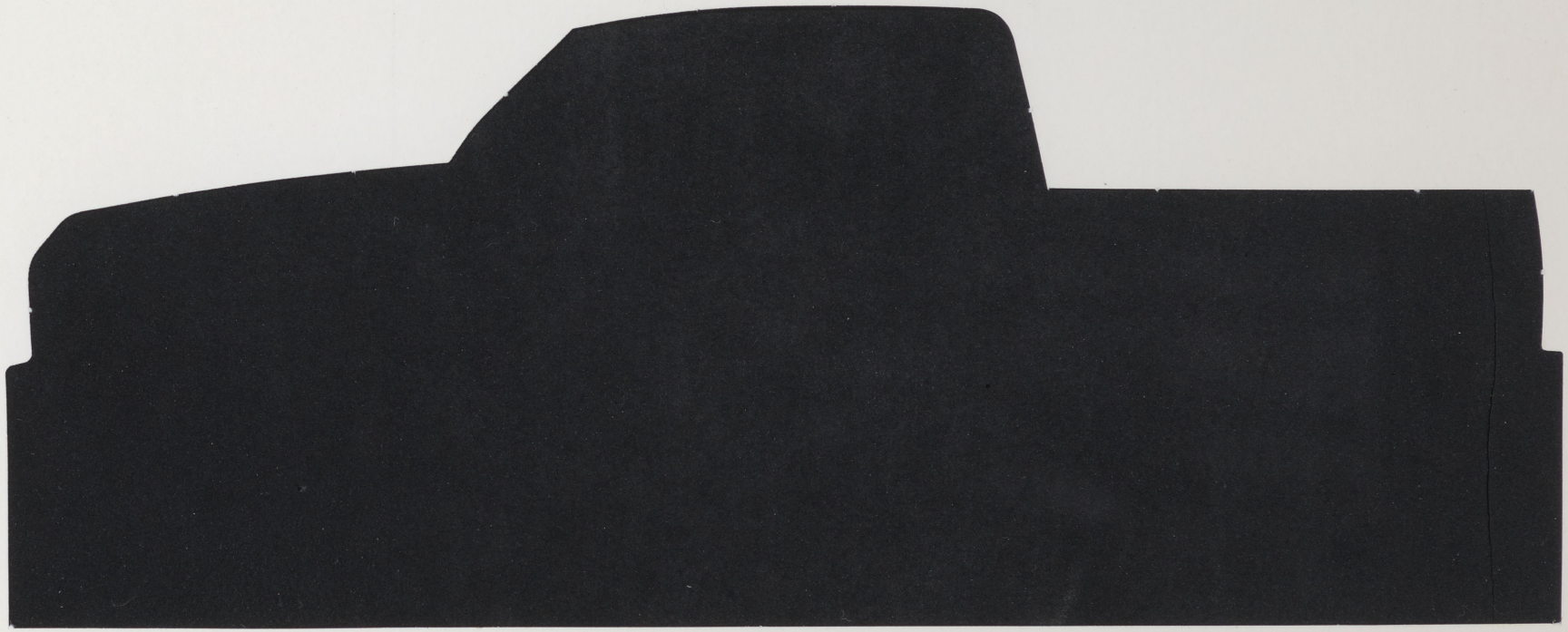
# Born Tough ... *Ranger for 1983*

Ford




*The pickup truck is as American as cowboys,*
*California, cornfields and suburban sprawl.*
*Born and bred in the pioneering spirit,*
*it caters to free-wheeling lifestyles of hard-working,*
*hard-playing, hard-driving Americans.*

# . . . An American Phenomenon . . .

If the pickup is an American phenomenon, it is also among the most enduring triumphs of Ford Motor Company's generations of design and engineering innovations. The very first vehicle Henry Ford made for sale was a panel truck. In 1917, the Company launched its first mass-produced one-ton truck, built on the chassis—and the success—of the Model T. Back in 1925, Ford introduced the pickup truck to American life.

Since then, Ford trucks have earned a reputation for endurance and what it means to be "Built Ford Tough." Today, Ford's truck expertise is known worldwide. Ford trucks are produced in 13 countries and sold in 80. In North America, in Europe, and in Latin America, Ford is number one in truck sales.

The Ford pickup truck is not only the Company's best-selling nameplate—car or truck—it is the top selling vehicle worldwide and has been for years.

Men, women, young and not so young, in rural, suburban and urban communities, North, South, East and West, discovered the many-sided pickup—its fun, its mobility, its rugged versatility. People gave up their single-purpose cars for a multi-mission vehicle and happily discovered they could have their comfort and convenience, too. People found that they could mix business with pleasure in a pickup . . . get away from it all . . . haul a load . . . go to town . . . or pack up gear and take to the hills, woods, and beaches.

For literally millions of Americans, the pickup invented new life-styles—or finally suited old ones—and it often cost them less than comparably-equipped cars. In the 1970's, the Ford pickup family—the F-100, F-150, F-250, F-350—became the best-selling vehicles in the Ford lineup.

Had it not been for the Iranian-inspired oil shock of 1979, this trend probably would have continued right into the wild blue yonder. But gas lines and rising prices jolted previously carefree Americans. In addition to rugged, reliable, rollicking transportation, they began to demand vehicles with higher fuel efficiency. In fact, high fuel efficiency became the number one purchase motivator, followed closely by the toughness and function of full-size pickups.

When fuel prices began to rise in 1979 and 1980, the North American truck market fell to 2.5 million units from its 1978 peak of 4.2 million. Buyers who needed trucks for commercial purposes still came around. But many who wanted them first for fun and secondarily for function could no longer ignore fuel economy and stayed away.

