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what is Chrysler waiting for?

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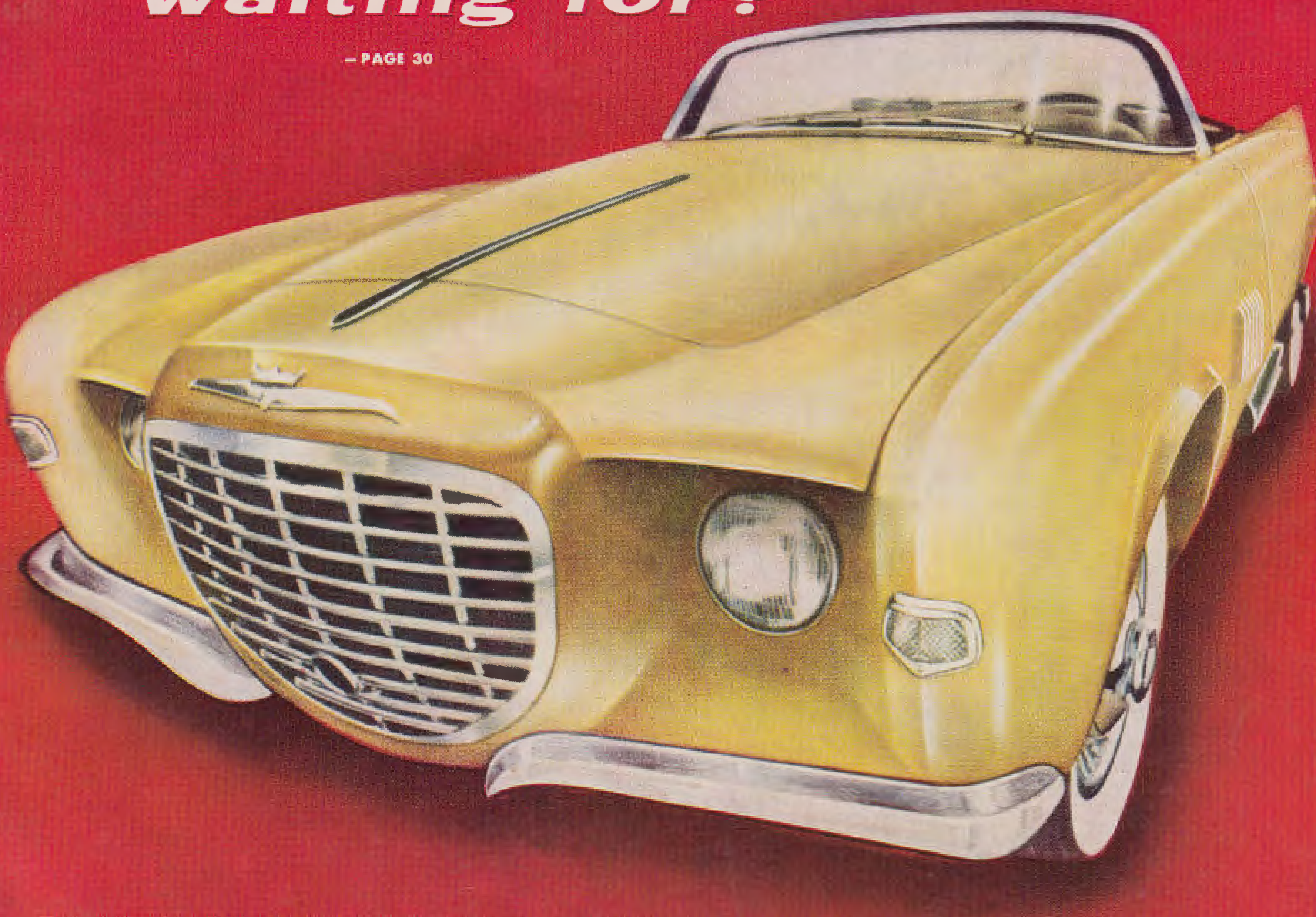

FOUR COMPARATIVE ROAD TESTS:

DODGE • MERCURY • PONTIAC and STUDEBAKER

The Atom Car You Will Never Drive

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Golden Hawk, now into fifth month of its endurance test, climbs dirt road at proving grounds.

