When Radar Came to Town

On January 7, 1952, after five years of testing and modifications to a radar system used by the Army and Navy in World War II, the Civil Aeronautics Administration inaugurated radar departure control procedures at its Washington National Airport. Six months later it began radar approach control procedures at the airport.

Originally developed by the British during World War II, radar provided an important tool for U.S. armed forces in World War II. RAdio Detection And Ranging equipment, coined RADAR by the U.S. Navy in 1940, allowed the military to adapt and use a new landing aid called ground control approach (GCA). The military selected Gilfillan Brothers, Inc. (today part of ITT), in Los Angles, CA, to develop the system in 1942. The following year, U.S Air Force air traffic controllers began routinely using GCA equipment to help military pilots land safely in poor visibility. The system was not designed for en route air traffic control.

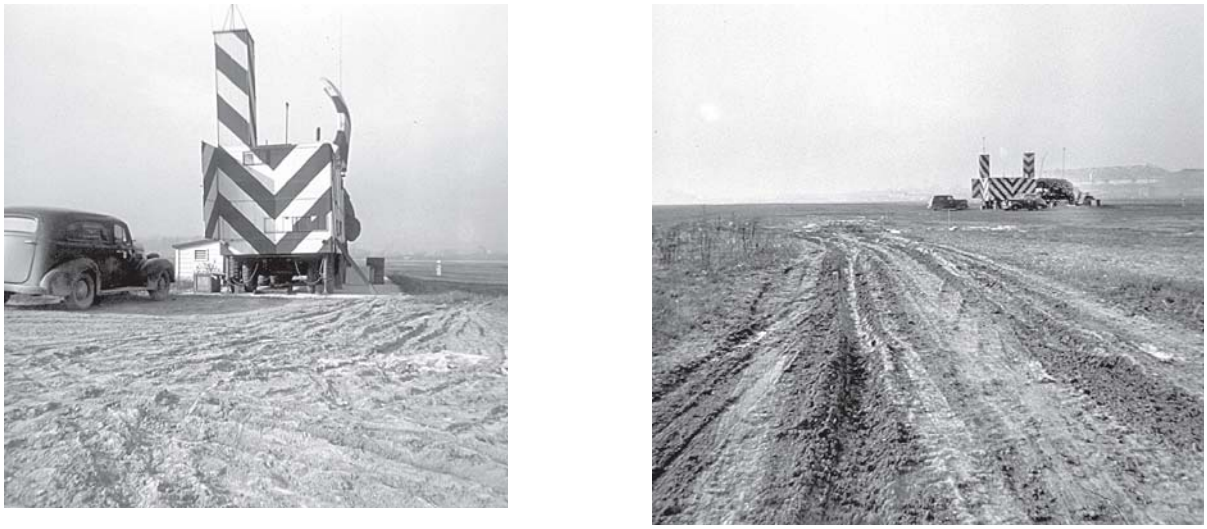
The GCA system included two oscillating radar antennas with narrow “pencil beams.” One scanned side to side (azimuth), the other up and down (elevation). A controller observed the precise angle returns from these azimuth and elevation radars and radioed landing guidance to the pilot. GCA also had a 360-degree rotating radar to monitor entire terminal area. It used a “fan” beam (narrow in azimuth and tall in elevation) to detect planes out to about 30 miles from the airport and up to altitudes of about 10,000 feet.

GCA consisted of two six-inch radar displays using cathode ray tubes. One screen displayed the approaching aircraft, which allowed the radar operator to direct pilots into a waiting position using voice radio. The other display helped the controller determine how the pilot should steer to find the proper heading and approach angle to land. The controller literally talked the pilot down using radio. The system required a five-man crew housed in a mobile trailers that could roll to a new runway or even a new airport when needed.

The CAA had no radar during the war years. After the war, CAA acquired four Gilfillan MPN-1 GCA trailers from the Army Air Force. CAA installed the trailers, identical to those used by the military during the war, at four airports: Washington National; Chicago Midway; Newark; LaGuardia. CAA and the Air Transport Association (ATA) paid for installation costs, and the CAA paid for all operation and maintenance costs. During the tests, conducted on a cooperative basis by the CAA, Army, Navy, ATA, and Gilfillan Brothers, CAA controllers operationally used the equipment to evaluate it and ascertain how they could use radar and how it could be adapted to civil aviation.

