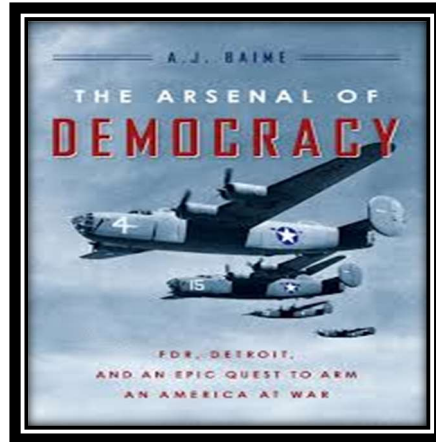


HOW DETROIT WON WORLD WAR TWO

THE MOTOR CITY'S MOST AMAZING WARTIME PRODUCTION MIRACLES AND HOW THEY HELPED WIN THE WAR

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THE AMERICAN AUTO INDUSTRY IN WW2

Dwight Eisenhower, the Supreme Commander of the Allied Expeditionary Force, would never forget the moment his boots hit the sand during Operation Overlord—the D-Day invasion of Normandy in 1944.

Shortly after the landings, Ike toured the beaches, which were littered with broken, bullet-pierced vehicles. It looked like a junkyard of dead machinery—yet also, proof that the war was being won by the soldiers of the American workforce, on assembly lines thousands of miles away.

“There was no sight in the war that so impressed me with the industrial might of America as the wreckage on the landing beaches,” he recalled in his memoirs. *“To any other nation, the disaster would have been almost decisive. But so great was America’s productive capacity that the great storm occasioned little more than a ripple in the development of our build-up.”*



AND WE DID IT

War is about valor, heroism, and sacrifice. But the story of victory during Operation Overlord, and the broader war, is also one of industrialism. World War II was, in large part, a contest between the Allies and Axis powers to dream up ingenious war machines and mass produce them with unparalleled speed. The D-Day invasion, for example, utilized some 50,000 vehicles of all types, well over 5,000 ships, and more than twice that number of airplanes. There were amphibious trucks, tanks, four-wheel-drive troop transporters, flame-throwing armored cars, jeeps, fighter planes, bombers... *No entity did more to produce that machinery than the American automobile industry, which at the time of World War II, had a larger economy than almost every foreign nation on earth.*

Think about it the next time you're sitting in your idling vehicle—about the contribution American car companies made to save the world from Hitler. Here's a look back at the most amazing stories that made Detroit the biggest war boomtown of them all.



William Knudsen, president of General Motors, met with President Franklin D. Roosevelt at the White House for the first meeting about the new National Defense Advisory Commission. Knudsen traded his high-paying auto executive job for a \$1 Government salary to help lead Detroit's war production effort.

WILLIAM KNUDSEN; GENTLEMEN 'WE MUST OUTBUILD HITLER

William Knudsen was president of General Motors—the largest corporation in history—in 1940. One day he was sitting in his Detroit office when he got a phone call from the President of the United States, Franklin Roosevelt. “Knudsen?” “Yes, Mr. President.” “I want to see you in Washington...”

Thus began William Knudsen's wartime adventure. FDR charged the Detroit auto man with heading up all military production in the U.S. Knudsen was making more money at GM than any executive outside of Hollywood, but he left his job to take on a government position, at a salary of \$1. Soon after, at the New York Auto Show, Knudsen gave a keynote speech that lit the flame of industrial Detroit. “The first half of 1941 is crucial,” Knudsen told a gathering of the most powerful Motor City executives. “Gentlemen, we must out-build Hitler.”

Knudsen went on to become a lieutenant general in the Army, the first and only civilian American to receive this honor, and those Detroit autumn became heroes in the battle of the assembly lines. As Arthur Herman wrote in his book *Freedom's Forge: How American Business Produced Victory in World War II*, by the war's end, Knudsen had gone from the president of GM to “the man who had built the U.S. armed services into the greatest military machine in history.”

FORD WILLOW RUN: THE PRODUCTION MIRACLE OF THE WAR.



Production line at the Ford Willow Run bomber plant. By 1945, Ford was churning out B-24 Liberators at the rate of one per hour.

One day in the spring of 1941, months before Pearl Harbor but well after the war had begun in Europe, a group of Ford cars lurched to a stop in an empty field outside Ypsilanti, Michigan.

As recollected in the book *Wheels for the World* by Douglas Brinkley, Charlie Sorensen, the company's foremost production guru, looked out and said, "We'll put a mile plant right across here!"

