

**GREEN THE WORLD**

**Operation Manual for Shuttle Personnel Carrier**



Thanks for buy our product. For your better use, please read through this manual before operate this vehicle to avoid any possible damage due to improper operation; and keep it in a proper way after reading for future reference.

**Important Information:**

Particularly important information is distinguished by the following notations:

**▼ Warning:**

**Fail to follow Warning instructions could result in severe injury or death to the vehicle occupants, bystanders or persons inspecting or repairing the vehicle.**

**Caution!**

**Fail to follow Caution instructions could cause damage to the vehicle.**

**Special Notice:**

**Because the seat & backrest wrapping film may stick to the seat vinyl and cause seat vinyl fading or stained, please remove the seat & backrest wrapping film when you start to use the vehicle!**

**If you have to stock the vehicle for a long time, please also remove the seat & backrest wrapping film.**

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## Products pictures for reference!



EG6088K



EG6118KA



EG6118KB



EG6158K

## 1. Brief Introduction

Our electric shuttle personnel carrier is a kind of environment-friendly passenger vehicle. It can be used in vacationland, villa areas, garden-style hotels, tourist scenic spots, etc.. Our electric shuttle personnel carrier is an ideal off-road electric vehicle with excellent performance, fashionable design, luxurious and delicate internal decoration as well as comfortable and safe ride.

## 2. Technical Description

Vehicle Type	Description	EG6088K		EG618KA		EG6118KB		Personnel Carrier		EG6158K	
		Dimensions(mm) (LxWxH)	4270X1490X2050	Dimensions(mm) (LxWxH)	4270X1490X2050	Dimensions(mm) (LxWxH)	5020X1490X2100	Dimensions(mm) (LxWxH)	5020X1490X2100	Dimensions(mm) (LxWxH)	5020X1490X2100
Passenger Capacity	Transmission system	With clutch	Without clutch								
Range (km) (smooth and straight road, 20km/h, full load)	6Vx8	3kW	60	/	/	/	/	/	/	/	/
Maximum Speed(km/h)	6Vx8	5kW	/	/	/	/	/	/	/	/	/
Parking Ability	6Vx12	5kW	/	100	/	100	80	/	75	80	80
Brake Distance(V=20Km/h)	6Vx12	7.5kW	/	115	/	110	110	/	100	105	105
Min. ground clearance (mm)	6Vx16	5kW	/	/	/	/	90	/	90	/	/
Parking Ability	48V/3kW	35	/	/	/	/	/	/	/	/	/
Brake Distance(V=20Km/h)	48V/5kW	/	/	/	/	/	40	/	40	/	/
Min. ground clearance (mm)	72V/5kW	/	32	/	32	50	30	48	48	25	25
Parking Ability	72V/7.5kW(AC)	/	40	/	40	50	35	50	50	40	40
Minimum Turning Radius(m)	4.5		4.5		5.35		5.35		5.35		5.35
Maximum Gradeability	20%		15%(5kw)		15%(5kw)		20%		15%(5kw)		20%
Noise(Db)	60		60		60		60		60		60
Tread(mm)	Front	1210	1210	1210	1210	1210	1210	1210	1210	1210	1210
	Rear	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Parking Ability	4	4	4	4	4	4	4	4	4	4	4
Brake Distance(V=20Km/h)	140	140	140	140	140	140	140	140	140	140	140
Min. ground clearance (mm)	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%

Vehicle Type	Description	Closed Electric Vehicle								
		EG6088KF		EG618KAF						
Dimensions(mm) (LxWxH)	4230X1490X2050	4230X1490X2050	5000X1490X2050	5000X1490X2050	5000X1490X2050					
Passenger Capacity	8	11	11	11	11					
Transmission system	With clutch	Without clutch	With clutch	Without clutch	With clutch					
Range (km) (smooth and straight road, 20km/h, full load)	6Vx8	3kW	60	/	/					
Maximum Speed(km/h)	6Vx8	5kW	/	/	/					
Parking Ability	6Vx12	5kW	/	100	/					
Brake Distance(V=20Km/h)	6Vx12	7.5kW	/	115	/					
Min. ground clearance (mm)	6Vx16	5kW	/	/	/					
Parking Ability	48V/3kW	35	/	/	/					
Brake Distance(V=20Km/h)	48V/5kW	/	/	/	/					
Min. ground clearance (mm)	72V/5kW	/	32	/	32					
Parking Ability	72V/7.5kW(AC)	/	40	/	32					
Minimum Turning Radius(m)	4.5		4.5		5.35		5.35		5.35	
Maximum Gradeability	15%		20%(5kw)		15%(5kw)		20%		15%(5kw)	
Noise(Db)	60		60		60		60		60	
Tread(mm)	Front	1210	1210	1200	1200					
	Rear	1200	1200	1185	1185					
Parking Ability	4	4	4	4	4					
Brake Distance(V=20Km/h)	140	140	140	135	135					
Min. ground clearance (mm)	20%	20%	20%	20%	20%					

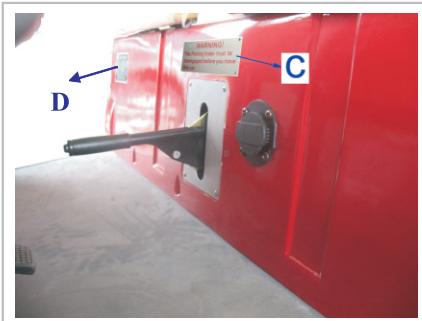
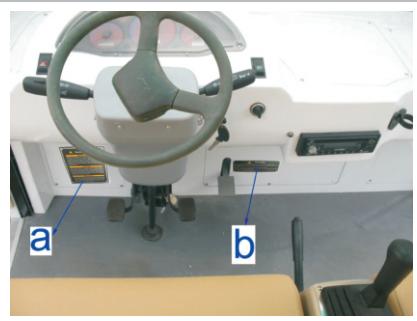
### 3. Important Labels

#### Safety and Instruction Labels

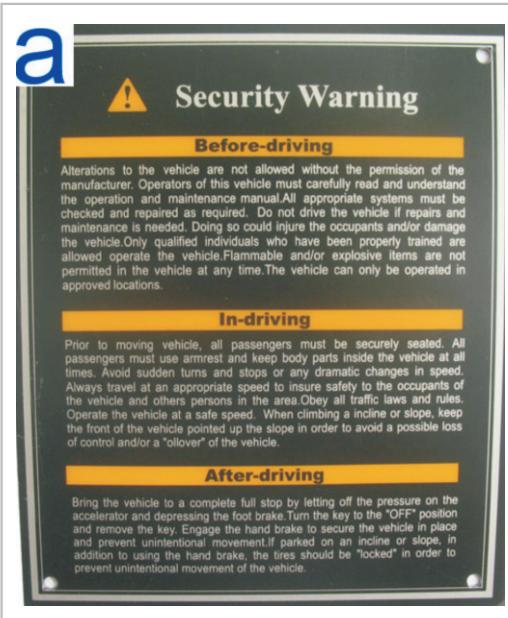
##### ▼ Warning:

Please read the following labels carefully before operating the vehicle, and promptly replace any labels which become unreadable or removed.

