citEcar Electric Shuttle
Owner's Manual

Sold and Distributed by

citEcar LLC
www.citEcarEV.com
Phone: (866) 542-8677
Fax: (843) 556-4080

Preface

Thanks for purchasing our electric vehicle. This manual contains information for proper operating, maintaining and caring of your electric vehicle. A thorough understanding of this manual will help you to obtain maximum enjoyment from this electric vehicle. Please keep it properly stored 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 to the vehicle occupants, bystanders or persons inspecting or repairing the vehicle.

CAUTION!
Failure to follow Caution instructions could cause damage to the vehicle.

Special Notices:
Because the seat & backrest wrapping film may stick to the seat vinyl and cause the seat vinyl to become stained, please remove the seat & backrest wrapping film when you receive the vehicle.

Index

1. 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 a comfortable and safe ride.

2. 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

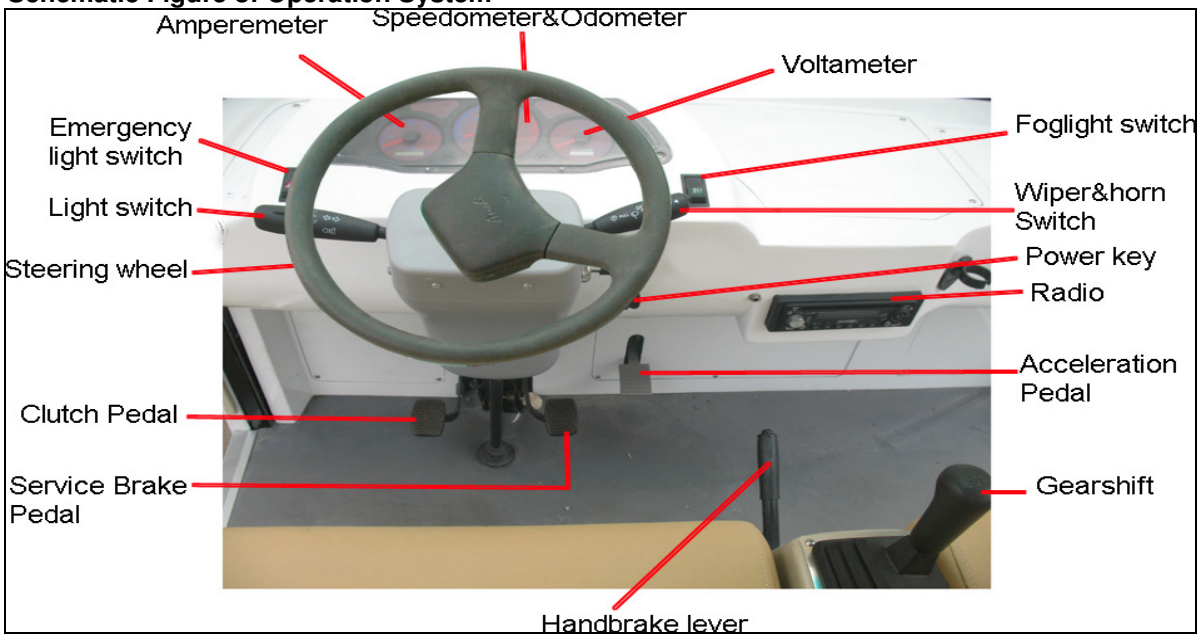
Label Content

a

b

3. Operating System

1) Schematic Figure of Operation System



2) Functions of Operating System

Ignition Key Switch —— Controls the power supply of the whole vehicle. When the key is inserted and turned clockwise, it will switch on lights, horn and the control system; when the key is turned back, the power will be switched off.

Accelerator Pedal —— Controls 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 is released gradually. When the pedal is fully released, the electric brake works.

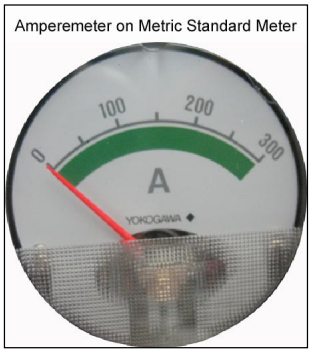
Service Brake pedal —— Decelerates the vehicle.

Clutch Pedal —— Controls the clutch. When driving, do not ride the clutch, otherwise, it will damage the clutch.

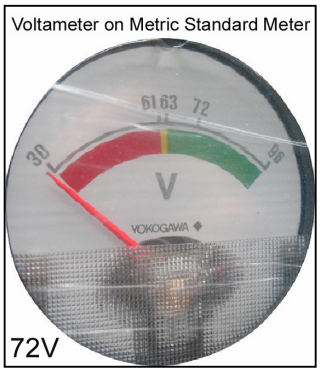
Handbrake Lever —— Used to park and brake the vehicle.

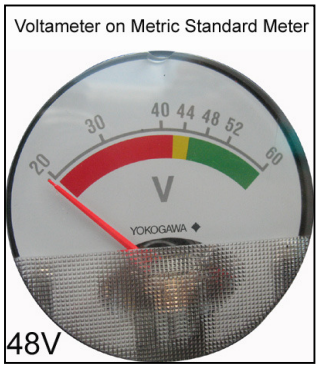
Steering wheel —— Controls the driving direction

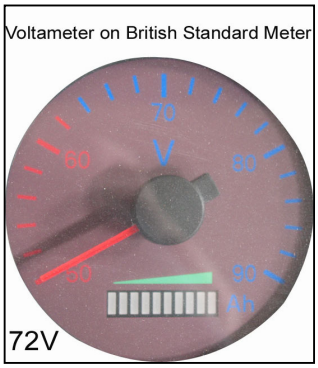
Ampere Meter —— Indicates the current of the working vehicle. And on the British one, there is also an hour meter on the bottom.