Edsel Ford (Henry Ford's only son) and Sorensen were the driving force behind the most ambitious industrial adventure in history up to that time: to build a factory that could turn out the biggest, most destructive bomber in the American arsenal, the **B-24 Liberator, at a rate of one per hour. Ford had never built a four-engine bomber, and aviation experts insisted it could not be done.**

Construction on the Willow Run Bomber Plant began in the spring of 1941 and it soon became the largest factory under one roof in the world. Its goal was to apply auto-making mass-production principles to 300-plus mph, 56,000-pound (when fully loaded) bombers. *The Washington Post* called Willow Run **"the greatest single manufacturing plant the world had ever seen,"** while *The Wall Street Journal* called it **"the production miracle of the war."**

By 1945, Ford had succeeded in building Liberators at a rate of one per hour. The company turned out a total of 8,685 B-24s. **Because of Ford, the B-24 is still the most mass-produced American military aircraft of all time.**

THE JEEP: 'AS FAITHFUL AS A DOG, AS STRONG AS A MULE'.

Of all the vehicles built during WWII, none is more iconic than the Jeep. Its story begins like this: In 1940, the Army asked car companies to come up with a design for a lightweight (2,175 pounds or less), four-wheel-drive vehicle that could be mass-produced and essentially take the place of what horses had been in warfare for centuries. **The vehicle had to conquer all kinds of terrain, and it had to be able to carry a 625-pound load.**



A Bantam jeep negotiates rough terrain. Jeeps have been called the grandfather of all SUVs.

Three companies built prototypes: Willys-Overland, Ford, and Bantam. The first two went on to make some 660,000 "blitz buggies"—**Willys** built 376,397 and Ford, **282,352**. Because the vehicles both had to use interchangeable parts, they were very similar. Miraculously, the first jeep that Ford constructed—GP No. 1 **Pygmy**—still exists; **it's on display at the U.S. Veterans Memorial Museum in Huntsville, Alabama.**

To see more of the Ford Pygmy copy and paste the below link into your browser

<https://www.hemmings.com/blog/2015/12/07/worlds-oldest-jeep-prototype-the-ford-pygmy-to-go-on-national-historic-vehicle-register/#&gid=1&pid=3>

Of the three prototypes that automakers submitted for the U.S. Army's new lightweight scout car in the early days of World War II, Ford's Pygmy probably shouldn't have stood a chance. It wasn't the lightest, it wasn't the fastest, and it wasn't the first submitted.

But it's still around today, making it the oldest jeep prototype tested by the Army as well as an excellent candidate for inclusion on the National Historic Vehicle Register.

As this vehicle took on the name Jeep (the origin of the moniker is highly debated), it also took on a life of its own, and today it has been called the grandfather of all SUVs.

The famed WWII war correspondent Ernie Pyle wrote of the jeep (just before he was killed in 1945, next to the one he had been riding in), "Good Lord, I don't think we could continue the war without the jeep.

It does everything. It goes everywhere. It's as faithful as a dog, as strong as a mule, and as agile as a goat."



The 1940 Ford Prototype "Jeep"
(Look familiar after 80 years?)

THE DETROIT ARSENAL TANK PLANT



Workers at a Chrysler plant assemble tanks. The company's first tank rolled off the assembly line even before the factory walls were completely built.

In 1940, William Knudsen telephoned K.T. Keller, the chief executive of Chrysler, and asked him if Chrysler could build tanks. "I don't know," came the answer. "I've never seen one of these things." Soon after, Chrysler broke ground on what would come to be known as the Detroit Arsenal Tank Plant, situated in what is now the suburb of Warren. Its goal: to build swarms of tanks according to auto-making mass production principles—something never accomplished before.

Even before the factory had been completed, the first Chrysler M3 tank rolled off the assembly line. The walls of the factory were not even up, so engineers brought a steam locomotive in to keep the place warm for the workers during Michigan's bitter winter of 1940-41. As the factory swelled to 1.25 million square feet, the company switched to M4 Sherman tanks, which were powered by a Frankenstein motor. Engineers took five six-cylinder engines that had been used in the Chrysler Royal and Windsor cars before the war and welded them together into one 30-cylinder motor that could pump 425 horsepower to the tank treads.

In the end, the Detroit Arsenal built more tanks than all of the Third Reich during the war years, tanks that roared through enemy lines to Hitler's Berlin.

THE AMPHIBIOUS "DUCK"



The amphibious 'duck' truck, designed and built by GM, operated both on water and on land.

Perhaps the most extraordinary of all of Detroit's World War II creations was a strange vehicle that could practically walk on water. The story goes back to 1942 when GM engineers got together with a marine architect and some Army officers to solve a critical problem. The army was planning massive, highly dangerous amphibious invasions, and there would be no port facilities for the landings. Soon a sketch was on paper for a vehicle that could launch from a ship, part the wave-propeller power, then hit the ground and drive at speeds of 50 mph, with three axles and six wheels (all-wheel drive).

