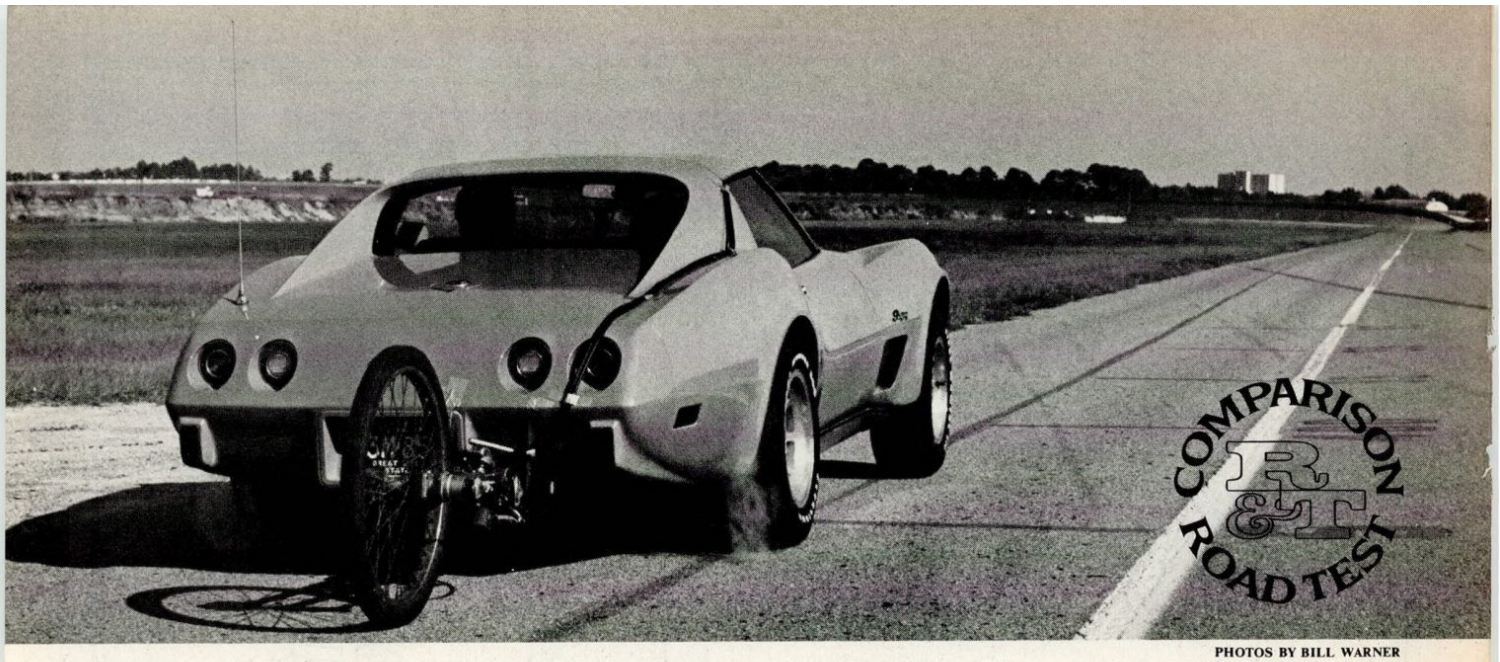


PHOTOS BY BILL WARNER

CORVETTE & SUPER CORVETTE

John Greenwood helps us test a stock Corvette and his 221-mph race car

FEW CARS IN the history of American sports-car racing have won more victories than the Chevrolet Corvette. And in the past six years no person has done more to earn the title of Mr Corvette than John Greenwood. Greenwood started building and running his own Corvettes in 1969, winning the SCCA A Production championship in 1970 and 1971. During 1972 and 1973, while running under B.F. Goodrich sponsorship, Greenwood's T/A radial-equipped Vette scored some impressive victories against competitors who had the advantage of running on stickier racing tires. Engine problems dashed Greenwood's hopes for a 1972 Le Mans class win, but the car's potential was clearly evident as it qualified fastest for the GT class—on T/A street tires no less!

With a new car again on racing rubber for 1974, Greenwood's Corvette won at Talledega with Milt Minter behind the wheel and at the Daytona IMSA finale with Greenwood driving. Although reliability problems, mainly with the engine, plagued Greenwood's efforts during 1975, he nevertheless managed to win three SCCA Trans-Am races in a row and the Championship, proving again that when the car is right it is probably the world's fastest GT.

