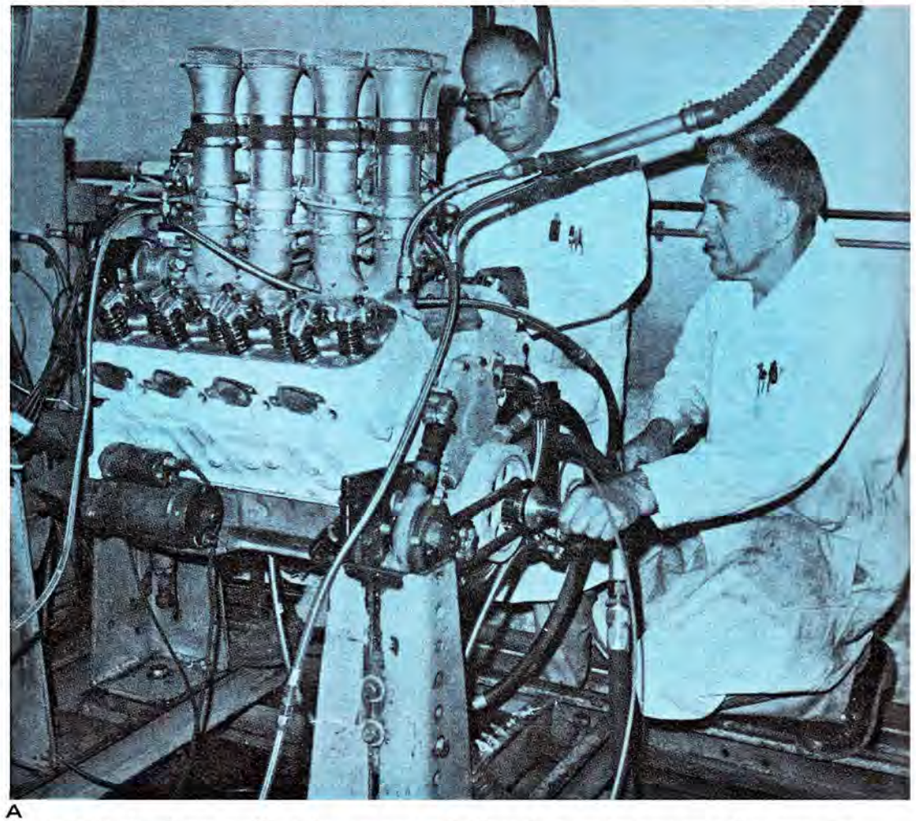
CHEVY'S 427: 600-PLUS

If racing's your game, let Traco show you how they wring out over 600 honest horses from Chevrolet's big one

Text and photos by Eric Rickman



A. Jim Travers, left, and Frank Coon combine their talents (under the trade name Traco) to build some of the most successful Chevrolets that have ever run. Here they set valve lash prior to a dyno run. Note the special Traco injector system. B. The larger late model intake valve is undercut at an angle of 20 degrees to improve the intake fuel flow. C. Two extra oil holes are drilled in pin bosses to insure oiling the hard-chromed Traco pin floating in the steel journal. D. Porting and polishing are done by Lockerman to further assist smooth fuel flow in the aluminum heads. Intakes need only polishing; tests show porting helps very little.

Chevrolet's prototype 427 engine made its debut in '63 in the Daytona 500, just after GM announced their no-racing policy. After a mediocre showing, the engine went under wraps until March of '65, when a scaled-down production version became available in a 396 cubic inch configuration. In the fall of '66, the new 'Vette with the L-36 cast iron 427 cubic inch engine was unveiled, and in early '67, the present L-88 heavy-duty, high-performance, aluminum-head model made the scene.

