Influential Cars of the 20th Century
VI

Jim Rauf
Carburetors

• In 1885, Wilhelm Maybach and Gottlieb Daimler developed a float carburetor based on the atomizer nozzle

• The Daimler-Maybach carburetor was copied extensively

• Until the advent of fuel injection systems, especially electronic fuel injection systems, carburetors were continuously developed to control fuel supplied to automobile gasoline engines

• A way of increasing engine power was to use larger carburetors
  - Two barrel and four-barrel carburetors
Four Barrel Carburetors

- The first four-barrel carburetors, with two primary bores and two secondary bores, were the Carter WCFB and identical Rochester 4GC.
- Introduced on the 1952 Cadillacs, Oldsmobile 98, Oldsmobile Super 88 and Buick Roadmaster.
- Oldsmobile referred the new carburetor as the “Quadri-Jet”.
- Buick called it the “Airpower”.

![Car images](image1.png) ![Car images](image2.png) ![Car images](image3.png)
Carburetors

- The spread-bore four-barrel carburetor, first released by Rochester in the 1965 model year as the "Quadrajet" has a much greater spread between the sizes of the primary and secondary throttle bores.
- The primaries in such a carburetor are quite small relative to conventional four-barrel practice, while the secondaries are quite large.
- The small primaries aid low-speed fuel economy and driveability, while the large secondaries permit maximum performance when it is called for.
- To tailor airflow through the secondary venturis, each of the secondary throats has an air valve at the top.
- This is configured much like a choke plate and is lightly spring-loaded into the closed position. The air valve opens progressively in response to engine speed and throttle opening, gradually allowing more air to flow through the secondary side of the carburetor.
- Typically, the air valve is linked to metering rods which are raised as the air valve opens, thereby adjusting secondary fuel flow.
Jeep Wagoneer-First SUV

• 1963 Jeep Wagoneer was the first true SUV
• It had a tremendous influence on the global industry
• Jeep produced it from 1963 to 1991 with just a few tweaks
• The Wagoneer was first available as a two-door or four-door SUV, or a two-door panel truck
• As the model progressed, it became available with more luxury features, including wooden side panels
• With air conditioning, high-quality audio, comfortable power seats, lots of chrome and optional woodwork, the Wagoneer was a well-equipped car
• This was the first proper SUV and the daddy of all modern SUVs

• 4x4 part-time (rear permanent, front engaged manually in off-road conditions), manual 3-speed gearbox
• Engine: 230.5 cui, 140 hp,
• Length: 183.66 in, wheelbase: 110 in
• Curb weight: 3730 lbs, gross weight 4500 lbs
• Top speed: 88 mph 0-60 mph 14.3 sec
• Fuel consumption: estimated 12.8 mpg
Jeep Wagoneer - First SUV

The 'Jeep' Wagoneer with 4-wheel drive has twice the traction of ordinary station wagons.

Let the other guy worry...you go in snow!

First really new family wagon in years. ‘Jeep’ Wagoneer with 4-wheel drive.

See 'Jeep' vehicles in action on TV... "CBS Cooking Meet with Walter Dornin."
Three Point Seat Belts- Volvo PV544

• 1958, Nils Bohlin, Volvo's first safety engineer, developed one of the most effective safety devices of all time

• It was the three-point safety belt using one continuous belt

• One section ran diagonally across the body while another section crossed the lap — for both lap and chest restraint

• The single belt was anchored to the car's frame by three connections

• With just one motion and a simple click into a side buckle, passengers were protected from serious injury

• Volvo introduced the belt as standard equipment in 1959 Volvo PV544
The DAF 600 was produced from 1959 until 1963. It was the first production car to have a continuously variable transmission (CVT) system. The DAF Variomatic CVT employs engine speed, via centrifugal weights, aided by an engine manifold vacuum, to shift the transmission. The increased manifold vacuum helped the variable pulleys shift to an even higher ratio so even though the engine RPM stays the same, the transmission increases the car's speed.

The Variomatic also permitted increased engine braking by operating a switch on the dashboard which reversed the action of the vacuum on the pulley's diaphragm, seeking a lower ratio with increased manifold vacuum.

The DAF design was limited to low power transmission.

In the late 1980s and early 90s, Subaru offered a CVT in their Justy mini-car, while Honda used one in the high-mileage Honda Civic HX of the late 90s. Improved CVTs capable of handling more powerful engines were developed in the late 90s and early 2000s.
Continuously Variable Transmission  DAF 600
1950s Imported Mass Market Automobiles

- VW
- Volvo
- Renault Dauphine
- Ford Anglia
- Austin Mini
- BMW Isetta
- Morris Minor
- Fiat 600
- Renault 4CV
“Big Thee” Response to the Imports

- **1960 Ford Falcon** - conventional car - OHV six
  - Front engine rear drive

- **1960 Plymouth Valiant** - conventional car front “slant six” engine rear drive
  - Unusual sculpted styling

