FACT SHEET:
INDOOR AIR POLLUTION ON AIRCRAFT

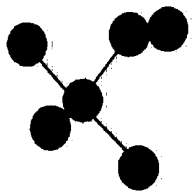
- The typical lack of adequate ventilation in commercial airliners causes the build-up of indoor air pollutants by acting as a trap for carbon dioxide (produced by humans and dry ice in airplane galleys); fibers and dust (from upholstery and other furnishings); fumes and vapors (from fuel and cleaning fluids); atmospheric ozone; nicotine; and a variety of bacteria, fungi and viruses.

- Increasingly, fresh air is cut back on aircraft to save money on fuel (ventilation uses more fuel because the air is brought in through the engines). Also, the trend in new aircraft is toward ventilation systems that run on 50 percent recycled air.

- Influenza, smallpox and other serious illnesses have resulted from in-transit exposure on aircraft, with the spread of microbes facilitated by inadequate ventilation. Such cases are documented by the American Journal of Epidemiology, the Centers for Disease Control, the World Health Organization and Aviation, Space and Environmental Medicine. Flu epidemics have been found to follow major air transit routes.

- The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the Building Officials and Code Administrators (BOCA) recommend that the minimum fresh air rates per person in buildings be established at 20 cubic feet per minute (cfm). A 1986 report by the National Academy of Sciences/National Research Council found ventilation rates in aircraft to be much lower than this standard.

- Ventilation rates in the first class section typically are much more adequate than in economy class, according to the NAS/NRC report. The economy class area showed a rate of less than 7 cfm per person, while first class passengers were exposed to 30-50 cfm per person.



- The NAS/NRC report found carbon dioxide levels on aircraft in excess of limits recommended by ASHRAE and the National Institute for Occupational Safety and Health (NIOSH), and ozone levels exceeded limits in 11 percent of all flights studied.

- Airlines often use external units to cool the air while planes are on the ground, causing contamination by fumes from the ramp area.

- The normal comfort level for relative humidity is between 30 and 65 percent, yet the NAS/NRC found relative humidity on aircraft at ranges between 2 and 23 percent. Low humidity can cause eye, respiratory and skin irritation.

- The NAS/NRC report found no excessive levels of carbon monoxide, airborne particulates or nicotine, all of which have been linked to tobacco smoke. Three independent studies of nicotine on aircraft also have shown levels well below ASHRAE and Occupational Safety and Health Administration (OSHA) standards.

- The NAS/NRC report included several recommendations to improve cabin air quality, including steps to increase ventilation and filtration, to set reasonable standards for pollutants, to encourage compliance, to establish an air quality monitoring program, and to ban smoking. The smoking ban is the only recommendation not supported by scientific data; however, it is the only recommendation that has been enacted into law.

- A report commissioned in 1980 by McDonnell Douglas Corporation advocated decreasing ventilation to 50 percent in existing DC-10s, claiming a fuel savings of 62,000 gallons per year. Based on that report, the firm recommended the installation of recycled air systems in existing DC-10s.

- However, the cost of adequate ventilation actually is small. If ventilation is increased to healthy standards on a typical, five-hour full flight aboard a 747, the extra cost for fuel amounts to $240, or 60 cents per passenger.

