

Road test Your own car

BY GRIFF BORDEN

Performance figures are easy to obtain
by following a few simple procedures.

CAR TEST:

TEST CONDITIONS		ACCELERATION AND TOP SPEED	
Altitude _____ feet	Temperature _____ degrees	Wind _____ mph	Grade _____
Wind direction _____		Fuel tank 3/4 full _____	
Weather _____		Top speed avg. 4 runs _____ mph	

SPEEDOMETER CORRECTIONS		RANGING DISTANCE		SPECIFICATIONS	
Car _____	Speed _____	Scale _____	Range _____	Engine type _____	Equipment _____
Actual _____	Manufacturer _____	MPS _____	Miles _____	HP _____	Make _____
30 _____	40 _____	50 _____	60 _____	Compression ratio _____	Mile _____
70 _____	80 _____	90 _____	100 _____	Max. _____	Top speed _____
110 _____	120 _____	130 _____	140 _____	Torque _____	Transmission _____
150 _____	160 _____	170 _____	180 _____	Drive shaft ratio _____	Final drive _____

FUEL CONSUMPTION	
MPS _____	Average _____
Mile _____	Mile _____
Mile _____	Mile _____
Mile _____	Mile _____
Mile _____	Mile _____

If YOU'RE a red-blooded car fan, there's probably no question that intrigues you more than performance. Whether you're comparing the new models, stepping for a car, competing in the daily freeway race, or just exchanging tall tales with your next-door neighbor, it's the number-one question. Maybe you've already collected a certain amount of performance data about your own car. If you have, the information is probably based on personal reaction, seat-of-the-pants road testing. This can be fairly accurate if it's done by someone blessed with both good judgment and an extensive knowledge of cars. But if it's done by the kind of dreamer who thinks his car is steering at 100 mph (just because the speedometer says it is, rest-of-the-points findings are all too likely to reflect their humble origin.

However, it is possible to get the answers to most "What'll she do?" questions in the form of solid facts and figures. MOTOR Life's road-testing staff has been doing it for years, and there's nothing in the testing techniques that we and other professional road testers use that's mysterious or difficult. Given the instruments, anyone can find out the real facts about his car's performance.

How to Make Speedometer Corrections

MOST cars have a kindly, optimistic error built into their speedometers' readings. If your car's instrument is less than 100 per cent off—and this is common—obviously your test readings will be affected. The first step in road testing is finding out whether there is a speed error and what it is. There are various ways of doing this.

One is to take advantage of the speedometer checking station set up by some auto clubs (the Auto Club of Southern California in Los Angeles, for example). Here for a nominal charge as soon as all you can drive onto a set of rollers that are geared to a dead-accurate road-speed indicator. You can know the exact error at speeds up to about 65 mph, as well as the error of the odometer or mileage counter.

Another, more tedious method is checking speedometer and odometer against a measured mile. Measured miles are marked off in exact places on road highways. Or, if you're really determined, you can measure off your own 1,000 feet with a tape.

One you have your measured mile, you cover it at a constant indicated speed—let's say 60 mph. If your speedometer is accurate, you'll cover the distance in exactly 90 seconds. But let's assume that it's not, and that test approach shows a time of 84.5 seconds. To find the ground speed, you divide the time in seconds into 3,600, and get an answer of 38.13, which is the speed you're actually doing when your speedometer reads 60. By repeating this procedure at different indicated speeds, you can correct your speed counter as extensively as you wish. For basic road test purposes you'll want to know exactly where actual speeds of 30, 45, and 60 fall on your speedometer.

You can carry out this same method of correction over a half-mile course, but you'd use 1,000 in place of 3,600 in your

calculation. Over a quarter-mile course you'd use 900 instead of 3,600. If you can hold a steady speed, you should get the most accurate results on the longest course.

Odometer accuracy is best tested over a five or ten-mile course. A call to your nearest state highway department office should get you the location of a long

measured course in your general area.

A high-quality odometer with fairly calibrated electric speedometer is ideal for speedometer correction. It can also be used with a radio-dialer counter to measure distance traveled, as a check against the car's odometer. Finally, speedometer service shops are equipped to measure and correct these errors.



