19 停车制动阀 Parking brake valve
- 20 制动气室 Brake chamber
- 21 双回路制动气阀 Dual- pipeline air brake valve
- 22 挂车制动气路连接器 Trailer braking pipeline coupler
- 23 溢流阀 Overflow valve

4×2 制动系统图 4 × 2 brake system diagram



6×4 制动系统图 6 × 4 brake system diagram



六、轮胎气压 Tyre pressure

气压单位 unit: kpa($\approx 1\text{kg/cm}^2$)

轮胎型号 tyre type	额定充气压力 kPa rated inflation pressure	轮胎层级 PR ply rating of tyre	额定负荷 rated load (单 single tyre/双胎 double tyre) kg
12.00-20	810 $\pm$ 20 (单胎 single tyre)、 740 $\pm$ 20 (双胎 double tyre)	18	3750/3350
11.00-20	910 $\pm$ 20 (单胎 single tyre)、 840 $\pm$ 20 (双胎 double tyre)	18	3650/3150
12.00R20	830 $\pm$ 20	18	3750/3450
11.00R20	930 $\pm$ 20	18	3550/3250
12R22.5	930 $\pm$ 20	18	3550/3250
11R22.5	830 $\pm$ 20	16	3000/2725
295/80R22.5	900 $\pm$ 20	18	3550/3250
315/80R22.5	830 $\pm$ 20	18	3750/3450
425/65R22.5	760 $\pm$ 20	18	4750

七、允许总质量和轴载质量 kg(公斤) Authorized Total Mass and Axle- loaded Mass (kg)

驱动形式 总质量 total mass 轴载质量 and axle-load mass	4×2	6×2	6×4 牵引 tractor	6×4 自卸 dumper	8×4
前轴额定轴载质量 Rated front axle- loaded mass	5500 7500	5500	5500	7500	5500
中、后桥额定轴载质量 Rated axle- loaded mass for middle, rear axle	11500 13000	11500 13000	11500 13000	13000 16000	13000 16000
汽车最大允许总质量 vehicel maximum autohrozed total mass	18000	25000	25000	25000	31000
列车最大允许总质量 Max total mass	43000	49000	49000	/	/

八、附表 Annex

序号 No.	名称 Name	拧紧力矩(N.m) Tightening torque(N.m)	备注 Remarks
1	气缸盖主螺栓 Cylinder head bolt	按转角法拧紧 Screw down by rotation	*
2	气缸盖辅助螺栓的螺母 Nuts of cylinder auxiliary nut	按转角法拧紧 Screw down by rotation	*
3	连杆螺栓 Connecting rod bolt	按转角法拧紧 Screw down by rotation	*
4	飞轮螺栓 Flywheel bolt	按转角法拧紧 Screw down by rotation	*
5	飞轮壳螺栓 Flywheel cover bolt	按转角法拧紧 Screw down by rotation	*
6	排气管螺栓 Exhaust pipe bolt	按转角法拧紧 Screw down by rotation	*
7	主轴承螺栓 Main bearing bolt	250N.m (25kgfm)	*
8	摇臂座螺栓 Lever bracket bolt	100N.m (10kgfm)	
9	曲轴皮带轮螺栓 Crankshaft pulley bolt	65N.m (6.5kgfm)	

序号 No.	名称 Name	拧紧力矩(N.m) Tightening torque(N.m)	备注 Remarks
10	正时中间齿轮轴用螺栓 Timing counter gear shaft bolt	180N.m (18kgfm)	
11	机油泵中间齿轮轴用螺栓 Oil pump counter gear shaft bolt	65N.m (6.5kgfm)	
12	前轴制动气室紧固带夹紧螺栓 Front axle brake chamber clamping bolt	10N.m (1kgfm)	
13	前轴横拉杆臂紧固螺母 Front axle tie rod retaining nut	300N.m (30kgfm)	
14	前轴车轮螺栓螺母 Front wheel bolt/nut	550-660N.m(铝合金车轮 610-680N.m) 55-66kgfm(Avional wheel 61-68kgfm)	
15	前驱动桥车轮螺栓螺母 Front drive axle wheel bolt and nut	550-660N.m(铝合金车轮 610-680N.m) 55-66kgfm(Aluminium alloy wheel 61-68kgfm)	
16	后桥车轮螺栓螺母 Rear axle wheel nut & bolt	550-660N.m(铝合金车轮 610-680N.m) 55-66kgfm(Aluminium alloy wheel 61-68kgfm)	
17	前驱动轮, 后桥输入法兰凸缘螺母 Front drive axle, rear input axle flanged nut	750-800N.m (55~60kgfm)	
18	前驱动轮, 后桥, 双后桥差速器壳紧固螺母 Front drive axle, rear axle, bogie carrier retaining nut	195N.m (19.5kgfm)	

