Type VII U-Boat Modifications

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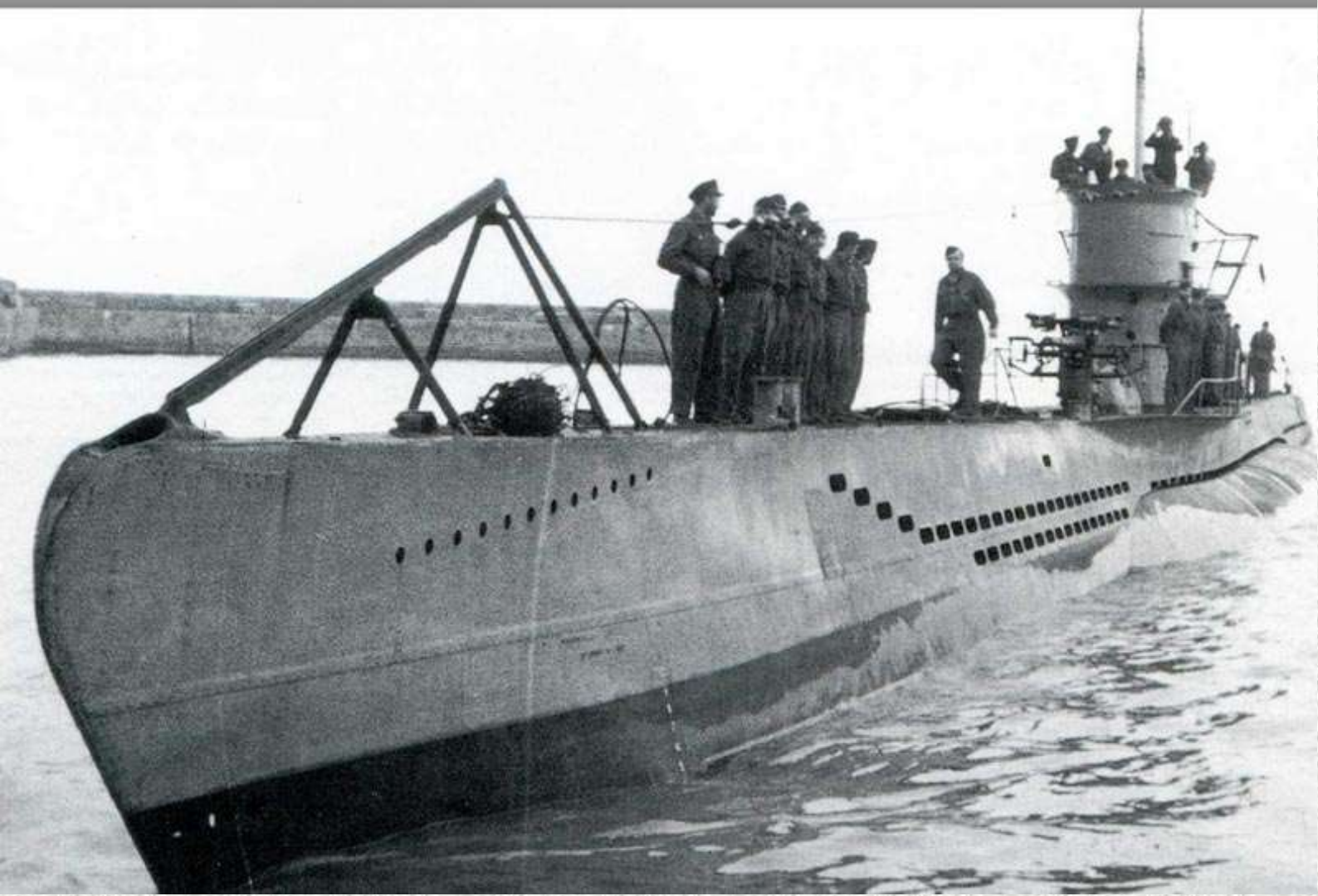
Accurate Model Parts



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Part I - Introduction

Several years ago, Revell released a 1/72nd scale kit of the early Type VIIC U-boat. The kit (number RV5015, named *Wolf Pack*) has become familiar to a large number of submarine modelling enthusiasts throughout the world. The aesthetic appeal of the VIIC and size of the kit enticed many armour and aircraft modellers away from their usual subjects and into the world of marine modelling. Due to the large scale and a market full of suitable aftermarket sets, it has also become a popular subject for many skilled super-detailers.

A little later, in 2006, Revell delighted us once again by releasing another 1/72nd U-boat kit (RV5045), this time for the Type VIIC/41. More recently Revell released a 1/144th scale early VIIC kit, which is essentially a half-sized version of its bigger brother. With such decent kits available to us, we now have the opportunity to make very accurate reproductions of the VIIC and VIIC/41 boats.

However, despite having decent kits to work with as a base, the opportunity for building very accurate VIIC models is still denied to many modellers. This is partly due to a limited understanding of the wide array of modifications that were made to the Type VIIC U-boat fleet. Without this essential knowledge, skilled super-detailers can opt for certain features that were not present on their chosen boat. Only with enough knowledge can their talents be fully utilised.

Whenever we study U-boats, we must always bear in mind that they were constantly modified. These improvements were made in an attempt to meet the changing technological and operational requirements of the Battle of the Atlantic. Newer more sophisticated equipment was fitted throughout the war. Older equipment was phased out, as were other features that were deemed to be superfluous to current requirements.

As a result of these modifications, the VIICs and VIIC/41s that managed to survive until the cessation of hostilities in 1945 had so many different external features to the first VIIC launched in June 1940. These modifications also mean that an individual boat could look different at various stages. For example, the tower of U 333 in April 1944 was very different to the tower of this boat when it was launched in June 1941.

Modellers often ask whether the U-boat they have chosen to model had net cutters, breakwaters or a wind deflector. And if so, when did their boat have these features? And when were they removed? They are often unclear about what time period the Revell kits are suitable for, and what alterations are needed to depict a mid-war boat.

No book will answer these pertinent questions. Even with a dozen books at their disposal, each replete with period photos, the modeller will struggle to identify how their chosen boat was modified and what features were present at a given time. With this in mind, I have written this article to address some of modifications that VIIC and VIIC/41 modellers should be aware of. The modifications made to the Type VIIA and VIIB are included to show the developments of the VII that preceded the launching of the first VIIC. I have limited the scope of this article to points of

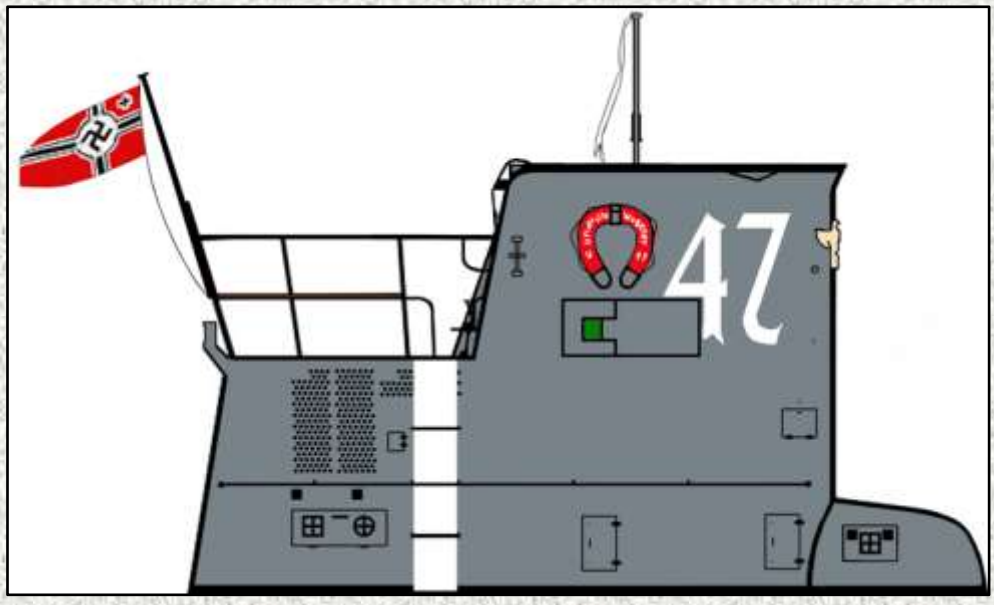
specific interest to the U-boat modeller. As such this overview is **NOT** intended in any way to be a comprehensive paper detailing every change made throughout the fleet.

Part II - Type VIIA & VIIB Modifications

Pre-war features

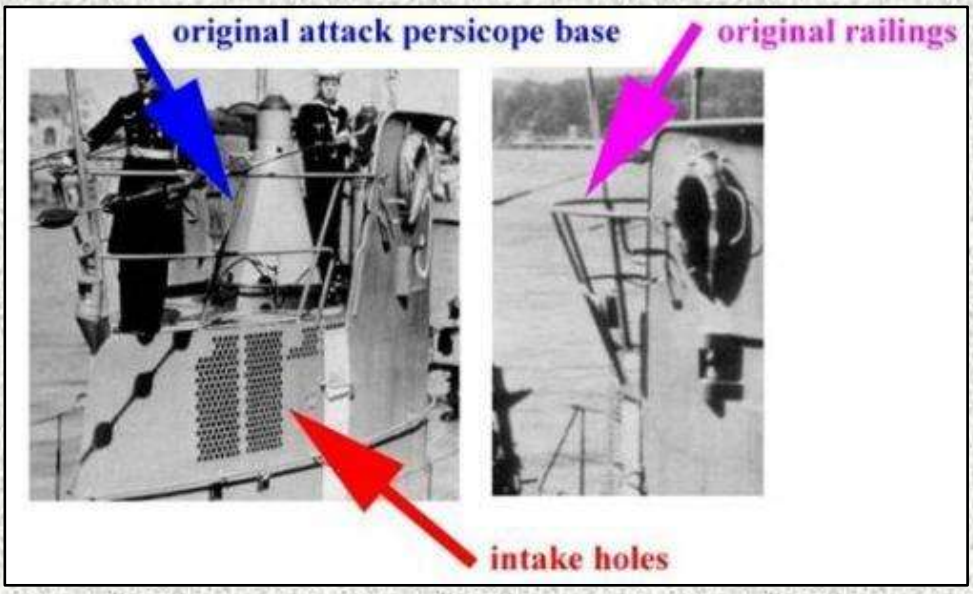
The VIIAs and early VIIBs had the following pre-war features -

- The U-number painted in large white numerals approximately 1 metre tall on both sides of the conning tower.
- a small plate (on each side) inscribed with U and the U-number (eg. U 35) just under the small drainage holes near to the bow.
- a bronze eagle plaque on the front face of the tower.
- the red horseshoe-shaped lifebelts on each side of the conning tower had the flotilla and U-number (e.g. "U-Flottille Wegener" and "U 48") marked in white letters. In some cases the lifebelt may have been marked with only the U-number.
- 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 the U-number.



Above: The starboard side of the U 47 at the start of the U-boat's career on the 17th December 1939. 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. There is no spray deflector halfway up the front of the tower.

Attack periscope base - The early attack periscope base was wider and of a simpler shape than the later bases. The VIIAs and the early VIIBs U 45, U 46, U 47, U 48, U 49, U 51, U 52 and U 53 had the early base. The VIIBs U 83 - U87, U 99 - U 102, and all VIICs, had the later base. The VIIBs U 50, U 54 and U 55 may have had either the early or later base.



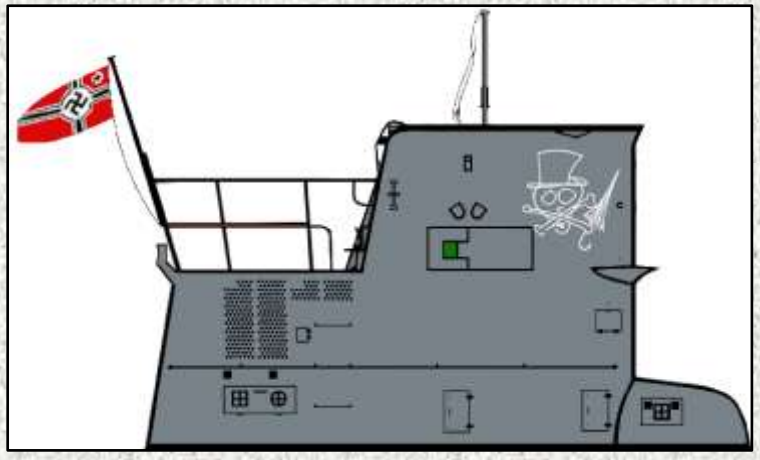
Above (1a & 1b): Early features on two photos of the VIIB U 51. The shape of the early VII railings and the early attack periscope base can be seen. Note the vertical ridge along the rear of the base. There were two circular holes near the foot of the base, plus two semi-circular holes at deck level. The railing bars near the foot of the attack periscope base were to allow another lifebelt to be housed.

Left (2): 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 railing seat is longer on the starboard side. The railings do not overhang as much as the VIIC railings. At this stage the 20mm was located on the aft deck rather than the tower. In the foreground can be seen the 20mm mount, minus the 20mm itself, which was stored below.

Net cutter - All the earliest VIIBs were launched with the net cutter. At some pre-war stages, some VIIAs did not have the net cutter. For example, U 35 did have the net cutter at some stages before the war, while it is missing in other pre-war shots.

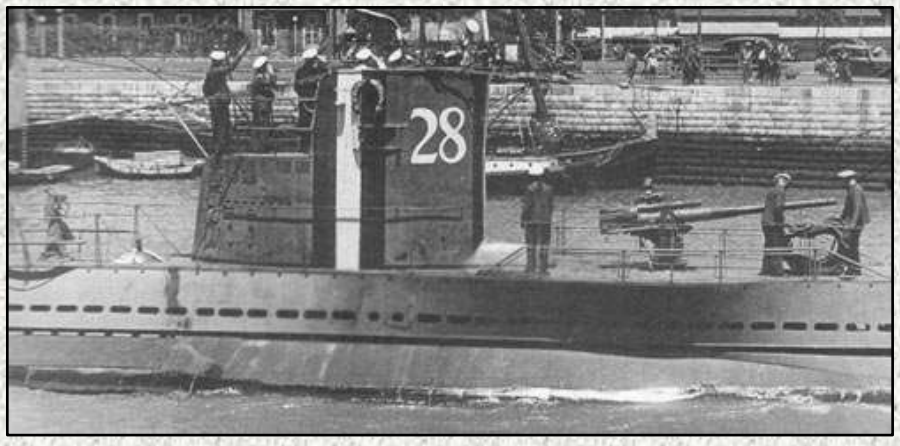
Breakwaters - One feature missing from the very earliest VIIBs was the breakwaters. These were fitted in 1939 to help protect the crew operating the 88mm deck gun from waves. The breakwaters were a standard feature of the VIIBs and VIICs when the earliest VIICs were launched. Note that the breakwaters did not feature on any VIIAs.

Spray deflector - The earliest VIIAs and VIIBs did not have the spray defector on the tower. A small deflector (which only partially extended around the tower) was fitted to the VIIBs in 1939 prior to the war.



Above right: U 47's tower in October 1939, with the small interim spray deflector.

Right (3): The VIIA U 28, with Spanish Civil War stripes. The line of flooding holes along the hull casing show this to be a VIIA. There is no spray deflector halfway up the front of the tower. Some early VIIAs had a lattice mesh grill beneath the forward deck railings; this feature was discontinued at some stage.



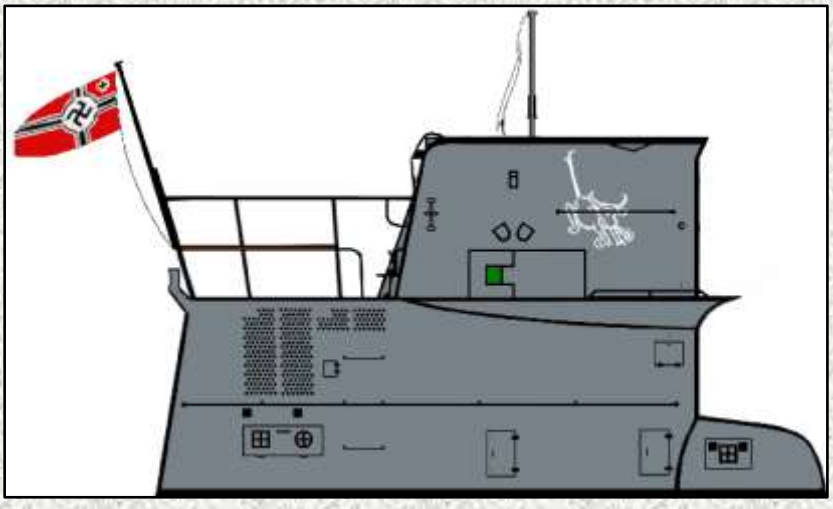
Removal of pre-war features - In late August 1939, many U-boats left to take up positions at sea in readiness for the commencement of hostilities. Knowing that the war was to start, the Germans made the following changes before the boats left on patrol -

- large U-numbers painted over.
- oval bow plates removed.
- bronze eagle plaque removed.
- identification markings on the lifebelts and lifebuoys painted over.
- two red and white emergency rescue buoys moved inside deck hatches.

