How to Install and Use Prest-O-Starter

—an efficient application for the self starting of internal combustion motors

THE PREST-O-LITE CO.
General Offices and Factory
INDIANAPOLIS, :: :: INDIANA

How to Install and Use Prest-O-Starter

The Prest-O-Starter is an application for the self-starting of internal combustion motors—it eliminates "cranking."

A stroke of the starter pump placed convenient to the operator, injects into the firing chamber of a gasoline motor a predetermined measure of purified acetylene, supplied from a Prest-O-Lite tank. This, mixed with the oxygen in such chamber, forms a combustible mixture that when ignited by an electric spark at the spark plug, produces energy sufficient to cause the motor to start.

The Prest-O-Starter not only insures a positive firing charge in the cylinders, but supplies acetylene under low pressure through the intake manifold—on which the motor will operate until it draws its gas from the carburetor.

Of the various methods devised for the easy starting of gasoline motors, the acetylene self-starter is by long odds the simplest and most efficient. It needs no expert to apply it, works on any motor old or new with equal success, weighs very little, is void of troublesome levers or complication, is absolutely safe, the cost of mainteance is infinitesimal and its life is the life of the engine. We have proven by actual tests and can substantiate theoretically that self-starting with acetylene is no more injurious to the working parts or life of a motor than starting by cranking. Furthermore, acetylene will not injure in the least the valves, cylinder walls or other metals with which it may come in contact. On the contrary it causes the disintegration of carbon deposits by virtue of the action of acetone (the solvent of acetylene under the Prest-O-Lite system) a small portion of which is carried into the cylinders.

The Prest-O-Lite tank used in connection with this Starter is too well and favorably known to need special comment. You will find it on the running board of a large percentage of the automobiles you see, and the same tank that supplies the perfect bright white light for the running lights of an automobile will also, if desired, supply the gas for the self-starting of its motor.

The Prest-O-Starter spells starting from the seat. It eliminates the inconveniences, exertion and possible embarrassments attending the old time cranking—a feature which any owner and operator will not be slow to appreciate.

The purpose of this booklet is to explain in a clear, simple manner, the method of operation, proper installation and correct use of the Prest-O-Starter. Don't file this away for future reference, but study it before you begin running your engine. We have spent a great deal of time and effort in making it as complete as it could be made, and we feel positive that if you get out of it all the information we have put into it, whether novice or expert, you will never have occasion to complain of the action of your Prest-O-Starter.

THE PREST-O-LITE CO.

INSTALLATION

The Prest-O-Starter equipment consists of a starter pump, injectors, check valves, cut-out by-pass valve, automatic reducing valve, brass tubing and connectors. A packing slip accompanies each shipment, and any shortage or error should be promptly reported.

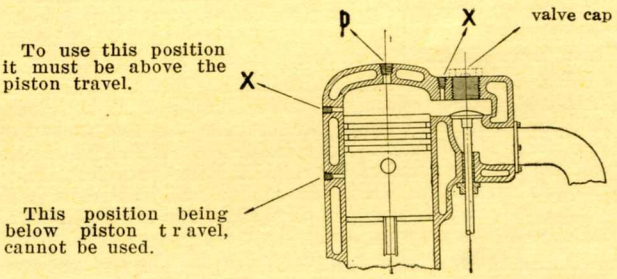
A correct installation is essential to perfect results. Your first step is the selection of a convenient location for the starter pump and the cut-out by-pass valve. This may be either on the dash, toe board or floor, preferably on the dash as this naturally lessens the distance from the pump to the injectors on the different cylinders, and this distance should be no greater than is absolutely necessary. When you have decided on the location of the pump and assured yourself that there is no obstruction on the reverse side of such location, cut the circular hole 2 13/16 inches in diameter. Remove the retaining ring and metal gasket from the pump and insert the pump in the opening, then replace the gasket and ring, drawing it up tight. Next tighten the set screw in the retaining ring to prevent ring from working loose. The cut-out by-pass valve may be placed wherever most convenient, but preferably in a direct line from the gas tank to the starter pump and in a horizontal position in order to prevent as much as possible the crossing of pipes which may in time cause leakage due to chafing. Cut the opening for this device, then insert and secure to place. Now drill a 11/32 inch hole in the inlet manifold and tap this with ⅛ inch pipe tap (before doing this it would be well to detach the carburetor in order to prevent cuttings from falling into it). Connect this opening in the manifold and the by-pass valve terminal of the cut-out by-pass valve with a piece of ¼ inch brass tubing, using a solderless elbow union at the manifold.

