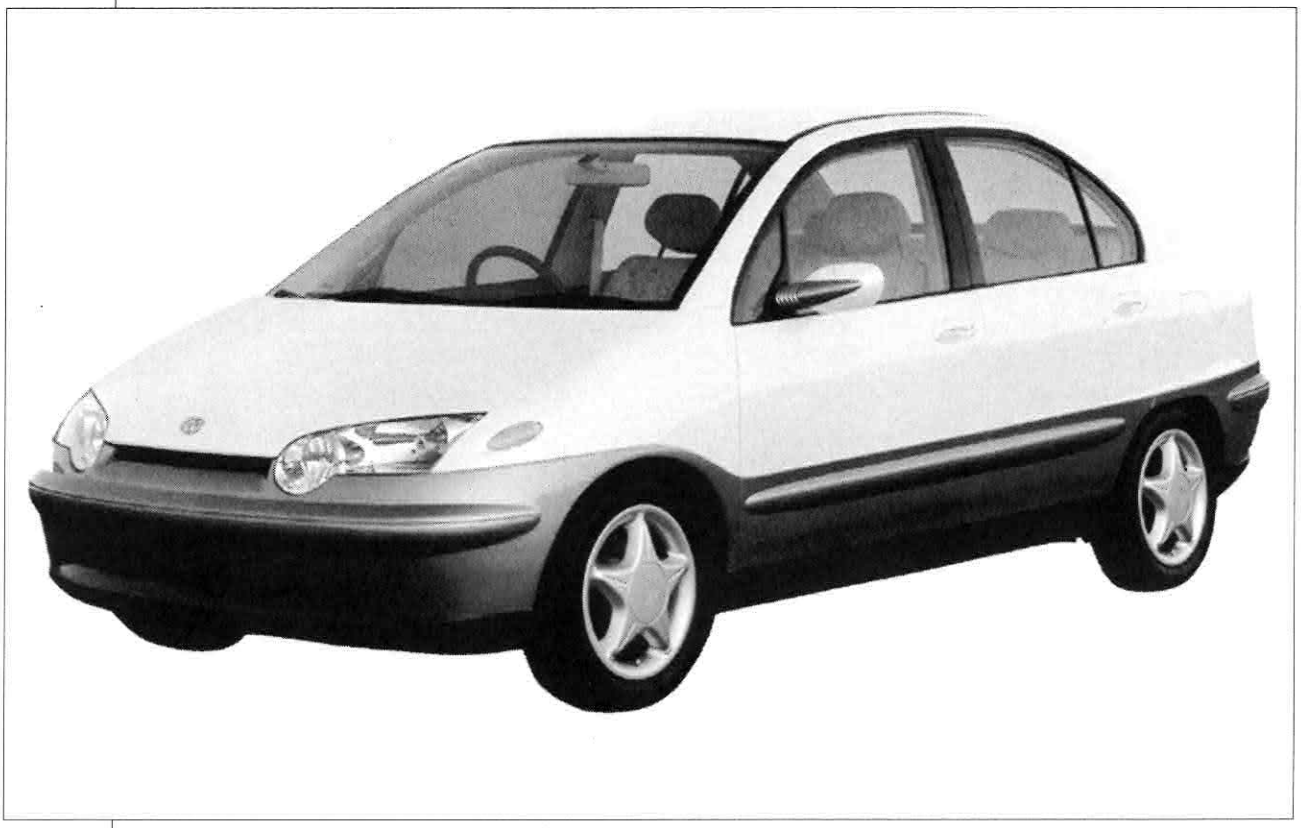
TOYOTA

THE NEW GENERATION SEDAN

TOYOTA Prius



In the coming century, passenger cars must be comfortable both to people and to the Earth. They must be easy to drive and offer ample room and convenience to all the occupants. They must give superb performance with low fuel consumption. They must be safe, clean, and compatible with the infrastructure.

The Toyota Prius meets all these requisites. With a completely new design concept that molds the traditional three-box body into a single flowing form, this car offers a new shape for comfortable sedans of the near future. It's our proposal for a new passenger car form that makes everyone feel a touch of happiness.

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Prius

You just naturally want to spend time in a Toyota Prius

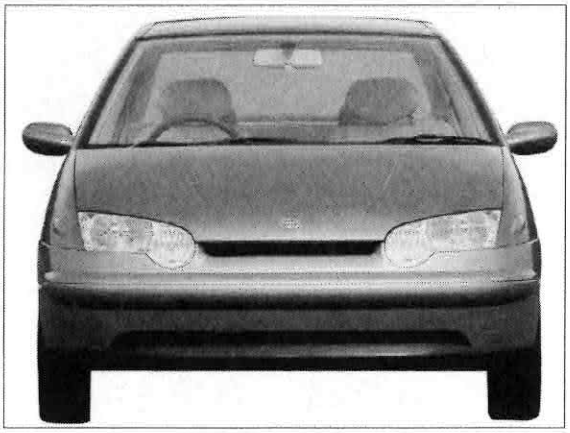
Designing a sedan with lots of room in a compact body is a difficult process, especially if it's one that's meant to be comfortable both to people and to the Earth. In designing the Toyota Prius, our first condition was complete comfort for four adults up to 190 cm tall. The designers created a flowing form to meet the demand for roominess, and also provide ample space for the powertrain and luggage compartment. The overall vehicle design, including the interior, takes a soft, natural, people-friendly approach that looks at comfort from every possible angle — ease of entry and exit, visibility, and overall habitability.

