

1988

## Corvette Specs and Technologies ZR-1 Automobile

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-more-

-- at any price.

With this unique LT5 engine, Corvette ZR-1 emerges with the strongest image, performance and value ever offered in a true production sports car -- anywhere has a power increase of more than 50 percent over the standard 198 V8." McElhanan. "The goal was a formidable one considering the engine is all-new and reliability of our current V8 engines," says Corvette Chief Engineer David R. Powerplant -- all-out performance, fuel efficiency and low emissions with the LT5 successfully meets the primary objectives we set for this requirements.

While U.S. Federal certification is incomplete, the ZR-1 is expected to deliver fuel economy above guidelines while meeting all applicable emissions requirements. The LT5 successfully refines road car capable of coming alive with all the ferocity of a purebred race car.

This all-new 5.7L aluminum V8 is actually two engines in one. High performance and horsepower at the top end are neatly balanced by smooth and responsive low-end operation. In operation, the ZR-1 is a smooth, quiet,

totally refined road car capable of coming alive with all the ferocity of a

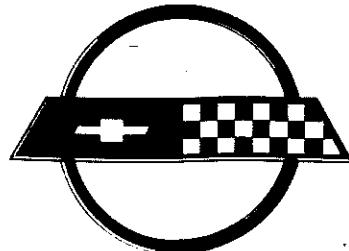
delivered fuel economy above guidelines while meeting all applicable emissions

four-valve-per-cylinder V8 engines to be built throughout the world for anything dual-personality V8 engine codenamed "LT5" -- one of the very few four-cam, WARREN, Mich. -- The punch in Chevrolet's Corvette ZR-1 is a

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CORVETTE



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The ZR-1 not only reinforces Corvette's legendary status as a technology leader, but thrusts it further into the limelight as the world's ultimate

productivity and torque figures won't be released until final Federal

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These objectives were targeted in Spring 1985 after early meetings between the Corvette Group and Tony Rudd of Lotus, where the possibility of designing 4-valve cylinder heads for the standard Chevrolet small block was discussed. From the beginning, it was increasingly clear the venerable veteran small block could not meet the objectives without incurring a gas guzzler penalty. The Corvette Group had also established the unsuitability of various other power configurations through exhaustive testing in the early '80s.

Turbocharged V6s and twin-turbocharged V8s were tested along with high horsepower, normally aspirated versions of the standard 5.7L V8. While all were able to generate the power levels required, they were incapable of meeting drivability, emissions and fuel economy goals.

More importantly, none offered the "cutting edge" technology essential to making the Corvette ZR-1 a "world class" competitor -- a technological edge seen as the key element in the ZR-1 program.

The emerging concept of a bi-modal vehicle -- two cars in one -- became the primary philosophy.

While seemingly impossible, the task of delivering a smooth, quiet, totally refined road car capable of coming alive with all the ferocity of a purebred race car was a challenge the Corvette Group relished -- and met.

The performance of the LT5-equipped ZR-1 is nothing short of astonishing. The very broad, smooth flow of power is the result of a robust torque curve -- in excess of 300 lb./ft. of torque from 1000 to 5000 rpm.

With braking and cornering power in excess of one g complementing the engine's incredibly broad performance range, the Corvette ZR-1 delivers a performance envelope-to-dollar value far exceeding anything currently on the planet.

The sophisticated design principles teamed with emerging technologies in metallurgy and engineering manufacturing.

And in keeping with Chevrolet tradition, it firmly establishes the minimum criteria by which future Corvettes will be designed.

The sophisticated design of the LT5 powerplant is a reflection of sound automotive wet-sleeve, open-deck construction with Nikasil-plated aluminum liners seated on liners, a one millimeter-tall flame-guard lip protects the cylinder head gasket.

The bore center spacing of 4.40 inches is identical to the millions of Chevrolet small block V8s. To maintain these bore centers, the small block-based bore was reduced from 4.00-inch to 3.90-inch, and the stroke was increased from 3.48-inch to 3.66-inch -- maintaining the original 5.7 liter displacement.

The Nikasil coating on the cylinder walls is a patented process that allows tolerances necessary for good power production and long-term durability savings, it delivers optimum ring sealing and permits the running of very close clearances.

The cylinder block is externally ribbed for strength, with a cast aluminum lower crankcase assembly that incorporates integral cast iron bearing cap bolts to the bottom of the block with up to six bolts per main bearing cap. The lower crankcase assembly extends the lower crankshaft structure below the centerline of the crankshaft for maximum structural rigidity.

#### HIGH-TECH SHORT BLOCK

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The block, lower crankcase assembly and cast aluminum oil sump have cast-in oil drainback passages on the outside of the cylinders. All upper engine oiling drains back through these passages which enter the sump below the crankshaft so that the rotating crankshaft mass is exposed to a minimal amount of drag from the oil splash.

The oil pan also carries a fabricated sheetmetal windage tray and surge baffle surrounding a cast aluminum oil pickup bolted to the bottom of the oil pan. This pickup seals to the lower crankcase assembly with a rubber "O" ring where a cast passage directs oil to a crankshaft driven, gerotor design oil pump been drilled and then plugged) to the main bearings that, in turn, oil the connecting rod bearings centrifugally as well as the main bearings. This results in the hole being in an area with the lowest load forces.

Engine oil is air cooled by the front radiator package and thermostatically controlled by an oil temperature control valve on the oil filter housing.

Main bearing diameter is 2.76 in. (70mm) with 2.10-in. (53.3mm) diameter connecting rod journals. Forged steel connecting rods carry shallow dished aluminum pistons on full floating wrist pins that are retained by snap rings.

The connecting rods have a center-to-center length of 5.74-in. (145.8mm) and the caps are pinned for precision alignment.

To ensure maximum smoothness and longevity, the crankshaft, torsional damper and flywheel are dynamically balanced as a unit before final assembly. Then all reciprocating parts are balanced and assembled in matched sets.

-MORE-

running on 87 octane unleaded fuel if necessary.

process, thus allowing a static compression ratio of 11:1 and the capability of works with the cloverleaf pads to promote greater control over the combustion A flat deck area around the perimeter of each mildly dished aluminum piston imparting turbulence in the cylinder.

a small quench area that directs the mixture toward the spark plug while reduces the distance the flame has to travel. Each tip of the cloverleaf forms plugs are designed for optimum volumetric efficiency. The central spark plug

The fast burn, cloverleaf combustion chambers with centrally located spark system.

is the relatively compact combustion chamber and its all-electronic management is the heart of the engine, and perhaps the most significant aspect of the LT5,

### COMBUSTION CHAMBERS

adjusting fingers, rockers or other linkages that would add unnecessary weight direct-acting hydraulic valve lifters eliminate the need for supplemental idler located in front of a roller chain sprocket on a common hub.

of camshafts driven by a small block-type primary chain that drives a half-speed heads narrow for optimum vehicle packaging. Each cylinder head carries a pair A narrow included angle of 22 degrees between the valves keeps the cylinder the real whiz-bang stuff starts with the 4-cylinder heads.

While there's no denying the sophistication of the new short block assembly,

### CYLINDER HEADS

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and less capable drivers.

Unauthorized use of the full power system by overzealous parking lot attendants

made limits engine operation to the primary inlet ports only, eliminating

locked out to prevent the secondary port throttle valves from opening. This

An added feature is the use of a power switch on the console that can be

driveability and awesome high-speed power -- all in the same package.

