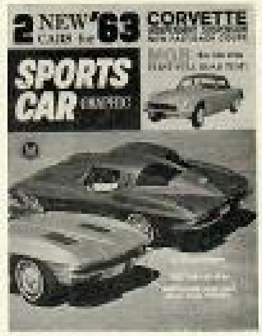
Volume 2 Number 7 November, 1962

SPORTS CAR GRAPHIC



The new cars gracing this month's cover will have considerable impact on the sport car market in the coming model year by virtue of their fine quality. Ray Brock shot the pair of Corvettes at the GM Proving Grounds.

ROAD TESTS

TECHNICAL

FEATURES

COMPETITION

DEPARTMENTS

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2 NEW CARS for '63

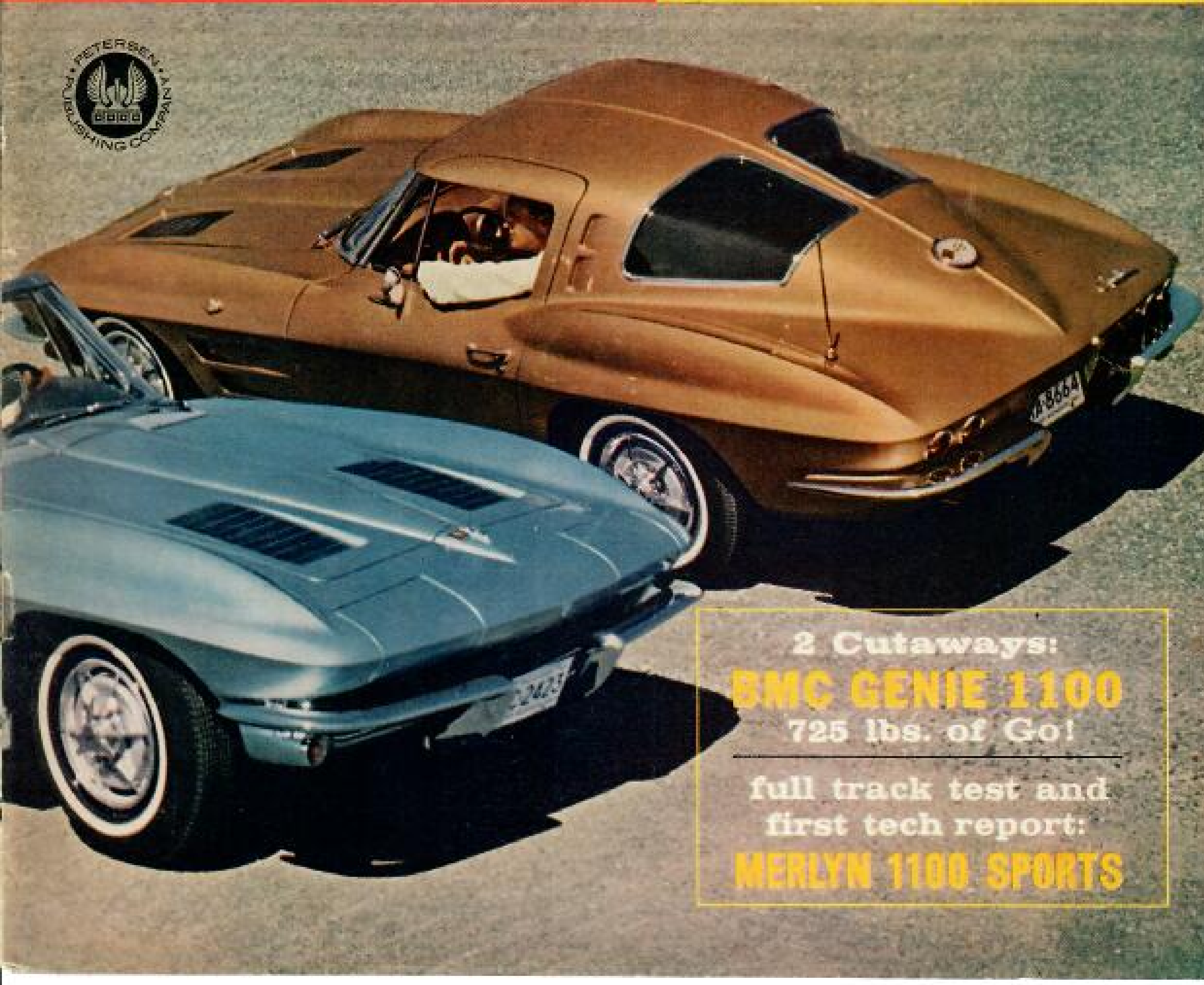
CORVETTE
INDEPENDENT SUSPENSION
NEW FASTBACK COUPE

SPORTS CAR GRAPHIC

IND

NOVEMBER 1962 50c
60c IN CANADA

MGB - More Cubic Inches
FIRST FULL ROAD TEST!



2 Cutaways:
BMC GENIE 1100
725 lbs. of Go!

full track test and
first tech report:
MERLYN 1100 SPORTS

Both the new models, above, negotiate corners with an "on rails" attitude. Driver effort is far less than that required by the '62 car. Ride is remarkably soft.

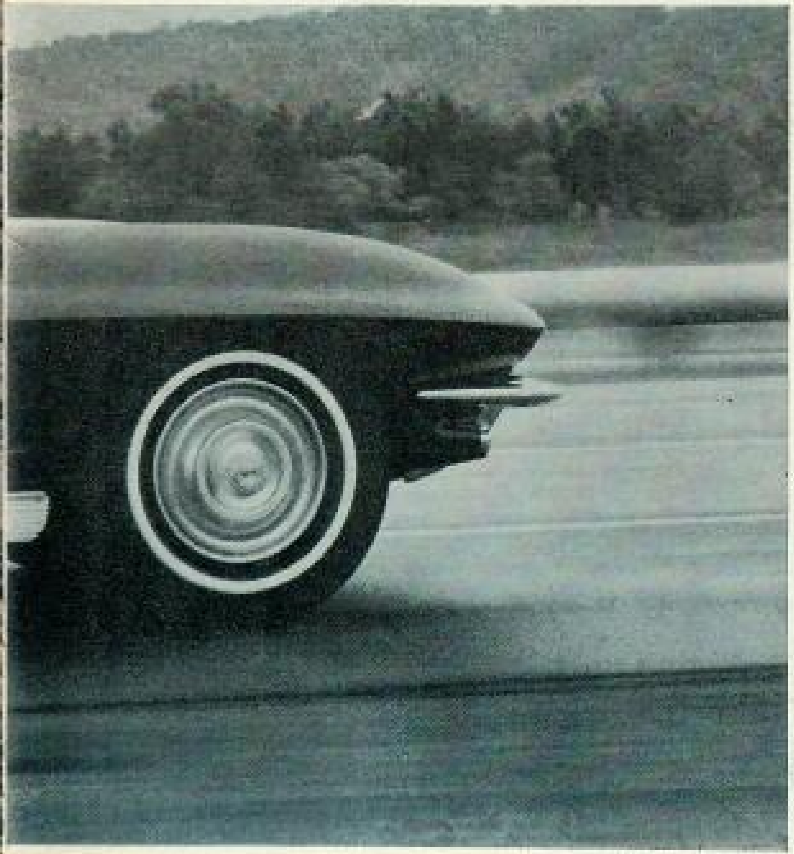
1963 CORVETTE STINGRAY

The Corvette really comes of age as a luxury,

Boat-tail configuration of the fastback coupe is a help toward attaining 161 mph (see text) . . .

ROAD TEST / 30-62

IN REPORTING ON OUR JUNKET TO FLORIDA last January with Chevy's Zora Duntov ("Project Track Test," April 1962 SCG) we mentioned spending several hours aboard a prototype. What we couldn't tell you was that this prototype was a disguised 1963 Corvette. From the firewall back it had a 1962 body, and new suspension was hung on a ladder frame of large diameter tubing. It proved to be an astounding departure from the '62 in every respect, clicking off five miles an hour faster at Daytona on the tri-oval, and five seconds a lap faster at Sebring, with the identical engine and gearbox used by the 1962 car. Both machines had what amounts to the heavy-duty suspension and brakes, stiffer springing and anti-sway controls, and vented, sintered-metal brakes. The prototype was a



high-performance sports car!

bit lighter than the '62, but the cobbled body didn't allow the 2-inch reduction in height incorporated in the '63 production Corvette.

