Depending on the motorcycle model, lighting may be either A.C. (lighting current supplied by A.C. generator) or D.C. (lighting current supplied by battery). Battery powered D.C. lighting has the advantage of operating with undiminished intensity when the engine is idling or stopped. When hooking up or troubleshooting the lighting circuits, refer to the wiring diagrams shown in the owner's manual or shop manual.

Headlights:

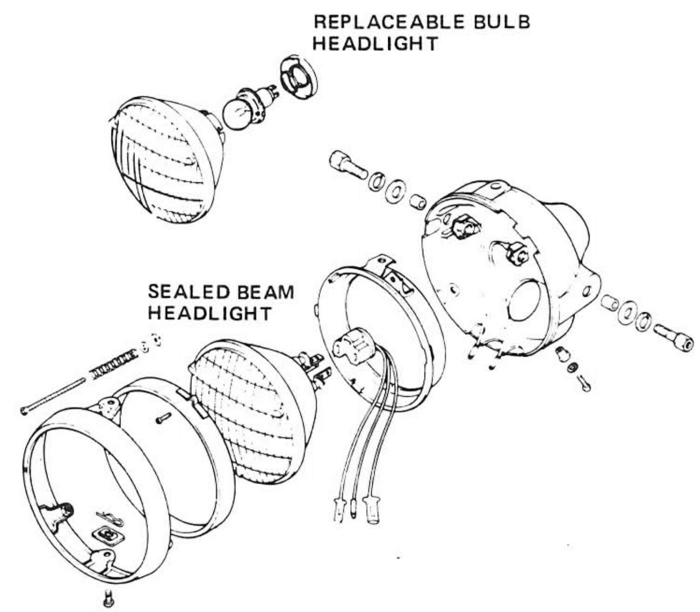

Fig. 88 Headlight Assembly (CB-550 shown here; this model is equipped with a sealed beam headlight for American use)

Headlights may have replaceable bulbs or may be sealed beam units (Fig. 88). A sealed beam headlight has the lens ③ , reflector ④ , and lighting filaments ⑥ assembled permanently in a sealed unit (Fig. 89). When a filament in a sealed beam headlight burns out, the entire unit must be replaced. It is somewhat more expensive to replace sealed beam units than bulbs, but the airtight seal excludes dust and moisture which could otherwise enter the headlight and tarnish or otherwise reduce the efficiency of the reflector.

There are two types of sealed beam construction. One type uses a glass reflector which is fused to the lens, forming its own protective bulb around the filaments. The other type uses a metal reflector permanently attached to the lens and sealed, but containing a conventional looking, non-removable bulb, as shown in Fig. 89.

