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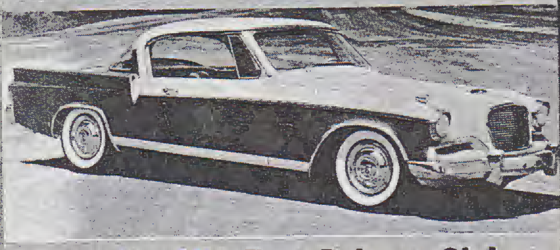

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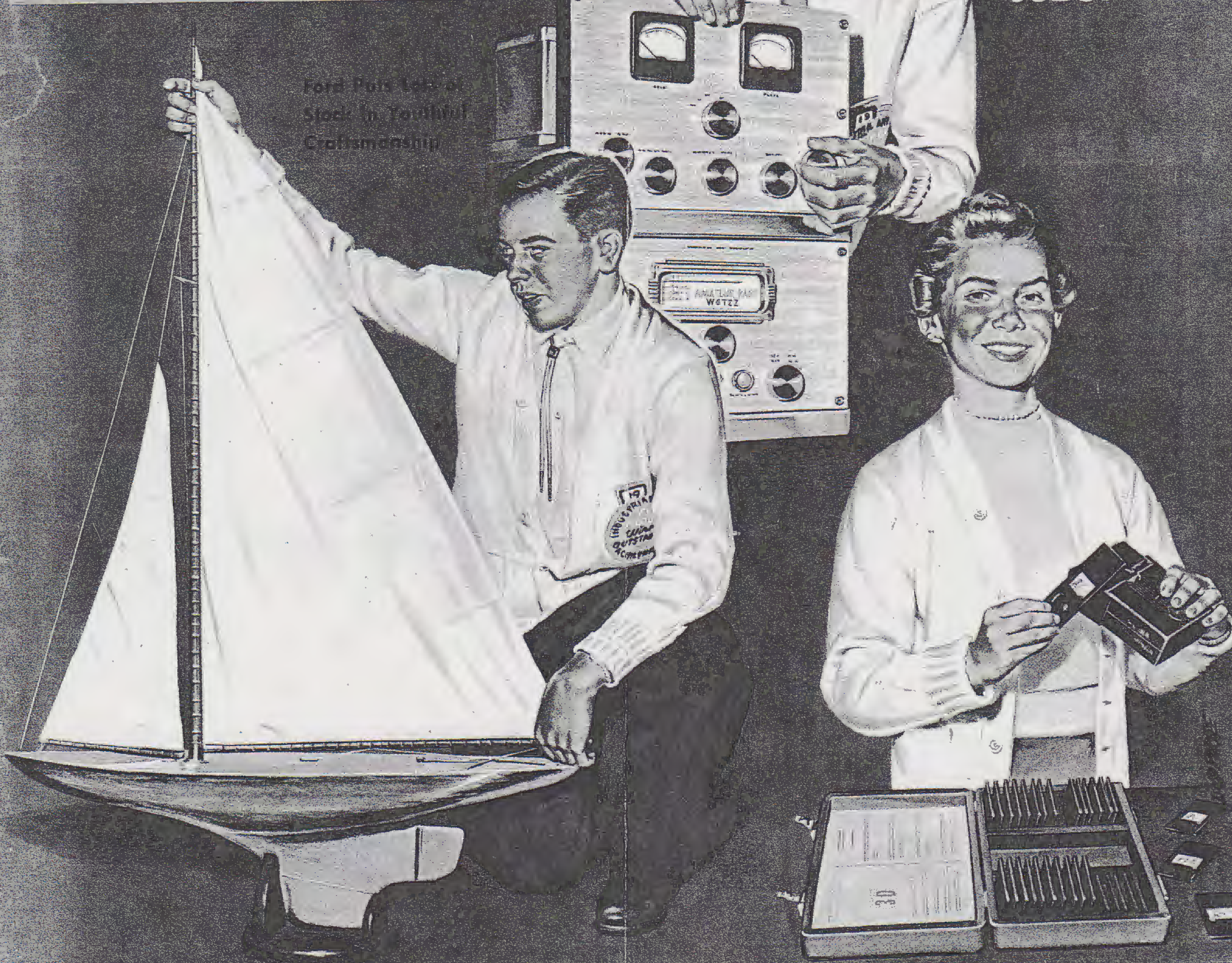

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We Drive the Golden Hawk

By the Members of the "YM" TEST DRIVERS CLUB With JOE WHERRY

SPECIFICATIONS

TEST CAR:

1956 Studebaker Golden Hawk Sports Coupe (all dimensions in inches unless otherwise noted).

ENGINE AND RELATED EQUIPMENT:

Cylinders, block, valves: 8, 90 deg. "V", overhead, hydraulic lifters. Bore and stroke: 4.0 x 3.50. Displacement: 352 cu. in. Compression ratio: 9.5. Brake horsepower at max. rpm: 275 at 4600. Piston speed at max. rpm: 2683 ft./min. Torque, max.: 380 ft. lbs. at 2800 rpm. Carburetion: 4 barrel. Exhaust system: dual. Choke: automatic. Fuel pump: mechanical. Fuel recommended: premium. Fuel tank capacity: 18 gallons. Crankcase capacity: 5 qts. (add 1 for partial flow filter). Drive shaft: exposed. Transmissions and rear axle ratios: manual with overdrive (3.92)—automatic (3.07). Gear change lever, location: conventional, on steering column. Cooling system capacity with heater: 26.5 qts. Electrical system: 12 volts, negative ground.

PASSENGER SPACE AND VISION:

Interior dimensions (front-rear) . . . Hiproom: 59.5-58.0. Headroom: 35.6-34.0. Legroom (with front seat at rearmost): 43.8-36.0. Seat height: 10.8-12.0. Luggage compartment depth: 51.5. Vision over hood for 70" tall driver: 16' 7" forward of bumper.

RUNNING GEAR AND BODY:

Wheelbase: 120.5. Tread (front-rear): 56.69-55.69. Length overall: 203.94. Width overall: 70.44. Height overall: 56.31. Ground clearance: 6.45. Turning circle diameter: 41'. Steering wheel lock-to-lock: 4.25 turns power; 5.25 turns mechanical. Tire size: 7.10 x 15. Weight (shipping) 3437 lbs. Brake lining area: 195 25 sq. in. Effectiveness rear brakes: 38%. Weight to brake area ratio: 17.6 lbs. per sq. in. Weight to power ratio: 12.5 lbs. per BHP. Suspension (front-rear): coil-semi-elliptic.

Sports car class with room for five 6-footers; from fine mesh grille to dual exhausts this job scored high

■ "Man, she's a real wheel spinner!" was the way Ted described the first exhilarating take-off in our test Studebaker "Golden Hawk." But there's more to driving this perfect example of the new crop of high-performance cars than merely mashing the throttle. In fact, mashing the throttle can get a fellow into a lot of trouble if the lead foot is not accompanied by a liberal helping of common horse sense.

What's the purpose behind such powerful cars? And, what is the proper technique for handling them? We'll consider these points after we examine the engineering features first.

"That's an awfully potent-looking engine," Don remarked when he lifted the hood. *Lifted* is right, too, for that sports car type grille is die-cast, making the hood plenty heavy.

"Right you are, Don," I replied, "and those 352 cubic inches of piston displacement turn up a maximum of 275 horsepower. The fact that the car weighs only 3,437 pounds and each horse needs to move only 12½ pounds of car weight is the reason this baby will 'lay rubber' with so little effort. Good streamlining reduces wind resistance so that true top speeds of 125 miles per hour are fairly easy on a straight stretch. But speed alone is not the most important thing about this car."

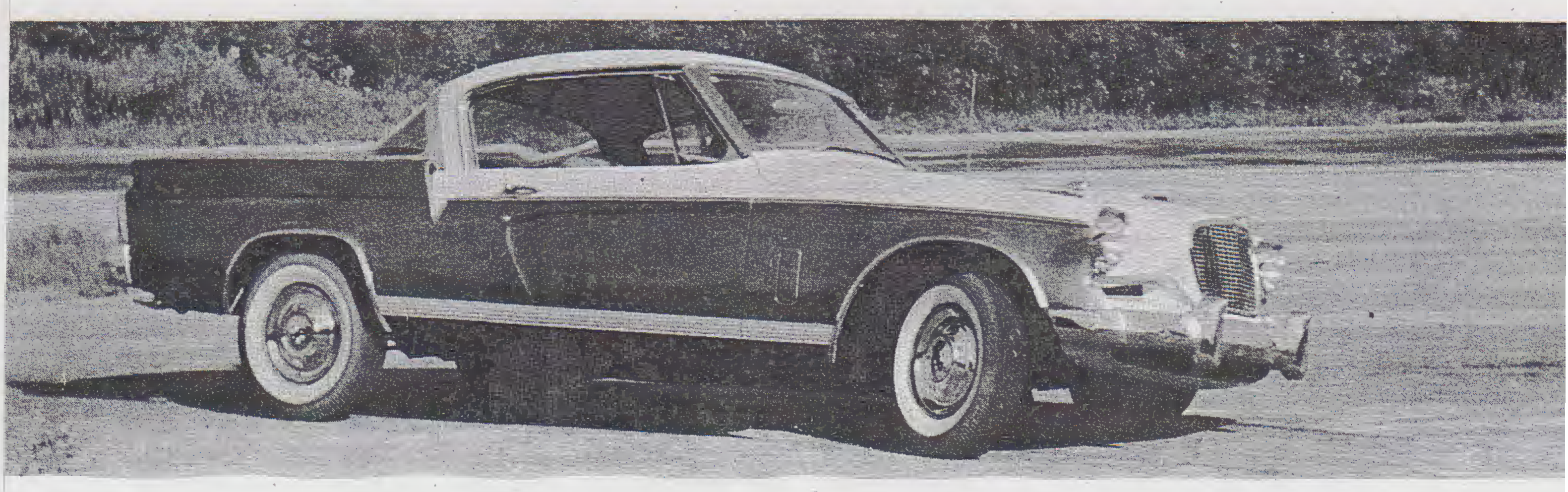
"But you could sure make time on a coast-to-coast trip, couldn't you?"

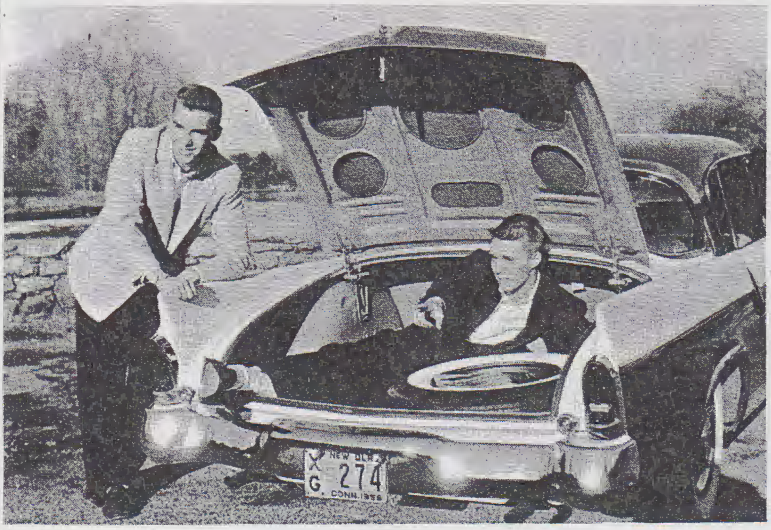
"Yes and no, Ted. Because you still have speed laws and the safety of other drivers to consider."

The Golden Hawk has been designed and will be produced in somewhat limited numbers to satisfy the desires of those who want ultimate performance. The tremendous following garnered by the imported sports cars has, in a way, put the American manufacturers to a severe test. No one, not even in Detroit, doubts there is a market for sports cars that are able to compete in competition, but the vast majority of Americans, research discloses, prefer a car that has the interior space to transport comfortably more than just two persons.

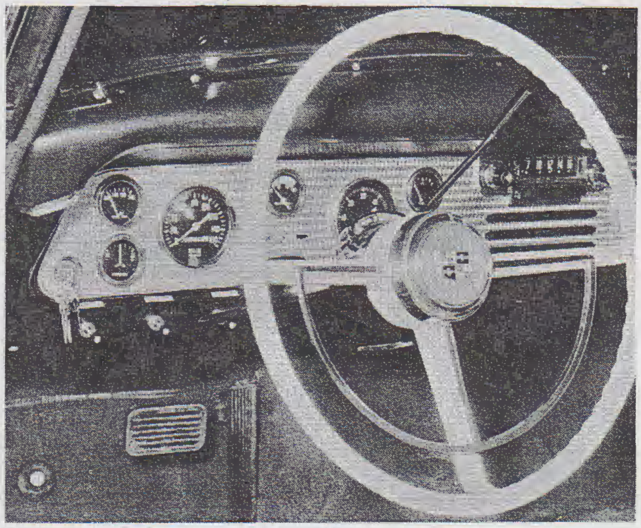
"And this is where cars like the Golden Hawk come in," put in Don.

For a manufacturer like Studebaker, while not a small company in the usual sense, is small in the automobile business





A little small for the family wash maybe, trunk is generous compared to most sports cars. Everything is substantial, too.



In instrumentation G.H. scores neat 100%: from left, ammeter (top), water temp., speed, vacuum, tach, fuel (top), oil.

as it has developed in this country. It would be foolish for Studebaker, for instance, to sink millions of bucks into the development of an out-and-out sports car, but when they have been able to develop a car with many fine characteristics of the real sports car and still retain the comforts of the family rig, they've got something.

Beginning under the hood, they've adopted the big Packard Clipper engine to the relatively light chassis of the Studebaker line of sports type coupes. This engine is heavy, so the fact that Packard's new transmission is cased in aluminum helps out here by reducing weight up front. It's too much weight over the front wheels, or near them, that causes cars to "plow" or make like a scoop shovel when cornering hard. This tremendous power has not been developed without taking fuel consumption into consideration. True, such an engine with holes 4 inches in diameter takes gas, but careful attention to the shape of the intake manifold allows this car to give as much as twenty miles per gallon of gasoline if driven steadily at moderate speed. But dig out hard from a few traffic lights and you'll be lucky to get twelve miles to the gallon if you lead-foot a throttle on any of the new crop of super-powered cars.

Then Ted got a brainwave:

"But wouldn't this car get better mileage, even with fairly snappy driving like the car's designed for if it didn't have the automatic transmission?"

YES, in capital letters, and here is where Studebaker has been smart. They have available a three-speed stick shift gearbox with overdrive. When so equipped, the time from a standing start to a true 60 miles per hour would be chopped from 9½ seconds in our blue and white test rig to 8½. Now, that's moving! Cruising along at a legal 50 per with the stick shift job, you can mash the throttle and the overdrive kicks back into third gear for passing and you shoot to 70 miles per hour in just a hair over 5 seconds. With the automatic transmission the time from 50 to 70 is just a hair under 6 seconds.

But come along and look over the chassis of this sportster, and then we'll go for a ride.

With the Golden Hawk on a hoist, the first thing you notice is a new type of brake drum. The outside, instead of being smooth, is finned to provide increased surface area. This permits much better air circulation and hence a more rapid cooling of the brakes. Hard driving necessitates hard braking and such use causes heat to build up to the point where the brakes lose effectiveness. This is called "brake fade" and it can render your brakes almost useless. You may have experienced this sometime when pedal action became increasingly hard and brake action correspondingly less. These cooling fins on the brake drums are an important safety feature. In our tests we found the Golden Hawk's brakes to be able to withstand a terrific beating and to cool rapidly, with the result that there is almost no fade even after a series of hard stops.

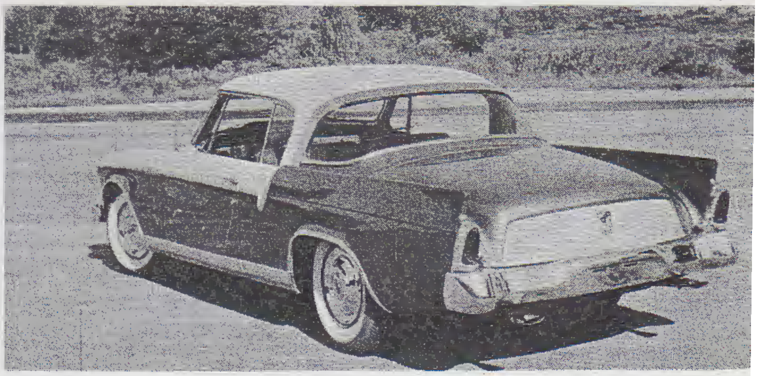
Under the front end you notice that the tie rods which connect the front wheels to the steering mechanism are of equal length. Though most cars are not so equipped, Studebaker has made this a feature of its cars for many years.

"So what does this mean?" queried one YM driver.

Simply that the amount of leverage required to turn in either direction is equal. With both tie rods the same length, the car turns as sharply in one direction as it does in the other. Think hard and I'll wager that you've noticed, on occasion, that some cars turn just a bit tighter one way.

Of course power steering is the big thing these days, and with the increased weight of cars there is good reason for power steering where one has to park a lot and drive in crowded streets. But the Golden Hawk is a car for the open roads, and on our test car from F. L. Mills Co. of Bridgeport, Connecticut, the steering was completely manual. Running through a series of turns the boys noticed that it was necessary to do considerable winding of the steering wheel. In fact 5¼ turns

(*Continued on page 67*)



YM's Teen Test Drivers examine windshield washer water bag, an improvement over glass bottles. They like the inset 3rd color style panel on the trunk, thought side V's a nice note.

Golden Hawk

(*Continued from page* 37)

of the wheel were necessary to go from extreme left to extrme right.

"Isn't that a lot of wheel turns for a sports type car?" Ted asked.

I had to admit that this many turns does reduce the driver's ability to snake the car through a course that would be a cinch in a Jaguar. However, a happy medium has been reached between understeer and oversteer to the extent that the car tends to return quickly to a straight ahead course.

"I've heard of oversteer and understeer," Don remarked, "but could you give us a rundown on just what you mean by the terms?"

Have you ever driven a car that wanted to keep turning after you got clear of the corner? If you have, you experienced maximum oversteer—you had to use considerable effort to bring the front wheels back to the straight-ahead position, and if you were traveling fast, you probably had a frantic time. On the other hand maybe you've driven a car that all but refused to stay in the turn and required effort to prevent it from straightening itself out while you were still in the turn. That was too much understeer. The front suspension of a car is more than springs and wheels and shock absorbers; it's a study in geometry. Toe-in or toe-out determines whether the tread will be scrubbed off the tires, but with everything else being equal, the caster of the wheels largely affects whether your car will under or oversteer.

"If you were getting a Golden Hawk, Joe, would you order it with power steering or without?"

That put me on the spot. Normally I do not like power steering because it takes away the feel of the road and generally has the effect of letting the car wander at high speeds or be too easily subjected to the influence of high cross winds. I have to answer this question in two ways. First, I would determine whether this car could be safely fitted with a longer pitman arm (the small arm that connects the steering tie rods to the steering mechanism); if this could be done, then I'd have much faster, more responsive steering. However, if this could not be safely recommended (and I'd go along with whatever the Studebaker chassis engineers had to advise since they know this car better than anyone else), then I'd order my Hawk with power steering for this cuts down the number of steering wheel turns to 4¼ from either extreme.

"Would faster steering make the Golden Hawk able to get on the track and compete in sports car races?"

To this I had to say that this car is not built for such purpose in any case. The suspension—see those fairly soft coil springs in front and not overly stiff 4-leaf springs in the rear—is designed to give a reasonably soft ride. No, the Hawk doesn't ride as soft as the average family car, but it won't spank you on a bumpy road the way an out-and-out sports car is likely to, either. This snazzy number gives you a lot of things you normally expect on a sports car while retaining most of the features required of the American type family car.

"But if you carry three passengers in the rear seat the guy in the middle is going to have a rough time," one of the boys said.

That's true, because the extremely low design meant placing the rear seat down low and close to the floorboards. This low flooring causes the drive shaft tunnel to extend a few inches above the level of the rear floor. Now in the interests of a sporting type interior, Studebaker has put in an armrest in the middle of the rear seat. When folded down, this armrest does not lie flush but extends above the seat level an inch or so. In other words this rear seat handles two persons, and that's all unless you want to make it comfortable for a small "third" by removing the armrest and filling in the resulting lack of upholstery. On the other hand there's plenty of room in the front seat for three persons of average size without crowding. As it stands, the Golden Hawk is a five-seater.

In the words of Ted and Don, the front office is a "real cool affair with the sort of instrument board that any guy would give his eye teeth for." Genuine Stewart Warner instruments are set neatly in a stainless steel panel below the padded dashboard top. White figures on black dials show up well and are easily read. Matching the speedometer (which reads very optimistically to 160 miles per hour) is an engine tachometer. I'd recommend that you watch the revolutions and keep 'em somewhere in the neighborhood of 3,000, and this car will then give you some amazing money-saving mileage and you won't be loafing along, either. To further the instrumentation is the practical inclusion of a manifold pressure gauge, the small dial between the tach and the speedometer. Showing the number of inches mercury that the manifold is pulling, this gauge gives the car driver the same sort of assistance that the corresponding gauge does on an airplane. Keeping the needle

(*Continued on page* 71)

(Continued from page 67)

of this gauge between 10 and 18 inches indicated means that your engine is taking on the correct amount of fuel mixture for efficient combustion and for economy, too. The rest of the gauges, oil pressure, etc., are real, too.

"So why, if this car can be economical," one of the boys popped, "do they give you 275 horses to play with and 125 or more top speed?"

Competition requires this manufacturer to make this blazing performance available. It seems that the American people are buying big power for talking purposes in the belief that they need a lot of cylinders in order to move.

But the availability of power can in itself be a safety factor if the driver knows how to use such power. Say for instance that you find yourself in a tight situation where power is needed in large quantity. Brother, you've got it with this baby, and that's where the *torque* counts more than sheer horsepower. After all you've got to be going full gun to develop total power, but note that this engine develops its maximum of 380 foot pounds torque at just 2800 revolutions per minute. One foot pound torque is the amount of twist, or actual driving force, measured 1 foot outward from the center of rotation. In other words, torque is, in a manner of speaking, the amount of power that is generated where it counts the most, right where the rear wheels touch the ground.

The boys, one of them a six-footer in spite of his seventeen years, found lots of legroom up front and a comfortable amount in the rear as well. Of course the top is so low that you have to duck and climb in the best way you can, but what matter that? The seat belts are attached in a unique way: the outside half of each individual belt is firmly fastened to the door panel while the inside half is attached through the split between the seat backs and through the floor to the frame of the car. Studebaker has the new safety door latches that resist pulling apart in case of an accident, but the way the seat belts fasten to the door provides an additional safety feature.

This Golden Hawk has three brothers that look identical on the outside but lack the tachometer and the manifold pressure gauge on the dash. Under the hoods these other three, called the Sky Hawk, Power Hawk, and Flight Hawk have 210, 170, and 101 horsepower respectively, with the latter model being the only six-cylinder job in the lot; it has the venerable little Champion engine that repeatedly wins fuel economy contests.

In the interests of keeping the good will of the sports car enthusiasts, Studebaker has retained the distortion-free flat windshield, something the boys agreed was a good idea. The body, as in recent years, has the sculptured concave on the sides and a minimum of chrome. Grille is in the best sports tradition and the hood is long and low. Probably the most distinctive styling feature is the contrastingly colored panel at the rear. According to Ted and Don, "that Hawk is outer space stuff, real cool, in other words, merely the most!"

Supersonics

(Continued from page 48)

for the fullback so they won't be in his way—and thus the kids live to play football another day.

In trans-sonic flight, the plane is traveling at practically the speed of sound and by the time the air at the wing gets the warning to the air ahead, the wing is right there too. The air piles up and has a nervous breakdown. This time we get a 200-pound fullback and he runs the ball through the other team by getting up a head of steam and just pushing all the opposition ahead of him.

In supersonic flight, the airplane knifes through the air before the air realizes the wing is there, and the air splits off the airplane surfaces like waves off a ship. These are the shock waves of the now incompressible air in supersonic flight. Our fullback is now a 200-pounder with a real flying start. He hits the other team solidly and drives right through them, bouncing players off each side of him before anyone can touch him.

So there it is, and like the fullback, the faster the plane goes the stronger it's got to be to withstand the punishment it has to take. The designers and engineers help make the plane's task easier by giving it the best possible shape and form to ease its job of smashing through the air.

Well, there is supersonics — very lightly touched on, but at least you now have the basic concept of what has happened when you hear that mysterious "sonic boom." Some plane has gotten up to or about Mach 1.0 and the pressure wave wound up by bouncing off your back yard as a kind of man-made thunderclap. These "booms" usually are multiple—two, three maybe more, very closely space explosive sounds. If you hear a multiple "boom," look up and see if you can spot a vapor trail in the sky. Chances are that you will and the airplane that made it is the one which just sent you a supersonic calling card.

APRIL -1956
George
KREM

McCAHILL TESTS

The Studebaker Golden Hawk

"A good-looking car, extremely pleasant to drive," is official McCahill verdict.

Tom feels more weight at rear end of Hawk would improve handling, prevent wheel spin.

"This car should be a bomb" is what Tom says of this plush job.

By Tom McCahill

THE Golden Hawk is a far cry from my old second-hand 1921 Light Six Studebaker which could do 0-60 mph in exactly five and a half minutes. This all-new, foreign-looking product of the Studebaker-Packard Corporation is being offered as the prestige car of the Studebaker line. For a power plant, the tremendous V8 Packard engine displacing 352 cubic inches and developing 275 horsepower was tossed between the frames. This, plus the comparatively low weight of 3,800 pounds, should make the Golden Kid just about the Bomb of the Century.

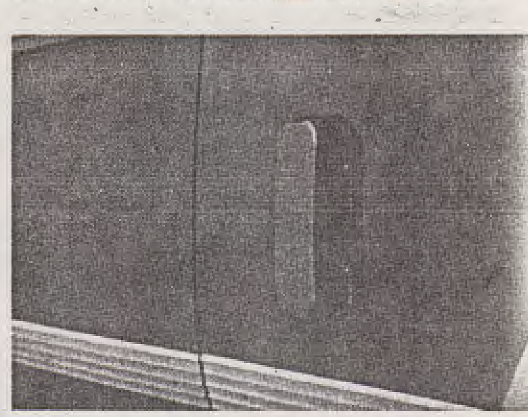
Since this car is a performance entry, let's consider its chances in that field before we get into the practical side. Unfortunately, the Golden Hawk delivered to me for testing had less than 50 miles on the speedometer and was loaded like a sailor on his first night in port—with power seats, power windows, power steering and Packard's UltraMatic transmission. So evaluating its real performance potential presented a problem.

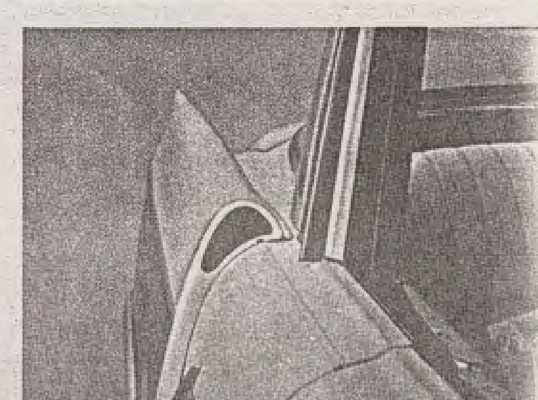
Packard engines are put together with extremely close tolerances at such vital points as the main bearings. This means careful break-in to avoid expansion damage. Unlike most other American cars with comparatively loose tolerances, these close-fitting parts will limit performance for a longer period of time.

After several hundred miles the engine in my test car was still extremely stiff and I only succeeded in making respectable test runs in the early morning while the engine was still on the very cool side. As this car has been one of the most widely-rumored "sleepers" of the

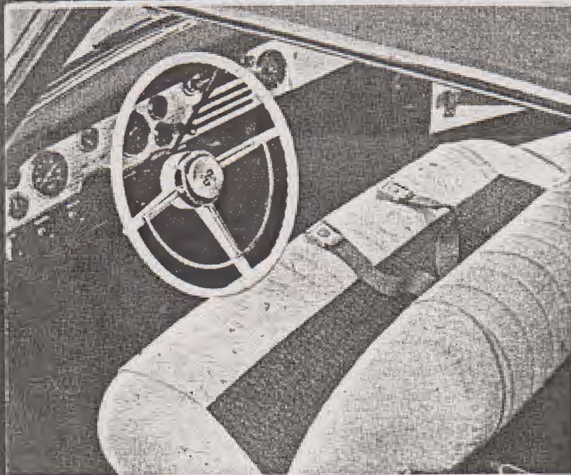
Singled out for McCahill praise is low-sloping hood allowing good view of road.

Front fender vents mark return of useful feature most American cars have discarded.

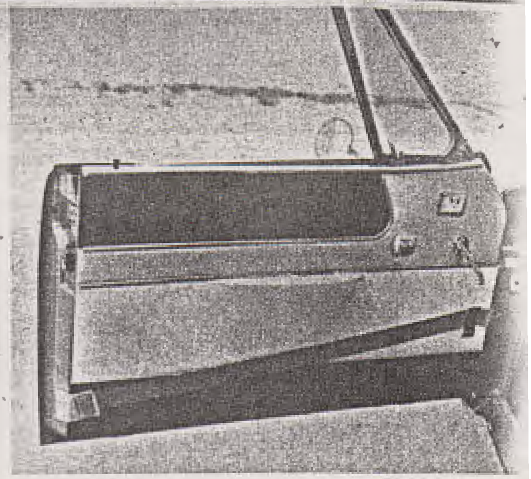




"Air scoops" are on rear fenders; front fenders mount the small parking lights.

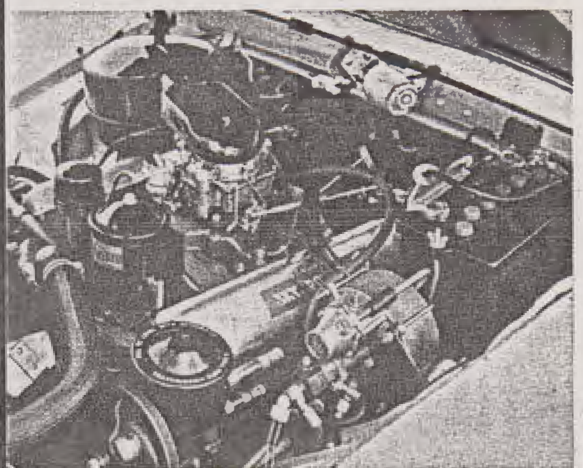


Tom calls the instrument panel the finest one he has ever seen on an American car.



Seat belts are unique in that the outside part of the belt fastens to the car door.

Golden Hawk sports tremendous V8 Packard engine which delivers big 275 horsepower.



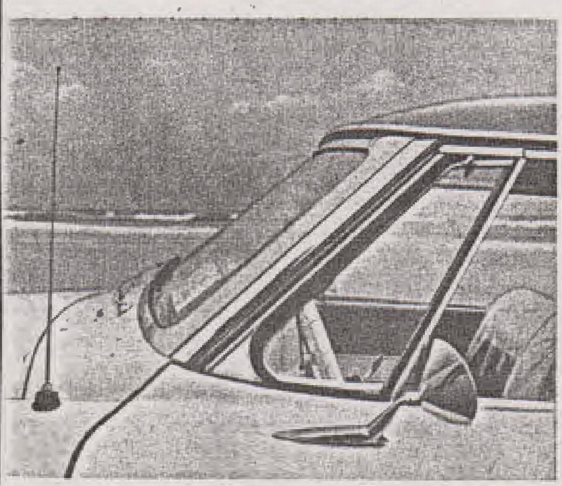
Jim McMichael, autodom's foremost trunk-tester, says that luggage space is ample.

'56 batch, speculations as to its performance against cars such as the Chrysler 300B have run rampant. The one they sent me to test was definitely neither equipped nor prepared to show the Hawk off at its best. So I can only speculate as to how fast a well-tuned, high-performance Hawk might go. But several well-prepared Hawks without the extra weight of the power equipment are entered in the Daytona Beach Speed Trials and we'll bring you up to date on the Hawk's ultimate performance next month.

Meanwhile, let's consider the Hawk I tested, which as already stated had more equipment inside its closed doors than Abercrombie & Fitch. Zero to 30 mph averaged 3.4 seconds and this, on the face of it, does not tell the full story. Due to the tremendous torque of the engine (380 foot-pounds @ 2800 rpm) *and* due to the fact that the Hawk is quite a nose-heavy car (because of its heavy engine), it is almost impossible to make a fast getaway start on any surface without considerable wheel-spinning. I feel that if I'd shoved two or three hundred pounds of sand in the trunk to equalize the weight distribution, my times would all have been considerably better. Zero to 60 averaged out at 9.6 seconds and 0-70 at 12.2. This is fast, as anyone knows, but really not too sensational or

Inside, claims Tom, the Hawk will match the lushness of any Detroit car ever built.

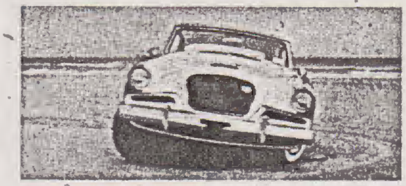
Semi-curved windshield gives all the visibility of any wraparound, gets Tom's nod.



outstanding when compared with the competition the Hawk must run against.

Top speed presented more problems. This is a car that doesn't *really* unwind, due to its cam design, until it's above 80 mph. Then it really starts to take hold. Because of my deadline for this issue, I couldn't wait for a smooth beach, which sometimes means a delay of weeks. The measured mile at Daytona Beach where I made my tests had more dips in it than a roulette wheel. On one run, when I [*Continued on page* 200]

Prestige car of the Studebaker line has brand-new look in grille, bumper design.



"Firm but comfortable suspension."

SPECIFICATIONS

MODEL TESTED:

Studebaker Golden Hawk

ENGINE:

V8 cylinder, OHV; bore 4.0 inches, stroke 3.5 inches; maximum torque 380 foot pounds @ 2,800 rpm; brake horsepower 275 @ 4600 rpm; compression ratio 9.5 to 1

DIMENSIONS:

Wheelbase 120.5 inches; overall length 203.94 inches; tread 56.69 inches front, 55.69 rear; width 70.44 inches; height 56.31 inches; weight 3,800 pounds; standard tire size 7.10x15; gas tank 18 gals

PERFORMANCE:

0 to 30 mph, 3.4 seconds
0 to 50 mph, 7.4 seconds
0 to 60 mph, 9.6 seconds
0 to 70 mph, 12.2 seconds
Top speed, 130 mph

At 60 mph on speedometer, actual speed 57.9 mph

The '56 Golden Hawk

[*Continued from page* 97]

got up to just above 120 mph, we were leaping as much as 15 or 20 feet through the air between sand mounds. (If you've ever sailed through the air like a kangaroo on fire at better than 120, touching the ground only occasionally, you will concede this is not the best formula for growing old.) Even if I hadn't been chicken I couldn't have made it go any faster.

What *would* this Hawk have done if the beach had been good? It is my sincere belief that it would have just topped 130 and stayed there as steady as the smile on Mona Lisa. After my beach runs I went over to Bob Osiecki's Racing Equipment Company. He was preparing a Golden Hawk for the Trials and after a lot of multiplying, squaring, cubing, dividing and consideration of gear ratios and tire size, we came to the conclusion that the stick job, unloaded, *should* run 135-plus on the beach, if conditions are right and the engine tuned to the teeth.

What this car definitely needs, in my opinion and in the opinion of some top race men such as Smokey Yunick, Marshall Teague and Bob Osiecki, is a real competition cam. Call it a "high performance" cam, "heavy duty" or whatever you choose, this car with a sharper cam might prove a real threat to the 300B Chryslers in the Speed Trials. As is, it's my guess that the Chryslers will take the Hawks with ease. In the MECHANIX ILLUSTRATED Trophy standing-start mile, even the hot Chevys should outrun them. If I'm wrong, there'll be no articles of mine in here next month—I'll be on a boat to Tasmania. But that's the way I see it.

Mauri Rose, three-time winner at Indianapolis, said when he sat in the car with me, "McCahill, look what you started." Rose is master-minding the Chevy team for Speed Week. He went on to remark that a few years ago we had nice, sloppy family cars without very good brakes or roadability and no performance. McCahill put in the pitch month after month for better brakes, more safety, better balance, roadability and all the rest—and today everyone's trying to build better road cars than the other guy. It's all your fault, said Mauri. "And don't try and argue with me," he added, "I've got all my old MI's at home and I can prove you're the guy responsible."

Well, if we made them safety and roadability-conscious, we're glad. But the performance of some well-known makes is out-and-out race car stuff today. It's my belief that we build several stock sedans now that could have won the Indianapolis race just ten years ago—perhaps even this Hawk—and that's something to think about.

The Golden Hawk is a good-looking car and extremely pleasant to drive. Inside the cabin it'll match the lushness of any American car ever built. The instrument panel is the finest I've ever seen on an American car. In addition to all the regular instruments it has a real oil gauge and ammeter, plus a magnificent tachometer and a vacuum gauge. These are smartly-designed, easy-to-read instruments mounted in a machined metal panel. In this department the Golden Hawk makes some other current models look like fish peddlers' carts.

The seat belts in the Hawk I tested were unique in that the outside part of the belt fastened to the door, which would help hold the doors closed in the event of a crash but might prove uncomfortable if the crash was such that the door was ripped open. One outstanding feature of this car is the windshield. This is not a wraparound with built-in distortion but a finely-placed, semi-curved windshield which, due to its placement closer to the driver, gives all the visibility of any wraparound. Another feature is the low-sloping hood which lets you see the roadway as close as four feet in front. The side mirror, almost opposite the driver's chestline, is the finest I've ever seen because, being right *there*, it gives you a much better rear view than most conventional center mirrors. When driving this car, the firm-but-comfortable suspension instills confidence. On the debit side, the emergency brake is located just right to de-knuckle you and I would be just as happy without the fender-mounted parking lights.

In summing up, the Golden Hawk is the car to watch in the '57 Speed Trials. Thanks to its low weight and terrific power, it would be just an afternoon's work to make

[*Continued on page* 202]

The '56 Golden Hawk

[Continued from page 201]

this car a little better balanced in the stern and to slip in a high-performance cam. A better selection of rear-axle ratios would also add to its potential. At this writing, all that is available is the 3.07 with UltraMatic and 3.92 with overdrive. The 3.92 with overdrive would prove much too tough to unwind on a soft beach or into a heavy wind. The fully-equipped car I tested—the most expensive model in the line—delivered in Florida for $4,250, a quite reasonable tab in my opinion for what you get. All in all, considering looks, performance and equipment, I think the Golden Hawk is quite a buy. It's as lush as any car selling for several hundred dollars more and it has a real semi-sports car look. I'd like to have one of these cars. Anybody should get a big kick out of owning one. •

Killing Off Our Men

[Continued from page 57]

rest. Actually a fit of simple hysterics, a good cry or a solid "mad" might easily do more for a man's life span when he is worried or disappointed than any amount of Spartan self control or big biceps.

And if he tried to be less brave—if he pampered himself by going to bed and calling a doctor when he didn't feel well, instead of trying to be a hero and refusing to "give in to weakness," he would probably be able to enjoy life longer.

Boiled down to its essentials, the ironic truth seems to be that the male death ratio is zooming largely because men are less able than women to cope with the stresses of modern life. And the reason men aren't able to cope with these stresses is because they are too busy protecting the myth of male superiority to deal with the bitter fact of male biological inferiority.

So while the women are finicky about their diets, scream, weep, have occasional hysterics, keep calling the doctor at the slightest discomfort and live to a comfortable widowhood; the men are strong, self-controlled, unafraid to punish themselves and their bodies to prove that they can "take it" and, in valiant masculine fashion, often succeed in leaving healthy widows. •

HIGH-FLYING HAWK

Brent Hagen APRIL 1956

BY RACER BROWN

"Golden Hawk" is the name applied to the Studebaker-Packard Corporation's 1956 high-powered "sports type" passenger car. The name and the components that make up performance factors were obviously chosen in an attempt to clip the tail feathers off a few other high-flying but ground-bound "birds."

The entire "Hawk" line, which includes four engine options, can best be described as controversial when speaking of appearance. Either you like 'em or you don't. Judging from the number of strangers who asked questions, looked, stooped, squinted, gave advice, etc., the vast majority voiced approval of the styling. But even if the lines do nothing for you, there are a few practical advantages of the long, low design.

Our test car had the same basic 352 cubic inch (4 inch bore, $3\frac{1}{2}$ inch stroke) overhead valve V8 engine that powered last year's Packards. It was also equipped with power steering, deluxe heater-defroster, signal-seeking radio, power-operated windows and seats and Packard's Ultramatic torque converter type automatic transmission. The engine is rated at 275 brake horsepower at 4600 rpm and 380 pounds-feet of torque at 2800 rpm. Wheelbase is $120\frac{1}{2}$ inches and overall length is $203\frac{13}{16}$ inches with $34\frac{7}{8}$ inches of overhang at the front. Inside, five people could be seated with three in front and two in back, but because of the low seat and rather large hump over the transmission, two in front could be accommodated more comfortably for long distances.

