

CAREERS IN AVIATION THRU STEM? THE AIRPORT IS A GOOD PLACE TO START

COMBINED WITH YOUR CLASSROOM PROGRAM IN SCIENCE, TECHNOLOGY, ENGINEERING, & MATH

GET THE GEARS TURNING

ASK US:

www.ANEairport.org

ANOKA COUNTY-BLAINE AIRPORT

BLAINE AIRPORT PROMOTION GROUP

TOURS AVAILABLE K-12

THE COMPASS-PAST AND PRESENT



A compass was first invented as early as 206BC. A compass referred to as a magnetic needle was used by the military in China in the 12th century (about 1040-1044). Recorded compass use as a maritime navigational device did not appear until 1117. Recorded evidence of the use of the compass in Western Europe appeared between 1187 and 1202.

These were the very earliest development in discoveries of magnetism and were used for orientation devices when visual navigation was limited by poor weather. Documents from this early stage of discovery described what is known today as **thermoremanence**, how a very thin piece of metal was shaped like a fish with a head and a tail, then subjected to hot coals until it was red hot. The tail of the fish was dipped in cold water. This heating and cooling process developed a magnetic property in the tail of the metal shape. When cooled the metal fish was then carefully placed on the surface of a bowl of water out of the disturbance of wind and rain and it would float. The fish head would rotate to a southern direction.

NAVIGATIONAL INSTRUMENTS

The basic dry magnetic portable compass is widely available. A disk, referred to as a compass rose defines the cardinal directions; north, south, east, and west. The disk is set in a frame of reference and is positioned on a pivotal point to allow free movement around the center of the frame. The frame has markings that are reference points of degrees in a circle called **Azimuth** from 360° **north**, **west** is 270°, **south** is 180°, **east** is 90°. This continues to be the basis for the modern compass but advancements in navigational instruments continue to be made. Development in Aerospace requires a greater understanding of earth's magnetic properties when developing new methods in safeguarding flight navigation in all weather conditions, flight maneuvers, and navigational advancements in vehicle construction.

BLAINE AIRPORT PROMOTION GROUP: www.ANEairport.org

MORE ABOUT AVIONICS: www.rcavionics.com

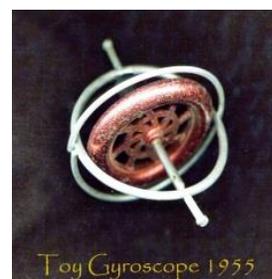
AIRCRAFT DIRECTIONAL INSTRUMENTS

Flying without instruments required visual sightings of land features, buildings, roadways, rail lines, & land section lines. In the early 1900s compasses were used as a general direction finding tool but the disk of the compass was not stable and would rotate in wide angles of the directional heading of where the pilot wanted to go. These were compasses or more



accurately called **Inclinometers** used for surveying and plotting building construction but were useful as a sighting tool for the early pioneering pilot. The disk would be aligned by viewing a distant object through the upright sighting frames. At the same time sighting through the magnifying glass would reveal what is called the **Azimuth** number corresponding to the direction being viewed.

“to view the earth’s rotation”



A small toy like device was developed by a French physicist in 1851 that had a heavy outside rim that housed a small wheel. When the inventor, Leon Foucault spun the wheel he found that the device would remain in a ridged position while the wheel was in motion. Leon named the device a **gyroscope**

because he believed this to be the characteristic way the earth rotates. The **gyroscope** was considered only as a toy until 1911 when an American inventor Elmer A. Sperry patented the **gyrocompass** which combines the force of gravity to a gyro wheel causing the axis of the wheel to always seek the north and south direction. The **gyroscope** has made possible a stable reference for both the attitude and direction of the aircraft carrying the gyro. The combined technology of the compass, attitude, and directional gyros in the **gyrocompass** present a clearer picture to the pilot and reduce in-flight corrections. “View your aircraft flight path from an outer-space view to help understand **gyro drift** and know how to compensate for it”.