

The Secret of Adam and Eve

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In May 1943, Adam and Eve only resembled what their descendents would become: huge gray machines standing seven feet high, ten feet long, and two feet wide. But Adam and Eve were merely components, motors, and wire spread across workhorses and mounted in cabinets in Building 26 of the National Cash Register Company in Dayton, Ohio. Like the machines they preceded, they held nearly 400 vacuum tubes, 64 individually wired bakelite rotors, and innumerable feet of wire. They were the first of their kind, the U.S. Navy's Cryptanalytic Bombes, and they were about to change history.

For three months, 800 U.S. Navy officers, sailors, and WAVES worked day and night to construct the Bombes; for what purpose, they did not know. Clearly the machines were important. So important that the U.S. Navy actually approved and assigned an engineer of German descent with relatives still in Germany to design the machine. Everyone assigned to the project was sworn to secrecy, but only a few actually knew the secret. Machinist First Class Phil Bocchiccio and Radioman K.P. Cook were not among those few. Yet they would be the first to use the machines.

They had spent the past few days getting Adam and Eve in working order, finding and fixing leaks as oil dripped from the various pieces. Although run on electricity, there were hundreds of moving parts requiring lubrication. Ensuring proper contact of the copper brushes on the bakelite rotors with the metal points wired to the other parts of the large apparatus was crucial to the machine's accuracy. Phil and K.P. made certain those contacts were made and speed was maintained.

Personnel in the Navy's cryptologic organization, OP-20-G in Washington, D.C., had been in virtually constant contact with officers and engineers in Dayton throughout the design and construction phase. Now the secure communication lines carried specific instructions to the National Cash Register Company. Phil and K.P. would be responsible for using those instructions to test the Navy's Bombes.

With the mechanisms in working order, they would now take the instructions and test the machines. The instructions, or menu, included how to set each of the 64 bakelite rotors and 32 input-output dials. Phil loaded the appropriate rotors onto Adam, while K.P. did the same for Eve. Each followed their own set of instructions and then turned the Bombes on.

The bottom rotors began to spin, beginning the process. When they completed one revolution of twenty-six steps, the rotor above it moved one step, much like a car odometer. Each column of four rotors moved in unison with the other columns. At one point, the machine stopped. Although with the bottom rotors spinning at nearly 1800 rpms, it took about four revolutions before they came to a complete halt. A second motor kicked in at this point and reversed the rotor back through those extra revolutions. At the correct location, the magnetic clutch that had engaged the rewind motor dropped out and the rotors stopped. Phil heard a clicking sound as the relay chassis did its job. Then the printer clacked and printed the position of each rotor and plug at that point. But the machine wasn't finished. It automatically engaged its forward motor again, the rotors started to spin once more. The machinery stopped, reversed, and printed twice more before coming to a final stop after twenty minutes.

Machinist First Class Bochicchio took the paper from the printer and read it. A series of numbers were typed on the page. He didn't know what it meant. He decided to verify the results. Phil spent a few moments resetting the rotors to the original positions indicated on his instructions and turned the Bombe on again. Twenty minutes later he removed the second sheet of paper. Again, the numbers held no meaning for him, but he was pleased to see that they matched the first set. Whatever it meant, at least the machine was doing the same thing twice.

Deciding to do one last check, he called over to his buddy, K.P. who was working with his own set of instructions on Eve. Phil and K.P. decided to use Phil's instructions on Eve to see if the results would continue. After changing the rotors on Eve to match Adam's and setting the dials according to the menu sent from Washington, they turned on the second Bombe. It spun, and whirred, and stopped, and printed, just as Adam had done. And in twenty minutes Eve's results were compared to Adam's. They matched.

Pleased with the fact that the machines behaved identically, the sailors took the paper printouts to their commanding officer, Lieutenant Commander Meader. The commander reviewed the results, but he too did not know what the numbers meant. Nonetheless, he had the sailors forward the results back to Washington. Commander Engstrom, head of the Navy's technical branch of the Naval Communications, OP-20-GM, received the message. But it would be a few days before the personnel in Dayton would hear anything back about their test run.

Word arrived: "That one hit paid for the entire project." Orders were given to build more.

Over the course of the war 121 U.S. Navy cryptanalytic Bombes would be built by Navy personnel at Dayton's National Cash Register Company and shipped to the Navy's Communications Annex in Washington, D.C. Machinist First Class Bocchicchio was told later, after being transferred to Washington, D.C. in September 1943, that the settings originally found by Adam resulted in decrypting a crucial Enigma message. The message gave the location of a German refueling submarine, a "milk cow." This allowed the Navy to target and sink the U-tanker and three submarines that were trying to refuel. It was the first of many such messages, broken by the Bombes, as the United States waged its war against the "milk cows." By sinking the refueling subs, Germany was forced to keep their attack U-boats closer to shore and shorten their time at sea.

Despite the \$50,000 per machine price tag, they more than paid for themselves. The Bombes routinely found the rotor and plug positions for the German's cryptologic workhorse, the cipher machine called Enigma. Knowing the daily settings for the machine allowed the U.S. and its allies to decipher virtually every intercepted Enigma-enciphered message sent by the different German services. The messages provided the enemy's intentions and plans, and allowed the United States military to prepare and counter their adversaries. Some historians believe that the Allies' ability to decipher and read the Enigma messages actually shortened the war by two years and saved unknown numbers of lives on both sides of the war. The U.S. Navy's Bombes contributed immeasurably to the Allies' success-and it all began with Adam and Eve.