Electric Bike Glossary

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AC Current – alternating current is the flow of electric charge in a wire that periodically reverses direction, 60 cycles per second in the USA. Produced by electric utilities and in our homes. Generally not used in LEVs as would require a power inverter to change battery current, that is DC, into AC. Advanced Battery – a battery using NiMH or Lithium cells. Usually requiring a BMS. Higher performance and higher cost.

Aftermarket Kit – a kit of components to convert a manual bicycle to an electric bicycle.

AIO – All in One Wheel – a wheel that contains the motor, battery, controller and often Bluetooth controls.

Amp – For Ampere a unit of electric current equal to a flow of one coulomb per second. A coulomb is 6×1018 electrons.

This is a measure of the amount of electrical current that passes a given point in a given amount of time. Used to describe the demand or supply of energy.

Amp Hour or Ah is a unit of electric charge. One Ah is equal to 3600 coulombs, the electric charge that flows in a wire over one hour. Specifies the electrical charge capacity of a battery. Usually used in LEV world to describe battery capacity.

Auxiliary Battery is a battery that can supply current to the vehicle, but is optional, or extra, or added on.

Back EMF, also known as back electromotive force, is the voltage, or electromotive force, that pushes against the current which induces it and momentarily caused by magnetic fields in a motor. Used by controllers to control brushless motors.

Balancing Cells – a feature of Battery Management Systems and some chargers to cause all the cells to be at the same voltage. This increases performance, battery life.

Battery or Energy Storage Device, is a combination of electrochemical cells, or cells, that create a specific voltage and current capability to power an electric motor or vehicle.

Battery Box, or Battery Package – the combination of cells that comprise a battery that provides electrical energy for the vehicle. Packed into the unique form factor for a particular vehicle. Often with BMS or motor controller inside the same box.

Benjamin's Electricity as Water explanation – Since the author was originally trained in Biology and is not good at math, the following model was established to explain electricity on an electric bike in the early days of his career:

Think of electricity as water. A can of water (cell) is the battery and is the supply of water to the vehicle. The size of the filler hole on top of the can is the 'rate of charge' or how fast we can add water (energy). A bigger hole means a shorter recharge time. The hole on the bottom of the can is the 'C rate' or maximum current. The bigger the hole, the more current may exit the can. Different batteries have different sized holes on both top and bottom.

The speed or pressure at which the water will flow out of the can is the voltage – or potential to do work. Higher pressure can move a motor faster or with more torque. Think of voltage as how powerfully the can will empty itself.

Amp hours describe the size of the can. Amps and coulombs describe the drops and globules of water.

A battery is a collection of cans, and a battery management system is a system of valves and microchips that controls the piping serving the cells and allows them to all

work together, safely and efficiently. The more cans, the higher the voltage or force of water that can be supplied.

A motor controller is needed because if we hooked the water supply (energy supply) up to the motor with nothing else, the motor would spin as fast as it can, and use all the water very quickly, overheating and maybe failing as it does so. A motor controller turns the current (water) supply on an off to control how fast the motor turns. Thus controlling speed and rationing the water supply.

The wiring harness is the piping that takes the water (current) to the places where it is needed. Switches are on / off valves.

This model is not complete, but hopefully will help some readers. The idea is not unique to Benjamin, but he wrote this version.

Battery Discharge Test – monitoring the current and voltage level of a battery over time when subjected to a known discharge load.

Battery Fires – This is rare to nearly non-existent with undamaged batteries properly handled.

Specifically: Batteries should not be left on charge unattended. Even new, or “good” batteries should always be in a fire-safe location, and a person aware that they are being charged, and able to react to problems. Metal racks or shelving, with nothing flammable nearby, or a shed or cabinet that is detached from the main building are ideal. Putting a timer on the power supply to the charging rack, so that batteries are never left on charge when the building is empty or for long periods of time is a safety and energy saving idea.

Putting the mains power on a cut off switch that can be reached even during a fire is important. And if batteries can be rolled or slid (carrying one could be dangerous) into the parking lot or outdoors during such an event it will improve safety and reduce clean up.

