A Plan for the Future

Car Life offers a program whereby Studebaker could update and expand its automotive line

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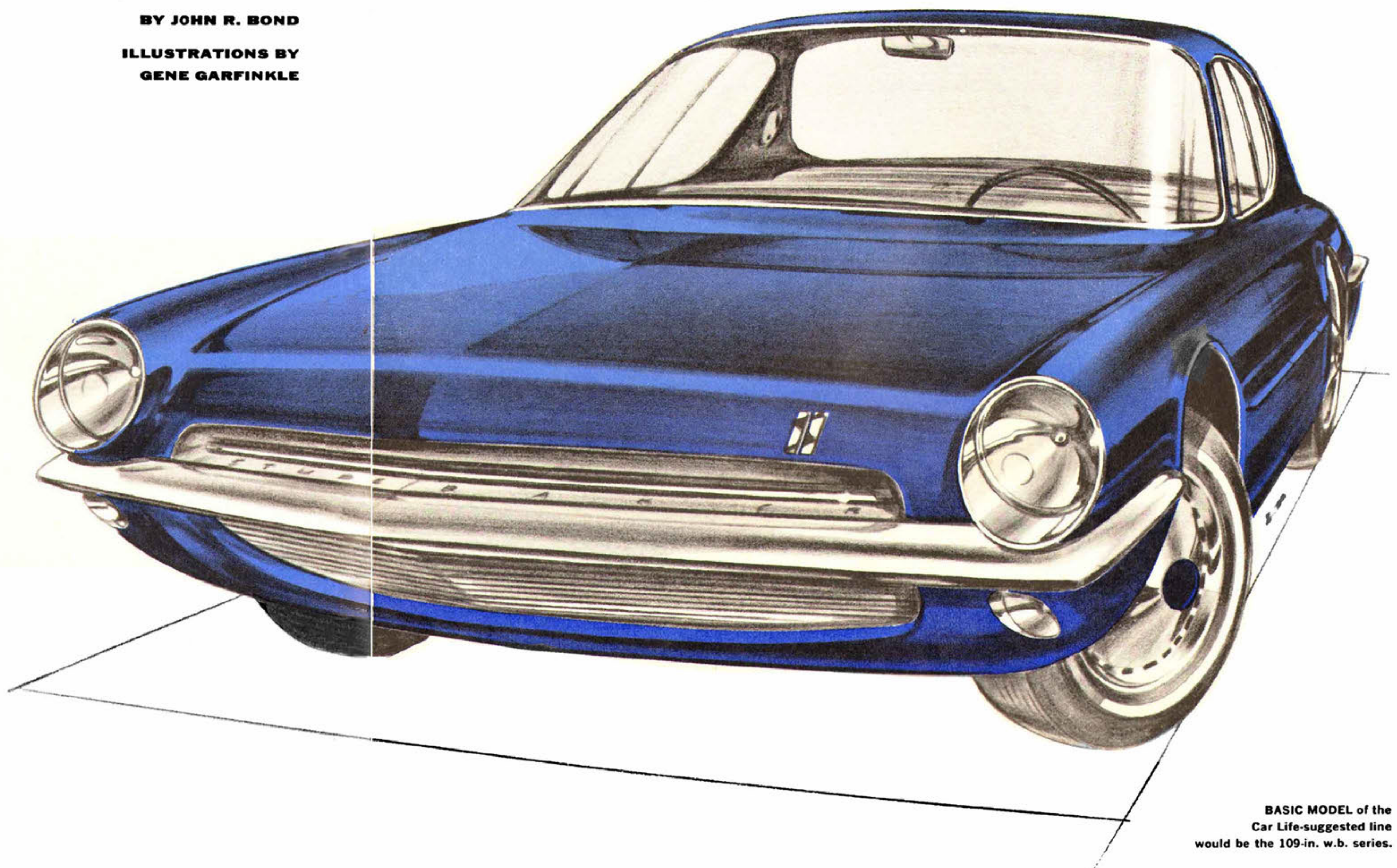

BASIC MODEL of the Car Life-suggested line would be the 109-in. w.b. series.

A favorite subject for discussion around the Car Life offices is "what would you do if . . ." and in the case of Studebaker the problem takes on special significance in view of the fact that a fairly drastic revision of the models may be in the offing, at 1964 model announcement time. This article is not intended to be a preview of what Studebaker will do, rather it is a compilation of what we think would be necessary to make Studebaker a stronger contender in the automotive industry.

