



List Of U-Boat Modifications & Identification Features

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Accurate Model Parts



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Part I - Introduction

Content of modification tables and identification lists

The tables and lists presented here are intended to act as a handy reference pointer to the U-boat modifications that have been described in other AMP articles. The modifications are spread out over a few articles so it may prove useful to have them listed here in one place in chronological order. The modifications have been divided into features prevalent in all types and to features that are particular to certain U-boat types. Other self-contained areas such as radar have been assigned their own tables for easy reference purposes.

It is important to recognise what the modification tables do and do not record. With the exception of the change from slotted to planked deck on new-build boats, **the tables in Part II and Part III record only the features retrofitted to existing boats**. An example is the deletion of the net cutter, which was ordered in March 1941 and implemented throughout the fleet in the months which followed. The tables do not list all the differences between features on all boats. For example, the VIIB U 99 possessed a different attack periscope housing to the VIIB U 48 because U 99 was built at a slightly later period when a later style of housing was favoured. This difference is not charted in the modification tables because it was not retrofitted to existing boats such as U 48. Since the modification tables only cover features that were retrofitted to existing boats, it is devoid of the many important features which characterised certain sub-variants or batches of boats. To fill in the gap, a list of characteristic identification features is intended to be used in conjunction with the modification tables. **The lists of identification features in Part V record the main visual differences between sub-variants and these differences tended not to be retrofitted to existing boats**. These features are presented in extended list format so that some explanatory descriptive text could be added. It is hoped that the combination of modifications tables and identification lists may allow a novice student to identify U-boats and their characteristic features more easily.

When trying to assess boats it is useful to refer to one book which lists the type, launch date, commissioning date and all the dates and locations of departure and arrival for all war patrols. This information is all available online but it is extremely useful to refer to one book in order to quickly find this information and compare with other boats. The book recommended for this purpose is *U-Boat Fact File: Detailed Service Histories of the Submarines Operated by the Kriegsmarine 1935-1945* by Peter Sharpe (Midland Publishing Limited, 1998).

In the tables, the code in the second column refers to the following -

- F - fitting for first time
- D - deletion (complete removal with nothing being added in its place)
- R - replacing with an alternative item or upgrading of existing equipment

Be very wary of the order date given in the third column. If an order for removal was issued on the 1st January 1942, this does NOT mean that your chosen boat will have had this feature removed on that date. Normally the feature would be fitted or removed when time and opportunity presented itself. Often this would occur during the next refit but there are many factors which may have delayed this process. For example, the installation of a 37mm automatic to the lower platform of a Turm IV took months to implement throughout the fleet due to supply issues. Additionally, the implementation of non-essential features may have been delayed due to a requirement to rush the boat back to sea. Lastly, in a few cases implementation occurred at a much later time period. An example is the fitting of the *Askania* magnetic compass fairing, which was implemented a year after the order date on Type VIIIs.

The dates given in the Tested column are derived from books or from an assessment of period photos. The latter would typically involve noticing that a feature was present on a boat before the order for implementation was issued. An example is the *S-Gerät* bow device, ordered on the 11th October 1940, but present in a period photograph in September 1940. The obvious conclusion, made in the presumption that the date of the photo is correct and the date of the order is also accurate, is that the bow device was tested at least a month prior to the order being issued.

The text in the "To op. boats" shows the date, month or approximate time period when the feature **began** to be implemented upon operational boats.

Some of the details, particularly the order dates, have been taken from authoritative U-boat history books. Other dates are the result of research and assessment of period photographs. For example, for the removal of the Type VII breakwaters every VII photograph at the author's disposal was examined for this feature. This became a lengthy process because the time period when the photo was taken may have to be determined. If the date was judged to be accurate, the next step was to note down the date and whether the feature was present or not. At the end of this process there would be reliable data from which to extract conclusions. Deductions could then be made as to the time period over which the feature was gradually withdrawn. Lastly, this time period was compared to the removal order date to see if there was a direct correlation. This process was conducted for the majority of the many modifications in the tables.

The accuracy of this process is limited by the sample size. With the removal of the breakwaters it was considered that sufficient data (enough photos) was available from which to draw reliable conclusions. For a different feature - the shroud around propellers on Type IIs - there was very scant evidence. This made the sample size unacceptably low and as a result it was not possible to draw any conclusions as to implementation date or frequency of use.

Another limiting factor for the information herein is the accuracy of the information sourced from books and articles. It was necessary to choose wisely the books from which to extract information. Some books and magazines have demonstrated an exactitude which allowed information to be taken on face value. Other sources are less reliable and an attempt was made to avoid propagating their mistakes. Period photographs are often found to be erroneous with regard to boat identity, location and date. The authors of some books, which shall not be named and shamed, have demonstrated a god given talent for misidentification that seems to be carried out with reckless abandon. A book in which a Type IX is mislabelled as a VIIC cannot be relied upon in any capacity. Some authors, with commendable awareness of the difficulties involved, err on the side of caution and do not make any attempt to identify the boat or a date when the photo was taken. This has required the author to try to establish the identity and date by taking into account the boat's type, location, paint colour, insignia, tonnage flags, crewmen, modifications, identification features and - to establish whether a boat is returning or departing - the condition of the paint. As knowledge of more and more identification features and modifications has increased, it has become easier to make assumptions on the content within photographs. Yet full identification is often impossible. The author remains on the side of caution when identifying particular boats and particular dates but an attempt at this enterprise is necessary to progressively build up enough information to learn more and more about U-boat modifications. In a work of this nature there will invariably be errors. The

information in these tables is merely the most accurate information known given the resources presently available. The information has been updated, with this version being the third iteration of the list of tables. At first glance the tables may look to be detailed, but they are very far from exhaustive and there is still so much left to learn about the modifications and when they were implemented.

The information in the tables and lists are summaries of information presented in the following AMP articles -

⊕ **Type VII U-Boat Modifications**

➤ Available within the downloadable AMP pdf *The Wolf Pack: A Collection Of U-Boat Modelling Articles* and as a standalone AMP article.

⊕ **Type VIIC Free-Flooding Vent Patterns**

➤ Available within the downloadable AMP pdf *The Wolf Pack: A Collection Of U-Boat Modelling Articles* and as a standalone AMP article.

⊕ **U 505: Modifications, Colours & Insignia**

➤ Available as an AMP pdf article and within *The Wolf Pack II: Another Collection Of U-Boat Modelling Articles* and as a standalone AMP article.

⊕ **Type II U-Boat Modifications & Vent Patterns**

➤ Available as an AMP pdf article and within *The Wolf Pack II: Another Collection Of U-Boat Modelling Articles* and as a standalone AMP article.

⊕ **Late War Type VIIC & VIIC/41 Configurations**

➤ Available as an AMP pdf article and within *The Wolf Pack II: Another Collection Of U-Boat Modelling Articles* and as a standalone AMP article.

⊕ **Askania, Side Cushions & Updated Type VII Vent Patterns**

➤ Available as a standalone AMP article.

⊕ **Type IX U-Boat Modifications & Features**

➤ Available as a standalone AMP article.

The identification features of the IAs, XBs and XIVs have not been covered previously and have been addressed briefly herein. Since no large model kits exist for these variants, modellers may not require detailed knowledge of these types and specific articles to address these types are not anticipated.

Acknowledgements

I would like to extend my gratitude to Dani Janer Åkerberg for his excellent work with his website U-Historia.com. There are many detailed articles on this website and I am most grateful to him for translating many of my articles for inclusion in his ever-expanding website. I am also grateful to Dani for suggesting to me that a list of modifications would be useful as this proved to be the stimulus for me to create the tables below.

Finally I would also like to thank Jerry Mason of uboatarchive.net for advising me on the VII weather balloon hydrogen feature and Simon Morris for assistance with VIIC/41 arrangements.

Part II - Modifications Applicable To All Types

Pre-war modifications prior to war					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Large white tower U-numbers	D	-	-	19/08/39	Painted over
Small oval plates at bow	D	-	-	19/08/39	-
Bronze eagle plaque on tower	D	-	-	19/08/39	-
Red horseshoe lifebelts on tower	R	-	-	19/08/39	Lifebelts retained but white text removed
Red / white lifebuoys on deck	D	-	-	19/08/39	Painted black on IXs

General modifications applicable to all main types					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Net cutters	F / D	-	-	Usually 39	Removed and then re-installed
Anti-vibration wires to both periscopes	F	-	-	40	-
<i>S-Gerät</i> bow device	F	11/10/40	Sep 40 on U 551	After order	Not on Type IIs
Net cutters	D	01/03/41	-	Mar / Apr 41	-
Mountings on tower for removable machine guns	F	27/07/42	-	Spring 41	-
Wooden panelling on tower bulwark	F	24/07/41	-	Autumn 41	Later boats had narrower panelling
Wooden strips to UZO and periscope bases	F	06/12/41	-	After order	-
<i>S-Gerät</i> bow device	D	24/04/42	-	After order	Order of 24/04/42 for removal but feature only blanked off
KDB	D	24/04/42	-	After order	Not universal
Change of slotted deck to planked deck	F	-	-	Latter half of 42	Usually on new built boats only; changeover took longer on VIIs
Mast antenna	D	19/11/42	-	After order	Deleted when radar box fitted
Radar box	F	19/11/42	-	After order	Not on Type IIs
Reversed jumping wires	F	-	-	Dec 42	On a few boats with Turm II
<i>Bold</i> decoys	F	-	-	42 or early 43	<i>Bold 4</i> introduced 44
Armoured plate to tower	F	-	-	First half of 43	Thicker plate added later
Deck gun on forward	D	27/04/43	-	After order	88mm retained on

