

# BugE™

## Owners Manual



Version 1.5 copyright Blue Sky Design 2006

*Welcome to an entirely new form of transportation!*

*The BugE is a Neighborhood Electric Vehicle for people who live and work within their community.*

*Between a Bicycle and a Car, the BugE is your personal transporter designed to do what we all do everyday; go to work, run errands, attend classes or meetings and visit friends.*

*Most of us usually drive less than 20 miles a day by ourselves. The BugE can do that quietly, simply and affordably.*

*The BugE can reduce the need and costs of driving your automobile because you use it only when you really need the speed, range and capacity of a large vehicle.*

*The rest of the time, your BugE will be a cleaner and more appropriate option for you, your community and the environment.*

*You will find your BugE a welcome non-threatening transportation alternative by motorists, bicyclists and pedestrians.*

*Please use your BugE appropriately and safely.*

*Sincerely,*

*Mark Murphy  
Blue Sky Design*

*This Vehicle would not exist without the support and creativity of the following brilliant individuals:*

*Ed Gunderson    Scott Smith    Mike Gould    Rich Ruggles  
Maurice Rhynes    Jazz Khalsa    Glen Houston    Jeff Homolka*

*And last, but not least, my wife Trish*

**The BugE is designed as a simple vehicle that can be assembled without special tools by ordinary people. This concept makes it possible for the BugE to be built, sold and used as a low cost community based business opportunity.**

**The BugE can be assembled by its owner, by individual home-based businesses or non-profit organizations to provide work or job training opportunities. We hope it makes a difference.**

**For BugE Vehicle Kit information contact:**

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Website: [www.BlueSkyDsn.com](http://www.BlueSkyDsn.com)**



## **Important Safety and Liability Information**

The Purchaser, Assembler and Builder(s) of this kit are the sole responsible party(s) for the proper and safe construction of this vehicle.

Blue Sky Design makes no claims for safety, stability or performance.

The BugE is designed as a single passenger vehicle only.

The driver and cargo weight capacity is 200 pounds.

The BugE is not intended for use on Federal freeways or State highways or any thoroughfare where normal traffic exceeds the speed of this vehicle.

The BugE is defined as a “Three Wheeled Electric Motorcycle” without a “Permanent Roof Structure”.

The Fairing is for aerodynamic benefit only.  
It is not designed for crash protection.

Do not lift this vehicle using the bodywork.  
Lift only with the wheels or metal frame.

Local ordinances and State or Federal laws may regulate or restrict the use, licensing and insurance requirements for this vehicle and/or driver.

The driver is the sole responsible party for the safe use, application and operation of this vehicle.

Keep this Manual in the vehicle. It should remain with the vehicle if sold.

Read this Owners Manual before using this vehicle.

The following information is intended only as a guide for use of this vehicle.

**NOTICE:** Are suggestions to avoid damage to the vehicle.

**CAUTION:** Are suggestions to avoid potential injury to the operator.

**WARNING:** Could cause injury or dangerous conditions if ignored.  
Getting in and out of the BugE



**Two black Rubber Hooks** on either side of the fairing are released, permitting the fairing to be tilted forward.

To close the Fairing, lower it into position, then re-hook both of the **Rubber Hooks**. Some BugEs may have mechanical latches and support struts.



The **Seat** should be positioned for the comfortable use of the primary driver. The seat can be repositioned by removing and re-installing it in different mounting holes.

**CAUTION:** Do not let the fairing drop. You could bump your head or damage the fairing.

**CAUTION:** Be sure to set the Parking Brake before exiting the BugE so it won't roll away.

**NOTICE:** Be sure to remove the On/Off Key when you get out to prevent theft or unauthorized use of your BugE.

## The BugE Controls

The BugE is steered with the **handlebars** just like a bicycle or motorbike.

The **Brake Levers** on the Handlebars operate the two front brakes. Each Brake lever operates one brake. **Always apply both brake levers together.**

**CAUTION: Using one brake lever will cause the BugE to pull to that side.**

The **Accelerator** is the **Black** Thumb Switch on the right Handlebar.

The **Turn Signals** are operated with the **Green** button on the control panel and indicate the left and right blinkers.

The **Horn** is a **Black** Button on the control panel.

The **Headlight** Switch is the **Red** button. Slide it up to turn on the headlights.

The **On/Off Key** is a **Red** Key inserted in the lock in front of the seat on the left. It is to prevent someone from driving the BugE without your permission.

**CAUTION:** Always turn off the power to prevent the BugE from moving if the Accelerator is accidentally pushed and for safety when charging the batteries.

