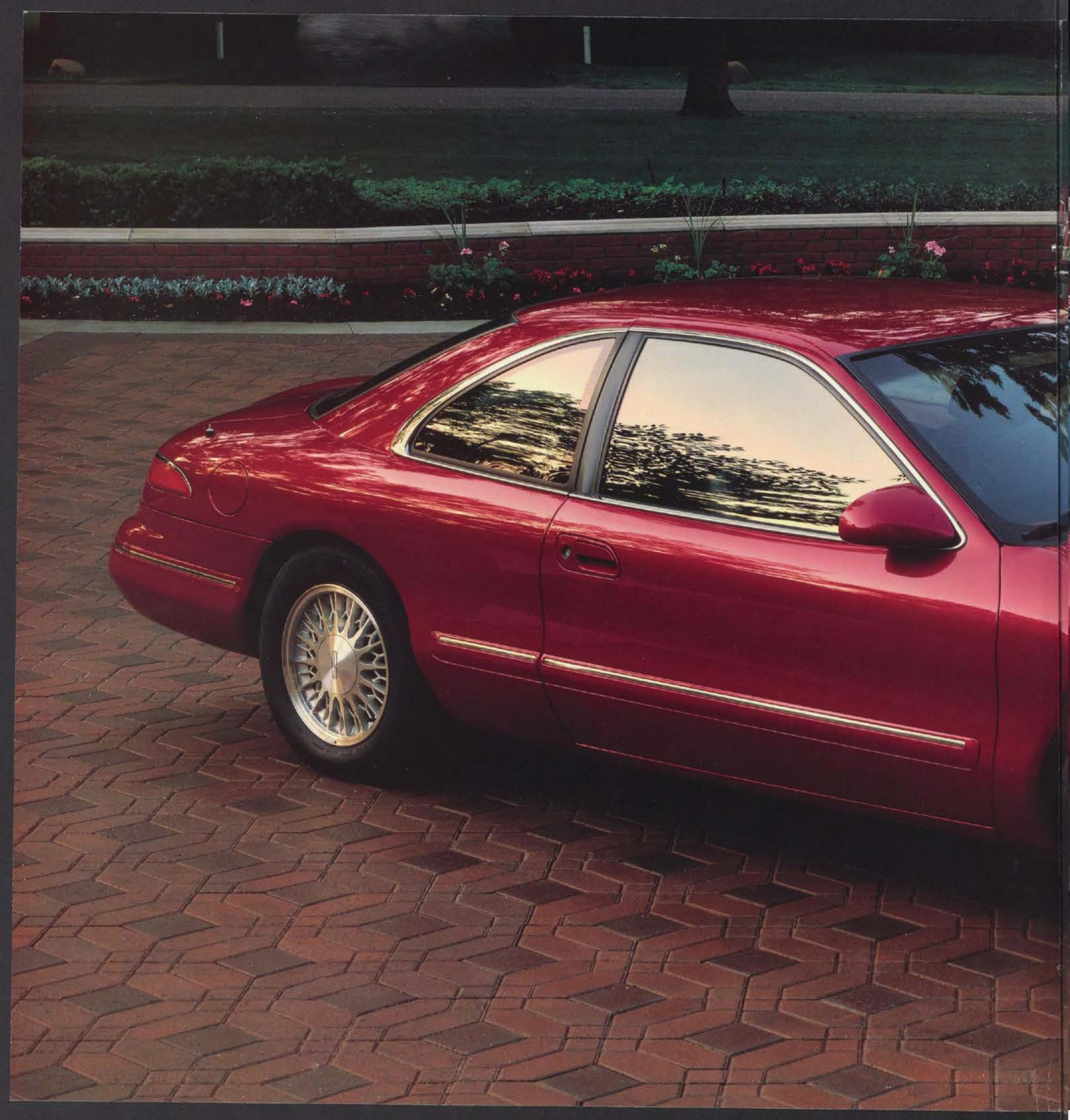
1993 LINCOLN MARK VIII

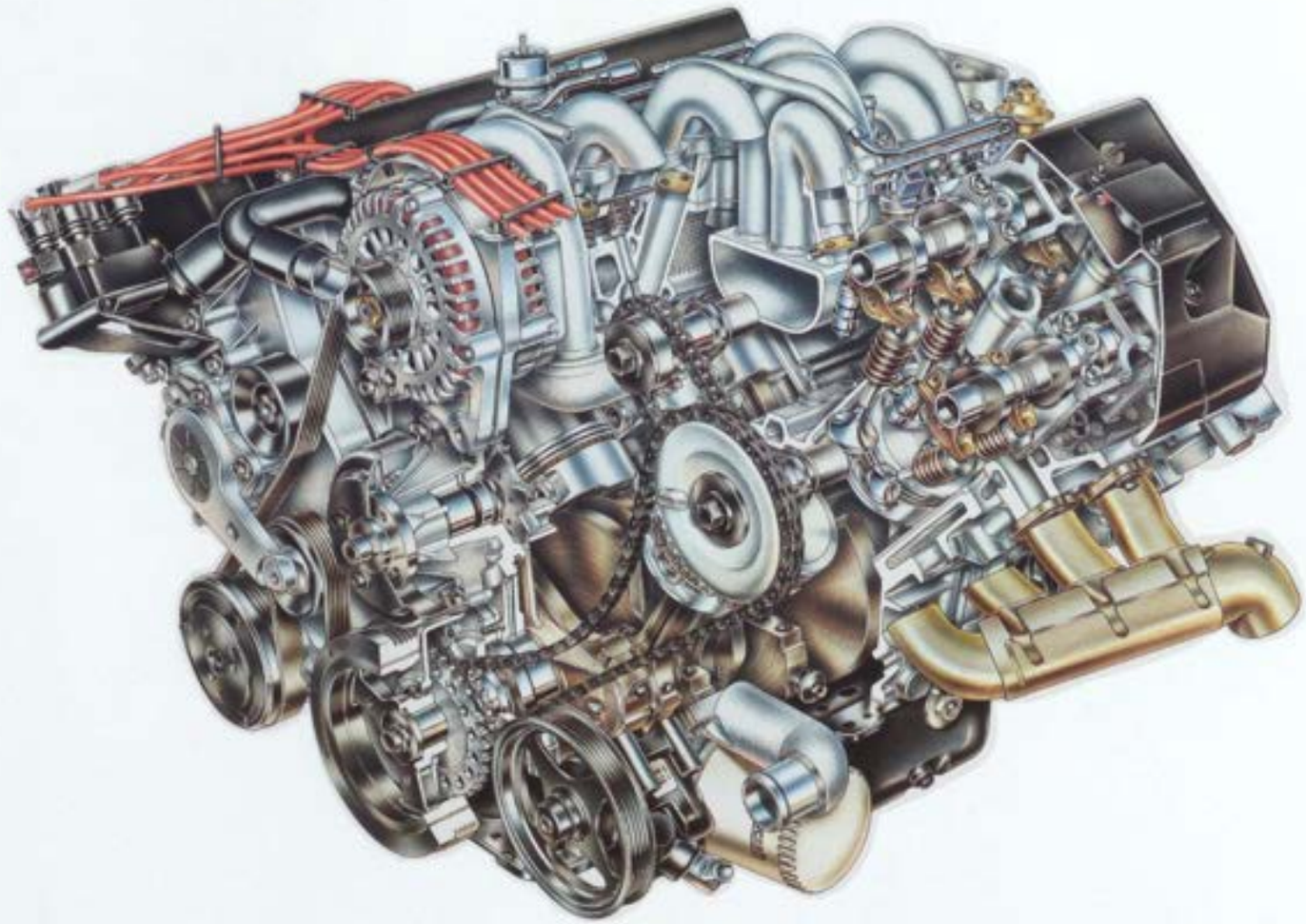



LINCOLN
MARK VIII

A DURABILITY STORY

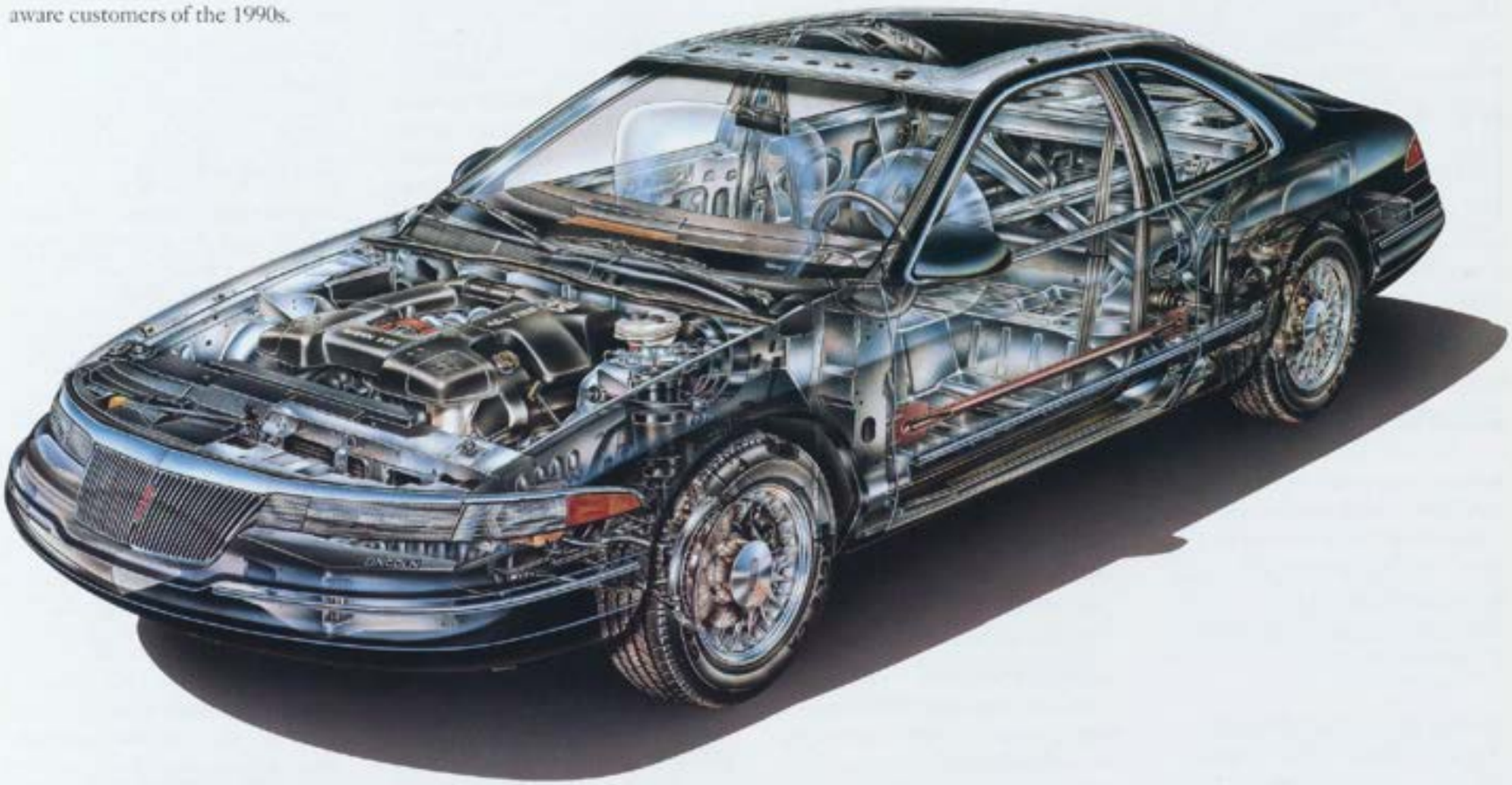
For durability, be sure to point out:

- Galvanized steel used throughout the body
- Urethane coating on lower panels resists stone pecking
- Sheet-molded-compound (SMC) hood is corrosion-proof
- Aluminum-alloy engine block/cylinder heads and driveshaft save weight, resist corrosion
- Anti-corrosion, coated-aluminum brake tubing provides a five-fold increase in corrosion protection vs. previous tubing
- Stainless-steel exhaust system
- Deep-skirt engine block, long cylinder head bolts, cross-bolted main bearing caps, all contribute to long life
- 4.6L Four Cam V-8 has shown virtually no wear after the equivalent of 100,000 miles of brutal testing



TECHNICAL GLOSSARY

The following glossary contains frequently used automotive terms that appear in this guide. Many of these terms will also be useful to sales consultants in their presentations to the well-informed and product-aware customers of the 1990s.



A-pillar: In a side view, the front-most roof-support pillar of a vehicle, located between the outer edge of the windshield and the leading edge of the upper part of the front door.

Active Safety: The features of an automobile that help enable a driver to avoid an accident. (Examples: responsive steering, Traction Assist, Anti-lock Braking System, excellent visibility.)

Aerodynamics: Airflow around a vehicle, with efficient airflow helping to improve fuel economy and reduce wind noise.

Air Extractors: The vent(s) in an automobile's body through which air is forced out of the interior by the heating/air-conditioning system, enhancing overall comfort.

Analog Instrumentation: The presentation of data (mph, engine rpm, fuel level, etc.) in a manner that allows the driver to perceive rate of change, generally using a needle and dial.

Anti-lock Braking System (ABS): A system that uses sensors and computers to determine if the wheels are about to lock up under braking, and, if necessary, automatically modulates braking to prevent lockup. (Note: While ABS might have the effect of shortening stopping distances on some road surfaces, its main goal is to allow the driver to maintain steering control of the car — active safety.)

Auxiliary-drive Belt: Traditionally, the "fan belt," although in today's automobiles it is as likely to turn pulleys for the power-steering unit, alternator, and other ancillary items.

B-pillar: The roof-support pillar between a car's front side window and rear side window, if there is one.

Backlight: An automobile's rear window.

Body in White: An automobile's body only — without engine, drivetrain, chassis, or interior components.

Bore (used with Stroke): The diameter of an engine's cylinders.

Brake Fade: The propensity of brake lining material to lose its effectiveness ("fade") when subjected to heat.

Brake Pads: The brake lining that directly contacts the rotor (disc) on both sides to stop it from turning.

Brake Rotors: A plate-shaped part in a disc-brake assembly, called the "disc," that turns with the wheels and is slowed through friction by the brake pads.

Breathing Capacity: The volume of air that an engine is capable of moving through the intake and exhaust system during its combustion cycle.

C-pillar: The roof-support pillar between a car's rearmost side window and its rear window.

Camber: The angle at which the front wheels deviate from perpendicular when viewed from directly in front of the car. (Positive camber — the tops of the front wheels are angled away from the car. Negative camber — the tops of the front wheels are angled toward the car.)

Cam(shaft): The engine component that causes the valves to open and close, allowing intake air to enter or exhaust gases to exit the combustion chamber.

Caster: The angle at which the front wheel's contact point with the steering axis deviates from perpendicular when viewed from the side of the car.

Catalytic Converter: A part of the exhaust system in which exhaust gases are chemically altered to create emissions that are less harmful to the environment.

Clamshell Combustion Chamber: The hemispherical-shaped area inside the Four Cam's combustion chamber where the fuel/air mixture is ignited. This unique shape promotes efficient breathing and ignition.

Compression Ratio: A measure of the extent to which combustible gases are compressed within the cylinder. It is a ratio of the cylinder and combustion chamber volume with the piston at the bottom of its stroke ("bottom dead center") to the volume at the end of the compression stroke. (Usually, the higher the compression ratio, the greater the power that is developed by the combustion of the compressed air/fuel mixture.)

Connecting Rods: The engine components that connect the crankshaft to the pistons, moving them up and down as the crankshaft rotates.

Contact Patch: The area of a tire that touches the ground.

Cowl: The part of an automobile's body behind the hood and immediately in front of the windshield.

"Cracked" Connecting Rods: A manufacturing process in which the connecting-rod casting has been scored for accurate alignment before the holes for the rod ends (or "caps") have been drilled. After drilling, the rod is separated along the crack. This process produces much more accurate alignment of the rods.

Crankshaft: The large, counter-weighted shaft that directly actuates piston movement and, through belt(s), chain(s), or gears, actuates camshaft rotation.

Crush Zone (or Crumple Zone): An area of an automobile that is designed to crumple progressively upon impact, absorbing some of the impact energy.

Cylinder Block: Cast of iron or aluminum alloy, the block is the basic structural component of the engine.

Cylinder Head: Attached to the block with bolts, the head contains the combustion chambers, valves, and, in an overhead-cam engine, the camshaft itself.

Cylinder Liners: Inserted in the block during manufacture, iron or steel sleeves are typically used in aluminum-alloy blocks to form a durable surface for the piston as it moves up and down.

Deep-skirt Engine Design: A cylinder block on which the sides (skirts) extend below the centerline of the crankshaft, adding to the rigidity of the block.

Differential: A gearset used in rear-drive cars that is designed so that the torque fed into it is split and delivered to two outputs that can turn at different speeds. When cornering, the outer wheels must cover a greater distance than the inner wheels. This is made possible by a differential. *See* Limited-slip Differential.

Digital Instrumentation: The presentation of data using electronically flashed or light-emitting diode (LED) numbers in a liquid-crystal display.

Disc Brakes: Unlike drum brakes, in which brake shoes are pressed against the surface of a drum, disc brakes are based on a rotor (disc) against which the brake pads are pressed. Disc brakes dissipate heat more quickly than drums, reducing or eliminating brake fade and improving stopping performance.

Displacement: The volume of an engine's cylinders, determined by one cylinder's bore and stroke, and the number of cylinders in the engine. (Displacement = (bore/2)^2 x π x stroke x number of cylinders.)

Dive: The dipping motion that the front of a car makes when stopping.

Double-overhead Camshaft (DOHC): A design that places camshafts above the valves in a cylinder head (one camshaft operating intake valves and the other the exhaust valves), which allows direct operation of the valves and variations in timing between the intake and the exhaust valves. Compared to an engine in which the valves are operated via pushrods from a cam in the block, overhead designs permit higher rpm because the valvetrain is lighter.

Driveability: The ability of a vehicle to respond to acceleration and braking commands over the entire range of road speeds.

Driveshaft: The shaft that transmits power from the transmission to the differential in a rear-drive powertrain.

EEC-IV (Electronic Engine Control): The engine-control-system module used on the Mark VIII that controls the transmission's shift-point selection, lockup, and hydraulic pressure and determines when to open the second set of throttle plates on the intake manifold. It also monitors the knock sensors and controls spark-plug firing, fuel injection, and the two-speed electric fuel pump and electric cooling fan.

Electronic Distributorless Ignition System (EDIS): In contrast to mechanical systems, the EDIS used on the Mark VIII delivers electricity to the spark plugs with precision at all rpm. There are no moving parts to wear and alter timing, so performance and fuel economy are improved.

Electronic Fuel Injection (EFI): A system that meters fuel to an engine, regulating fuel flow according to the engine's needs. By precisely controlling the amount of fuel used and by adjusting the air/fuel mixture, EFI improves engine performance and driveability.

Ergonomics: An applied science that, in the context of car design, is concerned with designing and arranging instrumentation and controls so that they can be most effectively and safely accessed and operated by occupants.

Exhaust Manifold: The network of passages that gathers exhaust gases and routes them toward the catalytic converter, the muffler, and the exhaust system.

Finite Element Analysis: The science of using computer simulations to measure the strength and performance of a part such as a cylinder block or body panel. Commonly used for safety engineering.

Floor Pan: The floor of the car's body. The floor pan fixes the dimensions for most of the car's external and structural panels. It is also the foundation for many of the car's mechanical systems.

Footprint: *See* Contact Patch.

Four Cam Engine: In a V-type engine, both cylinder banks will have one intake and one exhaust cam — hence "Four Cam."

Frontal-impact Test: One of the government-required crash tests for vehicle safety. (Vehicle safety is regulated by several Federal Motor Vehicle Safety Standards and regulations.) In the frontal-impact test, the government requires that a vehicle be propelled at a speed of 30 mph into a rigid barrier which is either perpendicular or inclines at an angle of up to 30 degrees relative to the longitudinal axis of the car.

Galvanized Steel: Zinc-coated steel used to help prevent rust and corrosion.

Gas-filled Shock Absorbers: A shock absorber in which a gas (such as nitrogen) replaces hydraulic fluid, resulting in more consistent performance over a wider range of ambient-temperature and operating conditions. (A liquid's viscosity can change depending on the temperature, adversely affecting performance.)

Gear Ratio: The number of revolutions a driving gear requires to turn a driven gear through one revolution.

Handling: A term covering all the aspects of a car's behavior that relate to directional control.

Horsepower (hp): A unit of measurement of an engine's power. One horsepower equals the power needed to lift 550 pounds one foot off the ground in one second (or one pound 550 feet off the ground in one second). Roadload horsepower is the force required to overcome a vehicle's rolling resistance and air resistance in order to maintain a desired speed.

Independent Suspension: A suspension in which the camber of a wheel (the direction in which it tilts) is not directly affected by the opposite wheel moving up and down.

Intake Manifold: The passages that direct the air or the air/fuel mixture from the throttle body to the intake ports in the cylinder heads.

Kick-down Point: The rpm at which an automatic transmission will shift down to the next lower gear. In a performance-oriented car, the point may be comparatively high.

Laminate: To unite layers of material by an adhesive or other means.

Limited-slip Differential: A limited-slip differential in a rear-drive automobile ensures that some torque is always distributed to both wheels, even when one is on a surface providing very little traction. This helps reduce wheelspin and improves traction.

Load-leveling Suspension: A suspension in which the vehicle remains level, front and rear, regardless of the load, contributing to stable handling and optimum headlight positioning.

Lockup Torque Converter: The torque converter transfers the engine's rotational forces to the transmission, which turns the driveshaft and rear wheels. When cruising speed has been reached, a mechanical link "locks up" the torque converter and the transmission, resulting in improved fuel economy.

Low-end Torque: The amount of torque produced at low rpm, important to performance during initial acceleration.

Main Bearings: The bearings in an engine block that support the crankshaft.

Microprocessor: A computer processor with memory and associated circuits contained on an integrated-circuit chip.

Modular Engines: A family of engines which share basic design and manufacturing features, allowing different versions of the same basic engine to be built for a variety of applications.

Overdrive: Any gearset in which the output shaft turns faster than the input shaft. Overdrive gears are used because they reduce engine rpms at cruising speed, contributing to increased fuel economy. Transmission gear ratios of less than 1:1 (such as 0.80:1) are overdrive ratios.

Overhead Cam(shaft): A type of valvetrain arrangement in which the engine's camshaft is mounted above the cylinder heads. This arrangement permits the use of valves that are stiffer and lighter, allowing the valves to open and close more rapidly. This enables the engine to run at higher rpm. (*See* Single-overhead Cam and Double-overhead Cam.)

Oversteer: When a vehicle covers a smaller curve radius than that corresponding to the steering-wheel angle, meaning that the vehicle turns proportionally more than the steering wheel is being turned by the driver. (*See* Understeer.)

Passive Safety: The features of an automobile that help reduce the risk of injury to occupants should an accident occur. (Examples: seat belts, air bags, and crush zones.)

Piston: A cylindrical metal part fitted to the engine's cylinder bore. The piston transmits combustion power to the crankshaft by means of a connecting rod.

Powertrain: The components that transmit power to the wheels, including the engine, clutch, transmission, driveshaft, torque converter, differential, and axle shaft. Also referred to as the drivetrain.

Rack-and-pinion Steering: A steering mechanism that consists of a small, "pinion" gear that meshes with a toothed bar or "rack." The ends of the rack are linked with tie rods to the steered wheels. When the pinion gear is rotated by the steering shaft, it moves the rack from side to side, turning the wheels. The steering ratio is defined as the ratio of pinion gear revolutions to rack travel. The spacing of the teeth on the rack allows the steering ratio to be variable over the travel of the pinion gear. This permits more precise steering corrections.

Roadholding: The ability of a car to grip the pavement.

Roll: The rotation of a car's body about a longitudinal axis while turning corners. Also called "sway" or "lean."

RPM: Revolutions per minute of the engine crankshaft during engine operation.

Single-overhead Cam(shaft) (SOHC): A design that places one camshaft above the valves in a cylinder head to actuate both intake and exhaust valves.

Squat: The tendency of the rear of a vehicle to sink during acceleration.

Stroke (used with Bore): The distance the engine's piston travels up from bottom dead center to top dead center within a cylinder.

Suspension: The springs, struts and/or shock absorbers, and linkage used to suspend the vehicle above the wheels.

Torque: A turning or twisting force, expressed in lb.-ft., that produces rotation. Torque is the energy that produces motion in the drivetrain, from flywheel to the rear wheels. Unlike horsepower, torque is a measure of force without regard for a time element. While related to horsepower, torque can be thought of as the force that propels a vehicle from a standing start up to a desired speed.

Traction Assist: An optional slip-control feature available on the Mark VIII. Using input from ABS sensors, the Traction Assist's electronic controls determine if rear-wheel spin is imminent. To help prevent this condition, the system brakes the wheel that is about to spin.

Transmission: A gearbox with a number of gear selections, used to match the engine's rpm and torque to different vehicle requirements.

Tuned Exhaust: An exhaust with a certain amount of back pressure based on an engine's specific requirements, for optimum performance.

Turning Circle (or Turning Diameter): The diameter of the smallest circle a vehicle can describe with its steering wheel locked.

Understeer: When a vehicle covers a larger curve radius than that corresponding to the steering-wheel angle, meaning that the vehicle turns proportionally less than the steering wheel is being turned.

Unsprung Weight: The amount of a vehicle's mass not supported by the springs or torsion bars. (Examples: tires and wheels.)

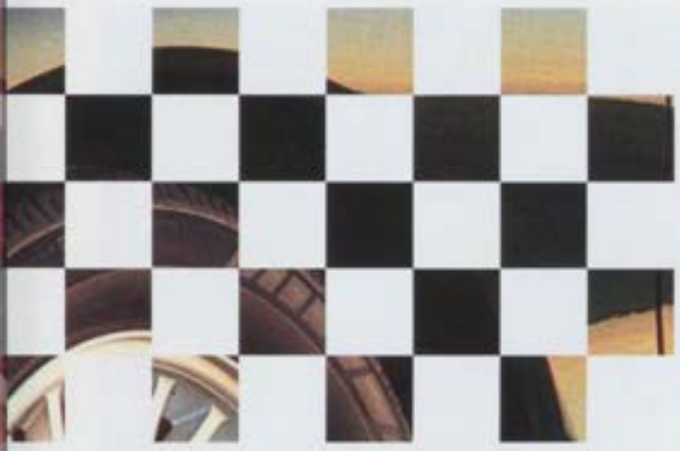
Up-shift Point: The rpm at which an automatic transmission will shift up to the next highest gear.

Valve: A device that can be opened or closed to allow or prevent the flow of a liquid or a gas. Most internal-combustion engines use intake valves to allow fuel/air mixture into the cylinders and exhaust valves to exhaust burnt gases. Engines with four, rather than two, valves per cylinder have more valve area, for increased efficiency and performance. The Four Cam V-8 has 32 valves.

Valvetrain: The collection of parts that make the valves operate, allowing fuel intake, compression, and exhaust.

Variable-assist Steering: A power-assist system that helps to reduce steering effort during low-speed maneuvers such as parking.

Weight Distribution: The percentage of the vehicle's weight over the front and rear wheels.



"Our objective was to develop not merely a performance-luxury car, but a car with such a broad range of capabilities that it would be recognized as the new Lincoln flagship. We believe we've succeeded."

Steve Lyons, General Marketing Manager, Lincoln-Mercury

With the Mark VIII, Lincoln offers customers what promises to be one of the hottest products in a market segment referred to as "sport-luxury" or "personal-luxury." Lincoln's designers, engineers, and manufacturing personnel welcome comparison of the new Mark VIII to any automobile in its class. The reason? Conceived as the ultimate, personal-luxury car, the Mark VIII offers an utterly unique combination of features designed for comfort/convenience, performance, driver-oriented handling, and across-the-board advances in product quality. It is, in short, a world-class car that customers will recognize as something very special indeed.

Introduction

The Mark VIII will bring with it a new type of customer. Lincoln sales consultants will find that the sport-luxury segment is different from that of the Town Car's or Continental's segment. It is, in fact, a unique market segment, characterized by high customer expectations and numerous product alternatives, including domestic and imported two- and four-door automobiles. This Part investigates the Lincoln Mark VIII's market segment and customers. It covers:

- Scope of the market segment
- How the Mark VIII is positioned vs. the competition
- Key specifications of the Mark VIII and its three primary competitors
- Demographics of customers in the sport-luxury segment

Used together with the selling strategies discussed in Part VIII, this Part will help prepare Lincoln sales consultants for success in a new market segment peopled, to some extent, by customers different from traditional Lincoln owners.

Market Scope

Market analysts expect that 1993 sales of luxury automobiles will be about one million units. Of that number, about 20 percent are expected to be in the "personal" or "sport-luxury" segment made up of coupes and sedans with prices that range from about $30,000 to $45,000. During the first year, Lincoln projections call for sales of about 36,000 Mark VIIIs. Projections for the going year are about 40,000.

Market-segment Position

Available in just one model, the Mark VIII is designed to represent the essence of a world-class, personal-luxury car. That is, whether in terms of design, engineering features, or quality, the Mark VIII is intended to be a viable alternative to virtually any vehicle in its market segment. Why just one model? Past experience with the Mark VII revealed that it was the LSC that customers really wanted. The single-model strategy represents a simple approach to giving customers what they expect in terms of performance and product features, while simplifying the buying process. At the same time, it results in less manufacturing complexity, contributing to improved product quality.

The Mark VIII is positioned against three primary and several secondary competitive models in a complex market segment in which the number of competitors has grown steadily since the Mark VII's introduction in 1984. The primary competitors are Lexus SC400, the Cadillac Eldorado (both the standard version and the performance-oriented Touring Coupe), and the Acura Legend Coupe. Compared to the Lexus, the Mark VIII offers more luxury and comfort touches and, of course, far greater front and rear seat room and more trunk space. Compared to the Eldorado and the Legend, the Mark VIII is positioned as a performance-oriented, rear-wheel-drive car offering exceptional design features and product quality.

While the SC400, Eldorado, and Legend are the Mark VIII's primary competition, it should be noted that, in the sport-luxury segment, buyers may well consider both two-door and four-door models and decide to "go where the car is." That is, their ultimate decision may be based on the car's features, appearance, and how it makes them "feel" as much as on a practical consideration of whether a four-door model is more convenient. This means that a variety of sedans such as the Cadillac Seville STS, Infiniti Q45, and Lexus LS400 could be considered secondary competition for the Mark VIII.

The accompanying chart includes key dimensions and specifications of the Mark VIII and its three primary competitors. A number of observations can be made based on the specifications contained in the chart.