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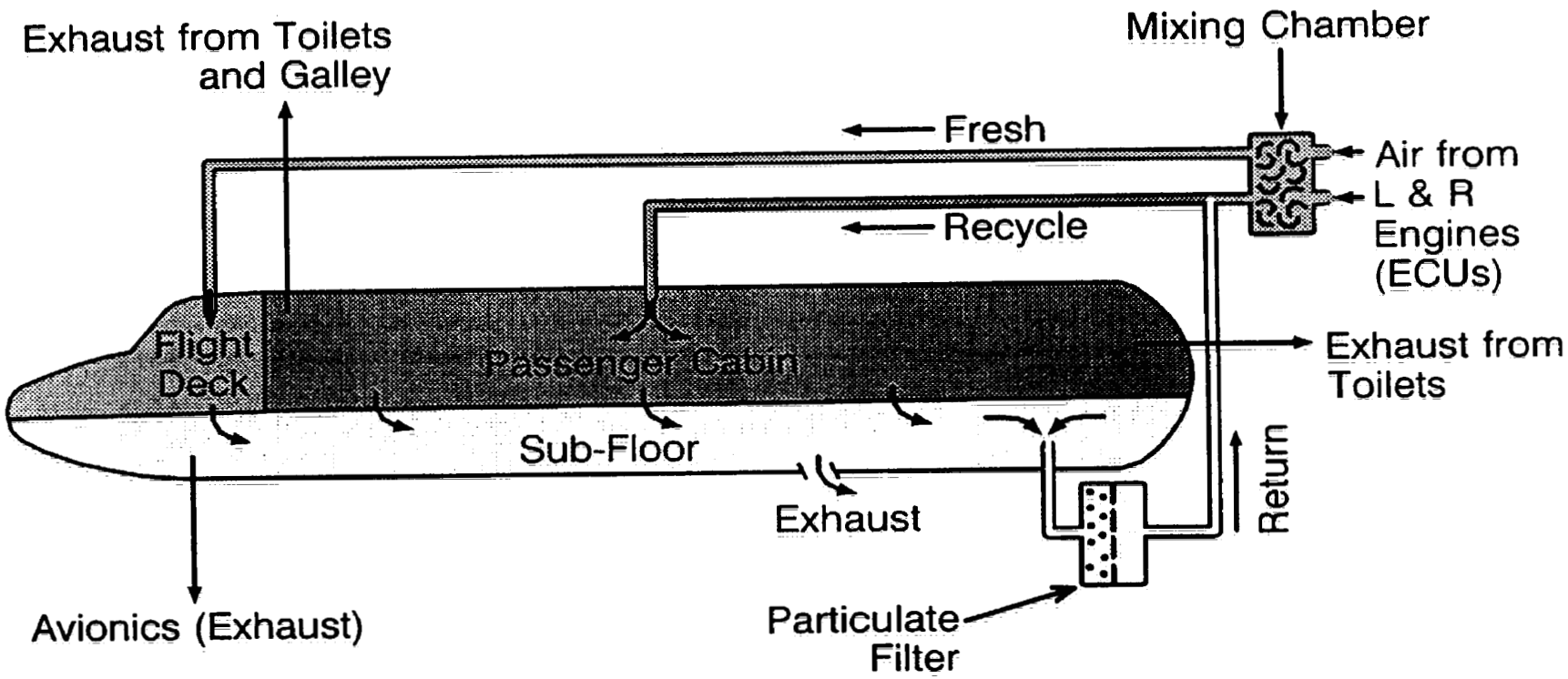
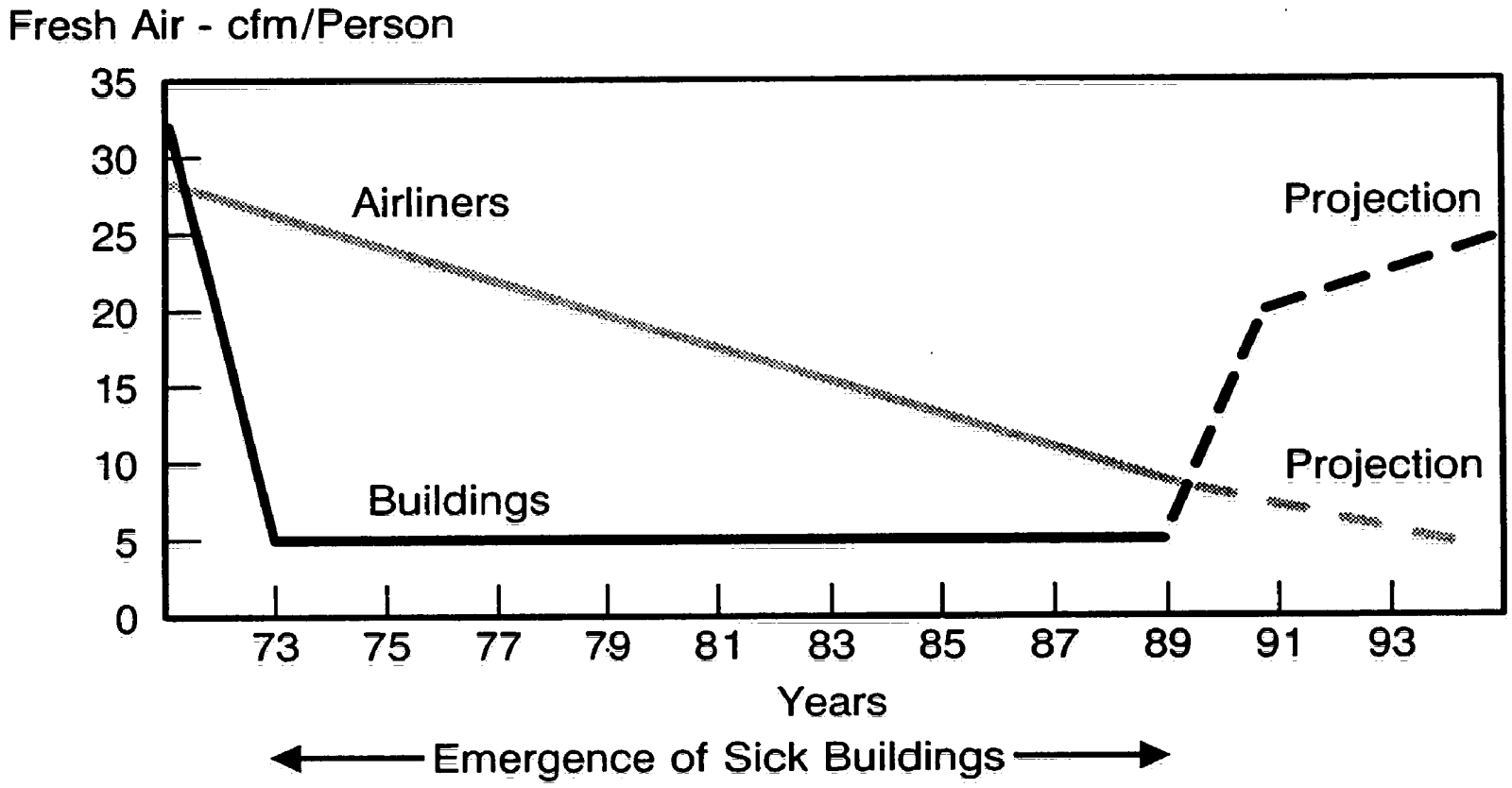
MD8O
CABIN AIR RECIRCULATION