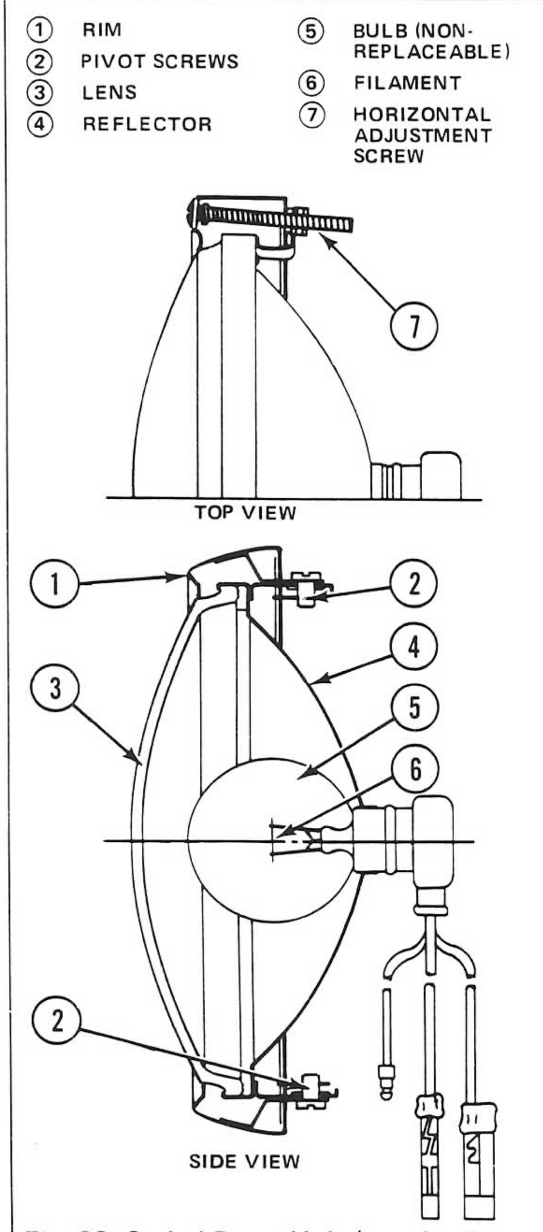

Fig. 89 Sealed Beam Unit (metal reflector type shown here)

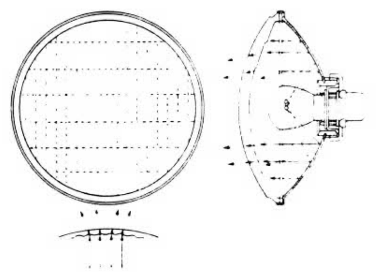

Fig. 90 Headlight Beam Reflection and Refraction

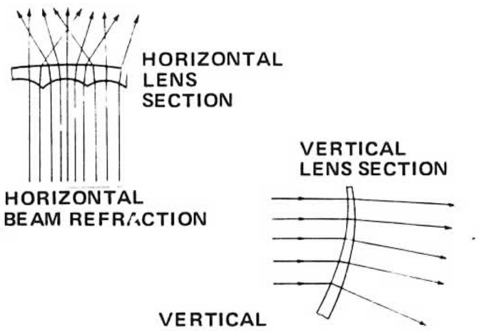

Fig. 91 Headlight Beam Refraction

① VERTICAL ADJUSTMENT (MOUNTING BOLTS)
② HORIZONTAL ADJUSTMENT SCREW

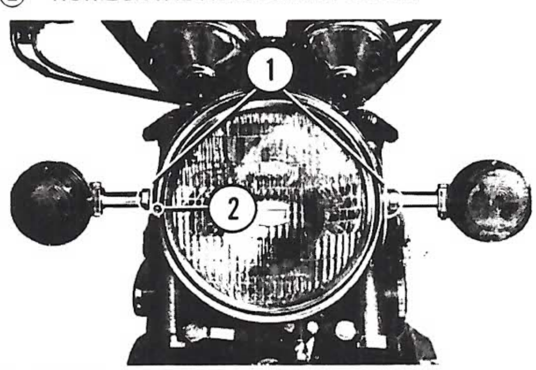

Fig. 92 Headlight Beam Adjustment

The inner surface of a headlight lens is composed of many light refracting segments. The edges of these segments are clearly visible from the outside and give the headlight its characteristic appearance, as though the lens were ruled off into rectangles (Fig. 90).

The shape of each lens segment is predominantly concave and causes light rays to diverge as they pass through the headlight lens (Fig. 91), providing broader illumination of the road ahead.

The headlight filaments emit light in all directions, and a reflector is required to redirect light rays toward the lens at a suitable angle (Fig. 90).

If a filament is moved off-center between the reflector and lens, the light rays it emits will strike the reflector and lens at a different angle. The direction and extent to which the filament is off-centered can therefore be used to alter the angle of the headlight beam. This principle is used to provide "high" and "low" beam capabilities within a single headlight unit. Dual beam headlights contain two filaments with just enough difference in position to provide high and low beam angles. A handlebar mounted switch enables the rider to light either high or low beam filaments.

Headlight mounting adjustments enable the beam to be precisely aimed. Vertical adjustment is accomplished by loosening the headlight mounting bolts ① (Fig. 92), and rotating the headlight assembly up or down. In some Honda models, such as the one shown in Fig. 92, the headlight mounting bolts are also the directional signal mounts. Horizontal adjustment is accomplished by turning an adjustment screw ② which pivots the headlight in its rim. Details of the horizontal adjustment mechanism are shown in Fig. 89.