Chassis

- Like the Lexus, the Mark VIII has a front-engine/rear-drive configuration, with a weight distribution more evenly balanced than the Eldorado's or Legend's. Because of its inherent balance and handling qualities, such a configuration is important in a powerful, sporting-oriented car. (See Part V, Performance and Handling, for more detail, and Part VIII, Sales Strategies, for brief competitive comparison highlights.)

Engine

- The most advanced engine ever installed in a production car by Ford Motor Company, the 4.6L Four Cam V-8 has four, chain-driven, overhead camshafts, and 32 valves. With its aluminum-alloy block and cylinder heads, this is a superlative engine, competitive with anything in its market segment. (Note that the standard Eldorado Coupe is equipped with the older 4.9-liter, overhead-valve V-8, not the double-overhead-cam Northstar engine used in the Allante and anticipated in the 1993 Eldorado Touring Coupe and Seville STS. Also note that the Legend V-6 engine has only a single-overhead camshaft.)

Exterior

- The Mark VIII is the longest of these cars and the widest of all but the Eldorado, contributing to its flowing design and interior spaciousness.
- The Mark VIII has the longest wheelbase of its key competitors, contributing to its exceptional ride qualities.

Interior

- The Mark VIII can seat five, and offers more shoulder room than its three primary competitors.

COMPARATIVE DIMENSIONS AND SPECIFICATIONS

	Mark VIII	Lexus SC400	Cadillac Eldorado	Acura Legend Coupe
Chassis				
Layout	RWD	RWD	FWD	FWD
Weight Distr. (%)	58/42	54/46	63/37	60/40
Engine				
Displ./Config.	4.6L V-8	4.0L V-8	4.9L V-8*	3.2L V-6
HP @ RPM	280 @ 5500	250 @ 5600	200 @ 4100	200 @ 5500
Torque @ RPM	285 @ 4500	260 @ 4400	275 @ 3000	210 @ 4500
Valvetrain	DOHC/32 valve	DOHC/32 valve	OHV/16 valve	SOHC/24 valve
Exterior (inches)				
Length	206.9	191.1	202.2	192.5
Wheelbase	113.0	105.9	108.0	111.4
Width	74.6	70.5	75.6	71.3
Front Tread	61.1	59.8	60.9	61.0
Rear Tread	60.2	60.0	60.9	60.6
Interior (inches)				
Front Legroom	42.6	44.1	42.6	42.9
Front Headroom	38.1	38.3	37.8	37.3
Front Shoulder Room	58.9	56.0	58.2	56.3
Rear Legroom	35.9	27.2	36.1	28.7
Rear Headroom	37.5	36.1	38.3	35.9
Rear Shoulder Room	59.5	52.7	57.6	54.9
Luggage Room	14.4 cu. ft.	9.3 cu. ft.	15.3 cu. ft.	14.1 cu. ft.
Seating	5	2+2	5	4

*The 1993 Eldorado Touring Coupe is equipped with the 4.6L Northstar V-8 which has four valves per cylinder, double-overhead camshafts, and develops 295 hp at 6000 rpm.

Demographics

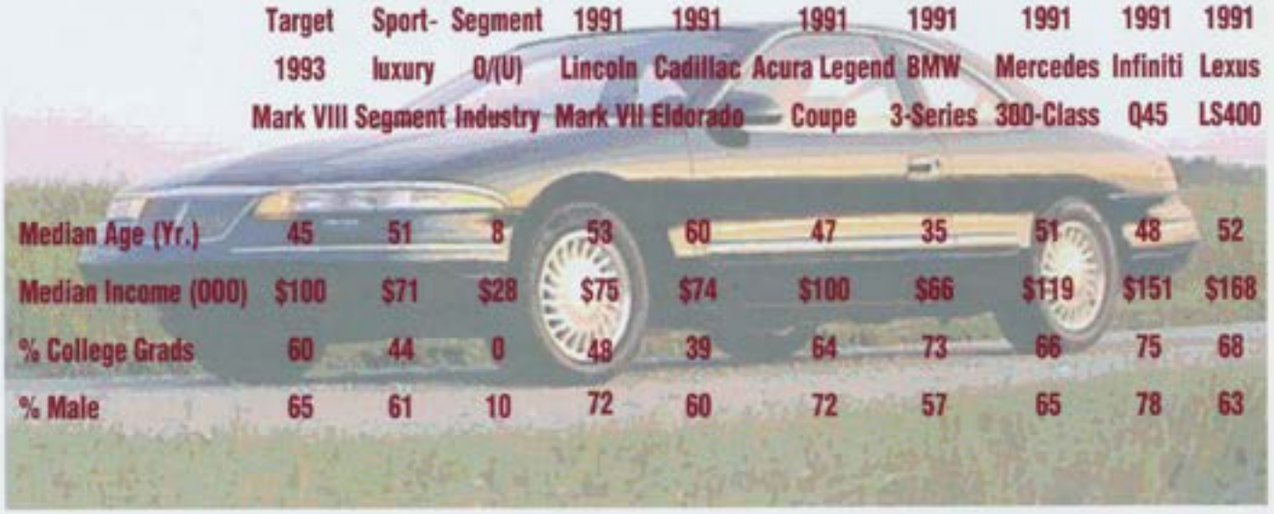
What types of people are expected to enter Lincoln-Mercury showrooms to inspect the Mark VIII? Generally, they are likely to represent a combination of present Mark VII owners, "move up" buyers (buyers moving to the luxury from near-luxury segments), and a variety of import and domestic luxury-car owners.

The chart below provides a capsule summary of how Mark VII owner demographics compare with anticipated demographics of Mark VIII buyers.

	Mark VII	Mark VIII
Median Age	53	45
Median Income	$75,000	$100,000
% College Grad.	48	60
% Male	72	65

As the chart indicates, the Lincoln Mark VIII buyer is expected to be younger, more affluent, and better-educated than Mark VII owners, reflecting the new model's broader target market. And, the new model is likely to have a stronger appeal to women. That has been demonstrated in Lincoln research clinics. "Women liked it across all demographic groups," noted one Lincoln market research executive. "There are definitely increased sales opportunities for selling to women with the Mark VIII. Its style, interior, and performance clearly have increased its appeal."

DEMOGRAPHIC COMPARISON



	Target 1993 Mark VIII	Sport-luxury Segment	Segment O/(U) Industry	1991 Lincoln Mark VII	1991 Cadillac Eldorado	1991 Acura Legend Coupe	1991 BMW 3-Series	1991 Mercedes 300-Class	1991 Infiniti Q45	1991 Lexus LS400
Median Age (Yr.)	45	51	8	53	60	47	35	51	48	52
Median Income (000)	$100	$71	$28	$75	$74	$100	$66	$119	$151	$168
% College Grads	60	44	0	48	39	64	73	66	75	68
% Male	65	61	10	72	60	72	57	65	78	63

Note: Data on Lexus SC400 not available

The chart above compares the demographics of both Mark VII and Mark VIII buyers with buyers of competitive models in the sport-luxury and luxury-import market segments.

As the chart reveals, Mercedes-Benz, Infiniti, and Lexus owners are comparatively young, highly educated consumers with high incomes. Their approach to car buying is likely to be different than the customers who have historically purchased Lincoln products. (See Part VIII, Sales Strategies, for suggestions on meeting the needs of customers in the sport-luxury segment.)

Although not reflected in the chart, it is noteworthy that pre-introduction exposure of the Mark VIII to potential customers revealed a particularly strong interest on the part of Mercedes-Benz and BMW owners. Many expressed a sincere interest in purchasing a domestic automobile if it would be as good a car as their import. A group representing even higher potential is formed by Mark VII and domestic/import move-up owners.

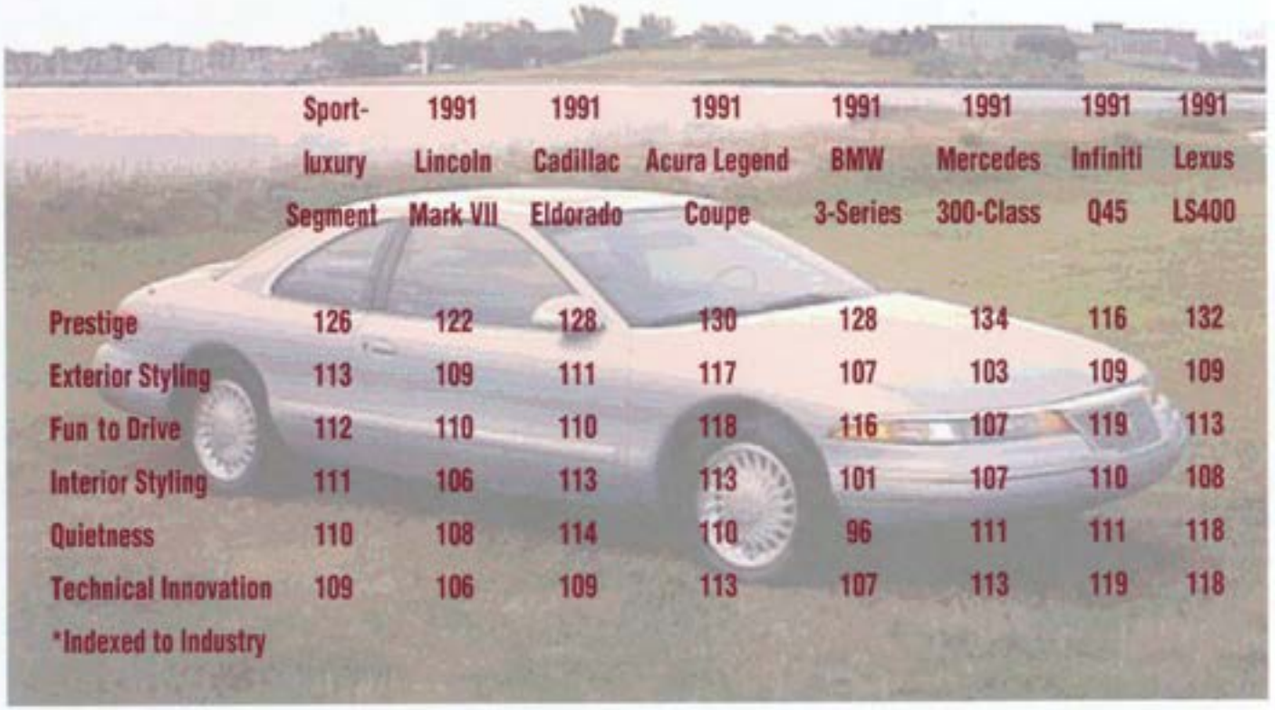
Purchase Reasons

How do current owners of cars within the sport-luxury market segment explain their reasons for purchase? The chart on this page shows the responses of Lincoln Mark VII, Cadillac Eldorado, Acura Legend Coupe, BMW 3-Series, Mercedes 300-Class, Infiniti Q45, and Lexus LS400 owners. The chart gives the purchase reasons for each model, where an index of 100 equals the industry average. A number higher or lower than the industry average reflects the relative weight owners of each vehicle placed on a particular purchase reason. The chart reveals a number of points worth keeping in mind in the context of the Mark VIII.

■ **"Prestige"** topped the list of motivators, no matter what vehicle was purchased, with Mercedes-Benz and Lexus owners citing it as especially important.

■ **"Exterior Styling"** was below industry average for the Mark VII, suggesting that the unique design of the Mark VIII will be an important factor in conquest sales.

PURCHASE REASONS*



	Sport-luxury Segment	1991 Lincoln Mark VII	1991 Cadillac Eldorado	1991 Acura Legend Coupe	1991 BMW 3-Series	1991 Mercedes 300-Class	1991 Infiniti Q45	1991 Lexus LS400
Prestige	126	122	128	130	128	134	116	132
Exterior Styling	113	109	111	117	107	103	109	109
Fun to Drive	112	110	110	118	116	107	119	113
Interior Styling	111	106	113	113	101	107	110	108
Quietness	110	108	114	110	96	111	111	118
Technical Innovation	109	106	109	113	107	113	119	118

*Indexed to Industry

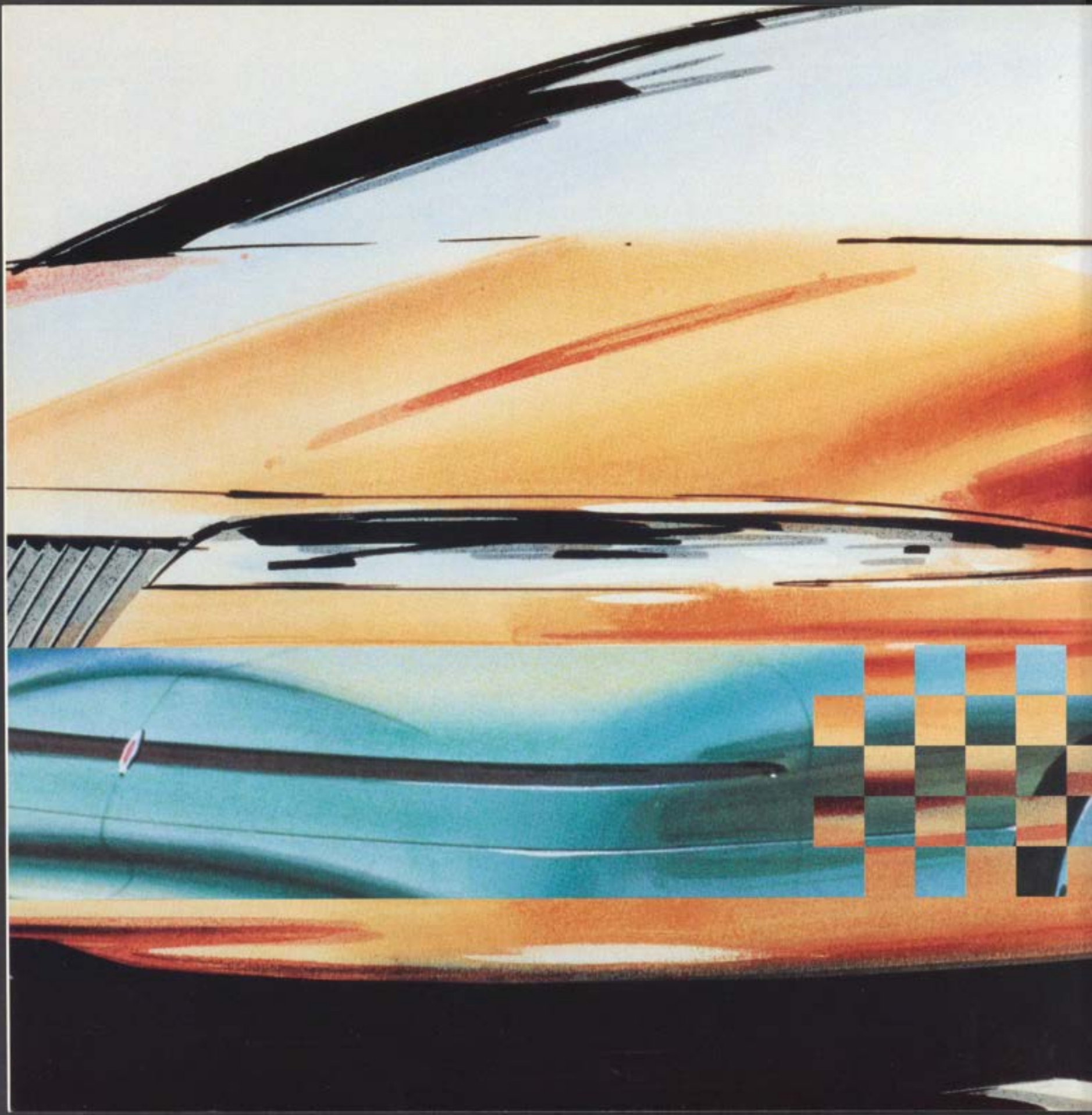
■ **"Fun to Drive"** was more highly rated by most import buyers than by either Mark VII or Cadillac owners. However, the Mark VIII, with its powerful V-8 and outstanding roadholding and steering qualities, will be of significant interest to these drivers.

■ The importance of **"Technical Innovation"** to Lexus and Infiniti buyers is worth noting, because technical innovation is such a large part of the Mark VIII story, from its 4.6L Four Cam V-8 and computer-controlled suspension to its available voice-activated telephone.

■ **"Interior Styling"** was another important motivator. That's good news for Lincoln sales consultants, because the Mark VIII offers a revolutionary interior in which the shape established by the instrument panel flows seamlessly into the doors and the rear seating area. This dramatic, "flow-through," driver-oriented design has already proven its appeal to customers during research clinics.

SUMMARY

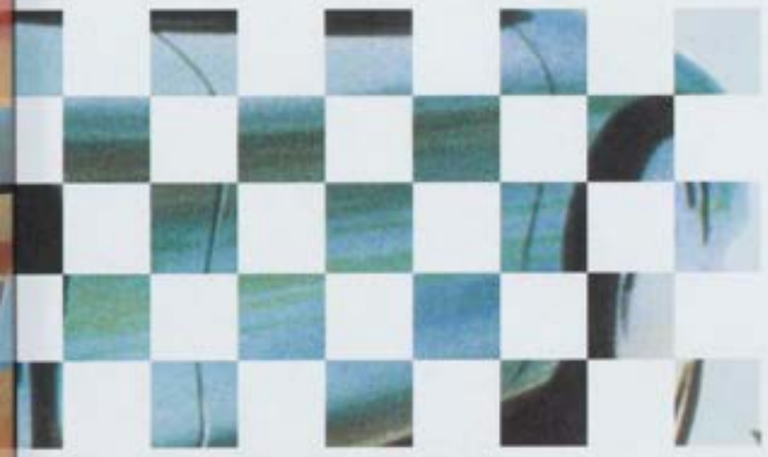
- The Mark VIII is aimed at a leadership position in the sport-luxury market segment, where it is positioned against three primary two-door competitors, the Lexus SC400, Cadillac Eldorado, and Acura Legend Coupe.
- The Mark VIII has the exterior/interior design features and performance to match anything in its class.
- A "typical" Mark VIII buyer seeks a state-of-the-art, driver-oriented car that commands respect and offers athletic performance.
- Mark VIII customers are projected to have a median age of 45 years, a median income of $100,000, and 60 percent are expected to be college graduates, making them younger, more affluent, and better educated than Mark VII owners or the median sport-luxury-segment owner.
- The Mark VIII offers Lincoln sales consultants outstanding opportunities in the sport-luxury market segment, which could total 200,000 units in 1993.



Part II — Shaping a New Mark

"The development period of the Mark VIII was a very exciting time. It was a time when we couldn't wait to come to work. We looked at the car's shape as an art form."

Kyu D. Kim, Design Manager, Luxury Car Exteriors



The introduction of a new Lincoln Mark has always been recognized as a special event in the automotive world. This precedent was set by the unveiling in October 1955 of the Continental Mark II, a car created largely in response to dealer requests to revive the elegant prewar Lincoln Continental. The Mark II became a classic in its own time, and established styling themes that would continue to echo through the series of Marks that followed. It was that echo that would subtly guide Lincoln designers as they set about creating a new Mark for a new world, the automotive marketplace of the 1990s.

Introduction

This Part will examine the details of the Mark VIII's exterior design. It covers:

- Design background and priorities
- Design evolution from early studies to finalized look
- Manufacturing highlights

Behind the "look" of the Mark VIII is a fascinating story of how very specific ideas and objectives were turned into reality. Understanding those objectives is central to an understanding of why this newest of Marks represents such exceptional new opportunities for the Lincoln sales consultant.

Continental, introduced for the 1940 model year.

Mark II (1956-1958)

Mark III (1969-1971)

Mark IV (1972-1976)

Mark V (1977-1979)

Mark VI (1980-1983)

Mark VII (1984-1992)

Mark VIII (1993)

Background

The design of any automobile represents a challenge, but the creation of a new Lincoln Mark involves special considerations. Not only must a fresh, new shape be developed that meets a variety of design and marketing goals, but that shape must somehow retain the special cues that distinguish the new model as, unmistakably, a Mark. Today, there exists only a handful of the world's automobiles that have retained, over a long period of time, the kind of look that has come to be recognized as a tradition. The Lincoln Mark is one of them.

It was with tradition in mind that Lincoln designers, looking ahead in the 1980s to the Mark VIII, took what Luxury and Large Car Design Director, Gale Halderman, called "a deep dive into history." There, surrounded by the rich tradition of past Marks, several of which have become coveted by automobile connoisseurs, the designers sought the direction for the new model. They explored many paths.

They studied, first, the Mark II and Mark III. The proportions of those cars, with their long hoods and short trunks, were considered carefully. The designers moved toward new proportions with a shorter hood and somewhat more "cab forward" theme. Of course, note was taken of the familiar spare-tire bulge in the trunk lid that actually dated to the pre-World War II Lincoln Continental and inspired the "Continental kits" of the '50s and '60s. The familiar vertical grille introduced on the Mark III, reputed at the time to be the domestic industry's costliest grille, was also studied.

This look at Marks past was the prelude to questions about the direction that would be taken by the new Mark. Should the new car be an evolution of the Mark VII? Should it possess a rather generic, luxury-coupe appearance? Perhaps it should echo design themes of the more popular Eurocars. Should a high-tech look predominate? Or, should the effort be directed towards creating a contemporary classic?

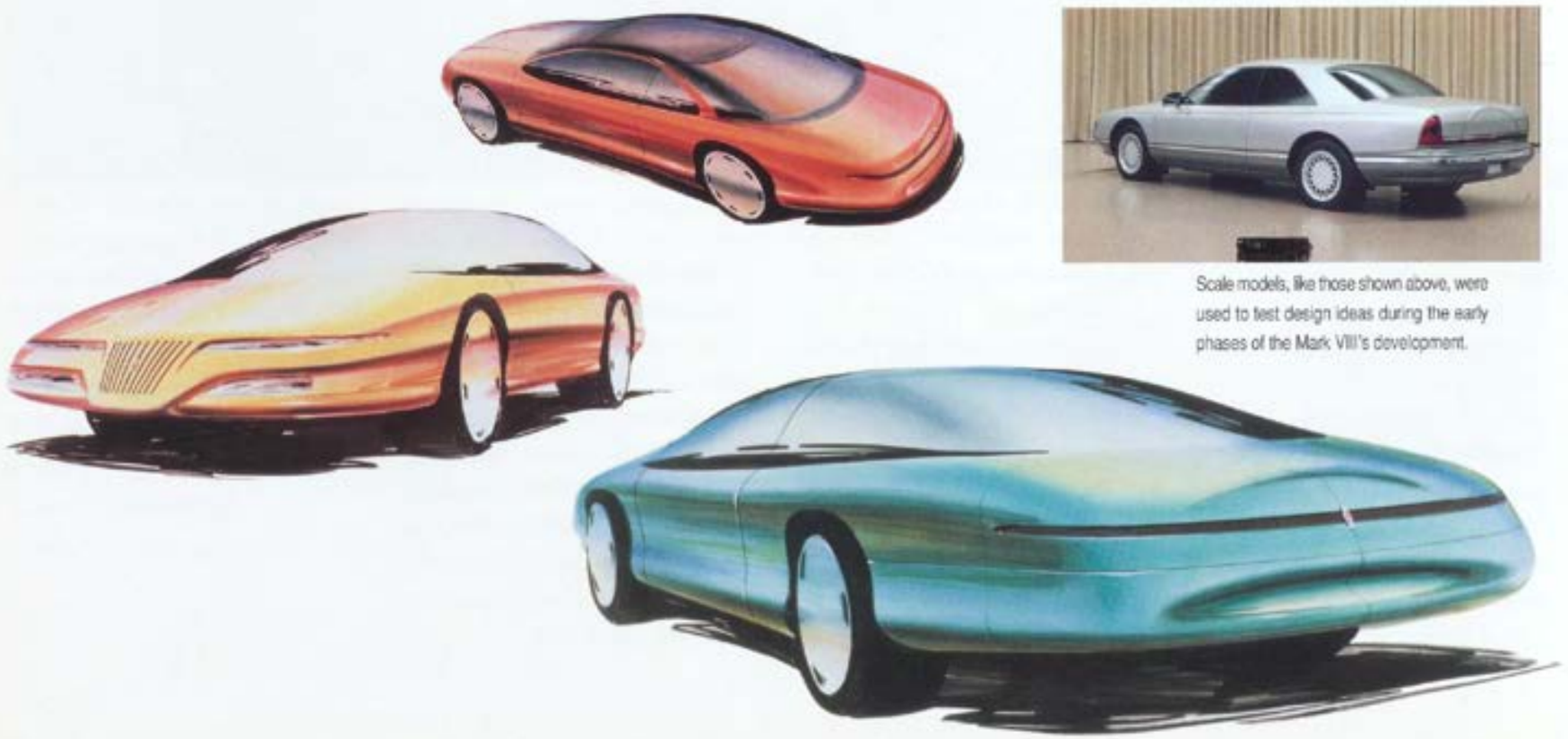
Design Priorities

The designers emerged from their research having decided to aim at creating a contemporary classic, and they also established the priorities of the new car's "look." These priorities were listed as follows:

- Develop a body shape imbued with a distinctive personality
- Aim for a "love-at-first-sight" appearance
- Ensure a look of quality and careful attention to detail

The Mark VIII's design phase was destined to be both exciting and complex. A variety of sketches was done, reflecting different approaches. A four-tenths-size scale model was built, and manufacturing concerns began to be addressed. The model was first exposed to the public at research clinics in Dallas and San Francisco. Feedback was positive, with people recognizing the car as new but still retaining distinctive Lincoln Mark cues.

At the same time, however, advance information about upcoming competitive models indicated that the mid-'90s were going to be an intensely competitive period in the Mark VIII's market segment. As a result, when the program's deadline was extended to ensure that the new Four Cam V-8 would be ready at Job 1 (the first production vehicle), it was decided to rethink the body shape while continuing to strive for the "contemporary classic look." "We still wanted our Mark cues," said Halderman, "but we now decided to do a design that would be totally new — more of a break from the Mark VII." Designer Kyu Kim called the result "pure sculpture."



Scale models, like those shown above, were used to test design ideas during the early phases of the Mark VIII's development.

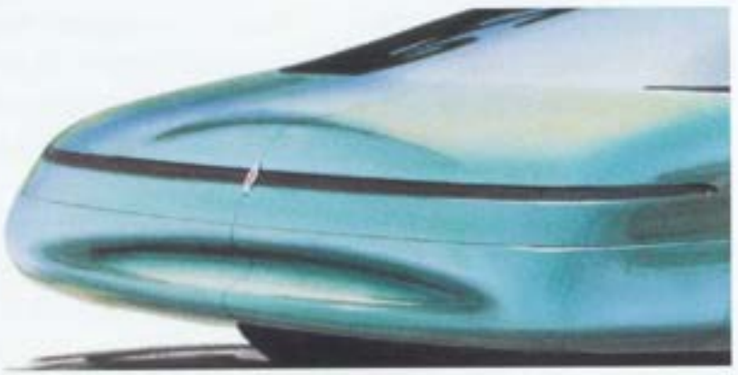
Stretching the Envelope

The redesign was undertaken beginning in the fall of 1988, and a new clay model was built for presentation to management. The model was named Stretch I because it represented a comparatively radical new direction that Lincoln designers believed would be most competitive with other manufacturers' products. Might Stretch I, which represented to the designers a pure expression of form, be too radical? The answer was "no." Lincoln executives were intent upon creating a world-class automobile even if it meant producing a car that was more dramatically different than the one initially planned. The go-ahead was given for further refinement, and the modified version, Stretch II, was given additional chrome around the taillights and at the front end, together with smoothly integrated, five-mph bumpers.

The final shape of the Mark VIII is reflected "about 70 percent" by Stretch II. The new car exhibits an unbroken, flowing form from hood to fender to decklid. Just as its low-profile headlamps blend smoothly into the front fascia, the flush tail lamps wrap smoothly around the rear deck into the fenders. "We tried to treat everything fluidly," said Kim, "but the shaping also imparts a strong, muscular look. We also think it is a look that will age well and look good many years from now, just like Marks of the past."

Top and above: Lincoln designers took a radically new direction with the design of Stretch I.

Left: About 70 percent of the Mark VIII's final shape is represented by Stretch II, shown here with designer Kyu Kim.

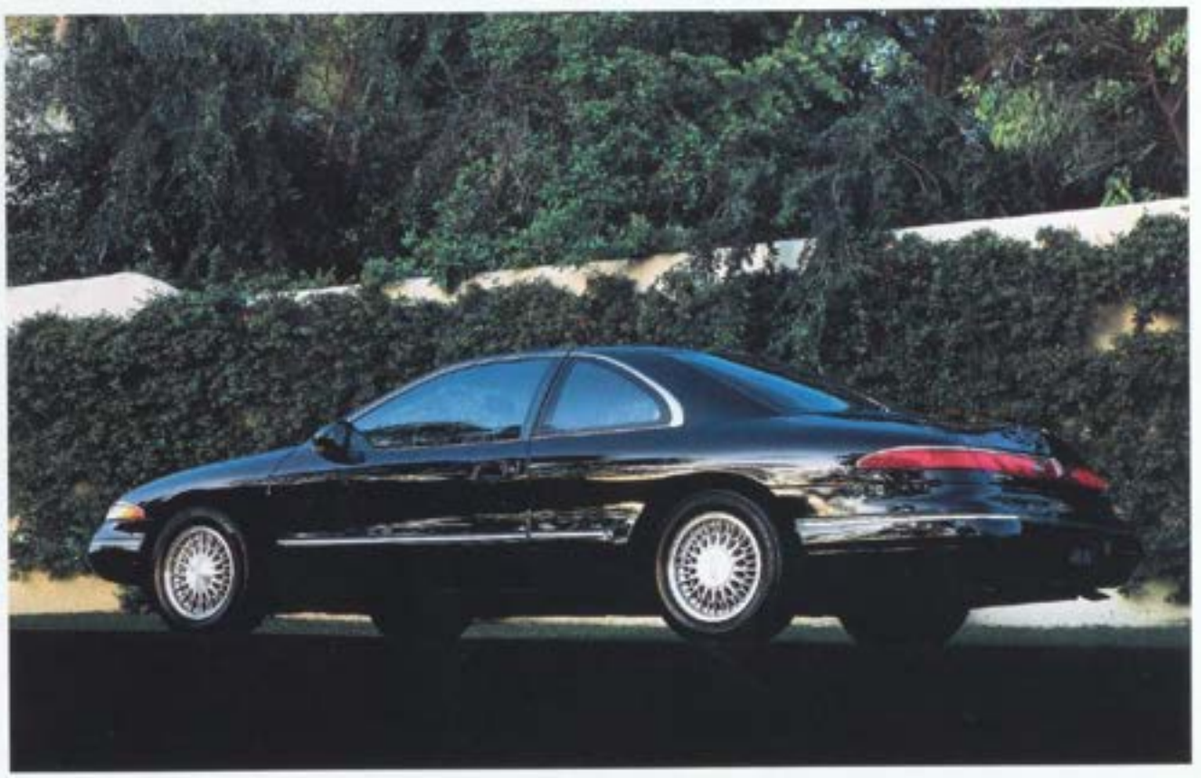


The spare-tire shape on the trunk lid serves two purposes: it is an undeniable link to the Mark heritage, and its sharp crease helps improve airflow. An especially low coefficient of drag that might compromise aesthetics was not itself a goal for the Mark VIII, although the car's 0.32 Cd is certainly competitive. But any trendiness that might ultimately tend to date the car was avoided. In keeping with the goal of ensuring a quality look with careful attention to detail, the bodyside molding was fully integrated into the car from the beginning. Not only does it enhance the Mark VIII's appearance, but it is also totally functional.

