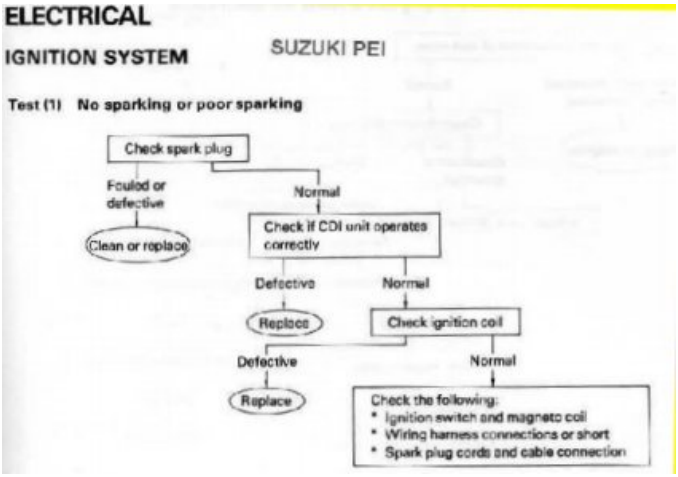
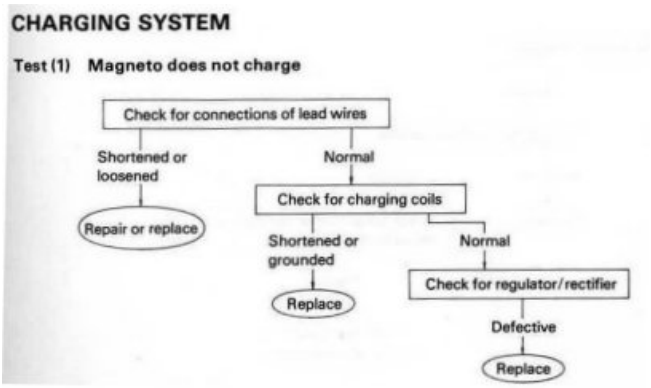
PEI Troubleshooting

I'm no expert on electrics, but I get a lot of questions on GT500 electronic ignitions. I've found it hard to find anything on GT500 PEI systems. These pages are about the GT250N or X7 PEI. I imagine that they are very similar:

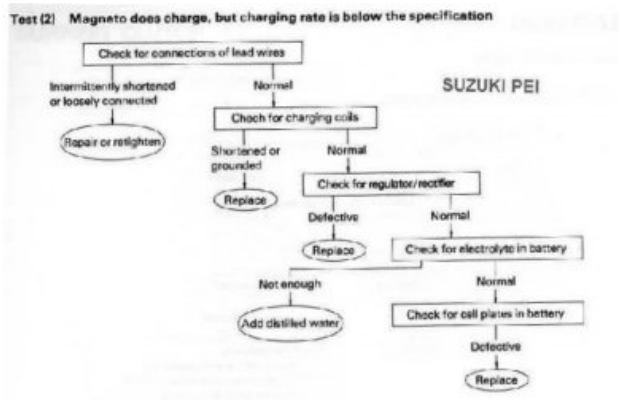
Ignition system - no sparking or poor spark:



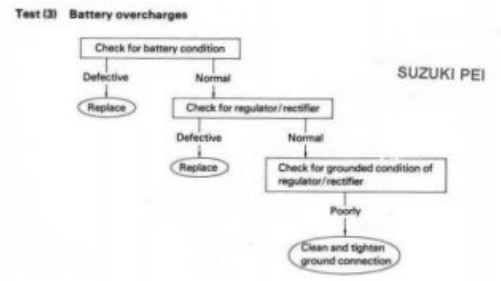
Charging system - magneto does not charge