Variable valve timing to optimize airflow and fuel delivery for crisp, low-speed

cams used for the primary inlet runners. In effect, the system delivers true

additionally, the cams for these secondary ports have more timing than the

ports are fully open to deliver maximum power.

temperature is high enough. Above 3500 rpm -- or half throttle -- the secondary

happen when the ECM knows, via various sensors, that the engine coolant

their individual computer-controlled injectors come on line. But this can only

injectors. When full power is demanded, the throttled secondary ports open and

under normal circumstances, the engine uses only the primary ports and

toward the front of the engine.

incorporates a primary inlet port and a slightly larger secondary inlet port

full throttle. This system feeds a 16-runner tuned length intake manifold that

The larger secondaries open at 80 percent of the primary opening -- or at

for full power operation.

A three-valve throttle body uses a very small primary throttle valve for

good fuel mileage and low-speed flexibility -- and tremendous top end power.

The induction system uses a unique three-phase arrangement that delivers

## THE INDUCTION SYSTEM

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With conventional distributors, timing advance is controlled by the ECM and mechanically distributed. Inaccuracies, associated with component tolerances and wear, compromise control and will eventually result in scheduled tune-ups. In this system, the distributor is replaced by four coils mounted at the rear end of the engine beneath the intake manifold. Each coil fires two spark plugs simultaneously while only one cylinder will be on a compression stroke. A crankshaft sensor reads the position of the machined notches on the integral crankshaft disc and sends a signal to the ECM, which, in turn, calculates the precise spark timing needed for the engine's immediate operational mode and signals the proper coil to fire the spark plugs.

A crankshaft sensor reads the position of the machined notches on the integral crankshaft disc and sends a signal to the ECM, which, in turn, calculates the precise spark timing of the system is built-in and never varies or needs adjustment. Spark advance is constantly modified by the ECM to best match conditions as computed from engine speed, load (determined by manifold pressure), throttle position and coolant temperature.

A further enhancement is the electronic spark control system which minimizes the occasional spark "knock" drivers may hear under acceleration or with lower octane fuel.

The system uses a piezoelectric sensor that responds to a characteristic vibration frequency transmitted through the engine block at the onset of knock. Spark advance is automatically adjusted for varying engine speed and load conditions. If detonation begins to occur (spark advance too great), the system immediately retards the ignition spark so audible knock is controlled.

## IGNITION SYSTEM

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inlet in one piece.

heat exchanger inlet and outlet, the engine bypass and the radiator outlet to the engine

The cast aluminum thermostat housing is also unique, incorporating the

RPMs or when the thermostat is closed during rapid acceleration.

the erosion and high pressure of the radiator when the engine is running at high  
according to coolant flow rate pressure. The purpose of this valve is to limit  
A unique feature of the LT5's thermostat is its bypass valve, which seats

engine's inlet.

engine is of a more constant temperature since it is sensed immediately at the  
By locating the LT5's thermostat on the inlet side, coolant going to the

in the radiator to be ingested into the hot engine.

flow to the top of the radiator which, in turn, forces the cold coolant resident  
the coolant -- now hot -- forces the thermostat to open, allowing hot coolant to  
engine ahead of the temperature-sensing thermostat. Once through the engine,  
Thermal cycling occurs whenever cold coolant is circulated through the

LT5 from the effects of thermal cycling.

relocated from the outlet to the inlet side of the engine to better protect the  
For the first time in open passenger car production, the thermostat has been  
is no exception.

The LT5 represents many firsts for GM engineering -- and its cooling system

## COOLING SYSTEM

and emissions.

maximum advance to provide the highest performance and lowest fuel consumption  
humidity. As long as there is no detonation, spark timing remains at the  
various grades of unleaded fuel plus changes in altitude, temperature and  
Electronic spark control allows the engine to more precisely adjust to

-More-

system.

An upper and lower cradle-type and have been simplified from the L98 four-piece highweight, high-strength material used in Corvette bumpers. The supports are new two-piece supports were created for this radiator out of Azdel, a

low-profile hood line.

The LT5's radiator has also been slanted rearward to maintain the Corvette's

improve filtering and self-purging, since the radiator has been positioned lower than the engine due to its larger size.

Interestingly, the high fill bottle is located higher than the radiator to improve filtering and self-purging, since the radiator has been positioned lower than the engine due to its larger size.

The cap is located not on the radiator but on its high fill bottle. The cap thickness is 1.34 inches. The cap relief pressure for the system is 17 psi.

The radiator is 17.20 inches tall (about two inches taller than the L98's) and 23.62 inches long. The radiator's frontal area is 406 square inches, while its core thickness is 1.34 inches. The cap relief pressure for the system is 17 psi.

The 15 percent increase in radiator size from the current L98 engine also helps the LT5's 16.7-quart capacity cooling system. The 3.3-quart capacity

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three years, versus the four to six years it would have taken otherwise.

It has resulted in the engine evolving from blueprint to reality in just

simultaneous engineering, with design and manufacturing progressing together.

The link between GM, Lotus and Mercury Marine is a "textbook" example of

operations resemble a race engine shop where each engine is hand-built.

Clean environment for machining and assembly. In some respects, assembly

stillwater, Oklahoma, in a 21,000-square-foot partitioned area that provides a

The LT5 engine is being manufactured under contract by Mercury Marine in

#### MODERN MANUFACTURING

192 degrees (F) and is fully open at 201-202 degrees (F).

controlled by a thermostat in the oil filter housing, which begins to open at

crankshaft inlet oil temperature from exceeding 265 degrees (F). Temperature is

provides cooled oil for lubrication throughout the engine and helps keep the

the air conditioning condenser and the radiator. The 12 x 20-inch cooler

Another cooling feature of the LT5 is its engine oil cooler located between

temperature.

separately, depending on the air conditioning head pressure and engine cooling

by separate 150 watt motors. Both 11.77-inch diameter fans may work together or

To further enhance cooling, the LT5 uses two five-blade plastic fans driven

as its heatex core, are similar to those used for the L98.

The LT5's coolant overflow bottle for extreme after-bottle conditions as well

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In its simplest terms, simultaneous engineering is product engineering and manufacturing working together from the beginning of a project to develop both the product and the process at the same time. This often calls for bringing several companies with differing areas of expertise together on the same site. Bud Agner, director of Mercury Marine's Stellwater operations, notes that key personnel from Chevrolet and Lotus visit Detroit, Norwich (England) and Stellwater periodically to keep abreast of the engineering effort.

"With the continuous project coordination, the LTS has taken shape amid strong and constant communication, enabling design and manufacturing processes to progress at a rapid pace," said Agner. "No major obstacles interfered with production. Yet, if they had arisen, they would have been overcome quickly and efficiently because of the excellent communication channels currently in place."

A world leader in intricate, highly engineered aluminum castings, Mercury Marine was a logical choice because of its close association with GM in manufacturing Mercurius and stern-drive inboard engines, many based on GM flexible machining centers.

Some foundry work is contracted out, but Mercury performs more than 95 percent of the highly specialized machining in-house on computer-controlled hand-assembled at a carefully structured series of work stations in a special "clean-room" environment. The work station environment emphasizes the hand-built quality of the engines.

To ensure the highest quality possible, all engines are individually assembled at a facility possibly structured series of work stations in a special

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After machining, the engine blocks are put on carts and moved down an assembly line from station-to-station where various parts are installed onto the base engine. The first several stations put the crankshaft, pistons, rods and are installed, and then the cam shafts, timing chains and so on until assembly is complete. At the final few stations, the engine is "dressed" (ready to install in the car), and then moved to the hot-test stand, where it is tested under dynamometer conditions.

Engines then move down line to the next work station where cylinder heads are installed, and then the cam shafts, timing chains and so on until assembly is complete. At the final few stations, the engine is "dressed" (ready to install in the car), and then moved to the hot-test stand, where it is tested under dynamometer conditions.

