Canada Tests Noise

➤ NOISE LOUD enough to be fatal to an unprotected observer is being generated at the National Research Council of Canada to make aircraft and aerospace vehicles of the future safer and better.

The high intensity noise is being produced in a new Acoustic Test Laboratory which has been built at NRC's National Aeronautical Establishment near Ottawa's Uplands Airport. It is Canada's first test facility for studying at the design stage the effects of noise on all the structural components that go into the construction of modern aircraft.

One main problem of future high speed flight will be achievement of greater fatigue resistance for more severe noise loadings, while simultaneously reducing the weight of components.

The laboratory will enable scientists to conduct a wide variety of tests to determine the life of structures such as metal panels for fuselages, wings and tail assemblies, when they are subjected to the high intensity noise fields produced by jet aircraft engines and high speed flight. Scientists also will be able to study how acoustical energy can set up damaging structural vibrations.

Dr. G. M. Lindberg, head of the $125,000 laboratory, said that requests have been received from several aircraft firms in Canada to use the facility for research and development work.

The new laboratory at present is equipped with two intense noise generators, driven by air from the air storage bottles of the NAE supersonic wind tunnel.

One generator creates noise of selected frequencies, while the other is a random noise siren.

The random siren generates broadband noise similar to that of a jet engine. Sound pressure levels vary from 140 decibels (db) to 165 db. A trained vocalist singing loudly three feet away exerts a pressure upon the ear of about 70 db. The ear feels pain at about 130 db, and a level of 165 db. can be fatal.

Sound travels from the sirens through a horn arrangement to a device called a progressive wave tube. A progressive or plane wave is one which is allowed to propagate freely and is not reflected. This tube is eight feet long and has a cross section one by four feet.

The side panels of the tube can be removed and replaced by a panel of any metal which is to be tested for its response when subjected to varying conditions of sound pressure, and to determine its life under conditions of acoustically-induced stress.

Strain gauges are attached to the test panel at points of peak stresses to measure the magnitudes of stress.

The strain gauge signals are amplified and recorded for detailed analysis.

The sound then propagates through another horn to a reverberation room and then to an anochoic (sound-deadening) chamber where it is absorbed and dissipated by panels of polyurethane foam. The chamber stops reflection of the sound back to the reverberation room which would create interference.

This arrangement simulates free space conditions in the reverberation room. It is as if the sound generator were pointed straight up in the open air.

The reverberation room, which is 15 feet by 15 feet by 10 feet high, is constructed so that an intense diffuse (uniform) sound field is created. At all points in the room sound levels are the same, and the sound waves are non-directional.

A large concrete plug at the far end of the room can be removed to connect it with the chamber. With this plug in place, electronic equipment packages can be suspended in the reverberation room and subjected to intense noise to satisfy environmental testing requirements.

The sound-diminishing qualities of a substance can be tested by removing the plug. Test panels are placed in the plug opening and the sirens are used to generate intense noise in the reverberation room. The noise-attenuating (reducing) qualities of the panel can be found by measuring the difference in sound levels in the two chambers with microphones. A typical example of one of these sound transmission loss studies would be to examine a test panel from the body of a jet aircraft to determine whether it will reduce the noise level within the cabin below the tolerance level.

Ship Pilots May Soon Navigate by Microfilm

➤ SHIP CAPTAINS will soon be able to navigate from 105 mm microfilmed slides of standard navigation charts.

The U. S. Army Mobility Equipment Command's Engineer Research and Development Laboratories, Fort Belvoir, Va., is developing a projector, the first designed specifically for shipboard installation, that backprojects a full-scale 42- x 36-inch colored image of a chart onto the underside of its transparent top.

Courses may be plotted on the top, over the image and may be easily erased.

A roll of vellum is provided also for a permanent record of the course.

The console-type projector may be installed near the helmsman to consolidate chartroom with pilot house, thus reducing time and effort spent by personnel.

Now being built under contract by ITEK Corporation, Burlington, Mass., the projector is programmed for extensive sea tests prior to permanent installation in the Army's 340-foot beach discharge lighter, Mark II.