The **Parking Brake** is a **Red** lever on the right side of the seat. Push it down with your foot to release the brake. Pull it up with your toe to engage the Parking Brake.

**CAUTION:** Never drive with the parking Brake engaged. It will wear out the brake, reduce battery performance and overheat the motor.

There may be additional custom features on individual BugE's such as fans or music systems.

## The BugE Gauges

The BugE has a **Speedometer** to indicate the vehicle speed. It may have additional features (Odometer, trip miles etc) depending on the unit installed.

There is a **Battery Meter** that will indicate the remaining power in the battery. As you drive the BugE you will become familiar with the meter readings and when to re-charge the batteries.



### **Driving the BugE**

- Clean the Windshield if needed (see Maintenance section)
- Adjust the Rear View mirrors if needed.
- Check that the fairing is down and latched
- Insert the On/Off Key and turn the Key to the On position
- Check the Battery Meter
- Release the Parking Brake.
- Place both hands on the handlebars.
- Press gently on the Accelerator Lever.





## Steering the BugE

**CAUTION:** Always keep both hands on the handlebars when driving.

Steering the BugE is easy, just like a bicycle. You can turn around easily on a typical 20 foot wide street. The BugE should feel comfortable and stable to drive under normal conditions.



**WARNING: Do not attempt sharp turns or fast cornering. Abrupt turns at speed could cause the BugE to tip over.**

### **Backing up**

Like a Bicycle or Motorcycle, the BugE Motor does not run in reverse. To back up you can push back with a foot, or get out of the BugE and push it backwards. Plan your moves and you shouldn't have to do this much.

### **Parking**

Since the BugE is technically a motorcycle, you are often allowed to park in motorcycle parking spaces. In any case it is usually much easier to find places to park than a car. Four BugE's can fit in one automobile parking space.

### **Cover your BugE**

We recommend you park your BugE under cover to protect it and keep it clean. A motorcycle size cover will do.

### **Re-charging**

Most newer commercial buildings, convenience stores, public buildings and many homes have outside electrical outlets for maintenance and service. If you have regular places you visit, you will often find a handy outlet to "Opportunity Charge" the batteries.

**NOTICE:** Always ask first if you can plug into someone's outlet. A full charge will cost less than a quarter.

If you have a lot of errands to attend to, "Opportunity Charging" can extend your range dramatically. Instead of waiting for the batteries to drain down and waiting for them to fully re-charge, charging often takes less time and keeps you up and running.

**NOTICE:** When charging a small red light will be visible on the charger. You can hear it come on.

### **Recharge cord**

The storage compartment in the BugE nose should always contain a convenient electrical cable to use for charging the BugE batteries. An optional retracting reel may be installed.

