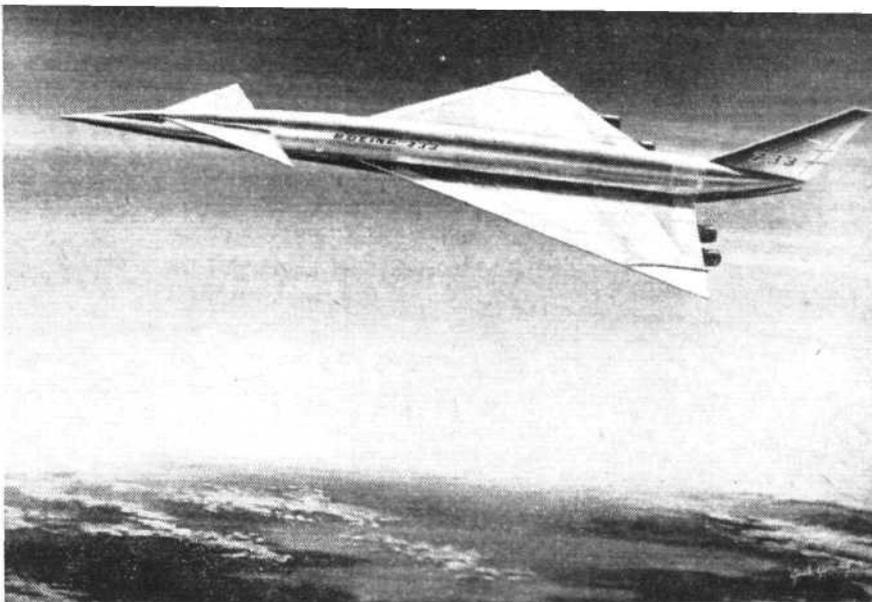


# CIVIL SUPERSONICS: TOO MUCH HURRY?

A PLEA FOR A MORE RATIONAL APPROACH

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THAT the development of the supersonic airliner should take second place to an intensive programme for enhancing the safety and efficiency of subsonic transport was the theme of a paper given by Mr Bo Lundberg, the eminent Swedish authority, at the recent Air Safety Seminar held by the Flight Safety Foundation. Mr Lundberg—whose career started with test piloting and design work 30 years ago—began his lecture by examining two of the major questions of supersonic flight, the sonic-boom problem and its implications for people on the ground, and the cosmic-ray hazard with its possible effects on those in the air.

There is general agreement [said the lecturer] that all technical design and operational problems involved in supersonic commercial aviation—at a Mach number anywhere between 2 and 3.5—can be solved in the near future, even if they are not solved today. The topical question widely discussed is, therefore, *when* this kind of aviation should be introduced.

With regard to two specific problems of a fundamental nature, and which are completely new to civil aviation, I am not yet convinced that they can ever be solved in a way compatible with economic operation. I maintain, therefore, that the first question to be answered concerns not *when*, but *if* we are to have supersonic aviation.

The two problems are those of sonic booms and cosmic radiation.

In order to indicate the severity of the sonic-boom problem it might be mentioned that a 180-ton Mach 2 or 3 airliner flying at 70,000ft, and presumably carrying some 100 passengers, would sweep the earth's surface with a thunder-like noise along its entire flight-path, the effect being a rattling (and often shattering) of windows and the awakening of sleeping people within a band of disturbance some 70 miles wide.

## Just as Important

Let us imagine the inaugural night-flight from New York to Los Angeles with such an aircraft; supposing that no restrictions in operation are imposed, then several millions of US citizens will be awakened from their sleep and pleasant dreams. Never before in history will have so many been disturbed so much by so few! Is it justifiable that millions of passengers on our spacecraft *Tellus* should be disturbed in this way to enable about 100 passengers flying from New York to Los Angeles to gain a couple of hours in flight time? My answer to this question is "No." Even with the strongest belief in, and enthusiasm for, aviation, I do maintain that people on the ground are as important in all respects as those who are temporarily in the air.