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To get the low-down on just what the latest developments in the 427 engines are, we took our trusty Hasselblad and trekked out to the Culver City shop of Jim Travers and Frank Coon, known to the trade as Traco. Jim and Frank have been having a great deal of success building Chevrolet engines for both the Canadian-American and the Trans-American racing circuits. The Can-Am association runs the Group VII unlimited sports cars, while the Trans-Am circuit races stock-bodied cars such as Camaros, Javelins and Mustangs. Thanks mostly to Traco, Chevrolet has enjoyed a phenomenally successful year on both circuits.

One of the most startling things we learned is that the L-88 engine (No. 3952315) is, right out of the crate, a near-perfect racing engine. Traco blueprints the engine and makes one major change, more for insurance than any other reason, and that's it. For all-out performance, they send the aluminum heads out to Lockerman for a port and polish job. Factory testing has shown that the intake needs no help; the exhaust can be aided somewhat with a bit of porting.

After close inspection of the disassembled engine, you begin to get the impression that Chevrolet's engineers have been paying attention to the things that Pink, Black, Zeuschel and other top engine builders have worked out over the years. For example, the crank is a forged steel unit that has been nitride-hardened; the mains have cross-drilled and chamfered oil passages. In addition, the block's oil galleries have been tapped and plugged — an old hot rod trick. Nothing need be done to the crank except fine balancing; the factory tolerances aren't close enough (for racing) to suit Traco. The block has extra-heavy webs, with four-bolt main caps. When Traco lays the crank in the block, they hold the intermediate bearing clearances to .0025-inch, with .003- to .004-inch rear main clearance. Stock heavy-duty Moraine 10400 bearings are used, and end play is held between .005- to .007-inch. Close bearing tolerances are held by having a supply of stock .0005- to .001-inch-undersize bearing shells handy. You can close a .003 gap to .0025 by switching the lower half bearing shell for a .0005-inch-undersize shell.

Traco had some wrist pin problems with their small-block engines, and as a result, have made up some special pins of 4130 steel — taper-drilled, hardened, centerless-ground and hard-chromed. With a perfect performance record for these pins, Traco uses them in the L-88 engine merely for insurance. The L-88 has full-floating pins; the stock rod has had the pin end dipped in a tinning alloy to smooth the steel-to-steel bearing surface. With the Traco pins, you have an alloy-dipped steel surface working against the hard-chromed pin. To insure oiling, Traco drills oil passages at both sides of the pin journal where it joins the rod web. The new heavy-duty, high-performance L-88 rods (No. 3942406) have already been shot-peened and magnafluxed at the factory. The rod cap bolt size has been increased from ⅜-inch to 7/16-inch, with body-fit bosses under the head and at the bearing parting line. If you use these rods in an early block, the lower edges of the cylinder wall will have to be notched to clear the larger nuts.

Traco carefully checks the rods for square in both the vertical and horizontal planes, then sizes the big end to a tolerance of plus or minus .0001-inch. The crank throws are "miked," and bearing shell combinations are selected to keep the rod clearances between .002- to .003-inch; total side clearance per throw is held between .016- to .020-inch.

With assembly oil over everything, the coefficient of friction changes and loading figures can be considerably off when using a torque wrench. Traco "mikes" the bolt stretch for absolute accuracy. When torqued to 70 ft-lbs, the 7/16-inch bolt shows .007-inch stretch; the ⅜-inch bolt shows .008-inch stretch when torqued to the recommended 50-55 ft-lbs.

The forged alloy 12 1/2:1 compression pistons (No. 3909857) are retained. These pistons take ring set No. 3879912, which has two chrome moly 1/16-inch compression rings and a 3/16-inch oil ring. Be sure to check the ring set; the two compression rings are 1/64-inch narrower than the passenger car ring. Install rings with a .026- to .030-inch end gap. If you switch to these later high-compression pistons, be sure to check valve interference. This should always be done, but particularly so in this case, because some early piston sets did get out that will hit the valves when using the higher-lift cam. Claying the piston top will serve, but Traco uses a more precise method. With a pair of valves installed in one chamber, the head's secured to the engine with a used (compressed) gasket. The cylinder being tested is then set at 20 degrees BTDC (before top dead center), and the valve free-travel is measured (with a dial indicator) from the seat to the point where it strikes the piston. These measurements are taken in 5-degree increments from 20 degrees before to 20 degrees after TDC. Once the engine has been assembled, these measurements are taken again, but this time the valve is being held by the valve spring, thereby giving a total-lift reading. By subtracting the final readings from the free-travel readings, the exact valve-to-piston clearance (in thousandths-of-an-inch) is determined. Traco holds the piston-to-wall clearance between .0065- and .0085-inch, and recommends that Spiralock retainers be used.