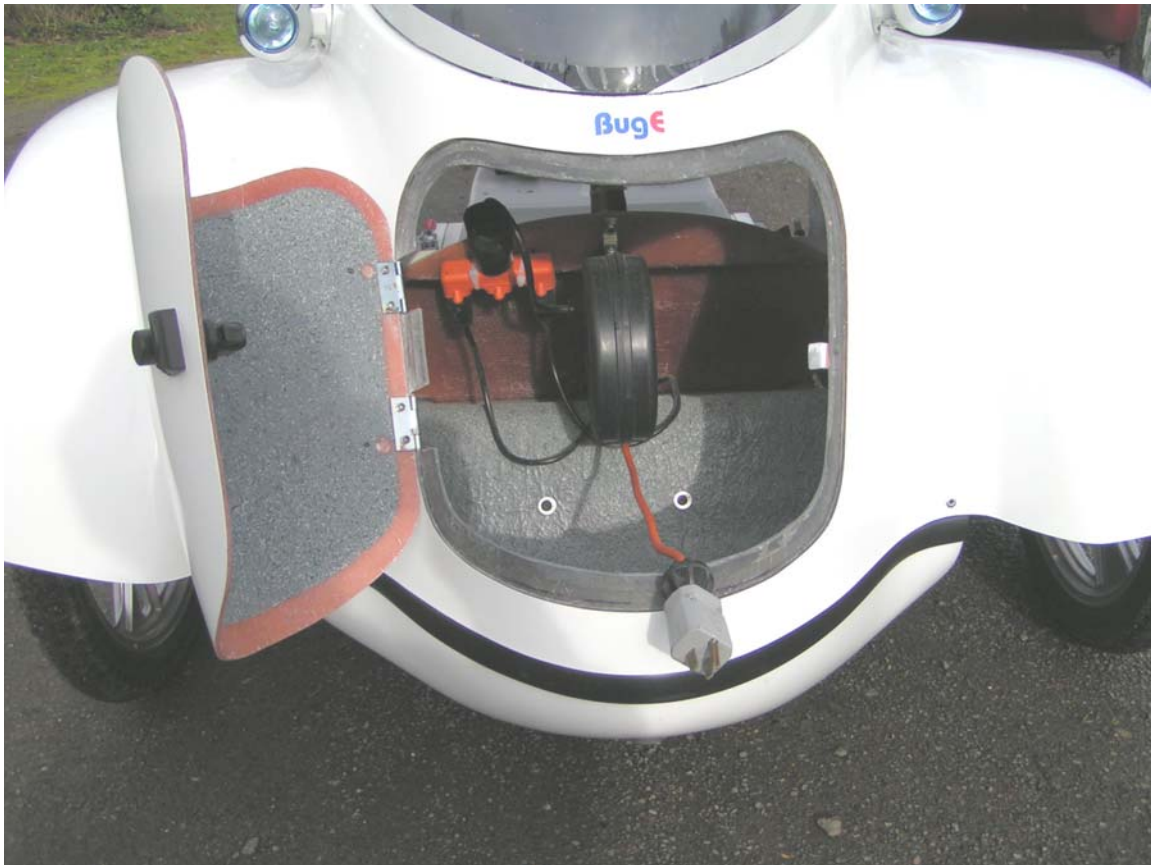
### **Recharge time**

Using one Soneil 4808 charger, drained batteries may require 12 hours to fully recharge. An optional second additional charger will reduce that time in half. The on board charger is designed to charge the batteries overnight and can be left plugged in to keep the batteries charged up.

**NOTICE:** Never leave the batteries discharged. Always recharge them as soon as possible. Not re-charging the batteries will ruin them quickly.

### **Cargo**

The front Storage Compartment will hold up to four plastic grocery bags, or about 25 pounds of cargo. In addition, the seat can be used to support a small back pack. (less than 10 pounds) There is a small storage tray in front of the seat as well.



### **Overloading**

The payload maximum for the BugE is 200 pounds. Put cargo in the front Storage Compartment.

**WARNING:** The BugE is for one person only.

### **Motor Care**

**NOTICE:** Low motor clearance. Avoid speed bumps, pot holes, and water puddles. Do not use off-road. Motor damage may result.

**NOTICE:** Motor overheating may result from hard use such as hill climbing, heavy loads and rapid acceleration. Abuse may cause damage to the motor. Motor is H rated to 180 degrees C.

## **Performance**

Under ideal conditions the BugE may go over 30 miles. However like automobile mileage estimates, there are many factors that can affect range.

Factors that reduce range are:

- Cold weather will reduce the batteries ability to deliver power.
- Older batteries will not be able to produce as much power.
- Partially discharged batteries will not have as much power in them.
- Windy conditions will create more air resistance.
- Hills will put a huge load on the motor and batteries.
- Stop and go traffic will tax the batteries by requiring lots of starts.
- Rapid acceleration and high speed will reduce range significantly.
- Heavy payloads will require more energy, reducing range.

The BugE is a very efficient vehicle. It is lightweight which requires less energy to move, the fairing is very aerodynamic reducing the air resistance and the tires create very little rolling resistance.

However, how you drive will have a big influence on your range.

The best techniques for increasing range are:

- Fully charging the batteries.
- Properly inflated tires (35 psi)
- Gentle acceleration
- Slower speeds
- Properly inflated tires
- Carrying light loads.
- Coasting down to stops
- Coasting down small hills.

**WARNING: Never coast down a long hill or allow the BugE to pick up speed beyond what it could attain under power on flat terrain.**

**Excess speed down hills can over heat the brakes and dramatically increase braking distances!**

**Loss of control could result in serious injury or death.**

**NOTICE: High speed (55+ mph) even if coasting down hill can destroy the motor by exceeding its rpm limit.**



## **Hazardous Conditions**

### **WARNING: Do not drive the BugE in unsafe conditions.**

Weather conditions play a major part in vehicle safety. As with any vehicle, you must take extra precautions during bad weather and road conditions.

### **Visibility**

Poor visibility obviously makes it harder for you to see and harder to be seen. Like a motorcycle, the BugE does not have windshield wipers.

If your BugE is equipped with a defroster fan use it to help reduce fogging.

Always carry a Chamois cloth to remove condensation

Always apply RainEx to the Canopy to help water bead up and roll off.

Always apply AntiFog to the inside of the Canopy to prevent fogging.

### **Road Conditions**

As with a bicycle or motorcycle, avoid pot holes and rutted surfaces. Slow down. POT HOLES, WATER AND MUD can damage the tires, wheels and the motor.

### **Braking**

Wet weather will increase braking distances and can cause skidding. Slow down.

