NAVIGATION

Transit Proves System

DATA FROM THE TRANSIT satellite now permit scientists here to say—with great assurance—that a nearly foolproof navigation system for ships and planes can be built, using radio satellites.

The Transit I-B satellite was launched April 13 to test theories on which such a navigation system could be based. Now, workers at the Applied Physics Laboratory of Johns Hopkins University, Silver Spring, Md., believe the theories are definitely confirmed.

Here is what they report:

1. All four frequencies on which the experimental satellite is sending signals have proved better than expected in clarity and freedom from distortion. Two have proved particularly good, Theodore Wyatt, project engineer for Transit, said.

2. The satellite, when sending its position to the ground, may have to use a different frequency from those used for signals navigators will need to figure the all-important Doppler effect. Further study of this program is in progress.

3. The Doppler effect calculations of Drs. George Weiffenbach and William Guier are confirmed.

The Doppler effect is a common phenomenon: sound waves coming from a moving object appear to have a higher pitch as the source of the sound approaches and lower as the source moves away. A train whistle, for instance, seems to change pitch as the train passes by.

From close by the change seems abrupt. From farther away, the frequency change is more gradual.

Thus, by calculating the degree of shift of the satellite's frequency, a navigator can figure his distance from it. The satellite will also be broadcasting its exact position. With these two bits of data a navigator can figure his position.

Sputnik I gave the scientists the idea that the Doppler shift could be used for navigation. By charting Sputnik's Doppler shifts, Drs. Weiffenbach and Guier found they could accurately calculate Sputnik's orbit.

Another Johns Hopkins physicist, Dr. Frank T. McClure, saw the practical military and civilian applications of the phenomenon. The Navy was sold on the idea.

Although Transit I-B has proved the system works, still more research will be necessary before the complete system can be sent up. Hopkins scientists are calculating slight signal distortions caused by the ionosphere and variations in the orbit of Transit caused by the irregular shape of the earth.

After this work, scientists figure four satellites spaced about the earth will give navigators data for navigational fixes every hour and a half.

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ROCKETS AND MISSILES

"Space Top" to Increase Missiles' Accuracy

A "SPACE TOP" promises greatly to increase the accuracy of United States missiles. The new ceramic gyroscope is claimed to be ten times as accurate as other gyroscopes.

Like all gyroscopes, it operates like a child's top. Spinning, it keeps its balance and thus serves as a stabilizing device in guidance systems. Gyroscopes of extreme accuracy are required for long-range missile accuracy and for space missions.

The new gyroscope, developed by the Minneapolis-Honeywell Regulator Co., is so free from friction that it can measure motion so slow that an hour hand on a watch moves 7,500 times faster. The gyro's motor spins at 24,000 revolutions per minute on a film of helium gas.

A second reason for the gyro's accuracy is that it is made of a new ceramic material as hard as sapphire. The material reduces expansion and wear problems associated with metal gyros.

The gyro's spin motor is the size of a golf ball. It can run a day on the electricity used to toast a slice of bread. The complete gyroscope is just 2.7 inches long and 2.8 inches in diameter. It weighs half a pound.

Honeywell has also announced a major program to put electrically suspended gyroscopes into production. In these, part of the gyro is electrically suspended in a vacuum.

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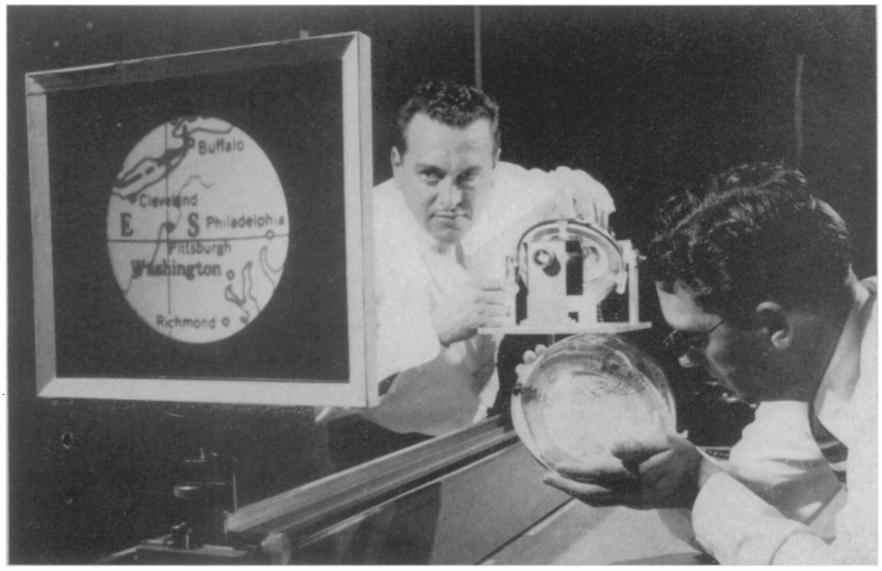

COMPUTER NAVIGATION—This experimental air navigation system may enable pilots to tell their location over earth merely by looking at a screen. A computer automatically positions a map inside a glass hemisphere so that the area over which the plane flies shows on the screen. Engineers Richard W. Kern and John F. Creedon, of the IBM Federal Systems Division laboratory at Owego, N. Y., are testing the system they helped develop.

ROCKETS AND MISSILES

Tower Near Canaveral For Watching Satellites

A 90-FOOT TOWER, erected as a landmark on a 9,000-acre land development project near Cocoa, Fla., is drawing visitors on their way to and from southern Florida and from towns as far as 75 to 100 miles away who want to "see the satellites go off." It is 12 miles from the Cape Canaveral missile test center.

The tower has an observation platform reached by elevator. From the platform, on a clear day, visitors with binoculars can get a clear view of the test center. Launchings are visible to the naked eye.

On an average day, about 100 persons may visit the tower. When a launching is announced in advance, however, motorists and amateur scientists arrive as much as two hours before the count-down to make sure they have a place on the observation tower, which is about 200 yards off U. S. Route 1.

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ROCKETS AND MISSILES

Tiros Satellite Given Spin Signal From Earth

TIROS I, the TV weather satellite, has required a "spin up." This was signaled by radio from the ground. The radio signal set off small rockets attached to Tiros. These are designed to set Tiros spinning again.

When Tiros was launched April 1, the National Aeronautics and Space Administration expected the spin-up would be required every 20 days. But nearly two months passed without the satellite's spin slowing to the point where spin-up was necessary. The satellite's spin, like that of a top, keeps it stable.

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