TERRAPLANE HUDSON

Service

TECHNICAL INFORMATION
PARTS—ACCESSORIES
MERCHANDISING

Issue 5 APRIL, 1935 1935 Series

You Are "Writing" Advertisements Every Day

Maybe you never sat down to write a piece of advertising "copy." Just the same, you are helping to create Hudson and Terraplane advertisements every day.

Not the kind of "ads" that people read in magazines or see on billboards, or that the mailman brings. But walking, living, breathing, ***talking*** advertisements.

And there has never yet been a printed automobile sales message that could, for high voltage selling effect, equal the word-of-mouth advertising of a thoroughly satisfied owner.

Consequently, you, in your everyday contacts with Hudson and Terraplane owners, are "writing" the most important advertisements in this company's entire sales program.

When you send away an owner who is satisfied with the treatment he has received and with a service job that "stays put," you are adding another talking advertisement to the tens of thousands that are helping every day to build greater public interest in Hudson-built cars and to create greater opportunities for every man in every branch of the Hudson organization.

The factory can build the best cars any automobile manufacturer produces, and the Sales Department can do a fine job of presenting them to the public. But on you men in the Service Department rests the final and vital responsibility of putting behind these cars the most powerful sales force ever discovered—the influence of satisfied owners, talking to their acquaintances and friends—creating an ever-widening circle of good will.

W. A. JAMES
Advertising Manager

PRINTED IN U. S. A.

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(Issues Nos. 1, 2, 3 and 4—1935 Series)

An Announcement

During the next six or seven months we will have to contend with the bug and insect nuisance. Your owners will drive in with the windshield spattered with bugs, often so thick as to obscure vision. You should be prepared to offer a courtesy service by quickly removing the insects and cleaning the windshield.

Hudson Instant Glass Cleaner is a chemical product which dissolves the bugs and cleans all dirt and film from the windshield, leaving it clear and sparkling. Spray it on and wipe the windshield with a dry cloth, and the job is done.

Hudson Instant Glass Cleaner is packed in 12-oz. bottles, equipped with sprayer for retail sale, and in gallon jugs for your own use. A special spray dispenser, pocket size, is available for the use of your service salesman. Use it as a courtesy service, and retail sales will follow as a natural result.

See bulletin for part number and resale schedules.

Vacuum Clutch Cables

Breakage of Vacuum Clutch Cables is due to binding of the clevis pin in the slot of the yoke on the cable. When this condition exists and the clutch is operated manually, the cable is pushed forward and kinked sharply, eventually breaking the strands of the cable.

Kinking of the cable can be prevented by placing a piece of $\frac{5}{8}$" copper tubing over the cable. The tube should be $3\frac{1}{2}$" long for 1934 and 1935 Terraplanes and Hudson 6's, while 5" length should be used on 1934 and 1935 Hudson 8's.

Remove the clevis pin from the cable yoke and remove the yoke and lock nuts from the cable end. Put the tube on the cable and run a nut onto the cable end and tighten against the tube to prevent rattling. Lock the first nut with a jam nut, then reinstall the yoke and yoke lock nuts.

The tube will prevent kinking of the cable, but will swivel sufficiently on the taper of the piston rod to permit alignment.

SELLING Service

When a car is sold and put into use, it is an absolute certainty that it will require service. Some of this service will be paid for by the owner while some will be "gratis." It is almost as certain that the Service Department of the dealer who sold the car will handle *all* the gratis service. The portion of the work paid for by the owner which is done by the dealer's Service Department depends almost entirely on the proficiency of that department.

Although the matter of getting the "paid" work is important, let's give some thought to the "gratis" work, particularly that which should be "paid work," and its cost to the dealer.

The necessity of doing gratis work can often be traced back to the sale of the new car. Even before the car is purchased a "millstone" is often hung around the Service Department's neck through promises or, if not promises, a selling story which practically says "all you have to do is give her gas, water and oil with an occasional puff of air in the tires and she'll run forever."

There never was and probably never will be an automobile or any other mechanism built that will not require some attention, so why not admit it, or better, make use of the fact when selling? For instance, "Mr. Prospect, this Terraplane has more alloy steel than any car, other than the Hudson, selling even for several times its price. Alloy steels are tougher and can be hardened on the wearing surfaces to give much longer life than ordinary steels.