### **Traction**

Wet and snowy weather will reduce traction and contribute to skidding around corners and when accelerating. Reducing tire pressure to 30 psi (normal pressure is 35psi) may help somewhat. If you skid, steer in the direction of the skid.

### **Wind**

Once again, like bicycles and motorcycles, you are subject to the same effects of wind. Gusty and windy conditions will affect the stability and your control of the BugE. If you feel buffeted by wind, slow down or stop in a sheltered area until the wind calms down.

### **CAUTION:**

- Always park the BugE facing the wind to avoid damage.
- Park under shelter in stormy conditions.
- Apply the parking Brake.

## Staying Warm

The BugE Fairing and canopy will offer you some shelter from wind chill and rain. However you should always dress for the weather even though your trips may be short.



## Care and Maintenance

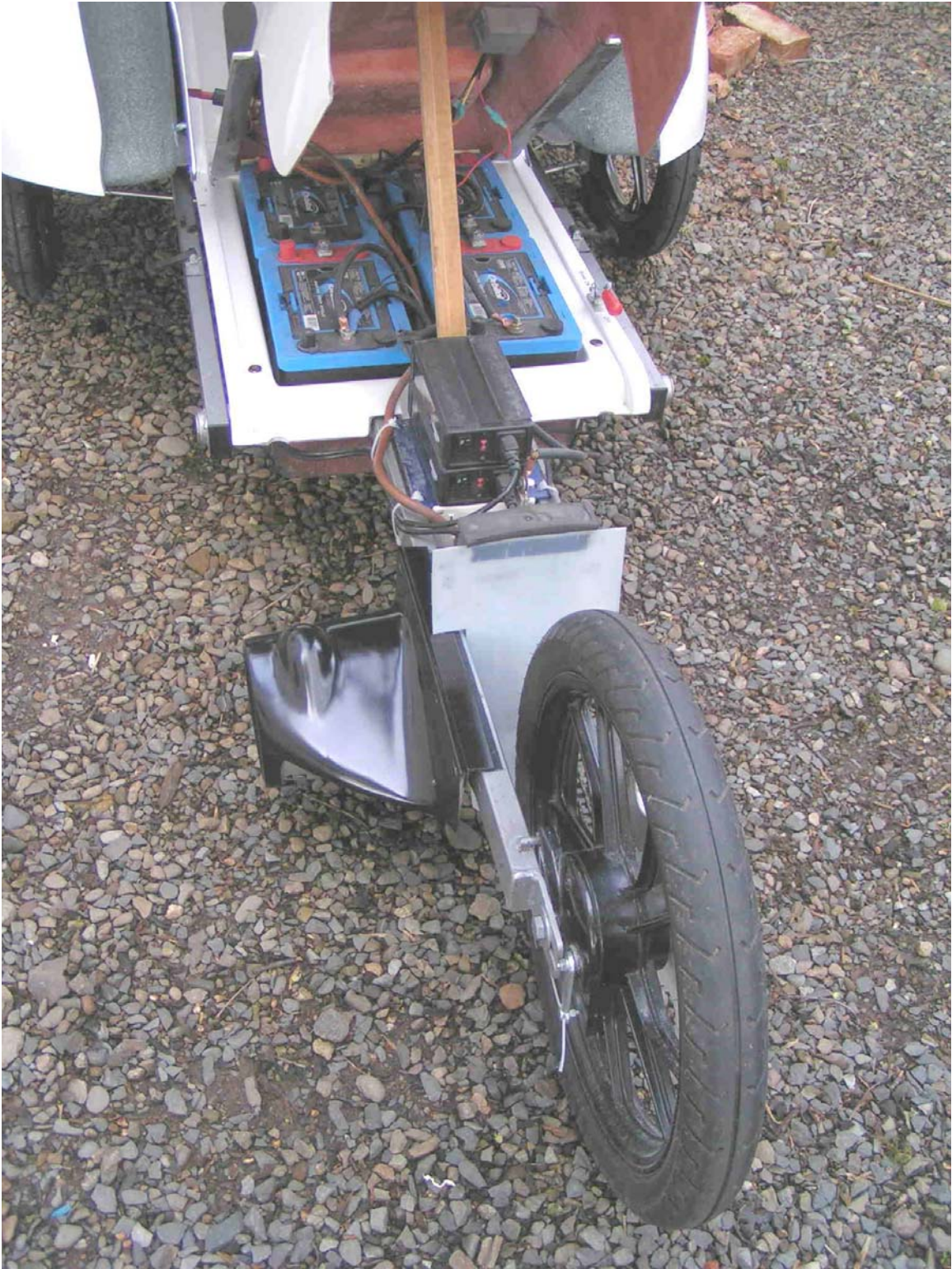
- Keep your BugE clean and store it in a garage.
- Clean the bodywork and canopy with Lemon Pledge or a suitable care product.
- Always keep the chargers plugged in.
- Replace any rusty, loose or damaged components.