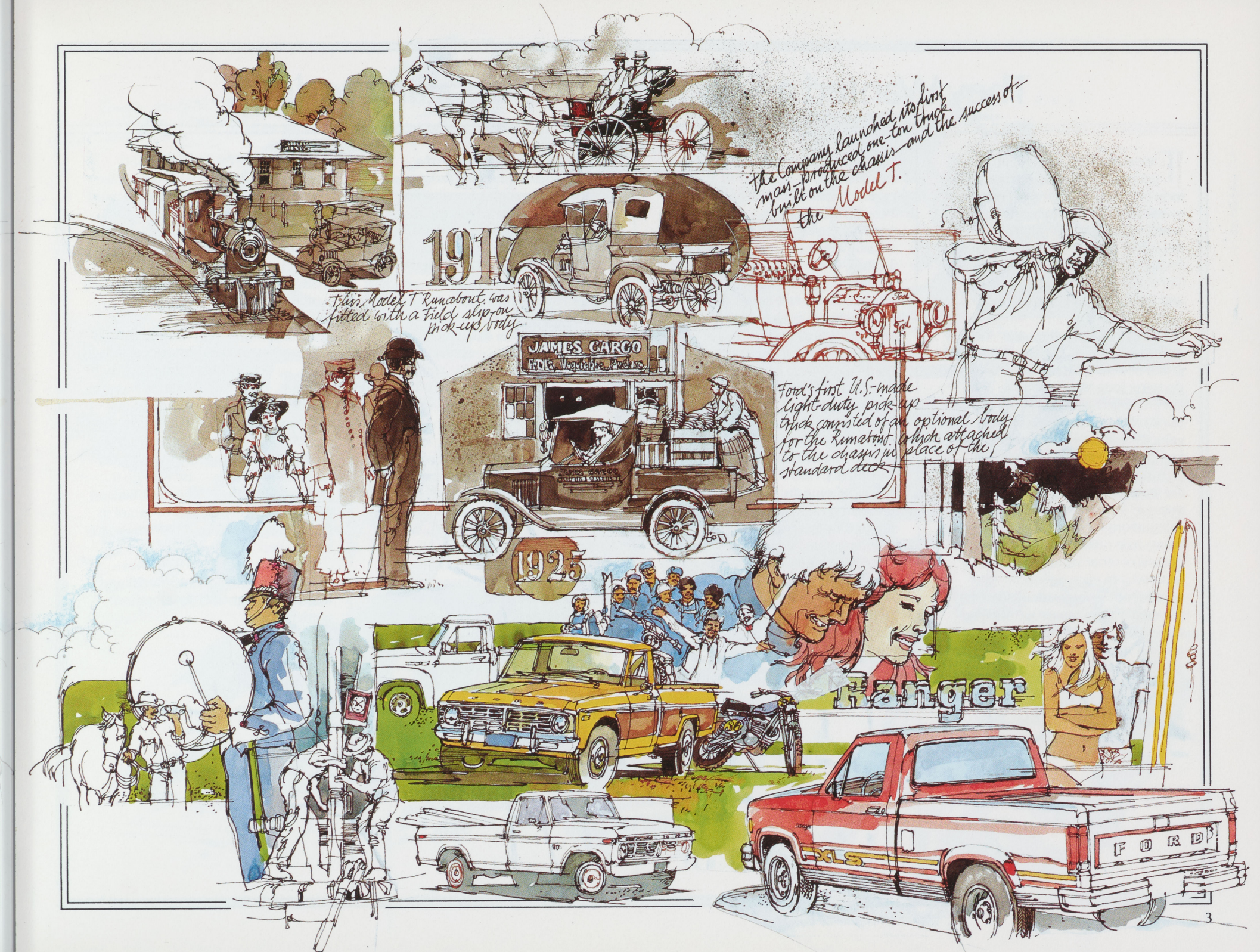
Fortunately, Ford had read the signals early. The Company had already spent almost $700 million to downsize the successful 1980 F-Series. But it was recognized, even before the F-Series was launched, that a full-fledged effort to recharge the pickup generation would require even smaller, more fuel-efficient, but still functional trucks. The compact pickup was a success just waiting to happen—and by 1980, Ford was already well into another $600 million plus light-truck development program to give buyers a new family of compact pickups.

Back in the 1970's, Ford had already begun to think about and plan the concept: a small and efficient but tough new pickup. It would have payload for commercial buyers, fuel economy for suburban truckers, and comfort and ride surprising even for luxury car devotees. It would respond to new realities, but sacrifice none of the old.

At the time, the market was about 95 percent full-size pickups—five percent compacts. Today it is 80-20 big-small. By 1985, Ford anticipates a 50-50 split. And if volumes recover by then, as expected, as many as two million buyers will want pickups, and over a million of them could be in the market for new compact pickups.

Ranger will enter this market on the heels of one of the most successful product development programs in the Company's history—one that was organized, planned, implemented and engineered on time and on target.

This booklet describes the five-year Ranger program: how it was conceived, planned, and followed through to the last detail. From every perspective, the program was successful, but two features stand out: the emphasis on quality . . . and the management methods used to achieve it, including, especially, a unique employe involvement program. The results are evident in thousands of technical details and a level of quality that should please the discerning buyer.


1917
This Model T Runabout was fitted with a field slip-on pick-up body
The Company launched its first mass-produced one-ton truck built on the chassis—and the success of—the Model T.
JAMES CARGO
1925
Ford's first U.S.-made light-duty pick-up truck consisted of an optional body for the Runabout which attached to the chassis in place of the standard deck
Ranger
XLS
FORD

# . . . They Wanted a Solid, Tough, Versatile Product . . .

Those involved in any major product program cannot always look back and say, "It's just what we wanted when we wanted it." Yet that is precisely how the Ranger is described by Ford truck executives. From the earliest planning stages in 1976, the Ranger program went well and established several company "firsts."

When the dust settled after the oil embargo of 1974, Ford put together a group of creative middle managers to do some long-term planning. They were charged with analyzing all future truck plans, determining what kinds of vehicles were needed to double the fuel economy of Ford's truck fleet.

Truck complexities are such that the team often found they had as many as 1,000 entries in their calculations for one model. Power-trains, axle ratios, inertia weights and dozens of other variables had to be factored into each equation. After burning out several calculators, they turned to Ford's most sophisticated computers to work out complex gaming studies for measuring precisely where every possible combination of vehicles would lead.

The results were revealing. According to the computer, if significant fuel economy improvements were to be achieved by the mid-1980's, some 40 to 50% of the truck fleet would have to have four-cylinder engines. Ironically, this discovery came at the height of the industry's success with full-size pickups, when more than 80 percent of those trucks had eight-cylinder engines, and when the all-new, more fuel-efficient F-Series program was already well underway.

The implications were clear: the trend would have to be toward smaller trucks designed around smaller engines—a bigger step than the industry had previously been willing to consider.

Once the direction had been established, Ford's truck planners began defining the vehicle and developing concept sketches. At the outset, they established several important criteria which were later quantified as program objectives:

