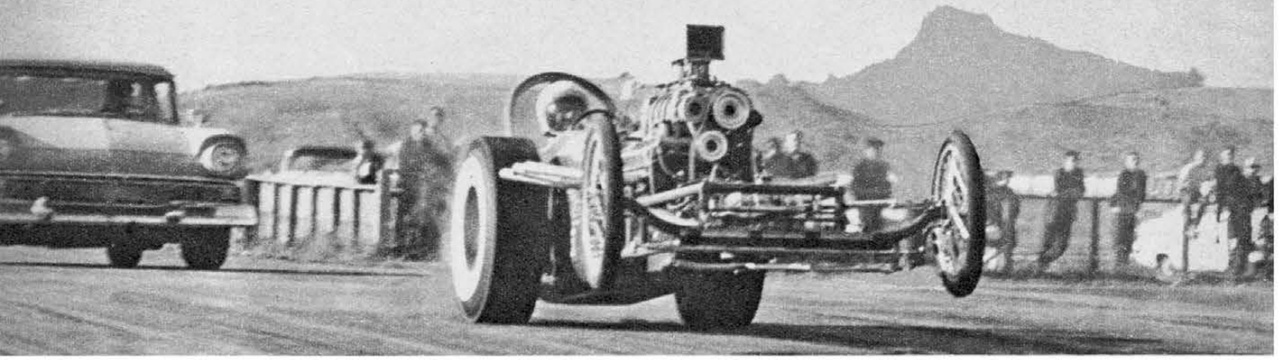
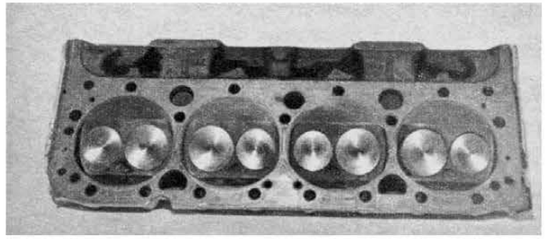
MODIFYING THE 265, 283 AND 327



THE secret of Chevy's success as a modified engine is directly traceable to the factors emphasized in the section of this book on its design: Compactness, light-weight combustion chamber design and valve train. The short length of the block makes it inherently stiff, and, while the main bearing area in relation to the maximum displacement possible within the confines of the block is low, the advantage of rigidity makes up for it. This solidity has made possible the extremes of compression and rpm which are the hallmark of a high output engine. As a consequence, the 265 Series has had much independent development time.

The combustion chamber is one of those happy affairs which retains its superior characteristics right up to extremes of compression and the low-inertia valve arrangement resulted in new rpm highs for production engines. Twisting a stock block mill to 8,500 was unheard of before the Chevy.

To improve on these inherently good characteristics, most modifiers have discovered, is mostly a matter of slanting the engine in the direction you want to go. If it is gross torque you want, you bore and stroke. If it is high rpm and screaming acceleration, you work on the head and valve train. If you are really horsepower mad you hang a blower on it or dump in the nitro. And, with proper attention to detail, the engine will stand almost anything. Well, not quite anything, but it continues to amaze the faithful.



Early (pre-1957) head should be avoided by modifiers. Later versions have bigger valves, altered combustion chamber, superior porting which make improvements easier, less costly.

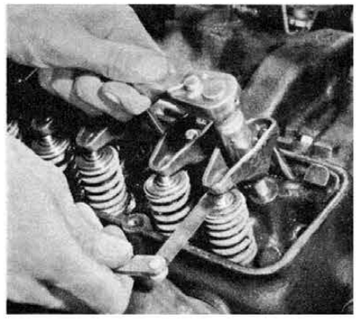
First, let me emphasize that there are two methods to approach the Chevy, as with any engine: (1) The casual, "I just want a few more horsepower," avenue; (2) "I want to be a winner."

The first is for the less interested, the person who may not care to put the time or money into an all-out project. The second attitude is self-explanatory and it requires much attention to detail and the expenditure of *beaucoup* loot, either as cash or in time and facilities. Not that the Chevy is more expensive to modify than other powerplants, it is cheaper in many instances, but this type of competition preparation is now almost an exact science and the record breakers at any event don't get that way by accident or by bolting on instant horsepower goodies.

For the enthusiast who just wants to have a sharp engine, it's hard to keep ahead of the factory. Chevy engineers keep coming with improvements which result in a most pleasant car to drive and maintain, yet which is capable of outstanding performance. So, the smartest modernization program for the performance-minded individual who has little enthusiasm for the niggling chores which go with a hot mill, is to swap for the latest from Chevrolet.

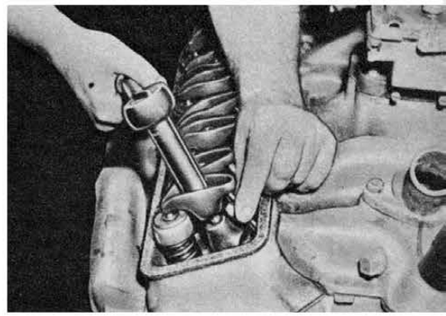
This might be a good place to emphasize that modifications (not to be confused with tuning) can only result in an engine which is less adaptable to the purposes for which the factory intended it. In other words you will sacrifice something in order to obtain something else, and what you will be giving up is the attention-free powerplant you now enjoy. The farther you go in modification, the more temperamental an engine becomes. Raising compression, for instance, calls for maintaining a cleaner combustion chamber and spark plugs. Plug life will also be shortened and ignition timing and carburetion become more critical.

Many hot rodders, in their desire to have a "full house" engine under the hood of a car which must serve them as daily transportation are constantly plagued with problems out



LEFT: Importance of correct valve stem-rocker arm clearance cannot be overstressed. Delicate touch with feeler gauge or use of dial indicator gage is necessary.

RIGHT: Hydraulic lifters, requiring zero lash, can be set by feel. Tighten rocker stud nut until pushrod can no longer be twisted between thumb and forefinger.



of proportion to the enjoyment they derive from the car. They would be better advised to back off a little and run something more suited to the purpose.

TUNING

The basic elements in tuning are spark timing and air/fuel mixture ratio. Anything having to do with delivering a hot spark to the optimum mixture in the cylinder at the proper time is within this category which includes, to be thorough, valve seating and clearance.

