

WHO MAKES THE CARS?

World-wide, a relative handful of large manufacturers dominates the automobile business. The trend is toward internationalization: exporting and importing, forming joint ventures with former competitors, building cars overseas, and designing one car for multiple markets. That's why marketing buzzwords like "world car" so often appear in ads. Larger companies have also continued to gobble up "boutique" and small carmakers: Ford owns Jaguar and a quarter of Mazda, GM owns half of Saab, BMW owns Land Rover.

TWINS, SIBLINGS, COUSINS

For decades carmakers have been selling similar cars under different nameplates. The rationale is that additional brands can capture more customers with the same merchandise.

Related models' similarity ranges from identical twinship to distant cousinhood. Sometimes one version costs less, offers different options, or comes with a better warranty, so it pays to check out the whole family. Examples of near-twins include the Chrysler Cirrus/Dodge Stratus, the Ford Taurus/Mercury Sable, the Mercury Villager/Nissan Quest, and the Isuzu Rodeo/Honda Passport.

With corporate cousins, each is modified to appeal to a slightly different market segment, such as younger buyers or families with children. Examples include such groupings as the Buick Skylark, Oldsmobile Achieva, and Pontiac Grand Am, or the Toyota Corolla and Geo Prizm.

Some Detroit companies have joint ventures with a Japanese automaker, with manufacturing facilities in the United States. GM and Toyota jointly manufacture the Corolla and Prizm in California. Ford and Mazda team up to make the Ford Probe and Mazda MX-6 in Michigan. Ford also manufactures the Mercury Villager and nearly identical Nissan Quest minivans in Ohio. Mitsubishi Diamond Star Motors in Illinois makes several virtually identical cars sold under the Eagle, Dodge, Chrysler, and Mitsubishi names. Examples: the Mitsubishi Eclipse/Eagle Talon, and Mitsubishi Mirage/Eagle Summit.

Here's a rundown of carmakers that sell cars in the U.S.

AUDI

Audi is a part of Volkswagen, and makes fairly costly sports sedans and station wagons. Audi has always been an innovative company technically (all Audis offer a sophisticated all-wheel-drive option called Quattro), but the cars have often been plagued by reliability problems. Later models have been much improved.

BMW

This German company is one of the world's leading makers of high-quality sports sedans. Careful engineering makes the BMW a true "driver's car," with emphasis on good performance and precise handling first, luxury second. All BMWs are rear-wheel-drive cars. A BMW was one of the must-have status symbols of the excessive 1980s, but it seems to have survived the overexposure. Like other European makes sold here, BMW has invested a lot in crashworthiness and advanced safety features. Its new plant in South Carolina makes the small BMW 318.

CHRYSLER CORP.

The smallest of Detroit's Big Three was founded in 1925 as the successor to the Maxwell Motor Co. For most of its history Chrysler has been a volatile company that has skirmished with bankruptcy more than once. Lately, Chrysler's finances look strong. The company more or less invented the minivan, whose sales skyrocketed in the 1980s. The Jeep division makes competitive sport-utility vehicles, and Chrysler's entire car lineup now consists of good-performing vehicles. Chrysler is also good at finding ways to squeeze production costs. That penny-pinching might contribute to Chrysler products' rather low reliability of late. Chrysler's car-marketing divisions include Plymouth, Dodge, and Chrysler, plus the Jeep/Eagle division.

Plymouth is in many respects similar to Dodge, but from a marketing standpoint Plymouth aims at the low-end buyer of Chrysler products. Similarly equipped, Plymouths are virtually identical to the Dodge versions of the same car.

Dodge is positioned slightly up-market from Plymouth, and lately it has had a broader product range with more offerings. It still aims primarily at the broad, bread-and-butter middle range of the market. You'll find the Dodge name on small, intermediate, and large sedans, as well as on a mid-sized coupe, a very expensive sports car, and on minivans and pickups.

Chrysler is the flagship name among the corporation's nameplates. The Chrysler brand offers the highest-end accouterments with its cars, although most Chryslers are virtually identical under the skin to some equivalent Dodge models.

Jeep and Eagle are the last descendants of the old American Motors Corp., which Chrysler absorbed in 1987. Although Eagle-badged cars are now knockoffs of Chrysler or Mitsubishi vehicles, sales have lagged. The division survives on sales of Jeeps, vastly popular though famously trouble-prone.

FORD MOTOR CO.

Henry Ford built his first car in 1896 and founded the Ford Motor Co. in 1903. Ford is the world's second-largest automobile producer. In recent years, it has considerably narrowed the sales gap between itself and General Motors. Ford is a worldwide company with extensive European operations. Several years ago it bought Jaguar. In the U.S., Ford has two passenger-car divisions: Lincoln-Mercury and Ford.

The **Ford** division of Ford Motor Co. aims at the broad middle market, and the best parts of its car lines are mid-sized and larger sedans. Since the 1920s, Ford's main rival has been Chevrolet. About 40% of Ford's production is trucks these days, thanks to surging markets in pickups, sport-utilities, and minivans.

Mercury aims higher in the market than the Ford Division. All Mercury cars are close copies of Ford products, but may have slightly plusher appointments. Where Ford might offer a four-cylinder, manual-transmission version, Mercury may offer only a V6 and automatic transmission.

Lincoln is Ford's luxury nameplate, although some Lincolns are more accurately described as fully-equipped rather than luxurious. Historically, Lincolns have been big, plush freeway floaters rather than true luxury cars. The Town Car is frequently used as a limo, since it's one of the largest, longest cars in mass production.

GENERAL MOTORS

Founded in 1908, GM remains the world's largest car and truck manufacturer. While Henry Ford tried to make one universal car that fit everyone, GM strove from the 1920s onwards to make a car "for every purse and purpose." Even though it has lost market share in recent years, it still accounts for more than a third of all passenger cars and light trucks sold in the United States. GM has six passenger car divisions plus GMC, a truck division.

Buick sees itself as a premium American car company. Most of the Buick lineup has suffered from sameness in recent years—sameness with other humdrum GM products. Buicks are supposed to be a notch above Oldsmobile and a notch below Cadillac. Buick appeals, in GM's thinking, to older, affluent buyers who are not quite ready to step into a Cadillac.

Cadillac, GM's luxury car division, for decades called itself "the standard of the world." By the 1980s it was abundantly clear that world standards were set by several European and later Japanese luxury cars, but certainly not by Cadillac. Lately, Cadillac has been trying to reposition itself as a direct competitor to Mercedes and BMW. Under that thinking, the traditional Cadillac buyer—an older, affluent male—would find a new Buick to be his dream car. Cadillac intends to woo the yet more affluent and more educated who tend to like European luxury cars.

Chevrolet has been part of General Motors since 1915. Chevrolets are GM's bread-and-butter cars, aimed at the broad middle market. Traditionally, Chevrolet has competed directly against Ford-named cars, but lately has tried to position itself as an alternative to imports. Moderate pricing is still Chevrolet's long suit. While the traditional Chevrolet was a full-sized sedan, the division has added more and more small cars, starting in the 1970s and 1980s. The Chevrolet name appears on a full range of cars, trucks, vans, and sport-utility vehicles, as well as on what was for years America's only true sports car, the Corvette.

Geo models are sold through Chevrolet dealers. The nameplate appears on GM versions of the Toyota Corolla (Geo Prizm), Suzuki Swift (Geo Metro), and Suzuki Sidekick (Geo Tracker.)

GMC's consumer products, as opposed to commercial trucks, are normally virtual twins of some Chevrolet trucks. Both GMC and Chevrolet light trucks are designed by GM's Truck and Bus division, built in the same plants, and badged as one or the other. The models pair off as follows: GMC Jimmy and Chevrolet Blazer; GMC Sonoma and Chevrolet S-10 pickup; GMC Yukon and Chevrolet Tahoe; GMC Safari and Chevrolet Astro; and GMC Suburban and Chevrolet Suburban.

Oldsmobile has been in existence for about a century, and some people think the design and styling in recent years reflect that. Oldsmobiles are positioned to appeal to slightly more affluent and older buyers than Chevrolet customers. Oldsmobile and Buick, in fact, go back and forth as being the GM division closest to Cadillac. Oldsmobile is trying to shed its stodgy image with a series of new vehicles such as the big Aurora and a mid-sized car tentatively named the Intrigue.

Pontiac aims at a sportier and younger-thinking crowd than the other GM divisions. Although its cars may differ only in small ways from other GM offerings, the substance of those differences is sporty styling and bold colors.

Pontiac claims it “builds excitement.” For some Pontiacs, that’s true only if you are easily excited.

Saturn, founded in the 1980s, began selling cars widely in 1991. Saturns are aimed at young, reasonably affluent and educated people who might otherwise consider a Toyota Corolla or Honda Civic. Among Saturn’s unusual features are flexible plastic body panels that rebound rather than dent after a mild blow, and are easy to replace if need be. Saturn pioneered a low-pressure sales environment at the dealership, and a “no-dicker sticker”—a non-negotiable selling price.

HONDA

Honda was originally a motorcycle manufacturer. It started building cars in 1962, and it now ranks tenth in the world in auto sales. The Accord has been one of the top-selling cars in the U.S. for a decade or more. Honda’s main strength has been good engineering and innovative design. Honda started the Japanese luxury-car market in this country when it introduced an upscale brand line, Acura, in the late 1980s.

Acura proved that a Japanese car could crack the U.S. luxury-car market. It led the charge that later included Lexus and Infiniti. Its flagship Legend has since been joined by the Integra, an upper-crust Honda Civic, and less successfully by a mid-sized entry, the Vigor, and its successor, the TL. Acuras have mostly been good-performing, reliable cars.

HYUNDAI

This giant Korean heavy-industrial company began selling cars in the U.S. in 1986. Hyundai’s sales formula has been low-priced cars with lots of content. A reputation for shoddy quality has hurt the company’s reputation, and the price gap between Hyundais and Japanese competitors has steadily narrowed.

ISUZU

Primarily a manufacturer of trucks, Isuzu has branched out into small cars from time to time. Right now it sells only trucks in the U.S. The noncommercial Isuzus include the Rodeo and Trooper. Overall, it has a tiny part of the U.S. market, and it shares its one North American manufacturing facility with Subaru.

JAGUAR

Jaguar, now owned by Ford, is one of the few English cars still sold in the U.S. Jaguar is a luxury nameplate that competes in price and prestige with the likes of Mercedes and BMW. Traditionally, Jaguar has focused on refining and perfecting known technologies rather than inventing new ones. Traditionally, too, Jaguar has had a poor reputation for reliability.

LAND ROVER

This British concern is now owned by BMW. It makes one of the costliest and status-filled sport-utility vehicles, the Range Rover, as well two smaller and cheaper four-wheel drives. Land Rovers were the safari car of choice before off-roading became a sport. They’re still designed with off-road excursions, rather than highway performance, uppermost in mind.

MAZDA

Mazda gained some fame as the only car company ever to successfully market cars with the Wankel rotary engine. The RX-7 sports car is the only survivor of that interesting breed. Though Mazda is a major maker with a full range of respectable and good-performing sedans and trucks, people probably associate Mazda most with the Miata, a relatively inexpensive, sporty two-seater that ignited a sports-car revival in the 1980s. Ford now owns about 25% of Mazda Motors.

MERCEDES-BENZ

This company dates back to 1886, when two competitors, Daimler and Benz, built the world’s first production cars. The two merged in 1926. The Mercedes name came about in 1900, when a successful car distributor in Nice, Emil Jellinek, agreed to handle Daimler’s new models—if the cars were named after his 11-year-old daughter, Mercedes. Mercedes-Benz has always been a luxury-car marque. The focus is on superb engineering and solid design rather than on flamboyance or even innovation. Safety has been a major design consideration for many years.

MITSUBISHI

Mitsubishi is part of a huge Japanese engineering company that started serious car production in 1959. It has maintained ties with Chrysler for over 25 years, and for a long time it supplied the small Dodge and Plymouth Colt. Their U.S. facility makes both Mitsubishi-nameplate cars such as the Galant and some Chrysler, Dodge, and Eagle cars.

NISSAN

Nissan, Japan's second-largest car company, competes closely with Toyota and Honda. Nissan, which used to be called Datsun, earned high marks and a lot of attention when it introduced the sporty, affordable 240Z in the early 1970s. The company offers a full line of cars and light trucks. Reliability has been good, but lately the company seems to have been cutting some design corners to save money. Nissan's luxury-car division is Infiniti.

Infiniti's big flagship, the Q45, was introduced in 1990 with a disastrously ineffective advertising campaign that failed to actually show the car. (There was in fact no car to show, because production was far behind schedule when the ads were made.) Infiniti now markets a range of five sedans, from small to full-sized. Infinitis tend to be well-engineered, reliable cars.

SAAB

Saab, now half-owned by General Motors, is Sweden's Number Two automaker, behind Volvo. Saabs have always been somewhat quirky. They used two-stroke engines well into the 1960s, and offered front-wheel drive decades before it became popular. They were among the first small, inexpensive imports to offer unit-body construction and fully independent suspension. Saab is one of the few carmakers that still uses turbocharging. Saab has moved upscale over the last 20 years. Modern Saabs appeal to the sports-sedan crowd; the company focuses marketing efforts on the cars' advanced safety features and turbocharged engines.

SUBARU

Subaru is the only successful Japanese car manufacturer founded since World War II. Traditionally, Subaru has competed near the low end of the market with relatively inexpensive, utilitarian cars. Subaru has gradually increased the overall quality of its offerings, and it's now the only carmaker to offer all-wheel drive on moderately-priced sedans and station wagons.

SUZUKI

Suzuki, like Honda, was originally a motorcycle manufacturer. It started branching out into small trucks in the 1950s. In this country it has offered mostly small sport-utility vehicles. Its Sidekick is essentially the same as the Geo Tracker.

TOYOTA

Toyota, by far the largest Japanese car company, ranks third in the world in sales, behind GM and Ford. Toyota sales took off in the U.S. in the 1970s because the company offered inexpensive, reliable, fuel-efficient cars when soaring fuel prices made Detroit's models particularly unappealing. Toyota gradually added larger cars and finally the luxury Lexus name to its American brand line. Along with Honda, it led the "transplants"—foreign-owned manufacturing facilities in the U.S. Most Corollas and Camrys sold in the U.S. are assembled here, and have been for years.

Lexus, Toyota's luxury nameplate, came to this country in 1989, and now offers a range of four cars of different sizes. Lexuses are justly famous for their smooth powertrains, near-total isolation from the road, superb ergonomics, and exceptional reliability.

VOLKSWAGEN

Volkswagen is one of the world's largest auto manufacturers, although sales in the U.S. have slackened considerably from the heyday of the Beetle. Poor quality plagued VWs sold in the 1980s and early 1990s, but that could now be changing. VW's smaller cars, like the Golf and Jetta, ride and handle particularly well.

VOLVO

Volvo, Sweden's largest automaker, has a reputation for safety and stodginess with its famously boxy sedans and wagons. For the last decade or so, Volvos have been decidedly upscale family cars: sturdily constructed, roomy, and fairly slow except in the highest trimlines. Volvo started selling a front-wheel drive car, the 850, only in 1993. The rest have rear-wheel drive.

FINDING A CAR

A family car used to be either a sedan or a station wagon. Now the choices are wider. Sedans are still the mainstay of the market, but more and more people are choosing a minivan or a sport-utility vehicle for everyday transportation.

SEDANS

Japanese companies have dominated the **small-car** market for years, and they still make some of the best, including the Mazda Protegé, Honda Civic, Toyota Corolla, Subaru Impreza, and Nissan Sentra. The Mazda and the Nissan were redesigned in 1995.

It's hard to find a bargain in a Japanese car: Reasonably equipped, many of the smallest models, like the Toyota Tercel, easily creep beyond \$13,000 and can hit \$15,000. The next size up, like the Mazda Protegé and Nissan Sentra, can go for \$17,000 or more.

One that performed surprisingly well in our tests is the Hyundai Accent from Korea—surprising because previous small Hyundais have performed so poorly for us. Reliability is unknown, though, and we advise caution.

Among domestic automakers, GM proved in 1995 that it can get things right when it wants to. The new Chevrolet Cavalier is a thoughtfully designed, well-executed small car. But the Cavalier and its Pontiac equivalent, the Sunfire, are still too new for us to predict their reliability. Other new domestic models include the Dodge and Plymouth Neon, introduced in 1994. The Neon offers roomy accommodations for a small car, and it performed reasonably well in our tests, but reliability is yet to be determined. Cost when reasonably equipped: in the mid-teens.

With so many good small cars available, we'd pass up the Ford Aspire, Geo Metro, and the Toyota Tercel. The Tercel has proved very reliable, but hasn't done all that well in our tests of roadworthiness.

Mid-sized Japanese nameplates like the Toyota Camry, Honda Accord, Mazda 626, Nissan Altima, and Subaru Legacy remain good choices. (All are assembled in the U.S.) The Accord was redesigned in 1994; the Legacy in 1995.

Worthy mid-sized domestic models include the Pontiac Grand Prix, Buick Regal, and Ford Taurus/Mercury Sable twins (completely redesigned for 1996). The Ford Contour and Mercury Mystique, a notch smaller than the Taurus, tested out very well, as did the Chrysler Cirrus/Dodge Stratus siblings. All four were new for 1995. The Cirrus and Stratus have a roomier rear seat, but the Contour and Mystique handle a bit better.

The new-for-1995 Toyota Avalon, a stretched version of the Camry, rides and drives like a luxury car. It's about as big as a mid-sized car gets, with an extra-roomy rear seat and trunk.

Large sedans have long been the province of domestic manufacturers. The most up-to-date candidates at the moment remain the Dodge Intrepid, Chrysler Concorde, and Eagle Vision triplets, and their stretched versions, the Chrysler New Yorker and LHS. They handle very well, like much smaller cars. They're roomy and have done very well in our performance tests. But they've had some quality and reliability problems in their first two years.

Other big domestics worth a look include the big, traditional Ford Crown Victoria and its Mercury stablemate, the Grand Marquis, and three models from GM: the Pontiac Bonneville, Buick Le Sabre, and Oldsmobile Eighty Eight.

SPORT-UTILITIES

Sport-utility vehicles are one of the fastest-growing parts of the market, and automakers have striven, with some success, to make them less like trucks. SUVs are easier to drive now, and they're apt to come loaded with carlike amenities. They have become quite expensive—many top the \$30,000 mark. They also guzzle gas and are hard to climb into and out of. But they offer a high, commanding view of the road, more cargo space than the average wagon, and the option of four-wheel drive.

They also provide a perception of safety—but that perception may be misplaced, particularly for people who drive a sport-utility vehicle as if it can defy the laws of physics. Sometimes, the four-wheel drive merely allows people to get hopelessly stuck farther off the road than a car can go.

Among domestic sport-utilities, the Ford Explorer and Jeep Grand Cherokee perform most impressively. The Ford was extensively updated for 1995, and its ride and handling improved. The Jeep Grand Cherokee handles well, rides nicely, and is more refined than the Explorer. We'd recommend it if not for its worse-than-average reliability record.

Among the Japanese sport-utilities, we like the Toyota Land Cruiser and the Isuzu Trooper. A \$40,000-plus price tag, however, makes the Land Cruiser more of a lifestyle statement than a viable substitute for a family car.

The SUV market is about to get more crowded, with new small models due from Toyota, Suzuki, and the Korean maker Kia, as well as upscale SUVs from Mercedes, Infiniti, and Cadillac.

MINIVANS

Minivans nearly gobbled up the station-wagon market whole in the mid-1980s, and Chrysler continues to dominate the market with the ubiquitous Dodge Caravan and Plymouth Voyager. The minivan is facing a challenge from the sport-utility market, thanks to an attitudinal backlash in which minivans are seen by some suburbanites as “too suburban.” But a van’s practical utility, comfort, and convenience cannot be denied.

The big news in minivans in 1995 was Ford’s Windstar. It’s big and ponderous, but comfortable and quiet by minivan standards. The Windstar tested out a little better than the Chrysler products in 1995. But Chrysler has stolen the trophy back with the redesigned 1996 Caravan and Voyager: They offer an optional sliding door on both sides, as well as a high level of comfort, quiet, refinement, and better use of space.

The Honda Odyssey is a minivan for people who don’t want a minivan. It’s built on a modified, lengthened Accord platform, and it drives a lot like an Accord. It has four doors, like a station wagon, but it’s taller and boxier than a wagon.

The General Motors front-wheel drive minivans, the Chevrolet Lumina, Oldsmobile Silhouette, and Pontiac Trans Sport, offer a couple of things other manufacturers do not: a power-operated sliding door and seating for three in the middle row. But those are about their only advantages. Handling, ride, and overall comfort are wanting. Replacements are due soon.

LUXURY CARS

The market for luxury makes such as Cadillac, Lexus, Mercedes, and BMW has tailed off in recent years. The uneven economic recovery, a strong Japanese yen, the crowding of nameplates, and a challenge from sport-utility vehicles all take a toll. So does the fact that such “luxury” features as automatic climate systems, leather upholstery, traction control, and dual air bags are now widely available on many cars.

Sales are flagging even in the category called, for want of a better name, near-luxury—the \$30,000 to \$40,000 price range. In our tests, foreign nameplates such as Mercedes, BMW, Lexus, and Infiniti have scored significantly higher than domestic models, but the sticker prices on most of the imports can come as a shock.

SPORTY CARS

The sporty-car market is in a down cycle, in part because it became overcrowded with new entries in the late 1980s and early 1990s. Perhaps, too, automakers failed to believe there was a limit to the number of people who want small, cramped, noisy, expensive, hard-riding cars with only two useable seats and a tiny trunk.

Moderately priced sporty cars we’ve recommended include the Acura Integra Coupe, Honda Prelude, Mazda Miata and MX-6, Saturn SC, and Toyota Celica GT. Among the costlier sports cars that have done well in our tests are the Mazda RX-7, Nissan 300ZX, Subaru SVX, and Toyota Supra.

WHAT’S AFFORDABLE?

With the average new car now selling for over \$20,000, people are finding alternatives: leasing new or buying used.

Leasing. What makes leasing seem appealing is that it offers lower monthly payments than a loan does, so you can drive a fancier car than you could otherwise afford. Of course, at the end of a loan term you own the car, while at the end of a lease you don’t. But under certain circumstances, leases may make sense: If you plan to turn in your car every two or three years anyway, and if your annual mileage is close to the maximum the lease allows. See also [Should You Lease](#)

Used cars. The used-car market may be two or three times the size of the new-car market. Buying a good, late-model used car offers potentially the best value. With a used car, you take much less of a depreciation hit, since the steepest depreciation takes place in the first couple of years.

CAR TYPES EXPLAINED

CONSUMER REPORTS publications define car types and body styles as follows:

CONVERTIBLES

Two-door passenger cars with a fabric top that folds down. Some sporty versions offer a removable hardtop.

Advantages: A sporty appearance, potential for good resale value, and the utmost in ventilation.

Disadvantages: Bodies tend to twist and flex on rough roads. Interior noise often high. Access to rear a chore. Putting top up and down or removing and mounting roof may be tedious. Flexible plastic rear window often creases or becomes translucent, limiting the quality of rearward view when top is up. More expensive to buy, and less trunk room than in an equivalent sedan. Not as secure from robbery as a fixed-roof car. Less safe in a rollover accident. Costlier to insure.

TWO-DOOR SEDANS (COUPES)

Advantages: Coupes normally have a sporty appearance with a roof that slopes low toward the rear. (A two-door sedan is normally similar to the four-door version.) The long doors give good access to the front seats. May be less prone to rattles than a four-door.

Disadvantages: Rear access usually a chore. Low roof often limits head room in rear. Doors often heavy, and difficult to open wide enough in tight parking spaces. Difficult to install child seat(s) in rear.

HATCHBACKS

Usually small, sometimes sporty, sometimes mid-sized cars with a trunk lid all of a piece with the back window. Trunk space is contiguous with passenger space. Most utilitarian of all car-body designs.

Advantages: A practical, versatile layout that maximizes cargo space and provides a large loading door through the rear. Usually cheaper than their four-door counterparts.

Disadvantages: Interior noise levels may be higher than in a sedan, and the rear cargo area is not as secure as an enclosed, lockable trunk.

LARGE CARS

Made for the highway, long and wide, usually with a powerful engine and fully-equipped interior. Good choice as a family sedan.

Advantages: Roomy and plush compared with smaller vehicles. Long wheelbase helps provide a smooth ride. Seats five with ease, sometimes six. Good for towing heavy loads. Weight and bulk may provide safety advantages. Relatively inexpensive to insure.

Disadvantages: Handling often sloppy. Weight makes them clumsy. Fuel economy mediocre to poor. Hard to park in a tight spot. Expensive to buy and maintain compared with smaller cars.

LUXURY CARS

Full-equipment level only the beginning. Usually high quality at a high price.

Advantages: May offer a refined, unusually quiet ride, precise handling, comfortable seats, effortless power, all the latest gadgets, plush appointments, and high-quality construction.

Disadvantages: May cost two or three times as much as nonluxury cars without being two or three times better. Some more ostentatious than luxurious. Costly to buy, service, and insure. May have poor fuel economy. Some miss the mark in one or more important attributes, like handling, noise, convenience, or comfort.

MEDIUM CARS

The largest automobile segment, including fairly small to fairly large cars. Good choice for a family sedan.

Advantages: Usually roomy compared with a small car. Should seat five in reasonable comfort. Often more powerful and better riding than a small car. Those known as sports sedans may handle especially well.

Disadvantages: Fuel economy usually only average, handling often imprecise. Towing usually limited to light loads. May seat only four people in comfort. Cost more to buy and operate than small cars.

MINIVANS

A large interior riding in a vehicle no longer than a mid-sized car. The most practical, utilitarian choice for moving lots of people or cargo in something that can double as a car.

Advantages: May have carlike ride, and be easy to handle. Plenty of room for up to seven passengers. Plenty of cargo space. Fuel economy generally good considering their bulk. Some offer all-wheel drive.

Disadvantages: Smaller vans can take lots of people, but not their luggage. Larger minivans can take both people and cargo, but cost more to buy and fuel up. Storage area not as secure as in a sedan. Not yet required to meet all passenger-car safety standards.

PICKUP TRUCKS

Emphasis is on cargo-hauling rather than people-moving.

Advantages: Often less expensive than a car. Able to carry loads too high or bulky or dirty for enclosed vehicles. Versatile, go-anywhere design. Four-wheel drive available. Extended-cab versions offer lockable cargo space, and small seats behind front seats.

Disadvantages: When it rains, uncovered cargo gets wet. Handling is often sluggish, the ride often uncomfortable. Passenger accommodations minimal. Fuel economy often poor, particularly with larger trucks.

SEDANS

Four-door passenger cars with an enclosed trunk.

Advantages: Rear doors make access much easier than in a two-door. Basic practicality of design makes them the most widely sold cars. Lockable trunk secures luggage better than a hatchback or minivan.

Disadvantages: Not as versatile as a minivan. Often more expensive than an equivalent two-door coupe.

SPORTS CARS AND SPORTY CARS

Includes two-seaters, 2+2s, coupes, and some hatchbacks. Performance, handling, and looks are the main considerations. Often impractical but fun.

Advantages: Expect good acceleration and braking, plus nimble handling. May or may not have a usable rear seat. Fuel economy ranges from excellent to average.

Disadvantages: Ride often stiff and jarring. Seats may be uncomfortable, cabin noisy and cramped. Luggage space may be close to zero. Often expensive to buy, service, and insure.

SPORT-UTILITY VEHICLES (SUVS)

Part truck, part minivan, part car. A popular alternative for those who dislike minivans.

Advantages: High, commanding view of the road. Four-wheel-drive capability for traction and stability. Good for hauling both people and cargo. Better ones have car-like ride and are easy to maneuver in routine driving. Good for towing.

Disadvantages: Sometimes costly to buy and maintain. Generally ponderous, slow, and clumsy in emergency driving situations. SUVs, particularly those with a short wheelbase, are tipper than cars. Four-wheel drive may be a primitive part-time system. High step-up can make access difficult. Fuel economy usually poor to abysmal. Reliability often worse than average. Many lack a passenger-side air bag.

HOW TO BUY A USED CAR You can find the best value if you buy a used car. Spending \$12,000 or \$13,000 on a new car buys you just a small and basic model with few options, something like a Plymouth Neon, Saturn, or Ford Aspire. But with \$10,000, you have a much wider choice of models and sizes in the vast used-car market.

A car depreciates most rapidly in its first couple of years, even though it can be expected to last a long time. So if you buy a one- or two-year-old car, you'll have a vehicle with most of its useful life ahead of it, and you'll pay far less than you would have for the same car when brand-new.

To find out how depreciation affects specific models, we recently compared the sticker prices for the 1992 model-year cars with their selling price as used cars at the end of 1994. The average car had lost about a third of its value. Sport-utility vehicles, minivans, and sporty cars had the lowest depreciation overall, good news for owners of those vehicles, bad news for used-car buyers. But medium cars such as the Ford Taurus and Chevrolet Corsica and large cars such as the Oldsmobile Ninety Eight Regency depreciated much more than average.

Buying a used car, particularly one whose warranty has expired, involves some risk. An unscrupulous seller may mask a serious flaw with paint or polish. And a car may have problems that aren't obvious from a cursory inspection.

WHERE TO LOOK

Some sources of used cars are better than others. Here's a rundown:

New-car dealers. They're usually the most trustworthy source, but their prices tend to be high. Many offer a warranty; it's typically just long enough to let you make sure the car's not a lemon, but it's longer on some high-end models. New-car dealers also have repair facilities. Some dealers may also have used cars available for lease. The popularity of leasing new cars has resulted in an increase in the number of two- and three-year-old used cars, ones turned in at the end of their lease period.

Independent used-car dealers. The car may have a dubious history. It may have come from a dealer who rejected it, a wholesale auction, a police force, a taxi fleet. Most used-car-only dealers lack repair facilities, so their cars may have had only cosmetic repairs before being put on sale.

Service stations. Some sell used cars as a sideline. If they've serviced the car, they can recount its history, a big advantage. Choose an established station with a good reputation.

Banks and other lenders. They sell repossessed cars.

Private owners. They tend to charge the lowest prices. But if you get a lemon, you'll have little recourse.

HOW TO LOOK

Ask the seller to show you service and repair bills, or the warranty booklet. Walk away from the deal if you don't see convincing evidence that the car has been serviced regularly and treated well. A car sold by a dealer must have a "Buyer's Guide" sticker with warranty information. Read it carefully. In most states, the words "as is" constitute a denial of warranty coverage.

Be sure to check the following areas:

Fluid levels and leaks. Automatic-transmission fluid should be pink and shouldn't smell burnt. Coolant shouldn't look rusty, and there should be no green stains on the radiator (evidence of leaks). There should be no oil spots around the engine or under the car (possible signs of leaky gaskets or worse).

Body integrity. Look for rust, especially in the trunk, wheel wells, and rocker panels (under the doors). Look for signs of an accident, including new welds, discolored surfaces, ripply body work, panels whose color doesn't quite match, doors that don't fit properly. A fresh paint job or fresh undercoating should make you suspicious.

Tires. If the car has less than 25,000 miles on the odometer, it should have its original tires, still with some useful tread. Bald or new tires could mean that the odometer has been turned back. Uneven tire wear could signal accident damage or poor wheel alignment. Make sure the car comes with a serviceable spare tire, a jack and a lug wrench.

Suspension. Pull and push on the top of each front tire. Any play or clunks could mean bad bearings or suspension joints. Push down and quickly release each corner of the car. More than one or two bounces could mean worn shocks or struts. Look at the car from the rear and side. A lopsided stance could mean sagging springs.

Interior. Seats shouldn't sag like an old chair, smell musty, or have ripped upholstery. Pedal wear should jibe with the odometer's reading. See that safety belts and controls work. Check the trunk for mildew or moisture.

HOW TO TEST DRIVE

During a half-hour drive on a clear, dry day, be sure the driving position is comfortable and that the controls are easy to see and reach. Also check:

Steering. With the engine off, there should be no more than 2 inches of play when you jiggle the steering wheel. Steering should be smooth and precise, with a minimum of vibration. A car that pulls to one side may need a simple alignment or proper tire inflation, or it may have been in an accident. "Crabbing," a sideways drift as the car moves forward, can indicate a serious problem.

Engine. Look for smooth acceleration and ample power on hills and when passing. Pinging or knocking is a sign of an out-of-tune engine, and blue smoke is a sign of oil guzzling. A bit of puffy white smoke on a cold day is all right, but a lot of smoke could mean a bad head gasket. Black smoke may signal only a minor fuel maladjustment.

Transmission. Shifting should be smooth. Signs of wear in automatics include a hesitation between the engine's acceleration and the car's. In manuals, a clutch that slips or doesn't engage smoothly is a sign of wear.

Brakes. On a traffic-free road, try a series of stops from about 45 mph. Warning signs include strong pulling to one side, pedal vibration (except with antilock brakes), an abnormally long stopping distance, and a need for increasing pressure on the pedal. With the engine idling, step on the brake pedal for 30 seconds. If it feels spongy or sinks, the brake system may have a leak.

Exhaust system. Sputtering or rumbling could mean a leak that's costly to fix.

Comfort and quiet. Drive at 30 to 40 mph over a bumpy road. Excessive bouncing may point to suspension problems. Make sure you can live with rattles and squeaks, which are hard to trace.

CLOSING THE DEAL

Have a mechanic assess the car, which should cost \$60 to \$100. Make sure the mechanic performs a compression test on all cylinders and assesses any flaws you've found. Ask the mechanic to give you a written estimate of repairs, which you can use in price negotiations.

Typical prices for used cars can be found in printed guides available in most libraries. Sometimes, however, the prices in those guides represent only a starting point for dealers. Also, a printed guide may not be up-to-date. To find out current prices at which cars are actually selling in your part of the country, call the CONSUMER REPORTS Used Car Price Service at 900-446-0500.

WHICH OPTIONS?

If you haven't bought a new car in a few years, you may not be up to speed on all the latest technology, both standard and optional, available in the current models. Major safety and convenience items include:

Air bags have become nearly universal. Used in conjunction with seat belts, air bags greatly soften the impact of a frontal collision. Just beginning to appear are side-impact air bags, mounted in the door or the edge of the seat. Volvo is pioneering them in this country, and BMW plans to install them soon. They may be common in a few years' time.

Antilock brakes use a computer to sense when a wheel is beginning to lock up and slide. With the wheels locked, braking effectiveness is diminished and you can't steer. Antilock brakes rapidly pulse the braking system, so you can both maintain braking and steer the car.

Traction control can be an enormous help maintaining traction, particularly with a rear-wheel-drive car. Traction-control systems use the antilock brake computer to selectively pulse the brakes on just the wheels that are slipping. More sophisticated versions throttle back the engine as well.

Four-wheel drive delivers the ultimate in traction, although no system can perform miracles: Even when four-wheeling, you have to drive appropriately for conditions.

