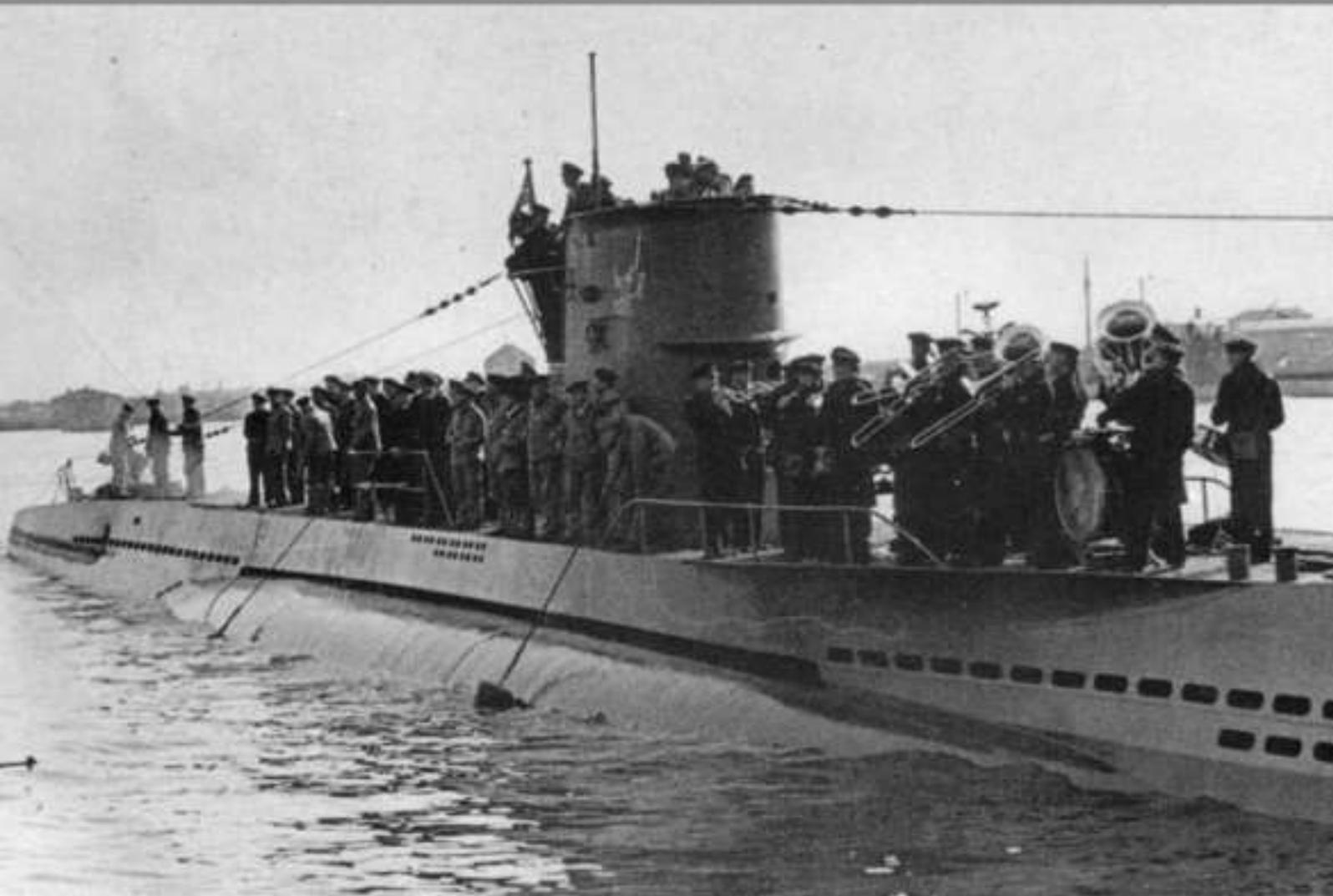


U 47 Modifications & Colours

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Accurate Model Parts



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Part I - Introduction

The following article discusses the modifications and paint colours of the famous Type VIIB U-boat U 47. A version has been available on the modelling website Modelshipwrights for many years and was published within Issue 65 (March 2006) of the SubCommittee magazine titled *Evolution Of A Type VII U-Boat: U-47 Modifications*. Readers who are interested in U 47 are directed to the author's book covering the patrol history, the sinking of HMS *Royal Oak* during the famous Scapa Flow raid and her commander Günther Prien -

Martindale, Dougie. *Günther Prien And U-47: The Bull Of Scapa Flow: From the Sinking of HMS Royal Oak to the Battle of the Atlantic* (Frontline Books in UK, U.S. Naval Institute Press in North America), 2018.

Notes on the drawings

To ensure that the colours in the drawings are as exact as possible, a diskette which included the correct RGB (red, blue, green) values for numerous RAL codes was obtained from *Multicolor UK Ltd.*, RAL's sales partner in the UK. The RAL (*Reichsausschuss für Lieferbedingungen* - Committee of the German Reich for Terms and Conditions of Sale) colours are the German equivalent of the British Standard colours in the UK and the Federal Standard in the US. The exact RGB values on this disk were used to portray *Dunkelgrau 51* (RAL7000) and *Schiffsbodenfarbe III Grau* (RAL7016) in the drawings. *Schlickgrau 58*, having had no RAL code associated with it, was matched as best as possible to the two-part set of Kriegsmarine paint chip cards produced by Snyder & Short Enterprises. It should be noted that the RAL codes are not exactly the same as the original Kriegsmarine paints - they were merely cross-references to the original paints. Another point to consider when viewing the drawings is that the colours will vary according to monitor settings.

During 1938 and 1939, the tower railings and their seats were not symmetrical on either side. In photographs taken from the port side, the parts of the starboard railings and starboard seat that did not have a symmetrical equivalent on the port side are visible. In order to avoid confusion, and illustrate the difference between the port and starboard railings and seats, only the sections of the railings and seat which were located on the port side are shown on the port drawing, and only the sections of the railings and seat which were located on the starboard side are shown on the starboard drawing.

The codes in the drawings can be found throughout Part II. The letter indicates the period when the modification occurred, whereas the number bears no particular significance.

The letters denote the following time periods -

- A At an unknown time before October 1939
- B Pre-war features removed on the afternoon of the 19th August 1939, prior to departure on the first war patrol
- C Late October/Early November 1939
- D December 1939 to February 1940
- E 8th/9th March 1940
- F April/May 1940
- G At an unknown time before July 1940
- H July/August 1940
- Z Colours or marking information

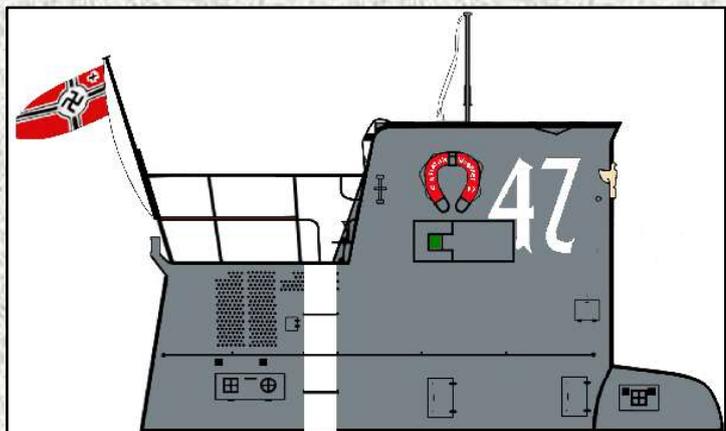
Part II - Chronological Discussion Of Modifications & Colours

In a discussion which deals with the colour of the paints used upon U 47, it is first necessary to explain the typical paint scheme applied to Kriegsmarine U-boats. All the U-boats of this era were painted in two greys. The “upper hull colour” was painted on the conning tower and the upper hull (above the waterline). The “lower hull colour” was a darker anti-fouling grey paint that was applied to the lower hull (below the waterline). This lower colour is covered in more detail in Part II. The horizontal division between the two greys took place just below the drainage holes on the hull. The wooden deck, which is covered in more detail in Part III, was treated with a black wood preservative rather than being painted.

Pre-war features

- “47” painted in large white numerals approximately 1 metre tall on both sides of the conning tower.
- a small oval plate (on each side) inscribed with “U 47” just under the small drainage holes near to the bow.
- a bronze eagle plaque on the front face of the tower, just below the wind deflector.
- the red horseshoe-shaped lifebelts on each side of the conning tower had “U-Flottille Wegener” and “U 47” marked in white letters.
- two red and white emergency rescue buoys. One was located just forward of the 20mm gun mount and the other was on the forward deck, just aft of the capstan. These red and white buoys had three white strips which curved in a circular pattern around the outside. Black text appeared upon these strips; the topmost strip read “Unterseeboot” followed by “U 47.”
- a dark grey or black patch of paint around and to the rear of the diesel exhaust outlet. This helped to camouflage the staining from the dirty exhaust gases.