The cabin-conscious package turns a 3-box car into a single flowing form.
The Toyota Prius's body seems to encapsulate the cabin space. The new designs calls on the concept of "Optimum Inside, Minimum Outside" to achieve comfortable roominess in a compact body — a combination of common sense and uncommon ingenuity.

▼ Prius side view

▲ Prius rear view

Distinctive yet familiar front end
Big, round foglamps with stepped reflectors and clear lenses; high/low-beam monobloc headlamps; and elliptical turn signals give the Toyota Prius a distinctive front end that soon becomes familiar. The large bumper, with protectors, and the wide tread give the car a feeling of stability and strength, instilling confidence.

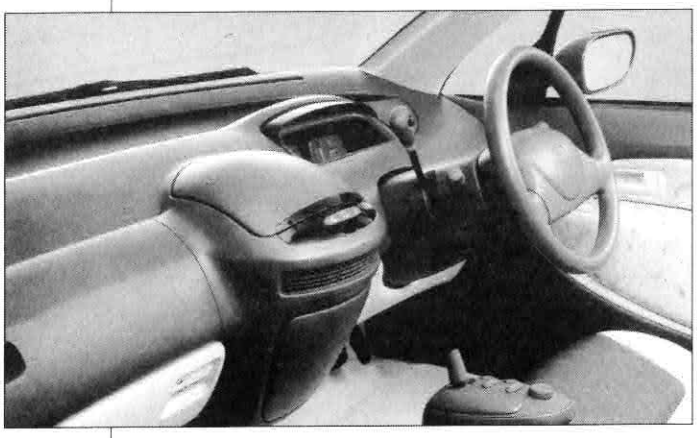


◀ Prius front view

▲ Prius interior

Naturally comfortable interior

Simple and natural, the interior design is completely unpretentious. Luxury sedan-size front seats ensure a relaxing ride.



▲ Instrument panel

The instrument panel is designed to emphasize the horizontal

The instrument panel enhances the broad, open feel of the interior with its emphasis on horizontal lines and shapes. The multivision display can be closed, lending a smooth, unitized appearance to the overall instrument panel design.

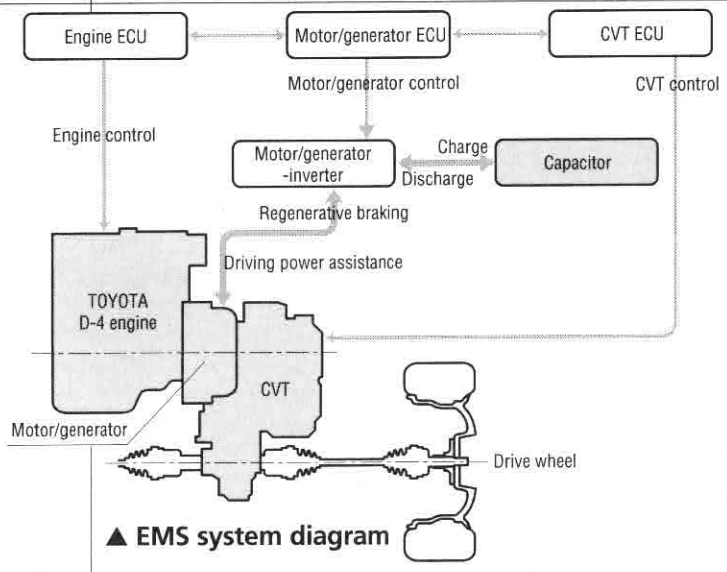
▲ Outer rearview mirror

Reshaped mirrors improve visibility

There's no triangular fillet between the A pillar and the outside rearview mirrors. Instead, they are attached with uniquely shaped front door division bars. This eliminates another blind spot, improving visibility down and to the front.

New powertrain improves fuel economy, protects the environment

Improving fuel economy not only makes a vehicle less expensive to operate, it also plays a key role in making the Earth more comfortable by reducing exhaust emissions and conserving resources. The Prius uses the Toyota Energy Management System (EMS) to maximize fuel economy. While boosting the efficiency of the engine and drivetrain, it also offers such remarkable functions as regenerating braking energy during deceleration, and turning off the engine when the car is stopped. With the Toyota EMS, the Prius targets* fuel economy of 30 km/liter (10.15 mode), a level twice that of other vehicles its size.

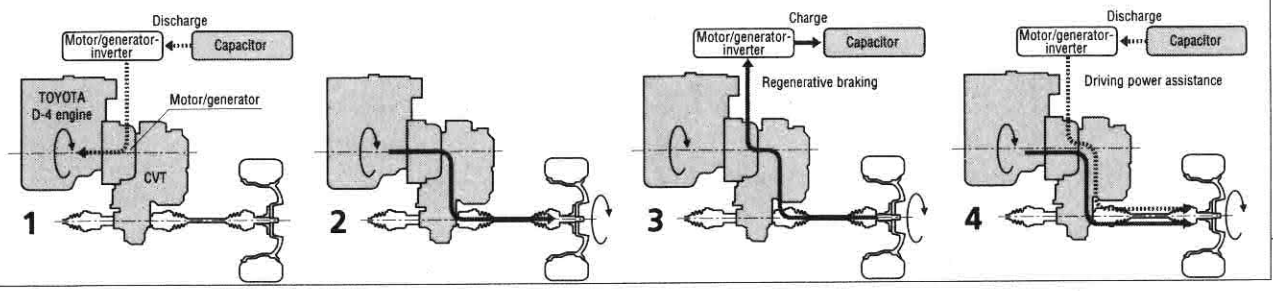


▲ EMS system diagram

1 Starting the engine
The motor uses power from the capacitor to start the engine.
2 Normal operation
CVT control ensures maximum fuel economy from the engine.
3 Deceleration
The motor/generator regenerates braking energy, storing it in the capacitor.
4 Acceleration
Energy from the capacitor is added to the engine power to assist acceleration.

