

**Publishers:** JOHN BOND, ELAINE BOND

**Editor:** DEAN BATCHELOR

**Managing Editor:** DAVE BLACK

**Technical Editor:** GORDON H. JENNINGS

**Editorial Associate:** JEAN KRUMPE

**Editorial Assistant:** PATRICIA DAVENPORT

**Europe:** HENRY MANNEY III

**Art Director:** HAL CRIPPEN

**Art Associate:** WILLIAM A. MOTTA

**Art Assistant:** BARBARA A. BOYTER

**Contributing Editors:**

WARREN BALLARD RICH CLEE

HANSJOERG BENDEL BILL COREY

JAMES T. CROW TONY HOGG

JERRY McNAMARA TOBY NIPPEL

CYRIL POSTHUMUS ROGER PROULX

**Circulation Manager:** RAY POWERS

**Subscription Fulfillment:** VIRGINIA BUNDY

ROAD & TRACK is published monthly by Enthusiasts' Publications, Inc.

834 Production Place, Newport Beach, Calif.

Second Class Postage paid at Newport Beach,

California, and at additional mailing offices.

Copyright 1962; Enthusiasts' Publications, Inc.



**Advertising Director:** BEN LAMASTER,  
366 Madison Avenue, New York 17, N.Y.,  
YUkon 6-1735.

**Western Advertising Manager:** RICHARD  
BARTKUS, 834 Production Place, Newport  
Beach, California, Midway 6-3981.

**Midwest Advertising Manager:** FRANK WIL-  
LARD, 1775 Penobscot Bldg., Detroit 26,  
Michigan, Woodward 3-1775.

**Advertising Assistant:** SHIRLEY MEYERS

**SUBSCRIPTIONS.** U.S., possessions, and Can-  
ada: \$5 one year, \$9 two years and \$12 three  
years. Single copy 50 cents. All other coun-  
tries: \$6.00 one year, \$11.00 two years, \$15.00  
three years. Foreign countries and Canada:  
remit by money order or draft on a bank in  
the U.S., payable in U.S. funds.

**CHANGE OF ADDRESS.** Three weeks notice  
is required for a change of address. Please  
furnish both old and new address, with an  
address imprint from a recent issue. Send to:  
Road & Track, 834 Production Place,  
Newport Beach, California.

**EDITORIAL CONTRIBUTIONS** are wel-  
comed by ROAD & TRACK but cannot be con-  
sidered unless guaranteed exclusive. Photo-  
graphs should be released for publication by  
source. Not responsible for return of unsol-  
icited manuscripts, photos or drawings unless  
accompanied by self-addressed stamped en-  
velope.

## COVER

The Corvette Sting Ray coupe and con-  
vertible models for 1963—described on  
pages 18-21, tested on pages 22-25.



ROAD & TRACK

R  
&  
T

THE MOTOR ENTHUSIAST'S MAGAZINE

OCTOBER 1962, VOLUME 14, NO. 2

## ROAD TESTS

- 1963 Corvette—the Sting Ray in street form 22  
Jaguar Mark X—the latest and most luxurious in a long line 26  
Studebaker Avanti—Loewy on a Lark 30

## FEATURES

- Moss Meeting—Stirling shows remarkable progress 13  
Corvette Technical Analysis 18  
Porsche F-1—model plans and cutaway 42  
Continental Commentary—a Corvair on Europe's highways 64  
The Iso-Rivolta—Corvette + Bertone=luxury GT 70  
Something Special—a 120-mph MG Midget 72  
What?—traffic-stopper in midtown Manhattan 76  
Mickey's Last Record Session?—everything but the Big One 80  
Ogle GT—a fiberglass body for BMC's 850 82

## SALON

- Rolls-Royce 40/50 Silver Ghost "London-Edinburgh" Tourer 51

## COMPETITION

- Grand Prix de France—first GP win for Gurney/Porsche 35  
Grand Prix of Germany—Graham Hill and BRM triumph at  
Nurburg Ring 58  
Calendar of 1963 International Events in the U.S.A. 74  
Race Summary—final placings and standings to date 83  
British Grand Prix—1-2-3 for English cars 85

## DEPARTMENTS

- People & Places 2      Letters 4      Books 10  
Time & Place 12      Miscellaneous Ramblings 15  
Tune-Up Clinic 62      Showcase 68  
Technical Correspondence 99      PS 96



