

## **Technology and Tactics:** How German U-Boat Forces Lost the Battle of the Atlantic

The Allied victory in the Battle of the Atlantic is considered by historians to be one of the most important of World War Two, and a necessary precursor to defeating the Third Reich. As Britain is an island nation, it relied heavily on imports from its colonies and the Western Hemisphere to sustain its population and the war effort.<sup>1</sup> German U-Boat commander Karl Donitz felt that the nation could be defeated simply by strangling their merchant trade with an aggressive U-Boat campaign.<sup>2</sup> The prolonged match required massive industrial resources, manpower, and logistic coordination from both combatants, and the outcome rested heavily on the efficient use of intelligence and advanced technologies.<sup>3</sup> Throughout the conflict, the German Navy conducted itself by continually seeking the weakest point in the Allied shipping system, while neglecting to invest in new technologies and tactics for their U-Boat corps until under threat of defeat from a vastly improved Allied shipping system. Consequentially, instead of making a decisive impact on Allied shipping in any one theatre of the vast battle, their efforts became more of an equalizing factor that forced Allied commanders to improve the merchant shipping program until existing U-Boat tactics and technologies became obsolete.

At the start of hostilities in September of 1939, the German Navy possessed 3 battleships, two battle cruisers, four standard cruisers, twenty-one destroyers, and fifty-seven submarines, about half of which were seaworthy.<sup>4</sup> This small force was far outnumbered by the massive British navy, a situation that resulted in overconfidence on the part of the British regarding their ability to keep the German naval threat in check.<sup>5</sup> In reality, Britain lacked the

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**1** *“The Battle of the Atlantic was the dominating factor all through the war, never for one moment could we forget that everything happening elsewhere on land, at sea, or in the air depended ultimately on its outcome” – British Prime Minister Winston Churchill*

capacity to provide essential naval and aerial escorts to their merchant shipping over the entirety of the North Atlantic and highly under-estimated the lethality of German U-Boat tactics, failing to develop the technology or tactics to successfully defend against the boats until at the point of defeat.<sup>6</sup> British leaders believed that they had enough merchant ships to outlast any fight of attrition, and put absolute faith in ASDIC, an early version of SONAR technology that allowed escort ships to locate submerged U-Boats. Their arrogance and self-righteousness ensured that the road to learning the lessons necessary to defeat the U-Boat threat would be long and littered with the bodies of many a brave sailor.<sup>7</sup>

Karl Donitz, the man in charge of the German U-Boat initiative, had been a successful sub commander in World War I, and later, a prisoner of war. While interned by the British, he developed the idea of wolf pack tactics, wherein a group of U-Boats made a coordinated attack on a well guarded merchant convoy, overcoming their defenses and then disappearing before the escorts could retaliate.<sup>8</sup> Donitz believed passionately that by disrupting Britain's merchant trade routes, he could force them into capitulation.<sup>9</sup> His superior, Admiral Erich Raeder, and more importantly, Hitler, disagreed with this point of view, believing that battleships would be the naval force that won World War Two, just as they had been in the Great War. With a shoestring budget, Donitz led his small but elite U-Boat corps to sink as many British merchant vessels as possible.<sup>10</sup> Over the next three and a half years, he nearly brought the Allied war effort to its knees, but continually lacked the political and industrial support necessary to make a lasting impact in any one theatre of the battle.<sup>11</sup> Instead, he operated by continually throwing his limited resources at the weakest point in the chain of Allied shipping, moving from the

English channel, to the mid-Atlantic gap, to the eastern seaboard of North America, and finally to the Caribbean before the Allied convoy system had no remaining weaknesses to exploit. Eventually receiving the funding he required when promoted in the final years of the battle, technological innovation was too late to save the doomed U-Boat program, which soon faded to little more than an occasional nuisance.<sup>12</sup>

In the first months of naval hostilities, the effectiveness of German U-Boats was severely limited by both range and availability.<sup>13</sup> With the fall of France in June of 1940, Germany gained direct access to the English Channel, greatly increasing the range of their U-Boat forces and Luftwaffe air cover, and U-Boats became a tangible threat to any shipping within a few hundred miles of the British Isles.<sup>14</sup> Although the United States claimed to be strictly neutral at the time, President Roosevelt was actively leading the country toward war, while ensuring that the British were well supplied in their efforts against Germany.<sup>15</sup> In September of 1940, he supplied Britain with fifty WWI-era destroyers and ten coast guard cutters in return for leases on British bases in Newfoundland and the West Indies,<sup>16</sup> despite public and congressional outcry claiming that he had violated the neutrality of the United States and committed an act of war.<sup>17</sup>

