



Heartland Science

Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

First Soap Box Derby

Dayton, in 1934, held the first "All-American Soap Box Derby," a race that has sparked interest in automotive engineering in thousands of young people. There were 34 entries in the first derby, which quickly became a national sensation. Local competitions still are held around Ohio counties, with winners coming to the event's home in Akron, Ohio every July for the World Championship race.



Myron Scott's Idea

Myron Scott was a journalist who came up with the idea of the "Soap Box Derby." He had been reporting on a race that only allowed "home-built" race cars in Dayton Ohio. He then copyrighted the idea and helped spread the idea nationally. The first "All-American Soap Box Derby" was held in Dayton in 1934, but moved to Akron in 1935 for a more challenging terrain. The sport was so popular that a permanent track called the "Derby Downs" was built in Akron in 1936. Derby Downs was built in a city park near the Akron Municipal Airport and the Goodyear Air Dock, where the blimps Macon and Akron were housed. A 1600-foot cement-paved raceway was constructed with three ten-foot lanes. The distance the cars would actually travel was 1175 feet.

The Rules

In 1937, a few new rules came into play. The age limits were changed from 6-16 to 9-15 years, and prior winners could no longer compete. Also, no car could cost more than \$10 and adult involvement was strictly prohibited. Today's rules are a little more complicated.

These days, The All-American Soap Box Derby Championship is still held annually in Akron and is comprised of 440 qualifiers from the U.S. and foreign countries. Each competitor builds his or her own gravity-powered car, with assistance from a parent or other adult, from kits purchased from the All-American Soap Box Derby. The first, second, and third place winners in each division and age group are now awarded college scholarships (up to \$5,000).



1965 Soap Box Derby Trophy

Did You Know?

- In 1934, the winners of the Soap Box Derby were Robert Turner (Muncie, IN) followed by Claude Alexander (Chattanooga, TN) and Jack Fusternberg (Omaha, NE). As first place winner in 1934, Robert Turner earned \$500. He won by only 1.4 seconds.
- Scott named the Chevrolet Corvette.
- Prior competitors in the Derby include: Johnny Carson (former Tonight Show host), Tom Sneva (1983 Indy 500 champion), and Cale Yarborough (multiple NASCAR WC champion).

Find out more...

- [All American Soap Box Derby](http://aasbd.com/)
(<http://aasbd.com/>)
- [Soap Box Derby History](http://aasbd.com/SBD_history.htm)
(http://aasbd.com/SBD_history.htm)
- [Soap Box Derby Historical Photos](http://aasbd.com/pic_gallery.htm)
(http://aasbd.com/pic_gallery.htm)
- [Smithsonian Article on the Soap Box Derby](http://www.smithsonianmag.si.edu/smithsonian/issues95/may95/object_may95.html)
(www.smithsonianmag.si.edu/smithsonian/issues95/may95/object_may95.html)



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Electrifying the Automobile

Charles F. Kettering and Edward Deeds in 1909 founded the Dayton Engineering Laboratories Company (Delco), which became known as the company that brought automobiles into the Age of Electricity. Kettering sold Delco to General Motors in 1916. He moved to Flint, Michigan, and became vice president of the GM Research Corporation. He worked there until retirement in 1947, acquiring the nickname "Boss Ket" as he fostered a spectacular series of automotive innovations.



Born on a farm outside Loudenville, Ohio in 1876, Kettering got a degree in electrical engineering from the Ohio State University and took his first job with National Cash Register (NCR). His inventions there included an electric motor for a cash register. Kettering left NCR in 1909 to start his own research and development firm, the Dayton Engineering Laboratories Company (Delco). Electricity had just begun to carve out a role in industry, and Kettering was convinced that electric devices could transform society. Most cars at that point used no electricity. Motorists started the car with a hand crank attached to the engine. Vehicles with headlights used oil lamps. Better storage batteries were becoming available, and enabled cars to use electric horns and headlights. Delco developed an electric ignition system for Cadillac, which became part of General Motors in 1909.



