PHYSICS

Computer Taught to "Hear"

An automatic computer has "learned" to recognize different sounds, spoken by either male or female voices, and was tested as giving 98% correct recognition.

➤ ONE STEP in teaching a computer to recognize human speech has been taken. An electronic "brain" has been taught to recognize the sound of the digits zero through nine when spoken by either male or female voices.

The automatic computer is correct 98% of the time, Drs. Carma Forgie, M. L. Groves and F. C. Frick of Massachusetts Institute of Technology's Lincoln Laboratory reported. They described the word-recognition achievement to the Acoustical Society of America meeting in Washington, D. C.

The scientists said the achievement showed a computer could be taught to make reliable decisions on the basis of a number of differing conditions, no one of which is in itself dependable.

The machine taught to identify words was Lincoln Laboratory's experimental computer, TX-O. A recording was made of ten speakers, male and female, reciting the digits zero through nine. The recordings of five of the speakers were then processed through the Resonance Vocoder developed by Haskins Laboratories. This provided a representation of speech, quantized in time, frequency and amplitude.

The machine was then instructed how to partition this information in various ways, classifying each bit of data as a vowel, consonant, a voiced consonant, simple vocalization or a stop. It was further instructed to discriminate among the vowels by an operation roughly equivalent to determining the frequency of the resonance peak.

None of these operations is linguistically precise or reliable, the scientists reported. However, the effect of these transformations was to encode each set of samples into a short string of symbols reflecting the word's gross structure. These strings, or patterns, were then stored in the computer in association with the word from which they were derived.

This process is an elementary form of learning.

The recordings of the remaining five speakers were processed through the system. The computer was instructed to print out the words spoken for the full-ten-voice sample, on which it scored 98% correct recognition.

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PHYSICS

Controlled H-Bombs May Produce Electric Power

➤ HYDROGEN BOMBS exploded twice an hour in a very large, especially designed vault could produce 12% of the total electrical power used in the United States.

Dr. Jay Orear, Columbia University physicist, outlined his method of harnessing nuclear power to the American Physical Society meeting in Washington, D. C. He suggested an above-ground chamber be constructed in a canyon 400 feet wide. The canyon would be closed off by two dams about 700 feet apart and its walls lined with steel plate to a height of about 500 feet.

A dome-shaped steel roof strong enough to withstand a pressure of about 500 pounds per square inch and covered with a deep layer of earth would complete the chamber.

A vault this size and strength could contain the force of a ten-kiloton nuclear bomb exploded 500 feet below the roof, Dr. Orear has calculated. A ten-kiloton detonation is equal to 10,000 tons of TNT and is considered a very small bomb.

Starting with an equal pressure on all sides of 150 pounds per square inch of wet steam, the ten-kiloton explosion would raise the chamber to a balanced temperature of several hundred degrees and pressure of 300 to 500 pounds a square inch, depending on the total quantity of water used.

Dr. Orear said the heat energy would then be extracted by pumping outside water through heat-exchanger pipes running through the upper part of the combustion chamber. The steam so generated would circulate through turbines and be condensed in the water reservoir behind the upstream dam.

"A single such chamber operating on two bombs per hour at an efficiency of 30% would produce 7,000,000 kilowatts, or 12% of the total United States electric power consumption," Dr. Orear concluded.

He recently completed a non-secret analysis of bomb test detection, part of a 20-part project on disarmament inspection sponsored by Columbia's Institute of War and Peace Studies.

One conclusion from this study was that nuclear weapons tests can be detected by measuring seismic waves, electromagnetic radiation and radioactivity.

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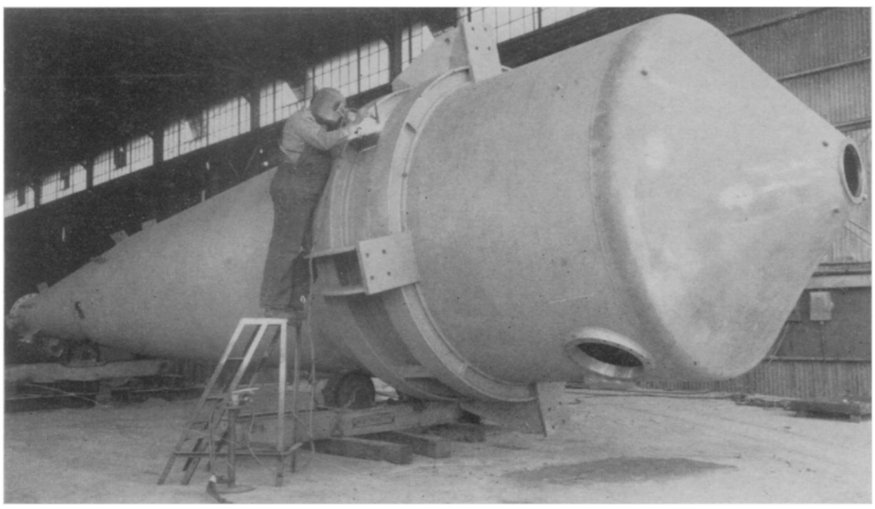

"BATTLESHIP" TANK—A "battleship" tank for use as a reservoir for fuel in rocket engine systems gets its final welding. It is 45 feet long, has a diameter of almost eight feet and a capacity of 9,300 gallons. When in use the tank will feed fuels to rocket engine systems in development tests.

ANTHROPOLOGY

Skeletal Study Provides Accurate Identification

➤ NEW FACTS which may simplify the identification of unknown skeletons, both military and civilian, have been announced.

Recent findings indicate the old concept of regular skeletal growth are somewhat inaccurate. A study involving the skeletons of 450 American soldiers killed in North Korea revealed that bone growth is completed at varying ages. Previously, it was believed this variability of bone growth was negligible.

In addition, it was found that different bones of the same individual may age at different rates. These facts were discovered when the skeletons were examined. Each had a complete record, supplied by the Army.

"There are regular lagging and accelerating phases of bone growth, occurring at different ages in different individuals," Dr. T. Dale Stewart, Smithsonian Institution curator of physical anthropology, said.

This information will assist in the more accurate identification of bones found by law enforcement men. Furthermore, anthropologists will be better able to determine the exact age at death of buried skeletons.

Working with Dr. Stewart on this project for the Army was Dr. Thomas W. McKern of the Quartermaster Research and Development Center at Natick, Mass.

Science News Letter, May 17, 1958