## Battery Replacement

We recommend four Optima or Exide brand Blue Top # 34 AGM type batteries. These are spill proof sealed batteries and do not need any Battery Acid or water added. Regular wet cell batteries of the same size will work too.

Batteries should be replaced when they will not hold a full charge or performance is not satisfactory. AGM type batteries are available at most battery retailers.

Always replace the batteries as a complete set. Replace the batteries with the same batteries of equivalent size and type. All battery retailers will give you a credit on your old batteries for recycling. Do not dispose of old batteries yourself.



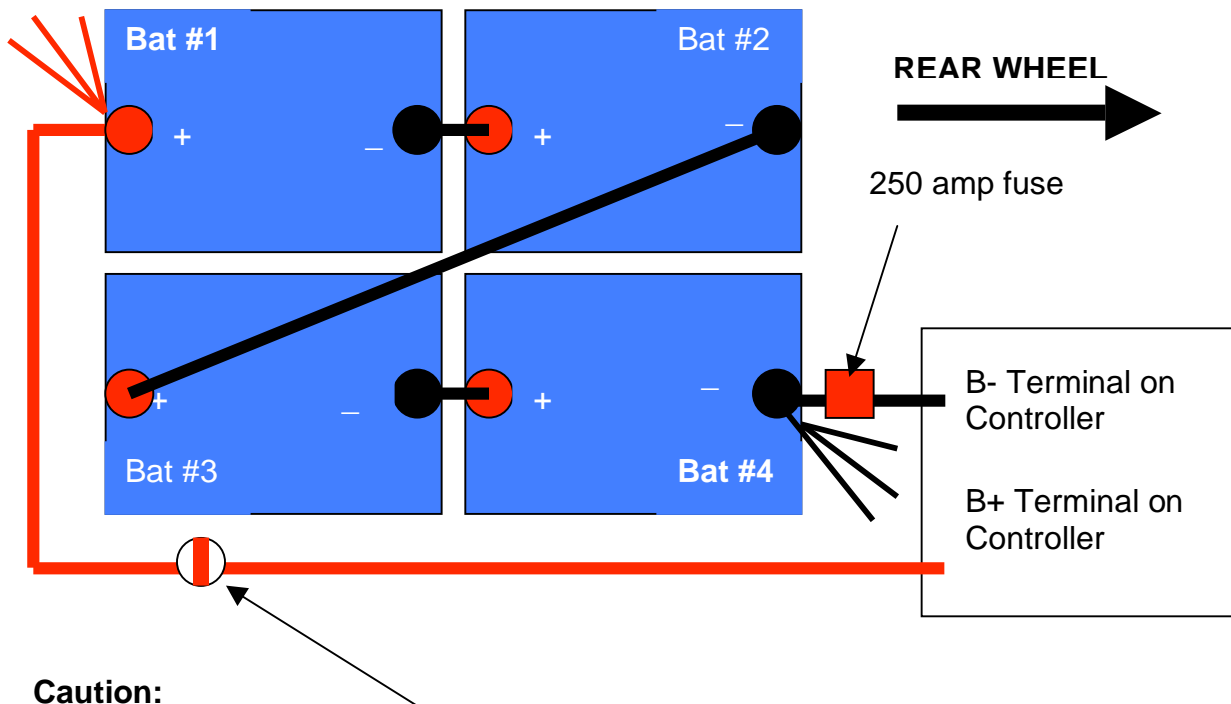


**CAUTION:** Turn the On/off Key off and remove it before disconnecting the batteries.

**WARNING: Shock Hazard** Be careful when disconnecting the batteries to prevent metal wrenches from contacting another battery terminal. Use tools with rubber covered handles.

**CAUTION:** Be sure to install and connect the batteries according to the Battery Layout Wiring Diagram. Positive(+) terminals connect to Negative(-) terminals so current flows from one battery to the next.

### Battery wiring Diagram



**Caution:**  
Always turn off the key switch before connecting batteries.

### Tires

The tires should be maintained at 35 psi. Replace the tires when the tread wears down. The tires are 2.25 x 16 and are available at most Motorcycle Shops. These tires also have inner tubes that should be replaced with the tires. If the tires has a flat, often the tube can be patched. In some cases a larger 3.00 x 16 rear tire may be fitted.