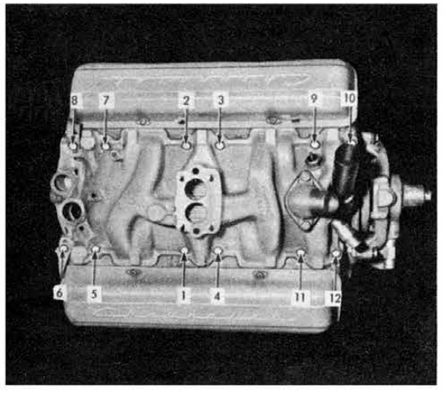
In my opinion, which is not original and is concurred in by most mechanics, the greatest single improvement to be made at minor cost in a stock engine is to give it a meticulous valve job. This means grinding heads and seats to a precise angle and mating them by lapping in with fine grinding compound, then setting clearances as close to the theoretical tolerance as possible. The inexperienced person has a tough time distinguishing proper clearance using a feeler gauge and you will notice that the old hand at tuning goes back several times to check and re-check the pull on his gauge. The best method is to use a dial indicator and a specialized type, the P&G Valve Gapper, is excellent. With it you can zero in . . . and even a .001-inch variation will affect valve timing. Use the clearances dictated by the manufacturer of the cam, if it is a proprietary type. With the solid lifter camshaft in the Chevy, specs call for .008 inch on the intake, .018 inch on exhaust valves. This is at normal operating temperature.

Valve lash is easily set at zero on the hydraulic lifter engine by tightening the rocker stud nut until there is no play between pushrod and rocker arm, just at the point where the pushrod cannot be rotated between the fingers.

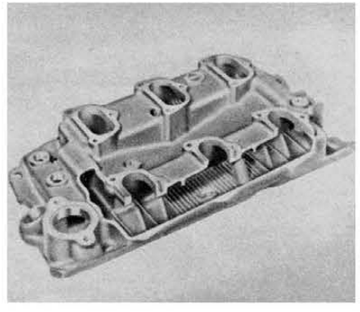
CARBURETION

In tuning the stock engine, the major item of carburetion is cleanliness. With the additives in modern fuels, carburetor fouling is a problem and regular "boiling out," or disassembly and cleaning in solvent is mandatory. Blow the jets and orifices out with compressed air (don't push a wire through them) and re-assemble with respect for tolerances given by the manufacturer for float drop and level. Make sure the throttle is opening fully with the pedal fully depressed, that the automatic choke is operating correctly, especially the release function, and that all slack is out of the linkage. The selection of jets is a matter of experience but keep this in mind: As you improve the breathing capacity of the engine, you can reach the limit of delivery of a given jet size and it is necessary to go richer. For instance, substituting an open exhaust for a stock muffler set up will call for larger jets. A quick look at the tail pipe will tell you if you are grossly rich or lean. Black soot indicates too rich, white deposits indicate too lean. A neutral gray is about right. For finer judgment, it is necessary to check the spark plugs. Most plug makers issue booklets or charts which show exactly the appearance of spark plugs under various carburetor or heat range conditions. Study them.

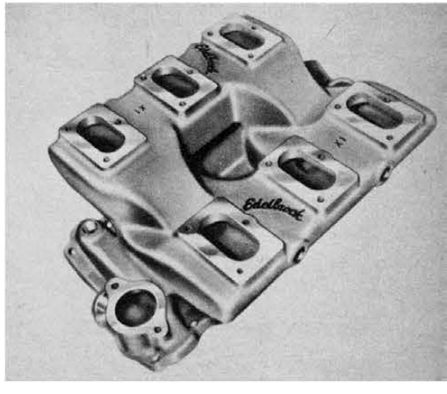
To increase performance, an obvious route is to increase the potential carburetion. I say potential because the engine will set its own limit beyond which adding carburetors is



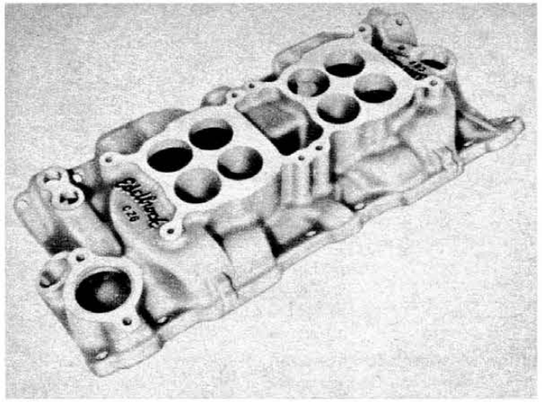
Stock single two-barrel carburetor manifold is usually first item discarded by hot rodders. Tightening sequence of manifold bolts should be adhered to in replacing.



Cutaway of Offenhauser six-carburetor manifold reveals huge ports and routing. Such designs are created for all-out competition engines, not well suited for street.



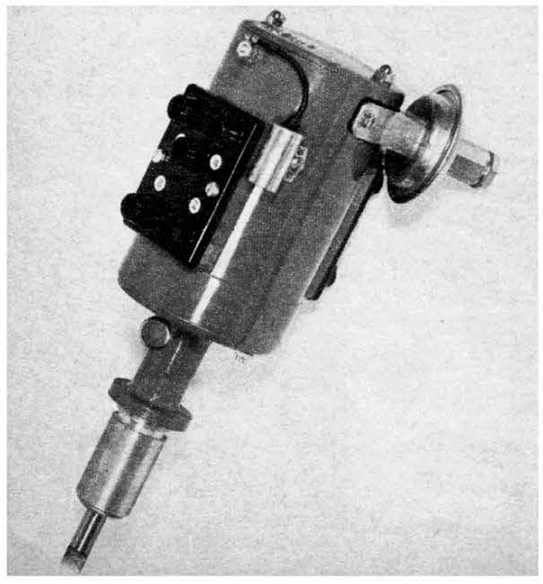
Edelbrock "ram" manifold is set up to take advantage of air pulsations in manifold. Intake and exhaust pipe length can be critical in super-tuned competition mill.



For street and strip, proprietary manifold which provides for use of two late four-barrel carburetors, such as Carter AFB or Rochester 4GC is good choice. Modified engine required.

Compromise for high-performance dual-purpose engine would be three two-barrel type. With such an arrangement, progressive linkage opening center carburetor first is a requirement.

Spalding "Flamethrower" distributor is dual-point type which calls for two coils. Duplicate system is aimed at eliminating lack of strong spark at high rpm when coil voltage drops off.



not only ridiculous but debilitating. This limit is a function of displacement, cam timing and porting; volumetric efficiency, in other words, and it can be related to venturi area.

A certain velocity is required of the incoming air, in order to make the carburetor operate efficiently and to keep the mixture "mixed." A small throttle bore will give high velocity in comparison to a large opening if the same *volume* of air is passed in a given time. Thus, a large carburetor on a small engine would be deficient in velocity. So, without going into the mathematics of the situation, there are certain norms which apply to the Chevy. You can take your cue from the factory here.

