



# **Student Lesson Guide**

## **Lessons 1-5**



### Forward facing yoke buttons



# SIA Flight Log

Start Date of this Log: \_\_\_\_\_

End Date of this Log: \_\_\_\_\_ Total Flight Hours this page: \_\_\_\_\_

Teacher name and signature: \_\_\_\_\_



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**Wright Brothers' first powered flight (1903):** *Orville and Wilbur Wright achieved the first controlled, sustained, powered flight in their aircraft, the Flyer, at Kitty Hawk, North Carolina.*

**Charles Lindbergh's solo transatlantic flight (1927):** *Lindbergh became the first person to fly solo and nonstop across the Atlantic Ocean in a plane known as 'The Spirit of St. Louis', flying from New York to Paris. This flight boosted public confidence in air travel.*

**Colonel Chuck Yeager breaks the sound barrier (1947):** *Yeager became the first person to fly faster than the speed of sound in the Bell X-1 aircraft (about 700 mph) at an altitude of 45,000 feet.*

**Launch of commercial jet travel (1958):** *National Airlines began the first U.S. commercial jet passenger service between New York and Miami, marking the beginning of the 'jet age' for public travel.*

**Apollo 11 moon landing (1969):** *While a spaceflight milestone, it was made possible by advancements in aviation and aerospace engineering. Neil Armstrong and Buzz Aldrin were the first humans to walk on the moon.*

**Commercial Aviation:** *is the sector of aviation focused on using aircraft to transport paying passengers, cargo, or mail for profit*

**General Aviation:** *(GA) is all civilian flying that isn't scheduled airline service; Personal travel, flight training, recreational flight etc...*

**Military Aviation:** *the use of aircraft for national defense and warfare; Fighter jets, bombers, drones, transport planes etc...*



## The 4 Forces Acting on the Aircraft:

**Lift:** *the force that opposes gravity and allows an aircraft to fly*

**Weight:** *the force of gravity pulling an aircraft downward, opposing the upward force of lift*

**Thrust:** *the force that moves the aircraft forward through the air, generated by the engines' propulsion system*

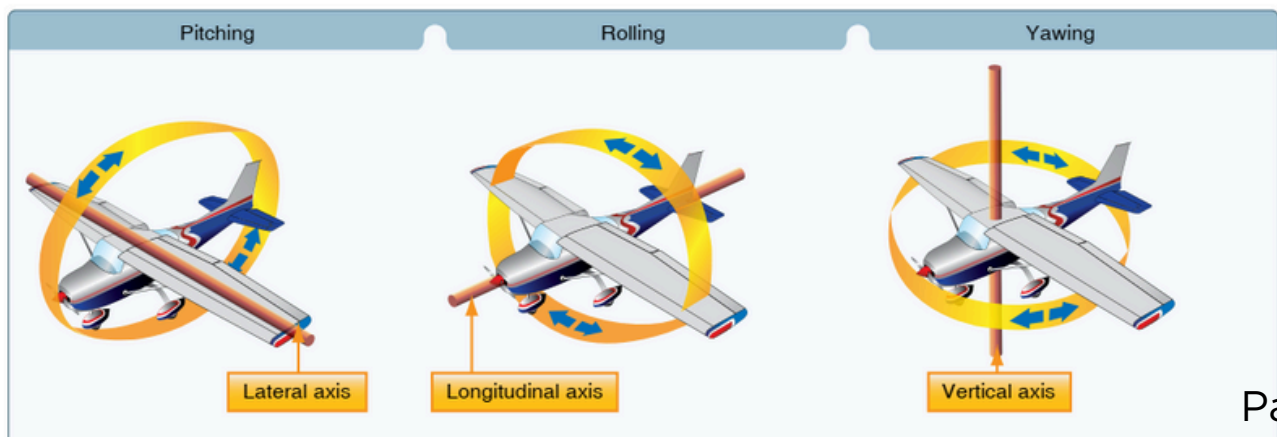
**Drag:** *the force that opposes an aircraft's motion*

## The 3 Axis's of Movement

**Pitch:** *the up-and-down rotation around the aircraft's lateral axis (moving the yoke in and out- Corresponds to the Elevator)*

**Roll:** *the movement of an aircraft rotating around its longitudinal axis, which runs from the nose to the tail (Rotating the yoke side to side- Corresponds to the Ailerons)*

**Yaw:** *the side-to-side movement of an aircraft's nose, which is a rotation around its vertical axis (Corresponds with the Rudder Pedals & Rudder)*



