
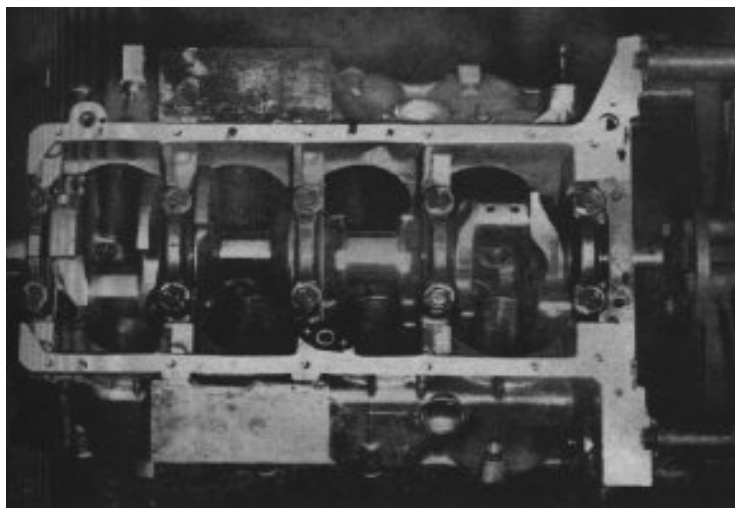


MODIFYING GM's ALUMINUM V8's

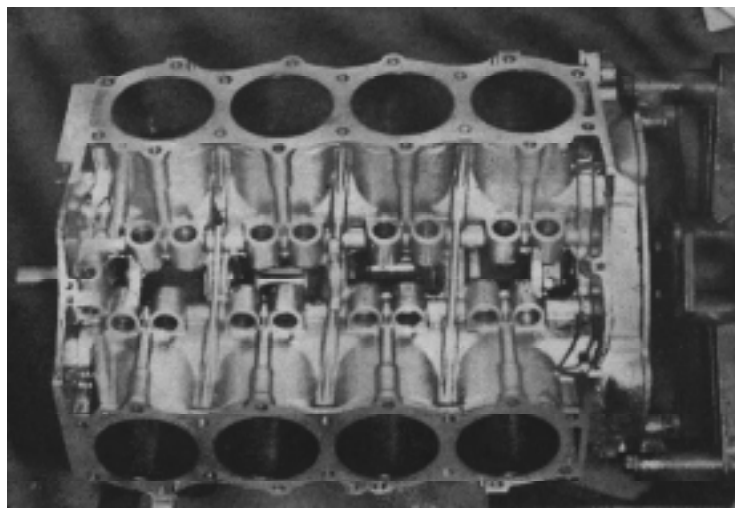
The 215-inch Olds F-85 and Buick Special engines need just a little help to make them real competitors in the small engine classes. Here's how to get better than one horsepower per inch by changing a few parts.



Vic Edelbrock checks the weight of the stock 215-inch Buick Special engine and discovers it weighs 266 pounds. Stock cast iron flywheel weighs 23 pounds extra, exhaust manifolds 21 lbs. and the generator 21 pounds. For a competition machine, weight could be under 275 lbs.



Bottom view of both the Olds and Buick appear the same with cast nodular iron crankshaft and steel main caps. Cast iron Cylinder liners are cast directly into the block, otherwise no inserts are used. All bolt holes tap into the aluminum



Top views of the blocks is also the same although Buick does not use the bolt holes at the top of each cylinder to hold down the heads like the Olds. There are two main oil galleries, each intersecting in a row of lifter bores while supplying bearings

by Ray Block (re-edited by Oliver Praudisch)

The second year of the "Compact Age" is in full swing now and at least two of the engines in the latest crop show qualities which should make them extremely popular among those with an outlook for performance. The two engines referred to are the new aluminum V8's used in the F-85 Oldsmobile and the Buick Special. Pontiac Tempest also offers an optional V8 but it is purchased from Buick and is identical in all ways to the Special engine. So, everything that applies to the Special engine in our story is ditto for the Tempest V8.

Our first look at the aluminum V8's came when the small Olds and Buick cars were introduced last fall but our observations were restricted to what we could see by lifting the hoods of the cars. Our second look came last December when we saw a pair of the engines being uncrated at the Edelbrock Equipment Company in Los Angeles where they were planning to make a series of dynamometer tests. We were invited to participate in these tests to develop speed equipment for the engines. In so doing, we were able to really get a thorough picture of the little engines as we witnessed and even helped tear the engines down, swap parts around, put them back together and then check results of the experiments on the dyno.

Olds F-85 and Buick Special V8's are quite similar. Both use a 3.50-inch bore and 2.8-inch stroke for 215 cubic inches. Both are rated at 155 horsepower for their standard engines although the Olds rating is at 4800 rpm while Buick's peak power rating is at 4600 rpm. In the advertised torque department, the Olds is rated at 210 pounds/feet at 3200 rpm while the Buick is rated 220 lb/feet at 2400 rpm. A 10 pound difference in torque is easy to understand but the big difference in maximum torque rpm doesn't make sense especially when engines are so nearly identical. A power and torque curve we found in an Olds manual leads us to believe that the Olds rating at 3200 is correct while the Buick maximum torque speed of 2400 rpm is probably a typographical error. Tests made on Edelbrock's dyno showed Buick maximum torque to be between 3100 and 3200 rpm.

Comparing the two engines part for part, we found almost everything below the cylinder heads interchangeable. Cylinder blocks are aluminum with ridged iron liners cast into the block. Everything else about the blocks is aluminum

with no inserts for cap screws, etc. Part numbers are different for the Buick and Olds blocks but except for a minor difference in the exterior surface around the rear of the blocks, they appeared identical. All interior measurements were the same. Olds blocks use a six-hole pattern around each bore for cylinder head cap screws while Buicks use only five but the Buick block had the extra tapped holes required by the Olds even though they weren't used. Steel main bearing caps were fitted to the "Y"-type block which has the bottom skirt well below the center line of the crankshaft for added main bearing support.