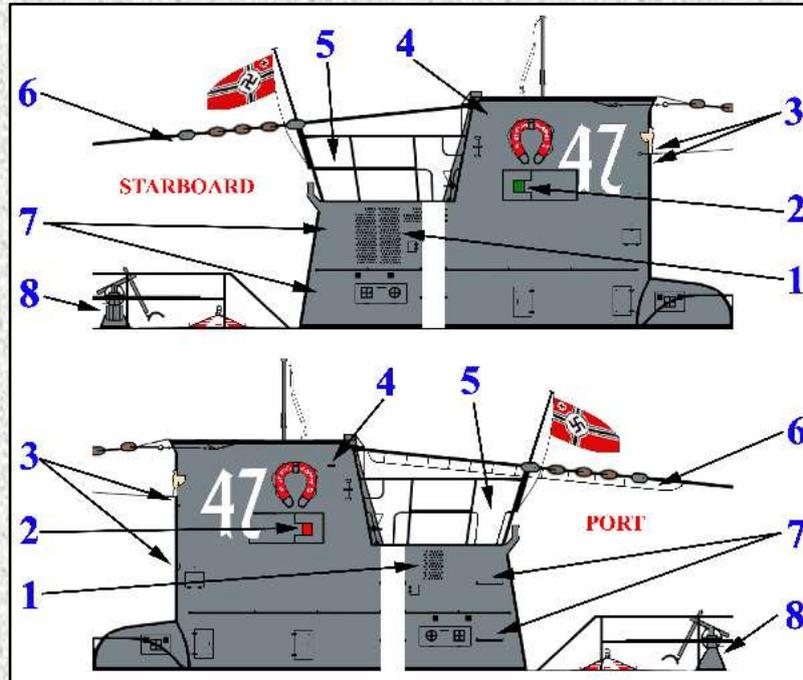
Right (1): The starboard side of the original tower of U 47 at the start of the U-boat's career on the 17th December 1938. The pre-war features on the tower are the identification number, red lifebelt and bronze eagle at the front of the tower. The vertical board behind the rungs was in place only on this date, the day of the commissioning ceremony, so that the pristine paintwork would not be smudged by the tips of sailors' dirty boots.





Left (2): A number of pre-war features are evident in this photo of U 47 during her *Indienststellung* (commissioning ceremony) on the 17th December 1938. The paint is fresh since all U-boats received a fresh coat of paint for their commissioning ceremony. Note that there was no spray deflector midway up the front of the conning tower at this time.

Below (3): U 47 in 1939 with a net cutter. At some point in 1939 when U 47 sailed past Gibraltar the boat did not have a net cutter. This was reintroduced prior to hostilities.



Above (4): This drawing illustrates the differences between either side of the original tower of U 47. The numbers indicate the following differences: 1 ventilation holes; 2 navigation light colour; 3 aerial and foghorn holes; 4 clip; 5 tower railings; 6 extra wires; 7 rungs; 8 cartridge tray.



Left (5): A comparison can be made between the tower railings and ventilation holes on either side of U 47's tower in this photo, taken at Wilhelmshaven on the 17th October 1939.

The upper hull colour (used upon the conning tower and the upper hull, above the waterline) at the start of U 47's career was likely the medium blue-grey *Dunkelgrau 51* (RAL7000, nearest FS match FS35237), the most common colour used in the U-boat fleet in early 1939.

U 47 colours (December 1938 to autumn 1940)	
upper hull	 Dunkelgrau 51 (RAL 7000)
lower hull	 Schiffsbodenfarbe III Grau (RAL 7016)

Above (6): The upper colour, *Dunkelgrau 51* (RAL7000), which was likely used upon U 47 from its launch on the 29th October 1938 until the summer or autumn of 1940. The dark grey anti-fouling colour, *Schiffsbodenfarbe III Grau* (RAL7016), was used upon the lower hull of U 47 throughout the boat's career.

Below (7): The three VIIBs look dark in this and a few other pre-war shots; it may be that the upper hull and tower of U 47 was a darker grey for a period during 1939. The dark patch surrounding the diesel exhaust outlet can be seen on U 47 and U 51. The dirty exhaust gases tended to blacken the paintwork around the outlet. During the pre-war period this area around the outlet was painted dark grey or black to disguise this weathering. By wartime this practice was generally discontinued.



During the pre-war period, the U-bootwaffe experimented with several paint colours on the upper hull and conning towers. In addition to *Dunkelgrau 51* - the most common of the Kriegsmarine paints - darker shades of grey were also used. The *Dunkelgrau 52* (RAL7024) paint was probably used on some U-boats. This darkish neutral grey was a little lighter than the dark grey *Schiffsbodenfarbe III Grau* used on the lower hull. Some of the pre-war shots of U 47 show a dark upper hull and conning tower. It may be that U 47 was painted for some pre-war periods in a grey that was darker than the standard *Dunkelgrau 51*.

Before October 1939

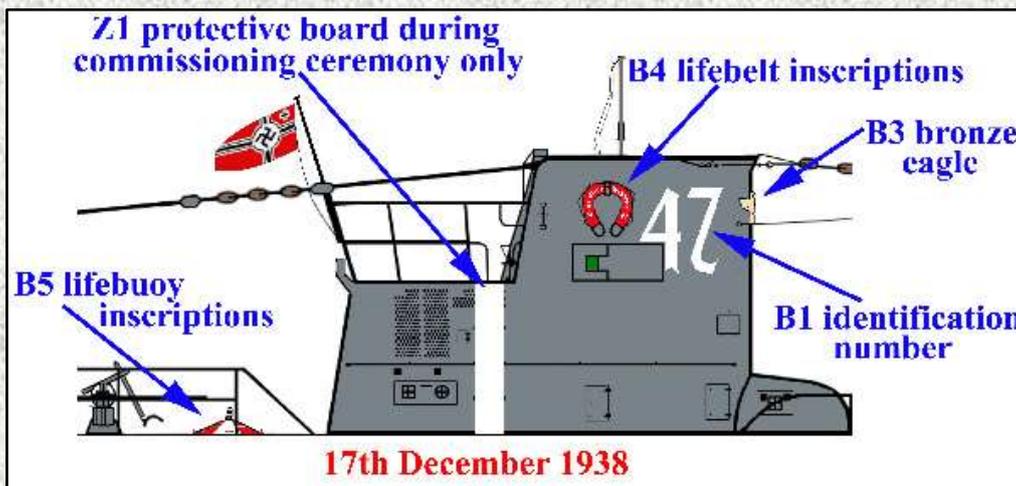
The following modifications were made at some point prior to October 1939 -

- a spray deflector was added midway up the front of the conning tower (A1).
- breakwaters were added on each side of the hull casing, outboard of the 88mm deck gun (A2).
- the two red and white emergency rescue buoys were moved inside deck hatches so as to be less obstructive to the crews working on the deck (A3).
- the dark grey/black patches over the diesel exhaust outlets were painted over with the upper colour, *Dunkelgrau 51* (A4).
- the net cutter was removed for a period in 1939 and reinstalled at some point prior to hostilities (A5).

Pre-war features removed on the 19th August 1939

On the afternoon of the 19th August 1939, just prior to departure on the first war patrol, the pre-war features were all removed -

- the large white 47 was painted over with *Dunkelgrau 51* paint (B1).
- the oval bow plates were removed (B2).
- the bronze eagle plaque was removed (B3).
- the identification markings on the lifebelts (B4) and lifebuoys (B5) were painted over.



Above (8): This drawing shows some of the features on the boat during commissioning that were removed prior to hostilities.

Late September 1939

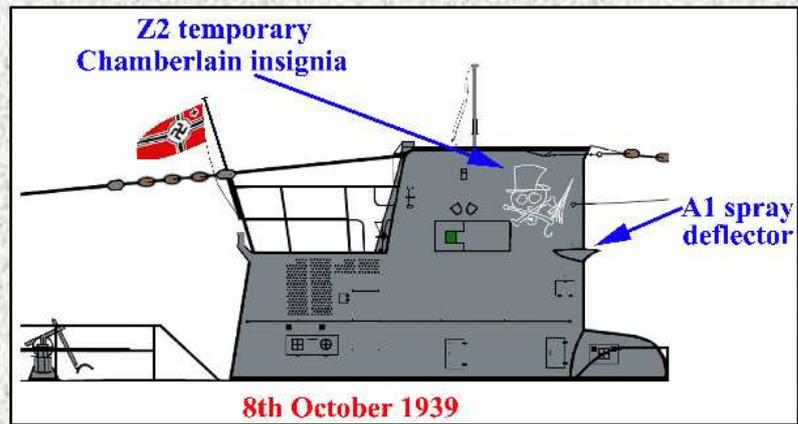
U 47 spent the period between the 16th September 1939 and the 2nd October 1939 being overhauled at the *Friedrich Krupp Germaniawerft* A.G. (hereafter referred to as *Germaniawerft*) shipyards. The boat was dry-docked between the 26th September and the 28th September.

Triumphant return on the 17th October 1939

The many photos taken of U 47 during late October 1939 allow us to gain an insight into the state of the paintwork as the U-boat sailed into harbour lock I in Wilhelmshaven on the 17th October 1939. However, it is difficult to determine what the upper colour of U 47 was at this time from these black and white photographs. Some of the photos show the upper colour looking dark, but this could have been caused by poor light conditions being present when the photographs were taken. Conversely, U 47 looks light in other photos, which could be due to the sun shining directly onto the U-boat. One can “prove” that U 47 was medium grey with one set of photos, and “prove” it was light grey with another. One modeller who had seen a limited number of photos of U 47 even thought that the U-boat had been painted black for the Scapa Flow mission!