Taillight and Stoplight:

The taillight on motorcycles intended for street use contains a two-filament bulb ① (Fig. 93). One filament is wired in parallel with the headlight. The other filament is connected to a switch that completes its circuit when the brakes are applied.

The red taillight lens ② has a clear section on its lower side to provide license plate illumination. Some off-road machines (e.g. Honda TL-250), which do not carry license plates may be equipped with a completely red taillight lens and may use a single filament bulb with no brake light circuit.

Stoplight Switches:

① BULB
② LENS
③ LICENSE PLATE BRACKET

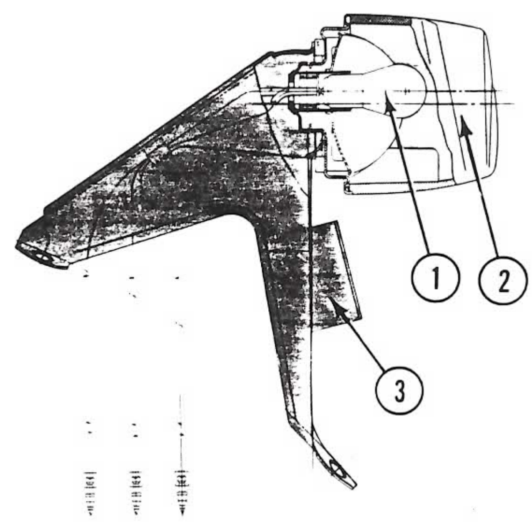

Fig. 93 Taillight and Stoplight Assembly

⑧ ADJUSTING NUT

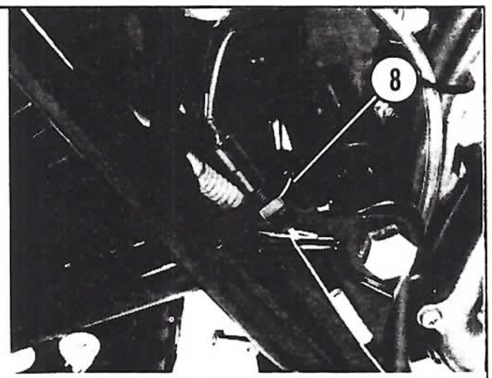

Fig. 94 Rear Brake Stoplight Switch Adjustment

All Honda motorcycles intended for street use are equipped with a rear brake stoplight switch of the type illustrated in Fig. 94 & 95. The rear brake pedal is connected to the operating rod ⑥ of the switch. When the pedal is depressed, this pulls the operating rod down, and the metal tip of the rod completes a circuit between the contacts ④ , lighting the stoplight. When the brake pedal is released, an internal spring ⑦ retracts the operating rod, and its metal tip is withdrawn from contact, breaking the circuit.

An adjusting nut ⑧ mounts the switch to the motorcycle frame. The adjusting nut is turned to raise or lower the switch, controlling the distance the brake pedal must pull the operating rod before the stoplight comes on. Switch height should be adjusted so there is some brake pedal free travel, and the stoplight comes on just before the brake takes effect.