Speedometer readings are often with stop-watch. The fact accuracy is possible by using second hand on ordinary watch.



Many miles have distance markers. If you mark a first mile, it doesn't take long to mark a quarter-mile with the tape.



Some auto clubs make free checks. These elaborate setups are best solution for those who have made gear changes.

Testing Acceleration and Top Speed

QUARTER-MILE CONVERSION TABLE—Seconds to MPH

Seconds	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
7.00	128.57	128.38	128.20	128.02	127.84	127.65	127.47	127.29	127.11	126.93
7.10	126.76	126.58	126.40	126.22	126.05	125.87	125.69	125.52	125.34	125.17
7.20	125.00	124.82	124.65	124.48	124.30	124.13	123.96	123.79	123.62	123.45
7.30	123.28	123.11	122.95	122.78	122.61	122.44	122.28	122.11	121.95	121.78
7.40	121.62	121.45	121.29	121.13	120.96	120.80	120.64	120.48	120.32	120.16
7.50	120.00	119.84	119.68	119.52	119.36	119.20	119.04	118.89	118.73	118.57
7.60	118.42	118.26	118.11	117.95	117.80	117.64	117.49	117.34	117.18	117.03
7.70	116.88	116.73	116.58	116.42	116.27	116.12	115.97	115.83	115.68	115.53
7.80	115.38	115.23	115.08	114.94	114.79	114.64	114.50	114.35	114.21	114.06
7.90	113.92	113.78	113.63	113.49	113.35	113.20	113.06	112.92	112.78	112.64
8.00	112.50	112.35	112.21	112.07	111.94	111.80	111.66	111.52	111.38	111.24
8.10	111.11	110.97	110.83	110.70	110.56	110.42	110.29	110.15	110.02	109.89
8.20	109.75	109.62	109.48	109.35	109.22	109.09	108.95	108.82	108.69	108.56
8.30	108.43	108.30	108.17	108.04	107.91	107.78	107.65	107.52	107.39	107.27
8.40	107.14	107.01	106.88	106.76	106.63	106.50	106.38	106.25	106.13	106.00
8.50	105.88	105.75	105.63	105.50	105.38	105.26	105.14	105.01	104.98	104.77
8.60	104.65	104.52	104.40	104.28	104.16	104.04	103.92	103.80	103.68	103.56
8.70	103.44	103.32	103.21	103.09	102.97	102.85	102.73	102.62	102.50	102.38
8.80	102.27	102.15	102.04	101.92	101.80	101.69	101.58	101.46	101.35	101.23
8.90	101.12	101.01	100.89	100.78	100.67	100.55	100.44	100.33	100.22	100.11
9.00	100.00	99.88	99.77	99.66	99.55	99.44	99.33	99.22	99.11	99.00
9.10	98.90	98.79	98.68	98.57	98.46	98.36	98.25	98.14	98.03	97.93
9.20	97.82	97.71	97.61	97.50	97.40	97.29	97.19	97.08	96.98	96.87
9.30	96.77	96.67	96.56	96.46	96.35	96.25	96.15	96.05	95.94	95.84
9.40	95.74	95.64	95.54	95.44	95.33	95.23	95.13	95.03	94.93	94.83
9.50	94.73	94.63	94.53	94.43	94.33	94.24	94.14	94.04	93.94	93.84
9.60	93.75	93.65	93.55	93.45	93.36	93.26	93.16	93.07	92.97	92.87
9.70	92.78	92.68	92.59	92.49	92.40	92.30	92.21	92.11	92.02	91.93
9.80	91.83	91.74	91.64	91.55	91.46	91.37	91.27	91.18	91.09	91.00
9.90	90.90	90.81	90.72	90.63	90.54	90.45	90.36	90.27	90.18	90.09
10.00	90.00	89.91	89.82	89.73	89.64	89.55	89.46	89.37	89.28	89.19