**Technical: New Corvettes and Porsche 8-Cyl. F-1**

**TESTS: SUPERCHARGED AVANTI, JAGUAR MK 10**

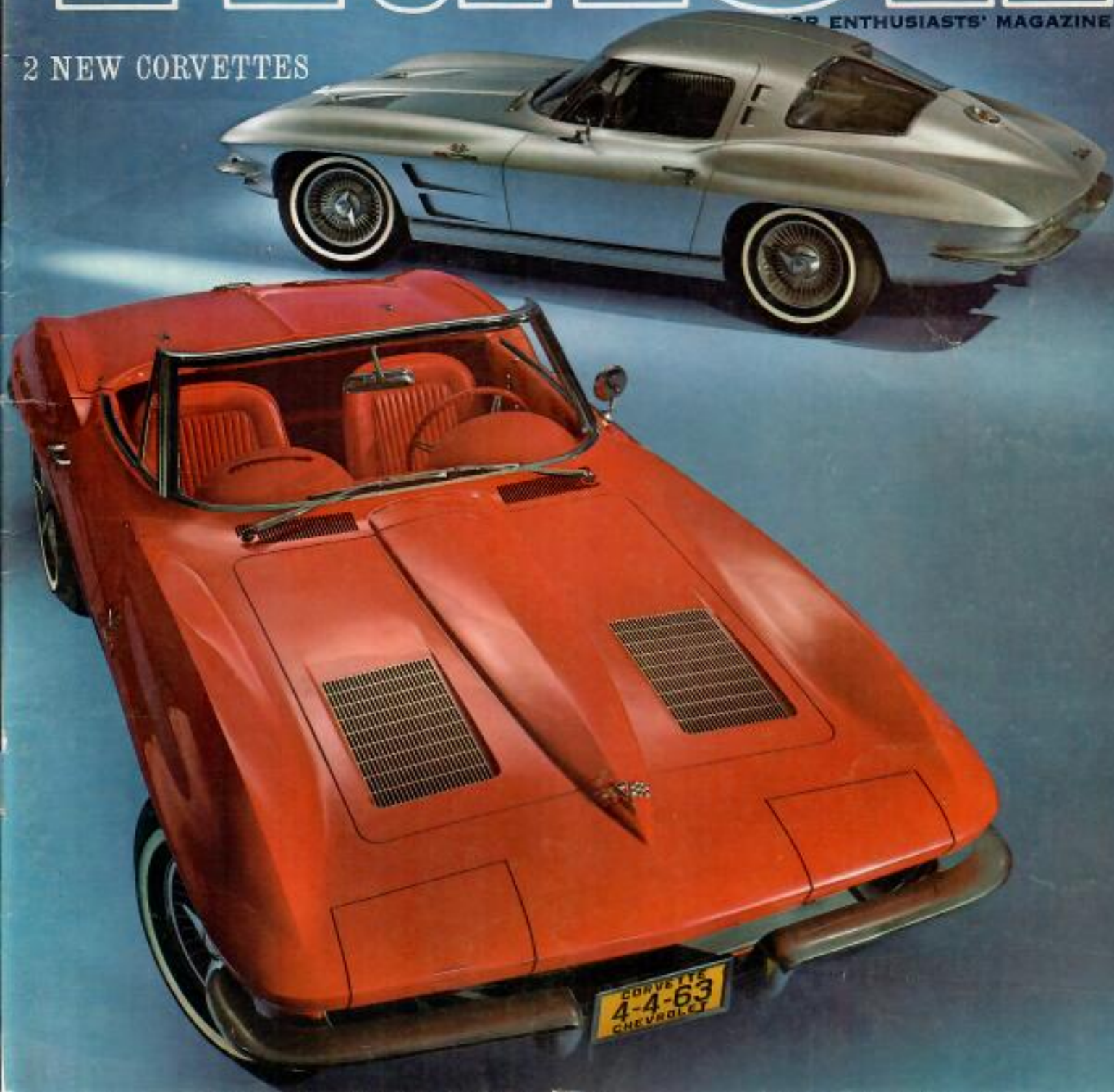
OCTOBER 1962

FIFTY CENTS

# ROAD & TRACK

CAR ENTHUSIASTS' MAGAZINE

2 NEW CORVETTES







# THE 1963 CORVETTE

## A Technical Analysis

BY JOHN R. BOND

**W**ITH THE ADVENT of a completely new Corvette (except for the engine and transmission), we are reminded of the fact that there wouldn't have been such a car at all—except for a couple of timely coincidences.

When Harley Earl, General Motors' styling chief (now retired), got the sports car bug, the stage was set. And Chevrolet's chief engineer at the time (Ed Cole) did the rest—he had owned a Jaguar XK-120 and a Cadillac-Allard.

Early in 1952, the GM styling section began work on some special cars for the January 1953 Motorama. On June 2, 1952, Chevrolet engineers were shown a plaster model of a proposed car having a wheelbase of 102 in.—the same as the XK-120. Project "Opel" it was called, and it was up to Chevrolet to provide a chassis and engine so that this show car would at least be driveable.