MINIMUM VENTILATION RATES



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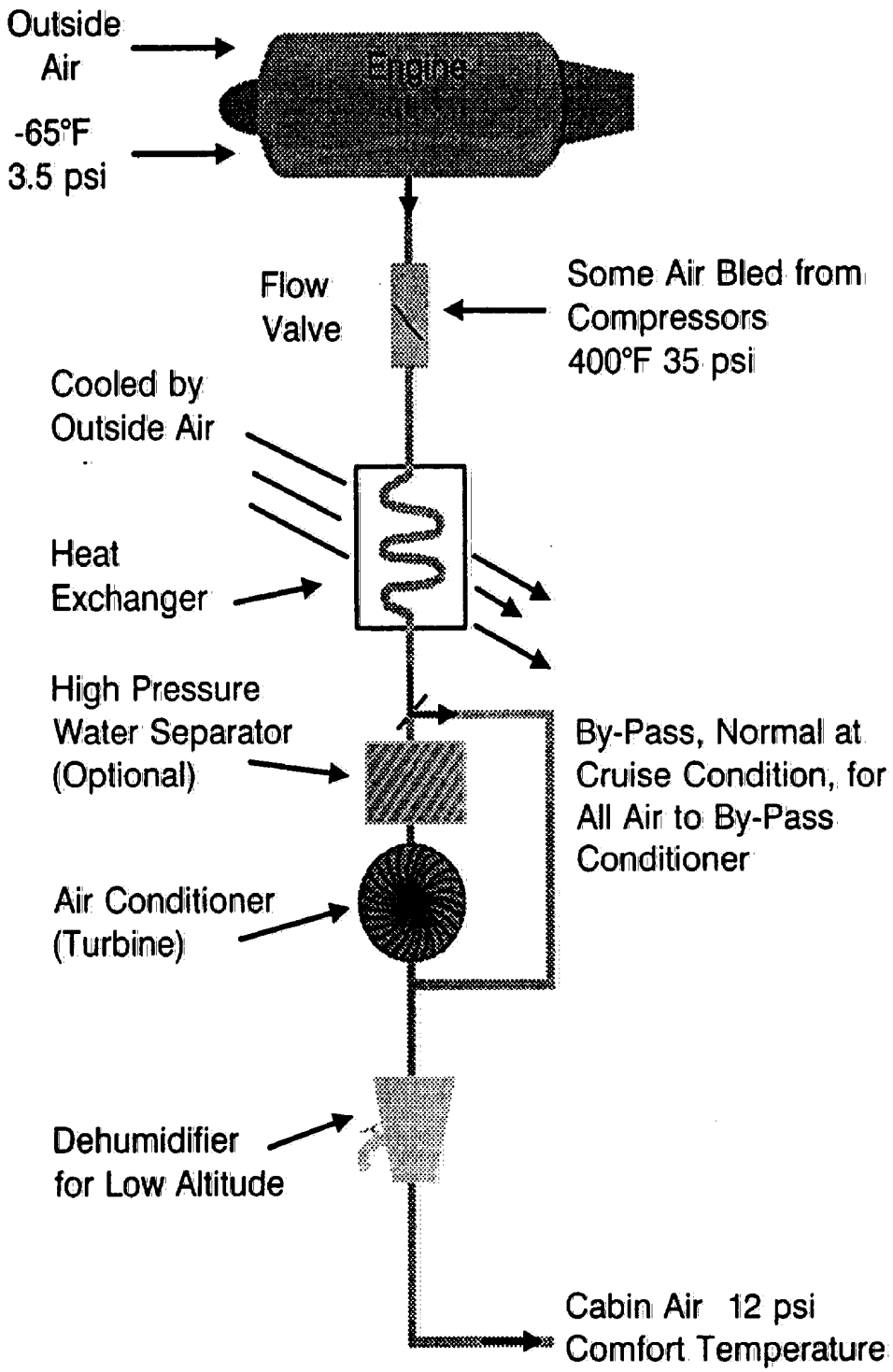
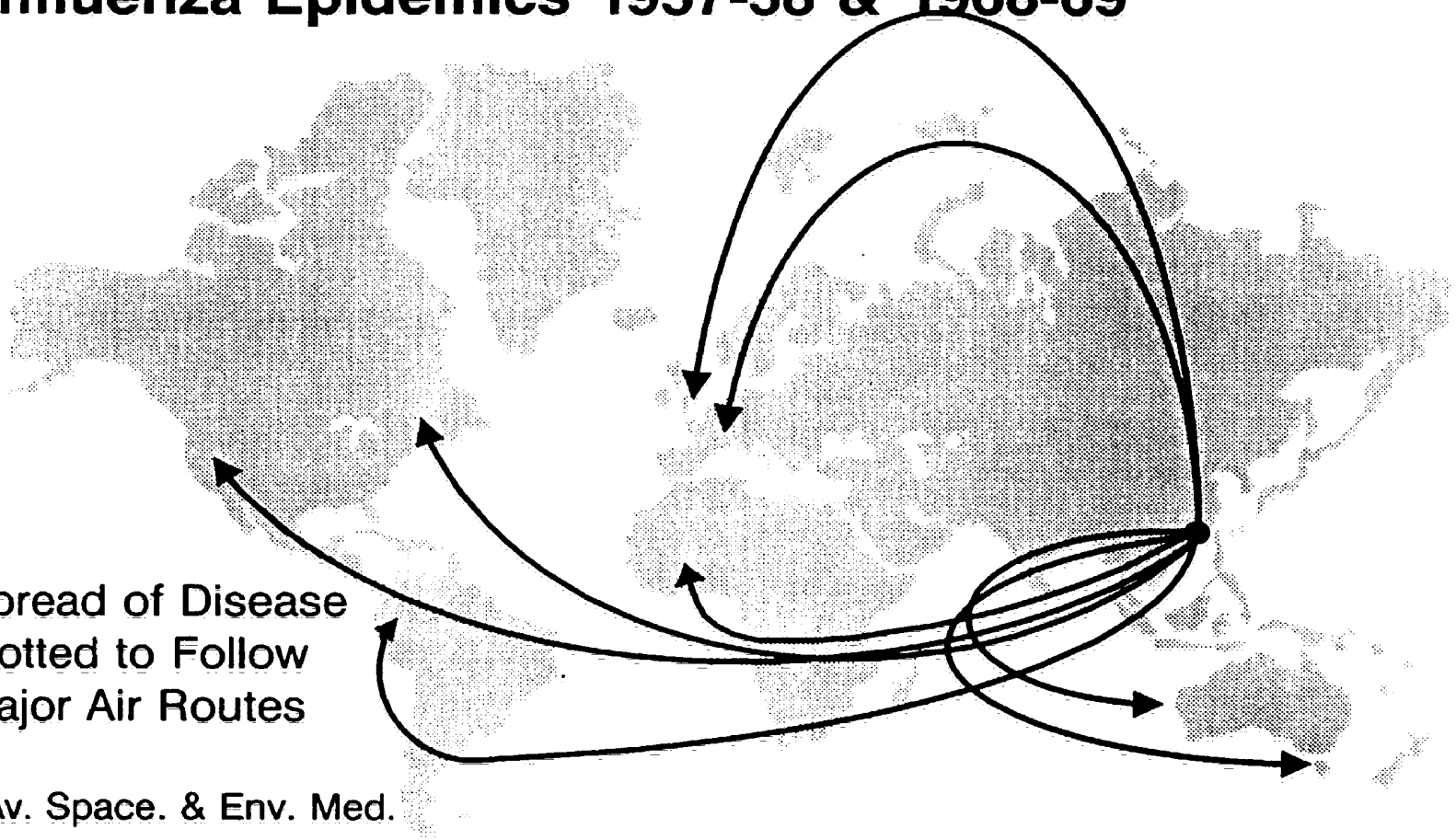
ENVIRONMENTAL CONTROL UNIT (ECU)