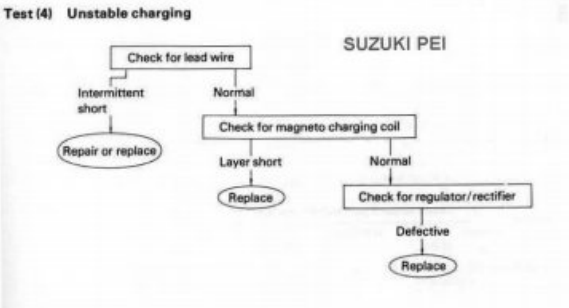
Charging system - magneto does charge - but charge below specs



Charging system - battery over charges



Charging system - unstable charging



Ignition system - description

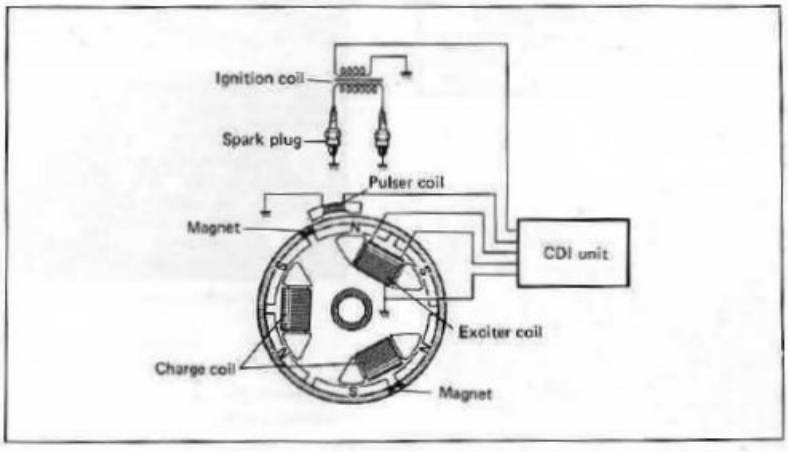
IGNITION SYSTEM

DESCRIPTION

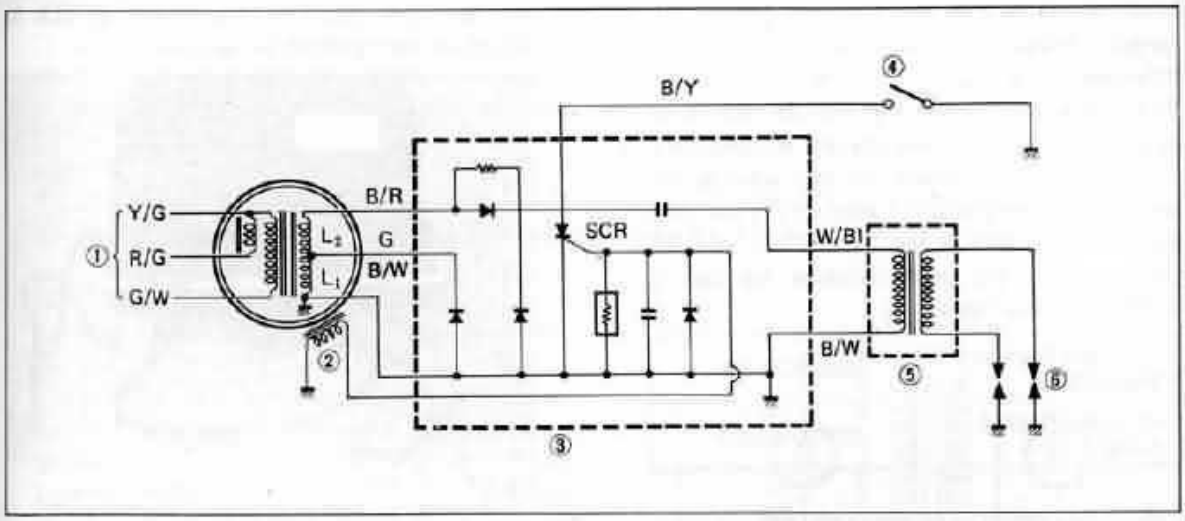
"PEI" system (pointless electronic ignition system) is employed for GT250N. "PEI" of this model is different from that of RM and TS series in that the pulser coil is located outside the outer surface of the flywheel. A small magnet is embedded on the outer surface of the flywheel. The magnet and pulser coil cause the "CDI" unit to operate.