Project Opel was completed in time, and the 2-seater roadster first shown to the public was renamed the Corvette. During the design stages some consideration of possible produc-

tion was entertained, and the reception of the car was so overwhelming that it was announced 300 examples would be produced. *Road & Track* said, in April 1953, "Chevrolet and Kaiser-Frazer are racing to see which will be first on the market with a volume-produced American sports car. Chevrolet's Corvette will be powered by a souped-up engine [the 6-cyl] delivering 160 bhp. K-F's car, designed by Howard Darrin, will be known as the DKF-161. Both will have fiberglass bodies, at least at first."

Chevrolet won the "race" and kept its 1954 promise—"We are in the sports car business to stay." The prototype had 160 bhp at 5200 rpm but production cars had 150 bhp. Originally, Chevrolet planned to build the first 300 bodies in fiberglass—and then convert to steel. But experience with the new material was so successful that the change was never made.

Until now, no really drastic changes have been made in the overall design, except of course the switch to a V-8 engine late in 1955. The original X-type frame, the 1953/54 passenger car front suspension, the basic body panels, etc.—all

These variations of the original theme led up to the all-new 1963 models

1953



The first Corvette was in the showrooms in late 1953.

1953



Corvette-based Corvair was 1953 Motorama show car.

1956





have remained unchanged except for a few minor details.

But for 1963 we have, as we hinted earlier, a completely new car. First of all, the new car is smaller than before. Secondly, there is a completely new chassis; a new frame, new front and rear suspension—even a new body type, a fastback coupe. In effect, there are three body types for 1963, a folding-top convertible, a hardtop option, and the fastback model. The engine line-up remains the same as last year: a 327-cu-in. engine in 4 options: 250, 300, 340 or 360 bhp.

To give an idea of the size change, the wheelbase is 4.0 in. shorter (now 98.0). The rear track is 2.0 in. narrower and the car's frontal area (by our arbitrary 80% of o.a. dimension formula) is reduced from 20.4 to 19.25 sq ft. Yet all interior seating dimensions are the same, or better, than before. The body material remains fiberglass, but there is an inner network of steel reinforcements around the door openings and under the cowl. (Some aluminum was used before, particularly at certain mounting points.)

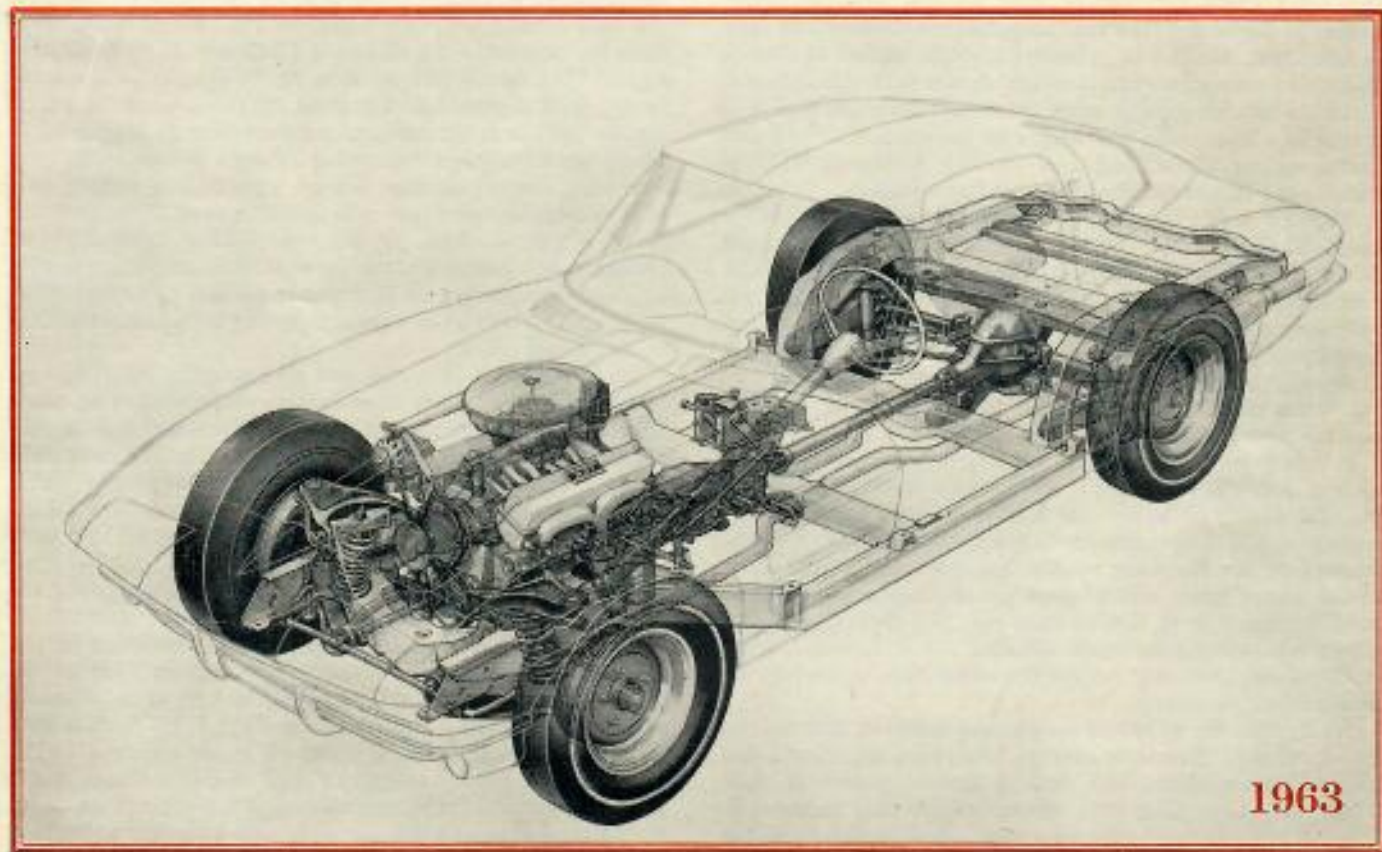
Though the smaller car should be (and is) lighter, the new