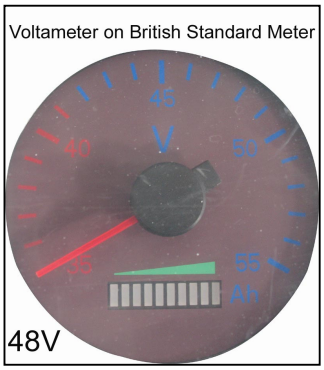


Voltage Meter—— Indicates the voltage of the battery. On Metric Standard Meter, it ranges from 20V to 60V (for 48V system) and 30V to 96V (for 72V system) from left to right, including 3 sections highlighted by Red, Yellow and Green. Green section represents the battery is full in capacity. With the 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 yellow 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 be used, the battery should be recharged immediately. On British Standard Meter, exception to using the Voltage to judge if the battery needs to be charged, the battery power meter on the bottom is also used as a battery power indicator. There are 10 divisions in this meter (from 1 to 10). This meter will descend from higher division to low ones as the battery discharges. When the battery is too low, the red indicator light will flash, reminding you to recharge the battery.

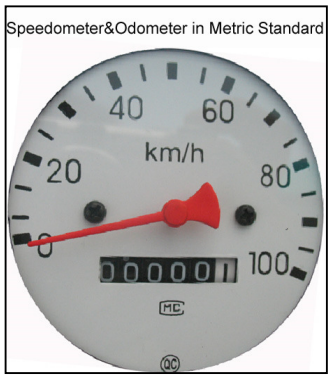


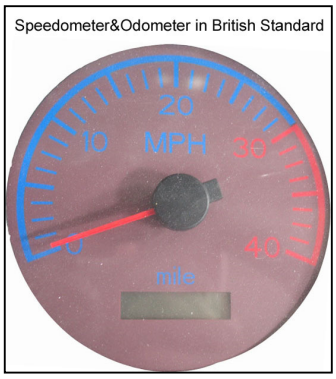


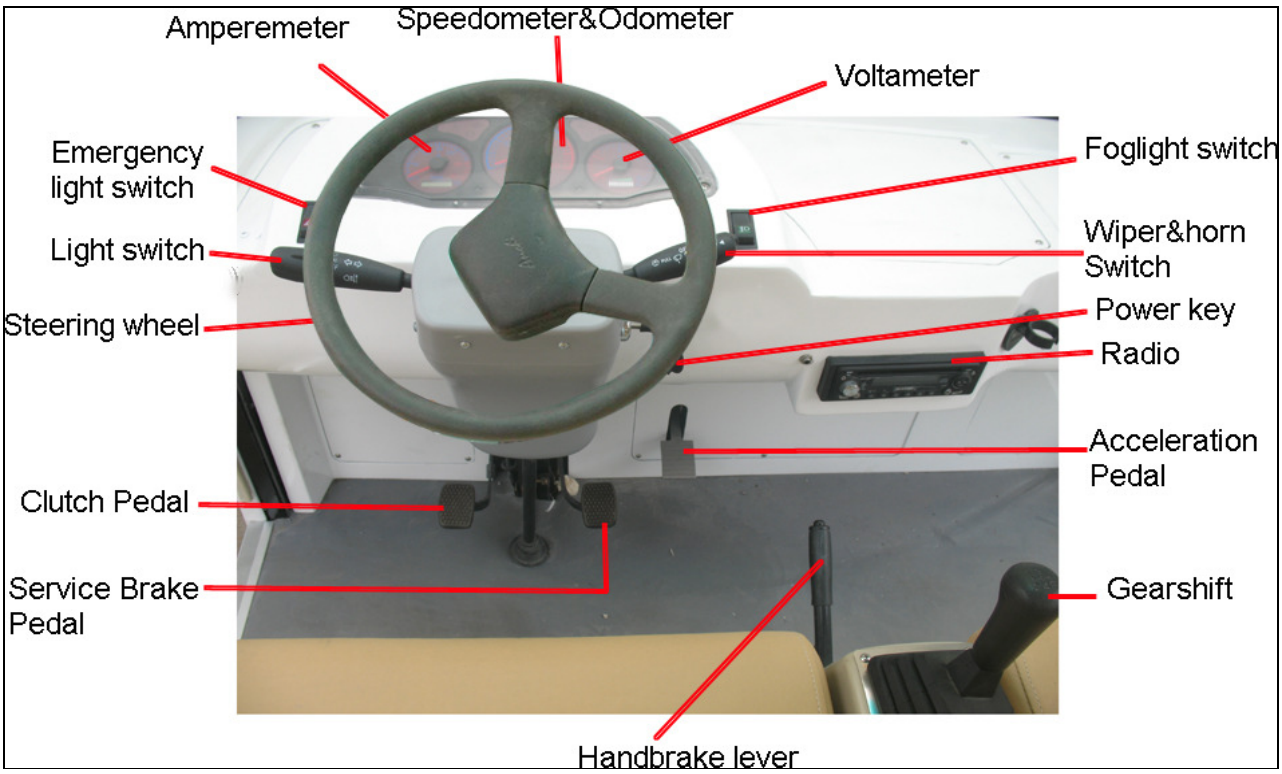




Speedometer & Odometer —— Indicates the speed the vehicle is running and the accumulated distance the vehicle has run. Both Metric and British ones are available.





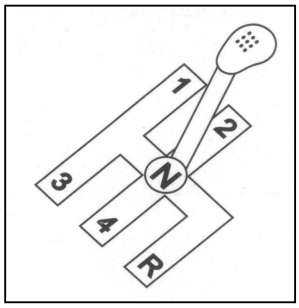


Light Switch — Controls light system, including turning signal, headlight (includes high beam and lower beam).

Wiper & Horn Switch — Controls the wiper and horn.