So the scene was set for the 1975 IMSA finale at Daytona International Speedway. Daytona has been the scene of some of Greenwood's most impressive wins and he was there to do battle against the likes of Peter Gregg, Al Holbert and Hurley Haywood in Porsche RSRs; Sam Posey, Brian Redman and Hans Stuck racing the indecently quick BMW CSLs and Al Unser and Allen Moffat driving the Horst Kwech-prepared Monzas. R&T was there also, not only to witness the final race in IMSA's most successful season to date, but for another in our series of production-versus-race-car comparison tests pitting Greenwood's ultimate plastic fantastic Corvette against a production 1976 Corvette.

For our track test Greenwood brought his new—virtually out of the box—1976 race car. Except for a brief shakedown on the skidpad and the banked 7½-mile oval of Ohio's Transportation Research Center (TRC), the car had never turned a wheel in combat.

The engine in Greenwood's IMSA car is an aluminum block ZL1 454-cu-in. V-8 with a 0.060-in. overbore that results in a displacement of 467 cu in. It's equipped with Carillo rods, a Chevrolet crank reworked by Moldex, a General Kinetics camshaft and a timing chain and roller rockers from Isky. Pistons, heads, valves and valve springs are Chevrolet. The oiling system is a dry-sump design incorporating a Weaver four-stage pump. A handmade radiator, shorter but wider and thicker than the production Corvette unit, is used because it can be placed vertically for improved cooling. The usual coolers are fitted to the engine, differential and transmission.

Sitting atop the engine is a unique fuel-injection system featuring a crossram magnesium manifold with a fuel cooler built into the bottom and Lucas injection components. Under development for three years, Greenwood attributes his engine's tremendous horsepower (700 bhp at 6800 rpm) and impressively smooth and flat torque curve (peak torque is 620 lb-ft at 4000 rpm) to this unit.

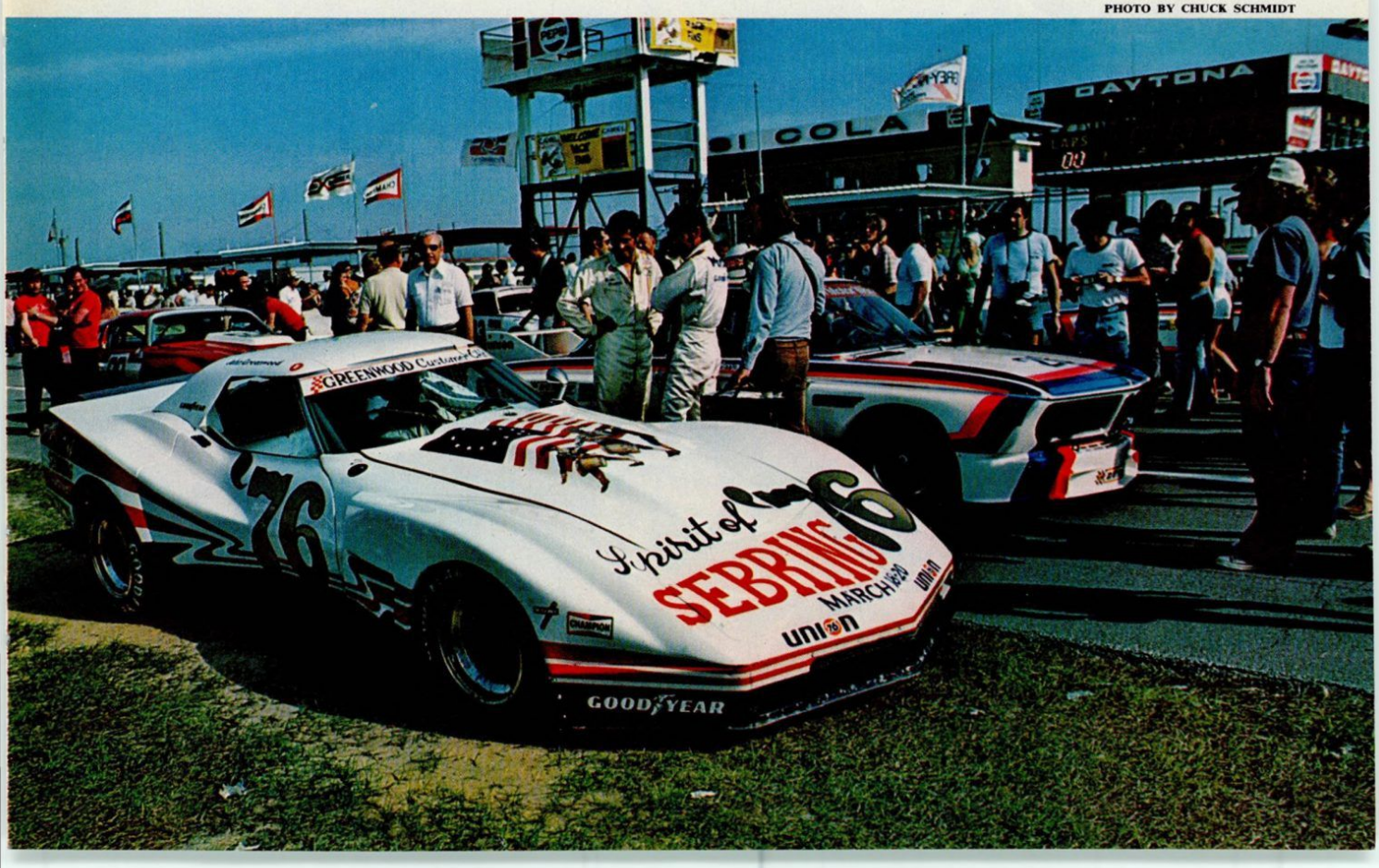
Backing up all that horsepower is a heavy-duty Muncie M22 Chevrolet 4-speed transmission. Affectionately called the Rock Crusher in racing circles, the Muncie gearbox is used as bought except that it's taken apart to check clearances and tolerances and then hand reassembled. The final drive ratio is 2.73:1 and combined with the 28-in.-tall rear tires gives the car a top speed of 221 mph at 7000 rpm.

