KING LONG
BUSES

# OPERATION MANUAL

User's Guide


**King-Long XMQ6900 Series Tourist Bus**

**Xiamen King Long United Automotive Industry Co., Ltd.**

# FOREWORD

King-Long XMQ6900 series tourist bus keeps features of superior economy, security and comfort. It has stable performance, strong power, luxury interior trimming and high speed, which could meet applications of passenger inter-city transportation, touring and business affairs, etc.

As for the specifications introduced in relate to information of the driving and operation, service and maintenance of the XMQ6900 series tourist bus, please read them carefully and make proper operation, maintenance and repair so as to ensure it in good condition. Special hint: without authorization of Xiamen King Long United Automotive Industry Co., Ltd, never modify the electrical deployment of the whole vehicle, and should not lap the power supply line in disorder. Improper usage and repair may have a strong impact on service performance of the complete vehicle, and thus the manufacturer , Xiamen King Long United Automotive Industry Co., Ltd. will not takes the responsibility for the damages caused by them.

Any problem in service, please contact our special maintenance network or after-sales department. We will ensure timely and complete maintenance as well as original parts supply.

In order to satisfy all kinds of different demand of the consumers, we strive to improve the quality of the product continuously to optimize our products. We should not give any further notice for any modification of the product in advance . The contents on the instruction book can only be used as reference. If there are facts not comply with the manual, will be subject to the actual state of the products because for some device and items, the vehicle will be finally equipped only if they have been taken as optional configurations.

Final interpretive right of the instruction book belongs to the Engineering Academy of Xiamen King Long United Automotive Industry Co., Ltd.

**Xiamen King Long United Automotive Industry Co., Ltd.**

**MAY. 2016**

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**4 . Vehicle starting and driving**

# Contents

# Contents

# Technical parameters of the complete vehicle

**(Vehicle No：D2900633)**

| | | | |
|---|---|---|---|
| Product Model | | | XMQ6900 |
| Engine model | | | ISB6.7E5 250 |
| Engine type | | | In-line six-cylinder ,water-cooling four stroke direct-injection, electronically controlling, diesel engine |
| Cylinder diameter × stroke (mm) | | | 107×124 |
| Displacement (mL) | | | 6700 |
| Compression ratio | | | 17.3:1 |
| Rated capacity / rotation speed Kw/r/min | | | 184/2500 |
| Max. torque / rotation speed N.m/r/min | | | 950/1200 |
| Dimensions | Overall length (mm) | | 8995 |
| | Overall width (mm) | | 2480 |
| | Overall height (mm) | | 3435 |
| | Wheelbase (mm) | | 4300 |
| | Wheel track | Front mm) | 2090 |
| | | Rear (mm) | 1860 |
| | Minimum lift-off clearance (mm) | | 230 |
| | Approach angle (°) | | 10 |
| | departure angle (°) | | 8 |
| | Front suspension / rear suspension (mm) | | 1905/2790 |
| Rated passenger (driver included) (person) | | | ≤39 |
| Mass parameter | Technically permissible maximum laden mass (kg) | | 14000 |
| | Technically permissible maximum mass of combination (kg) | | 17500 |
| | Technically permissible maximum laden mass for front axle (kg) | | 4500 |
| | Technically permissible maximum laden mass for rear axle (kg) | | 9500 |
| wheel | Tire size (front, rear) | | 275/70 R22.5 |
| | Tire inflation pressure (kpa) | | 700 |
| Performance parameter | Max. speed (km/h) | | 115 |
| | Fuel consumption (L) | | -- |
| | Maximum gradeability (%) | | 30 |
| | Min. turning diameter (m) | | 17 |

| | | |
|---|---|---|
| | parking braking ability ( 20% gradient) | parking for 5 minutes |
| Capacity data | Fuel tank（L） | 200 |
| | Engine oil（L） | 26.5 |
| | Transmission lubricant（L） | 42(first oil fill)；24（service oil change） |
| | Main retarder lubricant（L） | 11 |
| | Power steering hydraulic oil（L） | 6～7 |
| | Clutch oil（L） | 0 |

## Introduction to data plate


**Bus data plate**

The bus data plate may be affixed to either the upside of the front passenger door frame or to the side of the front passenger door step (the position may vary with vehicle model). There are many parameters on the plate, such as vehicle model, gross mass, vehicle serial number, vehicle capacity, VIN (short for vehicle identification number), chassis serial number, engine serial number, engine model, rated power, production data and etc..

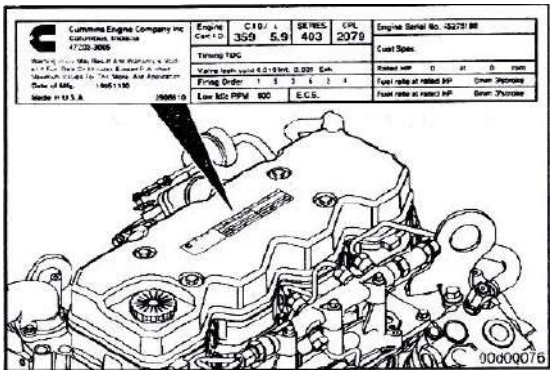
**Chassis data plate**

The chassis data plate with vehicle identification number (VIN) is upon the front door.

**Engine data plate**

The engine data plate is on top surface or salient top position of the engine, whose position may be various according to different engine manufacturing plant.

The engine number is stamped on the left or right block of the engine, whose position may be various according to different engine manufacturing plant.



## Product quality assurance

We insisted that the end user should make breaking-in maintenance of the rolling-out new vehicles in their initial driving mileage of 5000 km. Users must make proper operation and maintenance strictly according to relevant regulations in the instruction book. Please refer to “workshop manual” for product quality assurance and abide by related specification.

## Technical documents

The instruction book is used combined to the following specification:

Engine operation instruction or service manual

Note: the instruction book should be modified according to specific configuration of vehicle

## Body Structure

1. Structural style
Semi-integral body structure

2. Structure
The bodywork structure adopts closed girder construction of six major assembly parts, which are combined welded by rectangle steel pipes with advantages of strong structural stiffness, torsion resistance and bending resistance as well as relatively simple craftwork. Main components of skeleton have been performed anticorrosion treatment to ensure steady adhesion of coating and strong capacity of antirust and corrosion-proof.

3. Interior trim
The interior adopts flexible design and the floor adopts steel plate/wood block composite construction, and covered with anti-slip and antifriction leather with favorable sound insulation value.

4. Windows
The front windshield is the hyperboloid triplex glass fixed by the gluing; the rear windshields is fixed by harden glass, the side windows are sealing style, which are made of hollow glass. The driver's window is fixed with sliding window.
5. Baggage compartment
The baggage compartment adopts transverse run-through design, and they are all made of aluminum.

6. Seat
Driver's seat: Q15-2 driver seat, adjustable seat with high backrest and three-point belt.
Passenger seats: KE-1 type seat, with foot pedal and transverse movement function, high backrest, the all seats are equipped with three-points seat belt.

7. Interior accessory device
The vehicle is equipped with electronic clock, electric front windshield sunshade, driver side sunshade, electric driver window, safety hammer, emergency escaping window, curtain and luxury bilateral H type luggage rack，engine cabin fire extinguisher, electric mirrors, VDO travelling data recorder, reversal monitor, middle door (located in front of the rear axle), icebox, front and middle flip LCD TV, DVD player ,etc..

8. Air-conditioning system
Cooling system: WEBASTO top mounted dependent air-conditioning system..
Heating system: WEBASTO heating system. and NANFENG radiator system..
Defroster: NANFENG cooling /heating defrosting device
9. Door
The door adopts the full aluminum remote control out-swing pneumatic doors.
The out-swing door adopts the advanced electrically aerodynamic theory design, with the motion of opening and closing placidly、agile、safe、lock credible and anti-clamp function.
A. Basic function
a. There are two electrically switches, the interior one is trigger touch-tone, which located on the dashboard of the front right side of the driver, the outside one is a remote control switch. , both switches can control the door.
b. When the circuit is in OFF position , the emergency switch can be used in the interior and exterior ,the emergency switch of the door is located inwardly upon the entrance of the door and outwardly behind the passenger door respectively, Please rotate the switch and throw open the door in emergency.
c. Commonly the door is closed, when touch off any electrically switch, the door would move placidly at a certain velocity, along with it, the step-lamp lights .when touch off the switch again , the door would return placidly at a certain velocity, after the door returned , the step-lamp goes out.

B. Hint:
a. The door remote control acts only when the parking brake is on the parking gear.
b. The door could only be opened when the external mechanical lock isn't locked up.
c. In order to avoid impact, make sure that the door is completed closed or opened, before you make the next door switch operation.

Note: Deployment on the vehicle may be different with the above description because of different deploying requirement of the clients.

## Schematic illustration of the driver zone


1 DVD/MP3 player
2 Reversal monitor
3 Rocker switch
4 Light control handle
5 Combination instrument panel
6 Steering wheel
7 Wiper control handle
8 Gearbox operation panel
9 Fire extinguisher pushbutton switch
10 Electric mirrors pushbutton
11 WEBASTO heating panel
12 WEBASTO heater timing panel
13 Parking brake handle
14 Travelling data recorder
15 Radiator operation panel

## Instruction of instrument (VITI EDITION)

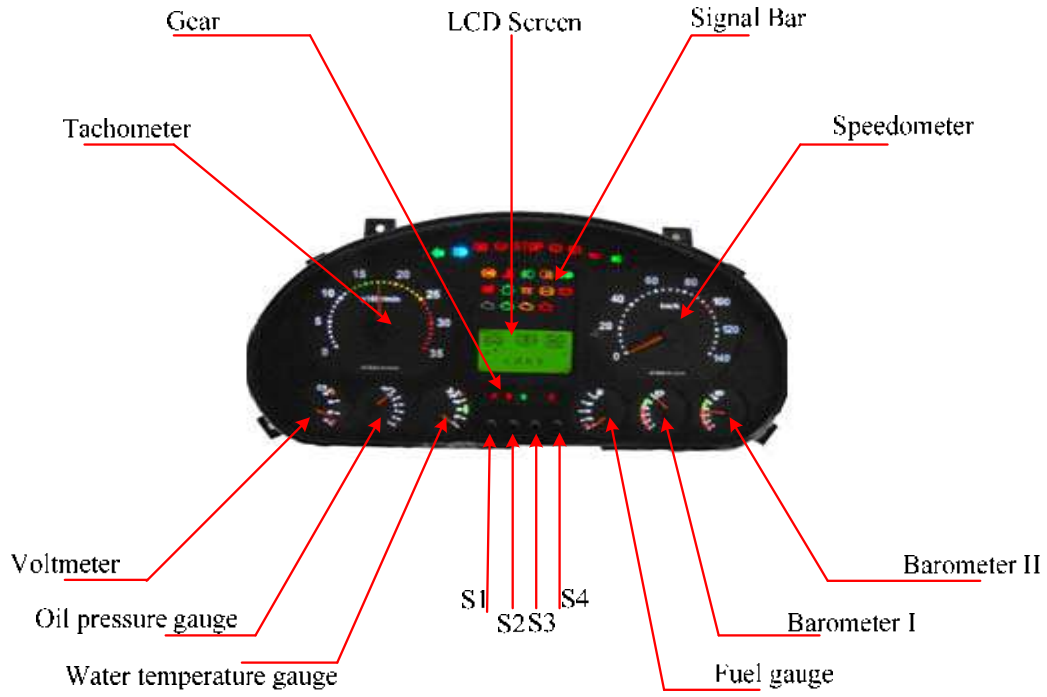



Figure-1 The Outline of ZB271M

The appearance of the ZB271M dashboard as shown in Figure-1 , it mainly contains eight indicator type measuring instruments, 29 icons which were lighted by the light-emitting diodes, one LCD screen and four buttons, dashboard pin definition go to **Appendix A**

### 2.1 Display Part.

1.Gear P—Brake gear, R—Reverse gear，N—Neutral gear，D—Drive gear，S—Safety belt.

2.Signal Bar. Go to **Appendix B.**

3.Speedometer .Display speed of car. Units :Km/h.

4.BarometerI and Barometer II. Display air pressure of car. Units: 0.1MPa .

5.Fuel gauge. Display amount of fuel. Units: Percentage.

6.Water temperature gauge .Display engine temperature of car. Units: ℃.

7.Oil pressure gauge. Display oil pressure gauge of car. Units : 0.1MPa.

8.Voltmeter .Display Voltage of car. Unit: V.

9.Tachometer .Display rotate speed of car. Units: r/min.

10.LCD Screen. Display interface information, engine information and so on. Go to **Appendix C**.

### 2.2 Button part

ZB271M dashboard has four buttons,S1、S2、S3、S4.

S1—Set Button. S2—Up Button. S3—Down Button. S4—Return Button.

S1 could set some information of dashboard, for example ,times, blacklight, VehPPK and so on.

S2 and S3 could flip the screen up or down.

S4 Return main interface.

Remarks: Do not press S1 when flip the screen up or down.

# 3 Instructions

### 3.1 LCD Display

3.1.1 After power on as shown in Figure-2: Total Mileage, Trip Mileage A and Trip Mileage B

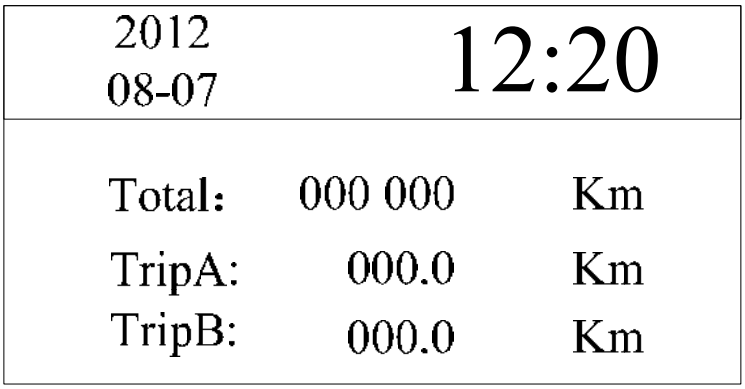



Figure-2 Main interface

3.1.2The second interface display engine information，as shown in Figure -3。

Accumulated rotates and Engine running time.

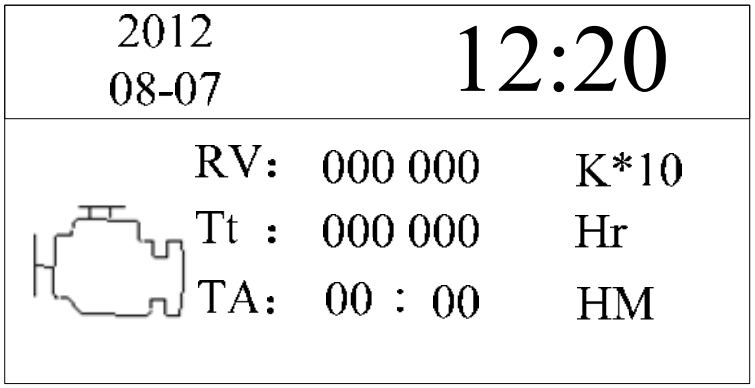



Figure-3 Engine information

3.1.3 The third and the fourth interface display information of Fuel and Mileage as shown in Figure -4 and

Figure -5.

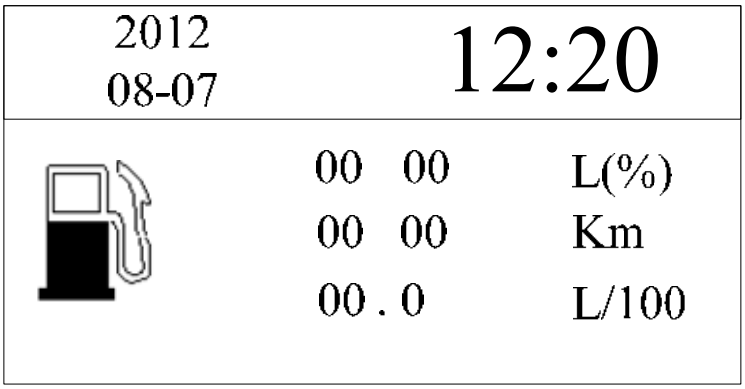



Figure-4 Fuel and Mileage information

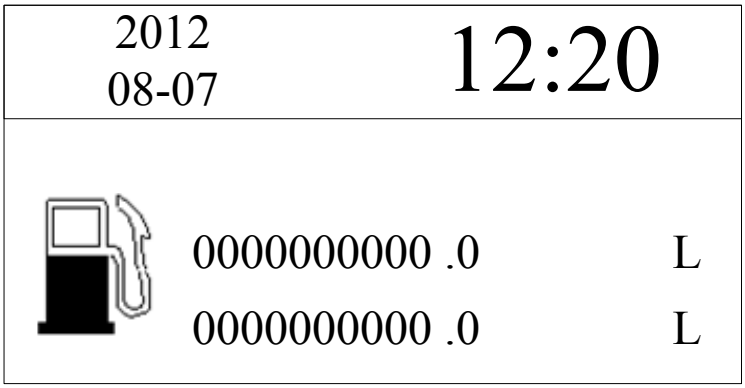



Figure-5 Fuel and Mileage information

3.1.4 The fifth interface display CNG and Catalyst. as shown in Figure-6

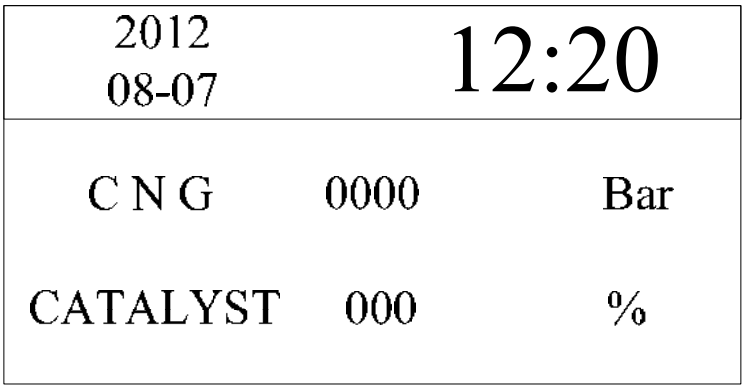



Figure-6 CNG and CATALYST

3.1.5 The sixth display inside temperature，outside temperature and engine compartment temperature. as shown in Figure-7

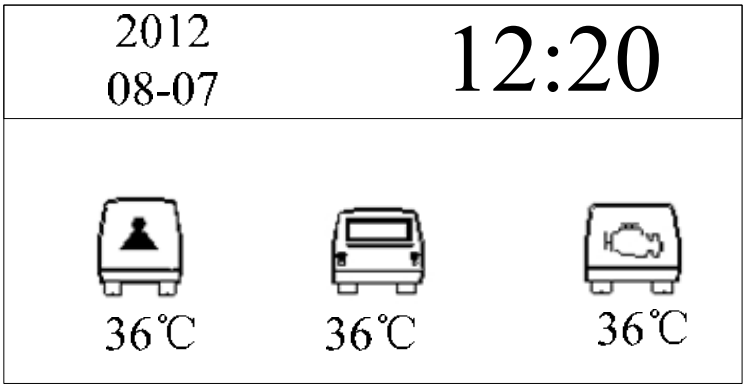



Figure-7 Car and Engine compartment temperature

3.1.6 The seventh、eighth、ninth、tenth and eleventh interface display ECM、TCM、ABS、AIR、Retarded information. as shown in Figure-8、9、10、11、12.

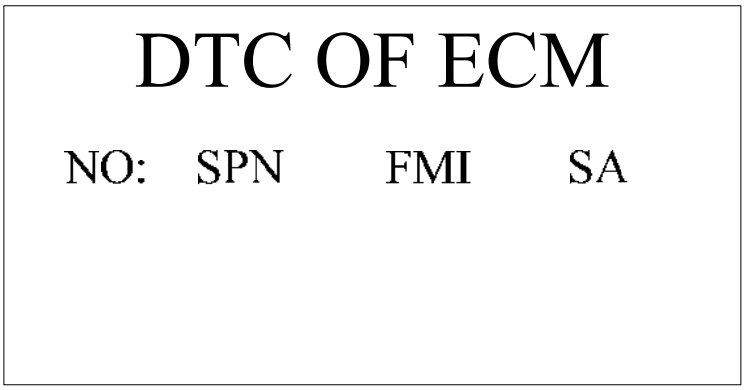



Figure-8 ECM Code

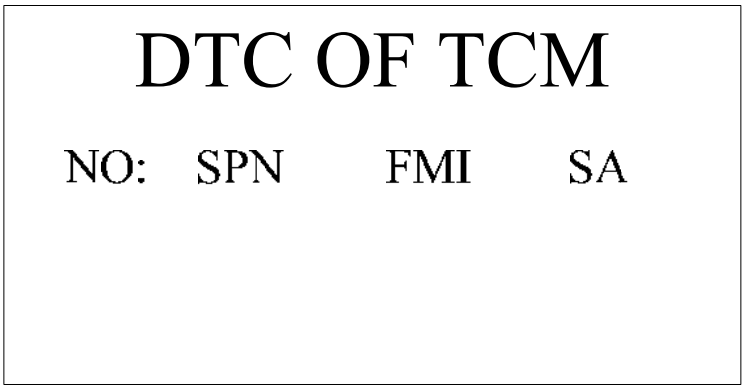



Figure-9 TCM Code

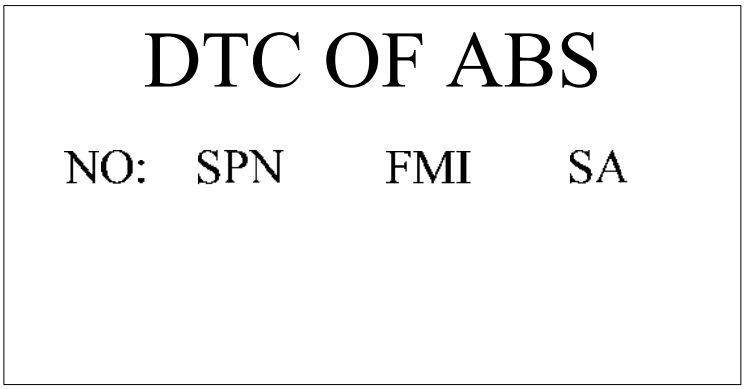



Figure-10 ABS Code

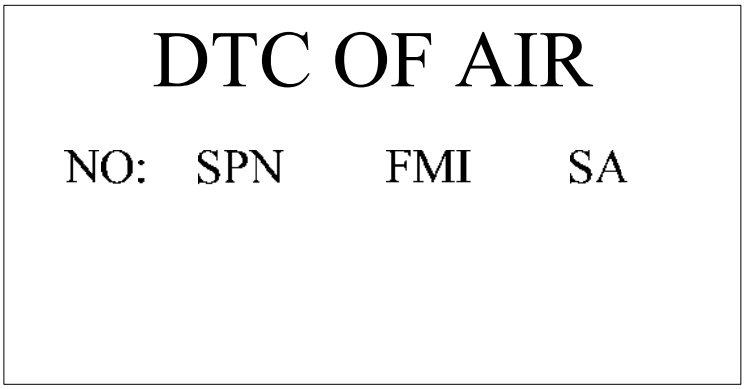



Figure-11 AIR Code

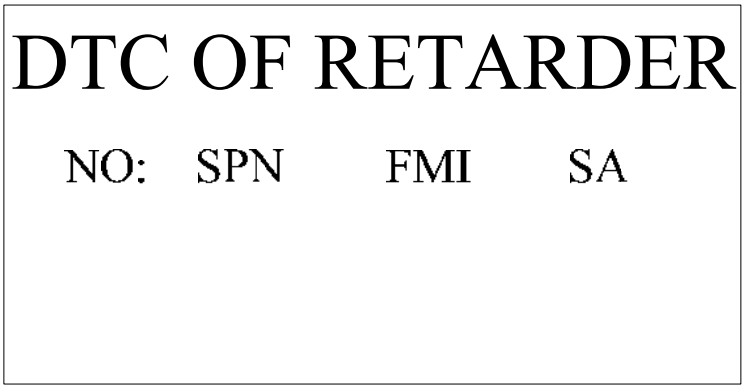



Figure-12 Retarded Code

3.1.7 The thirteenth interface display online module. as shown in Figure-13.

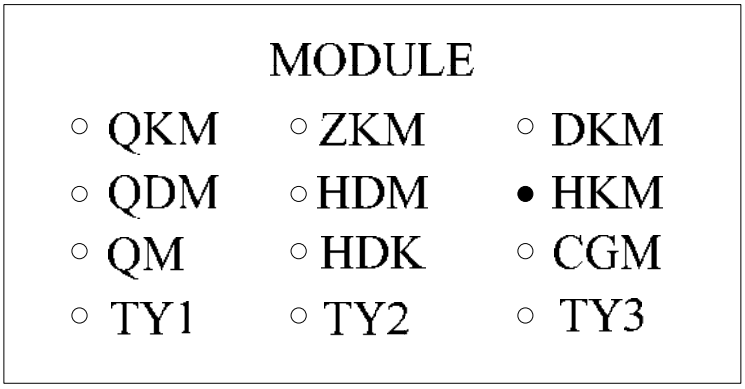


Figure-13 Online Module

### 3.2 Dashboard Set

3.2.1 First，Press S1 go to set interface, Second, Press S2 and S3 flip the interface up or down.

Could Set Time、Set Backlight、Set VehPPK、Set MotPPR、Clear Trip A、Clear Trip B、ClearTA、Clear Oneway OC. as shown in Figure-14、15、16、17、18、19、20、21

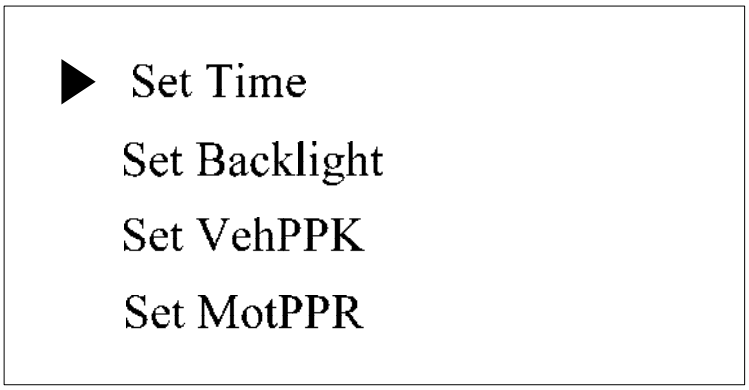



Figure-14 Set Time

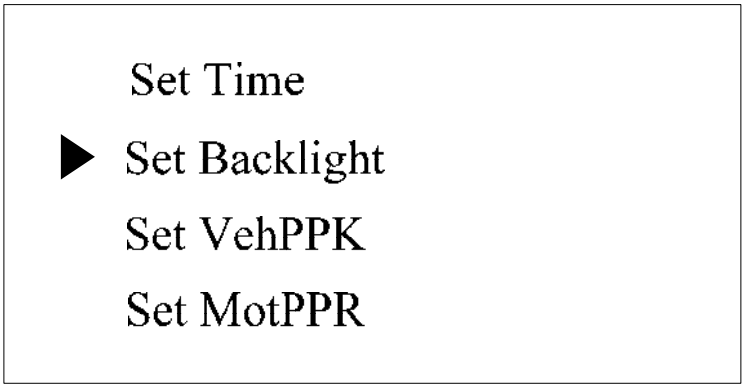



Figure-15 Set Backlight

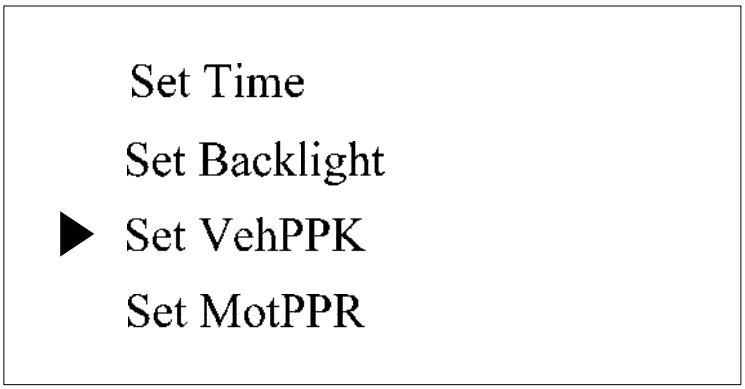



Figure-16 Set VehPPK

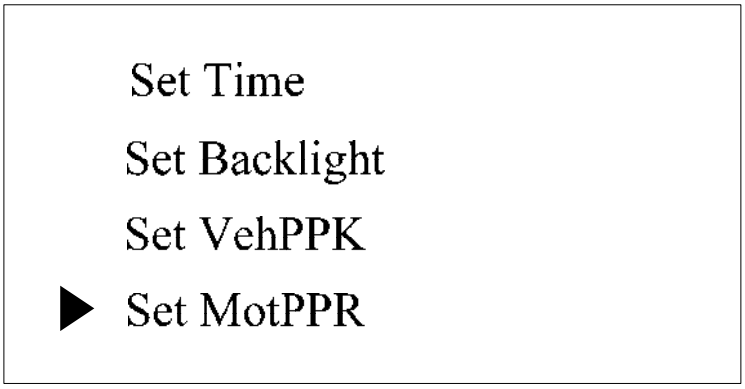



Figure-17 Set MotPPR

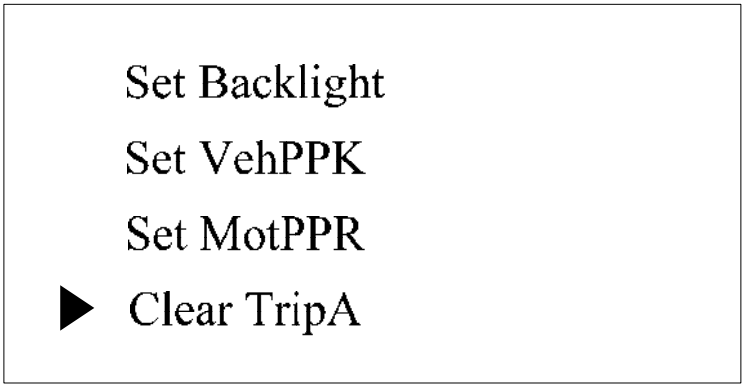



Figure-18 Clear Trip A

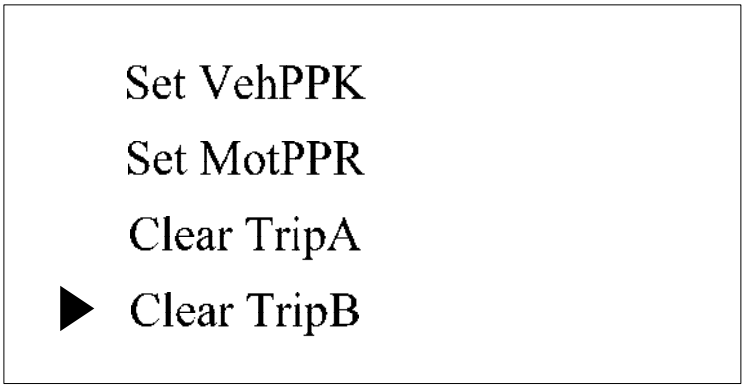



Figure-19 Clear Trip B

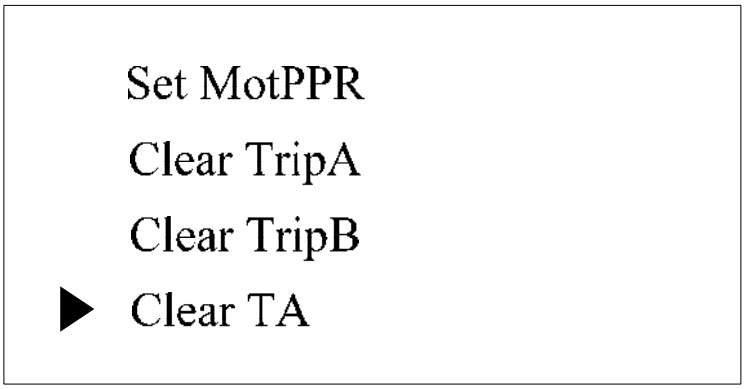


Figure-20 ClearTA

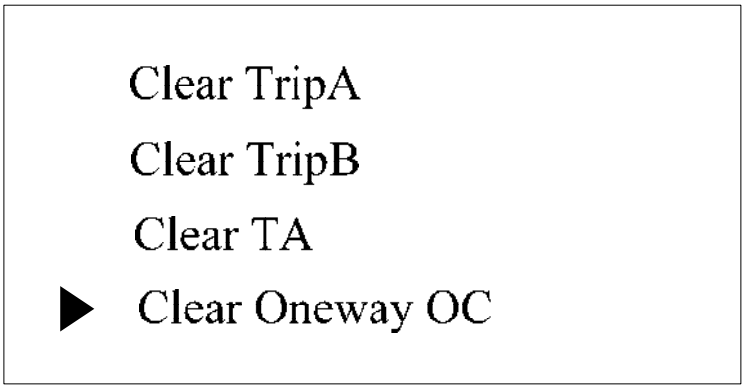



Figure-21 Clear Oneway OC

3.2.2 Set Time .First press S1 go to set interface, Second press S2 or S3 choose Set Time position as shown in Figure-14, Third press S1 go to Figure-22.

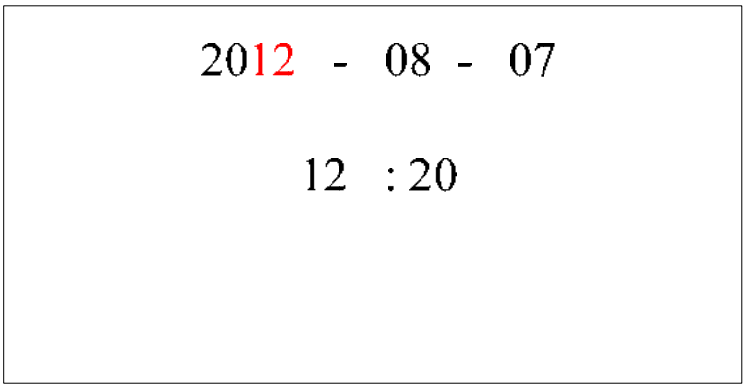



Figure-22 Set Year

Finally press S2 and S3 could increase or decrease years. After set year, could press S1 choose Month、Day、Hour、Minute as shown in Figure-23、24、25、26.And press S2 and S3 could set Month、Day、Hour、Minute. After Set press S4 two times return main interface.

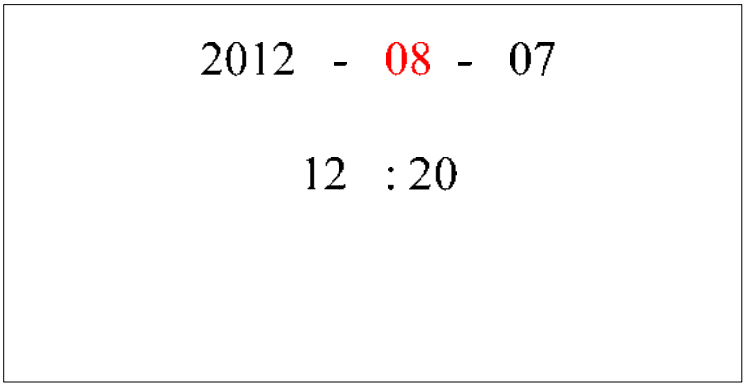



Figure-23 Set Month

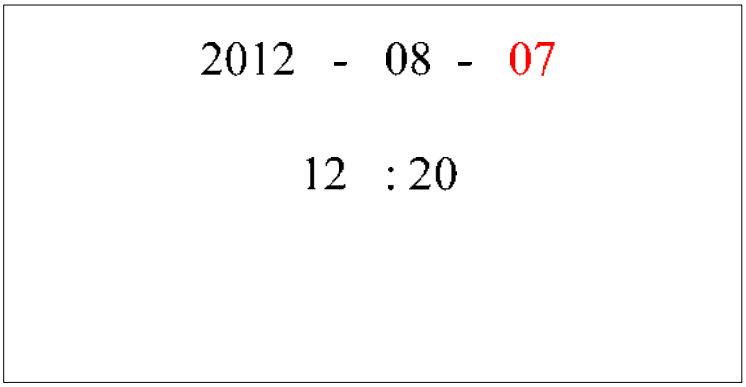



Figure-24 Set Day

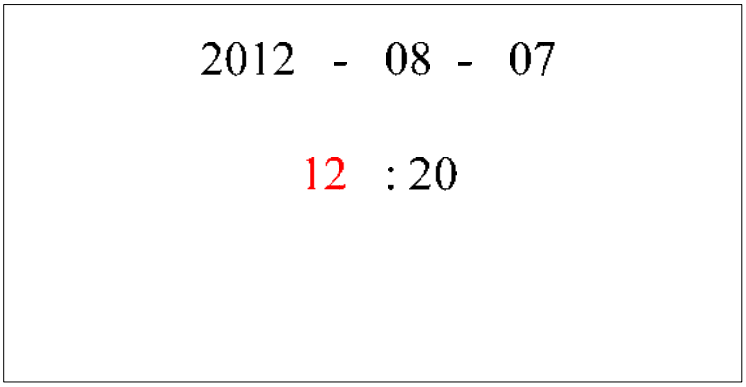



Figure-25 Set Hour

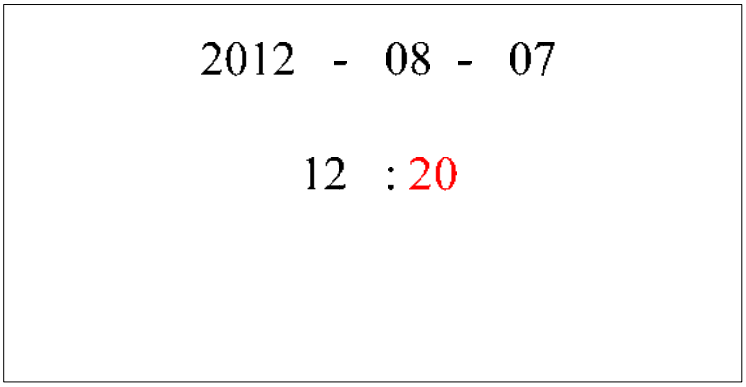



Figure-26 Set Minute

3.2.3 Set Backlight. First press S1 go to set interface, Second press S2 or S3 choose Set Backlight position as shown in Figure-15, Third press S1 go to Figure-27.

