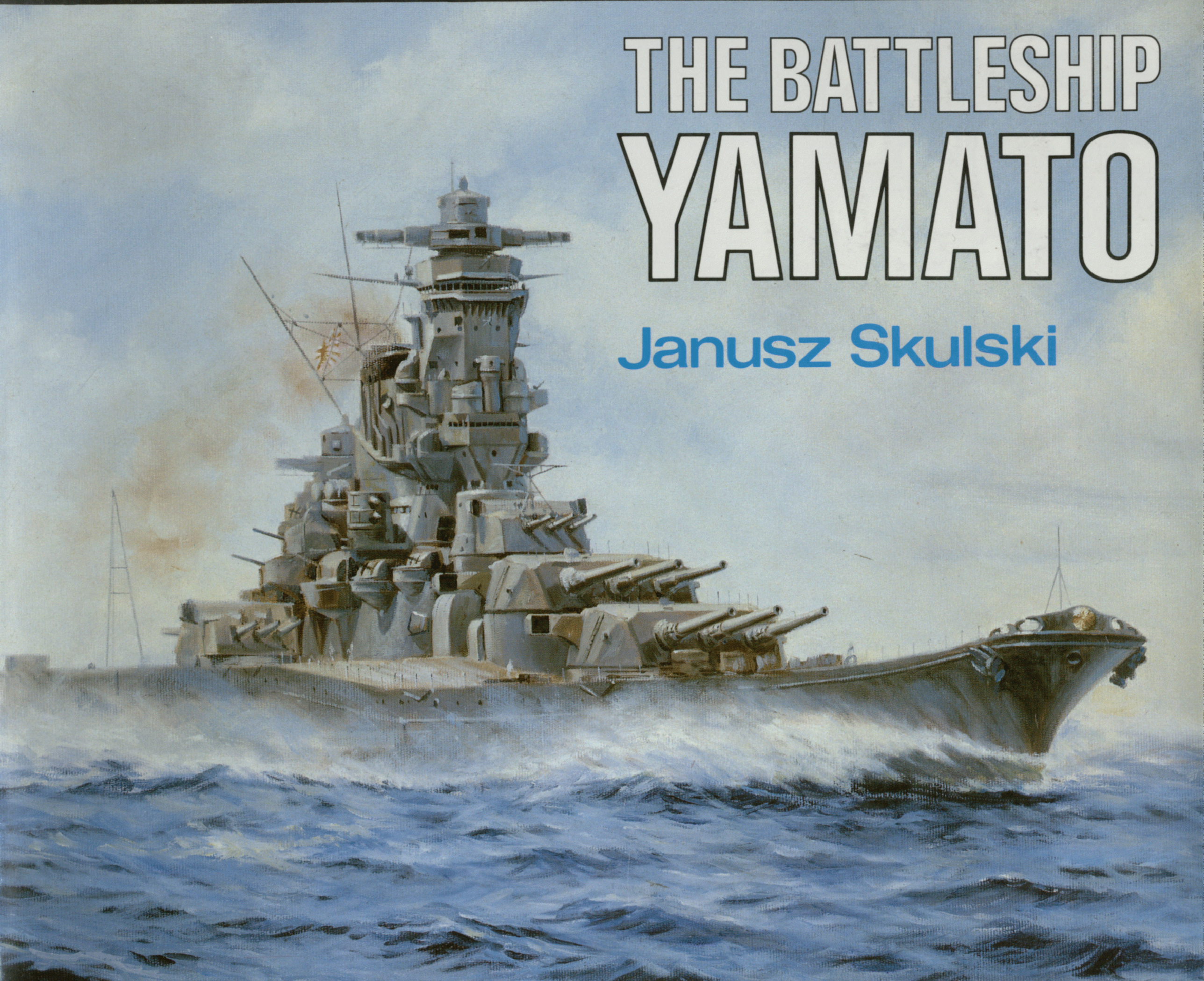
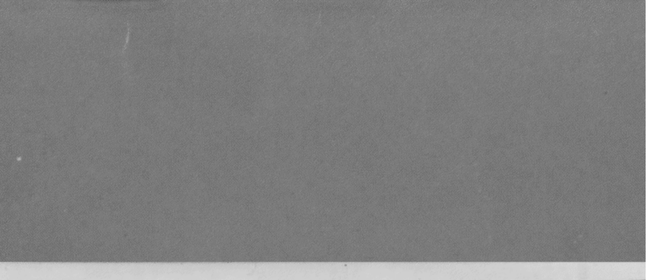
Anatomy of the Ship

THE BATTLESHIP YAMATO

Janusz Skulski





This highly acclaimed series aims to provide the finest documentation of individual ships and ship types ever published. It is a radical departure from the usual monograph approach, which concentrates on either the ship's service history, its technical details or external appearance. All of these aspects are included in the 'Anatomy of the Ship', but what makes the series unique is a complete set of superbly executed line drawings – the conventional 3-view type of plan as well as explanatory perspective views with fully descriptive keys. Although elaborate drawings are extremely popular in aviation publications, this is the first attempt to document ships in similar depth – literally down to the nuts and bolts.

These drawings are accurate, visually exciting and totally comprehensive, offering ship buffs, historians and modelmakers a novel insight into the technicalities of each ship type covered.

The Author

Janusz Skulski is a Polish modelmaker with a passion for accuracy – for example, before starting work on this book he built a large model of *Yamato* to help him interpret the original material as clearly as possible. He enjoys very good contacts in Japan and from a wide range of sources previously unavailable in the West has assembled what is probably the most all-embracing portfolio of drawings ever published on a Japanese warship. Even so, some aspects – like the machinery – proved impossible to reconstruct, so this volume concentrates on the visible, external features of the ship.

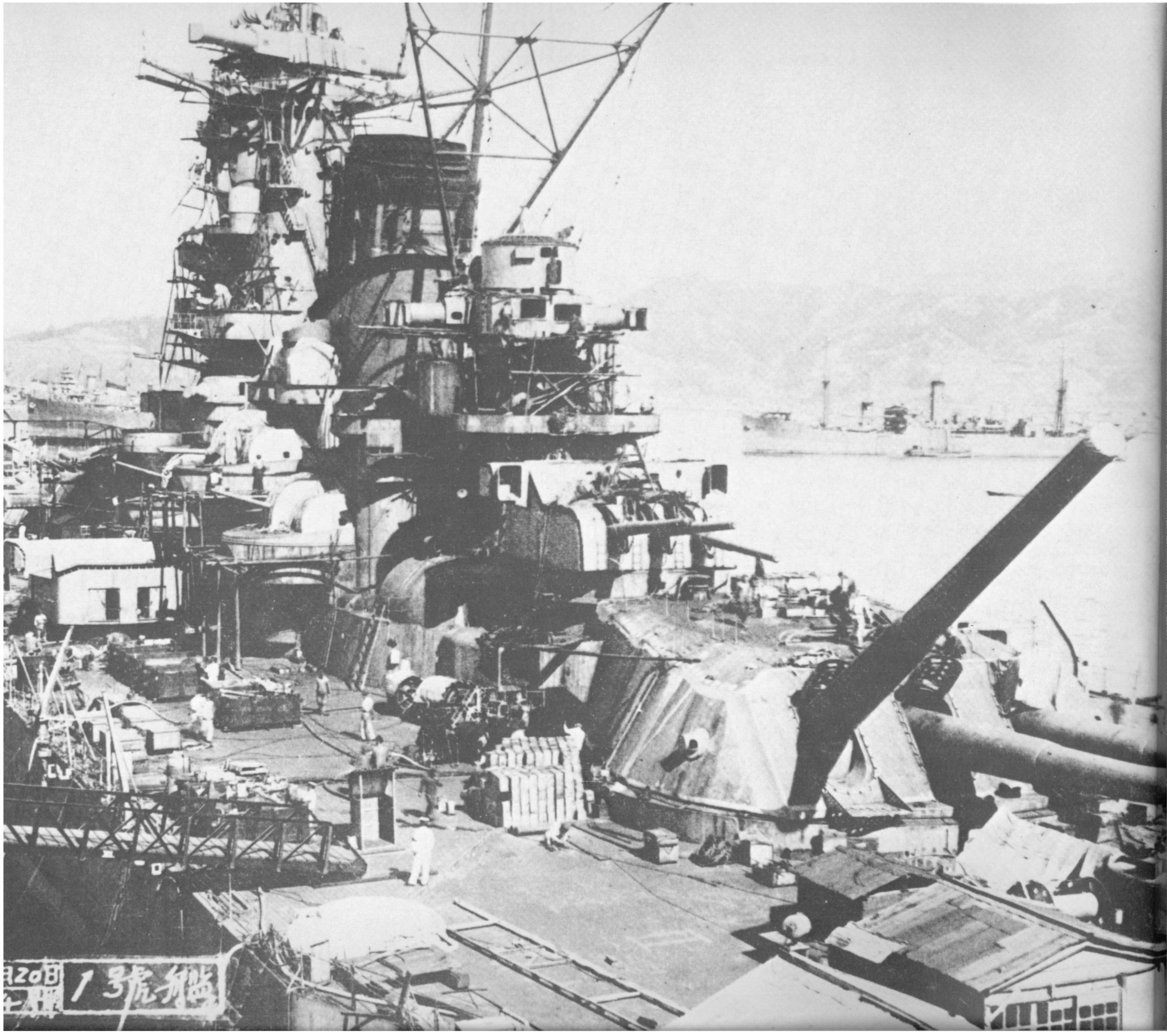
Although he has written a number of magazine articles on ship modelling subjects, this is Janusz Skulski's first book.

Front cover illustration
An original painting by Ross Watton of *Yamato* as completed.

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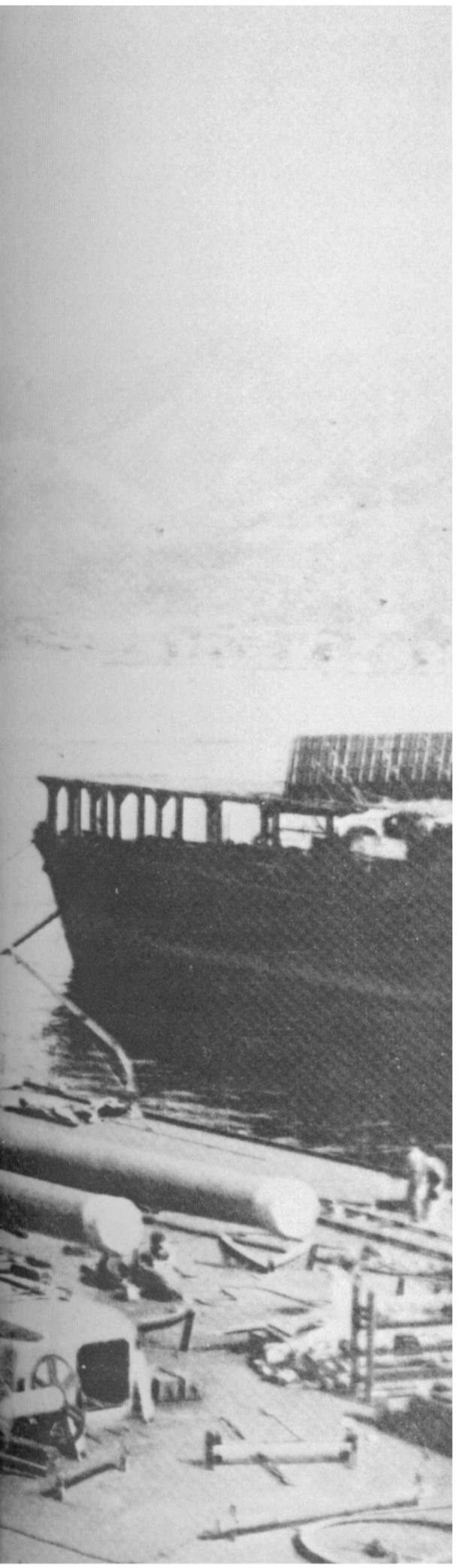
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of the
Ship

THE BATTLESHIP YAMATO


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Ship

THE BATTLESHIP YAMATO



Janusz Skulski

In memory of my mother Elizabeth

Frontispiece
1. *Yamato* fitting out at Kure, 20 September 1941. The steel mesh supports for the canvas blast bags can be seen above and below the nearest 46cm gun barrel (elevated to its maximum 45°). The carrier to starboard is the *Hosho*.

CPL

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I would like to honour my friend Naohiko Koike of Shizuoka because it is thanks to his great help in collecting the materials for my book and his hearty encouragement that I was able to write this monograph so far from Japan.

At the same time I would like to acknowledge the individuals who provided valuable assistance in this project.

Introduction

Yamato is Japan's oldest poetic name. It is the name of the territory on which the first seed of state was sown, and later became the name of the province on the Kii peninsula, in southwestern Honshu, whose capital is Nara.

This mystic and especially potent name was given to the largest and most powerful battleship ever built, which entered service in the Pacific War at the beginning of 1942. Throughout the Second World War, *Yamato* was not only Japan's modern, new generation battleship but also the pride and symbol of its Imperial Navy. Her loss, in the 'Kamikaze' operation 'Ten' ichigo' in April 1945, became a symbol of the downfall of the Empire and was a final confirmation of the eclipse of the world's floating fortresses. Originally built to oppose US battleships — with the capability to annihilate them in battle — she never in fact fought against them.

Yamato and her sister ship *Musashi* were sunk by the planes of the US carrier forces. As a result of revolutionary changes in sea warfare tactics, these carrier planes had become the fleets' main force of attack, giving battleships in some measure an auxiliary function. When the Bureau of Naval Construction began to make plans for the new battleship in 1934, there was no forewarning of the near supremacy of naval air forces and so she more strongly reflected the Tsushima tradition and the sea-battles of the First World War.

These super battleships, built by the supreme efforts of their constructors and the naval architects of the Imperial Japanese Navy, were extremely costly, and due to developments in research and new technology, were almost obsolete from the time they were accepted into service — seven years after the first design emerged.

On 16 December 1941, when *Yamato*, the first of four projected ships, entered service (*Musashi* completed on 5 August 1942; *Shinano* was converted into an aircraft-carrier and completed on 19 November 1944; the fourth ship, No 111, was cancelled about a third of the way through its construction), the world's most powerful battleships were:

UK:	*King George V* class (227.1m long, 38,000-44,460 tons displacement)
USA:	*North Carolina* class (222.1m long, 38,000-46,770 tons displacement)
France:	*Jean Bart* (247.8m long, 42,806-49,850 tons displacement)
Italy:	*Littorio* (237.8m long, 41,377-45,963 tons displacement)
Germany:	*Tirpitz* (251.0m long, 42,900-52,600 tons displacement).

Yamato exceeded the above not only by her 69,100-72,809 tons displacement and the calibre of her guns, but also by the shape and construction of her hull, armour protection, gunnery and optics. She was a tremendous achievement for the Japanese naval engineers and architects by any international standards.

Her 46cm (18in) guns, with 42-44km range and superior optics equipment, were the largest and most modern naval guns ever mounted and far exceeded the quality and construction of other countries'. (Even today the Japanese optics industry is the world's leading producer of cameras and other optical equipment.) Her 15m rangefinders gave tremendous precision to the main gunfire; her armour protection was 650mm thick and the side armour plate 410mm; and the shape of her hull reduced water resistance to a minimum. All in all, her construction was an extremely difficult and expensive enterprise, outstripping many times the building difficulties encountered on the typical dreadnought.

Yamato and her sister ships *Musashi* and *Shinano* were considered *the* strategic weapon of the Imperial Japanese Navy; their design and construction were top secret and carefully guarded against recognition. Unfortunately, just before the surrender of Japan, when the ships lay on the seabed, orders were given to destroy their documentation — all drawings and even photographs of the *Yamato*s — which had been deposited in the Japanese Naval Archives. The special services carried out this task to the letter, so that for many years after the war the only surviving records were the aerial photographs taken by US Navy aircraft during their attacks on these giants. It was not until 1948 that the first photograph of the ship's broadside, discovered by chance, was published; the most recent was published in 1981. Only fragments of the original documentation have survived. The ships have taken their secrets to the bottom of the sea.

On 1 August 1985, forty years after *Yamato* sank, the first Japanese expedition, in a small research submarine *Research Submersible 2* (on loan from the UK), found her remains and examined them carefully. They explained the secret of the ship's final moments. The last drawing in this book shows today's reconstruction of *Yamato*. Huge and devastating explosions tore the ship apart and her remains have been slowly sinking in the sand.

The state of her structure means that research work on her is impossible; moreover the Japanese are not planning a further expedition, wishing to leave in peace the last resting place of the ship and the 2498 members of her crew. We can assume, then, that most of the secrets of the ship's construction will remain unknown — particularly the details of her interior structure and machinery installations.

Thanks to the tremendous help of my Japanese friends, I have been able to assemble the surviving documentation — drawing, photographs, the reconstruction drawings which gives an idea of the ship's appearance, and photographs of the equipment. After my own initial research (which revealed numerous mistakes and discrepancies in existing reconstructions of *Yamato*) I decided to begin my study in such a way that I would be able to reconstruct the appearance of the ship with almost maximum precision. The study consisted of two phases. Firstly, using geometric methods to interpret the dimensions of the ship from the photographs, and taking advantage of existing documentation and reconstructions, I was able to make preliminary drawings. I then built a simple study model to the scale 1/133 and photographed it using a special high depth of focus lens, identifying the same precise points and angles as those on the original photographs of *Yamato* and *Musashi*. Putting the large transparencies of the original and model photographs in the same scale allowed me to correct and complete the first phase of the drawings. It was an extremely complicated and laborious job, demanding great concentration and precision, but the outcome of which was a set of working drawings (second phase) which became the basis for the detailed drawings shown in this book.

I sent the results of my work to the authorities in Japan and was surprised when it turned out that I had been the first to 'discover' a good many details.

My several years' work on *Yamato* — which has intrigued me since I was a boy — has been fascinating, despite the enormous effort and difficulties. Quite apart from my emotional attachment to *Yamato* and the warships of the Imperial Japanese Navy, which have been my main interest for years, the discovery of every 'secret', however small, has been truly a great adventure.

DESIGN

The Washington Treaty of 1922, with its prohibitions on the building of new battleships brought a halt to the 8-8 Project for the development of the Fleet, which comprised the building of eight modern battlecruisers and eight modern large battleships. This was quite a blow for the Japanese, particularly for the designers. Then came a change in the concept of warship construction. The designers and engineers wanted to increase the quality of the new units. They already considered the US Navy a potential opponent and wanted to ensure that their ships would be stronger and better armed than their US counterparts. Despite treaty prohibitions the Bureau of Naval Construction carried on with their studies and research and preparations for building the battleships reached a new phase of development at the beginning of 1930, although work was limited to preliminary studies until 1934. It was in October 1934 that the Bureau of Naval Construction received from the Naval General Staff the order to produce a design study of a new battleship with 46cm guns and a speed of 30 knots (US battleships then had a speed of 24-25 knots and 40.6cm guns).

The first finalized design was completed on 10 March 1935 under the designation A-140. The planned ship was to be bigger than the actual *Yamato*: length 294m, beam 41m, 69,500 tons displacement, 200,000hp turbine engines, speed 31 knots. This was too big for the Japanese strategists who reduced the speed requirement to 27 knots. It was a very difficult decision because until then they had attached great importance to high speed. The Bureau of Naval Construction's three groups of outstanding naval designers — Fujimoto, Hiraga and Fukada — had drawn up as many as twenty-three preliminary designs up to March 1937 (see Table 1).

After 1 April 1935, when the penultimate design stage had been completed, the naval designers suggested a mixed propulsion system of diesel and turbine engines. The turbines, with a total of 75,000hp, would drive two propellers; the diesel engines, with a total of 60,000hp, would drive two other propellers. After the second design stage it became the norm in all other versions to install diesel engines as the main machinery. By that time the Japanese Navy had a powerful two-cycle, double acting diesel engine providing more than 10,000hp. These engines had been used successfully as main propul-

TABLE 1: YAMATO SKETCH DESIGNS UP TO MARCH 1937

A-140 10 March 1935	Trial displacement 69,500 tons; dimensions 294 × 42.2 × 10.4m; steam turbines 200,000hp = 31kts; cruising range 8000 nm, 18kts; armament 9 × 46cm (× III), 12 × 15.5cm (× III), 12 × 12.7cm (× II), 24 × 25mm (× II)
A 1 April 1935	68,000 tons; dimensions 277 × 40.4 × 10.3m; steam turbines 132,000hp + diesel motors 68,000hp = 30kts; range 9200 nm, 18kts; armament as for A-140
B_2 1 April 1935	62,000 tons; dimensions 247 × 40.4 × 10.3m; steam turbines 140,000hp = 27.5kts, 9200 nm, 18kts; armament 8 × 46cm (× II); rest as for A-140
G 25 May 1935	65,838 tons; dimensions 273 × 37.7 × 10.4m; steam turbines 70,000hp + diesel 55,000hp = 28kts; range 9000 nm, 18kts; armament as for A-140
G_1-A 30 July 1935	61,000 tons; dimensions 245.5 × 38.9 × 10.4m; steam turbines 60,000hp + diesel 55,000hp = 26kts; range 6600 nm, 16kts; armament as for A-140
O 10 August 1935	59,500 tons; dimensions 244 × 38.9 × 10.4m; steam turbines 55,000hp + diesel 55,000hp = 26kts; range 6600nm, 16kts; armament 8 × 46cm (2 × III + 1 × II); rest as for A-140
O 12 August 1935	60,000 tons; dimensions 249 × 38.9 × 10.4m; steam turbines 55,000hp + diesel 55,000hp = 26kts; range 7200 nm, 16kts; armament as for O of 10 August 1935
O 14 August 1935	60,950 tons; dimensions 249 × 38.9 × 10.4m; steam turbines 65,000hp + diesel 65,000hp = 27kts; rest as for O of 10 August 1935
F 14 August 1935	60,350 tons; dimensions 268 × 38.9 × 10.4m; steam turbines 65,000hp + diesel 65,000hp = 27kts; range 7200 nm, 16kts, 8 × 46cm (2 × III + 1 × II); rest as for A-140
G_0-A 14 August 1935	65,450 tons; dimensions 268 × 38.9 × 10.4m; steam turbines 75,000hp + diesel 70,000hp = 28kts; 7200 nm, 16kts; armament as for A-140
K 1 August 1935	50,059 tons; dimensions 221 × 36.0 × 10.1m; steam turbines 40,000hp + diesel 40,000hp = 24kts; range 6600 nm, 16kts; 8 × 46cm (2 × III + 1 × II all forward); rest as for A-140
O 5 August 1935	51,900 tons; dimensions 235 × 37.0 × 10.3m; steam turbines 50,000hp + diesel 45,000hp = 26kts; rest as for K
O 5 August 1935	53,600 tons; dimensions 246 × 37.0 × 10.3m; steam turbines 65,000hp + diesel 65,000hp = 28kts; rest as for K
O 5 August 1935	53,600 tons, dimensions 237 × 37 × 10.3m steam turbines 50,000hp + diesel 50,000hp = 26kts; range 7200 nm, 16kts; armament as for K
G_2-A 30 August 1935	63,450 tons; dimensions 262 × 38.9 × 10.4m; steam turbines 73,000hp + diesel 70,000hp = 28kts; 7200 nm, 16kts; armament 9 × 46cm (× III all forward); rest as for A-140
I 30 July 1935	65,050 tons; dimensions 268 × 38.9 × 10.4m; steam turbines 73,000hp + diesel 70,000hp = 28kts; range 7200 nm, 16kts; armament 10 × 40.6cm (1 × III and 1 × II forward and aft); 8 × 15.5cm (2 × IV), 16 × 12.7cm (8 × II), 24 × 25mm (12 × II)
J_0 30 July 1935	52,000 tons; dimensions 242 × 36.2 × 10.1m; steam turbines 60,000hp + diesel 60,000hp = 27.5kts; range 7200 nm, 16kts; armament 9 × 40.6cm (3 × III all forward), 9 × 15.5cm (3 × III), 12 × 12.7cm (6 × II), 24 × 25mm (12 × II)
O 10 August 1935	53,000 tons; dimensions 244 × 36.6 × 10.2m; steam turbines 65,000hp + diesel 65,000hp = 28kts; rest as for J_0
J_2 30 July 1935	54,030 tons; dimensions 255 × 38.5 × 10.2m; steam turbines 65,000hp + diesel 70,000hp = 29 kts; range 6000 nm, 18kts; rest as for J_0
J_3 30 August 1935	58,400 tons; dimensions 252 × 38.9 × 10.2m; steam turbines 65,000hp + diesel 70,000hp = 28kts; range 7200 nm, 16kts; armament 12 × 40.6cm (2 × III forward and aft); rest as for J_0
F_3 5 October 1935	61,000 tons; dimensions 246 × 38.9 × 10.4m; steam turbines 75,000hp + diesel 60,000hp = 27kts; range 4900 nm, 16kts; armament 9 × 46cm (3 × III, 2 fore and 1 aft), 12 × 15.5cm (4 × III), 12 × 12.7cm (6 × II), 24 × 25mm (12 × II), 16 MG (4 × IV)
F_4 5 October 1935	62,545 tons; dimensions 248 × 38.9 × 10.4m; steam turbines 75,000hp + diesel 60,000hp = 27kts; range 7200 nm, 16kts; rest as for F_3
F_5 20 July 1936	65,200 tons; dimensions 253 × 38.9 × 10.4m; steam turbines 75,000hp + diesel 60,000hp = 27kts; range 7200 nm, 16kts; rest as for F_3

sion for the submarine tenders *Taigei* (converted into the aircraft-carrier *Ryuho*), *Takasaki* (converted into the aircraft-carrier *Zuiho*) and *Tsurugizaki* (converted into the aircraft-carrier *Shoho*) but at the time the Japanese did not possess any 30,000hp diesel engines which were to be used in *Yamato*. For machinery of the same propulsive power the diesel had the advantage of appreciably lower fuel consumption than that of the turbine, although the diesel was slightly heavier. (See Table 2.)

TABLE 2: COMPARISON OF DIESEL AND TURBINE ENGINES FOR ONE YAMATO PRELIMINARY DESIGN

Power (shp) Turbine	Diesel	Engine weight (tons)	Shp for 1m²	Fuel necessary for 18kts-8000nm (tons)
115,000	—	4008	823	8400
45,000	70,000	4253	753	5700

About two months after the provisional plans had been completed in July 1936 the designers came across an unexpected difficulty, which caused drastic changes to be made. *Yamato*'s engine rooms were to be covered with 200mm thick armoured plating which were integral elements of the hull's armoured box. The plating was not only protective but an integral part of the ship's structure, so after the diesel engines were installed it would have been impossible to replace them if they happened to cause problems. The designers had to return to their original plan and use 150,000shp turbine engines as the propulsion plant. In March 1937 the final design was drawn up by Dr Hiraga, leading naval architect of the Imperial Japanese Navy:

Sea trial displacement 68,200 tons; dimensions 256 (waterline), 263 (overall) × 38.9 × 10.4m; propulsion by steam turbines of 150,000hp = 27kts; cruising range 7200 nm at 16kts; armament 9 × 46cm (3 × III), 12 × 15.5cm (4 × III), 12 × 12.7cm (6 × II), 24 × 25mm (12 × II), 8 MG (2 × IV).

On 4 November 1937 *Yamato*'s construction began — the keel was laid down in the dry dock of the Kure Kaigun Kosho shipyard.

TABLE 3: **CHARACTERISTICS OF YAMATO, 1941**

Length overall:	263.0m
Length waterline:	256.0m
Length between perpendiculars:	244.0m
Beam:	38.9m (max)
Beam waterline:	36.9m
Draught (trial):	10.4m
Draught (full load):	10.86m
Displacement:	65,000 tons standard 69,100 tons trial 72,809 tons full load
Shaft horsepower:	153,553 (astern 45,000)
Speed:	27.46kts
Oil fuel capacity:	6300 tons
Radius of action:	7200 nm at 16kts
Propulsion plant:	4 steam turbines
Steam pressure	25kg/cm^2
Temperature:	325°C
Armour:	75 — 410mm side belt 200 — 230mm deck 190 — 650mm main turrets 380 — 560mm barbettes 50mm secondary turrets
Armament:	9 × 46cm (18.1in) triple turrets 12 × 15.5cm (6.1in) triple turrets 12 × 12.7cm (5in) twin mountings 24 × 25mm MG triple mountings 4 × 13mm MG twin mountings
Aircraft:	6 (max 7) floatplanes
Crew:	2500

BUILDING HISTORY

Work on the *Yamato* project began with the development and modernisation of four selected shipyards — Kure, Nagasaki, Yokosuka and Sasebo — in which the future ships were to be built, because at that time none of the Japanese shipyards could undertake the building of such gigantic hulls.

Yamato was built in Kure Kaigun Kosho (Kure naval yard's dry dock) which was deepened by about a metre and protected by a special roof on one side to screen it from view from the nearby hill. A gantry crane straddling the dock was used to lift parts weighing over 100 tons.

The new dock in Yokosuka was built for *Shinano*. *Musashi* was built in Nagasaki naval yard. The slipway on which the hull was built was covered by a sisal rope curtain to hide it; the rope was 2710km long and weighed 408 tons. *Musashi*'s launch weight (35,737 tons) was second only to the 37,287 tons of the British passenger liner *Queen Mary*.

The fourth battleship (No 111 which was never completed) was laid down in a new dry dock at Sasebo naval base.

The gigantic 46cm guns and their turrets, which were manufactured at Kure, were transported by the *Kashino* (displacement 11,000 tons, dimensions 135.0 × 18.8 × 6.7m), a ship specially built for the purpose.

In October 1934 the Bureau of Naval Construction was for the first time requested by the Imperial Japanese Navy's Naval General Staff to study the building of new super battleships with 18in guns. In March 1937 the design was finalised.

CAREER SUMMARY

4 November 1937: Laid down
8 August 1940: Launched
September-November 1939: Main engines fitted
May-October 1939: Boilers fitted
May-July 1941: Main guns fitted
16 December 1941: Commissioned. She then joined the First Battleship Division, which until then had consisted of *Nagato* and *Mutsu*, and began intensive training
12 February 1942: Became the flagship of Admiral Isoroku Yamamoto, Commander-in-Chief of the Combined Fleet
3-6 June 1942: Battle of Midway Island. *Yamato* served as Admiral Yamamoto's flagship and as the command centre in the battle. It was intended to use her main artillery at Midway. After the defeat and loss of four aircraft-carriers she returned to the Inland Sea. The battle once more confirmed the supremacy of aircraft-carriers in war and at that time a decision was made to convert the third battleship, *Shinano* (then being built), into a heavy aircraft-carrier
August 1942: During operations in the Solomon Islands *Yamato* went to Truk Island to support a series of operations to recapture Guadalcanal Island, but did not take part in the campaign
5 August 1942: *Musashi*, her sister ship, entered service and joined the First Battleship Division
22 January 1943: *Musashi* arrived at Truk to join *Yamato*
11 February 1943: *Musashi* became the flagship of Admiral Yamamoto. In the meantime the situation around the Solomon Islands went from bad to worse. The Japanese had to abandon Guadalcanal
18 April 1943: Admiral Isoroku Yamamoto was killed (his aircraft was shot down over Bougainville Island) and *Musashi* became the new flagship of Admiral Mineichi Koga, successor to Admiral Yamamoto
May 1943: *Musashi* (with the ashes of Admiral Yamamoto), *Yamato* and other ships sailed back to Japan and anchored in Tokyo Bay. Emperor Hirohito visited *Musashi* at the Yokosuka naval base — the first and last time he saw the super battleship. Both battleships were dry docked at Kure for inspection and necessary repairs. *Yamato* and *Musashi* were equipped with Type 21 radars. *Musashi* sailed back to Truk and about two weeks later *Yamato* followed
25 December 1943: *Yamato* was hit by a torpedo fired by the US submarine *Skate* near Truk. The torpedo hit her starboard underwater hull near No 3 main turret (frame 165) with the result that about 3000 tons of water flooded into the upper powder magazine

through the small hole in the side armour joint. *Yamato* was ordered to make for Japan

16 January 1944: *Yamato* arrived in Japan and was dry docked at Kure for necessary repairs and modification to the bracket structures of her side armour. At the same time her anti-aircraft armament was modernised. In place of two 15.5cm broadside turrets, which were removed, six twin 12.7cm mounts were installed. Twelve triple and twenty-six single AA machine-guns were mounted on her weather deck, Type 22 and Type 13 radars were installed and the construction of the main mast was changed. Repairs and modernisation lasted until April

April 1944: *Musashi* was forced to retreat from Truk to Palau atoll where she had been since the beginning of February

29 March 1944: *Musashi* was hit by a submarine torpedo fired by USS *Tunny*. One of three torpedoes hit her bow part killing seven men and injuring eleven. The damage was slight

3 April 1944: *Musashi* made port in Kure to repair her damage. While undergoing repair her AA armament were also modernised (same alteration as on *Yamato*) but as six twin 12.7cm guns were not available triple 25mm machine-guns were mounted

31 March 1944: Admiral Koga was killed and the new Combined Fleet Commander, Admiral Soetake Toyoda, was appointed

1 May 1944: *Yamato* was the first unit to join the other ships of the Combined Fleet at Lingga anchorage, south of Singapore

10 May 1944: *Yamato* went to Tawitawi in the Sulu Archipelago which was designated the starting point for the forthcoming showdown with US forces in the Southwest Pacific

16 May 1944: *Musashi* joined her sister *Yamato* and both ships began intensive training before battle. At that time the Combined Fleet was reorganised — the main part of the Fleet became a carrier striking force and the battleship group, including *Yamato* and *Musashi*, formed the support force for the aircraft-carriers. The Commander-in-Chief of the Combined Fleet hoisted his flag on the light cruiser *Oyodo*. When the US forces landed on Biak Island, West New Guinea, towards the end of May 1944 the Imperial Japanese Navy decided to use two 46cm gun battleships to attack the enemy invasion force. The plan was not realised as *Yamato* and *Musashi* were recalled on their way because of an imminent US invasion of Saipan Island

June 1944: After the Mariana Sea Battle (A Operation, the twin battleships taking part in the battle as part of Admiral Kurita's vanguard group) they arrived in the homeland to prepare for the next operation — defence of the Philippines. Five additional triple 25mm machine-guns were installed on *Yamato*, making twenty-nine triple and twenty-six single 25mm machine-guns (113 barrels)

9 July 1944: Both battleships left Japan and hurried south to Lingga anchorage

16 July 1944: Arrived at Lingga anchorage and underwent training. The surface force there was immediately alerted

18 October 1944: Left Lingga anchorage

22 October 1944: Arrived at Brunei. After refuelling *Yamato* and *Musashi* left to make a daring dash eastward through the Philippines to launch an attack on the enemy in Leyte Gulf

23 October 1944: In the early morning, when the surface force was passing northeast along Palawan Island, two heavy cruisers (*Atago*, flagship of Admiral Takeo Kurita, and *Maya*) were sunk by submarine torpedoes from USS *Darter* and USS *Dace*. Admiral Kurita hoisted his flag on *Yamato*

24 October 1944: *Musashi*'s war career ended on the Sibuyan Sea. As a result of air attack she was hit by twenty torpedoes, seventeen bombs and had more than fifteen near misses. In four and a half hours after the last attack the battleship went down with 1039 officers and men. *Yamato* was hit by three bombs only during the attack — forward of and in the vicinity of No 1 main gun turret. These did little damage and she was easily repaired

25 October 1944: *Yamato* broke through the San Bernardino Strait to the east of the island chain. The Battle of Samar Gulf took place in which *Yamato*'s 46cm guns opened fire on the US escort carriers and destroyers. It was the first and last of her battles with enemy ships. She fired a total of 104 rounds of 46cm projectiles as a result of which one escort carrier and one destroyer were sunk. In the Philippines the Imperial Japanese Navy not only failed to prevent the US forces from capturing the islands but suffered irretrievable damage. After the battle *Yamato* returned to Brunei Bay in Borneo, but not for long because of air raids by the Allied forces. The Navy ordered her to return to Japan.

16 November 1944: Escorted by destroyers *Yamato* left Brunei for the Inland Sea

23 November 1944: Her anti-aircraft armament was strengthened again by mounting 25mm machine-guns (up to fifty triple mounts and two single) — a total of 152 25mm barrels

28 November 1944: *Shinano* left Yokosuka and made her way to Kure where her fitting-out was to be completed

29 November 1944: On the way *Shinano* was hit by four torpedoes and sunk; incomplete water-tight compartmentation was the cause of her loss.

When the US forces landed on Okinawa *Yamato* was assigned a very unusual and grim mission: Operation 'Ten-ichigo' (Ten = Heaven, ichi = one, go = counter) — a suicide mission. Mitsuru Yoshida (author of *Requiem for the Battleship Yamato*) writes that the battleship, like the 'Kamikaze' aircraft, had enough fuel for a one-way trip only.

Yamato's theoretical task was to destroy the invasion fleet by her artillery or to run aground on the coast of Okinawa and support the Japanese Army. To reach the Okinawa coast or give an artillery battle without her own air umbrella and in the face of vast numbers of Allied forces in the air and on the sea was an almost hopeless task.

The Commander of the Task Force, Vice Admiral Seiichi Ito, was opposed to the operation, the idea for which came from Admiral Soemu Toyoda, Commander-in-Chief of the Combined Fleet. But the mission of *Yamato* and the ships accompanying her was to be realised. With her specially selected crew, Samurai traditions, Samurai flag, and the 'Kikusui' Chrysanthemum crest (the crest of Masashige Kusunoki, loyalist hero and martyr of the fourteenth century) on her funnel, *Yamato* started out on her final voyage.

SINKING OF THE YAMATO

The strike force — Task Force II of the 'Ten-ichigo' Operation — was formed in Tokuyama Bay on the Japanese Inland Sea. *Yamato*'s captain was Rear Admiral Kosaku Ariga; Vice Admiral Seiichi Iti was in direct command of the task force and had his headquarters on the battleship. The remaining ships (the light cruiser *Yahagi* was commanded by Commodore Tameichi Hara and the Second Destroyer Squadron was commanded by Rear Admiral Keizo Komura, with headquarters in *Yahagi*) consisted of eight destroyers: *Asashimo, Fuyutsuki, Hamakaze, Hatsushimo, Isokaze, Kasumi, Suzutsuki* and *Yukikaze*.

On 6 April 1945 *Yamato* fuelled and took on board a full supply of ammunition including anti-aircraft 'San-Shiki' projectiles for the 46cm main guns. At 1500hrs she left her base in Tokuyama Bay and sailed in the dark through the Bungo Strait at a speed of 20 knots. At 1800hrs she was in a state of readiness in which one-third of the crew were at battle stations, with the remainder sleeping in the vicinity of their stations because of the reported presence of US submarines off the Bungo Strait.

On 7 April, at 0700hrs, there was a ceremonial breakfast, and at 1000hrs radar contact was made with US planes, a state of readiness commanded and the ship closed up for action, with all doors, hatches and ventilators closed; even the escape manholes in the lower portion of the water-tight doors were clamped shut. This took about five to seven minutes, after which she was ready for battle in every respect.

Although US planes continuously observed the striking forces, an attack did not take place for about two hours. A few minutes past 1200hrs two large groups of US carrier-aircraft were noticed preparing for attack. *Yamato* increased her speed to 24 knots and the screen commenced the usual Japanese circling tactics.

At 1220hrs the first attack started — hit by two torpedoes at frames 150 and 125, and probably a third torpedo at frame 190. All three were concentrated on her port side, with four bomb hits in the vicinity of No 3 46cm gun turret. After the hits her port list angle of about 5°-6° was reduced to 1° by counter-flooding. Two of the bombs hit the top of frame 150 in the starboard side of the weather deck, destroying the 12.7cm high angle (HA) gun turret. It detonated on impact, blowing a hole reported to have been some 5.5-6.6m in diameter in the flying deck. Many 25mm machine-guns were knocked out.

The other two bombs followed the first two after about five minutes. One of them passed through the after secondary battery 15.5cm gun fire control station, wrecking the after director for the secondary battery, and hit slightly to port of the centre line just forward of the after 15.5cm mount. Both bombs penetrated the flying and upper decks and detonated above the armoured (200mm thick) deck. The 15.5cm gun turret was completely destroyed — with only one survivor from the gun crew. A fire began which was never extinguished — fire fighting efforts were disorganised and ineffective. The fire may have been the cause of the main magazine explosion which occurred as *Yamato* capsized some two hours and two attacks later.

The second series of attacks started 40-45 minutes after the first (about 1300hrs). The battleship was hit by three torpedoes on her port side, on frames 143, 124 and 131, and one torpedo on starboard frame 124, with a probable hit on frame 148, port side. The bomb hits were negligible. A port list angle of about 15°-16° was reduced to 5° by counter-flooding. At that moment all possible starboard compartments had been flooded. The torpedoes striking on the port side caused immediate flooding of No 8 and No 12 boiler rooms, the port outboard engine room and the port hydraulic machinery room. Her speed was not more than 18 knots.

The third series of attacks started about 30 minutes after the second, at about 1345hrs. The battleship received more torpedo hits: two hits on frames 135 and 154, and probably frame 164, all on the port side, and one hit on frame 150 to starboard. Again the bomb hits were negligible. The initial list was severe: some 16°-18° to port and increasing rapidly. The Executive Officer ordered flooding of the starboard boiler rooms No 3 and No 11 and the starboard hydraulic machinery room. It had some effect and for the time being stopped the ship's list.

The hit on the starboard side had caused a leak in the starboard outboard engine room, the two port hits flooding the inboard port boiler room No 10 and the other starting a leak in the port inboard engine room. Soon the list started to increase — the starboard outboard engine room was abandoned and flooded. Only some of the engine room crew managed to leave the compartment. The port list angle was about 22°-23°.

Yamato's speed was reduced to 10 knots. The effect of the two starboard torpedo hits, despite the loss of buoyancy, was to make the counter-flooding problem easier and delay *Yamato*'s sinking. She was steaming in a large circle and shortly after 1400hrs all power was lost. The Commanding Officer gave an order to prepare to abandon ship. The list was increasing at an alarming rate. Soon after the order she began to sink with a list of 90°. When she reached an angle of 120° a gigantic explosion of the stern ammunition magazines and a smaller explosion tore the ship up — the huge mushroom of smoke reached a ceiling of 6000m and the fire was seen by sentries on Kagoshima, more than 200km away.

At 1423hr the ship went down with 2498 officers and men — 280 were saved — all from topside stations. The explosion blast destroyed a few US aircraft.

There are two theories on the cause of the explosion. First, at the moment when the ship rolled over, the 'San-shiki' or HE type projectile fuzes struck the deck. But study of these fuzes by the US Bomb Disposal Office after the war revealed that fuze ignition would have been impossible.

The second theory seems to be more probable: that the fire aft ignited the magazines after the bombs had exploded in the after 15.5cm turret and magazines. The fire could have spread via the hoists, which could have been opened by the weight of falling projectiles and debris as the battleship rolled over.

HULL STRUCTURE

The research and design work was carried out simultaneously with the hull model tests, the main aim of which was to reduce hull resistance and increase propulsive efficiency. As many as fifty experimental hull models were built and tested in the experimental model basin of the Naval Technical Research Centre in Tokyo. This was then the largest basin of its type in Japan with a length of 245.5m, width of 12.5m and depth of 6.5m. The results of these experiments led to the adoption of a gigantic bulbous bow of such a size and shape that it was unique in the contemporary world. The hull resistance was reduced 8.2 per cent at a speed of 27 knots, and by improving the fitting of the shaft bracket and the bilge keel, a further reduction was achieved. In terms of effective horsepower, the former alteration resulted in a saving of 1900ehp and the latter 475ehp. Altogether, including the reduction in hull resistance by use of the bulbous bow, the savings totalled 7910ehp, or 15,820shp.

In the full power trial run, the 69,100 ton ship, powered by 153,553shp, reached a speed of 27.46 knots. Effective horsepower at that time was calculated at 76,700hp, propulsive efficiency reaching 50 per cent. The propulsive efficiency at her standard speed of 18 knots was 58.7 per cent — a level of efficiency seldom obtained by other vessels of the Japanese Navy. One of the excellent features of *Yamato*'s hull was that her displacement/length ratio was large and her speed/length ratio small compared with the hulls of the other battleships (see Table 4). Moreover, her prismatic coefficient was 0.612, probably the highest figure for any battleship in the world.

TABLE 4: **COMPARISON OF BATTLESHIP HULLS**

	Displacement/length ratio	Speed/length ratio
Yamato	112.2	0.940
Nelson	101.0	0.852
Nagato	98.14	1.001

Yamato's hull was broad and of relatively shallow draught for a ship with such large displacement (10.86m fully loaded). It meant that the *Yamato* class ships could use the naval bases and dry docks of the Imperial Japanese Navy without extra money being spent dredging or rebuilding.

Another very important feature of her hull was the method by which the shell plating was joined, namely the extensive use of lap-joints amidships. The butt-joint had long been used in shell plating to make the shell surface smooth, reducing its frictional resistance. However, a serious defect had been found in the outer bottom plates of the *Isuzu* class light cruiser and *Fubuki* class destroyers which gave cause for concern over the use of butt-jointed plates in *Yamato*. It was discovered that frictional resistance was greatly affected by the surface of the fore and after parts of a ship where the water pressure was greater than amidships. Based on this finding, butt-joint plating was used only in the fore and after parts of *Yamato*, the remaining section being covered by lap-joint plating. The method proved very effective when the ship was completed.

In the course of constructing *Yamato*'s huge hull, two factors — apparently contradictory — played an important part. The designers wanted to increase its strength and at the same time reduce the hull weight, for which the introduction of new methods was required. Dr Hiraga applied the method which had earlier been used for the heavy cruiser *Furutaka* whereby the armour plating not only served as protection against hits, but was also an integral part of the hull construction. The thickness and rigidity of the armour plating reinforced the hull strength considerably compared with traditional methods in which the armour merely was added on. This unique method was quite an innovation in international warship building circles at the time.

Another considerable saving in hull weight was achieved by using electric welding extensively and on a large scale except in such important features as the longitudinal structural members. The technique had not been fully adopted because welded joints on smaller warships built earlier had been found to be weak in comparison with the traditional riveted joints. The Japanese Navy was rather early in adopting electric welding. It was used more widely in the construction of *Yamato*'s upper structure and superstructure than in her hull. The largest welded block was 11m high and weighed 80 tons. (See Table 5.)

Another feature was that the main portion of the longitudinal structure was made with Ducol steel (DS) — the central longitudinal bulkhead was constructed in duplicate — to support heavy 200-230mm + 9mm DS deck plating. The deck extended to a width of 38.9m — the maximum width of the ship. To ensure the reliability of the electric services, the central ringmain electric circuit ran through the water-tight compartment inside the central bulkhead.

The weather deck — flush, with an untypical bottle shape in plan — had its own uniquely characteristic undulating profile. The

TABLE 5: **APPLICATION OF ELECTRIC WELDING AND RIVETED JOINTS**

	Length of welded joint	No of electrodes
Hull	343,422m	5,995,611
Fitting and equipment	120,347m	1,511,289
Protection	15m	636
Total	463,784m	7,507,536
	Trial condition	**No of rivets**
Yamato	69,100 tons	6,153,030
Mutsu	33,880 tons	3,733,753
Hiei	27,500 tons	2,874,622
Nachi (CA)	10,000 tons	2,711,100

TABLE 6: **BLAST PRESSURE (kg/cm²) RELATIVE TO GUN DISTANCE**

calibre/	15.5cm		40.6cm		46cm	
distance	1 barrel	3 barrels	1 barrel	2 barrels	1 barrel	3 barrels
5m	2.1	2.5	8.0	10.0	10.0	20.0
10m	0.95	1.6	4.0	6.0	5.8	11.0
15m	0.5	1.15	2.6	3.5	3.1	7.0
distance/ pressure						
1kg/cm²	9.4m	16.5m	30.6m	38.4m	35.0m	53.5m
0.5kg/cm²	15.0m	26.7m	46.0m	59.0m	50.0m	77.5m

extremely effective idea of using longitudinal framing — it minimised the structural weight — was another of Dr Hiraga's innovative methods which had been applied for the first time to the heavy cruiser *Furutaka*.

The characteristic shape of *Yamato*'s stem, extending upwards like an inverted cone, resulted, among other things, from the necessity of moving the hawse pipes away from the ship's centre line and as far forward as possible in order to protect the bulbous bow from being damaged by anchors. The lowering of the deck, starting from frame 110 towards the bow, was also connected with the reduction in weight and ship profile. The boat hangars, which were installed on both sides of the hull aft, were equipped with a single girder crane to lower boats directly to the water and gave the hull a modern and unusual appearance for that time. The middle part of the weather deck was covered with wooden 12.7cm planking, and three ships — *Yamato, Musashi* and *Nagato* — had planks of Japanese 'hinoki' cypress (the other ships of the Imperial Japanese Navy had decks made of wider, 20cm teak planking).

The aircraft deck, starting from frame 177 towards the stern, and the stern deck, from frame 227 forwards, were both covered with concrete (over the hangar the steel deck was reinforced with concrete.) The metal decks — including the anchor deck, part of the superstructure decks, the decks over the boat hangar girder crane and the stern deck — were all covered with chequer plating. The characteristic feature of *Yamato*'s deck compared with other battleships was that it was 'empty' — without equipment. This was to do with the terrific blast from the 46cm guns. Ventilators and ventilation openings were constructed and placed in such a way as to avoid or reduce the effect of the blast. The necessary equipment, such as boats, planes and paravane, was kept in completely protected magazines or hangars. The construction and shape of the superstructure sides, the lack of platform supports, and the protection of anti-aircraft (AA) batteries, observation and machine-gun control positions by shields were also to reduce blast effect. Later on, the open HA and AA guns were manned only when the main artillery 46cm guns were not in action. (Table 6 shows the blast pressure in relation to the distance from the gun's muzzles.) A blast pressure of 0.28kg/cm² was capable of destroying boats on board ship and a blast pressure of 1.16kg/cm² of tearing the clothing from crew and rendering them temporarily unconscious.

The *Yamato*'s 2490 ton stern section was supported by an extraordinarily large steel casting, weighing 91.3 tons. The shape of the stern itself (flat and almost transom-like) was determined by the planned installation of the 'Hain mat' system which allowed floatplanes to be hoisted aboard while the ship was underway. The 'mat' was a length of strong flexible material stowed on a reel of the same width as the flat of the stern, and unrolled across the surface of the sea as the ship moved slowly ahead. The floatplane then taxied on to the mat — which dampened the wave motion — and was hoisted aboard by crane. The system was tested successfully in 1933, but changed tactics forced the designers to abandon the idea before the ship went into service.

SUPERSTRUCTURE

Yamato's superstructure was positioned like an island on the huge deck of the battleship. Its shape differed considerably from the superstructures of the older ships of the Imperial Japanese Navy. Their towers — characteristic 'pagoda masts' — were built as a result of modernisation and rebuilding of the front tripod mast, which formed the core of their construction. On *Yamato* three features rose from the streamlined lower part of the superstructure with its sloping sides — the tower bridge under the 15m rangefinder, the funnel uptakes, and the after tower under the 10m rangefinder. The tower bridge and after tower were constructed around concentric cylinders. The inner 1.5m diameter cylinder of both towers was made of 20mm thick DS, inside of which ran the communications lines. On top of these inner cylinders were Type 98 'Hoiban' low angle directors in an armoured mounting. In the spaces between the cylinders were passages, staff briefing rooms etc. *Yamato*'s tower bridge area was 159m² (front) and 310m² (side) and was smaller than those on *Nagato*, for example. Use of the tower bridge posts and rooms had been tested on the battleship *Hiei* — it was especially for that purpose that the 'pagoda mast' was rebuilt, as a prototype for the *Yamato*

TABLE 7: YAMATO WEIGHT BREAKDOWN, TRIAL CONDITION

Item	Tons	Tonnes	%
Hull	20,212	20,536	29.2
Armour	21,266	21,607	30.8
Protection	1,629	1,655	2.4
Gun	11,661	11,848	16.9
Machinery	5,300	5,385	7.7
Fittings	1,756	1,784	2.5
Fixed equipment	417	424	0.6
Consumable stores	641	651	0.9
Torpedo*	75	76	0.1
Navigation and optical	95	97	0.1
Electric	1,108	1,125	1.6
Aircraft	111	113	0.2
Pressurized water in boilers	297	302	0.4
Fuel oil	4,210	4,278	6.1
Reserve feed water	212	215	0.3
Lubricating oil	61	62	0.1
Light oil	48	49	0.1
Total	69,100	70,209	100%

* Latest sources suggest 6-10 61cm torpedo tubes, possibly underwater.

class. After the necessary alterations, the tower bridge for the battleship was finally designed.

A similar procedure was applied to build a bridge for the heavy cruiser *Takao*, for which a full size wooden model of the upper part of the tower bridge had been constructed on the ship's hull. The main part of the superstructure and tower bridge were protected by 20mm armour plating capable of withstanding the force of projectiles from enemy aircraft.

ARMOUR

The weight of *Yamato*'s armour protection was 22,895 tons — the heaviest armoured ship ever built and a record which has not yet been broken. Her main section was protected by a sort of colossal armoured box. The box sides were protected at the top by 410mm Vickers hardened (VH) armour plating, which was designed to withstand 46cm armour piercing (AP) projectiles fired from a distance of more than 20,000m. The front and back of the box were protected by 340-300mm VH steel armour (see Table 8). From above the armour deck (middle deck of the ship), made of MNC steel armour plating 200-230mm thick (see drawing B8), formed protection against 46cm AP projectiles fired from a distance of 30,000m and could be penetrated only by a 1000kg AP bomb dropped from a height of 3400m or more. Another feature was the 9mm DS plating which extended 700mm beneath the armour deck. Its purpose was to protect against possible splinters such as armour bolts and rivet heads when the armour deck was hit by a bomb or projectile. Even part of the fore and after weather deck, other than the armoured main section, was protected by 35-50mm CNC steel which was sufficient to repel a 250kg bomb dropped by an enemy dive-bomber. The real achievement of *Yamato*'s design was the fact that the constructors managed to reduce the length of the main box-protected section vitals to 53.5 per cent of the total length. (In comparable battleships this ratio was 54.7 per cent for HMS *Nelson*, 63.15 per cent for *Nagato*.)

Despite her lower ratio, *Yamato*'s stability in damaged conditions was designed to be better than that of other Japanese capital ships. Heavy armour also protected two steering-engine rooms — for main and auxiliary rudders — which were situated outside the main armoured section of the ship. It consisted of two armoured boxes: the sides of the main rudder room were protected by 350-360mm VC armour, the top part by 200mm MNC and the auxiliary rudder by 250-300mm VC.

Another feature was the fact that the floors of *Yamato*'s ammunition magazines were protected by 50-80mm armour plating which extended from the bottom of the magazines and across water-tight compartments above the double bottom of the hull's shell. The idea was to protect them from the explosion of a hostile torpedo or mine beneath the ship.

A new method of armour protection was also adopted for the boiler uptakes. Funnel gases escaped through perforated plates which were adopted after careful tests proved that they reduced the weight of armour compared with conventional grating armour. The 380mm armour plating was perforated with holes of 180mm diameter (the total area of the holes being less than 55 per cent of the whole plating area). In addition, the inclined surfaces of the funnel were protected by 50mm armour which would detonate bombs before they reached the surface of the perforated plating.

TABLE 8: STEEL ARMOUR PLATING TYPES

VH:	Vickers hardened — non-cemented
VC:	Vickers cemented
NVNC:	New Vickers — non-cemented
MNC:	Molybden alloy — non-cemented
CNC:	Copper alloy — non-cemented
CNC_1; CNC_2:	Variants of the CNC type

Chemical properties of armour plates (%):

	Carbon	Nickel	Chromium	Copper	Molybden
VH	0.43-0.53	3.7-4.2	1.8-2.2	—	—
VC	0.43-0.53	3.7-4.2	1.8-2.2	0.20	—
MNC	0.30-0.38	3.3-3.8	1.8-2.2	—	0.25-0.40
CNC	0.38-0.46	2.5-3.0	0.8-1.3	0.9-1.3	—
CNC_1	0.38-0.46	1.8-2.3	1.5-2.0	0.6-1.0	—
CNC_2	0.38-0.46	1.3-1.8	1.5-2.0	0.6-1.0	—
NVNC	0.43-0.53	3.7-4.2	1.8-2.2	0.20	—

As mentioned, *Yamato*'s armour protection was designed to resist the terrific kinetic energy of 46cm projectiles weighing 1460kg and travelling at approximately 500m/sec. This was the calibre of both her own and her sister *Musashi*'s artillery which were never actually employed on other ships. Such requirements demanded the perfection of new technologies to avoid the increase in thickness of the armour plating. The builders could not apply the type of steel

which had been used before; it took as many as ten years of research and development to solve the problem. An extremely hard surface was a requisite requirement for the armour plating, but the ordinary method of cementation was expensive and could not achieve the desired plate thickness. A special method was adopted to harden the surface of the thick armour plates, which proved very effective: not only could it harden a portion as far as 140mm into the plate, it also greatly reduced production costs.

The next step was the adoption of armour plating of larger dimensions, a development connected with the reduction in the number of edges and joints exposed to projectile hits. The Japanese Navy ignored the expense involved in expanding the necessary facilities to manufacture larger pieces of armour for the *Yamato* class battleships. According to records, about $10,000,000 (US) were spent on expanding steel plate manufacturing facilities. As a result the dimensions of the side armour plates were: thickness 410mm; length 5.9m; width 3.6m (21.2m²); weight 68.5 tons.

Another problem was the emplacement of the armour, particularly the lower edge of the 410mm side armour, so that it could withstand a hit. *Yamato*'s side armour was equipped so as to drive a wedge with an angle of 10° at its lower edge when struck by the shock of a hit, but even this method proved insufficient after she was commissioned into service.

The underwater protection system was based on a lot of tests carried out on 1:3 scale models by means of well chosen explosive charges. The last test was carried out in 1939 on a full scale mockup of *Yamato* which was attacked with 400kg charges. The holding bulkhead did not remain water-tight but was not split open. The principal weakness was at the bottom connection between the holding bulkhead and the shell, and this section was redesigned for *Yamato*. Prior to construction, however, considerations of underwater projectile trajectories meant that the bulkhead was radically increased in thickness. As installed, it was 200mm thick at the top (the connection with the lower edge of the 410mm main side belt) to 75mm at the bottom connection with the shell — the entire system being designed to withstand an attack by a 400kg charge.

The biggest problem with the change in design was the method for connecting the main armour belt with the newly designed lower torpedo holding bulkhead. The decision was an unsatisfactory compromise reached over the objection of several officers who felt a delay in completion of the ship was warranted in view of the problems already apparent in the design. The design of the joint was based primarily on the ability of the steelmakers to produce the special shapes required in a reasonable amount of time. That joint was the weak point — and a significant design error — being entirely dependent for transverse strength on the shearing strength of tap rivets and three-ply rivets. The joint itself did not give adequate support in the transverse direction.

The above fears were confirmed by the damage to *Yamato* with a single torpedo hit on the starboard quarter, fired from a submarine, on 25 December 1943: 'A hole about 5m deep, extending downward from the top of the bulge connection (of the armour) and 25m long, between frames 151 and 173 was produced. Water flooded into the No 3 turret upper magazine from a small hole in the longitudinal bulkhead caused by caving in of waterline armour'. As a result of the Japanese investigation into this damage the Fourth Section (Ship Construction) authorised the installation of a 45° sloping plate across the corner of the upper void between the two inboard bulkheads during the January-April 1944 refit (see drawing B2).

Yamato's hull was divided into 1147 water-tight compartments (WTC) which comprised 1065 below the armour deck (middle deck) and 82 above. The maximum extension of WTC increased her buoyancy. Her reserve buoyancy reached as much as 57,450 tons (29,292 tons for *Nagato*, 21,300 tons for *Fuso*); this was 80 per cent (for *Yamato*, 67.6 per cent for *Nagato*, 55.2 per cent for *Fuso*) of her trial displacement. The new battleship was also designed to remain fairly stable when in a damaged condition.

In the event of her bow or stern sections, other than the armoured citadel, being flooded, it was believed that she could maintain her stability until she listed to 20°, and that her trim capacity would enable her to function with her freeboard forward reduced to 4.5m — *Yamato*'s fore freeboard was 10.0m, amidships 8.6m, after 6.4m — even if her fore part was completely destroyed and flooded.

FLOODING AND PUMPING SYSTEM

The flooding and pumping system was to fulfil the following requirements:

1. The resultant list and trim from the first torpedo hit should be reduced to under 4° list and 2.3m difference in draught fore and after within five minutes of the damage control system going into action;
2. The resultant list and trim from the second torpedo hit should be controlled within thirty minutes, to the above-mentioned standard.

By flooding the opposite damage control tanks, *Yamato* could also be heeled by 13.8° maximum, and another 4.5° list could be added by shifting fuel to the opposite fuel tanks. Altogether, it was believed that the system could enable *Yamato* to return to almost even keel from a list of 18.3°.

MACHINERY

The designers abandoned mixed propulsion (diesel and turbine) in the last phase of the project and *Yamato* was equipped with 150,000hp turbine propulsion machinery using 25kg/cm² and 325°C steam. Twelve boilers, each of 12,500hp were set up in four rows, three per row, and each located in a separate room. Three boilers in one row propelled each turbine. The Kampon type boilers were of a standard Japanese Navy design. The banks were nineteen tubes deep with superheaters — which were two-pass four-loop type

– between inner boiler rows 7 and 8. A peculiarity of Japanese naval boilers was the narrowing of the bank of tubes between the furnace and superheaters. The centre to centre length of the first three inner rows was 4.25m and rows 4 to 7 were reduced so that the distance between the superheaters and beyond the passage was only 3.263m. *Yamato*'s boiler rooms had a floor area of 798m². The ship's prismatic coefficient was 0.612 and its block coefficient 0.596. At maximum speed, when all twelve boilers were in operation, the consumption of fuel oil amounted to 62,700kg/hr: 1233kg per 1000m of the distance steamed.

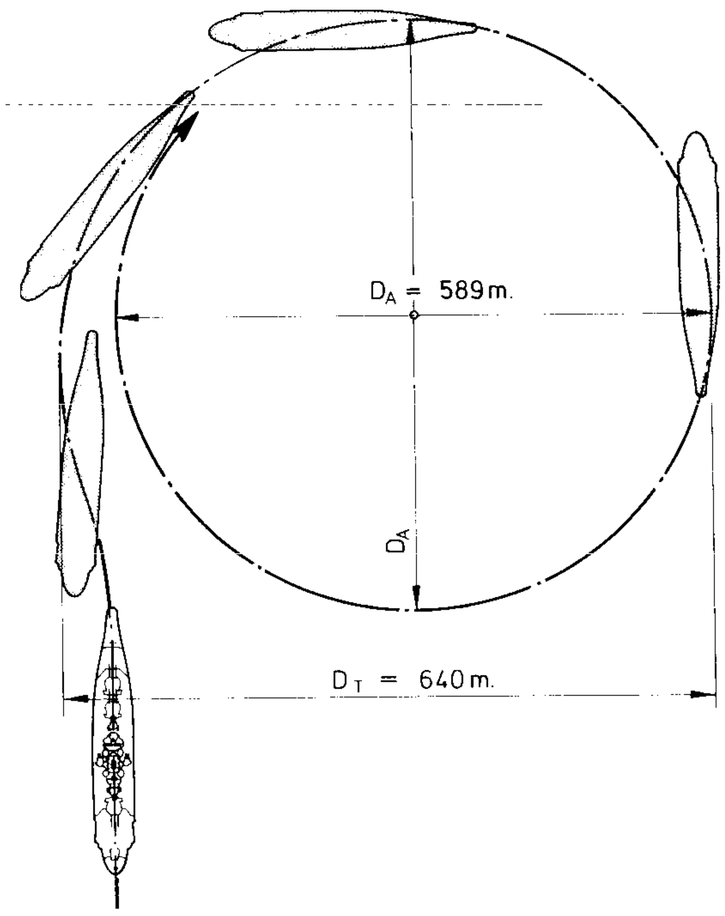


TABLE 9: **MACHINERY DATA**

	Shp	Engine room floor area			Shp/area
Yamato	150,000		640m²		238shp/m²
Nagato	82,000		516m²		158shp/m²
Power	10/10	8/10	6/10	4/10	Standard
Speed (kts)	27.46	26.6	25.6	23.2	16.47
Shp	153,553	120,655	90,080	61,430	18,595
Rpm	225				
Ehp	76,700	61,172	48,508	33,233	10,915
Propulsive coefficient	50.0	50.7	53.85	54.1	58.7
Admiralty coefficient	228	264	319	344	406
Fuel consumption kg/shp/hr	0.371				0.466

Yamato had 282 ventilation fans with a total power of 1284hp. She was the first Japanese warship to be equipped with an air-conditioning system. Although that amenity did not extend to all living quarters *Yamato* had a favourable reputation as the most comfortable ship in the Imperial Japanese Navy. Living space floor area per crew was 3.2m² per man on *Yamato*, 2.6m² per man on *Nagato*, 1.54m² per man on *Myoko* and 1.1m² on *Fubuki* (destroyer). The stability characteristics of *Yamato* were as follows: metacentric height GM = 2.88m (trials); maximum righting lever GZ = 1.2m; range of stability 70°; roll period 17.5 seconds. Actual man-days spent on hull construction were 999,000 (hull) and 696,000 (fittings) making a total of 1,695,000.

TURNING ABILITY

The ship's turning ability was superior compared with other battleships. *Yamato*'s tactical diameter was 640m, the advance diameter 589m (see drawing) giving a maximum heel of 9° when the ship was turned by the maximum rudder angle of 35° at a speed of 26 knots. The small heeling angle in a turn (necessary from the point of view of evading bombs and torpedoes, stability and fire control) was attributed to her metacentric height — GM = 2.88m during trials. Her rolling period was an impressively steady 17.5 seconds.

Yamato had two rudders — main and auxiliary — respectively 46m² and 16.5m² instead of the twin-rudder system of ordinary large warships. Originally it was planned to install two rudders, one each fore and aft, but the plan was later changed to fit the auxiliary rudder about 15m ahead of the main. In the trial run, however, an unexpected attribute of the auxiliary rudder was discovered, to the disappointment of the designers: so great was the turning momentum of the ship once she had begun to alter course that the auxiliary rudder alone could not reduce the momentum sufficiently to make her resume course.

ARMAMENT

Main armament: Type 94 46cm 45 calibre guns. The 46cm (18.1in) guns with which *Yamato* and *Musashi* were supplied were the only modern guns of this calibre ever mounted in a ship and represented quite an achievement for the Imperial Japanese Navy. Up to that time 40.6cm (16in) guns were the largest in general use, the only exception being the British battlecruiser *Furious* which was equipped for a short time with two single turrets with 45.7cm Model 1915 guns (18in). Japanese designers had been interested in using very large guns since 1920. The 13-16 class battleships from the 8-8 Project's cancelled programme were to be equipped with 46cm guns and at the same time they were testing 48cm (18.9in) guns. In 1934 the building programme for modern 46cm guns was restarted with a view to the new super battleships. The new guns — being perfected by the

engineer C Hada's team — were ready in 1939 and their production started in 1939-40. Twenty-seven guns were built of which 18 — six complete turrets — were mounted in *Yamato* and *Musashi*. The maximum weight of a triple turret was 2774 tonnes — about as heavy as a big destroyer. The AP projectile's 1460kg weight was one and a half times the weight of the 40.6cm projectiles.

Building these modern guns was extremely expensive and the designers had to solve a lot of new technical problems. However, the Japanese naval strategists' policy was to make each individual ship so powerful that even the resource-rich industrial United States would scarcely be able to match them.

Shell rooms, hoists and ram mechanisms: The number of projectiles per gun was 100 rounds, of which 60 projectiles were stowed in the turret rotating structure, making 180 projectiles in the turret (3 × 60). The remainder — 40 projectiles per gun, 120 per turret — were located in the shell rooms. So altogether the ship had 900 projectiles and the same amount of 300kg powder charges.

It was considered that 60 projectiles per gun was enough for battle; while fighting it was possible to supply the turret rotating structure with projectiles from the shell room, but it was quite a time-consuming process. The projectiles were moved by means of 'push-pull' gear: the projectiles in the turret were moved directly to the hoist (a simple 'pusher' type) on a 5° downwards tilting platform for transfer to the hoist proper. The hoist door closed automatically by a spring loaded crank activated by the weight of the projectile entering the hoist mechanism, and the projectile was seated on the hoist which was fitted with a set of three lifting and retaining pawls, back and front respectively. When the projectile reached the top of the hoist, it was carried into the tilting bucket (tilted 8° upwards) and held in the bucket by clips.

When the projectile was ready, it was moved from the bucket into the waiting tray before its transfer into the shell loading bogie and rammer. The loading bogie moved forward on rails, at the same time lowering into the gun load angle of 3°. After the gun had been loaded the shell rammer (chain) was taken back and the powder charge loaded.

Magazine and cordite handling room: Each of the three turrets had two cordite magazines. The lower room had one transfer bogie and one hoist servicing the centre gun; the upper room had two bogies and two hoists for the left and right guns. The entire propellant charge weighed 330kg — six charges each of 55kg. These were stowed in magazines in flash-tight stowage canisters (two per canister) from where they were removed and passed through flash-tight scuttles controlled by the cordite roller chute and into the turret rotating structure. A full charge (six 1/6 charges) was then transferred to the cordite hoist and hoist cages via the transfer bogie pivot tray. Each end of the hoist had a flash-tight door which was operated by a combination of cams and hand levers. Opening the upper flash door freed the rammer control. The cordite hoist was a flash-tight 2870 × 950mm trunk equipped to take one cordite cage. The cordite cage was supplied with a flash-tight container for the entire charge (330kg) which was opened at the same time as the charge was loaded into the gun chamber by cordite rammer (similar in construction to the shell rammer).

The gun drill (with times shown in seconds) was as follows:

1.	Depress gun from 20° elevation to loading angle of 3° at 8°/sec and allow for cut-off	2.75-3
2.	Open breech	2.0-2.5
3.	Move shell bogie forward	3.0
4.	Ram shell	3.0
5.	Withdraw rammer and return bogie	3.0
6.	Swing cordite cylinder and rammer to load position	3.0
7.	Ram charge	3.0
8.	Withdraw rammer	3.0
9.	Return cordite cylinder and rammer to firing position	3.0
10.	Close breech	2.0
11.	Elevate gun	2.75-3.0
12.	Recoil and run out	2.75-3.0

According to these times, at low elevation a 28-second firing cycle was possible and 40 seconds for maximum 45° elevation.

Train and elevation engine: Each turret was equipped with two sets of training gears, only one being used at a time. Contrary to previous Japanese practice, a worm gear was rejected because of space limitations and a rack and pinion system adopted. Each turret was equipped with two 500hp hydraulic motors for train drive — one for each set of gears.

Each gun was fitted with elevating and shifting cylinders. Rotation rate was 2°/sec, elevation rate 10°/sec, maximum elevation +45°, loading and underway (normal) position +3°, and minimum elevation -5°.

Each turret was equipped with auxiliary hoists with overhead travellers and chain purchase for emergency handling in the gunhouse. Hydraulic winches were used to move the projectiles to the hoists in emergencies; hydraulic valves allowed the magazines to be flooded completely in 20 minutes. Each powder magazine and shell room was equipped with sprinklers.

Gunhouse: Each turret was divided into four compartments, each comprising three guns plus equipment placed in a separate cell. The separate compartment behind the gunhouse was occupied by a 15m turret rangefinder. Armour protection was as follows:

Gunhouse: front 650mm, side 250mm (minimum), back 190mm, roof 270mm.
Barbette: 560mm — 380-440mm after parts.

PROJECTILES (See drawings E11)

Three basic types of projectile were used in the 46cm guns:

1. Armour piercing (Type 91). This weighed 1460kg and was

TABLE 10: **46cm GUN PERFORMANCE**

Elevation	Range (m)	Projectile flight time (sec)
10°	16,843	26.05
20°	27,916	49.21
30°	35,826	70.27
40°	40,700	89.42
45°	42,026	98.60

Power against targets at various ranges:

Range (m)	20,000	30,000
Gun elevation	12°34'	23°12'
Striking angle	16°31'	31°21'
Striking velocity (m/sec)	522	475
Penetration vertical plate (mm)	566	167
Penetration horizontal plate (mm)	416	230

TABLE 11: **46cm GUN MOUNT DATA**

Weights (tonnes) — rotating turret structure	
Three guns and breech mechanisms:	495 (165 per gun)
Remainder of elevating parts:	228
Turntable, minus elevating parts and armour:	350
Remainder of training parts below turntable:	647
Gunhouse armour:	790
Total weight:	2510
Total weight with ammunition:	2774
Gun data	
Designation:	Type 94 46cm 45cal
Calibre:	46cm (18.1in)
Length in calibres:	45
Length overall:	21,300mm
Construction type:	Wire wound and radially expanded muzzle 4 layers, breech 5 layers
Breech type:	Screw
Rifling: No of grooves	72
Twist uniform 1 in 28cal	
Groove depth	4.6mm
Bore cross-section	1698cm²
Projectile range:	17.59m
Chamber volume:	480 litres
Diameter of turret rollers (axle):	12,274mm
Distance from centre of rotation to trunnions (in fore and aft line):	3520mm
Height from centre line of guns to roller path:	4400mm
Distance between centre line of guns	3050mm
Recoil length:	1430mm
Ventilation:	Three 2.5hp fans for supply and five 5hp exhaust fans
Turret rangefinder:	15m base, elevation +10° and free train 160mils right, 130mils left
Local sights:	One 10cm telescope per gun
Spreads:	Normal spreads in 4 or 5 gun salvoes at maximum range about 500-600m; somewhat larger in broadside firing

TABLE 12: **46cm PROJECTILE DATA**

Muzzle velocity (AP projectile):	780m/sec
Muzzle velocity ('San Shiki' and HE projectile):	805m/sec
Projectile weight (AP projectile):	1460kg
Projectile weight ('San Shiki' and HE):	1360kg
Propelling charge weight	330kg (6 × 55kg)
Maximum range (AP projectile):	42,050m
Maximum altitude:	11,900m
Barrel life (approx):	200-250 service rounds
Bore pressure:	32kg/mm²

designed to enter the water short of the target, maintain its trajectory and penetrate the hull's torpedo defence system. The projectile nose was given a hydrodynamic shape so its trajectory would not alter drastically on entry. The Japanese had been quite impressed by the damage caused by rounds falling short on their partially completed battleship *Tosa* in firing experiments.

2. 46cm Type common 'San Shiki' Model 3. This was originally constructed and designed as AA, acting as an incendiary 'shotgun' projectile. It was fitted with 900 incendiary tubes (rubber thermite) and 600 steel stays. The projectile was supplied with a time fuze set to go off at a suitable height when the contents of 1600 incendiary tubes and stays exploded in cone of about 20° towards any incoming aircraft. In a fragment of a second after firing, the projectile shell was destroyed by a bursting charge, increasing the quantity of shell splinters. The incendiary tubes ignited about half a second later and burned for five seconds at 3000°C, giving a flame about 5m long.

3. Type HE (high explosive). This weighed 1360kg and contained 136lb of tri-nitro-anisole (TNA).

SECONDARY ARMAMENT

This consisted of 'Nendo Shiki' (Third Year Type) 15.5cm 60cal guns. Engineer C Hada designed the 15.5cm guns (as well as the 46cm guns) in 1932 as the main armament for 'B' class cruisers; they were also mounted in the *Mogami* class cruisers. These guns were the finest in use during the Second World War. *Yamato* originally had four 15.5cm triple gun turrets (the mounts were fitted to the *Mogami* class cruisers) gun but these were removed during the 1939-40 refit.

After modernisation *Yamato* had two triple turrets. The gun mounts and turrets were operated by electro-hydraulic power with mineral oil as the pressure medium (two 100hp motors per turret). Each turret had six hoists — one shell hoist and one powder hoist per gun. The shell handling room and powder hoist equipment was essentially a scaled down version of large calibre equipment. The hoists were activated by hydraulic motors supplied by the common ring.

HIGH ANGLE GUNS

As completed *Yamato* carried twelve Type 89 Model A-1-3 40cal 12.7cm guns in six twin enclosed mountings. The original shields were enclosed to reduce the effects of the terrific blast from the main 46cm guns. During the ship's refit (January-April 1944) she received an extra six twin mountings (Type 89 Model A-1 40cal 12.7cm without anti-blast protection) which were installed on existing Model A-1-3 positions. The guns with enclosed mountings were moved to both sides of the superstructure base.

The loader's two platforms moved up and down with the elevation of the mounting. The battery was semi-automatic using a

TABLE 13: **15.5cm GUN DATA**

Bore calibre:	15.5cm (6.1in)
Length:	60cal
Barrel length (overall):	9615mm
Construction:	Monoblock radially expanded
Breech mechanism:	Normal swinging (hand or hydraulic)
Weight with breech:	12.7 tonnes
Groove number:	40, twist uniform: 1 in 28cal
Chamber length:	1128mm
Chamber volume:	38 litres
Muzzle velocity:	980m/sec
Bore pressure:	34kg/mm^2
Barrel life:	250-300 rounds
Firing rate:	7-5 rounds/min
Maximum range (45°) AP:	27,400m
Maximum range (common):	26,500m
Maximum altitude:	12,600m
Elevation/depression:	55°/-10°
Projectile weight:	55.87kg (all types)
Charge weight:	19.5kg
Normal ammunition supply:	150 rounds/gun
One 8m rangefinder per turret	

TABLE 14: **12.7cm GUN DATA**

Designation:	Type 89 HA 12.7cm 40cal
Length:	40cal
Muzzle velocity:	725m/sec
Projectile weight:	23.05kg
Charge weight:	4.0kg
Maximum range:	14,800m
Maximum altitude:	9400m
Barrel life:	800-1500 service rounds
Rate of fire:	14 rounds/min maximum, 8 rounds/min sustained
Maximum elevation/depression:	90°/-8°
Construction:	Monoblock, autofrettaged
Rifling:	36 grooves, uniform twist — 1 in 28cal
Normal ammunition supply	300 fixed rounds per barrel

spring-operated rammer. Fuze setters were on the right side of each mount. Simple dredger-type hoists were used to lift the fixed ammunition to the gun platform.

LIGHT ANTI-AIRCRAFT GUNS

Type 96 25mm guns: *Yamato* was armed with a very successful anti-aircraft gun — Type 96, 25mm 60cal triple machine-guns of 1941 design, and after 1943 with single 25mm machine-guns of 1943 design. The guns were similar in construction to the French Hotchkiss type and constituted the main AA weapon of the Imperial Japanese Navy. The triple gun mount was manned by a crew of nine, the single (a free-swinging moveable mount) by a crew of three. The usual ammunition supply was 2000 rounds per gun (one barrel). The 15-round magazines were brought up by hoist to the level of the 25mm machine-gun platforms, and after stowed in ammunition boxes.

Type 93 13mm machine-guns: Two twin 13mm machine-gun mounts were installed on both sides of the tower bridge (deck VII)

TABLE 15: **25mm GUNS MOUNTED ON YAMATO**

1941 as completed	8 triple enclosed mounts	24 guns
September 1943	12 triple mounts (4 new triple open mounts fitted on weather deck)	36 guns
January-April 1944 refit	24 triple mounts and 26 single (12 new enclosed mounts and 26 single), on superstructure 8 open	98 guns
July 1944	29 triple mounts and 26 single (5 triple open mounts were added)	113 guns
January to April 1945	50 triple mounts and 2 single (21 new triple mounts, 6 enclosed and 15 open; 24 single mounts removed)	152 guns

TABLE 16: **25mm GUN DATA:**

Designation:	Type 96 'Shiki' 25mm 60cal MG
Length	60cal
Gun length overall:	2420mm
Muzzle velocity:	900m/sec
Projectile weight:	0.25kg
Maximum range:	6800m
Maximum altitude:	5000m
Rate of fire:	220 rounds/min
Maximum elevation/depression	90°/-10°

and were similar in construction to the Hotchkiss type, with horizontal range 6000m, vertical range 4500m, rate of fire 450 rounds per minute and ammunition supply 2500 rounds per gun.

FIRE CONTROL SYSTEM

Main battery: *Yamato* was equipped with the Type 98 low angle fire control system — the ultimate in Japanese low angle fire control installation and specially designed for the *Yamato* class battleships. The principal parts of this installation were as follows:

Four 15m rangefinders, one on top of the tower bridge and the remaining three in 46cm gun turrets, and one 10m rangefinder on top of the after tower. The one on top of the tower bridge was a triple rangefinder with one stereoscopic set. Special attention should be paid here to the high quality of Japanese optics and at the same time to the unusual base length of the 15m rangefinders which allowed exceptional range estimation and consequently a high degree of accuracy in shooting, usually bracketing the target with early salvoes.

Type 98 low angle 'Hoiban' directors were situated in two completely enclosed towers — one on top of the main 15m rangefinder and a second on top of the 10m rangefinder. They were manned by a control officer who operated the main telescope search sight and three others: layer, trainer and cross-leveller. Level and cross-level corrections were handled by a 'match the pointer' system. The director gave train and elevation orders to the guns.

Type 98 'Sokutekiban' was a component of Japanese fire control systems unknown in Western navies. It was a section of the computer and received its information from the directors. It gave target course and target speed information to the computers.

Type 98 'Shagekiban' low angle computer was the latest Japanese fire control table and the first low angle computer with an automatic electrical-mechanical follow-up system.

Type 98 firing device consisted of two components:
1. Trigger time limiting device: limited the time of two or more guns to 0.08-0.02 seconds after the firing circuit was activated.
2. Firing time separator: reduced interference in flight; two guns could not be fired at the same instant.

Yamato's main battery and her fire control system were also adopted for use as anti-aircraft fire.

Secondary guns: 15.5cm guns equipped with 8m turret rangefinder and fire control system. This was the same type as used in the main battery system with 4.5m instead of the 15m and 10m rangefinders.

12.7cm high angle guns: These were controlled by the Type 94 'Kosha Sochi' HA fire control system.

25mm machine-gun batteries: These were controlled by the Type 95 'Shageki Sochi' short range HA director. It was a simple course and speed system which was not up to Western standards, though all triple 25mm guns had the advantage of remote control.

SENSORS

Yamato and *Musashi*, as the most modern and strategically important battleships of the Imperial Japanese Navy, were supplied with the latest radar and electronic equipment.

Type 21: The first radar was installed on *Yamato* in September 1943. It was the Type 21 'Gô Dentan Kai 3' air and surface search radar. Two Type 7 'Gata' radar antennas of 'mattress' pattern with combined transmit and receive arrays were installed on both arms of the 15m rangefinder. The Type 21 'Kai 3' radar's wave length was 1.5m, power 25-30kW and range 120km (aircraft group), 70km (single aircraft).

Type 22: Surface search radar Type 22 'Gô Dentan Kai 4' was installed on *Yamato* during the January-April 1944 refit. The radar antenna comprised two electromagnetic horns — upper for receiving, lower for transmitting. Two Type 22 radars were installed on the upper sides of the tower bridge (deck IX). The radar was not adopted for fire control. Its characteristics were wave length 10cm, power 2kW, maximum detection range 35km ±700m (battleships) 20km (cruisers) 17km (destroyers), bearing error ±5°.

Type 13: The Type 13 'Gô Dentan' air search radar was fitted on *Yamato* during the January-April 1944 refit. Two ladder-type antennas were located on both sides of the main mast. The characteristics of the radar were a separate set for transmission and receiving, wave length 2.0m, power output 10kW maximum, maximum detection 100km (aircraft group) 50km (single aircraft), range error ±2-3km, bearing error ±10°.

Sonar: *Yamato* was equipped with Type 0 sonar arrays which could detect a submarine when the ship was dead in the water or proceeding at low speed.

AIRCRAFT AND CATAPULTS

Yamato was designed to carry seven floatplanes of the F1M2 'Pete' and E13A1 'Jake' types. They were launched into the air by two 19.5m long catapults, and a 6 ton crane with 20m long arm was used to lift them out of the water. The floatplanes were stowed in a hangar and before flight were moved across the aircraft deck by a system of trucks and rails to the catapults.

TABLE 17: **FLOATPLANE CHARACTERISTICS**

	F1M2 'Pete' two-seat general-purpose floatplane	E13A1 'Jake' long-range reconnaissance twin floatplane
Power plant	875hp	1080hp
Span	11.0m	14.50m
Length	9.5m	11.30m
Height	4.0m	7.4m
Speed (max)	370km/h	375km/h
Cruising speed	193km/h	195km/h
Range max/norm	740km/442km	2080km/1300km
Weight (max)	2856kg	4000kg
Ceiling	9440m	8730m
Armament	3 × 7.7mm MG + bombs	1 × 7.7mm MG + bombs
Wing area	29.54m^2	36.0m^2

BOATS

Yamato was designed to carry sixteen boats but usually carried fourteen. All boats were kept in hangars because of the terrific blast from the main battery. They were lowered and raised by an overhead travelling crane (side hangars) or by a 6 ton aircraft crane (boat hangars on the stern deck). The boats consisted of two 17m with 150hp drive, one 15m with 150hp drive, one 11m with 60hp drive, four 12m with 30hp drive, one 8m with 10hp drive, four 9m unpowered and one 6m unpowered.

SEARCHLIGHTS

On completion *Yamato* carried eight 150cm director controlled searchlights for night fighting. Their number was reduced to six in 1944 and to four in 1945; AA control positions were installed in their place. She also carried four 60cm and two 40cm signalling searchlights.

INTERIOR COMMUNICATIONS

These were based on three principal methods: voice tube (146 installed), telephone (491) and pneumatic air chute (14).

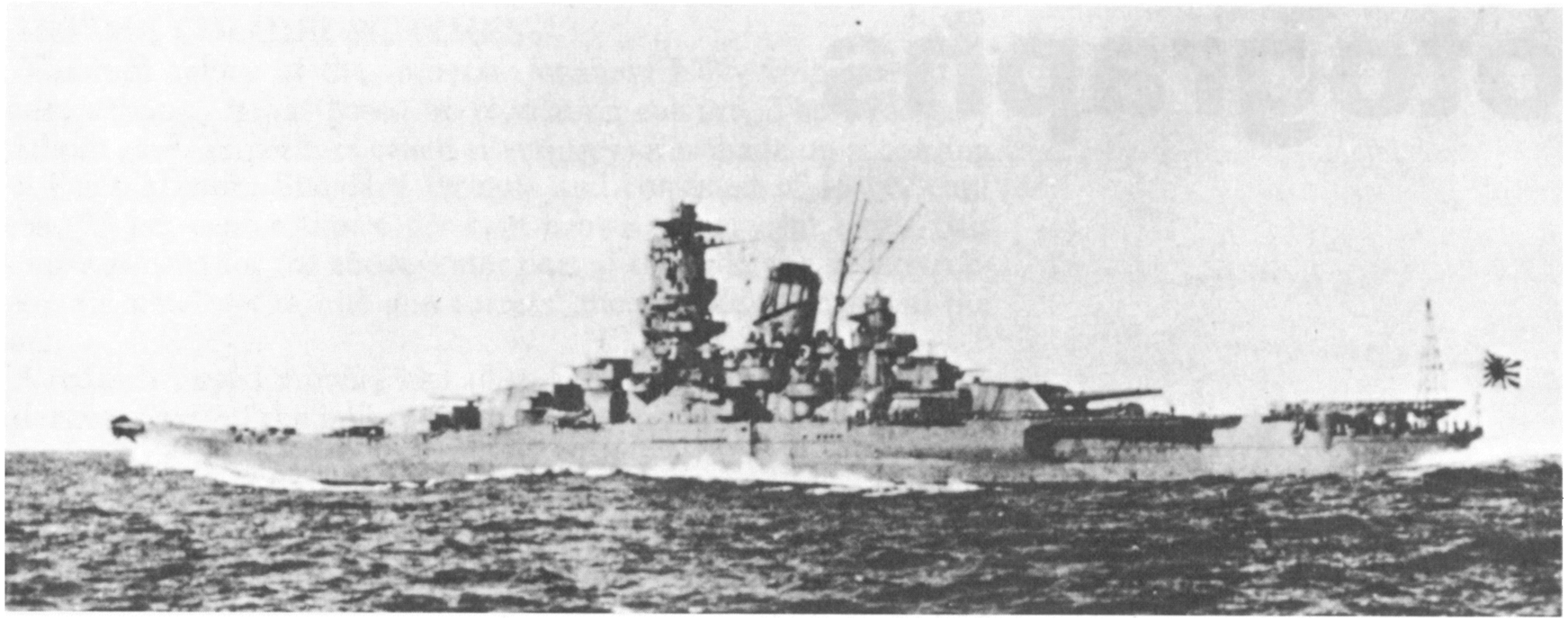
COMPLEMENT

Yamato's crew, excluding the flag personnel, at December 1941 was 2300 (150 officers and 2150 men). The complement at 7 April 1945 was 2767 officers and men.

WARTIME COLOUR SCHEMES

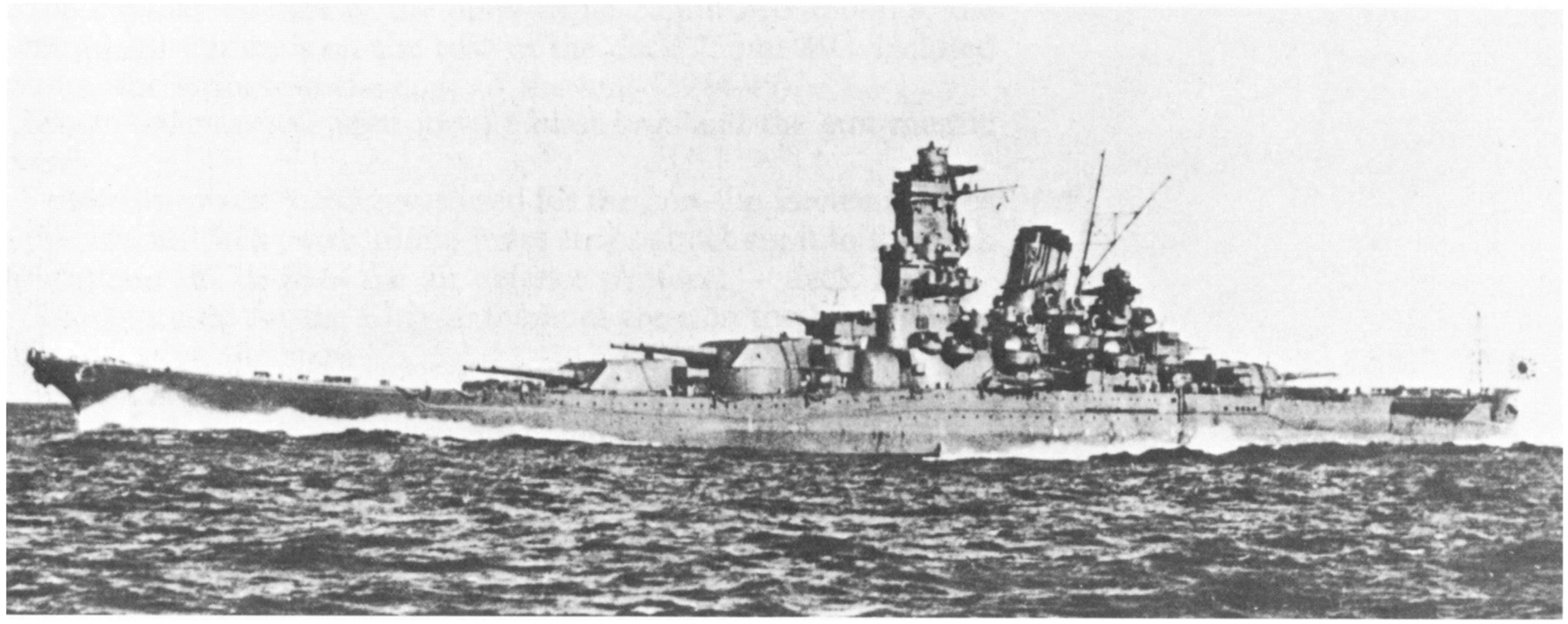
1. The hull colour of the Imperial Japanese Navy ships varied in shade, although it was based on regulation colours. The basic grey (medium grey, sometimes called silver-grey) was made up according to a Paint Mixture Standard formula and consisted of 15 per cent black, 75 per cent white, 6 per cent brown, 4 per cent blue. This colour was used for the above-water part of the hull, the superstructures, all metal decks, the gun turrets, the topside fittings and the boats.
2. A reddish-tinged brown ('aka aji ga katta chairo') was used on the underwater part of the hull consisting of 20 per cent red, 65 per cent brown, 10 per cent black, 5 per cent white.
3. The concrete surfaces of the aircraft deck were similar to the basic grey — some darker.
4. White was used for the azimuth scales of the AA rangefinders, the Chrysanthemum on both sides of the funnel (April 1945), the stripes on the circular railings of the open triple 25mm MG mounts, the 200mm high numbers on the base of the deck 25mm MG enclosed mounts, the stripes on the edge of the hull (1944-45).
5. Brown (canvas) was used for the blast bags and the gun muzzle covers.
6. Yellowish-brown (ochre) was used for the non-slip linoleum strips on the aircraft deck (with 10mm brass strips attaching it to the deck surface) and the deck of the air defence platform — deck XI.
7. Gold was used for the Chrysanthemum crest on the bow and the ship's name on the stern.
8. Black was used for the upper part of the funnel and mast.
9. The wooden deck was unpainted 'hinoki' cypress wood with a grey tint.
10. Aircraft: upper surface sea green N-1, lower surface gull grey N-2, orange stripes on wing's leading edge (middle parts), white-red-white stripes on floats. White on stripes on tailplanes and number codes on fins. Hinomaru was a red colour with white borders.

The Photographs



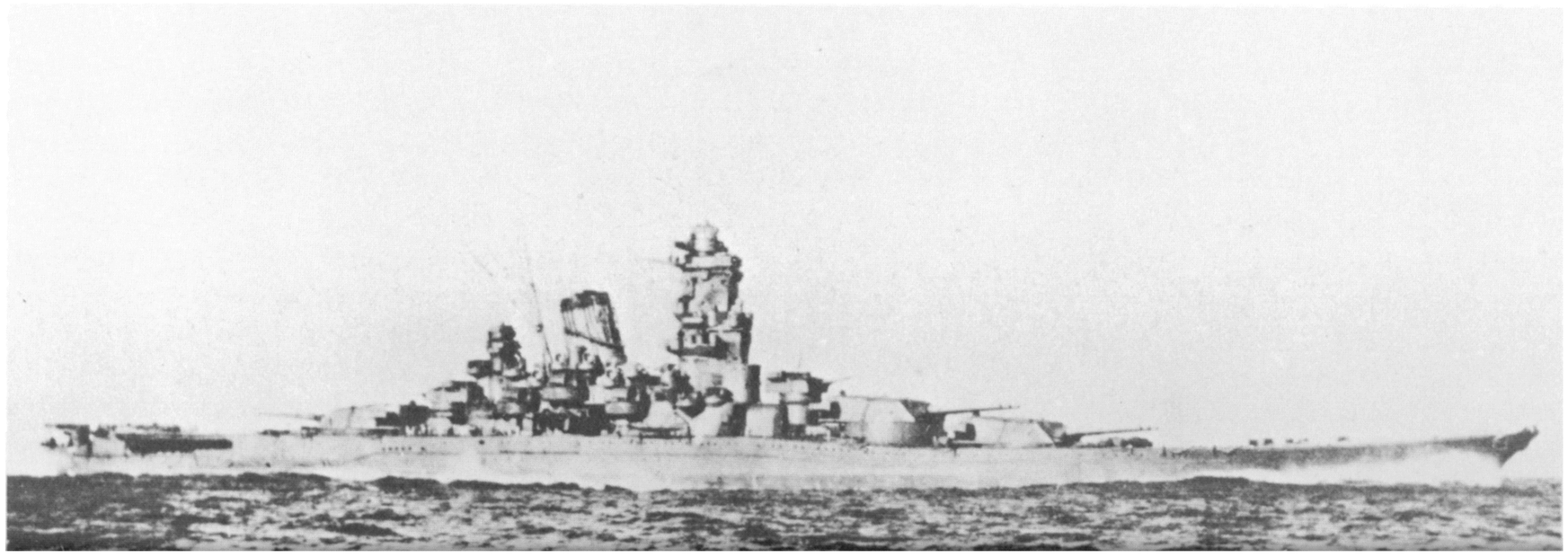
2. Quarter view of *Yamato* running builder's trials, 30 October 1941. The boat stowage hangar, catapult and lattice antenna on the crane platform are clearly visible.

Maru Special



3. Bow view of the ship on trials, 20 October 1941. This photo was found by chance three years after the end of the war, and was the first portrait of the ship published — up until then the only known photos were US aerial pictures taken during attacks on the ship.

Maru Special

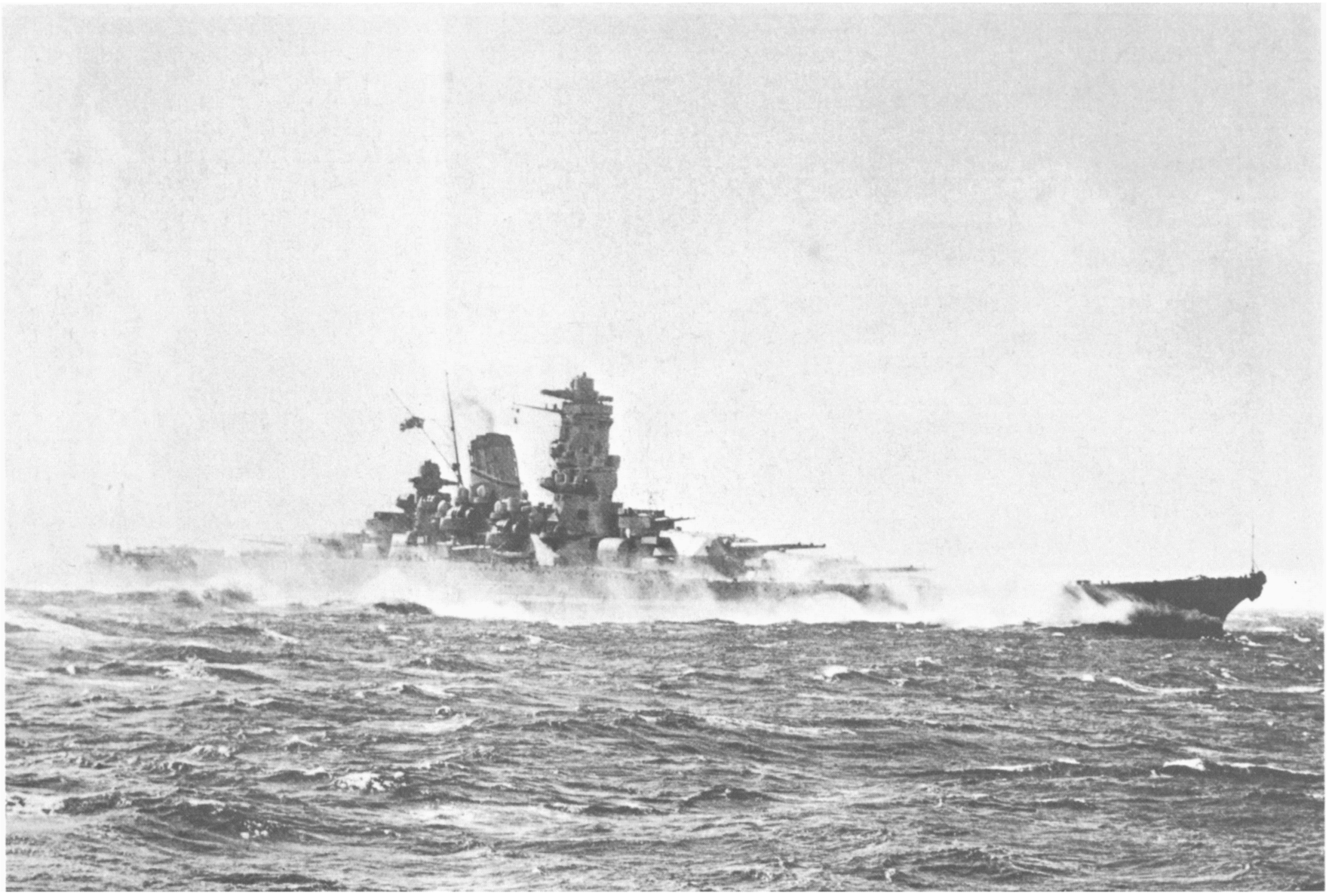


4. Broadside trials view, October 1941.

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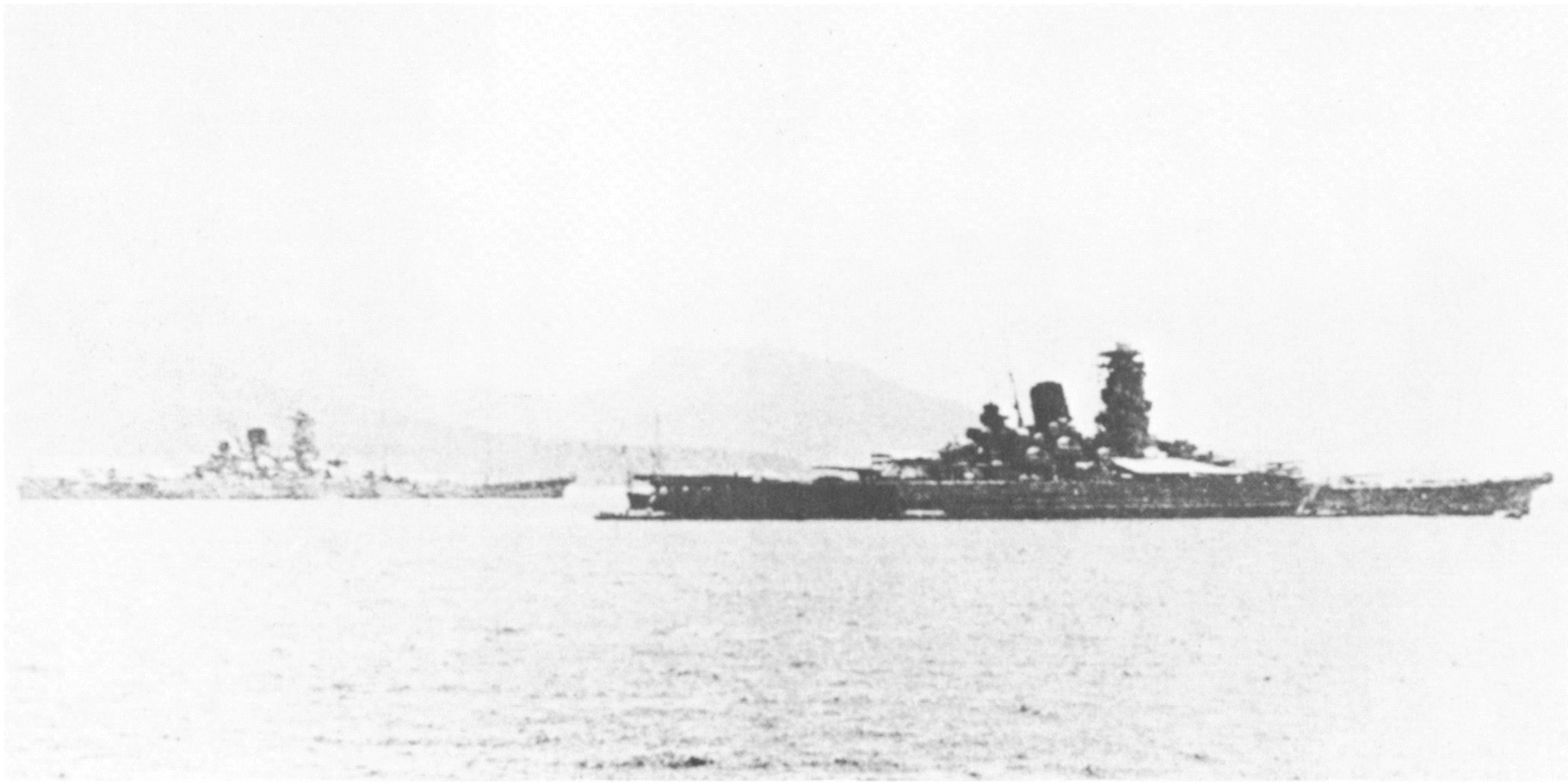
5. *Yamato* during her full power trial, 20 October 1941, outside Sakumo Bay. The ship reached 27.46 knots and developed 153,550hp.

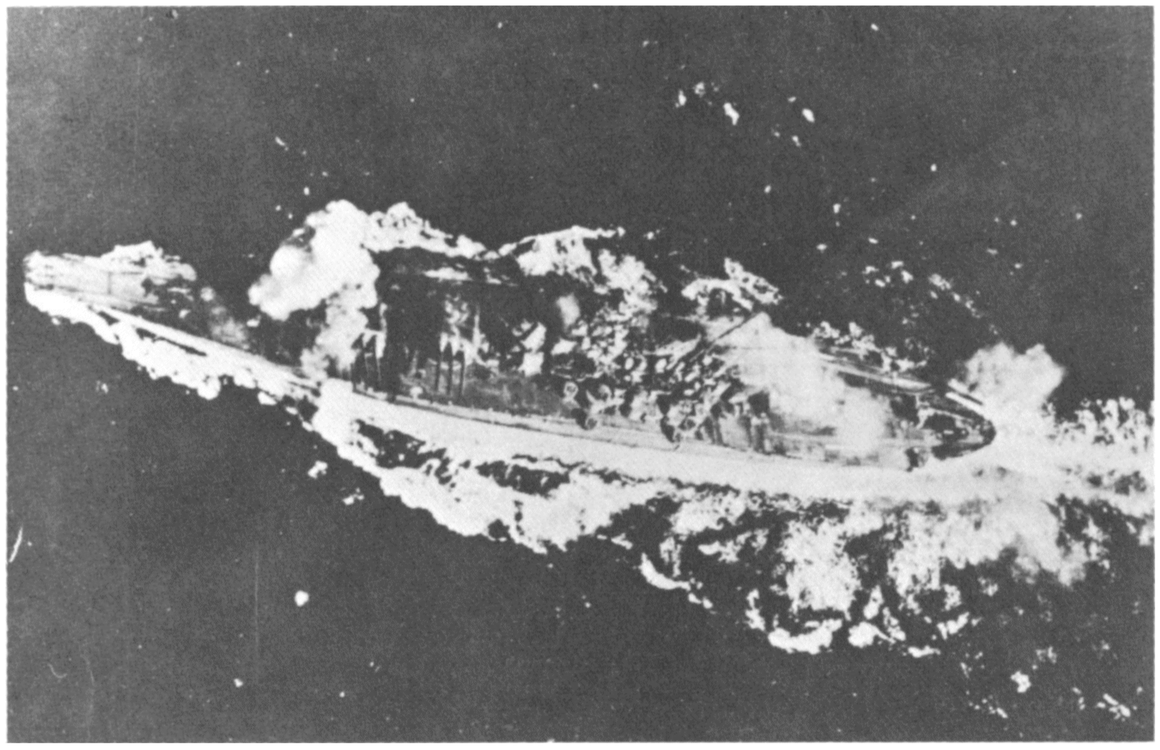
CPL

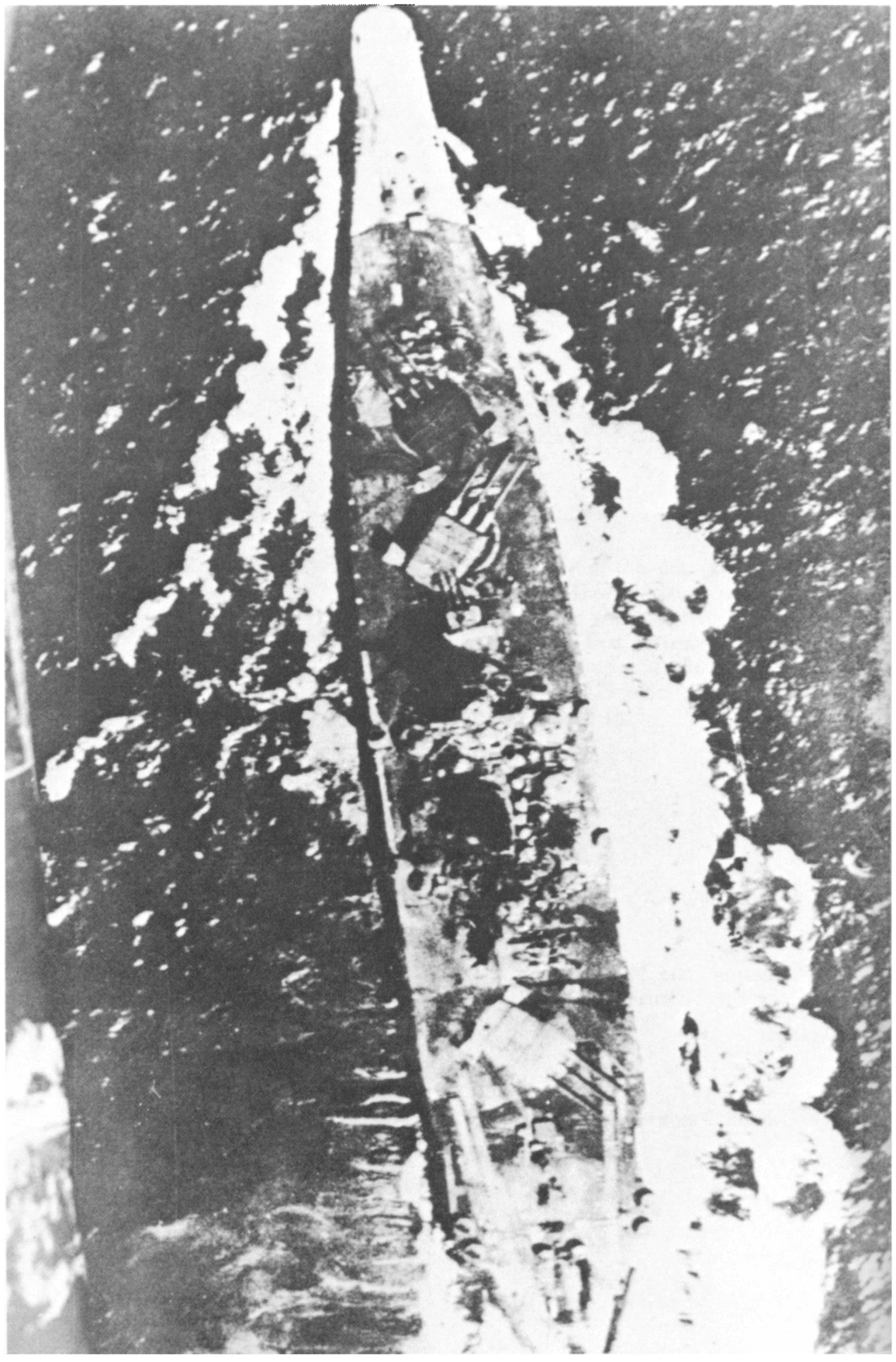


6. *Musashi* (nearest) and *Yamato* at the Truk anchorage in February 1943.