If your car is already equipped with a Prest-O-Lite tank, you need not disturb its location but when making your own installation place this tank where it is easy of access, and always in a horizontal position with valve uppermost. Don't put it near a muffler or other artificial heat. When using this gas tank for starting purposes only, connect the automatic reducing valve direct to the valve F on the tank. When using one tank for both starting and lighting systems, attach the hexagon ring of the two-way valve union to the valve F, you can then determine the proper manner of connecting to the two outlets in the following manner: Close the needle valve in the union tight, place a finger lightly over the small opening in each outlet, then open the tank valve slightly. The outlet at which you detect a pressure (indicating a flow of gas) connects to the automatic reducing valve. The other outlet will then lead to the lights which are to be regulated by the union valve. These outlets are also lettered on the valve union, outlet S leading to starter system and outlet L to the lights. When making these connections, be sure that the ground surface of all unions are perfectly clean and free from grit or dust. Draw unions up tight to insure against leakage, as the full pressure of the tank will be held continuously by these.

Now cut a piece of ¼ inch brass tubing the proper length to extend from the cut-out valve terminal of the cut-out by-pass valve to within a few inches of the automatic reducing valve, connecting the end at cut-out valve by means of the solderless connector, and the end at the tank by means of the short piece of rubber tubing. Next cut a piece of the same brass tubing the proper length to extend from the center terminal of the cut-out by-pass valve to the inlet connection "C" of the starter pump.

The installation of injectors will vary somewhat with the design of motor, as those on which our standard injector nipples may be used present different conditions, according to their location, thickness of metal, etc., while others require our combination spark plug and injector. On the T and L head type motors, using only one set of spark plugs, the plug is usually located in one of the valve caps while the other valve cap is either unoccupied or contains the priming cup. The latter valve cap is usually the best location for the injector. If the valve cap is unoccupied remove it from the engine, drill a 11/32 inch hole through the center and tap outside end with a ⅛ inch iron pipe size tap. Be sure that you remove all drillings from the valve cap, then return it to its proper place in the motor.

If the priming cup is located in a valve cap, or when using double ignition (with both valve caps occupied by spark plugs) and the priming cup is located in either of the openings marked X or P on this sketch, it would be



Cross section of an L head cylinder showing possible location of the injector.

best to remove the priming cup, using this opening for the injector nipple. If the priming cup is located on the side of cylinder, be sure that the opening is above the piston when at the top of its stroke, otherwise the injector will interfere with the movement of the piston, and the piston in turn interfere with the injection of gas. It is for this reason that the relief cock opening as placed on the side of some cylinders cannot be used for our purpose.

In some engines, the openings for priming cups are not drilled sufficiently large beyond the thread to permit the introduction of our injector nipple. If this condition exists in a valve cap, remove the cap from the engine and drill it the proper size. Should it be necessary to drill any openings through the cylinder wall, we suggest that it be done by a mechanic as caution must be used, not only to prevent cuttings from falling into the compression space, but in properly drilling through a possible water jacket.

Install the injector and check valves as fully explained under title of INJECTOR, page 5.

If you find that the injectors furnished by us are too long, interfering when seated with any moving parts inside the cylinder, or so short that the nipple from which the gas jet is directed does not project into the cylinder, clear of all adjoining metal, you should not try to use them, rather return them to The Prest-O-Lite Company, accompanied by sketch and information (thickness of metal, valve or piston clearance, location, etc.) that will permit our determining the proper length and we will immediately send you injectors with the nipple of proper length. These injectors may be exchanged at the home office of The Prest-O-Lite Company, Indianapolis or any of its branches, a list of which is given on the outside back cover.

If your engine has no available openings for the injector it will be necessary to use our combination spark plug and injector which is installed by simply removing the battery plugs and inserting these in their stead.

After placing the injectors properly, and mounting check valve thereon, connect check valves to the compression cylinder connections of the starter pump, by means of the small brass tubes furnished for this purpose. These connections are easily made by means of the couplings on both ends, of each tube. In order that the installation may be as neat as possible, it is best that the tubes be no longer than necessary, we consequently in the absence of information giving specific lengths, supply these with the half coupling brazed only to the one end. After cutting each tube to proper length the other half coupling can then be soldered on. Blow through all these tubes to know they are free from obstructions, before applying; be sure to attach the brazed end to the check valve on the injector as solder will not withstand the heat of the engine, AND SCREW ALL COUPLINGS TIGHT. After making these connections, bring the tubes as close together as possible and fasten them as a unit, by means of wire or tape, to reduce their vibration to a minimum.