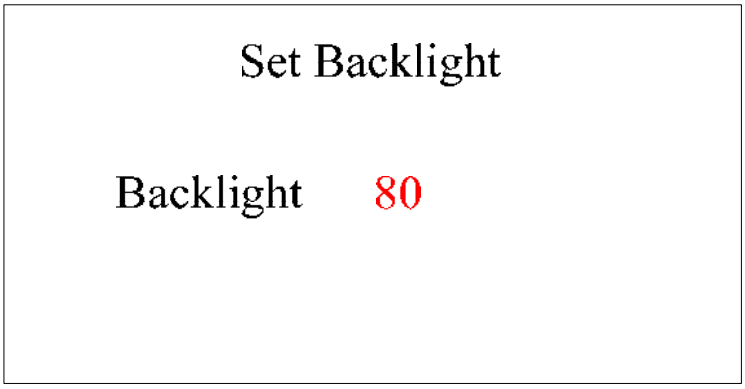



Figure-27 Set Backlight

Finally press S2 and S3 could increase or decrease backlight. After set backlight, press S4 two times return main interface.

3.2.4 Set VehPPK. First press S1 go to set interface, Second press S2 or S3 choose Set VehPPK position as shown in Figure-16, Third press S1 go to Figure-28.

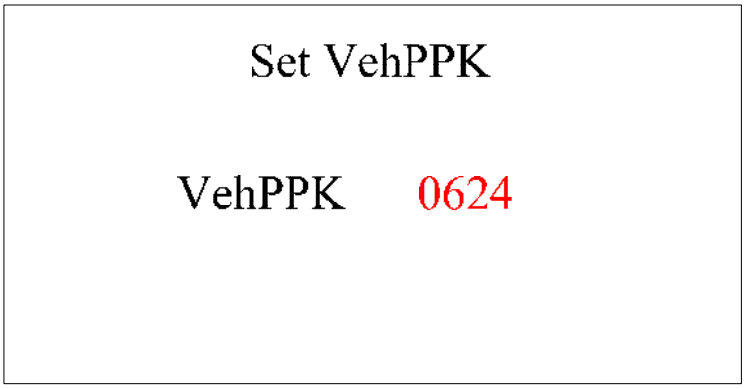



Figure-28 Set VehPPK

Finally press S2 and S3 could increase or decrease VehPPK. After set VehPPK, press S4 two times return main interface.

3.2.5 Set MotPPR. First press S1 go to set interface, Second press S2 or S3 choose Set MotPPR position as shown in Figure-17, Third press S1 go to Figure-29.

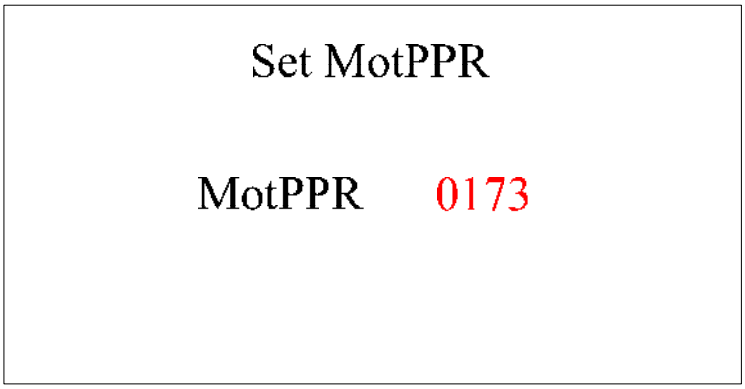


Figure-29 Set MotPPR

Finally press S2 and S3 could increase or decrease MotPPR. After set MotPPR, press S4 two times return main interface.

3.2.6 Clear Trip A. First press S1 go to set interface, Second press S2 or S3 choose Clear Trip A position as shown in Figure-18. Third press S1 clear Trip A and auto return main interface.

3.2.7 Clear Trip B. First press S1 go to set interface, Second press S2 or S3 choose Clear Trip B position as shown in Figure-19. Third press S1 clear Trip B and auto return main interface.

3.2.8 Clear TA. First press S1 go to set interface, Second press S2 or S3 choose Clear TA position as shown in Figure-20. Third press S1 clear TA and auto return main interface.

3.2.9 Clear One way OC. First press S1 go to set interface, Second press S2 or S3 choose Clear One way OC position as shown in Figure-21. Third press S1 clear One way OC and auto return main interface.

# Appendix **A** ZB271M Dashboard Pin Definition

Table A Pin Definition

| Pin | Name | Color | Remark |
|---|---|---|---|
| 1 | VPP | Red | |
| 2 | GND | Black | |
| 3 | WAKE_UP1 | Red | Connected to WAKE_UP2 inside |
| 4 | CANH1 | Yellow | Connected to CANH2 inside |
| 5 | CANH2 | Yellow | |
| 6 | CANL1 | Green | Connected to CANL2 inside |
| 7 | CANL2 | Green | |
| 8 | Empty | | |
| 9 | Empty | | |
| 10 | Empty | | |
| 11 | WAKE_UP2 | Red | |
| 12 | Empty | | |
| 13 | Empty | | |
| 14 | Empty | | |
| 15 | Empty | | |
| 16 | Empty | | |
| 17 | Empty | | |
| 18 | Empty | | |
| 19 | Empty | | |
| 20 | Empty | | |
| 21 | Empty | | |

# Appendix **B** ZB271M Signal Bar instructions

| Icon | Name | Color |
|---|---|---|
|  | Left turn light | Green |
|  | Right turn light | Green |
|  | Front fog light | Green |
|  | ABS | Yellow |
|  | Rear fog light | Yellow |
|  | Preheater | Yellow |
|  | Alarm of oil pressure | Red |
|  | Engine fault | Yellow |
|  | High beam | Blue |
| R | Return | Red |
|  | Alarm of gas pressure | Red |
|  | Clearance Lamp | Green |
| ASR | Avoid side slide | Red |
|  | Charge | Red |
|  | Parking light | Red |
|  | Low beam | Green |
|  | Alarm of water temperature | Red |
|  | Alarm of Fuel Low | Red |

# Appendix C ZB271M LCD Alarm instructions

| Icon | Icon Name | Icon | Icon Name |
|---|---|---|---|
|  | Front Door |  | Low Power |
|  | Middle Door |  | Alarm of water level |
|  | ECAS Fault |  | Concentrate lubrication |
|  | Engine cabin temperature too high |  | Alarm of oil filter |
|  | Lack water alarm of W.C |  | Alarm of oil filter |
|  | Rear cabin door |  | Rear Door |
|  | Left cabin door |  | Alarm of Retarded temperature |
|  | Right cabin door |  | Fault of turn light |
|  | Alarm of Oil Temperature |  | Alarm of ECAS |
|  | Brake Light Fault | CRUISE | Cruise |
|  | Safety Door |  | Brake Light |
|  | Break Wear |  | Antifreeze controller |

## Illustration of switch and indicator

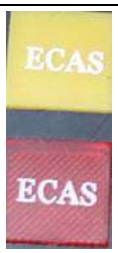
Number of switches , indicators and each own position may vary with the vehicle model and configuration state, please refer to the flowing sheet :

| Switch | Name | Color | Function | Notes |
|---|---|---|---|---|
|  | Daylight lamp | White | Pressed on top: interior lighting OFF<br>Pressed on bottom: interior lighting ON | |
|  | Hazard alarm lamp | White | Pressed on bottom: all turning indication lamps will turn on and flash | |
|  | Luggage compartment lamp | White | Pressed on top: the luggage cabin lamp OFF<br>Pressed on bottom: the luggage cabin lamp ON | |
|  | Ventilator | White | Pressed on top: the ventilator is turned off<br>Pressed on bottom: the ventilator is turned on | |
|  | Front fog lamp | White | Pressed on top: the front fog lamp OFF<br>Pressed on bottom: the front fog lamp ON | |
|  | Rear fog lamp | White | Pressed on top: the rear fog lamp OFF<br>Pressed on bottom: the rear fog lamp ON | |
|  | Reading lamp | White | Pressed on top: the reading lamp OFF<br>Pressed on bottom: the reading lamp ON | |
|  | Front windshield defrosting switch | White | Pressed on top: turn off defrosting function<br>Pressed on bottom: turn on defrosting function | |
|  | Heating water valve switch | White | Pressed on top: the valve is switched off<br>Pressed on bottom: the valve is switched on | |

| | | | | |
|---|---|---|---|---|
|  | Fresh air ventilating switch | White | Pressed on top: the ventilation function is switched off<br>Pressed on bottom: the ventilation function is switched on | |
|  | Horn | White | Pressed on top: the electric horn is turned off<br>Pressed on bottom: the electric horn is turned on | |
|  | Disinfection function switch | White | Pressed on top: the function is switched off<br>Pressed on bottom: the function is switched on | |
|  | Reversal monitor power switch | White | Pressed on top: turned off the monitor power<br>Pressed on bottom: turned on the monitor power | |
|  | Body Kneeling function switch | White | Pressed on top: turned on body restoration function, the body start restoring action.<br>Pressed on bottom: turned on the body kneeling function, the body start kneeling action | |
|  | Body raise/descend switch | White | Pressed on top: turned on the body height adjust function, the body start raising<br>Pressed on bottom: turned on the body height adjust function, the body start descending | |
|  | Body 2th height adjusting switch | White | Pressed on top: the body height restore to the normal height state from 2th height location.<br>Pressed on bottom: turned on the body height raise function, the body start raising the 2th height location. | When driving in rugged road, raise the vehicle body height for safe. |

| Switch | Name | Color | Function | Notes |
|---|---|---|---|---|
|  | Retarder foot-control function release switch | White | Pressed on top: the retarder foot-control function is turned on ;<br>Pressed on bottom: the retarder foot-control function is turned off | |
|  | Emergency power switch | White | Pressed on top: turn off the vehicle power<br>Pressed on bottom: turn on the vehicle power | 1) While only turn on the switch, could supply power only for 2 minutes;<br>2) Meanwhile, if also rotate the ignition key to ACC or ON shift, thus could supply power for long. |
|  | Front windshield sunshade switch | White | Pressed on top: the sunshade will be raised<br>Pressed on bottom: the sunshade will be descended down |  |
|  | Rearview mirror defrosting switch | White | Pressed on top: turn off defrosting function;<br>Pressed on bottom: turn on the defrosting function. | |
|  | Front passenger door switch | White | Pressed on top: close the door<br>Pressed on bottom: open the door | |
|  | Rear passenger door switch | White | Pressed on top: close the door<br>Pressed on bottom: open the door | |
|  | Flip TV switch | White | Pressed on top: turned off the power, folded the TV<br>Pressed on bottom: turned on the power, unfolded the TV | |

| | | | | |
|---|---|---|---|---|
|  | High/low shift switch | White | Pressed on top: turned on the high shift function<br>Pressed on bottom: turned on the low shift function | |
|  | Engine cabin fire extinguisher switch | Red | Pressed down : extinguisher will be activated | The powder will be burst out and coated on engine cylinder block so as to block up flame and combustion. Don't test to press this button down at normal condition |
|  | Driver window raise/descend switch | White | Pressed on top: turned on the raise function<br>Pressed on bottom: turned on the descend function | |
|  | Driver window pre-heating & defrosting switch | White | Pressed on top: turned off the defrosting function<br>Pressed on bottom: turned on the defrosting function | |
|  | Engine Diagnose function switch | White | Pressed on top: turned off the engine diagnose function<br>Pressed on bottom: turned on the engine diagnose function | |
|  | Engine cruise function switch | White | Pressed on top: turned off the engine cruise function<br>Pressed on bottom: turned on the engine cruise function | we advise clients not to use this switch |
|  | Cruise set switch | White | Pressed on top: turned off the engine cruise set<br>Pressed on bottom: turned on the engine cruise set | we advise clients not to use this switch |

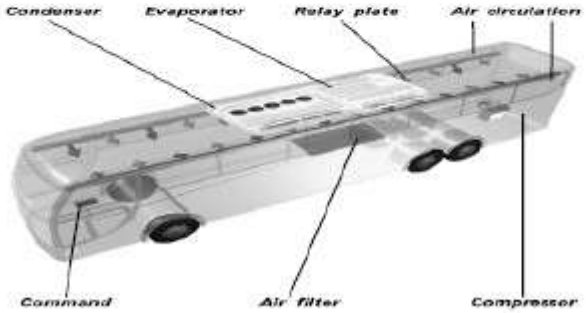
| Indicator lamp | Color | Function |
|---|---|---|
|  | Red | Engine fault alarm |
| | Yellow | Exceeding emission standard indication |
|  | Red | Gearbox oil temperature over-heat alarm |
| | Red | Gearbox fault alarm |
|  | Yellow | Kneeling function work indication |
| | Green | Body keep 2th height state indication |
|  | Yellow | ECAS alarm indication |
| | Red | ECAS function fault alarm |
|  | Yellow | Vehicle require maintenance indication |
| | White | Engine wait starting indication |

# CC350-355 series A/C Operation

**Equipment Description**

SPHEROS's air conditioner equipment, models CC350H roof top, are composed by two Evaporator modules, a Condenser module and a Compressor The system is inter linked by copper pipe which conduct the refrigerating gas compressed at the compressor by means of its components. As a result, refrigeration takes place. The electrical system is composed by a power panel with fuses and relays as well as an electronic controller that controls the selected temperature inside the vehicle. The electrical system is inter connected to the vehicle alternator and battery.

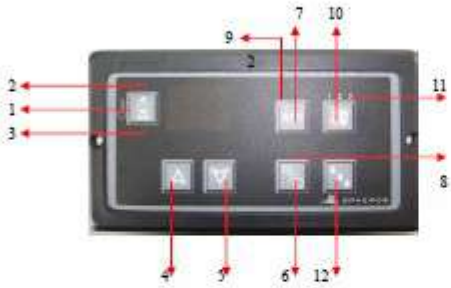
**Components Location**




**1、Introduce**

CC350H is an air environmental control systems for vehicles with function to automatic control refrigeration and heating.

**1.1 Control Panel Function Introduce:**




1. Internal / external temperature switch
2. External temperature display lights
3. Internal temperature display lights
4. Upwards
5. Downwards
6. Air updates (fresh air optional)
7. Automatic mode
8. Air updates lights (fresh air optional)
9. Automatic mode display lights
10. Ventilation button
11. Ventilation speed display lights
12. Heating mode button

### 1.2 Numeric Display

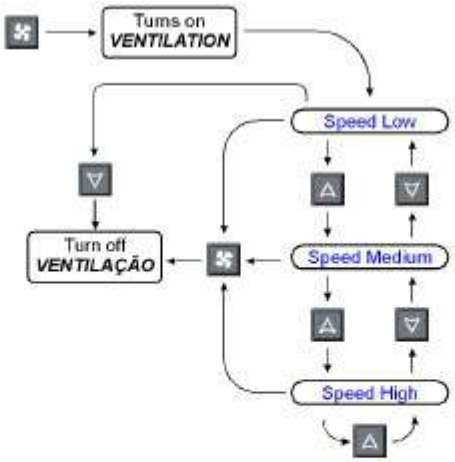
The two digits numeric display is used for informing the operator how the system is working. When there is no function active the display shows OF. Normally display shows the set point when in Auto Mode and the blower's speed when in Ventilation Mode.

### 1.3 Setpoint

Set point is the desired temperature inside the vehicle. To change it is necessary that the auto mode is selected. Press AUTO. Then, the set-point temperature will be shown and may be adjusted by pressing ▲ or ▼.

### 1.4 Ventilation Mode

The ventilation function is activated by the key . There are three operation blower's speeds. To change the blower's speed the ventilation function must be selected. Press . Then, the speed will be shown and may be adjusted by pressing ▲ or ▼. When you select the ventilation function, the damper (air renovation) is automatically opened. For closing the damper, the operator must press the key and ▼. At this time the indoor air will be normal cycle.




| Ventilation | Display Indication | LEDS |
|---|---|---|
| Off | u0 | |
| Low | u1 | |
| Medium | u2 | |
| High | u3 | |

### 1.5 Fresh Air/Air Circulation

There are two system operation modes: Intelligent mode and manual mode.

The smart air mode automatically controls according to the temperature conditions (internal, external and for renovating the air inside the vehicle). The manual mode allows the driver to control the opening of external air manually.

When the auto mode is activated, it is selected smart air .This operation enables the damper to operate in a way that it always seeks for the best comfort and thermal balance conditions as well saving fuel.

To change the damper state, please press  and the panel shows the damper statue :

| Indication | Damper state |
|---|---|
| oP | Open |
| CL | Closed |

When the damper state is shown press  to open or  to close the damper door. The display point will to turn off and the manual mode is taken over. After 10 minutes, the system returns to smart mode. In the smart air mode, the damper automatically opens, and after 10 seconds closed. Then 10 minutes later restart again, and circulate like this. This will just happens when the internal temperature is between 3° C over Set Point and 3° C below setpoint. The fresh air flap open and close automatically and the cycle is according the parameters **dn** and **df** . According to industry standard of China, the **dn** parameter is 50s, and the **df** is 9min. They both can be reinstall in accordance with user's requirements.

When the external temperature is below 15° C in cool mode, the system tries to cool down only with fresh air. The clutch waits 1 minute to engage. After elapsed this time the system checks if temperature reduces at least one degree. These is repeated until the temperature didn't reduces 1° C each minute, then clutch is engaged.

### 1.6 Auto Mode

Auto mode provides a full automatic control inside the bus. You just need to press and set the desired temperature. The system is designed to work by itself in order to select the best operation mode to reach the set point.

In the auto mode, the blower's speed, is usually automatic. However the operator may fixed the speed manually, following these steps:

-Turn on the Auto Mode pressing  key;

- Press  key. The blowers speed will be shown on display during a few seconds;

- If the operator press  or  key while the speed is being shown, the speed led will turn on. This indicates manual speed mode;

- Use and keys to select the desire speed; To return back to automatic control, press  key.

### 1.7 Test Mode

The system offers a test mode to diagnose the whole device, with actuation of the outputs and checking of inputs. Access to the module, in accordance with the following steps:

- Press simultaneously AUTO and  , the numerical display will exhibit - -, then enter the password 14.
- Using the  key to increment the decimal and  to increment the unit.
- Press the  key to confirm. If the password is wrong, the panel will display internal temperature. After the access password is confirmed, the control board will display "i", then the all input will be confirmed.
- Press  to convert between input and output.
- Press  , the control board will display i0 or o0 to show it is input or output. If it is input (i), the LED indicator light 2 will reads the input state. If the light flashing, it shows the parameters input closed, and if not flashing , it shows parameters input open.
- If you choose output parameter (0), press  to open and/or shut down. In this case, the LED light is on , and that indicate output parameters is on.
- Press  or  to convert between input and output. If open the output function, the all before set will be shut down.

- To withdraw the chosen input or output mode, please press  , and then press again, that will be ok.

| Input | Funtion | LED On | LED Blinking |
|---|---|---|---|
| i0 | Pressure switches input | Both pressure switches are OK | One or both pressure switches in FAIL status. Check connections and pressure switches. |
| i1 | ICE Sensor-Freezing of evaporator serpentine input. | ICE sensor OK | ICE Sensor indicates that the system is frozen. Check ICE Sensor and connections. |
| i2 | Start heating system- Show the enter. The current heating state. | Heating plate GL-W002 is exist. Start it, that's OK. | Heating plate GL-W002 is not exist. |

| Output | Description |
|---|---|
| o0 | Turns on blowers at low speed |
| o1 | Turns on blowers at medium speed |
| o2 | Turns on blowers at high speed |
| o3 | Open air renovation damper |
| o4 | Turns on fans(Condenser motors) |
| o5 | Turn on water pump |

| | |
|---|---|
| o6 | Opens roof heating valve(30%)(in case there is heating ) |
| o7 | Open roof heating valve（65%）(in case there is heating ） |
| o8 | Open roof heating valve（99%）(in case there is heating ） |
| CH | Gas charge function, allows refrigeration to take place, independently the control |

Function CH can make the air-conditioning to work not considering the internal temperature. When the internal temperature is not so high to start air-conditioning, but we want to start it to take test, we can use this function. All the other protection functions will be open in this mode.

The air-conditioning control system has other functions, such as record number of faults, the compressor's whole running time that from it starts and so on.

**Pre-heater Operation (Webasto)**

1. General

The standard digital timer enables you to preset the start of the heater operation up to 7 days in advance.

It is possible to program 3 different starting times, only one of which can be activated.

The standard digital timer features a wakeup alarm function.

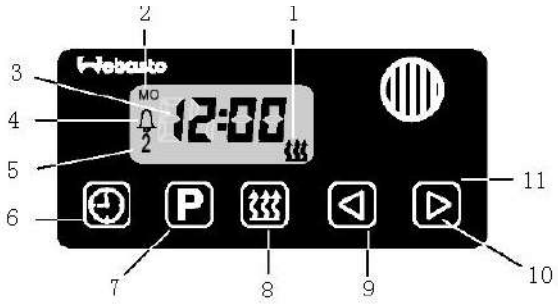
When the ignition switched on, the timer displays the current time and the day of the week.

When the heater is switched on, the display and the buttons are illuminated.

After the power supply has been connected, all symbols on the display will flash.

The current time and weekday must be set.

Standard Timer




1. heater “on” indicator
2. day of the week
3. time display
4. memory location
5. alarm indicator
6. time
7. program selection
8. instant heating
9. reverse
10. forward
11. panel

2. Operation

The timer can be operated in that all flashing symbols can be adjusted by means of the 10 and 9 buttons.

If the buttons are not pressed within 5 seconds, the time displayed will be stored.

If the 10 and 9 buttons are pressed for more than 2 seconds, the fast time-setting mode is activated.

If the ignition is switched off while the heater is operating in the continuous mode, the remaining operating time of 15 minutes is displayed and the heater continues to operate for this period of time.

3. Switch the heater on

Manually: by pressing the button 8 (continuous heating mode)

Automatically: by programming the heater starting time

4. Switch the heater off

Manually: by pressing the button 8

Automatically: after the programmed operating time has elapsed.

With the heater running: by programming the remaining operating time

5. Setting time/day of the week

Press the 6 button for more than 2 seconds-time of the day if flashing-and set the clock using the 9 and 10 buttons. Day of the week is flashing – adjust the day of the week.

6. Viewing the time

With the ignition switched off: press the 6 button.

7. Programming heater starting time:

Press the 7 button – the memory location is flashing – using the 9 and 10 buttons set start of the heater operating time. Day of the week is flashing- set the day of the week. By repeatedly pressing the 6 button, memory locations 2 and 3 can be programmed or the time display mode can be reached.

8. Recalling/erasing preset times

Repeatedly press the 6 button until the desired memory location is displayed. To erase the preset time, press the 7 button several times until the time of the day is displayed instead of the memory.

9. Programming duration of operating time The heater must be switched off. Press the 9 button for 3 seconds – operating time is flashing – and set the desired operating time (10 to 120 minutes) using the 9 and 10 buttons.

10. Setting the remaining operating time

Set the desired remaining operating time (1 to 120 minutes) using the 9 and 10 buttons. The remaining operating time refers to the time the heater still continues to remain in operation and the ignition switched off.

11. Setting the wakeup time

A wakeup time can only be programmed on the standard digital timer. The wakeup time is not bound to a specific day of the week.

Repeatedly press the 7 button until the bell symbol  appears on the display. Set the desired wakeup time using the 9 and 10 buttons. The alarm clock turns off after 5 minutes or when one of the buttons is pressed.

12. Recalling/erasing the wakeup time

Repeatedly press the 7 button until the bell symbol  appears on the display – read off wakeup time. To erase the wakeup time: press the 7 button until the bell symbol  is no longer visible on the display.

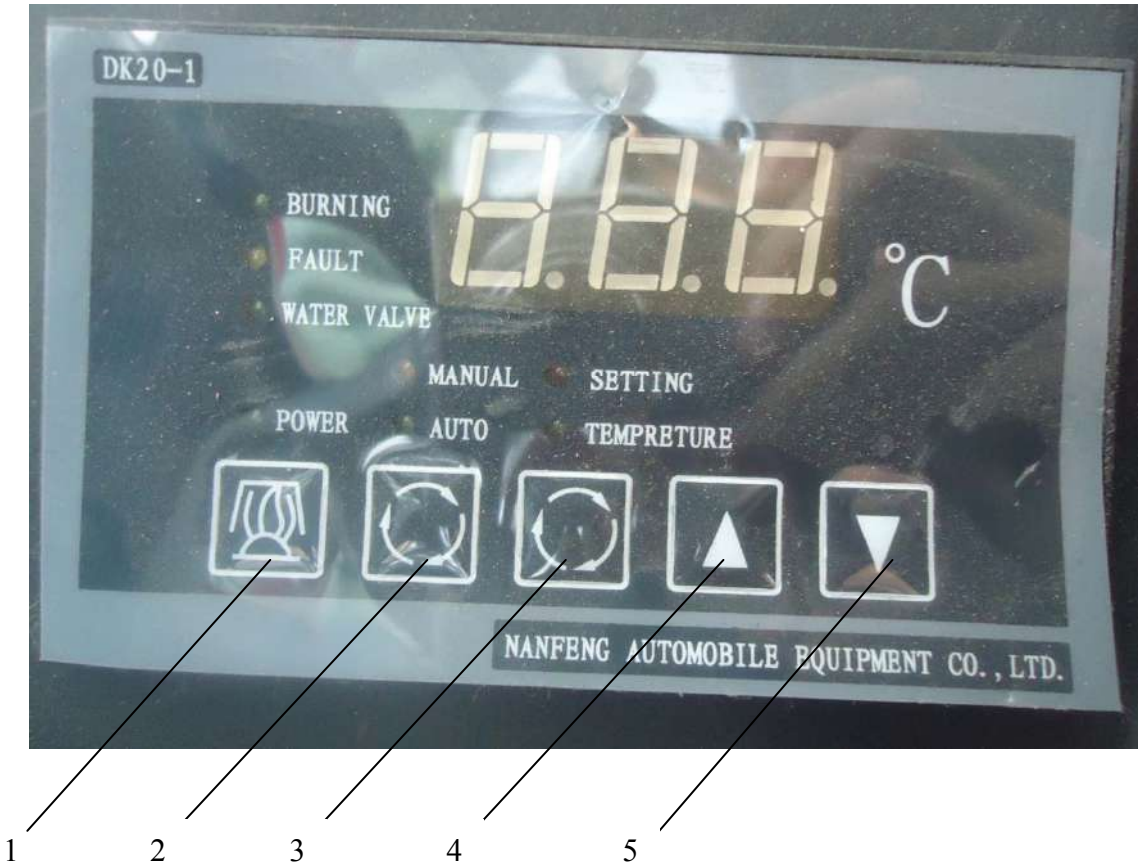
13. remote control

Possible by means of an optional external “instant heating” button

14. Vehicles with ADR equipment

On ADR vehicles it is not possible to program a preset starting time. The remaining time is shown on the display while the heater is in operation. The clock can be set. The alarm clock function can be programmed on the standard digital timer.

**NANFENG Panel Operation Description:**




1. Heating panel power switch: while pressing the button 1, the panel lamps are turning on or turning off, meanwhile, the heating opened or closed.

2. MANUAL/AUTO mode setting : while pressing on the button 2, may change over different mode state, once in AUTO mode, the water valve would open automatically and keep heating for room as far as the room temperature is below the temperature value which the system was already pre-established in advance; once in MANUAL mode, the WATER VALVE lamp lit on, the water valve keep opening all the time..

3. Temperature setting : In MANUAL mode state, if intend to adjust the room temperature, may press button 4 or button 5 until your desirable temperature value, but your operation should be pressed on the button 3 simultaneously.

# Gearbox Operation

## Transmission model (Automatic gearbox ZF 6AP1200B)


Push-button control with diagnostics connector,
Variant with 3 push buttons, horizontally arranged（details may be different from illustration）

**Fig.1**


Push-button control with diagnostics connector,
variant with 6 push buttons, horizontally arranged
(details may be different from illustration).

**Fig.2**

# Operation Instruction ( as per Fig.1 or Fig.2 panels)

### 1.1 Push-button control with diagnostics connector

#### 1.1.1 Variants

Variants: 3, 4, 5 or 6 push buttons for speed-range selection, horizontally or vertically arranged:

**R** = Reverse

**N** = Neutral

**D** = automatic forward driving range (Drive)

optional:

**1, 2, 3** = limited forward driving ranges

For a description of the driving ranges see Section 1.2

1.1.2 **Push-button illumination**

Brightness levels 1 (low) and 2 (high) are available for push-button illumination.
Turning the vehicle key into driving position causes the system to perform an automatic illumination test. All push buttons will be illuminated for approx. 1.2 s at level 2 before the system changes to level 1 for easier location of the push buttons.

After depression of a push button it will be illuminated at level 2 as soon as it is accepted by the electronic control system.

**Display of errors:**

- **Illumination level 1 is retained despite depressed push button**

Possible causes:
- Information needed for illumination is not provided by the electronic control unit. In such a case, normal driving is still possible.
- Hardware defect on push-button selector

- **Depressed push button flashes**

Cause: Push button is not accepted by the electronic control unit（for potential cases see Section 1.3and 1.4）

### 1.1.3 Push-button selector position

**NOTE**
If several push buttons are selected at the same time, the smallest gear locking button selected will be activated.
Example: If push buttons 3 and D are accidentally depressed at the same time, push button 3 will be activated.

## 1.2 Driving range

Driving ranges are selected through depression of the respective push buttons of the push-button range selector（see Section 1.1）,consult the vehicle operation instructions for precise information about the gears engaged in each of the speed ranges.

A defined range of gears is assigned to each driving range. Gearshifts are only executed at shift points defined by the electronic control unit.

Manual intervention in the automatic shifting process (shifting through driving ranges) is not expedient.

⚠ **DANGER !**
**If the push button "N" is depressed during driving operation, the power flow between engine and output will be interrupted.**
**Engine and retarder braking action are then lost.**
**Risk of accident! – Apply the brake!**
**For safety reasons, when faults occur in the electronic control unit, or whenever there is a power failure, the transmission will automatically select "Neutral".**

## 1.3 **Starting the engine**

The engine may only be started under the following conditions:

- Vehicle standstill
- Activated service or parking brake
- Push-button selector in Neutral position ("N")

**NOTE**
Starting interlock: If the push-button selector is not in neutral position, engine start will as a rule be prevented. For details consult the vehicle operating instructions of the vehicle manufacturer.

It may be possible to start the engine when the push-button selector is not in neutral position. In such a case, the push button depressed will flash after the engine

Starts（see Section 1.1.2）and the transmission will remain in Neutral. To drive off, the push button "N" will then

Have to be depressed and subsequently（see Section.1.4）the desired driving-range push button on the push-button range selector.

**CAUTION**
**Only jump-start on the battery, never on the starter! Do not turn the vehicle key while driving!**

## 1.4 **Engaging a gear**

**CAUTION**
**Never operate the push-button range selector and step on the accelerator at the same time!**

Warm up the engine for about 5 minutes, with the push-button range selector in neutral position, after prolonged standstill at ambient temperatures below -20°C.

### 1.4.1 **Standard**

- Accelerator pedal in idling position
- $n_{Mot}$ < 900 rpm
- Vehicle standstill
- Activated service or parking brake
- Select desired driving range by depressing-corresponding push button on push-button range selector.

In the following cases engagement of a starting gear is prevented by the electronic control unit in spite of a selected driving range (push button depressed). In such

cases, the pushbutton depressed will flash （see Section 1.1.2）

- Accelerator pedal operated
- $n_{Mot}$ > 900 rpm
- Driving speed > approx. 3 km/h and driving range selected do not correspond to actual driving direction.
- Transmission oil sump temperature below -20°C.

1.4.2 **Transmission with additional functions**

1.4.2.1 **Additional function “ Gear Release”**

(Additional installation by vehicle manufacturer, recommended by ZF!)

Procedure as described under 1.4.1. In addition to the cases mentioned under 1.4.1, engagement of a starting

gear is prevented by the electronic control unit in spite of a selected driving range (push button depressed) in the following case. In this case, the push button depressed

will flash (see Section 1.1.2)

1.4.2.2 **Additional function “ Additional pushbutton reverse gear”**

For engagement of the reverse gear, depress the R push button of the push-button range selector and promptly also the R push button on the instrument panel.

Remaining procedure as described under 1.4.1

In addition to the cases mentioned under 1.4.1 engagement of the reverse gear will be prevented by the electronic control unit in spite of the depressed R push button of the push-button range selector in the following case. In this case, the R push button depressed will flash （see Section 1.1.2）

- Additional R push button on instrument panel not depressed

1.5 **Starting**

After selecting the appropriate driving range, wait for approx. 1 to 2 seconds, then release the brake and accelerate.

Depending on vehicle configuration and loading state, the vehicle may start at low speed on a level track or on a slight uphill grade after release of the brake. If a lower driving speed is desired, this must be realized through operation of the brake pedal.

⚠ **DANGER!**

- **In the event of reduced grip of the front wheels, e.g. due to black ice, locking of the front wheels may occur. The vehicle can then no longer be steered.**
- **On major uphill grades, always accelerate with the parking brake activated**
  **Do not release the parking brake before you can feel propulsion. RISK OF ACCIDENT caused by vehicle rolling backwards!**
- **Fast rolling backwards in a forward gear, or rolling forward in the reverse gear, is not permitted and may result in stalling of the engine and loss of steering support.**
- **Always start with great care and gentle acceleration when starting near persons or obstacles in order to rule out any risks.**

### 1.6 **Downhill driving**

Before driving down steep gradients, select driving range 1, 2, or 3 on the push-button speed range selector, as the situation may require. This limits upshifts.

⚠ **DANGER !**
**In an extreme case, the hold mode will be cancelled to protect the engine.**
**In such a case, the transmission may shift up to the highest gear irrespective of driving range selected.**
**RISK OF ACCIDENT!**
**Watch revmeter!**

### 1.7 **Change in direction of travel**

Before changing from Forward to Reverse or vice versa:

- Bring the vehicle to a complete standstill.
- Depress push button "N" on the push-button range selector

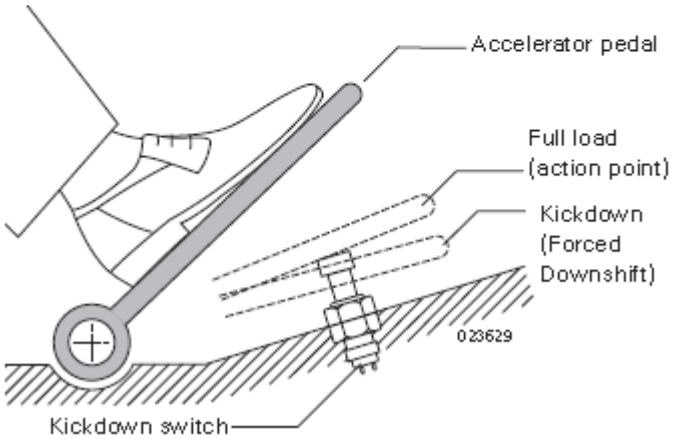
. Continue as described under Section 1.4

### 1.8 **Kickdown （forced downshift）**

To utilize maximum engine power, higher shift points can be realized via the kickdown switch (see illustration) or the CAN system (for acceleration or on uphill grades).

- Depress the accelerator pedal beyond the full-load action point (kickdown position).

**NOTE**
Use of the kickdown function increases fuel consumption.




## 1.9 **Retarder operation**

The retarder is a gear-dependent hydrodynamic brake which operates without wear. The retarder should be used for every braking action. This extends the life of the service brake. The retarder can be operated via a hand lever and/or the brake pedal.