B

Looking at the other end of the valve train for a moment, two optional cams are on the market: a chain drive (No. 3925535) and a gear drive (No. 3925533). Both have the same specs: Intake lift is .540-inch, with a duration of 354 degrees, and exhaust lift is .560-inch with a 360-degree duration. Traco uses the gear drive cam, keeping the cam endplay between .003- to .006-inch. When converting to the gear drive, you must obtain a thrust plate, called a bearing unit (No. 3887871), and a new ignition drive gear; because the gear-driven cam rotates in the opposite direction to a chain-driven cam. Chevrolet won't sell an ignition gear alone, but Iskenderian has them in stock.

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With a stronger cam, it was found that the engine needed more oil topside to keep the rockers alive. Some of the late L-88 engines are arriving with reworked tappets that have an annular groove cut around the circumference at the oil hole. There is no mention of this modification in the specs, and no parts number, so we suspect some of engineering's experimental tappets got out by mistake. Traco accomplishes the same thing by milling a .0015 flat spot, on one side only, between the oil hole and the body relief of the stock tappet (No. 5231585). When installing the tappets, give the base a slight polishing with some 600 wet or dry paper on a surface plate; it makes 'em live longer. The valve train has been further strengthened by increasing the size of the pushrods from ⅜-inch to 7/16-inch (intake No. 3942416, exhaust No. 3942415). Use the high-performance rod guides (No. 3879620) with the larger pushrods. Check the new rods, as there has been a slight factory modification; the early rods have a steel ball welded to the tip, whereas the later, modified rods have the ball recessed into the tip so only half of it protrudes. These later rods are preferred.

Chevrolet has retained their stamped steel rocker arms, and Traco subjects them to a micro-seal process that embeds a dry lubricant into the metal surface. The lower edges of the stud opening are smoothed by grinding, which prevents the possibility of cutting into the stud. The increased oil flow is utilized in the rocker by providing a series of oiling slots in the bearing portion of the rocker pivot balls (No. 3899622).

To gain increased horsepower from your L-36 iron 427 engine, the first step in that direction would be a switch to the L-88 aluminum heads (No. 3919838). Next, of course, would be the addition of the optional high-performance cam and heavy-duty valve train to utilize the greater breathing capacity of the

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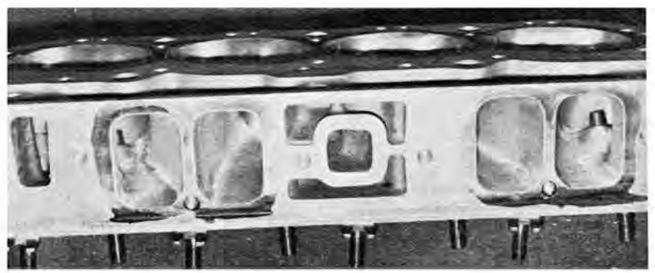