body is heavier so the net weight saving is only about 50 lb.

New body features, in addition to the steel reinforcing structure, include curved side-window glass, a new windshield, cowl-top ventilation, retractable headlights and an improved heater. The luggage compartment has been completely redesigned to give more useful space but there is no lid—access is by tilting the seat backs forward. The spare tire is carried in a sealed fiberglass housing, which is hinged so that its rear end drops down to the ground when released.

The chassis changes have been designed primarily to improve handling qualities. Even the basic weight distribution has been changed. Before, the Corvette carried 53% of its curb weight on the front wheels. The new distribution is 48/52, front to rear. This change, in conjunction with the revised suspension, reduces the former understeer to practically zero.

The front suspension is the familiar ball-type used on Chevrolet sedans since 1955 and it incorporates the anti-dive feature (upper arm pivot tilted about 9°). With this change,



First body change was in 1956.

1959



Dual headlights appeared in 1959.

1961

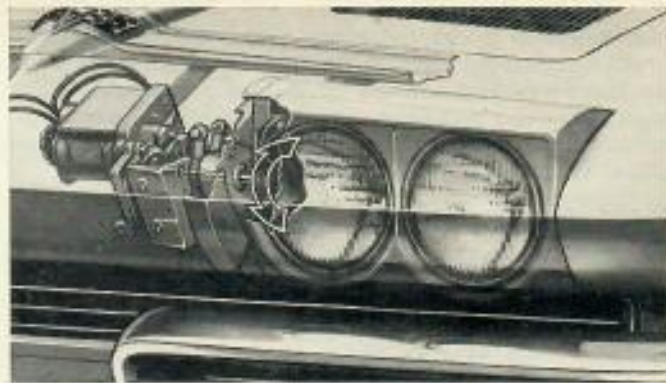


"Sting Ray" rear end treatment came in 1961.





*Steel reinforcing is built into the coupe body.*



*Electric mechanism for headlight retraction.*

## 1963 CORVETTE

the front cross member is now welded and no longer bolted to the frame. The rear suspension is all new and fully independent. The 3-link geometry is quite similar to that of Formula 1 racing cars and is clearly shown in the illustrations. Here the double-jointed open driveshaft on each side also serves as a suspension link and, with the control rods, forms the usual short and long arm (S.L.A.) geometry. Trailing radius rods take the brake and propulsion loads.

The rear spring is arranged almost exactly the same as the one used at the front of the 1937 Cord. This is a transverse 9-leaf assembly with rubber cushioned struts in tension at each end to make the connection. Advantages claimed for this all-new suspension system include improved ride and handling, lighter weight, reduced unsprung weight and elimination of rear-wheel tramp. The differential and spring are bolted to the rear cross-member and rubber is used between the member and the frame side rails.

It might be asked—why a leaf spring at the rear? The answer is simply that there is no room for coils except behind the rear axle. This would add both more total and more unsprung weight. Chevrolet points out that only the tips of the leaf spring are unsprung weight. Furthermore, a little study of the photo below and to the right shows that it would be very awkward to fit torsion bars into this layout, arranged either transversely or longitudinally. As it is, the trailing links extend just a little behind the wheel hubs to provide the tension strut mounting.