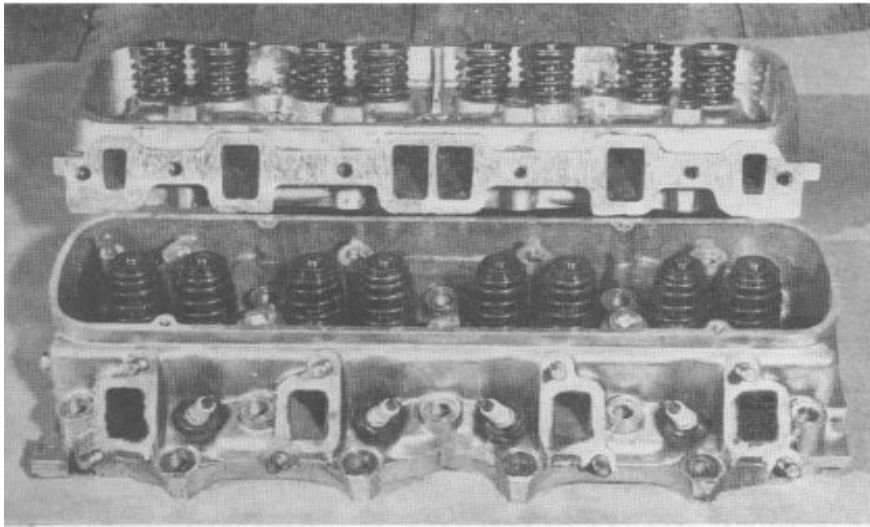
Crankshafts for the Olds and Buick engines share the same GM part number so are obviously identical. They are cast of Pearlitic malleable iron with 2.3-inch main bearing journals (less clearances) and 2-inch rod journals. Main bearing inserts are steel-backed Moraine with a babbitt overlay; number three main is fitted with thrust surfaces. Suggested main clearance is .0005-.0021 with crankshaft end play .004-.008 inch.

Connecting rods for the two engines share the same GM part number so are identical. Automobile Manufacturers Association specifications indicated a difference of one-third ounce (17.89 oz for Olds versus 17.55 oz for Buick) in rod weight but when the two engines were balanced by Edelbrock during the test program, they checked out within .1 ounce between engines. Rod bearings are also Moraine 100-A steel-backed babbitt with recommended clearances of .0002-.0022 inch and .006-.014 inch end play for two rods.

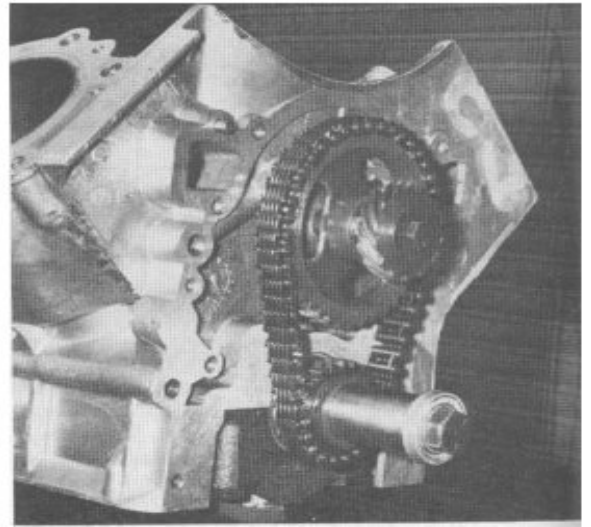
It's not until you get up to the piston department of the engines that you see a visible difference between the small V8's. Olds uses a flat-top piston while Buick's piston is a dished-top variety. Piston weights vary somewhat too with the Olds piston almost 3/4-ounce heavier than the Buick. Piston pins for the two engines are another common item as they have the same GM part number and are a press fit into unbushed upper rod ends.

Cylinder heads for the engines are completely different, both Olds and Buick used a variation of their larger V8 chambers. The little Olds head has a definite wedge chamber while the Buick head uses an oblong hemispherical chamber. Olds intake and exhaust valves are side-by-side across

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Cylinder heads for the Olds and Buick engines share the same spacing for intake ports, also the for exhaust, so their intake and exhaust manifolds are interchangeable. Olds head (front) is fitted with taper-wound valve springs, Buick uses straight wound but pressures for both are close.



Crank is well supported in deep block. Drive gear for the distributor and oil pump is keyed to camshaft and held in place by bolt. During the dyno tests, rapid wear was noted on the drive gear.

MODIFYING GM's ALUMINUM V8's continued

the center of the cylinder bore while the Buick valves, also side-by-side, are crowded over more toward the upper side of the bores. Buick's spark plug location is almost in the center of the cylinder while Olds' is in the top of the wedge, nearer the bottom edge of the cylinder bore. The larger capacity of the Olds chamber teams with the flat-top piston to give a compression ratio of 8.75:1 while the small Buick chamber and extra volume of the dished-top piston add up to give a 8.8:1 ratio.

Both cylinder heads use the same pattern and spacing for intake and exhaust port openings. Intake ports are close in design for the two engines but the Buick exhaust is typically Buick in design with a small, restricted port beneath the valve, flaring out as it reaches the manifold. Olds' exhaust port appears less restricted. Exhaust manifolds for the two engines are almost the same in appearance but have slightly different flange designs where they enter the exhaust pipes so use different part numbers. Except for the flange difference, they are interchangeable.

Valve trains for the two engines start out the same at the camshaft but change as they reach the head region. Both engines use the same camshaft and hydraulic lifters. Although timing figures on the AMA specification sheets released by Buick and Olds do not jibe, part numbers were the same on, the camshafts in the two test engines as well as in the parts books. Evidently, one manufacturer listed total timing including clearance ramps while the other listed effective timing at the valve. Using this theory, we will choose the lesser timing figures as effective and they are: Intake opens .22' BTC, closes 580 ABC for 2600 duration; exhaust opens 600 BBC, closes 200 ATC for 2600 duration and 42' overlap. Total lift for both intake and exhaust valves is .384-inch.

