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PARTS AND SURFACES OF AN AIRCRAFT

In consideration of the complexity of aircraft development and a desire to learn how an airplane can fly, a trainer style of aircraft has been chosen for this review of basic flight.

The wing design is a cantilever low-wing monoplane, with fixed landing gear and tail-wheel. Construction includes fabric covered welded steel tube fuselage, with plywood-sheathed center section, with outer wing panels and tail assembly. The Fairchild PT-19 is powered by either an in-line 175 hp Ranger L-440-1 or a 200 hp L-440-3.

The tandem seating, open cockpit trainer, Fairchild PT-19 had the nickname, "The Cradle of Heroes" providing the basic training of thousands of pilots. As we review the past we can better see the future in taking our place in careers in aviation.

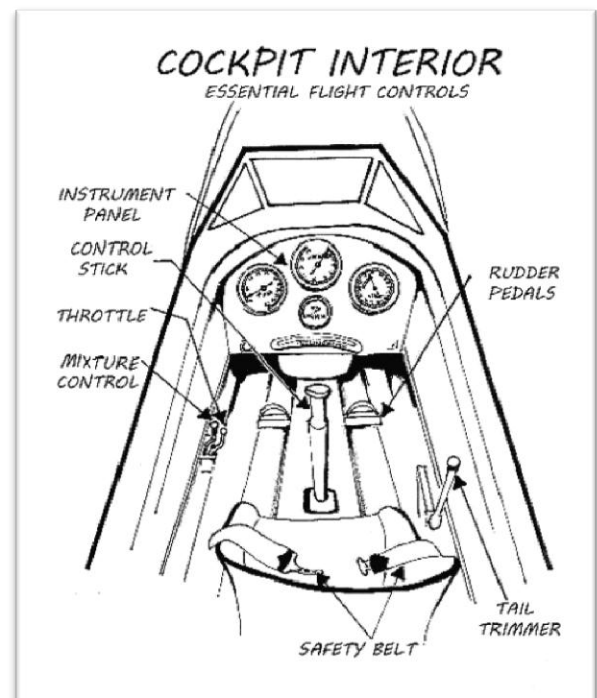
In the PT-19 the primary control of the airplane is from the cockpit "CONTROL STICK" and "RUDDER PEDALS". With the tandem cockpit configuration both cockpits are identical and the aircraft can be controlled from each location.

The control stick is positioned so the pilot can move the stick to control lateral movement, which will be identified as "ROLL" and the up and down motion identified as "PITCH". The "RUDDER PEDALS" provide side to side movement identified as "YAW".

The stall speed of the aircraft is when the airplane's forward thrust is not great enough to lift the airplane off the ground or lacks enough air flow over the wing to keep flying. The throttle provides control of the engine power. In order to gain lift at take off the throttle will be indicated as "FULL THROTTLE" full power. When desired altitude is reached, the throttle is reduced to about ¾-throttle.

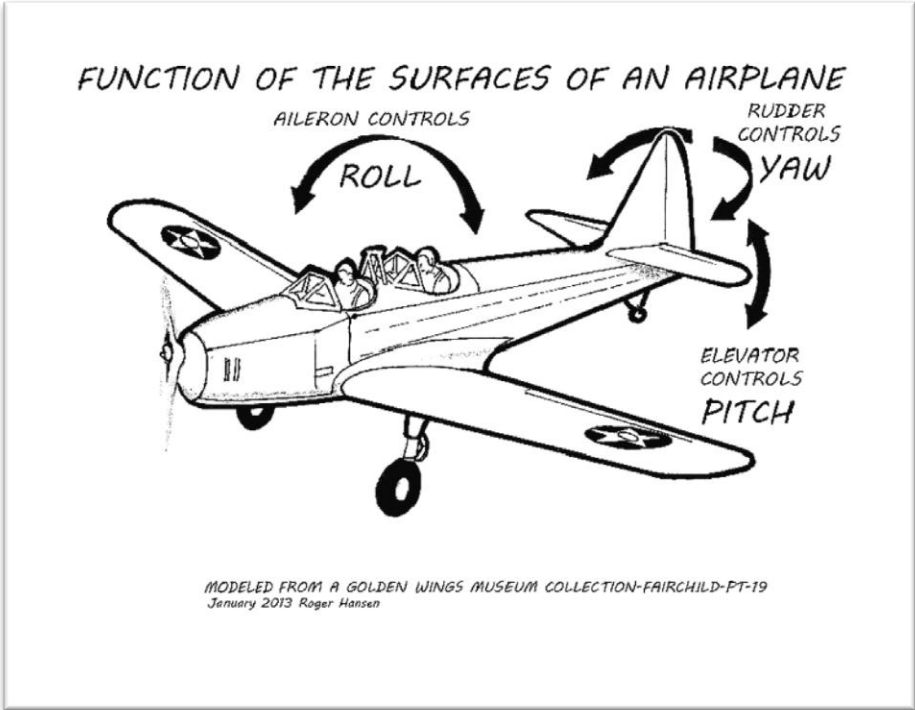


A model of the PT-19 can be seen at the Golden Wings Museum, Blaine, MN.