How Long Will Your Car Last?

By EUGENE J. HARDIG
Chief Engineer of Studebaker

Every car manufacturer subjects its models to gruelling endurance tests to learn how and why components fail.

ON A WOODED 880-acre site not far from South Bend, Indiana, a car is speeding night and day over a tortuous course of scientifically laid-out roads. From November 8th, 1955, until last March 1st, it had already been driven 43,709 miles and by the time you read this, will have traveled more miles than you will probably drive in the next three years.

The car is a 275-hp Studebaker Golden Hawk and it is being subjected to its rigorous non-stop testing at the Studebaker proving ground. It will be pushed without respite until it has a major mechanical failure.

This almost continuous run at the Studebaker proving ground is not unusual in the automobile industry. Just as we do at Studebaker, all other American car manufacturers submit every model they produce to this sort of grind. Such time-consuming, incredibly detailed and expensive tests are just one of the many practices which the immense competition in the field today has spurred and which results in better cars for the average car-buyers.

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Hawk is kept on move for almost 24 hours a day, stopped only for fueling, changes of drivers and ordinary servicing every 5,000 miles.

Extensive back roads Hawk travels daily at Studebaker proving grounds contain mud and dust roads, water hazards, 30% grade, other obstacles.


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How Long Will Your Car Last?

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Foı example, back in 1939, Studebaker proving-ground drivers added up about 150,000 miles of test driving. In 1955, on just the roads inside the test area, they totaled up mileage equivalent to 29 times around the world—722,178 miles. They put in another 383,771 miles on highways and city streets. As the hazards on the proving-ground routes are a great deal tougher than those encountered in normal driving, this amounts to something over four *million* miles of ordinary driving from the standpoint of wear.

Let's take a look at the routes over which the test Golden Hawk is making its repetitious rounds.

THE STUDEBAKER engineers' outdoor "laboratory" is scientifically calculated to test automobiles on a basis that accelerates normal car ageing. It consists of an intricate network of specially constructed roads and hazards built to duplicate nearly every conceivable condition of owner driving.

The speedway section is a three-lane, three-mile oval with banking at both ends. Along the inside of each of the two straightaways is an extra lane—one of gravel, and the other a duplicate of a country "washboard" road, where springs and shocks are shaken down.

The winding, treacherous "back road" called Route 1 twists, climbs and falls for almost three miles through a thick forest of oaks, maples and pines. In this short distance there are 10 curves, 12 hills, over 50 major bumps and 200 smaller ones. Incorporated in this section of the test route are precisely-named roads such as Mud Hole Rd., Skyline Rd.,

Author of article, Studebaker Chief Engineer Eugene Hardig (left), Ralph Feich, service engineer, Art Hunt, proving grounds director (right) examine component from test car.

Several dozen trips a day over railroad ties (above) is tough test of suspension and frame.

Dust Rd., Cobblestone Rd., and High Speed Bump Rd., as well as a few "extras" like the runs over railroad ties, through the sand oval, etc.

It is a matter of some pride to us here at Studebaker that these roads which cost over one million dollars to build in 1926 ($4,000,000 in terms of today's construction costs) are considered to be the very worst roads you can find anywhere. Each bump, every curve, was designed to reveal the innermost working secrets of cars freshly off the drafting boards and to work out the bugs that fly in between the drafting table and the assembly line.

One of the special torture chambers is the "water bath." This is a 200-foot-long, nine-foot-deep trough which is "paved" in lengths of split six-inch steel piping, the pieces of which are laid 30 inches apart in a staggered pattern. Each time the Hawk bumps over, sloshing through a foot of water, an overhead valve opens automatically and the car is treated to the heaviest drenching since the Johnstown flood. It's a pretty efficient test of water seals, ignition, and windshield wipers, particularly when it is repeated dozens of times a day.