"This Terraplane is further protected against abnormal wear by Hudson's 20 years of experience in balancing. Vibration exerts tremendously high pressures on engine, clutch, transmission and axle parts. Hudson was first to recognize this and started balancing all crankshafts in 1915. Since that time, their art of balancing has been developed to include almost every moving part. You can notice the difference particularly in the unusual quietness at high speeds where vibration usually does its greatest damage.

"This car is engineered and built to give you better service than any car you can buy, and we have a modern service station ready to help you keep this car in perfect operating condition.

"I'd like to show you our Service and Parts Department and have you meet Mr. Johnson, our Service Manager. You know, Mr. Prospect, I've seen a lot of men who called themselves mechanics, but when it comes to Terraplanes and Hudsons this man Johnson can't be beat."

When a prospect is given to understand that he is buying a fine mechanism and is brought to realize that it will require some attention and *your* Service Department is equipped and able to take care of it, he will seek the advice of *your* Service Dpeartment when in doubt about what his car needs. If he has been left to understand that the car requires no attention, he feels that he has a right to ask *you* to pay for fixing what might only be an imaginary trouble.

Some owners ask for "gratis" work when they themselves know that the conditions are their own responsibility. They hope the Service Manager will not be smart enough to detect their abuse or neglect of the car. It is not always possible to detect such efforts, but every precaution should be taken, as work given under these conditions does not improve your standing with the owner. He knows he should have paid, so to him the Service Manager didn't know his job. The owner will probably look for someone else to do the next work for him either because he is afraid the Service Manager may find him out or because he doesn't think the Service Manager knows enough to service the car correctly. There are, of course, other owners who when "winning" one free job will always expect it and will keep coming in for gratis work regardless of the age of the car.

It would be time well spent if every dealer and his Service Manager went over owner records together to determine the value to them of the gratis service they have given their owners. In most cases it would be found that gratis work given outside of the warranty or unjustified gratis work within the warranty had failed to hold either that owner's service business or future car business.

Gratis work, even though claim is accepted by the factory, cannot show a profit and may entail a loss to the dealer. In addition, maintenance handled on a gratis basis robs the shop of a rightful revenue and the attendant profit.

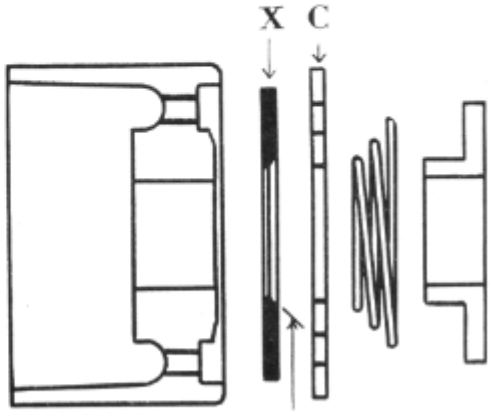
Cars are sold on a contract which specifies very definitely what the purchaser is to get for his money. He has no more right to expect considerations over and above the contract than the dealer has to ask the owner for an additional payment or an adjustment to offset extra work that was required on the used car that was traded in.

It's good business to live up to your contracts. It's poor business to give away your Service Revenue.

M. S. BALD, Service Department

Hudson Shock Absorbers

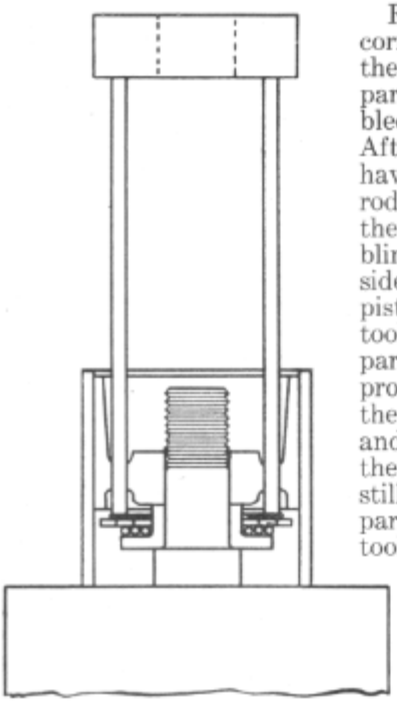
The working cylinder of the Hudson Shock Absorber is now a press fit on the top guide assembly. The assembly fork formerly used to hold the valve spring, valve plate and valve disc on the sleeve of the valve bushing cannot be used, as the entire assembly of the valve and piston must now be made within the working cylinder.



