



*Electric Vehicles*



# Owner's Manual and Service Guide

ACcel-2-DC and ACcel-2-AC

May 2014

## Notes:

- Only authorized persons should be allowed to operate the vehicle. It is recommended that the only persons allowed to operate the vehicle possess a valid motor vehicle driver's license.
- Don't depress the accelerator pedal and parking pedal at the same time, or it will damage the controller system and motor.
- Release the parking pedal before starting the vehicle, or it will damage the brake system as well as other parts.
- Don't modify the vehicle, or the performance and lifespan of the vehicle will be affected and can cause safety issues.
- Don't add any electronic equipment, such as an on-board phone to avoid interference with the control system.
- Don't overload.

## Table of Contents

<b>Specifications</b>	<b>3</b>
<b>Roof Installation</b>	<b>5</b>
<b>Operation</b>	<b>7</b>
Operation layout	7
Dashboard	7
Switches	8
Pedals	8
Charging	9
Cigarette lighter	9
<b>User information</b>	<b>9</b>
<b>Driver information</b>	<b>10</b>
<b>Driving</b>	<b>10</b>
Operation procedure	10
Safety	11
Driving on slopes	11
Parking notes	11
<b>Before initial use</b>	<b>12</b>
<b>Maintenance</b>	<b>12</b>
Battery maintenance	13
Charging the battery group	15
Brake system maintenance	15
Steering system maintenance	15
Motor maintenance	16
Lubrication maintenance	16
Maintenance schedule	17
<b>Troubleshooting</b>	<b>18</b>
<b>After-Sale Service</b>	<b>20</b>
<b>Monthly Maintenance Record</b>	<b>21</b>
<b>Electrical Diagrams</b>	<b>22</b>

## Vehicle Specifications

### ACcel-2-AC

Passengers	2
Battery group	48V, 8 x 6V, Trojan 105
Motor	7 HP KDS AC (64 PPR Encoder)
Controller power	Curtis 48V 450 Amp AC
Top speed (mph)	19.5 (20-25 LSV)
Load Capacity (lbs)	660
Weight including battery (lbs)	1360
Dimensions (in)	96 x 48 x 73
Ground clearance (in)	5
Turing Radius (ft)	11
Wheelbase (in)	66
Climbing capacity	30%
Front suspension	A-arm style independent suspension
Steering system	Rack and pinion
Brake system	4-wheel disc with mechanical foot e-brake
Tire size	205x50- 10 CST, DOT
Tire pressure (psi)	30
Drive train	Direct rear drive with 10.25:1 ratio
Front/rear tread (in)	37 / 39
Brake Distance (ft)	10
Charger	48V 17A
Charging time (hours)	8-10

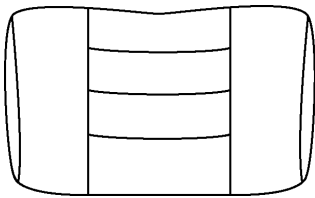
**ACcel-2-DC**

Passengers	2
Battery group	48V, 8 x 6V, 225AH
Motor	5.5 HP KDS DC Motor
Controller power	Curtis 48V 400 Amp DC 1268
Top speed (mph)	19.5 (20-25 LSV)
Load capacity	600
Weight including battery (lbs)	1350
Dimensions (in)	96 x 48 x 73
Ground clearance (in)	5
Turing Radius (ft)	12
Wheelbase (in)	65
Climbing capacity	30%
Front suspension	A-arm style independent suspension
Steering system	Rack and pinion
Brake system	4-wheel disc with mechanical foot e-brake
Tire size	205x50- 10 CST, DOT
Tire pressure (psi)	30
Drive train	Direct rear drive with 10.25:1 ratio
Front/rear tread (in)	37 / 39
Brake Distance (ft)	10
Charger	48V 18A
Charging time (hours)	8-10

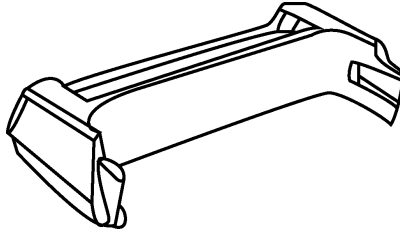
## Roof Installation

Pre-Installation preparation: Check the kit list as per below.