Emergency Light Switch — Controls the emergency light.

Fog light Switch — Controls the fog light.



Gearshift — There are 5 positions. 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.

4. Operational Process

4.1 Starting the Vehicle

Switch on the power key.

Step the clutch pedal to the bottom, select 1st position to go forward and R position to go backward. If going forward, after starting 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 the motor stays as small as possible as long as this current is enough for driving.

Release the parking handbrake lever.

Release the clutch pedal slowly.

Step down the acceleration pedal smoothly, and the vehicle starts moving.

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.

4.2 Stopping the Vehicle

1) Step the service brake pedal to decelerate the vehicle until it stops completely and shift the gear to Neutral position.

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.

4.3 Charge the Batteries

WARNING!

1) We have two different kinds of chargers for you to choose, one is an exterior charger and the other is an on-board charger. Before using the charger, please read the charger operation manual which attached with the charger.

2) Explosive hydrogen gas is produced while the battery is charged. Only charge the battery in well-ventilated areas.

3) Before using the charger, please check to see if the battery charger you are getting is correctly rated as per your local AC electricity network.

5) 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.

7) It is prohibited to open the housing of the charger.

8) Only a qualified electrician is allowed to open the housing of the charger.

9) The charger should be stored in a safe and dry room with good ventilation.

10) The charger should be packed properly if not to be used for long time.

Below is the charging procedure:

***** Turn off the Power of the Whole Vehicle**

1) When it's a non-onboard charger, one set of batteries, the process is as follows:

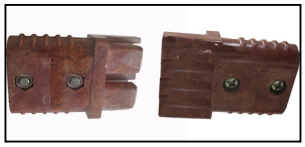
a) Connect the charger to DC receptacle on the vehicle.

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 if 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.

5. Rules for Safe Operation

Our electric vehicle is designed for simple operation; however, please make sure to observe the following safe operation instructions.

WARNING!

BEFORE OPERATING THE VEHICLE:

ALWAYS read this first before you start driving the vehicle.

ONLY authorized people should drive this vehicle, from the driver's side ONLY.

Do not drive this vehicle on a public road before it is registered and the license plate is mounted on vehicle.

Drive the vehicle ONLY in areas where it is allowed to be used by law or local regulations and the conditions are safe to do so.

DO NOT allow more than the designed people on the vehicle.

DO NOT overload the vehicle in any case, otherwise the motor may be damaged, the vehicle may also lose control and/or the driver and passengers will be put in danger.

DO NOT operate the vehicle while under the influence of alcohol or drugs, otherwise, their effect on vision and judgment will put the driver and passenger in danger.

DO NOT make the vehicle climb any slope beyond its grade ability.

DO NOT overtake other vehicles at crossroads, in blind areas or in any dangerous areas.

Always fasten the safety belt properly before the vehicle moves, adhering to the following instructions.

1) Be certain the seat belts are latched securely and are free from twists.

2) Position the shoulder belt across the top of the shoulder. Do not place the shoulder belt under an arm.

3) Loose fitting safety belts significantly reduce protection. Keep belts snug and positioned low on the hips.

4) Do not exceed the recommended number of occupants for the vehicle.

5) Bench seats are designed for two occupants only.

WHILE OPERATING THE VEHICLE

- Keep your entire body inside the vehicle, keep seated and hold 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 up slowly, and watch the back carefully.
- Avoid starting or stopping suddenly.
- Avoid turning the steering wheel too sharply at high speed.
- Always drive slowly up or down on the incline.
- Do not make any modification or addition which may affect the capacity or safety of the vehicle.
- Children are not allowed to play in the vehicle. Children should be seated between adults and protected by them when the vehicle is moving.

6. Maintenance

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

6.1 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 turn off 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 spark or damage to terminals. Please check every week to see if any battery cable is damaged or not. Any 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 should be fully recharged on the same day. Any delay on the re-charging will cause a negative effect on the battery.

Note: the lead-acid battery does not develop a memory, so it does not need to be 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) Checking the liquid level

During the use of the battery, the water inside electrolyte will be consumed because of electrolysis and volatilization, and that will cause liquid level be dropped, therefore it's a must to check the liquid level frequently, we recommend check it every week. Add distilled water if the liquid level is under the standard.

6) Watering

Flooded batteries need distilled 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.

Distilled 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 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.

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

7) Testing

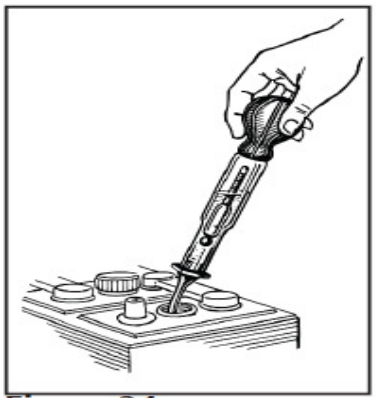
Visual inspection alone is not sufficient to determine the overall health of the battery. Both open-circuit voltage and specific gravity readings can give a good indication of the battery's charge level, age, and health. Routine voltage and gravity checks will not only show the state of charge but also help spot signs of issues with the 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.

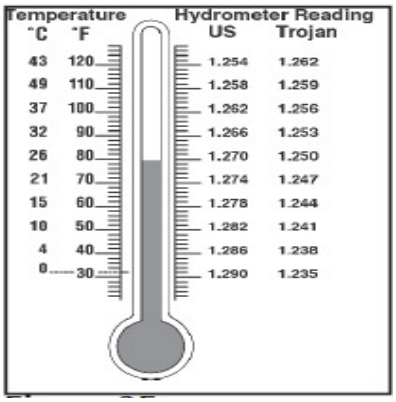
I. Specific Gravity Test (Flooded batteries only)

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 80º F

   Add .004 to readings for every 10º above 80º F

   Subtract .004 for every 10o below 80º F
9. Compare the readings.
10. Check the state of charge using Table 1.





