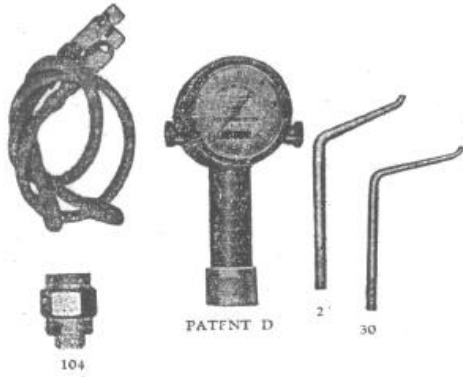


HUDSON -ESSEX



MOTOR GAUGE

THE MECHANICAL AND ELECTRICAL TESTER.

Some of its many advantages are enumerated below.

Determines exact position of piston and enables user to correctly set ignition timing.

Determines exact position of piston and enables user to correctly set valve timing.

Synchronizes ignition correctly.

Locates faulty coil or condenser.

Tests intensity of high tension coil.

Tests high tension wires for leaks when coil and condenser test satisfactory.

Tests primary circuit.

Tests high tension circuit.

INSTRUCTIONS

HUDSON-ESSEX SERVICE BULLETIN

TO ALL HUDSON-ESSEX DISTRIBUTORS AND DEALERS.

Subject: Timing and Synchronizing Valves and Ignition.

Maximum engine performance and smoothness of operation can be obtained only when ignition and valves are timed exactly right. Timing an engine by guess is sure to result in improper performance and should never be done. Proper timing is accomplished only when the controls and adjustments are so set that the spark occurs in correct and definite relation to the position of the piston.

A Timing Indicator (named the Motor Gauge) has been developed, which is adaptable to all different models. This tool may also be used to check the Coil and Condenser.

In service work today accuracy is a necessity and by the use of this tool the position of the Piston at top dead center (or any specified position before or after) may be accurately determined—thus the ignition may be set correctly and easily.

Ignition Timing is even more important than it was formerly, because of the demand of even better performance without increase in fuel consumption. Unless ignition is properly timed and synchronized there is a loss in performance and an increase in fuel consumption,, for which the carburetor is generally blamed.

A camshaft may be checked and set correctly. By the use of this tool one may also synchronize ignition correctly, locate a faulty coil, test the intensity of high tension coil, test high tension wires for leaks, locate faulty condenser.

SERVICE STATION TOOL EQUIPMENT

This tool, No. HE-291, applicable to Hudson-Essex for timing, synchronizing, coil and condenser testing complete with all attachments for 1930 models may be obtained at a net cost of \$25.00, F. O. B. Detroit.

It is highly important that each Hudson-Essex service station be in a position to accurately check and adjust the valve and ignition timing of all Hudson and Essex engines, and every service station should immediately provide themselves with a Motor Gauge Set.

That the actual workings of this tool may be readily understood, we are listing complete instructions for its use on the following pages.

GENERAL INFORMATION AND INSTRUCTIONS.

The Gauge is equipped with an adjustable spark gap, which is graduated in millimeters and is used in connection with ignition timing, coil and condenser testing. The tool is sturdy and reliable, yet it is a precision tool and must be handled accordingly. Care must be taken to avoid injury to any part of the indicator during installation. Handle it carefully and keep it lubricated. Do not distort it or keep it with other tools unless adequately protected. Always test the Gauge for free movement.

Breaker points should always be cleaned and adjusted before timing the ignition, because changing the width of the gap afterward would upset the timing.

Clean the electrodes and adjust the gaps of all spark plugs after timing.

USING THE MOTOR GAUGE TO SET IGNITION TIMING.

