Modern Automotive Technology Chapter 46

Advanced Diagnosis

North Montco Technical Career Center

Chapter 46

Advanced Diagnosis Learning Objectives

- Use advanced diagnostic tools to troubleshoot difficult problems
- Use a scan tool to find problems
- Explain the principles of a lab scope
- Evaluate ignition system operation
- Explain when and how to use an engine analyzer

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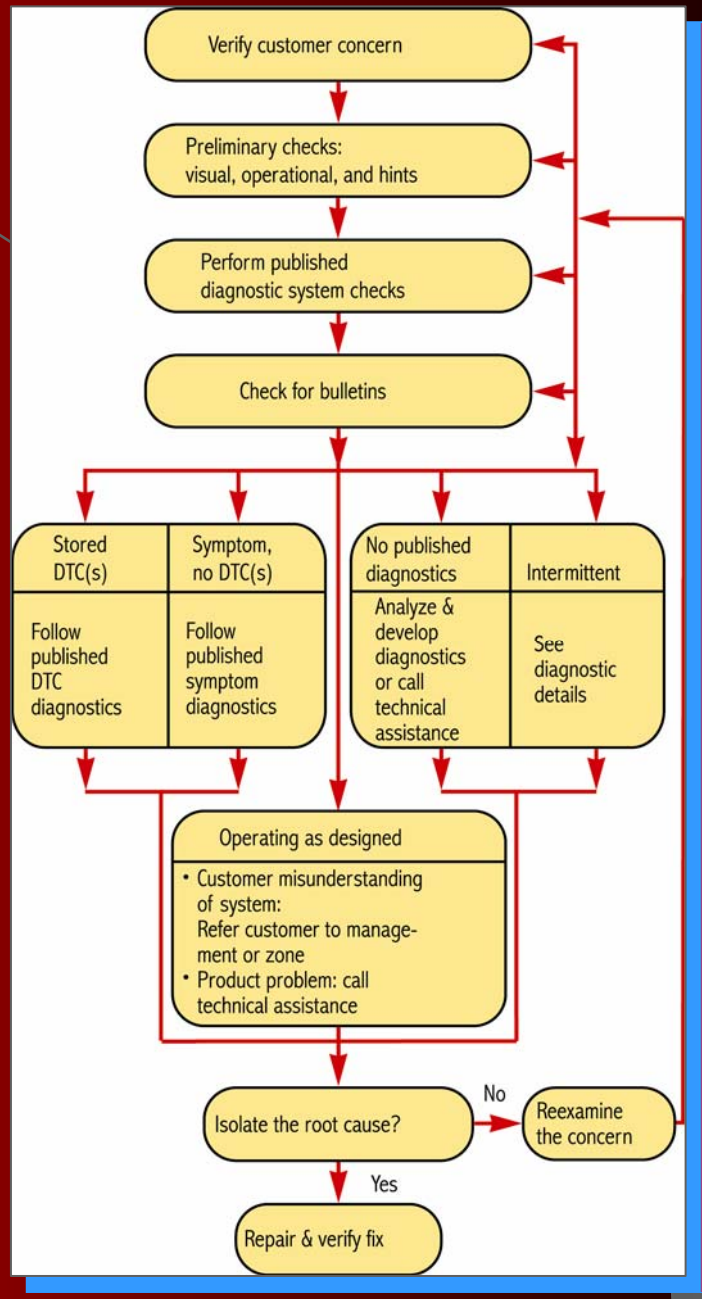
Strategy-Based Diagnostics



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1. Also called a multimeter, a DVOM is commonly used to check the condition of numerous electrical, engine-related components.
2. An DYNAMOMETER is used to measure the power output and performance of an engine.

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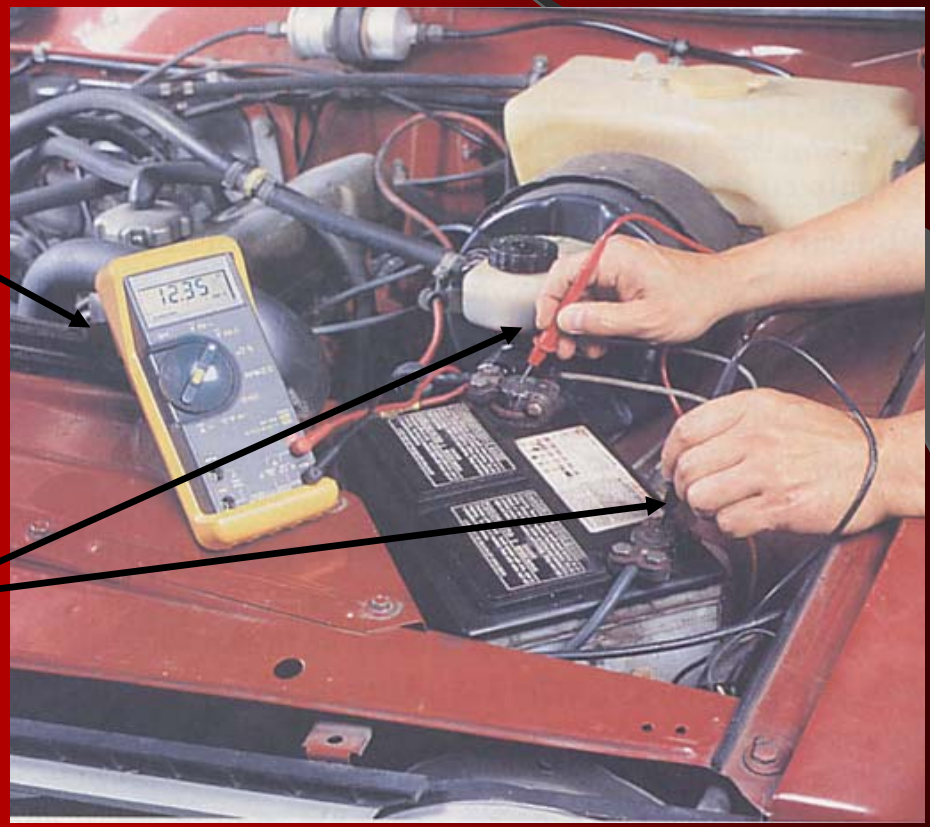
Digital Volt/Ohmmeter