④ CONTACT STRIP
⑤ OPERATING ROD INSULATOR
⑥ OPERATING ROD
⑦ RETURN SPRING
⑧ ADJUSTING NUT

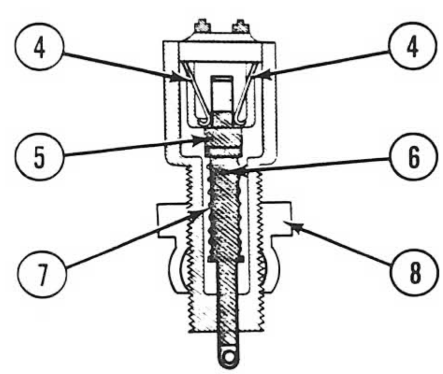

Fig. 95 Rear Brake Stoplight Switch

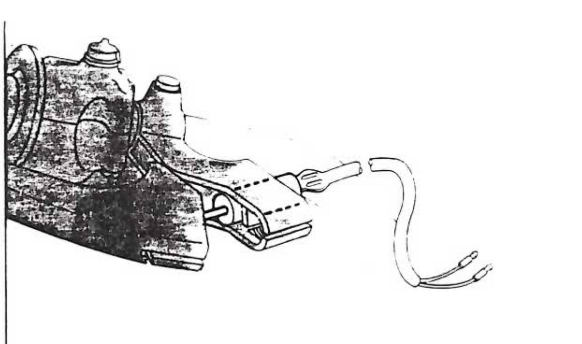

Fig. 96 Front Brake Stoplight Switch

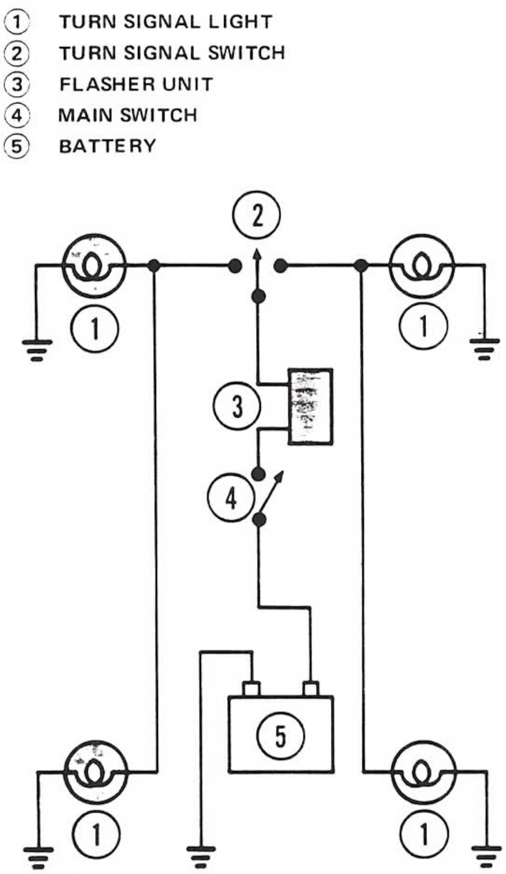

Fig. 97 Turn Signal Circuit

Honda street motorcycles of recent manufacture will also have a *front* brake stoplight switch. The front brake switch and rear brake switch are wired in parallel with each other and in series with the stoplight, so application of either or both brakes will complete the stoplight circuit. One type of front brake switch uses a plunger which completes the stoplight circuit when released by the brake lever (Fig. 96). Some of the Honda models equipped with hydraulic front brakes use a switch which is activated by hydraulic pressure in the brake line. None of the *front* brake switches on Honda motorcycles are adjustable.

Turn Signal Lights:

A simple turn signal circuit is shown in Fig. 97. With main switch (4) and turn signal switch (2) on, current flows from the battery (5), through a flasher unit (3), to either the left or right turn signal lights (1), as determined by the position of the turn signal switch (2). The flasher unit (3) repeatedly opens and closes the circuit, causing the turn signal lights to blink.

An indicator light, mounted in or near the instruments, flashes to show the rider that the turn signals are operating. A buzzer is sometimes added to the circuit to further attract the rider's attention, reminding him to cancel the signal after completing his turn. If a single indicator light is installed, it is wired in parallel with the turn signal switch (2) and will operate when either left or right turn signals are used. If separate left and right indicator lights are installed, they must be wired in parallel with the turn signal lights (1)

An interior view of the flasher unit used in Honda motorcycles is shown in Fig. 98. The spring plate (9) can be likened to an archery bow, held near its center by the spring plate holder (7). The contact point strip (8) acts like a bowstring, pulling the edges of the spring plate downward. Current flowing through the contact point strip heats the strip, causing it to elongate, releasing tension on the spring plate. The ends of the spring plate then flip upward against a stop (11), raising the contact point strip and separating the contact points (10)

After current flow ceases, the contact point strip cools and contracts, and the spring plate again bows downward. This lowers the contact point strip, closing the contact points and completing the circuit. The cycle is repeated, opening and closing the contact points at regular intervals.

