

AERONAUTICS

Autogiro Possesses Stability Which Airplane Cannot Match

Rotor With Flapping Hinge at Some Distance From Center of Rotation Is Stable; Wing Not Inherently So

THE IMPORTANT research finding, that autogiros with their whirling rotor blades have more inherent longitudinal stability (ability to react against a pitching motion in flight) than do normal airplanes, was announced at the concluding meeting of the Philadelphia chapter of the Institute of Aeronautical Sciences by Prof. Alexander Klemin of New York University, in a scientific report with Lieut. Victor Haugen, U. S. Army Air Corps, and S. B. Sherwin, first holder of the newly created Cierva Memorial Fellowship at New York University.

The new report contradicts some previous wind tunnel experiments and is in accordance with practical experience. The theoretical investigations show that the rotor with its flapping hinge placed at some distance from the center of rotation is definitely stable, Prof. Klemin declared. In this the rotor is superior to the airplane wing which has no inherent stability of its own.

The investigations also show that as the rotor is placed above the center of gravity of the machine with its axis of rotation somewhat behind the center of gravity, the autogiro will be stable without the intervention of the horizontal tail surfaces. Such inherent stability without horizontal tail action is impossible in the airplane. Furthermore, rotors of the direct control type are pivoted about a suitable point so that not only is it possible to secure longitudinal control without use of an elevator but the rotor tends to change its inclination so as to increase stability. In the airplane, flying with free stick, the stability is less than flying with stick held in a fixed position. In the autogiro with pivoted rotor, on the other hand, there is a dual stabilizing effect. Thus from the point of view of horizontal static stability, the autogiro has distinct points of superiority over the airplane.

To remove the discrepancy existing between wind tunnel data and theoretical and practical reasoning, Lieut. Haugen will conduct an original investigation into the stability of the rotor with offset

hinge, systematically varying the position of the hinge.

One of the most interesting problems in the helicopter today is whether superimposed air screws, as in the Breguet helicopter, or air screw placed on either side of the fuselage, as in the Focke helicopter, are more efficient. Mr. Sherwin has devised a special apparatus for investigating this point in the nine-foot wind tunnel of the Daniel Guggenheim School of Aeronautics of New York University.

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Brilliant Future Forecast

ROTARY winged aircraft of the autogiro or helicopter type will usher in the third stage of growth in man's con-

quest of the air, Igor I. Sikorsky, noted pilot and designer, told the meeting.

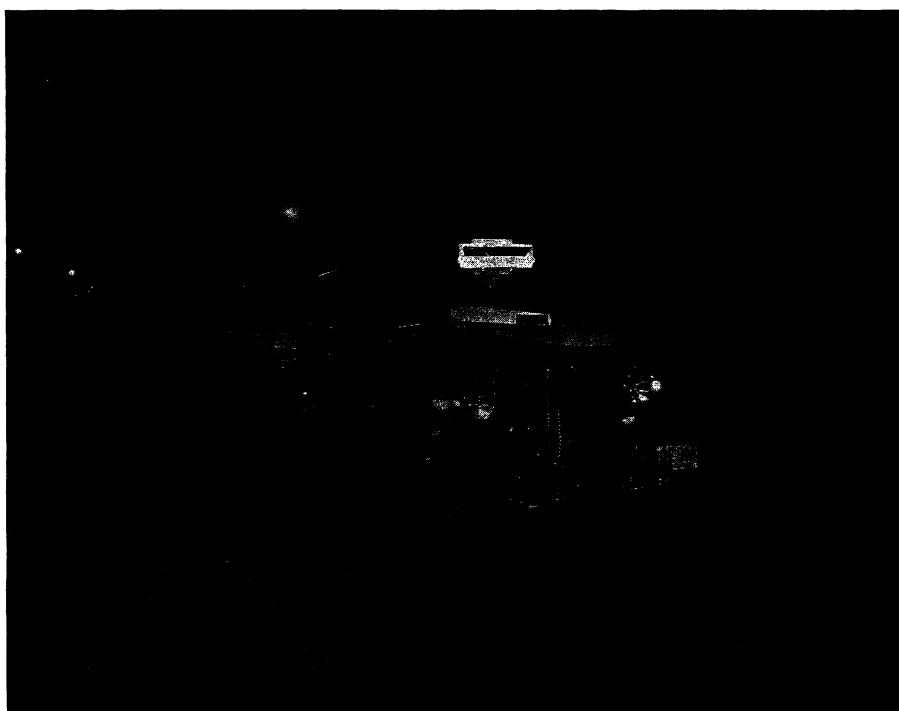
Mr. Sikorsky forecast a brilliant future for planes with rotary wings, particularly in the field of private flying, to add to lighter-than-air and heavier-than-air transportation, the two earlier stages of man's aerial transport.

By rotary wings, Mr. Sikorsky said, private flying can come into its own, for planes of this type overcome the main handicap of private flying today which is lack of ability to take off and land in small spaces. It is this handicap, he feels, rather than lack of speed, lack of safety or even high cost of operation which has limited private aviation.

For military use, Mr. Sikorsky foresees the day when rotary wing planes attached to the Navy will be used for rescue work at sea, the laying of mines, quick observation from small, isolated ships, and bombing.

