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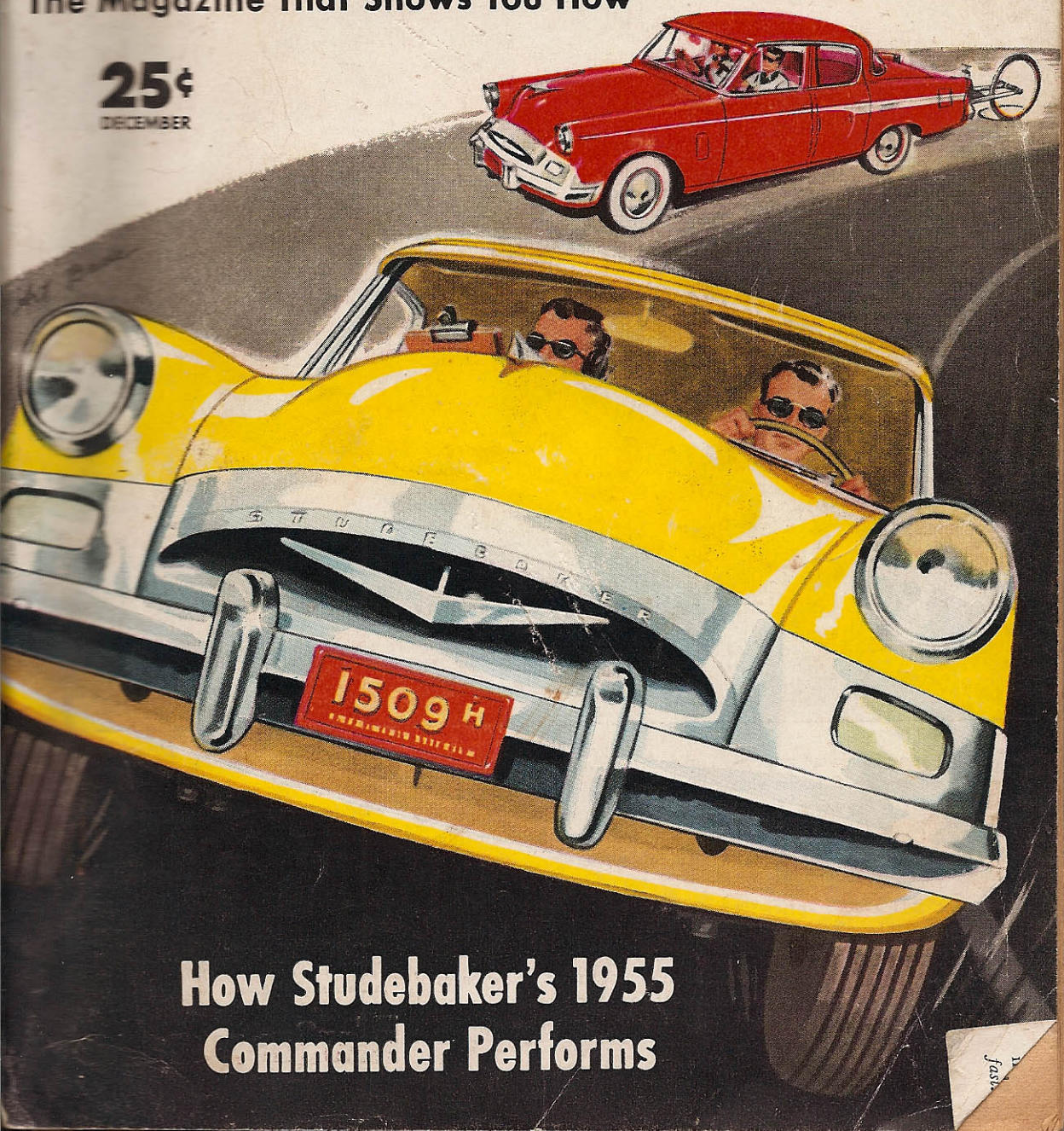


