LETTER FROM LONDON

Concorde challenge

The British-French airliner is a big incentive, but the boom hangs over it

by Larry Miller

The successful maiden flight of the French version of the supersonic Concorde airliner has brought closer the day when it will be ferrying passengers regularly across the Atlantic. It has also sharpened the urgency of a solution to the sonic boom problem.

Both the manufacturers and the British and French Governments are hopeful that the airliner will be in service in three years time. In the meantime, studies are going ahead in Britain, as they are in the U.S. (SN: 12/21, p. 616), on the effect of booms on man and his works.

Some argue that the noise problem has been overstated. Clearly many details about the effects of the sonic boom are unknown but it is known that the boom path can be from 50 to 70 miles wide and that an aircraft traveling along a flight path of 3,000 miles can affect some 200,000 square miles beneath it. Ground level overpressures—the buildup of air pressures from the supersonic flight — will be about 1.5 pounds per square foot, and perhaps higher during acceleration and when reflected shock waves combine.

What is not known as yet is the effect of these shock waves on buildings, nor their psychological effect on people.

Two approaches are being made to fill in these details, one using statistics, the other simulating shock waves with explosives.

With statistics, scientists hope to be able to quote the response of a building to sonic booms in terms of its response to existing environmental forces such as wind and traffic. Thus a building may respond twice as harshly to the sonic boom as to, say, gale-force winds. From this it might be possible to indicate what damage is likely to be caused by the boom, and how much maintenance will be required.

The statistical method is at present being tried on cathedrals. These buildings are ideal for research, since they have maintenance records going back a long way, and in the normal course of events are subjected not only to the noise of wind and traffic and thunder but also to the rumblings of the organ, the tolling of the bells and the striking of the clock. As yet no results are available, but they have already shown that some buildings are in a dreadful condition, and liable to partial collapse even without the effect of the sonic boom (SN: 3/15, p. 268).

The alternative approach is to produce controlled bangs in a precise way using explosive charges. The problem here is to produce a sound wave that lasts the correct length of time. This has been overcome by placing small charges in a line pointing towards the building, and then exploding them simultaneously so that sound wave from the furthest point arrives 100 milliseconds or so after that from the nearest. The technique is accurate enough for assessing the effects of sonic booms on buildings up to the size of a house, but it is unsuitable for cathedrals. When coupled with statistical method, however, it could provide much valuable data.

The psychological effect of booms has also been examined in a small way in Britain. This has been done by exploding charges in a random and controlled fashion over the heads of a small community. It was found that people rapidly got used to the noise, and though at first they objected to the experiments, they later failed to hear some of the bangs.

This is not to say that musicians, surgeons, invalids and others in special categories will find the noise acceptable, but it does suggest that more needs to be known about the precise response of people. It is interesting to note, in this connection, that in Britain, as in the U.S., the first few flights of Air Force supersonic planes evoked strong criticism from the public, but because so few test runs were made it has been impossible to judge the long-term effects.

It is unfortunate that the Concorde should have the drawback of noise, for it represents both a technological challenge and economic incentive that Britain desperately needs. Rising costs still threaten the project—the latest unofficial estimate for research and development is $1.4 billion, four times what it was in 1962, and in three years it could be more than $2.4 billion—but in view of the difficulties encountered by the U.S. supersonic transport project (SN: 11/2, p. 440) it seems likely the Concorde will have several years of pre-eminence before it is replaced by its much larger American cousin. The British-French plane will have competition in the supersonic sky only from the Russian Tupolev 144, which flew for the first time last Dec. 31.

Concorde's builders are banking on the years of no competition from a U.S. plane to make the project pay. But the sonic boom is not its only noise problem: there are indications that even take-off and landing noise will be too loud to pass restrictions in some major U.S. airports.