The pilot moves the control stick that is interconnected to vital control surfaces attached to the wings and the tail assembly of the aircraft. The rear edges of the wings and tail are called the “Trailing Edge” of these surfaces. The wings have controlled surfaces identified as “AILERONS” attached by hinges to the rear spars of the wings. Controlled flaps hinged to the tail are called “ELEVATORS”.

When the control stick is moved to the right it identifies with tilting the plane, “BANKING RIGHT”, or “ROLL” to the right. When the control stick is moved to the left a “BANK TO THE LEFT” will be initiated.



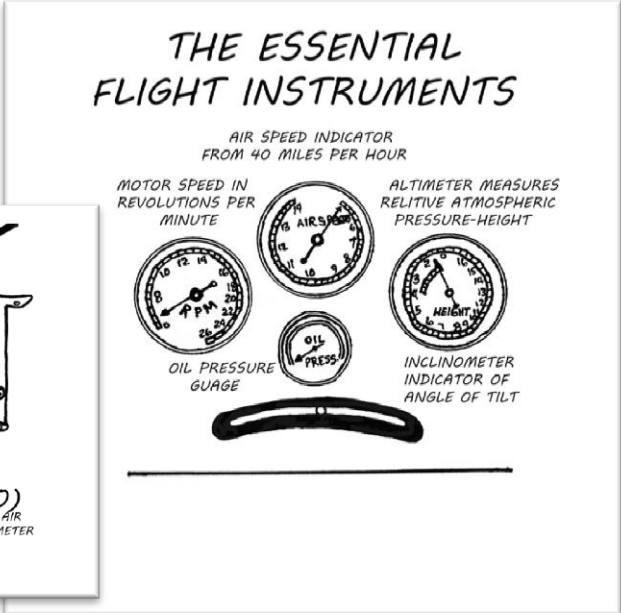
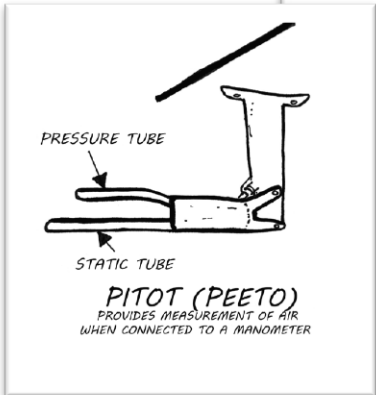
The control stick can also control the angle of the elevators. The movement of the control stick forward as well as toward the pilot seat will change the angle of the “ELEVATOR” that will provide a controlled change in the up and down angles of the aircrafts flight path. This controlled maneuver is identified as “PITCH”.

On the bottom of the cockpit and forward of the pilot seat are “RUDDER PEDALS” that are connected to the fuselage at its center to allow it to pivot when pressure is applied by the pilot. The pivot motion controlled by the pilot’s foot pressure on the right or left rudder pedal will change the angle of the “RUDDER” and will initiate controlled steering of the aircraft.

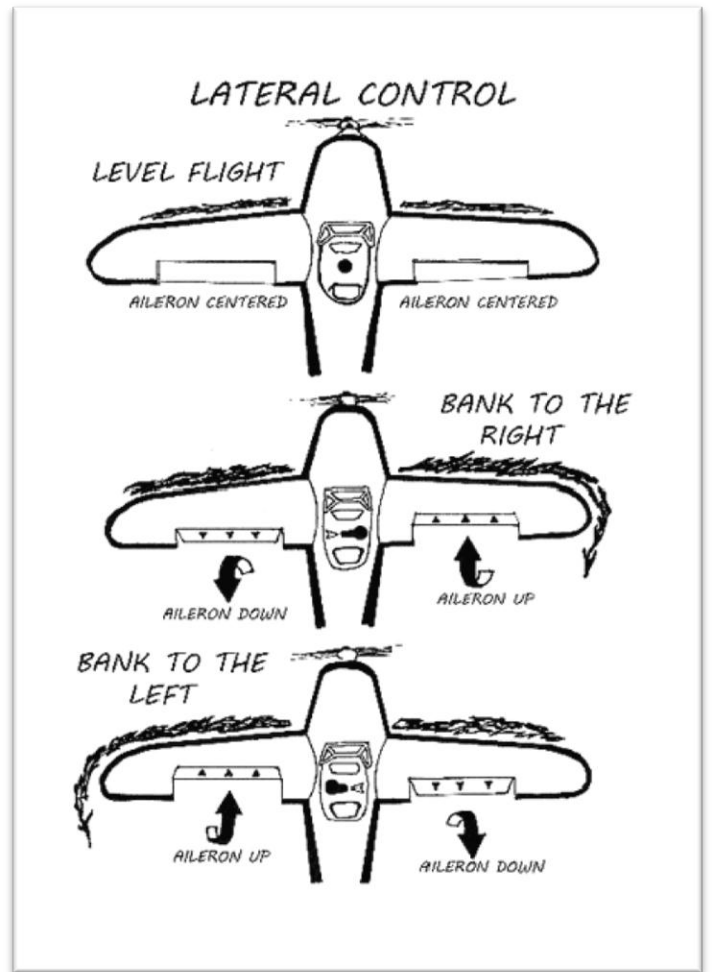
The “RUDDER” is hinged to the horizontal spar of the “STABILIZER” (tail-fin) and acts as a control for what is identified as “YAW”. The rudder has a side to side movement of about 30° angle in either direction. When a pilot pushes on the left rudder pedal during flight the rudder will be deflected to the left allowing the air-stream to strike the deflected rudder and cause the nose of the aircraft to turn to the left. The pilot putting pressure on the left or right rudder will control the amount of turn desired and the tail of the plane is pushed around and the nose of the airplane is turned in the direction of the pilot’s controlled choice.