Extinguishing a battery fire can be counter intuitive. Keep reading… There are several ways that batteries catch fire:

1. The cell experiences a defect, damage, or other situation that causes an electro chemical reaction that creates heat. This is called “thermal runaway” and

the heat created by this can ignite various parts of the battery such as the electrolyte, the battery packaging materials, or adjacent items. It is important to realize that even if the fire is “out”, thermal runaway may still be occurring and the fire may re-ignite.

2. External heat, such as materials next to the battery burning, can cause a battery to ignite. The addition of the battery to the fire can complicate extinguishing the fire.

3. Venting of flammable gases can occur with some types of battery – and these can be explosive if an ignition source is present.

How to extinguish:

1. Lithium fires need to be flooded with water. This may seem backwards, since lithium reacts badly with water – but the lithium used in batteries is a compound of lithium and very hard to extinguish with a conventional fire extinguisher. By flooding with water, the batteries will be cooled, oxygen excluded, and the fire should stop. But…thermal runaway can re-ignite the cells, so keep flooding it. And then keep on flooding some more. And yet some more flooding and for a long time. When it is cool, no steam present, about the temperature of the water being used – the fire is probably out. Move it to a safe place where if it does re-ignite, no harm will occur.

2. Battery boxes, materials around the cells, plastics. Most of this is Class A material. An ABC rated fire extinguisher will put this out. But many fire extinguishers are only B:C rated. Keep a large(ish) ABC extinguisher nearby. The author’s is a 30 lb model.

3. Lead Acid batteries on charge can vent hydrogen. Hydrogen is flammable, and if confined, explosive. The battery box is plastic, and can burn, and the electrolyte, lead, and other materials complicate this. The MSDS sheet advises to use a CO2 or B:C fire extinguisher and to avoid the fumes.

4. NiCad and NiMH batteries can vent hydrogen during thermal runaway events – or during a short circuit. Water will extinguish these fires, but a large battery that has exposed anode and cathode material may require a class D fire extinguisher (burning metal). These batteries are rare in LEV use today, and

quite stable. But they are used in large battery packages in some electric and hybrid cars.

Practical advice: When and if a fire occurs, have the battery charge rack or test rack configured in a way that fire is not a big problem. Move the burning battery with appropriate safety precautions (pulling the rolling charge rack out the door into the parking lot with a rope or chain, have a 30 lb ABC fire extinguisher and a ready source of water (hose, bucket, pressurized water fire extinguisher) at hand. And…. evacuate the building and call 911 if the fire spreads even a tiny bit. When the fire department arrives, advise them of the involvement of a battery and the type. Get the fumes out of the building and avoid breathing them. Keep people clear.

Belt Drive – a composite belt that replaces the function of a roller link chain for power transmission.

Bottom Bracket Motor – a motor located in or adjacent to the bottom bracket or pedal axle. Sometimes called a central motor or mid motor.

BMS- Battery Management System is an electronic circuit that is found on advanced batteries. The BMS prevents damage to the battery, and prevents safety problems of battery overheating and monitors the state of charge.

Brake Kill Switch – a device that turns off the motor when the user applies the brake lever.

Brush – the part of a brush type motor that connects the current to the windings, while allowing the motor to rotate. A wear point in such motors that can be replaced in many, but not all cases.

Brushless DC Motor – longer lasting and simpler than a brush type motor. There are no wear points other than the bearings. But more costly in terms of control electronics. Also called a BLDC Motor.

Brushless – Sensorless DC Motor – a DC motor whose controller uses a particular sequence of powering coils and back EMF to control the motor. Simpler in architecture, but more complex to control, these eliminate a common failure point of the Hall sensor used in most brushless motors.

Brush Type DC motor – uses brushes in the motor, which creates a wear point. But less expensive in terms of control electronics and manufacture. Worn brushes create a black dust that can build up in the motor and create a variety of problems.

CAN Bus – Controller Area Network . A device-to-device communications protocol that is used in some motor controllers, user interfaces, battery management systems. There are other bus systems used in this role. Notably the Energy Bus system used by some products, mostly in Germany.