Test Leads



Using a DVOM to Diagnosis an Electrical System Problem

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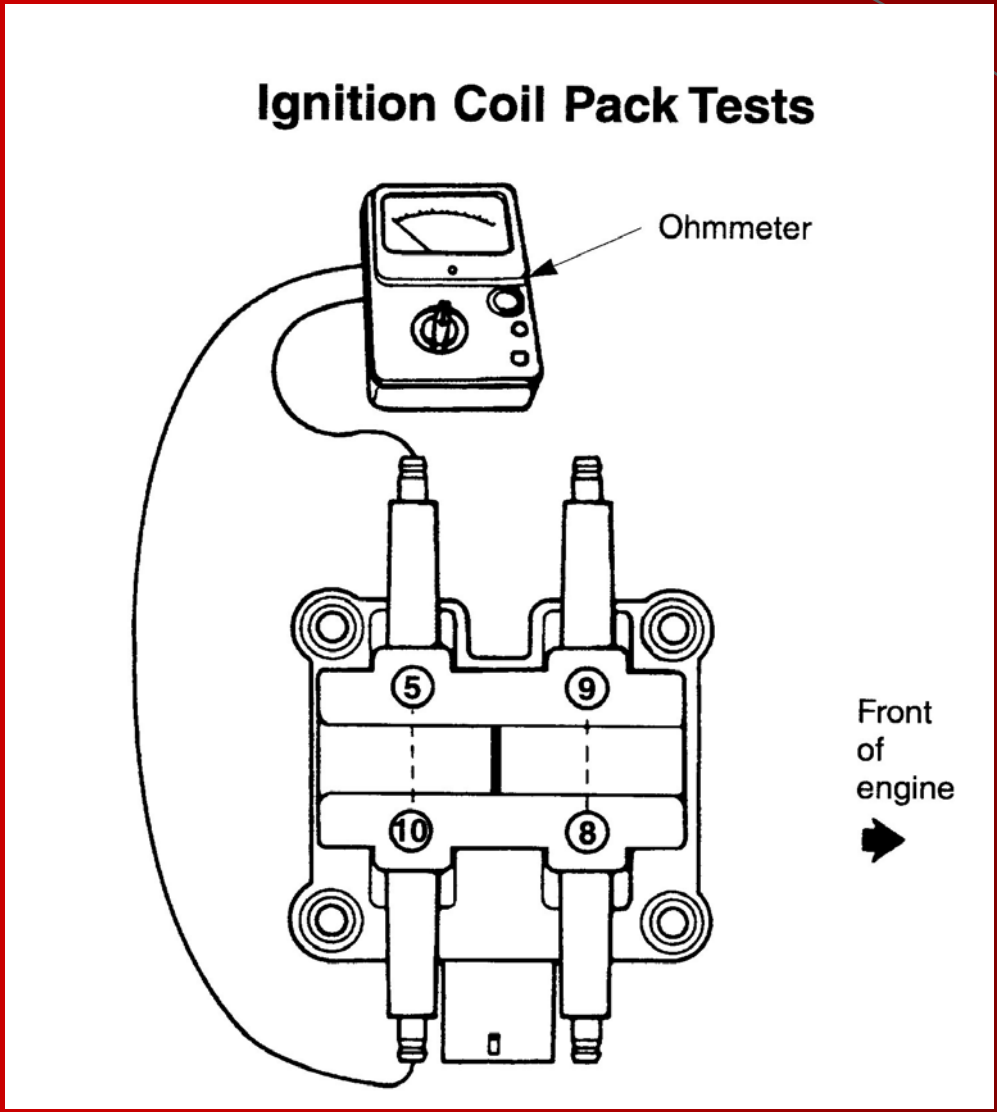

A General Guideline is: This Reading Should Usually be Between *500 to 1500 OHMS*