Part-time four-wheel drive, the kind found on most pickup trucks and some sport-utility vehicles, is engaged with a lever or a switch. It should be used only on loose, slippery surfaces like mud, sand, or snow. On dry pavement it would strain the driveline and scrub the tires every time you rounded a corner.

Several **full-time four-wheel-drive** systems are available. With some, you select four-wheel drive with a lever or switch, but you can stay in four-wheel all the time if you wish. Some cars and minivans offer a version of full-time four-wheel-drive known as all-wheel drive. It automatically shifts power in slippery conditions to whichever wheels will benefit. Those systems normally lack a regular four-wheel drive's low-range gear setting used in the most difficult terrain.

Adjustable shoulder-belt anchors are especially useful for very tall or very short people. They let you adjust the height of the upper anchor so the shoulder strap crosses your chest without sawing at your neck.

Security devices may discourage thieves—and reduce your insurance premiums. A central locking system may make you feel safer. The best have a remote key-fob transmitter so you can unlock the doors and turn on the interior lights before you reach the car. Some automatically unlock all the doors when you shift into Park—convenient if you're in your own driveway, but not so good if you're parking in a marginal neighborhood.

An automatic transmission is a virtual necessity for people who commute in stop-and-go traffic. The four-speed automatic is now common—as is electronically controlled shifting, which helps the transmission select the best gear for road conditions. The new automatics are more fuel-efficient than their three-speed ancestors, and they work effectively even with a small engine.

Air-conditioning is nearly universal these days. Aside from keeping you comfortable and alert in hot weather, an air-conditioner used with the defroster in wintertime helps defog windows by dehumidifying the air.

Automatic climate-control systems are trickling down from luxury cars to everyday models. You simply set the desired temperature and let the system do the rest.

A power driver's seat may seem like a frill, but particularly in cars with low front-seat cushions, this option lets you raise the seat for a better view of the road—especially helpful for short people. Seats with “memory” settings recall two or more sets of seat settings at the touch of a button.

OPTIONS: FROM WORTHWHILE TO WORTHLESS

HOW TO BUY AUTO SOUND

You can try out a radio, cassette, or CD player in a car dealer's showroom, but playing the wall-mounted display won't give you a clue as to how the system will sound in your car. That's determined primarily by the way the speakers you choose are installed and how they interact with the car.

Music played inside a car will be acoustically different from music played in the dealer's showroom or in your home. The passenger compartment, considerably smaller than a typical living room, makes variations in loudness across the music spectrum that are quite different from what you hear in most rooms. In the car, music competes with wind, road, and engine noise. Buildings, mountains, utility poles, and other cars can interfere with FM reception. Even so, auto sound technology has improved greatly in the last decade, and car owners can now demand, and get, audio quality approaching what they hear at home. You can turn the family car into a virtual concert hall on wheels, if you're willing to pay the price.

The "deluxe" audio systems that the automakers install at extra cost are notably better than those that are standard equipment in most cars. But such systems often list for many hundreds of dollars. For the same money or less, a good midpriced aftermarket radio/tape player and speaker system can provide improved results. In fact, if you're shopping for a new car, with some models you can "delete" the standard audio system and subtract its price from the total cost of the car. That price reduction could defray some of the cost of a superior aftermarket system.

If you just want to improve the system in your present car, you should start with the speakers. That may improve the sound enough to make the purchase of a new radio/tape player unnecessary.

RADIO/TAPE PLAYERS

Radio/tape players usually fit what's called a Deutsche Industrie Normenausschus (DIN) mounting: an opening approximately 2 by 7 inches in the dash. DIN-mounted models have larger usable front-panel space than do the shaft-mounted models made for older cars and many trucks.

A few cars require models that allow ISO (International Standards Organization) mounting, which uses screw holes for a special bracket. Some other models have their own way of mounting that calls for a special bracket to accommodate an aftermarket radio/tape player.

Adapters and kits are available for installing almost any radio/tape player in almost any car. But a model designed to fit your car's specific type of mounting generally makes a neater and more secure installation. One way to be sure the radio/tape player fits is to have it installed by the audio dealer. Installers are usually familiar with most car-and-stereo combinations and know which additional parts may be needed.

Convenience And Features

Digital tuning is standard with radio/tape players, including presets, programmable buttons you can set to your favorite stations. That's especially useful in a car because it helps you find the right station while keeping your eyes on the road. Not so many years ago, most car radio/tape players had only a single tone-control knob, which adjusted treble. Now, separate bass and treble controls are commonplace. Some players even offer a built-in equalizer.

Other standard radio features include:

Station seek This finds the next station up or down the dial. Some models let you limit reception to strong stations.

Station scan This lets you hop automatically along the entire radio band from one station to another, pausing briefly at each. You stop the scan when you hear what you like.

Preset scan Found on most models, this scans only the stations you've programmed with the preset buttons.

Auto-preset This sets the tuning buttons to the first few stations it finds on the dial, a help when you travel in unfamiliar areas.

Sound Power

The more amplifier power, the louder the sound the system can produce. A receiver's power output has become a major marketing point, but manufacturers' claims do call for skepticism. Some manufacturers, for example, inflate their figures by adding the power levels of both channels instead of stating them individually, a practice discouraged by the industry. (Voluntary standards prohibit such misleading statements, but they do not include the legal penalties that can be levied by the Federal Trade Commission for misleading statements about home stereo amplifiers.)

An actual power level of 10 to 17 watts per channel, easy to accomplish without sophisticated circuitry, should provide

all the power you need to flood the car with sound. You might run short of power with some receivers, however, if you use them with four speakers rather than two. But a receiver that can't function well with four speakers isn't necessarily a lost cause. You can increase its volume with an external amplifier, providing the stereo has a "preamp" output jack. Most models do.

Getting Good Reception

FM radio waves bounce off buildings, hills, and even other cars. When the same radio signal arrives at the car antenna at different times, especially prevalent in a moving car, you may hear increased noise or garble known as multipath distortion. Multipath can also cause bursts of noise as you drive along. You can often reorient an audio system's antenna to correct the problem at home, but you can't do that on the road. Some receivers are much better than others at coping with multipath distortion, but there is no clear correlation between multipath resistance and price.

Just about any model should do a good job of rejecting electrical noise from other cars' engines. All models have stereo "blend," which reduces the noise that's common with a weak station. This is achieved by gradually reducing FM stereo separation. The feature is useful, although some models drop into mono before the stereo noise is bad enough to require it.

Tape Players

Tape players, too, have features that make them easy to use. Most can jump to each successive selection on the tape, forward or backward, at the press of a button. A few can scan the tape and play the first few seconds of each selection. That helps you find a particular selection while keeping your eyes on the road. If you're impatient while waiting for the tape to rewind, you'll appreciate a model that lets you play the radio while the rewind mechanism whirs.

An automobile's tape player generally reproduces the entire tonal spectrum accurately, with little background noise. Dolby noise reduction is common, but usually only "B" type. Even so, you can play tapes made with Dolby "C" or "S" without much degradation. Dolby greatly reduces background noise and hiss, but you may not realize its full benefits amid the noise of the highway. Freedom from flutter is at least adequate with most models, even when driving on a moderately rough road surface.

Deterring Theft

A conventional car alarm isn't an effective deterrent in preventing equipment theft, according to many experts. Consequently, audio manufacturers have been diligently developing increasingly sophisticated technology to thwart stereo thieves. Unfortunately, the thieves have been just as diligently developing more sophisticated countermeasures.

Probably the best-known antitheft tactic is to make the receiver removable. Many DIN-mounted models are easy to slide out from a box in the dash with the flick of a handle. That method has an obvious drawback: Hiding the receiver in the trunk or lugging it to and fro is a nuisance. Sooner or later, you may be tempted to leave it in place, where it is even easier to steal than a fixed-mount model. Also, a receiver you've played and then unplugged could be hot enough to burn you.

There is a neater solution: a removable faceplate, which is easier to carry than the entire receiver. The face contains all the switches and displays, and is often coded in a way that prevents substitution of another face. Without the face, then, the receiver is useless to a thief, so it's less desirable to steal. Some models have an electronic security system that requires you to enter a three- or four-digit code to activate the stereo when it's reconnected. Unfortunately, such electronic locks are vulnerable to a thief who can get an unscrupulous dealer to defeat the lock.

Recommendations

Radio/tape players tend to perform very well in important categories such as FM reception and tape accuracy. While AM fidelity is not as good as that of FM, the AM tuners are generally better designed than those found in home stereo receivers.

For any special needs, pay particular attention to models that perform well in specific areas. For example, city dwellers should carefully consider how good a model is in multipath rejection, selectivity, and strong-signal performance.

CD PLAYERS

If you're prepared to start from scratch, consider a receiver with a CD player in place of the usual tape slot. However, many people are reluctant to scrap their existing car receivers in favor of a completely new stereo system. To ease the transition, there are other options for playing CDs on the road:

Portable CD players Portable CD players can be played through existing auto sound systems. If the car receiver has a front CD input jack, you can tether the CD player to the receiver with an inexpensive audio cord that has stereo mini-phone plugs at each end. Even without a CD jack, you still have two options. You should be able to obtain a cassette-like adapter that plays a CD through the tape player, but with some additional background noise and slight inaccuracy in frequency response. Also, you may be able to buy a modulator that connects to your radio's antenna jack. To hear a CD, simply tune to a predetermined FM frequency.

To conserve a CD player's batteries, plug it into a car's cigarette-lighter socket with an adapter. If the shocks of the road turn out to be too harsh for your portable CD player, consider a shock-absorbing permanent mount, standard with some portables and available for most others.

Dash-mount players A few car CD players can be mounted in an unfilled "DIN" slot in the dash and permanently wired to the receiver. Some stereos have a rear jack for that purpose.

CD changers If you don't want to fuss with discs and plastic boxes while driving, a multiple-disc changer might appeal to you. A changer can play hours of music without your having to lift a finger. You mount the changer, a box about the size of an unabridged dictionary, in the trunk. It is controlled by the receiver, if the receiver has that capability, or by a small controller on the dash.

Minidisc Players

The minidisc, a new music carrier that takes the form of a small cartridge containing a CD-like disc, has made it to the car. There are several models of single-play minidisc receivers, and even a few in-dash changers that take three or four discs at a time. However, prerecorded minidiscs are not available in many stores. You can record your own at home, but the combination of home and car minidisc equipment could cost nearly \$2000.

LOUDSPEAKERS

New speakers alone can improve a car's audio system quite noticeably, since speakers affect sound quality more directly than the radio/tape player does. Following are some points to consider:

Accuracy A speaker with high accuracy produces sounds that correspond closely to the electrical signals from the radio or tape player. Speakers should reproduce low-frequency notes with minimal distortion. Also, the rumble of background noise tends to drown out low notes; thus, car speakers need a boost in the lowest bass frequencies to make those frequencies audible. But since car speakers are often much smaller than those in a home audio system, they may strain to deliver loud, distortion-free bass.

Power Requirement The more powerful the amplifier, the louder the sound that's potentially available from a given pair of speakers. In addition, the more efficient the speakers, the louder the sound they'll produce from a given amplifier. Speaker efficiency is no measure of sound quality. But efficiency is an important consideration in a car, where a basic receiver may muster no more than 3 to 5 watts per channel and even high-powered models put out only 10 to 17 watts.

Some circular speakers demand lots of amplifier power, 30 watts or more per channel. Such speakers can't produce very loud sound unless you match them with a very high-powered receiver or an external amplifier. If you're planning to keep your present receiver and you're not sure how powerful it is, choose speakers that need relatively little power.

Mounting Simply replacing the original speakers with aftermarket speakers of the same size is usually a straightforward job. But installing speakers where there were none before demands savvy and skill. If you go that route, check your library for a clearly written auto sound guidebook. If you have a choice, mount the speakers on the package shelf. That location allows them to take advantage of the large trunk enclosure, producing the strongest bass. Hatchbacks and wagons lack a package shelf, so you'll have to settle for door or kick-panel mounting. With a door mount, the speakers should be placed as high as possible for best performance at high frequencies.

To accommodate do-it-yourselfers, each set of speakers comes with instructions for installation. Some instructions are clear, some not so clear. To ease installation, most cars have cutouts, holes in the car's panels shaped to accept the speakers. The cutouts are generally covered by a layer of upholstery. Mounting speakers larger than the factory cutouts requires cutting the metal, quite an involved job. Speakers usually come with templates to guide the cutting operation and include mounting hardware, although a few models come without speaker wire.

Because most installations involve some cutting of the car's interior, letting the auto sound dealer install the speakers may be a prudent investment. If you have any reservations about the job, leave it to a professional.

Recommendations

Whether or not you plan to do the installation yourself, do your homework before you shop. Check the available

space where you plan to place your speakers, and measure the clearance behind or below the mounting panel. If you have any problems making these measurements, get some advice. A well-informed salesperson should be able to determine which models will fit your car.

Try for larger, oval speakers if your car can accommodate them. As a class, they offer slightly better accuracy and bass capability than circular models. It's reasonable to expect good performance with oval speakers once the receiver's tone controls have been adjusted. Therefore, your choice of oval speakers may depend primarily on power requirements and price. If your car has room for only smaller, circular speakers, try to audition them before buying.

PHONES ON THE ROAD

Ten years after their introduction, cellular phones have been welcomed into American homes, briefcases, and cars faster than any other consumer electronics product, including color TV sets and VCRs. Not even an extended recession has dented their popularity. Several developments over the past few years have combined to increase the number of users.

Cellular carriers, the companies that operate local cellular systems, spent billions to install transmitting towers in more and more cities, towns, and wide-open spaces. Technology transformed the phones themselves. Professionally installed mobile car phones and heavy, handbag-sized transportables were joined by another type of phone, the handheld portable. It's usually small enough and light enough for a jacket pocket.

Because of a marketing technique called bundling, consumers get a discount on the phone itself if they sign up for service when they buy the phone. Those developments have begun to free cellular phones from their image as a techno-toy for executives and owners of fancy cars. In a recent survey of CONSUMER REPORTS' readers, 10% of whom own a cellular phone, business use was only the second-most-popular reason for buying a cellular phone. Even more readers bought their phone to use during emergencies, and many bought it to keep in touch with family members.

Our readers had mixed feelings about their purchase. Although 55% reported that they were "very" or "completely" satisfied with cellular-phone service, about the same percentage had experienced one or more problems with service. Moreover, 12% of our readers' phones have needed repair. That's unusually high for products with a median age of one year.

THREE TYPES OF PHONES

There are three configurations of cellular phones: mobile, transportable and portable. The type growing fastest in popularity is the portable type. These lightweights are usually carried in a pocket or a briefcase, but most come with car battery adapters. They represent about half the models on the market. The lightest weigh less than a pound, but the constant leapfrogging among brands vying for the lightweight title pretty much guarantees that the current minimum will soon be eclipsed.

The contract to activate the phone requires you to purchase service for a set period and, generally, to pay the carrier an activation charge of \$40 or so. In effect, by signing a contract, you get a discount. Ordering the phone a la carte adds hundreds of dollars to its price. Obviously, it's extremely important to shop around until you've determined a reasonable price for the phone-and-contract combination you want. But that doesn't necessarily mean you should buy the least expensive combination. The phone is a one-shot payment, while you'll pay for service month after month. Selecting the best cellular carrier and contract can be as important as saving \$50 on a phone.

HOW THE PHONE WORKS

Because it serves as a link in an elaborate wireless communications system, a cellular phone operates differently from other types of phones, whether corded or cordless. For starters, when you turn the phone on, an indicator shows the strength of the signal received from a nearby cellular transmitter. There is no dial tone because the phone isn't in contact with the local phone company's lines. It's communicating with an intermediary, the cellular carrier. To make a call, you enter the number as you would on any Touch-Tone phone. It appears on the phone's display as you tap the buttons, so you can correct errors. Then you press the Send key. When a call is over, you press the End key or turn the power off to break contact with the carrier's tower.

When the phone's power is off, you can neither make nor receive calls. People who call you hear a message from the cellular carrier stating that the phone is not available. To make the phone available for incoming calls, you must put it on standby, turn the power on, so the carrier's equipment can find you. But think twice before you give your number out: You pay a cellular carrier as much for a call you answer as for one you make, although the caller pays for the traditional noncellular charges.

You can hold a cellular conversation nearly anyplace (beneath a highway underpass, inside a building or miles from the nearest town), as long as the transmitter signals from both phone and carrier are strong enough. If you move out of a transmission tower's range during a call, you probably won't even know when the system hands you off to a closer tower. At worst, the conversation will be punctuated by a brief pause or click. It can happen, however, that the tower toward which you are headed has no available channel for your call, in which case you'll be unceremoniously dropped.

Another consequence of using airwaves in place of phone wires is a loss of privacy. Anyone with an inexpensive device called a radio scanner can listen in on your cellular conversation. (Technically, that's a federal crime, but it would be difficult to finger the perpetrators.) Although Congress banned the manufacture of radio scanners that can pick up cellular frequencies, it did nothing to reduce the large number of scanners already in use.

When you leave the area covered by your cellular carrier you are, in cellular parlance, roaming. A light or message on the phone shows whether the area you're in is covered by another carrier. Even if the new area is covered, you won't be able to make calls unless the other carrier's computer can recognize your phone. More and more carriers are agreeing to recognize each other's customers. Where that's not the case, you'll have to give the other carrier advance notice to use your phone in its territory. Your own carrier can tell you how to do that.

Rather than make roaming calls, though, you might be better off using a pay phone when away, because roaming calls incur substantial charges above regular cellular airtime rates. Tack-ons of \$3 for each day you make roaming calls, plus 50 cents to \$1 per minute of airtime, are typical. Make a long-distance roaming call and you'll also incur charges from your long-distance carrier. If you travel to a particular area frequently, it may be cheaper to register your phone there, under a second number, and pay a monthly fee than to incur roaming charges when you visit.

CELLULAR FEATURES

Light though they may be, the portables we tested are heavy on features, a number of them standard:

Memory and speed dialing. A portable phone is often used away from a Rolodex or phone directory, so it's useful to be able to store numbers in the phone itself. All our portables store at least 30 numbers, and nearly all let you enter an identifying name with each.

Phone numbers are stored in sequentially numbered memory locations, but with the majority of models you need not remember which location contains Aunt Ruth's number. You can simply scroll through all the names until hers pops up. If you do recall exactly where you put a number, you can speed-dial it by pressing two or three keys.

Call timer. Because cellular calls are so expensive (in some places, a daytime call lasting 10 minutes can cost \$8 to \$10), keeping track of airtime is a virtual necessity. In addition to a timer that shows the elapsed minutes for the current call, there's another that tallies conversational minutes cumulatively. That way, if you're running up a huge bill, you can find out and mothball the phone until the first of the month. Most of the models can also be set to beep at regular intervals to remind you of the passing time.

Battery-low indicator. On the road, a phone's battery is its lifeline, but it typically sustains conversation for no more than an hour or two and standby status for about 8 to 14 hours. In fact, short battery life was the biggest complaint CONSUMER REPORTS' readers had about the functioning of their portable phones. (That problem may diminish, however, with the recent introduction of nickel-metal hydride batteries, which are supposed to last longer than the nickel-cadmium batteries now used in cellular phones.) An indicator to tell you the battery has run down reminds you to recharge, if you're at home. On the road, it's a warning to pop in a fresh battery or head for a phone booth.

Own-number display. Every activated cellular phone has its own phone number. If you don't refer to it often, or if you lend the phone to a friend who doesn't know it, being able to call it up on the phone's display is helpful.

Roaming features. All models can be assigned more than one phone number, to let you register with more than one carrier, and all let you temporarily halt their ability to roam so you don't inadvertently run up extra charges.

Some models offer extra features and conveniences:

Battery-strength indicator. Most of the tested phones have an indicator that shows not just whether the battery is low, but roughly how much life is left. Nickel-cadmium batteries are notorious for conking out precipitously. A strong battery level means you have some time left, but not necessarily a lot.

Power tools. Most models have a recharger that produces so little current it can take more than eight hours to recharge a standard battery. Rapid rechargers cut the time to an hour or two.

Any-key and automatic answer. The first lets you answer incoming calls by pressing any key, useful when you need to answer quickly without looking at the phone. The second is even handier, it picks up calls for you after a couple of rings. On phones without these features, you have to press the Send key to answer a call.

One-touch dial, speakerphone. It is dangerous, of course, to dial while you're driving, but if you need to make a call when stopped in traffic, these two features can help. Some phones have dedicated keys that will dial numbers you've previously assigned them. That cuts down on dialing time. Most of the phones can be bought with a speakerphone kit, so you can keep both hands on the wheel while talking.

Automatic number selection. If you have two or more phone numbers, most models make you switch manually between them when you travel.

Built-in help. Nearly every cellular phone has features you won't use very often. If you need to disable long-distance calling, for example, and the instruction book isn't handy, most models will display instructions at the touch of a key or two.

MAKING THE CONNECTION

A cellular phone's most important jobs are to establish a connection with the carrier's transmitter, (more demanding than keeping up an existing connection), because the phone has to hunt down the strongest available channel, and to minimize channel noise when conditions are less than ideal. Those are factors that concern our cellular-phone-owning readers, as two in five complained about poor reception. And they're the factors we weighed most heavily in ranking the tested phones.

We equipped our electronics lab with a device that mimics the transmitter used by cellular carriers. Then we simulated such situations as making a call in a moving car, far from a carrier's transmitter, or within the potpourri of reflected and competing signals found in a large city. An experienced panel judged how well each model held its own against background noise and how natural the speaker's voice sounded. We also tested phones in the field, signing on with local carriers. In our case, the field was midtown Manhattan and the suburbs as well as real fields in nearby rural areas.

In the lab, some phones had an easier time than others initiating a connection with a weak transmitter signal, and some tamed noise far better than others. The more considerate models spared our panelists' ears by cutting off incoming sound when the noise grew too rough, although they didn't always cut the connection altogether. Maintaining a connection in spite of excessive noise is a real advantage: If conditions improve quickly, you won't have to dial again.

Phones that performed best in the lab also excelled in the field, but the differences between the best and worst were less pronounced with one of the two carriers we used. That result highlights the importance of selecting the right carrier.

We also found major performance differences in connection strength, the ability to keep an existing call going when the tower signal gets weaker. That may not be an issue when you stay put for an entire call, but a 10-minute drive down the interstate could put quite a bit of space between you and the transmitting tower. Even small movements of your hand or head can significantly change the level of the received signal. For the most part, the phones provided reasonably good voice quality and loudness.

SHOPPING FOR CELLULAR SERVICE

When you shop for a cellular phone, you'll probably find it bundled with service (California is an exception. There, phones are sold unbundled). Signing up for service when you buy the phone can save you hundreds of dollars on the cost of the phone itself. We've even seen mobile phones offered free to anyone who bought a pie, for instance, or tires, provided the buyer contracted for service.

Dealers can offer such low prices because cellular carriers, eager to increase their customer base, will pay them up to \$400 each time they sell a phone with service. Customers are so prized by the industry that it has its own name for them, "pops," short for members of the population. But attracting new customers isn't easy. Although the average monthly cellular bill nationwide has dropped from nearly \$100 to less than \$70 in the past five years, rates are still high. In some cases, a cellular call costs more than 50 times as much as a conventional call. In Delaware, for example, you'll pay about 4 cents for a five-minute local call from a garden-variety phone, but you'll pay up to \$3 to make the same call from a cellular phone. CONSUMER REPORTS' readers who use a cellular phone cited usage fees as the biggest drawback of phone service.

In most industries, competition would drive rates down, but the cellular-phone business, like the cable-TV business, is not an open market. Each of America's 734 cellular districts has at most two licensed carriers, and in much of the country, their prices are hardly competitive. The General Accounting Office, the investigative arm of Congress, recently found that in about two-thirds of the nation's largest markets, the prices charged by the two local carriers are almost the same.

When you buy a phone, the dealer may let you choose between the two carriers and among several payment plans. Or the dealer may try to present you with a fait accompli, one carrier, one plan. Based on our experience with local carriers and on information we obtained from around the country, there are often substantial differences in service, and, occasionally, in price, between competing carriers and plans. There are a number of strategies you can use to choose a carrier and service.

Do your homework. If your area has two carriers, get rate sheets directly from both. (Check under Mobile Telephone Services in the Yellow Pages.) Those sheets will list terms for a one-time activation charge and for all the plans the carriers offer, so if a salesperson fails to mention a plan that interests you, mention it yourself. If you know people who own a cellular phone, find out how satisfied they are with their carrier. And don't be taken in when a carrier brags

of having oodles of cells or channels: If its transmitters are in poor locations, its competitor may provide better service.

Try to avoid long-term commitments. Signing a one-year contract commits you to spending probably hundreds of dollars more than the cost of the phone and risking cancellation fees as high as \$200 if you change your mind in midstream. Until you know which carrier is better for you, make the shortest commitment possible. Carriers know that the longer you use their service, the less inclined you are to bother switching to their competitor, so not all carriers offer a month-to-month subscription. Still, many offer contracts that last less than a year.

Most carriers have plans tailored to common calling patterns. They stipulate a fixed fee for a monthly time allotment. Despite the fee, the sales brochures tout that time as "free." If you exceed the allotment, you pay a stated amount for each extra minute used during "peak" hours (usually daytime, Monday through Friday) and a lower amount for "off-peak" use.

Here are three typical plans:

An "economy" plan has a low monthly minimum, perhaps \$20 to \$30, and no free airtime, so you pay extra for every minute of every call. This plan is appropriate if you need a phone only for emergencies.

A "standard" or "basic" plan has a higher monthly fee than an economy plan and includes 30 or so free minutes, as well as lower rates for any extra airtime. It's designed for people who use a phone more than occasionally.

An "executive" plan calls for a monthly fee of \$100 to \$200, includes several free hours, and has the lowest rates for extra airtime. It's best for someone who uses the phone a lot, a salesperson, for instance.

In practice, carriers usually have a wider variety of plans than this, and some may offer discounts based on volume, or throw in services like call waiting or call forwarding. We found one plan that allowed off-peak calls for free. If you're not sure which plan is best for you, take the one with the lowest monthly fee until you establish a usage pattern. If you need to switch to a higher-volume plan before the contract is up, you shouldn't have any trouble.

Check the details. Major differences between carriers can sometimes be hidden in fine print. We found a carrier that had three more peak hours per day than its competitor. During those hours, using the competitor would save you 60%. A carrier that charges a full minute for an extra second's airtime is more expensive than one that measures airtime in 30-second increments; the smaller the increments, the better.

Some carriers make you dial extra numbers to reach a long-distance company other than the one with which they're affiliated. Others let you select your own company when you sign up.

Finally, think twice about using features and services you can live without, conferencing, perhaps, or hotlines that give information on sports, trivia or weather at the touch of a few keys. They run up airtime.

RECOMMENDATIONS

A number of phones offer optional kits that let you power the phone with a car battery, boost transmitter power to 3 watts, add an externally mounted antenna or convert to a speakerphone. Or consider buying a permanently installed mobile phone; a mobile phone is generally less expensive than a portable, and the extra power it provides is likely to make for better connections.

Once you've narrowed the choices, be sure to compare prices at several dealers. Within the space of a few miles, we found identical phones, bundled with identical contracts for airtime, priced hundreds of dollars apart. And shop for a carrier and contract as if they were part of the cost of the phone. Typically, you'll spend more on a year's service than you did on the phone.

HOW TO BUY AUTO SECURITY DEVICES

According to Uniform Crime Reports, 1,561,000 motor vehicles were stolen in 1993 alone. This is down 3.1% from 1991, when 1,661,738 thefts were reported. According to their publication, Crime in the United States, 7,915,199 automobiles were broken into for "accessories" (i.e. audio equipment) in 1992.

An unprotected car is an easy mark for a properly equipped professional, who can unlatch a door in less than a minute. Even an amateur using crude tools wouldn't need much time. At the very least, some electronic alarms and simple gadgets can slow down the crooks.

Car thieves want to work quickly and furtively, so the main goals of car alarms and other security devices are to scare thieves away or challenge them with a time-consuming task. In theory, a warning decal, a blinking dashboard display, or some more obvious device warns thieves that your car won't be an easy mark. They may have to spend time disabling the protection you have installed and they may set off flashing lights or a wailing siren in the process. Thieves willing to take those chances may gain entry to a car only to find that it can't be driven away; some security systems disable the engine. Alarm systems do have their detractors, who wonder whether the devices reduce crime or merely add another source of noise pollution. (False alarms are almost inevitable, either because a system has been improperly installed and adjusted or because a thunderstorm triggered the alarm.)

Despite the skepticism, car security systems sell well, from steel steering-wheel locks and collars to elaborate alarm systems to expensive electronic tracking systems. Alarm systems dominate the auto-security market. Most systems on the market are sold to specialized auto-security shops or car-alarm dealers and are usually professionally installed. But a number of alarm manufacturers also sell systems intended for installation by ambitious do-it-yourselfers. Many alarms contain similar components: a dashboard-mounted flashing LED display to warn away thieves; one or more sensors to detect a break-in; a siren to attract attention; a remote control to arm and disarm the system; and a control module to run the works. The more sophisticated "two-piece" models separate the control module and the siren; simpler "one-piece" systems put them in a single housing.

Installation entails finding a good location for each of those parts and putting them in place. If you've installed electronic car equipment before, you have some inkling of what you're in for. But if you've never drilled through sheet metal or poked around under the dashboard, installing an alarm could be frustrating, time-consuming, and even damaging to the car.

TO FOIL A THIEF

It stands to reason that the more forms of resistance an alarm system puts up, the more likely it is to foil a break-in. Here are a few important features to look for:

Siren. This is a system's major attention-getter, so it should sound long enough to attract attention but not so long that a false alarm seriously disturbs the peace. Several cycles of a minute or two each should be adequate. Most of the sophisticated two-piece alarms work that way. But some one-piece systems sound just once, and others won't stop until the car's battery goes dead. The louder the siren, the more likely it will be noticed. Sound levels range from about 83 to 97 decibels—loud enough to be heard if you're indoors and the car is at the curb but not as loud as some manufacturers claim. Your ear would have to be right next to the siren before it would sound as loud as the companies say.

The cry of the car alarm has become such a familiar urban sound that even a long, loud one can go ignored. Some systems differentiate themselves from the crowd by cycling through several unique sounds. The best systems have a standard attention-getting feature: When the siren sounds, the parking lights or, in a few cases, the headlights also flash.

Finding room for a siren in the engine compartment of a compact car may be difficult. You may have to remove some engine parts before you can drill the mounting holes. The best location is generally on the firewall or on inner fender walls. Point the siren down to keep dirt and moisture from collecting inside.

Engine disabler. In itself, this won't prevent a break-in or vandalism. But a thief won't be able to start the car once the alarm is armed. If you choose to disable the starter, as most manufacturers recommend, a thief won't be able to crank the engine. The thief may leave or he may try to find the disabler and bypass it. Alternatively, you could disable the fuel pump or the ignition system. But doing so leaves open the remote risk that the disabler could malfunction while you're driving.

Typically, the disabler goes between the ignition switch and the starter relay, to a wire that is not easily accessible. You'll need a test light or a voltmeter to identify it. Connecting can be difficult for novices. Many alarms feature a disabler as an option. A few make it standard. Statistics seem to show lower rates of theft for disabler-equipped cars, so we consider a disabler an important feature.

Intrusion sensors. These detect disturbances early, possibly before a thief has even opened a door. Shock sensors detect a sharp blow to the vehicle's body; motion detectors react to jacking, swaying, or bouncing motions; glass-breakage sensors respond if someone tampers with or breaks any of the car's glass.

The more types of sensors an alarm system has, the better. But good design and proper installation also matter. A sensor should protect all parts of the car equally; it should be designed so you can easily adjust its sensitivity, yet the sensors should not be overly sensitive or overly dependent on location, so they can provide maximum flexibility.

Some one-piece systems put intrusion sensors in the main housing, whereas other two-piece systems locate their intrusion sensors in the control box. Such designs limit your ability to position the sensors for optimum protection.

Most sensors have a screw or a stem you turn to adjust sensitivity. With others you adjust sensitivity by cutting a wire. In effect, those systems have only two sensitivity settings; we don't think that's enough. Intrusion sensors that are poorly designed, poorly installed, or improperly adjusted are a major cause of false alarms. They have to be adjusted just so. Intrusion sensors are typically screwed into holes drilled toward the center of the firewall. Their position affects their sensitivity.

Wiring. You must run wires between the passenger compartment and the engine area for flashing lights, power door-lock control, and other features. The car may have suitable openings near the fuse box. If not, you'll need to drill holes, taking care not to damage other wires and components. Run wires to the doors and trunk under the carpeting and rear seat, next to existing wires. For maximum security, make all wires as inconspicuous as possible, camouflaging them with electrical tape if needed.

Control box. This is the heart of the system, regulating the alarm through feedback from sensors and from commands you send it with the remote control. It's usually the toughest component to position. If it's combined with a siren (a "one-piece" system), it can go in the engine compartment. If the system has a separate control box, its best location is high up under the dashboard, a cramped spot but one that offers protection from the elements and from an intruder. Placement will also affect the control box antenna's ability to pick up signals from the remote control.

Door, hood, and trunk protection. Many alarms monitor the doors, trunk, and hood by detecting changes in a car's electrical usage. Those alarms will sound, for example, if someone opens a door and the dome light goes on. Some models can be connected to the car's own door switches. But if the car lacks courtesy lights under the hood or in the trunk, or if the alarm system lacks electrical sensing, the system should come with a set of pin switches to protect the hood and trunk. To install the switches, you'll need to drill into the sheet metal, typically in the trunk's lip and along the radiator support or the fender wall lip for the hood. A few alarm systems automatically lock power doors when they are armed.

Panic alarm. Most alarm systems come with a remote panic feature as standard equipment. It allows you to trigger the alarm with the remote control if you see someone trying to break into the car, or if you see someone suspicious approaching while you're in the car.

USE IT OR LOSE IT

An alarm's ease of use wouldn't seem to have much bearing on how well it protects your car. But you might not always arm the system if it's a nuisance to use. Some ease-of-use factors are fairly objective; others are a matter of personal preference. Among the features we considered:

Arming/Disarming. Alarm systems divide into those that use active arming and those that are passive. With active arming, the system won't work unless you press a remote control after leaving the car. A passive system automatically arms itself if you forget to arm it after the last protected point is closed, a feature known as "last-door arming."

With a number of systems you can choose between active and passive arming, but you usually have to make the decision when the system is installed. With fancy systems, you can expect to become familiar with the peculiar language of siren chirps, various patterns of sounds that are supposed to tell you what's what inside the system. You'll also need to become conversant with a variety of command sequences. To disarm these systems, you simply press the remote before opening the door and listen for the "all-clear" chirp. You don't need to lunge for a switch or key before the siren starts to blare.

Remote range. The remote controls for some systems have too short an operating range. Having a long range can be handy, for example, if you want to control the system from your living room. A long range also lets you control the alarm's panic feature at a safe distance from the car. However, many of the claimed distances are overly optimistic.