Toyota Energy Management System (EMS)

The Toyota EMS powertrain is a world first. It consists of a direct-injection Toyota D-4 gasoline engine, a belt-drive continuously variable transmission (CVT), and an induction motor/generator that receives power from and stores power to a capacitor. All the elements of the system are integrated and controlled by a computer (ECU). The efficient D-4 engine and CVT team up so the engine can be operated as close as possible to optimum fuel efficiency at any speed and under any driving conditions. In addition, when decelerating, the induction motor/generator works as a generator, regenerating braking energy and storing it in the capacitor as electricity. In turn, this power causes the motor/generator to act as a motor during acceleration, reducing the engine load. And because the engine restarts instantly when the accelerator is pressed, it can be turned off when the vehicle is stopped, holding fuel consumption to the absolute minimum.



TOYOTA MOTOR CORPORATION

Toyota D-4 Engine

The Toyota Prius has a new direct-injection Toyota D-4 gasoline engine, which has been further developed since its announcement in 1993. This engine injects fuel directly into the cylinders so it can match air-fuel mixtures to engine operating conditions precisely, and its control of intake air flow enables stratified combustion. The engine's combustion control system achieves an optimum balance of fuel economy and performance, stabilizing combustion and enabling the combustion of very lean mixtures for normal driving conditions. With this ideal combustion technology and the precise, high-rate EGR system made possible by the feedback from broad-area air-fuel ratio sensors, NOx emissions from the engine are very low. In addition, the NOx storage reduction catalytic converter reduces NOx emissions to the absolute minimum.

Belt-driven Continuously Variable Transmission (CVT)

PRIUS uses a belt-drive CVT. Electro-hydraulics control the width of the pulleys, continuously adjusting the effecting pulley radius. This sort of continuous control allows the engine to operate at its highest efficiency at all times. When decelerating, the CVT uses the smallest ratio possible. This minimizes engine absorption of decelerating energy and maximizes the motor/generator's production of electricity.

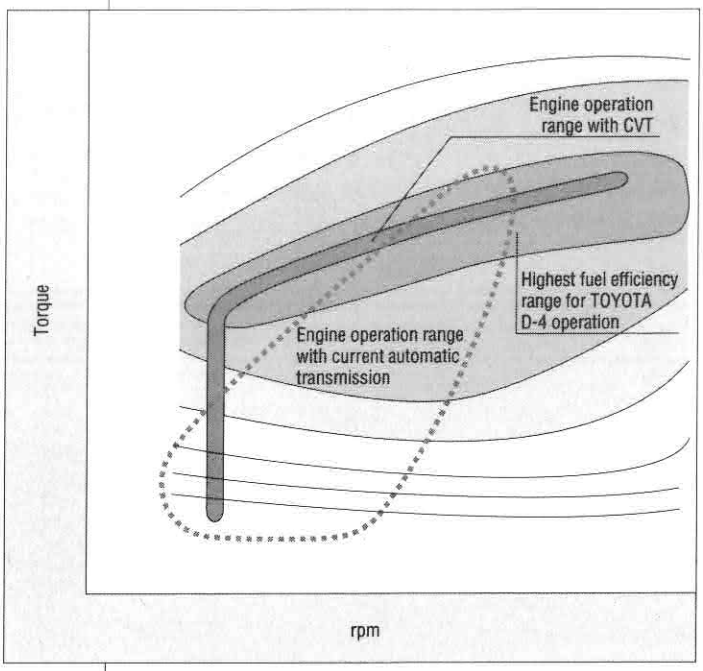
Capacitor

The electricity generated by the induction motor/generator is stored in a double-layer capacitor bank. The stored energy is used to start the engine or operate the motor during its power-assist function. With its large activated carbon electrodes, the capacitor has 10 times the power storage capacity of aluminum electrolytic capacitors. As no chemical reaction takes place during storage or release of energy with this capacitor, its energy release characteristics and its lifecycle are superior to lead-acid and other conventional batteries.

Induction Motor/Generator

The induction motor/generator, which is coupled directly to the drive shaft, takes the place of the starter, the alternator, and the flywheel, playing a central role in PRIUS's basic performance. It starts the engine and generates electricity for the car's auxiliary equipment. When decelerating and braking, it regenerates braking energy (generator function). When accelerating, it adds power (motor function) to assist the engine.

The cranking power of the induction motor/generator is much greater than that of a conventional starter, so the engine starts instantly. And because it turns the crankshaft directly, without gears, the system is also quieter and more durable. The motor/generator has dual windings, enabling it to operate at high voltage to charge the capacitor, and at 12V for compatibility with the conventional electrical system. Thus it can cope with the large power drain of the electric air-conditioner compressor.