By incorporating "world technologies" throughout the LT5 engine, its manufacturer and the car itself, Chevrolet has groomed the ZR-1 to its present state of performance which is second to none.

Couvette ZR-1 is sure to establish itself as the "performance bogey" for high performance automakers around the world. Its unique blend of emerging technologies and proven Chevrolet engineering shows conclusively that enthusiasts will never again settle for performance cars that only do some things well.

The ZR-1 does everything well and that, after all, is what Chevrolet performance is all about.

## WORLD TECHNOLOGIES

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Spotting a ZR-1 will be easy for experienced Corvette-watchers.

"This is a car with high performance levels that can still cruise comfortably at legal speeds on the highway in sixth gear with excellent fuel economy, says McElellan. "The technology inherent in the ZR-1 isn't there just to go fast; it's there to provide a level of total vehicle performance that purchasers in that range desire."

"The ZR-1 is a statement that we can do things today that no one even dreamed could be done 10 or 20 years ago," says Corvette Chief Engineer David R. McElellan. "We've achieved a spectacular level of performance and still are able to meet or exceed all government standards for fuel economy, safety, noise, emissions, regular grade fuel, etc.

The long-rumored, much-discussed four-cam, 32-valve Corvette ZR-1 is a technology tour de force -- a dual-personality sports car as accustomed to rush-hour traffic as it is to the open road.

ZR-1 -- The premier production sports car in the world.

Corvette -- Showcase for technological superiority for over three decades.

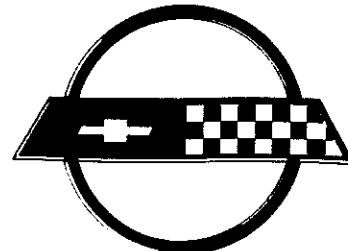
Chevrolet -- Performance king at General Motors.

WARREN, Mich. -- Chevrolet Corvette ZR-1.

The name says it all:

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performance envelope ... as Corvette engineers often will.

With the ZR-1 announcement, Corvette engineers did indeed punch the

fall behind."

the envelope -- the limits of what is technically feasible -- you're going to heritage of Corvette since Day One," says Schafsmas. "Unless you keep pushing technology, to demonstrate what we feel is really a sports car. That's been the Fred J. Schafsmas. "Corvette has always given us the opportunity to demonstrate

"And that is what Corvette has always been," says Chevrolet Chief Engineer

the test-track.

All this in an engine as vital in around-town driving as it is ferocious on

quarter miles well below 13 seconds and above 114 mph.

performance numbers for the ZR-1, such as zero-to-60 in the 4.2 second range and

But, unofficially, Corvette engineers have turned in straight-line

certification in the United States.

Official horsepower and torque figures won't be released until final

which has been a Corvette mainstay for two decades.

is 5.7 liters, the same as the legendary Chevy small-block overhead valve engine

all-aluminum, four-valve-per-cylinder, dual-overhead camshaft V8. Displacement

central to all the excitement is L75 -- option code for the ZR-1's unique

In this case, though, it's what's up front that counts.

are the most obvious exterior clues to the car's personality.

tall lamps and subtle ZR-1 and red bowtie badging on the new convex rear facia

GoodYear's widest-ever Eagle "Gatorback" tires. Distinctive quad rectangular

All are coupes with rear quarter panels gently flared to accommodate

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-more-

- o But horsepower and performance figures by themselves are no indication of how a car will perform -- or be asked to perform.
- o "The Corvette ZR-1 is system-engineered around its overall performance capabilities," says McLeillan, chief engineer for Corvette since the legendary Zora Arkus-Duntov retired in 1975.
- o Some specific points on the Corvette and the Corvette ZR-1 to keep in mind, says McLeillan are:
- o The Corvette ZR-1 has superb traction and control capabilities because of the larger high-performance Z-rated rear tires.
- o The Anti-Lock Brake System (ABS) that has been standard on all Corvettes since 1986 allows controlled stops and steering maneuvers under braking.
- o ABS enables the driver to make controlled stops from top speed with up to one g of deceleration.
- o The 6-speed manual transmission, Selective Ride Control (FX3) and Low Tire Pressure Warning System that are standard on all ZR-1s contribute to the car's performance envelope.
- o The Corvette has really proved its robustness on the race track. In three years of SCCA endurance racing, it was never defeated.
- o The "Power" key system on the Corvette ZR-1 allows the owner to limit the power of the car just below the standard Corvette.
- o The ZR-1 and the engine that powers it come by their already-legendary status with ease. They carry on the strong tradition of nearly one million Corvettes before them.

-MORE-

Corvette cognoscente as the engine code for the small-block 5.7 liter V8.)

receiving rave reviews from the motorizing press. (L98 is terminology familiar to

and convertible models to complete a sports car line-up that is already

The ZR-1 option on the Corvette coupe joins the L98-powered Corvette coupe

history of the American sports car.

Now it is Chevrolet's intention to establish another milestone year in the

SCCA-sanctioned Showroom Stock endurance racing.

recently, the current-generation Corvette has been an undefeated champion in

powerful alternative to the traditional 327-cubic-inch small-block V8. More

beginning in 1965, a new "big-block" engine option gave the Corvette buyers a

The '63 Sting Ray featured a sophisticated independent rear suspension.

Corvette technology has moved forward ever since.

rare and happy milestones in the history of automotive design," said another.

"It is our intention to make the Corvette a classic car, one of those

advertisements.

"Fantastic! Even in Turin No One Has Fuel Injection!" boasted one Corvette

Corvette as one of the world's most technological advanced automobiles in '57.

Optical Ramjet Fuel Injection and "four-on-the-floor" helped define

hood as if it were born there.

Historians will recall how the legendary '55 Chevy V8 fit under a Corvette

Corvette ZR-1.

As always, it's what's under the hood that is generating excitement for the

350 cid V8. The records show eight were produced.

"ZR-1" option package designed for racing the 1971 Corvette included the 330 hp

An often-overlooked fact is that the ZR-1 designation is not even new. A

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Performance innovations available for all 1989 Corvettes include a new smooth-shifting 6-speed manual transmission created to Corvette specifications by ZF (the respected West German gearbox builder), and a Delco/Bilstein adjustable shock absorber system (available on 6-speed coupes).

Dubbed FX3 Selective Ride Control, this innovative speed-variable suspension upgrade allows the driver to choose from the precision reflexes of a race-car suspension (Perf mode), traditional Corvette response (Sport mode), or the grand touring ride of a sport sedan (Touring mode) -- via a console-mounted switch.

Within each mode, there are six different shock absorber damping levels, another choice to buyers of America's own sports car. And what a choice it is!

For less than \$40,000, the L98 with Tuned Port Injection is available for coupe and convertible buyers who are satisfied with 0-to-60 times of under six seconds and a top speed in the vicinity of 150 mph. For approximately \$50,000, the ZR-1 is available for those select few drivers who seek even more.

Sherer muscle, though, is hardly what ZR-1 is all about. This is a sophisticated two-seat sports car, serving up the finest combination of performance and comfort ever offered to the American driving enthusiast.

The ZR-1 owner is surrounded by a Delco/Bose stereo sound system, power-adjustable leather sport seats, tilt/telescopic steering, air condit & owing this Corvette apart is the 32-valve all-aluminum 5.7 liter V8 codenamed "TS."

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displacement and tremendously efficient performance.

For starters -- better breathing, higher output per cubic inch of

### WHY 32 VALVES?

taking.