## Turning in the Aircraft:

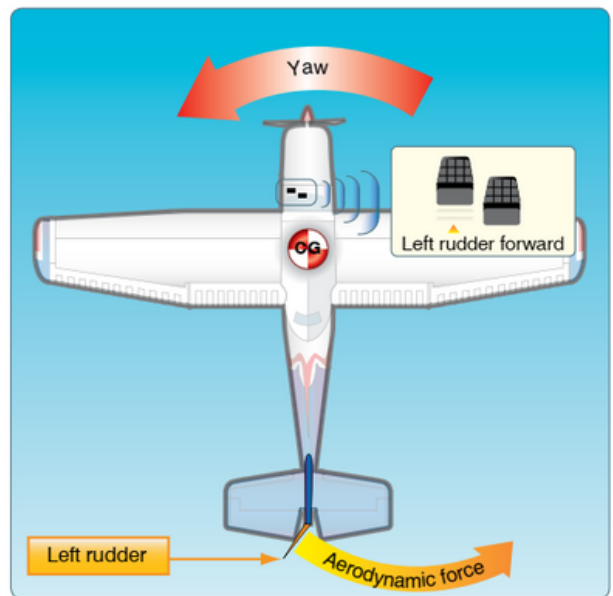
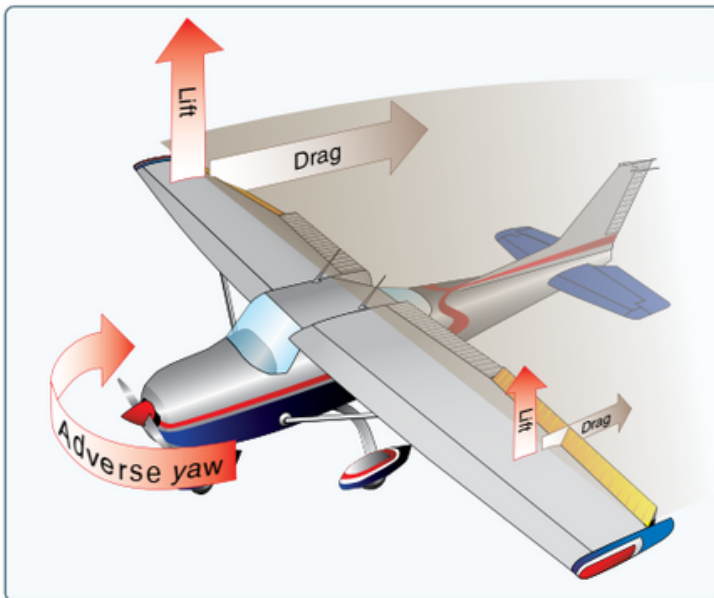
**Aileron:** a small, hinged part on the trailing edge of each airplane wing, near the tip, that controls the plane's roll (banking left or right)

**Elevator:** a movable part on the tail's horizontal stabilizer that controls the aircraft's pitch (up or down movement)

**Rudder:** a primary control surface located on the rear of the vertical stabilizer that controls the aircraft's movement around its vertical axis, a motion known as yaw

**Yaw:** the side-to-side movement of an aircraft's nose, which is a rotation around its vertical axis

**Adverse Yaw:** the tendency for an aircraft's nose to move in the opposite direction of a turn



**Propeller\Prop:** rotating airfoils that act like twisted wings to generate forward thrust, pushing or pulling an aircraft through the air

**Cowling:** covering that encloses an aircraft engine, serving to reduce drag and cool the engine

**Engine:** propels an aircraft by generating thrust

**Wing:** the airfoil on an aircraft that generates lift, allowing it to fly

**Fuselage:** the main body of an aircraft, functioning as the central structural component that holds the crew, passengers, and cargo