Unlike many race car conversions, Greenwood doesn't start with a street car which is then torn down to the bare chassis. Rather he buys a production Corvette frame, gussets it for strength and crash protection and modifies it to accept the engine which is relocated approximately 1½ in. to the right and back almost 1 ft.

Modifications to the front suspension are surprisingly few. The front suspension including control arms and attachment points is purely production. According to Greenwood, the production Corvette front camber curve is very good and although the race car is considerably lower than production the only thing changed (besides the expected switch to teflon bushings) is the steering geometry to achieve zero bump steer. The rear suspension is an all-new independent design featuring unequal-length upper and lower A-arms and coil springs in place of the production Corvette's transverse leaf spring. The production rear suspension has two big drawbacks for racing, Greenwood says: it results in a tremendous amount of squat and toe change during acceleration and braking. With Greenwood's design, the swing-arm length is considerably longer which means he not only has the ability to adjust to zero toe change but also can dial in 50–75 percent anti-squat.

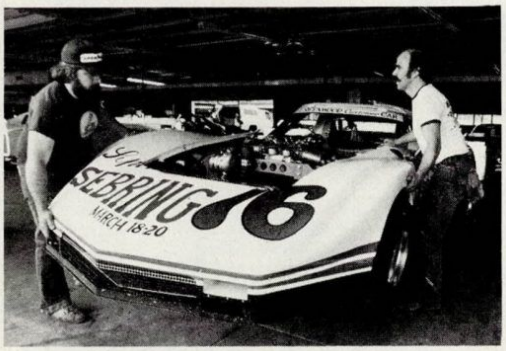
A high-speed banked track like Daytona obviously calls for a different chassis setup than the more usual road courses the IMSA cars run on. On a track such as Riverside or Laguna Seca the ideal setup is one where the car handles equally well ➔

PHOTO BY CHUCK SCHMIDT



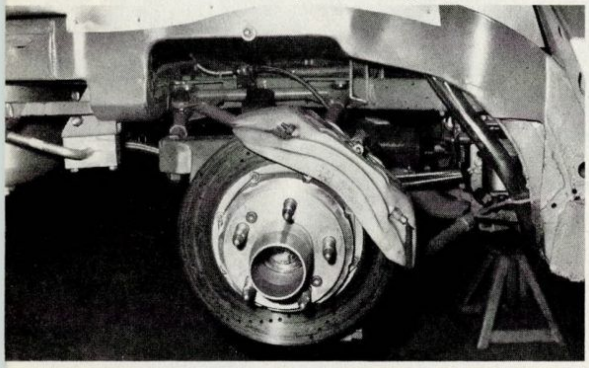
whether turning left or right. For Daytona a little extra weight is jacked into the left side of the car to improve the handling on the banking. But you can't adjust the car strictly for the banking as you can with a NASCAR stocker or you screw up the balance in the infield section.

The car likes to be stiff Greenwood says, and he uses spring rates that are about 25 percent stiffer than the Daytona suspension package that Chevrolet developed several years ago when Corvettes first started running the Daytona banking. Special Koni shocks with adjustable collars to facilitate ride height adjustment are fitted all around and an assortment of front and rear anti-roll bars allows final suspension tuning for various tracks. Braking a 2900-pound racing car from speeds in excess of 200 mph is not an easy task. The huge disc brakes Greenwood uses were originally designed by Hurst-Airheart to halt 3700-lb NASCAR stockers and are the only brakes Greenwood has found that are capable of holding down his Corvette. The rotors are drilled, not to improve cooling, but because Greenwood feels this aids brake response. Dual master cylinders—normal race-car practice—are incorporated into the system with a bal-

