ACOUSTICS

Foghorns Best Downwind

FOGHORNS are heard best when the ships they are warning are downwind, four scientists reported to the Acoustical Society of America meeting in Providence, R. I.

Their study of how sound carries over water when fog is present should help save lives and property at sea. Designers now have a scientific basis for planning fog signal stations so that the warning sounds can be heard over the longest possible distance.

The idea of using sound signals for finding one's position when lost in fog at sea is about as old as man's seafaring endeavors, the scientists said. Frequently, however, the warning sounds are heard too late to avert collisions or destruction on rocky shores.

The wind's roar and the sea's pounding make any sound difficult to hear under stormy foggy conditions. Now extensive tests of sound transmission over water off the Maine coast have shown that the range within which a given foghorn can be heard is much farther with the wind than against it.

Expressed more exactly, the scientists found that at a given distance upwind from a foghorn, the signal may be as much as 20 to 30 decibels weaker than at the same distance downwind.

They measured not only the hearing but also various conditions of the air through which the sound passed from the foghorn to receiving microphone aboard a laboratory vessel. The great difference observed between detection of sound upwind and downwind would require increasing a foghorn's power 100 to 1,000 times to make it heard the same distance upwind as downwind.

Since such an increase is not practical at this time, the scientists urge judicious planning of fog signal installations. By taking into account the direction of the prevailing wind during fog at a given station, the foghorn can be oriented so that the area of sea to be covered lies downwind, they concluded.

They also found that the presence of fog in the air above the sea does not in itself result in much loss of sound with distance. By measuring the size and number of water droplets in the foggy air, they confirmed this experimental finding using calculations from theory.

The scientists reporting their studies of sound in fog are Francis M. Wiener, J. H. Ball, C. M. Gogos and R. L. Hess of Bolt Beranek and Newman, Inc., Cambridge, Mass.

Science News Letter, June 25, 1960

Seen But Not Heard

RESTAURANTS from which automobile traffic can be seen but not heard are placed over the highway with a panoramic view of the Illinois Tollway in both directions.

How the sound and vibration problems involved in building such restaurants were successfully solved was reported to the Acoustical Society of America meeting in Providence, R. I., by Howard C. Hardy of Howard C. Hardy and Associates, Chicago.

Mr. Hardy said the passing of vehicles tends to transmit vibrations through the ground to the columns supporting the restaurant. The impact of the air carried along by the vehicles also disturbs the structure.

The extent of these problems was determined by studying the responses of other bridges built over expressways.

The effects were reduced below noticeable levels by making the bridge-like construction stiffer than would be required if there were no restaurant. Also, Mr. Hardy said, the bridge support foundation was placed in sand. Pre-stressed concrete beams were used to help damp vibrations.

Traffic noise was isolated by placing a suspended partition under the structure to muffle sounds coming through the floor and by an unusual geometrical design for the ceiling. Two-foot squares of acoustical tile were suspended in the three-foot recesses of a specially form-poured concrete ceiling.

To give a more pleasant background than the intermittent noise from dish-handling, conversation and foot traffic, a small amount of background noise is deliberately generated in the ventilation system.

In the finished structures, Mr. Hardy said, the loudest vehicles are barely audible and there is no perceptible vibration.

Science News Letter, June 25, 1960

Teach Computer Vowels

ATTEMPTS TO TEACH an electronic "brain" how to tell one vowel sound from another are being made at Bell Telephone Laboratories, a scientist reported to the Acoustical Society of America meeting in Providence, R. I.

Dr. J. D. Foulkes said the work was part of a continuing effort to make machines that can hear, "understand" and act on spoken commands. Many of the sounds humans make when talking are classified as vowels. They are such sounds as "a" in date, "ee" in feet, "i" in mine, "o" in old, and "u" in cube.

Humans recognize these sounds correctly regardless of whether they are made by a child talking in a high voice or a man bellowing in a very deep voice. However, explaining the difference to a computer is difficult because no electronic "brain" has the mental abilities of even a small part of the human brain.

Dr. Foulkes said that scientists think the differences humans hear in vowel sounds are due to "resonances." If you blow in a bottle, you hear its "resonant frequency." By blowing in two bottles at the same time, you hear two "resonances," and their relationship gives the sound a distinguishable quality.

In music, such qualities are called major and minor. They do not depend on the pitch of the notes.

Scientists believe relationships between resonances are responsible for the differing sounds of vowels, Dr. Foulkes reported. He said the Bell Labs were trying to classify these relationships in a way that a computer can handle.

Science News Letter, June 25, 1960

Oxygen in Sea from Dust

BILLIONS upon billions of tiny dust particles floating down to ocean surfaces every day may carry oxygen to fish living deep beneath the surface.

Tiny air bubbles found in ordinary drinking water yielded the clue that dust particles may be the way in which oxygen is introduced into ocean layers lacking oxygen-producing plants. William R. Turner of the Vitro Laboratories in Silver Spring, Md., reported his research on the microbubbles at the Acoustical Society of America meeting Providence, R. I.

He suggested that his research may explain why the accepted theory covering the persistence of bubbles in water does not seem to hold true for bubbles smaller than 15 microns. Instead of rising to the surface or dissolving in 20 to 30 minutes, microbubbles sometimes remain in water for days.

Mr. Turner said his experimental evidence indicated that the dust particles raining down from the sky are wrapped in a coat of air molecules when they hit the water.

The water then slowly wets the dust particles and part of the air jacket is gradually removed. Finally the dust particle becomes too heavy to remain afloat and sinks, carrying the remainder of its air jacket with it.

As the dust sinks, the air jacket continues to break away in tiny chunks that become microbubbles.

Science News Letter, June 25, 1960

"Tone of Voice" Told

A PERSON'S "tone of voice" can be told even when he whispers.

Three scientists reported to the Acoustical Society of America meeting in Providence, R. I., that their experiments on communication by voice showed most persons could easily recognize happiness, surprise, boredom or disbelief in the voice of an unseen speaker.

The speakers, who had no dramatic training, would say such a neutral sentence as, "The lamp stood on the desk," and try, at the same time, to express various emotions.

Results showed that it is possible to identify a number of tones of voice quite accurately even when there is a considerable amount of interfering noise or when the speaker whispers.

The scientists testing verbal recognition of emotion were Drs. Irwin Pollack, Herbert Rubenstein, and Arnold Horowitz of the human factors office of the Air Force Cambridge Research Center, Bedford, Mass.

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