Note position of chamfer

Figure 1

A new tool is now included in the Shock Absorber tool kit No. J-745 and its use is illustrated in Figure 2.



Use of Pronged Assembly Tool eliminates removal of Cylinder Tube when making valve change

Figure 2

Figure 1 shows the correct order in which the piston and valve parts should be assembled on the piston rod. After the valve parts have been put on the rod, put the piston on the prongs of the assembling tool with the valve side down, hold the piston at the top of the tool and press the valve parts down with the prongs of the tool. Let the piston drop in place and tighten down with the piston rod nut while still holding the valve parts in place with the tool.

The Shock Absorber tool kit also includes a thimble to place over the end of the piston rod to prevent damage to the oil seal in the upper bushing when assembling it, and a measuring filler cup.

The kit should be ordered direct from Hinckley-Myers Co., Jackson, Mich. The price is $3.00.

Filling Shock Absorbers

The direct acting shock absorber should be completely drained by pumping at least 15 strokes after the filler plug has been removed and the correct quantity of Hudson Shock Absorber Fluid added every 5000 miles.

The quantities required for the various units are as follows:

Model	Front	Rear
1934 Terraplane	3½ oz.	4½ oz.
1935 Terraplane	3½ oz.	4½ oz.
1934 Hudson 8—116″ W.B.	4¾ oz.	5 oz.
1934 Hudson 8—123″ W.B.	4¾ oz.	5¼ oz.
1935 Hudson 6	4¾ oz.	5¼ oz.
1935 Hudson 8 (all models)	4¾ oz.	5¼ oz.

The quantity and quality of fluid is important. Follow the above recommendations, using only Hudson Shock Absorber Fluid.

Owner Contacts Through Governors

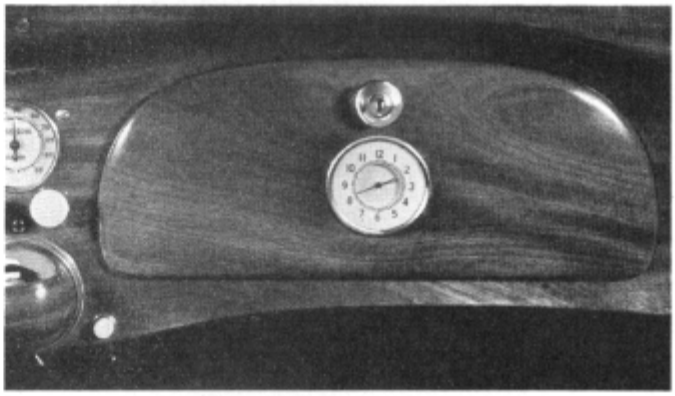
Letters received from owners indicate that some dealers are not taking advantage of the Carburetor Governor as a means of insuring the return of the new car owner to the Service Department.

If, at the time of delivery, the owner is impressed with the fact that your record of receival of the car shows the governor was in place and the seal unbroken, as likewise does your delivery sheet to him and that the record of its removal will be made when the car is brought in for the 500 mile inspection, there will be little doubt of his returning.

Practically every owner when buying a new car determines to take good care of it. He will want your records to show that he has. Get him in for the inspection and removal of the governor, even if you have to make a personal call to do so.

Show the owners you are interested in them and their cars, and keep them coming back. It's easier to get them into the habit of coming in when the car is new than it is to get them out of the habit of not coming in a little later.

When the governor is removed from cars equipped with Vacuum Clutch, the throttle rod should be lengthened two turns to maintain the proper position in the slot in the lower end of the throttle bellcrank.



Electric Clocks

You have been advised that electric clocks are now available for installation in glove box doors in the field. Perhaps a few instructions for assembling will be helpful.