The effectiveness of Donitz's U-Boat campaign increased through the summer of 1940, peaking in October, when his U-Boats managed to sink some 352 497 tons of Allied shipping in a single month. In one particularly devastating series of attacks, German submariners sank a record thirty-eight ships in three days, losing but a single member of their own in the process. The U-Boat program had matured, and the loss statistics for the last six months of 1940 showed

that it was high time for Allied commanders to change their anti-submersible tactics to match. Of the 217 merchant vessels lost in the last six months of 1940, only seventy-three were members of escorted convoys.<sup>18</sup> Faced with such massive losses, Allied commanders re-instated the convoy system that had resulted in an immediate 80% drop in losses during World War One; a critical irony demonstrative of Britain's outright refusal to learn from the past until it was almost too late.<sup>19</sup> In retrospect, while generally effective, the U-Boat campaign leading up to October of 1940 was not by any means a success. Lacking the sheer number of vessels required sink a decisive amount of Allied shipping and gain superiority over the North Atlantic despite numerous requests for more funding,<sup>20</sup> Donitz instead taught the Allied commanders a valuable lesson that would serve to improve their anti-submarine tactics and technology, while neglecting to modify his own to match what would become a serious threat.

Following the failure of the second great daylight raid of London in September of 1940, Hitler postponed Operation Sea Lion, his plan for invasion of the British Isles indefinitely,<sup>21</sup> freeing up precious naval resources that went into service escorting convoys in November of 1940. Allied shipping losses dropped almost immediately, as the German Navy could not supply enough new U-Boats to offset the increase in escort vessels.<sup>22</sup> With coastal shipping around the British Isles now adequately protected from the U-Boat threat, Donitz pushed the battle into the middle of the North Atlantic, where a six-hundred mile gap in escort cover existed due to the inadequate range of land-based aircraft and early escort vessels.<sup>23</sup> Employing wolf pack tactics and evading ASDIC by approaching convoys while surfaced at night, his U-Boats seemed unstoppable by anything short of constant air cover. Hoping to achieve air superiority over the

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4 | *"A continentally minded government and High Command [proved] incapable of grasping the idea that U-Boats could decide the issue of war" – German Admiral Karl Donitz*

North Atlantic, Britain outfitted a number of merchant ships with catapult-like devices that allowed them to host one fighter plane on board that could take off to combat enemy forces, but could not land back on the boat.<sup>24</sup> They also constructed small escort carriers from retrofitted merchant ships that could host up to six fighters, this time with space enough for them to land after a battle. These two experiments proved the value of air cover for a convoy, but it would be some time before enough proper carriers were available to turn the tide in the North Atlantic.<sup>25</sup>

In an effort to continue aiding Britain without officially joining the war, Roosevelt pushed the Lend-Lease Act through congress in March of 1941, giving him the authorization to distribute any defense-related article to any country whose defense he considered vital to that of the United States.<sup>26</sup> He also directed the US Navy to unofficially escort merchant convoys along the eastern seaboard,<sup>27</sup> and instituted a massive ship building program that produced thousands of tons of merchant shipping, including the mass produced liberty ship that would eventually offset losses from Donitz's wolf packs.<sup>28</sup>

At the same time, British cryptographers working in secrecy at a facility called Bletchley Park broke into the German Naval Enigma encryption system and began reading Donitz's operational communications to his U-Boats with increasing regularity.<sup>29</sup> This break was an important equalizing factor, as the German B-Dienst intelligence program had been reading British naval communications since 1930.<sup>30</sup> Alongside high frequency direction finding (HF/DF or "Huff-Duff") equipment that allowed radio operators to triangulate the position of an enemy

radio signal,<sup>31</sup> the break permitted Allied commanders a much-needed snapshot of U-Boat locations throughout the Atlantic, and gave them a chance to route their convoys away from threats.<sup>32</sup> The new intelligence technologies lead to an almost immediate reduction in merchant casualties, causing Donitz to suspect that his encryption codes had been broken. However, upon requesting a review of the Enigma system from his superiors, he was assured by the high command that the Enigma was unbreakable.<sup>33</sup>