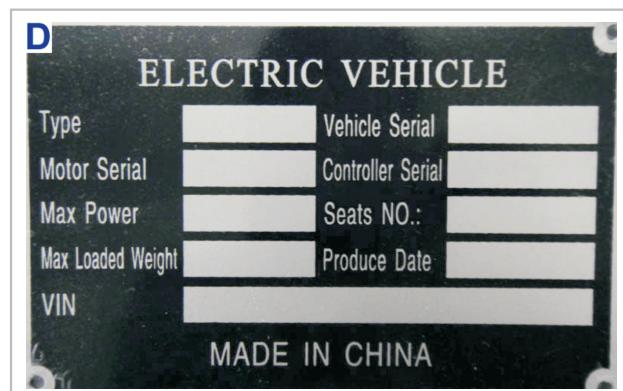
#### Label Position



#### Label Content



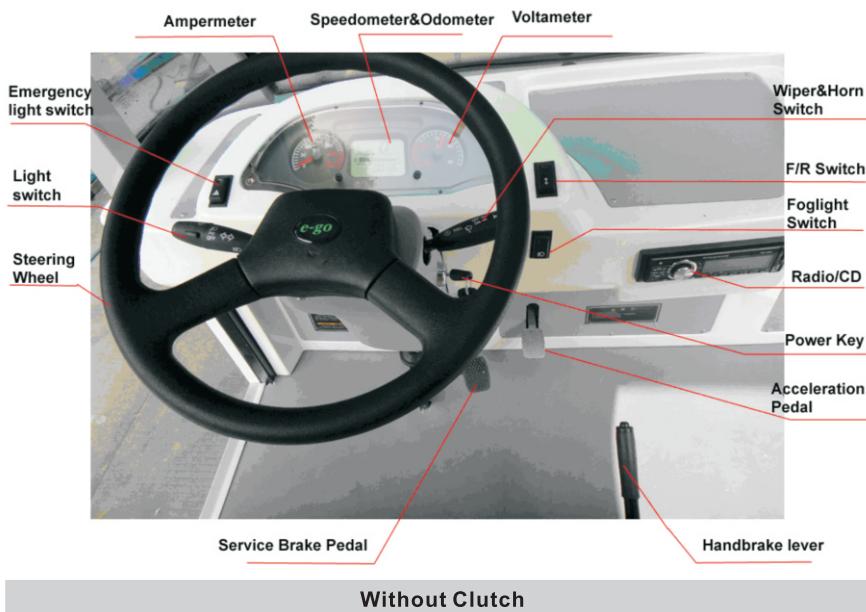
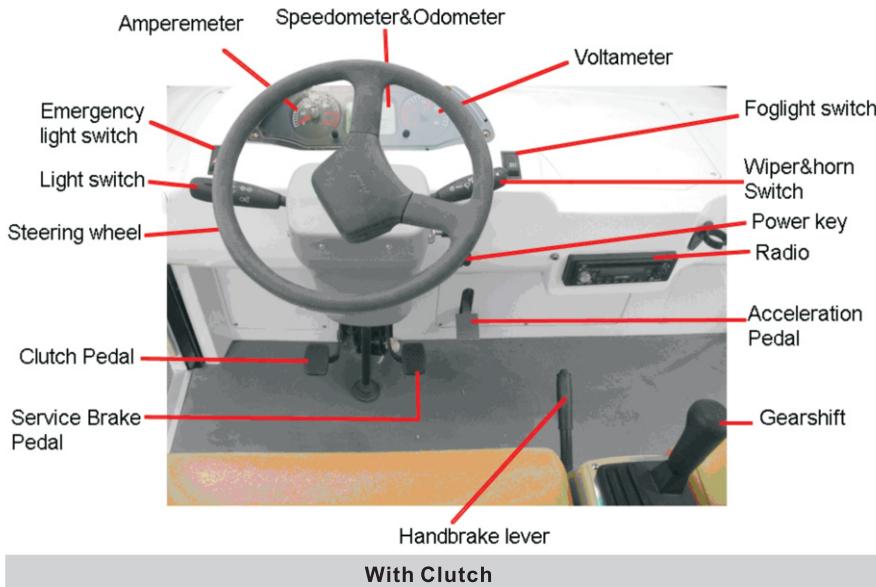
Name Plate (Vehicle Information)



For warranty purpose, it's necessary to provide the information on the name plate.

## 4. Operation System

### 1) Schematic Figure of Operation System



### 2) Functions of Operating System

**Power Key** — Control the power supply of the whole vehicle. When the key being inserted into it and turned clockwise, it will switch on lights, horn and the control system; when the key being turned back, the power will be switched off.



**Acceleration Pedal** — Control the speed. It should be stepped down slowly. The vehicle speeds up with the gradual stepping-down, and reaches the full speed when the pedal is stepped to the bottom. The vehicle slows down when the pedal being released gradually. When the pedal is fully released, electric brake works.

**Service Brake pedal** — Decelerate the vehicle.

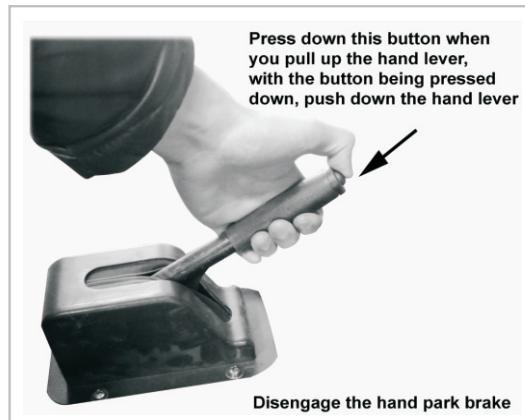
**Clutch Pedal** — Control the clutch. Work together with the gear shift to change the gear position of the vehicle. When driving, do not ride the clutch, otherwise, it will damage the clutch.

**Handbrake Lever** — Park and brake the vehicle.

To engage the parking brake, pull up the hand brake lever to the end;



**To disengage the parking brake**, pull up the hand brake lever to the end and then press down the button on the top of the brake lever, with the button being pressed down, push down the brake lever to the bottom.



#### WARNING!

Please always release the brake handle completely before you drive the vehicle.

**Steering wheel** — Control the driving direction

**Amperemeter** — Indicate the current of the working vehicle.

#### WARNING!

When the indicator reaches the red area, it means the vehicle is over-loaded.

Stop the vehicle and reduce some loading.



**Voltameter** — Indicate the voltage of battery. It ranges from 20V to 60V (for 48V system) and 30V to 90V (for 72V system) from left to right, including 2 sections highlighted by Red and White. White section represents the battery is in normal status. With the consumption of the power, the indicator will fall from the right to the left gradually. When the indicator comes to the intersection point of the white section and the red section, it represents that the battery will come to the end in capacity, now the battery should be re-charged. When the indicator comes to the red section, the vehicle is prohibited to use, the battery should be recharged immediately.



**Speedometer & Odometer & Battery power meter** — The speedometer is to indicate the speed of the vehicle is running and the odometer is to indicate the accumulated distance the vehicle has run, the battery power meter is to indicate the battery power left. There are 10 divisions on the meter (from 0 to 1). The meter will decline from the top to the bottom as the battery discharges. Don't drive the vehicle if only 2 divisions left.

**Speedometer & Odometer & Battery power meter**

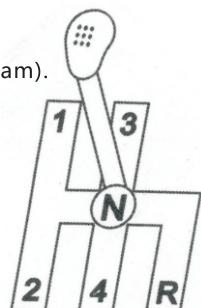


**Light Switch** — Control light system, including turning signal, headlight (includes high beam and lower beam).

**Wiper & Horn Switch** — Control the wiper and horn.

**Emergency Light Switch** — Control the emergency light.

**Fog light Switch** — Control the fog light.



**Gearshift** — Available on the bus with gear box and clutch. There is totally 4 forward positions and 1 reverse position. Forward shift includes 1, 2, 3 and 4. Reverse shift is R. It is recommended to use 1 for climbing, use 2, 3 and 4 for flat road.