This system is characterized by the fact that stable and reliable ignition timing is secured free from the effect of the load condition of the magneto.

The ignition coil used in the "PEI" system of GT250N is slightly different in that each end of ignition secondary winding is connected through a cord to the spark plug. Thus, the two plugs receive sparking energy at the same time.



IGNITION CIRCUIT



① Charge coil ② Pulser coil ③ CDI unit ④ Ignition switch
⑤ Ignition coil ⑥ Spark plug Exciter coil (Low-speed and high-speed coil) (L_1) (L_2)

B/R:	Black with red tracer	Y/G:	Yellow with green tracer
B/W:	Black with white tracer	G/W:	Green with white tracer
R/W:	Red with white tracer	R/G:	Red with green tracer
R/Y:	Black with yellow tracer	W/Bl:	White with blue tracer

Fig. 9-2

"PEI" operating principles

The speed characteristic of voltage available from exciter coils (both low-speed coil (L_1) and high-speed coil (L_2) is illustrated below. Note that applying to the condenser is the sum of the two voltages and is generally flat for the entire running speed range of the engine.

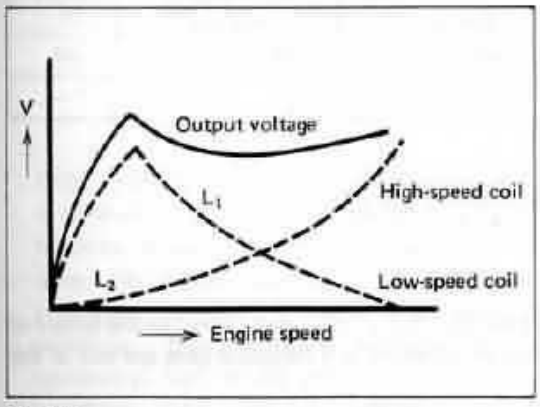


Fig. 9-3

The condensor is charged with the exciter coil as shown in Fig. 9-2. On the other hand, the output voltage from the pulser coil is applied to the gate of SCR to switch the SCR on. At this time, the condensor discharges the electricity in a moment. The discharged current passes through the primary coil of the ignition coil and induces high voltage of current to the ignition secondary coil. The high voltage current causes the plug to spark.

INSPECTION AND MAINTENANCE

Ignition system components

CDI unit

The purpose of inspecting the CDI unit is to determine whether or not the unit is electrically in good condition. There are two ways to inspect: one is simpler and based on the use of a special tool, which is the Type SS-II SUZUKI electro tester; the other involves the use of SUZUKI Pocket Tester.

SUZUKI Electro tester (SSII)	09900-28106
SUZUKI Pocket tester	09900-25001

CHECKING WITH ELECTRO TESTER:

Connect the CDI unit to the electro tester, as shown in Fig. 9-4. Twist the selector knob to "PEI" range, and turn on the power switch. The "PEI" indicator lamp will light up to tell that the CDI unit is in good, sound condition; if the lamp will not light up, it means, that the CDI is defective and needs to be replaced.

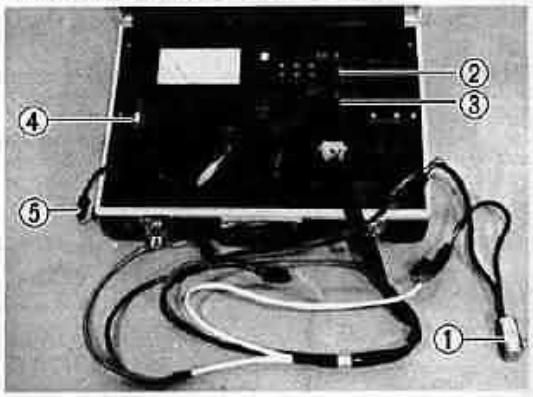


Fig. 9-4 ① CDI unit ② PEI indicator lamp ③ Selector knob on PEI ④ Power switch ⑤ External power supply cord

CHECKING WITH POCKET TESTER

Use a SUZUKI pocket tester (Special Tool No. 09900-2500) in reference to the chart of Fig.9-5 by adhering to these rules:

1) Before starting to check the "CDI" unit, be sure to have all lead-wire couplers unmade.
2) Just before putting your pocket tester to two "CDI" terminals, briefly shortcircuit them with a jumper.
3) Set the tester knob to "RX100" range.

