AVIATION

"Clipper Ships" of the Sky

Mail of the Future May be Carried Down the Skyway By Motorless Planes Soaring on Uprising Winds

By ROBERT D. POTTER

"AIRMAIL train departing for Philadelphia, Baltimore and Washington," drones the dispatcher's voice over the loudspeaker of the Newark airport. The crowd behind the guard fences strains its collective neck to watch the takeoff.

A sleek biplane, the "locomotive" of the "train," slowly gains speed for its takeoff into the light breeze. Four hundred feet behind it, on a light but strong towing cable, comes the Washington "mail car." Behind it, attached on 200 feet of cable is the Baltimore "car" and another 200 feet behind is the Philadelphia "car."

Without fuss the air train rises in the air and heads for Camden airport just outside Philadelphia. The "cars" in the aerial train are light weight gliders each with a pilot and 200 pounds of valuable mail.

Glider Cuts Loose

Over Camden there is no descent to the ground. The air train keeps its 100 mile an hour speed and heads for Baltimore and Washington. The Philadelphia glider simply cuts loose from its towing cable and sails gently to the ground. The cable swings for a moment from the Baltimore car, then shortens and finally disappears as the Baltimore pilot reels in its length.

Over Baltimore the uncoupling of the next glider occurs and in Washington the last glider descends to the ground. Down, too, comes the towing plane; for after all this is just a demonstration. It might just as well have continued on to Richmond.

Thus a commercial use for gliders is demonstrated to America.

Over in Russia the same scene of air trains soaring the sky is being re-enacted. The land of the Soviets envisions a day, not too far in the future, when trains of gliders will be shooting across frigid Siberia to the far-flung limits of the nation on the shores of the Pacific.

Russia with its vast distances sees in glider trains a swift, cheap transportation system to supplement its railroads. Glider trains need no costly roadbed or maintenance. Thousands of gliders can be built for the price of a single mile of railroad track. And the trained glider pilots make valuable, skilled recruits for the air force of Russia.

Gliding was the stepping stone from which man launched himself and learned to fly. Lilienthal in Germany, Chanute, Herring, Montgomery, and the Wrights in America, and Pilcher in England were among the pioneers who enabled man to build airplanes and fly even when skilled scientists with mathematics "proved" it could never be done.

Half forgotten now is the debt aviation owes to gliders and gliding. With airplanes a commercial success, gliders have been relegated to amateur sportsmen. There is reason to believe, however, that many airplane pilots who rush overhead at 150 and 200 miles an hour could learn plenty from gliders and gliding.

In analogy an airplane pilot is like the captain of a great ocean steamer with vast power at his command to drive through adverse weather conditions and forces of nature.

By the same picture a glider pilot, without a 200 horsepower engine ahead of him, is like the master of an old sailing ship; dependent wholly on the wind and weather for his safety and progress.

Navy Uses Gliders

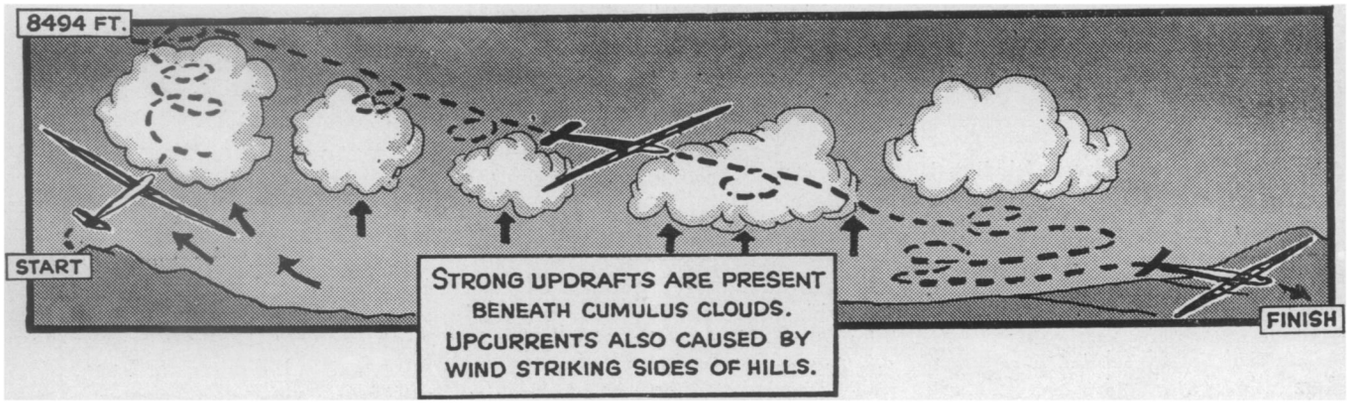
When the power fails in a great steamer whom would you rather trust; a seaman trained to read the weather and gain every advantage however small, which such knowledge brings, or one who knows only that if the boilers are kept filled with hot water and steam and a lever is pulled the ship will move?