On April 3, 1947, CAA controllers began in-service evaluations of the GCA radar system at Washington National and Chicago Municipal airports. New York's La Guardia and Newark airport received similar equipment later in the year. The CAA reduced the five man crew with a two-man crew. As Stan Seltzer, then the chief controller at Washington National, recalled, the trailer truck “was installed at the north end of the airport, adjacent to runway 18-36. The front of the GCA faced south toward the threshold of runway 36,

Washington National's primary instrument runway. Tower controllers used their personal cars to drive to and from the trailer. There was no paved road – just nice, gooey mud."



Gilfillan MPN-1 GCA Trailer at Washington National Airport

Each trailer had two radar scopes for use by the controllers. The area surveillance scope, provided controllers with a "birds-eye view of traffic within approximately thirty miles radius of the airport. The second radar scope presented two different views for about seven to ten miles out along the approach path to the airport. The upper half of the scope presented a vertical view of the approach path showing the ideal glide path to the runway together with mileage range marks from the runway. The bottom half of the same scope presented an "overhead" view of the same area and showed the centerline of the approach path to the runway, with similar mileage range marks.

The controller on the area surveillance scope provided pilots of the arriving aircraft with headings and altitude information, guiding him toward the final approach path. As the aircraft neared the approach path, control was transferred to the second controller (known as the "final controller") who would then provide headings to establish the aircraft on the final approach path and inform the pilot when to begin his gradual descent along the glide path. The controller provided the pilot distance from runway information during his progress as well as necessary corrections in heading and/or descent rate to ensure the aircraft would remain on the runway centerline and glide path to the runway.

CAA controllers quickly determined that the surveillance feature of the radar system afforded them instant vital information that they often received late, or not at all, from voice communications with the pilot. The 30-mile search scan portion of the GCA (airport surveillance radar or ASR), allowed controllers to "see" the position of aircraft under their control or in their area of control. The planes showed up as "pips" or dots of light on the scope to show the direction and distance the planes were from the airport. GCA ensured controllers maintained adequate separation between aircraft since they

could now “see” how far the planes were from each other. Being able to see the heretofore “invisible” planes allowed them to expedite departures and arrivals. In fact, controllers at LaGuardia Airport reported GCA helped triple the landing rate to 15 planes per hour.

Despite the benefits of GCA, the instrument landing system (ILS) remained the CAA’s primary landing system. GCA was only available at the four airport field test sites, and then only if offered by controllers or requested by pilots. As Seltzer explained, “CAA controllers learned to make GCA approaches by ‘offering’ civilian pilots approaches during good weather conditions. Eventually they made approaches during instrument weather condition if a pilot requested or accepted their offer.” In fact, on December 29, 1948, controllers at National offered a GCA approach to the pilot of President Harry Truman’s airplane, *The Independence*, when the President returned to Washington, DC, from a trip. The pilot accepted the offer, thus, Truman became the first U. S. President to be on an aircraft during a GCA approach. “Many controllers,” said Seltzer, “became geniuses at suggesting things to pilots based on the controllers’ radar observations. It was clearly a great tool… if only we would be permitted to use it.”

Many airline pilots, on the other hand, seemed reluctant to use GCA. The Air Line Pilots Association (ALPA), for example, initially opposed the use of radar for approach and departure control. Fearing a loss of control, some pilots objected to controllers giving them instructions – advisories or information could be given, but not instructions. From his experience, Seltzer related that some pilots asserted that “…no controller is gonna put his hands on my throttles or any other controls in my cockpit!” While others, claimed radar would be used by CAA as a tool for “spying” on pilots.

1950s ASR-1

The controllers’ evaluation of GCA convinced CAA officials of the utility of radar for air traffic control – not just for approach and departures. This early experiment with radar also convinced the airlines of the need to adapt radar to air traffic control. ATA hired Stan Seltzer in December 1951 to work on gaining acceptance of the use of radar for air traffic control. As part of that effort, American Airlines loaned Captain Sam Saint (also an ALPA member) to head ATA’s Navigation/Traffic Control Division in Washington, DC. Along with Seltzer and Saint, another American Airlines pilot and ALPA member, Walt Jensen, and the CAA’s Ed Barrow worked tirelessly on ATC and radar issues. Their efforts succeeded and in January 1952, the CAA officially commissioned radar departure control at Washington National Airport using an ASR-1 developed for especially for the CAA.