AIRLINERS - MICROBES

Influenza Epidemics 1957-58 & 1968-69



Spread of Disease
Plotted to Follow
Major Air Routes

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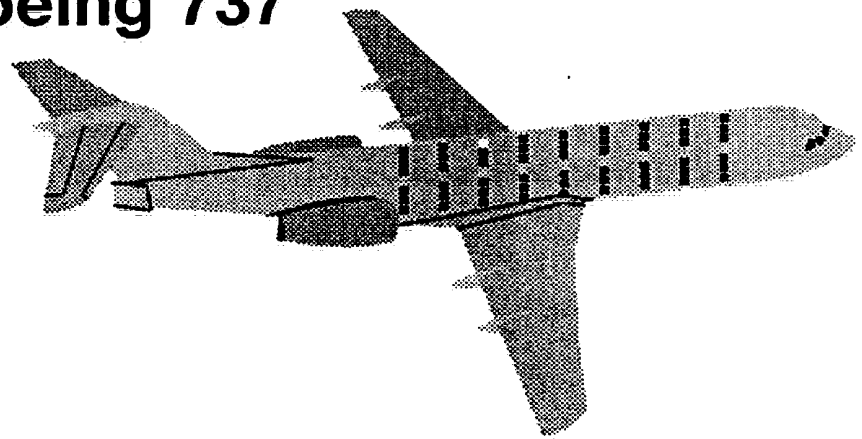
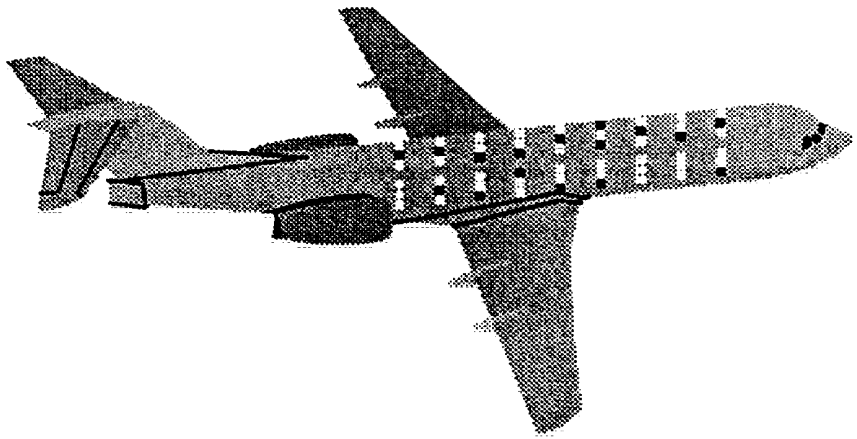
AIRLINERS - MICROBES