Other features. Look for systems that have an emergency override to disarm the alarm if the remote control is

missing or out of order, a valet switch (on passively armed models) to turn the system off when you hand the car over to a parking attendant, a dashboard display that tells you if the alarm was triggered while you were away, and well-written operating instructions.

RECOMMENDATIONS

Forced to choose between performance and ease of installation, we would pick performance, even if that means having the system professionally installed. If you opt to have an alarm professionally installed, choose the installer with care. An improperly installed system can be a nightmare to live with. In our experience, skill levels and fees vary considerably from one shop to another. Before buying a system to install yourself, take a look inside the package. Check out the instructions and wiring diagrams to make sure you can follow them. And note that you will most likely be dealing directly with the manufacturer if you run into problems.

Be sure to check with your insurance company to find out whether an alarm qualifies you for a discount on the comprehensive part of your premium. According to the Insurance Information Institute (III), ten states (Florida, Illinois, Kentucky, Louisiana, Massachusetts, Michigan, New York, Pennsylvania, Rhode Island, and Washington) require insurance companies to give car owners discounts on their comprehensive insurance for antitheft devices such as alarms, window etching, and electronic vehicle recovery systems, or give the insurance companies the option to do so. Discounts range from 5 to 20% per vehicle annually, depending on where you live.

DEALERS GOOD AND BAD

HAGGLING AND BARGAINING

Car-buying experience #1: In late 1993, we were looking for a four-cylinder Toyota Camry LE. Phone calls to several Toyota dealers turned up only one that had just the car we wanted. The car's \$20,863 sticker price included antilock brakes and some minor accessories. CONSUMER REPORTS' staffer's report:

"I couldn't find the car while strolling around the dealer's lot. But I did notice that all the new Camrys had an extra window sticker, a \$1495 dealer pack that included pinstriping, plastic door edging, and 'PDI', meaning predelivery inspection.

"The showroom was hectic. In one corner, a tough-looking character on a high dais presided over a swarm of supplicating salespeople. I finally collared a salesman, Walter, and told him immediately that I wouldn't pay for the \$1495 dealer pack. Walter seemed unfazed. I also told him I'd reckoned the dealer cost at \$17,607, and I asked for his lowest markup. He said \$20,863, the full sticker price. I laughed and offered \$18,700. Walter took my offer to Doug, who looked up long enough to say that the bottom price was \$20,100. Doug then left for the day.

"Walter relayed several more of my offers to the man at the dais, who rejected every one. After a \$19,600 offer was turned down, I said we couldn't do business and left. Walter caught up with me on the steps outside and coaxed me back into the showroom. This time, he said, he'd take my \$19,600 offer to the owner. After a long delay, he returned with a \$20,000 'bottom price.' I countered with \$19,700 and asked to see the owner myself. The owner, well dressed and icy, told me my offer was too low. I said \$19,700 was my limit. He said slowly and quietly that I had a 'perfect right' to make that offer, even though he'd just told me it was too low. He said he had no room to move on the car. Eventually he 'moved' down to \$19,788.

"Next stop: Jeff, the sales coordinator. He tried very hard to sell me undercoating and rustproofing. Then came Alex, the business manager. He tried very hard to sell me an extended-service warranty. When I suggested he save his breath, he pounded the desk and said he was 'required by law' to tell me about the warranty. He said the warranty was vital because it would pay for converting the air-conditioner to a new refrigerant in three years, when Freon would be banned. I pointed out that the car already had the new refrigerant.

"Alex wrote up the contract, adding a \$199 'office and conveyance' fee, a \$55 fee for transferring the tags, and a \$350 advertising fee. In all, it took me nearly two hours to escape from the showroom."

The final price for the Camry, \$19,788, was 12.4% above the dealer's cost.

NO-HAGGLE BUYING

Car-buying experience #2: About a year later, we were looking for a Saturn, an SL2 version with antilock brakes and Options Package 2, which includes equipment such as power locks and windows and air-conditioning. A phone call confirmed that the dealer had the car we wanted. CONSUMER REPORTS' staffer:

"The atmosphere in the showroom was relaxed. The salesman, Dave, showed me two cars. I chose one and asked Dave to remove the spoiler; that saved \$180. Saturn's policy is to charge the full sticker price. We worked through the details, and Dave's figures matched mine exactly. No haggling, just a civilized take-it-or-leave-it price. The business manager plugged an extended warranty and a few other dealer packs. I declined, and he let the matter drop.

"When I returned to take delivery, my car was sitting on carpeting, with helium balloons tethered to its doors. A little marquee on a stand addressed me by name, congratulated me, and thanked me for joining the Saturn family. The salesman went over every detail of the car. Then the big glass doors swung open and I drove out. Little gifts, a mug and cap with a Saturn logo, were stashed in the car."

The final price, \$15,725, was 14.9% above the dealer's cost. If we had been able to drive the same kind of bargain on the Saturn that we got with the Toyota, we would have saved \$342. But for many people, the happy experience may be worth a little extra money. In a way that's unfortunate, since Camrys are better cars in most respects than Saturns are.

GETTING THE BEST DEAL

New-car fever, like the flu, is seasonal. It strikes hardest in the fall, when the new car models come out, and in the spring, when the open road beckons. Its most serious symptoms are impulsiveness and haste. Victims rush to the dealer's showroom and, without benefit of research, select a model for its styling rather than its function. They don't bother to find out how much the dealer paid the factory for the car, nor do they shop several dealers and compare prices. As a result, they generally overpay by hundreds, even thousands of dollars.

There's a better way. By using the simple, step-by-step approach described here, you can buy the right car at the right price, even if you're not an auto expert or a skillful haggler.

If you're planning to lease a car, you'll still want to follow these steps to establish the price. Despite the impression left by all those leasing ads, terms of the lease deal are just as negotiable as the terms of a purchase.

STEP 1: NARROW YOUR CHOICES

Before you shop, decide first what best suits your needs—a large luxury car or a small economy model, a practical family sedan or a sporty coupe, a sport-utility vehicle or a minivan. Don't ask a salesperson to help you make up your mind. That invites the salesperson to recommend what the dealer wants to unload, rather than what's best for you.

Use this issue for an overview of what's in the showrooms, and winnow the list to a few models you can afford. Choosing from the cars we recommend is a good way to focus on a few. Recommended models are those that did well in our tests and that we judge will be reasonably reliable.

Phone area dealers to make sure the models you're looking for are in stock. Visit the showrooms and test-drive the cars. On the road, see how the car measures up in these areas:

- Is the driving position comfortable, with sufficient adjustability to accommodate everyone who will be driving the car?
- Is the view clear in all directions, without serious blind spots?
- Do all the controls work logically, and are they within easy reach? Are the safety belts easy to buckle? The radio easy to tune?
- How easy is it to get in and out of the rear seat? How roomy and convenient is the trunk or cargo area?

Drive the car over good roads and bad, and then leave. It's too early to talk money.

STEP 2: LEARN THE LINGO

When it comes time to dicker over price, you'll be able to negotiate on a more equal footing if you know the jargon dealers use. Here are some of the most common terms you're likely to encounter:

Sticker price, or list price. The federal government requires all new cars to carry a list-price sticker on the window. The price at the top of the sticker is the "base price"—the nominal price of the basic car, minus any extras. The bottom sticker price includes all extra-cost equipment installed on the car at the factory, as well as the destination charge. It's only an asking price, often 10% or more above the dealer's cost, and usually subject to considerable negotiation.

Dealer-invoice price. What the dealer paid the factory for the car. This is a much more important number for you to know.

Destination charge. What the dealer paid to have the car shipped from the factory. This charge is non-negotiable.

Factory-to-dealer rebate. A discount the dealer may occasionally get from the manufacturer, and may or may not pass along to the car buyer. Knowing about the rebate gives you more room to deal.

Factory-to-customer rebate. You'll know about this, as it's usually heavily promoted. You can wait and get the check directly from the automaker, or you can sign it over to the dealer as part of the down payment.

Trim lines. Most car models come in two or more trim lines, such as DX, LX, and EX, each with different standard and optional equipment. The higher (more expensive) the trim line, the fancier the equipment.

Standard equipment. What the car comes with, excluding extra-cost options.

Options. Most domestic models offer a long list of equipment at extra cost. If you don't find a car equipped exactly

the way you want it at the dealership, you can ask the dealer to special-order a car to your specifications, but be prepared to wait several weeks for delivery. Note that you may save money by choosing a higher trim line rather than adding options individually to the base model. Imports tend to come loaded with standard equipment, and generally, few or no options are available.

Options packages. Automakers sometimes group several options in a "preferred package" or "convenience group" to simplify the manufacturing process. The package generally costs less than all the options would if they were bought separately, but it's a poor deal if it includes lots of equipment you don't want or need.

No-haggle pricing. You pay the price on the window sticker, or on the placard drawn up by the dealer, just as you would when buying a toaster in a department store.

STEP 3: LEARN THE DEALER'S COST

Now it's time to do some homework: You need to find out how much the dealer paid for the car or cars you're considering. Knowing the dealer's invoice price gives you considerable leverage during the bargaining process.

You can get a rough idea of dealer cost by using the "cost factor" listed in the Car Profiles on this disc. The cost factor is the percentage of the sticker price that the dealer pays the automaker for the car. Multiply it by the sticker price, and you have an approximation of the dealer's cost and your room to bargain.

The CONSUMER REPORTS New Car Price Service, available by phone at 800-933-5555, provides a New Car Price Report that notes the latest list prices and dealer-invoice prices for the make, model, and trim line you specify. The printout also itemizes all factory options, with their list price and invoice price, and notes the options we recommend. It provides information hard to find elsewhere, such as any special financing deals or any factory-to-dealer or factory-to-customer rebates. Finally, it adds up everything for the car, equipped as you want.

Automakers mark up models differently. Sometimes, all an automaker's models have a similar markup. But companies with big, diverse lines, such as Chevrolet and Toyota, sell models with quite different markups. For the average model, the cars cost the dealer about 90% of the sticker price. The pricier vehicles (luxury cars, sporty-utility vehicles, sports cars) tend to be marked up the most. Markups on workaday sedans such as the Chevy Cavalier or small, entry-level models such as the Geo Tracker leave little room for dealing.

Dealer cost as a percentage of sticker price

MAKE	COST FACTOR(S) (%)
Acura	86-88
Audi	88
BMW	82-84
Buick	86-92
Cadillac	86-92
Chevrolet	85-94
Chrysler	90-94
Dodge	90-93
Eagle	90-95
Ford	86-92
GMC	87-90
Geo	92-95
Honda	87-90
Hyundai	88-90
Infiniti	83-88
Isuzu	85-88
Jaguar	82
Jeep	91-96
Land Rover	89
Lexus	82-83
Lincoln	87
Mazda	86-93
Mercedes-Benz	85
Mercury	89-92
Mitsubishi	80-90
Nissan	87-89
Oldsmobile	92-95
Plymouth	90-93
Pontiac	90-92

Saab	87-88
Saturn	87
Subaru	90-91
Suzuki	89-94
Toyota	84-92
Volkswagen	90-96
Volvo	92-95

Note: Saturn dealers follow a no-haggle policy.

If you're using another price guide (various guides are available at bookstores, newsstands, and public libraries), here's how you can make the most of it: Start with the basic prices for each make, model, and trim line you're considering. Add in each option and package you want, by name and manufacturer's code number. In separate columns, total the list prices and invoice prices of each car and its options. Add the destination charge to both columns (there's no markup on it). If a rebate is in effect, deduct it from the invoice-price column. The difference between the totals of the two columns is your bargaining room.

STEP 4: MAKE A DEAL

With price figures in hand, you're ready to negotiate. Stay cool; becoming emotionally attached to a car can melt your bargaining resolve. And keep the deal simple. Don't discuss trading in your old car or financing the new one until you have a firm quote on the new car. Raising those issues earlier will needlessly complicate the negotiations. And the salesperson could spoil a good deal on the new car by appraising your trade-in too low, or vice-versa.

Politely present your price figures and ask for the lowest markup over the invoice price that the dealer will accept. Don't reveal any quotes you've received from other dealers. Tell the salesperson you plan to visit several more dealers before you buy—and stick to that plan.

Be prepared to wait while the salesperson supposedly checks the price with the manager. Leaving you alone is a common pressure tactic. Bring a book to keep yourself entertained.

Don't write a check for a deposit, even if the salesperson insists it's refundable, until you're ready to sign the contract. A deposit can pressure you into hurrying your shopping. If a salesperson's firm quote is later rejected by the sales manager, you're dealing with an unethical operator. Go elsewhere.

What's a reasonable price? For a domestic mid-sized car in good supply, \$300 to \$500 over invoice price is a good deal. But \$1000 or more over invoice may be reasonable on some imports and desirable domestic models, depending on supply and demand. When the Chrysler Cirrus first came out, we had to pay \$2200 more than the sticker price because it was the only one in our area and we needed it quickly. (Herein lies a lesson: If you're in a hurry to buy a car, don't let the dealer know.)

How will you know you've gotten the best price? You won't, until you've shopped around. Remember, bargain up from the dealer-invoice price, not down from the sticker price.

Note that some models have siblings, similar except for the nameplate. If you're shopping for a Mercury Mystique, for instance, check out the similar Ford Contour as well. Sometimes one sibling is cheaper than another, or comes with a different mix of standard and optional equipment. The car descriptions on this disc note such family connections.

Sometimes cars are sold at what looks like dealer cost or even less. Don't be concerned that the dealer may not be making a profit. Dealers who sell domestic cars and some imports get a "holdback," typically 2½ or 3% of the car's base price, from the factory. Also, dealers generally make much of their profit from service and used-car sales.

Auto salespeople may say some crafty things during the negotiations. Here are some examples:

"The price I'm giving is good only if you buy now." A legitimate price should be good tomorrow, or next week.

"How much would you pay for this car?" This is a trap. If you bid too little, your offer will simply be rejected. If you bid too much, you lose. Let the salesperson quote the car's price.

"What do you think I should be entitled to make?" Another trick question you shouldn't answer. Remember, dealers make money in other ways than new-car sales.

"Shop around, then come back. I'll beat any offer." Insist on a firm quote on the spot. Threaten to leave if the salesperson doesn't cooperate.

"Your price information is wrong." If the salesperson challenges your figures, ask to see the dealer's invoice. That's only fair.

Salespeople sometimes spring extra costs on you at the last minute, after you think you've arrived at a firm deal. Here are some of them:

- Extended-service warranties. They're not worth the money, especially with today's long factory warranties.
- A "conveyance" or "documentation" fee for processing paperwork. Such fees are rarely negotiable.
- Dealer-applied rustproofing, fabric protection, paint sealant, and other gimmicks. Refuse them; they're not worth the money.
- Advertising fee. Dealers often tack on a fee to help cover local advertising expenses. That's a legitimate charge that the dealer must pay.

Read the sales contract carefully; don't let the salesperson rush you through the fine print. If you object to something, mark your change in the margin on all copies. Insist that the contract stipulate your right to void the agreement without penalty if the car isn't delivered by a reasonable specified date. The agreement usually allows the dealer to reappraise your trade-in upon delivery of the new car. That's reasonable, since anything could happen to your old car in the interim.

STEP 5: WRAP UP THE LOOSE ENDS

Once you've received a firm quote on the price of the new car, it's time to discuss your trade-in, if you have one. You can find out what your car is worth in your area by phoning the CONSUMER REPORTS Used Car Price Service at 900-446-0500.

Trading in generally nets a lower price than selling privately. But advertising, waiting for phone calls, and going for test-drives with strangers is a nuisance. Dealers sometimes offer below-market loan rates as a sales incentive. Don't jump at the dealer's terms without first checking the rates at local banks or your credit union.

ALTERNATIVE: NO-HAGGLE DEALERS

The carpet-bazaar atmosphere of the new-car showroom is slowly dying out as dealers try to attract customers who resent being treated as easy marks. General Motors' Saturn Corp. popularized the practice of no-haggle shopping by charging the full sticker price for all its cars. It has won over legions of converts with its pleasant, pressure-free approach. Now, an additional 1500 or so of the nation's 23,000 new-car dealers are experimenting with variations on one-price selling, abandoning haggling in favor of a discounted but non-negotiable price.

A fixed selling price, however, doesn't necessarily yield the best deal. Saturns are priced at 15% above dealer cost, compared with the average car's markup of about 11%. Even when a no-haggle price is below the sticker price, an informed shopper can often do better by bargaining hard on a conventionally priced car.

Auto brokers (listed in the Yellow Pages) are another alternative for car buyers who are wary of a showroom showdown. For a fee, the broker will contact several dealers near you and negotiate the best price on the model you want. But shopping the old-fashioned way is still the most effective, if you're willing to invest a little time for research. On your own, you can eliminate the agent's fee—and probably save several hundred dollars on the cost of the car.

Want to hone your negotiating skills? Click on the "Movie" button to see a video of how it is done. . . . When you're ready, test your skills against the Interactive Car Dealer.

TEST YOUR SKILLS AGAINST THE INTERACTIVE CAR DEALER

The interactive car dealer is prepared to test your skills with a series of crafty—but not uncommon—negotiating ploys. Click on the video icon to view each of the dealer's questions. Then click on the response you think is best and listen for CONSUMER REPORTS' analysis and advice. You can repeat the recorded advice by clicking again on the response.

Click here to begin.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. Where are the errors? Why don't we compare these numbers with your invoice to see where the differences are?
- B. Oh. How much higher are they?
- C. What can you sell it to me for?

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. Well, this car seems to be pretty popular. I think \$500 over your cost is fair.
- B. You sell cars every day. It's your job to tell me.
- C. I can afford to spend \$350 per month. Would that work out?

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. Well, I do need to sell it. Do you think I should trade it in?
- B. I will if you can give me a good deal. What can you give me for it?
- C. I haven't decided yet.

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. Yes, I'll need to finance it. Can you help me arrange the loan?
- B. I don't want to discuss financing yet.
- C. My bank will give me an 8.5% loan. Can you beat that?

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. No, I'm going to shop around at other dealers first. If that's your best offer, I'll come back to buy if no other dealers make me a better offer.
- B. Will you accept \$300?
- C. That sounds fair.

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. OK, I'll be back.
- B. Really? How much will you save me?
- C. I only plan to visit each dealership once. Give me your best price, and if yours is the best offer I get, then I'll come back.

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. I guess I'll buy then, since it seems like such a good offer.
- B. How late are you open tonight?
- C. Well, I'm not ready to buy today. I'm only interested in a firm price quote that I can compare to the others I get.

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. If that's a firm price quote, I'll compare it with the prices I get from other dealers.
- B. OK, I'll buy the car. That sounds like a great deal.
- C. Can I leave you a deposit to lock in that price?

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. Two hundred dollars is too much. I only want to leave \$100.
- B. OK, if that will lock in the price.
- C. No, I don't want to leave a deposit.

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. Walk out.
- B. Try to re-negotiate the deal.
- C. Accept the manager's offer.

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. Is the car so unreliable that I'll need protection for an additional 3 years?
- B. No, thanks.
- C. How much will it cost me?

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. OK, great. I want the car to look good for a long time, so those all sound like a good idea.
- B. Is rustproofing really necessary?

- C. No thank you, I don't want any additional rustproofing or fabric protection. Can I see your invoice to confirm the advertising fee?

Click here to go on to the next question.

The Dealer's turn:

Your turn! Click on the letter of your response.

- A. OK, when do I pick up my car?
- B. No, fill in everything. I'll read it before I sign it.
- C. Write in the price, and then I'll sign it.

Test Over!

SHOULD YOU LEASE INSTEAD OF BUY?

At first glance, leasing a car may be a tempting proposition: little or no down payment, lower monthly payments, and more car for the money. Nearly 25% of all new cars are now leased, up from about 10% just five years ago. Much of that growth has occurred in the luxury-car market. More than half of all cars with sticker prices over \$20,000 are leased. Unfortunately, leasing is often not as good a deal as it seems. And sizing up a lease deal is more difficult than negotiating to buy a car, mainly because all the figures you'll need to make an informed decision may not be disclosed. You'll have to pry them loose from the car dealer or lease company, if you can.

Consumer groups and some lawmakers have called for standardizing lease contracts and terminology to make comparison shopping easier. New York State enacted such a law that goes into effect this spring. Until other states follow suit, consumers' best strategy is to take a careful look at the numbers they are able to obtain and to compare prices from several leasing companies on the same car with the same equipment.

CONSUMER REPORTS' Lease/Loan Calculator, featured on this disc, will help you compare the cost of leasing versus financing. It is usually less expensive in the long run to finance a car rather than lease it. Paying cash, if you have it, can be less expensive still.

The surge of interest in leasing has also led to a growing market in used-car leases. Those deals are even trickier to navigate. If leasing a used car appeals to you, make sure the car will be under warranty for the full term of the lease. Have an independent mechanic check the vehicle's "wear" parts, such as brakes and tires. Parts that wear out during the term of your lease will be your responsibility to replace. All in all, you'll probably save money by buying a used car rather than leasing one.

HOW TO SIZE UP A LEASE

First, negotiate a price for the car the same way you would if you were buying it. Be sure to deduct any applicable rebates. Then ask for monthly lease payments based on that price. The CONSUMER REPORTS New Car Price Service, at 800-933-5555, provides information about rebates, as well as dealer cost and list prices for the car and all its options. Resist add-ons such as paint protection and rust-proofing, just as you would if you were buying the car new.

Ask for the rate or money factor of the lease, which is akin to the annual percentage rate you'd pay if you took a car loan. Sometimes it's referred to as the monthly lease charge or service fee. By any name, the lower the number, the better.

Ask about the residual value of the car. That's how much the leasing company estimates the car will be worth when the lease is up. Generally, the higher the residual value the better, because your monthly payments will be lower. Vehicles that hold their value well, such as sport-utility vehicles, often make the best lease deals. Those cars are likely to be worth more than three-quarters their original price three years later. Large sedans lose their value much more quickly. A three-year-old Oldsmobile Ninety Eight Regency is likely to be worth about half of its original value. So lease payments on the Olds must be higher to make up for the greater proportion of the car's value that will be used up during the term of the lease. The depreciation prediction in the car profiles can point you to cars that hold their value well.

Be wary, however, if leasing companies quote you widely different residual values for the same car. An unrealistically high residual value may be a tipoff that the company is baiting you with low monthly payments and will try to hit you with high wear-and-tear charges at the end of the lease.

Read the entire leasing contract. Walk away if the company won't let you take home a copy of the contract before you sign.

Watch out for end-of-lease charges, security deposits, document charges, or other extras. Those can all be negotiated.

Assess whether the annual mileage limit is appropriate for the amount of driving you do. Most car leases allow you 12,000 to 15,000 miles a year. If you go beyond that limit, you may be charged as much as 25 cents per mile. If you drive far less than the lease's limit, you will, in effect, be paying for miles you never drove.

Does the contract define "excess wear and tear," damage that you'll have to pay for when you turn in the car at lease end? If you nick a windshield, for example, you might be socked with a big repair bill.

Find out what happens if you want out of the lease before it expires. Once you take possession of the car, its value drops considerably. If you want to end the lease early, you'll have to make up any difference between the current value of the car and the amount you've paid to that point. Some leases are tougher still: They require you to make all the remaining payments if you terminate the lease early.

Make sure "gap insurance" is included. If the car is stolen or destroyed, that insurance will pay off the difference

between what you owe on the lease and what the car is worth, a difference that can amount to thousands of dollars. Some lease companies toss in this insurance for free; others charge up to \$500. It shouldn't cost more than a few hundred dollars for the term of the lease.

Make sure the manufacturer's warranty covers the entire term of the lease and the number of miles you're likely to drive.

It generally doesn't make economic sense to enter into a lease that's longer than four years. Three years is the norm, and a few companies offer their best deals on two-year leases. Consider only closed-end leases, which don't obligate you to buy the car at the end of the lease or to make up any shortfall in its residual value.

Generally, new-car dealers are less likely than private lease companies to ambush consumers at the end of the lease. If the lease gives you an option to purchase the car at lease end, ask how the price will be determined.

THE COST OF OWNERSHIP

The price you pay for a car, new or used, is just the beginning of the costs of car ownership. Here are the other principal expenses:

Insurance. The premiums will vary by hundreds of dollars, depending on many factors, including what company you insure with, the car you insure, how much liability coverage you buy, and the size of your deductibles. For advice on buying insurance and finding an insurance company that fits your needs, check *Insuring Your Car*, in *How To Buy*.

Gas and oil. Use the fuel calculator on this disc to estimate how much you'll spend on gas, given your local cost of fuel and how much driving you do. For example, if your car gets 20 miles per gallon on the highway and you drive 12,000 highway miles per year, at a cost of \$1.20 for a gallon of regular fuel, you'll spend about \$720. If you change your oil and filter every 3000 miles, add another \$80 to \$120.

Maintenance. This varies by how much work you want done, of course. Simple work, like topping off fluids, rotating tires, and changing spark plugs shouldn't cost more than \$100 per year. More involved work could easily become a major expense (see *Car Care*).

Repairs. Body work—even a minor dent or scratch—costs hundreds. Anything that involves work inside the engine or transmission is almost certain to exceed \$500. You can improve your odds of keeping repair bills to a minimum by choosing a car that has a good reliability history.

Tires and batteries. You'll replace a set of tires every two or three years; figure on that costing \$400. A battery every three or four years is another \$50 to \$100. For CONSUMER REPORTS' advice and information on how to buy these products, read *How To Buy Batteries* and *How To Buy Tires*.

Add-ons. You may decide to add a security system to your car, or a CD player, or a trailer hitch, or any of a number of extras at varying cost.

Keeping it clean. You may choose to do this in your driveway. But a weekly trip to the car wash could cost \$300 or more yearly.

In comparing costs of the cars you're considering, be sure to include all these factors in making a decision. Buying a car with a higher purchase price can pay off in the long run, if it's cheaper to insure or costs less to repair and maintain.

IF YOU GET A LEMON

For a relatively few owners, the excitement of driving home a brand-new 1996 automobile may be short-lived. They will experience an unexpected new-car feeling: total frustration. They got a lemon. If you wind up visiting the repair shop again and again, as mechanics try, without success, to fix your new car, you've got to face the realization that you need more help than you can get from a mechanic. It's time for arbitration.

Fourteen years ago, you could only take your case to court, a long and costly process. But since 1982, every state but Arkansas and South Dakota has enacted a lemon law. The states' lemon laws establish arbitration procedures designed to make it easier for owners of hopelessly defective automobiles to get a replacement car or a refund. Most states define a lemon as a new car that has been in the repair shop for 30 days or has been in for the same problem four times within the first year of ownership. But the road to satisfaction for lemon owners has turned out to be badly potholed. Weak laws, including many that allow auto manufacturers to run the arbitration process, poor oversight by the states and miles of red tape have stymied consumers at every turn.

CONSUMER REPORTS recently reviewed hundreds of lemon-law cases and compared statistics from thousands of others. The major finding: Consumers are much more likely to get satisfaction from a state-run arbitration program than from a program run by a manufacturer or a private arbitrator. In reviewing data from the state of Washington, it was found that manufacturers forced to take back a lemon are all too willing to ship that car out of state to unsuspecting buyers in the used-car market.

HOW THE LAWS WORK

All state lemon laws work in basically the same way. In courtlike arbitration proceedings, the owner of the car and the manufacturer tells his or her side to an "impartial" panel or to a judge. Thirteen states have established state-run arbitration programs sponsored by private groups or by the automakers themselves. In some states, consumers must start with a manufacturer-sponsored panel but may appeal their cases to a state panel.

Chrysler and Ford run their own arbitration panels, while GM uses the Better Business Bureau's Auto Line program. Except for Ford, which allows one dealer on each of its arbitration panels, the boards are made up of people with no connection to the manufacturer. Foreign-car manufacturers use one of several private arbitration boards. These include Autosolve (run by the American Automobile Association) and Autocap (run by the National Automobile Dealers Association).

YOUR ODDS OF WINNING

Some 55% of the consumers who entered the state-run arbitration program in Florida in 1991 won a refund or a replacement car. State-run programs in New York and Connecticut awarded refunds to consumers 48% and 77% of the time, respectively. By contrast, of 11,000 arbitration cases handled nationally by the Better Business Bureau in 1991, just 1500, or 14%, resulted in consumers receiving a replacement car or a full refund.

The odds of winning satisfaction from an automaker-sponsored arbitration program appear even slimmer. Chrysler Corp., for example, received 12,477 requests for arbitration in 1991 and accepted 7800 of those as "within jurisdiction." Of the 7880 accepted cases, only 1197 (or 9.6% of the original arbitration requests) were decided completely in the customer's favor. Ford reported that it handled 5605 complaints and awarded consumers all of what they requested 30% of the time. Ford appears to be making an effort in some states to resolve complaints before arbitration. In Washington, for example, of 126 Ford-related lemon law cases filed in 1990 and 1991, all but 12 were resolved before the case went to a hearing.

Unfortunately, few states, aside from the ones mentioned, keep records of lemon-law cases or even require reporting from the private organizations that run arbitration programs. Many are lackadaisical at best about helping consumers exercise their rights. When a CONSUMER REPORTS reporter called to ask about Colorado's law, for example, he found himself being switched among seven state offices before an official finally told him that the state's lemon law "is basically a civil matter between the consumer and the manufacturer. We have nothing to do with it." In Maryland, a legislative aid summed up his state's program: "It's useless, don't bother."

FILING A CLAIM

If you have to file a lemon-law claim, first consider hiring an attorney. The directors of several state arbitration programs told CONSUMER REPORTS that consumers who hire a lawyer are more likely to get a satisfactory settlement before the formal arbitration process begins. Also, consider hiring a knowledgeable mechanic to testify on your behalf. Arbitrators put considerable weight on such testimony, especially if the mechanic has experience with the make of automobile in question.

Consumers who went before arbitration panels often felt intimidated by the representatives sent by the manufacturer. That team often includes an attorney and a mechanic hired to testify on the automaker's behalf.

In hundreds of Florida cases reviewed, owners of cars with safety defects such as bad brakes or faulty steering generally got a refund. (Many states allow the dealer just one attempt to fix a safety-related defect before the lemon law can be invoked.) Refunds also were frequent for owners of autos that stalled or didn't start consistently. But complaints of water leaks, noises, bad paint, jumpy suspension, and premature wear of tires were almost always rejected.

Arguments made by the manufacturers varied little: The consumer abused the car or didn't service it according to instructions. Manufacturers frequently argued that the condition was normal in that type of car, or that the problem, whatever it happened to be, didn't substantially affect the car's value or safety.

LEMON PREVENTION

Avoiding a lemon in the first place can save you a lot of headaches. First, put the statistical odds in your favor: Avoid models with below-average scores in Predicted Reliability and in the Trouble Index. Second, before you buy, test-drive the actual car you'll be purchasing, not a demo model. Be on the lookout for unexplained noises and odd handling characteristics on bumpy roads and at highway speeds. Make sure every instrument in the car works.

Save all documentation, including brochure and advertisements about the car. Arbitration panels are likely to make manufacturers live up to their advertised claims. In a Florida lemon-law case, John Spadevecchia of Fort Lauderdale requested a refund of the \$104,352 purchase price of his 1991 Mercedes-Benz 500SL. The engine of his otherwise flawless Mercedes made a "whining" noise when the air conditioner was operated. "It really drives me crazy," Spadevecchia told the arbitrators. He showed the state panel a brochure that promised his car would be a "haven of soothing calm." The panel drove the car and agreed with Spadevecchia, awarding him a full refund.

When trouble does occur, start a paper trail by keeping records of the servicing. Insist that the service manager prepare a written repair order, even if you're told an order is not needed for warranty work. If you suspect your new car is a clunker, ask your state's attorney general or consumer-protection office for a copy of your state's lemon law. Watch for milestones that would affect your case, such as the number of repair attempts made or the period of time the car has been out of service. Most states allow just one year in which to file a claim. Connecticut, Hawaii, Iowa, Maine, Minnesota, Montana, New York, and North Carolina allow two years.

When you take the car in for repairs, describe the problem and the conditions under which it occurs. Insist that your words be written onto the repair order. Don't let the person who writes up your order make the diagnosis. If you say that the car stalls, object if the service writer simply puts down "Needs tune-up." The mechanic should make the diagnosis, and only after testing the car.

Give the dealer and the manufacturer every opportunity to make the car right. Arbitrators take a dim view of consumers who miss service appointments, fail to pick up the car on time or refuse to let the mechanics keep the car for as long as they require. If you have a car loan, continue to make the payments, even if the car is tied up in the shop. Some lemon owners have lost their cars to the finance company, and damaged their credit records, by stopping their payments. In most states, if you win your case you are entitled to a refund of car payments, plus interest.

INSURING YOUR CAR

Americans spent an average of \$638 per car on auto insurance in 1993, the latest year for which data are available. If you were paying that much for a TV or a camera, you'd certainly shop around. Yet, with auto insurance, most people don't. When we asked our readers last spring whether they had shopped the last time they bought or renewed insurance, six out of 10 said they had not.

Two things make it difficult to shop for auto insurance: Companies can charge widely different prices for similar coverage, and the quality of service is impossible to judge, until you're unfortunate enough to be in an accident. This report offers help on both counts. When it comes to cost, it's hard to avoid doing some legwork. You'll have to call different companies, describe your driving history and get their quotes. But you'll get much more useful information if you know what to ask, and if you know precisely what kind of coverage you need. CONSUMER REPORTS gives you that guidance, with tips for different kinds of consumers, from older drivers to newly licensed teens.

CONSUMER REPORTS RECOMMENDATIONS

Look first to the direct writers and exclusive-agency companies from our survey. They're likely to offer good service at competitive prices. In the Ratings, those insurers have a * after their names. The higher-rated ones are likely to offer very good service at competitive prices. You can find their phone numbers in the Yellow Pages, or through the 800 operator.

To identify low-priced companies, obtain a copy of your state's auto-insurance price comparison, where available. For more quotes, call a handful of agents and brokers recommended by friends. When you call insurers or their representatives, remember to ask for any discounts you might be entitled to. Try to obtain quotes from at least three companies. Then check our Ratings to see which of the less-expensive companies rated highest for service.

BEGIN WITH THE BASICS

First, keep in mind that auto insurance isn't meant to cover every dent and scratch. Like other kinds of insurance, auto insurance is best used to protect yourself against expenses you could not otherwise afford. To keep premiums reasonable, buy the coverage you really need and accept a high deductible. Depend on the insurance company only for major losses.

With that strategy, it's relatively easy to tailor your coverage for optimum savings. Auto insurance actually includes several different kinds of coverage, each with its own price, or premium. You can buy less or more of each, depending on your needs.

AVOIDING CATASTROPHES

The most necessary coverage against financial ruin is bodily-injury liability insurance. It pays for the other person's medical treatments, rehabilitation, or funeral costs when you're found at fault in an auto accident. It's mandatory in most states and the District of Columbia, and desirable wherever you live. Bodily injury liability and its companion coverage, property-damage liability, are sold with monetary limits, the limit of what the insurance company will pay after each accident. Each state requires drivers to have liability coverage up to certain specified limits.