Now test the installation for leaks. Open the valves at tank and cut-out, close the valve leading to lights, then test each connection from the tank to the starter pump with heavy soap suds. Any leakage even though slight will show in the form of bubbles. If hose connection leaks wrap it with wire. Leaks at unions and connectors can usually be stopped by screwing them real tight—if not, examine the seats, which must be clean and smooth.

The system as now installed is ready for use, and the only point left for successful operation is a careful study of the several features as follows:

STARTER PUMP.

The Starter Pump consists of a center or feed cylinder surrounded by several compression cylinders (one for each engine cylinder) the whole being enclosed in a metal body. The feed cylinder is connected by brass tubing through special fittings with a Prest-O-Lite gas tank, and at its outer end has a passage to each of the compression cylinders. The compression cylinders are connected by tubing to the injectors placed in the firing chambers of the engine.

Each cylinder has a plunger firmly fixed in the handle plate. On the out-stroke of these plungers, a vacuum is created in the compression cylinders (the passage to engine being closed by automatic check valves) while acetylene is drawn by suction into the feed cylinder, until at the end of the out-stroke, when by virtue of the vacuum this gas is drawn from the feed cylinder through the passages into the compression cylinders. On the in-stroke, the gas is forced from the compression cylinders past the check valves into the firing chambers of the motor.

After the outfit has been once started, you will find that in most cases, one or two strokes of the pump will be sufficient to start the motor, except in extremely cold weather when two or three strokes may be necessary to supply a proper mixture of gas—the number of strokes depending largely on the size of the motor.

As there is considerable resistance on both in and out strokes, it is advisable to move the plungers with some speed and decision. Where convenient, we suggest that the in-stroke be effected by the use of the foot.

As this pump is substantially made and carefully tested, it will require no attention other than an occasional few drops of oil at the point where the plunger rods pass through the head plate. Also an occasional oiling of cylinders to preserve the plunger packing in condition for perfect compression.

Should you in time detect a leakage by any of the plungers, it may be necessary to remove the plunger packing which may be procured from the Prest-O-Lite Company or its branches.

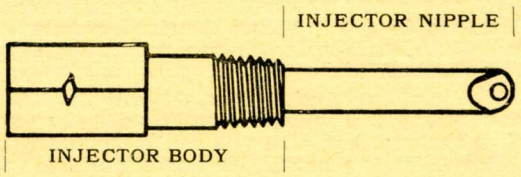
The pump must be kept free from dirt or grit. When not in service the handle plate should be closed tight.

INJECTORS.

The injector is the fitting screwed into the engine, through which the acetylene is injected into the firing chamber. The success of the Starter depends very largely upon the direction of the jet of gas through this injector and extreme care must be used to seat it properly.

If you will examine the nipple before placing the injector in position, you will note that the opening in this nipple is directed to correspond with the notch on the upper or hexagon part. This notch serves as a guide after the injector is inserted, enabling you to determine exactly the direction of the gas jet. Injectors must be screwed tightly in place.

On engines in which the injector and spark plug are located on the same side or in the same valve pocket, the opening must be pointed to direct the jet of gas around the

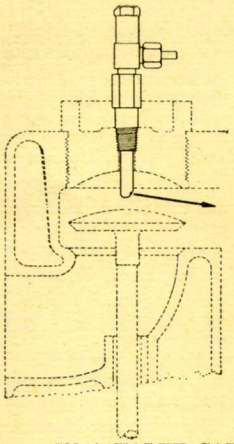


THE INJECTOR.

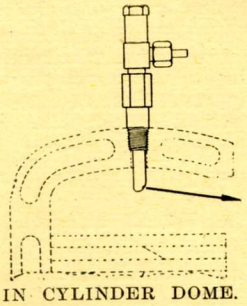
Comprised of an injector body and an injector nipple screwed together. Through this fitting the acetylene is introduced into the firing chamber.

cylinder; when using two sets of spark plugs and the injector is inserted in the top center of cylinder head or dome, on an L head cylinder, direct the jet of gas toward and directly between the two plugs; otherwise point it in the direction of the spark plug—not straight at it—but away at an angle of about forty-five degrees, which will cause the jet to strike the cylinder wall, following its circumference and leaving a firing mixture in the immediate vicinity of the plug. When two sets of spark plugs are used this direction applies to the battery plug.

