

Sky Mappers of the Alaska Aerial Survey

Aviation—Cartography

By JAMES NEVIN MILLER

Ten thousand feet above a certain section of picturesque Alaska, where landing fields are rare and waterways are treacherous, four Navy planes maneuvered the other day. Not a whit dismayed by the fact that for miles around there was nothing to be seen but high mountains covered with dense forests, and towering glaciers with surfaces of glass-like slipperiness, the pilots circled about until they found what they were seeking—a winding waterway, whose flowing current was not quite as swift as its neighbors. Whereupon, swooping low, in swiftly executed movements, the planes moved like one in a graceful landing.

A solitary scientist of the U. S. Geological Survey, who had been watching the maneuvers with the utmost interest, hailed one of the pilots as he was setting foot on a sandy beach preparatory to moving his craft to a desirable position, and queried: "Just who are you boys and what are you doing so far away from civilization?"

The flyer pointed to a sign on his plane that read: "Alaskan Survey, U. S. Navy". Then he replied: "These four ships comprise our entire airplane equipment, but we have a whale of a lot of fun and do quite a bit of mapping."

For two seasons the government has had a group of Navy planes in the wilds of southeastern Alaska for the purpose of surveying the vast resources of the country by means of the aerial mapping method. Cooperating in the project are four important government bureaus: the Naval Bureau of Aeronautics, the Geological Survey, the Forest Service, and the Bureau of Public Roads of the Department of Agriculture.

To say that the results have been gratifying is to underestimate the situation. In 1926, the very first year, 10,000 square miles were surveyed, while since then the all-seeing eyes of the aerial cameras have blocked out in scientific fashion an almost equal mileage, hitherto unknown, containing lakes, streams and other topographic features, whose value to American industry is well nigh inestimable.

For instance, it is no exaggeration to point out that the corps of "flying surveyors" has been largely responsible for the discovery of a new Alaskan industry—paper-making. The Tongass National Forest, lately mapped with



FORMATION OF PLANES far above the clouds

a high degree of thoroughness, is said to contain enough newsprint pulp to supply 25 per cent. of the needs of the United States indefinitely. Moreover, there recently has been located a power site of more than 20,000 horsepower. It is also in the Tongass Forest, on the east side of Taku Inlet near Greely Point.

In thus furthering their original objective and bettering it in a variety of ways, members of the Aerial Survey have had to do a lot of pioneering in respect to finding efficient methods of procedure. However, they have been exceedingly fortunate in their original choice of the amphibian type of plane. It has been maintained in regular use because of its ability to land on the water, and by careful manipulation of the landing gear, to taxi onto the beach, thereby enabling the ship to be secured and sheltered in some selected spot. The wisdom of this choice of plane has been borne out on numerous occasions when terrific storms would sweep down the narrow channels and blow with such force as to wreck any seaplane that happened to be moored in the water.

There are, of course, a good many places where planes cannot land or take off with impunity, and for this reason the U. S. S. Gannett, a mine sweeper which originally served as aircraft tender for the Navy Aircraft Squadrons, has been employed as tender for the Aerial Survey. Very few alterations were found necessary