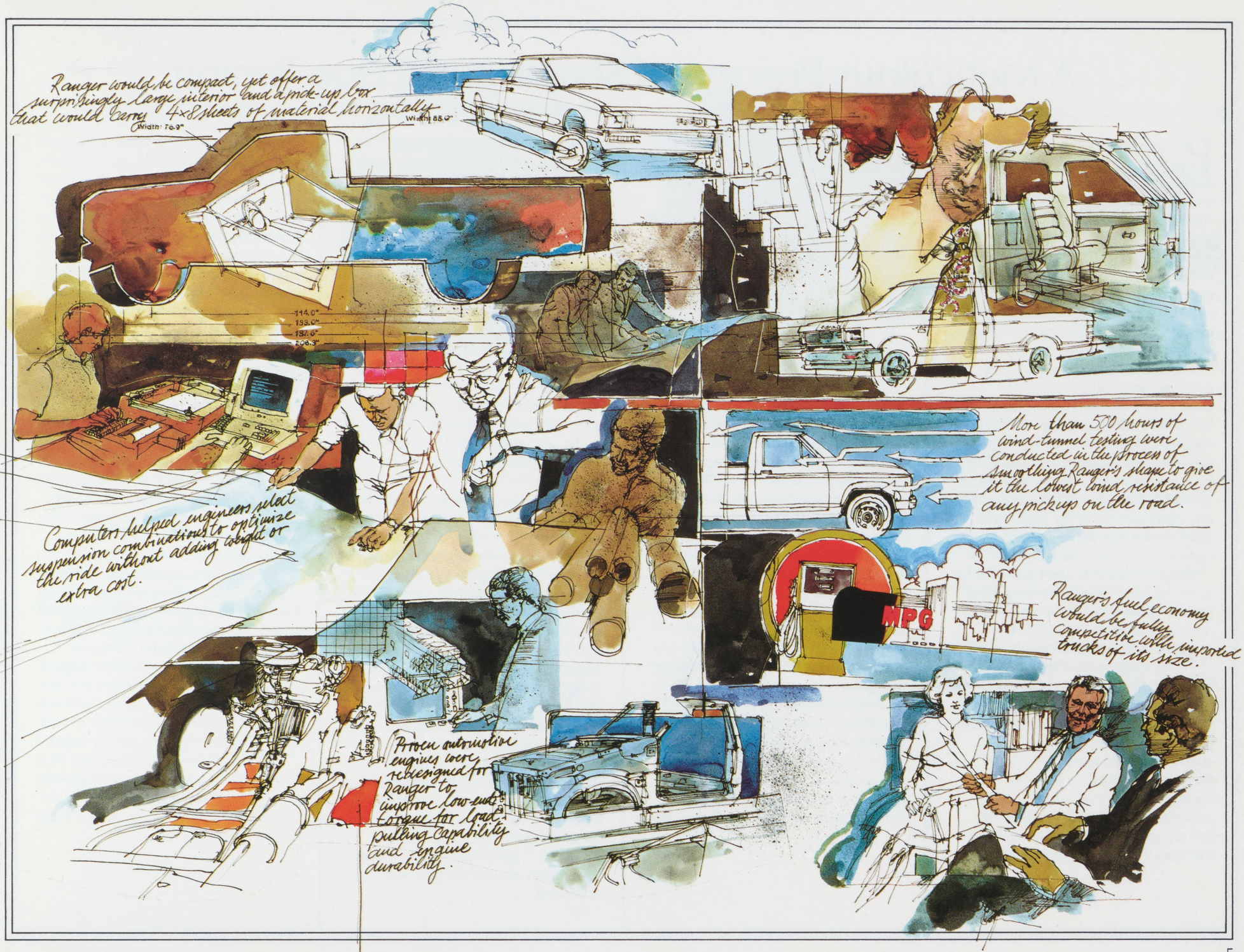
- Ranger would go head-to-head with imported trucks on fuel economy without compromising payload or utility.
- Ranger would incorporate the design and engineering toughness that had been critical in establishing Ford's leadership in full-size trucks.
- Ranger would achieve excellent ratings for quality, durability, reliability, ride and handling.
- Ranger would appeal to the broadest spectrum of truck buyers for both functional and personal use.
- Ranger would be developed as an integral part of the total truck business plan, not as an isolated product.

By early 1977, the planning team had developed several concepts for the new small truck. Taking 3/8-scale and full-scale models into the field, they tested them among owners of all kinds of trucks—large, small, imports, domestics. The exercise zeroed in on a number of characteristics that were universally important.

Significantly, the research confirmed that people expected even compact trucks to be real trucks—more than passenger-car derivatives, or tinny toys. They wanted a solid, tough, versatile product. Moreover, it was not the size that made the difference, but the look, feel and functional image the whole package created. In addition, customers stated they wanted a three-passenger cab with room and conveniences needed to make even six-foot Americans feel comfortable. Little details also mattered—like a five-bolt vs. four-bolt wheel, a strong truck stance and trailer towing capability.

Incorporating modifications based on their research, the planners defined the basic elements of the complete program. First, the Ranger 4x2 would be the standard-bearer of a full-line small truck family; then, over the next two years, a 4x4, a diesel engine, a five-speed transmission and a totally new utility vehicle—the Bronco II. Ranger's objectives were defined and quantified. A fuel economy target in the high 20 mpg (city label) range was established.

On November 26, 1979, the Ranger program was approved, and intensive design and development work began.


Ranger would be compact, yet offer a surprisingly large interior and a pick-up box that would carry 4×8 sheets of material horizontally
Width: 76.9"
Width: 88.0"
114.0"
133.0"
188.6"
206.3"
Computers helped engineers select suspension combinations to optimize the ride without adding weight or extra cost.
More than 500 hours of wind-tunnel testing were conducted in the process of smoothing Ranger's shape to give it the lowest wind resistance of any pickups on the road.
MPG
Ranger's fuel economy would be fully competitive with imported trucks of its size.
Proven automotive engines were redesigned for Ranger to improve low-end torque for load-pulling capability and engine durability.

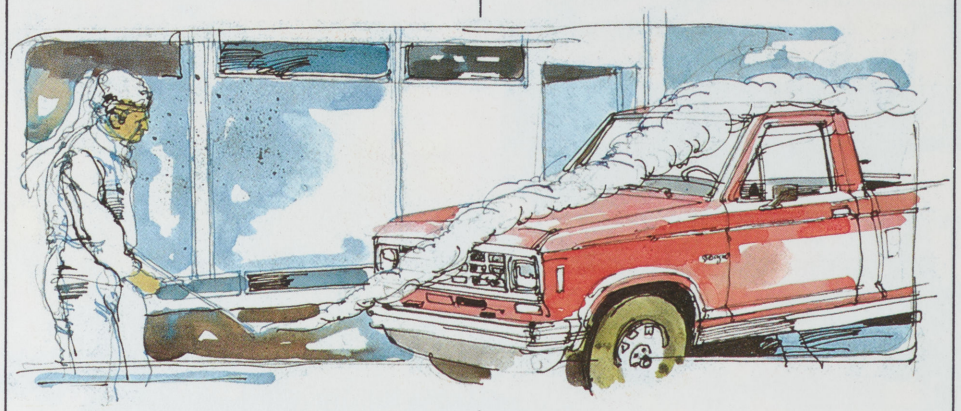
# . . . A Meticulous Process of Shaping and Fine-Tuning . . .

Product development is a synergistic process, involving teams of experts methodically working toward goals, resolving issues, reviewing, revising and reviewing again, until dozens of interrelated components and details come together in a sound and reliable system. No single factor is considered independently, no problem can go unresolved and, in the case of Ranger, no objective was to go unmet.