- **1960 Chevrolet Corvair** - unconventional design-
  - Air cooled rear engine with “swing axle” independent rear suspension
    - Target of Ralph Nader’s “Unsafe at any Speed”
1960 Chevrolet Corvair

- The **Chevrolet Corvair** was a compact car manufactured from 1960–1969 in two generations
- The only American-designed, mass-produced passenger car with a rear-mounted, air-cooled engine
- 1960-1964 models included 4-door sedan, 2-door coupe, convertible, 4-door station wagon, passenger van, commercial van, and pickup truck body styles in its first generation (1960–1964)
- 1965-1969 models included a 2-door coupe, convertible or 4-door hardtop
- Total production was about 1.8 million vehicles
Chevrolet Corvair

- Six cylinder horizontally opposed
- Air cooled
- Two carburetors
- Rear mounted
- 139.6 cu in (1960) to 144.7 cu in (1961-1969)
- 80 to 140 hp
- 160 and 180 hp with turbocharger
GM’s “Up Market” Front engine 1961 compact cars

- Buick Special
  - Had aluminum V-8

- Pontiac Tempest
  - Had rear transaxle, independent rear suspension, and flexible “rope” drive shaft
  - 194.5 cu in 4 cylinder engine (half of 389 cu in V-8)
  - Originally Pontiac was to offer a rear engine compact the Polaris based on the Corvair but early Corvair testing caused Pontiac (John De Lorean was Chief Engineer) to go with a front engine/ rear transaxle design

- Oldsmobile F 85
Turbocharger

- 1962, GM decided that the Oldsmobile Cutlass 3.5-litre V8 needed more power
- GM decided to offer a Garrett turbo charger in the Jet Fire V8 in 1962
Turbo chargers

- The exhaust from the cylinders passes through the **turbine blades**, causing the turbine to spin.
- The more exhaust that goes through the blades, the faster they spin.
- On the other end of the shaft that the turbine is attached to, the **compressor** pumps air into the cylinders.
- The compressor is a type of centrifugal pump -- it draws air in at the center of its blades and flings it outward as it spins.
- In order to handle speeds of up to 150,000 rpm, the turbine shaft has to be supported very carefully.
- Most bearings would explode at speeds like this, so most turbochargers use a **fluid bearing**.
- This type of bearing supports the shaft on a thin layer of oil that is constantly pumped around the shaft.
- This serves two purposes: It cools the shaft and some of the other turbocharger parts, and it allows the shaft to spin without much friction.
Turbochargers

• Putting a turbocharger in a mass-market automobile presented huge challenges for engineers in the 1960s

• The JetFire engine had a compression ratio of 10.25:1, which made it vulnerable to engine knock without modern-day engine management

• Oldsmobile got around this problem by using a system to inject ‘Turbo-Rocket Fluid’ into the cylinders

• Turbo-Rocket Fluid was actually just a 1:1 mixture of water and methanol

• Although the JetFire made the Cutlass noticeably quicker than its naturally-aspirated twin, it never caught on with the public

• Part of the reason was the JetFire’s price - the $300 premium for forced induction was astronomical in 1962

• The JetFire wasn’t too reliable, either; and the Turbo-Rocket Fluid injection system proved to be impractical

• Less than 4,000 JetFires were ever sold, and Oldsmobile pulled the plug on it after just one year of existence

• Turbochargers are now being widely used to boost power in small engines in order to meet fuel mileage requirements
Toyota Corolla

- **Toyota** introduced the **Corolla** in 1966
- The design was conventional with a traditional powertrain layout
- The engine was located longitudinally between the front wheels
- It was an overhead valve, 1077-cc four-cylinder engine
- The engine’s camshaft was located high in the cylinder block, allowing short pushrods
- The engine produced 60 hp at 6,000 rpm
- Its crankshaft was a five-main-bearing design
- It drove the rear wheels through a four-speed, all-synchromesh manual transmission
  - A two-speed “**Toyoglide**” automatic was available
Toyota Corolla

- The Corolla used the popular (for small cars) MacPherson struts but added a lower transverse leaf spring to reduce load on the struts and decrease the friction inherent in this type of suspension.
- The rear suspension used a solid axle suspended on longitudinal leaf springs.
- The styling was trim with nicely integrated grille, headlamps and bumper.
- The side profile, especially on the sportier fastback Sprinter model, was not unlike a smaller version of some American designs of the

- Road & Track of the Corolla recorded zero to 60 mph in 17 seconds for the 1,640 lb two-door.
- Top speed was 83 mph.
- The VW Beetle 1500 reached 60) in 22.5 seconds, and its top speed was 78 mph.
- The Corolla suffered from the usual small-car (except VW) malady of high engine rpm at highway speeds.
- 60 mph in the Corolla required almost 4000 rpm.
- 60 mph in the Beetle required just over 3000.
Toyota Corolla