序号 No.	名称 Name	拧紧力矩(N.m) Tightening torque(N.m)	备注 Remarks
19	差速器与圆锥被动齿轮紧固螺母 Differential & passive conical bearing retaining nut	325N.m (32.5kgfm)	
20	转向器与转向器支架连接螺栓螺母 Steering gear&steering gear bracket connecting bolt/nut	520 N•m±52 N•m	
21	转向摇臂固定螺母 Steering gear arm retaining nut	570 N•m±57 N•m	
22	横拉杆臂与转向横拉杆连接槽形螺母 Tie rod & steering tie rod connecting castle nut	大于 500N.m	
23	转向横、直拉杆球销螺母 Steering horizontal and straight tie rod ball pin nut	M20 220 N•m±10 N•m M24 300 N•m±30 N•m	
24	M18×1.5 空心螺栓拧紧力矩 Tightening torque of hollow bolt	50 N•m±10 N•m	
25	M26×1.5 空心螺栓拧紧力矩 Tightening torque of hollow bolt	75 N•m±15 N•m	
26	M22×1.5 卡套式管接头螺纹拧紧力矩 The thread tightening torque of ferrule-type compression joint	75 N•m±10 N•m	

序号 No.	名称 Name	拧紧力矩(N.m) Tightening torque(N.m)	备注 Remarks
27	驾驶室翻转轴处螺栓 Cab trip shaft bolt	135 N•m	
28	传动轴法兰螺栓 Transmission shaft flange bolt	M14×1.5 178-218 N•m	
29	传动轴中间支承螺栓 Transmission shaft intermediate bearing bolt	M14×1.5 195 N•m (19.5kgfm)	
30	方向盘紧固螺母 Steering wheel retaining nut	80 ±5 N•m	
31	悬架各安装点处紧固螺栓/螺母 Fasten bolts/nuts at each installation point of the suspension		
32	钢板弹簧支架、平衡轴支架、减振器支架的 螺栓螺母 Bolts and nuts for leaf spring bracket, balance shaft bracket, shock absorber bracket	178~218 N•m	
33	前簧 U 型螺栓螺母 Front spring U-shaped bolts and nuts	260±26 N•m	M18×1.5
34	前簧 U 型螺栓螺母 Front spring U-shaped bolts and nuts	270±27 N•m	M18×2

序号 No.	名称 Name	拧紧力矩(N.m) Tightening torque(N.m)	备注 Remarks
35	斯太尔单后桥板簧 U 型螺栓 Steyr single rear axle leaf spring U-bolt	$470 \pm 47 \text{ N}\cdot\text{m}$	M22×1.5
36	MAN 单后桥板簧 U 型螺栓 MAN single rear axle leaf spring U-bolt	$680 \pm 68 \text{ N}\cdot\text{m}$	M24×2
37	斯太尔整体式后平衡悬架板簧 U 型螺栓 Steyr integrated rear balance suspension leaf spring U-bolt	$550 \pm 40 \text{ N}\cdot\text{m}$	
		$510 \pm 51 \text{ N}\cdot\text{m}$	
		$840 \pm 84 \text{ N}\cdot\text{m}$	
38	斯太尔整体式双后桥平衡悬架推力杆螺栓 Steyr Integral Double Rear Axle Balance Suspension Thrust Rod Bolt	$530 \pm 40 \text{ N}\cdot\text{m}$	
39	断开式平衡悬架推力杆在横梁上紧固的螺栓 Bolt fastened on the crossbeam of the thrust rod of the disconnected balance suspension	$560 \pm 60 \text{ N}\cdot\text{m}$	
40	断开式平衡悬架下推力杆螺栓 Lower thrust rod bolt of disconnected balance suspension	$390 \pm 60 \text{ N}\cdot\text{m}$	
41	断开式平衡悬架橡胶轴承固定螺栓 Split type balance suspension rubber bearing fixing bolt	$370 \pm 50 \text{ N}\cdot\text{m}$	

