C5 LIMITED ACCESS

UNTIL JAN 7, 1997

The undersigned fully acknowledge the classified nature of materials enclosed and agree to act in accordance with the standards and regulations concerning the use of the enclosed information.

Project Supvr: EKE Marketing Mgr: DF 10-31

Engineering Mgr: JR. Traffic: AM 10

Design Supvr: KO Technical Mgr: MW

Project Number 002169

CHEVROLET M

GENERAL MOTO

CORVETTE

LIMITED ACCESS NOT INT

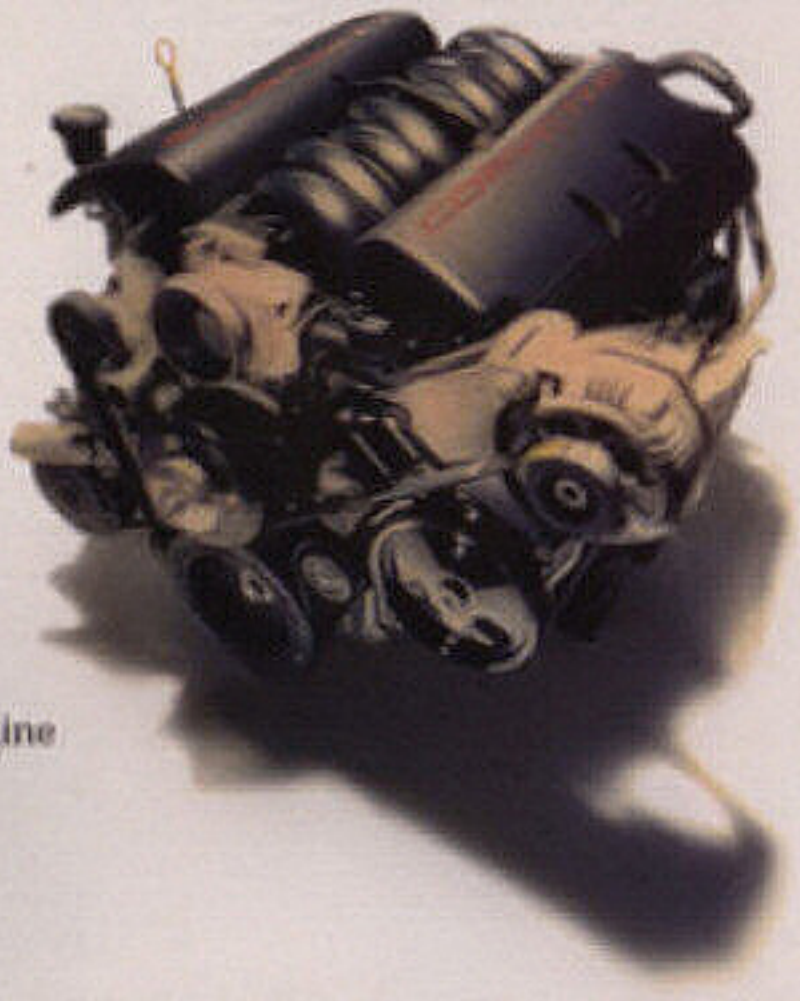
TRANS.6R4K31/333L25/241586.

DEVELOPMENT OF C5 CORVETTE • CRITICAL SURVEILLANCE TRACKING

FINDINGS ENCLOSED DOCUMENTATION • POWERTRAIN • STRUCTURE • ELECTRONICS • PERFORMANCE • MATERIALS • SUSPENSION • PROPRIETARY IMAGES

ENCLOSED MATERIALS • DEVELOPMENT C5 CORVETTE • CLEARED HIGHEST LEVELS • GMCORP • CHEVCORP

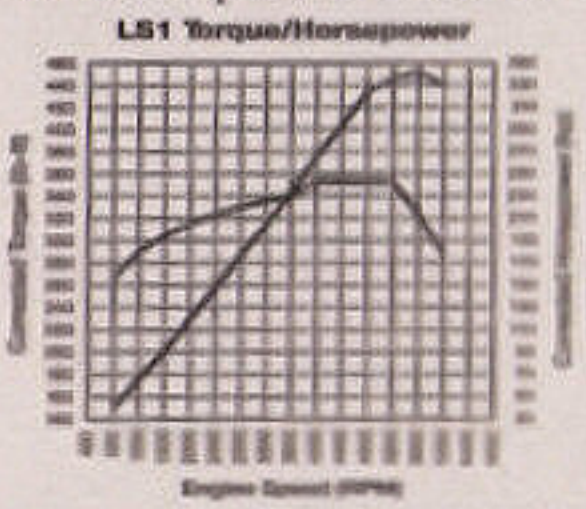
C5 THE NEXT VETTE • CODE{C5.SIDNANCY.005007}



5.7L V8 LS1 engine

The engine is entirely new. It is now aluminum, both lighter and stronger than its iron predecessor. Its deep-skirt design has increased structural rigidity, as have the smaller bores which allow more engine-block structure between the 4.40" bore centers. This increased rigidity reduces distortion and unwanted vibration.

Beyond the block, the redesigned four-bolt aluminum cylinder heads increase rigidity while virtually eliminating bore distortion. We have also gained rigidity with a new aluminum oil pan, now a structural member, attached to the block and bell housing. Even the connecting rods incorporate new technology: they are now made of powder metal, more durable even than pink rods used in race cars.