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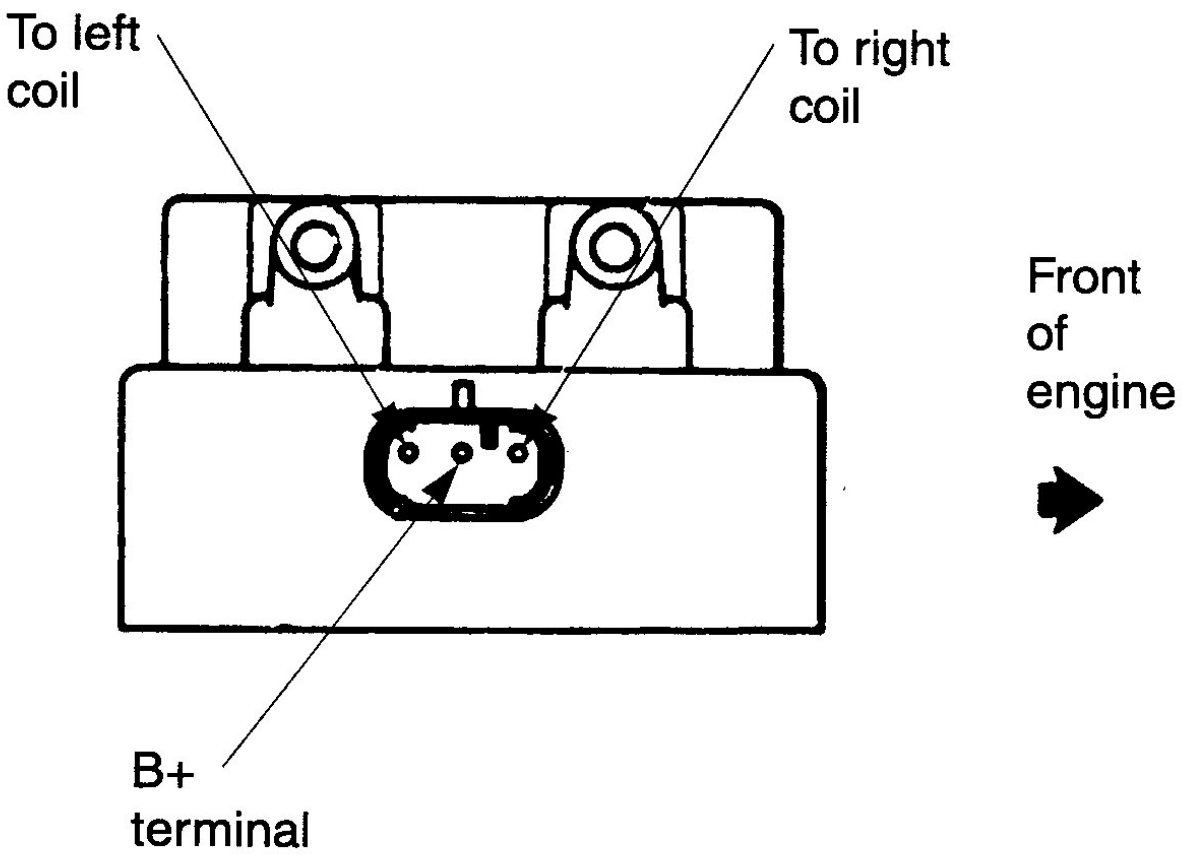

To check primary resistance, connect ohmmeter between B+ terminal and the pin corresponding to the coil in question.

A General Guideline is: This Reading Should Usually be *Less Than 1 OHM.*

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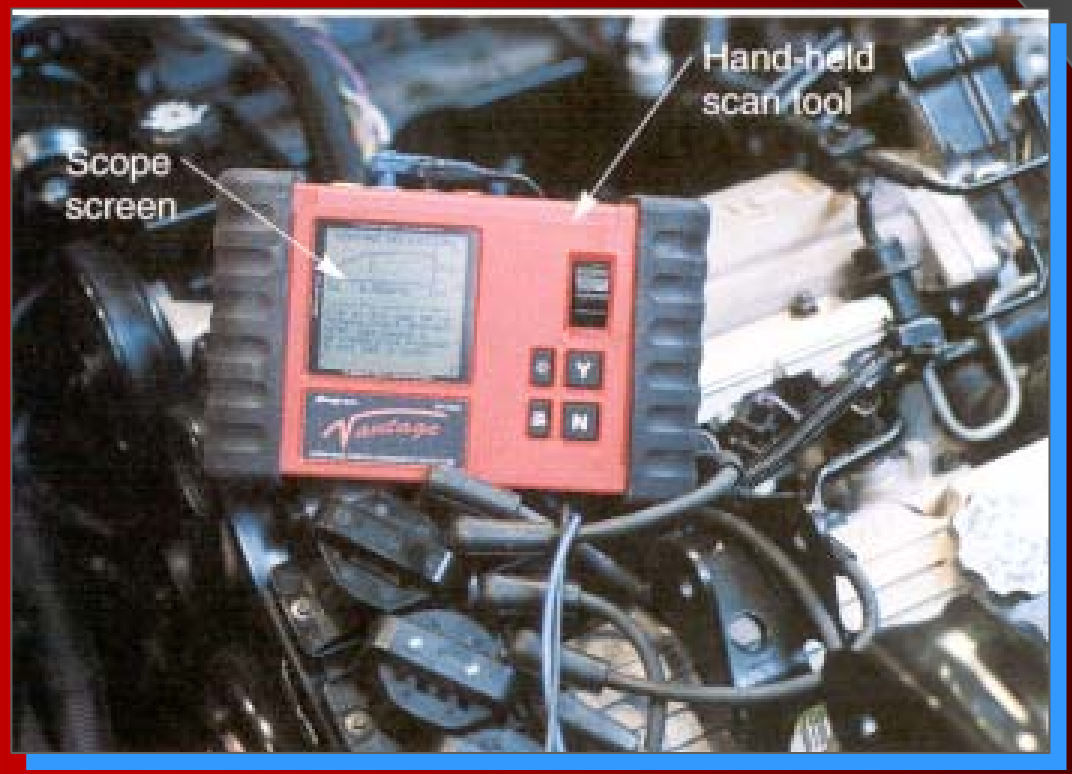
3. An OSCILLOSCOPE displays voltages in relation to time.
4. A CYLINDER POWER BALANCE TESTER will determine if a cylinder is firing properly and producing power