Current flowing through the turn signal circuit must heat the contact point strip sufficiently to operate the spring plate. If one of the turn signal lights burns out or becomes disconnected, the remaining light may not draw enough amperage to develop the necessary heat and will remain lit, without blinking.

Horn:

The horn produces sound by vibrating a metal diaphragm. The frequency with which the diaphragm vibrates determines the pitch of the sound, and the extent of diaphragm movement determines the amplitude (loudness) of the sound.

In some horns, the sound waves generated by the diaphragm are channeled through a duct of increasing diameter which amplifies the sound. Other horns are not fitted with a duct, but have a resonator plate in front of the diaphragm. Both types are used in Honda motorcycles.

A cross sectional view of a typical motorcycle horn is shown in Fig. 99. When the main switch (2) is closed, and the horn button (14) is depressed, current flows from the battery (1), through contact points (3) & (4), and through an electromagnet (9). The electromagnet attracts an iron ring (8) on the diaphragm shaft (10), and the diaphragm (7) is pulled inward. When this occurs, the iron ring strikes an insulator (5) on the movable contact point (4), separating it from the fixed contact point (3), and the circuit is broken. A return spring (11) then moves the diaphragm shaft and diaphragm forward. This releases the movable contact point, the contact points close, and the cycle repeats itself as long as the horn button is depressed.

The horn is usually equipped with an adjustment screw (12) which controls the height of the contact point holder (13) in relation to the position of the iron ring on the diaphragm shaft. Adjustment is made by ear, to produce the best sound.

(6) TERMINAL LUG
(7) SPRING PLATE HOLDER
(8) CONTACT POINT STRIP
(9) SPRING PLATE
(10) CONTACT POINTS
(11) SPRING PLATE SHOP
(12) COVER
(13) BASE

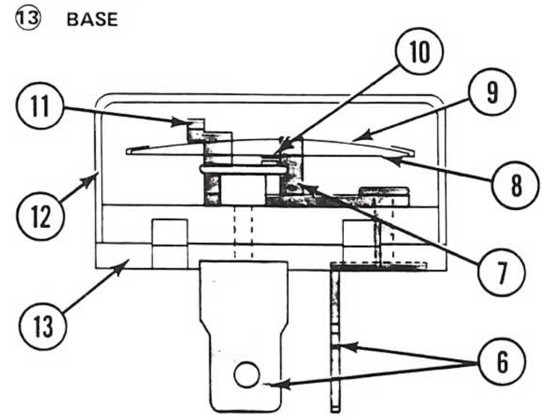

Fig. 98 Turn Signal Flasher Unit

(1) BATTERY
(2) MAIN SWITCH
(3) FIXED CONTACT POINT
(4) MOVABLE CONTACT POINT
(5) CONTACT POINT INSULATOR
(6) RESONATOR PLATE
(7) DIAPHRAGM
(8) IRON RING
(9) ELECTROMAGNET
(10) DIAPHRAGM SHAFT
(11) RETURN SPRING
(12) ADJUSTMENT SCREW
(13) CONTACT POINT HOLDER
(14) PUSH BUTTON SWITCH

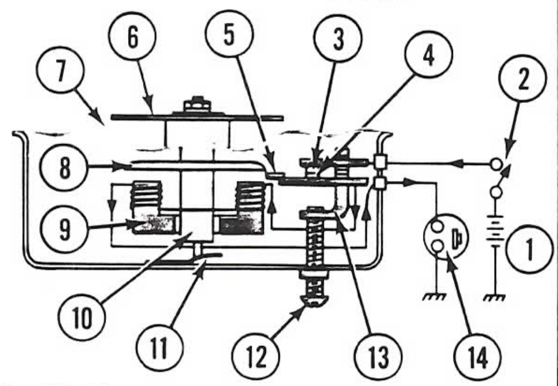

Fig. 99 Horn

① BATTERY
② MAIN SWITCH
③ VOLTAGE REGULATOR
④ COOLANT TEMPERATURE METER
⑤ COOLANT TEMPERATURE SENSOR
⑥ FUEL LEVEL METER
⑦ FUEL LEVEL SENSOR
⑧ FLOAT