Relatively efficient from a streamlining standpoint, the new body is striking and unique, not evolving from anyone's design except Mitchell's original Stingray, campaigned by Dick Thompson for two years as a Modified. That particular car drew comments both pro and con as to styling and we presume the '63 will foster comments from both camps. It is certainly sleek and sexy, and, since Corvettes have had the same basic styling since their inception, the change is certainly refreshing. Headlamps that rotate into position via individual electric motors are a wild departure from normal production-car philosophy, even though the idea isn't original.

Entry into both coupe and roadster is better with the new door, eliminating the dogleg. The new interior is a lot more business-like in seating and control-positioning, at no sacrifice in comfort or luxury. This is accented by the height reduction and adjustable steering column. There are two steering ratios: the standard 3.4-turn and an optional 2.9-turn unit.

Unlike the '62 model, the faster steering doesn't demand uncomfortable effort. It's firm, but only slightly more so than normal. The standard steering in the '63 car is really light and it's hard to believe you're turning a 3000-pound car. A power-assisted option is offered with the

Exceptionally neat but not quite as aerodynamic as the coupe is the optional hardtop installed on the convertible, above. Also shown are the optional alloy wheels with knock-off hubs.

smaller-engined units, as it is more probable that these will be used primarily as daily traffic cars.

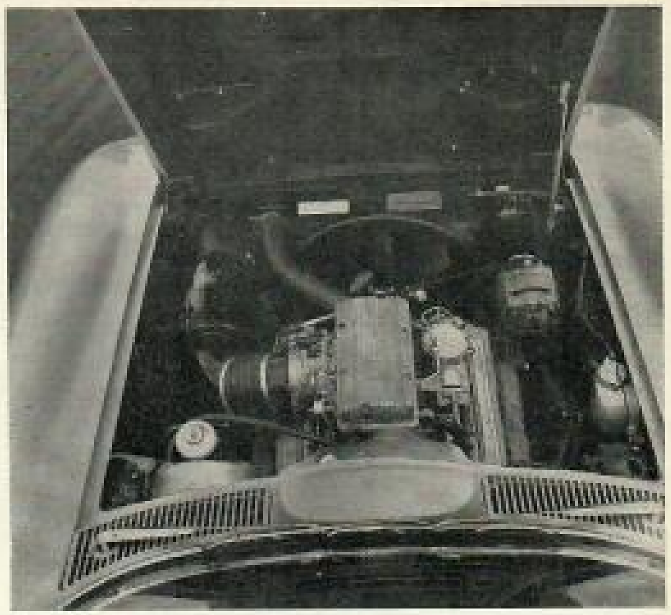
The only changes to the engine are reportedly in the fuel-injection "doghouse" or manifold. According to the SAE specifications, horsepower of the F.I. engine is the same as last year, 360, but this output is obtained at a slightly lower rpm, and torque has been increased from 300 lb/ft. to 352; a substantial amount for a minor change. The 4-speed, close-ratio gearbox that's standard with the "biggest" engines remains unchanged from last year and this is certainly justified; it's excellent in every respect.

Of course the big news is the suspension, the rear in particular. It's been obvious for years that Independent Rear Suspension would eventually come to Detroit, but the *type* used by Corvette proved a real shocker for us, as we never expected anything as "wild" in an ultra-modern sense. We queried Duntov at length as to *why* he arrived as this design conclusion. His answer amounted to this. There are two basic purposes for using an independent rear — improved unsprung weight and improved rear wheel geometry. He felt the design used best achieved these motives while embodying the all-important requirements of a production component — low cost, reliability, serviceability, and relative simplicity. The more you study this design, the more you realize just how well it fulfills these requirements.

Noticing that the two-joint halfshafts are used as upper control arms, we had two immediate questions. Did he come by the idea from English designs of the same type? What happens when a U-joint or halfshaft breaks?

