



Performance Testing the

396 CHEVELLE

**Chevy has developed a powerful Package--
but, they present it in a mild manner!**

By George Elliott

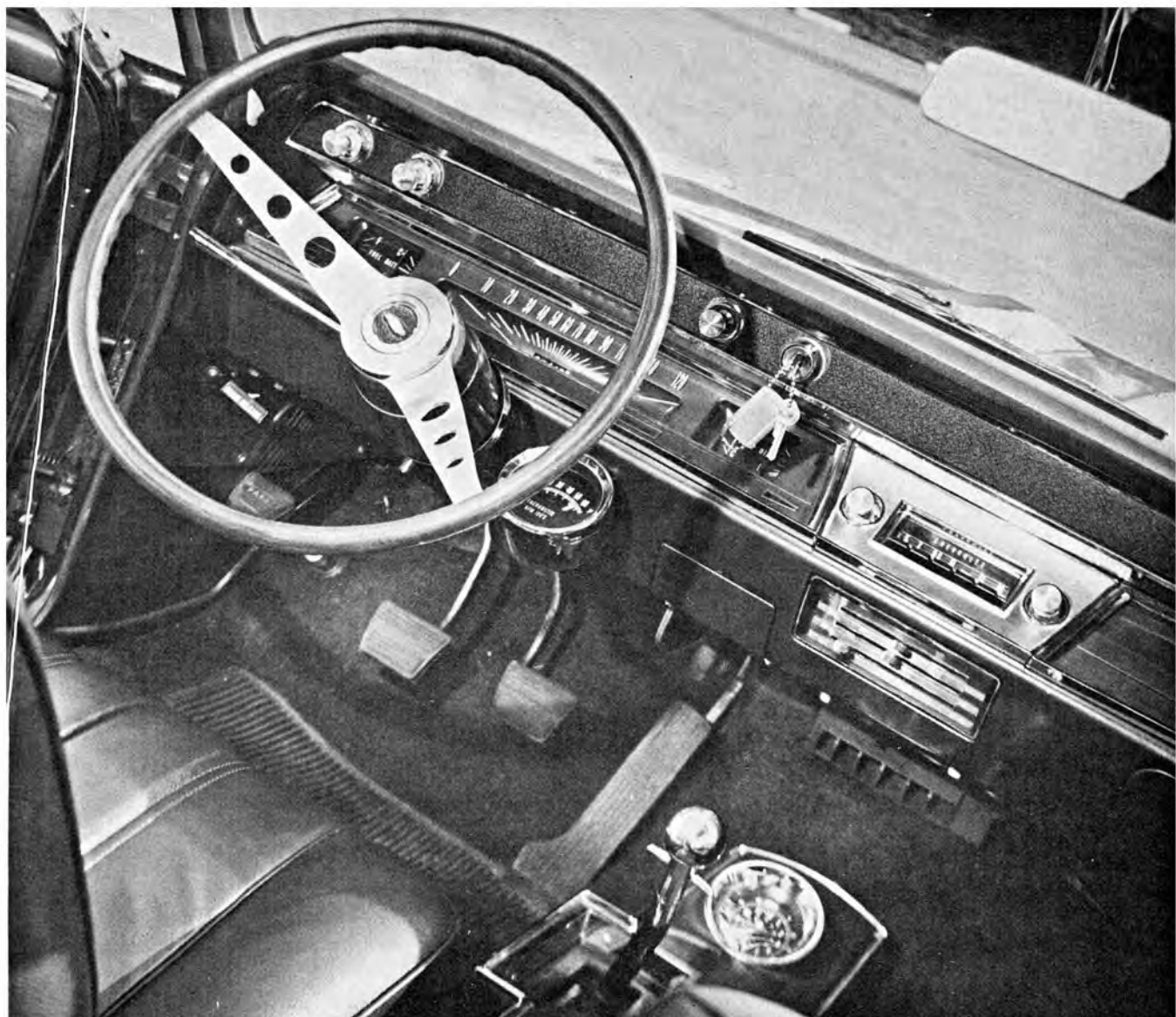
We wonder if Chevrolet is trying to be eliminated from the performance car ranks during 1966! They have reduced the horsepower rating in their 396-cubic-inch powerplants.