Pushrods, although of the same solid forged design with upset radiused ends, are slightly different in length. This is due to valve length and rocker arm design. Olds uses steel rocker arms with a ratio of 1.6 to 1 and a slight offset between pushrod and valve ends. The aluminum stands which support the rocker shaft are held in place by four

long cap screws which go completely through the head and into the block helping to hold down the heads as well as the rocker shafts. Oiling for the rockers comes from the main oil galleries, one on each side of the lifter chamber. These galleries run the length of the block and intersect the lifter bores with passages drilled to camshaft and crankshaft main bearings. Rocker oil passes through a passage up to the top of the block, then into a groove across the face of the Olds cylinder head where it then goes up through the head, around the front rocker stand cap screw and into the hollow rocker shaft.

Oiling for Buick rockers is similar except that the oil passage between the block and the front rocker stand is via a slant-bored passage in the Buick head. The Buick rocker arms are also 1.6:1 ratio but they are forged aluminum with pressed-in steel buttons on the valve end and sockets on the pushrod end. Buick rocker-shaft-stand assemblies fasten directly to the cylinder head, instead of on through into the block.

Valve sizes for the two engines are of similar dimensions although the Olds does use slightly larger intakes (1.522 vs. 1.500 inches) and exhausts (1.353 vs. 1.313 inches). An interesting item in the valve department of the engines is the fact that both use tapered valve stems but they each have their own ideas on the matter. Buick uses tapered valve stems on both intake and exhaust valves so they have .0005-inch more assembled clearance at the bottom of the guide than at the top. Olds tapers only the exhaust valve stem but they give .001-inch extra clearance at the bottom of the guides. AMA published valve stem sizes are .002 larger on the Olds and this plus about 1/4-inch extra length cancels, any ideas of interchangeability between the engines. One last difference, Olds uses a flat headed intake valve and tuliped exhaust while Buick reverses the order with a tuliped intake and flat exhaust.

Valve seat inserts are used by both Buick and Olds in their cylinder heads but each evidently has its own preference in material. Olds calls their seats steel, while Buick refers to theirs as sintered iron. The Olds seat seems to be

pressed into the head and the the aluminum head material crimped down over the top edge of the seat to lock it in place. Buick's seats appear to be pressed into place without any crimping. During the tests, a Buick head was ported too far in an attempt to improve breathing and had to be replaced. Just to check how secure the seats were, we popped a couple of them out but not without considerable difficulty. We tried to heat a spot on the seat red hot, then cool it quickly with an air hose to crack the insert but the aluminum head carried the heat away so fast that we had a hard time getting the seat hot enough. After this episode, we predict that the valve seats will not present any problems in normal service--they are in to stay.

Intake manifolds are different in appearance between the two engines but they will interchange from engine to engine since the intake port and bolt pattern in the Buick and Olds heads are the same. Olds uses a cast dam around the top of the manifold which matches a stamped steel air cleaner top that completely encloses the carburetor. Buick uses a conventional type air cleaner which covers only the top of the carburetor so does not use the raised dam.

The rest of the engine components are interchangeable; water pump, oil pump, fuel pump, timing sprockets and chain, timing cover, flywheels, etc. Even the starter and generator will interchange although they do have different part numbers. Comparing the Buick and Olds engine in broad terms, they are the same except for cylinder heads, piston design and part of the valve train.

Getting into the actual dynamometer test section of the comparison, we made more than thirty test runs on various combinations of compression, carburetion, cam timing, exhaust systems, ignition timing, porting, etc. We had first one, then the other engine on the dyno over a three-month period and accumulated a number of reports which we have sorted through to get facts for this story. Some of the tests did not prove anything or were repetitious so we discarded them. We also have changed the order in which the reports were compiled so that we don't have to jump back and forth from one engine to another.

The performance figures were compiled on Edelbrock's 700 horsepower Clayton dynamometer. The dyno is located in the rear of Edelbrock's large machine shop and we found the temperature to always be within a couple of degrees of 70 F during the middle of the day when we made our runs. Barometric readings were recorded from a barometer mounted next to the dyno and variations were very slight. Since atmospheric conditions were so uniform during our tests, we made no attempt to correct readings for temperature, barometric pressure and humidity, they were recorded just as observed on the dyno gauge.

We started out with the Olds engine first on the dyno so we will lead off with the Olds results and then follow up with the Buick. By checking the horsepower chart on this page, the results of the various changes we will describe can be noted throughout the entire rpm range.

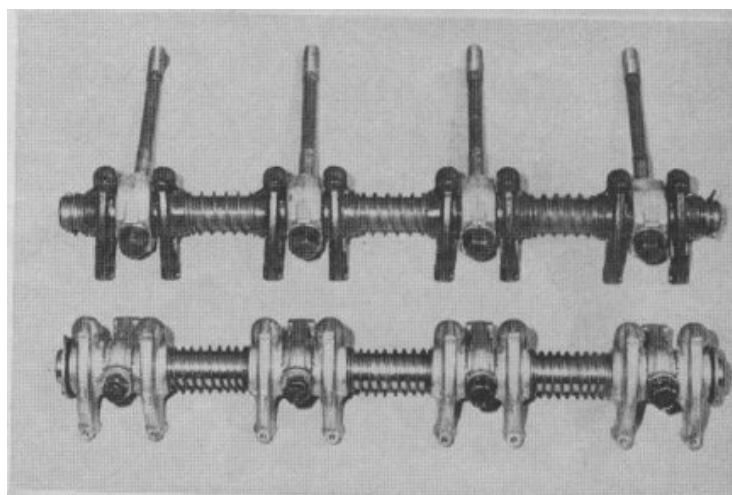
OLDS #1-The 215 cubic inch F-85 engine was completely stock for the first test but did have 61/2 hours of run-in time on the dyno at various speeds and under various loads. No fan or generator was used but the water pump was operating. The vacuum line to the distributor was disconnected since full throttle tests would not provide any vacuum advance anyway. Since our objective was for the best possible power, not economy, the primary jets on the two-barrel Rochester carburetor were changed. Stock jets were .046-inch. We tried both .048 and .050, finally choosing the .048-inch jets since they gave the best power.