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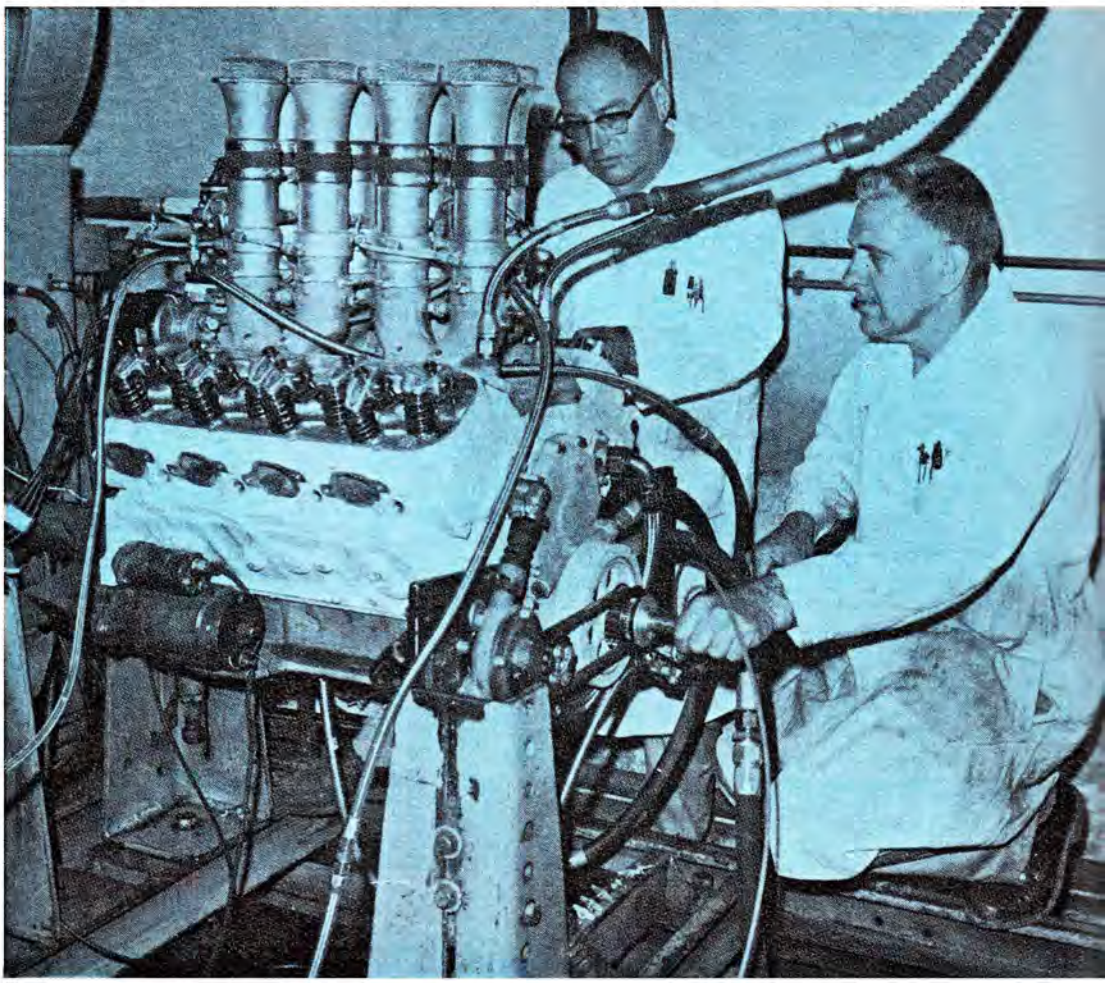

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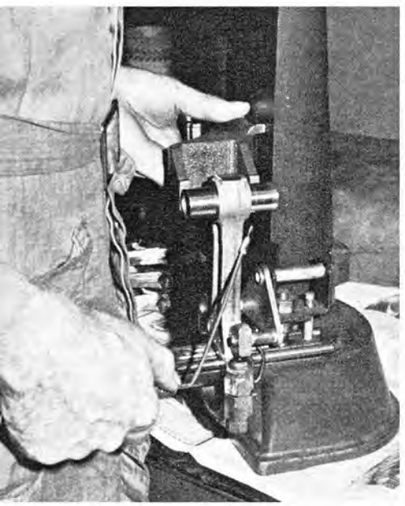