1. Remove all spark plugs and see that piston is below top dead center.
 2. Place rod through adapter and screw brass collar and pilot on rod, hand tight. Pass rod through the spark plug hole, then screw the threaded portion of adapter into the cylinder head tightly.
 3. Screw gauge onto the adapter by turning knurled coupling, moving gauge so that it will face user. The dial indicator is calibrated in .001 (one thousandth) of an inch, and the maximum movement of the gauge is .600, and care should be taken that too much reading does not appear on gauge, otherwise any further movement would damage instrument. This adjustment is made with adjustable brass pilot.
 4. Rotate crankshaft with starting crank until piston is ascending the compression stroke, which will be indicated by the escape of compression through the hole in the adapter. Continue to rotate crankshaft very slowly until the gauge reaches its highest point, indicating that the piston is at top dead center. Move dial of indicator until hand points to zero.
 5. Obtain proper settings for engine being timed, set spark control in retarded or advanced position, move dial of indicator to left the number of graduations on dial, to correspond with thousandths of an inch ignition timing, as shown on chart. Should ignition timing occur after top dead center, turn crank handle slowly until hand reaches the zero point. When ignition timing is before top dead center, the user may also ascertain top dead center, move dial to left number of graduations to correspond with thousandth of an inch ignition timing ahead of top dead center, make a complete revolution and when coming up on compression stroke, stop at zero, which will be the point at which the spark should occur. In all cases move dial to left to indicate proper point of spark occurrence.
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6. After piston is at its proper location, attach terminal wires to the brass terminals on sides of Motor Gauge, grounding one of them to engine. Remove high tension wire from center of coil, and place other Motor Gauge wire in coil connection. Open adjustable gap of Motor Gauge about three millimeters by turning right hand adjusting screw. Turn on ignition switch. Remove distributor head, loosen ignition housing and see that rotor of distributor is exactly in line with spark plug wire leading to number one cylinder or that cylinder being timed. Move distributor housing in direction of rotation until flash appears in indicator. Then lock ignition housing in place. Care must be taken not to move points beyond opening position.

7. After the proper setting is accomplished, turn the engine a few times by hand, re-check ignition breaker opening in relation to piston position to make sure that you have not made an error.

SYNCHRONIZING IGNITION.

To check synchronization of ignition four lobe cam, eight cylinder engines, follow instructions under heading ignition timing and set ignition as specified, ascertain order of fire and set ignition on the next cylinder in order of fire, the same as was done on number one, the cylinder used for timing, it being necessary to remove the gauge and adapter to the next cylinder of the firing order to set adjustable points.

The use of one set of points on eight cylinder cars had a tendency to let go or cut out at high speed. The points did not remain closed long enough to energize the coil. This brought about a double set of points with the use of four lobe cam, and the points now are closed twice the period as before. With this system one set is kept open while the other set operates, one set taking care of center four cylinders, the other set controlling 1, 2, 7, and 8. One set of points are fixed, the other adjustable. Both of these points should be so set that the spark occurs in correct and definite relation to the position of the piston. This adjustment is known as synchronizing.

USING THE MOTOR GAUGE FOR VALVE TIMING.

1. Remove valve plate cover and set No. 1 intake valve tappet to the proper clearance for checking, see chart on last page.

2. Insert gauge with adapter and rod as described in paragraphs 1, 2, 3, 4, and 5 under heading "Ignition Timing". Bring piston to top dead center and move dial of indicator until hand points to zero. Then move dial to the left, the number of thousandths of an inch intake valve opens after top dead center. Tap starting crank handle until hand of indicator points to zero. At this setting the intake should just be leaving the seat. It is important, when checking valve openings to have the piston at the end of exhaust stroke. as at this time, the intake valve is ready to operate. Should gauge indicate a difference of .040 or more than correct settings, timing chain or gear has jumped one or more teeth. When replacing a chain or gear the foregoing instructions may be followed:

USING MOTOR GAUGE FOR TESTING COIL AND CONDENSER.

Note: Gauge should not be in spark plug hole for this operation. Should be held in hand.

1. See that battery has enough capacity to turn engine over.
 2. Adjust breaker point gaps exact, while the breaker lever is at the high point of the cam.
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SERVICE STATION TOOL EQUIPMENT

3. See that breaker point spring is of proper tension, and breaker arm works free.
4. Remove high tension, wire from coil and connect to one terminal of gauge, and other terminal of gauge connect to high tension terminal of coil.
5. Start engine, and adjust right hand electrode of gauge until the spark gap between the points observed in the window of the indicator is five millimeters as read on the scale.

If spark cuts out between zero and five millimeters, it would indicate that coil is weak.

If a clean blue flame is produced increase adjustable spark gap to seven millimeters and if a steady spark is obtained at all speeds of engine, condition of circuit is satisfactory.

If spark cuts out between five and seven millimeters this would indicate that condenser is weak.

Should the flame appear red, this would indicate dirty points or weak condenser.

In order to determine the intensity of spark plug circuit, disconnect wire from plug and pass circuit through head of Motor Gauge by use of the wires supplied for such purpose.



= CHART =

1930 Models	Adap	Rod	Stroke	Ignition Timing	Before or After T.D.C.	Spark, Re-tard, Advance or Set	Valve Timing Intake Valve Opens	Before or After T.D.C.	Firing Order	Valve Clearance		Breaker Contact Separation
										Intake	Ex-haust	
HUDSON	104	3		.017"	B.T.C.	Set	.071	A.T.C.	16258374	.010	.010	.020
ESSEX	104	2		T.D.C	_____	Set	.071	A.T.C.	153624	.010	.010	.020