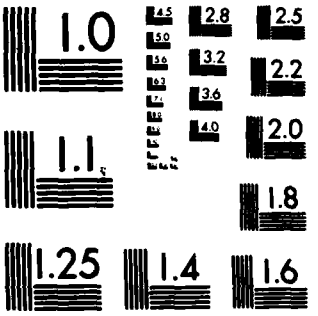
AD-A129 008 SUBMARINE CONSTRUCTION IN GERMANY (U-BOOTBAU IN DEUTSCHLAND)(U) NAVAL INTELLIGENCE SUPPORT CENTER WASHINGTON DC TRANSLATION DIV W FLUME ET AL. 25 APR 83 1/1

UNCLASSIFIED NISC-TRANS-7046 F/G 13/10.1 NL

END

DATE FILMED

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

UNCLASSIFIED

(2)

NAVAL INTELLIGENCE SUPPORT CENTER

TRANSLATION DIVISION NISC-62
4301 Suitland Road
Washington, D.C.

AD A129008

NISC TRANSLATION

TITLE: SUBMARINE CONSTRUCTION IN GERMANY

AUTHORS: W. FLUME AND J. ROHWER

TRANSLATED BY: LT. DANIEL PETERS, USNR-R
NISC TRANSLATION UNIT 0166

NISC TRANSLATION NO. 7046
DATE 25 APRIL 1983

UNCLASSIFIED

821/45

SUBMARINE CONSTRUCTION IN GERMANY

[Flume, W. and Rohwer, J.; U-Bootbau in Deutschland; Marine-Rundschau, No. 9, 1982, pp. 474, 476-479, 481-482, 484; German]

/474*

After German shipyards built and delivered more conventionally-powered submarines since 1959 than other shipbuilding countries, with the exception of the Soviet Union, the chief editors of the periodicals Wehrtechnik and Marine-Rundschau describe the present status of submarine construction in West Germany and add some observations about current new constructions and developments.

Since the first construction orders awarded in 1959, a total of 80 conventionally-powered submarines have been commissioned which were designed and for the most part built in Germany. Only six of them were built with German material help at shipyards of the foreign customer or by foreign shipyards under license. Currently, 15 additional submarine are under construction or on order, nine of which are being completed at foreign shipyards. If the six orders cancelled after the revolution in Iran are counted, 101 orders for German submarines have been received since the resumption of submarine construction. In comparison to that, France could book orders for domestic and foreign account 46, Great Britain 37, Japan 23, the U.S. 22, Sweden 20, the Netherlands 10, Italy 8, Yugoslavia 7, and Denmark 3. Soviet new construction and nuclear-powered submarines are not included in this list.

All submarines completed up to now were conceived, defined, and designed by the Luebeck engineering firm founded in 1946 by Prof. Gabler. They belong to three design families: the small Type-202 submarine of only 137 t, only two of which were built at the Atlas-Werken in Bremen, which however were decommissioned soon thereafter, due to revision of deployment concepts without any further development.

52 submarines belong to Types 201, 205, 206, and 207, which were intended for use in the narrow offshore area. Whereas the three Type-201 submarines and the 11 Type-205 (including two replacement ships) were all built by Howaldt-Deutsche Werke (HDW), in Kiel, this shipyard was the primary shipyard for the 18 Type-206 submarines for the FRG Navy, but 10 of the submarines were actually built at Rheinstahl-(Thyssen)-Nordseewerke in Emden. The Emden Shipyard built, in addition, 15 submarines of the somewhat modified Type 207 for Norway, while two submarines of the improved Type 205 were built by the Danish naval shipyard in Copenhagen under license, and Israel received her three submarines through an appropriate order for building under license with the British Vickers Barrow firm.

The third group consists of the Type 209, which proved to be an outstanding export success in its various versions. The submarines have no significant differences in displacement and equipment. Thus there are submarines which have the same hull diameter of 6.2 m, but a surface displacement of 1105 t (Type 209/0), 1185 t (Type 209/1), 1285 t (Type 209/2), and 1400 t (Type 209/3). In the meantime, 27 submarines of this class have been completed and delivered

---

*Numbers in right margin indicate pagination in original text.

Peru (5), Colombia (2), Turkey (4), Venezuela (2), Ecuador (2) and Indonesia (2). An additional four submarines are under construction for Peru, Turkey and Chile. Six of the submarines under contract to Iran were cancelled after the revolution, and under the most recent contract four submarines, which however belong to a somewhat larger version, are designated for India. /476

The two smaller types have already been repeatedly reported on in Marine-Rundschau, so that it is unnecessary to once again go into this matter here.*

---

*Compare: Ulrich Gabler, "Einhuellen- oder Zweihuellenbauweise im Unterseebootbau?" (Single- or Double-hull Design in Submarine Construction?), Marine-Rundschau, September 1979, pp. 547-550.