Oscilloscope

- Displays voltages in relation to time
- Produces a line on a cathode ray tube or liquid crystal screen



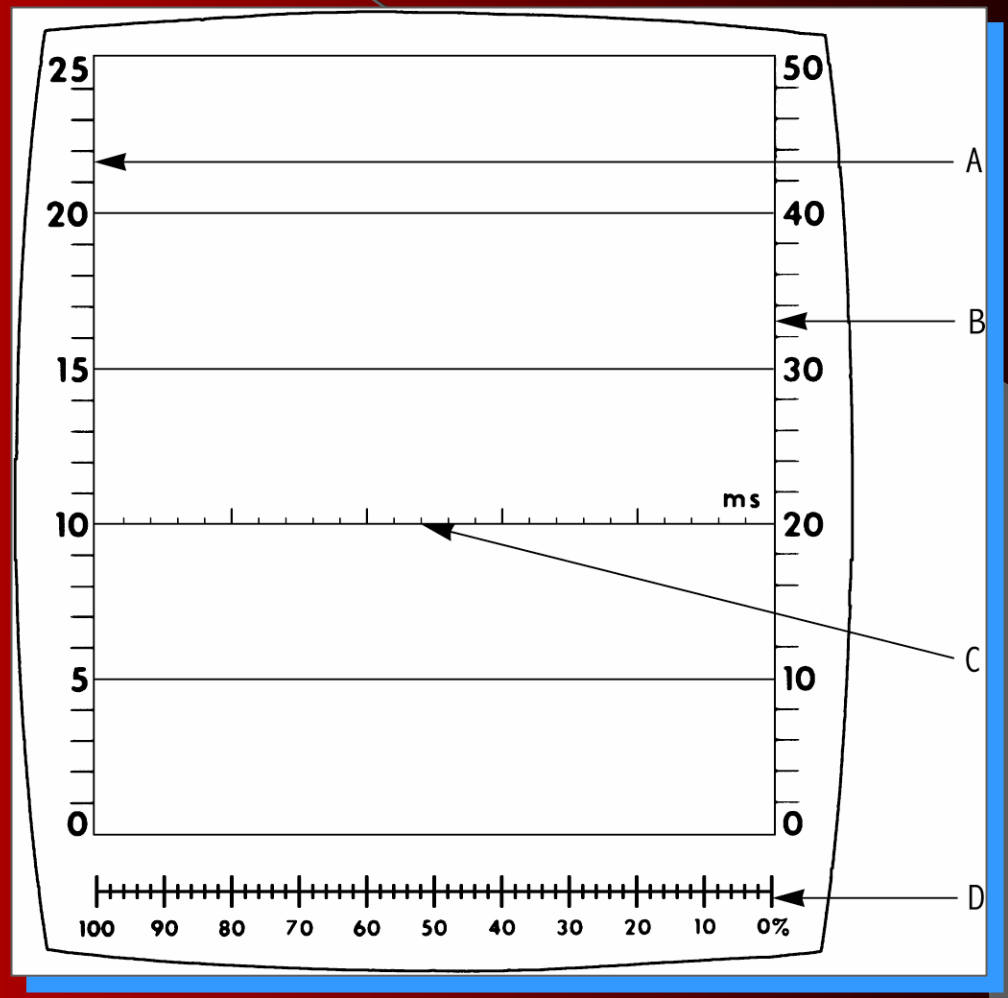
Oscilloscope Screen

A. 25,000 volt scale

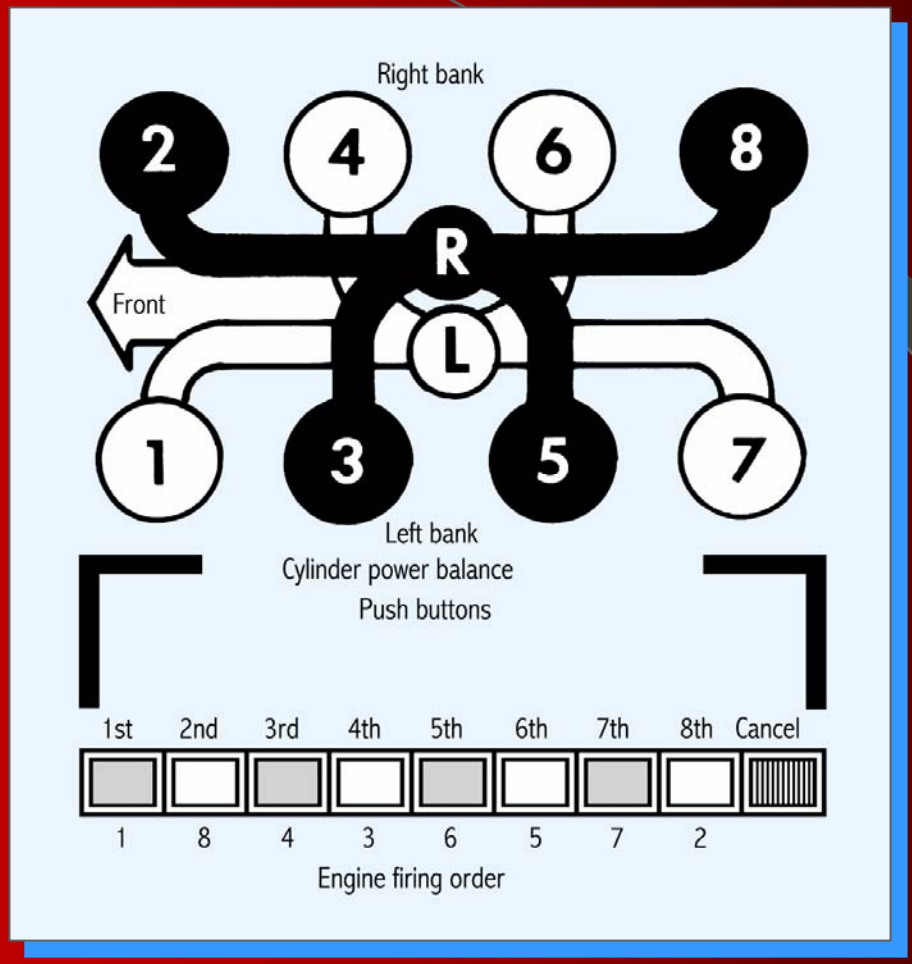
B. 50,000 volt scale

C. Time scale milliseconds

D. Time scale degrees



Cylinder Balance Test



Each analyzer button will short and disable one cylinder

