

## ELECTRONICS

# Pilots "Talked Down"

Regardless of weather, radar is able to "see" the plane as it approaches the landing field, and the operator sends complete instructions for landing.

## See Front Cover

► WHEN "SOUPY" weather makes landing airplanes a dangerous operation, ground radar stations can give the pilot orders that bring him down on an airport runway safely.

Demonstrating its ground controlled approach system to aviation writers at Banana River Naval Air Station in Florida, the Navy showed how pilots can be "talked down" when low visibility makes landing hazardous. A close-up of sensitive radar equipment that records the position of planes above an airport, permitting operators of the equipment to "see" clearly, regardless of weather, and to systematize and control their landing approaches is shown on the front cover of this SCIENCE NEWS LETTER.

Radar at the edge of the landing field follows the plane's maneuvers as a pilot approaches the landing field. Able to

"see" the plane as it appears clearly on the radar screen through the thickest fog, the radar operator sends the pilot complete instructions that bring his plane down on the runway to a perfect landing.

Ground controlled approach—GCA to Army and Navy flyers—was developed during the war and first sent into the field by the Armed Forces about November, 1944. Since then, the Navy says that simpler, more reliable and more easily operated equipment has been produced.

On the ground, the GCA installation includes two complete radar sets, six radio transmitters and six receivers. The whole unit is mounted in a trailer behind a four-ton truck.

On the plane, no special equipment is required as the communicating is done via ordinary radio transmitters and receivers. All the pilot has to do, Navy

GCA enthusiasts emphasize, is to fly according to the directions given him.

In addition to "talking down" the pilot from the ground, the control system protects him from collisions with radar warnings of any other aircraft in the vicinity.

Original GCA specifications called for equipment that would bring the airplane safely down to 150 feet above the airport, but it can do better than that. The elevation beam used is accurate to six feet, while the azimuth beam is correct within 20 feet.

With his safety hinging on the orders received from the ground, the pilot has to understand clearly his orders. Strict and precise language is used by the pilot and the ground station, including such familiar air terms as "ROGER" for "Your message is received and understood," and "WILCO" for "Your message is received, understood and will be complied with."

To guide a pilot in, the orders are "Steer . . . ." followed by "right" or "left" and a magnetic heading, while altitudes are simply sent as "Fly at . . . feet." With radar eyes to follow the plane, the ground station needs only these simple directions to bring a pilot down safely under "ceiling zero."

Basic GCA equipment was developed at the government-directed and supported radiation laboratory on the campus of the Massachusetts Institute of Technology, and this type of installation has been widely tested by the Navy, Army and the Civil Aeronautics Administration.

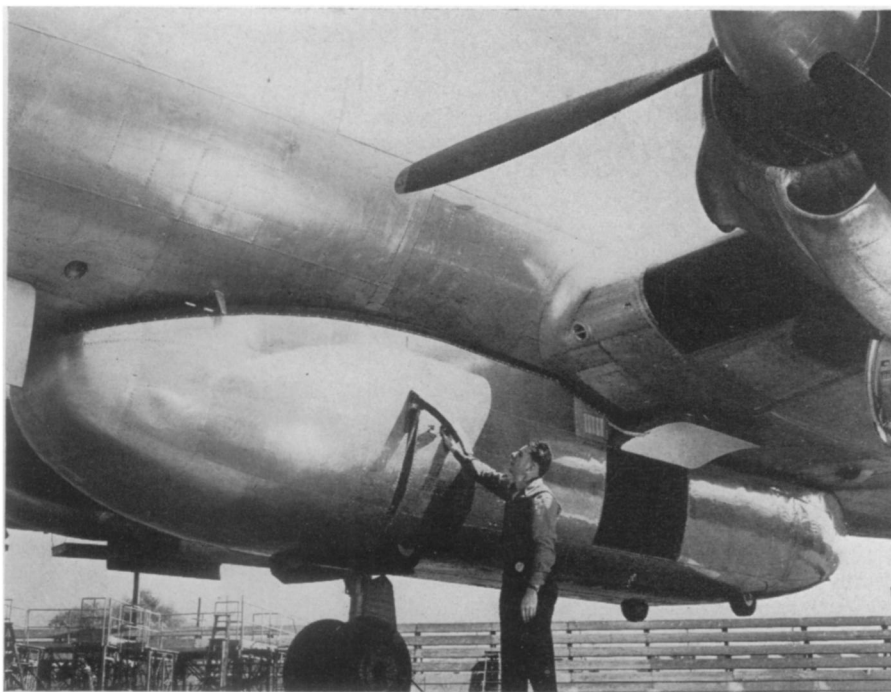
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## AERONAUTICS

## Four-Ton Cargo Container For 1,500-Mile Flights

► SLEEK, streamlined all-metal cargo containers, that fit snugly to the undersides of the bodies of giant Constellation airliners and hold four tons of baggage each, have been developed and tested by the Lockheed Aircraft Corporation, builders of the Constellation. The detachable container, called a Speedpak, can be attached to the belly of the fuselage in two minutes, or removed in the same brief time.