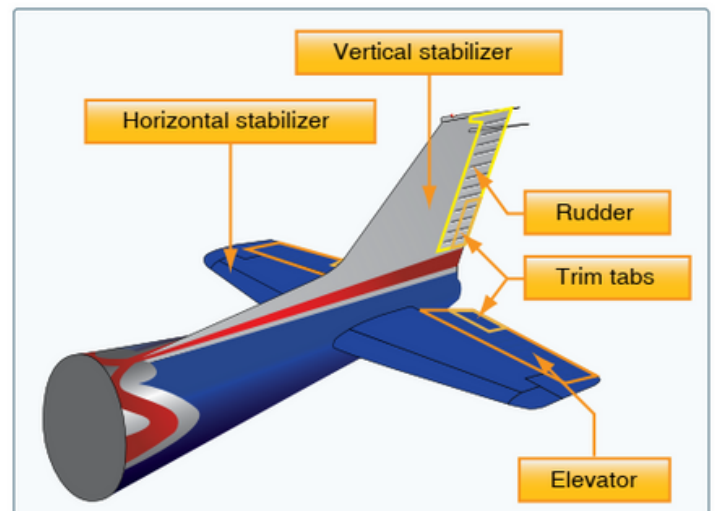
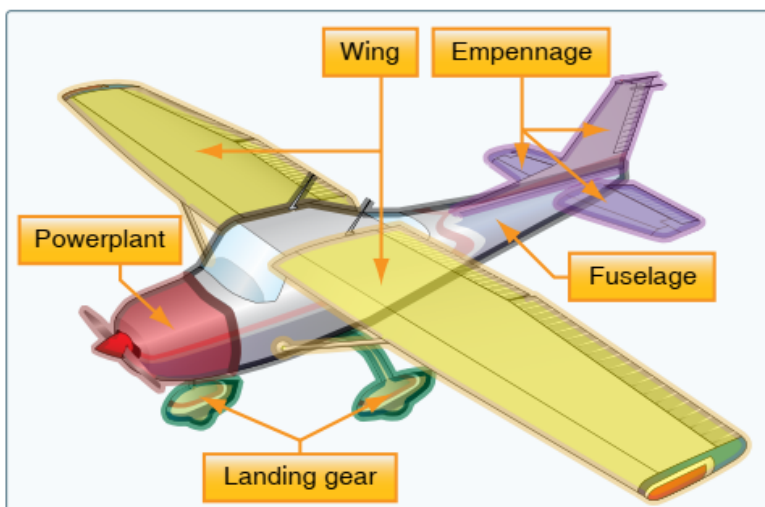
**Landing Gear:** the system of wheels, struts, and brakes that supports an aircraft on the ground and during takeoff and landing

**Power Plant:** the engine system that generates the thrust needed to propel it through the air

**Empennage:** the aircraft's tail assembly, which includes the vertical stabilizer (tail fin) and the horizontal stabilizer (tailplane)

Vertical Stabilizer: the upright fin on the tail of a plane

**Horizontal Stabilizer:** the small wing-like structure on an airplane's tail that keeps its nose from tilting up or down



**Straight and Level Flight:** *maintain a constant heading and altitude without climbing or descending*

**Banking:** *aircraft rolls or tilts to one side*

**Climbing:** *the operation of increasing an aircraft's altitude*

**Descending:** *to reduce altitude in a controlled manner, typically in preparation for landing*



**Autopilot:** *a computer system that controls an aircraft's flight without constant manual input from the pilot*



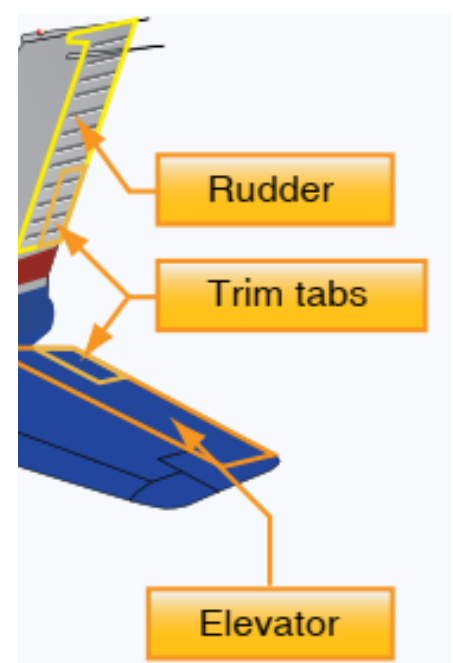
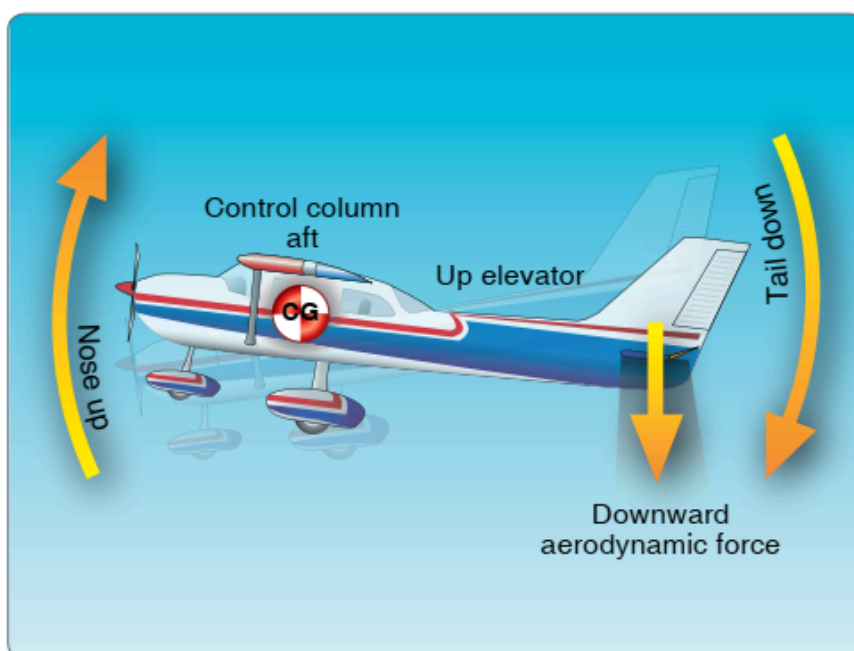