10.10	89.10	89.02	88.93	88.84	88.75	88.66	88.58	88.49	88.40	88.32
10.20	88.23	88.14	88.06	87.97	87.89	87.80	87.71	87.63	87.54	87.46
10.30	87.37	87.29	87.20	87.12	87.04	86.95	86.87	86.78	86.70	86.62
10.40	86.53	86.45	86.37	86.28	86.20	86.12	86.04	85.95	85.87	85.79
10.50	85.71	85.62	85.55	85.47	85.38	85.30	85.22	85.14	85.06	84.98
10.60	84.90	84.82	84.74	84.66	84.58	84.50	84.42	84.34	84.26	84.19
10.70	84.11	84.03	83.95	83.87	83.79	83.72	83.64	83.56	83.48	83.41
10.80	83.33	83.25	83.17	83.10	83.02	82.94	82.87	82.79	82.72	82.64
10.90	82.56	82.49	82.41	82.34	82.26	82.19	82.11	82.04	81.96	81.89
11.00	81.81	81.74	81.66	81.59	81.52	81.44	81.37	81.30	81.22	81.15
11.10	81.08	81.00	80.93	80.86	80.78	80.71	80.64	80.57	80.50	80.42
11.20	80.35	80.28	80.21	80.14	80.07	80.00	79.92	79.85	79.78	79.71
11.30	79.64	79.57	79.50	79.43	79.36	79.29	79.22	79.15	79.08	79.01
11.40	78.94	78.87	78.80	78.74	78.67	78.60	78.53	78.46	78.39	78.32
11.50	78.26	78.19	78.12	78.05	77.98	77.92	77.85	77.78	77.72	77.65
11.60	77.58	77.51	77.45	77.38	77.31	77.25	77.18	77.12	77.05	76.98
11.70	76.92	76.85	76.79	76.72	76.66	76.59	76.53	76.46	76.40	76.33
11.80	76.27	76.20	76.14	76.07	76.01	75.94	75.88	75.82	75.75	75.69
11.90	75.63	75.56	75.50	75.44	75.37	75.31	75.25	75.18	75.12	75.06
12.00	75.00	74.93	74.87	74.81	74.75	74.68	74.62	74.56	74.50	74.44
12.10	74.38	74.31	74.25	74.19	74.13	74.07	74.01	73.95	73.89	73.83
12.20	73.77	73.71	73.64	73.58	73.52	73.46	73.40	73.34	73.28	73.23
12.30	73.17	73.11	73.05	72.99	72.93	72.87	72.81	72.75	72.69	72.63
12.40	72.58	72.52	72.46	72.40	72.34	72.28	72.23	72.17	72.11	72.06
12.50	72.00	71.94	71.88	71.82	71.77	71.71	71.65	71.59	71.54	71.48
12.60	71.42	71.37	71.31	71.25	71.20	71.14	71.09	71.03	70.97	70.92
12.70	70.86	70.81	70.75	70.69	70.64	70.58	70.53	70.47	70.42	70.36
12.80	70.31	70.25	70.20	70.14	70.09	70.03	69.98	69.93	69.87	69.82
12.90	69.76	69.71	69.65	69.60	69.55	69.49	69.44	69.39	69.33	69.28
13.00	69.23	69.17	69.12	69.07	69.01	68.96	68.91	68.85	68.80	68.76
13.10	68.70	68.64	68.60	68.54	68.49	68.44	68.38	68.33	68.28	68.23
13.20	68.18	68.13	68.07	68.02	67.97	67.92	67.87	67.82	67.77	67.72
13.30	67.66	67.61	67.56	67.51	67.46	67.41	67.36	67.31	67.26	67.21
13.40	67.16	67.11	67.06	67.01	66.96	66.91	66.86	66.81	66.76	66.71
13.50	66.66	66.61	66.56	66.51	66.47	66.42	66.37	66.31	66.27	66.21
13.60	66.17	66.11	66.07	66.03	65.98	65.92	65.88	65.83	65.78	65.72
13.70	65.65	65.61	65.57	65.54	65.50	65.45	65.40	65.36	65.31	65.26
13.80	65.24	65.16	65.12	65.07	65.02	64.98	64.93	64.88	64.84	64.79
13.90	64.74	64.70	64.65	64.60	64.56	64.51	64.47	64.42	64.36	64.31

(To convert elapsed times into average miles an hour either above or below the times covered by this chart, divide the number of seconds into 900.)