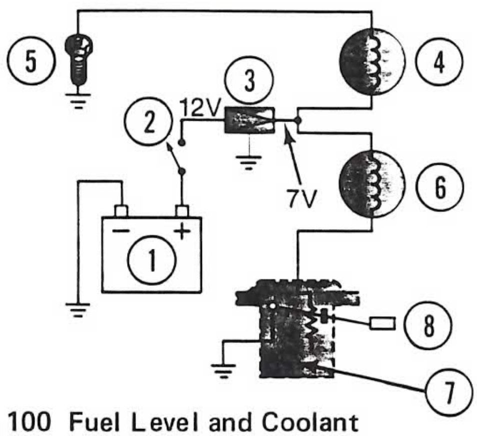

Fig. 100 Fuel Level and Coolant Temperature Gauge Circuits

① BATTERY
② MAIN SWITCH
③ FAN MOTOR
④ THERMOSTATIC SWITCH

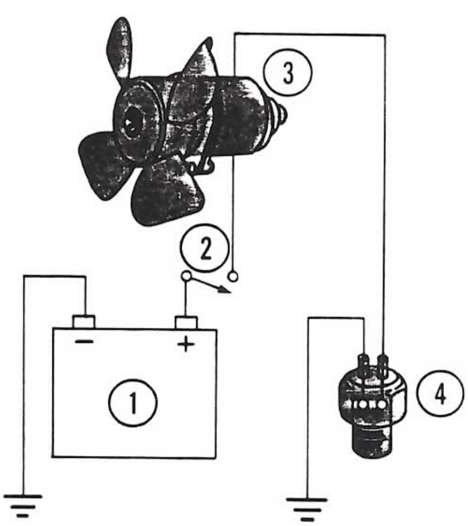

Fig. 101 Cooling Fan Circuit

Fuel Level and Coolant Temperature Gauges:

A diagram of the Honda GL-1000 fuel level and coolant temperature gauge circuit is shown in Fig. 100. The sensors and gauges require a 7 volt power supply. Since the Honda GL-1000 has a (12) volt battery, a voltage regulator (3) is used to reduce the voltage in this circuit to 7 volts.

The sensors (5) & (7) are variable resistance devices, controlling the amount of current flowing through the meters (4) & (6) . The meter needles are electromagnetically controlled and respond by moving across a calibrated scale in proportion to the current flowing through their circuits. Lower resistance results in higher meter readings, and vice versa.

The fuel level sensor (7) is essentially a rheostat whose movable arm is attached to a float (8) . As fuel level and float height become lower, current must travel through more of the sensor's resistor to complete its circuit. When the fuel tank is filled with gasoline, the float rises, and sensor resistance decreases.

The coolant temperature sensor (5) responds to heat. Resistance decreases as temperature rises.

Component testing procedures and resistance values are given in the shop manual.

Cooling Fan:

The Honda GL-1000 has an electrically driven fan behind the radiator. Fan operation is required only when the coolant (a 50-50 mixture of water and ethylene glycol anti-freeze) temperature exceeds the desired operating range. The fan motor (3) (Fig. 101) is therefore connected in series with a thermostatic switch (4) . When coolant temperature reaches a threshold of 98° – 102°C (208° – 215°F), the thermostatic switch closes, and the fan will operate until coolant temperature is lowered enough to open the thermostatic switch, or until the main switch (2) is turned off manually.

Thermostatic switch operation can be tested by checking electrical continuity while the sensor end of the switch is immersed in heated liquid. The test procedure is explained in detail in the shop manual.

A.C. generator (alternator) (-(∿)-): A device for converting mechanical energy into electrical energy of alternating current flow.

A.C. generator rotor: A magnet assembly that is rotated to induce electrical current in the stator.