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deck					Baltic and Arctic VIICs; 105mm retained on long range IXs
Anti-slip strips around deck gun	D	27/04/43	-	After order	Removed with deck gun
Base plate for deck gun	D	27/04/43	-	After order	Removed with deck gun
New UZO	R	-	-	Spring 43	-
Torpedo storage tubes under deck	D	-	-	Mid war	-
<i>Kohlenkasten</i> (coal scuttles)	F	04/06/43	-	Summer / autumn 43	Not universal; boxes varied in type; not on Type IIs
<i>Kohlenkasten</i> (coal scuttles)	D	30/10/43	-	Late 43 / early 44	Deleted due to excessive weight
Underwater refuelling	F	-	-	Late 43	Initially on new built boats; later on existing boats; not universal
Dive plane wires	R	-	-	43 or early 44	VIICs and IXs
A-shaped bracket on bottom of rudders	R	-	-	43 or early 44	VIICs and IXs
Outward facing tripods	R	-	-	43 onwards	On some boats
<i>Balcongerrät</i>	F	-	Jan 43	Late 43 onwards	Not on Type IIs
<i>S-Gerät</i> blanked bow device	D	-	-	Late 43 / early 44	Completely removed from stem
Rear jumping wire tripod support changed	R	-	-	Mid to late war	May not have been retrofitted
<i>Schnorchel</i> (ball float valve)	F	-	Aug / Sep 43	Jan 44 onwards	-
<i>Tarnmatte</i>	F	-	-	Jan 44 onwards	To <i>schnorchel</i> heads
New direction-finding loop	R	-	-	Spring 44 to late autumn 44	-
Spare barrel containers	F	-	-	Late war	Some boats only
Liferaft containers on foredeck	F	-	-	Late war	Some boats only
Rescue dinghy containers	F	-	-	Late war	Some boats only
Exhaust outlet moved below waterline	R	-	-	Late war	Unbroken line of vents
<i>Bali</i> antenna and supporting pole moved from port side of tower bulwark	R	-	-	Late 1944	Moved between periscopes on IXs; moved behind rear periscope on VIICs
<i>Schnorchel</i> (ring float valve)	R	-	Sep 44	Jan 45	Replaced ball float valve version

Part III - Modifications Applicable To Certain Types**Type IA**

Modifications specific to Type IAs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Wooden deck changed from small circles to slotted deck	R	-	-	Pre-war	-
5 front vents changed from horizontal to diagonal; 2 additional covered vents added under the 5 front vents; 7 additional vents added in centre	F	-	-	Pre-war	Vents change occurred in U 26 before U 25
Spray deflector	F	-	-	1939	-
Additional 6 vents (2 columns of 3) added to hull casing	F	-	-	By early war	On U 25; possibly on U 26 as well

Type II

Modifications specific to Type IIs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Insulators moved behind splitter	R	-	-	Pre-war	IAs and early IIBs
Net cutter S2	R	-	-	Pre-war	Replaced S1
Conical mount	F	-	-	Pre-war	Some IAs and IIBs
3 supports and seat for deck railings	F	-	-	Pre-war	IAs and IIBs (style R2)
Barrel container	F	-	-	38 or 39	IAs and IIBs (IICs had conical mount)
Net cutter	R	-	-	Late 38 or 39	S6 introduced
Extra vents added	F	-	-	Around 39	To U 9, U 10, U 18, U 21, U 22 and U 23
Side marker moved to top of magnetic compass housing	R	-	-	Around 39	On IICs only
Net cutter	R	-	-	Summer 39	Style unknown; IICs and IIDs had S4
Additional repeater on pole behind sky periscope	F	-	-	?	IAs and IIBs
Waterproof 20mm barrel	R	-	-	Early war	Replaced non-waterproof barrel
Red and white lifebuoy	F	-	-	Early war	Training boats only

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Bronze eagle on tower	F	-	-	Early war	Training boats only
Additions to deck railings	F	-	-	Early to mid-war	Either R 4 or R6
Supports bars on hull casing	D	-	-	Early to mid-war	Near to top of hull casing (bow and stern)
Extra vents added	F	-	-	42	Black Sea (BS) boats
Small machine guns on tower bulwark	F	-	-	43	On BS boats; before 20mm added to tower
20mm on wintergarten platform at rear of tower	F	-	-	Summer 43	On Black Sea (BS) boats; fitted on U 142 and U 146 by 1944
Twin 20mm on tower	R	-	-	Early 44	Replaced single 20mm on BS boats
20mm feature removed	R	-	-	Late war	IIDs
Extendable <i>schnorchel</i> on tower	F	-	-	Late war	On U 143, U 145, U 149, U 150 and U 151

Type VIIA

Modifications specific to Type VIIAs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
3 or 5 extra round holes added behind rear pattern	F	-	-	?	3 extra on U 27 to U 32 and U 34; 5 extra on U 33 and U 35
Some vent holes filled in at front of forward groups (both sides)	F	-	-	39	Evidenced upon U 29 and U 30
Extra group of ventilation holes added to port side of tower	F	-	-	39	These extra holes covered over when L-shaped trunks added
Double rear jumping wires replaced with single jumping wire	R	-	-	Autumn 39	Included two connector bars
Spray deflector	F	-	On U 30 spring 40	Autumn 40	Added later on VIIAs than on VIIBs; normally added to VIIAs with addition of L-shaped trunks

Type VIIA and VIIB

Modifications specific to Type VIIAs and VIIBs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Moving of 20mm from aft deck to tower	R	-	-	Winter 39 / 40	Included rebuilding of aft end of tower
Anti-slip strips around 20mm on aft deck	D	-	-	Winter 39 / 40	Removed when 20mm moved to tower
Air supply grill with vertical bars on starboard side	F	-	Tested on U 48 pre-war	Winter 39 / 40	Removed when L-shaped trunks fitted; probably VIIBs only
Detachable mount on top of UZO	R	-	-	Late 39 or early 40	Possibly VIIBs only
L-shaped air supply trunking	F	29/07/40	Tested on U 30 spring 40	Summer & autumn 40	Additional grips and ladder added
Extra deck railings on either side of tower	F	-	-	Summer & autumn 40	Required when L-shaped trunks fitted
Teardrop shaped air supply fairing in centre of tower	F	-	-	Spring 41	L-shaped trunking removed at this time

Note: Since U 48 had the air supply grill with vertical bars **before** the commencement of hostilities, it is probable that this boat was used to test this feature. At this time, perhaps in August 1939, U 48 was configured uniquely, having the air supply grill, no spray deflector, no breakwaters, and with the 20mm still on the aft deck.

Type VIIs

Modifications specific to Type VIIs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Breakwaters	F	-	-	Aug / Sep 39	-
Small spray deflector	F	-	-	Aug / Sep 39	On VIIBs only (small version not fitted to VIIAs)
Normal spray deflector	R	-	-	Oct / Nov 39	Replaced small spray deflector; normal deflector added before 20mm moved
Mounting plate for signal headlamp	F	26/09/40	-	After order	On attack periscope base
Extra horizontal bar added at mid-height to deck railings	R	03/02/41	-	After order	Railings differed between some boats; some had misshapen bar at front
Breakwaters	D	21/05/41	-	Apr / May / Jun 41	Retained upon post-operational VIIB training boats

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Experimental wind deflector	F	-	Late 40, 41	-	On U 70 and U 71 only; replaced with conventional deflector in 41
Wind deflector	F	29/05/41	Nov 40	After order	Fitted over course of Dec 40 to Dec 41; not always fitted to Mediterranean boats
Shelf at front of tower	F	07/05/42	-	After order	Not universal
Additional deck railings outboard of lower platform	F	-	-	Dec 42	Fitted when Turm II added; sometimes with deck extensions
88mm ammunition hatch on deck	D	-	-	Spring 43	Removed with 88mm
Dinghy in pressure-tight container	R	-	-	Spring 43	Dinghy on port side moved to position vacated by 88mm
Deck railings simplified	R	-	-	Spring 43	Following removal of 88mm deck gun
Protective board at top of forward hull casing	F	-	-	Spring 43	Either leather or wooden, on either side of hull casing
Askania magnetic compass fairing	R	15/10/42	-	Oct 43	Replaced old magnetic housing on new builds; at least 3 styles of <i>Askania</i> fairing in use
Pipes for <i>Schnorchel</i> on deck to starboard side of tower	F	-	-	Nov 43	Not universal
One life raft container on port side of forward deck	F	-	-	Late 43	On some boats only
3 or 4 life raft containers on port side of forward deck	F	-	-	Late 44	Usually 4 life rafts, sometimes 3; not universal

Diesel exhaust outlets specific to VIIs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Style 2	R	-	-	Spring 40	Replaced style 1
Style 3	F	-	-	41	Shroud added on some boats only
Style 4	R	-	-	Late 41	Replaced style 2 & 3
Style 5	R	-	-	Mid 42	Replaced style 4
Style 6	R	-	-	44 / 45	Fitted when <i>schnorchel</i> installed

Type IX

Modifications specific to Type IXs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Spray deflector	F	-	-	39 (before war)	Added before wind deflector
Wind deflector	F	-	-	Late 39	-
Seven extra tower rungs per side	F	-	-	Late 39 or early 40	Added to early IXAs.
Intake W to X	R	-	-	Early war	All by summer 40; U 38 prior to war
Railing from R1 to R2	R	-	-	Early war	IXAs only
Deck railings extended	R	-	-	Early 40	Different styles, multiple changes
Hull breakwaters	F	-	-	Spring 40	Not universal
Waterproof 20mm	F	-	-	Spring 40	Operational boats first
Deck breakwaters	F	-	-	40	Not universal; variable lengths
Black deck lifebuoys	D	-	-	40	-
Foldable metal seats	R	-	-	40	4 on bulwark; 2 on periscope housing
Ledge on bulwark and periscope housing	F	-	-	40	Replaced foldable seats
Inside rear of starboard side of tower	R	-	-	Summer 40	Along with intake style X replacing W
37mm semi-automatic on aft deck	F	-	-	Usually Dec 40 - May 41	-
Extra railings around 37mm semi-automatic	F	-	-	Early 41	-
20mm on aft deck	F	-	-	Early 41	On some boats; usually replaced by 37mm
Hull fairleads	F	-	-	Early 41	Not universal; two positions
Windscreen and base plate	F	-	-	Late 40 / early 41	Some had alternate metal version
Deck breakwaters	D	21/05/41	-	Summer 41	-
Hull breakwaters	D	-	-	First half of 42	-
Drainage holes below hull breakwaters	D	-	-	Spring 42	No longer fitted to new build boats
Simplified grills on deck	F	-	-	Early 42	On new build boats
Lookout mast on aft deck	F	-	-	Spring / summer 42	On U 183, U 184, U 185 and U 187 only; shortened early 43
Rockets	F	-	May 42	May 42	U 511 only
Extendable support ring	F	-	-	Summer 42	-
Compass repeater behind attack periscope	D	-	-	Autumn 42	-