A cardboard hanger, bearing a reproduction of the clock face, is being attached to the glove box door lock of all cars now leaving the factory. This hanger serves as a templet for laying out the hole in the door. Make sure the hanger is correctly located, then prick-punch at the exact center of the point where the hands converge. Remove templet and, using the circular saw furnished by Hinckley-Myers under their Part No. J-737, cut a hole 2.421″ in diameter.

Remove the two cover plate screws from the back of the clock and insert the clock through the hole. Attach wiring harness, making certain that connections are tight and terminals properly located so they will not touch the cover when installed. Replace cover screws and connect wiring harness to car circuit in accordance with instructions on tag attached to clock.

Servicing Steering Gears on Hudson Custom Models

There seems to be a general impression that it is necessary to remove the Steering Gears of the roller tooth type from the car (used on 1934—123″ W. B.

Hudsons and 1935 Hudson custom models) in order to adjust the mesh of the rollers with the worm. This is not necessary.

By removing the starter motor, the pitman arm and the steering gear housing rear cover plate, the cross shaft and roller assembly can be removed. This makes it possible to remove shims from the cross shaft in order to get a closer adjustment.

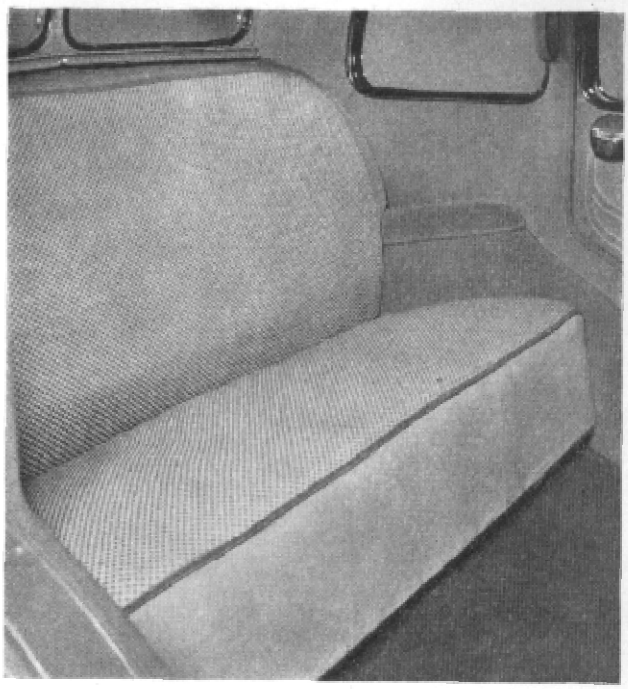
Custom Seat Covers

Numerous inquiries from the field have induced us to offer a complete line of custom made seat covers for the 1934 and 1935 Hudson and Terraplane.

The inclusion of this line of custom seat covers should not in any way affect your sales of the regular San-Toy covers (illustrated at right) which we have been merchandising for the past year, but will put you in a position to meet the demand for the type of cover which completely shields all trim inside the car.

While only the highest grade material is used, you will find prices in line with competition.

Prices and resale schedules are being furnished by bulletin with a book of samples.



Engine Tune-up

In the discussion in the March issue of TERRAPLANE-HUDSON SERVICE, we stated that 3½ volts was necessary for ignition and covered the various tests necessary to insure this voltage at the starting motor terminal under all conditions. Let us now start from this point and proceed through the low tension ignition circuit.

Low Tension Ignition Circuit

In addition to the battery, the ground strap and the starting motor cable, the low tension circuit consists of the wires leading from the starting motor terminal to the ignition switch to the coil, from the coil to the distributor resistor, the distributor breaker arm, the stationary breaker point and the grounded return circuit to the battery.

Voltages at Distributor

If the circuit from the starting motor to the distributor is good, the voltage at the distributor arm, with the breaker points open, should be the same as at the starting motor terminal. Any voltage reading at the breaker arm with the points closed indicates a poor breaker point contact or poor return circuit.

Distributor Ground Circuit

If the return circuit from the starting motor has been proven as explained (see "Voltage Drop in Starting Motor Return Circuit," page 63, March issue TERRAPLANE-HUDSON SERVICE) the only other points to be considered are the parts through which the circuit is completed from the distributor stationary point to the engine. (1) See that the breaker arm plate makes a good electrical contact with the distributor housing. (2) Check the distributor clamp to see that it makes good contact with the distributor and that the clamp screw has a clean seat on the distributor adjusting plate.