The idea of a relatively small car with ample passenger space, powered by a large displacement, high-output engine is a good one. Hence, the "Golden Hawk" should be able to out-perform other cars with equal passenger space. With the low center-of-gravity and with fairly large brakes, overall roadability should be good. But what happens to the handling characteristics when an engine-transmission combination that tips the scales at well over 900 pounds, is installed in a relatively light chassis? In the opinion of a necessarily nameless but honest Studebaker engineer, the handling of the "Golden Hawk" took a turn for the worse as compared to others in the "Hawk" line. That same opinion was expressed by others who also felt that the extra weight of the Packard engine and transmission, being primarily over the front wheels, would result in a grossly exaggerated and unfavorable front-to-rear weight distribution, which would make driving the car a delicate and risky job under any condition other than in a straight line. Read on and see how our findings dispel these rather premature opinions.

In the first place, the "Golden Hawk" is no heap of feathers. Our test car, which was a production model, weighed 3740 pounds with a full tank of fuel but without driver or passengers. Of this, 2200 pounds or 59 per cent of the total weight was on the front wheels and 1540 pounds or 41 per cent was on the rear wheels. These figures are entirely compatible with present-day passenger car practice and should serve to dispel the doubts of anyone who believes that the

"Golden Hawk" is any more "nose heavy" than other makes.

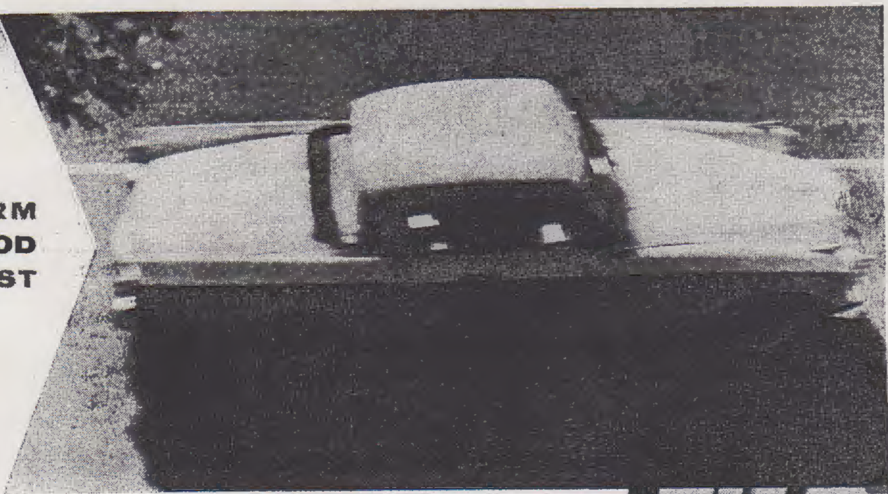
Our test car had 2030 miles on the odometer when we received it, so we drove it around a few days, for an additional 500 miles to help with the "loosening up" campaign. Then we took it to Paxton Products Division of McCulloch Motors Corporation in Inglewood, for a blast on their 300 horsepower Clayton chassis dynamometer. Maximum road horsepower was 132 at 3300 rpm, equivalent to 84 mph in high gear. This may seem quite low for the 352 cubic incher, but remember that advertised values are established by a bare engine at the flywheel, which is a far cry from an engine burdened with a fan, air cleaner, charging generator, power steering pump, mufflers and tailpipes and with the power routed through a fluid coupling and torque converter. Frankly, we expected a bit more from the engine but upon investigation, we found that the fuel/air mixture ratio was too lean for the extraction of maximum power. Had we corrected the mixture and thrown in a fresh set of spark plugs, maximum road horsepower would have been closer to 150. Power output at lower speeds left little doubt that all those cubic inches were working in the best interests of good acceleration. This confirmed our earlier impressions that, from a standing start, the "Golden Hawk" would be hard to beat, even with the Ultramatic.

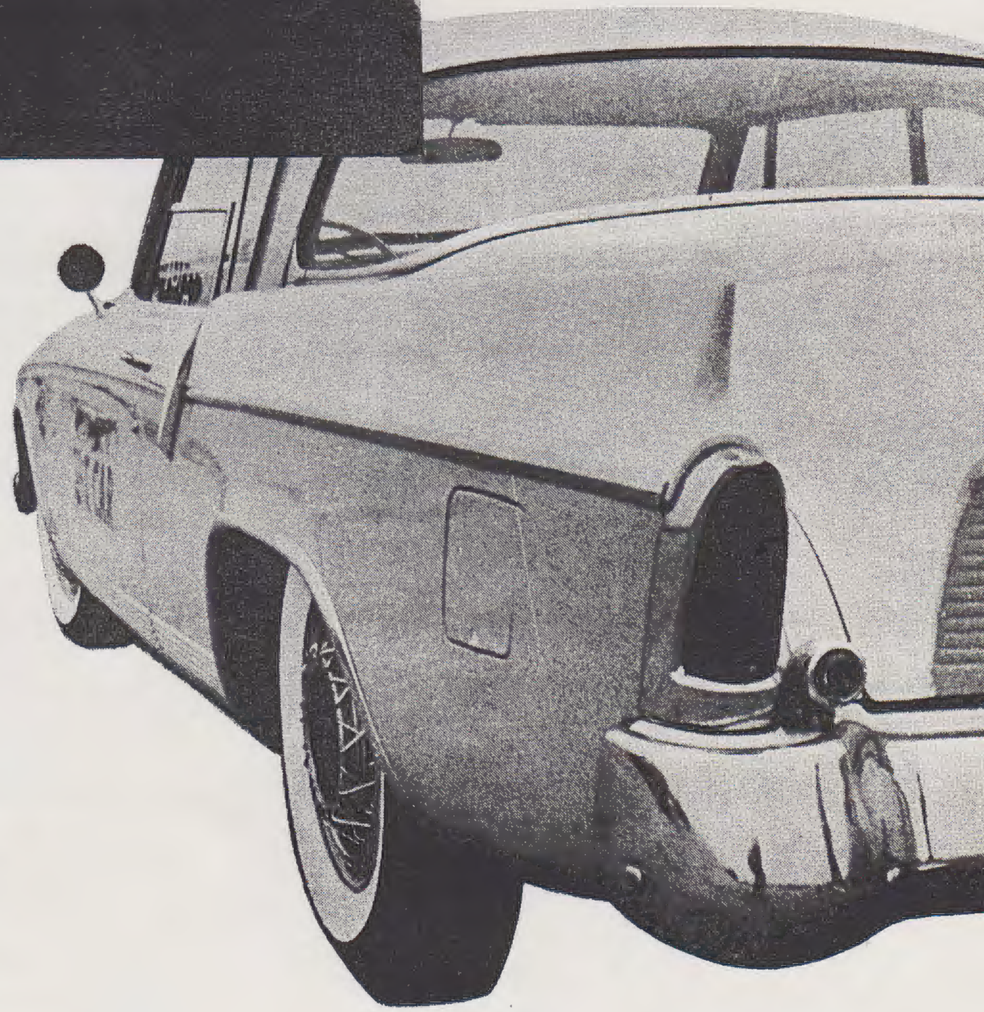
We were able to further explore the car's acceleration qualities by attending the new Long Beach drag strip. After several runs through the level standing quarter-mile course, the average speed at the end of the quarter was 79.8 mph and the average elapsed time was 17.5 seconds. Fortunately, a fellow with an overdrive-equipped "Golden Hawk" was present and we were able to compare his times against ours. By locking out the overdrive and using all three forward speeds, he was consistently able to turn better than 83 mph, about one mph short of the strip's class record. His average elapsed time was correspondingly better than ours, being 16.8 seconds. As it happened, it was our friend's first try with his new "Hawk" and he, too, was plagued with a lean mixture condition that caused the engine to "flatten out" in the higher speed ranges. If it hadn't been for this, the strip record for the class may well have been broken.

In order for us to obtain the best acceleration times from our "Golden Hawk," it was first necessary for us to do a bit of experimenting with the Ultramatic. This unit is slightly different in operation from other torque converters; in the "Golden Hawk," the transmission is manually controlled by a conventional

(Continued on next page)

HRM ROD TEST





FAR LEFT. ***Test crew pauses above cloud level on way to Mt. Wilson summit.***

CENTER. ***"At speed" on the curvaceous roads, "Golden Hawk" proved quite agile.***

BELOW. ***Most everyone approved of the "Hawk" styling, even to fiberglass rear fins.***

Even on the most vicious turns, the Studie stayed stuck. The most noticeable trait was the lean on left turns . . .

steering column selector and indicator quadrant, while in the new Packards, the same torque converter is operated by means of an electrically controlled push-button panel, á la jukebox. By moving the selector to "lo" when starting, the transmission will remain in low until the selector is moved to either "low drive" or "high drive," at which time a shift to the second speed is made followed by another shift into high "lockup." When starting with the selector in "low drive," the transmission first shifts into low, then makes the above shifts into intermediate and high "lockup." In this position, the transmission is a three-speed affair with all shifts made automatically. In the "high drive" position, starts are made in intermediate followed by a single automatic shift into high "lockup."

It should be explained that the intermediate or second speed, is not an intermediate "gear" as such. Instead, it is the torque converter reduction in high, but before the "lockup" occurs. When the transmission shifts into the third speed in "low drive" or the second speed in "high drive," it mechanically "locks out" the torque converter. Consequently, the term high "lockup" means that the transmission is in direct drive with no reductions. If a full-throttle start is made in "low drive," a detent holds the transmission in low until the throttle and the detent is released, permitting normal up-shifts to be made. A full-throttle start in "high drive" starts the car in intermediate, the detent and the shift to low being inoperative in this position. A downshift into low may be accomplished manually, by moving the selector to the "lo" position at any speed below about 45 mph for the purpose of "compression braking." In high, the "lockup" is released at about 20 mph while decelerating, which provides a good degree of "compression braking" in either of the "drive" positions. For passing purposes, the transmission will downshift into low when the throttle is floored at speeds of about 45 mph or less if the selector is in "low drive." In "high drive," the "lockup" is released, putting the torque converter into action when the throttle is floored below about 45 mph.

Thus, the Ultramatic is quite a versatile, if complicated, piece of machinery. For best performance in town or on the highway, "low drive" should satisfy most requirements. For "economy-run" drivers, "high drive" yields the most in miles-per-gallon while delivering adequate low speed performance. The one disadvantage found in the Ultramatic is that there is no way to hold the transmission in the intermediate speed. This feature is desirable for fairly fast mountain driving, for example, permitting a certain amount of "compression braking" when entering a turn and a good ratio with which to accelerate out of a turn.

The ratios of the Ultramatic are as follows: Low—torque converter plus 1.82 gear reduction, the same as low in "low drive"; intermediate — torque converter reduction only; high "lockup"—direct drive; reverse — torque converter plus 1.63 gear reduction. Maximum torque converter reduction ratio at stall speed is 2.9 at 1650 rpm. Rear axle gear ratio in Ultramatic equipped "Golden Hawks" is 3.07. Incidentally, automatic transmissions, under one name or another, have accounted for 90 per cent of Studebaker's passenger car production so far this year. That is, until a recent West Coast run on overdrive equipped "Hawks" wiped out the factory's supply of overdrive gearboxes, which brings up another point.

The policy-makers at Studebaker-Packard can take justifiable pride in the fact that they have more than one transmission type to offer prospective customers. In a car built primarily as a performance package with passenger space, the "Golden Hawk" needs something besides an automatic transmission to bring out its best qualities. Consequently, the rugged Packard three-speed transmission and overdrive is standard equipment on "Golden Hawks" with the Ultramatic as the only transmission option. The gearbox ratios are 2.49 in low, 1.59 in second, direct in high and the overdrive provides a .722 step-up. The standard rear axle gear ratio with the overdrive is 3.92, which results in a final drive ratio of 2.83. In conjunction with the overdrive is an 11-inch diameter Long semi-centrifugal pedal operated clutch. With either form of transmission, the remainder of the drive train consists of an open (Hotchkiss) two-piece driveshaft with a universal joint at each end and one to join the two sections and a semi-floating type rear axle assembly using hypoid final drive gears. This gearbox and the more favorable rear axle gear ratio was what spelled the difference between the speeds turned by our friend's "Golden Hawk" and our test car at the drag strip. So for once in automotive history, it's possible to have your cake and eat it too; maximum accelerative performance with the overdrive locked out, and what should be quite good fuel economy with the overdrive in operation. Also, it isn't likely that premature wear will occur in the engine by using the overdrive, because how can you "lug" a 352 cubic inch engine in a 3700 pound car?

But back to the rest of our acceleration times. By flooring the throttle and holding the brakes with the selector in either "low drive" or "lo" positions, we found that the zero to 60 mph runs could be made all the way in low without a shift. At a true 60 mph in low, the tachometer registered 4800 rpm, child's play for this engine. Our average zero to 60 mph time was 10 seconds flat. For our zero to 80 mph runs, we started in "low drive" the same as before, released the throttle at between 4800 and 5000 rpm so the shift to intermediate could be made, then buried our foot in the throttle again until a true 80 mph was reached. The average zero to 80 mph time was 17.7 seconds. After these runs, it was evident that the spark plugs had had enough of the lean fuel/air mixture condition mentioned earlier. If this had been corrected, I believe that about five or six per cent would have been lopped off the times. Twice during preliminary runs, we forgot to release the throttle in low to permit the shift to intermediate with the result that the tachometer kept climbing to 5600 rpm, at which time the hydraulic valve lifters loudly announced their retirement by "pumping up." At about 5200 rpm, there were clatterings from the valve department but this was apparently a valve spring "surge" because no "float" or "pump up" occurred until 5600 rpm was reached.

We drove the car over our usual course and in so doing, it became evident that the "Golden Hawk" possesses good (but not race car) handling qualities. The Saginaw recirculating ball type integral power steering was precise and any miscalculations in aim were very easily corrected, making directional control of the car quite simple at all times. This steering required more driver effort to turn the wheel than with other types and because of this and the 20 to 1 overall steering ratio, a very definite "feel-of-the-road" was maintained. The car was driven for a short distance with the power steering pump drive belt loosened, which permitted me-

. . . and right turns, but this caused no difficulty in maintaining the directional stability of the car.

chanical steering actuation and it was found that as long as the car was moving the steering wasn't excessively "heavy," but parking under this condition was a chore that required brute force. However, the standard Ross cam and twin lever mechanical steering gear has an overall ratio of 24 to 1, which is more favorable for non-power steering, but some of the response and precision of control is lost. It was our experience that the optional power steering with its "quicker" ratio is practically a "must" for the "Golden Hawk." The only fault we found was one that is common to most power steering units; a conscious effort was required to return the steering wheel to a neutral position after going through a turn. In all probability, this minor trait would vanish if the factory specified one to 2½ degrees of *negative* caster was changed to one to 1½ degrees *positive* caster. Prospective buyers had better make up their minds beforehand whether or not power steering is necessary, because it's a major (and expensive) operation to install it at a later date.

The tenacity with which our "Golden Hawk" stayed stuck to the road through the most violent road race maneuvers was considered exceptional. Only in the fastest turns did the rear end show any signs of "breaking loose," this being a simple matter to correct. Although the front end had a "heavy" feel to it in turns, it showed no tendencies to "wash out" into a slide. As long as the road surface was good, there were no ill effects, but sharp fast turns over rough roads produced a certain amount of "wallowing" in the front end. There was also a considerable amount of "body lean" in turns in spite of the relatively low center-of-gravity. This action was generated in the front end and speaks for the need of a stiffer anti-roll stabilizer. Usually, when there is a large degree of "lean," the front end isn't too responsive to steering corrections because the suspension geometry is pretty well loused up in this attitude. But with our "Golden Hawk," the "lean" had no effect on directional stability or steering responsiveness. On the straights, the Studie was a completely stable automobile, even at speeds well past the idiotic point.

The car is suspended in front by the conventional independent method of unequal length wishbones and coil springs with the direct-acting tubular Monroe or Delco shock absorbers located in the center of the springs. At the rear, a pair of fore-and-aft semi-elliptic leaf springs are used and are rigidly mounted at their front ends with compression shackles at the back. Direct-acting Monroe or Delco tubular shocks are mounted at an angle of about 30 degrees from the vertical. The front spring rate is 296 pounds per inch while the rear spring rate is 90 pounds per inch. This is definitely on the "soft" side for the weight of the car and would have accounted for very good riding qualities if the travel of both front and rear springs had been increased to prevent "bottoming" over moderate dips and bumps. The shock absorbers provided very good bump and dip control and the addition of stiffer shocks would be of questionable value.

As with other cars with a similar rear suspension layout, torque imparted to the rear axle causes the axle to rotate about its center in the opposite direction of wheel rotation, twisting the springs into most unbecoming shapes. The result is that the rear axle oscillates and the wheels jump madly up and down, traction goes down the chute and universal joints, transmissions and rear ends are shattered. This was never a problem with our Ultramatic "Hawk" but with an overdrive, it assumes major proportions during fast starts. As a consequence, a pair of torque-absorbing radius arms, like, for example, "Traction Masters" is a virtual necessity to prevent this destructive occurrence. Those desiring or requiring better roadability can haggle with their Studebaker dealers over the availability of a "kit" consisting of stiffer front and rear springs and a stiffer anti-roll front stabilizer. Now that Studebaker and Packard have fully merged, it's an even-money bet that within two or three years, the equivalent of the present "Hawk" line will feature a torsion bar suspension layout similar to that of the '55-'56 Packards. We're all for this.

Our test procedure at times calls for treatment that is abusive, which rapidly

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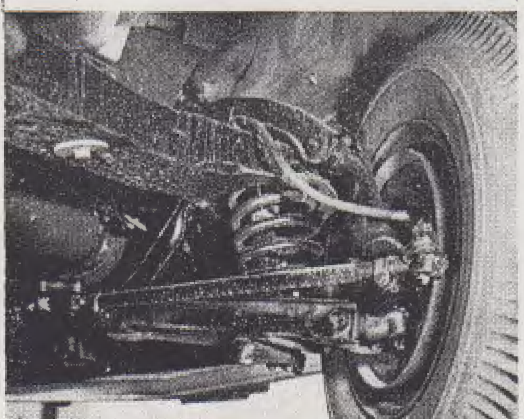
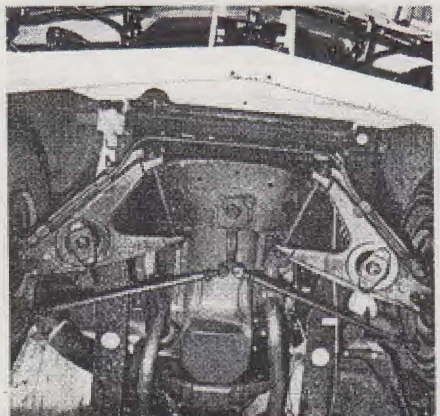
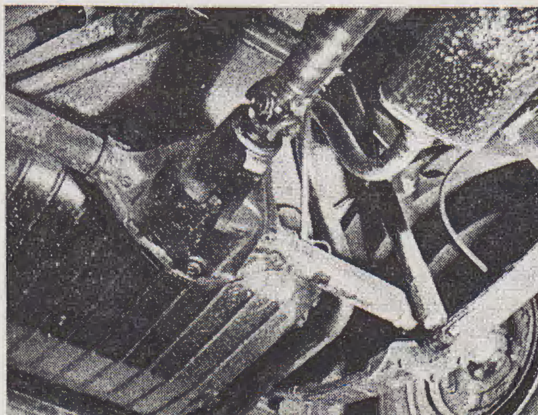


Front suspension is conventional independent system, using unequal length wishbones, coil springs with shock in center.



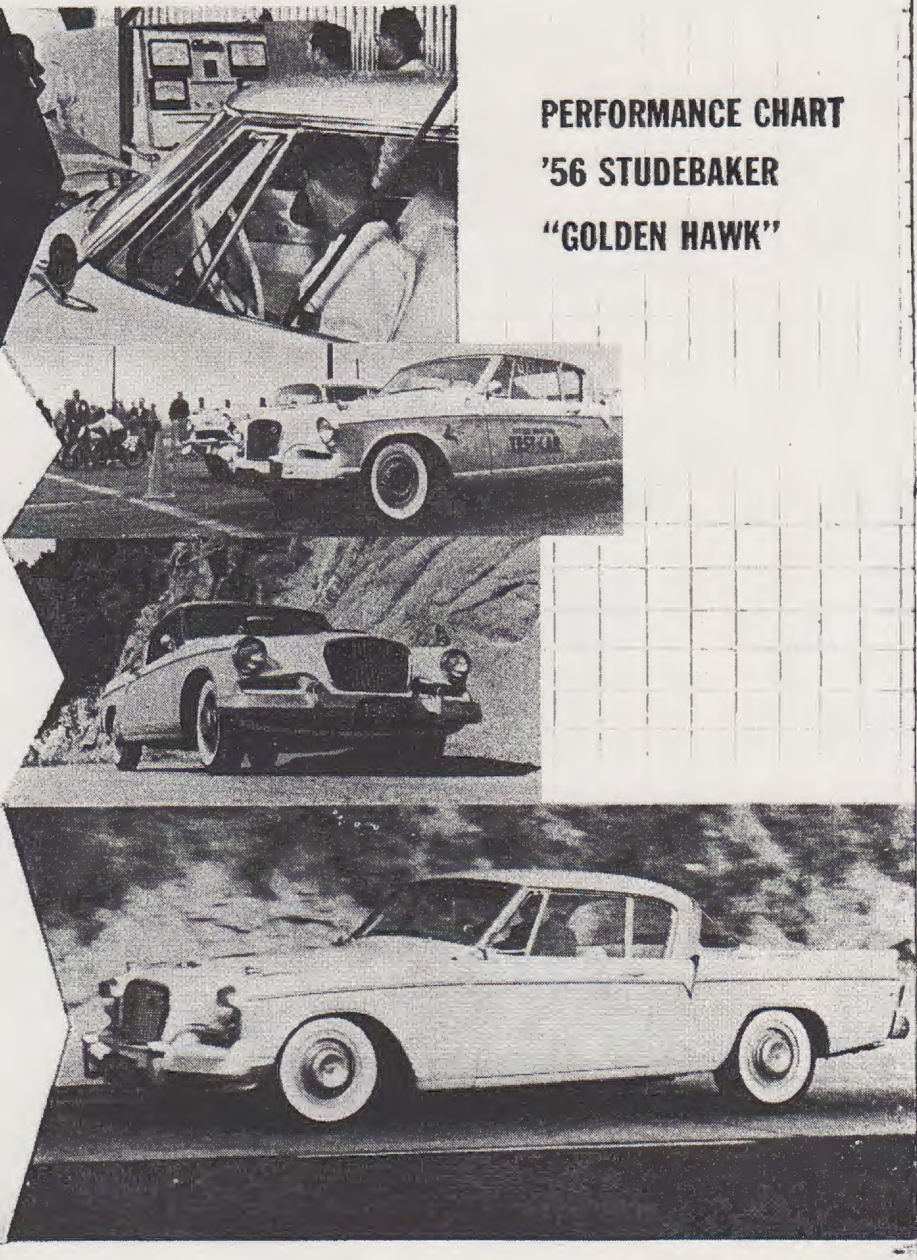
Worm's view of lower wishbones, stabilizer bar, front crossmember to which is mounted pivoting arm of center steering.



Rear suspension is by parallel semi-elliptic springs, angularly mounted shocks. Open driveline and hypoid drive gears are used.

Engine RPM	MPH*	Road Horsepower
2000	52	90
2500	65	112
3000	77	129
3300	84	132
3500	89	129
4000	101	112

*In high gear "lockup."
All dyno runs made in "low drive."



PERFORMANCE CHART '56 STUDEBAKER "GOLDEN HAWK"

ACCELERATION

Average 0 to 60 mph................10.0 secs.
Average 0 to 80 mph................17.7 secs.
Standing quarter-mile ....17.5 secs.

FUEL AND OIL CONSUMPTION

City driving................................12.5 mpg
Highway driving.........................16.5 mpg
Mountain driving.......................13.3 mpg
Average 1000 mile test............13.1 mpg
Oil consumption....................................nil

STATISTICS

Weight ....**3740 lbs.**
Weight distribution: 59% (2200 lbs.) front
41% (1540 lbs.) rear
Braking area......................195.25 sq. in.
Braking effectiveness, front.............62%
rear 38%
Ratio of car weight to brake lining area:
19.2 lbs. per sq. in.
Transmission type......Packard Ultramatic
Rear axle gear ratio..........................3.07

brings out and sometimes magnifies inherent faults of a car. In normal operation, a car is seldom, if ever, called upon to display its rigidity and resistance to stresses and strains imposed by deliberately abusive driving methods. As a case in point, we retired with our "Golden Hawk" to a favored stretch of dirt road that contains undulating dips, bumps and choppy "washboard" sections that are diagonal to the road. Here we found that the Studie was structurally quite sound; there were no major creaks or groans of protesting frame and body components nor was there any feel of "racking." Also, the directional stability of the car was not diminished under these conditions, denoting a good degree of frame rigidity.

Bendix duo-servo brakes, having a front diameter of 11 inches and a rear diameter of 10 inches, are standard on the "Hawk" line. The "Golden Hawks" and "Sky Hawks" have Budd composite drums that contain a steel center section and a cast iron drum with radial fins. The fins double the area in contact with the surrounding air, as compared to a conventional drum, thus reducing the tendency to "fade" by a sizeable margin under prolonged and severe brake applications. In normal and moderately severe use, the brakes of our test car were indeed excellent. Only under the most extremely severe conditions did any degree of "fade" occur, which was accompanied by rather erratic and unpredictable "pulling" to left or right. The brake lining area of the "Golden Hawk" is 195¼ square inches and represents a favorable 19.2 pounds of car weight per square inch of lining area, a figure almost without equal in present-day American passenger cars.

Driving the "Golden Hawk" required some "getting used to" for it is somewhat different from other cars of more conventional design and styling. First, the seats are quite low and one's legs are more nearly horizontal than in a "chair height" seat. Frankly, I find that this position is much more compatible with long distance driving. The steering wheel position is also low, being almost in one's lap, but it is placed about three inches too far to the right to be completely comfortable. This was a bit disconcerting at first because, habit prevailing, everyone who drove the car tried to "center" themselves with the wheel only to find they were too far away from the left hand armrest and window sill for any support. Later, everyone shifted their position closer to the left door and let the wheel position fall where it may. Another point of conflict was the location of the brake pedal, being below and slightly to the right of the steering column. This required "cocking" the right leg slightly to reach the pedal to prevent interference between the upper leg and steering wheel and was not compatible with the exertion of full pedal pressures. Obviously, left-foot braking was much easier, but what to do when there is a clutch pedal to contend with? Aside from these two faults, everything else in the cockpit is good or better. For example, forward visibility is really excellent because the driver is quite close to the windshield and there are no vertical posts or wraparound windshields to block or distort vision. The front fenders were always in view. The rear fenders, to which fiberglass "fins" have been attached were visible by either a glance rearward or into the rearview mirror.

The instrument panel is a hot rodder's delight. All the instruments have white markings on black backgrounds and are mounted in a simulated engine-turned panel that extends the full width of the dash. The instruments consist of a coolant temperature indicator with degree markings (instead of the usual "cold," "normal," "hot" indications), genuine ammeter and oil pressure gauges (instead of a batch of blinking and almost meaningless lights), a fuel level indicator, an electric zero to 6000 rpm tachometer (that approaches its limit of usefulness with the Packard engine), a zero to 160 mph combination speedometer-odometer (in the best of stock trim, about 30 mph of this would go unused) and, of all things, a very handy vacuum gauge for those who drive and tune their engines by the indications of this instrument. (Prospective buyers shouldn't be discouraged by the relatively low vacuum indications at idle speeds; it's the camshaft that causes this.) But seriously, it's an imposing, compact and functional group of instruments, instantly legible by day or by night. The accessory switches are located on the lower edge of the dash panel on the driver's side and are three-position toggles with identifying markings. The hand brake "T" handle is sensibly located on the right side of the steering column. The entire layout was done with a purpose; namely to make driving the "Golden Hawk" more of a pleasure than a chore.

Our test car didn't show signs of being an exceptional penny-pincher as regards fuel economy. The piper must be paid those pennies, even when the large displacement engine is just loafing most of the time. Our tank mileage for the acceleration and drag strip runs and the dyno checks averaged out at 10.1 miles per gallon. In normal city traffic, we averaged 12.5 mpg, in the mountains we averaged 13.3 mpg and on a 200-mile run on the highway at conservative speeds, we averaged 16.5 mpg. Our overall mileage for more than 1000 miles was 13.1 mpg. Oil consumption during our test was nil. An average driver even remotely concerned with fuel economy should certainly be able to top these figures without trying. The gang that drove the car, including HRM's Wally Parks, Bob Greene, Bob D'Olivo, Car Craft's Ray Brock and myself, have, as a group, more lead in the accumulative right foot than any other bunch ever assembled under one roof. We like the feel of the "punch" and are willing to pay for it. For our test, we used Mobil· "Special" gasoline.

When the rather heavy hood-grille combination is raised, one beholds a staggering amount of engine. It seems that every available inch is filled by the Packard engine, which is just plain BIG. We hot rodders have grown almost immune to things like this, but when the Detroiters do it, we are somewhat shocked and we feel that our domain has been invaded. But regardless of who does the deed, we agree with the idea and the results. However, a merger of an engine and chassis like the "Golden Hawk" does result in a few problems. For example, although the carburetor and ignition are easy enough to reach, a change of spark plugs is not easy, especially on the left side where the number seven plug is particularly inaccessible due to the proximity of the steering gear. Removal and replacement of the cylinder heads, front timing chain cover, oil pump and pan are about on a par with other cars.

The engine of our test car always performed smoothly and very quietly, aside from the fan noise at high speeds. There was never any valve lifter "clatter" when the engine was cold or after a fast run. At idle speeds, there was a slight but not annoying roughness that was traced to the camshaft, but this disappeared completely at 1000 to 1200 rpm. The single WCFB-2394S Carter four-throat carburetor was sensitive and responsive at all speeds and hot or cold starts were made with no

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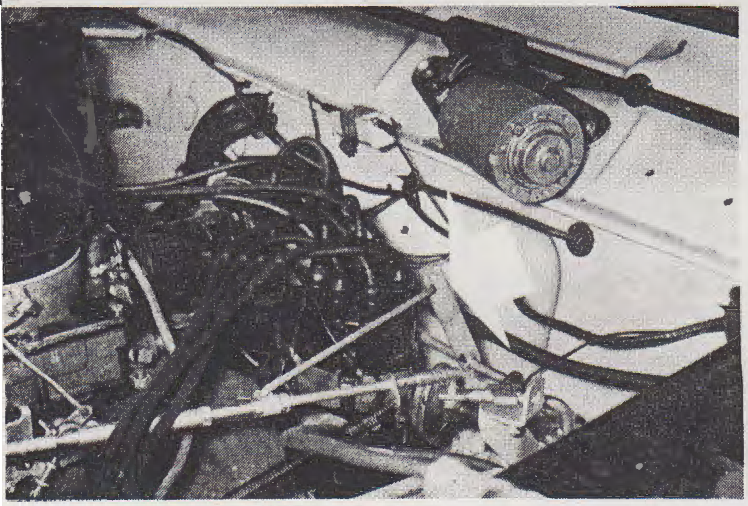
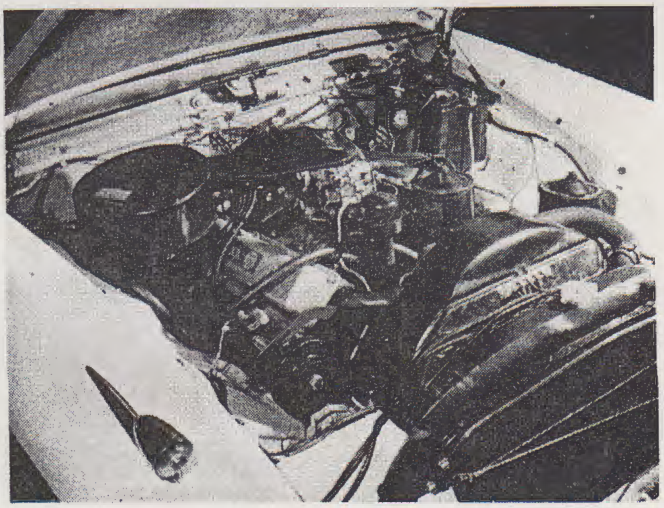
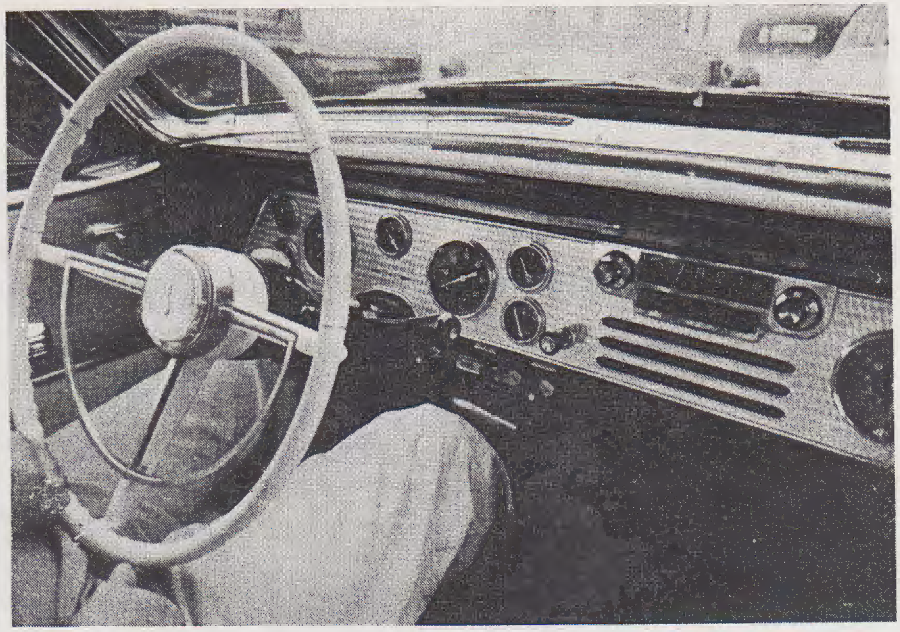


Arrow points to bellcrank arm that connects throttle linkage to transmission. Holes in arm adjust transmission shift points.



Big Packard V8 loads engine compartment to the roof, which makes routine maintenance a bit difficult but not impossible.



Excellent instrumentation, convenient accessory operation is provided in the "Hawk."

continued from page 21

THE '56 STUDEBAKER

trouble. It contained, however, a fault that is common to most four-throats with large capacity float chambers; during hard turns the fuel in the chambers sloshes around, uncovering the main metering jets causing the engine to "gasp" for fuel. This can be overcome by gradually squeezing the throttle to the floor, which supplies the engine with sufficient fuel from the accelerating pump circuit. The only other significant fact that emerged was that the one lonely carburetor contained venturi diameters that were not large enough to permit the big engine to "breathe" properly in the higher speed ranges. This was first detected on the dynamometer when the good showing obtained at lower speeds tapered off at the top end. Later, it was confirmed during the acceleration runs when, after the initial and very healthy "jump" off the line, the engine felt as though it were "laboring" above 3000 rpm. This can be checked by observing the relatively high vacuum reading (between three to five inches of mercury) when the engine is turning 4000 rpm or so with both primary and secondary throttles fully opened.

Happily, there is a good cure for the above situation. The double four-throat intake manifold of the '55 and '56 Packard "Caribbean" will drop right in place, requiring at most a minor bit of intake port alignment. There is a great variety of larger and smaller carburetors that will mount on this manifold but another Carter WCFB-2394S will work out nicely and, if the fuel/air mixture is properly attended to, will yield an increase of from 10 to 12 per cent in maximum power and a gain of 200 or 300 rpm in peaking speed. Maximum torque won't be affected, except to shift the peaking speed a bit higher and spread out the rpm range in which near-maximum torque is developed. The installation and mounting of another offset Studie oil bath air cleaner would be a simple matter. The intake manifold change, plus the addition of a good set of "scavenge" type exhaust headers to replace the stock dual cast iron manifolds should be among the first modifications made. By reducing the restrictions on both the intake and exhaust sides, these changes will bring out the inherently good "breathing" characteristics of which the engine is capable. Another modification which would help in this direction to some extent is a good porting and polishing job to take advantage of the large stock valve sizes (2 inch diameter intake, 1$^{11}/_{16}$ inch diameter exhaust).

Aside from the compression ratio, valve timing, valve spring pressures, intake manifolding and spark plugs, the "Golden Hawk" engine is identical with the engines of the 1955 Clipper "Custom," Packard and Packard "Caribbean" which were thoroughly dissected in the August '55 HRM. In "Golden Hawk" form, a compression ratio of 9½ to 1 is used. For more "urge," the heads can be milled .030 of an inch, which will boot the compression ratio to an even 10 to 1, about maximum with the stock valve timing and present day gasolines. By changing to a reground camshaft, the compression ratio could be a bit higher; about 10.3 to 1 would do it, which can be accomplished by milling the heads .045 of an inch. The stock valve timing, incidentally is as follows: Intake opens 14 degrees before top center, closes 62 degrees after bottom center, duration 256 degrees, lift at valve .398 of an inch. Exhaust opens 54 degrees before bottom center, closes 18 degrees

(*Continued on page 56*)

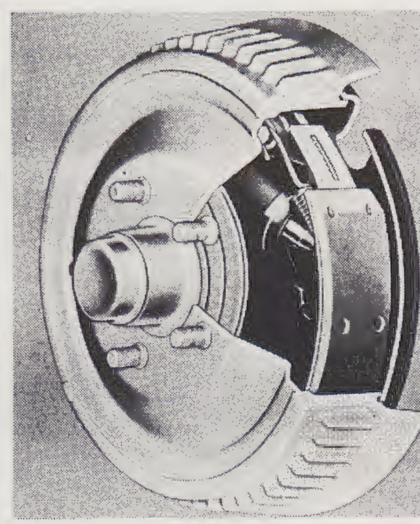
continued

THE '56 STUDEBAKER

after top center, duration 252 degrees, lift at valve .388 of an inch.

For the "big bore" kids, about the easiest way to increase the piston displacement would be to bore the cylinders to 4⅛ inches and use '56 Packard pistons and rings. This will raise the already huge number of cubes from 352 to 373. The 4⅛ inch bore diameter should be considered maximum. If anyone wished to take advantage of the new and very good welded stroker crankshafts that are available, he could, by increasing the stroke ¼ of an inch to 3¾ inches, and by using the 4⅛ inch bore, raise the displacement to the nice round figure of 400 cubic inches. That should be enough for the most avid cubic inch devotee.

Tuning the stock engine is relatively simple because only the fuel/air mixture



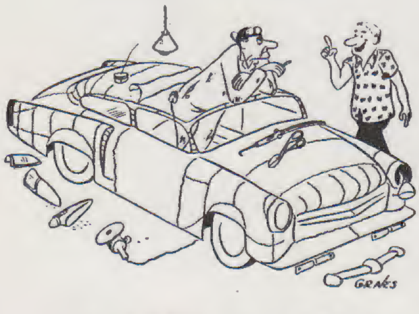
Composite Budd drums with radial fins are used on "Golden Hawk." Brakes on car were excellent, greatly resisted fade.

and the ignition need be considered. The lean mixture condition mentioned earlier is probably typical of most "Golden Hawks" and may be cured in one of two ways. The simplest method is to raise the Carter metering rod holder from 1/32 to 1/16 of an inch, after the air cleaner and metering rod cover have been removed from the carburetor. The other method is to drill, or preferably ream the main metering jets to a larger diameter in steps of .001 of an inch. The use of either method requires that the mixture be checked with a combustion analyzer for best results. The stock spark advance curve leaves little to be desired except to set the initial advance with a timing light so that the spark occurs at seven to nine crankshaft degrees before top center for use with the best gasolines. The Champion N18-67B "long reach" 14 mm plugs should be thoroughly sandblasted, cleaned and regapped at 2500 to 3000 mile intervals. If city driving is the rule, the plug electrode gap should be .033 to .038 of an inch. For sustained highway operation, .024 to .027 of an inch will do the job and if fuel economy is the prime objective, try a gap of .045 of an inch.

One point that should be mentioned is that the shift points of the Ultramatic are governed by the length of the link from the carburetor to a bellcrank at the back of the engine. One arm of the bellcrank has three holes in it to accept the link and these can be tried in order to find the most desirable shift points. For best performance, a fairly high rpm is desirable before a shift occurs and for this purpose, the bottom hole in the bellcrank arm seems to work out best.

The general construction, the fit of the doors, hood and trunk, the quality of the finish (synthetic enamel), upholstering and trim were all good. There wasn't a sign of a leak after the car had been exposed to torrential downpours for a couple of days and during this period, the two-speed electric windshield wipers proved their worth over the more conventional vacuum-operated wipers. Body squeaks and rattles were at a minimum, even after the "washboard" treatment. One discordant note was the lock and latch release of the trunk lid. This thing must've been designed for the grip of a gorilla. It took both hands to operate the release but once the lid was raised a bit, the stiff countersprings did the rest. However, I understand this minor complaint has been corrected in subsequent cars.

