

Blind Flying: The Origins of Instrument Flying

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[Excerpted from an article by the author in *Approach*.⁴]

It is ironic that the individual who made the most significant contributions to early instrument flying predicted that flying would remain an unnatural means of travel. Major (ultimately Colonel) William C. Ocker (1880-1942) was an Army aviator who first published the article "Blind Flying" in the *Journal of Aviation Medicine* in September 1930.⁷

Ocker was assisted in his work by Army aviator First Lieut. Carl J. Crane (1900-1982), as well as flight surgeons Col. Isaac H. Jones (1881-1956) and Capt. David A. Myers (1876-1957). Much of Ocker's medical knowledge was based on Dr. Jones' 1918 book, *Equilibrium and Vertigo*.⁵ Until about 1926, Ocker and his colleagues experienced tremendous opposition to the idea of flying "solely on instruments when flying under conditions of zero visibility"² due to the difficulty in understanding the vestibular system. Dr. Jones developed a continuing rivalry with Navy flight surgeon John R. Poppen (1893-1965) on the nature of the vestibular system and its contribution to equilibrium. Dr. Poppen stated that "complete dependence on reliable instruments" was necessary to fly in instrument meteorological conditions (IMC).¹

Their rivalry included semantics. In 1936, Dr. Poppen presented a paper stating, "What a horrible pity that we ever permitted ourselves the habitual use of this expression [blind flying] – the world's worst misnomer. It will take a generation to weed it out. In the words of the familiar vernacular, 'there ain't no such animal!'"⁹ His presentation "was followed by some of the most spirited discussion the [Aero Medical] Association has ever witnessed,"¹ with Ocker and Jones in adamant support of the term "blind flying." A year earlier, Ocker and Jones had said, "Any good pilot who understands his vestibular sense, and who is taught to fly blind, can now do so with complete safety. Today we fly by instruments of precision. Tomorrow by Robot. Consequently flying becomes safer and safer as the years roll on."⁶ Today Dr. Poppen's term "instrument flying" is now in general use.

Ocker first met Dr. Myers during his annual flight physical in 1926. Dr. Myers' subsequent involvement in blind flying came about after subjecting Ocker to the Jones-Bárány revolving chair during that exam. Myers demonstrated to his patient the

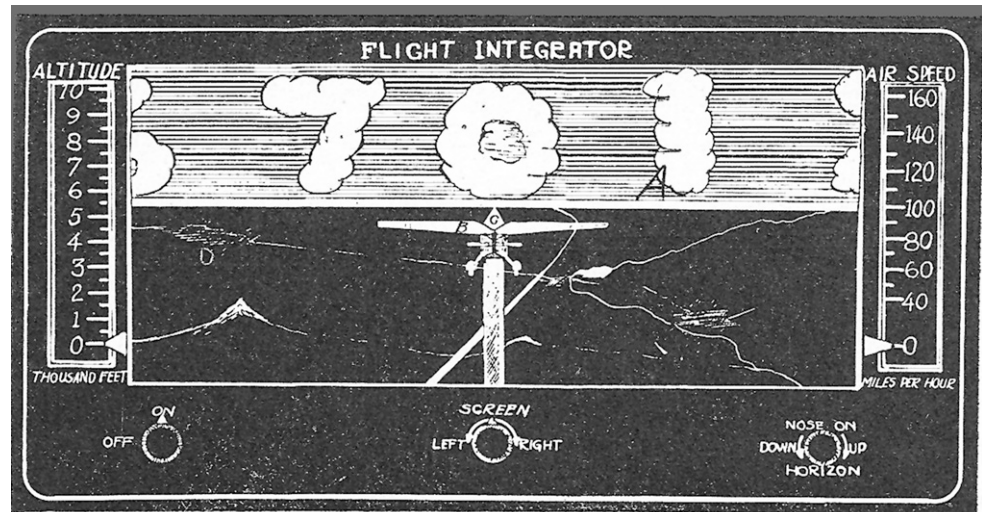


Fig. 1. The Flight Integrator as developed by Ocker and Crane.⁸ Note its remarkable similarity to current glass cockpit displays, despite this diagram being from 1932!

phenomenon of the human vestibular system's tendency to fool a pilot with what came to be termed by pilots as "vertigo." Ocker thought that he had been the subject of a deliberate trick: "My first impressions were, of course, that either there was some trick to the test or that I had developed some physical or mental defect."⁷

The first instrument to allow flying in IMC was the turn indicator, developed by Elmer A. Sperry in 1917, with assistance from his son, Lawrence B. Sperry. Most pilots and aircraft manufacturers as late as 1930 felt the turn indicator "was just one more 'gadget' that added weight to the airplane."⁸ However, it was Ocker who demonstrated its value in 1918 when he transported the Chief of the Army's Air Service, Maj. Gen. William Kenly, safely through mountain fog on a flight from Washington, D.C. to New Philadelphia, Ohio. After his experience in the rotating chair, Ocker returned with a turn indicator installed in a black box. While monitoring it without any outside visual cues, he correctly deduced the direction of rotation with 100% accuracy. Ocker and Myers then realized the true nature of the vestibular system—its role in spatial disorientation. Dr. Myers, ultimately retired as a Colonel after serving as chief flight surgeon for the Army Air Corps under General Henry "Hap" Arnold.³

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AEROSPACE MEDICINE HISTORY, *continued*

One of the best demonstrations of blind flying was conducted in 1929 by an Army Lieutenant named "Jimmie" Doolittle, who completed "a 15 mile circuit which included blind take-off and landing."⁸ By the time Ocker and Crane published their book *Blind Flight in Theory and Practice* in 1932,⁸ the concept of instrument flying was beginning to catch on. Early pilots were limited by night flying, clouds and fog, and the continued work by Ocker and his colleagues, as well as further instrument development allowed expansion of flight into these realms. Also by 1932, the Army, Navy, and Marine Corps had all established a regular course in blind flying. The necessity of these schools was well demonstrated when blind flight tests conducted by Ocker and Crane between 1929 and 1932 concluded that "[less] than 3% of all pilots tested could maintain control of the airplane (suitably equipped with instruments and a hood) for more than 20 minutes."⁸

Instruments available for orientation by 1932⁸ included the inclinometer, turn indicator, climb indicator, air speed indicator, spinning top, Sperry Artificial Horizon, Sperry Directional Gyro, the pitch-azimuth indicator, the flight integrator (**Fig. 1**)⁸, and the Air-I-Zon (an early version of angle-of-attack).

The most interesting was the flight integrator. Developed by Ocker and Crane, it never entered mass production. They described it as "an instrument for spatial orientation which incorporates all necessary information for proper execution of blind flight in one indicating face... It will be seen that the face of the

instrument presents a picture to the pilot that resembles, very closely, the pilots' natural instrument."⁸ The design of this instrument remarkably premonished today's glass panels. The background screen depicting an artificial horizon would slide left or right in conjunction with aircraft turns, while the miniature airplane would bank, climb and descend in relation to the actual aircraft.

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