

**TM 9-4910-749-10**

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**TECHNICAL MANUAL**

**OPERATOR'S MANUAL**

**FOR**

**TEST SET, TACHOMETER DWELL  
(NSN 4910-00-788-8549)**

**McGRAW COMMERCIAL EQUIPMENT COMPANY, INC.**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY  
MARCH 1984**



## SAFETY RULES FOR AUTOMOTIVE MAINTENANCE

### SAFETY EQUIPMENT

**FIRE EXTINGUISHER.** Never work on your car without having a suitable fire extinguisher handy. A 5-lb, or larger CO<sub>2</sub> or dry-chemical unit specified for gasoline/chemical/electrical fires is recommended.

**Fireproof Container.** Rags and flammable liquids should be stored only in fireproof, closed metal containers. A gasoline soaked rag should be allowed to dry thoroughly outdoors before being discarded.

**Safety Goggles.** We recommend wearing safety goggles when working on your car to protect your eyes from battery acid, gasoline and dust and dirt flying off moving engine parts.

### WARNINGS

Never look directly into the carburetor throat while the engine is cranking or running as sudden backfire can cause burns.

### LOOSE CLOTHING AND LONG HAIR (MOVING PARTS)

Be very careful not to get your hands, hair or clothes near any moving parts such as fan blades, belts and pulleys or throttle and transmission linkages. Never wear neckties or loose clothing when working on your car.

**JEWELRY** Never wear wrist watches, rings or other jewelry when working on your car. You'll avoid the possibility of catching on moving parts or causing an electrical short circuit which could shock or burn you.

### VENTILATION

Always work on your car in a well ventilated area. Never run the engine in a closed garage without venting the exhaust outside.

### SETTING THE BRAKE

Make sure that your car is in *park* or *neutral* and that the *parking brake* is firmly set.

### NOTE

Some vehicles have an automatic release on the parking brake when the engine is started. This must be disconnected when any testing is to be done in DRIVE.

### HOT SURFACES

Avoid contact with hot surfaces such as exhaust manifolds and pipes, mufflers (catalysts), the radiator and hoses. Never remove the radiator cap while the engine is hot, as escaping coolant under pressure may seriously burn you.

### SMOKING AND OPEN FLAMES

Never smoke while working on your car. Gasoline vapor is highly flammable, and the gas formed in a charging battery is explosive.

### BATTERY

Do not lay tools or equipment on the battery. Accidentally grounding the "HOT" battery terminal can shock and burn you and can damage wiring, the battery and your tools and testers.

Be careful of contact with battery acid. It can burn holes in your clothing and burn your skin or eyes.

### HIGH VOLTAGE

High voltage-30,000-50,000 volts--is present in the ignition coil, distributor cap, ignition wires and spark plugs. When handling ignition wires while the engine is running, use insulated pliers to avoid a shock. While not lethal, a shock may cause you to jerk involuntarily and hurt yourself.

Technical Manual

No. 9-4910-749-10

H E A D Q U A R T E R S  
DEPARTMENT OF THE ARMY  
Washington, DC, 12 March 1984

OPERATOR'S MANUAL  
FOR  
TEST SET, TACHOMETER DWELL  
(NSN 4910-00-788-8549)  
MC GRAW COMMERCIAL EQUIPMENT COMPANY, INC.

REPORTING OF ERRORS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, US Army Armament Munitions and Chemical Command, ATTN: DRSMC-MAS, Rock Island, IL 61299. A reply will be furnished directly to you.

NOTE

This manual is published for the purpose of identifying an authorized commercial manual for the use of the personnel to whom this equipment is issued.

Manufactured By: McGraw Commercial Equipment Company, Inc.  
7200 E. Fifteen Mile Road  
Sterling Heights, Michigan 48077

Procured under Contract No. DAA09-82-C-0843

Federal Supply Code For Manufacturers (FSCM): 8R076

NOTE

Manufacturer classifications. This publication contains the Operation of McGraw Part Number 3001019, Tach Dwell. No provisions have been made to repair this model.

This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

\*This manual supersedes TM 9-4910-749-10, 20 October 1983.



**SECTION I - INTRODUCTION**

**1-1. GENERAL INFORMATION**

a. The Inductive Dwell/Tach is used to test and adjust dwell, idle speed and idle mixture. It is also used to test the mechanical wear of the distributor, the PCV system and the condition of the breaker-points and the air-filter.

b. The Inductive Dwell/Tach will work on any 4, 6, or 8 cylinder, 4 cycle, negative or positive ground engines.

**1-2. ZERO ADJUST**

The pointer on the meter should rest on 0 whenever the leads are disconnected from the engine. The zero adjust lever is in the front. To zero the meter, move the zero adjust lever to the right or left until the pointer lines up on 0.