When the weather is dry enough to make the "dust" course a real obstacle, runs through the "water bath" are alternated with runs through Dust Road where grit and grime are forced into the working parts of the car, adding a far greater strain on the automobile's working components than you would ever find in ordinary driving.

The Golden Hawk currently under test was, like all other Studebaker test cars, chosen at random from the assembly line. I should mention that this procedure is, contrary to some opinion, standard practice in the auto industry. Results of company tests are only occasionally publicized and even those few people who believe that the industry overrates its products cannot be so illogical as to think that the we who design cars have anything to gain by kidding ourselves.

Our test Hawk is following a pretty well standardized test procedure. Barring brief fueling, driver-change and minor service stops, it is being driven over the above-described route for a full 24 hours a day.

Alternate circuits of one lap on Route 1 and two laps on the speedway make up the test cycle. Speeds on Route 1, of course, vary drastically according to terrain and obstacles but are generally in the 10-35 mph range. On the speedway, the Hawk is run at 60 mph on the turns, 80 mph on the east straightaway and 70 mph on the west straightaway, frequent braking and acceleration tests being made during the runs. The car is given normal servicing after each 5,000 miles. Literally thousands of continuous charts are kept on performance factors (a few of these charts are shown at right). These are sent back to the engineering department where we decipher the figures, study any faulty part, and work out ways to improve the product.

In order to obtain accurate data, a few special instruments are used. Among them are the Eddy current tow dynamometer, a trailer-like device used to produce a dragging force when towed. The effect may be compared to that of towing a car with its brakes set, except that the dynamometer may be adjusted to induce varying load factors. In the rear of the trailer, 50-pound shot bags are carried.

The dynamometer is used for cooling tests. With it, the Hawk is driven at wide open throttle but dragged down to any speed desired. As the car is driven under these varying load conditions, special instruments located in various parts of the cooling system transmit continuous temperature information to the test driver.

The Hawk is subjected to these cooling tests, as well as gas mileage measurements and fifth-wheel measurements of its true speeds, a number of times during its months of continuous use, the times carefully selected to give information under varying climatic, terrain and usage conditions.

THE ENDURANCE RUN which the Golden Hawk is currently undergoing is the third phase of testing this model—as well as all of our other models—has received. The original hand-built prototype was taken out for a gruelling 50,000 mile run and a series of exhaustive special-instrument tests, thus "proved" under tough real-life conditions before it was okayed for production.

When the Hawk was put into production, engineers still kept their eye on it. We took models at random from the production lines and sent them through one thousand-mile "quality control" checks at the proving grounds where the cars, using special equipment and weighted to simulate average passenger loads, were driven for a thousand miles over the same difficult routes the endurance-run Hawk is now using.

During these 1,000-mile "checks" the car was driven at very slow speeds and very high speeds, was constantly run through the gears to provide the best possible check on engine and transmission workings, was accelerated with open throttle hundreds of times. Other checks the car was subjected to tested its deceleration, fuel economy, chassis, springs and other mechanical components (*Continued on next page*)

CAR CENTER OF GRAVITY

Car No. 56 J2 Car Make Studebaker Car Model 56 J-K7
Body Style Hardtop Date 15 Nov. 1955 Odo. 1188
Tire Size 7.10-15 Tire Press. 26F 22R Loading Road Load
Extra Equip. Wet Air Cleaner, Oil Filter, Tachometer, Radio, Windshield Washer, Cigar Lighter, Clock, Directional Signals, Car Belts, Heater-Defroster, Back-up Lights, Over Drive Trans

DATA

	Car Level	Car Tilted	Diff.
Weight LF.	1046.50	1000.25	46.25
Weight RF.	1031.0	1003.0	28.0
Total Front Wt.	2077.50	2003.25	74.25
Weight LR.	790.25	828.25	38.0
Weight RR.	781.25	817.50	36.25
Total Rear Wt.	1571.50	1645.75	74.25
Total Car Wt.	3649.0	3649.0	
Protractor Read'g	1.2	276.4	15°28'45" 275.2
Wheelbase	120.75"		
5 Turns R Wheel	35.21"		
Tire Roll. Rad.	13.45"		