In Utah, for example, the required coverage is \$25,000 per person, \$50,000 per accident, and \$15,000 for property damage per accident. (Liability coverage is sometimes expressed in the policy as a string of numbers; for example, 25/50/15.) In many parts of the country, however, the state requirements wouldn't come close to covering potential losses. If a court ruled you owed more, you might have to dip into your other assets. So it makes sense to buy more coverage.

That extra insurance often isn't expensive. You pay the most for the first dollars of coverage. An umbrella policy is a more cost-effective way to buy liability coverage. It pays for losses above and beyond what's protected by auto and homeowners' insurance. A \$1-million umbrella policy typically costs about \$200 a year.

SWEATING THE SMALL STUFF

While most people may find it worthwhile to buy more liability insurance than they have, many should carry less collision and comprehensive insurance. Collision pays for the repair of your car or replacement of its market value when it collides in an accident or rolls over, regardless of who was at fault. Comprehensive, sometimes called "other than collision" in the policy, pays for similar replacement after theft or to repair damage caused by other events, such as fire, floods and windstorms. Both coverages carry deductibles.

The bigger the deductible you're willing to live with, the cheaper the coverage. In general, we recommend a minimum collision deductible of \$250 or \$500. If you have a moderately priced car more than five years old, you can save more money by dropping collision and comprehensive entirely. Most likely, the car's value has dropped so much that you wouldn't get much from the insurer if the car were totaled or stolen.

ZEROING IN ON PRICE

Which insurers should you consider? Obviously, price is the primary consideration. Before you start shopping, find out if your state insurance department offers free comparisons of auto-insurance prices; 36 states offer such guides. Most guides show what a number of insurers would charge for different types of driver in various regions in the state. Few of the guides are up-to-date, and the examples probably won't match your exact situation. But they can give you an idea of whether a company charges drivers like you more or less than average in your region.

Whether you use a telephone service or call companies, agents or brokers, try to get as many quotes as possible. Insurers don't always offer identical coverages. For instance, one company might offer \$250,00/\$500,000 in bodily-injury liability, while another might offer \$300,000/\$500,000. Still, try to compare similar coverages. If a company isn't listed in the Ratings, call your state insurance department for its record of consumer complaints. If complaints against a company are frequent relative to other carriers, look for another insurer.

BEFORE YOU SWITCH

Even if you can find a better price, leaving your current company isn't always wise. Insurers often reward longtime customers with discounts and accident-forgiveness programs. Liberty Mutual Insurance Co., for instance, waives surcharges for minor accidents for customers who have remained with the company, accident-free, for five years.

What is more, signing with a new company can be difficult. Families with teen-aged drivers have a particularly daunting time. Rates for young male drivers can be more than triple the base adult rate, because teens historically have severe and costly accidents. Christine and Mark Ahasic of Brooklyn, N.Y., discovered that after they placed their 17-year-old son, Mark, on their policy last spring. The six-month coverage for their 1993 Eagle Vision jumped to \$1883 from \$1061. But after shopping extensively, they found their original carrier, Allstate, still had the best price because of the discounts it offers long-term customers and holders of auto/home-insurance packages. After Mark Jr. went off to college in Illinois, the Ahasics got a 20% discount that applies to students without cars who aren't driving at school and who live more than 100 miles from home.

One frustration for consumers is that companies offering lower prices can be quite restrictive. For example, United Services Automobile Association and its sister carrier, USAA Casualty, offer competitive rates in many parts of the country. But they accept only active or retired military officers and their current and former dependents.

Other insurers don't limit their sales according to occupation or demographics. But that doesn't mean their arms are open. If you've had more than one accident or moving violation recently, you may have trouble finding coverage with any company except the one assigned to you through your state's assigned-risk or high-risk pool.

High-risk pools work the same way in most states. Private insurers must insure a certain number of "risky" drivers, based on their share of the auto-insurance market. These drivers pay very high rates. Once you're in the pool, you're usually stuck there for three years, the minimum amount of time it takes to clear a driving record. As your record improves, start shopping private companies. Companies that sell "nonstandard" coverage to "risky" drivers can be cheaper than assigned risk. You may even qualify for an intermediate-priced "standard" policy. Some states are helping drivers leave the high-risk pool. Starting this December in Texas, for instance, insurers must offer their standard rates to their high-risk pool customers who have been ticket- and accident-free for three years.

What if you're one of the millions of adult drivers with no violations or accidents in the past three years? Sometimes insurers offer new clients with good driving records an intermediate price, or "standard" rate, which may be reduced to the "preferred" rate after they've been with the company a few years. Others offer the preferred rate right away. But it doesn't hurt to do what Felicia Hsieh of Coral Springs, Fla., does: Always ask for the preferred rate immediately. "They don't give it to me until I ask," she notes.

QUESTIONS, QUESTIONS

In most states, insurance applicants can expect a barrage of questions that seem to have nothing to do with cars, including how long they've worked at their current job, whether they own their home, whether they smoke, even their level of schooling. That process, called underwriting, may determine whether you'll get coverage, and if you do, how much you'll pay. Not all underwriting is legitimate. A 1994 study of auto-insurance underwriting practices by the Texas Office of the Public Insurance Counsel showed that many insurers used illegal guidelines to restrict coverages based on marital status and nationality.

Nearly one in five companies had restrictions on new applicants between age 65 and 75, regardless of their driving ability. Texas law prohibits companies from dropping drivers with a limited number of not-at-fault accidents, but the study found that insurers made it hard for such drivers to get new coverage.

If you're not accepted, ask why. If it's a mistake on a credit record, for instance, try to get it fixed and apply again. Find out, too, what standards the company requires. Even if the agent says your only resort is the assigned-risk pool, call a few more companies. Insurers often differ on underwriting standards. Some will ask for five years of driving experience, others for only three.

Getting accepted for coverage doesn't put you in the clear. In most states, insurers have the right to cancel you for any reason within the first 60 days of coverage. They may cancel your policy, for example, if they find that you've lied about your record of accidents or violations. After 60 days of coverage, you can't be dropped in most states. But there are notable exceptions. If, after an accident, the insurer finds you misrepresented information, not listing a teen-aged driver on the policy, for instance, it may pay the claim but cancel further coverage. If a member of your household has a driver's license suspended, you could say good-bye to your insurance as well. Even a late payment can jeopardize your coverage.

CONSIDER THE CAR

Other factors won't disqualify you from coverage but can add hundreds of dollars to your premium. Owning a luxury or performance car, for instance: You'll pay a lot for insurance if you drive a Chevrolet Corvette or a Porsche. Less glamorous models also can be costly if they're stolen frequently for parts. The Honda Accord sedan ranks among the most wanted by car thieves, according to the National Insurance Crime Bureau. A 30-year-old would pay State Farm \$1032 a year, about 6 to 7% of the Accord's base price, to insure it in suburban Chicago with a standard policy.

A model's safety story counts, too. If it has antilock brakes and air bags, has done well in crash tests, and has generated low bodily-injury claims, it will cost less to insure relative to other models. For instance, Continental Insurance Co. charges virtually the same to insure a 1992 Geo Storm and a much more expensive 1994 Volvo 850 sedan because the Volvo has a better safety record.

WHAT ABOUT SERVICE?

Once you're covered, what are your chances of getting good service? It depends on the insurer. According to our readers, service varies significantly, particularly with respect to claims handling. When some 34,000 readers answered auto-insurance questions on CONSUMER REPORTS' 1994 Annual Questionnaire, they told us that promptness in claims handling was the single most significant factor in deciding how much they liked a company's service. (Our definition of prompt is a payment that arrives less than 30 days after the claim is filed.)

Among the best companies for prompt claims handling were Erie Insurance Exchange, Citizens Insurance Co. of America, Hartford Casualty Insurance Co. and Amica Mutual Insurance Co. Those companies delayed payment only about 6% of the time. Conversely, two of the slowest companies, 20th Century Insurance Co. and New Jersey Manufacturers Insurance Co., delayed payment 21% and 17% of the time, respectively.

For the most part, however, readers were paid promptly; 70% said they got their check within 14 days of filing their claim. Not that there weren't hassles. Some 14% of readers cited at least one problem regarding claims. Most frequent complaints: difficulty reaching an agent or company representative, and disagreement over the amount of damages.

WHO HAS THE BEST SERVICE?

The best way to ensure satisfaction after an accident is to shop for coverage among the companies that placed highly in our Ratings. First on the list is Amica Mutual Insurance Co., which has topped our Ratings five consecutive times. This year, it received an overall score of 95 out of 100 from our survey of its customers. The company at the bottom of the Ratings, Metropolitan Property and Casualty Insurance Co., earned a score of 78, where 80 means "very good" service. Nearly a quarter of Metropolitan's customers mentioned at least one claims problem.

The reasons for Amica's high ranking abound. In addition to its low percentage of late payments, Amica doesn't push policyholders to use specific garages. It requires just one estimate. And checks go out within two days of when the claim amount is established.

Amica's drawback is inaccessibility. In some regions, even applicants with spotless records can't get a toehold unless they are referred by current policyholders. The company also prefers applicants with driving records free of any accidents or violations in the previous three to five years. Nevertheless, Amica has accepted a fair number of CONSUMER REPORTS' readers in the past. In 1992, 12,630 readers called the company for quotes. It took on 3386 of those who applied.

Just behind Amica in the Ratings are United Services Automobile Association, USAA Casualty Insurance Co., and Cincinnati Insurance Co. All were high-rated when we last covered auto insurance in 1992. Amica, United Services and USAA are among several companies called "direct writers." Customers who call an 800 number or visit such a company's offices deal with employees, not commission agents or brokers. Direct writers often offer very competitive rates because they don't pay commissions, which can add 5 to 15% to the premium.

Among insurers that pay commissions, those using "exclusive" agents may be less expensive than those using independent agents. Commissions for exclusive agents are generally lower.

REPORT THAT ACCIDENT?

Even a good insurer will charge more to drivers who cost it money. At many companies, one at-fault accident that costs the company \$400 to \$500 can result in three years of substantial surcharges. More than one can mean nonrenewal. Some 12% of readers told us they decided not to file a claim with their insurer at some point in the past three years for fear it would raise their premium. As a result, they paid an average of \$300 out of pocket. But that's probably less than they would have spent on three years of surcharges.

When you report an accident, keeping good records can speed the claims process. Obtain the names and addresses of all drivers, passengers, and witnesses, as well as appropriate license-plate numbers and insurance-identification numbers. Take a photo of the damage as soon as you can. Copy all paperwork. And keep track of accident-related expenses (lost wages, telephone bills, rental-car payments) for later reimbursement.

Soon after you call the insurer, an adjuster or appraiser will call to see your car at home or in the shop. Don't authorize repairs until the car is inspected, or you could find yourself footing the bill. If the other driver was clearly at fault in an accident that damaged property only, you might be able to retrieve your collision deductible. Ask your insurance company to go after the other driver's company for reimbursement.

WHAT TO BUY AND HOW MUCH TO BUY

Type of coverage: Bodily-injury liability. Required in most states.

What it pays for: Medical, rehabilitation, and funeral costs if a member of your household is found at fault. Also, legal costs and settlements for nonmonetary losses (pain and suffering).

Whom it compensates: The other driver, the other driver's passengers, passengers in your car, pedestrians whom you or members of your household injure.

The choices: Coverage limits can be as low as your state minimum requirement and as high as \$500,000 per person and \$1 million per accident.

CONSUMER REPORTS recommends: If you have a home, bank accounts, and a reasonably well-paying job, buy at least \$100,000 per person, \$300,000 per accident. Buy the minimum required by your state only if you have a few assets and a low-paying job.

Type of coverage: Property-damage liability. Required in most states.

What it pays for: Repair and replacement of vehicles and any other property you or members of your household damage in an accident.

Whom it compensates: Owners of the damaged property who are not members of your household.

The choices: You can buy various limits, from the state minimums to \$100,000.

CONSUMER REPORTS recommends: At least \$50,000 on each car. State minimum requirements (as low as \$15,000) often won't cover repairs or replacement of a lot of cars today.

Type of coverage: Medical-payments coverage, also called "med pay." Usually optional.

What it pays for: Medical, rehabilitation, and some funeral costs. Also pays limited compensation for services needed during convalescence.

Whom it compensates: Your household members, regardless of fault. Passengers without sufficient health insurance. (They could also collect under bodily-injury liability.) Household members injured by a motor vehicle as pedestrians.

The choices: For a few dollars a year, you can buy coverage in increments of \$1000 or \$5000, up to \$25,000. There is no deductible.

CONSUMER REPORTS recommends: At most, \$5,000 per car for people with good health insurance. Your health plan probably covers you and your household already. If you aren't covered elsewhere, or have huge health-insurance copayments and deductibles, you may want to buy more to cover what your health insurance won't cover.

Type of coverage: Personal-injury protection. Mandatory in states with no-fault insurance, optional in some others.

What it pays for: A broader form of med pay, PIP pays medical and funeral costs. Also pays a portion of lost wages and the costs of in-home assistance, regardless of fault.

Whom it compensates: You and members of your household.

The choices: A basic coverage is required, usually with upper limits. You may be able to buy more. In some states, PIP coverage includes a deductible.

CONSUMER REPORTS recommends: If you have good health, life and disability coverage buy only state minimum requirements.

Type of coverage: Uninsured- and underinsured-motorist coverage. Mandatory in many states.

What it pays for: Medical costs, rehabilitation, funeral costs, and/or the losses from pain and suffering resulting from an accident caused by a hit-and-run or by a driver without insurance or without enough insurance.

Whom it compensates: You and members of your household, while riding in a car, as bicyclists, or as pedestrians.

The choices: Limits similar to those of bodily-injury liability. Most states say you can't buy more of this coverage than you buy of liability insurance.

CONSUMER REPORTS recommends: In densely populated states where lots of people drive uninsured, this coverage is essential. Buy at least \$100,000 per person and \$300,000 per accident, where such limits are offered.

Type of coverage: Collision. Optional.

What it pays for: Repair of auto damaged in a collision or roll-over, regardless of fault. Reimburses car's market value, minus the deductible, when car is totaled.

Whom it compensates: You and members of your household.

The choices: Deductibles range from \$50 to \$2500 per accident. Higher deductibles cost less.

CONSUMER REPORTS recommends: Deductible of at least \$250. Consider dropping entirely on low- and mid-priced cars five or more years old.

Type of coverage: Comprehensive. Optional.

What it pays for: Repair of car from wind storms, flood, fire, vandalism, theft, and some other events. Reimburses market value of car or car part, minus the deductible after a theft.

Whom it compensates: You and members of your household.

The choices: Deductibles range from \$0 to \$2500. Higher deductibles cost less. Some insurers won't offer deductibles higher than a certain amount.

CONSUMER REPORTS recommends: At least a \$250 deductible. Consider dropping entirely on low- and mid-priced cars five or more years old.

Other coverage: Glass breakage.

What it pays for: Covers comprehensive deductible when cracked glass needs replacement.

Whom it compensates: You and members of your household.

The choices: Usually cost 15 to 20% of one comprehensive premium. Available in a few states.

CONSUMER REPORTS recommends: Where offered, skip this coverage if it's more than a few dollars a year.

Other coverage: Rental reimbursement.

What it pays for: Car rental while yours is being fixed after an accident.

Whom it compensates: You and members of your household.

The choices: Typically \$15 to \$25 a year, pays about \$15 per day for up to 30 days.

CONSUMER REPORTS recommends: Buy this if you have only one car and no alternative transportation.

Other coverage: Towing insurance.

What it pays for: Towing from an accident, or if a car breaks down.

Whom it compensates: You and members of your household.

The choices: One available coverage, typically pays up to \$50 per tow. Costs about \$5 per car per year.

CONSUMER REPORTS recommends: Join an auto club that offers towing among its services. You'll get better value.

Other coverage: Uninsured motorist property damage (UMPD).

What it pays for: UMPD pays for damage to your property by someone without insurance, or without enough insurance to pay your costs.

Whom it compensates: You and members of your household.

The choices: UMPD has no deductible and is far cheaper than collision because it covers less.

CONSUMER REPORTS recommends: Buy this only if you don't have collision.

HOW TO SAVE

After you determine what coverage you need and compare prices among companies that provide the best service (see Ratings), ask for applicable discounts. Some may already be included in the premium:

- Auto/homeowners package (both policies must be with the same company).
- Multicar (policy must include at least two cars).
- Good-driver/renewal (no claims or tickets for at least 36 months).
- Passive restraints (automatic safety belts, air bags, or both).
- Antilock brakes.
- Antitheft devices (an approved device can be installed before or after the car's purchase).

For parents of teen-aged drivers. If your teen-agers don't own cars, name them on the policy as occasional operators of your least-expensive cars. If they do own cars, cover them under your policy. Otherwise, they will most likely go into the very costly state high-risk pool. Some people put their teen-agers who own their cars on separate insurance policies to shield themselves from liability. But lawyers we consulted say that parents might still be held liable in some states. More tactics: Check into discounts. Driver's education could qualify, as could a good academic record. If the driver goes to school more than 100 miles away, without a car, another discount may apply.

Young singles on their own. Avoid performance or "turbo" cars. A turbo engine can add as much as 13% to your premium. Be aware that if a roommate has had tickets or accidents, your insurance rates could be affected, even if you never lend out your car. Tie the knot: Married males under 30 pay the same premiums as older drivers.

Older people. If you're 50 or older, take a defensive-driving course that's approved by your state motor-vehicle

department. Completion may earn you a 5 to 15% discount on most coverages. In some states, discounts are available for all drivers. You may also be able to reduce your motor-vehicle points.

Travelers. If your policy covers collision, turn down the costly collision-damage waiver when you rent a car. (Your credit-card company may also provide that coverage free.) If you don't own a car but rent a lot, consider a non-owner liability policy for \$200 to \$300 a year. If you'll be away a long time without your car, drop collision and liability for that period. Your state may make you garage the car and surrender the license plates, however.

Commuters. If you drive just a few miles to public transportation, ask for a mileage discount. If you carpool, check for yet another discount.

HELP FROM YOUR STATE

Every state and the District of Columbia provide telephone numbers so residents can call with auto-insurance questions and complaints. States with a * provide auto-insurance shopping guides. Most guides offer price comparisons by region or individual county. The 800 numbers are accessible only in-state.

Note: The shopping guides for Alabama, Massachusetts, Nebraska and Wyoming have no price comparisons. Illinois offers a database with some price comparisons available at some public libraries.

STATE	PHONE NUMBER
Alabama*	334-269-3550
Alaska*	907-269-7900
Arizona*	602-912-8444
Arkansas	800-852-5494
California*	800-927-4357
Colorado*	303-894-7499
Connecticut*	203-297-3867
Delaware*	800-282-8611
District of Columbia	202-727-8000
Florida*	904-922-3132
Georgia	404-656-2070
Hawaii*	808-587-1234
Idaho	800-721-3272
Illinois	217-782-4515
Indiana	800-622-4461
Iowa	515-281-5705
Kansas	800-432-2484
Kentucky*	502-564-3630
Louisiana*	800-259-5300
Maine*	207-624-8475
Maryland*	800-492-6116
Massachusetts*	617-521-7777
Michigan*	517-373-0240
Minnesota*	800-657-3602
Mississippi	800-562-2957
Missouri*	800-726-7390
Montana*	800-332-6148
Nebraska*	402-471-2201
Nevada*	800-992-0900
New Hampshire	800-852-3416
New Jersey*	800-446-7467
New Mexico	800-947-4722
New York*	800-342-3736
North Carolina	800-662-7777
North Dakota*	800-247-0560
Ohio*	800-686-1526
Oklahoma	405-521-2828
Oregon*	503-378-4484
Pennsylvania*	717-787-2317
Rhode Island*	401-277-2223
South Carolina*	800-768-3467
South Dakota	605-773-3563
Tennessee	800-342-8385

Texas*	800-252-3439
Utah*	800-439-3805
Vermont*	802-828-3301
Virginia*	800-552-7945
Washington*	800-562-6900
West Virginia*	800-642-9004
Wisconsin*	800-236-8517
Wyoming*	800-438-5768

TAKING CARE OF YOUR CAR

In 1970, the average car on the road was about 5½ years old. By 1990, that average car was about 7½ years old. Why? Cars—both domestic and imported brands—are made better today than they were in the 1970s. A car that gets good treatment can last well past the time when you make the last payment, rewarding you with years of relatively low-cost transportation. This section gives you nine ways to make your car last a long time.

CHANGE THE OIL FREQUENTLY

Motor oil keeps engine parts lubricated, reducing friction so they move easily and last longer. But the protection eventually diminishes. Oil in a car's engine is subjected to high temperatures and contamination with water, metals, and the products of combustion. That depletes the additives in oil that keep it working the way it's supposed to.

Most auto manufacturers typically recommend an oil change every 7500 miles for cars driven under “normal” conditions, and more frequent changes under “severe” conditions. But many owners change the oil as often as every 2000 or 3000 miles, severe driving or not. There's no proof that changing the oil that often makes cars last longer, but a survey some years ago of CONSUMER REPORTS readers found a clear correlation between frequent oil changes and long car-life. We believe frequent changes are a good idea if you drive under these conditions:

- Most of your trips are shorter than 20 miles.
- You're often stuck in stop-and-go traffic.
- You drive where it's colder than 32° or hotter than 90°.
- You often drive in dusty or heavily polluted areas.
- You regularly drive fast in hot weather.
- The car is used to tow a trailer.

Most people change the oil filter when they change the oil. But we say that's not usually necessary—that with today's cars and oils, an oil-filter change at every other oil change is sufficient.

Many people prefer to pay someone else to change their oil. You can get the job done at an independent repair shop, a full-service gasoline filling station, a car dealer's service department, or a franchise oil-change shop. Cost is generally highest at the dealer, lowest at a franchise shop. Expect to pay about \$25 for an oil and filter change at a franchise shop. It's a while-you-wait job, typically half an hour.

Changing the oil is an easy do-it-yourself job, however. More than half the CONSUMER REPORTS' readers responding to a survey said they handled the chore themselves. To change a car's oil, you need a few basic tools, a way to elevate the car safely, and a place to take the old oil for proper disposal.

Your first step is to choose the right oil. It should be labeled with the **service classification** called for in your owner's manual—“For API Service SH,” for instance. Also, look for a starburst symbol on the container that reads, “FOR GASOLINE ENGINES.” Choose a **multi-viscosity** oil suitable for the weather in your area: SAE 5W-30 for temperatures between -20° and 60°, SAE 10W-30 for most other conditions normally found in the U.S. Consult your owner's manual for recommendations. Follow this step-by-step guide to changing the oil:

1. Let the car's engine run for a few minutes to warm the old oil, so it flows smoothly.
2. Raise the car on a ramp or jack stand—never get under a car that's supported only by a jack. Shut off the engine.
3. Remove the oil-drain plug (at the bottom of the engine) and let the old oil drain into a large pan.
4. Remove the old oil filter.
5. After the old oil has drained, screw in the oil-drain plug. If there's a gasket on it, make sure it's not deformed or broken—or, better yet, replace it with a new gasket.
6. Attach a new oil filter, first applying a thin coat of oil to its rubber gasket.
7. Pour in new oil, referring to the owner's manual to see how much oil the engine holds.
8. If you get any old oil on your skin, wash it off promptly.
9. Take the old oil and filter to a service station, municipal hazardous-materials center, or other location that will accept them. (Never pour engine oil down the drain or into the ground, or put it in your trash can. Used oil is a toxic substance that can pollute the underground water supply.)

DRIVE SENSIBLY

Today's cars can take more hard treatment than cars sold a few decades ago. But driving sensibly makes a difference—it helps keep your car trouble-free, it saves gasoline, and, of course, it's safer. Follow these rules for normal driving:

- Don't drive too fast for conditions.
- Don't tailgate.
- Use the left-most lane for passing only, moving back to the right as soon as you can.
- Stop and start gradually.
- Take corners at a controlled speed.
- Don't shift into reverse while the car is rolling forward, or vice-versa.
- Turn the wheels only while the car is moving, if possible.
- Avoid potholes. If you can't avoid one, release the brake pedal just before you hit so the wheel doesn't lock when it falls in.
- Don't idle the engine for more than 30 seconds; idling wastes fuel and puts more wear on the engine than driving.
- Don't try to use the windshield wipers if they're stuck in ice. And don't use them when the windshield is dry.
- Don't spin the wheels if you're stuck in snow or mud. Rock back and forth gently, using only Drive or Reverse. Alternately depress the accelerator gently and release it to set up a rocking motion, gradually increasing the car's travel.

Follow these rules for driving a new car:

- Avoid full-throttle acceleration.
- Don't avoid highway speeds; they're necessary for proper engine break-in.
- For the first 1000 miles, vary your speed on long stretches.
- Avoid unnecessary panic stops; they damage the brakes and tires.

INSPECT YOUR CAR'S SYSTEMS REGULARLY

People whose cars seem to last a long time don't wait for trouble before looking under the hood. They set up regular inspection routines that catch problems while they're still easy to correct.

You can do some of these checks yourself.

Once a week, check:

Coolant level, generally by looking at the plastic coolant-recovery reservoir. If low, add more water and antifreeze, generally a 50/50 mix. Don't open the radiator's pressurized cap.

Engine oil level, with dipstick. If low, add enough to bring level to between Add and Full marks. Don't check immediately after shutting off the engine. Wait at least 20 minutes to give the oil a chance to drain into the oil pan so you get an accurate reading.

Once a month, check:

Tire pressure, with a pressure gauge. If it's slightly low, fill to the required level at a service station. If it's very low, replace the tire with a spare, and have the low tire checked for leaks. Check the tires before you drive the car, while the tires are cold.

Automatic transmission fluid level and color, using a dipstick. If the level is low, add fluid to between the Add and Full marks. If the color has changed from normal red, pink, or green (varies by brand) to brown or black, the fluid and its filter need to be changed. If the color has turned sickly white or pale, the transmission oil cooler may need repair.

Power-steering fluid level, with dipstick. If it's low, have the system checked for leaks.

Brake fluid level, by removing the top of the master cylinder. If it's low, have the system checked for leaks.

Battery condition. For maintenance-free batteries, this means looking at an "eye" at the top of the battery. If the eye

is green or blue, the battery is okay; if it's black, the battery needs testing and charging; if it's pale or yellow, the battery is defective and needs replacing. Keep a low-maintenance battery topped off with distilled water, and keep battery terminals free of corrosion.

With every oil change, check:

CV joints (front-wheel-drive cars only) located on both sides of the differential at each front wheel. If either of the boots that cover the joints is greasy, have both boots replaced.

Rear-wheel differential fluid level (rear-wheel-drive cars only), by removing the plug and feeling for fluid with your little finger. If no fluid can be felt, add fluid and have the system checked.

Air filter (usually on top of engine). If it's dirty, replace it.

At every other oil change, check:

Cooling-system hoses. With the engine cold, squeeze the hoses and look for cracks and hard or mushy areas. With the engine running, look for bulges. Have all problem hoses replaced.

Exhaust system. With car on a lift, check for rust-through and loose clamps.

Brake pads or linings. If they show excessive wear, have them replaced.

PERFORM PREVENTIVE MAINTENANCE REGULARLY

Preventive maintenance is cheaper and easier than having a car repaired. It's also one of the keys to keeping a car for a long time. You can do some of these procedures on your own, but you'll probably want a mechanic to handle most of them.

With every oil change:

- Lubricate the universal joints (for models that require this—check your owner's manual).
- Clean mud off the driveshaft (rear-wheel-drive cars only).
- Replace the oil filter (every other oil change).

About once a year:

- Check the owner's manual for advice about whether to change the automatic transmission fluid and replace the filter.
- Clean debris from the radiator.
- Clean the battery-terminal connections.
- If the battery connections have white powdery deposits, wash the battery with a baking soda/water solution; rinse with water. (First, place tape over the vent holes in the battery caps—if any—to prevent baking-soda solution from getting into the battery.)

About every two years:

- Drain and flush the cooling system; refill with fresh coolant.

About every four years:

- Replace the engine drive belts.
- Replace the radiator hoses.

FIX MECHANICAL PROBLEMS PROMPTLY

An odd noise from the engine, smoke from the exhaust, brakes that pull to one side—all are symptoms of mechanical problems. Fixed promptly, these problems won't turn into worse headaches that can cost more to fix, shorten the life of your car, or even make driving more dangerous.

For advice on how to find a reliable mechanic, read the [When You Need Repairs](#) article.

FIX BODY PROBLEMS PROMPTLY

Basically, it's a matter of watching for minor dings and dents—any spot where the paint is missing—and having the spots touched up before rust can form. There's a payoff if you want to sell: Buyers know a car that looks good on the outside has probably been treated well. They're more likely to want a car whose exterior is in good shape than one with rust, dents, missing chrome, and dull paint.

Are dealer-applied car-treatments a good idea? Car dealers make much of their profit on rustproofing, paint and upholstery preservatives, and paint sealant. There are plenty of reasons to pass up these new-car options when they're offered:

- They're typically priced far higher than comparable services you could buy elsewhere—from an independent auto-body shop, for example.
- Upholstery treatments are generally no better than much cheaper do-it-yourself alternatives.
- Cars built today get plenty of rust protection at the factory; dealer-applied extras are unnecessary.
- Rustproofing that's applied improperly can actually increase the likelihood of body damage.

KEEP THE CAR GARAGED

Keeping a car in a garage saves wear on both the body and the mechanical systems, especially in areas where winters are severe—even an unheated garage is warmer than a cold driveway in winter. Cold can damage mechanical components. Cold also makes starting the engine harder, putting a strain on the starter motor, battery, and charging system. And cold weather makes engine oil and other lubricants thicker, reducing their effectiveness.

All year, a garage provides protection from other environmental assaults on your car:

- Bird droppings and sap from trees harm a car's paint.
- Exposure to the sun's ultraviolet rays dulls the paint.
- Rain and snow can rust unprotected spots on the body.
- Falling tree limbs can dent or scratch the car.
- A car left outside is more vulnerable to theft of the car itself, or of things left inside the car.

WASH AND WAX FREQUENTLY

Washing removes dirt, grease, salt, and other paint-weathering grime from the exterior. Waxing, once not considered necessary, can help your car's surface withstand the elements better.

If you take your car to a car wash, choose one with a brushless system, which won't scratch the paint. If you wash the car yourself, it'll probably come out cleaner, however. Just follow this procedure:

- Flush away loose dirt by hosing down the whole car. Don't forget underneath the body and wheel wells.
- Remove deposits of tree sap, bugs, and road tar with a soft cotton rag dampened with mineral spirits or a cleaner designed for the job. Rinse immediately.
- While the car is wet, use a lamb's-wool mitt or soft cotton cloth (don't use synthetic fabrics, which can scratch) to apply a solution of water and detergent. A cleaner designed especially for cars is the safest material to use; dishwashing liquids may be too harsh.
- Wash from the roof down so dirty water doesn't flow onto areas you've already cleaned. Rinse the mitt or cloth often and the car periodically, so suds don't dry.
- After the last rinse, dry with a soft cotton towel or genuine chamois.

For advice on selecting an auto polish, along with CONSUMER REPORTS' Ratings, read How To Buy Auto Polishes and Waxes.

KEEP THE INTERIOR CLEAN

It's not just for looks. A clean interior helps reduce wear on the carpets, rust on the floor, scratches on the metal and glass, and deterioration of the upholstery. For the best results, follow this procedure:

- In the trunk, wash all metal with soap and water. Vacuum carpeting. Spray silicone on the trunk's weather seals to keep them from drying and cracking.
- Inside the car, remove floor mats and put them on a clean surface. Vacuum the mats, and vacuum the car's

flooring, seats, side panels, and headlining. Don't forget hard-to-reach areas under seats and between cushions.

- For stained headliner, clean with a vinyl or fabric cleaner (whichever is appropriate).
- For stained carpeting, use a foaming carpet cleaner.
- Wash hard-plastic components with liquid detergent and water. When surfaces are dry, apply liquid furniture polish if you want a shiny finish.
- Wash cloth seats, safety belts, and fabric on door panels with liquid detergent and water.
- For cloth upholstery with food or beverage stains, use furniture upholstery cleaner.
- For cloth upholstery with oil, lipstick, crayon, or ink stains, use a spot lifter or stain remover.
- For leather or vinyl, use a mild liquid soap and water.
- Wash simulated chrome with plain water; take care to avoid scratching.
- Apply tire dressing, available in auto-parts stores, to brake, clutch, and accelerator pedal pads.
- Wash vinyl floor mats in a sink filled with liquid detergent and water. Rinse and hang up to dry.
- Spray door and window seals with silicone.
- Clean glass with a commercial glass cleaner or ammonia and water.

WHEN YOU NEED REPAIRS

Even the most reliable car on the road will eventually need some basic repairs. Brakes wear down, mufflers wear out, and transmissions become shiftless. Where can you find an honest mechanic who will do repairs quickly and well, and at a good price? The experiences of several thousand CONSUMER REPORTS readers can help answer that question.

On CONSUMER REPORTS' 1993 Annual Questionnaire to subscribers, we asked about muffler, brake and transmission repairs that had been done between 1991 and 1993. Some 12,000 people told us about muffler repairs, 22,000 about brakes and 6000 about transmissions. Responses reflect CONSUMER REPORTS' readers' experiences and may not represent those of customers in general.

Readers told CONSUMER REPORTS:

- Why they chose one type of repair shop over another.
- How much they were influenced by advertising, and whether they thought the ads were misleading.
- Whether they received an estimate before the repair work was done, and how accurate the estimate proved to be.
- What they actually paid.
- Whether they were subjected to a sales pitch for extra work.
- Whether the repairs were satisfactory, and whether the repair shop satisfactorily resolved any remaining problems.

Obviously, we couldn't rate individual local garages or dealerships. But we could judge them as a class and compare them with the leading repair chains, and with car-dealers' service departments.

Whether the problem was with the brakes, muffler, or transmission, one thing was clear: The readers who went to independent repair shops were, on average, most satisfied with the results. That should be reassuring to the many people who have become loyal customers of local mechanics. In general, we found that well over two-thirds of the people who went to independent garages for brake or muffler repairs were repeat customers, compared to about half of those who went to chains and dealerships for repairs.

AVOIDING MR. BADWRENCH

If you don't know a mechanic you trust, finding one can be a daunting task. Your best bet is to get recommendations from friends and family, and follow a few basic rules, both for choosing a repair shop and for working with it.

Take appearances seriously. The shop needn't be immaculate, but it should look clean and well maintained. There should be up-to-date electronic diagnostic equipment next to the service bays. Service personnel should be polite, and should ask detailed questions about your car's problem.

Check credentials. Look for framed certificates or window decals from the American Automobile Association (AAA) or the National Institute of Automotive Service Excellence (ASE). The AAA certifies garages that meet certain quality criteria. The ASE grants certificates to mechanics who pass exams in any of eight areas of expertise. Look also for signs of membership in the local chamber of commerce or Better Business Bureau.