Guenter Buettner, "20 Jahre U-Bootentwicklung in Luebeck... Rueckblick und Ausblick" ("20 Years of Submarine Construction in Luebeck: A Look Back and Prospects), Marine-Rundschau, September 1979, pp. 552-569.

The contracts, entered into with 11 different countries, and with diverse conditions, show that the design and basic conception of the Type 209 was so flexible that all special needs could be taken into consideration should the submarines be deployed in the eastern Mediterranean, the South Atlantic, southeast Pacific, Caribbean, Indian Ocean, South China Sea and the Indonesian area. The construction costs necessary to satisfy the various desires may emerge from the following figures:

For the first group of Greek submarines, some 400,000 design hours were necessary from conception to workshop drawings. For the Argentine submarines, an additional 130,000 hours were necessary, for the Peruvian 50,000, for the Venezuelan 110,000, and for the Indonesian 75,000. As fundamental characteristics of the submarines, which may in fact be operated in all the world's oceans, one might stress the following:

-single-hull submarine with the largest possible pressure-hull diameter, with the smallest possible length, while maintaining a limited displacement;

-good submerged manoeuverability with the least possible frictional drag;

-noiseless propeller for low revolutions with high propulsion efficiency;

-high submerged speed (up to 22 kn) and long submerged endurance with short snorkeling periods; /477

-minimum noise radiation through flexible and double-flexible machinery layout;

-long-range passive-active sonar gear with improved target data processing resolution;

-8 bow torpedo launch tubes for wire-guided and unguided torpedos with room for reserve torpedos;

-unmanned engine room and small crew (30) achieved by far-reaching not too far-reaching) automation.

The largest and most modern variations of the Type 209 would have been the six submarines with 1400-t surface displacement ordered by Iran, were it not for cancellation of the order after the Iranian revolution. The design cost for the Iranian submarines came to approximately 180,000 hours. The work at IKL for this type had to be performed so that in terms of time 2/3 of the work force worked on it. The relatively high additional design cost for the Iranian boats was determined in part by an intentional innovation: the construction of a bulkhead, dividing the boat, and the mounting of a rescue diving bell for the entire crew.* A rescue system of that type is of

*Compare Buettner, Op. cit., pp. 567-68.

particular value for all submarines operating in relatively shallow waters, since the crew can rescue itself from the submarine lying on the bottom. The maximum rescue depth coincides with the collapse depth of the submarine, which is the rated submergence depth of the submarine multiplied by a safety factor of two.

Cancellation of the Iranian contract in February 1979 during the extensive design work, which had not yet been completed, meant a deep cut for IKL, which, on the one hand, was also forced to search for contracts outside the submarine area and, on the other hand, to be on the lookout for additional contracts, which soon resulted in good luck for the company. On the basis of the Iranian submarines, plans were derived for two contracts for the Chilean Navy, and /478 in addition design work was continued for the planned replacements of the Norwegian submarines, the Type 210* and the development of additional improved

*See Buettner, Op. cit., pp. 567-68.

types was undertaken, as well as a special type for India with a displacement of 1500 t, and designs for the deferred Brazilian decision.* These projects

*See Marine-Rundschau, No. 7, 1982.

and the initiation of design work for additional 2000-t submarines, for which a market is appearing in Canada, Australia and perhaps even the U.S. resulted in the decision in the beginning of December 1981 that an expansion of the facilities of the IKL firm proved necessary. The development allowed the IKL staff to increase to around 290. With this capacity, IKL management believes it will also be busy in the future in its traditional fields. In particular, the strong position in submarine construction will be retained. In this connection, the head of IKL, L. Nohse, said*: "Fortunately, we occupy a very

*See Wehrtechnik, No. 4, 1982.

strong position, from a global viewpoint, in the realm of the relatively very narrow market of submarine development and construction. Here one must, in a sober appraisal, note that the defense of such a position is meaningful not only at present. It is also related to the fact that a modern submarine represents a thoroughly complex system. Therefore, it is imperative that all work be conducted in a single office. As a rule, this happens under considerable time pressure, i.e., it is a matter of either being able to handle large construction contracts with several hundred thousand design hours and thus over 200 million DM sales per contract, or not being able to handle such work at all. It is thus a matter of the retention of existing jobs. If one wants to retain existing jobs, in our situation one is forced to create new positions."