THE STUDEBAKER Corporation of South Bend, Ind., is America's oldest manufacturer of automobiles. In the Twenties it was strongly competitive, but in 1933 Studebaker was bankrupt; by 1941, it was again doing well and by the late Forties appeared to be in a comfortable position. Yet 10 years later the situation had reversed and sales fell well below 100,000 passenger cars per year.

The reasons for these extremes are many and varied, beyond the scope of this proposal. Our purpose here is to suggest a program designed to correct some of the problems, bearing in mind that it is no longer possible to show a profit on a volume of only 100,000 units per year and it is not possible to build a strong dealer organization with such a limited volume of sales.

Here we shall deal with the primary product, the *car*, a problem which at least as we see it, resolves into three important areas.

1. The product must be more competitive. While poor sales results can sometimes be blamed on an insufficient number of dealers, one of the prime reasons for lack of significant customer demand is unpopular appearance. In short, we rate "looks" above all other factors, as the most important single selling feature. Studebaker builds good cars, it has dealers in nearly all cities of more than 100,000 population, but the styling has been too far out-of-step with current fashion.

2. The present product range is too narrow. Studebaker builds only compacts (i.e., under 190 in. long, overall). While the Rambler success story in this category is well known, we must realize that only 21% of all cars sold are of true compact size, including the following cars:

Ford Falcon	355,886
Chevrolet Chevy II	343,693
Chevrolet Corvair	289,885
Rambler Classic	273,725
Rambler American	114,583
Studebaker Lark	77,436
Rambler Ambassador	34,796

As low man on the totem pole, and at that a pole which represents barely one-fifth of the total automotive business, the need for a full-size, 119-in. wheelbase Studebaker to compete with the Big Three (Ford, Chevrolet and Dodge) should be fairly obvious.

If we add up all sales in the group just above compact size, up to and including all cars having a wheelbase between 112 and 120 in., the slice of pie in this standard-size, popular-price group amounts to no less than 56% of the total market.

3. Manufacturing costs must be reduced, for survival. This is a simple and obvious statement to make—getting it done is something else. Volume, and we mean half a million units, is almost essential in order to be competitive in price. Capital, and lots of it, will be necessary to buy the modern manufacturing equipment that is, in turn, a prerequisite for lower manufacturing costs.

In the final analysis, the cost of a product can be controlled to a considerable extent by the engineers who do the design work. There is a large unexplored area in cost reduction via close liaison between engineering and manufacturing. There is, perhaps, an even more lucrative area to explore—the opposite of the current trend toward a wide variety of models and options; call it "standardization" (or even rationalization). We shall explore this further later on, but one of the ideas is to design the product so that it will be easier for the dealer to install, or even exchange, optional items. This would simplify manufacturing and reduce the multiplicity of models required to adequately stock the dealer.

The Product

So much for the preliminaries; how do we propose to achieve our three prime objectives?

Briefly, our program would be to design two basic cars, each with two wheelbase lengths. These would be 109 and 114 in.—and 119 and 129 in. The shortest model is the same as the current Lark, the next is 1 in. longer than the current 4-door Cruiser and Wagonaire. The 119-in. chassis would be all new and the 129-in. job would merely be a stretched-out version for a big luxury car.

For powerplants we propose dropping the in-line Six and replacing it with a 90° V-6 version of the current V-8. This would offer tremendous manufacturing savings and, as we shall see, sales advantages as well.

Names

Some good old Studebaker names would be revived for our proposed line of new cars. We thought of reviving Pierce-Arrow (owned by Studebaker), but finally settled on Packard for the big 129 in. wheelbase car designed to compete with Cadillac.

For the big-selling model (119 in. wheelbase), we liked President, after Studebaker's top car of the Thirties, a model still highly respected by those who remember it.

Next in line, in naval hierarchy of course, is the Admiral. We thought about Studebaker's Sheriff, Dictator and Champion but wanted to put the Commander in its proper sequence. Hence, we have named the second-best seller in the line the Admiral (114 in. wheelbase). The 109-in.-wheelbase replacement for the Lark would be the Commander.

The Avanti name would be continued, of course—we call it the Avanti II. The new proposed lineup thus looks like this:

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Class	New Name	Old Name	Wheelbase	O.A. Length
prestige	Packard	None	129 in.	220 in.
medium	President	None	119 in.	205 in.
standard	Admiral	Cruiser	114 in.	195 in.
compact	Commander	Lark	109 in.	185 in.
Grand Touring	Avanti II	Avanti	109 in.	185 in.