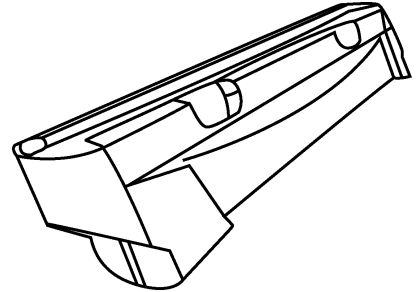
**1|** Backrest



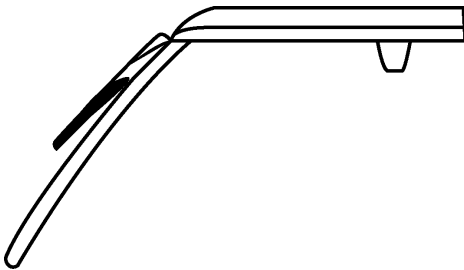
**2|** Rear lid



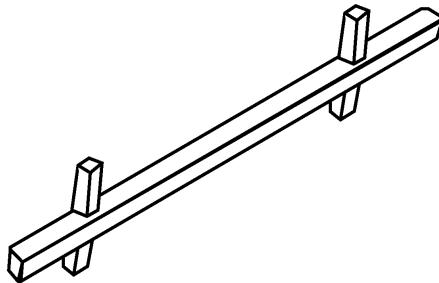
**3|** Windshield trim cover



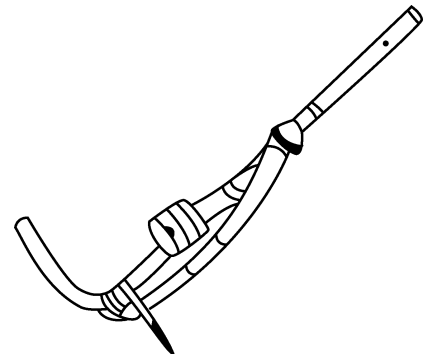
**4|** Roof kit



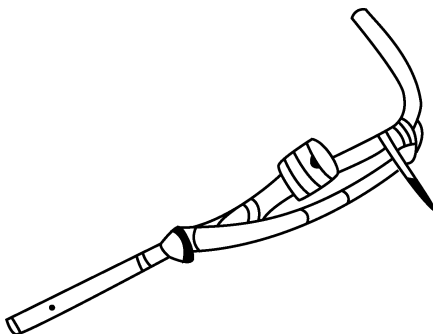
**5|** Backrest bracket



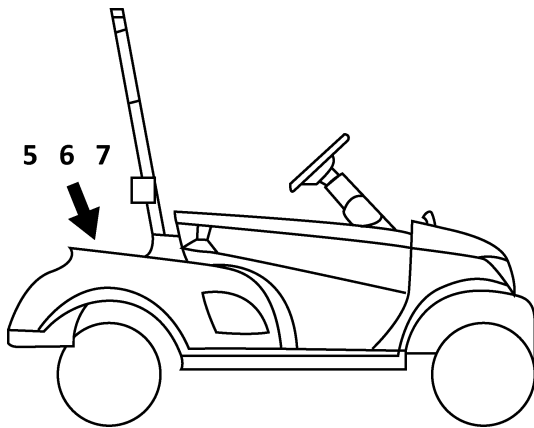
**6|** Rear column (Right)