Be prepared. Before taking the car to a mechanic, note the exact symptoms. Does the problem occur when it's hot outside or when it's cold? On startup, or when idling, turning, or accelerating? Is it intermittent or constant? Is there any unusual noise, odor, fumes, or smoke?

Tell the service writer (the person who writes up the work order) the exact nature of the problem or problems, but don't press for a diagnosis on the spot.

Get it in writing. Tell the shop you want a written estimate, and make sure it will telephone you for permission to proceed if the work turns out to be more expensive than first thought.

Estimates can be written only when the service person has some inkling of what the problem is. But it's always good practice to ask for one, if only because it establishes you as a wary customer.

Ask for the parts. Tell the shop that you want the mechanics to keep any old parts they remove from your car so that you can inspect them. If you distrust the service people, mark the troublesome parts with a felt pen before taking the car in for service, so you can be sure that the old part was really yours. Note that for some rebuilt parts, such as a starter or alternator, it's common practice for the shop to surrender the old one in exchange for the new one, so the old one from your car may not be available for inspection.

Avoid unnecessary "tuneups." Today's new cars are electronically controlled. They normally don't need to be adjusted or "tuned" like older cars, and are designed to go much longer between routine maintenance stops. But some car dealers try to foist a speeded-up maintenance schedule on their customers, one that recommends service more often than necessary. Read your owner's manual, and follow the manufacturer's service schedule, not the dealer's.

Know when to get more advice. Even good mechanics, like good doctors, can make mistakes in diagnosing a problem. A general rule of thumb: If a mechanic recommends a repair on a part of the car that's unrelated to the one you want to have fixed, go to another shop for a second opinion.

BRAKES

Independent garages didn't always do perfect brake work, in CONSUMER REPORTS' readers' experience. They took a little longer to fix the car than franchised repair chains, and they more often neglected to give a written estimate. But the independent local mechanics did more satisfactory repairs, and they charged less than either dealerships or chains.

Judging from our readers' responses, local garages draw much more repeat business than do chains or dealerships. Three-fourths of the people who used a local garage had been there before, compared with 61% for chains and 56% for dealerships. Nearly 30% of the readers who used a chain did so because they had been attracted by an ad. Of them, 28% thought the ad was misleading, most often because the advertised price didn't cover the cost of extra parts.

What to watch for:

Brake pads don't necessarily need to be replaced just because they squeak.

Unless they're badly worn, the squeaking can often be cured by cleaning out dust, installing clips, or lubricating the backs of the pads.

Some garages try to boost profits and save themselves time by installing new brake rotors instead of smoothing the old ones on a lathe. Question the shop closely to see if you really need new discs or drums, particularly if your car is fairly new and the brake discs haven't been turned before. Be suspicious if the shop recommends a laundry list of new parts before service people have made a thorough inspection.

MUFFLERS

For mufflers, as for brakes, our readers found that independent garages did more satisfactory work than franchised chains or new-car dealers. Independent repair shops were more likely than chains to fix the muffler right the first time and to do the work without pressuring the customer for additional repairs. Muffler chains, on the other hand, may offer an advantage over most independents: the convenience of while-you-wait service. According to our readers, 87% of muffler chains handled a repair in a few hours, compared with 55% of the independent garages and only 44% of new-car dealers.

What to watch for:

If part of the exhaust system fails, the mechanic may also want to replace most of the rest of the system, even though other components are still sound. That may seem excessive, but generally, it's not. It usually makes no sense to add one new component at a time; the parts of the exhaust system are often welded together or rust together, so they're hard to separate without damage.

Watch out, however, if a mechanic wants to replace the catalytic converter simply because it's "rusty." A converter quickly acquires a veneer of rust, but there's no reason to replace it unless it leaks or stops working. You can expect the catalytic converter to last 100,000 miles or more. The U.S. Environmental Protection Agency requires automakers to guarantee converters for the car's first 50,000 miles. As of 1995, that increased to 80,000 miles.

When you have a car's exhaust system repaired, be especially careful to check the wording of the warranty. Some warranties cover only one specific part of the exhaust system, such as the muffler, but not the attached parts. If that's the case, having a second muffler job performed under warranty can wind up costing nearly as much as the first job did.

TRANSMISSIONS

Transmission repairs are the automotive equivalent of a root canal. Transmissions, particularly automatics, are complex devices that can be costly and time-consuming to fix. You often can't tell whether you need a minor adjustment or a major overhaul, so you're at the mercy of a mechanic who has every incentive to recommend major surgery. On the whole, our readers were far less satisfied with transmission work than with brake or muffler repairs.

Nearly 60% of the survey respondents took their transmission troubles to a car dealer's service department, largely because they thought the repair would be covered by warranty. Around 30% went to an independent garage, and

10% went to a chain. Readers who went to an independent garage were most satisfied, followed by those who went to car dealers, then those who went to chains.

Repair costs tended to increase as cars accumulated mileage. Transmission repairs typically required more than two days, and often took longer than the mechanic had promised. About 30% of people who went to chains and new-car dealers, and 20% of those who went to independent garages, said they had to wait more than a day longer than they expected to get the car fixed.

Often, too, the transmission didn't stay fixed. About a fifth of the people who went to a dealer or an independent garage, and a third of those who went to a chain, had a further problem with the transmission within a month of the initial repair. The great majority went back to the same shop to fix the problem. While two-thirds of the garage customers who had problems with the initial repair ultimately came away satisfied, more than half of the chain and car-dealer customers said they still weren't happy with the result.

About four out of five readers who used a chain received a warranty for the repairs, while fewer than half who went to local garages or dealers had a warranty. But only 56% of the readers using a chain were happy with the way the warranty was honored.

What to watch for:

For transmission work, it's especially critical to go to a mechanic you know you can trust, preferably one who has done good transmission repairs for someone you know. The average person simply has no way to tell whether a transmission problem is major or minor.

Most readers who used a local garage either went to a shop they had used before or one that had been recommended to them.

If the car is driveable, be wary of dire warnings and a hard sell telling you that you must get a new transmission right away. Get a second opinion.

Of the readers who went to a chain, about one in five said they felt pressured to have more work done. Garages and new-car dealers exerted much less pressure.

Some shops will drop the transmission pan, point to any residue there, and cite it as proof that you need a new transmission. But a little residue is normal, particularly in an older transmission, and may mean nothing at all.

Even though we didn't receive enough responses to rate individual transmission chains, we were able to compare all chains with garages and new-car dealers.

OVERALL SATISFACTION WITH TRANSMISSION REPAIRS

Based on more than 6,000 responses to CONSUMER REPORTS' 1993 Annual Questionnaire, covering repairs made between 1991 and 1993. (Scores are on a scale of 0 to 100, with 100 being completely satisfied and 0 being completely dissatisfied.)

Independent garages:	78
New-car dealers:	68
Repair Chains:	62

What Influences Choice

Key reasons readers chose each type of shop for repairs.

Independent garages:	49% said been there before.
New-car dealers:	69% said covered by warranty.
Repair chains:	44% said convenient location.

Pressure for Extra Work

Percent of respondents who said they felt pressured to have additional work performed.

Independent garages:	5%
New-car dealers:	8%
Repair chains:	21%

Persistent Problems

Percent of respondents who said they still had problems with the transmission within a month of the repairs.

Independent garages:	20%
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New-car dealers: 23%
Repair chains: 32%

Percent of respondents who had a problem with initial repair and were dissatisfied with the way the shop remedied it.

Independent garages: 34%
New-car dealers: 58%
Repair chains: 59%

HOW A CAR WORKS

Cooling SystemA car's cooling system keeps the engine at the proper temperature, and is made up of the radiator, heater core, water pump, thermostat, hoses, intercooler and plumbing.

Electrical SystemA car's electrical system enables the car to start and function, and includes the starter, alternator, battery, horn, switches, controls, instruments, lights, radio and sound system, accessory motors, electronics and wiring.

Ignition SystemA car's ignition system fires off the fuel/air mixture in the engine, and is made up of the spark or glow plugs, coil, distributor, battery, electronic ignition, sensors and modules.

TransmissionThe transmission is the gearbox that takes power from the engine's crankshaft and delivers it to the driven axle or axles, or to the drive shaft. To change gears with a manual transmission, you use a clutch pedal and gear-shift lever. An automatic transmission changes the forward gears automatically.

Four-Wheel DriveFour-wheel drive is a system that makes all four wheels driving wheels. There are many variations. Most primitive are part-time systems, selected with a switch or lever. They connect all four wheels so all go the same speed. Full-time four-wheel-drive systems can stay engaged at all times if desired. They use a center differential or other device to manage the distribution of power to the front and rear wheels. When it senses impending wheel slip, it can lock itself temporarily. All-wheel-drive systems work invisibly, without the need to engage them separately. They also use a center differential or its equivalent to manage power distribution to the front and rear.

ABS (Antilock Brake System)ABS is a computer-controlled braking system that senses when a wheel is starting to lock up, and rapidly pumps the brake on that wheel to prevent skidding. The ABS computer may also selectively slow the wheels on cars with traction control.

Disc BrakesDisc brakes are an effective brake design now universal on the front wheels, and frequently on the rear wheels as well. The disc, also called a brake rotor, is a round plate bolted to the wheel hub. When the brakes are applied, a hydraulically powered caliper squeezes each disc to slow the car.

Drum BrakesDrum brakes are the older form of brakes in which a drum (which is like a shallow, round pan) is attached at each end of the axle. Inside are hydraulically activated shoes, which slow the car by pressing outward against the inside of the turning drums when the brake pedal is depressed.

PistonsPistons are hollow cylindrical components with a solid top that slide up and down within each cylinder. When the fuel/air mixture ignites, it forces the piston downward, which turns the crankshaft, which is connected to the transmission which then powers the drive axle. The turning crankshaft then pushes the piston upward, forcing out exhaust gases.

Rear SuspensionRear suspension is the collection of springs, bars, arms and shock absorbers that suspends the rear of the car over the rear wheels and cushions the ride.

Front SuspensionFront suspension is the collection of springs, bars, arms, struts and shock absorbers that suspends the front of the car over the front wheels and cushions the ride.

Two-Wheel DriveA system in which the engine powers only the front wheels or only the rear wheels.

SECRET WARRANTIES

If a design defect in a car is serious enough to prompt a federally mandated recall, owners of the affected cars are notified by mail. But even if a defect doesn't trigger the recall machinery, manufacturers often decide to pay for repairing that defect in customers' cars.

Of course, that free-repair policy doesn't do much good for the cars' owners unless they know about it. In most states, owners often learn about these "secret warranties" only after complaining to their dealer about the defect. Another way you can find out about a secret warranty is to keep track of the manufacturer's service bulletins, which are regularly sent to dealers and available from the National Highway Traffic Safety Administration (800-424-9393) and private watchdog groups like the Center for Auto Safety (2001 S Street NW, Suite 410, Washington, D.C. 20009).

CONSUMER REPORTS has long believed that secret warranties are unfair. They give the impression that a dealer is being generous by fixing a problem for free, when the truth is that the manufacturer has built a defective car. And secret warranties discriminate against people who don't know about them.

ARE BUMPERS FINALLY GETTING STRONGER?

For three brief years, from 1980 through 1982, a government standard required that each new car's front and rear be able to withstand a series of 3- and 5-mph blows. No damage was permitted to the bumpers or to safety-related components like headlights and turn signals. Those crashworthy bumpers effectively protected against expensive damage in minor parking-lot mishaps.

But in 1983 the Reagan Administration weakened the bumper standard so it applied only to safety-related components, and only up to a 2½-mph impact. The new standard didn't consider damage to the bumper or surrounding bodywork.

Many automakers, particularly General Motors and most foreign makes, immediately began to degrade their bumpers to the new minimums allowed by the law. The flimsier bumpers could not only be made cheaper; they could also be made lighter, an attribute that particularly appeals to automakers, who are trying to improve fuel economy so as to meet yet another government standard.

Currently, some automakers are again advertising 5-mph bumpers, but their claims really promise only that the safety-related components will remain intact. Apparently, the bumpers and surrounding bodywork are expendable, and repairing their damage can be costly indeed. In our bumper-basher tests, which mimic the old 5-mph standard, 43 of the cars we tested in the last three years sustained damage, ranging in cost from \$108 to \$2312.

But many cars have emerged from our 5-mph basher test with no damage at all. Among them are the Chevrolet Lumina, Chrysler Cirrus, Chrysler Concorde, Dodge Intrepid, Dodge and Plymouth Neon, Eagle Vision, Subaru Legacy, and Volvo 850. We think all cars should do as well, and we strongly support a return to the more demanding bumper standard that the government abandoned 12 years ago.

HOW TO BUY BATTERIES

A new car battery is too often a purchase made in haste after your old one dies. Left stranded, you turn for help to the nearest service station or auto center and settle for whatever the staff there recommends. You'll probably get a better battery at a better price, and save yourself aggravation, if you buy a new battery before your old one lets you down.

The usual telltale sign of a failing battery is slow cranking of the starter motor, especially in cold weather. Such sluggish starts should prompt a visit to the service station or auto center. There, staff can check that the battery isn't being handicapped by, say, corrosion on its terminals or an alternator belt so loose that the car's charging system isn't working properly. If no such problems turn up, the battery should be fully charged and a simple procedure known as a load test should be done to determine if the battery is really at death's door. An auto battery that's more than about four years old and is giving trouble will probably require replacement. This report, which includes Ratings of some widely sold batteries, aims to help you with that process.

CONSUMER REPORTS RECOMMENDATIONS

Any auto battery you buy may provide the power your car requires, providing its cold-cranking specification meets or exceeds the one for your car. But the models we rated highest were the most consistent performers. Sample after sample of those batteries lived up to their promises. You're far more likely to get a "lemon" if you buy a brand that's low-rated.

Choose among the top batteries, primarily by price and additionally by length of warranty and size of reserve capacity (models with a large capacity may prove to be more durable). Many car owners don't need a battery with a CCA level of more than 500 to 550. For them, good buys include the Exide Mega Cell Classic 24-60, NAPA Power 6024 and Omega (Wal-Mart) 48-24, all about \$40. In the 600- to 700-CCA group, the standouts are the Sears DieHard WeatherHandler 36524 (sold in warm-weather regions) and 36424. Both are \$60 and have a large reserve capacity and a fairly long warranty.

MEASURING UP

Battery-shopping begins with establishing the battery "group" size your car requires. (If you don't find battery-size information in your car's owner's manual, it's readily available wherever batteries are sold.) A battery's size number denotes its length, width, height and terminal type (batteries have either posts on top or bolt holes on the side, while dual-terminal batteries have both). Some cars can accommodate more than one size of battery.

CONSUMER REPORTS tried to buy every battery in size 24, among the most common sizes for passenger cars. But, since we could not find that size in several brands, we tested a few batteries in other sizes, mostly group size 26/70 (the dual numbers signify dual terminals). Size 24 and 26/70 are often interchangeable. Our test roster included all the major brands. Unfortunately, the AC-Delco batteries we tested have since been discontinued, thus they had to be dropped from the Ratings.

CRANKING POWER

Within each size, makers typically offer batteries that vary in starting power. That power is measured in cold-cranking amps (CCA), basically a measure of how much current the battery can deliver to the starter motor for 30 seconds of cranking in cold (0°) weather. Low temperatures challenge an auto battery by reducing its electrical efficiency and increasing the effort required to turn over the car's engine.

A battery catalog or retailer will tell you the cold-cranking amps specified for your car. Not every brand is made in every CCA level, so you may need to go a little above the recommended amperage in order to buy the brand of battery you want. However, as a rule, resist any sales pitch to buy a battery with a CCA rating far above the recommended level. The added power will probably cost more and confer little benefit, unless you drive in an extremely cold climate. (For many cars, automakers recommend a higher-CCA battery for Canada and list it as an option for the U.S.)

Don't be confused by advertisements that flatter batteries by citing their cranking amps. A battery's CA ratings is typically much higher than its cold-cranking output because CA is measured at 32° rather than 0°.

CONSUMER REPORTS' TESTS

Our testing sought to establish how well the batteries lived up to their performance claims. Because battery performance may vary markedly from sample to sample, we tested 10 or so samples of each battery, and we gave each sample two chances to pass our tests. The more samples that made the grade, the higher the battery's score.

CONSUMER REPORTS' Ratings are based primarily on tests designed to simulate a cold-weather start, the results of which provide a useful comparison even to those who live in balmy climes. For about half the brands, all or almost all of the samples delivered as promised in the cold-cranking tests. The worst performers, the GNB Champion 550 24-5 and Sears 60 36724, had enough samples fail that we think one of those batteries could let you down even

when it's new. Only one of 9 GNB Champion samples passed muster, a showing so dismal that CONSUMER REPORTS judged the battery Not Acceptable.

Different group sizes of a brand of battery may differ in their ability to meet performance claims. Because of that, CONSUMER REPORTS' test results won't necessarily apply to other sizes in a brand line, particularly if those other sizes vary in cold-cranking power and reserve capacity, the key "specs" for a battery.

RESERVE CAPACITY

On the whole, the tested batteries were very reliable in meeting their labeled claims of reserve capacity, the supposed time the battery should be able to power the engine and electrical accessories if the car's charging system fails. A battery with a high reserve capacity provides an additional safety margin in an emergency. Reserve capacity may also be an indication of a battery's longevity. When CONSUMER REPORTS ran six models of battery through special discharging and recharging tests that simulated long-term use, the batteries with a high reserve capacity generally survived the longest.

Heat accelerates the aging process in an auto battery. The specially tested batteries included two "hot climate" models, claimed by their manufacturers to be capable of especially long life in the warmer part of the country where they're sold. But they didn't last notably longer than other batteries with comparable reserve capacities.

WHERE TO BUY A BATTERY

Where you buy a battery can affect choice, price, and convenience, notably whether you install the battery yourself or have the seller handle the job. Following are the main choices.

Auto Service Centers

Examples: Goodyear, Firestone, Sears, Pep Boys

Comments: Service often fast, expert. Large, fresh inventory. Prices relatively low.

Stores That Sell Batteries

Examples: Wal-Mart, Kmart, Target, Trak Auto

Comments: May have the lowest prices. May not offer installation.

Small Garages

Examples: Service stations, tire and tuneup shops

Comments: Convenient (close at hand, comprehensive service). Prices relatively high, inventory low.

Auto Dealerships

Comments: First choice for cars under factory warranty. Experts on your make of car. Prices relatively high.

GETTING A FRESH BATTERY

When shopping for a new battery, you want to avoid samples that are past their prime. A battery that's more than six months old may have begun to age permanently because of internal chemical changes.

The industry's own test procedures call for batteries no more than 60 days old to serve as test samples. Since it's hard to find batteries that fresh in stores, we had to set a more realistic cutoff age of six months for our samples. In contrast to our last car-battery project in 1991, we were able to find samples that were less than six months old of all the models we wanted to test. But, at some outlets, we noticed some batteries that were older than about six months, and so no longer new, in CONSUMER REPORTS' judgment.

Before you buy a battery, check its age. Unfortunately, manufacturers seldom make it easy to tell when a battery was made. Read *How To Read A Battery* for help deciphering the shipping code found on most batteries. Look for a code that indicates the battery has been shipped from the factory within the last three months or so (batteries may sit in factory storage for some weeks before they're shipped).

INSTALLATION

Most places that sell you a car battery will also install it for you, for little or no additional cost. Alternatively, you can install the battery yourself. Some batteries come with installation instructions, which can also usually be found in the battery catalogs carried by retailers. Given that an auto battery weighs about 35 to 40 pounds, the toughest part of installing one may be lugging it to your car and returning the old one to the store or garage for recycling. You'll appreciate it if both batteries have a handle, as most of the tested models do.

Be careful to remove and install the cables correctly. Remove the negative (black) cable first from the old battery, and attach it last to the new one.

Your old battery should be returned to the store for recycling. Disposing of it by any other means is illegal in most states, because of the hazards posed by battery acid and lead plate. Some states require battery retailers to charge a \$5 or \$10 deposit on each new battery. The amount is refunded when the old battery is brought back to the retailer for recycling.

MAINTENANCE

A new car battery should be checked periodically, just as you would check the levels of engine oil or coolant. Battery acid can burn tissue, so you should protect your eyes and skin whenever you're working around a battery. These steps will ensure a long life for your battery:

- With a low-maintenance battery, check the level of electrolyte (battery liquid) every month or so at first. Top off the battery cells beneath each vent cap with water as needed (distilled water, whenever possible) and replace the caps securely.
- Check the hold-down hardware that keeps a battery from vibrating. Vibration can shorten a battery's life.
- Did you leave your headlights on? A deep discharge that leads to a dead battery is not only inconvenient, it also reduces a battery's lifetime, especially for a maintenance-free model. Keep a set of booster cables on hand to rouse a dead battery. For advice on buying cables, see the article [How To Buy Jumper Cables](#).
- Neutralize the sulfuric acid that can damage the battery terminals by removing the battery leads and washing leads and terminals with a solution of baking soda and water.
- Batteries last longer if they're maintained as close to fully charged as possible. If you drive your car infrequently, no more than once every few weeks, say, and mostly for short distances, consider using a battery charger to keep the battery up to snuff. For advice on buying chargers, see the article [How To Buy Battery Chargers](#).
- Sometimes, automotive electrical problems aren't the battery's fault. If the battery is properly maintained but too weak to crank over the engine, check the charging system and the alternator belt. If possible, go to a mechanic you trust. Electrical components, especially batteries and alternators, are too often replaced unnecessarily.

REFUNDS, FULL AND PARTIAL

Every auto battery comes with a complicated warranty. In most cases, it provides for a free replacement if the battery fails within a certain time. Three months is the most common period, but some batteries will be replaced free for up to 12, 18, and even 24 months (the latter for the Sears DieHard Gold 36080, a 675-CCA model).

If the battery fails after its free-replacement period, manufacturers offer a prorated warranty, in effect a partial credit toward a new battery based on the number of months since the battery was purchased. The credit is usually based on the battery's list price, and can be applied only to a replacement bought at that list price, which is often higher than the battery's retail price.

As a result, a warranty may turn out to be less generous than it appears at first. For example, suppose that you paid \$60 for a \$100 list-price battery. If the battery failed halfway through its warranty period, and the prorating were based on that \$100 list price, you'd have to pay \$50 for a replacement, almost as much as you paid for the original.

HOW TO BUY JUMPER CABLES A set of jumper, or booster, cables can cost \$10 or \$50. Price aside, here's what distinguishes booster cables from one another.

Wire thickness. The copper wires inside booster cables range in thickness, or gauge, from 4- to 10-gauge. (The lower the number, the heavier the wire; 4-gauge is about twice as thick as 10.) Thicker wire is usually better since it can deliver more current. CONSUMER REPORTS found that cables with 4- or 6-gauge wire were the best performers. All deliver current well enough to handle even most cold-weather boosts. A set of 8-gauge cables may not be up to cold-weather starts, but would probably suffice for a fair-weather boost. Unfortunately, you can't reliably judge wire gauge by looking at the exterior of the cable, since thin wire can easily be made into a fat cable by the addition of heavy sheathing and insulation.

Length. Most cables sold range from 8 to 16 feet. Cables that are 10 feet or less in length may limit you to nose-to-nose boosting, often awkward to arrange. Twelve-foot models are good enough for cars that are parked side by side or that are facing one another, nose to nose. A 16-foot cable allows you to park the cars far apart and in many orientations, possibly even one behind the other. There is a tradeoff for buying a longer cable: length increases the electrical resistance of a wire, which in turn reduces the current it can deliver. For that reason, longer cables need thicker wire, 4- or 6-gauge, usually. With wire that thick, even cables that are 16 feet long can deliver enough current.

Insulation. The grip and jaws of the clamp are usually covered by a thick coat of plastic insulation, for a comfortable grip and to prevent shorting should the clamps touch.

Instructions. For some cables, these are written only on the package. Hang-tagged instructions are easier to find and harder to lose.

Side-terminal extensions. Some cables have special designs, including extension jaws, that aim to make them easier to attach to batteries whose terminals are on the side rather than on top. We doubt you'll need any such special jaws, except perhaps if your battery fits into a very tight space in your engine compartment.

STEP BY STEP: THE SAFE BOOST

The low-voltage current that flows through booster cables is all but harmless to users. But, cross-connected (with one battery's positive terminals linked to the other's negative terminals) a set of cables can cause serious damage to the cars involved, and risk the safety of the user. Here, step by step, is a way to boost that makes such mishaps nearly impossible:

1. If your engine fails to turn over for no apparent reason (it isn't extremely cold, say, or the headlights weren't left on), check for corrosion where the battery leads join the terminals. Remove the leads, if necessary, and gently clean the terminals and leads with a wire terminal brush. Reconnect the leads and try again to start the car.
2. If step 1 leads nowhere, it's time to find a good Samaritan motorist to give you a boost. Practically any vehicle will do. Switch off the ignition and all electrical accessories in both cars. (The cars should not touch, as they might if positioned bumper-to-bumper).
3. Next, start to make the needed connections precisely in order. First, connect a positive (usually red) clamp to the disabled car's positive battery terminal; it's marked +, P, or Pos, and will be serviced by a red battery lead.
4. Move to the boosting car and attach the other red clamp to its positive battery terminal.
5. Still at the boosting car, clip one negative (black) clamp to a nonmoving, unpainted part of the engine compartment.
6. Finally, returning to the disabled car, attach the other negative clamp, again to a suitable spot in the engine compartment as far away from the battery as possible.
7. For most cars, it's recommended that the engine be running when the car is jumpstarting another vehicle. (However, there are exceptions; check your owner's manual.) Start the healthy car and rev the engine a bit. Then try to start the disabled car, which should fairly rapidly gain enough current to crank the engine. Once the engine has started, undo the clamps in reverse order.

CONSUMER REPORTS RECOMMENDATIONS

If winters are mild where you live, selecting a set of booster cables is simple. Cold weather, however, calls for cables with thick (4- or 6-gauge) wire, which delivers the high current a battery requires when temperatures dip. Performance varies only slightly among 4- and 6-gauge sets. Prices, on the other hand, range widely.

HOW TO BUY BATTERY CHARGERS

There are two main types of charger. The manual charger is the traditional type, cheap and simple. The relatively new fully automatic chargers shut off when the battery is charged and, in most cases, turn back on if the battery voltage drops. They also have a feature which allows them to be used to jump start cars. Here's how various chargers compare.

Price. Manual chargers typically cost \$35 or so. Automatic models are usually priced between \$60 and \$100.

Battery-charger hook up. Similar and straightforward for all chargers. Before plugging the charger into an AC outlet, you attach its positive cable to the battery's positive terminal, the one usually marked "+" or colored red. If the battery is in a car, you then secure the charger's negative cable to a nonmoving, unpainted part of the engine compartment (the alternator bracket is a good candidate, if you're familiar enough with your car's innards to find it). If the battery is outside the car, you connect the negative cable to the battery's negative terminal.

As an added measure of precaution, when the battery is out of the car, manufacturers recommend using an extension cable on the negative terminal so the final connection is at least 24 inches away from the battery.

Plugging in. An extension cord may be needed in order that the charger be close enough to the battery. Not just any cord will do. One with too small a wire gauge could diminish the voltage that reaches the charger, and so hamper charging. To minimize the chance of shortcharging, follow manufacturers' advice and use an extension cord as recommended in the instructions.

Current on, current off. Most chargers have an ammeter that shows how much current is flowing into the battery. Some automatic models have a switch that automatically adjusts the voltage a bit for different battery types (low maintenance, maintenance free and the deep cycle batteries used in marine, garden and recreational equipment).

On most automatics, an LED indicates when the charger "thinks" that the battery is fully charged and has shut itself off. With a manual charger, you have to monitor and turn the charger off when the ammeter indicates the battery is charged. (Prolonged overcharging can damage most types of batteries.)

Charging. Performance varies with charger type, charger current ratings, temperature, input voltage, and the type of battery being charged. The engine-start feature, found on fully automatic chargers, doesn't recharge a dead battery. Instead, as when an engine is jump-started with booster cables, the charger sends the car a jolt of electricity powerful enough to fire the starter motor, and so begins the car's own recharging of its battery.

If a battery is completely dead, or if it's very cold out, a 10- to 20-minute charge may be needed before the engine-start feature will successfully start a car.

Safety. During charging, a battery produces hydrogen gas. Though highly explosive, the gas poses little hazard unless it accumulates and is then ignited by a spark or flame. For safety's sake, then, avoid charging a battery in a poorly ventilated area, a closet, for example, or smoking around a battery that's under charge. Strictly follow the manufacturer's recommendations on the use of the charger.

To further err on the side of safety, you might want to choose a fully automatic charger. All battery chargers have a circuit breaker to prevent overloading.

HOW TO BUY TIRES Some tires are designed for long tread life, while others emphasize performance. But how do you tell which is which? Tire makers don't always describe their wares clearly. Here's a rough guide to the name game:

All-season tires. These are standard equipment on most sedans. They're designed to perform reasonably well under a variety of driving conditions—dry weather, rain, snow—without necessarily excelling in any one. They ride slightly more quietly than other types.

Touring tires. A notch higher in quality, they put a bit more emphasis on cornering and braking grip.

Performance tires. They're at the top of the quality scale. They carry a "speed rating" of at least H—certifying that they can safely sustain 130 mph. That doesn't mean you have to drive that fast to benefit from performance tires. A high speed rating generally indicates high overall quality—a tire that grips unusually well and that can withstand the punishment high speeds exact.

Another characteristic of performance tires is low sidewalls—an "aspect ratio" of 60 or less. The *How To Read a Tire* section decodes speed ratings, aspect ratios, and other common and important tire terms.

Ultra-high-performance tires, with a speed rating of V (149 mph) or Z (149 mph plus), may grip even better on wet and dry roads than ordinary performance (H-rated) tires. But they may ride more harshly, wear even more quickly, and get poor traction in snow. Some newer performance tires are rated "all-season" as well.

Automakers have good reasons for installing plain all-season tires rather than performance tires on most sedans. Low cost is an obvious priority. So is a design that rolls easily, with little resistance. That's important to automakers because of ever-tighter Corporate Average Fuel Economy (CAFE) standards, where fractions of an mpg count. But your priorities for replacement tires may be different.

If your car came with ordinary all-season or touring tires that are still serviceable, we don't recommend that you throw them out. But when it's time to replace them, performance tires could make a worthwhile upgrade—if they're available in a size that fits your car. Check with the tire dealer to make sure a different size will fit properly. Tire dealers have "fitment guides" that list permissible tire sizes for various cars.

ON THE TRACK

CONSUMER REPORTS' testing includes braking and cornering on wet and dry roads, and it factors in noise, rolling resistance, and subjective impressions of handling.

Braking. We make a series of stops from 60 mph on dry pavement and run wet-braking tests from 40 mph. We then disable the antilock brake system and repeat the wet-braking tests. Our braking tests clearly demonstrate the value of ABS as a safety factor: Tires stop significantly shorter with ABS than without on wet pavement.

Cornering grip. With each set of tires, we drive faster and faster around our skid pad, a 200-foot asphalt circle, both wet and dry. An accelerometer in the car records the sideward forces at which the tires start to skid.

Handling. These tests include many laps around our twisty mile-long handling course to give drivers a subjective feel for how the tires respond to steering.

Tire noise. We drive at a steady 30 mph, record the noise level on a digital tape recorder, and analyze the results in our audio lab.

Rolling resistance. We test how well a car can coast on the tested tires—a measure of "rolling resistance," which affects fuel economy. A tire with low rolling resistance will usually yield slightly better economy. Every little bit helps.

Tread life. We don't measure how quickly the tires wear. Such tests would be prohibitively expensive and not all that useful. Many factors—the car, the road conditions, tire pressure, your driving style—affect wear. What's more, tire makers already post a tread-wear rating on every tire (see *How To Read a Tire*). The higher the number, the longer the tread life. Those numbers provide rough guidance for tire buyers. Other factors being equal, the better the tire's grip, the softer its compound—and the lower the tread-wear rating.

HOW TO KEEP 'EM ROLLING

Give 'em air. Check pressure monthly—after the car has sat for a couple of hours, so the tires are cold. Use the pressures listed on the driver's door or in the owner's manual. Otherwise, the car may not deliver the ride and handling designed by the carmaker.

Inspect the treads. If the tread is wearing unevenly, have the car's alignment and suspension checked. A bubble in the sidewall is a blowout waiting to happen; replace the tire right away. Replace the tires when their one-

sixteenth of an inch of tread left. To check tread depth, insert a penny into the tread. If you see the top of Lincoln's head, the tire should be replaced.

Even out the wear. Rotate the tires at least every 10,000 miles. Rotation patterns vary; check the owner's manual.

Drive smoothly. High speeds, wheel-spinning acceleration, hard cornering, and panic braking reduce tire life.

Avoid hazards. If you can't straddle or steer around a pothole, brake hard—but release the pedal just before the tire drops into the pothole so it can roll through.

Shop by mail? Phone in your order, charge it to a credit card, and get the tires by UPS, usually within a few days. You have to pay a local garage to mount the tires—but even so, mail order is often cheapest. You can find mail-order ads in major car-buff magazines.

HOW TO BUY TIRE PRESSURE GAUGES

Underinflated car tires can worsen fuel economy, degrade handling, accelerate tire wear, even cause sudden tire failure. Overinflated tires harshen the ride, wear unevenly, and sometimes contribute to blowouts. With so many safety considerations riding on correct tire pressure, it pays to check your tires at least once a month. Too few motorists do. Surveys have shown that as many as half of all cars on the road have at least one tire that's seriously underinflated, by 4 pounds per square inch (psi) or more.

Don't rely on a service station's air-pump gauge. It can be wildly inaccurate and inconsistent. The only way to ensure that your tires are safely inflated is to check regularly with an accurate tire-pressure gauge. But an accurate gauge isn't always easy to come by.

PENCILS AND DIALS

The typical pencil gauge is a simple gadget. When you press the chuck at one end of the gauge against the tire's air valve, a rod-like bar with psi graduations slides out of the opposite end of the gauge. The higher the tire pressure, the farther the bar protrudes. Most of the pencil gauges we tested have a range from 10 to 50 psi. That's more than sufficient for checking standard automobile tires, although some limited-service spares require 60 psi or so.

The typical dial gauge has a housing much like a big pocket watch, with a pointer that sweeps around the dial and a short tube or a hose attached to the chuck. Dial gauges tend to have a wider range of pressures. Many can read 100 psi or more, sufficient for most bicycle tires as well as for car tires.

EASE OF USE

Gauges differ in the orientation of their chuck. On some models, the chuck is in line with the gauge. You push straight in to seat the chuck. On most models, however, the chuck is angled. The straight-chuck models were slightly more convenient to seat on deeply recessed tire valves. The angled models proved handier on valves that could be shielded by body panels.

Accidental bleeding of air is a common nuisance with tire gauges that are hard to seat tightly on a tire valve, either because they make a wobbly fit or they require a lot of effort to seal. On some of the gauges that were easiest to use, a deep collar helps guide the chuck and position it securely on the tire valve.