Attached to an army, he suggested, rotary winged planes could effectively take over many of the communications tasks now performed by motorcycles, automobiles, and even horses. Observations and control of artillery fire and bombing attack would be possible.

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MEASURING BRIGHTNESS

A new instrument that measures how well streets and roads are lighted. Mounted on an automobile, it records the true brightness of pavement, brightness of objects along or on the road, interference to seeing caused by glare. Its use may make possible saving of some of the 5000 lives lost annually in traffic accidents merely because motorists could not see safely.

Helicopter Ferries

BY means of helicopters and other rotary wing airplanes which can rise and descend vertically a speedy "ferry" service between distant airports and busy metropolitan centers will be possible, C. E. McCollum of Transcontinental & Western Air, Inc., told the Institute of Aeronautical Sciences.

In carrying more than 1,500,000 passengers a year the 17 major airlines of the nation encounter a great waste of time in getting the passengers to and from airports. Mr. McCollum estimated that in a single year, an hour for each passenger is needed in city-to-airport travel, on the average. This means that in a single year, 173 years of time was spent in the tedious crawl through busy streets in sharp contrast to the swift airplane flight to or from the airport.

The fantastic visions of great roof-top airports atop skyscrapers have little economic justification, Mr. Collum feels.

With the advent of rotary wing planes, a ferry service is wholly practical and it is much cheaper to use small plots of land in the city—no bigger than a square block—for this purpose. With the practical development now of the vertical beam radio altimeter it would be practical even to make landings through dense fog down into the "gorges" between a great city's skyscrapers. The new altimeter, in a hovering helicopter, could give an accurate picture of buildings beneath just as a sea captain now "heaves the lead" to get soundings in a ship's channel.

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CHEMISTRY

Solid "Alcohol" Exhibited At Field Museum, Chicago

SOLID chunks of "alcohol" are on exhibition at the Field Museum of Natural History, Chicago. It isn't some new fangled chemical but the mineral stibnite, in sixteenth century Europe called "alcohol." This antimony sulfide, most important ore of antimony, was known to the Arabs as "kohl," from the Arabic for color or stain. The powdered mineral was used as a cosmetic to increase the apparent size of the eye by blackening the eyelids. "Al" is Arabic for "the" . . . hence "al-kohl" or alcohol.

As years passed, alcohol became a general term for all sublimed powders and later for all distillates. In the last century the use of the word became restricted to the class of organic compounds that contain the hydroxyl group.

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PUBLIC HEALTH—ENGINEERING

"Knockout" Windshields Urged To Reduce Injuries

"KNOCKOUT" windshields for automobiles to reduce the toll of head and neck injuries which doctors now encounter so frequently in motor car accidents are suggested by Dr. B. L. Knight of Cedar Rapids, Iowa. (*Journal, American Medical Association, Dec. 2.*)

Noting that "the most serious medical problem in the United States today is the motor accident," Dr. Knight suggests the construction of windshields which would fall outward, without breaking, when struck with a force of more than 50 pounds from the inside.

The idea is that in the quick stop of an accident the passenger's body and head would be thrown against the windshield and instead of being severely injured by impact with the rigidly-held and very strong safety glass, the blow would merely drive out the windshield when the force was more than 50 pounds.

Problems of designing such a wind-

shield which would not rattle or fall out of its own accord would be encountered, but they do not appear insurmountable.

Dr. Knight, who as coroner for Linn County, Iowa, is frequently called in on fatal highway accidents, has other suggestions for increasing safety. They include:

1. Bumpers entirely around the car, with a removable section to permit changing tires, which would prevent accidents in which the bumper of a car locks into the wheel of another and overturns the car.

2. Improved highway markings preferably right on the pavement in the line of vision.

3. Greater streamlining of the lower body of motor cars so that the fenders do not protrude.

4. Compulsory driver's tests after an accident to discover any driver abnormalities.

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PHYSICS

New Electrical Micrometer Measures .000,005 Inch

A NEW and valuable kind of electrical micrometer, which uses a special radio tube to measure distances as small as five millionths of an inch, has been developed at the U. S. Naval Research Laboratory in Washington.

Dr. Ross Gunn, physicist and superintendent of the mechanics and electricity division of the Laboratory, described the new instrument at the meeting of the American Society of Mechanical Engineers in Philadelphia.

The electrical micrometer is a radio tube consisting of an electron-emitting filament and two tiny plates, insulated from one another and jointly supported by a rod which goes into an elastic diaphragm fixed in the bulbous part of the radio tube.

Outside the tube, and attached to the diaphragm, is spot welded another small rod whose job it is to detect tiny displacements.

Slight displacements of this rod are communicated through the diaphragm into the plates of the tube which move very slightly from their normal positions. This motion brings one plate nearer to the filament and the other plate farther away, resulting in a decided difference in flow of electrical current within the tube.

Normally the current to the two plates balances and zero current is obtained. With the slight shift of plate distance current flows in an amount proportional to the displacement. This current is put through a micrometer and the deflection of the needle of this instrument is a measure of original microscopic displacements.

Dr. Gunn stressed the compactness and stability of the new device as well as its great versatility to a variety of measurements. The electrical micrometer can be used to measure displacements at