RADIO AND AVIATION HISTORY

Radio and the Historic Flight of the NC-4

BY DAVE CROCKER

Dave Crocker has a knack for unearthing odd bits of radio history. Here he tells of a Navy "flying boat" that made history in 1919 most probably because of a great radio operator. (Editor)

Figure 1. The Navy-Curtiss NC-4 flying boat of 1919.

I am sure you are all familiar with the Trans-Atlantic flight of the NC-4 in 1919. No? Well, I'm not surprised. Most people are unaware of this historic event, as it was quickly overshadowed by many "Across the Pond" aviators, including Charles Lindbergh. Here's the background story.

In 1917, Congress appropriated funds for the construction of four huge, multi-engine "flying boats" capable of escorting U.S. convoys to Europe, thus, thwarting German submarine attacks. The contract went to the Curtiss Aeroplane and Motor Co. of Buffalo, New York, and work began on building the biggest sea-going airplanes the world had ever seen. The planes were designated "NC" for "Navy-Curtiss" — NC-1 and NC-2.

Just after construction of the NC-1 and NC-2 had been completed, World War I ended. However, it was then agreed that the NC-3 and NC-4, shown in Figure 1, would be finished, not for war purposes, but to compete in the British *Daily Mail* newspaper prize of 10,000 pounds to the first "aeroplane" to cross the Atlantic Ocean. The Navy decided to go for it, not for the money, but for the prestige.

BASIC DESCRIPTION AND RADIO EQUIPMENT

These 4-engine "flying boats" weighed in at about 28,000 pounds each, loaded. They carried a crew of six: a navigator, two pilots, two engineers and a radio operator.

The basic radio equipment in the NC-4 consisted of an SE 1340 tube-type transmitter, an SE 1310 spark transmitter, an SE 950 receiver, an SE 1605-B receiver/amplifier, an SE 1441A radio compass control panel, a radio compass condenser, and a rotatable direction-finding loop antenna for the radio compass equipment. Ancillary equipment included a change-over switch (transmit/receive), storage batteries, a dynamotor, radio/intercom selector switches, an antenna wire reel for deploying and recovering the trailing wire antenna, plus a key, microphone and headsets. All of this equipment was placed in a cramped radio compartment at the after portion of the flying boat's hull, except for the rotatable loop used with the radio compass and the spark transmitter and a wind-driven generator used with the spark transmitter. Figures 2 and 3 show the equipment layout in the radio compartment. As Figure 4 shows, the loop antenna was located aft of the radio compartment. The spark transmitter and its generator were installed outside the hull. The strut-mounted generator is shown in Figure 5.

THE SE 1340 TRANSMITTER

There were two configurations of the SE 1340. The first version used three Type CG-1162 tubes, one as the oscillator and two as modulators. The second version, used in the NC-4, had only two tubes, one as the oscillator and the other as a single tube modulator. The second version was smaller in size and added a provision for CW transmission. Thus, the transmitter installed in the NC-4 could be operated in three modes: CW, voice, or buzzer-modulated code. It operated on wavelengths of 600, 850, 952, 1,600 and 2,200 meters with a power output of 5 watts. Using a trailing wire antenna, its normal operating ranges were 100 nautical miles in the CW mode, 75 miles when buzzer-modulated and 60 miles in voice mode. Operating power was supplied by storage batteries and a battery-operated dynamotor. The 12-volt tube filaments drew 3.5 amperes and the dynamotor supplied 350vdc at 55ma. This transmitter was used for short range communications. One source states that this transmitter was removed before the longest leg of the flight in order to reduce weight.