It was the first self-starter system. Delco pioneered other electrifying inventions for the automobile, and Kettering was holder or co-holder of more than 140 patents. Working with research associates, Kettering's inventions included Freon for refrigerators and air-conditioning systems, the tetraethyl lead additive that boosted the octane rating of gasoline, new lacquer finishes for cars, and improved automotive brake and automatic transmission systems.

Quotations From Boss Kettering

As Charles F. Kettering's successes multiplied, people wondered about his secrets for success. He became a much-sought-after public speaker and a philosopher of invention. Some famous quotes from The Boss:

- "An inventor fails 999 times, and if he succeeds once, he's in. He treats his failures simply as practice shots."
- "Failures are finger posts on the road to achievement."
- "It's amazing what ordinary people can do if they set out without preconceived notions."
- "Believe and act as if it were impossible to fail."

- "Keep on going, and the chances are that you will stumble on something, perhaps when you are least expecting it. I never heard of anyone ever stumbling on something sitting down."
- "The world hates change, but it is the only thing that has brought progress."
- "People are very open-minded about new things -- as long as they're exactly like the old ones."
- "The biggest job we have is to teach a newly hired employee how to fail intelligently. We have to train him to experiment over and over and to keep on trying and failing until he learns what will work."
- "An inventor is simply a person who doesn't take his education too seriously. He tries and fails maybe a 1000 times. If he succeeds once then he's in."

Find out more...

- [MIT Biography of Kettering](http://web.mit.edu/invent/iow/kettering.html)
(<http://web.mit.edu/invent/iow/kettering.html>)
- [IEEE History of Kettering](http://www.ieee.org/organizations/history_center/legacies/kettering.html)
(www.ieee.org/organizations/history_center/legacies/kettering.html)



Heartland Science



Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

First Fill 'Er Up

In 1917, the Standard Oil Company of Ohio opened the first automobile filling station dealing exclusively in the sale of gasoline and petroleum products in Columbus, Ohio. It paved the way for modern service stations, where motorists can get a range of automotive products and services in a single stop.



Did You Know?

- Standard Oil of Ohio, or Sohio was acquired by British Petroleum which is now BP.
- Gas stations are called petrol stations, or petrol garages, outside of the U.S. and Canada.
- Gasoline is sold by the U.S. gallon in the United States and by the litre in most other parts of the world.



Find out more...

- [Standard Oil Company History](http://www.us-highways.com/sohist.htm)
(www.us-highways.com/sohist.htm)



Heartland Science

Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

Nation's First Gasoline-Powered Automobile

John Lambert, of Ohio City, Ohio, invented America's first gasoline-powered automobile in 1891. The three-wheel motorized buggy made transportation history, but was not a commercial success. Lambert dropped the idea of a car and worked on gasoline engines. Later, however, he resumed automobile manufacture and produced commercially successful four-wheel cars at his Buckeye Manufacturing plant.



The Lambert (1908 model shown to the right) could travel at about 25-30 miles per hour and was powered by a 15-horsepower Buckeye engine. It featured brass lights, leather seats, and a wooden floorboard.

Gas powered cars took off because petroleum was so inexpensive, and also due to the size of batteries required for earlier electric cars. However, with gas-powered vehicles came lots of extra noise on the streets, as the new vehicles were much noisier than their battery powered predecessors.



1908 Lambert

What is Octane?

Octane ratings are applied to gasoline based on how much the fuel can be compressed before it spontaneously ignites in a cylinder. If gas ignites by compression - rather than from a spark from the spark plug - it can cause knocking. Knocking damages an engine, so it is something to avoid. Low-octane gas -- 87-octane for example -- handles the least amount of compression before igniting, or knocking.

Did You Know?

- Thomas Midgley, Jr., an Ohio chemist who worked at the Dayton Engineering Laboratories Company (Delco) in 1921 invented the tetraethyl lead gasoline additive that prevented engine knock.

Find out more...