**Brakes:**

The brakes are drum type. The brake shoes can be replaced with **Tomas** brand parts also available through Motorcycle shops. The brakes should be checked occasionally for wear and adjustment.

The brake cables can be adjusted to compensate for brake wear by turning the cable adjusters on the ends of the brake levers.

**Chain:**

The chain is a motorcycle type# 420 chain. Replacement chain is available at Motorcycle shops. The chain should be kept oiled and adjusted by loosening the rear wheel axle and then pulling any slack out of the chain and retightening the rear wheel axle securely.

**Canopy:**

The Acrylic canopy should be kept clean with a cotton rag and furniture polish such as lemon Pledge. Scratches can often be buffed out with plastic polish available at Plastic Supply stores.

If the Canopy is cracked, it often can be repaired by drilling a small 1/8 hole in the end of the crack to keep it from continuing. The crack can then be repaired with Acrylic glue available at Plastic supply Stores.

**WARNING: Do not operate the BugE with a cracked or broken canopy. It can shatter and cause injury.**

The canopy can be replaced by removing the front Turn signal attachment screws and then gently separating the Velcro perimeter tape.

**Notice:** Modifications for an Open Cockpit mode are included in the Assembly Manual. (See Replacement Part Order Form)

The fiberglass Fairing, Fender Pan, Seat and Battery Pan should be kept clean using a furniture polish such as Lemon Pledge or automotive waxes.

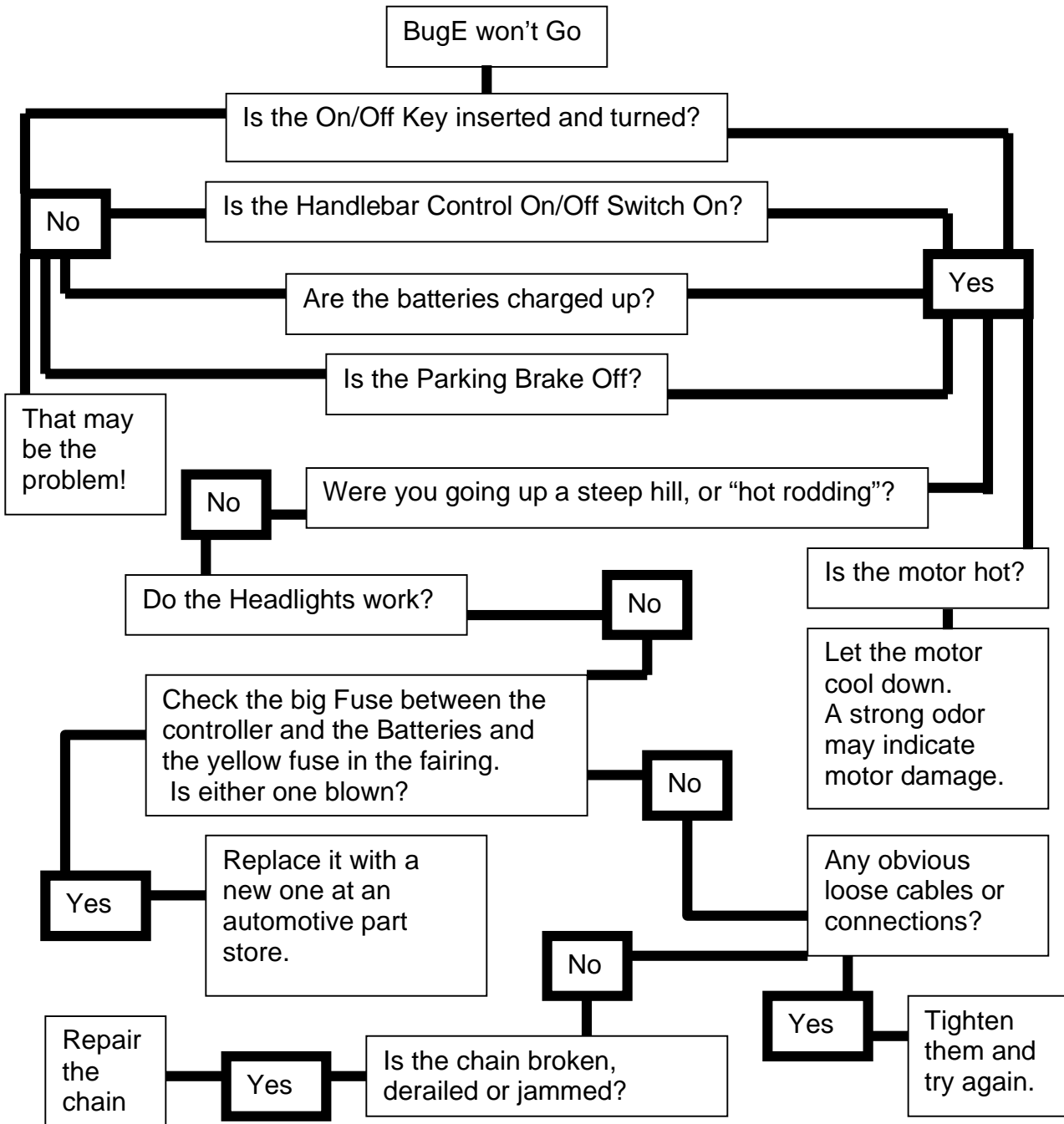
These parts can also be painted with automotive paints. Contact an auto body shop for details.