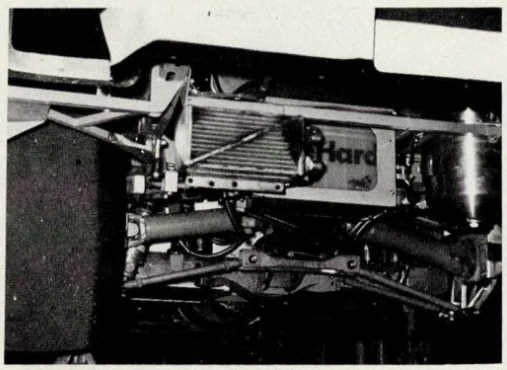


Front fiberglass can be removed and installed without disconnecting radiator as on previous car.

Rotors are drilled to improve braking response.



Race car's rear suspension has unequal-length A-arms.



SPECIFICATIONS COMPARISON
Production & Racing Corvettes

	Production	Racing
Price	$7605	$35,000
General:		
Weight, lb	3610 (curb)	2885 (race)
Weight distribution (with driver), front/rear, %	49/51	47/53
Track, front/rear, in.	58.7/59.5	59.5/64.2
Length, in.	185.2	187.0
Width, in.	69.0	82.0
Height, in.	48.0	47.0
Ground clearance, in.	4.4	3.0
Usable trunk space, cu ft	4.4	nil
Fuel capacity, U.S. gal.	17.0	32.0
Engine:		
Bore x stroke, mm	101.6 x 88.4	109.5 x 101.6
Displacement, cc/cu in.	5737/350	7654/467
Compression ratio	9.0:1	11.8:1
Bhp @ rpm, net	210 @ 5200	700 @ 6800
Torque @ rpm, lb-ft	255 @ 3600	620 @ 4000
Carburetion/fuel injection	one Rochester (4V)	Greenwood Crossram
Fuel requirement	unleaded, 91-oct	premium, 102-oct
Drivetrain:		
Gear ratios:		
4th	1.00	1.00
3rd	1.23	1.27
2nd	1.61	1.64
1st	2.43	2.20
Final drive ratio	3.55:1	2.73:1
Chassis:		
Brake system	11.75-in. vented discs front and rear, vacuum assisted	12.1-in. vented discs front and rear
Swept area sq in.	498	497
Wheels	cast alloy, 15 x 8	Sterling; 11 x 15 front, 17 x 15 rear
Tires	Firestone Steel Radial 500, GR70-15	Goodyear Blue Streak; 24.5 x 10-15 front, 28.0 x 17-15 rear
Front suspension	unequal-length A-arms, coil springs, tube shocks, anti-roll bar	unequal-length A-arms, coil springs, Koni adjustable tube shocks, anti-roll bar
Rear suspension	lower lateral arms, axle shafts as upper lateral arms, transverse leaf spring, tube shocks, anti-roll bar	unequal-length A-arms, coil springs, Koni adjustable tube shocks, anti-roll bar
Instrumentation:		
Instruments	160-mph speedo, 7000-rpm tach, 99,999 odo, 999.9 trip odo, oil press., coolant temp, ammeter, fuel level, clock	10,000-rpm tach, oil press., oil temp, coolant temp, rear-end temp, voltmeter, fuel press.
Warning lights	brake system, door ajar, headlights, seatbelts, hazard, high beam, directionals	oil press., voltmeter, fuel press.
Accommodation:		
Seating capacity, persons	2	1
Seat width, in.	2 x 18.0	14.0
Head room, in.	35.5	41.0
Calculated data:		
Lb/bhp (test weight)	19.0	4.7
Mph/1000 rpm (4th gear)	22.1	29.6
Engine revs/mi (60 mph)	2720	2030
Piston travel, ft/mi	1575	1355
Brake swept area, sq in./ton	250	305

ance bar that allows the front/rear brake bias to be varied. Sterling alloy wheels are fitted all around, 11 x 15 in. up front and huge 17 x 15 in. at the rear. The racing tires are Goodyear Blue Streaks, 24.5 x 10-15 in the front and 28.0 x 17-15 rear.