Compared to the Mark VII, the Mark VIII is 4.1 inches longer and almost an inch lower overall. Furthermore, the cowl height has been lowered 1.8 inches, and the windshield angle increased just over four degrees. Coupled with the Lincoln Mark VIII's dramatic shape, its dimensions result in a car that is clearly longer and sleeker than its predecessor.

The Result

Has the Lincoln team created a contemporary classic? That will be decided by the market and by time. But it is worth noting that the shape of the Mark VIII is one devoid of the gimmicks that tend to make a strong initial impression but quickly become dated. Instead, the "pure sculpture" of the Mark VIII's form is intended to possess the timeless appeal that one associates with the very first Mark, the Mark II. Customer reaction to prototypes has been overwhelmingly positive, as have the earliest press reports.



MANUFACTURING NOTEBOOK

Unique Line at the Wixom Plant

Just as a new factory was built for the Mark II, new developments at Lincoln's Wixom plant will contribute to the goal of ensuring quality for the Mark VIII. Perhaps the biggest news is that the new Mark will be built on a dedicated assembly line rather than on the same line as the other Lincoln models. And the highly trained and skilled 450-person workforce — drawn from those operators who volunteered to work on the new Mark VIII — will also be independent. The new line will move at a comparatively slow speed, and the Mark VIII will be built at a projected rate of 10 cars per hour (vs. a typical line speed for cars of this size of about 45 cars per hour).

For the operators, the dedicated Mark line means a smoother work flow and the opportunity to become more familiar with each operation. Because of the low line speed, technicians will be responsible for an entire operation at their stations. All Mark VIII operators will use newly developed Quality Deployment Sheets (QDS), written by themselves, to ensure quality. The sheets list torque specifications, the best sequence for an operation, and allocates the tasks that each operator is to perform. Results have indicated that QDS translate into high product quality by increasing job satisfaction.

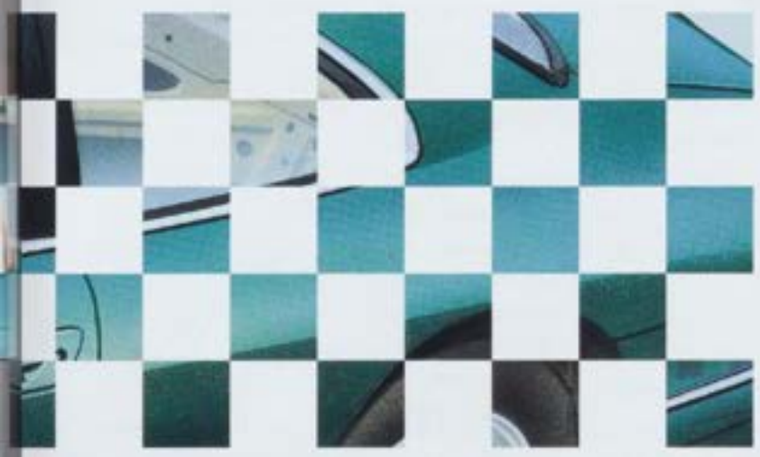
By the time Job 1 rolls off the new line, about 500 Mark VIII prototypes, an unusually large number, will have been built to help ensure that the Mark VIII gets off to a great start. As one plant worker said, "We have to believe in it!"

SUMMARY

- The Mark VIII was designed to be a "contemporary classic" that retains traditional Mark cues like the vertical grille and decklid spare-tire bulge, with a sculpted, well-proportioned shape possessing high customer appeal.
- The Mark VIII's basic form is a smooth, uninterrupted curve from front to rear, with the long hood merging gracefully into the steeply raked A-pillars and with the trunk merging seamlessly into the rear window and roof.
- The Mark VIII is 4.1 inches longer and over an inch lower than the Mark VII, contributing to its sleek appearance.

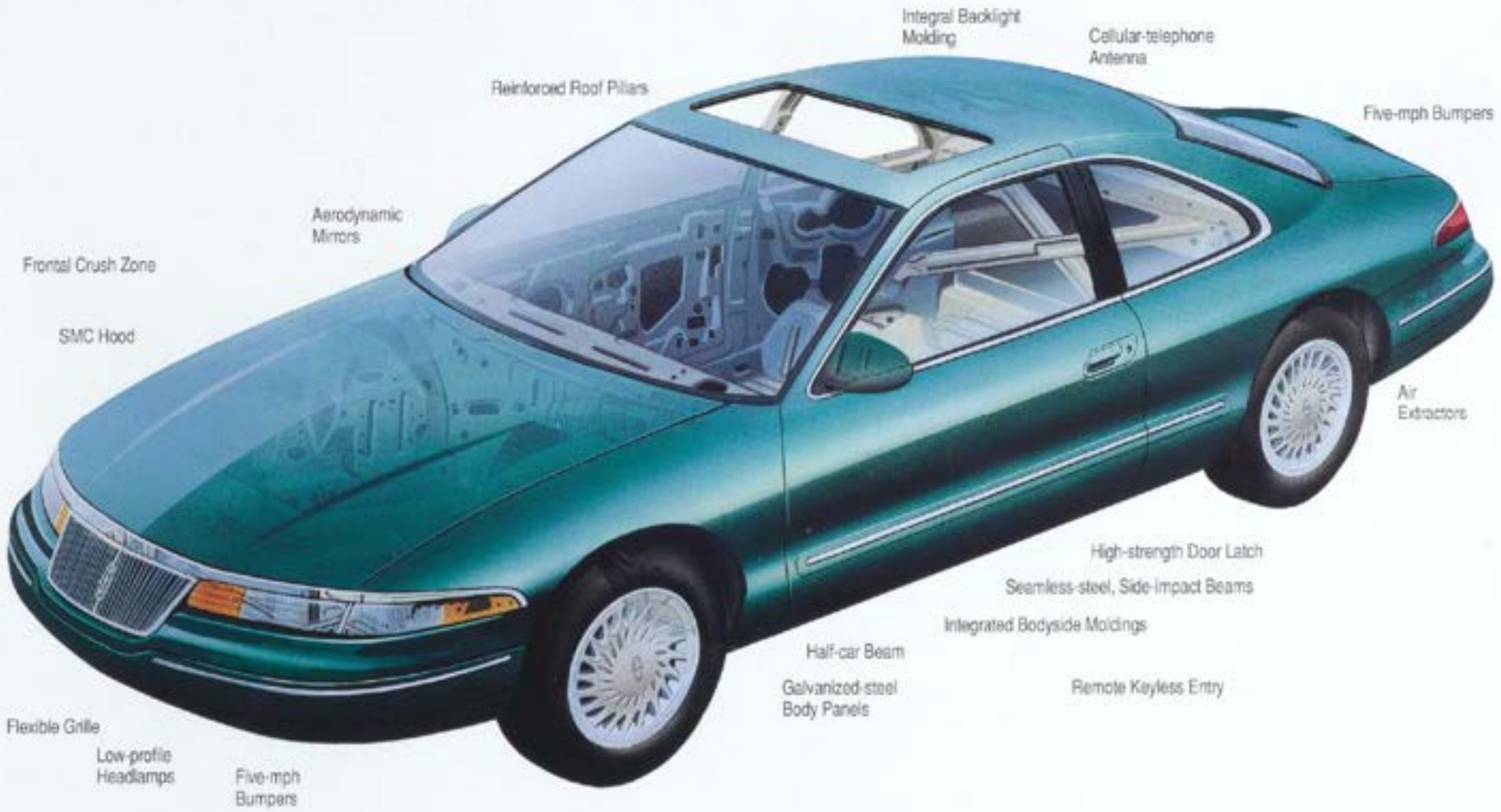
"Designers and manufacturing specialists worked together for, literally, a year, to get some of the details to work. But that's what it took to achieve our initial goal of clearly evident quality and attention to detail."

Ted Finney, Design Executive



Given the Mark VIII's dramatic design, a prospect's first impression is likely to be highly positive, as research with a variety of owner groups has already demonstrated. And, when customers learn about what's beneath the finely sculpted curves of the Mark VIII's bodywork, their interest will increase further. It is one thing to design a beautiful automobile, but it can be quite another to make that design practical from a manufacturing and safety standpoint. The Mark VIII team succeeded on all counts.

EXTERIOR ENGINEERING



Introduction

Once the initial impact of a customer's first look at the Mark VIII subsides, there remains a great, benefits-oriented story in the details of the car's exterior design and construction. In fact, much of the behind-the-scenes engineering of the Mark VIII was devoted to ensuring that the car's shape and details, as envisioned by its designers, could be faithfully executed.

This Part will examine the exterior features of the Mark VIII in detail. It covers:

- The grille, bumpers, and integral bodyside moldings
- Safety aspects such as the front and rear crush zones and door beams
- The story behind Ford's extensive use of computers in crash-simulation testing
- The body structure

Key Features and Benefits At A Glance

Flexible, Bright Grille

Although it looks like it's manufactured from chrome and metal, the grille of the Mark VIII actually represents new-materials technology. It is a flexible molding that cannot rust and is damage-resistant in five-mph impacts.

Five-mph Front and Rear Bumpers

Although no longer a federal requirement, five-mph bumpers are designed into the Mark VIII, offering owners added peace of mind and helping to reduce repair costs resulting from low-speed collisions and careless parkers.

Low-profile, Halogen Headlamps

The Mark VIII headlamps, at 72 mm (about 3.0") in height, are the slimmest-profile headlamps on any production car. They play an important role in the clean, aerodynamic shape of the front end.

Seamless-steel, Side-impact Beams

The use of a tubular beam made of ultra-high-strength steel mounted inside the door helps to protect the occupants during a side impact.

Sheet-molded-compound (SMC) Hood

The Mark VIII hood is built of SMC, a fiberglass material that offers numerous benefits. The molding process results in a part that is comparatively lightweight and has an extremely smooth surface that makes possible a high-quality paint finish. The material is immune to corrosion and denting.

Two-sided Galvanized Steel

With the exception of the roof panel, all exterior-exposed panels are constructed of two-sided, galvanized steel. The galvanizing process makes the metal extremely corrosion resistant and contributes to the car's lasting appearance and value.

Flexible, Bright Grille — Resists Damage

Also referred to by Lincoln designers and engineers as their "soft chrome" grille, this component represents an automotive-industry first. It is made of a hard but flexible material known as thermoplastic urethane (TPU). The bright appearance is achieved by bonding indium — a silvery-white, metallic element used as a plating over silver to make mirrors — to the TPU. The resulting grille can be twisted and accept an impact without being deformed, making it much less susceptible to damage than a traditional metal or plastic grille.

The soft chrome grille, made of indium bonded to thermoplastic urethane, resists damage caused by twisting or impact.

The front end is built for durability: Five-mph bumpers are made of resilient foam covered with plastic. Polycarbonate headlamp lenses resist breakage.

Five-mph Front and Rear Bumpers — Reduced Repair Needs/Costs

The front and rear bumpers of the Mark VIII are built of a specially developed plastic cover filled with resilient foam. The covers are highly scuff resistant, and the foam material can absorb a five-mph impact without damage, helping to reduce the costly repairs and inconvenience that can result from low-speed collisions.

Low-profile, Halogen Headlamps — Distinctive Appearance

Just 72 mm (about 3.0") high, the Mark VIII headlamps are the lowest-profile headlamps on any production car, and they contribute to the car's sleek, aerodynamic look. The halogen lamps offer 20 percent more light than sealed-beam designs, and the polycarbonate lenses are highly resistant to breakage.

Sheet-molded-compound (SMC) Hood — Rust-free and Lighter Weight

Sheet-molded compound is a material formed by a top and bottom layer of plastic separated by a filling of resin and fiberglass strands. This sheet of material is molded in metal dies using heat and pressure to form the part. The part itself is notably uniform in strength, and is smooth compared to a piece made of fiberglass strands sprayed into a mold. It is capable of accepting the high-quality finish required by Lincoln. The Mark VIII's SMC hood is strong, dent resistant, light, and cannot rust.

Note: The Mark VIII's hood is mounted on gas struts. The struts are simpler, lighter, and result in lower hood-opening effort than spring-mounted hoods.

The sheet-molded-compound (SMC) hood is lightweight and cannot rust.

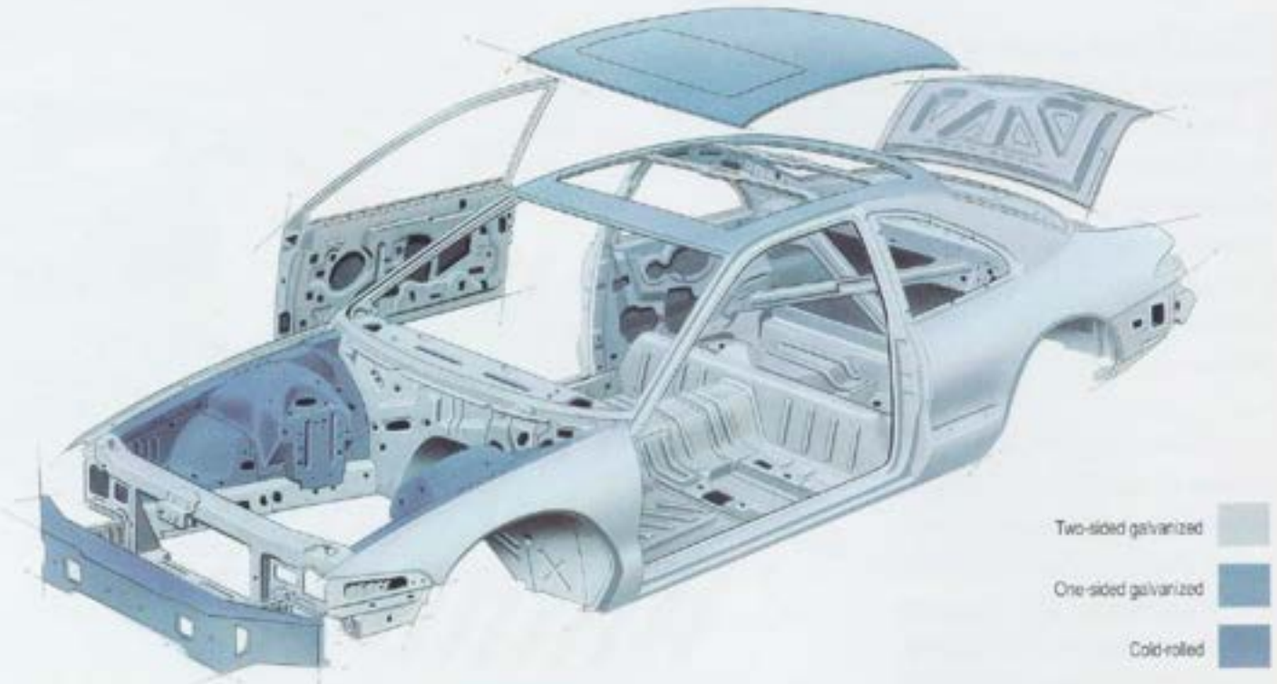
Integrated Bodyside Moldings — Combining Good Looks and Protection

The protective bodyside moldings on the Mark VIII are mounted in a precision-stamped recess in the doors and quarter panels. The moldings are the color of the body, and their integrated fit does nothing to detract from the car's sleek looks. At the same time, they help to protect the sheet metal from a carelessly opened door.

Aerodynamic Mirrors — Low Wind Resistance and a Flowing Look

The side mirrors are mounted in shells that blend smoothly into the door and help to minimize wind noise. The mirror housings are color-keyed to the body, and the mirrors themselves are heated to ensure visibility in freezing weather or damp conditions, improving convenience and safety.

Protective moldings mount in recesses stamped into the door and quarter-panel sheet metal. Aerodynamically shaped mirror housings reduce wind resistance.



Galvanized-steel Body Panels — Long-term Value

All of the sheet steel used in the Mark VIII's body is galvanized, a process that involves coating the steel with zinc, which resists rust. With the exception of the roof, which requires galvanizing on the inside only, all body panels are galvanized on both sides.

The Mark VIII's sheet metal is galvanized — coated with rust-resistant zinc. All but the roof is galvanized on both sides.

Note: A urethane coating is robotically applied to the lower portion of the vehicle to resist stone pecking and provide additional corrosion resistance.

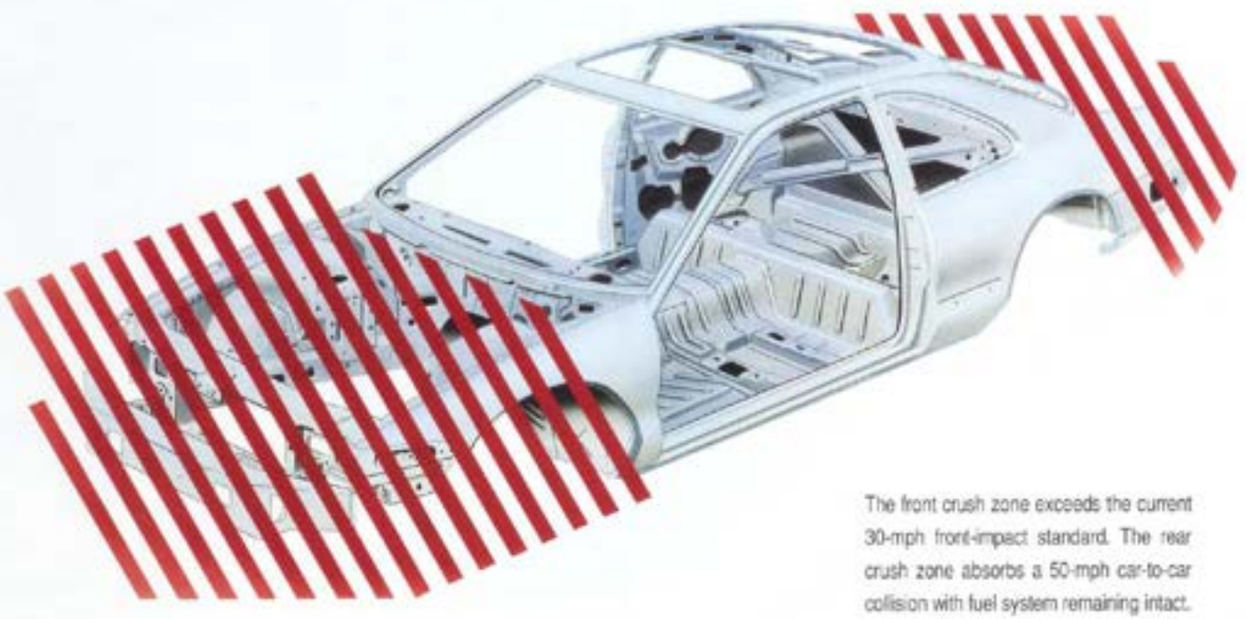
Frontal Crush Zone — Improved Passive Safety

A close look at a Mark VIII body in white (the car's white-painted unit body shell without any components mounted) would reveal subtle clues to how the body structure has been designed to help absorb impact in a collision.

Convolutions stamped into select portions of the body structure are designed to absorb impact in a controlled manner. The upper-rail structure along the top of the fender feeds loads into the doors and the sturdy, box-like structure formed in the rocker-panel area. Impact forces are channeled around the passenger compartment rather than directly into it. In addition, the hood has fold points and, if subjected to an impact, will collapse back at these points, rather than move rearwards into the windshield.

Convolutions stamped into the unibody are intended to help the body absorb impact forces in a controlled manner.

The benefit of the Mark VIII's front-end structure is that the car meets or exceeds all federal standards when tested at 35 mph, bettering the 30-mph front-impact standard currently mandated.



The front crush zone exceeds the current 30-mph front-impact standard. The rear crush zone absorbs a 50-mph car-to-car collision with fuel system remaining intact.

✓ ENGINEERING NOTEBOOK

Computer-aided Crash Simulation

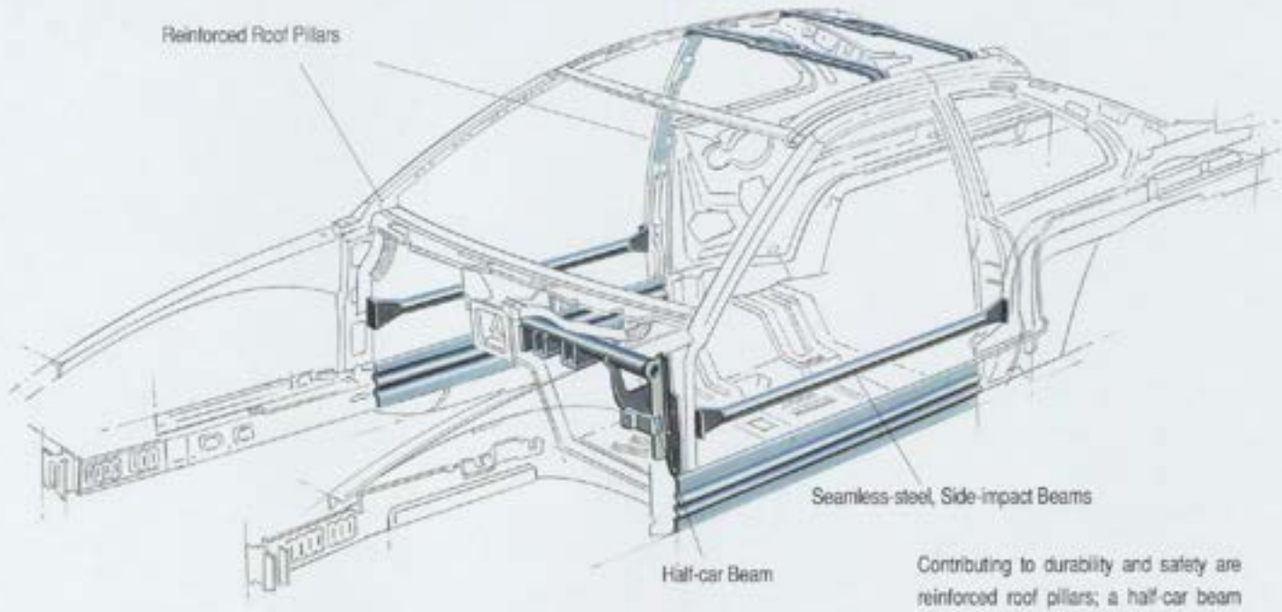
The Mark VIII was the first Ford product designed for crash protection using computers for finite element crash analysis, a process that allows engineers to analyze the effects of an impact on a given structure. The computer simulations included tests for front and rear collisions, supplemental air-bag deployment, and roof crush. In conducting these simulations, Ford engineers used advanced analytical technology and powerful supercomputers.

Reinforced Roof Pillars — Enhanced Occupant Protection

The base of each A-pillar (windshield pillar) is reinforced with a structure of gussets and braces at the point at which the pillars intersect the cowl. The B-pillar (behind the door) is also reinforced. Together, the reinforced pillars brace the roof and add crush resistance.

Seamless-steel, Side-impact Beams — Side-impact Protection

The Mark VIII's door-intrusion beam is made of seamless, 160,000-psi, steel tubing. Not only are these beams lighter than the sheet-metal beams used on the Mark VII, but they can resist a greater load. This ultra-strong beam helps to improve occupant protection in a side impact, and will help to make the Mark VIII one of the first Ford Motor Company products to meet 1994 dynamic-side-impact requirements.



Contributing to durability and safety are reinforced roof pillars; a half-car beam behind the instrument panel; and seamless-steel, side-impact beams in the doors.

High-strength Door Latch — Enhanced Security

The Mark VIII uses a new high-strength door latch. The latch is constructed of steel laminations with a plastic core. Despite the latch's great strength, the Mark VIII door is easy to open. The outside handle is specially contoured to match the design of the door, and a counterweight in the handle offsets the pressure of the latch springs to reduce door-opening efforts. Reinforcement and insulation in the quarter panel contribute further to the high-quality feel and sound associated with door opening and closing.

Note: The Mark VIII doors can be opened after a 35-mph frontal crash, a corporate safety requirement.

Half-car Beam — Added Protection in Impacts

Hidden behind the Mark VIII's instrument panel is a tubular-steel beam. The structure is designed to provide a stable mounting platform for the steering column, and allow proper positioning of the driver's supplemental air bag in frontal crashes.

Note: The three supplemental-air-bag deployment sensors are mounted on the radiator support, the cowl, and the instrument-panel supports. They are fully tested to ensure that the supplemental air bags will deploy in moderate to severe frontal impacts, yet will not inadvertently deploy in a low-speed impact.

Remote Keyless Entry — Enhanced Convenience and Security

The standard remote keyless entry system is based on a hand-held radio transmitter and a door-mounted receiver (module) that can store the codes of as many as four transmitters. At a distance of up to 33 feet, the remote system will unlock the driver's door, turn on the interior lamps for as long as 25 seconds, and disarm or reset the anti-theft system. The car can also be locked, and the trunk unlocked, using the transmitter. In addition, pressing the transmitter's PANIC button causes the horn to honk and the exterior lamps to flash for three minutes — unless these alarms are turned off by another press of the PANIC button from the same transmitter.

Use of a five-digit access code entered on the keypad on the driver's door can also unlock both doors, and the trunk. Should a door be left ajar, or a switch be faulty, a battery-saver function turns off the interior lamps and all courtesy lamps after 45 minutes.

Top: The remote keyless entry transmitter locks or unlocks the driver's door or trunk from up to 33 feet. Above: A five-digit access code unlocks the doors and the trunk.

The one-piece molding is bonded to the rear window during manufacturing, and it is mounted to the body at zero tolerance, for a perfect fit and leak resistance.

Integral Backlight Molding — The Quality of a Tight Fit

The Mark VIII backlight (rear window) is surrounded by an integral, one-piece molding that is bonded to the glass during manufacture. The one-piece molding results in a robust joint all around the light. Both the backlight and the windshield are robotically installed at zero tolerance (no uneven gaps between the molding and the body), ensuring a perfect fit, high-quality look, and leak resistance.

Aerodynamic Cellular-telephone Antenna — Developed for Low Wind Noise

In their quest to reduce interior noise to a minimum, Lincoln designers discovered that the cellular-telephone antenna was capable of producing a hum that could be heard throughout the car at certain speeds. Using a wind tunnel, the antenna's shape was redesigned to reduce wind noise.

The available cellular telephone's antenna was designed to eliminate hum at road speed.

Air Extractors — Flow-through Ventilation and Low Door-closing Effort

Concealed behind the rear-bumper extensions are interior-air extractors. These plastic, one-way valves permit air to be expelled from inside the vehicle, either during operation of the ventilation system or when the doors are closed. The valves (together with specially designed door seals) contribute to a comfortably low door-closing effort, enhancing overall comfort and convenience.

One-way vents allow interior air out of the car, for fresh-air replacement.

SUMMARY

- The Mark VIII's flexible, bright grille (an industry first) and five-mph bumpers help reduce the chance of costly damage in low-speed impacts. Integral bodyside moldings protect against those who carelessly open their car doors.
- Developed with computer-aided finite element analysis to help ensure maximum crashworthiness, the Mark VIII exceeds the government's 30-mph front-collision test requirements by five mph. It is also designed to absorb a 50-mph, car-to-car, rear impact while maintaining fuel-system integrity.
- An SMC hood, galvanized-steel body panels, and urethane coating on lower portions of the body offer long-term corrosion protection.
- The patented, low-wind-noise design of the Mark VIII's cellular-telephone antenna is just one example of the attention to detail found throughout the car.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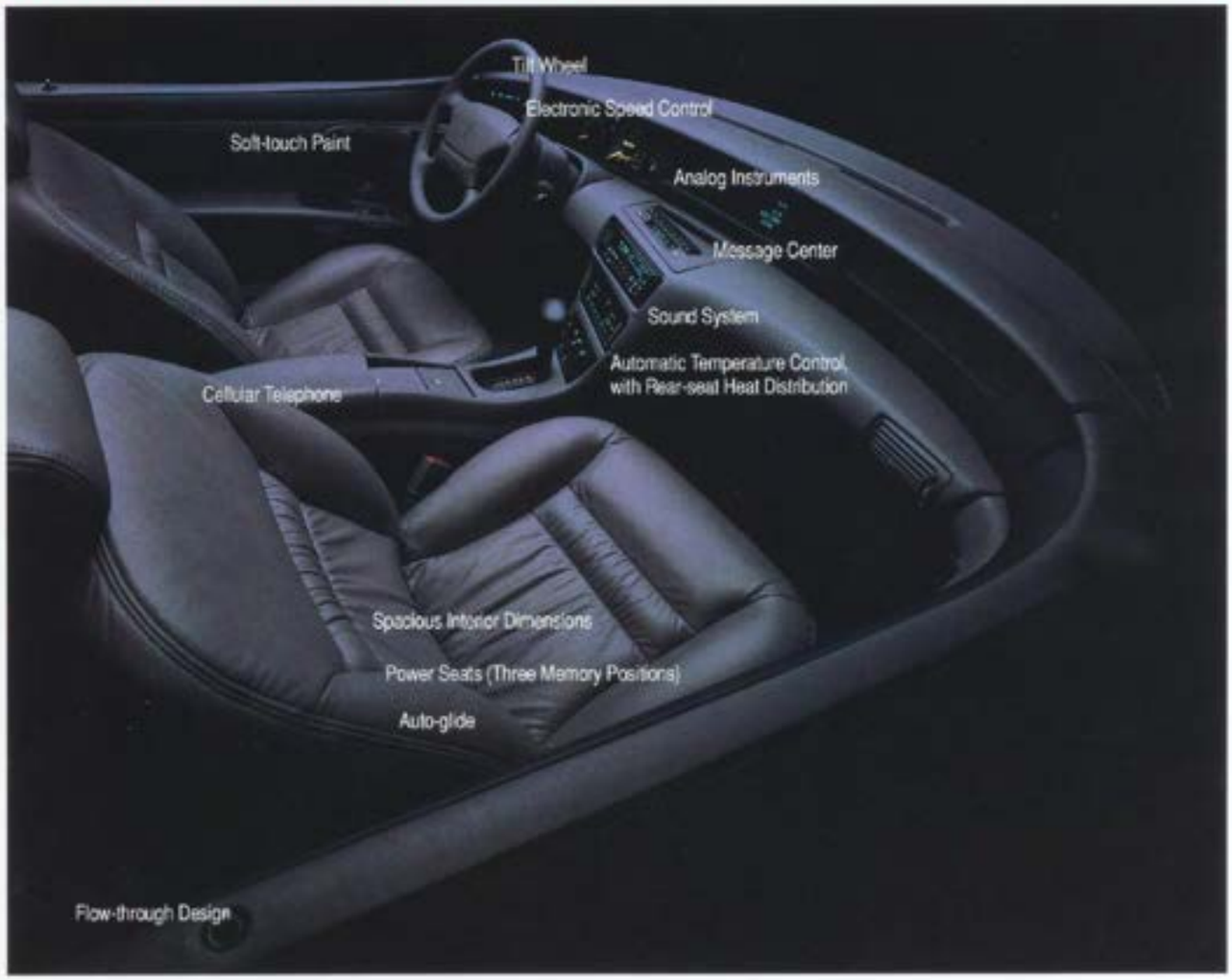
Part IV — Interior Comfort and Convenience

Mark VIII designers approached development of the interior with a simply stated goal: Develop the most exciting interior ever created by Ford Motor Company. It is not often that a production interior captures the excitement, and stirs the senses, as much as a designer's vividly evocative concept drawings. But the Mark VIII interior does. It generates just the sort of spontaneous excitement that its creators intended.