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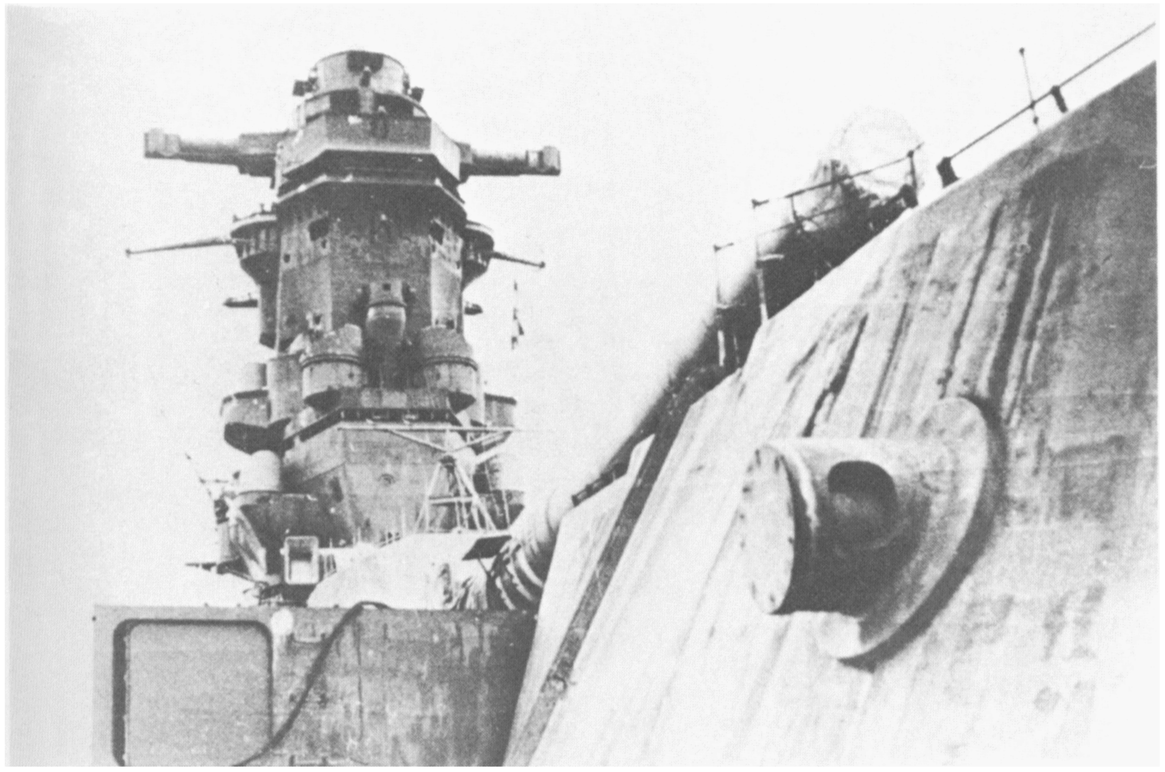






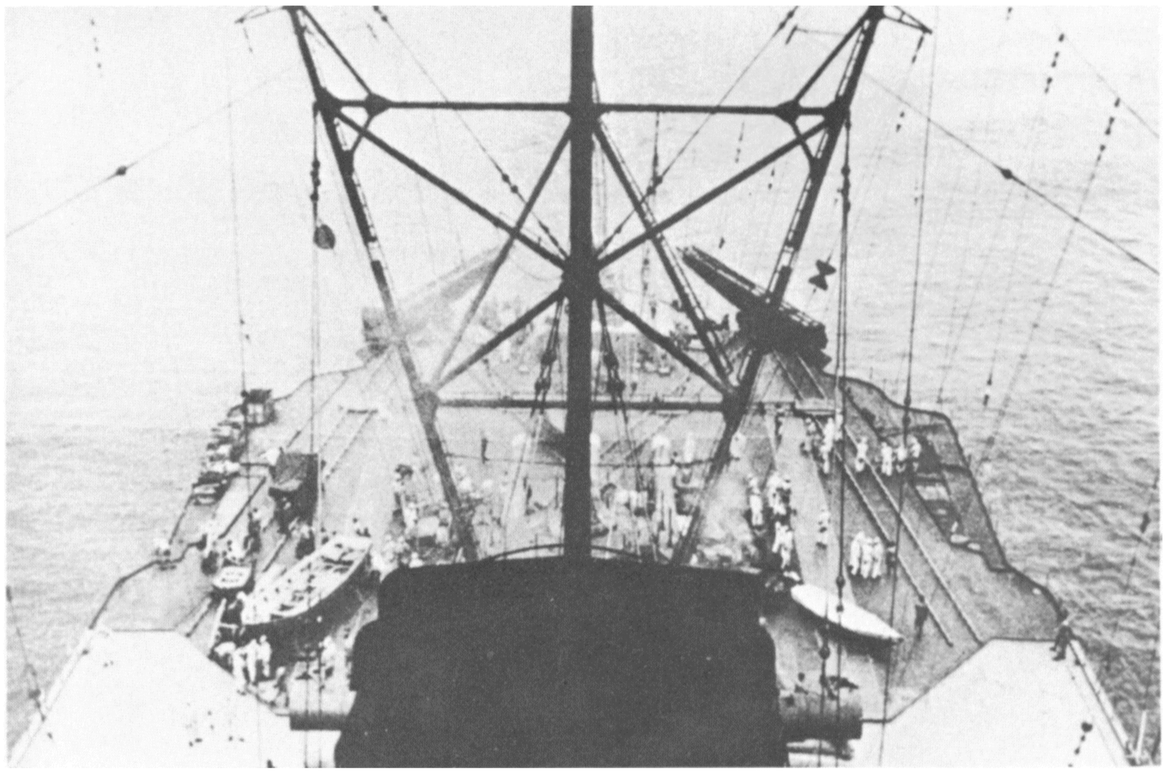
7,8. Two views of *Yamato* in the Sibuyan Sea taken on 24-25 October 1944 by attacking US aircraft. *Yamato* survived this attack but her sister *Musashi* was sunk after sustaining hits from twenty torpedoes and seventeen bombs. The first photo was taken at the moment of the bomb hit near No 1 46cm turret.

USN



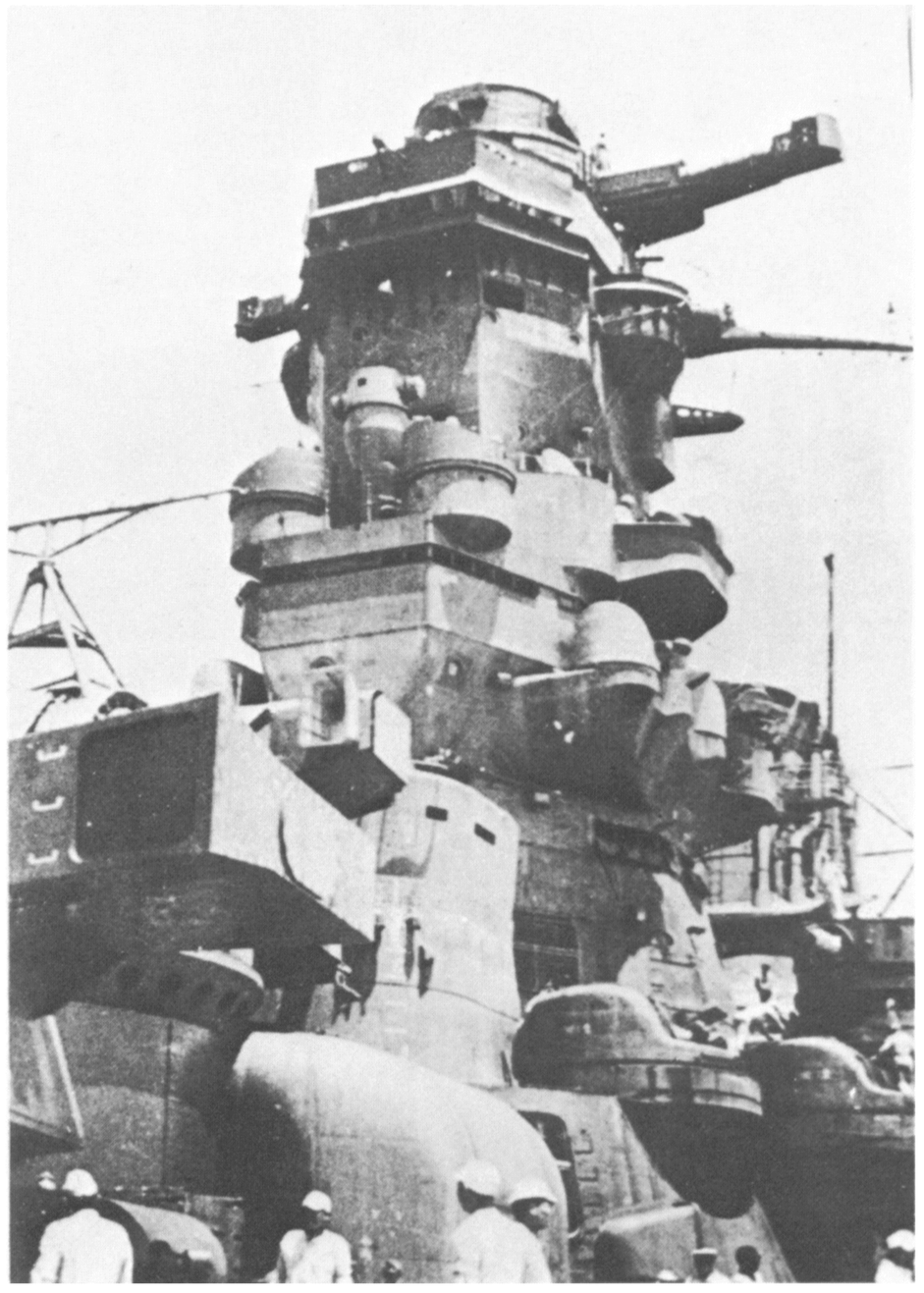
9. The tower bridge structure of *Musashi*. Note details of No 1 turret (including periscope) and 15m rangefinder in the foreground. The rangefinder is closed with a sliding steel screen.

Maru Special



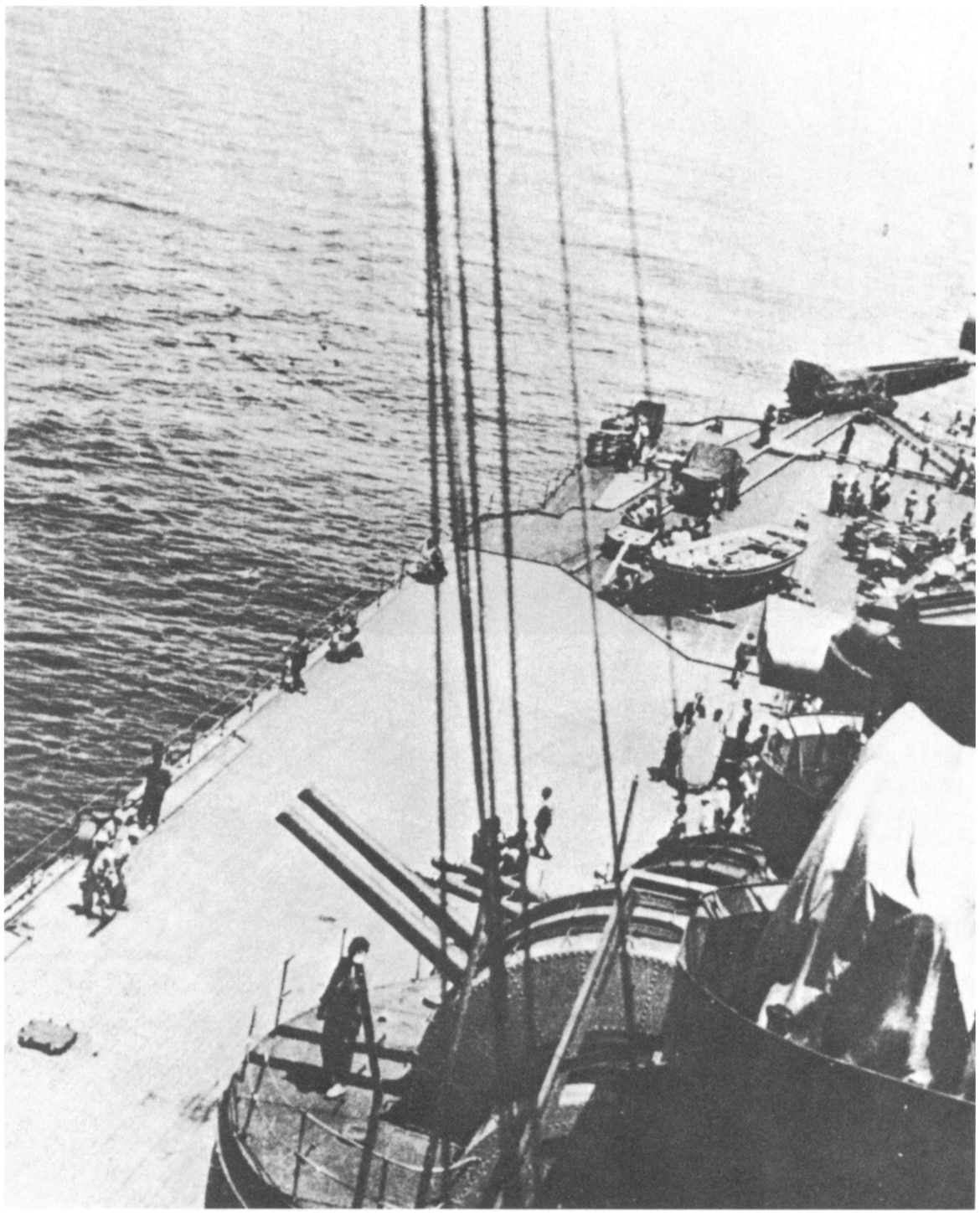
10. *Musashi* — view aft from bridge, showing the aircraft handling arrangements through the arms of the main mast. A 12m and a 6m boat are on deck temporarily.

Maru Special



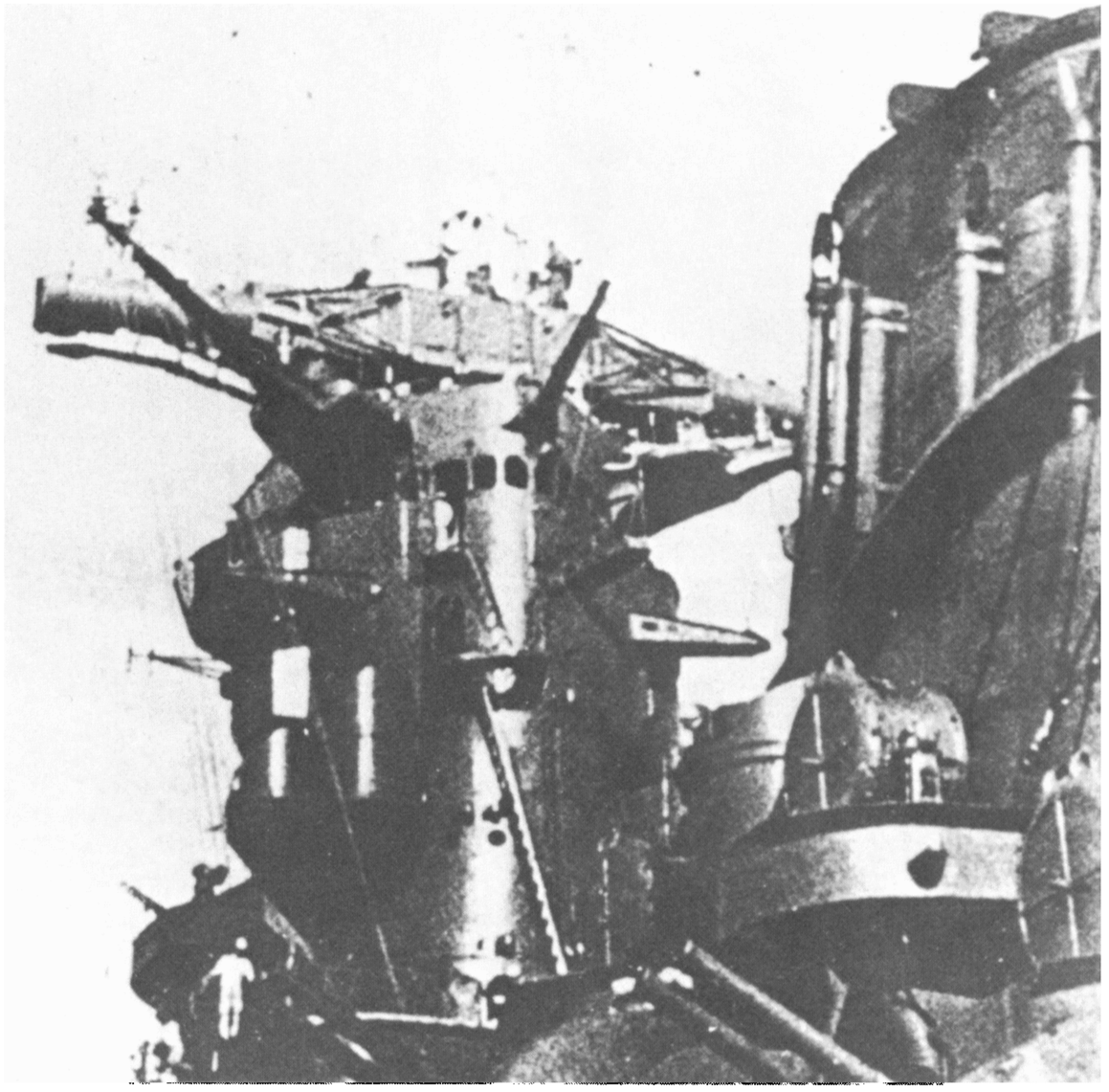
11. Bridge details, *Musashi*. Only the small openings around the combat bridge (deck X) were originally fitted on *Yamato*, but following her refit she looked exactly as in this photo.

Maru Special



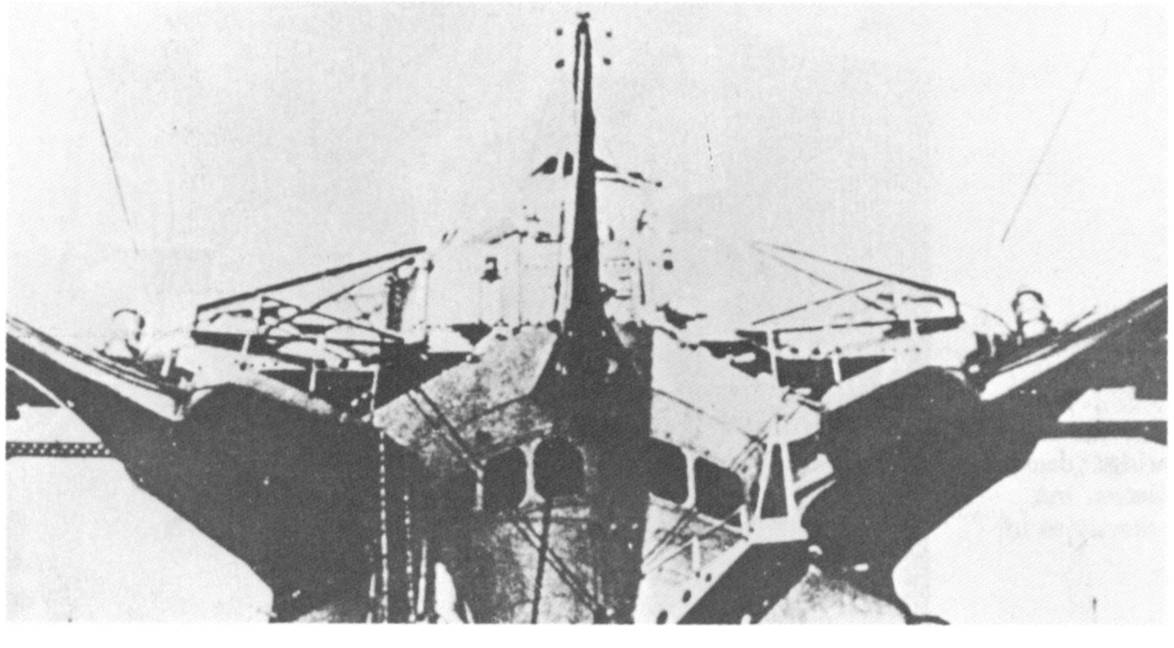
12. The division between the wooden deck and the steel aircraft deck is clearly visible in this view of *Musashi*. On *Yamato* the linoleum covering ran parallel to the rails, not to the centre line as on *Musashi*. Note the twin 12.7cm gun mount in the foreground, and the canvas-covered 150cm searchlight.

Maru Special



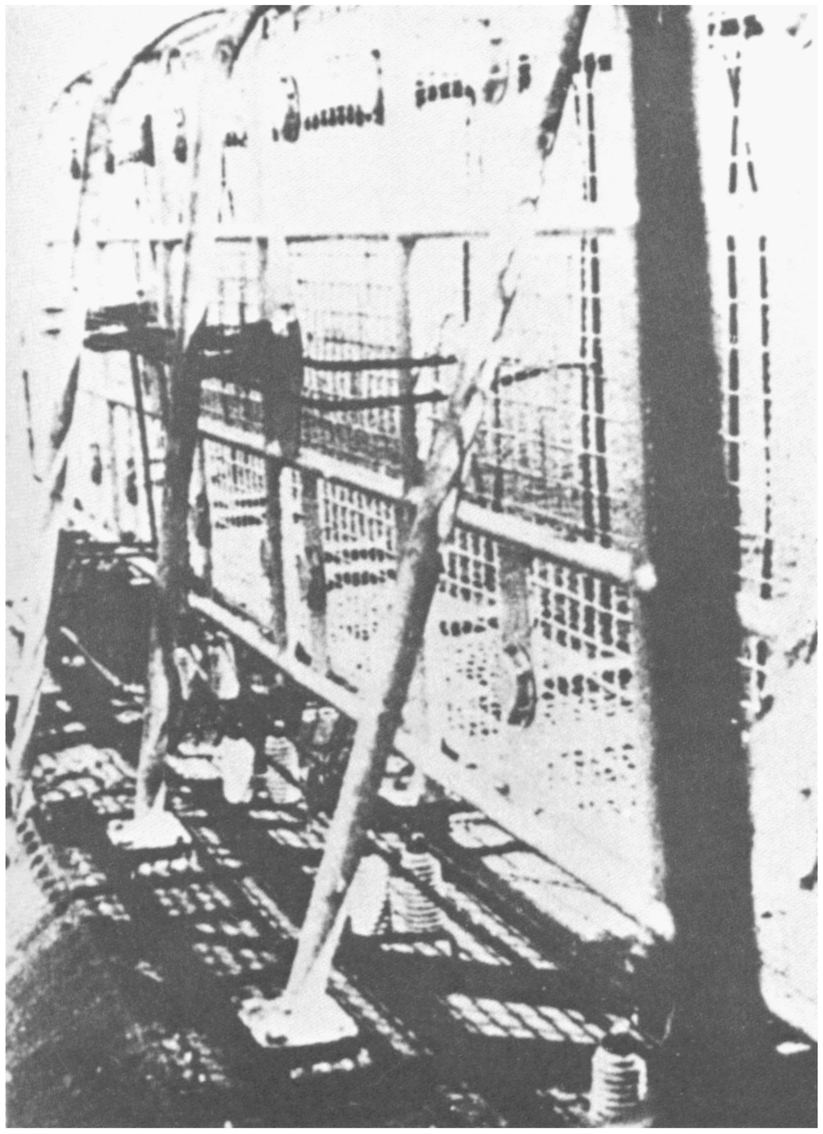
13. A rear view of *Musashi*'s tower bridge September of October 1943, with the funnel and searchlight platform in the foreground. Type 21 radar has been added to the arms of the rangefinder. *Yamato* did not leave the bridge ladders or the small UHF antenna platforms on the upper part of the tower.

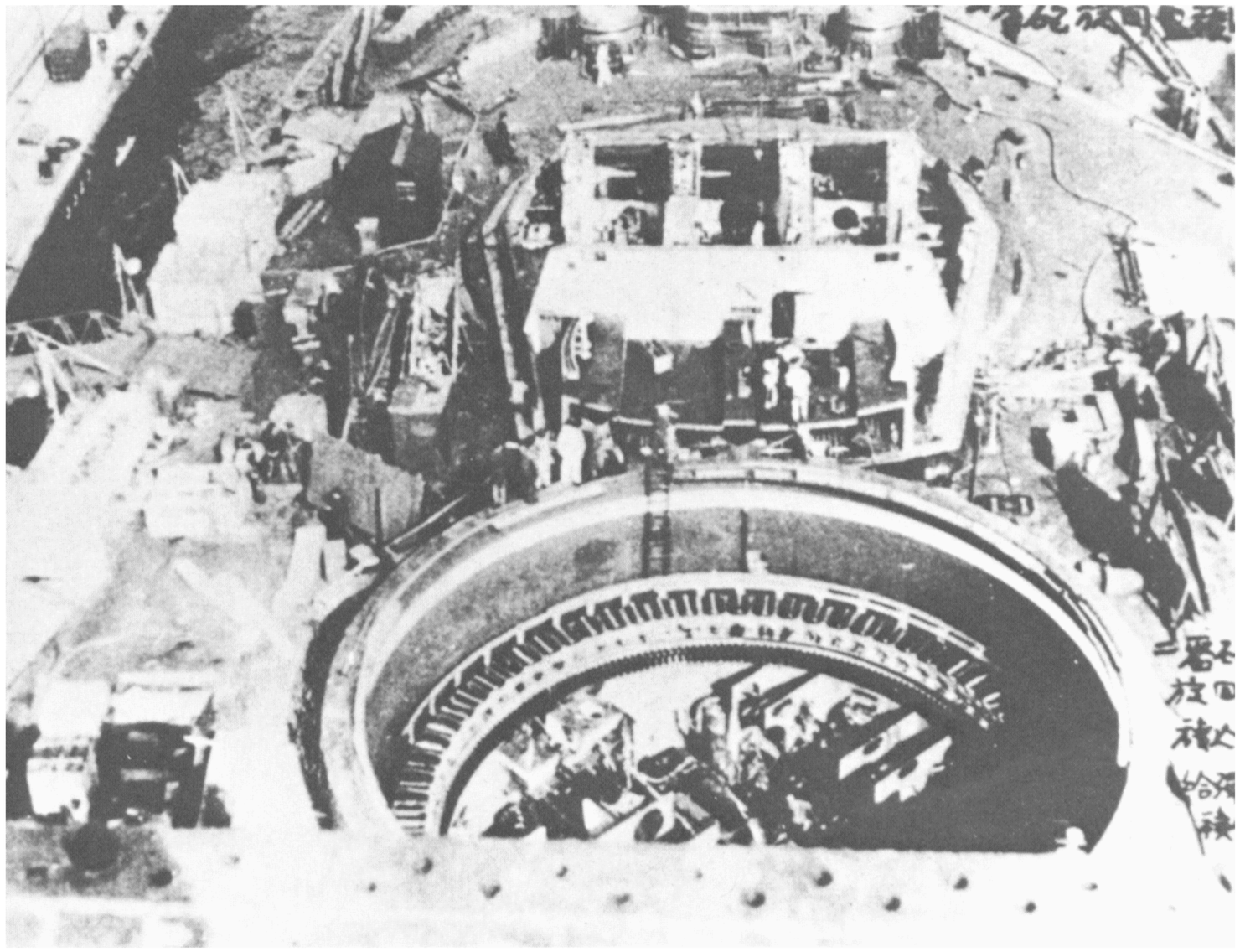
Maru Special



14. Close-up of the top of *Musashi*'s tower bridge and main rangefinder from aft. The lattice structure on the rear of the rangefinder may have been strengthening to carry the weight of the radar aerials.

Maru Special





15. Above: Details from aft of the port-side Type 7 'Gata' antenna of the Type 21 'Gô Dentan Kai 3' air and surface search radar mounted on *Musashi*'s main rangefinder arms.

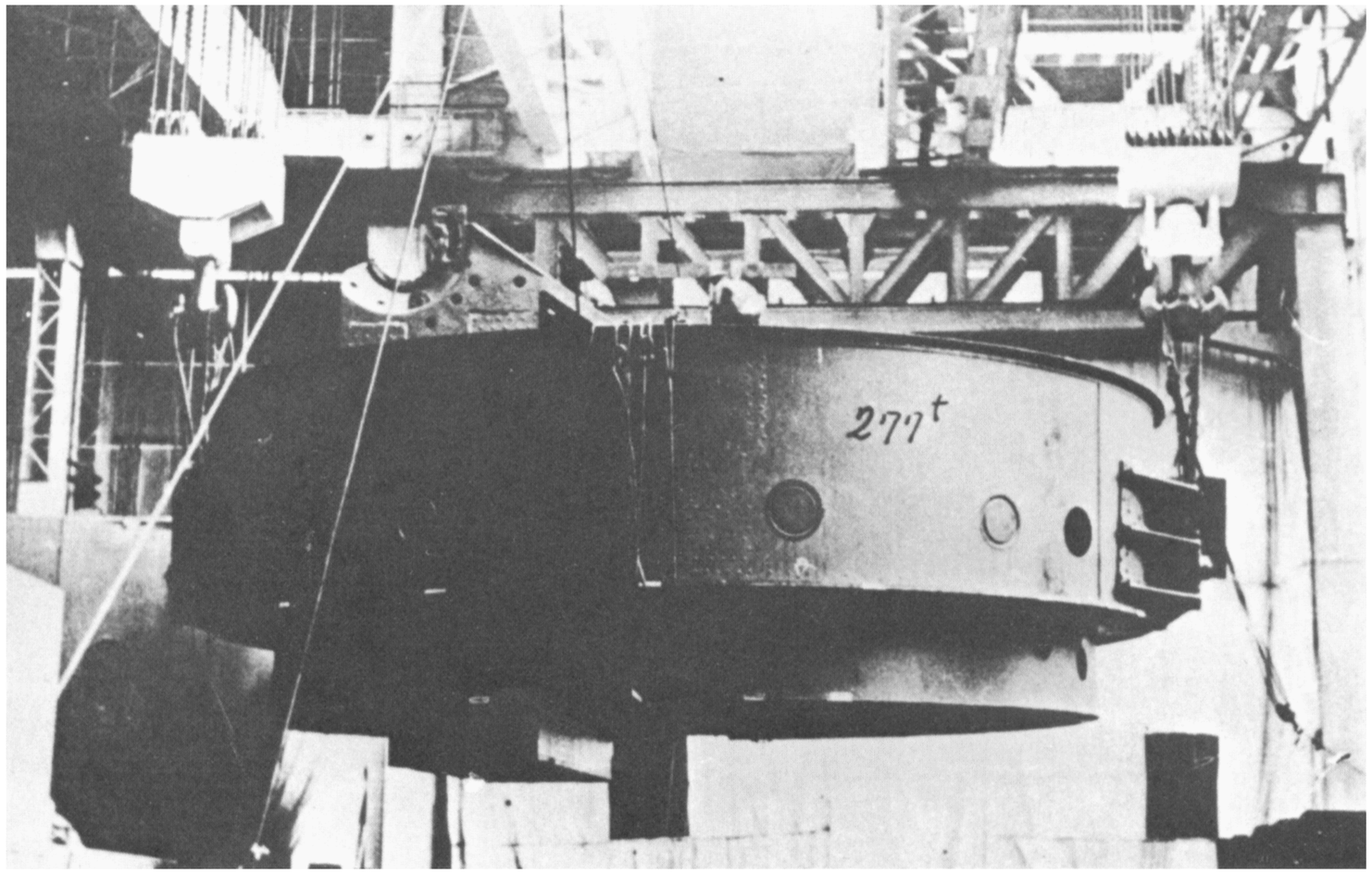
Maru Special

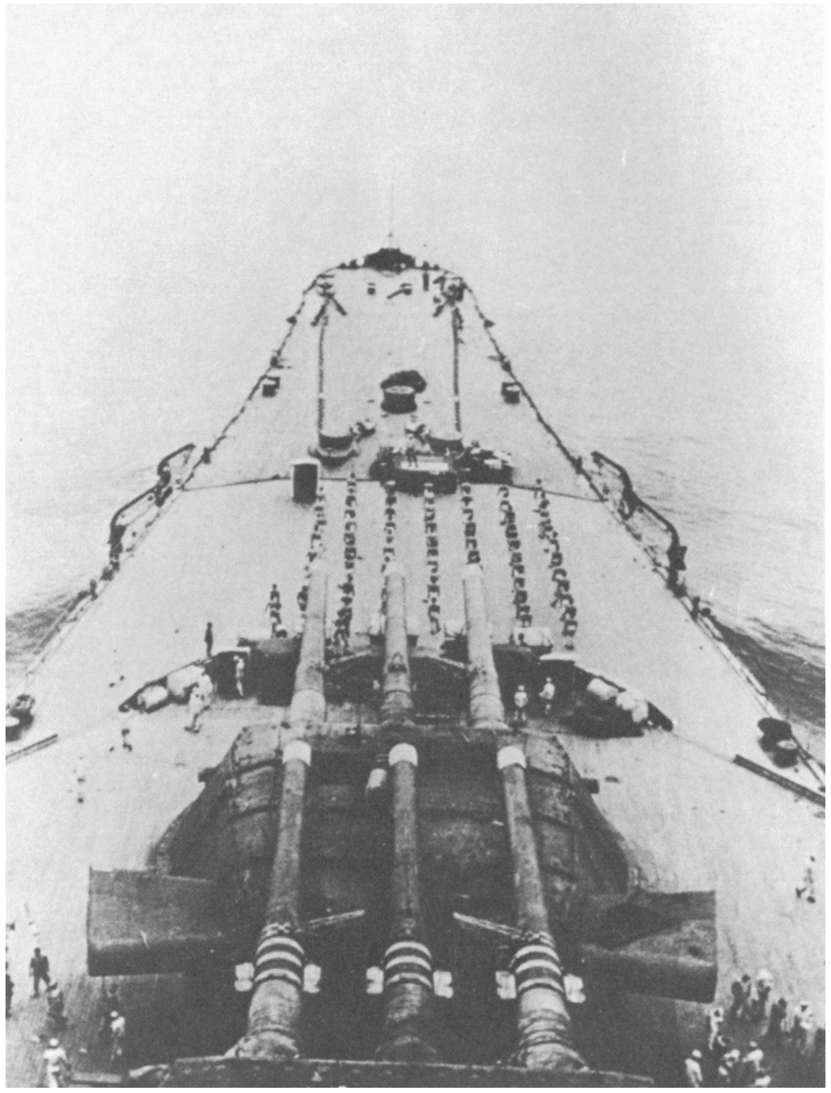
16. Top right: The forecastle of *Yamato* during construction (about June 1941). No 1 main armament gunhouse is nearing completion, but the barbette for No 2 is still empty.

Maru Special

17. Lower right: Part of the revolving structure for one of *Yamato*'s 46cm mountings during assembly. Minus machinery this section weighed 350 tonnes.

Maru Special





18. Some idea of the scale of these ships can be gauged from the size of the men in this view of *Musashi*'s forecastle, taken during trials June-July 1942.

Maru Special

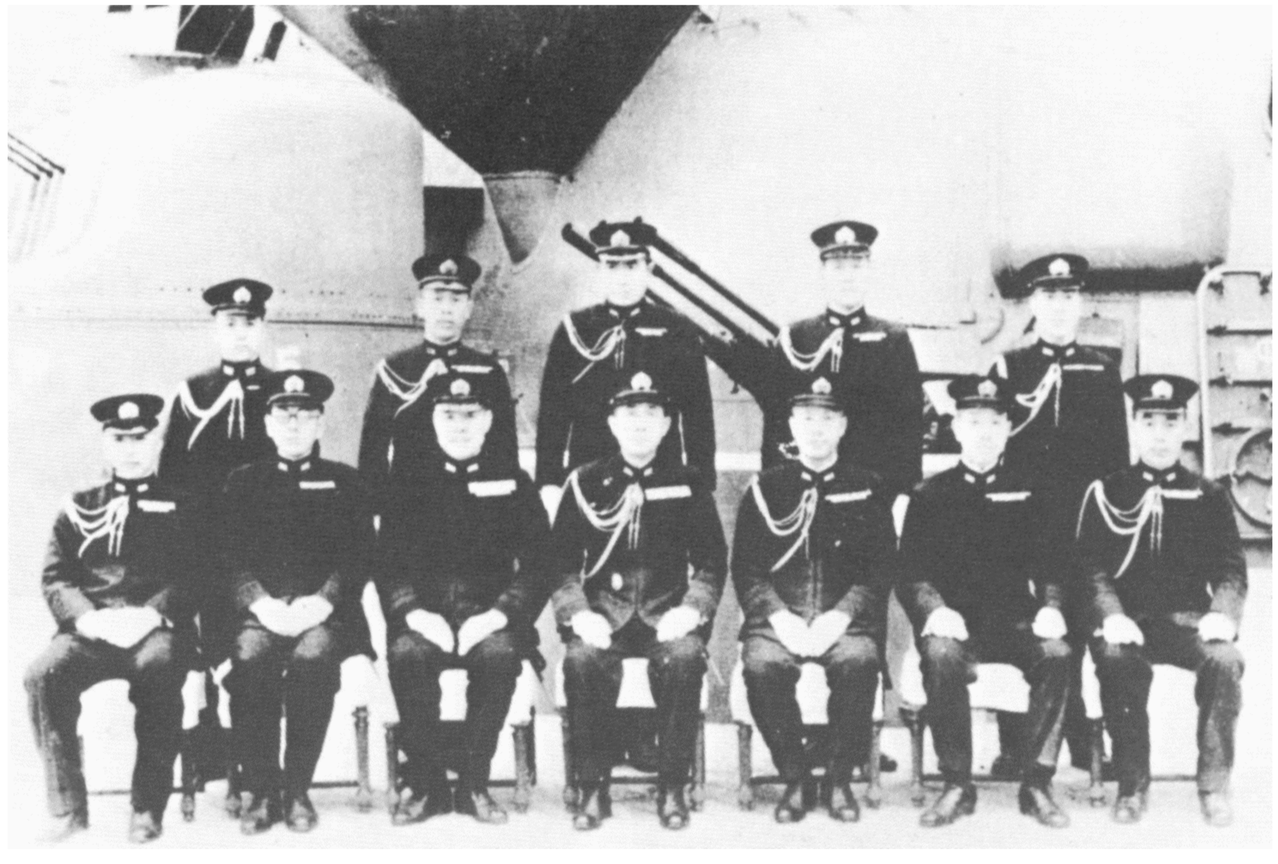


19. Admiral Yamamoto (front row, sixth from left) and his staff aboard the *Yamato* early in 1942. The photo is taken at the after end of the superstructure on the port side; the rear of the 15.5cm turret is visible in the left background.

Author

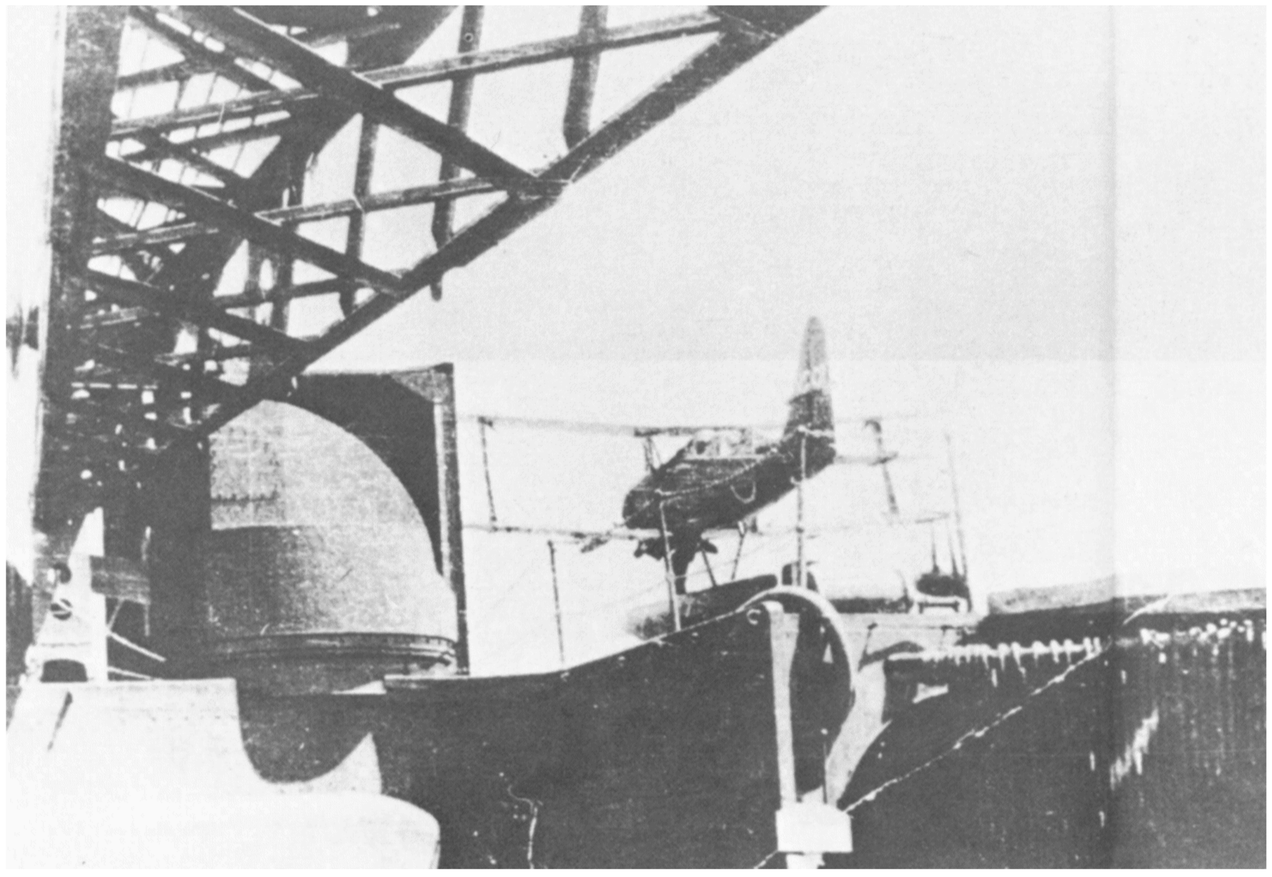
20. *Yamato*'s officers, 5 April 1945, two days before the ship was sunk. Seated centre is Rear Admiral Kosaku Ariga.

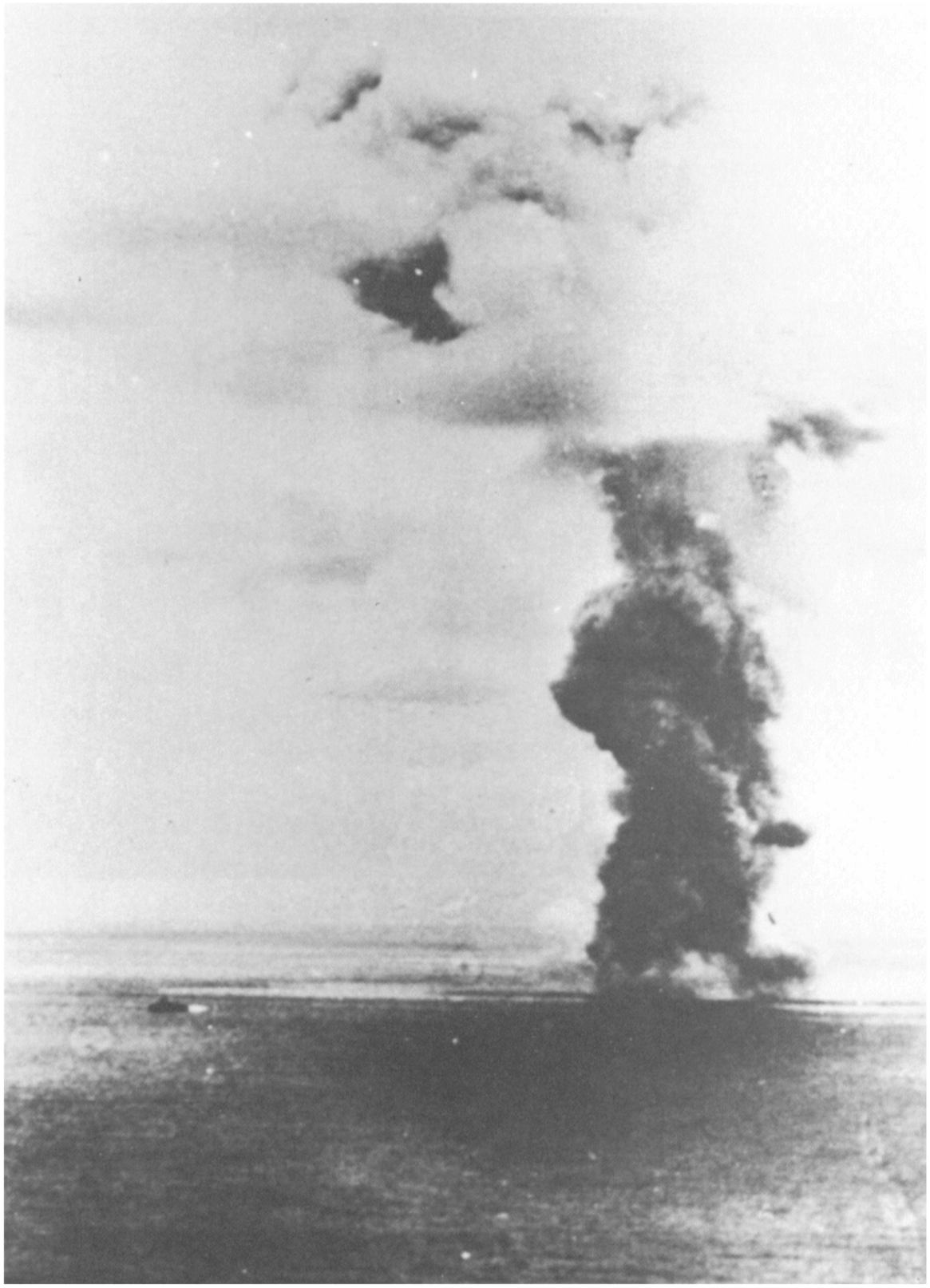
Rengo Kantai



21. A Mitsubishi F1M2 floatplane aboard *Musashi* seen from under the aircraft crane, January 1944. The new type MG control position can be seen to the left (note that the blast screens on *Yamato* had rounded, not square corners) and in the right foreground the sisal rope curtain that closed off the boat stowage.

Maru Special





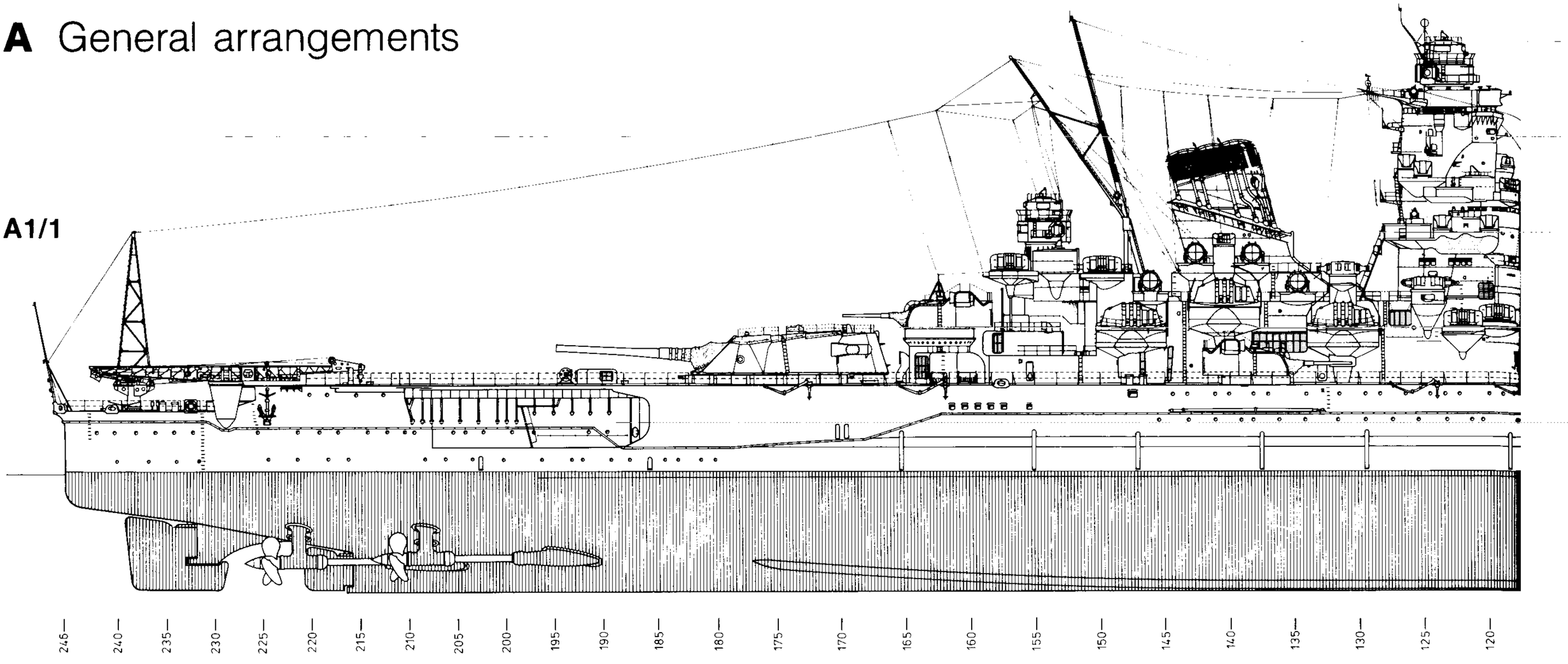
22. A pall of smoke rises high above the wreck of the *Yamato* just seconds after the explosion which blew apart the sinking hull.

US Defense Audio-Visual Agency

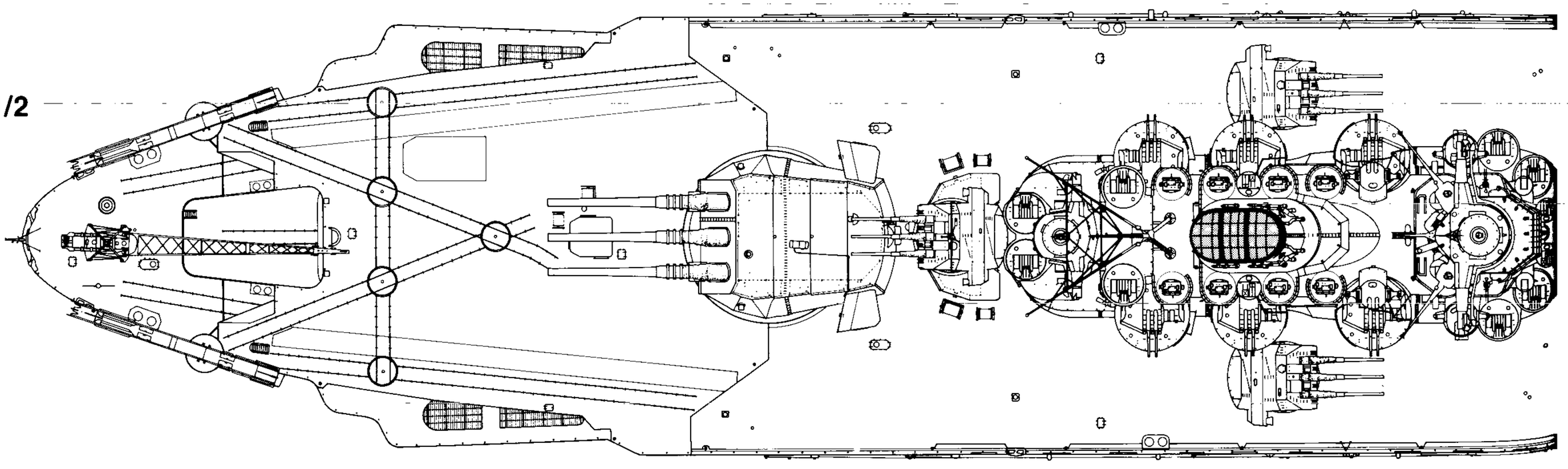
The Drawings

A General arrangements

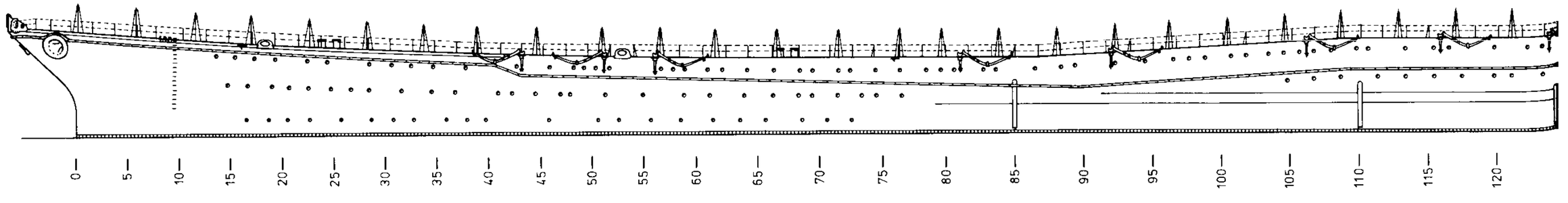
A1/1



A1/2

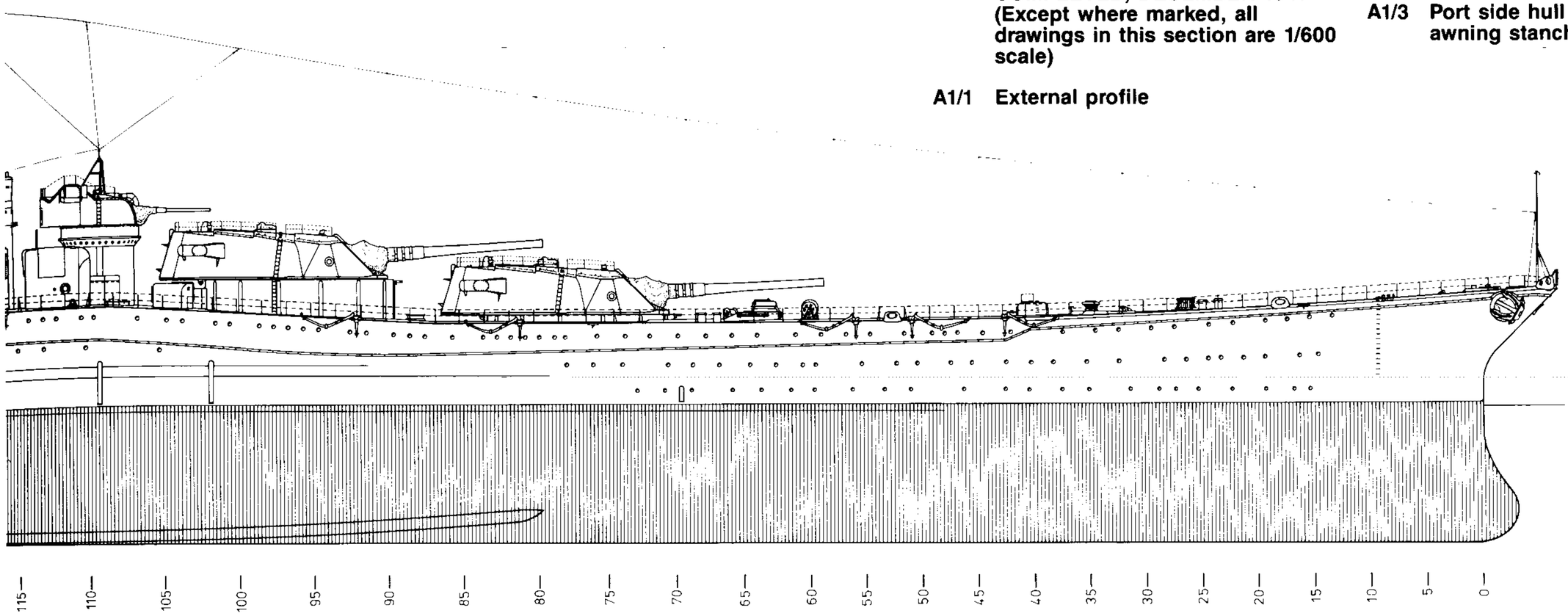


A1/3

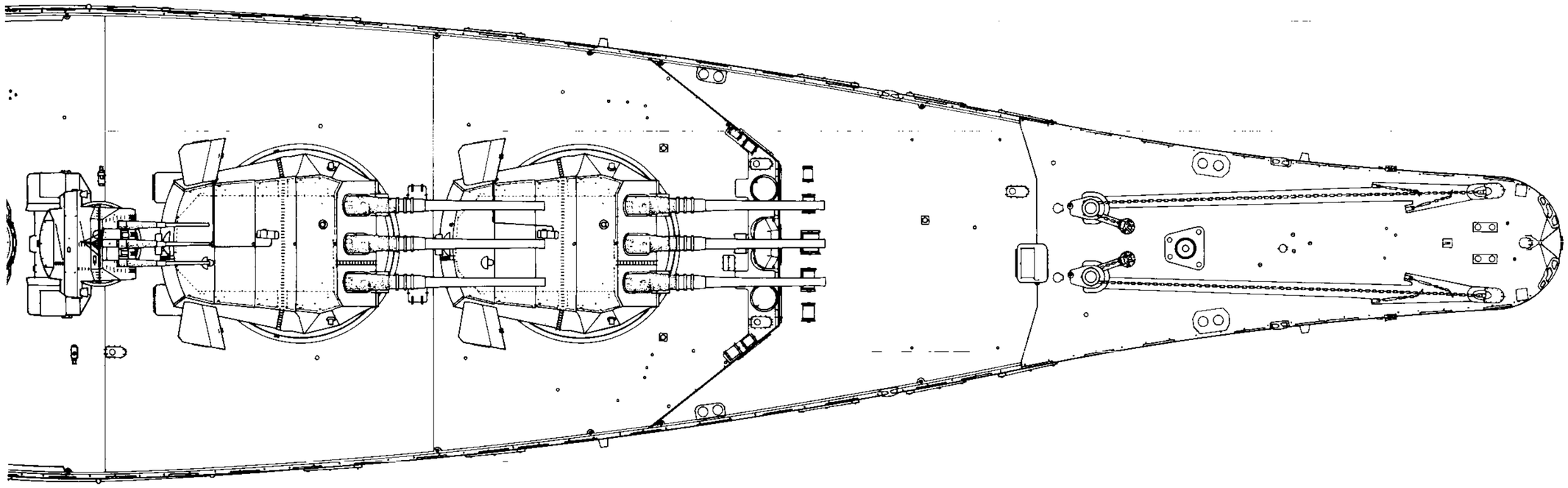


A1 THE BATTLESHIP YAMATO AS COMPLETED, DECEMBER 1941 (Except where marked, all drawings in this section are 1/600 scale)

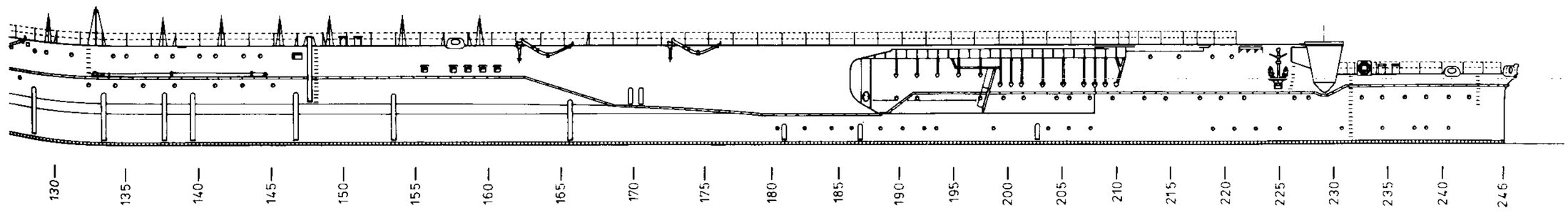
A1/1 External profile



A1/2 Plan



A1/3 Port side hull view with rails and awning stanchions



A General arrangements

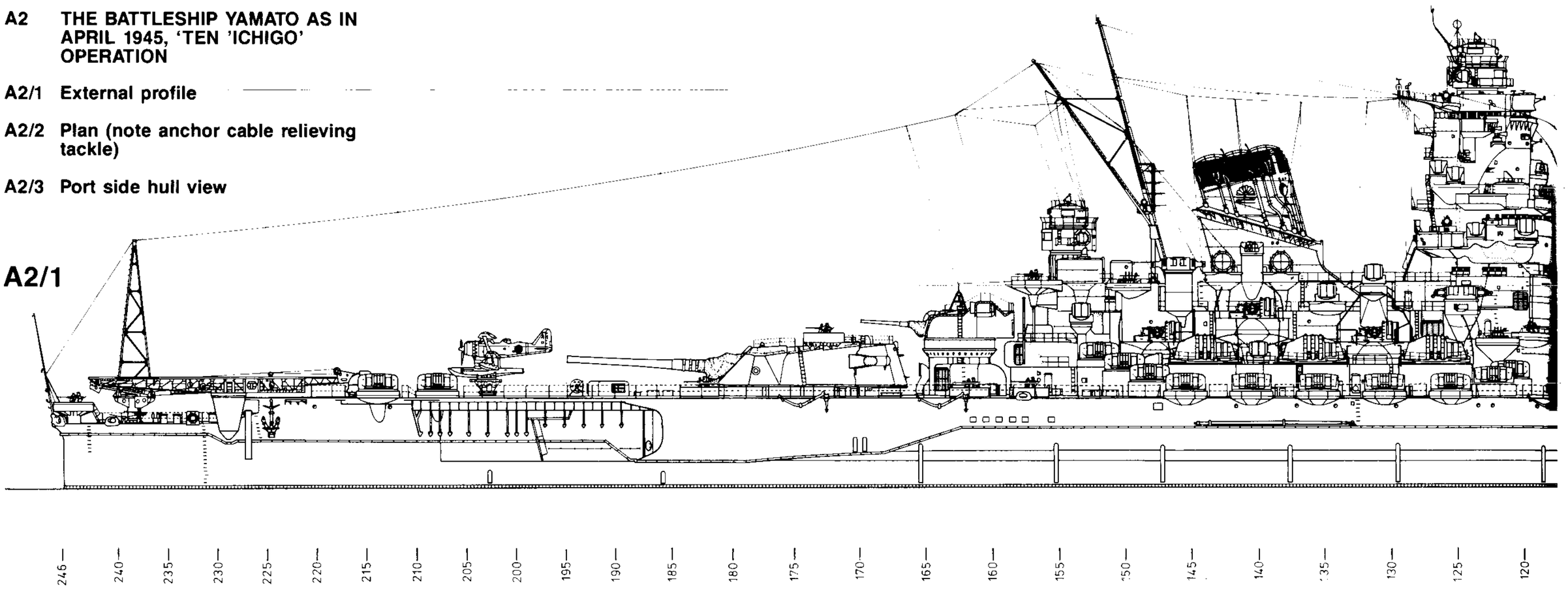
A2 THE BATTLESHIP YAMATO AS IN APRIL 1945, 'TEN 'ICHIGO' OPERATION

A2/1 External profile

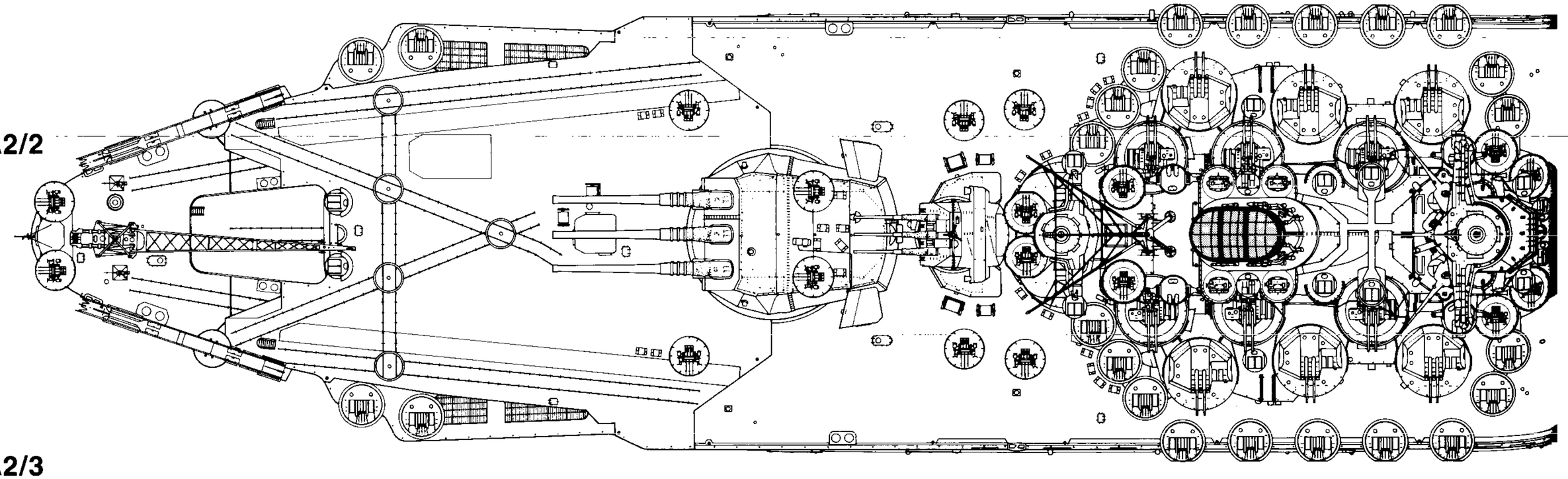
A2/2 Plan (note anchor cable relieving tackle)

A2/3 Port side hull view

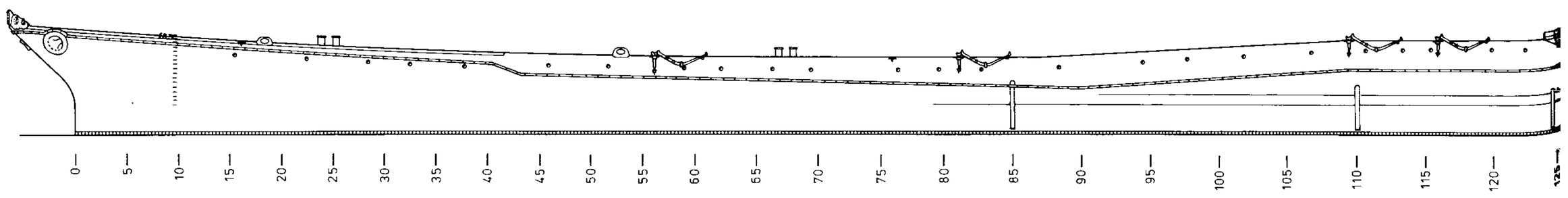
A2/1

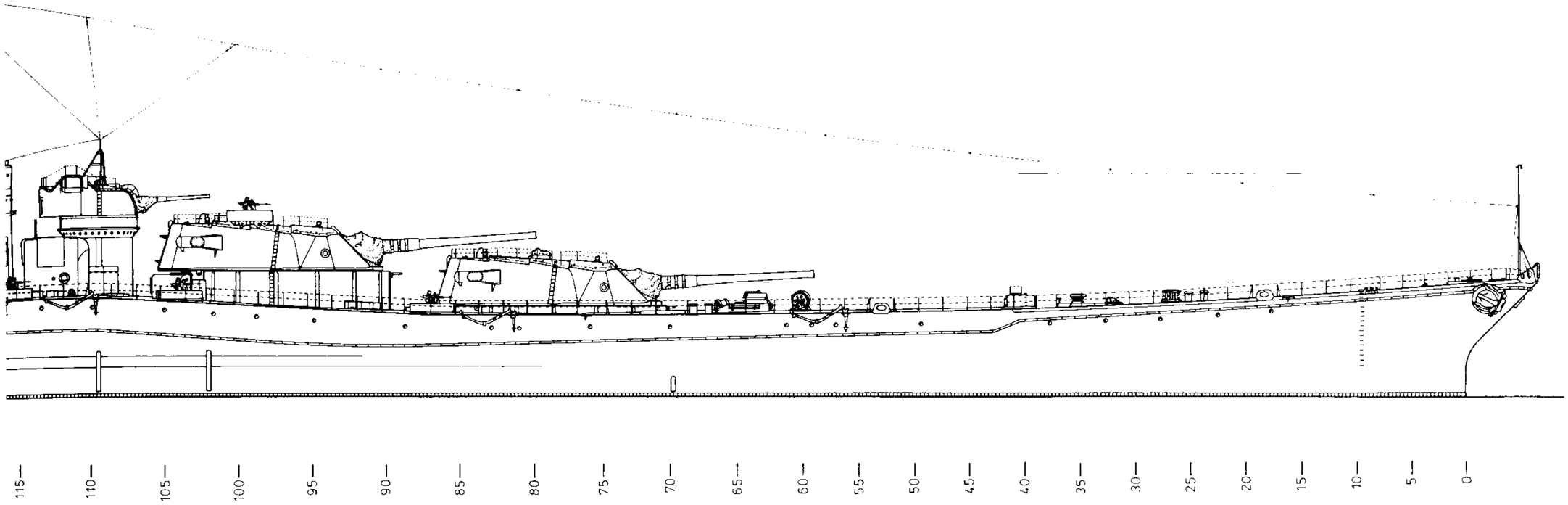


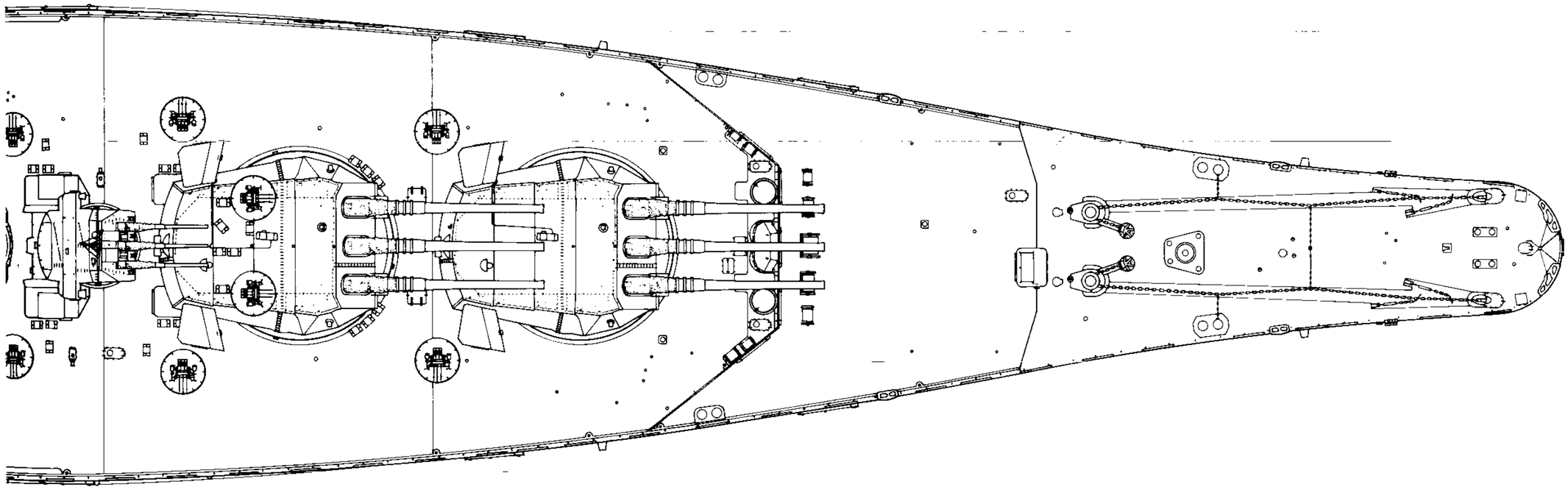
A2/2

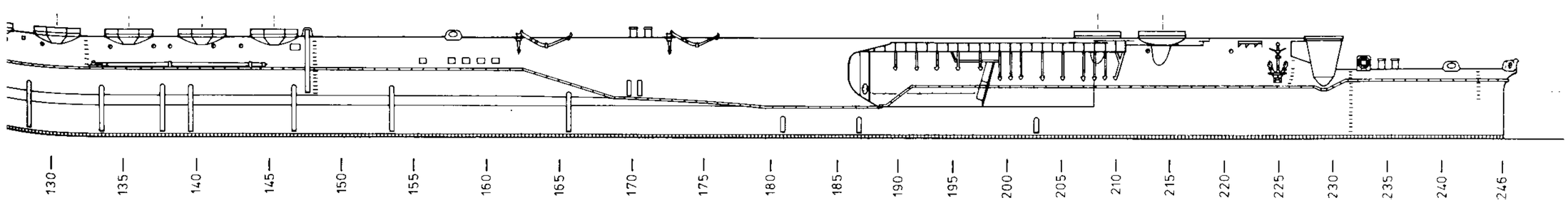


A2/3




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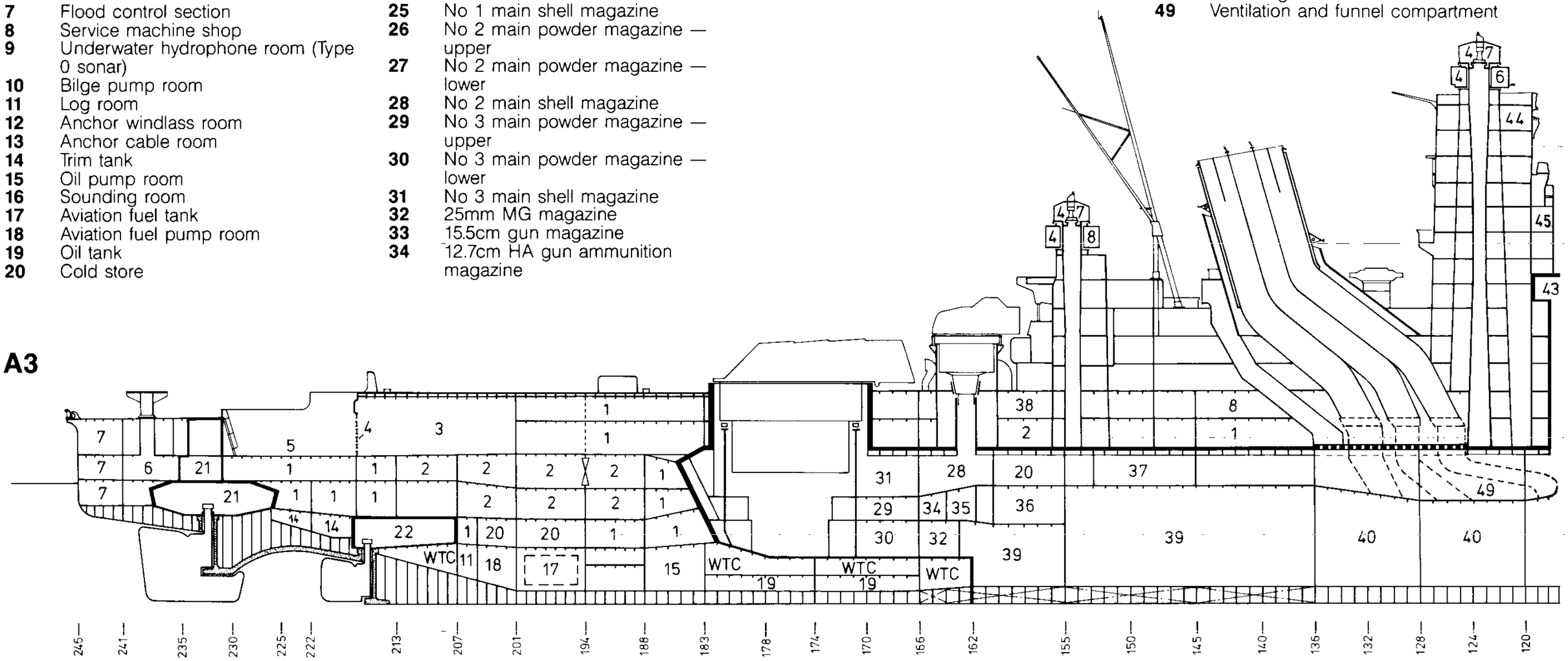

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A General arrangements

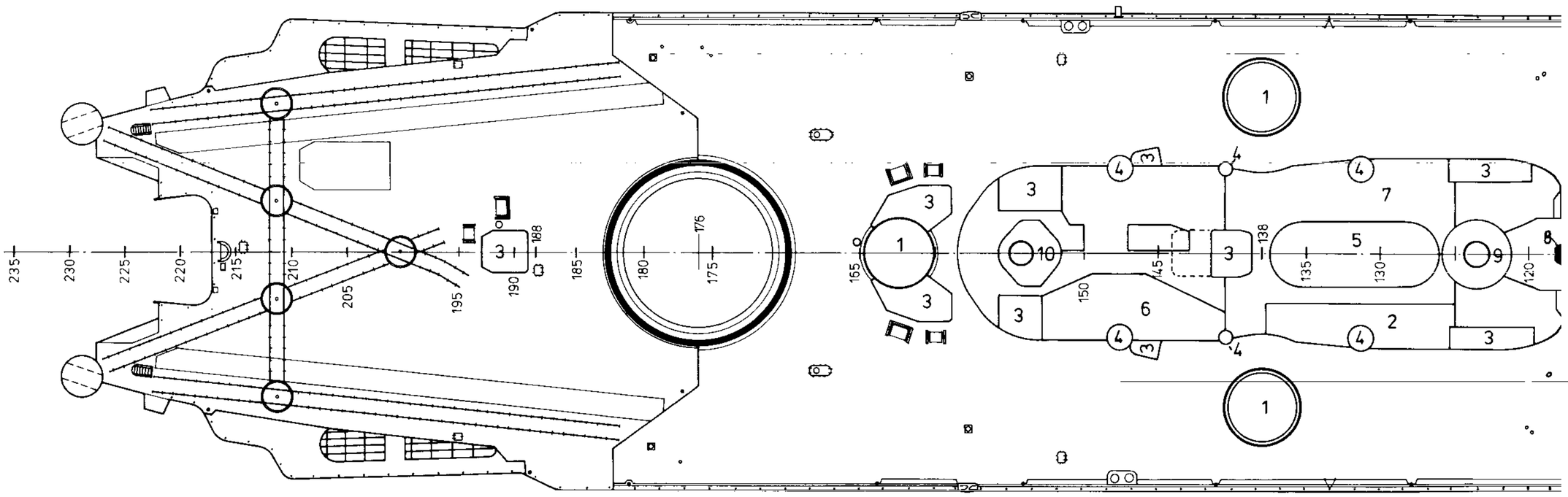
A3 INTERNAL PROFILE

1 Store
2 Crew space (living quarters)
3 Hangar
4 Hangar shutter door
5 Open hangar deck
6 Crane motor room
7 Flood control section
8 Service machine shop
9 Underwater hydrophone room (Type 0 sonar)
10 Bilge pump room
11 Log room
12 Anchor windlass room
13 Anchor cable room
14 Trim tank
15 Oil pump room
16 Sounding room
17 Aviation fuel tank
18 Aviation fuel pump room
19 Oil tank
20 Cold store
21 Main rudder engine room (armoured)
22 Auxiliary rudder engine room (armoured)
23 No 1 main powder magazine — upper
24 No 1 main powder magazine — lower
25 No 1 main shell magazine
26 No 2 main powder magazine — upper
27 No 2 main powder magazine — lower
28 No 2 main shell magazine
29 No 3 main powder magazine — upper
30 No 3 main powder magazine — lower
31 No 3 main shell magazine
32 25mm MG magazine
33 15.5cm gun magazine
34 12.7cm HA gun ammunition magazine
35 12.7cm HA gun ammunition magazine
36 Hydraulic pump room
37 Transformer space
38 Wireless room
39 Engine room — turbine
40 Boiler room
41 Gyro room
42 Conning tower
43 Communication tube
44 Bridge No 1
45 Bridge No 2
46 15m rangefinder
47 LA director Type 98
48 10m rangefinder
49 Ventilation and funnel compartment

A3



A4/1

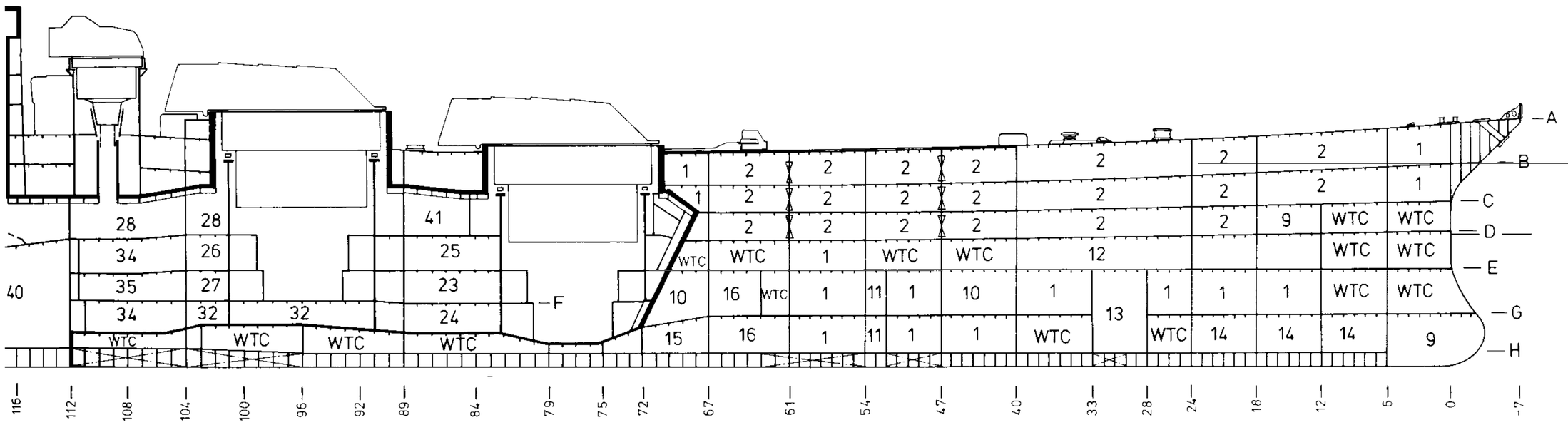


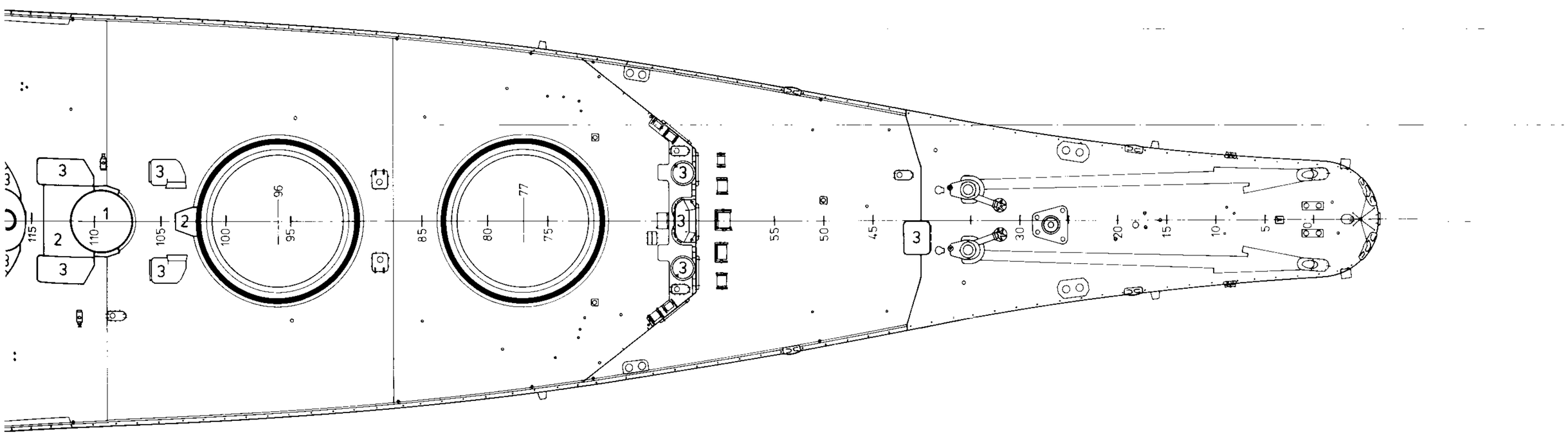
A Forecastle deck
B Upper deck
C Middle deck
D Lower deck
E Platform deck
F First hold deck
G Second hold deck
H Hatch deck (over double bottom deck)

A4 DECKS

A4/1 Forecastle deck (A)

1 15.5cm gun
2 Deck store
3 Ventilation trunk
4 12.7cm gun base
5 Funnel hatch
6 Foundry and welding shop
7 Forge (smithy)
8 Communication tube
9 Tower bridge armoured cable trunking
10 Aft tower armoured cable trunking

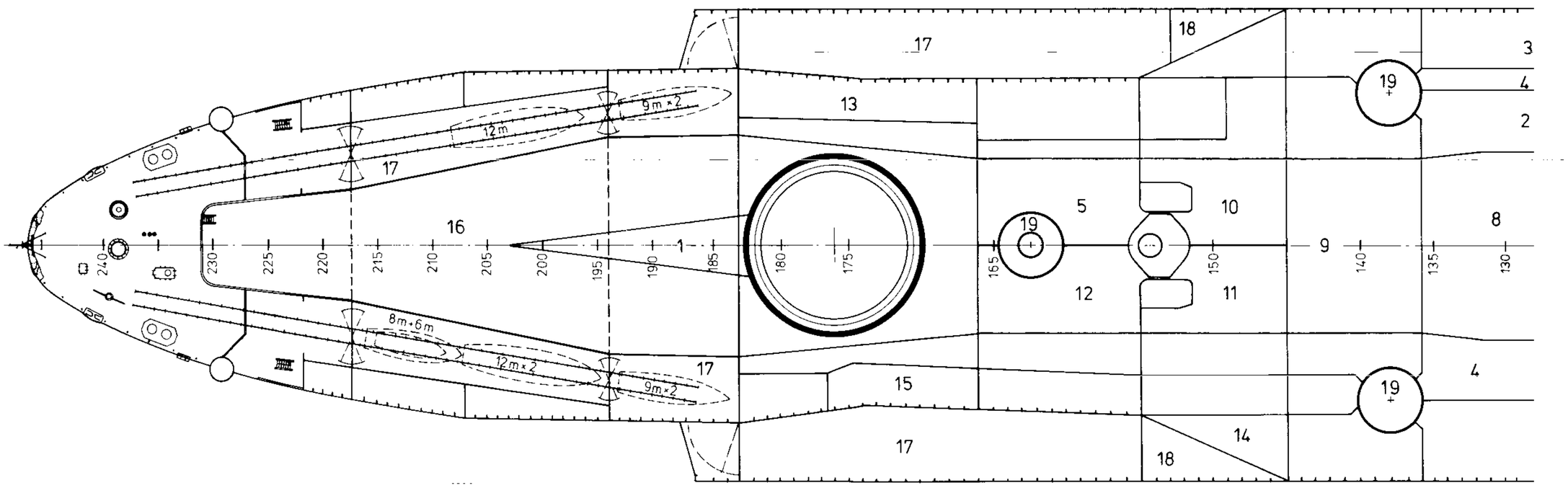




A General arrangements

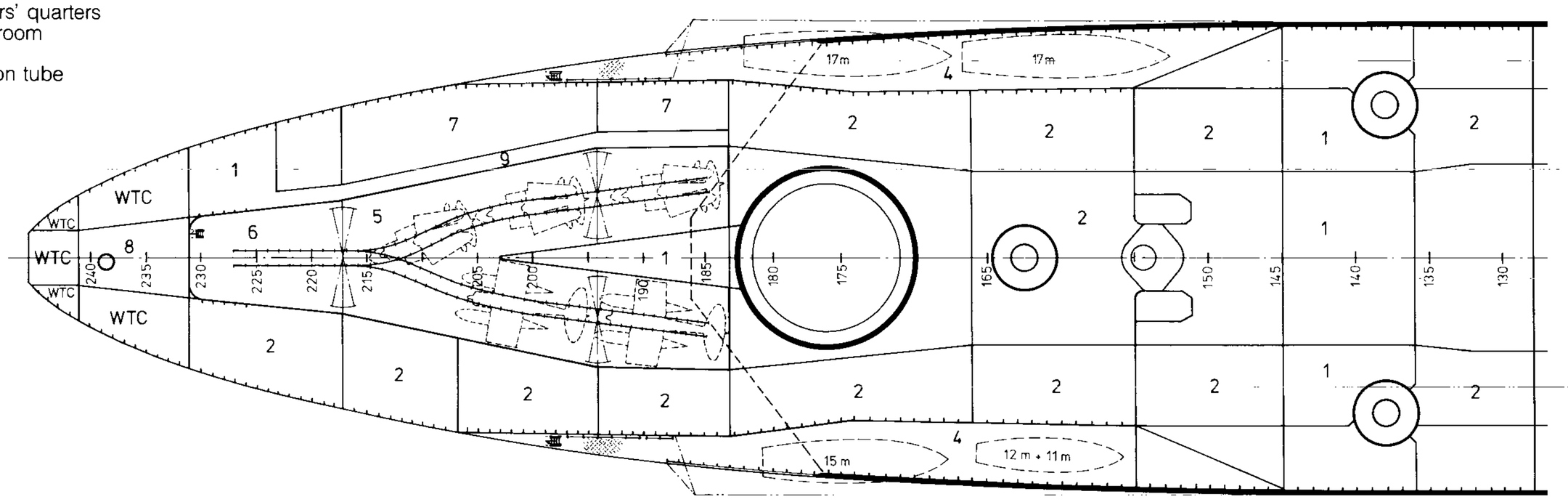
A4/2 Upper deck (B)

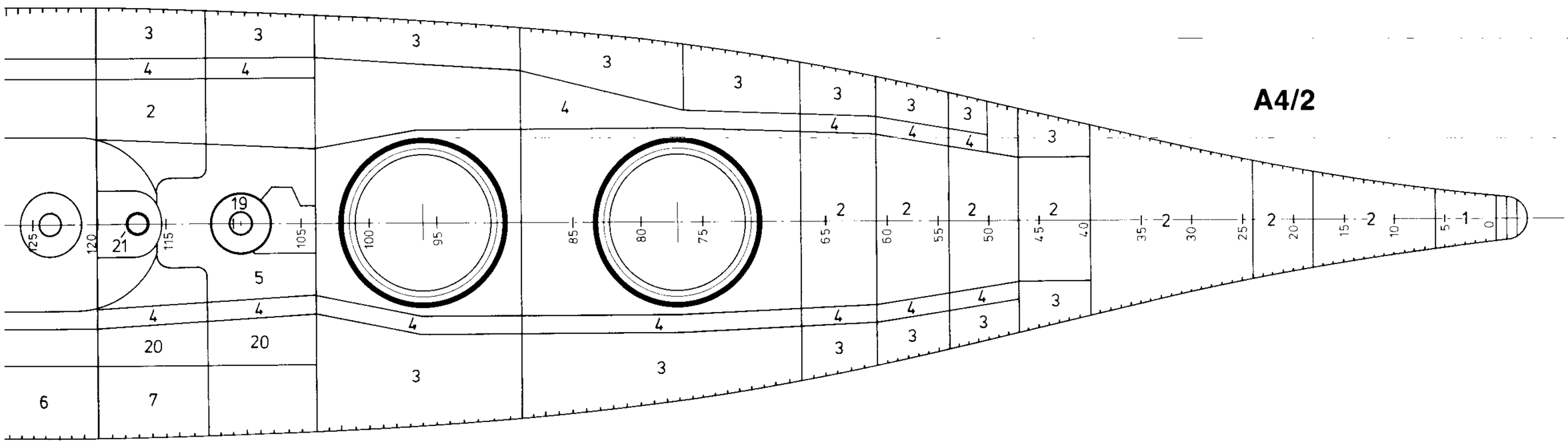
1 Store
2 Crew space
3 Officers' quarters
4 Passage
5 Wireless room
6 Admiral's day cabin
7 Admiral's cabin
8 Uptake space
9 Machine shop
10 Electrician's shop
11 Carpenter's shop
12 Dynamo room
13 Laundry
14 Galley
15 Wash place
16 Hangar space
17 Boat stowage (starboard two 9m, two 12m, one 8m, one 6m; port two 9m, one 12m boat)
18 Raft stowage
19 15.5cm triple gun base
20 Hall (lobby)
21 Communication tube

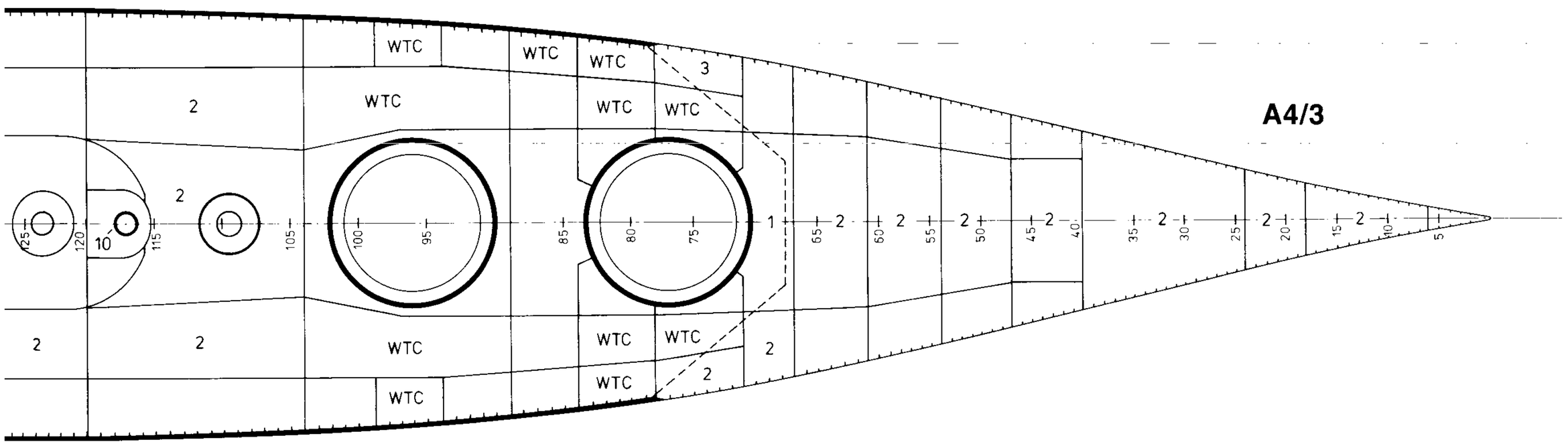


A4/3 Middle deck (C)

1 Store
2 Crew space
3 Sick-bay (hospital)
4 Boat towage (starboard one 15m, one 12m, one 11m; port two 17m boats)
5 Hangar
6 Open hangar deck
7 Warrant officers' quarters
8 Crane motor room
9 Passage
10 Communication tube




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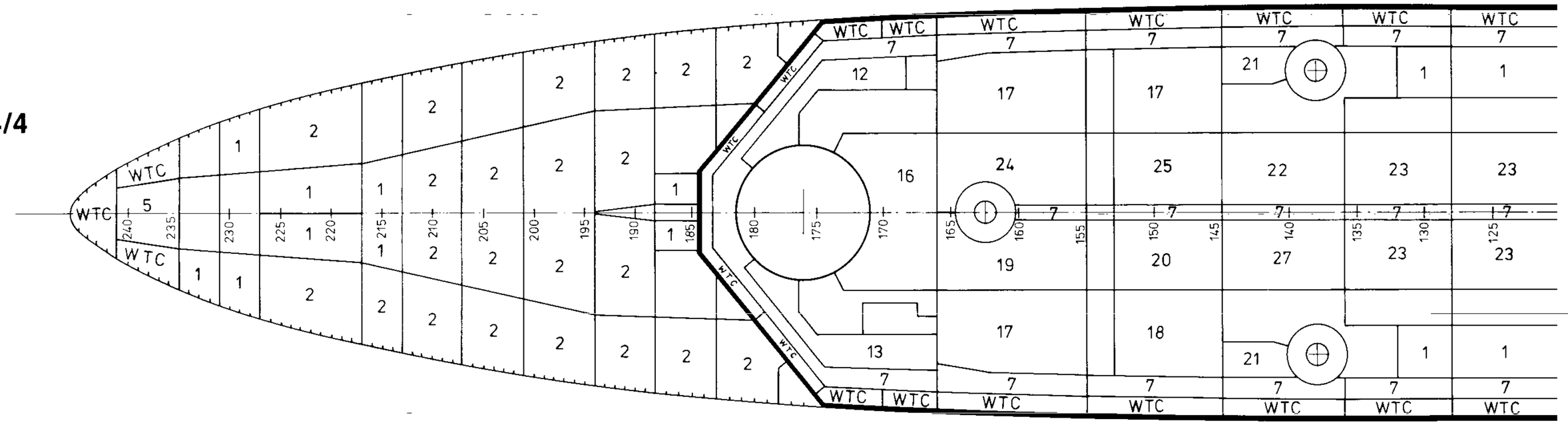

A4/3
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A General arrangements

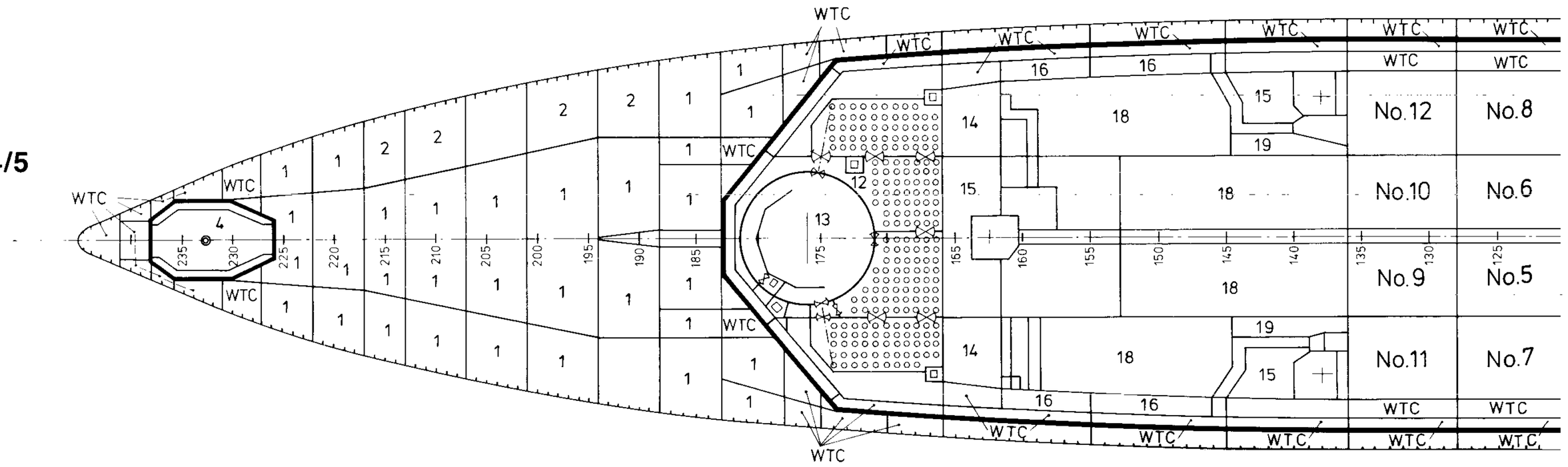
A4/4 Lower deck

1 Store
2 Crew space
3 Underwater hydrophone room
4 Isolation ward
5 Crane motor room
6 Main armament transmitting station
7 Wire lead passage
8 Secondary (15.5cm) armament transmitting station
9 HA (12.7cm) transmitting station
10 Gyro room
11 Telephone exchange
12 Cell room (battery)
13 Fan compartment
14 No 2 main shell magazine
14 Shell supply room
16 Secondary armament shell room
17 Dynamo room and ventilation space
18 Dynamo room
19 Cooling machinery room
20 Transformer room
21 Secondary armament (15.5cm) shell magazine
22 Flooding control stand
23 Ventilation and funnel compartment
24 Radio station
25 Wireless room and dynamo room
26 Lower control station
27 Engine room ventilation space

A4/4

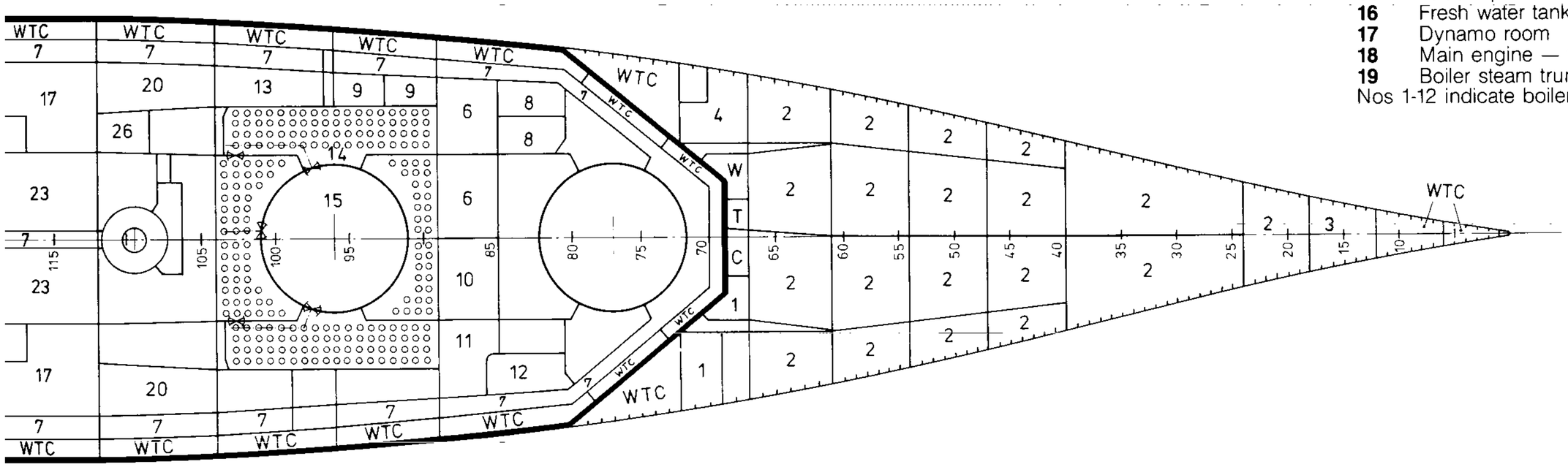


A4/5



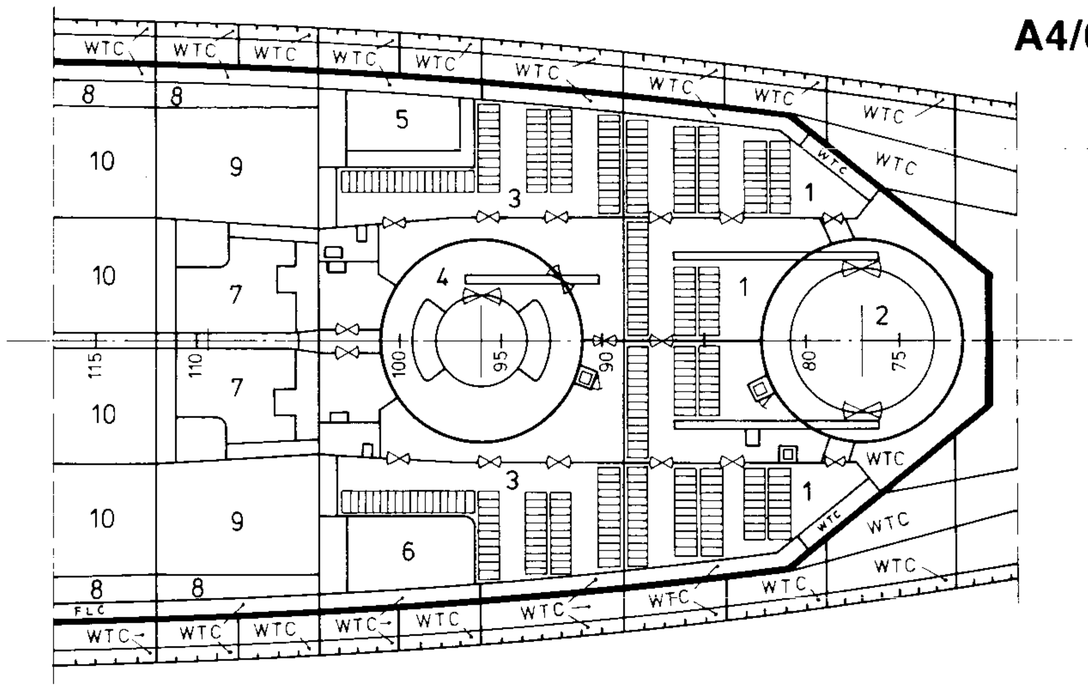
A4/5 Platform deck (E)

1 Store
2 Crew space
3 Anchor windlass room
4 Main rudder engine room (armoured)
5 Black powder store
6 No 1 main armament shell magazine
7 Shell supply room
8 No 2 main armament upper powder magazine (canister stowage)
9 No 1 magazine cooling machine room
10 Wireless telegraphy room
11 Powder supply room — upper
12 No 3 main armament shell magazine
13 Shell supply room
14 Black powder magazine
15 15.5cm powder magazine
16 Fresh water tank (hydraulic tank)
17 Dynamo room
18 Main engine — turbine space
19 Boiler steam trunking
Nos 1-12 indicate boiler rooms

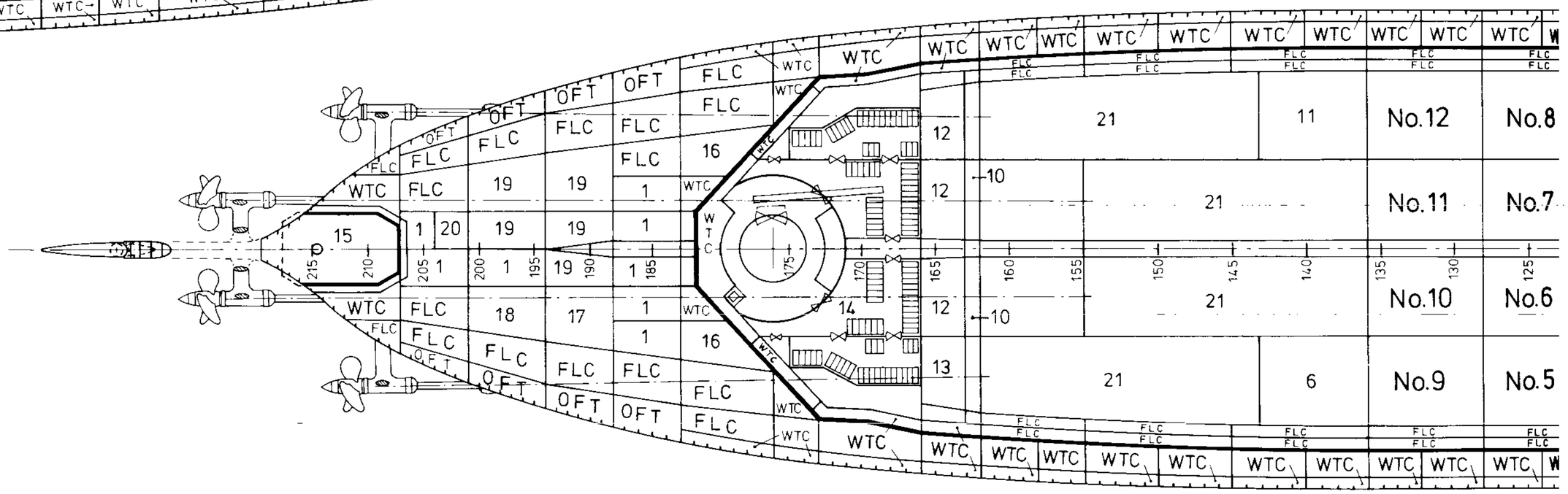


A General arrangements

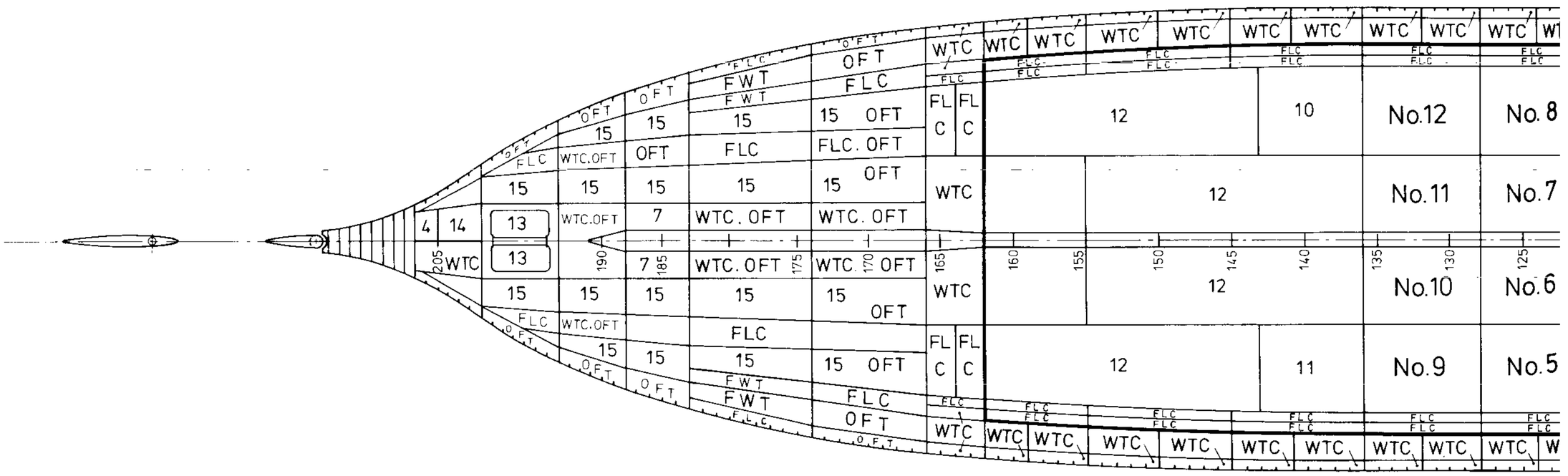
A4/6



A4/7



A4/8



A4/6 First hold deck (F)