On Hudson Super-Six models with the semi-automatic spark advance, where the distributor is not clamped rigidly but is movable, a poor contact may develop. A short ground wire from the distributor housing direct to the engine will insure a proper contact.

Distributor Breaker Points

The distributor breaker points must make a good electrical contact, must resist mechanical wear, pounding and electrical corrosion (burning and pitting). Further, their mounting must be proper to hold them true and the weight of the arm and spring tension must insure accurate following of the cam.

Poor material naturally will not stand up when it is considered that the points open and close 9000 times per mile in a Terraplane or Hudson Six distributor and 12000 times per mile in a Hudson Eight.

A poorly designed breaker arm either will not be rigid, permitting the points to get out of line and give poor contact, or will be heavy and have high inertia so that it will not follow the distributor cam truly at high speeds; it will flutter and cause poor contact. This same effect will be obtained with a weak spring. The importance of correct weight and spring tension is easily seen when it is known that at 80 m.p.h. the points of a Terraplane or Hudson Six distributor open and close at the rate of 12000 times per minute and on a Hudson Eight at 90 miles m.p.h. their rate is 18500 times per minute.

Genuine Auto Lite parts are the best answer to your distributor point troubles. A new set of points, however, will be of little value unless they are properly installed and the other parts of the system are in good condition.

Breaker Point Alignment

When new points are installed they should be tested to be sure they meet squarely. If full contact is not made, the current flow in the primary circuit will be reduced and the coil output will be correspondingly low. Properly aligned points also reduce arcing and decrease wear.

A thin piece of white paper and a piece of pencil carbon make a good indicator. When placed between the points while the distributor is running, a full circle should be imprinted on the paper; a partial circle indicates only partial contact, and the arm should be bent with a bending bar designed especially for the purpose.

Running-in New Points

When new points are installed it is recommended that the distributor cam be wiped dry and the distributor run for about 15 minutes. This will "seat" the breaker arm fiber block so that the points can be adjusted to the specified clearance with fair assurance that the adjustment will be held. After this run-in the cam should be lubricated with a light coating of vaseline and the points accurately adjusted. Excess lubricant on the cam will be thrown on the points and burnt, causing poor contact. Avoid excessive lubrication.

Dressing Points

The points can be cleaned with a stone if the surfaces are not pitted. A "pit and tit" condition can be removed only by grinding. This requires a special fixture to insure flat parallel faces*. Where such fixtures are not available, replacement of pitted points is recommended.

Breaker Point Adjustment

The point at which the breaker points open is usually understood to be important, but the point at which they close is equally important so far as the electrical system itself is concerned. The relation of the point of opening to the point of closing depends upon the shape of the cam and the adjustment of the points. Since the shape of the cam cannot be changed, our only concern in service is in the adjusting of the points.

The breaker points in the distributor of a six-cylinder engine open and close six times per revolution of the distributor shaft, or once every 60°. During this period the points should be closed 31° and open 29°. This means the points are closed and current is flowing through the primary circuit for only 1/400 second for each firing of a cylinder when a Terraplane is running 80 m.p.h. The duration of the open position of the points is slightly less.

In an eight-cylinder engine the points open and close eight times per revolution of the distributor shaft, or once every 45°. The points should be closed 29° and open 16°. This means that the points are closed and current is flowing through the primary circuit for only 1/600 second for each firing of a cylinder in a Hudson Eight traveling at 90 m.p.h. The points are open only 1/1200 second. The relation between the time which the points are open and closed is affected by the amount of point opening. As the points are opened wider the length of time or angle during which the points are open is increased and the time they are closed is decreased. Proper duration of opening and closing is obtained by adjusting the point to exactly .020″ maximum opening.

Effect on Spark Strength

During the 1/600 second that the points are closed the current flowing in the primary circuit must build up a magnetic field around the secondary winding of the ignition coil. This field strength is not built up instantaneously but requires a small fraction of a second. If, therefore, the time the points are closed is reduced by a wide point opening adjustment, the field strength will not have time to build up and a weak spark at the spark plug will result.