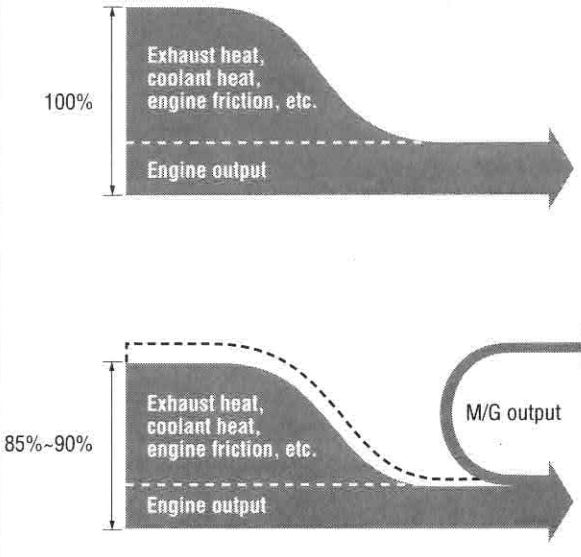
◀ Prius engine characteristics

Amazing new fuel economy technology

Integral control of the D-4 engine and the CVT provides precisely the amount of power needed, whether accelerating or driving normally, operating the engine in the range that gives the greatest fuel efficiency. When the demand for output is very low, the Toyota D-4 engine operates on extremely lean mixtures. When the demand is high, the CVT is adjusted to allow the engine to operate as close to its most economical point as possible.

Cleaner exhaust system

The Toyota D-4's combustion control and precise high-rate EGR keep exhaust emission levels very low. And its NOx storage reduction catalytic converter effectively reduces the NOx produced when burning lean mixtures, cleaning the emissions further. In addition, Toyota EMS's harmonic control system reduces the load on the engine, and eliminates unnecessary engine operation during deceleration and when the car is stopped, reducing overall exhaust emissions. Part of the great potential of this exhaust-cleaning system comes from the fact that its control system puts a priority on activating the catalyst (with heat) when cold temperatures or other adverse conditions threaten to increase emissions.

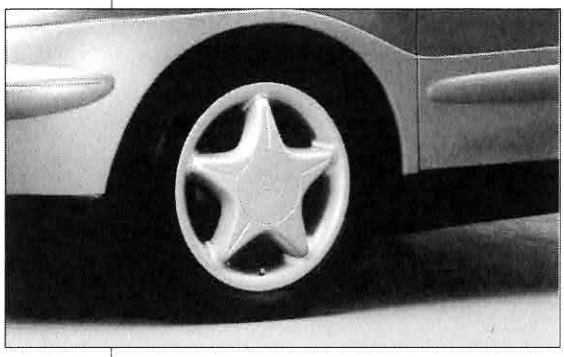


Regenerative braking system

Of the power the engine derives from fuel combustion, only about 20% can be used to drive the vehicle. The rest is lost to exhaust heat, heat exchange in the radiator, friction in the engine, and so on. The regenerated energy is used to assist engine power directly, and does not entail further loss of energy. Even if only a small amount of energy is regenerated, it makes a big difference in the fuel economy. In the Toyota Prius, this system achieves a 10%-15% improvement in fuel economy.

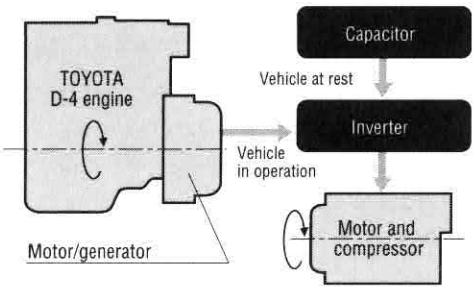
Functions that improve fuel efficiency and recyclability

To further boost Toyota EMS's energy efficiency, the steering, tires, air conditioning, glass, and body of the Prius were all carefully scrutinized to see how they affect fuel economy. In other areas such as emissions, noise, and recycling, the main objective was to create an environmentally friendly vehicle.

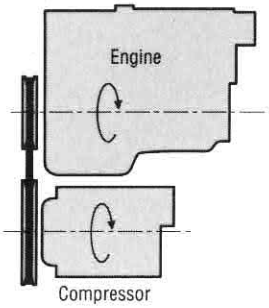


Electric power steering
The Toyota Prius has an electric power-assisted steering system that contributes to a 3% improvement in fuel economy.

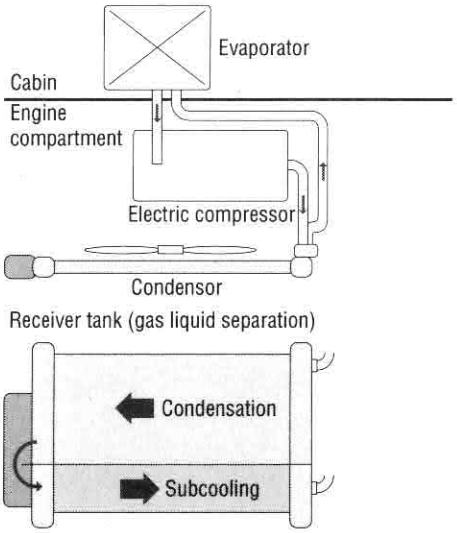
Low rolling resistance tires
Use of 15-inch wheels and a new tread compound reduced rolling resistance by 35% compared to conventional designs. This directly benefits fuel economy.