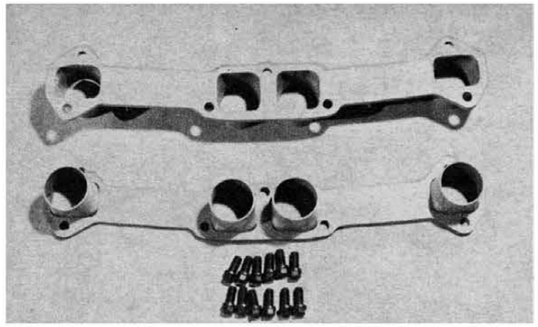
Notice that the rated horsepower is sharply increased from one engine to another when only a larger four-barrel, or multiple carburetion is the difference. It follows that you can go to that amount of carburetion with no problem, even for nothing but street use. If you are willing to put up with higher idling speeds and re-work the distributor, you can go further. If you have a more radical cam or improved porting, then the engine can handle more carburetion within the same displacement.

For the fully-modified competition engine, it becomes a matter of where the peak torque/horsepower curves are desired and placed. Basically, the higher the rpm, the more carburetion is required and the less flexibility is retained.

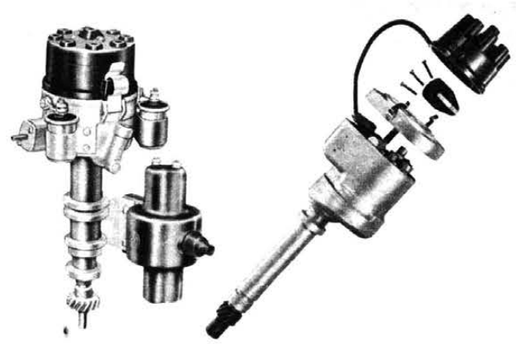
There are so many possible combinations of engine modifications that it is impossible to go into carburetor and manifold selection, beyond mentioning a few of the availabilities, which you will find illustrated. But, generally, for the street or dual-purpose car, use what the factory has done as a rule of thumb. With a 283 or 327, running a cam equivalent to the Duntov SR grind, cleaned up head, headers and so on, the equivalent of two Carter four-barrel carburetors (part nos. 3741089 and 3741090) would be a starting place. From this, if the engine is sharp in the upper rpm range, move up to two Carter AFB 3269 S (or properly, one 3269 and one 3270, part nos. 3797698, 3797697). Actually, one of these on the late manifold (1963 340 bhp) is adequate for street use. Competition, as noted, calls for the duals.

Proprietary manifolds, generally speaking, are for going beyond the limits of factory equipment, although there are those which, by virtue of altered internal routing, are much the same but are lighter, dissipate heat better or eliminate the heat riser. These custom made units are intended for specific carburetors, which the experience of the manufacturer indicates are suited to the engine in question. You can get an idea of the application intended by comparing the venturi area of the proposed carburetion with that which you now have or with the known area of factory optional carburetors. The 3269 and 2370 AFB, for example, have a five-inch air horn and primary venturis of 1.34 inch, secondaries measuring 1.56 inch, for a total venturi area of 6.66 square inches each. These are used on the big 409 honker, so you can see that your engine must be well modified to demand that kind of venturi area.

Progressive linkage is a necessity for dual purpose cars with ample carburetion at the top end. It is also of a higher quality than production linkage and gives a more sensitive feel to the throttle. The main advantage of a triple two-throat manifold set up is in the linkage which can be set to use only the center carburetor for most street driving, with



Rectangle-to-cylinder exhaust manifold flanges are offered by C & T Automotive for modifiers who build tuned exhaust headers designed to scavenge cylinders at given engine speed.

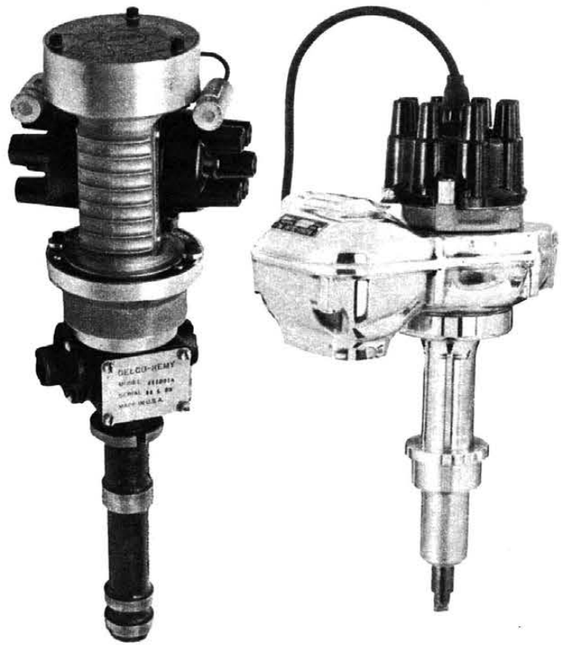


Mallory "Rev-Pol" ignition uses reversed polarity in coil to maintain high voltage at high rpm. Pounden magneto (right) uses many stock components to keep cost low, quality up.

good low speed engine characteristics because of the small venturi area.

IGNITION

Here is an area of some controversy and many debatable claims, but keep in mind when dealing in ignition components, that as long as the spark is there, arcing across the two plug electrodes, the mixture will be ignited. To make sure that a *spark*, never mind how "hot" or "fat," is delivered is the function of battery, coil, distributor and wiring. As compression rises and combustion chamber temperature goes up, the resistance to the creation of that arc also goes up. And, since compression and heat are greatest just at the time when the coil and distributor are running out of efficiency, ignition in a high performance engine becomes critical. For this reason many better-than-production ignition systems are offered. That they are of gross benefit under the driving conditions imposed by the fabled Little Old Lady From Pasadena, is highly dubious. But, as conditions get tougher, they prove their worth.



With the stock ignition, as with any optional equipment, the important factor is timing and delivery. Let's work backward from the plug.

First, a good conductor, with as little resistance to current as possible and as much resistance to breakage as possible is needed. Handling the high tension leads, removing and replacing them on the plugs is a pretty frequent habit with the competition mechanic. Consequently they all replace the radio-shielded TVRS impregnated-linen leads with copper or stainless steel conductor types. Either soldered or solderless connectors are used, but a solid contact must be made at both ends of the conductor. The distributor cap must be whole, clean and uncracked. Points should be smooth and mating surfaces parallel. The distributor gear, shaft and plate should be free from wobble or slack, point tension and gap correct as specified and advance mechanism operating properly. Then, if the condenser and coil are doing their job, the low tension lead is firmly in place and ground connections tight, there is nothing to prevent a spark from being delivered within the limits of the system.

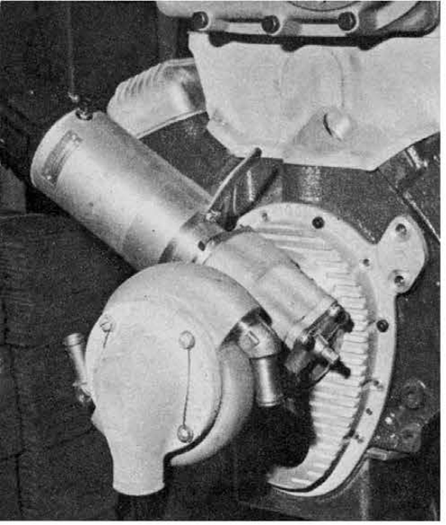
Spark timing, as a function of both the static (or idle speed) setting and the advance mechanism of the distributor, is highly variable. Both of these factors vary from engine to engine. There is no hard and fast setting to apply, and either dynamometer tuning or tuning in accordance with performance results is the only method to follow.