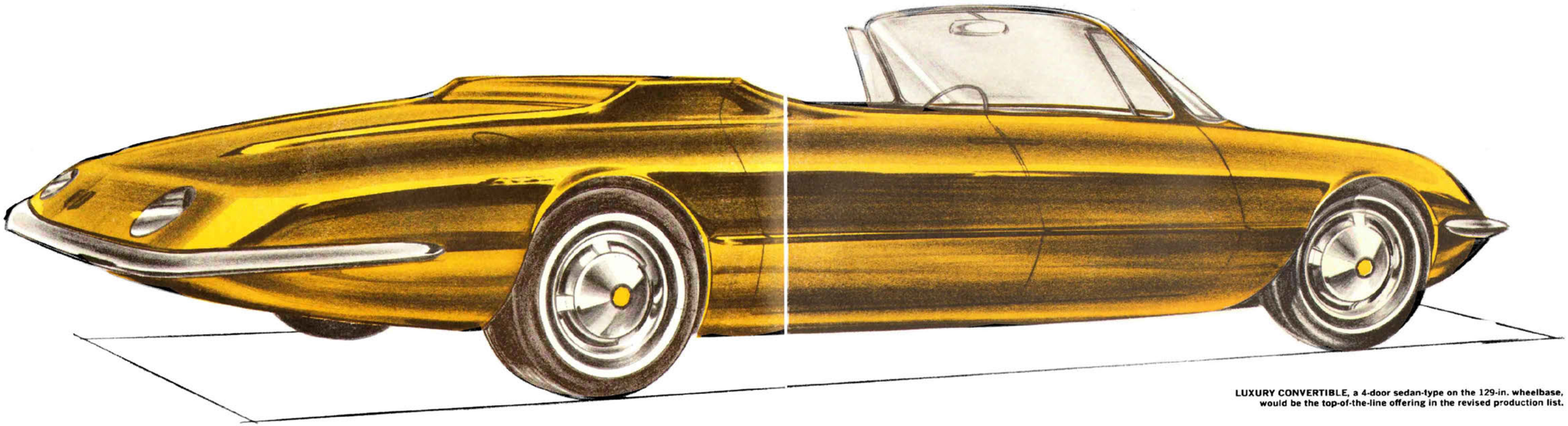
Engine Rationalization

The old in-line Six dates back to the 1939 Champion, although it now has overhead valves and a much heavier crankshaft, of course. Its primary limitation is that it was originally designed for a 3.00-in. cyl. bore and, with siamesed cylinders, there simply isn't any space left to keep up with the cu. in. race. While its 170 cu. in. is currently still in the picture (competitively) we believe more displacement will be necessary in the immediate future.

The V-8, on the other hand, was designed from the start with space for future expansion. With 4.5 in. bore centers there is room for a maximum cyl. bore of 4.10 in. (Chevrolet's 327 V-8 has 4.00 in. bores on 4.40 in. centers.) The block height (at 45°) is 10.09 in., enough room for a proper piston, rod, and a stroke of nearly 4.00 in.

Without going into all the details and ramifications, we propose a minor redesign involving a few pattern changes and oil-hole relocations. Some further tooling changes would also be required so that a 90° V-6 block could go down the same machine tool line.

Currently, the Studebaker V-8 engine has one cylinder size (3.5625 in.) and two strokes (3.25 or 3.625 in.). We made a lengthy analysis of engine ▶



LUXURY CONVERTIBLE, a 4-door sedan-type on the 129-in. wheelbase, would be the top-of-the-line offering in the revised production list.

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size requirements on the basis of competitive lb./bhp and high gear performance factors. A summary of this appears in Tables II and III.

The rationalization program thus breaks down to two basic engines: a V-6 block with two sets of core patterns, a V-8 block with three sets of core patterns, three different crankshafts, three pistons and one connecting rod. A summary is shown in Table I. The V-6 engine should weigh less than 500 lb. complete with flywheel, the V-8 about 150 lb. more.

Some head redesign would be necessary to allow space for the extra-large valves needed for the goal of one horsepower per cu. in. in the racing engine option, but most of the tooling would not need revision.