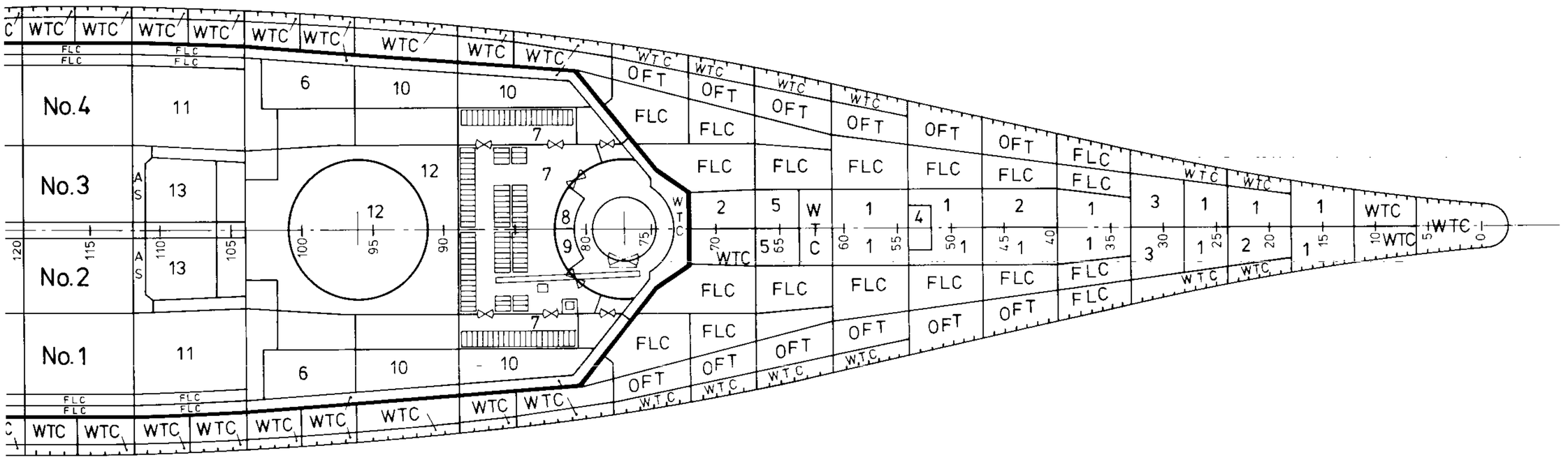
1 No 1 main armament upper powder magazine (canister stowage)
2 Powder supply room — upper
3 No 2 main armament lower powder magazine (canister stowage)
4 Powder supply room — lower
5 No 2 magazine cooling machinery room
6 Small arms magazine
7 15.5cm powder magazine
8 Passage
9 Pump room
10 Boiler room

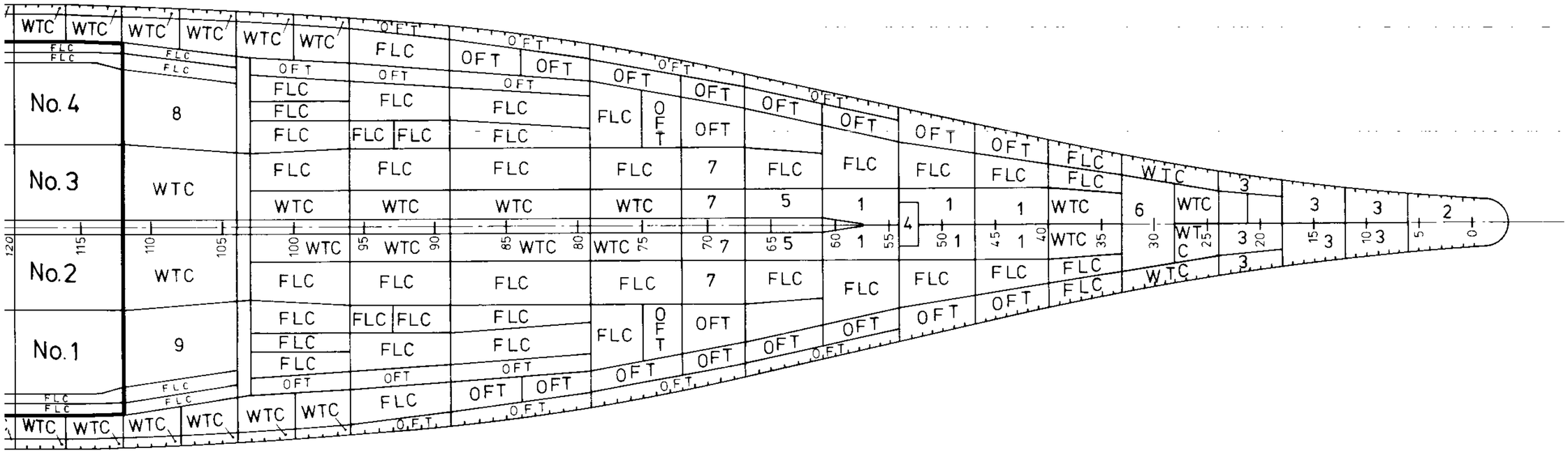
A4/7 Second hold deck (G)

1 Store
2 Bilge pump room
3 Anchor cable room
4 Log room
5 Sounding room
6 Cooling machinery room
7 No 1 main armament lower powder magazine
8 Flooding pipe room
9 Air (or carbon dioxide?) bottle room
10 Hydraulic pipe conduit
11 Hydraulic pump room
12 25mm ammunition magazine
13 12.7cm HA gun ammunition magazine
14 No 3 main armament lower powder magazine
15 Auxiliary rudder engine room (armoured)
16 Fresh water pipe room
17 Waste water pipe room
18 Cooling machinery room
19 Cold magazine
20 Aviation fuel control position
21 Engine room
Nos 1-12 indicate boiler rooms

A4/8 Hatch deck (H), above the double bottom

1 Store
2 Underwater hydrophone room — sonar Type 0 array
3 Trim tank
4 Log room
5 Sounding room
6 Anchor cable room
7 Oil pump room
8 Bilge pump room
9 Hydraulic monitoring compartment
10 Hydraulic pump room
11 Cooling machinery room
12 Engine room (turbine)
13 Aviation fuel tank
14 Aviation fuel pump room
15 Propeller shaft tunnel
Nos 1-12 indicate boiler rooms





A General arrangements

A5 SECTIONS

A5/1 Section, frame 30

1 Crew space
2 Anchor windlass room
3 Anchor cable room

A5/2 Section, frame 96

1 Officers' quarters
2 No 2 main armament shell magazine
3 No 2 main armament powder magazine — upper
4 No 2 main armament powder magazine — lower
5 25mm ammunition magazine
6 Wireless telegraphy room
7 HA gun transmitting station
8 Passage

A5/3 Section, frame 107

1 Officers' quarters
2 Passage
3 Crew space
4 Transformer room
5 Wire trunking passage
6 Dynamo room
7 Hydraulic pump room
8 Hydraulic measurements compartment
9 15.5cm ammunition magazine
10 12.7cm HA ammunition magazine
11 Wireless room

A5/4 Section, frame 141

1 Store
2 Machine service shop
3 Hydraulic pump room
4 Engine (turbine) room
5 15.5cm ammunition magazine
6 Flooding control position
7 Wire trunking passage
8 Steam trunking passage

A5/5 Section, frame 176

1 Boat stowage
2 Crew space
3 Laundry
4 Cells
5 No 3 main armament upper powder magazine
6 No 3 main armament lower powder magazine
7 Propeller shaft tunnel

A6 LINES

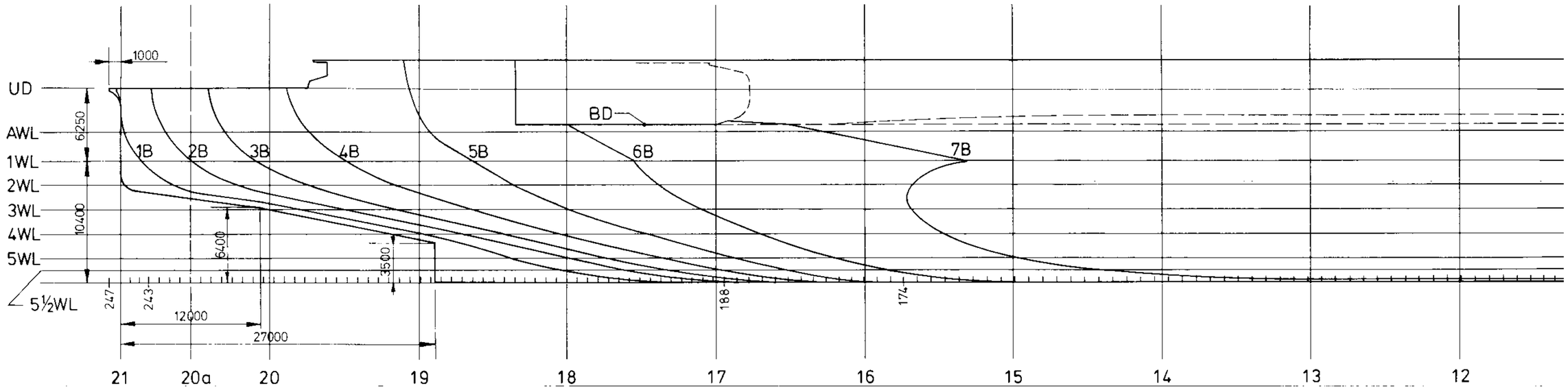
A6/1 Sheer elevation

A6/2 Waterline plan

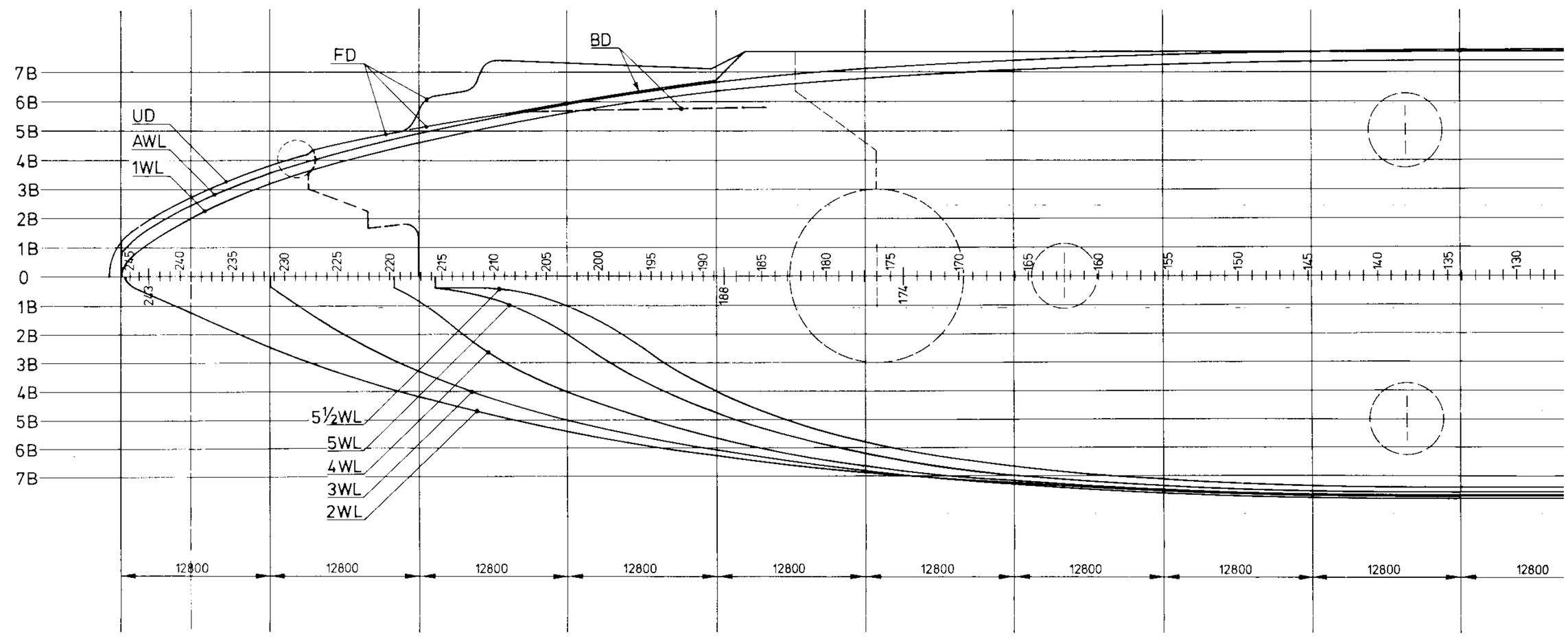
FD Forecastle deck
UD Upper deck
FP Forward perpendicular
BD Boat deck

Distance between frames:
Bow-FP = 857mm (7 frames)
FP-61 = 900mm
61-79 = 1100mm
79-174 = 1200mm
174-188 = 1100mm
188-243 = 900mm
243-246 = 800mm
246-247 = 1000mm
Distance square stations 1-21 = 12,800mm

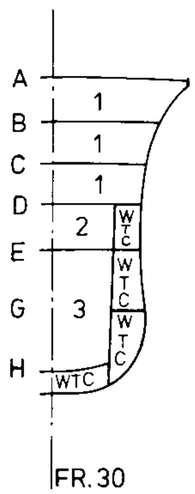
A6/1



A6/2

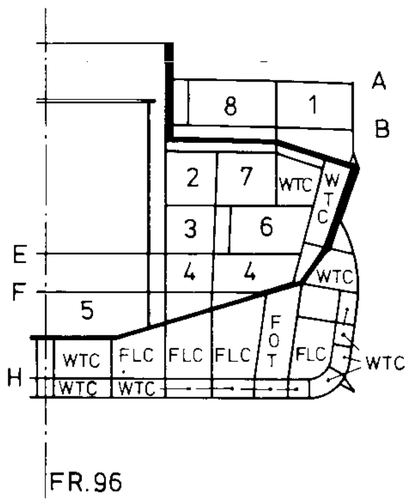


A5/1



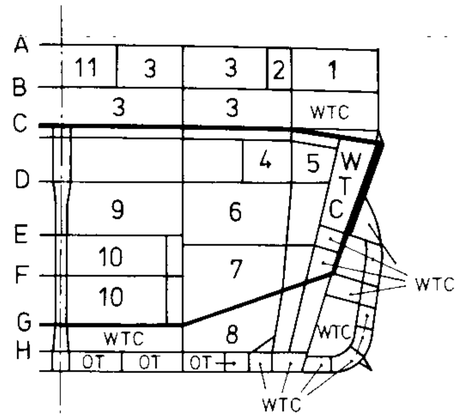
FR.30

A5/2



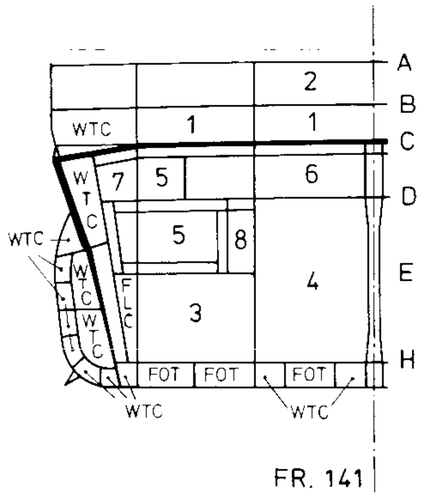
FR.96

A5/3



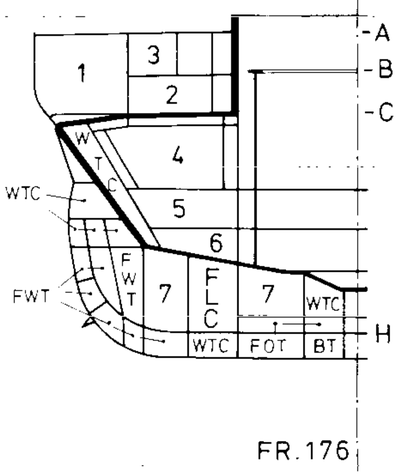
FR. 107

A5/4

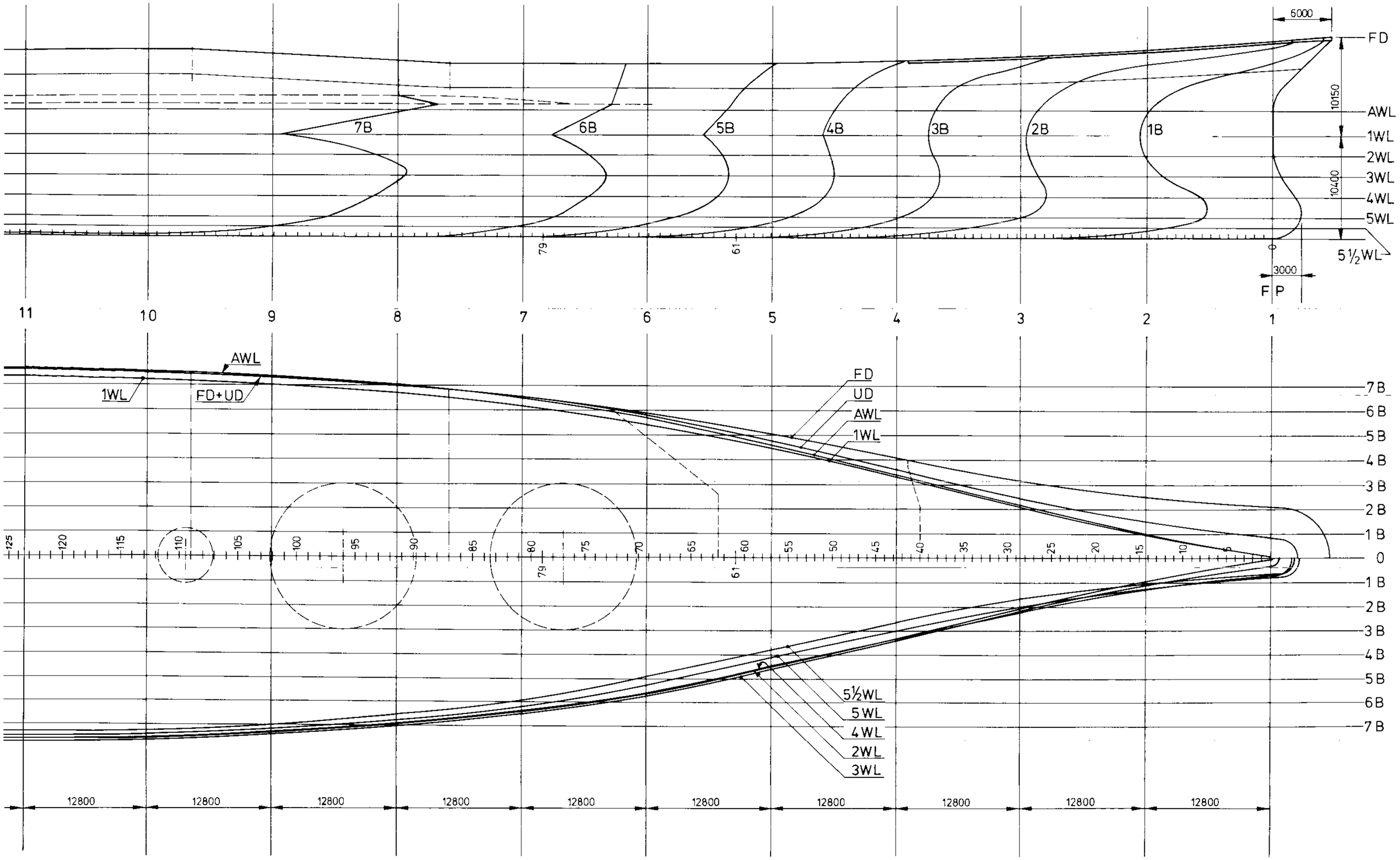


FR. 141

A5/5



FR.176

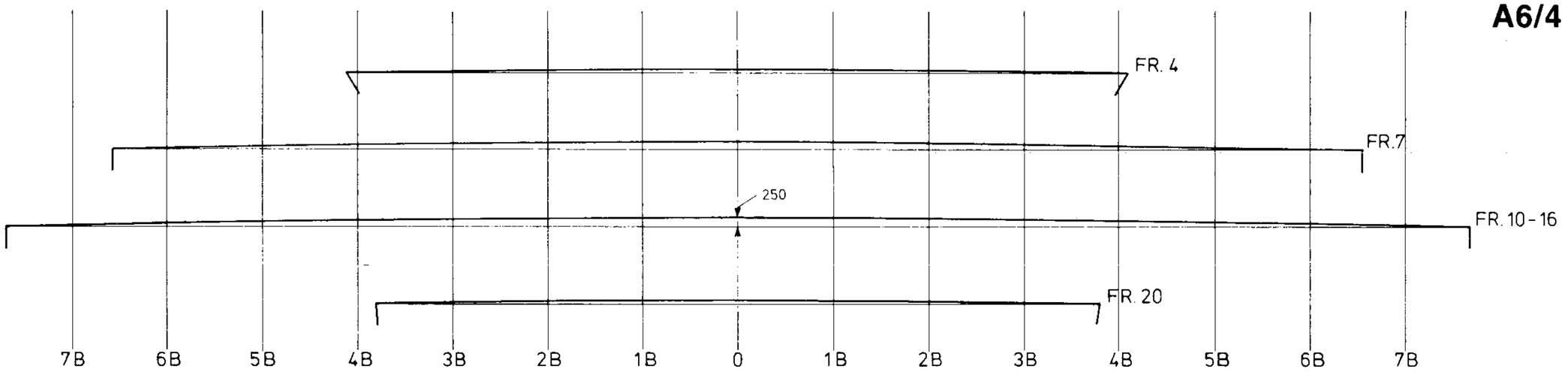


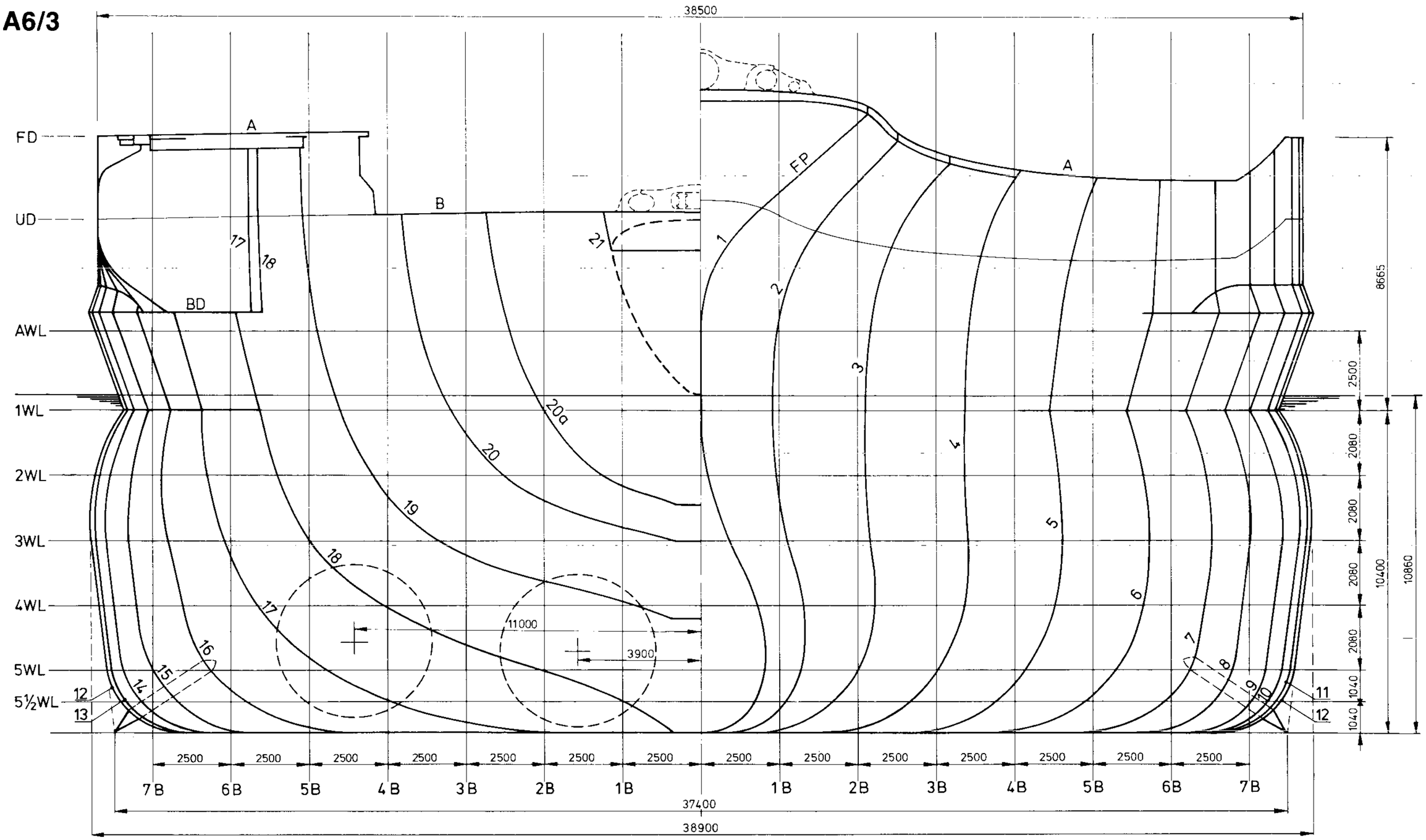
A General arrangements

A6/3 Body plan (1/200 scale)

A Line of forecastle deck at side
B Line of upper deck at side
FP Forward perpendicular

A6/4 Profile of forecastle deck (1/200 scale)





B Hull structure

B1 ARMOUR AND PROTECTIVE PLATING (Numbers give armour and protective plating thicknesses in millimetres; 1/1200 scale)

B1/1 Profile

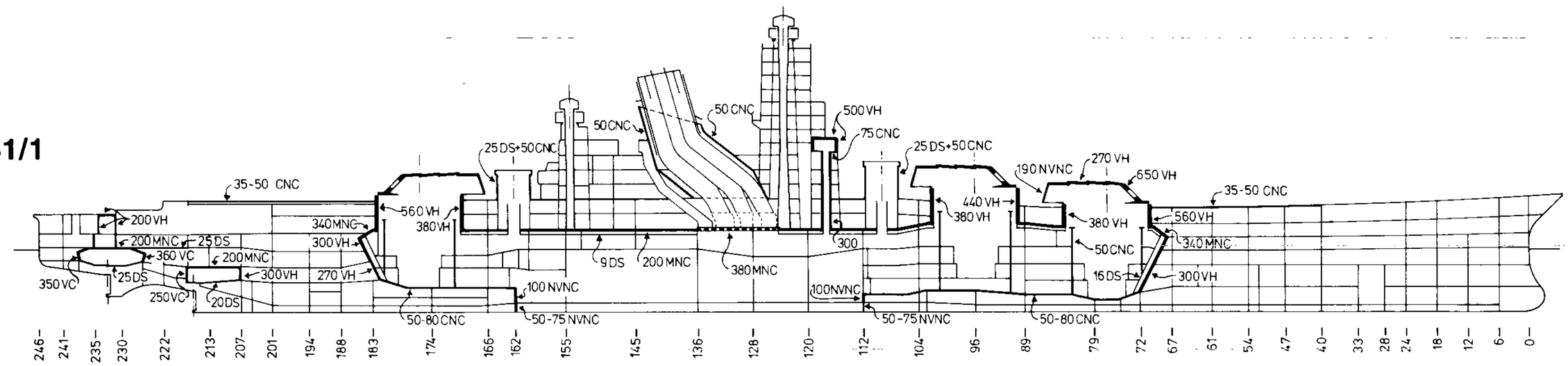
B1/2 Forecastle deck and middle deck

B1/3 Second hold deck

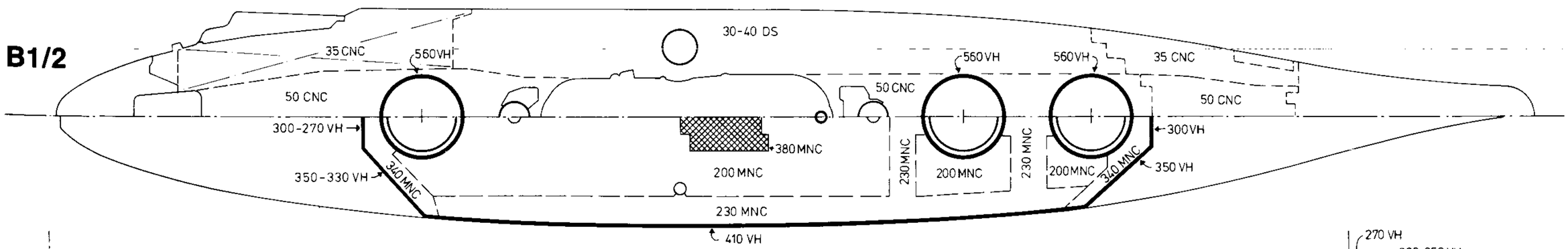
B1/4 Section at frame 77

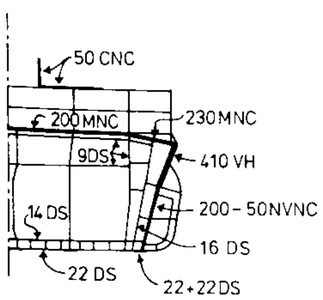
B1/5 Section at frame 135

B1/1

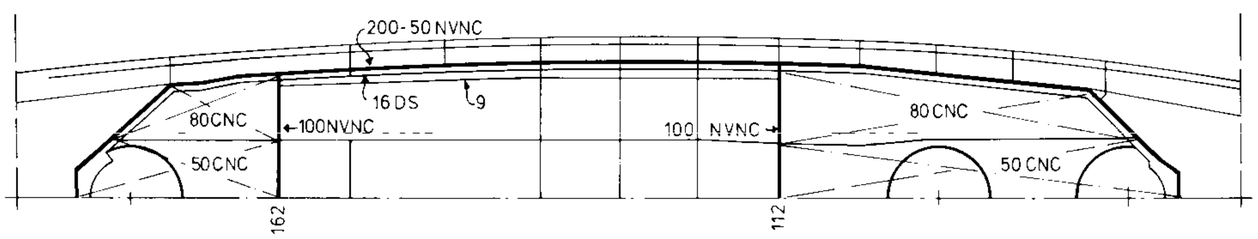


B1/2

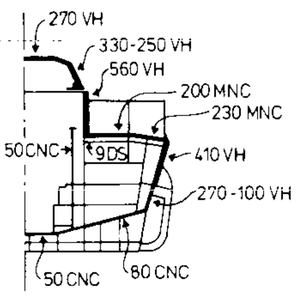




B1/5



B1/3

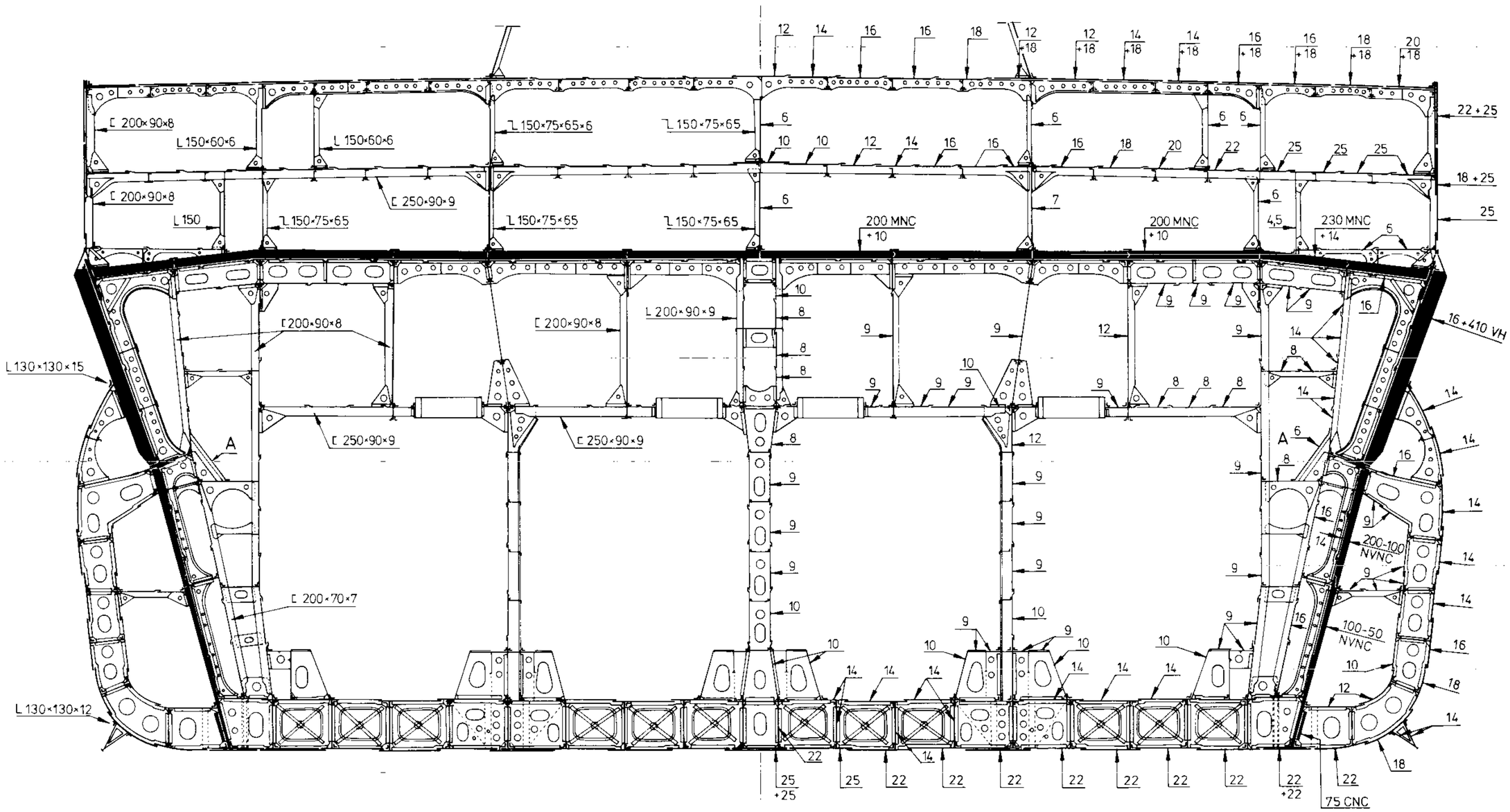


B1/4

B Hull structure

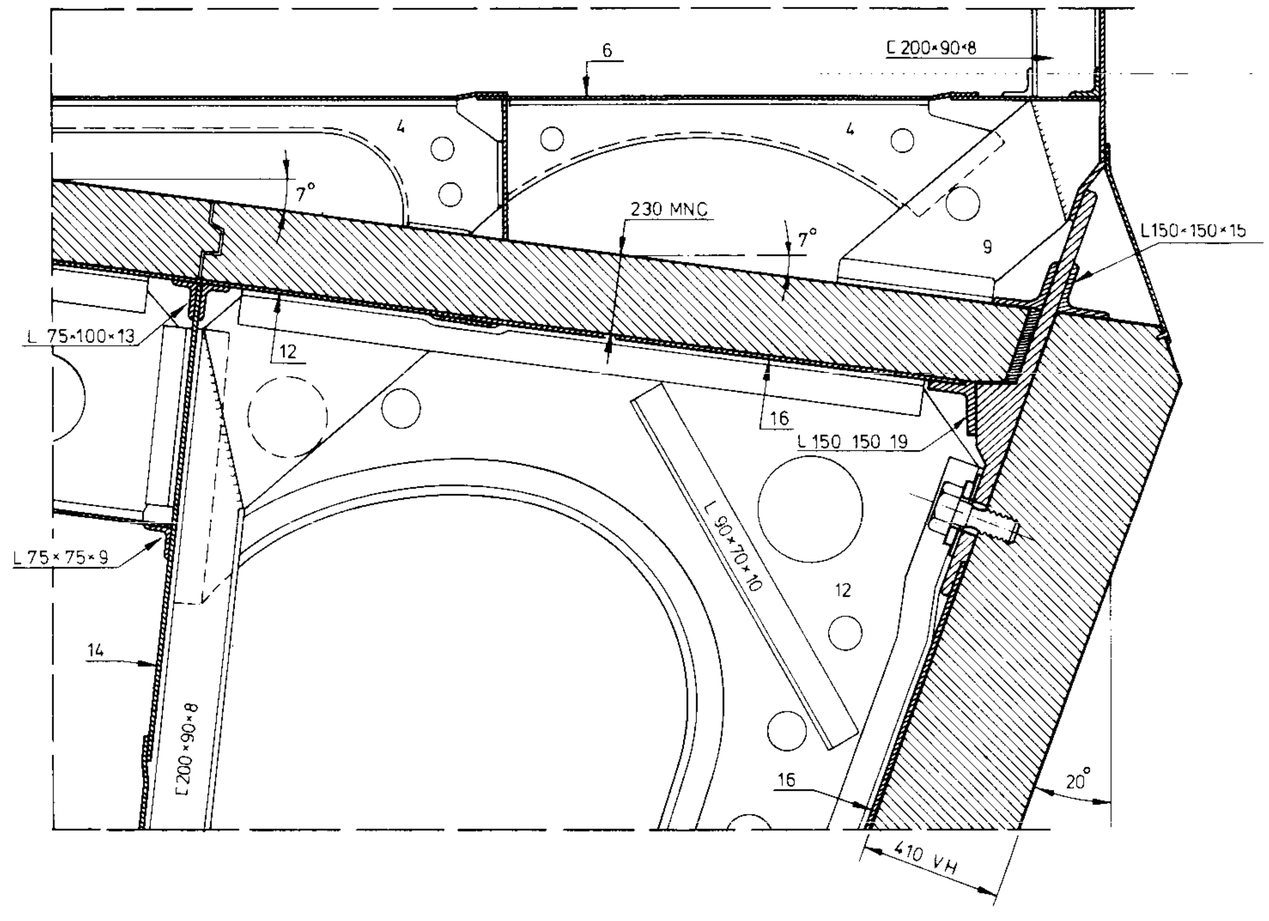
B2 MIDSHIPS HULL STRUCTURE (thickness of plates and armour in millimetres — right side; steel profiles — left side; 1/200 scale)

A Plate fitted at January-April 1944 refit



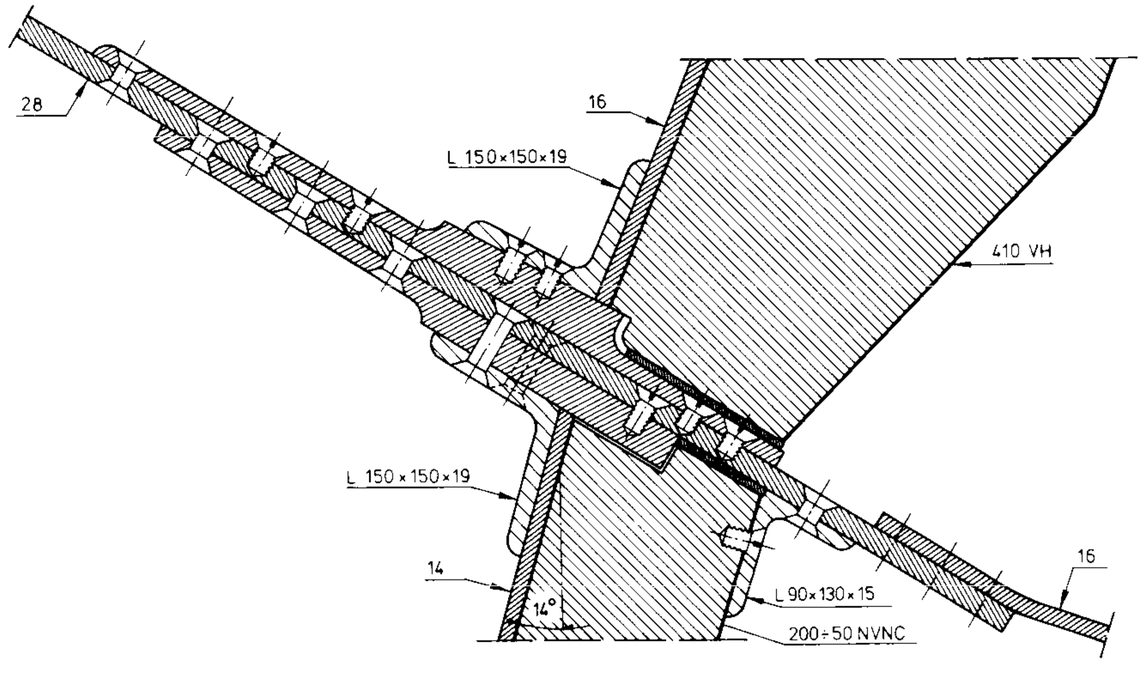
B2

B3 **JOINT OF VERTICAL (side) AND HORIZONTAL (deck) ARMOUR (1/30 scale)**



B3

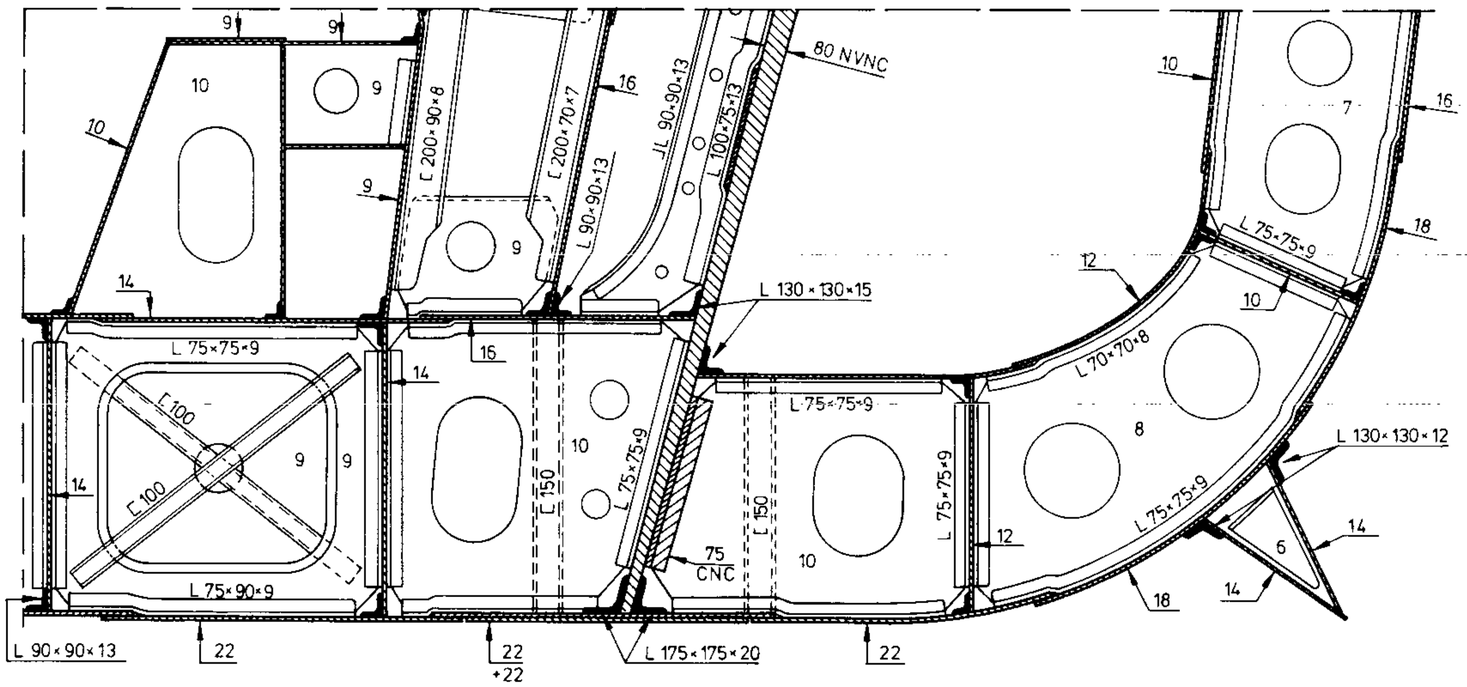
B4 **JOINT OF 410mm VH ARMOUR AND 200mm NVNC ARMOUR (1/10 scale)**



B4

B Hull structure

B5 BOTTOM FRAGMENT OF VERTICAL ARMOUR AND SIDE PLATING (1/50 scale)



B5

B6 **JOINT OF VERTICAL SIDE (410mm VH) WITH VERTICAL INNER (350mm VH) ARMOUR PLATING (no scale)**

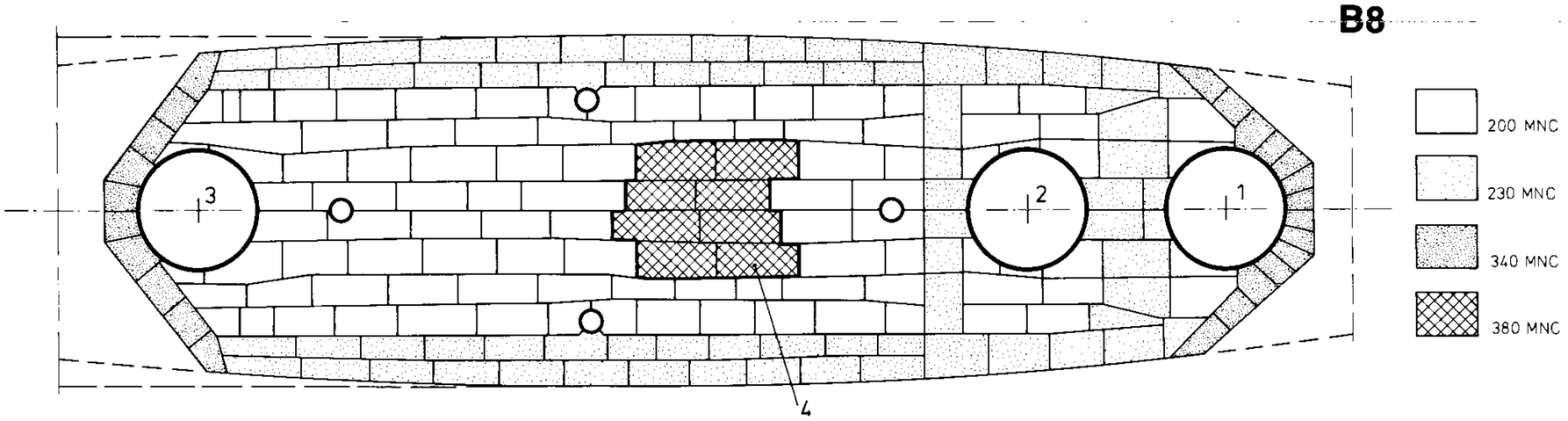
B7 **TYPICAL STEEL PLATE JOINTS (no scale)**

B8 **ARRANGEMENT (plan) OF MIDDLE DECK ARMOUR PLATE THICKNESS IN MILLIMETRES (1/1000 scale)**

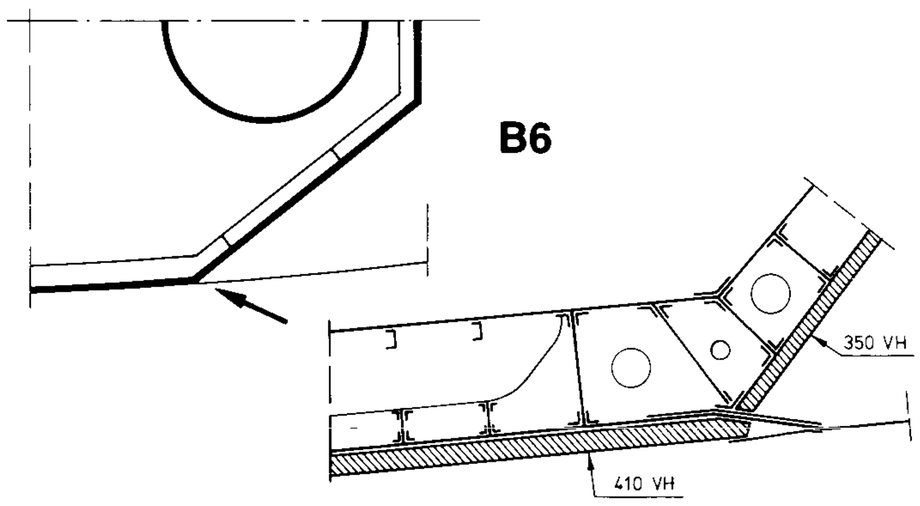
1-3 46cm gun turret barbettes; small circle — 15.5cm guns

4 380mm MNC armour plates with 180mm diameter holes (the total area of the holes being less than 55 per cent of the whole area of the plate)

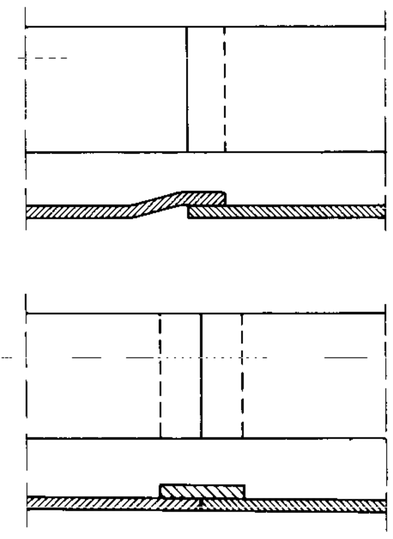
B8



B6



B7



C Superstructure

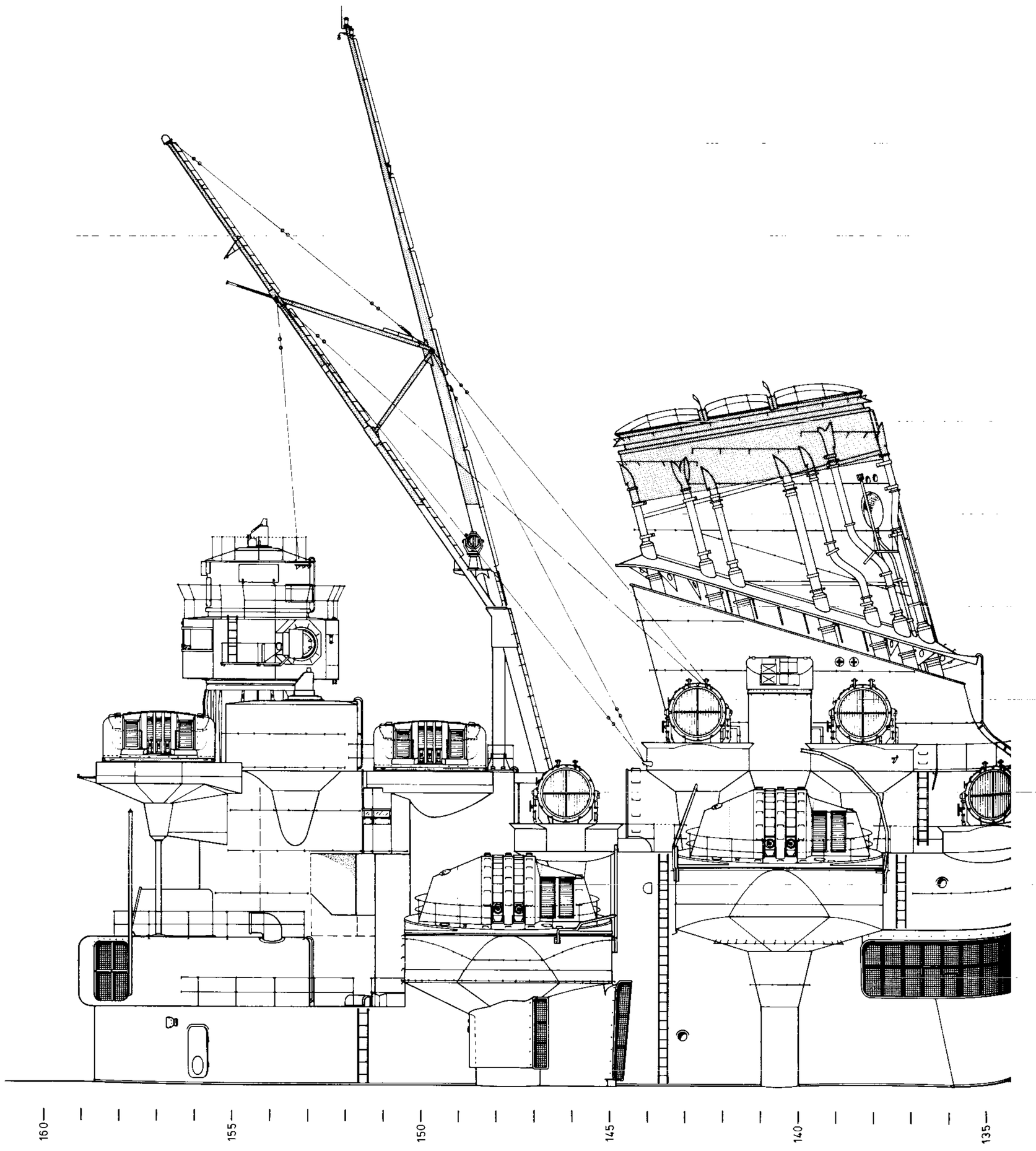
C1 SUPERSTRUCTURE, DECEMBER 1941 (1/200 scale)

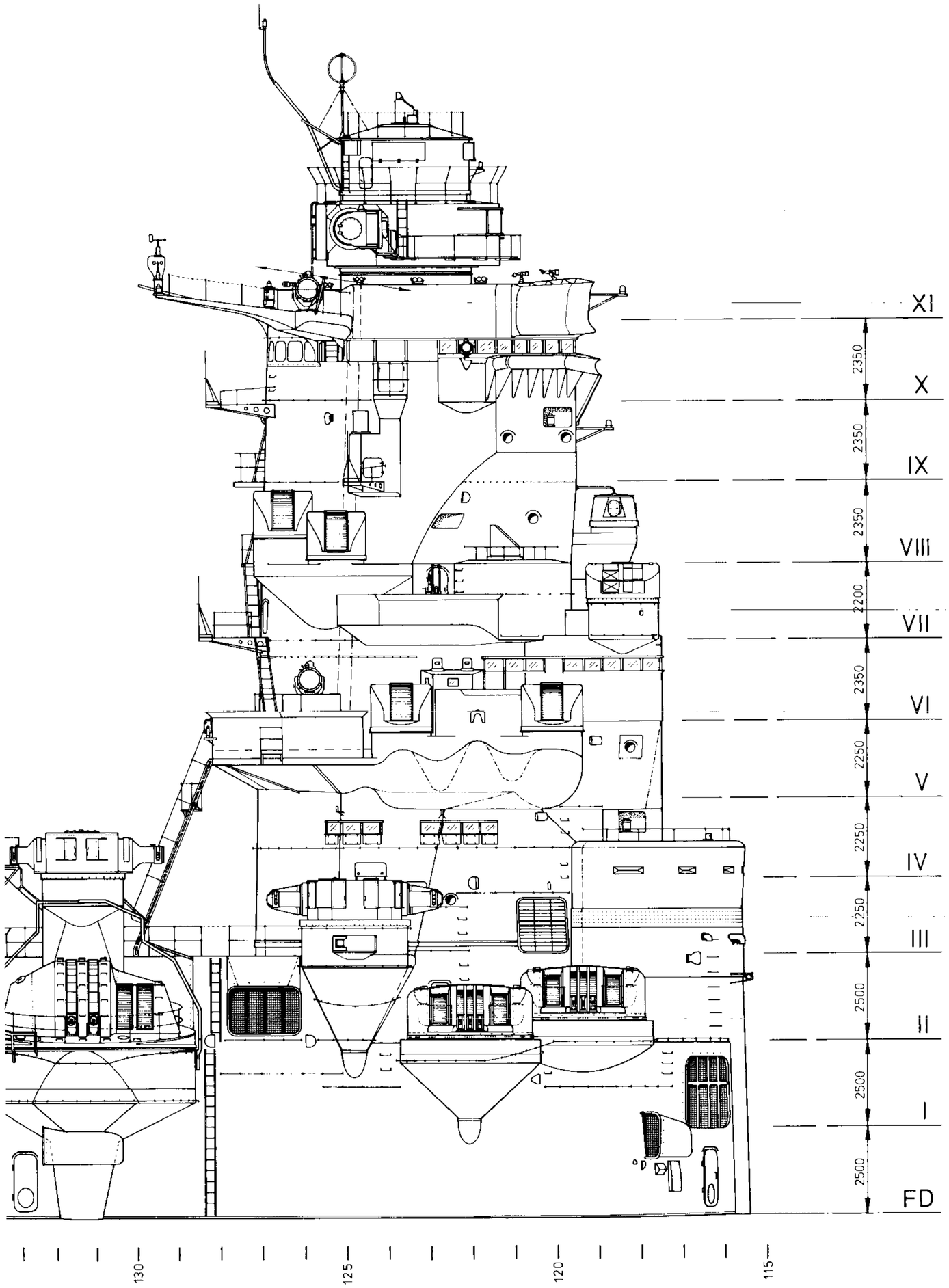
C1/1 Elevation

FD Forecastle deck
I-II Lower decks of superstructure
III Upper deck of middle part of superstructure
IV Fore part — conning tower
V Signal deck — rear part; both sides — four searchlight control towers (on sponsons)
VI Compass bridge — bridge No 2
VII MG control — two towers (identical on both sides of funnel), auxiliary Type 98 LA directors ('Hoiban'), identical to aft 10m rangefinder tower
VIII Fore part — 1.5m navigation rangefinder; aft — four searchlight control towers
X Combat bridge
XI Air defence combat post
Above XI — 15m rangefinder and on top of bridge Type 98 Low Angle director ('Hoiban')

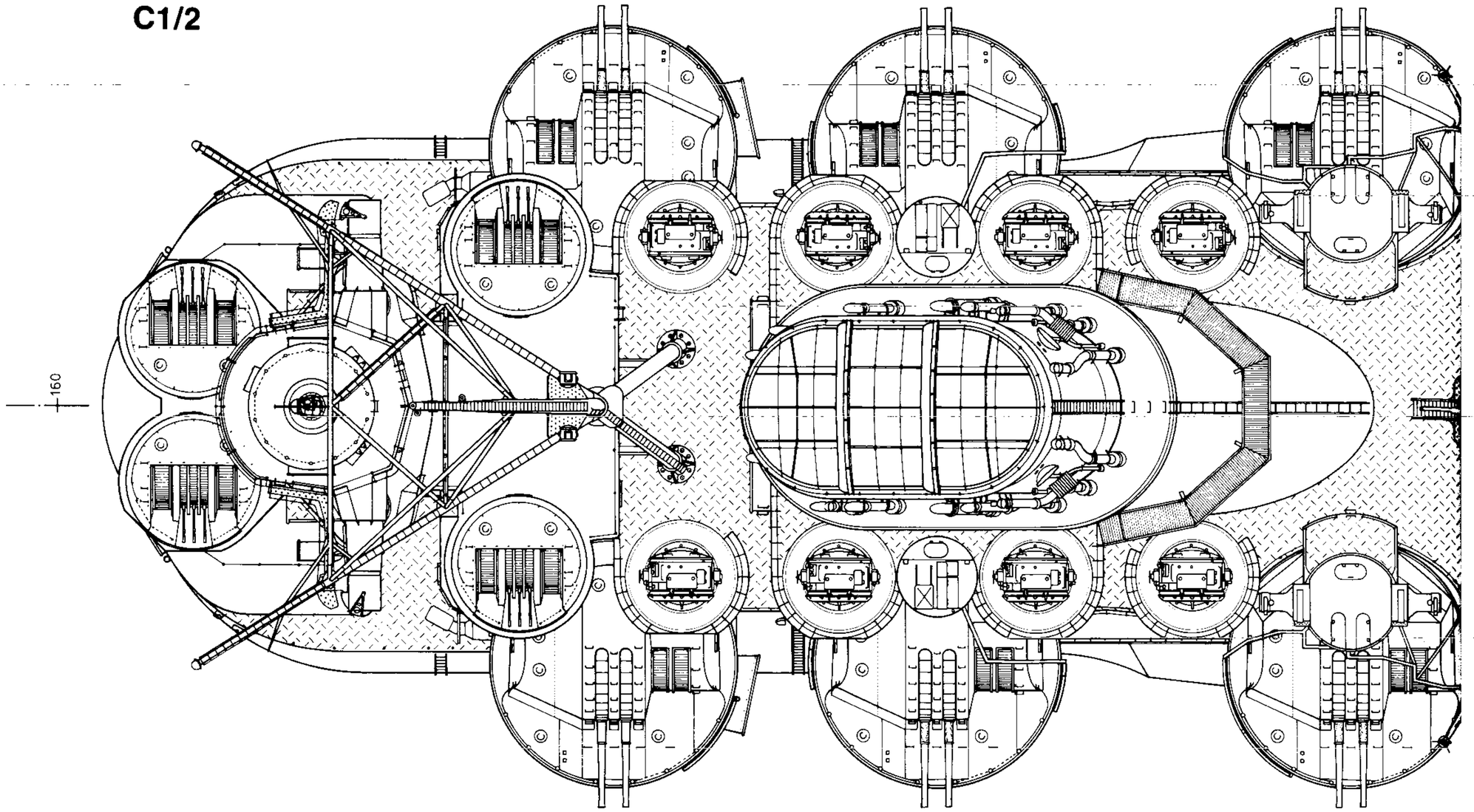
Note: 25mm triple enclosed mounts at frames 119, 122, 150, 157
12.7cm Type 89 Model A-1-3 guns at frames 131, 140, 148
4.5m rangefinder towers at frames 125, 131
150cm searchlights at frames 135, 138, 143, 146
60cm searchlights — tower structure decks VI, XI
40cm signal lamps on main mast platform

C1/1

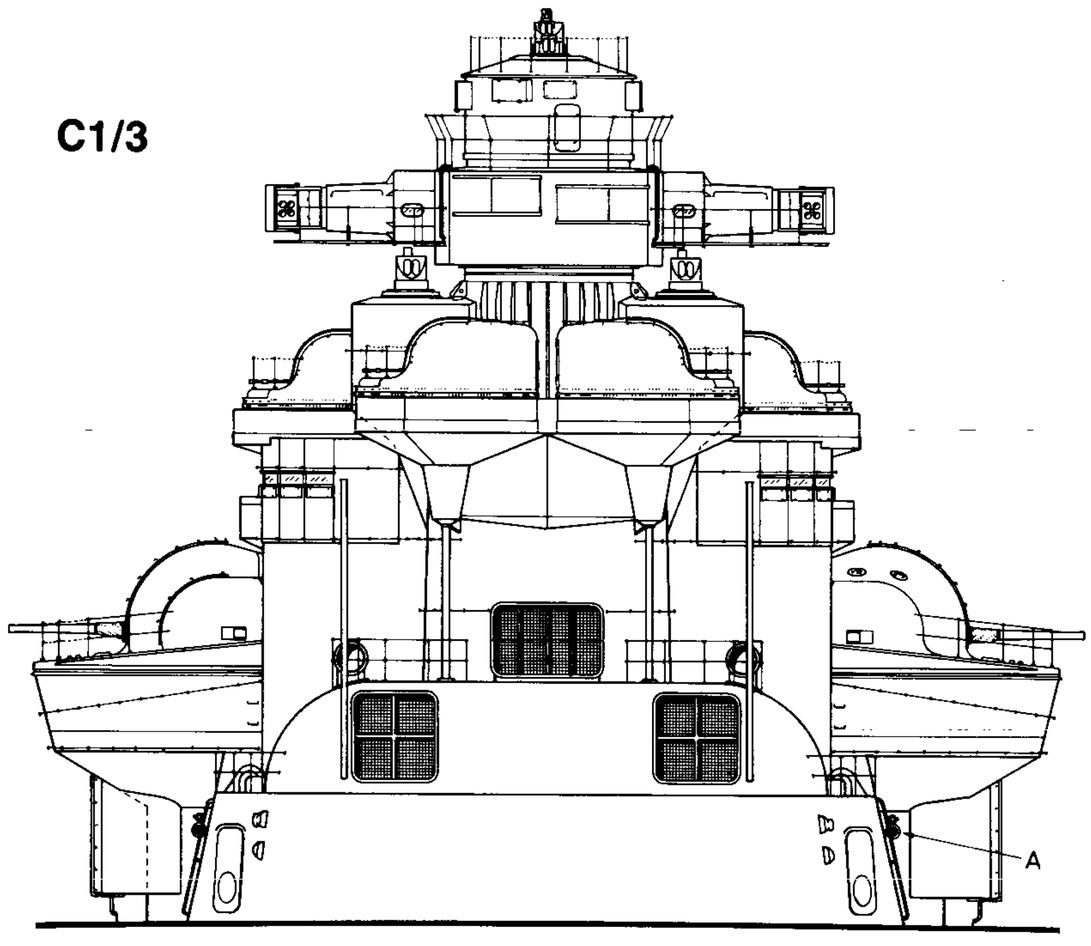


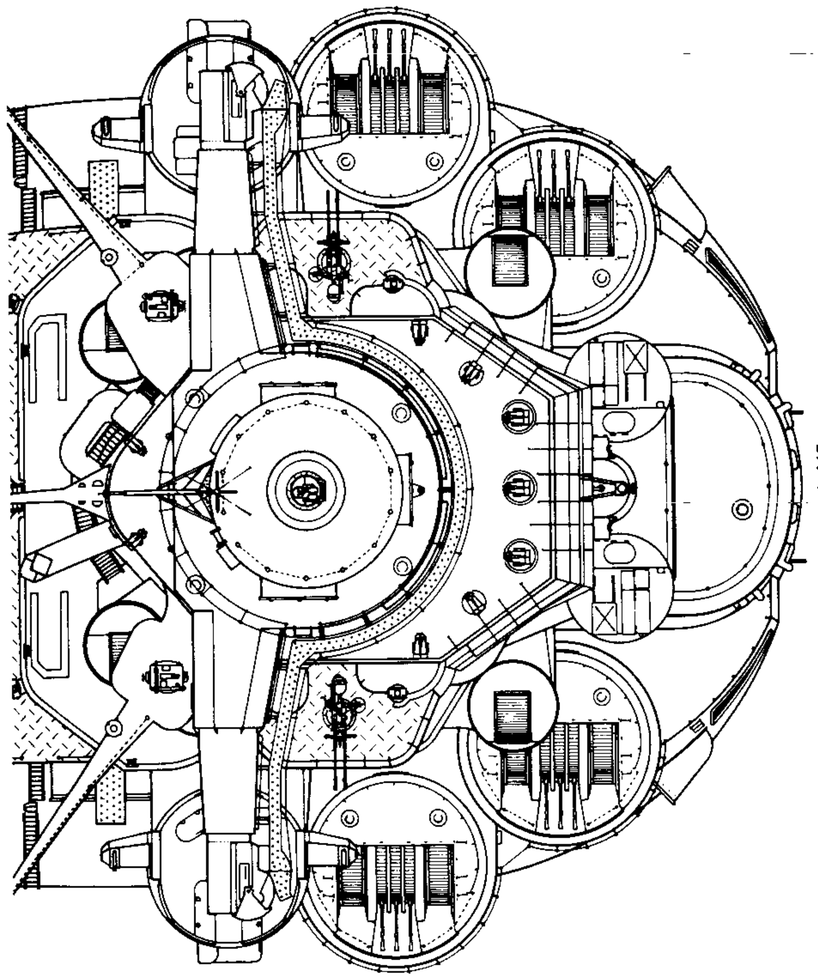

XI
X
IX
VIII
VII
VI
V
IV
III
II
I
FD
2350
2350
2350
2200
2350
2250
2250
2250
2500
2500
2500
130
125
120
115

C1/2



C1/3





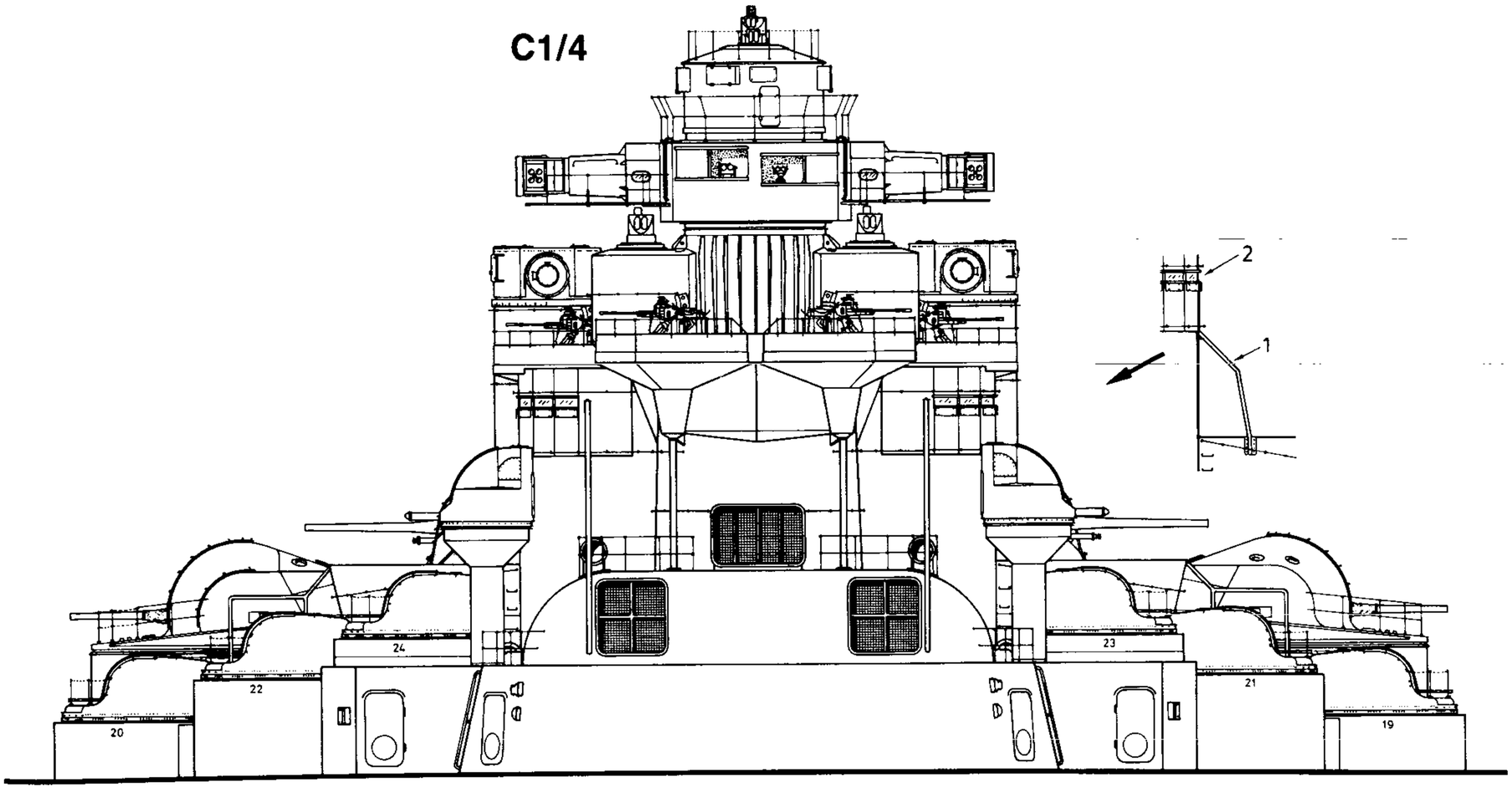
C1/2 Plan

C1/3 Rear elevation of the after tower structure with 10m rangefinder

A Deck loudspeaker

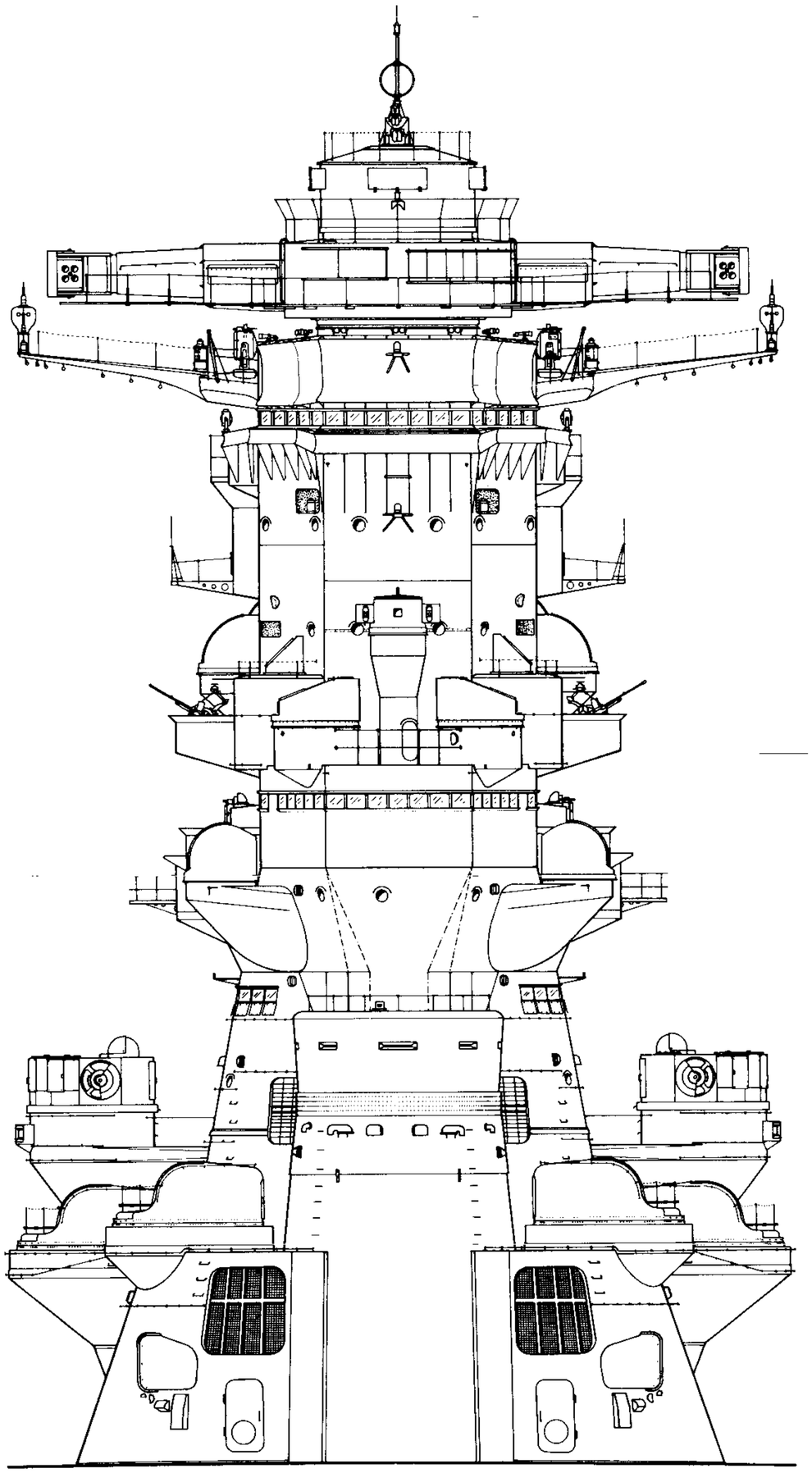
C1/4 Rear elevation of the after tower structure with 10m rangefinder, April 1945 (note the numbering of the 25mm gun mounts — white numbers 200mm high)

1 12.7cm gun barrel stop
2 After observation position

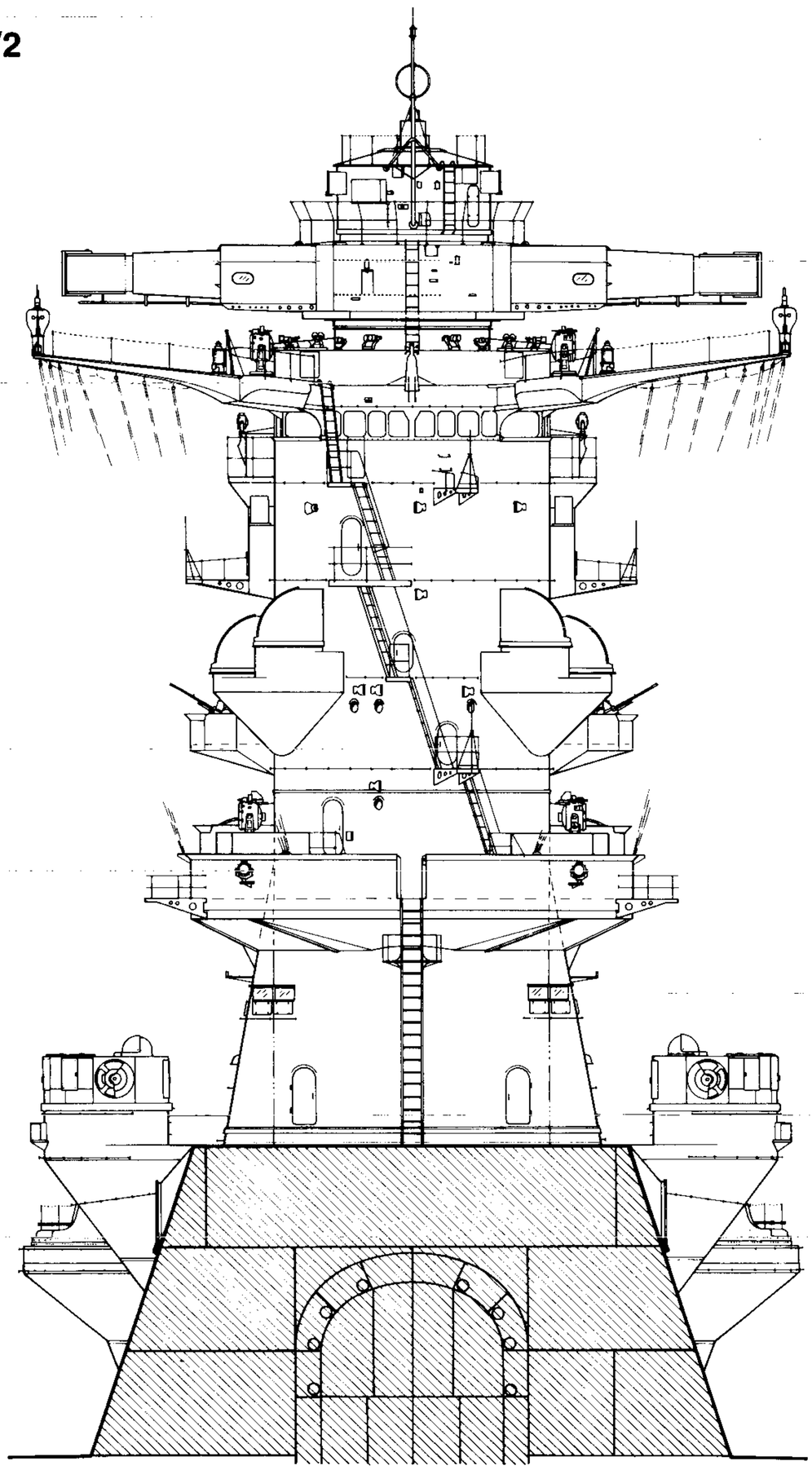


C Superstructure

C2/1



C2/2



C2 TOWER BRIDGE, DECEMBER 1941 (1/200 scale)

C2/1 Front elevation

C2/2 Rear elevation — section at frame 128

C2/3 Rear view of signal deck and yard

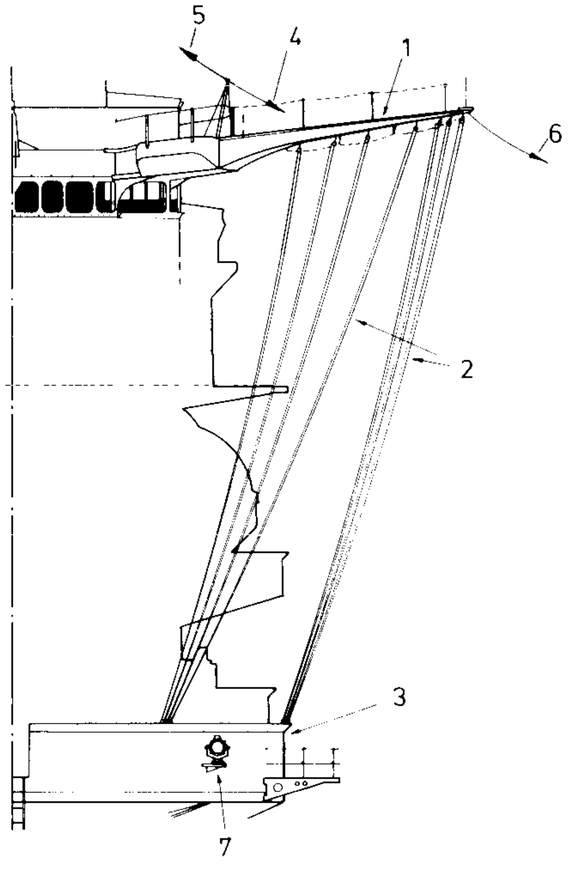
1 Signal yard
2 Signal halyards
3 Signal platform
4 Dressing line — to jack staff
5 Dressing line — to upper part of main mast
6 Main aerials — to arm of main mast (top)
7 30cm deck lamp

C2/4 Rear view to signal platform (section)

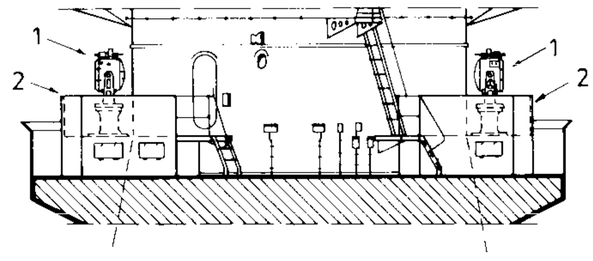
1 60cm searchlight
2 Searchlight's platform

C2/5 Railing of lower part of the superstructure (two bars, fore part one bar)

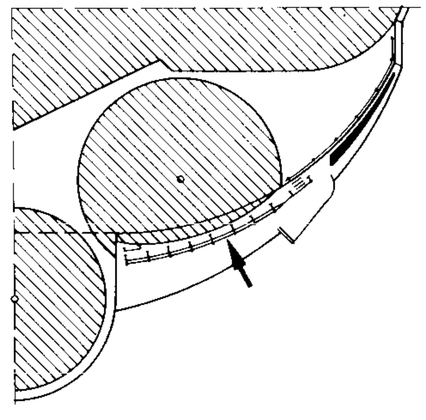
C2/3



C2/4



C2/5



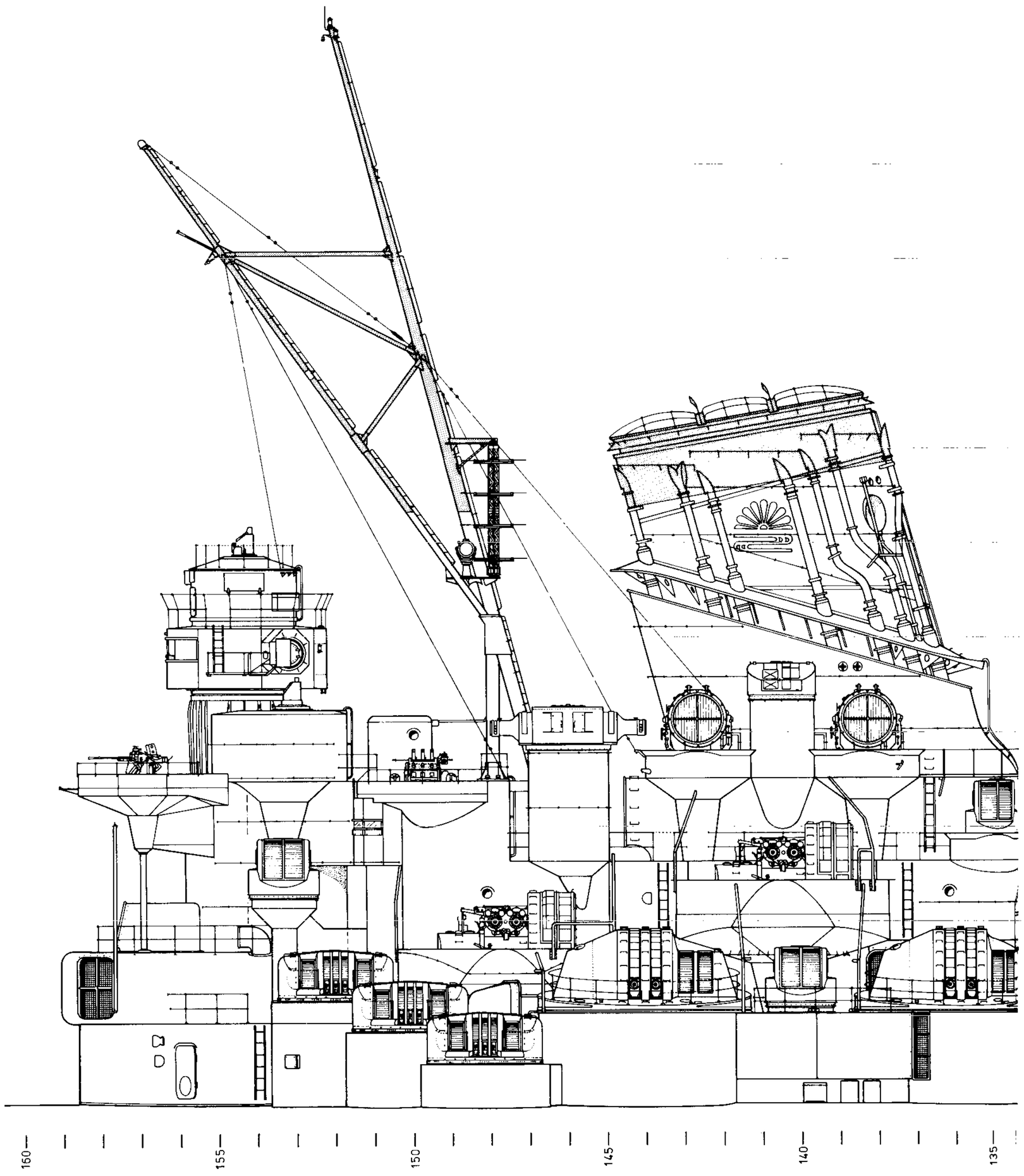
C Superstructure

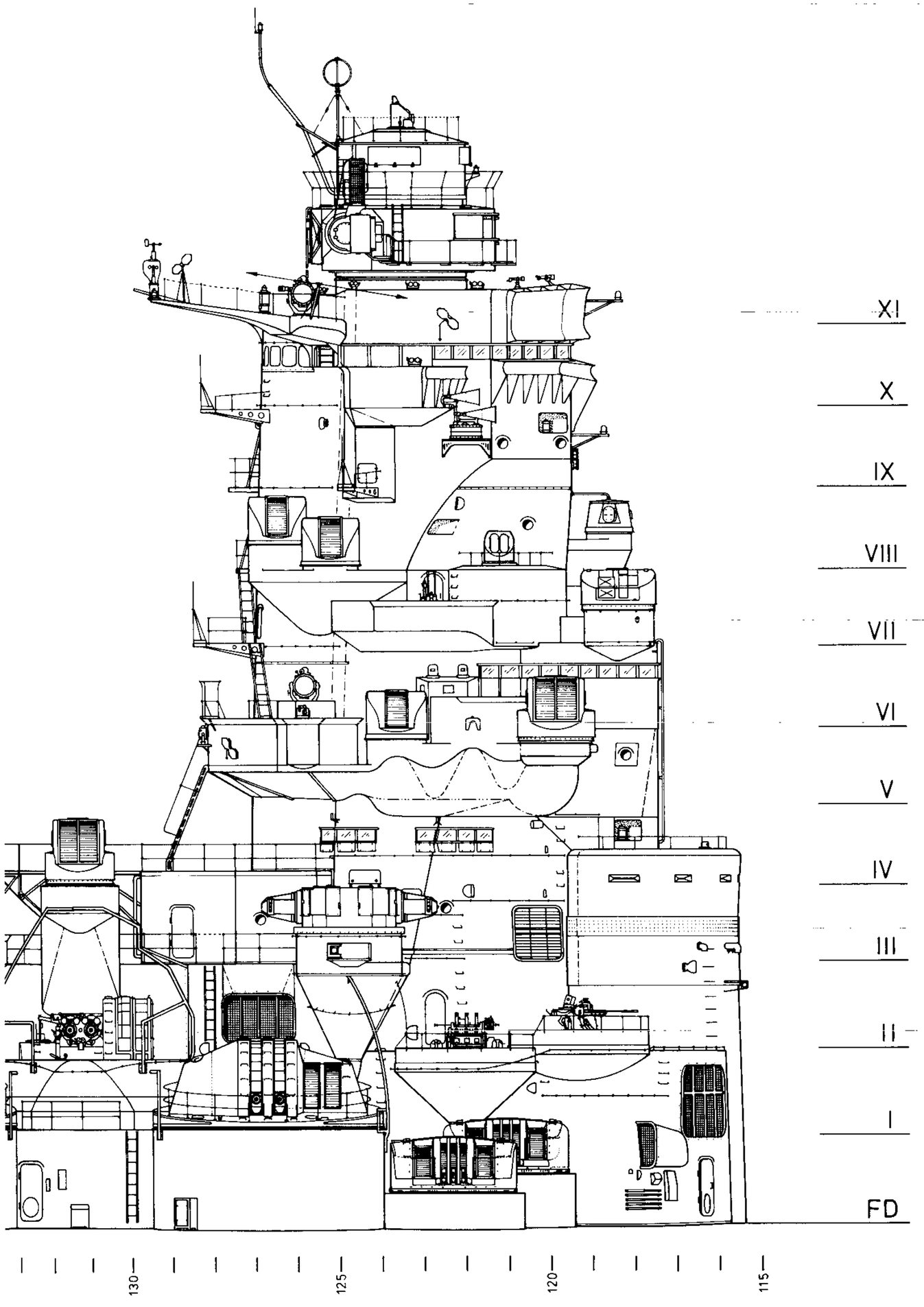
C3 SUPERSTRUCTURE, APRIL 1945 (1/200 scale)

C3/1 Elevation

New installations on tower bridge structure and mast:
Radar — Type 21 'Gô Dentan Kai 3' on 15m rangefinder (fitted 1943)
Deck X — combat bridge — new bigger platforms of both sides (1943)
Radar — Type 22 'Gô Dentan Kai 4' — both sides of bridge decks IX-X (1944)
Radar jammer — 7 antennas fitted on both sides and aft yard of air defence combat post, fore wall of tower, decks IX-X; and both sides of signal platform, deck V (1945)
Radar Type 13 'Gô' installed on both sides of main mast (1944)

C3/2 Plan




XI
X
IX
VIII
VII
VI
V
IV
III
II
I
FD
130
125
120
115

C4 SUPERSTRUCTURE VENTILATION DETAILS

C4/1 Typical intake (no scale)

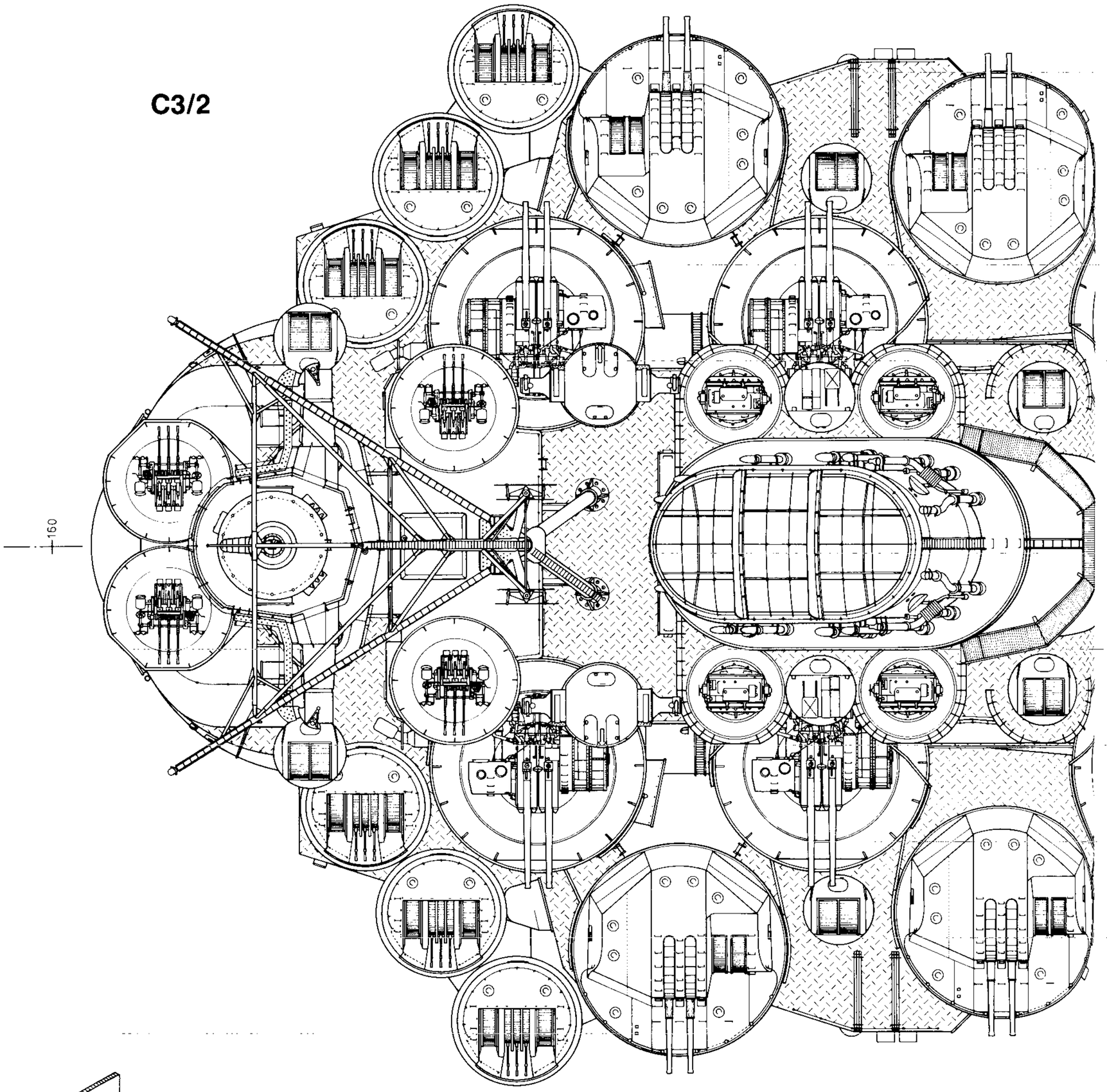
1 Plate of superstructure body
2 Railing for canvas shield
3 Pipe (30-50mm diameter)
4 Wire netting (cloth) frame
5 Wire netting screen

C4/2 Ventilation intake shutter (at back of conning tower; no scale)

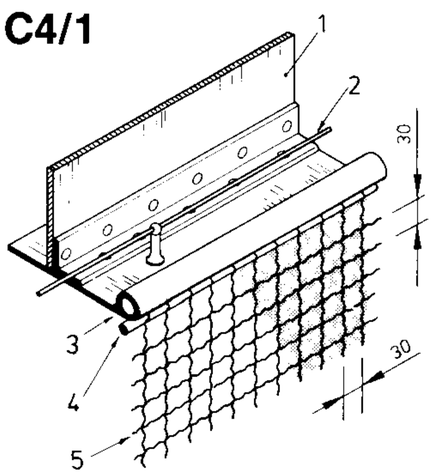
1 Superstructure body
2 Hole frame
3 Shutter

C4/3 Small ventilators from superstructure sides (1/25 scale)

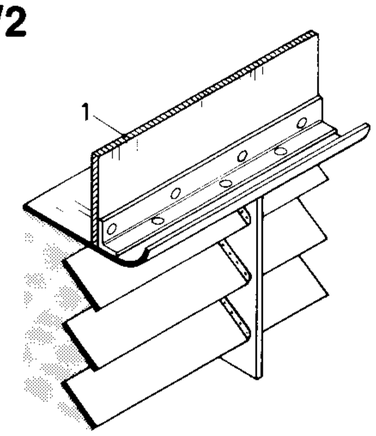
C3/2

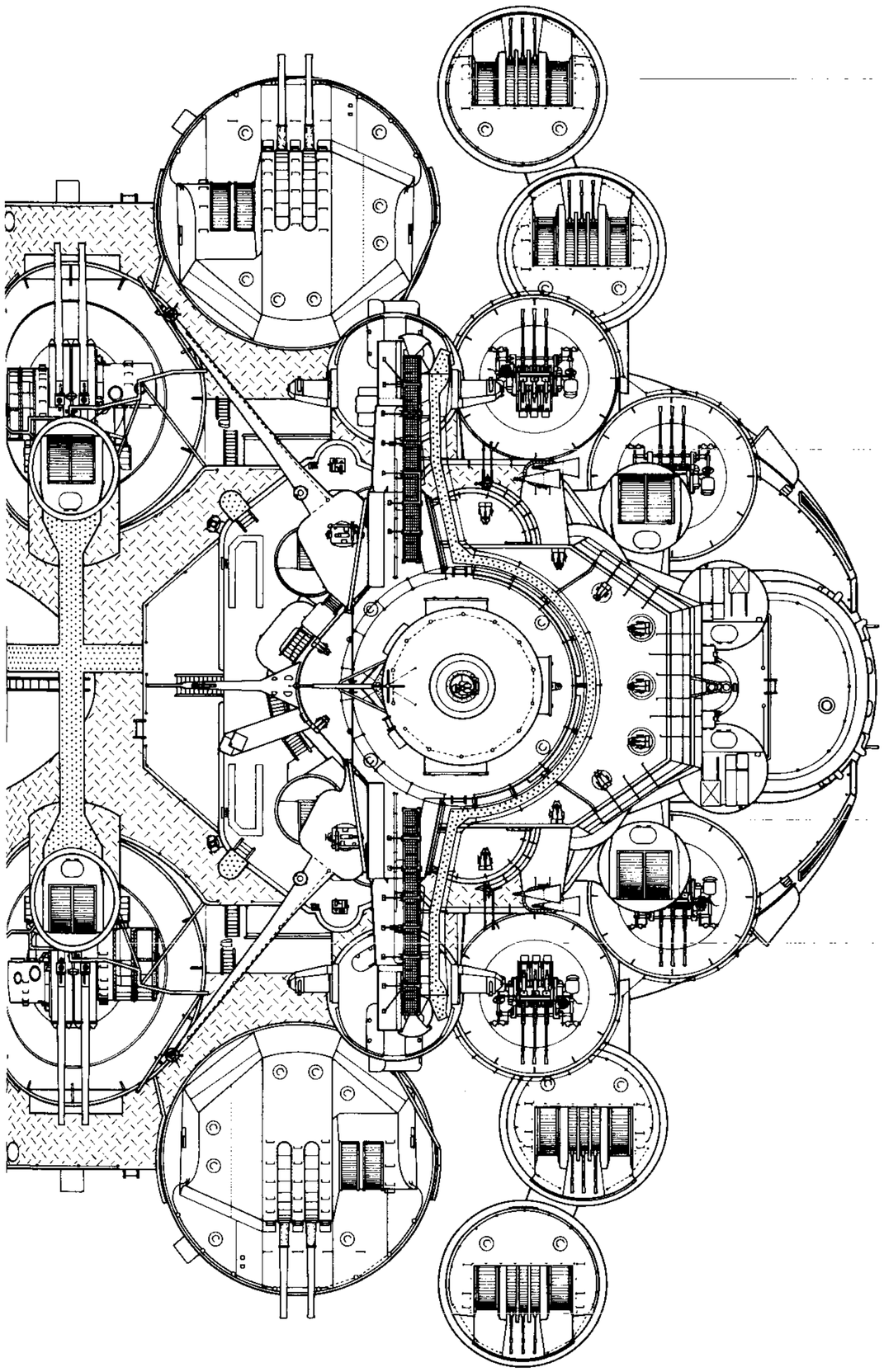


C4/1

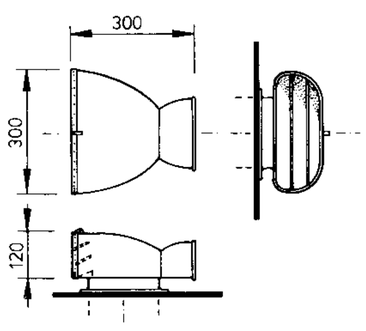


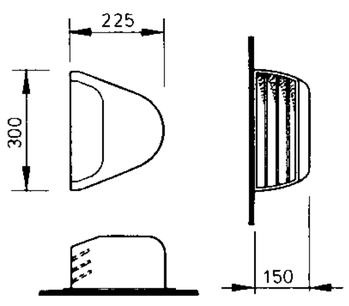
C4/2

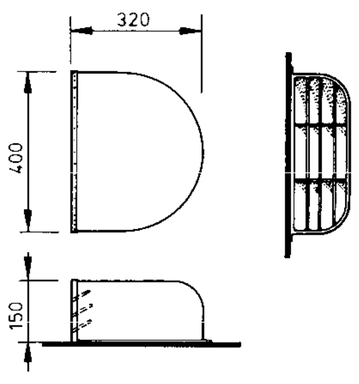


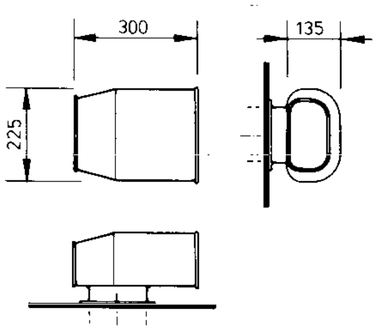


C4/3









C Superstructure

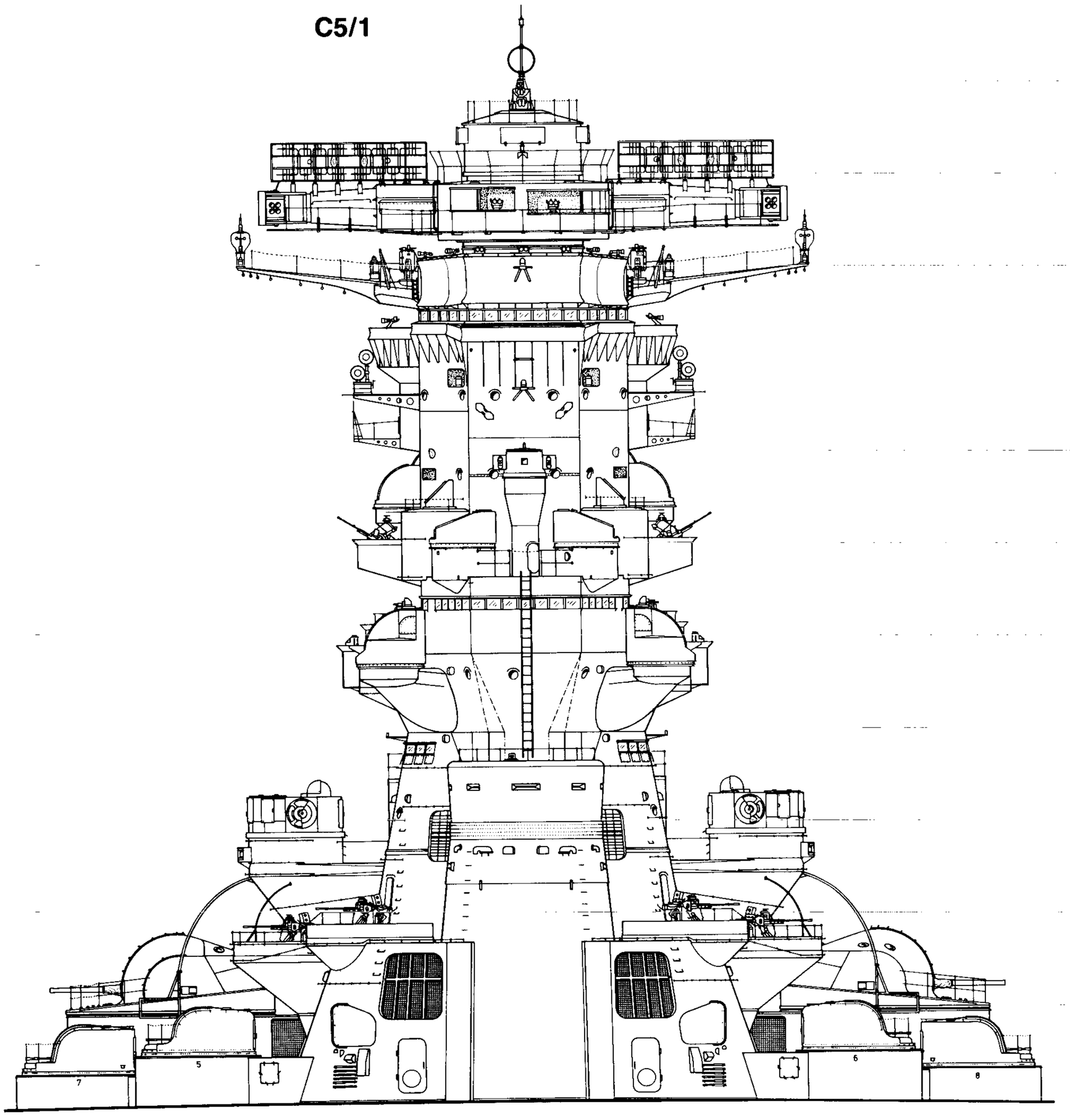
C5 TOWER BRIDGE, APRIL 1945 (1/200 scale)

C5/1 Front elevation

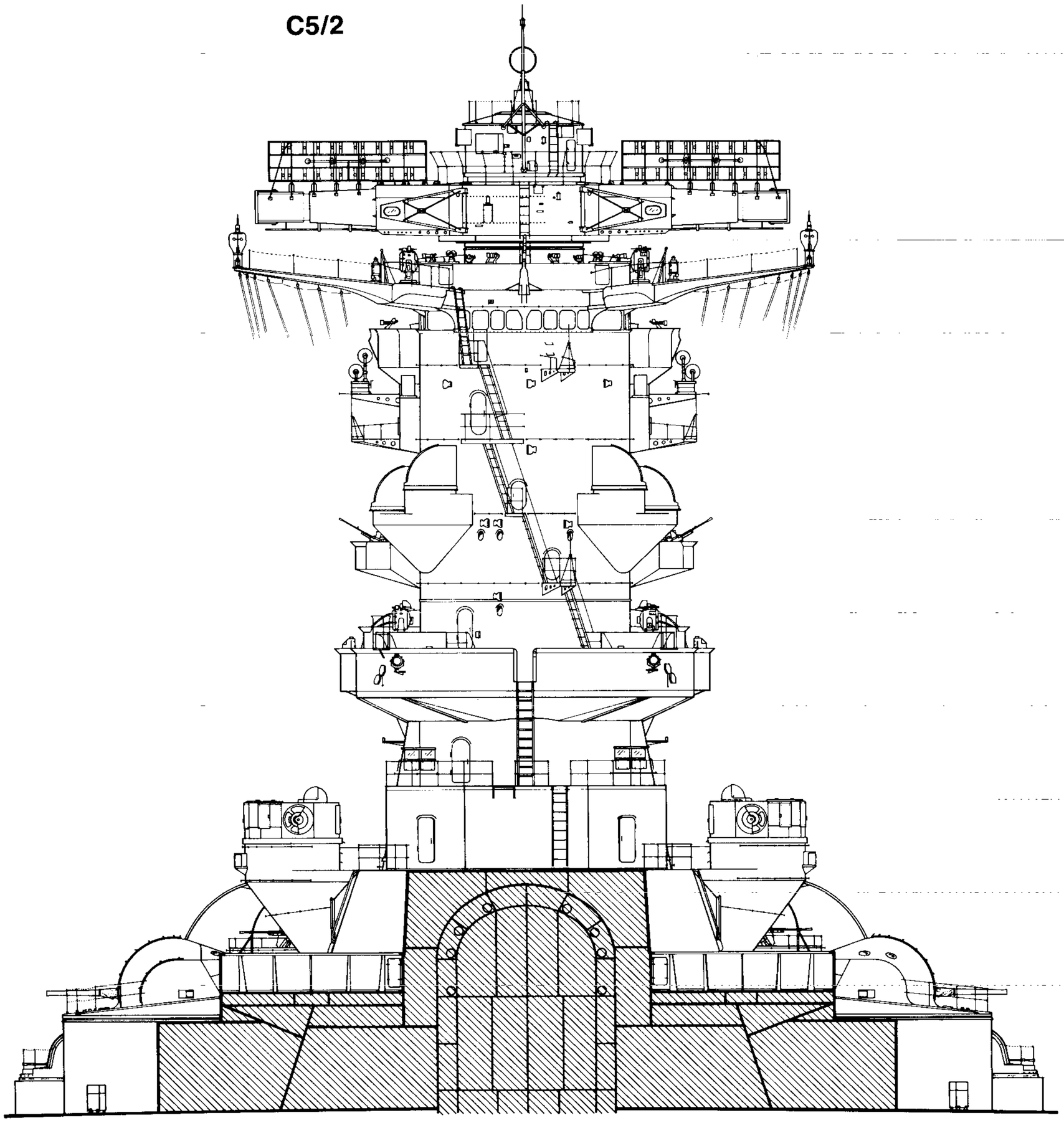
C5/2 Rear elevation (section at frame 130)

Note: Radar jammer — two antennas on upper fore wall of bridge and on both sides of signal platform.
On triple 25mm enclosed mounts white numbers are 200mm high

C5/1



C5/2



C Superstructure

C6 SECTIONS OF SUPERSTRUCTURE, 1941 (1/200 scale)

C6/1 Section view from frame 144 to aft tower with 10m rangefinder

C6/2 View from frame 144 to 140

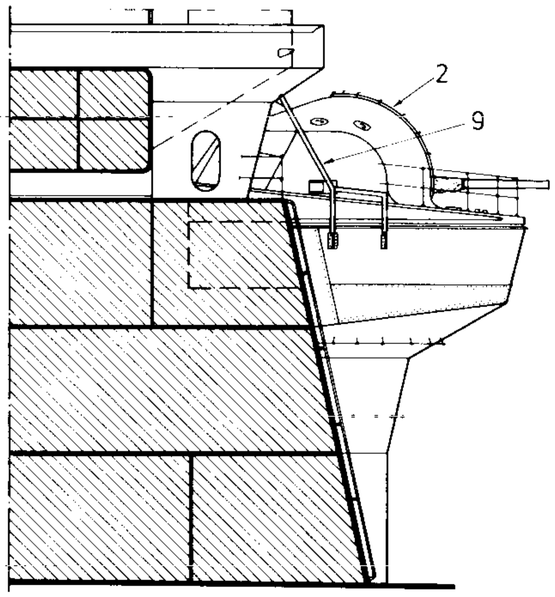
C6/3 View from frame 137 to 141

C6/4 View from frame 137 to 131

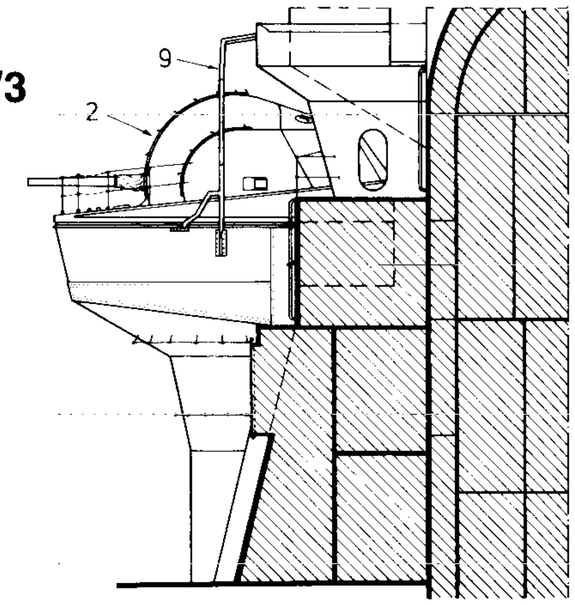
C6/5 View from frame 128 to 132

1 Triple 25mm mount
2 12.7cm gun mount (Type 89 Model A-1-3)
3 150cm searchlight
4 Type 89 LA director 'Hoiban'
5 Auxiliary Type 98 LA director 'Hoiban'
6 10m rangefinder
7 4.5m AA rangefinder
8 Ventilators
9 12.7cm gun barrel stop