However, this single flight will by no means indicate the severity of the vast problems confronting us. We just have to look far into the future and consider what supersonic aviation will look like many decades from now. Let us be quite clear about two facts: (a) once supersonic aviation has been introduced, it will grow and continue to grow indefinitely—if it is at all an economically sound proposition; (b) once introduced, but ultimately found to be a mistake because of protests of the public, it will not be possible for the airlines to turn back to pure subsonic civil aviation without economic disaster.

One just cannot wake up to a delayed state of common sense and declare that all the huge, sleek and beautiful aircraft, masterpieces of science and engineering, which were bought for several billion dollars, were quite nice to have for a while, but have now become so disliked by the world's population that we had better scrap them all! The point I therefore wish to make is that we have arrived at one of the most important cross-roads in history, not merely for aviation people but for all mankind.

We just cannot—or at least should not—bombard larger and larger portions of the earth's surface with ever-increasing sonic-

boom thunder without giving, in advance, full consideration to all the implications. It might be argued that all means of transportation (railroads, trucks, airports) are noisy. That is true; but the very big difference is that whereas it is physically possible to move away from railways, highways and airports, hundreds of millions of people would never be able to move away from the ever-increasing areas and frequency of sonic-boom thunder. Another significant difference is that sonic bangs are sudden and unexpected, whereas airport noise is of a gradual character which the neighbours can to some extent get used to.

It would, of course, be possible to impose restrictions on supersonic aviation—for instance, limitations to day-time or to over-sea operation. Obviously this would considerably limit the supersonic market, with adverse effects on the economics; yet I doubt whether even with such restrictions supersonic aviation would be justifiable from sociological, medical and legal points of view. People should have a right to enjoy quietness even in day-time. It should even be remembered that quite a few people are dependent on undisturbed sleep during the day, for instance because of work at night.

Furthermore, there will be tremendous legal problems. Who will pay the damages arising from hardships inflicted on people because of decreased sleeping time or from losses on account of reduced working capacity? And can one neglect the possibility of, for instance, people with weak hearts being killed by sudden sharp sonic bangs?

## A Matter of Dimensions

For medical and sociological reasons, supersonic aviation—be it by day or night, over sea or over sparsely populated areas—should be permitted only if the operators can guarantee that the sonic booms will be below a specified limit of intensity. This should be so low that light sleepers will normally not be awakened. But in the present state of the art, and in the foreseeable future, such a requirement cannot be satisfied economically, as it would limit the aircraft size to fighter-like dimensions.

The question of the acceptable intensity of sonic booms is, in my opinion, not an issue that should be determined on the basis of number of complaints. Such an attitude could result in concentrating supersonic civil aviation over sparsely populated areas or over sea, because "only," say, hundreds of thousands of people and not tens of millions would then be afflicted. The obvious thing to do is to conduct extensive test flights with existing military supersonic aircraft in various countries so as to assess the relationship between sonic bangs and their effects on people. Such test flights should be made at various heights so as to create a range of intensities and the aircraft should be flown—with different frequencies—both at night and day over various typical districts such as cities, densely or more sparsely populated countryside areas, and seas frequented by shipping. The tests should be supervised and evaluated, not least by medical experts. Although public reaction in the form of complaints and Gallup investigations should be assessed, the disturbance effect, in particular as regards sleep, should also be determined on a scientific medical basis.

The opinion has been expressed that if the *en route* sonic-boom noise is not any worse than the present "tolerable" airport noise, then it would—or must—be accepted by the public. I am convinced that if supersonic aviation were to be launched upon us on the basis of such a complete misjudgment of what is at stake it would cause severe public pressure, probably leading to extensive prohibition of this new form of civil aviation.

Turning now to the other problem—cosmic radiation. It is well known that the so-called total ionization has its maximum around 70,000ft, i.e., the very altitude at which the planned supersonic aircraft will fly. At this height the intensity is 200 or 300 times stronger than at the Earth's surface. It is also a fact that the so-