How Studebaker's 1955 Commander Performs

Testing the 1955 Studebaker Commander

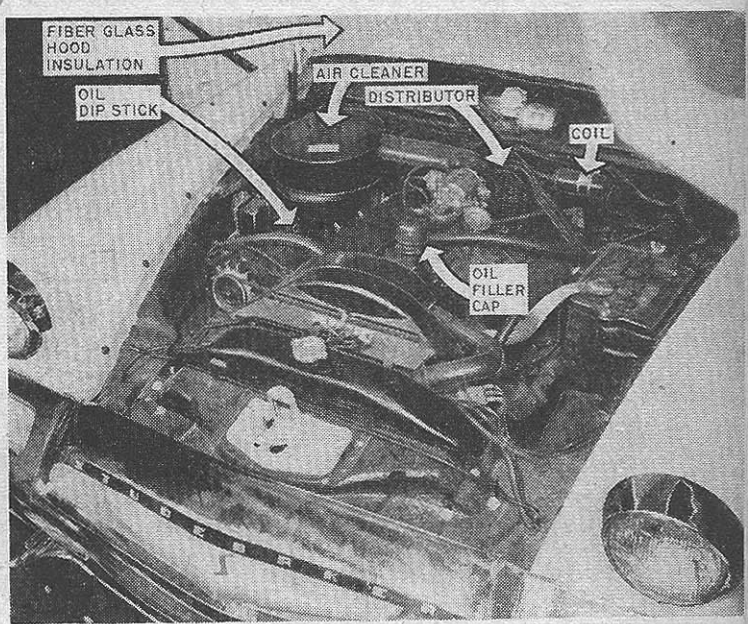
Rounding a curve at 60 mph, this Commander showed good ability to recover after leaving the road or making a sharp turn. For its weight, the car tracked well with a minimum of rear-end swerve even on rough roads.

By DON DINWIDDIE

THEY are building more than a car down in South Bend right now. They are reconstructing a few dreams that are not as old-fashioned as some people think—(1) that the smaller guy can keep up with the biggest guy in selling a good product, (2) if the men on the smaller fellow's team are determined to keep that product in competition. Of course, our job is not to tell you how much we admire the courage of both Studebaker's management and employees. Our job is to tell you how well their 1955 Commander is equipped to meet its competition, and the needs and desires of the car-buying public.

Studebaker's big news will be what they hope is a competitively priced car, which at this writing is slated to sell in the same price range as the Ford and Chevrolet —with the Champions priced to attract the low end of this price range, and the Commanders competing directly with Ford and Chevrolet's new V-8s. Specifically, Studebaker hopes that price reductions ranging from $37 to $287 per car will put them in the thick of the red-hot battle being waged for the cream of the volume market.

You have to keep this price picture in mind if you want to decide how effective a competitor the new Studebaker will be. We can't tell you



The 1955 Commander's 140 horsepower power plant rates a real cheer from servicemen, appears to be easier to work on than most V-8 types. Note the oil filling pipe on top of the block, close to the front for easy filling. The air cleaner is turned over the right bank of cylinders uncovering the distributor. The accelerating pump has 3 steps for quick adjustment to climate and altitude variations. No detonation was audible at any speed using regular gas, indicating smooth performance and operating economy.

Science at the Wheel — Studebaker Commander

MAKE OF CAR: Studebaker Regal Deluxe Commander 4-Door Sedan

START OF TESTS: September 7, 1954

GENERAL ROAD CONDITIONS (for gas mileage and acceleration tests): 3 mile black top, curved, oval track with banked turns. Clear sunny days and dry roads with very light winds

MILEAGE AT START OF TESTS: 10,814
MILES COVERED IN TESTS: 113

GAS USED: Regular **OIL USED:** 20W

CURB WEIGHT: 3270 lbs. 60% on front wheels, 40% on rear wheels

TIRE PRESSURES: 26 lbs. front; 22 lbs. rear for all tests.