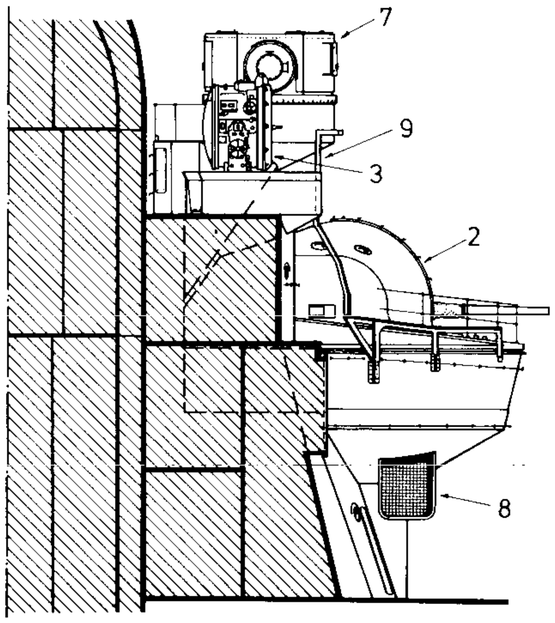
C6/2



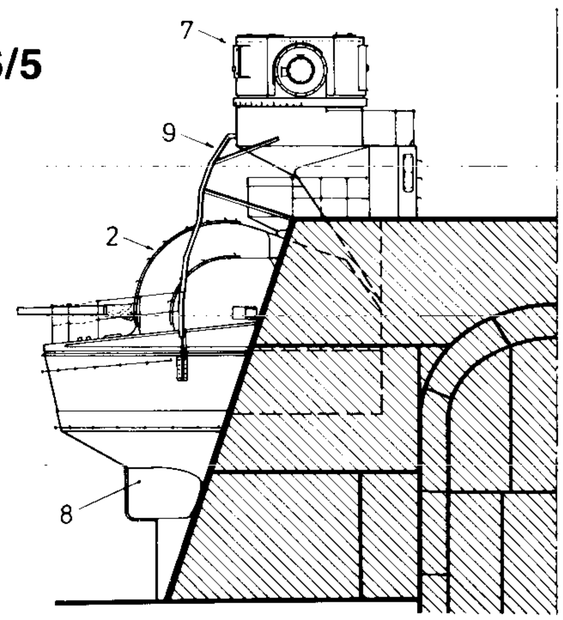
C6/3



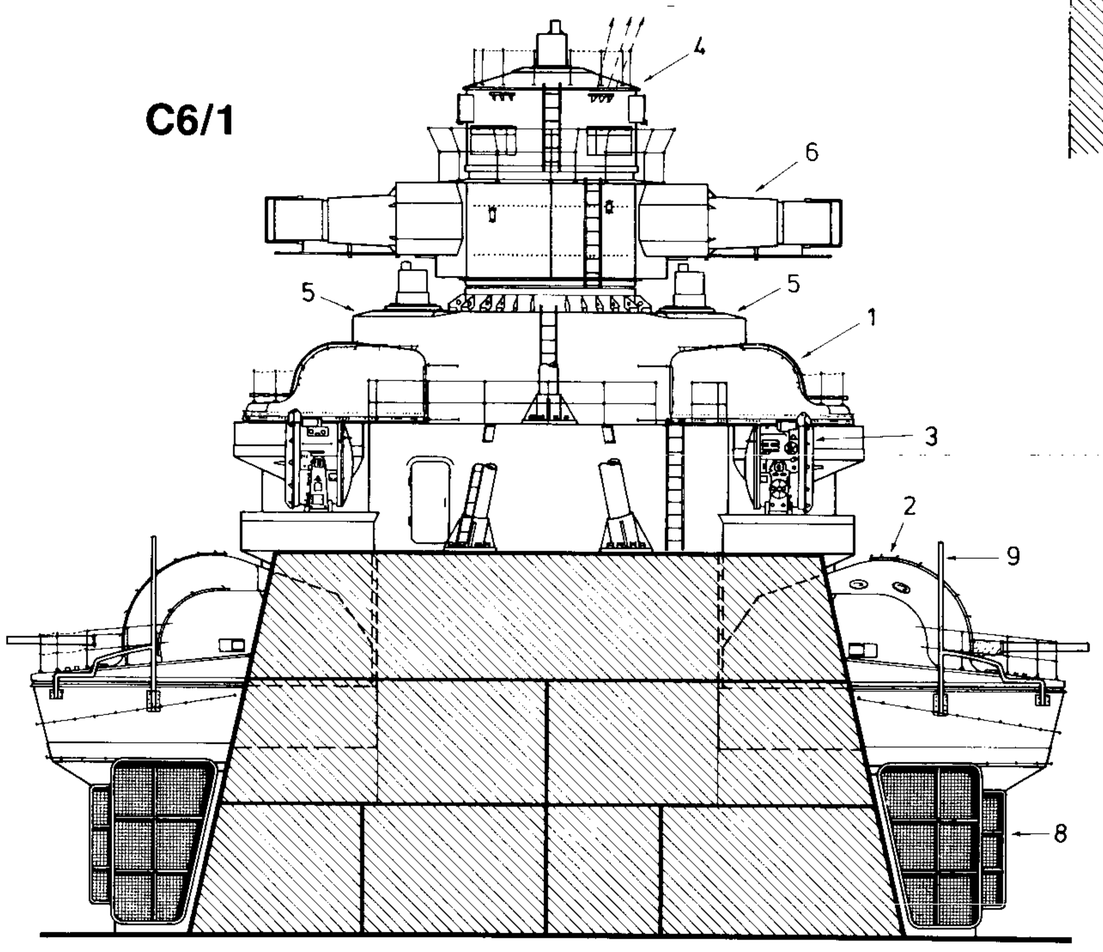
C6/4



C6/5



C6/1



C7 SECTIONS OF SUPERSTRUCTURE, 1945 (1/200 scale)

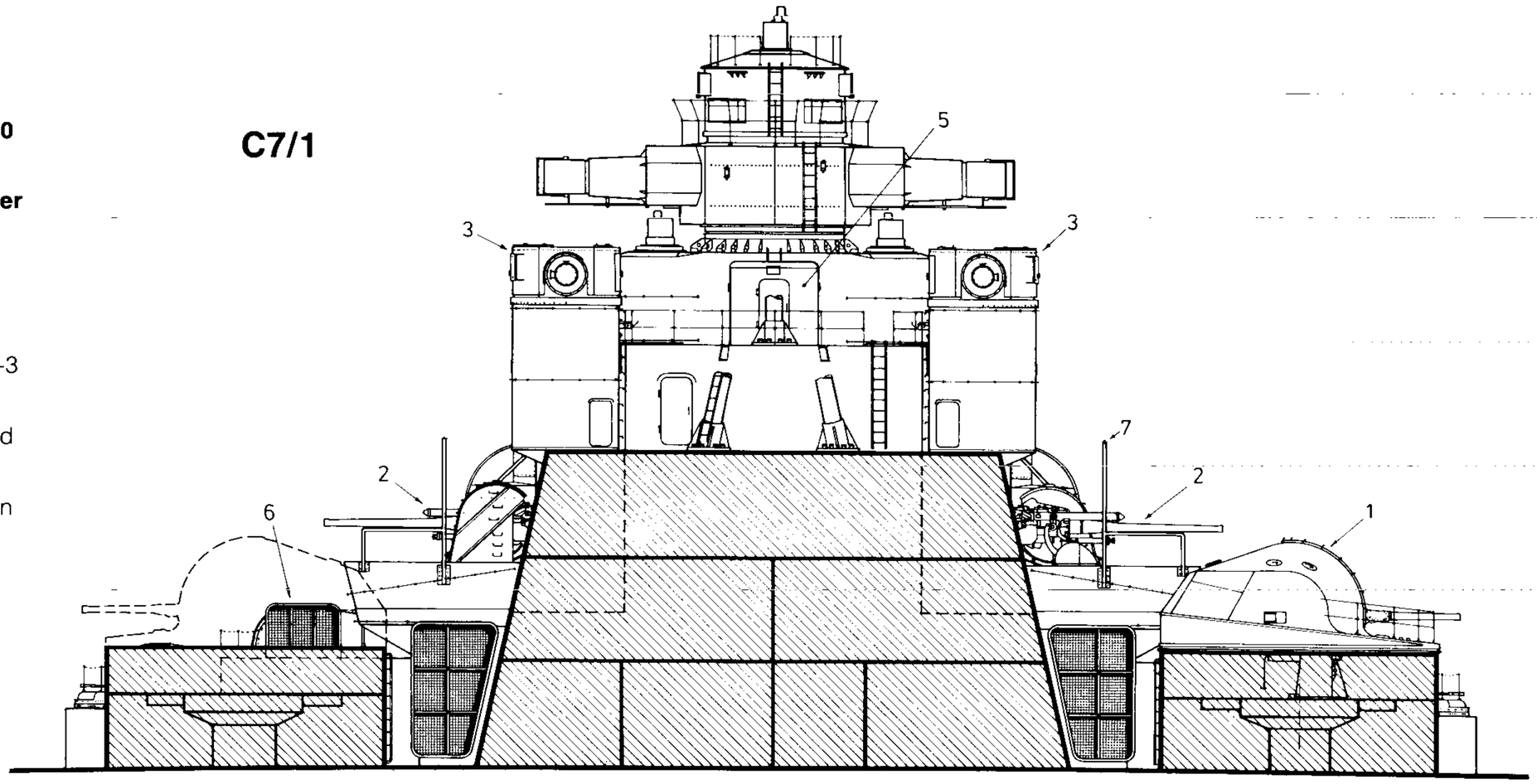
C7/1 View from frame 144 to aft tower with 10m rangefinder

C7/2 View from frame 141 to 136

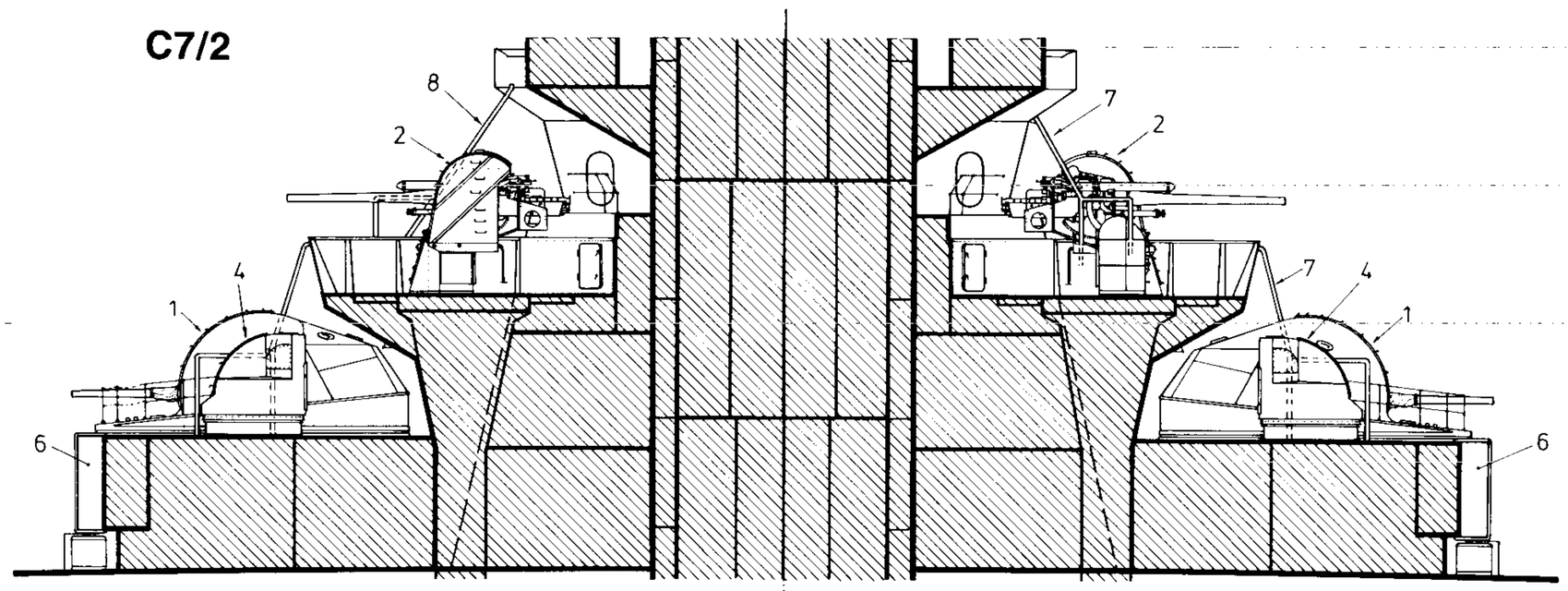
C7/3 View from frame 133 to 128

1 12.7cm mount Type 89 Model A-1-3
2 12.7cm mount Type 89 Model A-1 (fitted 1944)
3 4.5m AA rangefinder (in 1944 fitted from frame 131 to frame 146)
4 MG control towers (fitted 1944)
5 Type 13 'Gô' radar control position
6 Ventilators
7 12.7cm gun barrel stop — fore
8 12.7cm gun barrel stop — aft

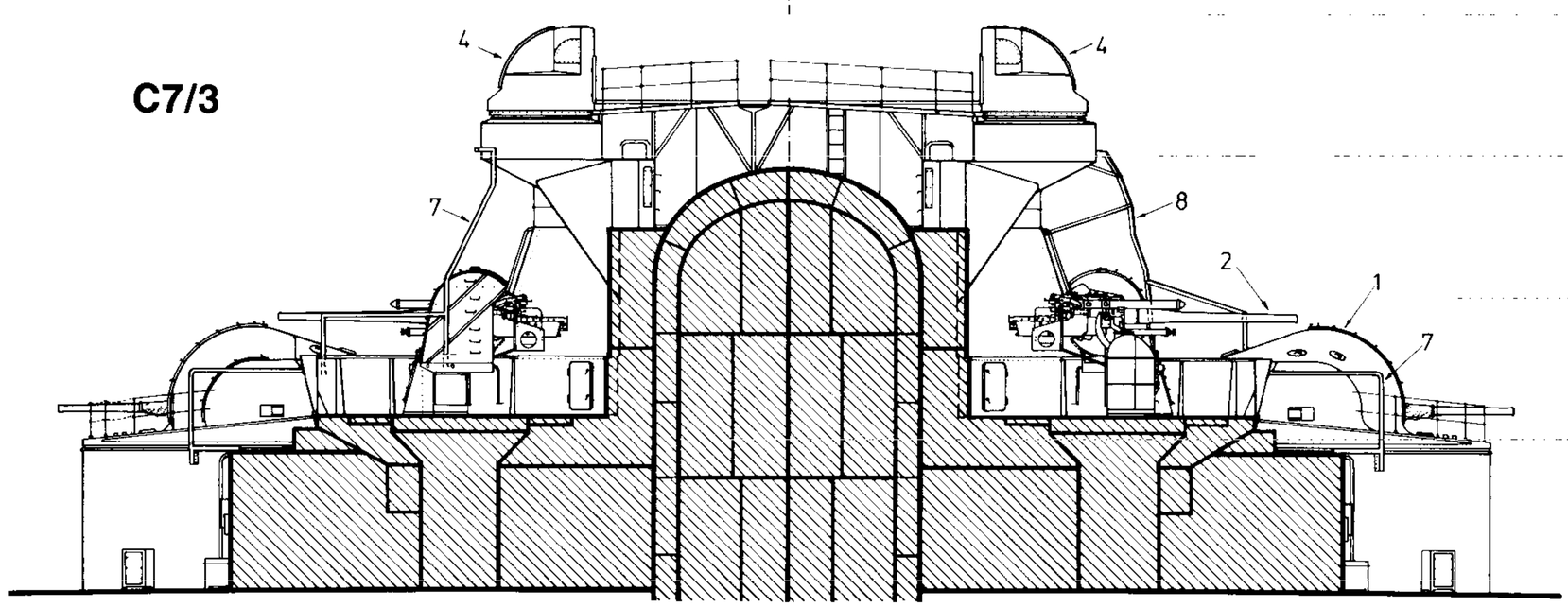
C7/1



C7/2



C7/3



C Superstructure

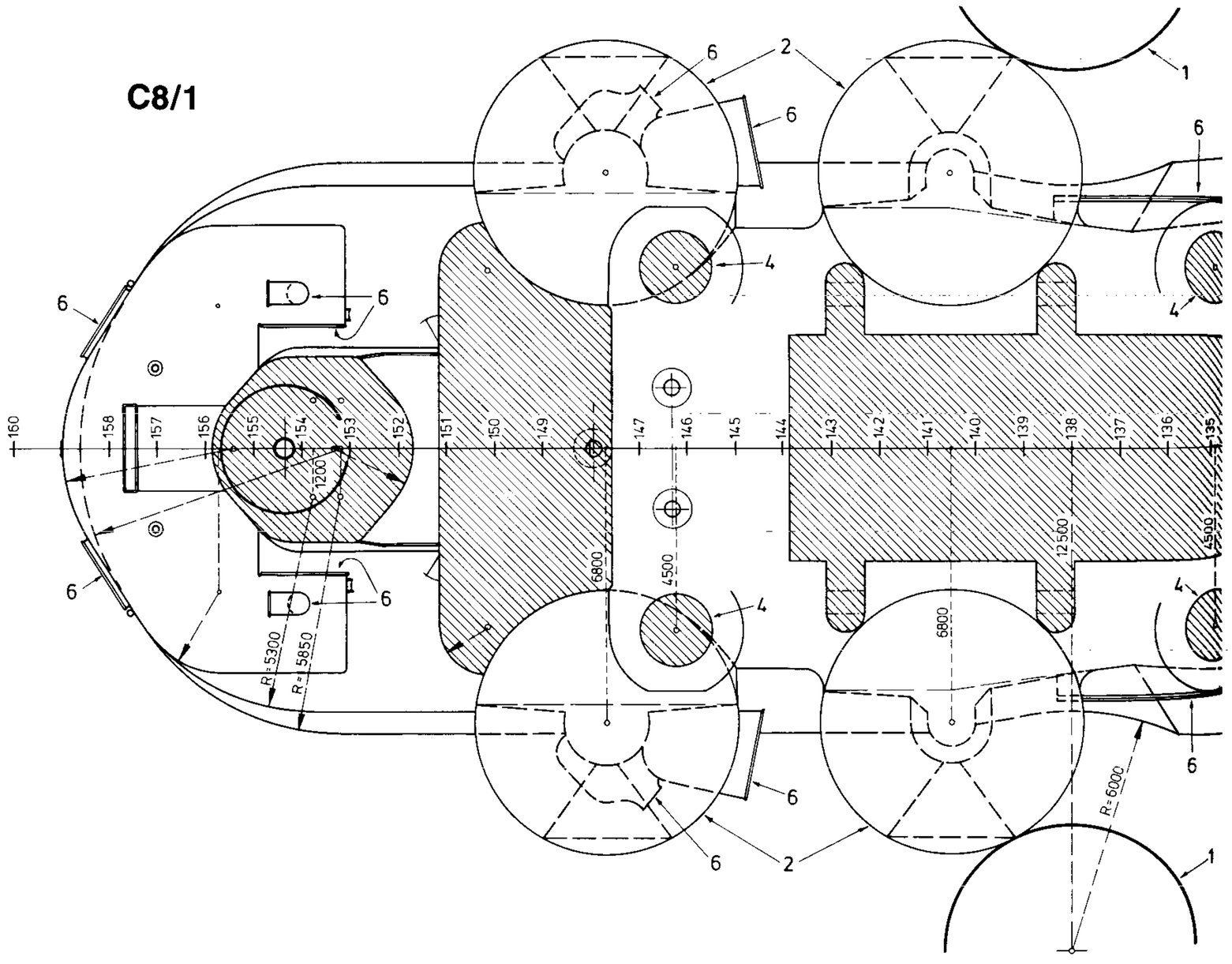
C8 SUPERSTRUCTURE DECKS, 1941 (1/200 scale)

C8/1 Geometrical plan of lower part of superstructure, decks FD — III

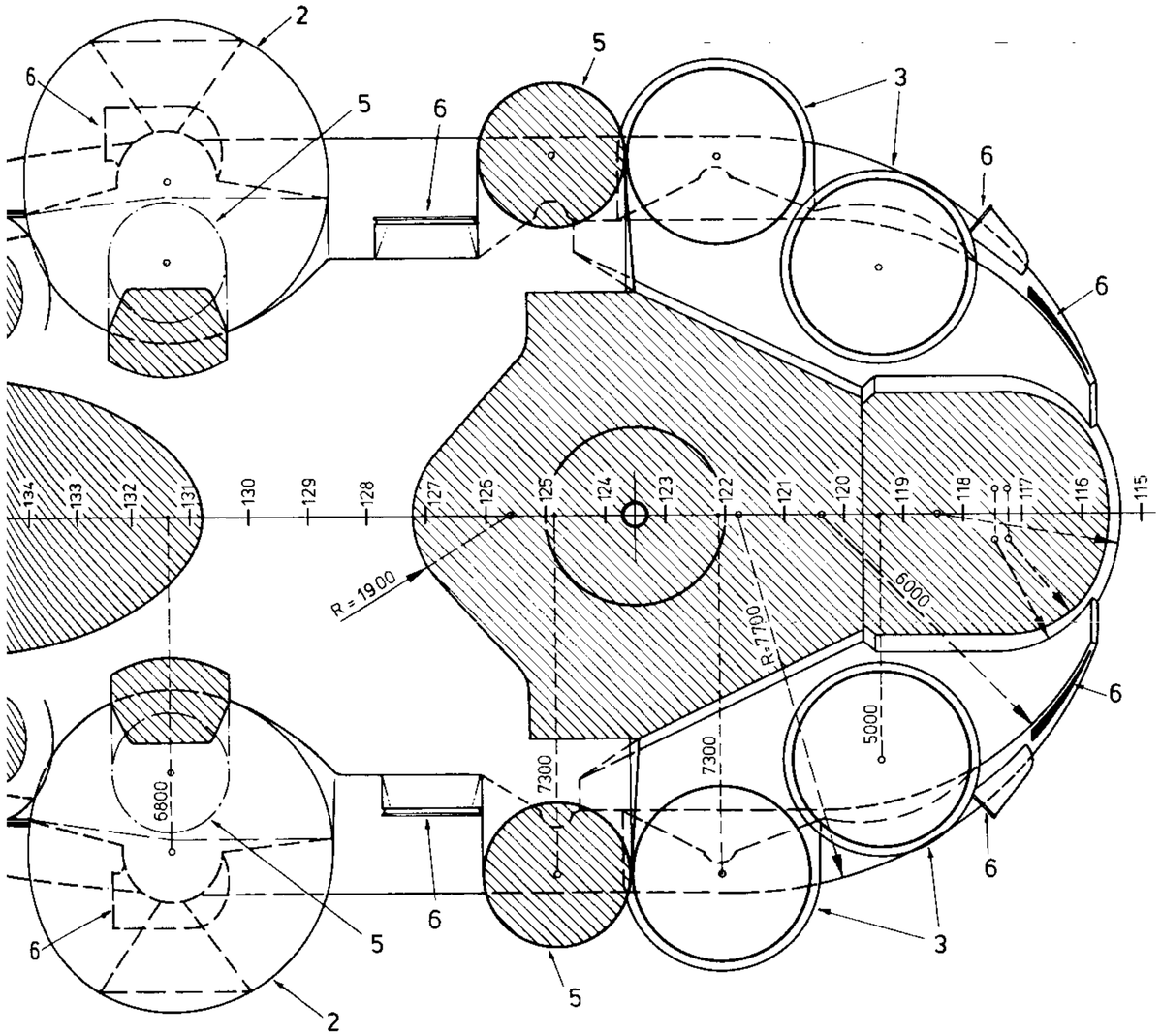
C8/2 Partial plan, decks FD — V

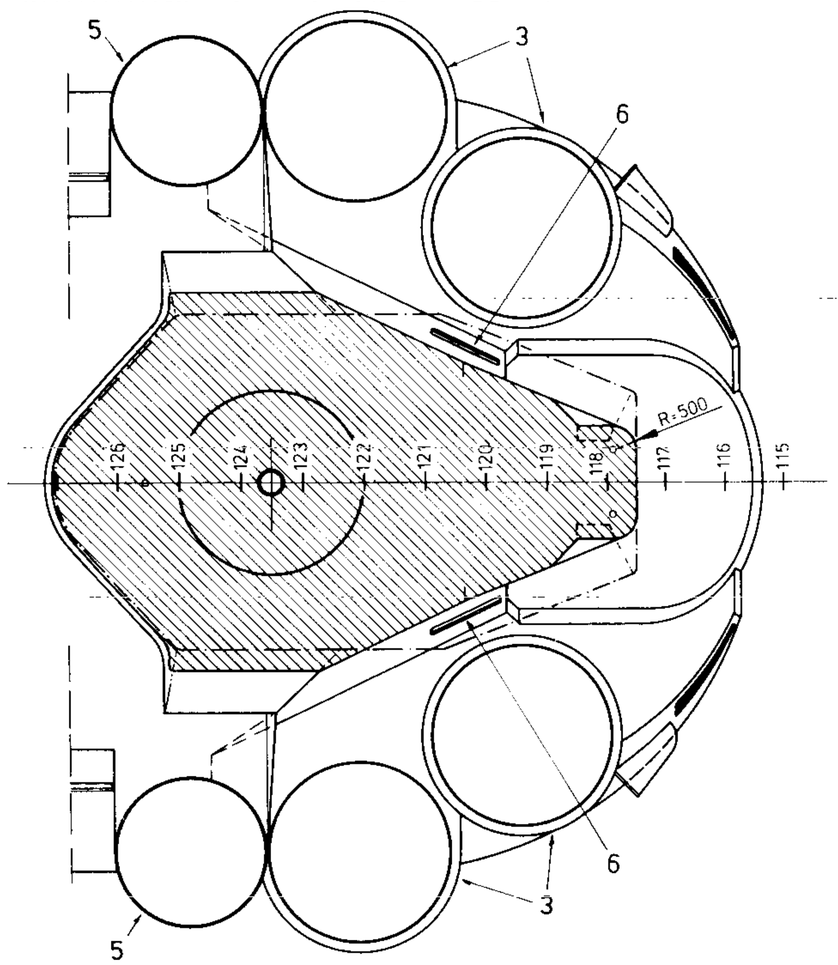
1 15.5cm gun barbette
2 12.7cm gun position
3 Triple 25mm MG position
4 150cm searchlight position
5 4.5m rangefinder position
6 Ventilator

C8/1



C8/2


2
5
6
3
R=1900
R=7100
6000
5000
7300
6800
134
133
132
131
130
129
128
127
126
125
124
123
122
121
120
119
118
117
116
115


5
3
6
R=500
126
125
124
123
122
121
120
119
118
117
116
115

C Superstructure

C9 DECKS OF TOWER BRIDGE STRUCTURE, 1941 (1/200 scale)

C9/1 Deck No XI — air defence command station

1 Wind baffle
2 Signal lamp
3 12cm and 9cm binoculars
4 Pelorus
5 Hatch (open)
6 15m rangefinder base
7 Signal yard with searchlight platform
8 60cm searchlight position
9 Daylight signalling lantern
10 Wind direction and intensity transmitter
11 Antenna yard
12 Dressing line stanchion
13 Dressing line: upper part of main mast column — to jack staff
14 Dressing line to top of main mast
15 Main aerials — to both tops of side arms of main mast
16 Downhauler (aerials)

C9/2 Deck No X, combat bridge (bridge No 1)

1 Wind baffle
2 Light signalling platform
3 Binoculars
4 Ladder
5 Antenna platform
6 Observation platform

C9/3 Deck No VII

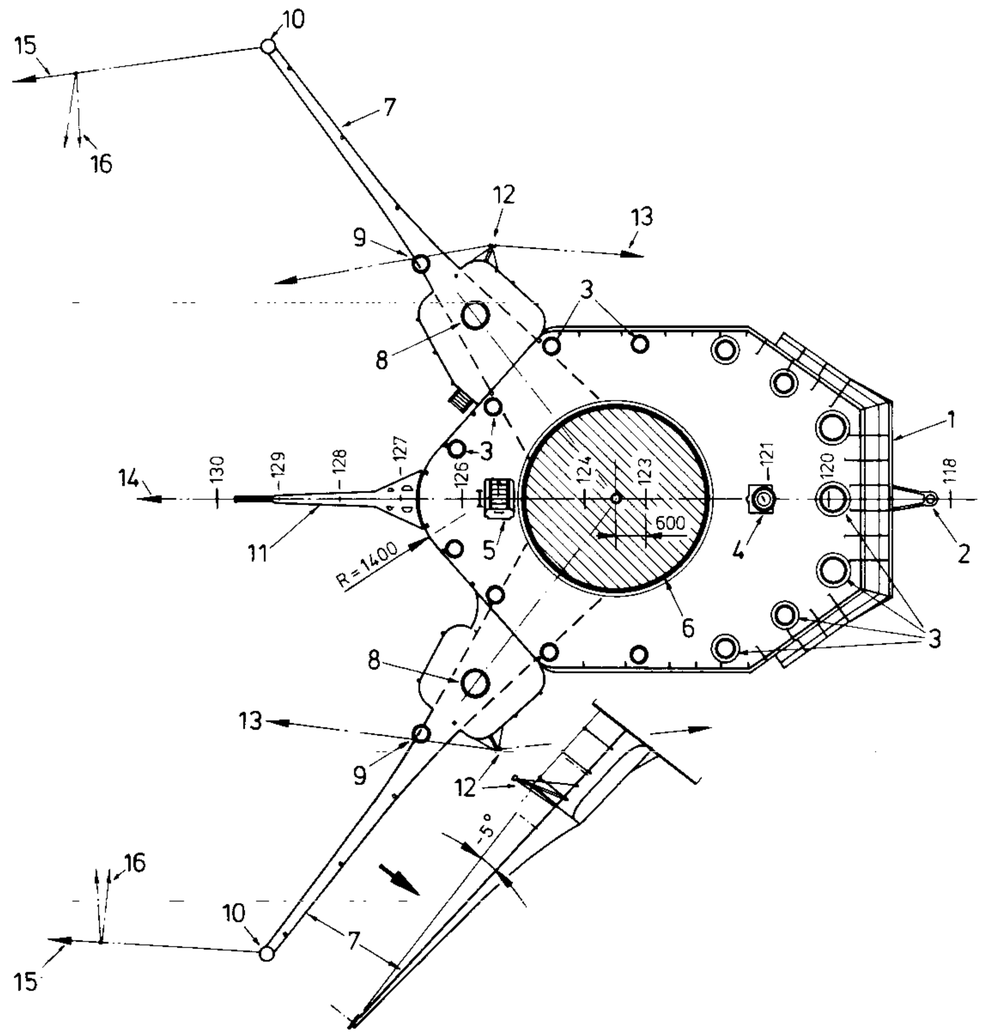
1 MG control towers
2 1.5m navigation rangefinder
3 Auxiliary Type 89 LA director ('Hoiban') with periscope
4 Twin 13mm MG mounting
5 Searchlight control tower
6 Antenna platform
7 Bridge No 2

C9/4 Deck No VI, compass platform (bridge No 2)

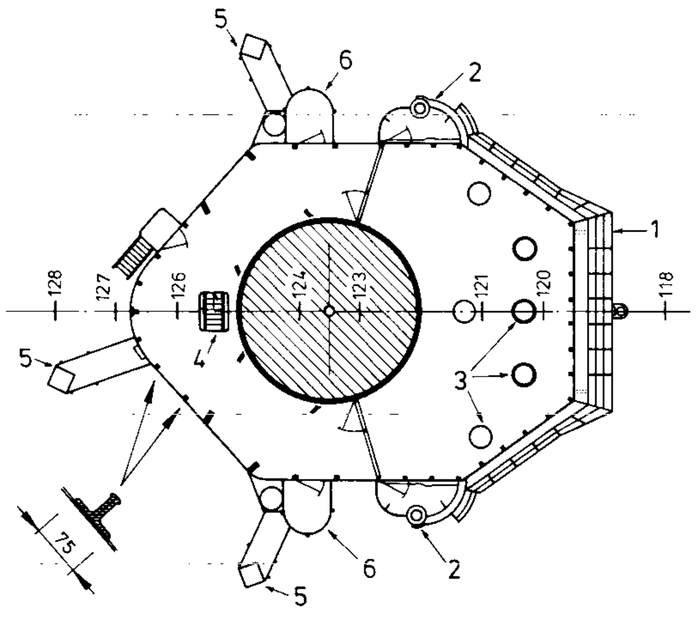
1 Searchlight control tower
2 Armoured observation position with periscope
3 60cm searchlight platform
4 Signal deck
5 Signal platform
6 Ladder
7 Compass bridge
8 30cm deck lamp

C9/5 View of compass platform and conning tower 1941 (no scale)

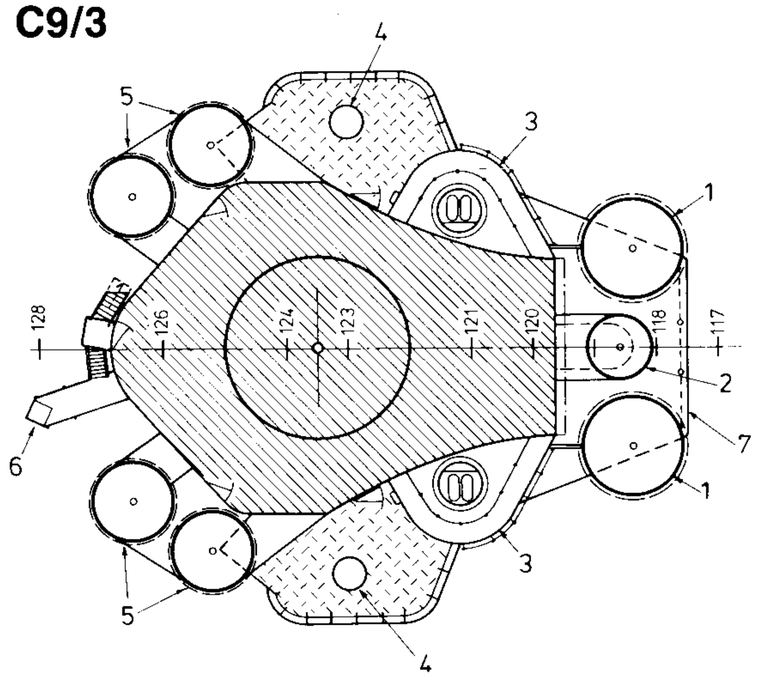
C9/1



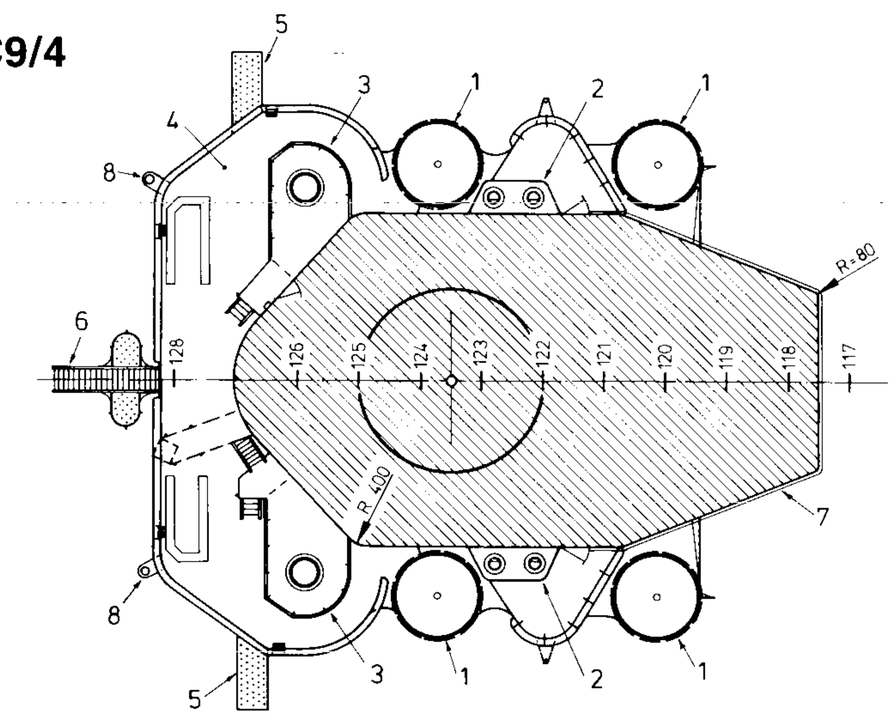
C9/2



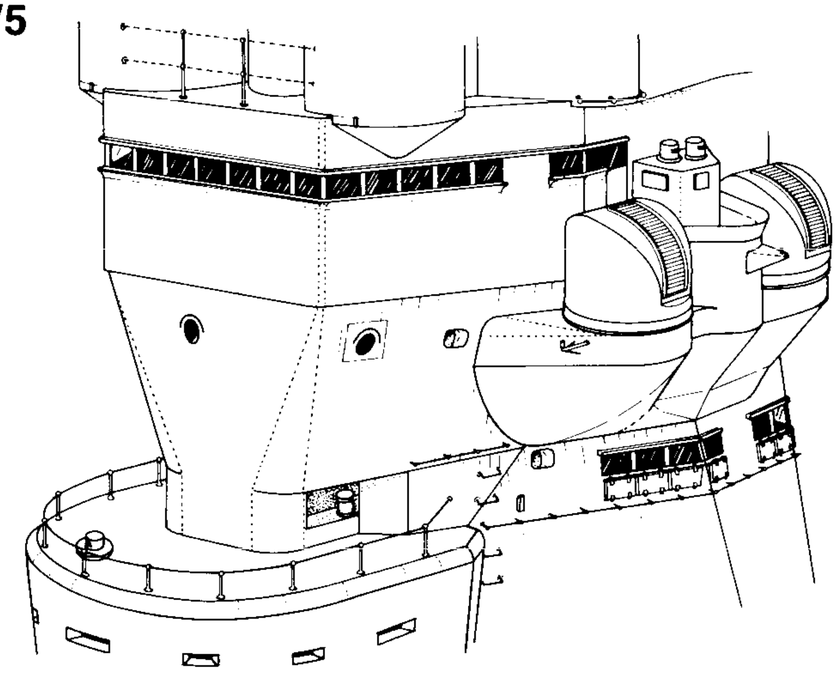
C9/3


4
5
3
1
128
126
124
123
121
120
118
117
2
7
6
1
3
5
4

C9/4


5
4
3
1
2
1
8
R=80
6
128
126
125
124
123
122
121
120
119
118
117
R 400
7
8
3
1
2
1
5

C9/5



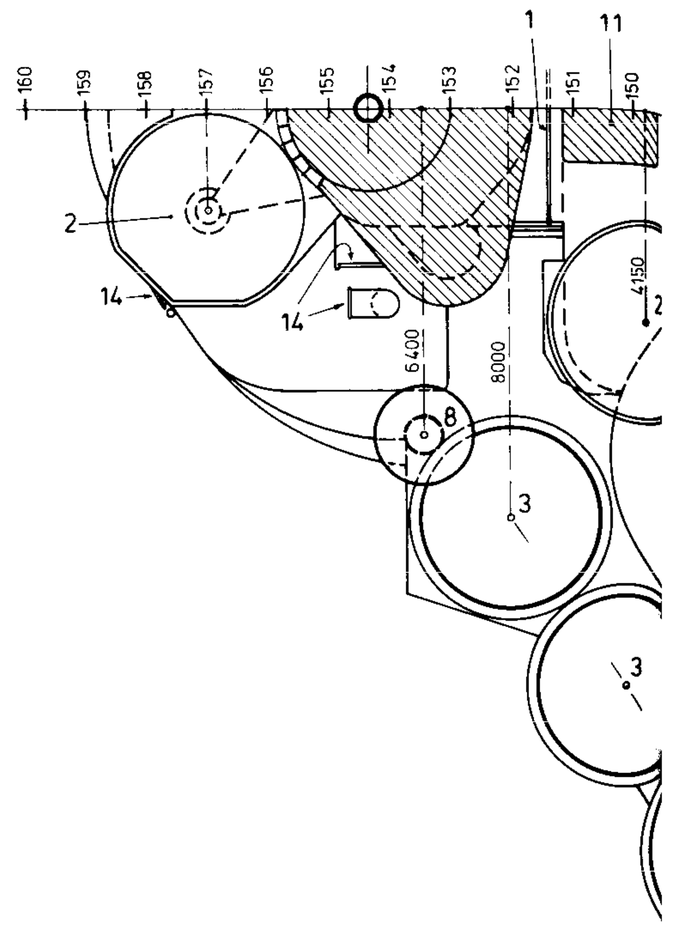
C Superstructure

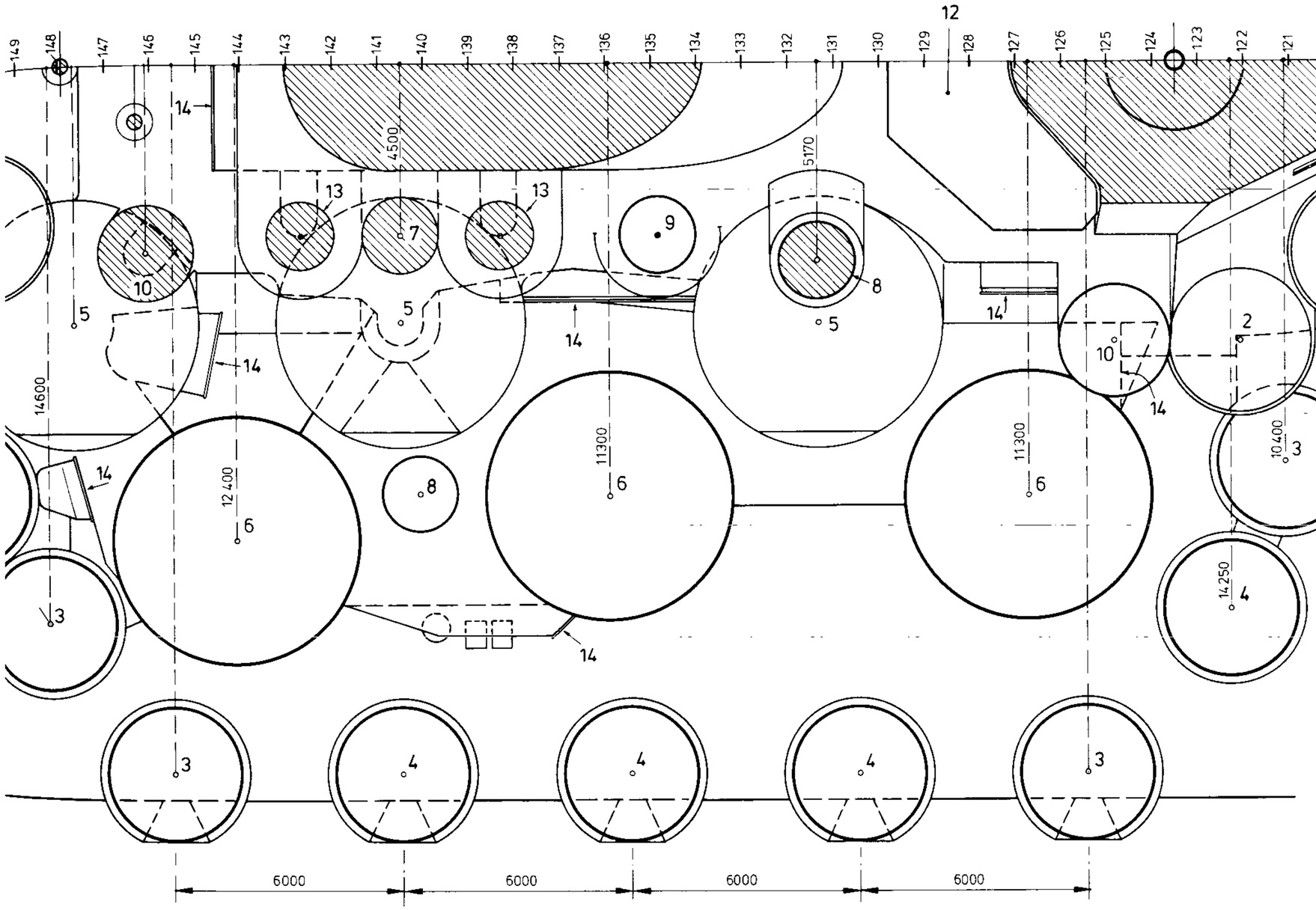
C10 SUPERSTRUCTURE DECKS, APRIL 1945 (1/200 scale)

C10/1 Geometrical plan of lower part of superstructure, decks FD — V

1 Expansion joint
2 Triple 25mm MG (open)
3 Triple 25mm MG with shield type 1 (fitted 1944)
4 Triple 25mm MG with shield type 2 (fitted 1945)
5 12.7cm gun Type 89 Model A-1
6 12.7cm gun Type 89 Model A-1-3
7 MG control tower
8 MG control tower fitted April 1944
9 MG control tower fitted 1945
10 4.5m AA rangefinder
11 Type 13 'Gô' radar control position fitted 1944
12 Structure fitted April 1944
13 150cm searchlight
14 Ventilator

C10/1




12
149 148 147 146 145 144 143 142 141 140 139 138 137 136 135 134 133 132 131 130 129 128 127 126 125 124 123 122 121 120 119 118 117 116 115
14
4500
5170
13
13
7
9
10
5
5
5
8
14
14
14
14
14
14
14
14
14
14600
12400
11300
11300
10400
14250
6
6
8
3
2
2
3
4
3
4
4
4
3
14
6000
6000
6000
6000

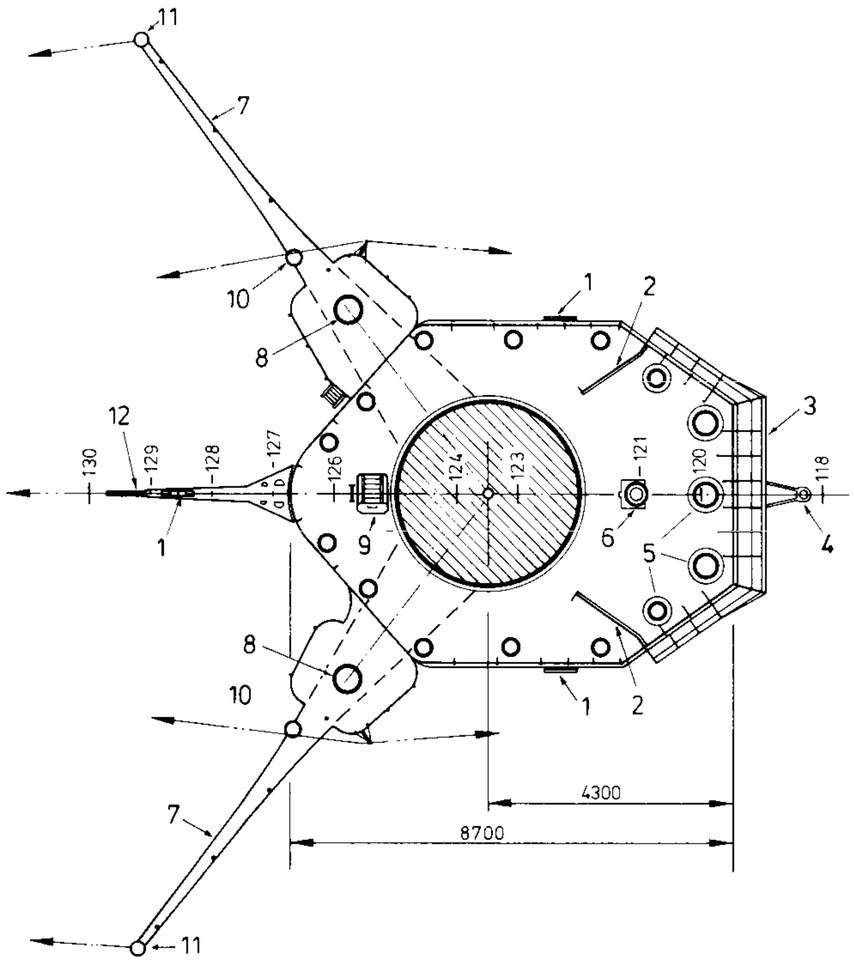
C Superstructure

C11 DECKS OF TOWER BRIDGE, 1945 (1/200 scale)

C11/1 Deck No IX, air defence command station

1 Radar jamming antenna fitted 1945
2 Railing (steel plate) fitted 1944
3 Wind baffle
4 Signal lamp
5 12cm and 9cm binocular pedestals
6 Pelorus
7 Signal yard with searchlight platform
8 60cm searchlight
9 Hatch
10 Daylight signalling lantern
11 Wind direction and intensity transmitter
12 Antenna yard

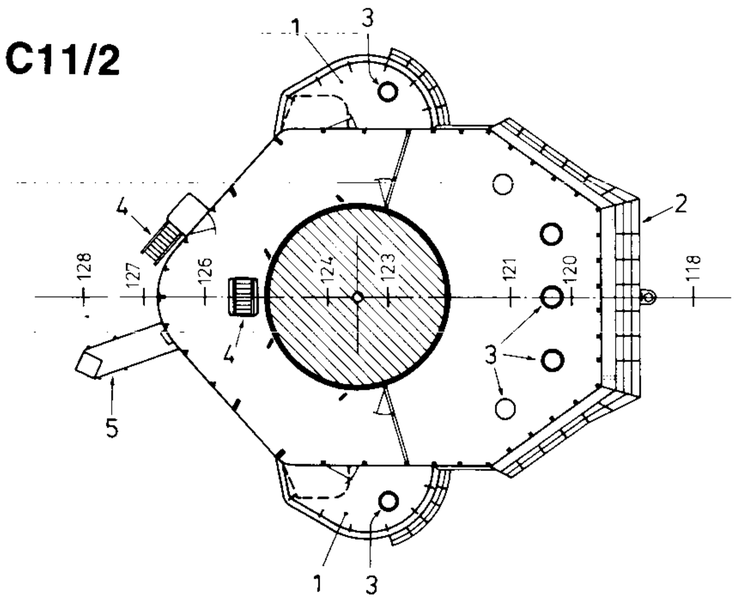
C11/1



C11/2 Deck No X, combat bridge (bridge No 1)

1 Observation platform fitted 1943
2 Wind baffle
3 Binocular position
4 Ladder
5 Antenna platform

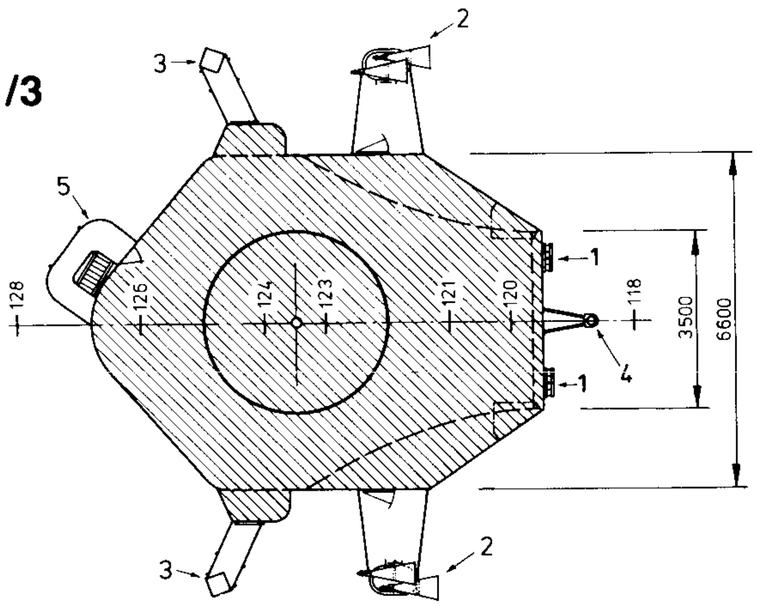
C11/2



C11/3 Deck No IX

1 Radar jamming antenna fitted 1945
2 Type 22 surface search radar horns antenna fitted April 1944 (16 January-15 April refit)
3 Antenna platform
4 Signal lamp
5 Ladder platform

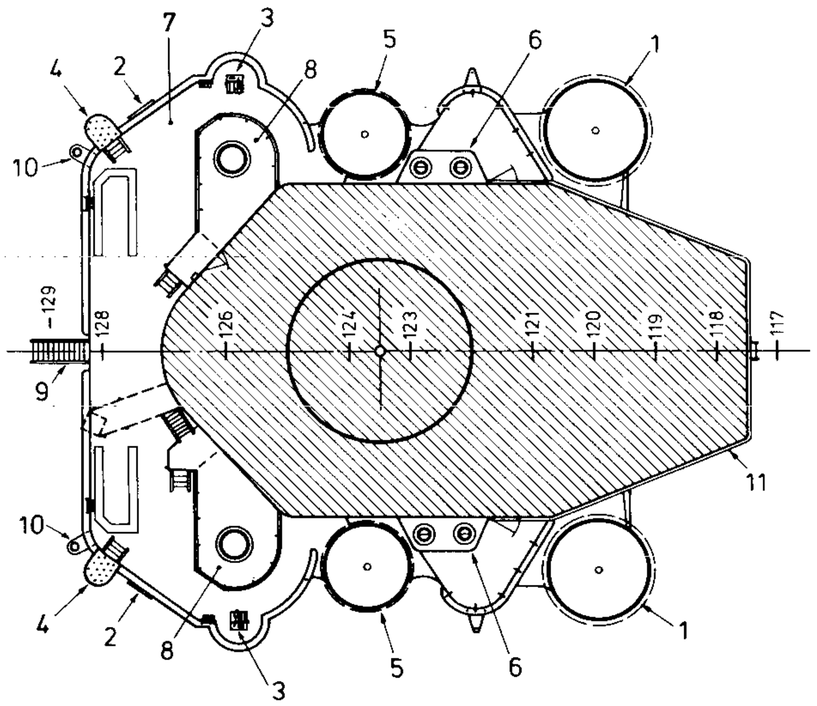
C11/3



C11/4 Deck No VI, compass bridge (bridge No 2)

1 MG control tower fitted April 1944
2 Radar jamming antenna fitted 1945
3 MG control position fitted April 1944
4 Signalling position fitted April 1944
5 Searchlight control tower
6 Armoured observation post with periscope on top
7 Signal deck
8 60cm searchlight platform
9 Ladder
10 30cm deck lamp
11 Compass bridge

C11/4



C Superstructure

C12 WIND BAFFLE ON UPPER PART OF TOWER BRIDGE STRUCTURE (1/75 scale)

C12/1 Front elevation of upper bridge

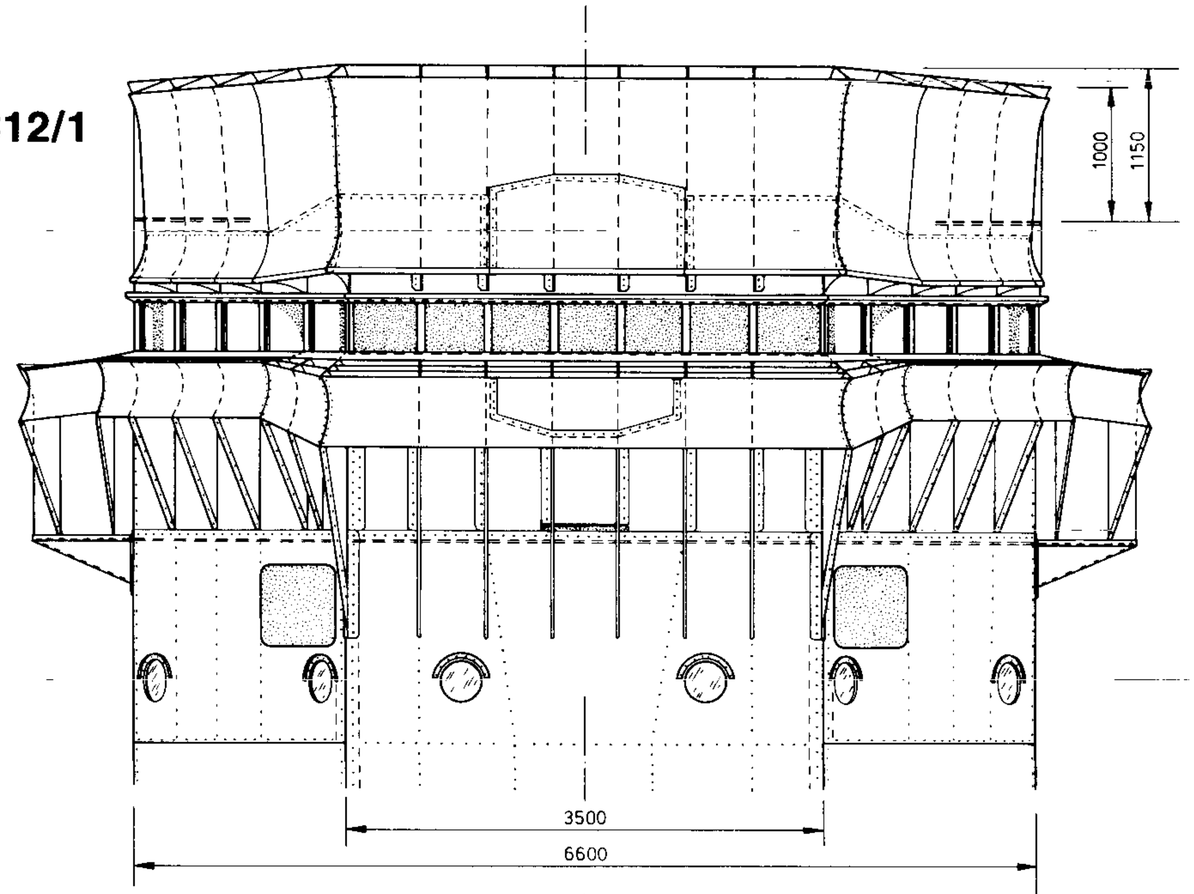
C12/2 Plan of air defence platform (circles = binocular pedestals)

C12/3 Plan of combat bridge deck

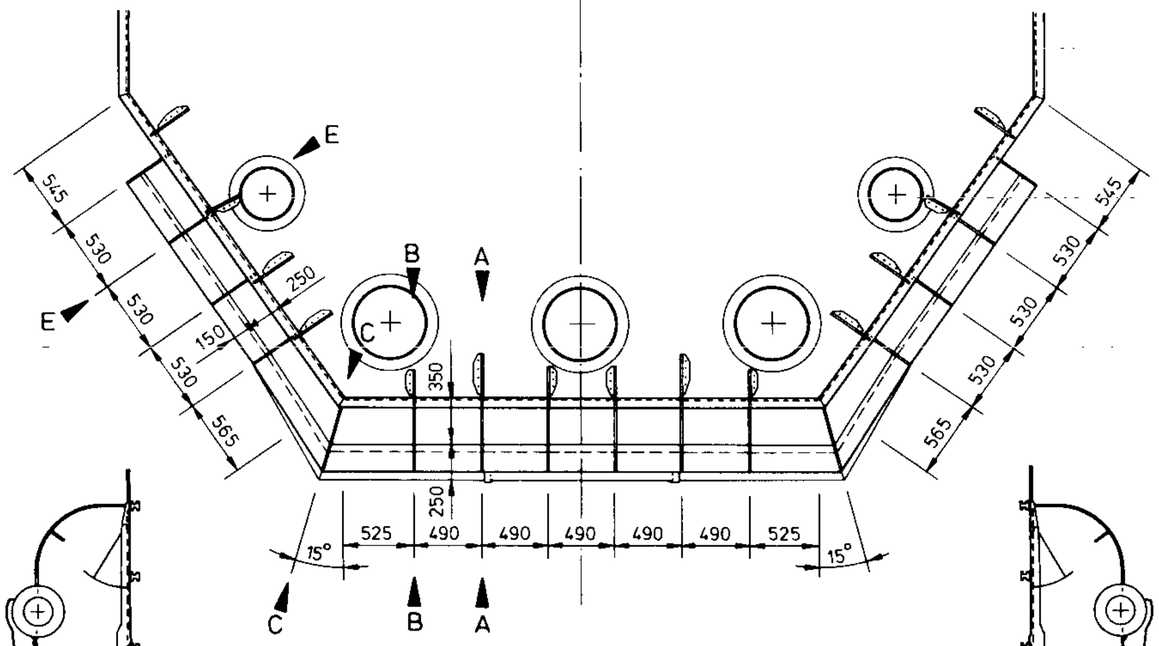
C12/4 Sections A-A, C-C, D-D, F-F

C12/5 Sections B-B, E-E, G-G (3 × scale)

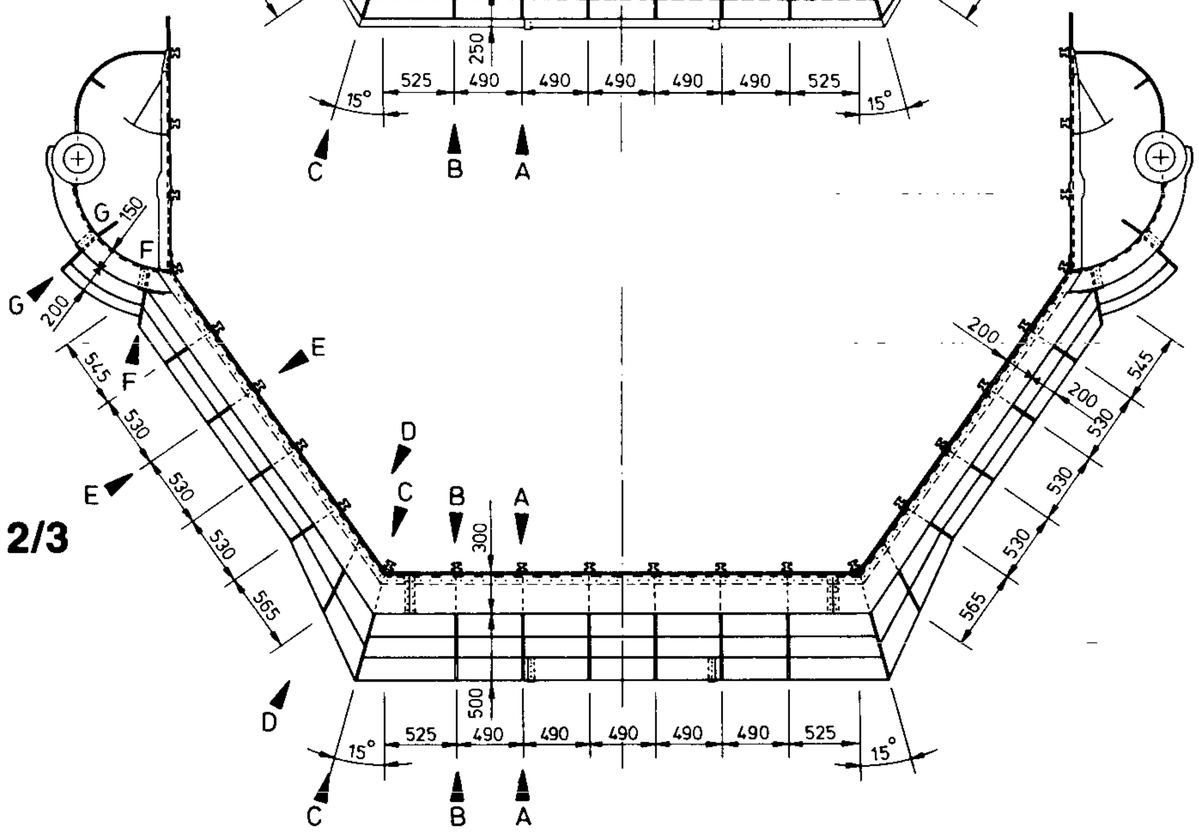
C12/1



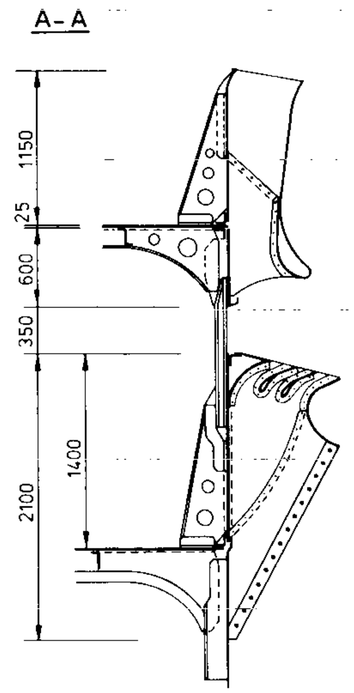
C12/2

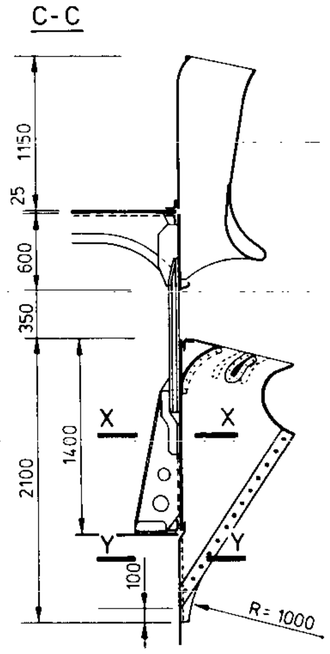


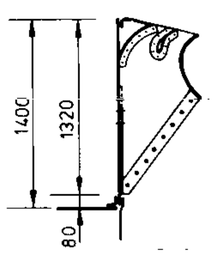
C12/3

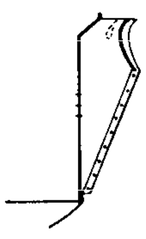


C12/4

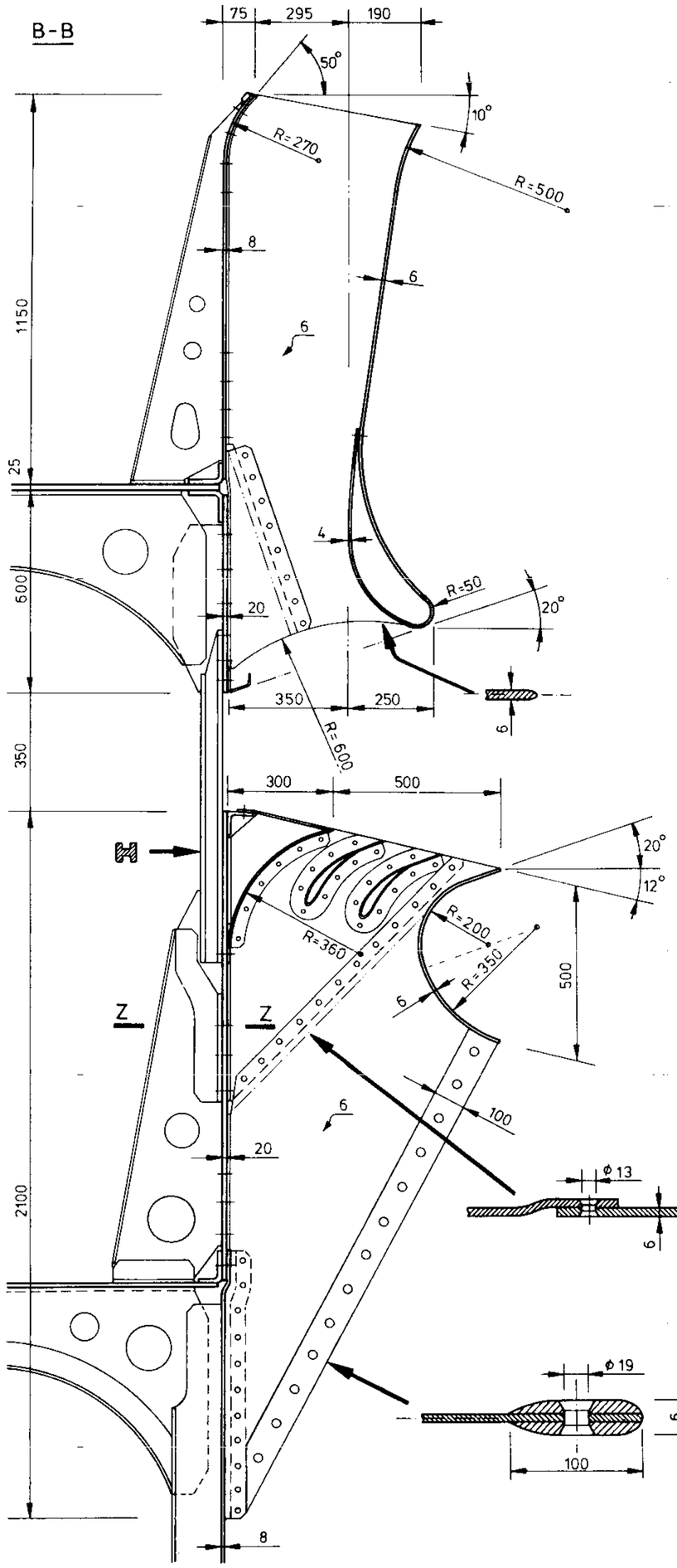


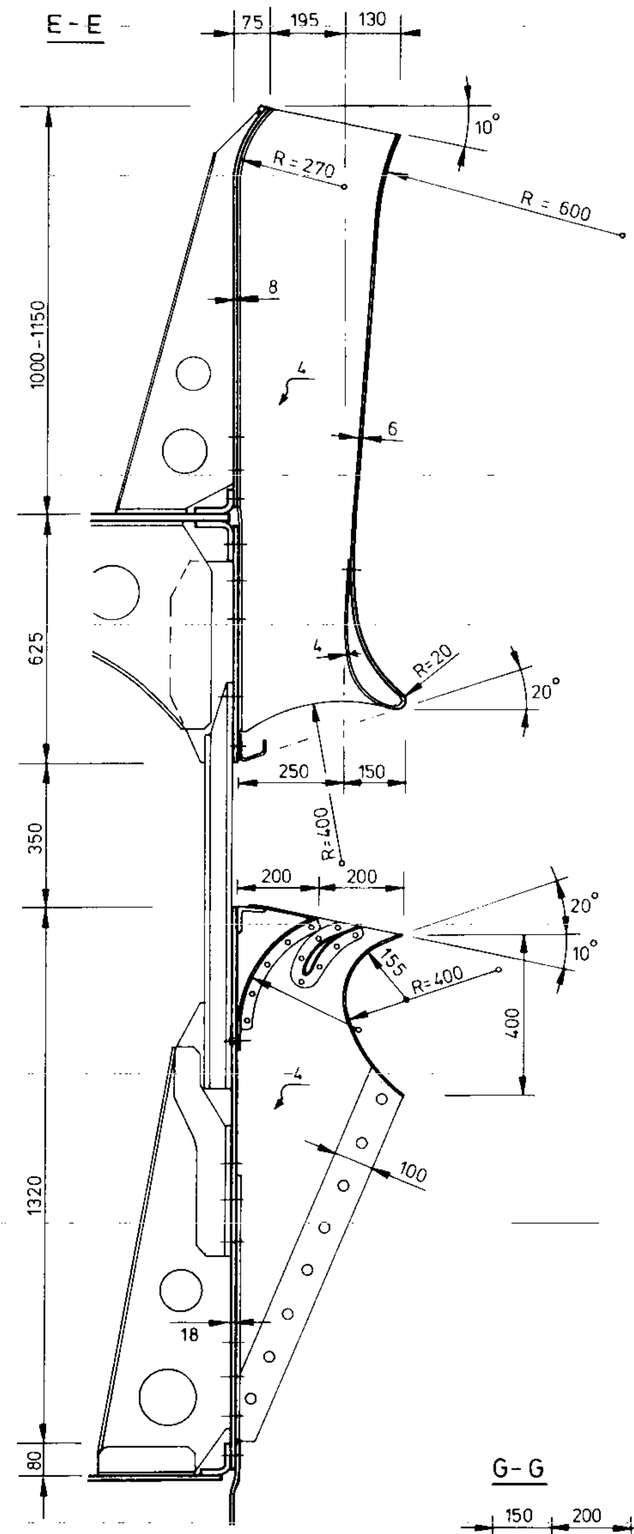


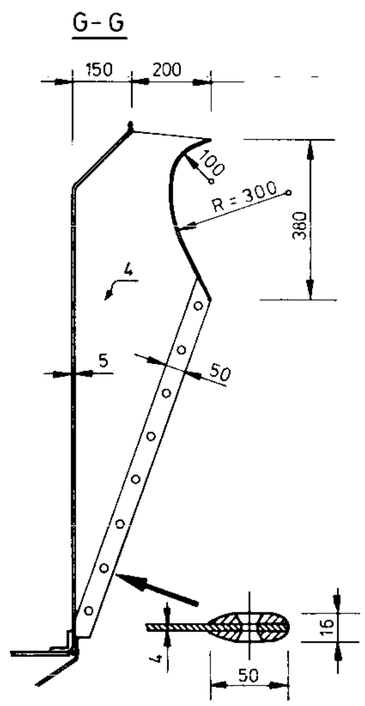




C12/5

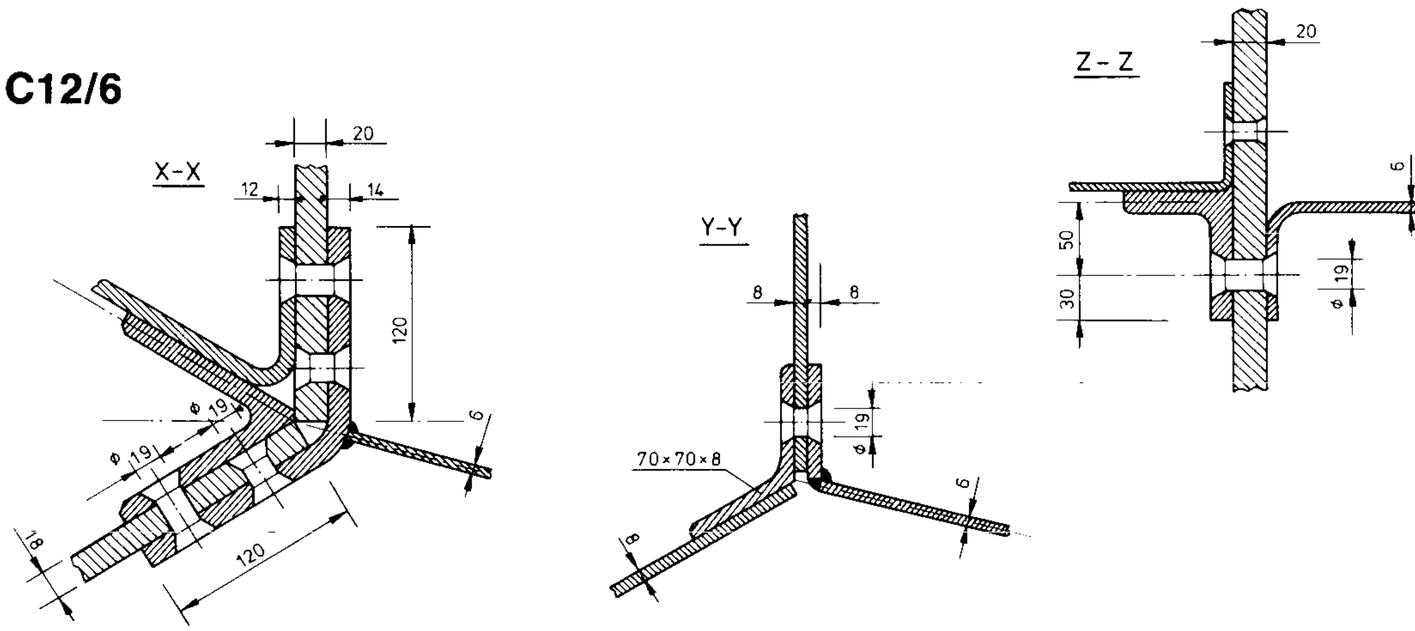

B-B
75
295
190
50°
10°
R=270
R=500
8
6
6
1150
25
600
4
R=50
20°
20
350
250
6
350
R=600
300
500
20°
12°
R=200
R=350
R=350
6
500
Z
Z
6
100
20
2100
ϕ 13
6
8
ϕ 19
10
6
26
10
100


E-E
75
195
130
10°
R=270
R=600
8
6
4
1000-1150
625
4
R=20
20°
250
150
350
R=400
200
200
20°
10°
155
R=400
400
4
100
1320
18
80

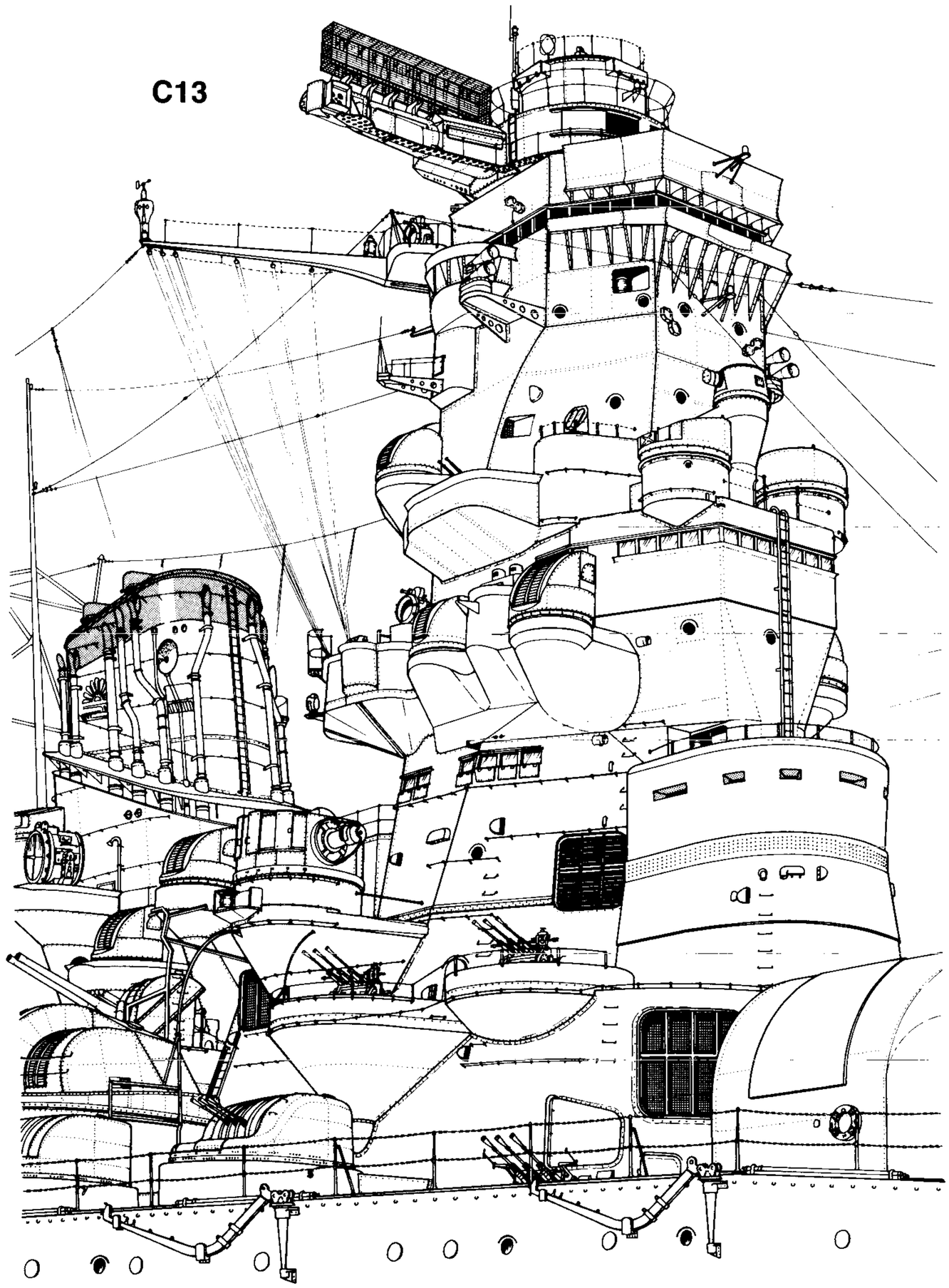

G-G
150
200
100
R=300
380
4
5
50
4
16
50

C Superstructure

C12/6 Sections X-X, Z-Z, Y-Y (12 × scale)

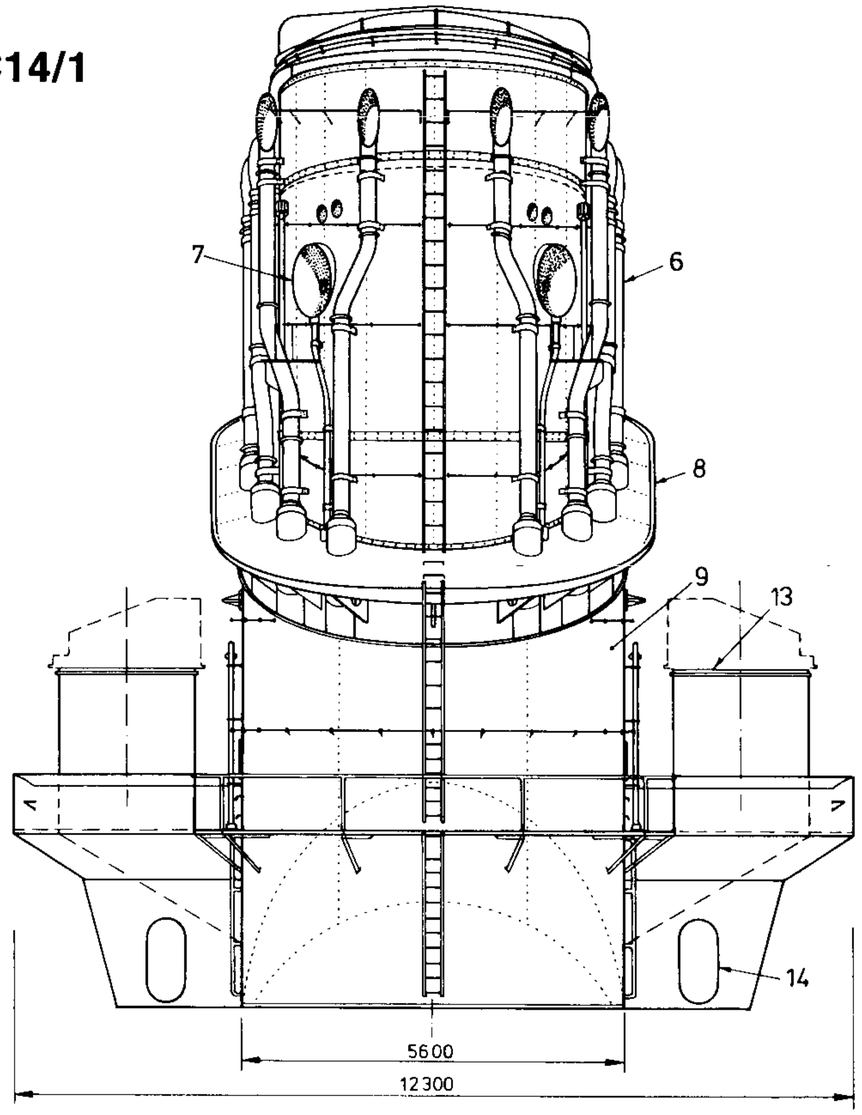


C13 PERSPECTIVE OF BRIDGE STRUCTURE, APRIL 1945 (no scale)

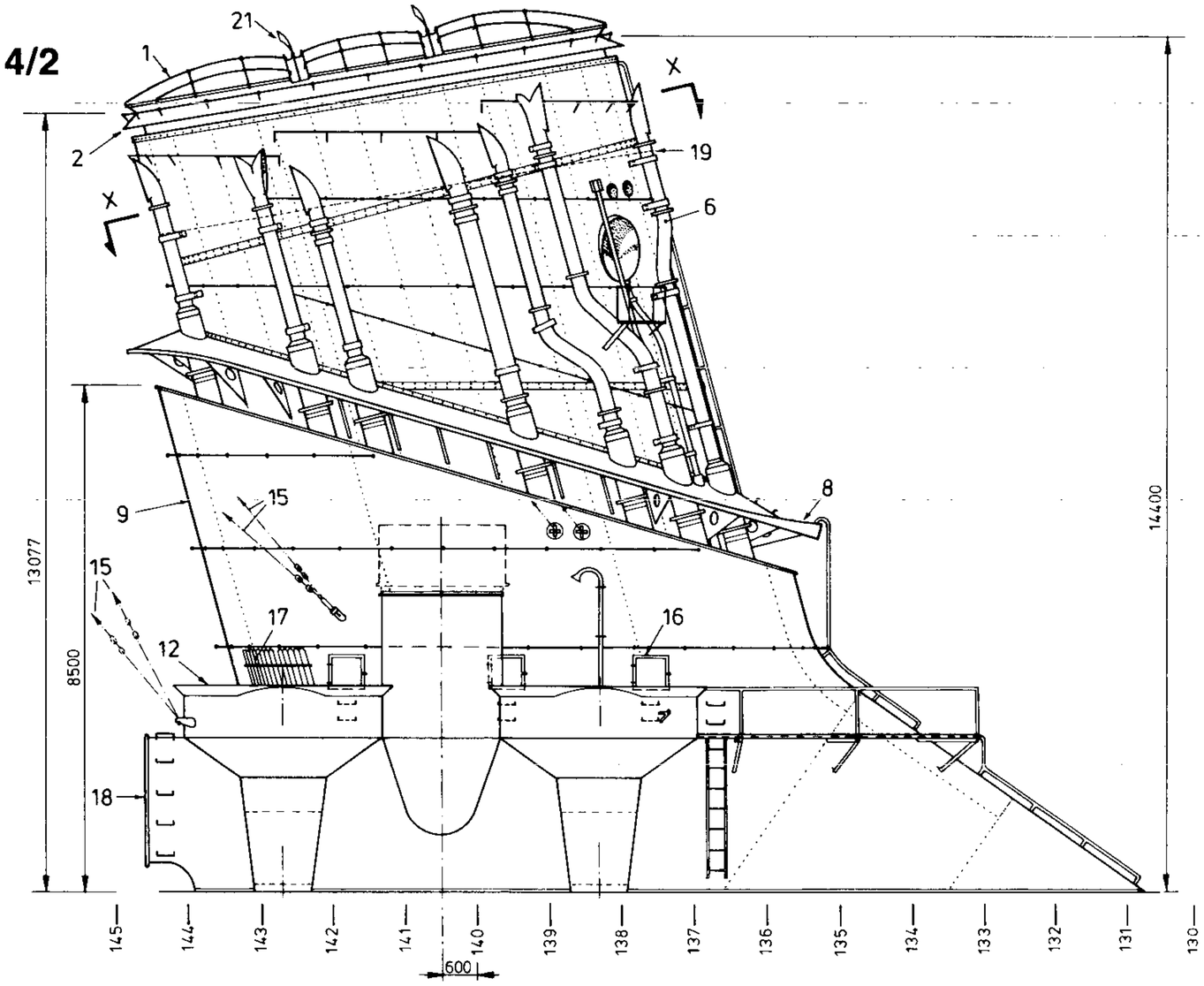


C Superstructure

C14/1



C14/2



C14 FUNNEL (1/75 scale except where marked otherwise)

C14/1 Front elevation

C14/2 Starboard profile

C14/3 Rear elevation

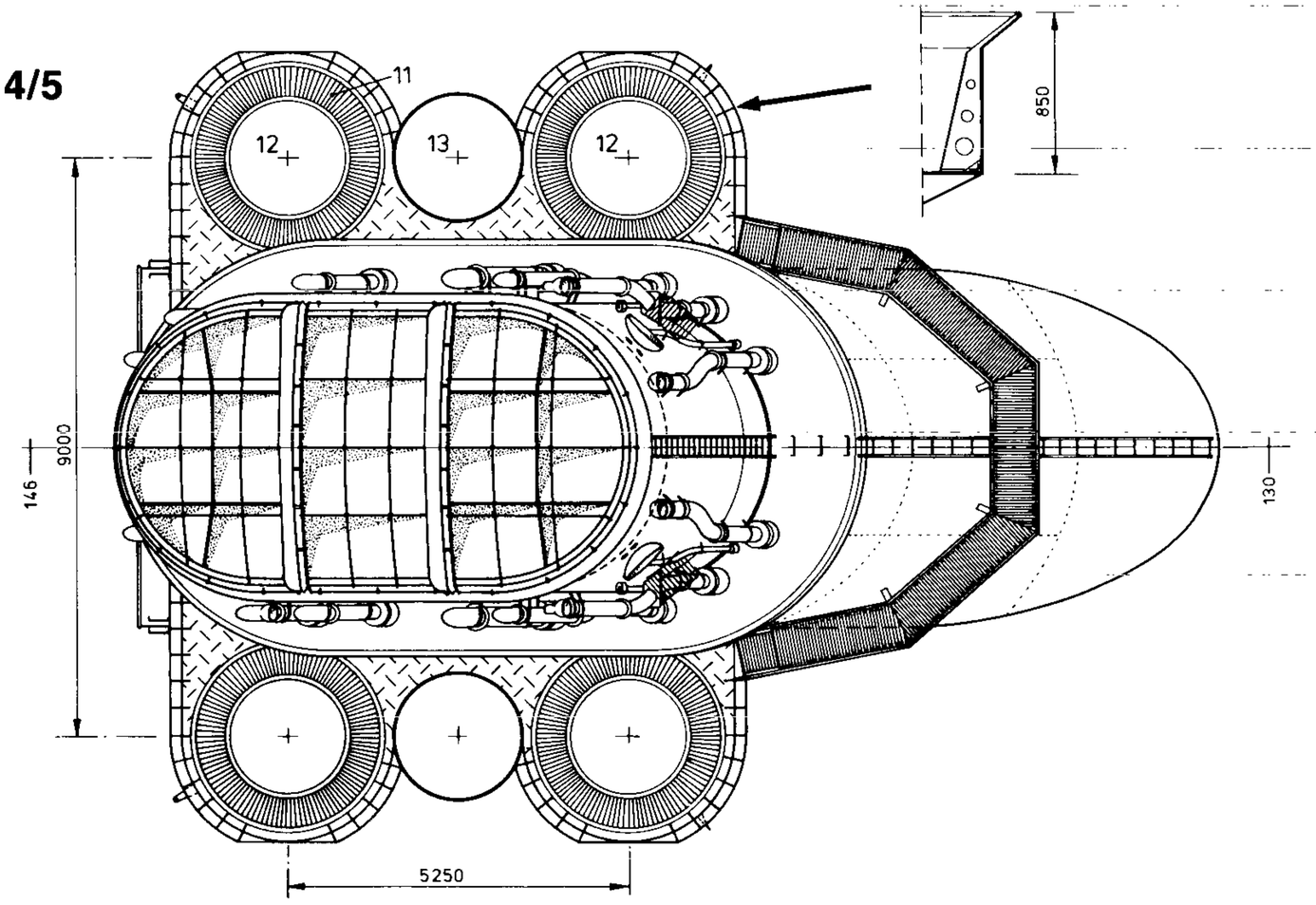
C14/4 Port side elevation, April 1945

C14/5 Plan

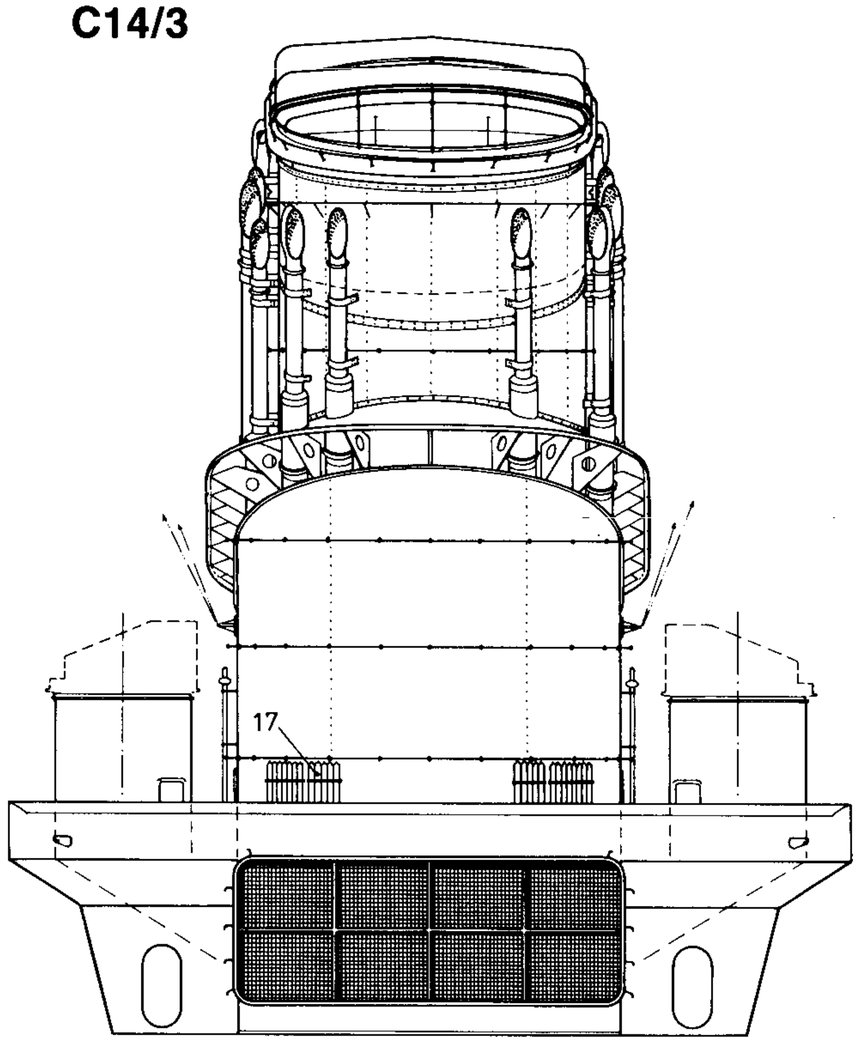
C14/6 Section X-X

C14/7 Plan of cage and hood

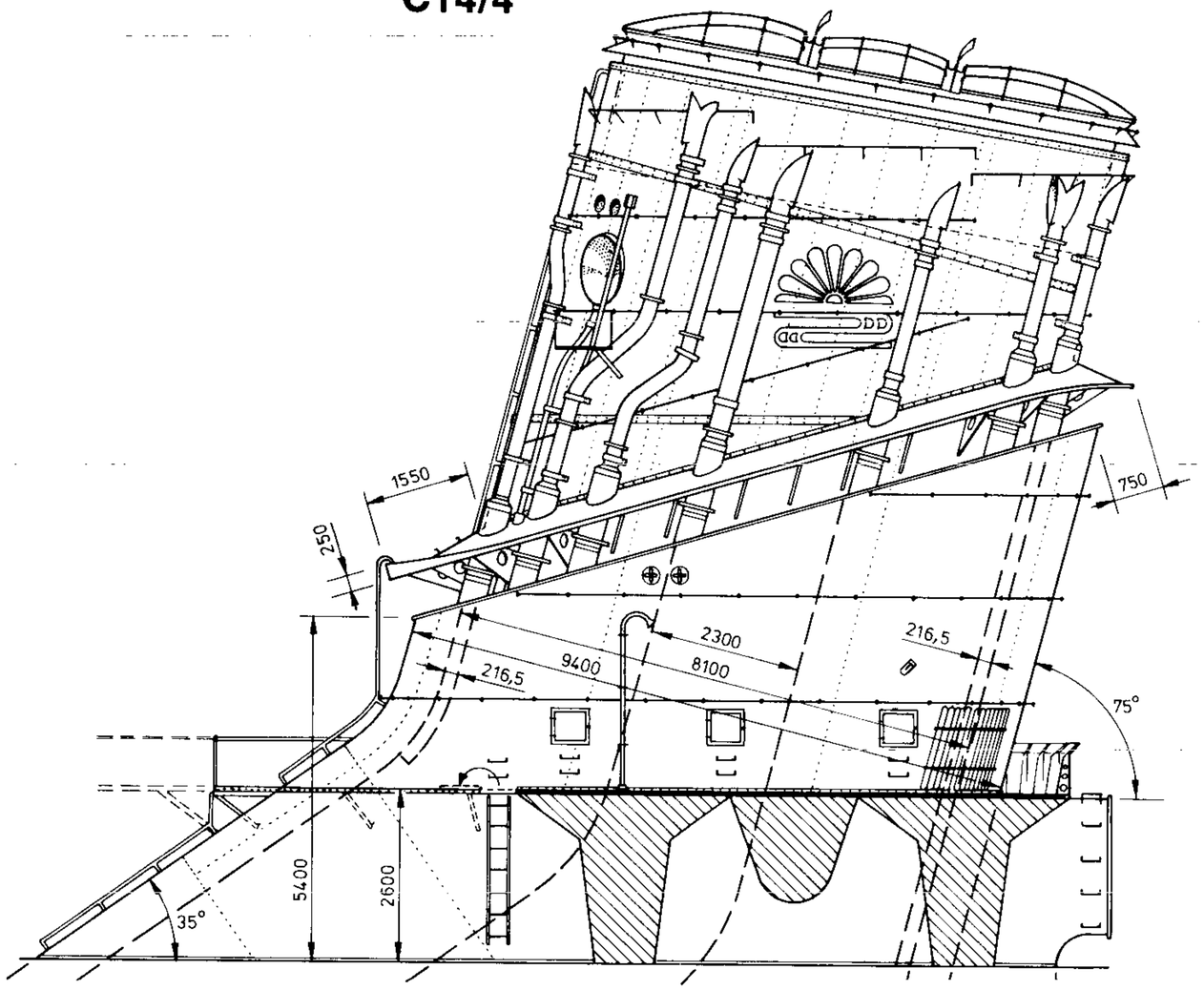
C14/5



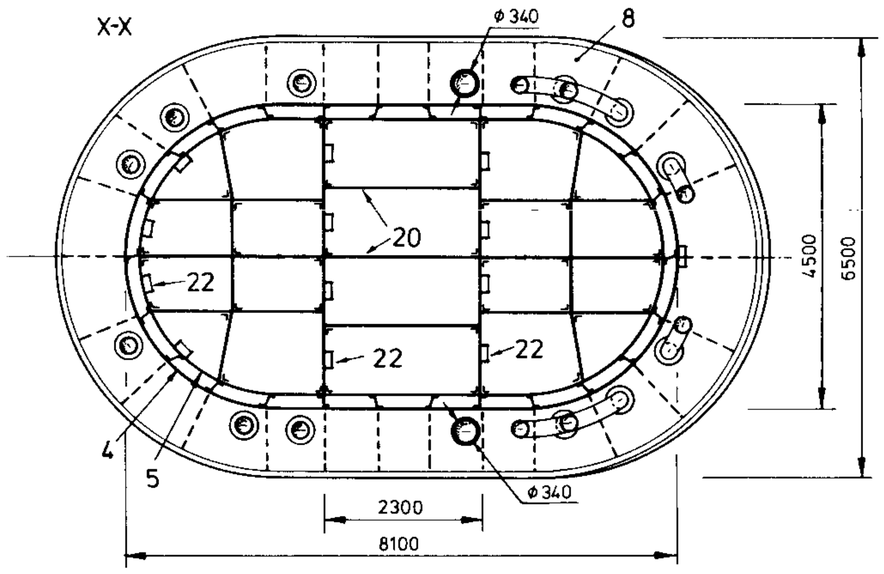
C14/3



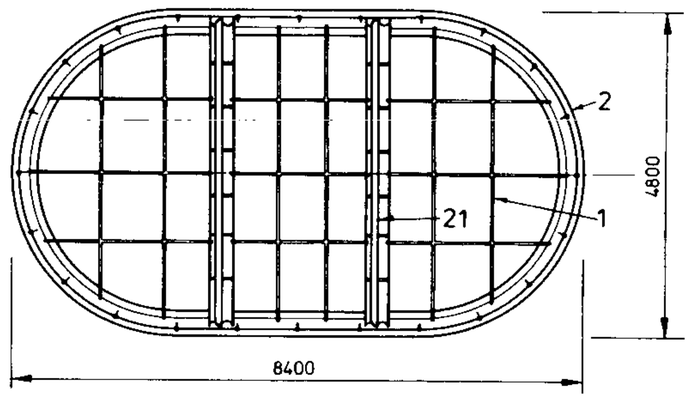
C14/4



C14/6



C14/7



C Superstructure

C14/8 General view of upper part (no scale)

1 Cage for canvas cover
2 Hood
3 Air out
4 Casing
5 Uptake
6 Steam pipes from boiler safety valves (two 340mm and six 260mm diameter)
7 Fog horn
8 Air-space rain cover
9 50mm armour plate casing
10 Searchlights and MG control platform
11 Grating
12 150cm searchlight position
13 MG control position
14 Passage hole
15 Main mast shrouds
16 Disconnecting manhole
17 Pipe box
18 Ventilation
19 Lower limit to black colour
20 Division plate
21 Wind shield
22 Inspection ladder

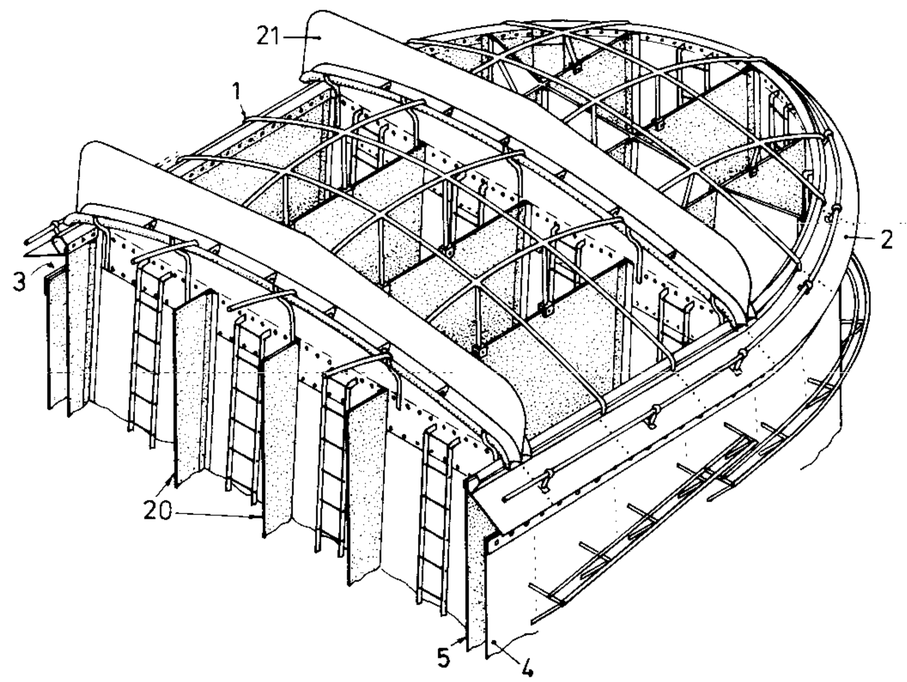
C14/9 White painted Chrysanthemum crest, carried only at 'Ten 'ichigo' Operation, April 1945 (1/50 scale)

C14/10 Upper part of funnel, profile (1/37.5 scale)

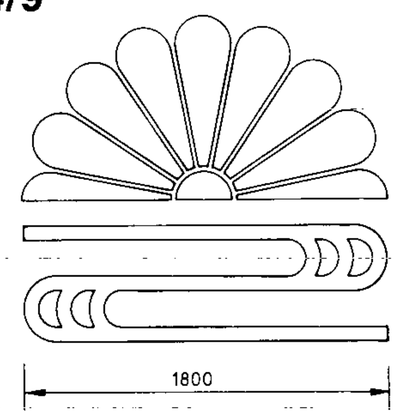
C14/11 Section (1/37.5 scale)

1 Cage
2 Hood
3 Air out
4 Casing
5 Uptake
6 Wind shield
7 Handrail
8 Inspection ladder
9 Gutters (from canvas cover)
10 Division plate

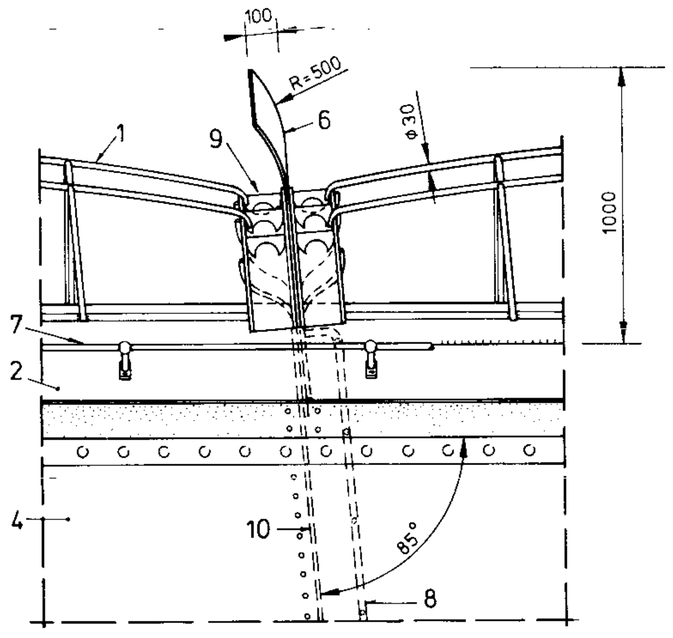
C14/8



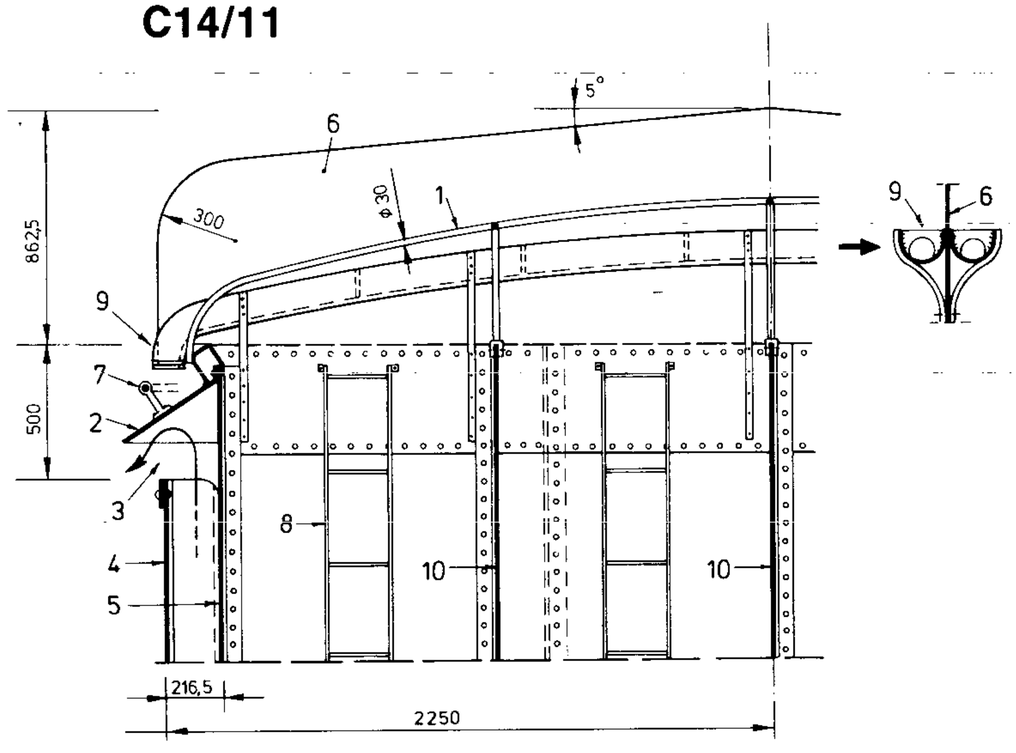
C14/9



C14/10



C14/11

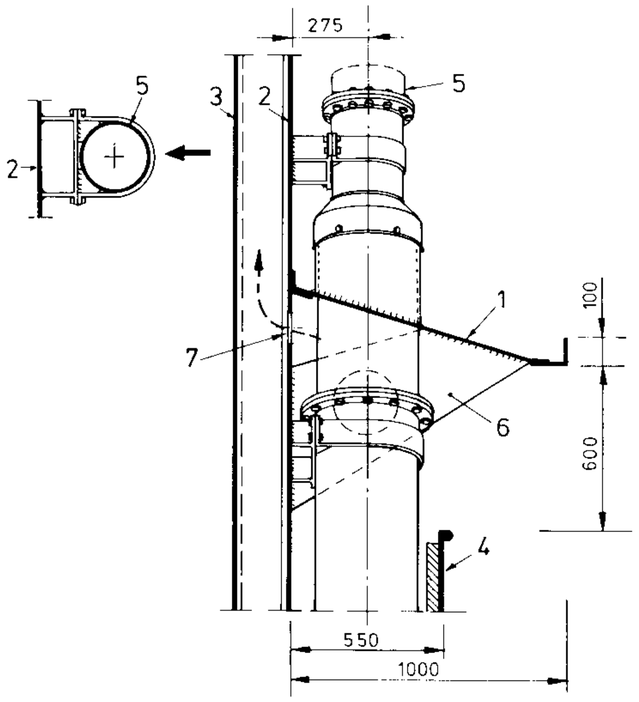


C14/12 **Detail of air-space rain cover (1/37.5 scale)**

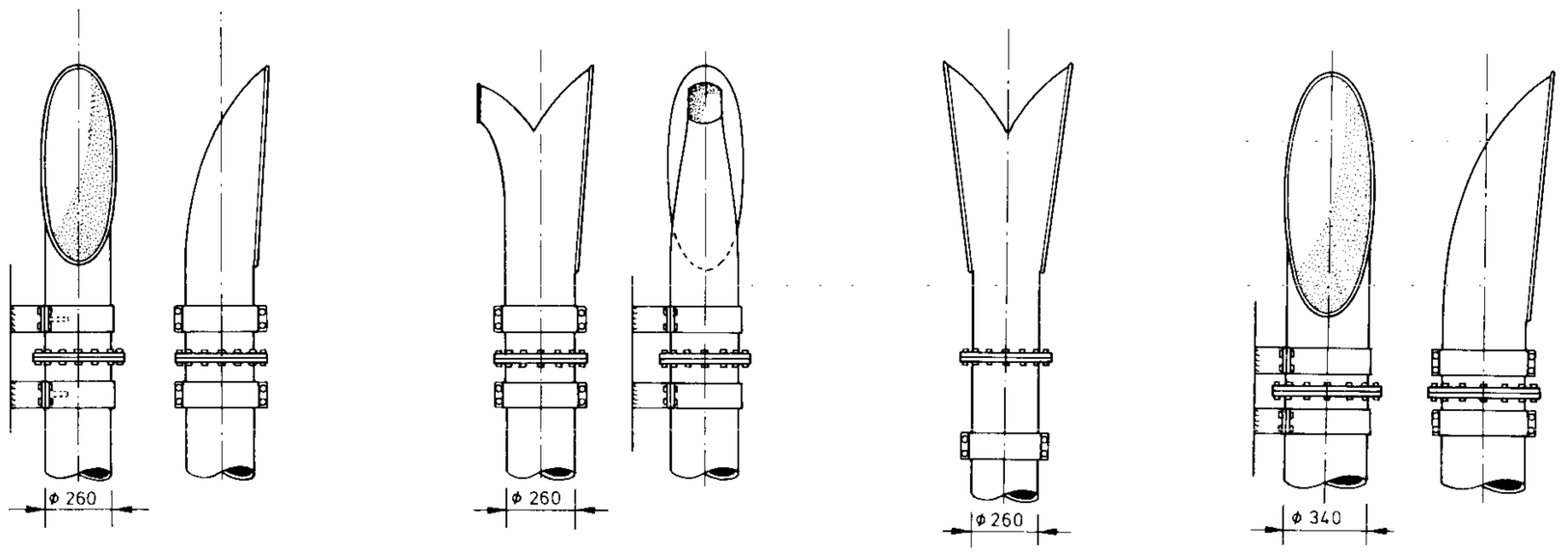
1 Air-space rain cover
2 Casing
3 Uptake
4 50mm armour plate casing
5 Steam pipe
6 Bracket
7 Ventilation holes