The giant transport, with the loaded Speedpak attached, can be used for flights up to 1,500 miles. Its speed is decreased by only about 10 miles an hour. The plane's flight characteristics are not impaired. An important feature of the Speedpak is the ease with which ground



**HEAVY LOAD**—With a loaded Speedpak firmly attached to its fuselage, a Lockheed Constellation is given final check by a mechanic prior to flight. Water-tight sealing on the joint between the Speedpak and the Constellation fuselage prevents seepage of moisture in flight. A waterproof tarpaulin gives additional protection for the baggage compartment.

attendants can load and unload passenger baggage, thus decreasing long waits at airports. A built-in electric hoist instantly lowers the Speedpak to con-

venient loading height, and as quickly raises it into position to be locked for flight.

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#### MEDICINE

## New Health Leads

**Better treatment of filariasis and schistosomiasis and new knowledge of antimony are being gained by cooperative research.**

► **NEW LEADS** to better treatment of filariasis and schistosomiasis, tropical diseases encountered by our troops in the Pacific theater of the war, and new knowledge of antimony, a chemical with both healing and poisoning properties, are being gained by cooperative research at the National Institute of Health and the Carnegie Institution of Washington.

Results to date of these studies, started during the war and still continuing, were reported by Dr. Frederick J. Brady, of the National Institute of Health, at a meeting of the Washington Philosophical Society.

The studies started with a search for better medicines to treat these two tropical diseases. One of them, filariasis, sometimes develops into the much dreaded elephantiasis.

In this search, 55 chemical compounds were tested. Many of these were new, some were covered by German patents and others had been previously known and used. Of the entire group, four were found more promising as remedies than fuadin, the antimony compound generally used to treat schistosomiasis. However, the scientists found that any trivalent antimony compound was effective in treating these tropical diseases.

The antimony compounds have two effects on the parasitic worms that cause filariasis: 1. They cause the microscopic worm embryos to disappear from the blood stream; 2. They sterilize the adult female worms which remain in the heart of the infected animal.

This has a bearing on treatment of the disease because hitherto scientists have held that treatment of filariasis in humans would bring on elephantiasis much faster than it would develop without treatment. According to this theory the antimony compound killed the female adult worms and the dead and dying worms in the lymph nodes caused the grotesque and disabling swellings known as elephantiasis. If the adult female worms are sterilized but not killed by the

treatment, then the treatment should be effective in checking the disease and preventing elephantiasis.

The action of antimony, though long used in medicine and familiar to the layman in the compound, tartar emetic, has never been fully known. Using antimony 124, a radioactive form of the metal made with the cyclotron at the Carnegie Institution, the scientists have gained new knowledge about this useful but poisonous chemical.

Tartar emetic, made with radioactive antimony, has been given to rats, dogs and men. It leaves the blood stream very rapidly and, in dogs, almost half of it is concentrated in the liver.

The thyroid gland, much to the scientists' surprise, also accumulates a large quantity of the antimony. Relatively small amounts stay in the lymph nodes and skin.

The liver, it was discovered, changes the tartar emetic into a new antimony compound. This, rather than the tartar emetic, may be what is effective in permanently sterilizing adult female worms and killing off the embryonic forms in the blood stream.

Whether this new compound has this remedial effect is not yet definitely known. The scientists do know now that the new compound is soluble in water, is less poisonous than tartar emetic and is excreted from the body faster than tartar emetic. They hope soon to be able to identify the new compound chemically.

One atom bomb research by-product will be to give more information about the action of antimony in the body, Dr. Brady said. Radioactive antimony made by cyclotron bombardment is not powerful enough for study by the tissue autographing technique.

This is a method for exposing photographic plates to radiation from radioactive elements in microscopic sections of body tissues. Examination of the sections shows the very cells of the body in which the radioactive chemical has been deposited.

When radioactive antimony becomes available from the pile used for uranium fission in atom bomb production, this technique can be used. Scientists will then know which cells of the liver and thyroid, for example, accumulate antimony and from that may learn more of what happens to it in the body or what it does in the body to poison or cure.

More knowledge of antimony and its use for curing schistosomiasis and filariasis is also expected from studies like those that developed BAL, the British anti-lewisite chemical that became a remedy for arsenic and mercury poisoning. BAL itself may be used in this phase of the work which will involve study of body enzymes. Arsenic poisons by tying up sulphhydryl groups in enzymes and BAL saves the victim by overcoming this chemical linkage. Antimony may similarly act through body enzymes.

A remedy for antimony poisoning, similar to BAL for arsenic poisoning, could then be developed, or BAL itself might prove useful. The importance of this lies in the fact that doctors must give antimony in close to poisoning doses to treat schistosomiasis effectively.

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#### CHEMISTRY

## Solid Nylon Sheeting Suitable for Handbags

► **NYLON LINES** of hoseless women throughout the nation seem to mean little to the Du Pont Company; they have announced the successful development of a nylon sheeting suitable for wallets, brief cases, handbags, seat covers and other articles customarily made of leather. It raises the question: will a nylon handbag make a contented woman if her legs are still nylonless?

The new solid nylon sheeting is tough and durable in leather-like applications, can be made in any thickness and in various colors, and can be run through embossing rolls to give it any grain or other finish. It is made by the simple process of forcing the soft plastic material through a slot on a special machine into one continuous strip. Perhaps before the nylon sheeting is available to the trade, nylon stockings will be plentiful, because the new sheeting still faces production problems, and manufacturing facilities must be constructed.

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Hollow-stemmed *grasses* are able to support a heavy head of grain due to tough, elastic fibers, and the sheathing base of leaves.