Here it should be noted how important submarine construction is in Germany today. At this time, about 2,000 people work on the design, construction and assembly of submarines. The submarines cost between 80 and 200 million DM (but not for Type 2000), which has meant sales in the last 20 years of more than 10 billion DM. In each case, half of the cost is alloted to the yard (there are about 500,000 production hours per submarine), the other half mostly to German contractors, such as, for example, Stahlwerke for special steels, /479 Krupp-Mak for torpedo launch tubes, MTU for diesel engines, Siemens for electrical systems and electric drives, AEG-Telefunken for electrical systems, Krapp-Atlas- Eletronik for electrical and sonar equipment, Zeiss for periscopes, and Varta as well as Wilhelm Hagen for batteries. However, we should also mention the IKL sister firm, Maschinenbau Gabler GmbH, also founded by Prof. Gabler, which, unlike IKL (involved solely in development), is a hardware-producing, roughly 130-man company. Not only are the small civilian TOURS submersibles built there, but also, among other things, whip antennas, UHF antennas, snorkels, radar masts, as well as wharf and dockside connections, for IKL and various submarine yards. Moreover, Maschinenbau Gabler is engaged in prototype design in the realm maritime technology.

The contracts for India

Parallel to the negotiations with other potential customers, the first discussions with India began some 12 years ago. The final contract for a new Type 1500, especially reflecting Indian desires, was placed first on 11 December 1981 against the stiffest international competition. Two are to be built at HDW and two in India. The surface displacement of approximately 1660 m^3 and with it an increased diameter of around 30 cm to 6.5 m (as opposed to Type 209), a result of the required deep submergence depth, the long underwater range, the low noise propagation and the rescue system with pressure-proof bulkheads and a rescue diving bell with a diameter of 2.6 m for the 40-man crew. The overall length of the submarine is 64.4 m; the standard displacement will be around 1450 t.

Since the Indians wanted to build two of the four submarines at the Mazagon Yard in Bombay, with parts from Germany, they have acquired a construction license and will also receive extensive design training. For this IKL in Luebeck will instruct some 25-30 Indians in the years 1982/83 in submarine construction and design. Moreover, the contract includes extensive logistical requirements for the first years of service life, as well as consultation with the yard in Bombay.

The family of the new Type 1500 (or as they are called at IKL, the "medium-sized" Type-209 submarines now being completed) and the "large" boats, also includes a Type 2000 with variations which are now being offered abroad through the HDW yard.

New Submarines for Norway

At the end of June 1980, IKL also submitted the blueprints and final design for the new Type-210 Norwegian submarine (Norwegian project No. 6071). Subsequently, the Norwegian yard directed construction requests to both German yards HDW and TNSW. The construction contract for the submarines is still anticipated in the year 1982. The number on order has not yet been determined - the construction requests mention 8, 10, 12 or, recently, even six submarines and two options. The submarine design has a standard displacement of 940 t, a pressure-proof bulkhead dividing the submarine, and is completely designed to Norwegian specifications. It is intended that these boats contain a weapon and navigation system to be developed by Kongsberg. This would be involved in subsequent modification of combat capabilities on the 18 German Type-206 submarines in return for Norwegian submarines purchases in Germany. This contract would mean construction work of around 400,000 hours for IKL.

Contracts from Argentina for Emden /481

The Argentine Navy, which last completed two Type-209 submarines in 1974 at its own yard with German help, decided not to order, in their continuing expansion program, like other navies, simple production under license of this type, since at the time of its decision in 1977 a proportionately larger type, which could have satisfied all their desires, was not yet available.

At this time, however, the TNSW firm had recently completed a newly-developed Type TR 1700, which displaces 2100 t surfaced, has a length of 65 m and a diameter of 7.3 m, which above all can be exploited by increasing the submergence depth to 300 m and, in conjunction with a suitable hull design and improvement of the propulsion system, in attainment of a submerged speed of 25 kn. The submarine possesses only six bow torpedo tubes, but can carry 16 reserve torpedos. A somewhat reduced Type TR 1400 possessed a displacement of 1650 t and was 9 m shorter, which was reflected in the reduction in propulsive power and the number of battery cells. The limited range and the reduced speed (to 21 kn) are counterbalanced by a somewhat improved maneuverability.

On 30 November 1977, the Argentine government signed the construction contract with TNSW for construction of the Type TR 1700 lead boat and the second submarine with TNSW at Emden. Meanwhile, the third and fourth submarines, which will be built at the Astilleros Demecq Garcia in Buenos Aires from sections delivered from Germany in 1982. Whereas delivery of the lead unit is planned for 1983, the other submarines will be furnished by 1986. Simultaneous with these four boats, two Type TR 1400 submarines were ordered which likewise should have been assembled in Buenos Aires in part from sections delivered from Germany, in order to be placed in service in 1984/85. This contract was so altered in the interim that the 5th and 6th submarines should also belong to Type TR 1700.

How far the Falklands crisis will adversely affect the completion of this contract is not yet known. In the interim, delivery of the submarines has not yet been reapproved by the West German government.

New German Submarines?

The biggest unknown at this time is the future development of the German submarine weapon. A shortage of money has put all projects for the time being on the back burner.