**7|** Rear column (Left)

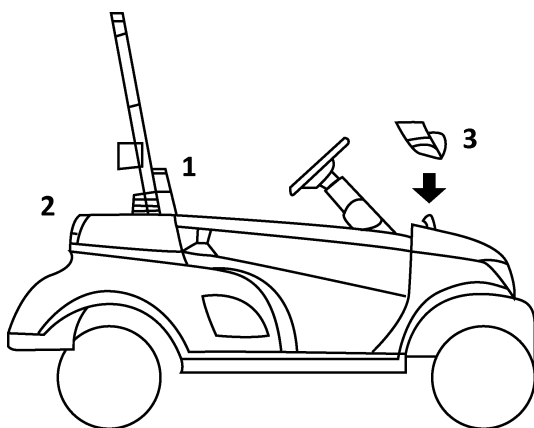


## Installation procedure



### First step

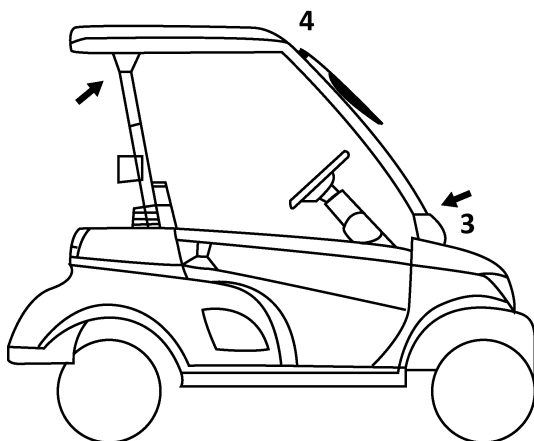
Put the rear columns (right and left) into the corresponding holes. Attach it to the chassis by M10 bolts. Then install the backrest bracket with a M6\*40 round screw, tighten.



### Second step

Install the backrest and rear box according to the location shown left. Attach the backrest by 4 M8 hex bolts, and attach the rear box by the M5 oversized head break mandrel rivets.

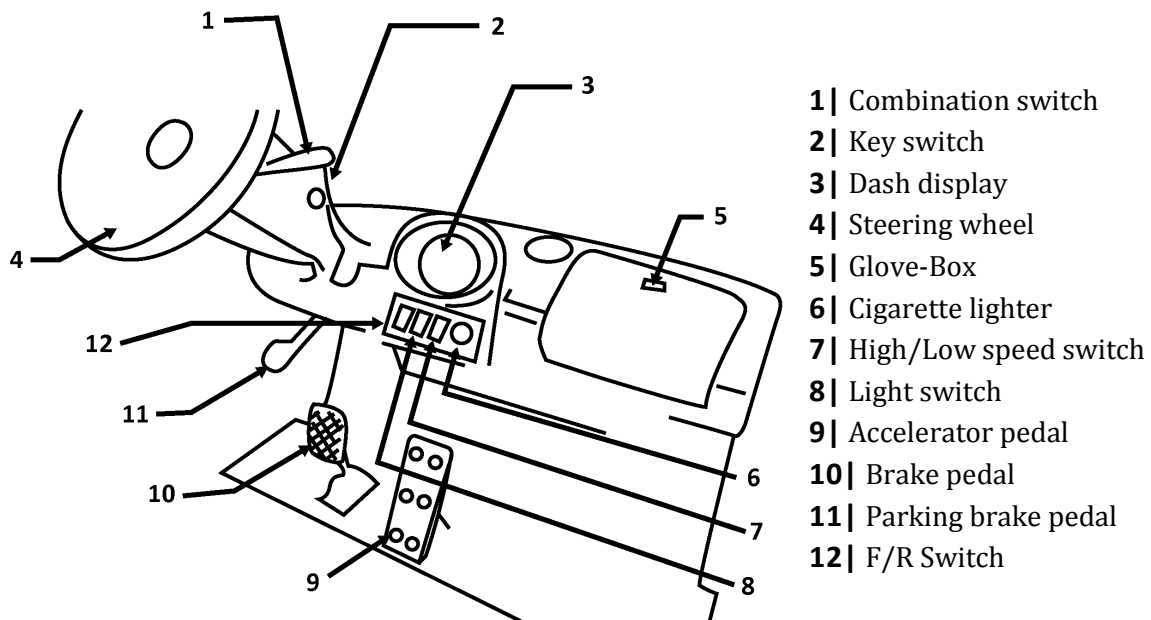
Put the windshield trim cover to the location shown left for next installation.