No, the idea was original, though he had seen a photograph of a similar layout on a Junior (Broadley's front-engined Lola) about the time they were bringing CERV

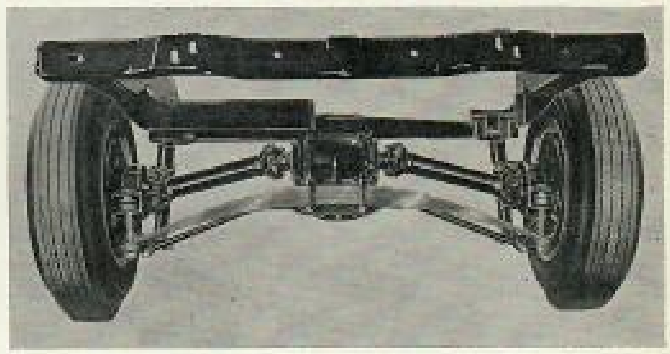
Cockpit changes, above, are many. Note the carpet inlays and "grab-bar" incorporated in the right dash nacelle trim.

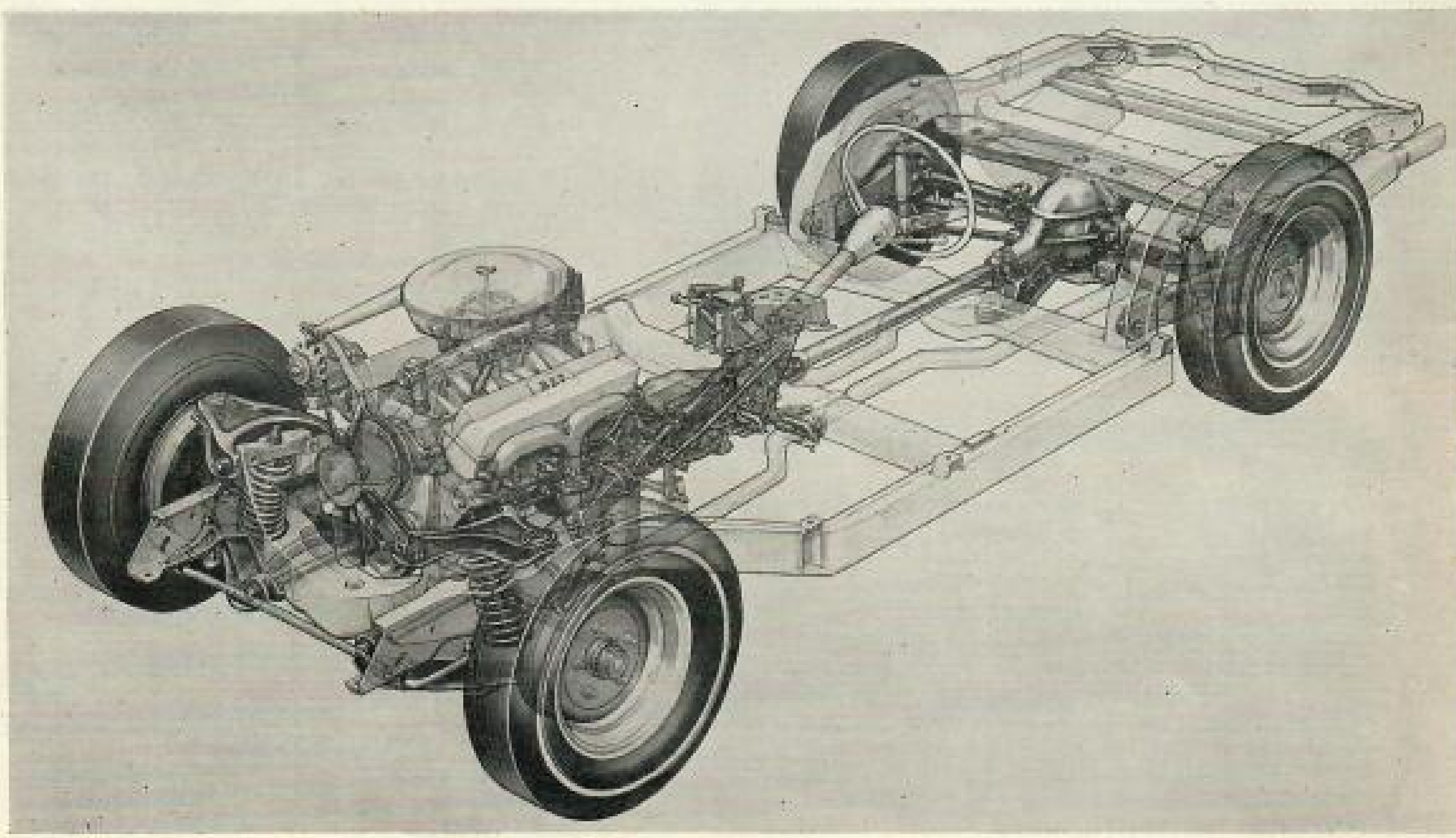


Obvious changes under the hood include redesigned "dog-house" and air intake. Alternator is standard on '63 models.

Below is the cobbled prototype we drove at Dayton and Sebring back in Jan., testing HD optional components for '63.

At right is the new rear suspension using the axles as upper arms. Inner pivots on the lower arms govern camber settings. The drawing below shows how it's positioned in the chassis. Rear-wheel toe-in is set by shimming the torque arms at the forward pivot. Note how the differential and leaf spring are fixed to the chassis by a rubber-cushioned transverse beam.





1963 CORVETTE STINGRAY

(continued)

from blueprint to prototype. CERV, incidentally, was used as a shake-down vehicle for the new suspension (May 1962 SCG). Unlike the controversial Lotus design (corrected on the latest models by no longer using the halfshaft as a suspension member), axle or joint failure will not be followed by collapse of the suspension. The combination hub-carrier/torque-arm pivots at its front end on a two-inch-wide bushing. Rear-wheel toe-in is accomplished with shims at this point. While the bushing itself is rubber, it will allow an angular change of the torque arm required for normal suspension travel but bind on the pin if the arc is increased beyond that, as would be the case if the axle or joint broke. Thus, some semblance of control can be retained in this instance and the car brought to a halt. They've successfully tested for just such an emergency, but don't anticipate it happening for several reasons. First, the axles receive only minor loading from suspension control. Second, the use of outboard rear brakes isolates the axle from heavy braking forces. One factor that Duntov was very interested in eliminating with this design was the use of slip-couplings. They have been