Ignition was power timed at 4000 rpm with a full load and proved to be 130 initial advance. Coupled with the 22 degree centrifugal advance in the stock distributor (AMA specs call for 26), the total advance used was 35. We checked

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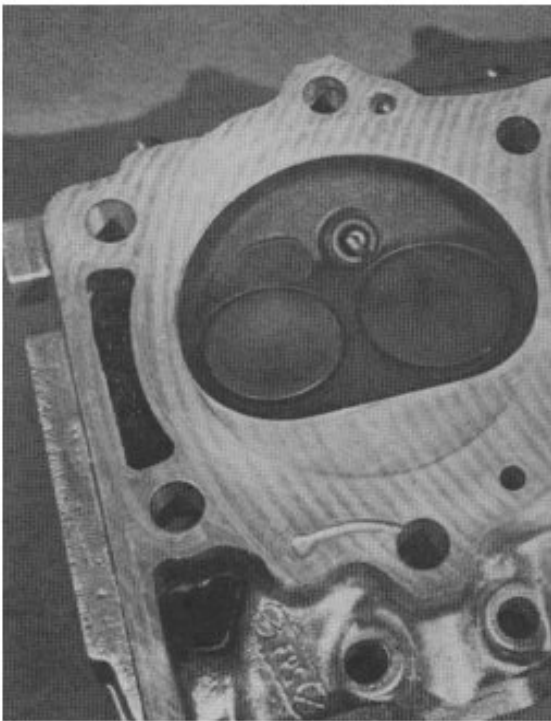
1961 BUICK SPECIAL 3.5 LITRE V8

| TEST | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 |
|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 73 | 93 | 113 | 128 | 137 | 139 | 136 | | | |
| 2 | 73 | 96 | 121 | 135 | 147 | 153 | 156 | | | |
| 3 | 69 | 94 | 122 | 140 | 161 | 174 | 177 | | | |
| 4 | 69 | 93 | 116 | 140 | 166 | 189 | 207 | 214 | 215 | |
| 5 | 70 | 93 | 118 | 146 | 171 | 197 | 213 | 222 | 226 | 220 |
| 6 | 73 | 93 | 115 | 146 | 173 | 198 | 217 | 226 | 230 | 226 |
| 7 | 71 | 93 | 114 | 148 | 173 | 198 | 218 | 230 | 233 | 233 |
| 8 | 71 | 93 | 114 | 148 | 171 | 197 | 215 | 229 | 231 | 231 |



1961 OLDS F-85 3.5 LITRE V8

| TEST | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 |
|------|------|------|------|------|------|------|------|------|------|------|
| 1 | 69 | 90 | 110 | 122 | 130 | 135 | 130 | | | |
| 2 | 68 | 87 | 110 | 125 | 134 | 140 | 137 | | | |
| 3 | 70 | 91 | 112 | 133 | 149 | 156 | 155 | | | |
| 4 | 75 | 98 | 118 | 134 | 146 | 150 | 150 | | | |
| 5 | 74 | 94 | 123 | 140 | 159 | 170 | 172 | | | |
| 6 | 68 | 86 | 112 | 133 | 163 | 179 | 189 | 194 | | |
| 7 | 60 | 77 | 103 | 130 | 154 | 175 | 187 | 192 | 192 | 187 |
| 8 | 68 | 83 | 109 | 145 | 161 | 181 | 197 | 201 | 200 | 191 |
| 8a | | | | | 164 | 183 | 198 | 208 | 213 | 208 |
| 8b | | | | | 168 | 187 | 202 | 208 | 213 | 208 |
| 9 | | | | | | | 203 | 212 | 217 | 223 |
| 10 | | | 109 | 144 | 165 | 188 | 205 | 211 | 217 | 213 |
| 11 | 63 | 85 | 104 | 136 | 156 | 177 | 191 | 200 | 203 | 199 |



MODIFYING GM's.

ALUMINUM V8's continued

the power readings in 500 rpm steps and recorded a maximum observed reading of 135 hp at 4500 rpm. Although some 20 hp less than the advertised 155, this is very good for a production engine with normal manufacturing tolerances and not too much break-in. Power fell off at 5000 rpm and an attempt to get a power reading above this speed was not successful as the valves started floating audibly at about 5300 rpm.-

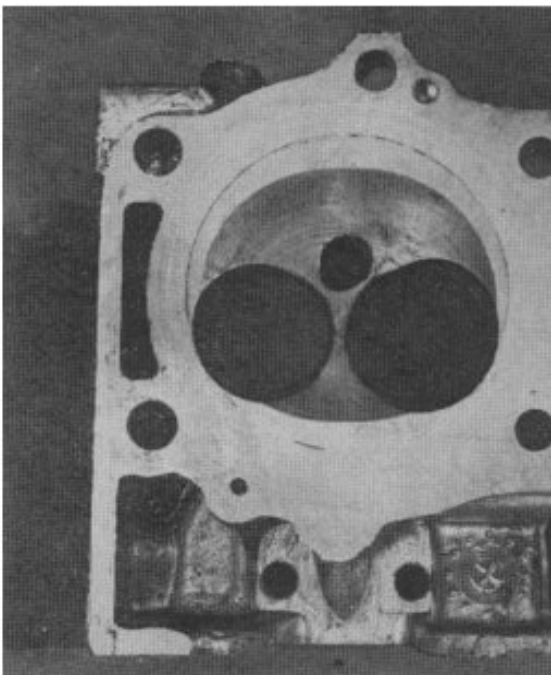
A subsequent check of the combustion area with a piston at top center and both gasket and cylinder head in place showed the actual compression of our tests Olds to be 8.6 to 1 instead of the advertised 8.75. This figure, too, although slightly low, is very close compared to various production V8's we have checked in the past.

OLDS #2 -For the second test, we made a simple change, one which any F-85 owner could easily make, and picked up a quick 5 hp at 4500 rpm. The change was to install a slightly larger Rochester carburetor in place of the stock carburetor. The stock Olds Rochester has two 1-inch venturii while the one we installed was designed for a 283-inch Chevy and has 1 3/32-inch venturii. The extra venturi area gave more power at all steps above 3000 rpm and provided the necessary extra intake charge to keep the power from dropping off rapidly above 4500. With the larger carburetor, power was 7 hp better at 5000 rpm. Although this doesn't sound like much, remember that this is a small displacement engine and we are not starting out with a lot of power. Jets in the larger Rochester were juggled a bit but worked best with stock .057 jets.

