

lessens confusion, so I decided upon the rulers only. Those carried were of the Captain Fields Improved type—graduated in degrees—and consequently the greatest objection to their use in aircraft; namely, creeping, when referring to compass roses, was removed.

I also carried a Dalton Mark VII Aircraft Navigational Computer, which I find a great convenience.

The actual navigation was comparable with such as would be practiced afloat—fixes were determined entirely by stellar observations at night. These fixes were more reliable than would be possible by crossing a line of position with a D.F. bearing, due to the amount of error which would be introduced by even a small angular error in the long-range D.F. bearings. By day, having only the single heavenly body for determination of lines of position, we did cross the bearings. However, during daylight hours we were nearer the radio stations and consequently the error introduced was generally considerably reduced.

The accuracy of fixes was very gratifying. By that, an accuracy of approximately ten miles is implied. My experience is that such a degree of accuracy is about the average one may expect in aerial navigation. A comparison of our expected time of arrival over Kaneohe Bay, Oahu, where our D.F. station is located, and the time of our actual landfall affords a good indication of the reliability of our sights. At 0457 L.C.T., while still above a solid cumulus bank, our fix by ★ Polaris and ★ Deneb was latitude $24^{\circ}04' N.$, longitude $153^{\circ}14' W.$ That was our last observation, and on the strength of it we advised our station we would pass over at 0700. We were then cruising at reduced speed so as to arrive at Pearl Harbor not earlier than 0800. Going below the clouds shortly after establishing the fix, we encountered light mist and scattered showers. The visibility varied between two to twelve miles, which prevented us sighting Molakai, as we would have done with normal visibility. At 0653 we sighted Makapuu Point slightly on our port bow, with Kaneohe Bay directly ahead. At 0700 we were directly off the radio station. This accuracy was due to smooth flying conditions at the time of sight, and of course it could not be cited as an example of accuracy consistently possible.

The greatest difficulty is, of course, the determination of drift angle. We carried smoke bombs and water flares for this purpose. The latter are of an improved pattern and are unusually effective when the surface of the water is visible. However, during both flights—westbound and eastbound—we were above solid cumulus banks approximately 90 per cent of the time. The smoke bombs are not entirely satisfactory. Although a special pattern has been developed, we find that the smoke blends too closely with the water color to afford a good reference mark.

Consequently, the difference between “no wind” positions and fixes established by observations were utilized entirely for determination of drift angle, and, of course, wind direction and velocity for laying new courses. This method proved to have been quite accurate, as indicated by the very nearly direct track we made for the entire westbound flight. However, it would not be so desirable in a region where sudden wind shifts could be expected. Then reliance would necessarily have to be placed on D.F. bearings despite their lack of extreme accuracy.

In addition to the actual navigation, I made both flights. In addition to recording courses, good, indicated and true air speeds, ground speed record was kept. As you may imagine, each 10 minutes.

I consider the development of the Greenw contribution to the science of navigation since 1914 since first published in the Air Almanac. It is a close second as a time saver and an aid to navigation. I owe you a debt of gratitude for those contributions.

I suppose you wonder what method I use. I use Dreisonstok exclusively. Probably not since it first became available in 1927 or 1928.

I would appreciate further communication matters which might be of mutual interest.

Thanking you very much for your letter, and in spite of my tardiness in replying, I am