In May of 1941, the German Navy launched the largest battleship ever built, the prestigious new Bismarck. It was to go into service hunting convoys throughout the North Atlantic, but was sunk before it reached the open ocean. Recognized by Allied commanders as a serious threat to North Atlantic convoys already strained by the threat of U-Boats, she was immediately dispatched by a small fleet of ships with orders to sink her.<sup>34</sup> This episode shows the absolute faith that the German High Command misplaced in its battleship program, despite the amazing productivity of Donitz's U-Boats while operating on a barely adequate budget.<sup>35</sup> Admiral Raeder still believed that the battleship was the king of the ocean, a position last widely held during World War One, but nonetheless shared by the Fuhrer, and one that politically influenced many naval decisions throughout the battle.

Over the summer of 1941, Roosevelt pushed the United States senate into extending the Neutrality Act of 1939,<sup>36</sup> extending US Naval protection to all merchant shipping west of Iceland. The German navy pushed Hitler for a declaration of war on the United States, seemingly without considering the possible implications of such a move.<sup>37</sup> Between September and December of 1941, there were multiple skirmishes between US Navy escorts and German

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6 | *"A continentally minded government and High Command [proved] incapable of grasping the idea that U-Boats could decide the issue of war" – German Admiral Karl Donitz*

U-Boats, although most were accidental, as the two countries were not yet at war and were actively avoiding open hostilities.<sup>38</sup> Upon officially entering the war on December 11, 1941, the poorly trained and highly inexperienced US naval armed guard was pressed into service protecting convoys throughout the Western Hemisphere. With U-Boats now purposely sinking ships flying the US flag, many died on their first voyage, their ships sunk only miles from the New York harbour.<sup>39</sup> Initially, the situation along the coast of the United States was devastating, with the admiralty refusing to implement a strong convoy system in spite of the lessons learned by the British navy over the previous two years. Although Donitz had just over a half dozen U-Boats available to patrol the North American coast, he was able to wreak havoc, primarily due to a continuing peacetime attitude in US cities, the lack of a blackout program and a strong escort system,<sup>40</sup> and the addition of a fourth wheel to the naval Enigma, which strengthened German encryption and blacked out allied intelligence from February of 1941 until December of 1942.<sup>41</sup>

Early in 1943, Hitler realized that Admiral Raeder's battleship strategy had run its course, and replaced him with Donitz, who immediately used his new power as Admiral of the German Navy to concentrate the U-Boat effort in the North Atlantic, determined to decide the battle that spring.<sup>42</sup> Allied shipping losses reached their peak in the mid-Atlantic gap during March of 1943, when 567 000 tons of shipping were sunk by U-Boats losing only six of their own. The number of U-Boats on patrol in the area was so great that convoys would often escape from one wolf pack only to fall into the clutches of another.<sup>43</sup> Donitz took note that air cover supplied by an aircraft carrier escorting a westbound convoy foiled the attempts of a wolf

pack to attack its merchant ships at the end of March, but failed to address the significance of this new threat to his U-Boats.<sup>44</sup>

In April, four more escort carriers became operational, and increasing numbers of B-24 Liberator long-range bombers entered service providing continuous air cover to convoys in the North Atlantic. Guided by a continuous stream of intelligence from the efforts of the Ultra program at Bletchley Park, these newly deployed forces sank forty-one U-Boats in May,<sup>45</sup> at the rate of more than one per day, in a massive twenty-six percent reduction in total U-Boat forces.<sup>46</sup> The massive increase in U-Boat losses is attributed to the drastic increase in air and carrier cover over the North Atlantic during the spring of 1943, combined with the intelligence supplied by cryptographers at Bletchley Park. Sixty percent of all U-Boats sunk during the period were attacked from the air, often while surfaced to recharge their batteries.<sup>47</sup> Additionally, the United States was producing more than a million tons of shipping per month, easily replacing everything that the U-Boats could sink.<sup>48</sup>