COMPUTATION

Horizontal C. of G.		Vertical C. of G.	
Log WB.	12.0818871-10	Log WB.-Log of Total Wt.	8.5197132-10
- Log Total Wt.	3.5621739	+Log Cot.A	.5575843
	8.5197132-10	+Log Wt.Transfer	1.3706965
+ Log Front Wt.	3.3175410	Log Y	.9479940
Log X	1.8372542	Y=CG.above Axle CL.	8.87
X=C.of G.to R. Axle	68.75	H=CG.above Grd.	22.32
Z=C.of G.to F. Axle	52.0		

WEIGHT SHEET

STUDEBAKER ENGINEERING DEPT.

MAKE Studebaker MODEL 56 J-K7 DATE 15 Nov 1955 ODO 1188
CAR # 56 J 2 SERIAL # 6030057 ENGINE # K 1005
BODY Hard Top

CAR WEIGHTS

Gasoline Full Water Full Oil Full Total
Spare tire, tube & wheel Yes Tools Yes Total

Allowable weight, 150 pounds per passenger.

	Ship.	Road	1 Pas.	2 Pas.	3 Pas.	4 Pas.	5 Pas.	6 Pas.
Passenger								
Position								
R.F.	1036					1164.0		
L.F.	1051					1181.25		
FRONT	2087					2345.25		
R.R.	779.5					952.5		
L.R.	788.5					957.25		
REAR	1568					1909.75		
TOTAL	3655					4255.0		

SPECIAL EQUIPMENT & REMARKS:

Bumper Jack Assembly — Tachometer
Wet Air Cleaner — Radio
Oil Filter — Cigar Lighter
White Wall Tires — Directional Lights
Windshield Washer — Clock
Glove Box Light — Heater - Defroster
Car Belts — Back-up Lights
Over Drive Trans
Solex Glass

OBSERVED BY RW

This is the driver's summary which gives the driver's comments for each shift through the 24-hour driving period during an endurance run. We just picked one day at random.

COMMENTS ON 56J-2
12-29-55

Spychalski—Odo. 20015 to 20131, Cooling, Speedway, Normal
Odo. 20007
Installed set of spark plugs.
Installed set of distributor points and condenser.
Removed master sample radiator core and installed production radiator.
Odo. 20015 to 20131
Drove vehicle on Speedway only for break-in of valves.
Odo. 20067
Exhaust leak at left bank exhaust pipe flange.
Odo. 20117
Installed new gasket, left bank exhaust pipe flange. This eliminated exhaust leak.
Topping—Odo. 20131 to 20452, Test Procedures 1 & 22, Route 1, Speedway, Normal
Odo. 20131
Drained water from radiator core and connected heater hoses.
Filled radiator with water.
Filled gas tank.
Checked tires, oil, water, and battery. All Ok.
Odo. 20452
Steering is hard.
Gas tank right bracket is cracked and has been working.
*Both doors work up and down and squeak on Route 1.
*LR glass keeps working back, leaving ¼" to ½" opening, causing bad draft on driver's neck.
Radio set panel light out.
Hine—Odo. 20452 to 20777, Test Procedures 1 & 22, Route1, Speedway, Normal
Odo. 20777—Rear axle inspection plate is leaking grease. Radio panel light does not work.
Vehicle seems to steer hard.
Cold air seems to be coming in from around accelerator rod hole in floor, also steering column pad at floor.
*Left door gloss and rear left glass have a gop that lets cold air in.
*Rear body center bolt looks okay.
Vehicle has rattles and chuckle in both doors.