Efficiency and high-rpm muscle that has the automotive engineering community talking. It's the low-speed tractability, crusing-speed plenty of raw power on tap). The big-block sting rays of the Sixties had horsepower alone doesn't tell all (the big-block sting rays of the Sixties had

The bottom line is a better than 50 percent jump in horsepower. But

injection and an ultra-high 11.0:1 compression ratio.

Fuel injectors per cylinder, secondary inlet port throttling, sequential fuel injection and an ultra-high 11.0:1 compression ratio. The bottom line is a better than 50 percent jump in horsepower. But

Design features include four valves per cylinder, dual overhead cams (four total) with direct lobe-to-lifter contact, 16-runner inlet manifold, two Multec

Beyond that, the LT5 is strictly 1990s technology.

(4.40 inches).

Corvette heritage in its displacement (5.7 liters) and cylinder bore spacing

While it is a completely new design, the LT5 pays tribute to traditional

engineering center in Hethel, England, and Mercury Marine.

effort of GM's C-P-C Group, Chevrolet Motor Division, GM's Group Lotus

### LT5 ENGINE FEATURES

era.

V8 that has reigned since 1955 as the most successful racing engine in history

for one. But the LT5 is certain to become the classic engine of the technology era.

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intake valve is also moving, but admits no fuel-air mixture. Secondary intake valve is on three valves per cylinder. The ports only. So operation, in effect, is on three valves per cylinder. The Below half-throttle, or 3500 rpm, the engine breathes through the primary linkage by a vacuum diaphragm which is signaled by computer. Intake and contain a port throttle butterfly actuated through a mechanical diameter and secondary to the rear. The secondary ports are five to 10 percent larger in the secondary to the rear. The intake ports are five to 10 percent larger than the primary being the one toward the front of the engine, and into two groups, the primary being the one toward the front of the engine, and within each cylinder, the intake ports, valves and cam lobes are divided sequentially fired fuel injector targeted over each of the intake valves. Each of the injector housings, which have an electronically controlled, there are now 16 runners instead of eight. These runners feed air directly into injection, but the throttle body has three butterflies instead of two -- and this three-phase system looks much like the L98 Corvette's Tuned Port LT5's easy disposition.

A unique three-phase multiple-throttle induction system is the secret to the

#### MULTIPLE THROTTLE INDUCTION

valves have distinct primary and secondary cam contours on each inlet camshaft to accommodate the LT5's unique induction system. Each pair of camshafts is driven by a highly durable duplex steel roller chain. The overhead design allows for weight savings and valve train simplification. This three-phase multiple-throttle induction system is the secret to the LT5's easy disposition.

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console. Here's how it works:

Everybody's talking about it -- the "power" key switch on the ZR-1's

#### THE "POWER" SWITCH

maximum performance, premium unleaded fuel is recommended.

"Knock" drivers may hear under acceleration or with lower octane fuel. For enhancement is the electronic spark control which minimizes the occasional spark timing is constantly optimized by the engine computer. A further

plugs leads.

direct-coil ignition module is comprised of four coils, each with two separate direct-coil ignition modules.

#### IGNITION AND ELECTRONICS

single engine.

produce both tractable low-speed and impressive high-speed characteristics in a computer-controlled coil, direct-fire ignition is featured. The

The effect is to provide true variable valve timing, optimize flow and duration than the primaries.

The secondary intake valves are actuated by cam lobes which have more injectors and all 32 valves.

four-barrel carburetor and the eight secondary injectors come on line. At this point things really begin to happen, with the engine now running on all 16

The secondary throttles open in a manner similar to the "secondaries" on a

mixture to enter the secondary intake valves.

personality. The secondary port throttle valves open to permit the fuel-air mixture to enter the secondary intake valves.

But when you put your foot down, there's a complete change in the ZR-1's

#10408-31589

-MOM-

steering cooler.

The standard Z51 Performance Handling Package includes heavy-duty front and rear springs and stabilizer bars, heavy-duty four-wheel disc brakes, and a power "uniframe," easily handles the added power of the LT5 engine. Forged-aluminum pieces, power rack-and-pinion steering and an aircraft-tight tread transverse springs, rear independent suspension with 5-link connections and This keenly tuned chassis, featuring fiber-glass composite front and rear suspension systems available on a production automobile.

The 1989 Corvette boasts one of the most sophisticated 4-wheel independent

#### 4-WHEEL INDEPENDENT SUSPENSION/GOODYEAR PERFORMANCE TIRES

highway cruising (65 mph @ 1600 rpm). Not only does this ZF-designed 6-speed help get the most out of the 32-valve V8, it complements the LT5's two tiers of performance with computer-aided gear selection (guiding the driver from 1st to 4th gear during certain light-throttle driving modes) and well-spaced ratios for both maximum performance and low-rpm highway cruising (65 mph @ 1600 rpm).

If a rugged performance transmission ever shifted like the proverbial "hot knife through butter," this is the one. Six speeds forward, fully synchronized.

"back to best." It is the standard manual on all '89 Vettes.

transmission, described by one journalist as bringing Corvette's transmission

The Corvette ZR-1 is equipped with the acclaimed ZF 6-speed manual

#### ZF 6-SPEED MANUAL TRANSMISSION

valve operation, in turn unleashing maximum 32-valve performance. Output to just below the L98-powered Corvette. The "Full" mode allows secondary "Normal" is locked in, the engine runs on primary ports only. This limits the keyed switch allows two modes -- "Normal" and "Full" power. When

#10408-31589

-more -

#10408-31589

- 10 -

Widest-ever P315/35ZR-17 Goodyear Eagle Uni-directional rear tires (speed rated to 193 MPH) are a ZR-1 signature. Front tires are P275/40ZR-17 Eagles. A Low-Tire-Pressure Warning System, a new option on all 1989 Corvette models and standard for ZR-1s, continuously monitors the air pressure in each tire while the vehicle is being driven.

Selective Ride Control, standard on ZR-1 and optional on '89 coupes, improves on the razor-sharp reflexes of the Z51 package and offers sport sedan-like ride quality -- when desired.

The driver can select from "Touring", "Sport" or "Performance" modes via a console-located switch:

- o Touring mode gives the Corvette driver smoothness and comfort you might not expect to find in a performance coupe.
- o Sport mode is not unlike Corvette's standard suspension, offering precise handling and wheel-controlled ride motion.
- o Performance mode delivers racetrack handling and ride.

Within each mode, there are six different shock absorber damping levels, depending on vehicle speed. Damping levels are automatically adjusted by electric motors. A variable damping level feature automatically "firms up" the ride as speed increases.

Selective Ride Control represents a joint effort between General Motors Engineering and Blitstein Engineering and has been featured on the Porsche 959 and Lotus F1 performance cars.

## SELECTIVE RIDE CONTROL

# # #

"ZR-1 is Corvette. Only more so!"

Dave McElhan has best summed up the ZR-1's raison d'être:  
Given all this, just what does ZR-1 mean. Perhaps Corvette Chief Engineer  
o Leather Sport Seats with power adjustment.  
o FX3 Selective Ride Control.  
o Corvette's highly acclaimed Delco/Bose stereo sound system.  
models, the ZR-1 coupe offers at no extra cost:  
In addition to standard equipment shared with 198 coupe and 198 convertible  
ZR-1 CONTENT  
disc brake at each wheel, is standard on every 1989 Corvette.  
available in a production automobile. This system, combined with a ventilated  
Bosch ABS II is one of the most sophisticated anti-lock braking systems

### BOSCH ABS II

#10408-31589

-more-

method of starting the Corvette.

defeating the steering column mechanism -- without changing the driver's usual

The "Pass-Key" security system thwarted a thief's most common approach --

system to its entire Camaro line.