Deciding that his boats could no longer sustain such incredible losses, Donitz ordered them into more southern waters near the Azores to operate against US convoys travelling to and from Gibraltar.<sup>49</sup> Unfortunately for his boats, the US Navy had deployed a number of 'hunter-killer' groups with express instructions to seek and destroy U-Boats. Guided by intelligence and no longer burdened with protecting convoys, the groups were highly effective, and the conditions in the south were only slightly more favourable to U-Boat commanders.<sup>50</sup> Concerned about his U-Boats lack of defense against the overwhelming number of new air units patrolling the Atlantic, Donitz issued an order on June 30 that no submersible was to leave port

without new anti-aircraft flak guns, an improved Enigma cipher, acoustic torpedoes, and a scanner capable of detecting Allied radar installed.<sup>51</sup>

Unfortunately for Donitz, all of this new technology came too late in the war to be of use to U-Boat commanders. By the summer of 1943, Bletchley had become adept at reading his communications in a timely manner, the British and American Navies had perfected their anti-submersible warfare techniques,<sup>52</sup> and a change to the US navy cipher system had crippled the intelligence gathering facilities of the German Navy.<sup>53</sup> Admiral Donitz was faced with a dilemma: Should he call off the doomed U-Boat campaign, Allied forces would gain superiority throughout the Atlantic, and continue supplying the war effort that had decimated the city of Hamburg near the end of July. But should he continue searching for convoys, the loss of men and vessels would be staggering.<sup>54</sup> Putting faith in his new technology, Donitz orders his U-Boats back to the North Atlantic with new operational protocols on August 23, 1943 to finish the fight against allied forces.<sup>55</sup>

With Bletchley Park reading German operational communications and German intelligence blacked out from Allied communications, the allies were ready for the onslaught. The Atlantic Gap was covered by long-range bombers based in Newfoundland, Iceland, and Northern Ireland,<sup>56</sup> and six new US Navy hunter-killer groups were on patrol, using Ultra intelligence to directly engage known wolf packs before they reached their target convoys.<sup>57</sup> With advanced knowledge of the exact location of target U-Boats that had been forced to hunt blindly for convoys, the hunted became the hunters. By November 7, 1943, only twelve allied

ships had been sunk in the effort to re-take the North Atlantic, at the cost of twenty U-Boats. Stripped of their invisibility by the efforts of the cryptographers at Bletchley Park and the advances of allied radar and HF/DF systems, Donitz was one more forced to abandon operations in the North Atlantic.<sup>58</sup> With B-Dienst still unable to break any of the new Allied ciphers, his U-Boats were recalled to the Bay of Biscay, where they were forced to rely entirely on blind luck to locate convoys.<sup>59</sup> Between April of 1943 and September of 1944, the American and British escort carriers and air forces cooperated to sink the majority of the U-Boat force operating in the Atlantic and Arctic oceans,<sup>60</sup> until what had once been a deadly threat to merchant shipping became no more than an occasional nuisance.

The Battle of the Atlantic was a massive waste in men and resources for both combatants. Over its four year span, it cost Germany seven hundred U-Boats and 26 000 crewmen, while Allied forces lost fifteen million tons of shipping and more than 70 000 naval and merchant seamen.<sup>61</sup> Had Admiral Donitz received the support that his program required from the Third Reich, or the British entered the war with the lessons of the Great War fixed firmly in mind, the outcome of World War Two may have been much different. As it stands, the heroic sacrifices that seamen on both sides of the battle put forth for their countries, the incredible mustering of Allied industrial strength, and the constant intervention of modern technology and intelligence efforts marked the battle as perhaps the greatest of the entire war; a testament to the incredible capacity of man to continually develop new ways to kill his brothers. Ultimately, Admiral Donitz and his U-Boat corps lost the battle due to a lack of support from the higher ranks of the Third Reich until it was effectively too late to change the

course of the battle, the inferior intelligence provided by the German B-Dienst service that failed to break newer ciphers put into place by the Allies near the end of the war, the development of carrier-based air cover of the North Atlantic, and an increase in the availability of both escort ships and long range bombers to protect the routes plied by Allied convoys. Early in the war, Donitz's U-Boats had been successful in taking advantage of an unprepared and overconfident enemy; by the end of the battle, these roles had been reversed, primarily due to the lack of funding for the U-Boat program pre-1943, and a deficit of technological investment throughout the battle that eventually resulted in the U-Boats being forced to face off against a vastly superior adversary.