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Askania magnetic compass fairing	F	15/10/42	-	Autumn 42	On new boats only; summer 42 on Seebeckwerft boats
37mm automatic on aft deck	R	-	-	Late 42	Replaced 20mm on some boats
Bachstelze	F	-	Aug 42	Early 43	3 pressure proof containers on IXD towers
Armoured doors	F	-	-	First half of 43	-
37mm automatic on aft deck	D	-	-	Spring / summer 43	Some retained with Turm II; deleted when Turm IV fitted
Reduced insulators	D	-	-	Spring 43	Forward jumping wires
Aft deck tall support posts	F	-	-	Spring 43 to early 44	On some new build boats; discontinued after early 44
Lookout mast on aft deck	D	-	-	May 43	From U 183 and U 185
Fast dive foredeck	F	-	Mar 44	Aug 44	Not universal
Torpedo trolley rails	F	-	-	Aug 44	Fitted with fast dive foredeck
Side cushions	F	-	-	Late war	On only a few boats
Round watertight hatch on starboard foredeck	R	-	-	Late war	-
Zweibel	F	-	-	Late war	U 889 only

Modifications specific to Type XBs

Feature	F, D or R	Order date	Tested	To op. boats	Other information
Pressure tight torpedo containers	F	-	-	Late 42 / early 43	One on either side, on top of the saddle tanks
Breakwaters	D	-	-	Spring 43	Removed with 105mm deck gun
Additional torpedo container on forward deck	F	-	-	Spring 43	In position vacated by 105mm (on U 219 and U 220 only)
37mm automatic on aft deck	D	-	-	Summer 43	Deleted from aft deck when Turm IV fitted
Life raft containers on forward deck	F	-	-	Late war	3 on port side, 2 on starboard side
Converted for long range transport (U 219)	R	-	-	Jan 44 - Aug 44	Mineshafts on saddle tanks replaced with cargo holds, schnorchel added
Converted for long range transport (U 234)	R	-	-	44 / early 45	Mineshafts on saddle tanks replaced with cargo holds, twin 37mm fitted, cut out foredeck, schnorchel

Part IV - Other Modifications**Towers**

Turm changes and associated armament arrangements					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Turm 0	F	-	-	All early boats	Fitted to all early boats; 1 * 20mm
Turm I	R	-	42	None	Tested on U 193 and U 553 only; 2 * twin MG151s upper + 1 * 20mm lower
<i>Mittelmeerturm</i>	R	-	-	Between Aug 42 - Sep 43	On Type VIIIs only; fitted La Spezia; 2 * twin Breda + 1 * 20mm
Monsun platform	F	-	-	Summer 42	On Far East IXs only
Turm II	R	-	-	Dec 42	1 * 20mm upper + 1 * 20mm lower
Turm III	R	-	Apr / May 43	-	For VIIDs only; 2 * 20mm; tested for short period then replaced by Turm II
Turm IV	R	14/11/42	-	Spring 43	2 * twin 20mm upper + 1 * Vierling lower (later 37mm lower)
Turm V	R	14/08/43	-	After order	Turm IV + plated forward platform; U 345 & U 362
Turm VI	R	14/08/43	-	After order	Turm IV + open forward platform; U 673 & U 973
Turm VII	R	14/08/43	-	After order	Platform encircling tower; 1 * twin 37mm forward + 1 * twin 37mm aft
Flak towers	F	16/04/43 - 20/05/43	-	Apr - Jun 43	1 * Vierling upper + 1 * 37mm lower + 1 * Vierling forward; U 256, U 441, U 621 & U 953
Flak to Turm IV	R	11/11/43	-	Nov / Dec 43	Flak boats changed to Turm IV

Features associated with Turm IVs					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Ammunition containers on tower	F	-	-	Spring 43	Part of Turm IV
Vierling	F	14/06/43	Mar 43	Spring 43	Initial weapon used on lower Turm IV platform
37mm automatic	F	15/10/43	-	Nov 43	Replaced Vierling
Extra railing bars	F	-	-	Early 44	Top of end of lower platform
Overhead railing bars	F	-	-	Early 44	Lower platform
Lattice mesh	F	-	-	First half of 44	To some railings
Twin 37mm automatic	R	-	-	Late 44 / early 45	Replaced 37mm automatic on some boats

Radar and radar warning

Radar and radar warning		
Antenna	Introduced	Removal
FuMB <i>Berta</i>	Late 41	May 42
FuMO 29 <i>Seetakt</i>	1942	1943
FuMB 1 <i>Metox</i>	Aug 42	Aug 43
FuMB Ant 2 <i>Honduras</i> (Biscay Cross)	Aug 42	Carried as spare
FuMO 30 <i>Seetakt</i>	Early 43	Early 44
FuMT 1 <i>Aphrodite</i>	Spring 43	-
FuMB Ant 3 <i>Bali I</i>	Apr / May 43	Not removed
FuMB 4 <i>Samos</i>	Apr / May 43	-
FuMB Ant 5 <i>Samoa</i>	Late 43	-
FuMB 7 <i>Naxos</i>	Oct 43	-
FuMB 8 <i>Wanze G1</i>	Aug 43	Early Nov 43
FuMB 9 <i>Wanze G2</i>	Late Nov 43	-
FuMB 10 <i>Borkum</i>	Nov 43	-
FuMB Ant 11 <i>Finger</i>	Oct 43	-
FuMB Ant 24 Cuba 1 <i>Fliege</i>	Feb 44	-
FuMB Ant 24 Cuba II <i>Mücke</i>	Before Jun 44	-
FuMO 61 <i>Hohentweil-U</i>	Mar 44	Not removed
FuMB 26 <i>Tunis</i>	May 44	Not removed
FuMB 28 <i>Naxos ZM4</i>	Aug 44	-

Rockets

Experimental rockets					
Feature	F, D or R	Order date	Tested	To op. boats	Other information
Wurfkörper 30cm Wk.Spr.42	F	-	31/05/42 - 05/06/42	-	U 511; 6 rockets on on aft deck
15cm Borsig	F	-	Early 43	-	U 511
RAG 8.6mm	F	-	Jun 43	-	U 984 and U 994
RAG 8.6mm	F	-	Oct / Nov 43	-	U 441
30 rockets on tower	F	-	Early 44	-	U 986 + another boat
Wurfkörper 30cm or Wurfkörper 21cm	F	-	Jun 44	-	U 24 at Constanta
Wurfkörper 30cm or Wurfkörper 21cm	F	-	Jul 44	-	U 9 at Constanta
RAG 8.6mm/Wurkörper	F	-	Aug 44	-	U 19 at Constanta
Solid fuel	F	-	Late 44	-	U A in Baltic
Laffrentz (towed floating pontoons)	F	-	Late war	-	U 1063

Part V - Identification Features Of U-Boat Variants

The following is a list of some of the more common identification features which have been useful in identifying a sub-variant or a batch of U-boats from a particular shipyard. As previously mentioned, these identification features were not retrofitted to existing boats. Also of note is that the U-numbers are inclusive (U 21 to U 24 would refer to U 21, U 22, U 23 and U 24).

One very helpful resource in identifying boats is Georg Högel's *U-Boat Emblems Of World War II 1939-1945* (Schiffer Military History, 1999). The book includes a large number of personal and flotilla insignia, UAK and training symbols, all of which can directly identify particular U-boats.

Identifying main types

The main types of U-boat operating within the Kriegsmarine were the IA, II, VII, IX, XB, XIV, XXI and XXIII. In addition, there were a limited number of experimental Walter boats (V 80 and four XVIs) and 14 foreign boats which were pressed into naval service. However, for the most part, the U-bootwaffe consisted of the main types above. Assuming you are presented with a good view of the upper hull then it is usually quite uncomplicated to determine the type of U-boat.

The first thing to ask is if the boat is a conventional boat or an *Elektroboot*. The streamlined hulls of the *Elektroboots* (XXIs and XXIIIs) and the research boats make identification of these late war types very straightforward. It does not take long to familiarise oneself with the two main *Elektroboots* types and the XXVIIIs and be able to distinguish between the large ocean going XXI and the small coastal XXIII.

If you see a photo of a conventional U-boat, look at the main drainage area in the central area of the boat. If the main drainage area has a long line of rectangular drainage holes then you are looking at a Type IA, IX or XIV. If there is an additional line of drainage holes directly above the rectangles then the boat is an XIV. If this long line is not present, then the boat will be either a Type

IA or IX. It is possible to mistake a Type IA for an IX but the section below (Identifying characteristics of Type IAs) should provide some clues as to how to tell apart the two types.

If the main drainage area does not have rectangular holes then you are looking at a small Type II or a medium size VII. After some study into shapes and profiles, it is usually possible to tell the difference between the small Type II and its larger brother, the VII. Other than size, the tower profile and vent patterns allow us to differentiate between the two types with relative ease.

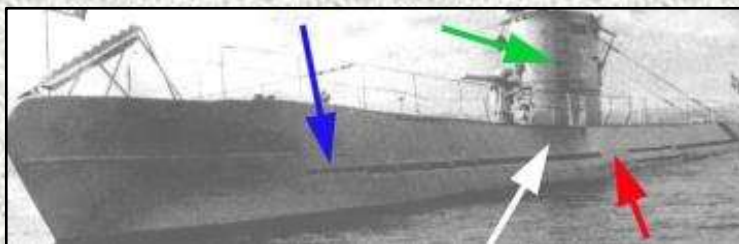
Now that you know the type (e.g. Type VII) you can then try to narrow it down into a sub-variant (VIIB) and then, if possible, into batch (e.g. U 54 to U 55). Some of the information required in this process is presented below.

