Factory timing mark on 1954 Oldsmobile is typical. It serves now under a wide range of conditions, but as octane ratings continue to rise, it becomes less and less useful. Timing with ping point as reference will be better in future.

POWER TIMING

BY BARNEY NAVARRO

Odds are that you're losing performance simply because you are not taking advantage of the higher octane ratings of new gasolines. Here's how to bring your car up to date

HOW can the performance of a car be improved without spending any money?

Good question. And not as ridiculous as it sounds, in this case. The answer is power timing.

In fact, it can be said that power output of most engines with a corrected spark setting may equal the performance improvement obtained by the installation of special high compression heads!

Consider this: engines are built with timing marks that correspond to the octane ratings of fuels that are available at the time of their manufacture. In recent years, gasoline companies have been marketing fuels with increasingly higher octane levels. Thus it is obvious that stock timing marks are quickly outdated—and the older the car, the greater the power benefits that are being missed. Even a current 1955 model, just out of Detroit, can be expected to stand an adjustment in the not too distant future.

The faster burning rate of the low octane fuels of yesterday required less spark advance than the slower burning of the new high octane gasolines. This difference in burning rate, in effect, produces somewhat the same result as running the engine with a retarded spark, if the factory timing marks are adhered to on the engine.

In many cases, the older engines will produce less horsepower with the new high-octane gasolines than they did with the earlier fuels. Advancing the spark to just under the ping point will do a marvelous job of improving the performance of most of these engines, but some of them will still fall short of their former output.

The purpose of the factory timing marks is not to supply a reference point for the production of maximum horsepower. Their function is to furnish the tuneup man with a handy reference so that he can set your distributor timing quickly and without driving your car.

The setting so obtained is one that fits a wide range of conditions. The advance is sufficient to give good all around performance, but isn't so extreme that detonation (ping) takes place under extreme driving conditions.

At this point, you may think that what is being said here does not apply to your car since it performs satisfactorily with ignition timing set on the factory marks. If you are right, it is only through a coincidence—since it often happens that the permanent marks suit the occasion. In brief, don't operate on the theory that correct spark timing merely means getting number one plug to fire when the mark lines up with the pointer.

To find the correct timing point on your car, all you need to do is advance the distributor until a slight ping is heard while accelerating at full throttle, then retard the distributor just enough to eliminate the ping.

If you are in doubt as to which way to rotate the distributor case to advance the firing point, remove the distributor cap and check the direction of rotor rotation. By turning the engine over with the starter, you will be able to observe the direction of rotor rotation. To advance the spark, rotate the distributor case in the direction opposite to rotor rotation.

The ping point is used as a reference point because we know that a high compression engine will produce maximum power with the spark advanced as close as possible to the point of detonation.

If the resultant increase in performance overwhelms you, don't lose sight of the fact that a change in setting will be necessary if any of the operating conditions are altered. A setting that works beautifully in the cold thin air of 7,000 feet, will produce detonation in, say, the hot dense atmosphere of Death Valley that would soon wreck your engine.

An aspect that should not be ignored, however, is the value of retarding the spark to conform to certain conditions.

We have heard car owners say, "My engine pings but I don't want to retard the spark because I'll lose power."

Such a view is an absolute paradox. When an engine is subject to detonation, power drops off at an alarming rate. Far more power is produced when the spark is retarded below the ping point.

Maybe the idea would seem less painful to the reluctant if we used different words in our recommendation. "Retard," to many people carries an inference that the spark is being made to fire late and they picture the piston as having started its downward travel on the power stroke before ignition of the charge. *Reducing the amount of spark advance* may be a better way of stating the case.

Any increase in compression ratio will also require that less advance be employed. Head milling or the installation of high compression heads always will require a reduction in spark advance, regardless of claims to the contrary.

Another factor may cause an alteration in the approach to timing. That is the carbon accumulation in the combustion chambers. When such chambers are clean, it often is possible to advance the spark from three to five degrees more than when they were crusted with carbon and lead compounds.