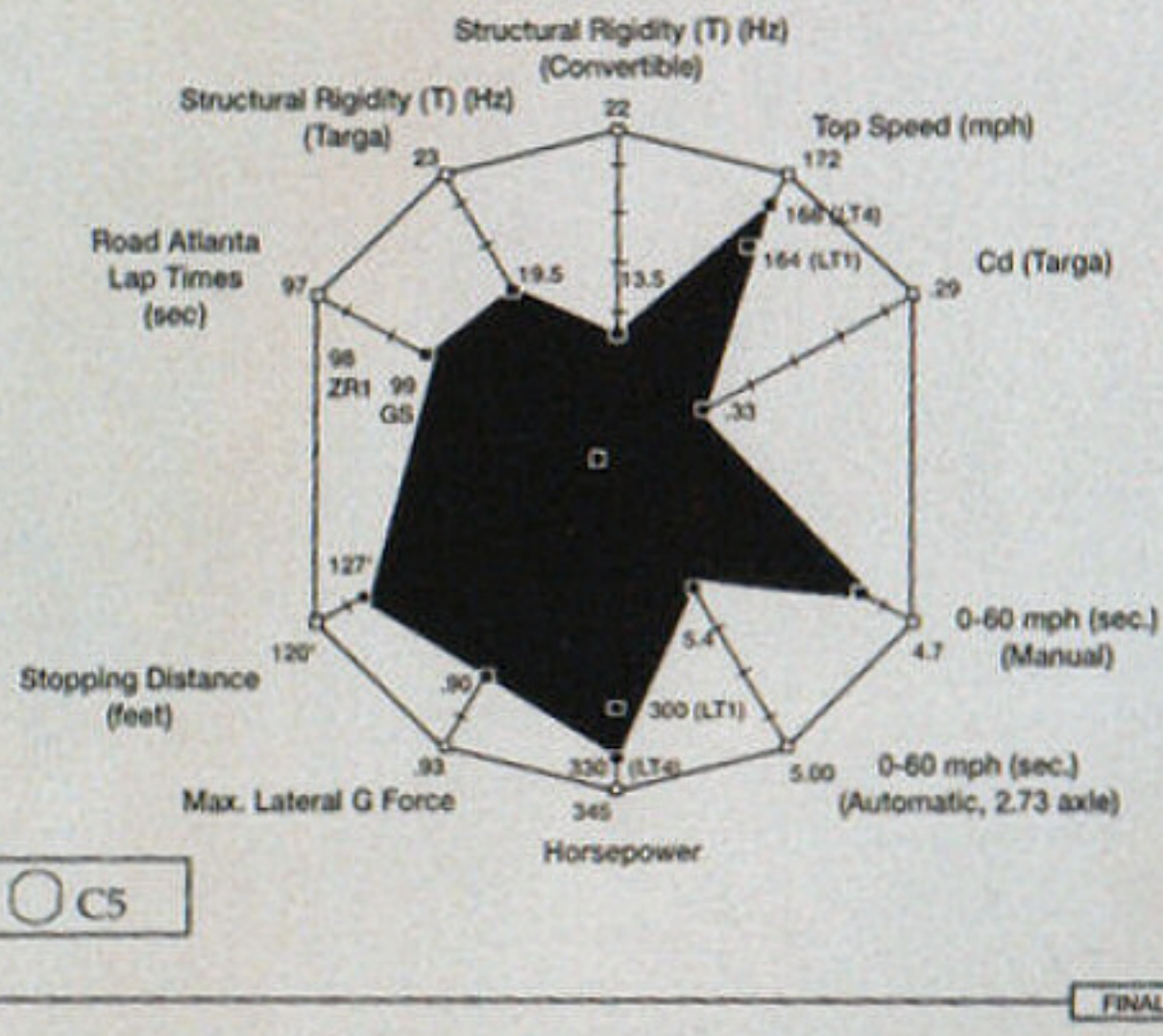
In terms of output, the LS1 produces 345 horsepower at 5600 rpm and 350 foot pounds of torque at 4400 rpm. Its compression ratio is 10.1:1 and displacement is 5.7 liters.

The C5 now has a transaxle configuration placing the transmission and its mass in the rear of the Corvette, as in most race cars, for better weight distribution. Since the new tunnel itself is smaller, as is the entirely new prop shaft (made from a composite of aluminum, aluminum oxide and ceramic), leg room has been increased substantially.

PROGRAM - Vehicle Requirements Achieved (FA-3)