The swoopy body bares a passing resemblance to a production Corvette but it's considerably wider and all surfaces are contoured for maximum downforce and minimum drag. This latest car incorporates a new level spoiler that replaces the big duck tail used previously. From his testing at TRC Greenwood discovered that the new design generates sufficient downforce

PERFORMANCE COMPARISON
Production & Racing Corvettes

	Production	Racing
Acceleration:		
Time to distance, sec:		
0-1320 ft (¼ mi)	16.5	13.9
Speed at end of ¼ mi, mph	87.0	128.0
Time to speed, sec:		
0-30 mph	3.4	4.0
0-60 mph	8.1	6.2
0-100 mph	23.6	9.8
Fuel economy:		
mpg	14.0 (normal)	4.0 (race)
Handling:		
Speed on 100-ft radius, mph	33.5	64.8 (267-ft radius)
Lateral acceleration, g	0.748	1.200
Speed thru 700-ft slalom, mph	59.1	na
Brakes:		
Minimum stopping distances, ft		
From 60 mph	160	123
From 80 mph	262	220
Pedal effort for 0.5g stop, lb	30	45
Fade, % increase in pedal effort, 6 stops from 60 mph @ 0.5 g	33	nil
Interior Noise:		
Idle in neutral, dBA	62	112
Maximum 1st gear	84	na
Constant 70 mph	75	na
90 mph	81	na

(around 1000 lb at 200 mph) with a tremendous reduction in drag. With a race weight of 2885 lb the Corvette gives away a lot to the considerably lighter Porsches, BMWs and Monzas, but 700 bhp and that aerodynamic body more than even the odds.

Purposeful is an apt description of the gutted interior. It contains a single bucket seat, a roll cage, a fire extinguishing system and the usual assortment of gauges, switches and fuses.

For the street-car portion of the test Chevrolet provided a bright orange 1976 coupe equipped with most of the items an enthusiast would want: high-performance L82 350-cu-in. V-8, close ratio 4-speed, a high altitude (high performance is a dirty word at Chevrolet these days) 3.50:1 axle ratio, power-assisted steering and brakes, lightweight aluminum wheels and the stiffer gymkhana suspension package.

In the past few years the Corvette has been somewhat emasculated as a result of emission regulations. The thundering 454-cu-in. V-8 is history, a 4-speed manual transmission can't be ordered in California and even the famed small block V-8 is only a shadow of its former self as catalysts, lower compression, retarded timing and the like have taken their toll.

In its 1976 emission trim the L82 engine produces only 210 bhp at 5200 rpm and 255 lb-ft of torque at 3600 rpm. But it still has forged pistons and cranks, special rods and heads and a bottom end that will withstand a lot of high-rpm twisting. So take heart. Even if the street version isn't as fast as it once was, the pieces are available from Chevrolet or people like Greenwood to turn it into a real runner.

Obviously confident of the durability of his latest creation,

Greenwood street conversion is next best thing to real race car.

Greenwood agreed to allow R&T to test his car the Wednesday *before* the IMSA race. While he and his crew finished sorting out the ride heights and tuning the engine, we turned our attentions to the production Corvette. We last tested a Corvette in February 1974 and as we expected this latest example is slightly heavier and about 0.5 sec slower, accelerating from 0–60 mph in 8.1 sec and covering the quarter mile in 16.5 sec. But that's still pretty impressive performance these days. We followed these acceleration runs with tests of braking, handling and noise.

Then it was on to the race car. With the fire extinguisher bottle removed the Engineering Editor contorted himself into a semi-uncomfortable position on the floor on the passenger side of the car and surrounded himself with the usual road testing paraphernalia. Greenwood made a few short bursts to clean the plugs and then he was ready for the acceleration tests. In today's era of rolling starts and with gearing set up for a top speed of more than 200 mph, Greenwood's Corvette just isn't set up for standing starts. To save the clutch and to keep the engine from stalling Greenwood had to feather the throttle for about 3–4 sec until the revs built up. This general reluctance to get underway is reflected in the figures: the stock Corvette took only 3.4 sec to accelerate to 30 mph, the 700-bhp race car needed 4.0 sec to reach the same speed. But from that point on it was no contest. Once over its bucking and snorting the Greenwood car exploded forward with a deafening din that carried it to 100 mph in under 10 sec and to 150 mph in exactly 18.0 sec. (The EE said his ears rang for three days following this incredible display of power and yes, he'll have ear plugs next time.) The street car took 23.6 sec to reach the century mark and had run out of power at 132 mph. Considering ⟶

the horsepower, the race car's quarter-mile time of 13.9 sec isn't all that impressive. But the figure that is indicative of its true potential is the quarter-mile speed: an incredible 128 mph. And Greenwood believes that with the proper gearing and smaller tires his car would be capable of turning the ¼ mile in less than 10 sec at speeds in excess of 160 mph!

Although a race car seldom has to brake to a complete stop except in emergency situations, the Greenwood car passed this test with flying colors. It stopped from 60 mph in 123 ft and from 80 mph in a mere 220 ft, about 40 ft better than the excellent-braking street car.

The lateral acceleration figure for the street Corvette is for a similar model we tested on our usual skidpad in southern California. That 0.748g number isn't particularly high but we average the times going clockwise and counterclockwise and the Corvette had a carburetion starvation problem turning right. For Greenwood's car the lateral acceleration is based on a 267-ft radius skidpad at TRC because the race car won't run without coughing and sputtering on a 100-ft radius circle.