The present forged crankshaft should suffice for the V-8, although a later change would be to use a cored, cast crankshaft with main bearings increased from 2.50 to 3.00 in. diameter. The V-6 could use a 2.50-in. cast crankshaft to save forging die costs. The large 4.10-in.-diameter pistons would be impact extrusions and this largest displacement model would require new angle-split rods for clearance reasons if all the old block interior dimensions were unchanged.

Actually, the engine development program should be set up in two stages. The first, already described, would involve an absolute minimum of changes. The second stage, for 1966 at the earliest, would involve a fairly complete redesign, primarily to reduce the size and weight of the engines. Thus, the block length at 45° could be reduced (*à la* 1963 Cadillac) with shorter rods and piston compression length. The cast, 3-in. main bearing shaft could wait for this redesign, as could the 401-R high-output engine. The camshaft should be raised about 0.5 in. for rod clearance and the expensive timing gears replaced by the latest (and better) chain drive with an aluminum sprocket having molded nylon tooth surfaces.

The accessories could be rearranged at this time in the current mode of a grouping in front on a die-cast aluminum housing. This, combined with the cored-out crankshaft, more compact cylinder block and other changes should reduce the V-6 weight from 500 to 460 lb., and the V-8 by 50 lb., from 650 to 600 lb.

At that time it would also be interesting to see a new approach to engine-driven accessories: for instance, a combined starter and alternator mounted at the front of the crankshaft, a simple, bolt-on power steering pump driven directly off the front end of the camshaft, and an optional air-conditioning compressor designed as a part of the package, rather than bolted on as an afterthought. Thus, a V-belt would only be necessary for driving the water pump or an optional compressor; it might even be possible to eliminate all belts.

Incidentally, these engines would be designed for quick and easy exchange so that if a customer saw a car that he wanted, but which happened to have the 279/195 V-8 engine, then the dealer could switch to the 248/150 V-6, or the 330/250 V-8 in an hour's time with two mechanics. (All axle ratios are the same in all models, 3.08:1.)

Transmissions

In order to eliminate the front transmission hump, as well as lower the rear seat, the 3 optional transmissions are all bolted directly to the differential. The transmissions for all models are identical, a 3-speed manual (Warner-Gear's T-86), the Warner T-10 4-speed and the usual 3-speed automatic.

Later, when time permits, the 3-speed should be equipped with a synchromesh low gear. An option for the 4-speed would be overdrive-type switches to provide an accelerator-controlled 3-4 shift and a kickdown from 4-3. This would allow a simple 3-speed, H-type control pattern with all the advantages of overdrive—at lower cost. All manual transmissions would have floor shift.

In automatic drive the torque converter would be bolted to the engine and this would require a larger front oil pump on the rear-mounted transmission—which otherwise is completely standard as now produced. All models would use a 11.25-in. converter, turned wrong-side-out so that the stator element would bolt to the block and facilitate the use of engine oil as the fluid medium. The outside diameter of this converter would be only 12 in. and no housing would be required. This saves weight and cost, and allows the engine and drive-line to be lowered. The control for the automatic would be a column lever with conventional manual-type H-pattern and no illuminated indicator is required. Position 1 gives low gear only, 2 gives 1st and 2nd gears only, position 3 is Drive. Park position would be via a knob on the instrument panel or incorporated in the first inch of handbrake movement.

On manual transmissions, the 10-in. clutch would bolt to the flywheel and no clutch/flywheel housing would be necessary because a hydraulic cylinder would be used for disengagement, with a flexible hose connection to allow engine shake.

The "open" converter and/or clutch design improves the cooling of these components and will be a tremendous boon for the serviceman.

As mentioned earlier, all differential assemblies are identical with a gear ratio of 3.08:1. The engine sizes have been carefully tailored to the weights for performance equal to or better than Studebaker's competition. However, the transaxle assembly lends itself to easy dealer exchange of assemblies, should special gear ratios or a limited-slip differential be required by the customer. Optional ratios of 2.76, 3.31 or 3.63 should suffice and these could be stocked by the dealer. A speedometer driven by one front wheel would retain speedometer accuracy, regardless of axle ratio changes.