Early war VIIA and VIIB modifications

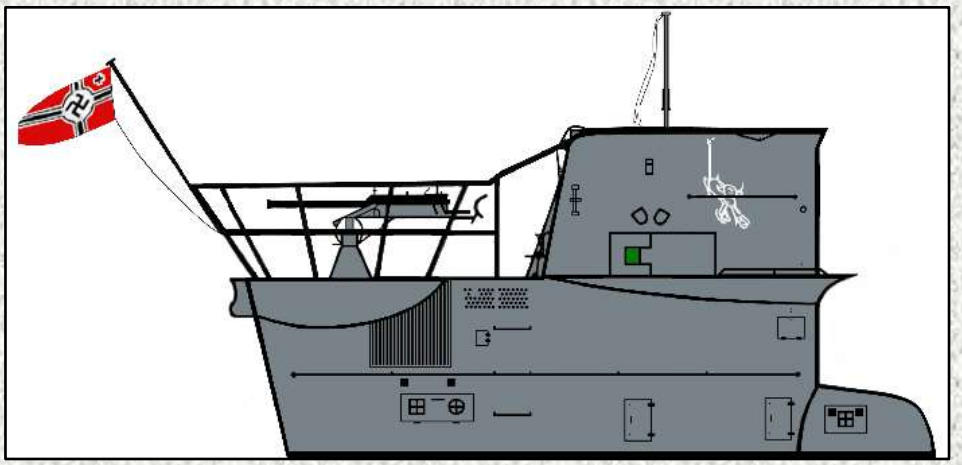
Spray deflector extension - In late 1939, the small interim spray deflector on VIIBs was extended around the tower.

Re-siting of 20mm - The VIIAs and the early VIIBs had their 20mm Flak gun mounted on the aft deck. This was not an ideal site as the tower 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 the conning tower. The re-siting of the 20mm took place over the cold winter of 1939/40.



Left: A larger spray deflector was extended to the rear of the tower bulwark.

Below: A few months later the rear of the VIIA and VIIB towers were completely rebuilt to accommodate the 20mm.

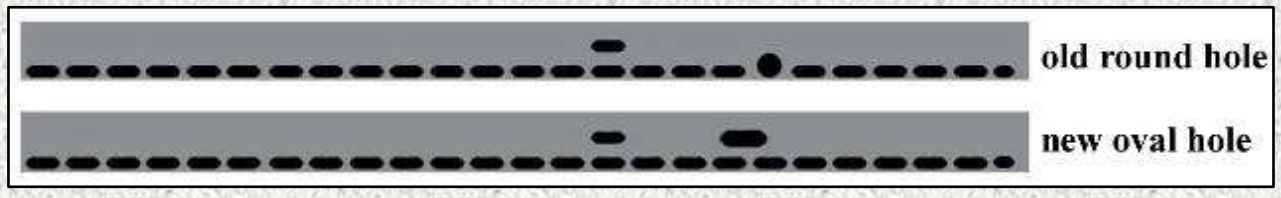


To accommodate the 20mm, the rear of the conning towers had to be greatly modified. The railings curved around in a circular shape to follow the much wider circular-shaped tower floor. These significant changes made the tower look quite different than before.

Since the rear of the tower was much 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 the new VIIB towers sloped in the opposite direction than before. A comparison between the old and new towers can be seen later in this article.

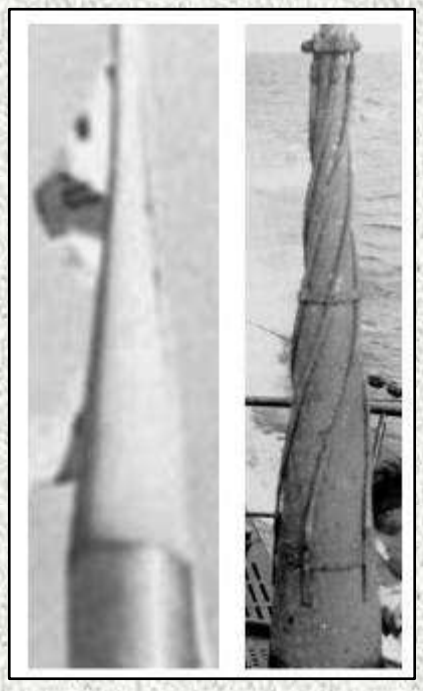
The anti-slip bars around the old 20mm mount location on the aft deck were removed at this time.

Exhaust outlet - At some stage, perhaps the spring of 1940, both diesel exhaust outlets were modified from being round in shape to being oval in shape. The changes in exhaust outlet are covered in more detail later in this article.



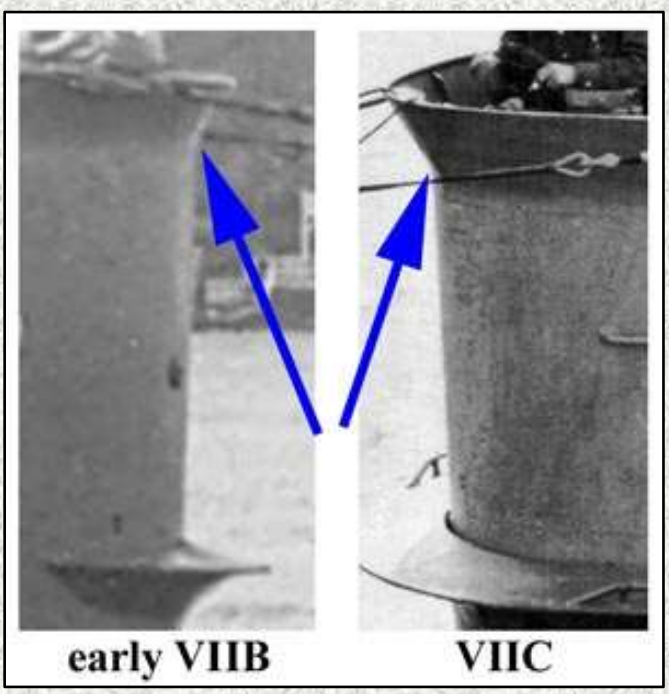
Above: The change from round to large oval exhaust outlet.

Anti-vibration wires - The top of the attack periscope on VIIAs and early VIIBs had no wires around the top. At some stage in 1940, anti-vibration wires were added to the top of periscopes to help reduce the wake left by a raised periscope. All the VIICs would have this feature.



Tower top edge - On the VIIAs and early VIIBs, the top of the tower on the outside face curved outwards at the top. At some stage it was decided to increase this curve slightly. On the images below, the vertical sides on the early VIIB extend higher up than on the VIIC (the blue arrow shows where the tower began to curve). This difference was quite slight, and isn't that noticeable unless one studies photos closely.

The VIIAs and the early VIIBs U 45, U 46, U 47, U 48,



Above (4a & 4b): On the left can be seen an early attack periscope, with no wires. The photo on the right shows anti-vibration wires winding around an attack periscope.

Left (5a & 5b): A comparison between the top edge on an early VIIB and a VIIC.

U 49, U 51, U 52 and U 53 had the early tower top. The VIIBs U 50, U 54, U 55, U 83 - U 87, U 99 - U 102, and all VIICs, had the later top.

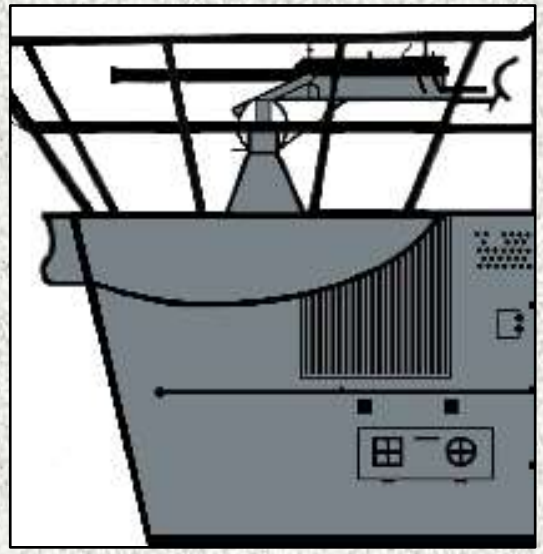
Air supply

On VIIAs and VIIBs, the main trunk providing air to the diesels was routed forward under the rear deckcasing, and then up inside the rear end of the tower (under the deck platform). Ventilation holes to let air into the intake trunk were located on the sides of the tower walls, primarily on the starboard side. As these were susceptible to interruption in high seas, this flawed design offered an inadequate supply of air to the diesels. Several modifications were made to the VIIAs and VIIBs to improve the air supply.

NB. As all VIICs had trunks build up the inside of the tower bulwark (at the rear of the bulwark), none of the VIICs suffered from this problem.

Air supply 1 (grill) - The addition of the 20mm to the tower resulted in some of the ventilation holes on the starboard side being blocked over. To compensate for the loss of these ventilation holes, a grill with vertical bars was added to the starboard side. All the earliest VIIBs - including U 47, U 48 and U 99 - had this grill on the starboard side of the tower.

A few of the ventilation holes on the port side were also blocked over by the addition of the 20mm. However, as these were fewer in number, the fitting of a similar grill to the port side was not deemed necessary.



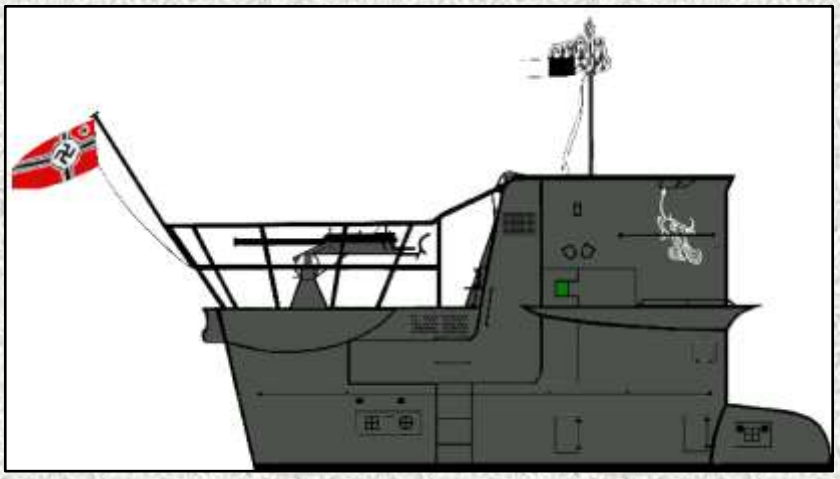
Right: The grill with vertical bars can be seen below the 20mm. A similar grill was **not** added on the port side.

Air supply 2 (trunking) - The supply of air to the diesels remained poor. In an attempt to resolve the issue, large air trunks were introduced in the summer of 1940. Two large L-shaped external trunks were built up both sides of the tower; these started under the 20mm platform and extended up the outside of the tower bulwark. The order to fit these trunks was placed on the 29th July 1940.

Above (6a & 6b): The L-shaped air trunks on the VIIA U 30 (left) and the VIIB U 47 (right). The trunks on U 30 were squarer in shape and smaller than the more rounded trunks on the VIIB. Note also the grill was on the side of the U 47 trunk, as opposed to the top of the trunks on U 30.

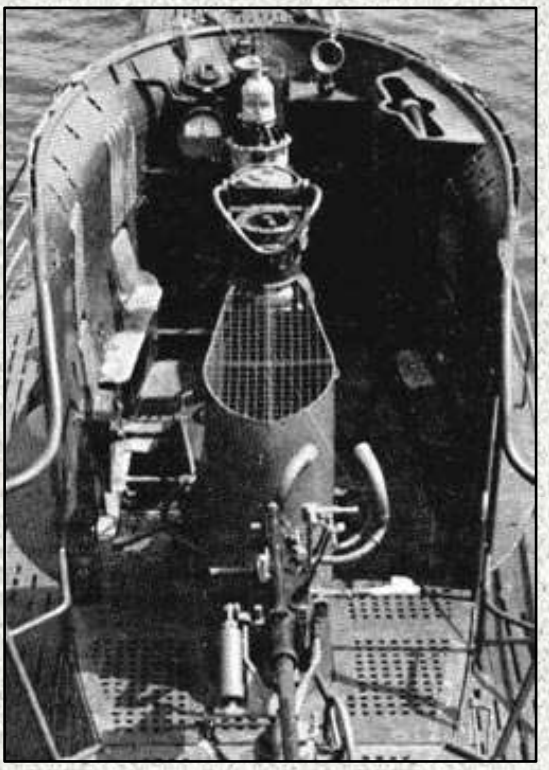
Below right: The tower of U 47 in late 1940, with air trunking on both sides. Note the grip, rung and ladder, which helped crewmen climb up from the deck to the tower.

There were some differences in design between the air trunks. Some were squarer in shape than others. Some boats such as U 30 and U 101 had the grill on the top of the trunks (horizontal surface) while other boats such as U 48 and U 52 had the grill on the sides of the trunks (near the top, on the vertical surface). There were often slight differences between the grill designs. For example, the grill on U 47 and U 48 was a mesh while U 73 had a series of vertical bars.



Grip bars and rungs were added on top of air trunks to allow the crewmen to climb up the sides of the tower. On some boats a short ladder was added from the bottom of the trunk to the deck below. On others such as U 52 no ladder was added.

Air supply 3 (teardrop fairing) - The L-shaped trunks were not the ultimate answer to the air supply problem. Their bulk and position meant that crewmen had to clamber over them when climbing from the deck to the tower. In the spring of 1941 existing VIIBs (and possibly some VIIAs) had their L-shaped trunks removed. A teardrop shaped fairing was then mounted onto the rear of the attack periscope base. U 48 operated with this new intake on the boat's last operational patrol. All the other VIIBs which survived until this time period were fitted with this new feature.



Above (7): The teardrop shaped fairing behind the attack periscope base on the VIIB U 86. The grill is at the top of the fairing.

VIIA and VIIB deck railings

On the early VIIAs and VIIBs, the forward deck railings had only one horizontal bar. There were no wires between the forward deck railings and aft deck railings - they were entirely separate from each other. Following an order placed on the 12th July 1940, two wires were added per side from the forward deck railings to the aft deck railings. These were added in order to help prevent crewmembers from falling overboard. However, the low height of the forward railings meant that an additional three bars - arranged in a triangular shape - needed to be added to the rear of the forward deck railings. These three bars raised the height of the attachment points, thus allowing two wires to run from the new bars back to the aft deck railings.

Extra railings were also introduced between forward and aft railings on VIIAs. Rather than having wires, the VIIAs had a full set of railing (with three horizontal bars) added to this area.

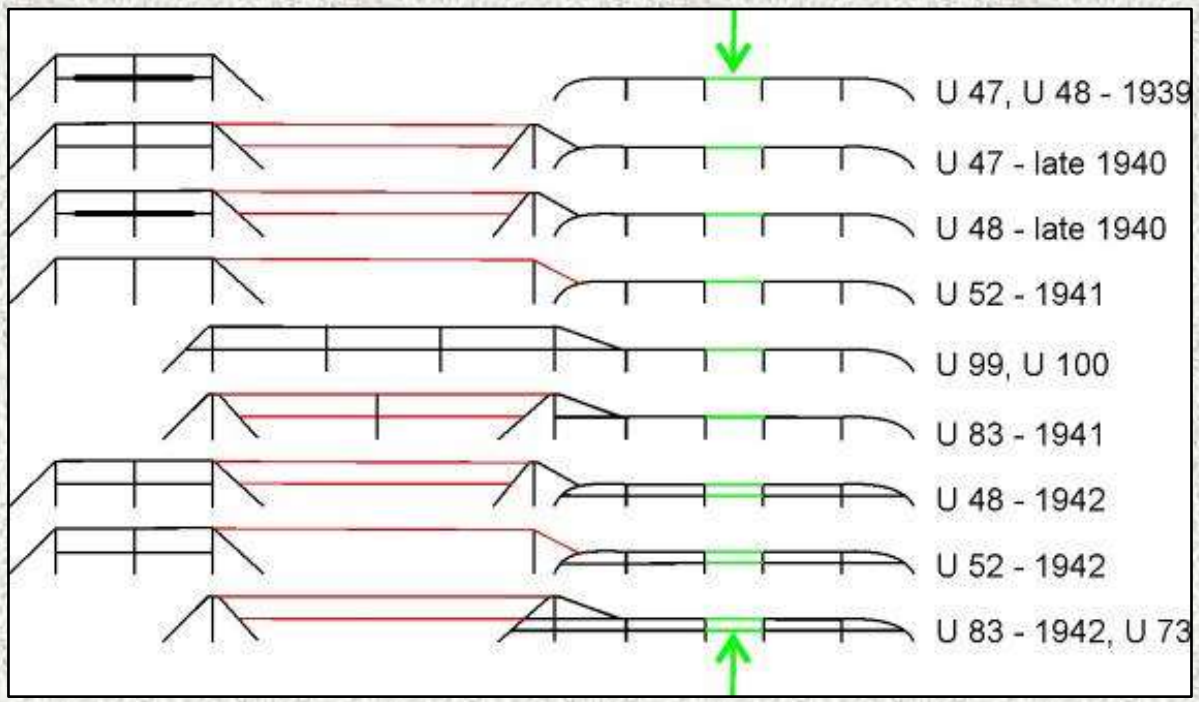
The early VIIAs and VIIBs had a wooden seat on either side of the aft deck. Some boats (U 47 and U 52) had the wooden seats on the aft deck railings removed, leaving only the supports remaining. On other boats (U 46 and U 48) the seats remained in place.