Notably, in many photos of U 47 available from October 1939, only a couple show the U-boat looking light in shade. In the majority of photos, U 47’s upper colour looks similar to *Dunkelgrau 51*. What is required is a photograph showing U 47 next to, or in the vicinity of, a warship or U-boat tender. The *Hellgrau 50* superstructures and *Dunkelgrau 51* upper hulls of these vessels would provide reference points with which to gauge the colour of U 47’s upper hull and conning tower. Good quality images of the famous photo taken on the 23rd October 1939 of U 47 passing by the battleship *Scharnhorst* provide us with just such an opportunity. In this photo, U 47 is very similar to the battleship’s *Dunkelgrau 51* hull, and much darker than the battleship’s *Hellgrau 50* superstructure. The photo of U 47 sailing past the training ship *Schleswig-Holstein* on the 23rd October 1939 suggests the same.

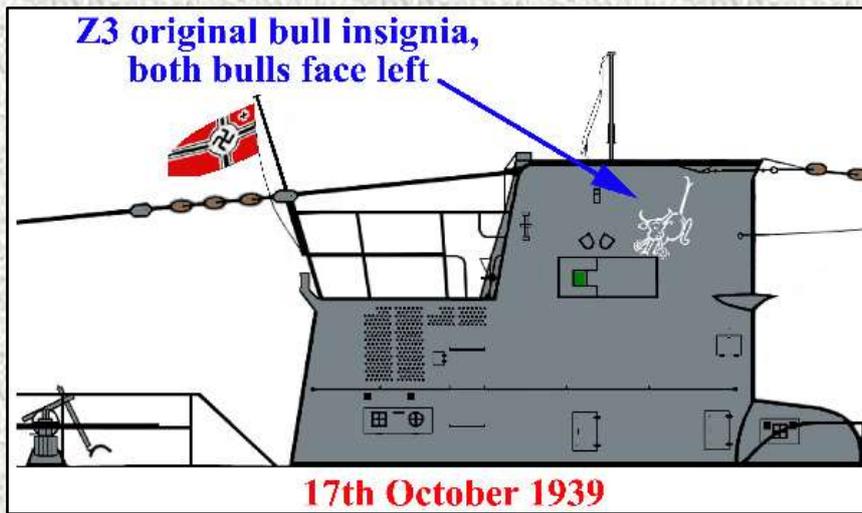
These photos strongly suggest that *Dunkelgrau 51* was the paint used upon U 47 in October 1939. What can be certain is that U 47 at this time was darker than the *Hellgrau 50* colour that was used on other famous U-boats such as U 99 and U 552.



Above (9): Before U 47’s departure on the Scapa Flow mission, a temporary drawing mocking the British Prime Minister Neville Chamberlain appeared on the tower. The pre-war features are no longer present, while the tower now has a small spray deflector midway up the tower.

Below (10): The famous photo of U 47 sailing in front of the *Scharnhorst*. The colour of U 47 looks very similar to the *Dunkelgrau 51* hull of the warship.





Several photographs taken of U 47 between the 17th and the 24th October 1939 show that the U-boat's paint was far from fresh, and had sustained a reasonable degree of weathering. The starboard side of the conning tower had numerous patches of a darker paint where the rust had been treated and painted over. This may have been red lead undercoat, or a grey paint. In contrast, the port side of the conning tower was adorned with several patches of rust, and seems not to have been touched up with the darker paint. One might assume that both sides of the conning tower would have been treated at the same time, but apparently this had not been the case. There was also one large patch of a darker colour on the top of the starboard hull casing, just above the starboard saddle tank, which may also have been red lead undercoat or dark grey paint.

Above (11): When U 47 returned from the Scapa Flow on the 17th October 1939, the tower was adorned with the original Bull Of Scapa Flow insignia. For more details please refer to the AMP article *The Snorting Bull Insignia*.

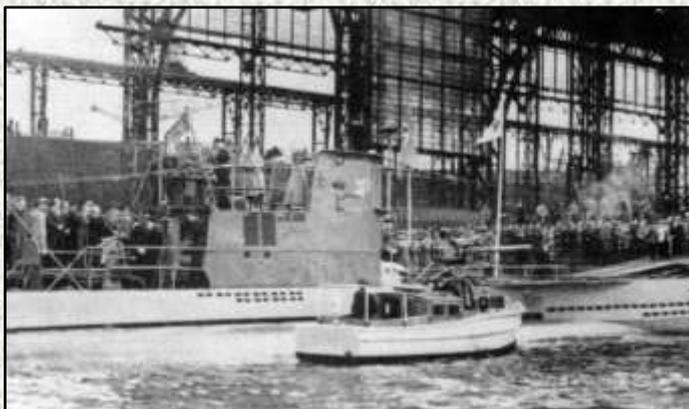
The area at the bottom of the U 47's tower, where the tower meets the deck, seems to have sustained a heavier rust build up than other areas. This was not uncommon, because water would drain down U-boats' towers and collect for a few seconds there before washing off the deck. In addition, the front of the towers often rusted quicker than the upper hulls because the front surfaces of the towers slapped against the water as U-boats ploughed through the seas.

The upper hull at this time was less patchy than the conning tower. There was a dirty scum line around and just above the normal waterline, and a good deal of exhaust staining was present on the hull around and abaft of the diesel exhaust hole. The saddle tanks were rustier than the hull sides. This was quite normal, as water constantly ran down over the tanks, allowing rust streaks to build up quickly.



Left (12): On the 23rd October, U 47 sailed past numerous battleships and cruisers moored in Kiel to celebrate the Scapa Flow mission. Crews of the *Scharnhorst*, *Emden* and the training ship *Schleswig-Holstein* paraded on deck in honour of the little U 47. This photo shows U 47 sailing past the training ship *Schleswig-Holstein*.

Right (13): U 47 enters the *Germaniawerft* shipyards on the 24th October 1939. The patchy appearance of the tower is apparent. Note also that the mount for the 20mm Flak gun was on the aft deck at this stage.



Left (14): Rust streaks can be seen on the dark grey *Schiffsbodenfarbe III Grau* saddle tanks. Note also the starboard breakwater at the right hand side, and the spray deflector midway up the front of the tower. Both these features were added at some stage before October 1939.

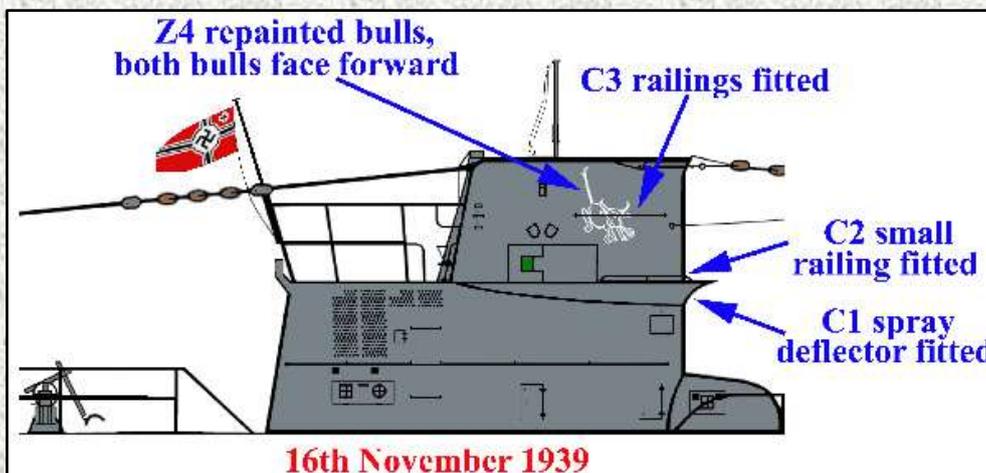
Late October/Early November 1939

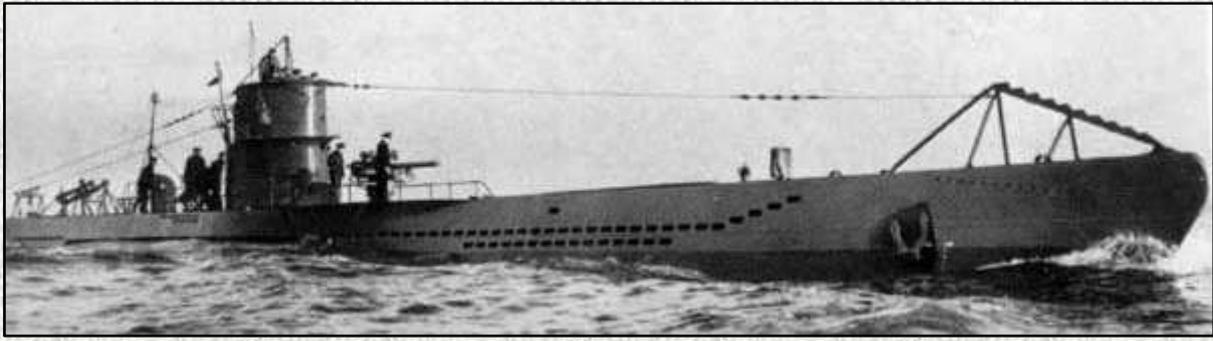
U 47 spent the period between the 24th October 1939 and the 13th November 1939 in the *Germaniawerft* shipyards in Kiel. The boat was in the large dry-dock between the 1st November and the 8th November, and a test run was completed on the 13th November 1939.

During this time in refit, the spray deflector was extended around the conning tower all the way back to the rear trailing edge of the tower bulwark (C1). Small railings were also fitted to the top side of the spray deflector (C2) and over each of the snorting bulls (C3).

During the Scapa Flow mission, the **port** side of U 47's hull had scraped an anchor chain. It is likely that the rusty links of the anchor cable, covered with seaweed and encrusted with barnacles, would have scraped off the anti-fouling paint on parts of the port side of U 47's hull and the keel. The necessary repairs were carried out at the *Germaniawerft* shipyards at this time.