"The Mark VIII interior captures an emotional appeal rather than a practical response. It's achieved by a total, seamless, wraparound design. It encloses you in a highly exciting, dramatic, safe space."

David Rees, Director, Mid-size Car Design

INTERIOR COMFORT AND CONVENIENCE



Introduction

The Mark VIII interior was created to reinforce the visual impact and design statement made by the bodywork. Curves and shapes established by the exterior are carried through inside, contributing to the car's harmonious look while establishing a sweeping, cockpit-like theme. The result has earned the highest scores of any Ford Motor Company interior during market-research clinics. All surfaces are padded or finished with "soft-touch" paint to improve tactile feedback and enhance the sense of luxury imparted to the driver and passengers. A no-nonsense analog instrument cluster — expected by Mark buyers — is standard, and all controls and switches are sensibly and conveniently arranged.

This Part covers the interior in detail. It explains:

- The "flow-through" design
- The features of the front seats
- The instrumentation and Message Center
- The climate-control system
- The sound system and the available, voice-activated cellular phone
- The innovative soft-touch paint

Key Features and Benefits At A Glance

Flow-through Design

The door trim, instrument panel, and console wrap around the driver and front passenger, then flow to the rear as a continuous form. The flow-through interior is visually exciting and soft to the touch — a design intended to provide aesthetic pleasure while keeping instrumentation and controls easily accessible.

Auto-glide Front Seats

This feature, coupled with the memory-seat feature, automatically moves the front seats forward to allow rear seat passengers to enter or exit easily. When the front seatbacks are tilted forward, the entire seat frame moves on its tracks as far to the front as possible. Lifting the seatback to an upright position causes the seat to return to its original position.

Message Center

In the middle of the instrument panel is a screen that displays warning and information messages. The Center's operation is simple and clear. Six convenient control buttons call up trip-computer messages on the easy-to-read screen, and warning messages appear when appropriate.

Rear-seat Heat Distribution

Duct work passing through the console and to the rear vents carries heated air to the rear-seat passengers. Heat is more evenly distributed throughout the car, for the greater comfort of all passengers. The diameter of the ducts is maximized for optimal flow.

Cellular Telephone

A Motorola hands-free telephone is an option. It can be voice activated so that telephone dialing and conversations offer as little distraction to the driver as possible. Answering the phone is made more convenient by a button that is mounted on the A-pillar.

Soft-touch Paint

To make the interior as inviting as possible to the touch, selected surfaces have been given special attention with soft-touch paint. This technological breakthrough allows interior paint to feel soft, adding to the tactile-feedback appeal of the interior.

The sweep of the two-tiered, flow-through design from the instrument panel to the rear-seat area is made possible by tight tolerances in the unibody's manufacturing process. The console, instruments, and controls surround the front seats, emphasizing the Mark VIII's driver orientation.

Flow-through Design — A Cohesive Sense of Spaciousness

"Flow-through" refers to the way in which the line of the instrument panel is carried into the console, doors, and rear quarters. It gives a sense of pleasing and spacious design while contributing to a sense of openness.

The two-tiered design of the instrument panel further supports this sense of uncluttered openness. The lower tier helps to define the cockpit-like seating spaces. The sound-system, climate-control, and Message-Center controls have been placed in the area where the lower tier and the console flow together, putting them within easy reach of the driver and passenger. The upper tier is set back from the lower one, and contains the instrument cluster and the Message Center.

Customers will be impressed by the design and by the interior's distinctively soft feel. Once they fully experience the Mark VIII's environment, they will find it remarkably pleasant and inviting.

Spacious Interior — A Luxury Coupe with Room for Five

Determining how best to utilize and arrange a vehicle's interior space so as to achieve optimal levels of comfort, safety, and ergonomic sense is an exacting undertaking, particularly considering the variety of different-sized occupants the car must accommodate. Lasers were used in designing the interior of the Mark VIII to determine how well a range of people could fit into the compartment and to evaluate ease of entering and exiting. Consideration was given to the smallest details. For example, armrests were indented to better conform to an arm's shape, and lumbar supports were redesigned to provide comfort to a wider range of back shapes.

The Mark VIII's interior appears much more spacious than that of its predecessor. While most of the interior dimensions have, indeed, been expanded, the feeling of spaciousness is enhanced by the reconfiguration of the interior space and the flow-through design. Even though the Mark VIII's height is about an inch less than that of the Mark VII, interior headroom has been increased by almost half an inch. Front legroom, too, has been increased. But the most significant increase is in shoulder room, especially in the front, where the Mark VIII is about three inches wider than the Mark VII. Both the open feeling of the interior and the actual increase in interior space enhance the comfort of the occupants. Overall visibility is outstanding, particularly when compared to the Eldorado.

In contrast to many other luxury coupes, the Mark VIII's rear seat has ample legroom for passengers, offering extremely comfortable quarters for short- and long-distance travel.

INTERIOR SPECIFICATIONS		
	Front	Rear
Headroom	38.1"	37.5"
Legroom	42.6"	35.9"
Shoulder Room	58.9"	59.5"

Even though the Mark VIII's height is about an inch less than that of the Mark VII, headroom, front legroom, and shoulder room have been increased.

✓ ENGINEERING NOTEBOOK

Comfort and Convenience Interdependencies

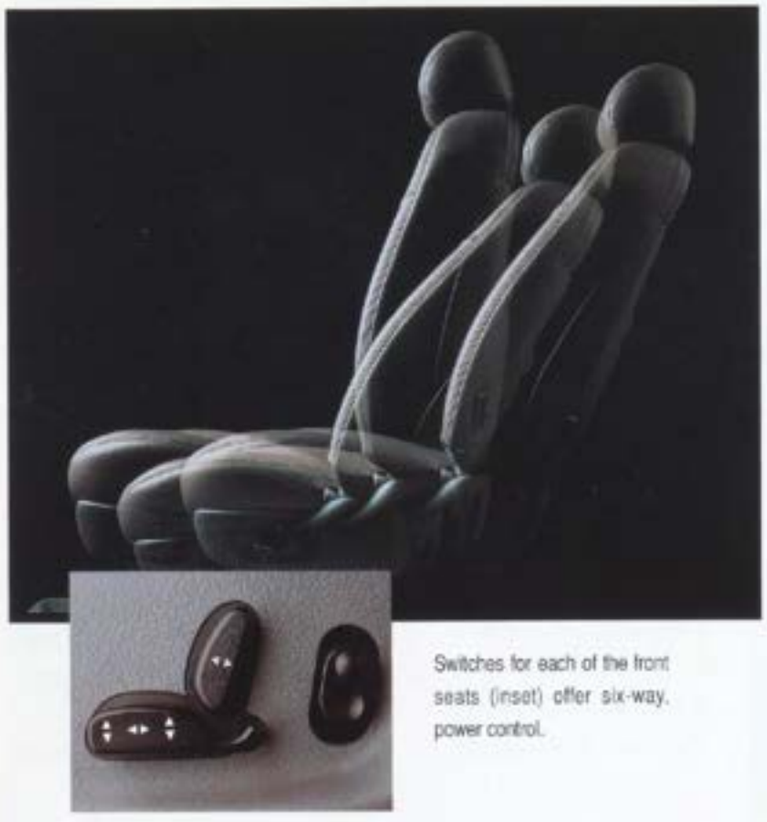
The Mark VIII's interior was not designed, and is not built, in isolation from the rest of the car. Much of its quality — especially its fit — depends on how well the body is built. The interior design requires trim to line up within very close tolerances. The difference of a couple of millimeters here or there would result in glaring mismatches. But the accurate fit of the flow-through interior styling attests to the precision with which the body is assembled.

The Mark VIII represents significant achievement in the quality of Ford Motor Company products. It is a forerunner of what can be expected from the company throughout the 1990s and into the next century.

Power-adjustable Seats — Individual Fit

The front seats feature power recliners and six-way, power adjustment. The supple seat leather is aromatic, with the appealing leather smell providing pleasure to the senses together with greater prestige.

The electrically adjustable seat cushions and seat backs accommodate a wide range of different-size people. Improved lumbar support is also provided. Tests during development led to two significant enhancements to the lumbar support, for improved seat comfort. First, the position of the lumbar support in the seat back was lowered to more accurately meet the point in a person's lower back where support is needed. Additionally, the shape of the support was changed — instead of fitting all the way across an occupant's back, it is narrower and shaped more like a ball, so that it can more effectively support the spine.



Switches for each of the front seats (inset) offer six-way, power control.

Auto-glide Seats — Automated Access

This system automatically moves the front seats forward with electric motors to allow rear-seat passengers easy access to the back and an unobstructed path when exiting. When the seatback is tilted forward, the seat shifts ahead to its forward stop. Putting the seatback in an upright position causes the seat to return to its original position. Should the seat encounter an obstacle (such as a knee), it stops automatically, adding to the comfort of all occupants.

If the ignition is off, the Auto-glide seats will function with the transmission in neutral or park, the driver's seat unoccupied, and a door open, allowing ready access to the back seat. If the ignition is on, the transmission must be in park or neutral, and the driver's seat unoccupied. This safety feature helps to prevent the car from being in gear when rear-seat entry or egress is attempted.

Auto-glide makes the rear seat as accessible as possible with little effort. The widest possible opening allows easy entry to, and exit from, the back seat.

Included is a driver memory function. Three different drivers can store their seat positions and recall them at the push of a button.

Auto-glide seats allow ready rear-seat access by automatically moving forward and then returning to their original position.

Tilt Steering Wheel — Improving Driver Comfort

The leather-wrapped steering wheel can be tilted vertically so that the instrument panel is clearly visible to drivers of different sizes, contributing to the safe operation of the vehicle. The driver's-side air bag is housed behind the pad of the steering-wheel hub. Even so, the horn can be operated by pushing any part of the pad, for immediate accessibility.

The steering wheel tilts for driver comfort and clear visibility of the instrument panel.

The analog instrumentation provides clear and concise information about vehicle speed, engine speed, coolant temperature, and fuel level.

Analog Instruments — Legible and Informative

The instrument package has been placed in the instrument panel's upper tier, in front of the driver. The analog instrumentation — speedometer, tachometer, fuel gauge, and engine-coolant temperature gauge — provides information about rate of change that is not apparent with digital instrumentation. The analog dials also give the Mark VIII's interior a sporting, fun-to-drive feel. Instrument layout was considered in relation to steering-wheel-hub design. The gauges' upper-tier position makes them easily readable to drivers of a wide range of sizes, for convenience and safe operation of the car.

✓ ENGINEERING NOTEBOOK

Space through Technology

Interior space depends to a great extent on the dimensions and shape of the car's floor pan and body. New metal-bending technology enabled changes to be made to the Mark VIII's floor pan that helped to increase the width of front foot room.

Besides the comfort of having more foot room, the wider Mark VIII footwell permitted designers to optimally position the driver's foot pedals, for improved ergonomics.

Message Center — Selectable Information and Warnings

In the middle of the instrument panel's upper tier is the Message Center. At the top of the Center's display is a digital clock. Beneath the clock, the Center provides trip computer data, warning messages about monitored systems, and driver-selected information.

Pressing the buttons located on the lower tier below the Message Center screen selects the information to be presented on the LED Message Center display screen. English or metric units of measure can be chosen. Information that can be selected includes:

- Range — calculated from the car's average fuel economy during more than 500 miles of driving history
- Fuel Status — fuel remaining or fuel used
- Fuel Economy — average or instantaneous
- Compass — one of eight directional headings

Another button resets the displayed feature, and an oil-change reset can be pushed after maintenance.

The Message Center provides trip-computer information and warnings from the center of the upper tier.

The Message Center is also part of a program that monitors many of the Mark VIII's more vital systems. Warning messages about those systems also appear on the display screen. They include:

- Door Ajar
- Check Engine Temperature
- Check Voltage Level
- Low Fuel Level
- Low Oil Level
- Low Engine Coolant
- Low Washer Fluid
- Check Exterior Lamps
- Trunk Ajar
- Air Ride Switch Off
- Check Traction Assist
- Check Air Ride System
- Oil Change Required
- Change Oil Soon

Although the systems are constantly monitored and a warning will appear if there is a problem, the driver can also test system operations by using the System Check switch.

The Message Center helps provide the driver with important information about the performance and safety of the vehicle. Warning messages alert the driver to problem areas so that proper maintenance can be done on a timely basis, for the longer life of the car. Reminders concerning the trunk lid, doors, exterior lamps, and washer-fluid level help maintain safe running conditions. The compass and fuel-economy information is particularly useful on long trips.

Automatic Temperature Control — Improved Comfort

The automatic temperature control is an electronic system that maintains a set temperature without driver or passenger intervention. An even flow of heated or cooled air is distributed by vents on the instrument panel and in the rear seating area. The diameters of these ducts are maximized for optimal heat flow to rear-seat passengers. The temperature-control system allows all occupants to travel in comfort without the need for constant adjustments.

Above: The temperature-control panel is easy to understand and to operate.

Voice-activated Cellular Telephone — A New Level of Convenience

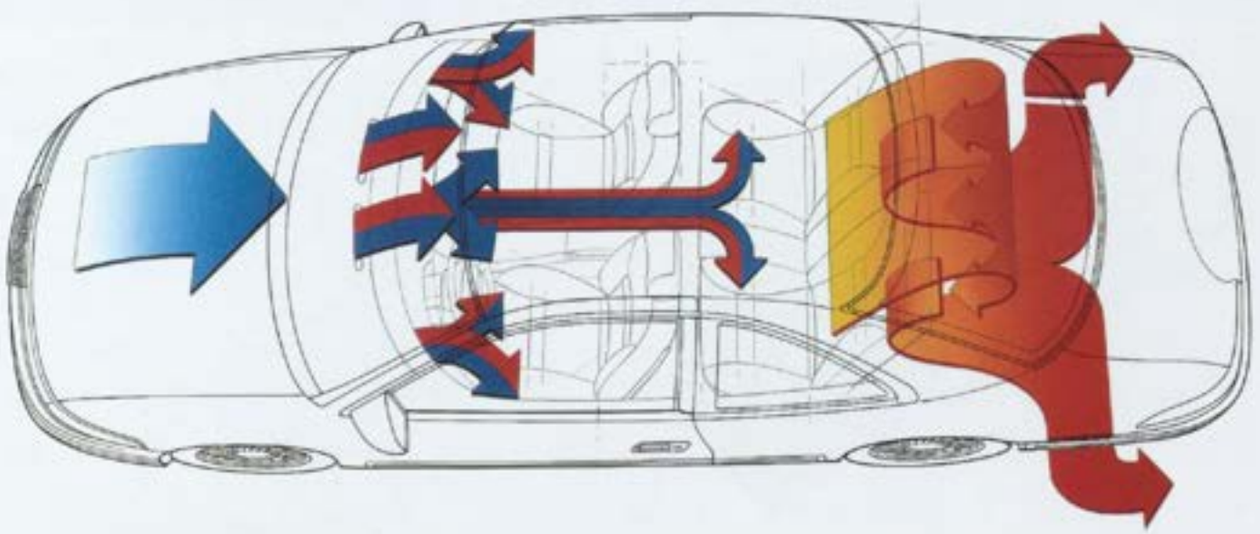
The handset of the optional cellular telephone is integrated into the center console, with a microphone and control button mounted in the driver's A-pillar. The telephone allows the driver to place a call using a pre-stored voice command, and 20 names can be entered into its voice memory. The convenient placement of the cellular telephone's microphone and control button on the A-pillar is an industry first. It allows the driver to place, accept, and end calls with ease.

Placing a call is as simple as tapping the button and saying a name. Receiving or ending a call requires only another touch of the button. The handset can be easily accessed should privacy be required or for placing calls not stored in memory.

Once the system has been set up, it is easily used, without the typical distractions associated with car telephones that require use of a handset at all times.

The car phone also offers accessibility to business contacts and family, as well as to police and other emergency personnel. The integrated packaging adds to the system's security because the telephone is hidden from sight. Integration also eliminates the possibility of an aftermarket installer introducing flaws into the interior or electrical system.

Below: Outside air is heated or cooled by the temperature-control system and distributed evenly throughout the cabin. It then passes out of the body through extractor vents.



Top: The optional voice-activated cellular telephone is controlled by a button on the A-pillar, where the microphone is located.

Above: The telephone handset is integrated into the console, for convenience and security.

High-level Sound System — The Sound of Owner Satisfaction

The standard AM/FM stereo sound system with cassette player is an 80-watt system with premium speakers in both doors and rear quarter panels. The radio control panel features six station-memory buttons, seek-and-scan capabilities, and an audio button with which treble, bass, balance, and fade are adjusted.

Upgraded, optional systems include:

- A compact-disc player/radio, in which a compact-disc player replaces the cassette player (requires JBL Audio System)
- A trunk-mounted, 10-compact-disc changer
- A 120-watt Ford JBL Audio System, with mid-range/tweeter and sub-woofer speakers replacing the speakers of the standard system

Soft-touch Paint — Inviting Texture

Complementing the engaging visual appeal of the seats and tiered instrument panel is the feel of the leather, trim, and even the painted surfaces on the instrument panel, console, and doors. For painted interior surfaces, a soft-touch paint was developed. To the touch, it feels as if it yields, like the leather surface of the seats or the cushioned arm rests.

Special paint developed for interior surfaces is soft to the touch, complementing the soft feel of the rest of the interior.

The optional compact-disc player/radio plays through a 120-watt Ford JBL Audio System.

The optional compact-disc changer holds ten discs and is mounted in the trunk.

ENGINEERING NOTEBOOK

Comfort and Convenience — Approaching the Whole Car

Not only is the interior expertly designed for comfort and convenience, but the body, engine, powertrain, and chassis components were also engineered to the same end. Here are a few examples:

- The chassis' air-suspension system with an independent rear end helps to absorb road shock before it is introduced to the cabin.
- The rubber subframe mounts reduce road and engine noise and vibration that reach the body and the interior.
- The engine is built to run quietly, with a thick front cover, laminated exhaust manifolds and oil pan, and other components designed for smooth operation.
- Doors were designed to reduce the amount of effort required for opening and closing. They can be unlocked by a remote keyless entry system or with the door key pad.
- The deck lid has been designed to close effortlessly.
- The trunk's opening is flush with the top of the bumper, for added convenience.

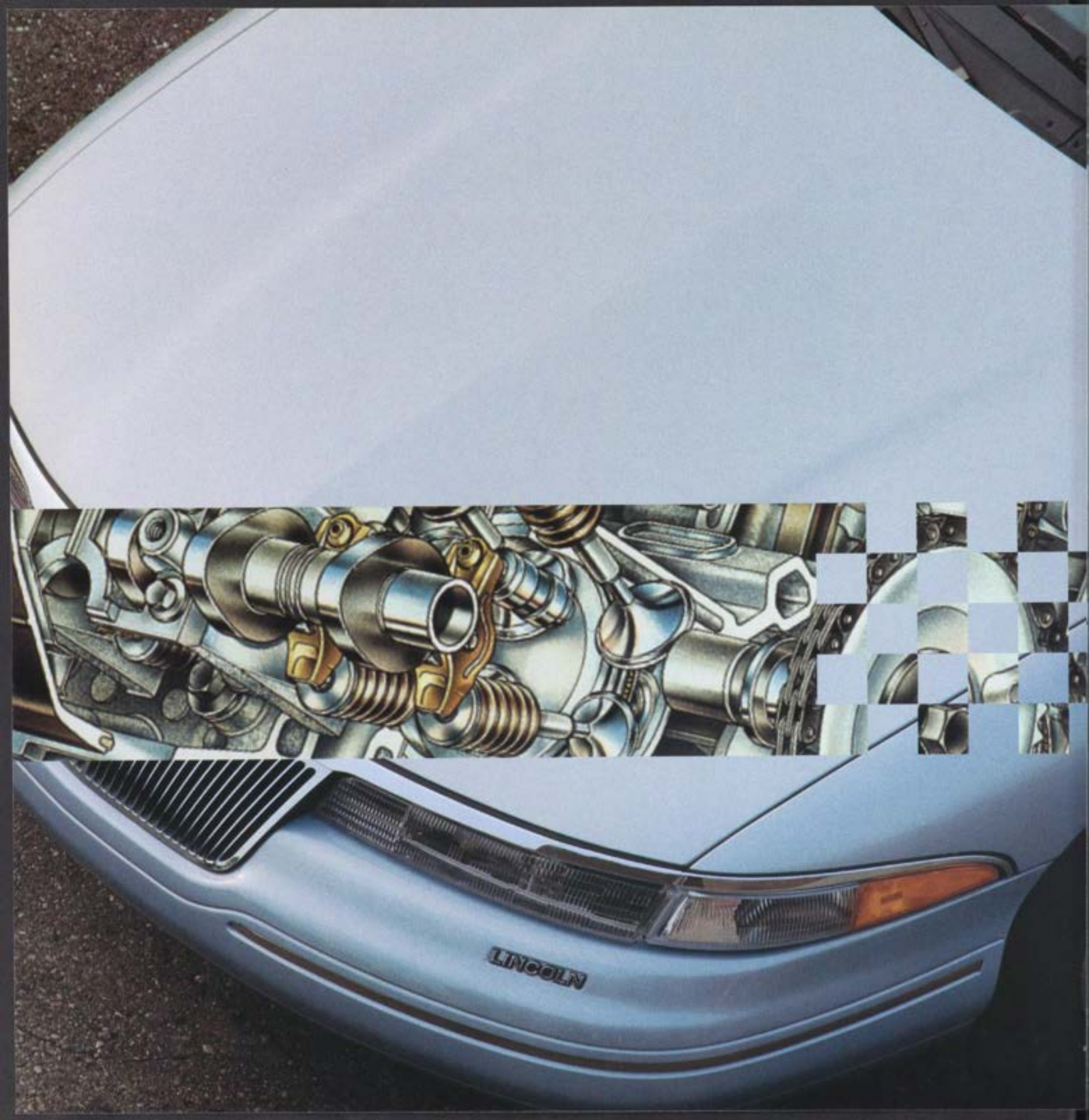
SUMMARY

- The unique, sophisticated styling of the Mark VIII's interior complements the comfort and room offered by the seats and the generous interior dimensions.

- From the moment a person enters the Mark VIII, consideration for the driver's and passengers' convenience is apparent — including the unobstructed access to the rear-seat area, the ergonomically placed controls, the inviting and aromatic seating surfaces, and the pleasing, tactile quality of all surfaces.

- The informative Message Center provides data for travel enjoyment and displays critical warnings that could help prevent costly damage to vehicle systems.

- The voice-activated cellular telephone, premium sound system, and automatic temperature-control system are easy to use.


LINCOLN

Part V — Performance and Handling

A driving enthusiast will immediately recognize the Mark VIII as something very special indeed. The technology in the car includes advances that once were the exclusive province of racing machines, limited-production sports cars, or concept vehicles intended to showcase future trends.

"When it comes to driving, this has got to be the best car the company's got! It goes, it handles, and it stops in a way that will be a real eye-opener to a lot of customers — and it does it all in comfort and luxury."

Paul Morel, Mark VIII Program Manager

From the 4.6L Four Cam V-8 to the air suspension that alters ride height, the Mark VIII represents the sort of automobile that once was only a dream.

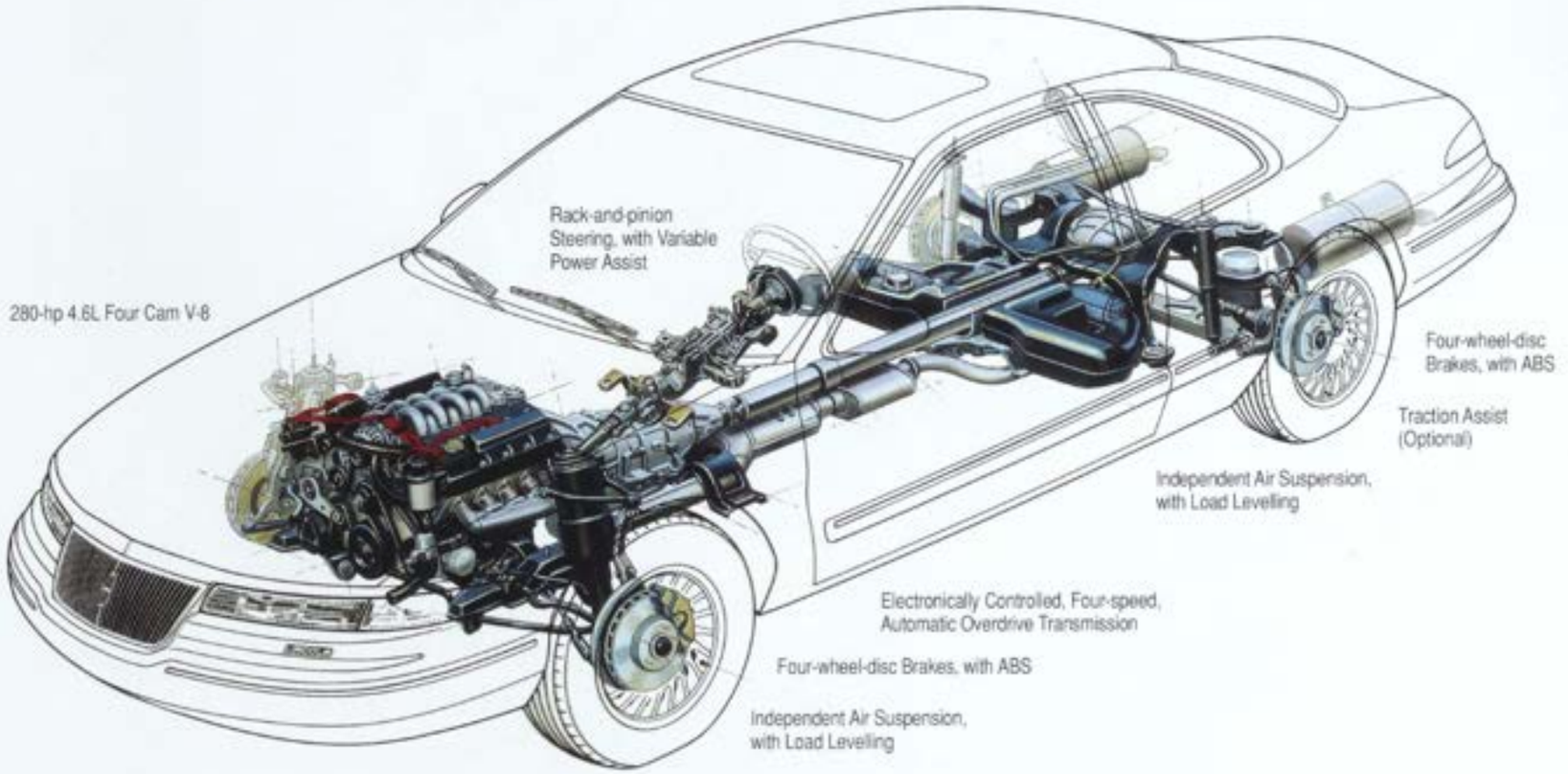
1993 LINCOLN MARK VIII

The Lincoln Mark VIII is an extraordinary car in every respect. It is a personal-luxury, performance car with the power to perform against the world's best, in a very hotly contested market segment. It is the result of a powerful commitment by literally thousands of people to make the Mark VIII the very best car we can build. This new flagship of the Lincoln line represents a revolution in design, engineering, quality, and performance. While retaining hints of its heritage, the Mark VIII boldly establishes the direction that Lincoln will take into the future.

Lee R. Miskowski
Vice President-General Manager
Lincoln-Mercury Division

PERFORMANCE AND HANDLING

State-of-the-art systems engineered to complement each other provide superior comfort, impressive power, and athletic handling.



Introduction

With the Mark VIII, Lincoln will offer what can truly be called a "driver's luxury car." Beneath the Mark VIII's flowing bodywork is an exciting story of performance engineering. Here is a luxury sport coupe with the predictable handling and steering qualities only a front-engine/rear-drive chassis can deliver. Investigation of the car's 4.6L Four-Cam V-8, wide-ratio, four-speed transmission, and suspension, brake, and steering systems will reveal engineering fully competitive with the world's most sought-after automobiles.

What's behind the performance and handling of the Mark VIII? That is what Part V is all about. It is divided into three sections for easy reference, covering all the components that make the Mark VIII go, steer, and stop:

- 4.6L Four Cam V-8 engine
- Electronic, four-speed, automatic overdrive transmission, and aluminum driveshaft
- Load-levelling air-suspension system, variable-power-assist steering, four-wheel-disc brakes with ABS, cast-aluminum wheels, and low-profile tires.

Key Features and Benefits At A Glance

High-performance Four-Cam V-8

The new DOHC, 32-valve engine is the second of Ford Motor Company's state-of-the-art, modular engines. Possessing design features once found only in the most exclusive sports cars, it contributes directly to the satisfaction of the Mark VIII driving experience.

Aluminum-alloy Block

Ford Motor Company's first production, aluminum-alloy cylinder block is lighter than a comparable iron block. Still, it maintains, and even surpasses, the strength and durability of other block types.