The standard acceleration tests are for zero to 30, zero to 45, zero to 60 mph, and elapsed time for the standing quarter-mile. For the first three you need a corrected speedometer (marked, for example, with grease pencil) and a stopwatch. Our procedure is for the driver to hold the watch in one hand and hold the steering wheel with the other. Frankly, the almost universal practice is to punch the watch to start it when the first trace of forward movement is felt. The alternative is to start the watch the instant the clutch is let out or, with an automatic transmission, the instant the throttle is mashed. This results in a time-consuming lag except in those rare cars with torque-tube drive and old-style gearbox. They usually start moving ahead the instant the clutch pedal is released.

The watch can be handled by an observer with a very small loss of accuracy, providing the driver's signals are clear and the observer's reactions are fast. This enables the driver to manipulate the shift lever without the encumbrance of a watch in his hand.

The standing quarter-mile also can be checked by a driver alone or, if desired, he can carry an observer. The only difference between this and the preceding tests is that the end-reading is determined by the quarter-mile marker instead of the position of the speedometer needle.

Every run should be balanced by a run in the opposite direction. If two north-bound runs are made, two should also be made headed south. The total should be added and averaged in order to arrive at a representative figure that allows for the effects of wind and grade.

TOP SPEED TESTS

For these you don't need a speedometer or a fifth wheel. The stopwatch and the measured quarter-mile are all that are needed to do the job. All you do is back off, about a mile from the beginning of the timing trap, and mash the throttle. As you pass the first marker you press (or your observer presses) the stopwatch to start it. As you pass the last marker the watch is punched again. The time required to cover the quarter-mile can then be converted into mph by dividing the elapsed time, in seconds, into 900. The only way to get an accurate, representative speed figure is to make runs in both directions and to average them.

We must stress the obvious importance of taking every reasonable safety precaution. It should be determined that the tires on the car are intended for use at the anticipated speeds. The wheel lug nuts should be checked for tightness. Before making top speed runs, all loose objects should be removed from the car or at least put in the luggage compartment.

Checking Fuel Consumption

The cheap, rough and simple way to measure fuel consumption is to fill the fuel tank, record the odometer reading, drive for a while, refill the tank and note the amount of fuel that goes in, along with the new ode reading. The amount of fuel, divided into the distance travelled, gives the average fuel consumption for that particular test run.

The best way to make accurate measurements of a car's gas mileage is to install one of the one-tenth of a gallon test burettes made for the job. They are quite inexpensive, can be installed on most cars in about half an hour and, using the Gauthier "Vacomat" as an illustration, have a guaranteed accuracy of 99.6 per cent.

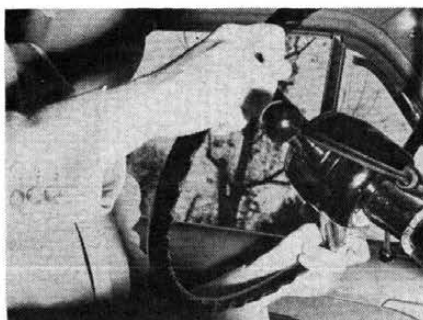
Standard procedure is to take readings at steady speeds of 30, 45 and 60 mph, using the corrected speedometer or a fifth wheel to determine the speed. Steady speeds cannot be held

if there are many other cars on the road, meaning that a fairly deserted road is a must for these fuel checks. Also, it should be as level as possible so that throttle and accelerator pump movements can be held at a minimum.

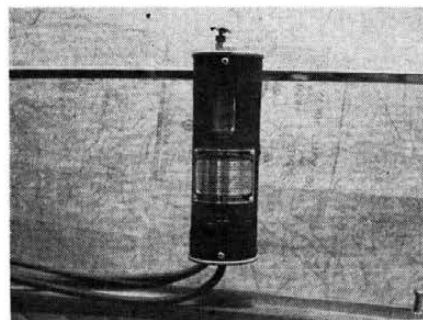
At the beginning of a check, the observer fills the burette and the driver maintains the desired steady speed. There are scribed lines at the top and bottom of the burette and, as the fuel level drops to the top line, the observer calls to the driver for an odometer reading. The driver continues to maintain the steady speed and, when the gasoline reaches the bottom line, indicating that one-tenth of a U.S. gallon has been consumed, the observer calls for another ode reading. Let's say the second reading was 7.75 and the first was 5.9. The difference is 1.85—the distance travelled on one-tenth of a gallon. Times ten, this makes 18.5 mpg.