C14/13 **Upper parts of steam pipes (1/37.5 scale)**

C14/12



C14/13

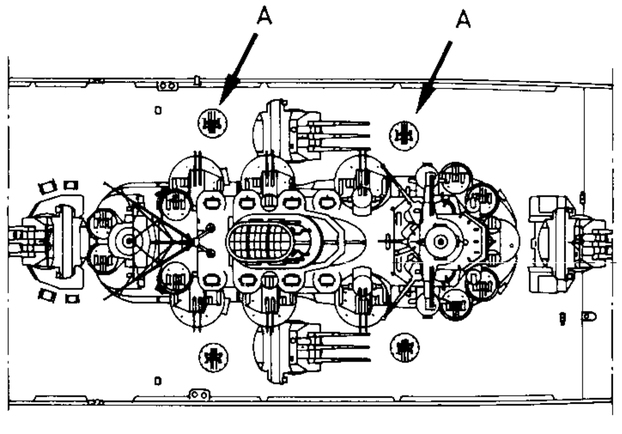


C Superstructure

C15 SUPERSTRUCTURE MODIFICATIONS

C15/1 Plan of midship section, September 1943 (1/1200 scale)

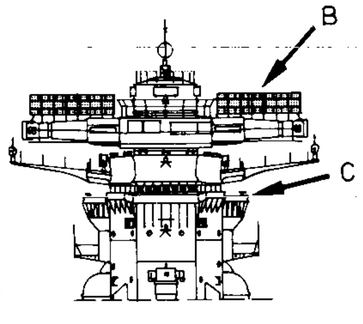
A 25mm AA guns



C15/1

C15/2 Upper part of bridge, September 1943 (1/600 scale)

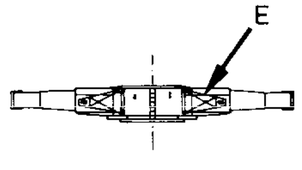
B Type 21 radar
C New platforms (similar to those on the *Musashi*)



C15/2

C15/3 Rangefinder, September 1943 (1/600 scale)

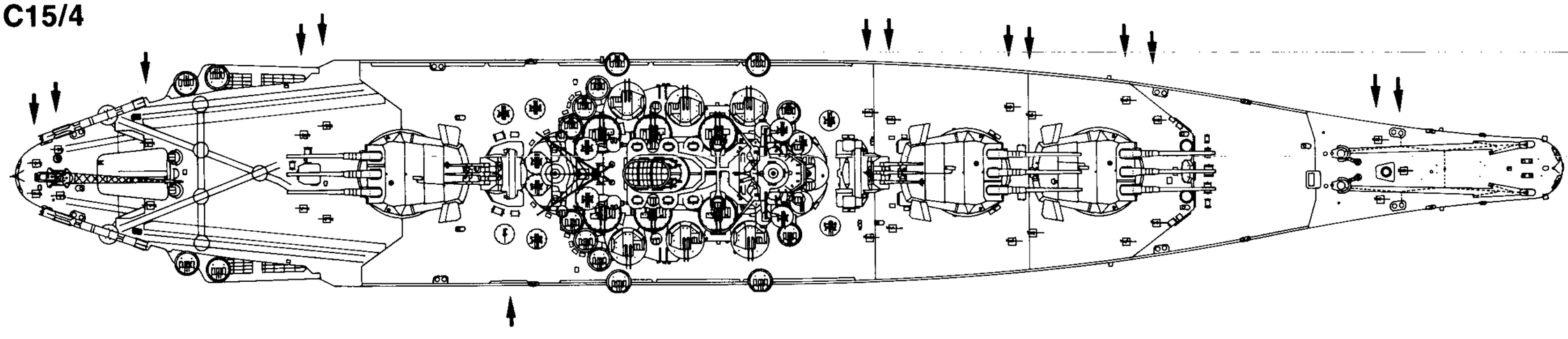
E Structural reinforcement



C15/3

C15/4 Plan view, October 1944 'Sho' Operation, (1/1200 scale)
Arrows indicate single 25mm AA guns

C15/4



C15/5 Superstructure elevation, October 1944 (1/600 scale)

A Painted white Type 98 LA director ('Hoiban')

C15/6 Hull scuttles blanked off, after 1944 refit (no scale)

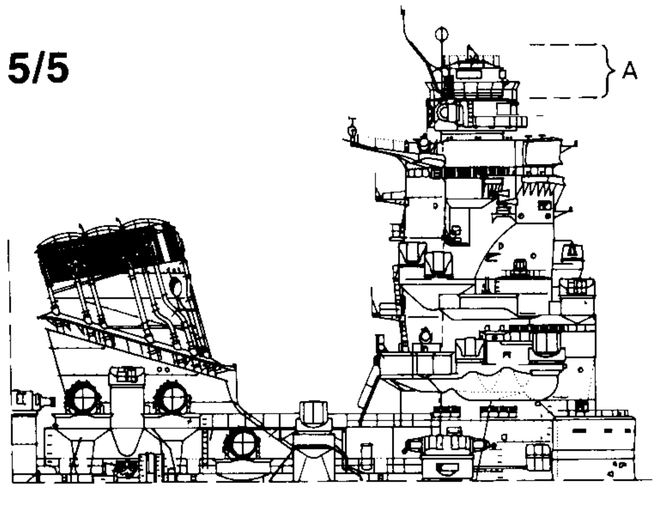
C15/7 Zareba for 25mm triple mounts on weather deck and Nos 2 and 3 46cm turrets (no scale)

A White stripe

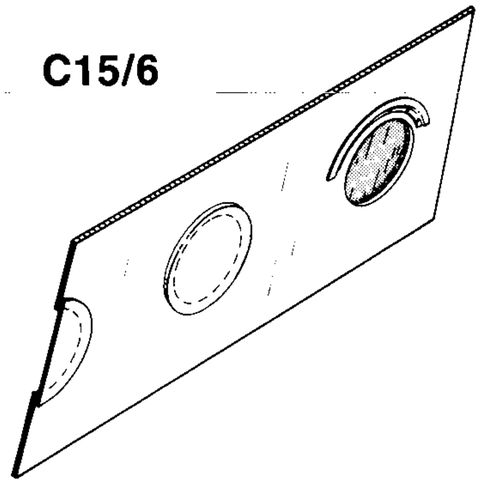
C15/8 Plan of weather-deck, 1944 (pecked line, 1945; 1/1200 scale)

A White painted rectangles on deck edge and white stripes between rails, 10m apart (to make it easier to gauge the ship's heading at night)

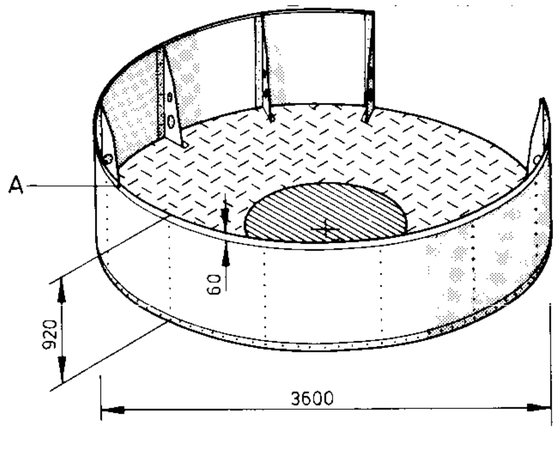
C15/5



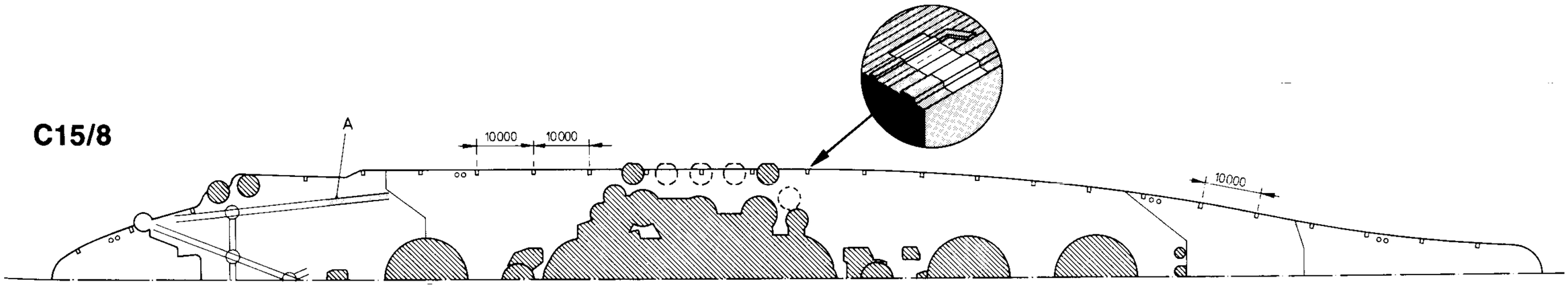
C15/6



C15/7



C15/8



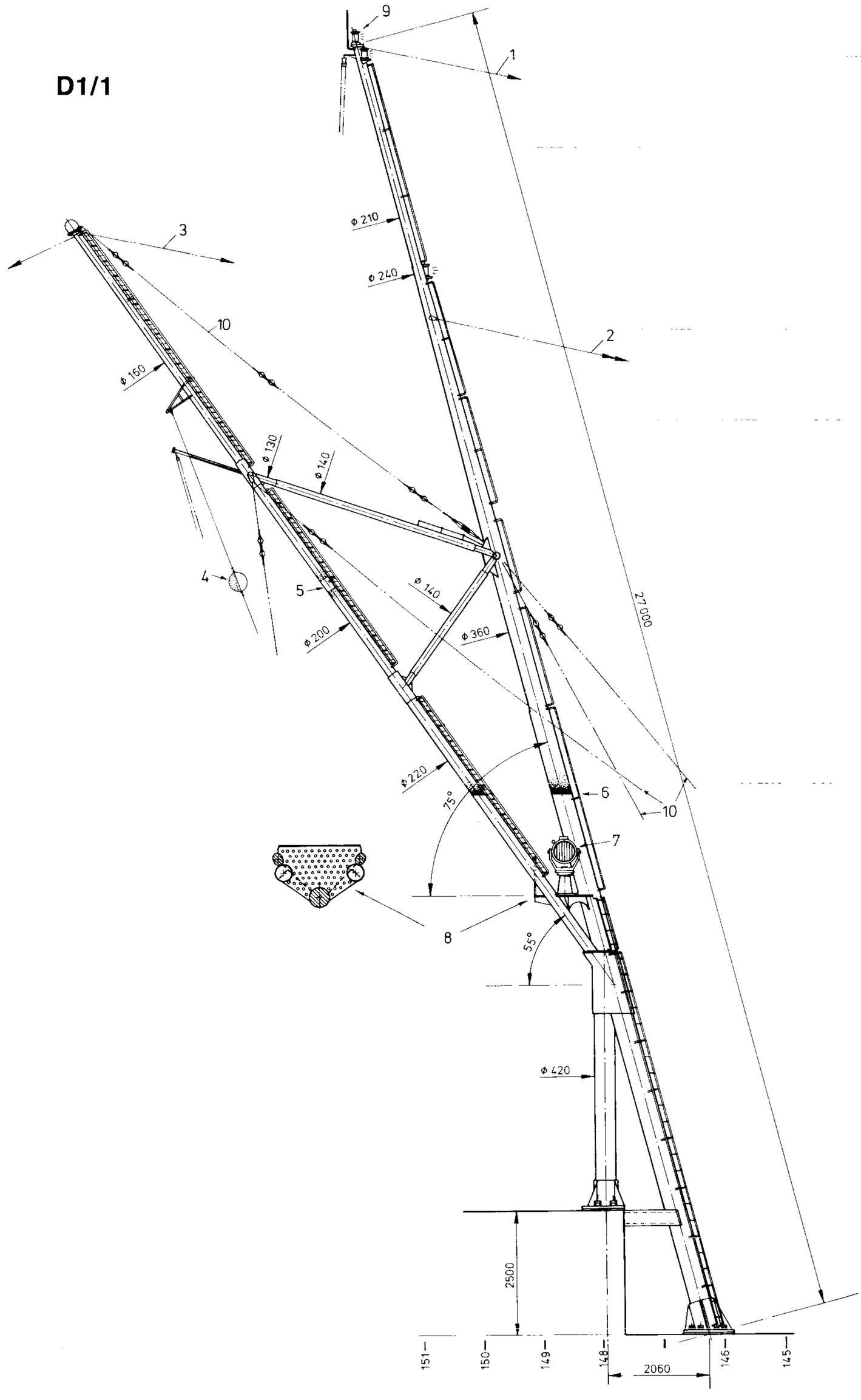
D Rig

D1 **TRIPOD MAIN MAST, 1941 (1/125 scale)**

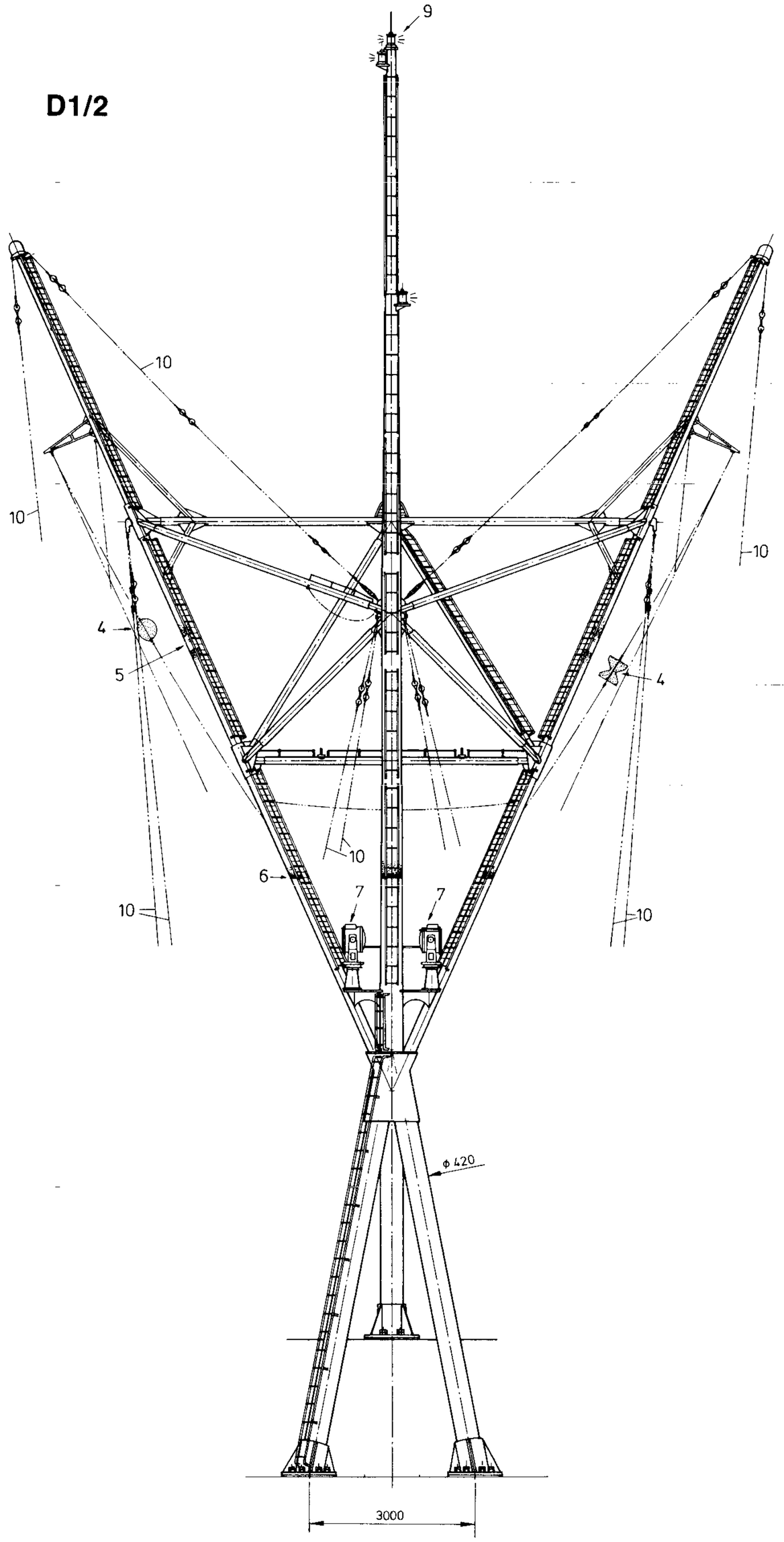
D1/1 **Profile view**

D1/2 **Front view (seen from forward)**

D1/1



D1/2

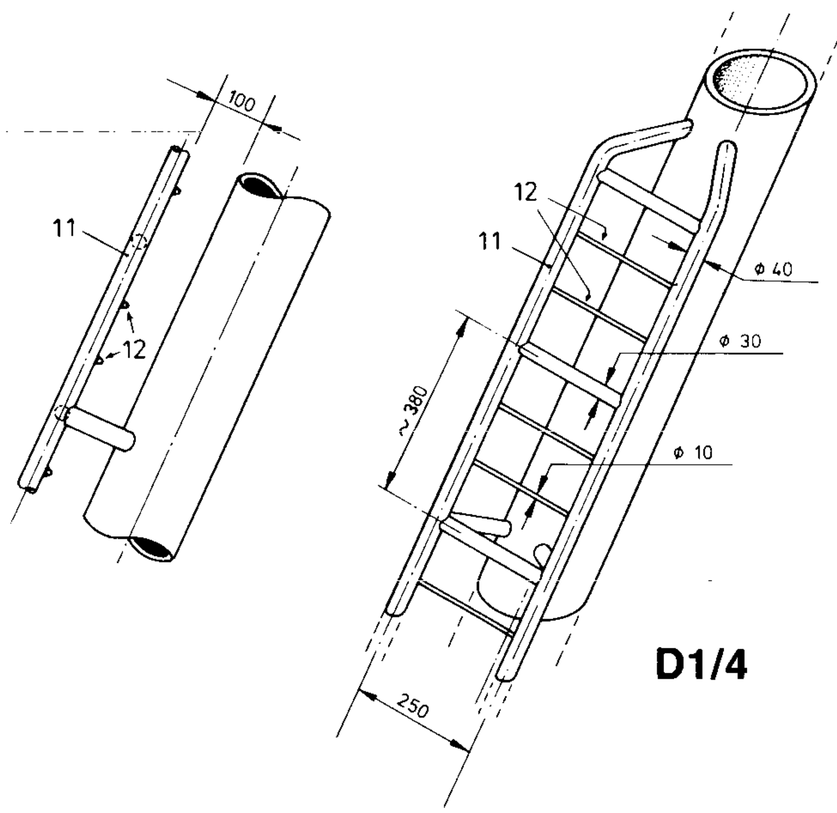


D Rig

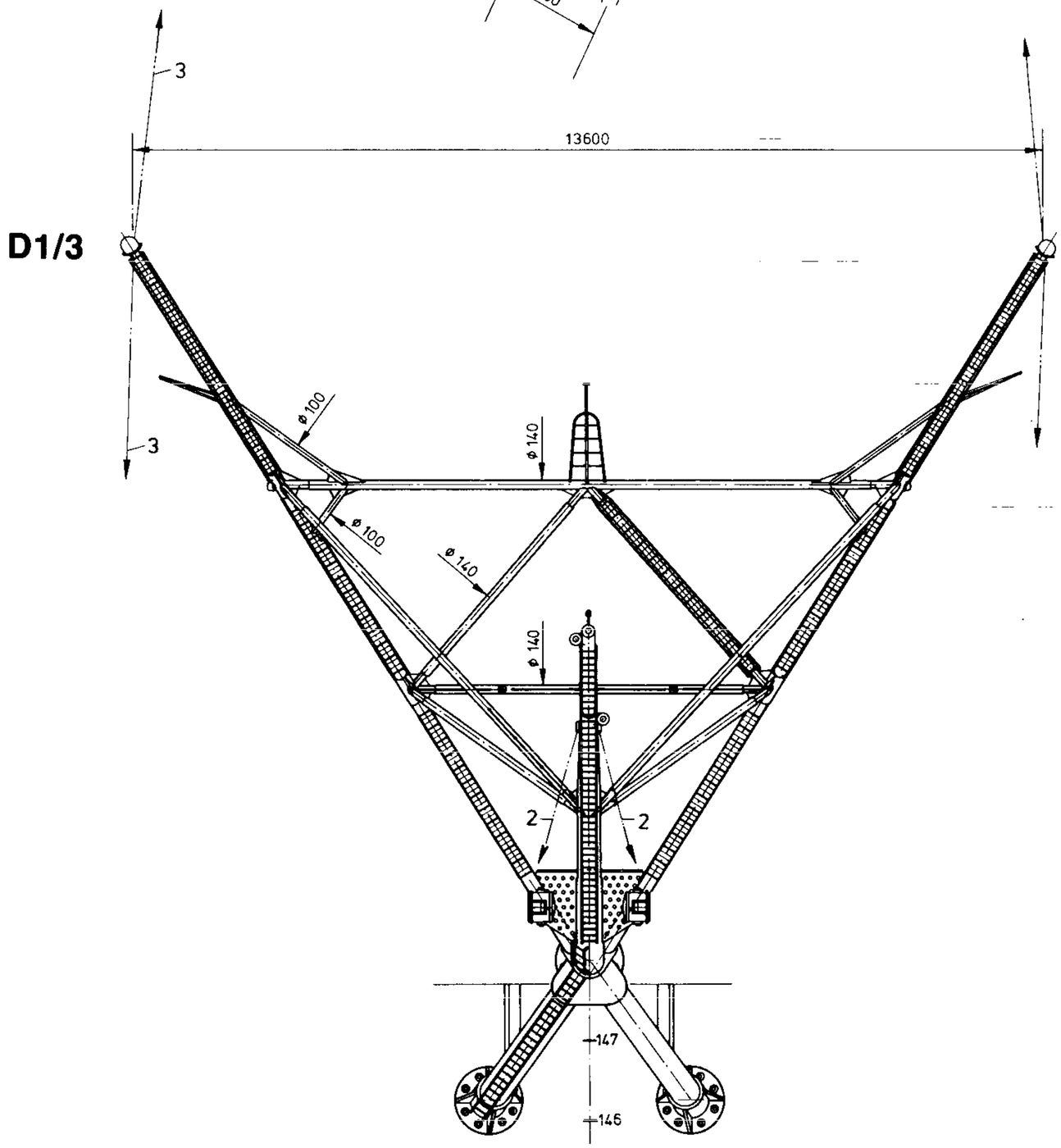
D1/3 Plan

D1/4 Detail of tripod leg (1/20 scale)

1 Single dressing line — to yard on back of air defence command post
2 Double dressing line through both sides of 60cm searchlight position to jack staff
3 Main aerial — from edge of signal yard on air defence post aft to crane mast
4 Helm signals — green ball starboard, red cones to port
5 White stripe
6 Lower limit of black paint
7 40cm signalling searchlight
8 Signal platform
9 Mast head flashing lamp
10 Steel wire shroud
11 Ladder
12 Secure bar



D1/4

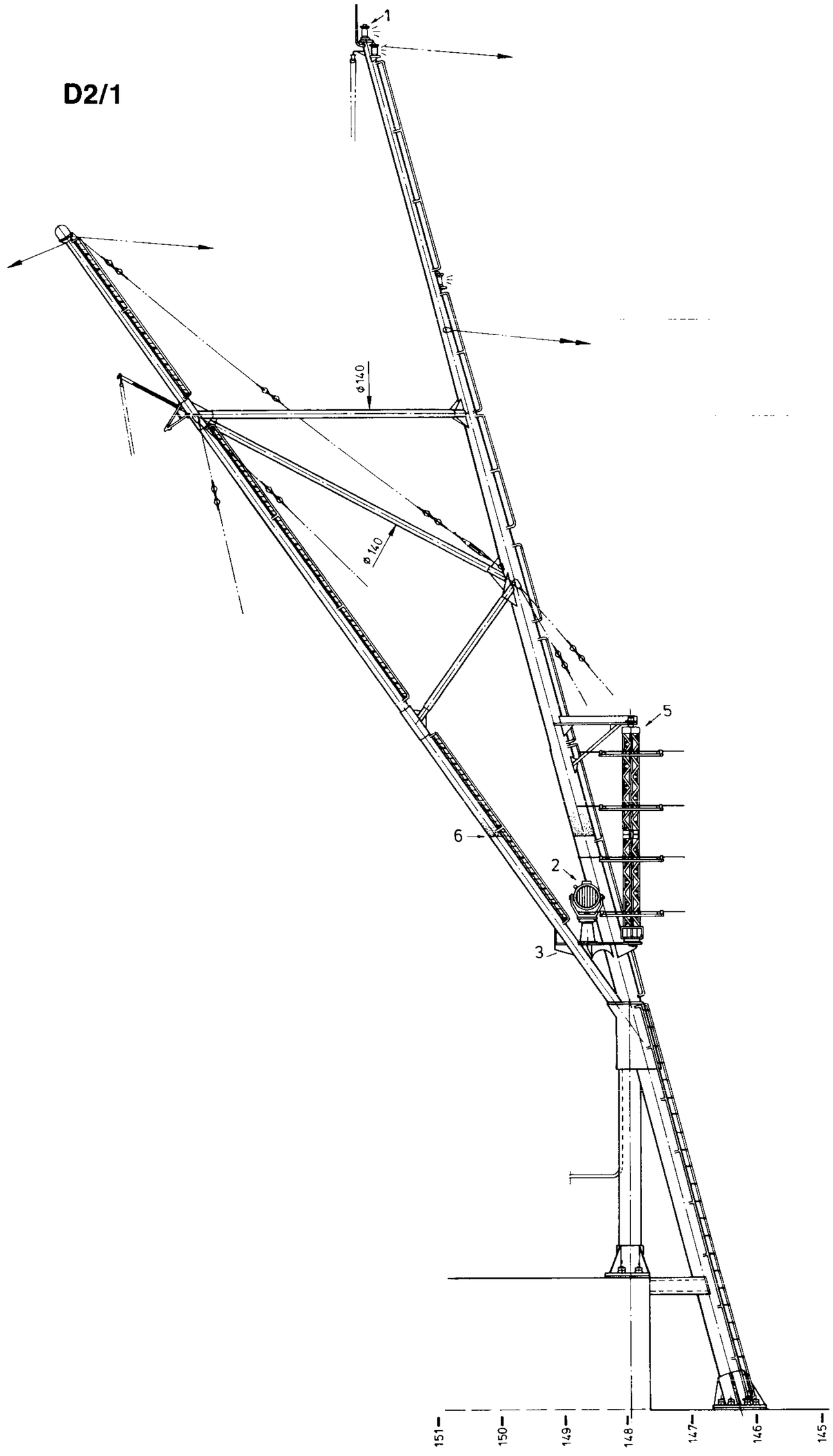


D1/3

D2 TRIPOD MAIN MAST AFTER JANUARY-APRIL 1944 REFIT (1/125 scale)

D2/1 Profile view

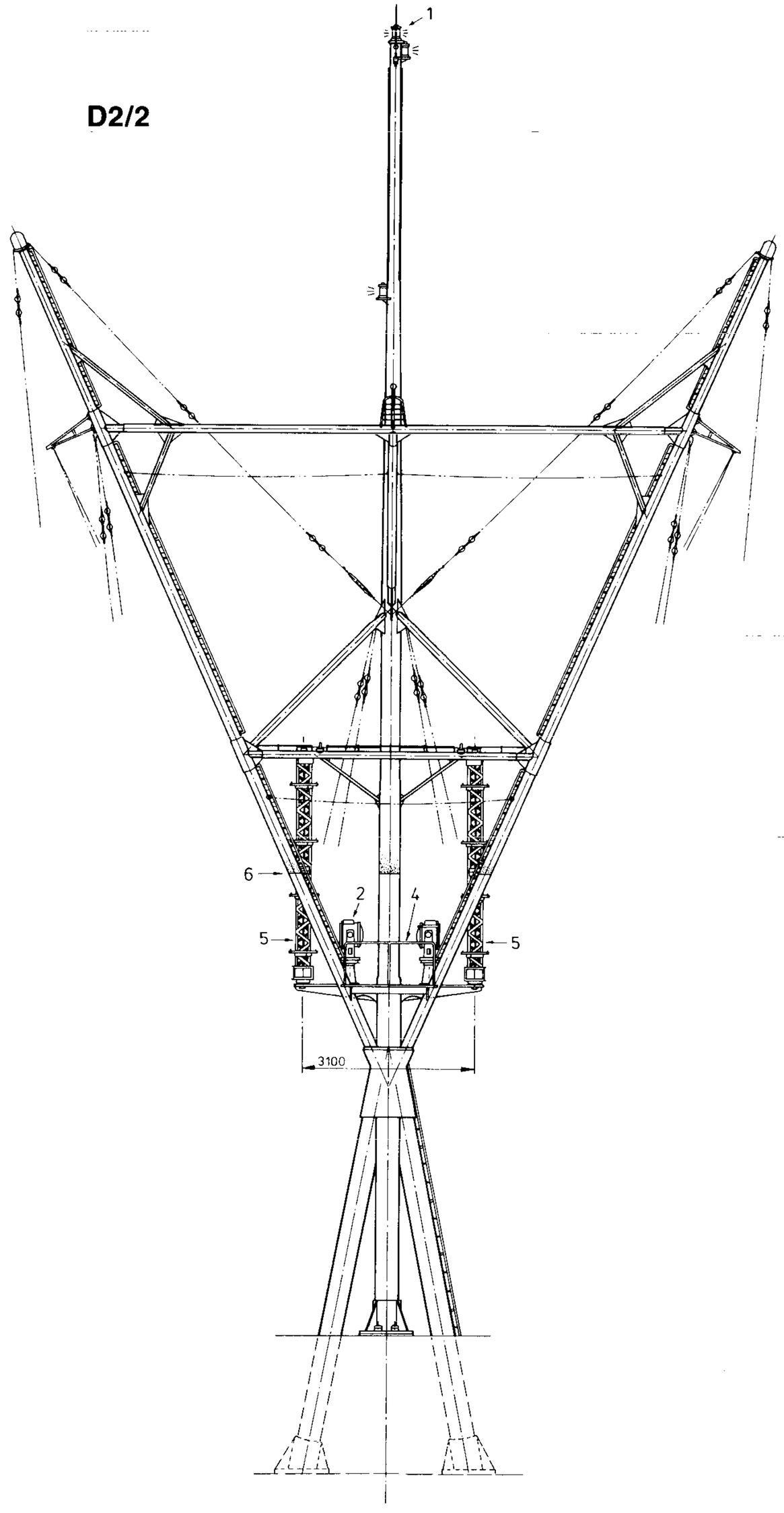
D2/1



D Rig

D2/2 Rear view (from ship's stern)

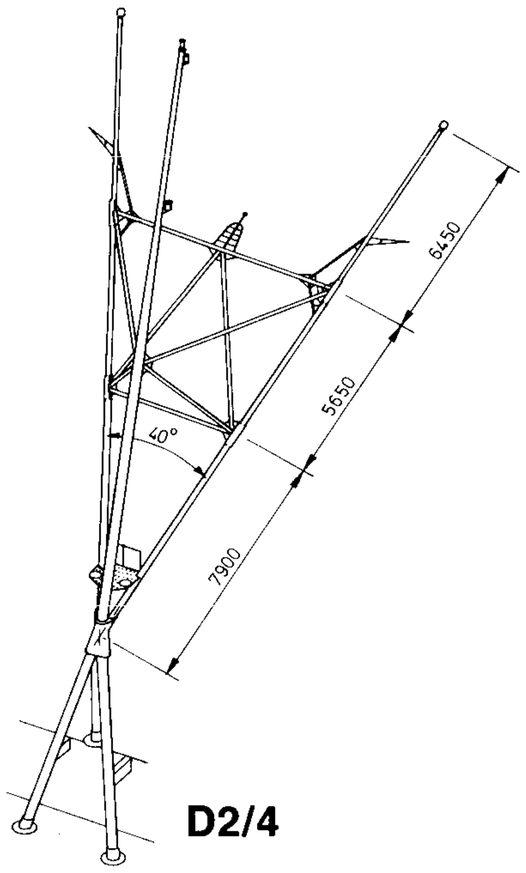
1 Mast head flashing lamp
2 40cm signalling searchlight
3 Signal platform
4 Railing
5 Type 13 'Gô' air search radar antenna
6 Lower limit of black paint



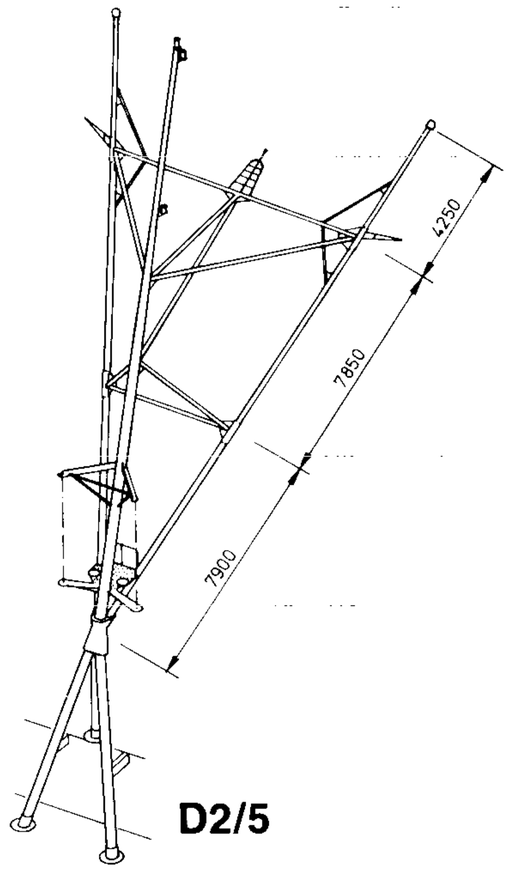
D2/3 Plan

D2/4 Schematic view, 1941-43 (no scale)

D2/5 Schematic view, after 1944 refit (no scale)

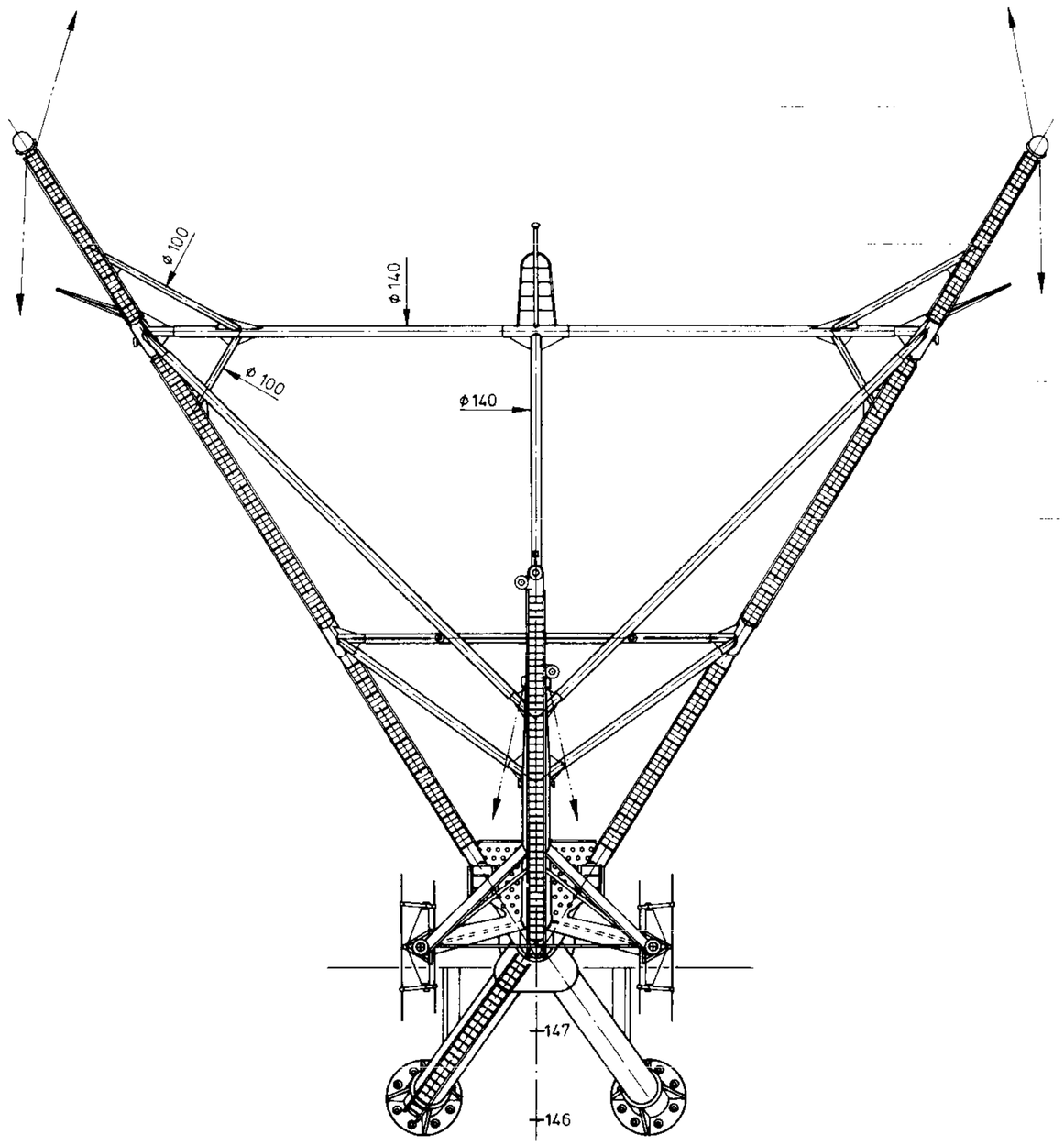


D2/4



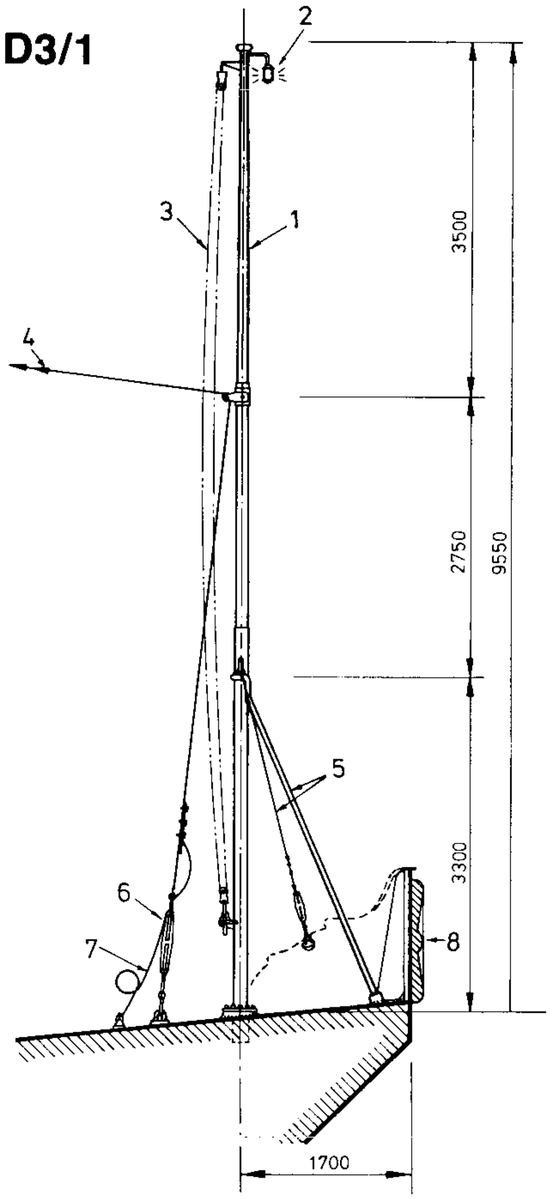
D2/5

D2/3

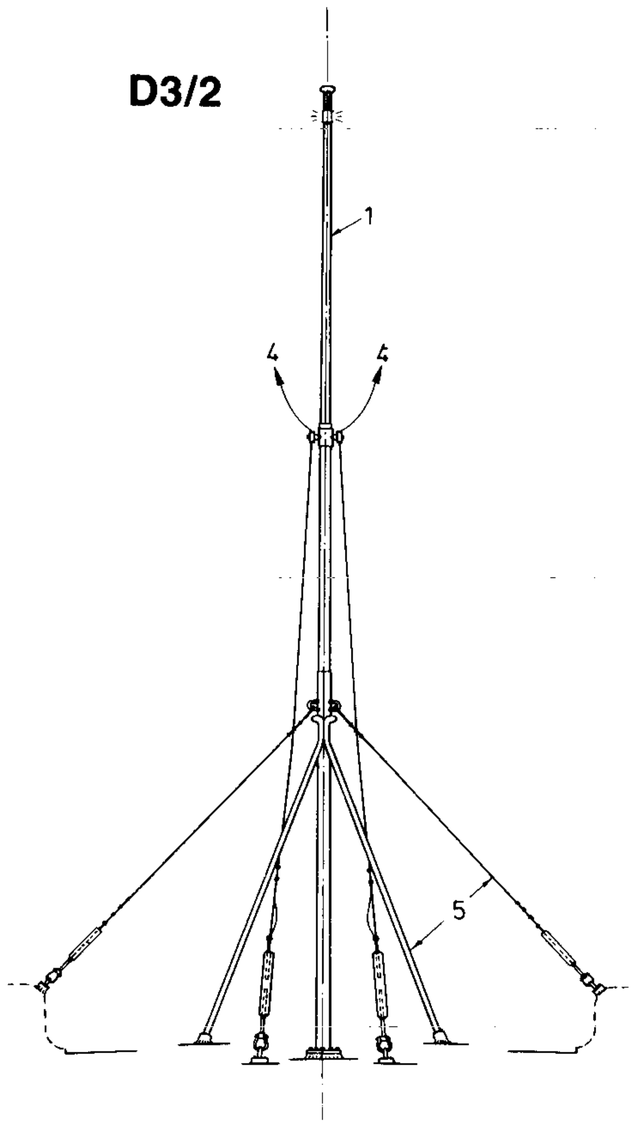


D Rig

D3/1



D3/2



D3 JACK STAFF (1/100 scale)

D3/1 Profile view

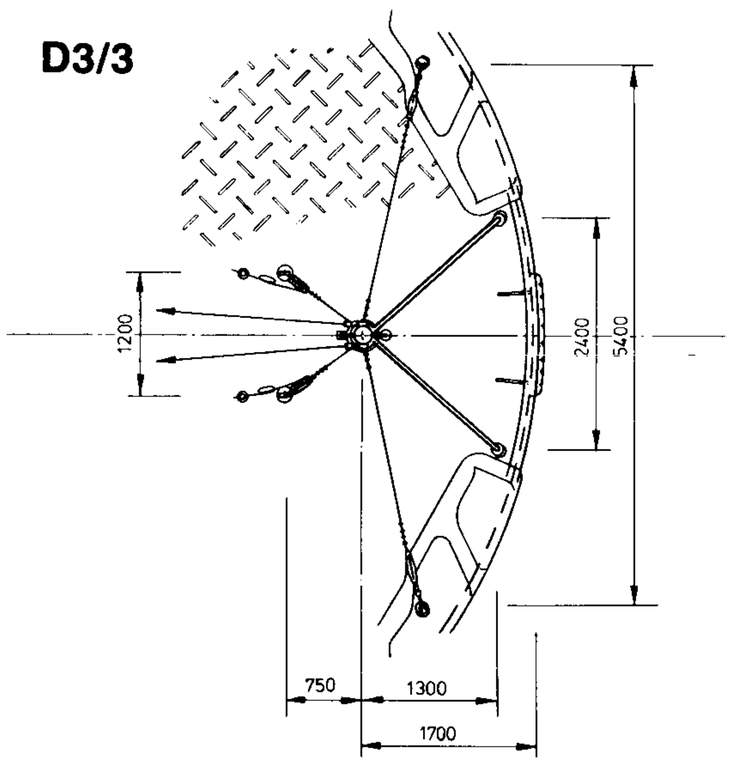
D3/2 Front view

D3/3 Plan

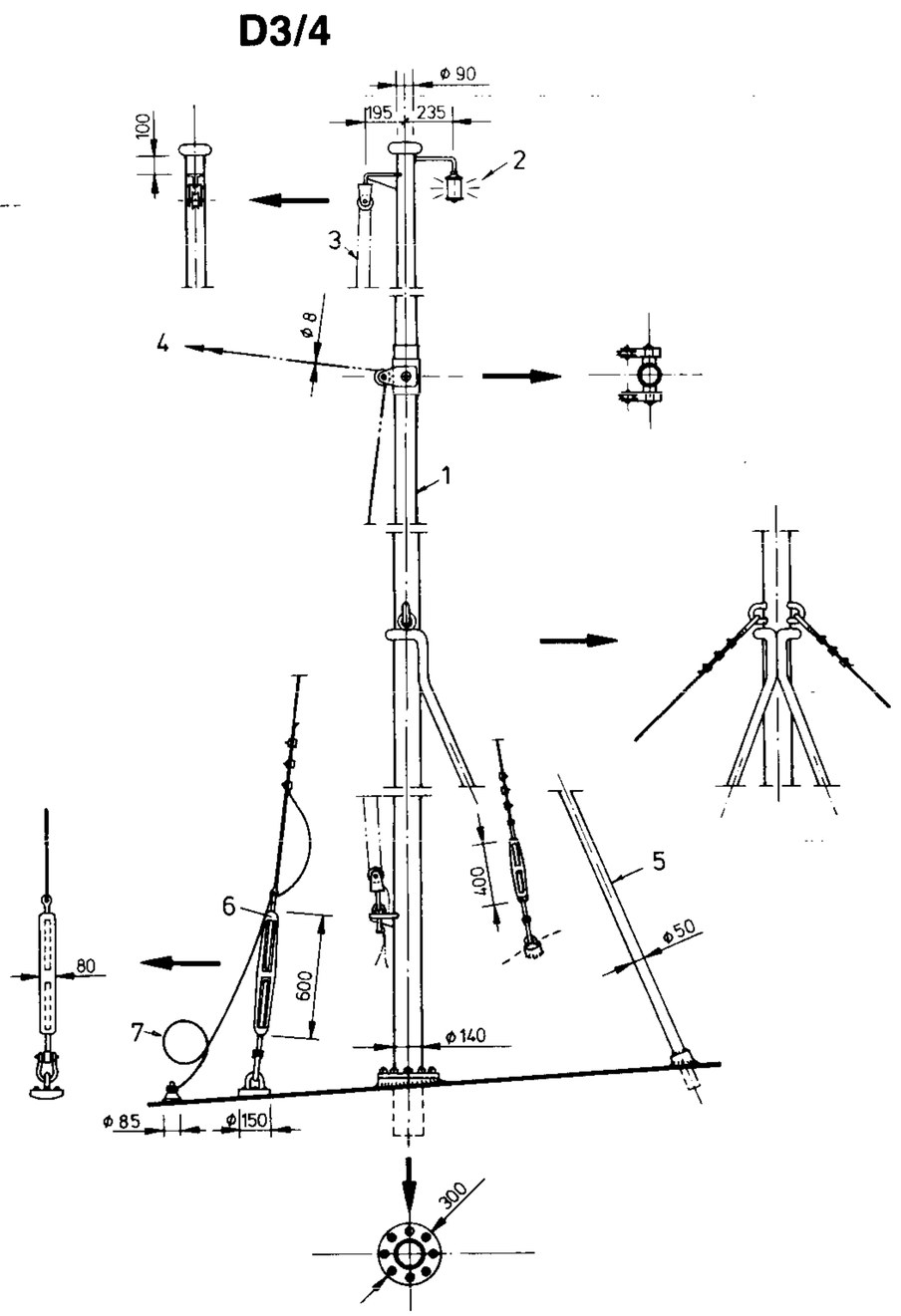
D3/4 Details (2 × scale)

1 Jack staff
2 Anchor light
3 Signal halyard
4 Dressing line (to both sides of 60cm searchlight platform on signal yards)
5 Stay
6 Bottle screw
7 Protective earthing
8 120cm Chrysanthemum crest

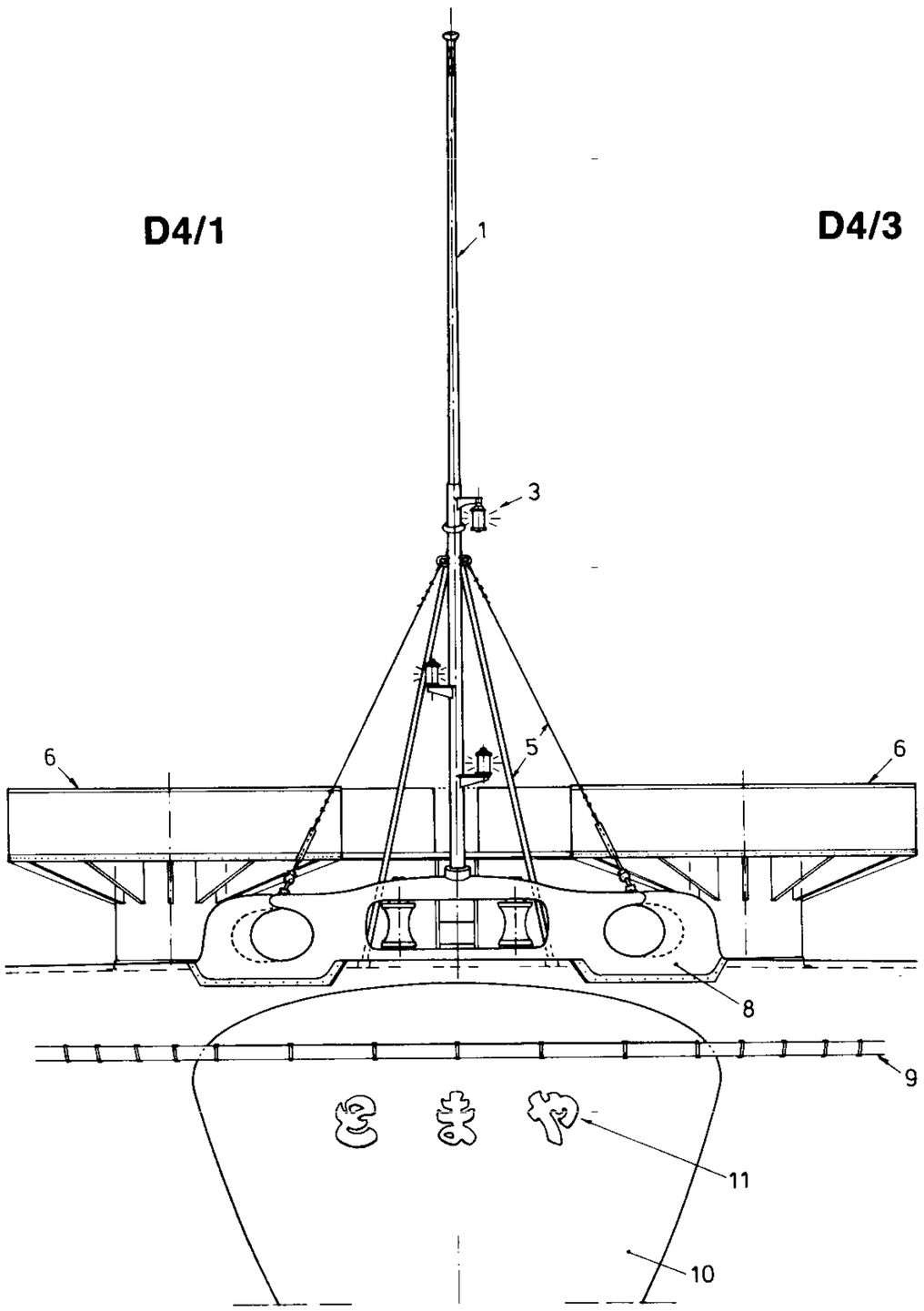
D3/3



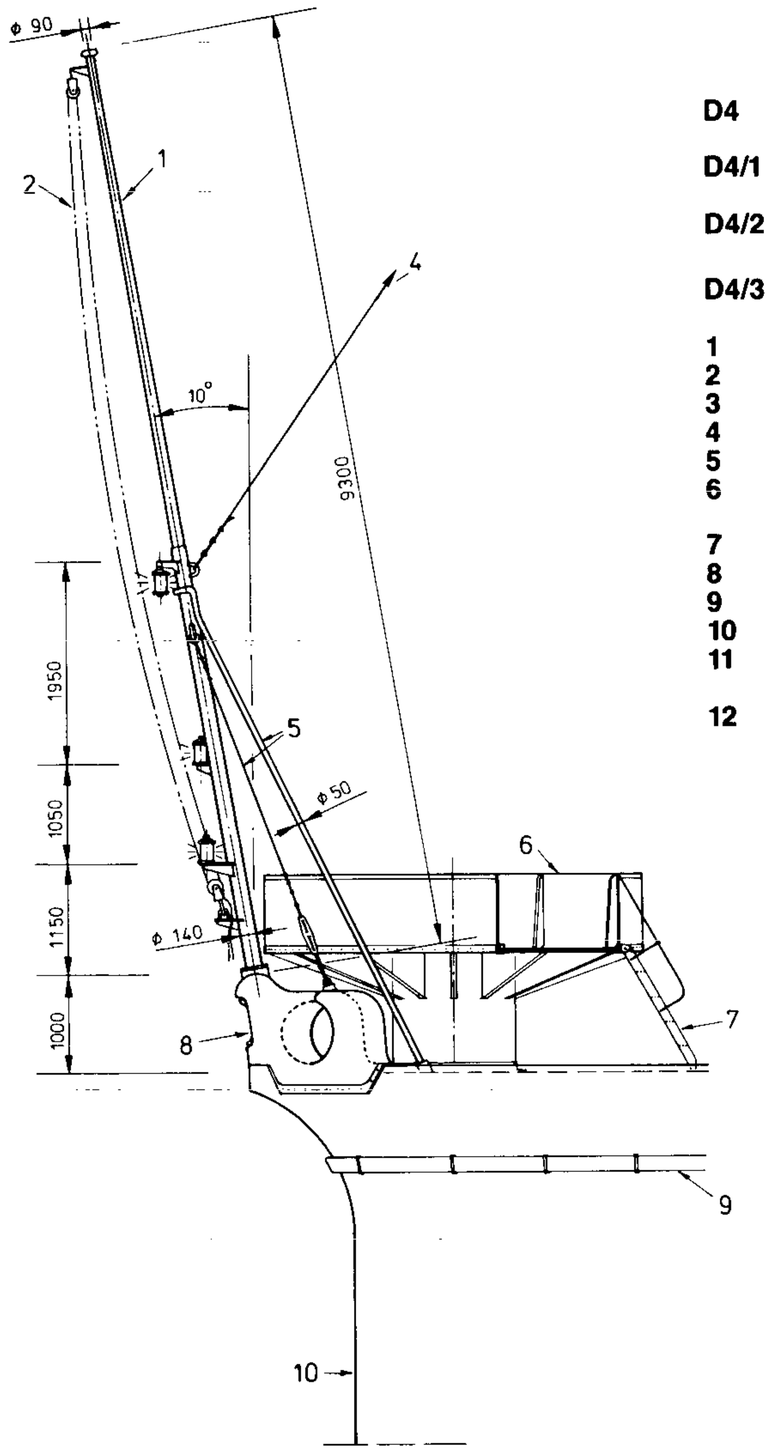
D3/4

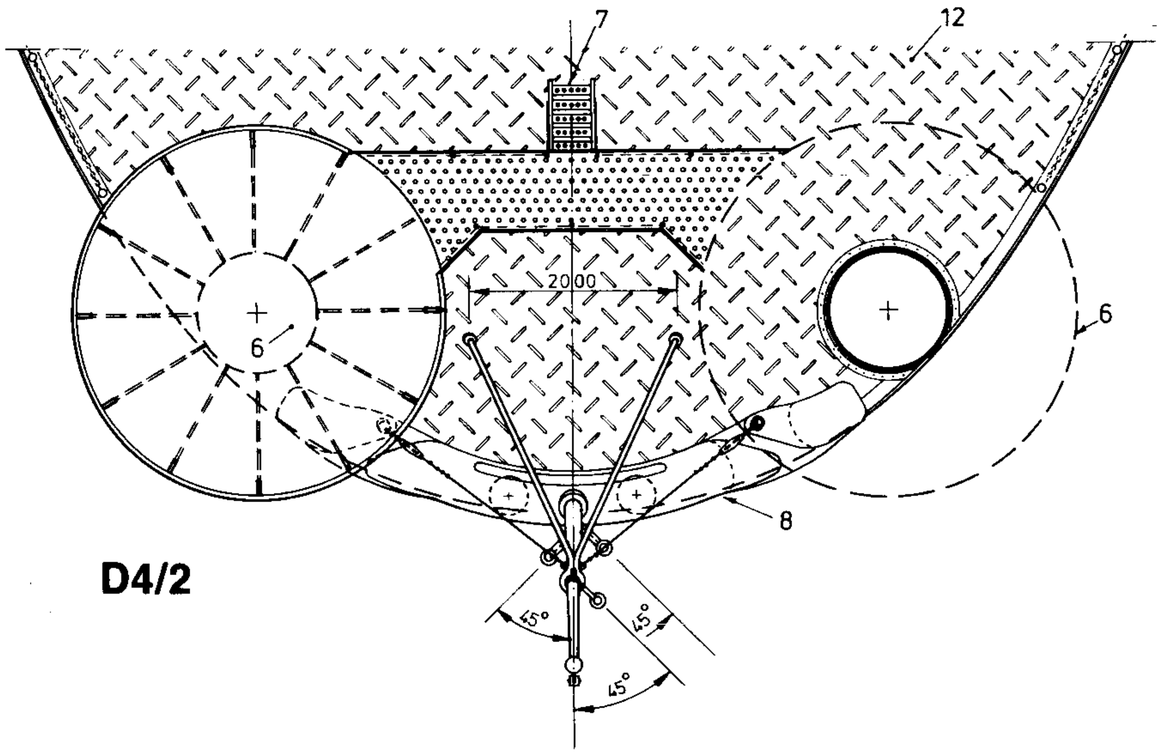


D4/1



D4/3





D4/2

D4 ENSIGN STAFF (1/100 scale)

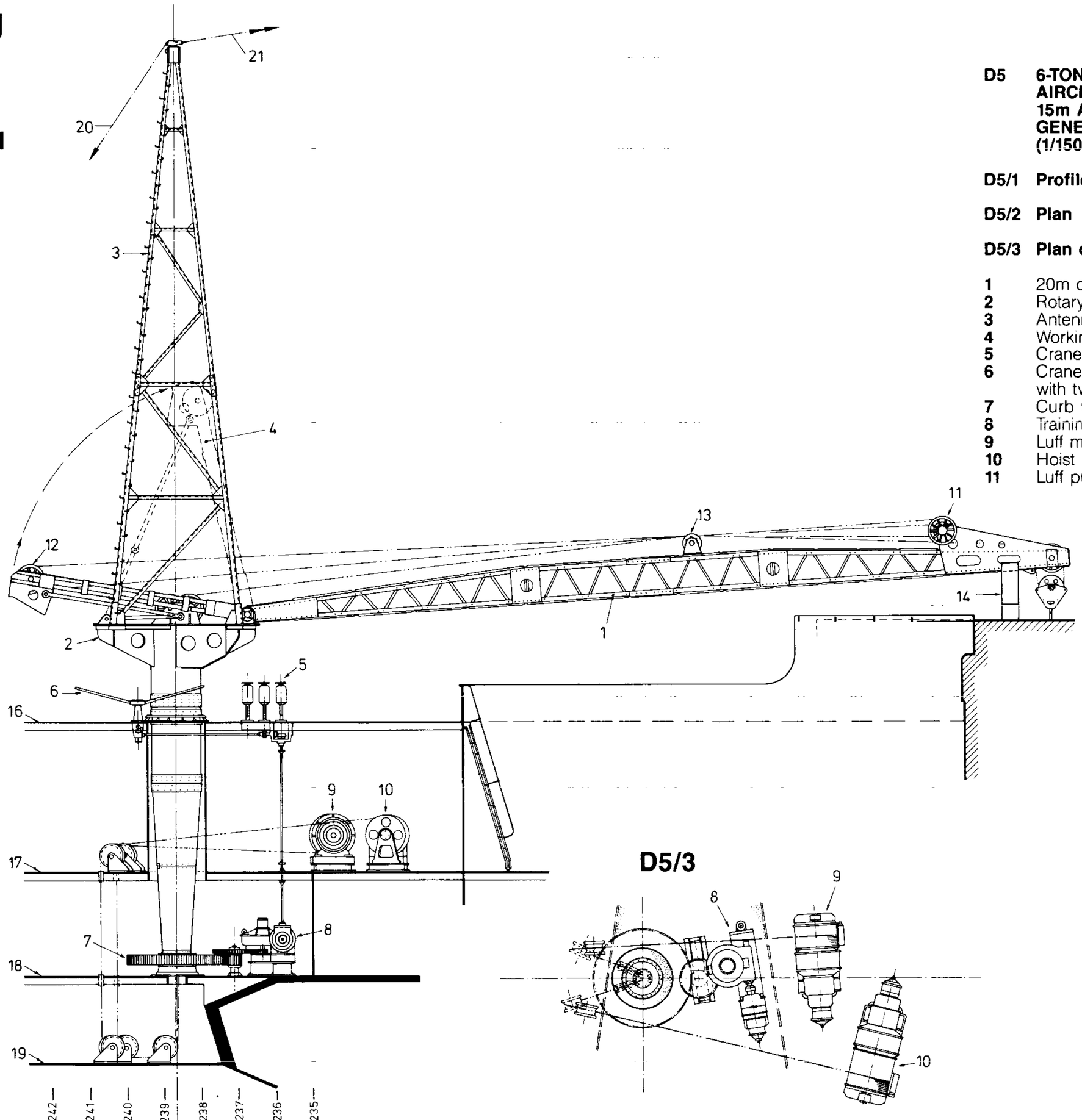
D4/1 View from astern

D4/2 Plan

D4/3 Side view

1 Ensign staff
2 Ensign halyard
3 Stern and overtaking light
4 Dressing line to top of crane mast
5 Stay
6 Triple 25mm MG open mount (fitted 1945)
7 Ladder
8 Towing fairlead
9 Degaussing cable
10 Flat part of stern
11 Gold 'hirangana' reading right to left *Ya-ma-to*
12 Chequer plates of stern deck

D5/1



D5 **6-TON STERN CRANE (FOR AIRCRAFT AND BOATS) WITH 15m ANTENNA MAST — GENERAL ARRANGEMENTS (1/150 scale)**

D5/1 **Profile view**

D5/2 **Plan**

D5/3 **Plan of crane propelling plant**

1 20m crane jib
2 Rotary crane platform
3 Antenna mast
4 Working position
5 Crane controls (handwheels)
6 Crane hand operation (emergency) with two bars
7 Curb wheel
8 Training motor
9 Luff motor
10 Hoist motor
11 Luff pulleys (fore) 4 pulleys

D5/3

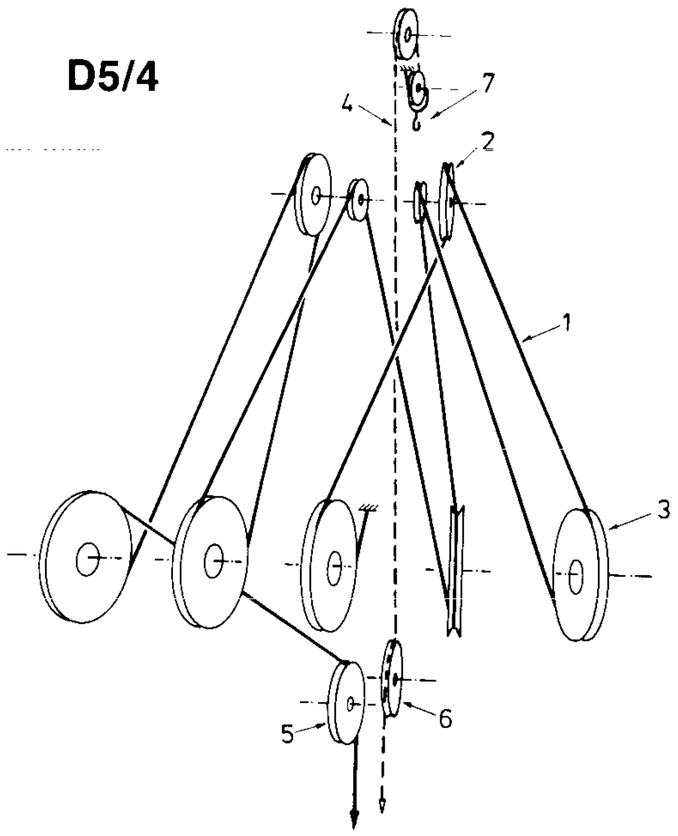
D5/2

12 Luff pulleys (aft) 5 pulleys
13 Rope guide rollers
14 Deck support of crane arm
15 Ship's centre line
16 Upper deck — stern deck
17 Middle deck
18 Lower deck
19 Platform deck
20 Dressing line to ensign staff
21 Two dressing lines (aerials) to top of main mast

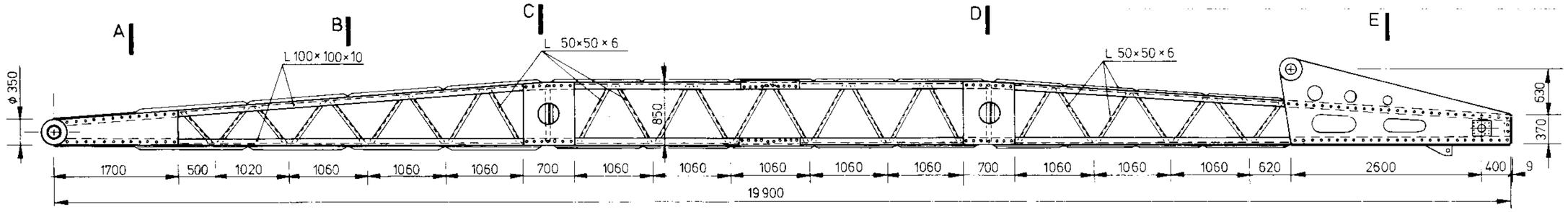
D5/4 Schematic of crane tacke (no scale)

1 Luff ropes
2 Luff pulleys — fore
3 Luff pulleys — aft
4 Hoist rope
5 Platform luff pulley
6 Platform hoist pulley
7 Crane hook

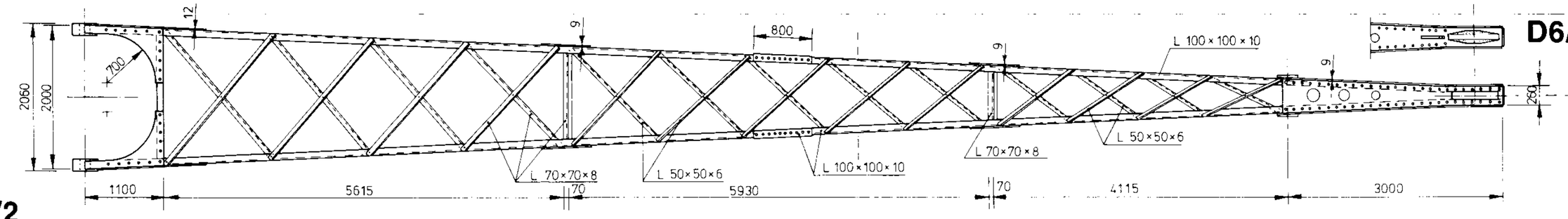
D5/4



D6/1



D6/3



D6/2

D6 CRANE JIB (1/100 scale)

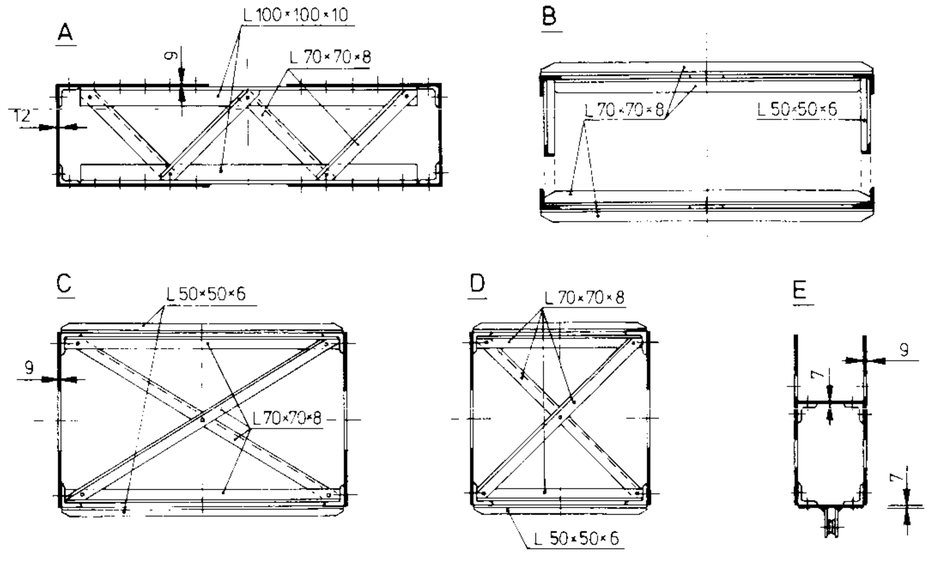
D6/1 Profile

D6/2 Plan

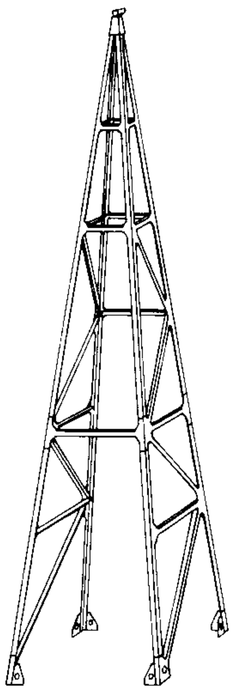
D6/3 Bottom view

D6/4 Sections (2 × scale)

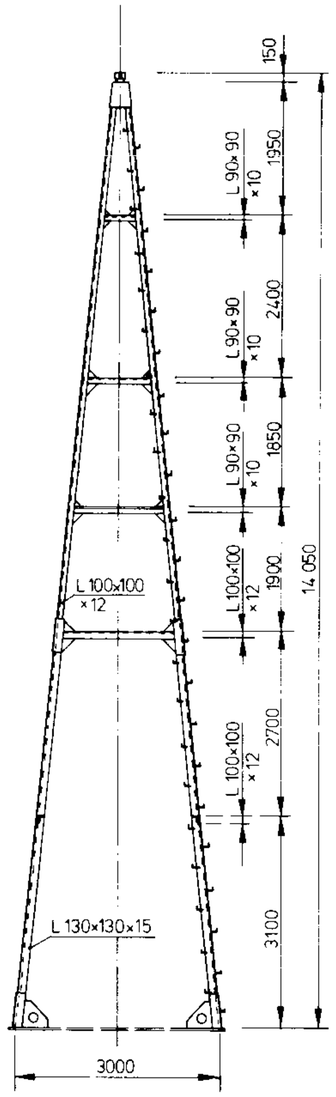
D6/4



D Rig



D7/1



D7/2

D7 ANTENNA MAST

D7/1 Perspective (no scale)

D7/2 Rear view (1/150 scale)

D8 CRANE PLATFORM (1/75 scale)

D8/1 Plan

D8/2 Section A-A

D8/3 Profile

D8/4 Front view

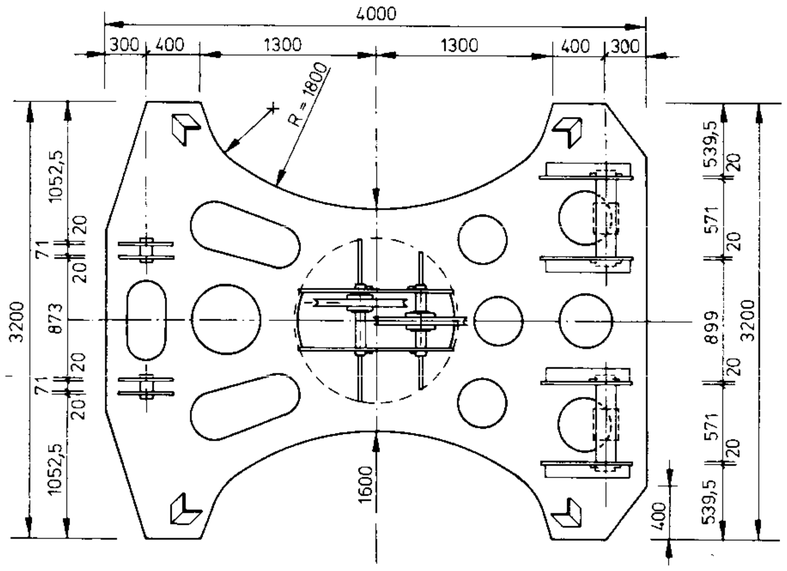
D8/5 Rear view

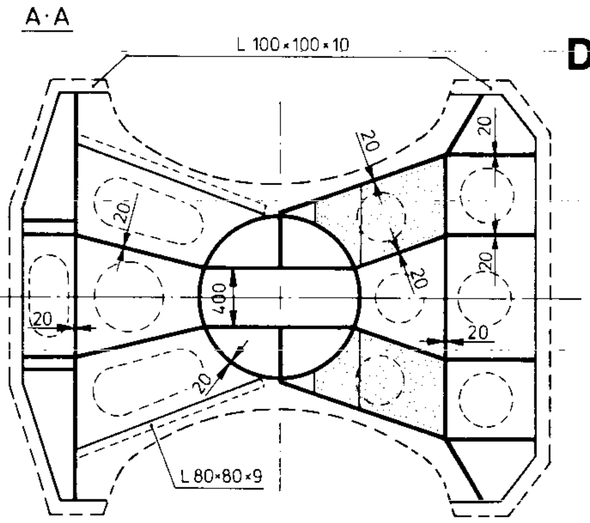
D8/6 Section B-B

D8/7 Detail of collar roller bearing (1/10 scale)

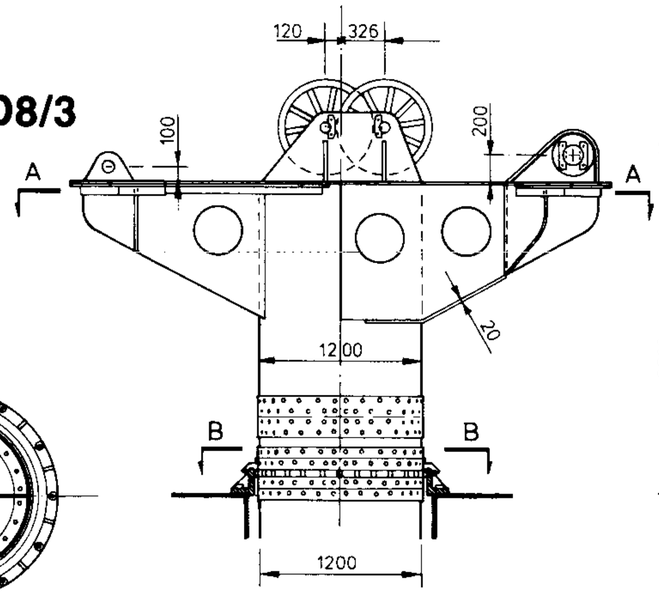
1 Upper deck
2 Collar roller bearing
3 Shield
4 Crane platform base

D8/1

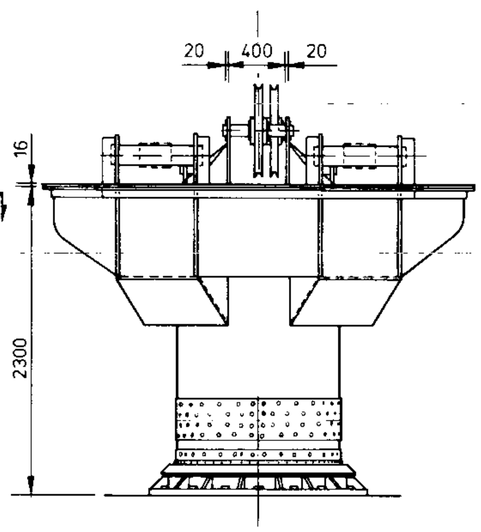




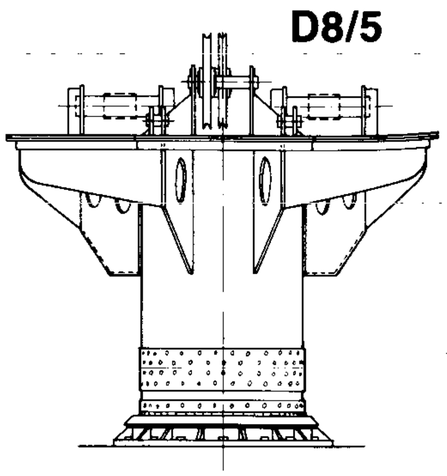
D8/2



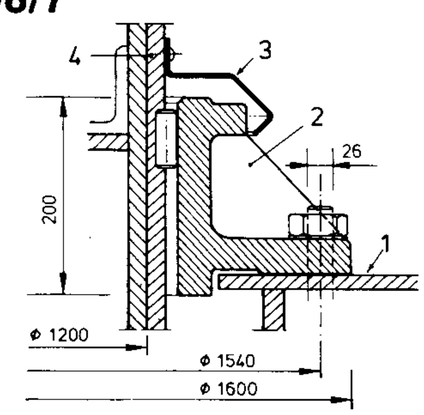
D8/3



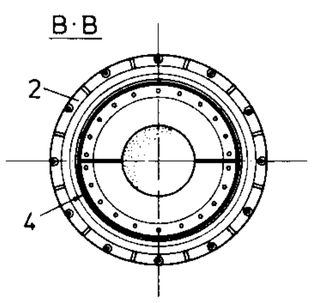
D8/4



D8/5



D8/7



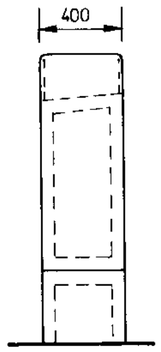
D8/6

D9 DECK SUPPORT OF CRANE ARM (1/50 scale)

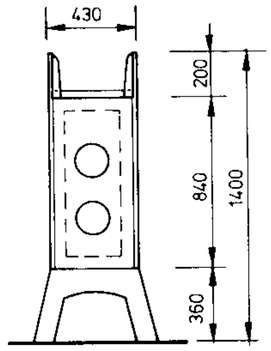
D9/1 Profile

D9/2 View from ship's stern

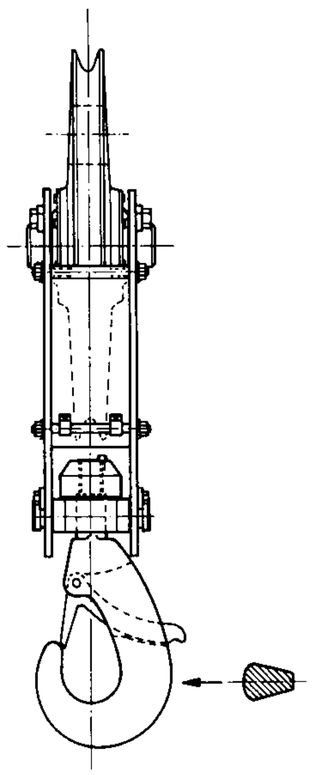
D9/1



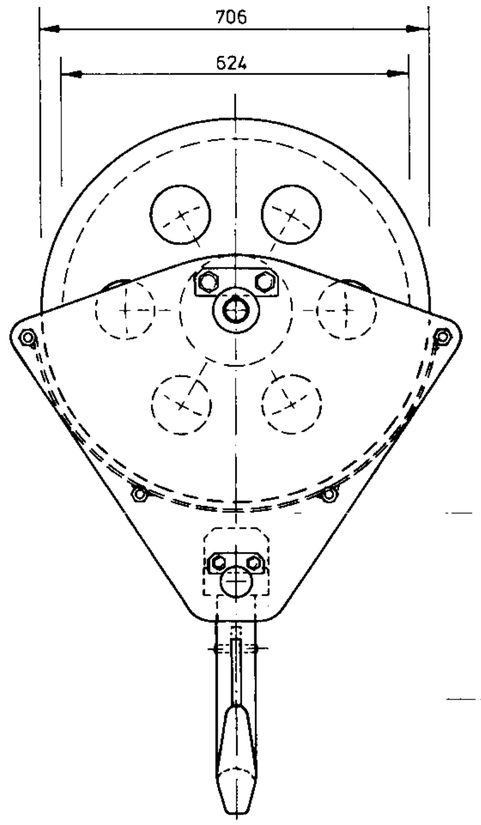
D9/2



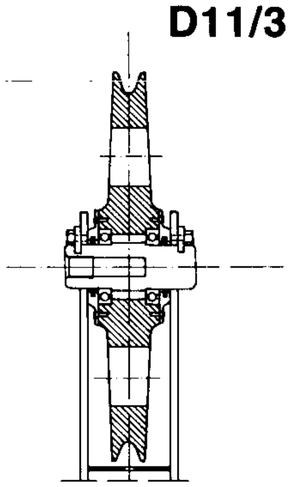
D11/1



D11/2



D11/3



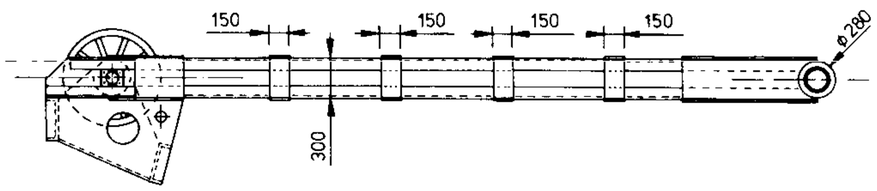
D11 CRANE HOOK (1/18.75 scale)

D11/1 Profile

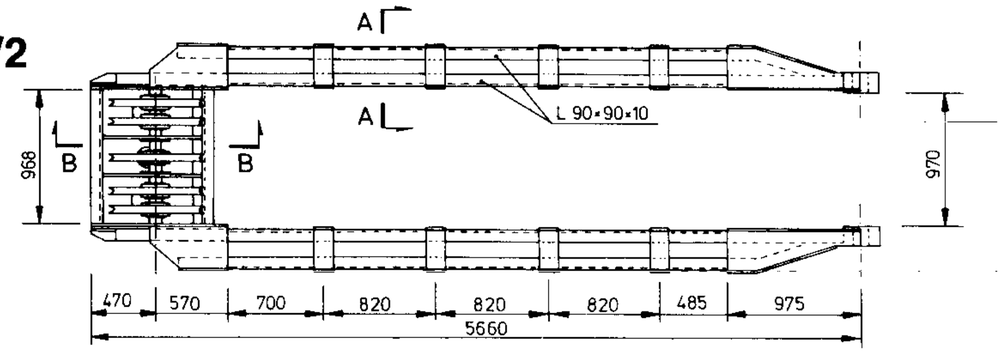
D11/2 Front view

D11/3 Cross section

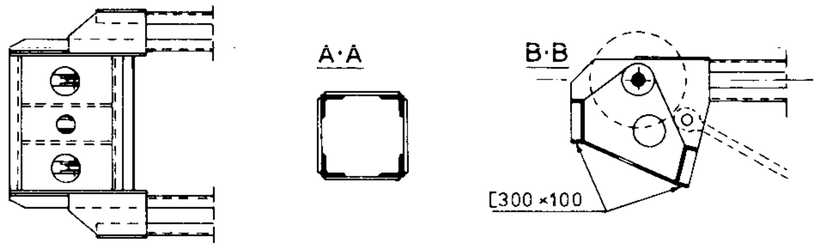
D10/1



D10/2



D10/3



D10 CRANE REAR FRAME WITH LUFF PULLEYS — WORKING POSITION 75° (1/75 scale)

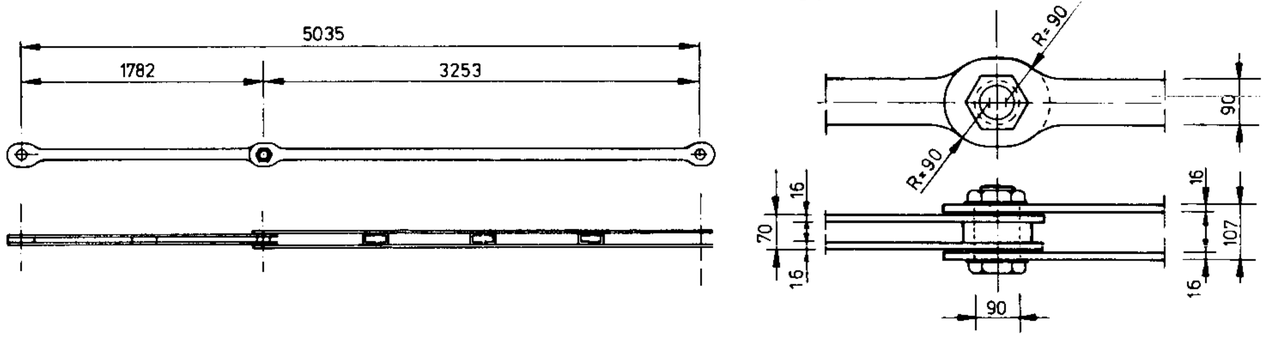
D10/1 Profile

D10/2 Plan

D10/3 Bottom view and sections

D10/4 Folding bracket of rear frame — profile, plan and detail

D10/4



D Rig

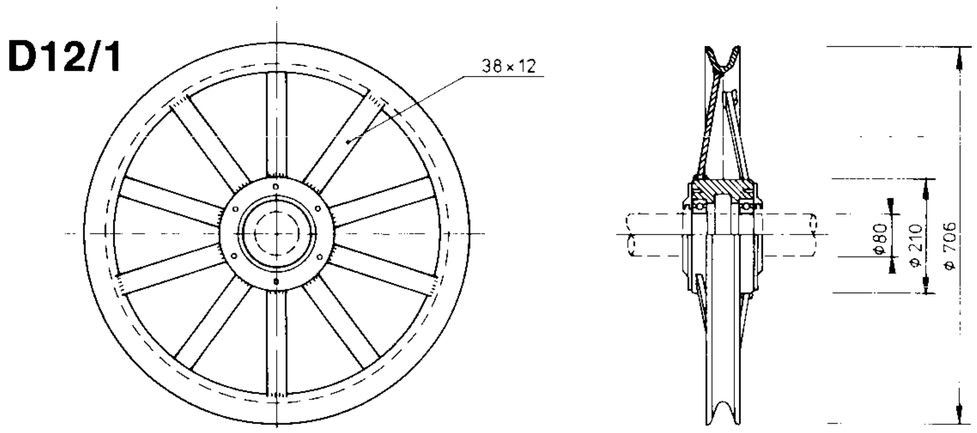
D12 CRANE PULLEY (1/18.75 scale)

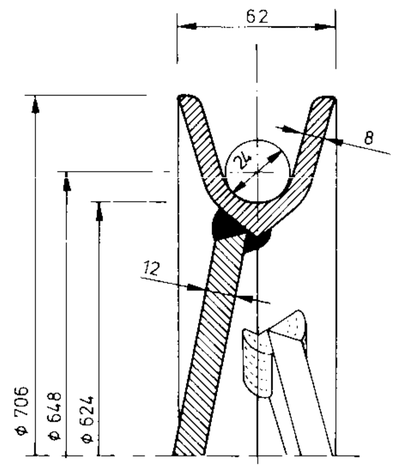
D12/1 Fore and aft luff pulleys

D12/2 Pulley from platform base

D12/3 Section (1/4 scale)

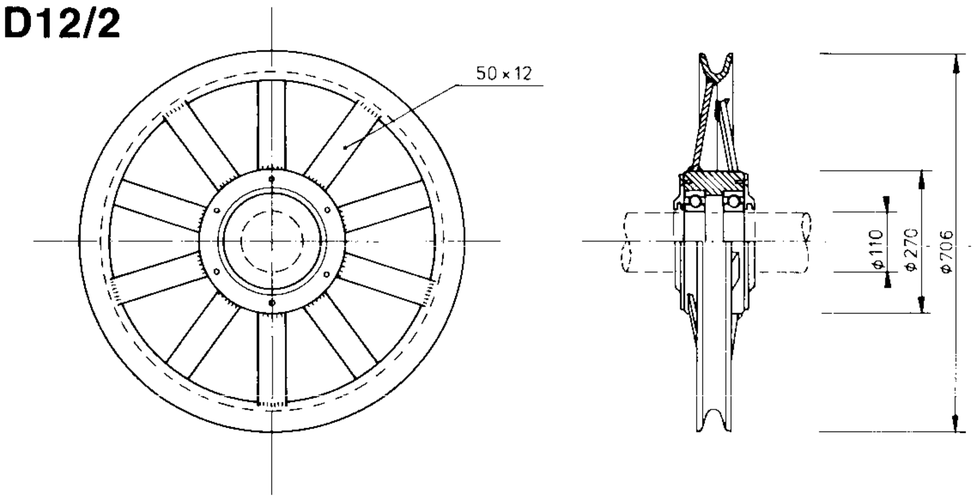
D12/1



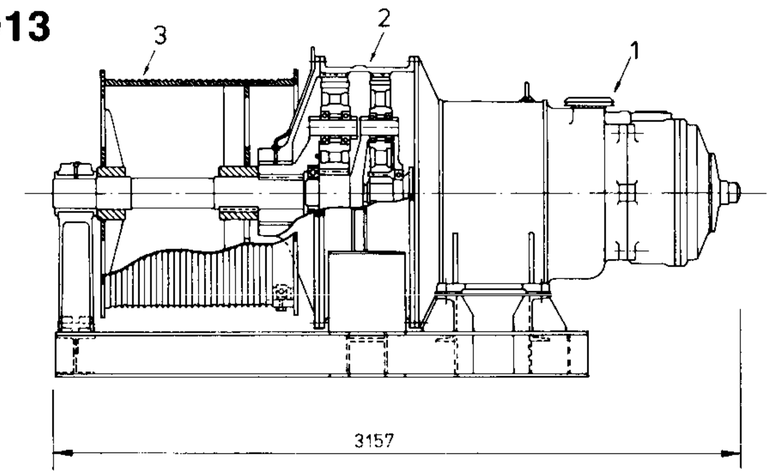


D12/3

D12/2



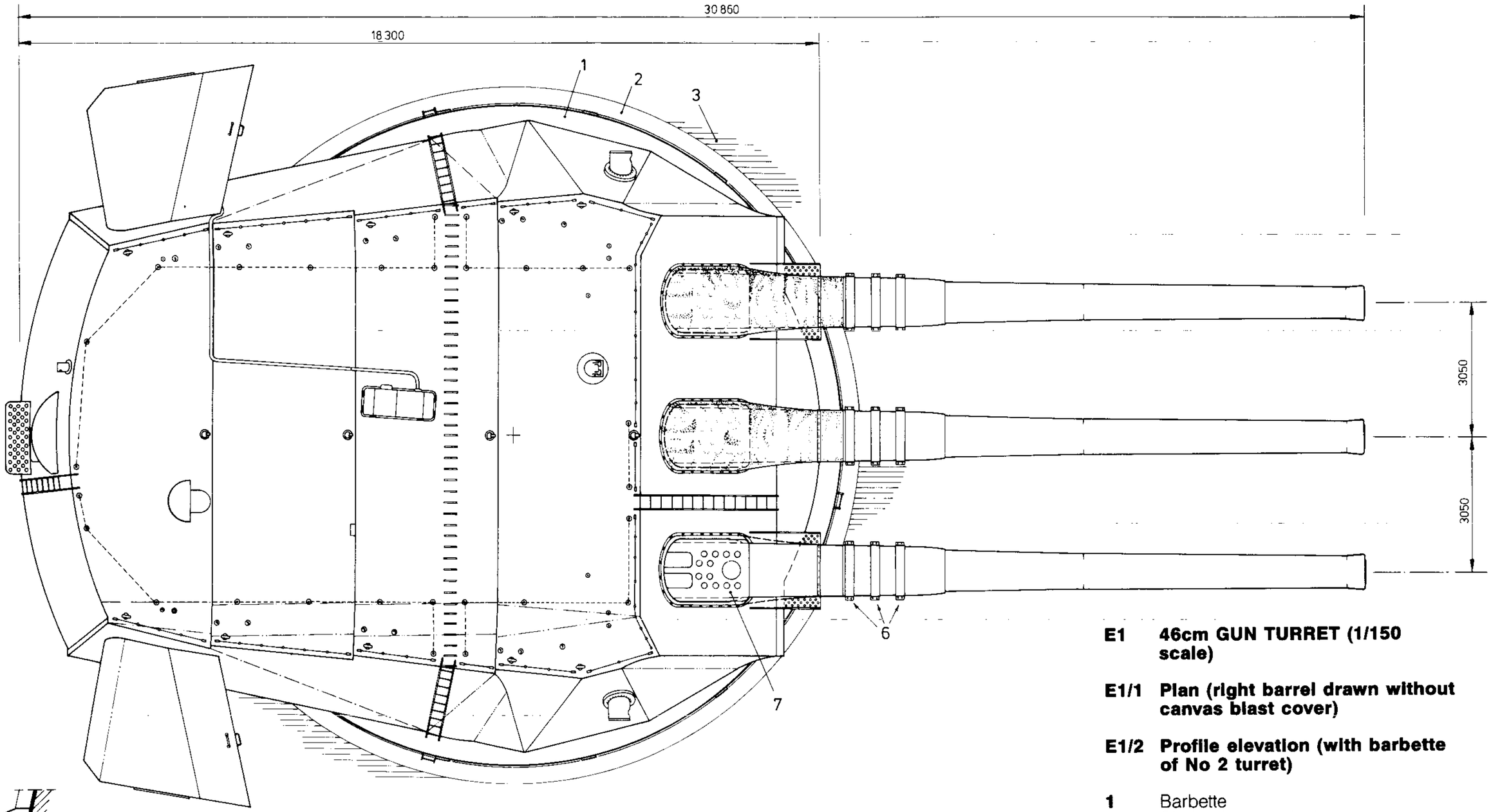
D13

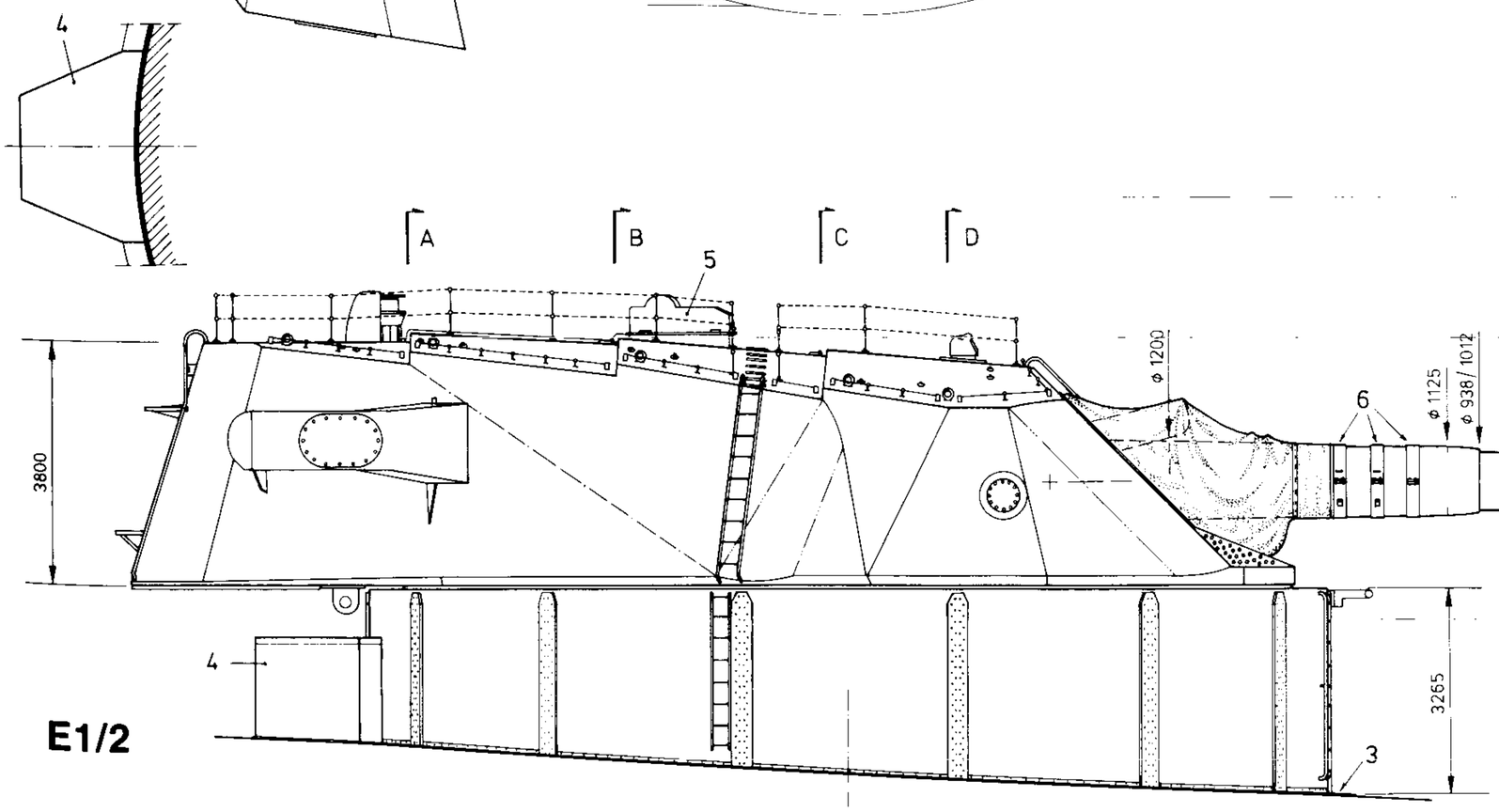


D13 CRANE ELECTRIC MOTOR AS DECK WINCH FOR PARAVANE (1/50 scale)

1 Electric motor 220V, 40kW
2 Variable-speed transmission gear
3 Rope drum

E1/1





E1/2

E1 46cm GUN TURRET (1/150 scale)

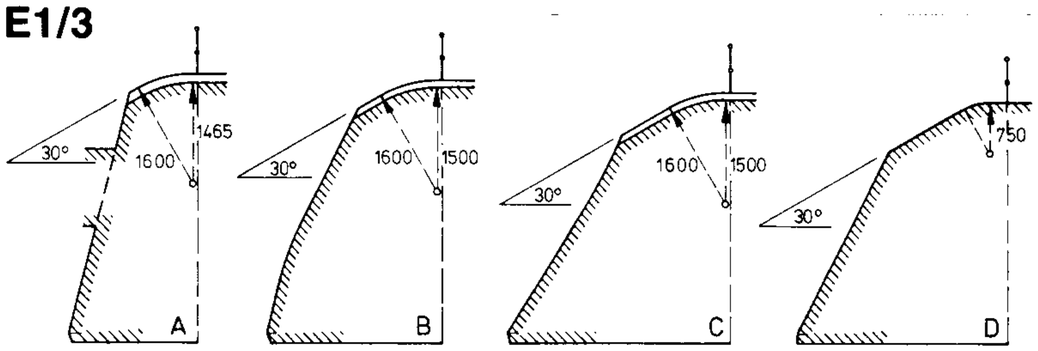
E1/1 Plan (right barrel drawn without canvas blast cover)

E1/2 Profile elevation (with barbette of No 2 turret)

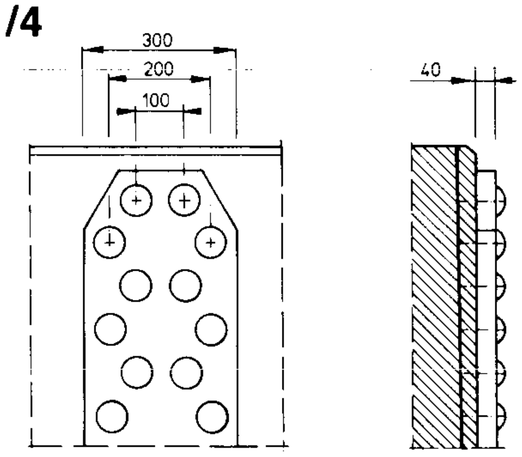
1 Barbette
2 Circle plate on deck
3 Wood deck planking
4 Box
5 Exercise aiming device
6 Clamping rings for testing instruments
7 Upper support for canvas blast cover

E Armament

E1/3



E1/4



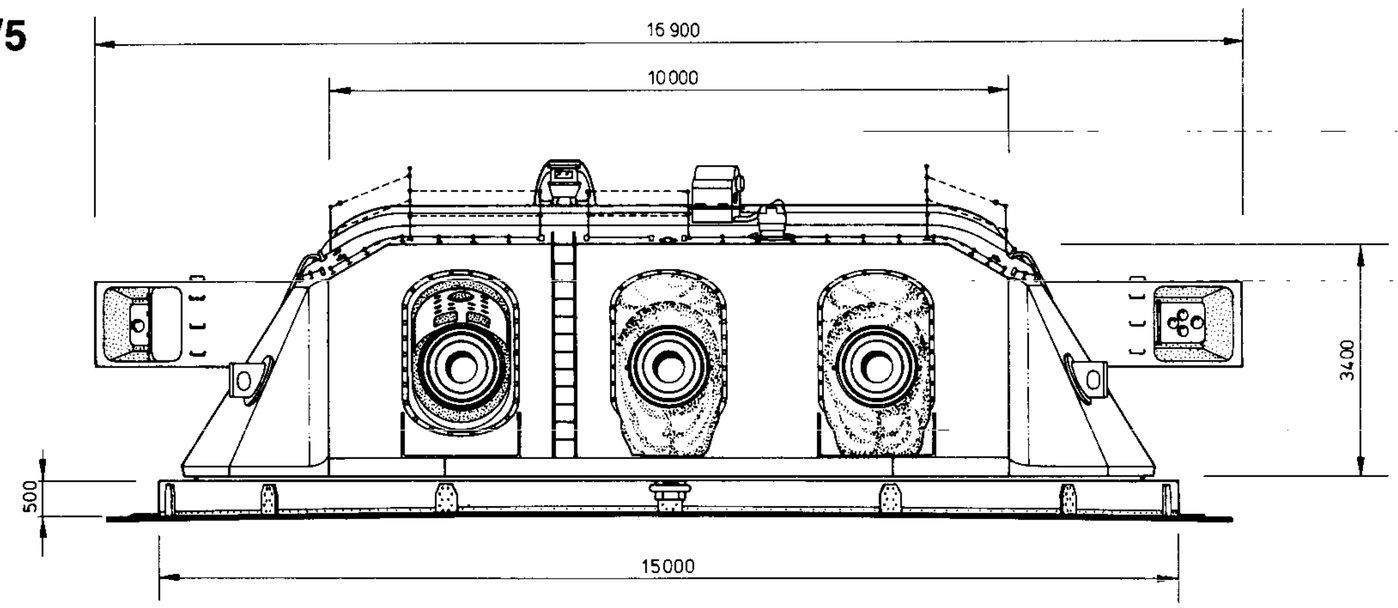
E1/3 Sections of gunhouse side walls

E1/4 Joint plates of barbette cover plating (1/20 scale)

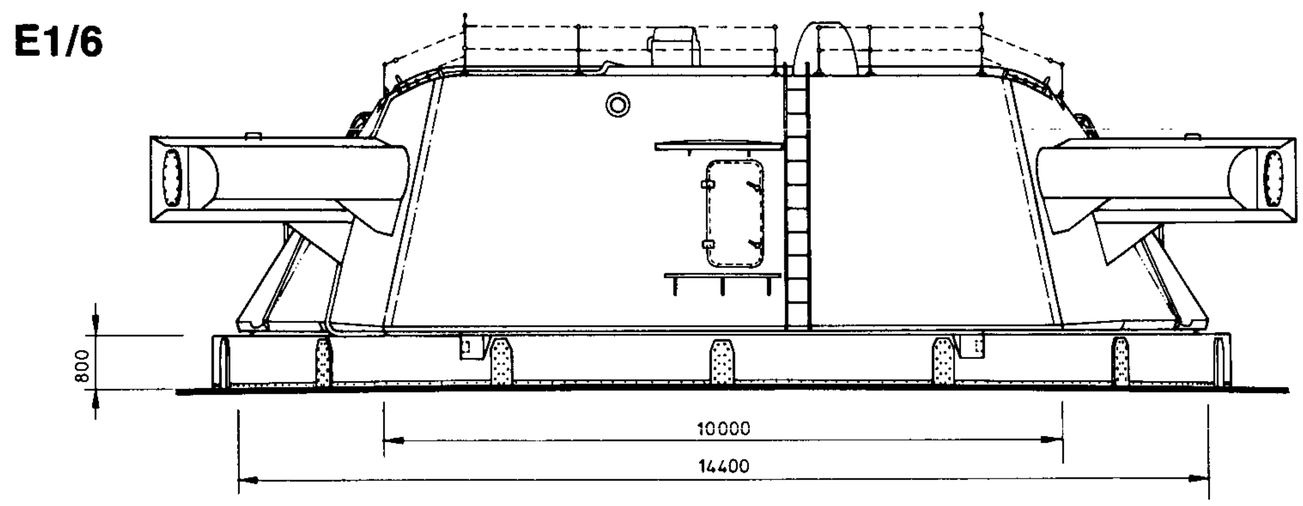
E1/5 Fore elevation of No 1 turret (right barrel drawn without canvas blast cover)
Note: partly open window of 15m rangefinder starboard arm

E1/6 Rear elevation No 3 turret

E1/5



E1/6



E1/7 Triple 25mm MG platforms fitted on gunhouse, 1945 (turrets No 2 and No 3) plan

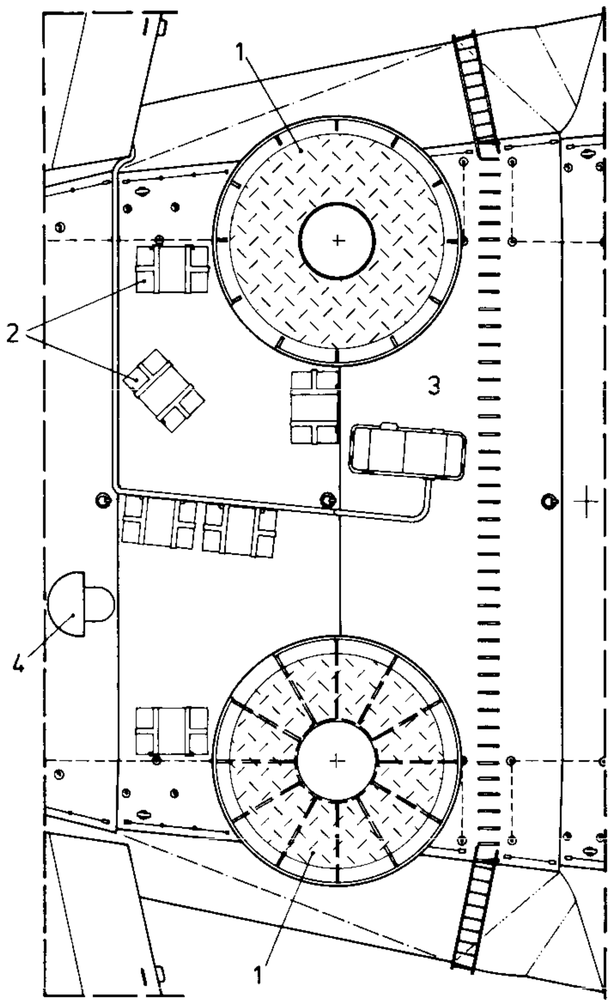
E1/8 Elevation of MG platforms

1 MG platform with white strip on upper part of zareba plating (main deck platforms the same)
2 25mm MG ammunition box for 240 rounds
3 Exercise aiming device
4 Periscope

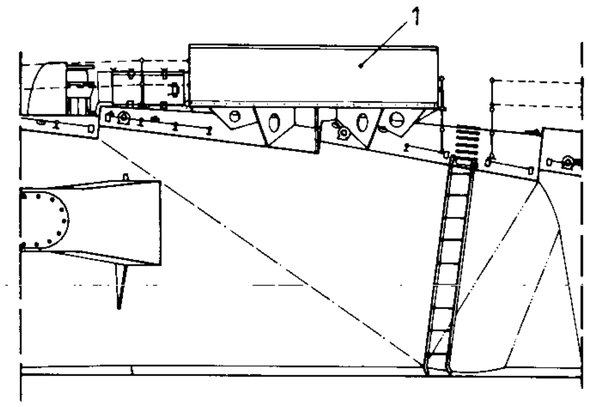
E1/9 Upper part of 46cm gunhouse (no scale)