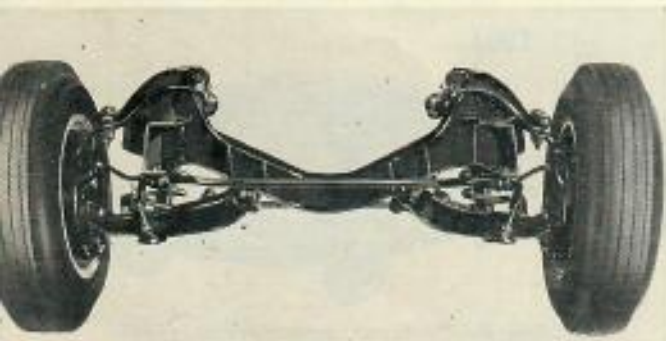
Along with the improved weight and handling features, we find some very interesting changes in the steering. First, there is a new recirculating-ball steering gear to reduce friction. Then, the center idler arm system has been abandoned in favor of the more accurate dual-arm, 3-link geometry. These

changes, along with the ball-jointed i.f.s., allow faster steering with less effort. There is a very clever change which gives any purchaser a choice of steering ratio. Two tapered holes are provided in each steering arm for the usual ball stud tie rod end. A simple service operation can change the steering from the standard ratio of 19.6:1 (formerly 21.0) to 17.0:1, overall. The turns, lock to lock, are 3.40 and 2.92, respectively, both slightly quicker than in 1962, when a special adapter plate was necessary to get the faster steering feature. There are three other interesting changes in this area: 1) a hydraulic steering damper is used, 2) a power-steering unit of the linkage-booster type is optional (except on the 340 and 360-bhp models) and, 3) a rubber bushed universal joint connects the steering shaft to the gear. This joint has a unique adjustment, arranged so that loosening two bolts will allow the steering wheel to be moved in or out by 1.5 in., or a total movement of 3.0 in.

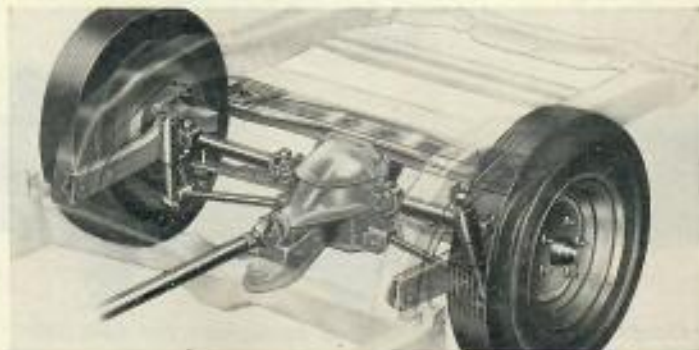
A new frame was mentioned earlier. Although it has no X-member, it is lighter than before, yet considerably more rigid in torsion. The side rails have been moved farther outboard for better body support. There are 12 body mounts and these tie in with the steel body reinforcements to give added beam strength. An unusual detail which certain other sports car manufacturers could copy is the attention paid to proper ground clearance for the dual exhaust system. The large cross-member under the seat has welded-in tubes which allow routing the exhaust pipes through, rather than over or under.

There are some brake changes, including adoption of the self-adjusting feature. The front drums are wider and the total drum swept area is raised from 259 to 328 sq in. Metallic (iron) linings remain optional and there is a "Special Performance" metallic brake option with larger diameter Al-Fin drums (334.3 sq in., swept), a dual master cylinder and a vacuum booster. These special brakes have a self-adjusting feature that compensates for wear when the car is moving

*Coil spring front suspension with ball joints.*



*Differential bolts to chassis—reduces unsprung weight.*





forward—the standard Corvette system requires reversing to adjust for wear. The former extra-wide rim wheel option (15 x 5.50K) is now standard equipment for all 1963 Corvettes.


Tire size remains 6.70-15 and, while most of the 1962 gear ratios are retained, the exception is the two engines with mechanical lifters (340 and 360 bhp). Formerly, these engines came with a 4.11:1 axle ratio; now the standard ratio is 3.70:1.

Engine changes are minor: a Delco alternator replaces the generator and there is closed crankcase ventilation. A smaller flywheel allows the engine to be lower and this requires a new clutch housing, which is aluminum as before. There are minor changes inside the plenum chamber (which is larger, too) of the fuel-injection intake manifold and the f.i. system gives an even quicker throttle response.

A special optional equipment group is listed as available only on the fast-back coupe—which shows which body style is destined for real competition. The list includes heavy-duty springs and shock absorbers, a stiffer front stabilizer bar, cast aluminum wheels with genuine knock-off hubs, a 36.5-gal. gas tank, finned aluminum brake drums, power-operated brakes with metallic linings and a dual master cylinder.