CAN Bus is one of five protocols used in the on board diagnostics (OBD) –II vehicle diagnostics standard. OBD-II has been mandatory for all cars sold in the USA since 1996. An EOBD version has been standard or all petrol vehicles sold in the EU since 2001. Components are relatively inexpensive because of high volume automotive use.

Capacitor – a passive two-terminal electrical component used to store electrons, that is electric charge. Can hold charge a long time and be discharged quickly, in seconds or less. Retains charge when electric source turned off, so safety caution required.

Computerized Battery Analyzer – CBA 3 or CBA 4 – A device that allows a battery to be discharged in a controlled fashion while monitored and reported on by computer software.

Charger – the electrical circuit that adjusts and controls current from the electrical mains to recharge the battery. It is very important to only use the correct charger for a given battery. There are Smart Chargers that have an IC chip to control the charge, and dumb chargers that the user must monitor to control the charge. As well as ‘on board’ chargers that are part of the bike and need only a cord, or maybe a power supply external to the bike.

Charging port – a place or connector where the charger can be connected to the battery. Often in an obscure or hidden location, usually with some sort of cap.

C-Rate is a unit of measurement that describes how fast a battery can supply current. A one C rate means that the battery can be completely discharged in one hour. Trying to go faster than that will simply not work or might damage the battery. A 2 C rate battery can be discharged in 30 minutes, or twice as fast as a 1c rate battery. This is important in regards to the power that can be developed by the motor attached to that battery. For example, a 500 watt motor that is climbing a hill might demand 30 amps of energy. If the

battery is a 10 AH battery, then it must supply energy at a 3c rate to allow the motor to do its job. If the battery is only capable of 1 c, the rider is likely to be walking this hill.

Cells – electrochemical cells convert stored chemical energy into electrical energy. Each cell contains a positive terminal, or cathode, and a negative terminal, or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work. The individual cells are combined into packages to provide appropriate voltage and current for a specific function … called "batteries".

Ceramic Magnets –used in electric motors, mainly iron oxide with other ingredients. Lower in performance and cost than Neodymium-Iron-Boron, also called Neodymium or Rare Earth, magnets that are used in most LEV motors.

Circuit Breaker – a switch that will trip or open when current reaches a preset level, interrupting the current flow as a safety measure. Can be "reset" by simply moving the switch handle.

Circuit Diagram – a way of drawing an electrical circuit that uses standard symbols for various electrical components.
http://www.rapidtables.com/electric/electrical_symbols.htm
http://www.physicsclassroom.com/class/circuits/Lesson-4/Circuit-Symbols-andCircuit-Diagrams

Cogging – the resistance that permanent magnets create in a motor. This can be felt when a motor is not energized and as it is rotated, there are moments of resistance and release as it rotates.

Connectors – the fittings that allow the electrical components and wiring to be connected. Often easily unplugged or released.

Connected Vehicle – refers to LEVs that use a phone circuit to connect to the internet, reporting to the vehicle maker on vehicle use and performance, reporting to the user on location via GPS, interacting with social networks to locate riding partners or friends, or calling for help in the event of an accident.

Coulombs – a fundamental unit of electrical charge equal to 6×1018 electrons. One amp-hr is equal to 3600 coulombs. That's a lot or electrons that are held by a one amphr battery. The amount of energy equal to one amp for one second.

Since battery state of charge for lithium is difficult to determine by measuring voltage, sophisticated BMS measure SOC of Lithium batteries by coulomb counting.

Clamp Meter or DC Clamp meter – measures amperage or current flow in a wire by "clamping" around the wire.

Crimping tool – a tool often resembling a large pair of pliers that is shaped to compress connectors onto the ends of wires.

Current – electrical current is a measure of the amount of electrical charge transferred per unit of time. The unit of electrical current is the ampere, defined as 1 coulomb/second. Usually used to describe the amount of electrical energy being used by the vehicle.

Cycle Analyst – a data meter or measuring and monitoring tool that monitors a number of electrical functions in real time when installed on a bike. An optional data logger or data recording device can keep a record of the measurements.

Data Logger – a device that can monitor and store for later evaluation the results from monitoring devices. Typical data recorded can include electrical activity, GPS location, temperature, etc.

DC – the unidirectional flow of electric charge and produced by batteries, thermocouples, solar cells, etc. Thus used in most LEVs. Could be changed to alternating current by a power inverter.

