TECHNOLOGY

"Draw" Body by Sound

The body's internal organs can now be mapped with a new ultrasonic instrument that uses the same principle as that of sonar systems—By Barbara Tufty

➤ A NEW DEVICE now maps the body's internal organs with sound waves.

The instrument, called Biosonar 200, works with ultrasonic frequencies, or sound waves too high for the human ear to hear, explained Benson Carlin, president of the Sonomedic Corporation, Westwood, N. J.

Shaped like an oversized fountain pen, the transducer is held over the body above the internal organ to be studied. Short pulses of ultrasonic energy radiate out, and harmlessly bounce back from the internal surfaces. The time they take to return is analyzed, and results are recorded immediately on the instrument's screen. A "map" of the organ inside the body can thus be studied.

The principle is the same as that of sonar systems using sound waves to locate objects under water, Mr. Carlin told the Acoustical Society of America meeting in New York.

Since the sound waves are reflected from almost any surface in the internal structure, he said, the position of these reflecting surfaces may be plotted, giving a map.

The process is simple, rapid, and requires no surgery. Formerly doctors have relied upon X-rays or other means to obtain information about the interior of the body. But radiation dosages make these procedures dangerous, and doctors had to use surgery to find information about the exact shape, position and motion of parts of the body.

One of the most promising applications of the new device is to find the position and condition of damage after a brain has been severely shocked, as in an automobile accident. The transducer is placed gently against the side of the skull above the ear, and within a second, the doctor can obtain an indication of where the brain damage is located.

The instrument can also measure and record pulsations of internal arteries, the movement of the heart's valves and walls, and the physical dimensions of other internal organs.

Operating electronically with 110 volts, the Biosonar weighs 50 pounds. It is only 22 inches long, 14½ inches wide and 14½ inches high.

• Science News Letter, 83:343 June 1, 1963

Westinghouse

OCEAN TEMPERATURE—This ultrasonic "thermometer" developed by Westinghouse Research Laboratories can pinpoint underwater temperatures at extreme depths to five-hundredths of a degree Fahrenheit, using ultrasonic vibrations which change in frequency with changes in temperature.

TECHNOLOGY

"Thermometer" Takes Sea's Temperature

➤ THE MIGHTY OCEAN is having its temperature taken, in measurements as precise as five-hundredths of a degree Fahrenheit.

The new "thermometer" which works by means of ultrasonics changes electrical pulsations from deep in the ocean into mechanical vibrations of ultrasonic frequency that can be measured on the sea's surface, explained Arthur Nelkin, manager of electroacoustics research, Westinghouse Research Laboratories at Pittsburgh.

The transducer contains a small aluminum disk, about an inch in diameter, which has a natural vibrating frequency of about 40,000 vibrations per second.

This disk is lowered into the ocean, attached to two wires which feed it direct current power.

Set in motion by a transistorized electronic circuit, the disk fixes the frequency at which the circuit produces electrical pulsations. These pulses are sent along the wires to the receiving equipment on a ship or platform at the water's surface, where they are counted.

The natural vibration rate of the disk changes with the ocean's temperature, Mr. Nelkin said. Temperatures are measured by observing the corresponding shift in frequency of the electrical oscillations.

Accurate knowledge of the ocean's temperatures is aiding scientists in their extensive study of ocean depths and man's relation to the sea. For example, said Mr. Nelkin, small changes in water temperature are known to affect the performance of sonar systems.

• Science News Letter, 83:343 June 1, 1963

TECHNOLOGY

Computer Analyzes Blood Constituents

➤ A TWO-MILLION-DOLLAR digital computer can now analyze the chemical constituents of human blood.

This does not mean that every surgeon or physician needs to buy the computer, however. It can be rented for a complete blood study for only $10. Data transmission systems available through standard telephone services permit communication between machines.

A team of physicians and chemists working on the same problem as the computer found that in more than 1,000 laboratory analyses it was never wrong.

The computer model is a "standard man," whose biochemical make-up is the average for a large population. But although some individuals vary in their response to a specific stress, such an individual's variations from the normal population can be programmed into the computer to get the correct answer.

The Rand Corporation has just published results of a blind competition between the laboratory team at the University of California at Los Angeles and the electronic computer at Santa Monica. The computer took only two minutes to produce a table showing the alterations in blood chemistry.

The teams analyzed alterations in blood chemistry occurring with the addition of alkaline materials, with lowering or raising of body temperature, when acid-alkaline balance was altered by metabolic changes or respiratory disease, and when salt solution was added.

The research is part of a continuing study, supported by the U.S. Air Force under Project Rand, of the use of mathematical procedures to develop models representing human physiological subsystems. It may open up ways of exploring physiological responses to stressful environments and of setting tolerable limits without endangering human lives. The U.S. Public Health Service supported the work of the UCLA members.

Drs. James V. Maloney Jr. and Gilbert B. Bradham at UCLA, with James C. DeHaven and Edward C. DeLand of the Rand Corporation, reported the study.

• Science News Letter, 83:343 June 1, 1963

PHYSICS

Instrument Used to Survey in Dark

➤ WORKING IN THE DARK, surveyors can measure base lines accurately up to 20 miles as compared to three miles in daylight.

The new sighting system, developed by AGA Corporation of America at Plainfield, N. J., is a portable electronic distance-measuring instrument employing a mercury arc lamp. It projects a highly modulated light beam 30 to 50 times more intense than other lamps to a passive reflector.

Distance is derived from the time required to travel to the reflector and back measured by the phase comparison method.

• Science News Letter, 83:343 June 1, 1963