With the start of the 1989 model year, Chevrolet extended the "Pass-Key"

percent.

the "Pass-Key" system and on January 1, 1989, increased that discount to 25

comprehensive insurance premium charges by 20 percent on Corvettes equipped with

Because of this significant drop, AAA of Michigan in 1987 reduced

o No 1987 or 1988, Vettes were stolen (through June 1988).

were left in the car or by a "friend" or parking lot attendant.

o Fewer than two of every 100 1986 Corvettes (the first year the anti-theft

system was offered) were stolen. Almost all were stolen because the keys

"Pass-Key" system) were stolen in 1985.

o Better than seven of every 100 1984 and 1985 Corvettes (without the

Michigan, of the Corvettes it has insured:

Statistics speak for themselves. According to the Automobile Club of

effective theft deterrent Chevrolet has ever offered.

Corvette's "Pass-Key" electronic auto-theft system has proven itself the most

WARREN, Mich. -- Short of providing a security guard with each car,

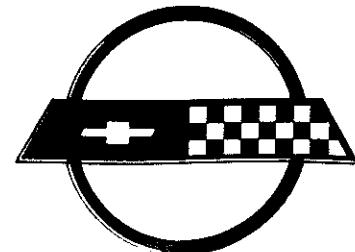
#10417-31589

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CONTACT: Ed Lechtzin

(313) 492-8836

CORVETTE



-more-

"Pass-Key" resulted from a combined project that involved the GM Research Laboratories, Chevrolet's Corvette Group, Delco Electronics Corp., and Saginaw Divisions.

Studies have indicated that even a few minutes' delay will thwart most car thieves. Examination of recovered stolen vehicles indicates that the steering column and ignition lock were attacked in over 60 percent of theft cases.

And that's just what the "Pass-Key" system's three components are designed to prevent:

A special ignition key with an electronically coded pellet. There are 15 different pellet codes and nearly 2,000 mechanical key codes -- leading to about 30,000 different combinations for an ignition key.

A special ignition lock containing a set of electrical contacts to measure the code of the pellet in the ignition key.

A "Pass-Key" control module that decides when it's okay for the vehicle to start.

o A "Pass-Key" control module that decides when it's okay for the vehicle to switch to activate.

From the driver's viewpoint, nothing has changed. Inserting and operating the proper key starts the car. There are no buttons to push. There are no predominate attack method -- would leave the starter system and fuel delivery another attempt with a key can be made. And, bypassing the ignition lock -- the thief using an improper key causes an immediate four-minute delay before

the proper key starts the car. There are no buttons to push. There are no

switches to activate.

Here is a breakdown of theft reports involving Corvettes from the Automobile Club of Michigan:

Calendar 1984

(Before Pass-Key) 1984 1981 881 66

Calendar 1985

(Before Pass-Key) 1984 929 929 76  
1985 570 570 35

Calendar 1986

1986 482 482 64 0  
1987 332 332 28 0  
1988 458 458 0 0

Calendar 1987

1986 1987 1988  
4 0 0  
6 0 0  
9 440 350 100  
1986 1987 1988  
4 0 0  
4 440 350 100

Calendar 1988  
(Through June)

0 0 0  
0 0 0  
4 4 4  
1986 1987 1988  
4 4 4  
4 440 350 100

# # #

Model Year Corvettes Insured Corvettes Stolen

#10417-31589

- more -

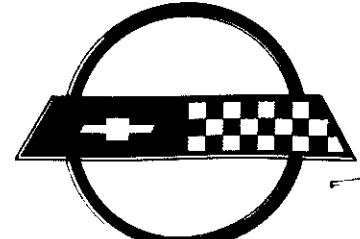
we chose a resin transfer mold (RTM) process." To the exploration of new technologies better suited to limited production and tooling-up a backlight and rear roof assembly was prohibitively high. "This led considered a one-piece unit using SMC (sheet-molded compound), but the cost of panel of the coupe into a two-piece top assembly," says McLellan. "We also "Initial proposals centered around utilizing the existing removable acrylic that led to the development of an entirely new composite production process, investigated during early stages of the program -- a systematic approach As Corvette Chief Engineer Dave McLellan explains, several technologies were

developed program in September 1987. Together with ASC Incorporated of Southgate, Mich. -- to initiate a hardtop open-air 'Vette reappeared in 1986. That interest prompted Chevrolet -- Corvette aficonados have been asking for a factory hardtop ever since the pricing for the new hardtop is not available at this time.

year. Current convertible body colors as an interim factory option for the 1989 model generateon convertibles (1986 to the present). It is being offered in all production of the 64-pound hardtop begins in March 1989 for all current WARREN, Mich. -- Corvette's convertible hardtop is back after more than a decade's absence.

#10416-31589  
FOR RELEASE: UPON RECEIPT CONTACT: Kart St. Antoine (313) 492-8839

CORVETTE



RTM uses a two-piece tool that forms the outer and inner roof skins. Resin, a steel and aluminum cage, and MAT (a special alcohol-based polyurethane) are then placed between the two halves before they are brought together and heated -- yielding a composite rod structure ready for painting.

The hardtop's exterior and interior are coated with a polyurethane finishing system, the latter receiving an ASC-formed headliner. The package also includes a heated backlight and chemically treated latex weatherstrips.

The finished hardtop -- good-looking, weatherproof and lightweight -- is so strong that it easily exceeds all crash-rollover tests.

In addition, the hardtop is designed so that it can be attached without removing the '86-'89 convertible's soft tonneau roof. Installation requires only a small metal bolt assembly that mounts to the car's headliner.

ASC has expanded its facilities near the Bowling Green, Kentucky Corvette plant to handle the manufacture, paint and installation of the hardtops.

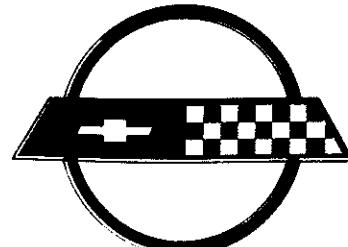
#10416-31589

-MORE-

- o Direct fire ignition system with crankshaft sensor incorporating ESC provides better drivability under varying conditions.
- o Electronic spark control (ESC) -- more accurate, durable and reliable.
- o Sequential fuel injection system with camshaft sensor.
- o for best fuel delivery range.
- o Two multec fuel injectors per cylinder -- each intake port has an injector low-speed drivability and economy.
- o Secondary inlet port throttling for optimum high-speed performance and十六-runner inlet manifold tuned to the power peak.
- o Thre valve, high-flow throttle body.
- o Camshaft duplex chain drive for durable, reliable operation and compact sprocket design.
- o Dual overhead camshafts (4 total) with direct lobe to lifter contact.
- o High-speed dual spring direct-acting valve train.
- o system breathing.
- o Four valves per cylinder (32 total) for optimum induction and exhaust plugs for smooth, efficient operation.
- o Fast-burn coverleaf combustion chambers with centrally located spark engine (RPO LT5) that powers Chevrolet's new Corvette ZR-1;
- WARREN, Mich. -- Here are the key features of the 5.7L TPI DOHC 32-valve

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(313) 492-8836 #10410-31589

CORVETTE



- O Center oilled forged steel crankshaft for strength and durability.
- O Thermostatically controlled oil cooler.
- O Gearotor oil pump for simple and efficient operation and more consistent oil pressure characteristics.
- O High capacity cooling system with the high flow water pump.
- O Single belt accessory drive with tensioner for improved belt life, proper loading of accessory bearings, and reduced maintenance.
- O Remote electric AIR pump operates only when needed for engine warm up.
- O Reduces parasitic losses.
- O Tubular stainless steel individual exhaust runners incorporated into engine compartment mounted catalytic converters to reduce heat loss and allow the catalyst to react with maximum effectiveness.