Identifying characteristics of Type IAs

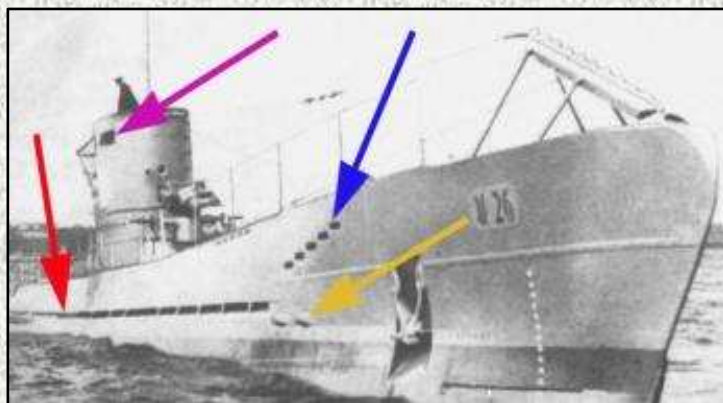
The two large Type IAs (U 25 and U 26) are very reminiscent of the very early IXAs. One method of distinguishing between the two types is to look at the top of the hull casing in the area outboard of the deck gun. On the IAs this area bulged outwards whereas on the IXAs this area was flat. Another distinguishing feature - one which is unique to the Type IA - is the position of the navigation lights high up on the tower. One more is the tower rungs - the IAs had nine rungs arranged vertically on the port side but none on the starboard side.

Care should be taken over the vents as more were added to the boats prior to the war. Details of the additional vents can be found in Part III of this article.

Above right (1): U 25 before any modifications were made to the vent patterns. The green arrow points to the nine grips arranged vertically on the port side of the tower. The white arrow points to the bulge in the area of the deck casing around the deck gun.



Below right (2): U 26 after the vents had been altered. The blue arrow shows how the new vents were arranged in a diagonal line rather than the horizontal line that can be seen in photo 1. The two extra covered vents are illustrated by the orange arrow. The red arrow points to the seven extra vents added along the centre of the boat. Lastly, the purple arrow points to the navigation light and its unique location high up on the tower of Type IAs.



Identifying characteristics of Type IIs

Vent patterns - A basic overview of the Type II vent patterns is given below. For more details please refer to the AMP article *Type II U-Boat Modifications & Vent Patterns*.

Front vent patterns -

- U 1 to U 6, U 7, U 13 to U 16 - 7 vents.
- U 8 to U 12, U 17 to U 20 - 9 vents (second from front was two much smaller ovals).
- U 21 to U 23 - 11 on top; 8 on bottom.
- U 120 and U 121 - 7 on top; 2 on bottom.

- U 56 to U 63 - 24 vents and two small circles above mid-hull plus multiple on front set.
- U 137 to U 139 - 23 vents and two small circles above mid-hull plus multiple on front set.
- U 140 - double row above mid-hull plus multiple on front set.
- U 141 to U 152 - row above a main drainage area; double row ahead of drainage area; multiple on front set.

Note 1: The numbers above show the number on the starboard side; the port side had one or more extra vents due to the absence of anchor recess.

Note 2: The numbers show the vents originally on boats before any additions.

Rear vent patterns -

- IIAs, IICs and IIDs, U 13 to U 16, U 19 - 12 vents.
- U 7 to U 12, U 17, U 18, U 20 to U 24, U 120, U 121 - 11 vents (two of the vents consisted of two circles rather than ovals).

Lower vents - In regard to the vents ahead and below the forward dive plane, the IICs and IIDs were different in that pairs of vents were merged to form 27 large vents.

Saddle tank vents - The IIDs are clearly identifiable by the extra lines of vents in their saddle tanks. At the bottom side of each saddle tank there was a curved line of 13 vents at the front and 12 at the rear. Additionally there were more vents higher up, with 7 at the front (or 9 on some boats) and 6 at the rear.

Tower styles -

- Style 1 (U 1 to U 6) - dashboard, no wheel.
- Style 2 (U 7 to U 12) - dashboard, no wheel, D/F loop on outside.
- Style 3A (U 13 to U 20) - D/F loop in housing, large navigation light housing.
- Style 3B (U 21 to U 24) - D/F loop in housing, normal light channel.
- Style 3C (U 56 to 60, U 62, U 63) - D/F loop in housing, narrow light channel.
- Style 4A (U 61) - large tower with bars, no spray deflector, two curves on top of bulwark.
- Style 4B (U 120, U 121) - large tower with bars and magnetic compass fairing, unique light housing.
- Style 4C (U 137 to U 152) - large tower with bars.

Note 1: Wintergartens and machine guns on bulwark were added to Black Sea boats and some IIDs.

Note 2: The spray deflector was present upon the IIDs plus U 120 and U 121. With the exception of U 21, it was not retrofitted to existing boats.

Pre-war bow identification plates - The IIAs had rectangular pre-war bow identification plates; IIBs and IICs had oval identification plates.

Six circular plates near bow - These six plates per side were exclusive to the IICs and IIDs.

U 6 - The deck style on U 6 consisted of small circles rather than slots.

U 9 - U 9 can be distinguished by the metal Iron Cross insignia on either side of the tower.

U 11 - The experimental tower was tested in February and March 1938 was then replaced by the normal tower. The *Alberich* coating was applied to the tower and hull in 1940.

Kort nozzles - The shrouds around the propellers were applied to IIDs (and U 16).

Air identification plate - The semi-circular air identification metal plate was placed behind the gun position and orientated sideways on U 120, U 121 and the IIDs.

Identifying characteristics of Type VIIAs

VIIAs - There are three major identifying characteristic of the VIIAs -

- Single rudder (as opposed to the pair of rudders on other VII variants).
- Torpedo tube on the aft deck.
- Vents running along the top of the hull casing (quite different from other VII variants).

Another exclusive VIIA feature was the mesh added within the stanchions on the forward deck railings.

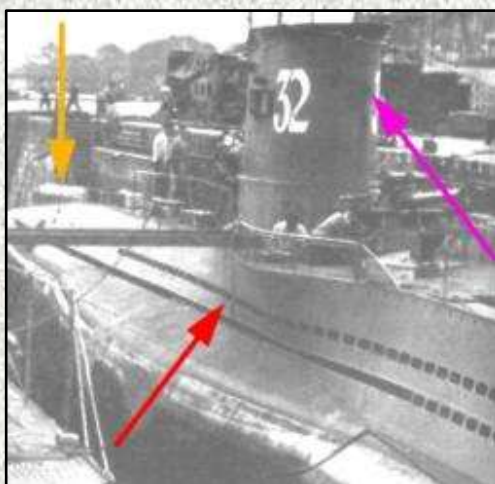
There are a number of shipyard specific features on the VIIAs and some are listed below.

AG Weser VIIAs (U 27 to U 32) - The main methods of identifying boats from this batch are -

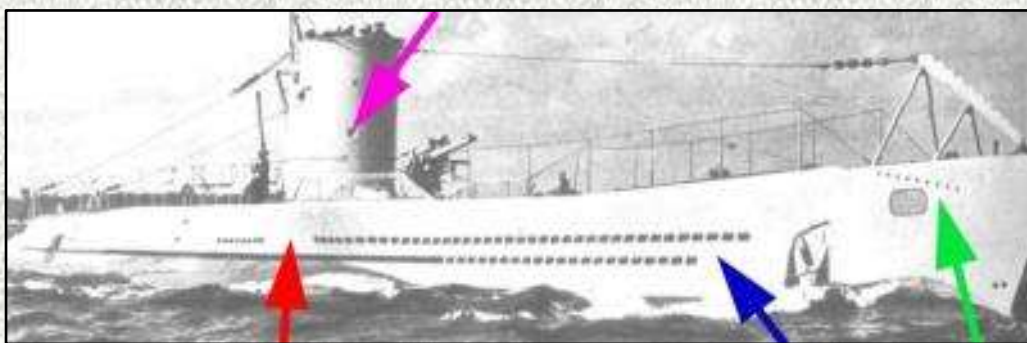
- Above the saddle tanks, the main vents ran in an unbroken line from the front all the way back to behind the tower.
- In the main forward pattern on the port side, on the top line, the third vent back from the front was missing.
- There were 4 circular holes near the bow.
- On the front of the tower, the foghorn opening was higher up and slightly offset to port.
- On the tower, the square and circle markers were **above** the two square drainage holes.

Germaniawerft VIIAs (U 33 to U 36) - The main methods of identifying boats from this batch are -

- There was a noticeable gap in the main vents above the saddle tanks.
- In the main pattern on the starboard side, the front three vents on the bottom line were missing.
- There was an extra 16 circular holes at the top of the hull casing (8 small ovals on U 33).
- There were 9 circular holes near the bow.
- On the front of the tower, the foghorn opening was lower down up and slightly offset to starboard.
- On the tower, the square and circle markers were **below** the two square drainage holes.



Above (3): An AG Weser VIIA, U 32, showing the unbroken line of vents running above the saddle tanks. The purple arrow shows the position of the large foghorn opening on the AG Weser boats. The orange arrow points to the aft torpedo tube, which protruded out of the aft deck.



Above (4): Four VIIAs, such as U 35 pictured here, were built at the *Germaniawerft* shipyard. These had several vent pattern differences compared to the *AG Weser* boats: the red arrow shows the vents missing along the main pattern; the blue arrow shows the three vents missing near the front (on the lower row); and the green shows the nine circular holes (as opposed to four on the other batch). Lastly, the purple arrow points to the foghorn opening, which can be compared to the photo of U 32 above.

Rear jumping wires of early VIIs

There were several key differences in the rear jumping wires mounted behind the tower.

Two jumping wires, with extra wires on starboard side - These additional wires were present on the **starboard** side of the rear jumping wires **only** on the VIIAs in the pre-war period.

Single rear jumping wire (early tower) - Around the start of the war, with the 20mm still on the aft deck, the double jumping wire arrangement on the VIIAs was cast aside in favour of a single rear jumping wire. This exclusive feature of the VIIAs was unique in that there were two connector bars. One connector was located between the top of the tripod supports and another connector was located between the two jumping wires (just behind the tower).

Single rear jumping wire (late tower) - The single rear jumping wire was retained upon the VIIAs when the rear tower was rebuilt to accommodate the 20mm. However, in this configuration a single jumping wire ran back from the top railing on the tower.