DOHC Valvetrain

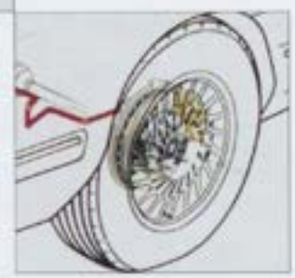
Each of the two cylinder heads — which, like the cylinder block, are made of aluminum alloy, for lighter weight — have double-overhead camshafts. This is another U.S.-production first for Ford. The cams actuate two intake and two exhaust valves per cylinder, combining high horsepower and torque with projected EPA of 17 city and 25 highway fuel economy.

Independent Rear Suspension

Both sides of the rear suspension react to the road surface independently of one another. This suspension design is intended to eliminate undesired steering action by either of the rear wheels, provide more predictable handling, and give the driver greater control of the Mark VIII.

Variable-power-assist Steering

A new power-assist system for the Mark VIII helps to reduce steering effort during low-speed maneuvers such as parking. As the car's road speed increases, the amount of the assist decreases, giving the driver a better feel of the road.



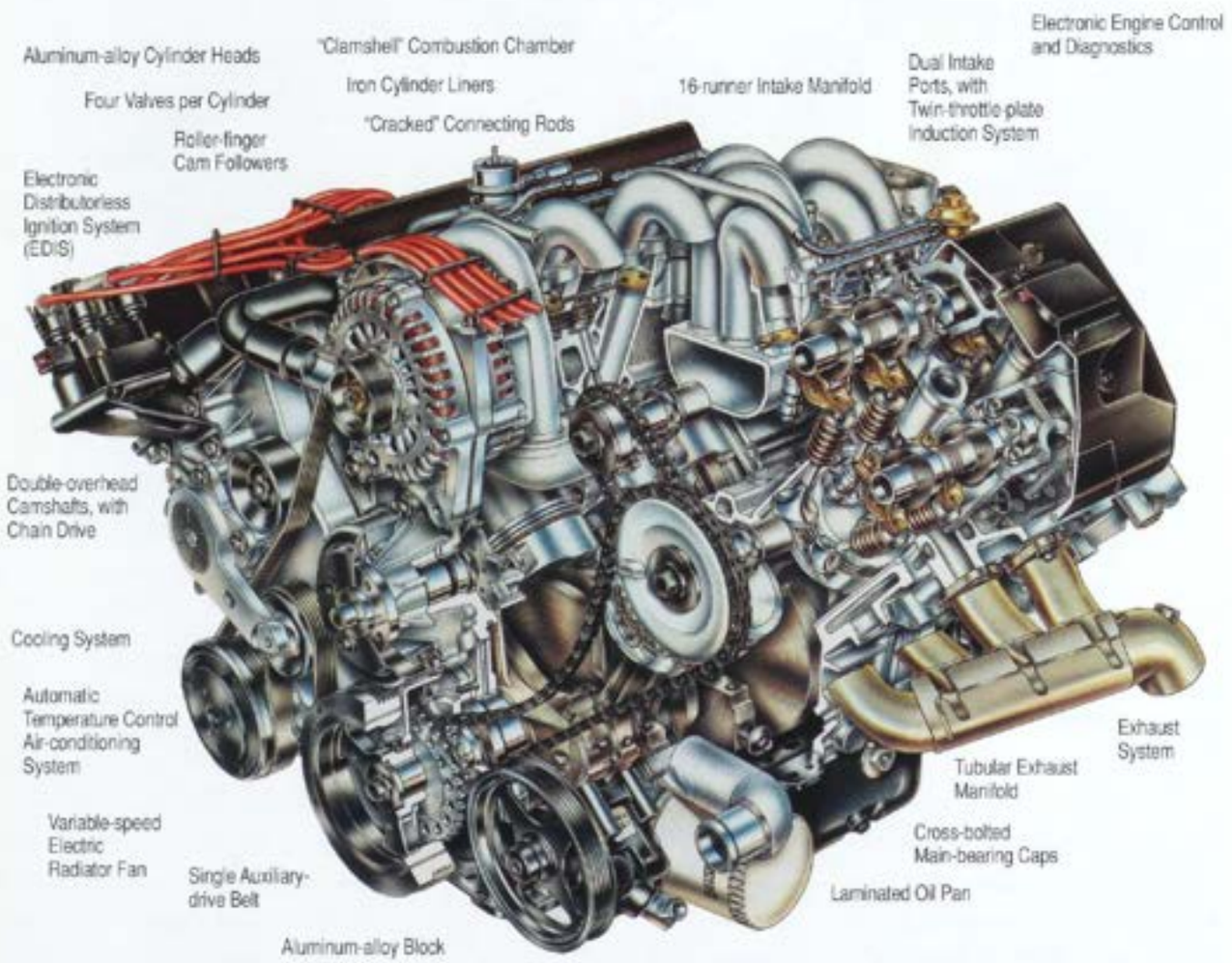
Traction Assist

This optional feature uses the braking system to prevent rear-wheel slip on slick road surfaces. By keeping the rear wheels from spinning, the system gives the driver greater control of the car.

4.6L FOUR CAM V-8

"We tested the engine under the severest of conditions. We found so little wear we decided to run the test again. It completed the second test with no indication of trouble."

Richard A. Willemsen, Supervisor, Powertrain Section, Specialty Car Design



Introduction

Introduced in March 1992, on the 60th anniversary of Ford's first V-8, the 4.6L Four Cam V-8 represents a $300 million investment in technology (on top of the $1 billion initially invested in the modular-engine program). With its four cams and 32 valves, it is the most advanced and powerful (280 hp) version of Ford's modular V-8, and it offers Lincoln sales consultants the opportunity to tell a fascinating, benefits-oriented story that will be of interest to Mark VIII customers.

According to Ford engineering measurements, the Four Cam is among the world's most fuel-efficient V-8s, one reason the Mark VIII incurs no gas-guzzler penalty. Ford found the engine to be 3 to 6 percent more fuel efficient than leading Japanese competition and about 7 percent more fuel efficient than the Mark VII's 5.0-liter HO engine.

This section of Part V covers the engine in detail.

Left: The aluminum-alloy block's skirt extends below the centerline of the crankshaft, providing increased stiffness. Iron cylinder liners add durability.

Deep-skirt, Aluminum-alloy Block — Light Weight

The aluminum-alloy engine block is about nine pounds lighter than the iron block of the single-cam, 4.6L engine. The block's lower portion, the "skirt," extends from the centerline of the crankshaft to the oil pan, providing increased stiffness and structural rigidity as well as reduced noise and vibration. The deep-skirt block resists twisting, so that internal components remain aligned, for a longer operating life.

Note: The aluminum front cover is thick and strong, serving as a structural member. The cover contributes to the block's rigidity. It also helps contain noise, for a quieter-running engine.

Cross-bolted Main-bearing Caps — Structural Rigidity

The main-bearing caps are cross-bolted — held in place by six bolts (four vertical bolts and two horizontal bolts for each cap). This design, commonly found in race engines, enables the bearings to better resist the angular forces applied to a crankshaft in a V-type, high-performance engine. The design and structural attachment of the main-bearing caps adds to the engine's long life.

Below: The main-bearing caps are cross-bolted for durability.

Iron Cylinder Liners — Long Wear

Another element in the block that contributes to the engine's longevity is the use of iron cylinder liners. They are specially treated to ensure that the piston rings and cylinder walls seat together very quickly during the initial break-in period. That helps reduce oil consumption, lowers friction, and improves fuel efficiency over the engine's life.

Connecting rods are scribed with a parting line along which they are "cracked" apart after drilling, for precise alignment in assembly.

"Cracked" Connecting Rods — Precise Alignment

The connecting rods are a lightweight design made of forged, "powdered" metal, which reduces the rods' mass. Less mass moving ("reciprocating") up and down means the engine has to overcome less inertia and can run more freely, improving fuel economy.

Each rod is scribed with a "cracked parting line" between its upper portion and lower end (bearing cap). Rods are drilled and tapped for the bolts that will ultimately hold the cap and bearings after assembly. During final manufacturing, the rod will be split along this parting line into two pieces. The precision of this manufacturing operation helps ensure accurate attachment and precise alignment, enhancing durability.

ALL-NEW, ALUMINUM-ALLOY CYLINDER HEADS
"CLAMSHELL" COMBUSTION CHAMBER
DUAL-OVERHEAD CAMSHAFTS
FOUR VALVES PER CYLINDER

The lightweight, aluminum-alloy cylinder head has hemispherical combustion chambers that maximize fuel efficiency and minimize emissions.

All-new, Aluminum-alloy Cylinder Heads — Less Weight

The Four Cam's cylinder heads are made of aluminum alloy, contributing to reduced engine weight. The result is enhanced performance and fuel efficiency. (Increasing the head/block structure's rigidity are long head bolts that fit deep into the block.)

"Clamshell" Combustion Chamber — Complete Combustion

The "clamshell" shape of the combustion chambers is essentially that of a hemisphere, a bowl-like shape that has long been associated with high-performance engines. Together with a centrally mounted spark plug, the shape encourages more complete mixture of the injected fuel and the intake air, providing cleaner combustion for lower emissions and maximized fuel efficiency. It also contributes to the 4.6-liter engine's ability to generate 280 horsepower, 30 percent more horsepower than its 5.0-liter predecessor.

Dual-overhead Camshafts — High Performance

Much of the "genius" of the 4.6L Four Cam V-8 has to do with the camshafts. Two are mounted in each of the cylinder heads, a production first for Ford Motor Company. One camshaft actuates two intake valves, and the other actuates two exhaust valves. The camshafts are a composite construction of powdered-metal lobes on tubular shafts, resulting in a lightweight component.

To take full advantage of the opportunities offered by the engine's variable-tuned induction system (see page 52), there are two completely different intake-camshaft profiles — one for the primary intake valve and one for the secondary intake valve. Low-speed performance is improved by the primary cam, which permits the primary intake valve to close earlier than the secondary intake valve. High-speed operation is enhanced by the secondary cam, which permits the secondary intake valve to close later than the primary intake valve.

Four Valves Per Cylinder — Maximum Flow

With four valves per cylinder (two intake and two exhaust), the total valve face area is greater than would be possible with just two valves per cylinder. Compared to the 4.6L, SOHC model, the Four Cam has 40 percent more total intake-valve area and 35 percent more exhaust-valve area. This increases air intake for powerful combustion and exhaust-gas extraction for improved efficiency.

The Four-Cam V-8 valvetrain combines exceptional performance and operating efficiency.

Roller-finger Cam Followers — Refined Operation

Instead of a rubbing, sliding tappet surface, the four camshafts act indirectly on the valve-stem tips via friction-reducing roller-finger followers. The roller-finger followers wear longer than conventional tappets, contributing to overall engine performance, efficiency, and durability. (Hydraulic lash adjusters eliminate the need for valve adjustment during servicing.)

Roller-finger cam followers actuate valves, reducing friction.

Chain-driven Camshafts — Quiet Strength

The camshafts are driven by steel chains rather than by a belt. A "silent" chain, which has lower engagement, or meshing, noise than the roller chain used in the SOHC engine, was selected for the primary camshaft drive. The silent chain features refined engagement onto the mating tooth of the sprocket. It is quieter than a single-row roller chain, plus it is stronger and generates slightly less friction. The structural front engine cover helps contain the chain's noise.

The chains that drive the camshafts are durable and operate quietly.

There are four chains and four individual tensioners in the cam-drive system: two long, primary chains from the crankshaft to the exhaust-cam sprocket on each bank of cylinders, and a shorter, secondary roller chain connecting the two camshafts of each bank for the proper phasing of one to the other.

Chain drive offers reliability — it is more durable than belt drive. Chain drive also does not require as much space as belt drive.

✓ ENGINEERING NOTEBOOK

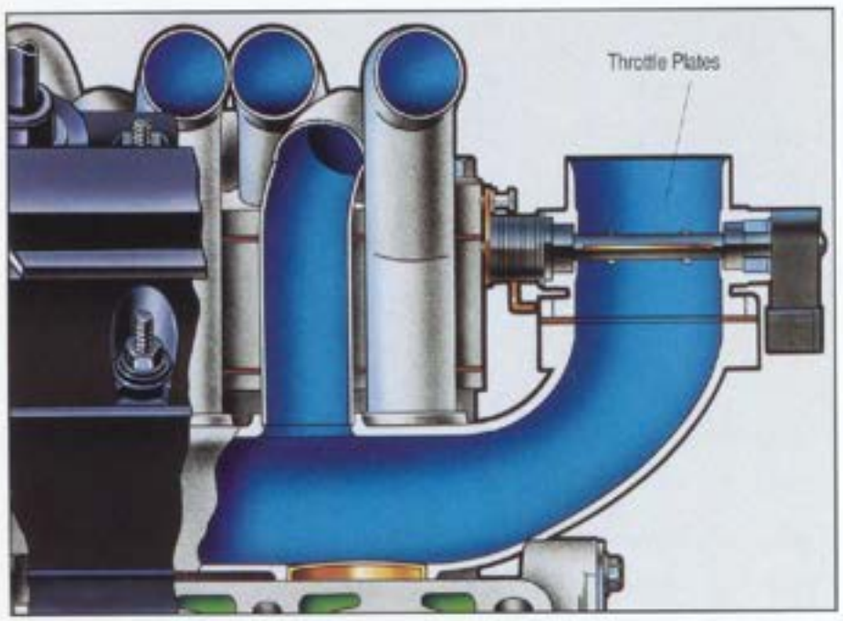
Pushrods vs. Overhead Camshafts

In an overhead-valve, V-8 engine, the camshaft actuates pushrods, which move rocker arms that, in turn, push open the intake and exhaust valves. However, in an overhead-cam engine such as the Four Cam, the camshaft lobes either push down directly on the valves or operate cam followers that act on the valves. With elimination of the pushrod, and fewer parts in the linkage between camshaft and valve, mechanical motion is more precise. There is less play in the valvetrain and less inertia to overcome. This allows the engine to rev higher without valvetrain float, and results in greater power potential.

Additionally, the location of the pushrods in an overhead-valve engine restricts the options for designing the combustion chambers — pushrods are on one side, while valves are on the other. There is little choice as to where to place the spark plug. But with an overhead-cam engine, there is greater latitude for placement of valves and spark plugs. The engine can be designed for better breathing, cleaner burning, greater power, and lower emissions. A double-overhead-cam configuration permits the spark plug to be centrally located, for even better combustion efficiency.

Pushrod Design

Overhead-camshaft Design



The two throttle plates for each cylinder open on a staggered basis, resulting in a flat torque curve — 95 percent of peak torque is available from 2000 to 5750 rpm.

Twin-throttle-plate Induction System — Consistent Overall Performance

Throttles controlling the amount of air to the intake manifold are mounted at the manifold's rear. Two throttle plates open on a staggered basis — designed to arrive at wide-open throttle at the same time.

In low-speed operation (under 3200 rpm) intake air is fed into the cylinder via the intake manifold's long, low-speed "primary runner" and a single intake valve. At about 3200 rpm, the secondary throttle plate opens, and air flows through both manifold runners and both intake valves, providing the engine with the high air volume needed to produce greater horsepower and torque. In effect, the Four Cam has two completely independent induction systems, one for low speeds and one for high speeds.

The twin-throttle-plate induction system results in a flat torque curve, with 95 percent of peak torque available from 2000 to 5750 rpm. This provides maximum fuel efficiency and improved engine control under both low- and high-speed driving conditions.

Separate air-intake runners feed each of the two throttle plates per cylinder, improving performance at all rpm.

✓ ENGINEERING NOTEBOOK

Variable-tuned Induction System — Wide Power Band

Engines with four valves per cylinder are noted for their high-end response. Improved engine performance due to better breathing usually does not become noticeable until the engine is in the higher-rpm range. However, most cars in the Mark VIII's market segment have automatic transmissions, which tend to shift before reaching this higher rpm range.

The problem of generating low-end power from a four-valve engine has led to a number of solutions. Some manufacturers have engineered rotating camshafts, designed to change valve timing for increased low-end torque. Various staged-induction systems also have been designed. In these systems, the amount of air entering the intake manifold determines low-end power production.

The Mark VIII's variable-tuned induction system is designed for good low-end response during slower driving. When power is required for driving at high engine speeds, the volume of intake air is increased by the opening of a second intake port in the cylinder head, freeing air from the intake runner connected to that port.

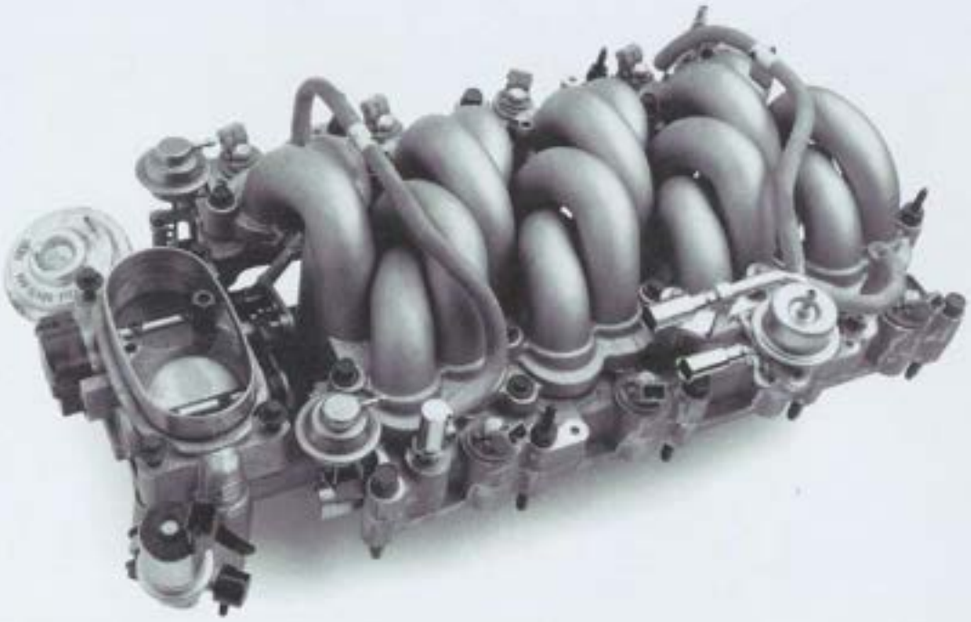
The result is even response throughout the range of engine speeds, with smooth power output in the 2000-to-6000-rpm range.

Dual-runner Intake Manifold — Enhanced Performance at all RPM

The intake manifold is an integral part of the induction system. It has 16 runners, two per cylinder — hence the term "dual-runner manifold." The runners are tuned: their lengths were calculated to help provide strong low-end torque as well as high-end horsepower.

The intake manifold has no coolant passages joining the cylinder heads. This means there is no hot engine coolant to heat up the intake air. Instead, coolant flows from the left to the right cylinder bank through an external tube. This allows the intake manifold and the air flowing through it to stay cooler, increasing the air's density. A cooler intake-air temperature provides higher mass flow, for increased torque, especially at lower rpm.

The Four Cam V-8 dual-runner intake manifold provides the necessary volume of cool air to ensure peak performance throughout the rpm range.



The intake manifold delivers cool air to the eight cylinders through 16 runners — two per cylinder.

Exhaust Manifolds — Helping to Reduce Noise

Stainless-steel, tubular, exhaust manifolds are used rather than the more usual, cast-iron manifolds. The oval-port, steel manifolds are lighter, more durable, and provide quicker warmup to aid in emissions reduction. Each of the manifolds empties into a separate palladium/rhodium, three-way catalytic converter with oxygen sensors, and then into a low-restriction, quasi-dual exhaust system. Both the exhaust manifolds and catalytic converters have laminated shielding to reduce exhaust noise.

The tubular exhaust manifolds are stainless steel, which is light and durable.

Oil Pan — Further Noise Reduction

The oil pan has an increased (vs. the SOHC engine), six-quart capacity. A plastic laminate sandwiched between two layers of steel on the floor of the oil reservoir helps contain engine noise.

The oil pan has a plastic laminate between steel layers, which helps contain noise.

Electronic Distributorless Ignition System (EDIS) — Perfect Sparks, Every Time

EDIS includes twin, front-mounted coils that deliver electricity to the spark plugs. The system uses an electronic crankshaft monitor that measures rpm, with a second cam-gear-mounted counter to determine crankshaft position and intake-valve opening. The EEC-IV electronic engine-control module triggers each fuel injector and spark plug.

EDIS offers precision at all rpm. Because there are no moving parts to wear and alter timing, spark timing is always perfect, improving performance and fuel economy. The system's precision permits elimination of complex, power-reducing, air-pump equipment.

Electronically controlled coils deliver ignition spark, without a distributor.

✓ ENGINEERING NOTEBOOK

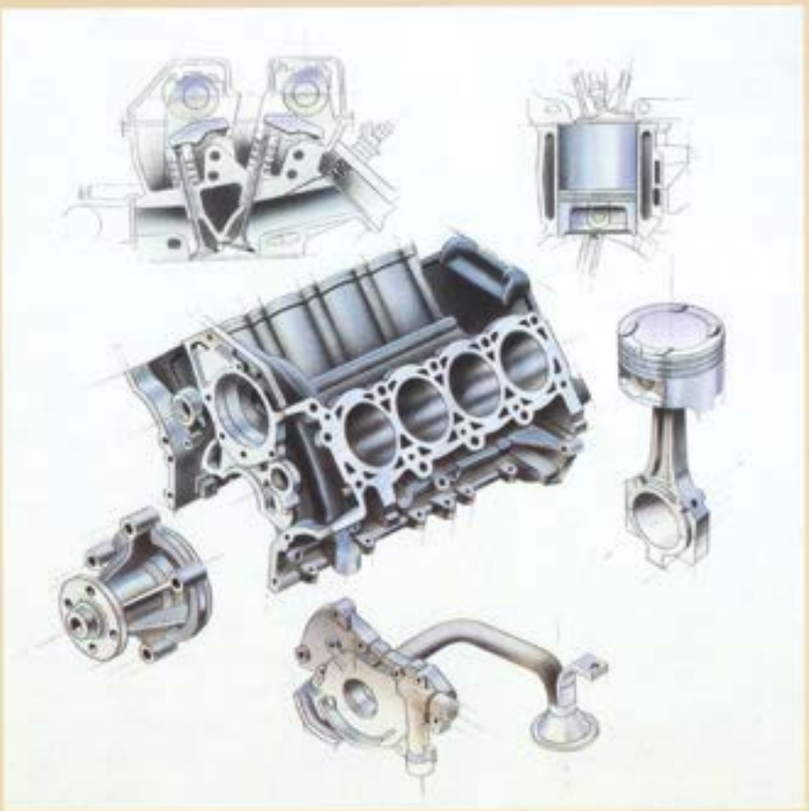
Modular Engines — What Are They?

"Modular" engines share basic design and manufacturing features, allowing different versions of the same basic engine to be built for a variety of applications. Among other benefits, both manufacturing flexibility and overall quality are improved by the modular concept. Once systems are designed for an engine to achieve improved emissions or fuel economy, the same design can be extended to other engine family members.

Shared design concepts or common components include:

- Base engine structure
- Aluminum cylinder heads
- "Clamshell" combustion chamber
- Pistons
- Variable-tuned induction system
- Valvetrain system
- Chain-driven camshafts
- Powdered-metal, "cracked" connecting rods
- Accessory-drive system
- Oil and water pumps

Engine family members are built side by side at Ford's Romeo, Michigan, plant. The introduction of a new engine to the family can be accomplished without the major retooling commonly required by an entirely different engine.

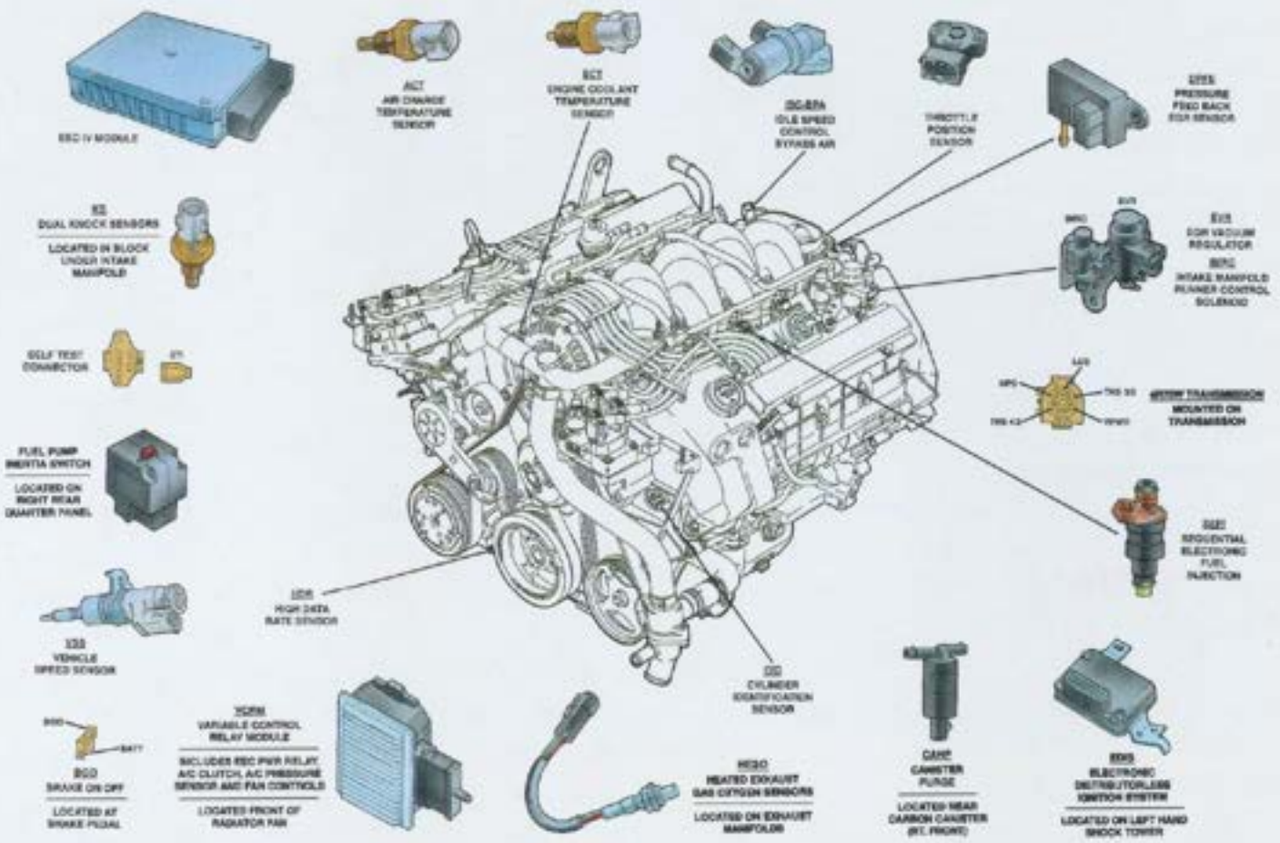


Electronic Engine Control — Precise Performance at all RPM

The 4.6L Four Cam V-8 is controlled by the 1993 version of the EEC-IV electronic engine-control-system module, which has 56 kilobytes of memory versus the 32 kilobytes of the previous model. The 1993 version of the EEC-IV performs 20 percent faster than its predecessor.

EEC-IV controls the transmission's shift-point selection, lockup, and hydraulic pressure (for smooth shifts), and determines when to open the second set of throttle plates on the intake manifold. It also monitors the knock sensors to retard spark as soon as one cylinder begins to experience knock, and controls the two-speed electric fuel pump and the electric cooling fan.

EEC-IV has a Hardware Limited Operation Strategy (HLOS) failure mode, which alerts the driver that there is a malfunction but still permits the car to be driven.



The engine and transmission functions are electronically controlled by the EEC-IV unit.

Cooling System — New Levels of Efficiency

The water pump draws water from the bottom of the engine, with the thermostat controlling inlet flow. This design maintains consistent coolant inlet temperature to protect the block and heads from undesirable hot/cold thermal cycling. The result is improved sealing of surfaces that warm up uniformly and stay at normal operating temperature, ensuring integrity of the cooling system against leaks.

A variable-speed fan is electrically powered, eliminating a power-robbing fan belt. Controlled by the EEC-IV system, the fan rotates at speeds between 1000 to 1850 rpm, tailored to cooling demands from the engine and accessories. The fan improves fuel economy, because the engine is not turning a fan belt when cooling is not required.

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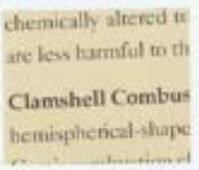

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Accessory Drive System — Reduced Weight and Maintenance

Engine accessories such as the alternator, air-conditioner compressor, and power-steering pump are turned by a single, serpentine belt. An automatic tensioner eliminates slack that could cause slippage and its attendant maintenance cost. All accessories are mounted to the engine, rather than on more conventional mounting brackets. The idler pulleys and tensioner are direct-mounted to the structural front engine cover. Belt life is expected to be 100,000 miles or more.

Mounting the engine accessories to the block helps to reduce weight under the hood. It also better maintains their alignment, which helps to reduce noise and vibration and to extend the belt life.

A single, serpentine belt is self adjusting and has a 100,000-mile life expectancy.

Stainless-steel Exhaust System — Long Life, High Performance

The three-piece exhaust system is made of stainless-steel tubing. The two headers flow through dual catalytic converters into a quasi-dual-exhaust system. It consists of a single underbody catalytic converter and a single exhaust pipe, which carries the exhaust gas to the rear of the car, where the pipe splits to either side. The system is tuned for excellent engine performance and an appropriately aggressive exhaust note. Corrosion-resistant stainless steel is designed for a 50,000-mile life.

The exhaust system is tuned for outstanding performance and consists of corrosion-resistant, stainless-steel tubing.

ENGINEERING NOTEBOOK

4.6L Four Cam V-8 — The Quiet Engine

The Four Cam engine was designed and engineered for reduced noise, vibration, and harshness — important considerations for personal-luxury automobiles, where a quiet cabin is a basic expectation.

- The aluminum-alloy block is manufactured for extra rigidity, reducing vibration. The block has deep skirts, cross-bolted main-bearing caps, deep head bolts, and a structural, aluminum front cover.
- The alternator, air-conditioning compressor, and power-steering pump are mounted directly to the engine block, which is more rigid than ancillary fixtures.
- The internally balanced crankshaft and lightweight components, such as pistons and connecting rods, present a low reciprocating mass, for reduced vibration and harshness.
- The valvetrain's smoothly engaging primary chain and its roller-finger cam followers with hydraulic lash adjusters help reduce noise.
- Laminated parts such as the exhaust manifolds and oil pan contribute to containing the noise produced by engine operation.
- Close-tolerance main bearings have a 25-to-45-micron clearance, minimizing piston-pin-to-connecting-rod clearance for reduced engine noise.
- The isolated cam-cover mounting system contributes to reduced noise.