While the vehicle's technical name was DUKW (in GM's code, D signified the model year 1942; U meant amphibious; K stood for front-drive; W for two-axle rear drive), the thing came to be known as the Duck. **GM built over 21,000 of them, at a cost to the government of \$10,800 each**, according to Michael W.R. Davis's *Detroit's Wartime Industry: Arsenal of Democracy*. At 31 feet long, the Duck could carry a payload of well over 5,000 pounds.

Pairs of them were strapped together to serve as landing craft for tanks. The vehicle made its most noteworthy mark during the Normandy invasion.

According to the U.S. Army Transportation Museum, between D-Day on June 6, 1944, and May 8, 1945, **Ducks moved 5.05 million tons of cargo onto the continent of Europe.**

THE FORD GLIDERS: BUILT TO CRASH LAND



The U.S. Army Air Force Waco CG-4A glider had a wingspan of over 83 feet long.

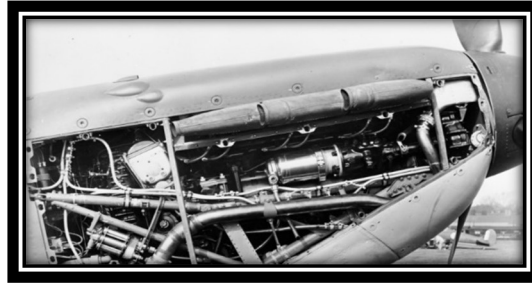
Around the time of Pearl Harbor, the U.S. Army approached Ford Motor Company about building an engineless aircraft that could be towed into the air by another airplane and set loose to glide through the ether, under no power of its own. Its mission? Delivering troops and equipment behind enemy lines, undetected. It was a novel idea. **As one Army general later put it: "Never before in history had any nation produced aviators whose duty it was to deliberately crash land."**

Years earlier, Henry Ford had built a plant in Iron Mountain, Michigan, which he used to turn leftover wood chips from Model T production into charcoal for barbecues. (The brand was originally called Ford Charcoal; **today it is Kingsford**, the largest producer of barbecue charcoal in the country.)

At this plant in 1942, Ford began mass producing a wooden glider called the Waco CG-4A, designed by Ohio-based Waco Aviation. Having never built a glider before, Ford managed to build more of them during WWII, at a cheaper cost, than any other company, and the CG-4A became the most widely used cargo/troop transporter glider of World War II.

With a wingspan of over 83 feet long and weighing about 7,500 pounds, each wooden glider could carry more than a dozen passengers. It could carry a tank or a Jeep. During the D-Day landings, fleets of these Ford-built gliders whistled engineless over the landing beaches during the pre-dawn hours. A handful of them still exist at the World War II Glider and Military Museum in Iron Mountain, Michigan, near where Ford originally built them decades ago.

PACKARD (ROLLS ROYCE MERLIN) ENGINES TAKE FLIGHT



Rolls Royce Merlin engine installed into the Spitfire Mark IIA for the Royal Air Force.

The Packard Motor Car Company of Detroit had just unveiled the first air-conditioned automobile (“cooled by mechanical refrigeration”) when the Battle of Britain began. The Brits were desperate for aircraft engines, so Packard took on a contract to build the jewel of the Royal Air Force: the Rolls-Royce Merlin liquid-cooled V12 aircraft engine.

This would not be easy. Packard had never built such a complex motor. The Merlin was the size of a coffin, more than 7 feet long.

At the same time, Los Angeles-based North American Aviation—a division of General Motors—was having trouble with a fighter plane called the P-51 Mustang; its V12 engine could not produce enough power at higher altitudes to make the Mustang competitive in dogfights. The U.S. Army Air Forces were desperate for a fighter that could outmaneuver enemy aircraft while maintaining enough range to accompany bombers on long-range missions. “You have to get a fighter to protect our bombers,” General Hap Arnold, the chief architect of the American Air Forces during WWII, told his deputy, according to his published diary. “Whether you use an existing type or have to start from scratch is your problem.”

When officials dropped this Packard Merlin engine into the North American P-51 Mustang, history was made. With top speeds of well over 400 mph, the Packard-powered P-51 became what most consider the best overall fighter aircraft of World War II. Packard made about 55,000 Merlin engines, and they changed the course of the war.

