

# Cryptanalysis - Time Point

From Donald Leichtweis, Capt. USN ret.

## Prologue

Alan Turing's biographical thriller "The Imitation Game" relates the British government's WWII efforts to break the German communications encoding and decoding at Bletchley Park. In 1936 Mr. Turing introduced the "Turing Machine", a theoretical computing device to formalize the concept of computation and algorithms. It is not a physical machine, but an idealized model used to study the limits of what can be computed. Turing machines are central to the 'Theory of Computation' helping to explore computability, algorithmic limits, and problems that have no algorithmic solution. The German Enigma machine was their target encoding device, the Chicago science museum has one shown here.



During WWII, Mr. Turing, et al, developed the Bombe machine; taking advantage of reverse engineering of a captured Enigma machine and some inputs from a Polish military intelligence group to aid in their decrypting of German submarine communications. Neither is highlighted in the movie. Also missing from the movie is that the Bombe was manufactured by the US at the Naval Computing Machine Laboratory (NCML) in Dayton Ohio. Post war, NCML personnel moved to St. Paul MN to work with the newly formed Engineering Research Associates company to continue electronic device creations for cryptanalysis. Although compartmentalized, the following Enigma capture story contributed to shorting WWII!

## The Time Point

Lieutenant Commander David Balme, who died January 3, 2016, at age 95, led a boarding party which captured an Enigma machine from a German U-boat during the Battle of Convoy OB138 in May 1941, a turning point in the Battle of the Atlantic!

At midday on May 9, 1941, Commander Joe Baker-Cresswell, captain of the British destroyer Bulldog, was about to order the ships of the 3<sup>rd</sup> Escort Group to leave west-bound trans-Atlantic Convoy OB318 to refuel at Iceland when two merchant ships were torpedoed in quick succession.

The torpedoes were fired from U-110, commanded by the German U-boat ace Fritz-Julius Lemp, who disregarded the proximity of the Royal Navy corvette Aubretia. Before his second salvo of torpedoes struck, Aubretia's Lieutenant Commander Vivian Smith commenced a counterattack with depth charges which blew U-110 to the surface. The destroyer Broadway attempted to ram the surfaced U-boat, and all three British ships opened fire with their guns. There was panic below decks on U-110 and the crew abandoned ship.

Established in 1980

Fifteen men were killed or drowned including Capt. Lemp, 32 survivors were picked up and hurried below deck in Aubretia. The action was over in minutes, and when Baker-Cresswell stopped Bulldog alongside the U-boat he found it wallowing stern-down in the Atlantic rollers. Balme was ordered to row across in Bulldog's whaler to "get whatever you can out of her - documents, books, charts, and get the wireless settings, anything like that".

Jumping on to the U-boat's outer hull he walked, revolver in hand, to the conning tower, at which point he had to holster his pistol to climb three ladders to the top of the tower and down again inside the U-boat to the control room. It was, he later recalled, "a very nasty moment because both my hands were occupied, and I was a sitting target for anyone down below". Balme was very frightened; he expected the boat to sink, or scuttling charges to blow up at any moment, or to be overcome by chlorine from damaged batteries. The inside of the boat was dimly lit, there was a "nasty" hissing noise, and he could hear water slopping in the bilges. "I immediately went right forward and right aft with my revolver in my hand to see if there was anybody about," he said later. Noting that despite damage the U-boat was clean and well-kept and there was food on the table, but finding no Germans aboard, Balme called down the boarding party and "started ransacking all the treasures of the U-boat".

In the wireless office, telegraphist Alan Long found "a funny sort of instrument. Sir, it looks like a typewriter, but when you press the keys something else comes up on it". Balme recognized this as "some sort of coding machine", which he ordered to be unscrewed, and he organized a human chain to carry the machine and other equipment, charts and documents up the ladders and into the whaler. Balme and Long had found an Enigma machine, the cipher device which the German U-boat service used to communicate to its fleet in, as the Germans thought, an unbreakable code. Besides that, day's settings they also recovered the daily settings until the end of June, which, when delivered later to Bletchley Park, enabled Alan Turing and his team to read the German naval "Hydra" code, the officer-only code, and, with the knowledge and experience gained, to go on to crack several other codes.

Lemp's crew was so demoralized and ill-disciplined that later in prison camp they talked freely to their interrogators about U-110 and about other boats in which they had served. Balme and his men spent six hours inside U-110, where for some time they were left alone in the Atlantic, listening to the distant sound of depth charges while the 3<sup>rd</sup> Escort Group hunted another U-boat.

When Bulldog returned, Balme passed a towline, and for a day U-110 was pulled towards Iceland, until about 11:00 on May 10, 1941, when the German vessel reared its bows in the air and sank stern-first. The loss of U-110 enabled the British to throw a cloak of secrecy over the whole affair, a cloak so dark that even when Captain Stephen Roskill, the official historian of the Royal Navy, wrote about the capture in 1959. Only those already in the know were able to read between the lines and would have realized that the secret of the capture was not the U-boat but the Enigma material which was salvaged from it.

Established in 1980

Balme had been told that the truth of his secret capture would be kept forever and was surprised when in the 1970s its secrets began to leak out. Baker-Cresswell and Smith were awarded the DSO, Balme the DSC, and Long the DSM, for enterprise and skill in action against enemy submarines.

There were also breaches of security: Baker-Cresswell had told Balme to bring him back a pair of binoculars. Balme brought back two, and he used these swastika-stamped Zeiss binoculars in his yacht for 50 years. He also pinched Lemp's cap from his cabin, keeping it as a souvenir until he presented it to the Imperial War Museum in 2003. Balme's navigational skill led to him being selected as an observer in the Fleet Air Arm. En route to Egypt in June 1942, he commanded a party of British gunners on-board the American merchantman *Chant*, part of a convoy intended for the relief of Malta - but was sunk. Rescued from the water, he spent two nights in an air raid shelter in Malta before flying on to take up his duty as senior observer of the 826 Naval Air Squadron. Balme's Fairey Albacore bombers perfected the technique of pathfinding - dropping flares for RAF Wellingtons to bomb. When he left, in February 1943, the Air Officer Commanding sent him a 'signal of thanks' for the "magnificent work with and for the Wellingtons. There is no doubt that these night attacks were one of the decisive factors in crushing the enemy's attack. The successful conclusion of the land battle may well prove to be a turning point in the war in Africa." Balme was mentioned in dispatches. Next Balme qualified as fighter direction officer (FDO) and was sent to the battleship *Renown*, and when she brought Winston Churchill and his staff back from the Quebec Conference in September 1943, Balme studied him closely.

Balme also attended the 21<sup>st</sup> birthday party of Mary Churchill (later Lady Soames). Almost Balme's last appointment was as staff FDO in the Eastern Fleet, in the battleship *Queen Elizabeth*, when with acting rank he became the youngest lieutenant commander in the fleet. His service included a month in the escort carrier *Empress* directing her aircraft on photo-reconnaissance missions over Malaysia.

In 1999 Balme was historical adviser during the making of the Oscar-winning film *U-571*, which recast the capture and boarding of *U-110* as an American victory. When the prime minister at the time, Tony Blair, called this an affront to British sailors; Balme, the one-time chairman of Lymington Conservatives, pointed out that it was a great film, that it would not have been financially viable without being Americanized, that the credits acknowledged the Royal Navy's role in capturing Enigma machines and code documents, and that he was glad the story had been told in tribute to all the men involved. Balme married Susan in Thurn in 1947. She survives him with their two sons and a daughter.

Lieutenant Commander David Balme, born October 1, 1920, died January 3, 2016. Amen