**Trim Tabs:** *small, adjustable surfaces on the trailing edge of a plane's main control surfaces (like the elevator, rudder, or ailerons)*

**'Trim' Wheel:** *allows a pilot to relieve the pressure on the yoke, letting the aircraft maintain a desired attitude (like straight and level flight) without constant manual input.*

**Elevator:** *a movable part on the tail's horizontal stabilizer that controls the aircraft's pitch (up or down movement)*

**Altitude:** *the vertical distance of an aircraft from a reference point, usually sea level or the ground*





**'Angle of Attack' (AOA):** determines how much lift the wing is generating. AOA is the angle between the chord line of an aircraft's wing and the oncoming airflow (aka your flight path)



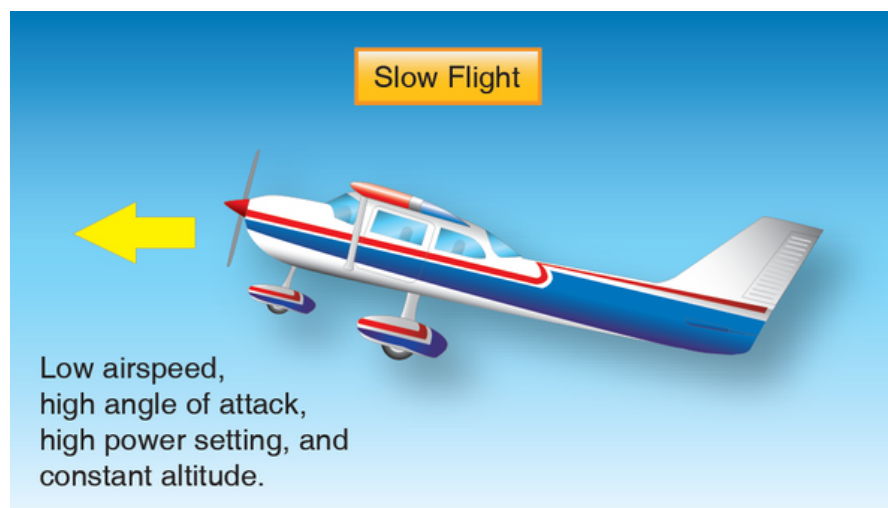
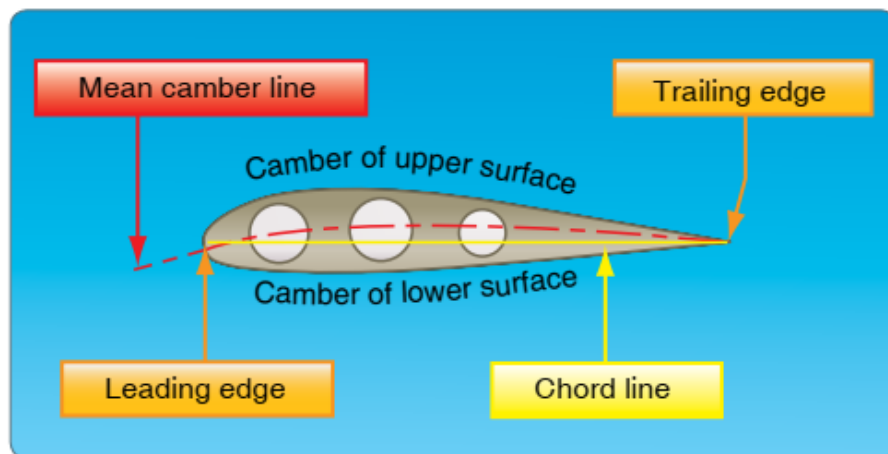
**Chord Line:** a straight line from the leading edge to the trailing edge of the wing (aka airfoil)

