

PHYSICS

How Constant Is Second?

The timekeeping of the atomic clocks will be checked for accuracy against astronomical clocks. Each type can now be measured with an accuracy of one part per 1,000,000,000.

► **WHETHER** astronomical clocks keep the same time as atomic clocks will be checked within five years, Dr. G. M. Clemence, director of the U. S. Naval Observatory's Nautical Almanac Office, predicted.

Each clock keeps time by an entirely different method. One depends on observations of the stars, the other on the millions of vibrations each atom of the element cesium makes every second.

This is the first time in history, Dr. Clemence said, that two basic timekeeping standards have been available for comparison. Each can be measured with an accuracy of one part per 1,000,000,000 or better. One result of such comparison could be an improved value for the speed of light, which is now known accurately only to one part in 10,000.

Another result might be the discovery that atomic time was continuously accelerated with respect to astronomical time.

Even if this did happen, Dr. Clemence said it would not necessarily refute Einstein's theory of relativity, fundamental to which is the belief that the velocity of light is constant.

It would, however, have "great and far-reaching" effects on basic physical theory and on astronomers' present ideas of the structure of the universe.

Dr. Clemence warned that widespread use of atomic time might lead to confusion. He suggested use of the term "essen" to designate the second as measured by atomic vibrations, keeping the commonly used word, second, to designate astronomical time.

Astronomers have recently changed the basis of measuring a second, Dr. Clemence pointed out. It no longer takes 86,400 seconds to make a mean solar day.

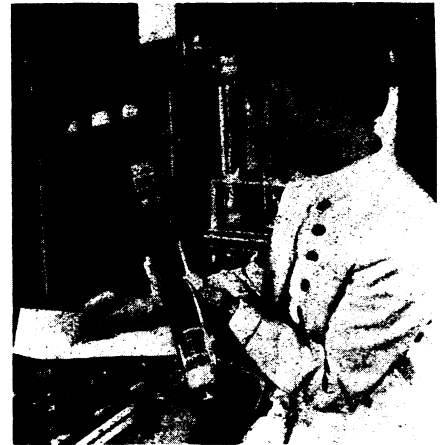
A second is now defined as a 31,556,925.975 part of the tropical year, which corresponds to the seasons, for 1900.0. This new measure of time is known as ephemeris time.

It was adopted because gradual increases in the precision of astronomical observations and improvements in man-made clocks have shown the earth's rotation rate, by which the old second was measured, varies.

This irregularity, therefore, makes the earth's rotation period unsuitable for use as a precise standard.

The new second is based on the period of the earth's revolution around the sun, and has been officially recognized by the International Astronomical Union and the International Committee on Weights and Measures.

Science News Letter, January 14, 1956



CAT EYE TUBE—This is the key tube for the U. S. Air Force's new supersensitive television system. The new TV is called the "Cat eye" because it is a thousand times as sensitive as the ordinary TV camera and enables pilots to "see in the dark."

This doubling of the cross-section means that matter is much less transparent to anti-protons than to protons, Dr. Segre said.

Other scientists participating in the anti-proton symposium were Drs. C. Weigand, O. Chamberlain and J. J. Murray, all of the University of California, and Dr. R. Serber of Columbia University.

If a star or system of stars made entirely of negative matter does exist, Dr. Segre said, and collided with ordinary stars, a "catastrophe of cosmic proportions" would be produced, with "fireworks the like of which have never been seen."

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Anti-Neutron Sought

New particle of negative matter will have no charge but will be negative because its magnetic poles will be reversed. Will be produced when anti-proton crashes nucleus.

► **A SEARCH** for a new particle of negative matter, the anti-neutron, is being launched at the University of California.

The anti-neutron, like the neutron, has no charge. It would annihilate matter in a collision with an ordinary neutron, the particle that keeps atomic reactors going.

Since the anti-neutron has no charge, its negative properties result from reversal of the tiny particle's magnetic poles.

Techniques for producing and detecting the anti-neutron are known and it is only a question of time before it is discovered, Dr. Emilio Segre said.

Scientists attending the American Physical Society meeting at the University of Southern California in Los Angeles learned of the hunt for the new particle of anti-

matter at a symposium on the anti-proton, whose discovery was announced on Oct. 19.

To make an anti-neutron, scientists will hurl an anti-proton at an atomic heart, then watch for the tracks made by the anti-neutron when it annihilates matter.

Anti-protons are produced from energy at the rate of about one every 15 minutes in Berkeley's giant bevatron. They are negatively charged particles of the same mass as protons, and are found only in high energy nuclear collisions such as occur in powerful atom smashers and cosmic radiation.

One unexpected property of the anti-proton is its effective size, twice that of the ordinary proton. This size, known as the cross-section, was expected by most scientists to be equal.

PSYCHOLOGY

Locate Melody Center in Brain

► **THE PART** of the brain that lets you know whether the band is playing The Star Spangled Banner or America, the Beautiful may have been located. At least, such a melody distinguishing center has been located in cat brains, and presumably there is a counterpart in human brains.

In the cat brain, the melody center is an area less than one-tenth of an inch on the surface of the brain area which is called the auditory cortex. The auditory cortex is the part of the brain controlling hearing.

When the auditory cortex is completely removed, the cats can still hear sounds, but cannot distinguish between simple melodies. So long as the one-tenth inch bit of auditory cortex on each side is left, however, the cats can tell the difference between patterns of notes, or melodies.

The discovery was reported by William D. Neff, Irving T. Diamond and Jay Goldberg of the University of Chicago at the meeting of the American Association for the Advancement of Science in Atlanta.

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