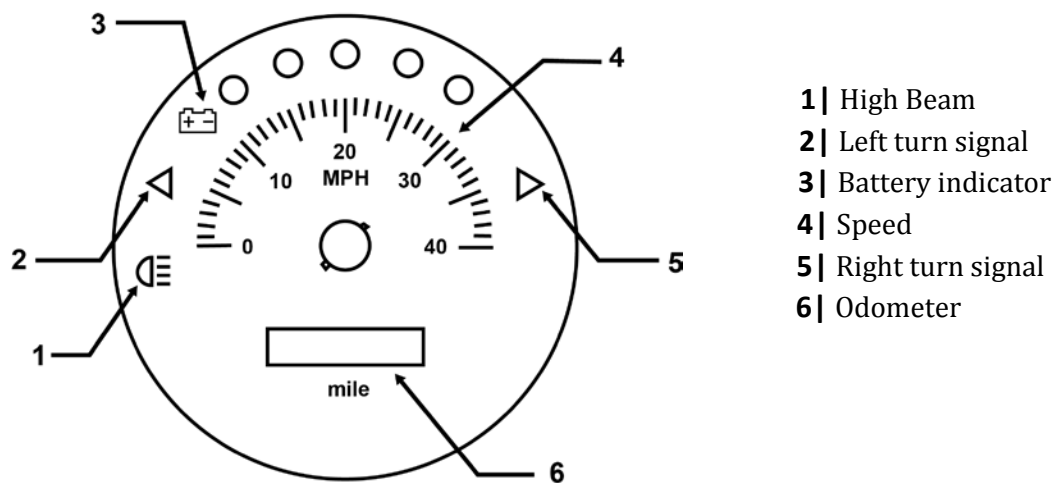
### Third step

Install the roof and windshield. Attach it with M8\*45 Hexagon bolts at the indicated location. Ensure the correct position after tightening all connections. Take caution during the installation to avoid surface scratches or other damages of parts.

## Operations

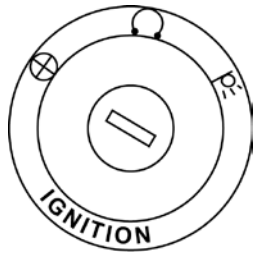


## Dashboard





## Key switch



- ⊗ Normal park position, only at this position can you remove the key.
- 🔑 All the power of your car is connected when key is at this position.

**WARNING: Do not take out the key when the vehicle is running. Do not leave the key alone, especially with children, to avoid any accident.**

## Forward/Backward switch

The switch has three positions. The vehicle goes forward when FWD is pressed down and backward when REV is pressed down. When the switch is unmoved, the vehicle is in the neutral position.

**WARNING: Strictly prohibit shifting forward and backward directly when the system is running, or it will damage the transmission system.**

## Combination switch

Turn the bar on the end of combination switch to turn on or off the lights. The small lights and head light will be on when on this position. All lights will be off when it is on the OFF position.

When the ignition light is on ACC or ON position, pulling the switch forward will signal right. Pushing it backward will signal left.

## Pedals

Depress the accelerator to move forward and backwards. Depress the brake pedal to lower the speed until the vehicle stops.

Put down the parking brake pedal to engage the parking brake, press again to release.

**WARNING:** Before leaving the cart, put the Forward/ Backward switch in the neutral position to park. The Forward/ Backward switch should be on neutral position when releasing the parking as well. Before running the parking brake should be released, or it may seriously damage the brake system and related parts.

## **Charging**

### *Charger Socket*

Plug one terminal of batter into charger socket (see picture), and plug the other terminal into main power when recharging the batteries.

## **Cigarette lighter**

The ignition power is DC12V.

## **User Information**

Read the specification of vehicles, and use vehicles according to manufacturer recommendation.

Do not modify the vehicles without manufacturer's approval. Any modifications will affect the function and safety of vehicles.

Any replacements of the spare parts (such as changing the battery, tires, seats, and so on) shouldn't affect the safety requirements.

This is a low speed electric vehicle, and should be used on approved roads and meet the road regulations.

## **Driver information**

Only authorized persons shall be allowed to operate the vehicle. It is recommended that only persons with a valid motor vehicle driver's license be allowed to operate the vehicle.

The driver should pay close attention to road conditions, passerby and the other vehicles on the road.

Remind passengers not to leave the seats and keep arms and legs inside the vehicle when it is moving.

Report to related departments once any accidents occur.

The driver should not modify, add or remove any parts of the vehicle. Do not add or install any additional handlebar on steering wheel if they are not original design.

The driver should operate vehicles in approved areas.

## **Driving**

### **Operation Procedure**

- 1|** Insert the key and turn it to ON position.
- 2|** Press the green head of the direction selector to the forward position.
- 3|** Release the parking brake and press the accelerator pedal. The speed will get increase as pedal is pressed downwards.
- 4|** When stopping the cart release the accelerator pedal and depress the brake pedal slowly. Then push down the parking pedal after stopping.

## **Safety**

Release the parking pedal before driving to avoid any damage of the brake shoes or motor.

Don't depress the accelerator pedal too aggressively or frequently or it will shorten the life of the accelerator and controller system.