### How to shift & select the gear position?

Step down the clutch to the bottom completely; shift the lever to Null position if it's not there, then shift the lever to your desired position as right picture.

To shift the lever to 1st position from Null: push the lever to left side first; then push to the front;

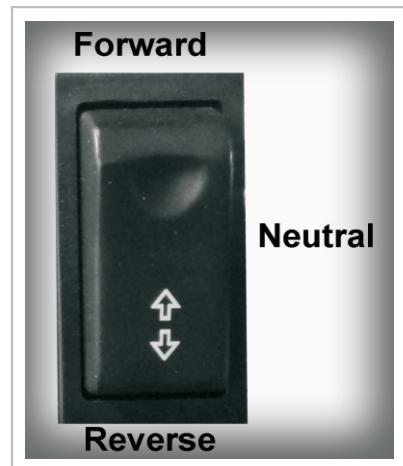
To shift the lever to 2nd position from Null: push the lever to left side first; then push to the back;

To shift the lever to 3rd position from Null: push forward the lever directly;

To shift the lever to 4th position from Null: pull backward the lever directly;

To shift the lever to R position from Null: push the lever to right side first; then push to the back. The reverse buzzer will beep to remind people around the vehicle.

**F/R Switch** —Available on the bus with automatic drive system. This is a three-position switch, depressing the upper part gets the vehicle moving forwards while depressing the lower part gets the vehicle moving backwards, and the middle is neutral.



#### WARNING!

This switch must be fully depressed into the proper position, or the electric system and motor will be damaged.

**NOTE:** The buzzer will beep when the lower part of this switch is depressed, to warning people around your vehicle.

## 5. Operational Process

### 5.1 Start the vehicle

1) Switch on the power key;

2) If your bus is equipped with gear box and clutch, step the clutch pedal to the bottom, select 1<sup>st</sup> position if go forward and R position if go backward. If go forward, after start the vehicle, change to right shift and make sure to use right speed when driving. Selection standard is to make sure that the working current of motor stays as small as possible as long as this current is enough for driving. If your bus comes with automatic drive system (stepless speed change system), press down the F/R switch to F position.

3) Release the parking handbrake lever.

4) Release the clutch pedal slowly (for bus with gear box and clutch).

5) After the clutch is released completely (for bus with gear box and clutch), step down the acceleration pedal smoothly; in this case, the vehicle starts running.

#### Caution!

1) Step down the clutch pedal to the bottom completely before shift the gearshift lever, otherwise, the gear inside the gear box may be damaged.

2) Don't ride the clutch when the vehicle is running.

3) Avoid running at high speed with lower gear position and low speed with higher gear position.

4) Always step down the accelerator gradually to avoid too big current.

#### ▼ Warning:

If you step the acceleration pedal before switching on the power key, the vehicle will not run. In this case, you should release the acceleration pedal first, and step it again, thus the vehicle will start running.

### 5.2 Stop the Vehicle

1) Step the service brake pedal to decelerate the vehicle until it stops completely and shifts the gear to Null position if the bus comes with gear box and clutch or press the F/R switch to the Null position if the bus comes with automatic drive system;

2) Engage the handbrake lever to park the vehicle;

3) Release the service brake;

4) Switch off all lights;

5) Switch off the power key and take out the key.

### 5.3 Charge the batteries

#### Caution!

- 1) We have two different kinds of charger for you to choose, one is exterior charger and the other is build-in (onboard) charger. Before you use the charger, please read the charger operation manual which attached with the charger.
- 2) Explosive hydrogen gas is produced while battery is charged. Only charge the battery in well-ventilated areas.
- 3) Before using the charger, please check if the battery charger you are getting to use is correctly rated as per your local AC electricity network.
- 4) Do not disconnect the DC output cord from the battery receptacle when the charger is ON, otherwise an arc could occur which may cause an explosion.
- 5) In summer time, do not charge the batteries when they are still hot, wait until they are cooled down.
- 6) Do not expose the batteries in sunshine when they are being charged.
- 7) In winter time when the temperature is low, charge the batteries in doors.
- 8) Charge the batteries in the same day when they are discharged, do not wait until the next day or after 24 hours.
- 9) Use the charger provided by the manufacturer to charge the batteries. Using other chargers may damage the batteries.
- 10) It is prohibited to open the housing of the charger.
- 11) Only qualified electrician is allowed to open the housing of the charger.
- 12) The charger should be stored in safe and dry room with good ventilation.
- 13) The charger should be packed properly if not used for long time.

Below is the charging procedure:

#### • Turn Off The Power Of The Whole Vehicle

- 1) When it's non-onboard charger, one set of batteries, the process is as follows:
  - a) Connect charger to DC receptacle on the vehicle;
  - b) Connect the charger to AC power;
  - c) Turn on the charger
  - d) Turn off the charger when the batteries are fully charged, disconnect the charger from AC power first, then disconnect the charger with AC receptacle;
- 2) When it's non-onboard charger, two sets of batteries, the process is as follows:
  - a) Disconnect the two DC receptacles under the driver's seat, refer to left picture;
  - b) Connect the chargers to the DC receptacles, one charger to one receptacles;
  - c) Connect the chargers to AC power;
  - d) Turn on the chargers;



- e) Turn off the chargers when the batteries are fully charged, disconnect the chargers with AC power first, then disconnect the chargers with DC receptacles;
  - f) Connect the two DC receptacles under the driver's seat.
- 3) When it's onboard (build-in) charger(s), no matter there is one set or two sets of batteries, the process is as follows:
    - a) Connect the charger(s) with AC power;
    - b) Turn on the charger(s);
    - c) Turn off the charger(s) when the batteries are fully charged, disconnect the charger(s) with AC power;

## 6. Rules for Safe Operation

The driver should have a good knowledge of the operation system of the vehicle and its features; meanwhile follow the rules for safe operation.

#### ▼ Warning:

- Drive the vehicle off road unless it is allowed.
- The vehicle cannot be over-loaded, otherwise the motor will be damaged, the vehicle will lose control and its life will be shortened.
- Unqualified persons are prohibited to drive the vehicle.
- Make sure this vehicle runs in its rated climbing ability.
- Don't overtake other vehicles at crossroad, in blind area or in other dangerous zone.

#### WHILE OPERATING THE VEHICLE

- Keep your entire body inside the vehicle, keep seated and holding on while the vehicle is moving.
- Do not start the vehicle until all occupants are securely seated.
- Keep your hands on the steering wheel and your eyes on the path you are going.
- Always back the vehicle slowly and watch the back carefully.
- Avoid starting and stopping suddenly.
- Avoid turning the vehicle too sharply at high speed.
- Always drive slowly up and down on the slope.
- Do not make any modification or addition which may affect the capacity or safety.
- Children are not allowed to play in the vehicle. Children should be seated between adults and protected while the vehicle is moving.