When control takes place exclusively via the brake pedal, there is usually a rocker switch "Retarder ON/OFF" on the instrument panel.

In the event of manual-lever control, the lever must be returned to neutral position after each braking action.

Consult the vehicle operating instructions for more details on retarder control.

**Conditions for retarder operation**

Retarder operation is accepted by the electronic control unit only under the following condtions:

- Accelerator pedal in idling position
- A forward gear is engaged
- The driving speed exceeds approx. 3 km/h
- The ABS system is not active

If any one of these conditions is not fulfilled with the retarder engaged, the retarder will be deactivated.

When the maximally permitted oil temperature acc. to Section 1.1.2 is approached, the retarder's performance will be reduced or the retarder will be disabled by the electronic control unit.

⚠ **DANGER!**
**Risk of accident due to reduced braking power!**

The retarder must be deactivated using the "Retarder ON/OFF" switch in the following cases:

- On icy roads.
  If an electronic braking system (EBS) and/or antilock system (ABS) is available, manual retarder shutdown is not required.
- When the permitted oil temperature acc. to Section 2.12 is exceeded.

Options for manually deactivating the retarder:

- Set the "Retarder ON/OFF" switch to the OFF position (if available)
- Set hand lever to zero position (if available)
- Depress pushbutton "N" on the pushbutton range selector and thus engage transmission neutral
  **CAUTION: Only in emergencies on black ice if there is no other option for switching off the retarder available.**

## 1.10 Stopping, parking

**Stopping**

The vehicle can be stopped at any time through activation of the service brake, irrespective of the position of the push-button range selector. In such a case, the automatic electronic gearchange unit will engage the appropriate starting gear. Owing to the propulsion of the converter, the vehicle may come to a standstill on a slight grade even without actuation of the brake.

- Activate service or parking brake

In the event of a prolonged halt, the push-button selector should be set to the neutral position.

⚠ **DANGER!**
**If the brake is not activated, the vehicle may start moving even without actuation of the accelerator pedal.**

**Transmission with function "Automatic Idle Shift" (AIS)**

The automatic electronic gearchange unit will set the transmission to "Neutral" if the following conditions prevail simultaneously:

- Vehicle approaching standstill
- Service or parking brake activated
- Accelerator pedal in idling position

The range selected last on the push-button selector will be retained. As soon as one of the three conditions no longer prevails, the appropriate starting gear will be engaged.

**Parking**

- Activate the parking brake
- Then depress push button "N" on the push-button range selector

⚠ **DANGER !**
**Before leaving the vehicle,**
**always activate the parking brake. When the engine is switched off, there is no direct connection between engine and axle. The vehicle can start to roll!**

## 1.11 Towing

### 1.11.1 Towing vehicle with coaxial transmission

#### 1.11.1.1 Transmission is functioning

- Push-button range selector in Neutral position.
- Max. towing time: 2 hours.
- Max. towing speed:
  Intercity and city buses: 25 km/h
  Coaches: 35 km/h

**NOTE**
At an ambient temperature below -15°C, the maximally permitted towing speed is 5 km/h.

#### 1.11.1.2 **Transmission damage suspected**

**CAUTION**
**If transmission damage is suspected, the propshaft flange between transmission and drive shaft must be disconnected.**

**Exception:** In a dangerous situation, towing without separation of the drive train is permitted until the vehicle has left the danger area (e.g. intersection, tunnel, etc.).

### 1.11.2 **Towing vehicle with angle drive transmission**

When a vehicle with angle drive transmission is towed, the propshaft between transmission and powered axle must always be disconnected.

**Exception:** In a dangerous situation, towing without separation of the drive train is permitted until the vehicle has left the danger area (e.g. intersection, tunnel, etc.). In such a case the following conditions apply:

- Push-button range selector in Neutral position.
- Max. towing time 10 minutes.
- Max. towing speed: 15 km/h

**NOTE**
At an ambient temperature below -15°C, the maximally permitted towing speed is 5 km/h.

## 1.12 **Temperature monitoring**

Transmission temperature monitoring is performed by the electronic control unit. Oil sump temperature and the oil temperature on the retarder output are sent to the vehicle computer via CAN. Depending on the vehicle application, alert signals will be issued when the permissible temperature limit values are exceeded.

Consult the vehicle operating instructions for more details.

When the permissible temperature limit values are approached during retarder operation, retarder performance will be reduced by the electronic control unit.

**Action to be taken in the event of a temperature alert:**

- Drive in partial-load range
- Using the "Retarder ON/OFF" switch:
  Deactivate the retarder.

**If this does NOT cause the oil temperature to drop:**

- Stop the vehicle.
- Put push-button range selector in Neutral position.
- Run engine at raised idle speed.

**NOTE**
If, after a few seconds, the temperature does not decrease to the permitted range, this may be due to:

- Oil level too low or too high.
- Contaminated vehicle heat exchanger.
- Defective cooling circuit.
- Transmission damage

Inform ZF Service Center!

## 1.13 **Status monitoring/warning lamps**

The diagnostics system of the electronic control unit monitors the transmission status every time the vehicle system voltage is switched on and continuously while the vehicle is in motion.

**Warning lamps**
Faults are indicated by warning lamps lighting up (red or yellow) and/or by warning messages which appear on the driver's display panel (consult the vehicle operating Instructions).

If a selected driving range is not accepted by the ECU, the push button depressed on the push-button speed range selector will flash （see Section 1.1.2）

## 1.14 **Transmission response to a malfunction**

To protect the transmission in the event of a malfunction, the following responses are provided:

**Shift into Neutral:**
In the event of serious malfunctions in the power supply to the transmission, e.g. short circuit.

**Engagement of emergency operation mode**

（see Section 1.14.1）

If there is an interruption of CAN communication or a loss of speed information.

⚠ **DANGER !**

**The following applies in the event of a malfunction of the transmission system:**

- **Serious risk of transmission damage**
- **Limited system monitoring**
  **RISK OF ACCIDENT!**
- **Continuation of the trip is only allowed if the utmost care is practiced by driving as slowly and foresighted as possible.**

### 1.14.1 **Emergency operation**

Depending on the fault prevailing, the following limitations may occur during emergency operation:

- Retarder function limited or not available.
- Automatic Idle Shift (AIS) function not available.
- No activation of the engine brake.
- Torque converter lockup clutch (WK) open.
- Limitation of engine torque for transmission protection (no engine control).
- Poorer shifting quality or no gearchanges.

# WABCO ABS BASIC INTRODUCTION

## 1. Introduction

Anti-lock Braking Systems (ABS) or - to use another common term - automatic anti-lock systems - are used to prevent a vehicle's wheel from locking as a result of excessive operation of the service brake, especially on a slippery road surface. Thus lateral control on the wheels being braked is maintained even at full brake application or in panic braking situations to ensure the cornering stability and steerability of a vehicle or a tractor-trailer combination to the greatest possible physical extent.

At the same time, the objective is to optimize the utilization of the available adhesion coefficient between tyres and the road surface and thus vehicle retardation and stopping distance.

High-performance ABS for commercial vehicles was first introduced at the end of 1981 by Mercedes-Benz and WABCO after elementary systems had been used in the USA from the mid 70s.

System design and control principles of this 4-channel system with individual wheel control (4 sensors - 4 modulators, called **4S/4M** below) were subsequently highly successful in the European market for commercial vehicles and became the basis for a world-wide standard for all commercial vehicles with power brakes.

ABS and ASR have proved their value as 4- and 6-channel systems in commercial vehicles. The reliability of systems and components from series production is excellent, in spite of their complexity. The demand is rising not only in Germany and Europe or Israel and Australia, but also in the USA and in Japan.

As is generally known, the EEC and other legal requirements demand automatic anti-lock braking systems for certain types of commercial vehicles.

It is these provisions and measures which have resulted in the even more widespread use of ABS and in greater numbers being produced; this in turn has allowed cost reductions to be implemented, in spite of keen competition. WABCO has now developed the 4$^{th}$ generation of ABS and ABS/ASR. The D-generation offers different variants in the form of modular system designs.

These are based on state-of-the-art electronics technology with high-performance micro computers, including data storage, and take into account recent diagnostic principles. The 4- and 6-channel ABS/ASR systems for commercial vehicles offer various interfaces for working together with electronic engine control systems and the optimal use of an integrated speed limiting facility. Special functions for both ABS and ASR operation are available for selection in off-road operations.

This document describes the basic elements and the operation, the design and the system configurations of these anti-lock systems for commercial vehicles. The subject of drive-slip control (ASR) is mentioned only briefly in the section on system functions.

# 2. System functions

## 2.1 Description of an ABS control cycle

In case of impending wheel lock, the brake pressure of the corresponding wheel will be decreased, held during expected or measured wheel re-acceleration and subsequently increased in steps after re-acceleration. The cycle is started again if the brake force is still too high for the actual friction level (adhesion).

Rear axle wheels are subject to individual control (IR), front axle wheels are subject to **M**odified **I**ndividual **R**egulation (MIR).

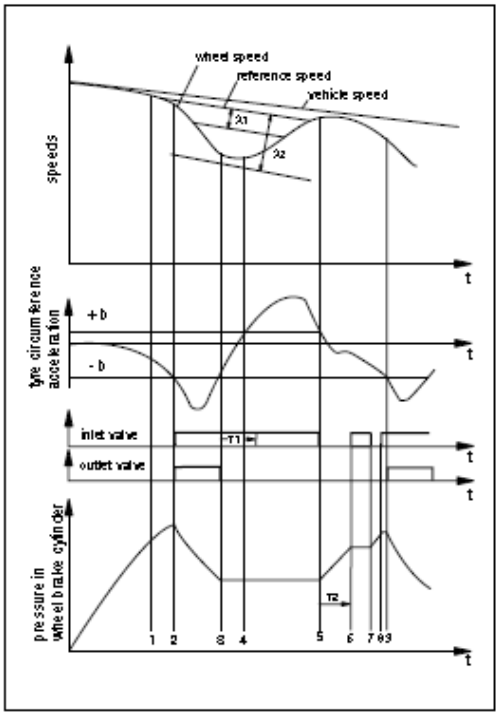



**Fig. 1**

Fig. 1 shows an example of a control cycle with the most important control variables, wheel deceleration threshold -b, wheel acceleration threshold +b and slip thresholds λ1 and λ2.

As the brake pressure increases, the wheel is progressively decelerated. At point 1 wheel deceleration exceeds a value that can not physically be exceeded by vehicle deceleration. The reference speed, which up to this point had been the same as the wheel speed, now diverges and is reduced according to a fictitious vehicle retardation from point 2 (exceeding the -b threshold) with a slower deceleration.

The deceleration threshold -b is exceeded at point 2. The wheel now moves into the unstable region of the μ-λ slip curve at which point the wheel has reached its maximum braking force and any further increase in braking torque does not achieve any further deceleration of the vehicle but merely deceleration of the wheel. For this reason the brake pressure is quickly reduced and so wheel deceleration decreases. The time taken for wheel deceleration is determined by the hysteresis of the wheel brake and by the characteristic of the μ-λ slip curve in the unstable region.

Only after the wheel brake hysteresis has been overcome a continued reduction in pressure leads to a decrease in wheel deceleration.

At point 3 the wheel deceleration signal -b drops below the threshold and the brake pressure is held at a constant level for a set time T1.

Normally, wheel acceleration will exceed the acceleration threshold +b within this set time (point 4). As long as this threshold is exceeded, the brake pressure is kept constant. If (for example on a low-friction surface) the +b signal is not generated within time T1, the brake pressure is further decreased by slip signal λ 1. During this control phase the higher slip threshold λ 2 is not reached.

At point 5, the curve falls below the threshold +b. The wheel is now in the stable region of the μ-λ slip curve.

Brake pressure is now rapidly applied for time T2 to overcome the brake hysteresis. The time T2 is fixed for the first control cycle and then recalculated for each subsequent control cycle. After the initial rapid phase, brake pressure is then increased more gradually by "pulses", by alternating pressure hold and pressure increase.

The basic logic demonstrated in this example is not fixed at all; it adapts to the corresponding dynamic response of the wheel to varying coefficients of friction, i.e. it implements an adaptive type of system control.

All threshold values depend on several different parameters, such as driving speed, vehicle deceleration, etc.

The number of control cycles results from the dynamic response of the overall control system composed of the ABS-control - the wheel brake - the wheel - the road. Here, the frictional connection is of vital importance. In general, 3 to 5 cycles per second are performed, but significantly fewer on wet ice.

If an engine brake / retarder is used during an ABS control cycle, it is switched on or off by the ECU. For the purpose of front axle Modified Individual Control (MIR), the system compares the front wheel signals and modulates the pressure for both front wheel brakes. If, for example, control is activated on a front wheel on a road surface with partially lower adhesion, the other wheel channel regulates the brake pressure so that pressure differences are built up (slowly, in graduated steps) to a limited maximum value.

In the event of a 4S/3M -or 6S/3M configuration being used, there is only one modulator on the front axle. The wheel locking first takes over ABS control of this axle. This results in a control process similar to Select Low which is called Modified Axle Control **(MAR).**

On 6x4 or 6x2 vehicles with a 6S/4M system, the same philosophy is used on the two rear wheels of one side which are controlled by one modulator. This type of system is called Modified Side Control **(MSR).**

### 2.1.1 Off-road ABS

The off-road mode can be used to allow more brake slip (temporary wheel lock) for braking on special surfaces. ECE R13 Supplement No. 7 requires the off-road ABS function to be reset as soon as the ignition is switched on again.

The vehicle manufacturer decides, according to vehicle type and application, whether this switch is fitted or not. Off-Road ABS disables ABS control at vehicle speeds of less than 15 km/h and allows greater brake slip up to 40 km/h At speeds above 40 km/h there is no modification to ABS control.

The mode selected is indicated to the driver by the warning lamp (WL) which will flash slowly unless other events result in a permanently lit warning lamp. The speed ranges and the warning light function can be altered via parameter settings. The vehicle manufacturer has to record in the driver's handbook that the off-road mode may not be used in ordinary road traffic because the vehicle might not meet the requirements of ECE 13 Cat.1 in these circumstances.

## 2.2 ASR

In addition to ABS control, trucks and buses can be equipped with an Anti Spin Regulation ASR, also known as drive-slip control. ASR reduces the amount of wheel spin (drive slip). The philosophy of ASR is based on keeping the slip of spinning drive wheels compared to the non-driven front wheels within a range providing the best possible traction and stability.

Depending on the road conditions ASR will start engine and/or brake control, if excessive wheel slip has been detected. On a homogeneous road surface, control is mainly achieved by reducing the speed of the engine, and differential brake control will be limited to synchronizing the wheels. If μ-split conditions apply, differential brake control will put pressure only to the brake cylinders of the wheel which is spinning. The engine torque is thus transferred to the other wheel.

Engine control will not commence until both wheels spin or the slip of the spinning wheel exceeds a certain threshold. During differential brake control, the pressure is supplied by way of actuation of the differential brake valve. The brake pressure of the wheel which is spinning is controlled by the corresponding ABS solenoid control valve.

To prevent pressure building up in the brake chamber for the driving wheel which is not spinning, the ABS solenoid control valve of this wheel will cut off brake pressure. This cut-off function is also available for the Z-axle modulators of a 6-channel system or optionally for a separate solenoid valve in case of a 4-channel system on a 6x2 vehicle. To prevent the foundation brake from overheating, the differential brake threshold is subject to a linear increase at vehicle speeds over 35 km/h, thus increasingly controlling slip by means of slowing the engine speed. When the vehicle's speed exceeds 50 km/h, differential brake control will not commence although any brake control in process will continue.
ASR for 6x4 vehicles with a 6S/4M or 6S/6M system takes the speeds and accelerations of both wheels of one side into account. In comparison to a 4S/4M system, this system is able to avoid spinning or locking of the driving wheels which have no sensors.

### 2.2.1 Traction mode

In deep snow or comparable conditions the traction can be increased by activating a special mode. By temporarily pushing the traction mode button for at least 150 milliseconds, the ECU switches to a type of ASR control with different thresholds and different engine/differential brake distribution to allow higher slip ratios. Depending on the parameters set on the ECU, an ordinary switch may be used for this purpose. Activation of the ASR traction mode is confirmed by slow flashing of the ASR lamp to inform the driver that vehicle's stability might be impaired.

## 2.3 Speed limiter with proportional valve

The auxiliary output can be used for limiting the speed using a proportional valve and an ASR operating cylinder. These components actuate an injection pump and consequently modulate the speed of the vehicle.

An idle stop cylinder is needed for certain single-lever injection pumps.

The speed limiter meets ECE requirements. The speed limiting value is part of the parameter record and is stored in the EEPROM. The standard parameter record has a default speed limiting value set to 160 km/h

This value can be changed via the diagnostic interface. The minimum

value is 20 km/h For vehicles with non-synchronized gearboxes, the neutral position has to be allocated to the related input or additional equipment is necessary.

A second speed limiting value can be defined as part of the procedure for setting the parameters (lowest speed setting). When the speed setting switch is actuated, the current speed is stored and compared to the parameter value for the speed setting. The vehicle's speed is limited to the higher of the two values as long as the speed setting switch is actuated.

The signal from a tachograph which is connected to the C3/B7 input port is required to give off between 2,400 and 24,000 pulses per kilometre. Suitable appliances are, for instance, the KIENZLE tachographs 1314 or 1318.

The ECU checks the input signal for plausibility and signalling errors. Any error is indicated by the warning lamp or ASR lamp if the vehicle is moving at a speed faster than 3 km/h

If no C3 signal is available, the wheel speed signals from the ABS/ASR system are used to limit the speed (does not comply with EC regulations!).

# ECAS System Introduction （for tourist bus use）

## 1. System introduction

The name ECAS stands for Electronically Controlled Air Suspension.

ECAS is an electronically controlled air suspension system with a large number of functions.

Air suspension systems have been used in motor vehicles since the mid 50s especially in buses. Air suspension systems are used in them as a standard and are increasingly being used in trucks and trailers. The advantages of air suspension over mechanical suspension (steel springs) are listed below:

- Increase in ride comfort due to lower spring rate and low natural frequency
- constant vehicle height irrespective of the load
- precise load-dependent activation of the brakes through use of the air bellows pressure as control pressure for the proportioning valve
- Kneeling function (lowering of one side of the vehicle to facilitate entry and exit)

The control system was initially designed with pure mechanically operating leveling valves, soon afterwards electromechanical control systems were developed . This served to enhance ease of operation and to facilitate raising/lowering processes.

ECAS is the most advanced development in this direction. Using electronic control units enabled decisive improvements in the conventional system; it enabled many functions for the first time ever:

- Reduction of the air consumption none while the vehicle is moving. Air savings of approximately 25 % were determined using ECAS compared to a conventional air suspension system in low-floor buses for scheduled route services.
- High speed of all control processes due to large valve cross-sections (nominal size 7 per air bellows).
- Easy installation. Only one air line is required from the solenoid valve block to each bellows and one to the storage tank.
- Raising/ lowering function and kneeling conform to the legal requirements
- High system flexibility for different kneeling types
- Extensive safety concept, error storage and diagnostics capabilities.

In mechanically controlled air suspension systems, the device that measures the level also controls the air spring. With ECAS, an electronic system takes over control, regulating the air springs by means of solenoid valves informed by measured values from sensors.

Apart form controlling the normal level, the electronic unit also covers control of the other functions: working together with control switches and sensors for the tyre deflection compensation, the ECU achieve this without the need for numerous additional valves required by conventional air suspension control.

ECAS at different configuration levels can be fitted in various bus types .

The ECAS system in a bus consists of the following components:

- an ECAS electronic unit (ECU)
- a solenoid valve (solo vehicle)
- 3 distance sensors
- optionally 1 pressure sensor
- Operating switches
- Sidewalk detector

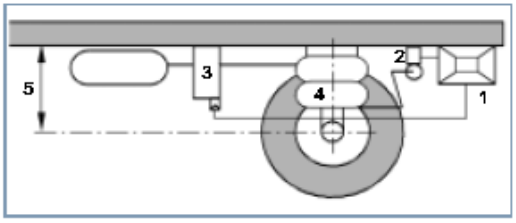



Abb. Example ECAS base system

1 ECU (electronics)
2 Distance sensor
3 Solenoid valve
4 Air-suspension bellows
5 Distance body/axle

**ECAS with CAN bus**

The most recent generation of the ECAS systems has CAN bus capability. Here the electronic systems are networked by means of a CAN bus and information is transmitted via SAE-CAN identifiers.

The CAN Bus (Controller Area Network) is a serial databus system, which was developed for networking controllers in automobiles with the aim to reduce cable harnesses. Instead of using an electrical circuit for each transmitted signal, the "bus" is based on a communication platform which regulates the relaying of messages between several devices.

The Flexibly Programmable Controls serve as an interface to provide each individual system a precise process I/O image, i.e. information on the inputs and outputs in the overall system, via a CAN data bus.

One of these SUB-CAN BUS systems is the CAN-BUS 'IES'. The ENR (ECAS) and various other systems, such as the electronic brake system EBS, are currently connected to it.

The systems are connected to their sub-systems via a system bus. The ECAS system is integrated in a vehicle system based on the CAN-BUS to ISO 11898.

The electronics provide the connection with the vehicle electrics via a CAN data bus and via separate inputs and outputs.

When this highly standardised technology was introduced, the vehicle manufacturers specified that the system suppliers are responsible for the systems.

## 2.1 System configuration

ECAS has a modular structure to ensure that different vehicle types can be equipped with the system. The choice of system components to be used is determined by what is required of the system.

With the most basic configuration level, only one axle is equipped with the ECAS air suspension and only one height sensor monitors the body height. With this configuration, the support bellows of a tandem axle can be interconnected.

However, if the body is to be kept parallel to the axle even when the load is distributed unevenly in the vehicle, it is necessary to arrange distance sensors on both sides and to control the support bellows of the axle or tandem axle by separate solenoid valves.

A vehicle with full air suspension is usually equipped with three distance sensors. The front axle, for example, has one distance sensor and the rear axle has two in this configuration.

Vehicles are also equipped with four distance sensors however. This applies mainly to vehicles with independent wheel suspension. With two front distance sensors it is possible to implement cornering detection and ESAC. The mean value from the two distance sensor signals is used for ECAS control.

The two bellows of the axles with only one distance sensor are interconnected by a restrictor to enable pressure equalisation. During brief changes in the direction of travel however, this restrictor prevents rapid pressure equalisation. This prevents exhaust of the bellows on the outermost side of the curve, thereby reducing tilt of the vehicle against the curve direction. If cornering is detected, automatic level correction is interrupted or is not started. This prevents correction of any rolling movements of the vehicle body occurring at this moment. The transverse restrictor is deactivated analogous to deactivation during kneeling. Calculation of this lateral acceleration is based on the front wheel speed information that is is transmitted from the EBS to the ECAS-ECU via the CAN-BUS.

In an articulated bus the axle of the trailer section is equipped with two additional distance sensors and its own control electronics.

A further breakdown of possible system configurations, illustrated by a circuit diagram and part numbers, is provided in the appendix.

**Pressure test connections**

The support bellows should be fitted with pressure test connections so that the control pressure of the LSV can be measured when testing the braking system.

These test connections also provide a makeshift solution for filling the support bellows in the event of a fault in the air suspension system. With the assistance of a tyre inflation hose, the vehicle can usually be driven to the workshop under it's own power.

# 3. System function

Although ECAS offers a wide range of functions, not all of them need to be implemented in any given system. The respective vehicle manufacturer is responsible for the system configuration and for setting all the parameters, both of which must never be changed without prior consent from the manufacturer.

## 3.1 Functions of the ECAS-ECU

### 3.1.1 Controlling the nominal level

Nominal level control is the basic function of ECAS. The continuous comparison of the actual values supplied by the distance sensors with the nominal values stored in the ECU keeps ECAS permanently informed of the vehicle's current ride height. If deviations exceed a certain tolerance range, solenoid valves are triggered and the actual level is adjusted to the nominal level by means of air intake or air exhaust of the air suspension bellows.

Unlike with conventional air suspension, the ride height is not only adjusted to the vehicle's normal level but any other preselected level. This means any level level that was set is maintained regardless of the number of passengers who who get on or off the bus.

In the event of greater level changes, the solenoid valves are pulsed (CAN II), shortly before the nominal level is reached, relative to the lifting speed and the distance to nominal level in order to prevent overshooting.

All control processes can be executed in parallel on the different axles (front and rear axle simultaneously) within the tolerance limits.

### 3.1.2 Normal level 1/2/3

Normal level 1 is the level that was defined by the vehicle manufacturer for normal driving. The normal level 1 determines the ride comfort, road safety and body height, which must comply with the legally prescribed limits.

Normal level 2 is level that deviates from normal level 1 as an adjustment to special driving conditions. Speed-dependent adjustment to this level is also possible. The height of normal level 2 is permanently defined by a set value (parameter) in the electronic unit. A switch is used to choose between normal level 1 and normal level 2.

For safety reasons, it is possible to automatically adjust the level to normal level 1 as soon as the vehicle exceeds a certain speed threshold (20 km/h for example); the level is then readjusted to the previous level once the speed drops below a lower speed threshold (10 km/h for example).

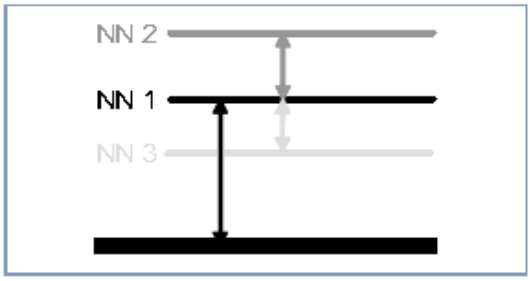



Abb. Illustration of the ride height

**Special aspects with regard to CAN II electronic systems**

- CAN II electronic systems also permit setting parameters for normal level 3 as a speed-dependent level
- Customer Level: Independent parameters can be set for levels on rear axle left and rear axle right.
- All levels are obtained via CAN identifier ASC2 … .

**Manual level adjustment using switches/ pushbuttons**

In certain cases it may be necessary to set a certain level which differs from normal levels 1/2. Pushbuttons can be used for lifting and lowering. When these are actuated, the bus is raised or lowered at the selected axle(s) by means of a preselector switch.

**Height limitation**

The electronic unit automatically discontinues height limitation when programmed (calibrated) values for the upper or lower limit positions are reached.

### 3.1.3 Kneeling

Kneeling is a special function for buses. The regulations for kneeling systems are described in section 35d of the StVZO (road traffic regulations). Kneeling describes a process whereby the bus is lowered to make it easier for passengers to get on and off. Depending on the parameter settings of the electronic control unit, this can take place towards on one side on both axles at the axle with one distance sensor (usually the front axle). ECAS provides the option to take the door position into account and to safeguard the lowering process by means of a contact strip that is monitored by ECAS. If the contact strip reacts during a kneeling process, the bus reverts to normal level.

Diverse kneeling function actuation types are possible depending on the electric wiring and the parameter settings of the electronic unit.

**Supply pressure monitoring**

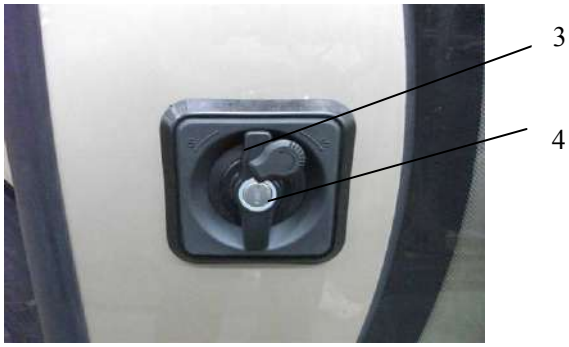
One precondition for kneeling is the availability of sufficient supply pressure to quickly raise a lowered and fully laden vehicle back to normal level. If the supply pressure has dropped below a value monitored by a pressure switch, ECAS will not permit kneeling in order not to prolong the time spent at bus stops.

**Open/close the passenger door.**

1. Before leaving the vehicle, press the button 1 of the door remote controller to close the door.


2. Use the key to lock the door. First insert key into the hole 3 and clockwise rotate key about 90°, then anticlockwise rotate handle 4, after that the door would be locked.

3. If need open the passage door, insert key into the hole 3 and clockwise rotate it about 90°, then clockwise rotate handle 4, follow press the button 2, after that the door would be opened.




**Appendix:**

The following are all type of door lock and door remote controller of King-Long.

Lock1

Lock 2

Lock 3

Door remote controller 2

Door remote controller 1

## Door emergency switch

The model 1 door emergency switch is located on right upside of the ingress.
The model 2 door emergency switch is located on right underside of the ingress
The model 3 door emergency switch is located inside the door pump cover which is on the top of the door.
Please rotate the switch and throw open the door in emergency.

**Special attention:** The door emergency switch is only used in the emergency mode. Please don't rotate the door emergency switch in driving for fear of danger.

Model 1

Model 2


Model 3

**Adjustment of the driver's seat**

The driver's seat may be made proper adjustment for the back and forth as well as the backrest angle according to requirement of the driver.

Handle 1 and Handle 2: cushion height adjustment

Handle 4: back and forth adjustment

Handle 3: adjustment of the driver’s weight

Left handle: backrest angle adjustment

Note: Number of handles varies with vehicle model


**Attention!**

**The seat should not be adjusted during driving to ensure driving safety.**

**Adjust the driver seat only when the vehicle is stopped and the parking brake is on.**

## Horn button

It is on the steering wheel. The horn is hooting when pressing the button 1.

The type of steering wheel may vary with vehicle model. Please use the horn only when strictly necessary to warn other drivers and pedestrians.

Model 1


Model 2

**Adjustment of the steering wheel**

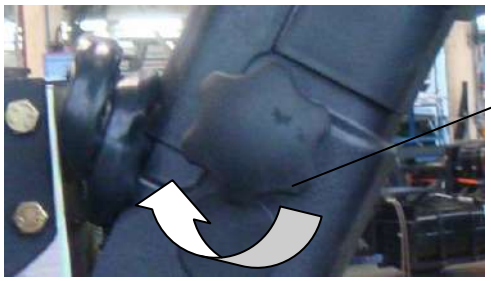
Pull-up the loosening handle 1 or rotate the loosening button 2. Adjust the height and the inclination of the steering wheel to the desired position. After adjusting, press the regulating handle or button down to lock the steering column.


Note: Number of handles varies with vehicle model

**Attention!**

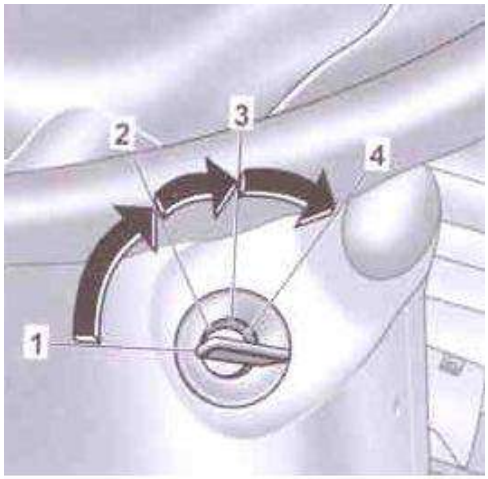
Adjust the steering wheel only when the vehicle is stopped and the parking brake is on.

After adjusting, press the regulating handle or button down in order to lock the steering column.



## Ignition switch

Position of the ignition key is shown in fig.1.




1."L" LOCK: Insert or remove the key in this position.
2."A" ACC: Power supply of the instrument is switched on
3."O" ON: Normal driving position
4."S" START: Initiating position of the engine, and the key may rebound to the "ON" position automatically after the startup.


Before starting the engine, turn the key to the “ACC” position and then to the “ON” position. At this point, three lights (red, yellow and green) on the dashboard will come on. Wait for the lights to go out completely before you start the engine. However, make sure that all of the self-check lights have gone out completely before starting the engine. Allow the engine to run at idle speed for three to five minutes after it has been started; but never let it run for more than 10 minutes at idle speed. If the vehicle does not move, increase the fuel to the accelerator modestly to increase the rotational speed of the engine a little; this will also prevent the early wear and tear of the engine.

Note：

1. Turn the ignition key to the OFF position after the engine has been turned off and has stopped running.
2. If the first attempt to start the engine is not successful, please wait two minutes before trying again.
3. If the engine fails to start after three attempts, check the fuel supply system. If the vehicle runs on natural gas, check the gas supply system.

**Attention!**

1. Do not remove the ignition key while the vehicle is in movement. And the ignition key should be turned to the LOCK position only after the engine shut down.
2. When leaving the vehicle, even for a short period, take the key out to avoid operation of the vehicle by children or unauthorized persons.

## Lamplight operating handles

Model 1

The lamplight operating handle is located on left underside of the steering wheel, which control the front small light, headlamp, headlamp dimming, etc


Model 2


OFF Indicating that the headlamp and the small lamp are all off.

Is the small lamp indication. The small lamp, the instrument light and the side indicator lamp will all be turned on when anti-clockwise rotating the handle to position of this identification.

Is the headlamp indication. The headlamp, small lamp, meter lamp and width lamp will all be turned on when continuously anti-clockwise rotating the handle to position of this identification.

Is the turning indication. By up and down motions of the operating handle may control the left and right turning lamp and that on the dashboard.

Is dimming indication. Back and forth the operating handle gently may actuate the headlamp dimming.

**Note：**

It's important to dip the lights promptly when approaching an upcoming vehicle in order to avoid dazzling its driver with the high beam of the headlight.

## Wiper operating handle

The wiper operating handle is located on right underside of the steering wheel. (model 1~2)

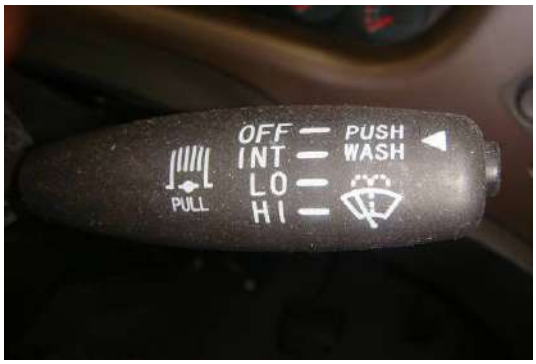
OFF Out of work
INT interval wiper operation step
LO Slow wiping
HI Quick wiping

The wiper may spray water by pressing the end of the handle.
The shifts of the retarder may be converted by up and down motion of the handle.

Note: do not actuate the wiper without water; press the washer button as needed, then actuate the wiper.

Model 1 (with retarder)

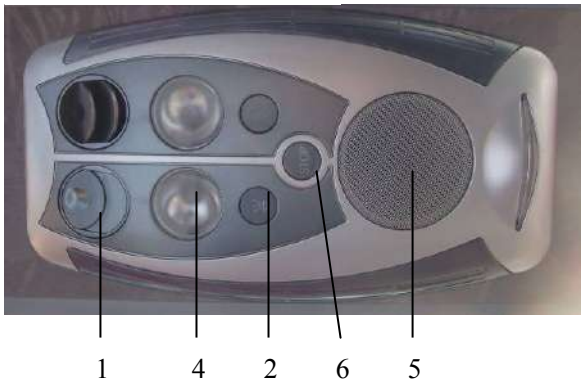

Model 2 (with exhaust brake)



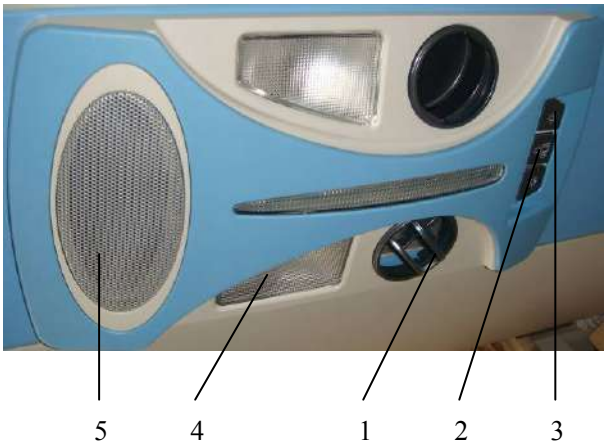
## Passenger control panel instruction

1. air outlet
2. service button
3. reading lamp button
4. lamp
5. loudhailer
6. stop button

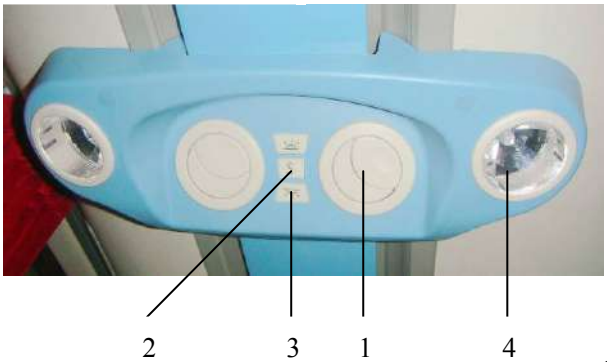
Model 1




Model 2




Model 3



**Safety hatch**

The safety hatch is located on scaffold of the vehicle. Please open the safety hatch according to the above diagrammatic representation and illustration for escaping in case of danger.