- [How Automobile Engines Work](http://auto.howstuffworks.com/engine.htm)
(<http://auto.howstuffworks.com/engine.htm>)
- [How Gasoline Works](http://science.howstuffworks.com/gasoline.htm)
(<http://science.howstuffworks.com/gasoline.htm>)



Heartland Science

Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

The Jeep

In 1940-1941, Delmar Roos and a team of engineers at the Willys-Overland Company (now the DaimlerChrysler Corporation) designed the famous Jeep in Toledo, Ohio. The four-wheel-drive vehicle, built for rough use, helped The Allies win World War II and has been called the most important piece of military equipment used in the war. General Dwight D. Eisenhower reportedly said that America could not have won World War II without it. In 1940, the Army put together a list of specifications for a new vehicle that could handle rough terrain and challenging weather conditions. 135 automotive companies were invited to try to design the new vehicle - but they had to do it within 49 days. The original specifications were printed in the Quartermaster Corps, on July 7, 1940. The specs required:



- A driving front axle with 2-speed transfer case including provisions for disengaging the front axle drive
- A body of rectangular design with a folding windshield and 3 bucket seats
- Increased engine power
- Means for towing
- 30-caliber machine gun mount
- Blackout lighting
- Oil-bath air cleaner
- Hydraulic brakes
- Full floating axles
- Wheelbase of 80"
- Maximum height of 40"
- Maximum weight of 1275 lbs.
- Approach and departure angles of 45 and 40 degrees, respectively
- Must reach 50 mph on hard surface
- Special bracing for a pintle hook setup
- No aluminum to be used for cylinder head
- At least 4 cylinders
- 8 of the 70 vehicles to be made had to be four-wheel-steer



The Bantam Company delivered its model on September 23, 1940, but it was 730 pounds overweight. Willys Overland provided two versions of its model called "the Quad" on November 11. Ford had their model, "the Pigmy" in by November 23. Both the Willys-Overland and the Ford models incorporated some of the Bantam designs -- which was understandable as they were each given free access to Bantam's blueprints. The Army liked all three design and ordered 1500 of each. Testing led to modifications on all three, and the final versions were called the Bantam 40 BRC, the Willys MA and the Ford GP (G for Government, P for 80" wheelbase).

In 1941 the War Department narrowed production to one model, the Willys-Overland, because it met the task and was lower priced than the others. The single model was manufactured by both Willys-Overland and Ford under the name GPW - with the W representing "Willys." Willys-Overland and Ford produced more than 637,000 Jeeps between 1941 and 1945. The basic model was later modified to make military amphibious vehicles, ambulances, tractors, and mail delivery vehicles.

What's a Jeep?

The word "Jeep" was first coined during WWI. Major E.P. Hogan wrote a history of Jeep development for the Army's Quartermaster review in 1941. In it, he explained that the word "Jeep" "is an old Army grease monkey term that dates back to WWI and was used by shop mechanics in referring to any new motor vehicle received for a test." Jeep also likely was derived from the coding GP (G for Government, P for 80" wheelbase).



What About Popeye?

In 1936, the popular comic strip Popeye introduced the word Jeep with its character "Eugene the Jeep." Eugene could say the words "Jeep, Jeep."

Find out more...

- [DaimlerChrysler Jeep](http://www.jeep.com)
(www.jeep.com)
- [The Jeep, A Real American Hero](http://www.off-road.com/jeep/jeephist.html)
(www.off-road.com/jeep/jeephist.html)
- [Eugene the Jeep](http://members.tripod.com/HoboJeepers/eugene.htm)
(<http://members.tripod.com/HoboJeepers/eugene.htm>)



Heartland Science



Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

World's Largest Land Vehicle

The Marion Power Shovel Company in Marion, Ohio, in 1965 built the world's largest land vehicle, NASA's Crawler Transporter (CT). It played a key role in the Apollo program, which landed Americans on the moon, and then tackled a new mission to help launch the space shuttle fleet. Bucyrus International acquired the Marion Power Shovel



Company in 1997.

How do you move 12 million pounds worth of a Saturn V rocket and its launching derrick 5 miles from an assembly building to the launch pad? Oh, by the way, you've got to keep the rocket vertical while negotiating a road with grades of 5 degrees.

NASA faced that problem in the 1960s, as the Apollo program swung into full gear. The Saturn V rocket had to be enormous to lift the 45-ton Apollo spacecraft on those historic earth orbital and lunar missions from 1967 to 1972. Engineers would assemble the rocket in a vehicle-assembly building located about 5 miles from the launch pad.