**Leading Edge:** the front-most edge of an aircraft's wing that cuts through the air first



**Trailing Edge:** where airflow that was separated by the leading edge rejoins

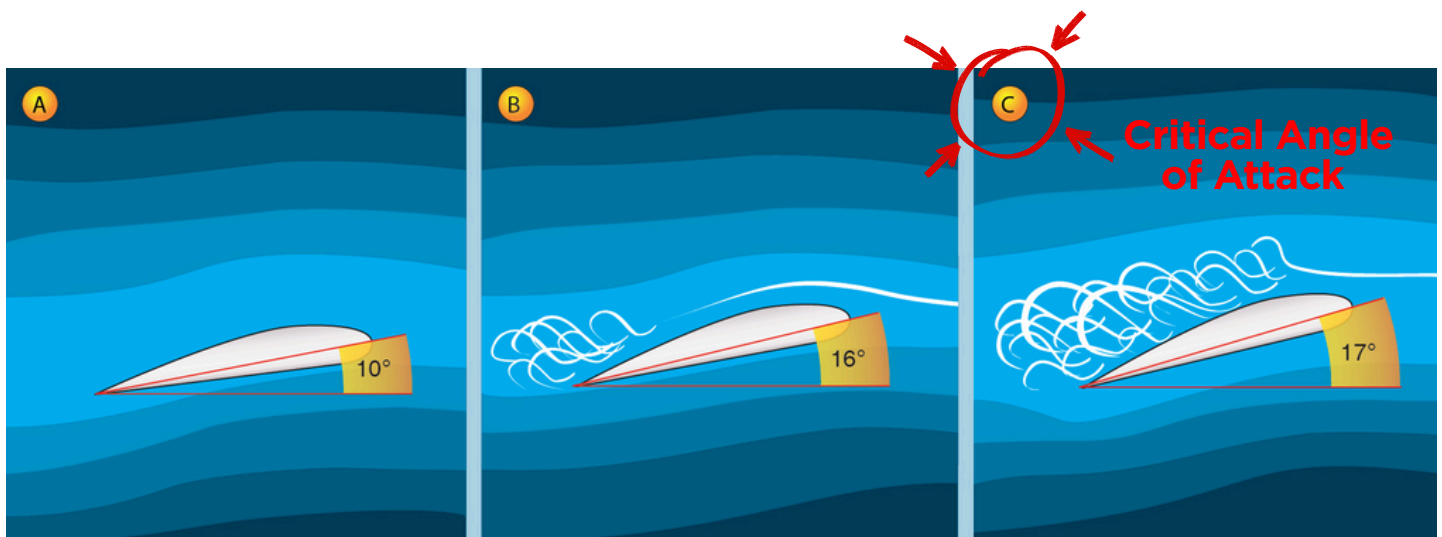
**Flight Path:** the path the aircraft is traveling



**Critical 'Angle of Attack':** *above a wings critical Angle of Attack, the flow of air separates from the upper surface and backfills, burbles, and eddies which reduces lift and increases drag on the aircraft*

**Stall:** *where the wing exceeds its critical angle of attack, causing the smooth airflow over its upper surface to separate, leading to a sudden, significant loss of lift*

**It is important for the pilot to understand that a stall is the result of exceeding the Critical 'Angle of Attack', not because you are moving too slow (insufficient airspeed) !!**



**LESSON****004- First SIA Sim Flight**

Take personal notes on the video lesson here. After completing the lesson, what is a goal you plan to accomplish while attempting your first flight? For example:

- Straight and level flight
- A slow and steady decent
- Maintain a desired altitude for several minutes

Challenge yourself!