CAR DRIFT IN NEUTRAL

Car No. 56 J 2 Car Make Studebaker Car Model 56 J-K7
Body Style Hard Top
Air Temp. 43° Baro. 29.4 Wind 0-5 m/h ESE
Test Weight 4255 Axle Ratio 3.92 Frontal Area 22.7 Sq. Ft.
Tire Size 7.10-15 Tire Press. 26F 22R Tire Roll. Rad. 13.45
Over Drive Trans Date 21 Nov 1955 Odo. 2588

Speed Decrement (MPH)	Total Time (Sec.)	Speed Decrement (MPH)	ΔT (Sec.)	Car Speed (MPH)	Ave. Decel. from Curve Ft/Sec²	Total Decel. Force (Lbs.)	Decel. Force due to Air Resist. (Lbs)	Air Resist. Lb/Sq.Ft of F.A.
-75		80-75		75				
-70		75-70		70	1.64	217.2	160.2	
70-65	4.68	70-65	4.68	65	1.49	197.4	140.4	
70-60	9.85	65-60	5.17	60	1.36	180.1	123.1	
70-55	15.44	60-55	5.59	55	1.23	163.0	106.0	
70-50	21.86	55-50	6.42	50	1.12	148.4	91.4	
70-45	29.01	50-45	7.15	45	1.02	135.1	78.1	
70-40	36.64	45-40	7.63	40	.92	121.8	64.8	
70-35	44.97	40-35	8.33	35	.83	109.9	52.9	
70-30	54.60	35-30	9.63	30	.76	100.6	43.6	
70-25	64.24	30-25	9.64	25	.69	91.5	34.5	
70-20	75.76	25-20	11.52	20	.62	82.2	25.2	
70-15	88.36	20-15	12.60	15	.57	75.6	18.6	
70-10	101.36	15-10	13.00	10	.52	68.9	11.9	
70-5	115.96	10-5	14.60	5	.47	62.2	5.2	
70-0	133.07	5-0	17.11	0	.43	57.0	0.0	
Rolling Resist. Lbs/1000 Lbs. of Car Wt.						13.4		

(Continued from preceding page)
plus body points of paint, chrome, door fits, trim and instruments, etc. The current production Golden Hawk already incorporates improvements based on the results of these first two testing phases.

Besides the three regular phases of testing, there are also periodic special tests like the crash tests made last year which resulted in interlocking safety door latches, the increased use of safety belts, crash padding, etc.

Studebaker is not alone in finding that many new car advances have come about by this constant and sometimes tedious work of grinding the cars around the testing courses. The results of similar runs on their own proving grounds have been of equal benefit to all of our competitors.

It is possible that you might be saying at this point, "Sure, it probably makes good sense to test cars, but does anything positive result? Don't the ideas for most improvements in cars really come from the engineering department rather than from the test drivers?"

As an engineer, I can tell you honestly that most improvements of a car already in production come about by the *cooperative* effort of the proving-ground crew and the engineers. But the men at the proving grounds can, at least in our organization, claim a few for their very own.

As a direct result of testing in 1954, the method of sealing the rear trunk lid on Studebaker cars was changed to eliminate any water seepage.

Another was the elimination of the cooling fan shroud which directed the air circulation onto the engine. Permitting lower production costs, a variation in grille design improved the circulation.

WHEN THE GOLDEN HAWK reaches the 50,000-mile mark in its current endurance run, it will be permitted a short respite. According to our fairest guesses, it will have gone the equivalent of about 200,000 miles of normal city, suburban and highway use. (I say "about" because the various sections of our proving grounds routes compound "normal usage" from three to seven times, varying with kind of road surface and component of car. In effect, our proving grounds tests simply "accelerate" normal driving conditions.) The Hawk will be completely torn down at that point, each part closely examined and, if found to still be in good shape, the Hawk will be again assembled and run for another 25,000 miles.

Although I have emphasized the tremendously strenuous quality of endurance testing, I do not mean to give the impression that our Hawk —or any test car—is mishandled. The purpose of the tests is not to "beat a car to death" but rather to learn as much as possible about its durability under the normal driving circumstances for which the cars are built.