In all, the "Golden Hawk" is a very neat and tidy package and one that is loaded not for bear but for some of the mythical four-wheeled predators that roam the streets and highways. A factory-tuned version has lapped the 2½ mile banked ova' Studebaker-Packard test track at speeds approaching 130 mph. This gives some idea of what a prospective buyer may expect. At a stoplight or on the highway, a sharp, well-tuned "Golden Hawk" is capable of giving complexes to the competition. Although the factory calls it a "sports type" car, we like to think of it as a production-line hot rod. But regardless of what it is called, the "Golden Hawk" represents passenger car performance at its best.



"Wait a minute, Joe, I just got another idea."

'57 PLYMOUTH — COMPLETE OWNER MAINTENANCE

Brent Hagen 3/01

AUTO MECHANICS

THE "HOW TO" MAGAZINE FOR CAR OWNERS

FEBRUARY 1957 35¢

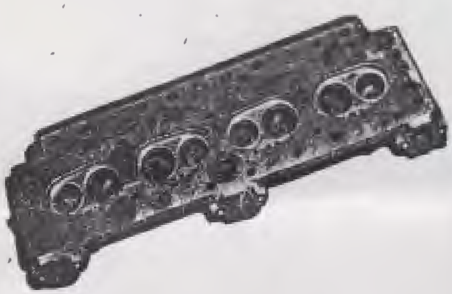
HOW TO:

- RENOVATE A STATION WAGON
- BUILD AN AIR COMPRESSOR
- SHOP IN A JUNK YARD

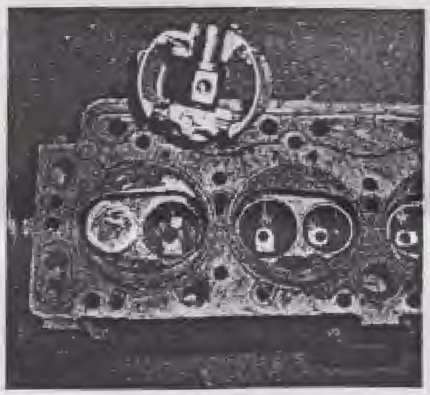
FRONT-END REPAIRS — see page 28

Making The Hawk Fly

By Pete Sukalac



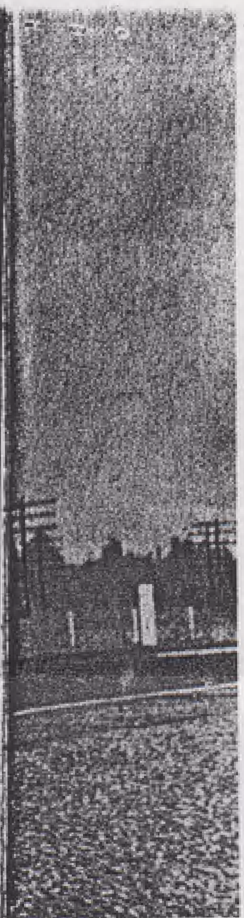
1 *Packard engine in the '56 Golden Hawk uses combustion chamber unlike any current design. Area under valve seats is too thick, passages are full of sharp bends.*



2 *Stock valves are heavy, and tend to float at the engine speeds above 4500 rpm. Continuous abuse in this range brought about damage to the piston at top of the picture.*

3 *Dan Kilcup uses a high speed grinder fitted with a rotary file to hog out ports. Stones of varying coarseness were then used to polish the metal of cumbustion chambers.*

Modifications To Packard Power Plant Increased Road Horsepower From 90 At 3000 rpm To 128



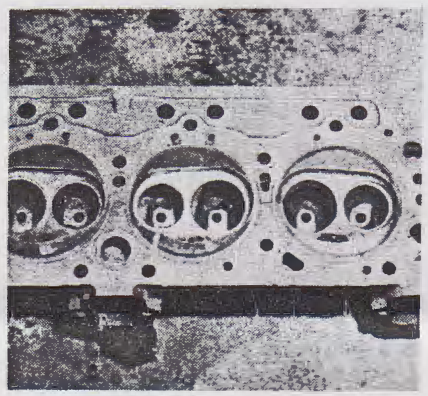
Modified Golden Hawk is smooth in traffic and a hairy bear on the open road, hitting 97 mph in ¼-mile from standing start.

FOR six months prior to release of the '56 Studebaker Golden Hawk, the publicity department of the S-P Corporation followed the usual practice of advertising the coming vehicle to the point where folks had their tongues hanging out a foot in sheer anticipation of the glorious event. Naturally, as so often happens, when the car did make its appearance many of these same people were more than a wee bit disappointed when they took their factory hot rod out to the local drag strip. Owners found themselves being dusted off by much less romantic iron. These people were learning that dropping in the biggest mill available doesn't necessarily make for the quickest car—even if the job was done at the factory.

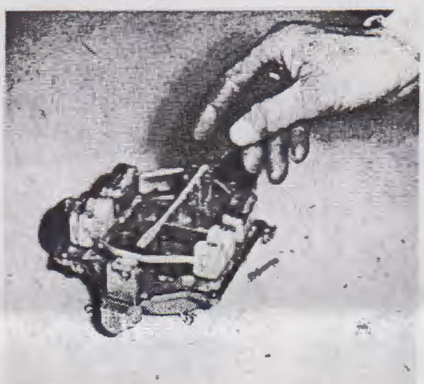
The 352 cu. inch Packard engine that powers the Golden Hawk is big. When you consider that it was designed to power cars in the better than two-ton category, you jump to the conclusion that the same engine would turn into a fireball when placed in a chassis weighing about 1,000 pounds less. That's what everyone thought, until they found that they couldn't get down a standing quarter mile in less than 17 seconds, or make a better speed in the same distance than 85 mph.

Don Rasmussen, a Stude dealer in Portland, Oregon, decided to find out just why this was so, and what could be done to make the coupes with the muscle-bound mills do their chores more quickly. Rather than break the routine of his own shop with experimental work, Don placed the test car in the capable hands of Dan Kilcup, a speed merchant in the same city. His parting instructions to Dan were, "Make the thing go, but don't make the engine too radical for street use." Plenty of performance, but keep the reliability and smoothness. That made sense.

Before starting any speed tuning, Dan put the car through a simple road test for acceleration and passing times. Using a stop watch, he determined that the best 0-60 time was 8.5 seconds, while 50-70 took a flat 8 seconds.

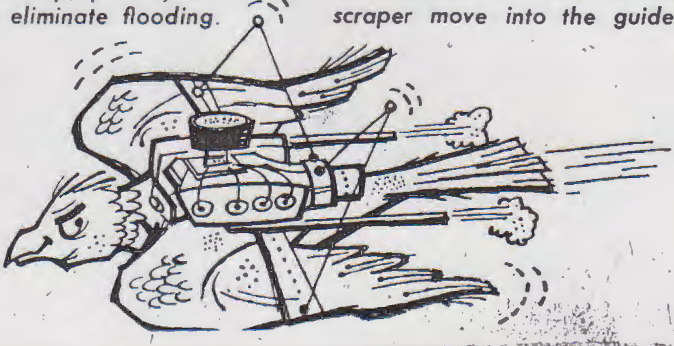


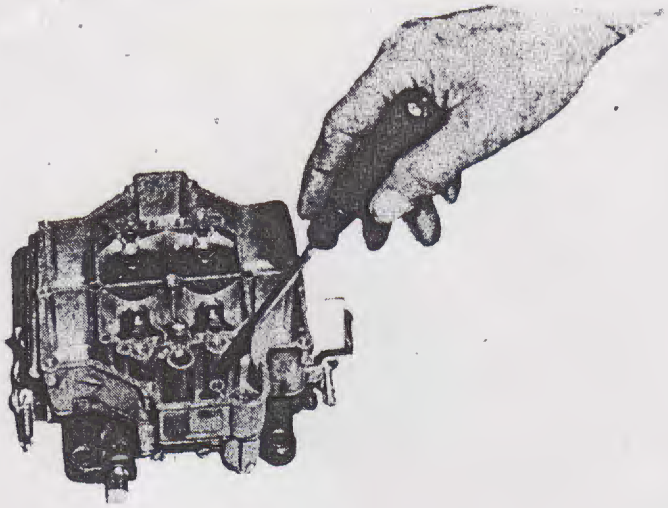
4 *The finished combustion chamber in center is glass-smooth compared to others. Note how unrestricted the valve ports are as compared to the ones in the right chamber.*

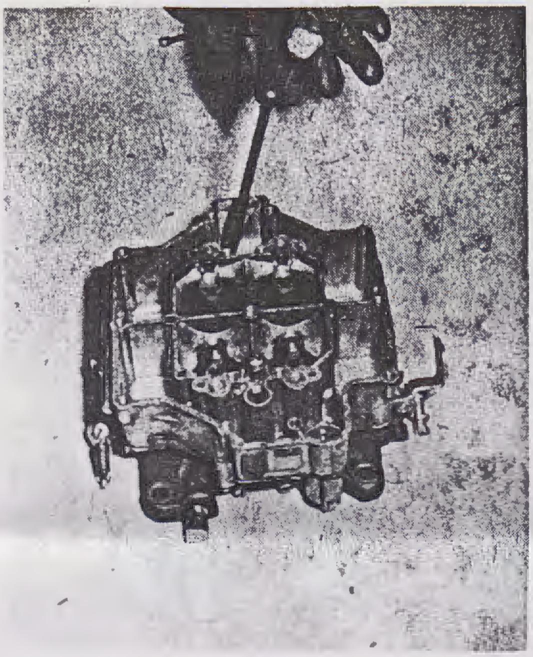


5 *Carburetor float drop was adjusted at point shown by bending stop tang. The secondary floats (front) were adjusted for 11/16" drop, primary set at 5/8" to eliminate flooding.*

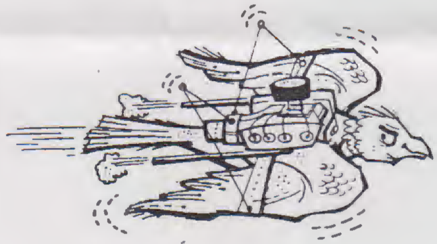
6 *Valves were tuliped and undercut to lighten them. The exhaust valve carbon scrapers were too close to the valve heads. A .125 cut let scraper move into the guide.*

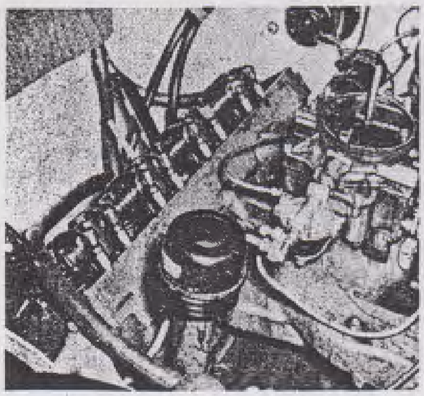




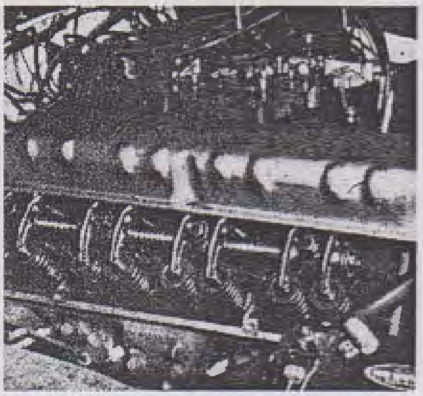


7 *Carburetor primary jets, above, were increased in size from .0935 to .104. Right: secondary carburetor jets, shown by screw driver, went from .0785 to .083.*

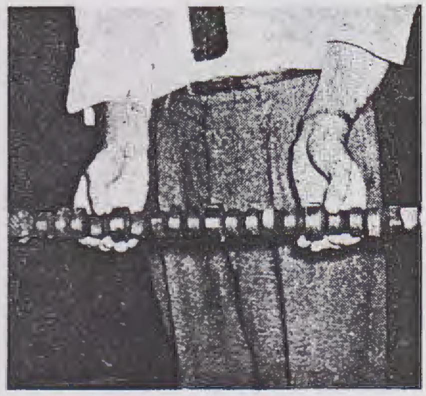




9 *Rocker adjustments can be seen from this angle. Intakes are set at .008, exhaust valves at .016 with engine hot.*



10 *As new rocker setup is higher at valve spring side, rocker covers had to be peened out to let rockers clear.*



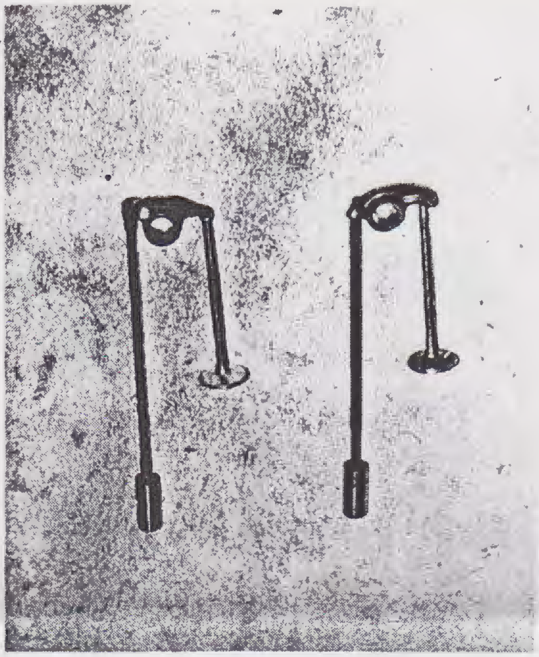
11 *Camshaft changes were unnecessary, as Packard camshaft has .395 lift, which is plenty high for modified engine.*

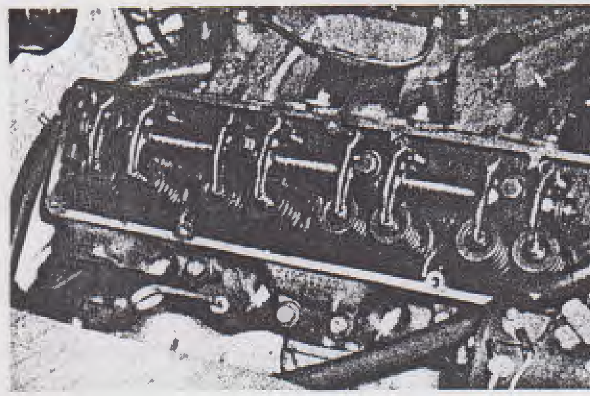
The standing ¼ mile run produced an average of 85 mph. The car was certainly not to be considered slow by any standards, but with all its cubic inches it should have done better. The next check was made on Blackie Blackburn's Clayton dynamometer. At 2,000 rpm the engine put out 46 hp at the rear wheels. At 3,000 rpm the power jumped to 90. Certainly a mill rated at 275 hp, and supposedly making good 380 foot pounds of torque at 2,800 rpm should show more output. Of course, some of the potential performance was held back because of the tight, new engine.

Heads, Manifold Pulled

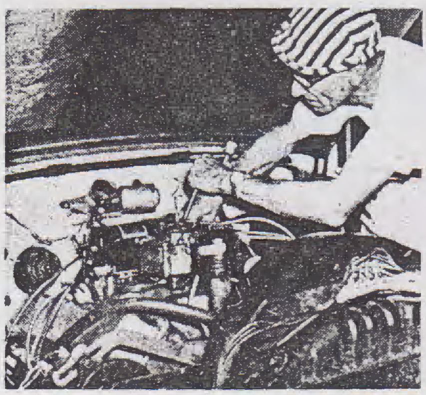
With the preliminary tests at an end, Dan drove the car to his shop where the hop up work was to be done. All hoses and wires were removed from the heads and the water drained from the block. The carburetor was left on the manifold when the latter was unbolted and lifted off the engine. The valve covers were removed and the head bolts backed off. When clear of the rocker arm assemblies, the heads were pulled and placed on a bench. The cam cover was removed and the push rods and hydraulic lifters plucked out of their holes and placed in their proper order on the same bench. A valve spring compressor was used to remove the valves and spring assemblies from the heads. The bare heads were then free for inspection. After looking over the valve-port layout, three things were immediately apparent to Dan. The valves were adequate in size, with the intakes measuring close to two inches in diameter. The valves were too heavy for quick acceleration and high rpm, and there was a large step in both the intake and exhaust ports that would impair proper breathing.

To modify the heads, Dan placed a wire brush in his high speed hand grinder and proceeded to clean the carbon, soot and other residue from the combustion chambers and



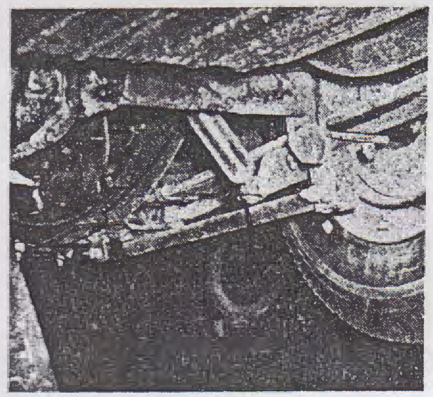


8 *Left: modified valve train is three oz. lighter than Packard's hydraulic setup at right. Above: 1956 Olds valve spring retainers were modified to fit Packard.*



12 *With mill reassembled, adjusts spark advance to get maximum power. Setting was checked on dynamometer.*

13 *Fuel mixture just right with big jets in carburetor. Plug insulator turned chocolate brown under hard pull load.*



14 *As no Traction Masters available, Dan made up these from shock absorber ends, two lengths of 1 1/8" Shelby tube.*

ports. When clean, the brush was exchanged for a rotary file and the steps in each port ground away. The fast cutting tool literally hogged its way through the tough cast iron. Next, a high speed stone was used to polish the combustion chambers. The actual time consumed in the grinding-polishing operation totaled out to one hour per chamber. Since considerable metal had been removed from each chamber, and not wanting to lose precious compression pressure, Dan sent the head to a machine shop with orders to take off a .100 cut. The cut would not only restore the factory ratio of 9.5:1, it would raise it a point. When the heads were returned, each chamber was chamfered along its perimeter to remove all sharp edges resulting from the grinding. The valve seats were then retouched using a 29° stone on the intakes and a 44.5° stone on the exhausts.

The valves were then checked in their respective seats for alignment and freedom of movement. The carbon scrapers on each of the exhaust valves were found to be so close to the valve heads that the ledges were not able to do their jobs. The exhaust valves were thereupon given a 125 cut up the stems. Each valve was then placed in a lathe and given a light tuliping and as much of an undercut as Dan considered safe. The valve edges were then recut in the grinding machine to match the seats. Each valve was then hand-lapped to ensure a gas-tight seal. The springs were checked for a stock tension of 187 pounds. To be on the safe side, the tension was increased by shimming up each spring with a washer, the thickness of the washers being dictated by the reliefs made in the heads for each spring. Enough of a ledge was retained to keep the springs from shifting. *(Continued on page 54)*

Your Car Can Save Your Life (Continued from page 15)

you'll want fuel at hand to fire a tire, its black smoke calculated to pinpoint your location.

Next, you remove the sun-visors for shovels, throwing up a sand windbreak around the chassis, leaving just enough entrance to squeeze through. As for that entrance? Better make it on the side facing the nearest continental air-lane. That'll let you manipulate a rear-view mirror for signaling without exposing more than an arm to the sun.

And don't underestimate that mirror of yours. Properly used (heading into the sun), it can attract search planes 45 miles distant—even when they're flying at 5,000 feet. You can signal with chrome-plated metal too—the hubcaps, trim, bumpers, or other reflective automotive accessories. But metal's glittering reflection reaches only about 35 miles (10 less than a mirror's). Still, that's considerable. And it means that often a plane will catch your signal long before you either hear or see it.

With a seat as an improvised bed, your windbreak thrown up, and that tire blazing away, you're ready to think about protective clothing—a layer or two of seat cover, upholstery fabric or ceiling liner. Even a patched together over-garment will isolate your body from the heat, conserve your strength and reduce water evaporation from the body. You can pin together the fabric with upholstery clips. A sharp piece of chrome stripping pinch-hits for a knife.

Even utensil-less, you needn't go without crockery—so long as you have hubcaps. Nor need you starve on any desert in the world (with possible exception of the Sahara) if you've got radiator water and a tire fire.

Desert Food

One delicacy is the prickly pear, a cactus. Its spines can be peeled off, the fruit eaten raw or boiled. Another is the common Yucca, its ripe fruit, stalk and leaves roasted to your taste preference. Edible too is the Sahuaro flower, from the common cactus of the Arizona desert. Arid America is alive with edibles including that Indian favorite, the beans of the mesquite (soak a handful of mesquite beans in a hubcap-full of radiator water and you've got one day's rations). In all, probably two score varieties of desert flora can be roasted or boiled to palatability over your tire fire.

But before you crawl into your chassis shelter for the night, it'd be a good idea to remove your sealed-beams, angle them at 45 degrees so you can switch them on should you hear a plane nosing overhead. For the electrical hook-up, borrow wire from your tail lights or from beneath the dash.

Laying out signal panels, there on the desert floor, is another job worth the effort. Even panels fabricated from floor coverings and upholstery are better than none. Outlined with strips of chrome, panels are visible to pilots at 10,000 feet or more. Another survival tip: Shatter the windshield or windows, scattering chunks of glass over your fabric panels. They'll reflect so that they can be seen for miles. And all you really need is a single panel, three feet wide and just as long as material allows. (75 ft. isn't too long.) That single panel is a universal distress call meaning, "require doctor . . . serious injuries."

Some, stranded deep-desert, have gone even further in bolstering their chances for survival: three ft. strips of shirt have been rigged to a fully-extended car antenna—a flag that stands out vividly against the drab dullness of desert America. At least one motorist used his car's clock (the stem-winding variety) as a portable compass, judging direction by the midday shadows of its hands; strips of inner tubes have been used as constricting bandages, throttling blood circulation while a snake bite was sucked clean of poison.

Far-fetched? Not at all! Every one of these ideas has saved a motorist's life one time or another. Taken together, they spell survival in any North American desert.

Winter Survival

In the bitterness of a winter your car can save your life too—although the techniques are different. Your first aim: preserve your body's warmth, hoarding every calorie of heat. That means fire—by burning your tires, fueled by gasoline; turning your car's interior into a snug, warm hut; insulating your body by multiple layers of fabric—foam rubber or upholstery; guarding the extremities—feet and hands—from frostbite (by mittening your hands in upholstery, inner-soling your shoes with floor mat); and protecting your face from the cold by smearing nose and ears heavily with chassis grease.

The major problem, then, is warmth. Here your car's windows are a help, but they need buttressing with layers of fiberboard from door interiors to really shut out the cold. From inner tubes you can cut serviceable leggings

(Continued on page 56)

Making The Hawk Fly (Continued from page 27)

Adjustable Rockers Used

The valve actuating train was next in line for checking. The '56 Packard engine featured hydraulic lifters, heavy steel push rods, and neat, short rocker arms. The rocker arms were light and well designed, but being non-adjustable, they wouldn't work if the hydraulic lifters were discarded—and this is exactly what Dan had in mind. He made up a sample assembly using a '56 Stude solid lifter (a perfect fit), aluminum push rod and a Stude adjustable rocker arm. Even though the Stude rocker arm was heavier than its Packard counterpart, the total weight saving was three ounces. Though it was a small saving, the lighter weight, coupled with the positive action of the solid lifter, swung the decision in their favor. Stock aluminum push rods were not readily available, so Dan made his own using the ball ends from '56 Studebaker rods and 61 ST .065 x ⅜ aluminum tubing. The lifters were a beautiful fit, but to make sure they wouldn't bind when hot, they were dressed down .001 with aluminum oxide paper.

While reassembling the valves in the heads, it appeared to Dan that the valve spring retainers were certainly thin and weak-appearing for the heavy duty work they had cut out for them. A set of '56 Olds retainers of much heavier construction were of the right diameter, but the holes were 11/32" and the Packard valve stems were ⅜". Sixteen of the Olds spring retainers were modified by chucking each in a lathe and taper, cutting the center to take the Packard valve stem and keepers. A lot of work, but better than losing a valve at 5,000 rpm.

Out on the road for a test, the car went like a bomb, up to a point. When idling, the carburetor tended to flood, but when under hard acceleration the thing would scream and then starve out. Obviously the 4 barrel carburetor needed some attention. The pot was removed from the manifold and the

Save Your Life

(Continued from page 55)

—slip your legs into them as if they were puttees. A couple of these sheathing each leg will do the trick.

As in the desert, to put your automotive survival kit to maximum use, you need to know something about the climate that is victimizing you. For it's fact: more motorists have frozen to death in the biting cold of a mid-west winter than in the Alaskan Arctic. Why? Because wind, as much as temperature, can kill. With a 45 mph wind blowing, you can freeze, although the thermometer is hovering at a paltry 24.8 degrees F. Human flesh, on the other hand, is slow to freeze (even at 20 below zero) unless the cold is wind-driven. That's why it's important to smear chassis grease over your face—with emphasis on nose and ears—if you must stand against a freezing wind. Even crankcase oil will insulate—when applied like salve to exposed skin areas.

Cold Kills Fast

There's far greater urgency to "get at it" in the cold for cold kills faster than heat does. You won't have the luxury of time to think things over—at least not until you're snugged down warm and out of the wind.

Your car's steel body becomes your haven. But there's too much headroom in today's average car, too much interior space for one human body to warm. Huddle inside your car and your body heat is wasted without appreciably warming the air. Your most urgent first job? Reduce that air space!

You might profitably decide to bed down on the floor, just *behind* the front seat. For here it's relatively simple to build a body-wide cubicle, reducing air space. Remove the front seat cushion, lay it as an insulating roof atop the back seat, leaving just enough headroom to crawl in. Lock one door and seal it where it forms one wall of your behind-the-backseat shelter. Insulate, this locked "wall" with fiberboard from the front doors. Thus, you've effectively reduced the size of your in-car shelter, have made it small enough so that your body can act as a kind of heater.

Seat Cover Blankets

As for blanketing? Scrounge the trunk's carpet, the underdash floor mat, the backseat's upholstery, all the seat covers you can rip off. It's surprising how two or three thin layers of fabric will insulate against the cold, keep you snugly warm.

Again, once the storm's abated, you should lay our aerial signals. It goes without saying that a tire emits voluminous smoke—smoke that can attract rescuers. Crankcase oil spilled over the snow, as kind of black panel (set with chromed auto accessories) has been used time and time again by marooned hunters, camplers and just plain motorists (oil can be "painted" atop snow using a whisk broom as a brush. Other usable "brushes": a flap of innertube, the core of oil filters). Five inflated innertubes laid out in a panel get the same results. You can "walk" a geometric snow-pattern, emphasizing it with crankcase oil. Remember this: any geometric pattern (cross, circle, triangle or straight line) is unmistakably man-made and recognizable from aloft.

Flash Floods

What of flash floods? Whether or not you survive depends upon their severity and depth, for your car isn't water-proof. But you can minimize the hazard if, as a flood rolls down upon you, you head into it—taking its brunt head-on. That way, your car offers least resistance, presents too, its strongest bulwark to the water's impact. Taken sideways, a flood has too often bowled over a car, carrying it and its driver to sudden death.

Cold weather or hot, flood or fire, the family car is a kind of automotive St. Bernard. For among its yards of wiring, its tons of steel, rubber, glass, fiberboard and fabric lurk every essential for family survival. Make no mistake about it, your car can save your life! STOP

Hawk

(Continued from page 55)

floats dropped 1/16" on the secondary side to ensure a full supply of fuel. To allay the starving problem, a bigger jet size was called for. The stock seat (.095) was exchanged for a .104 model and the secondary increased from .0785 to .083. The pot was assembled and remounted on the manifold. As a safety precaution, a Bendix electric pump was mounted at the tank outlet to ensure a supply of fuel under pressure to the mechanical pump. If the rig was to have an Achilles heel, it wasn't going to be the fuel system.

The car was tried again on the street. So much power was available at the rear wheels that if the most extreme care was not taken the rear would chatter and snake from side to side. Something had to be done to hold down the torque reaction. Dan checked on the supply of "Traction Masters." None were made to fit the Hawk. Taking a set of shock absorber ends and two lengths of 1⅛" Shelby tubing (.0625 wall) Dan set about making his own. The tubes were cut so they would run from the center of the spring-axle pads to the frame under the front shackles. Heavy duty steel strap was welded directly to the pads and the frame for anchors. These were drilled and the tubes, complete with rubber shock ends, bolted on.

Back on the test strip again, the car was clocked at 97 mph on the standing ¼, and 121.62 at the end of a ½ mile run. The rear wheels still broke loose if the full power available was used too quickly on starting, but the traction tubes did a good job. The car was again placed on Blackie's dyno and the rig given a full test. At 2,000 rpm it turned 88 hp at the rear wheels, while at 3,000 power output was 128. With the pipes and air cleaner removed, the output at 2,000 rpm was 98, this went to 138 at 3,000 and 158 at 3,500 rpm. Not bad! The car was as smooth and tractable as stock, and the performance was about as sharp as one could wish.

STOCK HAWK

Air temp. 77°

Compression pressure 140 pounds per cylinder at cranking speed.

RPM	ROAD HP
2000	46
3000	90

¼-mile	85 mph.
0-60	8.5 secs.
30-50	7 secs.
50-70	8 secs.

MODIFIED HAWK

Air temp. 85°

Compression pressure 215 pounds per cylinder at cranking speed.

RPM	ROAD HP
(Full Road Equipment)	
2000	88
2500	115
3000	128
3500	130
(Pipes & Cleaner Removed)	
1200	38
2000	98
2500	119
3000	138
3500	158

¼-mile	97 mph
½-mile	121.62 mph
0-60	7 secs.
30-50	5 secs.
50-70	5 secs.

STOP

BOB STRAIT

MECHANIX ILLUSTRATED

THE HOW-TO-DO MAGAZINE

25c

MAY

$3,000 Live Steamer—Page 100

Complete Plans for Flying Model of Baby Ace—Page 108

WIN A THUNDERBIRD... CORVETTE... GOLDEN HAWK IN EXCITING NEW $20,000 SAFETY CONTEST!

Special Section:

EVERYTHING TO KNOW ABOUT SCALE MODELS AND MODEL-MAKING

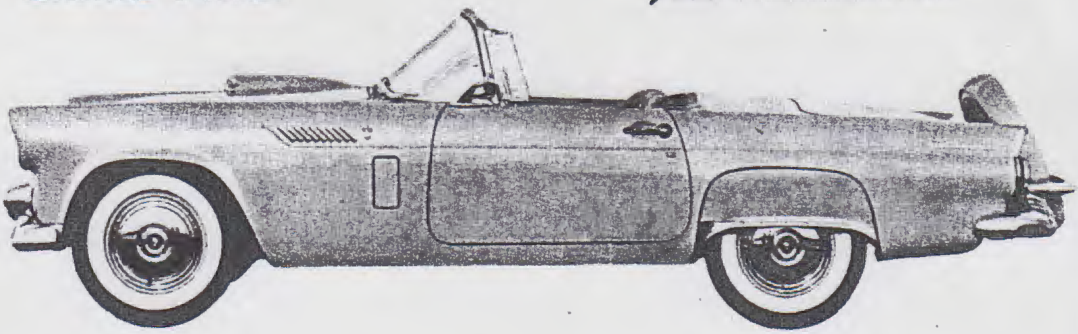
Build Your Kids This Plastic Gas-Engined Car—Page 114

Here It Is!

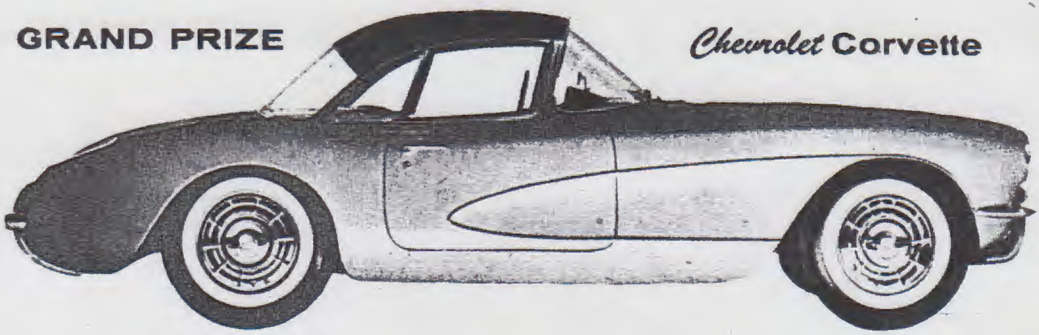
MI's $20,000 HIGHWAY

Win a Sports Car...

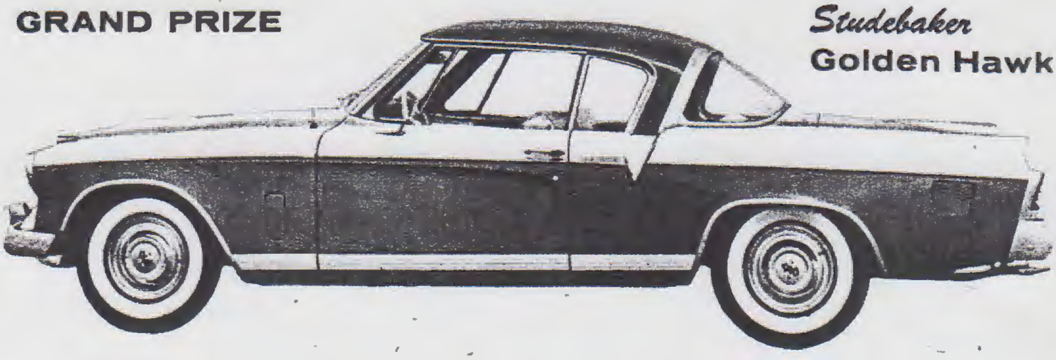
GRAND PRIZE *Ford* Thunderbird



GRAND PRIZE *Chevrolet* Corvette



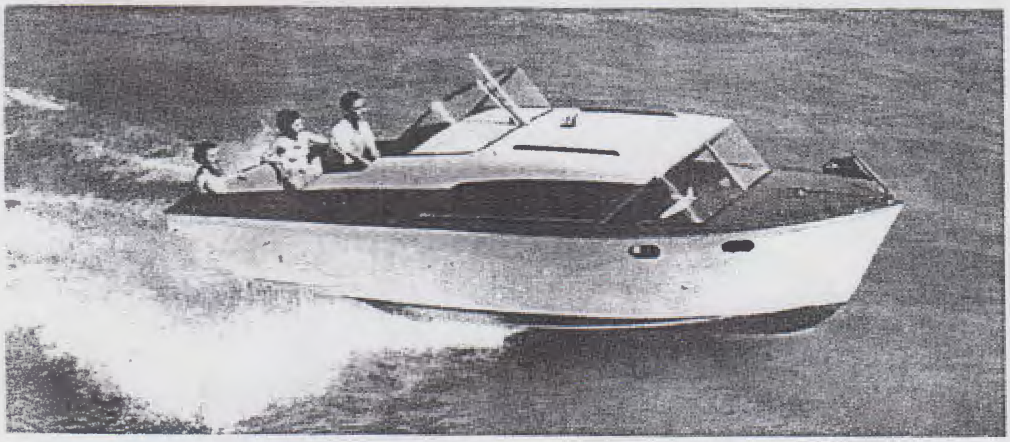
GRAND PRIZE *Studebaker* Golden Hawk



SAFETY CONTEST!

...Dozens of Other Great Prizes

HERE'S what you've been waiting for! MI presents the biggest and most exciting contest in its long history, giving you a chance to win your choice of three great American sports cars. Also on our prize list are beautiful boats, power workshops, outboard motors, cameras and many, many other awards. For those who didn't place in our Buildwords Contest last year, here is a fresh opportunity to hit the jackpot for a Ford Thunderbird, Chevrolet Corvette, Studebaker Golden Hawk or some other valuable prize you've always wanted! You'll find the $20,000 Highway Safety Contest is easy and fun, too.



4TH PRIZE

Chris-Craft's beautiful new 22-ft. Express Cruiser! Big cabin sleeps four, has galley, dinette, toilet and berths. Uses inboard or outboard power, does up to 27 mph. Kit is worth $1,141.

Complete Rules and Entry Blank On Pages 80-81

For Pictures of Other Prizes Turn the Page

Rules for MI Highway Safety Contest

Read All of Them Carefully Before Starting on Puzzle

1. The MI Highway Safety Contest is composed of four puzzles: No. 1 in the May 1956 issue of Mechanix Illustrated, No. 2 in the June issue, No. 3 in the July issue and No. 4 in the August issue.

2. Complete all four puzzles, trying for the highest possible score. In scoring, add the letter values on each horizontal line and place these sub-totals in the boxes marked LINE TOTALS. Then add LINE TOTALS to get your score for each puzzle. (See Sample Puzzle and How To Win.)

3. Write your score for each puzzle in the MY SCORE box. Write your total score for the four puzzles in the box marked GRAND TOTAL on Puzzle No. 4; *also write this Grand Total in the lower left corner on the address side of your envelope.* PRINT your name and address on each puzzle in the spaces provided.

4. You may submit legible *copies* of the first three puzzles. But Puzzle No. 4 must be clipped from the August 1956 issue.

5. The four completed puzzles—pinned, paper-clipped or stapled together—must be mailed in the same envelope. *Do not mail puzzles separately.* Do not include anything in the envelope except puzzles. Print your name and return address in the upper left corner on the front of your envelope, then address it to:
MI HIGHWAY SAFETY CONTEST
FAWCETT BUILDING
GREENWICH, CONN.

6. The final authority on acceptance of words used in the puzzles is the latest (1953) edition of Webster's New Collegiate Dictionary. Any *complete* word defined in the main section of this dictionary (pgs. 1 through 997) may be used—EXCEPT possessives formed with an apostrophe (e.g., *girl's*); hyphenated words (e.g., *post-mortem*), proper nouns (names), or abbreviations. Plurals and other accepted forms (such as past tense) of words may be used. The same word may be used more than once in the same puzzle or in different puzzles. All words must read from top to bottom or from left to right.

7. Entries must be postmarked not later than September 1, 1956. No entry will be acknowledged or returned. All entries become the property of Fawcett Publications, Inc.

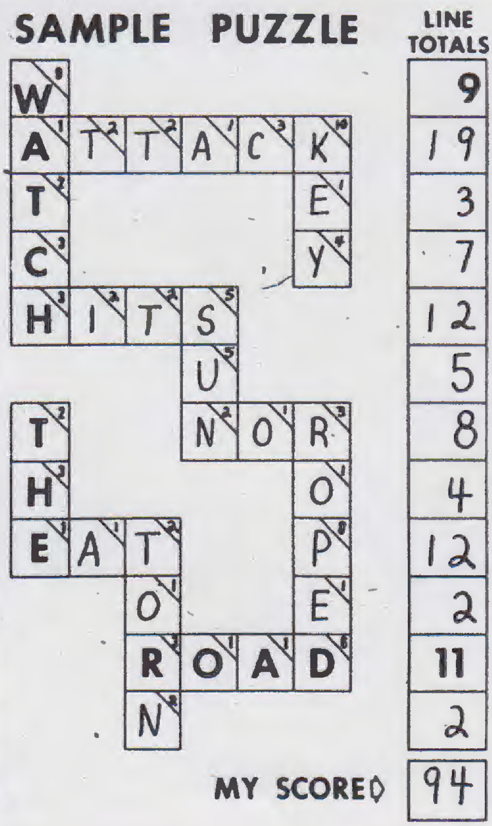
8. The three contestants having the highest scores will win Grand Prizes. The contestant with the highest score will be given his choice of a 1956 Ford Thunderbird, a Chevrolet Corvette or a Studebaker Golden Hawk. The contestant with the second highest score will have his choice of the other two cars. The contestant with the third highest score will win the remaining car. Other prizes will be awarded accordingly, with fourth prize going to the contestant with the fourth highest score, etc. Originality, neatness and legibility will be judging factors in event of ties.

9. The Editors of Mechanix Illustrated are the judges of this contest and their decisions shall be final. Correspondence will not be entered into with contestants concerning the contest, nor will telephone calls or telegrams relating to it be answered.

10. Contest is open to any resident of continental North America except employees of Fawcett Publications, Inc., its wholesale distributors and advertising agencies, and their employees and families.

11. The winners will be notified by mail and their names will be printed in a future issue of Mechanix Illustrated. •

SAMPLE PUZZLE



LETTER VALUE CHART

A-1	F-2	J-7	N-2	R-3	V-8
B-4	G-7	K-10	O-1	S-5	W-9
C-3	H-3	L-5	P-8	T-2	X-5
D-6	I-2	M-6	Q-10	U-5	Y-4
E-1					Z-1

HOW TO WIN

WORKING the puzzles in our MI HIGHWAY SAFETY CONTEST is easy, it's fun . . . and educational too! On the opposite page we've done a Sample Puzzle for your guidance.

You are to use the Safety Slogan letters as starting points in each puzzle. We began with the letter A in WATCH, then completed the other rows of interlocking squares much in the fashion of a crossword puzzle.

Next, we printed each letter's value in the triangular letter value spaces. Then we added the numbers on each horizontal line, placing these sums in the LINE TOTALS boxes.