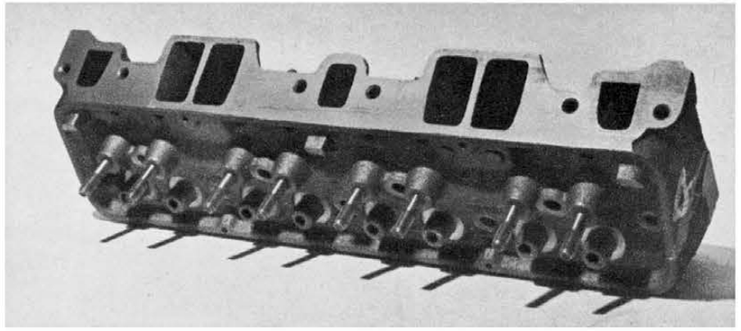
The dual-point distributor as used on Chevy high performance engines is good to the upper rpm limits of the unmodified engine. If modifications leading to extremes of rpm are part of your plan, then a proprietary ignition setup built specifically to handle such problems as are encountered here is a necessary investment.

These distributors, special coils and magnetos are engineered for specific engines and applications. The experience of the manufacturer will enable him to match the proper advance curve with your engine requirement. Normally, the hotter the modification, the more critical the curve and amount of advance, but to give you an idea of a starting place, the best average (across a number of engines) for a 10.5 compression ratio fuel-injected Corvette with Duntov cam works out to about 18° initial advance and 38° total at 3,000. Other engines with variations in cam timing and

FAR LEFT: Kong "Roto-Faze" distributor was early development in search for hotter spark at top speed. It uses two four-cylinder caps, is adjusted at factory for specific engine.

LEFT: Harman-Collins magneto is another which employs stock parts available over-the-counter at speed shops in any part of the country.





ABOVE: Ported head is example of job difficult to do well without experience. Shape of ports is more important consideration than sheer size in this modification.

LEFT: Magneto installation on blown engine calls for special adapter since nominal position of distributor would interfere with supercharger mounted atop engine.

carburetion begin with 12° static and as much as 28° in the centrifugal peaking at 3,400 to 4,000 rpm.

The new transistor ignition systems contribute greatly to point life, since the voltage used to trigger the spark is lower than that which normally passes through the points, and higher rpm can be tolerated in the distributor without loss of coil efficiency or point float.

The simple trick of putting a little tension behind the points, to damp their action and keep them on the cam, can be worked by using a small chunk of sponge rubber. Altering the full advance point by making the centrifugal stop larger can be accomplished by using a piece of copper or brass tubing to replace the neoprene bushing. It can be turned down to the proper diameter after experimentation. Or, any ignition specialist will put your distributor on a machine and alter the curve in any manner you desire.

CYLINDER HEAD

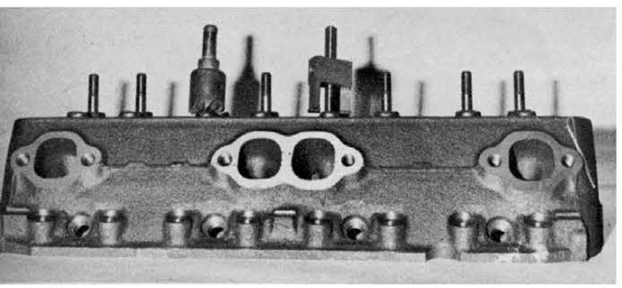
There have been several heads used on the 265 Series engines, and, as in most cases of this kind, the latest is the best.

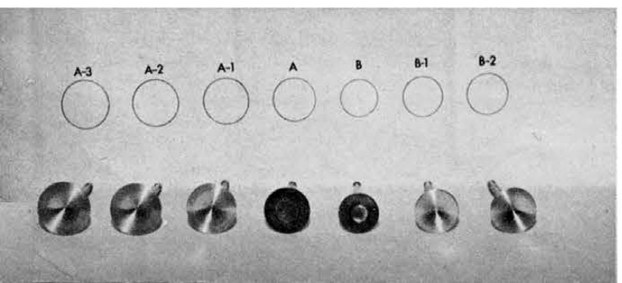
If you have one of the older models, (consult the tables for valve sizes for identification) and you want to re-work it, my best advice is, unless you understand thoroughly what you are doing and have proper tools, *don't*.

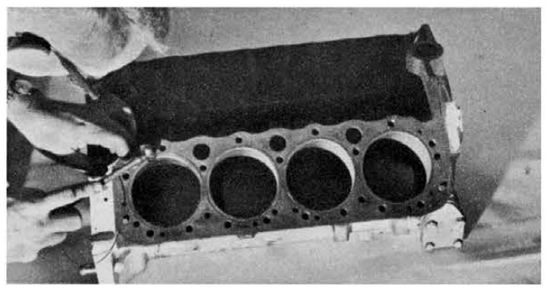
There are specialists in head porting who do such a superior job at such reasonable rates that the average mechanic should confine his efforts to removing and replacing the head assembly.

If you have perviously done head work, then the little Chevy V8 is handled in the same manner, except that the shape of the ports is more critical than the size. To go into these shapes in this discussion is not possible, but generally raising the ports and bringing them toward the same contour as the late FI heads is the general idea. Increasing the dimensions of both intake and exhaust ports by about ⅛ inch is all that's in the cards. Polishing of any port is beneficial, as is undercutting the valve openings and breaking all sharp edges anywhere in the port-combustion chamber area.

Larger valves can be installed in both the 1.72-1.5-inch valve diameter heads and the later 1.93-inch intake valve type. Up to two-inch intake valves and 1 11/16-inch can be used in these FI heads by using offset guides. The limitations on the previous heads are reached at 1⅞ and 1⅝ inches, respectively. Actually the 1957 heads with 9.5-to-1 compression ratio are the earliest which should be bothered with. In 1959 and later, the water-jacketed spark plug boss type came into production and is vastly preferable. Still, the 1961 and later fuel injection type is the best because combustion chamber improvements have already been made. Some machining around the combustion chamber walls is necessary with oversize valves to eliminate or reduce breathing restrictions, and it must be done carefully to make equalizing of combustion chamber volumes possible. This is tricky because you are getting into the critical gasket area, yet about .187 inch should be allowed clearance.