Model 1

When in emergency and dangerous condition, should

1) push upward with hands and make the hatch open
2) pull down the plastic cover and rotate red handle
3) push dome open
4) exit through hatch

Model 2

Model 3


Model 4

## Safety hammer

The safety hammer is located on the side window. Please take down the safety hammer and break open the safety window for escaping in case of danger.

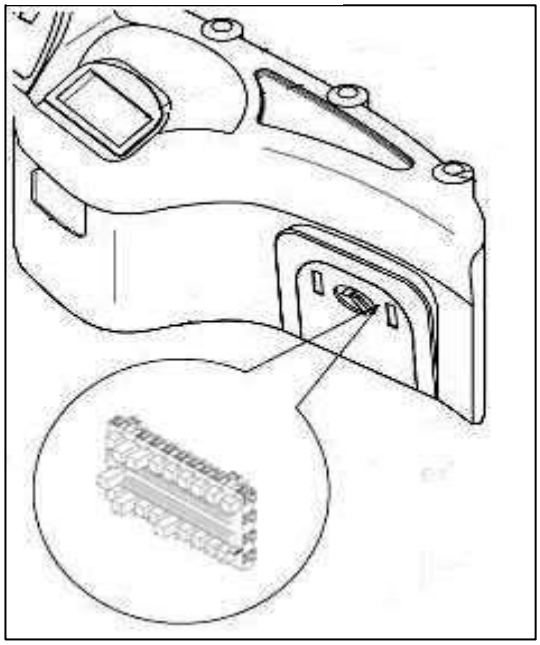
Model 1

Model 2

Model 3

**Relays & Fuses**

Installation Position



The Relays & Fuses Box always installed in the compartment of the instrument desk or a tool cabin belong to front right side panel.

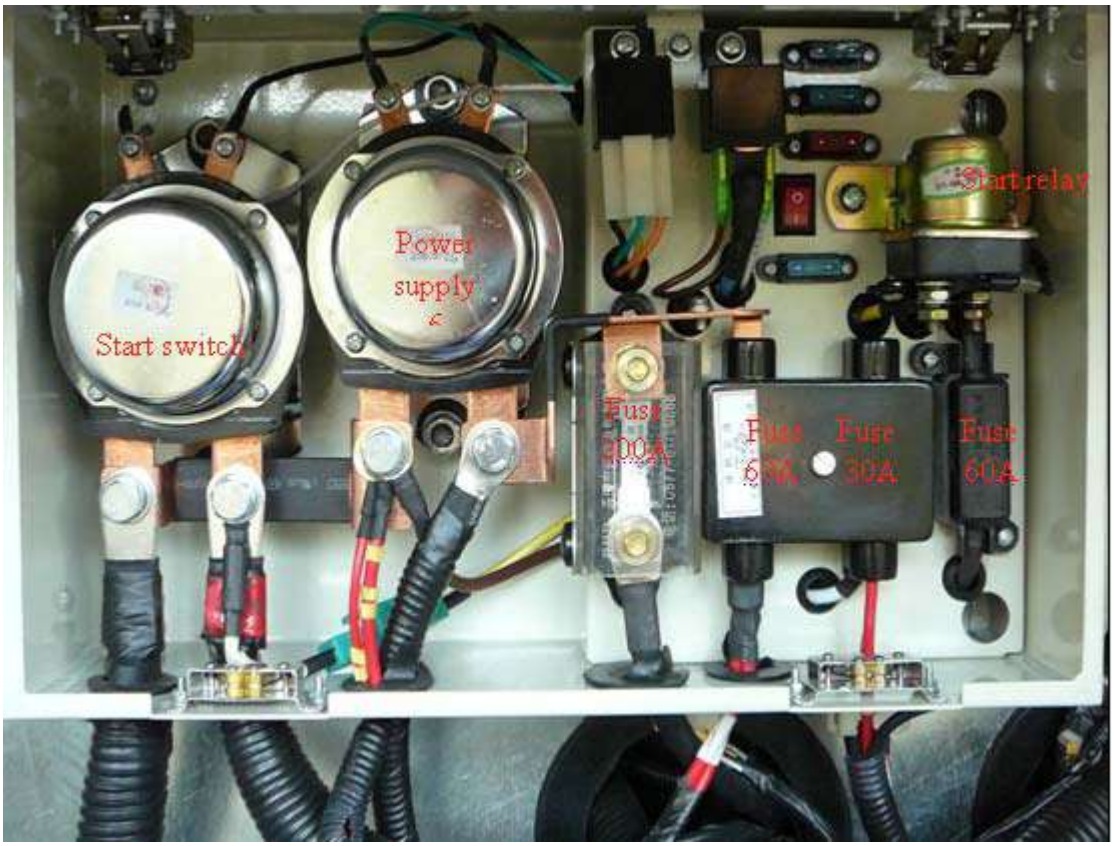
The box integrates 50 chip-type fuses, 20 general and special relays, and has 8 standby chip type fuses, one fuse clip, which makes its construction more compact and function more powerful. It improves design of the past Relays & Fuses Box , therefore it avoids weakness such as unreliability and short service life, it applies integrated circuit and designs 5 special relays: intermittent wiper relay, turning flasher relay, lower water level warning controller relay, monitor power relay, brake light failure warning relay (when power supply voltage is lower than 23V, power supply of acoustic set and monitor is cut off and will be begin to work again after power supply voltage resumes to normal).

**The vehicle installed the Relays & Fuses Box in the compartment of instrument desk.**

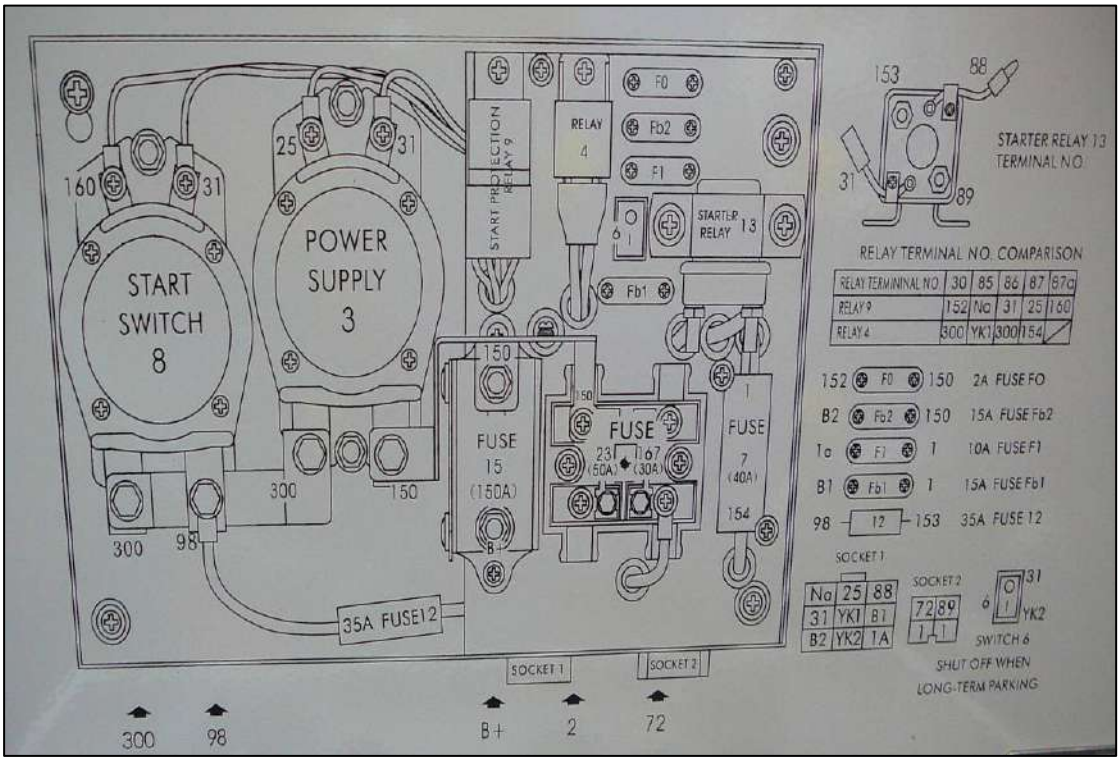
**The position of Management Module, CAN Processor Module, and the Relays & Fuses Box**

They are located in the compartment of instrument desk. When servicing, may open the desk cabin gate

**Switch control box (Model: CQ2025)**




**CQ2025 A wiring diagram (Printed on opposite cover of the switch control box)**



**Preparative for vehicle operation start up:**
**Check daily, before turning engine on:**

## 1. Check oil level of the engine

The warning “Engine oil pressure” is displayed as a signal item on the combination instrument when the oil pressure is too low, the alarm buzzer sounds, the warning light STOP comes on, stop the engine and check engine oil level at the dipstick. Provide immediately for the oil replenishment to its correct level.

The oil level should always be checked with the vehicle parked on level ground, before starting the engine up, or at least 5 minutes after having shut it down.

Open the engine compartment hood.

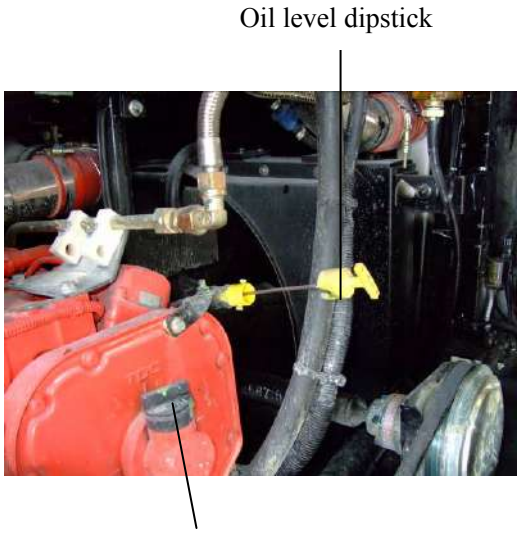
Take out the oil dipstick, and clean it with a clean cloth without loose threads, and put it back into its place fitting it in completely.

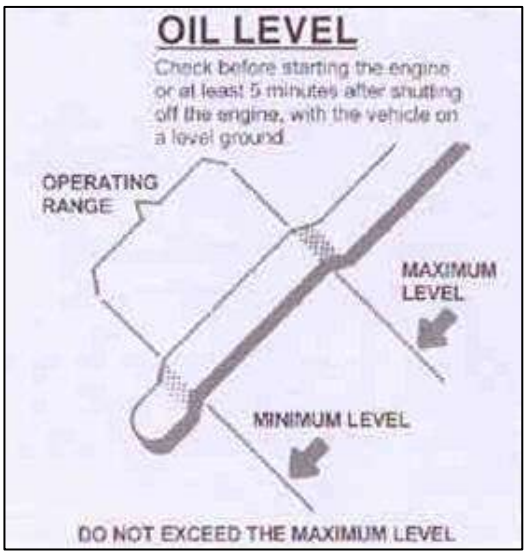
Once again pull out the dipstick and check the oil level.

a. The oil should not exceed the maximum level.. drain the excess.
b. If the oil is at operational level, do not add more oil to the crankcase.
c. If the oil is at or below the minimum level, add the same type and brand of oil to the crankcase as that already there, until reaching the maximum level..

After the checking, replace and fit the dipstick completely back into its place.

If the oil level is checked after the engine has been run for a period of time, then it should take at least five minutes before the measure to ensure the oil back flow to the oil sump in full.



## 2 Check level of the coolant

The coolant level is automatically monitored.

If coolant level gets too low，the digital indicator displays a driver information on the combination instrument. In this case, park vehicle in a safe place as traffic conditions permit, stop engine and visually check the coolant level.

Check the coolant level only when the engine doesn't work and its temperature is below 50℃.

The anti-freezing rust-inhibiting engine coolant level can be observed from the observe pipe.

The coolant level should be between the maximum level (MAX.) and minimum (MIN.) level indicators in the compensation tank.

If it is necessary to add coolant to the system:

a. Place the heating system command in the position of maximum heating potency.
b. Add the coolant to the system up until the maximum level indication. Only use coolant which is recommended.
c. The compensation tank cover should not be opened when temperature of the coolant is still high to avoid being scalded Place the lid on the system and turn it to the limit.
d. Pressure valve of the compensation tank should be opened when adding the coolant to eliminate air in coolant pipeline of the diesel engine.
e. Run the engine for a short time at varied rotations.
f. Stop the engine and check the coolant level.
   If necessary add more coolant to the system

Observe pipe

Observe pipe

Anti-freeze and antirust solution (mixture of glycol and water) should be added to cooling system from time to time to avoid sediment, frost, oxidation and increase boiling point.

Note: When adding coolant, please choose the same model to avoid sediment. If coolant is degenerative, replace it immediately.

Coolant specification as shown below: users should choose products produced by normal factories according to requirement

## 3 Fuel pre-filter with water separator (drain accumulated water)

Draining accumulated water

On a daily basis, check the lower cup of the water separator. If there is water in the cup, unscrew the draining plug one or two turns, to drain the accumulated water.

After draining the water, tighten the draining plug correctly.

When the accumulation of impurities in the lower cup is noticed, take the vehicle to a workshop to carry out its cleaning.

Changing the fuel pre-filtering element

The fuel filtering element should be changed periodically, at the intervals recommended in the maintenance manual. If however, the filtering element is easily saturated needing substitution at very short intervals, this is an indication of the accumulation of impurities in the interior of the fuel tank, and the cleaning of the latter should be carried out.

In order to change the fuel filter element, take the vehicle to a Dealer or a King-Long Workshop.

Fuel system discharge

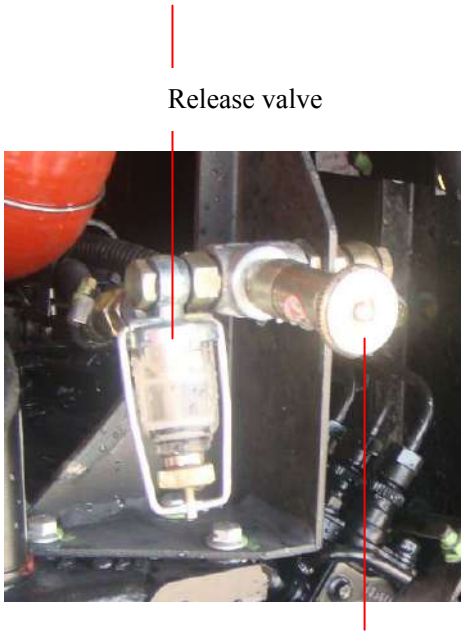
Activate the manual pump until feeling resistance on pumping.

Start up the engine without accelerating. If the engine does not start running in 20 seconds, interrupt the startup and wait at least one minute before trying again.

If the engine insists on not working, repeat the discharge operation.

Leave the engine running for about a minute to completely eliminate the air from the system by way of the auto-discharge system.

In order to reduce environment pollution problems, do not drain the residues accumulated in the water separator directly into Nature (rivers, lakes or soil). The drained residues should be collected in appropriate containers and taken to receiving centers to have proper final destination (see local legislation).




Model for Euro III IV

## 4. Fuel level

Turn the ignition key to drive position (on).
Check the fuel level on the indicator. If necessary, fill up the fuel tank. (But direct viewing by open the tank cover is preferred).

Eliminate deposite water in diesel filter in time and check fuel pipe for no leakage. Ensure sealing performance of fuel tank , and wipe up dirt before opening fuel tank.

Before filling up, shut down engine.
Do not drive vehicle in empty fuel tank. When the fuel level indicator is on the red bar, refuel the vehicle to avoid air entering the fuel system.
Fill the fuel tank only with good quality fuel free of contaminants. The fuel might as well be filled up when running in the humid area to avoid inner rustiness.

## 5. Vehicle lighting, intermittent lights and brake lights

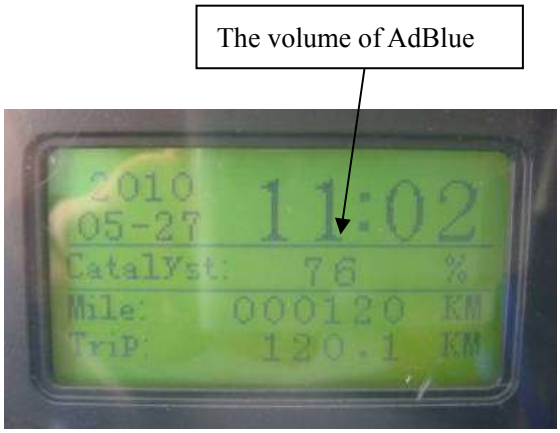
Check all instruments and indicator lamps for normal, especially the head lamp, the turning lamp, the brake lamp, the reversing lamp and the danger alarm lamp.
Check the bulb and the switch for their damage. To carry out the lamp substitution, hands should be very clean. If possible handle new lamps with tissue paper.
Clean the external of all instruments and indicator lamps to ensure clear indication.

Attention!
The traffic laws regulate the location, lighting intensity, and color of the lenses and the quantity of lanterns for each type of vehicle. The King-Long vehicles leave the factory in strict obeyance of these specifications. Traffic safety depends on these factors; therefore do not change the place of the lanterns. Substitute the damaged lanterns only for other original ones. Remember that a change of lantern colors can confuse other motorists and result in serious accidents. Avoid unnecessary lantern adaptations. When substituting lamps, use the same type and potency as the original lamps. Do not carry out any lamp adaptation in the headlights, as this will affect their adjustment and performance, putting the vehicle traffic safety at risk.
On a regular basis revise the illumination system, keeping it always in perfect working conditions

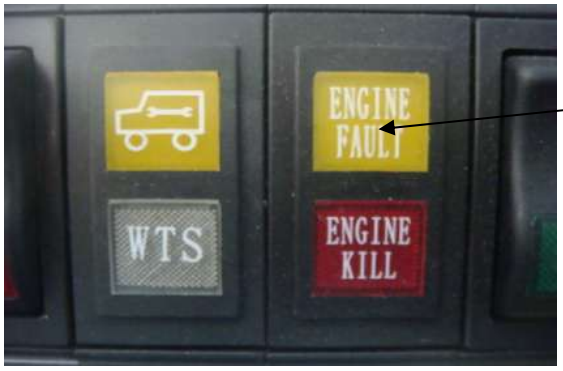
## 6. Check the level of AdBlue and the daily maintenance of SCR system

(1) Check the level of AdBlue.

When the vehicle key rotate the ON position, the LED screen of combination instrument will display the remain volume of the AdBlue, please see the right diagram.




The AdBlue consumption is 5 percent of the fuel consumption. If the remain volume of AdBlue is less than 12%, the lamp 1 will flash and you need add AdBlue. If the remain volume of AdBlue is less than 6%, this lamp will light and the power of engine will be declined forcibly. This will cause the emission substandard and it is not good to engine.




(2) The daily maintenance of SCR system

Please add the AdBlue when it is insufficiency. Ensure the AdBlue meet the requirement. Check the SCR system is well enough and has no leaking before driving. There is obvious add mark in AdBlue tank. If add substandard AdBlue, must stop the vehicle right now and clean the AdBlue tank, re-filling the qualified AdBlue. The air filter should be clean and replace regularly.

**Special attention:**

If the AdBlue spill in skin, mild irritation may occur. Wash off with soap and water. If the AdBlue spill in eye, irrigate eyes with large amount of water. The AdBlue is Non-combustible, if heated water evaporates and ammonia will be released.

**7. Drain water in air tank**

Open the water drain valve of air tank to drain oily water fully. If too much oily water is bled, check to see if desiccant needs to be replaced in air drier. (This may be avoided when adopting the automatic drain valve but it should be checked every two weeks)

## Check daily after turning engine on:

### 1. engine oil pressure

Run the engine.
The information on engine oil pressure can be requested through the driver information digital display.
If the oil pressure is too low, the oil pressure is automatically shown on the combination instrument.
Indication of the oil gauge will show a high value after the cold start of the engine and then it should be kept within the range of 0.07-0.52Mpa (0.7-5.2kg/$cm^2$) along with the increment of the oil temperature as well as the normal engine speed.

## 2. Pneumatic pressure

The air pressure gauge indicates the reserve pressure individually for the front and rear service brake circuits.
The reserve air pressure in each brake circuit must be sufficient for the correct operation of the brake system.
The STOP warning light comes on in case of low brake pressure in the service brake circuits.

Attention!
If the driver information indicator displays the warning “brake pressure” and the STOP warning light comes on with the engine running, it will be an indication that the air pressure is excessively low. Do not drive the vehicle if the air pressure gauge displays low air pressure in one or both brake circuits, as the service brake could fail to result in serious accident.

### 3. Tachometer working order


Indications on tachometer scale:

a. Green zone – operating range of maximum performance
b. Yellow zone – a little high speed range (warning of engine overspeed )
c. Red zone – engine overspeed range (risk of immediate engine damage)

Always observe tachometer while driving the vehicle.
Whenever possible keep engine running within the economical range.（green zone）
On downgrade, select an adequate gearbox speed and monitor vehicle speed to avoid engine operating in the danger range (red zone).
When the exhaust-brake is operating on down grades, select an adequate gearbox speed to keep engine speed within efficient exhaust-brake operation （yellow zone）.

Always avoid engine over revving (red zone), as engine operation in this speed range can give rise to a immediate engine damage or seriously jeopardize its durability.
The yellow range with red reticle can be used occasionally when the exhaust-brake needs to be used at its efficiency limit, however, at risk of engine durability. Therefore, do not operate in this range in a normal or usual way.

## 4. Steering play

### Steering wheel play

Run the engine at idle gear and straighten the front wheels forwards.
Turn the steering wheel alternatively to the right and to the left.
The steering play (free movement of the steering wheel) is measured on the perimeter of the steering wheel and should be between 20 and 30 mm.

**Control periodically, at least once a week:**

## 1. Check tire for abrasion and pressure and tire nut for fixture

The vehicle's safety and performance depend considerably on the state of the tires, reason why they should be checked daily.
Before driving a vehicle, check charging pressure of tire for normal, tire for damage, tire nut for fixture.
**Note:** At initial 50km, please tighten tire nuts of new vehicle to specified torque in appendix.

Tire pressure

Keep the tires always correctly calibrated. The inflation pressure should be checked with the tires cold at least once a week.
After driving the vehicle for some time, the tires heat and in consequence of the heat, the inflation pressure increases. Never, under any circumstance, empty heated tires to reestablish the recommended inflation pressure.
The pressure difference between the assemble tires on the same axle should not be superior to 0.1 bar.

Wheel hubs

Keep them always clean, eliminating eventual mud or other dirt adherence. Substitute the damaged and/or deformed hubs. The utilization of refurbished hubs is not recommended.

Wheel nut

Without fail re-tighten the wheel fastening nuts of new vehicles after running 50km.
The wheel fastening nuts should be retightened, crosswise, in turns, observing the recommended tightening torque according to the type of fastening nut. If a torque meter is not available, tighten the nuts strongly, using the vehicle tools without additional levers.

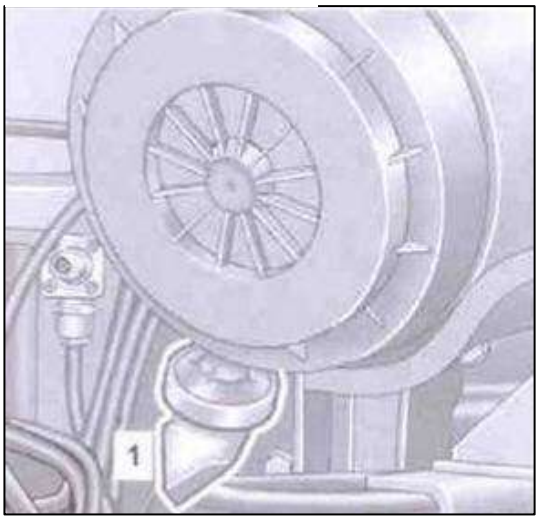
## 2. Air cleaner (activate the dust discharge valve to loosen accumulated dust)

The maintenance of the air cleaner is made up of the substitution of the filtering elements and should be done only when the maintenance indicator indicates the saturation of the element.

The cleaning of the main and safety filtering elements is not recommended. The re-utilization of the filtering elements can result in deficient filtering of the air and cause serious damage to the engine.

When washing the engine, conveniently protect the air inlet with a plastic or similar material to avoid the infiltration of water to the air filtering element. After washing the engine, remove the protection from the air inlet.

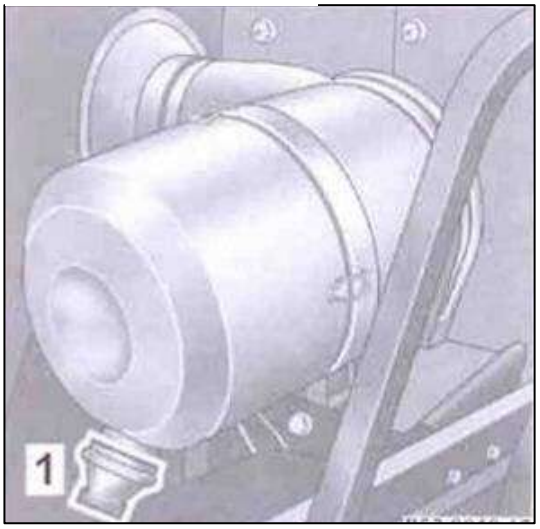
Model 1




Model II

Periodically press the dust discharge valve with your hand, in order to incomplete the dust which possibly be caught in the internal part maintaining them clear. At the same time, check clip connecting rubber hose of air intake system with steel tube in case of dust entering air intake system due to looseness and decrease in engine life.

The air cleaner restriction is electronically controlled. If the indication of saturated air cleaner appears in the display of digital indicator in combination instrument, send the vehicle to a King-Long Dealer or authorized workshop to inspect and clean the air intake system and substitute the main filtering element.




1 automatic dust discharge valve

Indication

The main filtering element of the air filter should be substitutes after maximum 2 years use.

The safety filtering element (optional) should be changed at every third main filtering element substitution, or after maximum 2 years of use.

### 3. General leakages (water, oil, fluids and fuel)

Check the engine, the transmission, the driving axle, the steering system, the cooling system and the oil pipeline, the air pipeline of the complete vehicle for their leakage.

## 4. Fastening and state of seat belts

Check buckle of the safety belt of the driver seat for normal and ensure for its lockup under the following situations when fastening the safety belt.

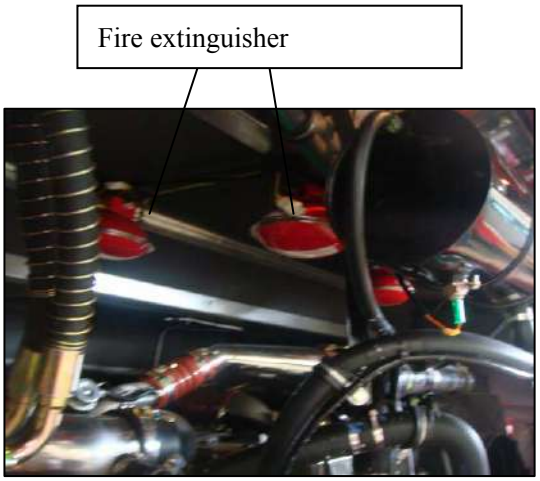
- The body dashes forward all of a sudden;
- The vehicle makes an emergency braking or an abrupt acceleration;

## 5. Check emergency devices and driver's tools

Such as extinguisher, crosstie for blocking vehicle, emergency hammer, jack and etc..

### Fire extinguisher:

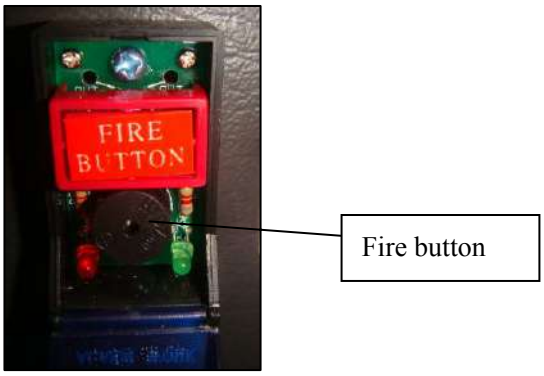
The pulse super-micro powder fire extinguisher is fixed in the engine compartment, when the compartment is on fire, the fire extinguisher activate automatically or is active by manual work to eradicate the fire




The fire button is usually located at auxiliary instrument desk in the driver compartment where people could operate it easily.


Operation：1. When the engine compartment caught fire, the driver should stop vehicle and switch off engine immediately, open the fire button cover, and press the fire button, start-up fire extinguisher

2.Fire extinguisher may start-up automatically when it catches fire or its temperature arrives at **170**℃.




**Important hint:**

1. Fire extinguisher can be used for one time only, DO NOT press the fire button except for emergency condition.

2. The fire extinguisher can not start–up by press the fire button manually if the vehicle battery is dead or power turn off.

3. If the vehicle needs to be repaired, you could take away the anode and the cathode. And put them back after the reparation completed.

Inner fire extinguisher is fixed under the passenger's chair, when vehicle caught fire, stop vehicle and use the fire extinguisher.

## 6. Working order of windshield wipers and conditions of wiper blades and arms

Regularly check the windshield wiper blades for dirt or damage.
Press the lever to activate the windshield washer

Caution: Do not use the windshield wipers when the windshield is dry. Before activating the wipers, push the head of the wiper lever inward to spray detergent onto the windshield.

Check surplus of detergent

Stop vehicle on a flat road, open side cover of instrument desk. Container of detergent is located inside instrument desk. If detergent is insufficient, add.
Add the clean water into the tank for windshield washer.
There are 2 kinds of water tank.

Model 1

Model 2

## 7. Electrical rearview mirror

Check, adjust and clean the rearview mirror.

### Rearview mirror control button

### Model 1

L: adjusting left rearview mirror.
R: adjusting right rearview mirror.
Mirror button: push down the arrow headed button to adjust the mirror for 4 directions.

Model 1


### Model 2

L: adjusting left rearview mirror.
R: adjusting right rearview mirror.
Mirror button: rotate the handle to adjust the mirror for 4 directions.

Model 2


Model 3

## Inspection every two weeks before and after driving

### Power steering

Ensure that all the maintenance service jobs on the steering system be carried out at the intervals recommended in the maintenance manual to guaranty total efficiency and safety.
If any working abnormality in the steering is noticed, immediately supply the necessary repairs.
The habits of forcing the steering too far against wheel obstacles and of activating the steering while the vehicle is stopped are harmful to the steering system and should be avoided.
In emergencies, in the case of damage to the power steering system, the steering may be used without hydraulic help, however, in this condition there will be more steering wheel play and the steering will become noticeably "heavier". Drive the vehicle very carefully and take it to an authorized King-Long Dealer or Workshop to re-establish the correct working order of the steering system.
**Important:** In the case of damage to the hydraulic steering pump or of the total loss of fluid from the hydraulic system, we recommend that the vehicle is not driven further than 50KM in order to avoid further damage to the steering system components.

Model 1

Model 2

Model 3

### Power steering fluid level

The power steering fluid level should be checked while the engine is running at idle and the fluid is hot. Run the engine at idle gear and turn the steering from side to side various times to heat the steering system fluid.
Check the level through the inspect window of the container.

## General state and tension of drive belts

Check the tension of engine belt, fan belt and compressor belt, if loose, tension it; if damaged, replace it.
Do not start up the engine without the drive belts. In the case of one of the belts breaking, immediately stop the engine and have a new belt put in.
The checking, adjustment or substitution of the drive belts should be carried out with the engine shut down.
Check cross plane of the belt for no cracks. Crackle in the transverse direction (along the belt width direction) is acceptable while that in longitudinal direction and transverse crack cross is unacceptable. Please replace the strap in case of abrasion or chip dropping off.
Too tight or too loose belt would make against proper operation of engine. Press belt to check tension. Please refer to the manual book of engine assembly for detailed adjusting method and tension of belt.
The poli-V belts demand technical knowledge, therefore we recommend that this job, when necessary, be carried out at a King-Long authorized Dealer or Workshop.

## Fan drive belts

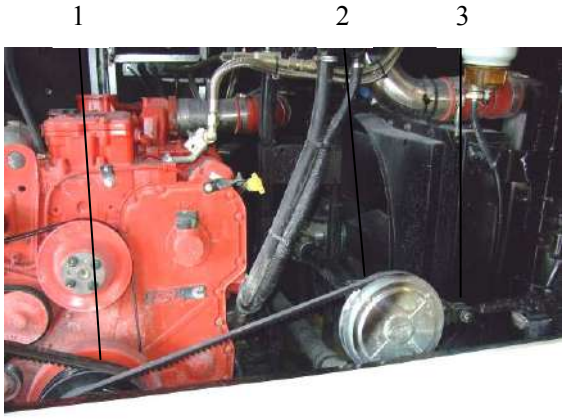
If it is necessary to replace the fan drive belts in emergency situations, adjust their tension in such a way that upon pressing them with one's thumb in the middle of the distance between the pulleys, a defection of approximately 20mm is observed. Loosen fastening nut of intermediary pulley before turning the adjusting bolt. After adjusting fan belt tension, tighten the fastening nut of intermediary pulley firmly.

### Model 1:

Adjusting method of the single belt driving fan belt is shown in the figure

1. Check tension of belt
   Apply force of 98N by the finger.
   Strap sinkage between the crank pulley 1 and the fan pulley 2 should be 15 ~ 20mm.

2. Adjust tension of cone belt
   Adjust bolt 3 until the tension is proper.
   The max offset angle of the fan pully shaft should not exceed 5°, or else please replace it.

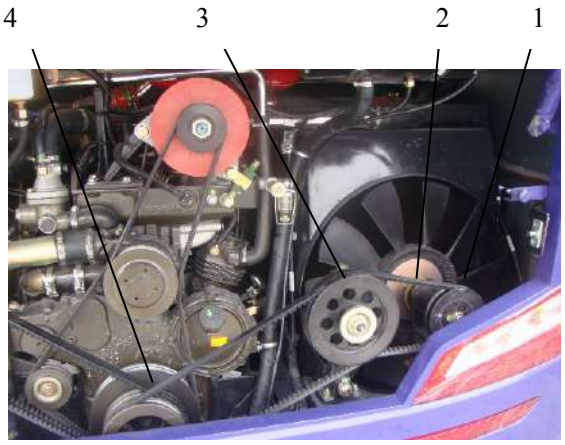



### Model 2:

Adjusting method of the fan belt is shown in the figure

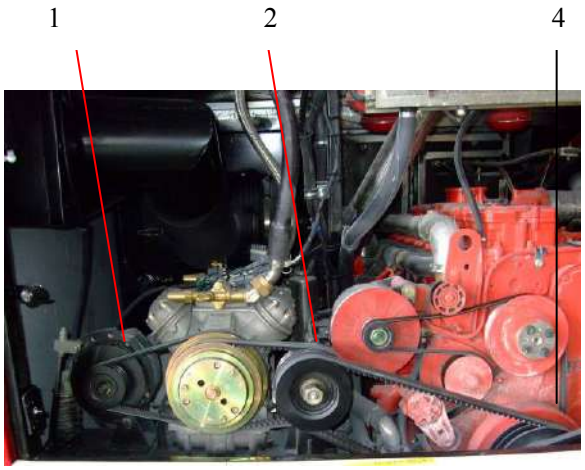
1. Check tension of belt
   Apply force of 98N by the finger.
   Strap sinkage between the crank pulley 4 and the counter pulley 2 should be 10-12mm.
   Strap sinkage between the counter pulley 2 and the fan pulley 1 should be 7 ~ 8mm.
2. Adjust tension of cone belt

Adjust bolt 3 and counter pulley 2 up and down until the tension is proper.



## Air conditioning compressor drive belt

The pneumatic tensioning system keeps the tension of air conditioning compressor drive belt correctly adjusted and do not need to be adjusted periodically.