Be sure to include in your LINE TOTALS the values of letters in the Safety Slogan. These are Bonus Scores that are printed in for your convenience, as is the LINE TOTAL when slogan letters occupy the entire line.

Finally, we added up the LINE TOTALS and printed this figure—94—in the box marked MY SCORE.

That's all there is to it! Every puzzle is done in exactly the same way.

Here's how to win yourself one of those great prizes: Check the Letter Value Chart—which remains the same for all puzzles—and find letters with highest values like Q, K and W. Then work in as many words as possible containing these letters. That will increase your score—and a high score is a free ticket to a valuable prize.

Read the rules two or three times before starting. Hours of work won't win a prize if you violate the rules.

A soft lead pencil will be best to use. Ink tends to run.

And have fun in that new sports car of yours! •

PUZZLE NO. 1

LETTER VALUE CHART

A-1	F-2	J-7	N-2	R-3	V-8
B-4	G-7	K-10	O-1	S-5	W-9
C-3	H-3	L-5	P-8	T-2	X-5
D-6	I-2	M-6	Q-10	U-5	Y-4
E-1					Z-1

NAME...

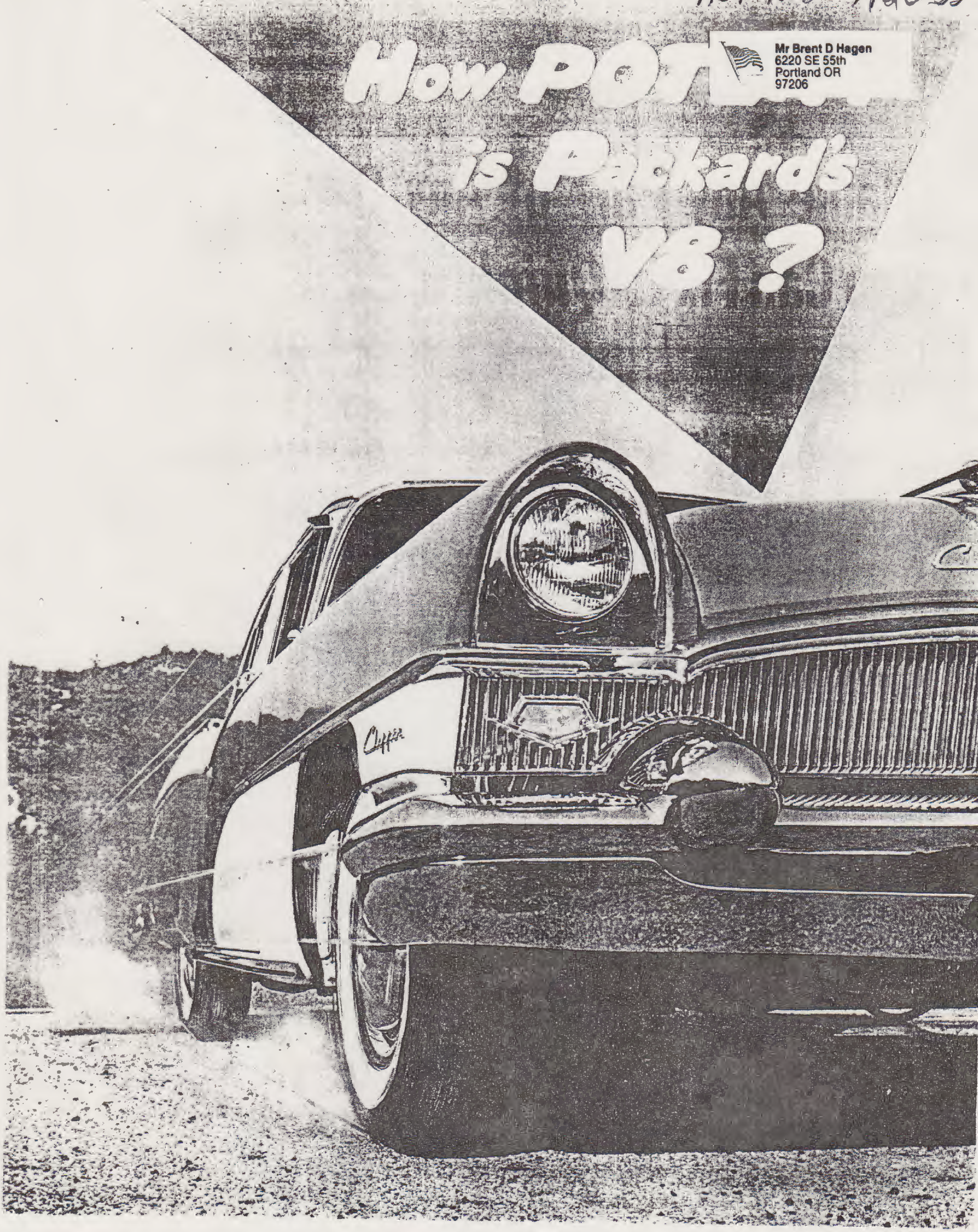
ADDRESS...

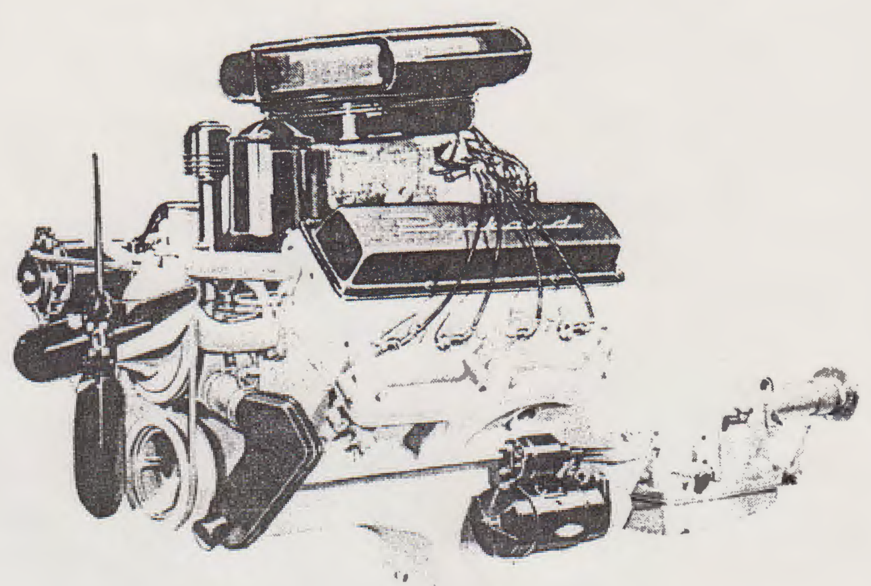
CITY..STATE..........................

Work puzzle, print name and address in blanks, clip along broken line; when you solve all four puzzles pin, paper-clip or staple them together and send them in.

HOT ROD AUG 55

Mr Brent D Hagen
6220 SE 55th
Portland OR
97206





Packard's bold bid for power includes a radical new chassis and the industry's biggest engine

By Racer Brown

The veil of secrecy that shrouded the new Packard V8 has been surpassed only by the Iron Curtain. Usually, new automotive developments are released to members of engineering groups and the press some time before the cars fill the showrooms, but this year Packard withheld specific information of two very significant innovations. Meanwhile, a few expert rumormongers had a field day. According to them, the new Packard V8 engine was a 400-cubic inch, two-cammed affair with an aluminum block. The actual result is slightly less spectacular, but nonetheless quite worthy of a detailed discussion.

In 1946, Packard instituted an engine development program to explore the possibilities of new and novel designs suitable for future production as successors to the venerable straight eight. To be sure, many unusual designs were tested and evaluated, as were new methods and materials (including aluminum cylinder blocks). By 1949, most of the details of the new Packard engine were established; that is, nearly everything except the piston displacement which was originally set at 269 cubic inches. The leaps and bounds by which other manufacturers increased piston displacement, power and torque prompted Packard engineers to reconsider and redesign, so they wouldn't be caught flat-footed with an engine that would be underpowered to sell the increasing numbers of performance-conscious buyers. So they went to the other extreme and made the production engines big, with provisions for going bigger whenever the need arises.

Currently, the Packard Division of the newly formed Studebaker-Packard Corporation is supplying 320-cubic inch V8 engines for both the '55 Hudson "Hornets" and the Nash "Ambassadors." Basically, these are "detuned" versions of the 320-cubic inch Clipper engine, which, in turn, is a smaller edition of the engine used in the Clipper "Custom," Packard and the Packard "Caribbean" models.

Packard engineers have never shied away from building engines of mammoth proportions and their latest effort is automatically a unanimous choice for the world-famous (but mythical) organization, "There Ain't No Substitute for Cubic Inches" Club, of which I modestly proclaim I am mythically president. This 352-cubic inch monster has a four-inch bore and a 3½-inch stroke, which results in the favorable stroke/bore ratio of .88 to 1. The maximum advertised brake horsepower is 260 obtained at an engine speed of 4600 rpm and maximum advertised torque is 355 pounds-feet between 2400 and 2800 rpm. The same size engine in the Clipper "Custom" produces 245 brake horsepower at 4600 rpm and 355 pounds-feet of torque at 2600 rpm. The smaller 320-cubic inch engine (3$^{13}/_{16}$-inch bore, 3½-inch stroke) in the Clipper "DeLuxe" and "Super" series yields 245 brake horsepower at 4600 rpm and 325 pounds-feet of torque at 2600 rpm. Both the Hudson and Nash versions put out 208 brake horsepower at 4200 rpm and 300 pounds-feet of torque at 2300 rpm. These values were obtained under the following conditions: The water, fuel and oil pumps were connected and operating; the generator was rotating but was not charging; the spark advance was manually adjusted for best torque; dynamometer exhaust collectors were used; intake manifold heat was blocked off; fuel was 93 octane Research gasoline; no fan or carburetor air cleaner was used. The dynamometer figures were corrected for a temperature of 68 degrees F. at 29.92 inches of mercury.

It should be realized that advertised power and torque figures do not represent "as installed" values. With the engine in the car and with the stock exhaust system hooked up, an air cleaner and fan installed, a "hot" intake manifold and a load applied to the generator, plus under-the-hood temperatures of around 100 degrees F., the power and torque will drop off on an average of about 14 and 12 per cent, respectively. Even so, the big Packard has the edge on all competitors in all departments; the displacement is 3.2 per cent larger than its closest rival, the advertised power is four per cent higher and the advertised maximum torque is 2.9 per cent more. This engine also scores in the matter of engine weight, the whole issue with all accessories except the air cleaner, tipping the scales at 698 pounds.

The 210-pound cylinder block is cast with the usual 90-degree span between cylinder banks from close-grained alloyed iron. The blocks for both engine sizes are identical except for the cylinder bore diameters and the coring of the cylinders. The upper half of the bell housing is an integral part of the block. Five transverse bulkheads separate the cylinders of each bank and are used as supports for both the crankshaft and the camshaft. The main bearing caps are located ⅛ of an inch above the oil pan surface in longitudinally broached recesses. The cylinders are surrounded by full-length water jackets, except at the inboard sides, where the jacket length is reduced to make room for the valve lifter bosses and two longitudinal oil galleries.

Distortion of the cylinder bores is minimized by tying the cylinder head screw bosses into vertical ribs. The center-to-center distance between adjacent cylinder bores is five inches, which leaves a minimum of one inch between bores (1$^{3}/_{16}$ inches in the 320-cubic inch engine)

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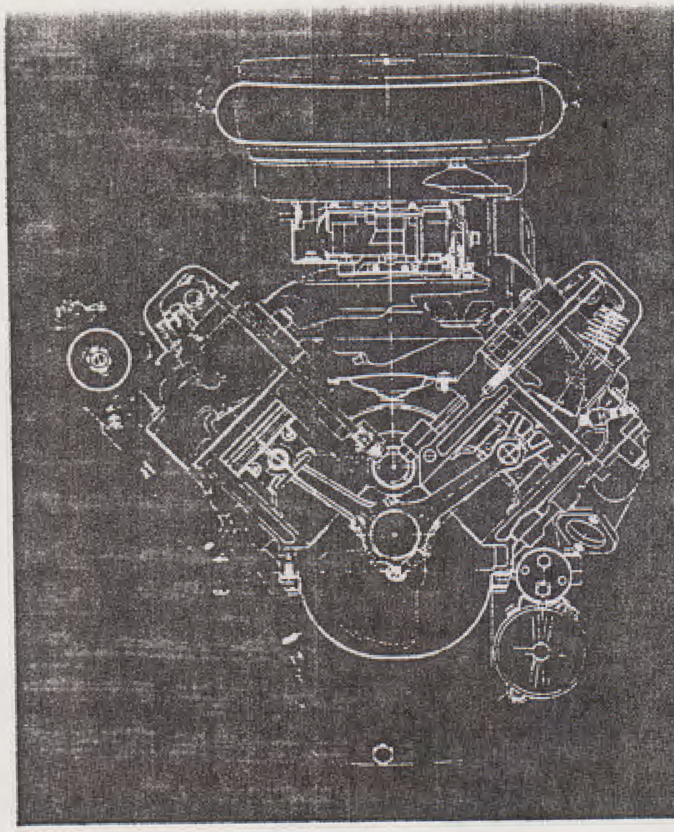
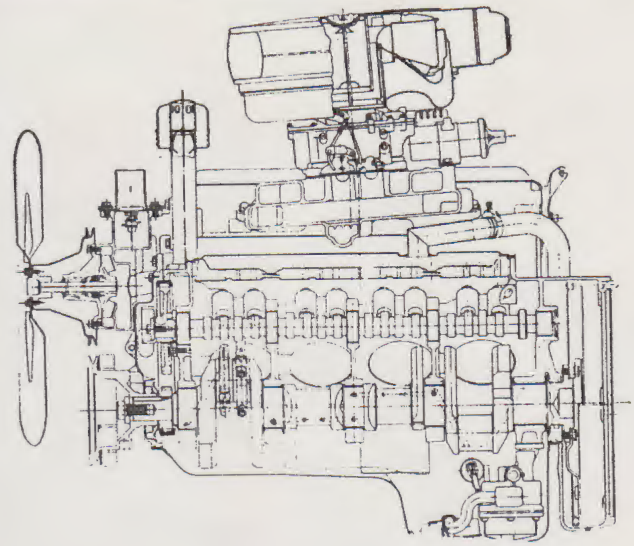


Transverse, left, and longitudinal sections of Packard V8. Note large ports, excellent water jacketing around critical areas.



PACKARD V8 continued

(Continued from preceding page)

for a head gasket seal. This little feature could and should be used by a few other manufacturers. This dimension also allows the bore diameters to be enlarged at a future date without scrapping the existing tooling. All that is required is a relatively simple and inexpensive change in the coring of the cylinders. Sufficient space in the underside of the block has been provided for a substantial increase in crankshaft stroke, when the need arises, without interference with the existing block casting or other parts. The overall length of the cylinder block is $27\frac{3}{4}$ inches. From all outward appearances, the block could be safely rebored to $4\frac{1}{8}$ inches with no particular danger from cylinder distortion or overheating; on Packard and Clipper "Custom" blocks, that is. The $3\frac{13}{16}$-inch bores of the Clipper "DeLuxe" and "Super" blocks, as well as those of the Hudson and Nash, could be bored to a maximum of $3\frac{15}{16}$ inches with reasonable safety.

Packard engineers went to considerable lengths to evaluate the relative merits of forged versus cast crankshafts. According to their findings, a steel casting provides a sufficiently high modulus of elasticity as well as material density to effect a lighter crankshaft without sacrifices in rigidity or stiffness. Also, a casting permits the counterweights to be more favorably disposed for balancing effectiveness, as well as coring of the crankpins to reduce the amount of unbalance and, consequently, the size of the counterweights. The finished Packard V8 crank is a heat-treated alloyed steel casting that weighs 56 pounds. The five main bearing journals are ground to a diameter of 2.500 inches and the crankpins are 2.250 inches in diameter. These dimensions are well within the realm of design conservatism shown elsewhere in the engine. With the $3\frac{1}{2}$-inch stroke, an overlap of $\frac{3}{8}$ of an inch is obtained between the crankpins and adjacent main bearing journals, which materially contributes to the torsional stiffness of the crank. The total connecting rod effective bearing area is 52.8 square inches and the total main bearing effective area is 38.6 square inches. A non-bonded rubber harmonic balancer is placed at the nose of the crank and 's effective in reducing the amplitude of torsional vibrations. The balancer is integral with the crankshaft pulley assembly. Fore-and-aft crankshaft thrust loads are taken by the flanged rear main bearing.

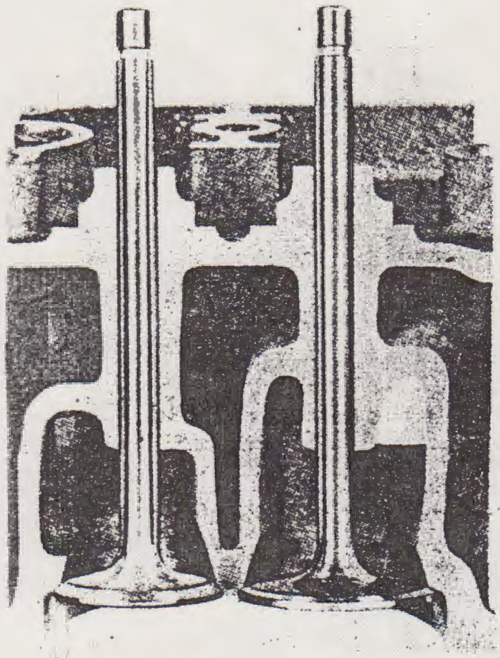
The main bearings are copper-lead, while connecting rod bearings are lead-babbitt, and both are of the steel-backed replaceable insert type. Both bearing materials are completely compatible with the heat-treated but unhardened steel crank. Each connecting rod has its own bearing that is locked in the rod and the crankshaft is drilled to oil each of the two bearings on the crankpins.

The healthy appearing connecting rods are drop forgings made from SAE 1041 steel. The beam is of "H" section design and the rods have a center-to-center length of $6\frac{23}{32}$ inches. Two specially formed high tensile steel bolts locate and secure the rod cap to the rod. A groove is machined at the juncture of rod and cap to provide lubrication from the rod bearings to the cylinder walls on the opposite bank. Balancing lugs form integral parts of the rod assembly, one lug at each end. A bronze piston pin bushing is pressed into the small eye of the rod and is bored to give .0002 of an inch clearance between the bushing and the pin. The connecting rod assembly has undergone very severe testing at loads and speeds far in excess of those encountered in any type of driving conditions. Each rod assembly weighs one pound 10 ounces.

Aluminum alloy "autothermic" pistons are used in which steel tension members control the amount and direction of piston expansion. The pistons "nest" about the crankshaft counterweights at the bottom of the stroke, which necessitates a "slipper" type skirt. Crown thickness of the flat-topped piston is .280 of an inch. Three ribs extend from the piston pin bosses to the crown for pin boss rigidity. The .980 of an inch diameter by $3\frac{1}{4}$ inch long piston pin is a full floating affair that is retained in the piston by snap rings and grooves in the pin bosses. The pin material is heat-treated SAE 1117 steel. The piston pin bores are offset $\frac{1}{16}$ of an inch in the direction of the major thrust face. Pistons are tin plated to minimize "scuffing" during the initial break-in period. Piston weight is one pound six ounces.

Two compression rings and one oil ring are used, all of which are located above the piston pin. The alloy cast iron compression rings are $\frac{5}{64}$ of an inch wide with a radial thickness of .200 of an inch and have tapered faces. The top ring is chrome plated to a thickness of from .004 to .007 of an inch for longer life and freedom from the effects of high temperatures and corrosive gases. The alloy cast iron oil ring is of open slot

Cutaway head shows generous passages, valve sizes and integral seat and guides.



design and measures 3/16 of an inch in width with a radial thickness of .166 of an inch. and uses a polygonally shaped light spring steel expander.

The hardenable alloy iron camshaft is driven by a one inch wide timing chain and sprockets on the crank- and camshafts. The cam is supported in the block by five removable steel-backed babbitt-coated bearings. The cam lobes are ground with a taper of six minutes and are positioned 1/16 of an inch in back of the valve lifter centers to avoid lifter overrun and insure positive lifter rotation. A helical gear, located ahead of the rear bearing journal. is an integral part of the camshaft and is used to drive the distributor.

Hydraulic valve lifters are used in all models. the bodies of which are Lubrite-coated hardenable iron. The lifter faces are ground to a spherical radius of 30 inches and the lifter body diameter is .904 of an inch. Lubriting the lifters and phosphate coating the camshaft is said to minimize initial break-in wear. which seems to be the period when cam and lifter wear is the most severe. In line with this. it is interesting to note that. although the cams in all the Packard engines are. to all intents and purposes. identical. cast steel camshafts are specified for the engines supplied to Hudson and Nash. Even more interesting would be a comparison of the wearing qualities of the two different camshaft materials. after each has been subjected to long periods of operational service. But this we won't know for a while.

The cylinder head castings are made from the same material as the block. They are interchangeable. left to right. and each head weighs 64 pounds. Very generous water jacketing has been provided around the ports. valves. spark plugs and combustion chambers. Each head is located on the block by two dowels and is secured by 15 capscrews. 7/16 of an inch in diameter, in a pattern that surrounds each cylinder with five capscrews. Cylinder head gaskets are of the embossed steel type, .025 of an inch thick.

After playing with many different combustion chamber configurations. Packard chose the elliptically shaped. high turbulence "wedge" type chamber. Tests have shown that. at compression ratios of 12 to 1. this design provides a low burning rate of the fuel/air mixture charge and avoids a rapid pressure rise. thereby minimizing combustion roughness. and the chamber is quite insensitive to combustion chamber deposits usually incurred during low speed. light load operation. "Quench" and "squish" areas. formed by a .045 of an inch piston-to-cylinder head clearance. cover 20 per cent of the total piston area. Each combustion chamber is fully machined. which makes for a consistent compression ratio for all cylinders.

The valve head diameters are unusually large for this type of combustion chamber, being 1 15/16 inches for the intake valves and 1 11/16 inches for the exhausts. This accounts for what appears to be a slight "shrouding" of the valves at the ends of the combustion chambers. The spark plug is located about 3/8 of an inch from the lateral axis of the cylinder bore toward the intake valve on the deep side of the chamber. Due to the angular location of the plug in the head, a counterbored passage connects the firing end of the plug with the main combustion chamber cavity. The present compression ratio of the Clipper and Packard engines is a conservative 8½ to 1. while the Hudson and Nash engines have an even more conservative ratio of 7.8 to 1. If one chose to use the heads of the 320-cubic inch Packard engine on the 352-cubic inch engine. a compression ratio of 9¼ to 1 would be obtained. which would be the upper limit for use with presently available gasolines. Or the heads may be milled .050 of an inch on the 352-cubic inch engine for the same result. The same amount milled from the heads of the Packard 320-cubic inch engine would result in a compression ratio of 9.1 to 1. To obtain a compression ratio of 7.8 to 1 on the Hudson and Nash, the heads from the 352-cubic inch engine are used. By milling the Hudson and Nash heads .065 of an inch. the compression ratio will be 8.7 to 1. When and if the heads are milled, each side of the intake manifold should be milled the same amount as the heads to maintain correct intake port alignment. Also. the pushrods should be shortened by the amount milled from the heads. As future fuels improve. it becomes a very simple matter of a coring and minor tooling change to increase the compression ratio of the Packard engine, which would undoubtedly be accomplished by lowering

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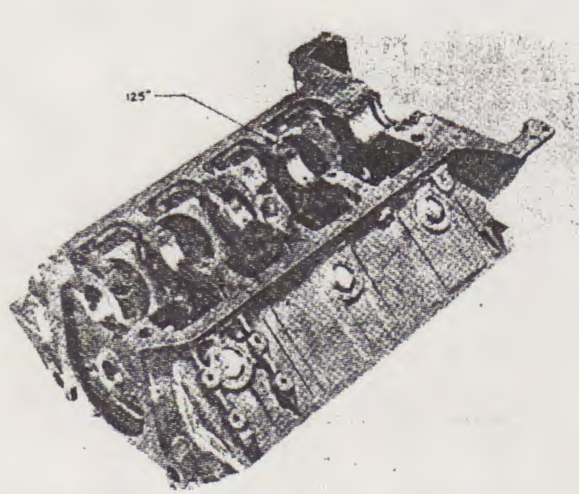
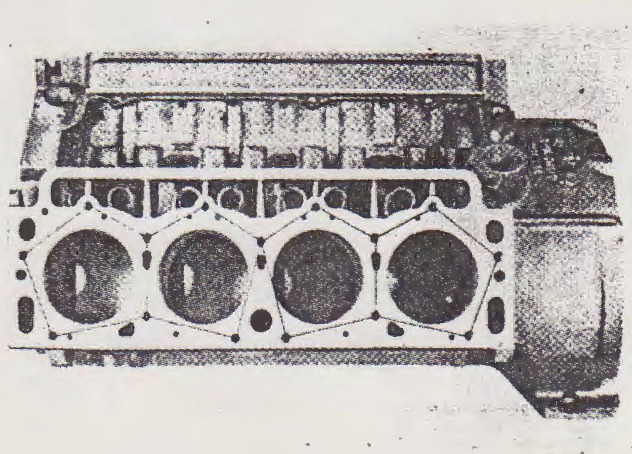


Bottom of sturdy Packard V8 block has broached recesses for the positive location of the five main bearing caps.



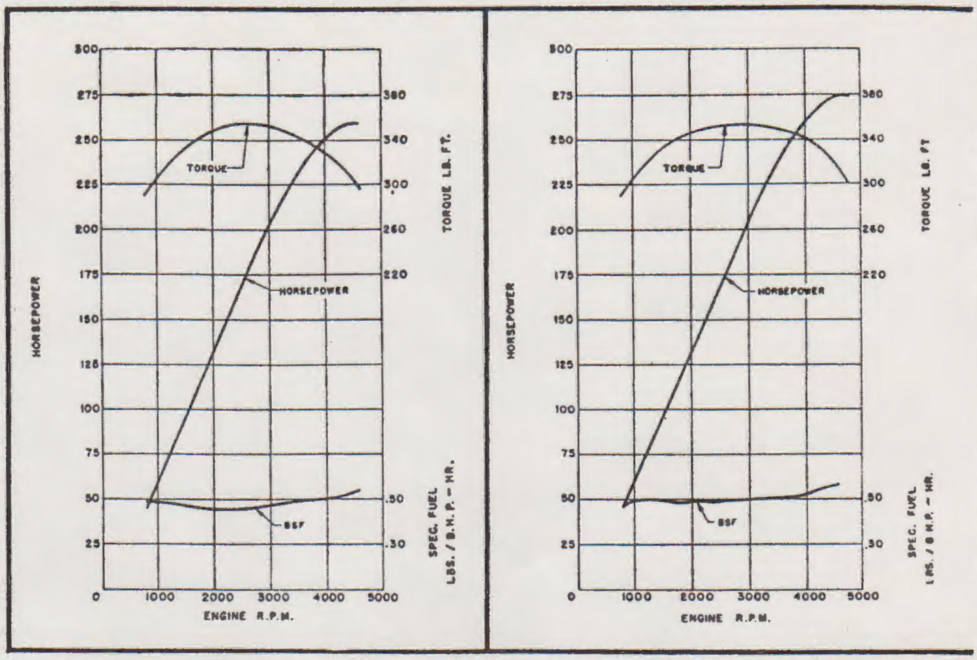
Cylinder head capscrew pattern and the widely spaced bores provide a good gasket seal with minimum block distortion.

(Continued from preceding page)

the "roof" of the wedge type chamber.

As previously mentioned, the valve sizes are quite generous, but much more important for a high volumetric efficiency, the ports are positively huge, especially on the intake side. As in other comparable designs, the intake ports of the Packard cylinder heads are rectangular in shape and arranged in pairs. Exhaust passages in the heads have been laid out so that the two end cylinders of each bank have individual ports, while the two center cylinders of each bank discharge exhaust gases into common ports. Each center port has a continuation extending upward and into the intake manifold pre-heat chamber. Both intake and exhaust valve guides are an integral part of the heads, which materially aid in reducing valve temperatures, not only at the valve stems but at the seats as well. In fact, tests involving the use of integral valve guides have shown that valve head temperatures can be lowered as much as 200 degrees F., with a corresponding reduction of valve stem temperature of 100 degrees F., as compared to the diminishing practice of using pressed-in guides, which erect a thermal barrier despite the similarity of metals and the proximity of the guides to the guide bores in the heads. Intake valves are made from Silichrome number one steel, while the exhausts are made from number 2112 austenitic steel. The valve seat angle is 30 degrees on the intake and 45 degrees on the exhausts. The longitudinal axes of the valves form an angle of 12 degrees with the longitudinal axes of the cylinder bores.

The valves are retained by conventional tapered split keepers, retainer washers and single valve springs. In an effort to obtain a satisfactory valve motion in the interests of good engine performance and yet not overload the nose of the cam lobes, the Packard cam lobe shape results in a relatively low rate of valve acceleration together with a low valve spring rate. The valve timing is as follows: Intake opens 14 degrees before top center, closes 56 degrees after bottom center, duration 250 degrees, lift at valve .375 of an inch. Exhaust opens 52 degrees before bottom center, closes 18 degrees after top center, duration 250 degrees, lift at valve .375 of an inch. The valve spring load is 82 pounds with the valve seated and 165 pounds with the valve open. The rocker arms are cast pearlitic malleable iron with flame hardened ends. These are located on a single longitudinal rocker shaft for each head, which is secured to the head by four rocker arm stands and four capscrews. The rocker arm lift ratio is 1.6 to 1. Pushrods are of steel tubing with an outside diameter of ⅜ of an inch and a wall thickness of .065 of



Brake horsepower, torque and brake specific fuel consumption curves of the standard 352-cubic inch Packard V8 engine, left, and the dual four-throat "Caribbean," right.

an inch. These contain hardened steel tips that are ground to a spherical radius of ¼ of an inch and are pressed into the open ends of the pushrods. Hydraulic valve lifter "pump-up" speed is about 5100 rpm. Hm-m-m. With a little intelligent work on the valve train, together with faster valve action and more lift, one could more fully utilize the inherently good "breathing" capacity of these engines. This might require different cam and lifter material though.

In the carburetion department, there seems to be a great divergence of the engineering minds. Hudson and Nash specify a single Carter WDG-2231-S two-throat carburetor while the Clipper "DeLuxe" and "Super" models call for a single Carter WCFB-2232-S four-throat. Both Clipper "Customs" and Packards use a single Rochester 4GC four-throat. The "Caribbean," Packard's answer to a certain earth-bound space ship, employs two of the above Rochesters on a well-designed, balanced intake manifold, which, incidentally, will fit the other engines of the species. All of the carburetors contain a thermostatically operated automatic choke which receives heat from the intake manifold "stove." The intake manifolds of the series are made from cast iron and have been symmetrically designed in an attempt to equalize the lengths of the passages.

The carburetors receive fuel under a pressure of from 3½ to 5½ psi from a mechanical pump located on the right side of the engine front cover. The pump is driven by a chrome plated, hardened stamped steel eccentric that is bolted onto the front of the camshaft sprocket. The unbalanced condition caused by the eccentric is compensated for by the non-symmetrical openings in the camshaft sprocket. The fuel pump is one component that has been simplified in the Packard design, for it no longer contains an integral vacuum booster pump. But you'd never guess where said vacuum booster is hiding. It's in the pan!

Exhaust gases are collected by cast iron manifolds that are positioned so that one won't get scorched changing spark plugs on a hot engine. With the standard exhaust system, the left-hand manifold connects to a two-inch diameter crossover pipe that passes beneath the engine and joins to a 2¼-inch diameter header pipe that extends to a reverse flow muffler. Tailpipe diameter is two inches. With the optional dual exhaust layout, the header pipe diameter is two inches and the tailpipe diameter is 1¾ inches.

Positive lubrication of the Packard engines is handled by a spur gear type pump assembly with a built-in pressure relief valve. The pump is driven by an intermediate shaft that couples with the distributor drive gear. Oil entering the pump through a screened floating pickup is directed through a rather complex system of galleries, drilled passages and headers to all main, connecting rod and camshaft bearings, as well as valve lifter guide bores, rocker shafts and arms, the timing chain and fuel pump eccentric. Other parts are lubricated by splash or drain-back oil. A very sensibly placed partial flow type oil filter is located on top of the engine at the left front. This little gem of forethought makes changing the filter cartridge an absolute joy rather than a tragedy. A constant system pressure of 50 psi is maintained by the pressure relief valve under all normal operating conditions. The oil pump assembly isn't complete without an eccentric vane-type vacuum booster pump for windshield wiper operation under low vacuum conditions. The pump performs double duty when the engine is idling because the pump exhaust creates a pressure differential in the crankcase, which aids in the circulation of air through the engine.

To satisfy both the present and future electrical requirements, particularly those of the ignition and the starter motor, Packard has adopted a 12-volt system. Auto-Lite electrical systems are used on the small displacement engines, while the big 'un employs Delco-Remy. The ignitions contain centrifugal advance mechanisms as well as vacuum advance boosters. The starter motor and solenoid assembly is located at the rear of the engine on the lower left side. The ignition is positioned at the back of the engine to the left of center and is driven by a helical gear that matches the gear on the camshaft.

The pressurized cooling system makes use of a single, high capacity centrifugal type pump that is driven via pulleys and a ⅝ of an inch V-belt from the crankshaft. The pump is mounted in a casting that resembles an intake manifold for some strange four-banger. Coolant enters the pump from the single lower radiator outlet, through an oil cooler for the "Ultramatic" fluid. The pump discharges coolant into an equalizing chamber in the "manifold" that directs a balanced flow to each cylinder bank. After circulating around the cylinders, the coolant is forced upward into the heads through cored passages, after which it flows through the "manifold" outlets into a header, which contains a single thermostat, and back to the radiator by a single inlet. A 19⅞-inch diameter four-bladed fan, mounted on the coolant pump hub, draws air through the radiator. The heat rejection of the new engines to the coolant has been reduced by about 21 per cent, as compared with the '54 straight eight, which, in part, attests to the increased thermal efficiency of the V8's.

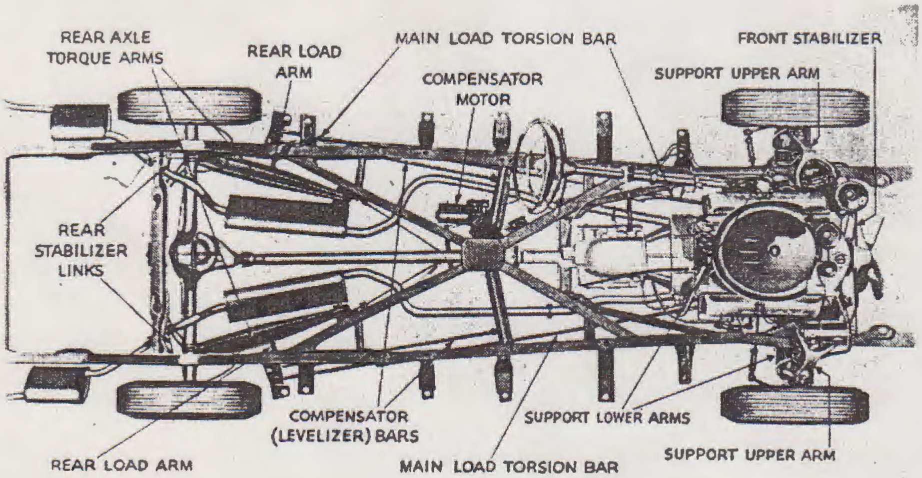
The method of balancing the engines is also of some interest. Before assembly, all of the rotating and reciprocating parts are individually balanced. This group includes the crankshaft, connecting rod assemblies, piston assemblies, flywheels and harmonic balancers. After the engine is put together, it is transferred to a special balancing machine, which motors the engine sufficiently to indicate the amount and location of unbalanced forces. The machine automatically stops the engine at this point and the indicated unbalance is compensated for by automatically drilling into the crankshaft pulley and welding a slug onto the flywheel. Packard claims that the stack-up of balancing tolerances that occurs during engine assembly is reduced to no more than ¼-inch-ounces by this method. Could be, but I'd like to know how the balancing machine compensates for the unbalanced forces that are absorbed by engine friction while the engine is being motored.

Oh, yes, almost forgot. The 352-cubic inch "Caribbean" engine is rated at 275 brake horsepower at 4800 rpm and 355 pounds-feet of torque at 2800 rpm. This engine uses the previously mentioned double four-throat manifold, carburetors and dual exhausts and is the most potent automotive engine currently being produced in this country.

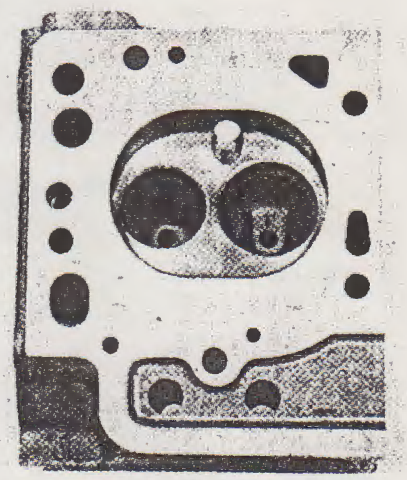
Along with their new engines, the Clipper "Custom" and Packard cars (352-cubic inch only) contain the most significant American suspension development since independently sprung front wheels. I refer to the much-publicized "torsion level ride." In this layout, the suspension medium is a pair of 106 inch long fore-and-aft torsion bars that are connected to front and rear load arms on each side. At the front, the load arms extend outward from the torsion bar, while at the back, the arms extend inward. This automatically eliminates the need for stops, adjustments, etc. Each rear load arm is also connected to a 46⅛ inch long "levelizer" bar, which parallels the main torsion bar. The front end of the levelizer bar is linked to a two-way electric motor that is called the "levelizer" or "compensator" motor. The levelizer bars and motor automatically adjust for load variations in the car (extra passengers, baggage, spare engines, nitro drums, etc.). This is done by applying a torsional force to the main bars, through the levelizer bars, so that the height of the car will remain constant throughout the range of unloaded and loaded conditions. When the front wheels go over a bump or fall in a hole, the wheel action is transmitted as a torsional load to the main torsion bars by the front load arms. Because the front and rear wheels are joined by a common torsion bar, the rear wheels actually anticipate the magnitude and direction of the front wheel disturbance and the rear wheels are "set" for the same disturbance before it occurs because the bars are twisted in a direction opposite that of the disturbance. In this instance, the back end knows exactly what the front end is doing, which is a novelty in itself.

The ride that is a product of this ingenious yet simple system borders on the fantastic. By my own standards, it is soft, yet the feeling of complete stability is there even at the highest speeds, unlike any other passenger car. The amount of body lean on turns is about par for a car of Packard dimensions, but this poses no threat to security. There is no floundering, wallowing or sashaying about on the worst kind of roads at speeds that

(*Continued on page 55*)



Packard's suspension medium is two full-length torsion bars. Shorter bars are connected to load compensator, which is necessary due to sensitivity of main load bars.



Fully machined combustion chamber has been tested at compression ratio of 12:1.

HOW POTENT IS PACKARD'S V8?

