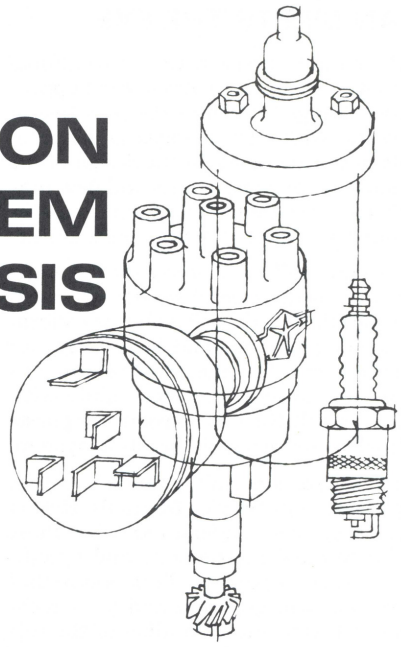
MASTER
TECHNICIANS
SERVICE
CONFERENCE

MEETING GUIDE 69-6

IGNITION SYSTEM ANALYSIS



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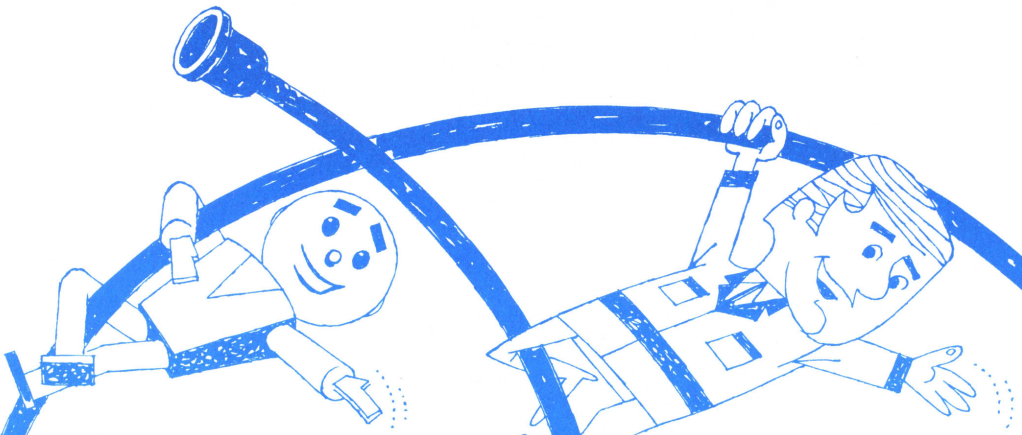

THERE'S MORE CHANGE THAN MEETS THE EYE

To the casual observer, the conventional automotive ignition system doesn't appear to have changed much in the past five or ten years. Although changes and refinements have been made in the design of the ignition system components and new materials have been introduced, ignition system improvements have been quite subtle.

The biggest and most important changes have been in the area of service specifications. Ignition timing, distributor calibration, spark plug type and heat range, for example, have become increasingly important and in some instances, quite critical. As a result there is no room for guesswork when servicing the ignition system.

This Tech session isn't intended to take the place of your Service Manuals. Rather it will help you understand why those Service Manual instructions and specifications are so important. Tech is sure that this session will give you and your technicians a better understanding of the role ignition plays in good engine performance. This in turn will help you all do a better job of ignition system analysis and service.

PREPARE AND PRE-PLAN THIS MEETING

This is the kind of session that will be much more effective if you do a little advance planning and are prepared to put on a good demonstration. So, call in your best ignition man and preview the film. Then, take the time to read the Reference Book and have your ignition man do ditto.

The Reference Book covers the inspection and testing of the entire ignition system from battery to spark plugs. This meeting presents a good opportunity for you and your crew to review these tests. Have your ignition man round up the equipment you'll need for a good working demonstration period.

For battery testing you'll want to have a hydrometer and battery-starter tester. If you also have a Cad-Tip Battery Tester, so much the better. You should also have a timing light and a voltmeter. A spark plug cleaner and tester and a collection of used plugs showing various kinds of wear or failure will add interest to the meeting. If possible, have your ignition man primed to demonstrate distributor testing using a distributor test bench.

And don't forget the Service Manuals. You should take every opportunity to sell your technicians on following recommended procedures and sticking to correct service specifications.

SHOW 'EM WHAT IT'S ALL ABOUT

Here's a general plan for putting on a good meeting. The first thing on the program should be the film, so fire up the projector, turn out the lights and relax while Tech and Bob talk to your men about ignition system analysis. After showing the film, pass out the Reference Books and invite questions and discussion.