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 80o 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

8) Battery Installation

Tighten the battery cables to battery terminals with a 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 to be installed or replaced only by a qualified electrician.

9) Battery Charging

NOTE: We provide two types of chargers for our vehicle, one is non-onboard charger, and another is onboard charger. The standard charger is non-onboard charger. Check your vehicle to see which kind of charger it has. The onboard charger is either installed in the rear bag well, or under the seat, or under the front body. When it's an onboard charger, a separate charging cord will be provided with the vehicle for connecting the charger and AC electricity.

WARNING! Before you use the charger, please read the operation manual provided with the charger.

WARNING! Explosive hydrogen gas is produced while battery is charging. Only charge the battery in well-ventilated areas.

WARNING! Before using the charger, please check to see if the battery charger you are getting is correctly rated as per your local AC electricity network.

WARNING! When using new battery, make sure new battery is in same specifications as original one and is appropriate in application.

The following are the charging steps:

1. Turn the power key to OFF.
2. Connect the DC output plug to the vehicle receptacle; and then connect it to your local AC power outlet.

WARNING! 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.

3. The charger will turn off automatically when the battery is fully charged.

WARNING! For non-onboard charger, the battery receptacle is combined with a security switch which can cut off the power of the vehicle when the battery is being charged, so the vehicle cannot be started as long as the DC plug is plugged into the battery receptacle. For onboard charger, the vehicle can be driven when the charger is connected! Do not try to drive the vehicle when the charger is connected to avoid any possible damage to the charger or vehicle.

4. After the charger turns off, disconnect the plug on the AC charging cable from the AC power outlet first, and then disconnect the DC output plug from the vehicle receptacle.
5. It is prohibited to open the housing of the charger.
6. Only a qualified electrician is allowed to open the housing of the charger.
7. The charger should be stored in safe and dry room with good ventilation.
8. The charger should be packed properly stored if not used for a long time.
9. Read carefully the operation manual for the charger for detailed operation instructions.

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, which is called Sulfation. If left unchecked it will reduce the overall capacity of the battery.

When the battery is fully charged, and remains 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. Equalizing charge is recommended every month for the batteries when they are used.

6.2 The Operation and Maintenance of Charger

Note: As standard configuration, the charger is built in the vehicle; in some cases, it may not be built in the vehicle. If it's built in the vehicle, the position of the charger is either under the front seat or the bag well or front body.

The procedure to use the charger (when the charger is built in the vehicle).

1. Connect the cord to the receptacle on the vehicle;
2. Connect the cord to the receptacle to the outlet of household grid.
3. After the charger cord is connected, the red indicator on the charger will flash, charger starts the procedure of self-inspection, after self-inspection, green indicator flashes, and charger starts to charge the batteries.
4. When battery capacity is less than 80%, the green indicator flashes slowly; when battery capacity is more than 80%, the green indicator flashes fast; when the battery is fully charged, the green indicator will stop flash and always be on, and the charger will stop charging automatically.

Note: This charger has the function of over-discharging protection to protect the battery from over-discharging. When battery is close to the charging point, it will reduce the discharging current from the battery to reduce the speed of the vehicle, if fails to charge the battery, it will cut the current from the battery and stop the vehicle to force user to charge the battery.

Note: When the grid voltage is out of range of 90-260V, the charger will stop charging to protect itself, in the same time, the failure code light will be on to remind users. When the voltage returns back to the requested voltage range of 90-260V, it will automatically start to charge.

Note: The charger will automatically start equalizing charge after 30 times of charging if you continue the charge disconnection from the grid and battery after the battery is fully charged.

Caution! Charger is not allowed to be used if there is water in it.

Caution! Use the charger when the environment temperature is between -10℃ to +45℃ Celsius Degrees

WARNING!

Only qualified electrician is allowed to open the housing of the charger.

WARNING!

When charging the batteries, hydrogen will be generated, so it's important to keep the charging area in a safe and dry area with good ventilation; and also to avoid fire and spark.

6.3 Maintenance of the Gear Box

1. The clearance for the clutch should be kept between 2-3mm.
2. The friction plate should be changed periodically; the friction value on one side should not exceed 2mm.
3. Adjust 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.
4. Change 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.
5. Clean the gear box before changing the oil.

WARNING! Never mix different oils.

6.4 Maintenance of the Traction Motor

WARNING! There should be No explosive gas vapor is in the air, otherwise, it may cause serve injury and damage to your body and property if the explosive gas vapor contacts the sparks generated from the motor.

6. For DC motor, the carbon brush should be checked every 3 months to see if it is worn or not as it is an easily worn part. If it is not replaced in time before it becomes worn out, it will damage the motor badly. The brush spring shall also be checked when checking the carbon brush.

7. Do not keep the motor running idly for long periods of time. Any idle running of the motor should be avoided.
8. Removal of mud, sand and other clinging objects shall be done frequently to facilitate the heat-radiation.
9. Periodically use the low pressure air to remove the dust from the carbon brush and the commutator. Periodically check the connection of the carbon brush and the commutator.

Main malfunction and possible reason of DC motor

Item	Symptoms	Possible Causes
1	All copper plates turn black.	The pressure of the brush is incorrect.
2	The commutating copper turns black in a certain order and in groups.	Short circuit happens between the commutating copper or among the armature coil; poor welding or disconnection happens between the commutating copper and the armature coil.
3	The commutating copper turns black disorderly.	The central line of the commutator deviates or its surface is not round and not smooth.
4	The brush wears out, changes colors and breaks.	The motor vibrates; the clearance between the brush and its holder is too big; the clearance between the brush and commutator is too big; the mica between different commutators extrudes; the brush is made by of wrong materials; the brush is wrong in type.
5	Big sparks	The motor is over-loaded; the commutator is not clean, not round or not smooth; mica or some commutator is coming out; the brush is not ground properly; the brush is big from pressure; the brush is wrong in type; the brush is jammed in the brush holder; the brush holder becomes loose or vibrating; the polarity and sequence of magnetic poles becomes wrong.
6	The brush and its wires get hot.	Big sparks from the brush; poor contact between brush and soft wires; small section area of soft wires.
7	The brush is noisy	The surface of the commutator is not smooth.