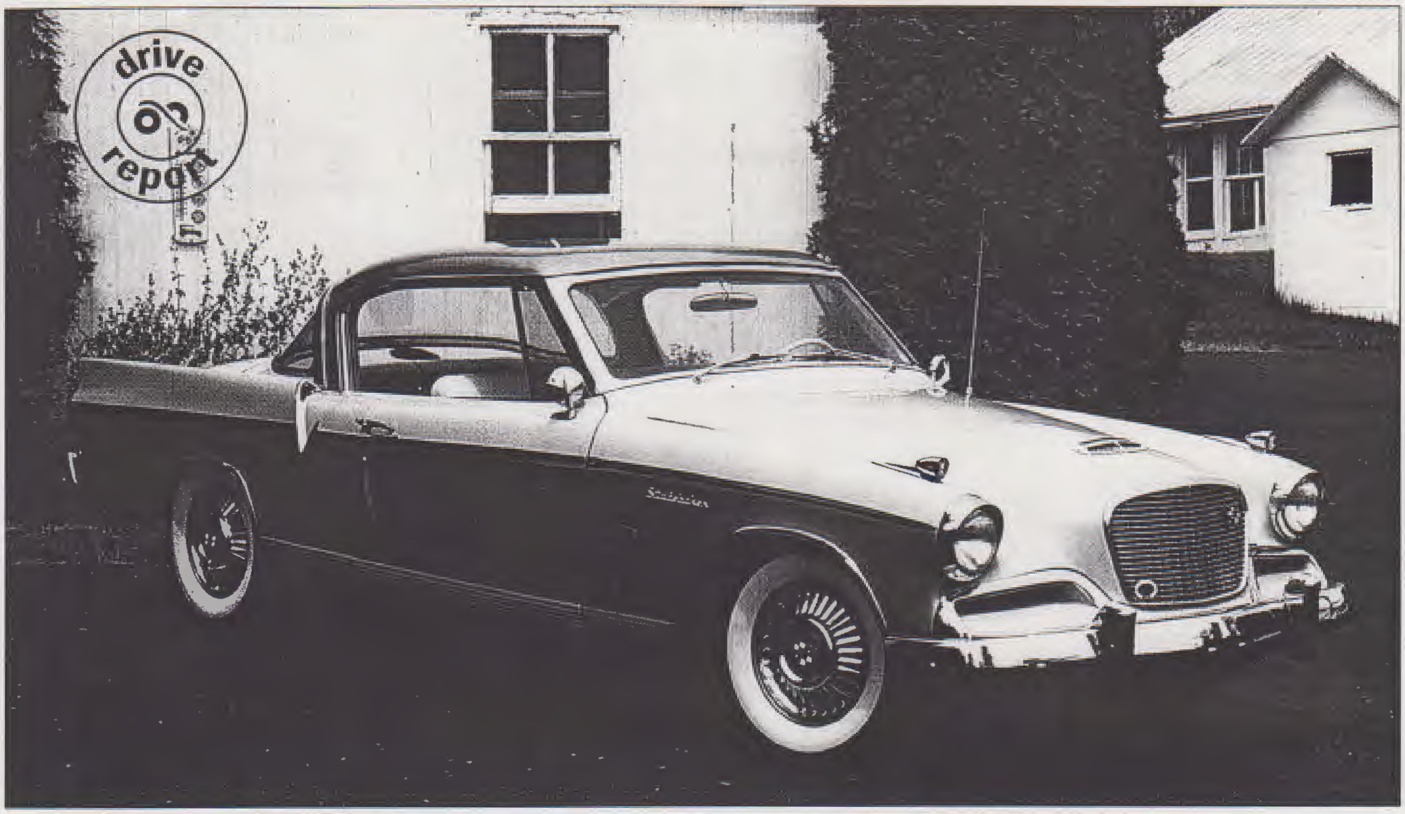
(*Continued from page 19*)

would otherwise be sheer insanity. I can't help but think one of these things would supply a lot of right answers in the Pan American road race, where the world's best suspension systems are reduced to mere adequacy.

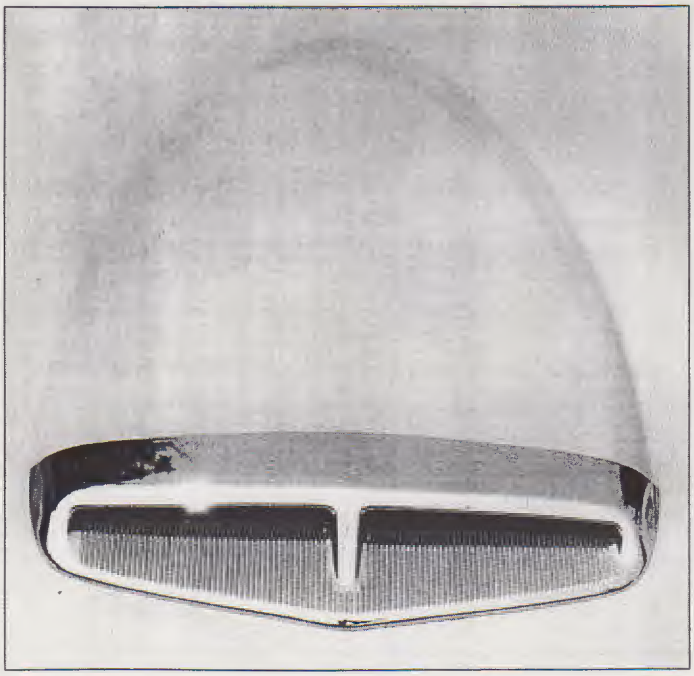
The most unfortunate part of the story, and surely a frustrating experience to a performance-minded prospective buyer interested in an excellent chassis, is the fact that on all models except the Clipper "DeLuxe," "Super" and "Custom," the "Twin Ultramatic" is standard equipment. This is true of the Hudson and Nash V8's as well. Only on the above Clipper models is there a synchromesh transmission as standard with the option of an overdrive, and only on the Clipper "Custom" can one purchase a synchromesh or overdrive *and* the torsion suspension. The "Ultramatic" is undoubtedly one of the better automatics, but let's face it: in spite of their advantages, all of these new-fangled torque converters sop up engine power like a dry sponge in the low and mid-range speeds. As yet, there is no substitute for a good synchromesh transmission for mechanical efficiency and optimum performance in all speed ranges. Of course, the record *average* of 104.7 mph for 25,000 miles (including all pit stops) posted by a pre-production Packard earlier this year speaks for itself. But this was a top speed run, made with the converter mechanically and automatically "locked out" above speeds of about 60 mph. In acceleration, the "Ultramatic" equipped cars are only fair. The best one of the bunch is the overdrive equipped Clipper "Custom." However, past sales records have shown that the public favors the automatic transmissions, so Packard not only encourages this choice, but makes it mandatory on some models. You can't condemn 'em for recognizing the buttered side of the bread, but to my way of thinking, the full potentialities of the Packard engines can never reach the pavement.

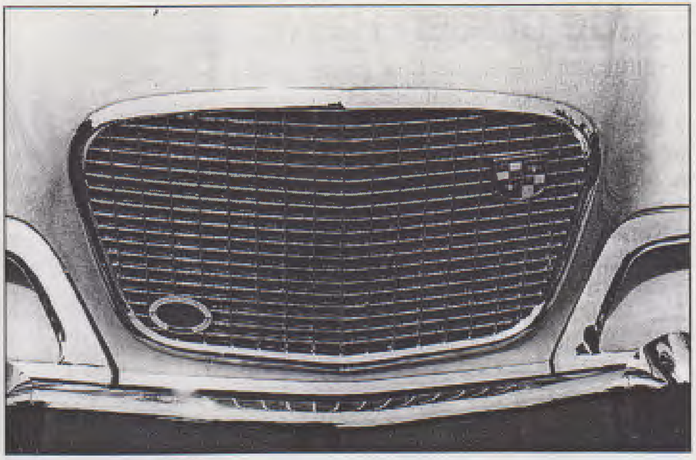
In summarizing, and in answer to the question posed by the title, the Packard V8's are good, big and hot, but could be hotter with a more liberal transmission choice. These engines have been laid out with forethought and a great deal of consideration for the guy who twists the nuts and bolts. Only a fraction of their design potential is being used now. Just stand back if anybody ever hangs a bigger bore and stroke in one of these giants! The suspension developments rate nothing but the highest praise and are bound to start a chain reaction among other manufacturers. A Packard is a pretty expensive chug for a person in the "low-priced three" bracket, but if nothing else, it serves to stimulate and direct thinking toward the desirable goal of good engine performance with a chassis to match.

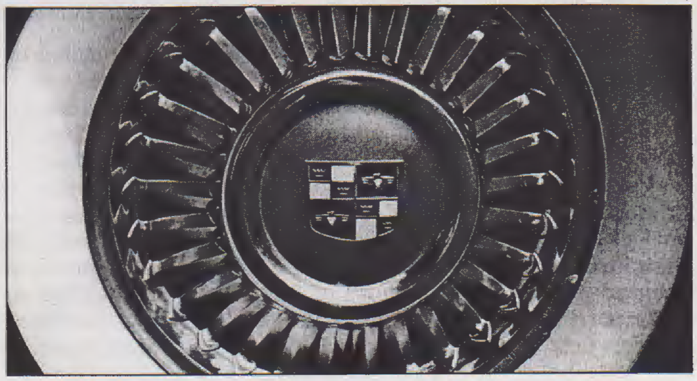
South Bend Ferrari



1956 Studebaker Golden Hawk







Above left: *Modest fins, accent area in rear cove help update original 1953 Loewy design of Stude hardtop.* ***Top right:*** *Grille design was undoubtedly inspired by the cars from Maranello.* ***Above right:*** *Wheel covers are ultra-flashy.*

by John F. Katz
photos by Vince Wright

Driving Impressions

ART Hettinger bought our drive-Report Golden Hawk in 1994, from the daughter of the original owner. Her father, a dentist named Palmer, had spent his leisure hours back in the fifties playing golf with doctors and lawyers, many of whom drove Thunderbirds or Corvettes. Doc Palmer wanted something a little different, so he bought a Golden Hawk. Like his buddies, he used his special car sparingly, mostly for drives to the country club—and occasionally for a little racin' in the street. "They were always heckling him about his Studebaker," Art told us, "so it really satisfied him when he beat a Corvette."

Dr. Palmer had his Hawk inspected for the last time in 1978, then stored it in his basement garage, taking it out only occasionally for cleaning. Art found the car remarkably well preserved, with no rust but needing some cosmetic work. He replaced the tires and carpets, repaired some minor collision damage at the right rear, and repainted the body its original Mocha and Doeskin hues. The front bumper has been re-chromed, and the headlight rims replaced, but the rest of the shiny stuff—indeed, the rest of the car—is original, with just 52,786 miles.

I have to duck low to squeeze into the Hawk, but once inside I'm sitting surprisingly high and bolt upright, in typical mid-fifties fashion. The steering wheel lays low, down in my lap, although the spokes and grips are well placed. Visibility isn't too bad all around, with the fins at the rear and high fenders up front helping to locate the corners of the car. Despite the Hawk's long wheelbase, there isn't that much car ahead of the windshield, and what little there is slopes away very neatly.

The Hawk instrument panel is so purely functional, you might wonder if the engineers locked the stylists in a closet and then gleefully ordered generic gauges out of a Stewart-Warner catalog. As plain and straightforward as the control panel on a fire pump, it's also one of the best looking dashboards of the decade. Its only functional flaw is the location of the radio, which requires a little reach.

The rear seat looks low and skimpy, but it's really no worse back there than in most mid-fifties hardtops. The lower cushion is generous, the backrest angle comfortable, and there's enough headroom to wear a cap. Admittedly, the dishpan-sized foot wells are a little weird.

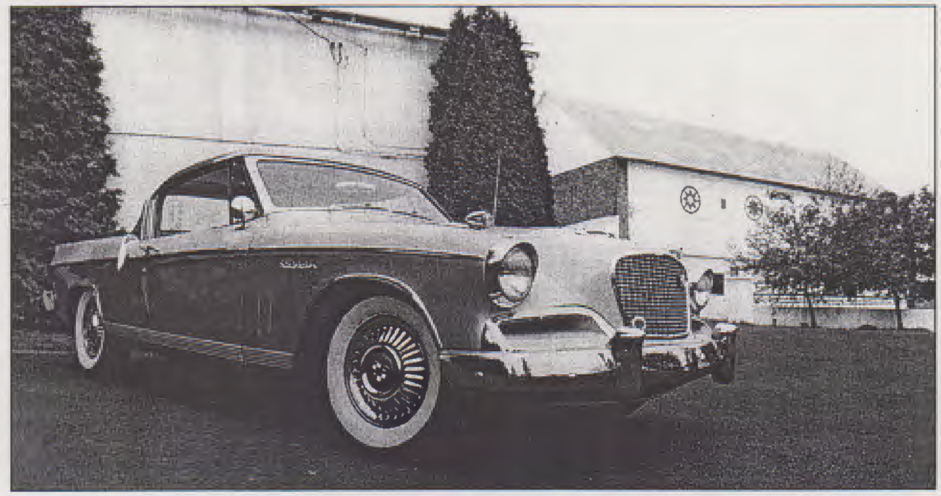
The shift pattern of the two-speed Packard Ultramatic is P-N-'D'-L-R, where the hash mark to the left of the D corresponds to High in a Packard, meaning that the transmission starts in high gear and relies on the torque converter alone for torque multiplication. The mark to the right of D corresponds to Packard's Drive, with the low gear kicking in for faster getaways.

The Packard V-8 rumbles—*no, sings*—a deep baritone song; this is how Ezio Pinza would have sounded if he were a race car. Even at low rpm, its prodigious torque rewards the smallest throttle opening with an urgent forward thrust. Get on it hard, and the rush toward Eternity will convert non-believers. Just as an experiment, Art said, he once tried flooring the gas from rest on dry pavement; the rear tires lost traction completely, spinning and smoking while generating only negligible forward progress.

The Hawk maneuvers with surprising ease, its narrow body, high seats, and good visibility suggesting a compact more than a mid-priced, full-size automobile. It glides smoothly over rough roads, with body motions well under control. The optional power steering responds accurately but offers little feedback. It does compensate for the weight of that Packard V-8; in normal driving, the Hawk feels no more nose-heavy than any big-block muscle car from a decade later.

Stude Golden Hawk

continued



If anything, the Hawk's brakes are its weak point. The pedal is offset way over to the left, feels dead and unyielding, and delivers little in the way of results.

Nonetheless, this first child of the Studebaker-Packard marriage showed great promise, combining South Bend's flair for extroverted styling ("damnable fins" and all) with the smooth and certain power of a Packard. It handles no worse than most of its contemporaries, and better than some. The Golden Hawk was easily strong enough to take on the Big Three; it's a pity that Studebaker-Packard was not.

History and Background

The marriage was hasty, and perhaps not well considered. But for richer or poorer, for better or for worse, Studebaker and Packard took the vow on October 1, 1954. The first child of their union was the finny, flashy, Packard-powered Golden Hawk of 1956.

Former Packard president James M. Nance, now president of the Studebaker-Packard combine, championed the Golden Hawk as a conspicuous flagship and fabulous performer that would show the world what Studebaker and Packard could accomplish together. Bob Bourke, who headed Raymond Loewy's design team at Studebaker, described "Big Jim" as "a great promoter, an electric personality." A decade later *Car and Driver* (see "Who Killed Studebaker," page 66), called him a "one-man, three-ring circus."

Certainly, Nance exuded confidence—and justifiably so, if one read the right statistics. South Bend's sales had expanded from a healthy $268 million in 1947 to $594 million in 1953, with an after-tax profit of $108 million in six years. Packard, producing fewer cars for a more rarefied market, had generated $48.5 million in profit in the same period. Taken together, the two nameplates had sold 5.5 percent of all new cars in America in 1950–53. As if to display its industrial dynamism, Studebaker-Packard operated two company-owned DC-3s on a daily schedule between Detroit and South Bend.

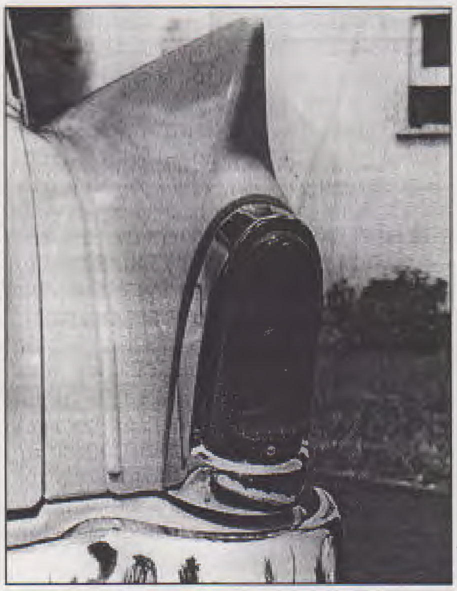
Bold plans were laid for an all-new line of '56 Studebakers, sharing the Packard-built 320-c.i.d. Clipper V-8 and Ultramatic transmission. The new se-

Above: *In 1956 Hawk was the most European of American cars.* ***Below:*** *False airscoops provide beginning for fins.* ***Facing page, top:*** *Graceful roofline wasn't changed from '53 design; taillamps carried over from earlier cars.*

The Fastest of the Fast in 1956

	Studebaker Golden Hawk	Buick Century	Chevrolet Corvette	Ford Thunderbird	Dodge D500	Chrysler 300B
Base price	$3,061	$2,963	$3,295*	$3,151	$2,833**	$4,242
C.i.d.	352	322	265	312	315	354
Compression	9.5:1	9.5:1	9.25:1	9.0:1	9.25:1	10.1:1
Carburetion	1x4v	1x4v	2x4v	1x4v	1x4v	2x4v
Bhp @ rpm	275 @ 4,600	255 @ 4,400	225 @ 5,200	225 @ 4,600	260 @ 4,800	340 @ 5,200
Torque	380 @ 2,800	341 @ 3,200	270 @ 3,600	324 @ 2,600	330 @ 3,000	385 @ 3,400
Transmission	2-speed auto	2-speed auto	3-speed manual	3-speed manual	2-speed auto	2-speed auto
Axle	3.07	3.36	3.55	3.31	3.73	3.08
Wheelbase	120.5	122.0	102.0	102.0	120.0	126.0
Track, f/r	56.4/55.6	59/59	57/59	56/56	58.9/59.2	60.4/59.6
Weight, lb.	3,360	3,890	2,870	3,088	3,505	4,360
Lb./bhp	12.2	15.2	12.8	13.7	13.5	12.8
Acceleration: 0-30	3.4	3.4	3.4	3.3	3.4	N/A
0-60	9.2	9.6	7.5	9.3	9.6	N/A
50-80	8.5	11.0	N/A	N/A	na	N/A
1/4-mile	17.3 @ 80	17.1 @ 80.5	15.9 @ 91	17.0 @ 85	17.2	N/A
Max mph	117.2	109.8	118.5	112.2	115.4	N/A
Mpg	12.2	11.1	12.0	13.5	N/A	N/A
60-0 braking	171 feet	155 feet	N/A	N/A	N/A	N/A

*includes optional engine tested
** Custom Royal Lancer with D500 package
Dimensions, unless noted otherwise, are in inches; torque in foot pounds; speeds in mph; times in seconds. Test results are from the following sources: Studebaker, *Motor Trend*, February 1956; Buick, *MT*, June 1956; Corvette, *Sports Cars Illustrated*, May 1956; Dodge, *SCI*, August 1956; T-Bird, *Road & Track*, August 1956. We could find no comparable test of a '56 Chrysler 300-B but have included its specifications for comparison.



dan would have been stunning: longer and wider than its predecessors, with a Buick/Olds-inspired greenhouse, very clean flanks, and an upright, trapezoidal grille. In December 1954, Loewy himself presented the full-size clay to Studebaker's somewhat skeptical management, who worried about the car's slightly tapering fenders.

But it didn't matter what they thought, because the real numbers wouldn't add up. Of that $108 million profit from 1947-53, almost half—$47 million—had been earned in 1948-49. By June '54, South Bend was *losing* $2.5 million per month. Packard had lost $1 million in the first quarter of the year, and the combined market share of Studebaker and Packard had fallen to 2.5 percent. Studebaker couldn't afford tooling for an all-new body. In late January 1955, Nance postponed the new car until early '57 (of course it wouldn't arrive then, either) and called for a rapid and economical face-lift of the current Studebaker line.

Celebrated industrial designer Loewy had run Studebaker styling as an independent consultant since 1936, dropping in three days a month to keep everything on track. His full-time crew in South Bend consisted of ten designers and about 30 clay pushers, wood carvers, and other supporting cast members, all headed by Bourke. Loewy billed South Bend around $1 million a year for the entire operation, including salaries—a not-outrageous fee by the standards of the times. Nonetheless, his contract was up in '55, and Nance decided not to renew it. Instead, the former Packard chief farmed out the '56 facelift to free-lancer Vince Gardner, who in seven weeks squared up the ends of the '53-55 sedans—and charged $7,500.

Nance still hoped to develop new two- and four-door hardtops out of the face-lifted sedan bodies, so he could phase out the separate line of Starlight and Starliner coupes that shared very little sedan tooling. And even with the older, smaller body shell, the Packard V-8 might still go into top-of-the-line President models. Alone among the independents, Packard had developed its own overhead-valve V-8 *and* automatic transmission, and Nance wanted to amortize some of that considerable investment by supplying engines and transmissions to Studebaker. Once again, however, the figures wouldn't mesh: Studebakers could be produced

Ultramatic

GM was the first automaker to introduce a modern, fully automatic transmission. Second was Packard, which launched its Ultramatic in mid-1949. None of the other independents ever built an automatic of their own. Even Ford wouldn't have its own automatic until '51, and Chrysler would debut its PowerFlite in mid-'53.

Even more remarkably, the Packard Ultramatic—at least in theory—combined the best characteristics of the HydraMatic and the Dynaflow in a way that GM wouldn't even approach until the sixties.

Packard chief research engineer Forest M. McFarland had been experimenting with torque converters for as long as anyone at GM. Wartime projects diverted his attention for awhile, but then McFarland—assisted by development project engineer Warren Bopp and staff engineer Herbert Misch—returned to his automatic transmission research in 1944.

McFarland was convinced that he could improve on GM's corporate HydraMatic and its "godawful number of shifts." With a simple fluid coupling that provided no torque multiplication, HydraMatic delivered relatively good engine braking and little "slip" but depended on a four-speed gearset for acceleration. Buick's Dynaflow torque converter, McFarland believed, was closer to the mark, but it allowed so much slip it felt as though it "was in second gear all the time."

McFarland's solution was a twin-turbine torque converter with an even higher maximum ratio than Buick's. As in the Dynaflow, a planetary gearset provided reverse and an emergency low. Ultramatic drivers could select High range and rely exclusively on the converter for smooth, unhurried starts (like a Dynaflow), or select Drive to accelerate in low gear and then automatically shift up to high (like Chevrolet's Powerglide). Naturally, Packard also provided a Low position to lock the transmission in low gear.

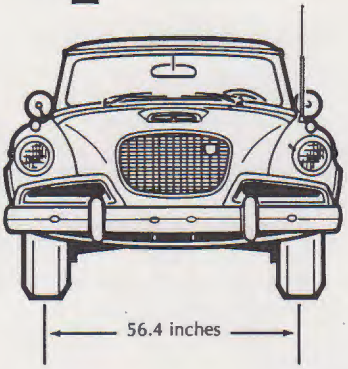
But what made Ultramatic unique was an internal, 11-inch, oil-bathed cork clutch that locked the torque converter solid at cruising speed. This combination of features gave Ultramatic the smoothness of a Dynaflow, with superior torque multiplication, plus—once the clutch engaged—the engine braking and fuel efficiency of a manual gearbox.

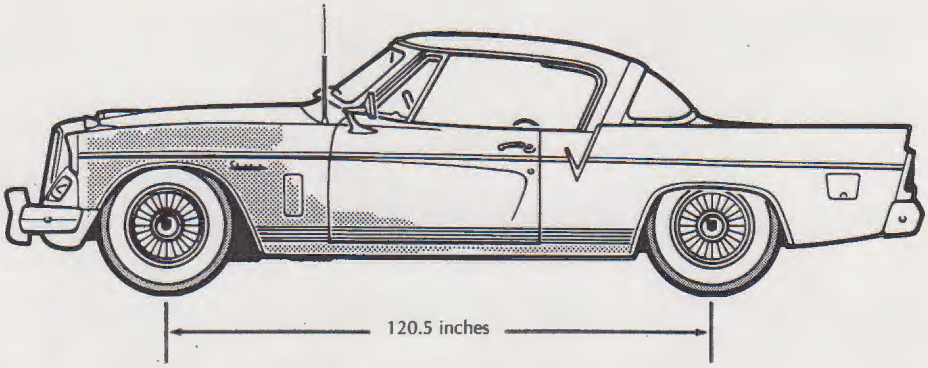
GM used locking converters on its buses, and in 1956 Borg-Warner added a lock-up clutch to the automatic transmission it supplied to Studebaker and Jaguar (a hybrid unit that depended on both a torque converter and a three-speed gearset for torque multiplication). But it wasn't until Chrysler re-invented the idea in 1978 that any of the Big Three offered a locking converter on a passenger car.

For Packard, the Ultramatic would prove more of an engineering achievement than a business success. The company poured $15 million into Ultramatic, and by 1954 still hadn't sold enough cars to recoup its investment. It was hoped that the merger with Studebaker would create a whole new market for Ultramatic. But the two-speed transmission proved a poor match for the underpowered, six-cylinder Champion, and was judged only "moderately satisfactory" with the Studebaker V-8s. Ultimately, it couldn't compete cost-wise with off-the-shelf units available from Borg-Warner or Detroit Gear, and so it expired with the last of the traditional Packards at the end of 1956.

illustrations by Russell von Sauers, The Graphic Automobile Studio

specifications





1956 Studebaker Golden Hawk

Price	$3,061
Std. equip. includes	Sky Power 352 V-8, finned iron brake drums, overdrive (with manual transmission), complete instrumentation with vacuum gauge and tachometer, full wheel covers
Options on dR car	Twin-Ultramatic transmission, power steering, power front windows, radio, heater, dual outside mirrors, tinted glass, whitewall tires, deluxe wheel covers
Est. price as tested	$3,565

ENGINE

Type	V-8
Bore x stroke	4 inches x 3.5 inches
Displacement	352 cubic inches
Compression ratio	9.5:1
Horsepower @ rpm	275 @ 4,600 (gross)
Torque @ rpm	380 @ 2,800 (gross)
Taxable horsepower	51.2
Net bhp at rear wheels	104 @ 3,000 rpm (80 mph)
Valve gear	Ohv
Valve lifters	Hydraulic
Main bearings	5
Induction system	1 Carter 4-bbl downdraft
Fuel system	Mechanical pump
Lubrication system	Pressure, gear pump
Cooling system	Pressure, centrifugal pump
Exhaust system	Dual
Electrical system	12-volt

TRANSMISSION

Type	Two-speed automatic with locking torque converter
Ratios: Low	1.82:1
High	1.00:1
Reverse	1.63:1
Max. torque converter	2.90:1 @ 1,650 rpm

DIFFERENTIAL

Type	Hypoid, semi-floating
Ratio	3.07:1

STEERING

Type	Saginaw recirculating ball with hydraulic servo
Turns lock-to-lock	4.25
Ratios	18.2:1 gear; 20.0:1 overall
Turning circle	41 feet, curb-to-curb

BRAKES

Type	Wagner 4-wheel hydraulic with vacuum servo
Front	11.0 x 2.5-inch drum
Rear	10.0 x 2.0-inch drum
Effective area	195.3 square inches
Parking brake	Mechanical, on rear drums

CHASSIS & BODY

Construction	Separate box-section ladder frame with 5 crossmembers
Body	Welded steel stampings cross members
Body style	5-seat pillarless coupe

SUSPENSION

Front	Independent, upper and lower A-arms, coil springs
Rear	Live axle, semi-elliptic leaf springs
Shock absorbers	Tubular, direct acting, front and rear
Tires	Firestone Deluxe Champion 7.10 x 15
Wheels	15-inch stamped steel disc

WEIGHTS AND MEASURES

Wheelbase	120.5 inches
Overall length	203.9 inches
Overall width	70.4 inches
Overall height	58.1 inches
Front track	56.4 inches
Rear track	55.6 inches
Min. road clearance	6.5 inches
Shipping weight	3,360 pounds

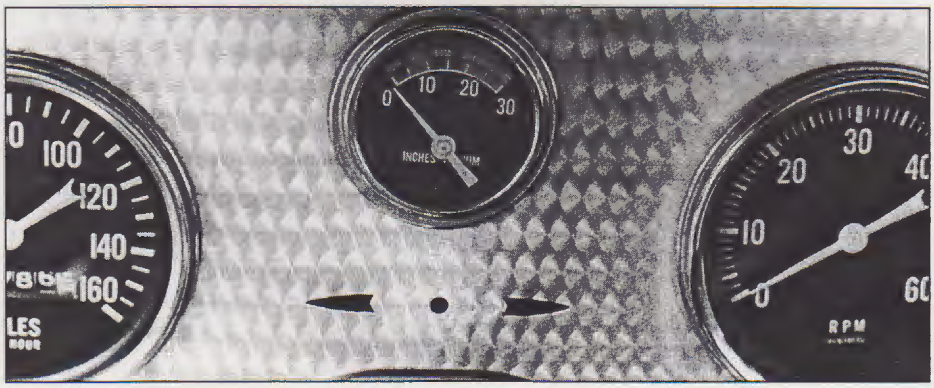
CAPACITIES

Crankcase	5 quarts
Transmission	11 pints
Rear axle	3.0 pints
Cooling system	26.5 quarts (with heater)
Fuel tank	18 gallons

CALCULATED DATA

Bhp per c.i.d.	0.781
Stroke/bore	0.875
Lb./bhp	12.2 pounds
Lb./sq. in. brake area	17.2
Production	4,071, Golden Hawk; 19,165, total 1956 Hawk

***Right:** Vacuum gauge and tach is in keeping with sporty image. **Facing page, top:** Big 352 Packard V-8 was good for 275 bhp. **Center left:** Driving position is firm and upright. **Right:** Dash design is very pleasing to enthusiasts. **Bottom:** Doors open wide for good access to front and rear.*



Stude Golden Hawk

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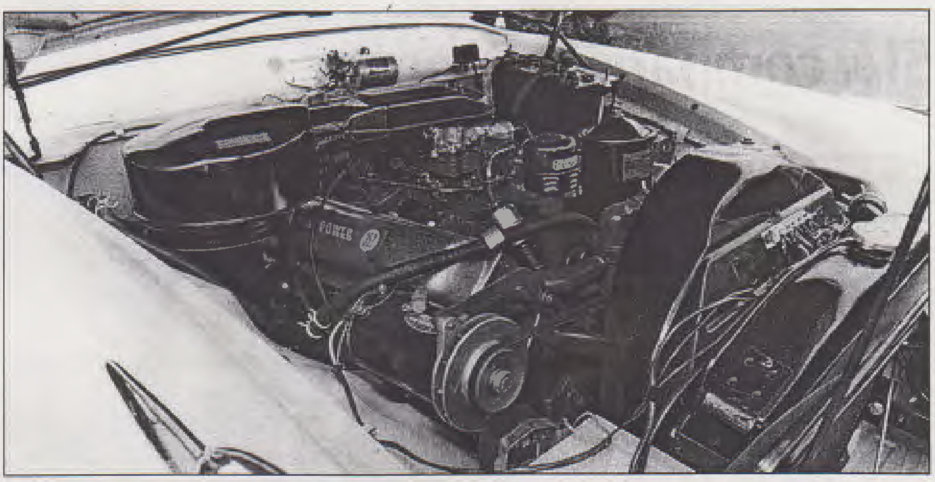
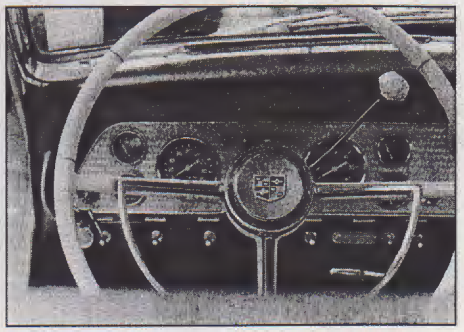




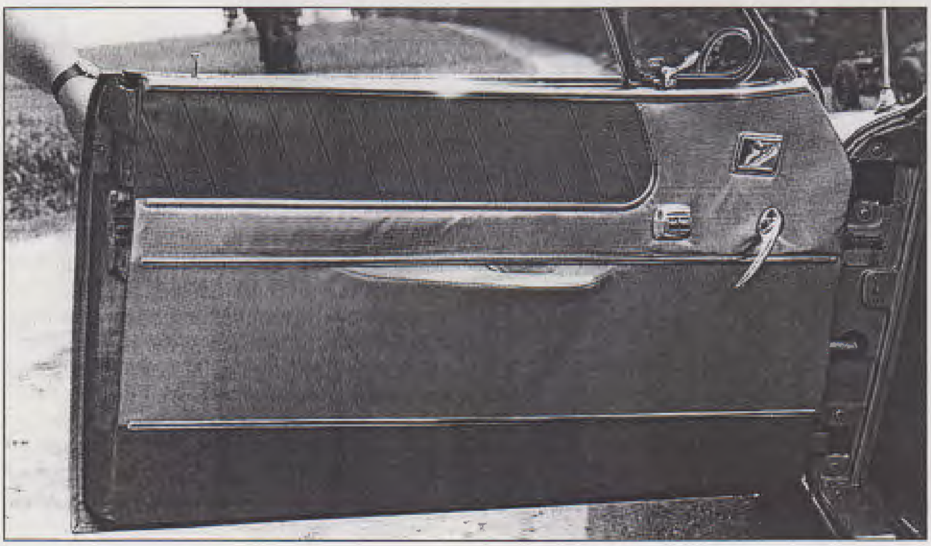
more economically with Studebaker V-8s, and with automatic transmissions from Borg-Warner or Detroit Gear.

Likewise, the new sedan-based hardtops would cost tooling dollars that the corporation didn't have. If Studebaker was to field a pillarless style-leader in '56, it would have to base it on the existing '53–55 coupe.

That lovely "Loewy Coupe" had been Studebaker's glory and, to some extent, its undoing. Bourke's group had developed it as a show car for Studebaker's centennial in '52, but management made an eleventh-hour decision to launch it as a limited-production model for 1953. Unfortunately, they also ordered Loewy to wring a bread-and-butter sedan out of the same styling theme. Not surprisingly, the long, slender, elegantly aerodynamic coupe translated into a high, narrow sedan with oddly sloped front and rear ends. Sales plunged when South Bend literally couldn't build the coupes fast enough—and couldn't give the sedans away.

Changes to both sedans and coupes had been minimal for '54 and then moderate for '55, when Sales chief Ken Elliott dictated a new and clumsily chromed front end—over the objections of both Bourke and Loewy. That January brought Studebaker's first wraparound windshield to sedans (and wagons) only. But it also brought a limited-edition flagship coupe called the President Speedster—trimmed inside like a custom hot-rod, with deep, diamond-shaped pleats in its leather upholstery and businesslike Stewart-Warner gauges set in an engine-turned panel. *Motor Life* found the Speedster "more like a sports car than any other hardtop." It set the tone for the Hawks to follow.

Now Nance asked Loewy's departing designers to facelift the coupe on their way out the door, while sticking to a strict tooling budget that specified so many dollars per panel. Bourke nonetheless welcomed the chance to reverse some of the damage done in '55. A completely new front end, he decided, would give the biggest bang for the tooling buck, so he lifted the Mercedes-inspired snout virtually intact from the big sedan that was never to be. Then he squared up the coupe's sloping rear deck, while saving 80 percent of the inner deck stampings—which meant there was no real increase in trunk room. Still kibitzing, Elliott insisted on plenty of chrome doodads, but at least he let Bourke design them this time. Perhaps the result wasn't as pure as the '53–54 coupe, but it looked enormously better than the '55, and was really quite handsome in its own right. And the Speedster-inspired dashboard was a revelation: a wall-to-wall spread of engine-turned metal housing handsome Stewart-Warner gauges.



Previously, Studebaker had called its pillared coupes Starlights, and pillarless models Starliners, and offered them in a range of price and trim that approximately covered the spread from a Chevrolet Two-Ten to an Olds 88. Nance heartily endorsed this strategy, which applied to Studebaker sedans as well. For '56, all the coupes became Hawks—although the origin of the name has not been recorded. At $1,986, the base-model, pillared-top Flight Hawk shared its 185-c.i.d., 101-bhp flathead six, as well as its level of trim, with the $1,946 Champion sedan. Next up came the $2,101 Power Hawk, still a pillared coupe but packing the 259-c.i.d., ohv V-8 from the equivalently trimmed Commander. This engine developed 170 bhp with a two-barrel carb, or 185 with a four-barrel and dual exhausts. Hardtop Sky Hawks, at $2,477, corresponded to President sedans, with a 210-bhp 289. Overdrive or a Borg-Warner automatic were optional on all three.

But the fanciest chick in the nest was the Golden Hawk, priced $100 over a Buick Century, and identifiable on the outside by an extra helping of chrome and what Bourke called "damnable plastic fins" grafted onto the same '53–55 quarter panel. (Years later, the

continued on page 66

Stude Golden Hawk

continued from page 15

designer wrote in *Automobile Quarterly* that he "kept those little fins at the rear of the Golden Hawk as restrained as I could and still please Sales.") Inside, Golden Hawks came with a tachometer (optional in lesser Hawks), a manifold-vacuum gauge, and rich cloth-and-vinyl upholstery.

But the Golden Hawk's most distinguishing feature was the Packard V-8 under the hood: not the Clipper 320, but the four-barrel 352 from the Clipper Custom, developing 275 bhp and bolted to a three-speed manual transmission with overdrive or to Packard's sophisticated Ultramatic (see sidebar, page 13). Oddly, the package did not include Packard's pioneering limited-slip differential. Still, the '56 Golden Hawk was the only model—ever—to combine a Studebaker badge and Packard power.

Sporty as they looked, the old coupes hadn't been known for their handling. The engineers, under Gene Hardig, addressed this problem with softer springs but firmer shocks for the Hawk. Golden Hawks and Sky Hawks featured finned-drum brakes, although the drum sizes—11 inches in front, 10 in the back—were the same as in any V-8 Stude sedan. For the Golden Hawk, Studebaker advertising claimed not only the best power-to-weight ratio but also the best ratio of brake area to weight of any American car. "Engineered to out-handle and out-run sports cars costing thousands more," the Golden Hawk offered "sports performance [with] room for 5 and a full-size trunk!"

Far from out-handling sports cars, however, the Golden Hawk developed a reputation for nose-heavy understeer. Most contemporary road tests only hinted at the problem. The *Motor Trend* staff reveled in the stability and precise steering of their manually steered Golden Hawk, reporting severe understeer only in tight, low-speed turns. They found the Golden Hawk's brakes "adequate for a sports-*type* car" (their emphasis) and praised them for not fading away completely in hard use.

Auto Age called the Golden Hawk "one of the fastest and best-looking cars ever made on these shores... a car of prey... going out after the Thunderbird, Corvette, Chrysler '300' market with a vengeance"—and then gingerly danced around its chassis shortcomings: "The steering felt perhaps a trifle slow for so fast a car, but dead accurate and free from play, and there was a slight but pleasant degree of understeer.... If you have been wondering, by the way, what

Who Killed Studebaker?

The March 1964 edition of *Car and Driver* has achieved a certain notoriety for its controversial comparison of GTOs from both Pontiac and Ferrari. But the same issue might as well be remembered for an equally audacious article titled "Who Killed Studebaker?" The venerable old South Bend automaker had fled to Canada just months before, leaving some 6,000 Indianians unemployed.

C/D's answer to its own question is angry and unflattering, characterizing Studebaker as "a company doomed for years, finally dying by its own hand." The editors pointed to "dead-last engineering," soft labor policies, and stubborn, insular management as proof that "Studebaker deserved to fail."

Automobile Quarterly waited until 1972 to publish a somewhat more sympathetic postmortem. Veteran historian Maurice Hendry attacked the *C/D* article as the product of a "Europhile press... psychologically incapable of recognizing good sound engineering—if it happens to have 'made in the USA' on it." Hardly dead last, Hendry argued, Studebaker had "a modern short-stroke ohv V-8, independent front suspension, automatic overdrive and power steering either before, at the same time as, or shortly after any of the Big Three."

Special Interest Autos seems to have drawn from both of these sources when it presented its own, more even-handed analysis of "How Studebaker Came Not To Be" in 1974.

Two dozen years later, we still see some merit to both arguments.

As *C/D* alleged, the Studebaker V-8 was undeniably heavy for its displacement. Various sources cite weights of 625–682 pounds for an engine that couldn't grow beyond 289 cubic inches; Cadillac's 331-c.i.d. V-8 weighed only 699 pounds. On the other hand, as an independent with just a fraction of GM's resources, Studebaker deserves credit for developing a modern V-8 at all—only two years after Cadillac and Olds, at the same time as Chrysler, and a year ahead of Ford.

Studebakers had vacuum-assisted brakes and variable-ratio steering in the 1930s. Certainly, as *C/D* noted, Studebakers suffered from brake fade and slow steering. So did Buicks.

Yes, Studebaker's labor costs in the forties were the highest in the industry. According to Hendry, however, tough cuts in the period from 1954–59 brought them in line with the Big Three's. Maybe by then it was too late.

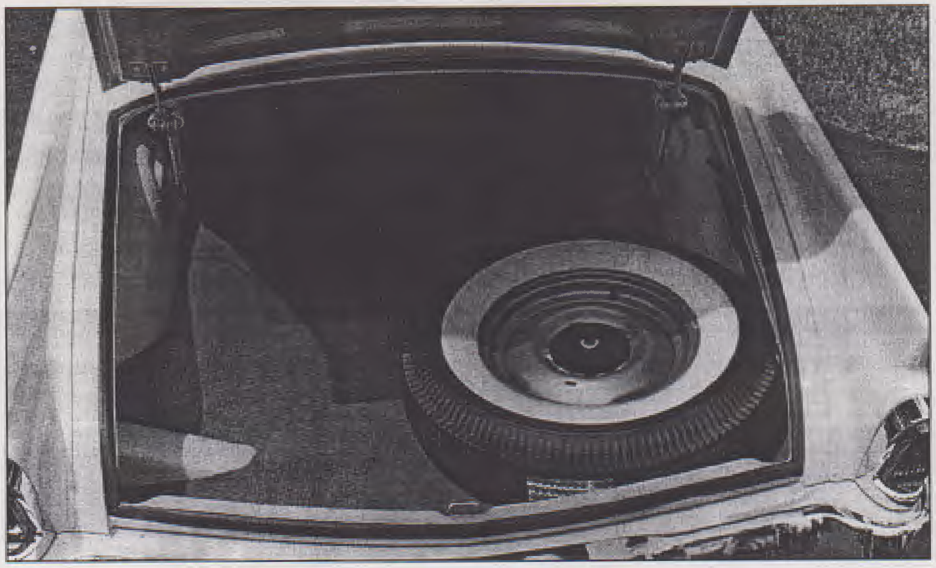
Hendry blamed Studebaker's demise on the same 1953–56 Ford vs. Chevy sales blitz that finished the other independents. But then even he admitted that Stude's dog-ugly '53 sedan had left South Bend's corporate pants around its ankles. *C/D* speculated that "had the sedans been offered in the 54-inch-high, 120-inch-wheelbase version that Loewy had in mind, Studebaker might still be building cars." Well, maybe. Obviously, a sedan that shared external sheet metal with the coupe would have looked worlds better, and might have spared some of South Bend's dwindling resources. But it's hard to imagine how it could have offered adequate rear-seat room for the four-door family trade. On the other hand, GM had no trouble peddling stylish four-door hardtops with somewhat restricted rear compartments two years later.