Originally it was part of the Navy's plan to modernize the 18 Type-206 submarines (Type 206A) in the mid-'80s, and then in the '90s to retire six mod. Type-205 submarines and later also the Type 206, and to introduce a new Type 208 with a newly-developed fuel cell propulsion system independent of outside air supply. For this Type 208, which originally was to have been 750 t, and for which the IKL-supplied preproposal was submitted long ago, the concept phase has had to be pushed back due to a shortage of money, so that now the introduction is first envisioned in the next millenium. This could lead to a decommissioning of the older Type-205 submarines, and with this a reduction in the German submarine flotilla before the follow-on submarines are ready. /482

It is questionable whether one can employ the Type-206 submarines, commissioned from 1973 to 1975, in spite of planned combat capability improvements, for more than 25 years, before they will be replaced by the new Type-208 submarines. Thus both sides recommend that the Norwegian Type-210 submarines, built with German financial and professional assistance, be seen as an interim solution for the German Navy, until whenever the propulsion system designed to function independent of external air sources is ready.

Submarine Construction in the FRG Since 1959

(Including boats built at German yards, those built according to German plans, and partially with German assistance at foreign yards, as well as those for which contracts were let but later cancelled).

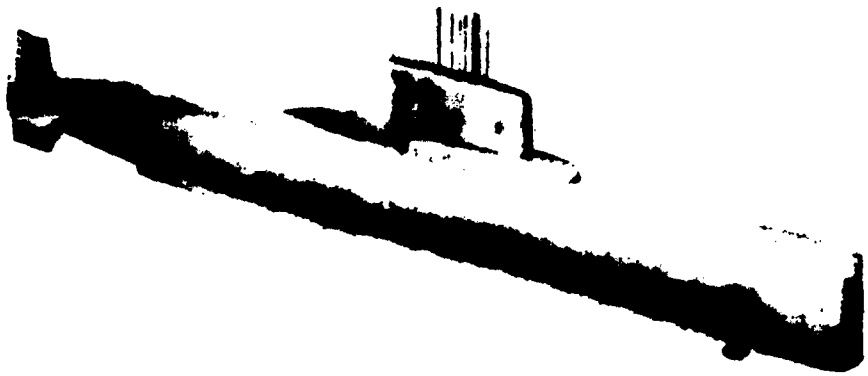
(Note: see numbered column headings on original).

1. Sequential number
2. Contract year
3. Country
4. Type
5. Construction Yard
6. Construction Number
7. Name
8. Pendant Number
9. Laying down of the keel
10. Launching
11. Commissioning
12. Operational Date
13. Status
14. Germany
15. Norway
16. Denmark
17. Greece
18. Argentina
19. Type
20. as the Norwegian KOBBEN
21. German

