



RACEPROVEN.COM
Professional racing Starters & alternators

Abbreviations

AC	Alternating Current
AH	Amp Hour
Amps	Amperes
AWG	American Wire Gauge
C	Computer Terminal
CA	Cranking Amps
CCA	Cold Cranking Amps
CS	Charging System
Diode	Diode
EME	Electromagnetic Effect
EMI	Electromagnetic Interference

F	Fahrenheit
FR	Field Report Terminal
ISO	International Organization of Standardization
IG	Ignition Terminal
L	Lamp Terminal
LRC	Load Response Control
ND	Nippondenso, DENSO
Ohms	Ohms
P	Power
PF	Power Factor
R	Resistance

RC	Reverse Capacity
S	Sense Terminal
V	Voltage
VD	Voltage Drop
VM	Voltage Meter
W	Watts
OFL	Off Set Left
OFR	Off Set Right

Terminology

ALTERNATING CURRENT: Electron flow alternates and flows in both directions (back and forth).

AMMETER: Measures the quantity of current flow. Ammeters are placed in series (inline) to count the electrons passing through it.

AMP HOUR: The ampere-hour rating (expressed in ampere-hours, or Ah) is the amount of current a fully charged battery can supply for 20 hours without having the terminal voltage fall below 10.5 V. This test is made at a temperature of 80°F (26.7°C). If a battery can deliver 4 A under these conditions, it is an 80-Ah battery (4 A X 20 hours = 80 Ah).

AMP: Unit used to measure current flow.

ARCING: Is the flow of electricity through the air from one conductor to another. Arcing can produce visible flashes and flames and emit crackling sounds. It is caused by overloaded electrical equipment.

ATOM: An atom is the smallest unit into which matter can be divided without charged particles being released. It also is the smallest unit of matter with the characteristic properties of an element.

CELL VOLTAGE: Each cell element of the battery produces approximately 2.1 volts, regardless of the quantity or size of the plates. Automobile batteries have six cells that are connected in series, which produces total voltage of 12.6 volts.

COLD CRANKING AMPS: This rating indicates the ability of a battery to deliver a specified current at low temperature. The rating is determined by the amount of current a fully charged battery can supply for 30 seconds at 0°F (- 17.8°C) without having the battery terminal voltage fall below 7.2 V.

CONDENSER: (Electrical) An electrical device characterized by its capacity to store an electric charge.

CONDUCTOR: Is any material that easily allows electrons (electricity) to flow.

CONVENTIONAL THEORY (also known as HOLE THEORY): States that current flows from POSITIVE to NEGATIVE. Protons or the lack of electrons (the holes) move towards the negative. (Current flow direction in Hole Theory is the opposite of that in Electron Theory.)

CRANKING AMPS (CA) rating: (not to be confused with COLD Cranking Amps), which is the battery's ability to deliver a cranking current at 32' F. This CA Rating is the same test as in the CCA rating, except it is calculated at a higher temperature. A battery with a CA rating of 800 may confuse a technician who may assume it is a CCA rating number. To convert CA at 32 'F to CCA at 0 'F, divide CA by 1.25. Example: a 650 CCA rated battery has the same current capacity as a 812 CA rated battery. This apparent marketing ploy may confuse the public into thinking they are purchasing a battery which is higher in capacity than it really is.

CURRENT: Is the quantity or flow rate of electrons moving past a point within one second. Current flow is also known as amperage, or amps for short.

CYCLING: The battery stores electricity in the form of chemical energy. Through a chemical reaction process, the battery creates and releases electricity as needed by the electrical system or devices. Since the battery loses its chemical energy in this process, the battery must be recharged by the alternator. By reversing electrical current flow through the battery, the chemical process is reversed, thus charging the battery. The cycle of discharging and charging is repeated continuously and is called "battery cycling".

DIODE: Component that allows current to flow in only one direction. A two-terminal semiconductor (rectifying) device that exhibits a nonlinear current- voltage characteristic. The function of a diode is not only to allow

occurrent in one direction but to block current in the opposite direction as well. The terminals of a diode are called the anode and cathode. There are two kinds of semiconductor diodes: a P-N junction diode which forms an electrical barrier at the interface between N- and P-type semiconductor layers, and a Schottky diode whose barrier is formed between metal and semiconductor regions.

DIRECT CURRENT: Electron Flow is in only one direction.

DONOR: An impurity from column V (15) of the periodic table, which adds a mobile electron to the conduction band of an intrinsic semiconductor, thereby making it more N-type. Commonly used donors are Arsenic (As) and Phosphorous (P).

DYNAMIC ELECTRICITY: Is electricity that is in motion. Voltage potential WITH electron flow. Two types of Dynamic electricity exist: DC & AC.

ELECTRICITY: Is a property of certain subatomic particles, such as electrons and protons, that gives rise to attractive and repulsive forces between them.