Two jumping wires, with extra wires on port side - These additional wires were present on the **port** side of the rear jumping wires **only** on the following boats -

- Early VIIBs (U 45 to U 55, U 99 to U 102).
- Early VIICs (U 93 to U 98).

Two jumping wires, no extra wires - This was the configuration that became standard and it was employed upon all VIIBs and VIICs not listed above.

Identifying characteristics of Type VIIs (A, B and C)

When studying the points below, it is helpful to know which batches were built and launched first. The first VIIC *Germaniawerft* batch was U 93 to U 98 and these were built slightly earlier than any other VIICs. U 69 to U 72 were originally going to be numbered as 99 to 102 (directly following on from 93 to 98) but then the batches were reserved, with U 69 to U 72 swapping numbers with U 99 to U 102 (99 to 102 became VIIBs). The batch U 69 to U 72 became the second VIIC batch built at *Germaniawerft*. Built and launched at the same time period were the early *Blohm & Voss* boats U 551 to U 558.

VIIAs and early VIIBs - If you spot the following features then the boat is either a VIIA or an early VIIB (U 45 - U 55) -

- Early attack periscope base.
- 20mm on aft deck.
- Numerous small round ventilation holes on both sides of the tower.
- An alternative set of deck railings which included a seat on the rear set.

Note: All existing boats had the 20mm re-sited to an enlarged rear tower in the winter of 1939 / 1940.

KDB cover - Up to and including the early part of 1940, a cover was often in place over the raised KDB in port photos of VIIBs. After this period this feature is generally absent.

Slope of trailing edge - One major identifying characteristic of the VIIAs and VIIBs, when the 20mm was located on the tower, was that the trailing edge undercut the rear of the tower. On VIICs the trailing edge sloped in the opposite direction.

Air intake and trunking - This is a very good way of identifying early VIIAs and VIIBs. The air trunking issue was an issue which plagued the VIIAs and VIIBs, with all but the last of the methods adopted to address this problem proving to be unsatisfactory. The arrangement employed in the VIICs was presumably acceptable as no modifications to the intakes were ever required on this sub-variant. If you do see any of the following features, you can assume you are looking at a VIIA or VIIB and can pin the photo down to the following time periods -

- Multiple small circular holes on the outside of the starboard side of the tower (1938 or 1939).
- Extra grill with vertical bars on starboard side (early 1940 to late summer 1940).
- L-shaped trunks on either side of tower (summer 1940 to spring 1941).
- Teardrop shaped fairing in middle of tower (spring 1941 onwards).

Note 1: U 48 had the grill with vertical bars in August 1939.

Note 2: U 30 had the L-shaped trunks in the spring of 1940.

L-shaped trunks - There were different styles between the air trunks on VIIAs and VIIBs -

- Sharper edged shaped trunk with horizontal grill at top (U 29 to U 32, U 34, U 74, U 85, U 99 and U 101).
- Rounded trunks with criss-cross grill on vertical sides (U 46 to U 48).
- Rounded trunks with a grill with vertical bars on vertical sides (U 52, U 73, U 75 and U 83).

Note 1: The boats which were sunk before they were able to be fitted with the trunks are U 28, U 33, U 35, U 36, U 45, U 49, U 50, U 53, U 54 and U 55.

Note 2: U 28, U 51, U 76, U 84, U 86, U 87, U 100 and U 102 would have had trunks but I have no information on the style employed.

Slat intake grills - This was a feature on U 69 to U 72, U 93 to U 98, U 331, and U 551 to U 557. The known styles are as follows -

- SG1 - U 95 (no lip), U 96 and U 97.
- SG2 - U 69, U 71, U 93, U 94 and U 331 (U 331 had 7 spaces, the rest had 6 spaces).
- SG3 - U 552, U 553, U 555 and U 557.

Note: Presumably all *Blohm & Voss* boats from U 551 to U 557 had SG3.

No mast antenna housing - The following early VIICs did not have the mast antenna housing (MAH) -

- U 69 to U 72, U 93 to U 98, U 331, and U 551 to U 557 (these boats had the slat gill).

- U 558 to U 574 plus other boats including U 392, U 651 and U 751 (these boats had the mesh grill).

Tower top edge - The top edge of the tower had a shallower curve on -

- All VIAs.
- Early VIIBs (U 45 to U 53).

Note: Other VIIBs boats not listed above, and all VIICs, had a more pronounced curve at the top of the tower. It is likely, but not certain, that the VIIBs U 54 and U 55 had the more pronounced curve.

Housing for weather balloon bottle and filler hose - This housing was present ahead of the sky periscope housing on the towers on -

- All VIAs.
- Early VIIBs (U 45 to U 55, U 99 to U 102).
- Early VIICs (U 93 to U 98).

Note: Previously referred to as a mobile voice pipe.

Coping - The coping was **not** present around the whole of the tower bulwark on -

- All VIAs.
- Early VIIBs (U 45 to U 55, U 99 to U 102).
- Early VIICs (U 93 to U 98).

Early attack periscope base - The early style featured on -

- All VIAs.
- Early VIIBs (U 45 to U 55).

Standard attack periscope base - The standard style featured on -

- Mid and late VIIBs (U 73 to U 76, U 83 to U 87, U 99 to U 102).
- All VIICs.

Note: There were some differences in the railings employed upon the standard attack periscope base.

One-piece wooden seat on tower - This one-piece wooden seat on either side of tower was a shipyard specific item employed upon the following *Germaniawerft* boats -

- All VIAs.
- U 45 to U 54, U 99 to U 102 (VIIBs).
- U 93 to U 98, U 201 to U 212 (VIICs).

Note: All other boats had three separate seats on either side of the tower.

Tower floor drainage pattern - On the tower floor, the VIIBs and early VIICs built at *Germaniawerft* had the drainage slots in the tower floor aligned with the length of the boat.

- All VIAs.
- U 45 to U 54, U 99 to U 102 (VIIBs).
- U 93 to U 98, U 201 to U 212 (VIICs).

Note: Other boats not listed above had the main groups of square drainage slots arranged in groups which were aligned towards the 20mm mount.

Small forward radio aerial inlet - Above the spray deflector, offset slightly to starboard, was the forward radio inlet. The following boats had the **small** forward radio inlet -

- All VIAs.
- Most VIIBs (U 45 to U 55, U 73 to U 76, U 83, U 99 to U 102).
- Very early VIICs (U 93 to U 98).

Note: U 52 originally had the smaller inlet but it appears to have been retrofitted with the large radio inlet (the larger inlet is visible when U 52 was a post operational training boat in late 1941 or 1942). However, U 46, U 48 and U 101 all have the small inlet during this same period so this feature cannot have been retrofitted to all boats.

Large forward radio aerial inlet - The following boats had the **large** forward radio inlet -

- Very late VIIBs (U 85 to U 87).
- All VIICs with the **exception of** U 93 to U 98.

Note: I do not have information regarding the inlet on U 84.

L-shaped radio connectors at the rear of tower - The feature was **not** present on -

- All VIAs.
- Most VIIBs (U 45 to U 55, U 73 to U 76, U 83, U 99 to U 102).
- Very early VIICs (U 93 to U 98).

Note: Boats such as U 73 and U 83 had this feature added when their towers were changed to the *Mittelmeerturm*.

The feature **was** present on -

- The very late VIIBs (U 85 to U 87).
- All VIICs with the **exception of** U 93 to U 98.

I do not have information regarding the connectors on U 84.

Navigation lights on tower - Both of the side navigation lights on either side of the tower, and the single navigation light at the rear, varied between batches and may be used to differentiate between boats.

Deck railings - The deck railings also varied between some boats.

No stern torpedo tube - U 83, U 203, U 331, U 352, U 401, U 431 and U 651.

Two forward torpedo tubes only - U 72, U 78, U 80, U 554 and U 555.

Mediterranean boats - For VIIBs and VIICs operating in the Mediterranean theatre, look out for a *Mittelmeerturm* tower or for splotch type camouflage patterns.

Planked deck - From the autumn of 1942, all new build VIIs were built with planked decks rather than slotted decks. This feature was not retrofitted to existing boats. We may surmise that -

- If you see a slotted deck then the boat was built before the autumn of 1942.
- If you see a planked deck then the boat was built in the autumn of 1942 or later.

Schnorchel - If this device was fitted to the port side of the deck then it is a Type VIIC or VIIC/41. A helpful list of each individual boat that was fitted with the *schnorchel*, including the month this feature was added, can be found at - http://www.uboat.net/technical/schnorchel_fitted.htm

Atlantic bow - As discussed in more detail in the article *Late War Type VIIC & VIIC/41 Configurations*, although the order to implement the Atlantic bow was issued on the 19th July 1941 the feature began to appear on launched boats towards the end of June 1942. With the exception of a few boats, most VIICs were being launched with the Atlantic bow by November 1942. This feature was not exclusive to VIIC/41s and was fitted to late VIICs and VIIC/41s.

Radar drive shaft housing - On the majority of early VIICs there was a semi-circular bulge on the port side of the tower. This was used to house the shaft for the mast antenna and, in the mid-war period, the shaft for the radar antenna. In the final VIIC/41s, including U 400, U 825, U 826, U 953, U 1056, U 1305, the towers were not built with the normal semi-circular housing but with an alternative housing consisting of a rectangular shape with rounded edges.

Note: My thanks to Simon Morris for this information.

Vent patterns for VIIBs and VIICs

Main vent patterns - The differences are covered in the article *Type VIIC Free-Flooding Vent Patterns* (which is now part of *The Wolf Pack*). An updated version can be found in the article *Askania, Side Cushions & Updated Type VII Vent Patterns*. In particular you should be looking at the main vent patterns ahead of the saddle tanks.

Round exhaust outlet - If you see a VIIB with a round diesel exhaust outlet, the photo will have been taken prior to around the summer of 1940. The boat must be U 45 to U 55, or U 99 to U 102. It cannot be a later VIIB or any of the VIICs.

All VIIBs - The easiest way to distinguish a VIIB from a VIIC is to look for the following features, which are specific only to VIIBs -

- Extra group of vents at the rear of the front pattern.
- No vents above upper torpedo door.
- One vent near stem (rather than two or three on the VIICs).

Curved line of vents - These vents, directly above the central drainage area in the area vacated by the breakwaters, differed between boats.

