ATTACHMENT 1

STRUCTURES GROUP CHAIRMAN'S FACTUAL REPORT

DCA18MA142

Cabin Pressurization System Description

CABIN PRESSURIZATION SYSTEM

According to Boeing's *737-600/700/800/900 Aircraft Maintenance Manual* (AMM), the airplane's air conditioning packs provide air to the cabin, and pressurization control system maintains a safe cabin altitude at all airplane altitudes.[1] The AMM also stated the following about cabin pressurization control:

> The airplane operates at altitudes where the oxygen density is not sufficient to sustain life. The pressurization control system keeps the airplane cabin interior at a safe altitude. This protects the passengers and crew from the effects of hypoxia (oxygen starvation).

For all pressurized flights, the cabin pressure altitude is determined by a pressure schedule that keeps the cabin altitude pressure below 8,000 feet which enables the flight crew to safely operate the airplane and protects passengers from the effects of hypoxia.

The manual indicated that the pressurization control system comprised three subsystems: 1) the cabin pressure control system – it controls the rate that air flows out of the cabin through the outflow valve, 2) the cabin pressure relief system – it protects the airplane structure from overpressure and negative pressure if the pressurization control system were to fail, and 3) the cabin pressure indication and warning system – it provides information to the flight crew about the status of the cabin altitude.

Components of the cabin pressure control system include a cabin pressure control module, two cabin pressure controllers, and an outflow valve. A sensor on each cabin pressure controller detects pressure in the cabin. The outflow valve provides position feedback to each cabin pressure controller (located in the electronic equipment compartment) and the cabin pressure control module (located on the forward overhead panel). The cabin altitude panel, which is part of the cabin pressure indication and warning system, includes an indicator that shows cabin altitude in 1,000 feet increments and the cabin pressure differential in increments of 0.2 pounds per square inch differential.

Pressurization control can be automatic or manual; a flight crew selects the mode using the cabin pressure control module (on the forward overhead panel).[2] With the automatic mode, each cabin pressure controller operates independently, with one controlling the outflow valve (the active controller) and the other providing backup.[3] The active controller changes with each flight or if any component in the operating channel during a flight were to fail. The manual pressurization control mode, which operates independently from the automatic system, overrides and bypasses the cabin pressure controllers. The usual mode of operation is automatic. The Boeing 737 flight crew operating manual preflight procedure has the flight crew set the pressurization system to AUTO before each flight, but manual may be set up as needed and the airplane is permitted to be dispatched with the pressurization system in the manual mode.

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[1] The air conditioning system uses bleed air from the engines to provide pressurized air to the cabin.
[2] The flight crew also sets the flight altitude (from -1,000 to 42,000 feet in 50 foot increments) and the landing altitude (from -1,000 to 14,000 feet in 50 foot increments) in the automatic mode using the cabin pressure control module.
[3] The outflow valve is located on the aft right fuselage skin below the aft service door.

The maximum cabin altitude for most flights is 8,000 feet pressure altitude. The cabin altitude warning switch, located on the ceiling in the forward electronic equipment compartment, detects when the cabin altitude has reached a critical point. Specifically, the cabin altitude warning switch closes when the cabin altitude reaches 10,000 pressure altitude ± 1,000 feet (9,000 to 11,000 feet pressure altitude). When the cabin switch closes, an aural warning annunciates as "an intermittent beep alarm" and the red CABIN ALTITUDE indicator light on the captain's and the first officer's instrument panels illuminates. When the cabin altitude returns to a level that is below 10,000 feet pressure altitude, the cabin altitude warning switch opens, the indicator lights no longer illuminates, and the warning circuit resets. An ALT HORN CUTOUT switch on the cabin altitude panel is used to deactivate the alarm.