When in valve cap or valve chamber the nipple should project into the cylinder—that is, beyond adjoining metal, about 3/16 inch to ¼ inch. If the lower surface of the valve cap is cupped, add to this measurement the depth of the cupping—but be certain that there still remains a clearance of not less than 1/16 inch between the injector nipple and valve (when wide open). When placed in the cylinder dome, alongside a spark plug as in the Silent Knight it should project about ½ inch. Diagrams on page 13 show the proper directions of the jet—the arrows indiing the direction of gas travel. A little experimenting on this adjustment will bring results and once right, it will stay right.



IN A VALVE CAP.



IN CYLINDER DOME.

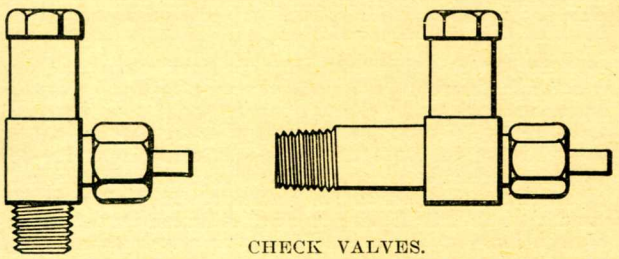
These cuts will serve to illustrate the importance of extending the injector into the cylinder, thereby allowing a proper direction and flow of gas.

As soon as these injectors are seated and directed in a way that is productive of satisfactory starts we earnestly recommend marking an immovable adjoining part of the cylinder with prick punch or paint, to correspond to the mark on the hexagon of the injector. This will insure of its proper insertion without unnecessary experimenting should it ever be disturbed.

CHECK VALVES.

Check valves are placed in the line, being screwed into injector firmly with a wrench to avoid changing its position. withhold the firing charge from the starting system. The valve is of the barrel or plunger type, maintaining a perfect seat by virtue of its weight.

When attaching check valves, be sure to hold the injector firmly with a wrench to avoid changing its position. Check valves must be placed with the head or hexagon cap pointed up. Those designed for vertical installation, car not be used for the horizontal installation and vice versa.



CHECK VALVES.

Type C for vertical installations.

Type D for horizontal installations.

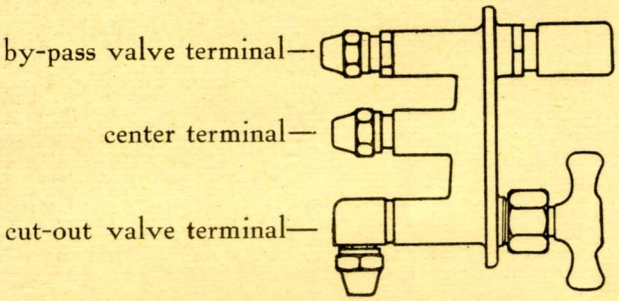
Both types are made either short or long stem to suit requirements. These check valves must be mounted on the engine with the head up, as shown on these sketches.

It is advisable to pour a very small quantity of kerosene into these occasionally to prevent the formation of a carbon deposit or the gumming of cylinder oil that may reach these valves and interfere with their operation. This can be done after unscrewing the hexagon cap.

If it is desired to retain the feature of priming cylinders with gasoline, the small hexagon cup on these check valves may be replaced with special priming cups, to be had from this Company and its branches.

CUT-OUT BY-PASS VALVE.

The cut-out by-pass valve serves a double purpose. The cut-out feature acts as a shut-off between the tank and the entire starter system, while the office of the by-pass valve is to provide a means of feeding acetylene thru the intake manifold—on which the engine can operate until such time as it draws its gas from the carburetor. The cut-out valve should be opened a few turns when about to use the starter and remain open for the entire time the by-pass is in service or until the engine starts, being closed tight immediately after. It will be noted from the



THE CUT-OUT BY-PASS VALVE.

Particularly adapted to use under conditions when the average motor is ordinarily very hard to start.

installation plan that the cut-out valve terminal connects to the automatic reducing valve at tank; center terminal to inlet cylinder "C" of starter pump; by-pass valve terminal to the in-take manifold of the engine.

The by-pass valve is open when the head is pushed in the full length of its travel, which may be accomplished by foot or hand.

PIPING.

