

# We've popped the hoods

on the incredible stories of grit and imagination that drive us forward. Dozens of our most fascinating models share the inside story of the engine's evolving technology. Discover the thinking behind our most advanced cars that started over a century ago, from the 1904 Packard Model L (front cover) with its cutting-edge technology — its engine out under the hood rather than tucked beneath the seat — to the 2009 Ford Focus Electric and everything in between. Dive into the surprising and daring history of the automobile on a deeper level

## Daily Programming

### Exploring Automotive Innovations

Join us for a 20-minute conversation about our world-class car collection. Topics change daily and may include everything from the basics to a deep dive on one or two cars. Check on-site signage for today's offerings.

Daily, 12:30

Meet outside Drive-In Theater

### Experiment with History

Uncover the STEM inside our cars, and discover how crowdsourcing changed travel opportunities in the 1940s.

Mon.-Fri., 11:00-12:30 and 1:00-2:30

Driving America

### Curator Close-Up

Curious what Matt Anderson, curator of transportation at The Henry Ford, has to say about engine innovations? Listen and view innovations and some exceptional engines using our digitized collection.

January 20, 1:00, Drive-In Theater

February 17, 1:00, Museum Plaza

### Corliss Steam Engine

How does that engine work, and what does it have to do with engines today? We can help! See the mighty Corliss Steam Engine power up, and experience firsthand the science behind its power, efficiency and precision.

Mon.-Fri., 10:30

Sat.-Sun., 1:30

Made in America: Power



Front cover and above: The Packard Model L's 4-cylinder, 22-horsepower engine was big and powerful — for 1904.

## Mark Your Calendar

### Make Something: Saturdays

January 13-February 24, 10:00-3:00

Museum Gallery Plaza

(near Your Place in Time)

### January

This month will come in with the roar of automobile power. Our Fresh Ideas themes will look at past, present (and future) power systems for automobiles with our Power Up! demonstration at 10:00, 11:00, 12:00, 1:00 and 2:00. Then we'll speed ahead with a hands-on exploration of some fresh ideas for automobiles of the future.

### February

Join us for "You Can Invent," and explore ways to move people and products from place to place.

*Hands-on activities recommended for 7 and up.*

### National Engineers Week Celebration

February 17-24

Engineers transform dreams into reality. The Henry Ford celebrates these dreamers and doers with daily hands-on learning opportunities, guest experts and the *Dream Big: Engineering Our World* film in the Giant Screen Experience.

### Michigan Invention Convention Showcase

March 19

Museum Plaza

The Michigan Invention Convention and Showcase provides a live, interactive opportunity for youth inventors and entrepreneurs to display their critical thinking and entrepreneurial skills through inventing and pitching a product, and offers an opportunity for everyone to celebrate inventors and entrepreneurs of all ages, backgrounds and disciplines.

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# The Science Behind PIXAR

LIMITED-ENGAGEMENT EXHIBITION

RUNNING THROUGH MARCH 18, 2018

Presented by **meijer**

HENRY FORD MUSEUM OF AMERICAN INNOVATION  
BUY TICKETS AT [THEHENRYFORD.ORG/PIXAR](http://THEHENRYFORD.ORG/PIXAR)

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# INNOVATION NATION

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CBS DreamTeam  
...It's Epic!