**CAUTION**

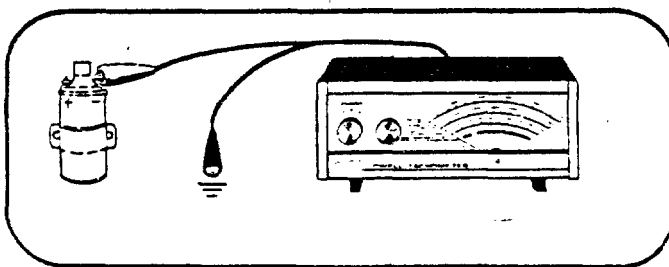
Read and observe the Safety Rules and Warnings for Automotive Maintenance in the front of this manual BEFORE PROCEEDING.

**SECTION II - OPERATION**

**1-3. BASIC TEST CONNECTIONS**

a. Turn the CYLINDER selector to the appropriate position for your engine.

b. Connect the RED test clip to the negative (-) terminal of the coil and connect the BLACK test clip to the engine ground (See Figure 1).



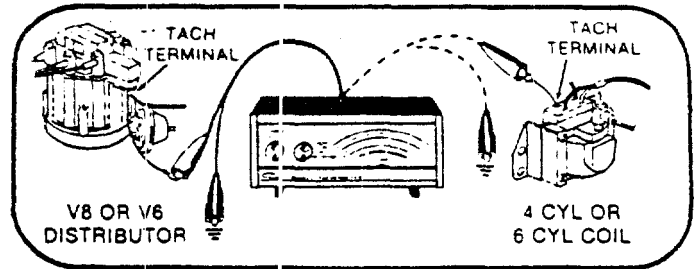
**FIGURE 1 - BASIC TEST CONNECTIONS**

**NOTE**

(1) The negative (-) terminal of the coil on FORD vehicles is marked DEC.

(2) On GENERAL MOTORS vehicles using the High Energy ignition (HEI) system, instead of connecting the RED test clip to the negative (-) terminal of the coil, connect the RED test clip to the tach terminal using the HEI terminal adapter clip provided with the tester. The tach terminal is located on the distributor for V8 and V6 engines while it is located on the coil for 4 cylinder or L6 engines (See Figure 2).

(3) On vehicles with a POSITIVE GROUND electrical system, connect the BLACK test clip to the negative (-) terminal of the coil and the RED test clip to the engine ground.



**FIGURE 2 - HEI IGNITION SYSTEMS**

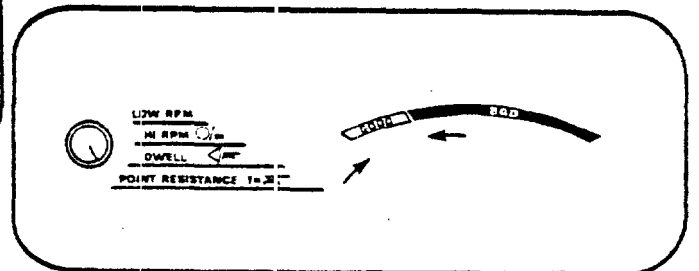
**1-4. POINT RESISTANCE TEST**

Perform this test if you have hard starting, inaccurate timing, a rough running engine and poor fuel economy which can be caused by burned points.

a. Turn the test selector to the POINT RESISTANCE position (See Figure 3).

b. Turn the cylinder selector to the 4 cylinder position.

c. Turn the vehicles IGNITION SWITCH to the ON position.



**FIGURE 3 - TEST SELECTOR AT POINT RESISTANCE POSITION**

**RESULTS:** Good-Points are in good condition  
 Bad-Points are bad. Replace.

**NOTE**

If the meter reads in the bad range, the points may be open. Momentarily crank the engine (without starting) and re-check.

**1-5. DWELL TEST**

a. If the point gap is not properly adjusted, the meter will show:

(1) Low Dwell, which can be the cause of poor ignition performance.

(2) High Dwell, which can cause excessive burning of the breaker points.

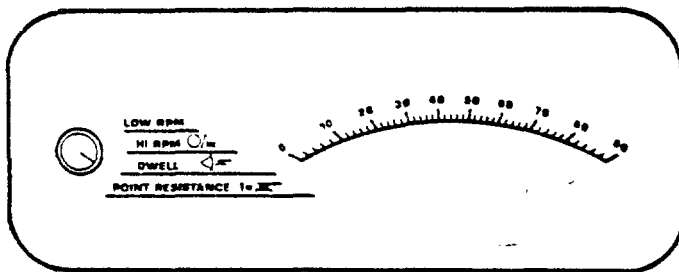
b. See your vehicle manual for the correct dwell for your vehicle.

c. To perform the dwell test:

(1) Turn the test selector to the DWELL position (See Figure 4).

