EARLY DAYS OF BENDIX RADIO

AS EXPERIENCED BY MALCOLM TAYLOR

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The following is a report on an interview with Malcolm Taylor concerning his history at Bendix spanning 37 years from June 1936 to his retirement in June of 1973. The interview took place on November 13, 2001 at Malcolm and Elizabeth Taylor's home at 610 Valley Lane, Towson, Maryland, 21286. The interviewers were Jack Shagena, Al Moeller and Charles Smearman, previous coworkers with Malcolm.

SUMMARY:

This report includes a look at Malcom's career prior to and during his time at Bendix Radio, his Washington area childhood, education at George Washington University and at Harvard, and how he arrived at Radio Research. His work in Washington, the move to Chicago upon the forming of Vince Bendix's conglomeration there, and the move to Fort Avenue in Baltimore are described. The move to the Joppa Road plant as WW II approached led to work on early radar systems. After the war, efforts turned to the Electronic Compass, speech security scrambling and aircraft collision avoidance systems. Before retirement he worked on the Apollo Reentry Instrumented Aircraft (ARIA).

HISTORY:

Malcolm Taylor was an employee of the Bendix Corporation or one of its later to be acquired companies for 37 years starting in 1936. He was born January 29, 1910 on a farm in Vienna, Virginia, an 18 mile street car ride from the Washington, DC Patent Office where his father worked. His father had moved from a job as an Ohio schoolteacher to work at the Navy Yard at Norfolk, Virginia and then to the Patent Office.

Malcolm studied Physics at GWU in Washington, DC and earned his Bachelors degree in 1932 and a Masters degree in 1936. Upon graduation he entered a tuition free course in Communication Engineering at Harvard University. The head of GWU at that time was a man named Brown who had visited Harvard and arranged for the course which was intended to continue through to a PhD degree. However, after attaining his second Masters degree in June of 1936 there were no more tuition free openings so Malcolm had to find a job. Late that June an incidental chat in a barbershop led Malcolm to a position at a firm called Radio Research in Washington, DC. There he started work with Lawrence (Bud) Hyland an ex-navy engineer. His first job was to use a file to smooth out the joints on the shields of antenna loops. Bud was a

believer in hands-on experience over book theory. They had a contract to produce several units of a U.S. Navy receiver and later a contract from the Argentine Navy. At Radio Research he worked under Bill Webb, who was the chief receiver engineer. Dick Able was the transmitter engineer. Other workers on the project were Al Hemphill and Vernon Moore.

In the spring of 1937, Vincent Bendix gathered together Radio Research, Dayton Instrument Company and some other companies into the Bendix Radio Corporation, a subsidiary of the Bendix Aviation Corporation. Bendix moved the conglomerate, except for the Radio Research office to Chicago in a building near the loop where Malcolm worked with about ten other engineers. In Chicago, Malcolm resided in a small, modest south Chicago Hotel that had previously been occupied by Al Capone and his gang. There he started work designing the coils for the superheterodyne six-band receiver prototype which was used by Amelia Earhart during her fatal 1937 flight . While on this project he was assisted by Karl Finsder, a very knowledgeable radio technician. By 1938 this radio became the RA 1 with models RA 1B, RA 1I and RA 1J with remote control dynamometer and was perfected through shock and exposure testing. The six bands covered the range from 0.15 to 15.0 MHz. They built about 100 units for US Navy aircraft installation and also some units for the Argentine Navy. The RA 1 was later farmed out to the Sparks Worthington Company of Jackson, Michigan, a former producer of home radio receivers. Malcolm donated a copy of the RA 1 Technical Handbook to the Bendix Radio Foundation for the museum archives at 1415 Key Highway in Baltimore, MD.

The Radio Research Washington, DC office was moved to the old GE building on Fort Avenue at Key Highway in Baltimore late in 1937 or early 1938 and after one year and nine months in Chicago, the Bendix Radio Corporation joined them in November 1938. Malcolm hoped to complete his trip to the Baltimore area from Chicago in time to be home for Thanksgiving. He traveled the 500 miles during an ice storm in his 1932 Ford with mechanical breaks which were too unbalanced to keep the car on the icy roads. As a consequence, he arrived one day late for Thanksgiving.

By the spring of 1941, in response to the armament build-up anticipating U.S. entry into World War II, the Bendix Radio Corporation moved into the newly constructed plant on East Joppa Road in Baltimore County. The attack on Pearl Harbor started a very busy era with a lot of overtime. Malcolm’s tasks there included a Ground Direction Finder which covered several different ranges and getting started on the receiver for the large tower mounted MPG radar and some smaller radar sets. The MPG prototype was finished just as the war ended, so it never went into production as some of the smaller sets did.

After the war he worked under Al Hemphill developing an airborne auto loop electronic compass which was manufactured at the Broening Highway plant as was a later model for commercial aircraft. A later spin-off from a Raytheon NY model using a Cathode Ray tube beam display and a motor rotated loop which, after refinement to meet vibration and humidity testing, went into production. Another development Malcolm worked on was a voice security scrambler/descrambler for Fort Bragg, NC.

As a result of the fatal collision between two commercial aircraft over the Grand Canyon in 1954, work started on the ground bounce Collision Avoidance system. This system combined

two unique concepts. First was the utilization of the time difference between a direct and a ground bounced radio signal along with aircraft altitudes to determine range between two aircraft at the same or near same altitude. The second and more fundamental concept called the Tau criteria which used the ratio of range to range rate (denoted by the Greek letter Tau) to measure the time to closest approach. When Tau fell to a predetermined minimum either a collision or a near miss was imminent and evasive action was mandated. This concept put forth by Dr. John Morrel of the Bendix staff remains the basis of the evasive action decision of all on board collision avoidance systems to this day. The flight testing of this system with Rule Colvin and Don Grempler flying a Beechcraft and a DC 10 on approaching flight paths with only 50 feet of altitude separation on passing was one of Malcolm's least favorite things to do. Malcolm also made significant engineering contributions to the engineering of the Apollo Reentry Instrumented Aircraft (ARIA) system.

Malcolm retired at age 63 in June of 1973. When asked to comment on the workaday culture at Bendix he agreed that there was ample freedom to develop one's own ideas and approach to problems; experimentation was encouraged. He remembers using Bendix transformers and tooling to build a 10-inch breadboard TV and fascinating the neighborhood children with it before commercial TV was available. He also remembers the free flow of spirits when the gang out in Chicago got together to celebrate Christmas of 1937. He could not accurately remember if the Christmas Turkey tradition started at Fort Avenue or at Joppa Road, almost certainly not in Chicago.