DC Motor – a motor that uses Direct Current.

Direct Drive motor – usually a hub motor that has no gear reduction. Such motors are simpler and quieter, but often larger and more expensive than Gear Type motors.

Display – the dashboard or user interface that reports on data such as speed, distance, time, and sometimes electrical data of the battery or motor or both.

DIY kit – a set of components to convert a manual bicycle to an electric bicycle.

Ebike – generic term for electric powered bikes, but in many cases meaning an electric bike that is controlled by a throttle rather than by the riders effort. (See Pedelec)

Electric Bicycle – a vehicle that is regarded by local law, wherever that may be, as a “bicycle”, with the rights and responsibilities of a manual bicycle. But having an electric motor and battery to assist the rider.

Electric Motor Scooter – this refers to vehicles that are electric and similar in function and style to a “Vespa” motor scooter.

Electric Mini Scooter – this refers to vehicles that are usually ridden standing up, and are quite small and low power / speed.

Electric Scooter – this can refer to either electric motor scooter, or electric mini scooter.

Electrolyte – the liquid or semi liquid material in a cell that provides a current path between the anode and cathode.

EPAC – Electric Pedal Assist Cycle or what European Union law calls an electric bike.

Farad –unit of capacitance of a capacitor. One farad charged capacitor has a potential difference of one volt when charged with one coulomb of electricity.

Fuse – a fusible link inserted into a circuit that will fail at a specific level of current flow and is intended to do so, interrupting the current as a safety measure. Often a tiny glass tube, sometimes a more current plastic automotive fuse.

Fuse Holder – the fitting that holds a fuse.

Foil / Polymer Foil cell packaging – a foil /plastic laminated pouch for the cell. Soft to the touch, these are not “lithium Polymer” batteries. They are lithium batteries packaged in a polymer package.

Gear Type motor - usually refers to a hub motor that uses a gear reduction inside the hub shell. Such motors are usually less expensive and get good performance but are noisy and have more wear points.

Hall Effect Sensor – also called a Hall Sensor - a sensor that can detect a magnetic field. Used in motors, sensors, torque sensors, throttles. Failed Hall Sensors are a common cause of motor failure.

Homologation – conforming to the laws of the land in which a vehicle will be used.

Horsepower – unit of work – about 750 watts. From 550 lbs raised one foot in one second – an old mining measurement that has transitioned into the modern world to describe power of motors.

Hub Motor – an electric motor located in the front or rear hub.

Human Electric Hybrid – an electric bicycle that allows both human and electric power. A very efficient system as humans are high torque, low endurance devices and electric motors are lower torque, high endurance devices limited only by the battery. Together they are a very efficient and useful propulsion system for a vehicle.

Human Power – usually about 100 watts equivalent when pedaling a bike. Humans are high torque source of energy on a bike.

IC Chip – Integrated Circuit Chip – a combination of interconnected electrical circuit elements fabricated on a semiconductor substrate. For ebike purposes, these are computers of various capability that are used in controllers, chargers, battery management systems, displays, user interface and inevitably more.

ICE – Internal Combustion Engine –the propulsion device in petrol-powered vehicles. Uses the combustion of a fossil fuel with an oxidizer, oxygen from air, to produce a force to move pistons that, via mechanical linkages, turn the wheels of the vehicle. A source of expense, pollution, noise, and political fuss.

Internal Resistance – Battery voltage when a battery does not draw current is called Open Circuit Voltage. When current is drawn, battery voltage drops due to the battery internal resistance, from the chemicals and materials in the battery. Motors also have internal resistance. Current times internal resistance is voltage that is opposite the open circuit voltage.

“It Depends”…the normal answer to any question about the performance of an electric vehicle. EV performance is dependent upon a variety of factors such as speed, gradient, rider weight, ambient temperature, condition of the battery, motor, vehicle. How much the rider contributes, and a bit of luck.

Joule – a unit of measurement of energy. The simplest definition is the work required to produce one watt of power for one second. A watt second, of which there would be 3,600 in a Watt Hour.