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5. A VACCUM PUMP is capable of producing a supply vacuum for operating and testing vacuum devices.
6. An EXHAUST GAS ANALYZER measures the chemical content and amount of pollution in the vehicle's exhaust.

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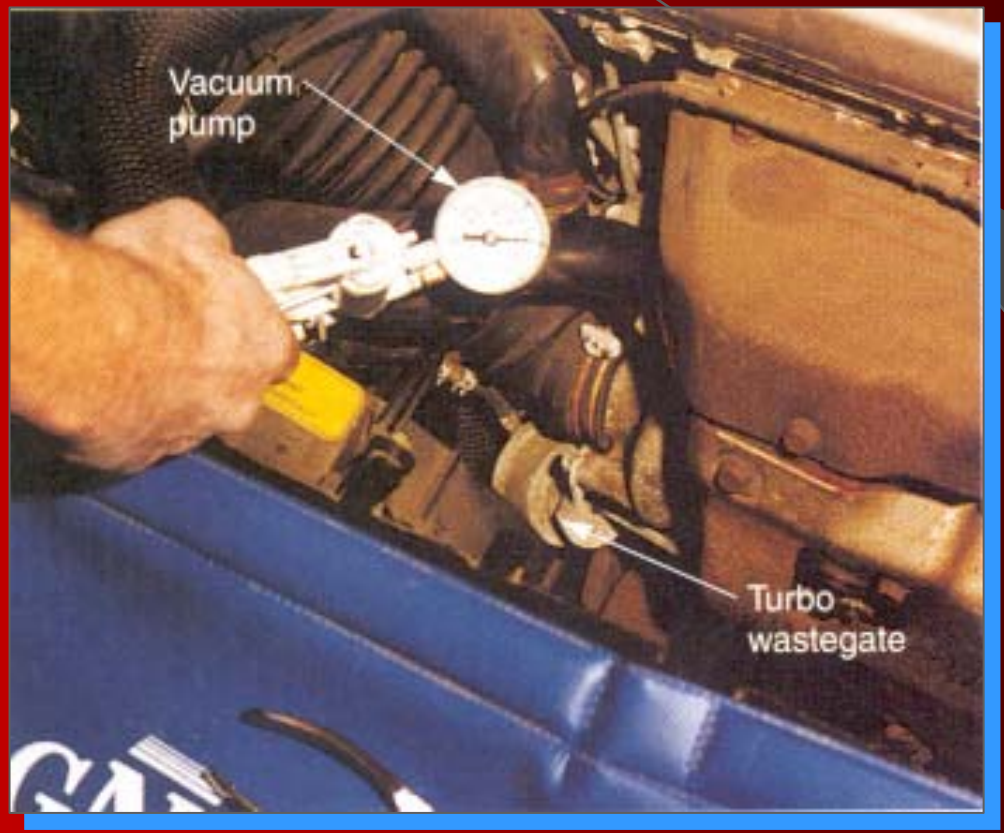
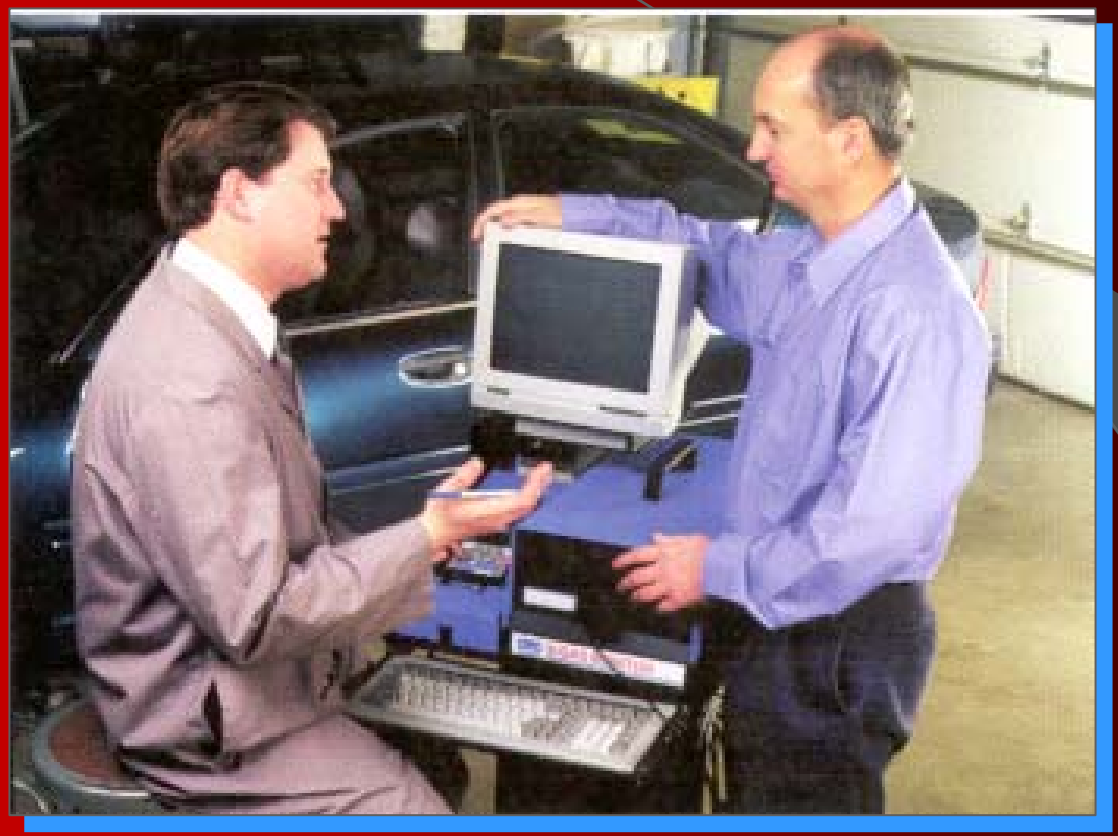
Hand Vacuum Pump