Don't start, stop, or turn in high speed.

Do not pass other vehicles traveling in the same direction at intersections, blind spots, or at other dangerous locations.

Avoid running over loose objects, potholes, and bumps to avoid the damage of the vehicle and the surroundings or hurting passengers.

Please observe and obey all traffic regulations, including the carry capacity requirement, authorized speed limits, and other marks.

Keep a clear view of the path of travel. Observe other traffic and pedestrians, and maintain a safe distance, based on speed of travel, from a vehicle ahead.

## **Driving on Slopes**

Ascend or descend grades slowly.

Do not turn around when driving on a slope.

Be careful when driving near to the edge of the slope. Please keep at least a wheel distance from the vehicle to the edge of the platform.

## **Parking Notes**

Park the cart on the flat and solid ground.

Depress the brake pedal. Keeping the direction switch in neutral position, turn off the ignition switch and take out the key.

Fix the wheels when parking the cart on the slope.

## Before Initial Use

Read, understand and follow the safety label on the instrument panel. Be sure you understand how to operate the vehicle, its equipment and how to use it safely. Maintaining good performance depends to a large extent on the operator.

### New Vehicle Inspection

Before a new vehicle is put into operation, the items shown below must be performed.

- 1| Check status of each spare part, especially the screw and nut on the steering wheel and brake.
- 2| Check for any leakage problems with the steering system , turning system and transaxle.
- 3| Check the electrolyte level of the battery.
- 4| Check if tire inflation is correct. Low pressure will lead to difficulty turning and bumpy riding.
- 5| Check if there is any damage between the wiring and other locations where pieces rub against each other.

## Maintenance

Turn off the electricity, take out the key and engage the parking brake.

When working underneath vehicles, please use jack and triangle wood to fix the front and rear wheels, in order to avoid accidents.

Keep the maintenance area clean and safe.

Please perform vehicle maintenance according to safety guidance.

No smoking in the working sites. The facility of extinguishing fire should exist in the working sites. Don't use fire to check the height and leakage of the electrolytes in the reserve battery. Don't use the flammable liquids to wash off parts.

Maintain the ventilation of working sites.

Check and maintain under safe working conditions. Check and maintain the braking, steering, speed direction control system, emergency facilities, head/rear lights, controller, and safety equipment.

Check the battery cover as per the right methods.

## **Battery Maintenance**

The batteries for this vehicle have high current, high capacity, and a long lifetime. To keep the vehicle in good performance, it is very important to maintain it in the correct procedure.

The connectors on the batteries are the output connectors. Keep the area clean and dry, with no foreign matter or dust on it, or the leakage or short-circuit. This will shorten the battery life or possibly burn it out.

**WARNING: Don't let tap water enter the battery.**

Check the height of the electrolyte periodically. Check it once per week in summer and once every two weeks the rest of the year. Standard height level is 10-15mm ( $\frac{1}{2}$ " ) higher than the battery plate. If is too low, please add the recommended distilled water or liquid.

Keep the wiring well-connected. After using the vehicle initially for 2-3 days, the completed inspection for all connectors should be carried out. Inspect the vehicle once a week following. Any loose or rusty connectors should be fixed. Loose or rusty connectors can cause high temperature, damage, or possible sparking.

**NOTE: Don't over-tighten terminals.**

Charge the battery immediately after discharge, or it will affect the battery life.

Keep the filling-water container clean, so no impurities will be put into the battery.

When the environment temperature is under  $-40^{\circ}\text{F}$ , the density of the electrolyte after charging is  $1.28 - 1.29\text{ g/cm}^3$ . If it is more than  $1.30\text{ g/cm}^3$ , the battery can be damaged badly. Add water immediately to keep the electrolyte value to normal. If the battery discharges by 80% (the electrolyte is between the range  $1.13 - 1.15\text{ g/cm}^3$ ), charge it immediately. At this range the vehicle can only last 2 - 3 mi. Don't discharge any longer, or it will damage the battery.

Charge the battery fully before storage. Charge it at least once a month for 24 hours.

## Battery Replacement

Replace the batteries immediately when it approaching to the battery life, as the capacity will decrease quite fast and can't meet the range requirement. The detailed replacement way can be consulted with the supplier.

Remove battery hold downs and cables. Lift out batteries with a commercially available lifting device.