We only have an idle noise reading for Greenwood's Corvette. Our sound meter as well as the EE's ears were adversely affected by that 112-dBA value and we had to recalibrate the meter on our return to Newport Beach, California.

With the straight line performance out of the way we got on with our timed laps around the 3.84-mi Daytona sports car track which includes more than two miles of high-speed banking. For the street car we increased the tire pressures to their recommended high-speed settings of 26 psi front and 36 psi rear. Then Greenwood went out and turned a few laps in the 2:38 area to familiarize himself with the handling characteristics of the stock Corvette. Satisfied the car was running properly he then cut a couple of fast laps finishing with a 2 min 36.2 sec, or an average speed of 88.6 mph.

For the race-car laps Greenwood preferred waiting until practice and qualifying for the IMSA race that weekend as a few minor problems had been uncovered by our acceleration tests and he wanted his crew to have time to correct them. Following an unhappy practice session on Friday Greenwood took only three laps during his qualifying session on Saturday. His second lap was the fastest turned all weekend and set a new record for Daytona: a time of 1:52.05 for an average speed of 123.4 mph. That time put Greenwood's Spirit of Sebring 1976 Corvette on the pole by almost 1.5 sec over the 2nd fastest qualifier, Al Unser in a Horst Kwech Monza. The race itself was a walkaway for Greenwood's red, white and blue Corvette as he averaged 116.78 mph for the 250 miles and a 39.36-sec margin of victory over the 2nd-place finisher, Brian Redman in a BMW. Quite a performance!

We knew the race car would be lots faster than the stock Corvette and now we knew exactly how much faster: 44.15 sec. But that 88.6-mph average for an absolutely stock street car is impressive and Greenwood who had never before driven a stock Corvette around any race course came in from his laps mighty impressed.

"The car is very neutral," Greenwood said. "On the power it understeers just a hair. If I went into a turn and the back end started moving around I'd get on the power and the rear would stick right in just like the race car does. So that's a good feature. I was real surprised with the brakes," Greenwood continued. "I didn't get on them super hard but I could get on them anywhere and I was always braking too early. On braking, there was a bit of trailing throttle oversteer if I went into a corner real deep and got on the brakes. The back end started to squat and move a little—but the tail didn't come around and it was very controllable. That's the advantage of the A-arm rear suspension on the race car. It eliminates the toe changes that induce trailing throttle oversteer."

"With the g forces generated on the banking—I was running about 130 mph up there—the car naturally felt a little undersprung. The car got a little light but not to the point where it started to wander."

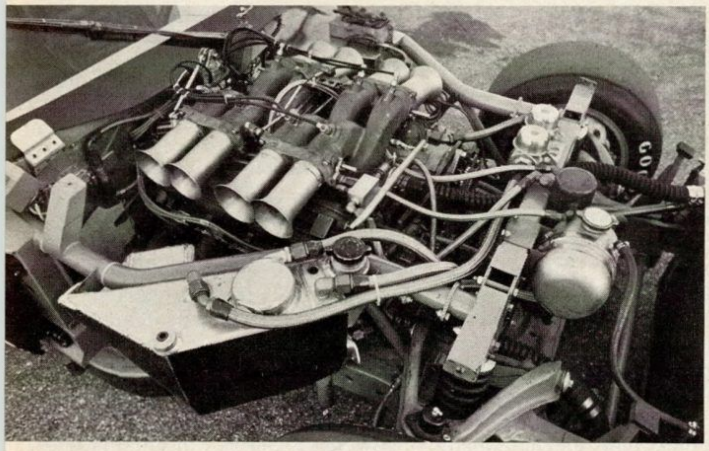
Stiffer springs, larger diameter anti-roll bars and a big front spoiler would improve handling significantly on a high-speed track like Daytona, Greenwood feels.

Having had considerable experience with racing on street radials, we asked Greenwood how the Corvettes GR70-15 Firestones work on a race track.

"The radials roll over on the sidewalls a little. And that's the thing I liked about the T/As; they didn't squat down when you cornered them hard. But these tires stick pretty well and are very predictable; they don't break away suddenly and that's an important consideration for driving on the street."

It's obvious from Greenwood's comments that Chevrolet has built a good sports car. But as Greenwood's race car so aptly demonstrates, it's usually possible to improve even a good thing. If you want to go GT racing, Greenwood will be happy to build you a duplicate of his car for around $20,000, less engine. If you're only interested in improved street performance or a car that looks like Greenwood's race car that's okay too because Greenwood's company markets an assortment of Corvette bodies, engine parts and suspension components including the complete A-arm rear suspension. Corvette drivers, the line to Greenwood's shop forms at the right.