The high voltage necessary to cause a spark at the spark plug does not occur while the magnetic field is being built up but rather when it collapses, due to the primary current being cut off by the breaker points opening. The collapse of a magnetic field also is not instantaneous but is much more rapid than its building; therefore, produces a higher voltage.

If the points are adjusted for too little opening, there will not be sufficient time for the magnetic field to collapse completely, resulting in pitted breaker points and short life of the coil.

There are very accurate fixtures available for setting distributor points to give the correct relation between the time of opening and closing and their use is strongly recommended. If, however, the adjustment must be made by measurement of the maximum point opening, a good feeler, preferably the wire loop type, should be used and the greatest care taken to set the gap at exactly .020″.

Pitted and Burnt Points

A great deal can be learned by careful examination of the condition, color, alignment and spacing of breaker points. Practice in diagnosing troubles by contact point reading will be invaluable to mechanics in locating trouble.

In some cases, where a genuine condenser or condenser of correct capacity has not been available, substitutions are made which may not be noticeable until a decided "pit and tit" condition has developed in the points. If the substituted condenser has too little capacity for the coil, the contact points will pit with a crater on the negative contact. If the condenser capacity is too great, the positive contact point will pit. This same effect will be caused by substituting a larger or smaller coil than factory standard.

The condition can also be caused by the points being adjusted too close or too many miles of slow driving, such as encountered in taxicab service. An increase in the condenser capacity would help this condition. A car driven continuously at high speeds might require a reduction in condenser capacity to prevent pitting.

If the faces of the points are of a bluish cast or show signs of excessive heat or burning, the trouble may be caused by high voltage in the primary side of the coil (see page 64 March issue TERRAPLANE-HUDSON SERVICE for causes of high voltage) or a poor condenser. The condenser should be tested. The most common test is to compare the performance of an ignition coil using a new condenser with its performance when using the condenser being tested. A capacity test is more accurate; however, testing equipment is not generally available except in radio testing kits.

The normal appearance of the faces of the points is a frosted gray across their entire surface with no signs of pitting or burning. This condition is the result of a perfectly balanced ignition circuit, in which all of the units have exactly the right capacity and all adjustments properly made.

J-748 Contact Point Honing Fixture—Price $17.25. Order direct from Hinckley-Myers Co., Jackson, Michigan.

Ignition Coils

Two ignition coils may look identical and even show the same ability to produce a spark under some conditions but be very different in their behavior under other conditions. The coils used on Terraplanes and Hudsons are good examples. Both look alike and produce the same voltage at low distributor speed; however, each is designed to build up the magnetic field at the proper rate and collapse it within the time available with the six or the eight-cylinder distributor for which they are designed. Interchanging the coils from a Terraplane to a Hudson or vice versa will give poor ignition performance.

When occasion arises to replace a coil, use only the genuine Auto Lite Coil of the type specified.

Testing coils with equipment that is available is a simple task; however, coils sometimes show "okay" on a test and will not perform consistently on a car. This discrepancy usually is due to the coil not being brought to operating temperature through actual running or by use of a coil heat before the test is made.

High Tension Leakage

Ignition coils are sometimes replaced for failure to produce a "hot" spark, when the actual fault is leakage through the insulation of the ignition cables or the distributor cap. In other words, the voltage produced by the coil is not being delivered to the spark plug.

Ignition Cables

Nearly everyone recognizes the fact that considerable leakage can occur when the cables are cracked or greasy and dirty but there has not been very much attention paid to losses caused by an almost invisible deterioration of the cables due to corona. This is a characteristic very much like static and is visible in the form of a bluish haze around the cable when the engine is run in an extremely dark place.

This was practically negligible on the low compression engines using ignition coils with secondary voltages below 9000. With present day high compression engines such as the Terraplanes and Hudsons it is necessary to have a secondary voltage of approximately 20,000.

The direct loss of electrical energy by corona is reduced to a minimum by shielding the ignition cables in a metal conduit. The air around the cables is broken down chemically by the corona, forming ozone which is confined in the conduit and destroys the rubber insulation, causing it to become porous and inefficient as an insulator.

Cables which are not held in place but allowed to vibrate will have short life. Sharp bends in high tension cables should be avoided, as rubber under compression or tension deteriorates more rapidly when subjected to the stress of high tension current.