The Chassis

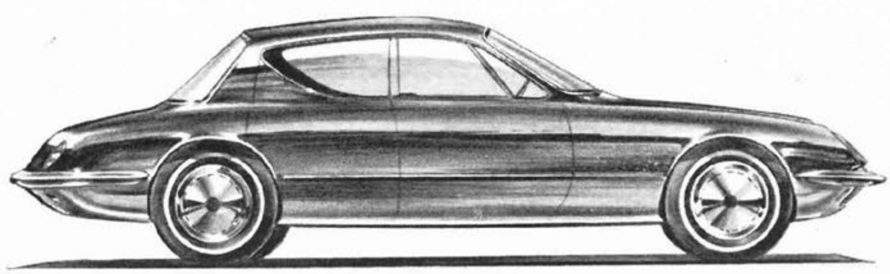
The concept of two basic packages, each on two wheelbase lengths, plus all new bodies, would require two new frames. We propose a new method of construction, one which might be described as semi-unit. This would consist of simple, easy-to-tool, perimeter-type frames (similar to the Olds 88), but with the body more or less integral rather than separated by, and mounted on, a dozen or more rubber cushions.

The two side rails for the 109 and 114 in. chassis would be identical except for length. They would be formed as box sections, measuring 5 x 5 in. The two long-wheelbase models would use rails 6 in. deep. The front torque boxes would be roughly triangular in section; to form the lower portion of the dash/floor, and extend completely across the frame, rail to rail (see drawing). Body rocker panels attach directly to the side rails, and the floor pan also adds to overall stiffness. The cowl structure would tie in front suspension loads to the rails and reinforce the joggle at the torque box.

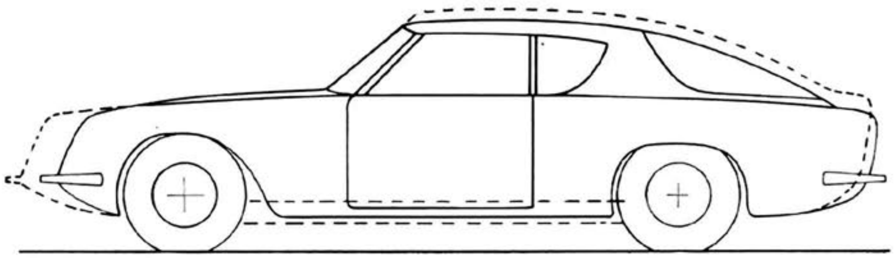
Studebaker's current front suspension would be used until time could be found to design a new one with ball joints, raised roll center, anti-dive and other modern features. All parts would be interchangeable between all models (except springs) and the difference in tread would be provided by the two frame designs.

A transaxle design is proposed because it has many advantages which offset its slightly higher cost of manu- ▶

STUDEBAKER— How Far Forward?



SMALL SEDAN, renamed Commander, would have small engines, light weight.



AVANTI II proposal shows more acceptable front end and tail sections.

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facture—independent rear suspension development is inevitable anyway. This suspension would be geometrically similar to the '63 Corvette, but with conventional semi-elliptic springs. The springs are inboard of the frame rails for better body/trunk support. This is permissible because rear-end roll stiffness need not be as strong as in front.

An inherent limitation of independent rear suspension is permissible universal joint angle. We would allow 4 in. rebound and 4 in. jounce travel on all models. This would be ample for the 109/114 chassis, but not enough for the two longer models. To obviate this, the 119 and 129 rear shock absorbers would be something new: the old double-acting lever types with a simple load-leveling device recently developed in England. This new shock utilizes the first few bumps (when moving off) to pump up pressure in the proper chambers so that the rear end always remains at the mid-point regardless of loading. With this feature low-rate springs can be used even though the total rear wheel travel is only 8 in.

Another riding comfort feature, long overdue, is compartmented pneumatic cushions. These would be standard on the 129 in. chassis, optional on the 119 in.

Brakes would be standardized as much as possible, possibly in 2 sizes only, such as 10 x 2 in. drums for the 109 and 114, and 12 x 2.5 in. for the two large cars. Aluminum front drums would be optional and are easy dealer modifications. Power brakes and power steering would also be designed for easy dealer removal or addition. Chevrolet's trick of adjustable steering ratio (on the Corvette) could be employed on all models, as could the in-out steering column adjustment.

Bodies

The two basic bodies would use a very large number of interchangeable steel parts, but fiberglass panels would be used in some models to give them identity.

Another area for easy dealer exchange is in the upholstery department. Here the multiplicity of options, colors and materials is a real headache for both manufacturer and dealer. We would propose snap-in door panels and zip-on seat covers for all models. If the customer wanted a de luxe-grade trim, or even genuine leather, the dealer could make the change, and the extra profit, in a few minutes.

Body outside trim details would also be rationalized—one model only, insofar as the factory is concerned. De luxe trim and accessory groups would all be dealer installed.

