

IGNITION OPERATION and DIAGNOSING FAULTS - QUESTIONNAIRE No. 1

PLEASE PRINT

NAME : DATE :

DEALERSHIP :

1. Name the 4 types of ignition systems used on small engines.
 1. *Breaker Point Ignition*
 2. *Transistor Controlled Ignition*
 3. *Capacitor Discharge Ignition*
 4. *Solid State Ignition*

2. What does the abbreviation of these various ignition systems mean.
 - (a) B.P.I. *Breaker Point Ignition*
 - (b) T.C.I. *Transistor Controlled Ignition*
 - (c) C.D.I. *Capacitor Discharge Ignition*
 - (d) S.S.I. *Solid State Ignition*

3. What is the objective of any ignition system.
To produce enough voltage to fire the spark plug, and at the right time, also to have enough voltage in reserve to cope with the changing conditions that the engine and spark plug encounter.

4. Name the 2 voltage circuits in the B.P.I., T.C.I. and the basic C.D.I. system.
 - (a) *Primary*
 - (b) *Secondary*

5. What is the step-up ratio of an ignition coil. *100:1*

6. What does KV. stand for. *Kilovolt*

7. How many volts in 1 KV. *1000*

8. How much voltage would you normally expect to find on the;
 - (a) Primary circuit *150v.*
 - (b) Secondary circuit *15Kv.*
 - (c) Spark plug *Between 5-10 Kv.*

9. Briefly describe, what is ignition reserve voltage.
Ignition reserve voltage is simply the difference in Kilovolts, between how much voltage the ignition coil can produce and how much voltage the spark plug requires to ignite the fuel mixture within the combustion chamber.

10. If the spark plug uses about 10 Kv. then how much voltage should the ignition coil produce to have enough voltage in reserve to cope with the changing conditions that the spark plug encounters.
 15 Kv.
11. Name some of the conditions that effect the spark plug voltage.
 .. *Gap setting*
 .. *Heat range*
 .. *Condition of the plug*
 .. *Fuel mixture*
 .. *Cylinder pressure*
 .. *Ignition timing*
12. Is the working voltage within all types of Ignition systems
 (a) Very similar
 (b) Vastly different.
13. How many voltage circuits to test in the S.S.I. system, and name them.
 .. 1 Voltage circuit, .. the secondary voltage.

1. Name the 2 types of ignition testing methods and briefly describe them.
1. Static testing... 2. Dynamic testing.....
In static testing the ignition parts are usually tested off the engine, in Dynamic testing the parts are tested on the engine, while cranking the engine over or while it is operating throughout its entire R.P.M. range.....

2. Name the two Polarities of the voltage in any electrical circuit.
 (1) *Positive.....* (2) *Negative.....*

3. When checking the ignition coil Output Voltage, you have a low or no voltage reading with the Kv. Polarity switch in the (+) position, what would be the next test procedure.
Change the Kv. Polarity switch to the [-] Negative position and re-test....

4. When testing the ignition coil Primary Voltage, you have a low or no voltage reading with the Black test lead connected to ground and the Red test lead connected to the coil primary terminal, what would be the next test procedure.
Reverse the test lead connections and re-test.....

5. When testing the ignition coil Primary Voltage on the Breaker Point Ignition (B.P.I.) system, you have a low In Circuit voltage reading, in either polarity, of about 50 volts, what would be the next test, and how much voltage would you expect to read.
Open circuit voltage test, between 10-20 volts.....

6. Briefly describe all of the Dynamic testing procedures for checking the complete 2 part Transistor Controlled Ignition (T.C.I.) system and what voltage readings would you normally expect to read at each test point.
Ignition coil Output Voltage, 15Kv. or 6mm. spark gap. Ignition coil Primary voltage, In Circuit test, approx 130v. Ignition coil Primary voltage, Open Circuit test, between 10-20 volts. Spark plug voltage between 5-10 Kv.....

7. When checking the 2 part C.D.I. system, you have a low voltage reading of only 5 Kv. when testing the ignition coil Output Voltage.
 - (a) What is the next test procedure for this system. *Primary voltage.....*
 - (b) What voltage reading would you expect to read. *150 volts.....*
 - (c) If the voltage reading is OK, which is the faulty part. *Ignition coil..*
 - (d) If low or no voltage reading, which is the faulty part. *C.D.I. Unit...*
 - (e) Name some of the conditions on the engine that may cause or contribute to the low or no voltage reading.
An improper air gap between the flywheel and the C.D.I. unit,.....
Faulty C.D.I. unit. Faulty ignition coil. Poor grounding of ignition parts. Poor wiring connections. Faulty stop switch.....

8. Briefly describe the Dynamic testing procedures for checking the one piece Solid State Ignition (S.S.I.) system and what are the voltage readings.
As there is only 1 part in this system, there is only 1 voltage circuit, the Secondary Voltage. You would normally expect about 15 Kv. or 6mm. spark gap and between 5-10 Kv. spark plug voltage.....