a constant source of trouble when used in conjunction with high-output engines, binding under load and causing all kinds of axle and axle-support failures. Corrective attempts are evident in the five-inch diameter splines of Bruce McLaren's Cooper-Monaco and Mickey Thompson's recirculating-ball spline used on his Indy cars. The Corvette setup eliminates their need completely, along with their power-absorption and inherent fragility.

Another shock came when we observed the use of a transverse leaf spring; something we'd thought Detroit had relegated to antiquity! On second thought, the advantages are obvious in this application — good unsprung weight, mounting simplification, and the roll-stabilization inherent in this type of spring setup. The spring bolts to the differential housing, an iron unit that should prove to be a welcome item to specials-builders in the near future. The latter is bolted solidly to a transverse beam on top and a small stamped member below, the latter also serving as an inner mount for the lower control arms. Attachment here, incidentally, is accomplished by eccentric bolts and several degrees of camber change (2 degrees negative is the normal setting) are possible in short order by adjusting them. The transverse upper member is the main mount for the assembly, however, and attaches to the frame rails through large rubber biscuits. The viscosity of these rubber biscuits is critical to rear stabilization in a road-racing application, yet must be reasonably soft to isolate vibration in a normal street machine. This and the front swaybar rubbers were items under study during the Florida junket in January, as part of their development of "heavy-duty" options.

With the majority of weight placed over the rear axle in the 1963 car, many changes were made to the front suspension, even though its basic type remains that of the '62 Corvette. The control arms are lighter and stronger, their geometry considerably different, and the coil springs are "sea-legged" quite a bit more; the sum total contributing to far greater braking and roll stabilization, plus taking advantage of the lighter front end for better, easier steering control.