Lfd. Nr.	Auftrag	Land	Klasse	Bauwerft	Bau-Nr.	Name	Kennung	Kiellegung	Stapellauf	Indienststellung	Ankunft operat.	Verbleib
1.	1959	Deutschland	Kl. 201	HDW, Kiel	1150	*U 1*	S 180	8. 6. 60	21. 10. 61	20. 3. 62	—	25. 3. 66 §
2.	1959	Deutschland	Kl. 201	HDW, Kiel	1151	*U 2*	S 181	1. 9. 60	25. 1. 61	3. 5. 62	—	15. 8. 3 §
3.	1959	Deutschland	Kl. 201	HDW, Kiel	1152	*U 3 'Kobben'*	S 182	12. 10. 60	7. 5. 62	14. 7. 62 20. 6. 64	als norweg. Kobben, deutsch U 3,	15. 9. 67 §
4.	1959	Deutschland	Kl. 202	Atlas, Brem.	404	*Hans Techel*	S 172	10. 10. 61	15. 3. 65	15. 10. 65	—	15. 12. 66 §
5.	1959	Deutschland	Kl. 202	Atlas, Brem.	405	*Friedrich Schurer*	S 173	10. 10. 61	10. 11. 65	6. 4. 66	—	15. 12. 66 §
6.	1959	Deutschland	Kl. 205	HDW, Kiel	1153	*U 4*	S 183	1. 4. 61	25. 8. 62	19. 11. 62	—	1. 8. 74 §
7.	1959	Deutschland	Kl. 205	HDW, Kiel	1154	*U 5*	S 184	1. 6. 61	20. 11. 62	4. 7. 63	—	17. 5. 74 §
8.	1959	Deutschland	Kl. 205	HDW, Kiel	1155	*U 6*	S 185	8. 11. 61	30. 1. 63	24. 7. 63	—	23. 8. 74 §
9.	1959	Deutschland	Kl. 205	HDW, Kiel	1156	*U 7*	S 186	1. 2. 62	10. 4. 63	16. 3. 64	—	12. 7. 74 §
10.	1959	Deutschland	Kl. 205	HDW, Kiel	1157	*U 8*	S 187	20. 2. 62	19. 6. 63	22. 7. 64	—	9. 10. 74 §
11.	1959	Deutschland	Kl. 205/v.	HDW, Kiel	508	*U 2*	S 181	1. 9. 64	15. 7. 66	11. 10. 66	—	
12.	1959	Deutschland	Kl. 205/v.	HDW, Kiel	509	*U 1*	S 180	1. 2. 65	17. 2. 67	26. 6. 67	—	
13.	1959	Deutschland	Kl. 205/v.	HDW, Kiel	1158	*U 9*	S 188	10. 12. 64	20. 10. 66	11. 4. 67	—	
14.	1959	Deutschland	Kl. 205/v.	HDW, Kiel	1159	*U 10*	S 189	15. 7. 65	5. 6. 67	28. 11. 67	—	
15.	1959	Deutschland	Kl. 205/v.	HDW, Kiel	1160	*U 11*	S 190	1. 4. 66	9. 2. 68	21. 6. 68	—	
16.	1959	Deutschland	Kl. 205/v.	HDW, Kiel	1161	*U 12*	S 191	1. 9. 66	10. 9. 68	14. 1. 69	—	
17.	1962	Norwegen	Kl. 207	TRN, Emden	351	*Kinn*	S 316	18. 3. 63	30. 11. 63	8. 4. 64		
18.	1962	Norwegen	Kl. 207	TRN, Emden	352	*Kya*	S 317	26. 5. 63	20. 2. 64	15. 6. 64		
19.	1962	Norwegen	Kl. 207	TRN, Emden	353	*Kobben*	S 318	9. 12. 63	25. 4. 64	17. 8. 64		
20.	1962	Norwegen	Kl. 207	TRN, Emden	354	*Kunna*	S 319	3. 3. 64	16. 7. 64	29. 10. 64		
21.	1962	Norwegen	Kl. 207	TRN, Emden	355	*Kaura*	S 315	19. 5. 64	16. 10. 64	5. 2. 65		
22.	1962	Norwegen	Kl. 207	TRN, Emden	356	*Ula*	S 300	21. 8. 64	19. 12. 64	7. 5. 65		
23.	1962	Norwegen	Kl. 207	TRN, Emden	357	*Utsira*	S 301	31. 10. 64	11. 3. 65	8. 7. 65		
24.	1962	Norwegen	Kl. 207	TRN, Emden	358	*Utstein*	S 302	8. 1. 65	19. 5. 65	15. 9. 65		
25.	1962	Norwegen	Kl. 207	TRN, Emden	359	*Utvaer*	S 303	24. 3. 65	30. 7. 65	1. 12. 65		
26.	1962	Norwegen	Kl. 207	TRN, Emden	360	*Uthaug*	S 304	31. 5. 65	8. 10. 65	16. 2. 66		
27.	1962	Norwegen	Kl. 207	TRN, Emden	361	*Sklinna*	S 305	17. 8. 65	21. 1. 66	27. 5. 66		
28.	1962	Norwegen	Kl. 207	TRN, Emden	362	*Skolpen*	S 306	1. 11. 65	24. 3. 66	17. 8. 66		
29.	1962	Norwegen	Kl. 207	TRN, Emden	363	*Stadt*	S 307	1. 2. 66	10. 6. 66	15. 11. 66		
30.	1962	Norwegen	Kl. 207	TRN, Emden	364	*Stord*	S 308	1. 4. 66	2. 9. 66	14. 2. 67		
31.	1962	Norwegen	Kl. 207	TRN, Emden	365	*Svenner*	S 309	8. 9. 66	27. 1. 67	12. 6. 67		
32.	1964	Dänemark	Kl. 205/v	Mar. Ars. Kopenhagen	.	*Narvhalen*	S 320	16. 2. 65	10. 9. 68	27. 2. 70	—	
33.	1964	Dänemark	Kl. 205/v		.	*Nordkuperen*	S 321	20. 1. 66	18. 12. 69	22. 12. 70	—	
34.	1968	Griechenland	Kl. 209/0	HDW, Kiel	1221	*Glavkos*	S 110	1. 9. 68	15. 9. 70	6. 9. 71	5. 11. 71	
35.	1968	Griechenland	Kl. 209/0	HDW, Kiel	1222	*Nereus*	S 111	15. 1. 69	7. 6. 71	10. 2. 72		
36.	1968	Griechenland	Kl. 209/0	HDW, Kiel	1223	*Triton*	S 112	1. 6. 69	14. 10. 71	8. 8. 72	23. 11. 72	
37.	1968	Griechenland	Kl. 209/0	HDW, Kiel	1224	*Proteus*	S 113	1. 10. 69	1. 2. 72	8. 8. 72	23. 11. 72	
38.	1969	Argentinien	Kl. 209/1	HDW/Tandanor	29	*Salta*	S 31	30. 4. 70	9. 11. 72	7. 3. 74		
39.	1969	Argentinien	Kl. 209/1	HDW/Tandanor	30	*San Luis*	S 32	1. 10. 70	3. 4. 73	24. 5. 74		
40.	1969	Deutschland	Kl. 206	HDW/Kiel	31	*U 13*	S 192	15. 11. 69	28. 9. 71	19. 4. 73		
41.	1969	Deutschland	Kl. 206	TRN/Emden	32/441	*U 14*	S 193	1. 3. 70	1. 2. 72	19. 4. 73		
42.	1969	Deutschland	Kl. 206	HDW/Kiel	33	*U 15*	S 194	1. 6. 70	15. 6. 72	17. 7. 74		
43.	1969	Deutschland	Kl. 206	TRN/Emden	34/442	*U 16*	S 195	1. 11. 70	29. 8. 72	9. 11. 73		
44.	1969	Deutschland	Kl. 206	HDW/Kiel	35	*U 17*	S 196	1. 10. 70	10. 10. 72	28. 11. 73		
45.	1969	Deutschland	Kl. 206	TRN/Emden	36/443	*U 18*	S 197	1. 4. 71	31. 10. 72	19. 12. 73		
46.	1969	Deutschland	Kl. 206	HDW/Kiel	37	*U 19*	S 198	5. 1. 71	15. 12. 72	9. 11. 73		
47.	1969	Deutschland	Kl. 206	TRN/Emden	38/444	*U 20*	S 199	3. 9. 71	16. 1. 73	24. 5. 74		
48.	1969	Deutschland	Kl. 206	HDW/Kiel	39	*U 21*	S 170	15. 4. 71	9. 3. 73	16. 8. 74		
49.	1969	Deutschland	Kl. 206	TRN/Emden	40/445	*U 22*	S 171	18. 11. 71	27. 3. 73	26. 7. 74		
50.	1969	Deutschland	Kl. 206	HDW/Kiel	41	*U 25*	S 174	1. 7. 71	23. 5. 73	14. 6. 74		