Below (15): U 47's conning tower on the 16th November 1939, with the extended spray deflector. From that date onwards the bulls both faced forward rather than both facing to the left.





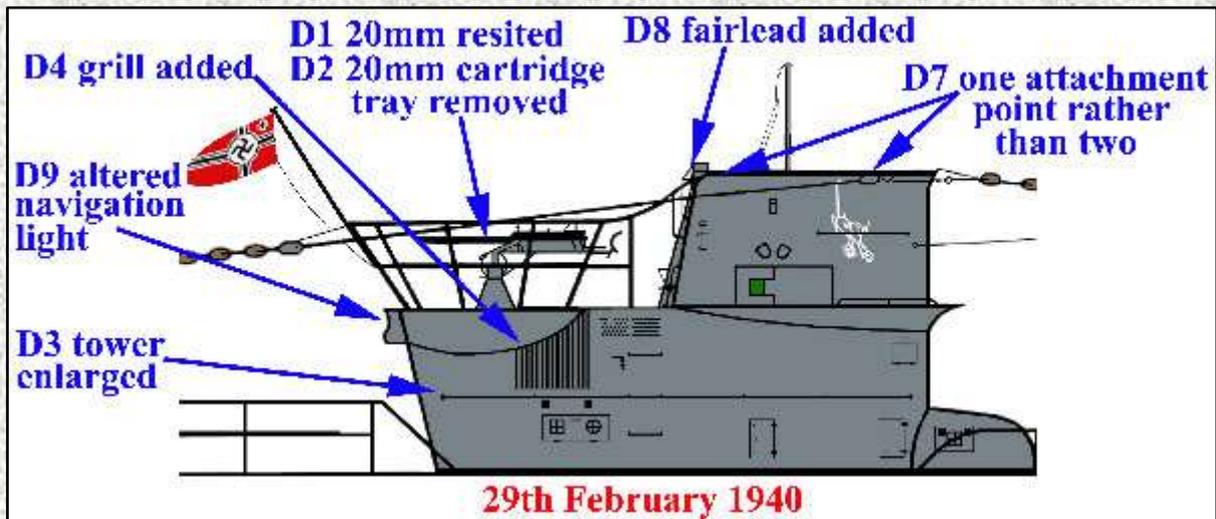
Above (16): The extended spray deflector can be discerned in this photo of U 47, taken before her 3rd patrol commenced on the 16th November 1939.

December 1939 to February 1940

U 47 entered the *Germaniawerft* shipyards in Kiel for a refit and overhaul in late December 1939, and did not leave until late February 1940. No work was done between the 27th December 1939 and the 13th January 1940 due to the festive holidays. In January and February 1940, the boat was present in DWK Dock XI.

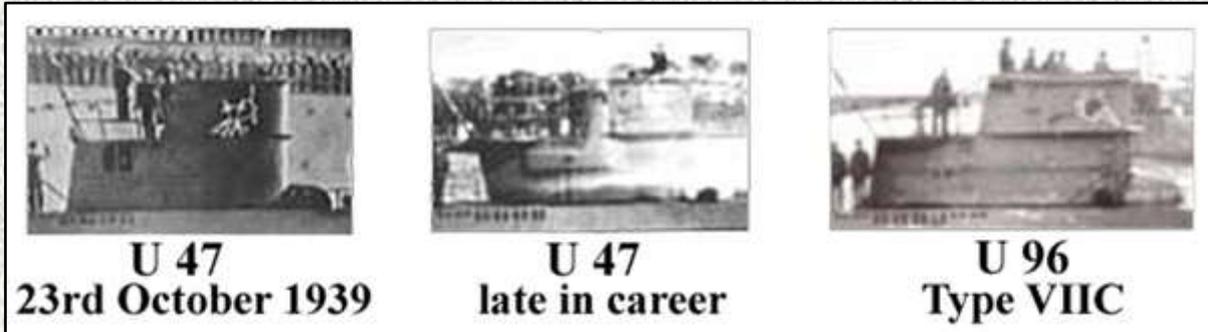
The original Type VIIs (also known as VIAs) and early VIIBs such as U 47 had their 20mm Flak gun mounted on the aft deck. This site had the following disadvantages – the bridge created a dead zone, it took time to get the gun into action, and it took time for the crew to get inside the U-boat in an emergency. For these reasons, it was decided to move the Flak gun to the aft end of U 47's conning tower (D1) during this refit. The cartridge tray on the starboard side of the 20mm mount - which held five 20mm cartridges was removed when the Flak gun was re-sited to the rear of the tower (D2) to allow easier movement around the rear of the tower.

The rear of U 47's conning tower was greatly enlarged to accommodate the 20mm (D3). The railings curved around in a circular shape to follow the much-wider circular-shaped tower floor.



Above (17): U 47's newly-modified tower on the 29th February 1940.

Since the rear of the tower was significantly larger than before, the rearmost vertical railing stanchion was located farther aft than it had been earlier. It was so much farther aft that the trailing edge of U 47's new tower sloped in the opposite direction than before. Also, the angle of the trailing edge of U 47's new tower was the opposite to the angle of the trailing edge of early VIIC towers. In fact, the angle of the trailing edge is one noticeable external difference that allows us to differentiate between a VIIB (with the 20mm on the rear of the tower) and a VIIC.



Above (18): These images show how the angle of the trailing edge of U 47's conning tower changed in the December 1939 - February 1940 refit. Comparisons in this area can be made between U 47 on the 23rd October 1939, U 47 late in her career, and the famous Type VIIC U 96.



Above left (19): Taken on the 6th July 1940, this image clearly shows U 47's modified tower, with the 20mm on the rear of the tower.

Above right (20): Another 6th July image, this photo illustrates how the new tower railings protruded out much farther than the old style tower railings.

The small square-shaped holes in the new conning tower floor had a pattern similar to that of U 99. This pattern differed slightly at the circular floor area of the tower from that which was present upon the later VIIB U 86, and VIICs. The square-shaped holes on U 86 and VIICs were arranged in seven groups around the 20mm Flak gun, with the columns of each group pointing towards the gun mount. On the rear deck of U 47 and U 99, the square holes were arranged in four groups around the 20mm Flak gun instead. On U 86 and VIICs each group of holes reached almost to the edge of the circular floor. However, at the rear of U 47's tower each group of holes stopped three or four inches from the edge of the circular floor.

A grill was added on the starboard side, beneath the front of the round area of the tower floor (D4). The addition of the 20mm to the tower resulted in some of the ventilation holes on the starboard side being blocked over, so a grill with vertical bars was chosen as a replacement for the

holes in this area. This allowed just as much, if not more, air to be accessed by the diesel intakes. A similar grill was **not** in place on the port side. On the port side, the addition of the 20mm to the tower reduced the number of circular intake holes.

Right (21): The grill with vertical bars can be seen behind the boat's laughing commander Prien in this 6th July 1940 photo.



U 47's first depth-charge attack, on the 29th November 1939, caused a leak in interior fuel bunker II. The leak worsened during the patrol, and necessitated repairs during this refit (D5). The leak was thought to have been repaired in mid-January, but late in the month, when pressure was again applied, a further leak was found. In the opinion of the *Germaniawerft* shipyards personnel, the leak had occurred due to depth-charges.

Late in January 1940, the GHG (*Gruppenhorchgerät* - group listening apparatus) hydrophones developed short circuits due to the freezing weather, and needed to be repaired (D6). Both of the magnetic compasses failed to function properly during the third patrol, though the main gyrocompass had still been operational. Repairs were made on the morning of the 5th December 1939. It is possible that these makeshift repairs were the only repairs made. Shortly after U 47 left Kiel, on the 2nd March, the magnetic compasses again ceased to function.

Other modifications to U 47 at this time included -

- only one jumping wire attachment point was present on each side of the conning tower rather than two (D7).
- the anti-slip bars around where the 20mm had been on the aft deck were removed (D8).
- the rear navigation light was altered (D9).

The conning tower and upper hull remained in *Dunkelgrau 51*.

8th/9th March 1940

At Schillig-Reede in Wilhelmshaven, on the afternoon of the 8th March 1940, U 47 was fitted with a new 20mm MG C/30 anti-aircraft gun (E1). The new gun featured a different gun sight and a waterproof barrel. Modifications were also made to the radios (E2) on the following day, the 9th March, at the U-boat base in Wilhelmshaven.

March/April 1940

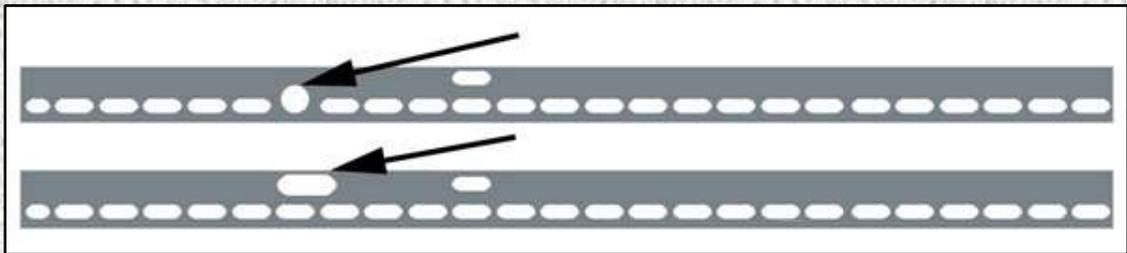
Small repairs were made to U 47 at the *Westwerft* shipyards in Wilhelmshaven between the 30th March 1940 and the 1st April 1940, during which the boat was dry-docked in dock II. This included repairs to the gun sight on the 20mm MG C/30 anti-aircraft gun and the starboard fuel pump, both of which had caused difficulty on the previous patrol.