We were a bit spoiled, perhaps, by testing the prototype first, as it had all the heavy-duty suspension items included and added up to a fantastic improvement over the '62 that was similarly equipped. The showroom model can't, quite naturally, perform the same tricks on a racing circuit, but it can come darn close. The ride and handling are great. We won't elaborate on how great; you've got to drive one to believe it. *(continued on page 81)*

TEST DATA
ROAD TEST 30/62

VEHICLE ....Corvette
PRICE (as tested) ..............N.A.
MODEL ....Stingray
OPTIONS ....360 hp engine, 4-speed gearbox

ENGINE:

Type: ....90° V-8, water-cooled, 4-cycle
Head: ....Cast iron, removable
Valves: ....OHV, pushrod/rocker
Max. bhp. ....360 @ 6000 rpms
Max. torque ....352 ft. lbs. @ 4000 rpms
Bore ....4.0 in. 101.6 mm.
Stroke ....3.25 in. 72.6 mm.
Displacement ....327 cu. in. 5359 cc.
Compression Ratio ....11.25 to 1
Induction System: ....Fuel injection (port type)
Exhaust System: ....Cast manifolds, to dual mufflers & exhausts
Electrical System: ....12V distributor, alternator

CLUTCH: ......Borg & Beck, single, disc, dry
Diameter: ....10 in.
Actuation: ....Mechanical

DIFFERENTIAL:
Ratio: ....3.7 to 1
Drive Axles (type): ....Open, 2-joint, no slip coupling

TRANSMISSION: ....4 speed, full synchromesh
Ratios: 1st ....2.20 to 1
2nd ....1.64 to 1
3rd ....1.31 to 1
4th ....1.0 to 1

STEERING: ....Recirc. ball sector
Turns Lock to Lock: 3.4
Turn Circle: ....36 ft.

BRAKES:
Drum Diameter ....11 in.
Swept Area ....328 sq. in.

CHASSIS:

Frame: ....Conventional, 5-cross member, box section steel
Body: ....Fiberglass
Front Suspension: ....Independent, unequal arms, coil springs, tube shocks, anti-sway bar
Rear Suspension: ....Independent, half-shaft upper, single lower, trailing-member, transverse leaf-springs
Tire Size & Type: ....6.70 x 15 tubeless

WEIGHTS AND MEASURES:

Wheelbase: .... 98 in.
Front Track: .... 56.3 in.
Rear Track: .... 57.0 in.
Overall Height .... 49.8 in.
Overall Width .... 69.2 in.
Overall Length ....175.3 in.
Ground Clearance ....8 in.
Curb Weight ....3036 lbs.
Test Weight ....3380 lbs.
Crankcase ....5 qts.
Cooling System ....15.5 qts.
Gas Tank ....20 gals.

PERFORMANCE

0-30 .... 2.2 sec.
0-40 .... 3.0 sec.
0-50 .... 4.2 sec.
0-60 .... 5.6 sec.
0-70 .... 8.8 sec.
0-80 ....10.1 sec.
0-90 ....12.3 sec.
0-100 ....14.1 sec.
Standing ¼ mile 14.1 sec. @ 102 mph
Top Speed (av. two-way run) 151 mph