1 Guard
2 Eye plate (for assembly)

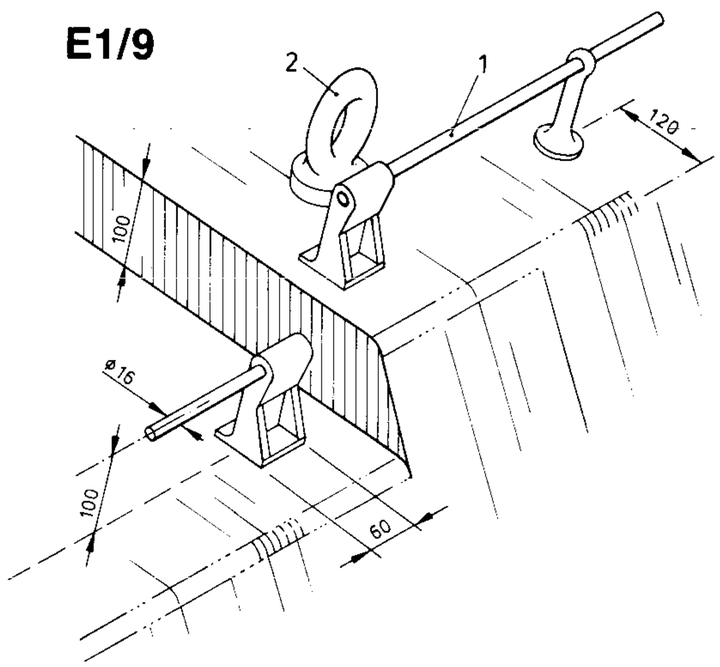
E1/7



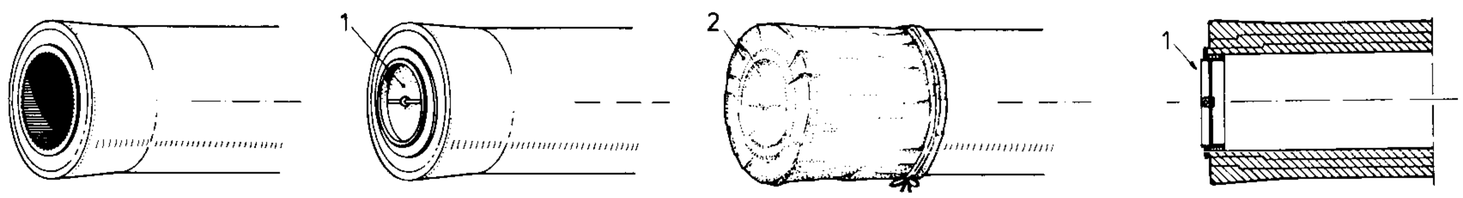
E1/8



E1/9



E2



E2 46cm GUN BARREL MUZZLE DETAILS (no scale)

1 Brass tompion
2 Canvas cover (brown in war, white in peacetime)

E Armament

E3 LOWER SHELL HANDLING ROOM — No 1 TURRET

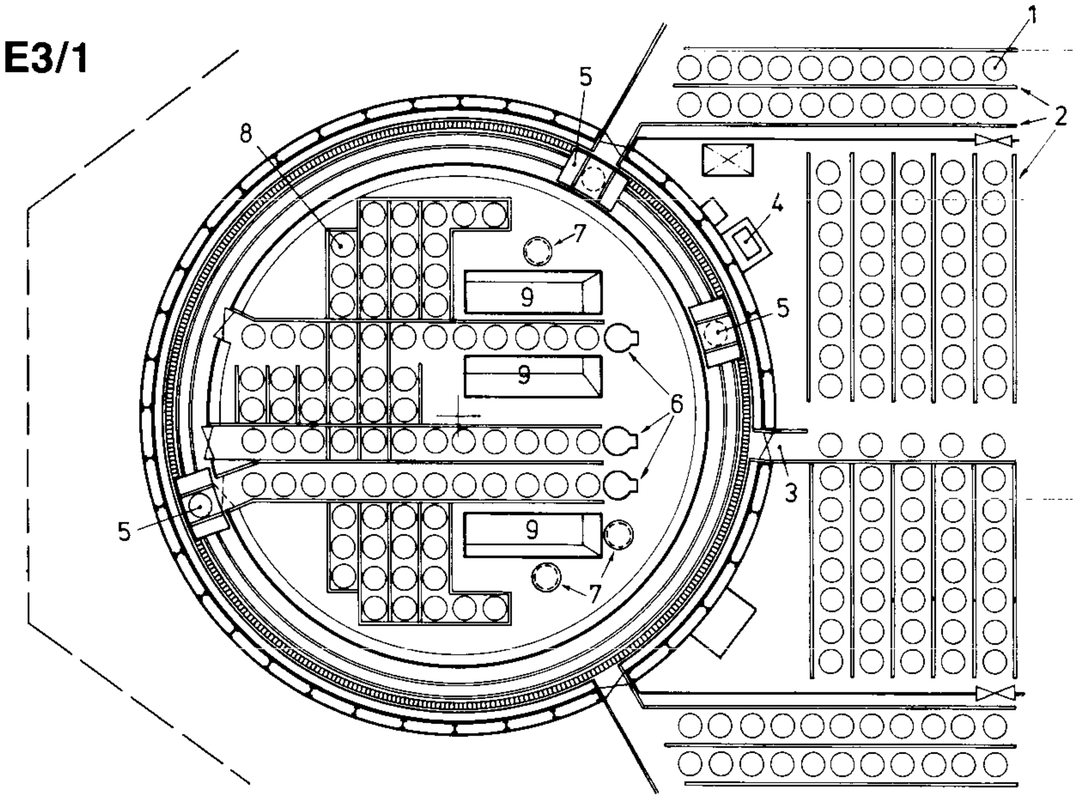
E3/1 Schematic plan (1/200 scale)

Note: Shells were moved by 'push-pull' gear along stowage skids (3) between stowage girders (2). The traversing motor (4) moved the shells into position to be moved into the turret rotating structure, whence the shell was transferred to shell hoists

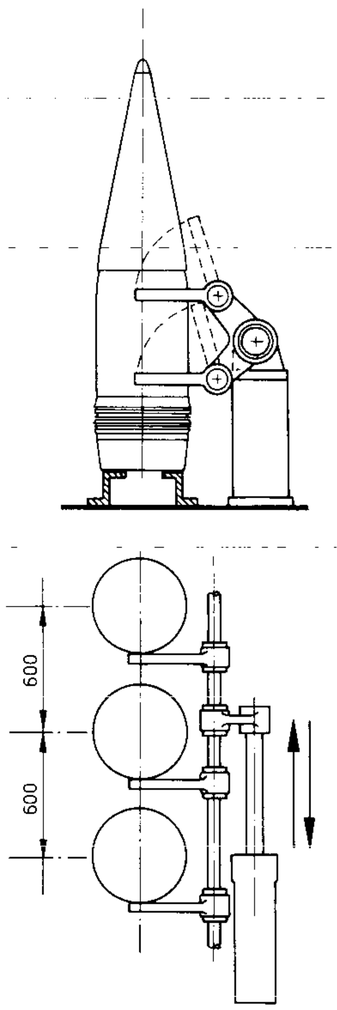
1 Shell stowage (outline) with 'push-pull' gear
2 Stowage girders in shell room
3 Stowage skids
4 Traversing motor
5 Shell bogie
6 Shell hoists
7 Auxiliary shell hoists
8 Rotating shell stowage with 'push-pull' gear on turret rotating structure
9 Cordite hoists

E3/2 Shell 'push-pull' gear, profile and plan (1/50 scale)

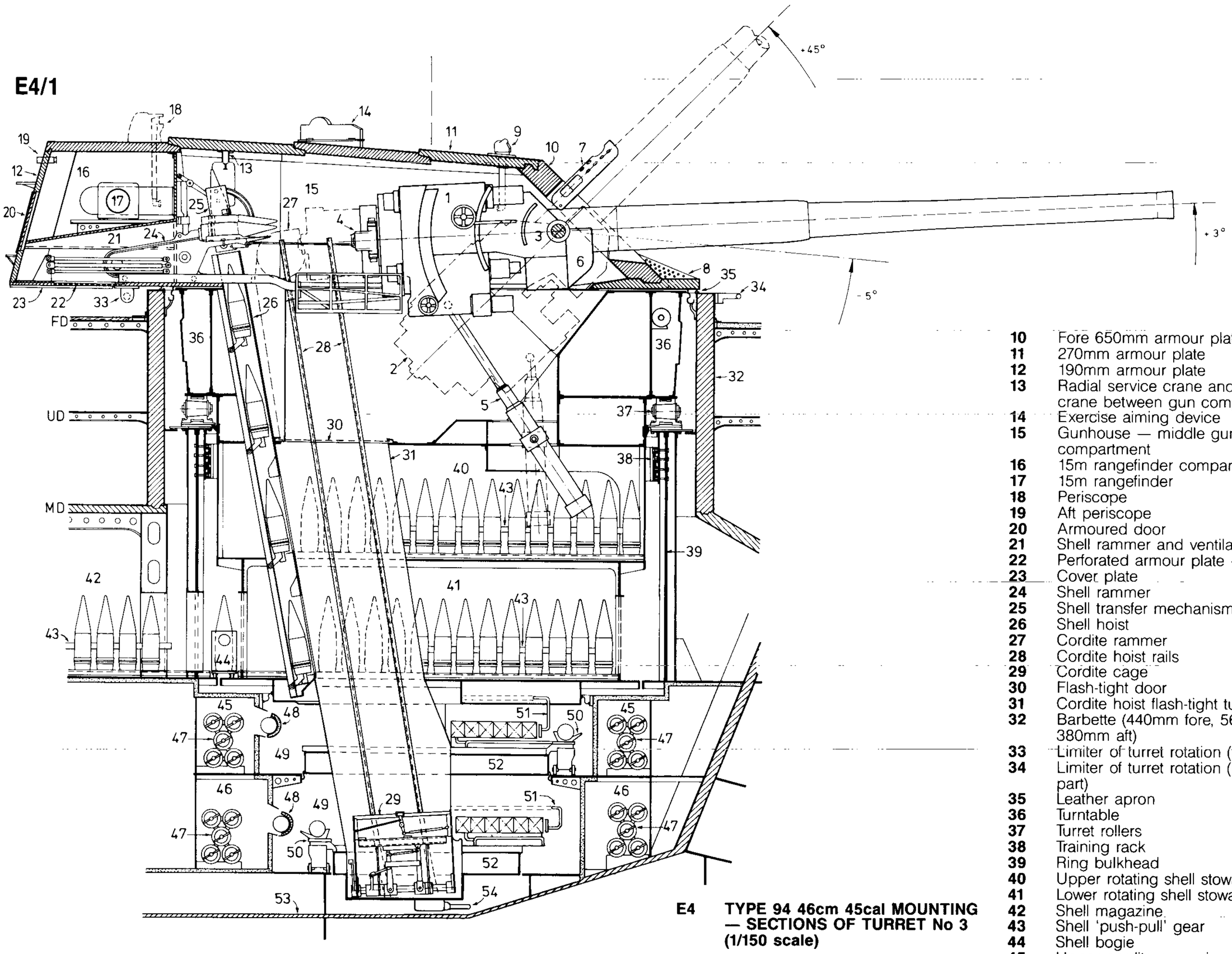
E3/1



E3/2



E4/1



E4 **TYPE 94 46cm 45cal MOUNTING — SECTIONS OF TURRET No 3 (1/150 scale)**

E4/1 **Profile**

1 Gun cradle, rest position (+3°); dashed line, maximum length of recoil (1430mm)
2 Maximum elevation (+45°); maximum depression (-5°)
3 Trunnion bearing
4 Breech mechanism
5 Elevating cylinder
6 Splinter protection
7 Upper support for canvas blast cover
8 Basket for canvas blast cover (only for right and left barrel)
9 Centre gun periscope
10 Fore 650mm armour plate
11 270mm armour plate
12 190mm armour plate
13 Radial service crane and door for crane between gun compartments
14 Exercise aiming device
15 Gunhouse — middle gun compartment
16 15m rangefinder compartment
17 15m rangefinder
18 Periscope
19 Aft periscope
20 Armoured door
21 Shell rammer and ventilation space
22 Perforated armour plate — ventilation
23 Cover plate
24 Shell rammer
25 Shell transfer mechanism
26 Shell hoist
27 Cordite rammer
28 Cordite hoist rails
29 Cordite cage
30 Flash-tight door
31 Cordite hoist flash-tight tunnel
32 Barbette (440mm fore, 560mm side, 380mm aft)
33 Limiter of turret rotation (turret part)
34 Limiter of turret rotation (barbette part)
35 Leather apron
36 Turntable
37 Turret rollers
38 Training rack
39 Ring bulkhead
40 Upper rotating shell stowage
41 Lower rotating shell stowage
42 Shell magazine
43 Shell 'push-pull' gear
44 Shell bogie
45 Upper cordite magazine
46 Lower cordite magazine
47 Cordite stowage — canisters for two 55kg charges
48 Flash-tight scuttle
49 Powder (cordite) handling room
50 Cordite transfer bogie
51 Cordite swinging rammer — moved 330kg charge into the hoist cage
52 Rotating platform of revolving turret structure
53 50mm-80mm thick armour
54 Cable lead in

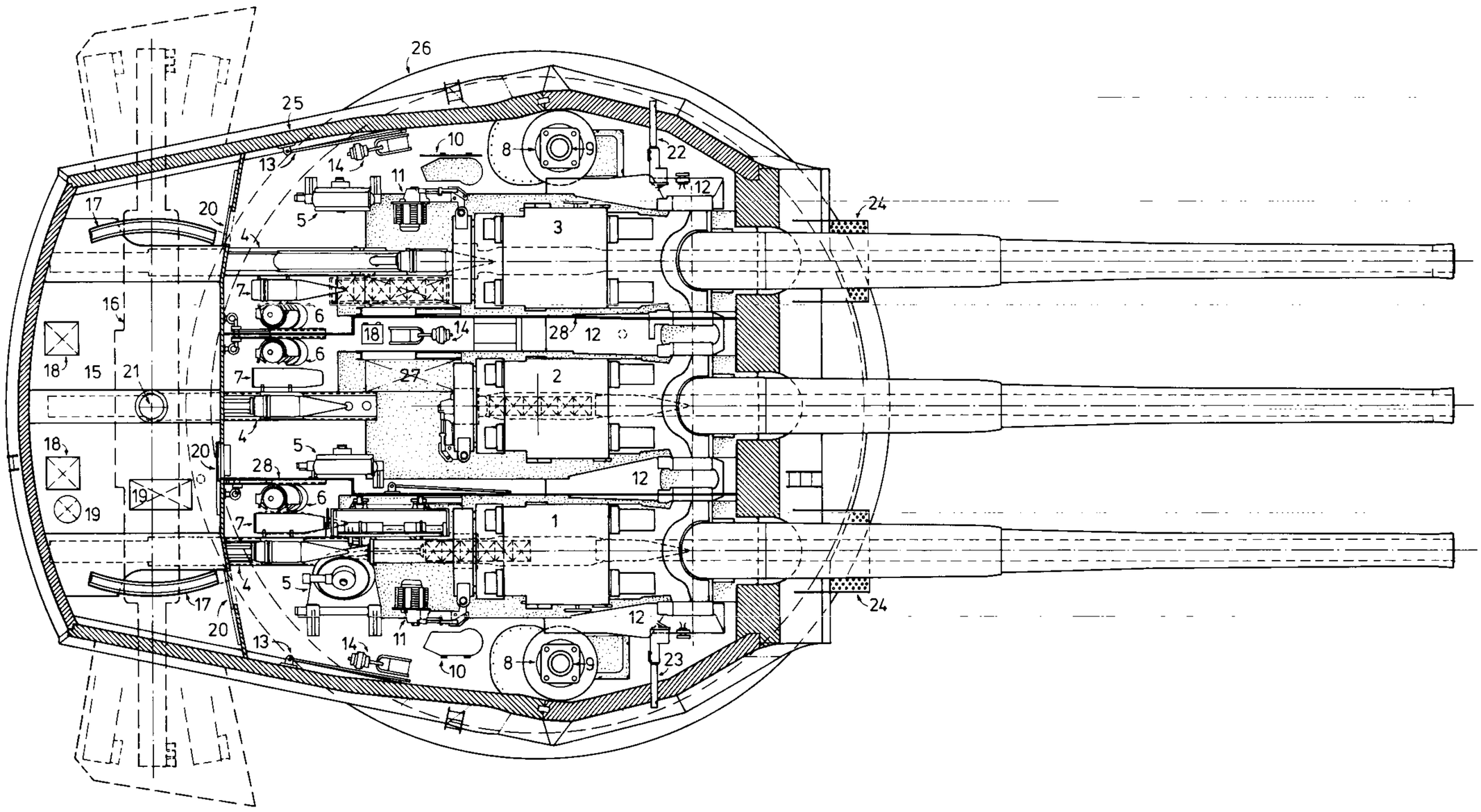
FD Forecastle deck — aircraft deck
UD Upper deck
MD Middle deck

E Armament

E4/2 Plan

1 Right gun — at moment of cordite charge (330kg) loading
2 Centre gun — ready to fire
3 Left gun — at moment of shell loading
4 Shell rammer
5 Cordite rammer
6 Shell transfer mechanism and shell hoist
7 Shell waiting tray
8 Hydraulic training engine
9 Training clutch handwheel
10 Auxiliary hoist
11 Breech block
12 Trunnion bearing
13 Side crane arm
14 Hydraulic engine of crane
15 15m rangefinder compartment
16 15m rangefinder
17 Rangefinder rotating rails
18 Hatch
19 Ventilation hole
20 Inner door
21 Rangefinder axis of rotation
22 Left gun periscope
23 Right gun periscope
24 Basket for canvas blast cover
25 250mm side armour
26 Barbette
27 Flash-tight door for cordite hoist — lower part of turntable
28 Steel bulkheads — separate gunhouse for three gun compartments

E4/2



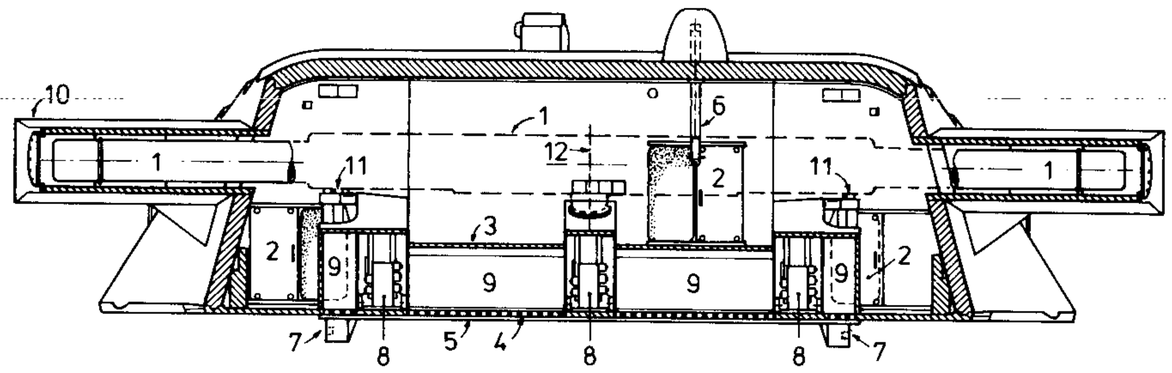
E4/3 Rear view — section of central part (gun loading position as on plan)

1 Gun periscope compartments
2 Recoil cylinder
3 Run-out cylinder
4 Elevating cylinder
5 Training hydraulic engine
6 Training pinion
7 Training rack
8 Turret rollers
9 Ring bulkhead
10 Turntable
11 Shell hoist
12 Cordite hoist rails
13 Cordite cage
14 Flash-tight door
15 Cordite hoist flash-tight tunnel
16 Barbette
17 Upper rotating shell stowage
18 Lower rotating shell stowage
19 Shell magazine
20 Shell 'push-pull' gear
21 Shell bogie
22 Upper cordite magazine
23 Lower cordite magazine
24 Cordite stowage — canisters for two 55kg charges
25 Flash-tight scuttle
26 Cordite handling room — upper
27 Cordite handling room — lower
28 Cordite transfer bogie
29 Revolving platform — upper
30 Revolving platform — lower
31 Apron
32 Cable lead in
33 50mm-80mm thick armour

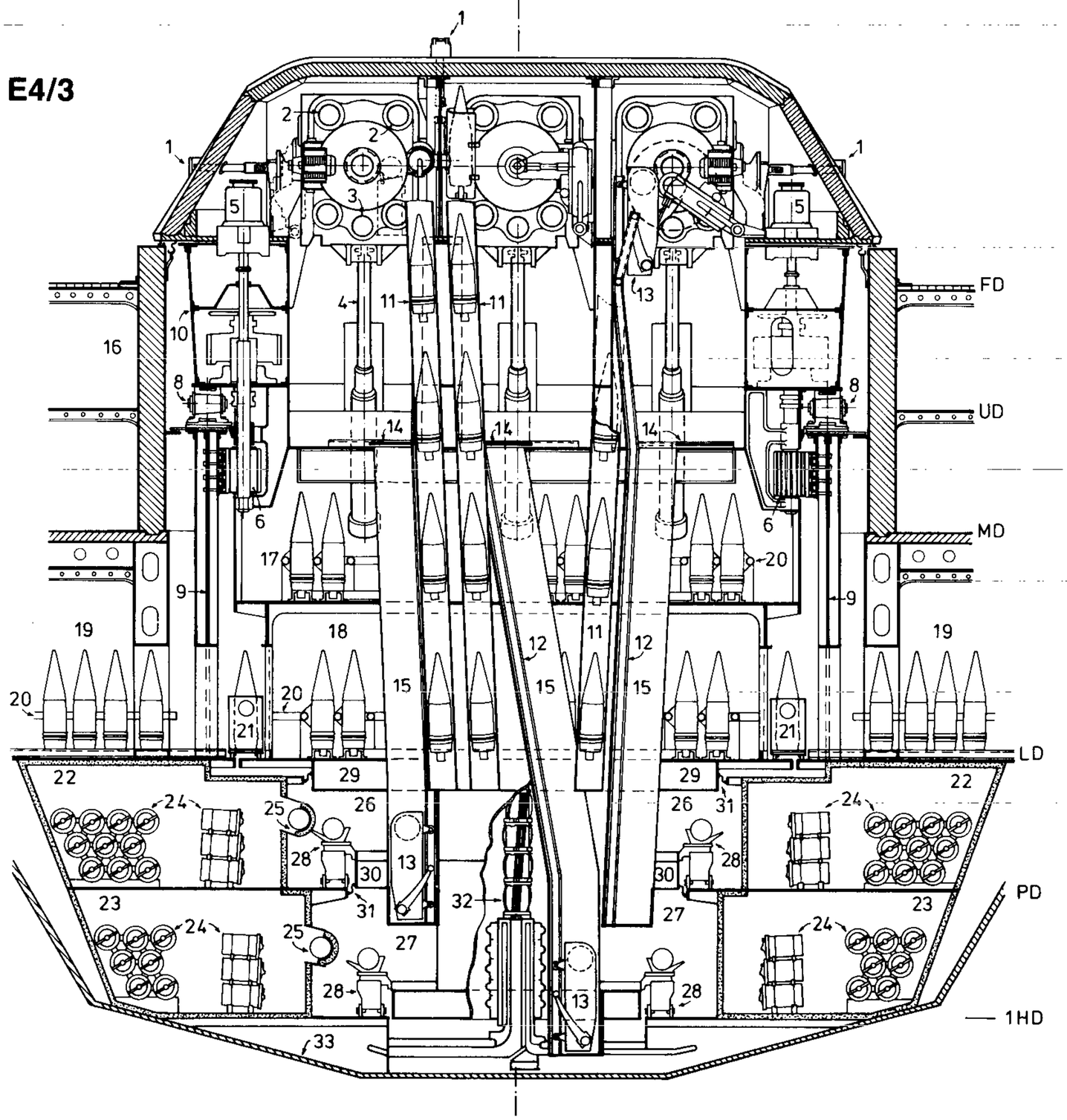
FD Forecastle deck — aircraft deck
UD Upper deck
MD Middle deck
LD Lower deck
PD Platform deck
1HD First hold deck

E4/4 Rear view — section of 15m rangefinder compartment

1 15m rangefinder
2 Inner door (sliding)
3 Inner deck of compartment
4 Perforated armour plate
5 Shield plate
6 Periscope
7 Limiter of turret rotation
8 Shell rammer
9 Ventilation space
10 Rangefinder cover
11 Rangefinder rotation rails
12 Axis of rotation



E4/4



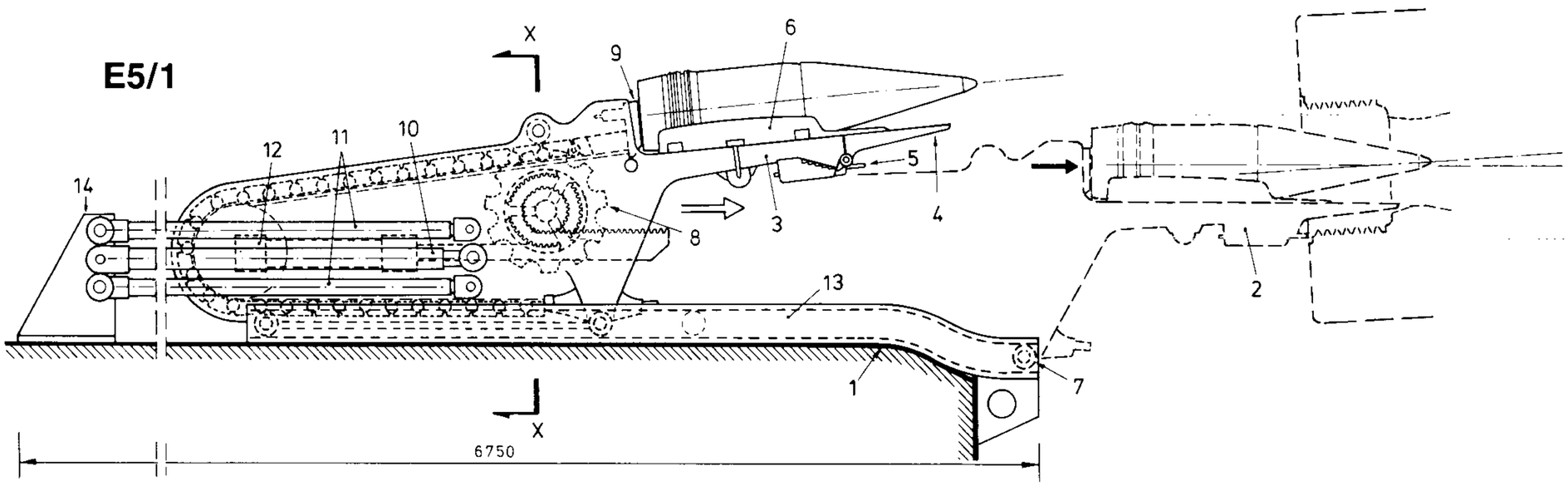
E Armament

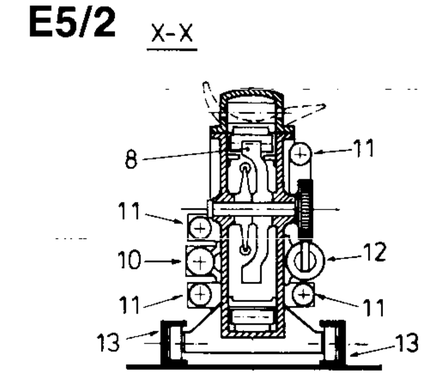
E5 46cm GUN TURRET MACHINERY (1/50 scale)

E5/1 Shell rammer, profile

E5/2 Shell rammer, section

1 Turntable
2 Loading position
3 Shell loading tray
4 Breech thread protection tray
5 Buffer stop to limit forward movement of bogie
6 Breech face anti-rolling grips
7 Foreward roller stop
8 Ram sprocket — the ram is a bicycle-type chain
9 Buffer
10 Run-out cylinder
11 Telescopic tube
12 Rammer cylinder
13 Rail
14 Support

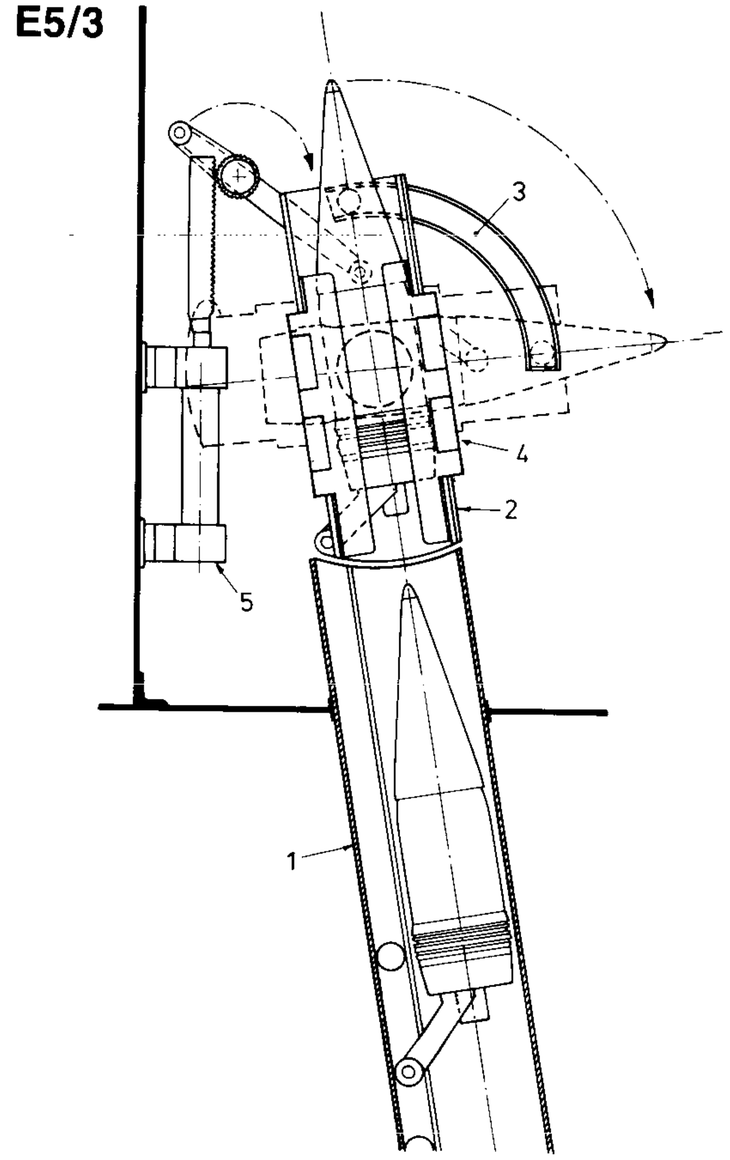


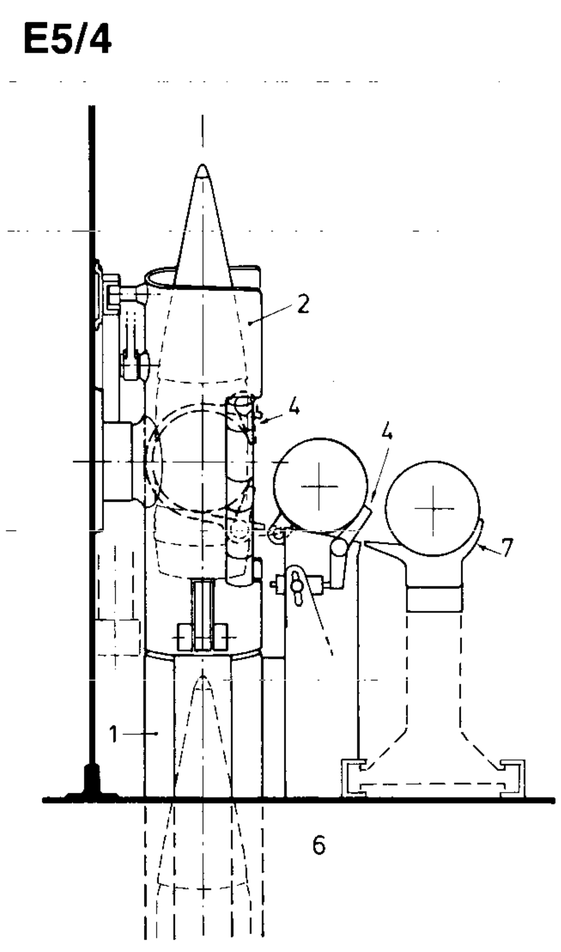


E5/3 Shell transfer mechanism, side view

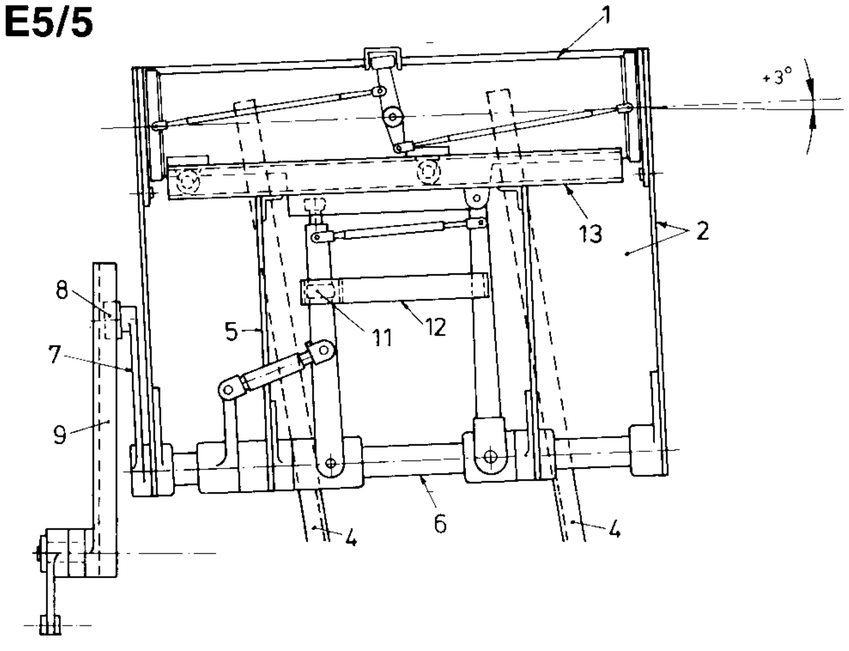
E5/4 Shell transfer mechanism, rear view

1 Shell hoist
2 Shell tilting bucket
3 Cam of shell tilting bucket
4 Clips
5 Shell tilting cylinder
6 Shell waiting tray
7 Shell loading tray of shell rammer

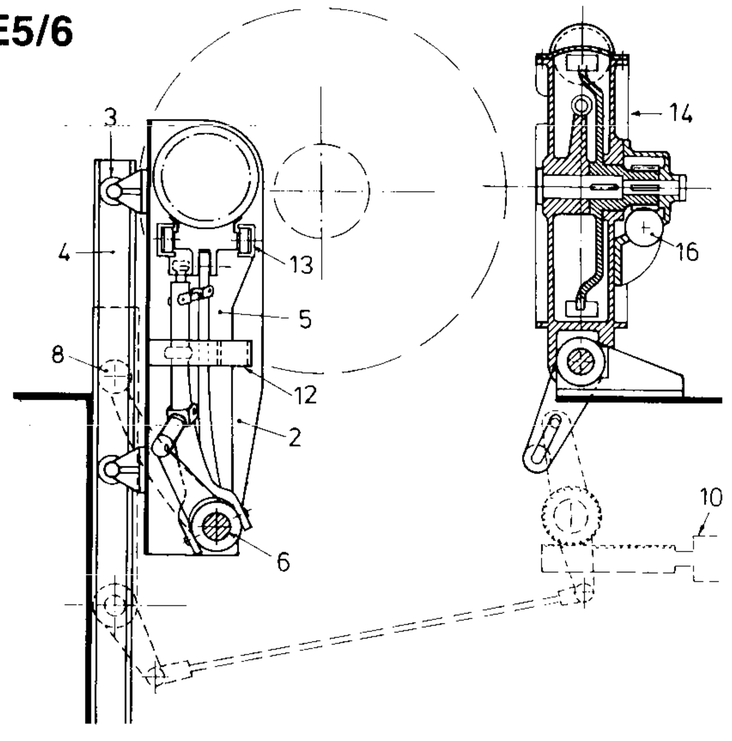




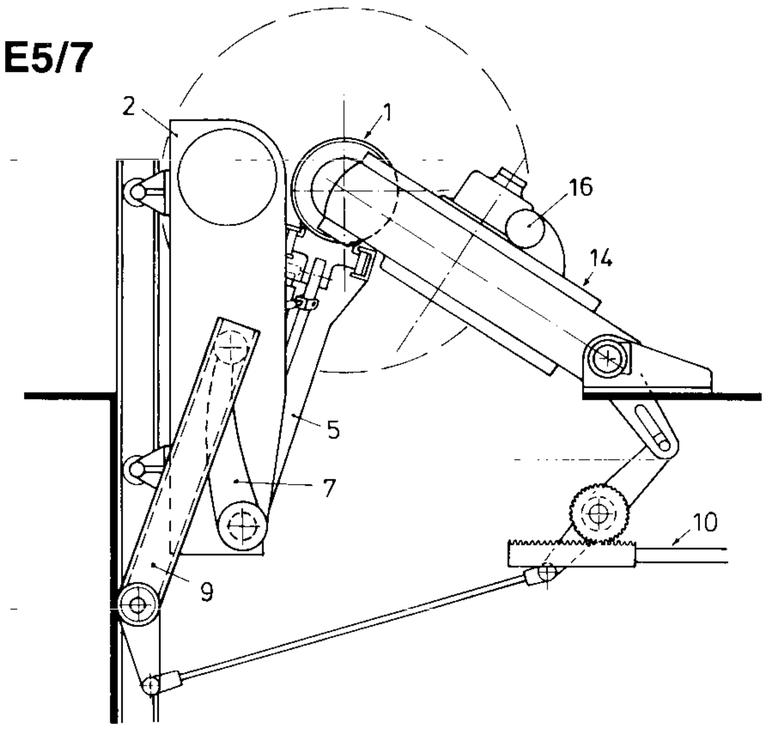
E5/5



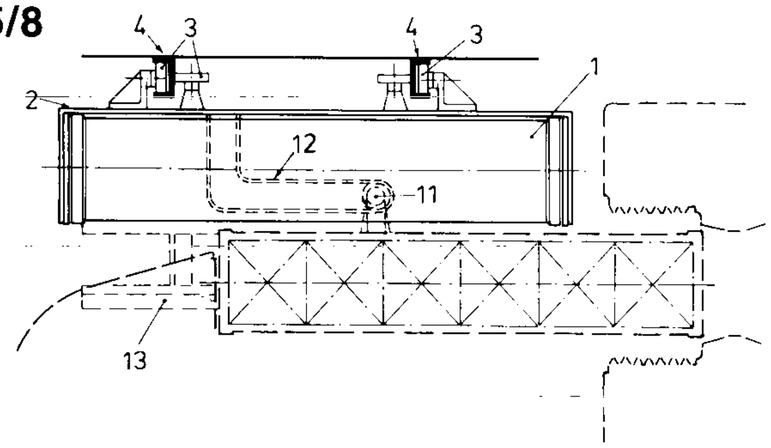
E5/6



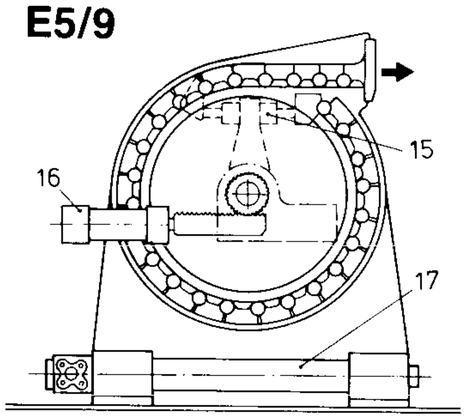
E5/7



E5/8



E5/9



E5/5 Cordite cage and cordite rammer, side view

E5/6 Rear section view

E5/7 Rear view — loading position for cage and cordite rammer

E5/8 Cordite cage, plan

E5/9 Cordite rammer, side view

1 Flash-tight charge container with six 55kg charges
2 Cage framework
3 Cage wheels
4 Guide rails from cordite magazine
5 Rotating rammer of cage
6 Shaft of rotating rammer
7 Shaft lever
8 Lever roller
9 Rail of lever roller drive to hydraulic mechanism
10 Hydraulic mechanism
11 Ramming crosshead
12 Groove — forcing the flash-tight container into load position
13 Flash-tight container rail and roller
14 Cordite rammer
15 Buffer stop
16 Ramming cylinder
17 Swivel tube and slant shaft of cordite rammer

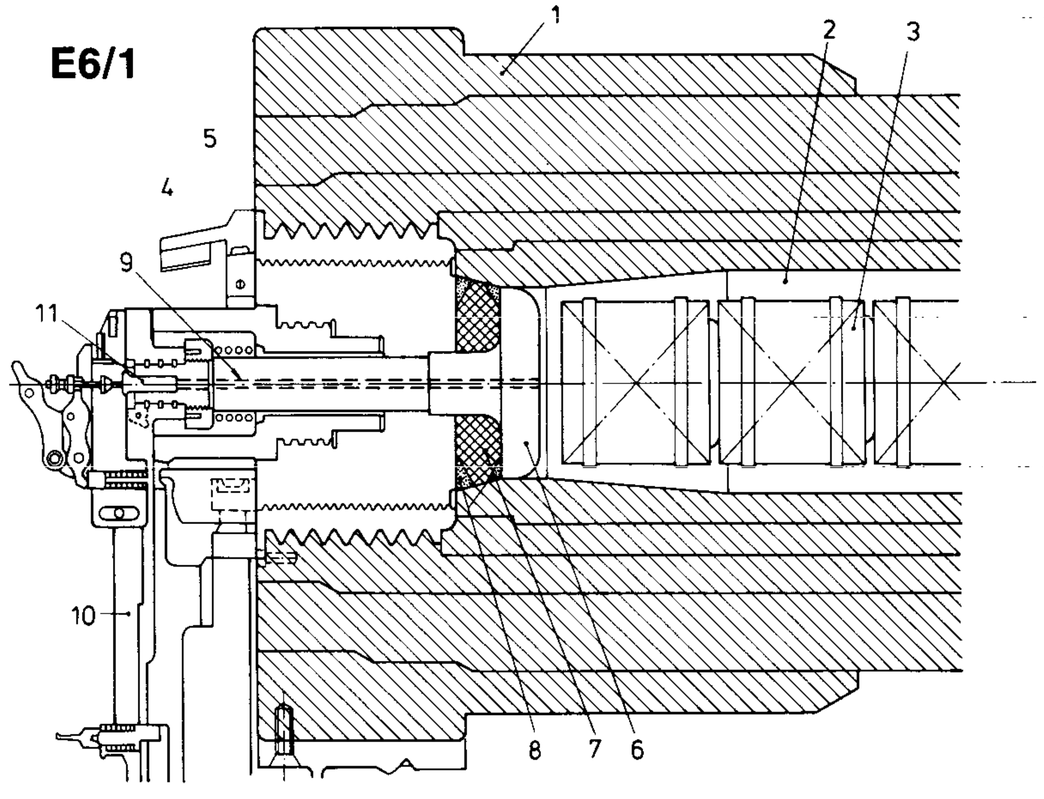
E Armament

E6 46cm BREECH MECHANISM

E6/1 Section (1/25 scale)

1 Breech ring
2 Chamber
3 Charge 55kg (six for a full charge)
4 Breech block piston
5 Threaded sectors
6 Obturator spindle
7 Gas check pad
8 Split rings
9 Vent bushing
10 Breech block carrier and driver
11 Electric primer

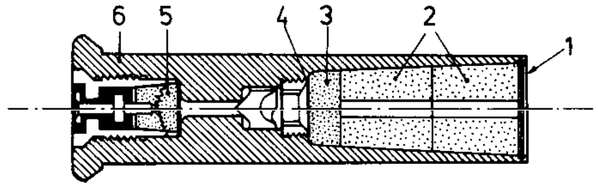
E6/1



E6/2 Electric primer, section (1/2.5 scale)

1 Loose filler, cold gauze two layers, parchment one layer
2 Compressed black powder
3 Small-grain black powder
4 Paper
5 Fibrous gun cotton
6 Copper base

E6/2



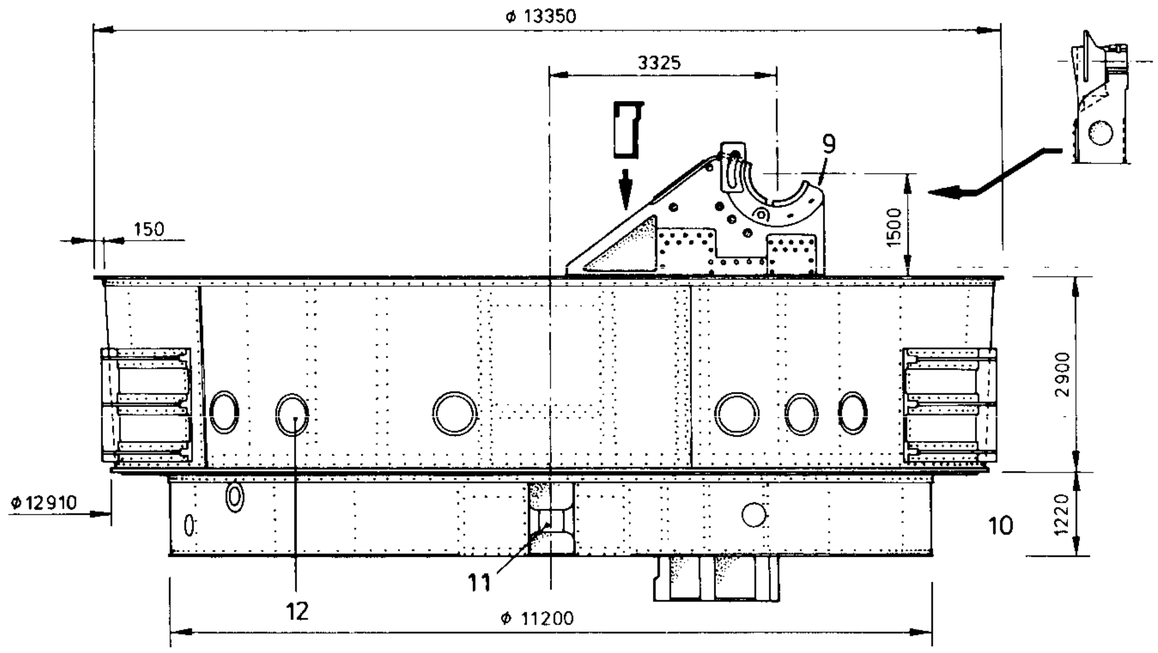
E7 TURNTABLE OF 46cm GUN MOUNTING (1/150 scale)

E7/1 Profile

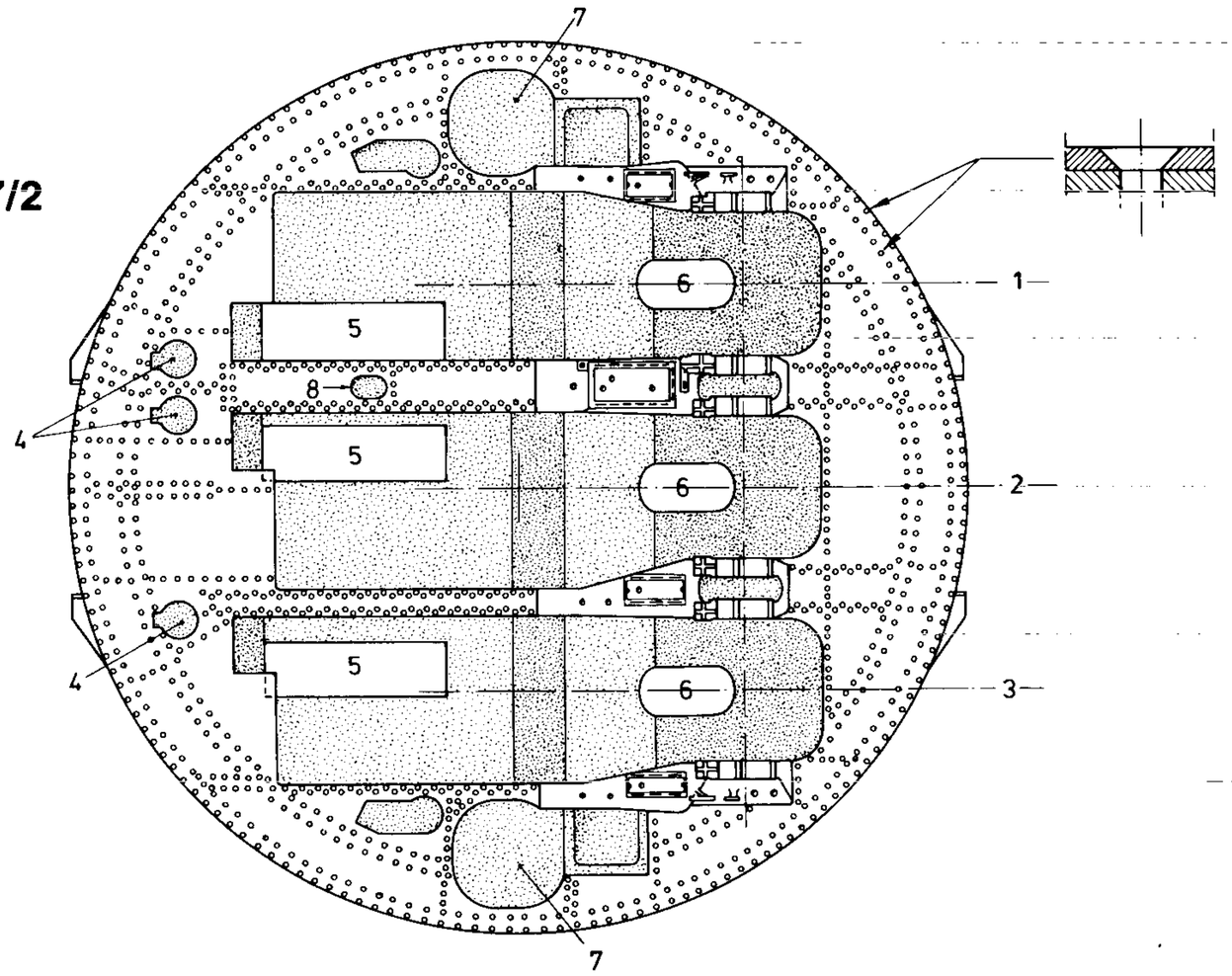
E7/2 Plan (turntable weight 350 tons)

1 Left gun axis
2 Centre gun axis
3 Right gun axis
4 Shell hoist
5 Cordite hoist
6 Holes of elevating cylinder (on louvred plate)
7 Holes of training shaft
8 Hatch
9 Trunnion bearing
10 Roller path seating
11 Hole for training pinion
12 Manhole

E7/1



E7/2

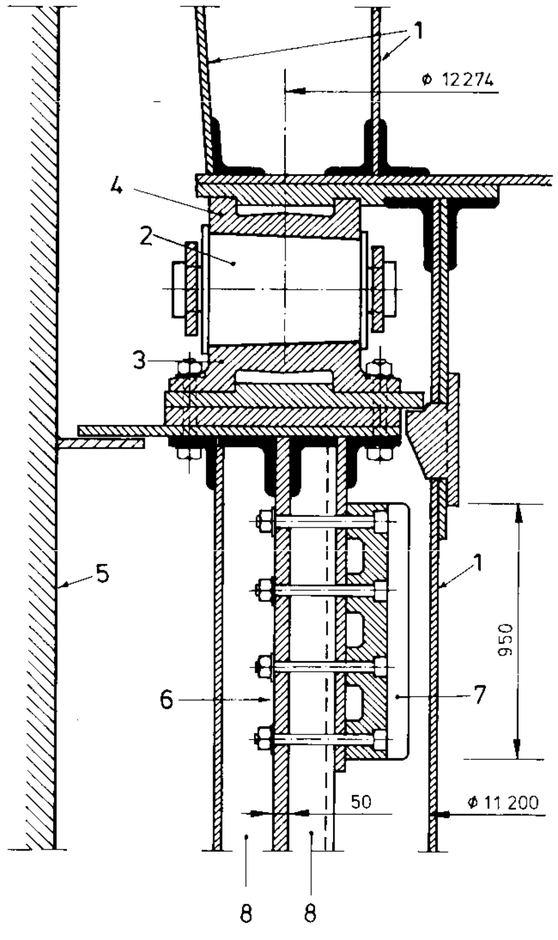


E Armament

E8 ROLLER BEARING OF TYPE 94 46cm TRIPLE TURRET (1/37.5 scale)

1 Turntable
2 Roller — 80 rollers per turret
3 Lower roller path
4 Upper roller path — turntable
5 560mm barbette armour
6 Ring bulkhead
7 Training rack
8 Vertical Z-frame

E8



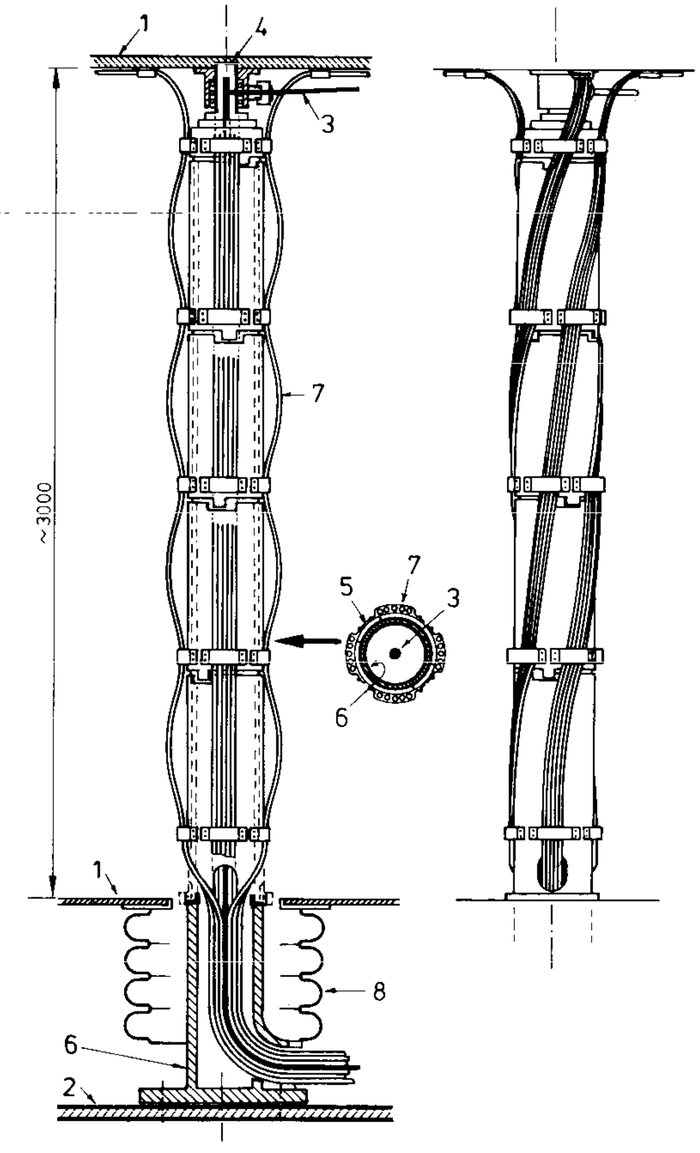
E9 CABLE LEAD INSTALLATION — BLAST AIR AND ELECTRICAL FLEXIBLE LINES (1/37.5 scale)

E9/1 Turret fore and aft

E9/2 During train

1 Training part of 46cm gun turret
2 Fixed part of ship
3 Blast air pipe
4 Central pivot of blast air
5 Outer tube
6 Inner tube
7 Electric cables
8 Central pivot of pressure and exhaust

E9/1 **E9/2**

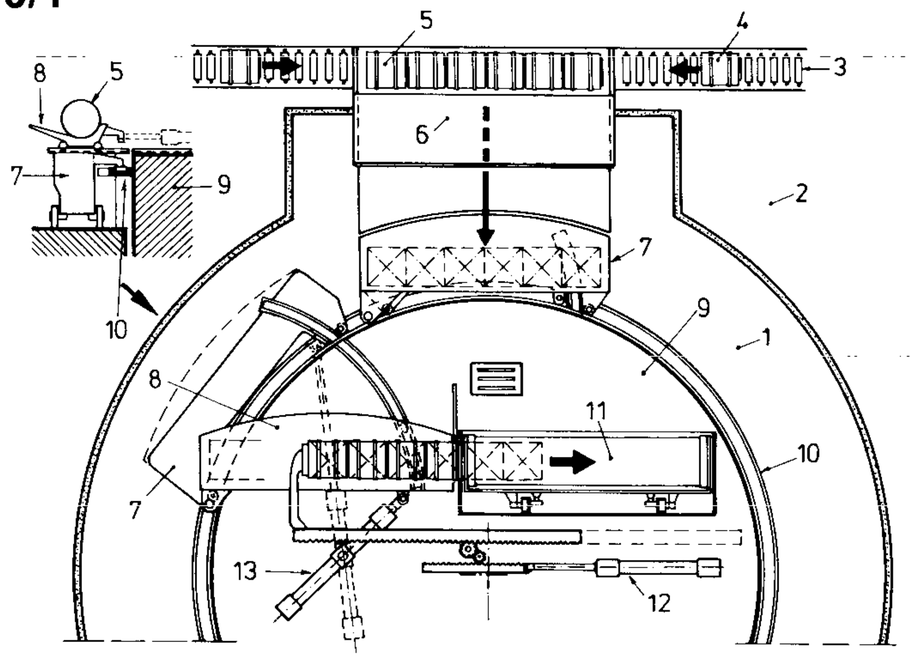


E10 TYPE 94 46cm GUN TURRET POWDER HANDLING GEAR

E10/1 Plan view (1/150 scale)

1 Powder handling room
2 Cordite magazine
3 Cordite roller chute
4 One-sixth charges (55kg)
5 Full powder charge six 55kg charges = 330kg cordite
6 Flash-tight scuttle
7 Cordite transfer bogie with swivelling part
8 Swivelling part of bogie
9 Turning part of turret structure
10 Rail (for bogie)
11 Cordite hoist cage
12 Rammer cylinder moves six charges into the hoist cage
13 Powder rack mechanism moves the swivelling part of bogie

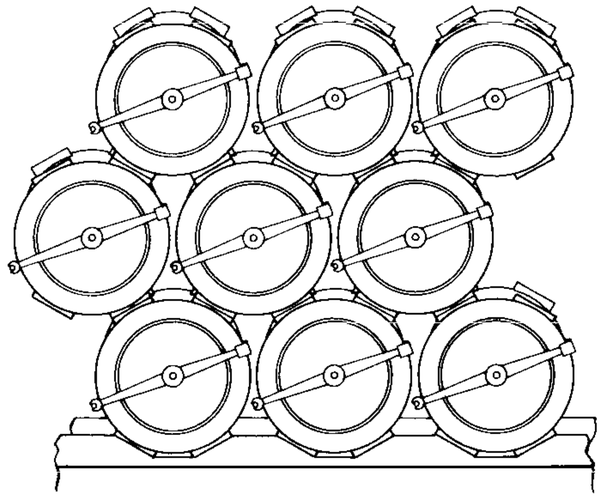
E10/1



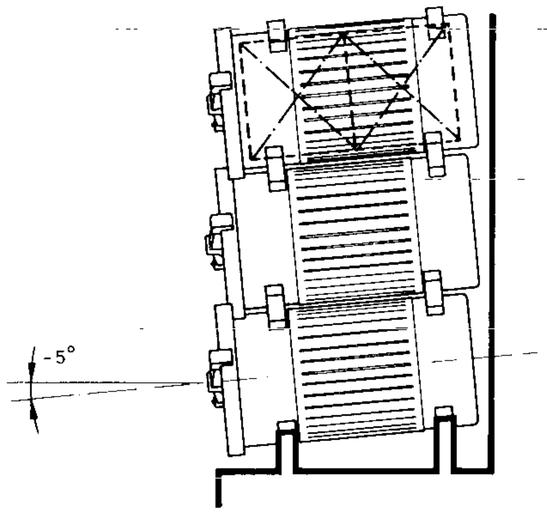
E10/2 Cordite stowage flash-tight canisters from powder magazine (one canister for two 55kg cordite charges) front view (1/37.5 scale)

E10/3 Profile (1/37.5 scale)

E10/2



E10/3



E Armament

E11 46cm GUN AMMUNITION

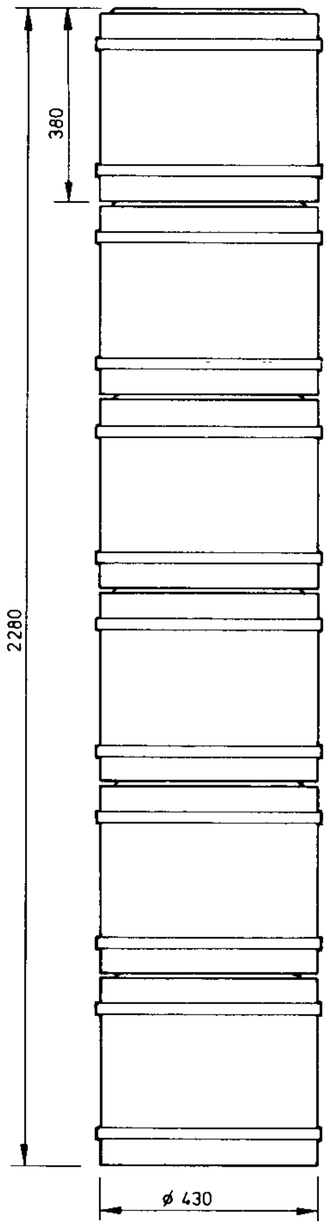
E11/1 Cordite charges for one round, six 55kg charges total cordite weight 330kg (1/20 scale)

E11/2 Type 91 46cm armour piercing projectiles, weight 1460kg (1/20 scale)

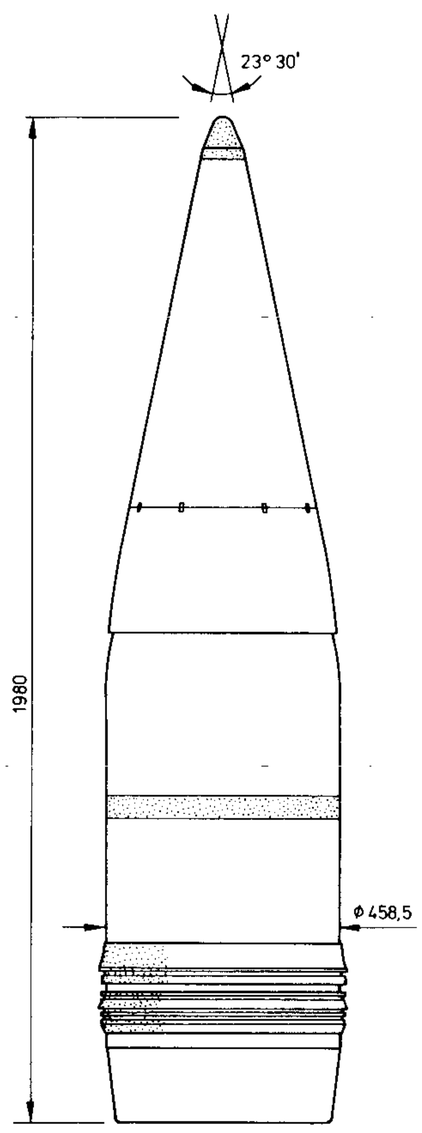
E11/3 Twin and single copper rotating bands of 46cm projectiles (1/4 scale)

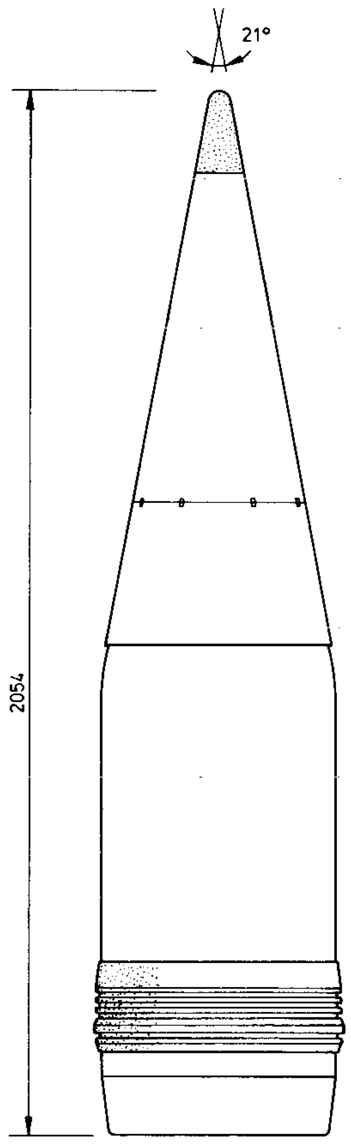
E11/4 'San-Shiki' common AA 46cm projectile Model 3, weight 1360kg (1/20 scale)

E11/1

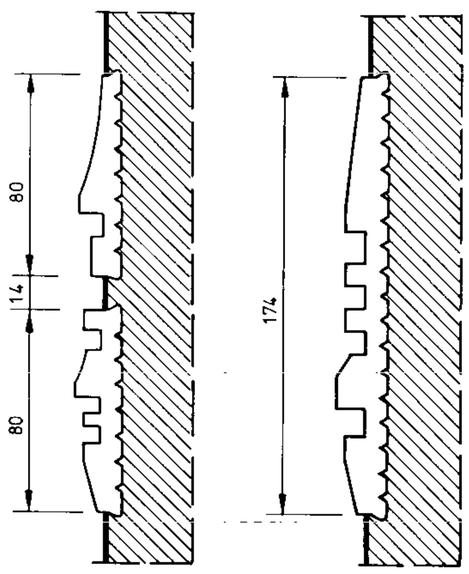


E11/2

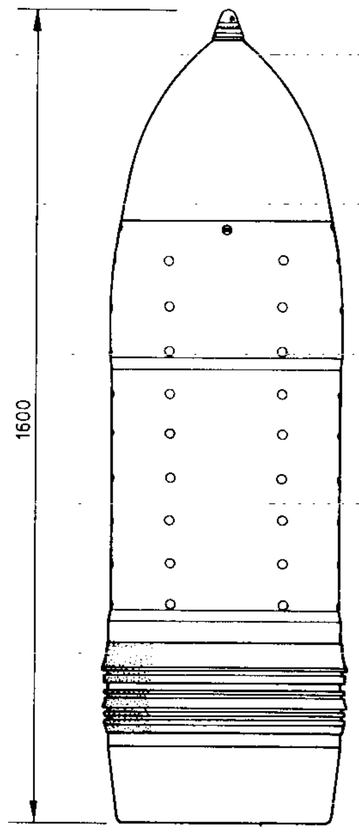




E11/3



E11/4



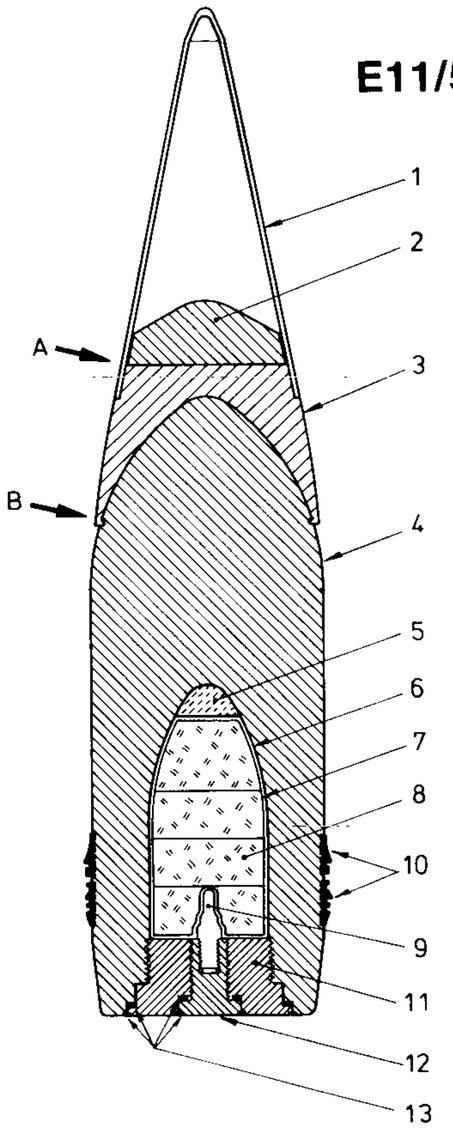
E11/5 Cross-section of Type 91 46cm armour piercing projectile (1/20 scale) with enlarged details 'A' and 'B'

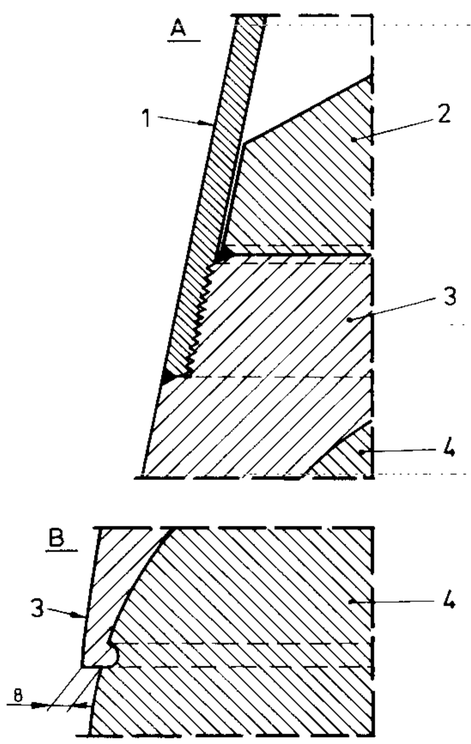
1 Hood — special wind-water shield
2 Cap head
3 Cap
4 Body
5 Aluminium 'anti-inertia' block
6 Cork lining
7 Wool wrap around filler
8 Tri-nitro-anisol filler
9 Fuze — Type 13 Mark 5 short delay base fuze
10 Copper rotating bands
11 Base
12 Fuze adapter
13 Copper gas-check rings — copper caulking

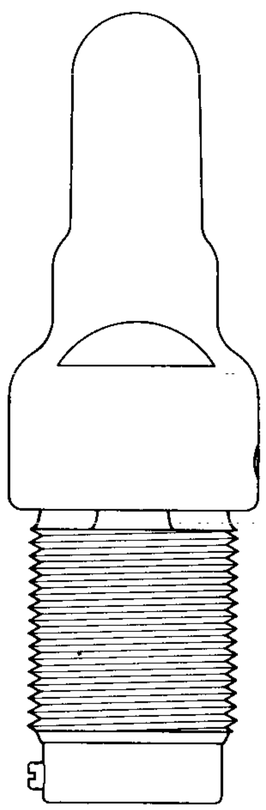
E11/6 Type 13 Mark 5 short delay base fuze (October 1941) weight 1289g, delay time 0.4 seconds, profile (1/2 scale)

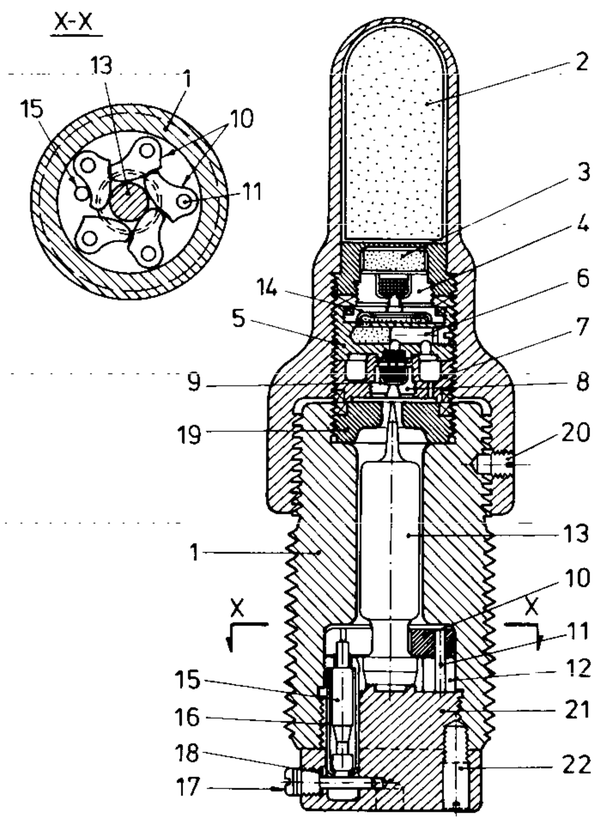
E11/7 Section (1/2 scale)

1 Body
2 Gaine (shimose 21g)
3 Auxiliary booster (1g tetryl)
4 No 2 primer
5 Delay train
6 Delay filling plug
7 No 1 primer
8 Primer holder
9 Copper cup
10 Interlocking arming delay pawls
11 Interlocking pawl pin
12 Interlocking pawl seat ring
13 Striker
14 Ignition chamber
15 Setback pin
16 Setback pin spring
17 Plug
18 Detent
19 Striker seat ring
20 Set screw
21 Base plug
22 Base plug stop screw









E Armament

E11/8 46cm 'San-Shiki' AA common projectile Model 3, weight 1360kg, No of fragments 1500, section (1/12.5 scale)

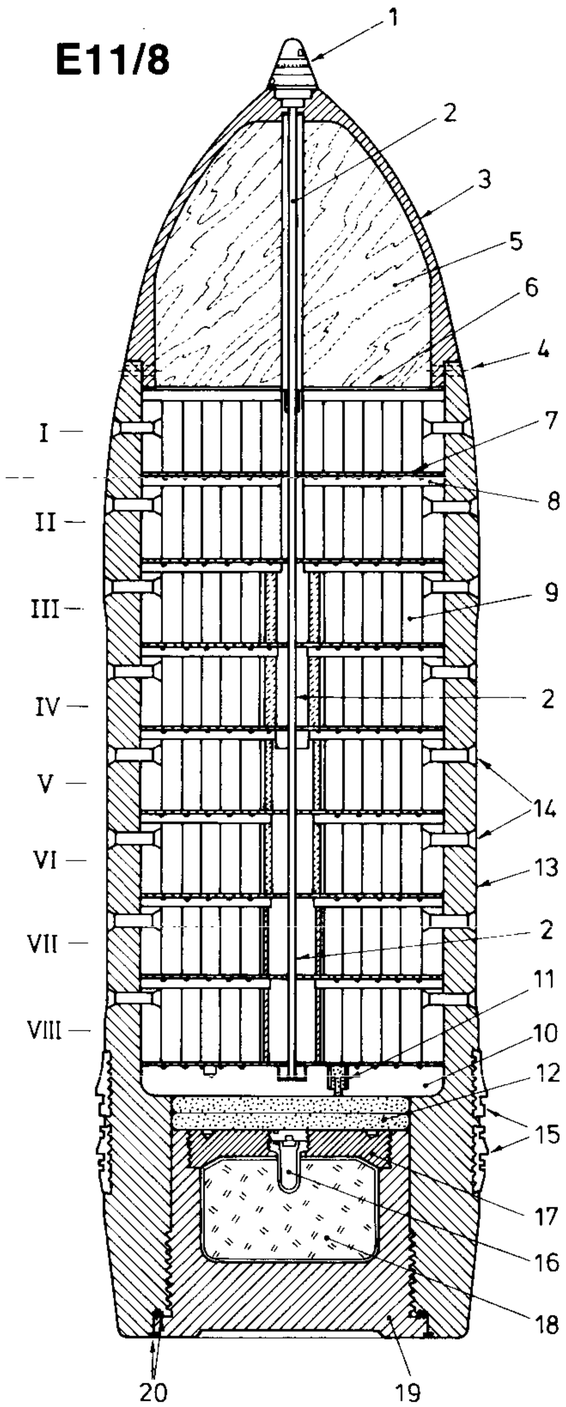
1 Time fuze
2 Speed fuze rod
3 Projectile head
4 Projectile head set screw
5 Adapter — wood
6 Filler lining
7 Quick match
8 Fuze plate
9 Incendiary fragments — rubber thermite
10 Base block
11 Delayed action charge
12 Ejecting charge and black powder
13 Shell case
14 Rotating attachment rivet
15 Copper rotating bands
16 Detonating fuze
17 Fuze base
18 Bursting charge (picric acid)
19 Base
20 Copper gas-check rings

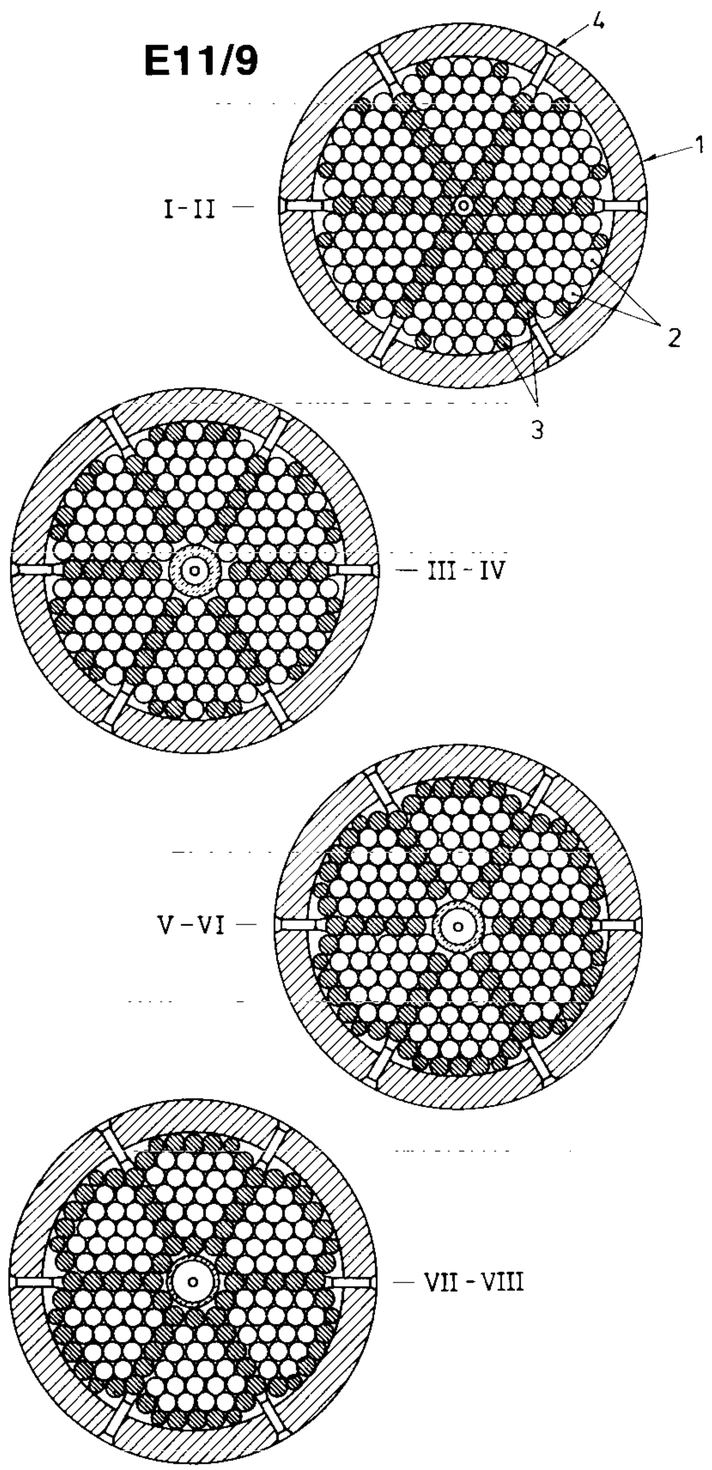
E11/9 Sections of 'San-Shiki' projectile — cluster braces (1/12.5 scale)

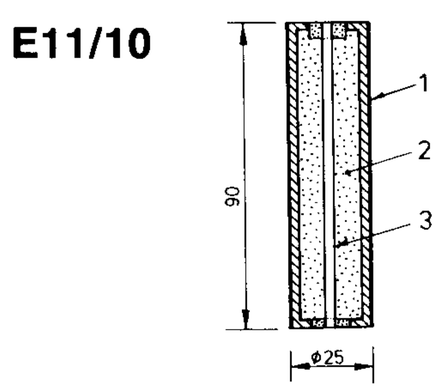
1 Shell case
2 Rubber thermite (incendiary fragments) — white circle 900 fragments
3 Stay — grey circle — 600 fragments
4 Speed fuze rod
5 Rotating attachment rivet

E11/10 Incendiary fragment — rubber thermite (1/3 scale)

1 Steel pipe
2 Incendiary composition
3 Hole





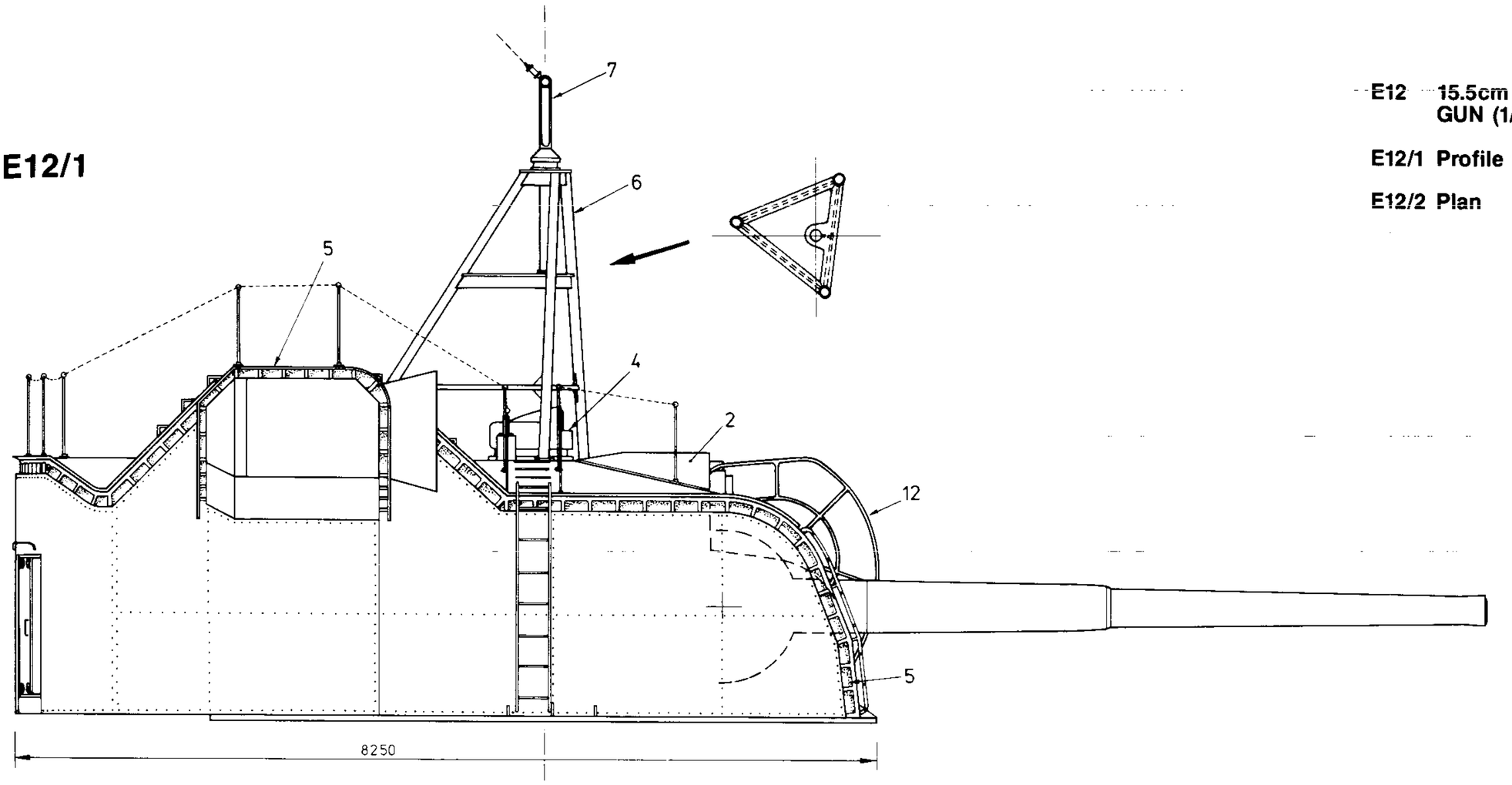


E12 15.5cm 60cal 3 'NENDO SHIKI' GUN (1/75 scale)

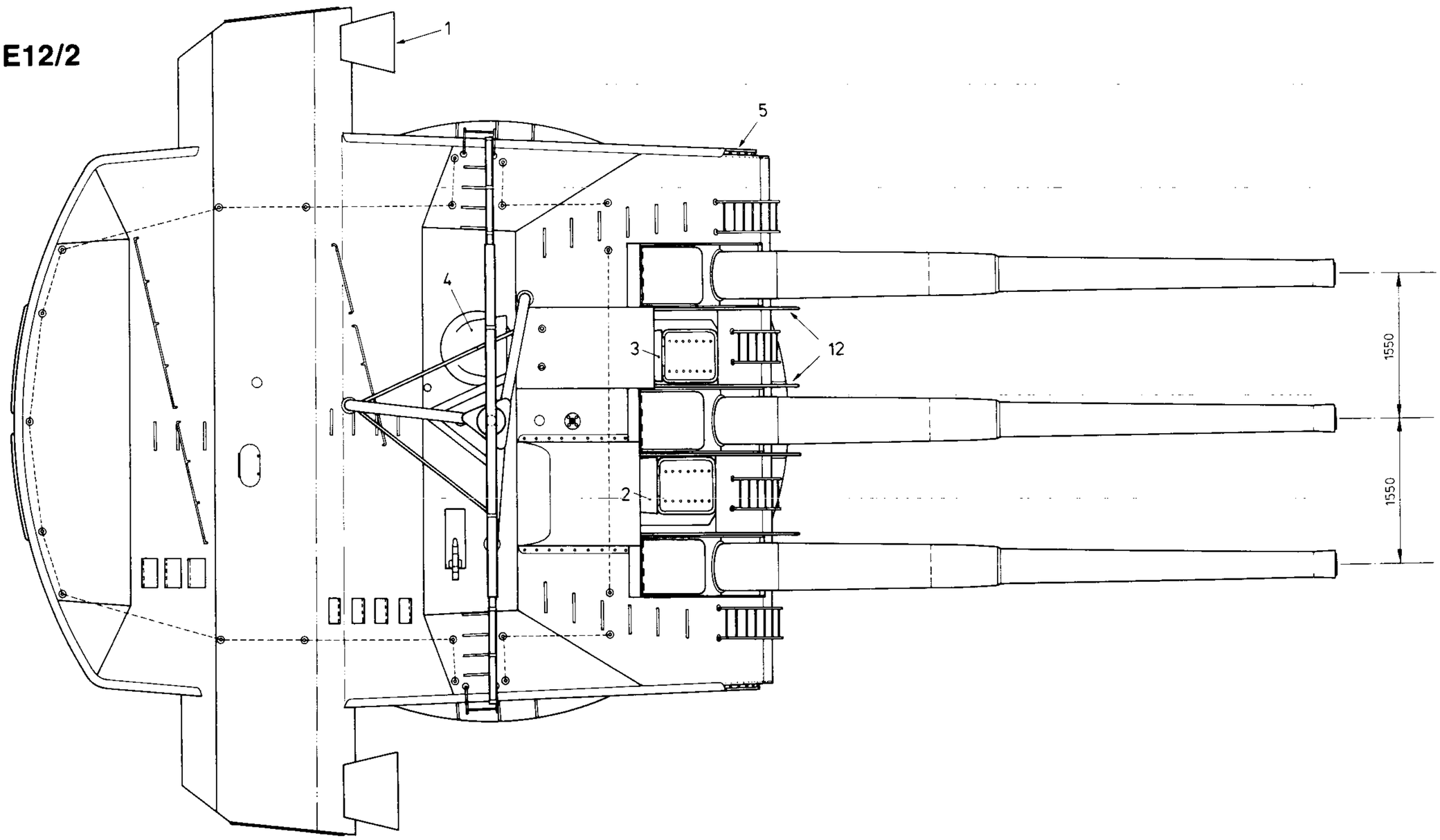
E12/1 Profile view

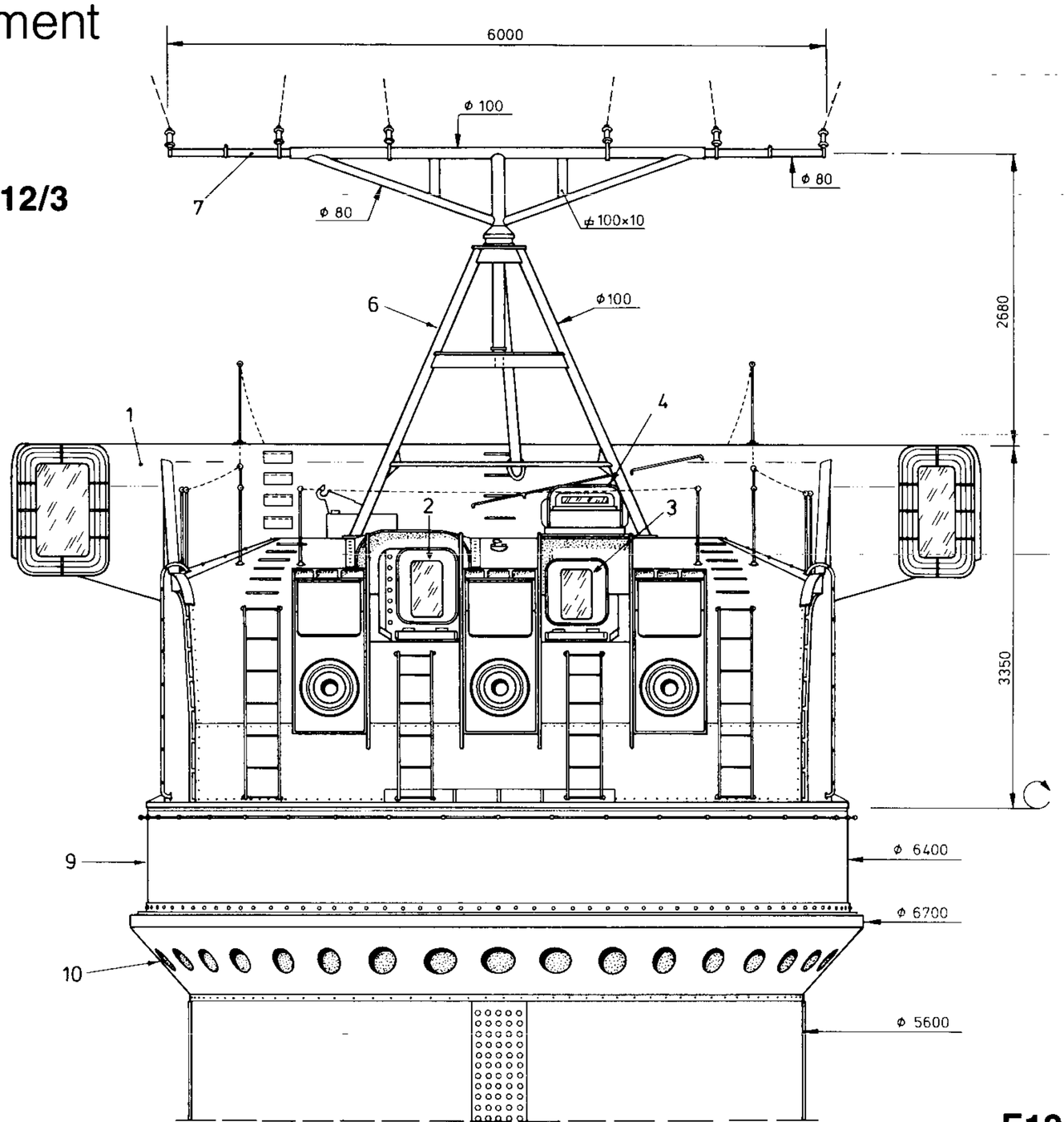
E12/2 Plan

E12/1

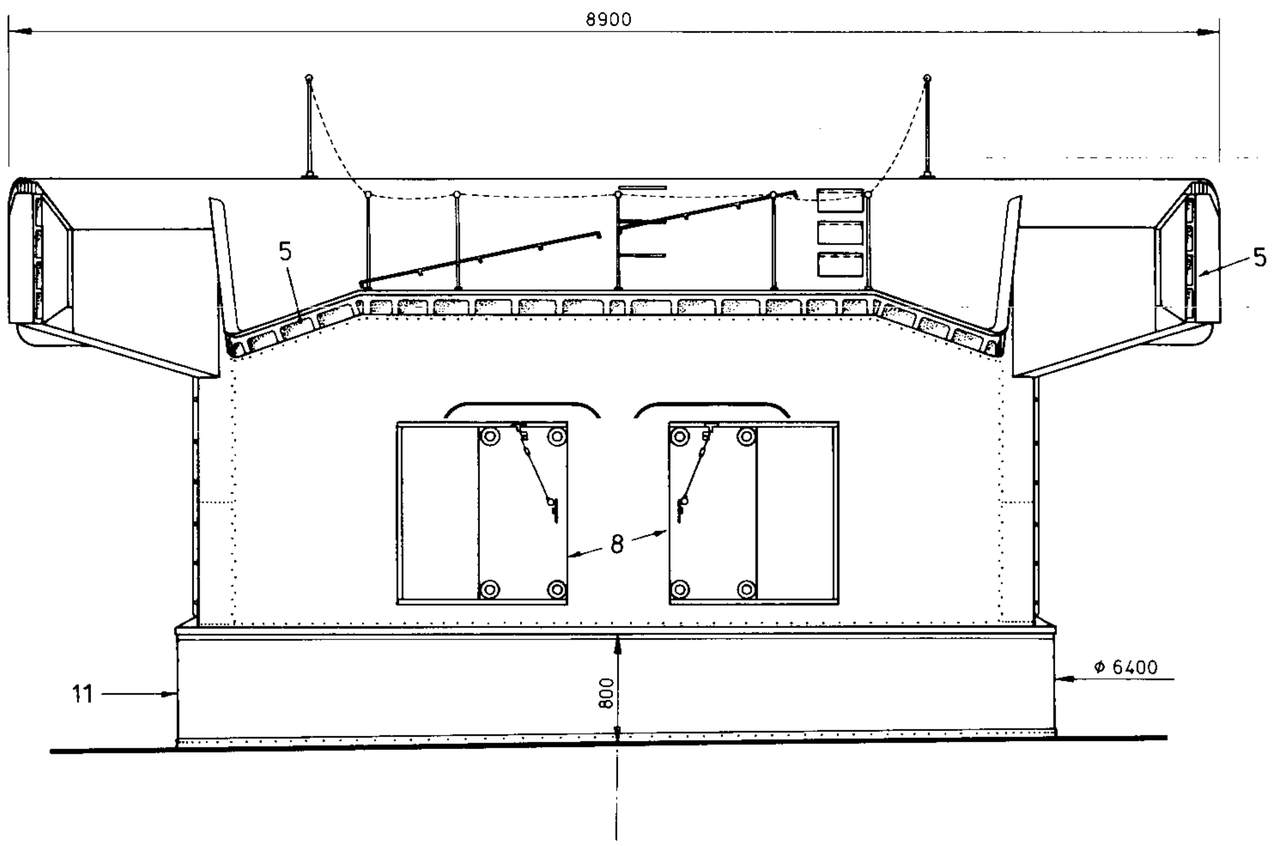


E12/2

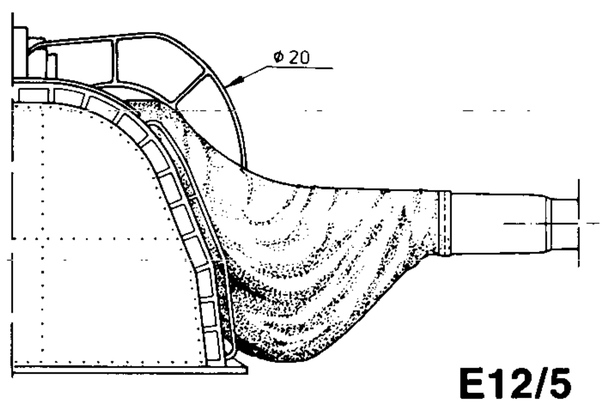




E12/3



E12/4



E12/5

E12/3 Front elevation

E12/4 Rear elevation

E12/5 Blast bag — canvas blast cover

1 8m rangefinder
2 Layer's spotting port
3 Trainer's spotting port
4 Turret chief telescope tower
5 Steel sheet lagging — heat protection
6 Tripod aerial mast on turret No 1 (frame 109)
7 Spar — non-rotating in relation to ship's axis
8 Sliding armoured doors
9 Barbette — for turret No 1 and No 4
10 Ventilation holes 36 × 300mm diameter (distance 10°)
11 Barbette for turrets No 2 and No 3
12 Stop (limiter) for blast bag

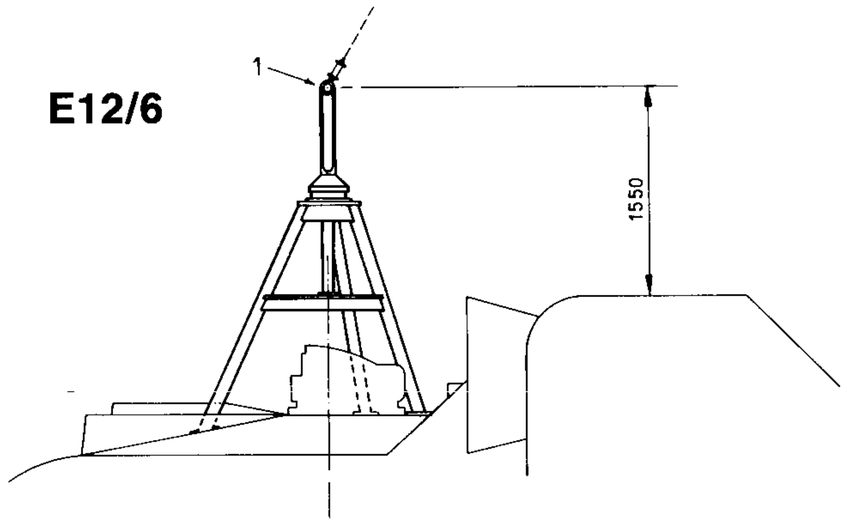
E12/6 Tripod aerial mast on 15.5cm turret No 4 (frame 163), profile

E12/7 Plan

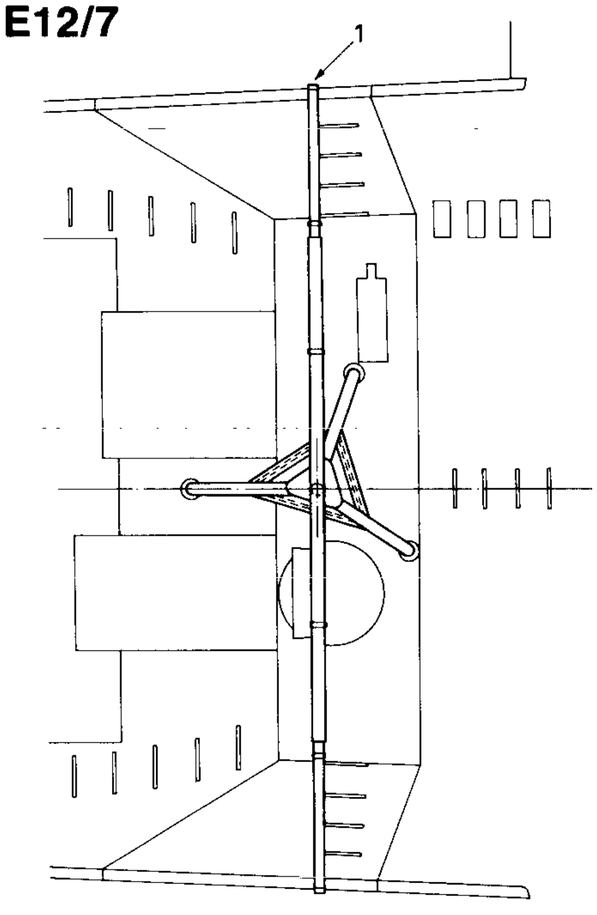
E12/8 Front elevation

1 Spar — non-rotating in relation to ship's axis

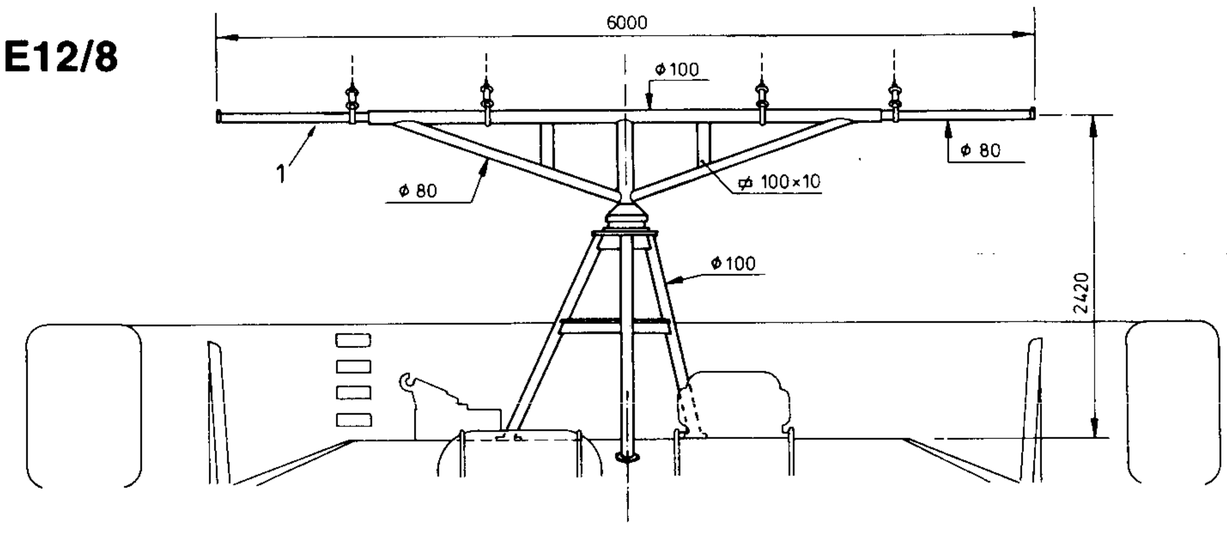
E12/6



E12/7



E12/8



E Armament

E12/9 **15.5cm 60cal 3 'Nendo Shiki' gun, perspective (no scale)**

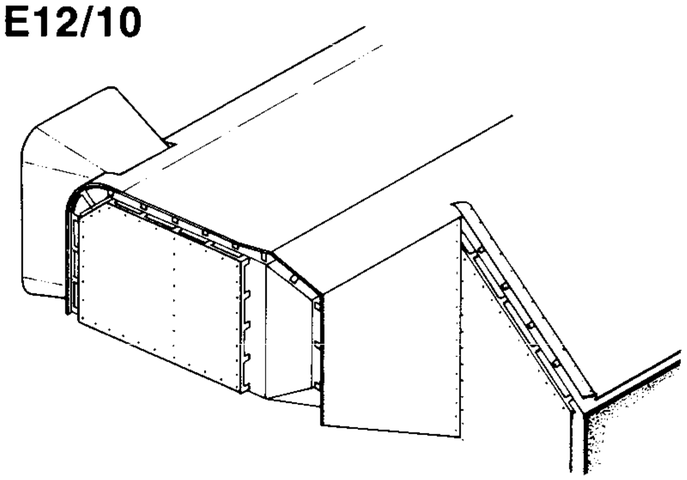
E12/10 **8m rangefinder arm, rear view (no scale)**

E12/11 **Detail of steel sheet lagging, heat protection (no scale)**

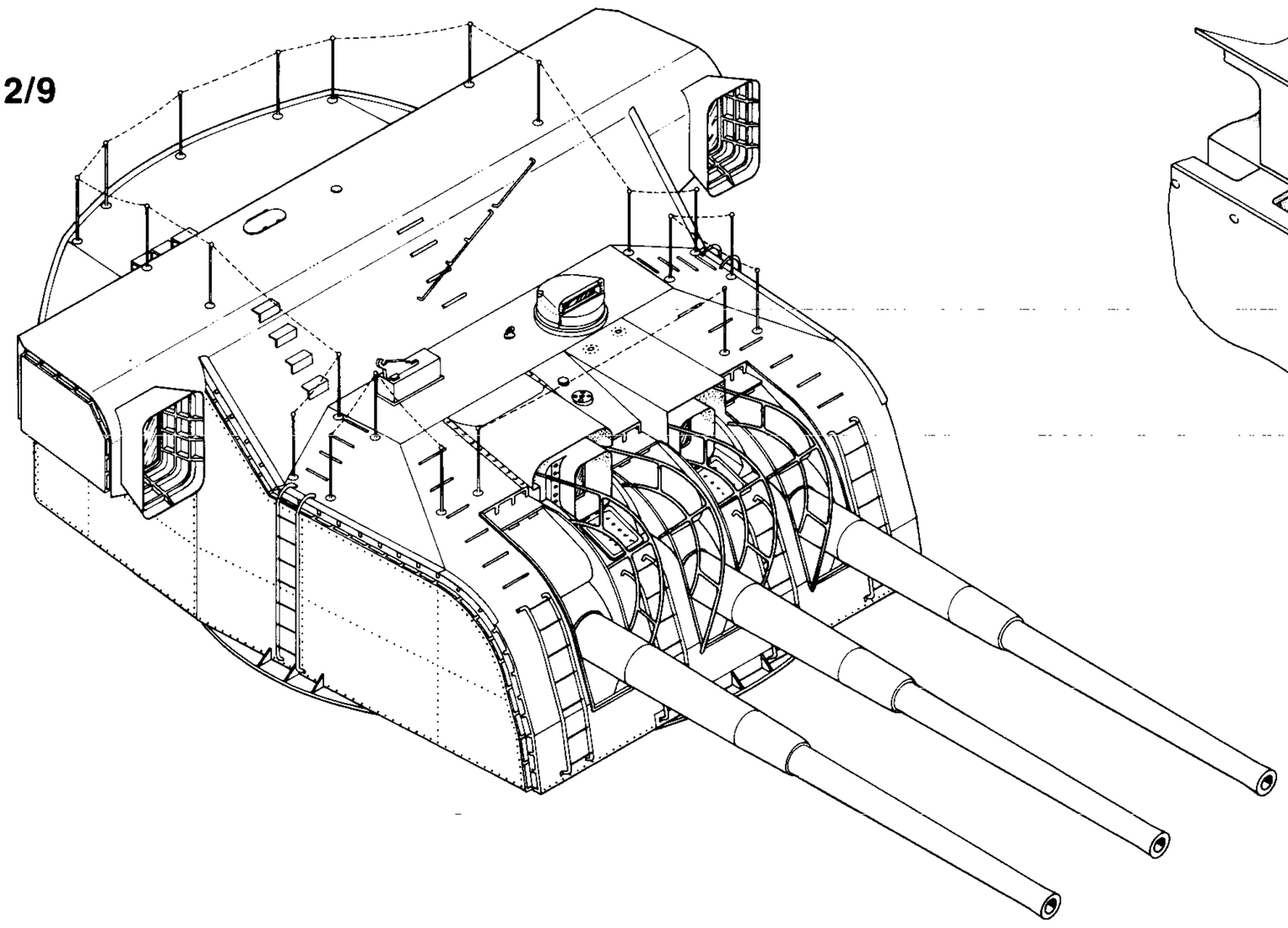
E12/12 **Detail of sliding armoured doors (1/10 scale)**

1 Door
2 Guide roll
3 Rigol

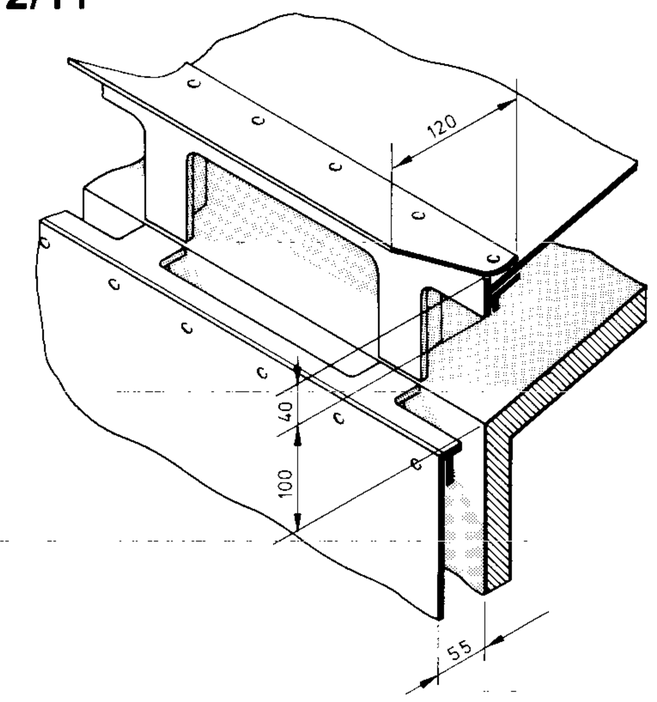
E12/10



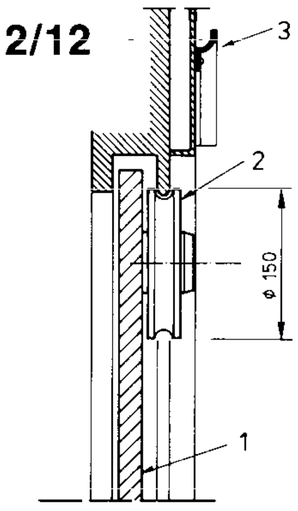
E12/9



E12/11



E12/12



E13 TYPE 89 12.7cm 40cal ANTI-AIRCRAFT GUN TURRET MODEL A-1-3 (1/75 scale, except where marked otherwise)