Put negative (—) pin of tester to: \ Put positive (+) pin of tester to:	B/R	G	B/Y	R/W	W/Bl	B/W
B/R		off	on	off	con	off
G	off		off	off	off	off
B/Y	off	off		off	con	off
R/W	off	on	on		con	on
W/Bl	off	off	con	off		off
B/W	off	on	on	on	con	

Fig. 9-5 : "CDI" Checking Chart

B/R : Black with red tracter
B/Y : Black with yellow tracer
R/W : Red with white tracer
B/W : Black with white tracer
G : Green

This chart presupposes that the "CDI" unit is in sound condition; "on", "off" and "con" in the boxes of the chart refer to what your pocket tester will indicate when its positive and negative pins are put to the indicated terminals of a good "CDI" unit.

1) "on"—Tester should indicate *continuity*; it means that you are checking a diode for continuity in its normal (forward) direction.
2) "con"—This stands for a condenser. The indicating hand of your tester will momentarily deflect and settles back to indicate *infinity*, meaning that the condenser being checked is *not* ruptured.
3) "off"—Tester should indicate *infinity*, that is, its indicating hand should remain undeflected to mean that the circuit being checked has an infinitely large resistance or, possibly, off as it should be.

Ignition coil

To check to see if the ignition coil is in sound condition or not, a SUZUKI electro tester (09900-28106) or a SUZUKI pocket tester should be used. The electro tester is more convenient for this purpose.

CHECKING WITH ELECTRO TESTER:

Connect the ignition coil to the tester as shown in Fig. 9-6. Turn the selector knob to "IGNITION COIL" range, and turn on the power switch. The moment the switch is turned on, a sparking will occur in the window on the righthand part of the tester. If the sparking electrodes are apart as much as 8 mm to produce the spark, then the ignition coil is in good condition. If no sparking occurs with this much gap, then it is defective and must be replaced.

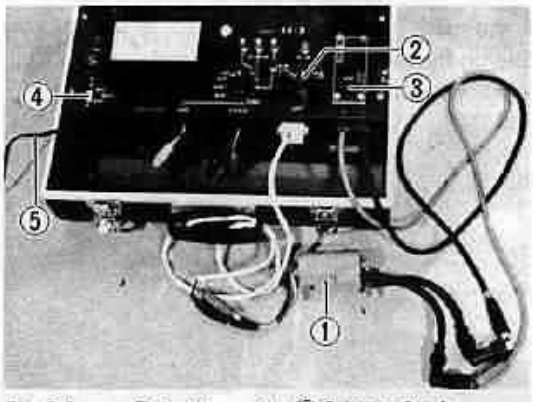


Fig. 9-6 ① Ignition coil on "IG coil" ② Selector knob ③ Spark gap window ④ Power switch ⑤ External power supply cord

CHECKING WITH POCKET TESTER:

A SUZUKI pocket tester or an ohm meter may be used, instead of the electro tester. In either case, the ignition coil is to be checked for continuity in both primary and secondary windings. Exact ohmic readings are not necessary, but, if the windings are in sound condition, their continuity will be noted with these approximate ohmic values.