序号 No.	名称 Name	拧紧力矩(N.m) Tightening torque(N.m)	备注 Remarks
42	空气悬架气囊托架与桥紧固螺栓 Air suspension air bag bracket and bridge fastening bolt	$400 \pm 40 \text{ N}\cdot\text{m}$	M20×2
43	空气悬架 V 型推力杆紧固螺栓 Air suspension V-shaped thrust rod fastening bolt	$400 \pm 40 \text{ N}\cdot\text{m}$	在横梁上紧固时
		$397 \sim 457 \text{ N}\cdot\text{m}$	在驱动桥上紧固时
44	空气悬架下推力杆螺栓 Air suspension lower thrust rod bolt	$380 \sim 437 \text{ N}\cdot\text{m}$	M18×2
48	空气悬架下推力杆螺栓 Air suspension lower thrust rod bolt	$397 \sim 457 \text{ N}\cdot\text{m}$	M18×1.5
49	气囊底座与气囊托架联接螺栓 Airbag base and airbag bracket connecting bolt	$250 \pm 25 \text{ N}\cdot\text{m}$	
50	复合悬架导向臂与导向臂支架固定螺栓 Composite suspension guide arm and guide arm bracket fixing bolt	$530 \pm 40 \text{ N}\cdot\text{m}$	
51	复合悬架横向推力杆固定螺栓 Composite suspension transverse thrust rod fixing bolt	$350 \pm 35 \text{ N}\cdot\text{m}$	
52	冷却系统胶管连接处 B 型涡轮传动式软管卡箍 Type B hose clip of the cooling system hose connection	$5.75 \pm 0.25 \text{ N}\cdot\text{m}$	

序号 No.	名称 Name	拧紧力矩(N.m) Tightening torque(N.m)	备注 Remarks
53	冷却系统胶管连接处内衬式大美式喉箍 American clip of the cooling system hose connection	8.0±0.5N.m	
54	中冷系统胶管连接处 T 型卡箍 Type T clip of the CAC hose connection	8.5±1N.m	

附表 3 主要螺栓螺母的拧紧力矩 Annexed table 3 Tightening torque of Main Bolts and Nuts

九、技术特性

Technical characteristics

1. 普通技术参数 General technical parameters

品牌 Brand	陕汽牌 shanqi		
车辆类型 Type	牵引车 tractor	自卸车 Dumper (二类 2-class)	载货车(二类)Truck (2-class)
车型号 Vehicle category	SX4257GR279	SX3315HR366	SX1315GL456
驱动型式 Drive type	6×2	8×4	8×4

品牌 Brand	陕汽牌 shanqi		
车辆类型 Type	牵引车 tractor	自卸车 Dumper (二类 2-class)	载货车(二类)Truck (2-class)
汽车列车最大设计质量 (Kg) Maximum design mass of vehicle combination (Kg)	49000	31000	31000
外形尺寸 (mm) Diameter (mm)	6885×2490×3560	9260/9660×2490×3360	11560×2490×3560
轴距 (mm) Axle base (mm)	1800+2700	1800+3575/3975+1350/1400	1800+4575+1350
轮距 (mm) Wheel base (mm)	2001/1860	2011/1860	2011/1860
前悬/后悬 (mm) Front/rear suspension (mm)	1485/900	1485/1000	1485/2350
整备质量 (Kg) Complete vehicle kerb mass (Kg)	8050	14950	9600

品牌 Brand	陕汽牌 shanqi		
车辆类型 Type	牵引车 tractor	自卸车 Dumper (二类 2-class)	载货车(二类)Truck (2-class)
允许最大轴载质量 (Kg) Maximum authorized axle-laden mass (Kg)	4600/20400	6500/6500/18000	6500/6500/18000
汽车列车最大设计质 量 (Kg) The maximum design mass of vehicle (Kg)	49000	31000	31000
最高车速 (km/h) Maximum speed	120	99	97
最大爬坡度 (%) maximum gradeability (%)	20	24	24
限定条件下百公里油 耗 (L/100 km) Fuel consumption of 100-kilometer under limited condition (L/100 km)	35	32	30