SPARK SETTING: 8° BTC at break

TEST DATA

GASOLINE MILEAGE (checked with fuel volume flow meter and 5th wheel. Temperature 78° F. Relative humidity 41. Barometer 29.25 in. Hg. Carried weight 504 lbs. Two runs made in opposite directions on black top, oval proving ground test track, using Drive gear of automatic transmission):

True Speed (5th Wheel)	True Miles per Gallon	Odometer Miles per Gallon	Ton Miles per Gallon (true)
20	22.9	23.4	43.1
30	22.5	23.0	42.5
40	21.0	21.5	39.6
50	19.2	19.6	36.2
60	17.3	17.6	32.6
70	15.0 (est.)	15.2 (est.)	28.3 (est.)

OPTIMUM ECONOMY SPEED: 23.1 mpg true at 24 mph

TRAFFIC FUEL CONSUMPTION (simulated traffic pattern of city driving—stops, acceleration, braking. Carried weight 500 lbs.): True mpg 14.3. Odometer mpg 14.65. True ton mpg 27.0.

ACCELERATION (timed with 5th wheel. Carried weight 490 lbs. Temperature 80° F. Relative humidity 41. Barometer 29.25 in. Hg. Spark 8° BTC. Figures are average of two runs in opposite directions):

True MPH	Gear Range	Average True Time (sec.)	True MPH	Gear Range	Average True Time (sec.)
0–20	Lo	3.20	0–70	2nd to 61 mph	24.50
0–30	Lo	5.51	0–80	2nd to 61 mph	37.6
0–40	Lo to 32 mph Then 2nd	8.60	20–40	Downshift to 2nd foot to floor start	6.85
0–50	Lo to 32 mph Then 2nd	12.53	20–60	"	15.50
0–60	Lo to 32 mph Then 2nd	17.40	20–80	"	36.0

Minimum time for 0-60 mph (true) over level road with no wind, best spark setting of 8° BTC, premium fuel and driver alone: 14.9 seconds.

ACCELERATION FACTORS (Temperature 80° F. Relative humidity 41. Barometer 22.95 in. Hg. Carried weight 490 lbs. Spark 8° BTC. Figures are average of two runs in opposite directions):

True Speed	Gear	MPH Per Sec.	Ft. per Sec. per Sec.
10	Lo	6.2	9.2
20	Lo	4.6	6.8
30	Lo	3.7	5.4
40	2nd	2.8	4.1
50	2nd	2.3	3.4
60	2nd	1.8	2.6
70	Direct	1.3	1.9
80	Direct	0.9	1.3

HILL CLIMBING (calculated from acceleration readings with allowances made for rotational inertia. Data same as preceding test):

Approx. MPH	Gear	Grade in %	Pull in lbs.
15	Lo	33	1190
40	2nd	14	530

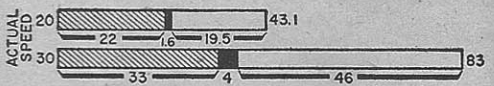
TOP SPEED AND SPEEDOMETER-ODOMETER CORRECTION: Odometer distance 9.21 miles; true distance 9 miles; odometer error at 35 mph .21 (plus) or + 2.4%:

MPH Speedometer Top Speed	True Speed	% Error Speedometer	Engine RPM	MPH Speedometer	True Speed	% Error Speedometer	Engine RPM
est. 108*	est. 100	..	4330	60	53.5	11	2400
100	92.0	8	4000	50	44.5	11	2000
90	82.3	9	3600	40	35.5	12	1600
80	73	9	3200	30	26.7	12	1200
70	63.3	10	2800	20	18	10	800

*Oval test track did not permit test of absolute maximum speed.