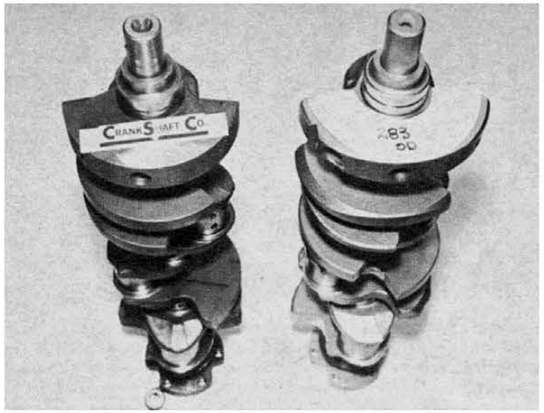




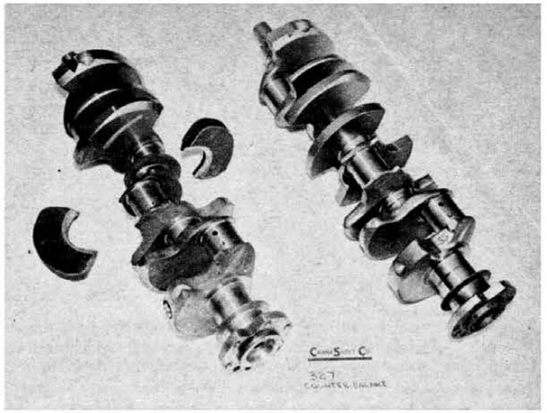
ABOVE: Conventional head gasket is dispensed with in many supercharged or high-performance engines and copper wire laid in milled groove around cylinder to effect head-block seal.

ABOVE LEFT: It is necessary to trim valve guide bosses when inner valve springs of certain types are to be used. Two types of cutters, obtainable at parts supply houses are shown.

LEFT: Wide choice of valve sizes is available for installation in Chevy head. Center are stock valves, larger size intake range to left, exhaust to right. Two-inch diameter is maximum.



Increasing displacement of older engine by substituting new 327 crank, although relatively simple, calls for some machine work. Larger counterweight of 327 shaft must be trimmed.



Improvement on factory crank for high performance purposes is achieved by Crankshaft Co. through welding an additional counterweight to center throw, not needed for production car.

So, in the hottest competition engines where two-inch valves are the big thing, the normal head gasket is dumped and compression rings used. Some O-rings of this type are available, but most builders use 17 gauge electrical copper wire laid into a groove cut with a special tool in a boring bar. This method is used on all of the big blown engines.

BIG INCHERS

The boring bar has long been the favorite tool of the hot rodder, and Tom Medley's immortal saying, "If it won't go, bore it out," has been tattooed on many a forearm instead of "Mother."

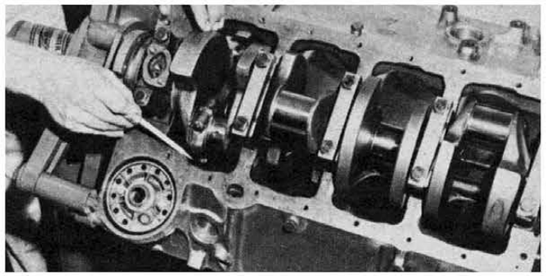
Nowadays, with factory engines developing 425 horsepower off the showroom floor, it seems antiquated to spend a lot of effort on a small engine bringing it up in displacement with the attendant risks. But, the "W" series is just a trifle difficult to shoehorn into the pre-1961 cars, of which many are hot rodders' favorites, so the displacement race has gone on. Again, the light weight of the 265 Series block, is the big item, since you can have 376 cubic inches, without too much perspiration, in the 327 configuration and 364 cubes in the 283 block (using the 327 crank) at no weight penalty.

Actually, there are a goodly number of four-inch strokers running today. This extreme stroke, combined with four-inch bore results in 402 cubic inches, which could be an advantage in many places. Such a radical increase of stroke is extremely limited in its application, of course, since the wrist pin, no matter how you arrange things, is going to be in the middle of the ring grooves. All of which contributes to extremely short life.

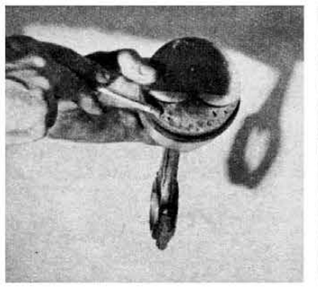
The boring limitation of the original 265 block is 3.875 inches. On the 283 it is four inches and the 327 can be safely overbored to 4.062 inches. These overbores will give you 283 inches with the stock stroke in the 265, 301 in the 283 and 337 in the 327. Above that it is a matter of crankshaft stroking.

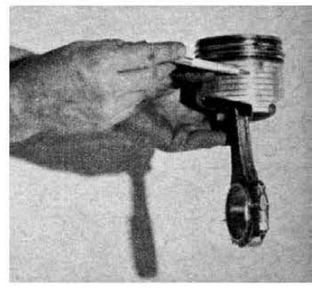
Today crank stroking is as common as boring was a few years ago. And with the Chevy so susceptible to taking a longer stroke and still revving like a good thing, the art has been particularly applied to these crankshafts.

The Crankshaft Company of Los Angeles, for example, is one of several specialist firms whose reputation is nationwide (and with whom many hot rodders do business from far off places) where "stroking" has become more than merely adding material to the journals and grinding it off center, as stroking once was. Now, it encompasses a complete re-building phase which takes into account the balancing out of heavier piston-rod assemblies and improving the crank itself through adding center counterweights, and so on. When you get into the

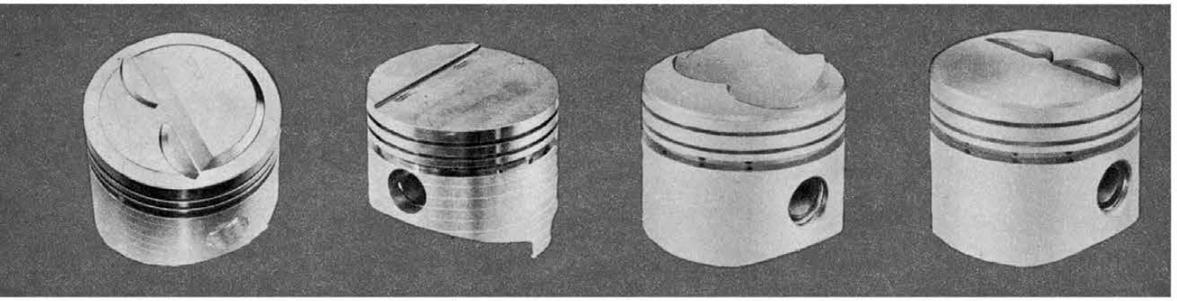


Close quarters in block are part of problem encountered when crankshaft is stroked. 3⅝ inch stroke is longest advised.





Necessity for high quality pistons is graphically illustrated here. Lean mixture and resulting high temperature quickly pitted and scored this piston. Ones of cheaper type might collapse.