We know of no particular reason for the hp reduction for '66. Therefore, POP ROD put a 396-cubic-inch, 360-hp Super Sports through a rigid performance test to see if there was any noticeable difference from the

1965 version. The test primarily consisted of highway driving as well as drag strip performance. It proved to be an interesting test.

Sliding behind the wheel for the first time in a Chevelle, we turned the ignition key and fired the big engine. The first sounds were different from what we expected. The engine idled at a smooth 550 rpm as if it were an engine for a luxury passenger car.

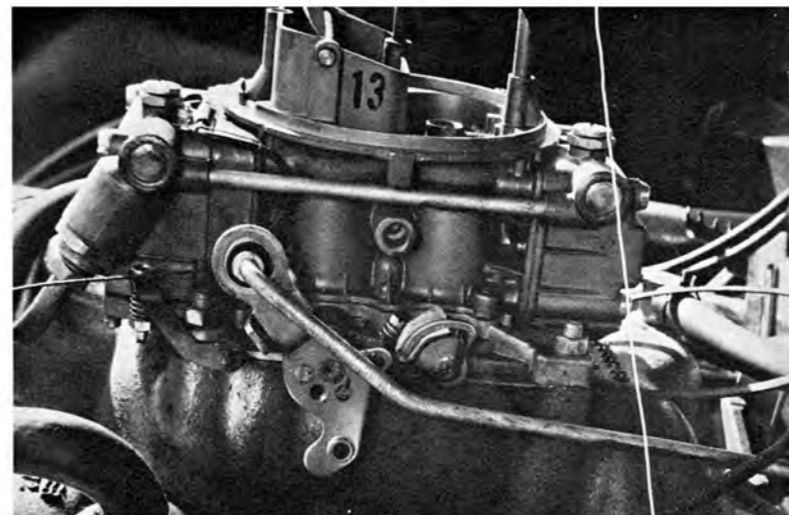
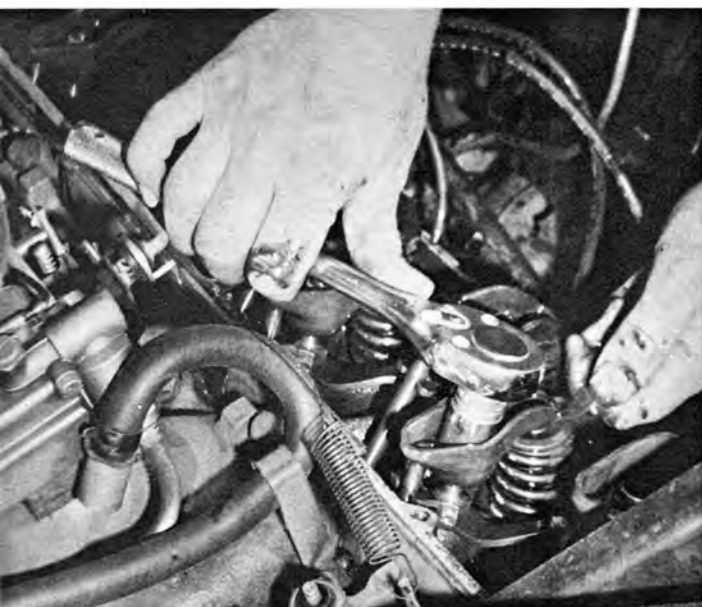
Tromping the throttle a few times, the situation changed. The Holley four-barrel carb opened with the deep tones of a racing carb and the tach revved quickly. Refreshed somewhat by the engine's sound, we shifted the four-speed transmission into first gear and started on our test. Testing grounds for the '66 Chevelle were the Los Angeles freeways, mountain roads, and, of course, the Lions' strip in Long



Stylish interior gives driver good position for shifting and access to accessories. Instrument panel could be improved.

Hood scoops denote the 396-cubic-inch engine. Car weight is well distributed for drag racing performance.





