Physics Instrument Finds Cable Break

Physics

Cable repair ships now on their way to the region south of Newfoundland to remedy the damage done by the recent earthquake will be able to cruise directly to the point of the breaks. An instrument used in a laboratory experiment in elementary physics courses permits the location of a cable break from the land to within half a mile, no matter whether the break is near shore or in the middle of the ocean.

This instrument is called the Wheatstone bridge, after its inventor, Sir Charles Wheatstone, British physicist and one of the pioneers in telegraphy. It is used to measure the resistance of a wire to the flow of electricity. This is done by connecting the unknown circuit and one whose resistance is known to a galvanometer, a sensitive current measuring instrument. The connection is so made that no current flows through the galvanometer when the two resistances are equal, and then the needle of the instrument points to zero.

When a cable breaks, the copper conducting wire is exposed to the ocean water, and so there is an electrical circuit from the land end through the cable to the break and back through the salt water. By means of a Wheatstone bridge, the resistance of this circuit is measured. The resistance of the water is high, but it is practically the same for short and long distances. But the longer the cable the greater the resistance of the cable, so that the higher the resistance, the farther the break is from land. As the resistance for any length of cable is accurately known, the distance of the break can easily be determined to within half a mile. The path of the cable is known, so when that distance is laid off, the place of the break is located.

When the repair ship reaches the point of the break there is still work ahead. First the crew must grapple for the cable, but it is not necessary to pull the broken end to the surface. In deep water, or when the end is caught, a special grapnel is used which cuts off the broken end and grasps the remainder. This is lifted to the surface, tested to see if the connection is clear to the shore, and then fastened to a buoy so that it may be located again. Then the ship cruises to the other side of the break and picks up the other end of the cable.

A new piece of cable is then spliced on to this end, and the ship returns to the other end, as marked by the buoy, paying out the new cable as it goes. This end is then spliced to the new piece of cable, the cable dropped over, and the complete cable connection is then restored. In deep water the new piece spliced in is sometimes as long as ten or twelve miles. The water is not very deep off Newfoundland, however, and much shorter lengths will suffice. By allowing plenty of slack in the new piece in making it longer than the parts of the original cable that were cut off, the probability of a future break in the same place is lessened.

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Meteorite May Carry Cosmic Secrets

Astronomy-Geology

One of the oldest things on the earth, a small stone that started wandering through space some ten thousand million years ago, according to the estimates of astronomers, perhaps before the earth itself was formed, was exhibited in New York by Dr. Harlow Shapley, director of the Harvard College Observatory. Dr. Shapley gave the second in a series of five lectures at the College of the City of New York.

The stone is a meteorite—one of a shower of "shooting stars" that traveled at a speed of 35 miles a second, and caught up with the earth, itself speeding along at 20 miles a second, in 1867. Though most of the members of this shower were completely burned by the friction with the earth's atmosphere, this one landed in Poland, and was finally brought to the attention of scientists.

The speed of the meteorite shows that it was moving in a "hyperbola". This proves that it came into the solar system from outer space, and, according to Dr. Shapley, such meteoric stones carry with them the story of the nature of the material universe in the times before the earth and other planets were formed.

In Dr. Shapley's first lecture, given recently, he outlined a classification of material systems from the smallest constituents of the atoms of matter to the universe itself. His second lecture was devoted to the subclassification that he calls the Microcosmos, which includes everything from the electrons to the meteorites.

He particularly emphasized the importance of meteorites in revealing knowledge of the outside universe.

"Our contact with the outside universe comes only through two media—light and meteors," he said. "The meteors that filter down through the atmosphere as meteorites provide opportunities for significant chemical analyses. It is estimated that a thousand million meteoric particles collide with the earth's atmosphere every twenty-four hours, and all but the largest and slowest are burned in the atmosphere.

"Prolonged studies of the numbers and motions of meteors (shooting stars) will contribute a test of theories of the origin of the earth, especially of the planetesimal hypothesis. The planetesimals are one class of meteors.

"There is a close connection between the clouds of meteors moving across the solar system and the great diffuse nebulae of the Milky Way. The nebulae are believed to be factors in the evolution of stars, and therefore studies of meteors will help to interpret the nature of the nebulae and their role in the evolution of stars and planets.

"Studies of the brightness of shooting stars indicate that the earth's atmosphere fifty miles above the surface is of about the same temperature as at the surface itself. Further knowledge of the upper atmosphere will come through theoretical studies and observations of the brightness of meteors."

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Bison in Alaska

Animal Husbandry

Bison herding may yet come to rival reindeer raising, the newest of Alaska's great industries, if the preliminary experiments reported by L. J. Palmer of the U. S. Biological Survey prove successful enough to justify their extension on a larger scale.

About a year and a half ago, Mr. Palmer states, 23 head of bison were shipped to the northern territory from the National Bison Range, Montana. Nine were released near the town of McCarty, and four held at the reindeer experiment station at Fairbanks. The animals came through their first winter in good shape, in spite of heavy snows, feeding on natural fodder, chiefly the wild vetch.

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