For the answer, NASA turned to Marion, a company world famous since the late 1800s for building mammoth steam shovels and other machines for digging and earth moving. The Ohio company built two identical machines straight out of science fiction. The Crawler Transporter is 131 feet long, 114 feet wide, weighs 6 million pounds, and rides on 4 double tracks, each pair bigger than a school bus. Its two giant diesel engines crank out 8,000 horsepower. They drive electric generators that supply current for the vehicle's 16 electric motors, which move it at a top speed of 1-2 miles per hour.

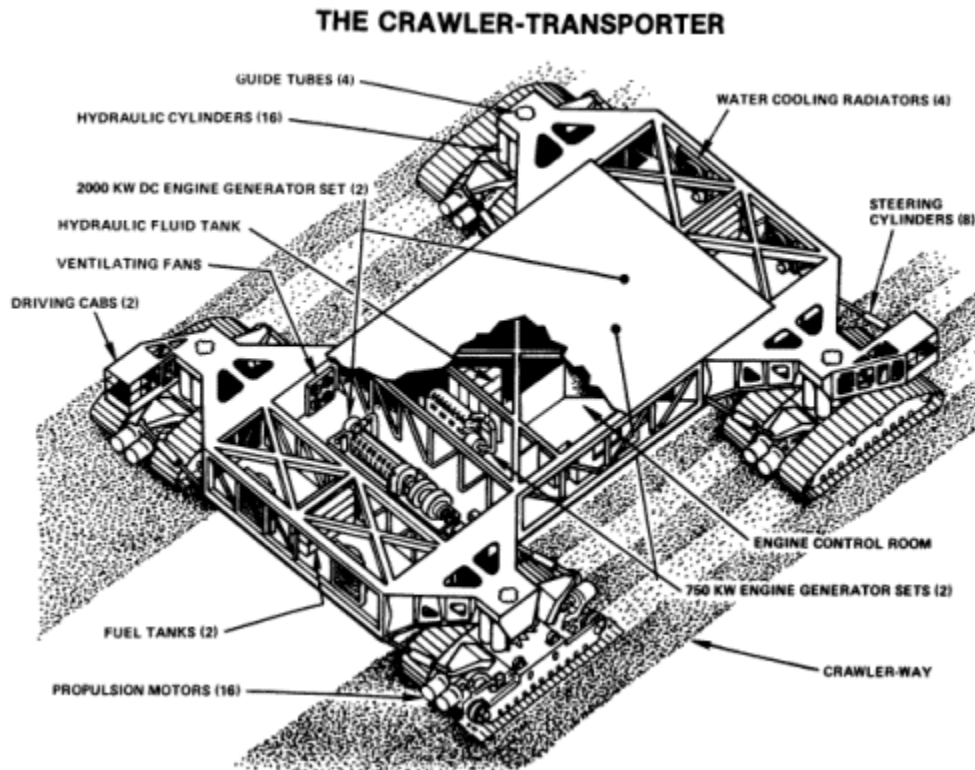
Fuel economy? About 42 feet per gallon, or 126 gallons per mile.

The Crawler Transporter, however, is both brawn and brains, with a sophisticated automatic load-leveling system that keeps spacecraft level, despite slight dips in the road.

Marion built the behemoths in Ohio, and shipped them to the Kennedy Space Center (KSC) in Florida for assembly. The Crawler Transporters carried all of the Apollo program rockets to the launch pad, including Apollo 11, the first lunar landing mission in 1969. Then they were modified for service in the space shuttle program.

KSC workers assemble the airplane-like shuttle orbiter, external fuel tank, and solid rocket boosters inside a huge building. Then the CT lifts the vehicle and its mobile launcher, and carries it to the launch pad. The upgraded Crawler Transporters use a laser guidance system to reach the launch pad, where they PLACE the Shuttle-topped mobile launcher onto the pad pedestals. The CT then rumbles away to a secure parking site away from the pad to avoid possible damage from launch.

If hurricane-strength winds move in, NASA summons a CT to carry the shuttle back to the safety of the vehicle assembly building. That return trip also may be necessary to repair problems with the shuttle detected just before launch. After each launch, the Crawler Transporter removes the mobile launcher from the pad so it can be refurbished.



Find out more...