2 整车主要总成及配置 principal assembly and configuration of vehicle

发动机 Engine	详细参数见发动机铭牌 Refer to engine nameplate
离合器 Clutch	Φ 430 型膜片弹簧离合器，液压操纵。 Φ 430-type diaphragm spring clutch, operated under hydraulic pressure
变速器 Transmission	双中间轴式变速器，远距离机械式操纵。 Double intermediate shaft transmission, mechanical operation in remote.
传动轴 Drive shaft	管状开式，万向节是十字滚针轴承式 Exposed tubular drive shaft with needle bearing cardan joint
前轴 Front shaft	5.5 吨级/7.5 吨级/9.5 吨级前轴 5.5 t , 7.5 t, 9.5 t front shaft
驱动桥 Drive axle	13 吨级/16 吨级驱动桥 13t, 16t drive axle
转向器 Diverter	循环球式动力转向器 ball circuit type power diverter

前悬架 Fronrsuspension	非独立纵置钢板弹簧悬架+液压筒式减振器 Non-independent longitudinal leaf spring suspension + hydraulic cylinder shock absorber
后悬架 Rear suspension	非独立纵置钢板弹簧悬架或空气悬架 Non-independent longitudinal leaf spring suspension or air suspension 非独立纵置钢板弹簧平衡悬架+推力杆或空气悬架 Non-independent longitudinal leaf spring balanced suspension + thrust rod or air suspension
制动系统 Brake System	行车制动：双回路压缩空气制动 Service brake: Double circuit brake of the engine 驻车制动：弹簧储能断气制动。 Parking brake: Energy storage spring brake 辅助制动：发动机排气制动。 Auxiliary brake: Exhaust brake of the engine 挂车制动：双管路挂车制动。 Trailer brake: Dual-circuit trailer brake
驾驶室 Cab	选用全金属平头液压翻转驾驶室 Adopt all metal flat hydraulic tilt cab

十、车辆报废处理及注意事项

Attention points for motor vehicle liquidation

1 汽车报废后,必须按国家法规要求,到当地环保部门指定单位进行拆卸分解,严禁私自拆卸分解。

Disassemble automobiles by nominated company authorized by local environment protection department according to national laws and regulations after they were rejected, it's forbidden to detach and disassemble automobile by themselves.

2 汽车尾气排放,污染空气对人体有害,本产品出厂时,经过严格检验,符合国家现行标准,用户对发动机大修后,应对尾气进行检测。

Because tail gas emission will make air contaminated and is bad for human body, vehicle should be strictly inspected and comply with current standard while the vehicle leaves factory. The tail gas should be checked after engine overhauled by users

3 发动机机油、齿轮油、液压油等矿物油,随意向土地排放,会造成土壤和地下水源污染,应集中回收处理。

If mineral oils, such as engine oil, gear oil, hydraulic oil, discharge into earth at random, it will make soil and underground water polluted, so centralized recovery should be done .

4 汽车防冻液、冷却液等，含有对人体有害物质，严禁随意排放，应集中回收处理。

Due to the harmful substance contained in anti-freeze liquid and cooling liquid of automobile, etc. It is forbidden to discharge them at random, centralized recovery should be done.

5 报废汽车用铅酸蓄电池（电瓶）及其电解液，对人体有害，必须按当地环保部门指定单位集中回收处理。

Rejected automobile lead-acid battery (battery cell) and its electrolyte, are bad for human body, so it should be recycled and treated intensively by nominated company authorized by local environment protection department.

6 本产品使用的塑料件、橡胶、玻璃、复合材料（如玻璃钢等件）、电器、仪表灯具等属低降解材料，损坏报废后不得随意抛洒，必须按当地环保部门指定单位集中回收处理。

Plastic parts, rubber, glass, composite material (such as glass reinforced plastic parts, etc.), electric equipment, instrument light used by the vehicle are materials with low degradation ability, Do not throw them at random after rejected , they must be recycled and treated intensively by nominated company authorized by local environment protection department.