From a design and engineering point of view, Ranger program objectives presented three major technical challenges: first, achieving maximum fuel economy without sacrificing anything in payload or full-function; second, achieving ride and handling characteristics superior to any other vehicle in the class; and third, achieving high standards of quality, durability and reliability.

Ranger's fuel economy goal was set in the high 20's for city driving. The aerodynamic shape, the powertrain and the vehicle weight were key factors in achieving the target.

*The aerodynamic shape* . . . At the Design Center, where Ranger's exterior personality was transformed from concept to prototype, the design team worked side by side with the aerodynamic engineers. Together they concentrated on shaping Ranger's image and, most importantly, on making it the most aerodynamically efficient pickup on the road. The designers focused



principally on making this small vehicle look as tough as the jobs it is going to perform. The aerodynamic engineers concentrated on smoothing every surface to optimize air-flow over, around and through the vehicle. The objective was to minimize wind resistance, or drag, which is critical to fuel economy goals. The more wind resistance, the more energy it takes to move the vehicle through the air.

The Ranger program targeted a 15 percent improvement in drag co-efficient over the redesigned F-Series—which is 13 percent better than its predecessor. The drag co-efficient measures wind resistance—that is, how well the body slides through the air.

Design and air flow management involved a meticulous evolutionary process of shaping and fine-tuning. Every surface was studied, every detail considered, first with 3/8-scale and later full-scale clay models in the studio and at the University of Maryland and Lockheed wind tunnels.

The three areas that received most attention were the frontal projection, the A-pillar between the windshield and the door, and the pickup box, where wind turbulence is greatest. Over a period of several months, during which each clay model was used five times for a total of almost 500 hours of wind-tunnel testing, the Ranger silhouette emerged. The body lines were strengthened . . . the hood and fender surfaces smartly tapered . . . the windshield angled back . . . the door offsets and drip molding optimized . . . a spoiler added to reduce turbulence at the underbody . . . headlamps rounded . . . backlite tapered . . . rocker-panel emphasized around the wheels . . . bumpers softened . . . grille narrowed . . . even the air flow around the box was improved.

Looking at the Ranger now, it is a solid, sporty, modern pickup truck. And the team's efforts paid off with a 20 percent improvement over the original theme to give Ranger the lowest drag rating of any pickup on the road and even better than some passenger cars. The higher-than-expected achievement contributed one mile per gallon to Ranger's fuel economy rating.

*The powertrain* . . . Early in the Ranger program, management decided that meaningful fuel economy improvements over existing pickup trucks could be achieved only by making a commitment to using four-cylinder engines. The major engineering challenge laid, therefore, in providing a powertrain that would deliver maximum efficiency plus performance and function comparable to full-size pickups.

After considering alternatives, the powertrain team selected two existing four-cylinder engines: a 2.0-liter gasoline engine for the base vehicle with a 2.3-liter option.

Ranger program funds were spent to improve engine durability, efficiency and reliability in truck applications. Indeed, priorities in the Ranger powertrain program were effectively focused on improving both the 2.0L and the 2.3L engines to enhance performance and fuel economy without sacrifice to durability. For example, the engines were redesigned with a new intake manifold, a revised camshaft, and a one-barrel carburetor to provide improved low-end torque for load pulling capability and engine durability. The torque improvement also allowed better powertrain matching for truck application. In addition, a new valve train was designed to reduce friction to a minimum, thus permitting greater operating efficiency, which translated to better fuel economy.

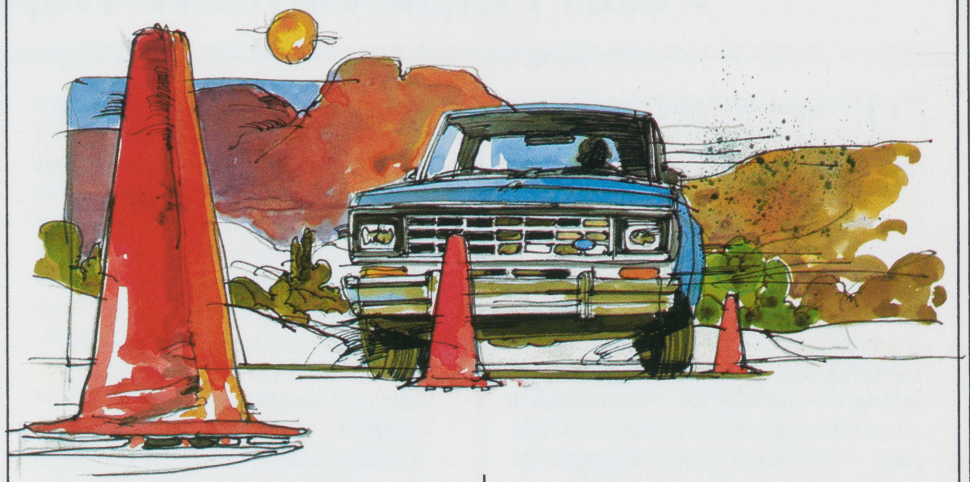
The Ranger powertrain was subjected to approximately 1,700,000 miles of in-vehicle durability testing. Both durability and reliability objectives were stiffer than for any other Ford engine and gave Ranger performance comparable for its size to full-size pickups.

If no compromise was made on the Ranger's engine performance, neither was any made on the rest of the drivetrain. Also significant was the 3.08 or 3.45 rear-axle ratio which Ranger owners may choose with both 2.0L and 2.3L engines and manual four-speed transmission, or with the 2.3L three-speed automatic transmission.

*The vehicle weight*... For any given engine, there is a direct correlation between low inertia (curb) weight and fuel economy. A prime engineering challenge, therefore, was to design the vehicle to meet the weight objective that was established to provide optimum fuel economy. Keeping vehicle weight down was as hard as fending off temptation in a candy store, especially since many functional requirements implied added weight.

Three factors were most responsible for bringing Ranger's weight in on target: day-in, day-out efforts by every engineer involved to reduce weight wherever possible... the use of sophisticated computer-based structural analysis techniques to optimize design of parts and components without adding weight ... and innovative use of premium lightweight materials.

The use of lightweight materials, alone, produced a 20 percent saving in Ranger's weight—about four-fifths of which resulted from the use of high-strength steel. Several unique applications represent important innovations in the industry:



- *The Pre-Assembled Hydraulic Clutch*–Master and slave cylinders are made from premium materials and all are tested before being installed in the vehicle. A self-adjustment feature makes the system virtually maintenance-free in normal service.
- *The Magnesium Clutch Housing*–The clutch housing is cast of magnesium instead of aluminum and saves approximately 25 percent in weight. This application represents the leading edge of technology.
- *The Clutch Disc Friction Material*–This material is manufactured with reduced asbestos and shows long life and superior performance.
- *The Aluminum 4x4 Axle Differential Case*–This is a first for trucks and saves approximately 18 pounds over cast iron of comparable strength.
- *The HSLA Wheels*–Both spider and rims are made from a low-sulfur HSLA steel typically used for critical pipe line applications.
- *The Magnesium Brake and Clutch Pedal Support Bracket*–The bracket is substantially lighter than its aluminum predecessor.
- *The Non-Asbestos Brake Lining*–Another first in the industry, the brake linings are made with either fiberglass or steel wool plus binder material.