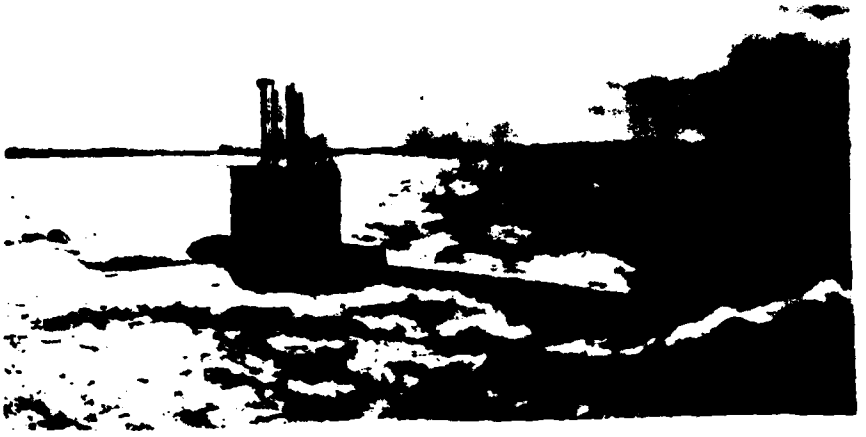
Lfd. Nr.	Auf-trag	Land	Klasse	Bau-werft	Bau-Nr.	Name	Ken-nung	Kiel-legung	Stapel-lauf	Indienst-stellung	Ankunft operat.	Verbleib
51.	1969	Deutschland	Kl. 206	TRN/Emden	42/446	*U 24*	S 173	20. 3. 72	26. 6. 73	16. 10. 74		
52.	1970	Deutschland	Kl. 206	HDW/Kiel	47	*U 27*	S 176	1. 10. 71	21. 8. 73	16. 10. 74		
53.	1970	Deutschland	Kl. 206	TRN/Emden	48/447	*U 26*	S 175	14. 7. 72	20. 11. 73	13. 3. 75		
54.	1970	Deutschland	Kl. 206	HDW/Kiel	49	*U 29*	S 178	10. 1. 72	5. 11. 73	27. 11. 74		
55.	1970	Deutschland	Kl. 206	TRN/Emden	50/448	*U 28*	S 177	4. 10. 72	22. 1. 74	18. 12. 74		
56.	1970	Deutschland	Kl. 206	TRN/Emden	51/450	*U 23*	S 172	5. 3. 73	25. 5. 74	2. 5. 75		
57.	1970	Deutschland	Kl. 206	TRN/Emden	52/449	*U 30*	S 179	5. 12. 72	4. 4. 74	13. 3. 75		
58.	1970	Peru	Kl. 209/1	HDW/Kiel	53	*Islay*	S 45	15. 3. 71	11. 10. 73	29. 8. 74	23. 1. 75	
59.	1970	Peru	Kl. 209/1	HDW/Kiel	54	*Arica*	S 46	1. 11. 71	5. 4. 74	21. 1. 75	4. 4. 75	
60.	1971	Kolumbien [22]	Kl. 209/1	HDW/Kiel	61	*Pijao*	S 28	1. 4. 72	10. 4. 74	18. 4. 75		
61.	1971	Kolumbien	Kl. 209/1	HDW/Kiel	62	*Tayrona*	S 29	1. 5. 72	16. 7. 74	16. 7. 75		
62.	1971	Türkei [23]	Kl. 209/1	HDW/Kiel	65	*Atilay*	S 347	1. 12. 72	23. 10. 74	23. 7. 75	6. 1. 76	
63.	1971	Türkei	Kl. 209/1	HDW/Kiel	66	*Saldiray*	S 348	2. 1. 73	14. 2. 75	21. 10. 75	16. 1. 77	
64.	1971	Venezuela	Kl. 209/2	HDW/Kiel	67	*Sabalo*	S 31	2. 5. 73	1. 7. 75	6. 8. 76		
65.	1971	Venezuela	Kl. 209/2	HDW/Kiel	68	*Caribe*	S 32	1. 8. 73	6. 11. 75	11. 3. 77		
66.	1972	Israel	540	Vickers	.	*Gal*		. . 73	2. 12. 75	. 1. 77		
67.	1972	Israel	540	Vickers	.	*Tanin*		. . 74	25. 10. 76	. 6. 77		
68.	1972	Israel	540	Vickers	.	*Rahav*		. . 75	. . 77	. 12. 77		
69.	1974	Ekuador [24]	Kl. 209/2	HDW/Kiel	91	*Shyri*	S 11	5. 8. 74	6. 10. 76	5. 11. 78	16. 3. 78	
70.	1974	Ekuador	Kl. 209/2	HDW/Kiel	92	*Huancavilca*	S 12	2. 1. 75	15. 3. 77	16. 3. 78	1. 6. 78	
71.	1974	Türkei	Kl. 209/1	HDW/Kiel	95	*Batiray*	S 349	1. 6. 75	24. 10. 77	20. 7. 78	29. 9. 78	
72.	1974	Türkei	Kl. 209/1	Gölcük	96	*Yildiray*	S 350	1. 5. 76	20. 7. 79	20. 7. 81		
73.	1975	Griechenland	Kl. 209/1	HDW/Kiel	106	*Poseidon*	S 116	15. 1. 76	21. 3. 78	21. 3. 78	22. 3. 79	