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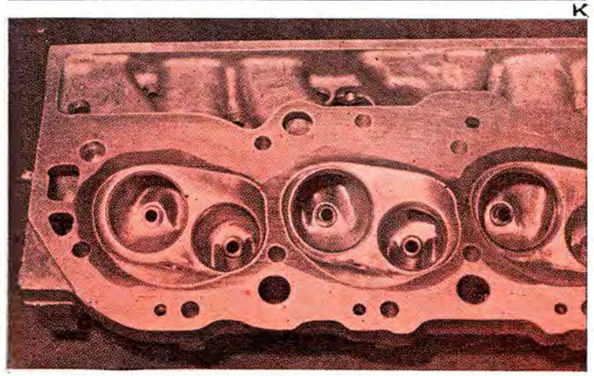

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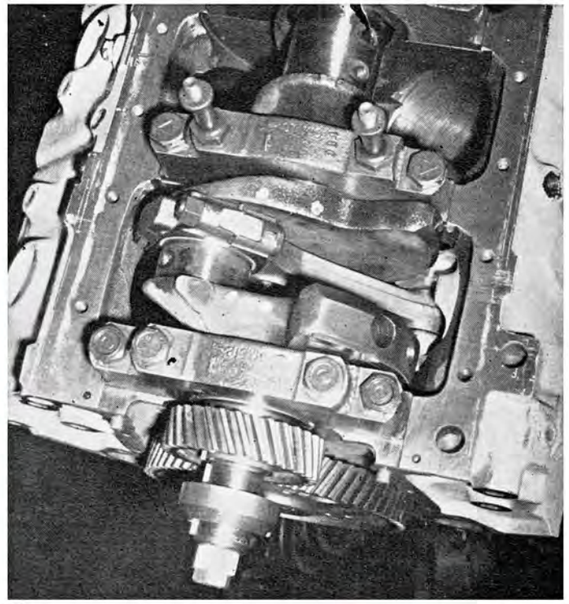

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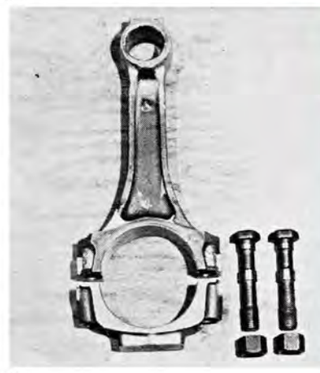

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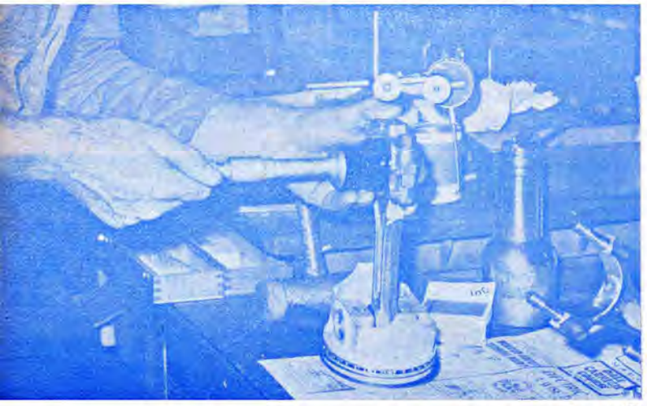

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late head. There is an even more recent modification that can be made to the aluminum head; for better performance, Traco installs the new heavy-duty valve spring (No. 3916164) with the stock spring retainer. When increasing the spring tension, it's advisable to install the heavy-duty rocker stud (No. 3921912), along with heli-coil (No. 452716), to anchor it firmly in the aluminum head.

Traco retains the stock valves: intake, 2.19-inch diameter (No. 33864808), and exhaust, 1.840-inch diameter (No. 3879619). The valves are reworked slightly by undercutting the head to a 20-degree angle, while the valve seats in the head are moved out to the edge of the valve, retaining a 3/64-inch intake seat and 1/16-inch exhaust seat. The valve seat inserts are Stellite and very hard to alter without the use of an orbital-type grinder.