- More -

the '89 coupe.

o The curb weight for the ZR-1 is 3,465 pounds-- 236 pounds more than  
tires.

o The ZR-1 features wider rear wheels (17 x 11 in.) and larger P315/35ZR17  
coupe.

o Rear tread width on the ZR-1 is 61.9 inches-- 1.5 inches more than the  
rear quarters, rockers, rear fascia and rear upper panel.  
rear of vehicle at its widest point. The widening requires new doors,  
rubber. It adds three inches (1 1/2 inches on either side) across the  
design treatment made specifically to accommodate new Goodyear Z-rated  
tire to the ZR-1's body from the door and extending rearward is a  
coupe.

o The ZR-1 is one inch longer and three inches wider than the '89 Corvette

## BODY

Here's a look at a few of those differences:  
that set Chevrolet's newest option apart from standard Corvettes.  
that you're looking at a Corvette ZR-1. But there are other subtle differences  
WARREN, Mich. -- The flared sides and rectangular tailamps are sure signs

#10412-31589

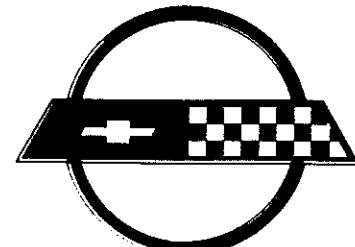
(313) 492-8839

Karti St. Antoinne

CONTACT:

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CORVETTE



- more -

198.

- o The LT5 holds seven more quarts of engine oil (12 qts. total) than the enclosed engine mass spec sheet for detail.)
- pounds of injector housings and cylinder liners over the L98. (See
- of additional exhaust manifold mass, a 25-pound crankshaft saddle and 26 connecting rod mass, an extra 31 pounds in the cylinder heads, 20 pounds
- studding, the LT5 packs an additional 10 pounds of camshaft, 17 pounds more
- aluminum cuts 89 pounds in the cylinder block alone from its cast iron
- pounds more than a comparably dressed cast iron L98. Although the use of
- to be attached to a 6-speed manual transmission weighs approximately 39
- o The all-aluminum LT5 engine (available only with the ZR-1 option) dressed

## ENGINE

1989 Z51-equipped coupe.

- o The front disc brakes on a ZR-1 measure 13 x 1.10 inches-- the same as a

## BRAKES

transmission.

- on '89 Corvette coupes. ZR-1s are not available with an automatic
- specifically designed for the ZR-1, but it is offered as optional equipment
- o The new ZF 6-speed transmission -- rated at 425 lbs.-ft. of torque -- was

## TRANSMISSION

and appearance features are identical.

- in command of an extraordinary Corvette. All other interior dimensions
- o Inside, the power switch on the center console puts the ZR-1 pilot

## INTERIOR

#10412-31589

- o The LT5 utilizes sequential fuel injection whereby fuel is released into the combustion chamber only when the piston is ready to fire. The L98 utilizes simultaneous double fire, a system that releases fuel each time the piston moves up in the cylinder.
- o The electronic control module (ECM) -- the "brain" -- of the LT5 has six additional duties to perform over and above the L98 ECM. Specifically, it adds to promote quick oxidation (A.I.R.) system to pump air into the exhaust gas stream to inject air/fuel mixture (The L98 has one);
- 1) Power key;
- 2) Three-stage induction system;
- 3) Air injection reaction (A.I.R.) system to pump air into the exhaust gases monitor the air/fuel mixture (The L98 has one);
- 4) Two O2 sensors -- one in each exhaust collector -- to continuously monitor the air/fuel mixture (The L98 has one);
- 5) Speed density system which determines the amount of airflow needed in the inlet manifold using a set of precise calculations for optimum fuel delivery and overall engine performance (the mass air flow system of the L98 utilizes a single meter between the air cleaner and the throttle to measure the airflow);
- 6) Rev limiter that kicks in at the 7000 RPM range, effectively shutting off additional fuel delivery to avoid accessory drive damage.
- o A larger slope back radiator system is utilized due to the increased thermal output of the LT5.
- o Electronic air conditioning (RPO C68) is not available with the LT5.
- more -

ENGINE - cont.

#10412-31589

# # #

the tail lamp treatment.

- o The ZR-1's tailpipes have a distinctive rectangular shape to complement restriction and maintain the LT5's output capabilities.
- o A 2 3/4-inch dual exhaust system is exclusive to the ZR-1 to provide low restriction and maintain the LT5's output capabilities.
- o Hydraulic mounts are standard with the LT5 to improve engine isolation.

#### CHASSIS

equipment on '89 coupes.)

- o All ZR-1s have the Z51 Performance Handling Package and FX3 Selective Ride Control suspension equipment as standard. (Z51 and FX3 are optional equipment on '89 coupes.)

#### SUSPENSION

#10412-31589

-MORE-

YEAR	ROADSTER	COUPE	TOTAL
1953	300		
1954	3,640		
1955	700		
1956	3,467		
1957	6,339		
1958	9,168		
1959	9,670		
1960	10,261		
1961	10,939		
1962	14,531		
1963	14,513		
1964	21,513		
1965	22,229		
1966	23,562		
	27,720		

Here are the year-by-year production numbers leading up to that milestone:

Bowling Green. Through the 1981 model, 909,689 Corvettes had been produced.

Flint, 1954 through 1981 models at St. Louis and 1981 through present models at

Only three GM plants have ever built Corvettes -- the 1953 Corvette at

car will be built at General Motors' C-P-C Bowling Green Assembly Plant.

model year, the one millionth version of America's only true production sports

assembly line in Flint, Michigan, on June 30, 1953. Sometime during the 1992

WARREN, Mich. -- The first production Chevrolet Corvette rolled off a short

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CORVETTE



1989: 9,749; 16,663 ; Total - 26,412

YEAR	ROADSTER	COUPE	TOTAL	#	#	#
1967	14,436	8,504	22,940			
1968	18,630	9,936	28,566			
1969	16,633	22,129	38,762			
1970	6,648	10,668	17,316			
1971	7,121	14,680	21,801			
1972	6,508	20,496	27,004			
1973	4,943	25,521	30,464			
1974	5,474	32,028	37,502			
1975	4,629	33,836	38,465			
1976	46,558	46,776 *	46,776 *			
1977	49,213	49,213				
1978	46,776	46,776				
1979	53,807	53,807				
1980	40,614	40,614				
1981	40,606	40,606				
1982	25,407	25,407	**			
1983	43	43				
1984	51,547	51,547				
1985	39,729	39,729				
1986	7,315	27,794	35,109			
1987	10,625	20,007	30,632			
1988	7,407	15,382	22,789 ***			
Totals	237,366	672,323	909,689			

\*\*\* -- Includes 2,050 35th Anniversary Special Edition models.  
 \*\* -- Includes 6,759 Collector's Edition models.  
 \* -- Includes 6,501 Limited Edition models.