On the front set of railings, one of the horizontal bars (shown in green in the drawing below) was slightly thinner in diameter than the rest. This bar (or both bars when there were two) could be removed. This did happen occasionally in port, when a plank of wood or walkway was extended over the deck at this location; this set up allowed men to walk freely onto to the deck without stepping over the forward deck railings.

When in port, removable deck railings could put in place. These removable railings were housed in the circular holes along the edge of the deck. This tended to occur in pre-war times more than in wartime. However, during wartime commissioning ceremonies the removable railings were usually in place. When the removable railings were used, two stanchions were placed at either end of the green section in the drawing above. There were attachment points (both at the top and bottom) on these horizontal stanchions, and these attachments allowed the removable railings to stay in place.

If we look again at the drawing below we can see that U 99 had a completely different set of railings. This style was a precursor for the late VIIB and VIIC railings which were to follow. In the U 99 style, there were no wires between front and aft railings. Instead there was a full set of railing

bars. Since U 99 never had a 20mm mount on the aft deck, there was no requirement to have a set of deck railings so far back on the aft deck. As a result, the aft railings on U 99 (and late VIIBs and all VIICs) only extended past the tower by a short distance.



Above: A rough sketch of the starboard railings evidenced on VIIB decks. The red lines are the wires which extended from the front to aft railings. The green lines are the removable bars.

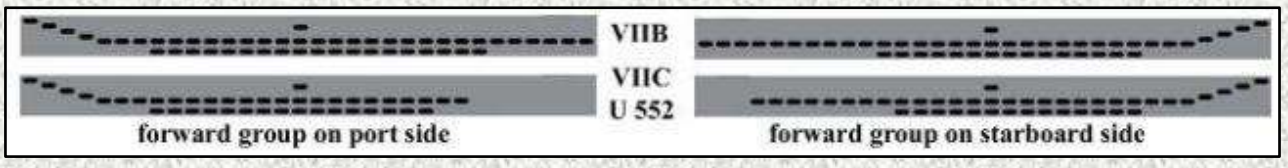
On late VIIBs such as U 83 yet another style of railing was added. These were similar to the U 99 railings, except with wires rather than bars between the front and aft set of railings. It was this style of railing that became standard on all the early VIICs.

On the 3rd February 1941 an order to modify the deck railings was issued. An extra horizontal bar - at mid-height - was to be introduced to the forward railings on VIIAs, VIIBs and VIICs. This order did take some time to complete. U 48 did receive the extra horizontal bar but only after the boat was relegated to training duties in June 1941.

Differentiating between variants

When we are collecting research material for our VIIC or VIIC/41 models, it can be very helpful to be able to differentiate between a VIIC and other VII variants. The VIIAs had a double line of free-flooding holes along the forward end of the hull casing. The top line of holes extended in an unbroken line all the way back over much of the saddle tanks. This pattern of holes, and part of the aft torpedo tube visible on the aft deck, are obvious ways of telling a VIIA in an above-the-waterline photo.

Although the VIIBs look similar to the VIICs, there are several ways of distinguishing between the two variants. A clear method of identifying a VIIB is to count the number of free-flooding holes on the forward hull casing. All VIIBs had more free-flooding holes on the hull casing than on VIICs. The different hole patterns are covered in more detail in the accompanying article *Type VIIC Free-Flooding Vent Patterns.*



Above: On the starboard side of all VIIBs, the top line of the forward group of main holes all have 28 holes. The maximum number on VIICs was 25. On the port side the VIIBs also had 28 holes. The maximum number on VIICs on the port side was 21.

Below (8a-8c): The red line has been added over the trailing edges. The left image shows the trailing edge when the 20mm mount was on the aft deck. A comparison of the middle and right image shows how we may distinguish a VIIB with the 20mm on the tower from a VIIC.

If there is no 20mm on the tower we can be certain the boat is an early VIIA or an early VIIB. To distinguish between a VIIC and a VIIB that has the 20mm on the tower, we only need to look at the trailing edge of the tower. The VIIBs with the 20mm had the trailing edge sloping in the opposite direction.

If we see L-shaped trunks or the teardrop fairing we know the boat is either a VIIA or VIIB. The reason we can be sure of this is that on all Type VIIC U-boats the air intake trunks were built up the inside walls of the tower.

The VIID can be distinguished by the mineshafts directly behind the tower. The VIIF can be easily recognized by the extended length and the numerous free-flooding holes extending all the way along the hull casing.

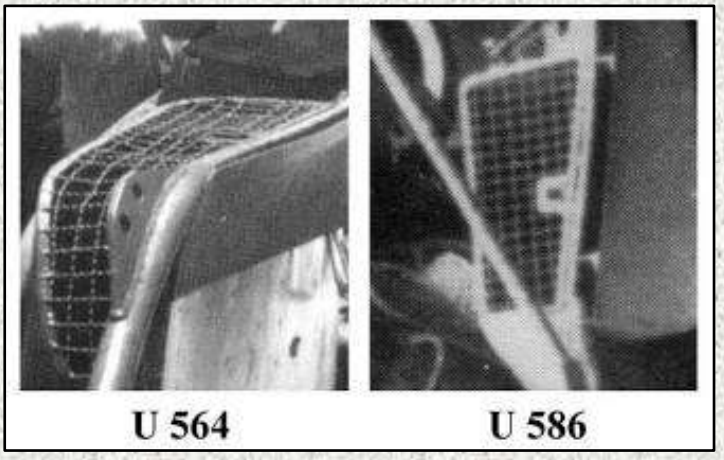
A number of the VIIC modifications which follow in the next section were just as applicable to the existing VIIBs as they were to the VIICs. These modifications were made to all the existing VIIBs and VIICs, regardless of the variant. For example, when U 48 was relegated to training duties the boat had the net cutter removed and was fitted with a wind deflector flange.

Part III - Early Type VIIC Modifications

Air intake grills

On all Type VIIC U-boats the air intake trunks were built up the inside walls of the tower. There were two styles of intake grill on VIICs -

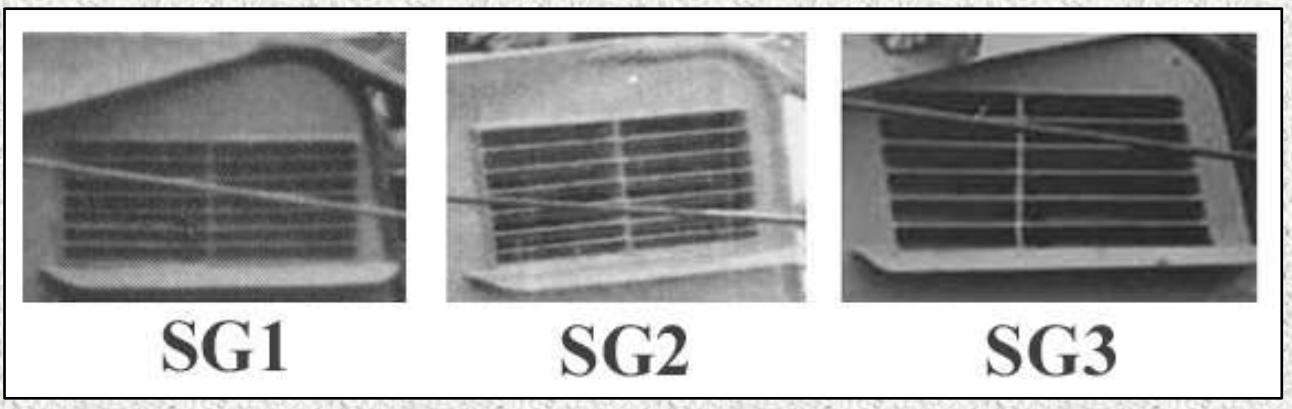
Mesh grill - This most common style, found directly at the top of the trunks, took the form of a wire-mesh screen. It can be seen at the top of Revell parts 49 and 50 (the part numbers in the text below refer to part numbers in Revell's early VIIC kit).



Slat grill - This less common style was found on the outside walls of the tower, high up and near the rear, and took the form of slats (parts 117 and 118). There were three different styles of slat grill. SG1 and SG2 featured on *Germaniawerft* built boats in the batches U 69 - U 72, and U 93 - U 98. SG3 appears to have featured on the *Blohm & Voss* built boats in the U 551 - U 557 batch.

Above (9a & 9b): Two different types of mesh grill.

Below (10a-10c): Three different types of slat grill.



SG1 - 7 horizontal spaces, with a vertical bar in the middle. The border sides were directly vertical, and not sloped. This group included U 95, U 96 and U 97.

SG2 - 7 horizontal spaces, with a vertical bar in the middle. The border sides were sloped, as was the vertical bar. This group included U 69, U 71, U 93 and U 94.

SG3 - 6 horizontal spaces, with a vertical bar offset from the middle. The border sides were sloped, but the vertical bar was directly vertical. This group included U 552 and U 557.

There was usually a curved lip below the grill on the majority of boats. One exception was U 95, which had no lip in this area.

Mast antenna housing

The majority of VIICs had a hydraulically extendable mast antenna housing (hereafter referred to as MAH) on the port side of the tower. However, some of the early VIICs did not have the MAH (part 125 in Revell kit). Looking from above, the MAH is semi-circular in shape, and greatly changes the look of the tower on the port side.

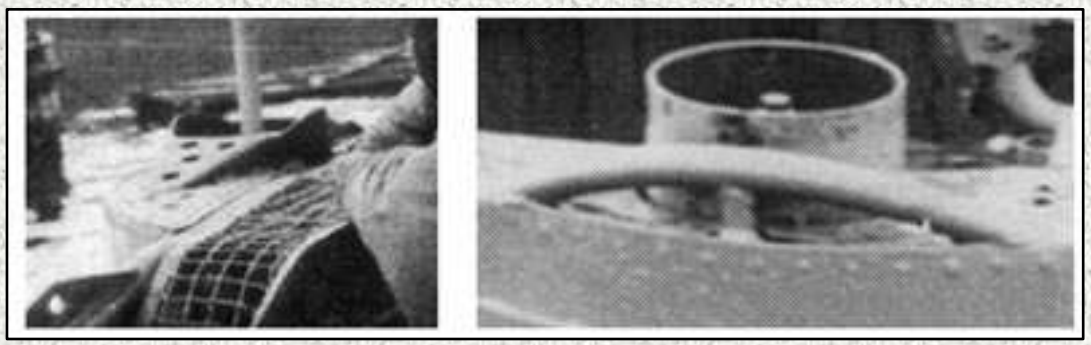
The following is a guide to which boats had the MAH and air intake grill styles -

Above (11a-11c): The semi-circular MAH can be seen to the right of the crewmen in the Group 1 photo. A lifebelt is attached to the top of the MAH.

Group 1 - The majority of VIICs had the MAH. All boats with the MAH had the mesh grill. All boats other than those with the numbers below fall into this category.

Group 2 - The very earliest VIICs had the slat grill and no MAH. These were U 69 - U 72 (*Germaniawerft*), U 93 - U 98 (*Germaniawerft*), U 551 - U 557 (*Blohm & Voss*), and U 331 (*Nordsee-Werke*). The popular boats U 69, U 96 and U 552 therefore fall into this category.

Group 3 - Some other boats had the mesh grill but no MAH. Many, if not all, of the *Blohm & Voss* boats between and including U 558 and U 574 fall in this category. Other boats which fall into group 3 are U 392, U 651 and U 751, which were all built at different shipyards. Given the large number of VIICs built, it is likely that other boats also fall into group 3.



Above (12a & 12b): The top of the MAH had different features. Boats such as U 201 and U 404 had the type featured in the left photo, which may be an earlier style. Many other boats, such as U 441 in the right photo, had a tube next to a protective bar. The height of the cylinder and protective bar varied between boats.

Earliest VIIC features

Net cutters - The one feature which has sparked countless questions is the net cutter (parts 111 to 114). Two net cutters were present at the bow of the very earliest VIICs - one on the forward deck and the other below the waterline on the stem. On the 1st March 1941 the order to remove the net cutters was issued. As a result, **most** of the net cutters were removed in March and April 1941.

U 96 early

U 96 late

Above (13a & 13b): The photo on the left shows U 96 with a net cutter. The photo on the right shows U 96 after the net cutter had been removed. The red arrows point to two of the triangular attachment points which were left at the edge of the deck when the net cutters were removed. There would be five brackets in total left upon removal of the net cutter.

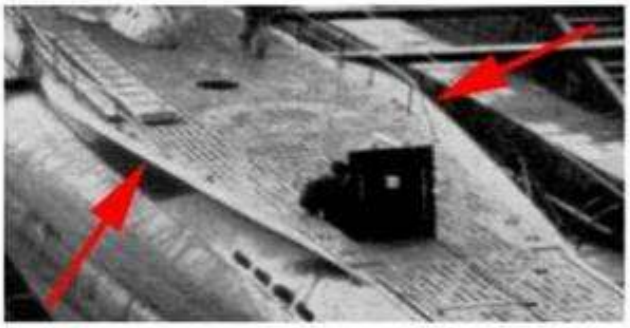
However, the net cutters were not removed from all boats in this period. For example, U 96 still had net cutters when arriving back from patrol on the 22nd May 1941. Similarly, U 94 still had net cutters when returning from patrol on the 4th June 1941. U 94 had been in port throughout March, and again for 11 days in April. But there are a variety of reasons why the net cutters were not removed from U 94 during these two periods. One reason may have been the necessity to get the boat back to sea as quickly as possible.

Opinions on whether the lower net cutter was removed at the same time as the upper net cutter vary. Some enthusiasts suggest the lower one may have been left in place. Others hold the view that both would have been removed at the same time. As I have yet to find a photo of a boat with a lower net cutter but no upper net cutter, I would suggest the latter.

The net cutter removal was not just applicable to VIICs. The Type IIs, IXs, VIIAs and VIIBs that were serving in the spring of 1941 all had their net cutters removed as well.

Breakwaters - The order to remove the breakwaters (parts 115 and 116) from VIIBs and VIICs was issued on the 21st May 1941. However, a few boats such as U 96 had their breakwaters removed slightly earlier. Generally speaking, the removal of the breakwaters occurred in the April/May/June 1941 period. Prior to this the breakwaters were generally present, while after this they were generally absent. The removal of this feature before the order issue date may have been done for evaluation purposes.

Below (14a & 14b): Type VIICs before and after the fitting of the breakwaters.



U 201
with breakwaters

U 82
no breakwaters

A pattern of small, round free-flooding holes usually replaced the breakwaters. This was intended to help the boat dive slightly faster, but any improvement must have been marginal. Some boats, and indeed all of the late war VIICs and VIIC/41s, did not have any holes in this area at all.

The pattern of holes in this area are covered in the accompanying article *Type VIIC Free-Flooding Vent Patterns.*

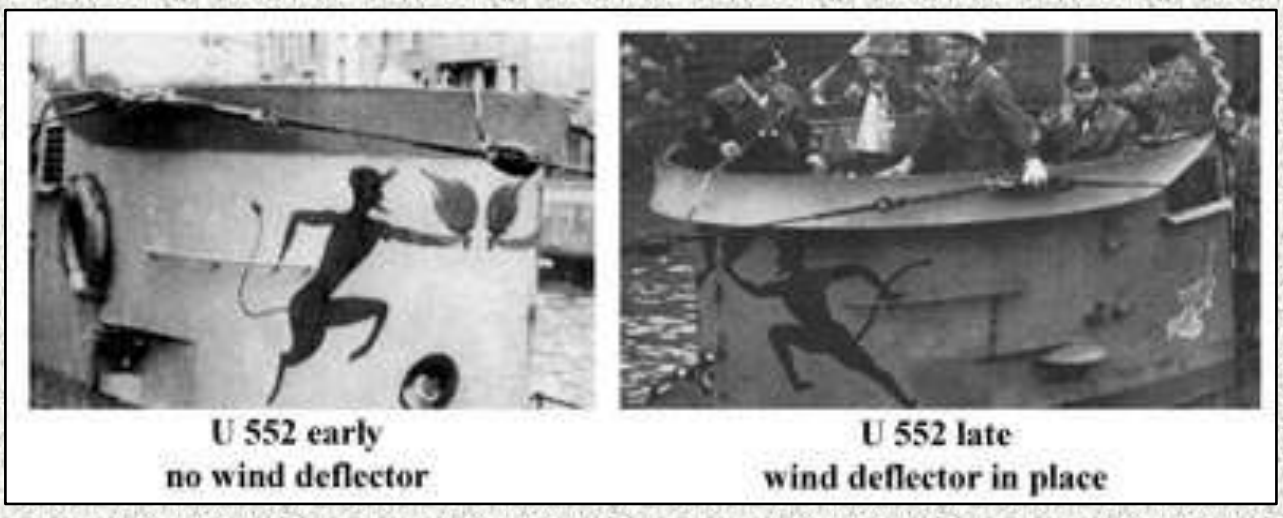
Wind deflector - Another modification was the wind deflector (parts 121 or 124). Fitted around the outside edge of the top of the tower, this flange was intended to block some of the wind and spray that blew upon the lookouts' faces. Note that this wind defector is not to be confused with the spray defector that featured halfway up the tower on every VIIC.