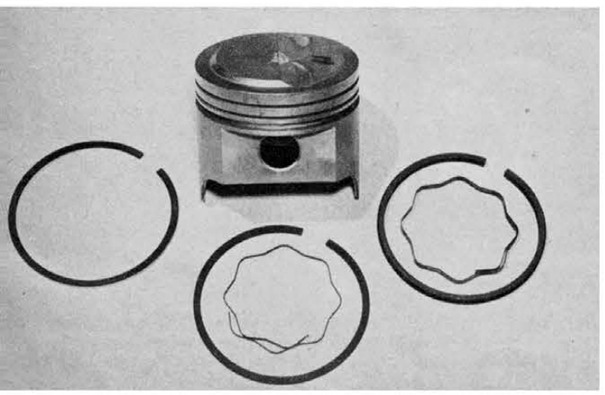
Special pistons are available in many configurations for any bore size and compression ratio. A few are shown here. Left to right: Forgedtrue pop up with valve relief, for normally aspirated engine. Forgedtrue step-head for supercharged engine. Jahns high-deflector head. Jahns ¼ inch deflector head. Manufacturers will shape piston crown to the configuration of combustion chamber.

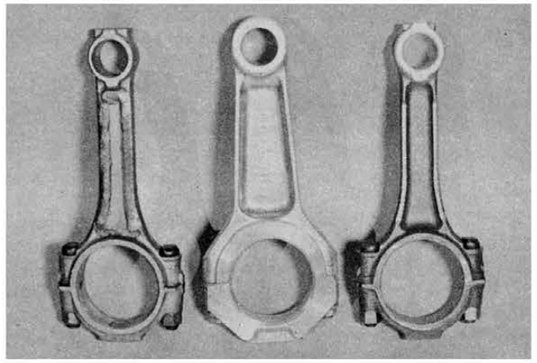
realm of engine costs involved with something like a blown dragster, the failure of a crank can be a catastrophe. So, the companies to whom this business is a livelihood take it seriously. And the rodder should approach the purchase of a crank and its installation in the same vein as the professionals.

You could quickly convert your older engine into a 327 by substituting the crank straight across were it not for the fact that the counterweights won't clear the block, so it is necessary to machine them to clear. This is the best crank to use for longer strokes, offering a little more pin overlap. These cranks are also built up (with the same process as used in applying metal to the crankpins for grinding) to provide more sheer strength in this area. C&T Automotive, who manufacture a lot of extreme-usage cranks, uses this technique.

C & T also turns out a four-inch stroker crafted from a Studebaker crank which is illustrative of the hassle involved in attaining these goals. They start with a Stude V8 crank from 1954 which has a four-inch stroke. It is also pretty sturdy. But, it is just a shade too long, so, by centering on the middle main journal and cutting off each counterweight to shift the bearing centers to the middle, they make it fit the Chevy main webs. This is only the beginning, however. There is no thrust flange on the Stude crank, thrust being taken in the original application at the center main, so C & T makes one in the Sigma arc welder and machines it to tolerances. Rod journals are built up to be machined to a 2.250-inch diameter in order to take Buick rods which have .300 inch more center-to-center distance than the Chevy. These rods are a trifle wide to fit on the crankpins, so they

Ordering rings with pistons from proprietary source is wise. Manufacturers' experience with product can be relied upon.





Extra strength in connecting rods can be attained through use of boxed rod (left) or proprietary aluminum alloy type (center).

are narrowed appropriately. This, of course, calls for some other bearing insert. Fortunately, 1960 Cadillac bearings have the right width and they are used.

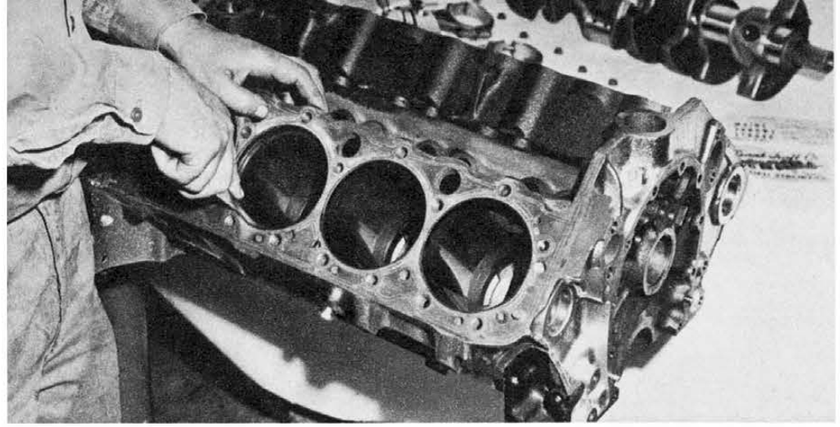
To balance out the rods, forged pistons and pin assembly, it is necessary to hollow out the counterweights, fill them with lead and weld everything solid. But, if you want a four-inch crank, this is about as inexpensive a way to get it as any other.

Weber Equipment Company is now making a crank in 3.750-inch stroke length with 180° throw arrangement. This is a cast Manganese-Silicon steel crank for competition with counterweights adequate for the contemplated piston-rod assembly.

PISTONS, PINS AND RODS

When you make the move to a large overbore, you leave the Chevrolet dealer's parts counter behind since the factory service pistons are only up to a maximum of .060 inch oversize. This means you must choose a proprietary piston.

Let's say at the outset that all specialized racing pistons are good and have worked well or the manufacturers would soon be out of business. However, as in all commodities, some are better than others. There is usually an easy way to distinguish the better grade: It costs more. This is not always true, nor are all pistons made under the same type of process the same. So it pays the prospective purchaser to examine the terminology as well as the product, in many instances. The performance of the product, who uses it and under what conditions is also important if your application is highly demanding.



Important dimension to be checked during assembly of engine is ring end-gap which should be measured with ring square in bore and set to manufacturer's specifications. Pistons should be ordered by giving actual bore size.

Generally, sand cast pistons are chosen for modified engines which are short of all-out and forged aluminum types for the blown and fuel-burners. This isn't hard and fast, there are supercharged Chevys running cast pistons and there are lots of mild street machines whose owners chose the forged slugs. At one time, the variety of bore sizes and crown configurations was not as plentiful in forged pistons as in the cast variety, but with the tremendous popularity of the 265 Series V8, this no longer holds true.

Forged True Piston Corporation, for instance, advertises "Any cylinder bore size, any stroke and any compression ratio" on its Chevy pistons. Moreover, for extremely hot, high compression engines, if you will send them a plaster cast of the combustion chamber with valves at maximum overlap position, they'll tailor the crown to fit.

When ordering any piston, always give the manufacturer your engine's true bore size. He'll make the clearance allowance according to the use to which the engine will be put.

Here is another group of people on whom you can rely. Tell them all the details of your Chevy engine, ask them to give you the compression ratio you want, or, having computed the c.r., give the piston pin center to crown height, they'll hold a close tolerance for you. In short, the pistons will be specifically for your application.

