AVIATION TIMELINE

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Types of Airplane

- A **monoplane** is an aircraft with one main set of wing surfaces. Since the late 1930s it has been the "ordinary" form for a fixed wing aircraft.

- A **biplane** is a fixed-wing aircraft with two main wings. The Wright brothers' Wright Flyer used a biplane design, as did most aircraft in the early years of aviation.

- A **triplane** is a fixed-wing aircraft equipped with three sets of wings, each roughly the same size and mounted one above the other. The best-known triplane is Fokker Dr.I during WW1.
Types of Airplane

- A **seaplane** is a fixed-wing aircraft which can only take off and landing on water.

- An **amphibian** is an aircraft that can take off and land on either land or water.

Aviation Timeline

- 1903: Wright Brothers’ “Flyer” makes first controlled flight of a powered, heavier than-air aircraft.
1906: Santos-Dumont makes the first successful European airplane flight.

14-bis, the plane in which Santos-Dumont made his historic 1907 flight. His plane flies a distance of about 200 feet in Paris.

1908: Piloting his plane, the “June Bug”, Glenn Curtiss was first American to fly a distance over one kilometer.
Aviation Timeline

- 1909: Louis Blériot becomes the first to fly across the English Channel.

It took 37 minutes for him to fly across the English Channel in 1909.

Aviation Timeline

- 1909: Monoplanes developed and used for relatively short-distance flights.

A circa 1955 photo of Cole Palen's restored 1909 Blériot monoplane flying from Stormville Airport.
Aviation Timeline

- 1911: First practical seaplane built. [Image]
  [http://www.century-of-flight.net/Aviation%20history/seaplane%20at%20war/Aviation%20at%20the%20Start%20of%20the%20First%20World%20War.htm]

- 1913: Airplanes used by French and British during WW1 as bombers and surveillance craft. [Image]
  [http://veronicathepajamathief365project.wor]
Aviation Timeline

- 1916: William Boeing's fascination with aviation leads to the creation of his own airplane manufacturing business. Over the next several decades, the company would evolve into the world's largest commercial airline manufacturer.

- 1918: The United States officially establishes air mail service with flights between New York City, Philadelphia and Washington D.C.

Aviation Timeline

- World War 1 saw the rise of the aircraft as a weapon system and the changing face of war.
- The aircraft changed the modern battlefield
- 1918: Fighter planes developed (and used in battle).

Aviation Timeline

1919 – 1938
- Aviation focus on Airmail Services
- Birth of Commercial Aviation
- Birth of the Airlines
- Birth of Air Traffic Control
- Charles Made an Historic Flight
- Birth of Instrument Flying

Large advancement in aircraft technology.
- Wood and canvas converts to aluminums.
- Engine development, in-line water cooled gasoline engines convert to rotary air cooled engines (increase propulsive power).
- After WWI, experienced fighter pilots were eager to show off their new skills.
- Air shows sprang up around the country, with air races and acrobatic stunts.
Aviation Timeline

- **1921: Birth of Rotating Beacons**
  - In 1921, the Army deployed *rotating beacons* in a line between Columbus and Dayton, Ohio, a distance of about 80 miles. The beacons, visible to pilots at 10-second intervals, made it possible to fly the route at night.

Aviation Timeline

- **Birth of the Airlines**
  - Building of the airways
    - Airmail routes become Airways
    - Lighted airway beacons—every 10 miles (1926)
    - Intermediate Airfields—every 50 miles
    - Airway Communication Stations (1928)
  - No ATC
Aviation Timeline

- 1926: Ford Tri-motor: First all-metal aircraft designed for passengers
- Ford Tri-motor’ also called as the “Tin Goose” because of its corrugated metal skin.
- Can carried 12/13 passengers and could fly up 6,000 feet (1,829 kilometre), but it’s climb to that altitude was slow, level off, bump around, and drop repeatedly before it reached its cruising altitude.
- With no air conditioning and little heating, the plane was hot in summer and cold in winter,
- With no circulation system, its environment was made even more unpleasant by the smell of hot oil and metal, leather seats, and disinfectant used to clean up after airsick passengers. Opening a window was the only way to escape the smell.

- 1927: Long-distance passenger craft developed that had constant radio contact with the ground.
- 1930s: The “Air Age” begins with pioneers like Amelia Earhart, Howard Hughes, and Charles Lindbergh.
Aviation Timeline

- **1927**: Charles Lindbergh, First flying across the Atlantic ocean (New York-Paris) in using the Spirit of St. Louis

- 3,610 miles (5,815km) in 33 and 1/2 hours.
- The first solo, non-stop transatlantic flight.

Challenges faced by Lindbergh

- He had not slept in nearly twenty-four hours when he took off, so fighting sleep was the most difficult part of the flight. Difficult to keep awake on long flight – put his face outside the cockpit to allow air to blast his face and eyes
- Susceptible to hypoxia and bad weather flying
- Fighting icing - cold
- Flying in poor visibility through fog for several hours
- Navigating only by the stars (when visible), using mental dead reckoning (maintain heading, time and speed)
- No proper water survival gears – if ditched in the sea might not survive.
Challenges faced by Lindbergh

- The plane designed with no forward visibility and only a periscope giving the pilot any forward view at all. Difficult to fly.
- Difficult to fly accurately with limited instrumentations. Might be deviated by wind causing lost in transit.
- No proper communications – if there was an aircraft or aircrew problem no way of getting help.
- There was no radio, no navigator, and no co-pilot.
- The aircraft was highly unstable, requiring constant vigilance by the pilot. Very stressful to pilot.