TOP - Olds chamber is wedge design with valves side by side across center of cylinder bore. Six bolt pattern around each cylinder ensures very good seal.

CENTER - Three pistons used during test were: Stock Buick, left t, which has dished top; stock Olds with fl@t top; JE high compression for Olds with pop-up top which boosted ratio to 12.3:1.

LEFT-Buick's chamber is semi-hemispherical in shape with small pockets for valves. With flat top Olds pistons, ratio was 12:1. Stock ratio is 8.8:1.



OLDS #3 - For this test, the engine was left completely stock except for the., installation of Edelbrock's new dual intake manifold and two stock Olds 1-inch venturi carburetors. Jetting was adjusted by trial .002 larger than stock with .048-inch jets in both carburetors. This move really confirmed the suspicion that the little V8's are well restricted for fuel economy reasons as the engine responded with increased power throughout the entire range. The maximum power reading was 156 hp, 21 more than stock. Compare test #1 and #3 on the -Olds horsepower chart to see how much difference the dual manifold, made throughout the whole rpm range, OLDS #4 -Back to stock again for this next test except that a set of JE experimental high compression pistons were fitted and the crank assembly rebalanced for the new pistons. Although the JE pistons had a raised head to increase compression, they were slightly lighter than the stock Olds pistons. Again the compression was checked by positioning a piston at top center, using wax to seal the gap between piston and wall, then bolting on a head with gasket and measuring the amount of light oil needed to fill the combustion chamber through the spark plug hole. The compression ratio was increased from 8.6 to 12.3 to 1 with the pop-up type pistons. Everything else in the engine was exactly as it was for test #1, a single stock carburetor with .048 jets, 35° total timing, stock exhaust, etc.

The increase in compression helped throughout the entire rpm range reaching a maximum horsepower reading of 150 at both 4500 and 5000 rpm. Power was up about 10% all the way from 2000 rpm to 5000 rpm.

OLDS #5 - The -next obvious test.- to make was a combination of #3 and #4, the high compression pistons and the dual intake manifold. The rest of the engine was left stock and spot checks made to see how well the stock AC 46FF spark plugs would stand the increase in pressure. They showed signs of blistering so were replaced with a set of colder Champion J 63R side-electrode plugs.

Carburetion and compression really made the little engine start to produce. Maximum power was jumped to 172 hp at 5000 rpm, an increase of 37 hp or 27% above the maximum power reading when stock.

OLDS #6 - The next step we took was to further improve the breathing ability of the engine. This we did by installing a camshaft reground by

Iskenderian to his E-4 grind. The stock hydraulic lifters were also replaced with Isky solid lifters and a set of adjustable pushrods used. Dual valve springs were installed in place of the single progressively wound stock spring. Another addition at this point was the installation of a Spalding dual-coil ignition in place of the stock distributor. We had not experienced any trouble with the stock ignition up to this point but with the extra compression and higher engine speeds anticipated, we knew that we soon might.

So, as we prepared for the dyno test, the stock engine had been modified to the following degree: High compression (12.3:1); dual intake manifold with two stock carburetors; Iskenderian E-4 cam and kit; and a Spalding ignition. We power timed the engine at 4000 rpm and ended up with .320 total advance. As we expected, the increase in camshaft timing cost us some power at the lower engine speeds but by 4000 rpm, the extra breathing started paying off as power went up at a rapid pace. We reached a maximum reading of 194 hp at 5500 rpm. Attempts to get a steady reading at 6000 rpm were unsuccessful as there was audible valve float just below 6000. Again, we had improved the power but the comparatively mild E-4 cam and springs would not reach the rpm's we wanted.

OLDS #7 - Another cam was sent over by Iskenderian, this time an E-2 grind with a stronger set of dual valve springs. We installed them but everything else was left exactly as it had been for test #6. The increased timing on the E-2 cam again shaved its share off the lower rpm power but started picking up above 4000 rpm. Power did not quite match the E-4 grind at its maximum, falling 2 hp short with 192 at 5500 rpm, but the engine could be turned an extra 1000 rpm with good power. A full load check was made at 7000 rpm and no audible valve float could be heard but power was off substantially.

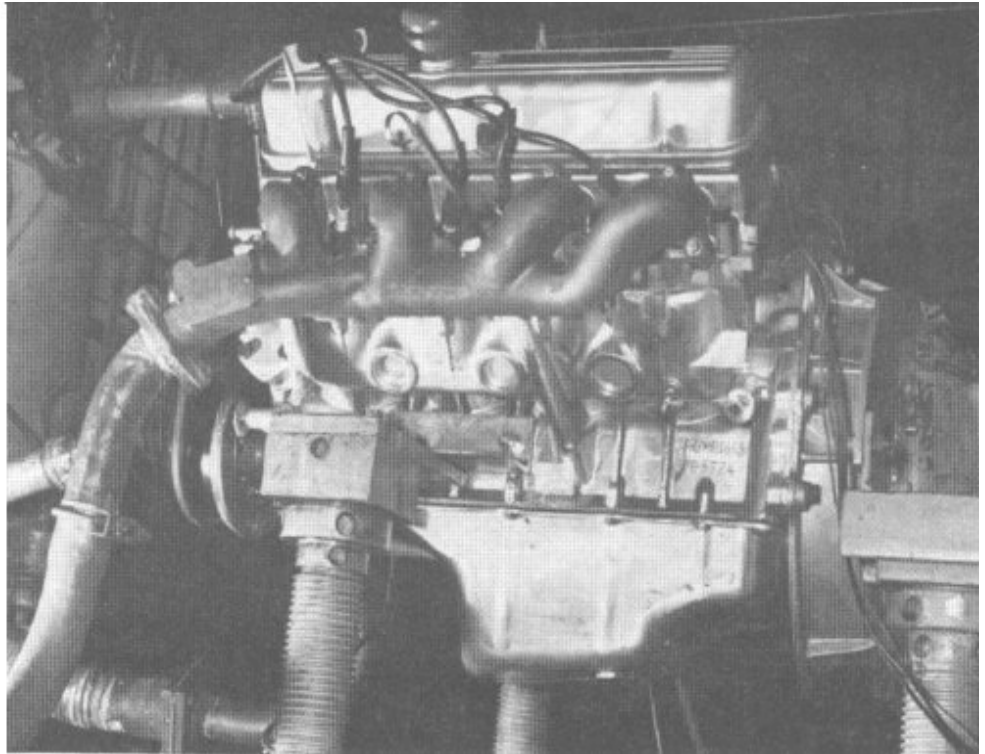
OLDS #8 - A set of special Hedman headers were installed for this test with everything else left exactly as it had been for test #7. Power was improved throughout the entire rpm range with a maximum reading of 201 hp reached at 5500, 200 hp at 6000 rpm. An interesting notation was that the low rpm power was improved more, percentage wise, than was the high rpm power. At one point, 3500 rpm, the difference between test #7 and #8 was an unbelievable 15 hp but we double checked it twice more and found it correct. At this point in the test, we double checked ignition timing again and found that we had lost about 30 total timing and had actually made this last run with only 29 total timing. A thorough