Repairs to the fiberglass parts can be done by fiberglass repair shops using Polyester cloth and resin. Replacement parts are available on the Replacement part order form.

**Trouble shooting:**

In most cases, a problem is obvious due to damage or wear and tear. Most electrical problems are due to Battery failure or a Switch in the Off position.

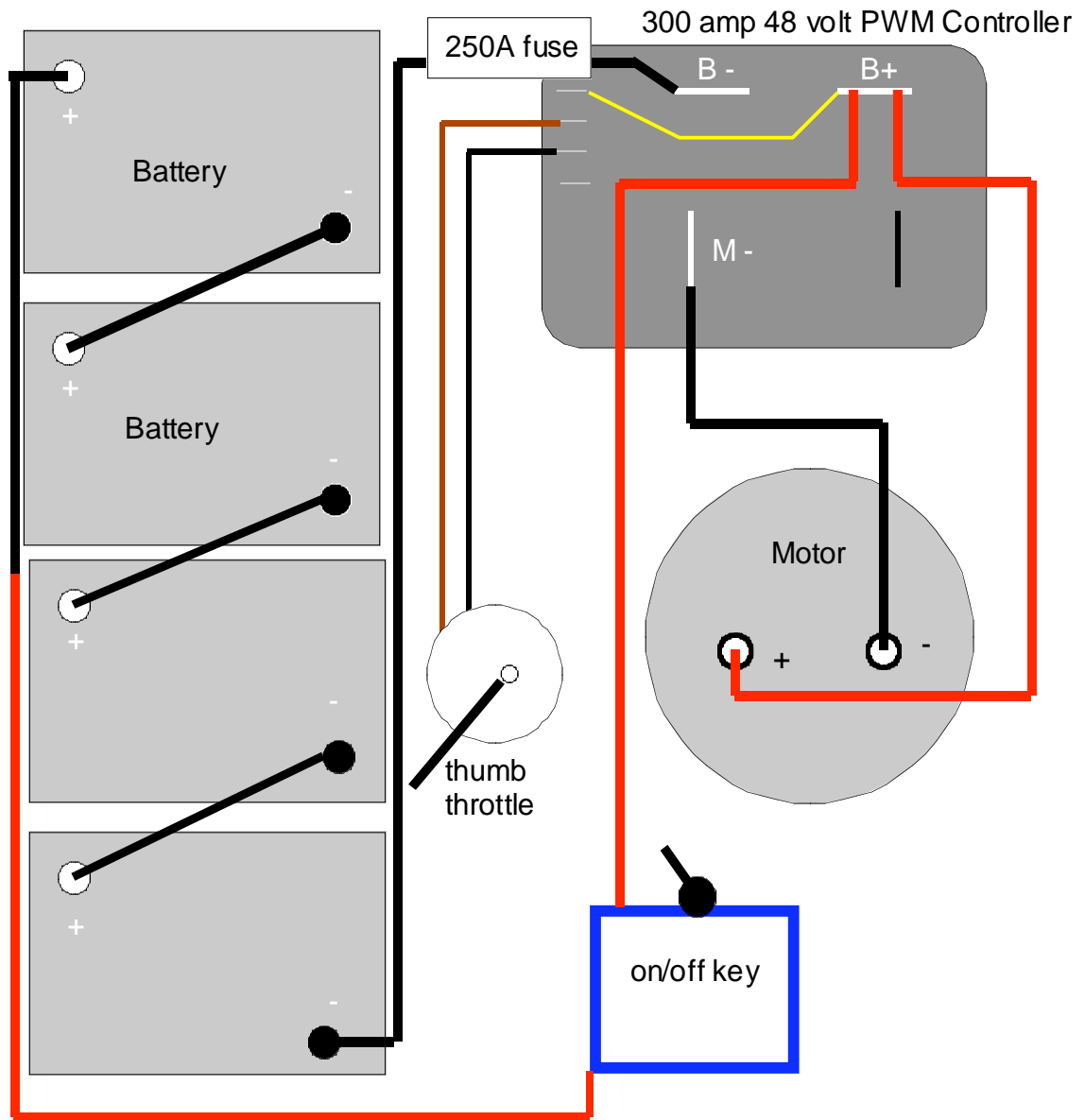
Occasionally the problem is a loose wire or blown fuse. The Fault Tracing Diagram may be helpful.