ELECTRON: The electron is the lightest stable subatomic particle known. It carries a negative charge which is considered the basic charge of electricity.

ELECTRON THEORY: States that current flows from NEGATIVE to POSITIVE. Electrons move from atom to atom as they move through the conductor towards positive.

HEAT: When current flows, heat will be generated. The higher the current flow, the greater the heat generated. An example would be a light bulb. If enough current flows across the filament, it will glow white hot and illuminate to produce light.

HOLE: A mobile electron vacancy in a semiconductor that acts like a positive electron charge ($+1.6 \times 10^{-19}$ coulomb) with a positive mass. It is an unoccupied spot among the electrons that are bound in their orbits. Under the application of an electric field, holes move in the opposite direction from electrons, thereby producing an electric current.

IMPURITY: In semiconductor technology, a material such as boron, phosphorus or arsenic is added in small quantities to a crystal to produce an excess of electrons (donor impurity) or holes (acceptor impurity). Also called "dopant".

INSULATOR: Is any material that inhibits (stops) the flow of electrons (electricity).

FIELD CURRENT SUPPLY: Is provided from two different sources - from the alternator itself or from the battery.

FIELD REPORT (FR): Terminal used by the regulator to communicate to the vehicle's computer the alternator's current output.

LAMP TERMINAL: Indicates if alternator output voltage is lower than the battery voltage. If the light gets dimmer as you rev up the engine, then you may have a problem with the alternator. If it gets brighter, the battery most likely is defective. Current flows through the warning lamp, through the resistors, transistors, and field coil, and then to ground, causing the lamp to illuminate. Once the alternator is at full output, voltage from the rectifier equals the battery voltage. Leveling to 12 volts on both sides turns the lamp off, a difference in voltage will turn the light on.

LEAKAGE: Small undesirable flow of current through an insulator, dielectric or diode.

LOAD: A source drives a load. Whatever component or piece of equipment is connected to a source and draws current from a source is a load on that source.

LOAD RESPONSE CONTROL (LRC): Was developed to "gradually" apply the field voltage, thus preventing engine torque from jerking. LRC is used together with Pulse Width Modulation (PWM) to apply a high speed repetitive waveform that in conjunction with the flyback diode, develops

almost a pure, smooth direct current in the field coil.

LUNDELL ALTERNATOR: The technical name for a "clawfoot-rotor" alternator.

MAGNETISM: ...now it gets complicated... Please go to www.thinkquest.org for proper explanation.

N-TYPE SEMICONDUCTOR: A semiconductor type in which the density of holes in the valence band is exceeded by the density of electrons in the conduction band. N-type behavior is induced by the addition of donor impurities, such as arsenic or phosphorus, to the crystal structure of silicon. In N-type semiconductors, electrons are the majority carriers, and holes are the minority carriers.

OHMMETER: Measures the resistance of an electrical circuit or component. No voltage can be applied while the ohmmeter is connected, or damage to the meter will occur.

OHMS: Unit of measurement for resistance.

OVERLOAD PROTECTION: Means by which a power supply is protected from permanent damage due to short circuits, excessive loads, or reverse polarities connected across the load terminals. Protection may be as simple as a fuse (which can be economically replaced), or may be electronic protection circuitry which automatically monitors load conditions as well as power supply component temperatures.

P-N JUNCTION: The basic structure formed by the intimate contact of P-type and N-type semiconductors. The important characteristic of a P-N junction is that it will conduct electric current with one polarity of applied voltage (forward bias) but will not conduct with the opposite polarity (reverse bias).

P-TYPE SEMICONDUCTOR: A semiconductor type in which the density of electrons in the conduction band is exceeded by the density of holes in the valence band. P-type behavior is induced by the addition of acceptor impurities, such as boron, to the crystal structure of silicon. In P-type semiconductors, holes are the majority carriers, and electrons are the minority carriers.

RECTIFIER: Multiple diode circuit that converts alternating current into pulsating direct current. Also includes heat sink assembly to dissipate generated heat from "Rectification process".

REGULATOR: A system which determines (selects) and enforces (maintains) the operating parameters of another system. In our case, it controls voltage.

RESERVE CAPACITY RATING: Is the time in minutes a vehicle can be driven after the charging system fails. This is roughly equivalent to the conditions after the alternator fails while the vehicle is being driven at night with the headlights on. The battery alone must supply current to the headlights and the computer/ignition system. The assumed battery load is a constant discharge current of 25 A. The reserve capacity rating is the length of time a fully charged battery that is at a temperature of 80°F (26.7°C) can supply 25 A before the terminal voltage falls below 10.5 V.

RESISTANCE: Is the force that reduces or stops the flow of electrons. It opposes voltage.