check was made to find just what had happened and it was found that the distributor and oil pump driving gear which bolts on the front of the camshaft and is not part of the cam billet, had worn badly and caused the retardation. We checked with the local Olds dealer and learned that they too had had this problem. We installed a new gear and rechecked for power.

OLDS #8A and #8B - For test #8A, we reset the total advance to 32 and started our checks at 4000 rpm. Power was up slightly at 4000 but improved quickly above 5500 rpm, show-

ing 13 hp better at 6000 rpm with a maximum reading of 213 hp. for maximum power. Since the effect of this change would not be noticeable at the lower speeds, we started our checks at 5000 rpm. Power was improved 4 hp at both 5500 and 6000 rpm but did not drop off above 6000 like it had with the smaller Rochesters and was 15 hp better at 6500 rpm.

We made further attempts to increase the power at this point by using larger .059 jets in the carburetors and increasing total timing to both 40° and 45° but could not improve on the 223 hp maximum reached with .057 jets and 36° total timing.



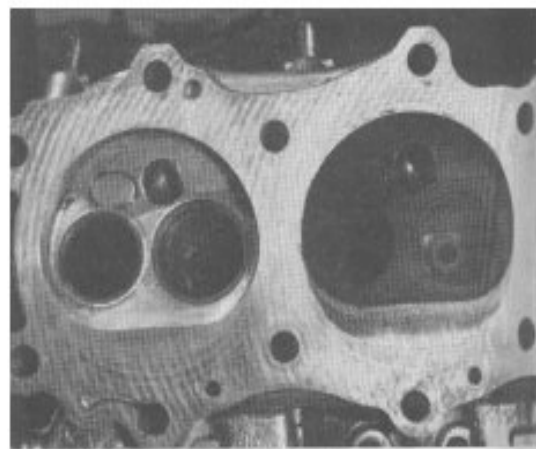
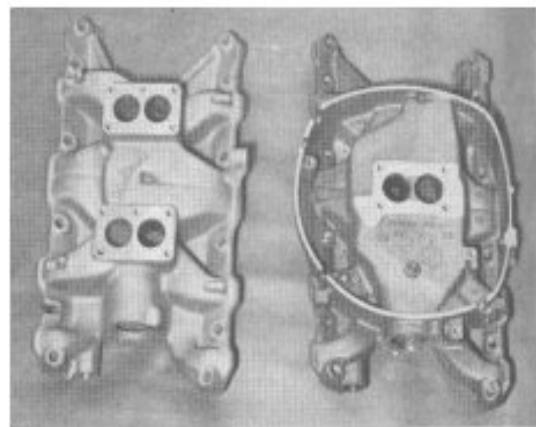
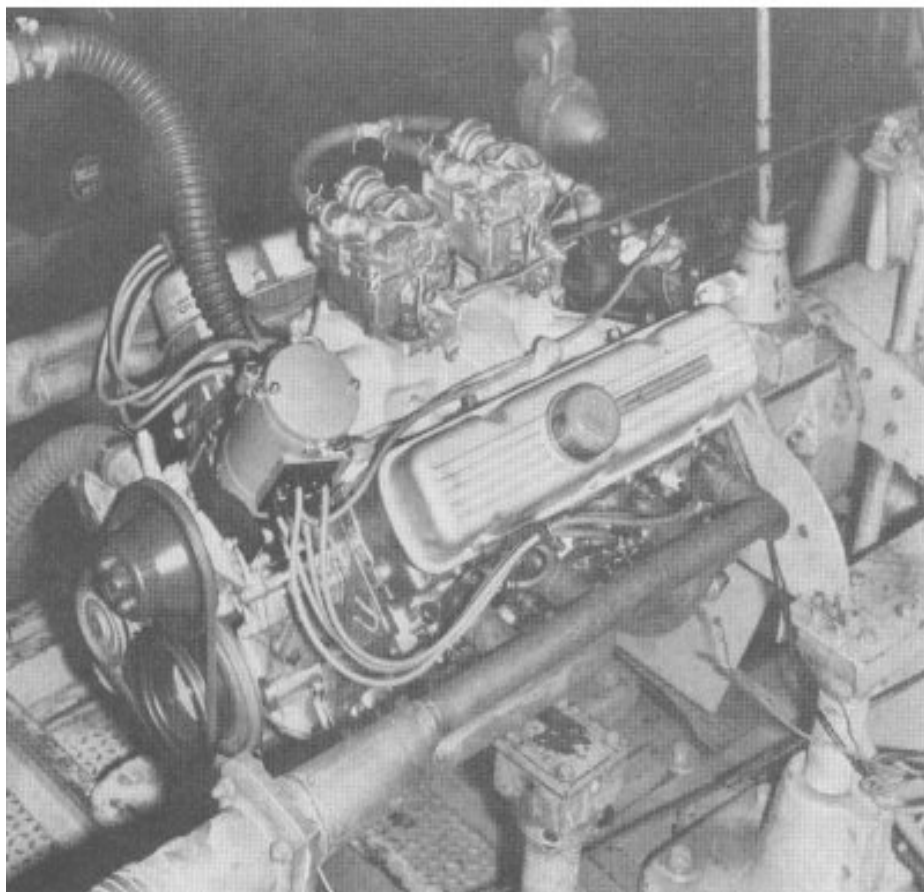
Stock exhaust manifolds for both Olds and Buick are similar in design but have small area in some places which restricted engines after intake had been opened up. Manifolds were reversed with outlet facing forward for use on dyno. The four-quart oil pan holds plenty for the small engine; temperature never got high.

ing 13 hp better at 6000 rpm with a maximum reading of 213 hp.