Adjusting method of the air conditioner belt is shown in the figure

1 Check tension of belt

Apply 98N force to belt with finger

Belt crank pulley 4 and middle pulley 2 should lower 10～12mm

2. Adjust tension of cone belt

Adjust nut 1until tension of belt is proper

## Check level of battery electrolyte

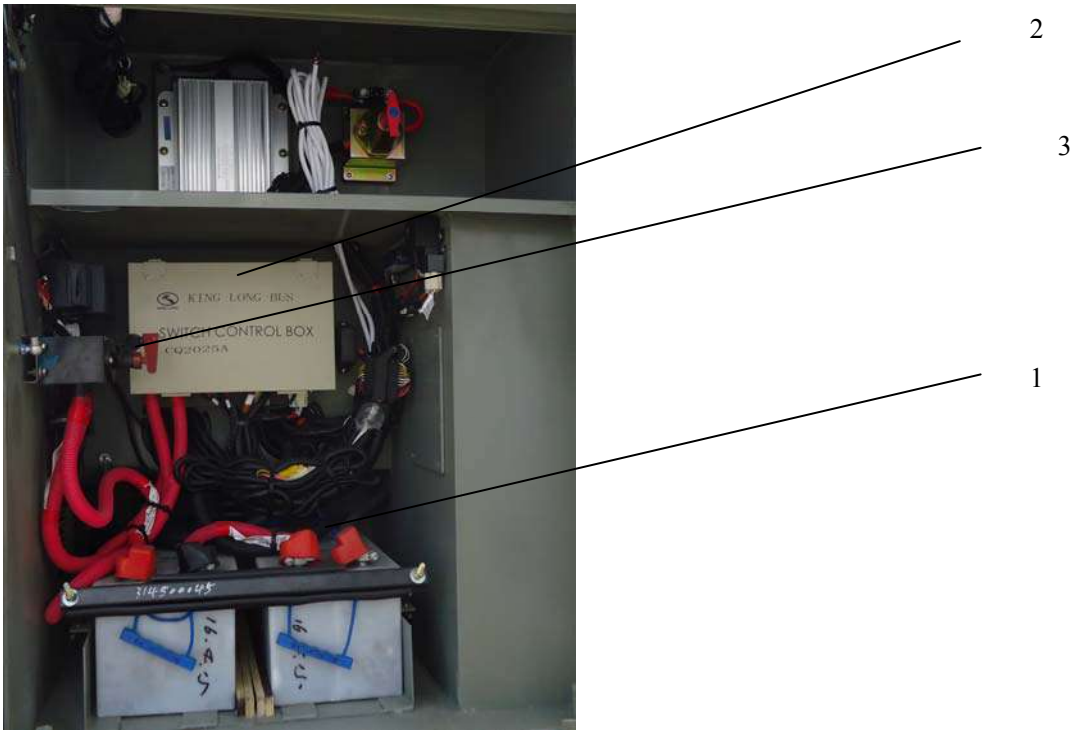
Open the battery cover to check level of electrolyte, if the level is lower than scale marked on the battery, please add it in time.

**Note:** During adding electrolyte, never start engine.

## Battery

The battery compartment is located at the second compartment of left or right rear side.

1 battery
2 switch control box
3 main power switch




To access the battery , open the switch control box panel.
After the vehicle has finished a day's work, the main power switch should be turned off.

Cleaning
Keep the batteries always externally clean and the air vent unobstructed. Avoid battery contact with petroleum derived products.

Charge
Do not allow batteries to maintain a charge inferior to 75% of the total charge.
Do not submit the batteries to excessive overcharges of discharges.

## Engine start up and shut down

### Procedures for engine start up

Activate parking brake.
Place the gear box lever in neutral. Start up is not possible in gear position.
Turn the ignition key into start position.
Start up without stepping on the accelerator. If the engine does not work after about 20 seconds, interrupt the start up process and wait at least 15 seconds before activating start again. To repeat start up, it is necessary to turn the key back to the off position.
Let the ignition key loose as soon as the engine starts running.

The engine rotation adjusts itself automatically in accordance with the coolant temperature alteration.

After engine start up, the vehicle can be put immediately into operation.

Note：
a. The engine should be running at low middle speed for 3-5 minutes on every day's first starting before the driving.
b. Never race the engine without warming up. During cold start, increase engine speed slowly and do not make engine run at maximum speed until water temperature of engine reaches to 70°C. At any time, do not make engine run at high speed under no load.
c. Never make engine run at idle speed for more than 10 minutes.
d. The oil pressure should be displayed on the dashboard in 15 seconds after the engine is started, otherwise, stop engine to check..
e. If parking brake indicator lights, indicating that parking brake has not be released.

Attention!

If on starting up the engine, the engine oil pressure indicator continues indicating low pressure, this means that the engine running order is in danger. Immediately shut down engine, find and correct the failure.

## Engine shut down

Loosen accelerator pedal.
Place the gear box lever in neutral position and apply the parking brake.
Turn the ignition key to the off position, without accelerating.

**Note:** After engine runs at heavy loading, temperature of cooling water is higher than 90ºC, so do not stop engine at once. The stalling should be made only after the engine has been running for a period of time and the water temperature lowed to the normal range. The parking brake is achieved by setting the hand brake handle on the control position after the stalling. The shift should be switched to the neutral position and power supply shut down. Please make necessary inspection of engine and then troubleshoot.

## Cautions

Cautions during the winter operation
① Please add long life coolant to cooling system.
② After parking, please exhaust water in air tank in time.
③ Before winter comes, please check level of battery electrolyte, specific gravity and voltage.
Water used in the radiator must be soften.
Never make engine start without preheating or run with trouble. In the cold climate, do not start engine until preheat it with hot water or vapor to more than 30-40ºC.
During driving downhill, do not place gearshift lever in neutral position to slip. Please apply exhaust brake or retarder.
Do not start vehicle until parking brake has been released

## Engine start up and shut down in the engine compartment

Park the vehicle and activate the parking brake.
Put the gear box lever or the automatic transmission selector in neutral (dead point).
If the transmission is in gear position, the start up with in the engine compartment will not work.
Turn the ignition key to gear position, without activating engine start up.

Engine start up
Press the start up switch (start) and activate the back cover course end switch bar in the engine compartment. Loosen the switches immediately the engine begins running.

Model 1


Model 2

When the engine is turned on by way of the start switch in engine compartment, and with the engine compartment gate open, the start engine by way of the ignition key is impossible.

Engine shut down:
Press the shut down switch (STOP).

To make the engine turn without starting up:
Press the engine start up and shut down buttons simultaneously.

Note: the final placement of the switches in the engine compartment is the responsibility of the vehicle body manufacturer.


Model 3

## Starting the vehicle

The vehicle could only be started when braking system pressure has reached 5kg/cm$^2$ above and each instrument and indicator lamp is on the proper condition, and the coolant temperature exceeds 60℃ as well as the parking brake has been released after the engine is started. Please make the startup in shift I.
On normal running condition:

- Pointer of oil gauge should be between 0.2 and 0.4Mpa（2-4kg/cm$^2$）.
- Pointer of water temperature gauge should be between 83℃ and 95℃.
- Pointer of barometer should be between 0.55 and 0.8 Mpa（5.5-8kg/cm$^2$）

After the vehicle starting, gear shifting should be made step by step and timely. The clutch pedal should not be released abruptly to impulse the starting when the vehicle is stuck in the mud or can not start on a spoil road.
The following problems should also be paid attention to during the driving

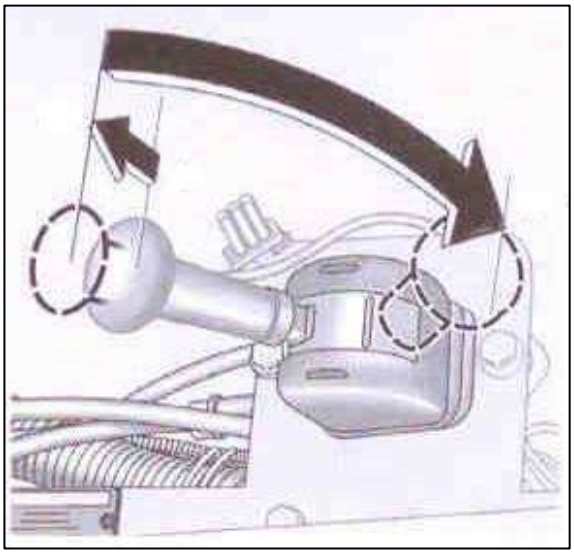
① If abnormal noise or odor occurs, please stop vehicle to check.
② Abrupt acceleration or emergency braking should be avoided as might.
③ Don't put foot on the clutch pedal during the driving.
④ Avoid engine overspeed. When driving long downhill, engine may overspeed easily after gearshift, at this time, pay attention to apply exhaust brake or retarder and service brake to ensure engine run at specified speed.
⑤ During driving downhill, never stop engine, otherwise, resulting in low pressure in brake pipeline and power steering gear failure.

During normal running condition, the pointer of water temperature gauge should be under the red sign that indicated the vehicle is on normal condition, if the pointer is on “H” indicate it is abnormal.

## Parking the vehicle

The parking brake should be always applied when the vehicle is parked.
Additionally, in some countries, it is determined by law that a vehicle parked on a slope must have at least one of its wheels wedged, to prevent its accidental moving.
In this case, always keep an appropriate wedge available for this purpose aboard the vehicle.
When parking on public highways, obey the legal determinations as far as the use of parking lights or reflecting panels.

## Parking brake handle



Pushing forward the brake handle is of driving state.
Pushing backward the brake handle is of parking state.

Always activate the parking brake when the vehicle is parked.
Besides activating the parking brake, when parking on upward or downward slopes, wedge one of the vehicle wheels to avoid the accidental moving of the vehicle.

**Application**
**Attention!**
On applying the parking brake, always check the locking of the lever in the total braking position, on the contrary, the lever may return automatically to the brake off position.
Pull back the parking brake valve lever in such a way that the lever is locked in total braking position. The parking brake warning light should light up.


Note:
In emergencies, with the possible failure of the service brake, the parking brake can be used as an emergency brake. In this case, slowly pull the parking brake lever allowing for a progressive braking without abruptly locking the wheels.

## General knowledge

King Long recommends that the bus be maintained according to the Maintenance Schedule in this section. Perform maintenance at whichever interval occurs first. At each scheduled maintenance interval, perform all previous maintenance checks they are due for scheduled maintenance.

## King-long Bus General Maintenance

Please make periodic inspection and maintenance of bus according to the operation manual to ensure good status. During service, stop bus on a horizontal road and ensure bus steady and engine stopping. Make functional inspection and running test after each service.

Important Notice: If bus often runs under poor conditions (such as poor road surface, high dust concentration, frequent bump etc.), maintenance interval should be shortened. During adding lubricant, before replacing filter or repairing, clean the place around related parts carefully. Please add lubricant with clean containers.

## Maintenance of engine and chassis assembly

- For the usage and maintenance of the engine, refer to relevant engine operation and maintenance manual.
- For maintenance of transmission and front-rear axle, please refer to relative users' guide.
- For use and maintenance of other parts of chassis, if without special user's guide or maintenance period, please refer to this manual for maintenance information.

## Body maintenance

1. Keep body clean .Timely clean should be made after daily running and don't scrape body with tool in order to avoid paint scratch and damage of roll covering.
2. Sealing strips of doors and windows should be kept integrated. Make timely replacement if damaged.
3. Prohibit washing body paint with hot water, buck, kerosene and other liquid which has damage to oil paint.
4. Check connections between body and frame frequently. If find something abnormal, repair it in time.
5. Frequently check fasteners inside vehicle and tighten them in time.
6. Frequently check conditions of passenger door. If find something abnormal, do adjustment in time.
7. Frequently check conditions of all lamps. If find any damage, replace it in time.

## ABS/EBS system maintenance and service:

1. Please cut off ECU control box to avoid the high voltage from outside to make damage to the ECU, when use the outer power supply to charge the battery.
2. When the vehicle need electric welding, cut off the ECU .never use the multimeter to measure the ECU box.
3. Inspect the engine voltage for stabilization periodically.

4. When maintain the brake shoe , do not damage the ring gear and sensor, clean the ring gear and sensor at the same time. after maintenance ,do remember to put the sensor to the limited position along the ring gear direction.
5. Make sure that the power is in off position when remove and install the components, keep the components clean and dry.
6. Never change the fuse capability or connect the fuse in disorder.
7. Change the indicator in time when it doesn't work.
8. Do not brush the ECU with water when cleaning it.

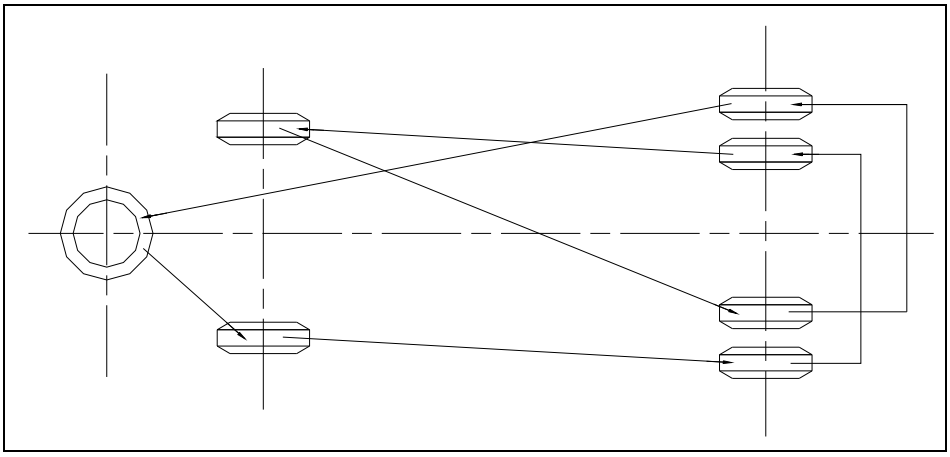
**Note**: for details about the working theory of ABS and maintenance, please refer to the ABS instruction book which is offered by provider.
Because of different allocation requirements, some of the vehicle model may not be equipped with ABS system, please use correctly according to actual condition of vehicle.

## Electrical system maintenance and service:

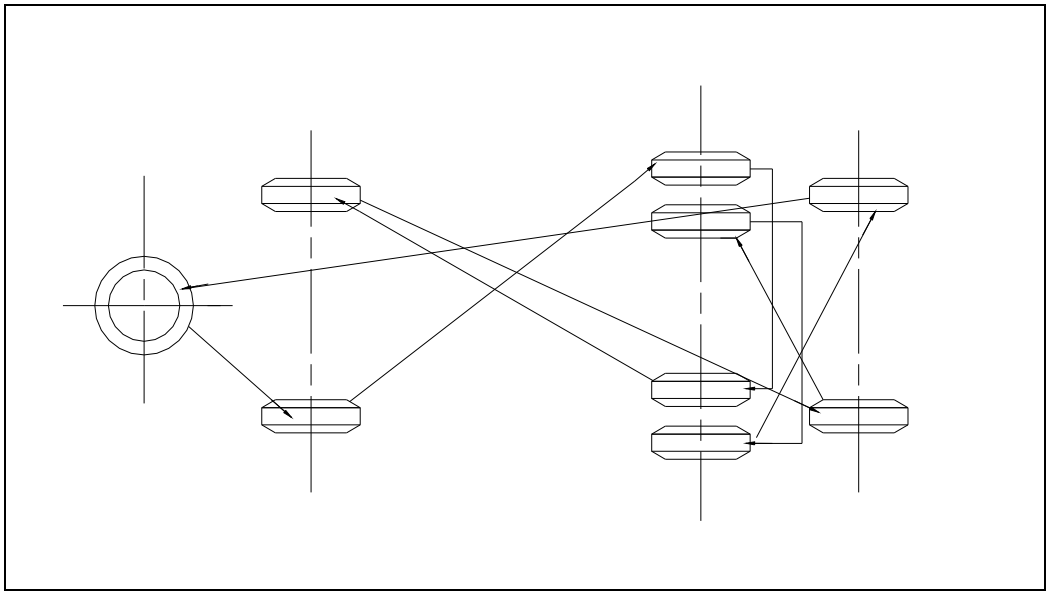
(1) When battery is charged by external power supply, disconnect ECU to prevent outer high voltage damage ECU (electric control unit).
(2) When vehicle needs to weld, disconnect ECU. Don't use multimeter to measure ECU control box.
(3) Monitor voltage stability of generator regularly.
(4) Parts dismantling must be carried out after electric has been shut off and should keep parts' cleanness and dry.
(5) Don't change fuse capacity casually or bestride connect fuse.
(6) When indicator doesn't work, replace it timely.
(7) Don't use water to scour ECU when doing ECU cleanness.
(8) Don't use multimeter to measure ECU.

## Tire transposition

The tire may appear certain abrasion after period of running. The tire should be made transposition as the drawing below after every 8000 km to 10000 km running for proper use and prolonged tire life. Four-wheel locating condition should be checked, dynamic balance and tire transposition be made at once if there shows early and irregular abrasion of the tire.



Tire transposition diagram (two axles)



Tire transposition diagram(three axles)

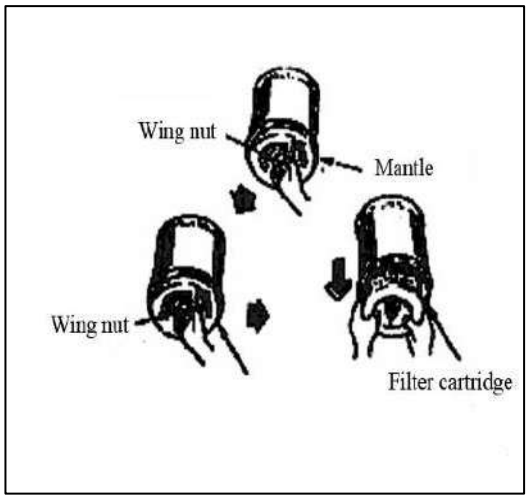
## Adjustment of the brake pedal free play

Loosen locknut of brake pedal push rod and adjust adjusting nut, and then measure the vertical distance from pedal free position to the position where pressing resistance increases apparently when depressing pedal. The value should be between 8mm and 12mm. After adjustment, lock the locknut.

## Bus cleaning

- Don’t pollute the environment when washing vehicle at washing shop.
- Be careful to use the high strength dissolve fluid.
- Don’t damage paint layer.
- Do not directly inject the water into radiator grill on right (left) back of the bus to prevent the water from entering engine through the air filter.
- Don’t pour water onto electrical equipment in order not to damage it.

## Cleaning the air filter

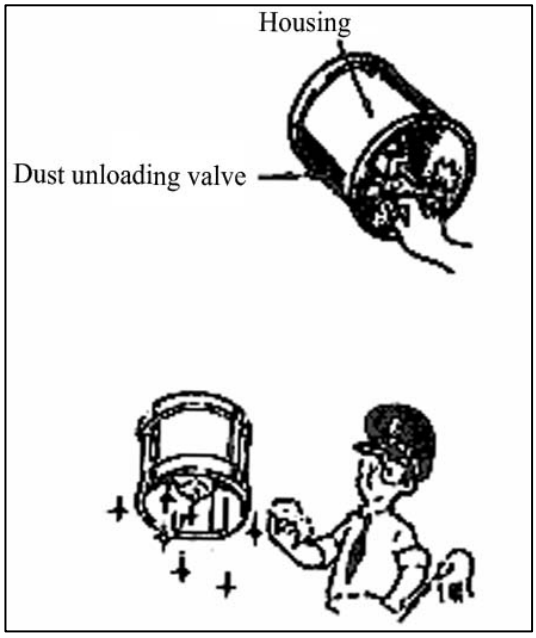



**Hint:** Please replace filter element under such conditions: it has been washed 5 times; filter element has been damaged; filter element is clogged excessively; after changing the engine oil .When air filter indicator on combination instrument lights, clean the air filter or replace the element.

Dirty air filter would lead to deficient power and engine worn. In order to assure the life and normal operation of engine, please perform periodic maintenance on air filter.

Check and maintain air filter every 2000km. Under some conditions, such as heavy dust and etc., interval time should be shortened.

The engine must be stalled during the air intake system maintaining and the engine should not be started after withdrawing the filter.




(1) Remove butterfly nut on cover cap and take down cover cap and then take out filter element

(2) Clean interior of the cover and the housing with a clean and dry napery. when cleaning the filter cartridge. prevent the water from entering the air filter.

(3) Exclude dust in unloading valve.

(4) The filter element may be cleaned by hand or by tapping the end surface with a wood bar or blown by compressed air . Also wash with lotion. But take care not to break element.

Blow with compressed air: blow the filter element from inside to the outside with the dry compressed air of the pressure not exceeding 5bar until there has no dust blown out.

**Caution:** Outside surface of the filter cartridge should be cleaned with cloth instead of blown with compressed air.

Wet washing: Put filter element in lukewarm containing general cleaning agent and swing it and then clean with fresh water and dry it after dehydration.

**Hint:** Before wet washing, blow filter element clean.

**Caution:** Vapor spray gun, solution, gasoline or equivalent should not be used during the cleaning.

－Before reinstalling air filter element, check element from inside to outside with check lamp for damage;

－Check sealing ring for damage or cracks.

**Caution:** Do not start the engine without mounting the air filter.

## Clean outside of the radiator

Keep outside of radiator clean. Compressed air current can eliminate all the dirt blocking air flow.
For vehicle equipped with intercooler, please keep air radiator fin clean. If there is hard dirt in radiator fin, blow fan side and then the other side with compressed vapor current. In order to avoid damage to air radiator fin or water radiator fin, ensure spray of air, water or vapor perpendicular to radiator surface. It should be sent to the king-long special maintenance station to make decontamination and final disposal if there has much dirt in the water radiator and the air radiator.

1. Clean water radiator fin and air radiator fin termly and eliminate dirt blocking air flow, which is important for ensuring the engine cooling.
2. For zone with many winged insect, please clean radiator fin frequently.
3. If users do not operate according to requirement, resulting in poor engine cooling and grave damage to components.
4. If don't comply with this requirement, it may cause poor engine cooling and bad damage to components.
5. Anti-freeze and antirust solution (mixture of glycol and water) should be added to cooling system perennially to avoid sediment, frost, oxidation and increase boiling point.
Note: When adding coolant, please choose the same model as much as possible in case of sediment. If coolant is degenerative, replace it entirely and immediately.
6．Never use water to replace coolant for a long period.
After long running of engine, scale will come into being in cooling system. It should be eliminated in time. Methods as follows: mix 700-800g caustic soda with 150g kerosene and then inject the mixed liquid into cooling water and make engine run at middle speed for 5-10 minutes. 10-12 hours later, make engine run again for 10-15 minutes and then drain aqueous solution and clean cooling system with clean water.

## Charging-up the coolant

Anti-freeze and antirust solution (mixture of glycol and water) should be added to cooling system perennially to avoid sediment, frost, oxidation and increase in boiling point.

**NOTE:** When adding coolant, please choose the same brand as much as possible in case of sediment. If coolant is degenerative, replace entirely.

Coolant specification as shown below: the users should choose proper brand according to requirement:

| Specs ℃ | Max. boiling point ℃ | Content of glycol | Pure water | Additive |
|---|---|---|---|---|
| -45 ℃ | 108.00 ℃ | 58% | 32% | 10% |
| -40 ℃ | 107.50 ℃ | 54% | 36% | 10% |
| -35 ℃ | 107.00 ℃ | 50% | 40% | 10% |
| -30 ℃ | 106.50 ℃ | 46% | 44% | 10% |
| -25 ℃ | 106.00 ℃ | 42% | 48% | 10% |
| -20 ℃ | 105.50 ℃ | 38% | 52% | 10% |
| -15 ℃ | 105.00 ℃ | 34% | 56% | 10% |
| -10 ℃ | 104.50 ℃ | 30% | 60% | 10% |

## Fuel recommendation

**1.** Diesel fuel (only apply to diesel vehicle) : only diesel of which cetane value is not less than 45 according to GB252 standard can be used. Sulfur content should not be more than 0.2％.
**2.** No. 0 light diesel fuel: Suitable for the zone where venture rate is 10％ and minimum temperature is higher than 4°C.
**3.** No.-10 light diesel fuel: Suitable for the zone where venture rate is 10 percent and minimum temperature is more than -5°C.
**4.** No.-20 light diesel fuel: Suitable for the zone where venture rate is 10 percent and minimum temperature is more than -14°C.
**5.** No.-35 light diesel fuel: Suitable for the zone where venture rate is 10 percent and minimum temperature is more than -29°C.
**6.** Natural gas (only apply to Natural Gas Vehicle ):use natural gas of which methane value is low to 65.

**Oil quality and specification recommendation**

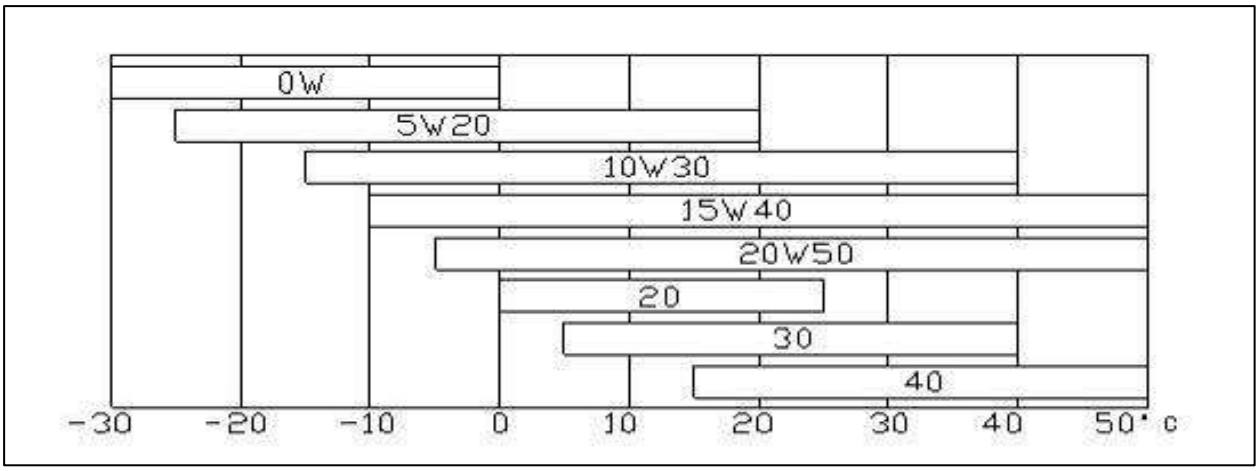
**Engine oil**

- Prefer using the engine oil whose quality is equivalent to or higher than level CF-4 or CH-4 of American Petroleum Institute API, or refer to the engine specification.
- Part of engine oil used for lubricating the piston will be burnt out (consumed) during the engine running. Engine oil must be replaced in certain period because of high temperature effect and the oil combustion product interfusing in the oil, especially the chemical additive in the oil will cause "abrasion" of the oil. This kind of abrasion depends on working condition of engine, quality of fuel and engine oil; therefore there has different oil changing interval. (Recommended oil changing interval is 12000km.)

**Engine oil viscosity**

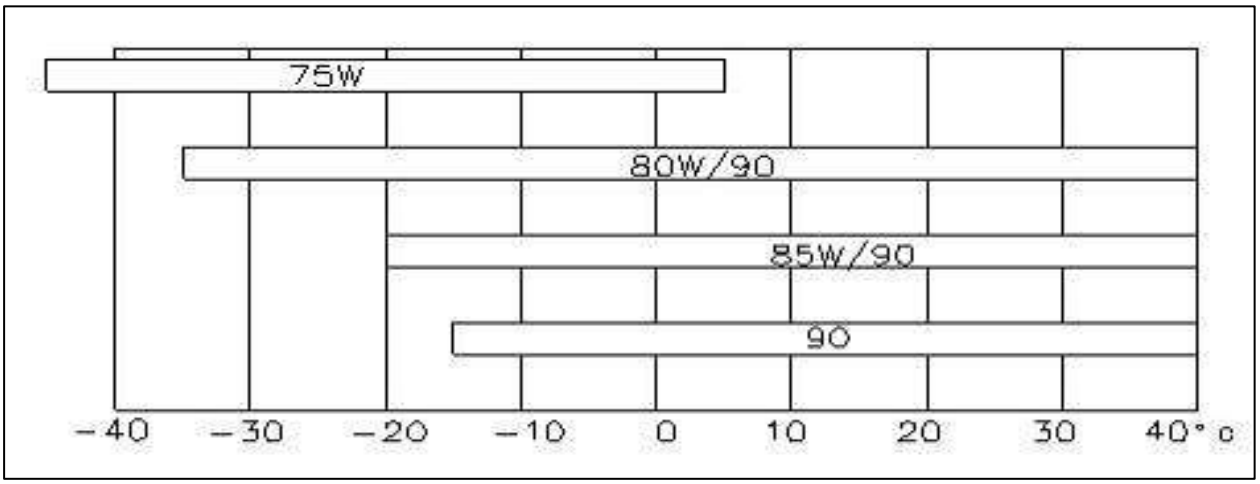
- Since oil viscosity fluctuated with temperature, so the ambient temperature of engine working area is very important to select viscosity grade (as shown in the figure). When temperature exceed lower limit, it may decrease cold start capacity of the engine but will not make any damage to the engine.
- Higher sticky engine oil may cause the engine difficult to start, so the ambient temperature of the engine starting is the main reference for selecting viscosity of the winter engine oil. Selecting multifunctional engine oil may avoid oil changing caused by temperature fluctuation.

**HINT:** Never add any additive to above engine oil and different kinds of oil should be avoided using at the same time (oil mixture must be the same grade oil and it is recommended to replace in time).



## Gear oil:

Apply gear oil in accord with SAE90 API GL-5 grade. Recommended gear oil viscosity grade is related to ambient temperature, as shown in figure.




## Power steering hydraulic oil:

Fulfill standard: please apply DEXRON-II D or DEXRON-III hydraulic fluid to steering gear;

## Final drive lubricant:

Meet the using condition of GL-5(SAE90) grade heavy duty hyperboloid gear oil defined by API and the ambient temperature requirement.

## Clutch oil:

- It is compound brake fluid (DOT3) and must fulfill the standard GB10830-98JG3, GB12981 91H2Y3. It should be paid attention not to mix brake fluid with different types, otherwise it will affect the using effect. The original brake fluid should be cleaned out before replacing the compound brake fluid.

## Chassis grease:

- Grease added in each part should use 2＃ lithium base lubricant (suitable for temperature within the range of -30~ +120℃).
- Vehicle with centralized lubrication should use 0# lithium base lubricant.

## Water tank coolant:

- Long life anti-freezing and antirust fluid should be added to water tank. The coolant could be general used both in winter and summer without adding and draining water in winter and it can prevent forming scale and corroding cooling system. Freezing point of the coolant should be noticed to 5℃ lower than the lowest environment temperature. Different type of coolant should not be mixed using.

- Replacing period of the coolant is 2 years.

For specification of the coolant please see the section "filling up coolant" in the chapter "maintenance and service ".

## Breaking-in of New Vehicle

Engine of new vehicle should be sure not to operate at the maximum power output during the breaking-in period to keep best performance and superior efficiency as well as guarantee durable service life. Please drive cautiously and pay more attention to abnormal phenomenon occurred during breaking-in period. Given break-in mileage of the new vehicle is 5,000 km. please run at speed under 100 km/h in breaking-in period.

### Preparation before breaking-in of the new vehicle

1. Wash the vehicle and check connection and tight situation of each place.
2. Check coolant storage in radiator and check each place of cooling system for leakage.
3. Check oil level of engine, clutch control system, transmission, drive axle, steering gear and clutch oil storage tank. If deficient, add and then check each place for leakage.
4. Check and see if braking system works properly and leakage phenomenon exists at connections of all valves and pipelines.
5. Check and see if phenomenon of loosing or clogging exists at each place of steering system.
6. Check and see if electric equipments, lamps and the instruments work properly and check battery electrolyte level.
7. Check whether tire pressure has meet requirement.
8. Check and see if each transmission gear can engage properly.

### Maintenance during breaking-in period

1. Running on smooth and good road surface.
2. Drive properly and engage the clutch smoothly. Gear shifting smoothly and impact is not allowed. Neutral gear sliding is forbidden while engine stop. Emergency brake should occur as few as possible.
3. Speed limitation during breaking-in period: first gear≤10km/h, second gear≤20km/h, third gear≤30km/h, fourth gear≤50km/h, fifth gear≤60km/h, overspeed gear using can not be permitted during breaking-in period .
4. Load limit: No load within 250km and never overload after 250km.
5. Often pay attention to the temperature of transmission, drive axle, wheel hub and brake drum. If overheating severely, find out causes and eliminate in time .
6. Pay more attention to keep the pressure of engine oil and the temperature of engine coolant within the normal range.

### Maintenance after breaking-in period

1. Tighten cylinder head and bolts (inc suspension). Tighten torque please refer to corresponding instruction. Tighten torques please refer to corresponding instructions.
2. Check valve clearance.
3. Check lubricant level of final drive and clean ventilation plug.
4. Replace engine oil、axle oil and oil filter element.
5. Replace hydraulic oil and oil tank filter of power steering hydraulic system.

6. Check connection of transmission control mechanism for looseness.
7. Check connections of steering gear for looseness and damage.
8. Tighten bolts and nuts of front and rear suspension（carry out when full load）
9. Check connections of chassis and driving system according to specified torques. Tighten torques please refer to corresponding instructions.
10. Check hydraulic system components of steering mechanism for fixing and tightness
11. Lubricate and maintain vehicle according to maintain items at 5,000km.
12. Check complete vehicle for oil, water and air leakage.

**Daily Maintenance Operation**

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Engine | Air cleaner | Check | No leakage, damage, and crack. |
| | | | Clips without looseness. |
| | Fuel-water separator | Drain | Release the water and fouling |
| | Cooling fan | Inspect | Do not pull or lever the cooling fan for starting the engine. |
| | | | No crack, looseness, bend or damage. |
| | air inlet/ outlet piping | Maintenance check | Pipes without wear and damage, clips without looseness prevent the air leakage. |
| | Coolant level | Check | Do not remove the water tank cover, unless the temperature i less than 50℃, otherwise, it's dangerous for operator |
| | | | Do not add the cold coolant into the hot engine, unless th engine temperature is less than 50℃ |
| | Engine oil level | Check / correct | Do not start engine when oil level less than "L" or more tha "H". |
| | | | Vehicle parking level, check the oil after engine stops for minutes |
| | Drive belt | Check / correct | No across crack, wear or material break off |
| | Crankcase breather tube | Check | Check the breather tube in cold winter, cleanup the ic blocking. |
| | Engine and Accessories | Check | No damage and crack |
| Clutch | Clutch pedal free stroke | Check / adjust | Clutch release bearing clearance |
| | | | Free stroke: 30～40 mm |
| | Clutch system | Check | Check if clutch separated completely, connection stable an not skidding |
| | Clutch brake flui level | Check / add | Compound brake fluid |
| | Brake chambe stroke | Check / adjust | |
| Air suspension | Vehicle body | Check | Observe the vehicle body whether tilt or not, the air spring (o piping) of one side is leaky if this side is lower. |
| | The air springs | Check | If hear the sound of leaking obviously， we can deal with th problem after confirming the specific leaky location |
| Training | 1.Correct operation: no neutral speed skidding; no idle speed running of engine for a long time | | |
| | 2.Correct maintenance: replace oil, oil filter element, diesel filter element , transmission, axle, angl transmission system periodically, clean and replace air filter element periodically | | |

## Periodical maintenance and operation items and regulations

Periodical maintenance of each class: do maintenance during each interval or certain miles .

**Special instruction**: if assembly instruction requires different oil replace period, please follow the instruction's requirement on maintenance period and operation. If else please refer to this manual for maintenance requirement.