GM Four Phase Vehicle Development Process

C5 vs. C4 Vehicle



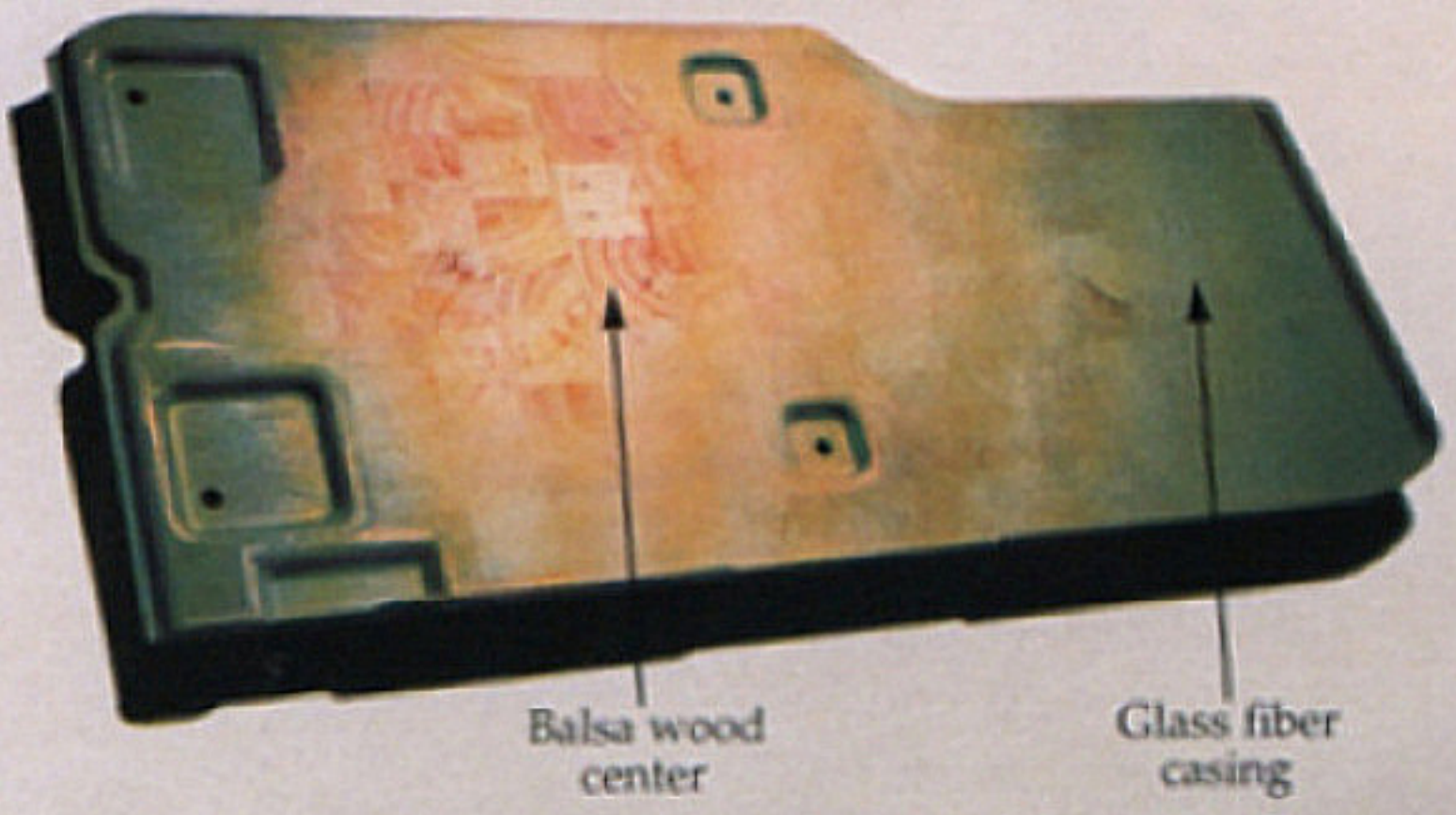
FINAL APPROVAL

The C5 is the most tested Corvette ever.

We conducted millions of miles of simulated testing, at times using Cray® supercomputers. We conducted many tests on a single prototype simulating 100,000 miles of driving. We logged tens of thousands of miles in CERV IV, Alpha and Beta prototypes at GM test facilities. We covered over 500,000 miles in actual C5 prototypes on paved roads, dirt roads, gravel roads, drag strips, race tracks and road courses including Road Atlanta, Road America and Grattan. We tested the C5 in temperatures in excess of 105° F in Arizona and Australia, and temperatures below -20°F in Alaska and Canada.

The results are charted above: the new Corvette shows significant gains in acceleration, braking, aerodynamics and top speed. This is no small accomplishment. In fact, on behalf of the entire C5 team, given the results above, we would like to request an additional week of vacation in the coming year.

MATERIALS



The C5 is unlike any car in the world, even down to the material we use to make its floor, an aircraft-type sandwich material made of kiln-cured Ecuadorian balsa wood encased in glass fiber. Exhaustive testing proved natural balsa unmatched in stiffness, mass and vibration-damping properties. This is the first automotive application of this technology to date.

Another innovation in materials is the process we use to make the aluminum suspension members. This process involves running cast parts through a forging operation, providing those parts with the respective advantages of both casting and forging: precise shapes and high strength.

Other lightweight, high-strength components include cast-aluminum crossmembers, composite nylon stabilizer bar links, composite leaf springs, magnesium steering column bracket, cast alloy brake and clutch pedals, and low-density polyester SMC inner body panels. Due to extensive use of these and other highly developed materials, the C5 Coupe is stronger and lighter than the C4.