April/May 1940

U 47 was present in the *Germaniawerft* shipyards in Kiel from the 29th April 1940 until the 31st May 1940. The U-boat was dry-docked from the 9th May until the 15th May, and a test run was completed in Kiel harbour on the 30th May.

The starboard diesel had broken down during the fifth patrol, on the 16th April, so it was repaired (F1) when U 47 returned to port. The crack in starboard diving tank IV (F2), sustained on the 9th April due to numerous depth charges, was also fixed. U 47 became grounded and stuck on two occasions during the fifth patrol - on the 14th April and early on the 16th April, off Norway. What damage, if any, occurred due to these groundings is unclear; perhaps the only consequence was that the anti-fouling paint and undercoat were scraped off in parts of the hull.

At some stage both diesel exhaust outlets were modified from being round in shape (along the aft drainage holes) to being oval in shape (above the level of the aft drainage holes) (F3). This may have occurred during this refit or the previous one.



6th July 1940

When U 47 returned to Kiel from the very successful sixth patrol on the 6th July 1940, the boat was very heavily weathered, with patches of the undercoat showing through in places. When U-boats were subjected to heavy weathering, their top layer of paint would peel off in patches. The older paint, or even the red or grey primer, that was beneath the top layer would be revealed. The first area for this to occur in was often the bow. The older bull had been painted over with a patch of *Dunkelgrau 51* paint. Then a fresh version of the snorting bull was added on top of the patch.

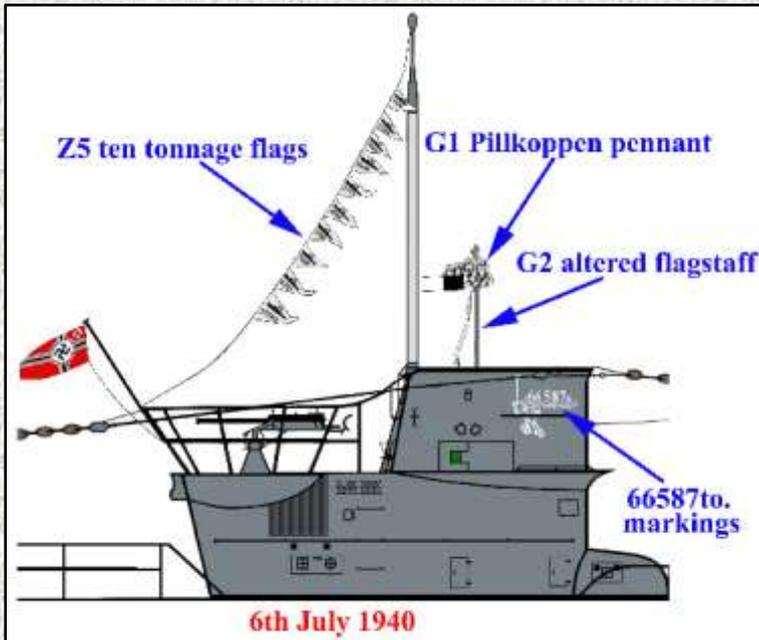
Once the crew had the opportunity to shave and wash after U 47's return, the commander's flagstaff was held in place on the starboard bulwark. The photographs taken at this time (6th July 1940 or shortly thereafter) show the Pillkoppen pennant (G1) for the first time. This pennant was in place on the top of a new or altered commander's flagstaff (G2). The new flagstaff did not have the attachment near the bottom which could be used to tie down the commissioning pennant, and prevent it flapping in the wind.

The addition of the Pillkoppen pennant and the new or altered flagstaff occurred at some stage prior to July 1940, though the exact time period is impossible to determine.

Above (22): Above is a comparison which shows how the diesel exhaust outlets were modified.



Above (23): U 47 is about to enter the *Germaniawerft* shipyards in Kiel on the 8th July 1940. The heavy weathering is clearly evident in this photo.



Left (24): U 47 had ten victory pennant flags (*erfolgswimpeln*) flying from the attack periscope on the 6th July 1940.

Below (25): A drawing of the Pillkoppen pennant.



Pillkoppen pennant

The Pillkoppen pennant on U 47 was associated with Pillkoppen (today Pilkopiai in Lithuania), a fishing village on the Kurische Nehrung (Curonian Spit). The Kurische Nehrung is a spit of land 100km long which lies on the coast of the Baltic Sea, just to the west of Lithuania. Several of the fishing villages on the Kurische Nehrung had decorative flags. Prior to 1844 these flags had been merely decorative, but during this year an order was given to use these flags to identify which village a fishing boat belonged to. The recognition sign was a flag half a metre long, and it was attached to an elaborate woodcarving. Each fishing village had its own combination of black and white colours. The Pillkoppen decoration consisted of two white triangles with their points facing towards each other on a black rectangular background.

The Kurische Nehrung used to be part of the region known as the Memelland. In 1919, the north became Lithuanian and the south Russian. The loss of this part of Germany to the harsh terms of the Versailles Treaty was one of the demands which many Germans believed to be unjust. Given that Günther Prien was a patriotic German, the use of the Pillkoppen pennant upon U 47 is likely to have been linked to the separation of the Kurische Nehrung from Germany by the despised Versailles Treaty.

July/August 1940

U 47's next refit took place in the *Germaniawerft* shipyards in Kiel between the 8th July 1940 and the 20th August 1940. The period between the 26th July and the 8th August were spend in dry-dock, and a test run was completed in Kiel harbour on the 17th August.

The most notable addition during this refit was the fitting of air trunks (H1). In original VIIs (also known as VIIAs) and VIIBs such as U 47, the supply of air to the diesel engines was poor. The main trunk providing air to the diesels was routed forward under the rear deck casing and up inside the after end of the tower. Ventilation holes to let air into the intake trunk were located on the after sides of the tower wall, primarily on the starboard side, and these were susceptible to interruption in high seas. To rectify this problem, during this refit large external L-shaped trunks were built up **both** sides of the tower, starting from the rear of the tower and extending up the after edge of the conning tower bulwarks.



Above left (26): The large air trunk on the starboard side (another was present on the port side) and the grill are apparent in this 3rd November 1940 image of U 47. The pattern of the square drainage holes on the floor of the tower are also noteworthy since they cannot usually be seen in most photos.

Above right (27): The darker grey colour and the air trunking can be seen on U 47's conning tower in this photo. The spray deflector, being a horizontal surface, was painted black.

Further modifications at this time are as follows -

- rungs were added on top of air trunks (H2).
- a short ladder was fitted between the two air trunks and the deck (H3).
- an additional three bars, in a triangular shape, were added to the forward deck railings (H4).
- in order to help prevent crewmembers from falling overboard, two wires were added per side from the forward deck railings to the aft deck railings (H5).
- the wooden seats on the aft deck railings were removed, leaving only the supports remaining (H6).

Below (28): The tower of U 47 in late 1940, with air trunking on both sides and *Schlickgrau 58* paint.



September/October 1940

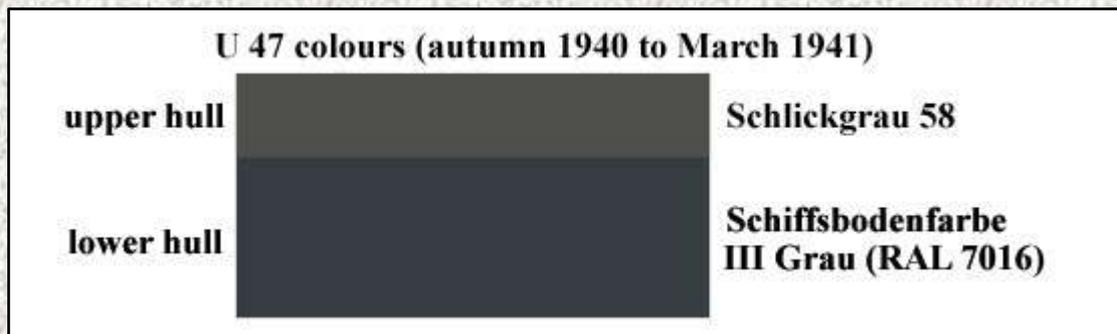
U 47's next overhaul and repair took place in the *Marinewerft* shipyards in Lorient between the 27th September 1940 and the 14th October 1940. The boat was in dry-dock between the 4th October and the 9th October, and a test run was completed on the 12th October. The departure of the 8th patrol was due to take place on the 13th October, but the torpedo attack computer ceased to function. A mechanic with spares travelled from Kiel to solve the problem, which was rectified on the 14th October.

The paint colour on the upper hull and conning tower of U 47 was changed to a darker grey at some stage. This change may have occurred during the July/August 1940 refit in Kiel, or it may have occurred during the September/October 1940 refit in Lorient. If the change of shipyard from Kiel to Lorient was the reason for the alteration in upper colour, then the September/October 1940 refit seems more likely.

The darker grey was possibly the petrol-proof camouflage paint *Schlickgrau 58*. This medium-to-dark grey (which had a touch of green) Kriegsmarine colour had no direct RAL equivalent during the war years, and was slightly darker than FS36134. Another possibility is the less common and slightly darker *Blaugrau 58/1*. This Kriegsmarine paint, which also had no direct RAL equivalent during the war years, was darker than FS36152.