**Maintenance operation and regulation every 5000km or 1 month depend on whichever occurs first.**

**Maintenance operation and regulation every 5000km**

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Steering system | Working condition | Check | Steering wheel max free rotation at middle 10 degrees |
| | redirector auxiliary oil and filter element | Check | Below 10℃ use DEXRON-II; above 10℃ use C-3/10W |
| | Fix bolts of each place | Fasten | Each fastening bolts not loosening, steering arm not loosening, steering wheel swift, |
| | Ball head | Lubricate | Each turning ball head not loosening, no clogging, clearance normal |
| | ZF series | | Maintenance Free |
| | GX85, GX 100, ZJ 100C | check | For first 5000km only, N32 which manufactured by Shanghai oil refining factory or ATF or related products which produced. |
| | IPS40-SB8575D series | check | For first 5000km only, Environment temperature >10℃, adopt CD level 15W/40 oil; Environment temperature <10℃, adopt No.8 hydraulic drive fluid. |
| Transmission（QJ series mechanism transmission） | Transmission fix bolt | Fasten | |
| | Transmission and Accessories | Check | No leakage, operation organization effective, no abnormal sound, wrong gear engagement. |
| | Lubricant oil | Change | The lubricant ZF-Ecofluid M 02E is compulsory for initial fillings of transmissions as well as fillings during transmission break-in（**only first 7500km**） |

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Front axle ( DF & FS series ) | Brake clearance | Check & adjust | |
| Rear axle ( DF & FS series ) | Brake clearance | Check & adjust | |
| Air suspension | Fasteners | Check/tighten | Check and tighten the bolts, rods, height control valves, air springs, shock absorbers, anti-roll bars. |
| | The top covers of air springs, height control valves and the joints of the air course | Check | Listening and wiping the liquid soap. If find any place is leaky, please either tighten the joints or change the seal tape and clean the accumulated water, oil in the piping and the dirt in the joints |
| Air suspension | The exterior surface of air springs | Check | Find out the places which are abraded, distended, bumped or cut |
| | The air spring | Change | The surface of the air spring is damaged and appears the cord fabric |
| | The air spring | Adjust/check | If air spring interfere and knock with the components around it, please adjust it in time. |
| | The air spring surface | Check/clean | Clean the lubricant grease on the surface, the dirt on the piston, the abnormal things placed between the piston and air spring. |
| | The air spring | Check | If there is leakage in the joints of the air springs and the top cover, the air springs should be taken apart, then check whether the edges of the air springs and the top cover or the tapered sealing zone are distorted. Change it if it is distorted. |
| | The bumper | Check | It's damage maybe the root damage of the tapered sealing zone |
| | The height control valve | Check | If a height control valve controls two air springs and one air springs is leaky, the other air springs has not air too. |
| Air suspension shock absorber | Shock absorber | Check | The external damage, the welding damage and the sealing damage result to the leakage of the shock absorber. |
| | The rod | Check | Check the rubber of the rod ball head and the rivet of the sleeve pipe and the ball head. Check the clamp and the tighten bolts if the it is the adjustable rod |
| | The rubber liner | Check | Check the ball joints of the anti-roll bar and the rubber liner bushing of the boom |

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Brake System | The brake pedal free stroke | Check & adjust | 10 - 15mm |
| | The braking condition | Check | Shoe drum clearance: 0.30mm ~ 0.50mm, in complete braking, pedal stroke not surpass 1/2 of the whole stroke, check dry tin condition |
| | The brake pressure | Check | Check whole vehicle brake pressure as required or not. Above 0.6MPa |
| | The brake nuts | Inspect | Inspect fastening of rear brake board's nut<br>7.7 - 9 (m): 150-180 Nm,<br>9m above:front;160-205 Nm, rear:196-245 Nm |
| | The pipe and joint sealing | Check | Check brake pipe and joint sealing , No leakage |
| Chassis | Fastening body and chassis connective bolts, nuts | Check | |
| | The whole vehicle body butter nozzle | Lubricate | Grease nozzle complete and effective, lubrication good |
| Electrical equipment | The whole vehicle light and instrument | Check | |
| | The battery fluid surface | Check | Add distilled water, |
| | The wire joint firmness, no rust | Check | No rust |
| | Air-con radiator filtration net | Clean | |

**Maintenance operation and regulation every 10000km or 3 months depend on whichever occurs first. Every 10000km include every 5000km maintenance operation**

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Engine | Oil | Replace | Check oil surface within required range |
| | | | Check engine and oil seal without apparent leakage |
| | | | Replace oil when engine water temperature is 60℃, for removing the impurity |
| | | | Oil level more than CF |
| | Oil filter | Replace | Before installation add 1/2—3/4 to filter |
| | Air filter | Check | Clean air filter element |
| | Air inlet/ outlet system | Check | No air leakage, no damage, each clip fastening good |
| | Cooling system and Intercooler | Check | No leakage, each clip without damage or loosen |
| | | | Water tank without leakage, damage, fouling |
| | Coolant filter | Replace | Before re-install the coolant filter, daubs the 15W-40 lubricate oil on the interface of the sealing ring. |
| | Fuel pump installation | Check | No leakage |
| | Air compressor | Check | No air, oil, coolant leakage, lock nut and bolt no loosen or damage |
| | | | No carbon deposit |
| | Brake system | Check | No leakage |
| Propeller shaft | fastening bolt | Check and fasten | Propeller shaft flange fastening bolts not loosening |
| | universal joint | Check and fasten | Universal joint each bearing no loosening or damage |
| Front axle （DF series） | Brake bottom board | Check | No loosening |
| | Hub bear | Check | No loosening |
| | Brake plate | Check / change | Change the brake plate when plate abrasion more than limit pit. |
| Rear axle （DF series） | Brake bottom board | Check | No loosening |
| | Hub bear | Check | No loosening |
| | Brake plate | Check / change | Change the brake plate when plate abrasion more than limit pit. |
| The leaf Suspension | Leaf spring | Check | Each fastening bolt not loosening, leaf spring no broken piece, no apparent change of elasticity |
| Brake system | Rear braking system | Check | Check brake frication piece thickness within required range by check port, visual check brake adjust arm working condition, running and stop brake good, each brake pipeline and air line no leakage |

**Maintenance operation and regulation every 20000km or 5 months depend on whichever occurs first. Every 20000km include every 10000km maintenance operation**

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Engine | Fuel filter | Replace | Replace fuel filter element accordingly |
| | Steering hydraulic oil | Replace | Steering auxiliary oil surface within required range |
| | Coolant system – anti-freezing | Check | Check the density of anti-freezing |
| Propeller shaft | Dust-proof cover | Check | Dust-proof cover without crack, damage, clip reliable, bracket no loosening |
| | Universal joint condition | Check | Universal joint without loosening, no block abnormal sound |
| | Propeller shaft bracket | Check | Propeller shaft bracket no loosening, screw torque 120 ~ 140Nm |
| | Middle bearing clearance | Check | Middle bearing clearance no more than 3mm |
| | Lubricate | Lubricate | Lubricate each butter nozzle with 2# lithium lubricant grease |
| Steering system | GX85, GX 100, ZJ 100C | Change oil and filter core of oil tank | N32 which manufactured by Shanghai oil refining factory or ATF or related product which produced. |
| | IPS40-SB8575D series | Change oil and filter core of oil tank | Environment temperature >10℃, adopt CD level 15W/40 oil;<br>Environment temperature <10℃, adopt No.8 hydraulic drive fluid |
| Front axle | Toe-in of front wheel | Check & adjust | Radial-ply tire: 0 ~ +2mm |
| Rear axle ( DF & FS series ) | Final drive | Filling-up | From injection hole into final drive filling Parathion-type 90 heavy-duty gear oil (GL-5) to the face. ( for first 1500km, than change for every 24,000km ) |
| The leaf suspension | | Check and fasten, weld accordingly | Not loosening, crack, fracture, misplacement, screw U bolt, front 196 ~ 294Nm, rear 343 ~ 392Nm |
| The air suspension | The liner bushing of the rod assembly | Change | The liner bushing is relative sliding with the ball head |
| | | Change | The liner bushing is knocked to bend and the tighten bolts of the adjustable rod are becoming invalid which result to the threads of the ball head and the steel pipe damaged. |
| | The rubber ball joints | Change | The crack on the surface of the rubber is very serious. The depth of the crack is up to 2mm and the length of it is up to 8mm |

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| The air suspension | The rubber ball joints | Change | There are gaps on the surface of the rubber |
| | | | The surface of the rubber become adhesive, brittle and the rubbe drop off seriously |
| | | | The connection of the metal and the rubber is damaged. The partia depth is up to 6mm |
| | | | The rubber ball joint rotates in the inner hole of the ball head a will |
| | The heigh control valve. | Check adjust | Check the equilibrium position of the adjustment bar of the heigh control valve. |
| | The rubber of The link rod | Change | Change it if the rubber of link rod becomes ageing, brittle, adhesiv and lose its elasticity |
| | The connecting members of the shock absorber | Check change | Check the connecting members of the shock absorber if they ar damaged please adjust or change them. |
| | the rubber | Check change | If the rubber is crack, brittle, adhesive and loses its elasticity pleas adjust or change them. |
| | The height | Check adjust | Charge the air springs and adjust to the design height, then chec the wheel base, the height of the vehicle body and the two side' wheels' locations which are relative to the frame. If it is necessar please adjust the height of the air springs and the length of the ro in order to arrive to the design request |
| Brake system | Brake pedal free stroke | Check | Break pedal free stroke 12 ~ 15mm |
| | Brake valve and pipe joint | Check and fasten | Break valve and pipe joint connection reliable and without air leakage |
| | ABS system | Check | ABS working properly |
| | Auxiliary brake, stop brake free stroke | Check | Effective, 20% dual direction stopping at slop reliable |
| | Retarder | Check | Retarder working properly |
| | Engine exhaust brake | Check | Exhaust brake working properly |
| Body, frame | door lock function | Check | Lock function good |
| | | | Sealing good |
| | cabin door sustain pole or air spring | Check | Cabin door lock function good, sustain pole or air spring effective |
| | inside and outside mirror | Check | Complete, no crack, effective, mirror clean, installation firm and reliable |

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Body, frame | front rear wind shield and side window glass | Check , clean | Clean, no crack, sealing good |
| | body with paint | Check | Body paint no crack or peeling, re-paint color the same as original |
| | pattern, character, company mark | Check | Pattern, character, company mark clear, complete |
| | Body and frame | Check | Function reliable, working properly, no distortion, crack, fracture, welding split, connective bolts and rivet fix firm and reliable |
| Inside establishment | Driver seat | Check | Fix firm, front rear up down lock function reliable |
| | | | Installation firm, backrest angle adjust lock function reliable |
| | Safety set | Check | Safety belt function good, connection reliable, fire extinguisher, urgency hammer complete and effective |
| | seat cover, carpet, curtain and armrest | Check | Clean, complete and firm |
| Compressor, air reservoir, safety valve | Compressor, air reservoir, safety valve | Clean, screw | Clean, connection reliable, no air leakage, safety valve normal, pressure at 8Mpa, check air reservoir, if with seeper, replace air drier filter element |
| Electrical equipment | Front lamp, horn, meters and signal | Check | set complete and effective |
| | Wiper generator | Check | Effective |
| | Wiper connection rod | Check, adjust | Reliable |
| | Whole vehicle wiring | Check, adjust | complete, reliable, insulation good |
| Air-conditioner | Air-con passage and read lamp control panel | Check | Air-con passage installation reliable, functional and effective |
| | Air vent set | Check | Installation firm , working properly |
| | Air-con strap tension and surface condition | Check | Tension proper, strap without crack, scuffing or distortion |
| | Magnetic clutch, fill lubricant | Check | Work properly, lubricant: 2# lithium grease |
| | Air-con pipe | Check | No leakage or interference |
| | Condenser, evaporator | Check | Clean, no dirt |
| | Coolant and fuel qty | Check | Up to requirement, fill if necessary |
| | Control switch | Check | Installation firm, operation normal and reliable |
| Heating system | Fuel, water heat pipelines | Check | No crack, oil, air or water leakage, joint not loosening, oil and water pipelines smooth |
| | Heating device | Check | Pipeline connection reliable, operation good |

**Maintenance operation and regulation every 40000km or 8 months depend on whichever occurs first. Every 40000km include every 20000km maintenance operation**

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Engine | Drive belt, Cooling fan belt tension | Check/adjust | Check each belt without loosening or damage |
| | Cooling fan bearing and bolt | Check/adjust | No damage, fouling, loosening |
| | Belt tension pulley bearing | Check/adjust | No damage, fouling, loosening |
| | Cylinder cover bolt | Check/adjust | No damage, loosening |
| | Air dryer | Replace | Replace air dryer |
| Suspension | Leaf spring bushing | Check | Clearance between leaf spring bush and pin normal, no abnormal abrasion, bush not crack, lubrication normal |

**Maintenance operation and regulation every 80000km or 12 months depend on whichever occurs first. Every 80000km include every 40000km maintenance operation**

| System | Item | Operation | Technical requirement |
|---|---|---|---|
| Engine | Thermostats | Replace | |
| | Fuel roughing filter | Replace | |
| | Cooling system | Release/ clean/ add | |
| | Radiator | Check | Radiator without leakage, damage, fouling. Hose without damage, clips without loosen or damage. |
| | Engine suspending | Check/fasten | Connection reliable, firm, soft mat no distortion layer or crack |
| | Overhead set- valves and injectors | Measure | Valve clearance within required range |
| Clutch | Clutch brake fluid level | Charge | Compound brake fluid |
| The leaf suspension | leaf spring bushing | Check | Clearance between leaf spring bushing and pin normal, no abnormal abrasion, bushing without crack, lubrication normal |

**Maintenance operation and regulation more than 80000km or corresponding time interval.**

**As for Cummins engine, ZF Series products, Allison and VOITH products, they will apply for their own special oil or grease change interval, please refer to the covering maintenance illustration from "King Long Bus Maintenance & Service Guide (2014)"**

**Maintenance period chart**

1、1st line is the item of break-in of new vehicle (prescript items completed after driving 5000KM or the day of registration vehicle)
2、Other items are compulsion maintenance program (the circulation is 80000KM/12 months)
3、For engine、axle、transmission please refer to producer's maintenance manual, if without special maintenance period, please refer to this manual for maintenance information.
4、"R" meaning: Replacement ; "I" meaning：Inspection & adjusting; "C" meaning：Cleaning

| Maintenanc | Maintenance period | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| item | *1000km | **5** | 5 | **10** | 15 | **20** | 25 | 30 | 35 | **40** | 45 | 50 | 55 | 60 | 65 | 70 | 75 | **80** |
| | Month | **1** | | **3** | | **5** | | 7 | | **8** | | 9 | | 10 | | 11 | | **12** |
| Engine | | | | | | | | | | | | | | | | | | |
| Engine oil | | R | I | R | I | R | I | R | I | R | I | R | I | R | I | R | I | R |
| Oil filter | | R | I | R | I | R | I | R | I | R | I | R | I | R | I | R | I | R |
| Fuel filter element | | R | I | R | I | R | I | R | I | R | I | R | I | R | I | R | I | R |
| Air filter element | | C | C | C | C | C | C | R | C | C | C | C | C | R | C | C | C | C |
| Check& adjust belt | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Check & adjust engine idle speed | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Fixing every bolt and connection on engine | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Checking seal of pipe & connector | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Coolant | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | R |
| Fuel system | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Oil & water separator | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Lubricating oil in gearbox of fan angle steering gear | | R | | I | | R | | I | | R | | I | | R | | I | | R |
| Air compressor, air reservoir & pipe | | I&C | | | | I&C | | | | I&C | | | | I&C | | | | I&C |
| Radiator & expand water tank | | I | | | | I | | | | I | | | | I | | | | I |
| Fuel tank & oil pipe | | I | | | | I | | | | I | | | | I | | | | I |
| Fuel pump | | I | | | | I | | | | I | | | | I | | | | I |
| Water & oil separator core | | I | | | | R | | | | R | | | | R | | | | R |
| Handle fuel pump | | C | | | | C | | | | C | | | | C | | | | C |
| Water pump | | I | | | | I | | | | I | | | | I | | | | I |
| Intake & exhaust manifold, muffle, exhaust pipe | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Turbocharger | | I&C | | | | I&C | | | | I&C | | | | I&C | | | | I&C |
| Intercooler | | I&C | | | | I&C | | | | I&C | | | | I&C | | | | I&C |
| Engine suspension device | | I | | | | I | | | | I | | | | I | | | | I |
| Valve clearance | | | | | | | | | | I | | | | | | | | I |
| Thermostat | | | | | | | | | | I | | | | | | | | I |

**Maintenance period chart**

1、1st line is the item of break-in of new vehicle (prescript items completed after driving 5000KM or the day of registration vehicle)
2、Other items are compulsion maintenance program (the circulation is 80000KM/12 months)
3、For engine、axle、transmission please refer to producer's maintenance manual, if without special maintenance period, please refer to this manual for maintenance information.
4、"R" meaning: Replacement ; "I" meaning：Inspection & adjusting; "C" meaning：Cleaning

| Maintenanc | Maintenance period | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| item | *1000km | **5** | 5 | **10** | 15 | **20** | 25 | 30 | 35 | **40** | 45 | 50 | 55 | 60 | 65 | 70 | 75 | **80** |
| | Month | **1** | | **3** | | **5** | | 7 | | **8** | | 9 | | 10 | | 11 | | **12** |
| Clutch | | | | | | | | | | | | | | | | | | |
| Release or meshing if not smoothly | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Oil pipe system | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Clutch plate abrasion | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Free stroke of clutch pedal | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Clutch oil | | I | | I | | I | | I | | I | | I | | I | | I | | R |
| Clutch cylinder & stroke | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Transmission | | | | | | | | | | | | | | | | | | |
| Transmission if not leaking oil | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Selector mechanism | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Lubricant oil | | R | | I | | I | | I | | R | | I | | I | | I | | R |
| Vent hole | | C | I | I | I | C | I | I | I | C | I | I | I | C | I | I | I | C |
| Propeller shaft | | | | | | | | | | | | | | | | | | |
| Drive shaft connecting parts | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Add lubricating oil in drive shaft | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Universal joint cross & bearing | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Fixing the bolt | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Middle bearing bracket & clearance | | I | | | | I | | | | I | | | | I | | | | I |
| Brake system | | | | | | | | | | | | | | | | | | |
| Brake pedal free stroke adjustment | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Driving brake , parking brake | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Brake pipe & connector seal | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Air dryer | | I | I | I | I | I | I | I | I | R | I | I | I | I | I | I | I | R |
| Brake air pressure | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| ABS system checking | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Brake board fixing | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Retarder | | C | | C | | C | | C | | C | | C | | C | | C | | C |

**Maintenance period chart**

1、1st line is the item of break-in of new vehicle (prescript items completed after driving 5000KM or the day of registration vehicle)
2、Other items are compulsion maintenance program (the circulation is 80000KM/12 months)
3、For engine、axle、transmission please refer to producer's maintenance manual, if without special maintenance period, please refer to this manual for maintenance information.
4、"R" meaning: Replacement ; "I" meaning：Inspection & adjusting; "C" meaning：Cleaning

| Maintenanc | Maintenance period | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| item | *1000km | **5** | 5 | **10** | 15 | **20** | 25 | 30 | 35 | **40** | 45 | 50 | 55 | 60 | 65 | 70 | 75 | **80** |
| | Month | **1** | | **3** | | **5** | | 7 | | **8** | | 9 | | 10 | | 11 | | **12** |
| Brake system | | | | | | | | | | | | | | | | | | |
| Brake drum & wearing plate abrasion | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Brake shoe plate clearance | | I | | | | I | | | | I | | | | I | | | | I |
| FR & RR brake checking | | I | | | | I | | | | I | | | | I | | | | I |
| Engine exhaust brake | | I | | | | I | | | | I | | | | I | | | | I |
| ABS unit checking | | I | | | | | | | | I | | | | | | | | I |
| Brake valve & other valves | | I | | | | | | | | I | | | | | | | | I |
| Axle & Tire | | | | | | | | | | | | | | | | | | |
| Tire& steel ring | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Checking & fixing RR axle housing & differential housing , RR cover half shaft bolt nut | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Lubricant steering main pin & brake adjusting arm & cam shaft | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Fixing wheel nut | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Tire transposition | | | | I | | | | | | I | | | | | | | | I |
| Four-wheel maintenance , clean bearing | | I | | | | I | | | | I | | | | I | | | | I |
| Checking & fixing front axle bolts ,nuts, bearings | | I | | | | I | | | | I | | | | I | | | | I |
| Checking & fixing rear axle bolts, nuts, bearings | | I | | | | I | | | | I | | | | I | | | | I |
| Clearance final drive vent hole | | C | | | | C | | | | C | | | | C | | | | C |
| Rear axle gear oil | | R | | | | I | | | | R | | | | I | | | | R |
| Front wheel alignment | | I | | | | | | | | I | | | | | | | | I |
| Tires air pressure | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Wheel rim, flange, spoke | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Suspension system | | | | | | | | | | | | | | | | | | |
| Thrust pole , connecting pole installation | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Air bag height, seal, integrality | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Suspension system fixing piece | | I | | | | I | | | | I | | | | I | | | | I |

**Maintenance period chart**

1、1st line is the item of break-in of new vehicle (prescript items completed after driving 5000KM or the day of registration vehicle)
2、Other items are compulsion maintenance program (the circulation is 80000KM/12 months)
3、For engine、axle、transmission please refer to producer's maintenance manual, if without special maintenance period, please refer to this manual for maintenance information.
4、"R" meaning: Replacement ; "I" meaning：Inspection & adjusting; "C" meaning：Cleaning

| Maintenanc | Maintenance period | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| item | *1000km | **5** | 5 | **10** | 15 | **20** | 25 | 30 | 35 | **40** | 45 | 50 | 55 | 60 | 65 | 70 | 75 | **80** |
| | Month | **1** | | **3** | | **5** | | 7 | | **8** | | 9 | | 10 | | 11 | | **12** |
| Suspension system | | | | | | | | | | | | | | | | | | |
| Suspension system lubricate oil | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Absorber working condition | | I | | | | | | | | I | | | | | | | | I |
| Steel plate suspension bush | | I | | | | | | | | I | | | | | | | | I |
| Left & right steel plate suspension flexibility | | I | | | | | | | | I | | | | | | | | I |
| Fixing suspension U type bolt | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Valves function | | I | | | | | | | | I | | | | | | | | I |
| Bracket & lifting lug installation & wearing state | | I | | | | | | | | I | | | | | | | | I |
| Steering system | | | | | | | | | | | | | | | | | | |
| Checking steering system working condition, oil leakage | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Steering wheel free stroke & working condition | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| Checking power steering hydraulic pressure system | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Steering booster oil & filter core | | R | | I | | I | | I | | R | | I | | I | | I | | R |
| Fixing bolts | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Lubricating steering ball | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Oil pump working condition | | I | | | | | | | | I | | | | | | | | I |
| Steering angle checking & adjusting | | I | | | | | | | | I | | | | | | | | I |
| Checking the crack of steering framework, steering knuckle & knuckle arm, vertical arm & axle | | | | | | | | | | I | | | | | | | | I |
| Main pin clearance | | | | | | | | | | I | | | | | | | | I |
| drive steering hydraulic oil | | I | I | I | I | I | I | I | I | R | I | I | I | I | I | I | I | I |
| Toe-in of front wheel | | I | | | | I | | | | I | | | | I | | | | I |

**Maintenance period chart**

1、1st line is the item of break-in of new vehicle (prescript items completed after driving 5000KM or the day of registration vehicle)
2、Other items are compulsion maintenance program (the circulation is 80000KM/12 months)
3、For engine、axle、transmission please refer to producer's maintenance manual, if without special maintenance period, please refer to this manual for maintenance information.
4、"R" meaning: Replacement ; "I" meaning：Inspection & adjusting; "C" meaning：Cleaning

| Maintenanc | Maintenance period | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| item | *1000km | **5** | 5 | **10** | 15 | **20** | 25 | 30 | 35 | **40** | 45 | 50 | 55 | 60 | 65 | 70 | 75 | **80** |
| | Month | **1** | | **3** | | **5** | | 7 | | **8** | | 9 | | 10 | | 11 | | **12** |
| Electrical system | | | | | | | | | | | | | | | | | | |
| All lights | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Battery electrolyte surface , connector | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| Wire box installation | | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I | I |
| All wires , circuitry, connectors | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| A/C system & pre-heater system | | | | | | | | | | | | | | | | | | |
| Air conditioner system refrigeration working condition | | I | | I | | I | | I | | I | | I | | I | | I | | I |
| A/C compressor belt rate of tension | | I | | | | I | | | | I | | | | I | | | | I |
| A/C system pressure, compressor freeze oil quantity | | I | | | | I | | | | I | | | | I | | | | I |
| Autonomous water heat system-fuel supply system | | I | | | | I | | | | I | | | | I | | | | I |
| Autonomous water heat system-water supply system | | I | | | | I | | | | I | | | | I | | | | I |
| Vehicle body, framework | | | | | | | | | | | | | | | | | | |
| Luggage bin door air spring, stay bar | | I | | | | I | | | | I | | | | I | | | | I |
| Engine bin door air spring, stay bar | | I | | | | I | | | | I | | | | I | | | | I |
| Rearview mirror fixing | | I | | | | I | | | | I | | | | I | | | | I |
| Vehicle body, framework checking | | I | | | | | | | | I | | | | | | | | I |

**The introduce about the lubricate points in King Long bus**
**At least every 5000 km, all these lubricating points should be lubricated.**

**There are five lubricate zones in bus**

1 steering drag rod

2 Steering knuckle kingpin, front brake self-adjusting arm in front axle.

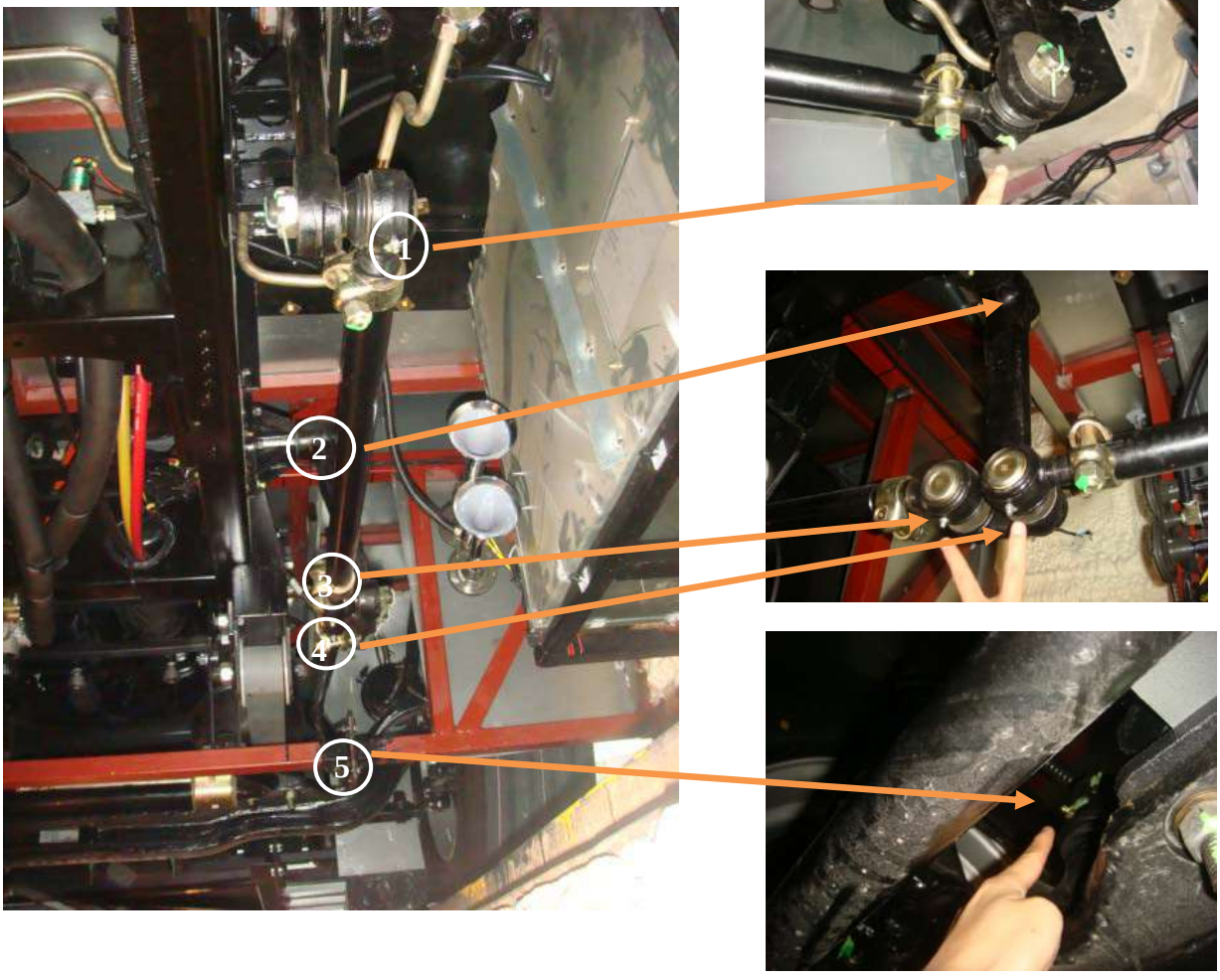
3 Rear brake self-adjusting arm in rear axle.

4 Propeller shaft

5 Engine cabin

## Part I Lubricate points in the steering drag rod

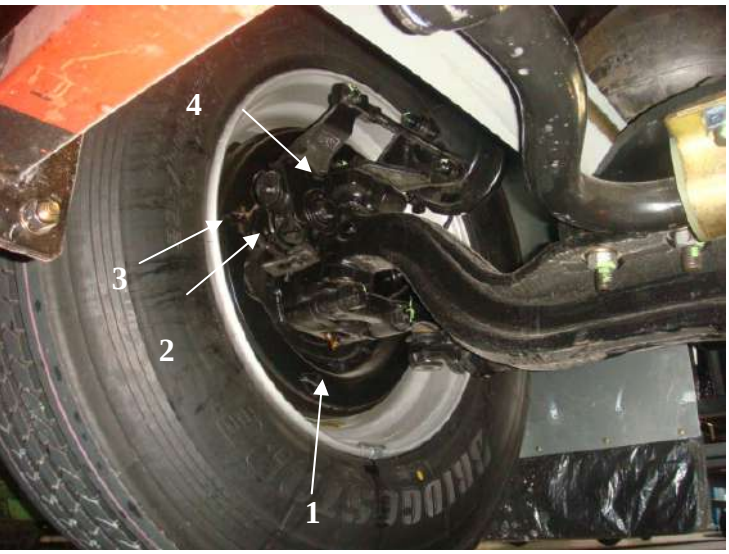
There are five lubricate points in steering drag link. One is at front end, three at middle, and another at rear end of drag link.



**For some buses, maybe there is only one drag link, so there is no points 2/3/4.**

## Part II Steering knuckle kingpin, front brake self-adjusting arm in front axle

Both left side and right side have four lubricate points. Two are for steering knuckle kingpin lubricating, the other two are for front brake adjusting arm lubricating.

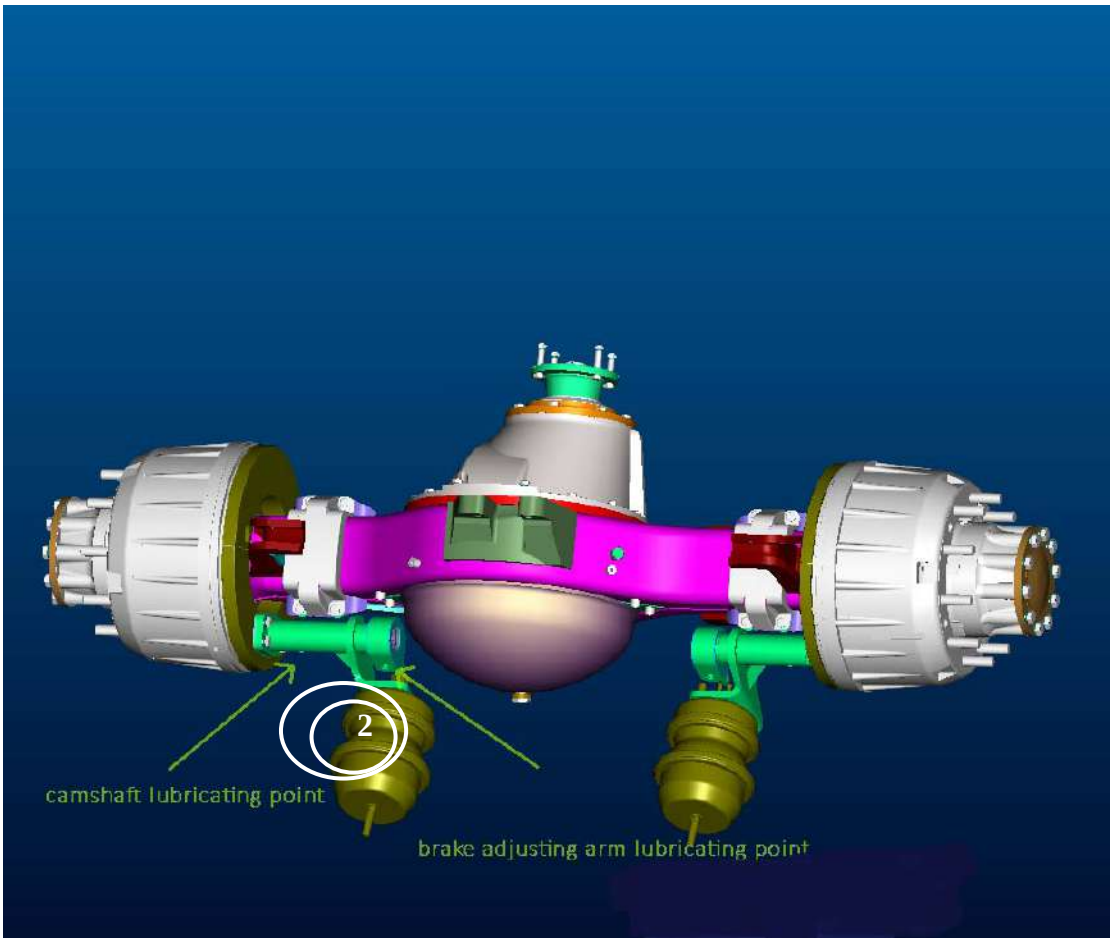



**Right side front tire**


**Left side front tire**

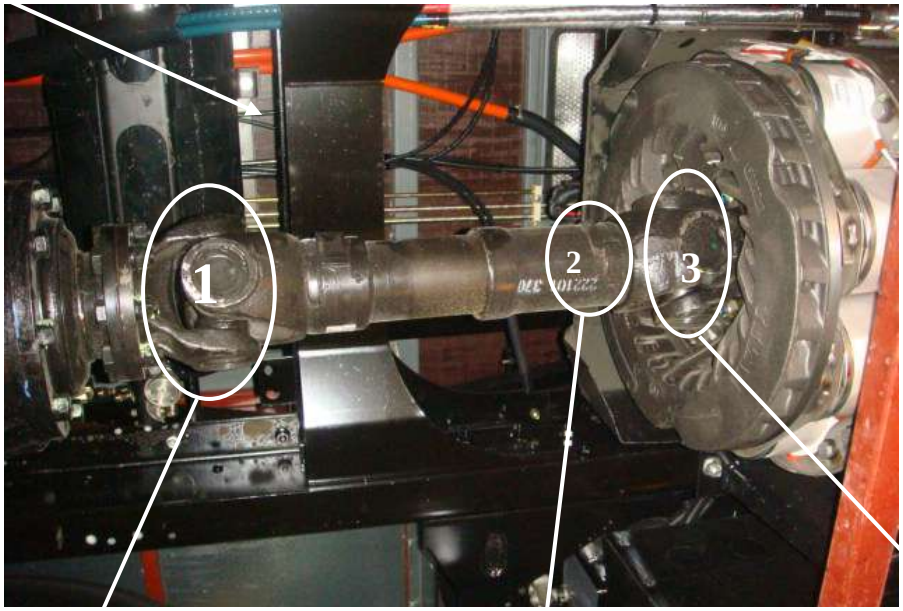
## Part III Lubricate points in the rear brake self-adjusting arm in rear axle

Both left side and right side of rear axle
have two lubricate points. They are lubricating rear brake adjusting arm and brake camshaft.



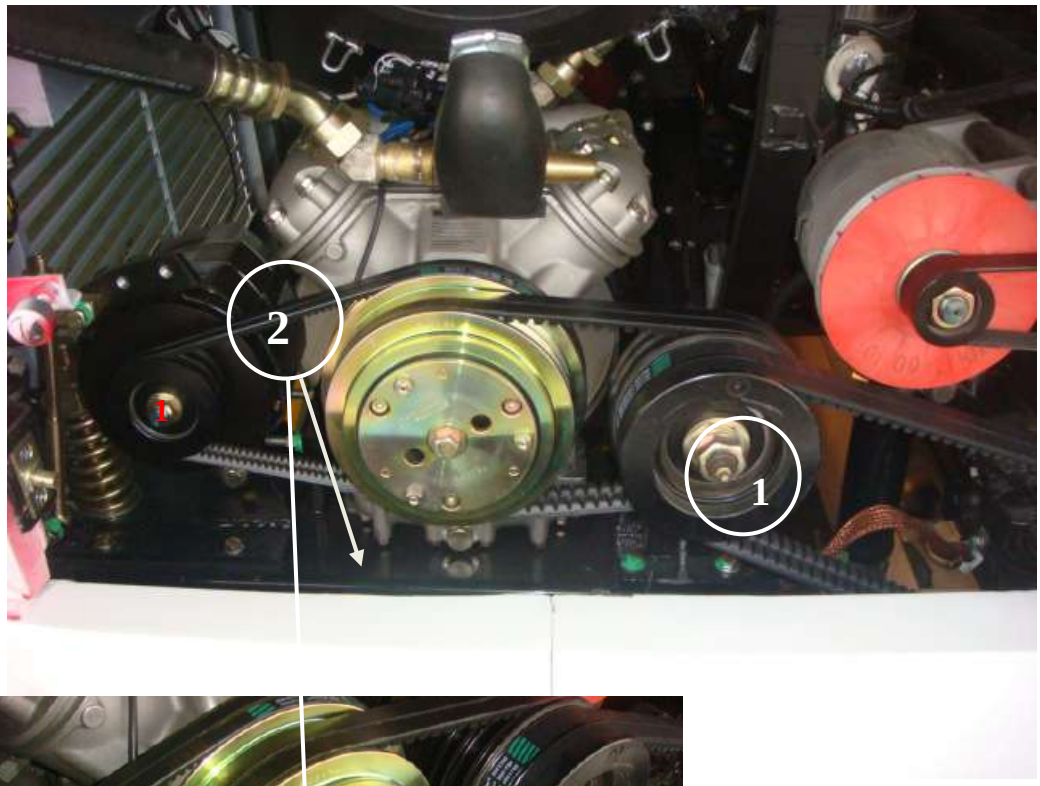

## Part IV Lubricate points in the propeller shaft

There are three lubricate points in the propeller shaft.