For, test #8B, we added another 4° initial timing to give 36 total and repeated the previous checks. Power was up an appreciable amount at 4000 and 5000 rpm, then equalled the readings of test #8A above 5000 rpm. This setting, 36 total advance, was determined the best setting for the ignition.

OLDS #9-The drop-off in power above 6000 rpm with no audible signs of valve float indicated that perhaps the engine could still use a little extra breathing so a pair of the Chevy Rochester carburetors with 13/32-inch venturii were installed in place of the stock Rochesters with 1-inch venturii. Spot checks proved stock .057 jets were best

OLDS #10 - In an attempt to improve the breathing through the Olds heads, we modified the chamber slightly, extending it .150-inch farther into the quench area to try to cut down on any shrouding effect this part of the chamber might have had on the valves. Everything else was left exactly as it had been for test #9. Checking the combustion chamber with a graduate after the modification, we found that we had lowered the compression ratio from 12.3 to an even 12 to 1. The modification evidently upset the turbulence in the cylinder because we had to richen the mixture up to regain power (.062 jets were finally used) and then fell off at 6500 rpm, probably because
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Above-215 Olds F-85 engine modified with 12.3:1 compression, Edelbrock dual manifold with Chevy Rochesters, Hedman custom headers, and spalding flame thrower ignition registered high of 223 horsepower; 88 more then when stock.

Top Right- Stock Olds intake manifold has raised damn to match the air cleaner, edelbrock dual fits both engines.

Bottom- Olds chamber modification attempt (left oncomepleted, right one marked) failed to improve performance.

the mixture was too rich at this point.

OLDS #11 - For the final test on the Olds, we reinstalled the stock pistons (after the chamber modification, the new compression ratio checked out at 8.3:1) so that we could find out just how much power could be gained strictly through bolt-on items that don't require pulling the pan of the car. Bolt-on equipment used included: Edelbrock dual intake manifold with two Chevy 1 3/32 Rochester carburetors; Isky E-2 camshaft with lifter, pushrod, spring kit; Spalding Flamethrower ignition; and Hedman headers.

With these comparatively easy-to-install items, a maximum power reading of 203 hp was recorded at 6000 rpm. This represents a 68 hp or 50% increase over the 135 hp reading recorded for the completely stock Olds F-85 engine.

Now, for you owners of Buick Spo, cials and Pontiac Tempest V8's, here's what we did to the little Buick engine and the results of these experiments.

BUICK #1 - For this first test everything was strictly stock except that -we had determined the carburetion needed richening .002-inch for best power. Spark setting was power timed

and checked to be 36 total. The Buick engine also had several hours break-in time on the dyrio.

Like the stock Olds engine, the Buick reached its maximum power at 4500 rpm with 139 hp recorded. As with the, Olds, valve float was audible at about 5300 rpm. The Buick compression ratio checked out at: 8.65:1 instead of the advertised 8.8:1 but this is very close and just a half point more than the Olds. Since the only difference between the Buick and Olds engine is in chamber and port design, the indication was that the Buick engine gets slightly better results from the larger quench area in the chamber and a resultant slight increase in power. Confirming the Buick's claim of 10 pounds/feet more torque than the Olds, we registered 10 pounds more than the Olds at both 3000 and 3500 rpm.

BUICK #2-Since the stock Buick piston has a dished top, we installed the complete set of stock Olds flat-top pistons in the Buick block (everything fits perfectly) and jumped from 8.65:1 to an accurate 12:1 c.r. Everything else was left exactly as it was for the first test; stock carburetor with .048

carburetor jets, 36 total advance, etc.

The power increase was good throughout the entire rpm range with a maximum of 156 reached at 5000 rpm. With stock Olds pistons probably retailing at about \$8 apiece, they look like a good investment for Buick engines although they are about 3/4-ounce heavier and the crank assembly should be rebalanced to make the job correct.

BUICK #3 - Edelbrock's dual intake manifold with stock carburetors was installed next with everything else left just as it had been for the last teg. As with the Olds engine, the extra breathing unlocked a nice chunk of hidden horsepower as the maximum reading of 177 at 5000 rpm was 21 hp more than it had been in test #2. From 3500 rpm on up, the extra carburetion really helped. Two changes, the Olds pistons and the dual manifold had increased the maximum power output of the Buick 38 horsepower. Not bad for a start.

BUICK #4 -Next, we skipped some of the small changes we had made in the Olds tests and went directly into a search for maximum power. The larger Chevy carburetors were installed on the dual manifold with .059 jets, the Isky

E-2 cam and kit were installed, - Hedman headers were bolted on and Spalding dual-coil ignition used. Again, timing was set under full power at 4000 rpm and checked to be 36'.

As expected, the power increase was quite good with a maximum reading of 215 hp recorded, but power flattened out just when we thought it should be strong. Checks showed the mixture was too lean and the Champion L 10 plugs being used were too hot.

BUICK #5 -Jets were changed to .062 (.003 larger) and colder Champion L 63R plugs installed. One other change was made strictly as a precautionary step, the oil pump relief spring was shimmed 1/16-inch to raise oil pressure 10 pounds to 60 psi at 6000 rpm.

This time the power was more like we had expected with a maximum of 226 hp reached at 6000 rpm. The richer jetting had also raised power throughout, the power range.

BUICK #6 - Iskenderian sent over another cam for us to try, this one a modified E-2 grind, so it was installed and everything else left as it had been for test #5. The new grind gave slightly better power, 4 more at 6000 rpm, and didn't hurt the lower speed readings so seemed an improvement. We tried to get a steady reading at 7000 rpm but ran into valve float at 6800.