If our Golden Hawk will travel 75,000 miles without major failure of any kind, we'll call it quits. In today's car picture, it seems unlikely that any owner will expect his car to cover the equivalent owner-driven 300,000 miles without something giving out.

Will the Hawk do it? We don't know yet. Many Studebakers have in the past; some haven't. The 1953 Studebaker Commander showed a crack in the frame around a front spring at the 50,000-mile point. The frame design for the production cars was altered, that area reinforced and the failure was never repeated.

We, of course, think the Golden Hawk is without major flaws. The fact that it has already completed almost an almost-continuous 50,000 miles tends to reinforce such an opinion. But if a single flaw got past the original 50,000-mile prototype test and the dozens of 1,000-mile checks of production models, we want to know about it. A better way to find out has not yet been devised than running one of the cars in the above-described endurance test. For from a realistic viewpoint, in the automotive engineering field, all the theory in the world doesn't mean a thing unless the tangible result of it can be proved to behave as we predict it will. ●

Five Ferraris Tested

Continued from page 35

The cars had the four-cylinder engine with a bore and stroke of 90 x 78 mm giving a total displacement of 1,984.86 cc. Both cars were fitted with two double-choke carburetors, though of different types. The Series 1 car was equipped with 4.50x16 wheels while the Series 2 Mondial had 5.00x16 wheels fitted.

TYPE 750 MONZA

THE THREE-LITER, four-cylinder Ferrari which was christened "type Monza" is a direct descendant of the two-liter, Formula II single seater with which Ascari won the World Championship in 1952 and 1953. First a 2½-liter, four-cylinder car was produced in Grand Prix and sports form. Then, for the 1953 Senigallia race, a three-liter based on the 2½-liter and externally exactly like it, was produced. This car showed great promise but suffered constantly from engine trouble. Consequently, in the 1953 Supercortemaggiore race at Monza, two three-liter, four-cylinder cars turned out. One, with a new style body by Autodromo of Modena was driven by Ascari, and the other, driven by Mike Hawthorn, was the Senigallia car with a Vignale body. Ascari blew up his engine during practice so Hawthorn's engine was transferred to his car and a 2½-liter engine substituted in Hawthorn's car.

During the race, when he was in the lead, Ascari crashed and completely wrecked the car.

The three-liter was next seen at Buenos Aires. The Senigallia car was driven by Bonomi and a new car—also with Vignale body—was driven by Milan. The Bonomi car broke its rear axle while in second place and the Milan car placed fifth. Then Bonomi took part in several races in Europe in 1954 with this four-cylinder car, having qualified success.

As a result of Ferrari's experience with these cars, two new models—both known under the new name of Type 750 Monza—were produced for the 1954 Supercortemaggiore race. Hawthorn, with the Farina-bodied car, took first place and Gonzáléz, driving the first Scaglietti-bodied car, took second place. This success was followed by Maglioli's tremendous exhibition of speed at the 12 hours of Rheims, and Hawthorn's wonderful performance in the Tourist Trophy with similar cars.

I was fortunate enough to be able to try four of these few 1954 three-liter Ferraris. The first one was the ex-Gonzáléz Supercortemaggiore four-speed gearbox car. This had suspension like that of the G.P. car with transverse leaf spring and in the front rubberblock inserts (the use of them was then standard practice). The second was Portago's new car for Sebring ('54) equipped with a five-speed gearbox and coil spring front suspension. The third car was Luigi Chinetti's—the one driven by Taruffi and Schell at Sebring, which differed from Portago's only in appearance (it had two air-scoops at the side of the body to allow air to the tires, and had a lower headrest). Fourth car was Tony Parravano's new Ferrari 750 which was further modified with additional air scoops to the front and rear brakes.

With Parravano's car, I drove from Modena to Rome and took part in the speed tests at Castelfusano.

The car weighed 1,680 lbs. dry and had a multi-tube steel frame, a five-speed gearbox in unit with the differential, and a de Dion rear axle with double radius rods and a transverse leaf spring mounted above the axle. It was finished in Italian racing red with polished aluminum wheels and upholstery in dark red leather.