**CAUTION:** If the BugE still won't go, You may have a bad Controller, Throttle or Motor. Contact the manufacturer.



**BASIC 48 VOLT WIRING DIAGRAM**



————— (#16 wire)      NOT TO SCALE  
————— (#4 cable)

## Efficiency Comparison

<u>Energy Use</u>	<u>BugE range</u>
Brew a pot of coffee	3 miles
Run a 1200 BTU Air Conditioner for one hour	4 miles
Run a 1250 Watt Wall Heater for one hour	7 miles
Wash a load of dishes in a dishwasher	25 miles
Wash a load of clothes in a Washing Machine	34 miles
Run a Refrigerator for a day	42 miles
Drive an Electric Car for 100 miles*	534 miles
Drive a Gasoline Car for 100 miles*	862 miles

The typical stop and go BugE energy use within cities is about 170 watt-hours per mile (580 BTU per mile). The national average residential price of electricity is about 6 cents per kilowatt-hour. This means the cost of electricity to run a BugE is about 1 cent per mile.

Sources: Eugene Water & Electric Board  
\*Mills McCarthy & Associates



## BugE Specifications

Length:	96"
Width:	41"
Height:	53"
Weight:	400 lbs with batteries
Horsepower:	3 hp/17bhp
Battery voltage:	48vdc
Speed*:	20    30    40
Range*:	40    30    10

\*(Performance will vary widely depending on circumstances and conditions)

## Replacement Parts

Many of the smaller parts are locally available or available directly from the Vendor or the Assembler of your vehicle. Larger Vehicle components are available from Blue Sky Design the BugE Kit supplier.

### Vehicle Component Replacement Part Order form

Ba	BugE Owners Manual	\$ 10.00
Bb	BugE Assembly Manual	\$ 35.00
B1	BugE Chassis Assembly	\$600.00*
B2	BugE Steering Spindle set	\$200.00
B3	BugE Front Wheel and Brake Assembly (1)	\$175.00
B4	BugE Rear Wheel and Brake Assembly	\$200.00
B5	BugE Seat	\$100.00*
B6	BugE Seat Cover	\$ 75.00
B7	BugE Battery Pan	\$250.00*
B8	BugE Fender Pan	\$350.00*
B9	BugE Motor Cover	\$100.00
B10	BugE Fairing Assembly	\$800.00*
B11	BugE Clear Canopy	\$400.00*

\*Large parts are shipped by truck, allow two weeks for delivery.

Shipping costs are based on size and weight. Contact [BlueSkyDsn@aol.com](mailto:BlueSkyDsn@aol.com) for a shipping quote.

Part	Description	Quantity	price	Total

Shipping cost total: ([BlueskyDsn@aol.com](mailto:BlueskyDsn@aol.com) for shipping quote) \_\_\_\_\_  
 Total order: \_\_\_\_\_



## Purchase agreement

The application of these parts beyond the control of the manufacturer.  
The safe use and application of these parts is the sole responsibility of the purchaser. No warranty or guarantee is made other than initial workmanship.  
Reproduction of proprietary parts is prohibited and will be subject to legal action.

**Purchase of these parts is deemed consent to these terms.**

Signature of purchaser \_\_\_\_\_

Ship to: \_\_\_\_\_

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

**Send Order to: Blue Sky Design** 49 North Second Street, Creswell, Oregon  
97426 Ph: 541 895-5421 [www.BlueSkyDsn.com](http://www.BlueSkyDsn.com) [BlueSkyDsn@aol.com](mailto:BlueSkyDsn@aol.com)

### Primary Component Suppliers

#### Electrical parts

EV Parts [www.EVparts.com](http://www.EVparts.com) PO Box 834 Carlesborg, WA. 98324  
Phone: (360) 582-1270 [Sales@evparts.com](mailto:Sales@evparts.com)

#### Motorcycle parts

Pro-Cycle [www.Procycle.us](http://www.Procycle.us) 2101 West 10<sup>th</sup> #B Eugene, OR  
97402 Phone: (541) 688-9543 [Jeff@procycle.us](mailto:Jeff@procycle.us)

(Other component vendors and/or local suppliers may also have suitable items).

# 12 Volt Wiring Harness