Speed Error	30	40	50	60	70	80	90
Actual	31	40	50	60	71	80	89

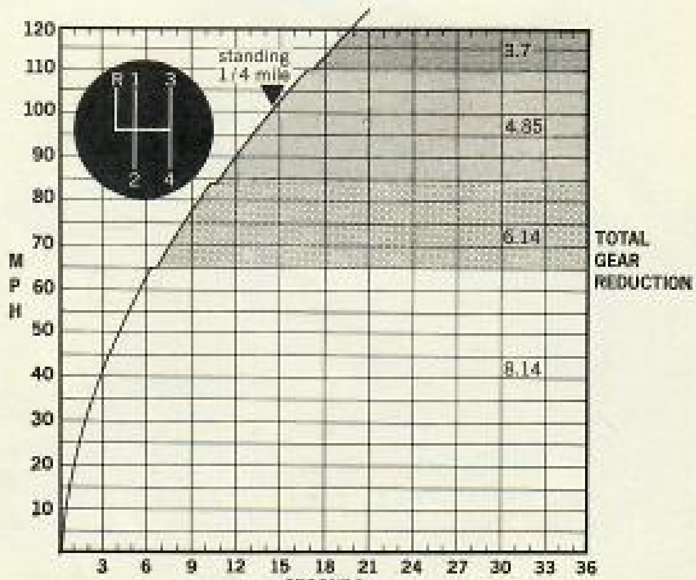
FUEL CONSUMPTION

Test: ....................N.A.
Average: ....................N.A.
Recommended Shift Points
Max. 1st .... 68 mph
Max. 2nd .... 85 mph
Max. 3rd ....110 mph
RPM Red-line ....6200 rpm
Speed Ranges in gears:
1st .... 0 to 63 mph
2nd ....12 to 82 mph
3rd ....18 to 105 mph
4th ....27 to top mph

Brake Test: 76 Average % G, over 10 stops.
Fade encountered on 9th stop.

REFERENCE FACTORS:

Bhp. per Cubic Inch 1.1
Lbs. per bhp. 8.4
Piston Speed @ Peak rpm ....3250 ft./min.
Swept Brake area per Lb. ....0.152 sq. in.



STREAMLINING

(continued from page 78)

design. Note its excellent performance as compared to the production sports car and G.T. coupe, each with identical power. The lower weight improves the low speed range, and the low FAC_d improves the high speed range. It is evident that there is much room for improvement in performance in this class, even though frontal area is held at 16 square feet, the same as the production G.T. coupe.

Next let's use the same streamliner body shell without the windshield and top. Instead it will be an open sports racer with headrest and wrap-around windscreen in the small modified class. This reduces frontal area to 13.3 square feet. Weight drops 100 pounds also, but power remains at 60 HP. This body shell is shown for a 48" tread, medium size engine and chassis. It could be used with many popular combinations of components. However, for purposes of comparison we have kept the horsepower at 60 and reduced the gross weight to 800 pounds. While this is a low weight figure, it has been reached in at least one car. Note that the FAC_d value (2.925) is identical to the proposed FRA exposed wheel car described earlier. Five horsepower less and 100 pounds more weight account for the difference in performance. Or, when compared with the coupe, the power is the same but weight is 100 pounds less and frontal area is less, to account for the gains in performance. Manufacture of identical cars in modest quantities would qualify these designs as production cars.

Now let's go all out in design with our last two cars. These cars are original and new developments, with the latest ideas in suspensions, space frames, and other features fully described previously. It is evident that the enveloping bodied streamliners offer no more wind resistance than the exposed wheel streamliners, even with nearly double the frontal area. It is also evident that frontal area for a sports car can be reduced by a narrower tread and a reclining position for the driver. With a 41-inch tread and the driver in the position used in Formula Junior, the frontal area drops to 8.5 square feet, while retaining smooth flow over the shell with a C_d of 0.22. This gets FAC_d to a new low of 1.870. The shell gets lighter and the smaller chassis also drops in weight, giving us a gross weight of 730 pounds, while holding the power at 60 HP. Note the top speed of 150 mph and acceleration superior to Formula Junior in the high speed range. While it would not be in races with the Juniors, it would excel in the modified sports car class well above its engine displacement size.

Since we are going all out, let's see what can be done in the Formula class with the new FRA rules. Let's use the same small streamliner body shell, again on the 41-inch tread, with 12-inch or 13-inch rims. We can eliminate the starter, reverse lights, battery, passenger seat seat and its floor, the doors, and part of the frame weight. This will drop the empty car weight to 450 pounds and give us a gross weight with driver and ½ fuel of 630 pounds, a very low figure but again, it was done in F-III years ago. The engine may use menthanol fuel, upping the power to 65 HP or more. Now we have gone all the way in weight reduction, air drag reduction, and power increase. What happens to performance? Top speed becomes 155 mph and acceleration is outstanding in *both* the low and the high speed ranges.