STOPPING ABILITY (Surface, level black top asphalt, clear and dry. Grade level. Surface temperature 75° F. Tires 6.70-15, Firestone 4 ply. Drag factor of road [average coefficient of friction between tires and road] .68. Pedal pressure 100 lbs. on all stops):

SERVICE BRAKE PANIC STOP



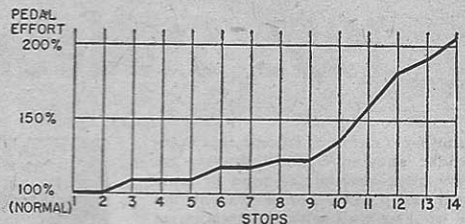
PANIC BRAKING stops from higher speeds not permitted on proving ground test track due to danger of locked brakes not releasing.

Distance traveled during average driver's reaction time (¾ sec.)

Brake lag: Distance covered between time brake pedal is depressed and wheels grip pavement

Braking distance: Distance covered between time wheels grip pavement until car comes to stop. Figure at ends of bars indicates total stopping distances in ft. (sum of reaction, brake lag and braking distances)

BRAKE FADE TESTS: As indicated below, number of stops required to double pedal effort was 14.



PARKING BRAKE TEST: Brake applied hard and suddenly from 20 mph actual speed

Braking Distance	Did Rear Wheels Lock? Right	Left
54 ft.	Yes	Yes

HORSEPOWER AT REAR AXLE (values calculated from acceleration data with allowances made for efficiencies and rotational inertia):

MPH True	RPM Engine	Equiv. Engine Torque (lb. ft.)	Axle Horsepower
95	4130	117	92
68	3080	137	78
44	2000	153	58

Per cent of advertised engine horsepower supplied to rear wheels: 66%

PERFORMANCE FACTORS
(Calculated)

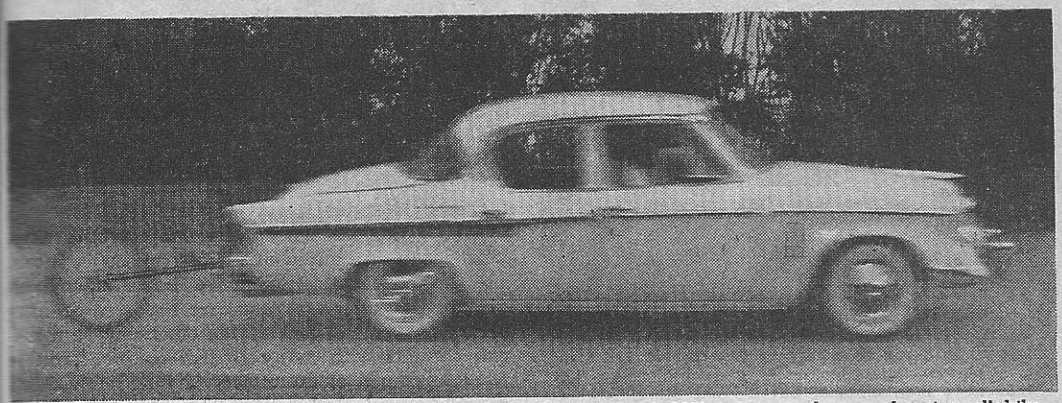
MPH (true) at maximum advertised horsepower 104 and torque 63. Engine rpm at 60 mph (also revolutions per mile) 2670 rpm. Average piston speed at 60 mph (also, ft./mile) 1250 ft./min. Cu. ft. per minute of mixture at 60 mph (also, cu. ft./mile) 173. Maximum engine horsepower (adv.) per ton of car (curb weight) 85.6. Reciprocating load factor (piston weight, bore, stroke, connecting rod) 13.3. Reciprocating load factor at 60 mph 945. Maximum engine horsepower (adv.) per cubic inch displacement 0.625.

CERTIFICATION

I certify that the test results in this report are the actual findings obtained in tests, conducted in strict accordance with good engineering practice, on the automobile named and under the conditions specified.

Edw J Chart

Member, Society of Automotive Engineers, American Society of Mechanical Engineers, Director, Automotive Research Laboratories, Professional Engineering Consultants, 1204 Noyes Street, Evanston, Illinois.