RESISTANCE FACTORS: Various factors can affect the resistance. These include: LENGTH of the conductor. The longer the conductor, the higher the resistance. DIAMETER of the conductor. The narrower the conductor, the higher the resistance. TEMPERATURE of the material. Depending on the material, most will increase resistance as temperature increases. PHYSICAL CONDITION (DAMAGE) to the material. Any damage will increase resistance. TYPE of MATERIAL used. Various materials have a wide range of resistances.

REVERSE BIAS: A voltage applied across a rectifying junction with a polarity that provides a high-resistance path.

REVERSE CURRENT: Current through a diode when reverse biased. An extremely small current also referred to as leakage.

ROTOR: The rotor consists of a coil of wire wrapped around an iron core. Current through the wire coil - called "field" current - produces a magnetic field around the core. The strength of the field current determines the strength of the magnetic field. The field current is D/C, or direct current. In other words, the current flows in one direction only, and is supplied to the wire coil by a set of brushes and slip rings. The magnetic field produced has, as any magnet, a north and a south pole. The rotor is driven by the alternator pulley, rotating as the engine runs, hence the name "rotor."

RIPPLE CURRENT: The portion of unfiltered AC current at the output of a filtered power supply.

RIPPLE VOLTAGE: The portion of unfiltered AC voltage and noise present at the output of a filtered power supply, operated at full load. It is typically stated as rms and peak-to-peak AC voltage (with zero ripple voltage would represent a perfect power supply).

SEMICONDUCTOR: Any material with exactly 4 free electrons in the outer orbit are called SEMICONDUCTORS.

SENSE: Terminal used by regulator to determine battery voltage. Some regulators will "sense" internally from the B+ of alternator terminal or externally through terminal on the voltage regulator.

SHORT CIRCUIT: Is a fault in an electrical apparatus whereby charge is allowed to flow between a phase and the electrical earth or between two phases. In less technical terms, a short circuit occurs when electricity moves through a circuit in an unintended direction, usually due to a connection forming where none was expected.

STATIC ELECTRICITY: Is electricity that is standing still; voltage potential with NO electron flow.

STATOR: Surrounding the rotor is another set of coils, usually three in number called the stator. The stator is fixed to the shell of the alternator, and does not turn. As the rotor turns within the stator windings, the magnetic field of the rotor sweeps through the stator windings, producing an electrical current in the windings. Because of the rotation of the rotor, an alternating current is produced. As, for example, the north pole of the magnetic field approaches one of the stator windings, there is little coupling taking place, and a weak current is produced. As the rotation continues, the magnetic field moves to the center of the winding, where maximum coupling takes place, and the induced current is at its peak. As the rotation continues to the point that the magnetic field is leaving the stator winding, the induced current is small. By this time, the south pole is approaching the winding, producing a weak current in the opposite direction. As this continues, the current produced in each winding is plotted against the angle of rotation of the rotor. The three stator windings are spaced inside the alternator 120 degrees apart, producing three separate sets, or "phases," of output voltages, spaced 120 degrees apart.

TRANSIENT VOLTAGE DIODE: Is a device used to protect sensitive electronics from voltage spikes.

ULTRASONIC: Signals that are just above the frequency range of human hearing of approximately 20 kHz.

VARISTOR: Is a type of resistor with a significantly non-ohmic current-voltage characteristic. Varistors are used to protect circuits against excessive voltage by acting as a spark gap.

VOLTAGE: Is the electrical force that moves electrons through a conductor. Voltage is electrical pressure also known as EMF (Electro Motive Force) that pushes electrons.

VOLTAGE DROP: Voltage or difference in potential developed across a component due to current flow.

VOLTAGE REGULATOR: Device or circuit that maintains constant output voltage (within certain limits) in spite of changing line voltage and/or load current.

VOLTAGE SPIKE: Voltage spikes are fast, short duration surges in the

electric potential (Electrical potential is the potential energy per unit charge associated with a static (time-invariant) electric field, also called the electrostatic potential or the electric potential, typically measured in volts) in a given circuit. The effect of a voltage spike is to produce a temporary increase in current in electricity this can cause excessive current flow in semiconductor junctions and the voltage may exceed the reverse breakdown potential, thus destroying or severely weakening the device.

VOLTMETER: Measures the voltage potential across or parallel to the circuit. The Voltmeter measures the amount of electrical pressure difference between two points being measured. Voltage can exist between two points without electron flow.

VOLTAGE SET POINT: Voltage maintained by the regulator under "minimum" load. Voltage set point is established by regulator manufacture. This can be changed to customer specs.

WATTS: A measure of power found by multiplying the Voltage by the Current.

WIRE AND CABLES: Wire and Cables 10 AWG and smaller is usually referred to as primary wire. 8 AWG and larger is usually referred to as cable. The larger the number, the smaller the wire size.

ZENER DIODE: A diode designed to conduct current when reverse biased with a specific threshold voltage (a.k.a. its avalanche point). Because of this, Zener diodes can be used by themselves as voltage-