The earliest VIICs did not have the wind deflector. The fitting of the wind deflector was ordered on the 29th May 1941. However, the process of fitting this feature seems to have been between December 1940 and December 1941 or so - a far greater time period than the process of removing the net cutters or breakwaters. One of the first boats to be fitted with this feature was U 69; it was present during the boat's commissioning ceremony on the 2nd November 1940. Other early examples of boats with the wind deflector are U 651 (December 1940) and U 96 (April 1941). But most boats during this period did not have this feature. It began to appear very slowly throughout the course of 1941. By July 1941, U 203 and U 701 did not have this feature. U 201 did not have the wind deflector in July either, and may not even have had this in September 1941. Nor did U 559 have this feature by late October 1941, while U 564 appears not to have had a wind deflector in November 1941.

Generally speaking, therefore, the wind deflector appeared as early as November 1940 but was still not present on some boats in November 1941. The boats that did have this feature before the order was issued were likely modified for evaluation purposes.

There may have been exceptions in relation to the boats serving in the Mediterranean. The VIIB U 73 did not even have wind deflector in September 1942, nor did U 81 in April 1942. This may have been in relation to the boats serving in the Mediterranean theatre.

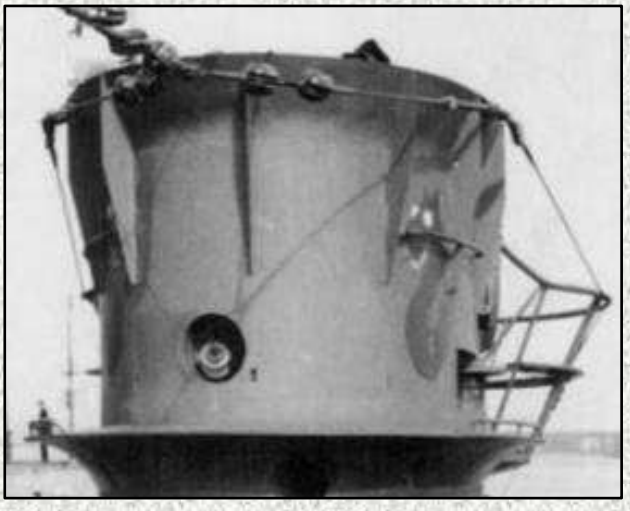
Below (15a & 15b): The same boat - U 552 - before and after the fitting of the wind deflector.



U 552 early
no wind deflector

U 552 late
wind deflector in place

Experimental wind deflector - The reason that U 69 was fitted with the wind deflector at such an early stage may have been for test purposes. In the months that followed there was likely an assessment of whether the flange had any appreciable benefit to the crewmen in the tower.



Left (16): An experimental wind deflector on U 71.

A different style of wind deflector was tried out on U 71. This experimental deflector consisted of ten vertical supports; these may have been intended to break the waves flowing against the tower. U 71 did have these supports during the boat's commissioning ceremony (with 12 rather than 10 supports). Two of the supports were removed at some stage. The boat still had these supports by the time it put into St. Nazaire in July 1941, and may have retained them into 1942.

U 70 also had these ten vertical supports, which were added some time after the launching of the boat in October 1940. At the beginning of 1941, U 70 had the usual style of wind deflector flange **on top** of the supports. A very fine photo of this feature, and informative text, can be found on pages 18 and 19 of edition 3 of the magazine *U-Boot im Focus*. The magazine always includes particularly interesting and good quality U-boat photos, and is highly recommended.

Combinations on popular boats - The following is a partial list of the combinations on the most popular boats. This is not complete due to absence of photographic material.

Combination on popular U-boats				
Boat	**Time**	**Netcutter**	**Breakwaters**	**Wind deflector**
U 69	19/09/40 (launch)	Y	Y	N
	02/11/40 (com)	Y	Y	Y
	05/05/41-08/07/41 (P3)	?	Y	Y
	Later in 1941	N	N	Y
U 93	Until 14/02/41 (com,P1,P2,P3)	Y	Y	N
	03/05/41-10/06/41 (P4)	Y	N	N
	(Possible combination?)	N	N	N
	Later in 1941	N	N	Y
U 94	Until 04/06/41 (com,P1,P2,P3,P4)	Y	N	N
	By late 1941	N	N	Y
U 96	14/09/40 (com)	Y	Y	N
	12/04/41-22/05/41 (P4)	Y	N	Y
	27/10/41-06/12/41 (P7)	N	N	Y
U 201	07/12/40 (launch)	Y	Y	N
	22/04/41-18/05/41 (P1)	N *	Y	N
	08/06/41-25/08/41 (P2,P3)	N	N	N
	Later in 1941	N	N	Y
U 552	14/09/40-16/03/41 (launch, com, P1)	Y	Y	N
	07/04/41-06/05/41 (P2)	N	Y	N
	Later in 1941	N	N	Y

Y=yes, N=no, P = patrol number, com = commissioning ceremony
* The absence of the net cutter on the 1st patrol is likely but not certain.

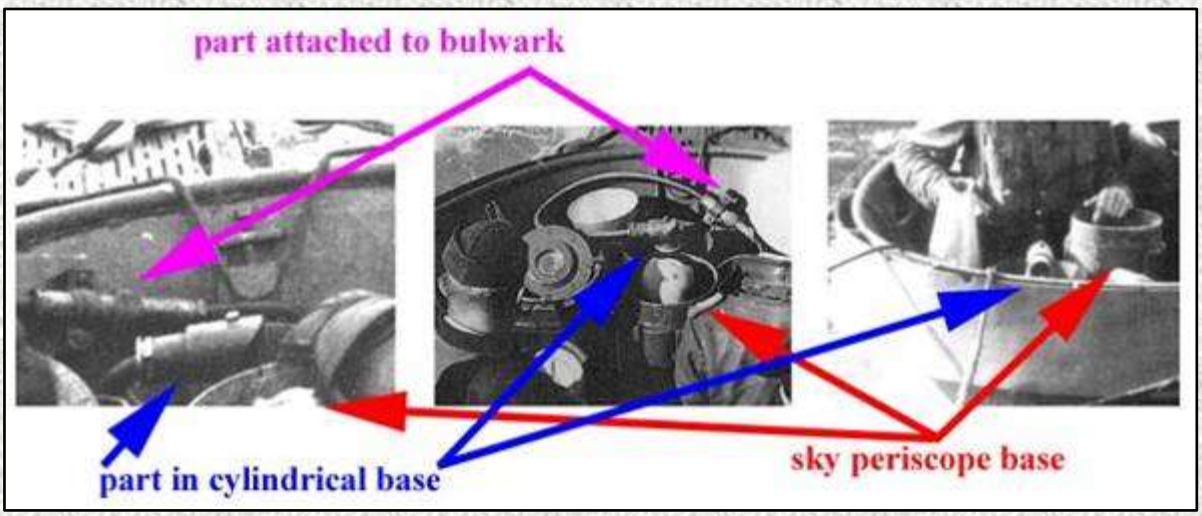
Please note the following on U 96 -

- the combination featured on U 96 in April and May 1941 (4th patrol) was quite unusual. The net cutter would usually be removed before the breakwaters were removed.
- Lothar-Günther Buchheim was a guest aboard U 96 on the 7th patrol. He drew upon his experiences when writing his classic novel *Das Boot.* The movie of the same name was based upon Buchheim's novel.
- the U 96 in the movie *Das Boot* has the following combination: netcutter-yes, breakwaters-yes, wind deflector-yes.

Please note the following on U 552 -

- U 552 had a sortie from 13/02/41 to 15/02/41. The 1st active patrol was from 18/02/41 to 16/03/41. On some sources the 1st patrol is given as the 2nd sailing (and the sortie given as the 1st sailing). Just to be clear, here the 1st patrol (P1) refers to the period from 18/02/41 to 16/03/41.
- the addition of the wind defector to U 552 may have occurred during the same refit as the removal of the breakwaters or, as in the case of U 201, during a later refit.

Mobile voice pipe - On the very earliest VIICs (and VIIBs) there was a piece of equipment at the front of the inside of the tower. The part can be seen in the photos below -

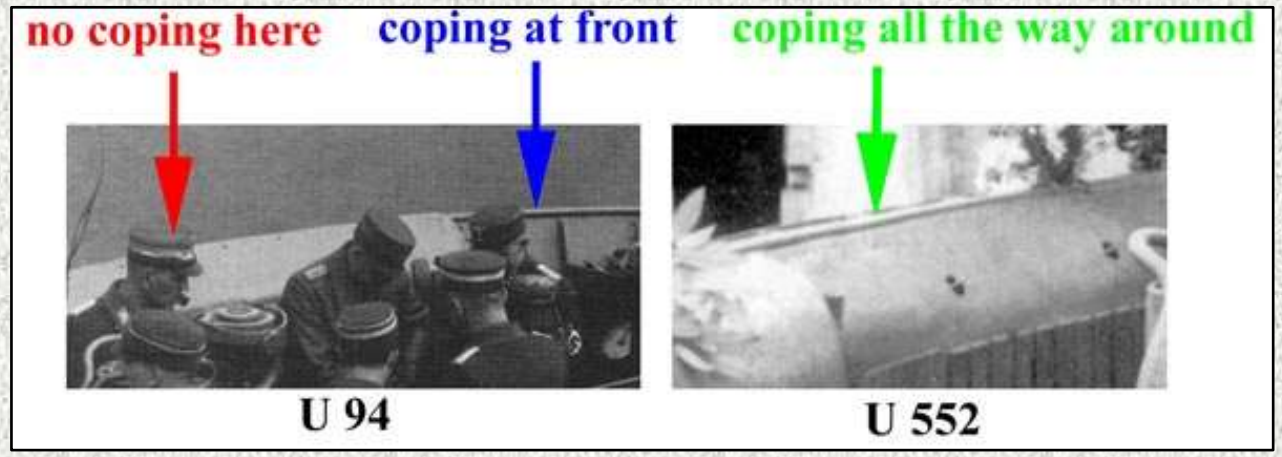


Above (17a-17c): The red arrows point to cylindrical base for the sky periscope, with the head of the sky periscope visible at the top. Ahead of the periscope base was another cylindrical object, which did not extend as high up as the periscope base. The blue arrows points to this base and the part inside. If we look at the middle photo we can see what appears to be a rubber hose running to another part. This second part, pointed to by the magenta arrows, was attached to the tower bulwark (sometimes this part offset to port, other times offset to starboard).

It has been suggested that this mystery equipment may have been a mobile voice pipe. The parts were in place on U 69, U 94 and U 96 but whether it featured upon U 201 is unclear. It was not in place on U 552 or the mid to late war VIICs.

Coping - On the earliest boats, coping (a circular bar) ran along the inside of the top edge of the bulwark. This only featured at the front of the tower, and was not in place towards the rear. This was the case on early VIIBs (such as U 48 and U 99) and earliest VIICs (such as U 69 and U 96).

Below (18a & 18b): Slight differences in the coping can be found between U 94 and U 552.



Other boats (such as the VIIB U 86 and the VIIC U 552) the coping was extended around the whole of the top of the bulwark, all the way to the rear of the tower.

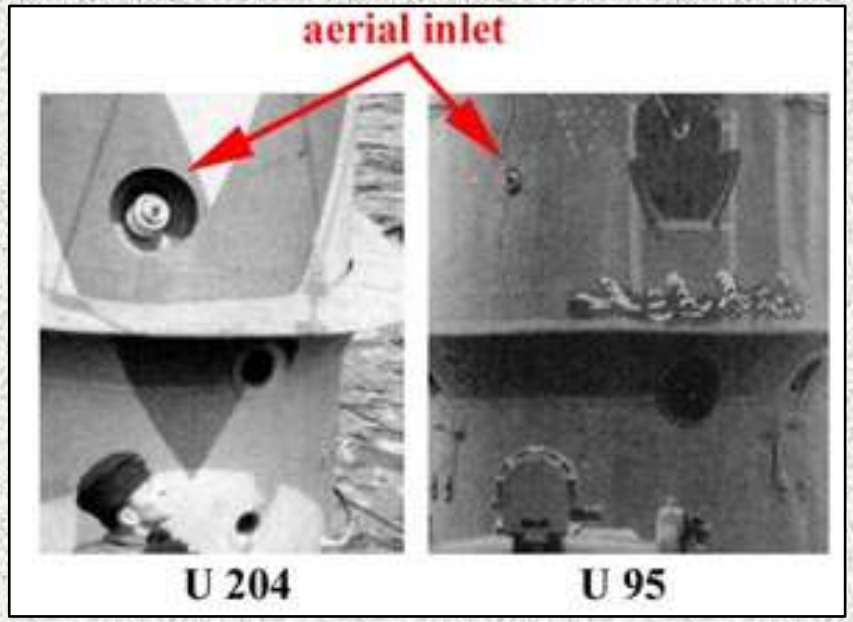
Tower railing seats - Many VIICs had three separate seats on either side. Examples include U 253, U 404, U 441, U 552, U 558, U 570 and U 586. However, some boats had one long seat, which extended the same length of the three small ones. This one long seat per side featured upon U 69, U 71, U 94, U 96 and U 201. This one long seat does appear to be particular to early *Germaniawerft* built VIICs.

Below (19a & 19b): The different aerial inlets on U 95 and U 204. The two holes (one of which is for a foghorn) can just be seen below the spray deflector. On late war boats one or both of these holes was omitted.

U 93 - U 98

The earliest *Germaniawerft* boats in the U 93 - U 98 batch had three features that remained from the VIIAs and early VIIBs.

U 93 - U 98 forward radio aerial inlet - The spray deflector on VIICs was located halfway up the outside face of the tower. Just above the spray deflector was a hole offset to starboard. Inside this hole was the radio aerial inlet for the forward jumping wire. A thin wire extended from this inlet to the jumping wires (which served as a radio aerial) above. This inlet was an insulated conduit which prevented the wire from short circuiting on the metal conning tower.

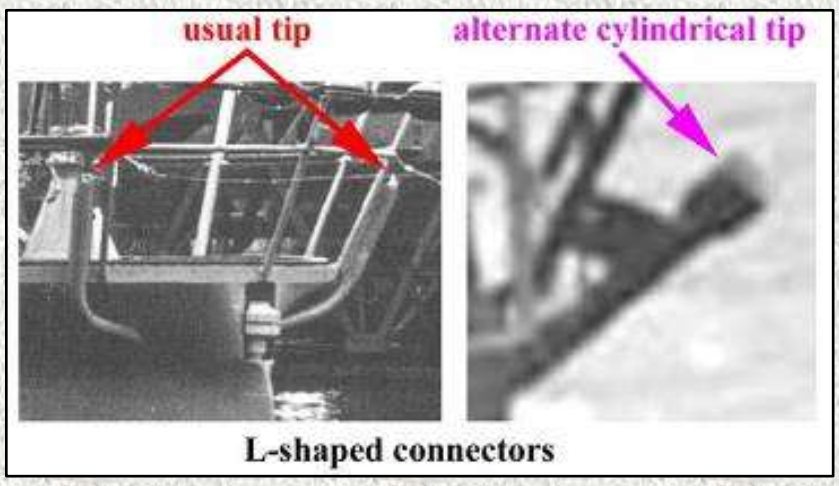


The earliest *Germaniawerft* boats (U 93 - U 98) were different from the other early VIICs in respect to their radio inlets. They did have the radio inlet aerial at this location, but the large surrounding hole around the inlet was not present on these particular boats. This style of inlet was also used on the VIIAs and early VIIBs.

Almost all of the VIIBs had the old style of inlet. One exception was U 87, which was the very last VIIB to be built. Another exception is in respect to U 52: this boat was built with the old style of inlet but was modified to the new inlet at some stage.

U 93 - U 98 rear radio aerial inlet - The majority of VIICs had two L-shaped connectors which ran parallel to the two vertical railing stanchions either side of the rearmost stanchion. The bottom of the connectors entered the tower beneath the rear of the tower floor, while a very thin wire ran from the top of the connectors to the jumping wires above. These L-shaped connectors were insulated conduits which prevented the wires from short circuiting on the metal conning tower. There were slight variations in their style - most had a pointed top while some had a cylindrical top.