The fifth wheel tests registered a 2.4% plus error on the odometer and 12% error on the speedometer—slightly higher than last year's average.

how it stacks up against the competition's '55 models, because we haven't been able to test them yet. But, appropriately enough, the test figures show that the Commander could give a licking to the '54 models of the three major cars Studebaker expects it to compete with in 1955—on fuel economy, acceleration, hill climbing and top speed. And we've a notion that their fuel economy, for which Studebaker is justly praised, will still stand high when all the '55 figures are in.

With an automatic transmission, the 1955 Studebaker Regal DeLuxe Commander registered its best fuel economy of 23.1 true miles per gallon (23.6 by the odometer) at 24 *mph*, and 14.3 true *mpg* over the city traffic pattern test. This places it well above its size-and-price competition and right near the top when compared with the eleven 1954 cars we have tested (next year's may be a different story, of course).

Nor was this Commander a slouch when it comes to acceleration tests from a standing start. It shaved quite a few seconds off the times registered by other 1954 cars in its size and price range. Of course, it is no match for the giant horsepower luxury wagons on either acceleration or top speed, but then it isn't intended to be.

The V-8 engine that produces these performance figures has been upped in horsepower rating from 120 to 140 for 1955, and it is interesting to speculate on just where those 20 extra horses came from. First we find that Studebaker's engine, like others, has gone in for the popular deep breathing exercises—by redesigning and enlarging the inlet and exhaust manifolds and valves, and increasing the exhaust pipe diameter to 2 inches, thereby doing a good job of reducing fluid friction. This allows a greater weight of air to be drawn into the cylinders when the throttle is opened, increasing what the engineers call the volumetric efficiency (why don't they call it by a more accurate name—*weight inducted efficiency*?)

These changes in the flow passages' design raise the peaking speed from 4,000 to 4,500 *rpm*, so that if no greater weight of air were inducted than before, you would automatically have a horsepower increase of: 120 *hp* (1954's rating) $\frac{4500}{4000} = 135$ *hp*. Hence the 20 *hp* increase claimed (with no change in valve timing) could be obtained by a 5 *hp* gain from the greater weight of air inducted on the 1955 model (better breathing) and a 15 *hp* gain from the 500 *rpm* increase in

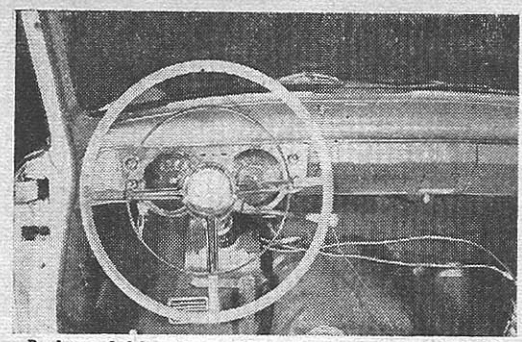
Drivers' Observations

ROADABILITY: Stability and tracking qualities good with little road wander. For its weight, a nice riding car. Whips on and off the road with good recovery and control and handles very well on rough roads. Engine noise and detonation is cut way down for less fatigue on long drives.

DRIVING COMFORT: Driver vision good all around—excellent over hood. Rear view mirror could be a mite deeper. Recessed and unhooded instrument dials easier for tall folks to read. Gold plate on dash panel produces softer reflections than chrome, but still glares at times. Ash tray and lighter have been moved closer to the driver for greater convenience. Nearly vertical backs on the front seats give good back support. Plenty of leg room front and back though knee of tall driver may strike steering column. Window and door handles operate easily, but catch on vent window opening can still trap your finger. Three-spoke steering wheel can be raised or lowered slightly by removable shims.