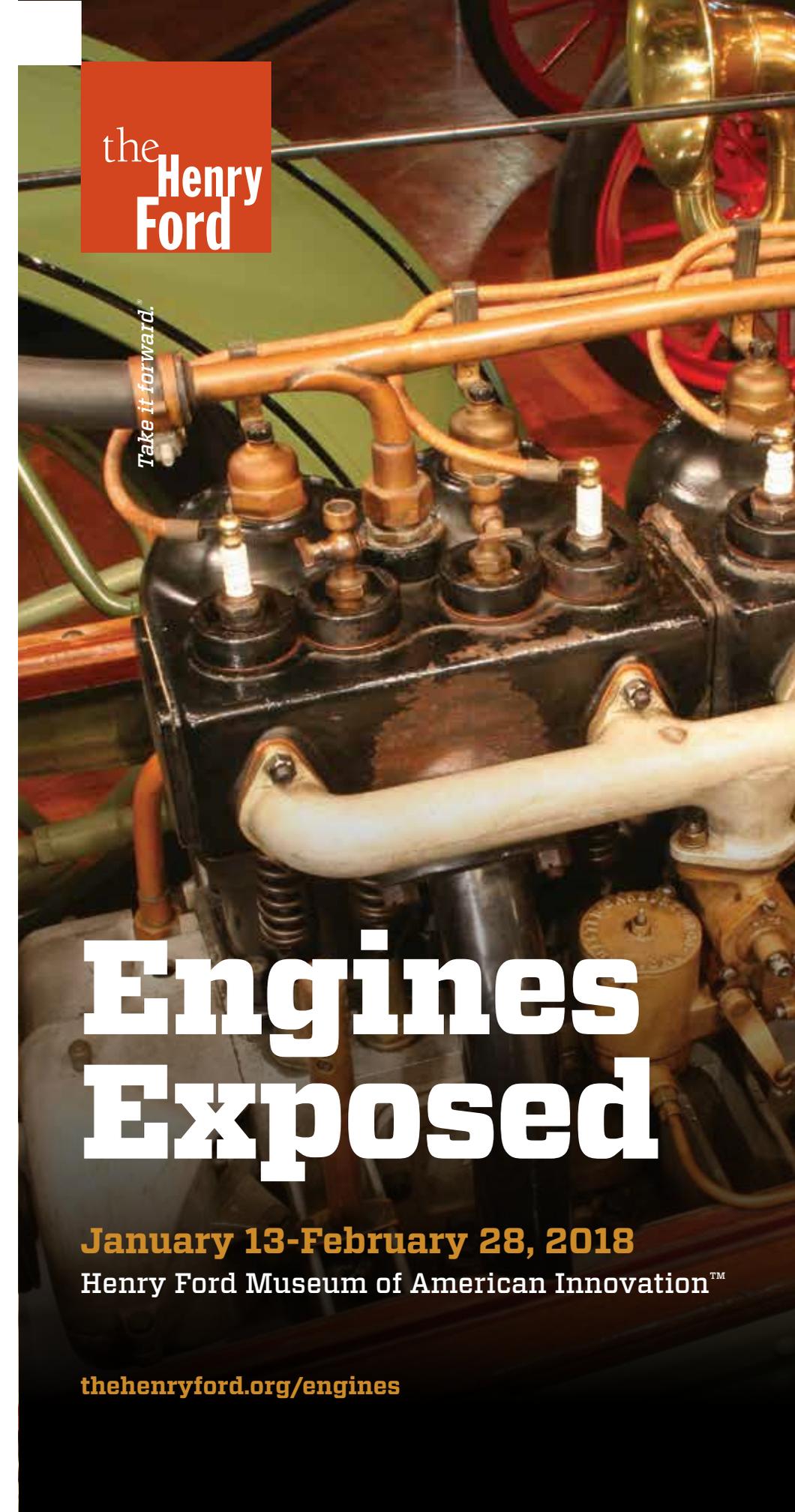
>> TUNE IN SATURDAY MORNINGS ON CBS, watch online at [thehenryford.org/innovationnation](http://thehenryford.org/innovationnation) or stop into the store to purchase the DVD.