- [NASA History of the Crawler-Transporter](http://www.hq.nasa.gov/office/pao/History/SP-4204/ch13-1.html)
(www.hq.nasa.gov/office/pao/History/SP-4204/ch13-1.html)



Heartland Science



Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

Olds' Oldsmobile

In 1897, Ransom E. Olds, a native of Geneva, Ohio, began manufacturing the Oldsmobile, America's first commercially successful automobile. The 3-horsepower vehicle had a sporty curved dashboard and was the first car manufactured with an assembly line system that foreshadowed modern mass-production methods. Oldsmobile is the oldest continuing car make manufactured in the United States.



The Oldsmobile was not America's first domestically produced car. That honor goes to a vehicle built in 1893 by Charles and Frank Duryea. They were two bicycle makers from Springfield, Massachusetts who were inspired to build a car after seeing a gasoline engine in 1886 at the Ohio State Fair. The Duryea brothers were the first in the United States to build cars for sale. By 1896, they had sold 13 vehicles.

Olds incorporated The Olds Motor Co. in 1897 in Lansing, Michigan, and it turned out 4 vehicles that first year. The "Curved-Dash Oldsmobile" had a single-cylinder engine, chain drive, and used tiller-type steering rather than a steering wheel. It sold for \$650. By 1978, Oldsmobile, a part of the General Motors Corp., had produced 20 million vehicles.



Early Oldsmobiles set a number of automotive records. In 1903, the Olds "Pirate" model traveled 5 miles in 6.5 minutes, a new world record. In 1905, two Oldsmobiles complete the first transcontinental race from New York City to Portland, Oregon in 44 days. In 1922, an Oldsmobile set another record by traveling 1,000 miles in 15 hours.

Find out more...

- [Oldsmobile History](http://www.oldsmobile.com/olds/enthusiasts/history.htm)
(www.oldsmobile.com/olds/enthusiasts/history.htm)



Heartland Science

Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

First Automatic Traffic Signal

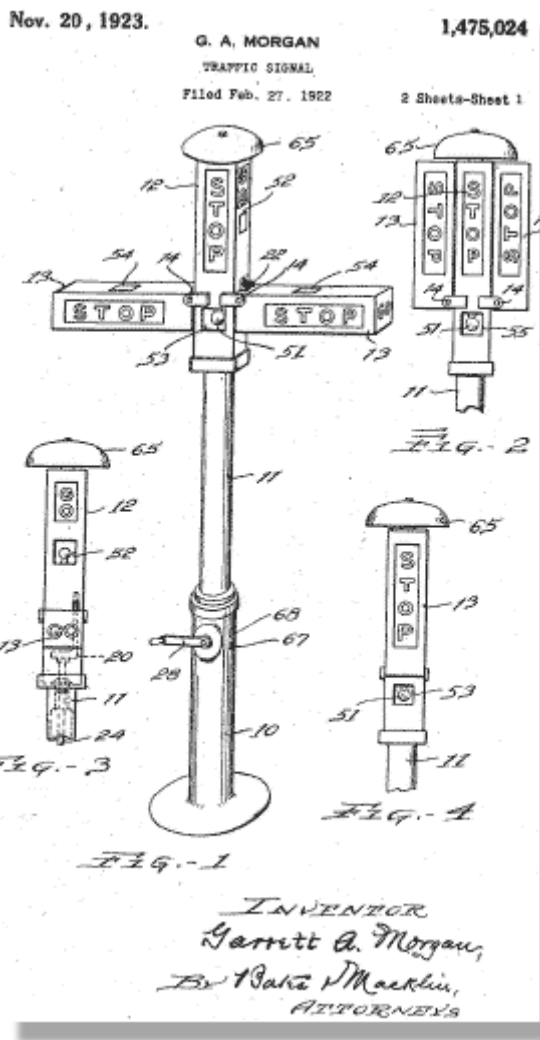
Garrett A. Morgan, an African-American businessman and inventor, invented the first automatic traffic signal in 1923. It brought order and greater safety to city streets congested with the increasingly popular horseless carriages. The first traffic signal was installed in Cleveland at the corner of Euclid Avenue & East 105th Street. Inspiration for the invention came to Morgan as he watched traffic flow on the busy streets of Cleveland. Morgan sold the invention to the General Electric Co for \$40,000, and GE began manufacturing the signals.