One entirely new option for all models is genuine leather seats in place of the normal vinyl-plastic.

Considerable work was also done in the field of aerodynamic research, both at the GM Tech Center and at Cal Tech in Pasadena. One of the results of this study was the decision to use retractable headlights. These are operated by a pair of electric motors and definitely lower the drag factor when closed. In case of trouble, the lights can be rotated into operating position manually by turning cranks which are located under the hood.

The 1963 Corvette has come a long way in 10 years—in fact, from a stylists' plaything to a full-blown, out-and-out dual-purpose sports car. 

# Test your sports car I.Q!

TRY THIS QUICK QUIZ BY QUAKER STATE



1. What is this man doing?



2. Recognize this classic?

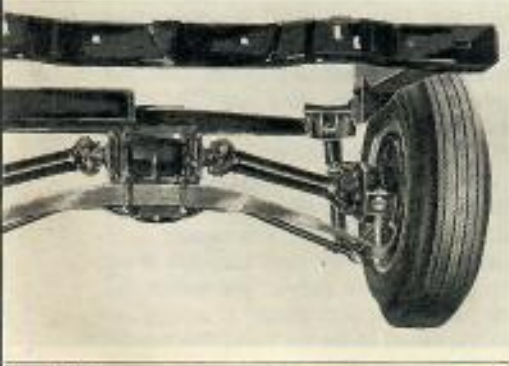


3. Can you name this tool?



4. What does this symbol stand for?

The only U.S. automotive use of transverse leaf.



Oil experts can tell you that motor oils vary widely in their ability to protect the life of your engine. And they know the finest motor oil money can buy is—Quaker State! Refined from 100% pure Pennsylvania Grade Crude Oil, years-ahead Quaker State gives every car longer-lasting lubrication and complete protection. Keeps your car on the road, out of the

repair shop—and saves you money. Insist on Quaker State—the best engine life preserver.

Answers: 1. He is a technical inspector checking the tightness of wheel spokes before sports car race. 2. 1932-3 Lincoln KB convertible sedan. 3. A torque wrench. 4. The life preserver stands for Quaker State Motor Oil—because it is the best engine life preserver.




QUAKER STATE OIL REFINING CORPORATION, OIL CITY, PENNSYLVANIA





# 1963 CORVETTE

*America's only production sports car is smaller, lighter (with better weight distribution) and has all-independent suspension*

 NOT SINCE 1960 has *Road & Track* tested a Corvette and, although we gave this devil his due ("The Corvette is unmatched for performance per dollar in terms of transportation machines . . ."), there was a desire expressed by our testers to "do something about the rear suspension." The tendency for the rear wheels to spin freely on acceleration and for the rear end to come sliding around rather quickly during hard cornering was always there. Chevrolet engineers had done a good job with what they had at hand, but there just wasn't enough with which to work. That production-component live rear axle could hop and dance like an Apache with a hot foot.

Now, with the advent of full independent rear suspension described in previous pages, the Corvette's handling characteristics are considerably different. In a word, the new Sting

Ray sticks! Whether you slam the car through an S-bend at 85 or pop the clutch at 5000 rpm at the drag strip, the result is the same—great gripping gobs of traction.

We proved it to our complete satisfaction on General Motors' infamous "Ride and Handling Road." Here, all GM divisions test just those factors in their own, and on competitors', vehicles. The 3-mile route includes samples of virtually every kind of road one could ever encounter. The main loop, while not smooth, is a satisfactory substitute for a road racing course. There are several sweeping right-handers, a keen S-bend and a sharp-right, sharp-left series that (purposely) is made even more interesting by rows of 1-in. ripples running transversely across the roadway. Obviously, if a car is pushed hard through here, a hopping rear axle will lose any semblance of traction; we suspect many a GM product has gone off the pavement, tail first, in this spot. But not so our test Corvette; we entered this with caution the first time through, testing traction with short bursts of throttle. Although we got lots of shaking and juddering throughout the car, it seemed to hold quite well. Second time through, more power, more speed. Third time around we gritted our teeth and held on—5000 rpm in 2nd gear produced just a trace of "scrabbling" at the rear while the whole car remained completely in control. Older Corvettes develop an incurable case of St. Vitus's Dance just at the sight of this corner.

The S-bend was even more fun: Every time through it we discovered we could have gone a little faster. We never did find the limit, although the last pass was made at nearly 90 mph. We noted that there appeared to be no excessive movement of the chassis in relation to the wheels, even when





straightening out fast bends such as these. It does have that distinct "walking" feeling peculiar to virtually all independently sprung cars—one senses the wheels working, moving up and down, one at a time, independent of the supremely stable platform.

