Sigsaly Story

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The Need for Secure Communications

Washington, D.C., 1941: The morning of December 7 found General George Marshall, the U.S. Army Chief of Staff, facing a difficult decision. American codebreakers had deciphered Japanese diplomatic traffic that indicated Japan had given up on a political solution to its problems with the United States. This meant that the prospect of war with that nation was now a distinct possibility. With this critical information in mind, Marshall was determined that a general warning to his Pacific commands, including Hawaii, was in order; however, the quickest way to relay this potentially vital and classified information was by secure phone. At the time, the only available secure communications technology was the A-3 Scrambler system operated in New York by the American Telegraph and Telephone Co. Although the device was considered state of the art, it was based on 1920s technology and many, including Marshall, were concerned that it was not secure. Marshall's suspicions were more than on the mark. Unbeknownst to him at the time, in the fall of 1941, The Deutsche Reichspost, the German organization tasked with handling telephone and telegraph traffic, had broken the A-3.

Through the use of an intercept site located in a former youth hostel on the Dutch coast, the Third Reich had become adept at intercepting and breaking A-3 calls between President Franklin Roosevelt and other prominent political and military leaders, including Prime Minister Winston Churchill. Fearful that his warnings could fall into Japanese hands, Marshall declined to use the A-3 and decided to send the fateful message to Hawaii by coded radiotelegraph. *It arrived after the attack had concluded.*

Marshall's communications predicament was a clear illustration of the challenges facing U.S. military and political leaders in their attempts to communicate securely. Persistent communication problems convinced the United States and its allies that in order to prevail against the Axis powers, they must develop not only the means to read their adversaries' communications, but also the means to protect their own. With this in mind, efforts were begun to construct a safe and secure worldwide voice communications system for use by Allied military and political leaders.

The Green Hornet to the Rescue

Efforts to create a secure voice system had existed since the 1920s. Some progress had been made, but as with the A-3, no device was able to offer complete security. In the early 1940's however, the situation began to improve. Bell Telephone Laboratories, under the direction of A. B. Clark (who later headed up the research and development effort at the fledgling NSA), and assisted by British mathematician Alan Turing, began work on what would become known as "the Green Hornet." The design of the system was based on earlier 1930s-era research on the transforming of voice signals into digital data. The device earned the nickname for the buzzing noise heard by someone attempting to eavesdrop on the conversation. The "buzz" closely resembled the theme song of the popular serial radio show of the time that went by the same title. In time, however, it acquired the more formal moniker of SIGSALY.

SIGSALY

The device's success in protecting voice communications was due to a new development known as "pulse code modulation," the predecessor of such present-day innovations as digital voice, data and video transmission. It also was one of the earliest applications of spread spectrum technology, which was key to its effective operation. The U.S. Army awarded the first contract for the device in 1942; formal deployment followed in 1943. The SIGSALY terminal was massive. Consisting of 40 racks of equipment, it weighed over 50 tons, and featured two turntables which were synchronized on both the sending and the receiving end by an agreed upon timing signal from the U.S. Naval Observatory. (For a more detailed explanation of the engineering aspects of SIGSALY, see J.V. Boone and R.R. Peterson's work, The Start of the Digital Revolution: SIGSALY Secure Digital Voice Communications in World War II, NSA Center for Cryptologic History, Ft. George G. Meade, Md.)

The Creation of the 805th

The creation of SIGSALY was only part of the challenge required to construct a secure worldwide voice system. A cadre of highly skilled individuals was required to run the newly created device effectively. This requirement was fulfilled in 1942 by the formation of the 805th Signal Service Company. Their mission was to maintain and operate the SIGSALY communications secure network between army headquarters in Washington and overseas locations throughout the world. All personnel were hand-picked for their special talents and qualifications; the group included individuals with extensive backgrounds in electronics and telephony. Classes were originally held in New York City to allow instructors from Bell Labs easy access to the school and the students. In July 1944, both the school and the headquarters of the 805th were moved to the Pentagon in Washington. By that time, a total of 193 officers and men had been trained. The unit would eventually reach a total of 356 individuals: 81 officers and 275 enlisted men. These individuals were assigned to 12 separate detachments, each consisting of 5 officers and 10 enlisted men. Each detachment was expected to operate on a 24-hour basis.

"Another Telephone Connection in Use"

The SIGSALY system was inaugurated on 15 July 1943 in a conference between London and the Pentagon (the original plan had called for one of the terminals to be installed in the White House, but Roosevelt, aware of Churchill's penchant for calling at all hours of the night, had decided to have the Washington terminal moved to the Pentagon with extensions to the White House and the Navy Department building.) In London, the bulk of the SIGSALY equipment was stored in the basement of Selfridges Department Store, with an extension to Churchill's war room, approximately a mile away. With the coming of SIGSALY, the shortcomings of the less than effective A-3 were now a thing of the past. The Deutsche Reichspost began to notice that the Allied signals on the A-3 system had been drastically reduced, prompting the chief engineer of the Dutch intercept site to conclude that "there was another telephone connection in use between the United States and England." The two-pronged "provide and protect"

strategy of the Allied cryptologic services was slowly beginning to produce results. Both sides of the effort began to sense that the goal of intercepting and decoding Axis traffic, while at the same time protecting their own communications from exploitation, was in reach.

"There Is Not Much To Be Gotten From Them Now"

Eventually a dozen SIGSALY terminals were distributed to the far corners of the globe, to include Washington; London; Algiers; Australia; Hawaii; Oakland, California; Paris (after its liberation); Guam; and, after VE Day, in Frankfurt and Berlin. Most interesting perhaps was the installation of the device on a 250-ton ship, an ocean lighter dubbed OL-31. This floating communications network tracked General Douglas MacArthur in his island-hopping campaign in the Pacific, and would have been a vital communications link if had it been necessary to conduct a full-fledged invasion of Japan. Most importantly, the network provided both military and civilian leaders access to secure voice communications. The SIGSALY was vital in protecting both discussions of significant issues and day-to-day administrative details of the war. All told, over 3,000 top-secret conferences were held using SIGSALY, a truly impressive statistic. Once again, Allied ingenuity and hard work had won the day. The best proof perhaps is a telling 1943 statement by the once successful Deutsche Reichspost on the future possibilities of intercept of high-level Allied communications, "there is not much to be gotten from them now."