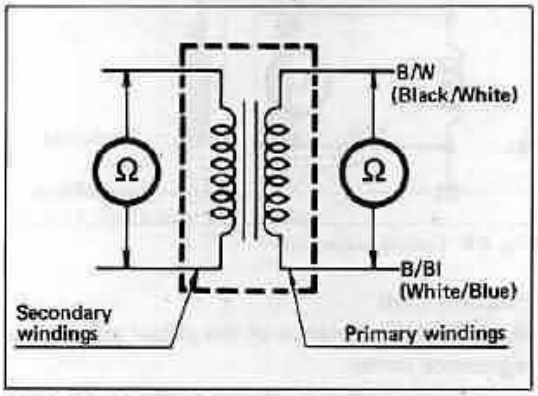


Fig. 9-7 Ignition coil test circuit for continuity

Primary winding	1 ohm
Secondary winding	10 kilohms

Magneto

EXCITER COIL

Using a circuit tester capable of measuring resistance accurate to a few ohms, or an ohmmeter, check the exciter coils (low-speed and high-speed) for ohmic resistance values. A coil noted to show infinity (meaning an open-circuited condition) or too low a resistance value (meaning short-circuit between coil turns through insulation layer) must be replaced. The reference ohmic values for this determination and the terminals to which the testing prods are to be put are indicated below.

High-speed coil	Between BLACK/RED and GREEN terminals	Approx. 30 ohms
Low-speed coil	Between GREEN and BLACK/WHITE terminals	Approx. 200 ohms

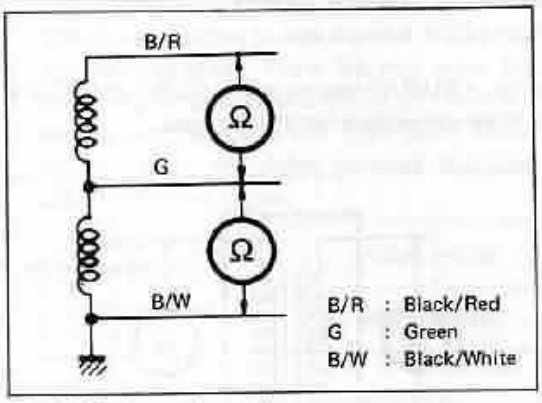


Fig. 9-8 Testing exciter coil

PULSER COIL

Measure the resistance of the pulser coil with a registance meter.

Pulser coil	Between RED/WHITE and BLACK/WHITE	Approx. 70 ohms

CHECKING AND ADJUSTING IGNITION TIMING

As long as the screws securing the stator are tight, the ignition timing initially set remains undisturbed to require no re-adjustment. Since engine disassembly involves the removal and installation of the stator, the methods of adjusting and checking the timing will be described:

Ignition timing adjustment

Secure the stator so that the line Ⓐ is aligned to the center of screw Ⓑ

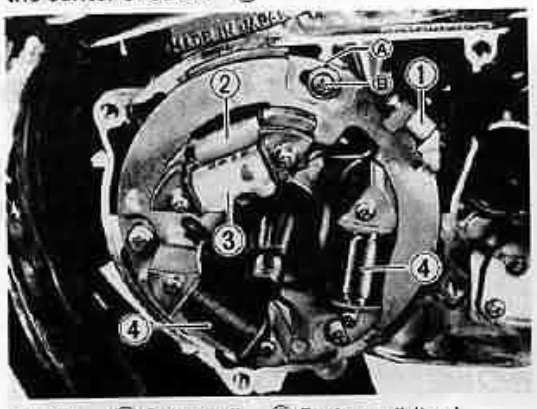


Fig. 9-9 ① Pulser coil ② Exciter coil (low) ③ Exciter coil (high) ④ Charge coil

Checking the timing

All you have to do is this: check to be sure that lines ① is aligned to the center of screw.

You may use a timing lamp to check the timing. In this case, run the engine at about 6,000 rpm: if the mark on crankcase appears aligned to the line on flywheel, then you may rest assured that ignition is timed correctly.