IGNITION OPERATION and DIAGNOSING FAULTS - QUESTIONNAIRE No. 3

1. (a) Name the 3 main parts in the 3 Part C.D.I. system.
1. *Exciter coil*..... 2. *Pulser coil*..... 3. *C.D.I. unit*.....
- (b) How much In Circuit voltage would you normally expect to read from each of those parts.
1. *.150 volts*..... 2. *.0.5 volt*..... 3. *.15 Kv.*.....
- (c) What voltage would you expect to read when testing the Exciter Coil,
1. In Circuit voltage. *.150v.*..... 2. Open Circuit voltage. *.150v.*....
- (d) What voltage would you expect to read when testing the Pulser Coil,
1. In Circuit voltage. *.0.5v.*..... 2. Open Circuit voltage *aprox. 1.5v.*
2. When Dynamic testing the 3 Part C.D.I. system you have no voltage reading when checking the high voltage output of the C.D.I. unit (Secondary Voltage), this indicates that either the C.D.I. Unit, Exciter Coil or the Pulser Coil is faulty, briefly describe the test procedures you would use to determine the condition of each of these 3 parts and the voltage you would expect to read when testing each of those parts.
The exciter coil In Circuit voltage test, 150v. If low or no voltage.... then perform the Open Circuit voltage test, 150v. The pulser coil In Circuit voltage test, 0.5v. If no voltage reading, then perform the Open Circuit voltage test, aprox. 1.5v......
3. What, if any, is the major difference in the voltage readings between the 3 Part C.D.I. system and the 3 Part T.C.I. system.
The Exciter Coil, open circuit voltage......
4. What are the various In Circuit and Open Circuit voltage tests and the amount of voltage expected when checking the complete 3 Part T.C.I. system.
The secondary voltage 15 Kv. The exciter coil In Circuit voltage, 130v. The exciter coil Open Circuit voltage, between 10-20 volts. The pulser coil In Circuit voltage, 0.5 volt. and the pulser coil Open Circuit voltage, aprox. 1.5 volts......
5. (a) Name the 4 main parts in the 4 Part T.C.I. system.
1. *Exciter coil*..... 2. *Pulser coil*.....
3. *T.C.I. unit*..... 4. *Ignition coil*.....
- (b) Name the 4 voltage circuits in the 4 Part T.C.I. system and the amount of voltage you would expect to read when testing these individual parts.
1. *Exciter coil voltage*..... *130v.*...
2. *Pulser coil voltage*..... *0.5v.*...
3. *Primary voltage*..... *130v.*...
4. *Secondary voltage*..... *15 Kv.*...
- (c) What voltage would you expect to read when testing the Exciter Coil Open Circuit voltage. *Between 10-20 volts*...
6. What, if any, is the major difference in the voltage readings between the 4 Part T.C.I. system and the 4 Part C.D.I. system.
The Exciter Coil, Open Circuit voltage.....

7. Briefly describe the 3 types of ignition systems you may encounter on Twin Cylinder engines.
On some engines there is one complete ignition system for each cylinder... other engines may have 2 ignition coils with one source of supply, but the majority of twin cylinder engines have the Wasted Spark system.
8. On the Wasted Spark ignition coil system fitted to most twin cylinder engines
- (a) How much voltage and what polarity would you expect to read when testing the ignition coil Output Voltage on each of the 2 high voltage leads.
About 15 Kv. on each lead, one (+) Positive the other (-) Negative
 - (b) Aproximately how much voltage would be required by the spark plug which uses (-) Negative voltage,*5*...Kv. and the spark plug that uses (+) Positive voltage,*10*...Kv.
 - (c) As the spark plug electrode erodes away, what influence does this have on the voltage required by the spark plug.
It will use about an extra 1000 v. for every .001" it erodes away.
 - (d) Why is it especially important that the wasted spark ignition system is in good condition.
Because if there is and deterioration in the ignition system, then there will be little or no reserve voltage on the (+) Positive side.
9. If you have an engine in for service and the customer complains that it is lacking overall performance and assuming that the fuel and mechanical condition is OK. and there is adequate voltage for the spark plug, what test would you perform next and what equipment would you use.
Ignition timing test using a power timing light.
10. On an engine fitted with a 1 or 2 piece electronic ignition system and the ignition timing is out by a few degrees,
- (a) what parts on the engine would you check for adjustment which may cause this out of timing condition.
The air gap between the flywheel and the ignition module.
 - (b) If all of the ignition parts are adjusted correctly, what other condition could cause the ignition to be out of timing.
The Electronic Ignition module.
11. On an engine fitted with a multi part ignition system and the ignition timing is out considerably, what part would you consider to be the most likely cause of this problem.
The pulser coil
- What are some of the problems associated with this part which will cause the ignition to be out of timing.
The air gap too wide or a faulty pulser coil.

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