# . . . "I Can't Believe How They Made That Ranger Ride" . . .

"I've been ridin' and drivin' for 40 years and I can't believe how they made that Ranger ride . . ." Even hard-bitten, veteran engineers take their hats off to another winner in Ford's long tradition of outstanding ride and handling achievements.

From the start of the Ranger development program, the ride and handling engineers set their sights on giving this pickup the "best possible suspension system of any truck on the road." They knew where to begin: the Ford-developed, time-honored Twin-I-Beam, a premier suspension system, for "toughness" in trucks.

The Twin-I's advantages are, by now, an engineering fact: its wide stance, twin-attachment points, its machined-in caster and camber precision, and its radius arm pivot-bracket location give it excellent anti-dive characteristics and inherently low harshness "as it rides the punch," according to old hands.

But Ranger's ride only started with Twin-I. As the team of 20 seasoned chassis and suspension engineers got going, they laid out a long-term program with two major thrusts:

- To balance front and rear wheel rates to achieve the minimum possible pitch and bounce, and
- To design-in enough suspension travel to achieve the lowest spring rates and lowest ride frequencies possible.

Fundamentally, this was a question of trading off a lot of variables, such as vehicle package, attitude, handling, roll, load, weight and cost. Often, such trade-offs result in a compromise. Not this time. The Ranger ride and handling team came up with a unique solution worthy of the name Ford.

The solution came via the great modern slide-rule: the computer. Over a period of several months, the engineers used the computer to calculate and recalculate the effect of several hundred suspension combinations, to find the optimum balance between front and rear spring rates. Countless computer runs later, the best alternatives, in terms of weight and cost as well as ride, were tested in several prototype vehicles. After rigorous and comprehensive vehicle testing, loaded and empty, the team found—and later verified on the computer—that a 310-pound front spring rate was not only superior for all ride and handling characteristics, but also eliminated the need for a standard front stabilizer bar and permitted alignment setting for uniform tire-tread wear under almost any conditions.

Once they determined the front spring rate, the team turned to the task of lengthening the rear spring and enlarging the jounce travel to about four inches, the ideal for the most acceptable ride frequencies. This is where years of Ford experience and hours of engineering and evaluation rides paid off.

The team knew very well that adjusting and readjusting that rear suspension until it worked precisely right with the front suspension would separate Ranger from the typical compact pickup ride that turns Americans off. And the excellent ride of every Ranger is assured because front and rear rates will be computer-selected individually, according to the options and payload of every vehicle.

Moreover, the suspension team was determined that Ranger's handling would not be sacrificed to its ride the way most other vehicles' are. In fact, the front and rear springs selection also takes into account road couple distribution to eliminate oversteer and give excellent down-the-road directional stability. In addition, vehicle attitude was controlled at an acceptable level, loaded or unloaded.

# "Quality"...Endurance Plus...

In engineering circles, they call it DQR—Durability, Quality, Reliability. It is fitting, because quality cannot stand alone. It is part of, supported by, and dependent on one of the major efforts throughout a vehicle program: to ensure the durability and reliability of every part of the system.

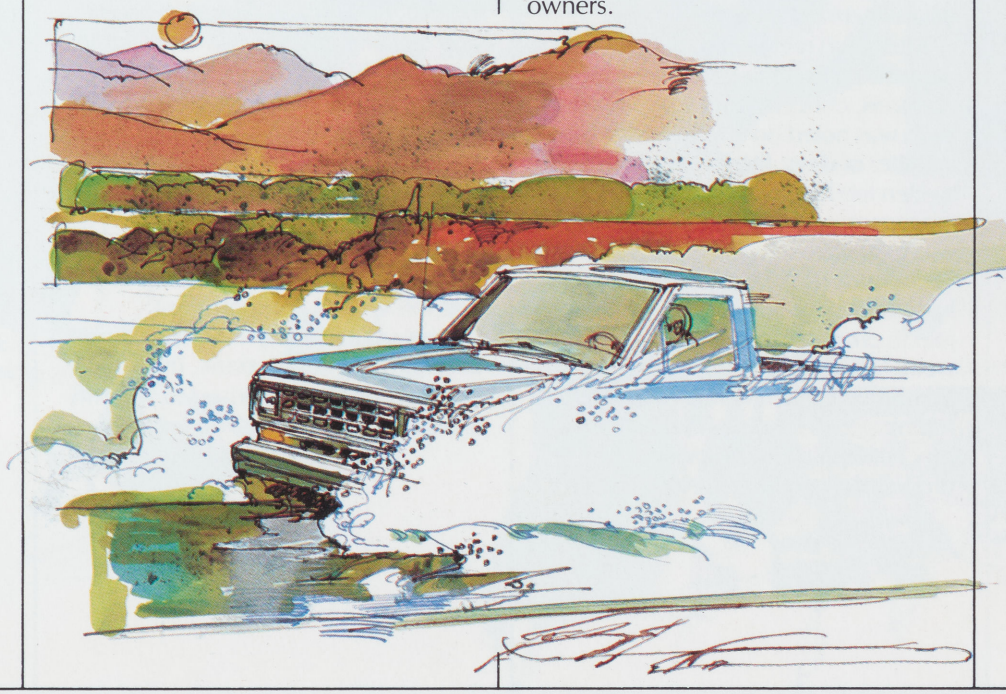
To the technical people durability and reliability spell attention to thousands of details, exhaustive testing and meaningful ways to measure progress against goals. To the eventual owner, their efforts are perceptible through use and basically come down to endurance plus minimum problems—which is another way of saying "quality."

DQR begins with design and engineering and extends through every phase of manufacturing and assembly. Ranger's durability effort began early in program proveout at the Arizona Proving Ground—Ford's year-round test facility with a mix of almost every surface anyone would likely drive on. The durability team began by using the same criteria that Ford uses for the full-size F-Series pickups. Ranger durability was to be equal to or better than its full-size Ford counterpart.

Simultaneously, Ford surveyed more than 1,600 full-size and compact truck owners nationwide to find out how they used them, on what kinds of roads and under what loads and conditions. Armed with responses as varied as the pickup is versatile, the team put Ranger through a rigorous test program at the Proving Ground which simulated the extreme conditions cross-country explorers, construction workers or oil field roughnecks might encounter. Ranger prototypes were subjected to the same tough course and conditions as the new downsized F-Series underwent in its development. Data was collected and results correlated with consumer requirements for durability over years of driving under such conditions.