## 7. Maintenance

Users should do maintenance as follows, which will decide the performance of the vehicle and life:

### 7.1 Maintenance of Battery:

#### ▼ Warning:

**Battery electrolyte is poisonous and dangerous, may cause severe burns, injury, etc.. Always wear protective clothing, gloves, and goggles when handling batteries, electrolyte, and charging your battery.**

**KEEP IT OUT OF REACH OF CHILDREN.**

#### 1) Cleaning

a. The exterior of the battery, the connection wires and bolts should always be kept clean and dry. When cleaning, please make sure all vent caps are tightly in place. Clean the battery top with a cloth or brush and solution of baking soda and water. When cleaning, do not allow any cleaning solution, or other foreign matter to get inside the battery. This should be done every week.

b. Clean battery terminals and the inside of cable clamps using a post and clamp cleaner. Clean terminals will have a bright metallic shine. This should be done when it is necessary.

c. Reconnect the clamps to the terminals and thinly coat them with petroleum jelly (Vaseline) to prevent corrosion.

#### ▼ Warning:

**Before you disconnect any battery cable from any terminal on the battery, please always remove the power by disconnecting the main battery cable from the controller.**

#### 2) Checking the terminals and nuts

The connection of the battery should always be kept in good condition. Please check every week on whether any battery cable terminal or nut has become loose in order to prevent any sparkle or damage to terminals. Please check every week on whether any battery cable is damaged or not, the damaged battery cable should be replaced immediately.

#### 3) No foreign matter

Do not place any objects on the battery and do not connect the positive pole to the negative pole. This may cause a short circuit, dangerous spark or may cause damage to the battery or injury to your body.

#### 4) Recharging

a. As long as you use the vehicle, regardless of how long you have used it, the battery shall be recharged fully on the same day. Any delay on the re-charging will cause negative effect on the battery.

**Notes:** the lead-acid battery does not develop a memory, so need not be fully discharged before recharging.

b. If the vehicle is going to be kept unused for a certain long time, the battery shall be fully recharged first. After that, the battery shall be fully recharged every 2 weeks.

c. When driving, the driver shall be always aware of the drop level of the battery power from the battery power meter, any drop means the battery power is diminishing. Besides, the driver shall estimate the distance needed to be taken, and recharge the battery at a proper time in case that the vehicle cannot get back to the recharging station in time for recharging.

#### ▼ Warning:

**Please make sure the battery is recharged before the battery power meter shows 20% power is left inside the battery. Over-discharged battery will have a very short service life and will make the recharging very difficult.**

#### ▼ Warning:

**During recharging, the vehicle shall be parked in a well-ventilated area with the fill caps tightly secured. Keep far away from any flame and sparks to avoid any explosion or fire that could cause physical injury or damage to the property.**

#### 5) WATERING

Flooded batteries need water. More importantly, watering must be done at the right time and in the right amount or else the battery's performance and longevity suffers.

Water should always be added after fully charging the battery. Prior to charging, there should be enough water to cover the plates. If the battery has been discharged partially or fully, the water level should also be above the plates. Keeping the water at the correct level after a full charge will prevent having to worry about the water level at a different state of charge. Depending on the local climate, charging methods, application, etc.. It's recommended that batteries be checked once a month until you get a feel for how thirsty your batteries are.

### **Important things to remember:**

1. Do not let the plates get exposed to air. This will damage (corrode) the plates.
2. Do not fill the water level in the filling well to the cap. This most likely will cause the battery to overflow acid, consequently losing capacity and causing a corrosive mess.
3. Do not use water with a high mineral content. Use distilled or deionized water only.

▼ **Warning:** The electrolyte is a solution of acid and water so skin contact should be avoided.

### **Step by step watering procedure:**

1. Open the vent caps and look inside the fill wells.
2. Check electrolyte level; the minimum level is at the top of the plates.
3. If necessary add just enough water to cover the plates at this time.
4. Put batteries on a complete charge before adding any additional water (refer to the Charging section).
5. Once charging is completed, open the vent caps and look inside the fill wells.
6. Add water until the electrolyte level is 1/8" below the bottom of the fill well.
7. A piece of rubber can be used safely as a dipstick to help determine this level.
8. Clean, replace, and tighten all vent caps.

**Caution!** Never add acid to a battery.

## **6) TESTING**

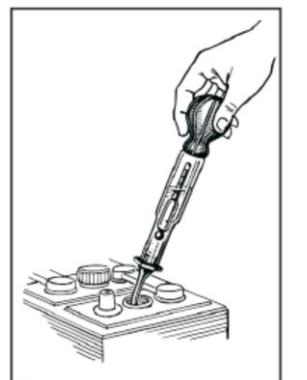
Visual inspection alone is not sufficient to determine the overall health of the battery. Both open-circuit voltage and specific gravity readings can give a good indication of the battery's charge level, age, and health. Routine voltage and gravity checks will not only show the state of charge but also help spot signs of improper vehicle, such as undercharging and over-watering, and possibly even locate a bad or weak battery. The following steps outline how to properly perform routine voltage and specific gravity testing on batteries.

### **I. Specific Gravity Test (Flooded batteries only)**

1. Do not add water at this time.
2. Fill and drain the hydrometer 2 to 4 times before pulling out a sample.
3. There should be enough sample electrolyte in the hydrometer to completely support the float.
4. Take a reading, record it, and return the electrolyte back to the cell.
5. To check another cell, repeat the 3 steps above.

### **6. Check all cells in the battery.**

7. Replace the vent caps and wipe off any electrolyte that might have been spilled.
8. Correct the readings to 80° F:  
Add .004 to readings for every 10° above 80° F  
Subtract .004 for every 10° below 80° F
9. Compare the readings.
10. Check the state of charge using Table 1.



Temperature °C °F	Hydrometer Reading US	Hydrometer Reading Trojan
43 120	1.254	1.262
49 110	1.258	1.259
37 100	1.262	1.256
32 90	1.266	1.253
26 80	1.270	1.250
21 70	1.274	1.247
15 60	1.278	1.244
10 50	1.282	1.241
4 40	1.286	1.238
0 30	1.290	1.235

The readings should be at or above the factory specification of 1.277 +/- .007. If any specific gravity readings register low, then follow the steps below.

1. Check and record voltage level(s).
2. Put battery(s) on a complete charge.
3. Take specific gravity readings again.

If any specific gravity readings still register low then follow the steps below.

1. Check voltage level(s).
2. Perform equalization charge. Refer to the Equalizing section for the proper procedure.
3. Take specific gravity readings again.

If any specific gravity reading still registers lower than the factory specification of 1.277 +/- .007 then one or more of the following conditions may exist:

1. The battery is old and approaching the end of its life.
  2. The battery was left in a state of discharge too long.
  3. Electrolyte was lost due to spillage or overflow.
  4. A weak or bad cell is developing.
  5. Battery was watered excessively previous to testing.
- Batteries in conditions 1 - 4 should be taken to a specialist for further evaluation or retired from service.

## II. Open-Circuit Voltage Test

For accurate voltage readings, batteries must remain idle (no charging, no discharging) for at least 6 hrs, preferably 24 hrs.

1. Disconnect all loads from the batteries.
2. Measure the voltage using a DC voltmeter.
3. Check the state of charge with Table 1.
4. Charge the battery if it registers 0% to 70% charged.

If battery registers below the Table 1 values, the following conditions may exist:

1. The battery was left in a state of discharge too long.
2. The battery has a bad cell.

Batteries in these conditions should be taken to a specialist for further evaluation or retired from service.