BUICK #7 - For this test, the Buick heads were ported out and the valve seats Moved out slightly on the inserts. As we mentioned earlier, the first head we tried to port was ruined when we went too deep in the exhaust port. There is not too much material around the ports and if you try to exceed 1/16-inch, you run into trouble. It was impossible to heli-arc the hole due to the thin walls so a new head was purchased and much more care taken on the second attempt. Actually, the amount of porting gained was hardly worth the effort, the valve job probably helped more.

Power was increased slightly at 5500 and 6000 with the best increase, 7 horsepower, shown at 6500 where power had previously dropped off. This indicated breathing ability of Buick heads and ports is probably pretty well taxed.

BUICK #8-A roller camshaft and kit were installed for this test, Isky's RR-2 grind. Everything else was exactly as it had been for test #7. The cam change did not help the power at all, in fact it was almost identical to the modified E-2 grind at low speeds and actually fell off slightly at the top.

The 233 horsepower reading we reached with the Buick was the highest achieved during the tests and although our maximum with the Olds'engine was

10 hp short of this, don't forget that we didn't have the modified E-2 grind in time to try it in the Olds. All things considered, we found the two engines quite evenly matched. The Olds ports appear a little less restrictive than those in the Buick but the Buick seems to have the edge in chamber design.

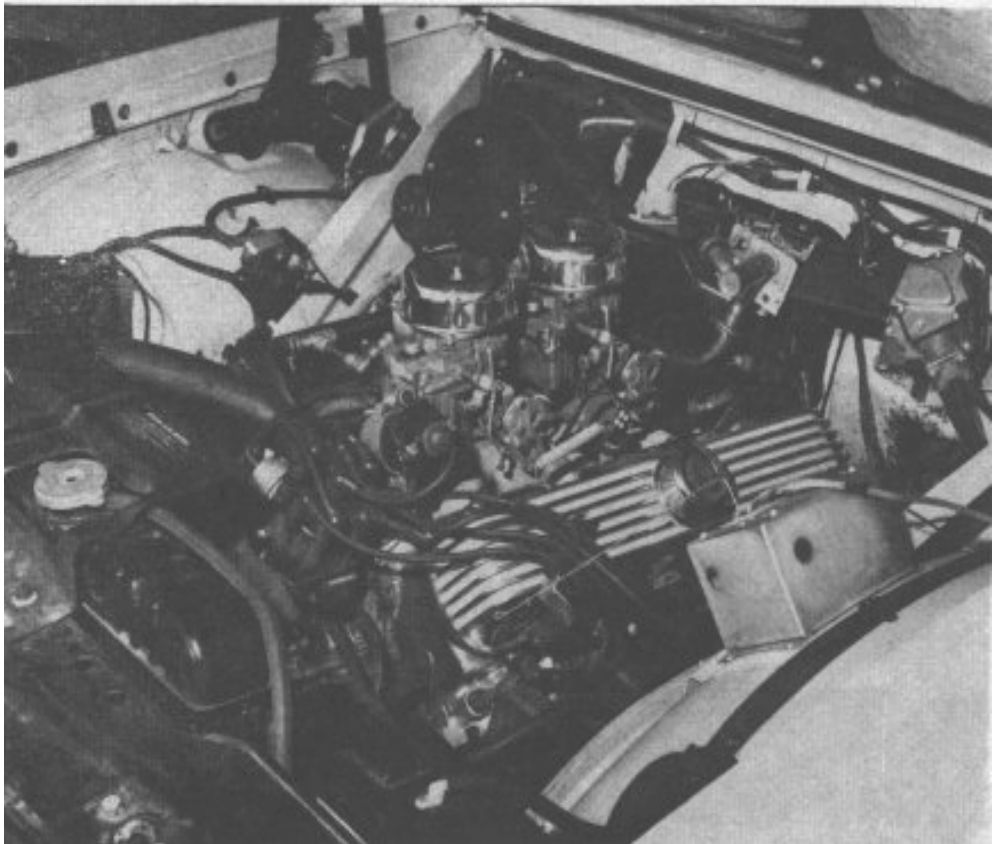
Both of the engines are very light and for use in competition cars or boats could be trimmed down to some pretty impressive figures in the weight department. Although GM advertises the engines as weighing 350 pounds complete, we did a little checking on Edelbrock's Fairbanks platform scales and came up with following weights. The stock Buick engine ready to run including flywheel and starter but no generator or exhaust manifolds, weighed 289 pounds. The flywheel weighed 23 pounds, the starter 17 lbs. The Olds was weighed complete with starter, flywheel, clutch, cast iron exhaust manifolds, air cleaner, etc., and totaled 326 pounds. Minus exhaust manifolds, it was 302 pounds.

All the work we did on these little engines produced no unusual problems. Despite turning them as high as 7000 rpm, the standard steel-backed babbitt, bearings looked perfect at the completion of the tests. We used the same shim steel head gaskets from start to finish of the tests and never had a sign of gasket leakage. In fact, we never used any sealing compound either, just

wiped off head, block--and gasket with a clean rag and put them together.

Despite all the teardown and reassembly, we only stripped two threads -in the aluminum engine, one head bolt hole in the block and one manifold bolt hole in a head. These we quickly and easily repaired by dragging out the Heli-Coil kit and installing steel inserts. For someone who is going to work on these aluminum V8's often, it's a good idea to keep Heli-Coils around. Although we followed the torque charts religiously, we stripped a couple.

The tests we made are just a hint of what will happen in the future because there are many enthusiasts in this country who will probably soon have these engines in racing boats, sports cars and other types of competition cars in the near future. When you turn loose a whole country loaded with hot rodders who are full of ideas, things start happening. Already, we have shown that it's easy to exceed one horsepower per cubic inch; it won't take much more to get one horse per pound. After that, a little boring and stroking plus a little more weight trimming should see an unheard-of figure for automobile engines of one inch per pound. Just imagine, one of these little lightweights could conceivably be opened out to 260 inches, weigh 260 pounds and produce in excess of 260 horsepower all ready to go! Sound good?



Olds F-85 sedan was used to street test dual manifold acceleration with slight change in mileage for average driving. The finned cast aluminum valve covers are another edelbrock item, they are also available for the Buick Special