## Part V Lubricate points in engine cabin

You may find 2 lubricating points when open the engine cabin, one is for A/C bracket, another is for A/C middle idle pulley shaft. There will be not these 2 points if there is no A/C on bus.




## Engine common trouble and its elimination (suitable for diesel engine)

### Diesel engine can not start

| Possible causes | Remedies |
|---|---|
| 1） Too low starting speed | 1) Check the starting system and assure the starting speed is not lower than 110rpm. |
| 2) Air exists in the injection system | 2) Check the looseness of the joints of the feed line. Unscrew the de-aeration bolt on the fuel cleaner and oil water separator assembly, then press fuel with hand priming pump until the fuel overflows without air bubbles. |
| 3) Fuel pipe clogged | 3) Determine the location of the clog and clear it. |
| 4) Fuel filter choked | 4) Replace the screw-on filter element of the fuel filter/oil-water separator assembly. |
| 5) Fuel supply pump does not apply fuel or applies fuel irregularly | 5) Check for leakage in the fuel inlet pipe<br>Clogging of the fuel supply pump filters and fix or replace. |
| 6) Insufficient fuel injection, without fuel injection or low injection pressure | 6) Check the injector atomization situations and replace a new one if it doesn't work. |
| 7) Starting system problems: | 7) Check the connection to be correct and reliable. |
| Incorrect terminals connection or bad contact; | |
| Insufficient battery charge; | Charge the battery. |
| Bad contact between the brush and communicator of the starter | Repair or replace the brush and clean the surface of the communicator with soft sand paper and blow off. |
| 8) Insufficient compression pressure; | 8) Replace the piston ring and press in the cylinder sleeve if necessary. |
| Piston ring worn-out<br>9) The fuel cut off solenoid valve joint is loose, dirty or corroded smudginess canker<br>10) Mounting timing incorrect | 9) Check the valve clearance, valve spring, valve stem, and valve seat. Grind the valve seat if necessary.<br>Tighten and wash or replace.<br>10) Check and adjust it. |

## Diesel engine power deficient

| Possible causes | Remedies |
|---|---|
| 1）Intake blocked | 1）Check the air cleaner, intake pipe, and clean or replace the air cleaner filter elements. |
| 2） high exhaust back pressure | 2）Check the valve timing, adjust it if necessary; Clean the exhaust pipe. |
| 3 ）Insufficient boost pressure of turbocharged system | 3）Check and eliminate the leakage in the pipe and joints. |
| 4) Turbocharger is out of order; Compressor and turbine passages are polluted, clogged or damaged; | 4) Dean or replace the compressor casing and turbine housing. |
| Bearing failure; | Replace it. |
| Carbon deposit and sludge in the back of turbine and compressor impellers. | Clean it. |
| 5）middle cooler mangle ,leave out | 5）Check and replace it. |
| 6）Fuel line blocked or leaky | 6）Check the seal of fuel line and fuel filter choking, or replace screw-on filter element. |
| 7）Poor atomization of injector | 7）Check the inject pressure, remove carbon, adjust and repair |
| 8）Incorrect distribution phase | 8）Check and adjust the distribution timing and valve lash |
| 9）Cylinder gasket leakage | 9）Tighten the cylinder head bolts according to the stated torque and order, or replace the cylinder gasket. |
| 10）Bad valve sealing | 10）Grind or replace it. |
| 11 ）Overheat engine or too high coolant temperature | 11）Check and repair the radiator, thermostat, and adjust fan belt tension. |
| 12）Piston ring broken<br>13）Sensor doesn’t work | 12）replace it<br>13）Check and replace it. |

## Abnormal noise during engine operation

| Possible causes | Remedies |
|---|---|
| 1) Connecting rod bearing bushing and main bearing bushing are worn-out and clash voice appears in the crankcase. | 1) Dismantle and check the bushing and, if necessary, replace it and keep the reasonable clearance as required. |
| 2) The Damper is damaged and invalid. | 2) Change components to keep regulated axial clearance |
| 3) The shock absorber is damaged and ineffective | 3) Check and see if the joint bolts are in good conditions, and change new ones if necessary. |
| 4) The valve knocks on the piston | 4) Check and adjust the valve timing. |
| 5) The driving gear is abraded and get too large gap. There is knocking sound at the timing gear box cover. | 5) Check the gear side clearance and change the gear or not according to the abrasion situations. |
| 6) Too big clearance between piston and cylinder and there is knocking sound at the cylinder wall. | 6) Change the piston and use the repairing cylinder liner. Keep the proper clearance between piston and cylinder. |
| 7) Puff vibration of supercharger | 7) Remove the carbon and waste in the compressor channel and the exhaust channel. |
| 8) The bearing of supercharger is damaged and the rotor knocks on the shell | 8) Change the supercharger assembly |
| 9) The valve clearance is too large and there is big noise at the cylinder head. | 9) Adjust the valve clearance. |

## Exhaust with black smoke

| Possible causes | Remedies |
|---|---|
| 1) Intake clogged | 1) heck and clean the air cleaner and intake passage. |
| 2) Poor fuel quality | 2) Use prescribed fuel. |
| 3) Incorrect distribution timing | 3) Adjust the distribution timing according to the instruction. |
| 4) Bad atomization of injector | 4) Check and repair or replace |
| 5) The injector spray too much fuel | 5) Check and adjust it accordion to the instruction. |
| 6) Check and repair or replace | 6) Check and repair leak in the pipe line and joints. |
| 7) Faulty turbocharger | 7) Check and replace the assembly. |
| 8) middle cooler damaged and leaked | 8) Repair or replace it |

## Exhaust with white and blue smoke

| Possible causes | Remedies |
|---|---|
| 1) Poor quality fuel and too much water in fuel | 1) Replace the fuel. |
| 2) Too low coolant temperature | 2) Check the working temperature of the thermostat, replace it if necessary. |
| 3) Incorrect distribution | 3) Check and adjust it. |
| 4) Too low Pressure | 4) Check the working temperature of the thermostat, replace it if necessary. |
| 5) Incorrect installing orientation of piston rings | 5) Check and reinstall correctly. |
| 6) Running at low load for long time | 6) Operate at proper speed and load |
| 7) Seal ring of turbocharger worn-out | 7) Check and replace it. |
| 8) thrust bearing of turbocharger worn-out | 8) Check and replace it. |
| 9) Oil return pipe of turbocharger | 9) Clean or repair it. |

## Too low oil pressure

| Possible causes | Remedies |
|---|---|
| 1) Diluted or incorrectly selected | 1) Select the proper oil. |
| 2) Inner and outer rotors of oil pump worn-out or too large | 2) Replace the oil pump. |
| 3) Oil filter choked | 3) Replace the whirling type filter element. |
| 4) Failure of oil filter pressure control | 4) Repair it. |
| 5) Gear of oil pump damage | 5) Replace it. |
| 6) Inlet oil tube of fuel pump crack | 6) Repair or replace it. |
| 7) Fixing bolt of oil pump inlet oil tube loose | 7) Tighten the bolt to the required torque. |
| 8) Too large bearing bushings clearance. | 8) Check and replace it. |

## Too high oil pressure

| Possible causes | Remedies |
|---|---|
| 1) Too low ambient temperature and too high oil viscosity | 1) Use the required grade engine oil. Operate at low speed after starting, and then check it when the oil temperature is normal. |
| 2) Over-flow valve clogged | 2) Check and clean it |

## Too high oil temperature and oil consumption

| Possible causes | Remedies |
|---|---|
| 1) Leakage in the exterior oil line | 1) Check and repair it. |
| 2) Too high diesel engine load | 2) Decrease the load. |
| 3) Use improper oil | 3) Use the oil as required. |
| 4) Piston ring stuck or seriously worn | 4) Check and repair, if necessary, replace it. |
| 5) Too much worn out of Cylinder bore | 5) Bore the cylinder and use the oversized piston rings or press in a repair –used cylinder sleeve. |
| 6) Valve guide seriously worn out and failed seal of valve stem | 6) Check and replace. |

## Chassis constant fault and elimination

### Propeller shaft

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Propeller shaft jogging（vehicle vibrates during driving） | 1. Propeller shaft sliding yoke assembled incorrectly<br>2. The propeller shaft is distortion or bending<br>3. The universal-joint journal or the needle bearing has been worn out or damaged<br>4. The propeller shaft loose<br>5. The propeller shaft is imbalance<br>6. The intermediate supporting bearing is worn out or damaged<br>7. Bracket of the intermediate supporting bearing is loose or the rubber damping material is aging | 1. Remove and let the sliding yoke and the fixing yoke on the same plane<br>2. Adjust or replace the propeller shaft<br>3. Replace the bearing<br>4. Tighten propeller shaft to specified torque<br>5. Adjust or replace the propeller shaft<br>6. Replace the intermediate supporting bearing<br>7. Make adjustment or replacement |
| Abnormal sound from the propeller shaft (during the starting and the running) | 1. Abrasion or damage of the universal joint<br>2. Abrasion or damage of the sliding yoke<br>3. Looseness of the propeller shaft<br>4. Inadequate lubrication to the needle bearing, the sliding yoke and the intermediate bearing | 1. Replace the universal joint<br>2. Replace the sliding yoke<br>3. Tighten it to specified torque<br>4. Make the lubrication |

## Transmission

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Difficult gear shift (Difficult gear engagement) | 1. Control mechanism | |
| | 1) Improper height of the control hinge | 1）Adjust the control hinge |
| | 2) There has clearance between the control hinge connection | 2）Correct or replace the parts |
| | 3) The control hinge bend | 3）Correct or replace the control hinge |
| | 2. Transmission | |
| | 1) Abrasion or damage of the bearing | 1）Replace the bearing |
| | 2) Synchronizer operates abnormally | 2）Correct or replace the parts |
| | 3) The shaft or the gear is wore or damaged | 3）Correct or replace the parts |
| | 4) Abnormal slip of the gear shifter shaft | 4）Correct |
| | 3. Others | |
| | 1) Clutch can not disengage normally | 1）See "Clutch does not disengage smoothly or can not disengage " |
| | 2) The lubrication viscosity is too high | 2）Use the lubrication of given grade |
| The transmission gear is off the engaging position | Transmission | |
| | 1) Shift fork distorted or worn | 1）Check the gear-shifter fork and make adjustment or replacement in case of bending |
| | 2) Abrasion of the lockup ball or the ball on the gear shifter shaft | 2）Disassemble and replace the worn-out parts |
| | 3) Breakdown or fatigue of the lock spring | 3）Replace the spring |
| | 4) Excessive clearance of the gear engagement | 4）Adjust the gear clearance or replace the gear |
| | 5) Excessive clearance along the gearing axial direction | 5）Measure the axial clearance and replace the thrust washer if necessary |
| | 6) Abrasion of the sliding bearing slipper or its end surface | 6）Replace the bushing |
| | 7) Abrasion of the main bearing | 7）Replace the main bearing |
| | Control mechanism | |
| | 1) The control mechanism is out of work | 1) Check and correct the control hinge |
| | 2) Movement of the shifter lever causes vibration of the vehicle | 2) Check damage of the engine rubber suspension and replace the faulted parts |

## Rear axle

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Abnormal sound from the rear axle (abnormal sound) | When the vehicle is starting<br>1) Excessive clearance between the differential gear<br>2) Excessive clearance between the driving and the driven gear<br>3) Looseness of the connecting flange and the propeller shaft<br>4) Too small pre-tightening force of the drive gear bearing<br>5) Looseness of the fixing bolt and nut of the driving gear<br>When the vehicle turning<br>1) There has abrasion or damage to the axle shaft gear, driving gear, spider, thrust shim and the axle shaft bearing and etc<br>2) Too low oil level | <br>1） Adjust the clearance<br>2） Adjust the clearance<br>3） Tighten it to specified torque<br>4） Adjust the pre-tightening force<br>5） Tighten it to specified torque<br><br>1） Adjust or replace the faulted parts<br>2） Fill up the lubrication |
| Abnormal sound of the rear axle ( improper sound) | When the vehicle is running:<br>1) Excessive clearance between the driving and the driven gear<br>2) Abrasion or damage of the bearing<br>3) Abrasion or damage of the gear<br>4) Too low oil level<br>When running with inertia<br>1) Too small clearance between the driving and the driven gear<br>2) Abrasion or damage of the bearing<br>3) Incorrect gear engaging position<br>4) Too low oil level | <br>1) Adjust the clearance<br>2) Replace the bearing<br>3) Make adjustment or replacement<br>4) Fill up the lubrication<br>1) Adjust the clearance<br>2) Replace the bearing<br>3) Adjust or replace the faulted parts<br>4) Fill up the lubrication |
| Leakage of the rear axle lubrication | 1. Abrasion, looseness or damage of the oil seal<br>2. Looseness of the differential lock bolt or damage of the gasket<br>3. Damage of the differential carrier mating surface<br>Looseness of the oil draining plug or damage of the gasket | 1. Replace the oil seal<br>2. Tighten to specified torque and replace gasket<br>3. Make trimming and replace the differential housing if necessary<br>4. Replace the gasket and tighten screw plug to specified torque |

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Leakage of the rear axle lubrication | 4. Blocking or damage of the ventilation plug<br>5. Axle housing cracks<br>6. Damage or distortion of the coupling flange sealing surface<br>7. Malfunction of bearing leads to radial run out of coupling flange<br>8. Axle housing distortion caused by overloading | 5. Clean or replace the ventilation plug<br>6. Repair or replace the axle housing<br>7. Adjust or replace the coupling flange<br>8. Replace the bearing<br>9. Adjust or replace the axle housing |
| Hub bearing jamming | 1. Excessive pre-tightening force of the hub bearing<br>2. Inadequate lubrication of the bearing or incorrect usage of the grease<br>3. The bearing is defiled by the dust<br>4. Water entering bearing due to malfunction of sealing ring | 1. Adjust the pre-tightening force<br>2. Intensify the lubrication or replace the grease<br>3. Clean and intensify the lubrication<br>4. Replace the sealing ring |

**Front axle and steering system**

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Steering wheel shimmy | 1. The steering system | |
| | 1) Steering gear housing bolt or steering column supporting loose | 1）Tighten to specified torque |
| | 2) Looseness of the steering connection point | 2）Adjust the junction |
| | 3) Excessive clearance of the steering gear housing | 3）Adjust the clearance |
| | 2. The front axle | |
| | 1) Unbalance or abrasion of the rim, the spoke and the wheel | 1）Balance all the components and replace faulted components. |
| | 2) Abrasion of the front wheel bearing | 2）Replace the bearing |
| | 3) Excessive abrasion of the king pin or the bushing | 3）Adjust or replace the faulted parts |
| | 4) Deformation of the knuckle | 4）Replace the knuckle |
| | 5) Improper wheel alignment | 5）Check and adjust the wheel alignment |

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| | 6) Fatigue of the front leaf spring, looseness of the "U" -bolt or damage of the central bolt | 6) Replace the faulted parts |
| Failure of steering wheel return to center | 1. The steering system<br>1) Difficulty in the gear engagement<br>2) Malfunction of power steering system<br>3) Improper contact with the power piston<br>4) Fatigue of the return spring<br>5) Malfunction of slide valve<br><br>2. The front axle<br>1) Excessive caster angle of the king pin | <br>1）Adjust the gear engagement<br>2）Overhaul and eliminate trouble<br><br>3）Adjust or replace the power piston<br><br>4）Replace the spring<br>5）Check diameter of the slide valve and the housing and replace them if necessary<br>1) Check and adjust the front wheel alignment |
| Misalignment of the steering wheel | 1. The alignment of front wheel incorrect<br>2. There has fatigue and damage in the front plate spring<br>3. Bending of the front axle<br>4. Unsmooth of the braking<br>5. Looseness of the front hub bearing nut<br>6. Inequality of the tire pressure<br>7. Tires with different dimension applied | 1. Check and adjust the front wheel alignment<br>2. Replace the faulted spring<br><br>3. Adjust or replace the front axle<br>4. Please refer to the chapter "braking"<br>5. Tighten to specified torque<br><br>6. Inflate to the given pressure<br>7. Replace the tire by the correct type |
| Disproportion or untimely tire wear | 1. The front axle<br>1) Incorrectness of the wheel alignment<br>2) Abrasion or wreckage of the hub bearing and looseness of the bearing nut<br>3) Over looseness or tightness of the ball stud, the king pin and the bushing<br>2. Tire<br>1) Tire pressure incorrect<br>2) Misalignment between the tire and the wheel | <br>1）Check and adjust the front wheel alignment<br>2）Replace the bearing or tighten nut to specified torque.<br><br>3）Make an adjustment and replace the faulted parts as needed<br><br><br>1）Supply to the given air pressure<br>2）Replace the tire or the wheel |

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Disproportion or untimely tire wear | 3. Others<br>1) Breakdown caused by the abrupt starting or the emergent braking<br>2) Overloading | 1) Correct the driving pattern<br>2) Make the loading according to the specified capacity |
| Heavy operation of the steering wheel (the steering system breakdown) | 1. Too low oil level<br>2. Lubricant deterioration or impurity in it<br>3. Abrasion of the steering junction<br>4. Fault of the power steering system<br>5. Excessive lubricant resistance caused by the pipeline sunken<br>6. Too low oil pressure caused by the ineffective hydraulic pump<br>7. There has air in the hydraulic pipeline<br>8. Malfunction of rotary valve<br>9. Abrasion or damage of the power cylinder and damage of the piston O -ring<br>10. Too much leakage of the oil inside the steering gear housing | 1. Add the lubricant to the given level<br>2. Replace the lubricant<br>3. Replace the ball stud<br>4. Overhaul and eliminate trouble.<br>5. Measure the backpressure and repair or replace the pipeline in case of the set value exceeded<br>6. Measure the oil pressure and the flow volume; disassemble and repair the hydraulic pump if the set value below<br>7. Bleed air and add oil.<br>8. Disassemble and repair rotary valve.<br>9. Disassemble and repair.<br>10. Disassemble and repair steering housing. |
| Heavy operation of the steering wheel (breakdown of the front axle) | 1. Improper adjustment of the wheel alignment (excessive caster angle)<br>2. Too little clearance between the king pin and bushing<br>3. Inverse installation of the thrust bearing<br>4. Inadequate lubrication of the front axle parts<br>5. Over tight or loose connection of the bull<br>6. Too low tire pressure<br>7. Excessive abrasion of the tire | 1. Check and adjust the wheel alignment<br>2. Check and adjust the clearance<br>3. Adjust the installation<br>4. Add the grease to the front axle<br>5. Check and lubricate the bulb stud<br>6. Inflate to the rated pressure<br>7. Replace the tire |

| | | |
|---|---|---|
| There has oil spillage in the steering oil tank | 1. Clogging of the strainer or the filter element<br>2. There has air in the pipeline | 1. Clean the filter strainer or replace the filter element<br>2. Add the oil and make the exhaustion |

**Braking system**

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Unsmooth of the wheel | 1. There has compressed air inside the braking chamber | 1. Check and adjust the exhaust valve of the quick releasing valve |
| | 2. Improper lubrication of the camshaft or improper return of the adjusting arm | 2. Adjust the faulted parts |
| | 3. Brake shoe or chamber return spring fatigued or broken | 3. Replace the faulted parts |
| | 4. The spring braking takes effect | 4. Eliminate causes of the spring braking unreleased |
| | 5. Clogging of the exhaust port in the quick release valve | 5. Disassemble and clean the faulted parts |
| | 6. Brake valve primary or secondary piston return failure | 6. Disassemble and clean the braking valve and replace the faulted parts as needed |
| There has abnormal sound when treading the brake pedal | 1. The clincher or the bolt is projected because of abrasion of the braking friction lining | 1. Replace the friction lining |
| | 2. Surface hardening of the friction lining | 2. Replace the friction lining |
| | 3. Deterioration of the friction lining | 3. Replace the friction lining |
| | 4. Improperly contact between the brake shoe and the friction lining | 4. Rivet the rivet or tighten bolt<br>5. Adjust or tighten the brake drum |
| | 5. Uneven abrasion of the brake drum internal surface or weak installation | 6. Adjust the clearance between the brake shoes and tighten the supporting pin locknut |
| | 6. Looseness of the brake shoe supporting | 7. Replace the hub bearing<br>8. Adjust or replace the brake drum |
| | 7. Abrasion of the hub bearing | |
| | 8. Deformation of the brake drum | |

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Unsteady braking | 1. Tire pressure uneven or tire dimension different | 1. Operate as required |
| | 2. Improper installation of the brake shoe or damage of the return spring | 2. Tighten the locknut of the brake shoe supporting pin and replace the return spring |
| | 3. Improper engagement of the braking friction lining | 3. Adjust the friction lining |
| | 4. Improper adjustment of the left and right brake | 4. Adjust the brake |
| | 5. Deterioration of the braking friction lining | 5. Replace the friction lining |
| | 6. Oil on the braking friction lining | 6. Clean with the gasoline to eliminate the effect of the leakage at the hub oil seal, oil cylinder cover and the rubber cap |
| | 7. Damage of the brake backing plate | 7. Replace it |
| | 8. Looseness of the leaf spring U-bolt | 8. Tighten the U-bolt |
| The braking can't be applied under all conditions | When compressed air pressure is normal: | |
| | 1. Too short of the brake valve travel | 1. Check ,and replace the braking valve if necessary |
| | 2. The camshaft doesn't rotate (the bushing is lack of lubricant) | 2. Check working condition of the camshaft and replace it as needed |
| | 3. Improper adjustment of the braking chamber pusher stroke | 3. Adjust the travel |
| | 4. Improper sliding contact of the relay valve | 4. Disassemble and repair |
| | 5. Overheat or deterioration of the braking friction lining | 5. Replace the friction lining |
| | 6. Improper engagement of the braking friction lining | 6. Adjust engagement position of the friction lining |
| | 7. There has lubricant on the friction lining or the brake drum | 7. Clean the oil trace with proper cleanser or replace the friction lining |
| | 8. Water entering brake drum | 8. Drying out the water by pressing the pedal gently during the running |

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| | When compressed air pressure is abnormal:<br>1. There has air leakage inside the air pipeline<br>2. The air compressor doesn't work<br>3. The pressure regulator is improper adjusted or failed because of the impurity entering or air leakage in the brake valve | 1. Repair the leakage point<br>2. Disassemble and repair air compressor<br>3. Adjust or wash<br>4. Disassemble and repair the brake valve |

## Common trouble and troubleshooting of electrical equipment and starting system

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| There has abnormal sound during the generator rotates | 1. The belt is of over loose or excessive abrasion with the shaking during the running<br>2. Bearing failure or oversize clearance<br>3. Too much bearing clearance | Adjust the belt and replace the bearing |
| The charging indicator light doesn't go off during the running and the vehicle is difficult to start | 1. The battery is lack of power<br>2. The generator is damaged<br>3. Charging indicator lamp loop short<br>4. The belt is slipping | 1. Charge the battery<br>2. Replace the generator<br>3. Check the circuit<br>4. Adjust the belt |
| The battery is lack of power excessively and incapable of charging at low speed | 1. The battery is damaged<br>2. The generator is damaged<br>3. The belt is slipping | 1. Replace the battery<br>2. Replace the generator<br>3. Adjust the belt |

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| Difficult in starting | 1. The battery has no power, or is lack of power or terminal loose<br>2. Poor contact of the starter switch, short circuit of the connector lug or bad of the solenoid<br>3. Starter pinion is clogged in the flywheel ring gear. Furthermore, engine bearing is burnt ,water on external of the combustion chamber and the consumption frozen may also caused the breakdown | 1. Charge, clean the joint and screw it<br>2. Repair or replace it<br>3. Repair or replace it<br>Found out the reason and eliminate it |
| Starting gear of the starter can not engage with the flywheel teeth | 1. Poor contact of the ignition switch or socket loose<br>2. Unsteady connection of the relay device or the solenoid switch<br>3. Turnoff of the starter solenoid switch<br>4. Damage of the starting gear or the gear ring of starter<br>5. Malfunction of engage switch<br>6. Starter armature shaft bent | 1. Clean and tighten<br>2. tighten it<br>3. Replace it<br>4. Repair the teeth or replace it<br>5. Found out the reason and eliminate it<br>6. Replace it |
| Starting gear of the starter can not disengage completely | 1. Starter starting gear sleeve too tight or stuck<br>2. Too little clearance between the starting gear and the flywheel ring gear or the starter gear damage<br>3. Magnetic coil dirty<br>4. Clogging of the transmission fork shaft<br>5. Locking of the engage switch | 1. Replace the shaft sleeve or clean and amend it<br>2. Adjust the clearance or replace the starting gear<br>3. Clean it<br>4. Clean and adjust it<br>5. Replace it |

## Common trouble and troubleshooting of air conditioner system

The remedy and trouble analysis under abnormal pressure

| No. | Pressure | Description | Analysis | Remedy |
|---|---|---|---|---|
| 1 | The high and low pressure is lower than normal. | There is bubble in the inspection glass；the cold air in the bus insufficient ； high pressure pipe a little bit warm and the low pressure pipe a little bit cold, the temperature difference is not too much； | The refrigerant filling is not enough and the system is leaking | Check the system for the leakage and find out the leaking point<br>And make the maintenance<br>Fill in refrigerant |
| | The high and low pressure are higher than normal | | The refrigerant is too much | Drain some part of the refrigerant or refrigerant oil |
| 2 | The high and low pressure are much lower than normal . | No liquid flow seen from the inspection glass;<br>Almost no refrigeration<br>Almost no temperature difference between high and low pressure pipe | Air conditioner system has serious leakage | Check the system and find out the leakage point and fill the enough refrigerant |
| 3 | The low pressure is nearly to zero or even the negative value;<br>The high pressure is lower than the normal value | No refrigerate in the system<br>The front or the rear part of the expansion valve has fog | expansion valve blocked；<br>expansion valve temperature sensor damaged or packing error | Changed the expanding valve<br>Change the expanding valve temperature sensor<br>Make good package for the expanding valve |
| | The high pressure and the low pressure are abnormal;<br>The pressures are higher than the normal values | The temperature of the sucking pipe is lower than the normal value and the frosting appeared | expansion valve opened too much | Change the expanding valve<br>Readjust the expanding valve |
| | The high pressure is higher than the normal value and the low pressure is lower than normal | The surface for the air suction pipe of the compressor has frost or condensate | Expanding valve damaged | Change the expanding valve |

| No. | Pressure | Description | Analysis | Remedy |
|---|---|---|---|---|
| 4 | The high and low pressure are much higher than the normal value and the needle of the gauge swing obviously | The cooling capability is Insufficient and the system has air and the bubbles seen in the inspection glass | Air mixed in the refrigerant The vacuum is not good for the first time filling refrigerant or after the maintenance | Discharge the refrigerant in the system and change the desiccators and also make the vacuum repeatedly for filling the refrigerant |
| 5 | The high pressure is higher than the normal value and the low pressure is nearly to zero or negative value and the gauge swing seriously | The air sent to the bus sometime cold and sometimes warm and the inspection glass looks yellow | Too much water in the system desiccators reaching the saturation the frosting water blocked the expanding valve | Change the desiccators and make the vacuum repeatedly and then re-fill the refrigerant |
| 6 | The low pressure is much higher than the normal value and the high pressure is a little bit higher than the normal value | Cold is in sufficient | The condenser blower doesn't work normally or there is blockage in the condenser radiator | Check the electric circuit diagram or cleaning the condenser |
| 7 | The high are low and low pressure are higher than the normal values | The cold air is insufficient | Compressor interior failure | Repair or change the compressor |
| 8 | The high and low pressure are lower than the normal value | Evaporator wind flow is insufficient | Evaporator blower not running or low in efficiently or the radiator of the evaporator blocked | Check the electric circuit diagram or clean the evaporator radiator |

Electric system trouble and remedy

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| the power lamp on the control panel not light | 1. + no power supply;<br>2. D+ not connected well;<br>3. harness not tight;<br>4. control unit failure; | 1. generator D+ no output, exchange the generator and repair<br>2. reconnect the cable D+;<br>3. reconnect the harness;<br>4. change the control panel or repair; |
| malfunction light on the control panel light up | 1. system pressure error;<br>2. pressure switch defective;<br>3. pressure switch harness not connected well;<br>4. harness connection not well;<br>5. control panel failure; | 1. to connect the manifold gauge and eliminate the malfunction;<br>2. change the pressure switch and repair;<br>3. reconnect the pressure switch;<br>4. harness connection;<br>5. change the control panel or repair; |
| refrigerant lamp is not lighted up | 1. defrost sensor failure or connection problem;<br>2. temperature control sensor failure or connection problem;<br>3. temperature control sensor installation position not good ;<br>4. temperature control switch defective;<br>5. harness connection not reliable;<br>6. Control panel defective | 1. change the defrost sensor or connect the cable again;<br>2. change the temperature control or connect the harness again;<br>3. re-install the temperature control into the correct position;<br>4. change the temperature control switch or repair;<br>5. harness connection again;<br>6. change the control panel or repair; |
| condenser fan not working | 1. malfunction lamp light up;<br>2. sensor failure;<br>3. relay failure;<br>4. fuse burnt;<br>5. battery not charge or connection loose;<br>6. harness connection not tight;<br>7. air blower connection loose;<br>8. air blower failure;<br>9. control panel failure; | 1. check the problem according to the item 2;<br>2. change sensor or sensor connection cable;<br>3. change the relay or repair the relay of the connecting harness;<br>4. change the fuse;<br>5. change the battery or recharge the battery ,make the connection;<br>6. re-connect the harness;<br>7. connecting to the venting cable;<br>8. change the blower or repair;<br>9. change the control panel or repair; |

| Fault symptom | Possible cause | Eliminating method |
|---|---|---|
| compressor not working | 1. compressor clutch connecting cable not connected well;<br>2. clutch damaged;<br>3. malfunction lamp light up;<br>4. refrigerant light not lighting up;<br>5. relay out of work;<br>6. no harness connection to the battery; | 1. reconnect the cable;<br>2. change the clutch or repair;<br>3. refer to the above-mentioned items; |
| evaporator blower not working | 1. relay not working;<br>2. battery no charge;<br>3. battery cable confected;<br>4. air blower harness not connected well;<br>5. harness connection not good;<br>6. venting blower cable not connecting well;<br>7. air blower or blower speed adjustable resistor failure;<br>8. control panel out of work; | 1. change relay or repair or connect the relay connecting cable;<br>2. change the battery or recharge;<br>3. reconnect the battery cable;<br>4. change the fuse;<br>5. reconnect the harness;<br>6. reconnect the blower motor connecting cable;<br>7. change the air blower or change the resistor for repair;<br>8. change the control panel or repair |

Driver tools table（one each）

| No. | Part name | No. | Part name |
|---|---|---|---|
| 1 | Tool box | 23 | Slip joint pliers 8” |
| 2 | Combination wrench 8 | 24 | Nipper pliers 6” |
| 3 | Combination wrench 10 | 25 | Tire pressure gauge 0-1.4MPa |
| 4 | Combination wrench 12 | 26 | Valve core wrench |
| 5 | Combination wrench 13 | 27 | Filter wrench（φ66-φ110） |
| 6 | Combination wrench 14 | 28 | Pry bar also used as rocker lever 55cm |
| 7 | Combination wrench 15 | 29 | Pry bar also used as handle 50cm |
| 8 | Combination wrench 16 | 30 | Pry bar booster 500X27X3mm |
| 9 | Combination wrench 17 | 31 | Grease gun 400cm3 (with hose) |
| 10 | Combination wrench 18 | 32 | Socket wrench for wheel nut 41 (hexagon) |
| 11 | Combination wrench 19 | 32 | Socket wrench for wheel nut 21（foursquare） |
| 12 | Combination wrench 21 | 33 | Torque bar 315X25X25 |
| 13 | Combination wrench 22 | 34 | Final drive locknut 46mm (hexagon) |
| 14 | Combination wrench 24 | 35 | Wrench for front wheel hub bearing nut 65 mm (hexagon) |
| 15 | Combination wrench 27 | 36 | Wrench for front wheel hub bearing nut 55 mm (hexagon) |
| 16 | Combination wrench 30 | 37 | Wrench for rear wheel hub bearing nut 110 mm (hexagon) |
| 17 | S-double box wrench 13X15 | 38 | Wrench for rear wheel hub bearing nut 102 mm (octagon) |
| 18 | Adjustable wrench 8” | 39 | Wrench for drive axle drain plug 13X13 （foursquare） |
| 19 | Adjustable wrench 12” | 40 | Wrench for access cover 6mm （hexagon） |
| 20 | Cross-head screwdriver 6” | 41 | Tool box |
| 21 | Flat-tip screwdriver 6*100MM | 42 | Jack 12.5t |
| 22 | Hammer 1 pound | 43 | Special tool box |

The special tools above are applied when Dong Feng axles used, while other axles are applied, the driver tools may vary as below.

| Name | Cancel | Number | Add | Axle manufacturer |
|---|---|---|---|---|
| Wrench for front wheel hub bearing nut | 70mm hexagon | 1 | 60X72 mm foursquare | ZF Front axle |
| | 70mm hexagon | 1 | 2.25’’or 57 mm hexagon | MeiChi Front axle |
| | 70mm hexagon | 1 | 58 mm hexagon | North Benz Front axle |
| | 70mm hexagon | 1 | 60 mm hexagon | Dong Feng portal axle |
| | 55mm hexagon | 1 | 41 mm fork hexagon | Hunan axle |
| Wrench for rear wheel hub bearing nut | 110 mm hexagon | 1 | 4.03’’or102 mm hexagon | MeiChi Rear axle |

| | | | | |
|---|---|---|---|---|
| Final drive locknut | 55 mm hexagon | 1 | 51 mm hexagon | Fangsheng rear axle(imported final drive) or Hangzhou sanhua 9T and 9.5T rear axle |
| Socket wrench for wheel nut | 32 mm hexagon | 1 | 41 mm hexagon | Dongfeng Dena or Hangzhou sanhua 9.5T rear axle |
| | | | 21 mm foursquare | |
| | 41 mm hexagon | | 38 mm hexagon | Hunan axle |
| | 21mm foursquare | | 22 mm foursquare | |
| Spare wheel lifter | 22X550mm (Used in all tour buses.) | | | Not used in city buses. |

# Tightening torque of main bolts and nuts

| Position | | Tightening torque（N·m） |
|---|---|---|
| Propeller shaft bolt （Bolt grade: 10.9 G） | M16×1.5×L | 270～330 |
| lock nut, steering knuckle limiting bolt（M16） | | 80～100 |
| Fixing nut, upper knuckle(M20) | | 280～350 |
| Binding nut, tie rod（M12） | | 75～100 |
| fixing nut ,ball pin of steering drag rod（M24） | | 280～300 |
| Lock nut, steering wheel (M18) | | 60～80 |
| fixing bolt , pitman arm and steering gear(M22) | | 570 |
| Front tire nut | Dongfeng axle | 580～650 |
| Rear tire nut | Dongfeng axle | 560～650 |
| Fixing nut, front axle U type bolt | | 320～350 |
| Fixing nut, rear axle U type bolt | | 360～440 |
| Connecting nut, between upper knuckle and steering knuckle | | 280～350 |
| Nut, trapeze form arm of Steering (left and right) | | 350～450 |
| King pin uniform lock nut | | 25～40 |
| Adjusting nut, front wheel hub bearing | | Min200 |
| Steering knuckle tie rod ball joint nut | | 250～310 |
| Fixing nut ,tie rod ball joint | | 40～60 |
| Connecting nut between Brake drum and wheel hub | | 295～412 |
| Fixing nut, Front brake chamber and bracket | | 40～60 |
| Fixing bolt, bracket of brake chamber | | 58～77 |
| Fixing bolt, brake backing plate and steering knuckle | | 160～210 |
| Fixing nut, Wheel | | 550～600 |
| King pin screw-plug | | 60～80 |
| Screw—fixing dust-proof cover | | 10～20 |
| Fixing bolt, wheel hub bearing cap | | 16～23 |
| Drain plug (M24X2) | | 130～150 |
| Fixing nut, Rear brake backing plate (M16X1.5) | | 225～265 |
| Drive bevel gear flange fixing nut (M36X1.5) | | 400～540 |

| | |
|---|---|
| Driven bevel gear bolt (M20X1.5) | 580～680 |
| Lock nut, front and rear steel plate pin | 55～70 |
| Lower slotted nut, front damper (M20) | 100～120 |
| Lower slotted nut, rear damper (M20) | 100～120 |
| Bolt, bearing cap (M22X1.5) | 440～490 |
| Axle shaft bolt (M16X1.5) | 140～180 |
| Fixing bolt, bracket of brake chamber (M14X1.5) | 90～120 |
| Oil level hole plug (M24X2) | 130～150 |
| Fixing nut, rear brake chamber (M16X1.5) | 170～190 |
| Bearing saddle bolt (M14X1.5) | 120～140 |
| Differential house bolt(M16 X1.5) | 220～280 |
| Bolt-stopper shim | 31～41 |
| Bolt, between final drive and rear axle house(M12 X1.5) | 130～150 |
| Wheel bolt(M24X1.5) | 420～490 |
| Connecting nut, wheel hub and brake drum(M22X1.5) | 300～420 |
| Rear adjusting nut(M84X2) | Min500 |
| Bolt, engine front suspending bracket | 90～110 |
| Connecting bolt , fly wheel house and frame bracket | 80～100 |
| Fixing bolt, clutch and fly wheel | 90～100 |
| Fixing bolt, between fly wheel house and clutch houseM10 | 60～65 |
| Fixing bolt, between Transmission and clutch house M18 | 290 |
| Fixing nut, transmission output rear connecting plate M10 | 49 |

