Veteran & Vintage

by Steve Wolff

Sentinels of the Airways

For the US Air Mail Service it was an inauspicious start. On May 15, 1918, young 2nd Lieutenant George L Boyle took off from Polo Field, Washington, DC, for Bustleton, Philadelphia, Pennsylvania, amid much fanfare and hope. Dignified onlookers included President Woodrow Wilson and his wife Edith, Postmaster General Albert S Burleson, and Second Assistant Postmaster General Otto Praeger. Swooping low over the field with confidence, Boyle and the Curtiss JN-4, carrying several thousand letters, turned north, then inexplicably south, where Boyle—now hopelessly lost—touched down near Waldorf, Maryland, some 25mi (40km) from his starting point, breaking the propeller in the process.

Two days later, given a chance to redeem himself, Lt Boyle departed again, this time with an escort, having been briefed to keep the Chesapeake Bay shoreline on his right. Shortly into the flight, engine trouble forced the escort to drop out. Undeterred, Boyle pressed on, discovering that the Delaware River, which he was supposed to follow to Philadelphia, was now on his left. Believing he was still following the Chesapeake Bay, he did a 180° turn and continued to follow the shoreline to Cape Charles, Virginia, where he ran out of gas, land, and airspeed simultaneously. All of this served to dramatically underscore the difficulties facing pilots trying to fly cross-country with unreliable compasses, and without adequate maps and ground-based navigational aids.

By 1921, the US Air Mail Service had firmly established itself as a daytime-only operation between New York and San Francisco. Named the Transcontinental, or 'T', route, mailplanes were flown to selected points along the railroad where the airplane would land in the evening and transfer the mail to a waiting train, which would move the postal cargo to a point farther down the line to be picked up in the morning by another aircraft.

BETTY COLE-KELLER

STEVE WOLFF

Surviving Thirties-era beacon at Site 32 on the SL-O airway, upgraded to a 36in double-ended style, without course lights and fuel tanks. Beacon was now classified as Type D standard beacon at intermediate field using AC commercial power.

This 'leapfrogging' of the mails across the continent drew the ire of Congressional appropriation committees and the scorn of rail officials, because it offered no advantages over rail transport.

To overcome the limitations of night-time operations, in mid-1923 the Post Office began to construct a series lighted airway beacons between Cheyenne, Wyoming, and Chicago, Illinois. This particular section was chosen because of its relatively flat terrain and proximity to commercial power. Also, airplanes leaving New York could reach Chicago before nightfall, while departures from San Francisco could land in Cheyenne before dark.

Regular night service began on July 1, 1924, and by January 1929 the entire 'T' route was lighted with the turning on of beacon number 25 at Miriam, Nevada. Westbound flights could now traverse the continent in 34 hours, while eastbound services took only 29 hours, besting the railroads by some two days. With the passage of the Air Commerce Act in 1926, lighting construction and maintenance continued under the Bureau of Commerce, Lighthouse Division, which rapidly expanded the system so that by 1933 there were 18,000 beacons in place.

Standard 51ft tower (opposite) with 24in beacon at Site 32 on the SL-O airway in the Twenties. Two course lights are below the beacon mounted on the maintenance platform and two 515USg fuel tanks supply the Kohler generator. The generator was housed in the building to the left of the tanks. This beacon was classed as Type CA, intermediate field with standard beacon and AC power generated at the site.

The earliest beacons were a 24in (61cm) drum mounted atop a standard 51ft (15.5m) steel tower and spaced every 10mi (16km), with an intermediate landing field at every third beacon. In the interest of bookkeeping, the beacons were numbered based on mileage from a terminal point west to east and south to north with the last digit dropped. Airways, named for routes between terminal cities, were designed so that no segment exceeded a distance of 1,000mi (1,600km) and were further divided into 100mi (160km) sections. Thus, a beacon along the SL-O (Salt Lake–Omaha) airway at 325mi (520km) from Salt Lake City, Utah, would be Beacon N° 32.

Rotating at 6rpm, each drum housed a 24in parabolic mirror with a 1,000-watt Mazda lamp projecting 1,000,000 candlepower. Inside the drum was an automatic lamp changer with a spare lamp. Should a lamp burn out, the new one could be installed and in focus in a matter of seconds. Flashing every ten seconds for one-tenth of a second, the beam was elevated about one degree above the

horizon and could be seen at a distance of 40mi (60km) on a clear night. Below the beacon were two course lights, mounted on a 6ft (1.8m)-square maintenance platform, pointing forward and backward along the airway. Each of these lights contained a 500-watt projector lamp with 100,000 candlepower, and they were fitted with specially designed mirrors of a cylindro-spherical shape behind an 18in (45cm) doublet lens. Equipped with red or green lenses, the course lights would denote the presence of a beacon only (red) or a landing field (green). Using a Morse code system, each course light alternately flashed a characteristic code, numbered between 1 and 9, while the main beam was swung 180 degrees opposite. By observing the coded flash, which corresponded to its mileage position along the airway, the pilot could determine his position; however, it behooved him to know which 100mi section he was on because the course lights were repeated identically for the next 100mi route.