Prius electric air conditioner

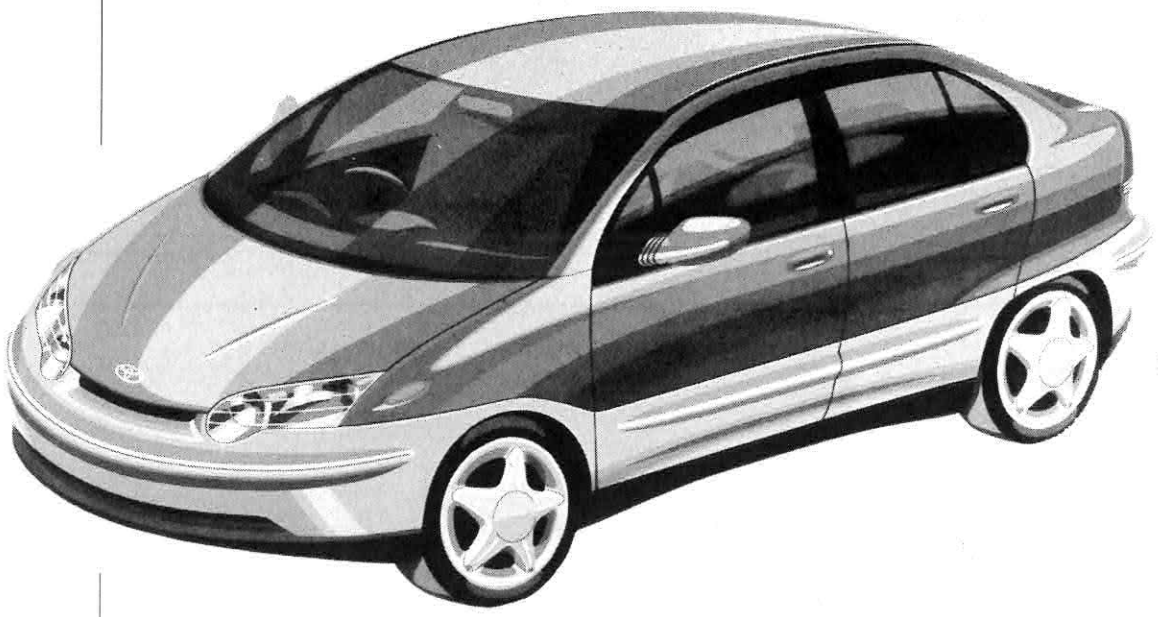


Conventional air conditioner



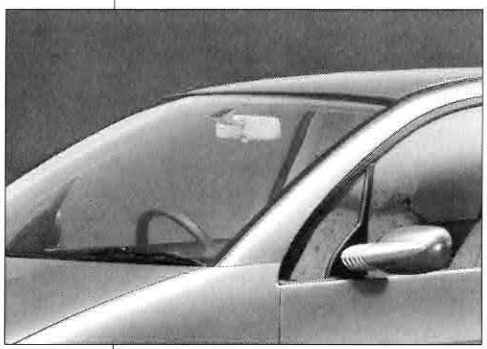
Prius electric air conditioner sub-cooler system

High-efficiency electric air conditioner
The speed of the air conditioner's electric compressor is controlled with an inverter. In situations that need little cooling power — when temperatures outside are not that high, for example — turning the compressor at lower speeds saves energy. Further, its two-level sub-cool cycle cuts power consumption by about 10% compared to conventional air conditioners. The system uses a condenser to precool the coolant before it goes into the air conditioner, increasing the heat exchange capacity. Finally, this small unit requires minimal space in addition to conserving electricity.



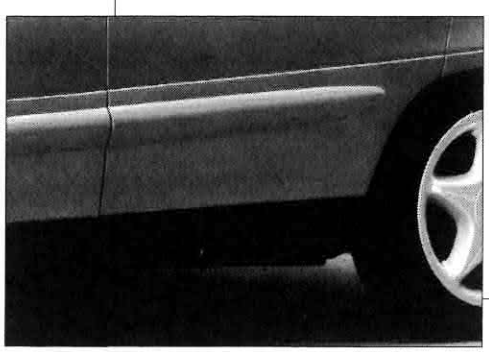
Aerodynamic body
Beneath the car, an engine undercover and a rear undercover reduce aerodynamic drag — one more detail that helps improve fuel economy.

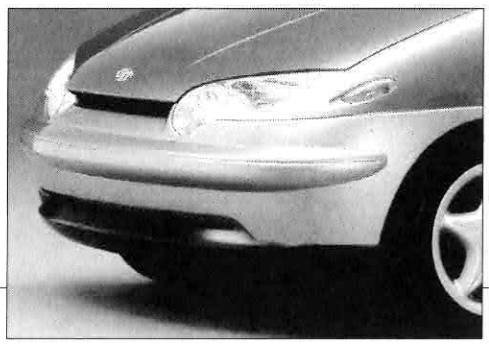
High-performance infrared ray-blocking glass
The windshield, side windows, and rear window use glass that effectively blocks out infrared thermal radiation. This limits sunlight-induced interior temperature increases, reducing the load on the air conditioning system. Special coatings on the glass also block out ultraviolet light, helping protect interior materials from fading and preventing sunburn.