What does it take to catch it? The knowledgeable sports car enthusiast will tell you this performance challenges all but the very hottest existing sports cars and Formula I racers. Simplicity in design and low cost available parts make it easier to build and maintain.

The small sports car is depicted in three views in Figure 4. The larger Streamliner body shell proposed for the production classes and larger modified specials is shown in front view on the left hand side for comparison as to frontal area. Although the body is roomy for engine and passengers, remember that what really counts is the smooth airflow all the way back to the small aft body section of less than half the frontal area.

Now the question becomes: in what group, sports cars or Formula racers, should this last proposed car race? It has an enveloping body like a sports car (which FRA rules for F-III do not prohibit). Because this body is streamlined, the car *goes* like a Formula Junior. Since it lacks starter, reverse, spare tire, and electrical equipment it does not qualify as a sports car — yet is not prohibited by FRA.

The design has outstanding performance, is simplest to construct, and low in cost, so it is reasonable to suspect that cars will be built and raced. Club rules will eventually be altered to provide a place for these cars when they exist in sufficient quantity to be a factor. In the meantime I would suggest that the first few cars be allowed to run with FRA Formula III. This is the class for which the car qualifies. The safety aspect is not of the magnitude that mixing class H sports cars and Formula Juniors would be. The matter should be considered promptly, though so that these first few cars will have a class in which to race.

Those desiring further information may contact Mr. Korff at P.O. Box 1043, Burbank, Calif. — Tech Ed.

CORVETTE STINGRAY

(continued from page 21)

Adhesion for both braking and acceleration are substantially improved, getting the new Corvette off the line a lot hotter *and* easier than the previous live-axle model. Hard deceleration, even from extreme velocity, produces a very satisfying and spider-like squat. This was a major factor in the reduced

continued

lap times at Sebring, along with streamlining and improved roadability. Streamlining, especially in the coupe, has produced a higher maximum velocity, as well as improved the top end acceleration. Pulling a 3.08 final drive and 8.20 rear tires, the coupe — sans mufflers — has been clocked at 161 mph! The roadster is short of this mark by 5 mph. We don't have any top-speed figure for the roadster with the optional hardtop, but it'll probably split the difference.

Two things were obvious from our tests. First, the '63 Corvette has all the attributes of the most sophisticated designs obtainable and is practically devoid of criticizable traits. We were told initially that it would be 300 pounds lighter than last year's car, but this hasn't been borne out by either shipping *or* curb weight figures. We came up with 3036 pounds for the roadster and 3053 pounds for the coupe in ready-to-run form. The increased weight of the latter is due to a "cage" of stamped, hat-section frame molded into the roof and attached to the main rails. Its primary purpose is to support the doors and windshields, it will also serve as roll-over protection, even though it's dubious that it'll be declared legal by SCCA as such. The second item of interest will be observed on the racetracks, where it's entirely possibly that a completely new crop of Corvette pilots will come to the fore. Why? The new car, while it can still be "tossed" like previous models, will garner even better results from being smoothly *driven* instead. Even the '62 car does not warrant the "dirt-track" style applied to it by leading Corvette pilots, and they will either adapt — which appears a bit doubtful — or get whipped by drivers with finess in the '63 car.

Per usual, there's a host of options listed for competition purpose — from 36.5-gallon gas tank to limited-slip rears, knock-off aluminum wheels to a complete Heavy Duty suspension option. There are three brake setups, all of them embodying a self-adjusting setup similar to that used at Sebring last year: standard lining, sintered-metal lining, and the metal lining combined with a finned drum and cooling scoops. There is no need for other than the standard brakes unless you plan extremely hard use or a competition application. The same goes for the suspension options, with the possible exception of the limited-slip. The aluminum wheels are very sexy-looking, so they might be desirable on a street machine but will cost a goodly-sized chunk of dough. The steel, bolt-on wheels — less knock-off hubs — will weigh about the same anyhow, so there won't be any saving in unsprung weight.

Summing it all up, this will be a good year for Corvettes and those selling, driving or racing them. SCG extends its congratulations to the Chevy people who contributed to bringing this car into being, and to Zora Duntov in particular.

— *Jerry Titus*