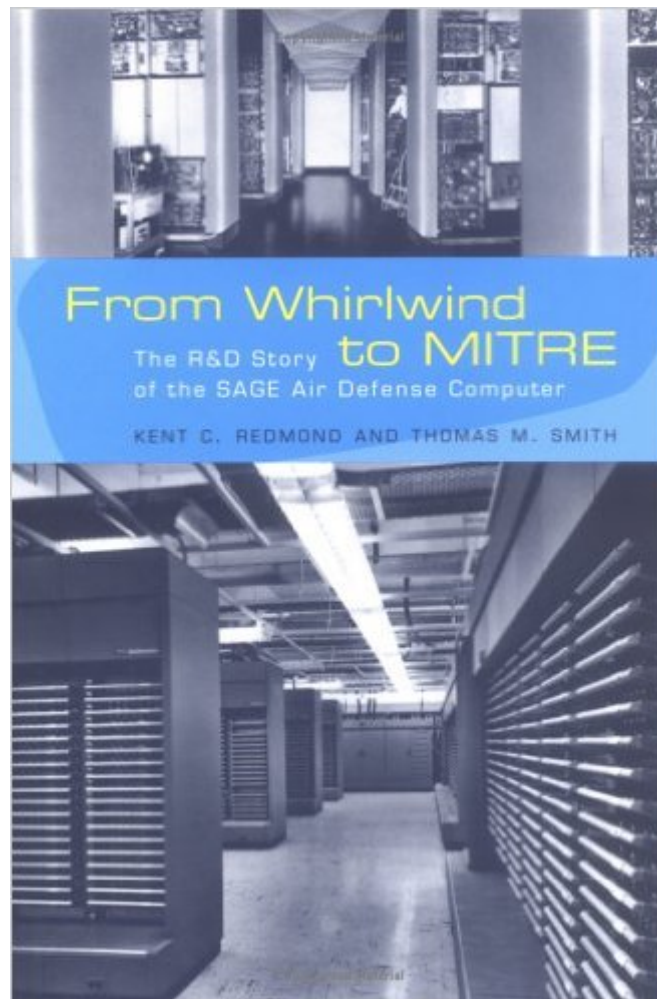# From Whirlwind To MITRE: The R&D Story Of The SAGE Air Defense Computer (History Of Computing)

Synopsis

This book presents an organizational and social history of one of the foundational projects of the computer era: the development of the SAGE (Semi-Automatic Ground Environment) air defense system, from its first test at Bedford, Massachusetts, in 1951, to the installation of the first unit of the New York Air Defense Sector of the SAGE system, in 1958. The idea for SAGE grew out of Project Whirlwind, a wartime computer development effort, when the U.S. Department of Defense realized that the Whirlwind computer might anchor a continent-wide advance warning system. Developed by MIT engineers and scientists for the U.S. Air Force, SAGE monitored North American skies for possible attack by manned aircraft and missiles for twenty-five years.Aside from its strategic importance, SAGE set the foundation for mass data-processing systems and foreshadowed many computer developments of the 1960s. The heart of the system, the AN/FSQ-7, was the first computer to have an internal memory composed of "magnetic cores," thousands of tiny ferrite rings that served as reversible electromagnets. SAGE also introduced computer-driven displays, online terminals, time sharing, high-reliability computation, digital signal processing, digital transmission over telephone lines, digital track-while-scan, digital simulation, computer networking, and duplex computing.The book shows how the wartime alliance of engineers, scientists, and the military exemplified by MIT's Radiation Lab helped to transform research and development practice in the United States through the end of the Cold War period.

Book Information

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Customer Reviews

I kind of expected this book to be the typical Smithsonian-style broad-stroke history of Whirlwind and the surrounding SAGE project. What I found was an exquisitely detailed account of the system's operation and development, written engagingly and with just the right amount of depth to prove that Redmond and Smith know what they're talking about.Whirlwind and SAGE were mammoth military-industrial undertakings -- far riskier and more ambitious than anything the U.S. government has tackled in recent times. The pace of the entire project, from the initial design sketches to full-blown deployment in concrete bunkers throughout the U.S., seems fantastic compared to modern contractor boondoggles. The project closely followed its projected timeline, practically scheduling technological breakthroughs enroute to a finished, working system that provided air defense security for decades. A classic example of the reach of Whirwind's designers was their decision to use magnetic core memory instead of williams tubes, mercury delay lines, or capacitive memory technologies. Immediately after deciding to use core memory, they set about inventing it so that it would be available for the first prototype machine, which was undergoing design in parallel with the memory development effort. As a result, Whirlwind's memory had unprecedented speed and reliability, and as a side effect core memory would dominate all commercial and government computer systems for the next twenty years.Redmond and Smith provide wonderful insight into the obstacles SAGE developers encountered, with stories that any engineer will find fascinating.

"From Whirlwind to MITRE" is the historical accounts of the Semi-Automatic Ground Environment (SAGE) project, which was one of the first(perhaps first) large military computer and software development projects for building an aircraft defense system. The book is full of little details and it makes the book at times hard to read as it isn't easy to keep track of who is who, who was where, and who did what. But for computer historians, this book is full of wonderful detail... while at the same time, it actually lacked details. More about that later.The Whirlwind computer was an early computer created at the Servomechanisms lab at MIT by Jay Forrester and his team (Jay Forrester who later became known for its influence in systems thinking). This project was "discovered" by the military who considered it a potentially useful starting point for building an aircraft defense system and asked the Jay Forrester and his team to build a prototype. The building of the prototype took a long time and involved an amazing amount of military and government politics.Eventually, the

project got far enough to separate out the team into a separate building/laboratory which they called Lincoln Laboratory. They continued the work on the non-prototype of SAGE (which now had a name). This also meant the involvement of many different contractors, leading to loads of politics, and communication overhead. Parts of the book here are wonderful as, being involved in large projects myself, it is amazing how little has changed since the 50s ;). At some point there was even a competing system which were pitched against each other, but the Whirlwind-based SAGE won that.The project was delivered after more than a decade of work.

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