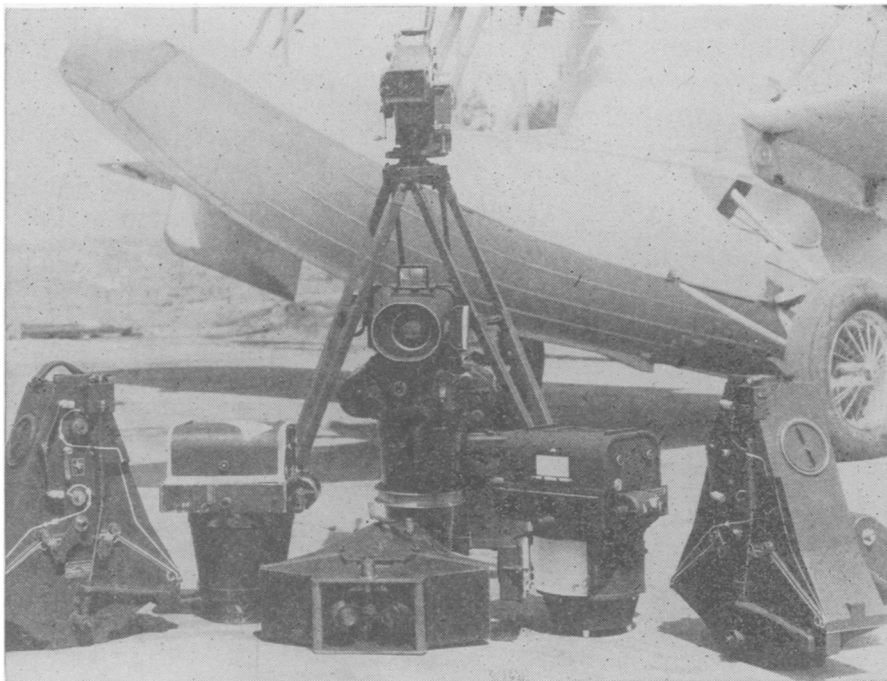
to prepare this vessel for her new duty. Prior to the assumption of her first task she had been fitted out with an extension boom enabling her to hoist a plane from the water and stow it on her stern.

The average person would hardly suppose that up in the great "north countries" the most modern comforts of home would be available for the "flying surveyors". But harken to their novel kind of domicile! A mammoth wooden barge, some 110 feet long and 40 feet wide, equipped with a towing bridle and anchoring gear, so that the craft might be pulled to convenient points by the tender, has been made over into living quarters for the 40 enlisted men and five officers of the Survey detachment. Electric lights are provided by a small lighting system, hot and cold water are available through the medium of a sizable water heater, and there's even a completely equipped photograph laboratory aboard, besides a space set apart for the overhauling of disabled planes.

Another unique part of the regular equipment is the supply of aerial cameras. Besides a motion picture outfit, utilized this past summer for a complete history of the season's activities, there have been available three multiple-lens cameras, one of which is a tri-lens affair and the other two equipped with four lenses. Just how these cameras are used is explained graphically by W. L. Richardson, Navy photographer:

"Three of the planes have been fitted with a special camera hatch located in the hull immediately below the rear cockpit. Here are installed the cameras used to take the oblique type of pictures so important in mapping observations. The T-2 or four lens camera, has met our most rigid tests. In ordinary mapping practice with a single lens camera of 12-inch focal length the flying photographers usually find 10,000 feet the best altitude. However, it was soon found that with this camera the usable area of each picture for mapping purposes was ordinarily less than a single square mile, at a scale of about 830 feet per inch. However, by employing the T-2 camera under like conditions, the Navy experts achieved a usable area of four square miles for each simultaneous exposure at a scale of about 1,550 feet per inch. Then, too, in the case of the single lens camera used at the customary elevation an area (*Turn to next page*)

Sky Mappers of the Alaska Survey—*Continued*



MANY CAMERAS, both still and motion picture, are needed in the work of mapping

only slightly over a mile wide is covered on each photographic strip, while with the T-2 camera an area over six miles wide is taken in.

"This of course greatly reduces the amount of flying time required in mapping any extended area. Moreover, the increase in width of ground area covered is gained, in the T-2 camera, by the use of two side chambers with their optical lenses pointing obliquely to left and right of the optical axis of the lens of the central vertical chamber. By this means two oblique photographs are secured which cover a ground area adjacent to left and right of the area photographed by the central chamber. The fourth is mounted in such a way that it covers an area that lies adjacent to, and to the rear of, the area covered by the central chamber. The purpose of this fourth chamber, then, is to greatly increase the accuracy with which the vertical and side views may be oriented by the map experts into a mosaic map, made by piecing the four sections together in painstaking fashion, after careful check-ups with ground data."

The fourth plane of the detachment has been converted into a sort of radio and meteorological laboratory, receiving weather reports on the wing from Navy radio stations in the region and preparing a weather map for charting the mapping planes. The

work of this plane has proved indispensable to the success of the mapping maneuvers. Fog and low visibility may develop at any moment in the Alaska wilds.