INSTRUMENTS AND CONTROLS: Ignition key starting. Automatic transmission operates smoothly. Clear, unobstructed view of gear quadrant, and green dot light behind shift positions makes it easy to tell where to shift at night. Full circle horn rim, though thin, interferes somewhat with a tall driver's view of the instruments. All switches on the dash are easily reached from the driver's position with a minimum of interference from the steering wheel and gear shift lever. Extra-wide brake pedal of past models has been narrowed and there is no interference with left foot's operation of dimmer switch.

SPECIAL COMMENTS: For children's safety, back doors can be locked by pushing down button and then closing without holding a release in or down, and you can't open rear door from inside or outside as long as the button is down—a very good feature. On the front door, you must either lock with a key or push down buttons from the inside as usual. Excellent design makes generator, voltage regulator, dipstick, oil filter and filling pipe, coil, air cleaner and distributor very easy to service. See they have a 12 instead of 7 pound pressure cap on this year's radiator. Also production engines will get a paint job—a blue block and aluminum painted valve covers and air cleaners. Cast iron camshaft and hardened lifters. More sound absorbing insulation this year. Stainless steel trim seems to show fingerprint and fingernail marks more than it should.



Brake pedal is not as wide as last year's, but it's still located so it can be used by either right or left foot. Gold plating around instrument panel produces softer reflections than chrome, but it's not glareproof, of course. Full circle horn rim may interfere with easy reading of the dials for some drivers, but Studebaker has eliminated the 1954 hoods over the dials and recessed them deeper to cut reflections and make reading easier and more adaptable to all sizes of drivers. The models you see may have a medallion and more chrome than our test car shows on its dashboard. Note new touch of elegance—a two-tone steering wheel.

the peaking speed of the engine.

By now, you may have already spotted the fact that this Commander's bore has been increased from 3⅜ to 3⁹⁄₁₆ and its stroke decreased from 3¼ to 2¹³⁄₁₆—for a net *decrease* in displacement (232.6 to 224 cu. in.). In brief, she's quite a bit oversquare—an ideal design for the stylist who wants to keep down engine height and provide good over-the-hood driver vision Engineering-wise, an oversquare design allows a relatively short stroke with large displacement and thus reduced piston speed—which is a good thing for those who travel at 80 *mph*.

As trends go, Studebaker has been conservative about its horsepower claims and increases. Even with the 20 *hp* increase in 1955, they have still retained the same dual carburetor. It's an odds-on bet that some hot rodders will convert Commanders to 4-barrel carbs for doubly hot performance. Personally, if we were to do any converting, our aching bones and budget would lead us to try a dual range transmission and 3.09 rear axle ratio on this Commander—to secure the last ounce of fuel economy possible with this already economical car.

Speaking of economy, Studebaker has wisely gone to better materials and increased dimensions on their valve lifters, which should cut down the owner's servicing costs and problems. Lifters, as you know, can bring pesky headaches with modern hi-compression engines. Also, that 945 reciprocating load factor at 60 *mph* indicates a relatively low degree of engine wear.

Although we reported on Studebaker's brake improvements last year, we didn't have the opportunity to run an actual performance test on them. This year's test indicates that these changes were effective improvements. On the only two panic stops we could complete (high speed panic stops are not permitted on proving ground test tracks because of fatal instances in which the brakes have failed to release after the wheels lock), the results of a 19.5-ft. braking distance stop from 20 *mph* and a 46-ft. stop from 30 *mph* are pretty close to the figures registered by all the 1954 cars we tested. They are also well within the limits specified for safe braking distances by National Safety Council tests.

And while we are on the subject of brakes, let's try to straighten out a few misconceptions. You may recall that when we first started these *Science at the Wheel* tests, we reported braking action in terms of percentage efficiency—a measure popular with many British testers. Trouble with this form of an answer is that it implies a greater accuracy than it delivers, based as it is on a standard as fickle as Cassidy's constant, and subject to variables in such a way as to make it meaningless to an engineer. On our '54 tests, we tried a new approach in answering the car buyers' question—how quickly will the car stop? We added together the average driver's reaction time as determined by exhaustive tests (you can beat this, of course, by anticipating braking situations), the brake lag (the interval between the time the driver's foot hits the brake and the car's wheels grip the pavement), and the distance actually covered after the wheels grip the pavement until the car comes to a full stop. Add them all together and theoretically you come up with an answer that will tell the average driver whether or not he can stop his car before he hits that truck suddenly looming up ahead of him.