Pencil gauges and most dial gauges hold their reading after the gauge has been removed from the tire valve. But to read some dial gauges, you must keep the chuck pressed against the valve while you kneel or squat. And with three of those models, you have to read the scale upside down. Dial gauges with an extension hose let you bring the readings closer to your eyes while holding the chuck on the tire valve. But the need to use two hands (again, while hunched down by the tire) offsets that advantage.

All the pencil gauges have a simple bleed stem, a little projection for releasing air from overinflated tires. On most dial gauges, a bleed valve allows you to let out air while you monitor the pressure. The valve gives greater control over the release of air, but relieving pressure from a badly overinflated tire can be slow.

INFLECTING ABUSE

Since tire gauges are apt to receive rough treatment, we gave a number of models a mild sampling of what can be expected at the owners' hands: We dropped our samples from 3 feet onto a tiled concrete floor. Almost all the pencil models came through the drop test essentially unscathed. Four samples sustained cracks that impaired their accuracy. Most dial gauges suffered damage, either to their calibration or in their physical structure.

DO'S AND DON'TS

1. Check pressure once a month.
2. Check the tires when they are "cold," before you've driven.
3. Follow the car manufacturer's tire-pressure recommendations.
4. Don't exceed the pressure stamped on the tire itself.
5. Don't forget to check the spare.

HOW TO BUY JACKS, JACK STANDS, AND RAMPS

Repairing and maintaining your own car can save you money, but it can also be riskier than many do-it-yourself auto mechanics may realize. Between 1987 and 1991, at least 100 Americans who were working under a car died or were injured when the car fell on them, either because the car slipped off its temporary support or because the support itself failed. In this section, we assess the safety, effectiveness, and convenience of the three devices most favored by weekend mechanics who need to lift and support a car: hydraulic jacks, jack stands, and drive-on ramps. Jacks lift a car to provide working space underneath; jack stands support a jacked-up car; drive-on ramps both lift and support a car.

HYDRAULIC JACKS

Overview

The right way to use a jack:

- Block wheels at the unsupported end of the car.
- Don't use a device with broken, cracked, or badly rusted parts.
- Use only on firm, flat, level ground.
- Set the parking brake and put the shift lever in Park or, with a manual transmission, in gear.

The hydraulic jacks CONSUMER REPORTS tested fall into three groups.

Full-sized floor jacks are similar to those used by professional mechanics. They can squeeze under even a low-slung car and raise it quite high; they have a large, deep saddle for secure positioning under a car's jacking point; and they have steel wheels (two of them can swivel) for easy maneuvering. Their cost ranges from about \$100 to \$350.

Compact floor jacks are a junior version of the full-sized model. They fall short of their bigger siblings in lifting range, saddle size, and ease of use, but they're light enough to carry easily in a car trunk. They cost about \$40 to \$50.

Bottle jacks are little more than small, vertical hydraulic cylinders with a short handle. While floor jacks will support half a car, bottle jacks should be used on only one corner. We tested them, despite their limited usefulness, because they're prominently displayed in automotive supply outlets where floor jacks are sold. They cost as little as \$12.

Details

Hydraulic jacks work more quickly and efficiently than ordinary mechanical jacks and can generally hold more weight. Their operating principle is quite simple: Basically, fluid and different-sized pistons allow you to use a small force to raise a heavy load a small distance.

Consider several characteristics when buying a hydraulic jack:

Lift range. The minimum height determines whether you can slide the jack under a car. With the floor jacks, minimum clearance is usually no problem. When fully lowered, their saddle is only 4 to 5½ inches off the floor. You can roll them under the jacking points of most cars. Most bottle jacks, on the other hand, stand at least seven inches high in their lowest position and wouldn't fit under low-slung cars.

To get an idea of whether a jack will fit beneath your car, measure the clearance from ground to jacking point and subtract an inch or so to compensate for an irregular road surface. If you ever plan on using the jack to change a flat, you should also subtract the height of the tire's sidewall.

At the other end of a jack's range is its maximum lift—the height to which it can take a car. That helps determine the height of the jack stand you can use as a support, which in turn will determine how much maneuvering room you'll have under the car.

All but one of the tested full-sized floor jacks could raise loads to at least 19 inches, high enough for use with just about any jack stand at its highest position—and high enough to give you quite a bit of clearance. The compact floor jacks, however, top out at about 15 inches, and the bottle jacks generally reach their peak at 13 to 14 inches.

Maximum load. Most of the hydraulic jacks we tested have a maximum load, set by their manufacturer, of at least two tons. That's more than enough to lift one end of the vast majority of cars on the road. Even an old 2½-ton gas guzzler with 60% of its weight up front presents only a 1½-ton load when its front end is lifted. One bottle jack is

rated at 1½ tons, but that load is unlikely to be exceeded, since bottle jacks should be used to lift only one corner of a car at a time.

In our tests, all the jacks held at least three tons—much more than their rated load. When we used a special stress/strain machine to burden the floor jacks still further, five were rendered useless, and four were temporarily compressed. When the jack stands and ramps were overloaded, all supported at least twice as much as their maker claimed. Manufacturers warn sternly against such overloading, and we concur, but if a jack stand slipped while the jack was left in place as a backup, the falling car might strain the jack beyond its rated capacity.

Ease of use. The greater a jack's lift per handle stroke, of course, the faster you can raise a car. We started the floor jacks off at their lowest height and counted the strokes required to reach 13 inches.

It took about 10 pumps of most full-sized floor jacks to raise the saddle to 13 inches (the Lincoln W93642 required fewer strokes). The same job took most compact models about 30 strokes. The bottle jacks start at a higher minimum height and have an extension screw that's operated manually, so it's hard to compare them with the other models. But it's safe to say that anyone using a bottle jack to lift a car could easily lose count of the strokes before job's end.

Obviously, though, the ease of jacking up a car should be measured not only by the strokes taken but also by the effort needed for each stroke. A push/pull gauge positioned at the handle grip of each jack registered the effort required to lift 1½ tons. The readings ranged from 60 to 135 pounds. Usually the more lift per stroke, the greater the effort required.

Reach, the distance from the end of a jack's handle to the center of its saddle, also affects ease of use. A long reach helps you position the jack under a car. And since the handle sticks out farther from the car, it's easier to pump with full strokes.

The 56- to 71-inch reach of the full-sized floor jacks is quite generous. The 34- to 37-inch reach of the compact models is barely adequate when you need to slide the jack far under the car. However, it seems positively expansive compared with the skimpy range of action permitted by bottle jacks. Most have a reach of only 9 to 14 inches. The Lincoln W93225 has a substantially longer reach than the other bottle jacks, at 20 inches, but that's still too short to help much.

All the floor jacks were easy to roll back and forth and from side to side. But there's more to maneuvering a floor jack than rolling it somewhere under the car's jacking point. You have to position it precisely, and you can't be sure that you're right on the mark until you start raising the saddle, which rises in an arc.

The full-sized models make it relatively easy to find the right spot. You simply tighten a release valve with a twist of the handle and begin to pump—making small rolling adjustments, if needed, as the saddle rises. With the compact floor models, however, you must remove the handle from its regular socket, tighten the release valve, then put the handle back in its socket before you can start pumping. If the rising saddle isn't making good contact with the jacking point, you have to repeat the whole process.

Bottle jacks are small and light, so they're easy to plant under the car, if there's enough clearance. Positioning them under the jacking point is easy, too, since they rise straight up. But that assumes there's room to pump with full strokes and, further, that you can trust the jacking point to hold steady on the jack's tiny saddle.

To lower a jack, you loosen its release valve. That's easiest with the full-sized floor jacks, which don't make you reposition the handle.

Safety. All the tested floor jacks have a bypass valve designed to prevent them from lifting a load greater than their rated capacity. When the weight reaches that limit, the bypass valve is supposed to reroute hydraulic fluid to the system's reservoir, thus preventing the saddle from rising further. All the valves worked well, cutting in to relieve pressure within a few hundred pounds of each jack's rated capacity.

The full-sized floor jacks have a large (about 5½-inch-wide), deep saddle with raised tabs around the edges. It's big enough to form a firm base for a car's frame, and the tabs help ensure that the jacking point won't slip off. The saddle of the compact jacks is smaller (less than three inches wide) and shallower, but it offers fairly good security.

By comparison, the saddle of the bottle jacks looks downright scary. It's not much bigger around than a quarter and is just about as flat, with only grooves or dimples to keep it from sliding out of place. You should feel secure with such a small support area only if the car's jacking point is level and the pavement flat and even. Unlike floor jacks, with their relatively wide stance spread over four wheels, bottle jacks have a small footprint that increases the possibility of tipping.

JACK STANDS

Overview Jack stands, sold in pairs, should be used to support a vehicle raised with a jack. They can be locked

mechanically to remain at any of several heights. The most significant difference among models lies in how they're raised. Most employ a convenient ratchet mechanism, but you must position some models by fitting a pin through aligned holes. Most stands cost \$50 or less per pair.

Details

No matter how good your jack, you shouldn't bet your life on its support alone while you're working near or under a car. Once the car is jacked up, support it with jack stands. Even some ramp manufacturers recommend stands as a backup. That may be overkill, but it's smart to use a belt-and-suspenders approach when you're under 1½ tons of steel.

We tested stands that ratchet their way upward by means of grooves in their column and those that are held in place by a steel pin you insert through holes in the base and column. The ratcheting stands offer 6 to 11 height settings; the pin-type stands offer 5.

Maximum load. The tested models are supposed to support from 2 to 3 tons each, so a pair should support from 4 to 6 tons. Given those credentials, even the stands with the lightest claimed load should hold up a behemoth of a car. Indeed, our stress/strain machine revealed that all the stands could safely support at least twice their rated load.

Ease of use. Ratcheting stands are clearly the easier type to adjust. Once the car is jacked up and the stand placed under the frame, you merely lift the column as high as you'd like. When you let go, it will automatically lock into place at the nearest lower position. The procedure requires one hand and a minimum of coordination.

With a pin-type stand, you lift the column with one hand, make sure the hole in the base lines up with the appropriate hole in the column, then use the other hand to insert the locking pin through the aligned holes (with the Petersen 30-1040, you insert a U-shaped pin through a pair of aligned holes). Once a car is supported, neither type of stand can be made to drop it. To lower the car, you jack the car back up a bit, slip out the stand, and operate the jack's release valve.

Safety. Most jack-stand saddles are winglike, with a depression down the middle that helps to center the load. The ends of the wings usually have tabs to keep the car from slipping off. There are exceptions, however. The saddle on the Tru-Cut JS6000 provides virtually no centering or containment, the U-shaped channel in the saddle of the Tru-Cut RJS25 is narrow and has no provision for centering, and the saddle of the Petersen 30-1040 is basically flat.

To see what would happen if you failed to align the car's contact point with the center of the saddle, we employed our stress/strain machine again, applying each stand's rated load to the edge of the saddle at its lowest and highest setting. All the stands kept a firm stance, with no tilting or bending.

Jack stands usually have some provision to prevent the column from coming all the way out of the base. With pin-type models, you use the pin to keep column and base together. A tab or pin keeps the column of most ratcheting stands from ever coming loose. But if you lift the Tru-Cut RJS25 by its column, the base will drop off. Be careful when lifting the aptly named Tru-Cut JS6000 for another reason: The two samples we bought had such sharp edges they could cause cuts.

As stable as the jack-stand bases were on hard, level surfaces, most had legs that would dig into soft surfaces like warm asphalt. A sinking stand could not only damage a driveway; it could shift the load and maybe even fall. The stands least likely to sink are the Petersen 30-1040, whose legs are connected with flat pieces of metal, and the Lincoln W93505, with a triangular section of metal at the bottom of each leg. To make any jack stand more stable and less apt to gouge soft surfaces, put a board under its legs.

DRIVE-ON RAMPS

Overview With ramps, you simply drive onto a perforated or bumpy incline, letting the car lift itself, in effect. Ramps must be used in pairs. Some ramps are one-piece; some, two. With a two-piece ramp, you can remove the incline section once the tires have climbed it. That gives you greater access under the car. However, cars with low ground clearance, a long overhang, or especially wide tires may not be able to ascend ramps at all. And ramps limit the kind of work you can do: You won't be able to do any work that requires removing the wheels. Ramps cost between about \$25 and \$50 a pair.

Details

Auto ramps do what jacks and stands do, but with less effort and often for less money. Not all cars can climb all ramps. And although ramps let you change the oil and work on the exhaust system, they won't, of course, let you do any chores that involve removing a wheel. We tested six ramps, costing from \$25 to \$50 a pair. Four models are one-piece; two are two-piece.

Dimensions, maximum load. The width of the track on the tested ramps ranged from 7¾ to 9½ inches. That

means some of the ramps would be too narrow for extra-wide tires. (A ramp should be at least an inch wider than your tires.) The height of the ramps ranged from 7¼ to 9½ inches. Ordinarily, the higher the better. But as it happened, the highest ramp, the Tru-Cut URB9000, also had the steepest incline, 27°. A steep incline can allow the front end of some cars to bump against the ramps before the tires can start to climb. If that happens, the car simply pushes the ramps around.

To see how compatible the ramps would be with various vehicles, we checked the clearance of more than 100 cars belonging to CONSUMER REPORTS staffers. About three-quarters of the cars didn't have sufficient clearance to climb the Tru-Cut. Even the ramp with the gentlest incline, 18°, was too steep for a quarter of the cars we surveyed. When such incompatibility occurs, you can effectively increase your car's clearance by putting a board—about 2 inches thick and a foot wide, and at least a foot long—in front of each ramp. That way, the tires mount the boards before they're forced to tackle the steeper incline.

When loaded to twice their rated capacity—that is, to between four and six tons per pair of ramps—no ramps showed any sign of damage.

Ease of use. Driving any car up a pair of ramps takes a bit of practice, and the difficulty varies from car to car. To see how easy it is to climb each set of ramps and stop in the right spot, we used two cars: a small front-wheel-drive sedan and a large rear-wheel-drive station wagon.

When the ramps were resting on rough pavement, both cars climbed all of them readily. But on a smooth surface of painted concrete, the large car had problems; most ramps tended to slide and get nudged along. Only the Sears 50122 and the Petersen 30-2310, which have rubber feet, stood their ground sufficiently. (Some of the feet fell off during harsh tests, but that didn't affect performance.)

A Hard Climb

A car with a low front end will often hit steep ramps near the top of the incline, then nudge them around.

In another test, we sprayed the ramps with water to reduce traction. All the ramps have perforations, bumps, and the like, intended to increase traction between tire and ramp. Even so, when we tried to drive up their wetted slopes with our test cars (forward with the front wheels of the small car and backward with the rear wheels of the large car), we usually couldn't do it from a standing start; the wheels spun too much. The only way to get up most of the ramps was to take a running start—a somewhat chancy business that we don't recommend. A more sensible approach: Make sure ramps and tires are free of water, grease, and oil before you drive up.

Not long after you've figured out how much throttle will take you up a ramp, you encounter the equally delicate proposition of determining exactly when to stop. All the tested ramps have some sort of tire "stop" meant to let the driver know that the car's wheels have gone as far as they should.

The Tru-Cut URB9000 has a stop that looks subtle but worked best in our tests. There's an initial hump at the top of the incline; after that, the platform bellies down slightly, then rises more and more steeply toward the front. Once a car has rolled over the hump, the driver has a comforting sense that the wheels want to settle in the shallow hollow of the platform.

The Petersen 30-2310 gives a driver little sense of where the car is on the platform. You can't determine when you've reached the top of the incline; the platform is flat, and despite the square-shouldered stop at the platform's end, the tires won't always tell you when you're there. The Petersen 30-2310 is also the only model that doesn't have a slope or bump at the beginning of the platform to prevent the car from rolling back down.

Safety. Although a very heavy car could conceivably squash a poorly made ramp, that didn't happen in our tests. Nevertheless, there are other ways in which ramps could let a car down. If the car were driven a little too far, it could tip the ramps forward and roll right off. A second scenario: Tires running on the sides of misaligned ramps might flip the ramps inward or outward. We examined the tested ramps for their resistance to tipping and flipping. Two of the larger models, the Sears 50122 and Tru-Cut URB9000, proved quite stable. But the fairly large Petersen 30-2310 started to tip forward as our tires hit the stops. When we misaligned a pair of the Petersens so that one tire rode on the edge of one ramp, the ramp flipped inward and was ruined. No other ramp misbehaved so readily when conditions weren't just right.

CONSUMER REPORTS RECOMMENDATIONS

An ambitious amateur mechanic is likely to need the extra under-car space provided by a hydraulic jack or ramps, as well as the security offered by jack stands.

The Lincoln W93642 (\$382), was the best full-sized floor jacks we tested. (Other models tested have since been discontinued.) Compact floor jacks aren't quite as versatile as full-sized jacks, but they're lighter and less expensive. Best by a small margin was the Custom Accessories 58887 (\$35). We're loath to recommend any bottle jack: They're

hard to use and may not fit under a low car or one with a flat tire.

All the jack stands had plenty of strength, but the ratcheting stands were far easier to use than the pin-type models. The Lincoln W93505 (\$93 per pair) was top-rated.

Drive-on ramps limit the work you can do, but they're a quick and relatively inexpensive way to raise and support a car. All the tested models proved strong enough for even a heavy car. The Sears 50122 (\$50 per pair) was our favorite; it proved especially stable.

HOW TO BUY AUTO POLISHES AND WAXES

The none-too-attractive chore of hosing down a car, washing it, drying it, applying a coat of wax and methodically buffing every square inch can forestall the day your car loses its showroom glow and succumbs to sun, ice, salt, tree sap and other environmental assaults.

Consumers spend some \$200 million yearly for products interchangeably labeled waxes, polishes and sealants. Most of the waxes are one-step formulations: A single application is supposed to remove embedded dirt that washing hasn't taken care of, smooth and shine the surface, and protect the paint. Most are designed for use on both the conventional finishes typical of older cars and the thinner, softer, clear-coat finishes found on many vehicles made since the early 1980s.

Whatever a wax's formula, its most important job is to make the paint's finish glossier. Wax should also be long lasting, shielding the paint from dirt and the elements for months. It should be easy to apply and buff away, without leaving a streaky residue or haze, and it should firmly but gently clean the paint.

PANEL TESTS

CONSUMER REPORTS could have tested the products by waxing hundreds of cars, but different cars' surfaces vary too much to guarantee comparable results. Instead, much of our testing took place on hundreds of standard black painted metal panels ordered from a laboratory that supplies the automotive industry. To cover the range of paints available, we bought some panels with a conventional finish and others with a clear-coat finish. We used black panels because their mirrorlike gloss brought out the effects of polish and made haze and scratches stand out clearly.

Gloss. Using a laboratory device called a Weather-Ometer, we simulated the sunshine, temperature, and humidity typical of a hot day in Miami and let some panels "weather" heavily, others moderately. We left the rest of the panels in their original, "new car" state. After waxing, we asked viewers to assess the panels' gloss. (We also took lab measurements of gloss, which tended to corroborate viewers' judgments but also showed small differences human eyes couldn't see.)

Most waxes modestly improved the gloss of weathered panels. Meguiar's liquid proved best of all, while Prism Spray Away did little to improve gloss. No product made the new-car panels even glossier, and some actually made their fresh paint look worse. Products in the second Ratings group left mild abrasions, haze, or both. Abrasive products can be useful in shining up old, oxidized paint; before you use them on nearly new paint, test them in an inconspicuous place such as the inside of the hood.

Durability. Many variables, including where you live and where you park, can affect how often you'll need to wax. Judging by our tests, though, most cars need to be waxed more than three times a year, the schedule usually recommended.

We waxed weathered panels, then subjected them to wash-and-weather cycles, the washing with a wax-free car detergent, the weathering on the roof of the CONSUMER REPORTS' headquarters. After some 42 days of exposure and over a dozen washings, more than three-quarters of the panels had lost a significant amount of wax.

Ease of use. Wax is usually applied with a soft cotton rag or foam pad; some products come with an applicator. You generally wait until the wax residue dries to a haze on the car, then buff it away with a clean rag. A few waxes are meant to be buffed while wet.

To see how easy each wax was to use, we needed the nooks, crannies and expansive surfaces of real cars, so we called on CONSUMER REPORTS' staffers to volunteer their vehicles. We selected more than 30 cars of various ages, makes, models, colors and paint condition, then waxed each car with a variety of products.

All the liquid waxes were easy to apply. The pastes were generally a bit harder to work with, but because most are presoftened, they didn't require as much muscle as did the old-fashioned rock-solid cakes of wax.

Removing all evidence of some waxes during the final stages of testing proved difficult. Although Prism Spray Away supposedly comes off with a jet from the garden hose, even a strong blast of water didn't remove all the wax; we either had to let the car air-dry completely and then buff it, or use a towel to wipe off both water and residue.

Cleaning. As a car ages, its finish oxidizes to a point where washing alone can't revitalize it. A good wax has enough muscle to restore the finish but is gentle enough not to harm the underlying paint. Gentleness is especially important with a clear-coat finish. Although car waxes used to contain mechanical abrasives like pumice, which would literally scrub off stains (and a bit of the paint), most now rely on solvents.

Most of the tested waxes were easily strong enough. When we waxed three dirty, weathered white cars, the best waxes cleaned as well as an effective polishing compound, and a host of others were almost as good. Only Prism Spray Away barely budged dirt.

To see whether wax would keep tough stains from penetrating the finish, we waxed test panels, soiled them with road tar and tree sap, left them outside for several days, then washed with detergent. The sap came off easily in all cases. The tar left permanent stains on all of our panels. It's best to try to remove any stains as soon as possible.

None of the waxes prevented rust from forming on a scratch that went down to the metal. We also sprayed waxed panels with simulated acid rain, prevalent in some regions because of air pollution. No wax proved a barrier to the discolored water spots and etching caused by our "rain." Unless you can park the car in a garage or carport, acid-rain damage is something you may have to live with. (Some carmakers say their paint resists acid rain, but we haven't tested those claims.)

Most waxes come with a warning not to apply them to plastic moldings and trim, but what if your hand slips? Almost half of the products stained plastic with a noticeable residue we couldn't easily remove. On the other hand, Liquid Lustre, which claimed that any residue left on plastic could be easily removed, was true to its word.

COLORFUL AND COSTLY WAXES

In preparing this report, CONSUMER REPORTS' shoppers rounded up three relatively new products, liquid "color" waxes called Color Magic, Color Match and Colorcote 2000. All leave behind a dye that supposedly masks minor scratches, nicks, and chips in a car's finish. They come in eight, nine, and 15 colors, respectively. A 16-ounce container of Color Magic or Colorcote 2000 costs \$5 or so, and 8 ounces of Color Match costs about \$6.

Despite the boasts of their manufacturers, such as "makes scratches . . . disappear like magic," "a paint job in a bottle," and so on, these products generally performed no better than many standard waxes when it came to gloss and durability. Color Magic, the best of the lot overall, would have come out in the middle of the Ratings. Worst was Colorcote (but it changed its formula after we tested).

Although colored waxes did make minor scratches less obvious on dark-colored cars than did plain waxes (which usually dry white), we see little point in buying them. A high-rated regular wax works better, touch-up paint protects a deeply scratched finish better, and a good polishing compound can fix slight scratches more effectively. Fixing serious scratches can be tricky in any case and is best left to an auto-body expert.

The colored waxes had another drawback: They were messy to use. It was hard to follow the manufacturers' suggestion that they be kept off skin and clothes. When they got on our testers' skin, all three products stained. It took repeated, vigorous soap-and-water washings to remove them.

CONSUMER REPORTS' shoppers also sent us a couple of fancy car waxes, the kind owners of expensive cars may favor. Klasse All-in-one liquid claims it's not abrasive and that it protects with an "elastic, non-chip, shrink-proof, heat, and scratch resistant acrylic finish." Zymöl paste says it's solvent-free, with all-natural oils and extracts and high concentrations of natural carnauba wax—too pricey for most car polishes. It comes in special formulations matched to the car's color, make, or national origin. For a few thousand dollars, Zymöl's manufacturer will even tailor a one-of-a-kind formulation to the car of your choice, basing the wax on such variables as paint thickness and what's under the paint.

When we ran both products through our tests, both were impressive overall. Both gave car finishes a superior gloss. Both improved the look of weathered panels more than any tested wax but the top-rated Meguiar's. And both were so expensive (you'll pay more than \$20 for 17 ounces of Klasse and \$40 for 8 ounces of Zymöl, plus \$20 for a Zymöl "pre-cleaner") that we'd suggest using a good regular wax instead.

CONSUMER REPORTS RECOMMENDATIONS For gloss and easy application, try top-rated Meguiar's Cleaner Wax Liquid (\$5.38 for 16 ounces) or Turtle Wax Carnauba (\$4.99 for 14 ounces). Although fourth-rated Nu Finish Liquid (\$5.27 for 16 ounces) was especially easy to apply, it earned a mediocre score for gloss.

If you hate to wax and won't do it often, consider Nu Finish Soft Paste (\$5.97 for 14 ounces), which earned top marks for durability and cleaning. Like its liquid brandmate, however, it left a weathered finish slightly less glossy than some of the other products.

If the car is new and water still beads on its finish, you may not need to wax at all. Simply wash the car regularly. Once you begin to wax, look to the high-rated products in the first Ratings group and avoid products in the second tier. They left mild abrasions or haze.

If the car's finish is weathered, it's safe to look also among that second tier of slightly abrasive products. The best currently available was Simoniz Super Blue Soft. Note that if you wash your car regularly and its paint is clean, you shouldn't need an abrasive wax.

Most of the waxes guarantee satisfaction or a full refund.

One caveat: Waxing the car is no substitute for regular washing, which is vital to keeping up a car's looks.

HOW TO READ A BATTERY

Like perishable food, batteries have a limited shelf life. Unlike most food, though, batteries that are fresh are hard to tell from ones you shouldn't buy—that is, ones more than six months old. That's because battery manufacturers encode the date each battery is manufactured.

The information you need is either printed on a sticker attached to the battery or stamped on the battery case. Though the code may contain a string of letters and numbers, only the first two characters are important.

Here's how to crack the code:

- Virtually all brands except Douglas start the code with a letter that represents the month of manufacture: **A** for January, **B** for February, and so on. Next comes a digit for the year—**5** for 1995, and so on. So **H5** stands for August 1995; a battery with **C5** was made in March 1995, and is by now too old to buy. Some codes skip the letter **I**, so **J** would represent September.
- Douglas batteries have a two-digit number for the month; 501 means January 1995; 412 means December 1994. Their codes are on the environmental label.

HOW TO READ A TIRE

The U.S. Department of Transportation requires tire manufacturers to provide a wealth of information on the sidewall of every tire. Here is a guide to deciphering the most important items.

Load index and speed rating. In the illustration, the “87” is a code that indicates the maximum weight the tire can carry at its maximum rated speed—not useful for most people. The “S” is one of several possible speed ratings, referring to the maximum speed a tire can sustain for an indefinite period. More than anything else, speed ratings indicate how well a tire resists overheating. Common speed ratings include S, which means a maximum of 112 mph; T, 118 mph; H, 130 mph; V, 149 mph; Z, 149 mph or more. Some tires, usually ordinary all-season radials (what most people buy), are not speed-rated at all.

Maximum load and pressure. The tire in the illustration can support 1201 pounds. And it should be inflated to no more than 35 pounds per square inch.

Tire size and aspect ratio. A “P” preceding the numbers indicates a passenger tire. (An “LT” would mean light truck; some passenger-car tires have no vehicle designation.) The “185” is the cross-sectional width of the tire in millimeters. The “70” is the aspect ratio, the ratio of the sidewall's height to the cross-section width. The height of this tire's sidewall is 70% of the tire's width. The R stands for radial. The “14” is the wheel rim's diameter, in inches.

Tread-wear rating. The government specifies tests in which tire makers rate the tread life of each tire against a “reference” tire graded at 100. In our example, the tread-wear rating of 420 indicates a tire that theoretically should last 4.2 times as long as the reference tire. A tread-wear index below 180 is quite low; an index of 500 would be quite high.

The tread-wear rating system has been criticized, with some justification, because the tire manufacturers conduct the tests without outside verification. Flawed though it may be, the tread-wear index is currently the only guide to tread life.

Date of manufacture. Embossed on every tire sidewall is a DOT serial number that includes a code identifying the place of manufacture. The last three digits are the date the tire was made. In our example, “054” indicates the 5th week of 1994.

Traction and temperature. The government specifies test protocols for traction and resistance to high temperatures on a scale of A to C, with A being the best. The tests are undemanding. Most tires score either A or B in each category.

SAFE DRIVING TIPS

As the bumper sticker says, safe driving is no accident. Long-term highway survival requires more than luck; it requires skill, judgment, courtesy, patience, quick reflexes, and knowledge of the rules of the road. Driving is a nearly universal activity in the United States, but *good* driving is far from universal. That's one reason more than 40,000 people die each year in highway accidents.

You've heard plenty of advice about how to drive. CONSUMER REPORTS' list of do's and don'ts includes some ideas you may not have heard before.

Leave your hostility out of the car. If you're feeling angry at something or someone, get someone else to do the driving, or take a bus.

When in doubt, chicken out. If you think that you can beat a red light, or that you have time to merge onto a highway or pass another car—but you're not sure—take the timid option.

Keep your car working properly. That includes: headlights (correctly aimed, all working) and other lights (no burned-out bulbs), tires (properly inflated, adequate tread), fluids (oil, coolant, brake and steering fluid, windshield-washer fluid—all at proper level), safety belts (operating smoothly), mirrors (properly positioned, not obscured), windows (clean, not cracked).

Know your car's limitations. If you drive a van or other high-profile vehicle, you're especially vulnerable to crosswinds. A low-powered car needs extra time to pass another car. A rear-wheel-drive vehicle behaves differently on slippery roads than one with front-wheel drive. The procedure for stopping a car with antilock brakes is different from that for a car without that feature.

Know your own limitations. If you're tired, you can't react as fast as when you're fully alert. Older drivers need longer to react to emergencies than younger ones. If you have trouble seeing at night, avoid driving then.

Use your car's safety equipment. Always wear safety belts, whether or not your vehicle has airbags. Adjust head restraints so they support the back of the head, not the neck. Know the proper use for your emergency flashers; in some states, it's legal to use them while moving, but in others they're only for stopped vehicles.

Be visible. If you don't have a white or brightly colored car, it's especially important to use your headlights when the time of day or weather reduces visibility. A good practice is to use headlights whenever you use your windshield wipers.

Don't provoke other drivers. Someone driving too slowly in the passing lane? Don't tailgate; wait for an opportunity to pass safely. And don't you be the one to obstruct the passing lane; it's against the law in many states.

Avoid dangerous drivers. If you encounter someone who's driving unsafely—speeding, weaving in and out of lanes, tailgating, passing where it's not permitted—steer clear. It's not up to you to teach that person a lesson. The farther you stay from unsafe drivers, the less your chances of becoming one of their victims.

Drive aware. Get in the habit of periodically checking your rear- and side-view mirrors and looking out the windows so you know what's around you. If you have to take sudden evasive action by steering into another lane or making a hard stop, you should know whether you're clear of other cars.

Adjust for conditions. If the road is slippery—from snow, ice, or rain—you'll have to drive slower and allow more space for sudden stops. Reduced visibility at night or in bad weather calls for slower speeds and greater caution. A fully loaded car can't maneuver out of danger as nimbly as one with just the driver on board.

Expect the worst. If you keep an eye out for other drivers and anticipate that they'll do exactly the wrong thing, you'll be ready to take the required protective action. For example, expect that car waiting on the highway entrance ramp to pull out right in front of you; make sure you have an escape plan when it does.

CHOOSING A SAFE CAR

In the past 15 years, U.S. highways have become safer than ever. Important safety features such as air bags and antilock brakes are becoming available in more and more new cars. More drivers and passengers than ever are buckling up. Use of safety belts has increased to about 67% nationwide. Stiffer laws, and stiffer enforcement, are reducing drunk driving. The result: While more than 50,000 people died in traffic accidents in 1980, the toll dropped to about 39,000 by 1992, even though more cars were driving more miles.

Unfortunately, the death toll shows signs of climbing again. It's estimated that 41,000 people died last year. In part, that's because an improving economy has encouraged more driving. But it may also reflect the fact that a few states have raised the speed limit on interstate highways from 55 mph to 65 mph in recent years. With the current antiregulatory mood in Washington, things may get worse. For example, states that fail to phase in regulations requiring the use of safety belts currently face a loss of federal highway funds. But Scott Klug, a Republican representative from Wisconsin, recently introduced a bill to eliminate such federal mandates.

The automakers, for their part, have dragged their feet on safety. Air bags are a case in point: For years, automakers insisted they couldn't mass-produce affordable air bags that worked reliably. But when car buyers began to demand cars with air bags, the automakers quickly learned to make affordable, reliable air bags.

WHAT TO LOOK FOR

Until the government and auto industry take a more enlightened view of safety, the best way for car buyers to protect themselves is to look for models with up-to-date safety equipment and design.

Air bags. Used with safety belts, air bags are among the most effective safety devices. They inflate instantly in a frontal collision, spreading crash forces over a large area. They don't protect in a side or rear crash or a rollover; that's where safety belts come in. But frontal impacts account for more than half of all traffic fatalities.

Almost all the 1996 models have at least a driver's-side air bag as standard equipment. Many have a passenger's-side air bag as well. Note: Don't place a rear-facing infant carrier in the front seat of a car equipped with an air bag. If the air bag deploys, it could seriously injure the infant.

Antilock-brake system. A highly effective safety feature, ABS offers two major benefits: It stops the car shorter on most slippery surfaces, and it lets you maintain steering control while braking. (A few models offer ABS only on the rear wheels, much less effective than four-wheels ABS.)

In two studies of collision claims by the Insurance Institute for Highway Safety (IIHS), an insurance-industry organization, cars with ABS seemed to fare no better than cars without. One reason for those surprising results is that ABS simply isn't a factor in some collisions. The IIHS didn't separate out side and rear collisions, or collisions in which the driver never used the brakes. Also, some drivers may expect too much from ABS. No brakes, whether ABS or conventional, can stop a car short on glare ice. Another possible reason is that drivers may not know how to use ABS. The old advice about pumping the brake pedal on a slippery surface doesn't hold with ABS. You step on the pedal firmly, without letting up, even when the pedal starts to vibrate rapidly, which is normal for ABS.

The benefits of ABS show up somewhat more clearly in a recent study by the National Highway Traffic Safety Administration. According to the agency's preliminary report, ABS in cars reduced pedestrian and bicycle fatalities by 27%. And on wet roads, ABS reduced fatal multiple-vehicle accidents by 24%. But there's an anomaly: Cars with ABS were involved in 28% more fatal accidents in which the car ran off the road.

Obviously, more and better studies of ABS are needed. Meanwhile, we remain convinced that ABS is highly effective and worthwhile. Availability is mixed.