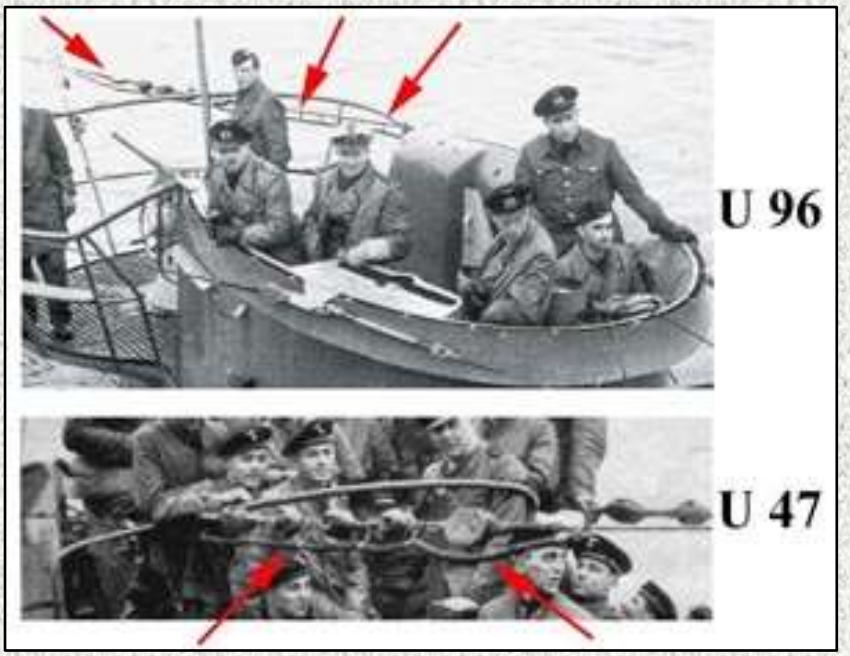
U 93 - U 98 were different to most VIICs in that they did not have the L-shaped connectors at the rear of the tower. The absence of L-shaped connectors is an excellent way of identifying a VIIC between the U 93 - U 98 range.



Left (20a & 20b): Photos showing the position of the connectors and the two different styles of tip. The VIIAs, early VIIBs, and the very earliest VIICs (U 93 - U 98) did not have these connectors.

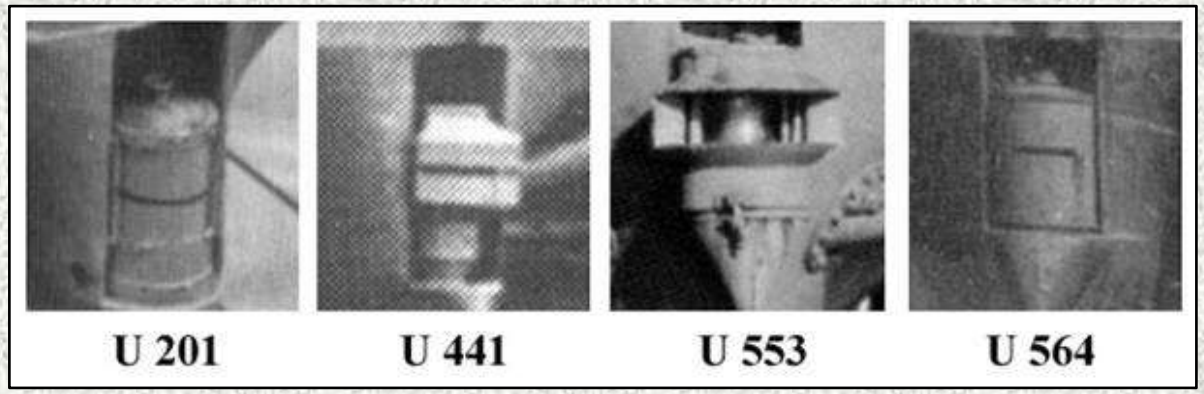
Below (21a & 21b): The red arrows point to the extra wires on the VIIB U 47 and the VIIC U 96.

U 93 - U 98 extra wires - There was a third difference evidenced on U 93 - U 98. Once again this was a feature left over from the VIIAs and early VIIBs. On the port jumping over the rear deck, there were additional wires in front and around the insulator blocks. On the photos below, the red arrows point to the extra wires on the port jumping wires of U 47 and U 96. The later VIIBs and other VIICs did not have this feature.



Navigation lights

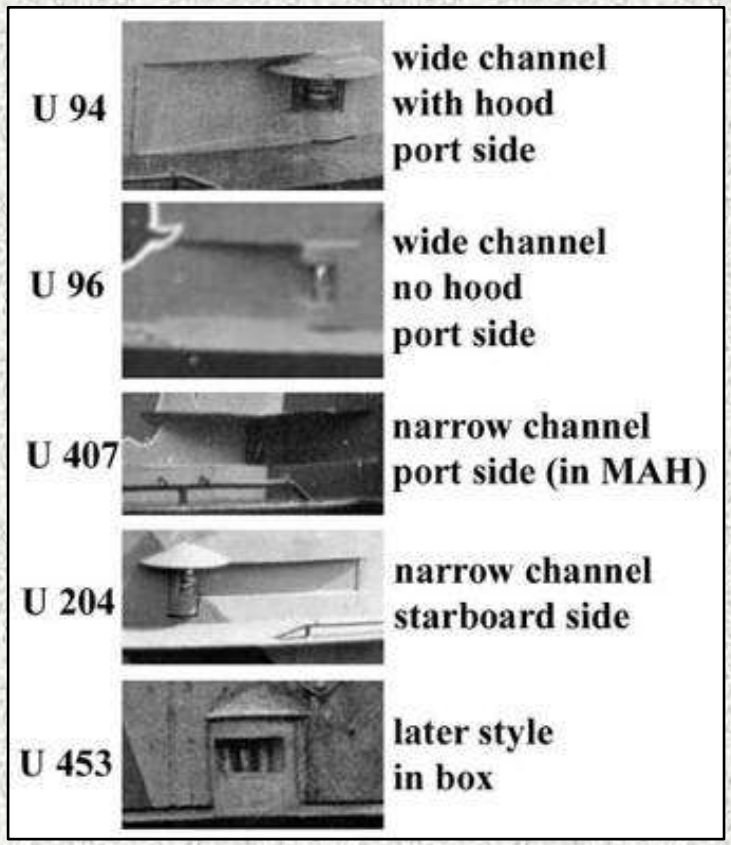
Rear lights - The rear navigation light on the VIIC tower was located directly at the rear, just below the railings. There were several different styles of rear light on VIICs.



Above (22a-22d): The light on U 564 is very similar to the U 201 light. The difference is that the U 564 light has the recessed area farther down. The light on U 553 (which also featured on U 552) is completely different, as is the U 441 light.

Below right (23a-23e): The side lights on various VIICs.

Side lights - The other two tower navigation lights were located on either side of the tower, above the spray deflector. The channel at the front of the lights allowed light to shine forward. Once again there were different styles on VIICs.



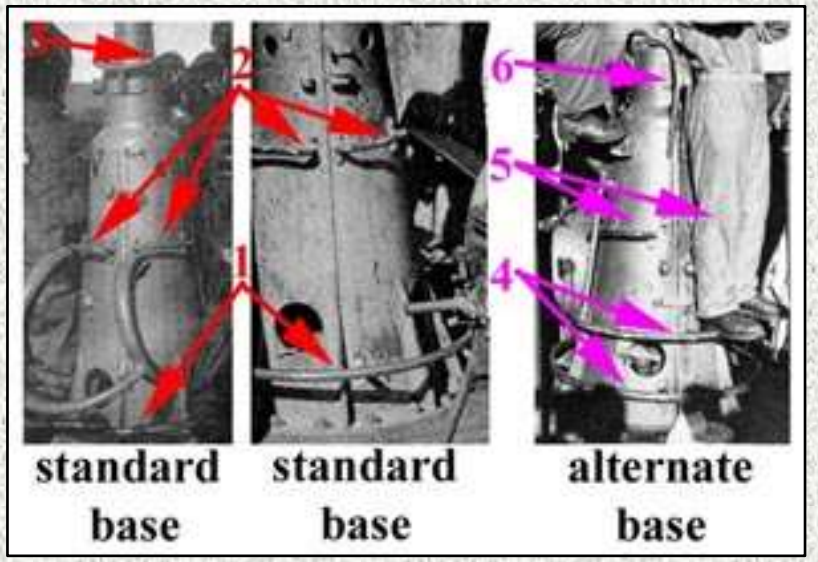
Boats which did not have a MAH had a wide channel (wide in height). Most boats with a wide channel had a hood on top of the light (such as U 69, U 94, U 552 and U 558) but a few other wide channel examples (such as U 93 and U 96) did not have a hood on top.

The VIICs which did have the MAH had a channel that was much thinner in height. These examples did not have an appreciable hood on the port side (due to the MAH) but did have a hood on the starboard side.

There were several different styles on mid-to-late war boats, some of which were encased within a protective box. Sometimes the lights on late war boats had to be moved farther forward as certain other features interfered with the position of the lights.

Attack periscope base

There were some differences in the railing bars on attack periscope bases.



Above (24a-24c): Views of standard base and alternate base.

Standard base - Most boats had one horizontal bar (number 1 above) which went all the way around the base, close to where the base met the floor. Note that U 201 was unusual in that its lower bar was modified to a step at some stage. There was also a pair of foot long horizontal bars (2) located around about halfway up the base; crew members could grip these when they were standing on the lower bar. At the top was a bendy wire (3) that could also be gripped by the crewmen.

Alternate base - A few boats such as U 552 had a different style of railing bars on their base. There were two bars (4) near the floor, and two foot-long bars (5) halfway up. There was also a totally different railing bar at the top; this featured two vertical bars running parallel to one another (6) that were joined near the top.

An order was issued on the 26th September 1940 to add a mounting plate for the signal headlamp to the aft end of the attack periscope base.

Diesel exhaust outlets

For details of diesel exhaust outlets please refer to "Type VIIC Free-Flooding Vent Patterns" article.

S-Gerät

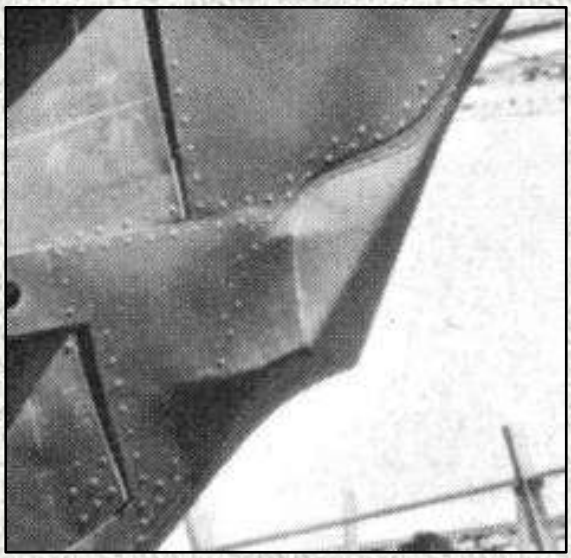
Above (25): The *S-Gerät* bow device (S-G) on the stem of U 559.

The main reason that the VIIC was developed from the VIIB was due to the S-Gerät (*Sonder-Gerät für aktive Schallortung* or "Special equipment for active sound location"). There was not enough space in the VIIB for this active sound equipment. So a lengthened version of the VIIB - the VIIC - was designed to house the set.

This active sound equipment was not available by the time the earliest VIICs were launched. But a bow device was fitted on the stem in readiness for when the equipment became available. The order to install this feature was placed on the 11th October 1940.

However, in time it was decided that the VIICs would not be fitted with the S-G internal equipment after all. An order to remove the equipment was placed on the 24th April 1942. Rather than removing

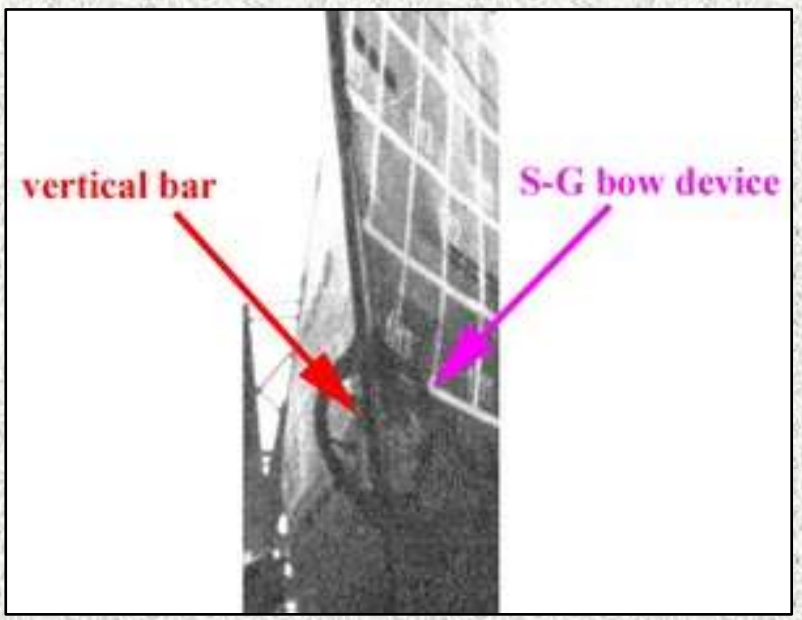
the bow device altogether, the boats with an existing bow device had this feature blanked off. Later boats would have no bow device on the stem at all.



Left (26): U 228 in the summer of 1942, with a blanked off *S-Gerät* bow device (S-G) on the stem.

Below (27): A photo of U 551 on the day it was launched, 14th September 1940. This proves that this *Blohm & Voss* boat did have the S-G bow device.

Some early VIICs did not have the S-G bow device at all. The earliest VIICs built at *Germaniawerft* (U 69 - U 72, U 93 - U 98) had lower net cutters when launched, but not the S-G. Certainly this was the case with U 70. In contrast, the early *Blohm & Voss* boats such as U 552 did have the S-G bow device.

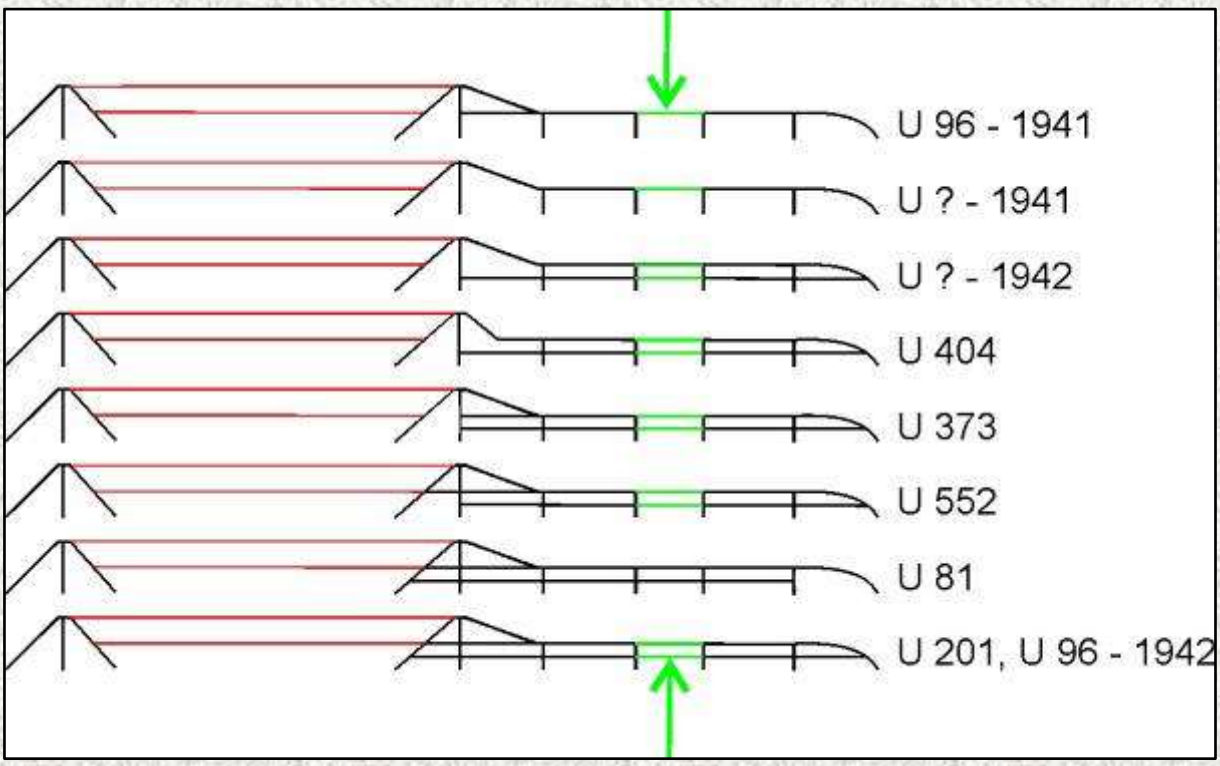


In the photo to the right there is a vertical bar running through the S-G. As this is the position occupied by the lower net cutter, it looks at first glance that this is a lower net cutter. It would seem nonsensical to put a net cutter in front of an active sonar detection device. But the sonar was not active at this stage - the internal S-G equipment was to be fitted at a later date. Could this really be a lower net cutter **and** the S-G bow device, with the intention being to remove the lower net cutter when the internal S-G equipment became available?

The puzzle may have a much simpler explanation. The vertical bar may simply be a removable guard to protect the stem from damage during the launch.