The upper hull and conning tower of U 47 remained in this shade of grey thereafter.

Below (29): The upper colour of U 47 from the September/October 1940 refit until the boat's demise in March 1941 may have been *Schlickgrau 58*.



Late October 1940

In late October 1940, repair work was carried out upon U 47 in the *Marinewerft* shipyards in Lorient. The photos at the start of the ninth patrol on the 3rd November 1940 show U 47 freshly painted in the same late 1940 dark grey.

It is quite likely that during this refit, or the December 1940 to February 1941 refit, anti-vibration wires were added to the top of the attack periscope (I1). These consisted of five wires which spiralled around the top of the periscope, above the stainless steel shaft. They reduced the vibration of the periscope as the U-boat travelled through the water and reduced the wake that was left behind.

December 1940 to February 1941

The last refit and overhaul carried out upon U 47 took place in the *Marinewerft* shipyards in Lorient between the 7th December 1940 and the 19th February 1941. The departure of the last patrol was delayed until the 20th February because the two trial runs on the 15th and 18th revealed some defects. The photos at the start of the tenth patrol on the 20th February 1941 show U 47 freshly painted in the same late 1940 dark grey. No external changes are visible in these photographs.

Summaries of the modifications, colours and refit dates can be found in Part VII.

Part III - Lower Hull Colour

The Kriegsmarine painting regulations (*Allegemeine Baubestimmungen Nr.31* or building regulations form Nr. 31) specify the colour of the many of the paints that were to be applied to U-boats. The U-boat section of two editions of Nr. 31 can be found at -

http://www.u-boot-archiv.de/dieboote/farben_maerz_1940.html

http://www.u-boot-archiv.de/dieboote/farben_juli_1944.html

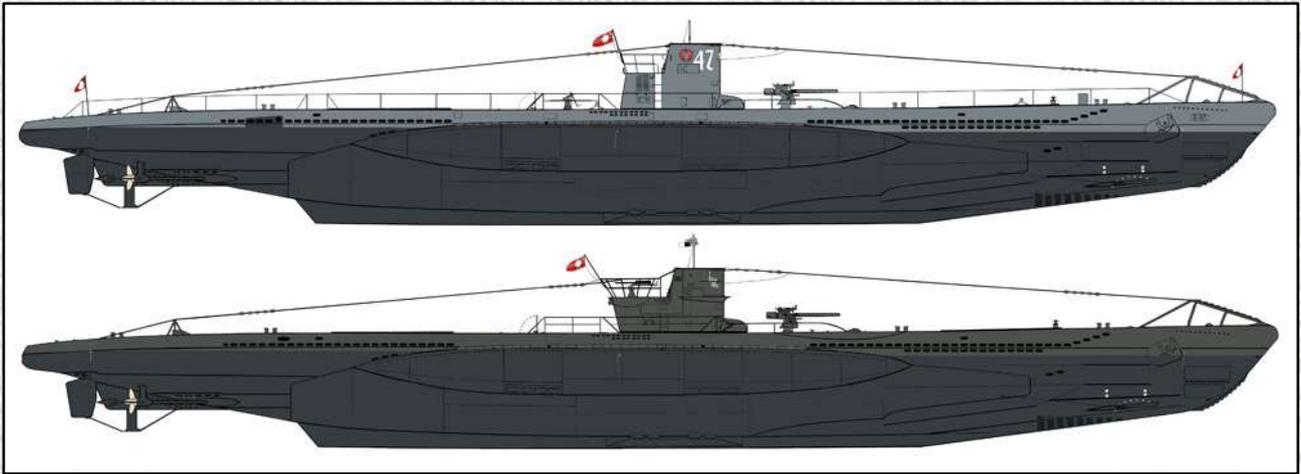
The March 1940, November 1941 and July 1944 editions of these painting regulations all state that the external sections of the lower hull were to be painted with two coats of anti-corrosion paint followed by two coats of the anti-fouling dark grey paint *Schiffsbodenfarbe III Grau* (RAL7016, in between FS36076 and FS35042). This is the paint that was likely to have been used upon the lower hull of U 47.

Since the U-boat arm had been experimenting with the colours above the waterline in the years leading up to the commencement of hostilities, it may have been possible that they also experimented with the colours below the waterline at this time. A comment by U 35 veteran Kurt Grosser suggests that colours other than dark grey may have been used in pre-war times. He maintains that when he reported aboard U 35 in April 1939 the lower hull of this U-boat was dark green. We should be extremely careful when dealing with veterans' memories of the colours used 60 to 65 years ago, but this comment is interesting in light of the fact that a green anti-fouling paint - *Schiffsbodenfarbe I Grün* (DKM 24) - was mentioned in the 1944 painting regulations. Considering this comment, it may be impossible to disprove the possibility that the lower hull of U 47 may conceivably have been dark green in pre-war times. However, the common dark grey colour arguably remains far more likely than this dark green colour.

Some drawings and models of U 47 show the U-boat with a red lower hull and a black bootline/boot-topping (the horizontal stripe between lower and upper waterline). Countless debates within the modelling community have been sparked by these, and other, drawings of red lower U-boat hulls. The red coloured hull is likely to be erroneous, as no positive evidence has ever surfaced of any U-boat, whether pre-war or wartime, having had a red hull. Without the pre-war painting regulations, which are currently unavailable to us, it is impossible to disprove the possibility that the lower hulls of some U-boats may have been painted in the Kriegsmarine red-brown anti-fouling paint (*Schiffsbodenfarbe III Rot* - RAL8013). The red lower hulls, however, will remain very questionable, and frankly extremely dubious, until such time as positive confirmation comes to light.

The black bootline seen in some drawings and upon some models is definitely erroneous as there are no photographs in common circulation showing any Kriegsmarine U-boats with a bootline. A good quality photo of U 47 being launched shows that the U-boat certainly did not have a bootline.

The artists who produced the drawings of U 47 and other U-boats with red hulls and bootlines may have been influenced by the standard Kriegsmarine surface unit colours of red-brown (RAL8013) hull and dark grey (RAL7016) bootline. Some artists may also have known that dark grey was the colour used on the lower hull of U-boats, but preferred to opt for red. The red hull provides a much more visually stimulating drawing than the drab, featureless grey, and artistic license may well have negated historical accuracy. The Amati 1/72nd U 47 kit is a perfect example of this. The model shown on the box has a red hull, yet the instructions specify that dark grey should be used. It is possible that marketing considerations may have taken precedence over accuracy in this case.



Above (30): U 47 at the start and end of her career, with the lower hull paint being *Schiffsbodenfarbe III Grau* (RAL7016).

Below right (31): In this photo, taken in Kiel in late October 1939, it can be seen that the area under Prien's feet has worn more heavily than other areas that were not walked upon as frequently. The areas of heavier wear would have been slightly browner.

Part IV - Wooden Deck Colours

The colour of U-boat decks has been a puzzling subject for many modellers and enthusiasts. The horizontal deck casing was made of thin steel, over which wooden planking was applied. The primary reason for using wood was that a metal surface ices up much more quickly in freezing weather than wood. Teak was too expensive to be used, so cheap local wood was used in its place. This explains why the wooden decks on U-boats did not exhibit the silvery appearance of weathered teak.

The March 1940, November 1941 and July 1944 editions of *Allgemeine Baubestimmungen Nr.31* (building regulations form Nr. 31) all state that the wooden deck was treated with a black wood preservative (*Teerfirnis Tf 99*). A U-boat deck started out as jet black in colour then quickly became charcoal in colour. As it was exposed to the elements, the deck developed a brown tinge. The more the deck was subjected to weathering, the lighter and browner it became. On the surfaces that were frequently walked upon, the wood preservative would wear more heavily and reveal more of the natural wood beneath. The deck would also become bleached by saltwater and the sun, causing small patches of white to appear. If a U-boat had not been serviced for many months, green algae would start to grow on the deck. As this plantlife was slippery, and therefore hazardous to the sailors walking on deck, the algae would not have been allowed to accumulate. It would have been removed before any serious built up took place.

The extreme bow and stern sections were not covered with wood; they were either painted the same black or dark grey colour as was used upon the watertight hatches and the square-shaped hatches, or with the "upper colour" used on the conning tower and upper hull. These metal areas were prone to rusting, whereas the wooden areas obviously were not. The watertight ready-use ammunition hatches and some of the square-shaped hatches on the deck were also not wood but metal. These were usually painted black or dark grey to match the treated wood.



Part V - Miscellaneous Colours

Conning tower

Spray deflector - When the spray deflector was extended in late October and early November 1939, it was painted black. Before this date it had been *Dunkelgrau 51*. The upper half of the fairing in front of the conning tower (which housed the magnetic compass) was often painted black or dark grey on Kriegsmarine U-boats, but this was not the case on U 47.

Wooden tower floor - The floor area behind the UZO was wood, and coated with black wood preservative. The area of the floor which was ahead of the UZO was metal, and painted black or dark grey.

Wooden slats - The vertical wooden slats on the inside of the conning tower bulwark prevented the crewmembers from sticking to the bulwark metal in freezing temperatures. These were coated with the black wood preservative used on the wooden decking.

Inside of bulwark - The inside walls of the tower bulwark were the same grey as the outside of the conning tower.

Vertical stripe behind rungs - Some U-boats, especially those involved in training, had a rectangular area surrounding the area behind the rungs on the tower sides painted black or dark grey. However, this did not feature upon U 47.

Conning tower base - A thin black or dark grey strip was painted around the base of the conning tower.