- The fifth generation 1983 Corolla saw a major shift from the front engine rear drive (FR) to the front engine front wheel front drive (FF)
- The front wheel drive achieved a major expansion in interior space
- The 1.6 liter engine featured the first electronically controlled four-speed automatic transmission for the class
- A new 1.8 liter diesel engine was also added to the existing 1.3, 1.5, and 1.6 liter engines
- In addition to the four-door sedans, the new body lineup also featured a five-door model that could be used much like a mini wagon - called the “liftback”
Toyota Corolla

• From 1966 through 2021 there have been 12 generations of Toyota Corollas
• The Corolla has changed over the years to incorporate new technologies and to meet changing customer demands
• The Corolla Hatchback is powered by a 168-hp, 2.0-liter four-cylinder engine mated to a standard six-speed manual or an optional continuously variable transmission
• Fuel economy with the manual transmission is a 28/37 mpg city/highway
• It is 32/41 mpg rating for the CVT
Toyota Corolla

• Toyota built on their experience with the first Corolla (1966)

• The Toyota Corolla became the best-selling car worldwide by 1974

• By 1997 it became the best-selling nameplate, surpassing that of the VW Beetle
  • The basic layout of the VW Beetle was unchanged over the years as was that of the Ford Model T

• Well over 40 million Corollas have been sold
Mustang I and II

- The Mustang I made its formal debut at the U.S. Grand Prix in Watkins Glen, New York on October 7, 1962, where test driver Dan Gurney lapped the track in a demonstration of the prototype.

- *Motor Trend* speculated that "Ford will produce a sports car to compete with the Corvette"—exactly the publicity stunt Lee Iacocca was hoping to achieve.

- For the next two years, both Mustang Is appeared at car shows and automotive events as show cars.

- The car attracted attention, "but was too complex for regular production.”

- Reactions from potential customers and focus groups demonstrated that the original concept of the Mustang I had limited appeal to the general public.

- Ford’s design group, developed 13 Mustang concepts.

- The four-seater Mustang was known beforehand to be the car that would actually be produced for sale using the first generation Ford Falcon platform.

- Based on a four-seater configuration and using a front-engine layout based on the Falcon, the Mustang II was much more conventional in design and concept and closely resembled the final production variant that would appear in 1964.
Mustang

• In the Spring of 1964 Ford introduced the new (technically an early 1965) Mustang

• It was based on the Falcon platform

• A hardtop coupe and convertible were initially offered, a 2+2 fastback coming out in time for the official opening of the 1965 model year

• The early introduction made the Mustang stand out

• Mustangs could be anything from a basic economy car to a high-powered sports machine

• Engines ranged from the 170 cid/101 hp six to a solid-lifter high-performance 289 cid 271hp V8

• The car could be “customized” to suit your desires
Mustang

- The Mustang's styling was the right thing at the right time
- The long-extended hood and short rear deck appealed greatly to young buyers
- The only car that came close to competing with the Mustang was the Corvair Monza Spyder
- The Corvair was stuck with its top-of-the-line 150 hp six
- With the Mustang, for a few bucks more you could get a 195 hp 289 cu in V8

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<th>1964-1/2 Mustang Base Prices</th>
<th>1964-1/2 Mustang Production Statistics</th>
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<td>2 Door Hardtop Coupe 97,705</td>
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<td>2 Door Convertible 2,614</td>
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<td>2 Door Hardtop Coupe 409,260</td>
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<td>2 Door Convertible 73,112</td>
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<td>2 Door Fastback Coupe 2,589</td>
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Mustang—exciting new car from Ford Motor Company... show stopper at the World's Fair

We think we have pretty fair grounds for showing off our Mustang at the World's Fair. The tradition of blending our "merger" of Ford and the Ford Motor Company. We've been together to turn our best judgment and engineering—and be nothing short of marvels.

Like the Mustang, each of our cars to date as an original idea, designed to answer your needs as a driver, passenger and competitor. From these we select some unique and exciting techniques to formulate the best cars of fine-quality product.

It's a sort of engineering excellence—from the start of an idea to that point long in the Mustang. Pardon the Thunderbird and all the rest of our fine product line.

When you visit our Wonder Island at the Fair, you'll find another example of how we do things with more. We and you inside a new Ford. At the Fair and what goes on a major show. Ford takes you from the performance past for all of the future.

Ford-built means better built.

[Image of a white Mustang car at the World's Fair with several flags in the background.]

Mustang

OLLI Spring 2021
Mustang

• The **Ford Mustang** was the first “pony car”

• It created a market for the other U.S. manufacturers to supply

• **Ford** expand its offerings with the **Mercury Cougar**

• **GM** entered the market with the 1967 **Chevrolet Camaro** and 1967 **Pontiac Firebird**

• **American Motors** entered the market with the 1967 **Javelin**

• **Chrysler** entered the market with the 1969 **Dodge Challenger** and 1970 **Plymouth Barracuda**

• All these cars were raced in the “**Trans Am**” road racing series
Mustang

- The “pony car” survives as the **Ford Mustang** and the **Chevrolet Camaro** and the **Dodge Challenger**