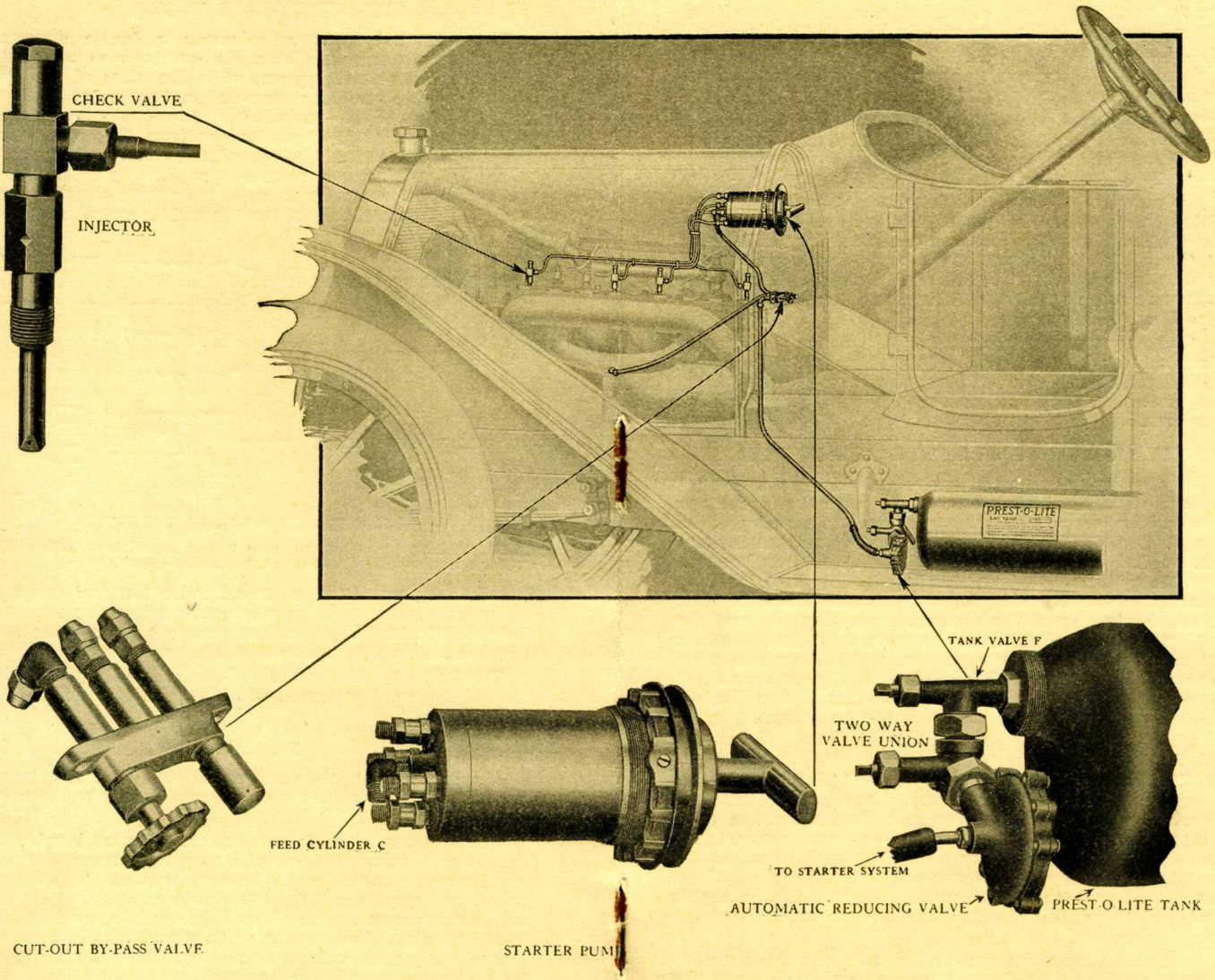
Absolutely tight joints and sound piping are of extreme importance as any leak even though small, would soon empty the tank.

With valves at tank and cut-out open, and valve to lights closed, test each joint with soap suds, as any leakage can then be detected in the form of bubbles. Tighten all unions and couplings, wrap the hose connection with wire, and if necessary examine all union seats to know they are free from dirt. Occasionally use a wrench on the stuffing box of the needle valves, as the opening and closing of the valves has a tendency to cause them to work loose.

IF YOU NOTICE AN UNUSUAL DEPRECIATION IN THE LIFE OF YOUR TANK AND CANNOT ACCOUNT FOR SUCH IN THE ADDITIONAL USE GIVEN IT LOOK FOR LEAKS. Care should be taken when fastening brass tubing that vibration will not cause it to chafe and wear thin. Rubber connections must be heavy walled to prevent collapse.

PREST-O-LITE TANK.