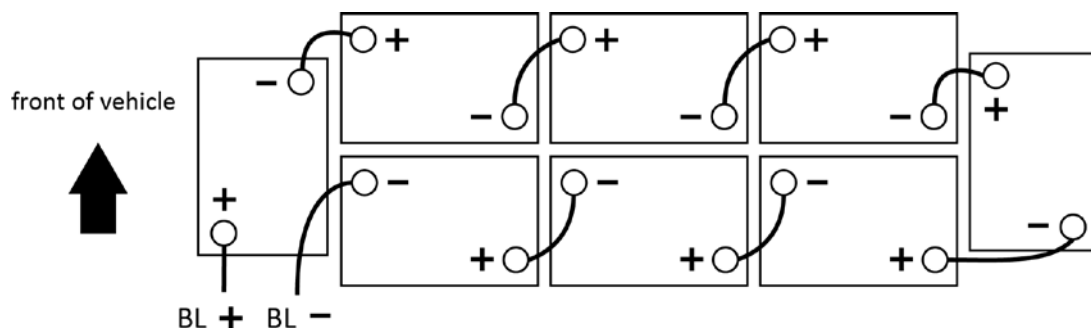
If the batteries have been cleaned and any acid in the battery rack area neutralized as recommended, no corrosion to the battery racks or surrounding area should be present. Any corrosion found should be immediately removed with a putty knife and a wire brush. The area should be washed with a solution of sodium bicarbonate (baking soda) and water and thoroughly dried before priming and painting with a corrosion resistant paint.

The batteries should be placed into the battery racks and the battery hold downs tightened to 45 - 55 in. lbs. (5 - 6 Nm) torque, to prevent movement but not tight enough to cause distortion of the battery cases.

Inspect all wires and terminals. Clean any corrosion from the battery terminals or the wire terminals with a solution of sodium bicarbonate (baking soda) and brush clean.

**WARNING: To prevent battery explosion that could result in severe personal injury or death, extreme care must be used with aerosol containers of battery terminal protectant. Insulate the metal container to prevent the metal can from contacting battery terminals which could result in an explosion.**

Use care to connect the battery wires as shown. Tighten the battery post hardware to 50 70 in. lbs. (6 -8 Nm) torque. Protect the battery terminals and battery wire terminals with a commercially available protective coating.



*Battery Connections*

## Charging the Battery group

In order to guarantee battery life, please use the recommended charger to charge the cart.

Keep the key switch on OFF position during charging.

Keep the battery in cool, dry location. Don't use the charger in rain or hot weather.

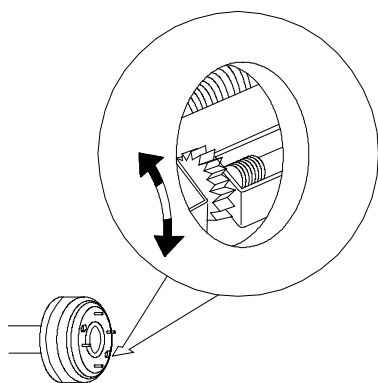
Don't overcharge the battery, or it the electrolyte will expel from the battery which can damage the vehicle and the storage performance of the battery.

Ensure that the AC power is consistent with the input power. After connected, the green light indicates the vehicle is charging. The red light indicates that charging is complete. At this time the power will be cut off automatically to avoid overcharging.

Charging should be monitored.

**NOTE: Don't remove the plug connected to the vehicle prior to disconnecting from the AC power source.**

## Brake System Maintenance



Adjust the gap between the brake drum and brake shoes.

Dial up the adjusting ratchet wheel of the brake drum until the wheel cannot turn freely, then dial down the ratchet wheel 7 - 8 teeth.

## Steering System Maintenance

Check if there is any damage to the dust cover of the tie-rod. A broken dust cover will let water in and damage the tie-rod, and the steering system will not be flexible. Replace a new one immediately once a worn one is found. Make sure the front wheel toe-in is between 3 - 5 mm ( $1/8 - 3/16$ "). If it exceeds this value, adjust the tie-rod screw stem.



## **Motor Maintenance**

Keep the motor surface clean at all times. Clean the surface with a dry cloth. Avoid any water entering into the motor.

## **Lubrication maintenance**

Check the brake once a month. Fill it full if the oil is low.

The gear oil should be changed once a year. User can choose gear oil according to the climate.