Ever since the beginning of the Survey, Juneau has been regarded as a central base for the plane operations. However, the practice has been to utilize various lesser bases, depending on what the next mapping objective happened to be.

Some of the more important incidents and accomplishments of this past summer are described by Lieut. Commander Arthur W. Radford, officer in charge: "On June 14, two of our planes, one equipped with radio, made a flight from Petersburg along the mainland south of Wrangell for the purpose of taking mapping photographs. Mr. B. F. Heintzelman of the Forest Service accompanied us on this expedition as well as on another the same day along the eastern coast of Baranof Island. Upon the conclusion of the latter flight he stated that he learned more about the topography of Baranof Island from his observations on that day than he had been able to discover from ground observations there over a period of ten years."

A humorous incident well worth the telling took place early in the summer, Lieut. Commander Radford says. "While inspecting beaches on Japonski

Island not far from Sitka in the hope of finding a good place to use as a temporary base for a few days, we were assured by the Secretary of the local Commercial Club, one Mr. Panamarkoff, that he had found just what we were seeking. Whereupon three of our officers were taken on an inspection tour of the beach in question. One of them remarked that it seemed a wee bit soft, but that did not phase the driver of the car in which they were riding. In order to prove the strength and hardness of the beach he made a sudden turn that put the car into the water about 15 feet from shore.

"Now the automobile came to a sickening stop. However, the motor was again started and after three attempts to pull out, the rear axle hit the extremely soft gravel. Meanwhile the tide was coming in with about a four foot rise yet to make. Repeated efforts to budge the truck failed, and shortly a truck was brought to the scene, and a towline hitched to the disabled car. But not a trifle did she budge! The close of this sad story is that the truck was finally left to the mercy of the incoming tide. Needless to say, we did NOT select this place as a temporary base for our planes."

Aside from their great importance for mapping purposes, the amphibian planes have been of considerable value as emergency modes of travel for high-ranking officials of the various government Bureaus and occasionally, for certain commercial interests. For instance, on a recent occasion a plane made a flight from Juneau to Petersburg and return, at the request of Major Elliott, president of the Alaska Road Commission, with Major Gillette, Corps of Engineers, U. S. A., as passenger. Major Gillette is chief engineer for the Road Commission and his visit to Petersburg was for the purpose of inspecting strategic dredging operations in Wrangell Narrows. A few days later a letter of thanks was received by the detachment from Major Elliott expressing the conviction that the aerial survey had enabled the Commission to settle immediately a question of great importance connected with the dredging maneuvers.

Some days afterwards, at the request of the Forest Service, a flight was made over Admiralty Island and the Speel River District with a Mr. Robert A. Kinzie as passenger. Mr. Kinzie is the chief (*Turn to next page*)

New Baking Powder Leaves No Residue

Chemistry

A baking powder which does not leave a residue in the finished bread or cake has just been worked out in the chemistry laboratories at the University of Wisconsin by Edwin O. Wiig. This new leavening agent has as its active agent acetonedicarboxylic acid, which during the baking process disappears entirely as gases.

The formation of carbon dioxide, the gas which "raises" the cake, is only part of the story of baking powder. The other part concerns the product which remains in the cake as a residue. The various commercial baking powders on the market at present leave as residues saline cathartics, such as sodium tartrate, Rochelle salt, disodium phosphate, sodium sulfate or aluminum hydroxide. There is still a question as to the possible ill effect of some of these materials upon health. Hence the advantage of a baking powder which leaves no residue whatsoever. Acetone is the only

other substance formed besides carbon dioxide, and the acetone completely evaporates at baking temperatures.

The new powder depends for its action on combination with the water of the dough, just as do the present powders. Hence in order to protect it from atmospheric moisture it is mixed with starch. This cornstarch has a second function, more important than that just mentioned. Starch makes it possible for the chemist to standardize his product. All baking powders much have approximately the same "raising" strength to make possible the use of any recipe. The housewife-consumer will not consult the label of her tin of baking powder, and then compute whether the "two tsps. b.p." of her recipe should be doubled or halved. Starch takes care of any variation in the amount of carbon dioxide given off by active agents of differing compositions.