Key Switch – a switch that is operated by a key. Used to attach batteries to the vehicle in a secure fashion, or to lock the on /off function of the vehicle.

Lacing a Wheel – this means to install the spokes between a hub and a rim to create a wire spoked or laced wheel.

Lead Acid Batteries – these are old technology batteries of modest cost that are used in most of the worlds light electric vehicles. While heavy, they are reliable, have excellent discharge and charge capabilities, and are nearly 100% recyclable. Also called SVRLA and Pb A or Pb batteries.

Light Electric Vehicle – This refers to electric powered vehicles that usually, but not always, weigh less than 100 KG but can be as much as 500Kg, and have 2 or 3 wheels. Electric bicycle, electric motor scooter, light electric motorcycle, Segway, Trikke, YikeBike, are all examples.

Light Electric Vehicle Association – a trade group that includes (at the time of this writing) 250 members from 29 countries. Focused on the promotion of electric bikes, scooters, LEVs. www.LEVAssociation.com

Low Speed Electric Assisted Bicycle – what USA law calls an electric bike.

Lithium Battery – Lithium batteries can store amazing amounts of energy. They have excellent performance, weight, life and temperature characteristics. And there are more than 100 types in development. (See interesting articles in Wikipedia for more info on such development.) Metallic lithium, when exposed to water or moisture, will burn. But most batteries (and elsewhere) use compounds of lithium that are more stable. Some lithium batteries use electrolyte that is flammable as well.

There are also lithium battery metallurgies that will not burn – but these are not in widespread use in the LEV world.

For the LEV technician, who may be working on a damaged battery, or a mislabeled battery, or a battery of unknown origin and make – the practical mindset and stance is

to treat all lithium (and any unidentified) battery as potentially flammable. See Battery Fires.

In the LEV world several variants such as Lithium Manganese, Lithium Iron Phosphate, are most common.

All of the lithium batteries currently used on LEVs - are potentially flammable and need a BMS, conscientious manufacturer, conscientious safety testing, and appropriate care and handling to reduce fire risk to users, dealers, freight carriers.

Lithium battery fires get a lot of press, but are actually very rare.

Nominal voltage ranges in the area of 3.5 volts, but varies depending on metallurgy details. A chart of nominal voltages can be found on Wikipedia.

Max Discharge or Max current refers to the discharge rate of the battery. See C rate.

Mains power – the main electrical supply from a wall socket, usually supplied by the local grid.

Manual Bicycle – propelled only by human power – a very old paradigm, like walking, sailboats, or manual typewriters, or writing with charcoal on a slate. Improved on by adding electric motor assist.

Mini Clamp Meter – a popular tool for measuring amperage or current flow. Most will also measure voltage and other parameters.

Mobility Scooter – slow speed, 3 or 4 wheel scooter intended to enhance mobility for people with mobility restrictions such as age, handicap, weight, injury.

MOSFET or FET is a metal–oxide–semiconductor field-effect transistor. You can impress people by being able to say that in one breath. The practical application for LEVs is that a MOSFET is a switch that can be controlled by an IC chip, and without physical movement be turned on and off under very high current loads. So FETs are key components to motor controllers, BMS, and anything to do with high power electronics. They generate heat, and when overheated, they can fail.

Motion Sensor, or Crank Rotation Sensor – detects through use of a hall sensor, a reed switch, or an optical sensor when the rider is pedaling. The signal sent to the motor

controller enables the motor to run only when the rider is pedaling in some bikes. This method of controlling a pedelec is not as intuitive and comfortable as using a torque sensor, but is much less expensive. Some wags have termed this the “system that gives you assistance only when you do not need it” due to the fact that some controllers will provide electrical assist in proportion to the speed that the rider is pedaling. Since climbing and accelerating are often slow pedaling events the motor assist may lag, until the rider reaches a certain speed (at which he may not longer need assistance.)

Motor Controller – An electronic circuit that controls the speed of the electric motor, as well as various other functions depending on the model and features of vehicle.

Motor – an electric motor that assists the rider. Can be located in various places and manners. Motor Scooter – electric motor scooter – a vehicle with performance and configuration similar to a gasoline motor scooter such as a Vespa or KYMCO.