THE STRENGTH OF THE INDEPENDENTS



A PT boat patrolling the waters along the coast of New Guinea, 1943. Packard built engines for the U.S. Navy's PT fleet

While Detroit's Big Three—GM, Ford, and Chrysler, and their many divisions—were the pillars of American industry in the 1940s, numerous smaller auto companies made major impacts during WWII, companies that are often forgotten today. **Nash Kelvinator**, builder of Nash cars and Kelvinator refrigerators before the war, made Pratt & Whitney aircraft engines and aircraft propellers. **Studebaker** made Wright Cyclone engines for the B-17 bomber. **De Soto** crafted parts for airplanes and anti-aircraft guns, and the **Hudson** Motor Car Company mass-produced aircraft motors. **Packard**, meanwhile, built V12 marine engines for the Navy's PT boats, such as the one that powered PT 109, the boat that young John F. Kennedy was on when it was sunk by the Japanese.

CHRYSLER'S SECRET CONTRIBUTIONS TO THE ATOM BOMB



The atomic bomb, codenamed 'Little Boy,' is hoisted into the bomb bay of the Enola Gay.

Pedestrians moving past 1525 Woodward Avenue in Detroit in 1943 might have noticed something odd about the place—an inordinate amount of security surrounding the first floor of an abandoned department store.

Something very curious was going on inside. Chrysler engineers had set up offices for something called Project X-100, and FBI agents were patrolling the premises, as the work was so Top Secret, none of the engineers working on the project had any knowledge of what it was all about.

Only the top executives at Chrysler knew that the company was helping to build the atomic bomb.

To laymen, the thing **[the Manhattan Project]** sounded almost incredibly fantastic,” according to Chrysler’s 1947 official history of its bomb work, entitled Secret. “But if the United States Government thought it practicable, this, [Chrysler CEO] Mr. Keller said, was all that the Corporation needed to know.”

At this laboratory on Woodward Avenue, Chrysler engineers designed diffusers—cylindrical metal containers—that would not corrode during the process of separating fissile uranium-235 from uranium-238, at the Army’s secret Oak Ridge atomic plant in Tennessee. By 1944, thousands of workers at Chrysler’s Lynch Road factory were at work building 3,500 of these diffusers. According to the Atomic Heritage Foundation, these diffusers were so well-designed, that they were not only instrumental in building the Little Boy bomb used on Hiroshima, but they remained in use until the 1980s.

THE SHEER ENORMITY OF GENERAL MOTORS



A worker inspects shell cases at the converted plant of GM's now-defunct Fisher division, known for building auto bodies.

At the time of Pearl Harbor, General Motors had dwarfed every other corporation in the world—by far. And by the end of the war, GM had become the largest military contractor in the world, responsible for more than \$12 billion in war production. Tanks were rolling out of **GM's Cadillac factory**, where some of the nation's most luxurious cars were being built just a few years earlier. **Oldsmobile** had delivered roughly 40 million artillery rounds. **Pontiac** was building highly complicated Oerlikon anti-aircraft guns.

GM's WWII production numbers (courtesy of the GM Heritage Center) tell the story: 119,562,000 artillery shells; 39,181,000 cartridge cases; 206,000 aircraft engines; 13,000 Navy fighter planes and torpedo bombers; 97,000 aircraft propellers; 301,000 aircraft gyrocompasses; 38,000 tanks and tank destroyers; 854,000 trucks; 190,000 canons; 1.9 million machine guns and submachine guns; 3.1 million carbines; 3.8 million electric motors; 11 million fuses; 360 million ball and roller bearings; 198,000 diesel engines; and more.

With the fate of the world at stake, GM played the starring role in the effort to outbuild Hitler and Hirohito. **No other corporation, anywhere on earth, at any time in history, ever did more to win a war.**

American industry provided almost two-thirds of all the Allied military equipment produced during the war: 297,000 aircraft, 193,000 artillery pieces, 8,000 tanks, and two million army trucks.

In four years, American industrial production, already the world's largest, doubled in size.



Aerial View of the Ford Motor Company Willow Run Bomber Plant, September 1941

Construction on the Willow Run Bomber Plant began in the spring of 1941 and it **soon became the largest factory under one roof in the world.**



THE VIDEO OF THE WILLOW RUN BOMBER PLANT (33 MIN)

BUILDING AN AIRPLANE

COPY AND PASTE THE FOLLOWING LINK INTO YOUR BROWSER

<https://www.youtube.com/watch?v=p2zunkteYbGQ>

**THE LAST OF THE 18,482 B-24 LIBERATORS ROLLS OUT OF THE WILLOW RUN FACTORY ON
JUNE 28, 1945**



WHAT HAPPENED TO THE PLANT?

The five-million-square-foot Willow Run plant was closed in 2010 as part of GM's bankruptcy proceedings. Most of the plant was demolished in 2014 but a 175,000-foot portion was offered to the Yankee Air Museum, housed in a hangar until a 2004 fire.

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