

#### FINDS LOCATION

*With this mechanical computer of latitude and longitude, Howard Hughes could quickly find his location at any time on his record-shattering flight.*

#### AERONAUTICS

## Round-The-World Flight Gave Test To Navigation Robot

**By Turning Dials With the Ease of Radio Tuning, Aviator Can Know Accurately His Location at Any Time**

THE ARMY Air Corps' new aerial navigation mechanism, never before permitted to be used on a civilian airplane, is a major reason why Howard Hughes was able to shatter the round-the-world record so decisively, it has been learned exclusively by Science Service.

For more than two years Army experts at Wright Field, Dayton, Ohio, have been working with the compact and ingenious latitude and longitude computer, invented by W. L. Maxson. Trial flights in Army planes demonstrated the worth of the robot computer. And then along came Howard Hughes with his plans for the round-the-world flight; the supreme test of aerial navigation.

Loaned to Hughes by the Army was Lieut. Thomas Thurlow, in charge of the Wright Field's section charged with the development of experimental navigation aids for Army planes. Lieut. Thurlow understood the operation of the Maxson navigator better than any other man. In the Hughes flight he saw the ideal test for this robot aid. On the success, or failure, in the Hughes flight depended the installation of the mechanism in the Army's giant bombers.

While construction details of the Maxson navigator are still Army secrets, its operation can now be told. It computes rapidly and completely automatically, without the aid of any books or tables of star positions, the geographical position of an observer who has taken a

sextant altitude of a celestial body.

The observer takes his "shot" of the sun or a star and cranks this altitude up on the machine in the altitude dial. Next the observer cranks in the exact time of his observation, in Greenwich Civil Time, on the G.C.T. dial and the date on the date dial.

Next (and all this takes less time to do than it takes to describe how to do it) the observer cranks in some rough longitude or latitude on the proper dial. Assuming he cranks in a longitude, the observer then cranks the latitude dial until another dial, marked "synchronize," registers zero. At this point the latitude and longitude readings will have changed until they represent one point on a line along which the observer's position lies.

#### Second Point

By repeating the process, assuming a different longitude, and again cranking the latitude dial until zero shows again on the synchronize dial, there is obtained a second point on the line along which the observer's position must be. This line, fixed by the two points, is all the information which any method of navigation can determine from a single observation of a celestial body.

To determine the exact position along this line, it is necessary to take a second sight on a celestial body and by repeating the cranking technique twice a second line is determined. Where these two lines intersect is the position of the observer.

All this sounds complicated but the twisting of the dials is no more difficult than tuning a radio set and just as quick. Errors of computation are avoided for the answers come out right if the proper numbers are set up on the dials.

While the Hughes flight is a remarkable tribute to powerful and reliable motors, a splendid plane, infinite ground crew preparation and very superior personnel, it is to this robot navigation computer that much of the success of the flight is credited. No matter how well a plane may fly, or how easily, it matters little if the navigators cannot, at all times, exactly fix the plane's position and plot the proper direction over distances of thousands of miles.

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The National Health Survey has measured hearing of a representative group of the American population, in 12 cities—the first time this has been done with precision instruments.

CHEMISTRY

# Fertility Vitamin E Made After 16 Years of Research

## Fed to Sterile Female Rats, Laboratory-Made White Powder Enables Them to Have Live Normal Babies

THE "essence of fertility," vitamin E, has at last been identified chemically, made in the laboratory and reduced to a chemical formula.

This culminates 16 years of research on the fertility vitamin. The achievement is announced in three highly technical papers in the journal, *Science*, (July 8) with some seven American scientists from three institutions participating.

Synthetic vitamin E, a white powder chemically named alpha tocopherol, when fed to sterile female white rats allows them to have normal babies as though they had never been deprived of natural vitamin E such as occurs in many foods.

The chemical part of the work is reported by Drs. Lee Irvin Smith, Herbert E. Ungnade and W. W. Prichard of the University of Minnesota School of Chemistry, and Dr. Oliver H. Emerson of Merck and Company Research Labora-

tories and the Institute of Experimental Biology at the University of California. At this same Institute the effect of the synthetic vitamin on animals was determined by Drs. Herbert M. Evans, Gladys A. Emerson and Oliver H. Emerson.

A number of other scientists have been working on the chemistry of this vitamin. Dr. P. Karrer of Switzerland, and his associates, H. Fritzsche, B. H. Ringier and H. Salomon, have also synthesized it.

