Spark Plug Performance Diagnosis

Introduction

The appearance of the firing-end of a spark plug graphically reflects the condition of an engine, the suitability of the spark plug heat rating, and whether or not the carburetor and ignition timing are properly adjusted.

This pamphlet is intended to assist you in correctly choosing your spark plugs and determining the performance condition of your engine.

■Even plugs which present a good appearance, such as those shown in Figures ⑥~㉔, can quite often be covered with a lead deposit which causes misfiring.

■Wet plug firing-ends such as shown in Figures ❶~❷ are normally attributed to one of the following causes:

(1) Excessive choking.
(2) Trouble within the ignition system.
(3) Oil pumping past worn piston rings and valve guides.

■The causes of sooty plugs like those shown in Figures ❸, ❹ and ❺ are usually the result of:

(1) A plug with a too high heat rating is being used and the plug firing-end does not reach its self-cleaning temperature (above 400~450℃) due to light load conditions.
(2) Use of a too rich air-fuel mixture of richer than 8:1~10:1
(3) Trouble in the ignition system.
(4) Improperly functioning cooling system resulting in excessive cooling.

■The firing-end burns illustrated in Figures ㉕, ㉖ and ㉗ may be a result of:

(1) Too low heat rating, permitting the plug to exceed the highest limit for optimum operating temperature of over 850~1000℃ due to excessively heavy load operations.
(2) A too lean air-fuel mixture.
(3) Ignition timing too over advanced.
(4) Abnormal combustion such as knocking.
(5) Cooling system trouble, which causes engine overheating.

■Overheating conditions shown in Figures ㉘ and ㉙ are due to intense knocking and pre-ignition following situations identical to those in Figures ㉕, ㉖ and ㉗ where increased temperature of the spark plug firing-end results in melting of the electrode.

1
Oil Fouled

2
Oil Fouled

3
Carbon Fouled

4
Too Cold

5
Too Cold

6
Cold or Rich
But OK

7
Cold or Rich
But OK

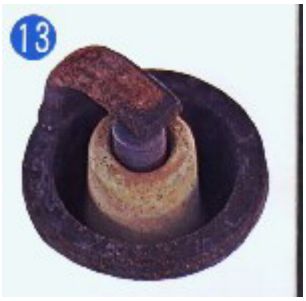
8
Cold or Rich
But OK

9
Good

10
Good

11
Good

12
Good



13
Real Good

14
The Best

15
Best

16
Best

17
Best

18
Good

19
Good

20
Good

21
Kinda Hot
But OK

22
Hot or Lean
But OK (?)

23
Hot or Lean
But OK (?)

24
Hot or Lean
But OK (?)

25
Too Hot or Lean
Pre-Ignition Range

26
Too Hot or Lean
Pre-Ignition Range

27
Too Hot or Lean
Pre-Ignition Range

28
Too Hot or Lean
Pre-Ignition Range

29
Too Hot or Lean
Pre-Ignition Range

Additional links for more Spark Plug info:

http://tsrsoftware.com/images/read_plugs-tsr_software.jpg

http://www.dragstuff.com/techarticles/reading-spark-plugs.html