

178 MAINTENANCE

Table 110 Battery Troubleshooting Guide

	Good Battery	Suspect Battery	Action
Plates	(+) chocolate color (-) gray	white (sulphated); + plates broken or corroded	Replace
Sediment	none, or small amount	sediment up to plates, causing short	Replace
Voltage	above 12 volts	below 12 volts	Test charge
Electrolyte level	above plates	below top of plates	Fill and test charge
Specific gravity	above 1.200 in all cells; no two cells more than 0.020 different	below 1.100, or difference of more than 0.020 between two cells	Test charge

Test charging

When the battery is suspected of being defective, first inspect the points noted in the chart below. The battery can be restored by charging it with the ordinary charge. If it will take a charge so that the voltage and specific gravity come up to normal, it may be considered good except in the following case:

* If the voltage suddenly jumps to over 13 volts just after the start of charging, the plates are probably sulphated. A good battery will rise to 12 volts immediately and then gradually go up to 12.5~13 volts in about 30 to 60 minutes after charging is started.

* If one cell produces no gas bubbles, or has a very low specific gravity, it is probably shorted.

* If there does not appear to be enough sediment to short the plates, but one cell has a low specific gravity after the battery is fully charged, the trouble may be just that there is insufficient acid in that cell. If this instance only, sulphuric acid solution may be added to correct the specific gravity.

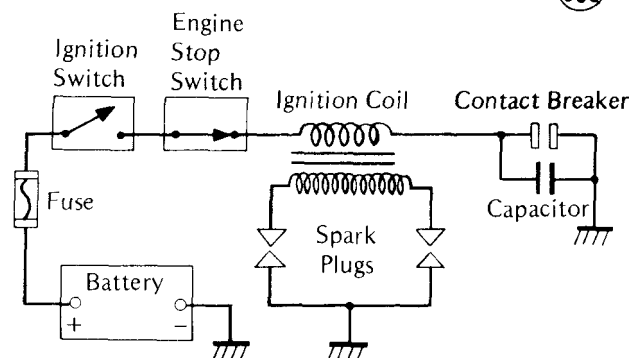
* If a fully charged battery not in use loses its charge after 2 to 7 days, or if the specific gravity drops markedly, the battery is defective. The self-discharge rate of a good battery is only about 1 % per day.

IGNITION SYSTEM

The ignition system, shown in Fig. 569, consists of the battery, contact breaker, capacitor, ignition coil, and two spark plugs (Pg.178). The battery supplies the current for the primary circuit, which includes the contact breaker points, capacitor, and the primary winding of the ignition coil. When the points suddenly open with the ignition switch turned on, a surge of electrons is produced in the secondary circuit, which includes the ignition coil secondary winding and the two spark plugs. For this system to function properly, all ignition parts must be in good order, the ignition timing correctly set, the ignition and engine stop switches not shorted, and all wiring in good condition (no shorts or breaks, and no loose or tarnished connections).

Ignition Circuit

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With the ignition switch on and the points closed, current flows in the primary circuit, including the ignition coil primary winding where the magnetic field (which accompanies electron flow) is concentrated (due to the winding). When the points open, this circuit is broken stopping the electron flow and collapsing the magnetic field. As this field collapses, magnetic flux cuts through the secondary winding inducing current in the winding. The voltage of this current, dependent on the number of turns in the secondary winding and the speed of the drop in the primary winding voltage is much greater than the voltage in the primary winding. It is this high voltage that causes a spark to jump across the spark plug electrodes. Since a greater ratio of secondary winding turns over primary turns and a sharper drop of primary winding voltage increase the secondary winding voltage that is produced, a certain ratio of turns in the ignition coil has been chosen and a certain voltage drop sharpness (determined by capacitor and breaker point performance) has been designed in the ignition system so that a spark of sufficient but not excessive strength will be produced.

Ordinarily in a 4-stroke engine, a spark jumps across the spark plug electrodes only every other time that the piston for that spark plug rises (once every 720° of crankshaft rotation). This is because between each compression stroke, in which a fuel/air mixture ready for combustion is in the cylinder, there is an exhaust stroke, in which the piston rises only to push out the burned gases. However, even if a spark does jump across