Lifebelt - A red horseshoe-shaped lifebelt was sometimes in place when a U-boat was manoeuvring in port. It would be held in place by a bracket on the outside of the tower bulwark. Only in pre-war photos of U 47 can this lifebelt be seen.

Starboard navigation light - Clear green.

Port navigation light - Clear red.

Rear navigation light on tower - Clear white.

Tower railings - The same grey as the conning tower.

Tower railing seats - These seats were made of wood and coated with the wood preservative. The inside edges of the seats were prone to wearing away and revealing the wood underneath.

Periscopes - Grease marks (usually vertical) from the raising, lowering and swivelling of the periscopes were often visible on the stainless steel shafts. The tops of the periscopes were grey.

UZO - *Überwasserzieloptik* (torpedo aimer) - From bottom to top - the base was grey, the compass heading ring was bronze, and the azimuth ring was black. Above this, the top removable part upon which the removable binoculars would sometimes sit was grey. Since it was removable and often kept inside the U-boat, this top part was usually less weathered than the tower bulwark.

Inside of tower hatch - White with a red circular handle. The circular rim which is visible when the

hatch is open was bronze.

Commander's flagstaff - This was often located on the starboard bulwark of the tower when U 47 was in port. It may have been *Dunkelgrau 51* early in the boat's career. When U 47 departed upon its final patrol on the 20th February 1941 it was white or the light grey *Hellgrau 50*.

D/F aerial - The circular direction-finding aerial was located on the top of the right hand bulwark of the tower. It was black with a grey top and bottom, and an unpainted bronze stem.

Engine repeater dial - This dial was located at the front of the tower bulwark, ahead and to the left of the UZO (the torpedo aimer). It had black outsides and white insides.

Megaphone - A megaphone can sometimes be seen sitting on top of the UZO in some photos. This seems to have been silver in colour.

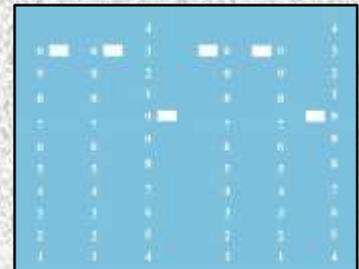
Armament

88mm deck guns - The barrel, breech housing and main mounting body of the deck gun were all painted the same grey as the conning tower. The base of the barrel (this was above the recoil tray), which slid back into a sleeve when the gun was fired, was heavily greased. The ring behind this, which acted as a guide for the barrel when it recoiled, was an unpainted metal which may have been bronze. The U-shaped padded gunlayer's harnesses were either artificial leather painted black or waxed canvas. The adjustable stems below were stainless steel. The circular control wheels were painted black on the outside and grey on the inside. The handles for the control wheels were wooden, and presumably coated with black wood preservative. The ring above the base (below the main mounting body), upon which the compass headings were marked, was an unpainted metal, perhaps bronze.

20mm Flak gun - The adjustable stem, which allowed the height of the gun to be altered, was stainless steel. Grease marks from raising, lowering and swivelling would be visible. The padded shoulder supports may have been artificial leather painted black or grey or waxed canvas. The barrel was gunmetal, and everything else was grey. When the 20mm Flak gun was mounted on the aft deck, a thin black strip was painted around the 20mm mount.

Hull

Depth markings - Three sets of waterline draught marking numerals were marked upon both sides of the hull. These small white numerals were aligned vertically. The top numeral, 9, started roughly at the division between the two greys, and the markings continued down the hull to the bottom numeral, 0. They were situated a few feet aft of the bow, on the saddle tanks, and a few feet forward of the stern.



Above right (32): The six sets of white waterline draught markings were used on all Type VIIIs. The rear set was different from the other two sets.

Right (33): The front set of waterline draught numerals on the port side stand out in this late October 1939 photo of U 47.



GHG (*Gruppenhorchgerät* - group listening apparatus) - These were acoustic listening devices that looked like a series of dots arranged in a semi-circle above both of the bow plane guards. They were bronze and usually left unpainted.

UT (*Unterwasser Telegraphie* - underwater telegraph) - The underwater telephone transducers consisted of two circles above the hydrophones, and two a few feet to the rear of the first pair. There were eight in total - four on each side of the hull. As with the GHG, they were bronze and usually left unpainted.

Propellers - Early U-boat propellers such as U 47's were made of bronze. Bronze propellers are bright and shiny when new, but turn darker and lose their shine with age. A slight greenish tint can accumulate in the corners.

Propeller shafts - Anti-fouling dark grey.

Deck parts

Bollards - When a U-boat was being moored to a harbour or pier, ropes were attached to extended bollards. The sides of the bollards were usually grey, and the tops were the same black or dark grey colour as the metal parts of the deck. The sides would often be rusty because the ropes would wear away the paint.

Capstan - This retractable electrical winch was situated on U 47's forward deck casing. The sides were grey and the top was the same colour black or dark grey as the metal parts of the deck. The sides would often be rusty because the ropes would wear away the paint.

KDB - (*Kristalldrehbasis Gerät* - rotating hydrophone array) - The stem was grey, or possibly red.

Wooden poles on deck - These would usually be painted with the same black wood preservative as was used on the wooden deck.

Rear navigation light - Clear white.

Inside of galley hatch - White with a red circular handle. The circular rim which is visible when the hatch is open was bronze.

Insulators - These porcelain insulators were attached in groups of three to the jumping wires, and prevented electricity in the wires from short-circuiting on the metal parts of the deck. They were either brown or bottle green. One either side of each group of three insulators were tension adjusters, and these were grey.

Jumping wires - Unpainted steel. In port, the wires were sometimes charged with electricity. When the wires were carrying current, a yellow plate with a red lightning flash hung from fore and aft cables to warn of the threat of electrical shock.

Part VI - Modelling Paints

Below is a list of the modelling paints that can be used to depict the three main Kriegsmarine paint colours that were applied to U 47. Cross-references to several paint ranges have been included to increase the likelihood that the modeller can choose a range they are familiar with. Also included are the RGB values of the RAL codes assigned to the Kriegsmarine paints. As previously

mentioned, there was no RAL code associated with *Schlickgrau 58*. The RGB values are therefore only approximate for this particular paint. The Federal Standard codes are the nearest matches to the RAL codes associated with the original Kriegsmarine paints.

⊕ *Dunkelgrau 51* (RAL7000, FS35237, RGB: R120, G131, B137)

➤ Paints: Colourcoats KM02, JPS 91-003, Xtracolor X123, Humbrol 145, Testors' Model-Master MM1721.

⊕ *Schiffsbodenfarbe III Grau* (RAL7016, in between FS36076 and FS35042, RGB: R54, G61, B65)

➤ Paints: Colourcoats KM05, JPS 91-001, Xtracolor X802, Humbrol 123, Revell 78, Testors' Model-Master MM2101.

⊕ *Schlickgrau 58* (slightly darker than FS36134, RGB: R77, G81, B76)

➤ Paints: Colourcoats KM11, JPS 91-029, Humbrol 78+31, Revell 47.

The most accurate paints are White Ensign Model's *Colourcoats* range, matched specifically to the Kriegsmarine paint colours. These enamel paints can be found at <http://whiteensignmodels.com>. The JPS acrylic paints can be found at http://www.jpsmodell.de/shop/jpswn_e.htm. There are companies which will mix paints specifically to either RAL codes or the RGB values.

Part VII - Summary Information

Modifications summary

The letter assigned to the modifications indicates the period when the modification occurred, whereas the number bears no particular significance.

Before October 1939

- A1 Spray deflector added.
- A2 Breakwaters added outboard of the 88mm deck gun.
- A3 Two emergency rescue buoys moved inside deck hatches.
- A4 Dark grey/black patch over diesel exhaust outlets painted over.
- A5 Net cutter removed for a period and then reinstalled.

Pre-war features removed on the 19th August 1939

- B1 White "47" on tower painted over.
- B2 Small oval plates near bow removed.
- B3 Bronze eagle plaque at front of tower removed.
- B4 White "U-Flottille Weneger" and "U 47" inscriptions on the two red horseshoe-shaped lifebelts painted over.
- B5 Identification markings on the two red and white emergency rescue buoys removed.

Late October/Early November 1939

- C1 Spray deflector extended around tower.
- C2 Small railings fitted to top side of spray deflector.
- C3 Small railings fitted over each of the snorting bulls.

December 1939 - February 1940

- D1 20mm Flak gun re-sited to aft end of tower.
- D2 Cartridge tray on starboard side of 20mm mount removed.
- D3 Tower enlarged to accommodate 20mm gun.
- D4 Grill added in place of some ventilation holes on the starboard side.
- D5 Leak in interior fuel bunker II repaired.
- D6 Short circuits in GHG hydrophones repaired.
- D7 Only one jumping wire attachment point fitted on each side of tower rather than two.
- D8 Anti-slip bars around where the 20mm had been on the aft deck removed.
- D9 Rear navigation light altered.

8th/9th March 1940

- E1 New 20mm MG C/30 anti-aircraft gun fitted.
- E2 Modifications made to radio sets.

April/May 1940

- F1 Starboard diesel repaired.
- F2 Crack in starboard diving tank IV repaired.
- F3 Both diesel exhaust outlets modified from round to oval (perhaps during this refit or previous one).

Before July 1940

- G1 Pillkopen pennant seen in photos for the first time.
- G2 Altered commander's flagstaff without attachment to tie down commissioning pennant.