Glider pilots fly and soar only because they know how to take advantage of uprising wind currents. They can gain altitude where airplane pilots without glider training can only descend. Even a three-foot difference in altitude may mean that one ship will glide over a treetop into a safe landing place beyond, while another will crash. The U. S. Navy is recognizing the value of glider training and uses them in preparing its future aviators.

Gliding is really divided into two categories; gliding and soaring. In glid-

HOW THEY KEEP ALOFT

Chart showing how the glider pilot takes advantage of clouds and ridges to give him altitude.



ing, the plane lands at a point lower in altitude than the starting point. It starts from a hilltop, for instance, and lands at the bottom of a valley, traveling in a gentle glide all the way. In soaring, the plane takes advantage of rising air currents, gains altitude, rises higher in the air than the starting point and sometimes lands above it. Most flights are a mixture of gliding and soaring.

The increasing skill of glider design and glider pilots is best told, perhaps, in the records of gliding. Up until June, 1934, the world's gliding record for airline distance was 136 miles, made in 1931 by Gunther Groenhoff of Germany.

On June 16 Hans Fischer, also of Germany, soared and glided 149 miles. Nine days later, on the 25th, Richard du Pont, Jr., sailed away from the hills at Elmira, N. Y., and landed in Somerset, N. J., 158 miles distant for a new world's record.

The record stayed in America with du Pont hardly longer than Fischer's 149 mile record lasted in the face of du Pont's feat. On July 27, Wolf Hirth, famous German gliding expert, took off from the mecca of German gliding on the mountain known as Wasserkuppe and in the next six hours traveled 232 miles. The distance record has thus returned to Germany with some 74 miles to spare.

Germany, too, holds the duration and altitude records. Kurt Schmidt on August 3 and 4 in 1933 stayed aloft in a glider for 36 hours and 35 minutes. Robert Kronfeld has reached an altitude of 8,494 feet in a sailplane built especially for soaring.

Mile and a Half Rise

By gliding, then, man has traveled farther than from New York City to Washington; stayed up in the air for a day and a half and gained an altitude of over a mile and a half. Not bad for a device without any motive power of its own.

How do they do it? Well built craft and skilled pilots are part of the story; nevertheless, breaking records demands propitious conditions.

The construction secrets that make possible breaking of records demand light-weight gliders, stable in even strong winds and yet sensitive to the slightest touch on the controls by the pilot.

Above all gliders need what the experts call a good angle of glide. This term simply means that the glider will travel a long distance horizontally for a given drop in altitude. Fifteen feet traveled forward for every foot lost in altitude is a common ratio nowadays. Thus to glide 300 feet a glider of this sort need only be 20 feet in the air.

RIDING THE WINDS

The Navy makes use of gliders to teach student fliers the delicate art of mastering the winds by taking advantage of all upward currents.

Soaring, the actual gaining of altitude, becomes possible when the upward air currents are gently raising the glider faster than the craft glides down. It is like trying to run down a fast moving escalator going upward.

If an upward wind raises a glider four feet a second while the craft must drop two feet a second to maintain stability there is a net gain of two feet each second upward.

For soaring, then, everything depends on finding air currents where there is a good steady updraft. The windward sides of mountains offer such conditions most of the time. That is why the favored gliding fields all over the world are situated on grassy meadows on hills or mountains that overlook valleys.

At such takeoff places the wind is simply deflected upward because the hill is in the way. But there are other spots where the sought-after upward air currents can be found. It is a knowledge of these conditions which makes possible the long distance flights by gliders.

What are the conditions necessary for soaring? One helpful air current is the type which rises from a plowed field which radiates heat better than the surrounding land. Above it, but invisible of course, there is usually an upward current of rising hot air. As a glider pilot travels cross country he must ever be on the lookout for such plowed lands and if nothing better in the way of wind conditions offers itself he will sail over it with a fair certainty that air currents will be rising and enable him to maintain or even increase altitude.

Better than the heat-caused rise of air from a field is the strong updraft of air beneath cumulus clouds. These are the great balls of fleecy vapor that often sail majestically about the summer sky. They mark the points where warm ground air rises until it reaches a height where its water vapor begins to condense into fog at the colder upper levels.

Watch For Clouds

Glider pilots watch for such clouds and in one way or another strive to get beneath them. Then by gliding back and forth in the updraft they can gain altitude. The trick often is one of hovering back and forth beneath a cumulus cloud until sufficient altitude is gained so that the pilot can glide over a range of hills en route to a record.

Suppose a pilot does gain what appears to be sufficient altitude for this step. Away goes the glider from beneath the cloud and away go the upward air currents. The craft does glide gently, as before, but now is losing alti-

tude. Will it pass over the ridge ahead? The pilot pushes the "stick" back to keep the glide at its maximum efficiency. Greatest forward distance for the least drop is the watchword. And yet the nose of the sailplane must not rise to a point where a stall will occur.