As an example of Traco's attention to detail, all their cylinder displacements are kept within a .10cc tolerance. To accomplish this, the usual head cc'ing method is used; then a clear plastic cup of known displacement is placed over one of the cylinder bores, with the piston at TDC. Fluid from a burette is flowed into the cup till it's full, and the amount of fluid used is read directly from the burette scale. Subtracting the fluid used from the cup's known displacement gives the pop-up piston displacement (in this case, 43.5cc). Subtract this from the combustion chamber displacement, and you have the actual total cc combustion chamber displacement. This allows exact compression ratio figures.

If you don't have the bread to go for the aluminum heads, the later, larger valves can be installed in the cast iron heads; but the work should be done by an expert, as a good deal of reaming is necessary to open the ports. A full porting job should be done at the same time to utilize the larger valve area.

With the need for better oiling in the late engine, additional attention is given to the stock pump (No. 3904838). This unit already has the heavy-duty bypass spring, so Traco has only to disassemble the pump and check the gear end clearance. Both the case and end plate can be shaved with fine emery paper on a surface plate till the gear end clearance is between .001- and .002-inch. The pickup screen is already baffled to keep the pickup area in the center of the pan. Traco carefully locates the pickup 3/16-inch from the bottom of the pan, and then brazes the pickup tube to the pump body. With all the extra oil splashing around in the valve train valley, it's advisable to retain the stock sheet metal oil baffle plate under the intake manifold.

Apparently Chevrolet feels that the single four-barrel Holley is the way to go with their stock manifold, although there is an optional triple two-barrel available (primary, No. 3925517; secondary, No. 3902353). Use the '67 intake manifold (No. 3904574). Horsepower readings in excess of 600 have been seen with the four-barrel setup on a highly modified all-out racing engine, and you can't beat that kind of horsepower. Both single and dual four-barrel manifolds are available from various local manufacturers. Traco uses a very special injection system of their own design on their racing engines, but they're understandably mum on horsepower figures.

Chevrolet has a good thing going in the 427, and you can bet that in '69 there will be many more goodies coming up to make this good engine a really great one. This will include an improvement to make the 427 the best boat engine ever. Keep an eye on HRM; as soon as the stuff is available, we will tell you all about it — together with the parts numbers — so you can go harass your local friendly Chevrolet dealer. ■■

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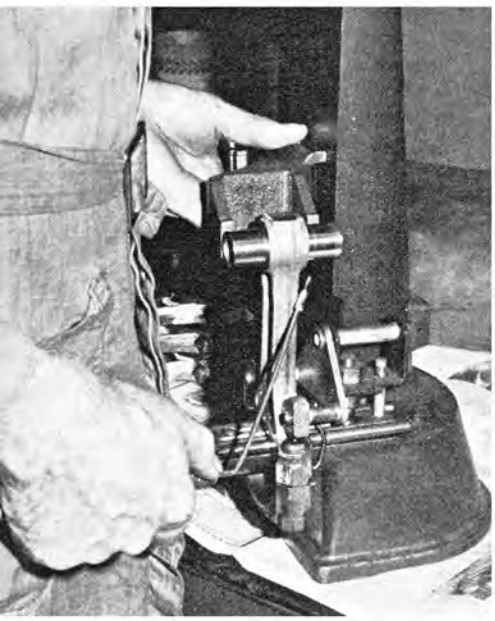

