

ENGINEERING

Detect Satellite Spies

Three systems of radio stations have been established to find and track satellites that may pass near the United States.

► A NETWORK of radio stations that can find and track silent and perhaps potentially dangerous reconnaissance satellites has been established across the southern portion of the United States as a protective measure.

The system is said to make it impossible for any nation to launch a satellite that passes near the United States without U. S. detection, even if the satellite does not send out a tell-tale beep-beep by radio.

Known as Spasur, which stands for Space Surveillance, the system is backed by the Advanced Research Projects Agency and is operated for ARPA by the Army's Ballistic Research Laboratories, Aberdeen, Md., and the Naval Research Laboratory.

Nine stations are now in operation. They work in clusters of three, so that the U. S. now has three complete systems forming an overlapping span across the southern U. S. This line is to be reinforced with other sets of three stations, but there is no present intention of drawing another electronic "Magenot line" across our space frontier farther north. It is believed that all satellites except those in a tight equatorial orbit will cut through the radio beams.

Beam of Energy

The middle station in each cluster is the transmitter. It is flanked by two receivers 250 miles away. The transmitter sends out a continuous fan-shaped beam of silent radio energy which hits and bounces off the satellites as they pass through it. This radio wave is similar to the radio signal sent out by a commercial broadcasting station in a moment of audio silence.

The receiving stations pick up the reflected radio signal. Since at least two stations "hear" the reflected radio, this enables operators to calculate the height, speed and direction of the satellites by triangulation and other methods.

Stations operated by the Naval Research Laboratory are active Minitrack stations, and stations operated by the Army Ballistic Research Laboratories are Doploc stations that use the Doppler principle taught in high school physics. Data received by the Navy-operated stations, which use the interferometer technique, are relayed instantly to the Naval Proving Ground, Dahlgren, Va., and also to the Naval Research Laboratory in Washington.

Data gathered through the Army-operated stations are sent to the Ballistic Research Laboratories, Aberdeen Proving Ground, Md. Eventually all data will be transmitted to Space Track, the Air Force Research Center at Cambridge, Mass.

The Army's stations are situated at Forrest City, Ark., Fort Sill, Okla., and White Sands Missile Range, N. M. The Navy's are at Fort Stewart, Ga., Jordan Lake, Ala., and Silver Lake, Calif. The Navy's second cluster is at Elephant Butte, N. M., Gila River, Ariz., and Brown Field, Calif.

Transmitters for the above clusters are situated at Jordan Lake, Fort Sill, and Gila River.

The favored way of tracking a man-made satellite is by sensitive receivers which detect and follow the radio signals emitted by the satellite itself. But some satellite radios are now dead, and some may be launched that do not have radio beacons. So the problem was to find a way of locating and tracking these satellites.

The urgency for such a system to track dead or silent satellites is underscored by current development of reconnaissance "moons." The Department of Defense sees them capable of photographing parts of the U. S. with a powerful lens, then transmitting the photographs by radio when passing back over the nation that sent it up.

Such moons also could eavesdrop on low-

power radio communications while over the U. S., or perhaps even slow down, by using reverse-thrust retrorockets, to become instruments of terror in wartime harassment.

Further urgency is imparted by the fact that some satellites might go unnoticed even though transmitting regularly on a radio frequency, it is understood.

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PHYSICS

Urge Relativity Tests Using Artificial Planets

► EINSTEIN'S theory of general relativity can be given a further test using artificial planets launched in the future, a United States scientist reports.

John J. Gilvarry of the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has calculated that man-made solar satellites would outclass natural ones in verifying general relativity. This is because the advance of an artificial planet's perihelion, or time of passage closest to the sun, can be made "significantly large."

At present, one of the three proofs of relativity, and the firmest, depends on the advance of Mercury's perihelion. The two artificial planets now orbiting the sun could not serve this purpose because their orbits are not known with sufficient accuracy, and the chances are high they will not be seen again.

But future space vehicles, launched with the idea of testing relativity theory, could do the job, Mr. Gilvarry suggests in *Nature* (March 7).

Science News Letter, March 21, 1959

BIOLOGY

Fire Ant Odor Trail Chemistry Studied

► SCIENTISTS may be hot on the trail of the imported fire ant—object of a multi-million dollar Federal eradication program.

Chemical trails laid down by worker ants are important since they guide the rest of the colony in its migrations and foraging for food. Now, Dr. Edward P. Wilson of Harvard University Biological Laboratories reports, it is known that the essential trail-blazing substance is a glandular secretion released through the fire ant's sting.

Working with the fire ant *Solenopsis saevissima* of a variety related to the imported fire ant, Dr. Wilson was able to direct foraging workers along artificial trails of freshly extracted venom that he had laid down. Further research pinpointed the substance as coming from the accessory gland which empties through the sting.

The substance, which seems to be chemically allied to or "even identical with" the toxic substance of the venom, apparently serves to orientate ants along the right path in addition to operating as a "releaser" in which the venom, for example, provides the trail.

Several problems as to the nature of the odor trail and the mechanism by which it is laid down still need to be studied, Dr. Wilson concludes in *Science* (March 6).

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RARE ALBINOS—A white corn snake and a white snapping turtle are examined by Dr. Max Hensley, professor of zoology at Michigan State University. Dr. Hensley is making a study of albinism in reptiles and amphibians. The turtle came from Ontario; the snake from Children's Nature Museum, Charlotte, N. C.