The keeping properties of acetonedicarboxylic acid baking powder are excellent, as Mr. Wiig has shown by various tests. It needs only to be kept in the customary moisture-proof tin. The keeping power of a product is of utmost importance to the manufacturer.

Further study of the suitability of acetonedicarboxylic acid as a leavening agent is being continued at the University of Wisconsin. The question of a cheaper source of raw material is still under investigation. At present citric acid is the raw material used in the making of acetonedicarboxylic acid. Cull lemons form the natural source of citric acid, and is the principal one in use. A shorter name for the substance would also be highly desirable, but that is a simple problem.

Science News-Letter, November 30, 1929

Sky Mappers of Alaskan Survey—Continued

consulting engineer for certain pulp and paper interests planning to build large paper mills in southeastern Alaska with an investment running into millions of dollars. For the first time Mr. Kinzie was able to get a bird's eye view of the timber concessions belonging to his employers, which are estimated as sufficient to supply their mills with pulp timber for at least 50 years.

A flight begun August 1, is believed to be one of the most important during the entire three years of operations. Two ships made mapping tours over Kruzof and Chichagof Islands while another plane made a six hour and 45 minute flight along the mainland to the northwest of Mount Fairweather. This was the longest single flight made by any plane in the detachment. The same afternoon a formation flight, carrying Dr. F. S. Smith and B. D. Stewart, executive officers of the Geological Survey, as passengers, was made over Taku Glacier and back again. Upon the return from this expedition a record was established by the tender Gannett, it is believed, in hoisting the four planes aboard the dock, although no special attempt was made to speed up operations. Thirteen minutes from the time the first plane of the formation touched water, the last plane landed on the dock. The Gannett's hoisting gear was de-

signed for reliability rather than for speed, so that the fact that it worked so well indicates the efficiency of her officers and crew.

At the close of his trip to Taku Glacier, Dr. Smith, in a letter to Commander Radford, officer in charge, said: "In quitting you and your associates of the Alaskan Aerial Survey Detachment, I want to record my admiration of the work you have accomplished and the valuable contribution you have made to the development of the north country. We of the Geological Survey recognize the immense value of the photographs you are making in all phases of our natural resources investigations, and I now realize the effectiveness of the airplane as a means of transportation and observation for the geologist and engineer."

On August 10, two planes of the detachment with Mr. B. F. Heintzelman of the Forest Service and Mr. R. H. Sargent of the Geological Survey, as passengers and observers, made a flight over the Taku River District to investigate the water power possibilities of three lakes recently discovered by the planes from photographs taken by the experts. That the discovery of these lakes has given new impetus to the development of the paper and pulp industry in southeastern Alaska is indicated by the following front page story published by

the *Alaskan Empire* of Juneau:

"The discovery of a lake by the Naval Alaskan Aerial Expedition capable of hydro-electric horsepower throughout the year, was announced today by E. F. Heintzelman, assistant district forester. It is located on the east shore of Taku Inlet, between Greely Point and Jaw Point, about two and a half miles from the beach. The discovery was made by Lieut. Commander A. W. Radford, flying one of the Naval Planes. It was apparent as soon as the photographs were developed that it was not shown on any existing maps and was hitherto unknown. The importance of the find in connection with the establishment of a pulp and paper mill here was emphasized today by Mr. Heintzelman. Both Mr. Heintzelman and Mr. R. S. Sargent flew over the lake and inspected the region as thoroughly as was possible from the air. Commenting on the find, Mr. Heintzelman said: 'This one discovery alone, in my opinion, far outweighs in value the total cost of all the aerial surveys made in southeast Alaska.'"

Navigators estimate that winds blowing along the seacoast of the Alaskan Peninsula in summer sometimes have a velocity of 80 to 100 miles an hour.

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