Acetylene used for self-starting is compressed into a seamless steel cylinder known as the Prest-O-Lite tank. This tank is equipped with gauge, safety devices and a regulating valve. In service, upon opening the valve, acetylene is released from its solution in the tank, enters the automatic reducing valve where the pressure is reduced to two ounces, thence through tubing to the cut-out valve of the starter system.



The Prest-O-Starter may be successfully applied to any multi-cylinder motor using a battery in some form for ignition.

The gas tank need not be shut off or interfered with after having once been turned on, providing you have no leaks in the gas line. Under those conditions, it would be well when through using, to close the valve at the tank as a very small leak will perceptibility shorten the life of the charge.

When using the two-way valve union, this valve regulates the supply to the lamps—and under these conditions valve F at tank should be opened a full turn to allow the passage of a sufficient volume of gas, to feed both Starter and lights. Valve to lights should be closed tight except when lights are burning.

Acetylene under our system is not dangerous nor is it injurious. It should be noted, however, that while more easily fired than gasoline gas, it is inclined to ignite on the weak side more easily than on the dense side of the mixture, a condition which may be met by the direction of the jet of gas in the cylinders. Too much acetylene must not be pocketed about the plug as a rich mixture cannot be fired. At the same time some gas must permeate about the plug, otherwise the results would be the same.

The service of a Prest-O-Lite tank is unlimited so far as the owner of one of them is concerned, for when exhausted it can be immediately exchanged for a full one by

merely paying the cost of exchange, at any one of the fifteen thousand dealers, twenty-six Prest-O-Lite branches, or thirteen charging plants.

Don't accept any tanks except those made and charged by The Prest-O-Lite Company.

When the tank is empty close the valve (F) tight.

AUTOMATIC REDUCING VALVE.

The pressure in a fully charged Prest-O-Lite tank, is 225 pounds, at 65 degrees Fahrenheit. It will be appreciated that the introduction of this pressure to the starting system materially increases the possibility of leakage at the joints. To reduce this to a minimum, we connect to the standard valve attached to all Prest-O-Lite tanks an automatic reducing valve, which reduces the pressure in the pipe lines to only two ounces.

This automatic reducing valve is a rather delicate instrument, carefully adjusted and tested and should under no condition be taken apart. If not abused or tampered with, we guarantee its operation for one year from date of purchase.

COMBINATION SPARK PLUG AND INJECTOR.

If the design on your engine provides no means of inserting our standard injector, it is necessary to use our combination spark plug and injector. These plugs take the place of the regular spark plugs on your machine and are so designed as to introduce the jet of acetylene gas into the cylinder. No special fittings are required for this; simply remove the old plugs and install these in their stead. Only one of these combination plugs is used for each cylinder; in case, therefore, your motor has two sets of spark plugs substitute ours on the battery side only. These plugs may be had ⅞ A. L. A. M., ½ inch standard or metric thread, from any of the branches of The Prest-O-Lite Company or dealers in automobile accessories.

IGNITION.

The ignition systems known as Dual Magneto; Duplex Magneto; Battery with multi unit vibrating coil; Distributor with single unit vibrating coil; Double Ignition (two independent system, one magneto and one battery); or any system using a battery and coil in some form, can be successfully used with this starter. You obtain the ignition exactly as you would were you trying to start the engine on gasoline gas in the way commonly known as "starting on compression."

If your ignition system consists only of a high tension magneto without available means of putting a spark in the cylinder by the pressure of a button or closing of a switch, it will not be possible to use our Starter unless suitable equipment is applied. Under those conditions the Starter will prove of service, however, in that it will be the means of introducing gas into the firing chamber, which can be ignited on one quick throw of the crank, starting the engine quickly instead of the necessity of "spinning" the engine in order to draw its gas from the carburetor.

When operating a push button on the Bosch dual, Simms or like magnetos, do not release the pressure on the button, until motor has taken two or more impulses, as on these a spark occurs on the release as well as the pressure of the button, which may cause a backfire.

Magnetos such as Remy and Splitdorf on the other hand produce their spark when the pressure on the starting button is released. Never continue to push the button after motor starts. If impossible to obtain a spark from

the button you can usually do so by a quick movement of the spark lever up and down the quadrant. It is perhaps needless to add that when starting the spark lever must be in a retard position.

If your magneto is so timed that you cannot get a free spark unless motor balances exactly right you can easily correct the difficulty which is due to an incorrect setting of either the breaker points in the magneto or of the distributor with relation to the make and break. Sometimes the trouble is due to an incorrect timing of the magneto—which can only be remedied by changing the magneto gearing. Should you have any trouble along this line, write us stating particulars including the make and model of your magneto.