**TABLE 1. State of charge as related to specific gravity and open circuit voltage**

Percentage of Charge	Specific Gravity Corrected to 80°F	Open-Circuit Voltage					
		6V	8V	12V	24V	36V	48V
100	1.277	6.37	8.49	12.73	25.46	38.20	50.93
90	1.258	6.31	8.41	12.62	25.24	37.85	50.47
80	1.238	6.25	8.33	12.50	25.00	37.49	49.99
70	1.217	6.19	8.25	12.37	24.74	37.12	49.49
60	1.195	6.12	8.16	12.24	24.48	36.72	48.96
50	1.172	6.05	8.07	12.10	24.20	36.31	48.41
40	1.148	5.98	7.97	11.96	23.92	35.87	47.83
30	1.124	5.91	7.88	11.81	23.63	35.44	47.26
20	1.098	5.83	7.77	11.66	23.32	34.97	46.63
10	1.073	5.75	7.67	11.51	23.02	34.52	46.03

## 7) Equalizing charge

Equalizing is an overcharge performed on flooded lead acid batteries after they have been fully charged. It reverses the buildup of negative chemical effects like stratification, a condition where acid concentration is greater at the bottom of the battery than at the top. Equalizing also helps to remove sulfate crystals that might have built up on the plates. If left unchecked, which is called sulfation, will reduce the overall capacity of the battery.

When the battery is fully charged, if keeping it connected with the charger, every 8 hours, the charger will charge 8 minutes to maintain the battery, after 20 hours, equalizing charge will start and last 2 hours. Equalizing charge can also be started manually by pressing down the 'STOP' button for 5 seconds when charging. Equalizing charge will start in 1 hour when the battery is fully charged.

Equalizing is recommended when low or wide ranging specific gravity (+/- .015) is detected after fully charging a battery.

## 8) Battery installation

Tighten the battery cables to battery terminals with torque of 95-105lbs.inch or 10.7-11.9 N.M. Make sure there is nothing else between the battery cable lug and battery terminal post.

### ▼ Warning:

**When working with the battery, DO NOT put wrenches or any other metal objects across the battery terminals, otherwise, an arc can occur, and it may cause explosion of the battery and physical injury.**

**Battery is installed or replaced only by the qualified electrician.**

## 7.2 Maintenance of the Gear Box:

- ①The clearance for the clutch should be kept between 2-3mm.
- ②The friction plate should be changed periodically; the friction value on one side should not exceed 2mm.
- ③Adjust the flatness of the platen spring plate (feeling manually): first tighten the screws diagonally, use your hand to check the flatness of the spring plate. If not flat, tighten the screws for the non-flat part.
- ④Change the gear oil inside the gear box periodically (for new vehicle, change the oil after one month or accumulated running distance exceed 1200kms;

change the oil again two months later, then change the oil every half a year)  
The oil type is 85W/90GL.

- ⑤Clean the gear box before changing the oil.

### Caution!

Never mix different oils.

### 7.3 Maintenance of the Traction DC Motor

- ① This traction motor is designed to use at the sea level not beyond 1200 meters and in a temperature between -25°C and 40°C.
- ② This motor can work properly with a voltage produced by battery in series.
- ③ Never keep the motor running idly.
- ④ No explosive gas shall exist in the air.
- ⑤ Any mud, sand and other clinging objects shall often be cleaned away so as to provide good heat-radiation.
- ⑥ Check the carbon brush every three months, change the worn carbon brush and weaken carbon brush press spring.

#### Trouble-Shooting for Motor:

▼ **Warning:** Only Qualified Electrician Can Change and Adjust The carbon Brush and Commutator.

Item	Symptoms	Possible Causes
	All copper plates turn black.	The pressure of brush is incorrect.
	The commutator turns black in a certain order and in groups.	Short circuit in the commutator or armature coil; poor welding or disconnection between the commutators and the armature coil.
	The commutator turns black in disorder.	The central line of the commutator deviates or its surface is not round and not smooth.
	The brush wears out, turns colors and become broken.	The motor vibrates; the clearance between the brush and its holder is too big; the clearance between the brush and commutators is too big; the mica between different commutators extrudes; the brush is made by wrong materials; the brush is wrong in type.
	Big sparkles	The motor is over-loaded; the commutators are not clean, not round or not smooth; mica or some commutators extrude; the brush is not ground properly; the brush is big in pressure; the brush is wrong in type; the brush is jammed in the brush holder; the brush holder become loose or vibrating; the polarity and sequence of magnetic poles become wrong.
	The brush and its wires get hot.	Big sparkles of the brush; poor contact between brush and soft wires; small section area of soft wires.
	The brush is noisy	The surface of the commutators is not smooth.

### 7.4 Maintenance of the Traction AC Motor

If your vehicle is equipped with AC motor, then the motor is maintenance free!

### 7.5 Maintenance of the Speed Controller

The speed controller of the vehicle is wholly imported, which adopts high frequency MOS technology to realize the control of speed, torque and brake with smoothness, silence, high efficiency and energy-save.

- Prevent the vehicle runs way when starts. When the vehicle starts, the controller will inspect signal from the accelerator, if signal exceeds 20%, the HPD (protection unit in the controller) will prohibit the output of controller.
- When the vehicle starts, the SRO (protection unit in the controller) will effect. The controller will self-check when the vehicle is running. If any defect is inspected, the controller will stop the vehicle to protect the operator and the vehicle.

#### ① Periodical Maintenance:

- a.Check if the contact between contacting points of the contactor is in good condition, check if any contact sticks or is jammed mechanically.
- b.Check if the micro switch in the accelerator can be switched on and off properly.
- c.Check if the switch for turn signal can be switched on and off properly.
- d.Check if all the connections between the motor, the battery, and the controller are in good condition.

Please use the following cleaning procedure for routine maintenance:

- 1)Turn the power key to OFF position.
- 2)Remove power by disconnecting the battery.
- 3)Discharge the capacitors in the controller by connecting a load (such as a contactor coil or a horn) across the controller's B+ and B- terminals.
- 4)Remove any dirt or corrosion from the connector areas. The controller should be wiped clean with moist rag. Dry it before reconnecting the battery. The controller should not be subjected to pressured water flow from either a standard hose or a power washer.
- 5)Make sure the connections are tight, but do not over-tighten them.

**NOTES:** All above checks shall be performed under power off. Above checks shall be carried out once every 3 months; after the power key turns off, the wave-filter capacitor in the controller unit shall keep discharging for a few minutes more; don't wash the electrical parts with water. It is allowed to remove dust with a brush or high-pressure air.

## 7.6 Maintenance of Brake System

- ① Step the brake pedal with a force of 30kg or so, the pedal travel shouldn't exceed 2/3 of the full free pedal travel.
- ② The clearance for the brake plate is self-adjusted. Under a force of around 20kgs, the parking brake handle should be fixed in one gear from 5 to 10 ratchet. When the brake handle is released completely, the brake function will stop.
- ③ Inspect and change brake shoe, add lubrication into the brake bearing periodically.

## 7.7 Lubrication of the Whole Vehicle

- ① Use 901 vehicle brake oil DOT3 as brake oil;
- ② Use 1L of 85W/90GL lubrication oil for gear box;
- ③ Use 1L of 90GL hypoid gear oil for the rear axle;
- ④ Lubrication points: a. steering gears; b. horizontal bars; c. steering ball joints; d. bearings;

## 7.8 Running-in of New Vehicle:

In order to guarantee the performance of the vehicle and enhance its reliability and working lift, all parts in motor should experience a certain period of running-in before the motor works with its maximum capacity, thus, each new vehicle is required to give one month of running-in time, detail procedure as per the following:

- ① Check the levels of oil, water and liquids carefully before running-in and fill them as requested if insufficient. The tire should meet 145R12 with the air pressure of 3.5kgf/cm<sup>2</sup>.