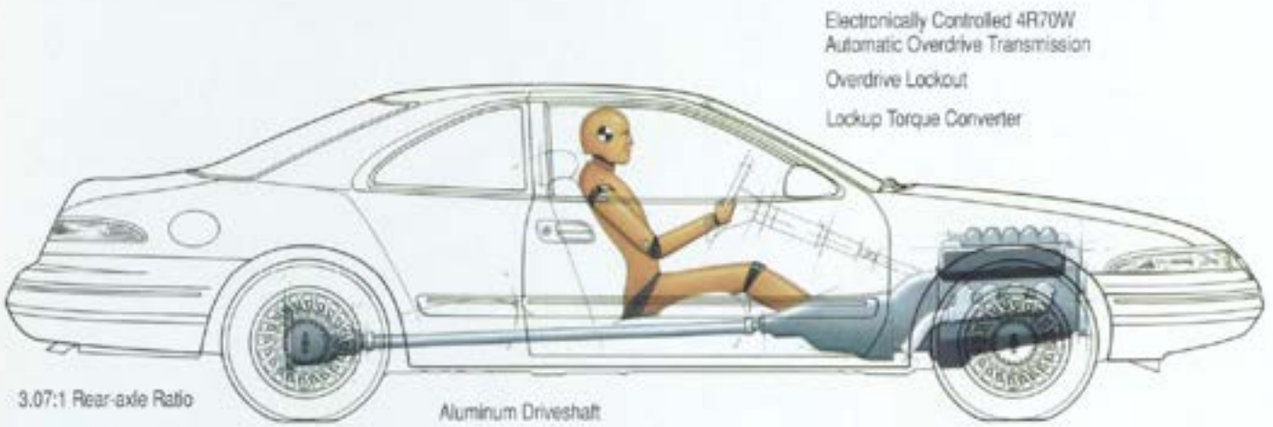
ENGINE SPECIFICATIONS

Type:	V-8
Bore/Stroke:	90.2 mm x 90.0 mm
Displacement (liters/cu.in.):	4.6/280
Compression Ratio:	9.8:1
Horsepower @ rpm:	280 @ 5500
Torque (lb.-ft.) @ rpm:	285 @ 4500
Valvetrain:	DOHC, 4 valves per cylinder

POWERTRAIN

"Although boasting of performance-oriented rear-axle ratios, many competitors don't have the low-end punch of the Mark VIII with its 3.07 rear axle. We've got a highly efficient engine/drivetrain in this car."

Richard T. Holychuk, Product Design Engineer, Specialty Car



Introduction

The Mark VIII powertrain was engineered to complement the performance of the 4.6L Four Cam V-8. Gear ratios and shift points were all selected to ensure that performance goals would be met while maintaining competitive fuel efficiency. The four-speed transmission has been redesigned from the Mark VII to meet the level of sophistication needed for the Mark VIII.

This section of Part V will examine the powertrain in detail.

Electronically Controlled 4R70W Automatic Overdrive Transmission — Suiting the Driver

The transmission carries a new Ford Motor Company designation: 4 = four speed; R = rear-wheel drive; 70 = 700-lb.-ft. of torque capacity; W = wide ratio.

The transmission features wide-ratio gearing matched to the broad torque curve of the 4.6L Four Cam V-8. Compared to the ratios of the Automatic Overdrive (AOD) and Electronically Controlled Automatic Overdrive (AODE) transmissions used in other Lincoln, Mercury, and Ford models, the 4R70W ratios offer a 16 percent increase in low gear torque output, improving start-up performance. Coupled with the 3.07:1 rear-axle ratio, the wide-ratio gearing combines exceptional fuel efficiency and acceleration.

Shift points are controlled electronically by the EEC-IV powertrain-control module, instead of hydraulically, as they were on previous transmissions. Using input from both engine and transmission concerning driver demand and conditions, shift points and torque-converter lockup-clutch operation are determined. This results in smooth transmission operation and delivers an effortless power flow from the engine.

The four-speed, automatic overdrive transmission is electronically controlled to deliver smooth shift performance.

Transmission	1st	2nd	3rd	4th	Reverse
4R70W	2.84	1.56	1.00	.70	2.33
AOD/AODE	2.40	1.47	1.00	.67	2.00

The 4R70W automatic overdrive transmission has gear ratios selected to combine a pleasing balance of performance and fuel efficiency.

Smaller Torque Converter — Improved Performance

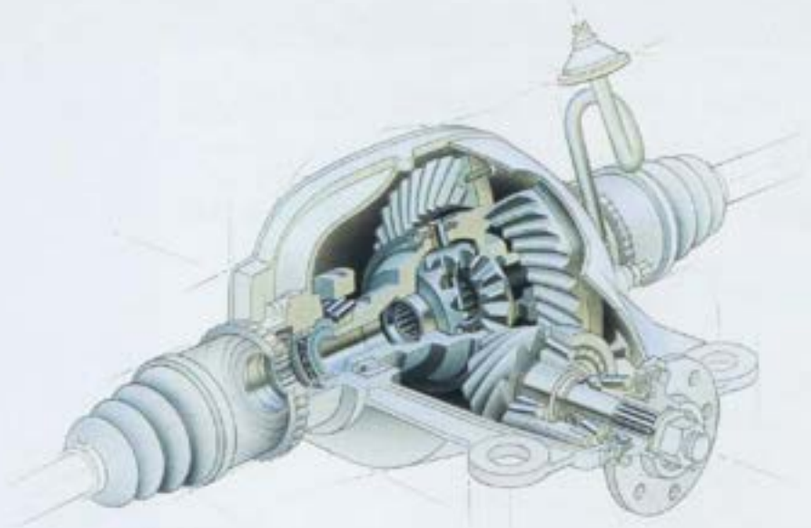
The 4R70W has an 11.25-inch-diameter torque converter rather than the 12-inch unit of the AODE. The smaller size makes the converter more responsive, improves wide-open-throttle shifts at 6000 rpm, and takes advantage of the Four Cam's performance potential.

Overdrive Lockout — Direct Control

An overdrive lockout button is located on the shifter. It allows the overdrive gear to be engaged or disengaged at the driver's discretion. During highway driving, the overdrive gear allows the same highway speed to be maintained at lower engine speed, which contributes to increased fuel economy. Locking out the overdrive gear at highway speed downshifts the transmission to third gear, permitting more spirited performance.

Lockup Torque Converter — Maximum Fuel Efficiency

The torque converter transfers the engine's rotational forces to the transmission, which turns the driveshaft and the rear wheels. The torque converter's primary link with the transmission is hydraulic. When cruising speed has been reached, a mechanical link "locks up" the torque converter and the transmission, resulting in improved fuel economy.



The 3.07:1 rear-axle ratio allows performance *and* economy.

3.07:1 Rear-axle Ratio — Economy and Performance

The Mark VIII's 3.07:1 rear-axle ratio balances economy and performance. Even with its outstanding performance, the Mark VIII avoids gas-guzzler taxes, with EPA-estimated fuel economy projected to be about 17 mpg city and 25 mpg highway.

Aluminum Driveshaft — Reducing Weight

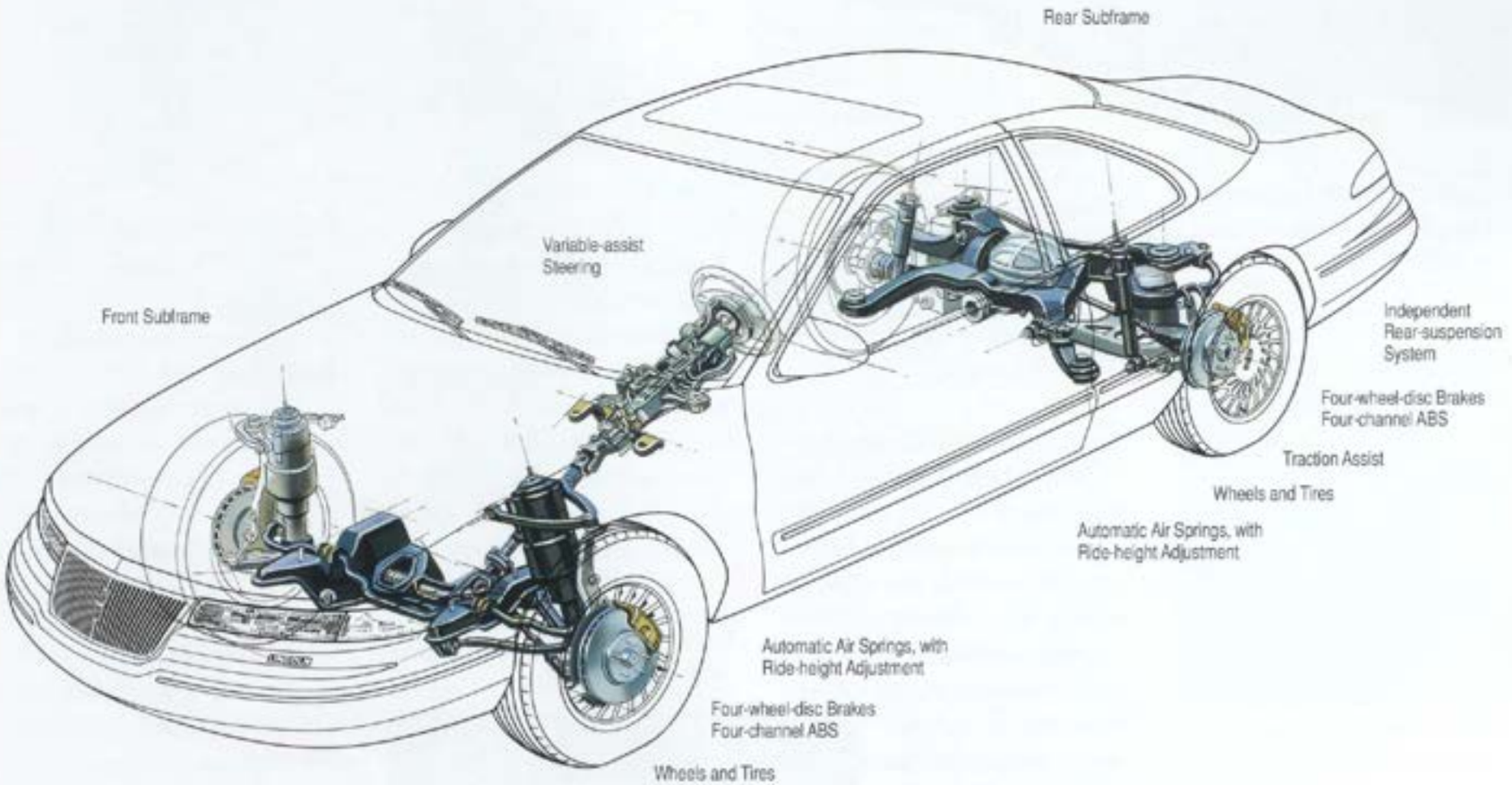
An aluminum driveshaft is used instead of steel, for light weight. Strength is enhanced by the driveshaft's thick cross section. Light weight contributes to increased fuel economy and balanced handling.

The aluminum driveshaft is extremely light, contributing to fuel economy and to a more balanced weight distribution.

CHASSIS

"When someone asks why the Mark VIII is so much fun to drive, we just say it's because it has our best chassis yet! Look at the light alloy wheels and 16-inch tires; check out the independent rear suspension. And all that's just part of the story."

Tom Lavender, Supervisor, Mark VIII Chassis Design Section



Introduction

No matter how impressive the story behind the Mark VIII, it is customer reaction that reveals whether the engineers achieved their goals. Initial reaction to the Mark VIII driving experience by focus-group participants has been highly positive. "Sports-car handling with luxury-car features," said one. "Sporty, comfortable, confident ride," said another. What's behind the Mark VIII's remarkable road manners and confidence-inspiring handling?

This section of Part V examines the car's chassis features.

With its rear-wheel drive, the Mark VIII offers more even weight distribution than front-drive models, and outstanding overall handling.

Front Engine/Rear Drive — Balanced Chassis for Balanced Handling

With its front-engine/rear-drive layout, the Mark VIII has a more favorable weight distribution — 58 percent front/42 percent rear — than a front-engine/front-drive layout could provide (62 percent or more of the weight is often on the front wheels). The immediate result of the Mark VIII's weight distribution is improved driver control when cornering, accelerating, and braking — all contributing to driving fun and to active safety.

Handling: A balanced car is less likely to understeer (push excessively and run wide in a corner) or oversteer (rear wheels break loose) than one that is excessively nose-heavy. It also is more predictable during cornering or an avoidance maneuver.

Acceleration: During acceleration the car's weight shifts to the rear drive wheels. This increased weight helps improve traction. In addition, the driver of a rear-drive car does not have to compensate for front-wheel-drive torque steer, the tendency of one of the two front wheels to pull harder than the other during acceleration.

Braking: When braking, a car's weight shifts to the front. Then, the front wheels are called upon to both slow the car and steer it. Compared to a front-drive model, the Mark VIII's front wheels and tires handle less of the car's weight, enabling the car to stop more efficiently and predictably.

A final point: With rear-wheel drive, all of the engine's available horsepower can be used. This is especially important in a performance-oriented coupe like the Mark VIII. Complicated engine management is not required to control the amount of power that reaches a front-drive car's transaxle, power that could cause disturbing torque steer or potentially damage the driveline itself.

During acceleration, a car's weight shifts rearward. Unlike a front-drive model, traction on the Mark VIII is therefore increased, improving performance and driver control.

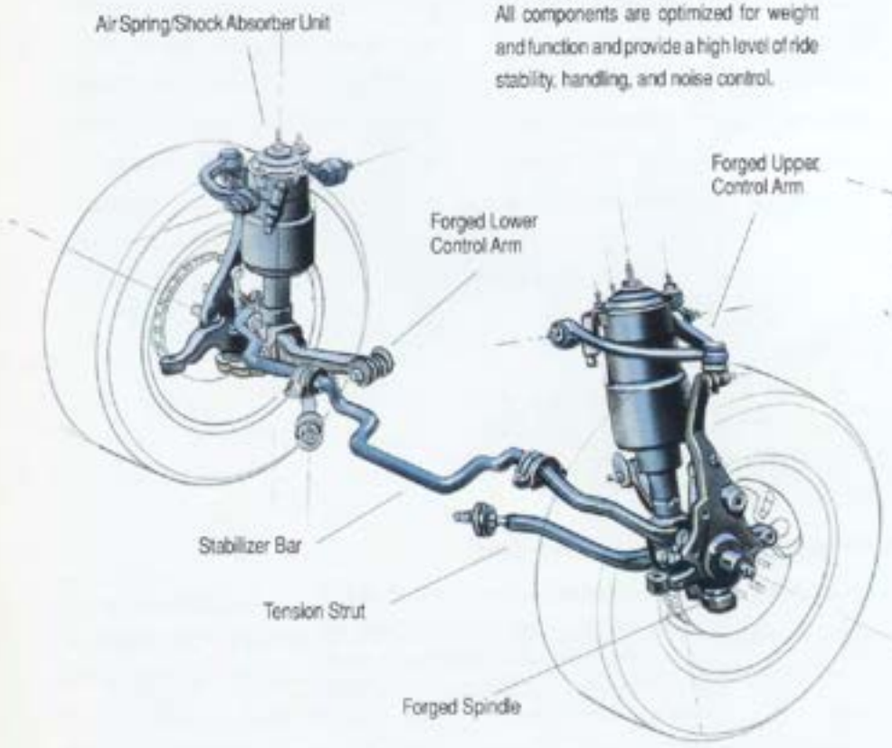
Self-levelling Air Springs — Improved Control and MPG

Instead of heavier coil or leaf springs, air springs are used front and rear. The Mark VIII's air springs are a second-generation design — modified for longer life, adding to the durability of the car. The system reacts more quickly and precisely than the Mark VII's, due to more comprehensive sensor-input processing.

To maintain the vehicle at a level height regardless of load, the computer analyzes and reacts to input from sensors monitoring steering input, speed, height, and passenger/luggage weight. There are three height sensors.

In addition, at speeds above 55 mph, the air springs lower the entire car by about 0.8 inch, contributing to vehicle stability and to slightly improved fuel economy.

The Mark VIII's front suspension includes an air-spring/shock-absorber assembly, forged control arms, and a stabilizer bar. All components are optimized for weight and function and provide a high level of ride stability, handling, and noise control.

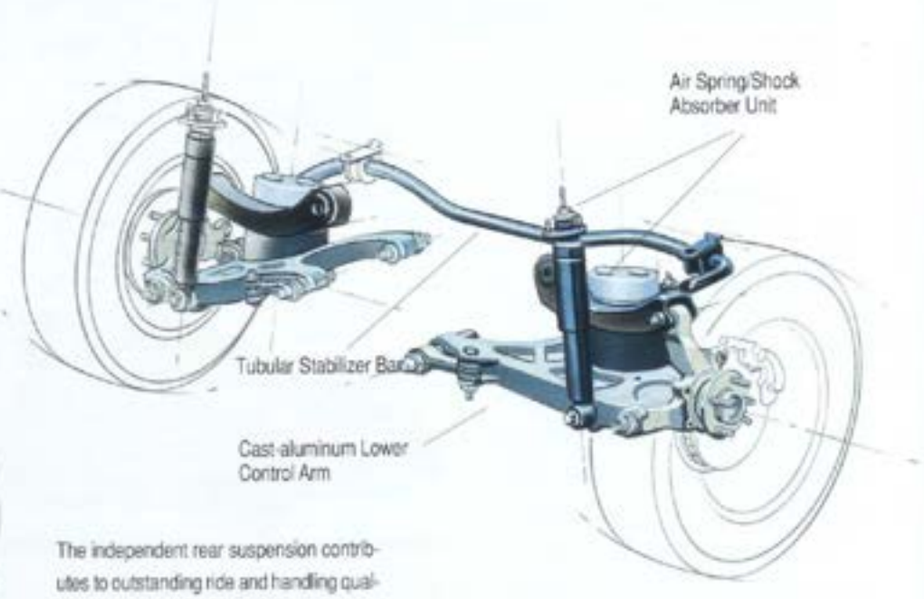


Independent Rear-suspension System — Maximum Traction, Handling, and Comfort

The rear suspension is totally new. Most significant is the change from the Mark VII's live rear axle to an independent rear suspension. It permits each wheel to react independently to bumps without disturbing the other. The result is improved overall handling and traction, especially on bumpy surfaces.

The rear suspension is precisely assembled and attached to a subframe with computer-controlled torque specifications. Lower control arms are high-precision aluminum parts that, while more expensive to manufacture than parts made of steel, reduce weight for improved fuel efficiency. The rear stabilizer bar is tubular, which also reduces weight.

A further advantage of the Mark VIII's independent rear suspension is the capability of setting caster and camber for consistent rear-wheel alignment. Aligned rear wheels contribute to a comfortable ride and improved handling.



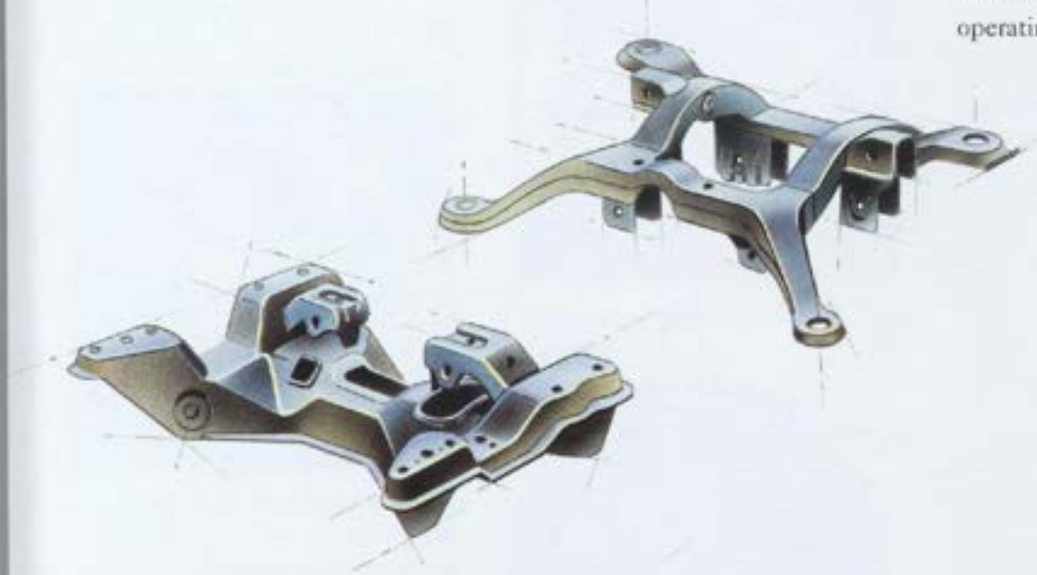
The independent rear suspension contributes to outstanding ride and handling qualities. Its air springs and aluminum lower-control arms help to reduce vehicle weight, for improved fuel economy and better handling.

Front and Rear Subframes — Reduced Noise, Vibration, and Harshness

The engine/transmission module and suspension components are mounted to subframes isolated from the body by rubber mounts. The front-suspension lower arm, tension strut, steering gear, and engine/transmission unit are attached to the front subframe. Hydraulic engine mounts, offering three to four times the vibration-damping ability of conventional mounts, are used. The rear-suspension arms, differential, and half-shafts are attached to the rear subframe. Every bolt holding these pieces to the subframes is precisely torqued, with tolerances more closely monitored — by computer — than for any other Ford Motor Company product.

The rear subframe is mounted to the body using four rubber mounting points. These mounts are "tuned" to the Mark VIII body to shield the cabin from road and engine noise and vibration, for a quieter and more comfortable interior.

Front and rear subframes carry powertrain and suspension components, reducing the noise and vibration transmitted to the body.



Variable-assist Steering — Sensitivity to Driving Conditions

The power-assisted, rack-and-pinion steering is "speed sensitive." Sensitivity is computer controlled, operating the Electronic Variable Orifice (EVO) in the power-steering pump to change the amount of power assistance. Variations are based on vehicle speed and how sharply the car is being turned. Steering effort at low speeds (such as when parking) is reduced, for improved driving ease. At road speeds, steering effort is increased, for better road feel. EVO is unique to the Mark VIII.

Additionally, changes in the front suspension allow tighter turning angles, for greater maneuverability. The turning circle is reduced from 40.0 feet for the Mark VII to 37.2 feet for the Mark VIII.

Steering is "speed sensitive," resulting in low steering effort at slow speeds, for convenience, and greater effort at road speeds, for better road feel.

Four-wheel-disc Brakes — Ventilated Against Fade

The four-wheel-disc brakes have the largest rotors of any Ford Motor Company production car. Front and rear rotors are vented, for more rapid dissipation of heat. The large, vented rotors contribute to shorter braking distances. The brakes are less subject to fade, making them more consistent, safe, and reliable. Braking distances are the shortest of any vehicle manufactured by Ford Motor Company, and superior to most of the competitors in the class.

Rotors are full cast iron — not assembled from components or made of other metals — to reduce corrosion. Pads are a non-asbestos composite material that includes Kevlar, which, compared to asbestos, is environmentally acceptable and helps to minimize the brake fade that increases stopping distances.

Brake discs are vented — slots within the rotors dissipate built-up heat, reducing brake fade.

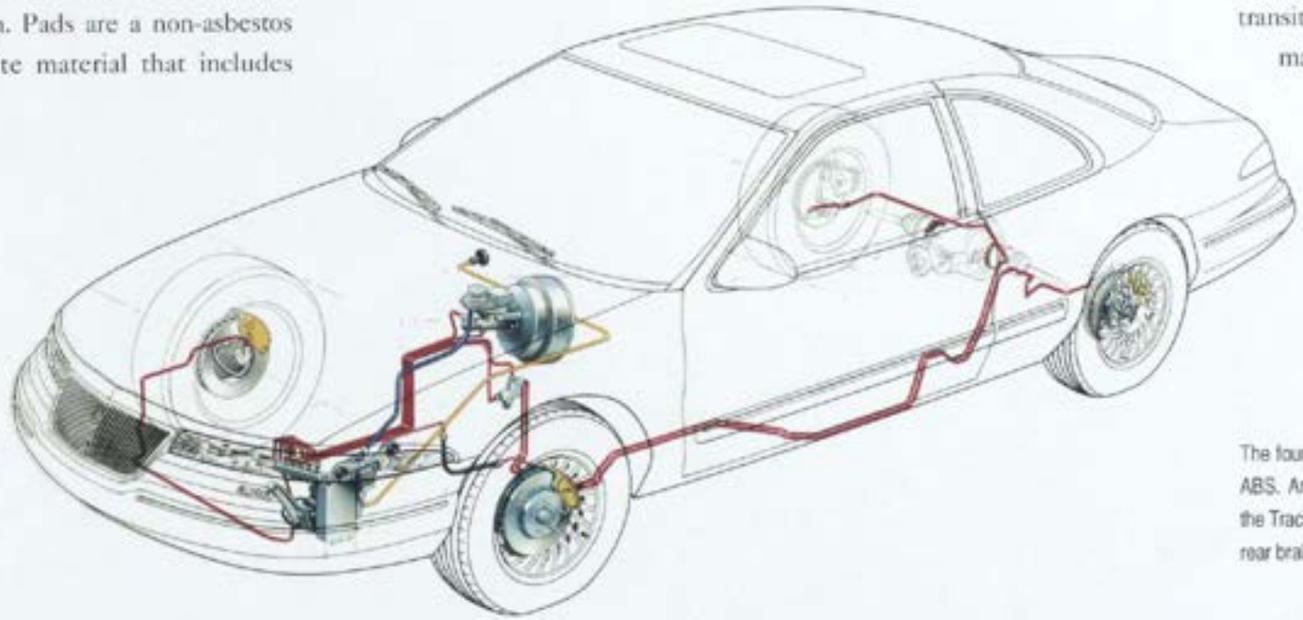
Four-channel ABS — Four-wheel Control

The Teves anti-lock braking system (ABS) has four channels rather than the three found on the Mark VII. Four channels allow modulation of the brakes and inclusion of Traction Assist. By design, the system's pulsations can be felt by the driver as a safety feature — if ABS is activated, the driver will know, through the pulsations, that the road surface offers less traction than may have been expected. By preventing wheel lockup, ABS gives the driver steering control in hard braking situations — adding to safety in emergency situations.

Traction Assist — Controlling Wheel Spin

The optional Traction Assist might be considered an adjunct to the Teves ABS. Using input from ABS sensors, the Traction Assist's electronic controls determine if wheel spin is imminent. To prevent this condition, the system brakes the rear wheel that is about to spin.

Traction Assist is a low-speed system; it works up to 34 miles per hour. From rest to 25 miles per hour, Traction Assist can apply 100 percent of the brake system's stopping power. To prevent too much heat from building up on the discs, between 25 and 34 miles per hour the system transitions to zero effectiveness. To maintain braking effectiveness, the Traction Assist system shuts down if the brakes become too hot.



The four-wheel-disc brakes feature Teves ABS. An electronic-control unit manages the Traction Assist system, which uses the rear brakes to prevent wheel slip.

Wheels and Tires — Low Weight, High Performance

The standard 16-inch-by-7-inch wheels are made of low-pressure, cast-aluminum alloy. Besides their distinctive look, they are the lightest wheels on a production car from the Ford Motor Company. The wheels are protected by a unique, corrosion-resistant clearcoat that has a three-year warranty. Brushed-aluminum, directional wheels are optional. The high-pressure spare tire is mounted on a special, 16-inch-by-4-inch aluminum rim, which helps to reduce overall weight.

Standard wheels are cast aluminum, protected by clearcoat.

The Mark VIII's low-profile, 225/60 R16 97V tires are rated for higher sustained speeds than the standard tires on the Mark VII. The Mark VIII's tires are V-rated; the Mark VII's were H-rated. The touring tires have a unique tread pattern. They provide a large "footprint," for more contact with the road, which adds to driver control. Handling is improved, and the rear wheels are better able to transfer the engine's power to the road.

Optional directional wheels are brushed aluminum.

Optional chrome wheels will be available February, 1993.

SUMMARY

4.6L FOUR CAM V-8

- The 4.6L Four Cam is Ford's second-generation modular V-8 engine, and includes such technology as double-overhead camshafts, four valves per cylinder, and variable induction tuning.
- Ford testing of the 4.6L Four Cam V-8 and competitive engines has shown the Four Cam to be among the most fuel-efficient V-8s on the market.
- Although having less displacement than the previous 5.0-liter, high-performance V-8s, the 4.6L Four Cam is 30 percent more powerful and 7 percent more fuel efficient.
- The 4.6L Four Cam's sophisticated electronic controls allow it to run cleanly, meeting all current emissions standards and achieving outstanding fuel efficiency.
- Ford's first all-aluminum, production V-8, the 4.6L Four Cam's light weight contributes to improved vehicle fuel economy and handling balance.

POWERTRAIN

- In large measure, the powertrain tailors the Mark VIII to the personality of the driver. Electronic control of the automatic overdrive transmission and electronic interface between the transmission and the engine's control unit add to the smoothness and comfort with which the Mark VIII can be driven. Yet the powertrain transforms rapidly to allow a more aggressive use of the car's potential.
- Lightweight components and appropriate gearing permit spirited driving, while also improving fuel economy.

CHASSIS

- Chassis components were designed and engineered for light weight, with the use of aluminum and rubber air springs in the suspension for improved ride and handling.
- Handling is enhanced by a tight turning circle, speed-sensitive steering, an independent rear suspension, and ABS.
- Added comfort is provided by the air springs and the isolated rear subframe.

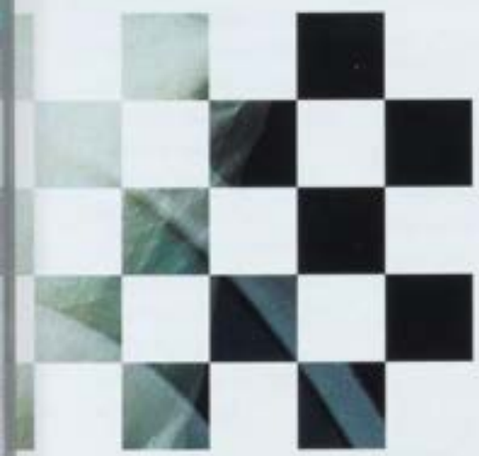
Preface

The *Mark VIII Product and Marketing Guide* was created to help you, the Lincoln sales consultant, make the most of the exciting, new sales opportunities that the Mark VIII represents. It can fairly be said that today's market for cars like the Mark VIII differs dramatically from the market into which the Mark VII was launched in 1984. Not only is there greater competition, but the prospects entering your showroom are also going to differ markedly from Continental and Town Car customers and, to some degree, from previous Mark buyers as well. This guide will give you the information necessary to understand the car itself, the sport-luxury market segment in which it competes, and the types of buyers this exciting new car will attract.