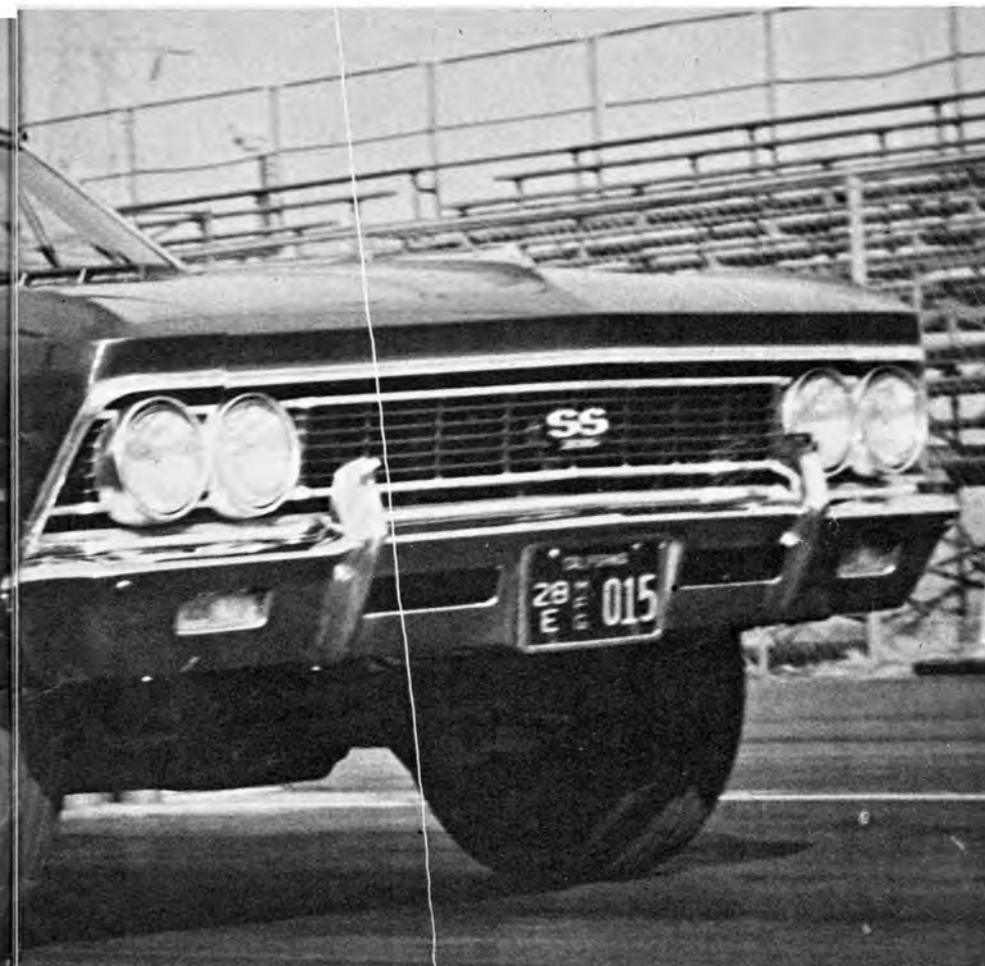
A small wood plug was made to fit in the secondary throttle arm. Performance increase was measured above three miles per hour.

Lifter pump-up was a problem during drag tests. Problem was solved with a new valve lash setting.

Once the traction problems were controlled, the Chevelle demonstrated its capabilities as a performance car.



Very popular on the Chevelles is the hub cap. The unit appears like an expensive custom wheel. It surprised many people!



Beach, Calif. Before doing any dragging, however, we drove the car on the streets to familiarize ourselves with the equipment.

We were impressed by the acceleration as we pulled onto the freeway. We pushed the throttle to the floor and watched the speedometer react to the engine's output. It was at this time we noticed some difficulty in reading the instrument panel.

The 1965 Super Sport had three large round holes for the instrument cluster. The speedometer and tach each occupy one hole and the other engine gauges fill the third. For '66 the panel is completely different. The tachometer is individually located next to the steering column, on the dash. The speedometer fills the entire center of the panel and the engine instruments are spaced on each side of the speedometer. Reading the tach and speedometer is difficult. The tach is located in such a spot that you must look over the steering wheel center and remove your eyes from the road. When reading the speedo, the lines which point to the figures on the face of the instrument don't match. When the needle is indicating 70 at the first glance, a closer look reveals that the instrument is really indicating 75. Something to remember if the Highway Patrol follows you!