Paired circular vents above torpedo doors - If these 12 holes are arranged in pairs the boat was built in the *Blohm & Voss* shipyard.

Four extra medium-sized vents above saddle tanks - If the VIIB or VIIC had these extra four single vents then the boat was constructed in the *Bremer Vulkan-Vegesacker Werft* shipyard.

Identifying characteristics of other Type VII variants

VIIDs - These six minelayers (U 213 to U 218) were nearly ten metres longer than VIICs. A plug within the centre section of the boat allowed five vertical mineshafts to be located abaft the tower. The top of the mineshafts protruded out of a long thin structure that can be seen directly behind the tower and it is this structure which makes identification of this sub-variant straightforward.

Certain complications arose on this sub-variant when additional armament was deemed necessary. The additional guns were normally added within an additional lower platform directly behind the original tower. However, there was no space for a lower platform on the VIIDs due to the presence of the mineshaft structure. The original proposal to negotiate this problem was Turm III, which had an upper platform - with a pair of guns sitting side by side - and no lower platform. It is not clear how many boats were converted to Turm III or how long this arrangement lasted for. In any case, this arrangement was apparently not considered satisfactory because VIIDs were fitted with a form of Turm II in late 1942 or early 1943.



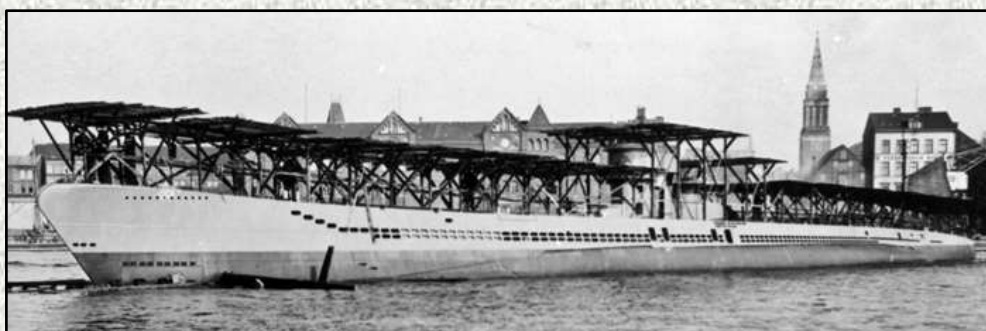
Left (5): U 213 showing clearly the small superstructure which was abaft the tower on all VIIDs. The five vertical minshafts were in place along the length of this structure, right up to the rear end of the Turm 0 tower.

Right (6): U 218 in September 1943 with a form of Turm II, consisting of a gun with shield on the upper platform and a single 20mm on the lower platform. Comparison with the photo of U 213 above shows the problem associated with any form of lower platform on VIIDs, namely that the lower platform obscured the top of a few of the minshafts.



Later in 1943, when additional armament was considered essential, U 218 was given a form of Turm IV. By the latter stages of the war U 218 possessed the standard fit of a pair of twin 20mms on the upper platform and a 37mm on the lower platform. On the forward deck of this boat, the old magnetic compass fairing had been replaced by the free-standing *Askania* type, a *schnorchel* was present, and there was a hatch in the location vacated by the 88mm deck gun. Unlike many boats in this period, the forward deck railings were retained.

VIIFs - These four boats (U 1059 to U 1062) were intended as torpedo transports. Ten metres longer than VIICs, they can easily be distinguished by their extended length and by the double row of vents which ran along the hull casing above the saddle tanks. They were the only Type VIIs to have torpedo storage channels at either side of the deck.



Left (7): The VIIF U 1061 with the double row of vents above the saddle tanks. Note the boat has an Atlantic bow.

Identifying characteristics of Type IXs

Bow vent patterns - An easy way to distinguish between early and late variants is by looking at the vents at the top of the bow area.

- All IXAs and IXBs, port side - 1 vent (3 metres back from bow).
- All IXAs and IXBs, starboard side - 1 vent (3 metres back from bow) and another vent lower down and next to stem.
- All IXC and IXDs, port side - 2 vents at top (3 metres and 4 metres back respectively).
- All IXC and IXDs, starboard side - 2 vents at top (3 metres and 4 metres back respectively).

Main vent patterns - Refer to Part VII of the article *Type IX U-Boat Modifications & Features* and page 26 of *Vom Original zum Modell: Uboottyp IXC* by Fritz Köhl and Axel Niestle. Later war boats had shrouded vents ahead of the main set and behind the main set of vents. U 172, U 183 and U 185 had 26 extra medium-sized vents directly ahead of the main vents which curved upwards. Type IXDs had extra vents due to being 14% longer.

Foofholes positions - All IXAs had the forward set in the same position, while on IXBs and IXCs they were three vents farther forward. On the early IXAs (U 37 to U 40) the rear set was above the middle of a vent. On later IXAs (U 41 to U 44) and all IXBs the rear set was above the rear end of one vent forward. On all IXCs the rear footholes were moved slightly farther back in the position above the front of the next vent. There was a shipyard specific difference in respect to the forward set of footholes being absent from the IXCs built at the *Seebeckwerft* shipyard in Bremerhaven.

Deck railings - Refer to Part VIII of the article *Type IX U-Boat Modifications & Features* and page 17 of *Vom Original zum Modell: Uboottyp IXC* by Fritz Köhl and Axel Niestle. Style 4S was exclusive to IXAs in the pre-war and early war period. Style 8S was exclusive to IXBs (except U 123) and the two earliest IXCs (U 67 and U 68) in the early war period.

Position of 105mm deck gun - One of the main ways to distinguish a Type IXA from later variants is to look for the position of the 105mm deck gun. On IXAs the gun was forward of the entry hatch; on IXBs and IXCs the gun was behind the entry hatch.

Sets of air intake holes on tower (IXAs only) - The IXAs originally had between 4 and 7 sets of air intakes per side on the outside of the tower. Each set consisted of a number of small circular holes. The number of sets varied between boats and this is a good way of identifying particular boats. This feature was removed in early 1940 to make way for what would become the standard IX intakes, which consisted of sets of grills.

Upper air intakes - The upper air intake styles on early Type IXs are as follows -

- Style W - IXAs and early IXBs (U 64, U 65, U 122, U 123 and U 124).
- Style X - IXAs and early IXBs (U 64, U 65, U 122, U 123 and U 124).
- Style Y - Later IXBs (U 103 to U 111).
- Style Z - IXCs and IXDs.

Railing styles -

- Style R1 - Pre-war IXAs and some wartime IXAs
- Style R2 - Some wartime IXAs.
- Style R3 - Earliest IXBs (U 64, U 65, U 122, U 123, U 124, U 103).
- Style R4 - Later IXBs (U 104 - U 111), all IXCs and IXDs.

Area on rear of starboard bulwark - This area was only on the IXAs and earliest IXBs (U 64, U 65, U 122, U 123 and U 124) when launched but it was removed in the summer of 1940.

IXA tower rungs - The IXAs originally had no tower rungs at all. On the port side there were only two horizontal railings and these were at the same level. There were two horizontal railings on the starboard side but the rear one was higher up. Early in the war, seven rungs were added to the towers of U 37, U 38 and U 39 ahead of the navigational light channels on each side; this consisted of three rungs added above the spray deflector and four added below the spray deflector per side.

Markers at rear of tower sides - The markers at the sides of the rear of the tower (square and cross and circle and cross) were present only on the IXAs and the first two IXBs (U 64 and U 65).

Foldable metal seats - The IXAs and the earliest IXBs (U 64, U 65, U 122, U 123 and U 124) had four foldable metal seats plus two on the sides of the periscope housing but these were removed in 1940.

Hatch on port side - From U 103 onwards (U 103 to U 111 plus all IXC and IXDs) there was a square and cross marker added to the door plus two drainage squares behind.

Two lines below small hatch - Just below the spray deflector on both sides of many IXs, there was a smaller hatch with a hole. From U 122 onwards (U 122, U 123, U 124, U 103 to U 111, all IXCs and IXDs) two long vertical lines were added below this hatch.

Front railing - On the *Deutsche Werke* boats (U 501 series) there was a break in the railing directly below the hatch with the two lines.

Wind deflector length -

- Long - Wartime IXAs
- Short and taper to a point - U 43 pre-war, IXBs, early IXCs.
- Long and taper to a point - Later IXCs.

Navigation light -

- No hood - IXAs, IXBs, early IXCs.
- Single hood - U 159, U 160.
- Double hood - Later IXCs.

Jumping wire attachment point -

- Style 1 - IXAs (U 37 to U 44), U 64, U 65, U 122, U 123, U 124, U 103, possibly U 104.
- Style 2 - possibly U 104, U 105, U 106, U 107, U 108, U 110.
- Style 3 - U 105 at a later point, U 108, U 109, all IXCs.

Third periscope - The IXAs and IXBs had three periscopes; IXCs and IXDs had two periscopes.

Periscopic rod aerial housing - This feature on the port side of the tower was not present on all the IXAs and the early IXBs (U 64, U 65, U 122 to U 124 and U 103 to U 107). It was present on the later IXBs (U 108 to U 111), all IXCs and IXDs.

Hull fairleads - The position varied between boats (position 1 and position 2).

Forward hatch - Some boats had the hatch offset to port.

37mm on foredeck - A few IXs including U 515, U 860 and U 873 were fitted with a 37mm semi-automatic on the foredeck in the position vacated by the 105mm.

Planked deck - From the autumn of 1942, all new build IXs were built with planked decks rather than slotted decks. This feature was not retrofitted to existing boats. We may surmise that -

- If you see a slotted deck then the boat was built before the autumn of 1942.
- If you see a planked deck then the boat was built in the autumn of 1942 or later.

Covers for torpedo storage tube covers - There was an initial style, employed upon pre-war IXAs, with a semi-circular bulge (MB). There were multiple styles, both metal and wooden, but it has not been possible to establish any pattern between boats and batches. Furthermore, photos often show a mix of styles employed upon a boat at same time.

Simplified metal hatches on deck - Boats from spring 1942 began to have simplified metal hatches on the deck rather than the previous wooden style.