Yes, the bird-like machine and its human occupant are successful. Over the peaks of the ridge they go to reach the windward side. Now come the upward air currents again. The pilot turns the nose of the glider parallel to the ridge and executes great circles, ovals and figure-eights back and forth, gaining altitude and surveying the layout of land ahead. Twenty-five minutes or a half hour may be spent in such maneuvers if nothing better presents itself ahead. The next ridge of hills may be two miles away.

A Friend in Need

But here comes another friend; another cumulus cloud. Patiently the pilot weaves back and forth waiting for it to come overhead. The upward air currents coming over the ridge become even stronger.

Instead of hovering just above the peak of the ridge the glider now gains height. Five hundred feet above the ridge it soars. Then 600; finally 700. That ridge two miles away can be scaled if the glider is just a little less than 800 feet above it at the start of a long glide.

The experienced eye of the glider pilot finally tells him that the safe 800 feet height has been reached and away he goes to surmount the distant obstacle. And thus the aerial "hop-skip and jumping" goes on.

Above the Clouds

In exceptional cases a glider pilot may be able to take his ship right up into a cumulus cloud and in some cases above it. Such was the fortunate happening which enabled Robert Kronfeld to set the altitude record of over 8,000 feet. He went right up through a great cloud, emerged on top and then "hopped" his way from one cloud to another in a journey that covered ninety miles. For more thrills and hazards German glider pilots occasionally fly inside great thunderclouds.

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Decayed teeth were more prevalent among upper class Egyptians than among the peasants who ate simple, coarse foods, a study of ancient skulls shows.

PSYCHOLOGY

Even the Best of Singers Carol Off True Pitch

OPERATIC and concert singers, even the most noted artists, habitually sing off pitch. This was the charge made by Dr. Harold G. Seashore, Eastman fellow in psychology of music at the State University of Iowa, at the recent meeting of the American Psychological Association.

Such variations from the true pitch of a song are probably unconscious on the part of the singer, Dr. Seashore indicated, although they may not be errors, either. Certainly the listener hears the performance as correct and artistic; the variations are not detected by the ear. In fact, Dr. Seashore considers it probable that if the singer were to sing rigidly in true pitch, his performance would be considered thin, mechanical, and lacking in feeling.

The singers studied included such well-known concert and operatic artists as Richard Crooks, Louise Homer and Lawrence Tibbett, as well as two college voice instructors. The songs were in legato style and varied in difficulty from "All Through the Night" to two Handel arias. The voices were recorded by means of a sound photographing device called the strobophotograph which recorded graphically each variation in pitch and intensity, however minute.

The photographic records revealed that what is heard as a single note when sung by the artist is really a vibrato or oscillation between two pitches which may be as much as eight tenths of a musical step apart.

From 78 to 85 per cent. of all tones are off-pitch some of the time, with an average deviation of one tenth of a step, Dr. Seashore found.

Hunt For Pitch

"Apparently singers to a degree 'hunt' for the correct pitch and interval extent," Dr. Seashore said. He concluded, however, that the errors found are not due to motor skill deficiency or to auditory misjudgment, but are deviations necessary for the legato flow of the song.

Gliding attacks, or the sliding up to the note sung, were found to be more common than musicians are willing to admit.

"Gliding attacks are universally condemned although we can now demonstrate that all good singers sing many tones with a rising pitch glide, sometimes as great as several whole tones," Dr. Seashore said. With Miss Homer, 13 per cent. and with Mr. Crooks, 33 per cent. of all the tones in the songs were begun with rising pitch glide. Falling gliding attack was found to be rare.

Science News Letter, September 29, 1934

INDUSTRIAL MEDICINE

Persons With Good Noses Selected to Work in Dust

MINERS must have good noses. So must stone cutters, grinders, sand blast men, and others who work in an atmosphere laden with rock dust or other abrasive particles, if they would keep their health and avoid lung troubles. For an important function of the nose is to filter out these particles and prevent them from entering the lungs. And noses differ greatly in the efficiency with which they perform this function.

Dr. Gunther Lehmann of the Kaiser-Wilhelm Institute for Workman's Physiology examined 426 noses. They belonged to miners. Of the 426 miners, 241 were ill with lung troubles, 185 were well.

The noses were tested by blowing into them air laden with a fixed amount of dust, and allowing the air to issue from the mouth while the breath was held. The dust content of this air was then measured and the percentage of the original content filtered out by the nose was thus determined. The healthy miners were found prevailing among the high percentages, the affected miners among the low percentages.

Dr. Lehmann recommends that no man be admitted to a dusty job unless he passes such a nose test. Had this been done, he states, with the miners he examined, 205 out of the 241 that fell ill would have been saved from their illness. Under no circumstances, he insists, should mouth breathers be accepted for such jobs.

Science News Letter, September 29, 1934