As the program proceeded over many months, the team increasingly interacted with specialists in design analysis and laboratory testing. The same cycle was repeated over and over again: Proving Ground test, problem identification, issue analysis, redesign, part procurement, laboratory testing or sophisticated scientific analysis... and then back to the Proving Ground until they were satisfied.

The total Ranger test plan involved more than 130 vehicles, approximately 1.5 million miles of durability testing—to be 2.5 million when the whole Ranger family is on line—and 300,000 hours of laboratory tests. The result is a compact pickup tested to the standards of a full-size truck and the special long-term needs of pickup owners.



Ford's commitment to durability can be measured by the $25 million fund established to improve this item alone... through design, manufacturing and assembly.

The list of achievements is a long one: the lubed-for-life, self-adjusting hydraulic clutch linkage system... computer-designed magnesium clutch housing, stronger and lighter... pin-rail caliper front disc brakes that give more even lining wear, and reduce vibration and shudder... steering linkage with rubber-lined ball joint sockets to improve center feel and eliminate maintenance... lube-free front and rear suspension... urethane windshield retention for better sealing and added greenhouse strength... weld-on front-end sheet metal to improve door and hood margins as well as reduce squeaks and rattles... newly designed engine mounts for top-down torquing... tire-wheel matching to improve ride and reduce vibration... computerized electrical system testing... computer-controlled front-end alignment for reduced tire wear and minimum alignment warranty... optimized rear axle ratios... extensive supplier upgrade program... computer-designed instrument panel... extensive use of computer graphics, finite element analysis and stress analysis... and a major engine program to improve low-end torque and cam wear.

# . . . "Our Quality Will Stack Up Against Anyone's" . . .

It is not so much that they have their own special Ranger Employe Involvement (EI) seal . . . or that an hourly employe was given time off to design and execute it . . . or that it appears on walls, letterheads, memos and clothes everywhere at Ford's Louisville Assembly Plant where Ranger will be built. What counts is that every worker takes it personally and believes it means something special. And at Louisville, it does.

EI at Louisville means the workers actually helped design the Ranger: it is their product, it is their business, it is their pride that is on the line, and they are ready and raring to start building it to show what they can do to equal or exceed the quality of any competitive truck—domestic or imported.

Initiated more than 18 months before production start-up, the Ranger EI program involves system by system design reviews by assembly operators, line supervisors, plant management and design and engineering personnel from early developmental phases through Job 1. One by one, prototype vehicles or specific systems—such as the chassis, the pickup box and tailgate structure, the powertrain package, or the interior seats and trim—were shipped to Louisville. There, the plant's "Good Old Friday Noon News" announced its arrival with fanfare and invited everyone to attend scheduled reviews.

They gathered around the prototypes, placed where the line operations will be performed. Examining all the hardware, the group was encouraged to take things apart, study them, ask questions, banter, and discuss ways to revise design or processing or even plant facilities—anything to improve the quality or reliability of the system.

After each review, the participants were asked for their comments, opinions, concerns and suggestions. Each was noted on a form and within a matter of days, the employe had written feedback in hand from plant management explaining what action was to be taken.

Enthusiasm for the program ran so high that operators were invited to join in production tests—such as water leak tests, electrocoating, component attachments, or fuel-fill testing—to determine how well these procedures will work under production conditions. At the same time, assembly and design engineers and operators were involved in a series of prototype reviews in Dearborn to identify and resolve assembly concerns during the build process.

By the end of the reviews, most employes, including repairmen and quality assurance operators, had taken an active part. Management received a total of 376 quality and reliability improvement proposals, of which more than half were incorporated into the Ranger program.

Among the changes made in response to employe proposals were a redesigned fuel filler pipe grommet to provide consistent clamp orientation for servicing; redesigned brake hose bracket for cost and weight savings; and facilities and process revisions to improve electrocoat coverage in the cab. Louisville participation in the prototype builds resulted in significant reductions in the Ranger's complexity and resolution of some important assembly issues such as how the pickup box is attached.

Perhaps the most significant result was the engine compartment "clean-up campaign." Responding to employes' suggestions, the engine compartment was revised to simplify assembly and repair. The workers were delighted—as much by the fact that their ideas had been taken seriously as by the enormous progress that had been made.

Clearly, the Ranger EI program brings the workers closer and better prepared to what they ultimately build. Equally important, it gave designers some insights that they might not have had—for Ranger and for future programs.

At Louisville, they believe EI really means something special:

"Yes. I put my 2¢ in and they used my idea in the next design we saw . . ."

"It's not a snow job . . . they actually made the changes we suggested . . ."

"I couldn't design it from scratch . . . but I can look at the design and see from my experience what has to be done . . ."

"They're going to make it work, because it was invented here . . ."

"With this crew, our quality will stack up against anyone . . . and I mean anyone . . ."

"We're doing business a different way . . ."


EI
EMPLOYE INVOLVEMENT
UAW — FORD
Employe involvement enables management, salaried and hourly employes to become partners in quality.
With their hands on prototype parts, assembly operators suggested improvements on the build procedures at their line stations.

# . . . Louisville . . . Will Rival Any Truck Plant . . .

Ford chose the Louisville Assembly Plant to build Ranger for a lot of good reasons. The plant ranked second in a worldwide quality audit of all Ford plants, had been turning out cars and trucks steadily since 1955 and had one of the smoothest launches in Ford history with the 1980 F-Series.

Preparing Ranger's manufacture and assembly was a two-pronged effort: first, plant involvement in product development to ensure its feasibility for high-volume production; and second, modernizing a large portion of the plant's 1.7 million square feet of space, which is enough room to accommodate the entire Ranger family.

Plant management worked closely with designers and engineers during each prototype phase from the earliest builds with hand-made-and-assembled components.

With Ranger, involvement was not only earlier, but also more comprehensive than ever. In each phase, process and systems engineers reviewed, evaluated the risk to quality goals, and signed off on every element of the vehicle. The advantage of this thorough participation really shows up when the first 100 to 300 pre-production trucks are run off on the line. During this special 12-day cycle, plant employes become familiar with their jobs and establish their own work patterns. Any quality problems that become apparent at this point must be corrected before full production starts. By the end of this process, several people have signed off several times on each detail of the Ranger.

