

Application Information

Force to Test Ailerons on an Airplane

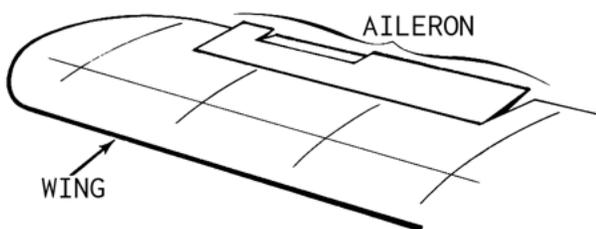
Ailerons are the outer hinged panels on the trailing edge of the airplane's wing. By raising one wing's aileron and lowering the opposite wing's, an imbalance will occur causing the airfoil to change. This change generates the rolling of an aircraft which causes an aircraft to bank and alter its path. On early aircraft, adjustment of the aileron was made through a wire and pulley system controlled by either a joystick or wheel in the cockpit. Though the actual movement of the aileron is controlled by hydraulics today, the fundamental control has not changed. Aircraft still employ either a joystick or wheel, but the resistance generated is not from the aileron directly, rather via a digitized feedback loop. To provide the pilot this feedback, a potentiometer correlates the physical movement of the aileron and sends this data to the control in the cockpit which simulates the actual resistance. This positive feedback of the aileron via the cockpit controls enables the pilot to properly determine how they want the aircraft to move.

It is vital that the aileron's controls are in perfect working order. Otherwise, inaccurate feedback could cause an unexpected variance of the aircraft, causing pilot control difficulty and even placing the aircraft in danger. Maintenance testing must be regularly performed on the aileron control system to verify it is working as expected. According to The Code of Federal Regulations, Control System Loads (14 CFR 25.397) detailed by the FAA, the minimum and maximum resistance forces in joystick-type aileron control feedback a pilot must encounter is between 40 lbs. (18 kg) and 100 lbs. (45 kg) respectively.

One international airline utilizes the Shimpo FG-3008 Digital Force Gauge with 110 lbs. (50 kg) capacity to verify the joystick control aileron resistance forces. By utilizing the programmable high and low limits, they receive an audio signal when the forces to control the joystick are above or below the allowable regulation forces. They chose the Shimpo force gauge due to its simplicity, repeatability, small size and accuracy of the measurements. The Shimpo force gauge allows them to confidently affirm that there would not be an unexpected rolling of the aircraft due to the pilot's control of the aileron, ensuring proper aircraft operation and passenger safety.

Equipment Used

- *FG-3008 Digital Force Gauge*



FG-3000 Digital Force Gauge