② During running-in time, the speed should be limited as follows:

Current Model	Shift	1	2	3	4
EG6088		100A	50A	50A	55A
EG6118KA, EG6118KB		110A	55A	50A	65A
EG6158K		110A	60A	55A	70A

③ If possible, try your best to avoid driving on poor conditions roads.

④ Check and tighten regularly the fixing parts of each connecting points.

### Notes:

- 1)To avoid any damage on the brake shoe, handbrake should be released to its bottom before staring the vehicle.
- 2)The lubricant for rear power assembly must be applied and changed as per user's manual.
- 3)The brake system must be adjusted once every 3 months.
- 4)The electricity system must be checked once every 3 months (especially main circuit) for its fastening parts and wiring connections. Meanwhile the contactor should be checked, any defective parts should be replaced immediately. Its dust should be cleaned by low pressure air.
- 5)The electric contactors easily become hot if their mutual contact is not in good condition, so special attention should be paid regularly to the electric contactors.
- 6)When changing the fuse, make sure that the new fuse is right in rated current.
- 7)For the sake of safety, disconnect the positive pole from the battery when maintenance is done.
- 8)Never step the accelerator hard and frequently, which may shorten the life of the controller.
- 9)It is prohibited to fill any other liquids (such as battery additives, mineral water and tap water) into the battery, ONLY the distilled water is allowed to fill in the battery.
- 10)Do not drive at high speed when going downhill; slow down the vehicle when turning; and remind the passengers to hold on when turning and going downhill.
- 11)Children are not allowed to play in the vehicle; Children should be seated between adults and vicleed by adults when the vehicle is running.

## 8. Periodic Maintenance Charts

Regular maintenance is required for the best performance and safe operation of the vehicle.

### ▼ Warning:

**Make sure to turn off the power key and apply the park brake when you do the maintenance unless specified. If the owner is not familiar with the maintenance of this vehicle, the dealer should do the work.**

**1D** – per day **1W** – per week **1M** – per month **1Q** – per quarter **1Y** – per year

Item	Descriptions	1D	1W	1M	1Q	1Y
Battery	1. Check the liquid level. Please add the distilled water if necessary.	Y				
	2. Charge the battery	Y				
	3. Tighten the nut on the battery cable		Y			
	4. Check if the battery is over-discharged (the battery power meter flashing)	Y				
	5. Check the liquid density of the battery, standard density should be $1.275 \pm 0.005$ (25°C).		Y			
	6. Check if the battery is charged fully by 3 ways: a) using the hydrometer; b) checking the battery power meter;	Y				
	7. Clean the surface of battery		Y			
Charger	8. Observe the charging status, check if the charger plug becomes hot.	Y				
	9. Clean the surface of the charger. Do not get any water inside the charger.		Y			
Controller	10. Check if all terminals are tightened properly. Please do this after the power is off.			Y		
	11. Clean the surface of the controller.			Y		
Motor	12. Check if the solenoid is in order, checking its touching point.				Y	
	13. Check if any water gets in. Check if it becomes too hot.	Y				
	14. Check if the carbon brush should be replaced.				Y	
Chassis and body	15. Check if the accelerator pedal works well and if it can be released freely and automatically.			Y		
	16. Check if the brake drum and the brake shoe should be replaced or not.				Y	
	17. Check if the hand brake functions.				Y	
	18. Check if the hose and tube for the brake liquid leaking.			Y		
	19. Check if the brake liquid inside the brake liquid tank is enough.			Y		
	20. Check the air pressure inside the tire, check if the tire surface is worn, check if the nuts are tightened properly.	Y				
	21. Check if the shock absorber has any oil leaking, flat or abnormal noise.			Y		
	22. Check if there is oil leaking on the gear box and the rear end.	Y				
	23. Add the lubricant inside the wheel hub, steering system.			Y		
	24. Adjust the toe-in of the front end				Y	
	25. Clean the body and seat				Y	

After above maintenance, drive the vehicle to check if the vehicle works properly.

## 9. Storage

Please follow the steps as below when the vehicle is stored.

1. Check the liquid level inside the battery; recharge it fully before storing the vehicle.

### ▼ Warning:

Please charge the battery once a month if your vehicle will be stored more than one month.

2. Turn the power key to OFF position, remove the key, and store the key in a safe position.

3. Engage the Handbrake.

4. Check the tire pressure to make sure its pressure is set to recommended pressure.

5. Clean the exterior of the vehicle and apply the rust inhibitor.

6. Cover the vehicle with a breathable cover and store it in a dry, safe and well-ventilated place.

7. If the vehicle is planned to store for a longer time, then please check the liquid level inside the battery once a month, recharge the battery

## 10. Trouble Shooting

There is no settled mode to diagnose and eliminate the malfunction of electric vehicles. During maintaining and checking, we suggest you first listen, then look and feel. Below is the diagnoses and maintenance of some common malfunctions.

**1) The vehicle doesn't move.** Turn on power key, step on the accelerator pedal, the vehicle doesn't move.

Malfunction	Possible reason	Troubleshooting
Turn on power key, Voltameter has no signal	1. Connector(s) in Circuit is loose or open	Tighten or connect
	2. Fuse of controller or main circuit is open	Change fuse
	3. Battery cable(s) is loose or disconnected	Tighten or change
	4. Power key is broken	Change
	5. Voltameter is broken	Change
	6. Battery terminals connect improperly	Adjust
Turn on power key, Voltameter has signal.	1. Improper operating procedure	Operate properly
	2. Controller Failure	Check or Change
	3. Solenoid Failure	Check, repair, change
	4. Accelerator Failure	Repair or Change
	5. Motor Failure	Repair or change
	6. Parking brake doesn't loosen	Loosen parking brake
	7. Over-heat protection	Check, eliminate

**2) Lose control when vehicle starts running: speed cannot be adjusted**

Malfunction	Possible reason	Troubleshooting
Vehicle runs at full speed when it just starts	1. Terminals of Solenoid stick together	Check, repair
	2. Controller failure	Change
	3. Potentiometer failure	Repair, change
Vehicle stops immediately after it starts	1. Internal short of Motor	Repair, change
	2. Motor is assembled too tight or blocked	Repair, change
	3. Controller failure	Repair, change
	4. Accelerator Failure	Repair, change
Normal at low speed Weak power at high speed	1. Controller Failure	Check, change
	2. Motor Failure	Check, change
	3. Accelerator Failure	Check, change

**3) Vehicle cannot change direction: vehicle can only run in the one direction**

Malfunction	Possible reason	Troubleshooting
Vehicle can only run in one direction	1. Gear box failure	Change
	2. Controller Failure	Change

**4) Possible reason and troubleshooting of the malfunction of electric vehicle mechanic system**

System	Malfunction	Possible reason	Troubleshooting
Transmission System	Abnormal sound when running	1. Clearance of rear axle decelerating gear is too big, or the decelerating gear is broken	Adjust, change
		2. Transmission cross shaft wear out	Change
		3. Gear of transmission wear out or damage	Change
		4. Flange bearing damage	Change
		5. Motor bearing damage	Change
		6. Gear liquid is deficient or empty	Add Gear liquid
	Hard to shift gear, and/or gear shift jumps in different positions	1. Clutch cannot separate smoothly	Adjust
		2. Gear shift tightwire damage	Change
Steering System	Steering heavy	3. Gear inside transmission case wear out	Change
		4. Orientation pin loosen	Change
		1. Pressure of front tire is deficient.	Check the pressure and Inflate
		2. Screw plug of Redirector is too tight	Adjust
		3. Lack of lube in redirector	Maintain, add lube
		4. Toe-in abnormal	Adjust
		5. Clearance of tension rod ball is too big	Change
	Steering unstable ( wheels flirt )	6. Steering knuckle and master pin is not lubricating	Add Lube
		7. Steering shaft or its plastic cover wear out	Change
		1. Rack of redirector wear out	Change Redirector
		2. Screw plug of Redirector is too tight	Adjust
		3. Toe-in adjust improperly	Adjust
		4. Bearing of front wheel wear out	Change
		5. Tie rod ball and joint wear out	Change tie rod
		6. Redirector loose	Tighten