CAUTION! Only a qualified technician is allowed to perform the maintenance on the motor.
Only qualified electrician is allowed to change and adjust the Carbon Brush and Commutator

Main malfunction and possible reason of AC motor.

Item	Symptoms	Possible Causes
1	The motor is noisy	The bearing is damaged

6.5 Maintenance of the Speed Controller

CAUTION!
Only a qualified electrician is allowed to do the maintenance for the controller.
WARNING!
There are no user serviceable parts inside the controller. No attempt should be made to open, repair, or otherwise modify the controller. Doing so may damage the controller and will void the warranty.

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-saving operation.
• Prevents the vehicle from running away when started. 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 take effect.
The controller will self-check when the vehicle is running. If any defect is detected, the controller will stop the vehicle to protect the operator and the vehicle.

Cleaning
It is recommended that the controller be kept clean and dry and that its fault history file be checked and cleared periodically.
Periodically cleaning the controller exterior will help protect it against corrosion and possible electrical control problems created by the dirt, grime, and chemicals that are part of the operating environment and that normally exist in battery powered systems.

Please use the following cleaning procedure for routine maintenance:
1) Turn the power key to OFF position.
2) Turn off the 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.

NOTE: All above checks shall be performed under power off. Above checks shall be carried out once every 3 months; after the power key is turned off, the wave-filter capacitor in the controller unit will 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.

Faulty History File
The handheld programmer (to be ordered separately) can be used to access the controller's fault history file. The programmer will read out all the faults the controller has experienced since the last time the history file was cleared. Faults such as contactor faults may be the result of loose wires; contractor wiring should be carefully checked. Faults such as over temperature may be caused by operator habits or by overloading.
After a problem has been diagnosed and corrected, it is a good idea to clear the fault history file. This allows the controller to accumulate a new file of faults. By checking the new history file at a later date, you can readily determine whether the problem was indeed fixed.

Or checking the problems according to the flashing of the STATUS light on the top of the controller, please refer to the details mentioned in our service manual which is available separately.

Please contact your local dealer or a qualified electrician to work on the problems related to the motor, controller or electrical system of the vehicle when you are not able to fix them.

Main malfunction of the controller and possible causes

Item	Symptoms	Possible Causes
1	The vehicle cannot start	1) The controller does not have power 2) No signal is transmitted to the controller 3) The contacting point of the contactor stuck 4) The controller or the motor is damaged 5) The Motor encoder is not programmed properly or damaged 6) The Motor or controller is under protection because of over-temperature 7) The Electromagnetic brake locked
2	The vehicle can only move at one direction	1) The F/R switch is damaged or disconnected to the harness.
3	The vehicle cannot reach maximum speed	1) The battery is going to run out. 2) The hand brake is not released or the brake shoe doesn't release. 3) The accelerator failed 4) The Controller failed 5) Too much loading 6) The Motor or controller is under protection because of over-temperature 7) The Motor encoder failed

6.6 Maintenance of Rear Axle:

While using your vehicle, the rear axle should be maintained daily, periodically and randomly.
1. Periodic maintenance means the driver should do some daily maintenance before, in or after driving to prevent something unexpected happens. The maintenance is focused on clearance and examine as followed:
1) Clean the dust and mud on the cover to keep the axle clean
2) Check all the connections are in good condition, in case there is any damage, if any contact sticks or there is any travel in the contact.
3) Check the gear oil is enough or not, and add some in time if it is not.
4) Check if there is any link in the connection and transmission units or any unusual sound inside the axle;
5) Check the brake drum, the exterior temperature and smell, it should be adjusted and repaired in time if there is any problem.
6) Check if the breather valve ventilate or not in case the oil linked;
7) Check if there is any section in the parking brake cable broken or loosen, replace a new one if there is necessary.

2. Periodic maintenance: The axle should be done first grade maintenance, second grade maintenance and third grade maintenance
First grade maintenance focuses on lubricate, fixation and gear oil replacement.
Second grade maintenance focuses on check, adjustment and gear oil replacement.
Third grade maintenance focuses on the whole part cleaning, assembly and gear oil replacement.
Maintenance in each grade should follow the requirement.

Periodic maintenance as following sheet:

Period	Grade
Every Month	**Do first grade maintenance as required above**
Every 2 months	**Do second grade maintenance as required above**
Every half year	**Do third grade maintenance as required above**

Malfunction and troubleshooting for rear axle

Symptom(s)	Possible cause(s)	Troubleshooting
The axle housing gear and bearing are damaged, and there is too much noise on the final drive	1. The gear oil is insufficient or used improperly	Add some oil or replace with new oil
	2. The bearing is not assembled correctly	Assemble correctly
	3. Adjust the brake shoe pin shim or the interval.	Adjust or replace
	4. The gear between axle 1 and 2 is not touched tightly	Adjust correctly
	5. The final drive is too noisy: 1) Check if there is any impurity 2). Check to see if the gear is damaged	Remove the impurity (clean), replace the gear
	6. Axle 1 strikes heavily	Adjust or replace with a new one
	7. The rear axle is out of shape (check if it is overloaded)	Replace
Lack of braking force	1. There is a gap between the brake shoes and drum.	Adjust the gap
	2. There is oil or dirt on the brake shoes or drum.	Remove the impurity (clean)
	3.There is air in the brake pipe	Release the air
	4. The brake pipe leaks.	Repair the pipe
	5. The brake shoes are over worn.	Replace with a new one
	6. The brake cable is too long or is blocked.	Adjust the brake cable
The brake is difficult to release completely	1. The brake pedal does not release back smoothly	Replace with a new one
	2. The brake shoe is worn	Refit or replace
	3. The is some block on the transmission unit's replace	Refit or replace
The oil leaks	1. The Oil Seal is damaged	Replace with a new one
	2. Too much Oil	Adjust the oil lever

6.7 Maintenance of Brake System

1. Step on 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.

6.8 Wheel Replacement

WARNING!

