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BOMARC

Introduction

Lowell: In answer to your inquiry about the ERA/UNIVAC involvement in BOMARC guidance computers, I can only offer a rather sketchy account – that was well over 60 years ago! My age is against me these days as all activity, whether mental or physical is slower than previous times. In addition, I had destroyed a lot of the paperwork that I had had of that period. I did spend a great deal of effort and time on the development and delivery of the first two computers as noted in the following two sections. I hope that this data will give you some help. *Curt*

William C. Nelson – 3 August 2017.

Experiences

The original ERA 1104 development started about December 1953 and concluded about November 1956 with delivery to and acceptance by Westinghouse, our customer. This installation was made to Patrick Air Force Base[1] at Cape Canaveral, Florida.

Since I oversaw the power system design of the computer, I started my travels to FL in 1955 to lay the groundwork for the system installation. Then, through the spring of 1956 I spent most of my time in Florida – even moving my family there for several months. The selloff of this computer was very lengthy and painstaking due to the marginal quality of the Cathode Ray Tube (CRT) devices we were receiving from Radio Corporation of America (RCA). As you may know, the random-access memory (RAM) was composed of these CRTs.

I also became involved with the second BOMARC computer in June of 1957 when I helped with the development of a special Input/Output system required for the computer. As I recall, this computer had made advancements in design over the original 1104, especially in the area of RAM. The customer was again Westinghouse but this time the installation was made at Eglin Air Force Base, Florida. I was heavily involved in the acceptance of this computer as a copy of my old trip report recorded.

[1] Photo of base entrance monument by LABenson, July 2016

Trip Report

Remington Rand Univac

DIVISION OF SPERRY RAND CORPORATION

INTRA-COMPANYT COMMUNICATION

TO: FILE

FROM: W. C. Nelson

PERSON OR DEPARTMENT:

CITY & STATE: St. Paul – 21 October 1958

DEPARTMENT: Control Systems

SUBJECT: Trip Report

Eglin Air Force Base, Florida
Westinghouse – Bomarc Installation

September 23 to October 11 –

H. E. Edquist and I arrived at Eglin Air Force Base on the afternoon of September 23. We ascertained that there were approximately 20 electrical jobs unfinished and problems unsolved and about an equal number of mechanical jobs in order to complete the final acceptance of the computer system. The immediate goal was to complete the electrical items in order to get the computer accepted operationally. We therefore could proceed with the 24-hour endurance run, which was the major obstacle to acceptance. Westinghouse engineering, represented by J. R. Bowen, indicated we probably could start the endurance if we would complete a few of these remaining items (which he chose as the most important). With this in mind, the work was concentrated on these items.

On Monday, September 29, we were nearly ready to start the endurance run; however, Westinghouse (W. R. Bevan and M. R. Briggs of Baltimore) decided that all remaining electrical and mechanical items must be completed before the run could be started. This position was changed somewhat when RRU contracts informed Westinghouse that the computer would not be available for their use until payment was made for the system. (Up until this time, Westinghouse programmers had been allowed computer time in order to finish debugging their tactical program.) The entire Westinghouse operations group under W. F. Wagner was anxious to bypass some of the listed items in order to obtain usage of the computer as soon as possible.

H. E. Edquist returned to St. Paul on September 28th since he had completed the items which were his responsibility. On October 1, R. L. Gehring, supervisor of Military installation and Maintenance, arrived at the site. On October 3, a mechanical technician, Don Thompson, arrived to clean up the mechanical discrepancies.

W. Bray, an electrical inspector for Westinghouse was at the site from September 29th through October 1st, to make a quality control inspection of the machine. His report was added to the list of items to be completed. We agreed to accomplish all items on this new list but requested a delay in those requiring hardware which was unavailable at the site.

By October 5, with concentrated effort by everyone present, the majority of the items had been taken care of; consequently, Westinghouse was willing for us to start the endurance run. Our first two attempts were failures mainly because of problems in the output system we did not

know existed. The tactical program, when run over an extended period of time showed up these problems. We had not arrived at the root of our troubles before starting the second attempt, although we believed we had cured them. Tuesday evening, we shut down the machine (after our second failure) for the first time since Sunday morning (October 5) and it was decided that Wednesday must be spent thoroughly investigating these output failures. Two items were discovered to be the major source of trouble; one a design error which had gone undetected, and the other a low relay supply voltage, caused by the natural aging of selenium rectifiers. Another cause was removed by weeding out the weak core register units in the output system.

On Wednesday afternoon, as these troubles were being eliminated, an accidental short in one of the chassis blew out three rectifiers in the +200-volt power supply causing a shutdown. This was hastily repaired and seemed to be all right. We then erased the drum in preparation for the coming memory tests which could cause trouble due to the power failure. So, at about 1:30 a.m. Thursday morning, we attempted to start again on the endurance run, but this time a failure in the MD section caused difficulties and the start was delayed until about 9:00 a.m. Our first 8 hours produced two component failures, on in input and one in the output section. The next 12 hours (after repair of the above problems) were trouble free; however, 3½ hours before the end of the run, the +200-volt power supply broke down again, causing our third error. After this supply was again repaired the run continued smoothly to completion at 6:30 p.m. Friday. (Incidentally, this second power supply failure was caused by faulty repair of the supply the day before and not due to component failure.)

A second mechanical technician, Ken Fernlund, came down to help finish the mechanical jobs. He was on the site from October 7th to the 9th, when both mechanical technicians returned to St. Paul. R. L. Gehring and I left for St. Paul on Saturday morning since the remaining items were relatively easily solved and we could see no further use for our services.

It should be emphasized here that every man concerned with this final checkout applied his maximum effort, and extremely long hours were worked including Saturdays and Sundays. L. T. Thorsrud has worked particularly hard, not only during the weeks described in this report but for … [The last page of the report had been lost.]

Research Comments

One genealogy chart [circa 1982] identifies the 1104 as the BOMARC Guidance (Patrick AFB) and a G-40 as the BOMAR Guidance (Eglin AFB). That chart also indicates that the G-40 followed the CP642A. **The chart is in error** – if the Eglin delivery took place in October 1958 and the first 642A was delivered in September 1961. Also, the 1104 units were primarily built with vacuum tube logic modules whereas the 642A logic was built with germanium transistors.

Wikipedia shows that there were eight BOMARC installations. The involvement of UNIVAC with other than the first two isn't documented in the papers available to our Legacy Committee.

Thanks to Curt for finding the old report on the initial 1104 installations. *LABenson*, editor.