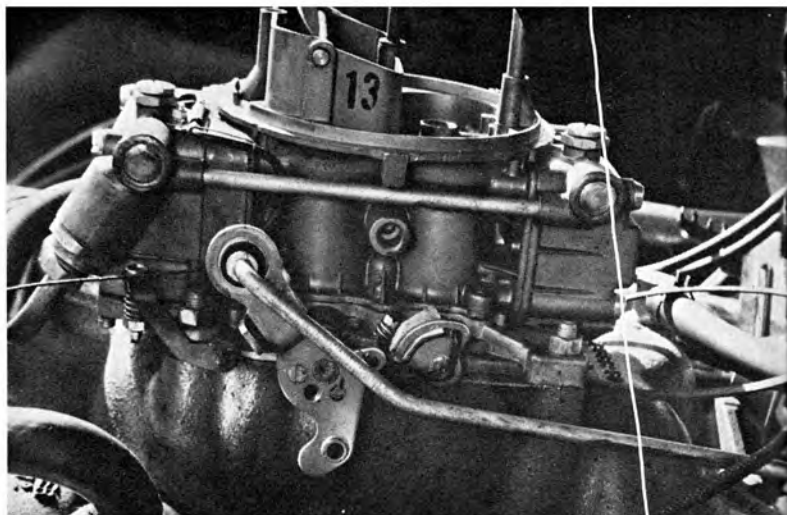
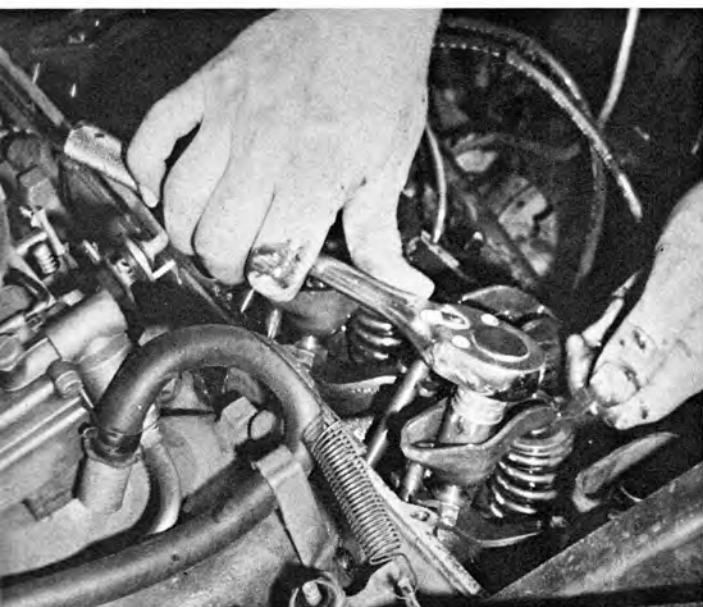
Turning off the freeway means many stop and go starts in Los Angeles. With a four-speed trans it also means a lot of shifting. Chevrolet evidently had the city driver in mind when building the clutch for the 396 Chevelle.

Two clutches are offered with the 396 engines. The horsepower is the deciding factor as to which unit your car is to be equipped. The 325 hp versions have a 10.4-inch clutch disc that is put into operation by a diaphragm pressure plate producing 2100-to-2300 pounds of pressure. With the 360 hp mill, the clutch is 11.0 inches with a 2300-to-2600 pressure plate. Although the pressure sounds great, one can depress and release the pedal with ease and smoothness.

When the 396 engine was announced, it was also known as the Z-11 "mystery" engine that upset the stockers at Daytona Beach with unbelievable performance. Since the first 396, however, Chevy has made several changes. As previously mentioned, there is a horsepower drop for the '66 engines. Briefly looking through the engine figures, one will be able to detect the difference between the 325 and 360 hp models.

Both engines are bored and stroked to 4.094 x 3.76, respectively, for 396 cubes. One of the major changes from the '65 engines is the compression ratio. This year the engine produces 10.25-to-1 where as, last year's engines had 11-to-1 ratios. The pistons

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are still aluminum domed type and are connected to dropped forged steel rods.

As you would expect from two different horsepower engines, the torque varies. With the 325 hp engine you can expect 410 lbs. ft. torque at 3200 rpms. The 360 hp mill produces 420 lbs. ft. torque at 3600 revs.