E13/1 Right profile

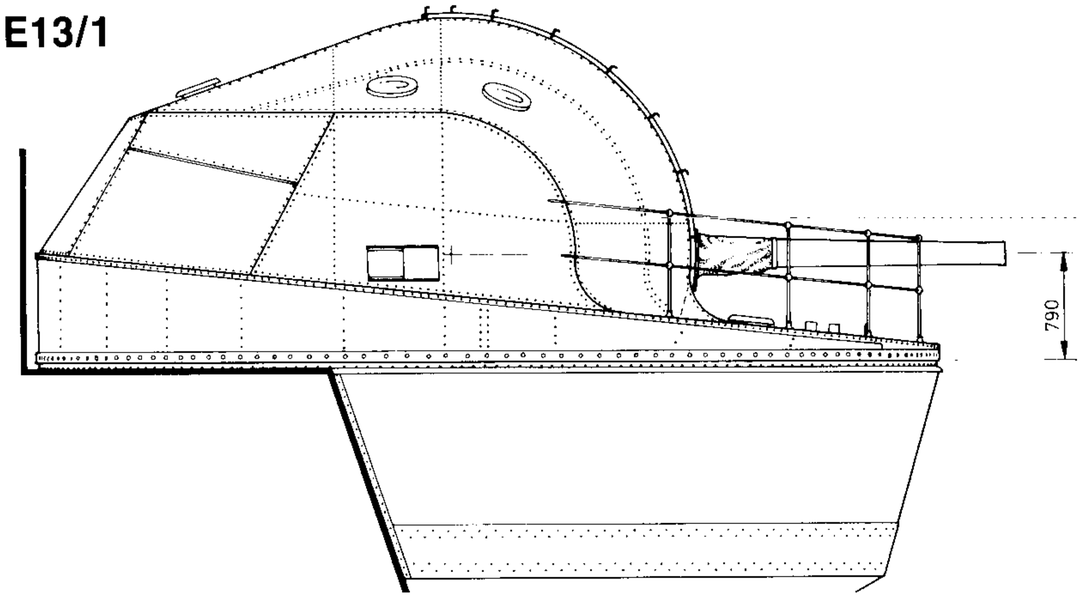
E13/2 Front elevation

E13/3 Plan

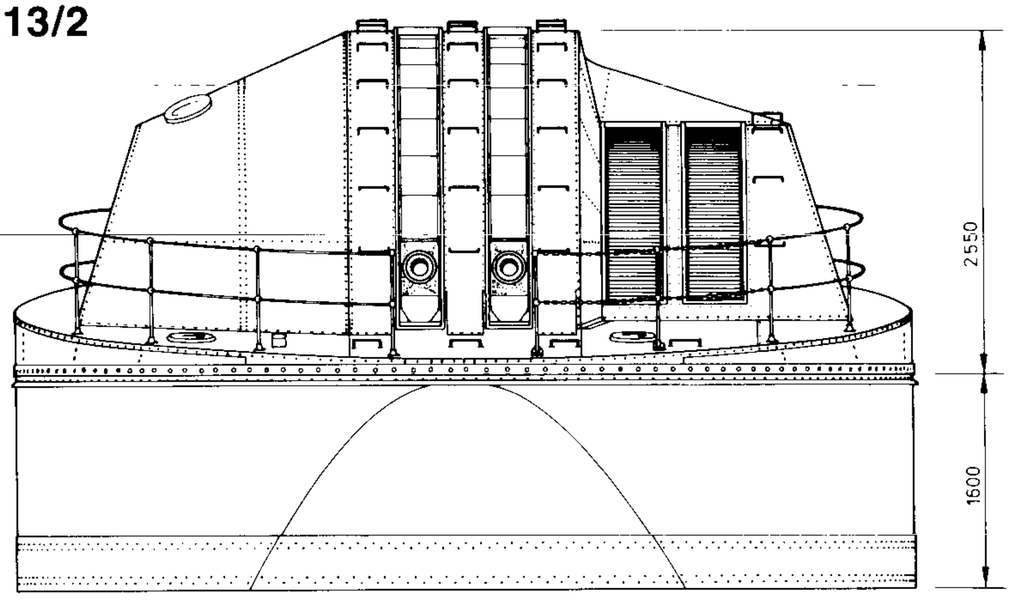
E13/4 Left profile

E13/5 Rear elevation

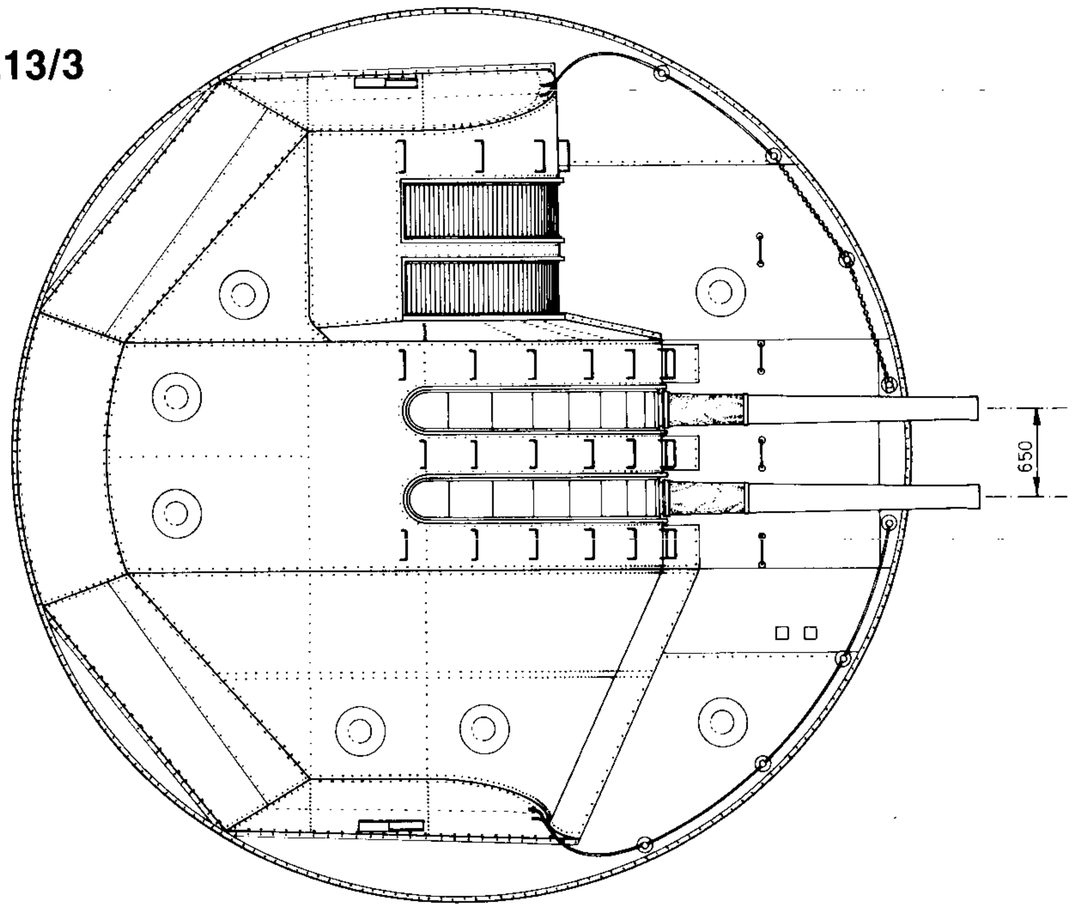
E13/1



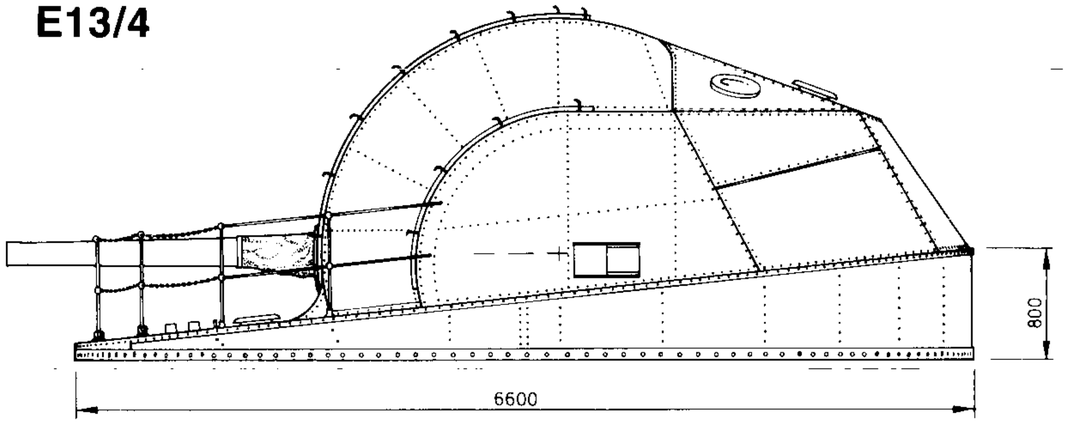
E13/2



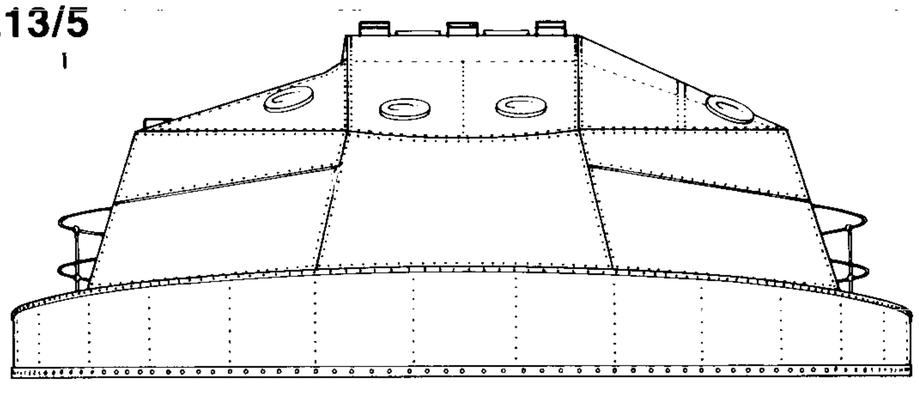
E13/3



E13/4



E13/5



E Armament

E13/6 **General view of turret with rotating shield (no scale)**

1 Rail post — folding
2 Ventilator
3 Sight glass

E13/7 **Ventilator — section (1/15 scale)**

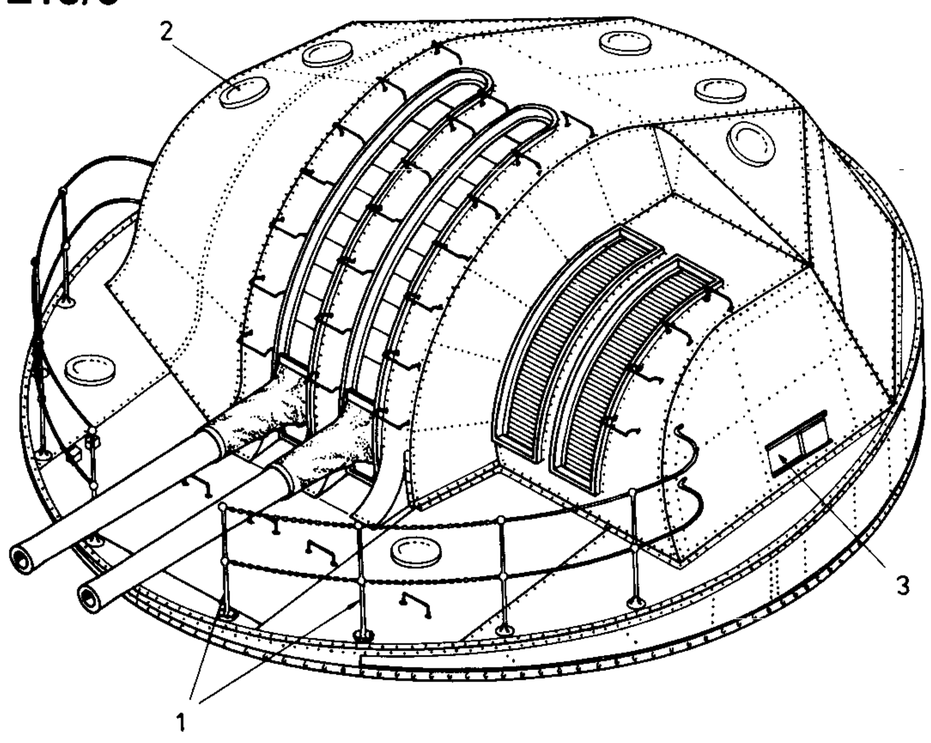
E13/8 **Detail of lower part of shield (1/15 scale)**

E13/9 **Section of lower part of shield (1/15 scale)**

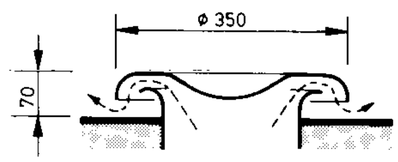
E13/10 **Detail of upper part of shield (no scale)**

E13/11 **Detail of sight glass, closed (no scale)**

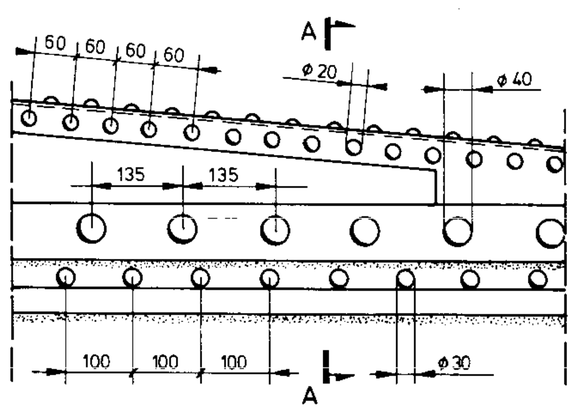
E13/6



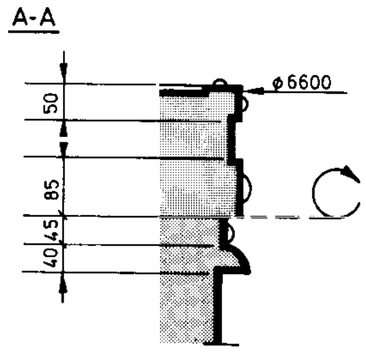
E13/7



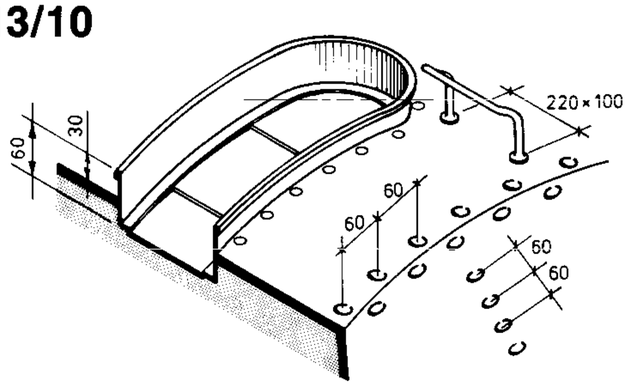
E13/8



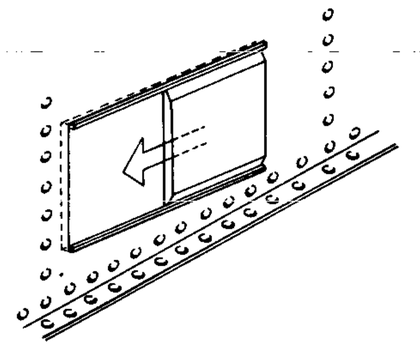
E13/9



E13/10



E13/11



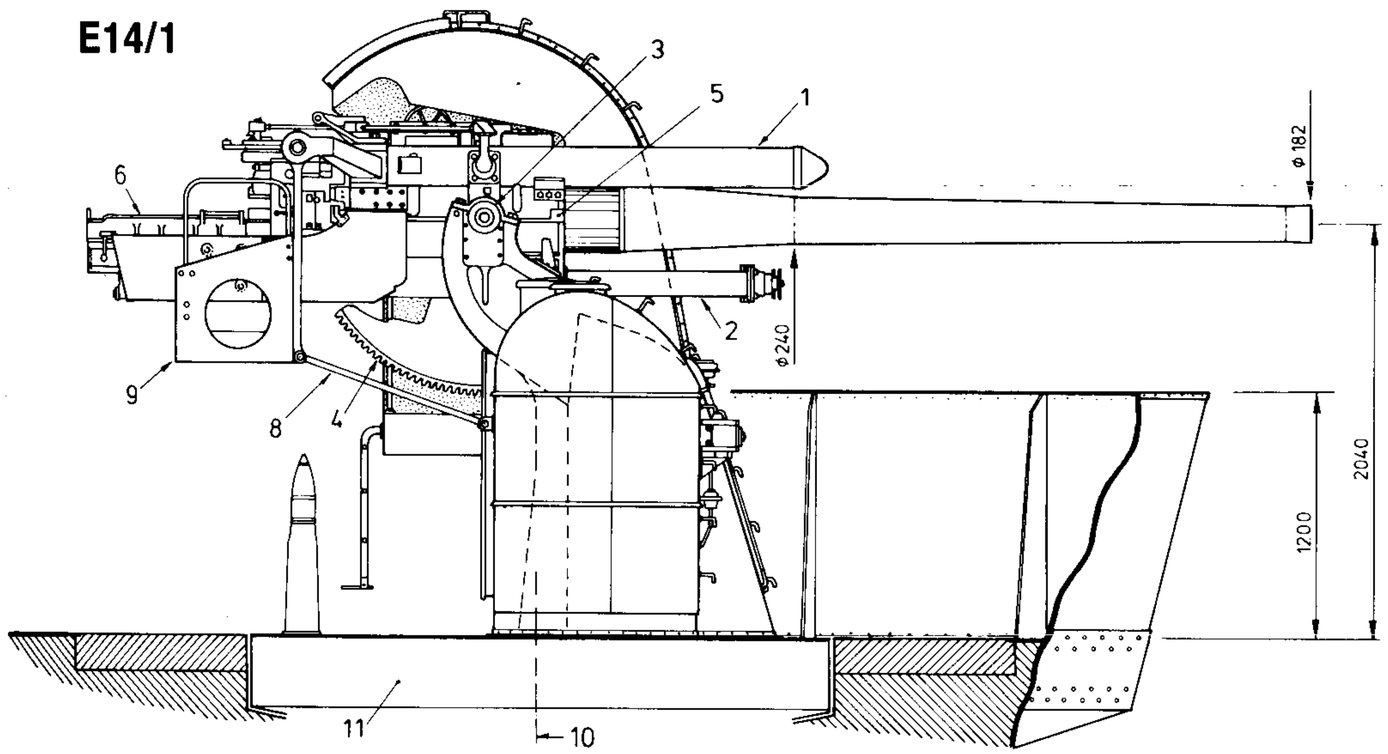
E14 **TYPE 89 12.7cm 40cal AA GUN MODEL A-1, FITTED 1944 (1/50 scale)**

E14/1 **Right profile**

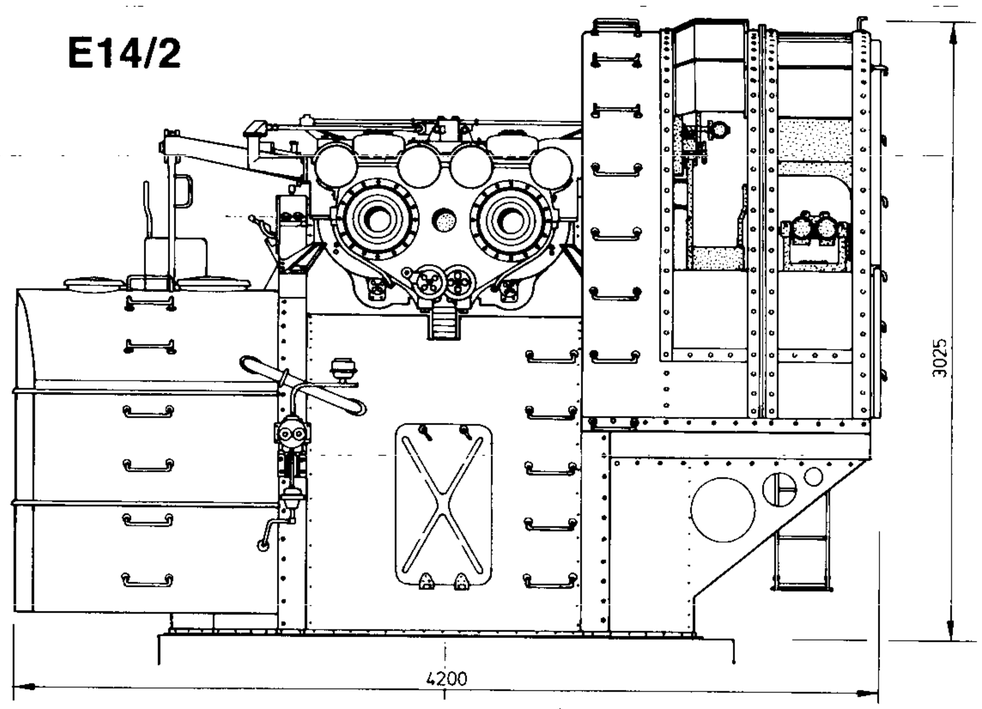
E14/2 **Front elevation**

E14/3 **Left profile**

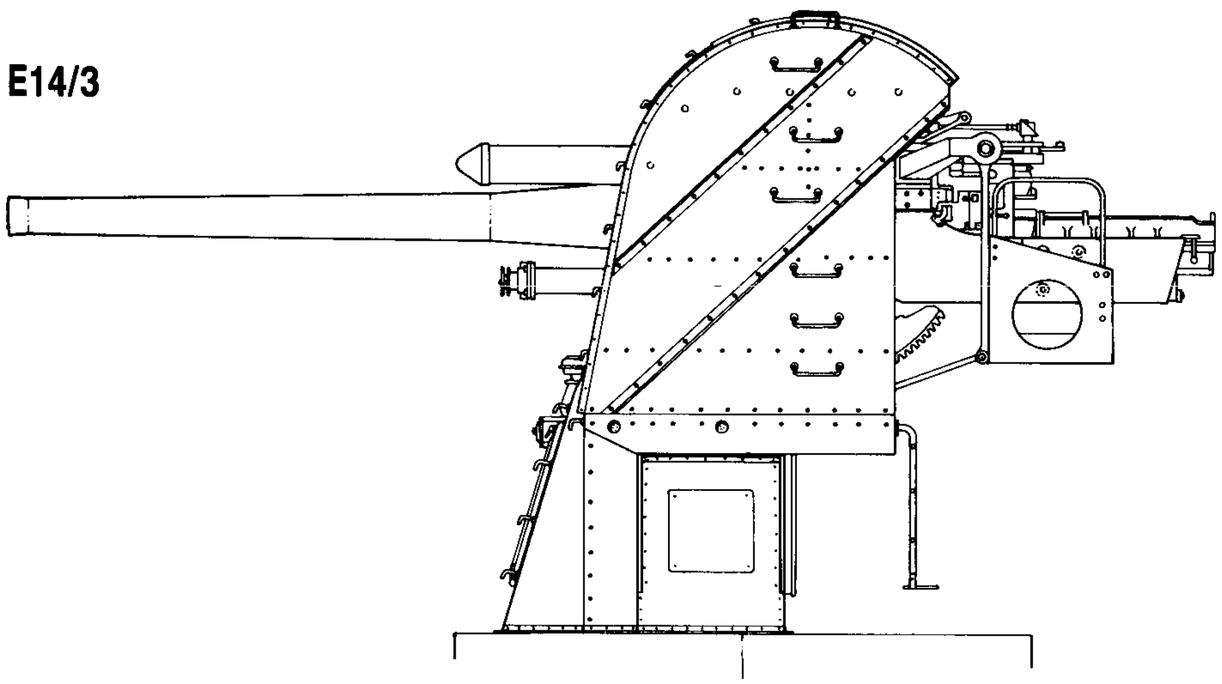
E14/1



E14/2



E14/3



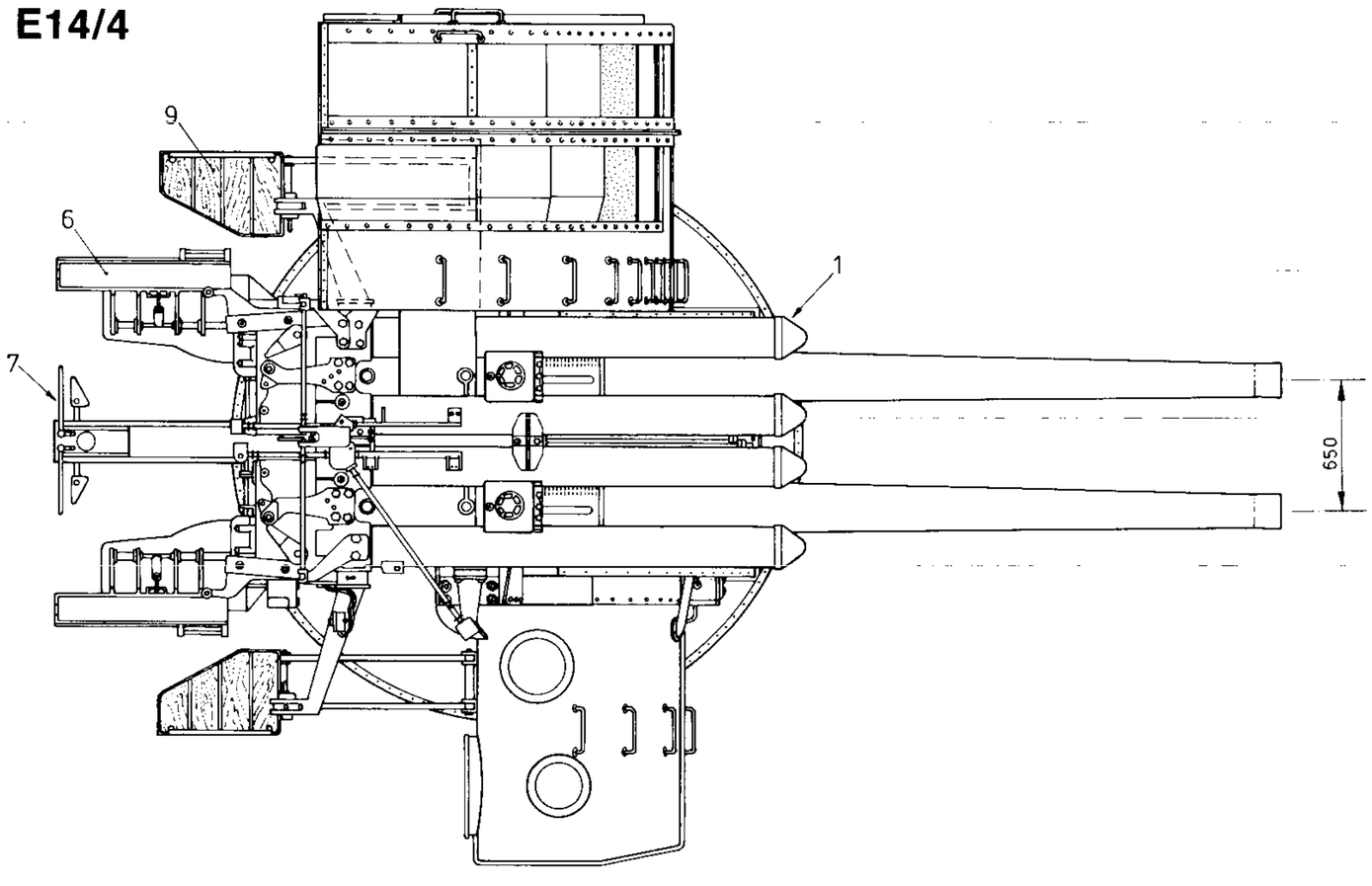
E Armament

E14/4 Plan

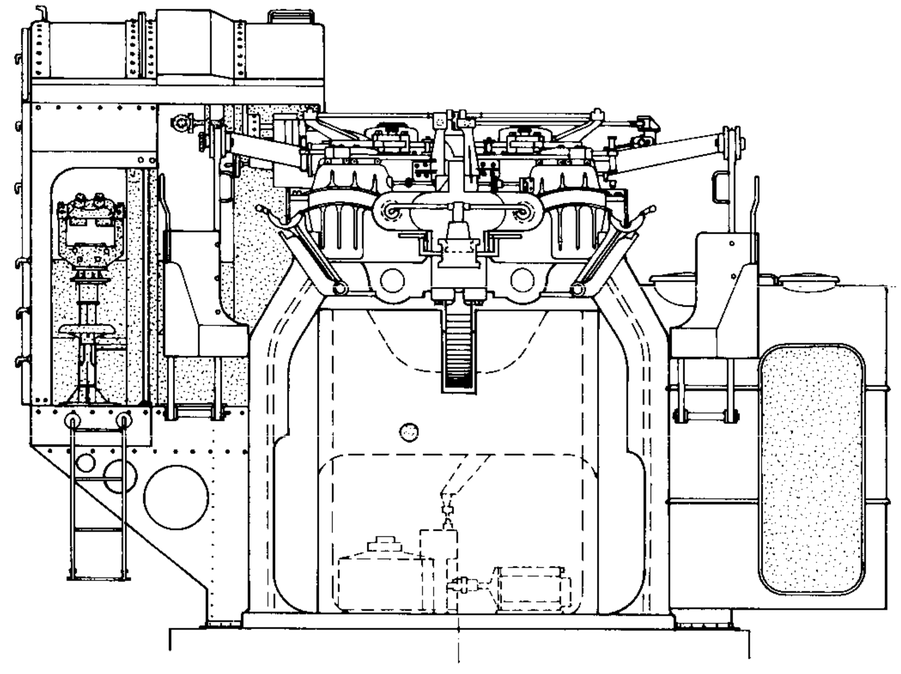
E14/5 Rear elevation

1 Recoil cylinders
2 Recuperators
3 Trunnion
4 Elevating arc
5 Support
6 Shell waiting tray
7 Shell rammer
8 Pantograph
9 Charger platform
10 Axle
11 Base ring

E14/4



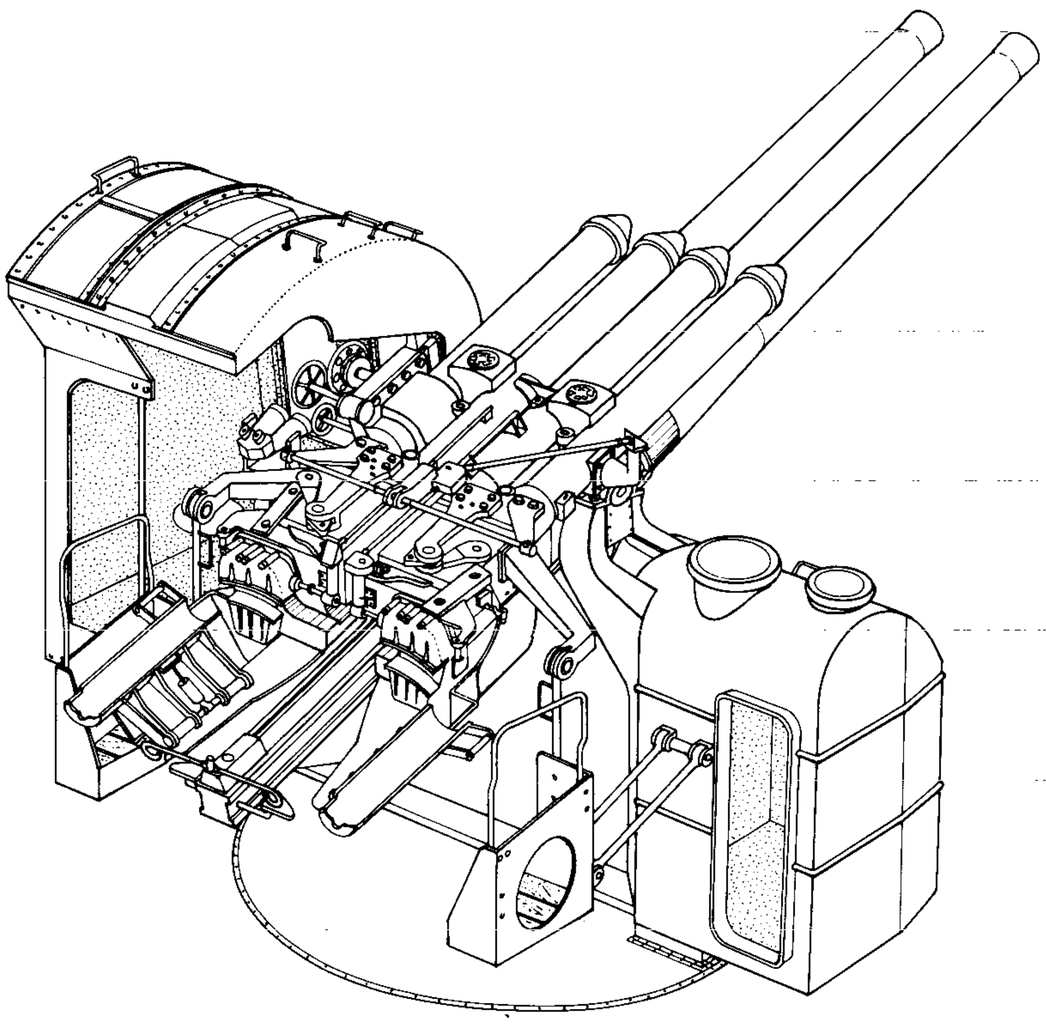
E14/5



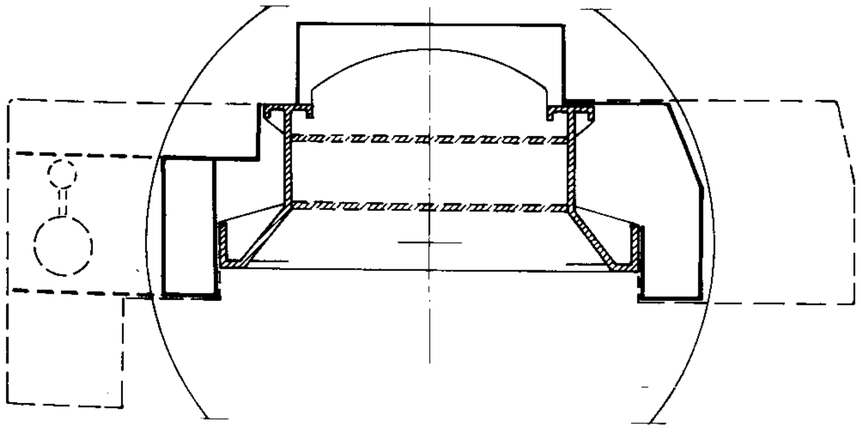
E14/6 General view of mount (no scale)

E14/7 Schematic of mounting base ring

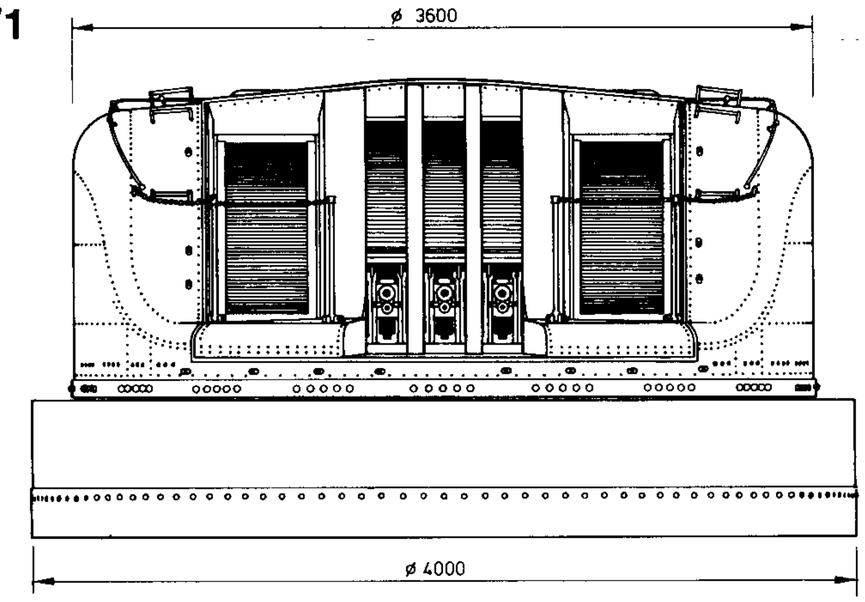
E14/6



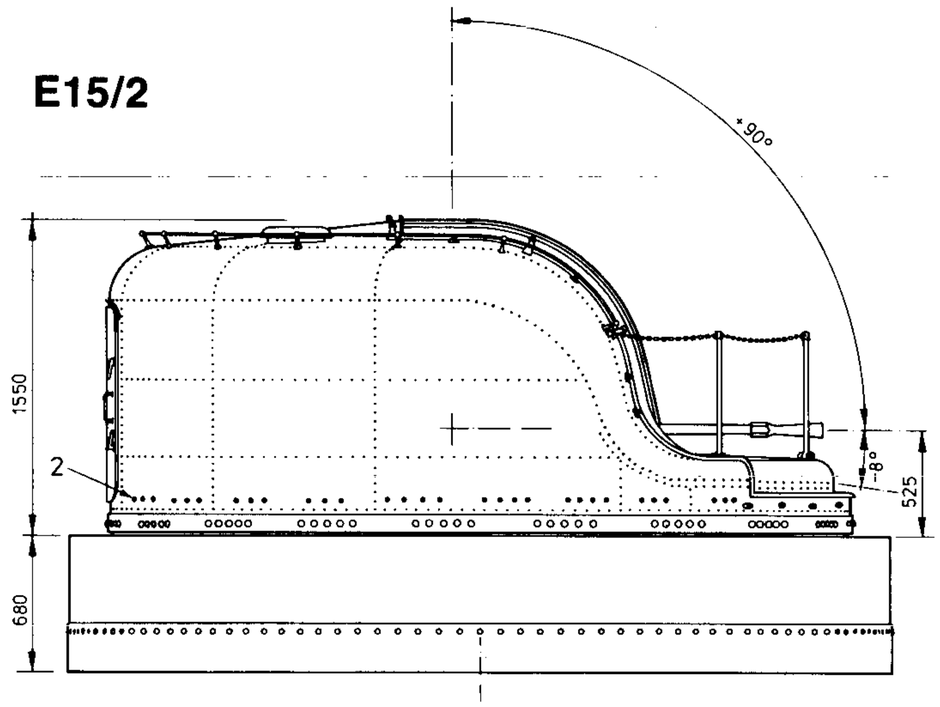
E14/7



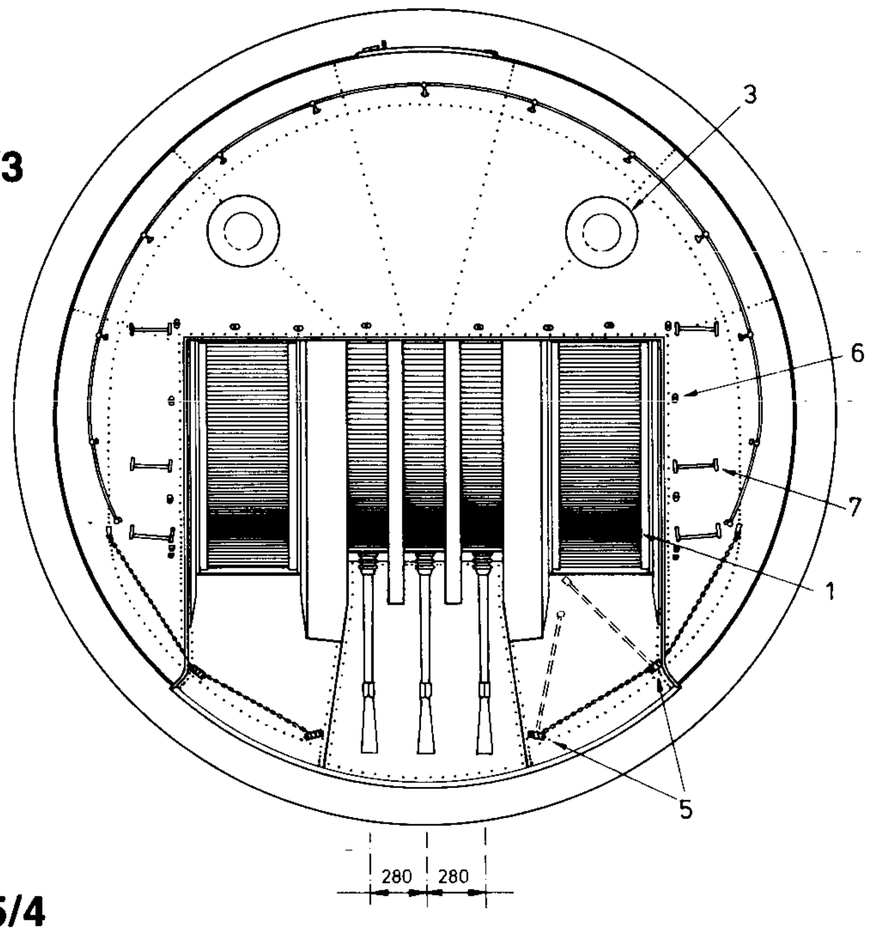
E15/1



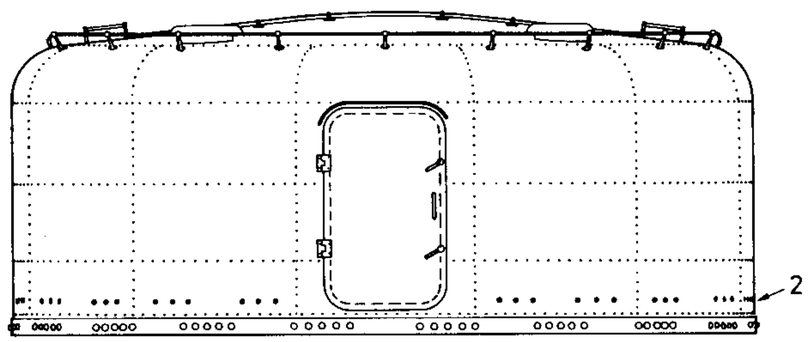
E15/2



E15/3



E15/4



E15 **TYPE 96 'SHIKI' TRIPLE 25mm AA GUN WITH SHIELD ADOPTED AT THE END OF 1941, CREW NINE PEOPLE (1/50 scale, except where noted otherwise)**

E15/1 **Front elevation**

E15/2 **Profile**

E15/3 **Plan**

E15/4 **Rear view — rotating part**

1 Iron shutter — 20mm strips (typical)
2 Ventilation holes
3 Ventilators (typical)
4 Ship's hull
5 Rail stanchion — folding
6 Eye plate for canvas cover
7 Step iron

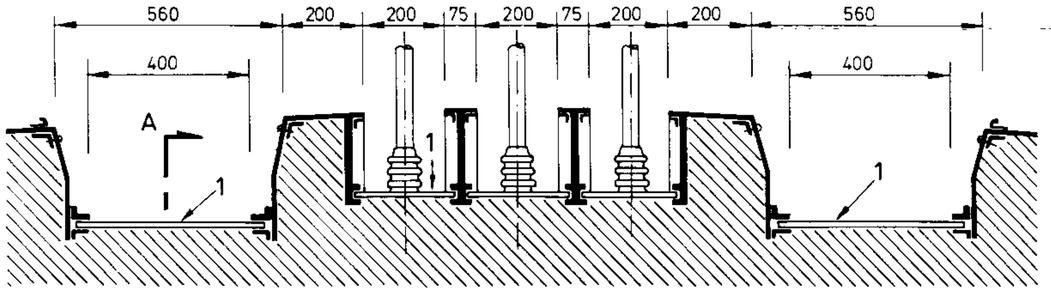
E15/5 Section of covering (2 × scale)

E15/6 Detail of port shutter (2 × scale)

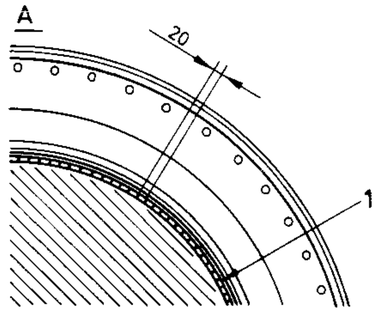
E15/7 Riveting of the lower part covering (1/15 scale)

E15/8 Step iron (no scale)

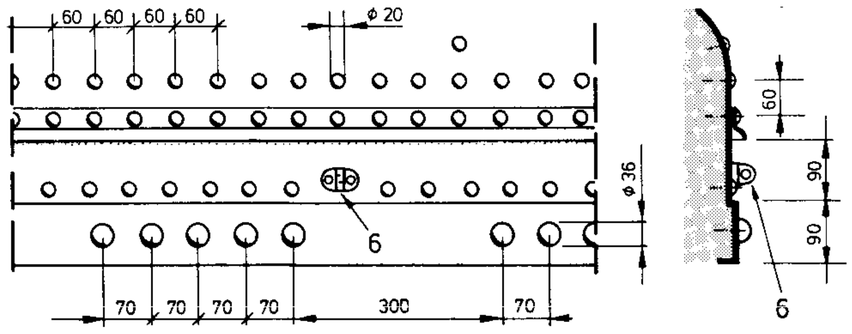
E15/5



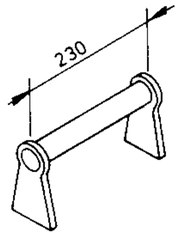
E15/6



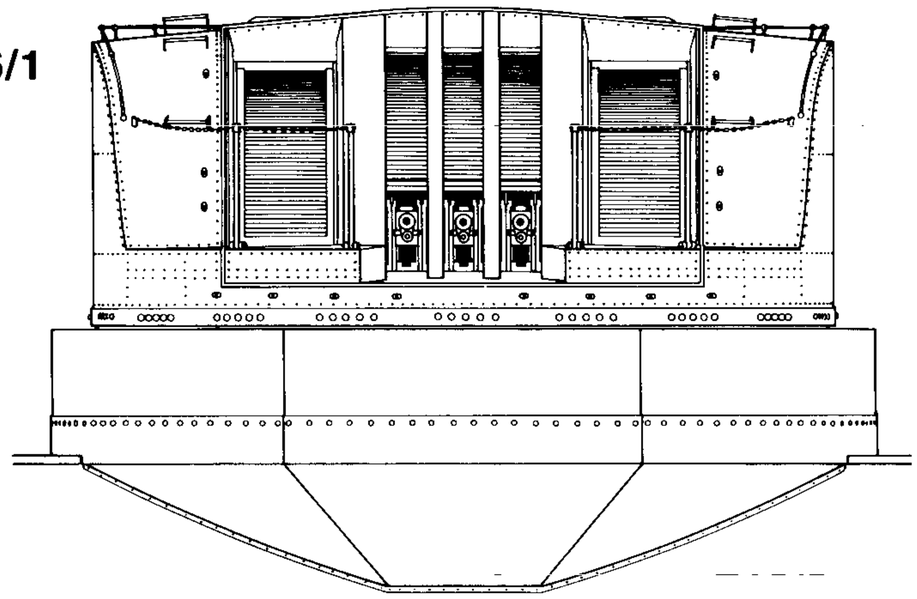
E15/7



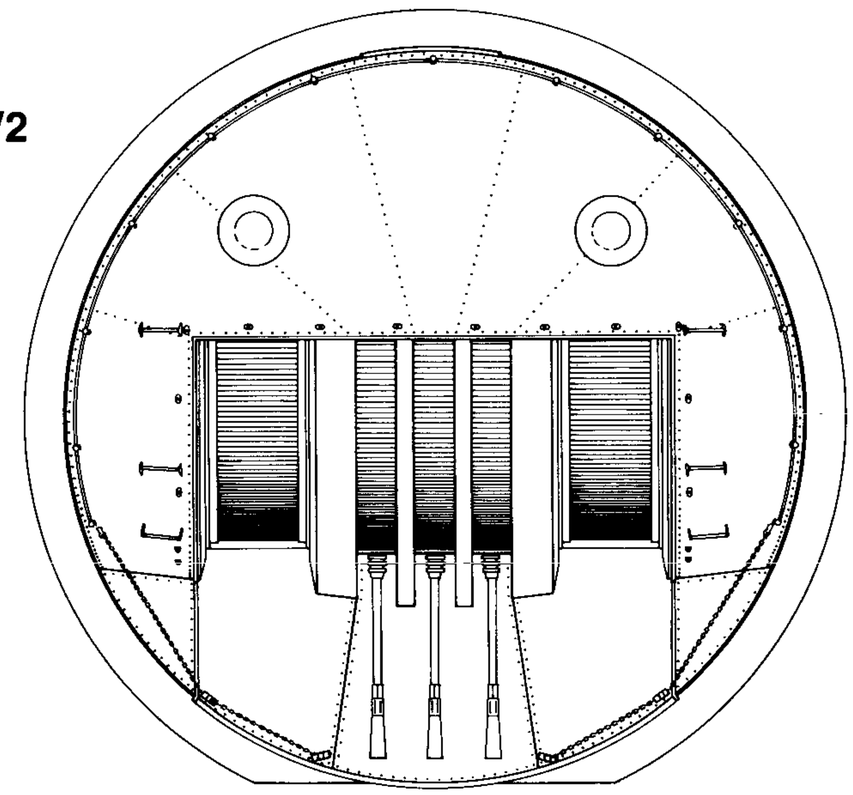
E15/8



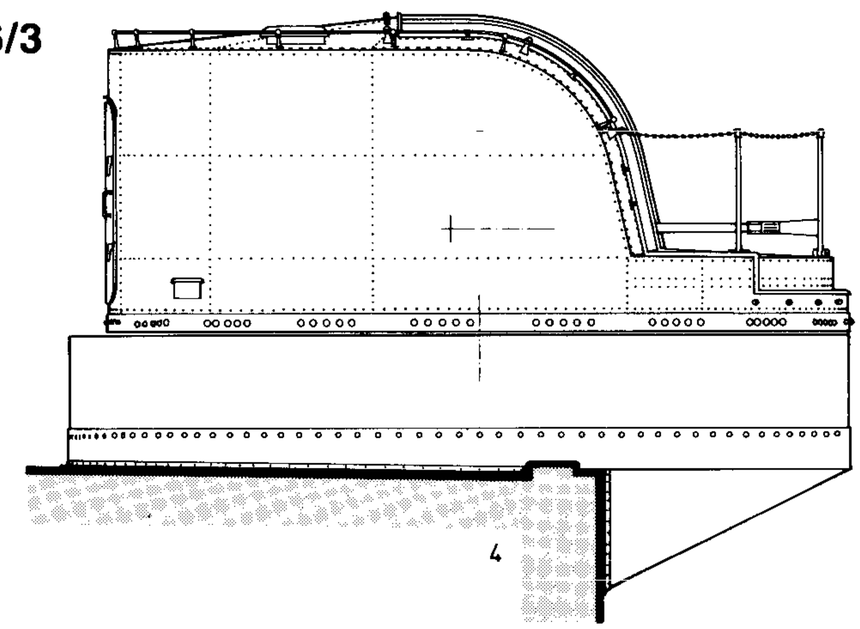
E16/1



E16/2



E16/3



E16 TYPE 96 TRIPLE 25mm AA GUN WITH THE NEW TYPE SHIELD, FITTED JANUARY 1945 (1/50 scale)

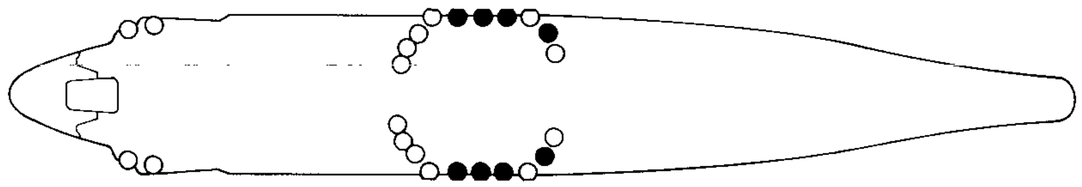
E16/1 Front elevation

E16/2 Plan

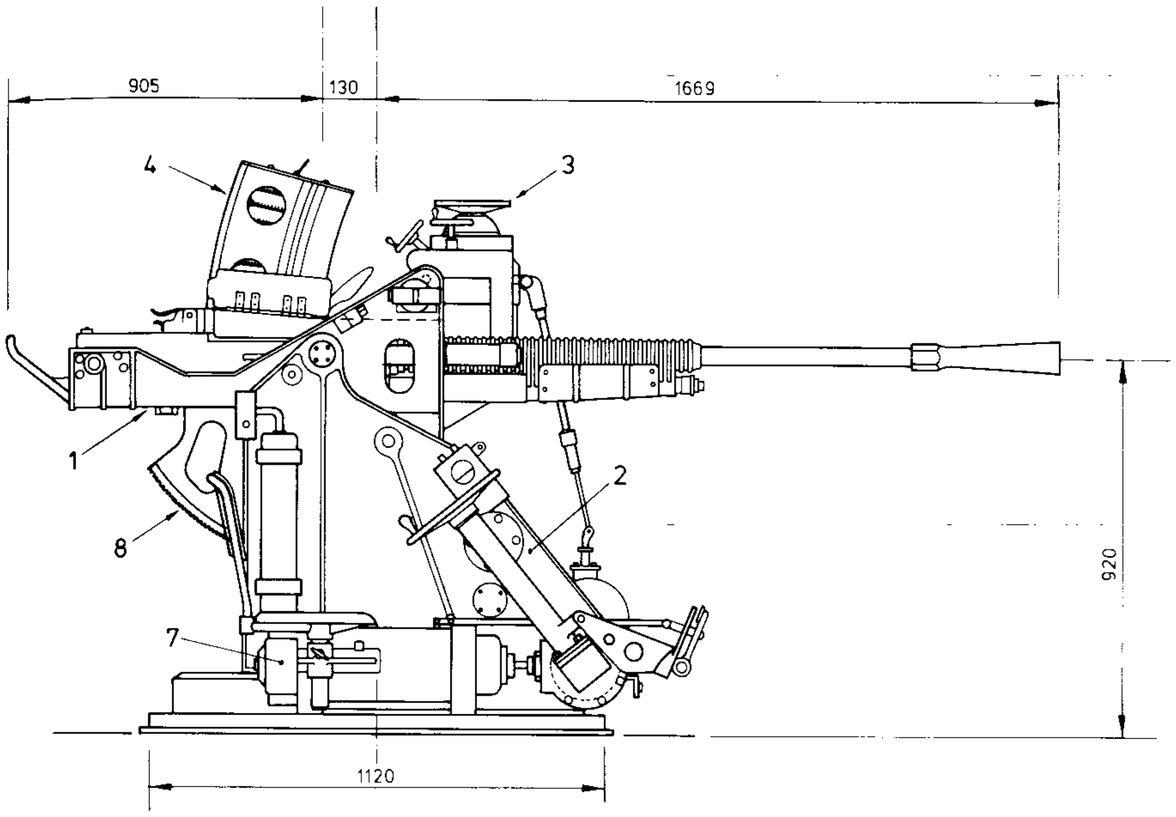
E16/3 Profile

E17 ARRANGEMENT OF COVERED TRIPLE 25mm MG GUN MOUNTS (white circles = old, 1941, type shield; black circles = new, 1945, type shields, no scale)

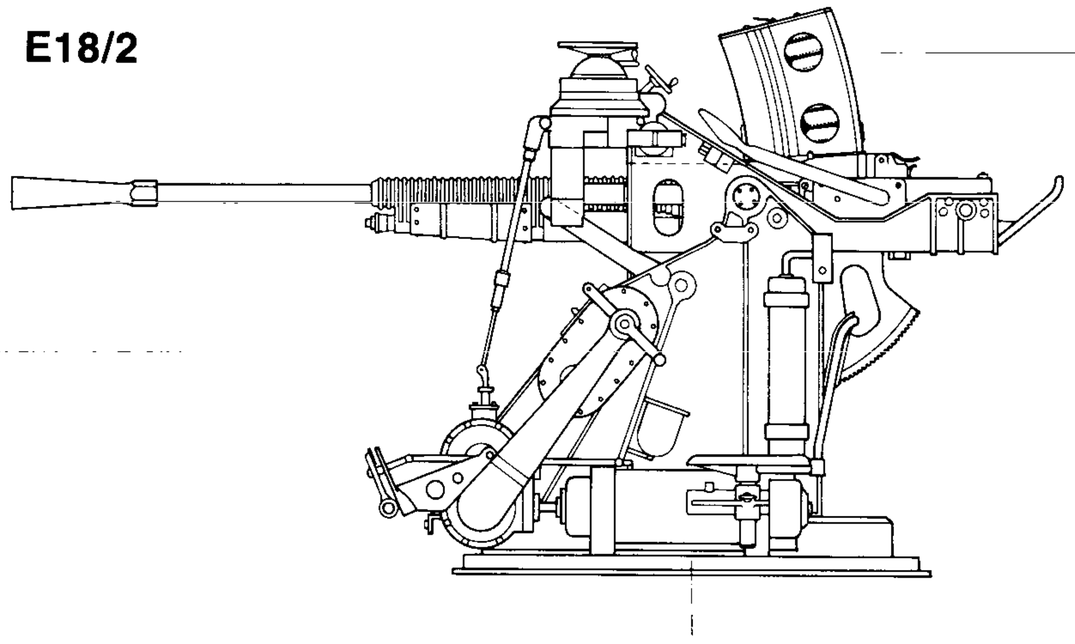
E17



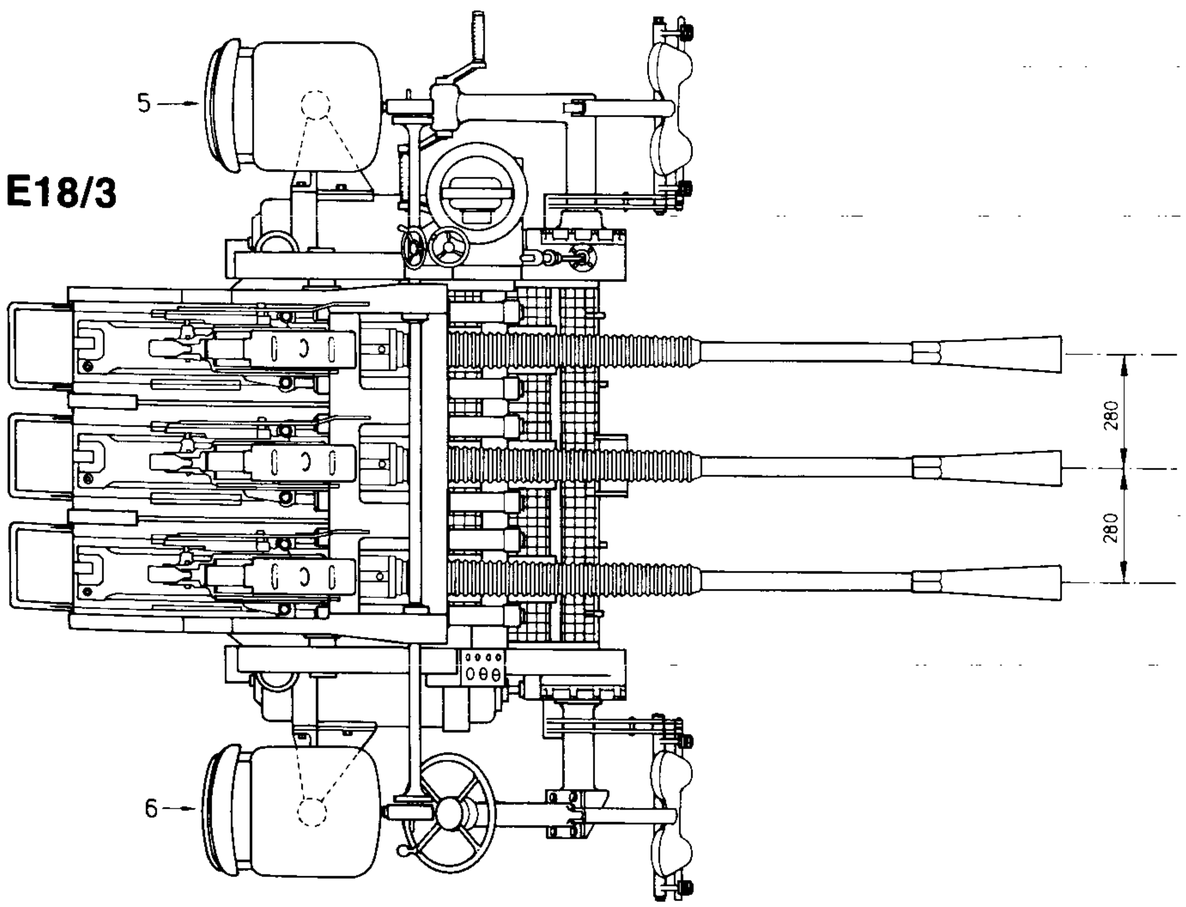
E18/1



E18/2



E18/3



E18 TYPE 96 TRIPLE 25mm MG AS USED IN SHIELDED AND OPEN MOUNTINGS (1/25 scale)

E18/1 Right profile

E18/2 Left profile

E18/3 Plan

E Armament

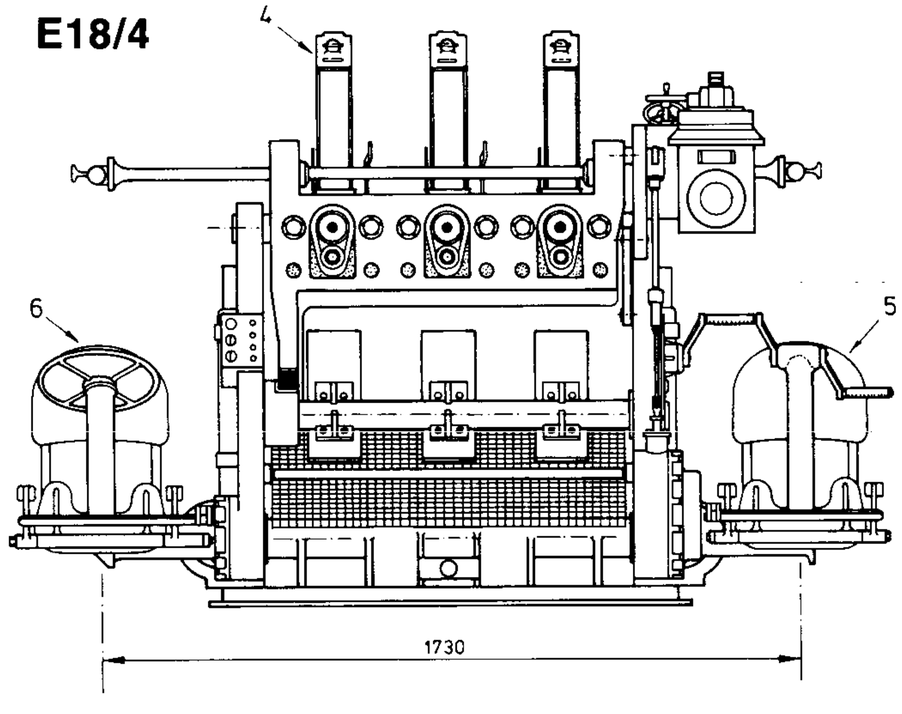
E18/4 **Front elevation**

E18/5 **Cross-section of trunnion bracket**

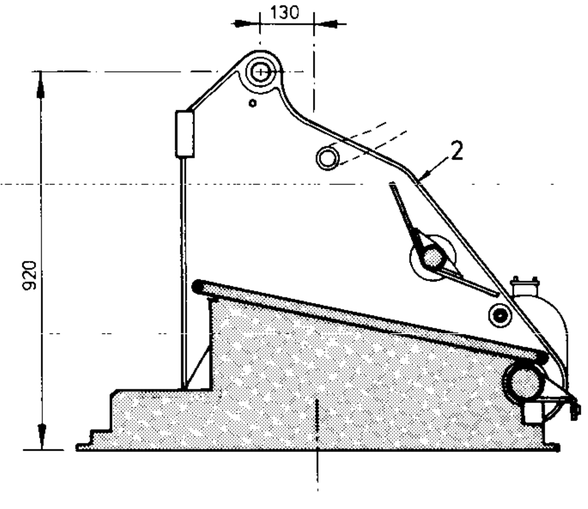
E18/6 **Top carriage with simplified gun sight — used with guns fitted on main and quarterdeck in 1944-45, front and profile view**

1 Top carriage
2 Trunnion bracket
3 Range dial
4 Magazine with fifteen rounds
5 Trainer
6 Pointer
7 1hp electric motor
8 Toothed elevating quadrant

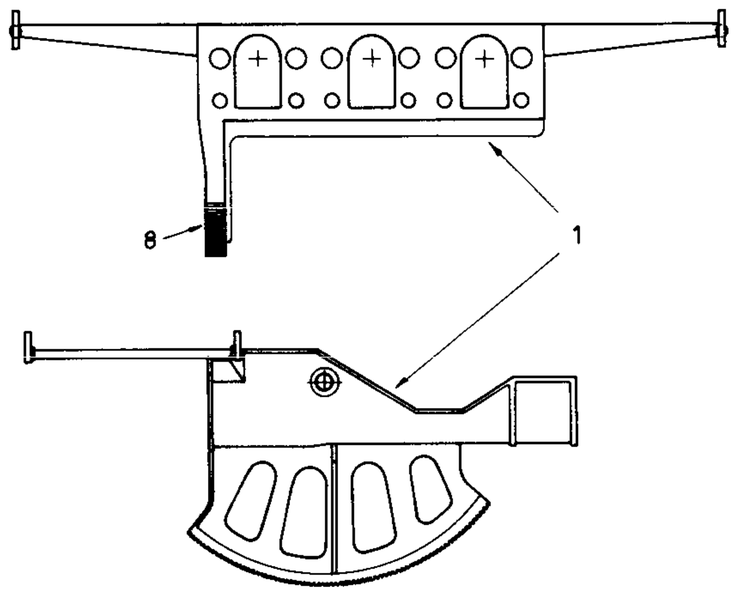
E18/4



E18/5



E18/6



E19 **MOVEABLE SINGLE 25mm MG MOUNT FITTED 1944-45 (1/25 scale)**

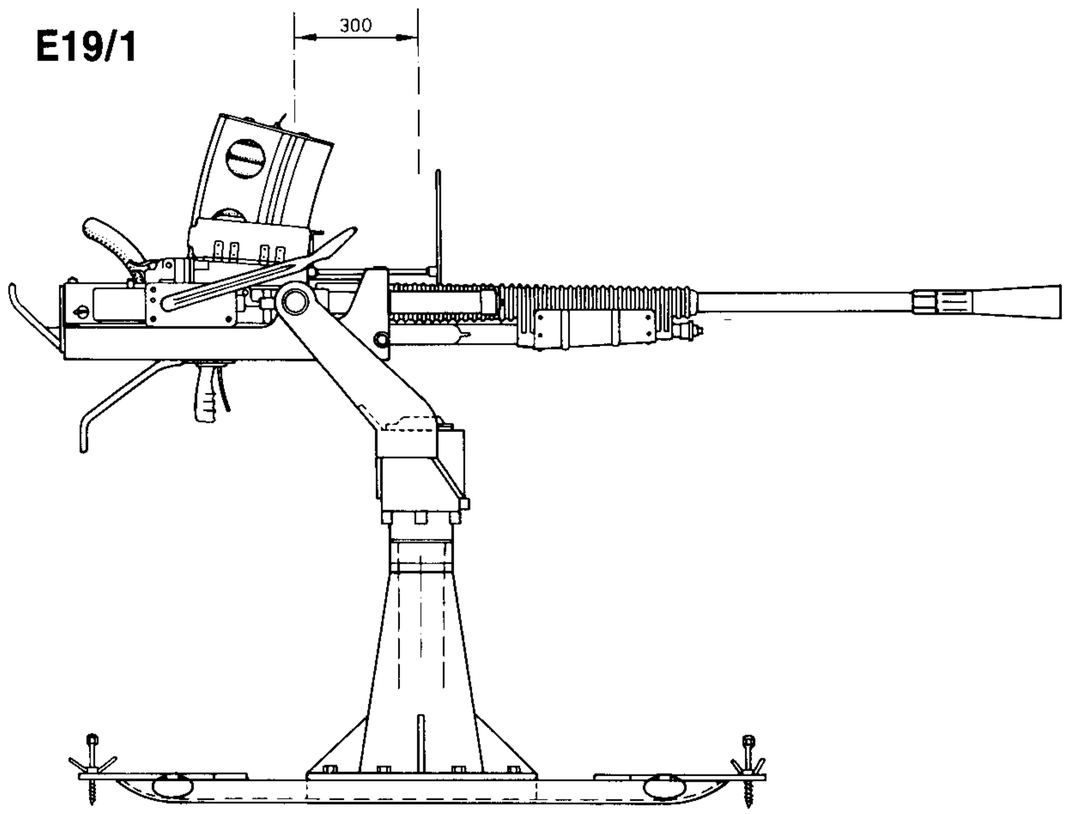
E19/1 **Right profile**

E19/2 **Left profile**

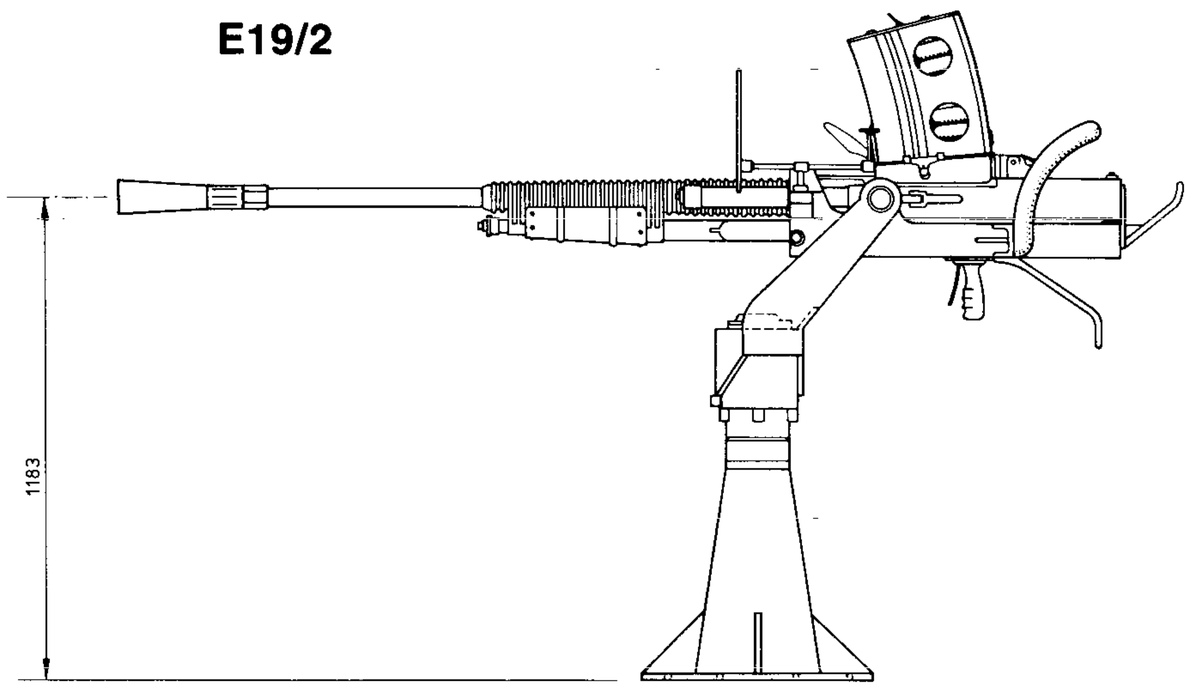
E19/3 **Plan**

E19/4 **Front elevation**

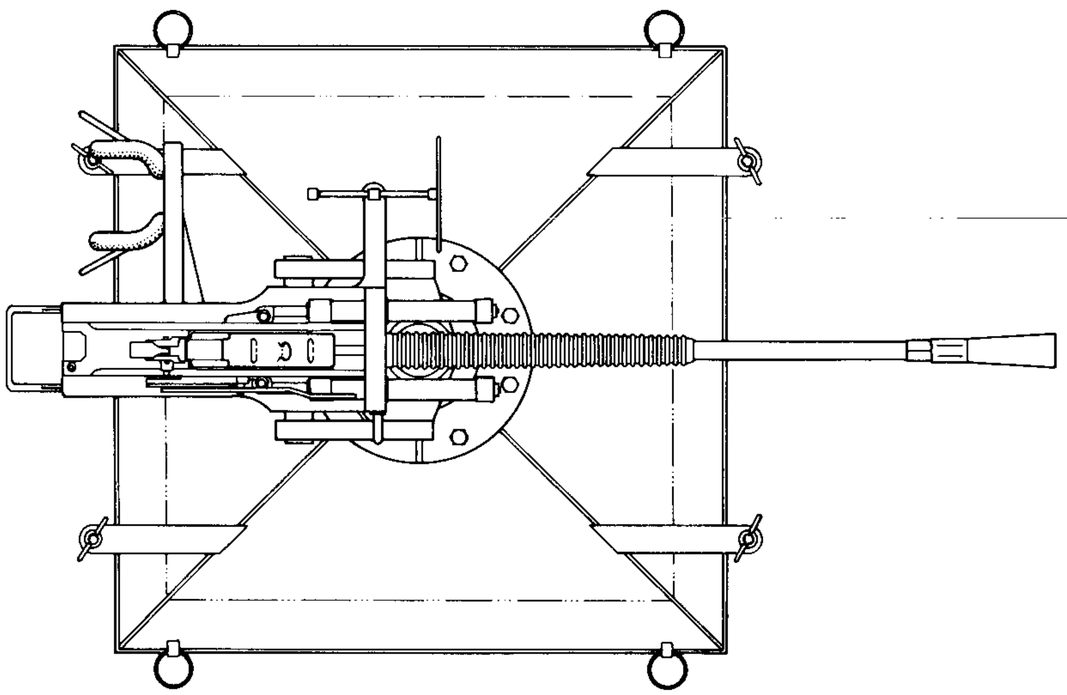
E19/1



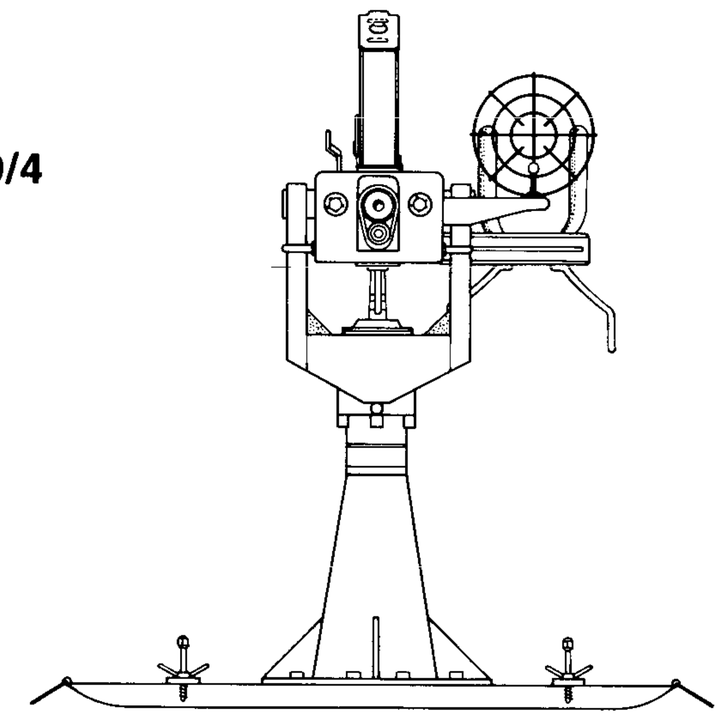
E19/2



E19/3



E19/4



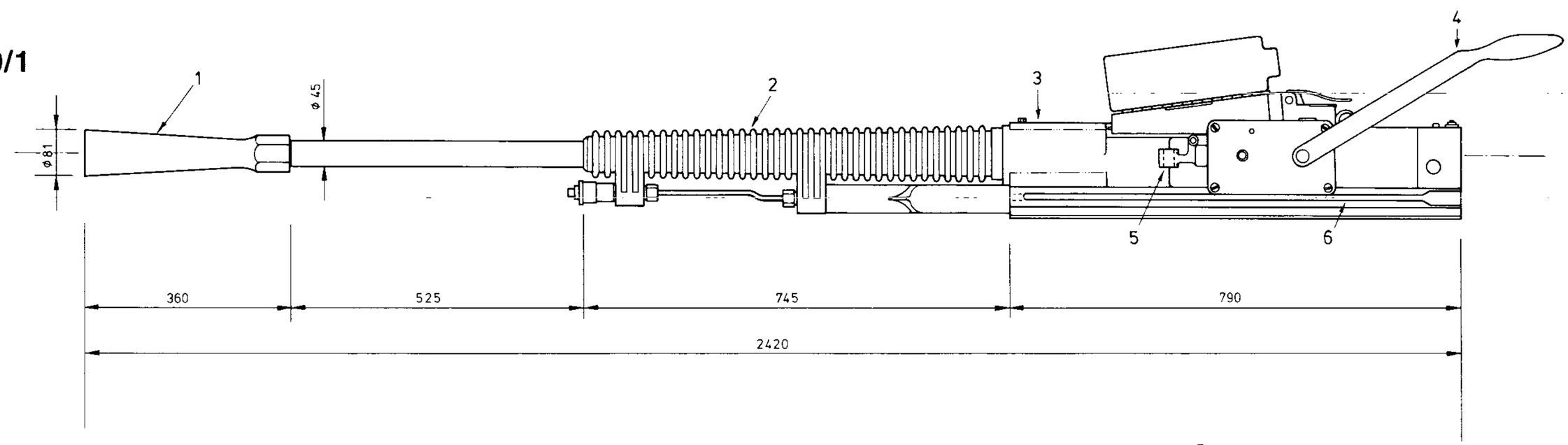
E Armament

E20 TYPE 96 25mm AA GUN — BARREL WITH BREECH BLOCK (1/12.5 scale)

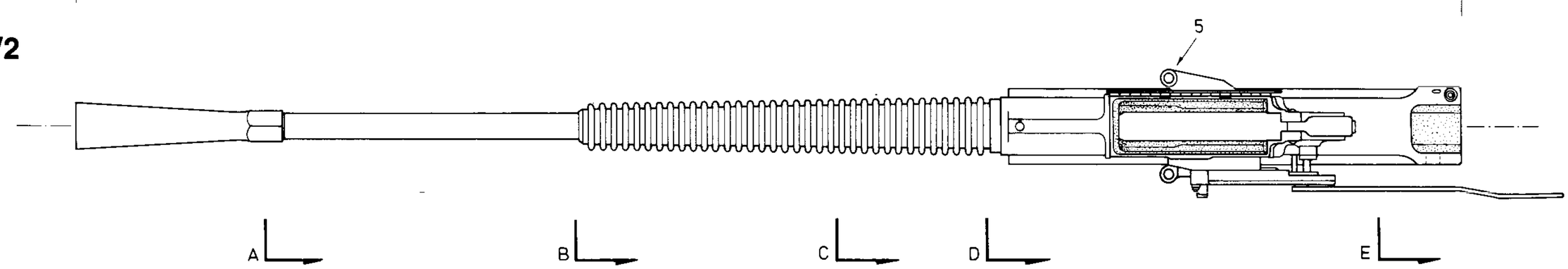
E20/1 Profile

E20/2 Plan

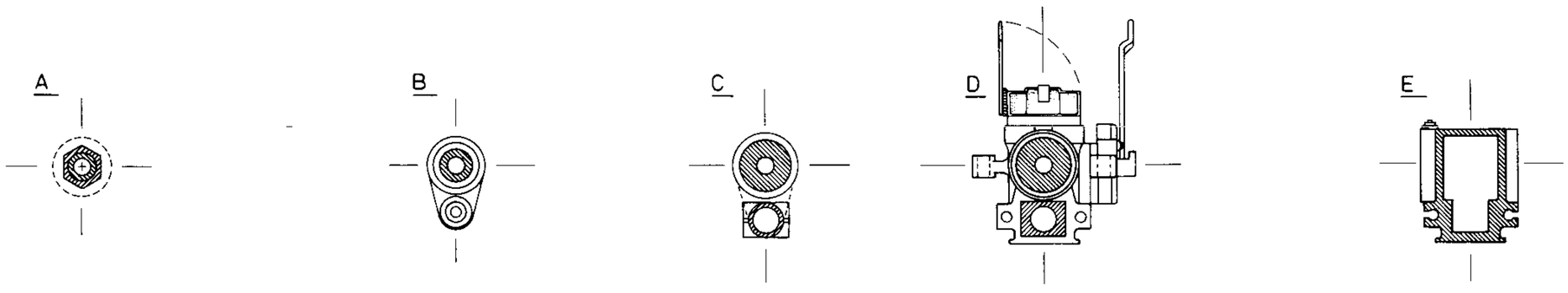
E20/1



E20/2



E20/3



E20/3 Sections

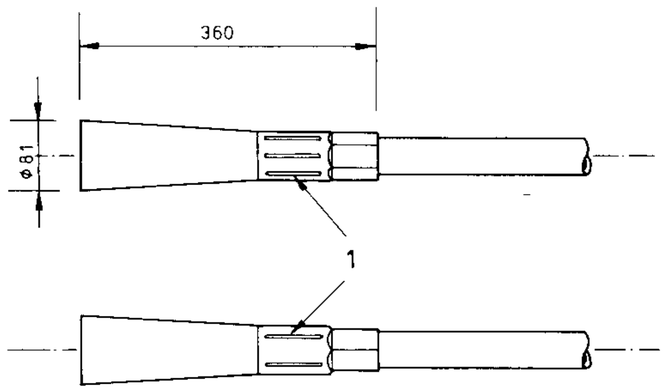
1 Muzzle flash eliminator
2 Radiator
3 Breech block housing
4 Grip — operating lever
5 Counter-recoil piston rod lug
6 Slide rail

E20/4 **New type muzzle flash eliminator (with gun fitted at period 1943-45)**

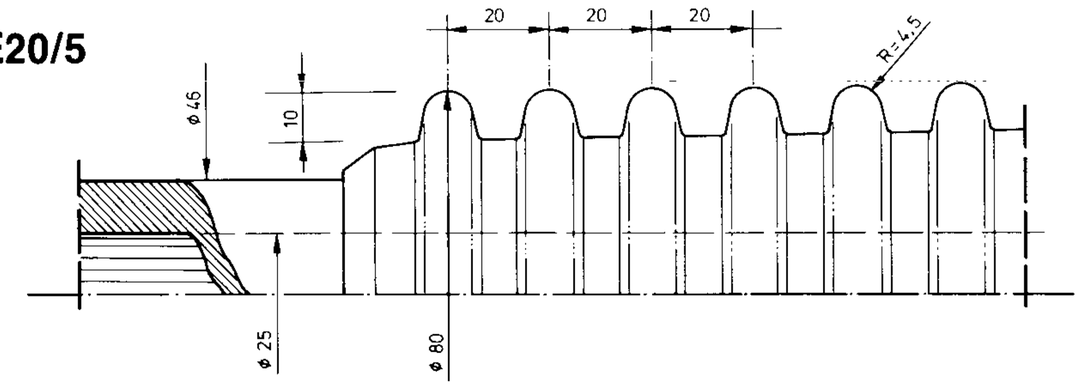
1 Exhaust ports

E20/5 **Detail of barrel cooling fins (1/2 scale)**

E20/4



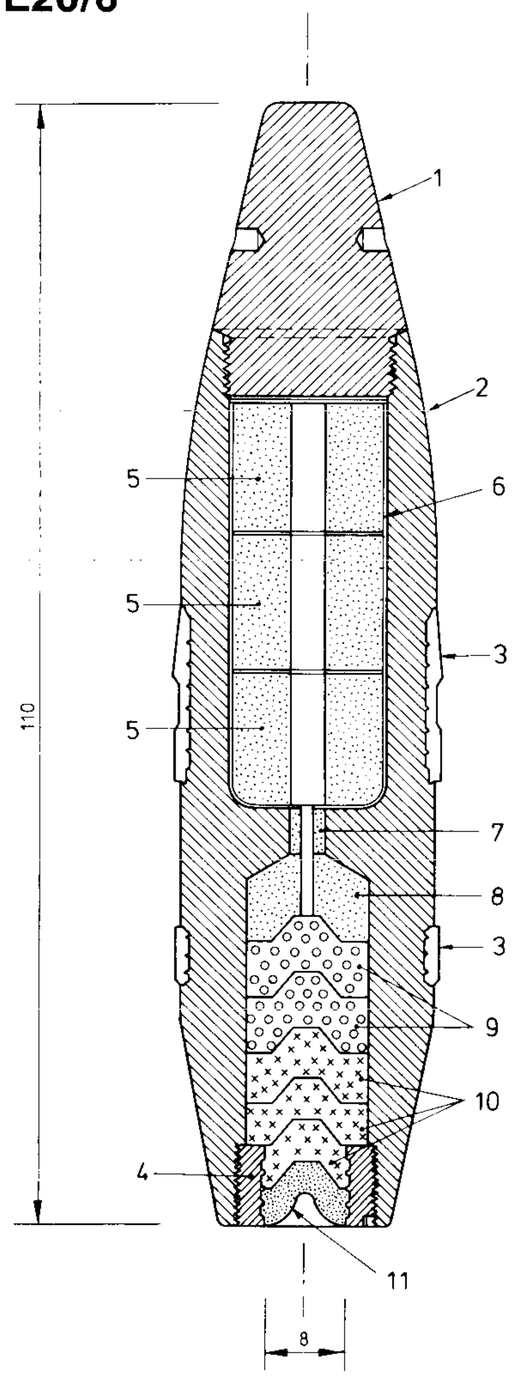
E20/5



E20/6 **25mm projectile — multi-coloured tracer (full size)**

1 Head
2 Body
3 Copper band
4 Base screw
5 Smoke powder — fine grain black powder
6 Paper cylinder
7 Black powder column
8 Fire transfer powder
9 Red illuminating powder
10 Blue illuminating powder
11 Igniter

E20/6



E Armament

E21 **TYPE 93 'SHIKI' TWIN 13mm MACHINE-GUN MOUNT (1/25 scale)**

E21/1 **Left profile**

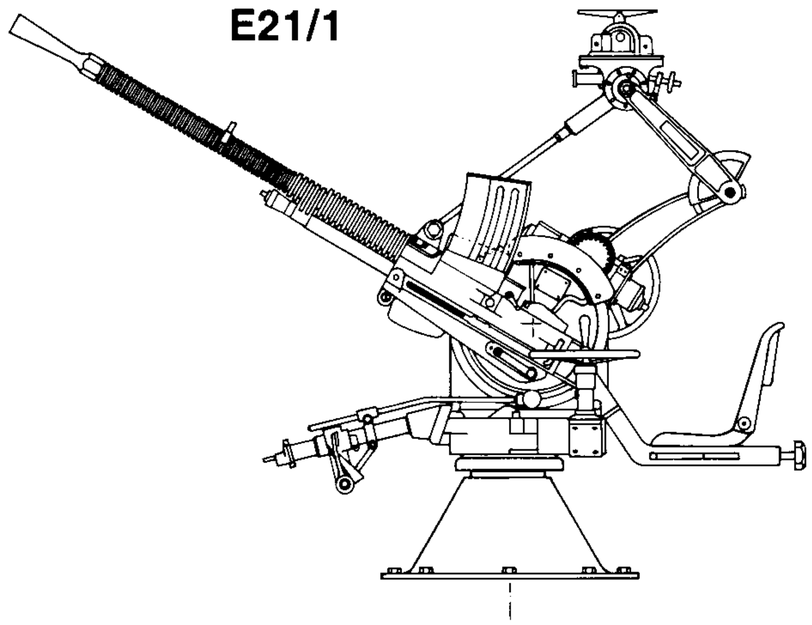
E21/2 **Front view**

E21/3 **Right profile**

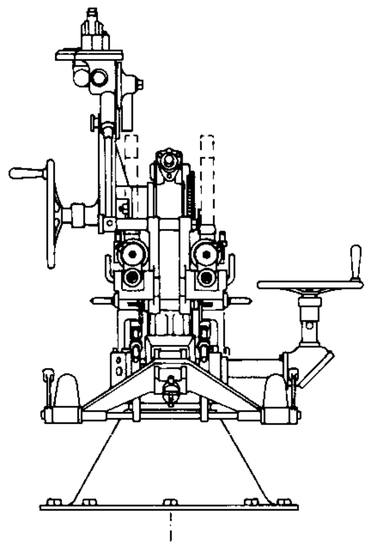
E21/4 **Plan**

E21/5 **Barrel with cooling fins (1/10 scale)**

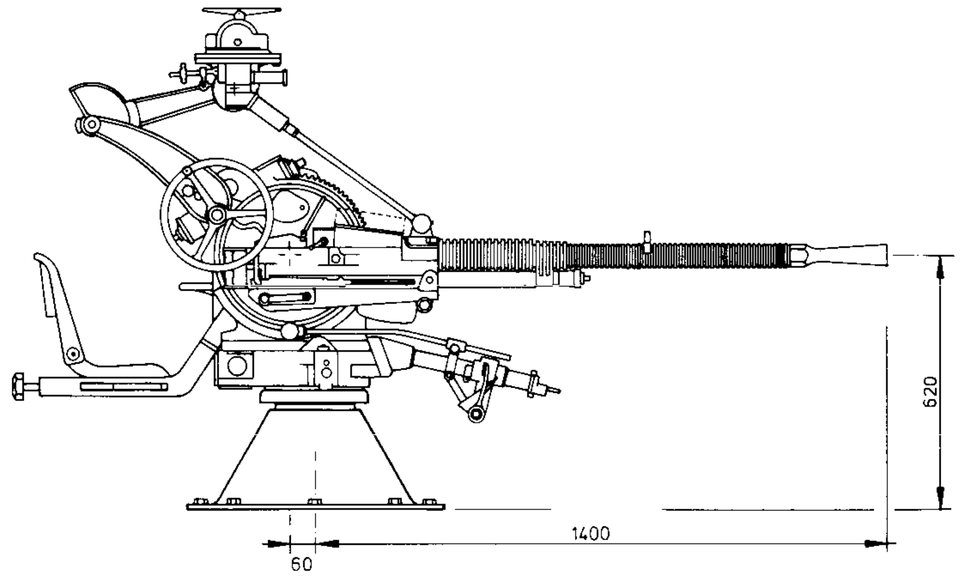
E21/1



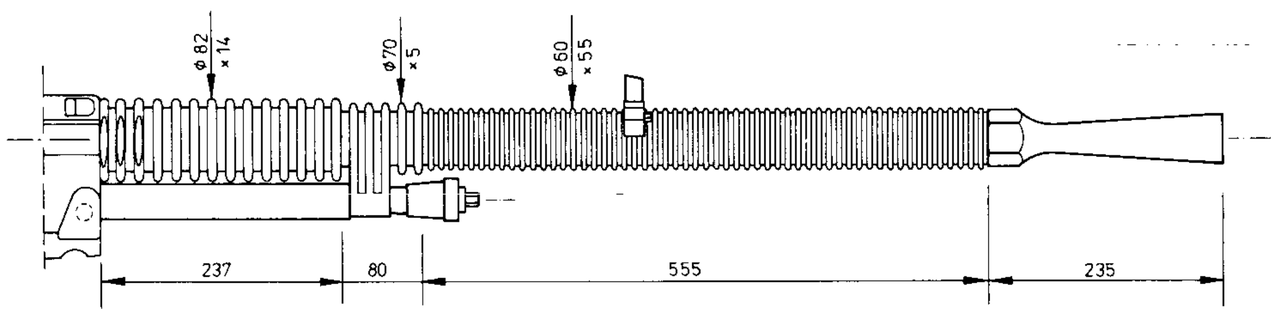
E21/2



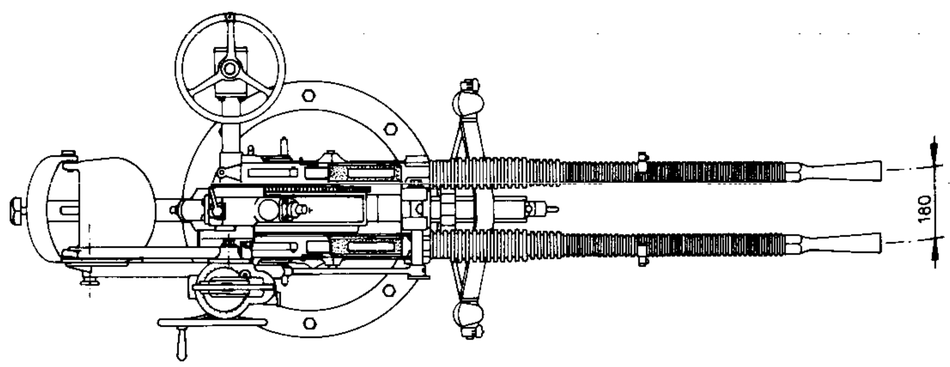
E21/3



E21/5



E21/4

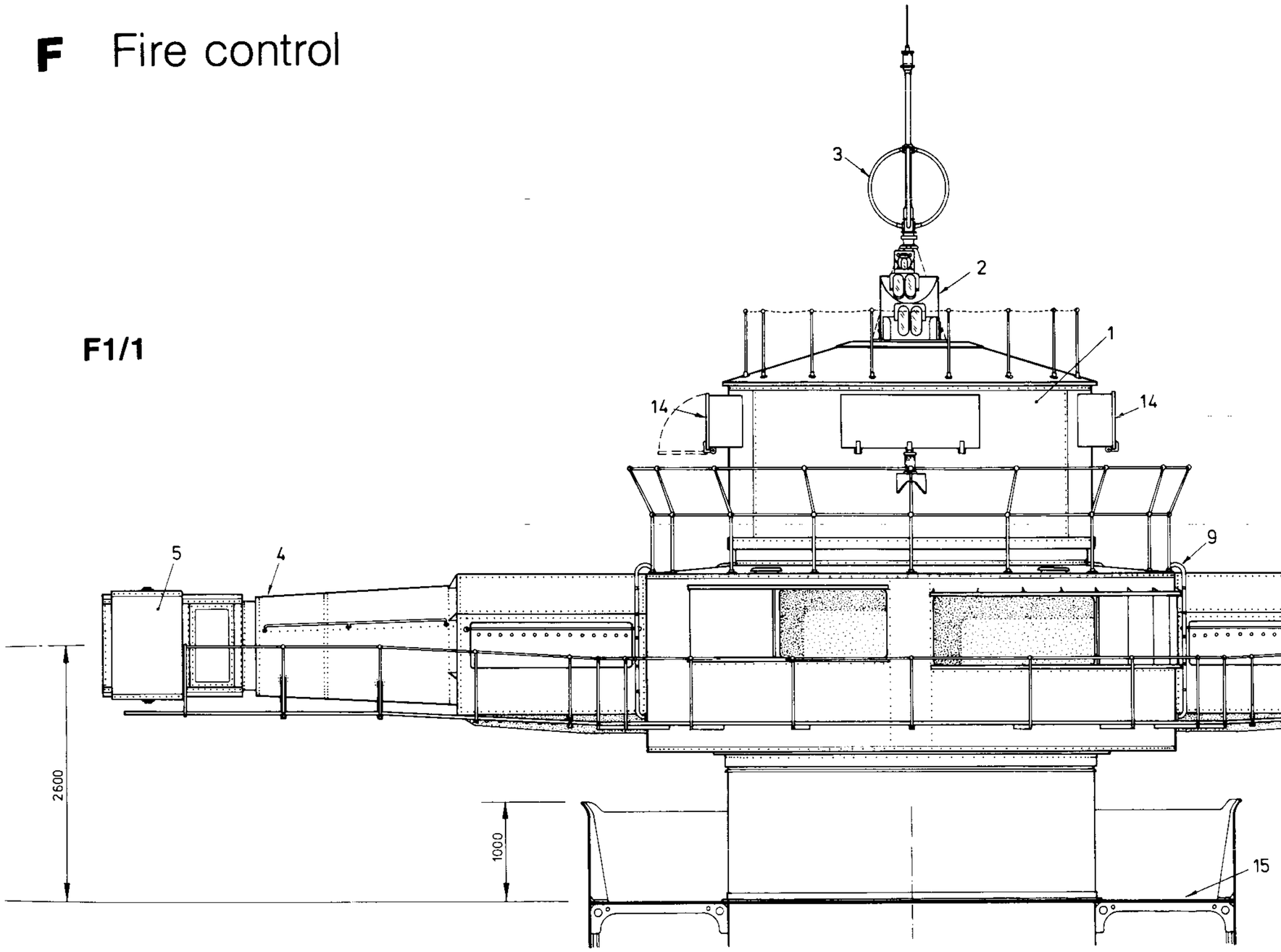


F1 **MAIN LOW ANGLE DIRECTOR AND 15m RANGEFINDER (1/75 scale)**

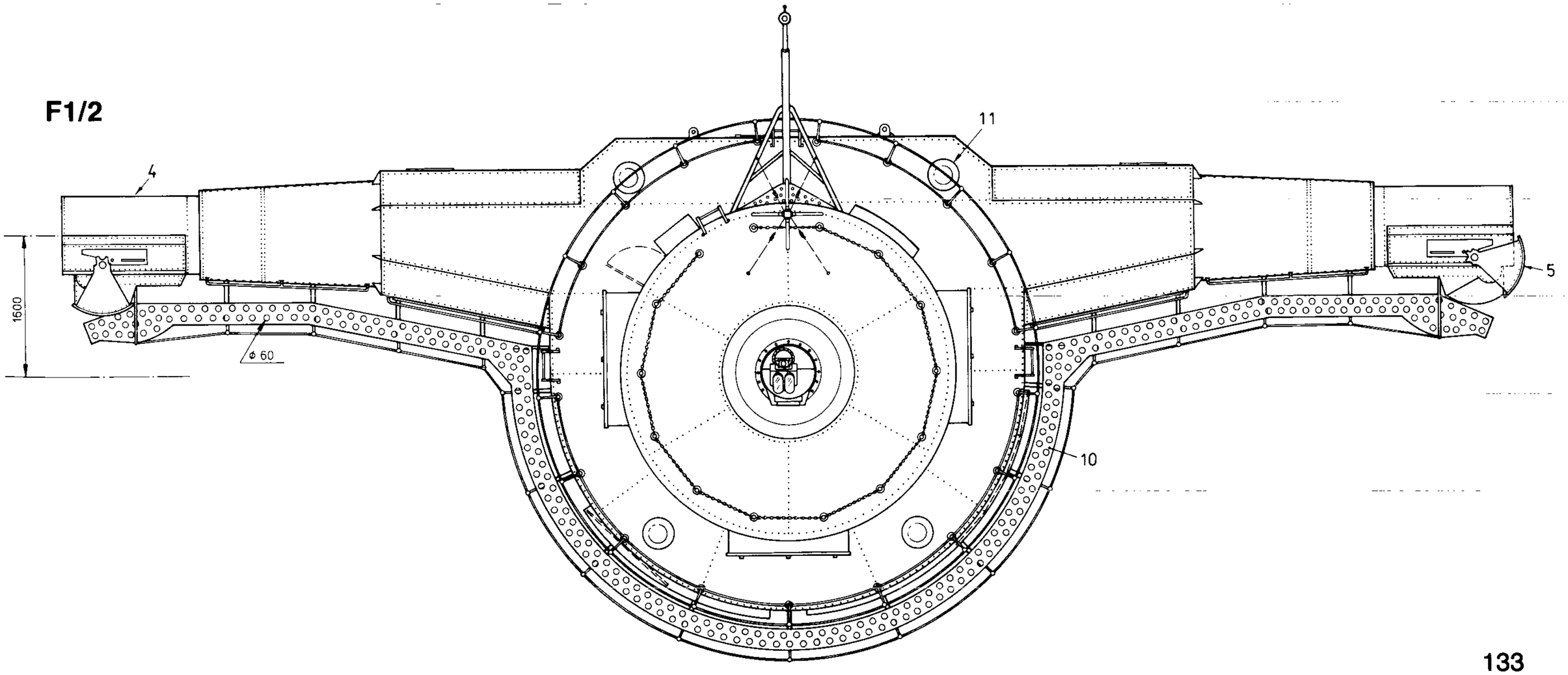
F1/1 **Front elevation**

F1/2 **Plan**

F1/1



F1/2

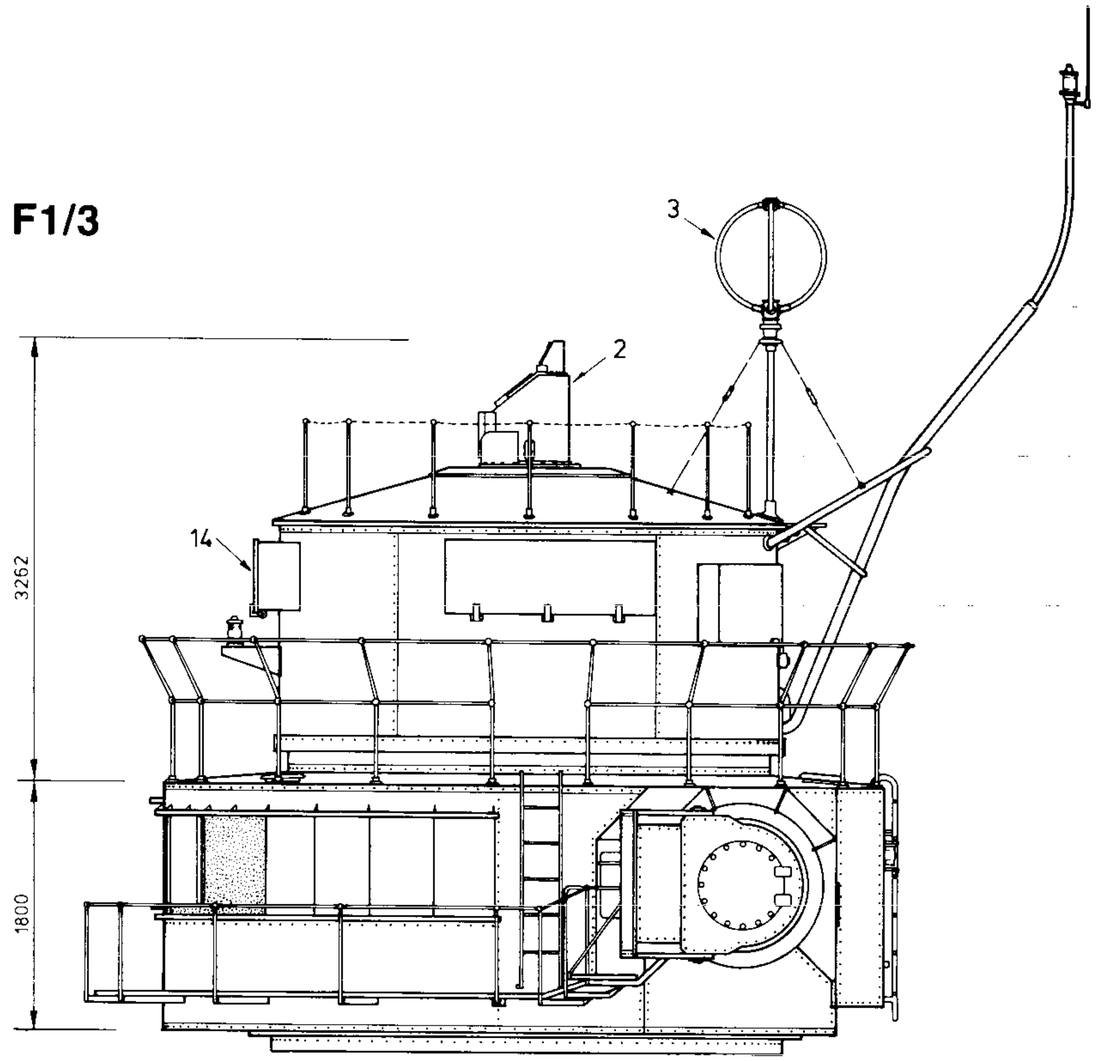


F Fire control

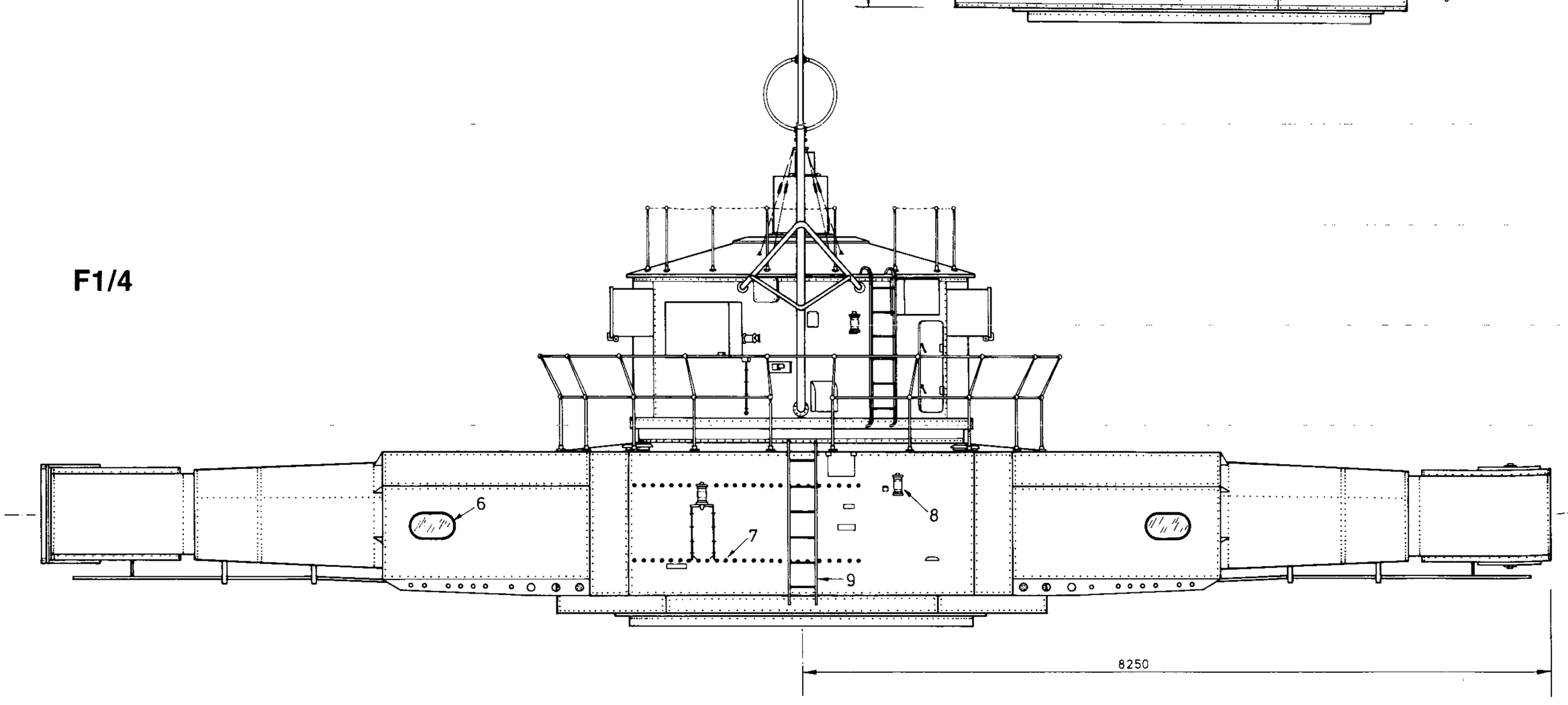
F1/3 Profile view, port side

F1/4 Rear elevation

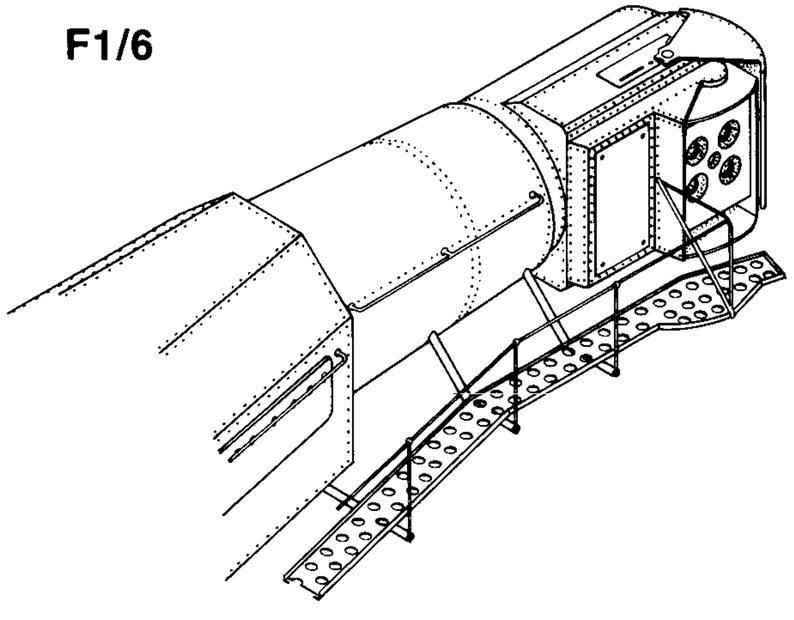
F1/3



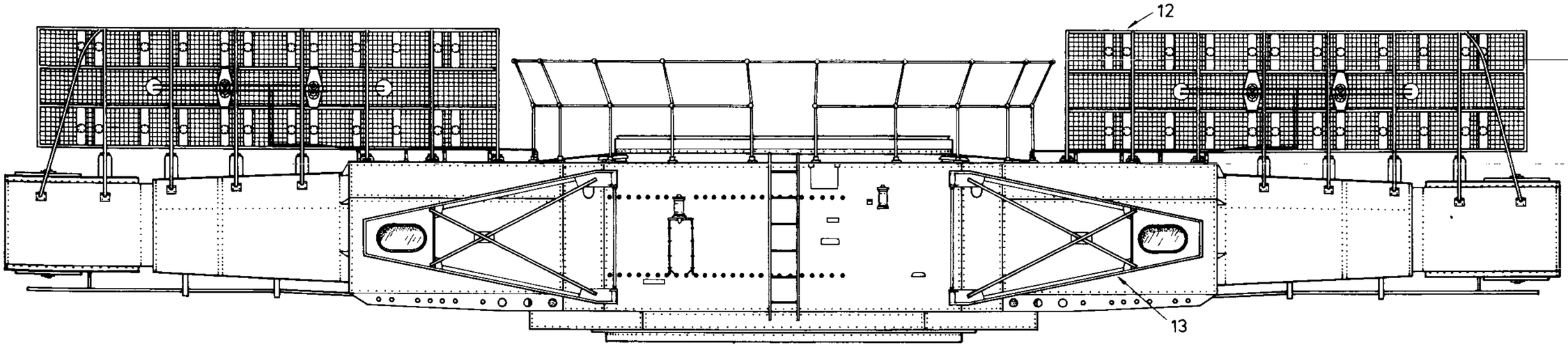
F1/4



F1/6



F1/5



F1/5 Rear elevation of rangefinder with Type 21 radar antenna, rotating part, 1943-45

F1/6 15m rangefinder arm, perspective (no scale)