You should not expect to start your motor with fouled or faulty spark plugs, or a weak battery.

TO START THE MOTOR.

With the equipment satisfactorily installed, and understanding it thoroughly you are ready to start. Make certain that the valves at gas tank and cut-out are open and the ignition switch is at "off" position. Give the pump one or two full strokes (two or three may be necessary when starting a new outfit to force all the air from the line), which will inject gas into the cylinders. Then with throttle partly open and spark control lever in retard position, immediately throw on the battery switch—and the vibrator or pressing of the starting button, will fire the charge and start the motor.

The by-pass valve should be opened by pressure from the foot or hand, immediately after the charge in the cylinder is fired, but only when the engine refuses to continue running without this service. When warm, it is rarely pressed into service; when engine is cold a fraction of a minute is usually all that is required; in extremely cold weather, it may be necessary to leave it open a half minute. Mind the by-pass valve when in use by closing and opening it frequently and allow it to remain closed just as soon as the engine will continue to run without it.

If the engine does not stop on contact, you can advance spark control lever to the point where you do make a contact, snapping it back instantly. If the motor backfires, in case you bring the spark lever back quick enough, you will catch the next cylinder and reverse the engine to its proper direction of rotation.

If the starting of the motor when lights are lighted snuffs out the lights, open the valve F at tank a little wider.

HOW TO STOP THE MOTOR.

Air is essential to combustion, but a burned charge remaining in the cylinder contains very little of it and it is therefore important, that when motor is stopped the gasoline throttle be handled in a way to introduce air.

After the switch is thrown off, the throttle lever should be opened, which will allow the engine to take in a large volume of the mixture during the last few revolutions. When the throttle is wide open the mixture at slow speed is much thinner than with throttle closed—in other words the proportion of air to gasoline is greater; this is apt to vary however, with the setting of different carburetors, it is therefore advisable to do a little experimenting in order to determine the exact position of the throttle lever on the quadrant, which is productive of best results. An open throttle will scavenge the cylinder of a burned charge, and almost without exception prevents the engine stopping on dead center.

IF MOTOR FAILS TO START.

KNOW THAT Valves at tank and cut-out by-pass valve are open.

The injector is installed as instructed by us, pointing in the proper direction and projecting the proper distance into the firing chamber.
Battery supplies a good fat spark.
Gas tank contains gas.
You have no leaks in the gas line and connections.

If one stroke of the pump is not sufficient to start the motor, try two strokes. Large cylinders and extremely cold weather, may even require as much as three strokes. A little practice along this line will make perfect.

If the Starter was applied to an old motor, uncertain starting or mis-firing may be traced to fouled spark plugs—acetone introduced with the acetylene removes and dissolves carbon always found in used cylinders and the small particles would lodge on the spark plug points. It is, therefore, advisable to thoroughly clean the cylinders of a used engine with Prest-O-Carbon Remover before applying the Starter.

In extremely cold weather, it might be advisable to give a stroke of the pump immediately after stopping the motor. The products of combustion in an internal combustion engine are carbon dioxide and water and it is possible that some of this moisture may collect at the check valves on the injectors. Should this freeze it will interfere with the movement of the valve, a condition which may be forestalled by a stroke of the pump when leaving the car which will not only free the valve and passages from all moisture, but charge the cylinder for a quick start.

If the motor stops on dead center, namely, the extreme top or bottom of a stroke, it will be necessary to move the fly wheel a fourth turn (by the use of the starting handle) before the engine may be started with the Starter.

A CONDITION UNDER WHICH MOTOR CANNOT BE STARTED.

A condition under which the Prest-O-Starter would fail to start the motor and you would be obliged to resort to the crank is when the engine stops on dead center, and the chance for this is practically nil on an engine that has worked into its bearings and is smoothed. The excessive friction of a new engine makes it liable to stop in any position of the piston, but an engine on which the moving parts are perfectly free and valves seat perfectly would rarely stop at that point, as one cylinder would then be under full compression. When a multi-cylinder motor stops, there is always a certain see-saw action, due to insufficient energy in the fly wheel to carry the motor over compression, causing the piston to bounce back. This slight rebound causes compression on another cylinder and the crank finally comes to rest in a position where all pistons are near mid-stroke and under this condition at least one of the cylinders is at firing point.