Used to check vacuum-actuated devices and vacuum diaphragms

Dynamometer



Using a five-gas analyzer with a dynamometer

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7. A SCAN TOOL is incorporated into analyzers for retrieving trouble codes and circuit operating values.
8. A VACUUM GAUGE measures negative air pressure produced by the engine, fuel pump, vacuum pump, and other components.

Using a Scanner

Vacuum Gauge Diagnosis

Normal engine reading

Vacuum gauge should have reading of 18-22 inches of vacuum. The needle should remain steady.

Burned or leaky valves

Burned valve will cause pointer to drop every time burned valve opens.

Weak valve springs

Vacuum will be normal at idle but pointer will fluctuate excessively at higher speeds.

Worn valve guides

If pointer fluctuates excessively at idle but steadies at higher speeds, valves may be worn allowing air to upset fuel mixture.

Choked muffler

Vacuum will slowly drop to zero when engine speed is high.

Intake manifold air leak

If pointer is down 3 to 9 inches from normal at idle, throttle valve is not closing or intake gaskets are leaking.

Carburetor or fuel injection problem

A poor air-fuel mixture at idle can cause needle to slowly drift back and forth.

Sticking valves

A sticking valve will cause pointer to drop intermittently.

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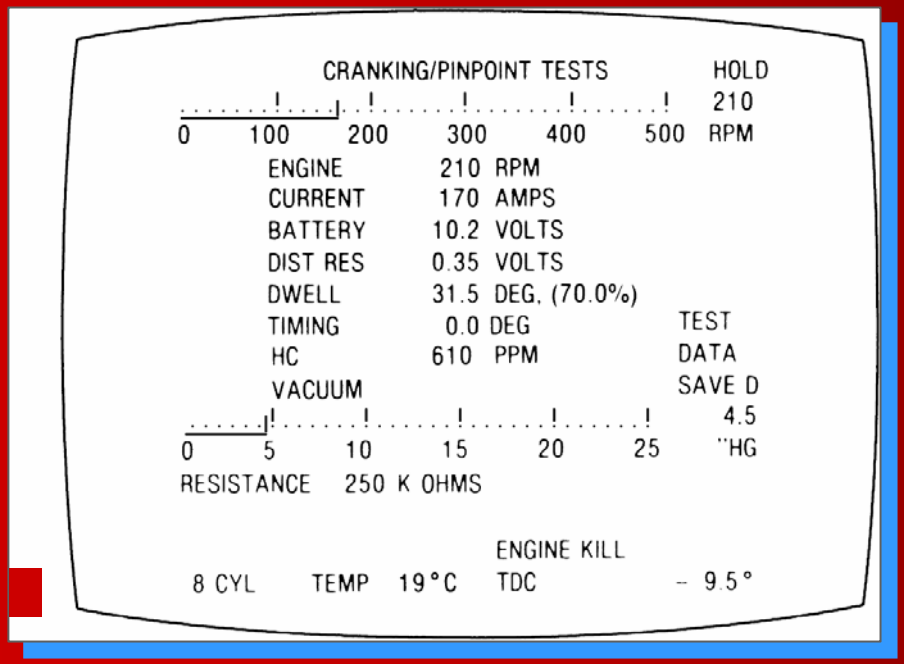
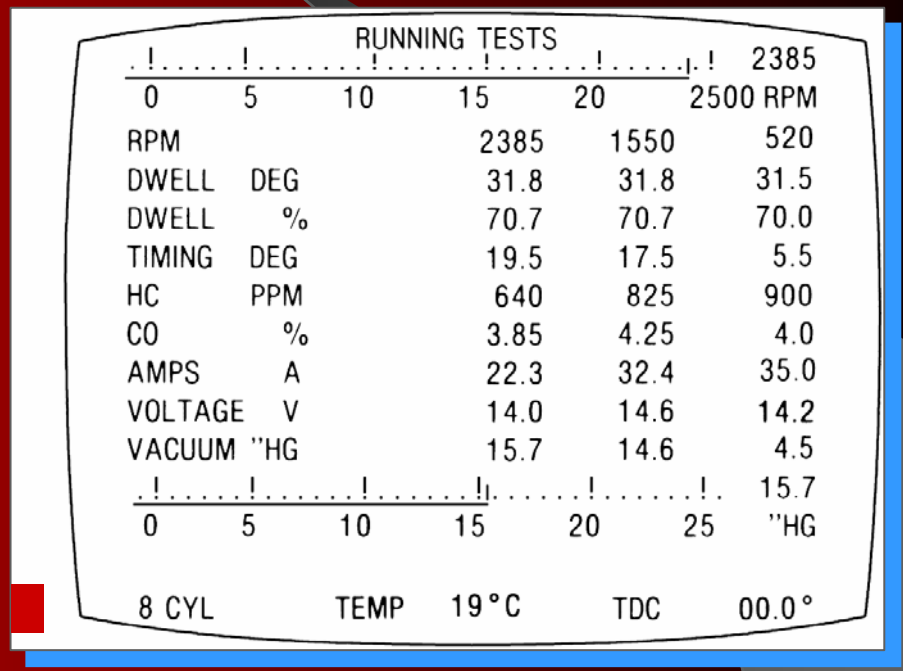
9. A DWELL METER will detect point misadjustment and other problems.
10. When adjusting fuel injection or ignition timing, a TACHOMETER is used to measure engine speed in rpm.

Analyzer Digital Display



Cranking tests



Running tests

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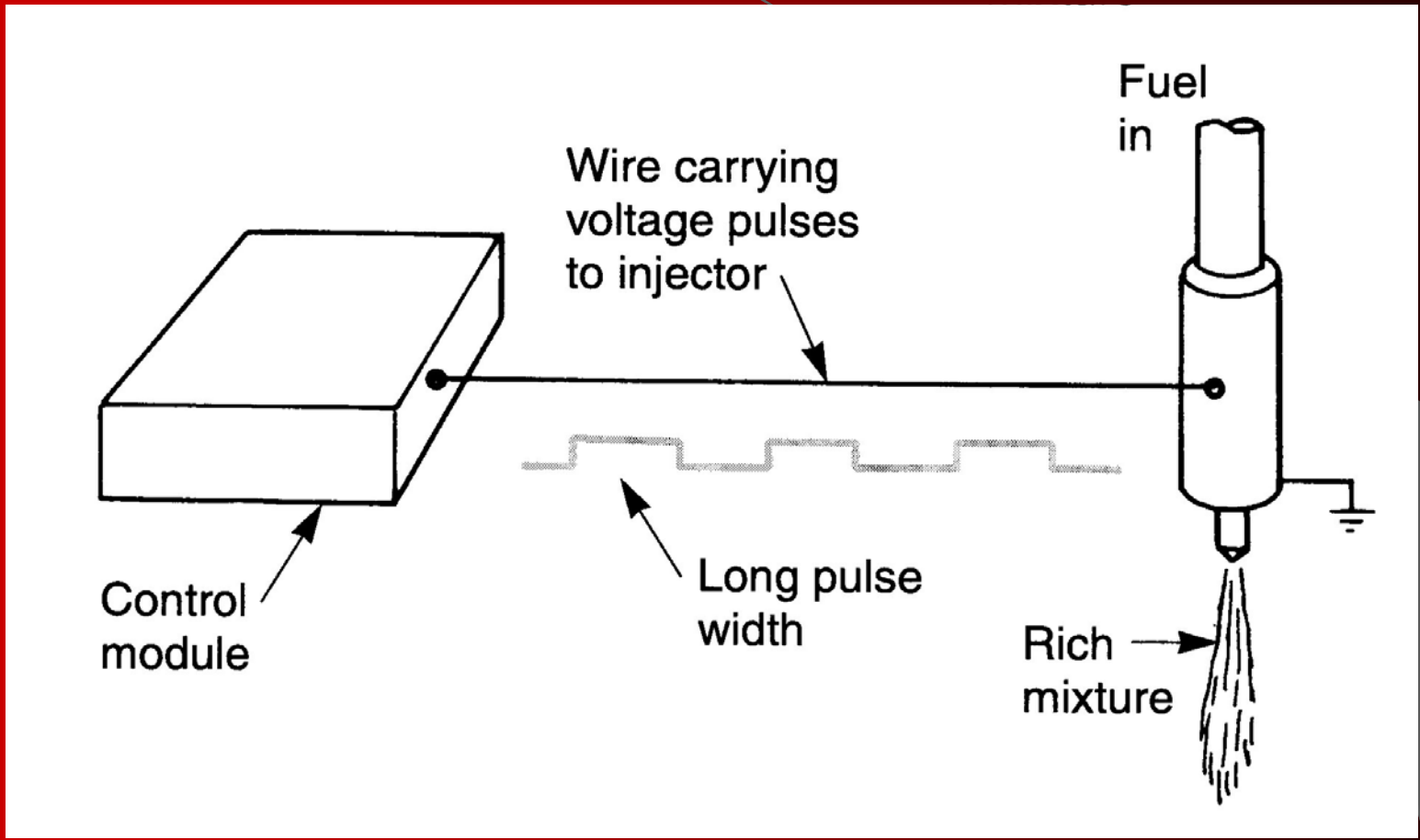