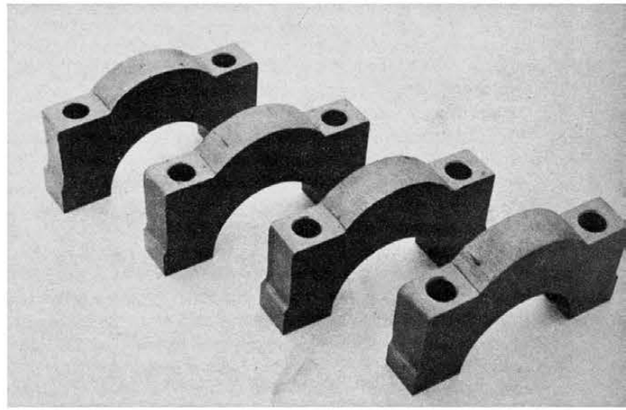
For competition engines, it is a good idea to float the wrist pins. Assembly and disassembly are made easier and the friction losses are decreased. Most piston manufacturers use a superior grade of pin compatible with the piston and offer their own or a high grade of rings known to be suited to the use they will be put to. So, order your rings with the pistons.

Ring gap, checked in the bore, is highly important. Set it to manufacturer's specs when assembling the engine.

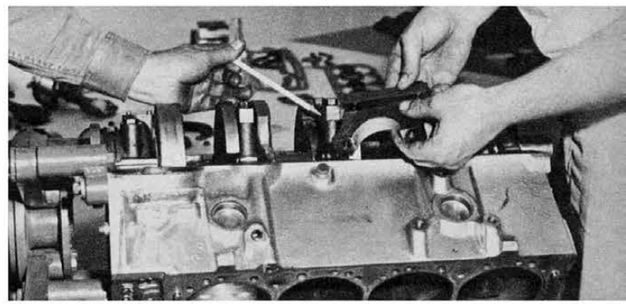
Special rings are available for the 360 bhp FI 327, incidentally, which will overcome some of the oil consumption and compression loss noted with factory pistons which were machined with grooves too narrow for adequate ring action.

CRANK ASSEMBLY INSTALLATION

A couple of admonitions are in order here. If the engine is to be more than a street-only machine powerplant, use a set of steel main caps. They are inexpensive and add strength where it is needed. There are only four to a set, the rear main never gives any trouble. Secondly, use only top grade bearing inserts. The factory Moraine 500 grade or equivalent is highly recommended. These are steel-backed aluminum, with a thin babbit overlay and a bearing of a similar type, but incorporating a new design feature, called "Multi-surface" is on the market. This insert is deliberately "out of round," to

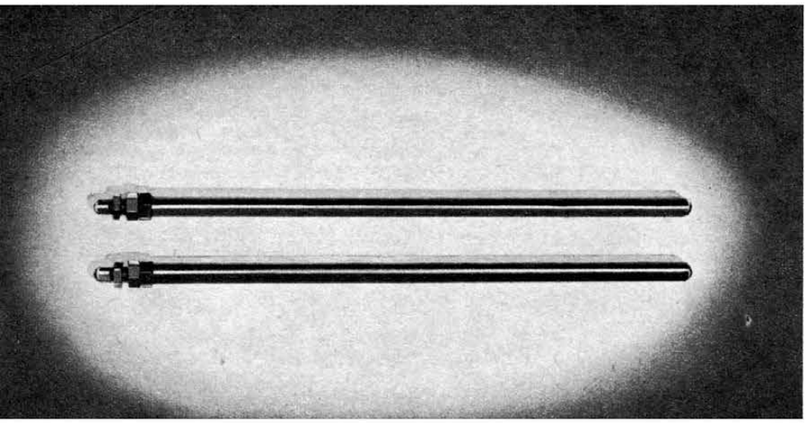


Supercharged, ultra high compression or long stroke engines should have heavy-duty main bearing caps installed. These are from C & T Automotive, other firms offer similar type.



ABOVE: Another method of stiffening mains is by strapping standard cap. Bottom end of Chevy will stand lots of abuse.

BELOW: Use of a number of precision measuring devices is necessary. Deck height of piston is checked by micrometer.



Special adjustable pushrods made from seamless chrome moly tubing are recommended by most cam grinders. Extra strength is required by heavy valve springs. Adjusting feature will compensate for reground camshaft lobes.

control oil film thickness at point of pressure and looks good. Crankshaft Company is the supplier.

No serious engine builder will install a crank assembly without a degree wheel, a dial indicator and a micrometer depth gauge, since establishing TDC and the deck height of each piston is an absolute necessity, stroker or stocker.

CAM AND VALVE TRAIN

Don't expect miracles from a camshaft. The advertisers who proclaim the victories won by users of their products are not exaggerating. They assume that you have enough sense to know that a lot of other factors entered into the building of a winning engine. It is true that the cam is the heart of the mill, but it alone cannot accomplish everything. It is a part of the whole combination which must be just right to outdistance the opposition.

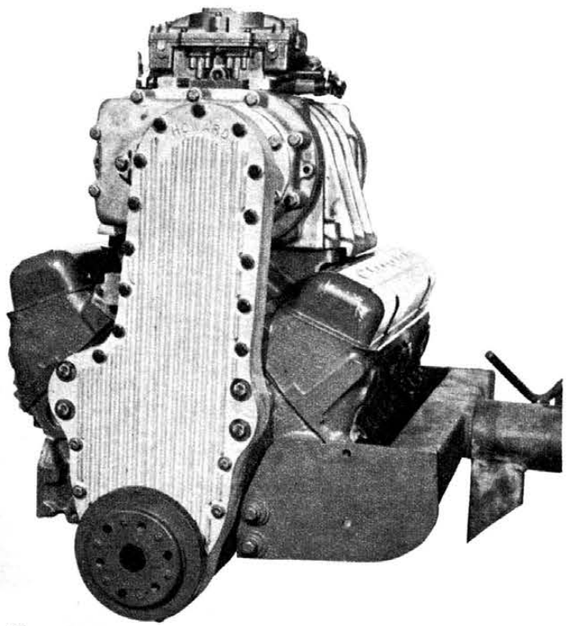
Especially in a cam is it necessary to sacrifice something in order to get something else. So, if you want more revs, more top end horsepower, you will have to give up a smooth idle and low speed torque. So, choose your cam for the exact purpose you have in mind. All cam grinders endeavor to give you pretty much the straight dope on the action of their various grinds. Allow a little leeway for enthusiasm, but you can trust their recommendations, generally speaking.