0.0
GALLONS
USED

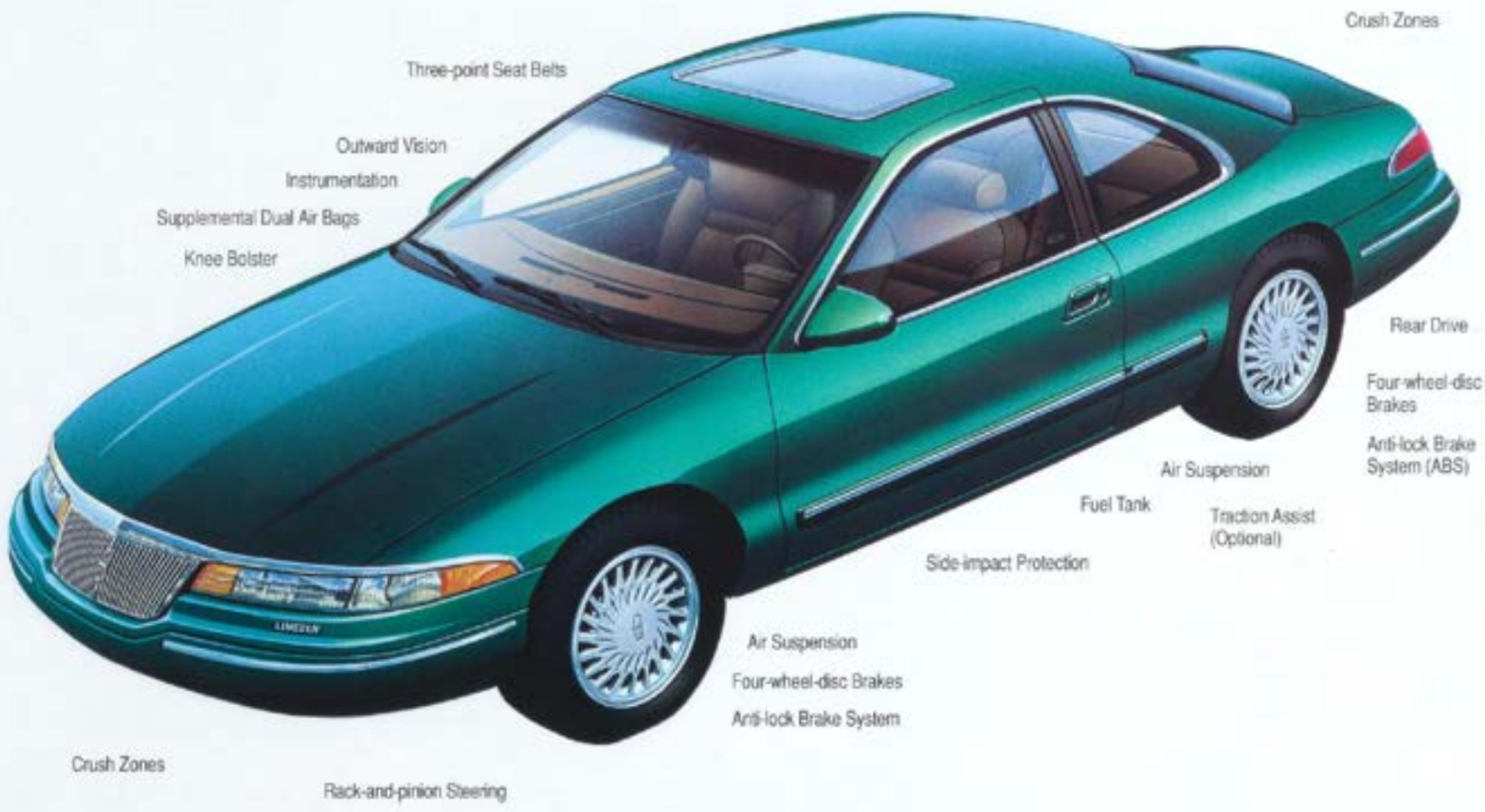
"The Mark VIII's body structure benefited from the most intensive use of computers on any new car in Ford Motor Company history. We believe we are leading the industry in this area, and that the new Mark offers tangible customer benefits in terms of crashworthiness."

Wayne Hamann, Manager, Vehicle Systems, Computer-aided Engineering



Safety. Perhaps never before has the subject played such a prominent role in the development, marketing, and selling of automobiles. Today, it is the rare customer who is not interested in an automobile's safety features. From the standpoint of safety, the Mark VIII can be seen as an automobile that offers maximized opportunity to avoid a crash. But it is also a car engineered to meet or surpass all U.S. regulations should a crash occur — comforting knowledge for any customer.

SAFETY

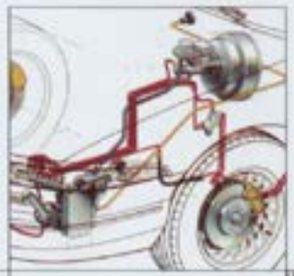


Introduction

Automotive engineers have long discussed safety in terms of active and passive safety. The first involves all aspects of the car's design and performance that contribute to accident avoidance. Does it respond immediately to steering input? Does it stop in a short distance and in a straight line? Can it accelerate out of danger? Passive safety involves the car's structure and restraint systems and the features they offer to protect occupants after a crash has occurred.

This Part examines the active- and passive-safety features offered by the Mark VIII.

Key Features and Benefits At A Glance



Dual Front Air Bags

Supplemental air bags are provided for both the driver and the front-seat passenger. In conjunction with the three-point seat belts, the instrument panel with knee bolster, and the energy-absorbing, collapsing steering column, the supplemental air bags offer added protection for the upper body in a moderate-to-severe frontal impact. All Lincoln automobiles have standard dual front air bags.

Side-Impact Protection

From body structure to specially made door beams to the shape of the interior door panels, the sides of the Mark VIII are designed as a system to help protect the car's occupants in a side impact. Lincoln's attention to this aspect of occupant safety is in advance of federal standards requiring such protection.

Crush Zones

Ahead of the cowling and behind the rear window, the body is designed to crush progressively in an impact. The front or the rear of the car absorbs much of the impact energy, instead of passing it directly through the body to the passenger compartment.

Front-engine/ Rear-drive Layout

A performance car with rear drive arguably has a handling advantage over other engine/ powertrain layouts. Balanced handling contributes to the active-safety capabilities of the Mark VIII.

Anti-lock Brake System (ABS)

ABS is designed to prevent wheels from locking during hard braking, such as in emergencies, or when the road is more slippery than the driver expects. The system helps the driver to maintain steering control and enhances stopping ability.

Traction Assist

This optional system helps to prevent wheel spin at lower speeds, particularly under acceleration. An adjunct to ABS, Traction Assist uses one or both of the rear brakes to reduce spin and optimize traction.

The standard supplemental air bags that are provided for both the driver and the front-seat passenger are most effective when seat belts are worn.

Seat Belts/Supplemental Dual Air Bags — Reduced Risk of Injury

The front seats and the outboard, rear-seat positions have standard three-point seat belts (combined lap and shoulder belts). Two front supplemental air bags are standard — one in the steering-wheel hub for the driver and one in the instrument panel for the front-seat passenger.

When the driver and front passenger are wearing their seat belts, they are restrained in their seats in an impact. When sensors detect that an impact is severe enough that it may cause potential injury, the supplemental air bags are deployed. With the seat belts helping to hold the driver and front passenger in positions in which the supplemental air bags can be most effective, the supplemental air bags help to protect their upper torsos and heads from impact forces.

Knee Bolsters — Countering Submarining

The lower instrument panel is a knee bolster for the driver and the front seat passenger — a passive-safety feature. The bolsters are intended to help absorb impact energy and control the forward thrust of the occupants' knees beneath the instrument panel, commonly referred to as "submarining."

Knee bolsters help to keep the driver and front-seat passenger from sliding forward in a frontal impact, so that the seat belts and air bags can be most effective.

✓ ENGINEERING NOTEBOOK

Three Impacts in One

When a car is involved in a collision, there can actually be three impacts — not one. First, the car comes into contact with another object. Second, the occupants impact either their restraints or some part of the interior. Third, the occupants' organs can impact within their bodies.

The objective of much of Lincoln's safety engineering is to reduce the effect of all three impacts: The car's body crushes rather than remaining rigid, to absorb impact energy before it reaches the occupants. The seat belts help restrain the occupants, while air bags provide additional protection.

The Lincoln customer can take comfort in the comprehensive impact protection provided by the Mark VIII's many safety systems.

Driver Visibility — The Heart of Active Safety

Excellent driver visibility is central to accident avoidance, which is what active safety is all about. Good visibility helps a driver see and anticipate emergency situations, possibly providing valuable reaction time. From the Mark VIII's driver's seat, the low cowl and beltline and generous glass area afford an excellent view to the front, sides, and rear.

Complementary features include:

- Rear-window defogger, to keep the rear window clear in cold and damp weather
- Heated outside rearview mirrors, which are electrically cleared of fog, ice, and snow

Electrically heated exterior mirrors provide a clear view in adverse driving conditions.

The instrument panel and Message Center are located to provide easy-to-read information and critical warnings at a glance.

Analog Instrumentation — Quick Communication, Minimal Distraction

The Mark VIII is equipped with analog, rather than digital, instruments — speedometer, tachometer, engine-coolant temperature gauge, and fuel gauge. Digital displays for these instruments, while seemingly more precise, may not be particularly easy to read. In an analog arrangement, needles against a plain field and clearly marked numbers quickly show their information, providing a sense of the rate at which the reading is changing. Warning lights also quickly alert the driver when one of the car's systems requires attention.

The Mark VIII's analog instrumentation shows information clearly and quickly, while indicating rate of change.

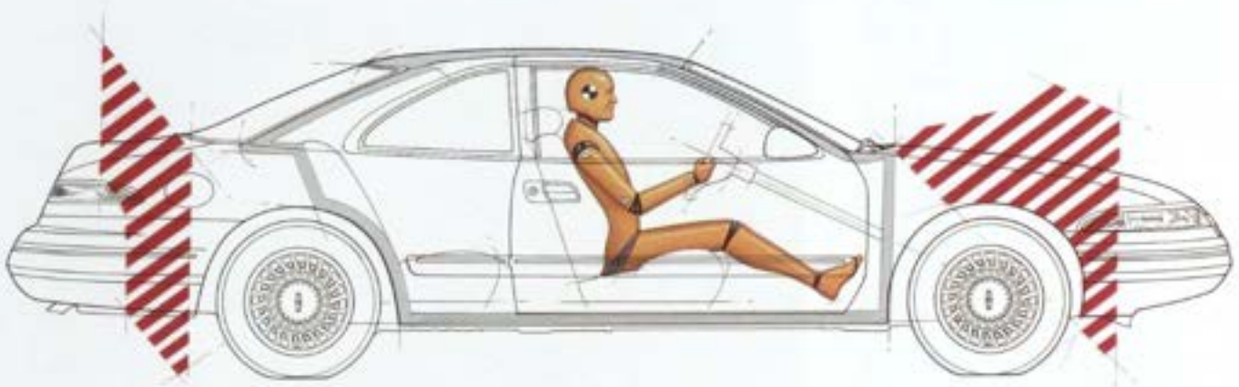
Message Center — Easy-to-read Information, Critical Warnings

The Message Center clearly displays information in both word and number form that is readily visible because of the Center's central location. Clearly delivered information enhances active safety. Minimal attention is required to read the instruments, so that the driver can concentrate on the road and driving. Additionally, because the Message Center keeps the driver fully informed about the conditions of vital systems, maintenance requirements are more likely to be recognized and heeded.

Side-impact Protection — Reinforced for Safety

Tubular, ultra-high-strength-steel beams and spacer brackets have been developed to reinforce the doors and help protect occupants in a side impact. Inside, bolsters on the doors help protect the driver and front passenger in the shoulder and hip area, and help cushion their upper bodies when the car is struck from the side.

Door beams are made of ultra-high-strength, tubular steel.



Crush zones in the front and rear of the car (shaded areas) absorb some impact energy, so it is not passed on to the occupants in the cabin.

Crush Zones — Absorbing Energy Before It Reaches Occupants

The car's front and rear are designed to absorb impact energy, crushing progressively within specific zones. The longitudinal frame rails have accordion-like convolutions that fold together upon impact, spaced to increase crush resistance as the passenger compartment is approached.

Fuel Tank — Protected Position

The fuel tank is positioned mid-ship in the vehicle, under the floor pan. It is protected from rear-end collisions by the rear crush zone and the axle. The tank has maintained its integrity in 50-mph, car-to-car, test crashes, meeting Ford corporate requirements.

The fuel tank is located under the floor pan, ahead of the rear axle, where it is protected from rear-end collisions by the rear crush zone.

Front Engine/Rear Drive — Balanced for Consistent Control

With a front-engine/rear-drive layout, the Mark VIII has a more even weight distribution than a front-engine/front-drive layout could provide. A balanced car is less likely to understeer (push excessively and run wide in a corner) or oversteer (rear wheels break loose), making it more predictable while cornering or making an avoidance maneuver.

The Mark VIII is a rear-drive car offering predictable handling under a variety of driving conditions.

Under acceleration, the Mark VIII's weight shifts to its rear drive wheels, where traction is most important.

During acceleration, the car's weight shifts to the rear wheels, which are the Mark VIII's drive wheels. Increased weight on the drive wheels improves traction.

When braking, a car's weight shifts to the front, so the front wheels must be able to turn the car as well as play a major role in slowing it. With an evenly balanced weight distribution, the Mark VIII's front wheels and tires handle less of the car's weight, enabling the car to stop more efficiently and predictably.

Rack-and-pinion Steering — Quick Response

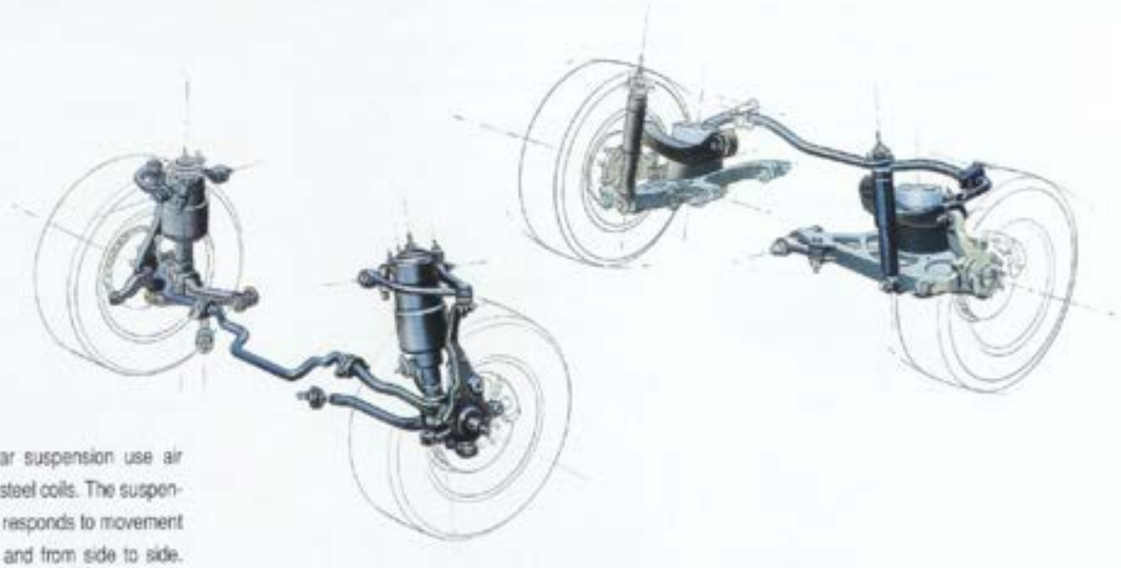
The performance-oriented, rack-and-pinion steering system has safety characteristics as well. At 2.6 complete turns of the steering wheel from lock to lock, the system is very responsive, enabling a driver to perform avoidance maneuvers quickly and with precision. These response capabilities can help an alert driver avoid accidents.

Air Suspension — Confidence-inspiring Handling

The Mark VIII's suspension system includes gas-filled shock absorbers and air springs, which are used instead of steel coil springs.

The air springs automatically level the Mark VIII to accommodate occupant and luggage loading. A level body maintains headlight effectiveness, for improved nighttime visibility, and increased active safety.

At speeds above 55 miles per hour, the air springs automatically lower the Mark VIII by about 0.8 inches. Lowering the car at higher speeds improves aerodynamics, enhancing stability and contributing to the driver's control of the vehicle.



The front and rear suspension use air springs instead of steel coils. The suspension automatically responds to movement from front to rear and from side to side. Steering is very responsive, with 2.6 turns lock to lock.

Four-wheel-disc Brakes — Consistent, Short Stops

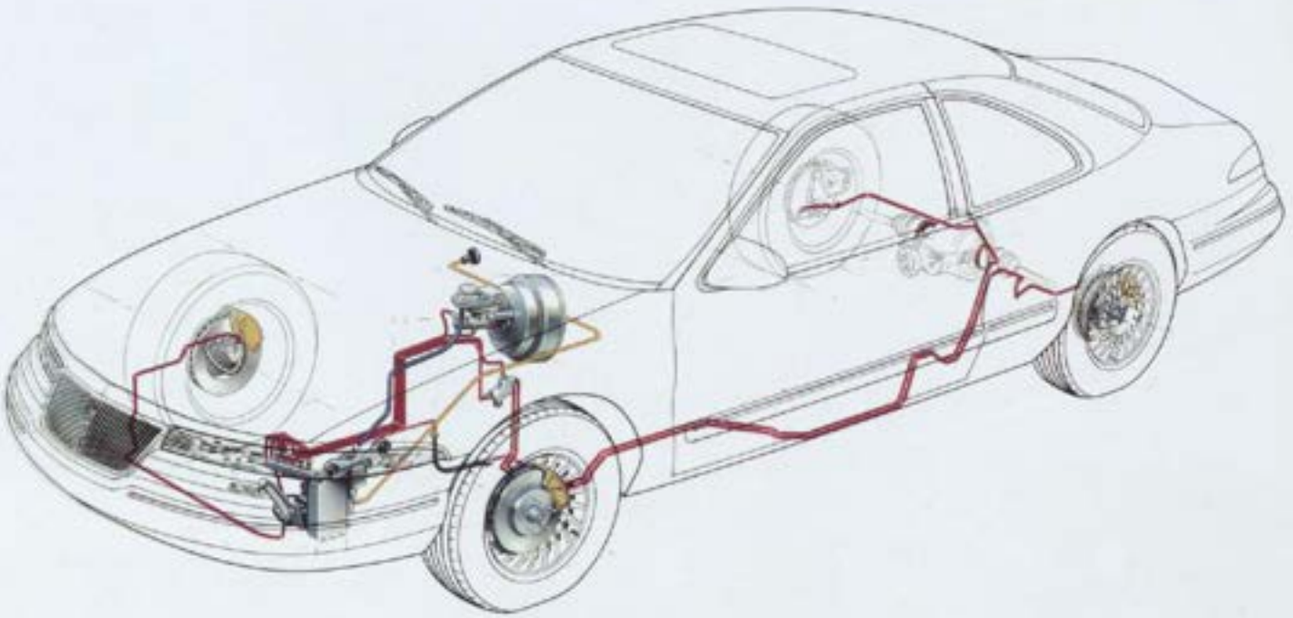
The Mark VIII, like most luxury-sport automobiles, has disc brakes at all four wheels because of their contribution to active safety. Disc brakes dissipate heat readily, increasing their ability to resist fade from application to application. In addition, both the front and rear brake rotors are ventilated to further improve their heat-dissipation capabilities. The cooler the rotor, the more effectively the calipers can slow or stop the car.

Ventilated disc brakes quickly dissipate heat, to maintain effectiveness during heavy use.

Anti-lock Brake System (ABS) — Preventing Lock-up for Safer Stops

One of the most dramatic advances in vehicular safety in the past quarter century, anti-lock brakes have become a common, expected feature on cars in the Mark VIII's market segment. The Mark VIII is equipped with four-channel ABS that allows brake modulation and Traction Assist. ABS helps to keep brakes from locking up when stopping. The system senses imminent lockup, and modulates brake pressure to maintain maximum stopping power. While ABS can shorten stopping distances, particularly on wet or icy pavement, its primary effect is to improve steering control.

When the front wheels lock up during a braking maneuver, any attempt to steer the car will have little effect. By helping to prevent lockup, ABS allows the driver to stop or maneuver around an emergency. ABS is one of the Mark VIII's most important active-safety features.



An adjunct to the ABS system which prevents wheel lock-up for safer stops, Traction Assist uses brake control to help prevent wheel spin.

Traction Assist — Preventing Wheel Spin for Control

The optional Traction Assist system detects low-speed wheel spin and intervenes via the rear brakes to slow the spinning wheel until traction is regained. Traction Assist contributes to smooth, controlled acceleration and improved traction on slippery roads.

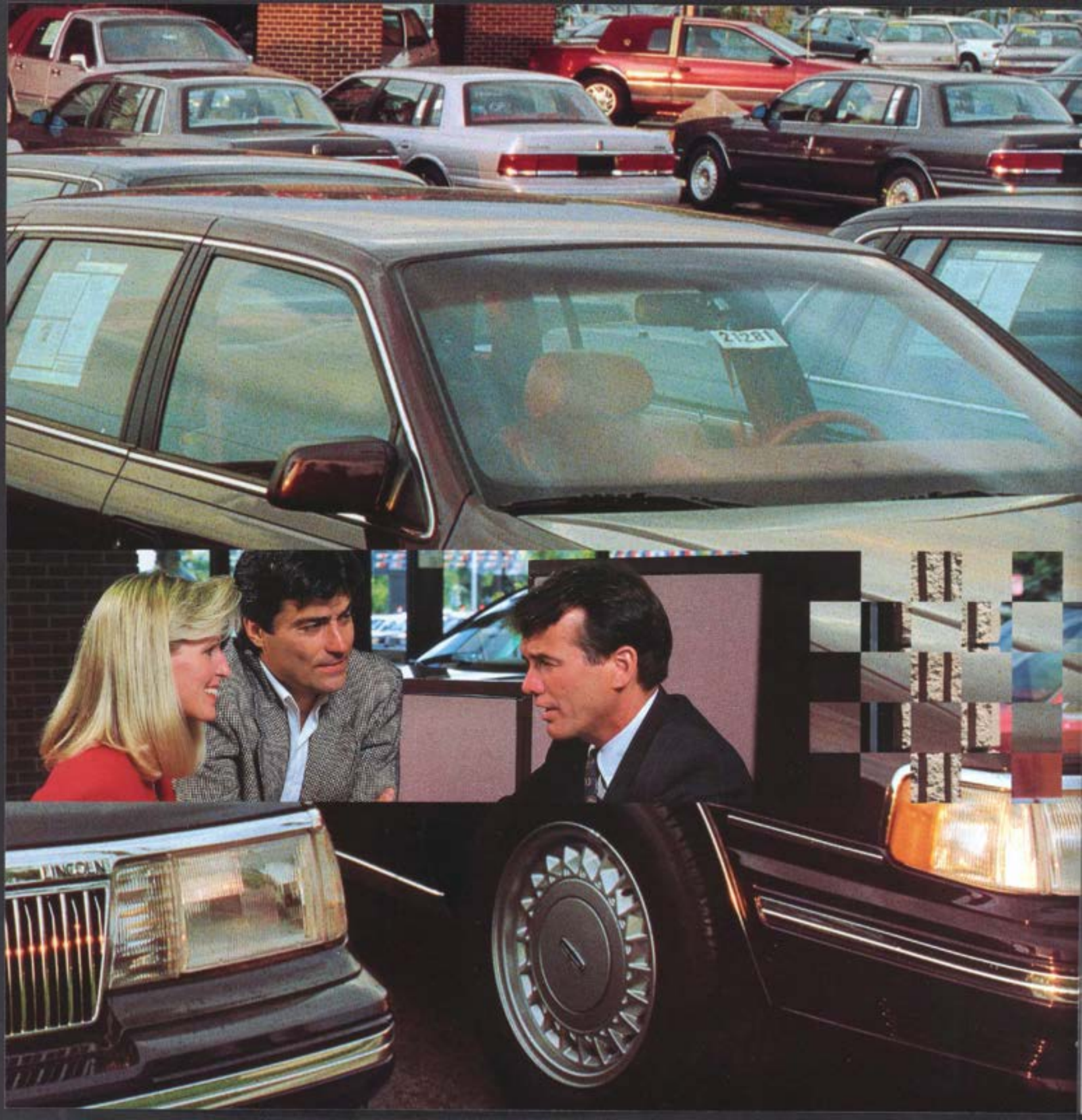
SUMMARY

- The Mark VIII offers standard supplemental air bags for the driver and front passenger as part of its occupant-restraint system.
- The Mark VIII's front crumple zone helps to provide protection in frontal impacts, while the rear zone can maintain fuel-system integrity in a 50-mph, car-to-car impact, a corporate requirement.
- The door beams meet, and exceed, 1994 federal standards.
- The Mark VIII's anti-lock brakes and precise rack-and-pinion steering help drivers to avoid accidents.
- The outstanding visibility afforded the Mark VIII driver, together with the car's efficient climate-control system, analog instrumentation, and easy-to-use Message Center are subtle contributors to driver efficiency and overall safety.

Part I, The Market, provides information about the unique sport-luxury market segment in which the Mark VIII competes — a market segment that is extremely diverse.

Part II, Shaping a New Mark, gives you the background story on the Mark VIII's design and describes the process used by the designers to meet the customers' anticipated needs and purchase motivations. Basically, it will enable you to explain to customers, as necessary, the concepts behind the Mark VIII's exterior design.

Parts III, IV, and **V** cover the features and benefits of the Mark VIII in detail. **Part III, Exterior Engineering,** examines the features of the car's body construction and provides numerous details that reveal the meticulous attention paid to every aspect of the car. **Part IV, Interior Comfort and Convenience,** covers the revolutionary interior, which is unlike anything yet seen in a Lincoln — or in any other car. **Part V, Performance and Handling,** describes the engine/drivetrain and chassis components — suspension, steering, and brakes — that make the Mark VIII the most driver-oriented Lincoln ever.


LINCOLN

Part VII — Customer Satisfaction

As manufacturers compete for customers in today's automotive marketplace, their efforts must go well beyond the product itself. The time-constrained, value-conscious car buyer of the 1990s will make his or her purchase from the manufacturer whose dealers offer the most convenient and professional sales experience and service. Eventually, these customer expectations — already actively shaping several segments of the market — will impact virtually every aspect of buying and owning an automobile. Lincoln has taken the steps to ensure that it, and its dealers, maintain a competitive edge in what is becoming an absolutely essential ingredient for success.

"Our customers are going to expect the ultimate in courteous, hassle-free service. The Lincoln Commitment Program and the Standards we've established for our sales and service personnel are our response. We are aiming at nothing less than total customer satisfaction."

Mark Hutchins, General Sales Manager, Lincoln-Mercury

Introduction

"All dealership personnel will treat every customer as a potential lifetime purchaser, communicating a professional image that embraces honesty and concern for customer wants and needs." This is the "Mission Statement" of the Sales and Service Standards, developed to help ensure customer satisfaction. Accomplishment of this mission requires that all dealership employees — supported by company personnel and programs — work together towards this common goal. The Sales and Service Standards, together with the Lincoln Commitment Program, are integral to all successful relationships between Lincoln sales consultants and their customers.

Sales Standards

In the sport-luxury market segment, a high level of sales professionalism is expected by customers. It was with sales professionalism in mind that Lincoln developed the Standards for its sales consultants and others involved in the sales process.

A study of material in the Customer Satisfaction Standards Implementation Kit, available in the dealership, will provide suggestions for meeting each of the Standards. The training series entitled "Bring Them Back for Life," prepared by Ford Education and Training, is another excellent tool for sales consultants.

Service Standards

Customers in the sport-luxury market segment expect service, as well as sales, professionalism. The Service Standards set forth service department practices that support customer satisfaction throughout the ownership experience. As with the Sales Standards, the goal of the Service Standards is to help turn Mark VIII buyers into lifetime purchasers.

SALES STANDARDS

- Customers courteously acknowledged within two minutes of arrival and advised that a sales consultant is available upon request
- Advisory relationship established by a knowledgeable sales consultant who listens to customers, identifies needs, and ensures that needs are met
- A test drive offered to all customers
- A pleasant, non-pressured purchase experience and thorough explanations provided by the sales consultant, sales management, and F & I personnel
- Sales consultant delivery of the vehicle to the customer in perfect condition, when promised, using a checklist
- The customer contacted by the sales consultant within one week after delivery, to ensure total satisfaction

SERVICE STANDARDS

- Appointment available within one day of customer's requested service day
- Write-up begins within four minutes of arrival
- Service needs courteously identified, accurately recorded on Repair Order, and verified with customer
- Vehicle serviced right on first visit
- Service status provided within one minute of inquiry
- Vehicle ready at agreed upon time
- Thorough explanation of work done, coverage, and charges

LINCOLN COMMITMENT

The Lincoln Commitment Program

The Lincoln Commitment Program, which supports and complements the Sales and Service Standards, is based on extensive research with consumers throughout the United States. The research was aimed at answering the question: "What do our customers want?" This Part of the *Mark VIII Product and Marketing Guide* describes the Lincoln Commitment Program that was originally developed in the early '80s and revised in 1990, as Lincoln continued its ongoing efforts to fully meet the expectations of its customers.

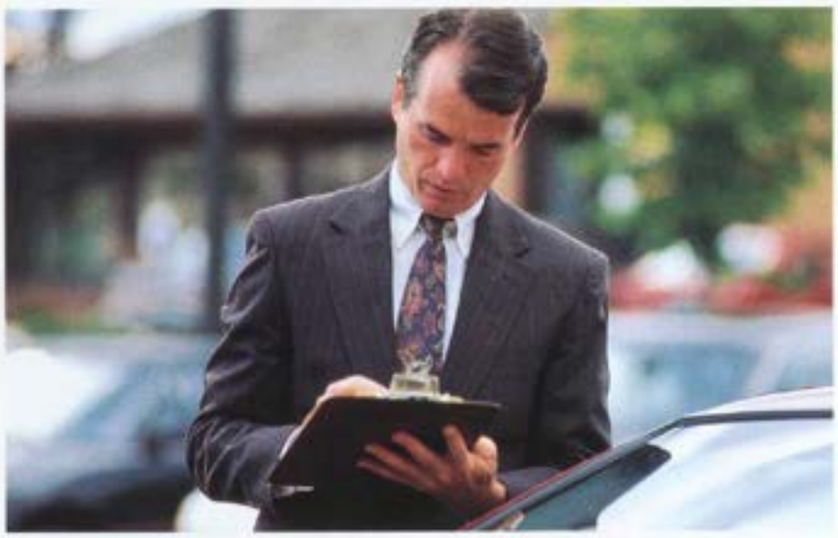
Lincoln focus-group research identified these five key expectations among luxury-car owners: technician certification, service loaners, roadside service, sales consultant certification, and an informative delivery process. The Lincoln Commitment Program was designed to address each of these wants.