THE SE 1310 TRANSMITTER

The SE 1310 was the primary transmitter used for long range communications. A 500-watt spark

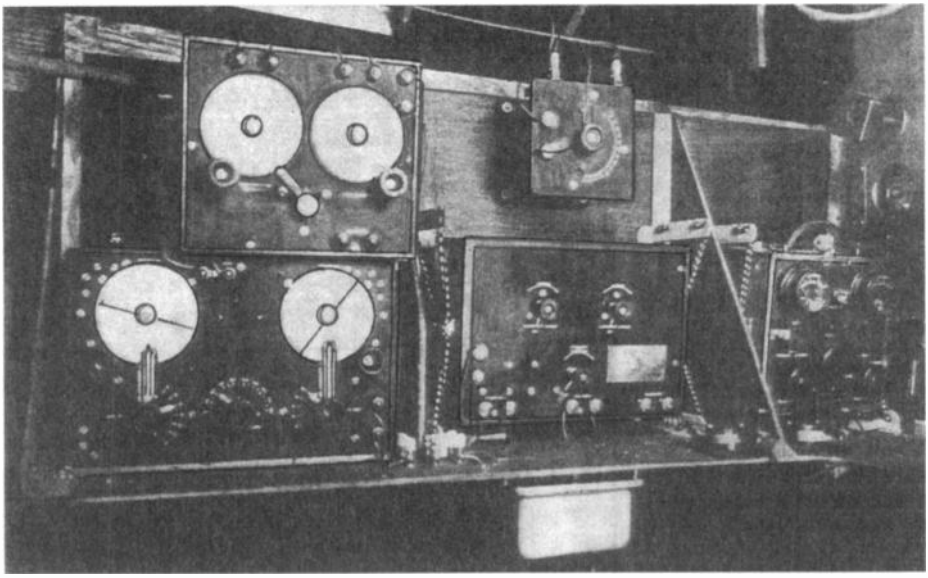

Figure 2. Photograph of the radio equipment aboard the NC-4.

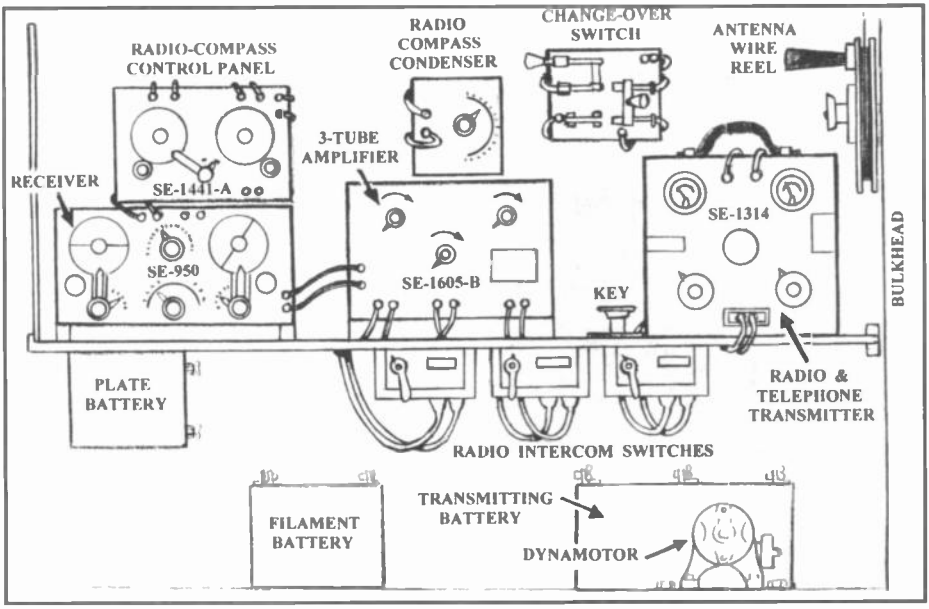

Figure 3. Diagram of the individual radio components and their placement in the radio room of the NC-4.

transmitter, it was installed outside the hull. Also mounted outside the hull was the wind-driven generator that supplied power to the spark transmitter. This transmitter maintained reliable communications with land-based stations over distances as great as 650 nautical miles (about 748 statue miles) and with destroyers up to 520 nautical miles.

THE SE 950 RECEIVER

This receiver was a 3-tube regenerative set with two stages of audio amplification that tuned from 300 to 2,500 meters. It used Type CW-933 tubes and was powered by A and B batteries. The set was modified for use as a radio compass receiver when used in conjunction with the SE 1441-A compass control panel.