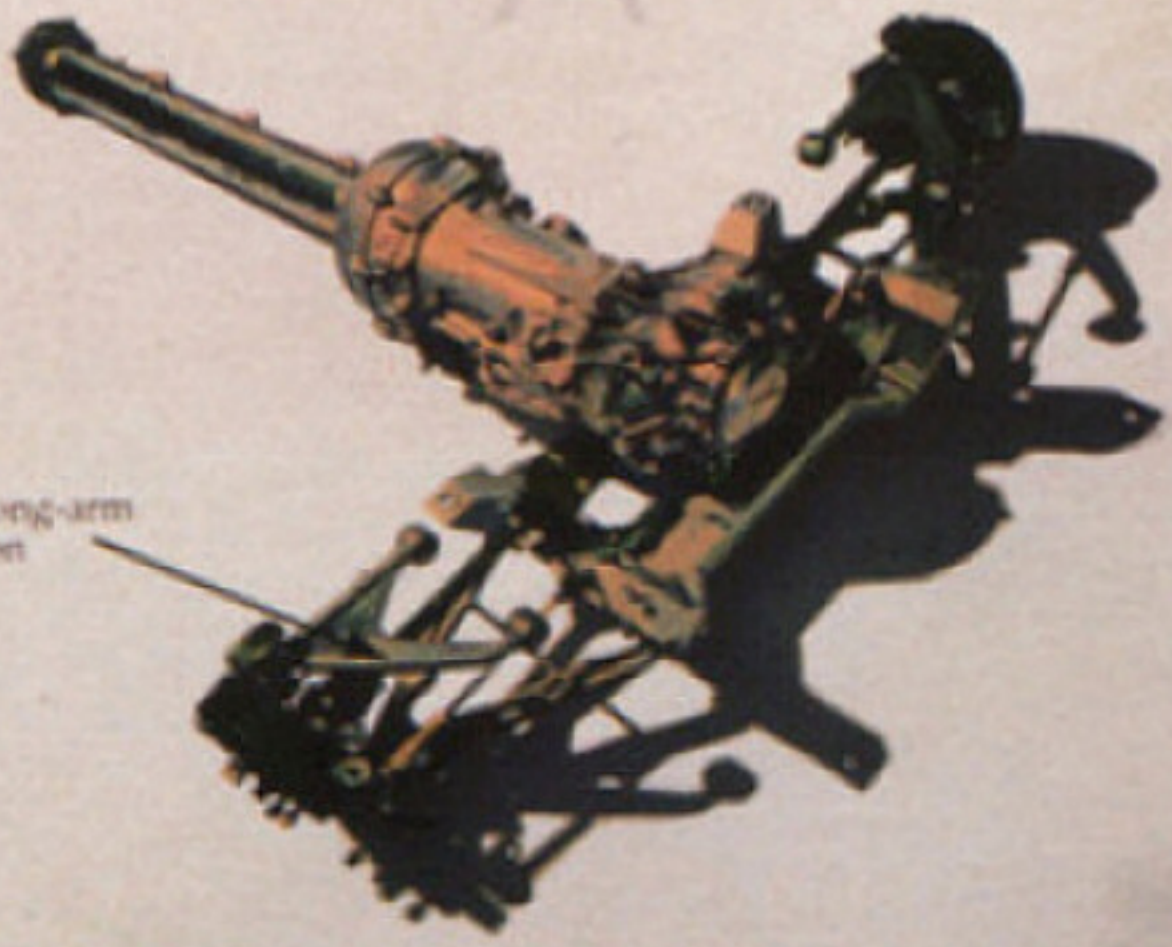
Closed tunnel backbone and hydroformed rails

Our results tell us that the C5 has the stiffest open-roof production sports car frame in the world. This structural rigidity comes without the cost of increased curb weight: While the C5 has a structural rigidity four-and-a-half times greater than the model it succeeds, it is also lighter.

These results were possible through new manufacturing technology. We have developed our own hydroform process to produce the C5 frame rails. These frame rails, the largest single hydroformed automotive parts in the world, are pressed from single pieces of tubular steel, giving them a much higher level of structural integrity than traditional rails made of individual components welded together. This hydroformed perimeter frame works in conjunction with a closed tunnel backbone which surrounds the drivetrain, a much more rigid configuration than conventional frames.

In terms of durability, the C5 has been tested to handle up to three lifetimes of Corvette usage. We might suggest that buyers choose a color their grandchildren will like.

SUSPENSION



C5 short-arm/long-arm suspension

The ride and handling of the new C5 is simply extraordinary. This is due to a redesigned suspension system working off a C5 structure that is 450% stiffer than its predecessor. This solid structure allows the suspension to do its job with minimal shake or flex in the body.

The C5 suspension is entirely new. After sifting through variations numbering in the tens of thousands, we were able to refine the intricacies that set the C5 short-arm/long-arm suspension apart from similar configurations. Proper, exact design and location of all components is critical for maximum performance. In fact, we found that a mere 2 mm difference in positioning one component to another changed performance substantially.

The results of these efforts are highly improved linear handling (nimble, quick, responsive), excellent limit handling (predictable, forgiving, stable) and a ride some drivers may find better than many luxury sedans.