## Bolts torque table

| Torques for bolts with metric unified threads | | | |
|---|---|---|---|
| Dimension of bolt | Torques N.m*(ft-lb) | | |
| | 8.8 | 10.9 | 12.9 |
| M4 | 3(2) | 5(3) | 5(4) |
| M5 | 6(4) | 9(7) | 10(7) |
| M6 | 10(7) | 15(11) | 18(13) |
| M8 | 25(18) | 35(26) | 45(33) |
| M10 | 50(37) | 75(55) | 83(61) |
| M12 | 88(65) | 123(91) | 147(108) |
| M14 | 137(101) | 196(145) | 235(173) |
| M16 | 211(156) | 300(221) | 358(264) |
| M18 | 290(213) | 412(303) | 490(361) |
| M20 | 412(304) | 578(426) | 696(513) |
| M22 | 560(413) | 785(559) | 942(695) |
| M24 | 711(524) | 1000(738) | 1200(885) |
| M27 | 1050(774) | 1480(1092) | 1774(1308) |
| M30 | 1420(1047) | 2010(1482) | 2400(1770) |
| Torques for bolts with metric fine threads | | | |
| Dimension of bolt | Torques N.m*(ft-lb) | | |
| | 8.8 | 10.9 | 12.9 |
| M8×1 | 26(19) | 37(27) | 48(35) |
| M10×1.25 | 52(38) | 76(56) | 88(65) |
| M12×1.25 | 98(72) | 137(101) | 126(119) |
| M12×1.5 | 93(69) | 127(94) | 152(112) |
| M14×1.5 | 152(112) | 216(159) | 255(188) |
| M16×1.5 | 225(166) | 318(235) | 383(282) |
| M18×1.5 | 324(239) | 466(344) | 554(409) |
| M20×1.5 | 461(340) | 628(463) | 775(572) |
| M22×1.5 | 618(456) | 863(636) | 1058(780) |
| M24×2 | 780(575) | 1096(808) | 1294(954) |
| M27×2 | 1147(846) | 1578(1164) | 1920(1416) |
| M30×2 | 1568(1156) | 2254(1662) | 2695(1988) |

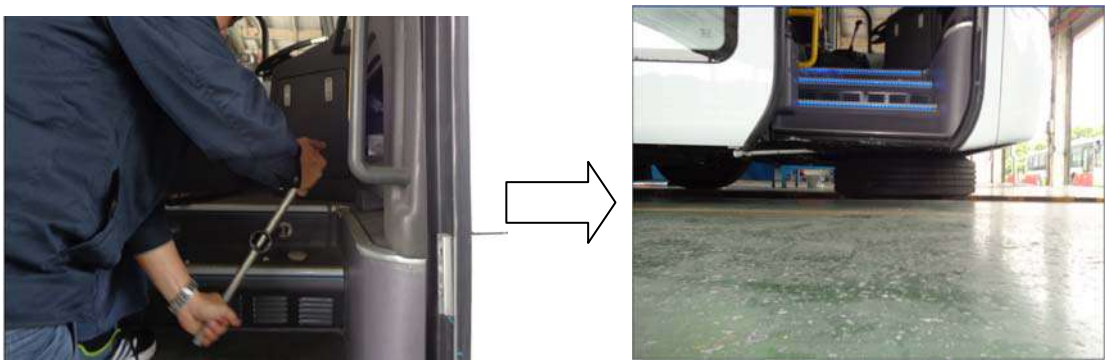
The torque values allow bolt yield strength up to 90%, assuming a friction coefficient of μ

# Illustration for spare tyre dismounting & mounting

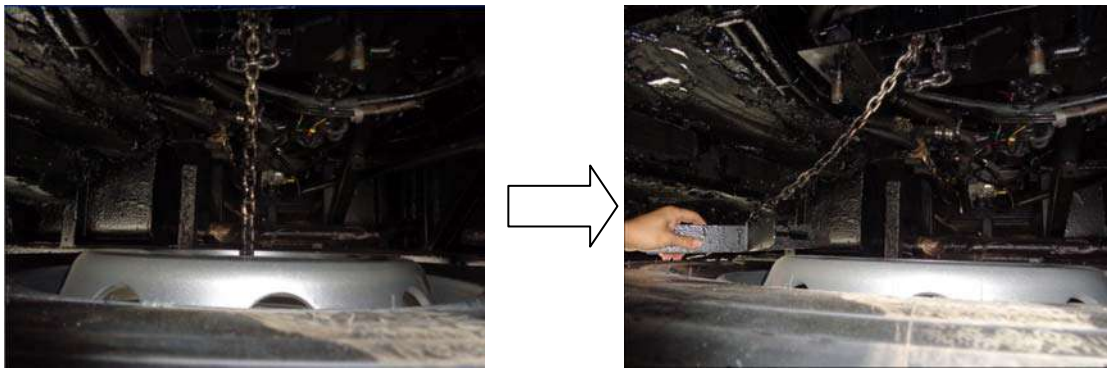
## A. Dismounting the spare tyre

1、 loose the 2 nuts below spare tyre and take them down.

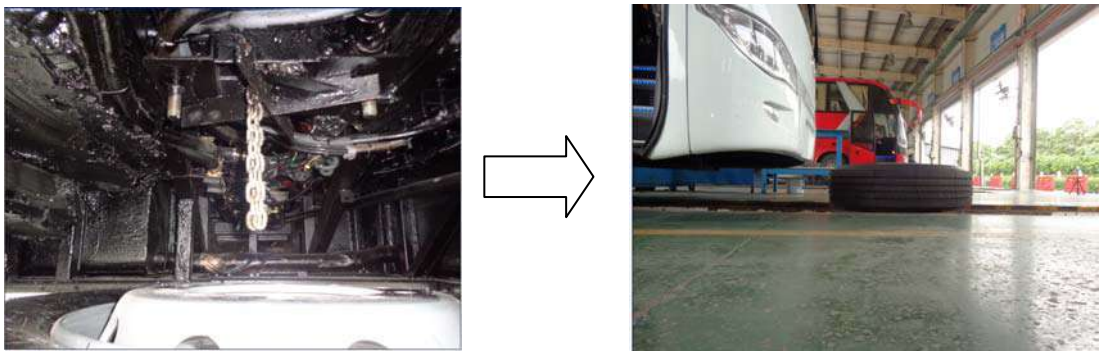
2、 fetch out the rubber stopper from front step , while the crowbar is inserted in the groove belong to hoisting rocker, then rotate it anticlockwise, you see, the spare tyre fall down slowly until landing the floor.



3、 remove the spare tyre's bracket and iron chain from rim .

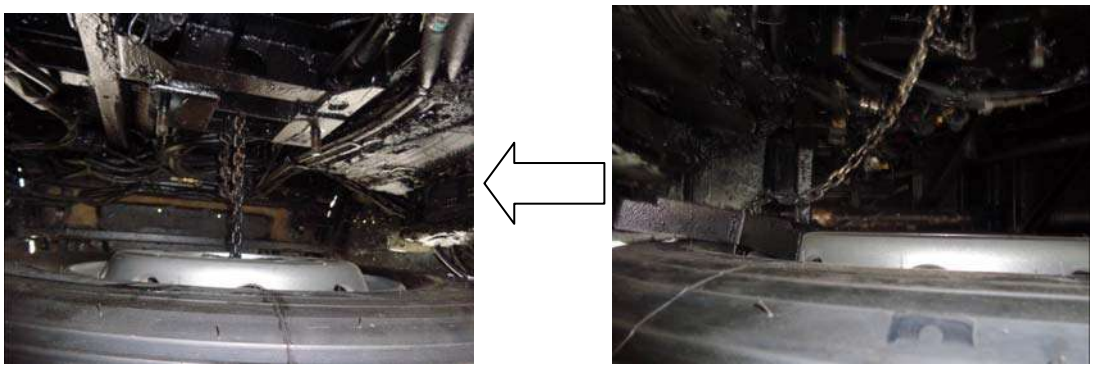


4、 rotate the hoisting rocker clockwise, and make both the bracket and iron chain raise until returning back the initial position, then the spare tyre could be used after the vehicle leave.



## B. Mounting the spare tyre

1、 Move the spare tyre under spare tyre's bracket, rotate the rocker anticlockwise until the bracket landing the floor ,next, put it into the spare tyre rim .



2、 Rotate crowbar clockwise to raise spare tyre until the height that keep rim stick on the lower surface of beam.

Attention: keep alignment between 2 bolts in chassis frame and 2 bolt holes in rim, meanwhile, assure bolts come out from rim.

3、 Fasten the wheel nuts, then take back the spare tyre's rocker into the tool box .

# The Operation Tips for Maintenance Free Lead-acid Batteries

1. Safety

1.1 There is some vitriol liquid in the batteries, which is corrosivity. Please keep away from kids. Please must wear protective glasses and rubber gloves when operating. If the vitriol put into eyes, skin and clothes carelessly, please wash by a lot of water right now, the severe injured should go to hospital.

1.2 There exits hydrogen and oxygen when charging. Once emerge open fire or exhaust hole jamming, it will cause explosion. So the batteries should keep away from open fire and avoid short circuit.

1.3 The shell of batteries is made up polypropylene by injection molding. So it should be kept away from open fire because the polypropylene is inflammable.

2. Storage

2.1 The products series is electrolyte lead-acid batteries, it should store in dry, clean and ventilated environment , its'temperature range between 5 and 25 centigrade degree. It should not be touched into direct sunshine and heat source away from less than 2m .If the environment temperature is too high, it will impact on batteries' function.

2.2 The batteries should not be inversely laid, shocked and repressed by machine.

2.3 The storage period of batteries is 6 months at room temperature. The batteries need not be charging in the 6 months. If the storage period overpass more than 6 months, it can be used only after charging.

3. Charging

There exits hydrogen and oxygen in the later charging period, so it causes the water loss. The higher of charging voltage ,the bigger the water losing . The batteries series need not add water during using. So we strongly suggest constant voltage charging, try to avoid constant current charging.

3.1 Replenish charging

3.1.1 Constant current charging

It is charging 2 to 4 hours by one tenth of batteries capacity.

3.1.2 Constant voltage charging

It is constant voltage charging 16 hours by 16.0V. (the max current no more than 25A)

3.2 Normal charging

3.2.1 Constant current charging

It is charging 2 to 4 hours by one-twentieth of batteries capacity, when voltage is to 14.4V, and continue charging 2 to 3 hours.

3.2.2 Constant voltage charging

It is constant voltage charging 20 hours by 16.0V. (the max current no more than 25A)

3.3 There exits gas when charging. In order to avoid exploding, so should check the exhaust hole on the top of batteries frequently.

3.4 Please connect charging machine positive with batteries positive, and connect charging machine negative with batteries negative. No reverse charging.

3.5 In order to avoid electrolyte splashing for too high temperature, you should decrease charging voltage or charging current if the electrolyte temperature is more than 45℃ .

4. Installation

4.1 In order to avoid unnecessary failure, should pay attention to safety mark before installation.

4.2 In order to avoid corrosion, should smear Vaseline on battery terminal before installation. Connection should be steady and dependable. Do not knock the terminal to avoid it loosening and inner acids leaking.

4.3 Connect batteries positive with vehicle or engine positive first at installation, then connect batteries negative with vehicle or engine negative.

4.4 In order to avoid batteries damage, Please fix the battery firmly in the battery bracket .

5. Maintenance

5.1 There is the indicator of electric charge on the batteries cover. When the indicator shows green, the batteries use normally. When the indicator shows black, the batteries should be charged in time. When the indicator shows white, should change in time.

5.2 It should be charged in time if the battery capacity decrease for any reason.

5.3 The battery should avoid over-charging during charging to prolong its' service life.

5.4 It should be dismantled from the vehicle and stored in a dry and ventilative place if disused for a long time (normally more than 15days). It should be charged again every 3 to 6 months. (It depends on the indicator shows black).

# The table of Lubricant, Power steering oil and Grease

## 1 Main assembly lubricant

| Oil site | Lubricant | Type | Level |
|---|---|---|---|
| Engine | Diesel engine oil | 15W/40 | API CH – 4/SG |
| Transmission | Gear oil | SAE 85W-90 | API GL – 4 |
| Main reducer | Gear oil | SAE 85W-90 | API GL – 5 |

Explanation ： 1) Diesel engine oil--API CH -4/SG ,15W/40 , be used upwards -10℃
10W API CH– 4/SG be used between -5℃～-20℃
5W/30 API CH– 4/SG be used upwards -25℃
2) Gear oil – could be used between -20℃～50℃

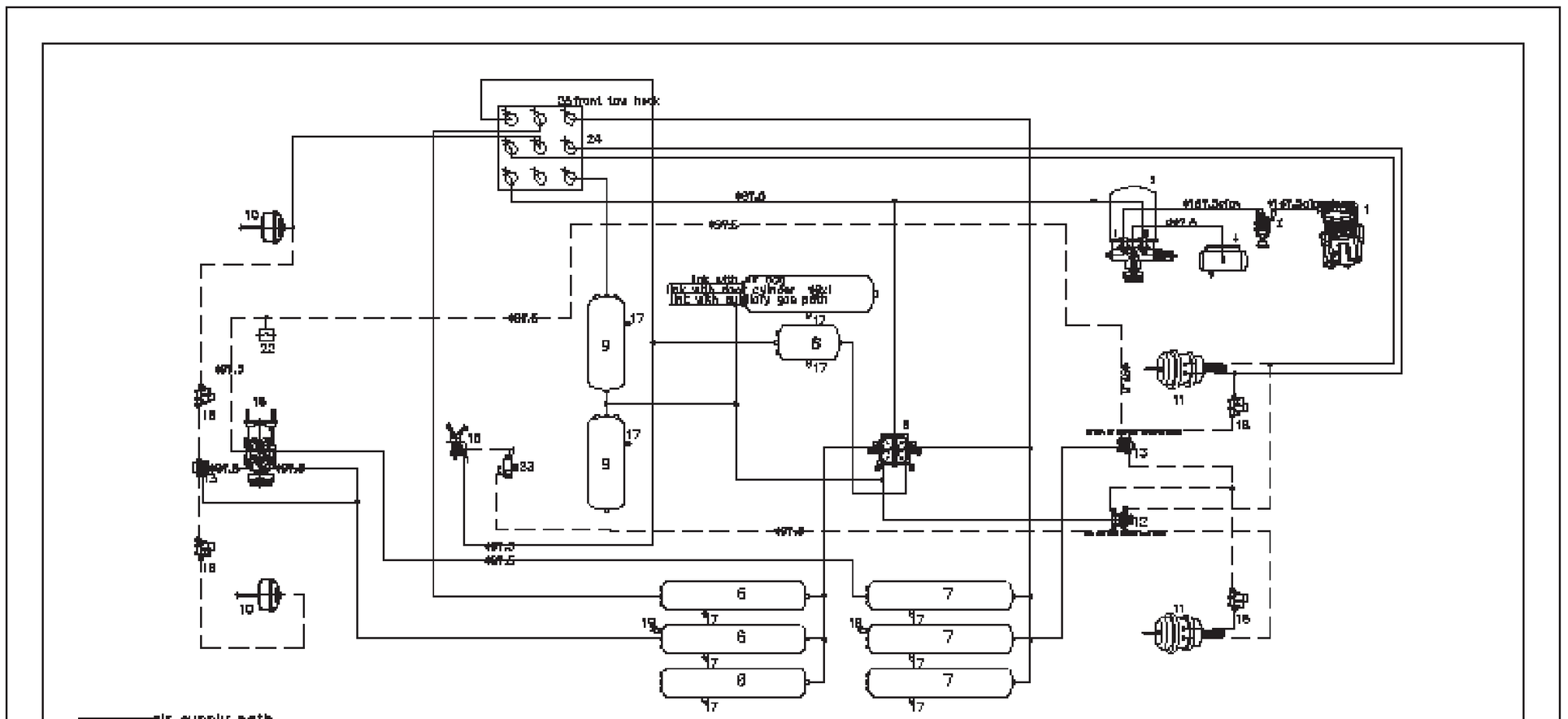
## 2 Power steering oil

Fulfill standard: please apply **DEXRON-II D or DEXRON-III** hydraulic fluid to steering gear;

## 3 Others

| Oil Site | Oil used | Nominate |
|---|---|---|
| Clutch | Synthesize grade oil | Nominate to use DOT3，DOT 4, etc., |
| Bearing and ball pin | Li - grease | 2# |
| Coolant | Nominate to use SINOPEC brand, YF-2A (upward -45°C centigrade) coolant， can’t mix to use different type coolant | |

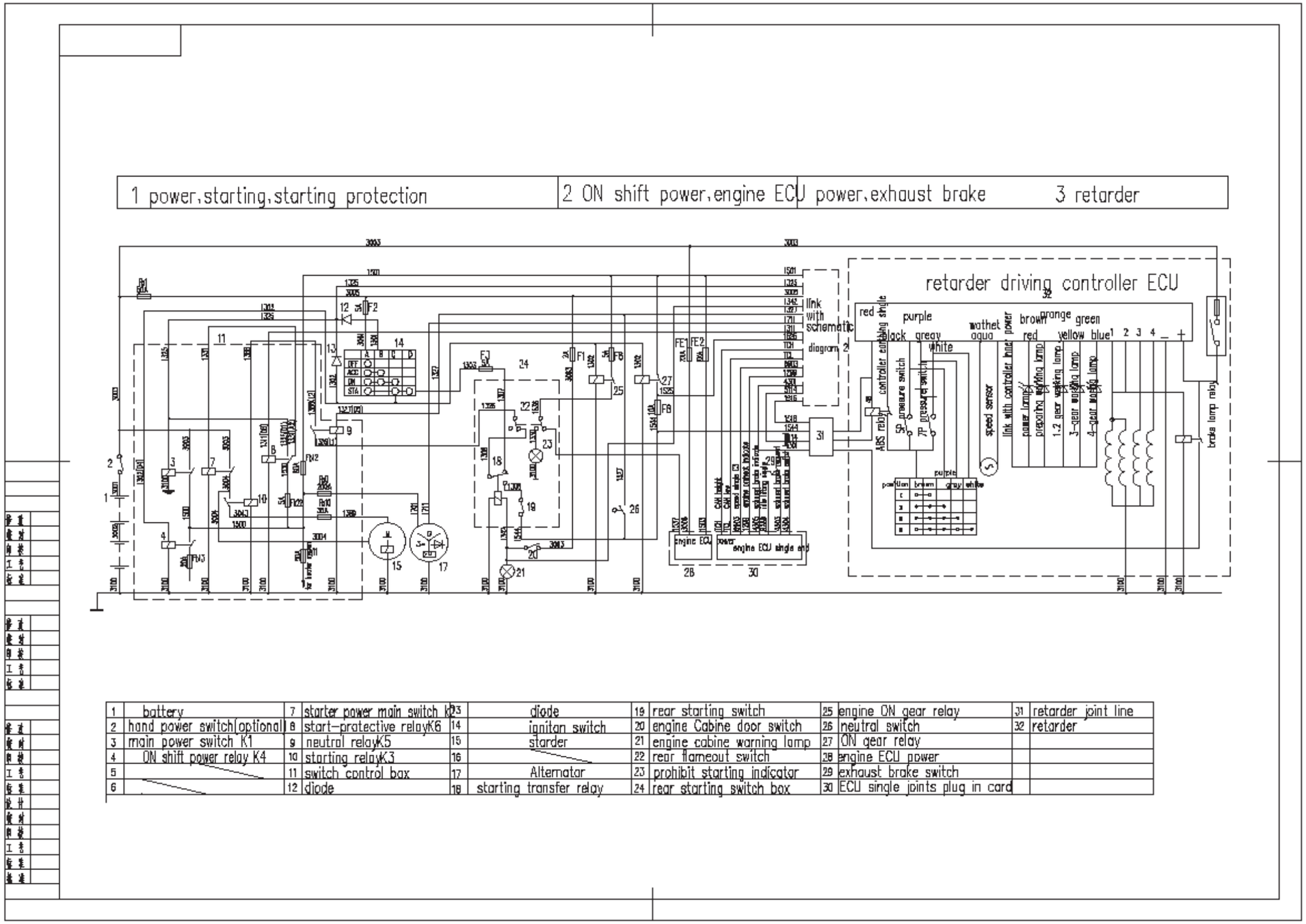
**Air braking schematic diagram**




1.air compressor 2.condenser 3.air dryer 4.regeneration tank
5.four-circuit valve 6.front braking gas chamber 7.rear braking gas chamber
8.hand braking gas chamber 9.auxiliary/air bag gas chamber
10.front braking cylinder 11.Spring brake air chamber 12.differential valve 13.relay valve
15.hand braking valve 16.braking valve 17.Water release valve
18.ABS electromagnetic valve 19.air pressure warning sensor
21.ASR electromagnetic valve 22.pressure switch 23.3/2 solenoid valve 24.detecting panel-air pressure
25.detecting gas valve assembly

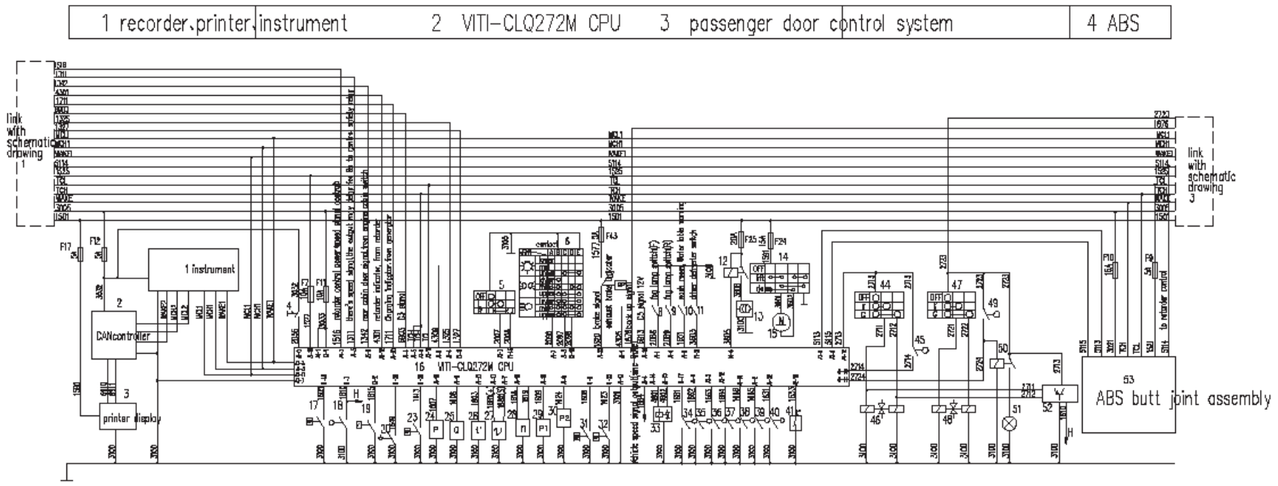
pipe type.the tube Φ8? and Φ9.5 in the drawing is made
of nylon;Φ16?.5 tube is mode of steel.
detecting gas valve(25)is installed on detecting panel(24).
detecting gas valve and air dryer(21)port is connected with PA11
φ9X1.5 tube which is linked with tow hook.
other joint pipes of trial connector are all φ5X1 PA11 pipes.
other brake hoses are all Φ14? nylon pipes except those link to brake chamber .

**Electric schematic diagram of the complete car (1)**




| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | battery | 7 | starter power main switch K2 | 13 | diode | 19 | rear starting switch | 25 | engine ON gear relay | 31 | retarder joint line |
| 2 | hand power switch(optional) | 8 | start-protective relayK6 | 14 | ignitan switch | 20 | engine Cabine door switch | 26 | neutral switch | 32 | retarder |
| 3 | main power switch K1 | 9 | neutral relayK5 | 15 | starder | 21 | engine cabine warning lamp | 27 | ON gear relay | | |
| 4 | ON shift power relay K4 | 10 | starting relayK3 | 16 | | 22 | rear flameout switch | 28 | engine ECU power | | |
| 5 | | 11 | switch control box | 17 | Alternator | 23 | prohibit starting indicator | 29 | exhaust brake switch | | |
| 6 | | 12 | diode | 18 | starting transfer relay | 24 | rear starting switch box | 30 | ECU single joints plug in card | | |

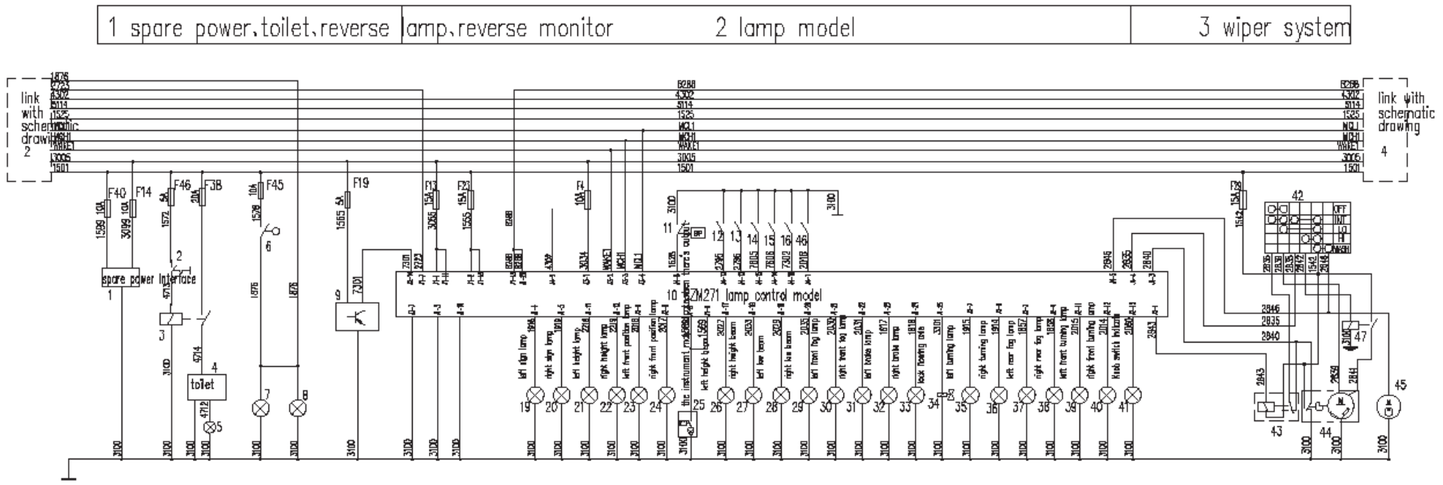
**Electric schematic diagram of the complete car (2)**




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | instrument | 13 | driver window | 25 | fuel sensor | 37 | right brake shoe(the 2 axle) | 43 | |
| 2 | CAN controller with turning recorder | 14 | driver window lifter switch | 26 | water temperature sensor | 38 | left brake shoe(the 3 axle) | 44 | front door switch |
| 3 | printer display | 15 | driver window lifter motor | 27 | speedometer sensor | 39 | right brake shoe(the 3 axle) | 45 | front door cylinder microswitch |
| 4 | emergency switch | 16 | VITI-CLQ272M CPU | 28 | tachometer sensor | 40 | emergency door warning switch | 46 | front door electro-magnetic valve |
| 5 | turn signal switch | 17 | Switch Oil pressure warner | 29 | Sensor, air pressure 1 | 41 | retarder high temperture warning | 47 | mid door switch |
| 6 | lamp switch | 18 | hand brake lamp switch | 30 | sensor,air pressure 2 | 42 | | 48 | mid door electro-magnetic valve |
| 7 | brake lamp switch | 19 | cabin temperture sensor | 31 | Air pressure warning switch 1 | | | 43 | |
| 8 | front fog lamp switch | 20 | coolant level switch | 32 | air pressure warning switch 2 | | | 49 | mid door cylinder microswitch |
| 9 | rear fog lamp switch | 21 | | 33 | III speed electromagnetic clutch fan | | | 44 | front door switch |
| 10 | wash room Water lable warning | 22 | switch | 34 | front left brake shoe | | | 45 | front door cylinder microswitch |
| 11 | driver deforster switch | 23 | Warning lamp switch of air filter blocking | 35 | front right brake shoe | | | 48 | front door electro-magnetic valve |
| 12 | driver deforster relay | 24 | Oil pressure sensor | 36 | the 2 axle left brake shoe | | | 47 | mid door switch |
| | | | | | | | | 48 | mid door electro-magnetic valve |

| | |
|---|---|
| 49 | mid door cylinder microswitch |
| 50 | mid door relay |
| 51 | mid door lamp |
| 52 | passenger door remote controller |
| 53 | ABS butt joint assembly |
| 54 | |
| 49 | mid door cylinder microswitch |
| 50 | mid door relay |
| 51 | mid door lamp |
| 52 | passenger door remote controller |
| 53 | ABS butt joint assembly |
| 54 | |

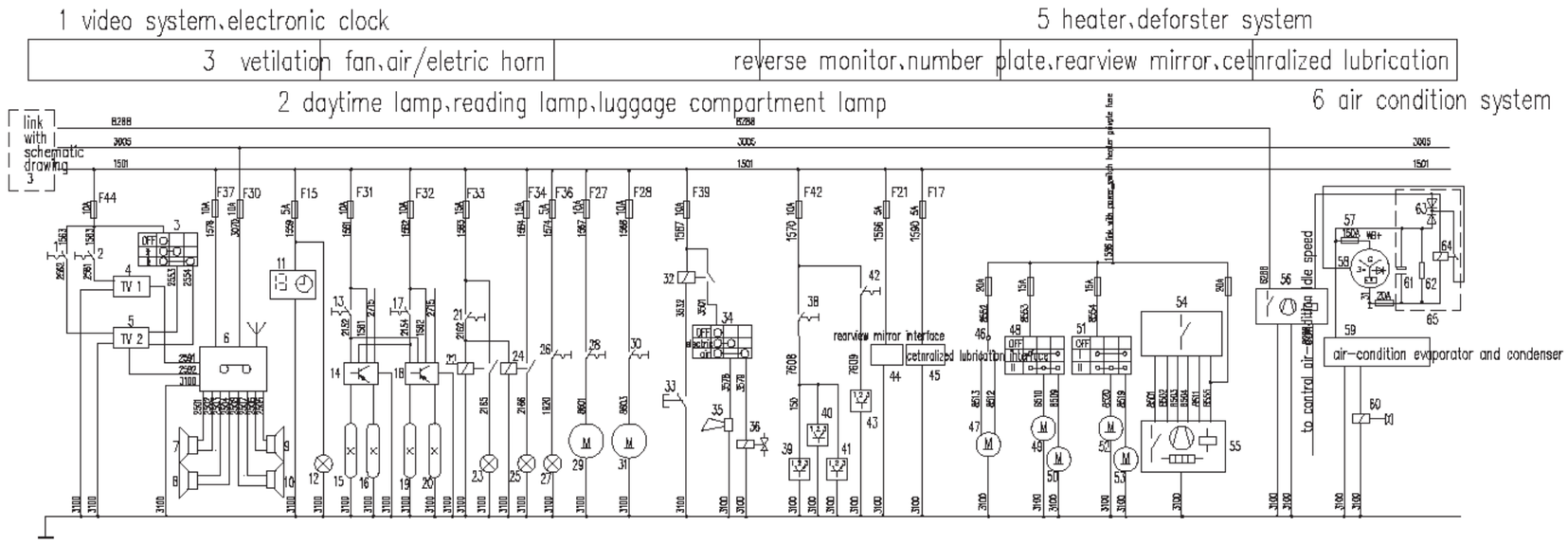
**Electric schematic diagram of the complete car (3)**




| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | spare power connecting ver | 7 | left reverse lamp | 13 | door emergency valve rotated warning | 19 | left Side sign lamp | 25 | dryer | 31 | right front fog lamp | 37 | left rear fog lamp | 43 | wiper relay |
| 2 | wash room switch | 8 | right reverse lamp | 14 | stop switch | 20 | right Side sign lamp | 26 | left high beam | 32 | left brake lamp | 38 | right rear fog lamp | 44 | wiper motor |
| 3 | toilet power relay | 9 | Reverse monitor | 15 | service switch | 21 | left height lamp | 27 | right high beam | 33 | right brake lamp | 39 | left front turning lamp | 45 | scrubber motor |
| 4 | toilet | 10 | CZM271 lamp control module | 16 | monitor switch | 22 | right height lamp | 28 | left low beam | 34 | flowing axle electro-magnetic valve | 40 | right front turning lamp | 46 | daytime lamp switch |
| 5 | toilet occupied indicator | 11 | Following axle locked switch | 17 | | 23 | left front Position lamp | 29 | right low beam | 35 | left turning lamp | 41 | Knob switch indicate | 47 | wiper high speed relay |
| 6 | Reverse lamp switch | 12 | door emergency valve caver | 18 | pen waring | 24 | right front Position lamp | 30 | left front fog lamp | 36 | right turning lamp | 42 | wiper switch | 48 | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 6125BYD4-0000-3700003 | | |
| 更改标记 | 更改数量 | 更改单 | 更改文件号 | 更改时间 | | 电气系统原理图和 | 重量 | 重量kg | 比例 | 张次 | |
| 设 计 | 审核数 | 2011110B | 标准化 | | | | | | 1:1 | 1 | |
| 审 核 | | | 批准时间 | | | 成都客车股份有限公司 | | | | | |
| 工 艺 | | | 批准 | | | 厦门金龙联合 | | | | | |
| 标 准 | | | 会签数 | | | 汽车工业有限公司 | | | | | |

**Electric schematic diagram of the complete car (4)**




| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TV2 power switch | 11 | electric clock | 21 | reading lamp switch | 31 | rear windshield motor | 41 | rear number plate | 51 | rear blower switch | 61 | capacitance |
| 2 | TV1 power switch | 12 | driver lamp | 22 | left reading lamp relay | 32 | horn relay | 42 | inner display switch | 52 | rear high speed blower motor | 62 | resistance |
| 3 | Switch,TV overturn | 13 | left daylight switch | 23 | left reading lamp | 33 | horn button | 43 | inner display | 53 | rear low speed blower motor | 63 | diode graop |
| 4 | TV1 | 14 | daylight controller | 24 | right reading lamp relay | 34 | Horn switch assy | 44 | rear view power interface | 54 | heater controller | 64 | control relay |
| 5 | TV2 | 15 | left front daylight lamp | 25 | right reading lamp | 35 | Electric horn | 45 | cetnralized lubrication power interface | 55 | heater | 65 | capacitance box |
| 6 | DVD player | 16 | left rear daylight lamp | 26 | Switch, luggage compartment lamp | 36 | air horn electric solenoid valve | 46 | deforster switch | 56 | air-condition panel | 66 | |
| 7 | left front speaker | 17 | right daylight lamp switch | 27 | luggage compartment lamp | 37 | | 47 | deforster motor | 57 | 150A air condition fuse | 67 | |
| 8 | left rear speaker | 18 | daylight lamp controller | 28 | front winshield switch | 38 | outer number plate switch | 48 | front blower switch | 58 | generator for air-condition | 68 | |
| 9 | right front speaker | 19 | right front daylight lamp | 29 | front sky window motor | 39 | front number plate | 49 | front high speed blower motor | 59 | air-condition evaporator and | 69 | condenser |
| 10 | right rear speaker | 20 | right rear daylight lamp | 30 | rear sky window switch | 40 | side number plate | 50 | front low speed blower motor | 60 | Air-condition compressor | 70 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | 图样标记 | 6125BYD4—0000—3700004 |
| 更改标记 | 更改处数 | 更改者 | 更改文件号 | 更改日期 | 更改说明 | 主要参数 | 电气系统原理图三 |
| 主 干 | 贾海明 | 20111108 | 标准化 | | | | 重量 / 质量kg / 比例 1:1 / 张次 1 |
| 审 核 | | | 会签栏 | | | 设计参数 | 成型前电器总系统 |
| 审 查 | | | 批准 | | | 发布 | 厦门金龙联合汽车工业有限公司 |
| 主 管 | | | 实施日期 | | | | |