The essential flight instruments are “KEY” to safe piloting and knowledge of their functions is very important during a few minute review of a pre-flight check list. For an example, the oil pressure gauge is the early warning indicator that an engine problem may be developing.

The “AIR SPEED INDICATOR” located on the instrument panel is connected to a “PRESSURE TUBE” located near the front of the aircraft. The A.S.I. gauge will provide the pilot with valuable air speed information for take off and landings as well as calculating fuel consumption.

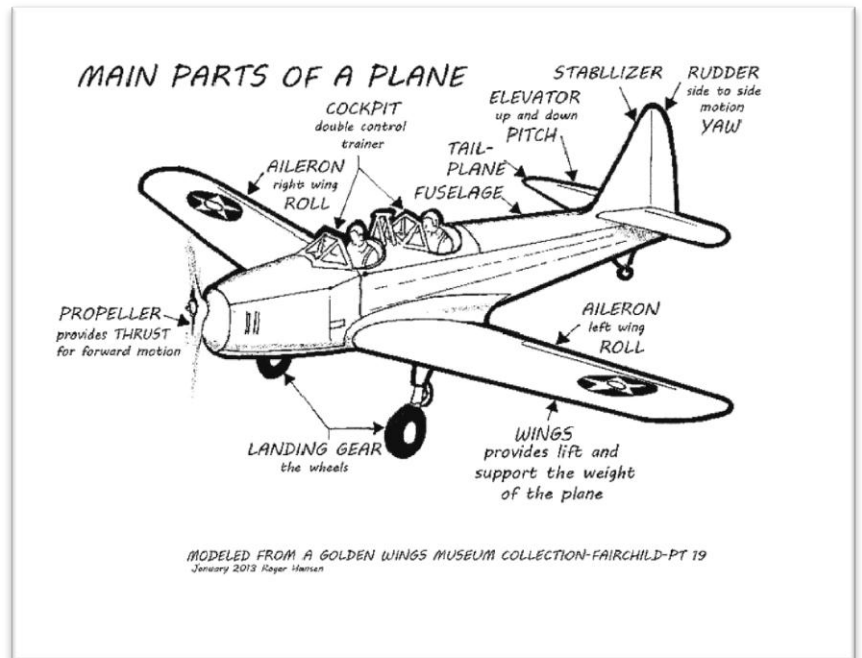


Lateral control is made possible by moving the control stick either right or left of center for banking or holding the control stick in a center position for level flight. During flight the pilot moves the control stick off center to the right to make a right bank. The aileron on the right wing will be controlled to move up from its centered position and the left wing aileron will be controlled to go down. The rush of air over the right wing strikes the right aileron and tries to force it out of the way. The pilot controls the aileron for the appropriate angle of bank and this allows air over the wing to try and force the aileron to be pushed back to its central position. This air movement also causes a lack of lift to the right wing creating a vortex of spiraling air forcing the wing tip to be pushed downward and creating drag on the right wing tip that actually helps in turning the aircraft. The left wing aileron is in the down position providing more wing surface on the underside of the wing that will provide greater lift to the left wing. The banking of the aircraft to the left is controlled the same way by moving the control stick to the left.



The review of aircraft parts and controlled surfaces is just the beginning of the introduction to aerospace technology. The joy of seeing a super-fast modern aircraft in action is a wonderful sight but the pilots of those wonderful aircraft had to start with these same basic learning and training principles.

Taxying, taking off, and even flying straight and level are forms of training that can prepare you for other rewarding careers in aerospace industries. As you gain confidence and experience in these early lessons you will find that setting goals and reaching them in other areas will be made easier. ☯



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