(2) Turn the cylinder selector to the appropriate position for your engine.

(3) Start engine, let idle while observing the meter.



**FIGURE 4 - TEST SELECTOR AT DWELL POSITION**

**NOTE**

If your distributor is equipped with dual points, refer to your vehicle manual for proper testing and adjustment instructions.

**RESULTS:** Low-Point gap too wide. Reset.  
 Normal-Point gap properly adjusted.  
 High-Point gap too small. Reset.

**1-6. DISTRIBUTOR-MECHANICAL WEAR TEST**

a. Excessive distributor mechanical wear causes inaccurate timing and abnormal spark advance, resulting in poor engine performance.

b. To perform the Mechanical Wear Test for Distributor:

(1) Turn the test selector to the DWELL position (See Figure 4).

(2) Briefly increase engine RPM to approximately 1500, while observing the meter and note the change in dwell from the value at idle.

**NOTE**

Some distributors have off-center pivoting breaker-plates which will cause dwell changes in excess of 3°. This is normal for this type of distributor. See your vehicle manual.

**RESULTS:** Change within 3°-Normal  
 Change more than 3°-Worn out distributor, cam, or bushings. Replace or repair as needed.

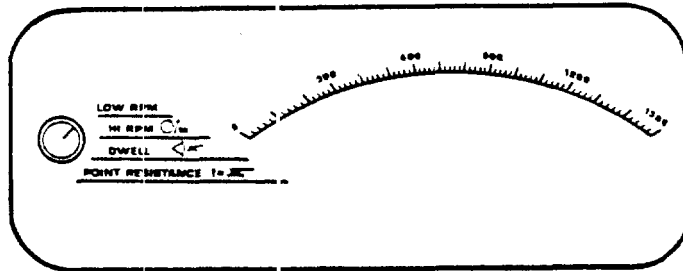
**1-7. RPM/IDLE SPEED TEST**

a. High idle speed causes excessive brake wear, while low idle speed causes engine stalling and roughness. Refer to your vehicle manual for correct idle speed.

b. To perform the idle speed test do the following:

(1) Turn the test selector switch to the LOW RPM position (See Figure 5).

(2) On automatic transmission vehicles, place shift selector in the correct position as specified by the auto manufacturers.



**FIGURE 5 - IDLE SPEED/IDLE MIXTURE BALANCE TESTS**

**WARNING**

Make sure that the parking brake is set

(3) Observe the LOW RPM scale (0-1500 RPM).

**RESULTS:** Too high-Speed adjusted too fast  
Adjust idle speed screw.  
Normal-Speed correctly adjusted.  
Too Low-Speed adjusted too slow.  
Adjust idle speed screw.

**1-8. IDLE MIXTURE BALANCE TEST****WARNING**

Place shift selector in Neutral or Park before proceeding with this test.

a. Excessive leanness or richness causes a rough operating engine, diseling or stalling at idle. A vacuum gauge can also be used to adjust the idle mixture.

b. To perform the idle mixture balance test do the following:

(1) Turn the test selector switch to LOW RPM position (See Figure 5).

(2) At normal idle speed, observe meter and turn idle mixture screw(s) slowly in (clockwise) and/or out (counter-clockwise) to achieve highest RPM and smoothest idle operation.

**RESULTS:** Too far in - Causes lean mixture and rough idle. Adjust.  
Normal-Runs smoothly. No adjustment needed.  
Too far out - Causes rich mixture, rough idle, and poor fuel economy. Adjust.

(3) After idle mixture is adjusted, readjust idle speed.

**NOTE**

On many late model emission-controlled vehicles, limiter caps have been installed to prevent overrich idle mixtures. Refer to specific recommendations of manufacturer.

**1-9. PCV TEST**

a. A defective PCV permits crankcase vapors to escape to the atmosphere. This increases air pollution, and causes rough idling.

b. To perform the PCV test do the following:

(1) Turn the test selector to the LOW RPM position (See Figure 5).

(2) At normal idle speed, pull out the PCV hose assembly from the valve cover of the engine.

(3) Place thumb over end of PCV valve while observing meter.

**RESULTS:** Speed drops 50 RPM or more-PCV ok.  
Speed drops less than 50 RPM-PCV defective. Clean or replace the PCV valve and clean the PCV hose.

(4) Reconnect the PCV hose assembly to the valve cover of the engine.

**1-10. AIR FILTER TEST**

a. A dirty air filter causes an overrich fuel mixture resulting in poor fuel economy and loss of power.

b. To perform the air filter test do the following:

(1) Turn the test selector to LOW RPM position (See Figure 5).

