PHYSICS

Measure Baseball Curve

Low-speed ballistics has come to the aid of the baseball pitcher with calculations of the important factors that go into an effective curve ball, spin and speed.

➤ BASEBALL pitchers take note. Spin means a lot more to an effective curve ball than speed. And with the right combination of spin and speed, the maximum curve you can expect to throw is about 17 inches.

These are the scientific findings of a former director of the National Bureau of Standards and a life-long baseball fan, Dr. Lyman J. Briggs.

In setting out to determine the relationship of spin to deflection at different speeds, a problem that also has application to low-speed ballistics, Dr. Briggs enlisted the services of Cookie Lavagetto, manager of the Washington Senators, and some members of his pitching staff. For more precise calculations he used the NBS wind tunnel.

At Griffith Stadium he fastened light, flat tape to a baseball and laid it loosely on the ground, free from twist, between the pitcher's mound and home plate. After the ball had been thrown and caught, the number of complete turns in the twisted tape indicated the number of times the ball had spun during the 60-foot route. The number of spins ranged from seven to 16.

Assuming that the speed of the pitch was 100 feet per second—the most effective speed for a curve ball and well within a professional pitcher's capability—the maximum spin was 1,600 revolutions per minute.

As a result of many measurements in the wind tunnel, Dr. Briggs found that for spins up to 1,800 rpm and wind speeds up to 150 feet per second (equivalent to the speed of the pitched ball) the lateral deflection, or curve, of the ball was directly proportional to the spin and to the square of the speed.

Curves of 11.7 inches at 1,200 rpm and 17.5 inches at 1,800 rpm were found to be the maximum curvatures attainable for a pitched ball traveling at 100 feet per second. Any increase in speed for these rates of spin resulted in lesser curvatures.

These findings apply to balls spinning about a vertical axis. Usually the spin axis of a pitched ball is inclined from the vertical, which makes the curvature less. If the spin were horizontal, there would be no sidewise deflection.

Science News Letter, April 4, 1959

GEOPHYSICS

World Magnetism Charted

➤ AN ELECTRONIC computer at the Coast and Geodetic Survey will soon be given the job of digesting 150,000 geodetic observations to be used in making of one world map—the 1960 magnetic chart.

This chart is published every five years and is used by navigators to determine the variation of their compass needles from true north.

Without the computer, the job would be almost impossible. It might take one man 100 years to do. With the computer, the calculations will be made in about four weeks.

Robert W. Miller, of the Survey's computer office, said the present computer will do the job far faster than those used in 1950 and 1955. The same calculations that will take 125 machine hours this year took approximately 800 machine hours in 1950 when the computers used had a much more limited storage capacity, he said.

The 150,000 observations have been made from all parts of the world over the past 60 years. Most of them have been made on land, but some were made by ships at sea or planes in the air.

All available figures for any point will be used. The latest reading for any particular point may have been made at any time between 1900 and 1958.

The geodetic observations are punched in cards, printed on large sheets by country or area and then reduced by the computer to the date of the chart, in this case 1960.

Reduction calculations include multiplying annual changes by the number of years that have elapsed since the observation was made. Eventually, the machine groups the figures for each one-degree quadrangle of the earth's surface, or 60 nautical miles square at the equator.

Then the chart makers draw lines showing how much the compass will vary from true north in 1960, as well as lines indicating the annual rate of change. Since the charts are only published every five years, the Survey must issue data on yearly deviations so that navigators can make adjustments on the magnetic chart.

Yearly shifts in the magnetic field of the earth, said Mr. Miller, are fairly constant, with the exception of "outstanding disturbances" in the field that occur roughly every four to seven years. There have been about 15 such disturbances since 1911, he said.

Science News Letter, April 4, 1959

GEOPHYSICS

Soviets Find Evidence Of Under-Ice Continent

➤ RUSSIAN scientists have found the first positive evidence that the Antarctic contains a large solid land mass of continental proportions.

Their work was reported by Morton J. Rubin, a U. S. Weather Bureau meteorologist, on his return from a 15-month tour as a liaison scientist at the Soviet International Geophyscial Year station at Mirny on the east coast of Antartica.

Previously, it had only been speculated that there was a great land area under the thousands of feet of ice cap. U. S. scientists had found that the western part of Antarctica consisted of a series of islands.

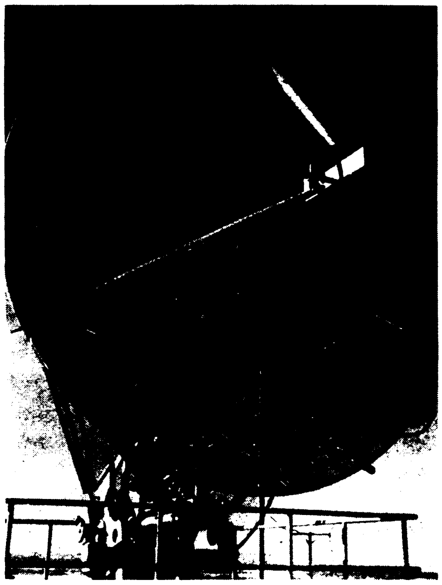
A Russian team traversed about 1,400 miles of the eastern section from Mirny to the Pole of Inaccessibility (the latter an area particularly hard to reach over the surface), taking seismic soundings every 30 to 50 miles.

To make the soundings, they drilled about 200 feet into the snow and ice, exploded charges at the depth and recorded the echoes off the earth below.

They found that the land began about 200 miles in from the edge of the ice cap. Land levels varied from sea level to about 10,000 feet above. At the 10,000-foot level, which happened to be at the Pole of Inaccessibility, the ice cover was 3,000 feet thick. The ice was as much as 14,000 feet thick in other areas.

Mr. Rubin found the 145 Soviets at the Mirny station friendly and cooperative. He said this was the case among the scientists of all the nations in the Antarctic. A Russian meteorologist was assigned to the U. S Little America station in exchange for Mr. Rubin.

Science News Letter, April 4, 1959



SPACE WEB—An 18-foot parabolic antenna at General Electric Company's space vehicle tracking station, Schenectady, N. Y., was used to pick up signals from Pioneer IV more than 410,000 miles from earth. Signals were fed into a low-noise parametric amplifier where they were amplified and converted for use by a conventional receiver. Engineer Allen D. French, who is in charge of the space project, examines the antenna.