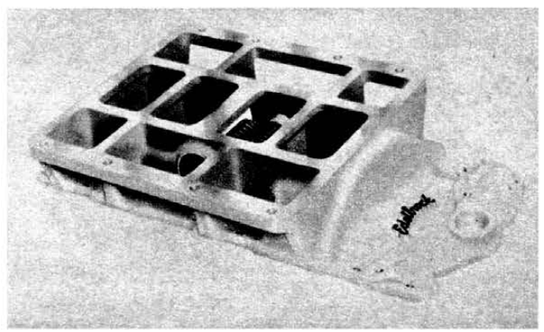
My analysis of a cam for Chevy has always been to stack it up against the Duntov SR grind on which we have complete data. True, it is primarily a road race grind, but it makes great all around cam with the carbureted engine. You can improve on it for acceleration or you can get a stick which will wind a Chevy tighter, but using it as a norm, it is easy to see which way to go. A top end cam will have much more overlap, an acceleration cam (one which works well from about 1,000 rpm on up) such as you would enjoy surprising friends at stoplights with, will have a swift lift and less overlap.

Either pin the rocker studs or replace the stock type with screw-in studs which are available at most speed shops. A hardened stud has been used in late high-performance engines and it is difficult to pin, if not impossible, so it is best removed and replaced with the threaded type. Also, keeping valve clearances after setting is made easier now with "Pos-a-locks" set-screw locking rocker stud nuts.

Valve springs should be matched to the cam, either Chevy or proprietary. The action of the cam will determine at what point float is to occur and there is no point in running more spring pressure than needed. A few more pounds will get you a few more revs out of a given cam but it is often dubious if you are accomplishing anything. By all means, bring your springs up to the newest specs, including installed height, which is critical, through the use of shims. The careful selection of individual springs often accomplishes more than adding tension, inasmuch as float will occur at the speed determined by the weakest spring. If you are not limited by stock regulations the easiest method is to order them from a reliable cam vendor who, presumably, rates each spring accurately.

Using aluminum retainers rather than the factory steel type is worthwhile, as is anything which lessens reciprocating weight.





ABOVE: Installation of supercharger calls for long list of accessories including special intake manifold and valley cover.

LEFT: Blower drive can be by chain, Gilmer (notched) belt or Vee belt when mounted atop engine. Alternate position is directly ahead of the powerplant, with direct drive from crankshaft.

BIG, BAD BLOWERS

There is nothing quite so spine tingling as the sound of a couple of GMC-blown dragsters at the starting line just after the flag comes up. There you have horsepower in the raw and it is not mild. To attain all that screaming thrust is not a casual bolt-on operation, needless to say. The care and feeding of GMC blowers and blown engines is a study in itself.

Chevys have been quite successful in the blown category, but here is where cubic inches begin to be a shade more important than weight and some of the bigger mills have passed the 265 Series in potential. However, they are not passé and numerous trophies are won each week by the little engines. Some have even been de-stroked to 233 cubic inches and twisted to the fantastic peak of 10,000 rpm under the impetus of a big compressor!

But these are strictly drag or Bonneville rigs, not for the dabbler and the cost is the highest.

If you are interested in this phase of Chevy modification, I'd suggest that you write to the manufacturers or distributors of blower kits: Moon Equipment, Bell Auto Parts (Cragar), Howard's Automotive, Iskenderian, etc., for recommendations.

MISCELLANEOUS

In this catch-all are a few reminders.

Increased oil capacity is necessary with a competition engine. Add to the pan or get a special eight-quart pan.

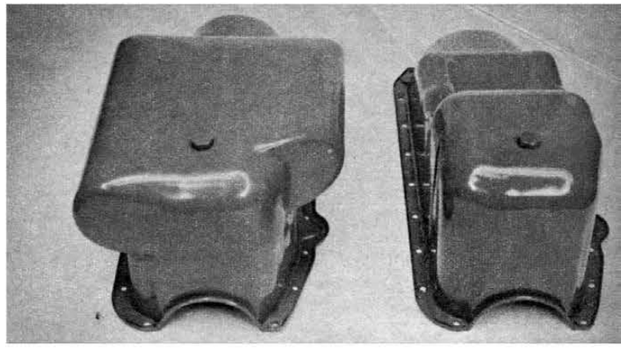
Increased fuel pressure or delivery rate is usually required. Chevy's heavy-duty pump (stock on 409's) is good, or an electric pump *ahead* of the mechanical type is a good investment.

The aluminum bearings (such as Moraine 400-500) have a high resistance to imbedding particles which would ordinarily be absorbed by regular babbit type. Thus dirty oil, carelessly left shavings or grindings will score the crank. Keep it clean. Use a heavy-duty oil filter of the full flow type.

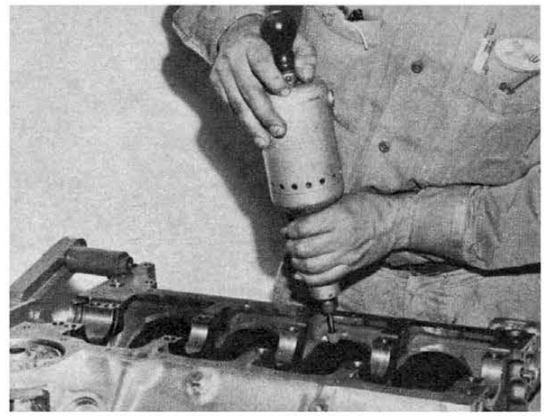
Renew the timing chain from time to time, whether it looks like it needs it or not. This is a critical area where power can be lost.

Keep it clean. The best engine you'll ever see will also probably be the cleanest.

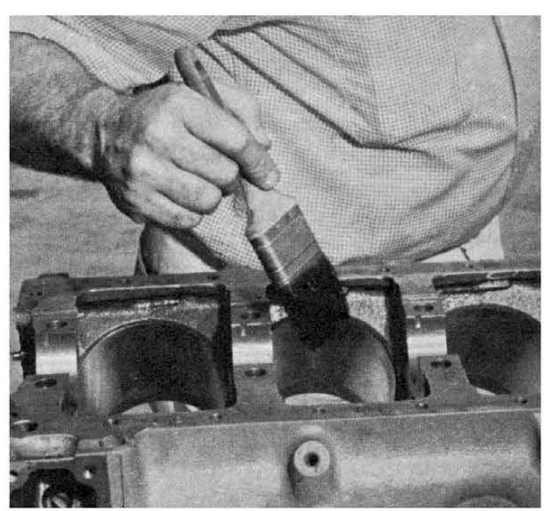
Now. You can pass on to the bigger and, if not better, certainly impressive "W" Series modifications, which are currently causing rodders to burn the midnight electricity all over the country. ■



Additional cooling for high-performance engine can be derived from large amount of lubricant. Capacities as high as ten quarts are used. Ten quart pan is shown alongside of the stocker.



Increased stroke often calls for notching Chevy block. Hand porting tool is being used here to establish clearance for larger counterweight of stroked crank. This does not reduce strength.



Cleanliness is next to Godliness in modifying. Thorough cleanup of block and all parts is part of pre-assembly.