(2) Remove the air filter and note the RPM reading.

(3) At normal idle speed, with the air filter in place, note the RPM reading.

**RESULTS:** Minimal RPM Change-Air Filter ok.  
Excessive RPM Change-Air Filter is dirty and restricted. Replace.

**NOTE**

For use with waterproof electrical ignition systems, you must use Adapter, Engine Electric, NSN 4910-00-356-7504 which is a component of Adapter Set, Engine, NSN 4910-00-348-7600.





By Order of the Secretary of the Army:

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BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
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1-2		3		<p>Figure 3 shows test selector set at Dwell. This should show test selector set at Point Resistance position.</p>


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## THE METRIC SYSTEM AND EQUIVALENTS

### LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches  
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches  
 1 Kilometer = 1000 Meters = 0.621 Miles

### WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1000 Grams = 2.2 Lb  
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

### LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

### SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches  
 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet  
 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

### CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches  
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

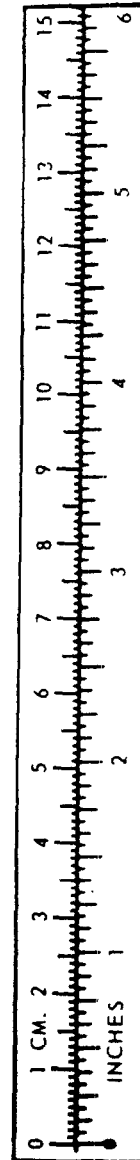
### TEMPERATURE

$5/9 (°F - 32) = °C$   
 212° Fahrenheit is equivalent to 100° Celsius  
 90° Fahrenheit is equivalent to 32° Celsius  
 32° Fahrenheit is equivalent to 0° Celsius  
 $9/5 C° + 32 = F°$

### APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches . . . . .	Centimeters . . . . .	2.540
Feet . . . . .	Meters . . . . .	0.305
Yards . . . . .	Meters . . . . .	0.914
Miles . . . . .	Kilometers . . . . .	1.609
Square Inches . . . . .	Square Centimeters . . . . .	6.451
Square Feet . . . . .	Square Meters . . . . .	0.093
Square Yards . . . . .	Square Meters . . . . .	0.836
Square Miles . . . . .	Square Kilometers . . . . .	2.590
Acres . . . . .	Square Hectometers . . . . .	0.405
Cubic Feet . . . . .	Cubic Meters . . . . .	0.028
Cubic Yards . . . . .	Cubic Meters . . . . .	0.765
Fluid Ounces . . . . .	Milliliters . . . . .	29.573
Pints . . . . .	Liters . . . . .	0.473
Quarts . . . . .	Liters . . . . .	0.946
Gallons . . . . .	Liters . . . . .	3.785
Ounces . . . . .	Grams . . . . .	28.349
Pounds . . . . .	Kilograms . . . . .	0.454
Short Tons . . . . .	Metric Tons . . . . .	0.907
Pound-Feet . . . . .	Newton-Meters . . . . .	1.356
Pounds per Square Inch . . . . .	Kilopascals . . . . .	6.895
Miles per Gallon . . . . .	Kilometers per Liter . . . . .	0.425
Miles per Hour . . . . .	Kilometers per Hour . . . . .	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters . . . . .	Inches . . . . .	0.394
Meters . . . . .	Feet . . . . .	3.280
Meters . . . . .	Yards . . . . .	1.094
Kilometers . . . . .	Miles . . . . .	0.621
Square Centimeters . . . . .	Square Inches . . . . .	0.155
Square Meters . . . . .	Square Feet . . . . .	10.764
Square Meters . . . . .	Square Yards . . . . .	1.196
Square Kilometers . . . . .	Square Miles . . . . .	0.386
Square Hectometers . . . . .	Acres . . . . .	2.471
Cubic Meters . . . . .	Cubic Feet . . . . .	35.315
Cubic Meters . . . . .	Cubic Yards . . . . .	1.308
Milliliters . . . . .	Fluid Ounces . . . . .	0.034
Liters . . . . .	Pints . . . . .	2.113
Liters . . . . .	Quarts . . . . .	1.057
Liters . . . . .	Gallons . . . . .	0.264
Grams . . . . .	Ounces . . . . .	0.035
Kilograms . . . . .	Pounds . . . . .	2.205
Metric Tons . . . . .	Short Tons . . . . .	1.102
Newton-Meters . . . . .	Pound-Feet . . . . .	0.738
Kilopascals . . . . .	Pounds per Square Inch . . . . .	0.145
Kilometers per Liter . . . . .	Miles per Gallon . . . . .	2.354
Kilometers per Hour . . . . .	Miles per Hour . . . . .	0.621



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