Most of the horsepower difference between the two engines is in the camshafts, valves and carburetors. The cam timing on the 360 hp engine is as follows: Intake opens at 58 degrees BTC and closes at 102 degrees ATC. Exhaust valves open at 106 degrees BBC and close at 54 degrees ATC. Duration of this cam is 340 degrees and there is a 112-degree overlap. Timing on the 325 hp cam is: Intakes open, 40 degrees BTC and close at 102 degrees ABC. Exhaust opens at 87 degrees BBC and closes at 55 degrees ATC. The duration is 322 degrees with a 92-degree overlap. The overlap period is that time when both the intake and exhaust valves are open together. The valves on the 360 engine are slightly larger than those in the 325 mill.

Carburetion is provided by either a Holley four-barrel or Rochester quadri-jet. Size of the four-barrel is 1.562 inches in both primary and secondary barrels. The quadri-jet has 1.38 inches primary bores and the secondary bore is 2.25 inches.

Now that you have the latest data on the '66 396 engines, let's see how the car transfers the power to the ground. This part of the test was to be performed at the Lions' drag strip.

When we entered the strip, the car was weighed. The scales indicated 3880 with less than a half-tank of gas. Sixty-two percent of this weight is on the rear wheels, which is ideal for dragging.

The first runs were with the car in a stock trim - air cleaner installed, power steering connected and a factory tune. We pulled to the starting line and staged in the signal. The rpms were raised to 2500. The green light flashed and out came the clutch with equal application of throttle. Immediately we lost traction! This also confirmed a suspicion we had that our car did not have a limited slip rear end. We backed off the throttle until the tires regained traction. Going through the gears we encountered lifter "pump-up" at 5500 rpm, which, of course, ends the engine's acceleration curve. The time we received on the first run was 95 mph in 15.85 seconds.

Chevy offers several differential ratios for the Chevelle. They include 3.31, 3.55:1 as limited slip or non-limited slip units. There are 4.10, 4.56, and 4.88 offered as limited slip units only. Our car was equipped with 3.73:1 gears, which are the standard gears for the 360 hp Chevelle.

We switched drivers and again pulled the Chevelle to the starting line. Again the car was in stock trim, but



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without the air cleaner this time. The rpms were brought to 1800 for this run. The clutch was released and the throttle floorboarded. Again the tires broke traction, but not as bad. Lifter pump-up was still obvious above 5000 rpm. The end result of this run was 96 mph and the ET dropped to 15.40.

Before making any more runs, the car was pulled to the pits for minor tuning. The minor tuning is what it takes to improve the performance in a major way.

The valve covers were removed and valve clearance re-set. The factory has the valves set approximately two turns in from zero lash. We set .002 clearance in them. Next, we thought that the secondary throttles on the carb should open sooner. Locating a small piece of wood in the area, we were able to make a plug for the carb arm to allow the butterflies to begin their operation earlier. We should point out, however, that there are kits for this carburetor modification. At the drag strip, you have to do with what you have and that was the best solution at the time. The stick was held in place with a piece of masking tape.

The engine was put back together and the Chevelle brought to the line once again. This time the rpm was not raised over idle. The green light came on and the clutch was released as the rpms raised. Traction was good. Once the car's momentum started, the throttle was mashed full open. This time we revved the engine to 6100 rpms in first and 6000 in second and third. The difference was extremely noticeable, as the time showed. The clocks indicated 100.22 mph and the ET dropped to 14.42.

Several more runs were tried, the big main challenge being the starts. We were averaging 99 to 100 mph consistently with the ETs in the mid-14-second bracket.

The same day as we were testing our Chevelle, there were two other 396 Super Sports racing too. They quickly raced up to query us for the information on what we did. We first heard what problems they were having. They all remarked about lifter pump-up and traction problems. One owner had slicks for his car and, therefore, solved his traction problem. But, it takes more than just slicks!

Several exhaust-header manufacturers make tuned headers for the 396 Chevilles. The factory can provide a low gear ratio for dragging. There are all sorts of cheater and racing slicks available. By utilizing these parts and the "no-cost" tune tips that we mentioned, your Chevelle should be in the low 13-second ET bracket. If you are a real eager performance seeker, then you can supertune on the dyno or even "blueprint" your engine. Your results would probably be 12 second ETs. This year's AHRA stock eliminator was a 396 Chevelle. Of course, it was not factory sponsored. Just a hard running Chevy with a little work on it!

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