

An 8-hour period from the San Francisco Bay Area via Seattle (passenger cabin) on to Anchorage (cargo bay).
A Langan Dual Hygrothermograph with Pressure Sensor was used to gather five sets of data.
Experienced altitude, temperature and air moisture were recorded.

Precious Cargo — People and Animals

Bear Facts -- #58

Many live creatures fly our skies daily. Animals frequent the cargo hatches.
Here are examples of some flights and measurements made in various aircraft venues.
An expanded program of data gathering is planned.



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the DataBear

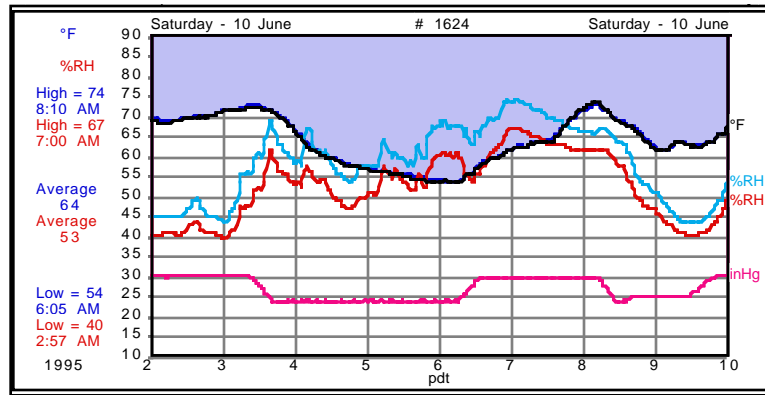
Bear Facts are published to provide useful insights into the operation and applications for the DataBear™ Measurer and associated complete instruments.

The air of aircraft is conditioned to an environment experienced at approximately 6000' altitude when in flight. The passenger cabins have the air volume changed and conditioned during flight; the cargo bays are sealed. Temperature is monitored and controlled.

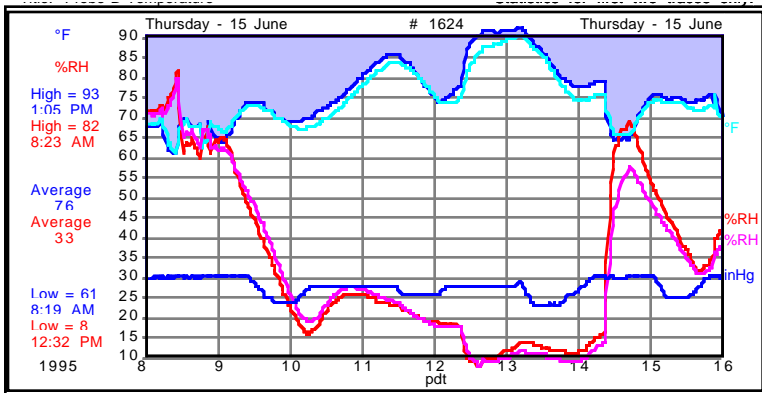
During long flights passengers often experience the 'itchy nose' effect brought on by dry air; in the cargo areas, below deck, the air is more stable as it changes more slowly. The data shown here are from three aircraft routes: temperature, relative humidity and barometric pressure were all measured each minute. Data were gathered in the passenger cabin and in a cargo bay with and without an animal on board. Differences between similar sensors (in particular with humidity) show the changes that can occur even within a few feet in an enclosed space or near a wall. All times are Pacific Daylight Time; all vertical scales 10 to 90; the aircraft were MD-80s.

DayOne compares passenger and cargo exposure (plot on front). The San Francisco-Seattle segment demonstrates a typical dry aircraft environment caused by the introduction of high-altitude air and rapid air exchange in the passenger cabin. The temperature was probably reset by the cabin crew midway to Seattle; was warmer when the cabin was exposed to outside air on landing and cooled as the sensors were moved into the cargo bay. With the open bay it warmed then cooled during the flight to Alaska. The sealed bay dried more slowly. The angular barometric pressure trace designates when the aircraft is on the ground, when climbing or descending and when at altitude (limited to the cabin/cargo pressure).

DayTwo compares the cargo bay with a live animal on board. From Alaska to Seattle a Husky dog was transported in the monitored cargo bay. During some of the flight the dog was alarmed and barked (heard in the passenger cabin); the moisture in the enclosed space indicated it breathed heavily. (While the flight was calm, the dog managed to escape the cage and was free among the luggage.) From Seattle to San Francisco the temperature and humidity levels reduced in a manner similar to the earlier flight between Seattle and Anchorage. The reason the humidity did not rise inversely to temperature is the contravening introduction of dryer air.



DayThree show data gathered on an 8-hour loop from San Jose to Las Vegas to Tucson to Los Angeles to San Jose with all data measured at two points within the cargo bay. This was selected as a representative summer flight. The barometric pressure shows the times aloft and the higher elevations of Las Vegas and Tucson. The relative humidity shows the dry air aloft as well as that experienced in the Southwestern US deserts. The temperature shows the summer heat inland and the cooler (and more moist) environment at sea level on the Pacific coast.



This randomly selected day was not particularly hot. It is clear, however, with the heat greater when the cargo bays are open the bays will adjust to the outside air. (The two temperature sensors show the differences inside the bay.) This on-the-tarmac exposure has the greatest thermal danger to cargo being transported- live or otherwise perishable. In the air, exposure tends to longer periods of dry air- except where the local environment is already dry. The humidity changes dramatically.

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Portable miniature instruments are used to measure the three parameters that define a psychrometric environment. In doing so, any unit of moisture can be obtained to describe comfort for passengers or animals carried aboard aircraft. Langan instruments are used to audit in-transit environments.