July/August 1940

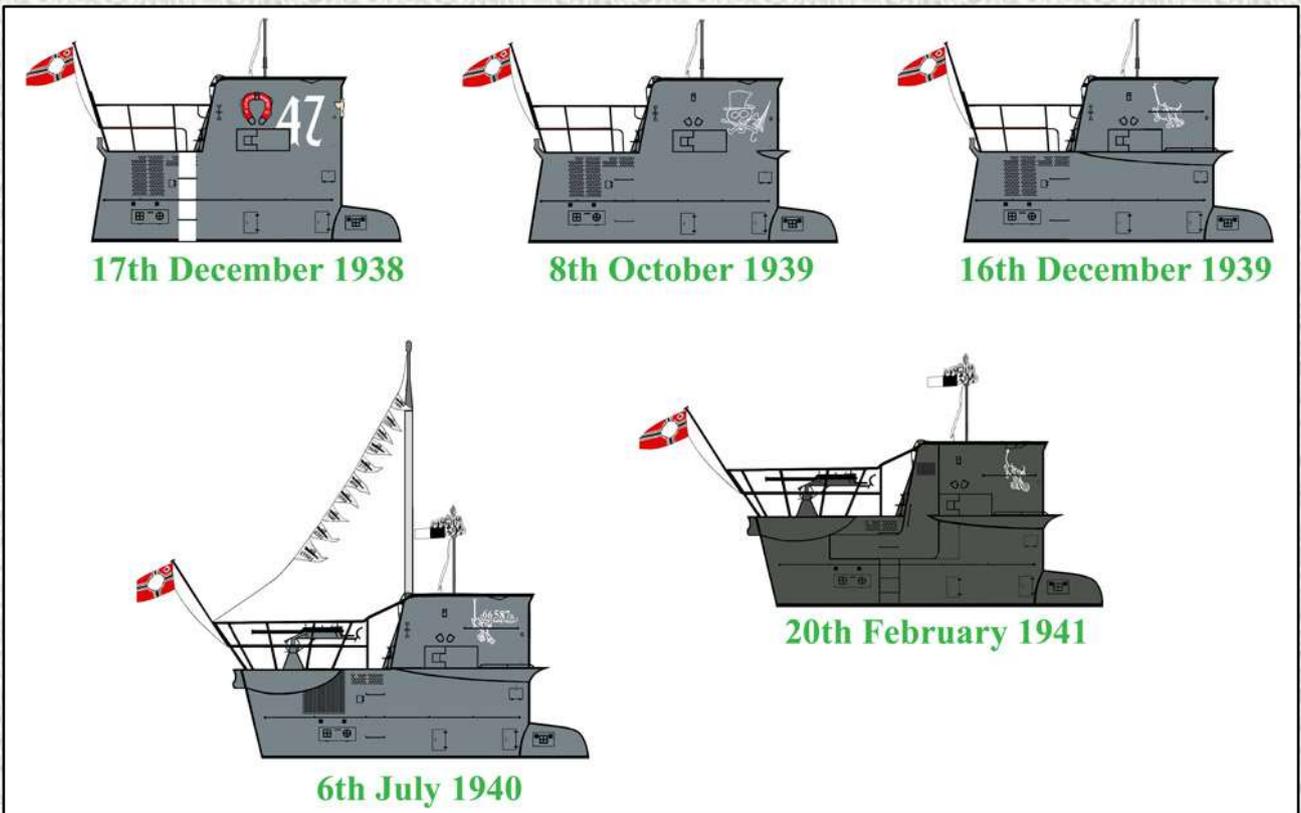
- H1 Air trunking fitted.
- H2 Tower rungs added on top of air trunks.
- H3 Short ladders fitted between air trunks and deck.
- H4 Additional three bars, in a triangular shape, added to the forward deck railings.
- H5 Two wires added per side from the forward deck railings to the aft deck railings.
- H6 Wooden seats removed from aft deck railings.

Late October 1940, September/October 1940, and December 1940 to February 1941

- I1 Anti-vibration wires probably added to the top of the attack periscope during either of the last two refits.

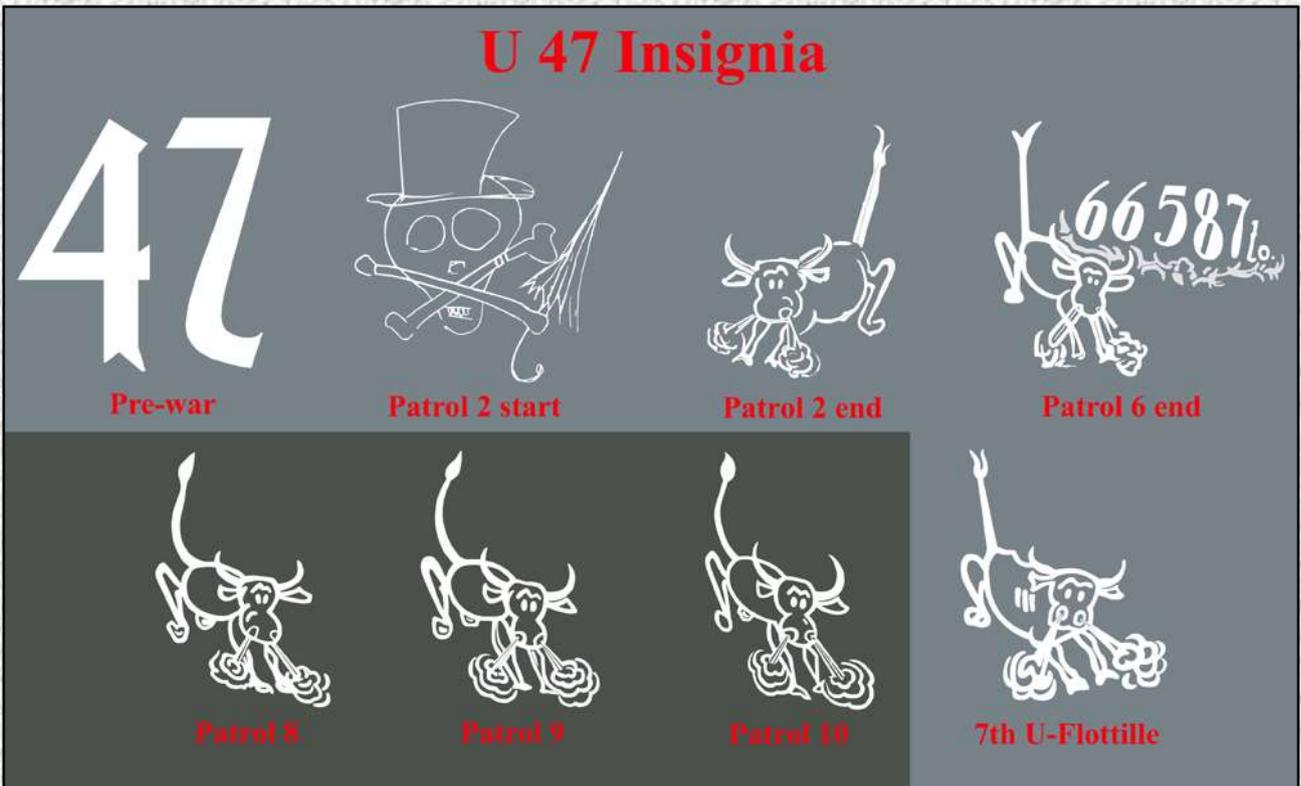
Main colours summary

Pre-war	Upper colour medium blue-grey <i>Dunkelgrau 51</i> (RAL7000). A darker grey upper colour may have been used for a period prior to the war. Lower colour dark grey <i>Schiffsbodenfarbe III Grau</i> (RAL7016)
19 th August 1939	Pre-war markings and inscriptions removed in afternoon
8 th October 1939	Temporary Chamberlain drawing
15 th /16 th October 1939	Original bull insignia added, both facing to left
Early November 1939	Both bulls repainted facing forward
6 th July 1940	"66587 to.", with leaves below, present near bulls. First appearance in photographs of Pillkopen pennant.
Sept/Oct 1940	Upper colour changed from <i>Dunkelgrau 51</i> to a darker grey, possibly <i>Schlickgrau 58</i> . This change may have occurred during the July/August 1940 refit. The upper colour remained in this shade of grey thereafter.



Above (34): A comparison of the towers over the course of U 47's career.

Below (35): The insignia on the towers of U 47.



Refit and repair dates summary

19/09/39	Kiel
16/09/39 to 02/10/39	<i>Germaniawerft</i> (dry-docked between 26/09/39 and 28/09/39)
21/10/39 to 23/10/39	<i>Germaniawerft</i>
24/10/39 to 13/11/39	<i>Germaniawerft</i> (dry-docked between 01/11/39 and 08/11/39)
12/39 to 02/40	<i>Germaniawerft</i> (dry-docked in DWK Dock XI in January and February 1940)
08/03/40 and 09/03/40	Wilhelmshaven
30/03/40 to 01/04/40	Dry-docked in dock II of Wilhelmshaven's <i>Westwerft</i> shipyards
29/04/40 to 31/05/40	<i>Germaniawerft</i> (dry-docked between 09/05/40 and 15/05/40)
08/07/40 to 20/08/40	<i>Germaniawerft</i> (dry-docked between 26/07/40 and 08/08/40)
27/09/40 to 14/10/40	<i>Marinewerft</i> (dry-docked between 04/10/40 and 09/10/40)
Late October 1940	<i>Marinewerft</i>
07/12/40 to 19/02/41	<i>Marinewerft</i>

Part VIII - References & Sources

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⊕ Cover (bottom).

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