

## ENGINEERING

# Spot Underground A-Test

Detection of underground nuclear bomb test explosions has been improved with refinements in two seismic techniques. Long distance detection may be possible.

IMPROVEMENT of two seismic techniques may enable scientists to detect underground nuclear tests at considerable distances.

This prediction came as a result of several years of "intensive seismological research" by the U. S. Coast and Geodetic Survey for the Atomic Energy Commission.

Dr. Dean S. Carder, chief seismologist of the Survey, said the major difficulty is to distinguish between sub-surface nuclear explosions and comparable natural earthquakes, that occur by the thousands annually.

The two techniques described by Dr. Carder are 1. the use of arrays of electrically connected seismic detectors, at least 100 in each array, and 2. the implacement of detectors in deep holes.

Detection of nuclear tests is based on the differences in ground movements produced by explosions and natural earthquakes. Caused by scissors-like motion along a natural geological fault, earthquake movements are upward in certain areas and downward

in others. Explosions produce only upward movements of the ground.

The seismic array was developed to filter out interfering "noises" in order to distinguish between the earthquake and explosion characteristics. Much of the interference is of the some frequencies as the seismic signals that need to be recorded.

The array detectors must be arranged in an extremely precise way, Dr. Carder said. Data from the detectors are fed into a central station where an electronic device sorts out the background "noise." A precise array, he said, should be able to detect the first weak signal of an earthquake or explosion even if it is weaker than the interference.

By placing seismic detectors in deep holes, down to 5,000 feet, the "noise" could be reduced ten-fold. This is possible, he explained, because the "noise" is confined mostly to the surface.

Dr. Carder pointed out that the HARD-TACK II and PLUM BOB nuclear test series, which included underground explosions, led to some confusion concerning

seismic detection. Previously, it was thought that the first recorded movement produced by explosions would be upward. The results showed, however, that some motions were up, some down, and some unclear.

Dr. Carder said Columbia University and the California Institute of Technology are conducting studies on the strengths of waves at various depths. This may aid in discrimination on the origin of the waves. The scientists hope to prove that earthquake waves are strong at depths and at the surface, while explosion waves are weaker near the surface. Studies will also be made to determine how the frequencies of the waves may differ.

Science News Letter, August 22, 1959

## PSYCHOLOGY

## Skin Response Identifies Emotionality in Prejudice

YOUR SKIN betrays your prejudice. Emotion plays an important role in a person's likes and dislikes and can be measured physically, Dr. Joseph B. Cooper of San Jose College (Calif.) reports.

Dr. Cooper has shown this emotional response when a prejudice is challenged in what he describes as the first physiological measurement of the relation between emotion and prejudice. He reports his findings in *Science* (Aug. 7).

Emotion involves many physiological changes that mobilize the body to meet emergency, the psychologist explains. He measured one of these changes while the subject listened to statements that either "panned" or praised groups he had already evaluated as "liked intensely" or "disliked intensely." The galvanic skin response, in which electrical changes are recorded by electrodes attached to a person's palms, was the technique used.

Analysis of the responses of the college students tested showed a further distinction between positive and negative prejudices. The students displayed more emotion when complimentary statements were made about disliked groups than with complimentary statements about liked groups. The responses were compared in both cases with complimentary statements about groups to which the student expressed "neutrality."

In another test the procedure of having the student rank ethnic and national groups and then measuring his emotional response was reversed. First the student listened while complimentary statements were made about nine of these groups. His galvanic skin response was measured. On the basis of the student's physical reactions, the researchers determined which group was most liked and which least liked.

Later, the student ranked the nine groups in a paired comparison test; he circled the name of the one group which he preferred in each pair. Each group name, such as Austrians, Jews, Mexicans and Japanese, appeared once paired with every other.

As predicted, Dr. Cooper concludes, there was very close agreement between a student's galvanic skin response and his rating of the various groups.

His skin actually did reflect his prejudices.

Science News Letter, August 22, 1959



**SPACE TELEVISION**—A network of three or four manned space stations, such as that shown in the photograph, fixed at points approximately 22,000 miles above the earth's equator, may link major cities with live television and microwave radio communications. As described by engineers at the Radio Corporation of America's Astro-Electronic Products Division, Princeton, N. J., the vehicle would be doughnut shaped. Each satellite would carry several narrow-beam microwave antennas, each one aimed at a specific city or area. The satellites could also serve as "orbital post offices."