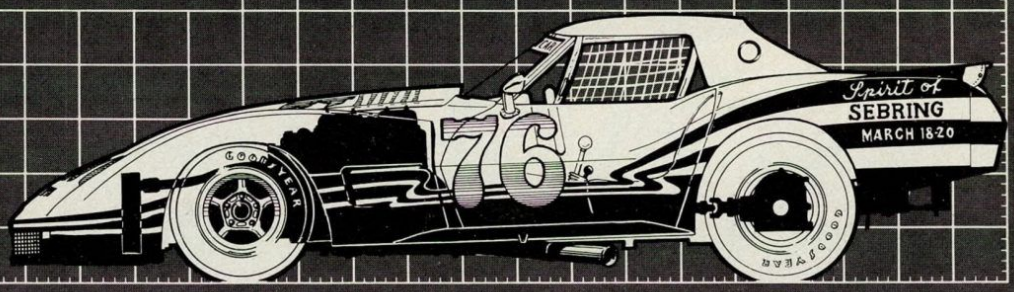
Crossram fuel injection manifold dominates top of engine.



Typical race car fare: large readable gauges, easily accessible fuses, fire extinguisher bottle, primary and back-up ignition systems on right door. Also note reverse lockout for shifter.

ROAD TEST

SUPER CORVETTE



SCALE: 10" DIVISIONS

PRICE

List price $35,000

MANUFACTURER

John Greenwood Sales, Inc
677 Elmwood
Troy, Mich. 48084

GENERAL

Race weight, lb	2885
Test weight	3260
Weight distribution (with driver), front/rear, %	47/53
Wheelbase, in.	98.0
Track, front/rear	59.5/64.2
Length	187.0
Width	82.0
Height	47.0
Ground clearance	3.0
Overhang, front/rear	45.0/44.0
Usable trunk space, cu ft	nil
Fuel capacity, U.S. gal.	32.0

ENGINE

Type	ohv V-8
Bore x stroke, mm	109.5 x 101.6
Equivalent in.	4.31 x 4.00
Displacement, cc/cu in.	7654/467
Compression ratio	11.8:1
Bhp @ rpm, net	700 @ 6800
Equivalent mph	215
Torque @ rpm, lb-ft	620 @ 4000
Equivalent mph	126
Fuel injection	Greenwood Crossram
Fuel requirement	premium, 102-oct

DRIVETRAIN

Transmission	4-sp manual
Gear ratios: 4th (1.00)	2.73:1
3rd (1.27)	3.47:1
2nd (1.64)	4.48:1
1st (2.20)	6.01:1
Final drive ratio	2.73:1

CHASSIS & BODY

Layout ..... front engine/rear drive
Body/frame ..... steel ladder frame, separate fiberglass body
Brake system .. 12.1-in. vented discs front and rear
Swept area, sq in. 497
Wheels ..... Sterling; 11 x 15 front, 17 x 15 rear
Tires ..... Goodyear Blue Streak; 24.5 x 10-15 front, 28.0 x 17-15 rear
Steering type ..... recirculating ball
Overall ratio 15.8:1
Turns, lock-to-lock 1.75
Front suspension: unequal-length A-arms, coil springs, Koni adjustable tube shocks, anti-roll bar
Rear suspension: unequal-length A-arms, coil springs, Koni adjustable tube shocks, anti-roll bar

INSTRUMENTATION

Instruments: 10,000-rpm tach, oil press., oil temp, coolant temp, rear-end temp, voltmeter, fuel press.
Warning lights: oil press., voltmeter, fuel press.

ACCOMMODATION

Seating capacity, persons	1
Seat width	14.0
Head room	41.0
Seat back adjustment, deg	0

CALCULATED DATA

Lb/bhp (test weight)	4.7
Mph/1000 rpm (4th gear)	29.6
Engine revs/mi (60 mph)	2030
Piston travel, ft/mi	1355
Brake swept area, sq in./ton	305

ROAD TEST RESULTS

ACCELERATION

Time to distance, sec:	
0-100 ft	4.1
0-500 ft	8.7
0-1320 ft (¼ mi)	13.9
Speed at end of ¼ mi, mph	128.0
Time to speed, sec:	
0-30 mph	4.0
0-50 mph	5.5
0-60 mph	6.2
0-80 mph	7.8
0-100 mph	9.8
0-120 mph	12.7
0-150 mph	18.0

SPEEDS IN GEARS

4th gear (7000 rpm)	221
3rd (7000)	182
2nd (7000)	136
1st (7000)	102

FUEL ECONOMY

Race driving, mpg	4.0
Cruising range, mi (1-gal. res)	124

HANDLING

Speed on 267-ft radius, mph	64.8
Lateral acceleration, g	1.200
Speed thru 700-ft slalom, mph	na