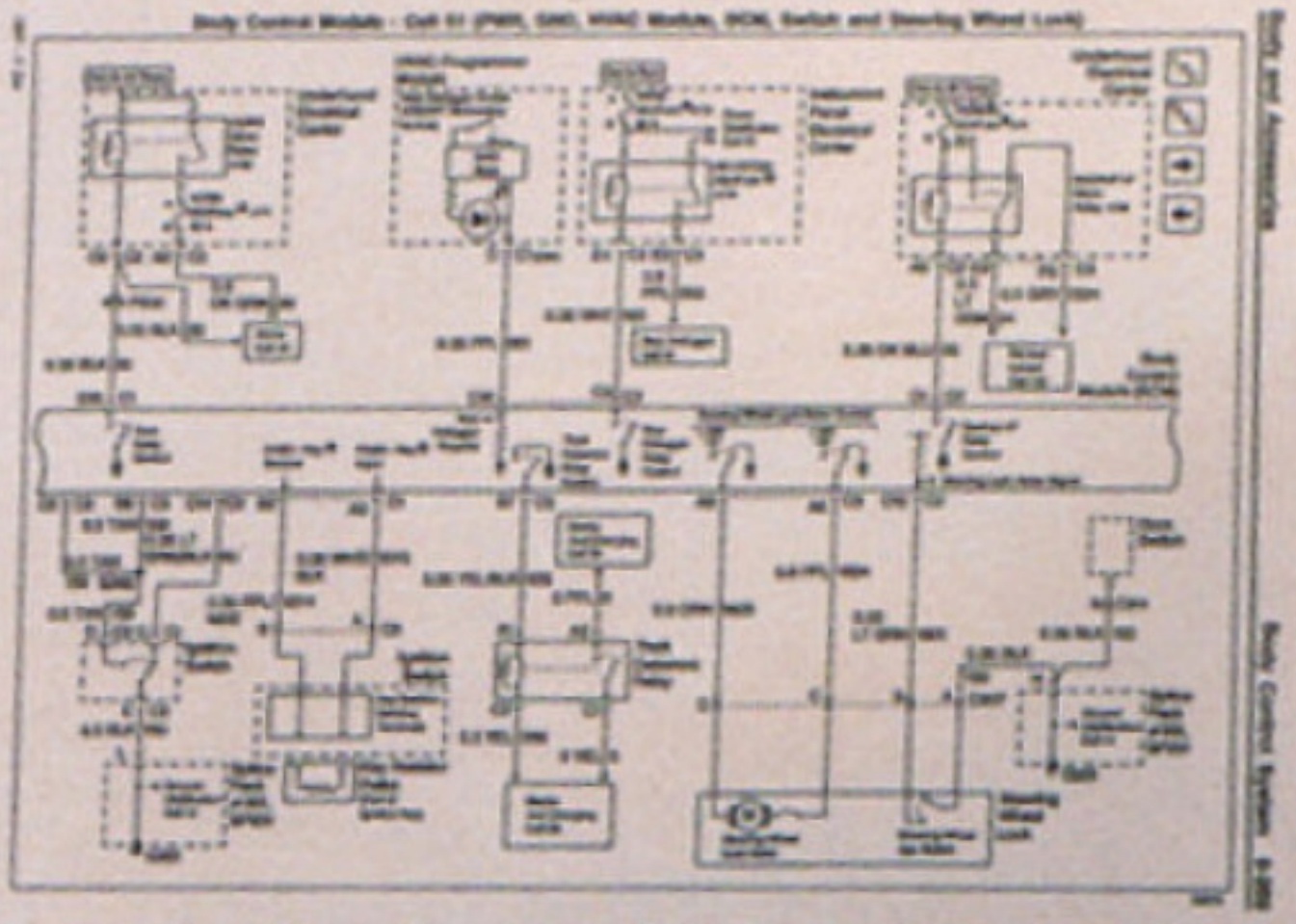
SUSPENSION

Even the best suspensions will not perform to their potential unless paired with appropriate tires.

Tires had to be designed and manufactured specifically for the C5 suspension. The result is the Goodyear Eagle F1 GS, the new extended-mobility C5 tire. These "run flat" tires have self-supporting walls which enable them to go as far as 200 miles at 55 mph without pressure. We have found that ride and performance are so good on these tires when flat that deflation may go unnoticed. Each tire is fitted with a pressure monitor in its valve which sends a warning to the dashboard if pressure drops below 25 psi.

The C5 is the first Corvette equipped with tires utilizing Goodyear's aquachannel technology. This design reduces hydroplaning on wet surfaces, while increased tire/road contact improves handling in dry conditions. The tread-block design itself reduces road noise.

The C5 is also the first Corvette that needs no spare tire. This not only saves weight, it allows more cargo area.