When the gab session starts to lag, move the meeting out into the service area and let your ignition man take over. Kick off the demonstration part of the meeting by covering battery testing. Let him use his own favorite testing tools, but make sure he demonstrates proper use of a hydrometer and battery-starter tester.

It might be a good idea to have him demonstrate how a spark intensity test gives a quick indication of the overall condition of the ignition system. Be sure and have him demonstrate the cranking voltage test as a quick way of finding out whether primary voltage at the coil is okay. It would also be worthwhile to have him show how to check for high resistance in the primary circuit by testing voltage drop between battery and ballast resistor. Time permitting, demonstrate the hookup for checking voltage drop between the ignition coil and the distributor ground . . . the Reference Book suggests an easy way to do this.

It would be a good idea to use a timing light to demonstrate how vacuum advance gets into the act if the vacuum advance line isn't disconnected and plugged . . . particularly if engine idle speed is higher than specified. Be sure he mentions the importance of ignition cable routing and the importance of making sure that ignition cables are firmly seated in the coil and ignition coil towers. It's easy to demonstrate how air trapped under a cable nipple can push the cable partly out of its tower.

If your ignition man was able to round up some good examples of various kinds of spark plug wear and damage, take time to discuss this facet of ignition system analysis. Unless most of your men are completely familiar with your distributor test bench, a demonstration of testing vacuum and centrifugal advance performance would be very worthwhile.

Before you adjourn the meeting, call it to order long enough to cover the questions and answers on the back of the Meeting Guide. Tech thinks you'll be pleasantly surprised at how much all of you have learned about ignition system analysis.

Master Technician customer care QUIZ

1. The open circuit voltmeter method of testing a battery is not practical on most current model cars.

RIGHT . . . The introduction of batteries with solid, rather than soft-sealed, tops virtually eliminated the open-circuit voltmeter method of battery testing. (Page 2)

2. One of the most significant things to watch for, when using a hydrometer to test a battery, is differences in readings between cells.

RIGHT . . . If the electrolyte in any cell reads .025 points lower than the highest reading cell, there is a good chance that the low reading cell is damaged or worn out. (Page 3)

3. If the ignition system is in good condition, the secondary voltage will remain constant under all operating conditions.

WRONG . . . The actual output voltage of the coil is determined by the amount of voltage needed to cause the spark to jump the plug gap. This varies from about 5,000 volts at idle speed to about 15,000 volts at higher speeds. (Page 3)

4. At engine idle speed the ballast resistor remains cool, its resistance is low so current flow in the primary ignition circuit is high.

WRONG . . . At lower engine speeds the ballast resistor gets much warmer and its resistance increases. This limits primary voltage and reduces current flow at low speed which reduces arcing across the ignition points. (Page 5)

5. As engine speed increases, the time available to burn the mixture in the cylinders decreases. That's why the centrifugal advance is needed.

RIGHT . . . The centrifugal advance mechanism in the distributor automatically adjusts timing so that the mixture is ignited earlier. This gives the mixture time to burn completely during the power stroke. (Page 5)

6. Under part-throttle and light-load conditions the air-fuel mixture is highly compressed and burns faster so less ignition advance is needed.

WRONG . . . Because the combustion process is slower under part-throttle and light-load conditions, the mixture must be ignited sooner. The vacuum advance unit takes care of this little detail. (Page 6)

7. Because ignition point gap and dwell affect timing as well as secondary voltage, timing must be rechecked whenever point gap is changed.

RIGHT . . . If contact point gap is too wide, the points open sooner so ignition timing is actually advanced. Besides, dwell is reduced and this decreases secondary voltage, causing a miss at higher engine speeds. (Page 8)

8. The voltage drop between the distributor side of the ignition coil and ground should not be more than .4 of a volt.

WRONG . . . With ignition points closed and the ignition switch on, the voltage drop should not be more than .1 of a volt. If the drop is greater, check for burned or glazed distributor point contacts. (Page 10)

9. An ignition system in good condition can produce more ignition energy than needed. That's why special resistance-type ignition cables are used.

RIGHT . . . The resistance built into those radio-type cables suppresses the extra energy that isn't needed for good ignition. This reduces radio interference and increases plug life. Be sure and use the recommended ignition cables. (Page 12)

10. Spark plug electrodes become rounded by use but resistance-type ignition cables eliminate electrode wear and gap growth.

WRONG . . . Although the resistance-type ignition cables extend plug life, it is normal for spark plug gap to increase about .001" every 1,000 miles of driving. Plug electrodes become rounded and this, in combination with gap growth, increases the voltage required for good ignition. (Page 12)

Make sure that your men receive credit for this session. Fill out and return the PARTICIPATION REPORT which replaces the individual questionnaires.

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