WHY THEY AREN'T HOTTER?

1960's cars have tremendous performance potential, but a strange compromise with economy is holding them down

by Roger Huntington

HOW CAN we get a car that will accelerate like a bat in city and highway traffic—but still give good gas mileage, smooth, flexible low-speed performance, silence, and that will still be relatively inexpensive to produce?

Of course, this has always been a problem with Detroit; but this latest "economy kick" of the last couple of years has focused more attention on the performance-economy compromise than ever before. Engineers say the public is expecting the impossible. The public says it's willing to sacrifice performance for economy—then gripes when the new model doesn't go like the old one. Some outside observers think Detroit is falling behind on the performance-economy compromise, that bigger, heavier cars are costing us at *both* ends.

Auto enthusiasts generally think of the lbs.-per-horsepower ratio as the best yardstick for rating the acceleration of a car. On this basis, our average Detroit models should show a steady improvement in acceleration over the last eight or 10 years, since the start of the horsepower race. But some of them haven't—and it's left us wondering about the validity of the old weight/horsepower theory.

But let's think about this a second. Detroit's advertised horsepower and torque figures are 'way above the actual output on the road. Why shouldn't they be? These official power tests are run in the lab under ideal conditions—without fans, muffler or air cleaners and with optimum spark advance, and then all the figures are "corrected" to sea level and 60 degrees Farenheit air temperature, which can add five or six per cent. Furthermore, the difference between the advertised output and the true output on the road will vary quite widely between makes and models. There's no way you can predict this from drawings or spec sheets.

So, why should we put such faith in the weight/horsepower ratio as a yardstick for performance?

No, it has been my observation from numerous road tests that we can get a truer picture by comparing the total weights of cars (with passengers), the rear axle gear ratios, and the cubic inches of the engines. This is especially true with automatic transmissions that have shift points well below the peak of the horsepower curve. Admittedly, comparisons get a little hazy between makes where the difference between honest and advertised output varies widely; but if you stick to one make, this yardstick works.

It stands to reason. If the engine shifts below the peak of the power curve, the effective engine output will tend to be a function of medium-speed torque. Torque depends primarily on cubic inches in any engine. The maximum forward thrust of the tires against the pavement is a prime function of torque *times* overall gear ratio. And the rate of acceleration depends on the forward thrust divided by total car weight. So, if we multiply cubic inches by axle ratio, and divide by weight, we should come up with a reasonably accurate rating factor for acceleration.

Let's try it. Let's compare standard Ford Fairlane V-8 models with automatic transmission and power pack for the years 1955, 1957 and the current 1960 model. We'll assume an average curb weight, 300-lb. passenger load and standard axle ratio: Here's how they work out:

	WEIGHT	GEAR	INCHES	FACTOR
1955	3800	3.31	272	.237
1957	4000	3.10	312	.242
1960	4300	2.91	352	.238

And here's how they stack up performance-wise, using approximate figures from our past road tests:

	0-60 MPH	¼-MILE E.T.	¼ SPEED
1955	12	19	75
1957	11	18	80
1960	11½	19	80

Some surprises, eh? To put it bluntly, the down-to-earth road performance of some of our popular stock models has not increased appreciably in the last three or four years, despite what weight/horsepower calculations would suggest. The dazzling performance of some of the "Super Stock" models, with proper gears and all the goodies, has blinded us to the facts, I fear. These models are favorite test fodder, but they don't represent one per cent of the cars sold to the public. It's the other 99 per cent that concerns Detroit most.

And it will be pretty obvious from the above figures that weight and gear ratio are holding back performance progress today. Larger, fancier bodies with more elaborate trim and interior fittings, more glass area, etc., are 500 lbs. heavier than their 1955 counterparts, maybe more in some cases. In order to heft this extra bulk and weight around with decent gas mileage, Detroit has gradually gone to bigger and bigger engines —then tied them to "fast" axle ratios to cut down the piston speed and revolutions per mile. Result is that ordinary acceleration has not really been going any place in particular these last few years.

Giving a motorist increased performance with increased fuel economy is a very ticklish engineering problem—and when you throw fancy heavyweight bodies into the problem, it gets really thick. I think Detroit has done remarkably well to even keep its head above water in this problem.

As a matter of fact, highway gas mileage (at legal speeds) of many late models is as good as corresponding models of five years ago, maybe a bit better. The above three Ford models show nearly equal mileage at 60-mph cruising speeds on the highway, all of them ranging between 16 and 18 mpg. This stands to reason, too. At moderate, steady speeds, car weight has little effect on drag—and internal engine friction eats up almost as much horsepower as it takes to push the car along. And engine friction, in turn, depends heavily on piston speed. Thus faster axle ratios, which reduce the crankshaft revs per mile, are a very potent weapon in controlling steady-speed fuel consumption with big-inch engines.

It's in city traffic where we get in trouble—(and don't forget that the bulk of America's driving is done in fairly dense city and suburban traffic). Here the car is being accelerated and decelerated constantly. Car *weight* is the big factor here; engine friction and wind resistance are unimportant. An important secondary factor is the increased accelerator pump output in the carburetor required to keep big-inch engines with sewer-pipe-size ports from stumbling when you step on the throttle at low speeds. (These pumps squirt raw gas into the manifold when the throttle is punched—and the bigger the engine, the more gas you need just to keep it running.)

Add up the ingredients—higher car weight, more cubic inches, stop-and-go driving—and you've got no prescription for gas mileage. Take the '60 Ford. With 500 lbs. more weight and 80 more cubic inches than the '55, its highway gas mileage at 60 mph is just about equal—but in city traffic you'd be lucky to come within four or five mpg of the smaller, lighter car.