Long Pulse Width = Rich Fuel Mixture

What Causes a “Rich” Mixture?

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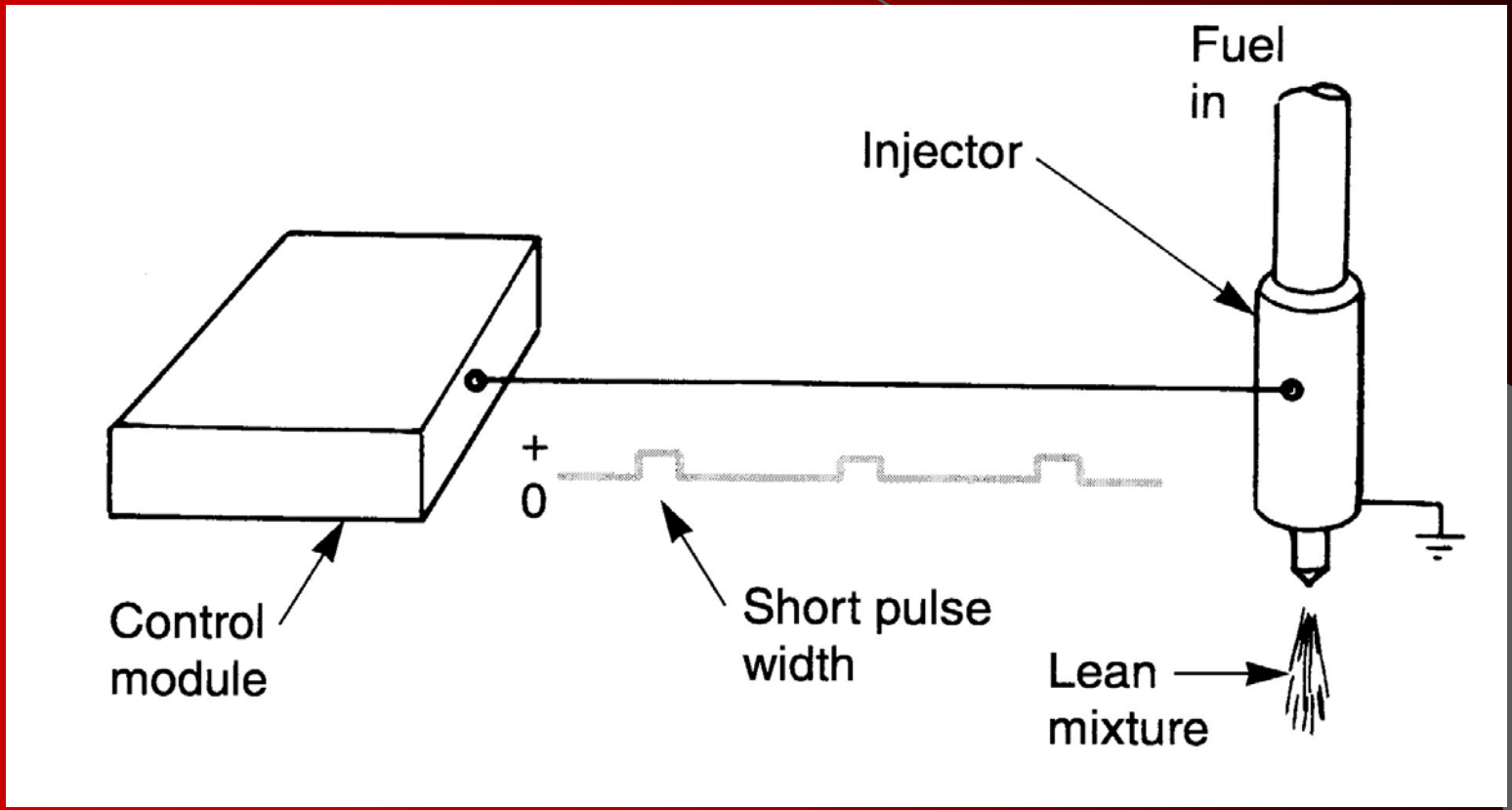

Short Pulse Width = Lean Fuel Mixture

What Causes a “Lean” Mixture?

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