RSPP dash and floor sound insulation
Some 90% of the dash and floor sound insulation is recycled soundproof products (RSPP), which are a mixture of fiber and urethane chips retrieved from shredder residue from the scrapping of post-use vehicles. This is the world's first use of such recycled material, which offers excellent sound absorbing and insulating properties.

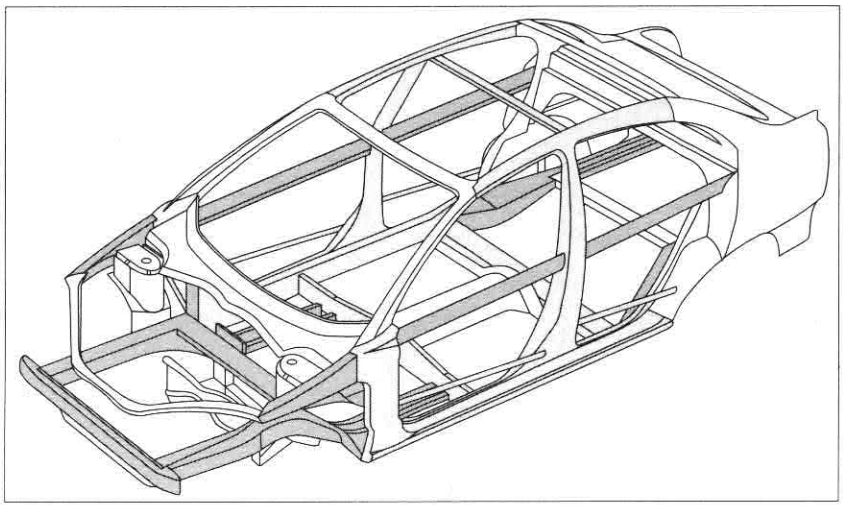
Colored bumpers and side moldings
Bumpers and side moldings offer added protection in minor scrapes. The use of colored polypropylene for the bumpers and moldings means they don't have to be painted and they never fade. What's more, scratches don't change the color. This should reduce repair costs and the number of parts being discarded. Polypropylene is also readily recyclable, which helps conserve resources.





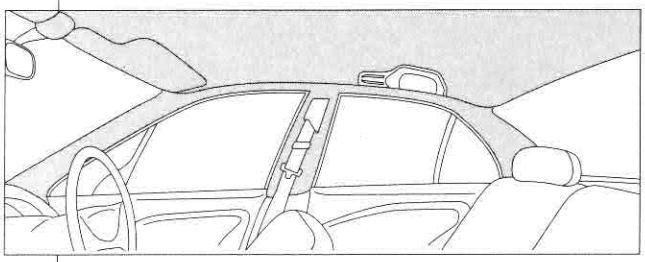
Advanced safety features

Safety is basic to the comfort of an automobile's passengers. The Toyota Prius was designed for enhanced safety. Its body structure efficiently disperses, transmits , and absorbs collision impact energy, protecting the passenger cabin. Safety equipment includes antilock braking system (ABS), an emergency braking assist system, supplemental restraint system (SRS) airbags, built-in child seats, and seatbelts with pretensioners. This array of safety features adds to the peace of mind of drivers and passengers alike.



Body structure

Where head-on collisions are concerned, the front side members are straight and the body is designed to disperse, transmit, and absorb collision energy. This structure allows a safe, secure cabin, even though the body is lightweight. Side-on collision forces are dispersed with side impact beams in the doors and a reinforced center pillar, which spreads the force of impact to the rocker panels, roof and floor cross members, roof side rail, and so on.

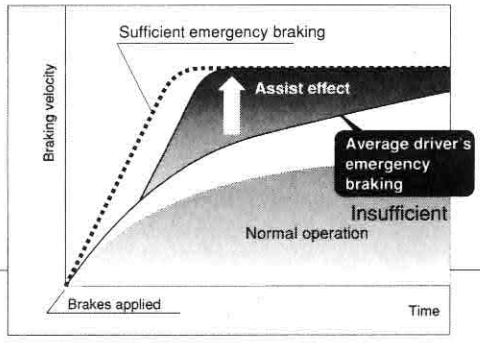


Soft upper interior

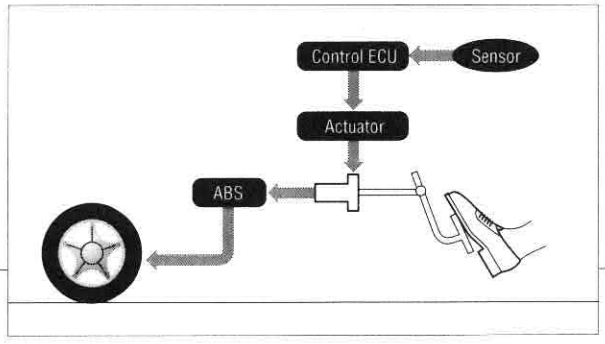
The upper parts of the interior—headliner, front, center, and rear pillars, and so forth—are covered with energy-absorbing materials, minimizing the likelihood of injury from secondary impact.