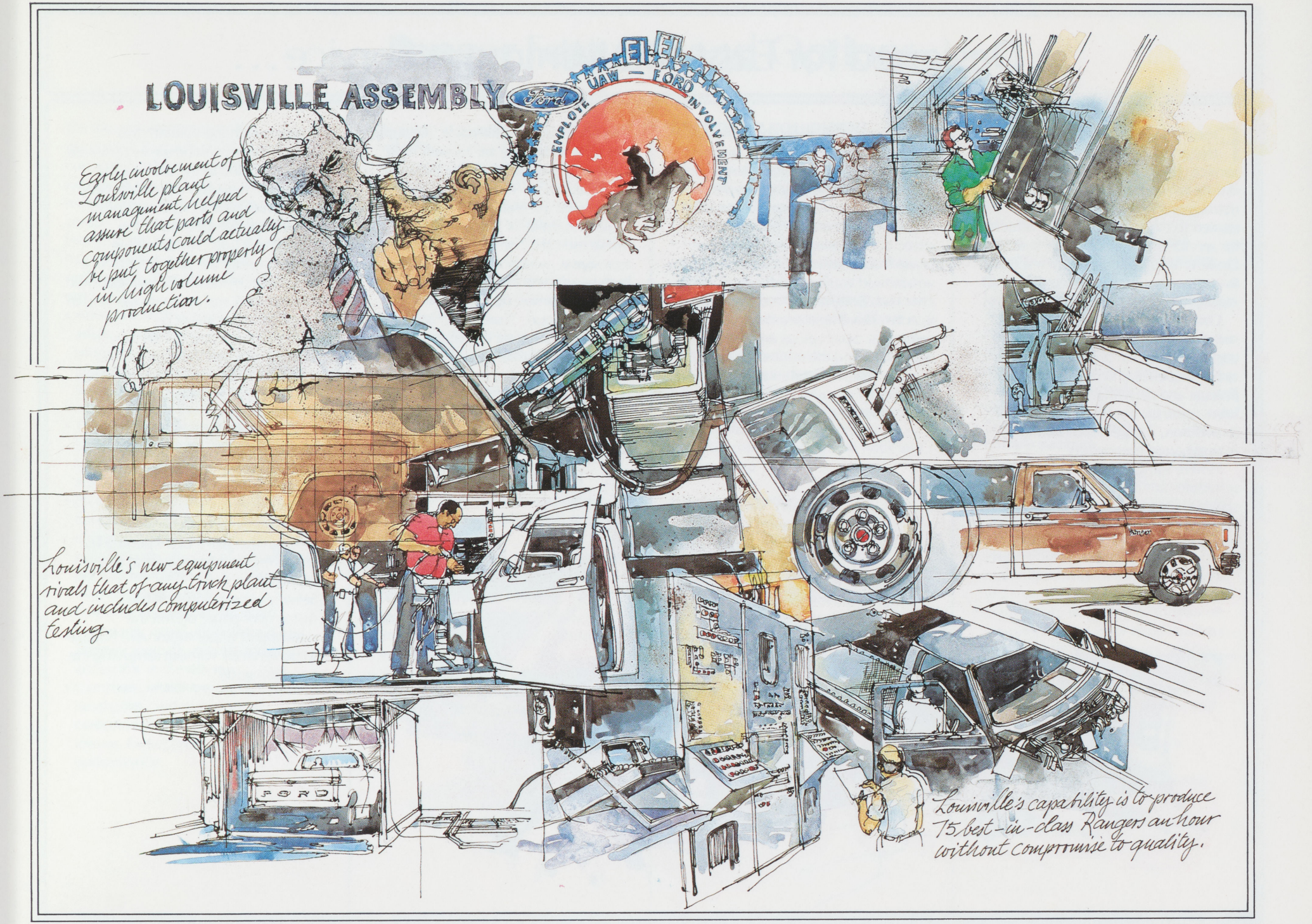
If all systems are "go," Job One is given the green light. But that is not the end of quality control. After four days of production, all responsible activities thoroughly inspect vehicles coming off the line and make a final determination that the quality is indeed "O.K. to ship."

During the long and complex process, a parallel one is underway to get Louisville ready for Ranger production. As a working tool for start-up, a complete scale model of the entire plant, as it will be refurbished, is set up so that everyone can become familiar with it before Job One. Little red boxes show basic equipment . . . blue are robots . . . green are stock racks . . . yellow lines running through the model are overhead conveyors.

Indeed, the Louisville of the Ranger generation is quite different from what it used to be. Most of the welding subsystems have been re-engineered to produce up to 100 jobs per hour. More than 90 per cent of the spot welding is automatic. New material handling magazines allow more efficient utilization of manpower and contribute to Ranger's ambitious line speed.

When it is completed, Louisville's advanced equipment will rival any truck plant: the UNIMETS electronic testing device for completely testing the entire instrument panel before installation . . . roll-test machines for dynamic brake tests . . . a tire and wheel assembly which perfectly matches 425 sets of rims and tires every hour for the best balance points before weights are applied . . . an automatic toe-in machine.

All of this preparation and training and equipping is organized and integrated to support one thing: a production line which turns out 75 Rangers every hour—Ford Motor Company's fastest vehicle assembly line with the highest quality levels ever set. Louisville is ready: the attention to detail, the early involvement in product development, the latest equipment, the unique Employe Involvement program, the special utility workers on each line for quality assurance, checks and double checks—all count when the line rolls.


LOUISVILLE ASSEMBLY
Ford
EMPLOYEE INVOLVEMENT
UAW — FORD
EI
Early involvement of Louisville plant management helped assure that parts and components could actually be put together properly in high volume production.
Louisville's new equipment rivals that of any truck plant and includes computerized testing.
Louisville's capability is to produce 75 best-in-class Rangers an hour without compromise to quality.

# . . . Designed for Easy and Minimum Service . . .

From its inception, Ranger was designed for easy and minimum service. Ranger was the first program during which dealership service managers and technicians were invited to examine prototype vehicles for service and maintenance features. Dozens of suggestions were fed back to engineers who evaluated them and incorporated many in the final design.

One of Ranger's greatest achievements is the elimination of many traditional service procedures. The entire suspension system, steering linkage and driveshaft require no lubrication for the life of the vehicle. In addition, Ranger features a maintenance-free battery.

Where Ranger does require service, schedules are impressively well spaced. For example, spark plugs and the air filter are recommended for replacement every 30,000 miles.

Headlamps, taillamps and grilles all have simple screw fasteners with direct access for fumble-free removal.

Under the hood, most service operations are simple and accessible. Fluid levels for engine oil and automatic transmission, power steering, brake master cylinder, clutch and windshield washer fluids are all easily checked. Several of these functions feature convenient see-through reservoirs. Spark plugs are easily accessible and the coolant drain cock is easily reached from under the hood with plenty of room underneath for uninterrupted coolant drainage.

In addition, the alternator, air pump and power steering are located right up front and on top for easy removal and installation. The starter motor is also clearly accessible.

Serviceability is just as apparent inside the cab. The ignition, horn, turn signal, windshield wiper and high beam switches are serviced simply by removing the steering column shroud. There is no need to remove the steering wheel or work under the instrument panel. The fuse block is mounted to the left of the steering column at the bottom of the instrument panel and is covered by a small trim panel which can be removed without tools.