Two cowl-windshield assemblies would be required because the 2 smaller cars are 71-in. wide overall as compared with 77-in. for the 119 and 129 chassis. But all doors would be the same stampings for all 4 cars. Front doors are shown 36-in. wide on the 109 and 114 4-door, 42 in. wide on the 2-door bodies (not shown), 42 in. wide on the 119 and 129 4-door models. Rear doors are all 33 in. wide with different cut-outs for rear wheel clearance, according to wheelbase requirements.

All doors are the convertible type for easier tooling and because of the popularity of hardtop styling.

Only two windshields are required and these would be of single-constant radius type with no wrap-around or compound curves.

All roofs would be fiberglass with bonded-in polyurethane headlining. This would save a tremendous amount of time and money on tools.

The anticipated popularity of the 114 and 119 chassis should make all-steel front and rear ends practical, but the Avanti, the 109 and the 129 models could use fiberglass fender panels for styling individuality at very low cost.

We would like to see all door hinges of the ball type, similar to permanently lubricated steering joints and easy to align. Latches should be the positive-taper-pin type used on the Avanti. All door glass would be curved and designed to give maximum shoulder room (where more space is most needed) rather than extra hip room,

TABLE I—ENGINES

Name	bhp	bore x stroke	cu. in.	rod length	Piston compression ht.
Economy V-6	127	3.562 x 3.50	209	6.50	1.84
the Big Six	150	3.875 x 3.50	248	6.50	1.84
Economy V-8	195	3.562 x 3.50	279	6.50	1.84
Hi-Torque V-8	250	3.875 x 3.50	330	6.50	1.84
Hi-Power V-8	325	4.100 x 3.80	401	6.50	1.69
Racing V-8	401	4.100 x 3.80	401	6.50	1.69

TABLE II—PERFORMANCE FACTORS
(cu. ft./ton mile)

New Name	Wheelbase	Curb Weight	Tires	engine size, cu. in. 209	248	279	330	401	401-R
Commander	109	2800	6.00-15	96	112	—	—	—	—
Admiral	114	3100	6.50-14	—	105	118	139	—	—
President	119	3400	7.10-15	—	98	110	130	157	—
Packard	129	4000	8.00-14	—	—	—	—	124	—
Avanti II	109	2800	6.50-14	—	—	—	—	185	185

as on the Lincoln Continental for example.

The 71-in.-wide bodies, with a track of 58-in., should have interior widths of 59-60 in. The wider 77-in. bodies with a track of 61-in. should achieve seating widths of 63-64 in. to be competitive. (The larger tires required on the 119 and 129 chassis limit seat width, despite the 6-in. wider bodies.)

The Avanti II

The Gran Turismo Avanti model has proven to be extremely successful, both as a special sort of car and as an attention-getter for Studebaker. It doesn't make any money for the corporation and it might even be losing a little. But the dealers like it and it definitely should be continued, in improved form.

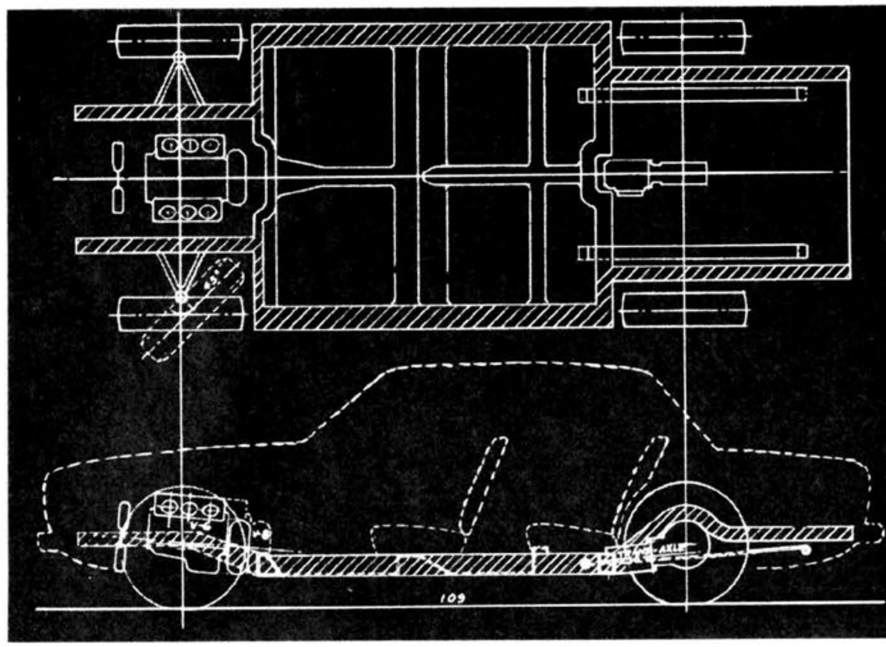
The most needed improvements are a better weight distribution (less weight on the front end) and a less controversial styling treatment.