## MARK YOUR CALENDAR

For These Popular Car Shows In Greenfield Village

**Motor Muster**  
June 16-17, 2018  
Open Saturday 'til 9  
Free with membership  
Great Father's Day outing! Kick off the start of summer in Greenfield Village with one of the most extensive and carefully chosen selection of vehicles in the country.  
[thehenryford.org/motormuster](http://thehenryford.org/motormuster)

**68th Annual Old Car Festival**  
September 8-9, 2018  
Open Saturday 'til 9  
Free with membership  
Feel the passion behind America's longest-running antique car show, featuring hundreds of authentic vehicles from the 1890s through 1932.  
[thehenryford.org/oldcarfestival](http://thehenryford.org/oldcarfestival)



# Engines Exposed

January 13-February 28, 2018  
Henry Ford Museum of American Innovation™

[thehenryford.org/engines](http://thehenryford.org/engines)

# Curator's Choice: Top 15 Engines Exposed

There are more than 60 on view, but here Matt Anderson, curator of transportation at The Henry Ford, describes some of his favorites.

## 1 2009 Ford Focus Electric

Electric motor: AC, permanent magnet, 105 kilowatt, 141 horsepower

Ford previewed its entry into the electric vehicle market with this car specially built for *The Jay Leno Show*. The sizable AC/DC inverter dominates the space under the hood, with the electric motor mostly hidden underneath. Note the large fan at front to keep the motor cool. Also note the prominent "Caution" decal on the inverter. Modern automobile power plants are better than ever, and the days of the shade tree mechanic may be gone for good.

## 2 1903 Holsman

Horizontally opposed 2-cylinder engine, T-head valves, 64 cubic inches displacement, 5 horsepower

Simplicity was the Holsman's motto. It was easy to build, easy to drive and easy to maintain — by 1903 standards, anyway. The air-cooled engine eliminated the weight (and expense) of a radiator. The T-head engine design put the intake valve on one side of the cylinder and the exhaust valve on the other.

## 3 1932 Ford V-8 Engine

V-8 cylinder engine, L-head valves, 221 cubic inches displacement, 65 horsepower

Low price meant four-cylinders, so Chevrolet turned heads with the inline-six in its 1929 models. Ford responded with a V-8 for 1932. How to sell a big engine for a small price? The typical V-8 used a separate crankcase and cylinder blocks. Ford cut costs by casting the three pieces as one unit. This original V-8 design remained in production, with modifications, until 1953.

## 4 1914 Ford Model T

Inline 4-cylinder engine, L-head valves, 177 cubic inches displacement, 20 horsepower

The Model T's cylinders are cast *en bloc*, in a single unit. The engine has no fuel pump, relying on gravity to feed the carburetor. There is no water pump either, as a thermosiphon effect was used to circulate cooling water. The cylinder head is removed in one piece for easier servicing. Electric start wasn't available on the T until 1919.

## 5 1925 Ford X-8 Engine

X-8 cylinder engine, L-head valves, 108 cubic inches displacement, horsepower unknown

Henry Ford had high hopes for his experimental X-8 engine in the early 1920s. About 10 working examples were built, some cooled by water and some by air. But the shape required complex manifolds to route fuel and exhaust, and the lower spark plugs collected dirt and mud from the road. Ford turned to a more conventional and more successful inline-four for the 1928-1931 Model A.

## 6 1968 Mercury Cougar

V-8 cylinder engine, overhead valves, 390 cubic inches displacement, 335 horsepower

Unlike other pony cars, the upscale Cougar didn't bother with 6-cylinder plants. V-8 was the only available engine layout. This XR7-G model is equipped with Mercury's 390-4V engine. The "V" is for Venturi, meaning there's a four-barrel carburetor under that air cleaner. And the "G" in the model name? That's for Dan Gurney, who raced Cougars in Trans Am competition.

## 7 1951 Crosley Hotshot

Inline 4-cylinder engine, overhead camshaft, 44 cubic inches displacement, 26.5 horsepower

The Hotshot debuted in 1946 with an engine made from brazed sheet metal. The block and cylinder head weighed a mere 15 pounds! This "Tin Wonder" construction proved itself in PT boats and bomber planes in World War II but corroded quickly in consumer cars, where maintenance was less rigorous. Crosley switched to a conventional cast-iron engine in 1949.

### Add an EcoBoost Today!

Modern engines combine horsepower and efficiency to power even the biggest, baddest trucks, including the 3.5L EcoBoost-powered F-150 Raptor. Visit the **Ford Rouge Factory Tour** to see where they're born.