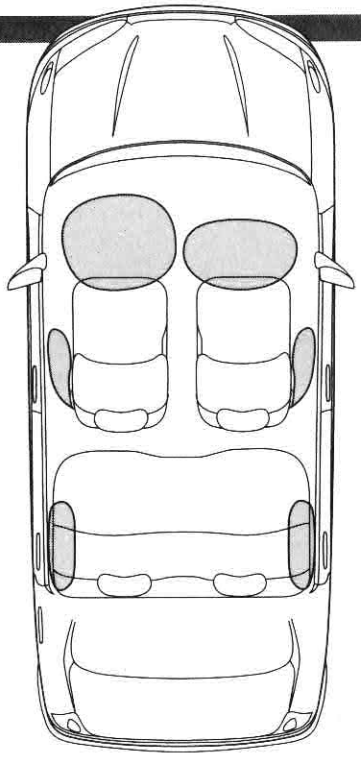
Emergency braking assist system

The driver should always depress the brake pedal as hard as possible to get the greatest braking performance from ABS-equipped cars, because the wheels cannot lock up. But in a real emergency, people find it difficult to concentrate on braking, and cannot seem to depress the pedal with all their might. The emergency braking assist system helps maximize ABS performance by judging the degree of emergency according to pedal stroke and velocity. It then provides power assist to the pedal, commensurate with the emergency.



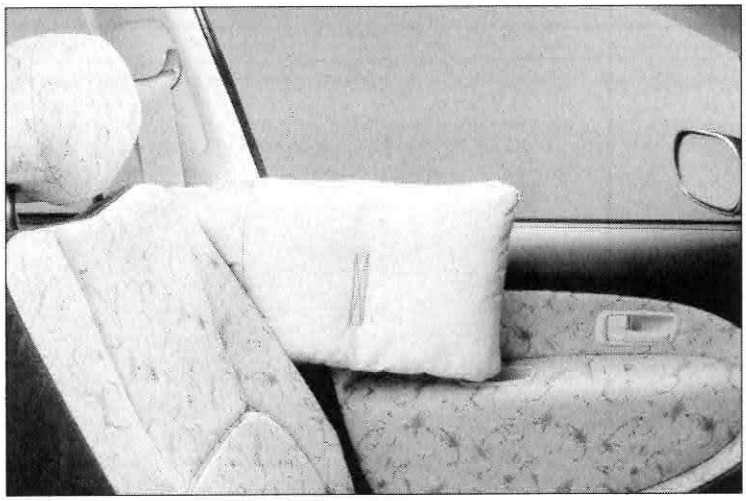
Operating range for emergency braking assist system





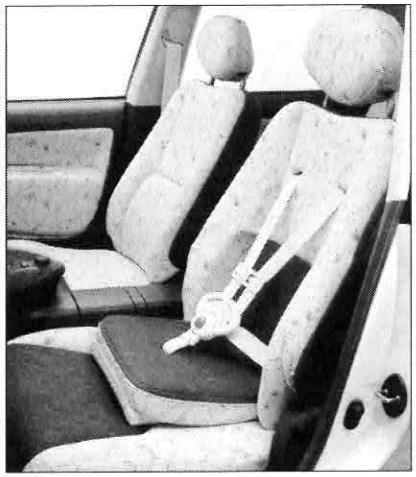
Side SRS airbags

The side SRS airbags are mounted in the outer shoulder side of the driver and passenger seatbacks, and the inner side of the rear door trim. With two in front on the driver and passenger sides and two on each side, the Toyota Prius has a total of six SRS airbags.



Built-in child seats

Child seats are built into the front passenger seat and the left rear seat. They pull out in one easy motion, and feature a five-point seatbelt.



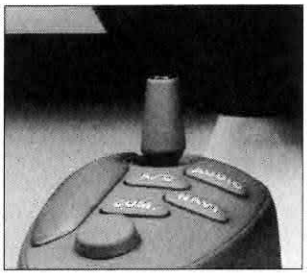
Other features

- Tire pressure warning system
- Anti-Lock Brake System (ABS)
- Seatbelt pretensioners

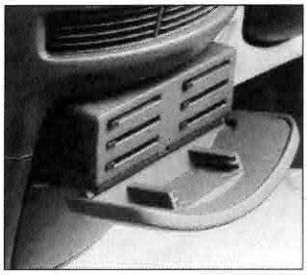
Functional equipment improves comfort and convenience

Drivers today, and tomorrow, demand more and more convenience from their cars. The Toyota Prius features a multimedia system that incorporates state-of-the-art navigation, road traffic information receivers, and telecommunications systems. Other features that enhance comfort and peace of mind include an anti-theft system and a front passenger seat that folds forward, presenting a flat surface that can be used as a table or a place to put luggage.

Display ▶



Joystick ▶



PC card port ▶

A new multimedia system from the near future

The multimedia system in the Toyota Prius features such functions as navigation, road traffic information, town-guide information, automatic expressway toll payment, audiovisual entertainment, and telecommunications. The convenient, flip-up display opens at a touch. Input with a joystick switch and voice-activated controls is simple and easy. The system also allows the input of destination information from PC cards, and will accept traffic information input from the infrastructure. The Toyota Prius multimedia system shows what on-board information and communications will be like in the very near future.