March 1977 - Alaska - Boeing 737



1 of 54
Passengers
with Influenza



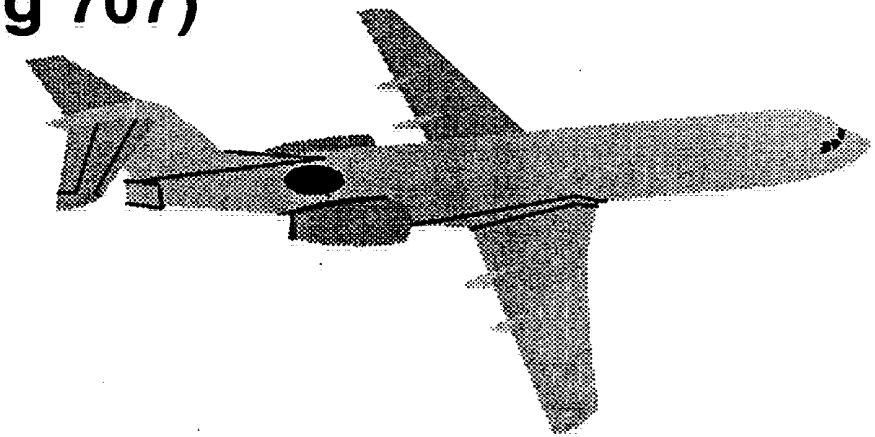
38 Passengers (72%)
Had Influenza within
3 Days of Flight

(Am.J. Epid.)

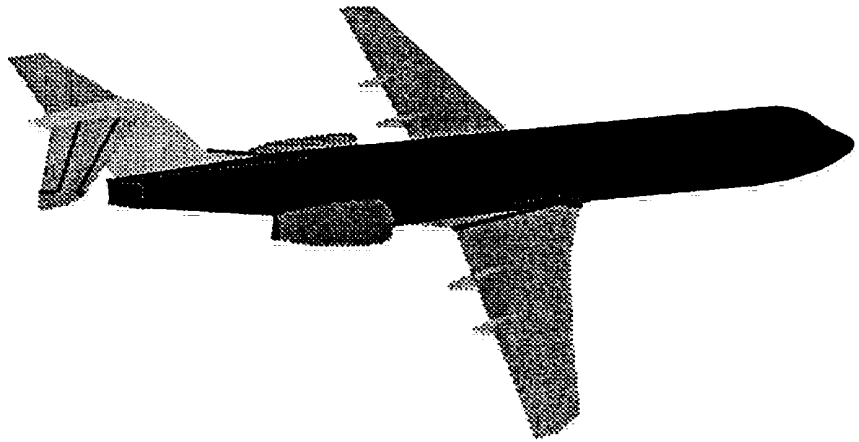
AIRLINERS - MICROBES

Canadian Trials: (Boeing 707)