- Summer: GL-4 90
- Winter: GL-80W/90

Replace the grease for the rear axle once a year, using recommended oil type GL-5 90 and GL-5 80W/90. Fill the level to 1.2 liters (40 oz).

When changing, first twist down the oil plug to discharge the gear oil. Clean the oil plug and replace it, then inject the new gear oil.

## Maintenance Schedule

<i>Item</i>	<i>weekly</i>	<i>monthly</i>	<i>quarterly</i>
Check tire pressure	•		
Check tires for abrasions	•		
Check tightness of the bearing bolt and the tire nut	•		
Tire rotation			•
Check braking and the parking function		•	
Check brake tube for leakage		•	
Check if brake shoes are worn			•
Check if steering wheel works freely			•
Check brake pump			
Check tightness for the turning ball joint and rod		•	
Check nut on the steering rack's spindle		•	
Check tightness of steering rack and bracket		•	
Inspect and adjust front wheel's toe-in			•
Checking tightness of front absorber and helix spring			•
Check height of electrolyte	•		
Check density of electrolyte	•		
Check if the battery's pole is loose		•	
Clean battery pole by water		•	
Check light and relay performance		•	
Clean and fix wiring connector		•	
Check and adjust front tire's bearing		•	
Check or replace transaxle		•	
Check performance of gearbox and bearing (after the first		•	
Check motor's bolts and nuts		•	
Clear and lubricate front wheel bearing		•	
Checking motor bearing		•	
Lubricate other parts (use general oil)		•	

## Troubleshooting

The authorized qualification for repair, the requirement for application, safety and the maintenance requirement should be the same.

<i>Problem</i>	<i>Possible reason</i>	<i>Processing methods</i>
Cart cannot move	Operation procedure is wrong	Refer to user manual
	Wiring connector is eroded	Cut off the power, remove the nut, clean the connector and replace the nut
	Battery power is low	Charge the battery
	Direction switch is damaged	Replace part
	Accelerator is damaged	Replace part
	Direction contactor is damaged	Replace part
	Wiring is loose	Repair or replace parts
Vehicle moves slowly and/or stops when climbing	Vehicle is overloaded resulting in the shutting off the controller when temperature reaches 167° F	Lighten the load of the vehicle to decrease the temperature
Releasing the accelerator pedal does not slow down the vehicle	The spring for the accelerator pedal is broken and the pedal cannot reposition	Shut off the ignition lock, step on the parking pedal ,then contact with the supplier

No indication (LEDs) on the dashboard	Parts are loose	Lock the inserted parts
	Fuse is burned out	Replace the fuse
Bumpy riding	The tire pressure is unbalanced	Balance the air pressure
	The front and rear wheel are not aligned	Correct the assembly of the wheels
Turning is difficult	Tire pressure is too low	Inflate tires
	Shaft is short of lubrication.	Add lubrication
	The direction shaft pin or joints are damaged	Replace parts
Turning excessively	Tie-rod is damaged	Replace part
	Steering rack has not been adjusted well or abased	Adjust or replace
	The direction shaft is loose	Tighten direction shaft
Lack of power, slow response	Low battery power	Charge the battery
	Damaged drive gear	Replace
	Speed control system is faulty	Maintain speed control system
Rear bearing is leaking oil	Axle of the tire or the washer is damaged	Replace parts
	Too much oil	Reduce oil quantity

Abnormal noise	Drive gear or the bearing is damaged	Replace part
	Bearing of front or rear suspension is damaged	Adjust or replace
	Wheel screw is loose	Tighten
	Motor's bearing is damaged	Replace part
Low braking power	Brake drum is damaged	Replace part
	Brake shoe is not clean	Keep clean
<i>These possible causes are just for your reference and do not include all causes that result in these listed issues.</i>		

## After-Sale Service

Star EV will provide the friendly service and technical support for the users.

