The early days of the automobile.

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Starting in the late 1700's, European engineers began tinkering with motor powered vehicles. Steam, combustion, and electrical motors had all been attempted. It was uncertain which type of engine would power the automobile. At first, the electric car was the most popular, but at the time a battery did not exist that would allow a car to move with much speed or over a long distance. Even though some of the earlier speed records were set by electric cars, they did not stay in production past the first decade of the 20th century. The steam-driven automobile lasted into 1920's. However, the price on steam powered engines, either to build or maintain was incomparable to the gas powered engines. Not only was the price a problem, but the risk of a boiler explosion also kept the steam engine from becoming popular. The combustion engine continually beat out the competition, and the early American automobile pioneers like Ransom E. Olds and Henry Ford built reliable

Automotive production on a commercial scale started in France. Commercial production in the United States was equal to that of Europe's. In those days, the European industry consisted of small independent firms that would turn out a few cars by means of precise engineering and handicraft methods. The American automobile plants were assembly line operations, which meant using parts made by independent suppliers and putting them together at the plant. The United States had about 2,000 firms producing one or more cars. The number of firms had decreased to about 100 and by 1929 to 44. In 1976 the Motor Vehicle Manufacturers Association had only 11 members. The same situation occurred in Europe and Japan.

The first automobile produced for the masses in the US was the three-horsepower, curved-dash Oldsmobile; 425 of them were sold and 5,000 this model is still prized by collectors. The firm prospered, and it was noted by others, and, 241 automobile-manufacturing firms went into business in the United States. One of these was the Ford Motor Company which was organized, and sold its first car. The company produced 1,700 cars during its first full year of business. Henry Ford produced the Model T to be an economical car for the average American. By 1920 Ford sold over a million cars.

At the beginning of the century the automobile entered the transportation market as a toy for the rich. However, it became increasingly popular among the general population because it gave travelers the freedom to travel when they wanted to and where they wanted. As a result, in North America and Europe the automobile became cheaper and more accessible to the middle class. This was facilitated by Henry Ford who did two important things. First he priced his car to be as affordable as possible and second, he paid his workers enough to be able to purchase the cars they were manufacturing. This helped push wages and auto sales upward. The convenience of the automobile freed people from the need to live near rail lines or stations; they could choose locations almost anywhere in an urban area, as long as roads were available to connect them to other places. Many states in the US established motor fuel taxes that were used only to build and maintain highways helping the auto highway system become self-supporting.

The social effects of the automobile were as great. Freedom of choice encouraged many family vacations to places previously impossible. Urban dwellers had the opportunity to rediscover pristine landscapes, just as rural dwellers were able to shop in towns and cities. Teenagers gained more and more independence with driving freedom. Dating couples found a portable place to be alone as the automobile helped to facilitate relaxed sexual attitudes.Americans experienced TRAFFIC JAMS for the first time, as well as traffic accidents and fatalities. Soon demands were made for licensure and safety regulation on the state level. Despite the drawbacks, Americans loved their cars. As more and more were purchased, drivers saw their worlds grow much larger.

Popularity of the automobile has consistently moved with the state of the economy, growing during the boom period after World War I and dropping abruptly during the Great Depression, when unemployment was high. World War II saw a large increase in mass transit because employment was high and automobiles were scarce. The rapid growth of car owners after World War II, particularly in the United States and Western Europe demonstrated the population's favor towards automobiles. During the war, automobile motors, fuel, and tires were in short supply. There was an unsatisfied demand when the war ended and plenty of production capacity as factories turned off the war machine. Many people had saved money because there was little to buy, beyond necessities, in the war years. Workers relied heavily on mass transportation during the war and longed for the freedom and flexibility of the automobile.

A historian has said that Henry Ford freed common people from the limitations of their geography. The automobile created mobility on a scale never known before, and the total effect on living habits and social customs is endless. In the days of horse-drawn transportation, the practical limit of wagon travel was 10 to 15 miles, so that meant any community or individual farm more than 15 miles from a city, a railroad, or a navigable waterway was isolated from the mainstream of economic and social life. Motor vehicles and paved roads have narrowed the gap between rural and urban life. Farmers can ship easily and economically by truck and can drive to town when it is convenient. In addition, such institutions as regional schools and hospitals are now accessible by bus and car.