But, says engineering, the driver's reaction time varies with the driver and his ability to anticipate braking situations. Also the

1955 STUDEBAKER COMMANDER SPECIFICATIONS

ENGINE: Overhead valve V-8; bore 3⁹⁄₁₆; stroke 2¹³⁄₁₆; advertised maximum brake horsepower rated 140 at 4500 rpm (taxable horsepower 40.6); advertised maximum torque 202 ft. lbs., 136 psi at 2800 rpm, corrected to 60° F. and 29.92 in. Hg.; compression ratio 7.5 to 1 (may offer 8 to 1 on some models); piston displacement 224 cu. in.; fuel specified regular.

TRANSMISSION: Studebaker Automatic Drive (optional) with 3.54 rear axle ratio; (other rear axle ratios: 4.09 conventional; 4.27 overdrive).

STEERING: Turning circle 41 ft., curb to curb. Overall ratio 24-1. Torque to turn 22 ft. lb. static, 3-6 ft. lb. rolling.

EXTERIOR: Wheelbase 116.5 in.; overall length 202½ in.; overall width 69¼ in.; overall height 60³⁄₁₆ in.; curb weight 3270 lbs. (10 gal. fuel, oil and water); minimum road clearance 6⁵⁄₁₆ in. at extension pipe ahead of muffler.

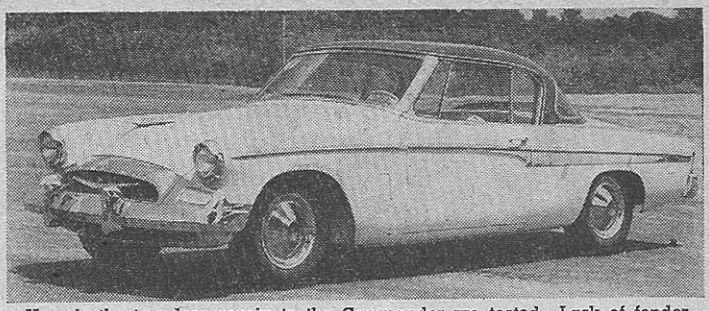
INTERIOR: Headroom, front seat 36 in., rear seat 35; legroom, front seat 42½ in., rear seat 10¼ in.; hiproom, front seat 59½ in., rear seat 59 in.; total front seat adjustment at floor 4¹¹⁄₁₆ in. (5½ incl. second seat position).

VISIBILITY: Windshield area 918 sq. in.; rear window area 944 sq. in.; driver's eye to road over left front fender 24 ft. 8 in., over hood center 32 ft. 5 in., over right front fender 40 ft.

EQUIPMENT: Battery, Willard; 6 volt, 15 plate; 100 amp. hours, located under hood, left front; tires 6.70-15 4 ply; recommended pressure 26 lbs. front, 22 lbs. rear, cold; springing, front coil, rear leaf; frame, box section ladder type—5 cross members.

CAPACITIES: Fuel tank 18 gals.; crankcase 6 qts.; optional oil filter; cooling system 19 qts. with heater; differential 2.5-3 pts.; transmission 19 pts.; luggage comp't. dimensions 52 x 52 x 23 cu. ft. (less tire displ. and tools).

measurement of brake lag depends on the point during the depressing of the brake pedal at which you start to measure, how you can make that measurement without any loss of time that would be falsely charged against brake lag, and how you determine exactly when the wheels start to grip the road surface, to find out when brake lag ends and car skid begins. Finally, the distance the car will skid before coming to a full stop is determined by that rascal known as the *coefficient of friction* between the car's wheels and the road surface (another variable), and this in turn varies even with such supposedly innocent factors as relative humidity. As for the effect of road surface, here's one example. Tests have shown that it will take a car as much as 20 more feet to stop from 40 *mph* on old, dry concrete than on newly laid dry concrete.



