WORK-ENERGY-POWER

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Report on Air France Crash Points to Pilot Training

PARIS — The co-pilot at the controls of the Air France jet that went down two years ago after leaving Brazil, killing 228, had **not been trained to fly the aircraft in manual mode or to promptly recognize and respond to a speed-sensor malfunction at high altitude,** according to a detailed analysis by French investigators released Friday.

Introduction: This Airbus 330 nosed up while traveling at 500 mph and lost power. It is stated the plane was rising at 7000 ft/min(h/t) and eventually reached a speed of just 60 knots(stalling speed). This application's point is to show this Airbus 330's kinetic energy was reduced to almost zero(60 knots = ~ 100 ft/s , this is not much kinetic energy) by converting KE into potential energy. QUESTION: Show that this plane's 500 mph of kinetic energy is dissipated into potential energy in ~ 1.2 minutes ? HINTS: See below.

Reporters and members of victims' families listened Friday during a news conference at Le Bourget airport, near Paris, as investigators outlined their findings in the Air France jetliner crash.

Over all, the report, from France's Bureau of Investigations ***and Analysis, appeared to support the theory that fundamental errors by the pilots caused the plane to stall and plummet 38,000 feet.*** It called for significant changes to training procedures related to high-altitude trouble. The crisis for the Air France jet, an Airbus 330, began shortly after its captain had left the cockpit for a rest break***. Pilots no longer flew manually at altitudes above 24,500 feet***. "They never get to feel what the aircraft is like at altitude," he said, adding, "It's a problem across the industry."

An initial chronology of the flight's final moments, published in May***, confirmed suspicions that a loss of consistent speed readings,But investigators found that the loss of valid speed readings lasted for no more than a minute of the plane's terrifying four-minute descent.***The investigators found that the jet continued to respond to the commands until impact. **Those commands, however, were consistently inappropriate for a plane approaching a stall at high altitude**.

Instead of pointing the nose down in order to regain speed, the pilot at the controls drove it higher, worsening the loss of forward momentum and depriving the plane of lift. As abruptly as the plane **had climbed — at 7,000 feet per minute**, more than twice the rate of takeoff — **its recorded speed declined, dropping almost instantaneously to 60 knots,** the minimum velocity recognized by the plane's computers. A stall warning sounded twice. The co-pilots tried to call the captain back. However, the investigators noted, neither "made any reference to the stall warning" or "formally identified the stall situation."

About a minute later, the captain returned. Airspeed readings continued to fluctuate wildly. Meanwhile, the jet's *nose was pointing up from the airstream at about 16 degrees* — far beyond the maximum of around 5 degrees considered safe at high altitudes, where the air is thin. But the pilots could not know this, the report said, because that information — called the angle of attack — is not displayed in the cockpit. As the plane plunged toward the sea at vertical speed of nearly 11,000 feet per minute, the angle at one point exceeded 40 degrees. Investigators recommended that safety regulators worldwide consider requiring jet makers to include an angle of attack indicator "directly accessible to pilots."

HINTS: P = Work or Energy/time , 60 mph = 88 ft/s

(kinetic energy lost)/[potential energy gain]/[time] = time

kinetic energy lost =[potential energy gain/time] x time

$1/2\ m\ v^2$ = [mgh/t] time

$1/2\ m\ v^2$ = [mg][h/t] time

$[\ v^2/2]/\ g[h/t]$ = time to dissipate the kinetic energy of plane into potential energy.