74.	1975	Griechenland	Kl. 209/1	HDW/Kiel	107	*Amfitriti*	S 117	26. 4. 76	14. 6. 78	3. 7. 79	14. 8. 79	
75.	1975	Griechenland	Kl. 209/1	HDW/Kiel	108	*Okeanos*	S 118	1. 10. 76	16. 11. 78	15. 11. 79	. . 80	
76.	1976	Griechenland	Kl. 209/1	HDW/Kiel	118	*Pontos*	S 119	25. 1. 77	21. 3. 79	29. 4. 80	. . 80	
77.	1976	Peru	Kl. 209/1	HDW/Kiel	131	*Casma*	S 31	15. 7. 77	31. 8. 79	19. 12. 80	29. 3. 81	
78.	1976	Peru	Kl. 209/1	HDW/Kiel	132	*Antofagasta*	S 32	3. 10. 77	19. 12. 79	20. 2. 81	. . 81	
79.	1977	Peru	Kl. 209/1	HDW/Kiel	133	*Chipana*	S 33	15. 8. 78	19. 10. 81	. . 83		(besch. Kollision) [28]
80.	1977	Peru	Kl. 209/1	HDW/Kiel	134	*Pisagua*	S 34	1. 11. 78	19. 5. 81	20. 9. 82		
81.	1977	Indonesien [25]	Kl. 209/2	HDW/Kiel	135	*Cakra*	S 401	25. 11. 77	10. 9. 80	13. 3. 81		
82.	1977	Indonesien	Kl. 209/2	HDW/Kiel	136	*Nanggala*	S 402	14. 3. 78	10. 9. 80	. . 82		
83.	1978	Türkei	Kl. 209/1	Gölcük	171	.	S 351	21. 3. 80		. . 83		
84.	1978	Iran	Kl. 209/3	HDW/Kiel	140	.	.	—	—	—	—	Feb. 79 annulliert
85.	1978	Iran	Kl. 209/3	HDW/Kiel	141	.	.	—	—	—	—	Feb. 79 annulliert [29]
86.	1978	Iran	Kl. 209/3	HDW/Kiel	142	.	.	—	—	—	—	Feb. 79 annulliert
87.	1978	Iran	Kl. 209/3	HDW/Kiel	143	.	.	—	—	—	—	Feb. 79 annulliert
88.	1978	Iran	Kl. 209/3	HDW/Kiel	144	.	.	—	—	—	—	Feb. 79 annulliert
89.	1978	Iran	Kl. 209/3	HDW/Kiel	145	.	.	—	—	—	—	Feb. 79 annulliert
90.	1977	Argentinien [26]	TR 1700	TNSW/Emden		*Santa Cruz*	S 41	. . 80	. . 82	. . 83		
91.	1977	Argentinien	TR 1700	TNSW Emden		*San Juan*	S 42	. . 82	. .	. .		
92.	1977	Argentinien	TR 1700	Tandanor		.	S 43	. .	. .	. .		
93.	1977	Argentinien	TR 1700	Tandanor		.	S 44	. .	. .	. .		
94.	1977	Argentinien	TR 1400/1700	Tandanor			S 45	. .	. .	. .		
95.	1977	Argentinien	TR 1400/1700	Tandanor			S 46	. .	. .	. . 86		
96.	1980	Chile	Kl. 209/3	HDW/Kiel	181	*Chipana*		1. 11. 80	. .	. . 83		
97.	1980	Chile	Kl. 209/3	HDW/Kiel	182			1. 11. 80	. .	. . 84		
98.	1981	Indien [27]	Typ 1500	HDW/Kiel	186	.	.	. . 82	. .	. . 86		
99.	1981	Indien	Typ 1500	Mazagon	187	.	.	. . 82	. .	. . 86		
100.	1981	Indien	Typ 1500	Mazagon			.	. .	. .	. . 87		
101.	1981	Indien	Typ 1500	Mazagon		.	.	. .	. .	. . 87		