Tests have shown increases in car speed up to 15% by simply replacing ignition cables although the old ones showed no visible breaks in the insulation. It is advisable to replace ignition cables between 10,000 and 15,000 miles of operation.

Spark Plugs

The only purpose of a spark plug is to provide a gap for the spark to jump in the combustion chamber. The conditions under which the plug must operate, however, make its design very important.

The problem of resisting destruction from heat is not serious, except in the selection of material for the electrodes. Pressure may cause leakage between the shell and the insulator or around the electrode. Any loss that may occur at these points is not serious when measured in actual power loss or wasted fuel; however, leakage of hot gases past the porcelain greatly increases the temperature of the porcelain and causes preignition.

Spark Plug Temperature

The temperature of the lower tip of the porcelain is determined by the distance the heat must flow to get to the cooling water. The path is from the porcelain through the gasket to the shell to the cylinder head to the cooling water. This path is lengthened or shortened in designing a plug by the location of the insulator seat in the shell. If the seat is near the top of the shell, the path is long and the plug will run hot; if the seat is down in the threaded section of the shell, the path will be short and the plug will run relatively cool. Plugs are manufactured with the operating temperature of the lower end of the porcelain increasing from cold racing plugs to the hottest in steps of 40° to 50°.

Coloring of Porcelain

A plug operating at the proper temperature should show a light brown color on the bottom of the porcelain. An excessively heated plug will be dead white while a plug which operates below its proper temperature will be dark brown or black.

Selecting Plugs

The plugs supplied in Terraplanes and Hudsons are correct for general driving; however, they may be too hot for consistent high speeds in hot weather and too cold for continuous city driving in cold weather.

If one plug in an engine appears to be too cold or too hot, look at the rest of the plugs. If they are all the same, then make sure of the driving habits of the owner before changing to a hotter or colder plug. They may be dark, due to only a few miles of city driving, before coming into your shop, even though the car is used considerably at high speeds and requires the operating temperature for which the plug was designed.

Fouled Plugs

Always remember that a fouled plug does not necessarily indicate a bad plug. Insulation leakage, gasket leakage or improper point adjustments are the only conditions in the plug itself which will cause fouling.

Any condition in the electrical system which prevents proper voltage reaching the plug will cause a miss, allowing gasoline to accumulate and burn on the plug when firing does occur. A rich mixture even if only during the warm-up will cause gasoline fouling, as will lost compression.

These conditions cause a "gas" fouling which gives a dull black appearance to the lower end of the porcelain. Oil fouling usually makes a shiny black deposit on the bottom of the porcelain.

Be sure conditions which may cause gas or oil fouling are corrected before installing a hotter plug. A hot plug will not correct these conditions but simply increase the time before fouling occurs again.

Spark plugs may be overheated by a lean gasoline mixture. Be sure the carburetor is adjusted correctly before installing a cooler plug to overcome a "dead white" porcelain condition. Lean mixtures also burn valves and pistons and take the tension out of piston rings.

Fuels often make as much as 50° variation in the temperature of the lower end of the porcelain. Cheap gasoline is not always economical to use.

Spark Plug Gap

Spark plug gaps should be set at .025". An increase to .028" may give better low speed operation and starting while .022" is more desirable for high speeds. Knowledge of the car owner's driving habits alone should be the guide in deviating from the standard setting of .025" gap.

Great care should be exercised in setting spark plug gaps. It is difficult to get a setting within .001" of that desired. In many cases a careful setting is destroyed in installing the plug. The 14 mm. plug does not require as much force to tighten it into the cylinder head as do the larger plugs. Too much pressure exerted on the wrench will distort the spark plug shell and change the gap.

Before installing a plug be sure the seat around the plug port in the cylinder head is absolutely clean. Dirt may cause a leak and also will increase the operating temperature of the plug. Use only folded copper gaskets. The use of a copper asbestos gasket as used a few years ago will increase the operating temperature of the plug.