Dr. Evans discovered vitamin E as the result of investigations begun 16 years ago.

Some physicians have reported that wheat germ oil, rich natural source of vitamin E, has helped some women to bear children, although they had been unable to bear living children before the vitamin treatment. Without the vitamin, Dr. Evans has found, female rats grow and are apparently not hurt in any

way except that they are sterile. When mated, their unborn young die. In male rats the reproductive germ cells all die when the animals are deprived of the vitamin.

Alpha tocopherol is apparently identical with vitamin E, but other chemicals, among them durohydroquinone, have been obtained which when given in larger amounts have a vitamin E-like action. This is not surprising, Dr. Evans points out, since it has already been well established that several chemical substances function as vitamins A and D respectively, and the same holds true for certain hormones or glandular products.

*Science News Letter, July 23, 1938*

BIOLOGY

## Lindbergh Glass Heart Uses Blood of "Living Fossil"

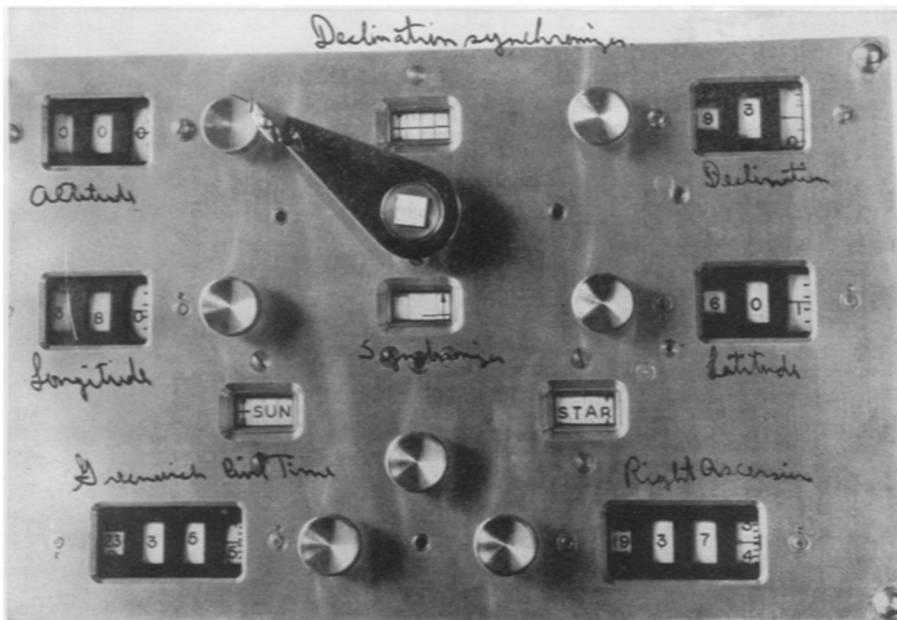
NEWEST triumph of Col. Charles Lindbergh's "glass heart" apparatus, in supplying oxygen along with the fluid it circulates to organs living outside the body, is accomplished by using blood of what might be termed a living fossil. And blue blood at that.

The creature that supplied the blood is a member of one of the oldest zoological aristocracies on earth, the horseshoe crab. Horseshoe crab shells are familiar to every stroller along the sea beach. They look somewhat like crabs, but are considerably more primitive, and they have a history running back hundreds of millions of years. They may even be ancestral to the rest of us, through a race of sea animals long since extinct, the ostracoderms.

The problem of supplying oxygen through the fluid in the "glass heart" long had the experimenters stymied. They found they could not use hemoglobin, the red pigment of ordinary vertebrate blood, because it very quickly broke down into a compound that would not carry oxygen, called methemoglobin.

Then, relates Dr. Richard Bing of Columbia University and the New York Presbyterian Hospital, it was decided to try the blood pigment of the horseshoe crab, a blue stuff known as hemocyanin. A lot of crabs had to be sacrificed to get a sufficient supply of blood, for each crab yielded only about 100 cubic centimeters, or a scant half-teacupful.

The blood itself was not used, but the hemocyanin was extracted and purified through a long series of chemical steps. When it was added to the circulating fluid in the right proportions it worked quite successfully, keeping various mam-



### EASY OPERATION

Like the dials of your radio set, the knobs of the robot navigator are easily twirled to give the aviator his position in the trackless airways.