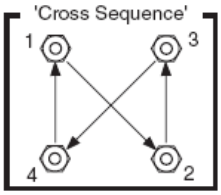
Before doing anything on the wheel and tire, please make sure the power key is positioned on OFF position.
Please read the tire manufacturer's instructions and never exceed their recommendation.
Protect face and eyes from escaping air when removing the valve core.
Be sure the mounting/demounting machine is anchored to floor.
Wear safety equipment when mounting/demounting the wheel and tire.

To remove a wheel on the vehicle:

1) Block the wheel, then loosen the lug nuts
2) Use a jack to lift the vehicle, and then remove the lug nuts and the wheel.

To install a wheel on the vehicle:

1) Use a jack to lift the vehicle, and then put the wheel onto the wheel hub with lug nuts.
2) Finger tighten the lug nuts, then tighten lug nuts to 50-85ft.lbs.(70-115Nm) in 20ft.lbs.(30Nm) increments following the 'cross sequence' pattern.



3) Remove the jack.

If the tire is flat, remove the wheel and inflate the tire to the maximum recommended pressure for the tire. Immerse the tire in water to locate the leak and mark with chalk. Place tire plug according to the manufacturer's specifications.

6.9 Brake Adjustment

WARNING!

If you have any problem with the brakes, please consult our dealers. Brake failure can result in serious accident or physical danger.

The brakes on the vehicle can be self-adjusted.
Before you operate the vehicle, please press down on the brake pedal several times to make sure the brakes are functioning properly.
Check and replace the brake shoe periodically.

7. Lubrication of the Whole Vehicle

Check all fluids and lubricate the vehicle monthly. Lubricate more frequently during periods of high use.
Gear Box: 85W/90GL – 1 Liter
Brake Fluid: 901 DOT3
Rear Axle: 90GL-5 Hypoid - 1 Liter
Grease Lubrication Points: Steering column, axle, wheel bearings, steering ball joint

8. Running-in of New Vehicle

In order to guarantee the performance of the vehicle and enhance its reliability and working life, all parts in the 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^2.
2. During running-in time, the speed should be limited as follows:

Current / Shift / Model	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 roads with poor conditions.
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 starting 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 correct 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 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 when the vehicle is in operation.

12) Periodic Maintenance Charts

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

9. Periodic Maintenance

WARNING!

Make sure to turn off the power key and apply the parking 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±0.005 (25□).		Y			
	6. Check to see if the battery is charged fully by 2 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 to see 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 to see if all terminals are tightened properly. Please do this after the power is off.				Y	
	11. Clean the surface of the controller.				Y	
	12. Check if the solenoid is in order, checking its touching point.					Y
Motor	13. Check if any water gets in. Check if it becomes too hot.	Y				
	14. Check if the carbon brush should be replaced.					Y
	15. Check whether the accelerator pedal works well and if it can be released freely and automatically.				Y	

Chassis and body	16. Check whether the brake drum and the brake shoe should be replaced or not.				Y	
	17. Check to see if the hand brake functions.				Y	
	18. Check to see if the hose and tube for the brake fluid is leaking.			Y		
	19. Check to see if the brake fluid inside the brake fluid tank is enough.			Y		
	20. Check the air pressure inside the tire, check if the tire surface is worn. Check to see if the nuts are tightened properly.		Y			
	21. Check to see 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 to see if the vehicle works properly.						

10. Storage

Please follow the steps as below when the vehicle is being 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 be stored for a longer time, then please check the liquid level inside the battery once a month, recharge the battery

11. Trouble Shooting

There is no certain 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, Volta meter 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. Volta meter is broken	Change
	6. Battery terminals connected improperly	Adjust
Turn on power key, Volta meter 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 mechanical 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 worn out	Change
		3. Gear of transmission worn out or damaged	Change
		4. Flange bearing damage	Change
		5. Motor bearing damage	Change
		6. Gear fluid is deficient or empty	Add gear fluid
	Hard to shift gear, and/or gear shift jumps in different positions	1. Clutch cannot separate smoothly	Adjust
		2. Gear shift tight wire damaged	Change
		3. Gear inside transmission case worn out	Change
		4. Orientation pin is loose	Change
Steering System	Steering heavy	1. Pressure of front tire is low	Check pressure and Inflate
		2. Screw plug of Redirector is too tight	Adjust
		3. Lack of lube in redirector	Maintain, add lubricant
		4. Toe-in abnormal	Adjust
		5. Clearance of tension rod ball is too big	Change
		6. Steering knuckle and master pin is not lubricating	Add Lubricant
		7. Steering shaft or its plastic cover worn out	Change
	Steering unstable （wheels flirt）	1. Rack of redirector worn out	Change Redirector
		2. Screw plug of Redirector is too tight	Adjust
		3. Toe-in adjusted improperly	Adjust
		4. Bearing of front wheel worn out	Change
		5. Tie rod ball and joint worn out	Change tie rod
		6. Redirector loose	Tighten
Driving System	Deflected Running	1.The pressure of 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 Wear	1. Tire pressure is not to specification	Inflate or exchange
		2. Toe-in is improper	Adjust
		3. Drum bearing loose	Change
		4. U-type bolt of leaf spring is loose	Tighten
		5. Rim distorted (out of round), frame distorted (out of round)	Tighten
		6. Brake force of each wheel is different	Adjust
		7. Overexerting, accelerating or braking frequently	Alter operation