The *C/D* article was particularly hard on Nance. True, he spent $74 million of Packard's money and had nothing to show for it but the Hawk and a sedan that was still narrow and unattractive. But this is the same James Nance who went on to manage Mercury, where he inspired class and subtlety in a division that was definitely headed the wrong way down Buck Rogers Boulevard.

Once Curtiss-Wright took over, it didn't matter anyway. Even *C/D* related how, by mid-'58, the Wall Street bankers were already casting lots for Studebaker's remains, anxiously coveting South Bend's $140 million in accumulated credits. When Harold Churchill, Nance's successor, actually made $28.5 million selling Larks, they maneuvered him out of the company.

Ultimately, Studebaker's fate was decided far from Indiana. Maybe an all-new car in '60, or '56, or even '53 wouldn't have made any difference anyway. But the people who put their hearts and sweat into designing and engineering and managing and assembling Studebakers deserved a better chance.

Facing page: *Rear seats have gran turismo appearance thanks to center armrest.* ***Above:*** *Deep footwells in rear for more leg room.* ***Below:*** *For a sporty car it has good trunk room.*



the heavier Packard engine has done to the balance of the Studebaker, let us say that the car does seem noticeably heavier at the front than last year's Speedster, but this works out seemingly to its advantage." Sure.

On assignment for *Speed Age*, Racer Bill Holland took a Golden Hawk around Packard's own 2.5-mile oval in Detroit on a rain-soaked day and still averaged 121.0 mph. He found the Golden Hawk's power steering "light in operation and not geared too fast for average reflexes," and its chassis "balanced properly so that it can still be controlled with the steering wheel while it is sliding."

Only *Car Life* openly criticized the Golden Hawk's handling: "Primarily the Hawk's trouble is weight distribution. The car is heavy on the front end, which results in a tendency for the rear wheels to slide on dry pavement.... The powerful, well-built engine on the Golden Hawk provides more power than the chassis design can properly handle. A full-throttle start in reduced 'D' range spins the rear wheels on dry pavement and keeps the tires screaming on the concrete up to 25 mph.... These troubles could be remedied to some extent by filling the trunk with sand bags [but] perhaps the best solution is to buy the lower-priced Sky Hawk with its lighter-weight Studebaker V-8."

That said, *Car Life* still allowed that the Golden Hawk's overall roadability was "excellent when compared with other five- and six-passenger cars, but falls behind the two other semi-sports cars, Corvette and Thunderbird." And they thought the new front end, though "simple" and "pleasing," suggested a "South Bend Ferrari."

Studebaker sold just 82,000 cars in '56, but nearly one-quarter of them were Hawks. South Bend was on to something.

The big Packards were gone for '57, and with them their V-8 engine and Ultramatic transmission. The Hawk lineup was rationalized to just two models: the pillared Silver Hawk with six-cylinder or 259-c.i.d. V-8 power; and the hardtop Golden Hawk, now motivated by Studebaker's 289, but producing the same 275 horses (at 4,800 rpm) thanks to a McCulloch centrifugal supercharger. Though the Stude V-8 weighed only 50–100 pounds less than the Packard mill, Hardig considered this a happier solution.

A column-shifter with overdrive was still standard, but the automatic option was now the three-speed, Borg-Warner-supplied "Flightomatic." The engineers even updated the Hawk chassis with variable-ratio steering and, finally, an optional "Twin Traction" limited-slip differential. Both Hawks now wore outward-curving fins, metal this time but still tacked on to those 1953-vintage fenders. *Sports Cars Illustrated* found the Golden Hawk's handling dramatically improved, while acceleration to 60 (despite a 14 percent reduction in peak torque) was quicker by a whisker.

The so-called "Packard Hawk" that joined the line in '58 was also powered by a supercharged Studebaker V-8.

Nance, meanwhile, had tried to borrow tooling dollars from the major New York insurance companies that held Studebaker stock. No deal. He proposed assembling cars for Ford or Chrysler, and even tried to convince GM to endorse a loan. Desperate for cash, Studebaker agreed to turn over its management to Curtiss-Wright in late '56. In return, the aerospace contractor bought up Studebaker's defense business and pre-paid a lease on two Studebaker plants. C-W president Roy Hurley planned to maintain South Bend at its break-even point for two years, write its losses off of C-W's taxes, then collect $40 million on a stock-option deal. Nance resigned before the ink was dry. So did Studebaker chairman Paul Hoffman.

Studebaker's fate was sealed. ❧

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Auto Age

Mar 56 "Studebaker's Golden Hawk", page 22, 3 pages

Jun 56 "How long will your car last" by Eugene Harding, chief engineer of Studebaker, pg 26, 5 pages, color photo of 56J test vechicle

The Auto Car

Feb 56 "South Bend Shuffle", page 135

Hot Rod

Aug 55 "How Potent is Packard's V8 ? by Racer Brown, page 15, 6 pages.

Apr 56 "High-Flying Hawk" by Racer Brown, page 16, 9 pages

Feb 57 "Here's What Happens When You Throw the Book At Your... Stude, Packard, Nash or Hudson "Big 8" by Don Francisco, page 24, 6 pages

Mechanix Illustrated

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Jan 56 "Driving Stude's new Golden Hawk" by Ken Fermoyle page 26, 2 pages

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MOTOR SPORT

Jan-Feb 56 color photo of 56J on front, road test by Bill Holland on page 16, 4 pages, B & W 56J ad inside back cover

Motor Trend

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~~Feb 56 color photo of Sky Hawk on front cover, "56 Studebaker Golden Hawk Road Tests" by Jim Lodge, page 20, 5 pages B & W ad page 5~~

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Apr 56 color drawing of 56J on front cover, "How hot is the Studebaker Golden Hawk", page 73, 5 pages

Speed Age

Mar 56 color photos of 56J on front, "Bill Holland Tests: Studebaker Golden Hawk" by Bill Holland, page 22, 4 pages

Jul 56 photo of 56J on front, "Jim Reece Track Tests America's 1956 Sports Cars" by Jim Reece, page 19, 7 pages.

Motorsport

ANC

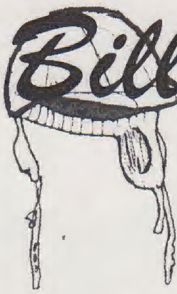
JANUARY—FEBRUARY 1956—35¢

Brent Hagen

BILL HOLLAND TESTS THE GOLDEN HAWK · JANES COVERS SOUTHERN 500 AND GLEN

We are very happy to present herewith the first in a series of Road Test articles by Bill Holland, winner of the Indianapolis 500-Mile Classic in 1949, second place man in 1947, 1948 and 1950 and member of the Champion Sparkplug 100-Mile-an-Hour Club. Bill, who except for a mix up in pit signals at Indy would have been a two-time winner, has one of the finest records at the big brick oval and on sprint, midget and championship tracks throughout the country. His appraisal of 1956 American cars will be unbiased and authoritative and we are both proud and happy to welcome him aboard as chief test pilot for Motorsport.

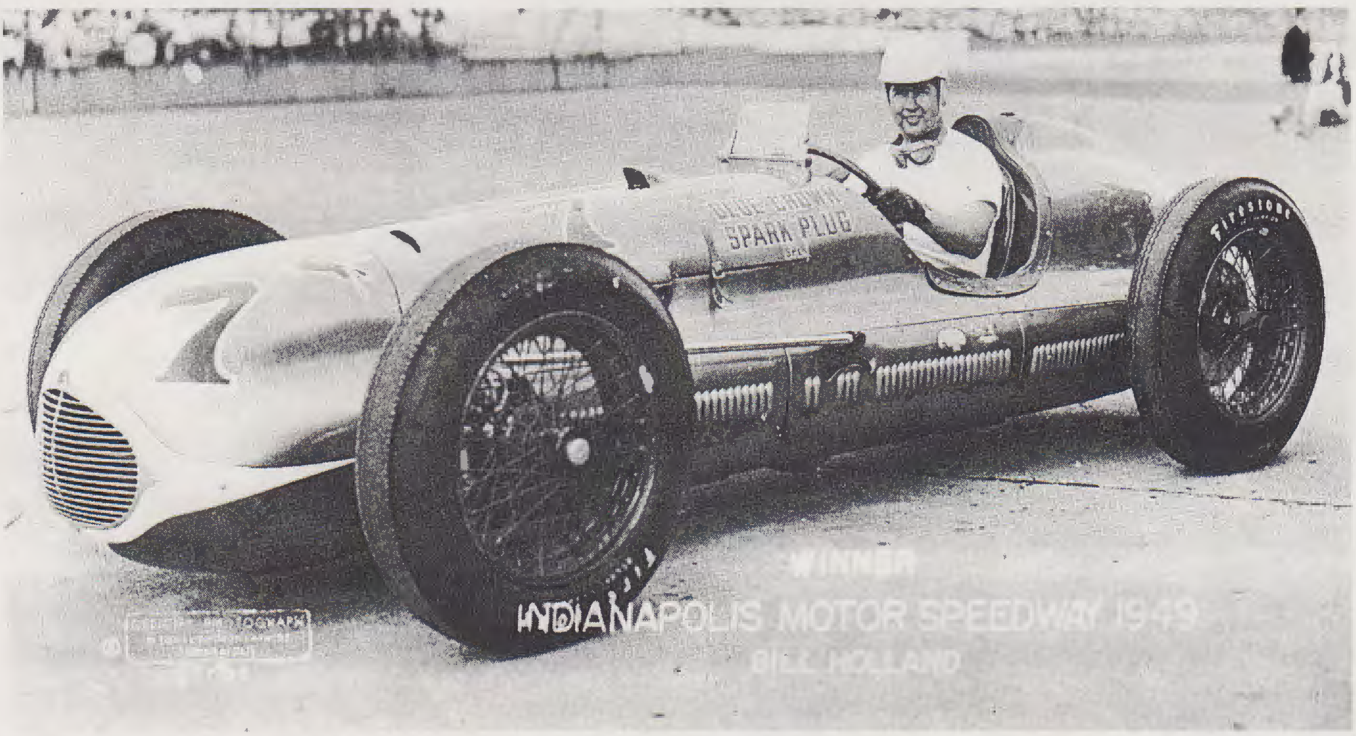
Right: Holland shows Golden Hawk model to a pretty model. Model (car) is longer and lower than other models, somewhat like European cars.



Bill Holland Tests....

NEW 275 HP 5-PASSENGER SPORTS TYPE HITS 0 TO 60 IN 9.4 SECONDS WITH A TOP READING AT 125 MPH.

By Bill Holland



▶ You sports car lovers who didn't buy the 1955 Studebaker because they didn't have enough muscles, can now step right up and put your money on the line. You're going to love the Golden Hawk, it has GO to spare, it is now a speedster with SPEED. It will do 125 mph by the clock and 0-60 in 9.4 seconds with Ultramatic transmission, 3.07 gear ratio, hydraulic valve lifters, a smooth cam, power steering and brakes. Imagine what this little beauty would do with a good racing kit.

I drove the Golden Hawk last month during the press showing at the Packard Proving Grounds in Detroit. It was a miserable day, raining hard with about a 30 mph gusty crosswind, but in spite of these conditions I had no trouble doing 120 mph around the big two and one half mile banked concrete oval. Later in the day after it stopped raining, but with the track still wet I was clocked at 122 mph. The next day with the sun shining I averaged 123 mph and reached a top speed of 125 on the straights. It handled beautifully; even in the crosswind I experienced no diving at all.

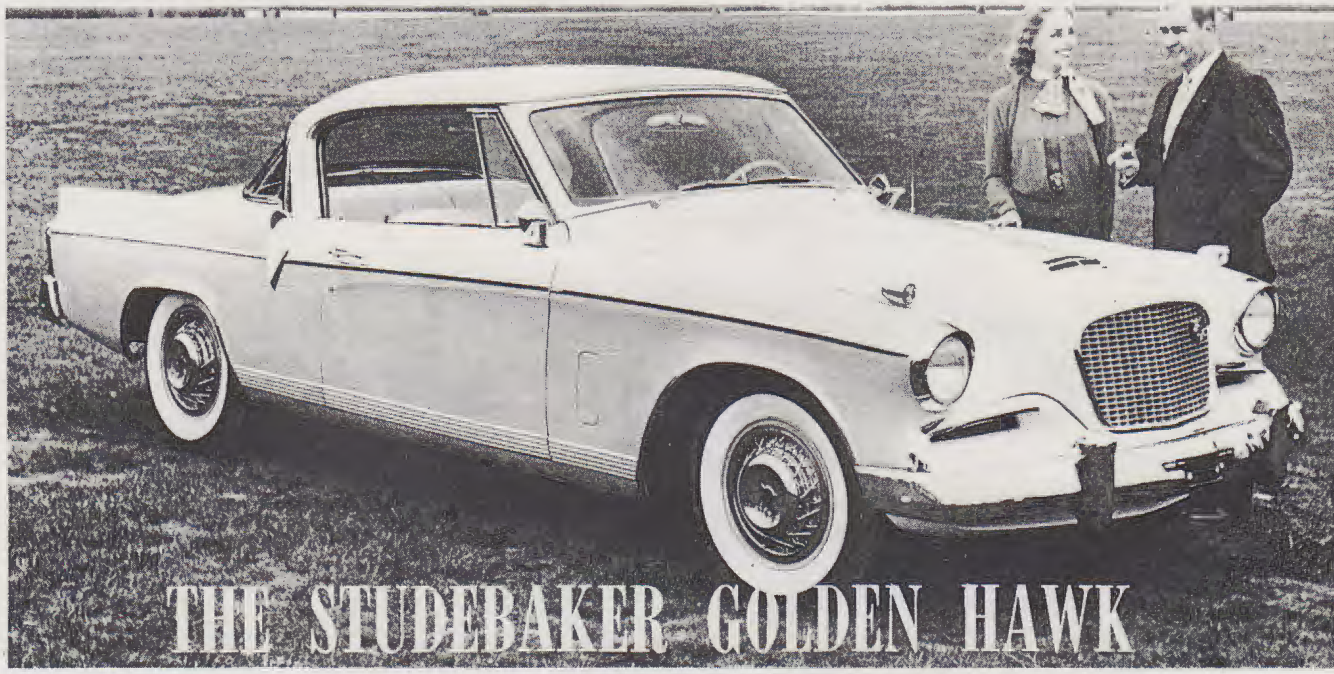
This new Studebaker has everything an American sports type car should have, smart looks, performance, good handling, and most important for the American car buyer, comfort for four passengers at a reasonable price.

Some of the interesting features in this new car are, the big, short stroke V-8 engine, with 352 cubic inches, 9.5 to 1 compression, 275 hp, 380 ft. lbs. of torque at 2800 rpm, four barrel carburetor, 12 volt system with 30 amp. generator, and dual exhaust system.

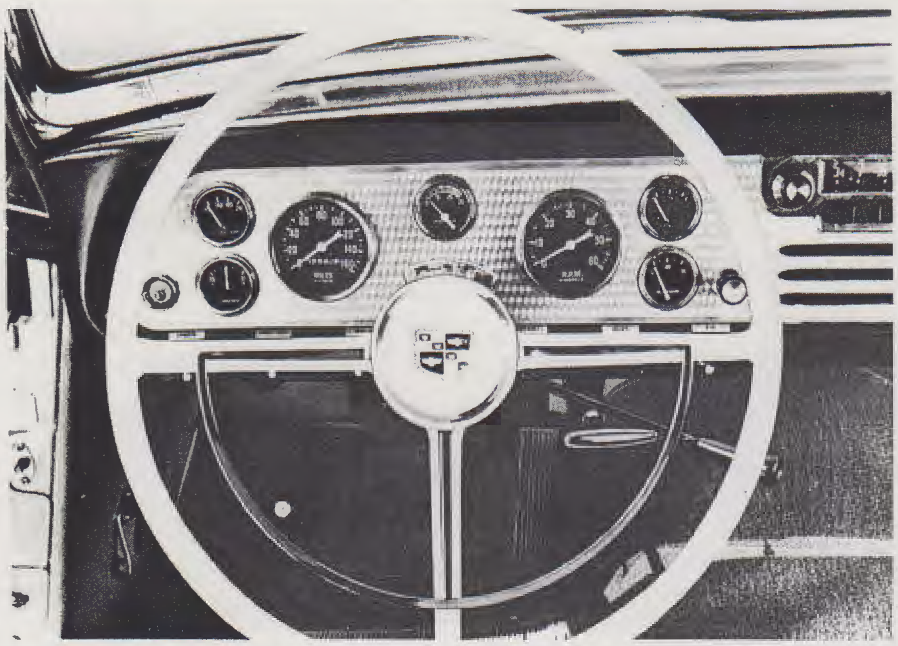
The built in safety features are, new brakes with Safety-Fin drums, crash tested safety door latches, increased passing efficiency, new safety strength steel bodies using heavy gauge, box section, girder construction, new safety beam headlights, higher capacity defroster system, tubeless tires, selftightening wheel bolts, padded dash and padding on the rear of the front seat, a hill holder to prevent rolling back on hills.

The radial dial instruments on the dash are of functional design inspired by Grand Prix race cars; included are, 140 mph speedometer, tachometer, large

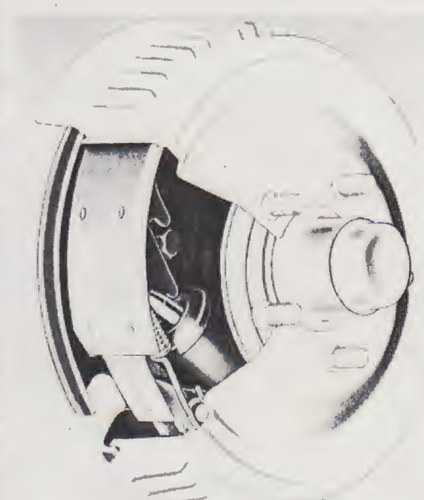
(*Continued on Page* 46)



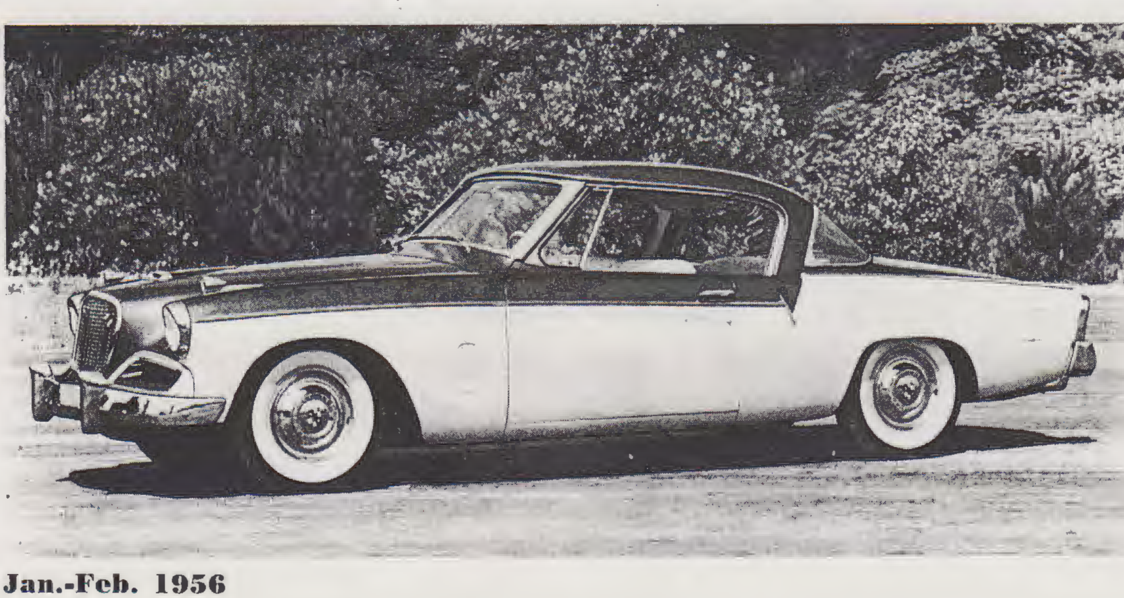
THE STUDEBAKER GOLDEN HAWK



The instrument panel on the Golden Hawk incorporates a tachometer and vacuum gauge in addition to standard instruments. Panel is padded.



Finned brake drums on President and Golden Hawk were designed to prevent brake fade by increasing air circulation, heat radiation area.



The Sky Hawk is one of two hardtop models in Studebaker's line of sporty cars. Sky Hawk has 287 cubic inch V-8 engine that develops 210 hp.

Motor City Mirror

(*Continued from page* 13)

and getting it out more effectively have been given careful treatment.

Efforts to control this greater horsepower have been manifested in some brake redesigns and improvements, but this has seemed a rather sterile area. The fact is that brakes are fairly close to optimum levels of virtue in their present designs. At any rate, it is no secret that every development shop in the industry is working overtime trying to find some kind of improved braking system.

And, finally, the mechanical side has seen an all but unanimous movement to 12-volt electrical systems. The 6-volt wiring has practically passed on.

A few postscripts remain options, as reflected in 1956. To begin with, automatic transmissions are moving very close to standard equipment, and they operate more virtuously than ever before—smoother, faster, more efficiently. The new General Motors automatic transmission, third in that company's "stable," is worth mention.

Second, power steering is at last coming down in price to the level where it should be. The power steering mechanism has long been overpriced; the reductions of 1956 will do a little toward compensating for the general increases in list prices of the automobiles themselves. Then there's the matter of air-conditioning; it caught on better than was expected during 1955 and it is expected to be more widely ordered in 1956. (The new Continental started off with air conditioning as an option, but by the time this reaches print it may be installed as standard equipment, so widespread has been the call for it).

The big 1956 swing in styling has been toward the use of accentuated rear quarters. Fenders, taking a cue from the highly distinctive Cadillac fins of years past, have mostly tended in an upswept direction. This seems a generally accepted styling trend. Less decisive has been the front end treatment; the rounded hood motif of the Chrysler cars and the somewhat more straightened, more right-angled pattern of the General Motors designs are each finding adherents.

In between front and rear the industry has outdone itself for 1956 with imaginative handling of side panels. Speedlines, highlights and chrome moulding have been utilized in more ways than could be thought imaginable. The breakup of the side panels into various planes has been accentuated by the use of more color (and often more vivid color) than has been the case heretofore. One make, at least, has not only three-color combinations, but also a panel of gold intruded between them —making it a four-tone job!

Some grilles seem to be edging away from the massive bar treatment which gained vogue after the war, toward more refined honeycombs or similar treatment, a turn for which original credit must be given to Cadillac. Wheels are fancier than ever; the plain discs of past years have been dolled up by stamping with simulated ridges, rectangles, closely-meshed spokes and practically every other treatment you can think of.

Windows are larger all around—bigger windshields, more completely wrapped around rear lights. There seems some indication, too, that body lines are being lowered ever so slightly at the waist, and the height of the windows somewhat enlarged. The one exception to this trend is in the new Continental, where the rear quarters are blind, in deference to the tradition established with the Lincoln-Continental of the prewar and postwar periods.

Four-door hardtops are jumping out like corn pops over a hot fire. This seems to be the standard four-door car of the future, just as the two-door hardtop has largely replaced the traditional coupe.

A word, now, as to the factories that build these chromed creations. Enlargement is the order of the day throughout the industry. The Big Three have taken the lead in expanding manufacturing and assembly facilities; and the smaller producers are not far behind, in scale with their respective outlooks. The noteworthy aspect of this expansion is that it is largely in automated equipment—which means that precision of manufacture will be continually better.

Completion of the nine-figure building programs of the big companies—and most of it will be done in 1956—should result in the industry's capacity being enlarged to cope with today's higher plateau of production without an agonizing amount of overtime. Volume in 1955 ran close to 8,000,000 cars plus another 1,200,000 trucks or so. The output in 1956 will be close to those figures, from all reliable estimates; and it will be achieved with less overtime (which ultimately means less cost for the customers) and with more uniformity and greater precision.

Bill Holland Test

(*Continued from page* 16)

sweephand clock, and water temperature, oil pressure, ammeter, manifold vacuum, and fuel gauges.

The 1956 Golden Hawk presents a strikingly new appearance. The hood is higher and gives the sensation of power and length. There is an air scoop near the grille; reminds me of the Ferrari. The rear deck also is higher and more massive providing 20 per cent more storage space. The new fenders are fleet and long in appearance with fins at the rear. The wheels are spoked and neat looking with 7.10 - 15 tires.

Visibility is good both front and rear. There is an arm rest in the center of the rear seat. The car is longer, 204 inches overall, it weighs 3,325 lbs. and is only 4 feet 8 inches high. Rear overhang is 49 inches.

All the driving at Detroit was at high speeds and on high banked turns, so to get a better feel of the car under near normal road conditions, we took it to the Studebaker Proving Grounds, 10 miles west of South Bend, Indiana. The grounds here are beautiful and very well kept, the three-mile track is very much like any black top highway you might drive on, anywhere around the country. The turns are banked but only slightly. The outside lane is smooth, the inside lane is quite bumpy. Adjoining the track is a road that winds up thru the hills and woods, then back to the track again. This is called the durability course and is full of turns and bumps. Some of the turns are covered with small pebbles and sand, others have built in ripples and bumps. It was designed to give a severe test of a car's durability as well as handling characteristics.

The day I arrived to make the tests, it rained all day, but we decided to make the tests anyway, so keep in mind everything we did in this test was on a wet surface.

Eddie Reynolds who is in charge at the proving grounds, drove me around the course a few times to acquaint me with it. We were accompanied by Lyn Milliken of Studebaker Public Relations Dept.

The track was cleared of the regular tests cars and we were ready to start the test of the Golden Hawk, I was assisted in the tests by one of the factory's regular test drivers, Ernest Wiggins.

First we checked the speedometer for accuracy on the measured tenths marked on the backstretch. We found it to be only one mile an hour fast at 60 mph.

We then ran a series of acceleration tests with the following results,

0-30	mph —	3.5 seconds	
0-60	" —	9.4 "	
30-60	" —	5.9 "	
40-60	" —	4.0 "	
60-100	" —	21.0 "	(high gear)

These times are amazing, I think and they were done with a 3.07 gear in the rear and Ultramatic transmission. The top engine rpm was 5,000. This is also good for stock hydraulic valve lifters. I noticed at 80 mph in high gear the engine was only turning 3,000 rpm.

Most of the American sport car builders have increased the horsepower and top speed of their cars, but haven't increased the braking power to keep pace with it. Studebaker has taken care of this too with their new Safety-Fin brake drums, which increase the cooling area about 100 percent. I made two stops as quickly as possible on the wet surface, from 100 mph. I noticed no fade, nor any tendency to pull to either side.

We then did a few fairly fast laps around the three mile track going into the turns about 85 to 90, sliding a little but with good control and recovery at all times. The steering setup of five and one-half turns lock to lock is fast enough for highway driving.

We left the track then and drove around the course in the hills for about an hour, trying just about everything possible on the wet surface. There were wet leaves on both sides of the road in most places too, so we couldn't slide around as much as I would have liked. However I found I could negotiate the turns marked 30 mph at 45 and the 40 mph turns at 50. There is some lean noticeable on the corners, but not excessive, due to the low suspension of the Golden Hawk. It rode over the big built in bumps very nicely too; the ride is not too soft, neither is it stiff enough to be uncomfortable on the highway. The new adjustable Gabriel shock absorber is available from the Studebaker factory. With this shock you can get the kind of ride you prefer, soft, medium or hard.

So we headed back to the garage convinced that this car is going to make a lot of new friends in 1956.

Road Testing Simca

(*Continued from page* 21)

Personally I'd have to see such an accomplishment to believe it, but according to a Simca owner, "to own a Simca is to love a Simca." A reputation for durability and dependability seems well founded for the writer did his best to induce rattles and other troubles in the test car without any bad results.

The "Aronde" Grand Large hardtop provides room for five average size persons. The styling is in the best continental tradition, and those who prefer the absence of a door post between the side windows and the rear-quarter windows should approve. All windows roll down mechanically, and on this score I found my first beef: eight full turns are required to roll down the side windows, making raising or lowering far too slow a process. During my tests down near the water front the Simca got thoroughly doused with spray several times, necessitating the use of the windshield wipers. Ordinarily one has excellent visibility forward, all around in fact, but in rainy weather, the driver will be hampered by a 5-inch wide blind spot at the left side of the windshield.

Continuing with the comparatively few technical objections I found on the Simca, I feel that it is a distinct disadvantage to be able to lock the doors externally only from the right side. The door handles, too, do not measure up to the high standard of workmanship noted on the rest of the car, file marks being visible, indicating a possible hasty final assembly and inspection. The handles, however, are aluminum as are most of the interior fittings, parking brake handle, etc. The trim on the steering wheel is of plastic and in appearance, at least, this trim seems none too sturdy. The small aluminum panel fastened to the bottom center of the dash carries several auxiliary controls —the ignition switch which is pushed in for on, pulled out for off (the key locks the transmission only); the choke control; a pull starter, etc.

The instruments are well grouped and with the exception of a water temperature gauge, which is missing, are adequate. A red light warns of the approaching emptiness of the tank when the 2-gallon level is reached. Red lights are also used in place of the more useful instruments to warn of low oil pressure and generator discharge. It seems that there has been some effort to make the Simca somewhat more palatable for the average American driver, but enthusiasts would probably prefer instruments that tell the whole story.

On the credit side, as opposed to these foregoing objections, I believe that the Simca can become an import marque of considerable importance if a vigorous sales program is undertaken. Thoroughly pleasing to drive, the little car is very capable in any traffic situation. Excellent maneuverability, a very short turning radius, ability to start off smoothly on the level in 2nd gear and to cruise nicely in the 30-MPH range in 4th gear, or to handle almost any situation in 3rd gear, makes this an excellent car for around town where parking problems and heavy traffic make a small car definitely the peer of the big stuff. On the open road the Simca can be safely cruised at 60 MPH all day long, and if you've a mind to take to the side roads, ability to corner and keep a sure footing on gravel and secondary roads will please the fellow who drives for the fun of it. The ride is remarkably soft for a car with a moderately firm suspension by means of coil springs up front and semi-elliptics aft. Telescoping double action shock absorbers effectively iron out bumps, while providing better than average stability in hard going. The car did bottom, but it took effort.

Under the hood one finds the usual compact layout of the small imports—a tiny overhead valve engine that is readily serviceable. The three bearing crankshaft is both dynamically and statically balanced. A conventional thermostat controls cooling system circulation and the spark is automatically advanced. The oil sump is so designed as to achieve considerable cooling from the air stream. Lucas ignition components are fitted and the carburetor is a Solex unit. The use of the more widespread British parts should relieve some of the servicing problems.

In view of the similarly sized and competitively priced imported cars, mostly of British origin, the Simca Hardtop (and the 4-door Sedan for that matter) stacks up as an exceedingly attractive package with quality, comfort and that all important factor—performance. Economical to operate, the Grand Large turned in nearly 26 miles per gallon over a hard driving weekend. Part of the kick of the imported car field is the wide variety available, and the new Simcas certainly should increase interest. In my opinion, this car has a lot to offer.

WHAT'S KILLING SPORTS CAR RACING?

Speed Age

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MARCH 1956

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CUSTOMIZE YOUR ENGINE

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BILL HOLLAND REPORTS ON STUDEBAKER'S GOLDEN HAWK

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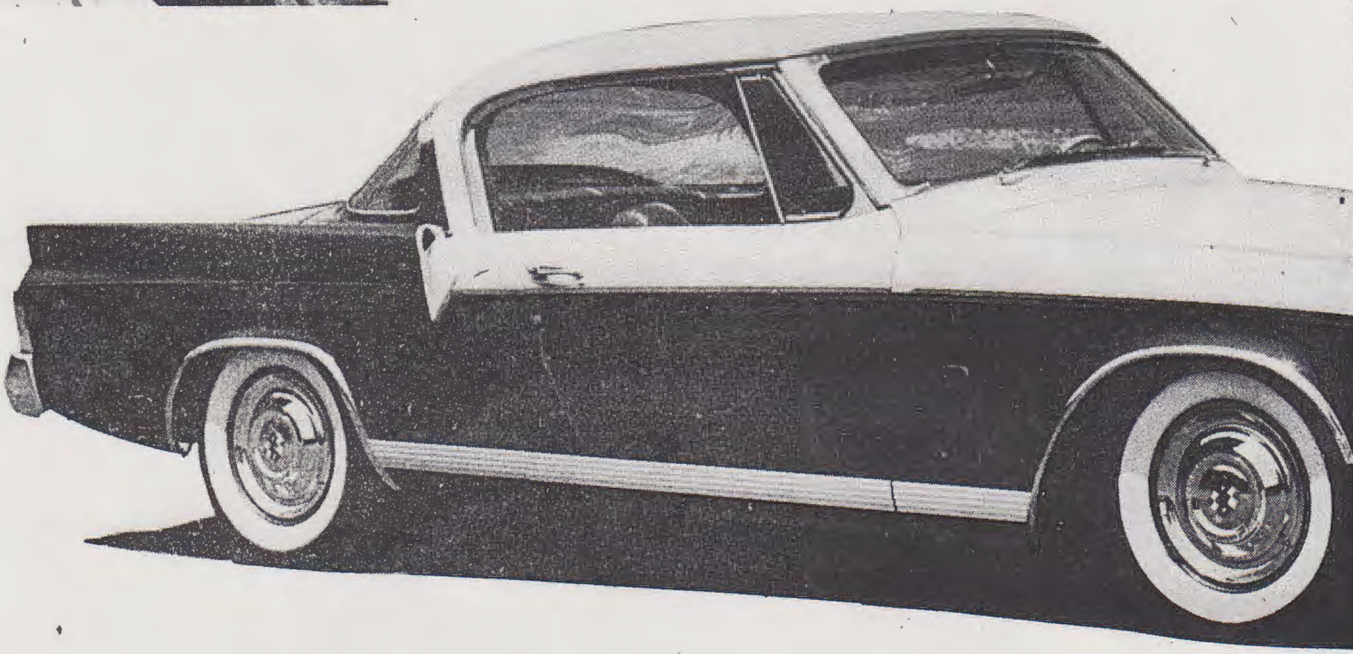
Bill France Forecasts:

THE YEAR AHEAD FOR STOCK CARS

Bill Holland



Studebaker Golden Hawk Specifications

Engine

Type: 90 V8
Valve Arrangement: In-head
Bore and stroke: 4 x 3½"
Displacement (cu in): 352
Cam ground (three-quarter)
Compression Ratio: 9.5-1
Taxable horsepower: 51.2
Advertised max brake horsepower at Engine Rpm: 275 @ 4600
Max torque (Ft lb @ rpm): 380 @ 2800
Carburetor: 4-barrel, downdraft
Exhaust: Dual

Capacity

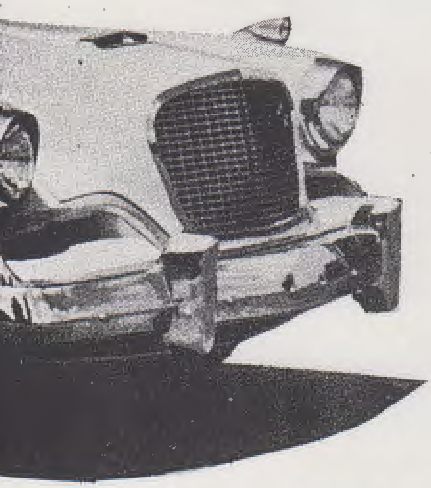
Oil: 5 quarts
Water (heater): 26.5 quarts (without heater): 25 quarts
Gas: 18 gallons

General

Wheelbase: 120.5 inches
Overall length: 203.9 inches
Overall width: 70.4 inches
Overall height: 56.3 inches
Tread front: 56.36 inches rear: 55.6 inches
Tires: Tubeless, 7.10 x 15

A great race driver and former Indy winner gives his opinion of the leader of the first line of sports cars in America

tests: Studebaker GOLDEN HAWK



By BILL HOLLAND

THIS WORLD IS BECOMING quite a confusing place for racing drivers like me. Just a short time ago there were only two kinds of cars as far as I was concerned—the racing car and the passenger car. It was very easy to tell them apart because one was an ultra-fast, stark or almost ugly single-seater and the other was a large, beautifully styled and sedate vehicle that would carry five or six people in complete comfort. "Never the twain shall meet," I thought.

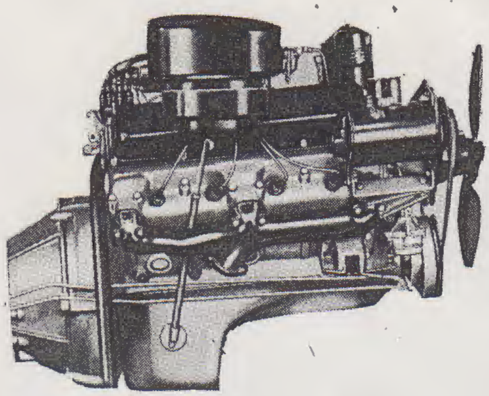
Studebaker has proved I was wrong. Their new Golden Hawk is faster than many race cars, wonderful to look at and roomy enough to carry the whole family. This car is the lead model in a special four-model line of sports-type cars, the first, as far as I know, line of such cars to be introduced by an American auto maker.

Late in September, 1955, I was lucky enough to become the first person, other than a Studebaker engineer, to drive the Golden Hawk. It was in Detroit, on the fast, banked track on the Studebaker-Packard proving grounds. With many hundreds of miles of racing on the Indianapolis track behind me I felt completely at home on the big two-and-a-half mile oval so I climbed into the Stude and charged right off.

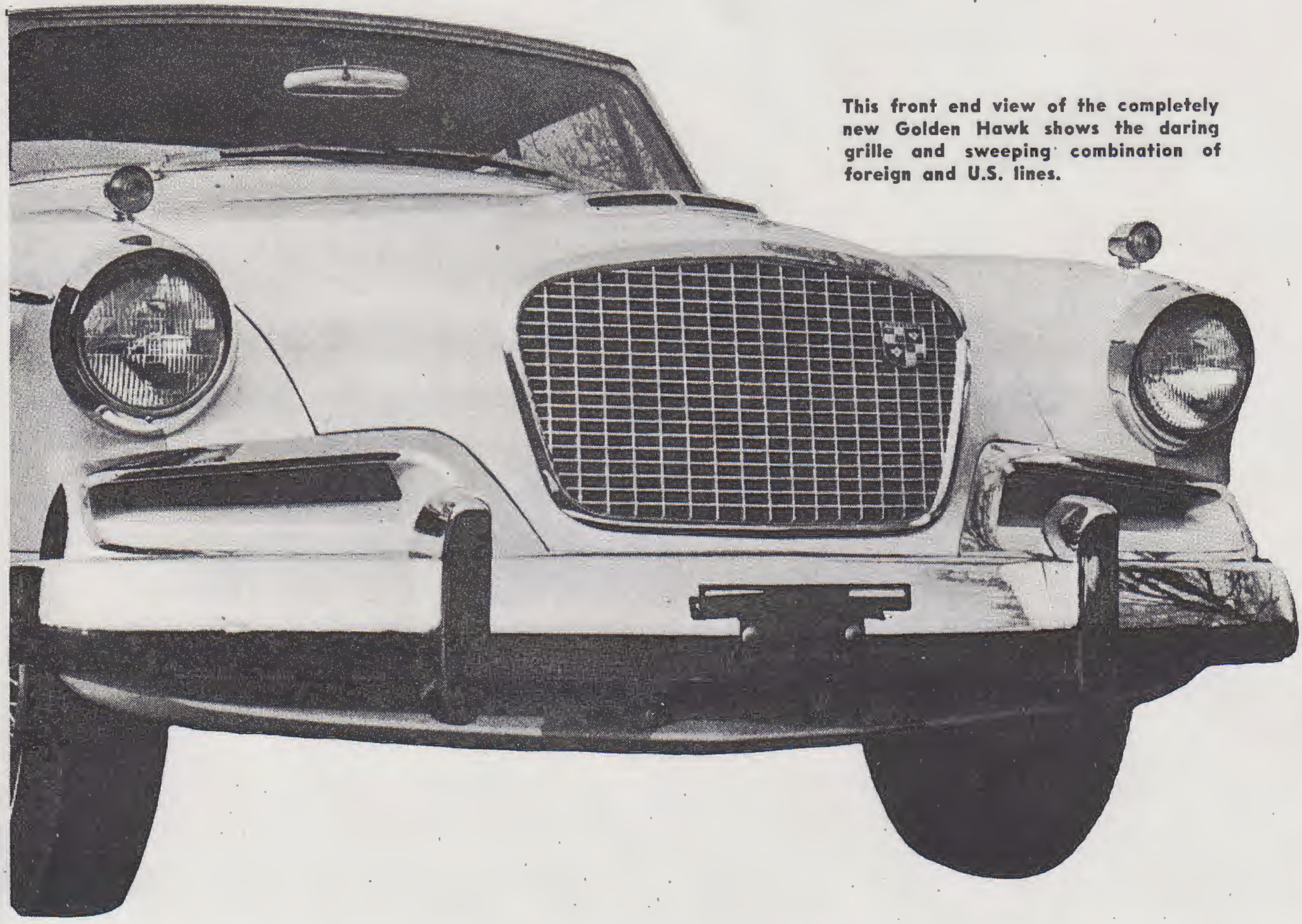
I was impressed immediately with the tremendous acceleration of the car. Floor-boarded, it took off with hardly a trace of wheel spin and roared with turbine-like smoothness well up over the 100-mph mark without any lag or "flat spots" at all. Round and round I went and the speedometer needle slid easily past the 125-mph mark.