Gas mileage test without special instruments calls for extra care in filling tank, then noting level of fuel in pipe neck.



Absolutely steady driving, with one eye on corrected speedometer and odometer, is a little tricky. Assistance is helpful.



Fuel-flow meter is necessary for very accurate mileage test. It costs \$17.75, attaches to fuel lines, runs off manifold.

Braking Distance Test

The best device for making brake tests is the AAA-type solenoid detonator. Standard procedure is as follows: Using the *corrected* speedometer, best stopping distances are determined at speeds of 30, 45, and 60 mph. These must be *steady* speeds, with the car neither accelerating nor slowing down at the time the test emergency stop is made. The brakes are kept on hard until the car has come to a standstill. The driver and observer get out and with a lumber crayon make a mark on the pavement immediately under the detonator. Then they measure the distance with a tape.

We have never experienced any particular difficulty or danger in making emergency stops at 30 or 45 mph. At 60 mph, however, slamming the binders on hard can get you in trouble. Some cars come to a true, straight-line stop from any speed. Then there are some that pull violently to one side.

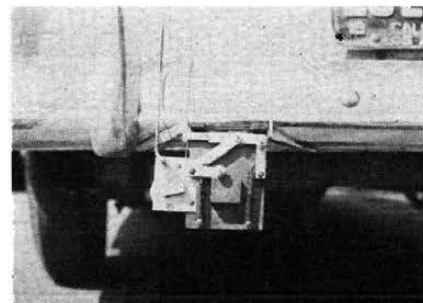
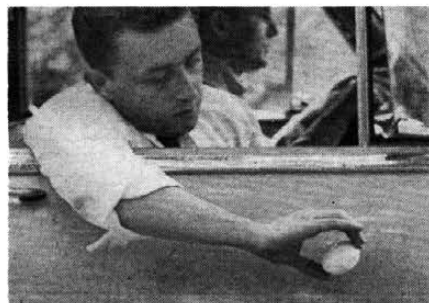
There are others with ultra-soft rear springs that perform a wild, risky rear-axle hop when the brakes are put on hard at high speed. It's easy to get into a bad high-speed spin under such conditions, so it's best to feel your way, starting with mild brake applications and working up to the harder ones.

It's hard to find a good substitute for a brake test detonator. A pistol is no good. It's illegal, the bullet mark on the pavement is impossible to find, and ricocheting bullets aren't good for tires. Of the various substitutes we've tried experimentally, eggs are the best! The observer holds his arm out of the car window, with an egg in his hand. He watches the driver's brake foot and the instant he sees it hit the brake pedal, he throws the egg downward as hard as he can. The splattered egg makes a mark that's pretty easy to find and enables fairly accurate braking distances to be recorded.

Brake test with an egg is comical but inexpensive. As driver hits the pedal, egg is thrown at the road marking the spot.

More scientific brake test calls for AAA detonator. It is actuated by stoplight and fires colored powder charge onto road.

Measurement from mark should be to location on car where marker was aimed. Brake tests are hard on tires and wheels.



Finding a Course

If you plan to check top speed, finding an adequate test course can be a big problem. Abandoned air strips are usually not hard to find, but they're seldom long enough to be useful for anything but brake and acceleration tests. The ideal—and Detroit's testers agree—is the long desert highway where there is no speed limit, little traffic, and where visibility is unimpaired for many, many miles.

For a top speed run you need a straight stretch of at least two-and-a-half miles. Timed runs can be made over any measured distance, but standard practice is to use a quarter-mile (1320 feet). This quarter-mile trap should be carefully measured off with a tape, and each end of it marked in such a way that it can be easily recognized at a distance of about 300 feet. Piles of rocks, or stakes with rags tied to them, serve this purpose nicely.