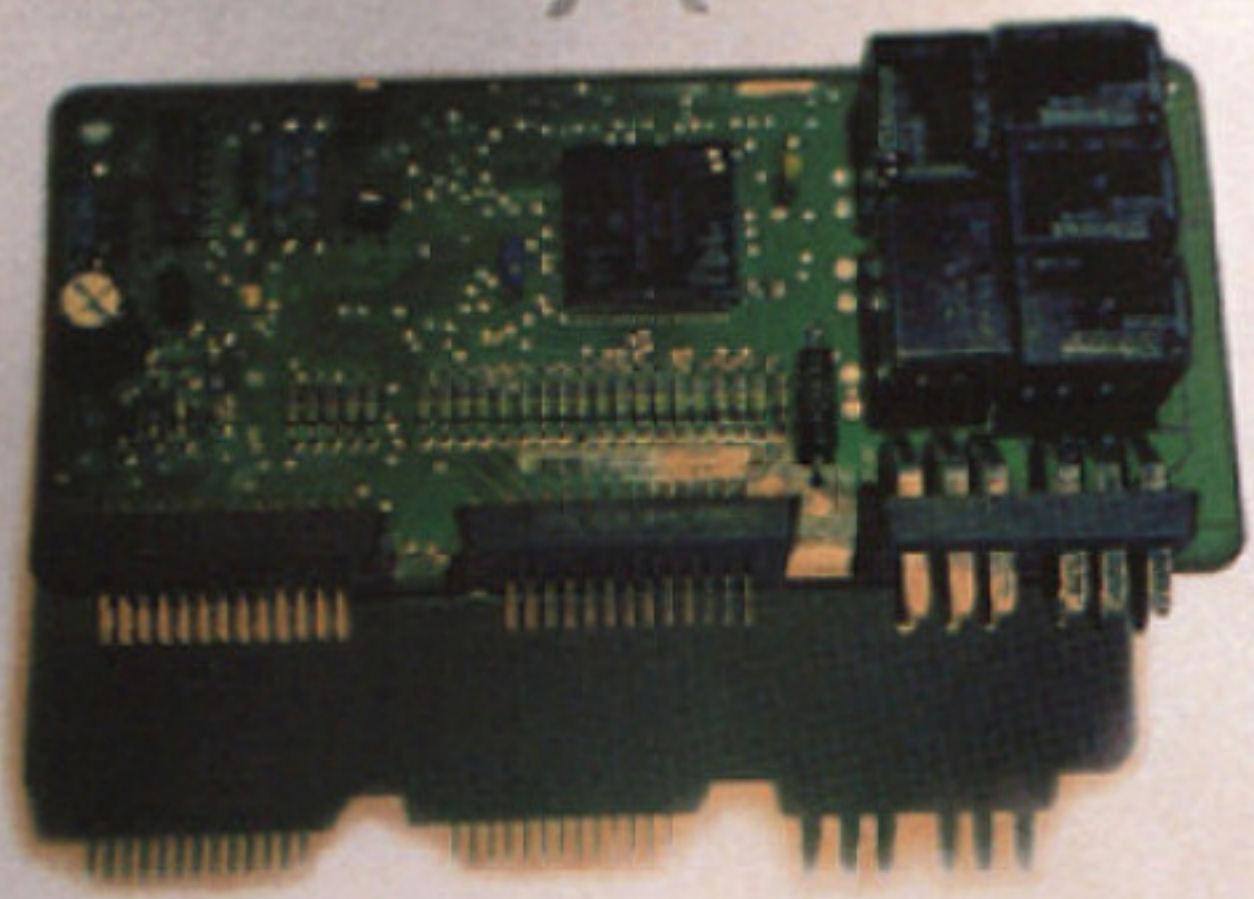


We have developed a completely new electrical system for the C5, making use of multiplexing technology. Multiplexing allows wires to carry more than one signal so a variety of data can be shared over a single line. This efficiency accounts for a 20% decrease of wiring in the new harness.

Configured in what we call a "zone control" strategy, the multiplex system monitors and runs virtually every function of the car while providing automatic backup in case of failure: if the primary data link for a system goes down, local data will be used to run that zone of the car. In effect, we have created a reliable primary system backed up by a reliable secondary system.

The computer-based multiplex system also takes care of details a driver may overlook. For example, if an interior light is left on, the computer will shut off power to that circuit after 15 minutes.

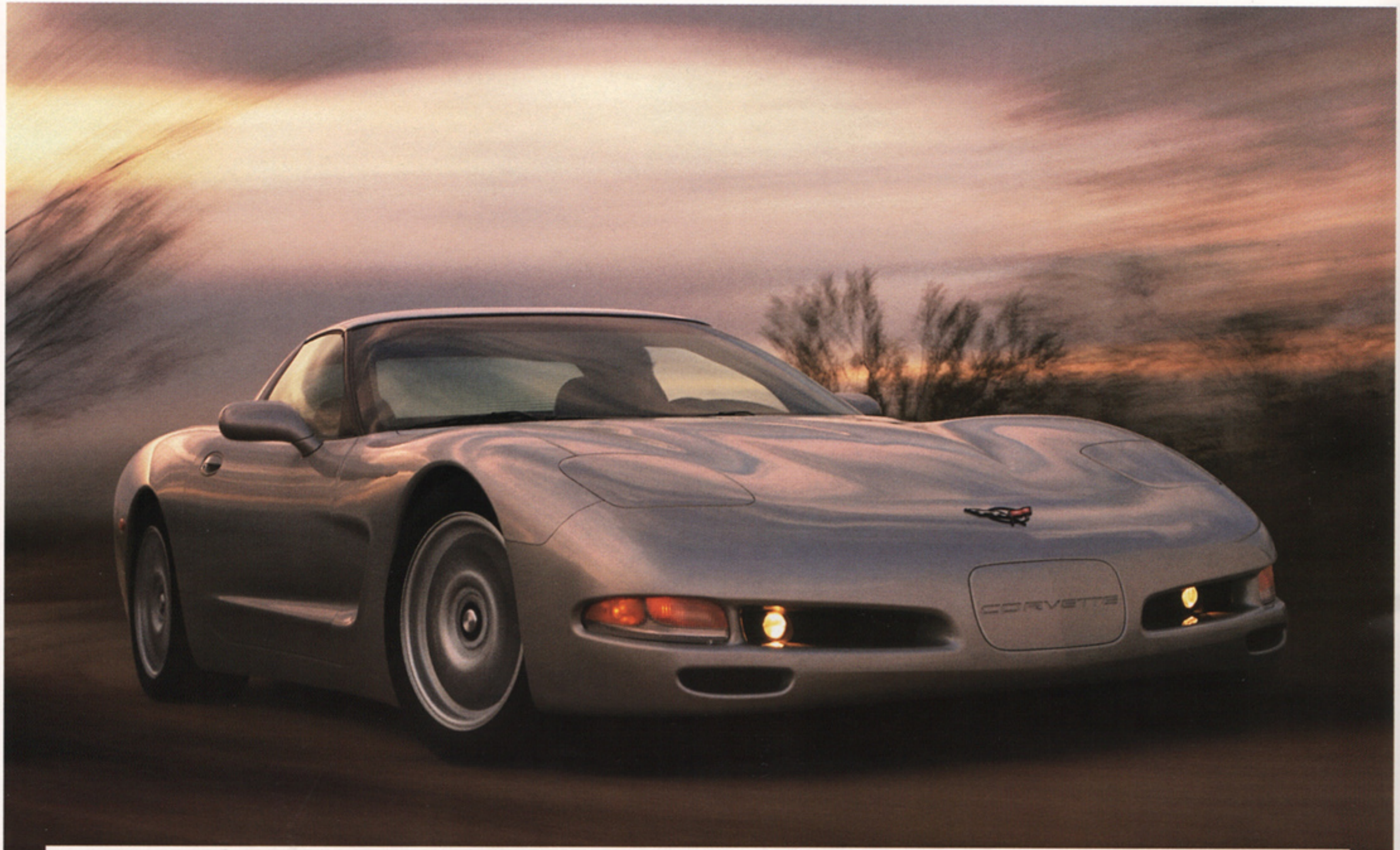
Since the C5 electrical system is software-based, it can be reprogrammed to take advantage of new technologies.