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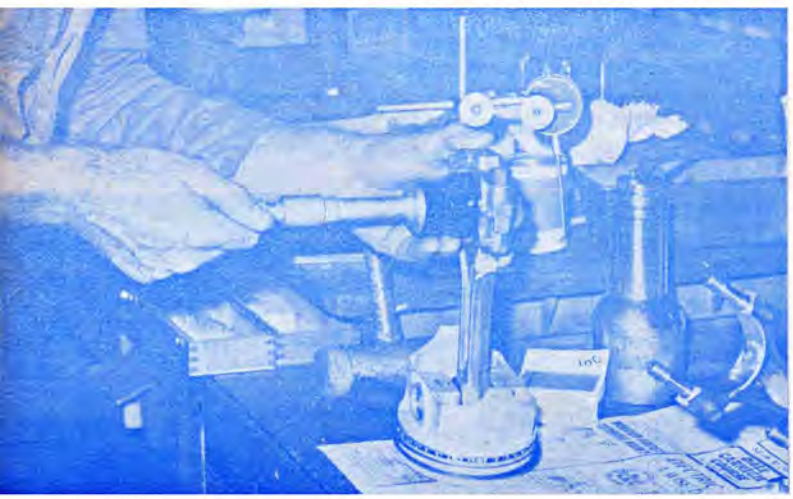

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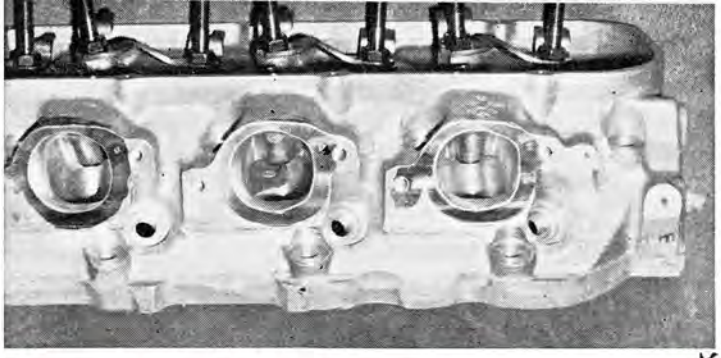
late head. There is an even more recent modification that can be made to the aluminum head; for better performance, Traco installs the new heavy-duty valve spring (No. 3916164) with the stock spring retainer. When increasing the spring tension, it's advisable to install the heavy-duty rocker stud (No. 3921912), along with heli-coil (No. 452716), to anchor it firmly in the aluminum head.

Traco retains the stock valves: intake, 2.19-inch diameter (No. 33864808), and exhaust, 1.840-inch diameter (No. 3879619). The valves are reworked slightly by undercutting the head to a 20-degree angle, while the valve seats in the head are moved out to the edge of the valve, retaining a 3/64-inch intake seat and 1/16-inch exhaust seat. The valve seat inserts are Stellite and very hard to alter without the use of an orbital-type grinder.

As an example of Traco's attention to detail, all their cylinder displacements are kept within a .10cc tolerance. To accomplish this, the usual head cc'ing method is used; then a clear plastic cup of known displacement is placed over one of the cylinder bores, with the piston at TDC. Fluid from a burette is flowed into the cup till it's full, and the amount of fluid used is read directly from the burette scale. Subtracting the fluid used from the cup's known displacement gives the pop-up



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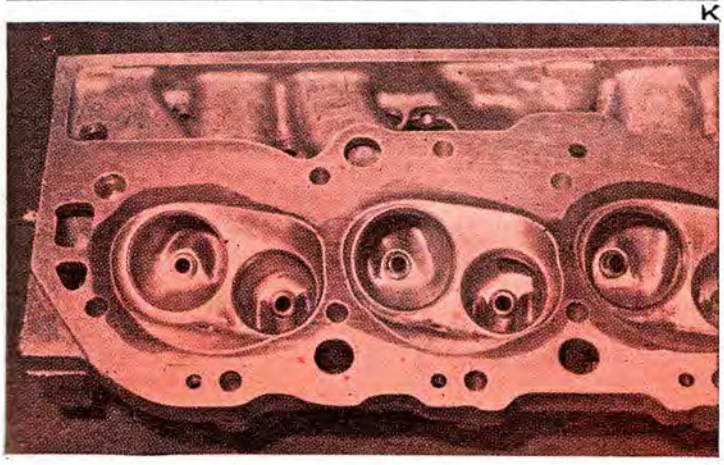