Morgan was the son of former slaves, and grew up on a farm in Kentucky. As a teen, he moved to Cincinnati, Ohio. While he never went past elementary school in formal training, he did work with a tutor in Cincinnati. Morgan moved to Cleveland in 1895 and went to work as a sewing machine repairman. His understanding of mechanics helped him both in this trade and also in his memorable inventions. In 1907, he launched his own business that repaired sewing machines and also trained others to do the same. Not a man to focus just on one thing, Morgan started a newspaper in 1920 called the "Cleveland Call." It was during this period that Morgan came up with the idea of the traffic signal.

While colored lights were incorporated later, Morgan's idea was a machine that displayed three versions of signs: "stop" -- "go" -- and an "all-directional stop." The all directional stop was design to allow people to cross the busy streets. While other may have been working on similar ideas at the time, Morgan was the first to acquire a U.S. patent for his work, which was granted on November 20, 1923.

Morgan also contributed to public safety with other inventions. He invented helmets and gas masks used by firefighters in the early 1900's. He also invented a gas mask that was used extensively in 1914 during World War I to protect service people from the effects of chlorine gas fumes.



Did You Know?

- Morgan invented the first hair straightener which he sold as "Morgan Hair Refining Cream."
- He also designed a "de-curling" comb.
- Morgan invented "zig-zag" sewing machine stitching.

Find out more...

- [Garrett Morgan: Father of the Stoplight](http://www.nhtsa.dot.gov/kids/safeschool/morgan2.html)
(www.nhtsa.dot.gov/kids/safeschool/morgan2.html)
- [Morgan's Patents and Illustrations](http://www.princeton.edu/~mcbrown/display/morgan_patents.html)
(www.princeton.edu/~mcbrown/display/morgan_patents.html)



Heartland Science

Ohio's Legacy of Discovery & Innovation



Transportation

From the Soapbox Derby to the Jeep

First Regularly Produced Car and Ad

Alexander Winton founded the Winton Motor Carriage Company, the first American company to sell a regularly produced automobile and the first to produce a truck. Winton emigrated from Scotland to New York in 1878, and then settled in Cleveland, OH in 1882. He is said to have placed the first automobile ad, which appeared in *Scientific American* magazine.



Winton's first cars were built and assembled by hand. They were beautiful, with a leather roof and gas lamps. Winton promotional brochures explained that the car had "just enough polished brass... to enliven the general effect." The Goodrich Rubber Company of Akron, Ohio made the rubber tires for Winton cars.

On March 24, 1898, Robert Allison of Port Carbon, PA became the first person to buy an American-built automobile. He reportedly was inspired to buy one after being influenced by Winton's ad in *Scientific American* magazine.

By the end of 1889, Winton sold 21 automobiles, and by the end of 1890 more than a hundred more. That total made Winton the largest manufacturer of gas-powered automobiles in the U.S. at the time.

In 1903 Horatio Nelson Jackson drove a new Winton cross-country. It was the first successful automobile drive across the United States. His young bulldog, Bud, accompanied him on the trip. Winton stayed open for business until 1924, when the onslaught of automobile manufactures provided too much competition.



Did You Know?

- Winton was the first to incorporate a steering wheel in his design, instead of a tiller
- Winton developed the first storage battery that proved practical.
- Winton was the first to put the engine in the front of the car, instead of underneath the frame.
- Winton built the first car carrier in America to help deliver his product.
- The Winton's tank held 11-12 gallons of gas. According to the Winton brochure, this was "sufficient to run the car about 175 miles over ordinary roads."

Find out more...

- [PBS Profile of Horatio Nelson Jackson's Drive Across America](http://www.pbs.org/horatio/car)
(www.pbs.org/horatio/car)
- [Winton Owner's Manual](http://www.pbs.org/horatio/car/winton.html)
(www.pbs.org/horatio/car/winton.html)
- [Photo Gallery of Jackson's Winton](http://www.pbs.org/horatio/car/image01.html)
(www.pbs.org/horatio/car/image01.html)