Ignition Timing

Ignition timing is important both for fuel economy and performance. Slow timing will give slow acceleration and high fuel consumption. As the timing is advanced, fuel consumption is reduced and acceleration is increased up to a certain point when the acceleration again begins to decrease. The fuel consumption, however, will continue to decrease with further increase of the spark advance. A point is finally reached when fuel knock prevents use of the full throttle and therefore reduces acceleration so greatly that such settings are impractical. Such fast settings are also apt to cause backfiring when cranking the engine and cause damages to the starting motor.

The best setting for general servicing is the point of maximum acceleration, as the gain in fuel economy produced by further advance is not sufficient to offset the loss in performance.

The following results of tests that have been made on a 1935 Terraplane De Luxe Coach and a 1935 Hudson Special Sedan show the effect of timing on acceleration and fuel economy.

(1) Terraplane De Luxe Coach—6 to 1 head—Octane rating of fuel, 69. Mileage at time of test 2480-passenger load, 320 pounds.

Ignition Timing	High Gear Acceleration 10 to 40 m. p. h.	Gasoline m. p. h. 30 m. p. h.
D. C.	11 2/5 sec.	22
½" B. D. C.	9 4/5 sec.	23
1" B. D. C.	10 1/5 sec.	23½

(2) Hudson Special Sedan—6 to 1 head—Octane rating of fuel, 69. Mileage at time of test, 7162. Passenger load, 320 pounds.

Ignition Timing	High Gear Acceleration 10 to 40 m. p. h.	Gasoline m. p. h. 30 m. p. h.
D. C.	10 2/5 sec.	18
½" B. D. C.	9 3/5 sec.	20
1" B. D. C.	9 4/5 sec.	21

Octane Rating

On these cars with the gasoline that was being used ½" B. D. C. is undoubtedly the best setting. As the octane rating is increased, the timing can also be increased with a gain in both acceleration and fuel economy. One inch before dead center is about the maximum advance to be recommended regardless of the fuel used. If a fuel of lower octane rating is used, a later spark must be used to prevent fuel knock. This results in loss of acceleration as well as increased fuel consumption.

The ignition timing with 7 to 1 compression cylinder heads using ethylized fuel should be the same as a 6 to 1 head using a standard fuel. If an engine equipped with a high compression head is operated on a fuel which requires the timing to be set later than ½" before dead center to prevent fuel knock, gasoline consumption is increased and very little advantage in performance is obtained from the higher compression.

Automatic Advance

Since the ignition is set either with the engine "dead" or by use of a synchroscope* with the engine at idle speed (the latter method is recommended since the setting is accurate under running conditions), the actual advance depends upon the characteristics of the automatic advance mechanism.

The distributors on Terraplane and Hudson Engines have the ignition completely retarded until a speed of 800 r. p. m. plus is reached. The timing is then advanced uniformly until a speed of 4000 r. p. m. is reached. The Terraplane automatic advance is 29° and the Hudson 35°. A change either in the point at which the automatic starts to advance or the rate at which the timing is advanced as the speed increases will require a different initial ignition timing.

A stretch spring in the advance mechanism will permit the advance to begin at a lower engine r. p. m. and will give a greater advance for any given r. p. m. unless it is compensated for by a retarded initial setting. If the advance mechanism is not operating freely, it may not advance at all, giving a very late timing above the engine idling speed, or it may not start advancing until a high speed is reached and then advance to its maximum rapidly, giving correct timing only at idle and the higher speeds.

A sticking advance mechanism may also prevent complete retard so that the timing will have to be set late to prevent knocking at low speeds or backfiring when cranking. This will give a late timing at higher speeds, cutting down performance, increasing gasoline consumption and in extreme cases damaging the engine parts due to the excess heat caused by the late timing.

By the use of a synchroscope* the point at which advance begins can be estimated and the advance can be watched as the engine speed is increased. Particular attention should be given to the return as the engine slows down to idle to see that it comes back to the original setting.

Bench testing equipment for distributors is available and is recommended where the volume of work is sufficient, as the checking of the advance, ability of the points to follow the cam, and the duration of the open and closed positions of the points can be checked accurately while the distributor is running.

The May issue of TERRAPLANE-HUDSON SERVICE will carry another article on Engine Tune-up, dealing with mechanical conditions to be considered and carburetion.

**J-696—Synchroscope—Price $6.90 net. Order direct from Hinckley-Myers Co., Jackson, Michigan.*