And, of course, we all know that so many horsepower pro-

duced means so many pints of gasoline burned per minute. Thus, if you expect more horsepower from your engine by using the throttle harder on the street and highway, you're bound to burn more gas. And when you have 300 hp available under the hood, as on the '60 Ford, instead of 182 as on the '55 power pack, it's pretty likely you'll *use* more of it. This adds to the fuel consumption problem with late models.

So, it would seem at this point that the critics have got an argument when they say Detroit is falling behind in the performance-economy compromise. Bigger, heavier cars apparently are costing us dearly in both departments.

No discussion of car performance would be complete without some reference to top speeds—even though, as we say, current road conditions and speed laws make it pretty much an academic question these days. But, it would be interesting to know what effect the heavier bodies, faster gears and bigger engines have had on the top end of the performance range. Unfortunately, we can't learn much by studying Daytona results. Not only are many of those cars professionally prepared and tuned, but optimum gear ratios are used. Their top speeds don't necessarily bear any resemblance to showroom performance.

Here are my top-speed estimates for the three previously mentioned Ford models, assuming standard showroom condition, no special tuning and standard tires at 28 lbs. pressure:

1955	101 mph
1957	110
1960	116

In evaluating top speed, we must remember that car weight has very little effect, since it only affects tire rolling resistance, and this is much less than wind resistance at high speeds. Body frontal area and streamlining are important factors; but actually, there's very little to choose here between the various full-size American passenger car bodies of the last few years. About the only model that had any degree of refinement was the '53-'55 Studebaker coupe. The rest will give pretty close to 475 lbs. of wind drag at a speed of 120 mph. (The Stude coupe has about 350 lbs.) Gear ratio can influence top speed if the engine isn't permitted to wind up around the peak of the power curve at the top end. But it so happens that as speeds went up, the trend in axle ratios came down—so the effect was minimized.

No, relative top speeds on late American cars pretty much boil down to *brute horsepower*. The car that can kick out the most horses at the clutch goes the fastest. If we estimate this "true" power output by means of an accelerometer test, or by checking the terminal speed of the car at the end of a standing quarter-mile acceleration run (as it has been found that this speed is closely correlated to the true weight/horsepower ratio), we can estimate top speeds pretty closely. Here are my estimates on some of the hotter 1960 "Super Stock" models (again assuming standard equipment, standard tune and standard tires at 28 lbs. pressure):

Chevrolet "Police" (335 hp)	124 mph
Chrysler 300-F (400 hp)	132
Dodge Ram Dart (330 hp)	128
Ford Interceptor (360 hp)	122
Plymouth Fury (310 hp)	126
Pontiac Bonneville (348 hp)	130

It's pretty obvious from this that there is little relationship between advertised horsepower and honest output at the clutch. Fords have been the worst offenders on this score for years, and still are. Their only model that actually came decently close to the advertised rating was the 1957 supercharged racing job, rated at 300 hp. That engine would put out pretty close to 300 horses as it came from the showroom. Fords can be tuned to go; but don't count on it without work.

Let's get back to performance and economy again. We came to the conclusion that Detroit is falling behind on the compromise, largely because of a supposed demand for bigger, fancier bodies. So the question now is whether there is some practical way to substantially improve acceleration without affecting average gas mileage—or maybe even keep acceleration where it is now and substantially improve gas mileage.

I think there is.

The first idea that comes to mind, of course, would be smaller, lighter cars with smaller engines. This will do it beautifully—and we're trending swiftly in this direction. The new low-priced compacts introduced last fall accepted a substantial cut in performance to get their 20-30 mpg. In fact, the first of the "medium" compacts, the new Comet, has even lower performance because it uses the regular Falcon engine and weighs 150 lbs. more. But, this isn't the true trend. The Buick and Olds medium compacts coming out next fall will have 0-60 mph times in the 11-13 seconds range, comparable with many standard full-size V-8 models, and yet should give at least five mpg better fuel economy. Where we go from there is anybody's guess.

It looks right now, though, like the new medium compacts will bring with them a new era in the performance-economy compromise. At first it will seem like the problem is solved; we'll get economy-car mileage with power pack performance. And for the enthusiasts who are willing to sacrifice some economy for even more performance, we'll undoubtedly have "Gran Turismo" and Super Stock compacts just like we now have in the big-car field. The G.T. Corvair should be close to production by the time this is in print. And what they might do with those little V-8 engines in the Buick-Olds compacts—it could be real interesting! Of course, if history repeats, as it so often does, and we find the performance race outrunning the economy race, we could end up right where we are now in 1970!

But, I have a suggestion for current big-car designs. Earlier in this article, we learned why big engines and heavy bodies hurt gas mileage in city traffic, but didn't affect it much on the highway. Okay. So we've got to swallow poor city mileage on our big luxury cars. But why not at least give us better acceleration by raising axle ratios? This would have very little effect on economy in town, where most of us do most of our driving—and yet we'd get a more responsive, maneuverable car. We'd get the kind of performance we ought to get with 350-cubic-inch engines. For the man who does most of his driving on the highway, present ultra-fast ratios could be retained as optional equipment. New-car salesmen should be carefully instructed in the effect of axle ratios on performance and economy, so they can help the buyer in selecting the right ratio to suit his particular needs. Let's get away from the idea of a "standard" axle ratio—and certainly from standard ratios best suited to highway driving that represent a relatively small proportion of the total mileage on the average car. Let's learn to select axle ratios with as much care as we do color and upholstery and engine options. It's a way to unleash the true performance potential of a car. •

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when in doubt about

1960 car statistics