▲ Traffic information

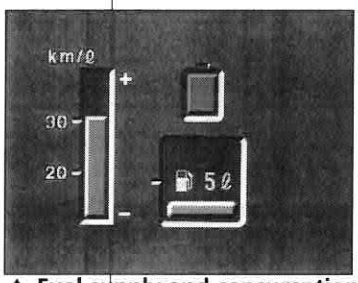
▼ Functions

Function	Operation
Navigation	Route mapping
	Current location
Traffic condition/town-guide information	Indicates congested areas, suggests alternative routes
	Indicates closed or regulated roads, suggests alternative routes
	Indicates parking areas with vacancies, other town information
Expressway toll payment	Pays tolls without stopping
Audiovisual entertainment	AM/FM reception
	FM multiplex reception
	TV reception
	MD playback
	CD/DVD playback (including CD-G, photo CD, and video CD)
Telecommunications	Inter-vehicle communication (sends current position information, receives and displays other car's position)
	Emergency communications
	Electronic mail functions
	Transmits and receives data

Transmit and Receive Data

Toyota PRIUS's multimedia system uses its telephone to access information about nearby facilities, retail outlets, and so forth. The system accesses all sorts of information, even while the car is moving. In the future, systems like the one in the Toyota Prius will interact with the infrastructure, providing shopping information from department stores, menus from restaurants, and directions to filling stations and garages when the car needs fuel or repairs.

▲ Restaurant menu



▲ Fuel supply and consumption

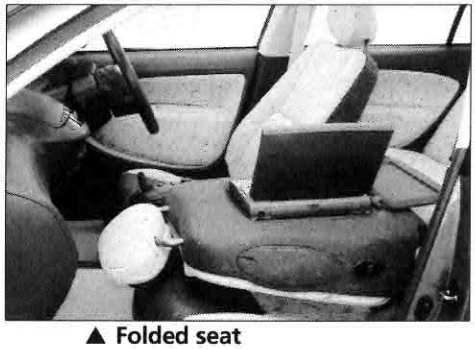
▲ Local information

▲ Diagnosis

E-mail ▶

E-mail functions

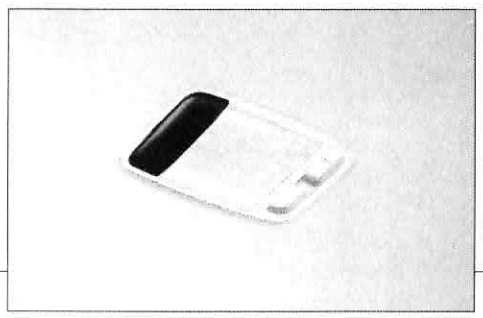
A camera and microphone mounted in the vehicle allow transmission of visual or voice electronic mail. Because the mail system pinpoints where the messages originate, other cars know exactly where to find the vehicle transmitting the signal.



▲ Folded seat

Folding front passenger seat

The front passenger seat back can be folded down flat on the cushion, forming a table that even has a revolving tray. In addition, tipping the seat up and pushing it completely forward creates space enough for a large suitcase or other big items.

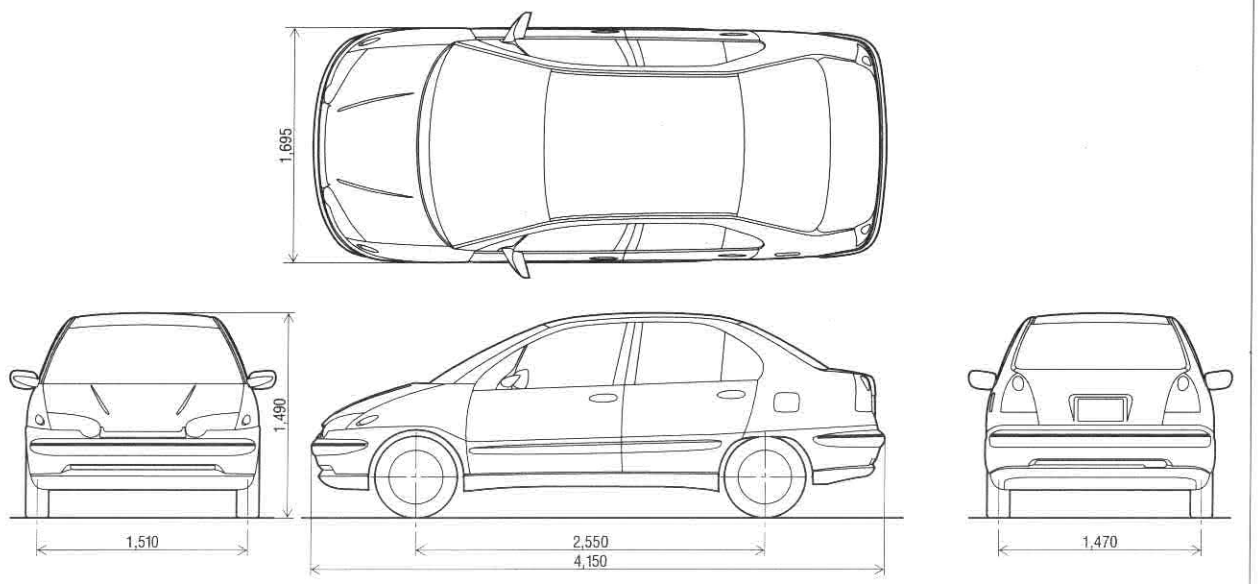


◀ Sensor

New security system

A four-directional sensor mounted in the dome lamp continuously sends out microwaves to detect any attempt to break into the car while it is parked.

SPECIFICATIONS



Main Specifications

Overall length		4,150 mm
Overall width		1,695 mm
Overall height		1,490 mm
Seating capacity		5
Wheelbase		2,550 mm
Tread	Front	1,510 mm
	Rear	1,470 mm
Powertrain		Toyota EMS (with Toyota D-4)
Displacement		1,498 cc