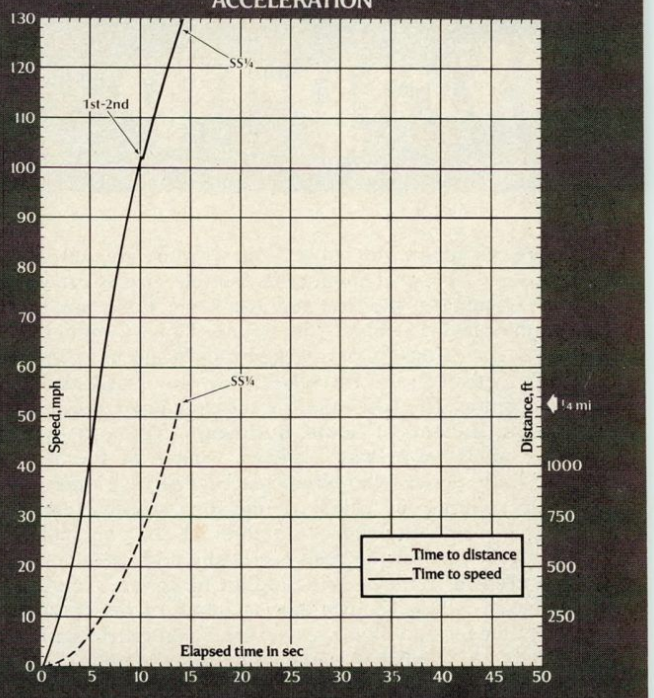
BRAKES

Minimum stopping distances, ft:	
From 60 mph	123
From 80 mph	220
Control in panic stop	excellent
Pedal effort for 0.5g stop, lb	45
Fade: percent increase in pedal effort to maintain 0.5g deceleration in 6 stops from 60 mph	nil
Overall brake rating	excellent

INTERIOR NOISE

All noise readings in dBA:	
Idle in neutral	112
Maximum, 1st gear	na
Constant 30 mph	na
50 mph	na
70 mph	na
90 mph	na

ACCELERATION



Ferrari 308 GTB and Subaru 4wd Tests

ROAD & TRACK

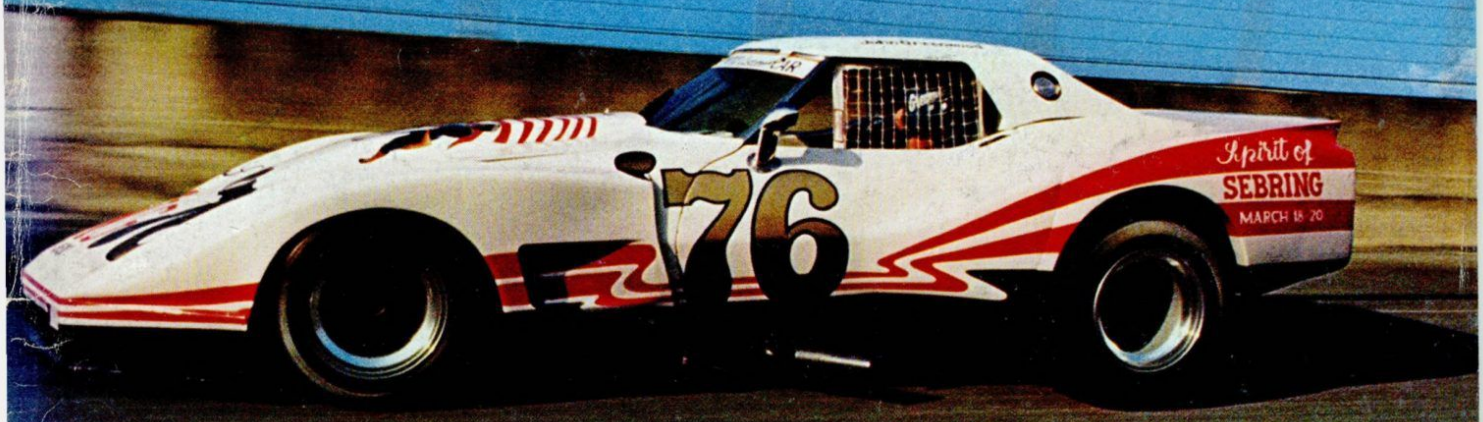
MARCH 1976 UK 45p $1.25

$50,000 FERRARI STATION WAGON

D-Type Jaguar – 3-Time Le Mans Winner

Bargain Classics – Guide to Used Sports Cars

New V-6 Volvo 264



CORVETTE TRACK TEST

220-mph Competition Car vs Production Model