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<sup>1</sup> (Story, 2006, p. 26)

<sup>2</sup> (Gleichauf, 1990, p. 223)

<sup>3</sup> (Murray & Millett, 2000, p. 235)

<sup>4</sup> (Gleichauf, 1990, p. 14)

<sup>5</sup> (Gleichauf, 1990, p. 14)

<sup>6</sup> (Murray & Millett, 2000, p. 236)

<sup>7</sup> (Gleichauf, 1990, pp. 224-225)

<sup>8</sup> (Gleichauf, 1990, p. 223)

<sup>9</sup> (Murray & Millett, 2000, p. 238)

<sup>10</sup> (Murray & Millett, 2000, p. 238)

<sup>11</sup> (Gleichauf, 1990, p. 226)

<sup>12</sup> (Gleichauf, 1990, p. 229)

<sup>13</sup> (Murray & Millett, 2000, p. 236)

<sup>14</sup> (Murray & Millett, 2000, p. 236)

<sup>15</sup> (Gleichauf, 1990, p. 14)

<sup>16</sup> (Murray & Millett, 2000, p. 15)

<sup>17</sup> (Gleichauf, 1990, p. 16)

<sup>18</sup> (Murray & Millett, 2000, p. 239)

<sup>19</sup> (Gleichauf, 1990, p. 225)

<sup>20</sup> (Gleichauf, 1990, p. 223)

<sup>21</sup> (Murray & Millett, 2000, p. 89)

<sup>22</sup> (Murray & Millett, 2000, p. 239)

<sup>23</sup> (Miller, 1980, p. 50)

<sup>24</sup> (Miller, 1980, p. 51)

<sup>25</sup> (Miller, 1980, p. 53)

<sup>26</sup> (Gleichauf, 1990, p. 18)

<sup>27</sup> (Gleichauf, 1990, p. 15)

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- <sup>28</sup> (Murray & Millett, 2000, p. 240)  
<sup>29</sup> (Calvocaressi, 1980, p. 85)  
<sup>30</sup> (Gleichauf, 1990, p. 227)  
<sup>31</sup> (Calvocaressi, 1980, p. 42)  
<sup>32</sup> (Murray & Millett, 2000, p. 246)  
<sup>33</sup> (Gleichauf, 1990, p. 228)  
<sup>34</sup> (Miller, 1980, p. 43)  
<sup>35</sup> (Murray & Millett, 2000, p. 243)  
<sup>36</sup> (Gleichauf, 1990, p. 17)  
<sup>37</sup> (Murray & Millett, 2000, p. 248)  
<sup>38</sup> (Gleichauf, 1990, p. 17)  
<sup>39</sup> (Gleichauf, 1990, p. 231)  
<sup>40</sup> (Murray & Millett, 2000, p. 250)  
<sup>41</sup> (Calvocaressi, 1980, p. 87)  
<sup>42</sup> (Bercuson & Herwig, 1997, p. 170)  
<sup>43</sup> (Miller, 1980, p. 137)  
<sup>44</sup> (Miller, 1980, p. 138)  
<sup>45</sup> (Miller, 1980, p. 141)  
<sup>46</sup> (Bercuson & Herwig, 1997, p. 237)  
<sup>47</sup> (Bercuson & Herwig, 1997, p. 238)  
<sup>48</sup> (Story, 2006, p. 26)  
<sup>49</sup> (Bercuson & Herwig, 1997, p. 237)  
<sup>50</sup> (Miller, 1980, p. 143)  
<sup>51</sup> (Bercuson & Herwig, 1997, pp. 240-241)  
<sup>52</sup> (Kozaczuk, 1984, p. 198)  
<sup>53</sup> (Bercuson & Herwig, 1997, p. 243)  
<sup>54</sup> (Bercuson & Herwig, 1997, p. 238)  
<sup>55</sup> (Bercuson & Herwig, 1997, p. 243)  
<sup>56</sup> (Miller, 1980, p. 145)  
<sup>57</sup> (Bercuson & Herwig, 1997, pp. 248-249)  
<sup>58</sup> (Bercuson & Herwig, 1997, p. 294)  
<sup>59</sup> (Bercuson & Herwig, 1997, p. 298)  
<sup>60</sup> (Miller, 1980, p. 145)  
<sup>61</sup> (Story, 2006, p. 26)

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