Associated with the beacons were day markers consisting of a 54ft (16.4m) concrete arrow pointing to the next higher beacon number; these were originally painted chrome yellow with an 8in (20cm) black border. During the night this arrow was lit from above by high-intensity lights mounted on the tower frame. At the 'feather' end of the arrow was a 12 x 14ft (3.7 x 4.3m) power shed, housing a Kohler or Westinghouse generator if no local power was available. On the roof of the power shed was painted the airway route and the beacon site number. Between the shed and the arrow was the tower, painted with alternating chrome yellow-and-black bands if in the wooded terrain of the east, or red-and-white in the sparse desert regions of the west. By 1932 all towers were painted with alternating bands of white and 'international' orange.

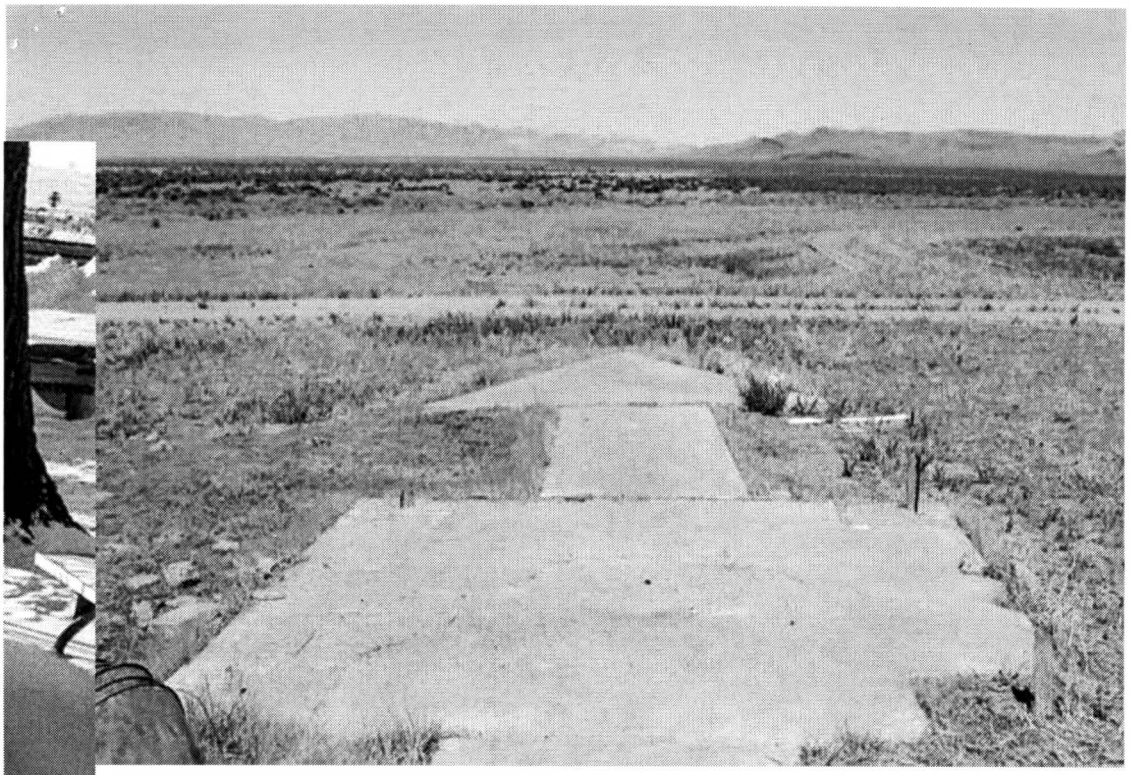
In 1931, in the interest of economy, many of the 24in-style beacons, along with course lights, were replaced with a double-ended high-intensity 500,000-watt 36in (91cm) beacon, and designed with a two-doublet lens system, an inner color-coded flashing lens with more than 400,000 candle power and clear outer prismatic lens. Rotating at 6rpm the beacon projected a beam of approximately 1,600,000 candlepower. Flashing every five seconds for a third of a second, they could be seen from 150mi (240km) away on a clear night. With the increase in candlepower, beacons could now be spaced every 15mi (24km). Many of the surplus 24in beacons were placed atop the 36in types at terminal airports, saving the latter for use during inclement weather.