Finally I came in and checked with the engineers who had been timing me. I was delighted, but not at all surprised to find that the Golden Hawk had done two laps at an average of 121.0 miles per hour on the rain-soaked track. I told them I was impressed. It was an understatement.

Some weeks later, SPEED AGE asked me to go out to the Studebaker proving grounds in South Bend, Ind., to give the Golden Hawk a more thorough workout. Here I was able to run accurate acceleration and braking tests and I got to drive the car over a great variety



The 275-horsepower V-8 engine gives the Golden Hawk the highest horsepower to weight ratio of any volume-built U. S. car.



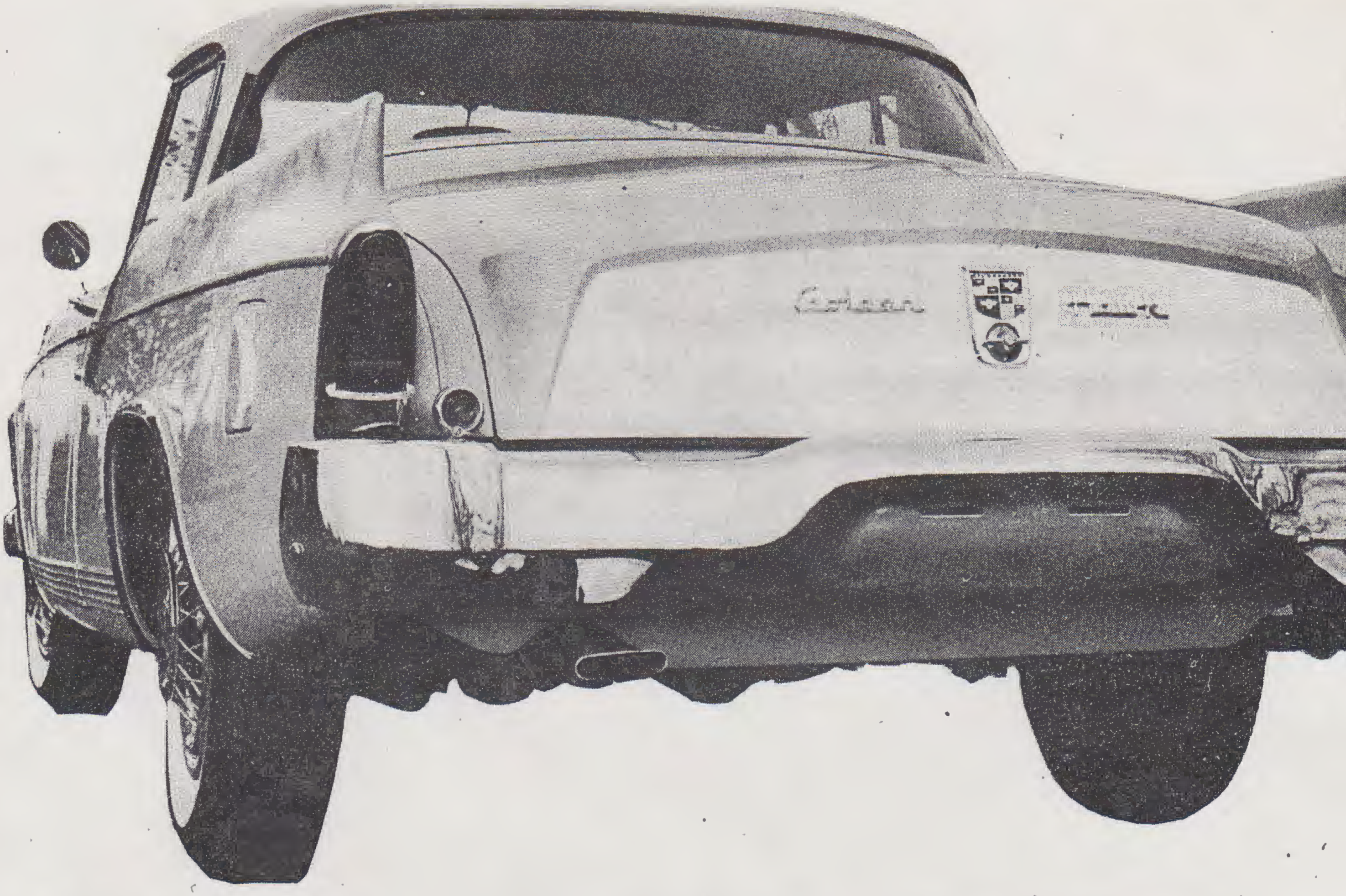
This front end view of the completely new Golden Hawk shows the daring grille and sweeping combination of foreign and U.S. lines.

of road surfaces. Here's what I found.

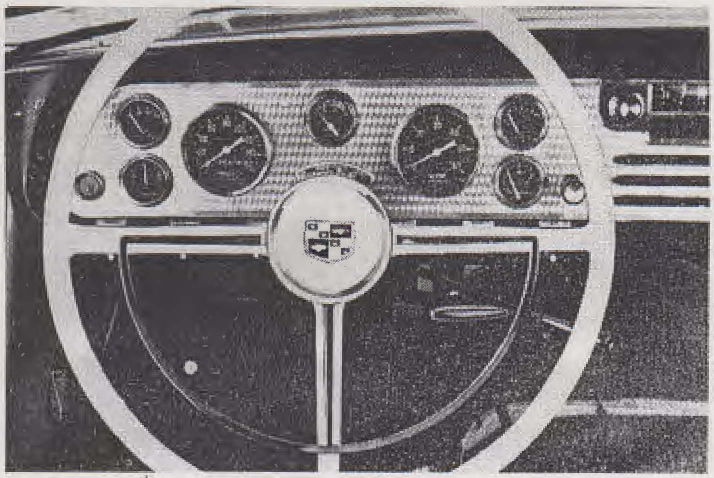
My original impression about the acceleration was easily confirmed. The Golden Hawk is absolutely breathtaking in acceleration, either from a standing start or from any cruising speed up to 80 or 90 miles per hour. From zero to 60 mph took just 9.6 seconds and the car needed only six seconds to go from 30 to 60 mph. That's about 20 per cent faster than the average fast sedan. These figures were gotten with a car equipped with the 1956 Packard Ultramatic transmission. Most of the Golden Hawks will be delivered with this automatic setup, but a manual three-speed shift and overdrive is also to be made available. You should be able to get even better performance, shifting by hand, and the overdrive will more than likely improve gas mileage if that's what you're interested in.

You may be wondering whether or not the car is hard to drive, or even if it's safe. I will say definitely that this automobile is not a compromise in any way between safety and performance. The power steering is light in operation and not geared too fast for average reflexes, and the new finned brakes are especially good. The seating position is such that you are always completely relaxed and yet alert, and visibility is excellent all around.

Just under five feet in height, the car has a center of gravity so low that it would be almost impossible to turn it over. I put it through several controlled slides and found it recovered perfectly. It is balanced properly so that it can still be controlled with the steering wheel while it is sliding. This technique will be necessary only in an emergency, of course, but it's nice to know that your car is



Looking at the west end of the GH going east reveals a new concept in rear design. Over fender fins and squared trunk are among the attractions. Notice dual exhausts.



Dashboard incorporates a tachometer and vacuum gauge in addition to standard instruments. Standard safety equipment includes the crash pads for the panel, padding on the back of the front seat.

up to any situation that might arise.

I took the Stude over some bumpy, windy, hilly roads on the test grounds and found that I never once had to "fight" it. The ride is somewhat firmer than on previous Studebaker hardtops, but even on the worst bumps at high speed it never becomes harsh. That roof looks awfully low, but you soon learn that you don't have to worry about banging your head on it.

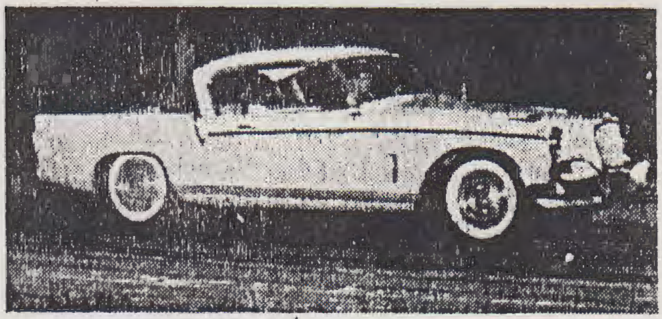
By now you may have gotten the impression that I like the car. I won't be at all guarded in my opinions; I like it very much. It has all the power anyone could want, and then some—275-horsepower to be exact. In design, all the Hawk line is in sharp contrast to Studebaker's big new styling of its President, Commander and Champion series. The Golden Hawk is long and low and very sporty, and yet it has none of the disadvantages of the usual sports car. There is an excellent heater and defroster system, a fine radio, plenty of space for luggage and no service problem. Interior finishing is very attractive and the dashboard has enough instruments to satisfy an engineer, including a tachometer and a vacuum gauge. Seats are all extremely comfortable and so is the price—factory list $2800.00. Other models in the line step down in price and aim at combining performance with economy. The Sky Hawk has 210-horsepower V8, the Power Hawk 170-horsepower V8 engine, and the Flight Hawk has a 101-horsepower six-cylinder engine.

When you see your first Golden Hawk on the road, take a good, close look at the driver; it might be me. And I wouldn't be surprised if the second one you saw had another familiar face behind the wheel—your own. ●

How Hot is the Hawk?

Test Report on Studebaker's Sports-Type Newcomer

Coming 'round the bend, this Golden Hawk shows a degree of tilt that looks less than most, but our instruments show it is a shade above average. However, though the angle is relatively high, the actual arc through which your body swings is low, because the car seat is so close to the ground. Thus the driver notices less sway than with the average car.



There's power just aching to go on this new Hawk. Zero to a true 60 takes 8.8 to 9.6 seconds, depending on the spark setting, the carried weight, the road and weather conditions. To hold this power back, this Studebaker newcomer has brakes that show excellent fade resistance, due in part to the cooling fins on the outside of the drums.

WE DON'T often wish we were 20 years younger, but we did the first night we drove the Golden Hawk. Couldn't help wondering how this gay and gleaming powerhouse would have stacked up against our old Model A in date-drawing power 20 years ago. Oh well . . .

The wife was real nice about it. She let us wonder happily in silence. And so did the two younguns we packed along with us in the back seat.

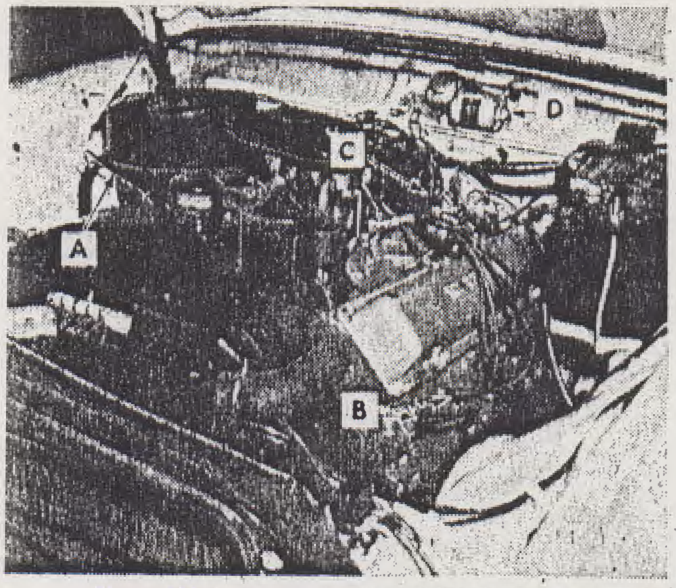
Speaking of back seats, some purists may howl about the impossibility of having rear seats in *true* sports car design (whatever that is). Let 'em howl, as long as they do it in the anti-social seclusion of their racy two-seaters. The important point Studebaker makes with their new Hawk series is that there is no reason why a family man can't get his kicks driving a truly distinctive looking car, without having to leave his family at home. (Unless, that is, he prefers having the size family only a station wagon can handle.)

As for performance, this new Hawk won't take a back seat to any American stock car we have tested. From zero to a true 60 *mph* in our test model took a measly 9.6 seconds, even loaded down with test equipment and two engineers. And you can chop this time down to 8.8 seconds under the most ideal conditions of the driver alone, no wind, premium fuel, and the best spark setting for acceleration.

When we moved up a notch to the 0-70 and 0-80 *mph* test runs, we got 12.8 and 17.7 seconds respectively. These are the same runs, by the way, on which last year's Studebaker Commander registered 24.5 and 37.6 seconds elapsed time. So you can see there is nothing ersatz about the sports performance Studebaker has built into the new Hawk series.

At 80 *mph*, incidentally, this Hawk is still accelerating at a rate of 2.8 ft./sec., proving that the reserve guts are there—if you can find a road on which it is safe to spill them. The same limitation applies to that top speed of 117.5 true. . . .

When you compare the 3690 lb. curb weight of this Hawk with the weights of the "lower-price" three (3535, 3550 and 3690) it should come as no surprise that the Hawk, with an advertised 275 *hp* rating, has about the highest horsepower-to-weight ratio of any American stock car. Add into the picture the Hawk's giant torque—advertised as 380 at 2800 rpm (even at the rear axle, this still comes out to between 226 and 236). Add in still another pertinent factor, the 58% front, 42% rear wheel weight distribution. The sum of all these factors simply means that you'll have no trouble at all burning rubber on the getaways, until you learn how to treat this impulsive pow-



Those 275 horses make it a tight fit under the low hood. But most important servicing points are readily accessible. Note (A) oil dipstick, (B) spark plugs, (C) distributor, and (D) electric windshield wiper motor. Transmission dipstick is under floorboards in the center of the floor ahead of the front seat.

erhouse with respect and finesse.

Mind you, all this time we're talking about a Golden Hawk with a 3.07 to 1 rear axle and Ultramatic. Get one that has the 3.92 axle with overdrive and you are guaranteed membership in the Royal Order of Tire Burners. Just as you would be if you tried to prove out that calculated hill climbing ability our test chart shows. The torque is there to produce it, but the rear wheels will slip before you could actually reach the 2030 pound pull needed for a 58% grade at 15 *mph.*

What would be the maximum pull you could actually expect? That depends on the road friction coefficient. Let's say it is 0.70 (dry, new concrete roads range from 0.70 to 1, depending on speed). Multiply this 0.70 by the rear end force of 1530 or so pounds with which the Studie presses down on the road. The result is about 1120 pounds—roughly the practical limit of pull before the wheels slip.

Does all of the Hawk's spectacular get-up-and-go mean that the Studebaker engineers working on this sports model tossed fuel economy out the window? Not those boys—with their fuel-saving ways. Of course, you can't run any 275 *hp* car on a motor-scoot's gas ration. But the fuel consumption figures this new Hawk produces are excellent, particularly on the level road—constant speed test runs, as these test figures show:

Level road, Constant Speed Fuel Mileage	1955 Studebaker Commander-140 hp 3.54:1 rear axle ratio	1956 Studebaker Golden Hawk-275 hp / 3.07:1 rear axle ratio
20	22.9	16.4
30	22.5	22.1
40	21.0	20.4
50	19.2	18.9
60	17.3	17.9
70	15.0	15.4

Note that, with the exception of the figure at 20 *mph,* fuel mileage for the two cars averages out closely, despite the tremendous increase in horsepower of the Hawk. In fact, the Hawk actually shows up a little better than last year's Commander at the higher speed ranges. This is in part due to the more economical rear axle ratio on this year's Hawk (3.07 to 1 vs. 3.54 to 1 on the 1955 Commander). It's also due in part to having a smaller frontal area which doesn't build up as much wind resistance.

Also, to complicate the picture, there's the Ultramatic transmission on the new Hawk, which locks into direct drive at 25 *mph,* to prevent the wasteful slippage normally found in hydraulic torque convertors in this speed range. Most of today's cars give maximum economy (*not* efficiency) at about 30 *mph,* and somewhat less at 20 *mph.* This Hawk followed the same pattern only a little more so, with a good 22.1 *mpg* at 30 *mph* which dropped to 16.4 *mpg* at 20 *mph.*. The prime reason for such a drop, in this case, is the unlocking of the clutch at this low speed—which means that the torque convertor is "paddling." The locking action also penalizes 20-40 *mph* acceleration times because of the hesitating clunk you get when flooring the gas pedal to make i downshift for a better pickup gear ratio.

Driver's Observations

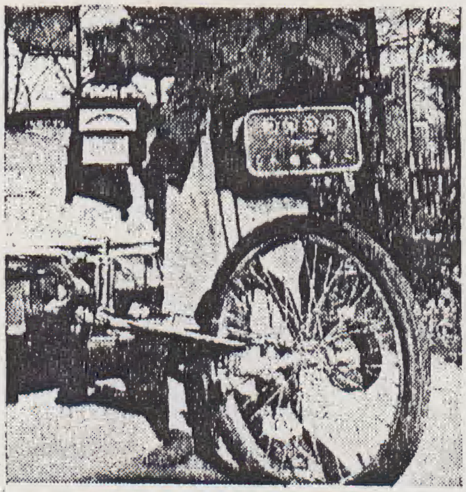
ROADABILITY: Excellent high speed performance (particularly on the straightaways). Pickup is there aplenty (those exhausts purr like happy tigers), and car would be even hotter if gearing blended with power plant a little more smoothly, and rear end carried a greater share of weight.

Except at locking and unlocking points on Ultramatic, however, the shifts are smooth with detent on P and R. On a couple of tries, Reverse failed to engage. Transmission will not upshift unless you take foot off gas pedal or upshift manually.

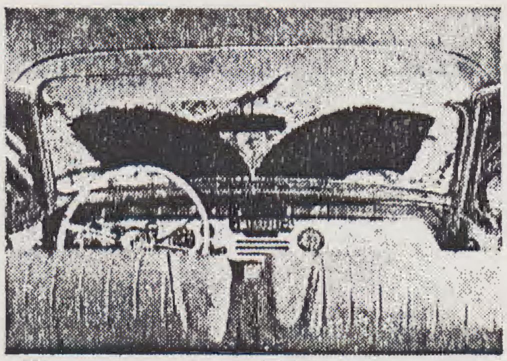
Car tracks well and shows little wind wander. Non-powered steering stiff with little play and quick recovery. Corners fairly tightly for a stock car, but not for a sports car. Wind whistle higher than average when side vent is open—and you need this open to get much heat in winter. Overall noise level inside moderate.

RIDING AND DRIVING COMFORT: Far more comfortable than most sportsters, with better bump absorption through softer suspension. Interior quite roomy, (there's more headroom, by the way, than you'll find in some hardtops). Very moderate sway (of passengers, if not car) on curves. Driver vision fairly good (excellent over the hood). Steering wheel seems to be set more on vertical—like a sports car—which makes it fairly easy to handle but so low that your thigh hits it when your right foot tries to reach that brake pedal to the left of the steering column. Better geometry needed here—or left foot braking. For tall people, getting in and out of ca takes more maneuvering because o low-set wheel.

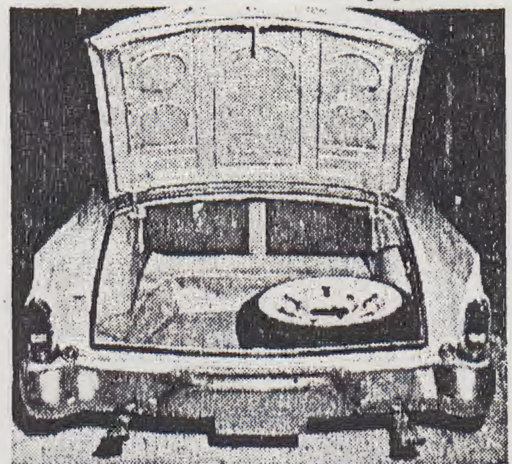
INSTRUMENTS AND CONTROLS Those are real gages—not imaginary works of art. Airplane-type toggl switches for headlights, dashlights electric two-speed wipers, etc., worl easily, and we're kind of taken witl the idea of not having to yank on o tune in the control you want. Bu watch that you don't overthrow switcl when you're hurrying. All control clearly labeled for daytime but nc for nighttime use. Key well not li Steering wheel well-dished (not just token cavity) for safety. It has n sharp projections and half-circle hor ring gives a clear view of gages.



Some of the equipment it takes to run a performance test. The 5th wheel mounted on the car is used in conjunction with the meter in the test engineer's right hand to give true *mph*. The electronic counter in his left hand is used in calibrating the odometer, and also in other tests. The blood, sweat and tears involved in double-checking every test finding are not shown here.



No wraparound windshield here, which means smaller blind vision areas during snow and mud conditions, but more corner post interference. Wiper arc clearance in center is better than many. Perforated sound-absorbing material is used on roof, and honest faces on gages.



There's more room here than many sports models have in the trunk, though height is naturally limited compared to average passenger model, and spare tire takes up a lot of usable space.

Maybe it's those finned brake drums Studie added this year to cool things off, but this Hawk's brakes proved far more fade resistant than those on last year's Commander. Pedal pressure came nowhere near doubling in 12 successive panic stops. In fact, the Hawk was one of the relatively few cars we have tested whose brakes could be locked immediately after our fade tests.

How about roadability and general riding qualities? Here we immediately get back to the qualities that are supposedly inherent in sports car design. The purists will tell you that a true sports car is a stiffly sprung, hard riding son-of-a-cam that eats horseshoe curves at 80 per. Could be. In fact, those very hard-riding qualities (plus that front-seat-only space we mentioned earlier) may help explain why relatively few sports cars, and a lot of stock cars, are sold to the American public.

Studebaker's answer to this problem of trying to design a sports-type car that would still appeal to a volume market, is a compromise. The Hawk is a wide notch above most sports cars in riding comfort, but a notch below in curve-holding ability. As a measure of the Hawk's relatively soft suspension, it registered a high 5° tilt angle on our 40 *mph* turning circle test, and a high 4° nose-down braking dip. This side tilt on the curves, incidentally, feels much less than it actually is, because in a low-slung sports design like the Hawk, you sit close to the road and your body there-

TECH TALK

IT'S a refreshing change to note that the instrument panel also has an engine tachometer and a vacuum gage (connected to the intake manifold). While not scientifically exact, that vacuum gage can give you good guidance on economy. For example, an engine requires a retarded spark and a very rich mixture for good idling at the low idle speeds, which the public seems to prefer. Hence if the car is driven at low speed (without accelerating), the fuel economy is poor, mainly because of the rich mixture. (This is another reason for the low mileage at 20 *mph*).

Since, at or near idling, the vacuum is high (the throttle is essentially closed) the vacuum gage is used to indicate this "poor" range of operation. As the speed is increased to, say, 30 or 40 *mph*, the fuel-air mixture can be considerably leaned, the spark can be considerably advanced and operation becomes more economical (the "good" region indicated by the vacuum gage). Now, as the speed is again increased to, say, 60 *mph*, the load on the engine is considerably increased (about 7 *hp* is required for level-road driving at 30 *mph* and about 30 *hp* at 60 *mph*). It is in the range of 60 *mph* or higher that the engine becomes most *efficient* since it is operating on a lean mixture, a highly advanced spark and at moderate *rpm*. On the other hand, the *mpg* figure has fallen (in the Studie, 22.1 *mpg* at 30 *mph* versus 17.0 *mpg* at 60). That's only a 22% decrease in *mpg* to take care of a big 400% increase in load! Thus the overall *efficiency* of the car as a mechanical prime mover is only 11.5% at 30 *mph* but 16.4% at 60 *mph*. (This means, for example, that at 30 *mph* only 11.5% of the energy in the gasoline is converted into useful work.)

Of course, at speeds of 70 to 80 and above, the efficiency of the engine eventually begins to decrease for several reasons: (1) The horsepower load on the engine becomes high enough to produce "knock." Since knock imposes high stresses on the engine, it is avoided or minimized by retarding the spark (the vacuum advance mechanism on the distributor). (2) Also the fuel-air ratio must be increased to get more power, or practically, to avoid burning the exhaust valves with the lean (oxidizing) mixtures and (3) the *rpm* has increased to a point where a good deal of power is wasted in friction.

So high speed operation, while it may be fairly *efficient* is *uneconomical* because *mpgs* are low. This condition is also reflected by the vacuum gage since, with the engine near WOT, the vacuum in the manifold is low. Thus, at very high vacuum (closed throttle) or very low vacuum (wide-open throttle) in the intake manifold, gasoline economy is poor and a vacuum gage will help to show you a more economical range of operation. Such a gage does *not* indicate engine efficiency, however, which rises to its maximum at about 80 *mph* on many of today's cars.

For Women Only

THIS beauty has me worried. For years, I have watched my husband look longingly at glamorous sports cars while I relaxed, secure in the knowledge he wouldn't upset the budget by buying one. After all, where would we carry the children? Yes indeed, that back seat is a threat I hadn't counted on.

Then again, we just might be able to afford a Hawk without piling a third mortgage on top of the second one. The interior upholstery and trim of white, smoke-blue, silver and black is certainly beautiful. And the top is fixed, thank goodness, so there won't be any more of those ruined hair-dos or lobster sunburns I used to get in our old convertible when my husband decided it was top-down weather. And why not look like we might be a two-car family, even if we only own one. . . .

Wait a minute. Buying a new car indeed! The old one has four more good years in it yet. Besides, wouldn't as powerful a car as this be expensive to maintain? The power windows are hard to operate with your gloves on. It also isn't easy to grasp that recess and pull the door closed, if you're wearing gloves, because the gripping space is small. And also (my husband says) because the handle is so close to the hinges you don't get good leverage, it takes a lot of strength to close the door. The dash top is shiny but not very wide and the reflective chrome trimming is about average—though I'd love to change the angle of the windshield molding strip so it wouldn't bounce light at me. While the trunk space is probably generous for a sports car, we'd have to add a luggage rack on top to transport our family with all the baggage we carry. . . .

Still and all, the road slips under that low hood so smoothly, and the styling is truly distinctive. The parking lights on the fender are more than just a decorative touch—I can actually see whether they're working (and whether I pulled the turn-signal lever in the right direction!). Incidentally, I like being able to work that lever without having to take my hands off the wheel. This car certainly should have power steering, to make it easier to handle. My husband and I both like mounting the ashtrays on the doors. He's a left-handed smoker and I hold a cigaret in my right hand. Too many of the centrally located ashtrays on other cars allow hot ashes to drop on a man's suit or a woman's nylons.

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fore does not move very far along the arc with 5° included angle.

Similarly, if you were to photograph that braking dip, it wouldn't look like 4° because the Hawk is only about 56 in. high overall.

Our odometer and speedometer tests showed clearly that our test Golden Hawk had more precise instrumentation than passenger cars usually have. We don't know whether more honest instruments are a characteristic of sports cars, since we haven't tested enough of them to tell, but we should imagine that sport car owners might be more finicky about accuracy, and less subject to ego-inflating padded performance figures.

As for the dash layout of those instrument dials, well, can you remember when gages on the dash were just gages? That is, open-faced, easy-to-read instruments for telling you what the score was—instead of showing you how souped-up the designer was the day he okayed that new dashboard design? The dash on the Hawk has the same honest and open dial faces. And there are a lot of well-labeled ones—including Water Temp., Amperes, Fuel, Oil Pressure, a tachometer, built-in vacuum gage, with color bands, for decelerate, idle, good, fair and poor. There's also a Miles-Per-Hour gage otherwise known as a speedometer, which reads to 160. All are easy to read, though the speedometer labels only the alternate tens (0, 20, 40, etc.). So you have to do some fast interpolating when you see that policeman overtaking you.

Because of its permanently attached top, the Hawk came out of our water penetration tests a good bit drier than the other sports cars we have tested. One quarter vent window whose catch had been sprung by previous usage, leaked quite a bit. And hood leaks gave the engine a good bath, which didn't dampen its performance.

The price story on this Studebaker newcomer strikes us as newsworthy in itself. Suggested factory list price of the 1956 Golden Hawk J-5 is pegged at $3,057. This includes federal taxes and delivery and handling charges, but not state and local taxes, and optionals. The overdrive with 3.92 axle ratio is standard, but Ultramatic with 3.07 ratio is optional at $100. Power brakes are $37.66, power steering $107.60, power seat $45.19, wire wheels $63.89, and radio $86.39. The safety-conscious can get seat belts for $25.95. Crash padding for the dashboard is standard equipment on the Golden Hawk, we are told (though our test car didn't have it). It's optional on the other models in the Hawk series.—D. D.

1956 STUDEBAKER GOLDEN HAWK-8 SPECIFICATIONS

ENGINE: V-8. Bore 4 in.; stroke 3.5 in. Advertised maximum brake horsepower 275 at 4600 rpm. Taxable horsepower 51.2. Advertised maximum torque 380 lb ft and mean effective pressure of 162 psi at 2800 rpm. Compression ratio 9.5 to 1. Piston displacement 352 cu in. Fuel specified Premium.

TRANSMISSION: Ultramatic with 1.82 accelerating gear and 2.90 torque converter at a stall speed of 1650 rpm. (3 speed with overdrive is standard); Rear axle ratio: 3.07 (other rear axle ratios: 3.92 overdrive); 3.07 automatic.

STEERING: Turning circle 41 ft, curb to curb. Overall ratio 33.8 to 1. 5¼ turns lock to lock.

EXTERIOR: Wheelbase 120½ in. Overall length 204 in. Overall width 72 in. Overall height, unloaded 57 in. Curb weight 3690 lb (with 10 gal gas, oil and water). Minimum road clearance 6¾ in. at frame cross member.

INTERIOR: Headroom: front seat 36½ in. and rear seat 36 in. Legroom: front seat 43 in. Kneeroom: rear seat 8 in. to 12½ in. Hiproom: front seat 58 in. and rear seat 56½ in. (two 26 in. seating spaces with arm rest raised). Total front seat adjustment at floor: 4½ in. forward or back; 0 in. up or down.

VISIBILITY: Windshield area 858 sq in. Rear window area 910 sq in.; from eye of 5 ft 8 in. driver and seat in best position, distance from driver's eye to road over left front fender is 21 ft. 9 in. (or 14 ft 10 in. blind distance to car); over hood center 32 ft 2 in. or 23 ft 9 in. blind distance to car); over right front fender 27 ft 5 in. (or 19 ft 8 in. blind distance to car).

EQUIPMENT: Battery, Willard 12-volt, 9 plate, 60-amp hours, located left rear engine. Tires 7.10-15 ply 4; recommended pressure 26 psi front, 24 psi rear. Springing: front coil, rear leaf. Frame: box section, 6 cross members.

CAPACITIES: Fuel tank 18 gal. Crankcase 5 qt. Cooling system 26.5 qt with heater. Differential 3 pt. Transmission 22 pt. Luggage compt. dimensions: 48 in. deep, 28 in. wide, and 16 in. high usable space.

Science at the Wheel — Studebaker Golden Hawk-8

MODEL: Studebaker Golden Hawk 8 Hardtop Coupe

TEST DATES: Dec. 14 through Dec. 29

GENERAL ROAD AND WEATHER CONDITIONS. Portland concrete generally smooth and level; clear winter days 13° to 34°, 29.4 to 30.1 in. Hg

MILEAGE AT START: 1675; **MILES COVERED:** 748

GAS: Premium; **OIL:** SAE 20W

CURB WEIGHT (with 10 gal gas): 3690 lb; 58% on front wheels; 42% on rear wheels

TIRE PRESSURE: 26 psi front; 24 psi rear

SPARK SETTING: 5° bTC at idle rpm

REAR AXLE GEAR RATIO: 3.07 to 1

TEST DATA

GASOLINE MILEAGE (checked with fuel volume flow meter and 5th wheel. Temperature 13° F; relative humidity 60%; barometer 29.8 in. Hg)

LEVEL ROAD FUEL CONSUMPTION (carried weight 570 lb. Average of two or more runs made in opposite directions over same road):

True MPH	True MPG	Odometer MPG	True Ton MPG
20	16.4	16.5	34.9
30	22.1	22.3	47.0
40	20.4	20.6	43.5
50	18.9	19.0	40.3
60	17.0	17.1	36.2
70	15.4	15.4	32.8

TRAFFIC FUEL CONSUMPTION (carried weight 560 lb): Simulated traffic pattern of city driving—stops, acceleration, braking:

True MPG	Odometer MPG	True Ton MPG	True Average MPH
10.6	10.7	22.5	22.5

CITY-COUNTRY FUEL CONSUMPTION (miles covered on 5 gal gas):

True Mileage	Odometer Mileage	True MPG	True Average MPH
82.6	83.1	16.5	33.0

OVERALL FUEL AND OIL consumed during test:

Total Mileage	Total Gal Fuel	Total Oil	True MPG	Odometer MPG	Oil MPQ
748	68.0	2½ qts	11.0	11.0	298

OVERALL EFFICIENCY to move car's mass against road friction and air resistance, calculated from level road mpg, weight, and frontal area of car: 11.5% at 30 mph; 16.4% at 60 mph.

ACCELERATION—LEVEL ROAD (timed with 5th wheel; carried weight 390 lb; temperature 34° F; relative humidity 40%; barometer 29.8 in. Hg; spark 8° bTC; average of two or more runs in opposite directions over same road):

True MPH	Gear Range	Average True Time (sec)	True MPH	Gear Range	Average True Time (sec)
0-20	Lo	2.40	0-80	Lo to 68 mph Conv. to speed	17.7
0-30	Lo	3.79	20-40	Drive	4.68
0-40	Lo	5.40	20-60	Drive	8.88
0-50	Lo	7.20	20-70	Drive	12.1
0-60	Lo	9.60	20-80	Drive	17.0
0-70	Lo to 68 mph Conv. to speed	12.8			

SPEED AT END OF ¼ MILE FROM STOP: 80.2 mph (true) in 17.2 seconds.

MINIMUM ACCELERATION time for 0-60 mph (true) over level road with no wind, best spark setting, premium fuel and driver alone 8.8 seconds.

ACCELERATION FACTORS:

True MPH	Gear	MPH per sec	Ft/sec²
10	Lo	8.3	12
30	Lo	6.7	9.8
50	Lo	4.8	7.0
60	Lo	3.7	5.4
80	Converter	1.9	2.8

HILL CLIMBING (calculated from acceleration data with allowances made for rotational inertia):

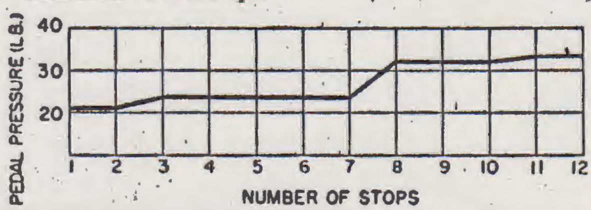
Approx MPH	Gear	Grade %	Pull in lb
15	Lo + Conv.	58	2030
40	Lo + Conv.	32	1240

SPEEDOMETER-ODOMETER CORRECTIONS: Odometer distance 10.00 miles; true distance 9.92 miles; odometer error at 30 mph +0.08 miles. Multiplication factor and % of error 0.992 and +0.8%:

Speedometer MPH	True MPH	% Error Speedometer	Engine RPM	Speedometer MPH	True MPH	% Error Speedometer	Engine RPM
120	117.5	+2.1	4300	60	57.7	+4.0	2150
110	107.5	+2.3	3940	50	47.7	+4.8	1800
100	97.7	+2.4	3590	40	38.0	+5.3	1440
90	87.8	+2.5	3230	30	28.3	+6.0	1100
80	77.8	+2.8	2870	20	18.7	+7.0	1000
70	67.9	+3.1	2520				

LATERAL SWAY TEST OF CORNERING ABILITY: At 40 mph on 285-ft radius circle, side tilt angle recorded was 5°.

BRAKE FADE TESTS (repeated applications of brake from 60 mph to 30 mph at deceleration rate of 7 ft/sec²): As indicated below, pedal effort did not double in 12 test stops.



LONGITUDINAL DIP ON BRAKING: At a deceleration rate of 21 ft/sec², body nose diving angle was 4°.

PARKING BRAKE TEST: When brake was applied hard and suddenly from 20 mph true speed, car braking distance was 39 ft 2 in. Left wheel locked; right wheel locked.

CHASSIS DYNAMOMETER HORSEPOWER (tests made by Jack Dezell, Clark Automotive Service, Chicago): Temperature 68° F; relative humidity 70%; barometer 29.6 in. Hg.

MPH True	Engine RPM	Vacuum (in. Hg)	Horsepower
93	3400	1¼	114
67	2500	1	92
48	1800	1	72

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

MPH True	Engine RPM	Equiv. Engine Torque (lb ft)	Axle Horsepower
115	4200	219	175
82	3000	238	136
54	2000	242	92

Per cent of advertised engine horsepower supplied to rear wheels: 64%.

PERFORMANCE FACTORS

(Calculated)

126 mph (true) at maximum advertised horsepower and 76 mph at max adv torque. Engine rpm at 60 mph (also revolutions per mile) 2230 rpm. Average piston speed at 60 mph (also, ft/mile) 1300 ft/min. Cu ft per minute of mixture at 60 mph (also, cu ft/mile) 228. Maximum engine horsepower (adv) per ton of car (curb weight) 149. Reciprocating load factor at 60 mph (based on piston weight, bore, stroke, rpm; an indicator of wear and stress on the engine; low values desirable) 748. Maximum engine horsepower (adv) per cu in. displacement 0.78. Power performance factor (a weighted average of CR, piston displacement, and curb weight): 173.

Above data and signed certification are reproduced from test reports.

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 F Ebert

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

Science at the Wheel — Plymouth Belvedere V-8

MODEL: Plymouth Belvedere V-8 Four-door

TEST DATES: Dec. 16, 1955 through Jan. 3, 1956

GENERAL ROAD AND WEATHER CONDITIONS: Portland concrete generally smooth and level; cold winter days

MILEAGE AT START: 1945

MILES COVERED: 325

GAS: Premium; **OIL:** SAE 20W

CURB WEIGHT (with 10 gal. gas): 3690 lbs. 56% on front wheels; 44% on rear wheels

TIRE PRESSURE: 26 psi front; 26 psi rear

SPARK SETTING: 4° bTC at idle rpm

REAR AXLE GEAR RATIO: 3.54 to 1

TEST DATA

GASOLINE MILEAGE (checked with fuel volume flow meter and 5th wheel. Temperature 31° F; relative humidity 60%; barometer 30.1 in. Hg)

LEVEL ROAD FUEL CONSUMPTION (carried weight 585 lbs. Average of two or more runs made in opposite directions over same road):

True MPH	True MPG	Odometer MPG	True Ton MPG
20	20.6	21.6	44.0
30	22.5	23.7	48.1
40	19.3	20.3	41.2
50	17.2	18.0	36.8
60	15.9	16.5	34.0
70	14.8	15.3	31.6

TRAFFIC FUEL CONSUMPTION (carried weight 565 lbs.): Simulated traffic pattern of city driving—stops, acceleration, braking:

True MPG	Odometer MPG	True Ton MPG	True Average MPH
12.2	12.75	26.0	22.2

CITY-COUNTRY FUEL CONSUMPTION (miles covered on 5 gal. gas):

True Mileage	Odometer Mileage	True MPG	True Average MPH
83.4	87.5	16.7	32.9

OVERALL FUEL AND OIL consumed during test:

Total Mileage	Total Gal. Fuel	Total Oil	True MPG	Odometer MPG	Oil MPQ
325	26.2	None	11.8	12.4	....

OVERALL EFFICIENCY to move car's mass against road friction and air resistance, calculated from level road mpg, weight and frontal area of car: 12.0% at 30 mph; 16.5% at 60 mph.

ACCELERATION—LEVEL ROAD (timed with 5th wheel; carried weight 410 lbs.; temperature 34° F; relative humidity 70%; barometer 29.5 in. Hg; spark 4° bTC; average of two or more runs in opposite directions over same road):

True MPH	Gear Range	Average True Time (sec)	True MPH	Gear Range	Average True Time (sec)
0-20	Lo	2.88	0-80	Lo	22.2
0-30	Lo	4.77	20-40	Lo	4.68
0-40	Lo	6.90	20-60	Lo	10.3
0-50	Lo	9.42	20-70	Lo	14.9
0-60	Lo to 56 mph Conv. to speed	12.5	20-80	Lo	20.0
0-70	Lo to 56 mph Conv. to speed	17.1			

SPEED AT END OF ¼ MILE FROM STOP: 73.4 mph (true) in 18.7 sec.