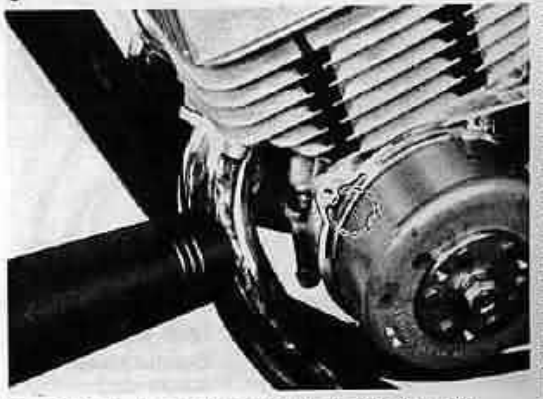


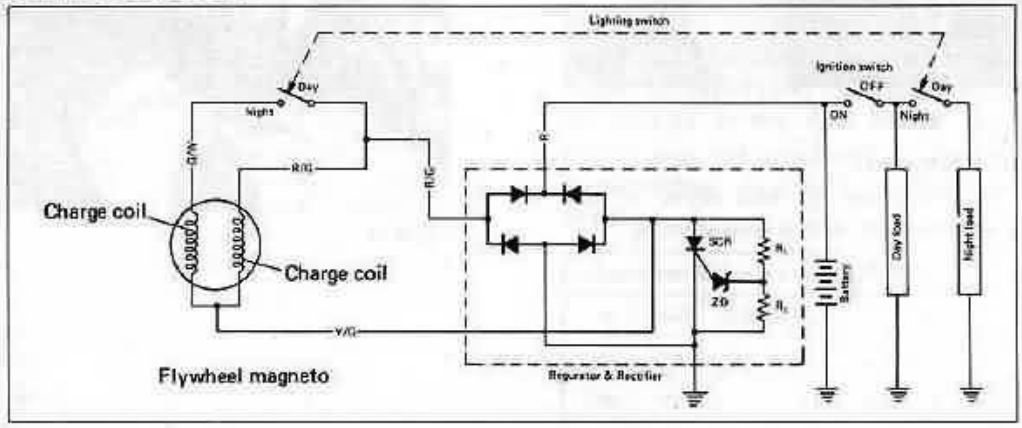
Fig. 9-10 Timing marks on flywheel and crankcase

CHARGING SYSTEM

DESCRIPTION

The charging system is composed of a flywheel magneto, which has 2 charging coils, full-wave rectifier and SCR voltage regulator. One of the 2 charge coils is used exclusively at night. The rectifier and voltage regulator form a monobloc.

CHARGING CIRCUIT



G/W : Green with white tracer
R/G : Red with green tracer
R : Red
Y/G : Yellow with green tracer

SCR : Silicon Controlled Rectifier
ZD : Zenner diode

INSPECTION

To inspect the proper operation of the charging system, check the resistance of the magneto coil and continuity of the regulator and rectifier.
Decide the condition of the charging system quickly, by the battery charging voltage, as shown in the table below.

	Voltage	Condition
Day time	16V or over	Defective regulator/rectifier
	15V to 16V	Normal
	15V or under	Defective lighting switch, charging coil or rectifier
Night time	15V or over	Defective regulator/rectifier
	14V to 15V	Normal
	14V or under	Defective lighting switch, charging coil or rectifier

NOTE:
(1) Above values are based on the load of the standard specifications, which may therefore vary with changes of load of head lamp, etc. in other specifications than the standard ones.
(2) Measurement is to be made at the engine speed of 5,000 rpm.

Fig. 9-13

Regulator/rectifier

Check the continuity of lead wires of the regulator and rectifier, with a pocket tester.

	Put positive (+) pin of tester to:				
		R/G	Y/G	B/W	R
Put negative (–) pin of tester to:	R/G		off	off	on
	Y/G	off		off	on
	B/W	on	on		off
	R	off	off	off	

R/G: Red with green tracer
Y/G: Yellow with green tracer
B/W: Black with white tracer
R: Red

Fig. 9-14

Charging coil

Resistance of the charging coil should be in the range as shown in the table below.

G/W-Y/G	Approx. 1 Ω
R/G-Y/G	Approx. 1 Ω

G/W: Green with white tracer
Y/G: Yellow with green tracer
R/G: Red with green tracer

Fig. 9-15