

Consequently, the Organization believes that future efforts to resolve this problem are likely to be heavily influenced by the need to address global environmental problems, such as long-range air pollution, depletion of the ozone layer, and the greenhouse effect.

HIGH ALTITUDE EMISSIONS

The civil aviation industry is acutely aware that while aircraft noise is currently the number one, high-profile concern of those living near airports, of far greater consequence in the longer term to all could be that of gaseous emissions at high altitude.

While research is at an early stage and there is consequently no conclusive evidence to date, there are some indications that such emissions, particularly during cruise at 10 to 13 kilometres (33,000 to 43,000 feet), may be contributing to global warming and to the depletion, albeit marginally, of the ozone layer - that fragile shield around the earth which protects mankind from harmful ultra violet radiation.

While there is no question that considerable progress has been made in recent years in curtailing gaseous emissions from aircraft engines, there is what may be regarded as a certain irony to this progress.

For the very technology that has contributed to improved fuel efficiency and reduced carbon monoxide and carbon dioxide emissions has also resulted in greater emissions of nitrogen oxides. And it is these latter emissions that have been implicated in the depletion of the ozone layer, global warming, and long-range air pollution, although their relative

contribution is believed to be very small.

Aircraft engine manufacturers have invested millions of dollars in research to overcome this problem and, as a result of staged combustion technology, new engines proposed for aircraft, such as the **Boeing 777**, will emit 30% to 40% less nitrogen oxides without the trade-off effect of increased carbon emissions.

LONG-RANGE POLLUTION

In essence, long-range air pollution refers to the adverse effects which air pollution can create at considerable distances from the source, one of the most controversial being acid rain caused by pollutants such as nitrogen oxides being "washed out" of the atmosphere.

While aircraft engine emissions en route probably make a small contribution in this regard, actions aimed at resolving local air quality problems near airports have unquestionably helped to reduce civil aviation's contribution.

Moreover, an action plan adopted by governments at the **Earth Summit** in Rio de Janeiro in 1992 gave strong support to the example of the **United Nations Economic Commission for Europe** which, in 1979, adopted the Convention on Long-Range Transboundary Air Pollution.

The long periods which aircraft used to spend idling at airports, adding to pollution, has been drastically reduced by improved ground handling and scheduling so that the aircraft remain at the gate until a take-off slot has been cleared.



This convention is aimed at preventing acid rain precipitation and photochemical smog. Canada and the United States are signatories, along with most European States.

One of the protocols to the convention focuses on nitrogen oxides and commits parties to a freeze of national emissions, that is to say emissions from all sources, at 1987 levels by this year (1994). It is important to point out that while this commitment covering all sources does not in itself require parties to take measures against engine aircraft emissions, in practice it may encourage them to consider doing so.

OZONE LAYER DEPLETION

In this regard, studies show that the ozone layer around the earth, which protects it from the harmful ultraviolet radiation, is being depleted by man-made gases. Aircraft may be having an impact here, particularly those that fly at very high altitude. This is an important factor to be taken into account in any future development of supersonic aircraft.