Traction control. This feature is supposed to prevent the wheels from spinning and losing traction if you step on the accelerator too hard. Traction control is nice to have in a front-wheel-drive car, and especially useful with rear-wheel drive, which can be touchy on slippery roads.

The low-speed traction control in some cars is effective only up to about 25 mph. When it senses that a wheel is just starting to spin, it automatically applies the brake on that wheel to slow it down. All-speed traction control, as its name implies, works at any speed. When it senses imminent wheel spin, it automatically applies the brakes, reduces engine power, or shifts the automatic transmission into a higher gear, or all three. It not only helps you get started on a slippery road, it also helps prevent you from spinning a wheel while cornering, and possibly losing traction and skidding.

If you're not sure which type of traction control a car has, check the owner's manual.

Safety belts. The presence of an air bag doesn't mean you can neglect to buckle up. A safety belt holds you in position so the air bag can do its job properly. Also, a safety belt can protect you in the kinds of accidents where an

air bag isn't effective.

A few awkward, dated belt designs still linger. One is the annoying motorized shoulder belt, which slides across your chest when you close the door. When the shoulder belt is in place, it's easy to forget to buckle the manual lap belt. Another type anchors the shoulder-and-lap strap to the door. Both designs have safety problems: If the door flies open in an accident, you could be thrown from the car.

Built-in child restraints. Some models offer built-in child safety seats. Such seats have one important advantage: They're always installed properly. (Surveys indicate that many people install and use removable child restraints improperly.)

WHEN CARS CRUMPLE

In a crash, a car's body should crumple at a controlled rate, absorbing crash energy while leaving the cabin intact. The only reliable way to find out how well a car does that is to crash-test it.

Traffic safety has long been the purview of the National Highway Traffic Safety Administration (NHTSA). Since frontal impacts account for more than half of all traffic fatalities, the NHTSA focuses on those by running two series of front-end crash tests.

In one series, a car is crashed head-on into a rigid, flat barrier at 30 mph while instrumented driver and passenger dummies record the crash forces. If the car has manual safety belts, they remain unbuckled. All car models must pass that test. To pass, the car must not subject the dummies to forces above a certain threshold on the head, chest and upper legs. Automakers crash their own cars and then certify to the government that all their cars would pass the test. The government spot-checks by crashing 30 to 40 cars each year. Nearly every car passes the spot checks. A recent notable exception was the BMW 3-Series, from 1993 to early 1995. Those cars have since been recalled for modification.

The second series of government tests involves crashing about 35 cars a year under the New Car Assessment Program (NCAP). Again, the cars run head-on into a rigid, flat barrier, but this time at 35 mph, with the dummies belted in. That test is about one-third more severe than the 30-mph test because crash severity increases exponentially with speed. New cars aren't required to pass the NCAP test, as it's intended primarily to inform car buyers. You can call the NHTSA hotline at 800-424-9393 for test results, or check the crash protection scores in the profiles of The Cars on this disc.

Many safety experts credit the NCAP program with effectively shaming the automakers into making cars more crashworthy. Despite Detroit's constant complaints about the tests, the crashworthiness scores of U.S. cars have improved dramatically in the 15 years since the government started publicizing the test results. Not that the NCAP test is all-revealing. It indicates only what happens to a car's occupants in a specifically defined full-frontal crash. It says little about a car's ability to protect occupants in a crash that's off center, or at an angle, or broadside, or from the rear. Also, the test simulates a crash between two vehicles of similar size and weight, each approaching at 35 mph. A small car that does well in the NCAP test might do considerably worse in a crash with a heavier vehicle.

Nevertheless, an NHTSA study of nearly 400 fatal head-on crashes seems to confirm NCAP's value. Models that did well in the NCAP tests had a significantly lower actual fatality rate than models that did poorly. These days, nearly all new cars score at least reasonably well in the NCAP test. Only sport-utility vehicles, as a class, still fare poorly. The newly redesigned Chevrolet Blazer, for example, not only inflicted a lethal "injury" on the passenger dummy, but its fuel tank ripped open and dumped its contents onto the pavement.

T-BONE CRASHES

In a front or rear impact, body panels have considerable room to crumple and absorb the energy of a crash before infringing on the occupants. That's not the case in side impacts. Such crashes are the second most lethal type of accident, killing about 9000 people last year.

The government is finally phasing in a useful side-impact standard that requires the car's entire structure, from floor to roof, to be reinforced. In this test, known as Standard 214, a moving, wedge-shaped barrier hits the side of a stopped car. The test simulates a crash in which a car traveling at 15 mph is broadsided by another going 30 mph. Instrumented dummies must "survive" the collision. This year, 25% of each manufacturer's new cars must meet the standard. By the 1997 model year, all new cars will have to comply. For models that don't yet meet the standard, some automakers seem quite willing to confuse the issue by hyping "side door beams." All passenger cars have been required to have side door beams for years.

Standard 214 is a good test, but it could be better. The NHTSA had initially planned a more severe side-impact test, on the order of the frontal NCAP tests, with published results but no government mandate. Not surprisingly, the automakers opposed it. Two years ago, the House Transportation Committee caved in to the automakers and killed the funding for the project, even though the price tag for that important safety measure was a mere \$600,000 a year.

Unfortunately, the government still allows the automakers to pretend that so-called light trucks, minivans, pickups and sport-utility vehicles, aren't really passenger cars. Standard 214 won't apply to those vehicles for years to come.

TOUGH CRASH TESTS ON POPULAR SEDANS

Up to now, the only information on how cars behave in a collision has come from the National Highway Traffic Safety Administration (NHTSA), which has been crash-testing cars since 1979. But this year, the Insurance Institute For Highway Safety (IIHS) staged a different, and in many ways tougher, series of crash-tests on 14 sedans.

The government and IIHS tests complement each other. Here's how they differ: The government crashes cars into a rigid barrier, so the car absorbs all the crash forces. The IIHS used a honeycomb barrier that crushes, absorbing some of the crash forces just as one car does when it hits another. The government crashes cars at 35 mph. The IIHS ran its test at 40 mph. The government crashes its cars head-on into the barrier. The IIHS staged offset-barrier crashes. Only the left side of the car, 40% of the front end, hits the barrier. Since an offset crash concentrates the crash forces over a smaller frontal area, it's an especially severe test of a car's ability to crush progressively without intruding on passenger space. A full-frontal crash puts more emphasis on the car's air bags and safety belts.

The IIHS graded the sedans largely on these factors:

Structure. The most important scoring factor. A car's structure should absorb crash energy effectively, without severely deforming the passenger compartment. But in some cars, the dashboard was pushed back considerably, the doors jammed shut, or the floor panel or center console buckled, trapping the driver dummy's feet or legs.

Restraints. How well the safety belt and air bag controlled the driver dummy's movement and prevented contact with hard interior surfaces.

Injury measurements. Analysis of the forces recorded by instruments on the test dummy's head, neck, chest, legs, and feet, estimating the severity of the "injuries."

If it has not already, the IIHS plans to crash-test the redesigned 1996 Ford Taurus soon, with other models to follow. CONSUMER REPORTS has long urged the NHTSA to add similar tests to its schedule.

EMERGENCY EQUIPMENT: TROUBLE ON THE ROAD

A flat tire or a breakdown that sidelines your car puts you in harm's way. According to the National Highway Traffic Safety Administration, more than 400 people died in 1990 when motorists plowed into parked vehicles. No doubt some of those cars had been parked because of trouble on the road. An average driver approaching your car at 60 mph needs at least 200 feet to stop. That's more than the effective range of most cars' emergency flashers. If a hill or curve conceals your presence, the margin of safety may be even smaller. Thus, some sort of auxiliary warning device should be standard gear in every car.

TRIANGLE REFLECTORS: BEST CHOICE Compared with emergency flares or warning lights, triangles have several advantages: They're reusable and they don't require electrical power. You can place them hundreds of feet from the car. And they can sit in the trunk for years without losing their effectiveness.

The U.S. Department of Transportation (DOT) requires interstate truck drivers to carry triangles, and has a standard governing their performance and design. The standard requires, among other things, that triangles be highly reflective, 17 to 22 inches on a side, with a stable base. Models meeting the standard carry a certification statement or the letters DOT. As you might expect, they look and perform pretty much alike. And, in our tests, they outperformed a brand (since discontinued) that didn't meet the standard.

Suggested retail prices range from \$10 for a single triangle to \$27 for a set of three. But we found that selling prices varied considerably. For example, one set of three triangles cost us \$16 plus shipping by mail, while a similar set cost us \$27 at an auto-supply store.

We tested each triangle's visibility by viewing it from distances of 100, 200, 300, and 400 feet. We put the triangles in front of a parked car so we could compare the triangle to the car's flashers. For night tests, we aimed a car's low-beam headlights at the triangles from the same distances. All the triangles that conform to the government standard invariably appeared brighter than the car's flashers.

Once deployed, a triangle should stand up to wind gusts and to vibrations from passing traffic. All the ones we tested have a weighted base and proved quite stable. To be effective at night, a triangle must be placed perpendicular to the traffic flow. Turn it more than a few degrees from that position and its visibility drops off sharply.

You should have at least three triangles on hand so you can position them to both alert other drivers and help guide them safely around your vehicle. Let common sense and road conditions guide you.

FUSEE FLARES: BRIGHT IN FOG Like triangle reflectors, flares can be placed as far from the car as necessary, and they don't require electric power. These powder-filled tubes produce a small, bright red flame when they're struck like a match.

Though widely used, flares have a number of drawbacks:

- Flares didn't command our attention as well as triangles did. Their light comes from one small source and isn't very conspicuous at a distance. The light could be mistaken for a taillight. A flare does have an edge in heavy fog: It creates a large red-cloud effect.
- A flare's light may not last until help arrives.
- Flares produce gagging fumes and smoke and pose a fire hazard near dry brush or combustible materials.
- Flares should be replaced about every three years for maximum effectiveness, according to one manufacturer.

Some flares have a wire stand that keeps the burning end off the ground. Others stand vertically when you push a spike into the ground. Spiked flares won't tip over, but they can be all but impossible to drive into concrete or asphalt. If you can't drive the flare into the ground, you'll have to lay it on its side. It will lose some of its visibility that way, and it may roll away. (One 15-minute flare we bought had a plastic tab around its cap to prevent rolling.) Even if you do manage to plant a spiked flare, it could flatten another car's tire if you don't remove the spike when you leave.

Flares sell for a few dollars apiece and most commonly come in 15- and 20-minute versions (30-minute versions are available, but they may be hard to find).

FLASHING LIGHTS: NONE TOO BRIGHT These lights, which typically mount magnetically on the car roof, resemble the flasher on an emergency vehicle. They draw power from the car's cigarette-lighter socket, so they won't work in every emergency. The ones we bought cost \$16 to \$20.

Up close, the flashes emanating from these lights may seem bright enough. But from a couple of hundred feet away, even the better lights we tested, the PM Revolving Signal Light 771A and 771R, were no more visible than our car's own emergency flashers. If you could place one of these flashing lights 100 feet from the car, it might provide a useful warning. But the cord for the PM Revolving Signal Lights is only 10½ feet long.

FLASHLIGHTS: DIM BULBS Add a couple of blinking bulbs to a flashlight, put a word like "hazard" on the package, and you have a product that might almost pass as a roadside emergency signal. Don't be taken in. We bought such lights and lanterns from four makers (Cobra, Eveready, Imperial, and Johnlite) and tested them as warning signals. They provided virtually no light from a distance. A flashlight can be invaluable in an emergency, but not to warn motorists.

EMERGENCY GEAR: A BASIC LIST

Something as minor as a shard of glass can disable a car without warning. Assuming you don't have a cellular phone on board and so can't call for help immediately, you'll need to carry other equipment to keep a brief delay from becoming a major interruption. The following list, by no means exhaustive, should serve as a rough guide to what you need. All the equipment is readily available at auto-parts shops, hardware stores, and pharmacies.

Essentials. No driver should be without a first-aid kit, which should include a variety of bandages. Of the two Johnson & Johnson kits we examined, the First Aid Kit 8155, about \$15 at most pharmacies, was better stocked than one targeted for use in a car. The American Red Cross also sells a well-stocked first-aid kit for \$30. Contact your local Red Cross chapter for ordering information.

A flat tire can be one of the simplest things to fix, provided you have a lug wrench and a working jack to make the change. Be sure the spare is ready to be called into service, check its pressure when you check the other tires'. If the battery conks out, booster cables enable a passing motorist to give you a jump start. If you drive in a cold climate, we recommend a hefty, four- or six-gauge set of cables. For added reach, get a 16-foot version.

Other essentials include a flashlight and spare change for telephone calls. You might also want to carry a white towel or pillowcase; it can protect clothing if you have to crawl under the car, and it can serve as a warning flag.

Basic tools. You may not be handy with tools, but a passing Good Samaritan might be. Keep these tools in a small pouch or tackle box in the trunk: pliers, screwdrivers (both flat and Phillips head), open-end wrenches, electrical tape and duct tape, a wire hanger, and a pocket knife.

Extra security. If you're willing to go the extra mile, possibly on foot, carry an empty red container specifically designed to hold gasoline, along with a siphon. Be sure the container is completely empty after you use it. Air it out for a few minutes, then cap it before you put it back in the trunk. When you get home, air the container outdoors until the gasoline fumes have dissipated.

A blown fuse can disable taillights or even prevent the car from running. Keep a few replacement fuses in the glove compartment. Check the car's owner's manual for the size of fuses you need and the location of the fuse box.

You may never need to use a fire extinguisher, but you may want to keep one on board for an added sense of security. Be sure you buy one with an Underwriters Laboratories rating of at least 1A;10B,C. (Those letters and numbers, standard coding on fire extinguishers, denote a unit that can handle small fires of all types.)

HOW TO BUY CHILD SAFETY SEATS

Jennifer L. Metcalf of Fort Dodge, Iowa, says she'll never underestimate the value of a properly installed child safety seat. It saved her newborn son Evan. On a rainy November morning, mother and son were traveling on a fast two-lane secondary road. The temperature was dropping and, when Jennifer pulled out to pass a car, her sedan hit a patch of ice. The car spun, hit a ditch, and rolled over. It landed upright, with both sides smashed, all the windows shattered, and the roof over the passenger seat crushed. Motorists who stopped to help seemed astonished to see Jennifer emerge from the car with Evan in her arms. He suffered only a cut nose. Without the safety seat, he would have been tossed around in the car, perhaps even thrown from it, and severely if not fatally injured.

Events like that have led all states to require infants and small children to ride in a safety seat. Every manufacturer must certify that its seats meet government standards, which include protection in a head-on crash. Yet despite the laws and standards, automobile accidents remain the leading cause of death for children under age five in the U.S. The National Highway Traffic Safety Administration (NHTSA) estimates that some 700 children die in car crashes each year. Another 60,000 to 70,000 are injured.

Parents who don't use a safety seat shoulder the blame for many of those deaths and injuries. According to NHTSA, about 80% of adults now buckle up. But the usage rate for child safety seats is only about 65%. Other parents unwittingly contribute to death and injury statistics by failing to install and use the safety seat properly.

Faulty safety seats may also contribute to the toll. Our crash tests of 25 safety seats turned up three unsafe models, the Century 590 and Evenflo On My Way 206, for infants, and the Kolcraft Traveler 700, for infants and small children. Those three seats are more likely than others to fail when used in certain ways, even if properly installed. We have judged them Not Acceptable.

As we were preparing this report for publication, Evenflo independently issued a recall of the On My Way 206. The company's own tests show that, in a crash under certain conditions, the seat may crack when used without its base. Seats made between May 7, 1994 and May 31, 1995 are affected.

The company has set up a toll-free number (800-225-3056) for consumers who own the infant seat. Callers will hear a recording that says there have been no reports of cracks in actual usage and no injuries reported. The message states that the seat is safe to use with its base. Based on CONSUMER REPORTS' tests, we concur. Callers can obtain a "no-tools-required retrofit kit" at no charge. We have ordered a kit and will report on its effectiveness later this year.

We're glad that Evenflo has recalled this seat. Historically, however, such recalls are seldom completely effective. The company can readily notify only those owners who filled out and mailed in registration cards. If you know anyone who owns an On My Way 206, tell him or her about the recall. CONSUMER REPORTS has asked Century and Kolcraft to recall their unsafe seats, too.

Reliable information on the brands and models of safety seats involved in accidents isn't readily available. So we don't know if injuries or deaths have been associated with the seats we judged Not Acceptable. Further, we don't know how many of those safety seats are currently in use. But, according to NHTSA, approximately 200,000 On My Way 206 infant seats are affected by the Evenflo recall. The other 22 safety seats we tested provided an adequate level of protection in our tests. Any of them would make a suitably safe choice.

CONSUMER REPORTS RECOMMENDATIONS

Nearly all the seats we tested kept their test dummies safe even in slightly stricter tests than those currently mandated by the government. Except for the three Not Acceptable seats, any model we tested would be a good choice, provided it fits your vehicle. The clear choices are:

- Infant seat—the top-rated Century 565 (\$35), **A BEST BUY**.
- Convertible seat—the Century 1000 STE Classic (\$53), **A BEST BUY**. If you can't find that Century, look first at the higher-rated models that use a five-point harness. That design offers somewhat better protection than a T-shield or an overhead shield.
- Booster seat—Any tested model can safely be used without its shield or harness to position a child to wear vehicle safety belts. For younger children who may not stay put: the Century Breverra Premiere 4885 or 4880 (used with the harness or shield), each about \$60.

If you own the Not Acceptable Century 590, throw away the base. If you own the Not Acceptable Evenflo On My Way 206, use it only with its base and call the manufacturer for information about the recall. Owners of the Not Acceptable Kolcraft Traveler 700 should use the seat only with infants: with the seat in the rear-facing position, for a child up to 1 year old. The Kolcraft Traveler should not be used in the forward-facing position.

All safety seats come with a registration card. Fill it out and mail it in, so you can be contacted if the seat is the subject of a recall.

A TYPICAL MODEL

For the typical child safety seat, expect:

- Adequate protection in a 30-mph head-on crash.
- Fully assembled product, with adequate instructions.
- Locking clip for use with vehicle safety belts, if needed.
- Removable, machine-washable pads.
- Mail-in registration card, so you can be notified of a manufacturer's recall.
- 1-year warranty.
- Certification for use in vehicles. Some are also certified for use in airplanes.

NEW FEDERAL STANDARDS

Shortly before this report went to press, the National Highway Traffic Safety Administration (NHTSA) announced that it will soon require new, tougher certification criteria for safety seats. The new tests are similar in many ways to the ones we used. Key parts of the new NHTSA requirements include:

- The use of a 20-pound dummy, representing a typical 9-month old, for infant seats and convertible seats in their rear-facing position. Seats that meet the new standard can be labeled for use by infants up to 22 pounds, the weight of a typical 1-year old. The new standard was set to encourage the practice of having infants ride in the rear-facing position until they reach their first birthday.
- Certification tests for booster seats that parallel our tests, using a dummy representing a 3-year old and one representing a 6-year old. Certification for boosters now requires testing with only the "3-year-old" dummy. The new criteria take effect in January 1996 for add-on safety seats, in September 1996 for seats built into cars and minivans.

TESTING FOR SAFETY

In our past reports on child safety seats, we took statements of compliance with the federal standard as assurance of their safety. This time, we crash-tested the seats ourselves to find out how well they perform in trials that were similar to, but in some cases slightly tougher than, the ones the government specifies. We used "sled tests" that simulate a 30-mph head-on crash into a fixed barrier. The tests were done under our direction by a contract laboratory that also does safety testing for many manufacturers.

Following manufacturers' instructions, we installed each safety seat securely on an automobile seat attached to a test sled, then harnessed a crash-test dummy snugly into the seat. High-speed cameras tracked the movement of the dummy and safety seat. After the crash, we examined the seat's structural integrity.

We tested the three types of seats available:

- Infant seats, typically labeled for babies up to 20 pounds, about the weight of a 9-month-old. To meet current government standards, infant seats have been tested with a dummy weighing 17½-pounds, the size of a typical 6-month old. But since most seats are labeled for heavier children than that, we used a dummy the weight and size of a typical 9-month old.
- Convertible seats, used facing rearward for babies until they're a year old and facing forward for children to age four or so. They are typically labeled for use with children up to about 40 pounds. To test their safety for toddlers, we used the same dummy the manufacturers use to meet government standards (a 33-pound model, comparable with a 3-year-old). To test safety for infants, we tested representative designs from each manufacturer using the "9-month-old" dummy. Similarly designed models should perform the same.
- Booster seats, designed for that in-between age when a child is too big for a convertible seat but too small to use the vehicle's safety belts. They're used either with an attached shield or harness to restrain a child or without the shield or harness to boost a child up so the vehicle's lap-and-shoulder belts fit properly. We tested with both the "3-year-old" dummy and a 47-pound one representing a typical 6-year-old.

THE PROBLEMS WE FOUND

Infant seats. The Not Acceptable Century and Evenflo consist of a detachable base and a carrier. According to

the instructions, the base can remain installed in the vehicle and the carrier snapped into and out of it. Or, the carrier can be strapped in alone, using the vehicle's belts. We tested both ways.

In our sled tests, the Century 590 performed well when used without its base. But when tested with the base and using the "9-month-old" dummy, the force of the impact separated the carrier and dummy from the base. We repeated the test on three new samples. The same failure occurred with two. With the other, the carrier rotated backward enough to compromise an infant's safety. In a final test with a "6-month-old" dummy, the seat's performance was acceptable, but just marginally. We had given the Century 590 high marks in past reports, based solely on its convenience, assuming that the federal standard assured its safety. We were disturbed by its unexpectedly poor crash-test performance.

In contrast to the Century, the Evenflo On My Way 206 remained secure when used with its base in tests with the "9-month-old" dummy. But when tested without its base, the carrier broke at one of the hook-ups for the vehicle belt. That left one side of the carrier, with the dummy strapped inside, unsecured from the bench seat. A second test yielded the same result. In one test with the "9-month-old" dummy and another with the "6-month-old" dummy, the shell cracked but did not break in the belt hook-up area.

Convertible seat. When tested in the rear-facing position with the "9-month-old" dummy, the Kolcraft Traveler 700 performed safely. It failed our safety tests when we used the "3-year-old" dummy with the seat facing forward, as it would be for a small child. The seat's buckle failed, releasing both harness and dummy. As the dummy hit the shield, it broke away. In one test, the dummy was left hanging from the seat's harness straps. In another, it was ejected from the seat.

Booster seats. Century advises against using its booster seats with the shield or harness for children over 45 pounds, so we didn't test Century's seats that way. In contrast, Fisher-Price recommends using the shield on its booster with children over 40 pounds but not with smaller children, contrary to the advice of safety experts. We tested that model both ways with both the "3-year-old" and "6-year-old" dummies.

Overall, all four boosters provided very good protection when used without the shield and with the vehicle's safety belts. But results differed when we tested with the shields. The Gerry Double Guard and Fisher-Price no-back models provided only fair to poor protection with the "6-year-old" dummy. The two Century Breverra high-back boosters provided better upper-body protection than the no-back booster seats.

WHICH HARNESES ARE SAFEST?

CONSUMER REPORTS' tests also allowed us to evaluate the effectiveness of the various harness systems used in convertible seats. The five-point harness provided the best protection against head injury. The overhead-shield design provided less protection than either the five-point harness or the T-shield models.

TYPES

Choosing the right safety seat goes a long way toward making your child safer and more comfortable. And, the more convenient the seat is to use, the more likely it is to be used every time your child is in the car. Here, we describe the types of seats, variations in harness designs, and the good points and drawbacks of each.

Convertible seats

For babies up to 1 year old, a convertible seat can be mounted in a rear-facing position. For children up to about 40 pounds, the seat can be installed in a forward-facing position. You can choose among three types of restraint:

- **5-point harness.** This type of restraint uses five straps, two at the shoulders, two at the legs, one at the crotch. It provides the best protection against head injury for all children, and the best fit for small infants.

Good points: The 5-point harness is easy to buckle and unbuckle.

Drawback: Straps can get in the way when you put the child in the seat.

- **T-shield.** This type uses a plastic, T-shaped yoke that buckles into the seat at the crotch, connected to a pair of harness straps. It provides good protection.

Good points: The T-shield is easy to move out of the way when seating child. Usually easy to buckle and unbuckle.

Drawback: A small infant's head may not clear the shield.

- **Overhead shield.** This type has a padded, tray-like shield that swings down over the child's head.

Good points: Such shields are generally easy to use. Some are adjustable to fit a smaller child or to accommodate bulky winter clothing.

Drawbacks: Doesn't protect against head injury as well as other designs. A small infant's head may not clear the shield. Shield may block your view of the buckle.

Infant seats

Best choice for newborns and small infants. Seats for infants face rearward in a semireclined position to help support baby's head, neck, and back.

Good points: All double as a baby carrier. Some come with a detachable base that remains installed in the vehicle.

Drawbacks: None.

Booster seats

For those too big for a convertible seat, but too small for the vehicle's belts.

Good points: High-back boosters used with their harness and shield are effective for smaller kids who may not remain seated unless confined. High-back boosters and no-back models can be used without shield to make child sit high enough to use vehicle's safety belts. That's best with children old enough to understand the importance of staying seated and buckled up.

Drawbacks: In our tests, no-back, shielded boosters did not protect well, especially with a larger dummy.

Built-in seats

For those over 1 year old and 20 pounds. Some GM, Ford, Chrysler, and Volvo models offer an optional safety seat integrated into the rear seat. Typically uses a 5-point harness, and converts to a booster.

Good points: No installation. Can't dislodge in a crash. Places a child farther away from the front seats, reducing the risk of head injury.

Drawbacks: Lacks head support for sleeping child. (But designs for some new cars will recline.)

INSTALLATION

Installing a safety seat can't be left to instinct or logic. It's important to refer to the section on safety-seat installation in your vehicle owner's manual and heed all the instructions that come with the safety seat you buy. If the information in either manual isn't clear, call the automaker, the safety-seat manufacturer or both.

Safety-belt snafus. The center rear seat is the safest place to install a child safety seat. In most vehicles, the center lap belt will hold a safety seat securely. But some lap belts are too short to cover a sizable safety seat, especially if it has to be rear-facing. In some cars, the distance between belt anchors may be insufficient to fit a safety seat. Along with those problems, we had difficulty threading safety belts through some seats. Lap-and-shoulder belts pose an assortment of problems. You may need a locking clip, a supplemental buckle, or a replacement belt.

Fit, form, and frustration. Deeply contoured seats and some bucket seats make secure installation of a safety seat difficult or even impossible. Some cars have a raised center rear seat. A safety seat installed there is likely to slide around and wobble. We found that the safety seats' instructions were usually reasonably helpful in explaining how to cope with oddities of car-seat design.

About air bags. If you and the child are usually the car's only occupants, you may prefer to install an infant seat in the front. Generally, that's fine, but not if the car has a passenger-side air bag. (Only a few vehicles have an air bag that can be disabled.) When triggered, an air bag will strike the back of the infant seat, dealing a violent blow to the baby's head. Experts recommend moving the passenger seat as far back as possible to minimize the risk of injury when a child in a forward-facing convertible seat or booster rides in front.

SAFETY-SEAT ALTERNATIVES?

Safety vest. The All Our Kids Travel Vest 602 (\$43) proved difficult to fit to a child and to our test vehicles. Worse, half the samples we bought came with an incorrectly threaded harness, a problem that wasn't obvious and not clarified by the instructions. Even after we threaded the straps according to the photo on the box, the vest was just fair in our crash tests. In March, the All Our Kids Travel Vest models 600 and 602 were recalled due to a flammability problem. If you own one of those vests, return it to the company: 1540 Beach Street, Montabello, CA 90640, for fire-retardant treatment.

Traveling infant bed. The Cosco Dream Ride Ultra 02-719 (\$63), can be used as a conventional infant seat or

as a traveling bed for premature infants and others who must lie flat. As a bed, the Dream Ride performed well in three of four crash-tests. In one test, however, it partially released from the safety-belt hook-up. It performed poorly as an infant seat. It tipped too far backward and increased the risk of injury.

Safety seats plus. The Safeline Sit 'n' Stroll and the Century 4-in-1 System convert from safety seat to stroller. When we covered their prowess as strollers in a recent report, we favored the Century, but it incorporates the Not Acceptable Century 590 safety seat. The Safeline proved to be a safe child seat, but not a particularly convenient one. As a stroller, it didn't negotiate curbs very well, its brakes were hard to use, and its handle was too low for tall adults. Converting it from safety seat to stroller, with a child weighing 20 pounds or more, would require considerable strength.

FOR MORE INFORMATION

On recalls: Call NHTSA's Auto Safety Hot Line (800-424-9393). Be ready to provide the brand name, model number, and manufacturing date, all found on the seat itself.

On installation: The 1996 edition of our New Car Buying Guide offers additional information on child safety in automobiles. It's available in bookstores or by mail, for \$8.95. To order, call 515-237-4903.

On other baby products: Our Guide to Baby Products offers buying advice and testing information on cribs, high chairs, strollers, and more. Price: \$13.95. To order, call 800-500-9760.

WHERE TO CALL

If you have trouble locating a brand, call the company.

All Our Kids:	800-545-3265
Century:	800-837-4044
Cosco:	800-544-1108
Evenflo:	800-233-5921
Fisher Price:	800-432-5437
Gerry:	800-626-2996
Kolcraft:	800-453-7673
Safeline:	800-829-1625

IMPORTANT UPDATE #1: MORE ON UNSAFE SAFETY SEATS

The government and the manufacturers of the child safety seats that did poorly in CONSUMER REPORTS' recent tests have been active since the report was released.

Kolcraft. The National Highway Traffic Safety Administration (NHTSA) announced a recall of Kolcraft Traveler 700 child safety seats, citing "recent media reports" that raised questions about the seat's effectiveness. About 100,000 seats are affected by the recall.

In tests performed by Kolcraft after the company learned of CONSUMER REPORTS' findings, the manufacturer claimed that failures did occur "on occasion" when the Traveler 700 was crash-tested at speeds above those specified by the government. The failures occurred in models made after November 1, 1994, when the company redesigned the seat.

People who bought a Traveler 700 made after November 1, 1994 and mailed in the registration card will automatically get a replacement buckle assembly. Owners of Kolcraft safety seats who didn't register their seats can call 800-453-7673 to request the new buckle. It will also fit seats made before November 1, 1994.

Kolcraft announced its replacement-buckle program about a month after CONSUMER REPORTS released its crash-test findings. CR applauds the company for acting in a timely and responsible manner.

Century. The Century 590 infant seat failed CONSUMER REPORTS' crash-tests. As a result, the NHTSA is conducting its own defect investigation. The manufacturer continues to deny that there are safety problems with the Century 590. In CR's tests, the seat failed to provide protection when used with its base. It works fine when installed directly onto the vehicle seat without its base.

All Our Kids. This company made the All Our Kids Travel Vest, recalled due to a flammability problem. The company recently went out of business and is no longer responding to phone calls.

CONSUMER REPORTS plans further tests, to evaluate the fix for the Kolcraft, a fix for the Evenflo On My Way 206 (a seat voluntarily recalled in August) as well as the new Evenflo 207. CR also petitioned the NHTSA to upgrade its test standards and procedures for safety seats. The agency is considering whether to make the requested changes.

IMPORTANT UPDATE #2: FIXES FOR UNSAFE SAFETY SEATS?

Last fall we judged three child safety seats Not Acceptable because they failed our crash-tests. We have since tested retrofits offered for two seats, which owners can install to make those seats safer. The third manufacturer continues to maintain that its seat is safe, despite mounting evidence to the contrary. Here's the latest:

Kolcraft: Now Safer. The Kolcraft Traveler 700 can be used facing rearward for infants, facing forward for toddlers. In our crash-tests, the buckle assembly and overhead shield broke when the seat was forward-facing. Such a failure could eject a child from the seat. Kolcraft will provide a replacement buckle to owners of some 100,000 Traveler 700 seats made between November 1994 and August 1995; call 800-453-7673.

The replacement buckle assembly held tight in our follow-up crash-test. But the harness straps slipped on impact, so the test dummy's upper body wasn't restrained quite as well as we'd like. Nonetheless, parents who have installed the replacement buckle can feel confident that the buckle and shield will stay intact.

Evenflo: Ineffective fix. The Evenflo On My Way 206 consists of an infant carrier and base. You can keep the base strapped in the car and pop the carrier in and out to transport the baby, or use the carrier alone as a safety seat. The 206 failed our tests when used without its base. The carrier broke where the safety belt hooks into it, so it was no longer secured to the car. Evenflo voluntarily devised a retrofit kit to solve the problem, offering the kit to owners of some 200,000 On My Way 206 seats; call 800-225-3056.

The retrofit is supposed to reinforce the area where the safety belt threads through the carrier. But in our follow-up crash-test, although the safety belt continued to hold the carrier, the reinforcements dislodged and the carrier cracked in the same general area as in our first test. Therefore, we still recommend using the Evenflo On My Way 206 only *with* its base, and securing the base with the car's safety belt.

Evenflo has discontinued the On My Way 206. Its replacement, the On My Way 207, performed well in our safety tests.

Century: Still a problem. Century continues to deny that its Century 590 infant seat has a safety problem. In our tests, the 590 performed well *without* its base. When tested with the base, the carrier and dummy were ejected and the base broke in three out of four runs. In the fourth run, the carrier rotated backward enough to compromise an infant's safety.

The manufacturer has launched a publicity campaign to discredit our findings. But other tests also point to a safety problem. At our urging, the National Highway Traffic Safety Administration began its own technical evaluation and crash-tested the 590; the base cracked much the way it did in our tests. In a different test, run by the Canadian government, the carrier was ejected from the base.

Following publication of our original report, several class-action law suits were filed against Century. And we have since learned of an accident in which a nine-week-old infant was ejected from the vehicle while still strapped to the 590 carrier, which broke away from its base. The infant was unharmed.

Our advice remains: Don't use the 590 with its base. We still believe Century should voluntarily recall the 590. Failing that, the NHTSA should order a recall.

FIND RECENT RECALLS

Every year, hundreds of thousands of autos are recalled to repair safety-related defects or defects in the emissions system. The repairs are performed free of charge to the car owner. Although the government oversees the recalls, most are in fact initiated by the manufacturers.

CONSUMER REPORTS highlights safety recalls, but its recalls listings are not exhaustive. To check our recalls database, click on the icon at the lower right of this screen. For the very latest information on whether your car has been subject to a safety recall, call the National Highway Traffic Safety Administration's toll-free hotline, at (800) 424-9393 (366-0123 for Washington, D.C. residents).

To find a possible emissions-related defect, which can cause many engine problems, you can ask a new-car dealer to look up your car, or you can call the manufacturer's customer-service number. You can also write to the Environmental Protection Agency (491 M Street, SW, Washington, D.C. 20460), or call (202) 233-9240. You will need your car's Vehicle Identification Number (VIN), which is printed on the car's registration and title, and on the car itself in the front, left-hand corner of the dashboard where it meets the windshield.