Yet, the effect on city life has been, if anything, more prominent than the effect on the farms. The automobile has radically changed city life by accelerating the outward expansion of population into the suburbs. The suburban trend is emphasized by the fact that highway transportation encourages business and industry to move outward to sites where land is cheaper, where access by car and truck is easier than in crowded cities, and where space is available for their one or two story structures. Better roads were constructed, which further increased travel throughout the nation. As with other automobile-related phenomena, the trend is most noticeable in the United States but is rapidly appearing elsewhere in the world.

Before the automobile, people both lived in the city and worked in the city, or lived in the country and worked on a farm. Because of the automobile, the growth of suburbs has allowed people to live on the outskirts of the city and be able to work in the city by commuting. New jobs due to the impact of the automobile such as fast food, city or highway construction, state patrol or police, convenience stores, gas stations, auto repair shops, auto shops, etc. allow more employment for the world's growing population.

Of the 10,000 or so cars that were on the road by the start of the 20th century, three-quarters were electric or had external combustion steam engines, but the versatile and efficient gas-burning internal combustion power plant was destined for dominance. Partnered with ever-

improving transmissions, tires, brakes, lights, and other such essentials of vehicular travel, it redefined the meaning of mobility, an urge as old as the human species.

The United States alone—where 25 million horses supplied most local transportation had about the same number of cars just three decades later. The country also had giant industries to manufacture them and keep them running and a vast network of hard-surfaced roads, tunnels, and bridges to support their conquest of time and distance. By century's end, the average American adult would travel more than 10,000 miles a year by car.

Other countries did much of the technological pioneering of automobiles. A French military engineer, Nicholas-Joseph Cugnot, lit the fuse by assembling a three-wheeled, steam-powered tractor to haul artillery. Although hopelessly slow, his creation managed to run into a stone wall during field trials—history's first auto accident. About a century later, a German traveling salesman named Nicholaus Otto constructed the first practical internal combustion engine; it used a four stroke cycle of a piston to draw a fuel-air mixture into a cylinder, compress it, mechanically capture energy after ignition, and expel the exhaust before beginning the cycle anew. Shortly thereafter, two other German engineers, Gottlieb Daimler and Karl Benz, improved the design and attached their motors to various vehicles.

These ideas leaped the Atlantic, and within a decade all manner of primitive cars—open topped, bone-jarring contraptions often steered by tillers—were chugging along the streets and byways of the land. They were so alarming to livestock that Vermont passed a state law requiring a person to walk in front of a car carrying a red warning flag, and some rural counties banned them altogether. But even cautious farmers couldn't resist their appeal, memorably expressed by a future titan named Henry Ford: "Everybody wants to be somewhere he isn't. As soon as he gets there he wants to go right back."

Behind Ford's homespun ways lay mechanical gifts of a rare order. He grew up on a farm in Dearborn, Michigan, and worked the land himself for a number of years before moving to Detroit, where he was employed as a machinist and then as chief engineer of an electric light company. All the while he tinkered with cars, displaying such obvious talents that he readily found backers when he formed the Ford Motor Company at the age of 40.

The business prospered from the start, and after the introduction of the Model T, it left all rivals in the dust. The Tin Lizzie, as the Model T was affectionately called, reflected Ford's rural roots. Standing seven feet high, with a four-cylinder, 20-horsepower engine that produced a top speed of 45 miles per hour, it was unpretentious, reliable, and remarkably sturdy. Most important from a marketing point of view, it was cheap—an affordable $850 that first year—and became astonishingly cheaper as the years passed, eventually dropping to the almost irresistible level of $290. "Every time I lower the price a dollar, we gain a thousand new buyers," boasted Ford. As for the cost of upkeep, the Tin Lizzie was a marvel. A replacement muffler cost 25 cents, a new fender $2.50.

What made such bargain prices possible was mass production, a competitive weapon that Henry Ford honed with obsessive genius. Its basis, the use of standardized, precision-made parts, had spun fortunes for a number of earlier American industrialists—armaments maker Samuel Colt and harvester king Cyrus McCormick among them. But that was only the starting point for Ford and his engineers. In search of efficiencies they created superb machine tools, among them a device that could simultaneously drill 45 holes in an engine block. They mechanized steps that were done by hand in other factories, such as the painting of wheels. Ford's painting machine could handle 2,000 wheels an hour. In 1913, with little fanfare, they tried out another tactic for

boosting productivity: the moving assembly line, a concept borrowed from the meat-packing industry.

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