Bacillus Subtilis
Spores Released to
Simulate 3 Sneezes



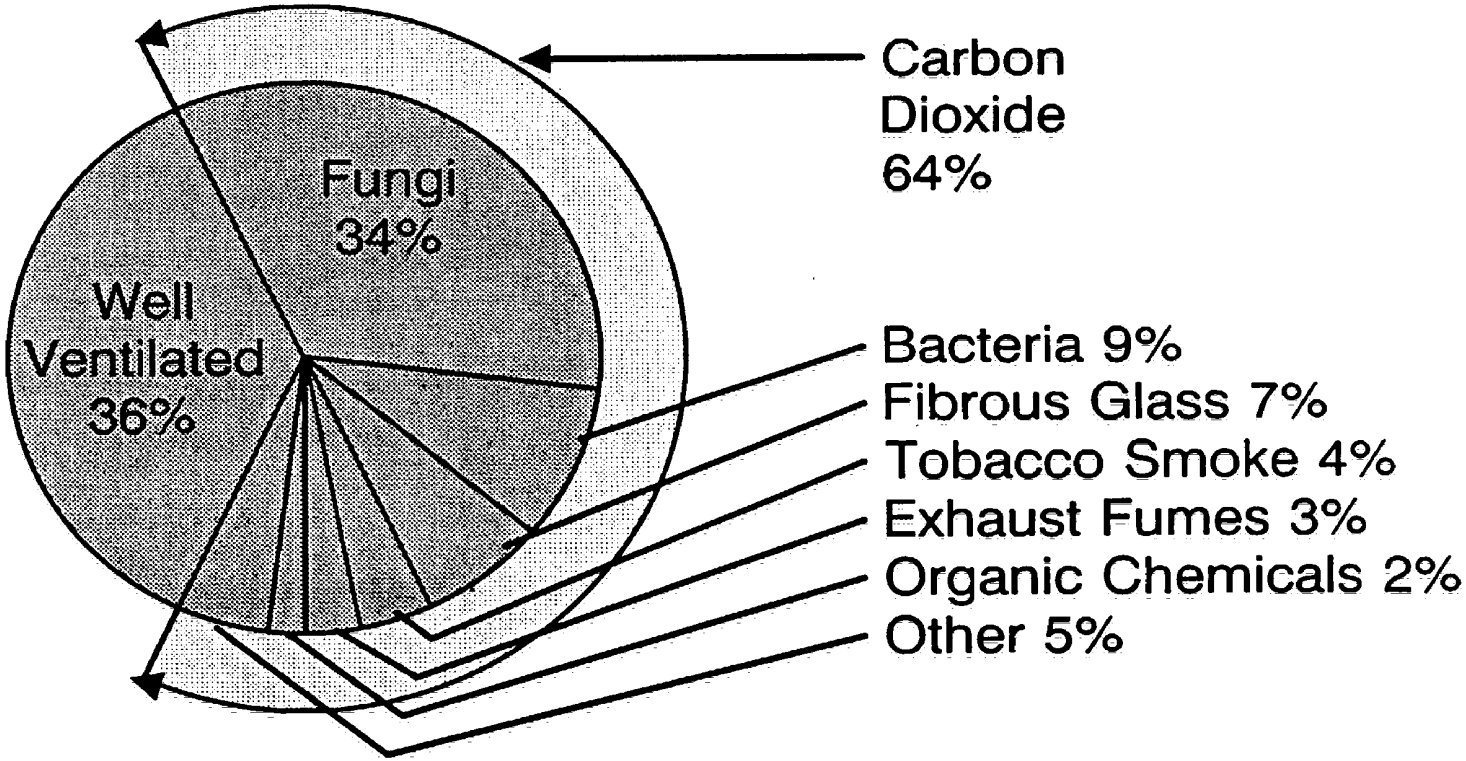
100% Contamination
When Aircraft on Ground
Prior to Pressurization