Beacons were installed in every conceivable type of terrain and pushed contemporary technology to its limits. They crossed Georgia swamps, Allegheny mountain tops, and remote western deserts, and were even located along the walls of the Columbia River Gorge. At extremely remote sites without commercial power, beacons were powered by two gasoline generators, one used as a standby and supplied by two 515USg (1,950l) fuel tanks. At night,

AGA cabinet beacon powered by acetylene gas without a 6ft pylon on top. Classed as ARB (acetylene range beacon), these small beacons had a 300mm dioptric lens at the top of the pylon and blinked 60 times per minute. They were installed every 3m where terrain obstructed the view of larger towers

with the aid of an astronomical clock—or a photo-electric cell during inclement weather—a generator would start to crank. If it failed to come on line, the other would automatically crank and the process would repeat itself until one ran. Thermostats would automatically shut down the generator if it became too hot, or too cold in freezing temperatures, then start them at intervals throughout the day to keep the oil warm.

In areas where it was impossible to regularly service beacons, specially designed acetylene gas-powered beacons were installed. Manufactured by the Amalgamated Gas Accumulator Company (AGA), they were mounted atop 20ft (6.1m) steel towers over a steel tank shed housing ten acetylene tanks in the western deserts, and could operate unattended for up to nine months. The double acetylene burners were turned on and off by a Swedish-designed 'sun' valve that would operate only during the night or in reduced visibility. Called 'range lanterns', they filled the gap between major beacon sites and marked airway centerlines. Flashing 22 times per minute, they had two 18in doublet lenses that pointed up and down the airway with a 300mm or 375mm dioptric lens mounted on top flashing the course code, which was visible from any



The 54ft-long arrows were associated with beacon sites where course changes took place and pointed to the next higher numbered beacon. Square concrete area is where the tower was anchored, and there are remains of the steel supports that were painted International Orange.

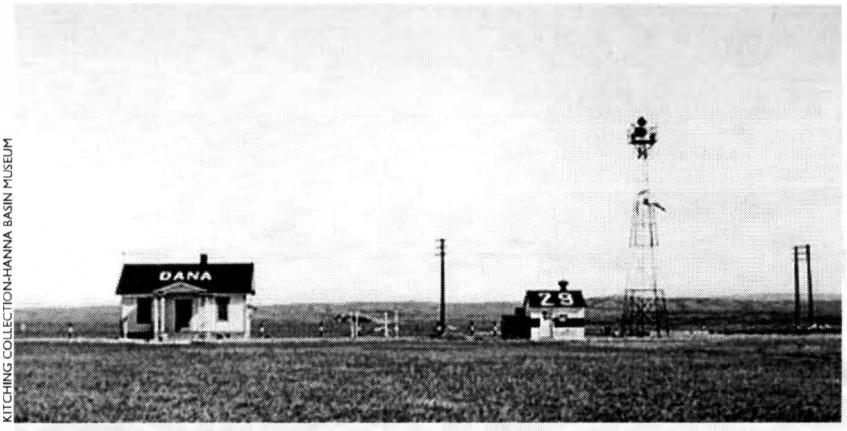
A double-ended range lantern manufactured by AGA. These beacons were turned on and off by a Swedish-designed 'sun valve', used two burners fed by ten acetylene tanks housed in the steel shed below, and would operate up to ten months without service.

direction. Where terrain blocked the view of successive beacons, small AGA cabinet beacons were installed every 3mi (5km) to fill in the route between the standard beacons. Mounted atop a 6ft pylon was a 300mm dioptric lens, visible from any direction, flashing 60 times per minute if on an airway, or 100 times per minute if outlining the perimeter of a landing field.

The airway beacon system, albeit primitive and hampered by reduced visibilities, laid the ground work for the modern federal airway system. In the context of the times, it was six years ahead of Europe's attempts at scheduled night flying. Lasting almost 50 years, these luminous sentinels crisscrossed the United States, guiding airmen through myriad weather conditions and potentially perilous aerial pathways. The lighted airway reached its zenith in 1946 when more than 2,000 beacons were in use, the last being decommissioned in 1972 on Whitewater Hill near Palm Beach, California. ✈

PHOTOS: BOB PEARCE

Site 29 on the SL-O airway in the mid-Twenties. A 24in beacon with two course lights—green in this case to denote the presence of a landing field. The small building with '29' painted on its roof is the power house. Large house with 'DANA' on the roof is for the airway keeper.



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