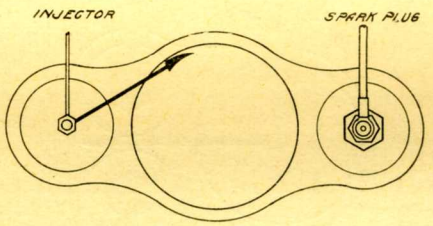
Don't lead yourself into the fallacy of believing that the Prest-O-Starter should start your motor under conditions when it would be difficult or even impossible to start by cranking—for it will not—but give it your assistance by keeping the engine in good repair, valves tight, properly lubricated, good spark plugs, fat spark—all the little attentions a piece of moving machinery has the proper right to expect, and we know you will consider it one of the best investments you have ever made.

The success of the Prest-O-Starter depends very largely upon the direction of the jet of gas from the injector into the cylinder. As this actual direction is governed by conditions and shapes which vary with the different designs and makes of motors however, it will have to be left to the user to determine by a little experimenting just what is necessary in his particular case.

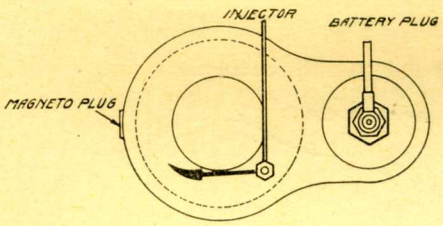
On pages 5 and 6 we treat this subject in a general way. That data added to the information conveyed in the following seven sketches, showing the most successful directions of gas travel under certain specific installations will, we are certain, enable even the novice to arrive at the satisfactory answer in the shortest possible length of time.

The arrow in each sketch shows the proper direction of gas travel.

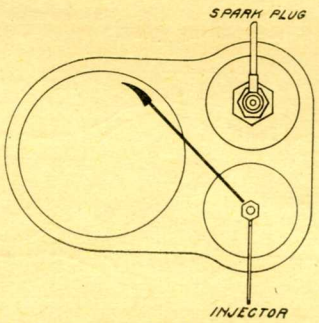
This information does not apply where combined injector and spark plug are used, as under those conditions the direction of gas is provided for in the design of the plug.



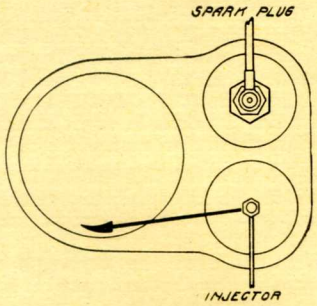
The T head cylinder—with spark plug in one valve cap only—other valve cap used for injector. Direct the gas as shown. On large cylinders it may be necessary to point the gas more directly at the plug.



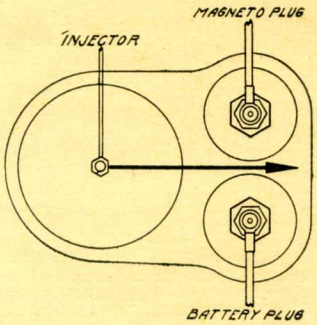
The L head cylinder—with one valve in the head—battery plug in valve cap—magneto plug in the side of cylinder opposite—injector in cylinder dome. The gas must flow around the cylinder to the battery plug.



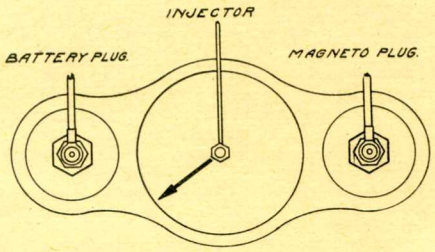
The L head cylinder—spark plug occupies one valve cap—injector placed in unoccupied valve cap. The gas on small cylinders is directed across and around the cylinder.



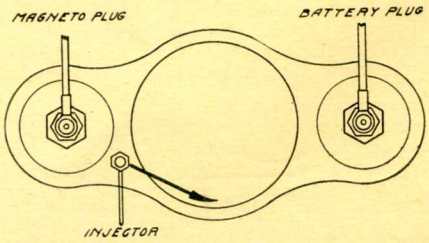
The L head cylinder—spark plug occupies one valve cap—injector placed in unoccupied valve cap. The gas on larger cylinders is directed around the cylinder, which slightly reduces the distance of gas travel as compared with the direction on the preceding sketch.



The L head cylinder—both valve caps occupied by spark plugs—injector in center of cylinder dome. Gas is directed toward and directly between the two plugs.



The T head cylinder—both valve caps occupied by spark plugs—injector in cylinder dome. Gas should be directed as indicated toward the battery plug.



The T head cylinder—both valve caps occupied by spark plugs—injector in valve chamber. Direct the gas as indicated toward the battery plug.

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