Charles Lindbergh Impact

- Aviation became a more established.
- Aviation becomes respectable and the popular Lindbergh goes on world tours to promote aviation and Pan-American Airways.
Aviation Timeline

- 1933: First of the modern airliners (Boeing 247) developed. It could carry 13 passengers and travel at 155 mph.

- 1934: Amelia Earhart and Lockheed Electra 10" mysteriously disappeared while on a "round the world flight.

Donald Douglas, the first - and youngest - aeronautical engineers in America

The company's first successful aircraft, the Cloudster, made its first flight on February 24, 1921. Later that year, the company would change its name to simply The Douglas Company.
In 1935, DC-3 first aircraft to make money carrying passengers rather than mail. It seated 21 passengers and its 1,000 horsepower engine made it possible to fly coast to coast in 16 hours. It proved air transport could be profitable. Ninety percent of air traffic was flying on these aircraft by 1940.
Birth of Air Traffic Control

- First airport controller (1929)

Archie League at St. Louis Airport, 1929

Birth of Air Traffic Control
1929-1933

- Light gun
- Control tower
- First radio-equipped control tower—Cleveland (1930)
Birth of Instrument Flying

- Jimmy Doolittle’s first “blind flight” (September 24, 1929)
- LFR Four-Course Navigation System (early 30s) → First instrument airways

The end of “see and avoid”

Birth of Instrument Flying

- New Flying Instruments developed to enable flying during night and bad weather
  - Visual radio direction finder: Using vibration system to direct the aircraft. The closer the plane is to the beacon, the more intense the vibration.
  - Artificial horizon: showed what angle the plane was flying in relation to the ground, whether and how the wings were tilted, whether the nose was up, down or level, and to what degree.
  - Barometric altimeter showed how far above the ground of a particular field. They will sensitively record the time and therefore the distance which a sound or radio impulse travels from a plane to the ground and back.
World War II

- Drastic increase in the of aircraft development and production
- Aircraft faster and more maneuverable
- Stronger in design
- Weapon systems are more sophisticated
- Roles are dedicated:
  - Fighter
  - Bomber
  - Attack
  - Reconnaissance
- Operate with high accuracy

Aviation Timeline

- 1936: Spitfires (fast maneuverable fighter airplanes) developed for use in WWII.

Aviation Timeline

- 1943: Helicopters are mass-produced for WWII.

1943: Jet-powered fighters are developed and used in WWII.

Cold War 1945 - 1991

- Most ex-military aircraft were used in the business of transporting people and goods.
- Many companies existed, with routes that criss-crossed North America, Europe and other parts of the world.
- Heavy and super-heavy bomber airframes (e.g., B-29, Lancaster, DC-3) easily converted into commercial aircraft.
- By 1952, the British state airline introduced into service the first jet airliner, the De Havilland Comet (the plane suffered a series of highly public failures).
- Other jet airliner designs Boeing 707 -comfortable, higher safety and meet passenger expectations.
- In October of 1947, Chuck Yeager took the rocket powered Bell X-1 past the speed of sound (1st controlled, level flight to cross the sound barrier).
Cold War 1945 - 1991

- Further barriers of distance were eliminated in 1948 and 1952 as the first jet crossing of the Atlantic occurred and the first nonstop flight to Australia occurred.
- In 1967, the X-15 set the air speed record for an airplane at 4,534 mph or Mach 6.1 (7,297 km/h).
- 1969, Boeing came out with its vision for the future of air travel (Boeing 747). This plane is still one of the largest aircraft ever to fly, and it carries millions of passengers each year.
- Commercial aviation progressed even further in 1976 as British Airways provide supersonic service across the Atlantic (Concorde).
- A few years earlier the SR-71 Blackbird had set the record for crossing the Atlantic in under 2 hours.

Aviation Timeline

- 1947: Airplanes fly faster than the speed of sound.
  - The Douglas D-558-2 Skyrocket (shown here at Edwards Air Force Base circa May 1949) pushed past Mach 2 on November 20, 1953, beating an advanced X-1 to the record.
  - [http://www.airspacemag.com/history-of-flight/Mach_1.html](http://www.airspacemag.com/history-of-flight/Mach_1.html)

- 1947: Radar is developed to keep track of aircraft from the ground.
- 1950s: The airliner begins to replace other means of transportation as the primary means of long-distance travel.
Aviation Timeline

- 1968: Aircraft are developed that can take off and land vertically, without the use of a runway (Harrier “Jump Jet.”).

- 1969: The Concorde is developed and used as the first supersonic airliner. (It crosses the Atlantic Ocean in less than 3 hours.)

- 1981: Space Shuttle is developed as a reusable space ship that can land after reentry into Earth's atmosphere.

- 1981: The Lockhead F-117A is developed, which is virtually invisible to radar.