System	Malfunction	Possible reason	Troubleshooting
Brake System	Deflected Running	1.The pressure of the two front tires is different	Inflate
		2.Toe-in is too big or too small	Adjust
		3. Tightness of the left and right drum bearing of front wheels is different	Adjust
		4.Brake of one wheel is too tight	Adjust or Change
		5.Spring shock absorber is abnormal	Change
		6.Front suspension loose	Change
	Abnormal Tire Fray	1.Tire pressure is abnormal or left and right tire doesn' t be exchanged for a long time	Inflate or exchange
		2.Toe-in is improper	Adjust
		3.Drum bearing loose	Change
		4. U type Bolt of Leaf Spring loose	Tighten
		5. Rim distort, frame distort	Tighten
		6.Brace force of each wheel is different	Adjust
		7. Overexert accelerate or brake frequently	Alter operation

System	Malfunction	Possible reason	Troubleshooting
Brake System	Braking drag	1.Brake pedal has no free travel	Adjust
		2.Clearance between brake shoe and drum is too small or releasing spring is disable.	Adjust or Change
		3.Piston of wheel cylinder is ineffective	Check, Change
		4.Piston of master cylinder is ineffective	Change
		5.Parking brake is ineffective	Change spring
	Braking noise	1.Shoes distort	Change
		2.Brace facing wear out	Change
		3.Eywinker in brake system	Check, Eliminate
		4.Brace drum breach, scrape to uneven	Change

## 11. Wiring Diagram

- 1) Wiring Diagram of Series System (FIG.1)
- 2) Wiring Diagram of Sepex System (FIG.2)
- 3) Wiring Diagram of AC (72V, 7.5KW) automatic drive System (FIG.3)
- 4) Wiring Diagram of AC (72V, 7.5KW) manual drive System (FIG.4)

This manual tries to be as sound and elaborate as possible in literal and figurative description as well as technical description on the basis of existent data. At the same time, our company reserves the right to alter the content of this manual and this manual is subject to change without prior notice; in addition, our company has the final say on the interpretation of this manual.

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**Wiring Diagram of Shuttle Bus in Series System**