Early VIIC deck railings

The development of the VIIB deck railings (discussed earlier in the article) was continued into the VIICs. The very first VIICs, such as U 69, U 94 and U 96, all had the style shown in the top of the drawing below -



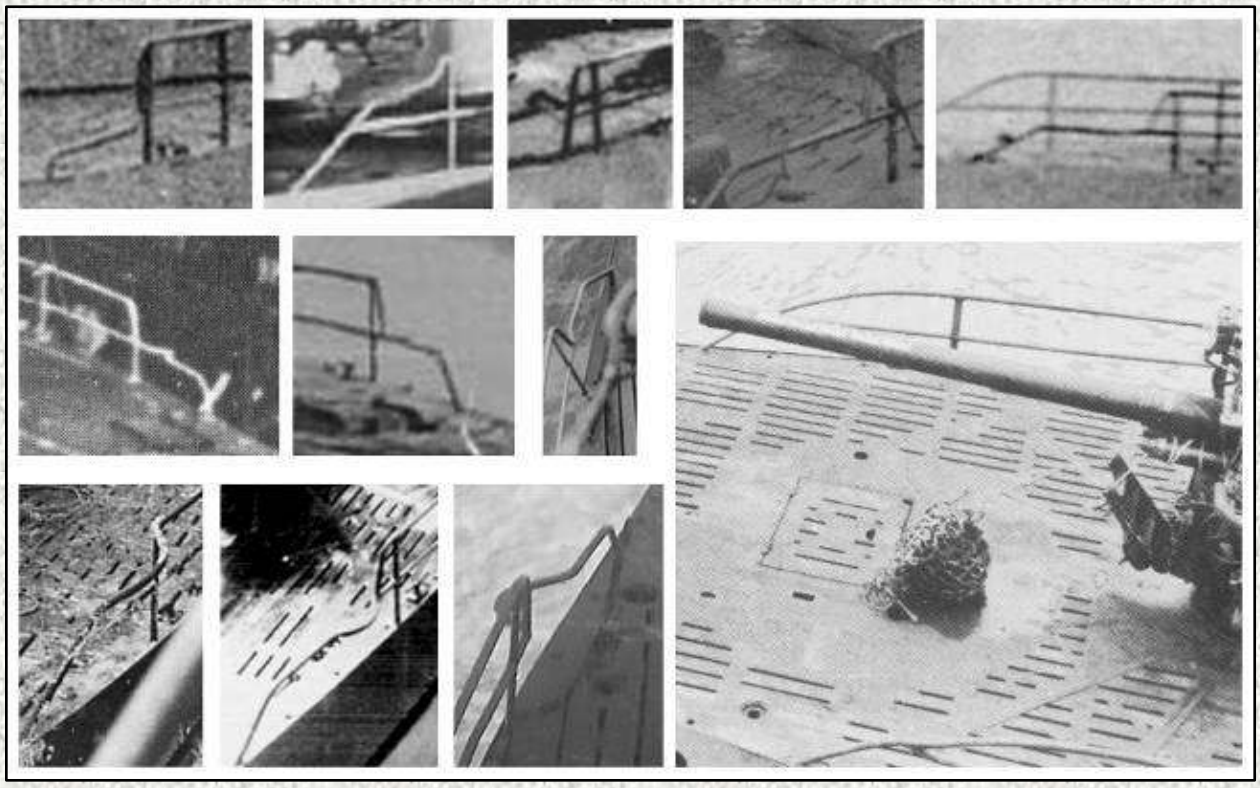
Above: A rough sketch of the starboard railings evidenced on early VIIC decks. The red lines are the wires which extended from the front to the aft railings. The green lines are the removable bars, which were discussed in the VIIB section.

On the 3rd February 1941, an order to introduce an extra horizontal bar at mid-height was issued. The drawing above shows the effect of this order.

We can also see that there were many different arrangements with respect to the bars at the rear of the front set of railings. The most usual style was arguably the U 201 style at the bottom of the drawing.

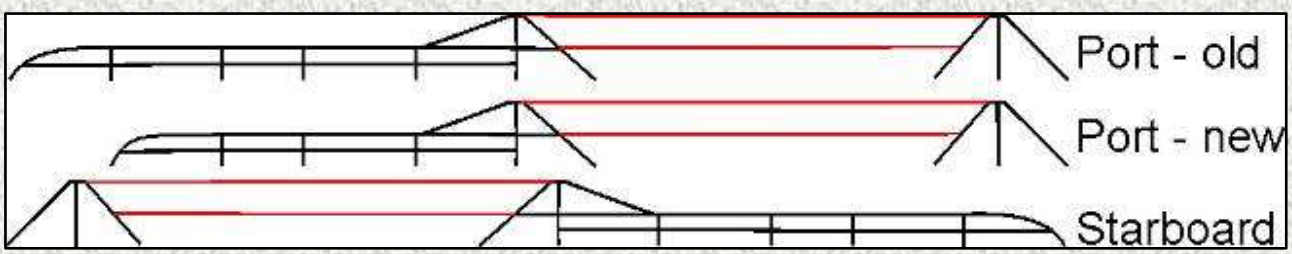
Some boats did go to sea with the removable bar (shown in green above) missing. This is evidenced by photos of U 204 and an early U 552, both of which have the bottom bar removed. Other photos of U 552 returning from an early patrol even show both bars missing.

A strange modification was made to the forward port railing on a number of boats. This was made only to the forward port railing, and not on the starboard side. The front bar on the port side was changed to a variety of different shapes. Many boats, including U 84, U 201, U 203, U 276, U 315, U 333, U 334, U 380, U 405, U 427, U 432, U 466, U 552, U 570, U 584, U 596, U 608, U 612, U 617, U 735 and U 755, had this strange misshapen bar. Some were launched with this feature, while earlier boats such as U 201 and U 552 had their original normal bar altered to the strange shape.



Above (28a-28l): A collage showing the misshapen forward port railing on a number of VIICs.

Below: The alterations made to the port railings on U 552. Modellers should bear this in mind if depicting the boat in 1942.



The large image on the bottom right of the collage above is of U 552. Early in the boat's career it had a normal port railing. At some point the port bar was altered to the arrangement that can only just be seen above. If we compare the front of the starboard and port railings to the flooding holes on the deck, we can see that the port side did not extend as far as the starboard side. This is demonstrated in the drawing below.

Other early VIIC modifications

Wooden strips - Unfortunately for the lookouts, the series of vertical strips running around the tower bulwark were not heaters to warm their hands. Rather they were wooden strips which prevented the lookouts from sticking to the bulwark sides in icy conditions. The VIIAs, VIIBs and the very earliest VIICs (such as U 94) had only a few shorter-length wooden strips with rounded edges on the tower bulwarks; these did not extend all the way around the bulwark.

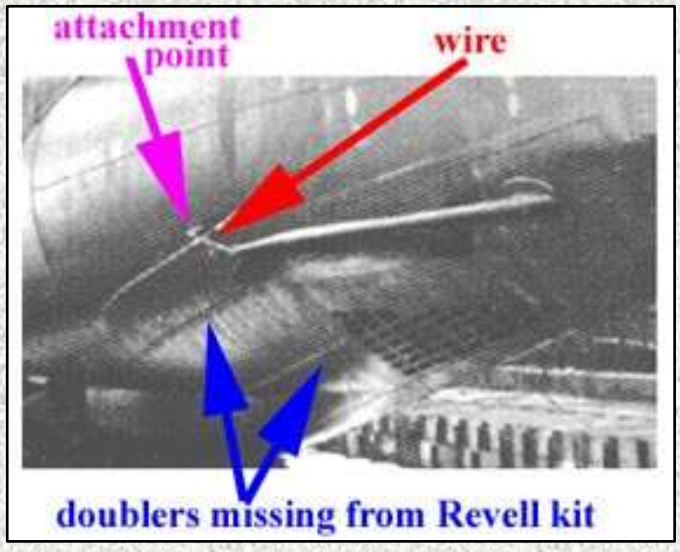
An order was placed on the 24th July 1941 to line the bulwarks with wooden strips. Sometimes the wooden strips also featured on the inside of the air trunks. A few months later, on the 6th December 1940, an order was issued to add the wooden strips to the periscope bases. The wooden strips were also added around the UZO.

MG34 - In 1942 some boats had mounting plates fitted to the top edge of the tower bulwark. These allowed for 7.92mm single MG34 machine guns to be mounted on the top of the bulwark edge. Usually there was one MG34 but up to three machine guns are evidenced in period photos. On rare occasions a twin MG34 was used.

Extra tower railings - On a few boats, such as U 136 and U 441, there were extra vertical railing bars on the side of the tower. These allowed crewmen easier access when they climbed up the tower sides.

KDB - The *Kristalldrehbasisgerät* (KDB, crystal base instrument) was a rotating T-shaped device on forward deck. This could be extended or retracted into the deck. Pre-war boats often had a canvas bag over this device for protection. The order to remove the KDB was placed on the 24th April 1942.

Foreplane tensioner wire - On the earliest VIICs a wire ran from the edge of the foreplanes to the pressure hull. Of interest here is that the position where the wire entered the hull is incorrect in several plans. The magenta photo below shows the true position.



Above (29): The blue arrows point to two doublers (horizontal strengthening strips that were added to the hull casing for extra strength). These two doublers, and the two on the other side of the hull, are missing from the Revell kits. The magenta arrow points to the true location of where the foreplane tensioner wire entered the pressure hull.

U 404 - An object featured on the upper part of the front of the tower, just offset to port. This was not part of a *schnorchel*.

U 453 - This Mediterranean boat had an indentation in the lower torpedo doors.

U 600 - This VIIC had a few strange features, and may have been used as a test bed. The top of the air intakes had a rectangular flange and the forward aerial inlet was the old U 93 – U 98 style. There were additional wooden strips on the inside of the tower; these had a horizontal orientation rather than the usual vertical orientation. A shelf was added to the front of the inside of the tower. Of particular interest is that a glass/Perspex windscreen about six inches in height featured at the rear of the shelf.

Part IV - Mid-to-late War Type VIIC Modifications

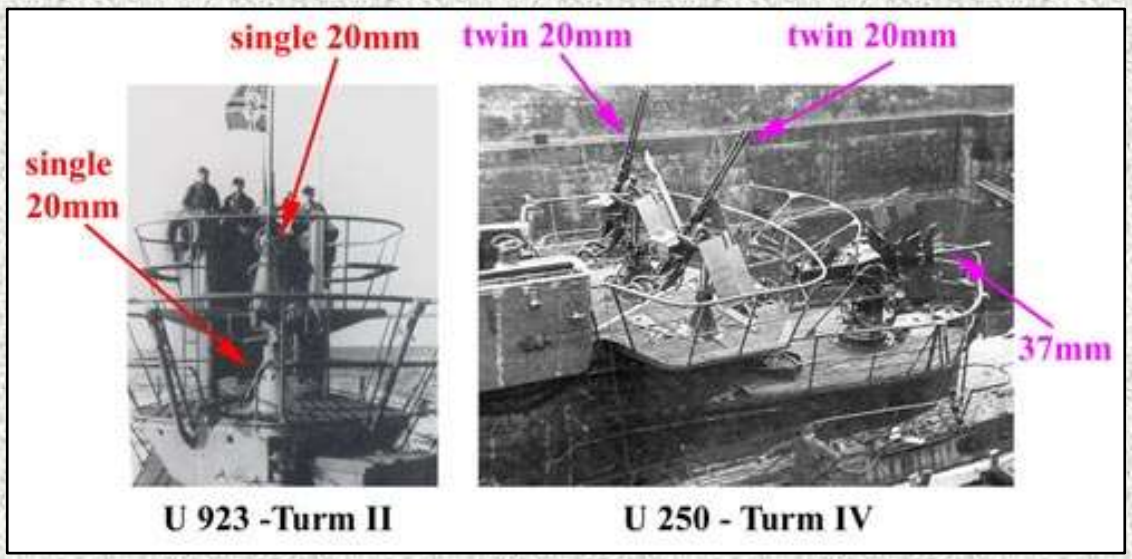
Tower

Turm II - The tower on the early VIIC Revell kit is the standard early tower that was present on all early VIICs. This tower was known as Turm 0. The Turm 0 towers began to be modified to Bridge Conversion II (known as Turm II) in December 1942. Turm II featured two single 20mms.

One single 20mm was on the upper platform behind the bridge. The other single 20mm was on an extra lower platform; the wooden planks on this lower platform were arranged in a circular shape around the 20mm.

It has been said that the wintergarten refers specifically to the lower platform on a Turm II or Turm IV bridge. This would mean that the upper Flak platform was not the wintergarten - only the lower platform was. However, at present the upper platform (and also the rear of the tower on an early Turm 0) is often referred to as the wintergarten. Whether this is technically correct or not, the usage of the term wintergarten to Turm 0 is now widely accepted.

New railings were added on the edges of the deck near the rear of the new wintergarten platform. In addition, two watertight ammunition containers were fitted to the front end of the lower platform.



Above (30a & 30b): A comparison between a Turm II and IV tower. Note that the U-numbers were not numbered consecutively. This was done on purpose to disguise the true number of boats coming off the German slipways. U 552, for example, was launched **more than three** years before U 250. U 923 was launched early enough (just) to have a Turm II but would have later been converted to Turm IV.

Turm IV - Turm II was only an intermediate solution until suitable armament was available. When such armament became available in 1943, VIIC towers were modified from Turm II to IV. The early Turm IV featured a pair of twin 20mms (mounted side by side) on the upper platform, and a quadruple 20mm (*Vierling*) on the lower platform.

To distinguish between a Turm II and Turm IV we need to look at the upper platform. If there is only one gun then it is a Turm II. If there are two separate gun mounts then it is a Turm IV. Note also that to accommodate an extra gun, the upper platform on a Turm IV was slightly wider than the upper platform on a Turm II.

The process of modifying existing towers to Turm IV began around the spring of 1943 or so. By August 1943 no boat was allowed to go on operations without a Turm IV tower.

In late 1943 an automatic 37mm gun became available. This single 37mm replaced the quadruple 20mm. A number of boats were fitted with the 37mm by the start of December 1943.

This combination of two twin 20mms and one 37mm became standard for all the VIICs and VIIC/41s until the end of the war. At the very end of the war some boats did exchange their 37mm for a twin 37mm (on a single mount).

Watertight ammunition containers were fitted to both platforms. There were normally three on the lower platform (two at the front and one at the rear) and two on the upper platform.

Additional life-raft containers were fitted to the rear edge of the lower wintergarten platforms. These containers looked like two large circular bulges.

A lattice mesh grill was fitted to the bottom half of some tower railings. This extended from the floor up to the horizontal railing bar. On some of these mesh grills, an additional perforated steel plate was present up to a height of around six inches.

A Turm IV tower features on Revell's VIIC/41 model. This has lead some modellers to assume, quite understandably, that the Turm IV was specific to the VIIC/41s. This is not so. The VIIC/41s did have the Turm IV. But the VIICs that were lucky enough to survive until mid-1943 were modified from Turm II to Turm IV.

Nautilus Models make a very useful resin/PE Turm IV conversion set. Although the replacement tower quite clearly has two twin 20mms (making it a Turm IV), it has been marketed as a Turm II.

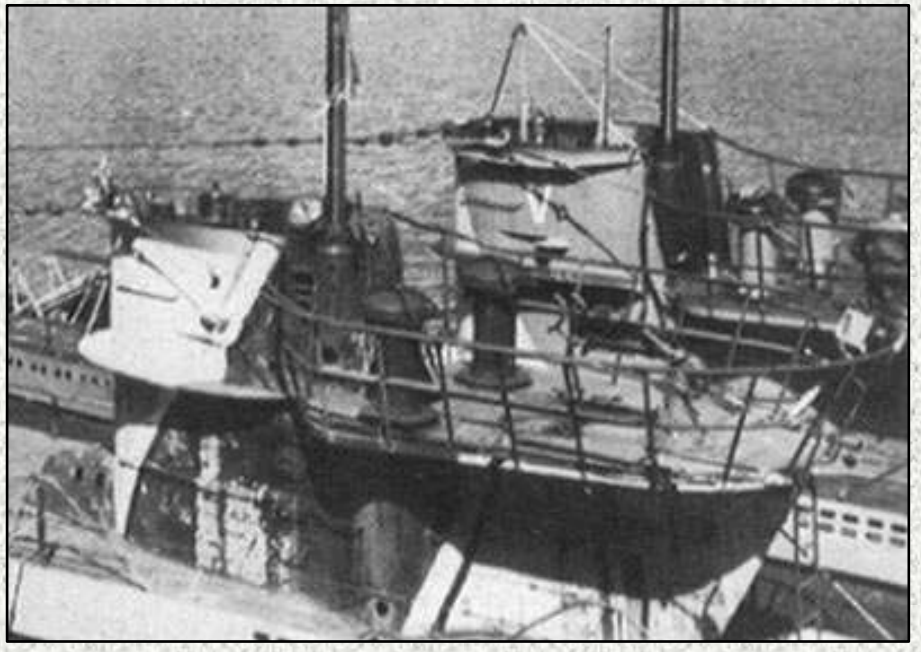
Mittelmeerturm - A number of VIICs which served in the Mediterranean Sea between August 1942 and September 1943 were fitted with a *Mittelmeerturm* (Mediterranean tower). Noticeably longer than the standard early VIIC Turm 0, this tower featured two twin 13.2mm Breda machine guns (side by side in pressure tight pods) and a single 20mm behind.