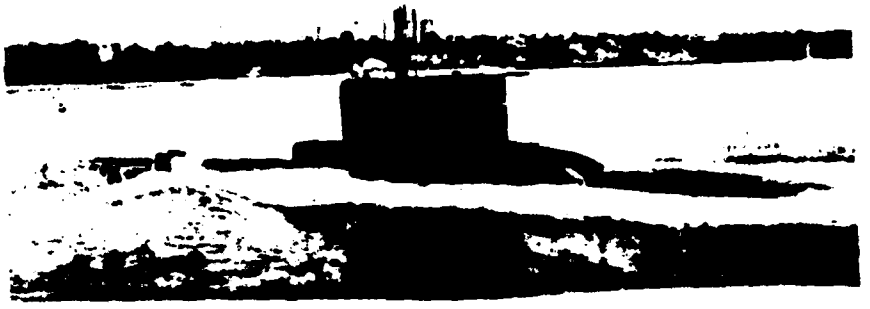
22. Colombia
23. Turkey
24. Ecuador
25. Indonesia
26. Argentina
27. India
28. Damaged in a collision
29. Cancelled in February 1979



Model of the HDW Type 209 submarine, a good exemplar of the hull configuration of modern submarines.

The latest, nearly finished Type-209 submarine is the CHIPANA designated for the Peruvian Navy, shown here at the fitting-out dock at HDW.

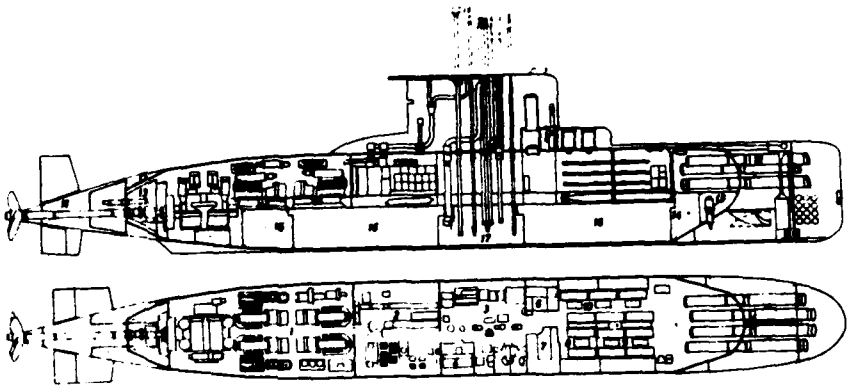




The Type-209 submarines, developed by IKL, Luebeck and built by HDW, have become an export hit among conventionally powered submarines. In accordance with customers' wishes, they are offered in various versions.

The 18 Type-206 submarines in service in the West German Navy were built at HDW, Kiel, and Thyssen Nordseewerke, Emden. Their combat upgrading, planned for the mid-'80s, is presently under reconsideration.

A characteristic feature of the Type-209 submarine is the "mast forest" above the conning tower.



1. Engine room
2. Engine control platform
3. Combat information center
4. Radio room
5. Sanitary facilities
6. Commander's quarters
7. Galley
8/9. Accomodations for Officers and petty officers
10. Crew accomodations
11/12. Main ballast tanks
13. Trim tanks
14. Torpedo room
15. Fuel tanks
16. Battery rooms
17. Compensating tanks

END

DATE
FILMED

6-83

DTIC