Underneath the vehicle, the exhaust system can be easily removed or replaced due to the use of a flat flange joint between the catalyst and muffler inlet pipe as well as slip-on hangers that do not require the removal of a bolt. The spare tire is mounted under the pickup bed on a carrier that conveniently swings down when needed and is otherwise held in place by the tire wrench.

When more complex service is called for, Ranger's design allows service personnel to keep both repair time and costs at reasonable levels. Some examples:

- The air conditioner/heater blower motor, located in the engine compartment, can be serviced by removing three screws and disconnecting the wire harness.
- The heater core can be serviced through the glove box opening by removing an access door in the plenum.
- Service access doors on the instrument panel permit the windshield wiper motor and linkage to be serviced without removing the cowl top grille.

# Ranger Features and Options

It is the important inches that distinguish Ranger's comfort and convenience from every other compact pickup on the road. Key inches are what make Ranger a big little truck: a compact that looks big and acts big and feels big, because Ford's truck designers have made the most of every opportunity. Proof is evident inside and out:

- Adequate seating room for three adults; comfortable head room, leg room and hip room dimensions, and chair-like "command" seating with foam-on-spring seat construction for American-style comfort.
- Twin-I-Beam front suspension with high-strength steel stamped axles, lubed-for-life ball joints and camber adjustment capability.
- Pickup box with double-wall construction; one-piece, quick-release tailgate; integral stake pockets and rope tie holes, and sidewall support pockets for loading 4x8 sheet materials horizontally.
- Ford's first computer-designed instrument panel with displays and controls logically placed and easily accessible to the driver.
- Camshaft, intake manifold, cylinder head ports, and single-throat carburetor designed for good low-end torque, fuel economy and performance.
- Weld-on front-end sheet metal for tight door and hood margins and fewer squeaks and rattles.
- Ventilated and self-adjusting hydraulic clutch for smooth operation, extended life and reduced maintenance.
- Unique magnesium clutch housing for weight reduction.
- 4-speed manual transmission designed for shifting ease with a crisp, positive feel.
- Pin-rail slider front disc brakes for more even lining wear and less vibration.
- Computer-selected front and rear springs based on total option weight of each individual truck to ensure optimal ride and proper vehicle attitude.
- Computer-controlled front-end alignment for tighter tolerances which reduce tire wear and maintenance costs.
- Computerized electrical system testing for thorough systems check before vehicle shipment.
- Harmonic variations of wheels and tires matched to provide excellent ride quality.
- Extensive corrosion protection with three-year, unlimited mileage warranty against perforation.

## STANDARD EQUIPMENT

- 2.0-liter engine.
- 4-speed manual transmission.
- 1200-pound payload.
- Maintainance-free battery.
- 14.5 gallon midship gas tank.
- P185/75R-14SL glass-belted radial tires.
- Forced air ventilation with four instrument panel registers and a four-speed fan.
- Three-nozzle defroster.
- Halogen headlamps.
- Inside hood release.
- Covered glove box plus open storage bin on standard instrument panel.
- Interior trim including coat hook and dome lamp.

## RANGER OPTIONS

- 2.3-liter engine.
- Automatic transmission.
- XL, XLT Lariat and XLS trim groups, including rocker panel molding, accent paint or tape stripes and upgraded interior trim.
- 1,600-pound payload.
- P195/75R-14SL steel-belted radial tires.
- P205/75R-14SL steel-belted radial tires.
- Power steering.
- Power brakes.
- Air conditioning.
- 13 gallon auxiliary fuel tank.
- Step bumper.
- Tinted glass.
- Tilt steering wheel.
- Sliding rear window.
- Vent windows.
- Reclining bucket seats.
- AM, AM/FM Monaural, AM/FM stereo, AM/FM 8-track, AM/FM Cassette and radio flexibility sound options.
- Low-mount western swing-away outside mirrors.
- Heavy duty alternator and battery.
- Styled steel wheels.
- Auxiliary transmission oil cooler.
- Cast aluminum wheels.
- Deluxe wheel trim.
- Trailer towing package.
- Camper package.
- Exterior protection group, including chrome front bumper with bumper guards and end caps, upper bodyside molding, and door edge guards.
- Convenience group, including dual electric horns, cigar lighter, intermittent wipers, day/night mirror, and visor vanity mirror.
- Light group, including headlamp-on warning buzzer, right-hand courtesy lamp switch, glove box and ashtray, and cargo lamp.
- Security lock group, including lockable gas cap(s), glove box, and under frame spare tire carrier.
- Three different two-tone paint schemes.
- Fourteen exterior and four interior colors.

# Coming Attractions in the Ranger Family

The 1983 Ranger is Ford's first domestic compact pickup—and the first member of a most appealing family. After the Ranger 4x2 (coming in the spring of '82), the rest of the Rangers will follow in rapid succession: a 4x4 option . . . a diesel engine . . . a five-speed overdrive transmission . . . then the long-awaited Bronco II . . . and more, each one built on Ranger quality and strength.

# Ranger Specifications

| | Short WB | Long WB |
|---|---|---|
| Wheelbase | 108.0″ | 114.0″ |
| Length | 175.6″ | 187.6″ |
| Height | 63.9″ | 63.9″ |
| Width | 65.0″ | 65.0″ |
| Box: Inside Length at Floor | 72.0″ | 84.0″ |
| Maximum Inside Width at Floor | 54.3″ | 54.3″ |
| Width Between Wheelhouses | 40.4″ | 40.4″ |
| Side Panel Height | 16.6″ | 16.6″ |
| Tread: Front | 55.0″ | 55.0″ |
| Rear | 54.6″ | 54.6″ |
| Interior: Head Room | 39.2″ | 39.2″ |
| Hip Room | 55.0″ | 55.0″ |
| Leg Room | 42.1″ | 42.1″ |
| Shoulder Room | 55.6″ | 55.6″ |
| Curb Weight | 2526 lbs. | 2559 lbs. |
| Payload: Standard | 1200 lbs. | 1200 lbs. |
| Optional | 1600 lbs. | 1600 lbs. |
| Fuel Tank Capacity: Standard | 14.5 gallons | 14.5 gallons |
| Auxiliary | 13.0 gallons | 13.0 gallons |
| Turning Diameter | 36.4 feet | 38.2 feet |

**Powertrain**

Engines: 2.0L I-4 gas
Torque: 104 ft-lbs. at 2600 rpm
Horsepower: 73 hp at 4000 rpm

2.3L I-4 gas
Torque: 116 ft-lbs at 2400 rpm
Horsepower: 80 hp at 4000 rpm

Transmissions: 4-speed manual
3-speed automatic

| Axle Ratios: | 2.0L-M4* | 2.0L-M4 | 2.3L-M4 | 2.3L-A3 |
|---|---|---|---|---|
| Standard | 3.08 | 3.45 | 3.08 | 3.08 |
| Optional | — | — | 3.45 | 3.45 |

*With fuel-saver package only

PRINTED IN U.S.A.