MASSIVE RECALL TO FIX SAFETY BELTS IN 8 MILLION CARS

In late May, the National Highway Traffic Safety Administration (NHTSA) announced one of the largest safety recalls in its history. Nine Japanese and U.S. automakers would recall some 8.4 million vehicles to repair or replace the front safety belts. The costs, which are to be borne by the automakers, range from \$50 to \$200 per vehicle. The recall had its origins nearly a year ago, when the NHTSA started to review complaints that the front safety belts in 1986 to 1991 Honda Civics can come unbuckled in a crash. But it soon became clear that the Civic wasn't the only car affected.

The front safety belts, made in Japan by Takata Corp., were fitted in millions of cars between 1986 and 1991. Many Japanese cars, and some cars made for Chrysler, Ford, and General Motors, used the belts. The affected belts carry a number beginning with TK52 or A7 on the lower part of the buckle or on the webbing. Apparently, part of a plastic release button deteriorates after several years' exposure to ultraviolet light. The button becomes brittle and breaks, with chips jamming the mechanism. As a result, the belts may fail to latch, fail to stay latched, or fail to unlatch.

Following are vehicles with safety belts affected by the recall (based on data from the NHTSA):

Acura:

'86-91 Integra, '86-90 Legend, '91 NSX.

Dodge:

'86-91 Colt, '86-89 Conquest, '86-91 Ram/Ram D-50, '87-89 Raider, '91 Stealth.

Eagle:

'89-91 Summit, '90-91 Talon.

Plymouth:

'86-91 Colt, '90-91 Laser.

Ford:

'88-91 Festiva.

General Motors (Geo):

'89-91 Metro, Tracker, '90-91 Storm.

Honda:

'86-91 Accord, Civic, Prelude, '86-87 & '89-91 Civic CRX.

Infiniti:

'90-91 M30, Q45.

Isuzu:

'90-91 Impulse, Pickup, '91 Rodeo, Stylus.

Mazda:

'88-89 323 sedan and wagon, '88-89 MX-6, '88-91 929, MPV van.

Mitsubishi:

'86-88 Cordia, '90-91 Eclipse, '86-87 & '89 Galant, '86-91 Mirage, Montero, Pickup, '88-90 Sigma, '86 Starion, '91 3000GT, '87-90 Van/Wagon.

Nissan:

'87-88 200SX, '89-91 240SX (manual lap belt), '88-91 Pathfinder, '87-91 Sentra, '88-91 D21 truck, '87-90 C22 Van.

Subaru:

'87-91 Justy, '88-90 Loyale.

Suzuki:

'88-91 Samurai, Sidekick, '89-91 Swift.

The government has received hundreds of complaints, and reports of 47 injuries related to the Takata belts. No deaths have been reported.

Under the terms of the recall, automakers must repair or replace belts in vehicles more than eight years old, even though current law normally exempts vehicles that old. For buckles that aren't broken, automakers must repair the

release button or provide some sort of guide or shield. And the automakers must extend or maintain a lifetime warranty on all front-belt components.

According to the NHTSA, recall notices were supposed to be mailed beginning in the fall of 1995. But if the front belts in your car don't seem to work properly, contact the dealer immediately. (Listen for a click when you buckle up, and be sure the belt stays buckled when you tug on the shoulder strap.) If you bought one of the recalled vehicles used, you may not receive a recall notice. Have a dealer check the belts.

CHRYSLER MINIVANS: A DEADLY PROBLEM, BUT NO RECALL

At the end of March 1995, Chrysler Corp. held a news conference, placed ads in newspapers and magazines, and sent letters to owners of some 4 million Chrysler Town & Country, Dodge Caravan, and Plymouth Voyager vans. The automaker was publicizing a "service action" to replace the rear-liftgate latch with a stronger one at no cost. Chrysler's actions, which capped an 18-month probe by the National Highway Transportation Safety Administration (NHTSA), weren't a formal recall, despite mounting evidence that one was warranted.

Vans made from 1984 through 1994 have the suspect latches. According to an NHTSA memorandum, the government had turned up "151 alleged crash-related liftgate openings [with] as many as 107 ejections, 76 injuries and 32 fatalities." In these crashes, often side-impact collisions, where vehicles spun around, the rear hatch popped open, spilling passengers from the back seat or cargo area onto the road. Many cases involved children. In one case, the third seat flew out the back, with the victim still belted in.

Apparently, the liftgate can open even at low speed. The Insurance Institute for Highway Safety, an industry group that tracks accident data, tested the rear bumpers of the seven most popular minivans last year by backing vehicles into a pole at 5 mph. The hatch popped only on the Dodge Caravan. A 1990 internal Chrysler memo shows that the company knew its latch was weaker than those of competitors. Some other minivans actually have two rear latches. And all other minivans have a secondary latch on the liftgate, which catches even if the primary liftgate does not close completely. The Chrysler memo estimates that the latch could have been beefed up at a cost of just 25 cents to 50 cents per vehicle. Replacing the latches now would cost \$50 to \$90 per van, according to various estimates. (Chrysler's 1996 minivans come with a strengthened latch and a secondary latch.)

Clarence Ditlow, director of the Center for Auto Safety (and a Consumers Union board member), accuses the NHTSA of "rolling over for Chrysler just as it's done for General Motors." He cited last year's settlement with GM over side-mounted fuel tanks implicated in fires on certain pickup trucks. The U.S. Department of Transportation ended its investigation when GM agreed to spend more than \$50-million on various safety programs. Ditlow and other consumer activists say the NHTSA is bargaining away its enforcement powers by agreeing to deals that stop short of full-fledged safety recalls. But Tim Hurd, an NHTSA spokesman, says that if the government had been forced to sue Chrysler, the litigation could have dragged on for years, with perhaps no van repaired in the interim.

Bill Boehly, NHTSA associate administrator for safety assurance, says his agency will monitor Chrysler's progress in replacing the latches. He said that if "completion rates" for repairs are not satisfactory, the NHTSA would consider further action. From 1988 to 1993, the completion rate for all vehicle recalls—the percentage of cars actually fixed—was 68%. If that rate holds for Chrysler's minivans, it would leave some 1.3 million vans unrepaired.

There is a significant difference between a recall and a "service action." In a formal recall, the manufacturer and dealer can be fined \$1000 per vehicle if the problem is not remedied promptly, and the notification letter sent owners is strong and unambiguous. But Chrysler faces no such sanction with its "service action," and its letter to minivan owners downplays the latch problem, noting that there is "no formal determination that a safety defect exists." That's technically correct, because the NHTSA has not moved for a recall.

If you own one of the minivans and have not yet been notified, you should see the dealer or call the company at 800-646-4826. Have the latch fixed as soon as possible (Chrysler says it will handle later-model vehicles first). And be sure all passengers wear safety belts, even after the latch is strengthened.

Models affected

1987-95 Dodge Caravan

1987-95 Dodge Grand Caravan

1987-95 Plymouth Voyager

1987-95 Plymouth Grand Voyager

1990-95 Chrysler Town & Country

INSIDE CONSUMER REPORTS CONSUMER REPORTS is published by Consumers Union, an independent, nonprofit testing and information organization serving only consumers. We are a comprehensive source for unbiased advice about consumer concerns. Since 1936, CONSUMER REPORTS' mission has been to test products, inform the public and protect consumers. Our income is derived solely from the sale of CONSUMER REPORTS and our other services, and from nonrestrictive, noncommercial contributions, grants and fees.

WE BUY all products we test on the open market. Our shoppers go into the stores and buy the products off the shelf, just as you do. We receive no special treatment. We accept no free samples. If a manufacturer sends us a free product, we send it right back.

WE TEST products under controlled laboratory conditions in 50 state-of-the-art laboratories at our National Research and Testing Center in Yonkers, N.Y., and at our Auto Test Center in Connecticut. Our reports and Ratings are based on laboratory tests, controlled-use tests and expert judgments by CONSUMER REPORTS' technical and research staff.

WE SURVEY our millions of readers to bring you information on the reliability of hundreds of auto models and of major products like appliances and electronic gear. Reader-survey data also help us rate insurance, as well as other consumer services.

WE REPORT on current issues of concern to consumers. CONSUMER REPORTS' staff of researchers and editors brings you in-depth information on matters that affect your health, your money and your well-being as a consumer.

WE ACCEPT NO ADS from companies. We do advertise our own services, which provide impartial information and advice to consumers. We don't let any company use our reports or Ratings for commercial purposes. If that happens, we insist that the company stop, and take whatever additional steps are open to us.

HOW CONSUMER REPORTS RATES PRODUCTS

CONSUMER REPORTS' decisions about which products and services to evaluate are based on many factors. Costly products, like automobiles and major appliances, are tested on a regular schedule. Others are tested as often as appropriate and feasible.

When a product has been chosen for testing, the first steps are taken by CONSUMER REPORTS' market information specialists. They analyze the marketplace and recommend brands and models to be tested. Then CONSUMER REPORTS' shoppers purchase the selected items anonymously at retail, like ordinary consumers. CONSUMER REPORTS has a network of more than 100 part-time shoppers in 48 cities throughout the U.S.

Nearly all testing is done at our laboratories in Yonkers, N.Y., and at our Auto Test Center and track in Connecticut.

CONSUMER REPORTS' engineers test products for performance, convenience, safety and economy of operation. Evaluations are based on lab tests, controlled-use tests, expert judgments, trained panels and reader volunteer panels. After thorough testing, CONSUMER REPORTS' editors work with the technical experts to prepare articles for publication.

CONSUMER REPORTS' product Ratings are derived from the test results. Ratings are usually based on estimated overall quality, without regard to price. A Rating applies only to the brand and model listed, not to other models sold under the same brand name.

CONSUMER REPORTS uses two special product Ratings:

- A **BEST BUY** designates a product both high in quality and low in price.
- **NOT ACCEPTABLE** designates a product found to be unsafe, defective or clearly not capable of performing its advertised task.

CONSUMER REPORTS' members play a key role in product research. Responses to CONSUMER REPORTS' Annual Questionnaire form the basis for product repair and reliability evaluations. Responses to this and other reader surveys have served as the basis for articles on both products and services.

CONSUMER REPORTS' readers also contribute suggestions on what to test and sometimes take part in home-use tests of products.

CONSUMERS UNION PRODUCTS AND SERVICES

CONSUMER REPORTS

Published monthly, plus our Buying Guide issue in December. \$24 a year, \$39 for 2 years. To subscribe, call 800-234-1645.

New Car Price Service

Our reports compare sticker price to dealer's invoice for car and factory-installed options. \$12 for the first report, \$10 for each additional report. Call 800-933-5555, 8 a.m. to midnight, ET, 7 days a week.

Used Car Price Service

Find current market value in your area. Have ready the car model year, make, model, mileage, major options, condition, number of cylinders. \$1.75 per minute; typical calls last 5 minutes or more. Call 900-446-0500, 7 a.m. to 2 a.m. ET, 7 days a week. Not available in Canada, Alaska, Hawaii and certain areas of continental U.S.

Home Price Service

Estimate home value for insurance, refinancing, buying or selling. Get price histories since 1990. Covers most metro areas, many states. \$10 for 10 minutes, with faxed report. Call 800-775-1212. Not available in Canada, Alaska, Hawaii, and certain areas of continental U.S.

Auto Insurance Price Service

Receive a list comparing up to 25 of the least expensive policies for drivers and vehicles in your household, including Ratings scores and shopping tips. \$12 for first vehicle, \$8 for each additional vehicle. Call 800-807-8050, 8 a.m. to 8 p.m., Monday through Saturday. Service is available in California, Florida, and Washington.

CONSUMER REPORTS Books

More than 100 helpful books in print. To order, call 515-237-4903.

Facts By Fax

Specially edited reports from CONSUMER REPORTS are available by fax or mail. \$7.75 per report. To order an index of available reports, for \$1, call 800-896-7788. Not available outside the U.S.

CONSUMER REPORTS Travel Letter

Monthly newsletter with travel values; strategies for finding the best airfares, hotel rates, rental-car rates. \$39 a year. Call 800-234-1970.

CONSUMER REPORTS on Health

Monthly newsletter with information on nutrition, fitness, new treatments and medical breakthroughs. \$24 a year. Call 800-234-2188.

Zillions: for Kids from CONSUMER REPORTS

Bimonthly magazine for kids 8 and up explores products from toys to fast foods; exposes ad claims, fads. \$16 a year (6 issues), \$26 for 2 years. Call 800-234-2078.

Electronic Publishing

To get CONSUMER REPORTS on-line (specially edited versions of reports), use America Online, CompuServe, or Prodigy. To get full-text reports via searchable databases, use Knight-Ridder or Nexis.

CONSUMER REPORTS Television

We make informational videos for children and adults. For information, write CRTV, 101 Truman Avenue, Yonkers, NY 10703-1057.

Contributions from subscribers to CONSUMER REPORTS' publications and consumers who support the work that we do are a vital part of our continued expansion. If you would like to contribute to CU or would like information regarding a tax-deductible Lifetime Membership (including a lifetime subscription to CR), please contact Mary Ellen Murphy, at 914-378-2487, or write to:

Consumers Union
Dept. MEM-CDR
101 Truman Avenue

Yonkers, N.Y. 10703

HOW WE TEST CARSOne of the unique and important aspects of CONSUMER REPORTS' auto-testing program is how we get the cars we test. Unlike other magazines, we buy all our cars anonymously from dealers, just as you would. That way, we're sure of getting a typical production model rather than a car carefully prepared by the manufacturer.

We report on a group of cars nearly every month, more than 40 cars each year. They include mostly practical family sedans, with a smattering of luxury cars, sporty coupes, sport-utility vehicles, pickup trucks, and vans. Our auto engineers and other staffers take turns using each car for everyday driving until the car is broken in. Then our engineers and technicians put the cars through several thousand miles of formal tests at our test facility in Connecticut, and on public roads, to find out things you couldn't possibly learn during a brief test drive at the dealership. The combined results of that research form the basis of our reports.

We group our findings into four basic categories: performance, comfort, convenience, and fuel economy. But safety is a central theme running throughout all of our tests. One aspect of safety is a car's ability to protect its occupants in a crash. To inform you about that, we interpret government crash-test results and note the availability of vital safety equipment such as air bags and proper safety belts.

Another aspect of safety is a car's ability to avoid a crash altogether, a composite of elements such as acceleration, handling, braking, and cockpit design. A poor driving position, for example, is not only uncomfortable, but it can also cause premature fatigue, reducing your concentration and preventing you from reacting quickly and effectively in an emergency. Tall drivers should have room to stretch out, and short drivers should be able to see the road without craning. We check whether the seat and steering column provide sufficient adjustment for a comfortable reach to the steering wheel and pedals, and whether all controls are easy to use and all displays are easy to see.

A COMPLETE PHYSICAL

To make sure each car is a typical sample, we inspect its vital parts as soon as we take delivery. Using a 50-item checklist, we go over the fluid levels, engine tuning, headlight aim and much more to make sure they're within the manufacturer's specifications. If we find a major defect, we let the dealer repair it. After the car is broken in and before our formal tests begin, we inspect the car again.

CHANGING PLACES

CONSUMER REPORTS' engineers drive each group of cars in convoy five times around a 30-mile course, switching cars after each lap. As they drive over the smooth highways and rutted rural roads, they tape-record their judgments of ride, handling, seat comfort, driving position, noise and other factors that can make a car more or less safe and easy to live with.

DROPPING THE ANCHOR

We run our braking tests on both wet and dry pavement. Clearly, the shorter the stop, the better. But stops should also be straight, without swerving, even in our test where the pavement is more slippery on one side of the car than on the other. Cars with antilock brakes enjoy a considerable advantage in all our wet-pavement braking tests. One of our tests consists of 10 consecutive stops from 60 mph to check the brakes' resistance to "fade", overheating and loss of effectiveness, which might occur during hard braking in mountainous terrain or when you tow a trailer.

SILENCE IS GOLDEN

Our engineers drive each car at specified speeds on smooth and coarse pavement while a tape recorder registers the noise level. We also record the noise level during full-throttle acceleration. Our audio engineers then analyze the tape in our electronics lab. In addition, we factor in our test drivers' subjective judgments about the intensity and quality of the noise. A noisy car is not only unpleasant, it can cause driver fatigue and dangerous lapses in judgment.

HOW FAST?

A car should have enough power to merge safely onto a highway, keep up with traffic on uphill stretches and pass safely on a two-lane road. A car's speedometer is rarely dead-on accurate, so we use sophisticated electronic test gear during our acceleration runs, a computer inside the car to record the test data on a tape, and an electronic sensor that scans the pavement with a beam of light. The sensor provides precise data on the car's speed, elapsed time, and distance traveled.

PUSHING THE LIMITSOur handling tests at the track tell us not only how quickly a car can negotiate a sharp curve or make a fast lane change, but also how the car behaves when pressed beyond its cornering ability. Emergency handling becomes critically important if you have to swerve around a child who runs out from between parked cars, or if you misjudge a curve and enter it too quickly. A "forgiving" car responds controllably and predictably to a typical driver's instinctive actions, while a "twitchy" car may require the skill and reflexes of a seasoned test driver.

CONSUMER REPORTS' TESTS PROTECT YOU

"In our judgment, the Suzuki Samurai is so likely to roll over during a maneuver that could be demanded of any car at any time that it is unfit for its intended use. We therefore judge it Not Acceptable."

With those words, CONSUMER REPORTS made worldwide headlines in the summer of 1988. CONSUMER REPORTS' engineers tested the 1988-model Samurai, along with three other sport utility vehicles at our auto-test facility in Connecticut. During moderate-speed emergency maneuvers designed to duplicate the kind of evasive action a driver might take to avoid, say, a child darting into traffic, the Samurai began to roll over onto its side. We can reach that judgment because every vehicle we report on is put through a complete series of tests, including carefully calibrated test-track maneuvers and thousands of miles of real-world driving. By the time our car testers have finished with a car, they know not only how fast it can go from 0 to 60 mph, but how well it stops on roads both wet and dry, how controllably it negotiates turns both sharp and gentle, how comfortable it is to ride in, and how much you might have to pay to fix the bumpers after an accident at parking-lot speeds.

The 1988 Suzuki Samurai demonstrated a design so dangerous that it put people's lives in jeopardy. Once CONSUMER REPORTS' tests revealed this critical safety hazard, sales of this once-popular car plummeted.

HOW WE ASSESS RELIABILITY

Each year, we survey CONSUMER REPORTS subscribers on their experiences with a broad range of products and services. Their responses to our Annual Questionnaire are combined to produce a consumer information resource that is unmatched anywhere.

The hundreds of thousands of responses to the questionnaire form the basis of the unique product-reliability information published throughout the year—including information on the reliability of appliances, audio-video equipment, air-conditioners, and lawn mowers, as well as the important data on autos that can help you buy a car that is less likely to give you trouble. To gather the reliability information on cars, we ask readers to tell us about serious problems they've experienced with their cars in the previous year. They complete a detailed checklist of 16 potential "trouble spots" of the cars, from the engine and transmission to the paint and air-conditioner. From that information, we create the Reliability History charts for more than 250 models, showing you how often previous owners of these models have experienced problems, and in which components. We then summarize those detailed charts in various ways—like the Trouble Indexes for used cars, and the Reliability Indexes and Predicted Reliability judgments for new cars—to help you select new or used cars that are likely to be the most reliable.

Besides asking questions about autos and other products, the questionnaire asks about readers' experiences with consumer services. Recent years' surveys have supplied CONSUMER REPORTS with ratings of homeowners' insurance, airlines, cable TV, auto insurance, rental cars, and a host of other services.

Our 1993 questionnaire asked readers about their experiences with brake, muffler, and transmission repair shops. Responses were used as the basis for a feature story in the September 1994 issue of CONSUMER REPORTS, and form a part of When You Need Repairs on this disc. The 1994 questionnaire asked readers vital questions about auto insurance; the information led to the Ratings of insurance companies you'll find in Insuring Your Car.

Since 1971, CONSUMER REPORTS' staff of professional social scientists have spent a major part of each year researching and writing the Annual Questionnaire, and analyzing and interpreting the data it generates. Some of the information they gather puts CONSUMER REPORTS in the forefront on important consumer topics. One recent questionnaire included questions about consumers' relationships with their doctors. This was one of the largest and most comprehensive surveys ever undertaken on this topic, and led to the story "You and Your Doctor" in the February 1995 issue of CONSUMER REPORTS. And last year, the questionnaire probed readers' experiences seeking help for stress and other emotional problems from mental-health professionals, family doctors, and self-help groups, leading to a ground-breaking story published in November 1995.

TEST, INFORM, PROTECT: PROTECTING CONSUMERS SINCE 1936

MASS PRODUCTION SETS STAGE FOR CONSUMERISM

To its founders and forebears, CONSUMER REPORTS represented a visionary economic experiment: Arm consumers with impartial scientific information about mousetraps, they theorized, and only the better mousetraps would survive. In 1936, product-testing was a startlingly new concept, partly because the very idea of brand-name products was still fairly new. Only the decade before, mass production had begun filling the world with new things—autos, radios, toothbrushes. Homes in cities were being wired not only for the light electricity provided, but for the appliances it would run. Mass production was making a cornucopia of products available to masses of people, many of whom had had little before in the way of material possessions.

Along with economic growth, new challenges arose. Products once made by family and neighbors were increasingly made by strangers working in some distant factory. The only clues to quality were the name on the package, the brand name, and whatever you were told in the product's advertising.

Ads for many products played on the social insecurities of the time. Listerine's "Even your best friend won't tell you" was among the more famous lines in this new "whisper copy." Some benefits came from the hype: toothpaste ads helped promote toothbrushing, for example. But the ad trade followed few rules. Claims for a product didn't have to be true. In hard-sell ads, they often weren't. A lack of industrial standards posed a major challenge to consumers faced with a huge array of new product choices. American industry had moved to mass production without much planning or thought. Companies were producing products with little sense of how well they worked. Some early household appliances presented serious hazards of electric shock and fire. Waste and inefficiency was another side-effect. When the government first began testing the light bulbs it bought, for instance, it found that three-quarters of them failed to meet the manufacturers' own standards and had to be thrown out.

World War I showed how badly the nation needed standards for objects as simple as screws. As Secretary of Commerce, Herbert Hoover prescribed and implemented simplification, standardization and a reduction in the number of types of products manufactured. Under his leadership, the National Bureau of Standards, once merely the official keeper of weights and measures, was staffed with dozens of chemists, physicists, and other scientists testing food, textiles, building materials—anything the government might buy.

GETTING YOUR MONEY'S WORTH

While some called marketing and advertising a "science", others wanted science to join the consumer's side of the deal. This was the central argument of "Your Money's Worth," a book published in 1927, written by economist Stuart Chase and engineer Frederick Schlink. Schlink presented the Bureau of Standards' work as a model of scientific testing that might be done to benefit consumers. In vivid, elegant language, this book described the forces operating in the new mass-marketed world, through which "consumers make their blundering way, so many Alices in the Wonderland of salesmanship." It gave examples of problems with products that consumers were likely to run into—shortweighting, mislabeling, quackery and uselessness. It also pointed out deceptive products by name.

The book mentioned a home-grown testing program Schlink had organized at a consumer club in White Plains, N.Y. The club distributed its own mimeographed lists of products: those "considered to be of good value in relation to their price," and those "products one might well avoid, whether on account of inferior quality, unreasonable price, or of false and misleading advertising."

"Your Money's Worth" became a best-seller. Using the hundreds of letters it prompted, the authors turned their neighborhood club into Consumers' Research, Inc., and its mimeographed list of products into Consumers' Research Bulletin. This magazine, the first to be devoted to the idea of testing products for the benefit of consumers, followed the example of a respected engineering journal and took no advertising.

In its first year, 1927, the Bulletin had 565 subscribers. By 1933, the Great Depression had a firm grip on the nation, and the Bulletin had 42,000 subscribers. That year, Schlink published "100,000,000 Guinea Pigs: Dangers in Everyday Foods, Drugs, and Cosmetics." with co-author Arthur Kallet, an engineer and Consumers Research director. The book inspired a wave of investigative, consumer-oriented journalism not seen since Upton Sinclair, Ida Tarbell, and others had raked muck at the beginning of the century.

CONSUMERISM AND UNIONISM COLLIDE

Consumers' Research Bulletin made the idea of testing products a much-discussed topic among intellectuals. Scientific testing was proposed for everything from schools and insurance policies to birth-control devices and doctors. But as the Depression deepened, people increasingly looked to Consumers' Research for more than information on products and services. Some wanted it to establish a political party, or to sell recommended goods under a consumer brand name, or to found a cooperative, or to serve as a model for a new social order. Also at that time, intense labor unrest was spreading across the nation. Workers at thousands of companies were struggling to form unions. The strike was their key tool.

Despite its utopian ideals, Consumers' Research was not immune from the mood of workers. Colston Warne, an economics professor at Amherst who was one of Consumers' Research's National Advisory Committee in 1934 and who later became the president of Consumers Union's Board of Directors, recalled what happened: "[Consumers' Research founder] Schlink had attracted a growing band of enthusiastic reformers who envisioned consumer testing as the way to a new social order. Indeed Schlink himself felt that it was a privilege to work at Consumers' Research—such a privilege that pressure for shortened working hours or higher wages represented heresy."

Schlink balked at demands from his own workers for increased pay and improved working conditions. When they tried to form a union, he fired three organizers, leading 40 other workers to walk off the job. Consumerism had run into another of the great social forces unleashed by the Industrial Revolution—unionism.

CONSUMER REPORTS IS BORN

The workers fired from Consumers' Research never went back. Instead, on February 6, 1936, they started their own consumer group, with Arthur Kallet as director. The group decided that it would not only provide consumers with "information and counsel on goods and services" and "maintain laboratories ... to supervise and conduct research and tests." It would also report "labor conditions under which such goods are produced and distributed." Labor conditions weren't allowed to affect product Ratings, for that would be tampering with the ideals of scientific product-testing. But the group's intent was clear in the name of the organization: Consumers Union.

Consumers Union quickly founded its own consumer testing magazine. First published in May, 1936 under the name "Consumers Union Reports," the magazine's circulation began at 4,000. It was renamed CONSUMER REPORTS in 1942. The first cover of CONSUMER REPORTS showed a photo of two looming milk bottles. Inside, a story asked what the difference was between grade A and grade B milk and concluded that the greatest difference was price. Other stories, illustrated with dramatic photos and reproductions of ads, evaluated breakfast cereals, soap and stockings, using a three-tier ratings scheme: Best Buy, Also Acceptable, and Not Acceptable. "The ratings of products are determined by both quality and price," the magazine explained. "Products listed as 'Best Buys' represent not necessarily the best quality of all the products listed, but what is believed to be the best value for your money."

The first issue also covered economic and medical issues. An article on credit unions explained what they were and why they were much cheaper than banks for getting loans. Clear, straightforward information on medical products, including over-the-counter remedies like Alka Seltzer, set the tone for future reporting on consumer aspects of health care.

Later in the 1930s and 1940s, articles calling for affordable health care coverage for all Americans put CONSUMER REPORTS at odds with the medical establishment, setting a tradition of strong public policy positions on behalf of consumers that exists to the present day.

In those early years, CU needed all the technical help it could get. It had few scientists and technicians on staff, relying on consultants—principally from universities and government agencies. The number of test samples that could be purchased was limited. CONSUMER REPORTS' first auto tester, Lawrence Crooks, was able to write about many cars only by borrowing new models from friends.

CONSUMER REPORTS' GROWING PAINS

Within its first year, the number of pages in the REPORTS increased to 32, and the number of members in the Union shot up to 37,000. But there were hazards ahead for this new enterprise, including overt hostility from more traditional publishers.

Newspapers and magazines that depended on advertising refused to risk endangering their source of revenue by printing advertising for Consumers Union, an organization that criticized products by name. Eventually, more than 60 publications, including The New York Times, refused to take Consumers Union's ads. So, the organization devised other promotions. What worked best were direct mailings and personal recruitment by members. Despite a recession and layoffs in 1938, Consumers Union had 85,000 members by 1939, outstripping its rival, Consumers' Research.

By 1942, American assembly lines were producing airplanes, tanks and trucks instead of automobiles, refrigerators, and radios, so there wasn't much to test. Rationing was imposed, making it hard for CONSUMER REPORTS to buy test samples of things like shoes. Membership in Consumers Union eventually dropped to half the 1939 level. The staff dwindled, many joined the military. Still the organization managed to publish a weekly newsletter called Bread and Butter, whose purpose was to help consumers keep track of wartime concerns such as price controls and the housing shortage. To save paper, CONSUMER REPORTS was printed on fewer pages. It reported on items like leg cosmetics and men's handkerchiefs, with many articles keyed to scarcity or maintenance.

CONSUMER REPORTS JOINS THE POST-WAR BOOM

The turning point for CONSUMER REPORTS came at the end of the war. After all those years of making do, people were eager to acquire more than the necessities of life. Responses to the Annual Questionnaire that CONSUMER

REPORTS mailed to its readers in 1944 showed a tremendous desire for automobiles, washing machines, vacuum cleaners and other hardware. America went on a buying spree, and people increasingly turned to CONSUMER REPORTS for advice on what to buy.

By 1950, subscriptions had reached nearly half a million. These new subscribers wanted help in choosing among the flood of new products on the market. The economic boom of the 1950's finally brought CONSUMER REPORTS the resources to create its longest-dreamed-of test facilities. In 1954, it moved to Mt. Vernon, N.Y. setting up offices and labs in a rambling brick building that was once an optics factory.

In addition to bringing financial success, the post war years carried a new mood. It was now all right—even commendable—for a product-testing agency to aim at improving the consumer's chance of getting good value.

CONSUMER REPORTS THROUGH THE YEARS

Through the 1950s and 1960s, Consumers Union resolved to give the readers of CONSUMER REPORTS the test-based advice they needed while still working on behalf of broader consumer interests. Board members and staffers regularly testified before congressional committees, for instance, on topics ranging from watered ham to price fixing of drugs.

In the 1970s, in keeping with its original goal to “create and maintain decent living standards for ultimate consumers,” Consumers Union established its own consumer-advocacy offices in Washington D.C., San Francisco, Calif., and Austin, Texas. Partly due to work done by advocacy offices, house paint is now lead-free, lawyers can advertise, and consumers have saved on utilities in Texas and on produce prices nationwide. Recent legislative efforts of Consumers Union advocacy offices have centered around: national health care reform, housing, insurance, food, economic discrimination, product safety, and the environment.

Although the 1980s began in a difficult economic climate, CONSUMER REPORTS was strong enough by the middle part of the decade to launch a host of valuable new products for consumers. During this period, two newsletters were born: the CONSUMER REPORTS Travel Letter and CONSUMER REPORTS on Health. Both have achieved significant followings and recognition in their respective fields.

Also during this period, CONSUMER REPORTS began offering a tool that can save car buyers hundreds, even thousands, of dollars. With just a phone call, the CONSUMER REPORTS New-Car Price Service and the CONSUMER REPORTS Used Car Price Service equip car buyers with pricing information that is crucial to negotiating a good new- or used-car deal.

Also around this time, CONSUMER REPORTS stepped into the world of publishing for children with a bi-monthly called Penny Power. In 1990, the magazine was renamed Zillions: for Kids from CONSUMER REPORTS. Written for ages 10 to 14, the magazine helps kids decipher marketing messages aimed at them and make sensible purchases with their money.

NEW CHALLENGES OF THE INFORMATION AGE

Founded at the peak of the Industrial Age, CONSUMER REPORTS now welcomes the computer-based Information Age. While continuing to publish its information in print form, CONSUMER REPORTS is now available via computer and modem through all the major commercial on-line services: America Online, CompuServe and Prodigy. Full-text searchable databases are on Knight-Ridder, Lexis/Nexis and on CD-ROM.

As the fax machine became implanted in offices and homes, CONSUMER REPORTS began offering to consumers its past test reports and articles via Facts by Fax. Using its expertise with toll-free phone services and databases, the organization recently introduced the CONSUMER REPORTS Home Price Service, which enables consumers to learn through a phone call the sale price of a particular home or condo, or all the homes sold on a block. As more home computers are equipped for multimedia CD-ROMs, CONSUMER REPORTS has begun offering its information in that format.

And there's much more to come. CONSUMER REPORTS looks forward to this new era of providing you with unbiased information in new ways—information you need to make wise decisions about the products and services you buy and use, and about your health and safety as a consumer.

THE ADVERTISING GAME

Automobile advertisements, like many advertisements in general, often go to extreme and sometimes confusing lengths to attract consumers and sell their wares. Here, we offer a compilation of several such auto ads.

Click on the photo icon to test-drive your prowess at deciphering the "real deal." Click once on the photo to return to CONSUMER REPORTS' analysis of the ad.

INVASION OF THE ASTERISKS

(Originally published in November 1986.)

This full-page advertisement for an auto dealer in Greensboro, N.C., offers a particular model for "\$98.71* per mo. 'til fall." The price is large. The asterisk is not. And the fatal footnote is minuscule.

It says that first, you need \$1200 down, cash or trade. Second, the \$98.71 applies only for payments one through four. That's what "'til fall" means. The next 50 payments are \$198.71 each.

THE PRICE IS RIGHT—OR IS IT?

The Aurora, Ill., car dealer responsible for this ad seemed to be selling the pricey Buick Reatta for \$6910. Only by reading the fine print would you discover that the actual selling price was \$21,914, which represented a "discount" of \$6910 from the sticker price.

The small print also revealed that the car was an "executive driven model." In other words, it was a used car.

HOW MANY CYLINDERS?

(Originally published in April 1995.)

After reading this ad, you might ask yourself: "Just how many cylinders do most cars have, if fours, sixes, and eights all cost more than \$34.95 for a tune-up?"

A NEW MODEL FROM FORD?

(Originally published in November 1990.)

According to the contents of this advertisement, a Ford dealer in Ohio appeared to have exclusive sales rights to a new, as-yet-unheralded Ford model called the Taurus II. But if you think that the \$9999 "Taurus" in the ad looks suspiciously like the cheaper and smaller Ford Escort, you are right. The dealer's ad explains all in the smaller print: "Ford wants to name this new car Escort, but one look and you'll agree Taurus II is a lot closer." In a similar spirit, the small print explains the fate of the headlined 100,000-mile warranty: "P.S. The 100,000 mile warranty offer actually ends at noon tomorrow."

DIRT CHEAP?

(Originally published in September 1993.)

The text of this Suzuki ad says that mountain rangers had trouble chasing night-driving off-roaders whose 4x4s were harming the environment until the rangers began driving Sidekick 4WDs. The price? Some might assume from the presentation of the ad that it's \$11,899. But the minuscule message at the bottom explains that that is, in fact, the suggested retail price for a two-wheel-drive model.

SIZING IT UP

(Originally published in April 1993.)

A CONSUMER REPORTS reader from Texas concluded: "The only possible meaning that this slogan [in the advertisement] conveys is that 'no other van of this size is larger than this van!'"