The C5 is designed so that the same digital information that regulates the engine and other systems of the car is also sent directly to the gages. In effect, through these gages, the driver looks in on the engine and other systems of the car.

There have never been gages in an automobile like those in the C5. Two ultraviolet light sources behind the instrument panel trigger "black light" graphics. These large, 180-degree gages are so accurate that the greatest margin for error is in the attachment of the needles to their posts.

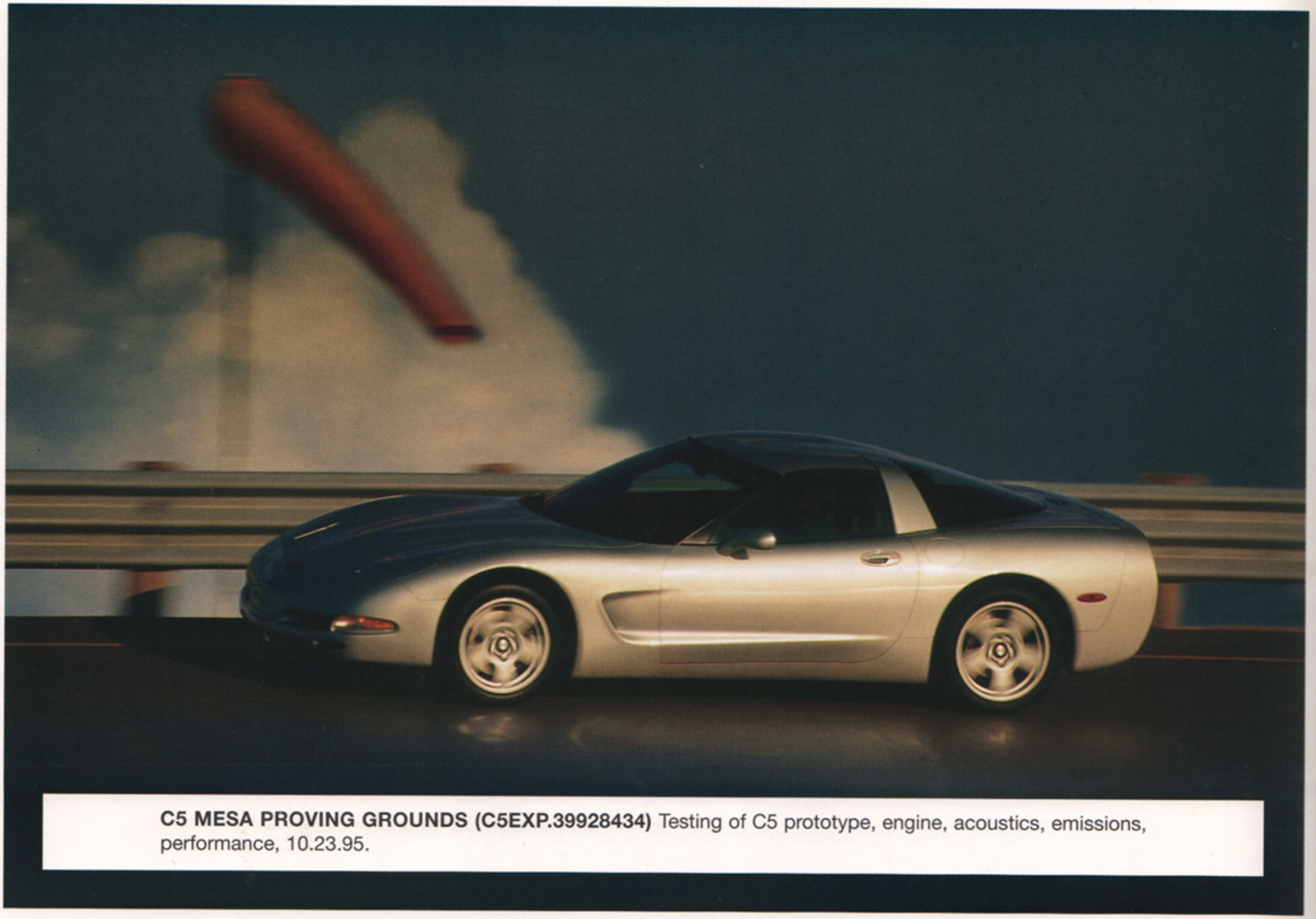
The C5 also has a 20-character display called the Driver Information Center which provides information and warnings in the driver's choice of English, Spanish, French or German. It can also be programmed to display English or metric units. Through this information center, a full range of programmable settings may be chosen, including entry codes, alarms, seating and lighting.