Lookout mast - This feature was present on the port side of the aft deck on U 183, U 184, U 185 and U 187.

Fast dive foredeck - Known as *Schnelltauchback*, completions began on operational boats in the autumn of 1944. Torpedo trolley rails began on the port side of the tower, turned at a 45-degree angle, and then turned again to run centrally along the foredeck up to the point where the narrow section of the fast dive foredeck began. This feature was only added to the Type IXs.

Schnorchel - If this device was fitted to the starboard side of the deck then it is a Type IX or XB. A helpful list of each individual boat that was fitted with the *schnorchel*, including the month this feature was added, can be found at - http://www.uboat.net/technical/schnorchel_fitted.htm

Zweibel - The *Zweibel* system at the bow was reportedly only fitted to U 889.

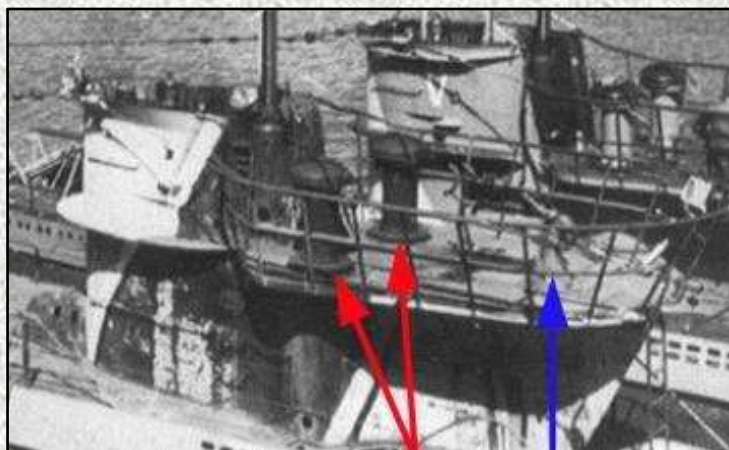
Identifying characteristics of tower (Turm) versions

The term *Turm* (meaning tower in German) relates to the *style* of tower and armament outfit employed on a U-boat. In 1944 the Type VIIC, VIID, IXC, IXD and XB U-boats were all outfitted with Turm IV, with the same armament outfit and the same platform arrangements. However, since there were differences in size between the variants, the actual Turm IV towers were slightly different sizes on each variant. But the same basic tower arrangement was present in all types and we are able to refer to a Turm arrangement regardless of U-boat variant.

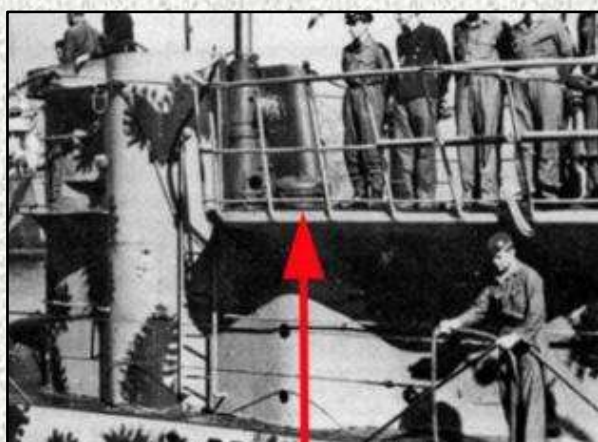
The first and most obvious question to ask is if the tower has one or two tower platforms. If there is only one platform then we can see a Turm 0 or *Mittelmeerturm*. If there are two platforms it is a Turm II or Turm IV. As can be seen below, differentiating between a Turm 0 or *Mittelmeerturm* is very straightforward. The differences between a Turm II and Turm IV are less obvious but with careful study and some practice it is usually possible.

Turm 0 or Mittelmeerturm - Type VIIIBs and VIICs which served in the Mediterranean had their normal Turm 0 tower modified to *Mittelmeerturm* standard when the boat visited La Spezia. The *Mittelmeerturm* tower is easily distinguished by its far greater length and the slope of the rear edge, which undercuts the tower. Another way of discerning a *Mittelmeerturm* is the increased number of vertical stanchions required on such a lengthened tower arrangement. The standard weapons fit for this tower was a pair of twin 13.2mm Breda machine guns, housed in waterproof pressure-proof

Pods (sitting side by side) plus a single 20mm behind on the centreline. Sometimes the twin Breda guns were housed inside the large pods, other times the twin barrels are visible atop the pods.



Above (8): U 73 and U 561 in September 1942. The red arrows point to the pressure-proof pods housing the twin 13.2mm machine guns on U 73. The guns are presently contained within the pods. In some photos, the twin barrels are ready for use and are visible above the pods. The blue arrow points to the single 20mm at the rear of the tower. Note also the additional number of vertical stanchions required to surround the extended *Mittelmeerturm*.



Left (9): The large pods make identification straightforward but on a few occasions photos show the pods recessed into the tower, with only the top of the pod being visible. This is the case with this image of U 596, with the red arrow pointing to the base of the pod lid. Another identification feature of the Mediterranean U-boats is the camouflage pattern, which was customarily applied in Italian ports.

Monsun platforms - Long range Type IXs which sailed for the Far East were outfitted with a Monsun platform. This consisted of a second 20mm gun added in a round platform on the aft deck, with a catwalk on a decreasing angle down to the rear platform.

Extra gun platforms - There were a few boats other than the Monsun boats which had a completely separate anti-aircraft structure built on the aft deck. A walkway was built to permit men to move between this round platform and the main tower area. The boats to feature this arrangement included the IXA U 43, the VIIB U 84 and the XIV U 462. This arrangement may not have been utilised for long periods since the completely separate round platform would have impacted negatively upon hydrodynamic performance

Turn II or IV - The easiest way to identify a Turn II is to recognise a single 20mm on the upper platform and a single 20mm on the lower platform. The Turn IV was markedly different in having a pair of twin 20mms sitting side by side on the upper platform.

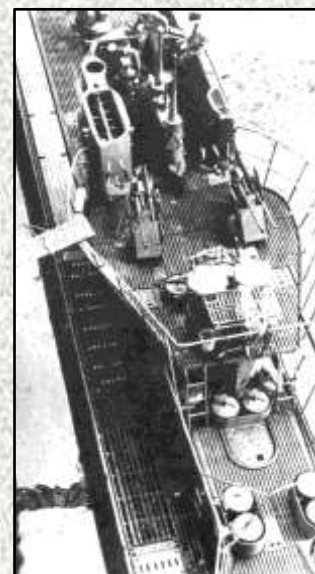
If the armament cannot be established, then a photo taken directly from the rear may assist you. You should ask yourself how wide the upper platform is in relation to the lower platform. The upper platform on a Turn II was roughly the same width as the lower platform. By contrast, the upper platform on a Turn IV was wider than the lower platform (it was wider to accommodate a pair of weapons rather than one single weapon).

Type IX Turn II - An exclusive feature of the Turn II on Type IXs was that the front of the rear platform (on the sides) was raised up. A wooden seat was present on top of this raised section despite it being of no identifiable benefit. From the side this made the tower look like it had three levels and this can be an excellent way of distinguishing a Type IX Turn II from a Type VII Type II (or indeed a Type IX Turn IV). Additionally, the Turn II had an intake grill on the sides of the tower whereas the Turn IV did not.

Type IXD Turn II - The IXDs had a set of side railings on both port and starboard sides of the upper platform. The rear of the upper platform was not curved but straight. In the centre was a large set of bars consisting of four thick horizontals, three thick verticals and 38 thin verticals. In between this centre set of bars and the side railings was a gap on either side permitting access down via a ladder to the lower platform. To help prevent crewmen climbing up or down the ladder from falling overboard, there was an additional set of railings on each side consisting of three horizontal bars plus one diagonal which curved down and met with the top of the top railing bar on the lower railings.

Type IXD Turn IV - The IXDs were 14% longer than the earlier sub-variants and required a noticeably longer tower due to the presence of the pressure proof containers housing the parts for the *Bachstelze* observation helicopter. The upper platform had 16 verticals in total rather than 10 or 12 with IXCs. One identification feature is that the rear of the upper platform was a straight edge, behind which were two ladders down to the lower platform. The front section of the lower platform was straight-sided rather than curved.

Right (10): The IXD U 862 late in the war. The Turn IV towers on this sub-variant were much larger than the usual Turn IVs, with the containers for the *Bachstelze* at the rear of the top platform and a straight section of railings directly behind.

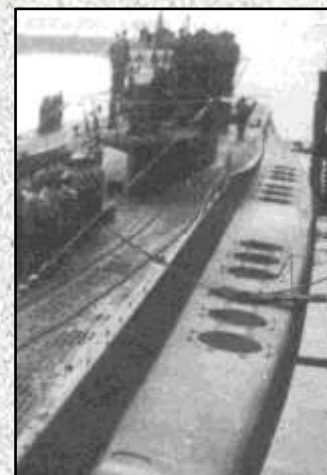


Experimental towers - As mentioned previously, the Type IIB U 11 had an experimental tower, with smooth surfaces to cut down on hydrodynamic resistance, between February and March 1938. The boat reverted back to the normal IIB profile thereafter. Another test which involved hydrodynamic resistance was made using the Type IXA U 37, which had been relegated to training duties in 1941 after a very successful combat career. The Type IX tower was removed and a Type XXI tower added, presumably to measure how much hydrodynamic benefit was afforded by the use of the streamlined XXI tower as opposed to the older conventional tower. During tests conducted in the Baltic in 1944, this unique combination of XXI tower and IX hull made for a quite surreal permutation.

