

# Acoustic experts seek methods to Silence the noisy jet

Excessive noise has been touted as the cause of a variety of physical ailments — heart attacks, ulcers, high blood pressure, eyesight damage, nervous breakdowns. It even has been suggested that it has an effect on sexual potency. Because of this, people living in communities close to major airports reasonably might be expected to be the most vocal of complainers about noise created by huge jet aircraft.

Generally speaking, the reverse has been true. The majority of airport community residents swallow their complaints, and grin and bear the screaming whine of the jetliners whose takeoff and landings have been known to generate enough noise to knock pictures from walls and to crack windowpanes.

The reason for their tolerance is not hard to explain. Most Canadian airports were built originally in isolated areas. The cities grew out to engulf them and loopholes in zoning laws were used, for example in Montreal and Toronto, to allow apartment buildings to go up within a few hundred feet of the end of runways. Thus, the bulk of airport area residents knew in advance that they were moving into a prime area of noise pollution.

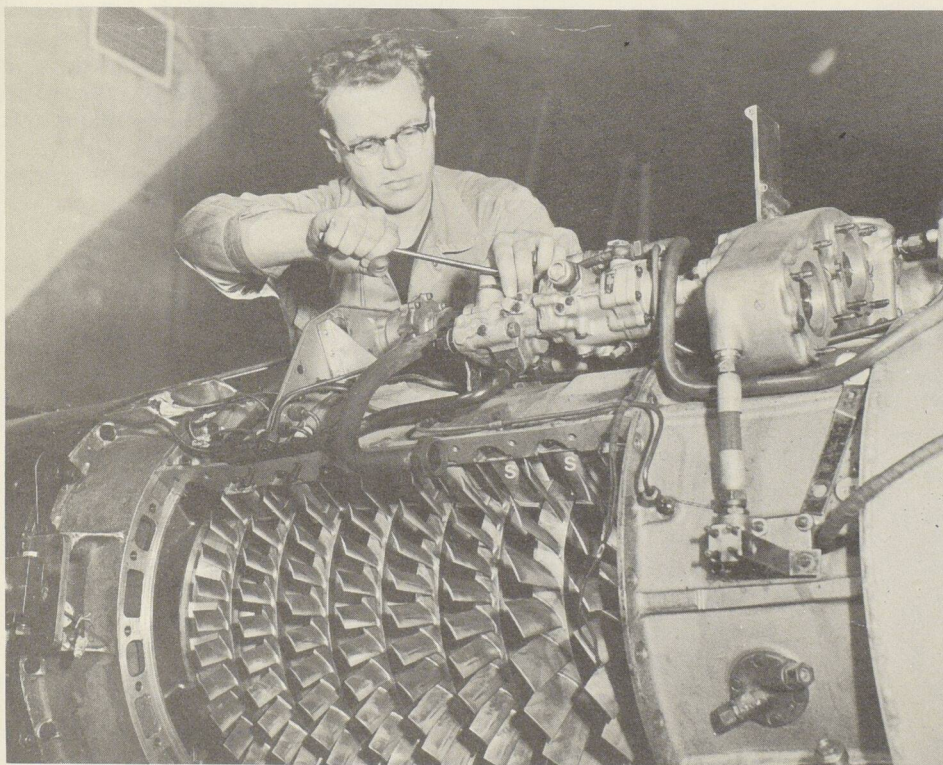
However, while airport area resi-

dents have been relatively tranquil in the past, this situation will not likely last. The public in general is becoming increasingly vocal about this particular kind of environmental pollution in anticipation of the coming of age in the early 1970's of the next family of jets — the supersonic transport (SST). The Anglo-French Concorde is expected to be in operation in 1971, with Air Canada receiving delivery of four Concorde in 1973. The Concorde, according to the magazine *Aerospace Technology*, may have a "rather startling" noise of 124 decibels sound pressure level during landing approach.

Under the decibel scale of noise measurement, the threshold of pain which occurs at approximately 130 decibels has been used as an index of noise injury hazard. This is approximately 45 decibels higher than the level at which damage to the hearing mechanism may be produced by long-term exposure.

In the past, aircraft manufacturers have made many changes to the jet engine in an attempt to lower the sound effects of the subsonic jet transports. Generally, these have taken the form of suppression of noise at the exhaust, considered the prime source.

The exhaust produces noise through the turbulent mixing of the highspeed flow of air coming out of the tailpipe with the stagnant air around it. One improvement came through fluting the pipes. Another came with the bypass type engines (the fan jets) where the central core of the exhaust is surrounded by a ring of air moving with an intermediate speed. These and other improvements reduced the primary source of noise to the point where for many engines it is equal to or lower than other sources such as the compressor. On fan jets, as the diameter of the fan (the front stage of the compressor) is increased to gain more air than is needed for the main operation of the engine, so also is this compressor or fan noise increased. The compressor noise is brought up in order to bring jet exhaust noise down and, under many operating conditions, the compressor becomes the most significant noise source on the engine. This is particularly true when engines turn over at a reasonable rate, but do not provide much thrust, such as when the plane comes down its glide path to land. —>



Technician makes adjustments to jet engine. Casing section of the compressor has been removed exposing rotor rings. Stator rings were partially removed with the casing section. Those attached to the casing are indicated by the letter (s).

*Un technicien règle un turboréacteur. Une partie de la paroi du compresseur a été enlevée pour que l'on puisse voir les rotors. Les aubages des stators fixés à la paroi ont été aussi enlevés mais on peut voir des aubes de stator en (s), par exemple.*

The NRC-designed stator ring test model with 25 stator blades whose leading edges have been sectioned into a stepped profile by webbed means. Each blade is manufactured by injecting polypropylene into a special mould shown in foreground. —>

*Aubage de stator, étudié au CNRC, avec ses 25 aubes à bord d'attaque discontinu. Chaque aube est fabriquée à l'aide du moule spécial (premier plan) dans lequel on injecte du polypropylène.*