MINIMUM ACCELERATION time for 0-60 mph (true) over level road with no wind, best spark setting, premium fuel and driver alone 11.0 seconds.

ACCELERATION FACTORS:

True MPH	Gear	MPH per sec	Ft/sec2
10	Lo + conv.	6.7	9.8
30	Lo + conv.	4.9	7.2
50	Lo + conv.	3.6	5.3
60	Converter	2.9	4.3
80	Converter	1.6	2.3

HILL CLIMBING (calculated from acceleration data with allowances made for rotational inertia):

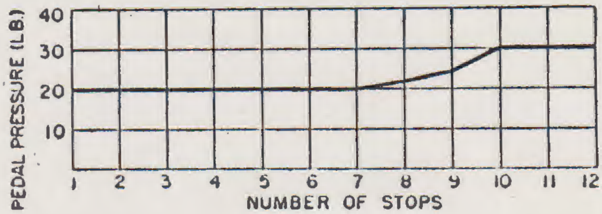
Approx MPH	Gear	Grade %	Pull in lb
15	Lo + Converter	39	1470
40	Lo + Converter	23	904

SPEEDOMETER-ODOMETER CORRECTIONS: Odometer distance 10.00 miles; true distance 9.53 miles; odometer error at 30 mph + 0.47 miles. Multiplication factor and % of error 0.953 and 4.9%:

Speedometer MPH	True MPH	% Error Speedometer	Engine RPM	Speedometer MPH	True MPH	% Error Speedometer	Engine RPM
112	105.8	+5.9	4680	60	57.6	4.2	2660
100	94.7	5.6	4210	50	48.4	3.3	2250
90	85.5	5.3	3820	40	39.0	2.6	1870
80	76.2	5.0	3425	30	29.8	+0.67	1490
70	67.0	4.5	3050	20	20.3	−1.5	1100

LATERAL SWAY TEST OF CORNERING ABILITY: At 40 mph on 285-ft. radius circle, side tilt angle recorded was 5°.

BRAKE FADE TESTS (repeated applications from 60 mph to 30 mph at deceleration rate of 7 ft/sec²): As indicated below, pedal effort did not double in 12 test stops.



LONGITUDINAL DIP ON BRAKING: At a deceleration rate of 21 ft/sec², body nose diving angle was 4°.

PARKING BRAKE TEST: When brake was applied hard and suddenly from 10 mph true speed, violent chatter of rear axle a/c brake on drive shaft; use for parking only.

CHASSIS DYNAMOMETER HORSEPOWER (tests made by Jack Dezell, Clark Automotive Service, Chicago): Temperature 65° F; relative humidity 50%; barometer 29.1 in. Hg.

MPH True	Engine RPM	Vacuum (in. Hg.)	Horsepower
76	3400	1.8	96
54	2500	1.4	67
42	2000	1.1	52

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

MPH True	Engine RPM	Equiv. Engine Torque (lb ft)	Axle Horsepower
95	4200	158	126
66	3000	176	100
42	2000	168	64

Per cent of advertised engine horsepower supplied to rear wheels: 65%.

PERFORMANCE FACTORS

(Calculated)

99 mph (true) at maximum advertised horsepower and 52 mph at max adv torque. Engine rpm at 60 mph (also revolutions per mile) 2750 rpm. Average piston speed at 60 mph (also, ft/mile) 1435 ft/min. Cu ft per minute of mixture at 60 mph (also, cu ft/mile) 221. Maximum engine horsepower (adv) per ton of car (curb weight) 108. Reciprocating load factor at 60 mph (based on piston weight, bore, stroke, rpm; an indicator of wear and stress on the engine; low values desirable) 1032. Maximum engine horsepower (adv) per cu in. displacement 0.725. Power performance factor (a weighted average of CR, piston displacement, and curb weight): 125.

Above data and signed certification are reproduced from test reports.

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 Cleet

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

Science at the Wheel Chevrolet Bel-Air V-8

MODEL: Chevrolet Bel-Air V-8 4-door hardtop

TEST DATES: November 22 through November 29

GENERAL ROAD AND WEATHER CONDITIONS: Portland concrete, smooth and generally level

MILEAGE AT START OF TESTS: 387

MILES COVERED: 275

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

CURB WEIGHT (with 10 gal. gas): 3500 lbs. 54% on front wheels; 46% on rear wheels

TIRE PRESSURE: 24 psi front; 24 psi rear

SPARK SETTING: 4° bTC at idle rpm

REAR AXLE GEAR RATIO: 3.55 to 1.0

TEST DATA

GASOLINE MILEAGE (checked with fuel volume flow meter and 5th wheel. Temperature 26° F; relative humidity 40%; barometer 29.8 in. Hg)

LEVEL ROAD FUEL CONSUMPTION (carried weight 650 lbs. Average of two or more runs made in opposite directions over same road):

True MPH	True MPG	Odometer MPG	True Ton MPG
20	19.7	20.0	40.9
30	19.7	20.0	40.9
40	19.1	19.4	39.6
50	17.8	18.1	36.9
60	15.8	16.0	32.8
70	13.3	13.5	27.6

TRAFFIC FUEL CONSUMPTION (carried weight 625 lbs.): Simulated traffic pattern of city driving—stops, acceleration, braking:

True MPG	Odometer MPG	True Ton MPG	True Average MPH
12.5	12.7	25.8	22.7

CITY-COUNTRY FUEL CONSUMPTION (miles covered on 5 gal. gas):

True Mileage	Odometer Mileage	True MPG	True Average MPH
81.6	83.1	16.3	33.1

OVERALL FUEL AND OIL consumed during test:

Total Mileage	Total Gal Fuel	Total Oil	True MPG	Odometer MPG	Oil MPQ
275	23.7	1 qt.	11.4	11.6	275

OVERALL EFFICIENCY to move car's mass against road friction and air resistance, calculated from level road mpg, weight, and frontal area of car: 10.2% at 30 mph; 16.3% at 60 mph.

ACCELERATION—LEVEL ROAD (timed with 5th wheel; carried weight 450 lb.; temperature 44° F; relative humidity 50%; barometer 29.2 in. Hg; spark 4° bTC; average of two or more runs in opposite directions over same road):

True MPH	Gear Range	Average True Time (sec)	True MPH	Gear Range	Average True Time (sec)
0-20	Lo	2.88	0-80	Lo to 50 mph	
0-30	Lo	4.79		Converter to speed	26.4
0-40	Lo	7.01	20-40	Lo	4.20
0-50	Lo	10.1	20-60	Lo to 50 mph	
0-60	Lo to 50 mph			Converter to speed	11.3
	Converter to speed	14.1	20-70	Lo to 50 mph	
0-70	Lo to 50 mph			Converter to speed	16.5
	Converter to speed	19.3	20-80	Lo to 50 mph	
				Converter to speed	23.6

SPEED AT END OF ¼ MILE FROM STOP: 73.2 mph (true) in 19.2 sec.

MINIMUM ACCELERATION time for 0-60 mph (true) over level road with no wind, best spark setting, premium fuel and driver alone 12.1 seconds.

ACCELERATION FACTORS:

True MPH	Gear	MPH/sec	Ft/sec²
10	Lo & Converter	7.0	10
30	Lo & Converter	4.8	7.0
50	Converter	3.0	4.4
60	Converter	2.3	3.4
80	Converter	1.2	1.8

HILL CLIMBING (calculated from acceleration data with allowances made for rotational inertia):

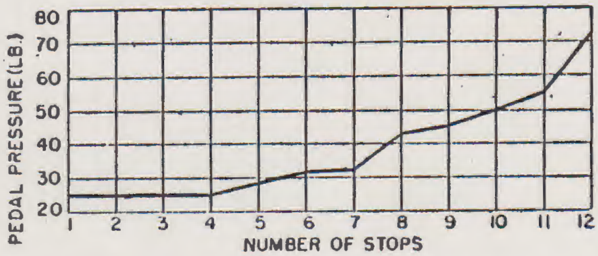
Approx MPH	Gear	Grade %	Pull in lb
15	Kickdown	40	1460
40	Kickdown	21	800

SPEEDOMETER-ODOMETER CORRECTIONS: Odometer distance 10.00 miles; true distance 9.82 miles; odometer error at 40 mph 0.18 miles. Multiplication factor and % of error 0.982 and 1.8%:

Speedometer MPH	True MPH	% Error Speedometer	Engine RPM	Speedometer MPH	True MPH	% Error Speedometer	Engine RPM
102.5	99.5	+3.0	4430	50	49.8	+0.4	2280
90	88.0	+2.3	3920	40	40.2	−0.5	1870
80	78.3	+2.2	3500	30	30.6	−2.0	1460
70	69.0	+1.5	3100	20	21.1	−5.2	1050
60	59.5	+0.85	2700				

LATERAL SWAY TEST OF CORNERING ABILITY: At 40 mph on 285-ft radius circle, side tilt angle recorded was 4½°.

BRAKE FADE TESTS (repeated applications of brake from 60 mph to 30 mph at deceleration rate of 7 ft/sec²): As indicated below, pedal effort doubled in 10 test stops.



LONGITUDINAL DIP ON BRAKING: At a deceleration rate of 21 ft/sec², body nose diving angle was 2¾°.

PARKING BRAKE TEST: When brake was applied hard and suddenly from 20 mph true speed, car braking distance was 38 ft. Left wheel locked; right wheel locked.

CHASSIS DYNAMOMETER HORSEPOWER (tests made by Jack Dezell, Clark Automotive Service, Chicago): Temperature 72° F; relative humidity 60%; barometer 29.6 in. Hg.

MPH True	Engine RPM	Vacuum (in. Hg)	Horsepower
75	3400	2.5	95
55	2500	1.5	74
35	1800	1.25	50

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

MPH True	Engine RPM	Equiv. Engine Torque (lb ft)	Axle Horsepower
90	4000	157	119
65	3000	172	98
40	2000	161	61

Per cent of advertised engine horsepower supplied to rear wheels: 67%.

PERFORMANCE FACTORS

(Calculated)

99 mph (true) at maximum advertised horsepower and 52 mph at max adv torque. Engine rpm at 60 mph (also revolutions per mile) 2720 rpm. Average piston speed at 60 mph (also, ft/mile) 1360 ft/min. Cu ft per minute of mixture at 60 mph (also, cu ft/mile) 208. Maximum engine horsepower (adv) per ton of car (curb weight) 97.2. Reciprocating load factor at 60 mph (based on piston weight, bore, stroke, rpm; an indicator of wear and stress on the engine; low values desirable) 918. Maximum engine horsepower (adv) per cu inch displacement 0.64. Power performance factor (a weighted average of CR, piston displacement, and curb weight): 128.

Above data and signed certification are reproduced from test reports.

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 Ebert

Member, Society of Automotive Engineers, American Society of Mechanical Engineers, Director, Automotive Research Laboratories, Professional Engineering Consultants, 1201 Noyes Street, Evanston, Illinois.

Performance Report with Power Pack

MODEL: Chevrolet Bel-Air V-8 4-Door Hardtop

TEST DATES: 1-6-56 through 1-14-56

GENERAL ROAD AND WEATHER CONDITIONS: Portland concrete generally smooth and level; cold winter days 24° to 38° F., barometer 29.7 to 29.8 in. Hg.

MILEAGE AT START: 379 **MILES COVERED:** 248

GAS: Premium **OIL:** SAE 10

CURB WEIGHT (with 10 gal gas): 3535 lb; 54% on front wheels; 46% on rear wheels

TIRE PRESSURE: 24 psi front; 24 psi rear

SPARK SETTING: 4° bTC at idle rpm

REAR AXLE GEAR RATIO: 3.55 to 1

TEST DATA

GASOLINE MILEAGE (checked with fuel volume flow meter and 5th wheel. Temperature 24° F; relative humidity 60%; barometer 29.8 in. Hg)

LEVEL ROAD FUEL CONSUMPTION (carried weight 603 lb. Average of two or more runs made in opposite directions over same road):

True MPH	True MPG	Odometer MPG	True Ton MPG
20	21.0	21.5	43.5
30	21.4	22.0	44.3
40	20.0	20.5	41.5
50	17.9	18.3	37.0
60	15.9	16.3	32.9
70	14.0	14.2	24.7

TRAFFIC FUEL CONSUMPTION (carried weight 573 lb): Simulated traffic pattern of city driving—stops, acceleration, braking:

True MPG	Odometer MPG	True Ton MPG	True Average MPH
13.0	13.3	26.7	22.2

CITY-COUNTRY FUEL CONSUMPTION (miles covered on 5 gal gas):

True Mileage	Odometer Mileage	True MPG	True Average MPH
85.3	87.1	17.1	32.9

OVERALL FUEL AND OIL consumed during test:

Total Mileage	Total Gal. Fuel	Total Oil	True MPG	Odometer MPG	Oil MPQ
248	18.3	1 qt.	13.2	13.5	248

ACCELERATION—LEVEL ROAD (timed with 5th wheel; carried weight 433 lb; temperature 28° F; relative humidity 50%; barometer 29.8 in. Hg; spark 4° bTC; average of two or more runs in opposite directions over same road):

True MPH	Gear Range	Average True Time (sec)	True MPH	Gear Range	Average True Time (sec)
0-20	Lo	2.75	0-80	Lo to 55 mph Convt. to speed	20.00
0-30	Lo	4.29			
0-40	Lo	6.00	20-40	Drive	4.08
0-50	Lo	8.05	20-60	Drive	9.08
0-60	Lo to 55 mph Convt. to speed	11.00	20-70	Drive	13.1
			20-80	Drive	18.1
0-70	Lo to 55 mph Convt. to speed	15.00			

SPEED AT END OF ¼ MILE FROM STOP: 77 mph (true) in 18.6 sec.

MINIMUM ACCELERATION time for 0-60 mph (true) over level road with no wind, best spark setting, premium fuel and driver alone 9.8 seconds.

SPEEDOMETER-ODOMETER CORRECTIONS: Odometer distance 10.00 miles; true distance 9.76 miles; odometer error at 30 mph + .24 miles. Multiplication factor and % of error 0.976 and 2.5%:

Speedometer MPH	True MPH	% Error Speedometer	Engine RPM	Speedometer MPH	True MPH	% Error Speedometer	Engine RPM
106	108.0	−1.8	4740	50	49.8	+0.40	2270
90	91.4	−1.5	4040	40	40.0	0.00	1850
80	80.8	−1.0	3590	30	30.4	+1.3	1440
70	70.2	−0.28	3140	20	20.8	+3.8	1050
60	59.6	+0.67	2680				

CHASSIS DYNAMOMETER HORSEPOWER (tests made by Jack Dezell, Clark Automotive Service, Chicago): Temperature 68° F; relative humidity 40%; barometer 29.7 in. Hg.

MPH True	Engine RPM	Vacuum (in. Hg)	Horsepower
77	3400	1.5	112
55	2500	1.25	74
43	2000	1.0	58

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

MPH True	Engine RPM	Equiv Engine Torque (lb ft)	Axle Horsepower
91	4000	184	140
67	3000	210	120
43	2000	202	79

Per cent of advertised engine horsepower supplied to rear wheels: 68%.

PERFORMANCE FACTORS
(Calculated)

104 mph (true) at maximum advertised horsepower. Engine rpm at 60 mph (also revolutions per mile) 2720 rpm. Average piston speed at 60 mph (also, ft/mile) 1360 ft/min. Cu ft per minute of mixture at 60 mph (also, cu ft/mile) 208. Maximum engine horsepower (adv) per ton of car (curb weight) 116. Reciprocating load factor at 60 mph (based on piston weight, bore, stroke, rpm; an indicator of wear and stress on the engine; low values desirable) 918. Maximum engine horsepower (adv) per cu in. displacement 0.775. Power performance factor (a weighted average of CR, piston displacement, and curb weight): 134.

Above data and signed certification are reproduced from test reports.

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 F Obert

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

ALL DETROIT SPORTS CARS COMPARED AND RATED!

Speed Age®

FOR EVERY MOTOR ENTHUSIAST

JULY 1956

SPECIAL REPORT: ALL ABOUT HOT ROD FUELS

GOLDEN HAWK

LET'S SAVE THE DIRT TRACKS!!

300–B

CORVETTE

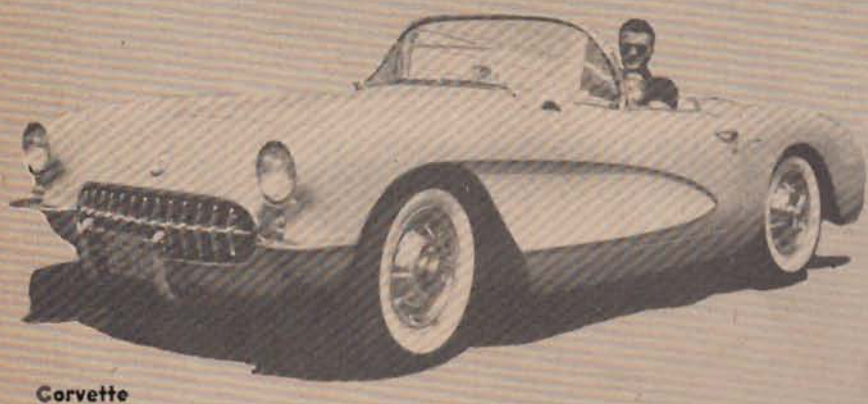
STOCK CAR RECORDS ARE PHONY

THUNDERBIRD

Jimmy

Golden Hawk

Thunderbird



Corvette

Chrysler 300B

By JIMMY REECE

TESTING AMERICA'S LEADING sports cars, the Chrysler 300-B, Chevrolet Corvette, Ford Thunderbird and Studebaker Golden Hawk, turned into an interesting assignment for me. Actually, I'm not certain that these can be classed as true sports cars, but I do feel that the Corvette, perhaps, comes the closest to fitting into that bracket. The others are sports-type cars, with the exception of the 300 which I consider more on a passenger car basis but a potent piece of machinery that would be appealing to any sport.

Of the four cars tested, the 300-B appealed more to me personally than the others. In my opinion, it fits all

No one knows as much about Detroit's production cars as the nation's stock car drivers. Day after day, on all kinds of road surfaces and conditions these men put stock cars through grueling trials and tests in competition with one another. In view of these facts, SPEED AGE has arranged for a series of tests of all Detroit cars by the nation's leading stock car drivers. We feel it will assure our readers of the inside story on performance and handling as interpreted by the men best qualified to judge.

This month, Jimmy Reece brings you his EXPERT TEST of the Chrysler 300B, Ford Thunderbird, Chevrolet Corvette and Studebaker Golden Hawk.

Reece TRACK TESTS AMERICA'S '56 SPORTS CARS

but a few minor points which I consider vital to safe, comfortable driving with added performance. It already has been proven as a potent stock car racing machine and its rich qualities and splendid performance make it an overwhelmingly pleasing passenger car.

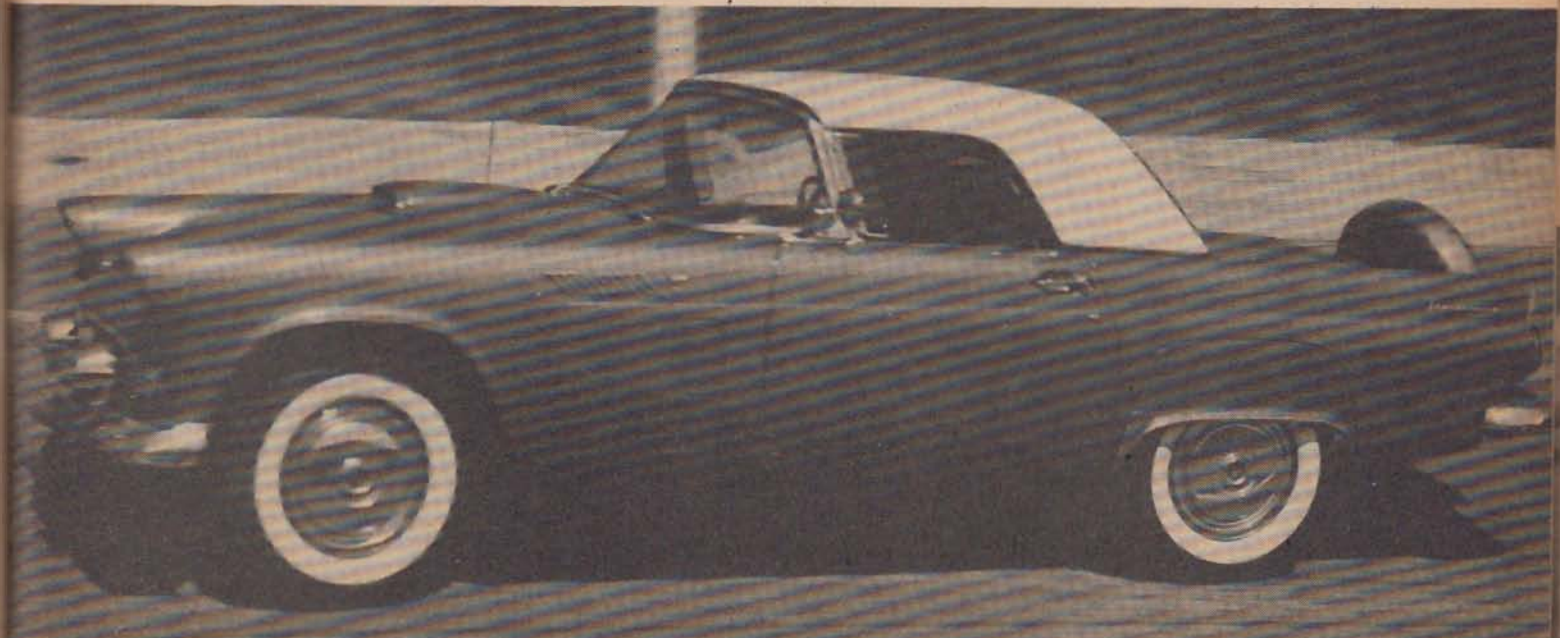
In all cases, I found both appealing and disappointing features about each of the cars tested. In every case, one feature was outstanding over all others such as the Golden Hawk's blazing get-away from a standing start, or the T-Bird's comfortable ride, and I found that, generally, each of these cars would make an owner proud.

It is difficult to make an accurate comparison between each of the cars tested since the differences varied to extremes in some cases, but we did determine that America's venture into the sports car world has not been a lost cause. Three of the cars tested were equipped with automatic transmissions. The exception was the Hawk which was equipped with a standard stick shift, a more preferable type of transmission over the automatics if you are looking for drag-type acceleration.

For acceleration, we put each of the cars through gruelling runs over the smooth and elaborate drag strip at Long Beach, Calif. We tested them both for acceleration from a standing start through the measured quarter-mile and for zero to 60 mph performance. In each case, the Hawk was by far the fastest, taking off with a neck snapping burst of speed that was impressive, to say the least. The Corvette followed, still fast but a bit slower than the Hawk. Then came the T-Bird, holding slightly better acceleration figures than the 300.

But while the Hawk got top rating for acceleration, it trailed the others in handling and cornering. In this department the 300 heads the list with a firm, stable ride in the corners, with little lean and plenty of assurance that it knows where it is going. Next

Jimmy Reece in the Thunderbird at speed.



Low canopy of T-Bird is tight fit for brawny Jimmy Reece.

Corvette's seating position gets checked by Jimmy.

Chrysler 300 was Jimmy's choice in the touring car class.

Best designed instrument panel was that of Golden Hawk.

I found the Corvette's handling abilities stable and firm, although a bit too rigid. The Thunderbird had a great tendency to "roll" in tight turns while the Hawk was much too slow on steering and showed a tremendous amount of lean in even moderate corners.

As for styling, I was most impressed with the 300 which is more in the stock pleasure car category. The other three, of the sports-type or sports car lines, are more comparable and the Thunderbird gets my choice here over the Corvette and Hawk, in that order. Interior-wise, the order of ranking them is almost the same. I say almost because the Corvette's instrument panel could definitely stand improvement, while the others were more closely grouped and easy to read without glancing away from the road for too long a period.

Now, let's examine each car more thoroughly.

STUDEBAKER HAWK

The Hawk, which is the result of the merger between Studebaker and Packard, embraces the Studebaker lines but gets off to a thundering start with a 275 hp Packard-built engine. This virtual bomb for a power plant, encased in a comparatively light chassis, makes for one of the most powerful cars on the road today. Its acceleration figures are startling, but spoiled by the fact that the car's suspension is too soft for good handling and cornering.

On the Long Beach drag strip, it out-performed each of our other three test cars with a trip through the quarter-mile in 17.01 seconds, hitting a speed of better than 85 mph. From zero to 60 mph, which was a bit rough to make because the rear wheels had a strong tendency to break loose from the pavement, the Hawk stopped our watches in 7.80 seconds.

In both acceleration runs, I was hampered by the gear shift lever which, when pushed into second gear, almost comes in contact with the top of the dash panel, making it extremely difficult to shift with speed. But still the car took off like a shot, with lightning-like speed. Torque is a big feature with this rather light chassis and engine that is loaded for bear.

Acceleration of the Hawk could, I believe, be improved through the use of Traction Masters; that is, radius-type rods that connect from the rear end to the frame, preventing the rear springs from rolling up and allowing the rear wheels to break loose when the tremendous power is applied. Stiffer springs and shocks also would be a help.

On our Mexican Road Race-type testing course, in the hills of Palos Verdes, Calif., the Hawk's tendency to be too slow in the steering department was very much in evidence. Our course covered hills and a straightaway with several horseshoe turns to provide an exacting test for handling and cornering.

On severe turns, there was a tremendous amount of body roll, causing the rear wheel to lift and break traction. On one severe curve, the roll-over was so extensive that it placed a tell-tale black mark almost down to the white sidewall of the tires. This, of course, occurred under extreme conditions but in comparison with the other cars tested, the Golden Hawk did not handle as well. That the steering was too slow was shown by the fact that it was necessary to twist the wheel more than usual in order to hold a tight turn.

Driving characteristics of the Hawk are not at all unimpressive. I was pleased with the instrument panel, which was complete with tachometer and vacuum gauge. The instruments, grouped for easy reading, were dark faced and of the type we use in race cars. All necessary gauges are located directly in front of the driver.

I was impressed with the car's low styling, although it takes a while to get used to, and I bumped my head on the roof in the back seat. But the body lines have an appealing appearance from front to rear. Inside styling also is appealing, although leg room, as in most sports cars, is not over abundant.

Two interior details on the Golden Hawk, in my opinion, could stand improving. One is the angle location of the brake pedal in relation to the clutch. The latter is located in the normal position, but the brake pedal is closer to the floor, making both pedals uneven and confusing.

The other item is seat belts, of the type installed in our test car. One end of the belt is anchored to the floor and passed through the front seat where it is attached to the other end by means of a buckle. The other end, however, is fastened to the door so that, when the belt is hooked over the occupant, it is anchored to the floor in one place and to the door in the other, to hold the door closed in case of an accident. This set-up does not appear to be too useful since doors usually are subject to great strain, causing them to fly open in a severe crash. The belt being hooked to the door may not be much help in that case and the belt itself would be useless.

CHEVROLET CORVETTE

As for the Corvette, our acceleration tests unearthed these figures: zero to 60 in 8.40 seconds, and a quarter-mile from a standing start in 17.12 seconds. Under tremendous power of acceleration, the rear wheels broke traction but not to a great extent, giving the rear discs more bite for a smooth, fast take-off.

In city driving, the Corvette rides firmly but stiff. I was not too impressed with its riding characteristics in the city; but once on the highway, the stiff suspension and shocking was a great boon to proper handling and cornering at high speeds. The car handled the sharp curves well, holding firmly to the road without a great deal of lean.

Carburetion, by means of two four-throat carburetors, could be improved for competition. In tight turns, the shifting of weight and fuel caused a momentary miss at a time when power was needed. But the engine delivered plenty of punch for smashing get-away down the long chutes. Acceleration was good, too, in city traffic where sometimes it is needed rather badly.

The linkage set up on the Corvette is such that one carburetor is in operation until the throttle is depressed half-way. There is a distinct stop there before the second carb cuts in, giving more power. But in our tests, using half throttle, we ran up to 97 mph as indicated on the speedometer.

The engine of the Corvette seems to be sturdy enough. We wound it as high as 7000 rpm, according to the tachometer, without any noticeable vibration or valve float. And it has a healthy sound, coupled with dual exhausts that give a pleasant rumble of power.

Certainly an attention gatherer, the Corvette's new styling for 1956 is greatly improved over former years. Re-locating of the tail lights, installation of side windows, a new hydraulic top and better workmanship of the

Black marks in concrete show where Jimmy made repeated turning tests.

High speed turns on mountain bend gave Jimmy Reece a good idea of relative handling under these conditions.

fiberglass body are great improvements. The instrument panel, however, is not at all practical. Each of the important instruments, tachometer and oil gauge, are located on the passenger's side, away from the driver. To read them accurately, I was forced to take my eyes from the road longer than is considered safe. Grouping of all instruments in one location in front of the driver would help a great deal.

Steering is fast, but not fast enough for competition. On our test course, subjecting the car to sharp corners at speed, brake fade was evident but not as severe as in many cars. However, for competition, the car could use bigger brakes. Back to the steering department, I was really impressed by the addition of a new type steering wheel, much on the same order as those used in race cars, with metal spokes and a *racey* look.

Corvette engineers this year have made a few minor changes in the chassis, such as caster degree and suspension rate in the rear. These changes have made a better handling car, with a stable feel. In the tight turns of our test course, for instance, the car tended to drift in the corners. But it was a comfortable and secure drift that left me with complete control of the automobile and I was able to handle it as desired by opening or closing the throttle.

The Corvette engine, producing 225 hp at 5000 rpm, lists a piston displacement of 265 cubic inches. With the exception of the carburetors cutting out slightly on hard turns, it is a smooth operating and highly efficient engine.

Knock-off hubs on all four wheels add to that racing look but I do believe that the fake air scoops mounted on both front fenders could have been put to good use such as to cool the brakes. As for the body itself, although styled nicely and greatly improved over previous models, it had a tendency to rattle, probably from the stiff suspension and shocking. This, however, was not evident on high speed driving.

Transmission on the Corvette seemed healthy enough. It gave me the impression that it would withstand the punishment of rapid acceleration and rather harsh treatment without offering trouble. In many of our cornering and handling tests of the car, I used low gear as a braking power to reduce speed for corners, thus saving the brakes as much as possible. The braking in low gear was not tremendous but it did help slow the car and was most useful for quick acceleration afterwards. The gear selector, located on the floor between the two seats, is easily accessible and works freely.

In the treacherous turns of our test course, I found that the Corvette maintained good speed and creditable handling abilities adaptable for racing but it was necessary to keep engine rpms up in order to maintain a good racing pace. This was not too difficult to do since good handling characteristics made it unnecessary for me to focus all my attention on fighting the wheel.

FORD THUNDERBIRD

Although the Thunderbird, to me, showed better styling, it impressed me as more of a family-type sports car in comparison with the Corvette. The ride was noticeably softer and more comfortable but excessive lean in tight corners made it seem less secure when it came to handling. As in the case of our Chrysler 300 test car, the T-Bird was equipped with power steering which is difficult to get used to after pulling the wheels of race cars.

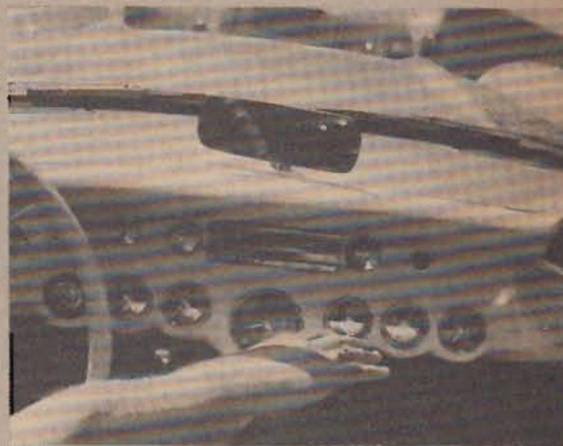
On acceleration runs, the Thunderbird was third in comparison with our other test cars. In the quarter-mile run from a standing start, it clipped off the distance in 17.21 seconds, and hit an impressive 8.60 second clocking for the zero to 60 test. Of the several tests we ran for acceleration, we achieved the best figures by shifting from low range to drive at approximately 4000 rpm as indicated by the tachometer. At one time, I did wind the engine as high as 4600 rpm but our figures were not as good.

The engine generally is sound and healthy. It is capable of cruising along at 75 or 80 mph without effort or noticeable strain. Increased slightly over last year's model, the '56 Bird offers 225 hp with Fordomatic, listing a piston displacement of 312 cubic inches. Wringing it out over our test course, the power plant responded nicely to throttle punishment with the exception of carburetion which, as in the case of the Hawk and Corvette, caused a slight cut out in extreme turns.

For competition, the Thunderbird is definitely undershocked, and could stand a big improvement in the brake department. Our high speed tests for cornering showed considerable lean in the corners which prevented my

(*Continued on page 96*)

Tire pressures received special attention to insure proper handling.



Corvette cockpit layout is scaled by Jimmy.

Golden Hawk's safety belts were commented on by test crew.

Jimmy checks 300B's plugs before making runs.

(Continued from page 93)

vergent competitive interests of members of the sponsoring organization and contained only three races.

Ron Pearson continued Volvo's winning string in the sedan races during Saturday's opening event by finishing 13 seconds ahead of Marv Patchem in a Simca Aronde.

The Ladies' Race saw some of the finest driving of the week-end as Pat Sawyer, driving Nick Pastor's modified Triumph TR-2, came within one second of having victory snatched from her by the Lotus Mk 9 driven by Meyera Buchanan, who lost valuable ground when she stopped to close the car door in mid-race.

Only three cars turned out for the races for Formula III and unrestricted category cars, Marion Playan finishing well ahead in his MG-powered Formula Libre entry. •

Track Tests

(Continued from page 23)

getting back on the throttle immediately without getting into a slide. The rear end felt stable, however, and showed no tendency to jump into an undesired skid. At more moderate speeds, handling was better.

The ride itself on the Thunderbird was more comfortable than with the Hawk or Corvette. It was more on the pleasure car line, with a good seating and steering wheel position for commanding comfort. Inside, I liked the security of the car's safety belt and padded dash which, in the latter's case, was far better than any of the other cars tested. The Corvette, of course, did not have a padded dash but the others did. In comparison, the Thunderbird's padding was thicker and more practical for the purpose for which it is intended.

During rough treatment over our test course, I used the brakes a great deal, and found evidence of brake fade although not quite as much as with the Corvette. Due to the car's tendency to lean hard in the turns, I used more brake on the Thunderbird than on the Corvette, and while the brakes became hot, they did not fade too quickly.

CHRYSLER 300-B

As for the Chrysler 300-B, I found it to be the best handling car I've ever driven from a dealer's showroom. This is one car that came from the manufacturer with all the goodies a critical driver looks for. With the exception of the power steering, which was *too* quick, it filled just about every factor I look for in an automobile.

While it did not accelerate as quickly as the others, it must be remembered that it packs a great deal more weight. Taking this into consideration, acceleration for the car is plenty rapid. On the drag strip, our figures for the quarter-mile standing start gave us a reading of 17.80 which was attained by starting in low range and shifting into drive at about 45 mph. On the zero to 60 run, made the same way, our watches indicated a 9.10 second clocking.

On the test course, the big 300 handled best of all our test cars. It stayed flat on the tight turns, without lean or body roll, and the rear end felt more secure to me than it did with any of the others. At all times, I was conscious of a perfect feel of control. In addition, it carbureted without a miss where the others had that slight miss just when the power was needed.

In just about every passenger car I've driven, the shocks were too light or unstable for any kind of punishment. Such was not the case with the 300. The chassis was firm and stable, yet the ride was smooth and comfortable. For racing, I would prefer the shocks a bit tighter but they are very suitable for the road.

COMPARISON OF ACCELERATION

	Quarter-Mile Run in Seconds*	0-60 mph
Golden Hawk	17.01	7.8
Corvette	17.12	8.4
Thunderbird	17.21	8.6
Chrysler 300-B	17.80	9.1

*Standing start

Inside and out, the 300 filled the bill for handling, styling, power, speed and driving comfort. The body lines are sleek, with just the right amount of chrome to set it off. Inside, the seats, all leather, are filled with arm chair comfort. In our test car, seats were controlled by four-way power that made available any type driving position desired.

One of the most impressive features about the 300's interior, to me at least, was the extra long brake pedal. From driving race cars with the foot brake on the left side of the cockpit, I've formed a habit of braking with my left foot without taking my right one away from the throttle. The pedal on the 300 extends on both sides of the steering column where it can be reached easily with the left foot—or the right if desired.

Push button driving was another feature that impressed me greatly, although for a time, I was hunting for

	CHEVROLET CORVETTE	CHRYSLER 300-B	FORD THUNDERBIRD	STUDEBAKER GOLDEN HAWK
Cylinders	V-8	V-8	V-8	V-8
Bore and stroke	3.75 x 3.00	3.94 x 3.63	3.80 x 3.44	4.00 x 3.50
Horsepower	225	340	225	275
Displacement	265	354	312	352
Compression ratio	9.3-1	9.0-1	9.0-1	9.5-1
Maximum torque	270	NA	324	380
Carburetion	dual 4-barrel	dual 4-barrel	one 4-barrel	one 4-barrel
Wheelbase	102	126	102	120.5
Overall length	168	223	185	204
Overall width	71	79	71	70
Overall height	51	58.6	52.2	56.3

the usual stick gear selector on the steering column. But the push button selectors are great—a coming thing I believe, in all Detroit products. With my left arm resting on the arm rest of the door, I could select the gear I wanted, press it with one finger and the car was underway.

Under the hood, a 340 hp V-8 engine, packs a terrific punch. Fed by dual four-throat carburetors, the big powerplant develops tremendous torque. Idling, the engine sounds like a race car, and it rumbled with a pleasant sound that indicated power. Boasting 9.0 to 1 compression, the engine has a high-output full-race cam with mechanical valve lifters and rocker arms. Two oil bath air cleaners on the carburetors greatly increase engine breathing.

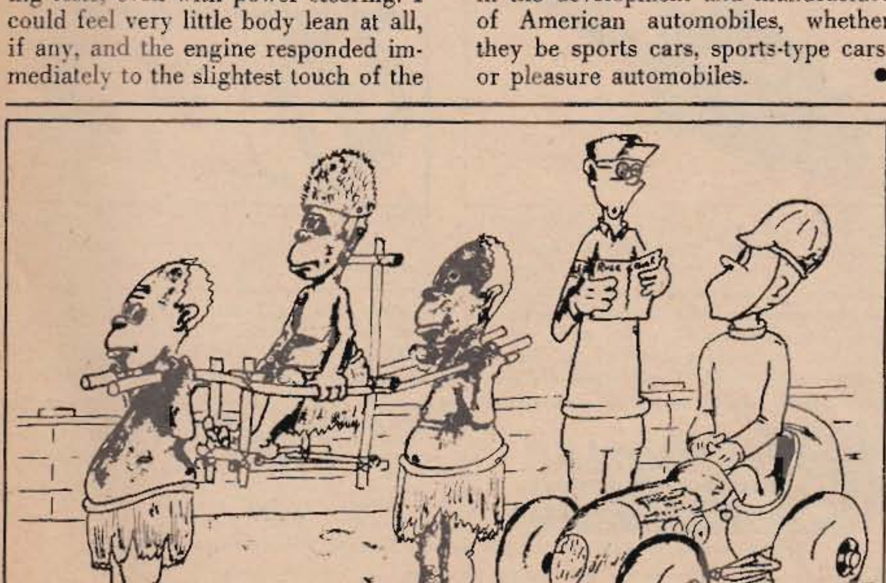
At no time during acceleration runs, did the rear wheels break traction. Get-away was fast and smooth, without the chatter of undershocking or too soft suspension. Long and low, the 300 settled to an even take-off when the power was applied.

I was really surprised with the way the car handled under severe cornering tests, even with power steering. I could feel very little body lean at all, if any, and the engine responded immediately to the slightest touch of the throttle. Although it is big, the 300 maneuvered through hills, S turns and city traffic with all the ease of a smaller car, and all of this in strict comfort.

While I consider the power steering too fast for racing, it was ideal for parking. The 300, in fact, was easier to drop into a parking spot than a smaller car. The steering wheel will turn from lock to lock with pressure from one finger. But for my own purposes, I'd prefer not to have power steering, and I guess most race drivers share this feeling.

In conclusion, I would like to say again, that America's venture into the sports car or sport-type car world has not been a lost cause. Each of the cars tested showed definite features that were outstanding and superior, and they are getting better all the time.

True, we found unappealing features and many that needed improvements for both highway and track conditions. But I think racing of all types in this country, has and will continue to play an important part in the development and manufacture of American automobiles, whether they be sports cars, sports-type cars, or pleasure automobiles. •



Their letter said African midget champs!