On the rear end, the original package limitations required a high rear seat because of Lark frame limitations. This in turn put the rear roof line rather high. The new perimeter-type frame and transaxle described earlier will allow a more conventional tail section.

The transaxle also puts more weight on the rear wheels, a step in the right direction. The 109-in. chassis proposed here for the V-6 Commander puts the cowl section 5-in. farther forward than on the other three models. This was done to give more legroom on the short, 109-in. wheelbase, because a 209 or 248-cu. in. V-6 engine gives ample power with little or no need for including a V-8 option.

But the Avanti needs a V-8, so its cowl/windshield is 5-in. aft. It would have been possible to put the 4.5 in. extra length of two more cylinders on the forward end of the block but this would have made weight distribution worse. Instead, the Avanti II gets a specially formed front torque box so that the two extra cylinders are figuratively behind the V-6 engine package. This doesn't reduce the forward weight bias by any tremendous amount, but is a definite help. Our drawing of the Avanti II also shows how the extreme front end overhang of the original Avanti has been reduced by 8 in. The revised V-8 engine should be about 50 lb. lighter and our goal would be to change the fore and aft weight distribution from 60%/40% to at least 55/45.

These changes should improve the car's cornering power, although a new front suspension will ultimately be required, as mentioned earlier. Bendix-produced caliper-disc brakes would continue at least on the Avanti.



BASIC CHASSIS has a perimeter-type of frame, would come in two sizes to adapt to four models of cars. Transaxle with semi-elliptic leaf springs would be used at rear, ball-joint independent suspension at the front.

We would propose a future lightweight stripped competition model with a weight goal (with 401-R iron engine) of 2800 lb., or 300 lb. less than the proposed Avanti II.

Because the above car wouldn't beat the 183-cu. in. Ferrari Berlinettas (300 bhp, 2315 lb.), we would like to suggest a smaller 2-seater car with a wheelbase of about 98 in. The powerplant for it would be an aluminum block version of the 209 cu. in. V-6, with stroke reduced to 3.00 in. for 179 cu. in., a single overhead camshaft for each bank and big inclined valves as on the new Willys 6-cyl. engine. The camshafts would be driven by a 1-in.-wide Gilmer timing belt, outside and behind the engine. Drive would come off an extension at the rear of the camshaft.

This V-6 should ultimately develop 300 bhp at about 8500 rpm. How it would do in competition would depend to a large extent on how close the designers could come to the minimum weight allowance of 1589 lb.

Conclusion

Having now exposed our own ideas as to what Studebaker *should* do, it remains to be seen what Studebaker *will* do. Despite some setbacks, the firm is still in a good financial position and, obviously can't afford to stand still in this changing world. ■

TABLE III—HORSEPOWER COMPARISON

Compacts	New Commander	Old Lark	American	Comet	Corvair	Chevy II	Falcon	Valiant
Std. 6-cyl.	127	112	90	85	80	90	85	101
1st opt.	150	180	125	101	84	120	101	145
2nd opt	no V-8	210	138	116	102	—	116	—
3rd opt	—	240	—	164	150	—	164	—

Standards	New Admiral	Old Cruiser	Tempest	F-85	Special	Classic	Dart	Fairl./ Meteor
Std	150	180	115	155	135	127	101	101
1st opt.	195	210	140	190	155	138	145	116
2nd opt.	250	240	166	215	200	250	—	145
3rd opt.	—	—	260	—	—	270	—	164

Mediums	New President	Chev	Galaxie	Plymouth	Dodge	Pont.	Merc.	Olds 88
6-cyl.	150	140	138	145	145	none	none	none
1st V-8	195	195	195	230	230	215	250	280
2nd opt.	250	250	250	265	265	303	300	330
3rd opt.	325	340	300	305	305	348	330	345
4th opt.	—	—	330	—	—	370	—	—
SS/opt.	401	425	425	415	415	405	425	—