**Annunciator:** *An aircraft annunciator is a warning light or display that alerts pilots to both normal and abnormal aircraft system conditions*

**Gauge:** *A specific type of instrument designed to measure and display a single physical quantity*

**Instrument:** *An instrument is the broader category for any device in the cockpit that provides the pilot with data about the aircraft's flight situation, which can include gauges and other complex devices*

**Indicator:** *An aircraft indicator is a flight instrument that displays information about the aircraft's performance, position, or orientation. Examples include the airspeed indicator, which measures speed relative to the air; the altimeter, which shows height above sea level; and the attitude indicator, which displays pitch and bank angles*

**Display:** *An aircraft display is an electronic or physical instrument in the cockpit that presents vital flight information to the pilot, such as altitude, speed, and attitude, on one or more screens. Common types include the Primary Flight Display (PFD), which combines traditional gauges, and Multi-Function Displays (MFDs), which show navigation maps, weather, and system status. Head-Up Displays (HUDs) are a type of display that projects information onto a transparent screen in the pilot's line of sight*

**Steam gauges** are individual, traditional mechanical dials, while **Glass panels** are integrated electronic displays on screens that present the same information digitally

### ***Your Primary Flight Instruments-The “Six-Pack”:***

***Airspeed Indicator:*** shows how fast the plane is flying through the air

***Attitude Indicator:*** shows an aircraft's pitch (nose up or down) and bank (wing tilt) relative to the horizon

***Altimeter:*** measures an aircraft's altitude above a specific reference point, usually mean sea level (MSL)

***Vertical Speed Indicator:*** shows an aircraft's rate of climb or descent, measured in feet per minute (FPM)

***Heading Indicator:*** also know as ‘**directional gyro**’, shows the aircrafts heading in degrees relative to magnetic north.

*A compass like display.*

***Turn coordinator/Turn and Slip Coordinator:*** (may also be referred to as the ‘turn and bank indicator’), shows how fast an aircraft is turning.





## Full panel overview

Flight Instruments  
'Steam  
Gauges'

Garmin GTN 530  
Nav\Com Display

Throttle

Trim Wheel



**Pitot Heat Switch:** an electric heating element that keeps the pitot tube from icing over, which would cause the airspeed indicator to malfunction (also acts as a stall warning sensor!)

**Pitot Tube:** measures fluid speed (like air or water) by sensing pressure, using a front-facing hole for "total" pressure and side holes for "static" pressure, with the difference revealing the fluid's velocity, acting like a speedometer



**Tachometer, RPM Gauge:** *a simple instrument that shows the speed of the engine in revolutions per minute (RPM)*

**CDI'S and ADF'S:**

**Course Deviation Indicator:** *shows how far an aircraft is to the left or right of its desired flight path*

**Glide Slope Indicator:** *system that provides pilots with vertical guidance to maintain the correct descent angle for landing*

**ADF Bearing Indicator:** *“Automatic Direction Finder”, navigation instrument that uses a needle to show the relative bearing of the aircraft to a radio beacon*





**Fuel Quantity:** *shows pilots how much usable fuel is in the tanks*

**Fuel Flow Indicator:** *an instrument showing the rate (e.g., lbs/hr or gal/hr) and sometimes the total amount of fuel being consumed by an engine*

**Exhaust Gas Temp:** *the temperature of hot gases leaving the engine*

**Cylinder Head Temperature:** *the actual temperature of an engine's cylinder head*



**Oil Pressure:** *the force from the oil pump pushing oil through the engine to lubricate, cool, and clean moving parts, preventing metal-on-metal contact*

**Vacuum Pressure:** *the suction created by an engine-driven pump to power essential gyroscopic instruments like the attitude indicator and heading indicator*

**Cylinder Head Temperature \ Oil Pressure**



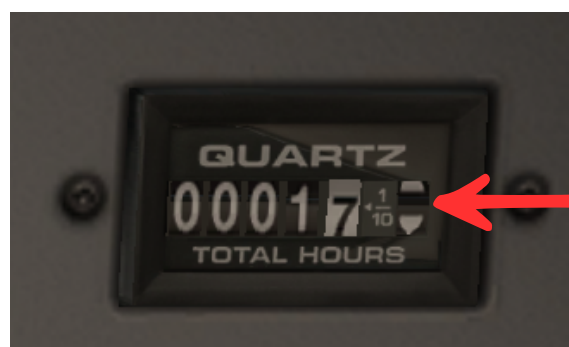
**Vacuum Pressure \ Ammeter or Load Meter**

**Throttle:** *mechanism in the cockpit that allows the pilot to change the amount of power or thrust produced by the aircraft's engines*



**Throttle**

**Hobbs Meter (Hour Meter):** *a simple meter that tracks the aircraft's operating time (engine-on time).*



**Hobbs Meter**

**Lessons 6-12 coming soon....**

**For additional tutorials on  
how to fly the SIA Sim,  
scan below!**



**[https://studentsinaviation.org  
/videos/](https://studentsinaviation.org/videos/)**