■ **Lincoln Technician Certification Program:** Customers want to be assured that their vehicle is serviced by factory-trained service technicians. At Lincoln-Mercury dealerships, technicians can earn Lincoln Technician Certification by demonstrating advanced knowledge through the Lincoln Technician Certification Program.

■ **Lincoln Service Loaner Program:** Lincoln owners are provided with a loaner or rental allowance of up to $30 per day for five days if warranty service requires their Lincoln to be left overnight. When available, a Lincoln loaner should be provided.

■ **Lincoln Roadside Service Assistance Program:** Lincoln provides complimentary Roadside Service Assistance 24 hours a day, seven days a week. Assistance can be requested by calling 1-800-521-4140.

The Program includes:
(1) Road and tow service or reimbursement up to a maximum of $100 per disablement;
(2) Emergency lock-out service or reimbursement up to a maximum of $100;
(3) Emergency travel-expense reimbursement; and
(4) Travel planning assistance.
For more complete information, please refer to the Lincoln Roadside Assistance Information Book.



■ **The Lincoln Delivery Process:** The Lincoln Delivery Process is a disciplined approach to ensuring customer satisfaction at delivery and establishing an ongoing, positive relationship between the customer and the dealership.

The Process includes:

(1) Dealership/sales consultant preparation before the customer arrives, including completion of a pre-delivery service record and maintenance schedule to be given to the customer at delivery;

(2) The customer delivery meeting to complete all required paperwork and outline what is included in the delivery process;

(3) Touring the service department with the customer;

(4) Presenting the vehicle to the customer, introducing him or her to service personnel, and scheduling the first service visit;

(5) An orientation drive;

(6) Delivery checklist review and send-off, and

(7) Follow-up.

Because the Lincoln Delivery Process is pertinent, informative, and well-organized, customers should understand the importance of spending the approximately 45 minutes necessary for its completion.

To make certain that customers allow sufficient time for a thorough presentation at delivery, it is important that sales consultants set expectations with customers as to: what will be covered, how long it will take, and how the customer will benefit in terms of understanding the Mark VIII's operation, the ease of future service requirements, and overall satisfaction with the ownership experience.

Remember, this special attention given by the sales consultant and dealership is meant to make the customer feel important and appreciated.

For those customers who may be pressed for time, sales consultants should attempt to schedule a convenient time for the customer to return for a thorough demonstration of his or her new vehicle.

Additionally, a delivery audio cassette has been provided. This "guided tour" introduces customers to all the operating features of their new Lincoln, as well as restating the many benefits of the Lincoln Commitment Program. However, this cassette is meant to reinforce, never replace, a careful review of the Mark VIII's features during delivery.

During the delivery process, sales consultants should be certain to mention the complimentary inspection available after 1,000 miles of service. This inspection covers brakes, tire pressure, power steering, fluid levels, ventilation system, and other items. Customers should also be reminded that following the recommended Mark VIII maintenance schedule and keeping an accurate record of the service work performed will help ensure higher resale value when they sell or trade-in their automobile. Mark VIII buyers are provided with a passport-style maintenance schedule, complete with Cross pen, with space for recording this information.

Additionally, when delivering a new Mark VIII to a customer, it is especially important for a sales consultant to help the customer set the memory function for the driver's seat and understand the operation of the optional voice-activated cellular telephone. Programming-in the dealership's phone number for the customer's convenience is an excellent way to demonstrate how telephone numbers are stored in the memory. These small services help a customer take personal "ownership" of his or her new Mark VIII and contribute to overall satisfaction with the purchase.

■ **Lincoln Sales Consultant Advanced Certification Program:** Customers expect sales consultants to have highly developed interpersonal skills along with comprehensive product knowledge. And they expect the company to keep the salesperson fully informed of any changes to product and services. To meet this expectation, Lincoln sales consultants are provided with specialized training, after which they are certified.

A certified sales consultant who has been shown by Quality Care Performance (QCP) survey results to have achieved a high degree of customer satisfaction, and who has demonstrated that he or she is capable of achieving a high sales volume, is invited to participate in Lincoln Advanced Certification. Advanced Certification requires:

— Completion of 1992 Base Certification
— Attainment of a Lincoln QCP score of 9.0 or better
— Return of five or more Lincoln Surveys
— Attendance at Phase III Team Training or completion of Mastery Test
— Attendance at Sales Strategy Seminars

The Certification and Advanced Certification programs are designed to encourage professional development and lead to increased customer satisfaction and loyalty.

To supplement these five key aspects of the Lincoln Commitment Program designed to meet identified customer expectations, extensive field support is available. Lincoln-Mercury Owner Loyalty Managers assist dealerships in implementing the Lincoln Commitment Program by conducting meetings with dealership personnel to raise awareness of the program and its importance as a sales tool. Additionally, each Ford Parts and Service District's Lincoln Quality Care Manager provides continued, in-field support, helping the dealership address customer problems and concerns immediately. Specifically to support the launch of the Mark VIII, engineers have been made available to speed responses to any customer concerns that may arise. The direct handling of any problems and concerns increases satisfaction and loyalty among owners, and, through reputation and referrals, attracts new customers.

Other aspects of the Lincoln Commitment Program include:

■ **Lincoln Commitment Customer Assistance Center/"800" Telephone Number:** This number (1-800-521-4140) is a 24-hour hotline to connect customers with someone who will assist them in dealership relations. Customer concerns with their dealerships are addressed 24 hours a day. During normal business hours, customer inquiries are followed up by specialists. After business hours, messages will be taken from customers, then specialists will follow up on the next business day.

The Customer Assistance Center also provides access to a designated Mark VIII technical service specialist empowered to make warranty and service loaner adjustments. By immediately addressing problems, Lincoln diffuses potential dissatisfaction with dealership-related issues.

■ **Lincoln Dealership Recognition Program:** Top dealerships are recognized and awarded for their performance in sales and service — beginning at the time of sale and continuing through the ownership experience. The awards recognize the achievements of sales consultants and service technicians, and are based on the results of customer QCP surveys.

■ **Customer Diagnostic Evaluation Process:** This process utilizes the Diagnostic Evaluation Work Booklet as a tool to be used by the customer for diagnosing vehicle service needs. The booklet clearly lists service symptoms and problems under four distinct categories — heater and air conditioner, noise and vibration, automatic transmission, and engine driveability. By checking the appropriate boxes in the booklet, customers can better define problems they are experiencing.

■ **Service Bay Diagnostic System:** Ford Motor Company has developed the Service Bay Diagnostic System®, or SBDS®. This system is one of the most important advances in the automotive service industry. It is a state-of-the-art, computerized, information and diagnostic system that helps technicians identify the cause of even the most difficult intermittent and hard-to-find driveability concerns.

Additionally, problems that cannot be readily identified, or that are not evident when the vehicle is brought into the dealership, can be traced using the Customer Flight Recorder, part of the technologically sophisticated Service Bay Diagnostic System. The recorder plugs into the vehicle, which is then driven by service personnel or by the customer until the problem is experienced. Then information gathered by the recorder can be diagnosed using SBDS, and problems resolved as efficiently as possible.

■ **Expedited Parts Replacement Program:** Should replacement parts be necessary, the Program includes expedited freight handling on a no-charge basis, a special Mark VIII parts hotline, and a nationwide referral program for shipment of out-of-stock parts. Owners of Mark VIIIs that require service will be assured of the fastest possible turnaround if needed parts are not available at their Lincoln-Mercury dealership.

Lincoln Warranty Program/Ford Extended Service Plan (Ford ESP)

The Lincoln Warranty has been expanded beyond the warranty for other Ford Motor Company models. This reflects the confidence that Lincoln has in the quality of the Mark VIII and its other models.

The Lincoln Warranty Program has the following features, which should be pointed out to customers:

LINCOLN WARRANTY PROGRAM

Four-year/50,000-mile bumper-to-bumper limited warranty, covering all components except tires, battery, service adjustments, wear items, and maintenance
Six-year/100,000-mile corrosion-related perforation limited warranty
One-year/12,000-mile surface-rust limited warranty
Five-year/50,000-mile safety-restraint limited warranty, covering all safety-restraint systems
Four-year/50,000-mile battery limited warranty, which is pro-rated after 12 months/12,000 miles
Five-year/50,000-mile federal emissions-defect limited warranty, which covers emissions-related defects on selected parts
Two-year/24,000-mile (five years/50,000 miles on some parts) federal emissions-defect limited warranty, covering emissions-control devices or systems that cause the vehicle to fail an EPA-approved emissions test

Ford **EXTENDED SERVICE PLAN**

Customers who take advantage of the optional Ford Extended Service Plan (Ford ESP) for Lincoln models maintain that it increases peace of mind. There are four offerings as part of Ford ESP: Ford ESP Powertrain CARE, Ford ESP Extra CARE, Ford ESP Premium CARE, and Ford ESP Maintenance CARE.

Each offering covers specified components, rental-car reimbursement, towing coverage, and travel protection. Remaining coverage is transferrable. Deductible and credit-card payment plans are available. Exploring these coverages with your customers will help you to tailor a Ford Extended Service Plan to their specific needs and driving habits.

Research indicates that Ford ESP coverage helps increase customer confidence and satisfaction with the product and helps build loyalty to Lincoln products and the dealership.

SUMMARY

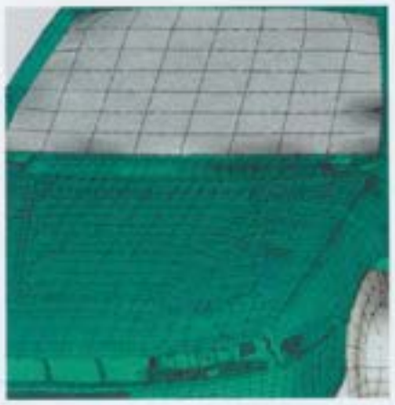
- Lincoln's Sales and Service Standards are an excellent basis for achieving customer satisfaction and building long-term customer relationships.
- Lincoln is committed to customer satisfaction, and it is the object of various programs that affect every step of the ownership experience — all encompassed by the Lincoln Commitment Program.
- The Lincoln Warranty Program and Ford Extended Service Plan focus on maintaining customer satisfaction after the purchase.
- Drawing the customer's attention to Lincoln's programs and plans is an important part of a sales presentation.


LINCOLN

"We need to recognize that the Mark VIII customer group is going to include people we haven't seen before, individuals whose expectations of car-buying have been changed by Lexus and Infiniti. They'll expect courtesy, of course, and product and competitive knowledge second to none."

Dave Zuchowski, Lincoln Marketing Plans Manager

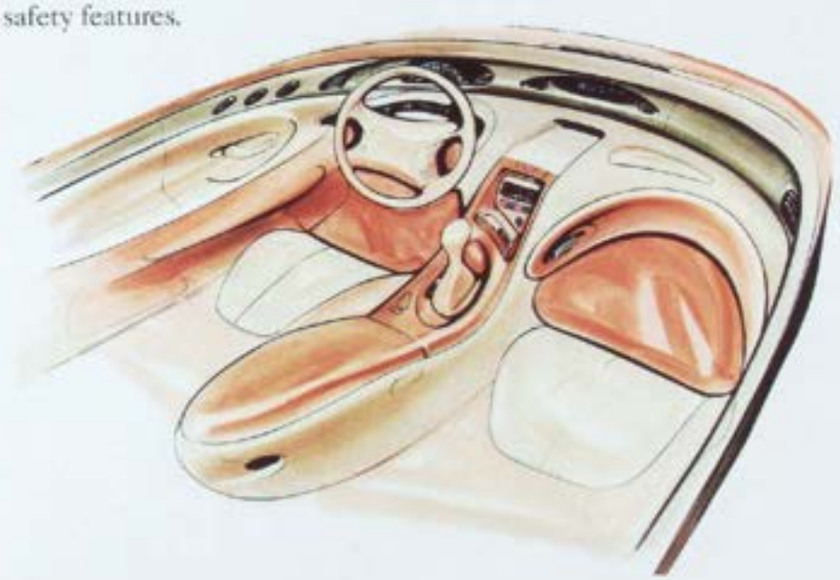
In the ever-evolving automotive marketplace, both manufacturers and salespeople are continually challenged by shifts in customer needs and expectations. This is particularly true in the Mark VIII market segment, where baby boomers will be key consumers. These buyers are proving to be much more demanding in their product purchases than they were in past decades, and meeting their demands will be a key to sales success.



Part VI, Safety, looks at the Mark VIII from the vantage point of safety. Perhaps never before has safety been such a concern in the automotive industry. This Part, which brings together active-safety and passive-safety features from previous sections, serves as a handy reference for the Mark VIII's many safety features.

Part VII, Customer Satisfaction, describes the programs Lincoln offers in support of the Mark VIII. Making full use of this support system will be integral to selling the Mark VIII against competitive models.

Part VIII, Sales Strategies, discusses aspects of the sales process relating to the market segment in which the Mark VIII competes, and presents portraits of the different buyer types that Lincoln has targeted. This Part stresses that new approaches may be necessary to meet the expectations and shopping methods of the comparatively young, well-informed consumers who form the car's primary target market.



Following Part VIII is a **Technical Glossary**, which explains terms used in the guide. Given the technology in the Mark VIII, you will find the Technical Glossary to be a useful and convenient reference source.

Throughout this guide, there are numerous photographs and illustrations designed to help explain the car's many features. In addition, you will find sidebars that present particularly interesting aspects of the manufacturing and engineering processes. Overall, this guide can be read on several levels: there is the primary text itself, the summary at each section's end, and the informational captions. Just as the Mark VIII represents new engineering and manufacturing technologies, it also brings new and exciting opportunities for those who will sell it. A careful study of this guide will help prepare you to make the most of the Mark VIII.

SALES SATISFACTION

Manufacturer	Index
Lexus	146
Cadillac	140
Infiniti	138
Lincoln	**136**
Mercedes-Benz	132
Saturn	131
Buick	131
Oldsmobile	127
Mercury	123
Jaguar	120
Industry Average	110

Source: 1991 J.D. Power Sales Satisfaction Study

Introduction

This Part focuses on the Mark VIII customer and reviews some of the techniques that will prove useful in meeting his or her expectations. It covers:

- Lincoln's performance in the 1991 J.D. Power Sales Satisfaction study (after 90 days of ownership)
- Profiles of anticipated customer types and what each will seek in an automobile
- How the Mark VIII buyer is projected to differ from the Mark VII buyer, and what that implies for the sales process
- A review of the "what, what, why" approach to qualifying for buyer motivations, and the role of listening
- An overview approach to a presentation strategy together with suggestions for a variety of Mark VIII demonstrations aimed at different buyer motivations

As Part I indicated, the Mark VIII is positioned in the highly competitive sport-luxury market segment, made up of both import and domestic two- and four-door models. Mark VIII customers are expected to be younger, better-educated, and more affluent than buyers of Continental or Town Car. It is highly likely that these customers will shop the competition and, while Lincoln is confident that the Mark VIII will be fully competitive, the *sales experience* must be fully competitive, too.

The accompanying J.D. Power chart compares the sales satisfaction ratings of the top 10 makes after customers had owned their cars for 90 days. New-car buyers were asked to rate the sales process, delivery, and the condition of the vehicle.

As the chart indicates, Lincoln sales consultants have achieved comparatively high ratings, outperforming Mercedes-Benz. However, complacency is hardly appropriate; everyone is aiming for an edge in the marketplace, and today's sales professional must strive to be even more aware of, and meet, the expectations of many types of customers.

Customer Profiles

During development of the Mark VIII, and during ongoing market research with different customer groups, Lincoln marketing specialists developed a portrait of the likely Mark VIII prospect. This customer, whether male or female, seeks a number of qualities in the car he or she drives. Those qualities, and how they are fulfilled by the Mark VIII, are listed in the chart below.

Traditional Lincoln Buyers vs. Mark VIII Customers

Just as Cadillac salespeople have learned that the traditional Cadillac buyer is quite different from a Seville STS or Eldorado Touring Coupe prospect, Lincoln sales consultants can expect to see differences between Town Car and Continental — or even Mark VII — buyers, and Mark VIII prospects. The chart on the right illustrates what some of the key differences are likely to be.

THE MARK VIII CUSTOMER — A PORTRAIT

Qualities Sought in Automobile	How Mark VIII Fulfills
Refined	Minimal Noise, Vibration, Harshness; Smooth
Powerful	280-hp V-8
Distinctive	Unique Styling
Spirited	Responsive, 32-valve Engine; Wide-ratio 4R70W Transmission
Precise	High-quality Manufacture
Exciting	Fast Acceleration, Outstanding Handling
Innovative	32-valve, Four Cam Engine, Active-type Air Suspension
Authoritative	Strong Overall Performance
Inspiring	Great Looks, Exciting to Drive
Smart	Functional, Good Looks
High-Tech	Advanced Engine/Drivetrain, Message Center, Optional Voice-activated Cellular Phone
Athletic	Exceptional Roadholding, Braking, Strong Acceleration on Demand, Styling (Sculptured Sides)
Daring	Revolutionary Interior Design

TRADITIONAL LINCOLN BUYER VS. MARK VIII BUYER

	Traditional Customer	Mark VIII Customer
Wants a Demo Drive	No/Perhaps	Yes, perhaps several
Strong Focus on the "Driving Experience"	No	Yes
Wants a Presentation	Sometimes	Absolutely
Shops Competition	Perhaps	Yes, 4 - 5 brands
Focused on Price/Color	Yes	Less than on advantages of car/why should I buy?
Is Very Product Savvy	No	Yes
Expects to Make a Quick Purchase Decision	Yes	No. On average may take 21 days to close

The chart reveals several noteworthy points.

Demo Drive: For Mark VIII buyers, the demonstration drive is likely to be central to the purchase decision. It needs to be well-planned and may require an hour or more to complete.

Presentation: The Mark VIII customer is not likely to merely ask, "How much? What color? What interiors and options are available?" Instead, a presentation aimed at needs expressed during careful qualifying will be required.

Competition: Not only will the customer be shopping and driving the competition, but Lincoln sales consultants themselves will need to be entirely familiar with these automobiles. (Competitive information can be found in the *1993 Mark VIII Competitive Comparison Guide* and *Video Series*.)

Overall, selling to the new breed of Mark customer will require carefully honed skills.

Anticipated Mark VIII Customer Groups

Lincoln has identified six general customer groups, which might be described as follows:

Mature People with Active Lifestyles

- Past middle age, these people are "young at heart" and lead active lives.
- They want a car with handling that inspires confidence while offering good performance and safety.
- They seek contemporary, good looks that convey a youthful image while commanding respect.
- These customers may currently be driving a Mark VII, Eldorado, Legend, Continental, LS400, or Q45.

Established Professionals

- These people have "made it" and are ready to enjoy the mid-life success they have achieved.
- They no longer need an expensive import to signal their success and want to make an "intelligent" luxury purchase.
- They want a car that's fun to drive and obviously distinctive.
- They would prefer to "buy American" if they find a product that is fully competitive in terms of quality, image, and value.
- Age 40 to 55, the established professional may be driving a Mercedes-Benz, BMW 5-Series, or a Jaguar.

Maturing Baby Boomers

- Baby Boomers seek a distinctive, high-tech, driver-oriented automobile.
- These customers want a vehicle with a competitive quality image and value, which they previously didn't believe domestic products offered.

Post-muscle-car Enthusiasts

- Younger car enthusiasts "graduating" from less sophisticated muscle cars will find, in the Mark VIII, increased refinement coupled with outstanding performance and handling.
- These prospects, under age 40, want a fun-to-drive car with good performance. However, they also want a car that commands respect while offering a more refined ride, more luxury, and, perhaps, more high-tech features than the Corvettes, Nissan 300ZXs, and Toyota Supras they may be driving.

New Professionals

- These are recent graduates of business, law, or medical school, whose first car may have been Japanese.
- They seek a "state-of-the-art," driver-oriented car that is fun to drive, something distinctively "special."
- They seek fully competitive quality, image, and value, which they previously felt domestic products did not offer.
- Age 25 to 30, this group is likely to be driving cars such as Hondas, Toyotas, and Acuras.

Pioneering Celebrities

- Professional athletes and entertainers, who want a distinctive luxury car that is not like the European cars that everyone else in their circle is driving, are likely to find the Mark VIII appealing.
- This group is willing to buy American if the car has the "right image" and high performance.
- This group is likely to be driving such cars as Jaguars, Porsches, or exotics.

This variety of customer groups speaks again to the complexity of the sport-luxury market segment. But, whatever group they belong to, some Mark VIII customers may lean more towards the technical features of the car, while others focus on its design and luxury features. In either case, sales consultants should be prepared with a presentation geared to the customer's expressed interests.

Customer Expectations

The upwardly mobile customers who form so much of the sport-luxury segment will have much in common as consumers, and the most successful sales consultants of the '90s will be those who best meet their expectations. Research done by a variety of manufacturers suggests the following about the demanding customers who will be Mark VIII prospects.

- These customers will not pay exorbitant prices, but they will pay a premium for convenience, service, and quality.
- The price/value relationship will be based on the ownership experience over a period of perhaps two or three years, and will include how successful the manufacturer's distribution system has been in terms of saving the customer time, reducing anxiety, and catering to his or her needs. It will also be based on levels of convenience, service, and quality available from other marques, especially Lexus.
- These customers will be discriminating in their choices and demanding in performance, both of the vehicle and of the sales consultant and dealership.
- Sales consultants who make the most efficient use of the customer's time, during and after the sale, will earn customer loyalty.

Meeting Customer Expectations

Sales consultants seldom get the opportunity to learn why a customer did not buy from them. Of course, there can be any number of reasons, but sophisticated prospects looking at a Mark VIII will have definite expectations of the sales process including:

(1) Their interest in the product will need to be heightened.

(2) The presentation should be targeted precisely at their concerns.

(3) The sales consultant should express a clear interest in them as individuals. Satisfying these needs requires skillful qualifying for buyer motivations, a somewhat different task than qualifying for price range, general driving habits, color preferences, etc.

In its simplest form, the qualification process can be broken down into three familiar key questions —
(1) What are you interested in?
(2) What do you mean by that?
(3) Why is that important?

Using this structured "what, what, why" method ensures that a sales presentation will be tailored to meet customer expectations. Consciously or unconsciously, many sales consultants ask one, if not all, of these three questions.

Not incidentally, in an era in which customers like those for the Mark VIII are likely to be "time poor" and need to make the most of their car-shopping opportunity, a well-planned series of qualifying questions can save time for both prospect and sales consultant.

Remember, too, the importance of listening. Because without listening to, and *hearing*, what the customer has to say, a sales consultant could base a presentation on what he or she wants to talk about, not what the customer wants to hear. There are so many stories in the Mark VIII that listening to the customer is key to ensuring that your presentation will be correctly targeted.

Presentations

The Mark VIII is an exciting automobile, uniquely designed inside and out. It offers a full complement of technically fascinating details that contribute to its performance, handling, and comfort/convenience. As always, the challenge is to communicate the appropriate story in a way that a customer can appreciate. The following are suggestions for meeting that challenge:

- Remember that a customer can be intimidated if the car seems overly complex. There will be some Mark VIII prospects who are highly technical, but others who are not. Accurate qualifying will help you identify the level of technical knowledge that your customer possesses.
- Although the Mark VIII buyer is likely to be affluent, do not neglect to show the value inherent in the car. No matter how wealthy prospects may be, they want to feel that the car they are purchasing is worth the money being spent. Do not forget that some of your import competitors continue to experience price resistance, and customers will walk away unless they see the value in the product and believe they are spending their money wisely.

- Make sure your customer comes away from your presentation *remembering* some key points. That means keeping the presentation focused and limited in scope. How much should you plan to discuss? It is probably a good idea to start with just five or six key features aimed directly at the customer's primary purchase motivation. And, because most people's listening skills can use polishing, it is a good idea to start and to finish your key-feature presentation with especially dramatic points that the customer will remember after leaving the showroom.

Perhaps never before has the demonstration drive offered Lincoln sales consultants the potential it does with the Mark VIII. This is true because it is likely that a customer will also drive one or more competitive models and because the Mark VIII is the most driver-oriented Lincoln ever built.

The following brief, benefits-oriented suggestions are targeted at specific attributes of the Mark VIII that should be highlighted during the demonstration drive and other product presentations. Included are Performance and Ride/Handling, Quality, Safety, Durability, and Comfort/Convenience.

SUMMARY

- In 1991, Lincoln finished in fourth place in the J.D. Power Sales Satisfaction study (after 90 days of ownership), within 10 points of the leader and 26 points above the industry average — a strong base for future improvement.
- A variety of different customer types is likely to be interested in the Mark VIII and, whether they are established professionals or aging baby boomers, each will have particular interests and viewpoints to be addressed.
- As compared to buyers of the Town Car, Continental, and Mark VII, Mark VIII customers will be more affluent and better educated, and they are projected to possess more product knowledge/interest. They'll require a thorough demo, will carefully shop the competition, and may take up to 21 days to reach a purchase decision.
- Use the "what, what, why" technique of qualifying for customer purchase motivations so that a focused presentation tailored to individual customer needs and expectations can be made.
- Prepare detailed — but not overwhelming — demonstration drives and presentations that focus on key buyer motivations and reveal how the Mark VIII adresses them.

A PERFORMANCE AND RIDE/HANDLING STORY

For performance, be sure to demonstrate:

- Smooth, 280-hp Four Cam V-8
- Wide-ratio, electronic, four-speed, overdrive, automatic transmission combines good acceleration with projected EPA of 17 city and 25 highway fuel economy
- Optional Traction Assist improves driver control and performance by eliminating wheel spin during initial acceleration
- Overdrive lockout button can maximize performance
- Most fuel-efficient engine in its class
- Best-performing Mark in history

For ride/handling, be sure to demonstrate:

- Front-engine/rear-drive chassis layout for optimum weight distribution and improved handling
- Hydraulic engine mounts offer improved vibration-damping ability over conventional mounts.
- Four-wheel, independent suspension with front/rear stabilizer bars and gas-filled shock absorbers optimizes ride quality while delivering sporty handling and outstanding driver control
- Standard, four-channel ABS keeps car under control and minimizes stopping distance in slippery conditions
- Outstanding stopping performance provided by largest disc brakes on any Ford Motor Company automobile
- Computer-controlled vehicle height to keep the car level regardless of load; additionally, the car is lowered about 0.8 inches at 55 mph for improved aerodynamics, which, in turn, improves the vehicle's stability and provides for better driver control
- New (vs. Mark VII) Electronic Variable Orifice (EVO) steering senses how much assist is needed; reduces steering efforts during parking/low-speed maneuvers while increasing road feel at highway speeds
- 225/60 R16 97V tires have a large "footprint" to maximize traction and braking performance

A QUALITY STORY

For quality, be sure to point out:

- Low line speed (10 cars per hour) and dedicated Mark VIII workforce ensure expertise and precision assembly
- Robot-applied, zero-tolerance windshield and backlight installation for perfect fit and leak resistance
- All Mark VIII sheet metal produced by single supplier working to tolerances of plus or minus 0.040", for the tightest fit yet of any Ford Motor Company product
- Narrow tolerances in the sheet metal and added bracing between the A-pillars result in the interior's superior fit and finish and allow its flow-through design
- The unique flow-through interior theme highlights high leather content
- Entire wiring harness produced by one supplier who has worked with Lincoln on development for three years and developed a zero-defect target in this key area
- Ninety percent of trim is hand-applied, for superior fit
- Standards for prototype models were higher than ever before; 40-to-50-vehicle test fleet has been in operation; millions of test miles have been put on the powertrain
- Demonstrated quality of the modular V-8 introduced in the Town Car is comparable to any engine in the world; $300 million more spent to develop the 4.6L Four Cam version
- The Lincoln Commitment Program is designed to help ensure customer satisfaction with every aspect of the purchase and ownership experience — sales consultants, service technicians, and dealership personnel work together to meet customer expectations for courteous, knowledgeable, convenient, and prompt service

A SAFETY STORY

For passive safety (the Mark VIII's built-in characteristics that help protect occupants in an accident), **be sure to point out:**

- Ford conducts front-impact tests at 35 mph, exceeding 30-mph government requirement
- Body engineered to help direct impact energy around passenger compartment
- Reinforced roof pillars to meet or exceed federal roof-crush standards
- Standard, driver's-side and front-passenger's-side air-bag supplemental restraint system
- High-strength side-impact beams meet or exceed 1994 federal standards
- High-strength door latches keep doors closed even under 4000-pound loads
- Doors can be opened after 35-mph crash
- Rear crush zone designed to maintain fuel-system integrity in 50-mph, car-to-car impact, a corporate requirement
- Rear floor pan reinforced for seat belt anchorages

For active safety (the capabilities of the Mark VIII that help the driver avoid accidents), **be sure to point out:**

- Speed-sensitive, rack-and-pinion steering offers good road feel and helps avoid obstacles
- Large, four-wheel-disc brakes with four-channel ABS and Kevlar/organic, fade-resistant lining for short stops on all surfaces
- Powerful engine for instant acceleration
- Excellent driver visibility thanks to low cowl and overall design

A COMFORT/CONVENIENCE STORY

For comfort, be sure to point out:

- Engine has lightweight pistons and rods and precision-balanced crankshaft to minimize vibration
- Four-wheel, independent suspension with air springs
- Full, five-passenger seating
- Generous use of insulation materials to minimize noise, vibration, harshness
- Cellular phone antenna designed to help reduce wind noise
- Tilt steering column
- Ergonomic control layout places switches within easy reach
- Lighted switches with raised bumps for easy identification
- Six-way, power driver and passenger seats with power recliners and standard lumbar supports
- Rear seat heat-distribution ducts
- Tinted glass

For convenience, be sure to demonstrate:

- Auto-glide front seats (memory on driver's side) to ease rear-seat entry/egress
- Optional, voice-activated, hands-free cellular phone
- Remote keyless entry system
- Spacious glovebox
- Heated, power outside rearview mirrors
- Side window defogger
- Heated rear window
- Power windows with one-touch-down for driver's side
- Anti-theft alarm system
- Power door locks
- Console-mounted gearshift and cup holder
- Underhood and luggage-compartment lamps
- Dual, illuminated visor vanities
- Electrochromic inside/outside mirrors
- Remote decklid release; low lift-over height
- Remote fuel-filler-door release
- Electronic Message Center
- Interval wiper control
- Optional JBL Sound System with 10-disc changer