Here is the two-door cousin to the Commander we tested. Lack of fender pants means you'll be able to get at wheels easily, though tubeless tires on all models should reduce roadside tire changing.

Had enough? Now you know why engineers argue with each other over brake testing till the cows come home. For, of all eleven 1954 cars we have tested, the widest variations in stopping distances on the same type road surface ranged from four feet on stops made from 20 *mph* to 17 feet on 50 *mph* stops. As any engineer worth his salt will tell you, the variations imposed by the measuring devices available, plus those created by different weather conditions, make these figures relatively meaningless as a measure of a car's stopping ability.

More to the point and easier to measure accurately is the brake fade test, which gives you a good indication of the ability of the car's brakes to stand up under hard usage. We've added these fade tests to the *Science at the Wheel* chart, and we hope to bring you the same information on all of the 1955 models we test. Under this severe test, the Studebaker Commander showed good brakes. It took 14 successive stops to a little more than double the pedal pressure required, and no serious fading was evident.

The brake loading factor in the 1955 Studie Commander (that is, its pound curb weight per square inch with 195.3 inch brake lining) is an excellent 16.7. Incidentally, they have lowered their high brake pedal to 4 inches from the floor, which should reduce braking reaction time a bit and lessen the chance of catching your foot under it. It also isn't as wide as last year's pedal, which some drivers found a bit awkward. Its location is still somewhat to the left of the steering column, which is fine if you like to do some braking with the left foot (rarely necessary with Studebaker's fine hill-holder transmission feature).

As a purely subjective observation, without rear seat passengers this Commander seemed nose-heavy enough to probably cause some troublesome braking at high speeds. Its 60% front wheel-40% back wheel weight distribution might account for this feeling—but such nose-heavy weight distribution has been more of a trend than an exception on many modern cars.

Our test car rated well on the usual test driver observations—as a good road holder on curves, rough roads, and off-and-on the straightaway shoulders with no rear end swerve. (Sorry we couldn't give it our regular tilt angle test, but the conditions under which we run this could not be duplicated at the proving ground test track). As a hill climber, this car proved to be an eager performer. Vibration and shock seemed a little less noticeable than the average, and the engine, nestling under a fiber glass liner this year, was quiet.

On the theory that it was setting the style with its long, low and sporty look of recent years, Studebaker is showing the courage of its convictions by sticking to the same basic style for 1955, with minor changes in front end grill, rub rail, hood ornaments, and windshield moldings. Note that we didn't call these chrome, because they aren't; they're stainless steel, which won't chip and flake on you. Interiors have been pepped up even more than in 1954 with decorative (and washable) fabrics, and the chrome promoters left the dashboard we inspected pretty much alone. But don't count on that clean, unchromed right hand side of the dash on the models you will look at. The engineers may have to bow to the dealers and add some glare-producing medallions and such, because the dealers believe such gimcrackery is what sells cars.

We prefer to think it's a matter of good performance—and price. Studebaker has had the former for many years and is hoping that—come '55—its price will also be right.—END

Did You Miss a 1954 Test?

If you have missed the 1954 tests covering the Oldsmobile 88 and Super 88, appearing in our October, 1954 issue; the Chevrolet Station Wagon and Cadillac Series 62, appearing in our August, 1954 issue; the Ford V-8, Buick Century, Mercury Monterey and Packard Patrician, appearing in June, 1954; the Plymouth Belvedere and Chrysler New Yorker De Luxe, appearing in April, 1954; or the Nash Rambler, appearing in February, 1954, send 25¢ for each issue you want. Address requests for back issues to SCIENCE AND MECHANICS, 450 East Ohio Street, Chicago 11, Ill.