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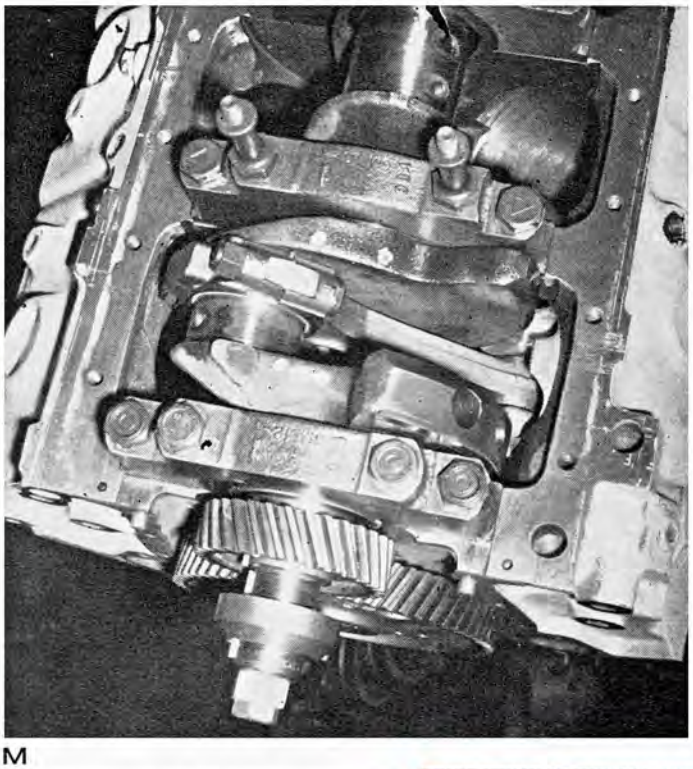

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piston displacement (in this case, 43.5cc). Subtract this from the combustion chamber displacement, and you have the actual total cc combustion chamber displacement. This allows exact compression ratio figures.

If you don't have the bread to go for the aluminum heads, the later, larger valves can be installed in the cast iron heads; but the work should be done by an expert, as a good deal of reaming is necessary to open the ports. A full porting job should be done at the same time to utilize the larger valve area.

With the need for better oiling in the late engine, additional attention is given to the stock pump (No. 3904838). This unit already has the heavy-duty bypass spring, so Traco has only to disassemble the pump and check the gear end clearance. Both the case and end plate can be shaved with fine emery paper on a surface plate till the gear end clearance is between .001- and .002-inch. The pickup screen is already baffled to keep the pickup area in the center of the pan. Traco carefully locates the pickup 3/16-inch from the bottom of the pan, and then brazes the pickup tube to the pump body. With all the extra oil splashing around in the valve train valley, it's advisable to retain the stock sheet metal oil baffle plate under the intake manifold.

Apparently Chevrolet feels that the single four-barrel Holley is the way to go with their stock manifold, although there is an optional triple two-barrel available (primary, No. 3925517; secondary, No. 3902353). Use the '67 intake manifold (No. 3904574). Horsepower readings in excess of 600 have been seen with the four-barrel setup on a highly modified all-out racing engine, and you can't beat that kind of horsepower. Both single and dual four-barrel manifolds are available from various local manufacturers. Traco uses a very special injection system of their own design on their racing engines, but they're understandably mum on horsepower figures.

Chevrolet has a good thing going in the 427, and you can bet that in '69 there will be many more goodies coming up to make this good engine a really great one. This will include an improvement to make the 427 the best boat engine ever. Keep an eye on HRM; as soon as the stuff is available, we will tell you all about it — together with the parts numbers — so you can go harass your local friendly Chevrolet dealer. ■■

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