There are three reasons why the combustion chamber deposits alter spark timing requirements. Their order of importance will vary with engine design, so we can't say that any one of the following should head the list:

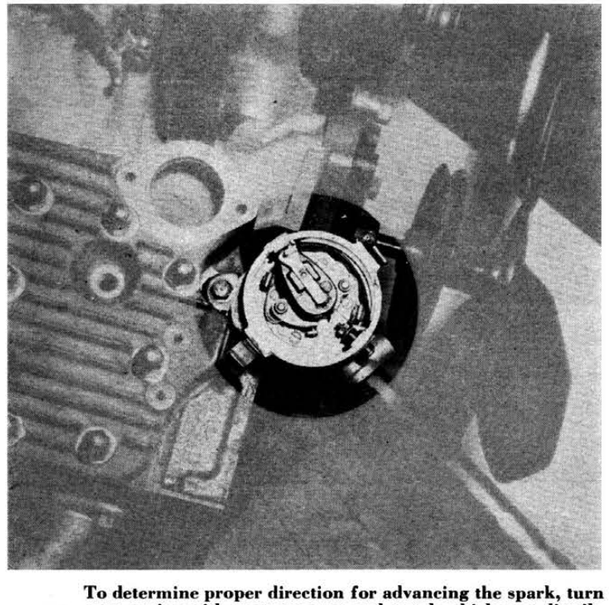
First, a compression ratio increase is an obvious result of combustion chamber deposits, so it is quite apparent that this will promote detonation. Next, the coating of the combustion chamber surface has an insulating effect which prevents much heat from being carried away to the water jackets, so combustion chamber temperatures rise. Finally, any increase in temperatures speeds up a chemical reaction, and this too accelerates the tendency toward detonation.

Anyone who has watched the soot glow at the back of a fireplace can visualize easily what happens with sharp projecting edges of carbon in the combustion chambers. These glowing particles can ignite the fuel charge before the plug fires; or they can cause the portion of the fuel mixture farthest from the plug to ignite before the flame reaches that region.

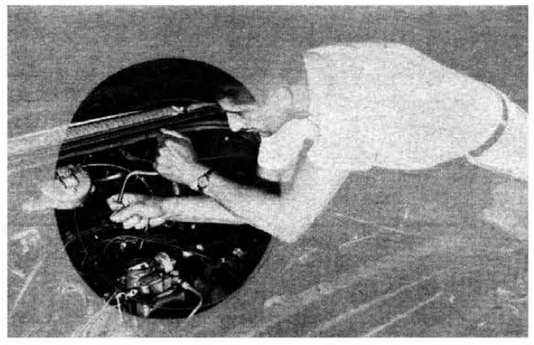
This may be a good place to point out that what we said earlier, about the slower burning rate of high octane fuel, should not be taken to mean that it isn't doing its best for the late model high compression engines.

Although the burning rate is detrimental, it is compensated for by the increase in the burning rate produced by higher compression.

Actually, part of the increase in power derived from high compression results from the shortened burning period and the necessity for less spark advance. As we've said before in these pages, spark advance is a necessary evil, for it really starts the combustion of the fuel charge before the burning can do any useful work.



To determine proper direction for advancing the spark, turn over engine with starter motor and watch which way distributor rotor turns. Then twist outer case in opposite direction.



Barney Navarro loosening the retaining clamp on a distributor base, which, as with most new ohv V-8's, is inconveniently located, being crowded between firewall and engine block.

Close examination of dynamometer test records made at various automobile factories reveal a rather interesting fact. The test on which the advertised horsepower ratings are based upon are made with a manual spark setting. When these charts indicate a manual setting, they do not infer that a distributor is employed that has no automatic advance mechanism. The truth of the matter is that the timing marks are disregarded and the automatic advance mechanism is not depended upon to advance the spark to the precise point where maximum power is realized.

Before rushing out to power-time the family car, it will be well to understand why the factory timing mark must be a compromise. All automobiles, as previously noted, are not driven under the same conditions. Some travel at high altitudes, others in low-level areas. Such differences in temperature and atmospheric pressure call for varying amounts of spark advance. Cold air and low atmospheric pressure allow more spark advance than hot air and high atmospheric pressure. If distributors were equipped with devices that corrected the spark advance to conform to atmospheric pressure and temperature changes, such compromises as are built into the factory timing marks would not be necessary. •