Brake System	Brake fail	1. Master cylinder and/or wheel cylinder damaged, leaking oil	Check, eliminate, change
		2. Brake fluid is low or empty	Add fluid
		3. Air enters into oil pipe	Let air out
		4. Free travel of brake pedal is too long or the clearance of arrester is too big	Adjust
		5. Brake drum wears out or distorts	Change
		6. Master cylinder leaks oil internally	Change
	Braking deviation	1. The clearance of left brake drum shoe and right brake drum shoe is different	Adjust
		2. Oil on one of the arrester's brake shoe	Clean or change
		3. Tire pressure is different	Repair or Change
		4. One wheel cylinder's piston blocks	Adjust
		5. Wheel aligned improperly	Adjust
		6. Brake drum becomes out of round	Change
	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. Brake facing wears out	Change
		3. Eye winker in brake system	Check, Eliminate
		4. Brake drum breach, scrape to uneven	Change

12. Wiring Diagram

1) Wiring Diagram of Series System (FIG.1)
2) Wiring Diagram of Sepex System (FIG.2)

FIG. 1

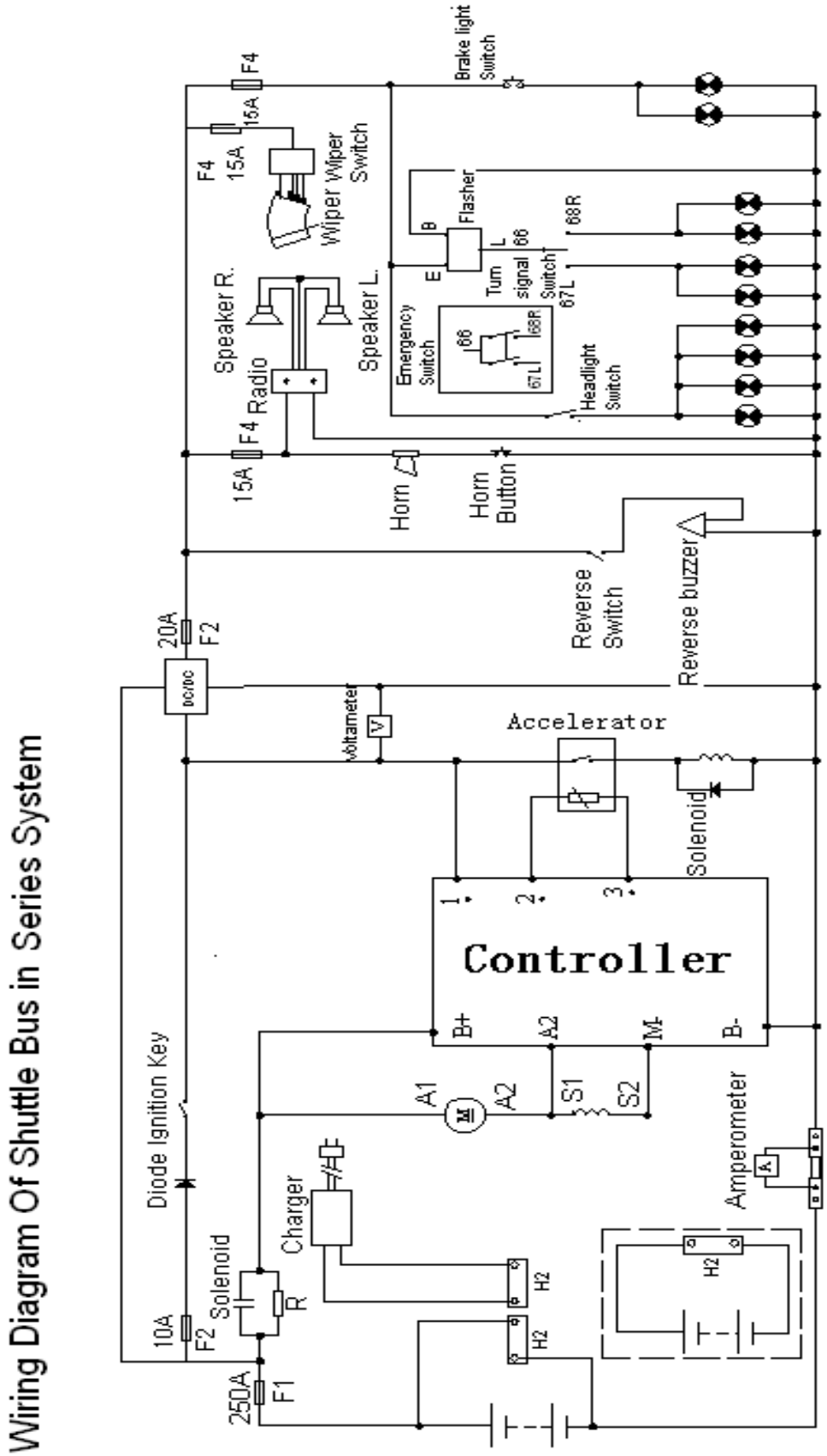
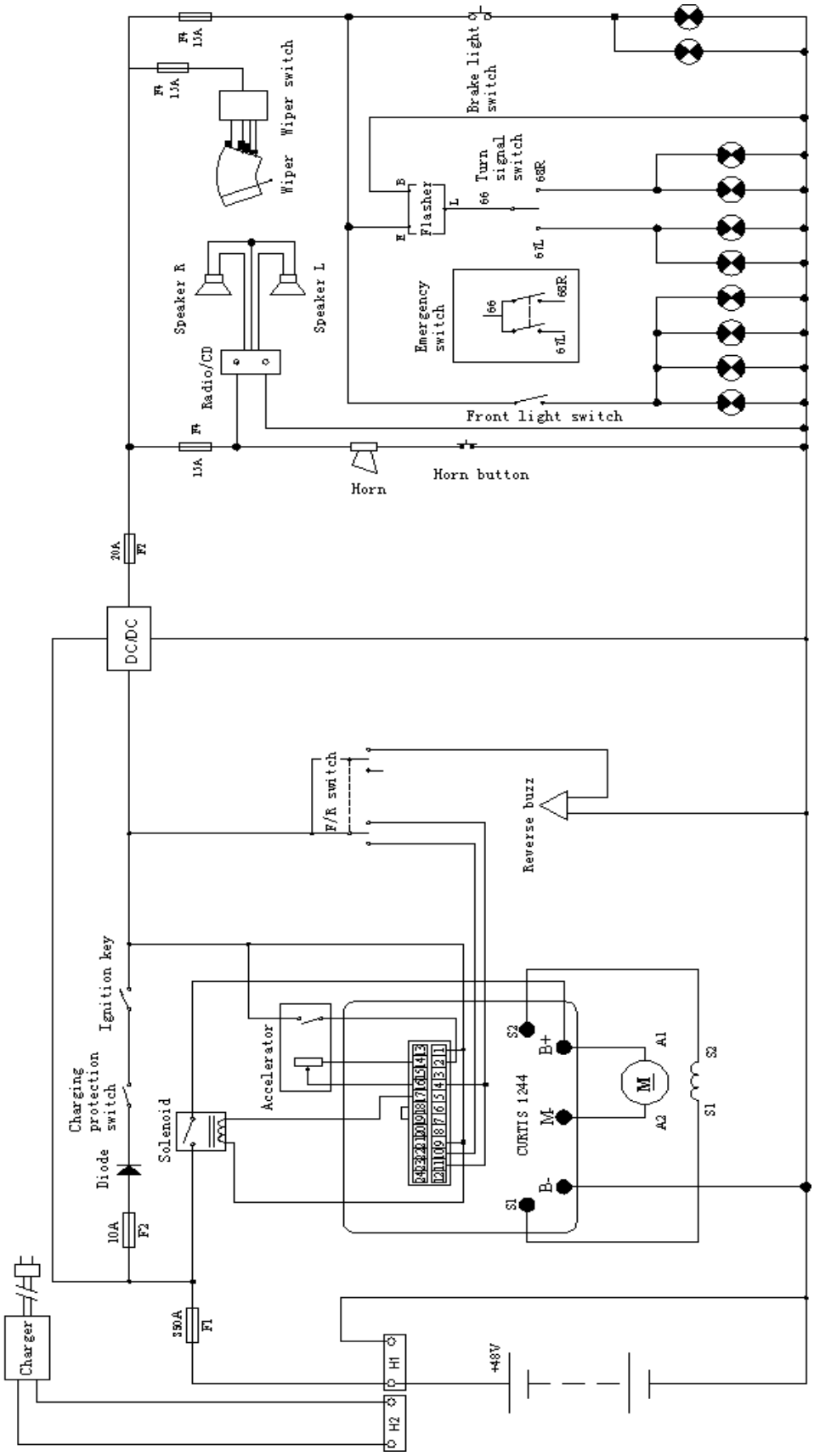