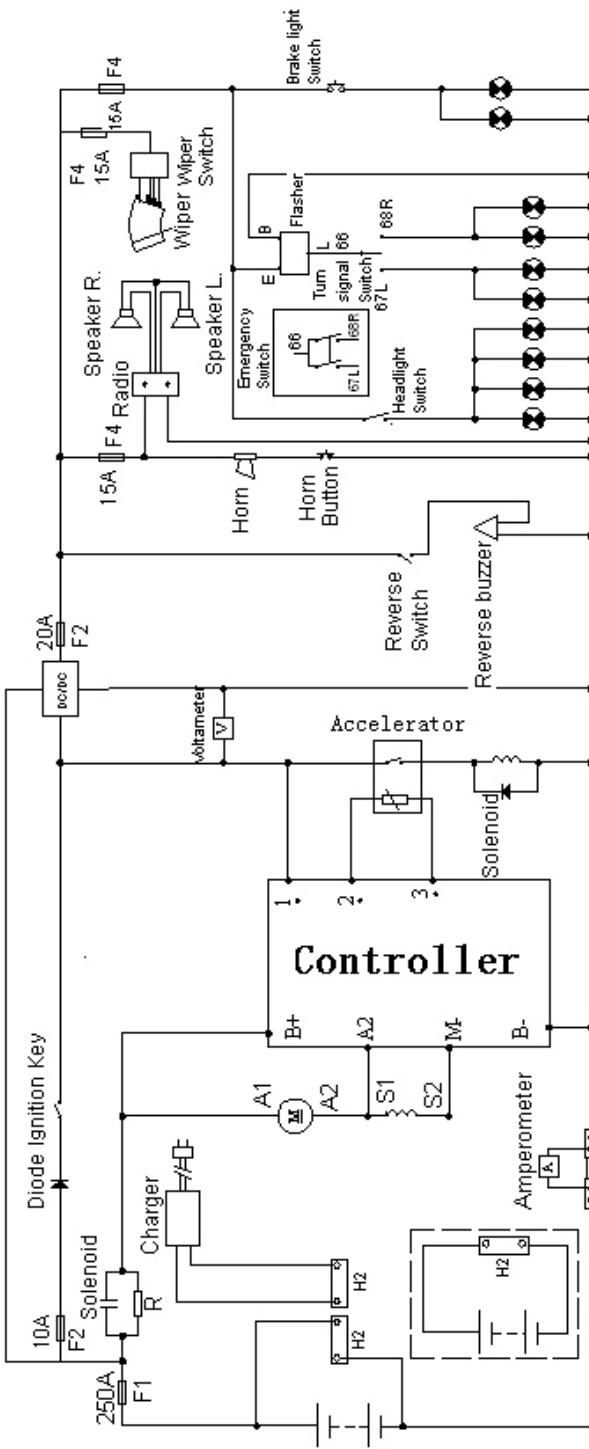


FIG1

## Wiring Diagram of Electric Shuttle in Sepex System

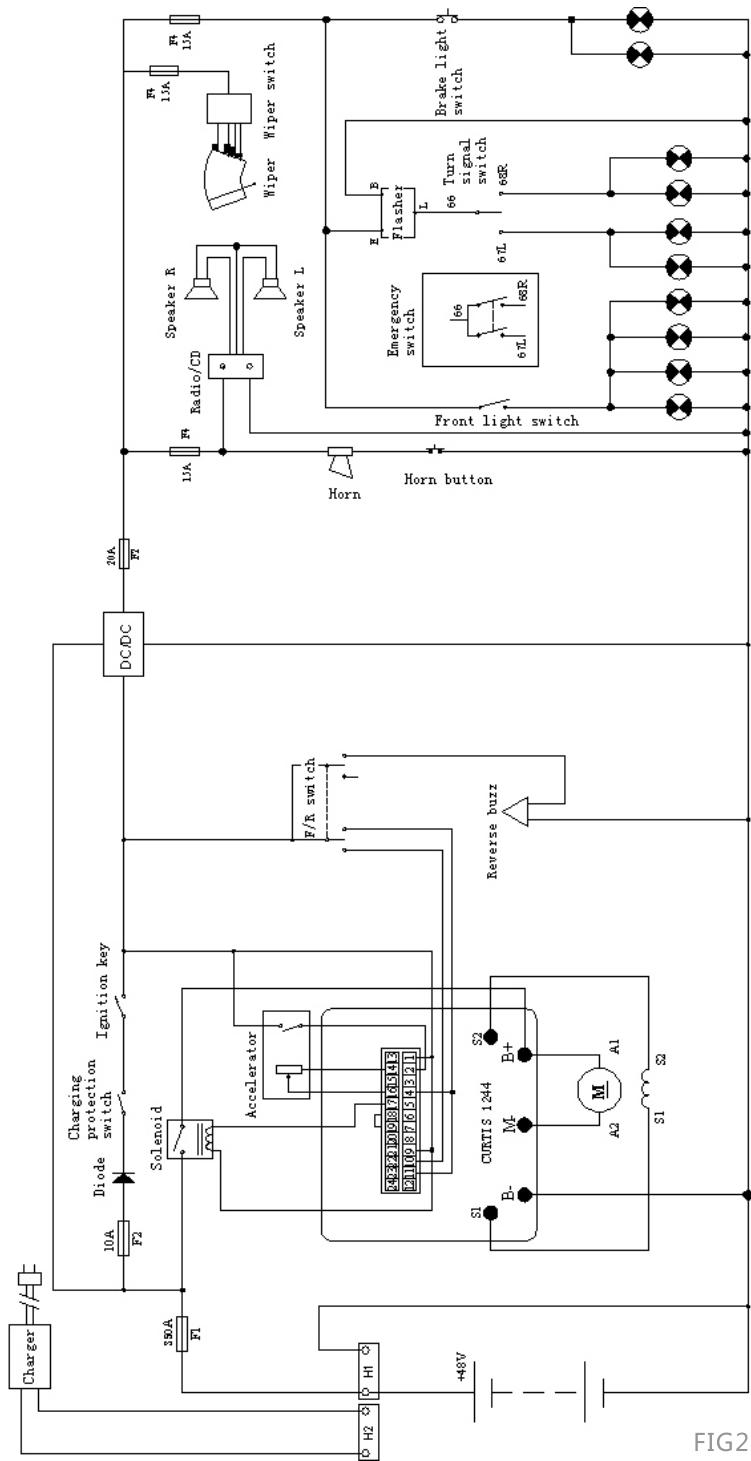


FIG2

ZAPI AC2 Wiring diagram

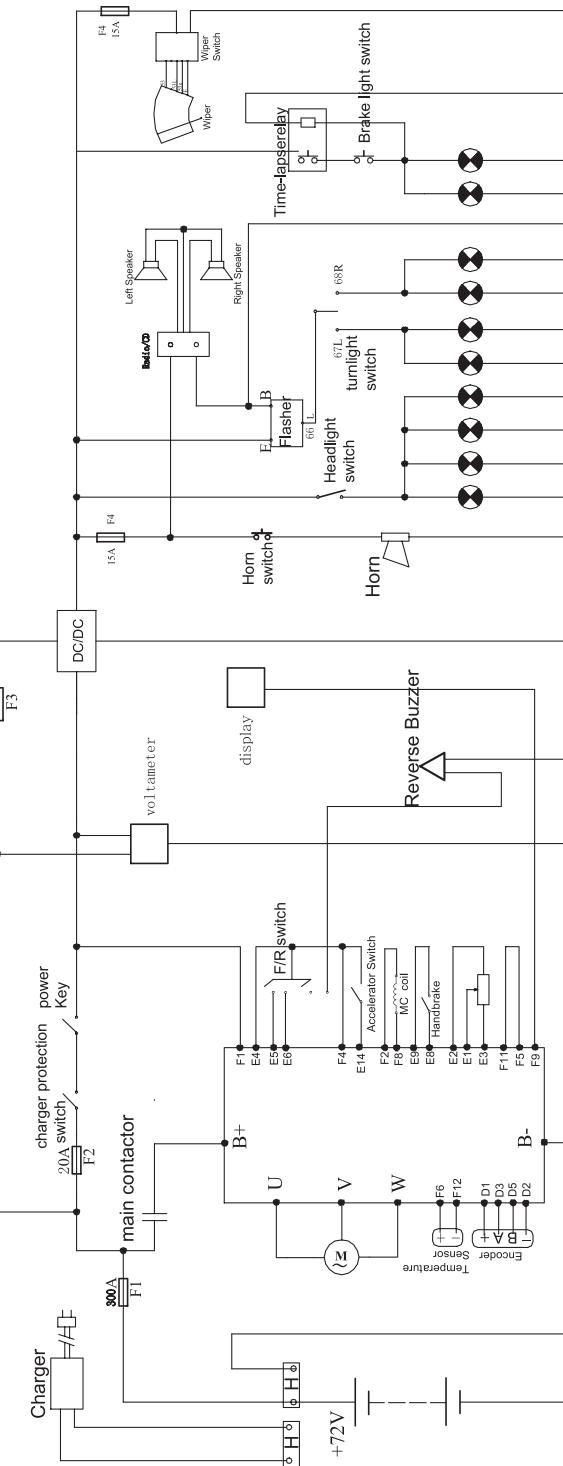


FIG3

ZAPI AC2 Wiring diagram

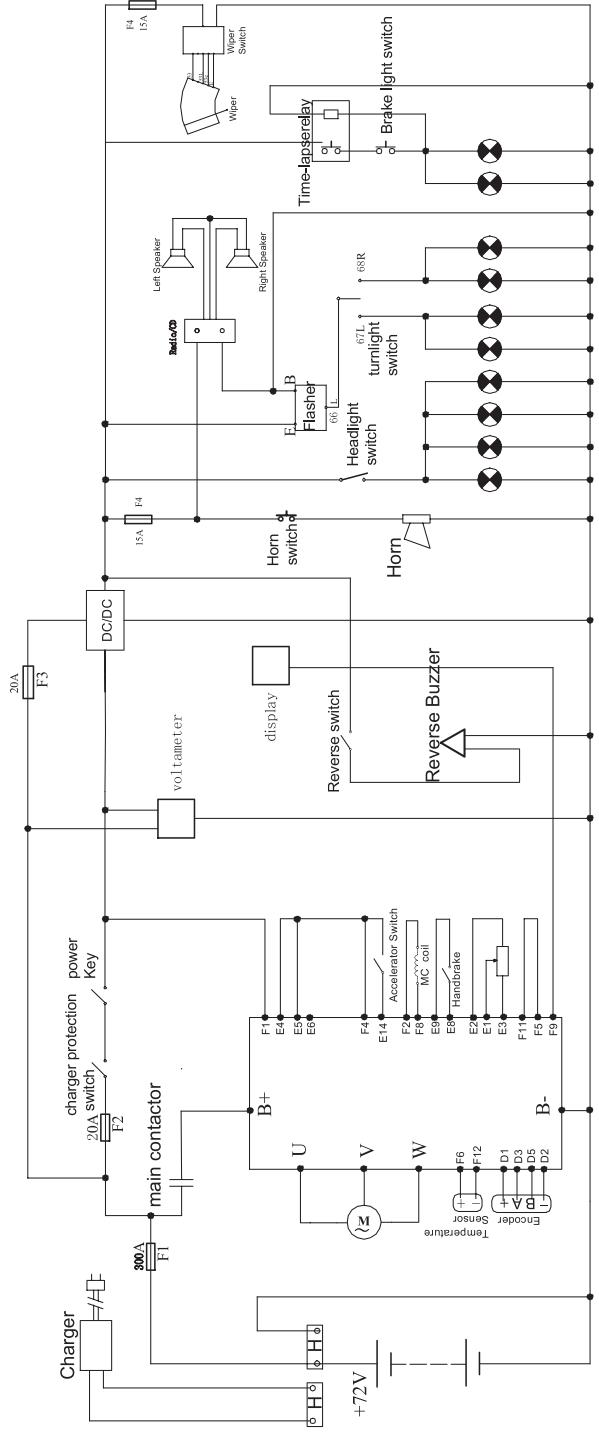


FIG.4