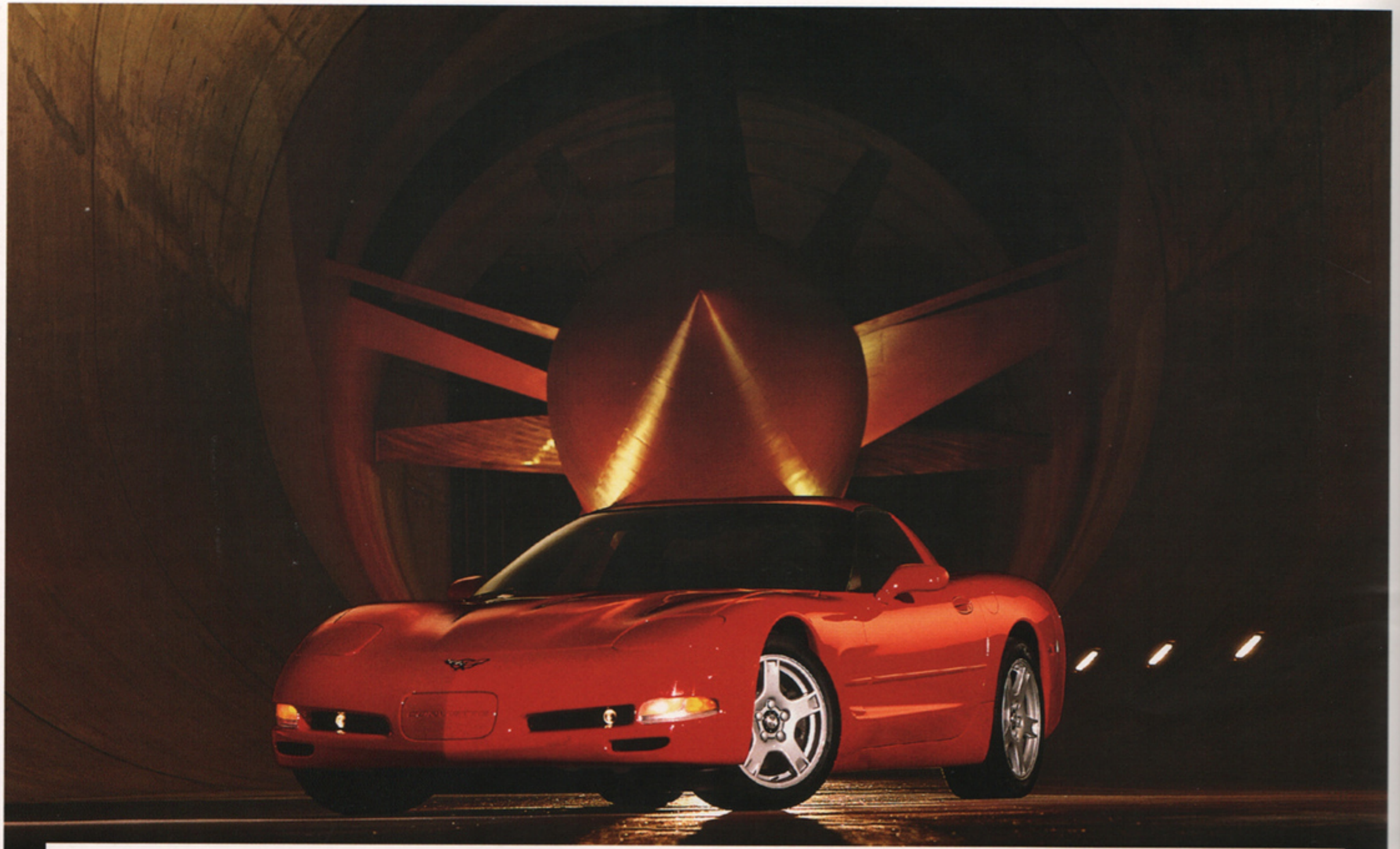
C5 AUSTRALIAN DESERT (C5EXP.43421443) High-ambient-temperature testing, speeds in excess of 100 mph, extended intervals, closed course, professional driver unknown, 1.14.96.

C5 AUTOBAHN (C5EXP.5573829) Exact nature of activity unconfirmed, details unconfirmed, 11.24.96.

C5 ROAD ATLANTA (C5EXP.38718563) Extended road course testing, powertrain, suspension, cooling, braking, 3-hour tests at performance limits, 10.4.95.



C5 MESA PROVING GROUNDS (C5EXP.39928434) Testing of C5 prototype, engine, acoustics, emissions, performance, 10.23.95.



C5 WIND TUNNEL (C5EXP.1132980) Aerodynamics testing, Design Center, 11.2.95.

C5 WARREN TECH CENTER (C5EXP.24564117) Note: ultraviolet gages framed within steering wheel, six-speed transmission indicated on shifter, 11.19.96.