MSDS Sheets – Material Safety Data Sheets that list all the characteristics of the materials used in the component, vehicle, lubricants, etc.

Multi Meter – A measuring tool that can measure several electrical characteristics. This term is often used interchangeably with volt meter or VOM.

NEV or Neighborhood Electric Vehicle – electric vehicle similar to golf cart, but road legal, faster, and equipped with safety gear to meet requirements.

Outboard Drive – one way to describe the Currie drive system that uses a motor mounted outboard of the frame on the left side of the rear triangle and then drives the rear wheel through a secondary chain gear reduction. Many examples also use a planetary gear reduction as well.

Parasitic current draw- a “leakage” or even a deliberate current draw (such as in a standby mode) that causes batteries to discharge slowly. There are a number of controller, user interface, and BMS functions that use a small amount of current all the time – on some bikes.

Pb or Pb A Batteries refers to Lead Acid Batteries. Nominal voltage is 2 volts per cell.

Planetary gears – used inside “gear type” hub motors to reduce the high rpm of the electric motor to a usable speed for the vehicle.

Potentiometer – also called a Pot – is a variable resistor that is used to control such things as volume on stereos. In the LEV world, they are sometimes used as throttles.

Printed Circuit Boards – also called PCB , also called “the board” are the green boards that have the copper colored printing that carries current between electrical components such as resistors, capacitors, transistors, MOSFETs, etc. The foundation of all electrical circuits today.

Pulse Width Modulation – the action of a controller turning current on and off in a specific pattern to control the speed and rotation of a motor.

Neodymium – a rare earth metal that is used for the production of high energy permanent magnets. Such magnets are commonly found in LEV motors, and are a source of considerable cost.

Ni Cad – Nickel Cadmium batteries, not used for some time by electric bikes but found on some older models. Toxic and lower in performance than NiMH and Lithium. Nominal voltage is 1.2 volts.

NiMH Battery – Nickel Metal Hydride battery – non toxic, higher performance than Lead Acid, less performance than Lithium. Not common, but found in some ebikes. Nominal voltage is 1.2 volts.

Ohm – the unit of resistance. Ohm’s Law –

$V = I \times R$

$I = V/R$

$R = V/I$

(V = Volts; I = Current; R = Resistance)

PAS bike – a Pedal Assist System bike, usually designed for the Japanese market and using a proportional power paradigm – the motor delivers additional power in proportion to the effort being exerted by the rider. PAS is a Yamaha patent. This term is often misused to describe any bike where the rider must pedal for the motor to run – such are better termed “Pedelecs”.

Pedelec – an electric bicycle where the rider must pedal for the motor to run. Variants of this are the PAS paradigm used in Japan, and the EPAC paradigm used in Europe.

Permanent Magnet – a magnet that stays magnetized without external supplies of energy. These are used in almost all motors used on LEVs.

Push to start, or Pedal to start – some ebikes require the user to pedal a few strokes or gain a certain speed by pedaling before the motor can be activated.

Range – the distance a vehicle can travel on one charge, often exaggerated in marketing materials and dependent on the many factors listed under “It depends” above.

Regen or Regeneration – Since a motor is mechanically the same as a generator, it is possible in direct drive motors to electrically switch them to a generator and direct some charge energy to the battery – thus recovering some of the energy expended to reach speed or to climb a hill. The amount of energy recovered, in an electric bike, is quite modest and this makes a good sales point, but is not a major source of additional range.

Recumbent Bike – a vehicle that positions the rider in a sitting position, rather than the normal bicycle riding position.

Speed Sensor (rotation sensor) is a device that detects rate of pedaling and is used to activate power in pedelecs. Not as nice a “feel” as a torque sensor system. Can be optical, hall effect, or reed switch.

Shunt - a resistive device that allows data to be collected off an active circuit without affecting the performance of that circuit.

SOC – State of Charge is the “gas gauge” or how much useable energy is in the battery. Seemingly a simple task, this can be critical to user satisfaction and can be complex to establish.

SSEB – Scooter Style Electric Bike. This is an electric bike that has pedals and is therefore legally a bicycle, but looks like a motor scooter. Popular in China, exported from China to many places.