Identifying characteristics of other types

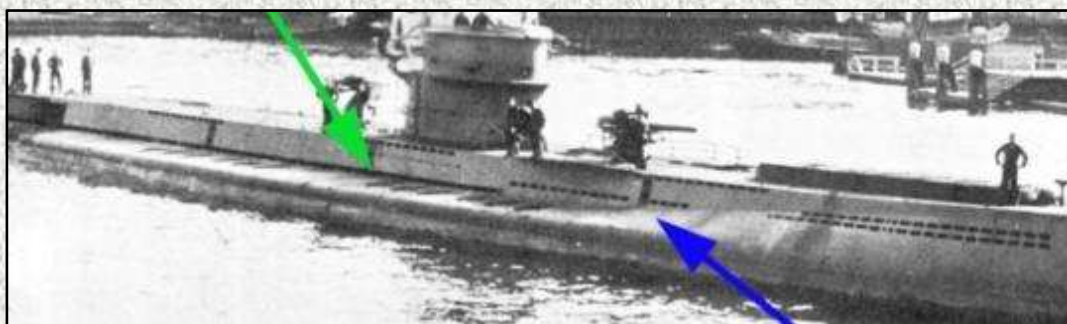
XBs - These eight boats were the largest and heaviest U-boats in Kriegsmarine service and were more often employed in the supply role rather than as minelayers. In the centre section, just outboard of the hull casing, there is a long, wide, horizontal area populated with minshafts. This horizontal surface bends to meet the vertical sides of the hull casing, lending the type an ungainly appearance which cannot be mistaken with any other type. There was also a set of minshafts on the forward deck.

The Turm II on the XBs was quite short, allowing space for the 37mm on the aft deck to be retained.



Above right (11): Clearly visible on this XB photo are the large round vertical minshafts on the long, flat horizontal surfaces of the saddle tanks. In late 1942 and early 1943, a long tubular pressure tight storage container was added over this area.

Below (12): The XB U 119 on the 17th August 1942. The blue arrow points to the curve between the vertical hull casing and the long horizontal area on either side of the hull. The green arrow points to the minshafts.



XIVs - These ten U-boats (U 459 to U 464, U 487 to U 490) were used in the resupply role, transferring torpedoes, fuel and supplies to VIICs and IXs at sea. Although these boats were the same length as the VIICs, the XIVs displaced over twice the weight and were 50% wider than the VIICs. This inevitably resulted in a fatter boat, with a much wider deck and a chubby stern. As they were not designed to sink shipping, the XIVs were not fitted with a deck cannon.

On first glance it is possible to mistake an XIV for an IX so we should be aware of a few helpful identification aids. Firstly, unlike IXs, the Type XIVs had no magnetic compass fairing at the front of the tower (U 459 did initially have this feature but it was removed in early 1942). Secondly is the main drainage area. Both the IXs and XIVs had the line of rectangular shaped holes but the distinguishing feature here is that the XIVs had an additional (and very long) row of vents on top.

As with all types, additional armament was added in the mid-war period. In mid-June 1943, U 462 had an additional separate flak platform (with a Vierling) added behind the tower, with a walkway to enable crewmembers to pass to and from the main tower. In the summer of 1943, U 488 had a lower platform (with a Vierling) added and an additional array of vents immediately at the top of the hull casing.

For additional study on this type, please refer to the definitive source on the subject, Axel Urbanke's *Suppliers Of The Grey Wolves: The Story Of The German Submarine Tankers 1941 - 44* (Luftfahrtverlag-Start, 2013).

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Left (13): A characteristic feature of the XIVs is the single line of medium-sized free-flooding vents running in an unbroken line just above the main drainage area.



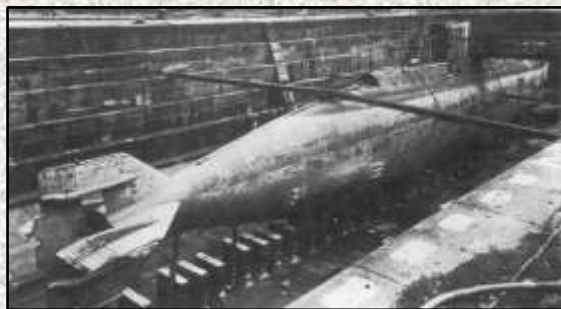
Right (14): The plump rear end of the Type XIVs lends it an appearance which sets it apart from other types.

Type XVIIs - There were several research U-boats built to test the Walter propulsion system - the four-man V 80 prototype, four XVIIAs and three XVIIBs. Helmut Walter's idea was that propulsion would be provided by hydrogen peroxide being broken down and used to drive a turbine. The Walter boats were significant in being air-independent and allowing for a high underwater speed of around 25 knots. Issues included the hydrogen peroxide fuel being highly flammable and needing specialised storage, supply problems, complexity in terms of building and maintenance, and a large volume of hydrogen peroxide being required to be carried on the U-boat. This resulted in the system not being a viable propulsion system at that point in time.

Right (15-17): Three images of the Type XVIIB U 1407 which had a single torpedo tube on either side of the bow. The stern tapered to a narrow cross section ahead of the dive planes, which was completely different to the XXI and XXIII. There was a step down on the top of the aft hull and a *Balcongerät* under the bow.

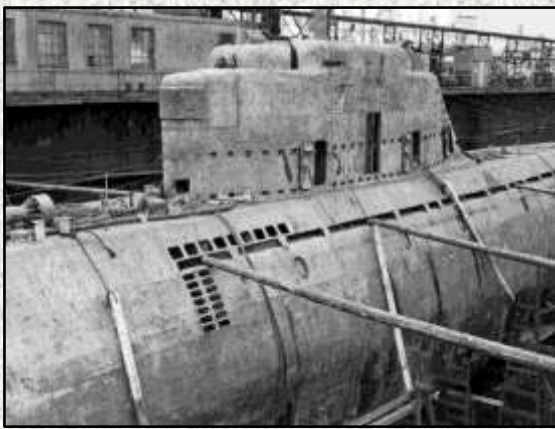
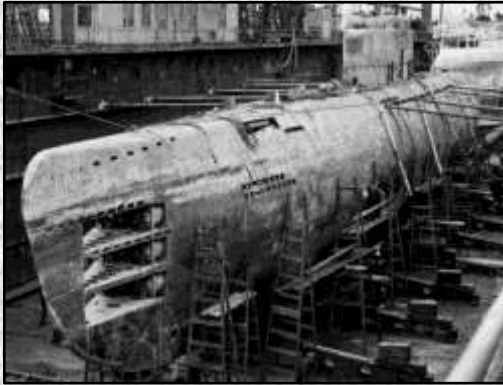


Type XXI - The hydrodynamic improvements that resulted from the work on the Walter boats was carried forward in the revolutionary Type XXI and XXIII *Elektroboot* designs. These two types sported streamlined hulls which were designed primarily to sail underwater and were completely different to any of the conventional types. Innovations on the XXI included a high underwater speed of 17 knots, silent creeper motors which allowed near silent performance at low speeds, being able to dive much deeper, and being able to launch three salvos of six torpedoes within 20 minutes.



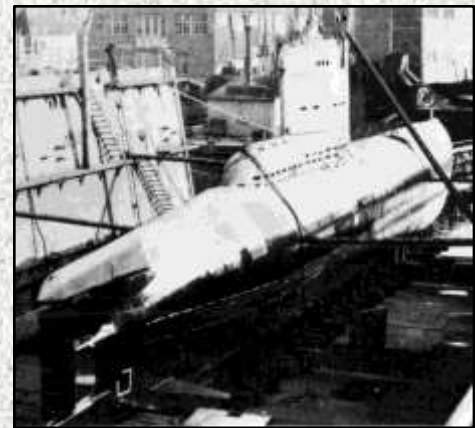
On the Type XXI there was no wooden deck along the top of the hull that was characteristic of the conventional types. The differences in the free-flooding vents on the tower can be seen on

pages 115 to 118 *Anatomy Of The Ship: The Type XXI U-Boat* by Fritz Köhl and Eberhard Rössler. Characteristic features of the XXI were the six torpedo tubes at the bow, the *Balcongerrät* under the bow, a huge single rudder and the lengthy streamlined tower.



Top left, above and left (18-20): The streamlined teardrop-shaped hull of the large Type XXI U 3503 can be seen in these photos. Unlike conventional U-boats, the tower was streamlined and the two twin 20mm guns at the top of the tower were remotely controlled from inside the boat. The dive planes retracted when not required to improve submerged performance. Although the Type XXI did not play a decisive role during the war, its design innovations massively influenced post-war submarine designs around the world.

Type XXIII - It is very simple to distinguish between the two *Elektroboots*, with the coastal Type XXIII being much smaller than the ocean going Type XXI and the boats having completely different tower shapes. There was no wooden deck along the top of the hull, though there were sections of narrow wooden planks on the foredeck.

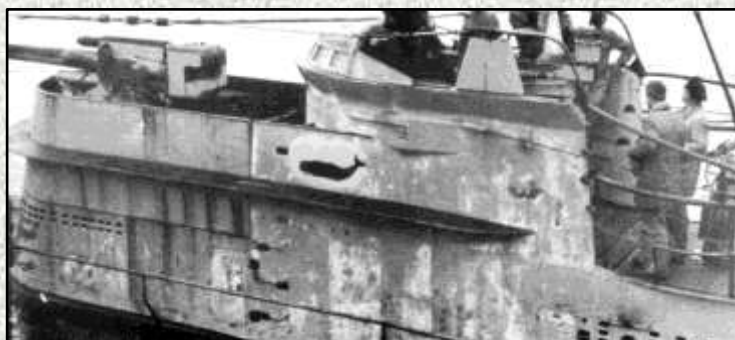


Above (21): The streamlined hull of the small coastal Type XXIII U 2361. The blunt nose of the coastal *Elektroboots* is distinctive. The bow had a single torpedo tube on either side, with a *Balcongerrät* which looked comparatively large at the underside.

Left (22): On this image of the XXIII U 2361 we can see that the tower was tall in comparison with the length. There was a pronounced fairing at the rear of the tower and rungs at the front. The curve at the top of the tower is reminiscent of early U-boats before the wind deflectors were added.

Foreign U-boats - There were 14 foreign boats which were commissioned into Kriegsmarine service. One of note is the U A, a large, ungainly U-boat built for the Turkish Navy as the *Batiray*. When war broke out this boat was withheld from Turkey and entered Kriegsmarine service.

Right (23): Unless we are having a spectacularly bad day at the office we cannot mistake U A for any other boat in Kriegsmarine service. As can be seen in this photo from December 1941, the 105mm is partially enclosed at the front end of the tower and a row of viewing ports is just behind. The spray deflector mounted halfway up the tower is a feature we are used to seeing upon U-boats but this elongated version on U A must surely win the prize for the longest deflector.



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