# 1990 CORVETTE

## ZR-1

GENERAL		ENGINE		STD		PERFORMANCE	
Base Price .....	\$58,995	Type .....	90° V8 DOHC (LT5)	Cast Aluminum		EPA Mileage (city/highway) .....	16/25
Vehicle Type .....	2-Door Coupe	Block Material .....				Cruising Range .....	380 miles
Vehicle Class .....	Mini-Compact	Cylinder Head Material .....				0-60 mph Acceleration .....	4.3 sec.
Primary Structure .....	Welded Steel Uniframe	Configuration/	Alum./4 vhs per cyl./yes			1/4 mile Acceleration .....	12.8 sec.
Body Material .....	Fiberglass-Reinforced Plastic (SMC)	Hydraulic Lifters (yes/no) .....	3.90 x 3.66 in. (99 x 93 mm)			Braking, 60-0 mph .....	125 ft.
SUSPENSION		CAPACITIES/CALCULATED DATA		DIMENSIONS		INTERIOR	
Front .....	Independent, Alum. Parallel Short and Long Arm (SLA) and Steering Knuckle, Transverse Monoleaf Spring and Steel Stabilizer	No. Cylinders and Arrangement .....	V8	Engine Oil .....	12 qts.	Wheelbase .....	96.2 in.
		Displacement .....	5.7L/350 CID	Fuel .....	20 gal.	Frontal Area .....	59.6/61.9 in.
		Compression Ratio .....	11.0:1	Engine Coolant .....	16.7 qts.	Height Overall .....	177.4 in.
		Induction System .....	MFI	Interior Volume .....	48.7 cu. ft.	Width Overall .....	74.0 in.
		Horsepower (SAE net) .....	370 @ 5800	Trunk/Cargo Volume .....	17.9 cu. ft.	Height Overall .....	46.7 in.
		Torque (SAE net) .....	370 @ 5600	Weight-to-Power Ratio .....	9.1 lbs/hp	Min. Ground Clearance .....	4.7 in.
		Emission Control System .....	Cat. Convert./	Frontal Area .....	19.4 ft. <sup>2</sup>	Weight Distribution (front/rear) .....	52/48%
			Air Injection w/Computer Comm. Cntrl, EGR, Evap. Emm. Control	Specific Output .....	64.91 hp/ft.	Curb Weight .....	3,465 lbs.
STEERING		DRIVETRAIN		STD		INTERIOR	
Type .....	Power, Rack-and-Pinion	Cam Drive .....				Overhang (front/rear) .....	40.5 in./40.7 in.
Ratio .....	15.6:1	Recommended Fuel (minimum, combined) .....	87 octane			Interior .....	
Turns, lock-to-lock .....	2.25					Head Room .....	36.4 in.
Turning Diameter, curb-to-curb .....	40.0 ft.					Leg Room .....	42.6 in.
BRAKES		WHEELS AND TIRES		STD		INTERIOR	
Type .....	Power, Vacuum with front/rear Electrohydraulic Anti-Lock	Wheel Size/Type (front/rear) .....	17 x 9.5/17 x 11 in., Aluminum Alloy			Shoulder Room .....	54.1 in.
Front, size .....	Disc, 13 x 10 in.	Tires Size/Type (front/rear) .....	P275/40ZR17/P315/35ZR17 Goodyear Steel-Belted Eagle ZR			Hip Room .....	49.3 in.
Rear, size .....	Disc, 12 x 10 in.	Spare Size .....	T155/70D17				
Total Swept Area (front/rear) .....	10291 in. <sup>2</sup>						

The following information will be used for a variety of C-P-C and GM internal and external documents, including plant fact sheets to aid in timely response to media queries and the annual year-end releases for plant communities. Provide estimates where necessary. If you have questions, contact Kathy Tanner at 8-562-1129 (Wiemels Plants, Bowling Green and Van Nuy's), Mark Ladd at 8-562-1129 (Spileman Plants) or Sharon Hines at 8-562-1218 (Bettine Plants).

Average employment for calendar year 1987  
1251  
1073  
44,032,272  
42,720,898  
Number of local suppliers (50-mile radius) -- 1987  
273 (2)  
Number of local suppliers (50-mile radius) -- 1988  
286 (2)

Estimated payroll for calendar year 1988  
1073  
44,032,272  
42,720,898  
Number of local suppliers (50-mile radius) -- 1987  
273 (2)  
Number of local suppliers (50-mile radius) -- 1988  
286 (2)

Total \$ purchases from local suppliers -- 1988  
1,983,392,121 (8)  
-- include freight and transportation.

Estimated \$ and hours for employee training -- 1988  
\$1,141,521 / 66,561 hrs  
-- include freight and transportation.

Significant highlights in training (attach if needed) See Attachment I  
185  
\$355,568  
Purchase value of U.S. Savings Bonds through payroll deduction in 1988  
\$ 67,750  
Total contributed by employees to United Way -- 1988  
\$288,627.69  
Number of GM Suggestion Plan awards in 1988  
185  
\$288,627.69  
Total amount paid for Suggestion Plan awards -- 1988  
Number of maximum \$20,000 awards during 1988  
1  
0  
5  
\$26,540 - See Attachment

Equipment donations -- specify equipment, recipients  
Does plant offer tours; name of contact?  
Yes - Plant Security

(2) Items do not include payments made by DAC in C-P-C Headquarters.  
(4) External payments are now being made by C-P-C Headquarters.

502-745-8228

Preparer's title	Krissy Taylot
Plant/Department	C-P-C Bowling Green, Financial Dept.
Centrex phone number	8-281-5216
Date	

#### SEE ATTACHMENT IV

Please make note of significant interaction with community, suppliers, educational institutions, etc., which indicate GM's commitment to its communities.

#### SEE ATTACHMENT III

Please detail significant highlights for 1988. Examples include new plant openings, distribution of plant facilities, community recognition of plant employees, new or improved facilities, environmental improvements, anti-reversaries, automotive highlights in plant city, other major events.

1988 model year production was 22,789 units and will be 23,000 units for the 1988 calendar year of which approximately one-third were convertible.

Bowling Green Plant had a line speed change on January 4, 1988 from one shift at 16 J.P.H. to one shift at 11 J.P.H.

Number of total weight of major products produced for 1988 model year and 1988 calendar respectively. If applicable, also indicate which GM cars/truck utilize your products/components, model mix percentages and current line rate. Also indicate if any major production schedules changes occurred during the year.

1. Training was renamed Human Resource Development and reports directly to the Plant Manager. This year showed a 12% increase in training volume.
2. The first Joint Training Program funded by National Reservoir Funds grant of \$11.2 million. A second program with unused funds from the first program and an additional \$472,000 grant has been started.
3. Pre-retirement programs for employees and spouses living on fixed incomes, wise investments and advised employees approaching retirement age on use of leisure time.
4. In-plant college classes conducted by Western General Studies.
5. A variety of vocational courses including G.E.D., computer and electronics classes and small engine repair have also been offered.

TOTAL \$ 32,058 - 80

ITEM/RECIPIENT	\$ VALUE
1. Four drafting tables - Bowling Green High School	800.00
2. Five drafting tables - Warren Central High School	1,000.00
3. Office Desk - N.A.A.C.P.	250.00
4. Apple II3 PC - Junior Achievement	250.00
5. Used Security Chevrolet S-10 Blazer	1,193.00
6. Typewriter and desk - N.A.A.C.P.	625.00
7. Displayitter - Western Kentucky University Department of Communication	4,200.00
8. Office Chairs - Bowling Green State Vocational/Technical School	52.00
9. Damaged 1988 Chevrolet Corvette	18,870.00
10. Office Chairs - Bowling Green Senior Citizens Centre	300.00
11. Paper Supplies - Bowling Green City Schools	4,518.80
and Warren County Schools	

ATTACHMENT II - Equipment Donations

1. Transporation Manager, Betty Lovensstein named Bowlin Green's "Woman of the Year for 1987".
2. A new procedure was begun to spray all Corvettes with a vinyl-like coating for protection during shipping.
3. Bowlin Green produced 2,050 Special Edition 35th Anniversary Cars.
4. The Corvette Challenge was provided 56 Corvettes for the series. Except for a specially sealed engine, these vehicles were produced like all other production Corvettes.
5. In honor of the Corvette's 35th Anniversary, Chevrolet remodeled the Tour Room.
6. The plant completed a very ambitious pilot-prototype program with a total of 95 '89 and '90 vehicles built on-line.
7. A second state-of-the art roll test was added. The machine provides the capability to complete additional re-testing.
8. The annual Corvette Homecoming attracted thousands of Corvette owners and enthusiasts to the plant. The Sunraycer was also on display during the homecoming weekend.
9. The United Way honored the plant and the U.A.W. for outstanding efforts in supporting the organization.
10. During the 1988 calendar year, approximately 34,000 visitors toured the Corvette Plant.