Wiring Diagram Of Shuttle Bus in Series System
Brake light Switch
F4
15A
Wiper Switch
Flasher
Turn signal Switch
Emergency Switch
Headlight Switch
Speaker R.
Speaker L.
Radio
Horn
Horn Button
Reverse Switch
Reverse buzzer
20A
F2
dc/dc
Voltameter
Accelerator
Solenoid
Controller
B+
A2
M-
B-
A1
S1
S2
Amperometer
Diode Ignition Key
Charger
10A
250A
F1
H2

FIG 2.

Wiring Diagram Of Electric Shuttle in Sepex system



Client Responsibilities

Maintenance Issues

Batteries – Battery fluid must be checked at least once monthly. Use distilled water only. Do no overfill.

Battery Cables – Tighten battery cables per battery manufacturer instructions located on batteries. Failure to tighten once a month could result in damage to the batteries. BEFORE placing the vehicle into service, please check all battery cables and tighten as they may become loose due to turbulence in shipping.

Battery Lock Washers - Make sure a qualified technician maintains lock washers on all battery posts when replacement batteries are needed.

Charger Power Cord – Do not remove the manufacture tag on the power cord as doing so will void the warranty. Always unplug the charger before turning the vehicle on.

Charging – Each charger must have a dedicated circuit with 20 amps. Vehicle should be left plugged in when not in use. Charger will trickle charge at 80% only when needed. Improper charging will lower range.

Extension Cords – We do not recommend using an extension cord to charge. If you do use one, it must be heavy duty (10 gauge) as the extension cord will determine how many amps the charger will receive.

Parking Brake – All vehicles have a parking brake (hand or foot). Driving with parking brake engaged will damage the motor and braking systems and can create a fire hazard. Always disengage the parking brake before driving.

Storage – Vehicles should NOT be left out in the elements 24/7. We recommend storing covered in a garage environment in order to preserve the integrity of the paint and fit/finish of the vehicle.

Tires – Must be inflated to proper capacity. Upon delivery, please check all lug nuts and tighten as they may become loose due to turbulence in shipping. Additionally, check lug nut tightness once a month.

Tow Switch – Must be pointed to “Run” and not “Tow” to operate. Must be in “Tow” position if towing.

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 interpretation right of this manual.

May 2015