Starter / Lighting / Ignition batteries (SLI batteries) – the battery in a car or gasoline motorcycle. Usually optimized for high rate of discharge over a short period of time. Not usually satisfactory for traction application. Usually Pb, but sometimes Li.

SVRLA – Sealed Valve Regulated Lead Acid batteries are a common type of ebike and e scooter battery today but becoming less so.

Switch – a mechanical or solid-state device that can open or close an electrical circuit. (Turn it on or off)

Thermal Runaway – a badly made or abused advanced battery can experience this – the result is the battery gets very hot, perhaps catching fire. Well-designed cells and BMS prevent this in most cases.

Tire Scrubber – a friction roller that rides against the vehicle tire and uses the outside diameter of the tire as a gear reduction as well as the point of power application. A very simply system that was the primary paradigm in the early days of electric bikes – only the EVO (Electric Bike Factory) system is still in production.

Throttle – a device operated by the user to control the speed of the vehicle. Can be twist grip, thumb operated, or other methods. The innards are usually a magnet and a hall sensor. Since the hall sensor can detect how far away the magnet is and vary the signal voltage from the throttle, this is a popular and reliable approach. Some throttles operate a potentiometer, which is less and less common.

Torque – moment of force that is defined as force times lever arm. Foot force applied to a bike pedal results in a torque applied to the crank. Twisting force.

Torque Sensor – a device that detects and measures the energy applied by pedaling. Torque sensors come in a variety of types and configurations and are the preferred method of determining if the rider is pedaling a pedelec (electric bike where the rider must be pedaling for the motor to run) and are a required part of the Japanese proportional power paradigm as required by Japanese law and patented by Yamaha.

Traction batteries – batteries used for electric vehicles.

TMM4 – a torque sensor used in many pedelecs that measures force applied to the crank with a sensor located in the right rear drop out (where the axel of the rear wheel is held by the frame of the bike).

Unicycle – electric unicycle – also called mono wheel.

User Interface – the interaction of the user and the machine which includes controls, seat, pedals, but usually refers primarily to the data display of information like speed, distance, SOC. Rapidly becoming interactive with the internet and GPS via phone and other devices.

Vehicle Controller – an electronic circuit that monitors and regulates the motor controller, user interface, battery management system and other features.

Volts, Voltage - One volt is the difference in electric potential between two points of a conducting wire when an electric current of one ampere dissipates one watt of power between those points. A battery cell supplies current at a voltage resulting from the particular chemicals used in the battery cell. Lead acid provides 2 volts, lithium ion 3.5 volts. refers to the force that a given level of electrical flow can exert. The scientific definition is complex, but see “Benjamin’s electricity as water”.

Volt Meter – some are called Volt Ohm Meter or VOM. Measures voltage, resistance and in some cases other parameters.

Warranty – A promise by the manufacturer / dealer about the life and reliability of the product or component. In many cases the effective warranty process is that the phone number has been disconnected.

Watts – Unit of power. One watt is defined as one joule (an energy unit) per second so specifies the rate of energy conversion or transfer. Used to specify the power of a motor, for electric bikes 250 watts is typical up to 750 watts allowed in U.S. Human pedal power on a bike can be 100 watts with Tour de France riders up to 800 watts. One horsepower is 746 watts.

Watt Hour – is a unit of energy. Battery Wh can be calculated by multiplying Ah rating by voltage rating. A 36 V battery rated at 10 Ah has 360 Wh energy capacity when fully discharged.is a measurement of energy usually used to describe battery capacity for LEVs. The formula that applies is to multiply volts times AH and this will give you watts. A Kilowatt (1000 watts) is a pretty big battery that might be found on a motor scooter, while a pedelec may have about 360 watt hours in it’s 36 volt by 10 AH battery.

Wikipedia – a very useful online resource for ebike technicians that explains many aspects of battery metallurgy, electrical theory and more.

Wire – braided or solid metal inside an insulating material that provides a current path and connect components.

Wiring Harness or Harness – the wires, connectors and switches that carry electrical current and signals about the vehicle.

Zap – included here to have an entry under Z. A pioneering electric bike company that produced a friction drive DIY kit, and the first electric mini scooters.