

## TRANSIT by Arlyn Solberg

The TRANSIT satellite system was developed by the Applied Physics Laboratory (APL) of Johns Hopkins University [Baltimore, MD] for the U.S. Navy. Just days after the launching of Sputnik I on October 4<sup>th</sup>, 1957, APL scientists George Weiffenbach and William Guier were able to determine Sputnik's orbit by analyzing the Doppler shift of its radio signals during a single pass. Frank McClure, the chairman of APL's Research Center, suggested that if the satellite's position were known and predictable, the Doppler shift could be used to locate a receiver on Earth.

Commemorative stamp 'jpg' courtesy  
of the Charles Babbage Institute

Stamp Translation by  
Lowell A. Benson



Development of the TRANSIT system began in 1958, and a prototype satellite, Transit 1A was launched in September 1959. That failed to reach orbit. A second satellite, Transit 1B, was successfully launched April 13, 1960 by a Thor-Able star rocket. The first successful tests of the system were made in 1960, and the system entered naval service in 1964.

- 4 October 1957 yr.
- First in the world - Soviet artificial satellite of Earth
- 40 Kopeks, Postage of the USSR

### What I did.

This is the system which I programmed and tested in late 1963 based on a model from APL. I was working in San Diego for UNIVAC on the Naval Tactical Data Systems (NTDS). I was assigned the task of analyzing and converting the APL Fortran model into assembler language to run on the on-board AN/USQ-20 NTDS computers. The Navy had installed a 'transceiver' on a Cruiser [or destroyer – it was a long time ago] which was in dry dock at the Mare Island Naval shipyard north of San Francisco in early 1964. I had use of the on board computer system and transceiver equipment during third shifts. I finally got correct results based on APL's data profiles and the Navy decided to run a sea trial.

I had a secret clearance and was sent to Norfolk, VA naval shipyard in March, '64 to run some tests on the system which had been installed on the CGN-9 as I recall. The CGN-9 was the USS Long Beach, a Cruiser(C), Guided missile (G), Nuclear (N) powered ship. Everything re-tested as expected and was ready for sea trials.

I was requested to join the fleet after the upcoming sea trials. Navy HQ in Washington DC gave me a field rank of Lt. Commander, USN as I had to fly over Cuba on my way to sea trials in the Virgin Islands. They wanted me to be treated as an officer in case the plane went down and I was captured. I still have the ID card. The fleet sailed into the Caribbean and I was sent to meet them in late March, 1964 to make sure that

the systems were running ok. I arrived in St. Thomas, Virgin Islands via San Juan, Puerto Rico and checked into the Holiday Inn to await the fleet arrival. The fleet was still a couple days out of port and I and our engineer from San Diego enjoyed the mini-vacation.

We were finally contacted and picked up in a launch to go out to the CGN-9 to check out the results of the sea trial that the Navy had run on the way down. I verified that the data fit within tolerances as I had expected. We compared the satellite navigation positioning data to the Loran C data and found our accuracy was about  $1/10^{\text{th}}$  of a mile in Longitude/Latitude. The Loran system was about  $1/2$  mile in accuracy. The navy command on board was satisfied with the results and I was returned to the island after about two hours on board. I didn't realize at the time the magnitude of the importance of the system in years to come. I had successfully programmed and tested the Navy's version of the forerunner to the first GPS!