One other incident further emphasized the car's greatly increased traction. When we started our acceleration runs we ran the engine up to 3000 rpm and began to ease out the clutch. On the older Corvettes this would have been enough to set the rear wheels a-spinning and the car off to a good, quick start. On the Sting Ray, nothing happened except that the car sort of lurched away from the starting point. We tried it again with 3500 rpm, then 4000 and 5000. The truth was apparent: traction is so good you have to wind up to at least 4500 rpm before you can induce off-the-line wheelspin. And, at that, the wheels don't spin very much. Our test car, despite being a pilot-line model (these are cars run down a preliminary assembly line to test procedures and are therefore not always the mechanical equals of regular production cars) and equipped with a 3.70:1 differential ratio, was faster up to 60 mph than our 1960 test car, which had a 4.10 ratio (but a 283-cu in. engine). As a matter of comparison, here are the acceleration figures for that 1960 f.i. Corvette, our 1963 test car and a 1962 (f.i., 327 cu in., 4.11:1) Corvette tested by *Car Life* magazine:

	1960	1962	1963
0-40	4.2	3.6	3.4
0-60	6.6	5.9	5.9
0-80	9.6	9.3	10.2
0-100	14.5	14.0	16.5
¼-mile	14.2	14.0	14.9

The increased traction gives the '63 equal or better acceleration up to 60 mph, but from there on up the lack of a 4.11 axle ratio hurts its performance in comparison with the others. (As a point of interest, Corvette Positraction gearsets are available in 3.08, 3.36, 3.55, 3.70, 4.11 and 4.56 ratios.) Because the test car was a pre-production model, and the test driving was limited to the GM test track, *Road & Track* intends to test a production model at a later date.

There are many, many improvements elsewhere in the Corvette, including completely new (although production sedan components) front suspension, frame, seats, outside panels, inside panels, dash, steering wheel, *ad gloriam*. When you get right down to it, the car is virtually all new, using mostly only the education gained from the old one.

One thing the designers thought of this time around—the driver. Not only is the steering wheel adjustable for reach (3 in., in and out) so that you can drive Italian-style, but the seats are comfortable and give enough leg room. Instruments are all new and better placed, with twin 6-in. speedometer and tachometer directly in front of the steering wheel. The passenger still has a panic handle in front of him, but it isn't quite as obvious as before. Also, there's a locking glove cubby (gin bin, to the country club set). Our only complaint about the interior was in the coupe, where all we could see in the rear view mirror was that silly bar splitting the rear window down the middle.

While our test car was a fuel-injected, 360-bhp convertible, we also drove the new coupe. Both have one major drawback in common—the lack of easy entry to storage space behind the seat. Both cars have adequate luggage space, but the lug-






Convertible top, and luggage, is stored under cover.

## 1963 CORVETTE

gage, or anything else that is hauled in that area, must be put in from the front; there are no deck lids. In the case of the convertible, the top must be disconnected from its tonneau panel and the seat backs flipped forward before access is gained. In the coupe, there's room for a couple of young children and lots of baggage behind the seats, but they all have to go in through the doors. (One of those Aston Martin type rear-window doors would have been an ideal solution—perhaps Chevrolet could offer one as an option.)

The coupe is very quiet inside, with little wind noise below 70 mph. Available with power steering and power brakes, and Powerglide automatic transmission, it probably will earn Corvette a bigger share in the burgeoning "personal car" market.

As a purely sporting car, the new Corvette will know few peers on road or track. It has proved, in its "stone-age form," the master of most production-line competitors; in its nice, shiny new concept it ought to be nearly unbeatable. 



The headlight buckets are rotated into operating position by electric motors—with stops for correct height adjustment.



New raked-back windshield and removable top are vast improvements over previous models. Design is busy but well integrated.







SCALE: 1/4" = 1" (1/8")

### DIMENSIONS

Wheelbase, in.	98.0
Tread, f and r.	56.3/57.0
Over-all length, in.	175.3
width	69.6
height	49.8
equivalent vol, cu ft.	351
Frontal area, sq ft.	19.3
Ground clearance, in.	5.0
Steering ratio, o/a.	19.6
turns, lock to lock	3.4
turning circle, ft.	n.a.
Hip room, front	2 x 20.5
Hip room, rear	n.a.
Pedal to seat back, max.	40.8
Floor to ground	7.5

### CALCULATED DATA

Lb/hp (test wt)	9.4
Cu ft/ton mile	154
Mph/1000 rpm (4th)	21.8
Engine revs/mile	2750
Piston travel, ft/mile	1490
Rpm @ 2500 ft/min	4615
equivalent mph	101
R&T wear index	41.0