**Last tour departs 3:00.**  
See a *Guest Services associate* for details.

## 8 1987 Ford Thunderbird Stock Car

V-8 cylinder engine, overhead valves, 351 cubic inches displacement, 625 horsepower

Bill Elliott's 212.809 mph speed record, set while qualifying with this car at Talladega in 1987, brought great publicity to NASCAR. Not so for Bobby Allison's subsequent high-speed crash, which injured several spectators. In response, NASCAR mandated carburetor restrictor plates at superspeedways. The plates reduced the flow of air and fuel into the cylinders, cutting engine power and speed.

## 9 1956 Chrysler 300-B Stock Car

V-8 cylinder engine, overhead valves, 352 cubic inches displacement, 355 horsepower

They didn't call the Chrysler 300 letter series luxury cars "bankers' hot rods" for nothing. The 1956 300-B's big V-8 achieved that holy grail of one horsepower per cubic inch. The cars dominated NASCAR, where rules still restricted teams to stock power. Note the cutout in the right wheel well and the nearby spotlight. These modifications allowed the driver to check tire wear through a hole in the firewall.

## 10 1951 Beatty Belly Tank Lakester

V-8 cylinder engine, overhead valves, 260 cubic inches displacement, 400 horsepower, supercharged

Between the six Stromberg carburetors and the Oldsmobile V-8 sits a modified GMC 6-71 supercharger. The device compresses air going into the engine, effectively putting more oxygen into the cylinders for a more powerful explosion in each ignition cycle. Tom Beatty was an early believer in superchargers on racing hot rods, with plenty of speed records to support his faith.

## 11 1949 Kaiser Traveler

Inline 6-cylinder engine, L-head valves, 226 cubic inches displacement, 100 horsepower

The inline or straight-six engine layout offers a good blend of power and fuel economy and superb mechanical balance. No wonder it remained the base engine of choice in American cars for nearly 50 years. Starting in the 1970s, oil embargoes and front-wheel drive pushed the straight-six aside in favor of more efficient, more compact inline-four and V-6 powerplants.



1987 Ford Thunderbird Stock Car

## 12 1896 Riker Electric

DC motor, 20 lead-acid batteries, 40 volts, 1 horsepower

The Riker's motor is mounted alongside its rear wheel and connected to it by a single reduction gear — about as simple an automotive transmission as you'll find. That single rear wheel also eliminates the need for a differential. Builder Andrew Riker went on to become the first president of the Society of Automotive Engineers.

## 13 1971 Honda CB750 Motorcycle

Inline 4-cylinder engine, single overhead camshaft, 45 cubic inches displacement, 67 horsepower

Honda aimed squarely at the U.S. market with the CB750. The big transverse 4-cylinder engine appealed to American tastes for speed and power, and the four mufflers gave the bike a unique look. Math whizzes will find that 45 cubic inches translates to about 736 cubic centimeters, a bit shy of 750. That's just good marketing. When it comes to engine size, round up!

## 14 1904 Packard Model L

Inline 4-cylinder engine, L-head valves, 242 cubic inches displacement, 22 horsepower

This is cutting-edge technology, circa 1904. The engine is out under the hood rather than tucked beneath the seat. It's also larger, with four cylinders rather than one or two. The valves are mechanical rather than atmospheric. Cooling is by water continuously circulated through a radiator with an ox-yoke shape destined to become a Packard trademark.

## 15 1955 Chevrolet Corvette

V-8 cylinder engine, overhead valves, 265 cubic inches displacement, 195 horsepower

Note the big gold "V" in the word "Chevrolet" on the front fenders. That means there's one of Chevy's new-for-1955 small-block V-8 engines under the hood rather than the "Blue Flame" 6. GM kept the small-block design in production until 2003, building more than 100 million of the engines across nearly every one of its divisions.

# Engines Exposed Exhibit Map

Check out more autos with their hoods popped. Need help locating? See a museum presenter for assistance.