- ATTACHMENT IV - Interaction with Community, Suppliers, etc.
1. The Plant Participated in the Western Kentucky University Presidents Club Dinner and the N.A.A.C.P. Annual Freedom Banquet.
  2. The Corvette Plant provided corporate sponsorship for the B.G. Road Race - 10K Classic. (The winner of a random drawing of those completing the 10K race or 2 mile walk was awarded a brand new, red, 1989 Corvette Road Race Organization.)
  3. Financial sponsorship has been provided to the Western Kentucky University Soccer League, men's and women's basketball programs.
  4. GM Participated in the Kentucky Commission for Handicapped Children Open House; W.K.U./E.O. Seminar; Kentucky Commission for Employment of the Handicapped Annual Awards Banquet; and N.A.A.C.P. Youth Improvement Open House.
  5. Corvette employees raised over \$1,000 by participating in the March of Dimes Walk America program.

PLANT	CPC Bowling Green	CITY	Bowling Green
The following information will be used for a variety of C-P-C and GM internal and external documents, including Plant fact sheets to aid in timely response to media queries and the annual year-end releases for plant communities. Provide estimates where necessary. If you have questions, contact Kathy Tanner at 8-562-1929 (enginee plants, Bowling Green, Framingham, Tarrytown, Oklahoma City and Van Nuys), or Sharon Hines at 8-562-1218 (stamping plants, Arlingto, Doraville, Fairfax, Lakewood and Willow Run).			
Average employment for calendar year 1988	1,052		
Estimated average employment for calendar year 1989	1,227		
Payroll for calendar year 1988	40,068,425,24		
Estimated payroll for calendar year 1989	46,451,636,91		
Estimated \$ and hours for employee training -- 1989	\$1,897,200 -- 96,833.	5 Manhours	
Training (attach if needed)			
Total contributed by employees to United Way -- 1989	73,884		
Purchase value of U.S. Savings Bonds through payroll deduction in 1989	346,226		
Number of GM Suggestion Plan awards in 1989	136		
Total amount paid for Suggestion Plan awards -- 1989	\$186,400		
Number of maximum \$20,000 awards during 1989	0		
Total dollar amounts of savings realized from suggestion awards in 1989	744,500		
Number of college students in internships			
Number of students in ongoing co-op programs	4		
Equipment donations -- specify equipment, recipients			
Does plant offer tours; name and phone number of contact For tours, contact Bill Smith at 8-281-5419 or (502) 745-8419.			

Worksheets prepared by	Jane Bowlin	Date	11/14/89
Preparer's title	Community Coordinator	Centrex phone number	(8) 281-5217
Plant/Department	Personnel		

Not applicable.

**JOBS BANK ACTIVITIES (if applicable)**

See attachment.

Please make note of significant interaction with community, suppliers, educational institutions, etc., which indicate GM's commitment to its communities. Significant fund-raising activities or charitable donations.

See attachment.

Please detail significant highlights for 1989. Examples include new plant products announcements, changes in product mix, environmental improvements, other new or improved facilities, community recognition of plant or anniversarys, disruption of plant facilities, production milestones or plant employees, automobile highlights in plant city, other major events.

1989 calendar year production is forecast at 25,278 (actual)

Model year production: Coupe - 16,663; Convertible - 9,749; Total - 26,412

Number and types of major products manufactured for 1989 model year and 1989 calendar year respectively. If applicable, also indicate which GM cars/truck utilize your products/components, i.e., "A" body, "F" body, etc. Please be specific and respond in appropriate measure of production, i.e., numbers of axles, doors or engines.

## **Significant Training Highlights**

1. Joint training on job security issues
2. Wellness training
3. Earthquake awareness training
4. Quality Network
5. Safety Training
  - A. Product related
  - I. Air bags
  - 2. Electronic Diagnostics
  - B. Hazardous Comminications
  - C. Hazardous Material Handling
  - D. Robotic Safety
  - E. Fire Brigade
  - F. CPR and First Aid
  - G. Rigging
  - H. Fork Truck Safety

5. Safety Training
  - A. SPC and problem solving
  - B. Awareness
4. Quality Network
3. Earthquake awareness training
2. Wellness training
1. Joint training on job security issues

1. Joint training on job security issues
  - A. SPC and problem solving
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  - A. Product related
  - I. Air bags
  - 2. Electronic Diagnostics
  - B. Hazardous Comminications
  - C. Hazardous Material Handling
  - D. Robotic Safety
  - E. Fire Brigade
  - F. CPR and First Aid
  - G. Rigging
  - H. Fork Truck Safety
6. Stress Management
7. Time Management
8. Ergonomics
9. Leadership styles and practices
10. Technical training
  - A. Related to plant tooling
11. Communications
  - A. Perception, Listening, Oral & Written

## Significant Highights for 1989:

- January: Production increased from 11 to 13 jobs per hour.
- February: Corvette was named to Car and Driver magazine's "10 Best Cars" list.
- March: Production increased from 13 to 14 jobs per hour.
- April: Corvette was named as one of the "Top 10 Sports Cars" of all times by Motor Trend Magazine.
- June: The plant received funding for a \$4.9 million body washer.
- August: The last 1989 Corvette rolled off the line August 19. The vehicle came off the line August 15.
- More than 13,000 visited Bowling Green during the annual Corvette Homecoming. The plant hosted 3,500 people on plant tours during the event.
- The first restorable ZR-1 was delivered to super Chevy dealer Rick Hendrick August 29 at a dinner especially for the occasion at a local country club. Guests included Corvette and C-P-C executives and dozens of local dignitaries and their wives.
- September: The Plant Launched Chevrolet dealer technician ZR-1 training in-house -- the first time a GM plant has hosted classes for dealers.
- October: The week of October 2nd, the plant was down for inventory adjustment.
- November: Corvette's assembly plant shut down for the celebration in an inpromptu ceremony. Corvette employees joined in the celebration as the assembly plant joined in the celebration.
- December: The Plant Launched Chevrolet dealer technician ZR-1 training in the 80s."

Significant interaction with community, suppliers, etc., for 1989:

Pledged \$98,727 to the Bowling Green - Warren County United Way.

Donated \$4,000 in food, clothing and toys to the needy at Christmas. Corvette employees refurbished 30 bicycles to near perfect condition to give to area children over the holidays.

The Plant sponsored a Corvette Classic Soccer Tournament at Western Kentucky University.

Donations adding up to thousands of dollars were given to a variety of community activities and events. Included among them were junior Achievement, the Capitol Arts, Crime Stoppers, the National Child Safety Council and a Drug and Alcohol program.

The Plant hosted several events, inviting people in the community to participate; these included two autocrosses and the Corvette Heartbeat Run.

Corvette hosted close to 50,000 visitors from across the United States and from a number of foreign countries, making it the second largest tourist attraction in the area and seventh in Kentucky.

Twelve employees completed credits towards an associate's degree at Western Kentucky University by taking classes offered in the plant. A total of 830 people completed a 40-hour joint training program taught by hourly and salaried employees at the local vocational school.