

AVIATION

# Miniature Airplanes Now Fly Freely in New Test Tunnel

## Ailerons and Rudders Are Controlled by Magnetic Fields Acting on Electro-Magnets Aboard Models

**M**INIATURE airplanes take off and maneuver for the sake of science in the world's first "free-flight" wind tunnel just demonstrated for the first time by the National Advisory Committee for Aeronautics at its laboratories at Langley Field, Va.

Instead of the small counterpart of a full-sized airplane being held conventionally in an experimental blast of air, the artificial breeze is increased until the model takes off by itself and flies freely. Then ailerons and rudder are controlled by magnetic fields acting on small electro-magnets in the model's wings. The scientist in charge maneuvers the test model plane just as a pilot handles a real one.

"We expect that this new method of studying airplane stability and control will give us much information directly that we have hitherto obtained theoretically or by empirical estimation," said Dr. George W. Lewis, N.A.C.A. director of research.

"Bumps" or gusts of wind are measured and studied by two new devices made by N.A.C.A. experts.

One of these is a bump recording instrument small enough to fit into the pocket. About 160 of these instruments are placed in airplanes and seaplanes of different types during actual flight. One of them has been carried by the China Clipper on round trips between San Francisco and Manila. From the curve traced by the instrument, engineers are able to reconstruct every roughness of the voyage and tell what stresses the craft withstood.

### Gusts to Order

Gusts are made to order in a new tunnel and model airplanes are catapulted into them. As fast as an arrow is shot from a bow, the tiny plane is accelerated to 50 miles per hour in a few feet of travel. Hit by the gust, its action is recorded by a motion picture camera.

The famous N. A. C. A. cowling which streamlined air-cooled engines so effectively several years ago has been im-

proved and adapted to the 1500 horsepower engines developed in the past few years. There is an adjustable nose slot in the new cowling design so that the pilot can give the engine more cooling air while it is working hardest.

### Reduce Power Needed

Just by reducing the size of rivets in an airplane wing by  $1/32$  of an inch, it is possible to reduce the power necessary by 100 horsepower. This is one result of the experiments on the friction drag on the wings of large modern airplanes. In operating high-performance modern aircraft, the importance of smooth surface in a wing is so great that the N.A.C.A. experts suggest it may be found economical to have service crews wipe off accumulated dirt and dust on wing surfaces at every stop.

Large air transports leaving our airports in the future may be catapulted in order to assist their take-off and reduce the long run now necessary, if a suggestion of the N.A.C.A. is adopted. A catapult with half the acceleration of

gravity would reduce the take-off distance from 1800 feet to 1150 feet.

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AVIATION

## Aerial Research Race On; U. S. Supremacy Menaced

**A**VIATION today owes much to the men and apparatus in a group of buildings at Langley Field, Va. These laboratories of the National Advisory Committee for Aeronautics have changed the tempo and style of modern aeronautics.

Cruising speeds have jumped beyond 200 miles per hour, with greatly increased economy. Greater safety has been achieved, thanks to new methods of controlling aircraft. All because scientists have dreamed, tested and accomplished.

Manufacturers have learned to snatch eagerly the latest N.A.C.A. research findings. Next year's airplanes wear today's successful research results. Foreign war and commercial planes undergo metamorphosis as American advances become known.

Imitation is the most sincere flattery. But American aviation circles are a little disturbed over the large-scale duplication, with embellishments, of the N.A.C.A. laboratories by Germany, Italy and Russia. Millions of dollars are being spent on aeronautical research in those war-fearing countries.

Uncle Sam's researchers are pushing ahead on new developments: Learning



FLYING FREE IN WIND TUNNEL

more about airplane control by flying miniature planes freely in a special wind tunnel; creating artificial wind gusts and testing planes in them; improving the famous N.A.C.A. cowling to reduce wind resistance of new giant air-cooled engines; bettering seaplanes; experimenting with rotorplanes, etc.

The great international research race in aeronautics is getting closer. America has been way out in the lead. But our research, which always pays magnificent dividends, must be continued and expanded to keep up with the world procession.

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light-gathering camera should be useful in recording the relatively poor lighting conditions that will prevail in Peru.

#### For Corona Pictures

The U. S. Navy-National Geographic Society expedition—perhaps the most pretentious of all American parties which will take the field—will employ a new device developed by Dr. Irvine Gardner of the National Bureau of Standards in Washington that should obtain better pictures of the far-flung, but faint, streamers which blaze out hundreds of thousands of miles into space from the shining corona of the sun.

Dr. Gardner's device is a rotating disk with four sections cut out of it like pieces of pie. This disk spins 100 times a minute in front of his telescopic camera. The amount of light reaching the photographic plates depends on the openings in the disk. Out near the rim the openings are large and nearly all the light will come through. Nearer the center, more and more light is cut off. The object of the device is to secure about equal light from the brilliantly bright part of the corona near the sun's surface and from the very faint outer portions of the corona. Photographs of the corona, in the past, have sometimes been overexposed by the brilliant inner corona before sufficient light from the outer co- (Turn to page 342)

ASTRONOMY

# New Equipment To Be Used On June Eclipse Expedition

## Wide-Aperture Camera and Device for Distributing Light on Plates May Disclose New Facts on Corona

**W**HILE, in the main, scientific observations on the sun's corona have not changed markedly in the last twenty years, each new eclipse brings refinement of technique and some really new observing equipment. The eclipse of June 8 is no exception.

On the Peruvian coast, north of Chimbote, at an altitude of 3,000 feet a new device will be used for the first time in a total eclipse of the sun—the fast Schmidt type camera operated by Prof. Charles H. Smiley, director of Ladd Observatory of Brown University. This

small camera will have an optical aperture of  $f/1$ , which means that the diameter of the light-collecting mirror of the instrument is equal to its focal length. The best of candid cameras, one can recall, are  $f/2$  or  $f/1.5$ , while most telescope cameras are  $f/10$  or more. The lower the aperture the greater the light-gathering power of the instrument and the shorter may be the exposure time. Prof. Smiley's Schmidt camera can scan the sky through 20 astronomical degrees, while the ordinary reflector camera can picture only about one degree. The fast