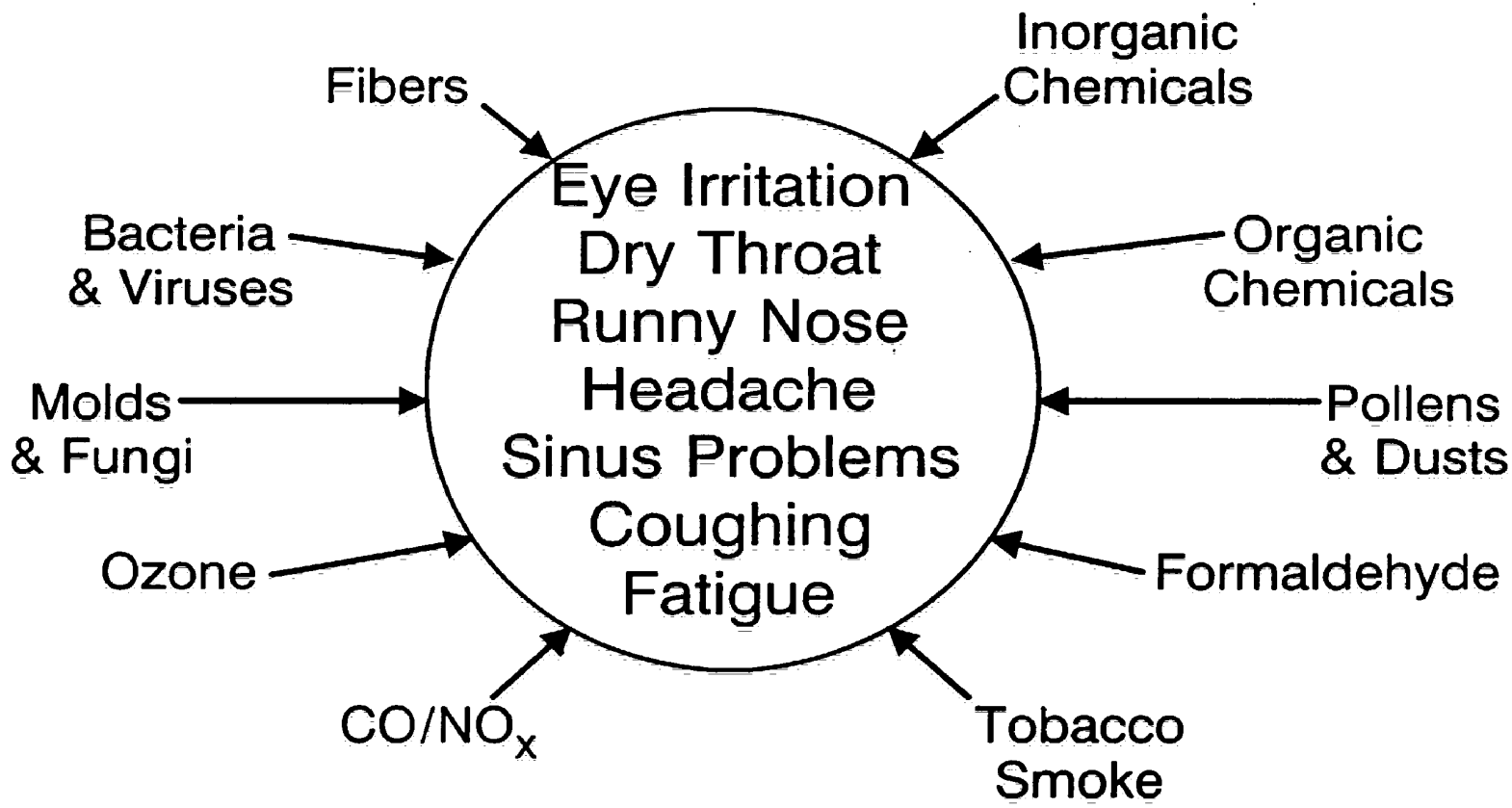
Av. Space. & Env. Med. '76

ACVA EXPERIENCES
1980 - 87

(225 Major Buildings) Summary of Pollutants Found:



SICK BUILDING SYNDROME
OVERLAPPING SYMPTOMOLOGY



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