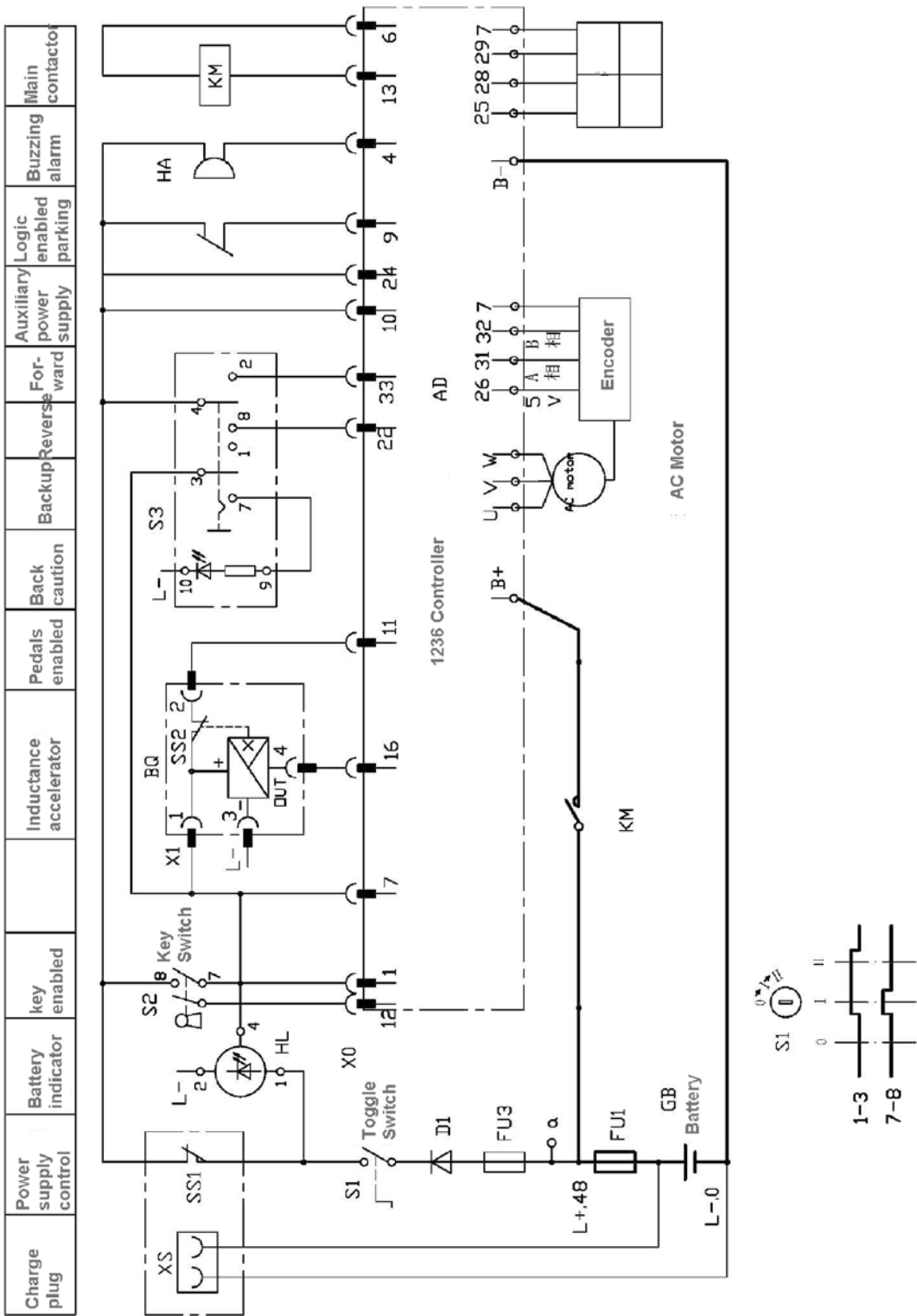
Users can report faulty problems by telephone, fax and email. Keep Star EV informed for the model number, VIN number, estimated delivery time, contract number and date as well as a detailed description or photos of the faulty parts and problems, and our team will handle it accordingly.

Do not disassemble.

## Monthly Maintenance record

<i>Record</i>		<i>VIN NO:</i>		<i>Date</i>	
		<i>Normal</i>	<i>Abnormal</i>	<i>Remarks</i>	
Is tire pressure normal? Are wing nuts tightened?					
Is the batteries' liquid level normal?					
Any batteries or controller motor wirings loose?					
Is the controller system normal?					
Is the fixed screw for the steering system normal?					
Are the wiring connectors clean?					
Are the body and the frame of the vehicle normal?					
Are the front axle and rear axle normal?					

Electrical Diagram for AC Controller



Electrical Diagram for DC Controller