A.C. generator stator: Nonrotating windings in which the A.C. generator rotor induces electrical current.

alternating current (A.C.): A flow of electricity which continuously reverses direction through repeated cycles.

ammeter: An instrument for measuring amperage.

ampere (A.): A unit of measurement of the flow rate of electricity. *Amperes* = volts ÷ ohms.

ampere-hour (amp.-hr.): A unit of measurement used mostly to rate the electrical energy a battery can deliver. *Ampere-hours* = amperes x flow time in hours.

ampere-hour capacity: The amount of electrical energy (expressed in ampere-hours) that a battery can deliver for a specified length of time.

armature: The moving component of an electric motor or other electromechanical device.

battery (⊣|‖⊢): A D.C. voltage source which converts chemical energy into electrical energy.

chassis ground (⏚ , ⊥): A connection to the motorcycle frame, used to complete an electrical circuit.

capacitor (condenser) (⊣⊢): A device containing two separated conducting surfaces which temporarily store electrical energy.

commutator: The part of an electric motor's armature to which the field coils are connected.

detonation: Explosive combustion of the air-fuel mixture in the combustion chamber occurring after the timed spark.

direct current (D.C.): A flow of electricity continuously in one direction.

dwell angle: The distance (measured in degrees or in percent of one full revolution) which the contact point cam of an ignition system rotates while the contact points remain closed.

electrolyte: A current carrying substance (e.g. battery acid) in which the conduction of electricity is accompanied by chemical action.

electron: A negatively charged particle orbiting the nucleus of an atom.

energy transfer system: A low tension magneto ignition system in which the contact points are connected in parallel with the magneto and ignition coil windings.

field coil: A coil of wire wound around an iron core, used in electric motors and in some A.C. generators to produce a magnetic field.

fuse (-∽-): A protective device, usually a small wire or metal strip, which melts and breaks the circuit if current exceeds its rated value.

ignition coil (3‖E): An iron core transformer which converts low voltage to high voltage for an ignition spark.

induction: Generation of electrical current in a conductor by variation of a magnetic field affecting the conductor.

magneto: An A.C. generator which serves as the voltage source for ignition.

ohm (Ω): A unit of measurement of the resistance to a flow of electricity. *Ohms* = volts ÷ amperes.

Ohm's law: The relationship between electromotive force (voltage), flow rate (amperage), and resistance (ohms). Volts = amperes x ohms.

ohmmeter: An instrument for measuring electrical resistance, calibrated in ohms.

parallel circuit: The interconnection of two or more electrical components such that current may flow from the voltage source directly to each component, without passing through any intervening component to complete the circuit.

rectifier: A device which converts alternating current into direct current.

resistance: The ability of a conductor to impede the flow of electricity, dissipating electrical energy in the form of heat. Resistance is measured in terms of ohms.

resistor (-ww-): A device which can be connected into an electrical circuit for the purpose of impeding the flow of electricity to a specified degree.

rheostat: A variable resistor having one fixed terminal and one movable contact. A *rheostat* is adjustable to produce a range of resistance values.

series circuit: The interconnection of two or more electrical components such that current flowing from the voltage source must pass through each component in turn to complete the circuit.

series-parallel circuit: The interconnection of electrical components which branches into both series and parallel current paths.

silicon diode (⊳|–): A two-electrode semiconductor which blocks current flow in only one direction.

spark plug heat range: The ability of a spark plug to transfer heat from its center electrode to its outer shell. Spark plugs are manufactured with a variety of heat transference rates for different engine temperature conditions.

spark plug reach: The distance from the shoulder above the spark plug threads to the opposite end of the threads.

volt (V.): A unit of measurement of the electromotive force which causes a flow of electricity. *Volts* = amperes x ohms.

voltage regulator: A device which limits its output voltage to a predetermined value or which varies voltage according to a predetermined plan.

voltmeter: An instrument for measuring voltage.

VOM: Volt-ohm-milliameter; a test instrument for measuring voltage, resistance, and amperes, with several calibration ranges.

watt (W.): A unit of measurement of electrical power. *Watts* = volts x amperes.

zener diode (⊳|–): An electronic device that blocks reverse current flow below a predetermined level and passes the amount of reverse current which exceeds that level.