If you're willing to do without top speed figures, you should have no trouble locating a test course. Brake and acceleration tests can be run on any deserted road where the ground is fairly level and visibility is good. Fuel consumption tests can be run anywhere that there's fairly level terrain, a minimum of traffic to interfere with your steady speeds, and an appropriate speed limit.

WHERE TO GET INSTRUMENTS

TAPES: Steel or cloth tapes can be had from any hardware or drafting supply store. Keuffel & Esser's "Wyteface" 100-foot steel tape is hard to beat at \$6.50.

STOPWATCHES: Many jewelers stock these. You're almost certain of finding them in any sporting goods shop or war surplus outlet. The Swiss Minerva Company is the world's leading manufacturer of quality stopwatches and a catalog illustrating many types may be had by writing their U.S. importer.

GRAVITY ACCELEROMETER: Perfometer, \$24.95, from Atmosphere Corp., 11 East 48th St., New York, N. Y. Tapley Meter, \$87.50 and up, from Tapley Products Corp., 53 Park Place, New York 7, N. Y.

VACUUM GAUGE: Motor Minder, \$10.95, a Stewart-Warner product available in most auto supply stores. Mile-O-Meter, \$9.95 and up, from Gale Hall Engineering, Dept. MLG 75, Northampton, N. H. Moto-Chek, \$4.98, from New England Surplus Sales, Dept. ML5-5, Newburyport, Mass.

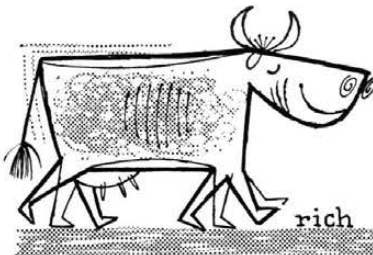
FUEL CONSUMPTION METER: Vacomat, \$17.75, from Donat A. Gauthier, 2970 West Grand Blvd., Detroit 2, Mich. **BRAKE TEST DETONATOR:** American Automobile Assn., 17th and Pennsylvania Ave., Washington, D.C.

FIFTH WHEEL AND ELECTRIC SPEEDOMETER: \$850 from Tracktest Equipment Co., Box 499, Franklin, Mich.

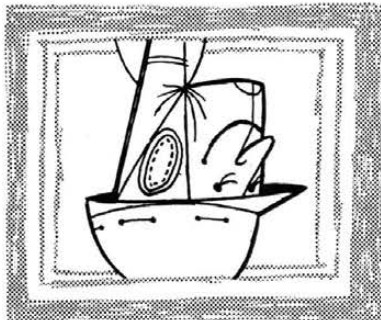
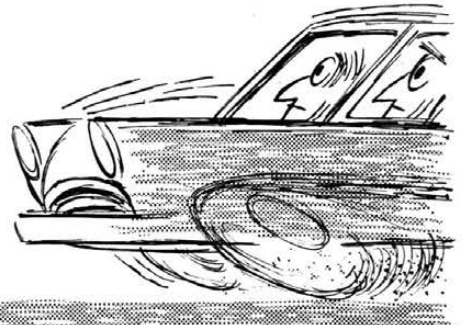
Make Your Road Test a Safe One



Two heads are better than one. So never test a car when you are alone. A second car handy is good advice.



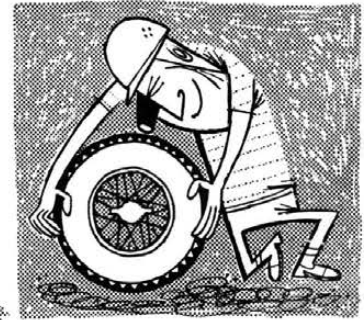
Things have a habit of popping up unexpectedly when you are going at top speed, since flat straightaways without side roads are hard to find. To be safe, it is best to get this figure from road test reports in a reliable publication.



Crash helmet is best kind of safety insurance you can carry, especially when you feel that you must go fast.



Braking causes some cars to behave strangely. So go slow on locking wheels until the car's characteristics are known.



Check tires before all tests. Remember: many tires will peel off tread at very high speeds.