Two excellent photos of U 596 with a *Mittelmeerturm* can be seen on page 8 and 9 of edition 3 of the magazine *U-Boot Im Focus*. The magazine states that the tower was also known as the La Spezia conning tower as the conversion took place at a shipyard at this base. An assessment of the patrol history of the Mediterranean boats correlates with this statement. All the boats serving in the Mediterranean Sea between August 1942 and September 1943 did put into La Spezia at some point. They would often put into this port at the first opportunity after passing through to the Mediterranean. Or, if the boat was already serving here in late summer 1942, the boat would visit La Spezia to have the tower altered.

The following VIICs definitely had a *Mittelmeerturm* - U 81, U 83, U 443, U 410, U 443, U 453, U 561, U 565, U 596, U 616, U 617 and U 755. So too did the VIIB U 73.

The following VIICs did serve in the Mediterranean Sea between August 1942 and September 1943, and did visit La Spezia – U 77, U 97, U 205, U 303, U 331, U 371, U 375, U 380, U 407, U 414, U 431, U 458, U 559, U 562, U 593, U 602, U 605 and U 660. It is likely that these boats did have the *Mittelmeerturm* after they visited the La Spezia shipyard.

Below (31): The VIIB U 73 and VIIC U 561 at La Spezia on the 5th September 1942. Both boats have the *Mittelmeerturm.* The two large black objects are the pressure tight containers which housed the 13.2mm Breda machine guns. Note that the trailing edge of the tower, and the ladder behind.



Flak boats - A few boats received much heavier armament in the hope they could fight off enemy aircraft. Some even had a platform in front of the tower.

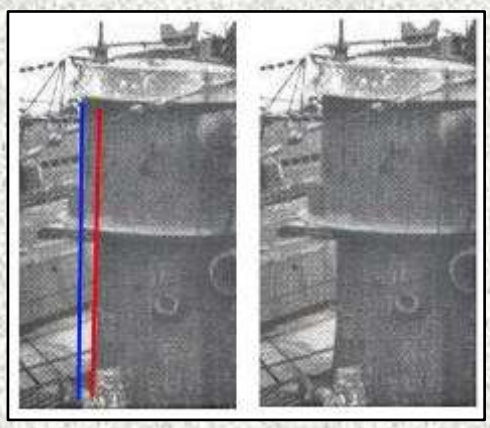
Armoured boxes - Armoured boxes were fitted to the towers to protect lookouts from aircraft fire. The order to fit these boxes was issued on the 4th June 1943. Sometimes there would be one box, while on other boats there was a box on either side. Generally the port box was to house one crewman, while the starboard box was to house five men.

The design of the boxes differed between boats. Some boxes had round edges, others had sharp edges. The port box was usually farther forward than the starboard box. Given that the boxes had intruded upon the space that the navigation lights had previously assumed, the lights were usually moved inside their own small protective boxes and positioned directly ahead of the armoured boxes. In the photo of U 667 above, the boat does not appear to have any side navigation lights at all.

The excessive weight of the boxes reduced the stability of boats in high seas. As a result an order to remove the boxes was placed on the 30th October 1943. However, some boats did retain the boxes long after the order was issued.

Above (32): U 667 in autumn 1943, with an armoured box on either side of the tower. The port box has rounded edges while the starboard one has sharp edges. Some boats had armoured boxes and armour plating.

Below (33): The blue line on the image below shows how far the top half extends, with the red line showing how far the bottom half extends. This discernible difference was due to the armour plating added above the spray deflector.



Armour plating - Armour plating was added to the top half of the front face of the late war towers. This feature did last until the end of the war.

The addition of the armour plating meant that the side navigation lights had to be altered. Another necessary alteration was in respect to the radio aerial inlet for the forward jumping wire. As this inlet was located above the spray deflector, it too had to be altered.

On early boats there were two holes (one of which was for a foghorn) below the spray deflector. On late war boats one or both of these holes was omitted.

Shelf near front of tower - Following an order placed on the 7th May 1942, a shelf was added to the front of the inside of the tower. The photo below shows an example of the shelf. The circular hole allowed the head of the sky periscope (see blue arrow) to protrude through the shelf. Some of these shelves were curved rather than flat, and were not quite a lengthy as the example below.

Left (34): An unusual feature of this photo is that this particular boat has two jumping wires over the front deck. U 1192 was another boat with two forward jumping wires.

Late UZO - A different type of UZO was used in late war boats.

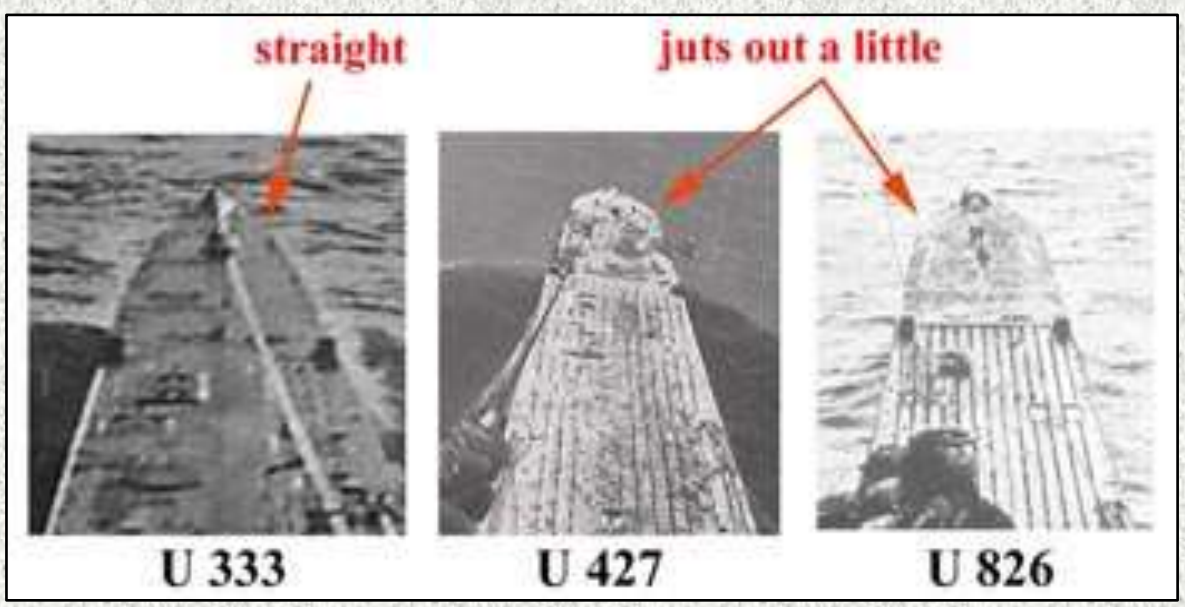
Right (35): The later style of UZO.

Below (36a-36c): A comparison of decks on three different VIICs.

Deck

Atlantic bow - If we look at the particulars for VIICs and VIIC/41s we see a difference in length between the boats - the VIIC/41 was 13cm longer than the VIIC. The difference was due to the bow of the VIIC/41 being widened and extended. This extended bow was known as the Atlantic bow (*Atlantiksteven*).

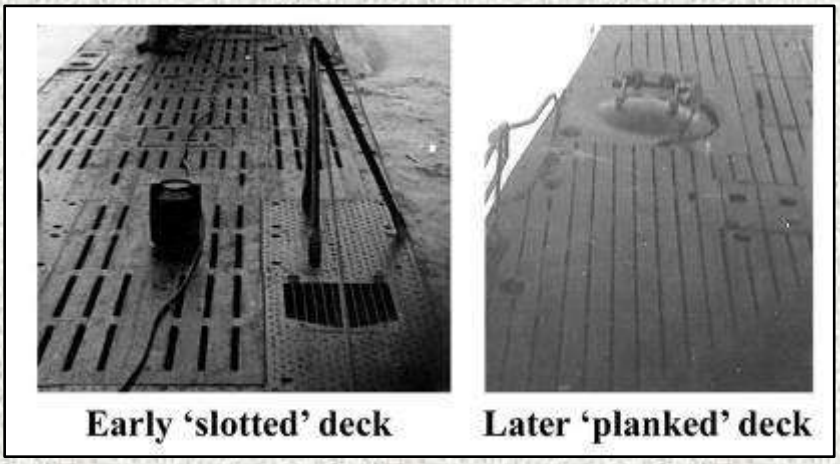
Conventional theory holds that only VIIC/41s had the Atlantic bow. However, let us study the photos below closely. The image on the left shows the normal early VIIC bow profile. The middle and right images show the bows of U 427 and U 826. These boats have a different bow profile, one that is much wider towards the tip of the bow. These are certainly different to the profile of the bow of U 333 and the early VIICs.



However, U 427 and U 826 were **not VIIC/41s**. Rather they are later build VIICs. If an Atlantic bow had been added, then these VIICs would have been 13cm longer than earlier VIICs. Did U 427 and U 826 receive a full Atlantic bow? Or did they receive a bow modification that was wider in profile but not as long as a full Atlantic bow?

Although the introduction of the Atlantic bows was ordered on the 19th July 1941, it was not introduced until later in the war.

Slotted/planked deck - There is a major difference between the decks on the Revell early VIIC kit and the VIIC/41 kit - the early deck has slots while the later is arranged in planks. Some enthusiasts have quite naturally come to the conclusion that the slotted deck was particular to the VIIC, and the planked deck particular to the VIIC/41. This is not so. The change from slotted to planked is evidenced by photos of newly built boats in late 1942. The first VIICs to be built with the planked deck were launched as early as the autumn of 1942. However, as there were variations between shipyards, the introduction of the planked decks may have taken place a little after the autumn 1942 date in some yards.



To surmise, the early VIICs had the slotted deck, the later VIICs (launched on or after autumn 1942 or so) had the planked deck.

While the other modifications would all be retrofitted to existing boats, the installation of the planked deck only took place on newly built boats. Changing existing decks to the planked arrangement was nowhere near worthwhile for the expenditure in both time and cost. Therefore, boats which were launched with the slotted deck very likely kept this slotted deck until their demise.

Above (37a & 37b): The difference between a slotted and planked deck is illustrated in these two photos.

Right (38): U 235 in December 1942. We can see clearly that this VIIC has a planked deck. Of equal interest is that the boat still had a Turm 0 tower. At this particular time the Turm 0 had yet to be replaced by a Turm II.

The earliest VIIC/41, U 1163, was launched on the 12th June 1943. As this was many months after the first adoption of the planked deck, we can assume with reasonable certainly that **all** of the VIIC/41s had planked decks.

Following an order on the 27th April 1943, the 88mm deck gun was removed from all but the Mediterranean and Arctic boats. As the planked deck was in use many months before the removal of the 88mm, there were some boats which had the planked deck **AND** the 88mm.

Schnorchel - This system included a hinged mast, a clamp to hold the mast when upright, and air trunking behind. U 235, U 236 and U 237 were all damaged by an air raid in 1943. The three boats were fitted with a *schnorchel* in September and October 1943 and used to evaluate the device. The *schnorchel* began to be used on operational boats from November 1943, though only two VIICs were fitted by the start of March 1944. Due to limited availability a number of boats had to go out on patrol in 1944 without this essential device. A *runddipol* style antenna was usually mounted on top of the mast.

An essential guide to which boats were equipped with the *schnorchel* can be found at http://www.uboat.net/technical/schnorchel_fitted.htm This link details which VIICs were fitted with the *schnorchel*, and the month in which the device was fitted. The VIIC/41s are not included in this list.

The company OTW offers a 32nd scale model kit of the VIIC. OTW also offer the kit with a Turm IV tower, *schnorchel* and slotted deck. In this version the slotted deck has been altered to allow space for the *schnorchel*.

As few photos of VIICs with a Turm IV tower, *schnorchel* and slotted deck are in common circulation, a few have wondered which VIICs actually had this combination. A photo of U 953 in

April 1944 unmistakably shows a slotted deck and *schnorchel* so we can be certain that this boat had these features. But which other boats also had this combination?

When we look at the list of boats equipped with *schnorchels*, we will see a number of boats launched before the introduction of the planked deck around the autumn of 1942. These include U 92, U 211, U 212, U 251, U 255, U 256, U 260, U 262, U 264, U 267 and U 953. Other *schnorchel*-equipped boats launched towards the end of 1942 may have had the slotted deck, and may be added to this list. As all VIICs that were built before the autumn of 1942 had the slotted deck, it follows that these boats had at one time the slotted deck and a *schnorchel*. This assumes that the deck was not changed from slotted to planked deck when the *schnorchel* was fitted. Given the cost and time expenditure, the shortages near the end of the war, and the fact that U 953 still retained the slotted deck when the *schnorchel* was fitted, it is likely that many or all boats also retained the slotted deck until their demise.

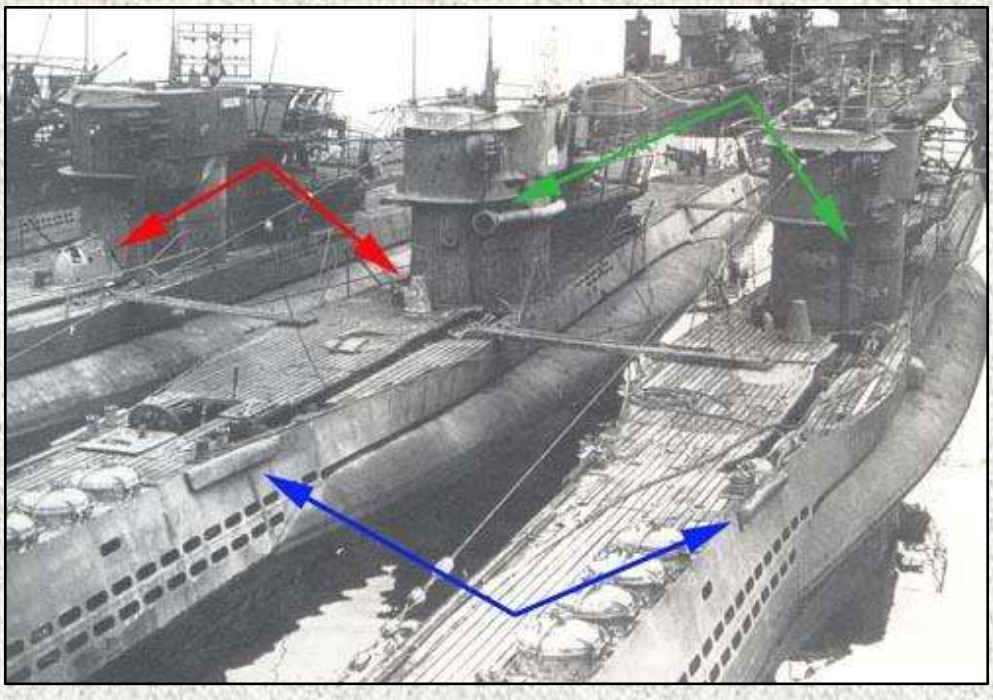
Since the *schnorchels* were fitted after the time when a Turm IV tower was made compulsory (August 1943), then it follows that these boats would all have had the Turm IV when they had the *schnorchel*.

Left (39): When the schnorchel was fitted a pipe was added on the deck, just to the port side of the tower. The blue arrow points to the pipe.

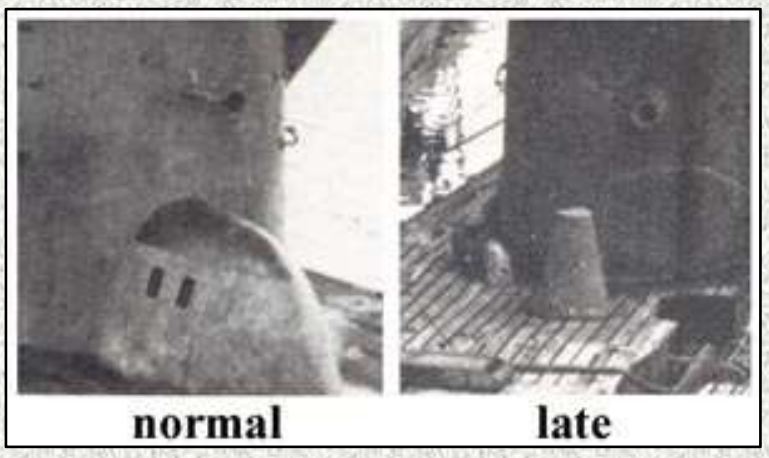
Below (40): Several boats after the war had ended. The green arrows show the two main types of *schnorchels*; the air pipe that can be seen on the middle boat is not present on the boat on the right hand side of the photo. Another difference concerns the magnetic compass fairing, which is covered next. The boat on the left still has the old fairing, whereas the middle boat has the *Askania* magnetic compass fairing. The blue arrows point to a feature that featured on all late war boats. Note that there are railings on the deck on either side of the tower but none farther forward. Lastly, the middle boat has a hatch where the in the old 88mm location, while the boat on the right has no such hatch.