### SPECIFICATIONS

List price	n.a.
Curb weight, lb.	3030
Test weight	3380
distribution, %	48/52
Tire size	6.70-15
Brake swept area	328
Engine type	V-8, ohv
Bore & stroke	4.0 x 3.25
Displacement, cc	5340
cu in.	326.7
Compression ratio	11.25
Bhp @ rpm	360 @ 6000
equivalent mph	131
Torque, lb-ft	352 @ 4000
equivalent mph	87

### GEAR RATIOS

4th (1.00)	3.70
3rd (1.31)	4.86
2nd (1.66)	6.14
1st (2.20)	8.14

### SPEEDOMETER ERROR

30 mph	actual, 28.5
60 mph	58.0

### PERFORMANCE

Top speed (6500), mph	142
best timed run	n.a.
3rd (6500)	106
2nd (6500)	85
1st (6550)	65

### FUEL CONSUMPTION

Normal range, mpg. . . . 11/14

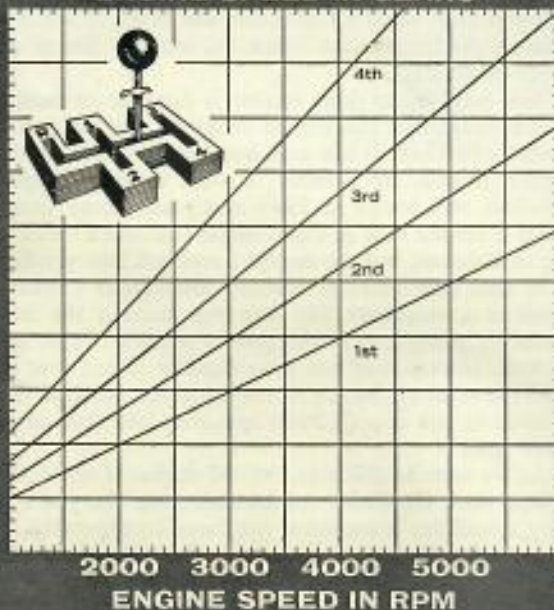
### ACCELERATION

0-30 mph, sec	2.5
0-40	3.4
0-50	4.5
0-60	5.9
0-70	8.0
0-80	10.2
0-100	16.5
Standing 1/4 mile	14.9
speed at end	95

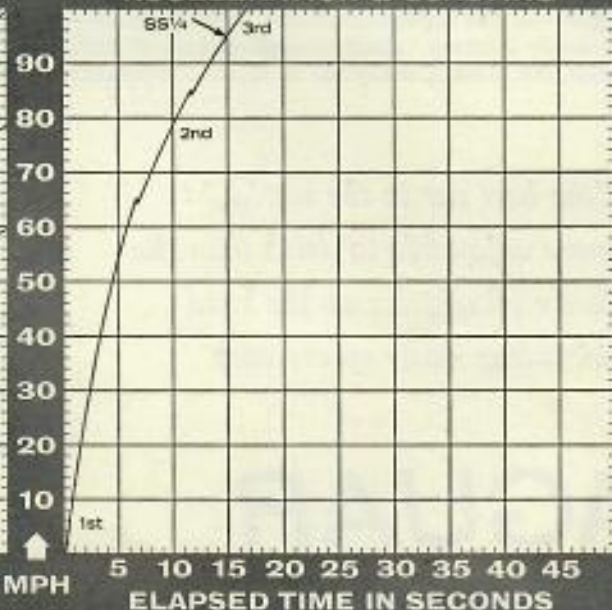
### TAPLEY DATA

4th, lb/ton @ mph	430 @ 75
3rd	550 @ 68
2nd	off scale
Total drag at 60 mph, lb	120

### ENGINE SPEED IN GEARS



### ACCELERATION & COASTING








*Convertible top, and luggage, is stored under cover.*

## 1963 CORVETTE

gage, or anything else that is hauled in that area, must be put in from the front; there are no deck lids. In the case of the convertible, the top must be disconnected from its tonneau panel and the seat backs flipped forward before access is gained. In the coupe, there's room for a couple of young children and lots of baggage behind the seats, but they all have to go in through the doors. (One of those Aston Martin type rear-window doors would have been an ideal solution—perhaps Chevrolet could offer one as an option.)

The coupe is very quiet inside, with little wind noise below 70 mph. Available with power steering and power brakes, and Powerglide automatic transmission, it probably will earn Corvette a bigger share in the burgeoning "personal car" market.

As a purely sporting car, the new Corvette will know few peers on road or track. It has proved, in its "stone-age form," the master of most production-line competitors; in its nice, shiny new concept it ought to be nearly unbeatable. 



*The headlight buckets are rotated into operating position by electric motors—with stops for correct height adjustment.*



*New raked-back windshield and removable top are vast improvements over previous models. Design is busy but well integrated.*