THE SE 1441-A COMPASS CONTROL PANEL

This unit contained a reversing switch and two variable capacitors. The capacitors were used to

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(NC-4, continued)

tune the direction-finding loop and an auxiliary coil that was employed when the SE 950 was used in the radio compass system. The reversing switch changed the phasing of the coils in the loop antenna.

THE SE 1605-B AMPLIFIER

Although identified as an amplifier, this set was really a 6-tube radio receiver. It consisted of three RF stages, a detector stage, and two AF stages. It was powered by a set of A and B batteries. The tuning range of the B version was 1,500 to 5,400 meters. This receiver was used for both communications and direction finding.

ANTENNA CHOICES

In addition to the direction-finding loop, a trailing wire antenna was used in flight communications. A wire antenna strung across the top wing's skid fins was used when the aircraft was in the water.

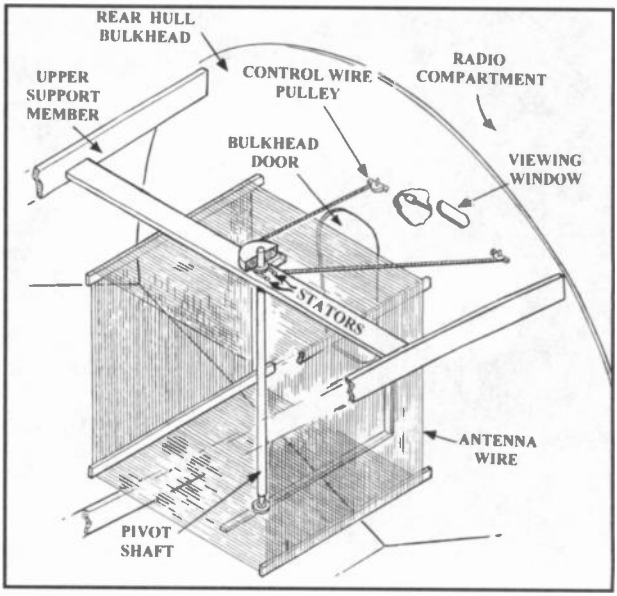

Figure 4. Illustration of the radio compass direction finder loop antenna, which is housed in the rear compartment of the NC-4's hull.

CREW

The captain and navigator chosen for the NC-4 was Lt. Commander Albert C. Read. The radio operator was Herbert Rodd, who was an exceptionally gifted radio technician. Of all the radio operators chosen for the NC boats, Rodd was unique in his passion for radio. This was an important fact that would play a key role throughout the flight.

Figure 5. The propeller-driven generator (see arrow) for the transmitter is mounted to the center engine strut.

FIRST FLIGHT

On May 8, 1919, the NC-1, NC-3 and NC-4 took off for Halifax, Nova Scotia, their first leg of the journey to Europe. (The NC-2 never flew, as it was damaged by fire in the hangar, and became a parts plane instead.) While off Cape Cod, the NC-4 had two engine failures and had to leave the formation. After taxiing to the Chatham Naval Air Station, it had serious engine work done. Later the NC-4 or "Nancy Four" rejoined the other two planes in Newfoundland. From there all three set off for the Azores, 1,200 miles away.

The Azores trip was the longest and most dangerous part of the flight. The Navy had placed destroyers every 50 miles as check-off points and radio contacts. However, the NC-1 became totally lost and off course in the fog. Its radio seemed useless, so, deciding to wait out the fog and reorganize, the crew opted to land in the ocean. Big mistake!

The huge sea swells soon carried off one pontoon and the bottom fabric of the tail assembly. Unable to fly, the NC-1 was out of the race. After many hours adrift, it was found by a destroyer which had to sink it, as it had become a hazard to sea navigation.

Like the NC-1, the NC-3 became way off course in the fog and also chose to land. As with the NC-1, the huge waves damaged the plane so badly it was unable to take off again. Unknown to the crew, vibrations had worked the ground wire connection loose, so they could not send any messages. Without power, they let the winds push them backwards for 60 hours to the Azores. A truly remarkable feat. Two down and one to go.