There were different types of *schnorchel*. One discernible difference is that some boats has a large air pipe in the horizontal position (just under halfway up the tower, on the port side). Other boats did not have this pipe.

A few boats had a wave deflector shield on the deck in front of the *schnorchel*.



Magnetic compass fairing - The magnetic compass was located inside a fairing at the front end of the VIIC tower (at the foot of the tower). A new style of housing was introduced in 1944. The new housing was entirely separate from the tower itself, and was located just ahead of the old location.



Above (41a & 41b): The old magnetic compass fairing was very different to the late Askania fairing.

U 1172, which was launched at the end of 1943, did have the new housing in March 1944. But many boats still had the old housing in the summer of 1944. Most VIICs and VIIC/41s did have the new housing by the end of the war. But there were exceptions - U 278 and U 977 still had the old fairing at the cessation of hostilities.

The VIIC/41 U 995 had the old fairing when launched in July 1943. The museum boat U 995 currently has the new housing, which presumably was added at some stage in 1944 or 1945.

Note that on page 9 of *U-Boot Im Focus* Edition 2, it is stated that the new "Askania" magnetic compass was ordered for new boats on the 15th October 1942. The order may indeed have been placed on that date, with implementation coming at a much later date.

88mm - The 88mm deck gun and the base plate beneath the gun were removed from all but the Mediterranean and Arctic boats; this was authorised on the 27th April 1943. According the uboat.net, in July 1944 some VIICs of the 8th U-Flottille were refitted with deck guns when operating in the Baltic (source: http://www.uboat.net/technical/guns.htm). The strips on the deck around the 88mm were also removed.

Deck ammunition hatch - Early boats had a pressure-tight container for the 88mm ammunition on the port side of the forward deck; these were omitted when the 88mm was removed.

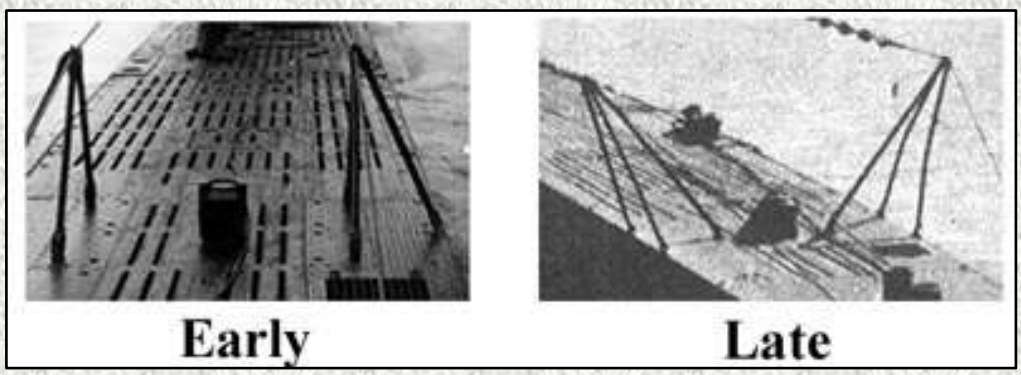
Life-rafts - The early VIIs had a dingy stowed in a pressure-tight container on the port side of the forward deck. When the deck gun was removed, this container was also taken away. A 5-man rubber escape dingy compartment was fitted at this stage to the location where the 88mm had been.

Life-rafts containers - Late in the war four life-raft containers (on occasion three) were fitted on the port side of the forward deck. U 963 even had two life-rafts on the aft deck.

Torpedo containers - Early VIIs had two torpedo containers under the deck casing (one under the forward deck and the other under the aft deck). A torpedo from each container could, albeit with some difficulty, be moved into the boat at sea. By mid-war the threat of enemy aircraft meant that such an operation was unnecessarily hazardous. As a result the containers were removed.

Rear jumping wire supports - There were two jumping wires over the rear decks. These were each supported by three stanchions near the stern. On the early boats there were two stanchions towards the inside, with one stanchion on the outside. The jumping wire was attached at the join of the three stanchions, which occurred directly over the two inside stanchions.

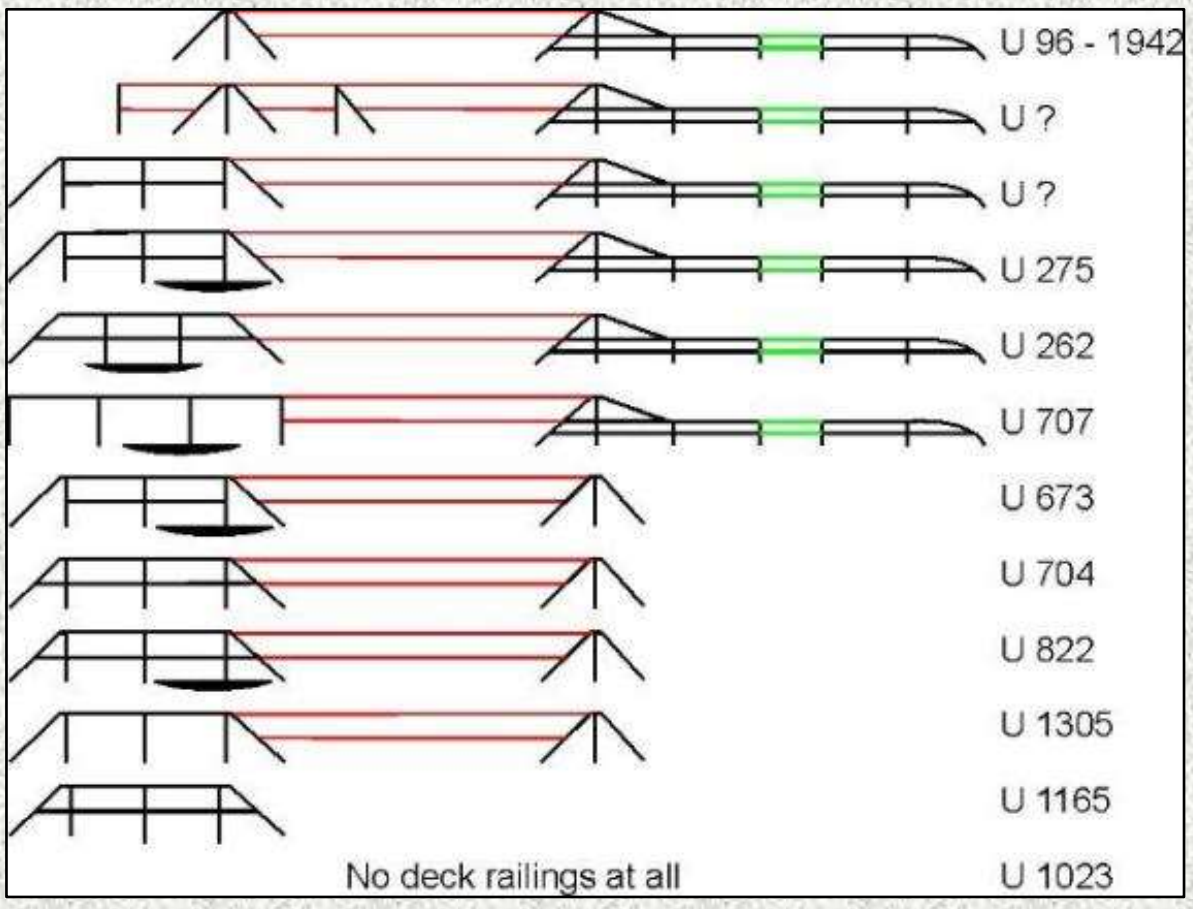
On later boats, there was a single stanchion on the inside, and two stanchions on the outside. These all leaned towards the outside, joining at a point that was outboard of the deck itself. This meant that the jumping wires were suspended farther outboard than before (roughly over the edge of the deck). As a result of the wires being farther outboard, crewmen could enjoy better movement around the aft deck.



Above (42a & 42b): A comparison between early and late aft deck jumping wire supports.

Mid-to-late war VIIC deck railings - The rear end of the Turm II and Turm IV towers were much wider than the original Turm 0 tower. As a result there was less space on either side of the tower. This raised complications for crewmen, who would be much more likely to fall overboard than before. To help prevent this, a new style of railing was introduced on either side of the lower wintergarten platform.

Below: The starboard railings on late war boats. The modifications in the railings resulted from other changes to the boats; these included the fitting of lower platforms and the removal of the deck gun.



These railings lay at an angle, thus allowing crewmen the space to pass by. Some of these styles can be seen in the sketch above.

These new railings at the rear were introduced to new boats with Turm II and Turm IV towers. Most of the older boats retrofitted with Turm II and Turm IV also received the new railings. One exception was U 377, which retained the old triangular railings even when it had a Turm IV.

Since there was so little space for crewmen to pass by the sides of the tower, a small semi-circular platform was added to the sides of the hull casing. This was added to most, but not all, boats. On one boat which did not have this little platform (U 1165), two of the vertical stanchions on the rear railings actually entered the side of the hull casing, not the edge of the deck.

By late war the boats spend most of their time underwater, hiding away from patrolling aircraft. Crewmen did not frequent the deck as their colleagues had done during early war patrols. As there was no longer an 88mm, there was no longer a requirement for deck railings on either side of the 88mm. These were removed on most late war boats. All that remained were three bars on either side of the front of the tower. These bars were retained so that the two wires running parallel with the tower could be kept.

The continual development of the deck railings finally ended with the configuration on U 1023. This boat had no deck railings at all.

Radar

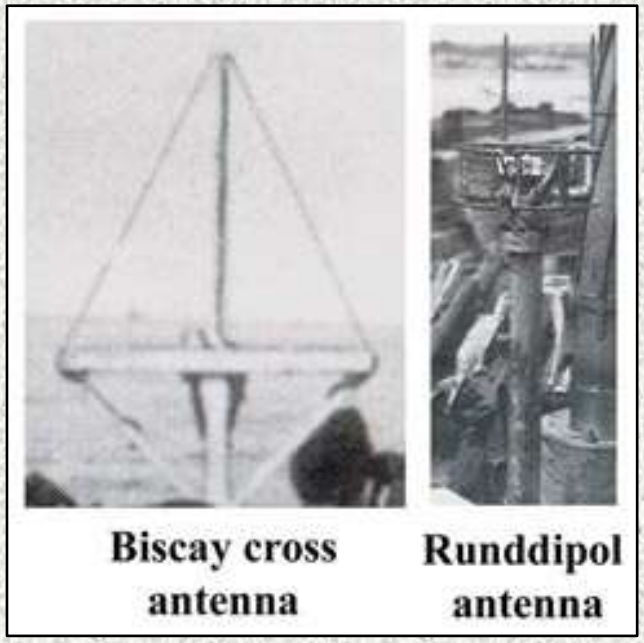
Radar warning receiver antenna - The first radar antenna visible on VIIC towers was the rudimentary Biscay Cross antenna for the FuMB-1 *Metox* radar warning receiver. This was an improvised structure made of wood and wire. It was mounted on a bracket on the attack periscope base, and brought into the boat every time the boat dived. All U-boats were to be given this equipment from late August 1942 onwards, though by December 1942 the whole fleet had not yet been fitted.

In 1943 Allied aircraft were homing in on emissions radiated by the *Metox* equipment itself. The Germans eventually realised this, and banned use of the *Metox* in August 1943.

A new radar warning receiver, the FuMB-9 *Wanz*, began to be fitted in August 1943. The antenna for this set was the *runddipol* - a cylinder enclosed in a wire mesh frame, with two diploes pointing vertically out of the top. However, this new set also emitted signals that were picked up by Allied aircraft. The Germans once again realised this, and banned use of the FuMB-9 *Wanz* in November 1943.

Several more sophisticated radar warning receiver sets were fitted to U-boats until the cessation of hostilities. These sets either used the *runddipol* or a similar antenna. These antennas were located in different places - either just ahead of the attack periscope base, or ahead of the FuMO-30 antenna box on the port side of the tower, or sometimes inside the D/F loop.

Very late in the war a different antenna was used in conjunction with the FuMB-35 *Athos*.



Above (43a & 43b): Two well-known types of antenna.

Radar antenna - The first U-boat radar set was the FuMO-29 *Gema*. The antenna consisted of two horizontal rows of 6 dipoles each, mounted at the front of the tower. A few VIICs operated with the FuMO-29 in 1941.

In 1942 the FuMO-30 was introduced. This used the same *Gema* set inside the boat but used a completely different antenna. The 12 diploes were removed, and replaced with a new rectangular wire-mesh antenna. This was housed in a large box on the port side of the tower, exactly where the MAH had been. This new box had sharper edges than the MAH (which had been round in shape).

Now that the MAH had been replaced by the FuMO-30 box, the hydraulically extendable mast antenna (which had been located in the MAH) would have to find another home. The mast antenna was moved to starboard side of the tower, being attached to the D/F aerial loop. The order for moving the hydraulically extendable mast antenna occurred on the 5th August 1943.

The FuMO-30 was replaced by the FuMO-61 *Hohentweil*. The antenna for the *Hohentweil* was also rectangular and housed in the same box on the port side. This new antenna was fitted to U-boats from the beginning of 1944. Many boats were equipped by autumn 1944.

Left (44): The FuMO-30 antenna raised above the purpose-built box on the port side of the tower.

Other mid-to-late war modifications

Aphrodite - Two hydrogen cylinders for the *Aphrodite* decoy system were housed in the FuMO-30 box at the port side of the tower. *Aphrodite* was ordered on the 5th June 1943, deployed in autumn 1943, and still in use by spring 1944. This was replaced by *Thesis*, which was stored internally.

Alberich - Only a few boats were fitted with sound absorbing anechoic tiles. Known as *Alberich*, this reduced the sonar reflection of the boat.

Tarnmatte - A sound absorbing coating was also added to a number of *schnorchel* heads. Known as *Tarnmatte*, it can be distinguished by a criss-cross shape on the top surface.

Balkon-Gerät - This system consisted of 48 hydrophones in a round dome at the bottom of the stem. It was standard on XXIs but was fitted to some VIICs and VIIC/41s in 1944 and 1945. It does not feature upon the VIIC/41 kit.

Part V - Final Thoughts

Museum boat U 995

The VIIC/41 U 995 survived the war. Several years later, in 1952, the boat was commissioned into the Norwegian Navy. The boat served under the name *Kaura* (with the NATO number S309) until retirement in 1965. The Norwegian Navy removed the lower platform, leaving the former U 995 with no wintergarten behind the tower. This harked back to the early days of the VIIC when the boats had no lower platform. Two other German U-boats, U 926 and U 1202, also served in the post war Norwegian Navy.

After her Norwegian service, U 995 was returned to Germany. By the end of the 1960's the exterior of the boat was in poor condition. During 1970 and 1971 the boat was restored back to what she looked like during her wartime Kriegsmarine service. By November 1971 the boat was looking much more like her former self, with a lower platform (wintergarten) in place once again. The *Balkon-Gerät* was still in place at this time. In March 1972 U 995 was transported to her permanent resting place at Laboe. The boat did not have the *Balkon-Gerät* during the transit, and this feature is not on the boat at present.

During the many years that have passed since her transit, the boat has lain outdoors at Laboe. In recent years some anti-corrosion measures have been conducted to combat the corrosive impact of the elements. These measures have made an impact upon the exterior of the boat. Some free-flooding holes have been replaced with steel plate, while other features have been changed.

These changes are evidenced by the walk-around photos of U 995 available in books and on the internet. As some of these photos show areas that are not visible in U-boat books and pictorials, it can be tempting to use the U 995 photos as primary reference material. However, given the fact that much of the exterior of U 995 was rebuilt in the early 1970's, and the anti-corrosion measures conducted in recent years, we must be **VERY** cautious if we are thinking doing so. The exterior of the current U 995 cannot be considered as prototypical. Many features look slightly different to those which featured on the boat when she was in her wartime prime.

Suitability of the Revell kits

Revell's early war Type VIIC kit (RV5015) has a Turm 0 tower, which featured on VIICs during 1940, 1941 and 1942 (and probably on some boats during the earliest part of 1943). So the tower included in the kit is suitable, without significant alteration, for Type VIIC U-boats at these time periods.

If modelling a boat which served in the Mediterranean between August 1942 and September 1943, it is likely that the Revell tower should be altered to the *Mittelmeerturm* tower. If depicting a boat in December 1942 or the early part of 1943, the Revell tower may have to be altered to the Turm II tower. If depicting a boat in the spring of 1943, conversion to the Turm IV tower may be required; this alteration will certainly be required from August 1943 onwards. To depict a VIIC from August 1942 onwards, some form of radar antenna should be fitted to the tower.

Revell's late war Type VIIC/41 kit (RV5045) has a planked deck, Atlantic bow, *schnorchel* and Turm IV tower. It has the regular style of magnetic compass fairing rather than the late one. This makes the model suitable for late war VIICs and VIIC/41s with the old magnetic compass fairing.

Part VI - Acknowledgements, References & Photo Sources

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Note: The standard bow / Atlantic Bow, slotted / planked deck and Askania magnetic compass fairing are discussed in depth within the AMP article "Late War Type VIIC & VIIC/41 Configurations". The Askania fairing is also discussed in the AMP article "Askania, Side Cushions & Updated Type VII Vent Patterns".