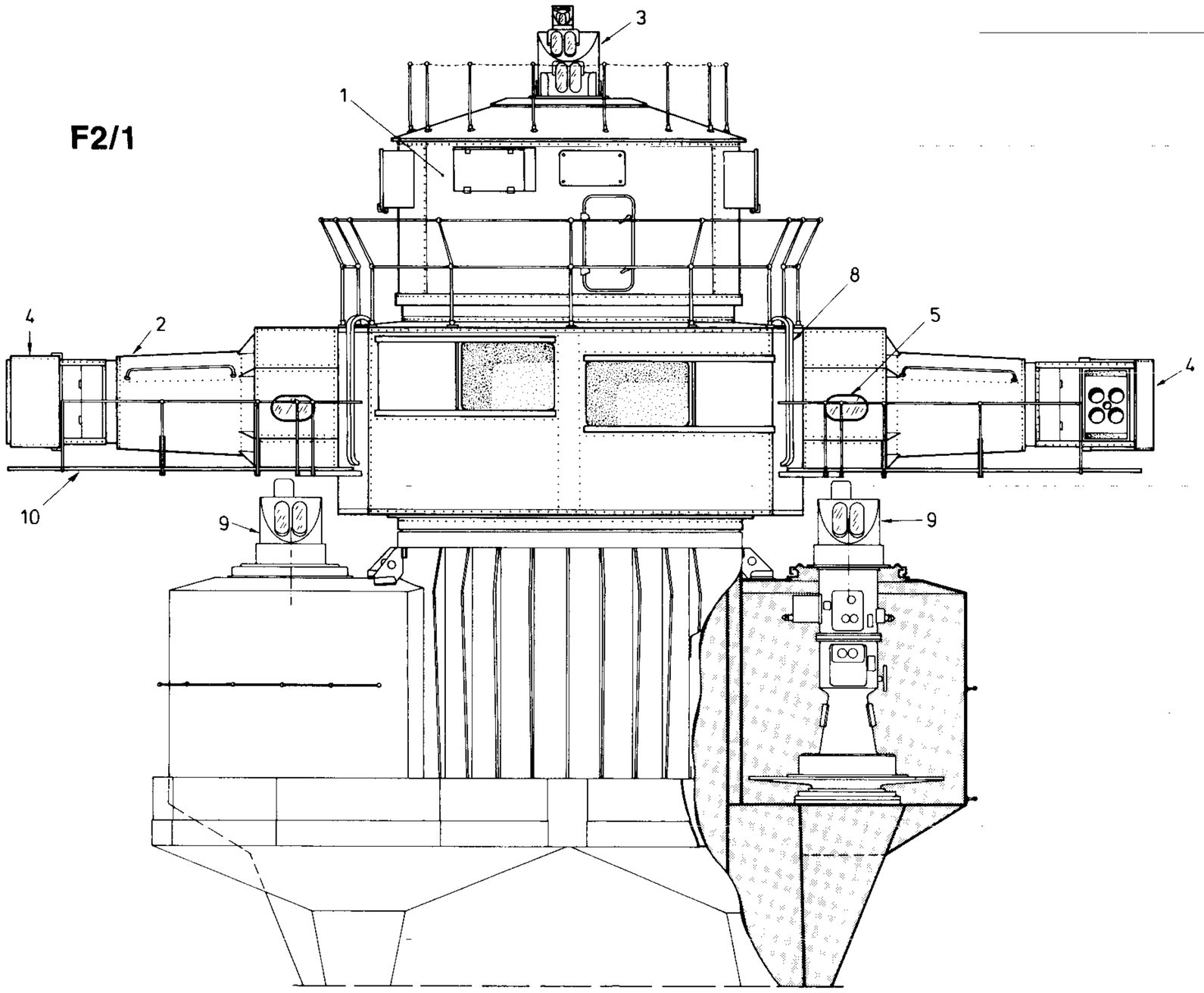
1 Low angle director Type 98 'Hoiban' (non-rotating part)
2 Periscope tower (rotating part)
3 Radio direction finder
4 15m rangefinder
5 Moveable shield
6 Sight glass
7 Ventilation holes
8 Lights
9 Ladder
10 Platform
11 Ventilators
12 Type 21 radar antenna fitted September 1943
13 Strengthening framework (fitted at the same time as radar)
14 Windows
15 Air defence command position (Deck XI)

F2 LOW-ANGLE DIRECTOR AND 10m RANGEFINDER (1/75 scale)

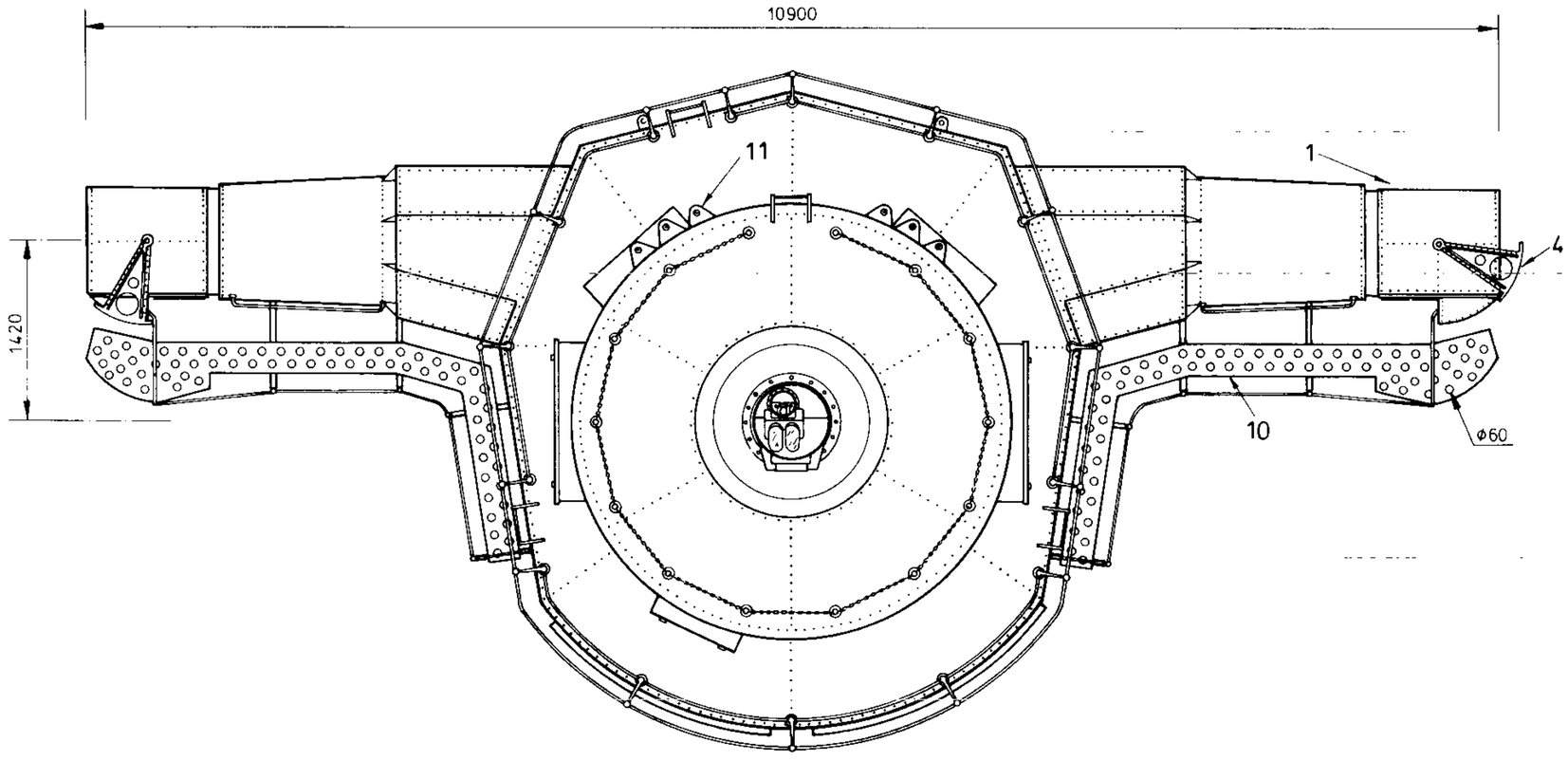
F2/1 Front elevation (view from stern)

F2/2 Plan

F2/1



F2/2



F2/3 **Profile view (starboard)**

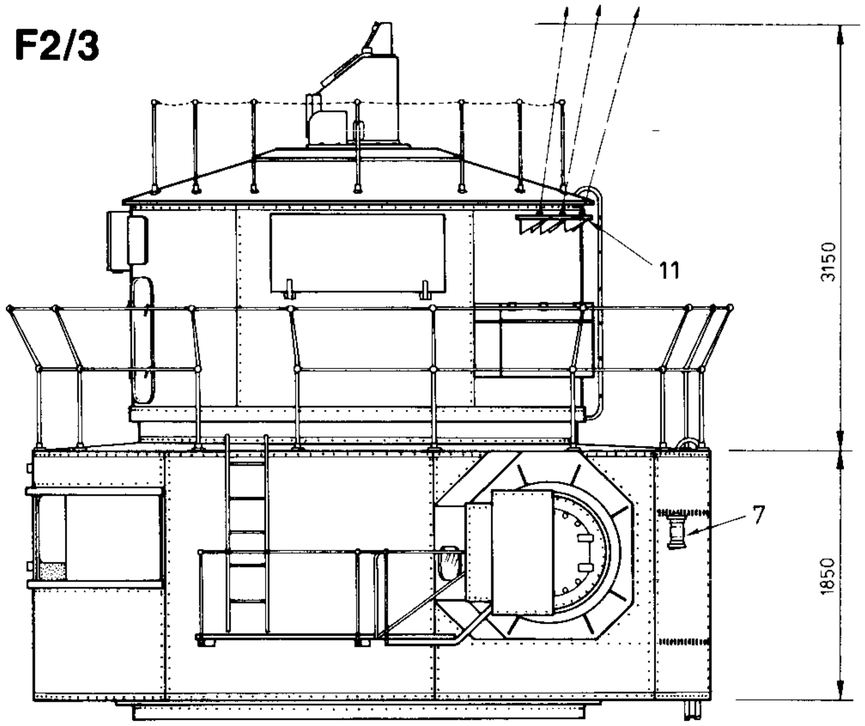
F2/4 **Rear elevation (view from bow)**

F2/5 **Lower part of tower (plan: auxiliary LA director)**

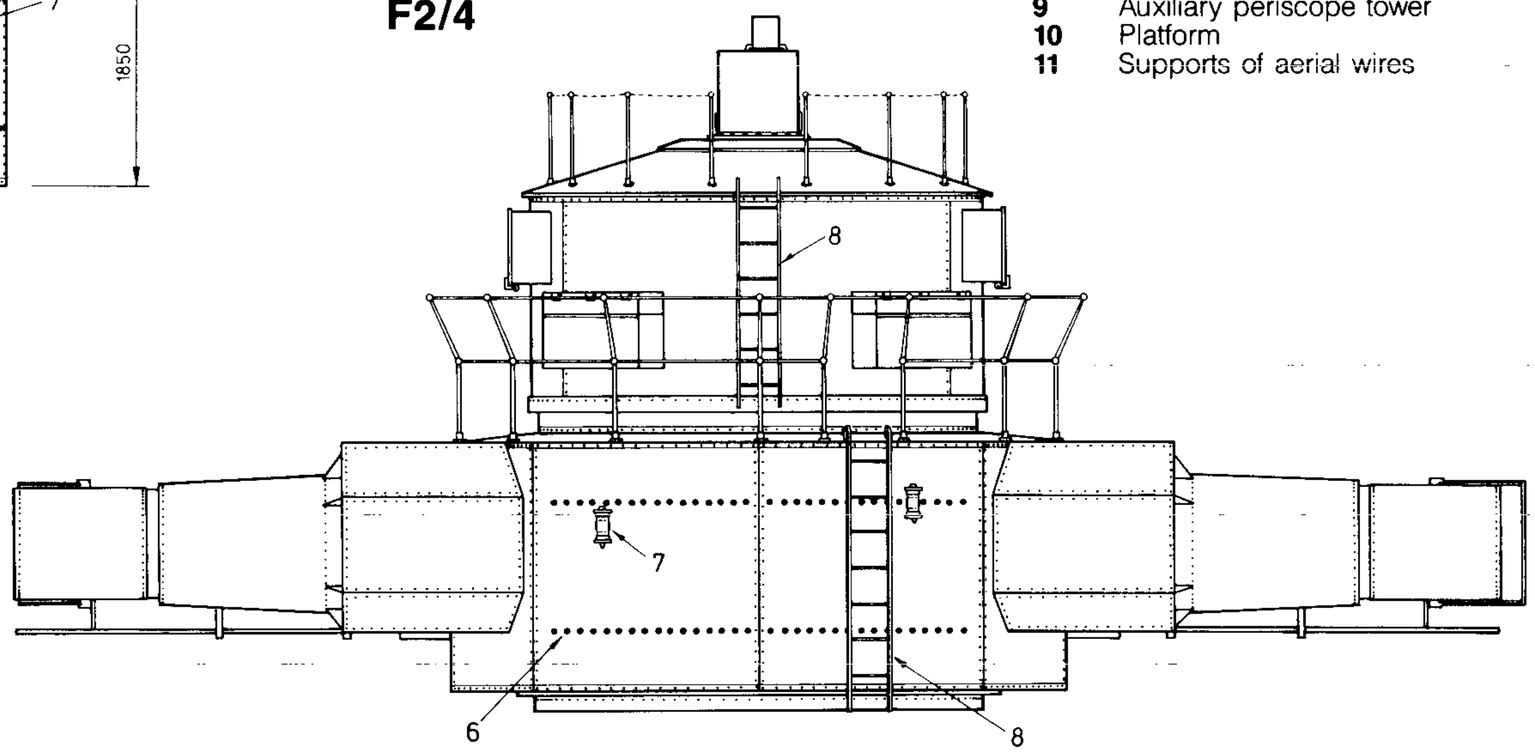
F2/6 **10m rangefinder arm, perspective (no scale)**

1 Low angle director Type 98 'Hoiban' (non-rotating part)
2 10m rangefinder
3 Periscope tower (rotating part)
4 Moveable shield
5 Sight glass
6 Ventilation holes
7 Light
8 Ladder
9 Auxiliary periscope tower
10 Platform
11 Supports of aerial wires

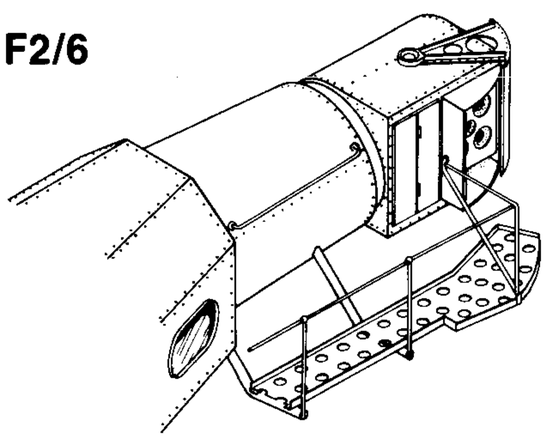
F2/3



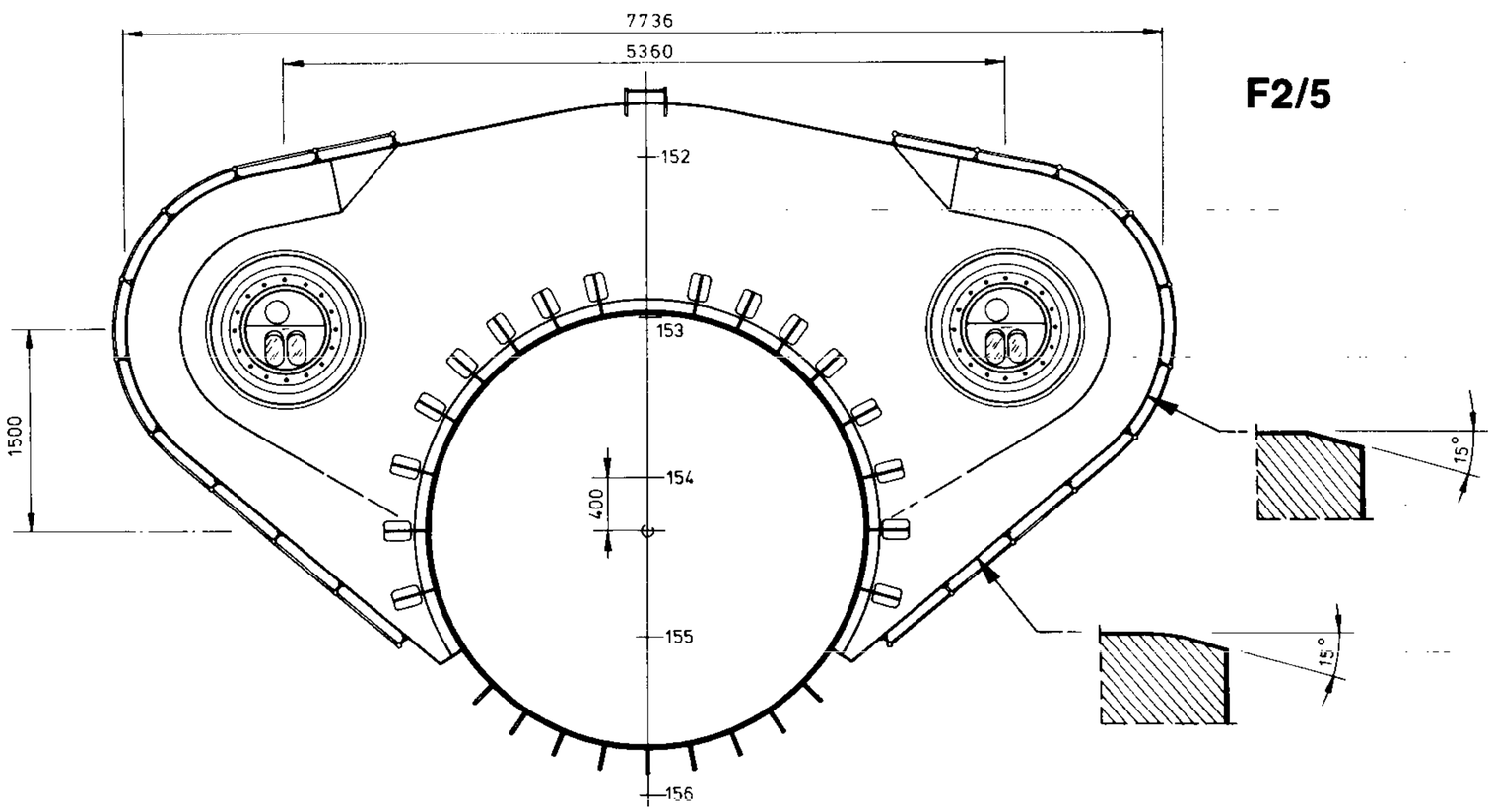
F2/4



F2/6

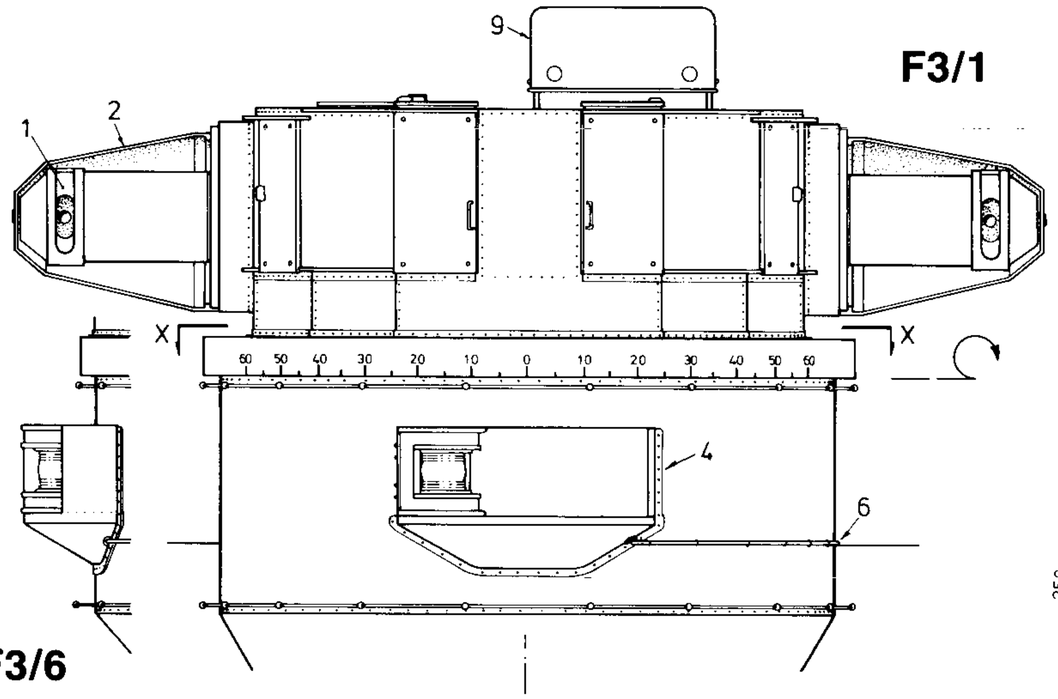


F2/5

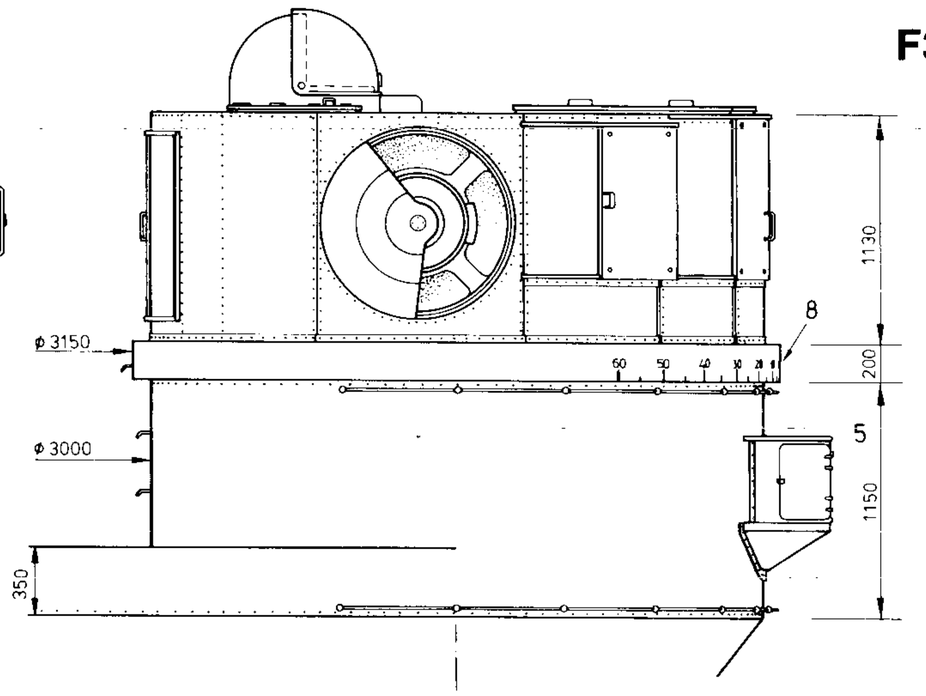


F Fire control

F3/1

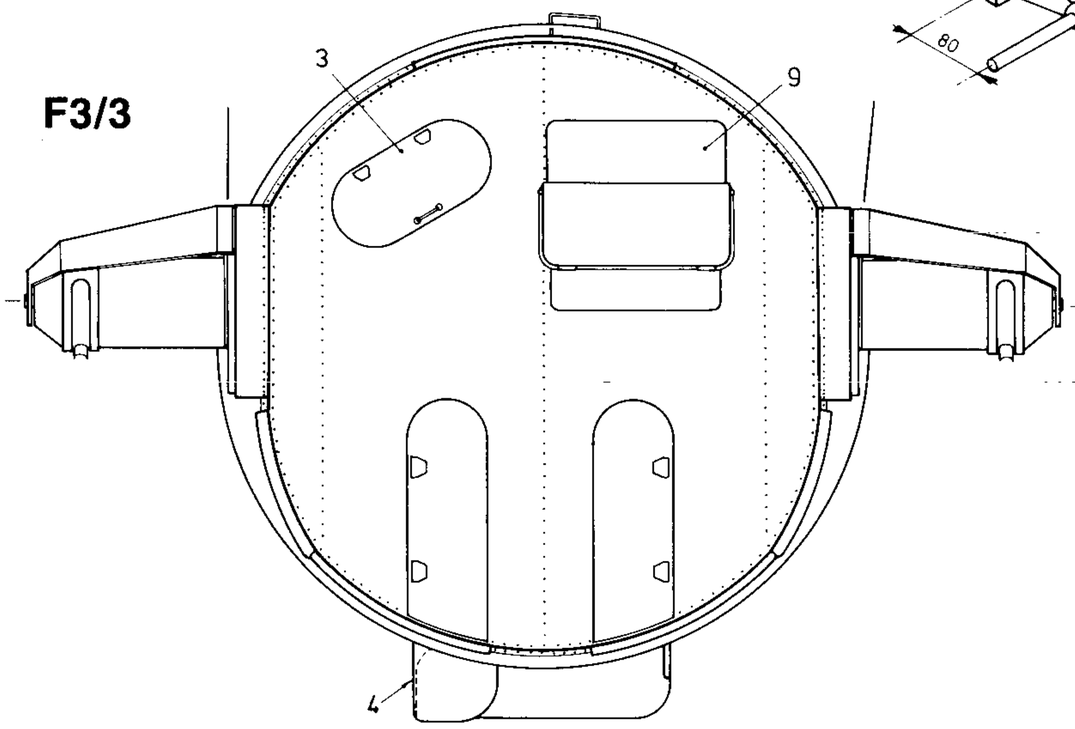


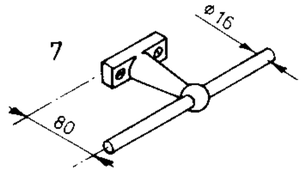
F3/2

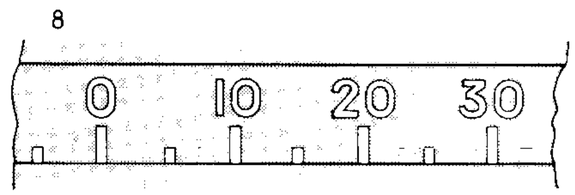


F3/6

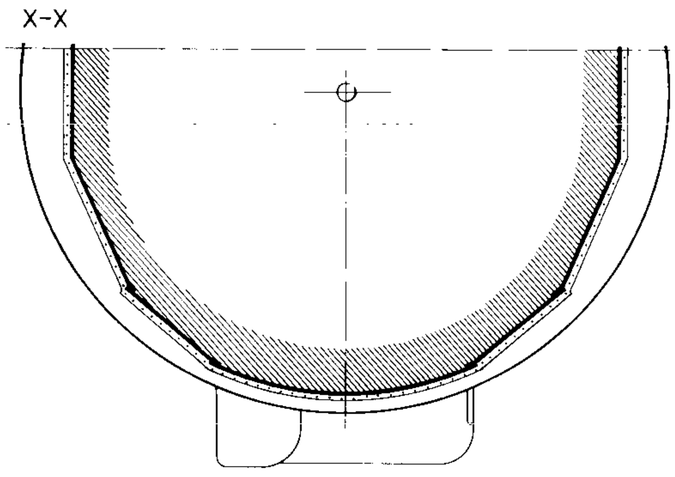
F3/3



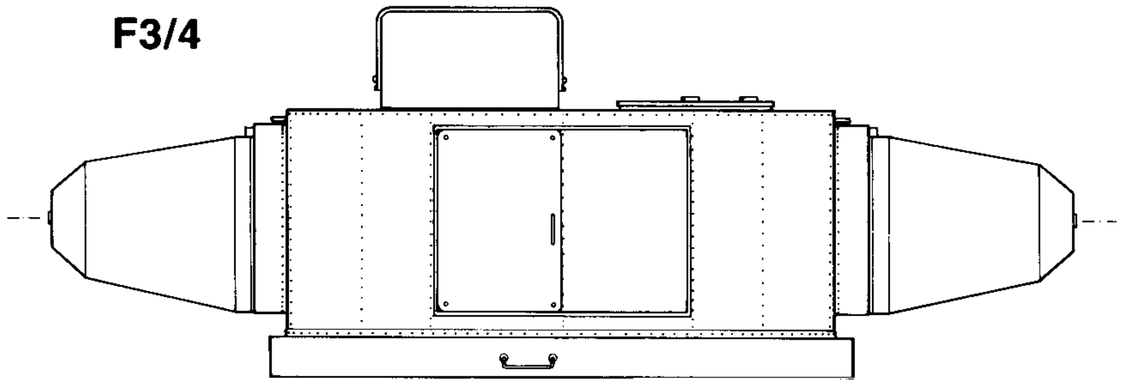




F3/5



F3/4



F3 4.5m RANGEFINDERS OF TYPE 94 HIGH ANGLE FIRE CONTROL SYSTEM 'KOSHA SOCHI' (1/50 scale)

F3/1 4.5m rangefinder with navigation light on base, starboard (frame 125), seen from outboard

F3/2 Profile view

F3/3 Plan

F3/4 Rear view

F3/5 Section X-X

F3/6 Navigation light viewed from bow

1 4.5m rangefinder
2 Rotating shield
3 Hatch
4 Navigation light with electric lantern
5 Access doors
6 Electric cable
7 Detail of handrail stay
8 Circular 5° scale, white numbers
9 Observation port cover (closed)

F4 4.5m RANGEFINDER (frame 131); APRIL 1944 FITTED AT FRAME 146 (1/50 scale)

F4/1 Front elevation (seen from outboard) note white circular scale

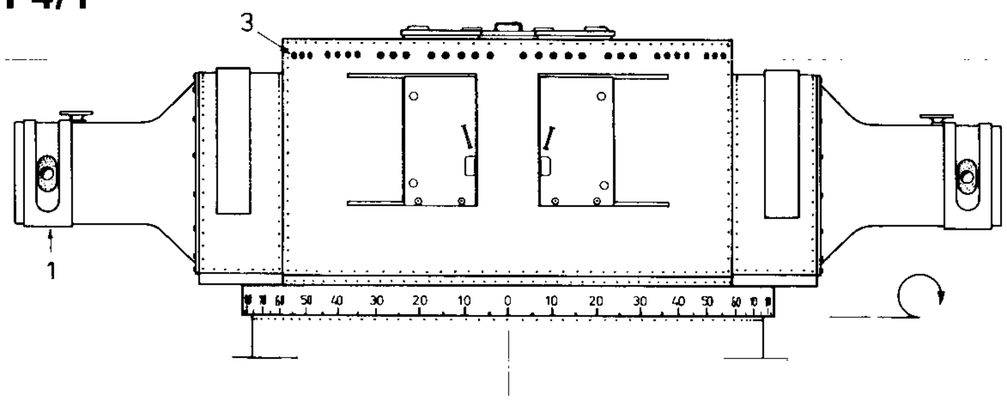
F4/2 Plan

F4/3 Profile view

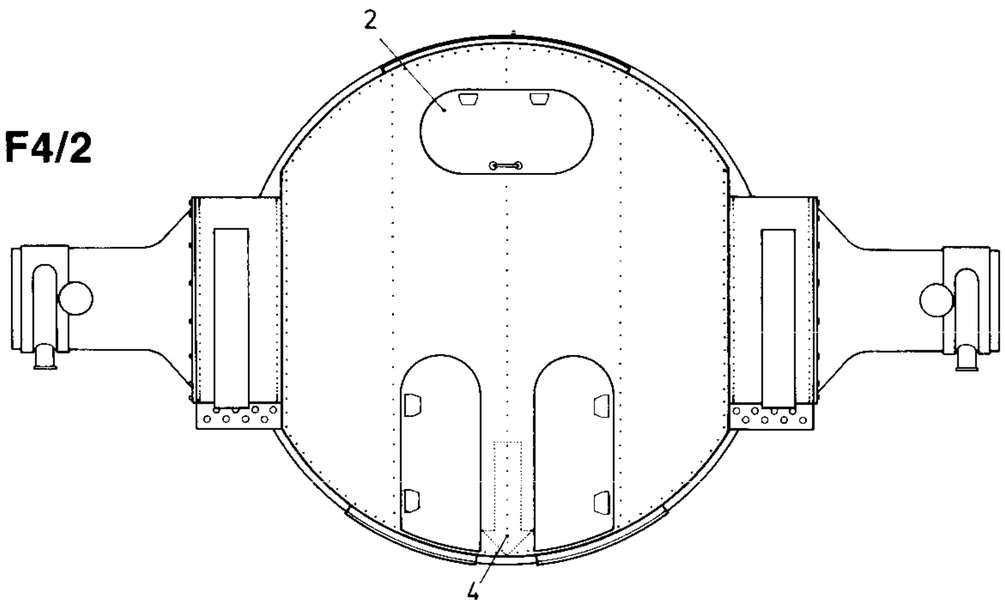
F4/4 Rear view

1 4.5m rangefinder
2 Hatch
3 Ventilation holes
4 White painted arrow 1944-45

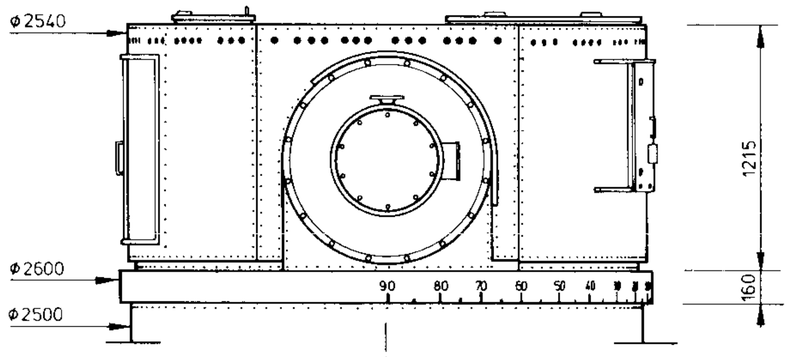
F4/1



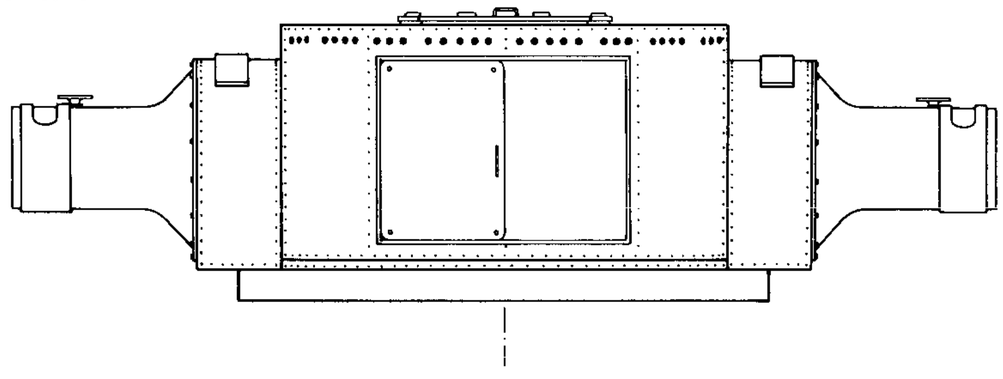
F4/2



F4/3



F4/4



F Fire control

F5 **BASE OF 4.5m RANGEFINDER (frame 131) 1941 (1/75 scale)**

F5/1 **Profile view**

F5/2 **Front view (seen from outboard)**

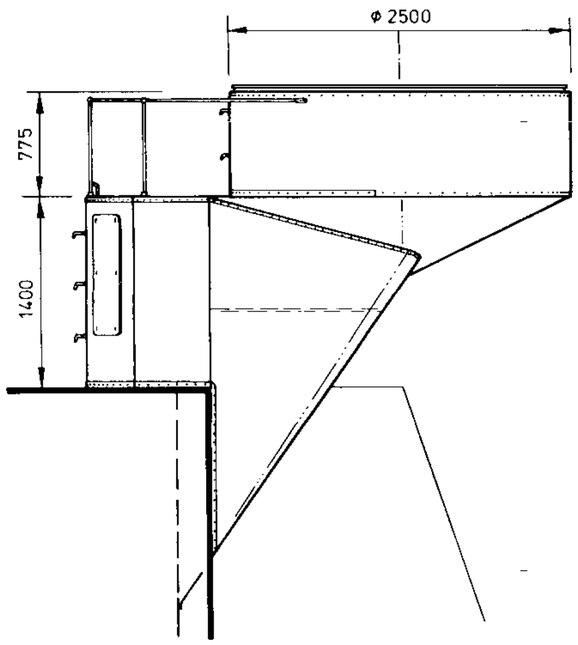
F5/3 **Plan**

F6 **BASE OF 4.5m RANGEFINDER WHEN TRANSFERRED FROM FRAME 131 TO 146, APRIL 1944 (1/75 scale)**

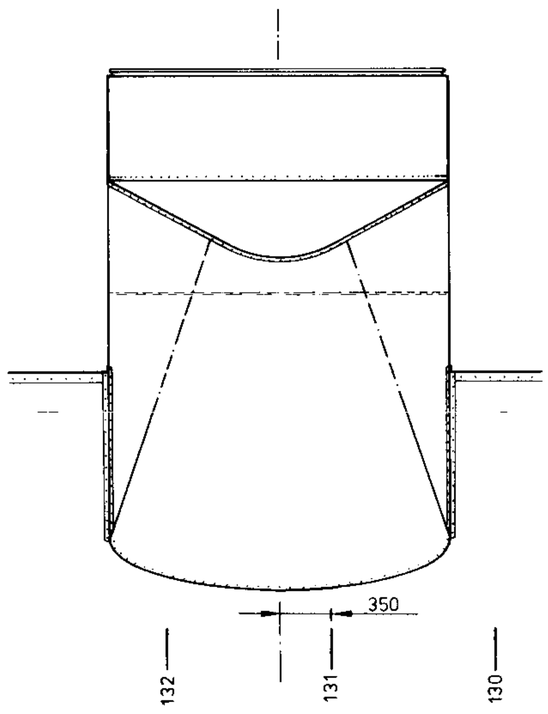
F6/1 **Profile (viewed from outboard)**

F6/2 **Plan, starboard side**

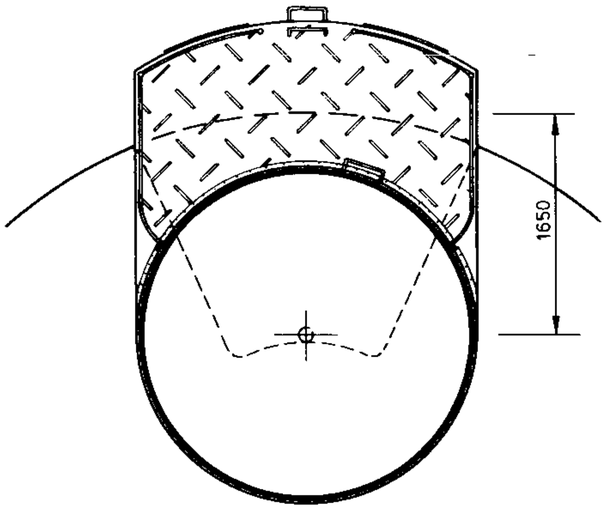
F5/1



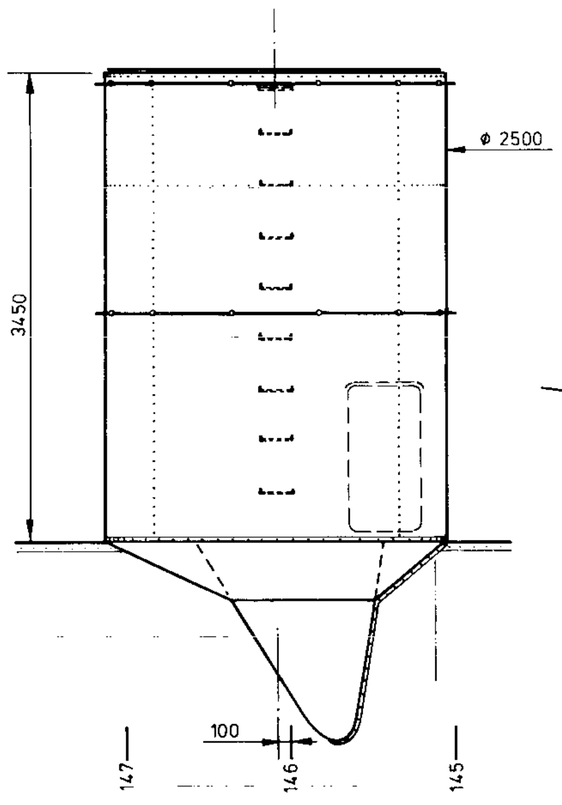
F5/2



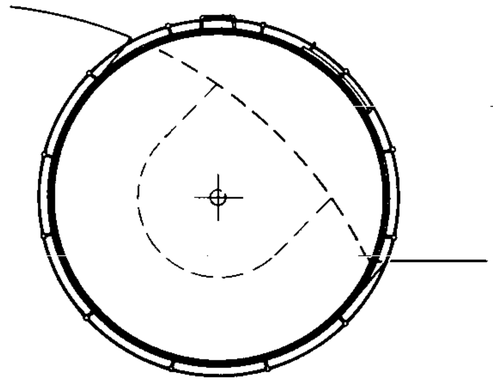
F5/3



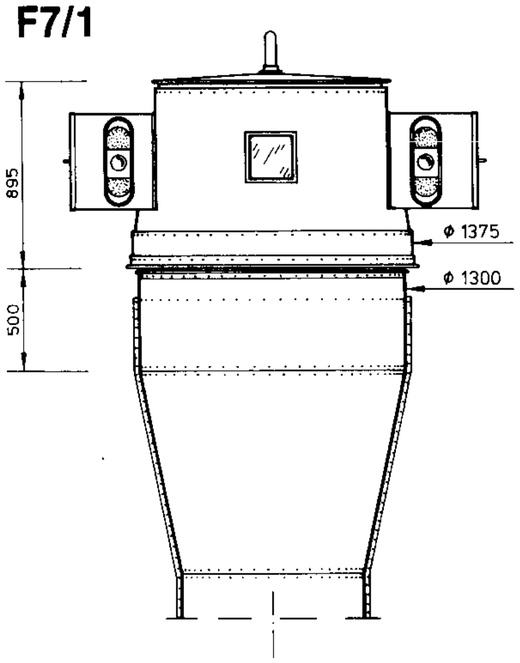
F6/1



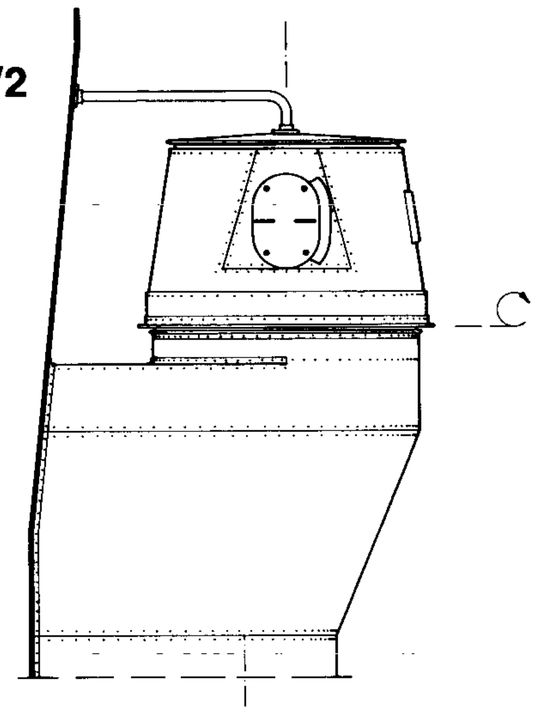
F6/2



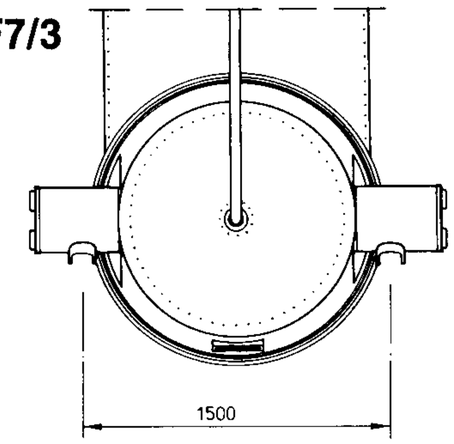
F7/1



F7/2



F7/3



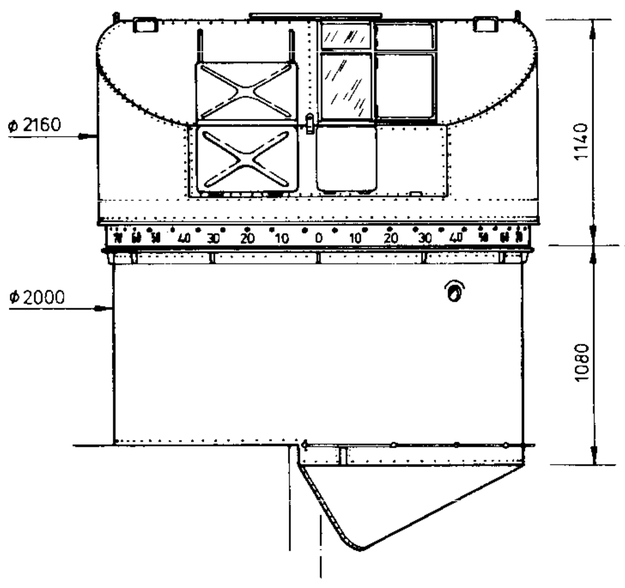
F7 **1.5m NAVIGATION RANGEFINDER 14 'SHIKI' TYPE (1/50 scale)**

F7/1 **Front elevation**

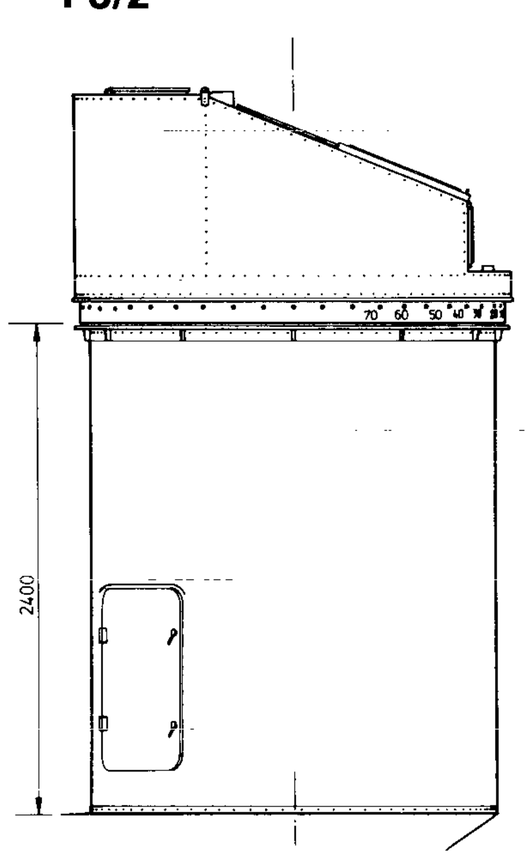
F7/2 **Profile**

F7/3 **Plan**

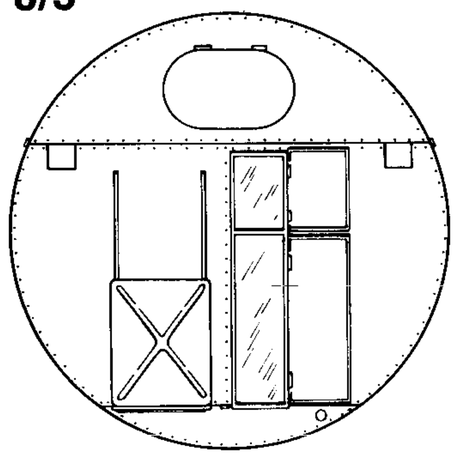
F8/1



F8/2



F8/3



F8 **TYPE 95 MACHINE-GUN CONTROL TOWER (fitted on compass bridge and both sides of funnel; 1/50 scale)**

Note: White azimuth scale

F8/1 **Front elevation with base of compass bridge**

F8/2 **Profile view with base of funnel platform**

F8/3 **Plan**

F Fire control

F9 SEARCHLIGHT CONTROL TOWER FITTED AT SIDES OF COMPASS BRIDGE (note roller shutter as on triple 25mm enclosed mount; 1/50 scale)

F9/1 Front elevation

F9/2 Profile

F9/3 Plan

F9/4 Rear elevation

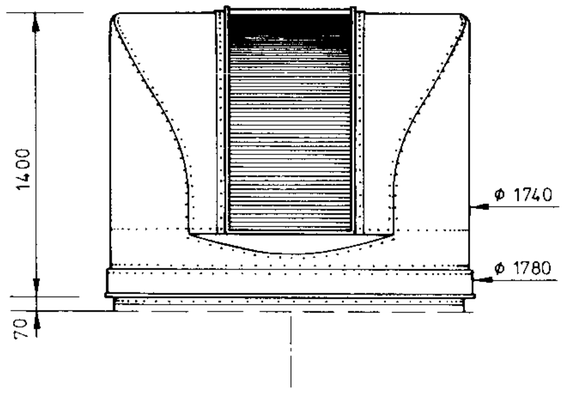
F10 SEARCHLIGHT CONTROL TOWER FITTED ON REAR PART OF TOWER BRIDGE (1/50 scale)

F10/1 Front elevation

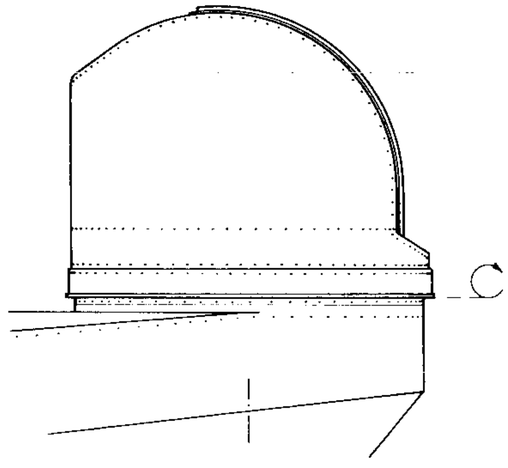
F10/2 Profile

F10/3 Plan

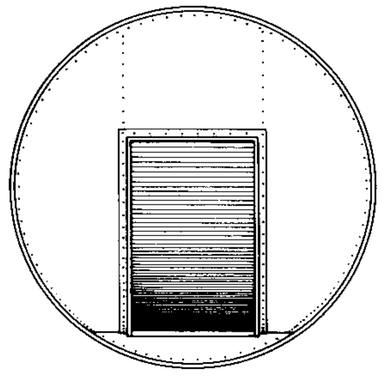
F9/1



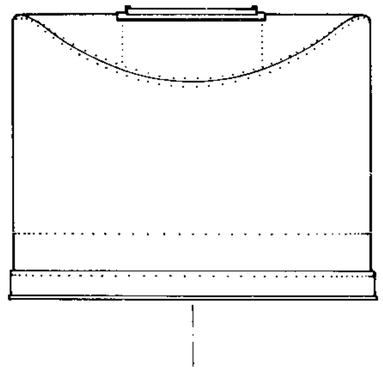
F9/2



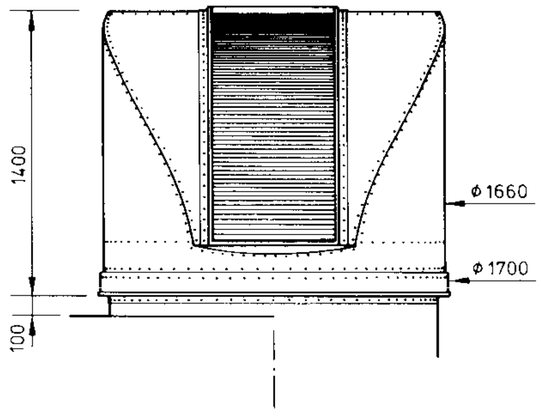
F9/3



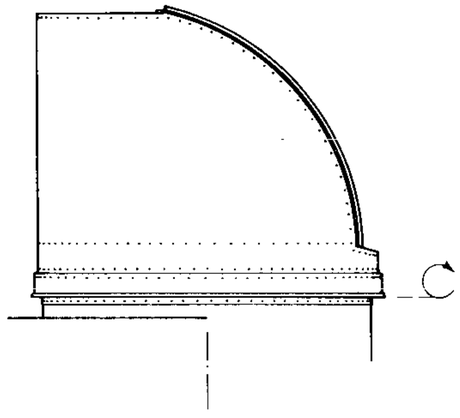
F9/4



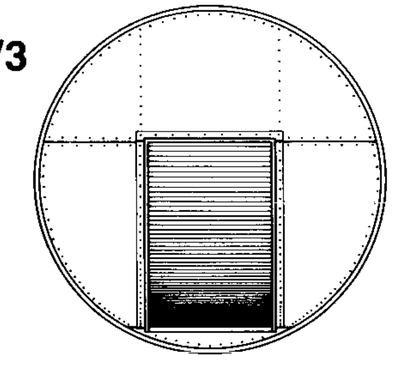
F10/1



F10/2



F10/3



F11 MACHINE-GUN CONTROL TOWER FITTED AFTER REFIT 1944 AND 1945 (1/50 scale)

F11/1 Front elevation with base of frame 215 (140)

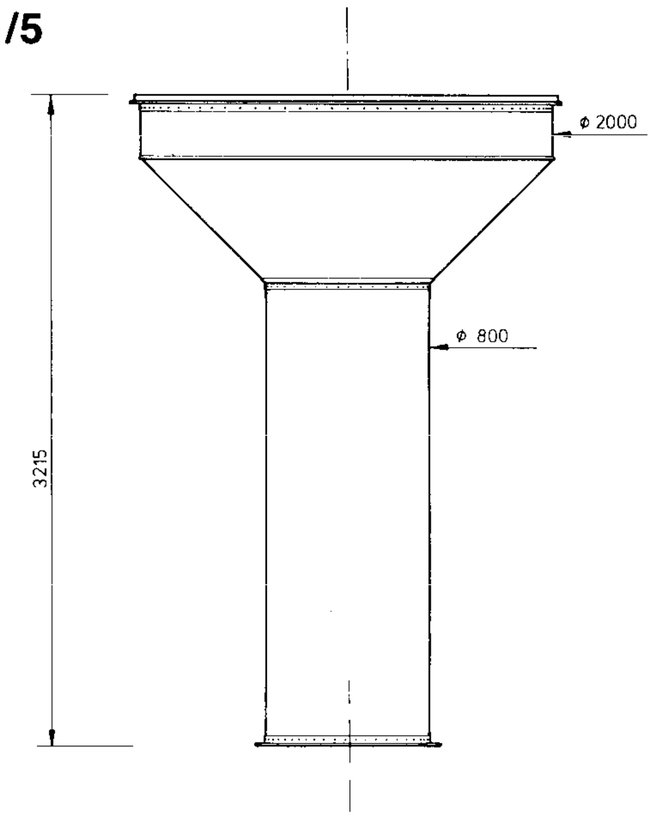
F11/2 Profile — with base of frame 215

F11/3 Plan

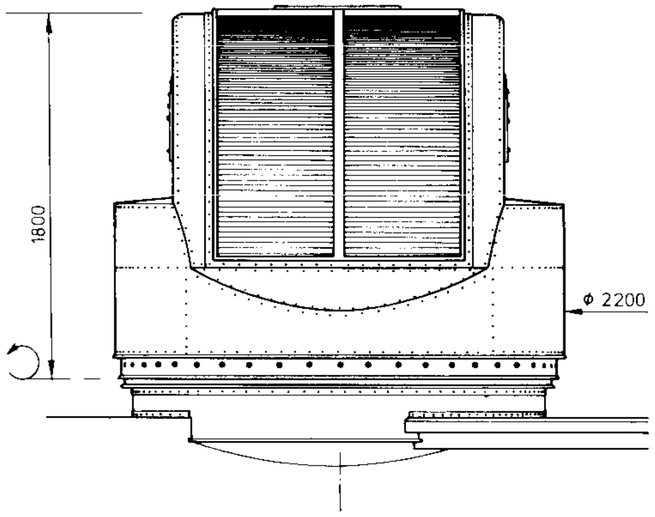
F11/4 Rear view — with base of frames 131 and 135

F11/5 Base of frame 155

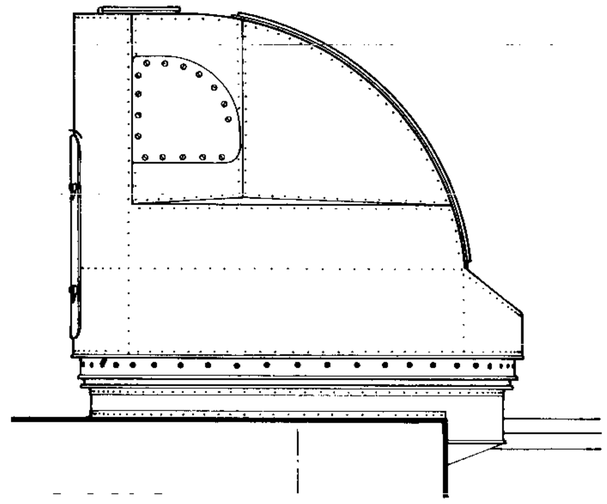
F11/5



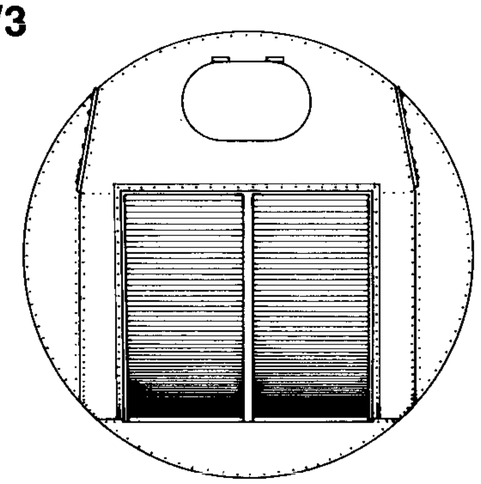
F11/1



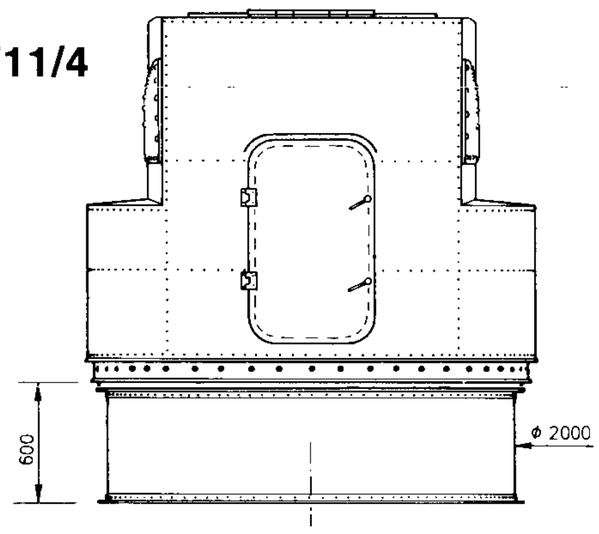
F11/2



F11/3



F11/4



F Fire control

F12 TYPE 94 RANGEFINDER FROM ENCLOSED TOWERS (1/37.5 scale)

F12/1 Front view

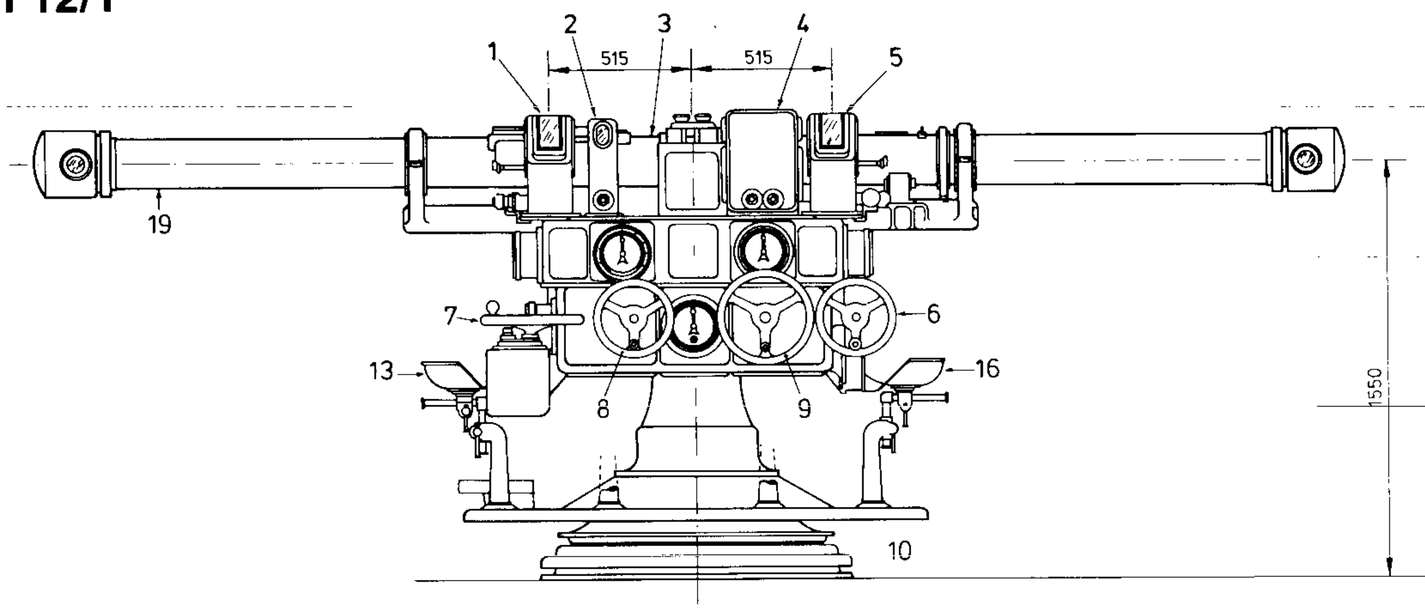
F12/2 Plan

1 Training telescope
2 Vertical inclination telescope
3 4.5m anti-aircraft rangefinder
4 Lateral inclination telescope
5 Elevation telescope
6 Elevation handle
7 Training handwheel
8 Vertical inclination handwheel
9 Lateral inclination handwheel
10 Vibration damper
11 Rangefinder observer
12 Range transmitter
13 Training pointer
14 Vertical inclination pointer
15 Lateral inclination pointer
16 Elevation pointer
17 Spotter

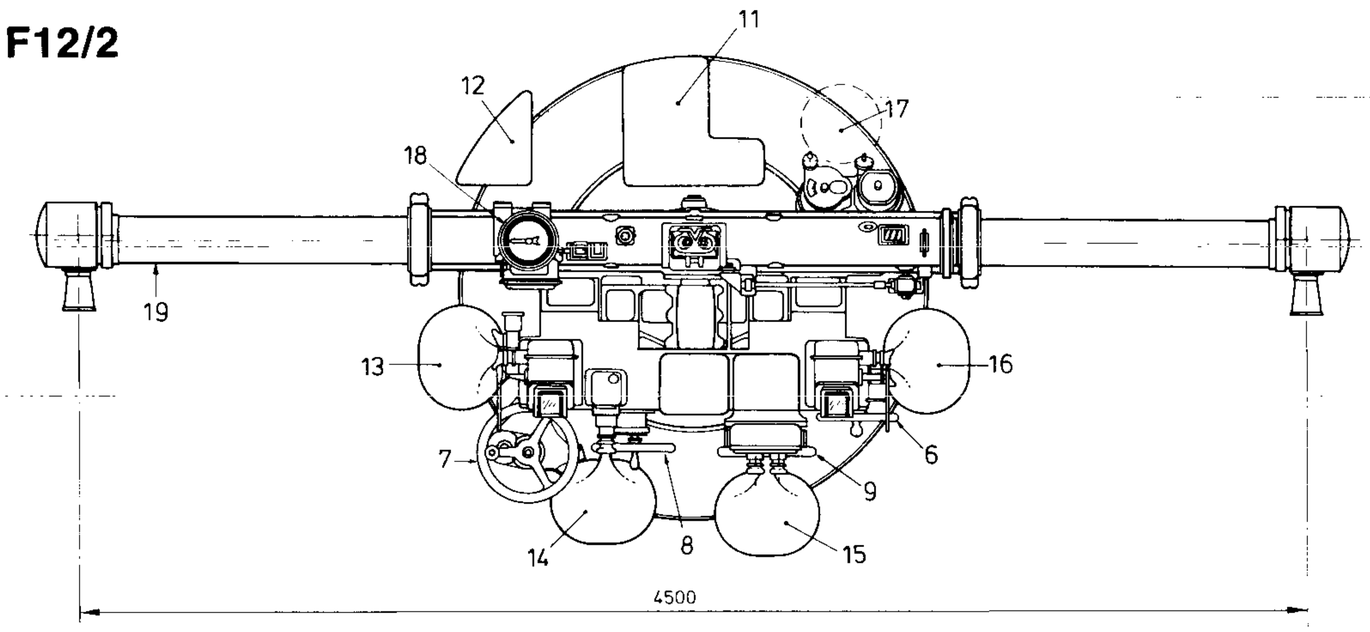
F12/3 Type 94 computer (similar to Type 98 fitted on *Yamato*) plan of controls and pointers

1 Future range dial
2 Range correction
3 Illumination switch
4 Inherent speed correction
5 Parallax correction
6 Vertical deflection balancing wheel
7 Vertical angle dial
8 Training angle dial
9 Lateral deflection balancing wheel
10 Compass repeater
11 Projector lamp
12 Projector lamp switch
13 Co-ordinates converter projector
14 Fuze reader
15 Fuze correction
16 Level target correction
17 Fuze dial
18 Range drum
19 Range change rate dial
20 Auxiliary switch for range mark
21 Range change rate chart

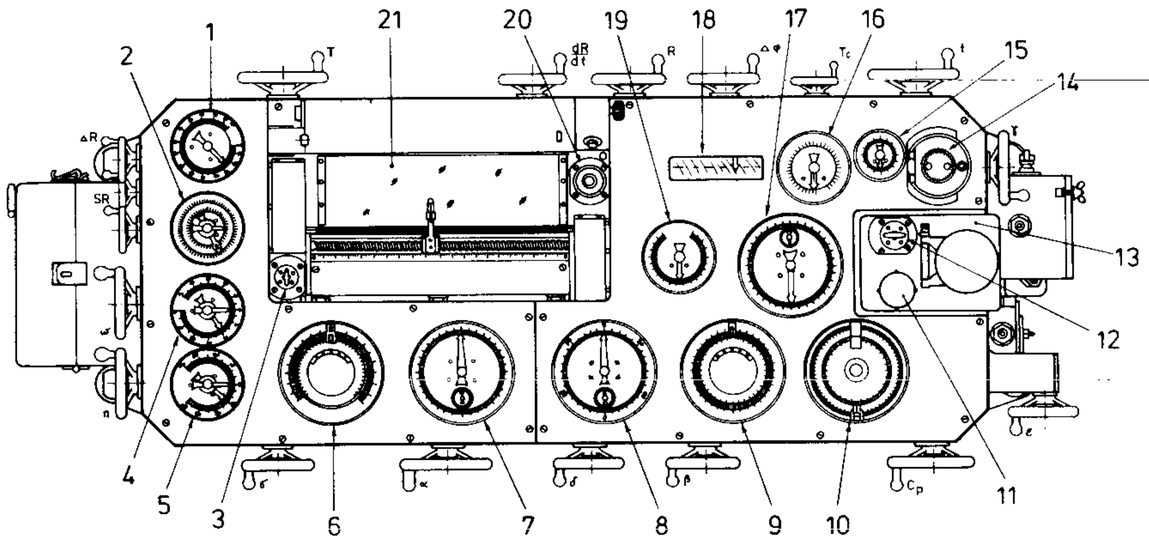
F12/1



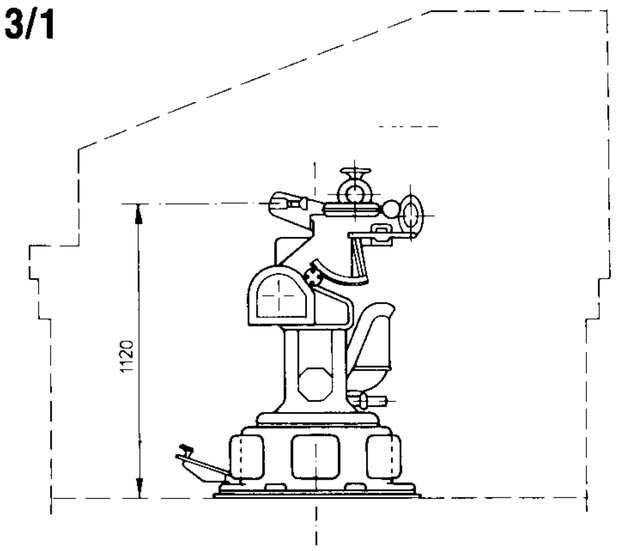
F12/2



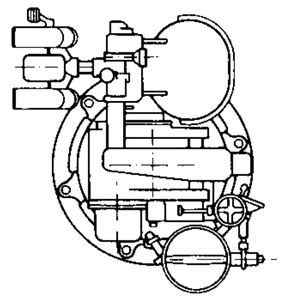
F12/3



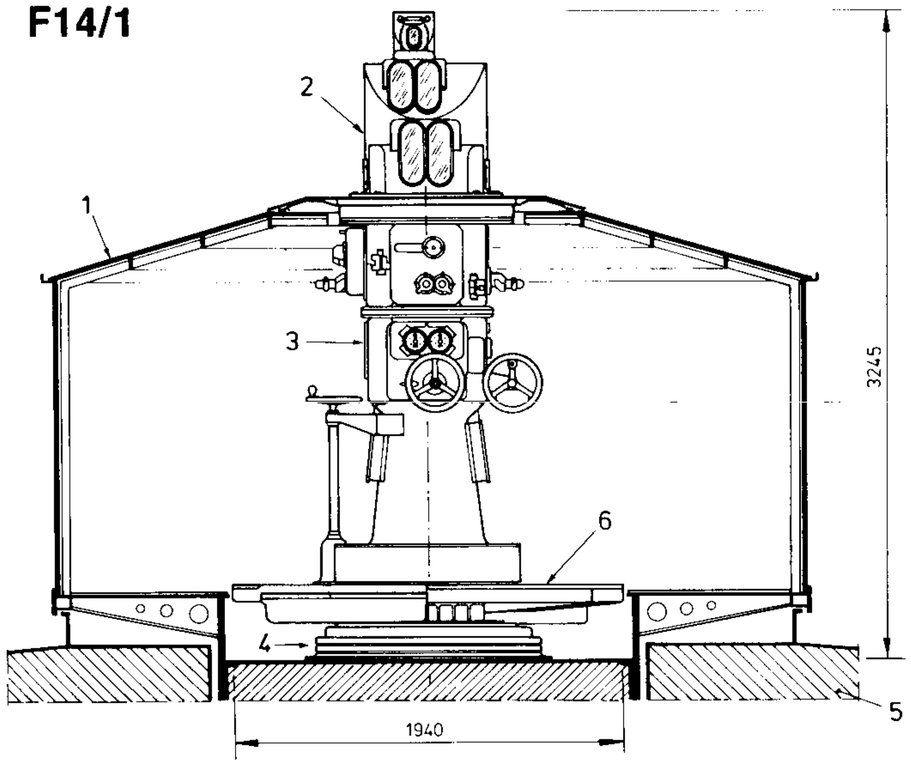
F13/1



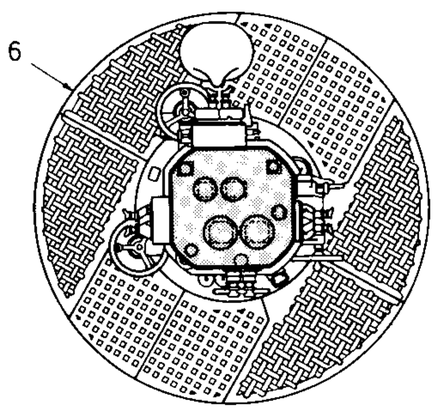
F13/2



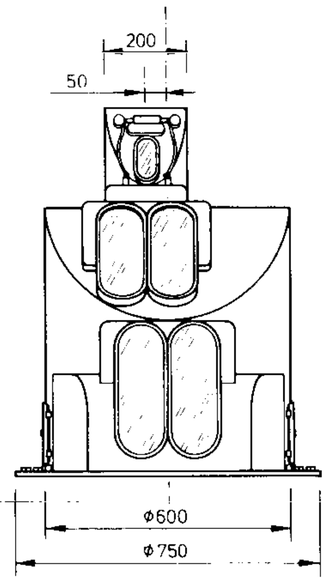
F14/1



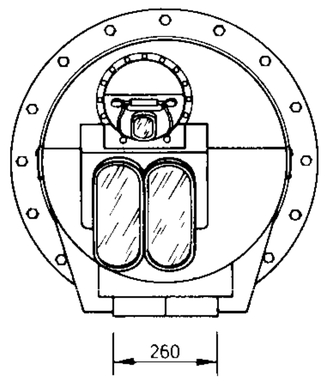
F14/2



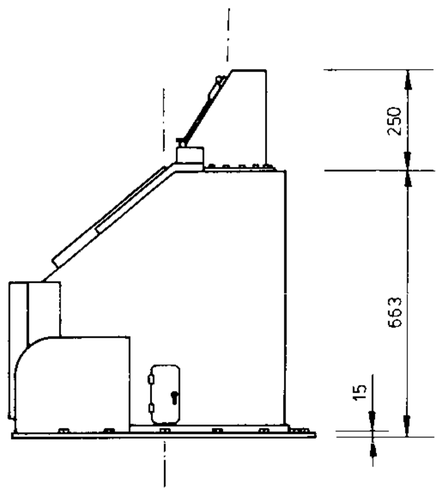
F15/1



F15/2



F15/3



F13 MACHINE GUN CONTROL POSITION (no scale)

F13/1 Profile

F13/2 Plan

F14 TYPE 98 LOW ANGLE DIRECTOR 'HOIBAN' ATOP THE MAIN 15m AND 10m RANGEFINDERS (1/50 scale)

F14/1 Section view of enclosed tower

F14/2 Plan of director

1 Non-rotating closed tower
2 Rotating periscope tower
3 Director
4 Vibration damper
5 Rotating body of rangefinder
6 Rotating platform

F15 PERISCOPE TOWER OF TYPE 98 LOW ANGLE DIRECTOR (1/25 scale)

F15/1 Front elevation

F15/2 Plan

F15/3 Profile

F Fire control

F16 21 'GÔ DENTAN KAI 3' AIR SEARCH RADAR MATTRESS TYPE ANTENNA

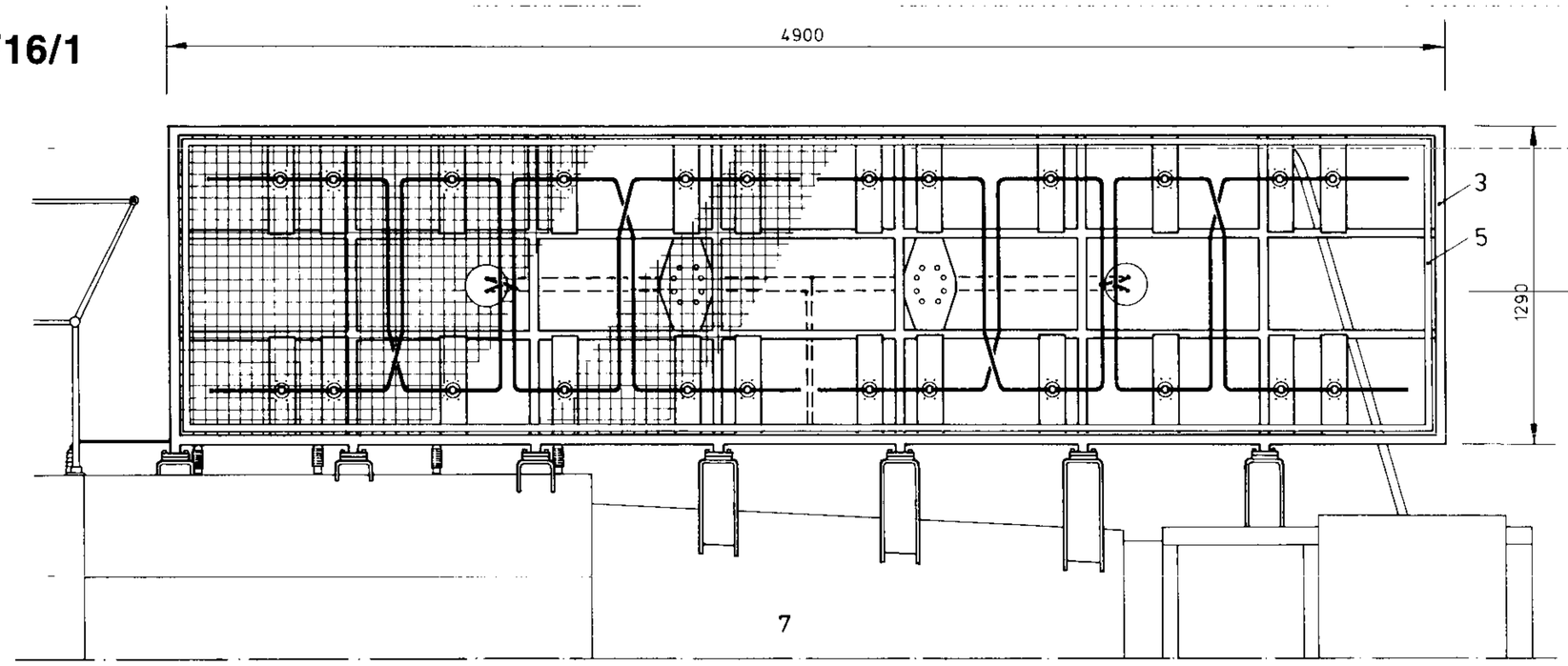
Note: Fitted on *Yamato*'s 15m rangefinder, September 1943. The antenna consisted of combined transmitting and receiving arrays of 10mm diameter copper bars

F16/1 Front elevation (1/37.5 scale)

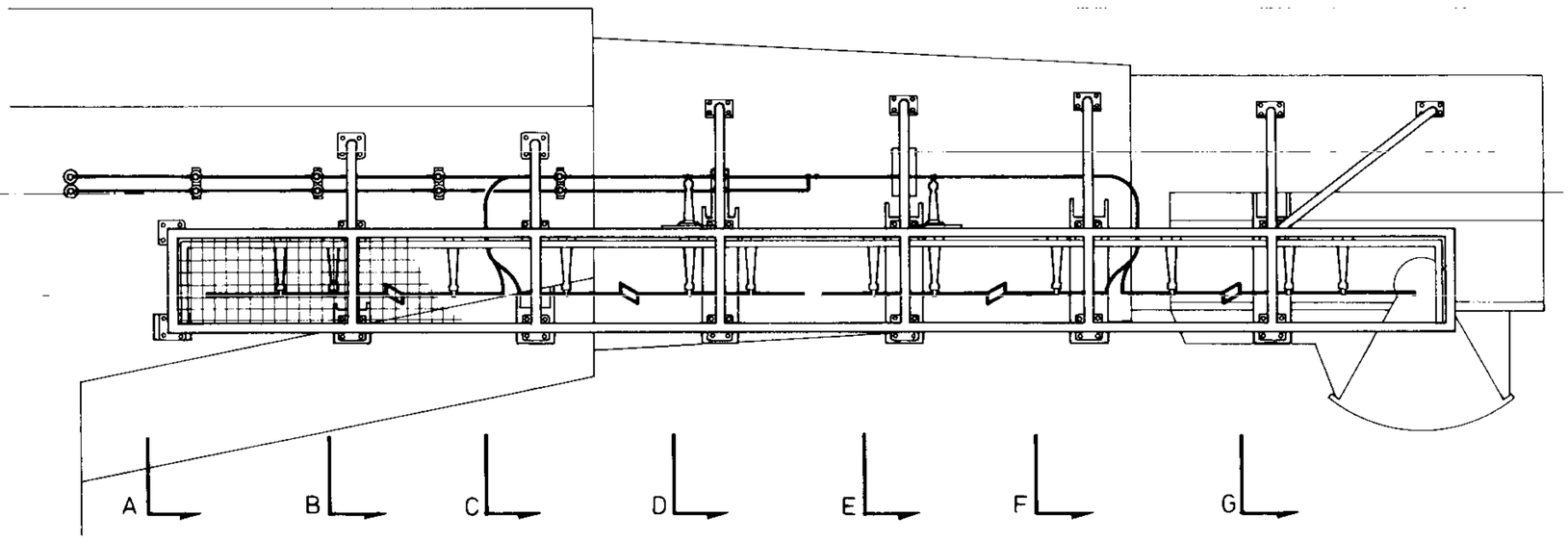
F16/2 Plan (1/37.5 scale)

F16/3 Rear elevation (1/37.5 scale)

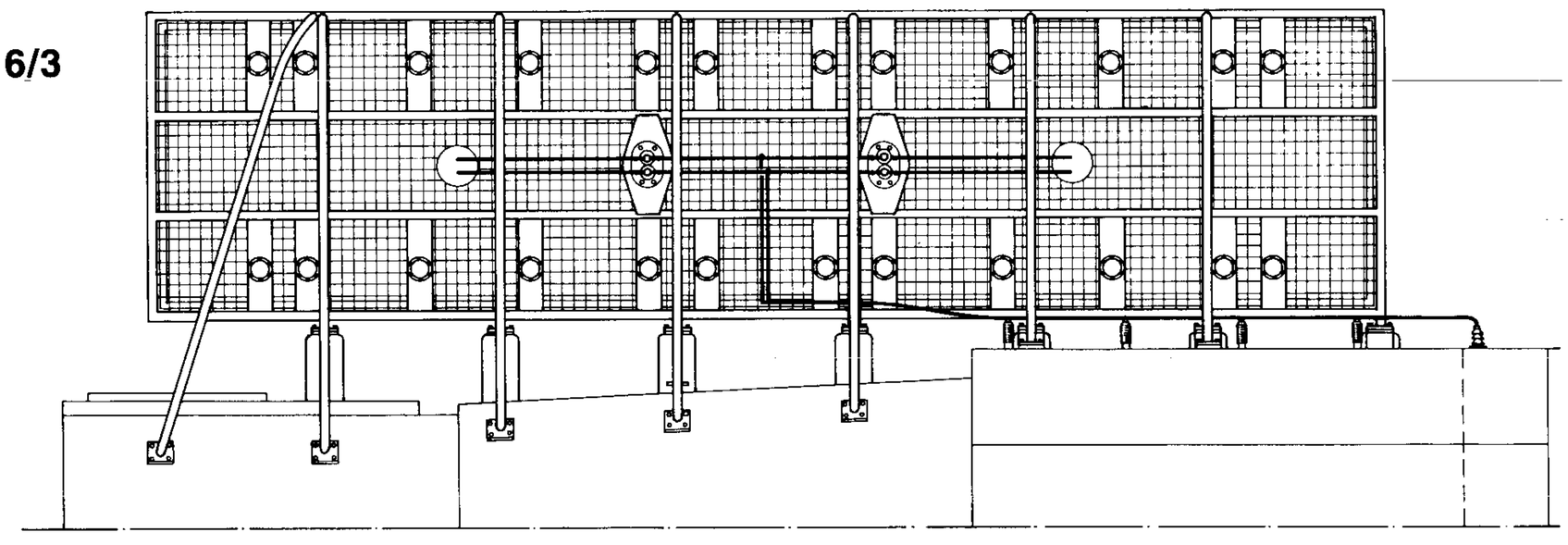
F16/1



F16/2

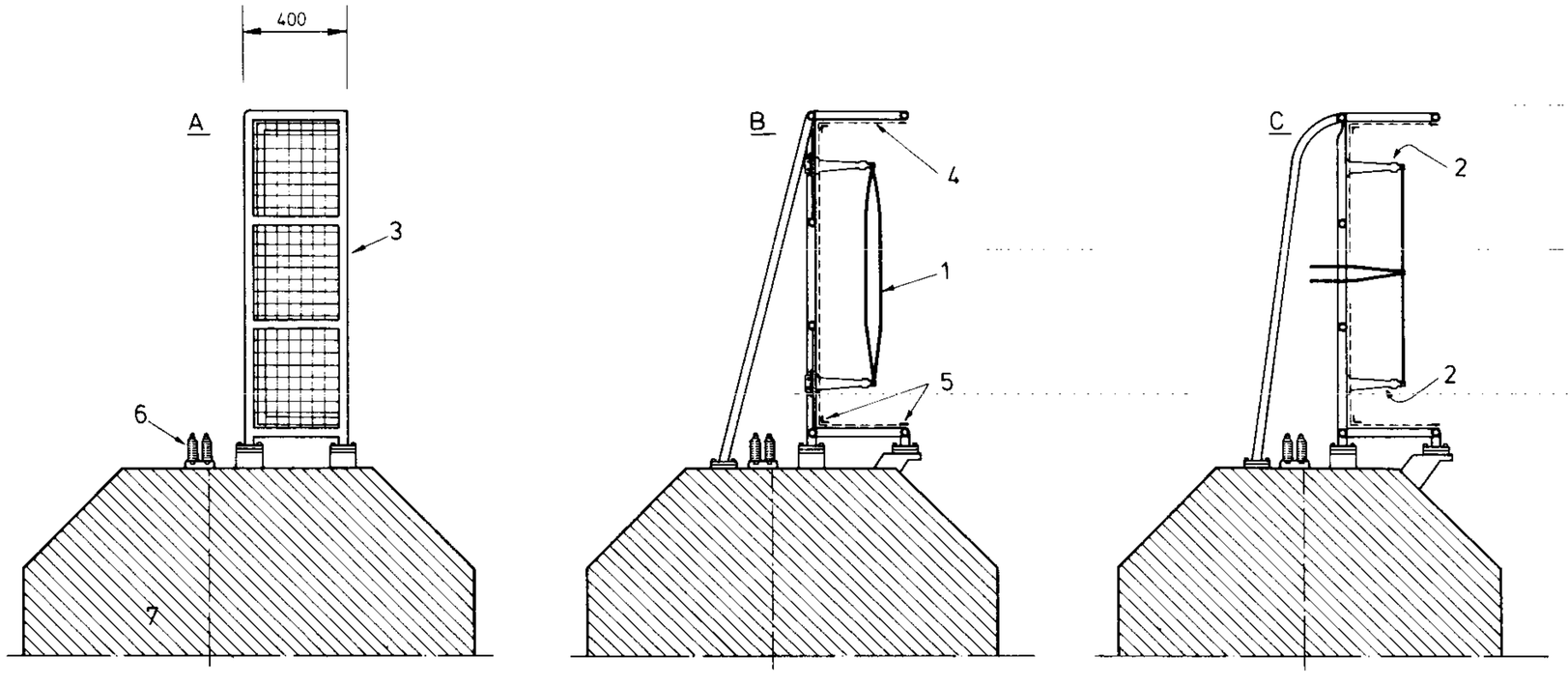


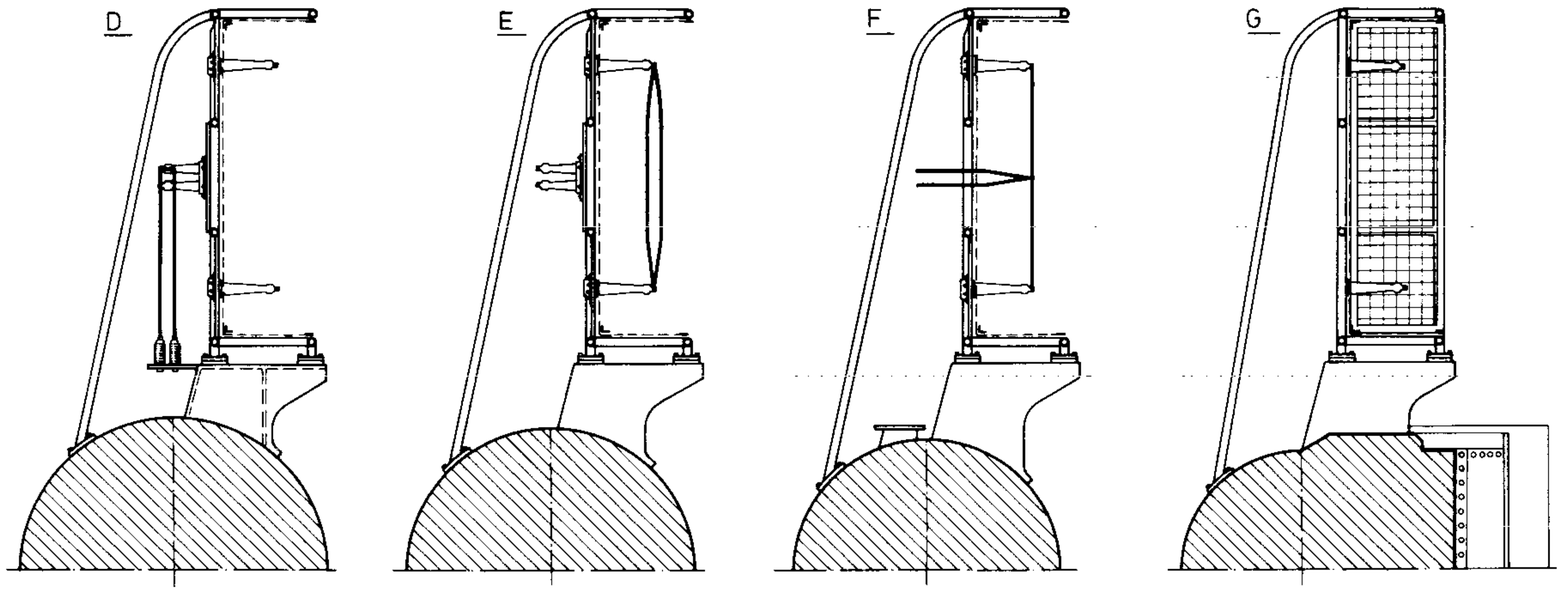
F16/3



F16/4 Cross-sections (1/37.5 scale)

1 Array
2 Insulators (black colour)
3 Antenna frame (40mm diameter pipe)
4 Wire screen grid
5 Internal supporting frame for wire screen grid
6 Insulators (fitted on rangefinder body) of white porcelain
7 15m rangefinder





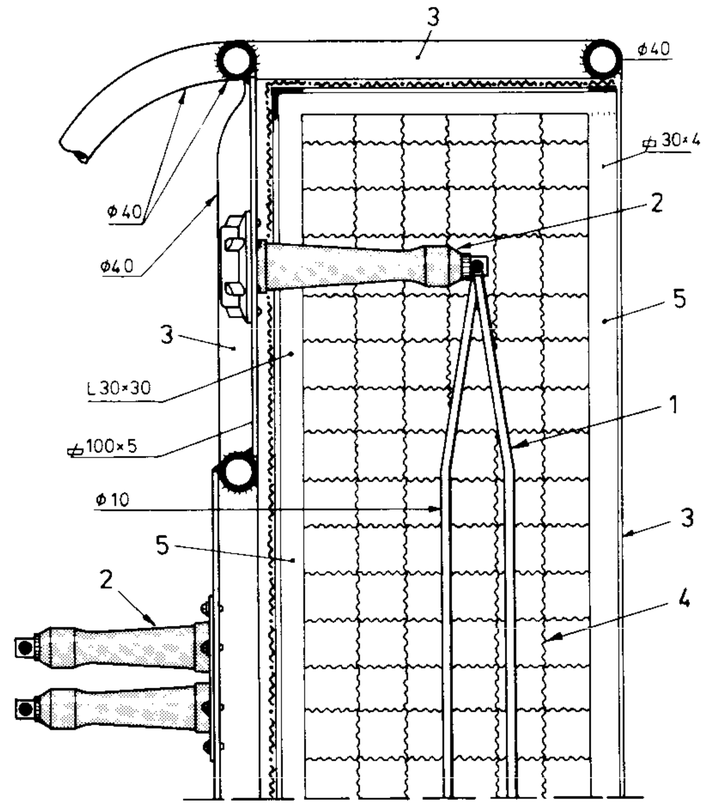
F Fire control

F16/5 Section in detail (1/10 scale)

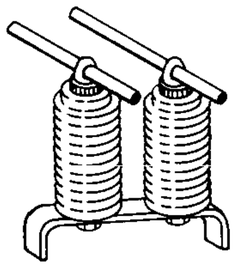
F16/6 Insulators fixed on rangefinder body (no scale)

F16/7 Detail of wire screen grid (no scale)

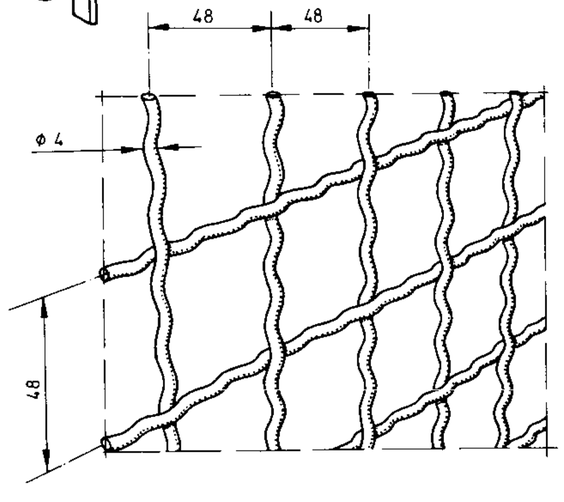
F16/5



F16/6



F16/7

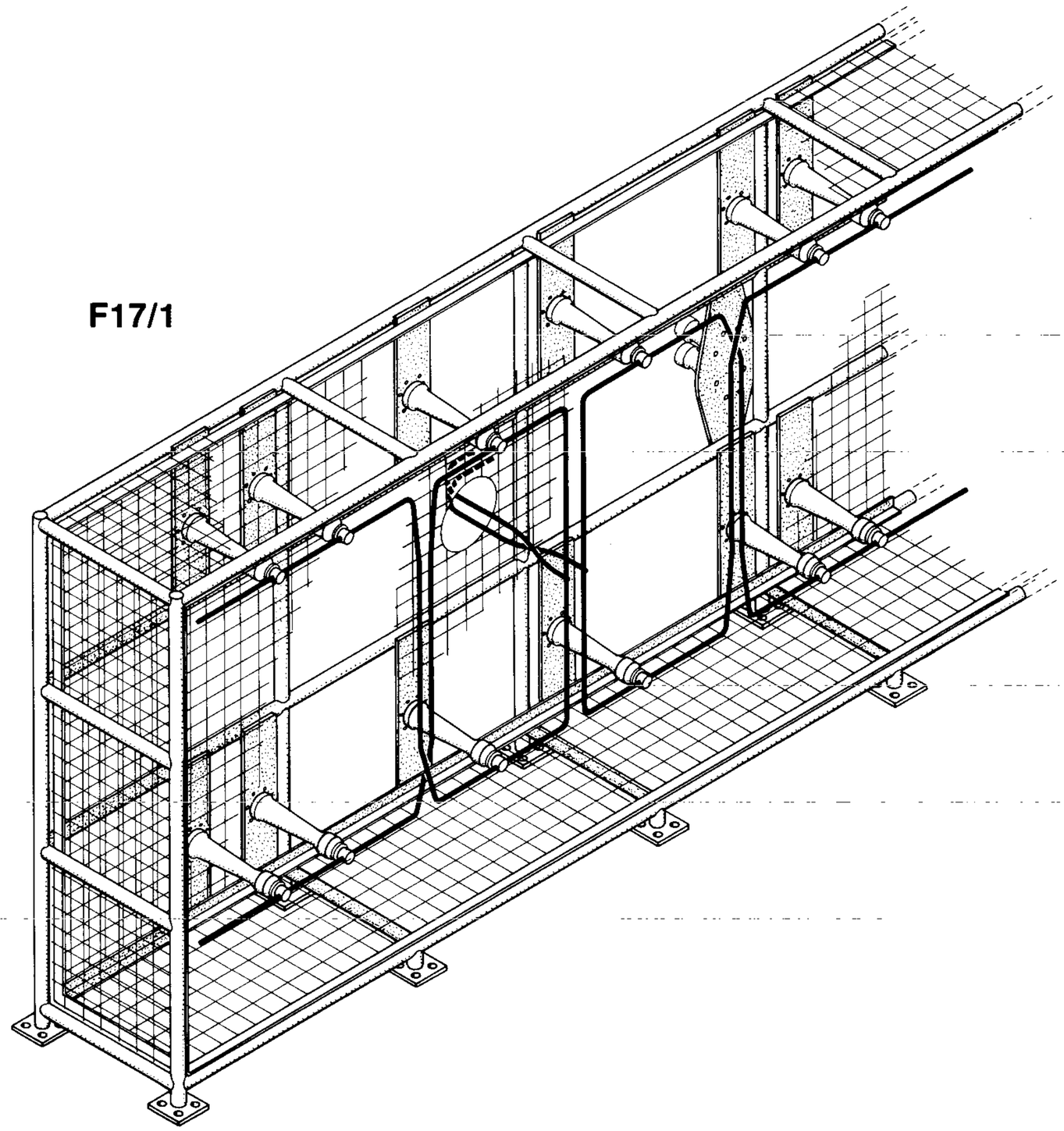


F17 **TYPE 21 'GÔ' RADAR ANTENNA (no scale)**

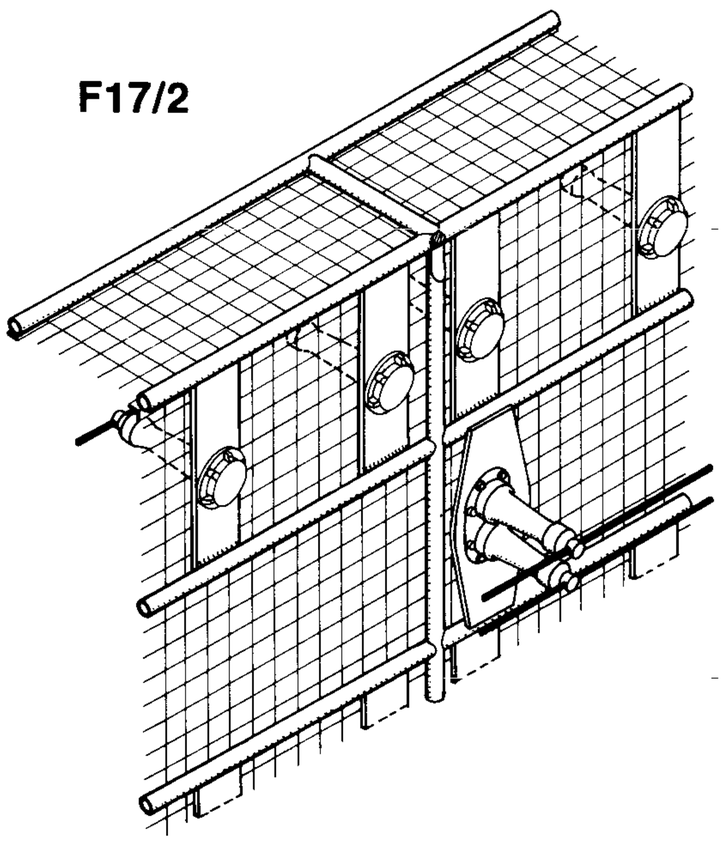
F17/1 **Front view**

F17/2 **Rear view**

F17/1



F17/2



F Fire control

F18 13 'GÔ' TYPE AIR SEARCH RADAR ANTENNA ('3 SHIKI 1 GÔ 3 GATA DENTAN') INSTALLED ON BOTH SIDES OF MAIN MAST DURING JANUARY-APRIL 1944 REFIT (1/37.5 scale)

F18/1 Front elevation

F18/2 Profile

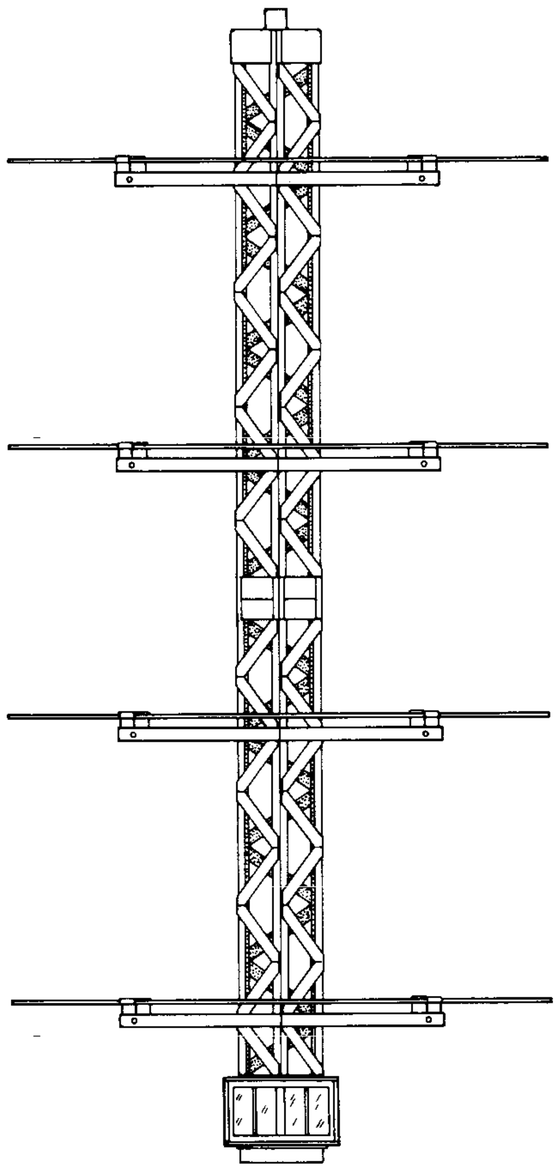
F18/3 Rear elevation

F18/4 Plan

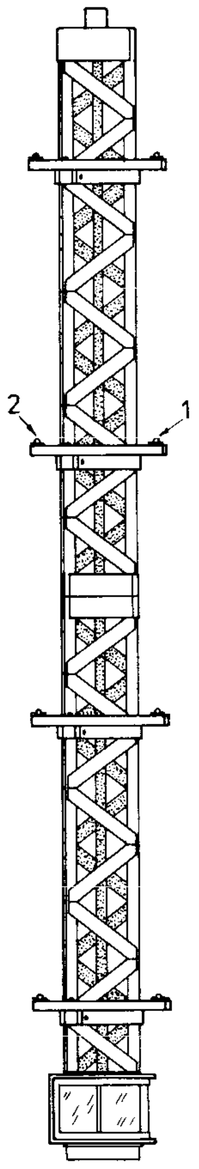
F18/5 Section of pillar (1/18.75 scale)

1 Receiving array (10mm diameter pipe)
2 Transmitting array (10mm diameter pipe)

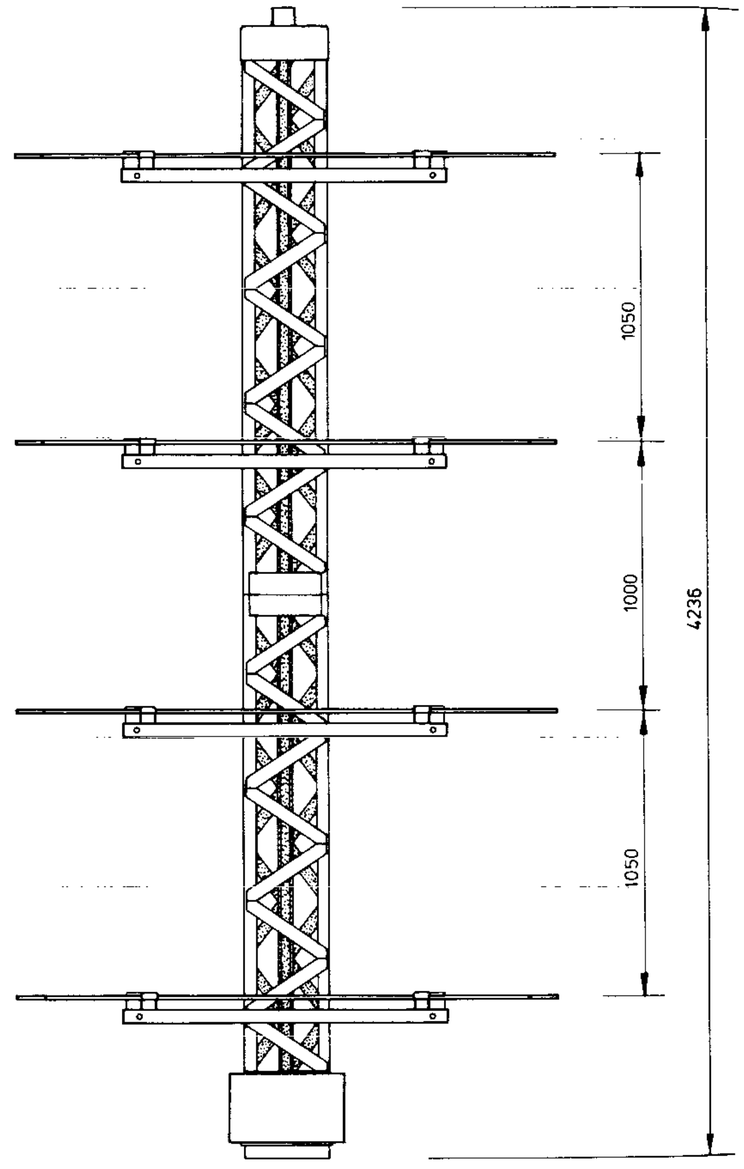
F18/1



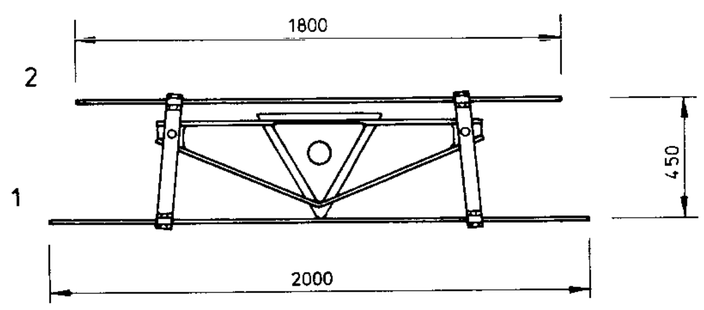
F18/2



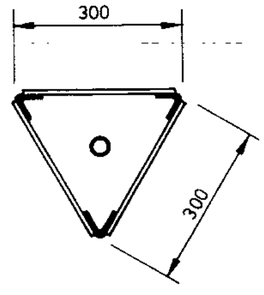
F18/3



F18/4



F18/5



F19 THE '22 GÔ DENTAN KAI 4' SURFACE SEARCH RADAR HORNS ANTENNA, FITTED JANUARY-APRIL 1944 (1/37.5 scale)

F19/1 Profile (starboard)

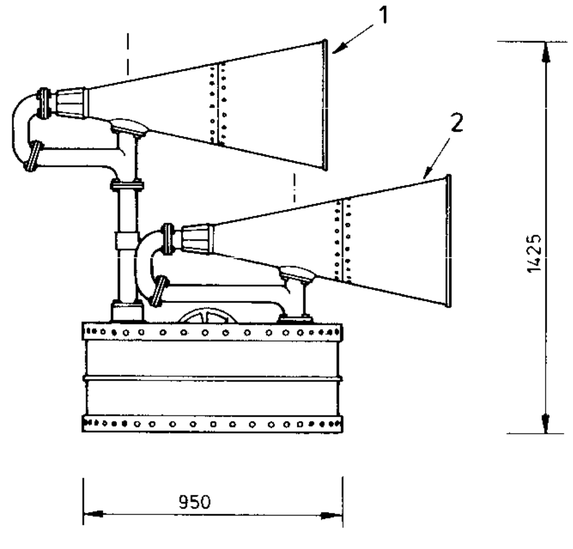
F19/2 Front elevation (starboard)

F19/3 Plan (starboard)

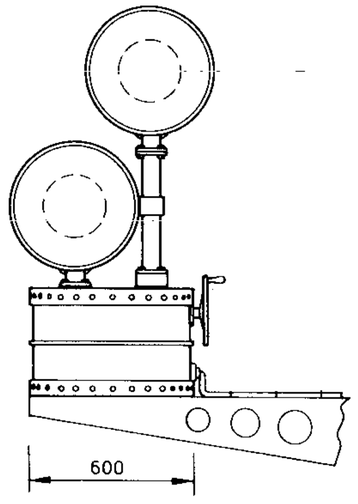
F19/4 Plan (port)

1 Receiving horn (upper)
2 Transmitting horn (lower)

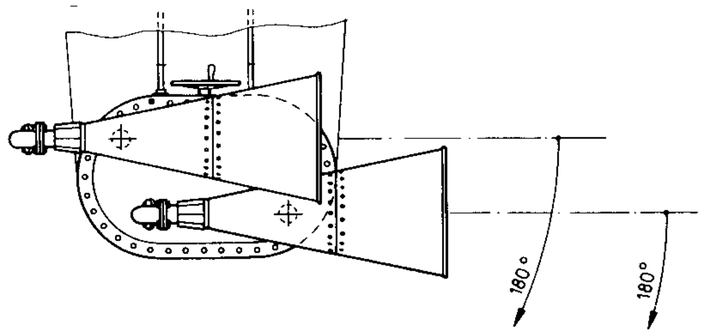
F19/1



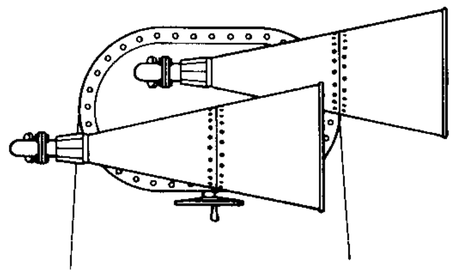
F19/2



F19/3



F19/4



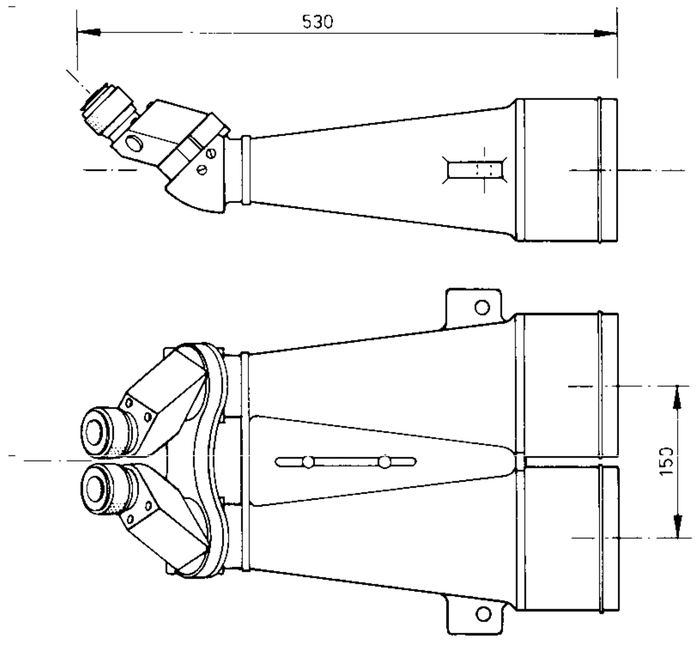
F Fire control

F20 BINOCULARS (1/10 scale)

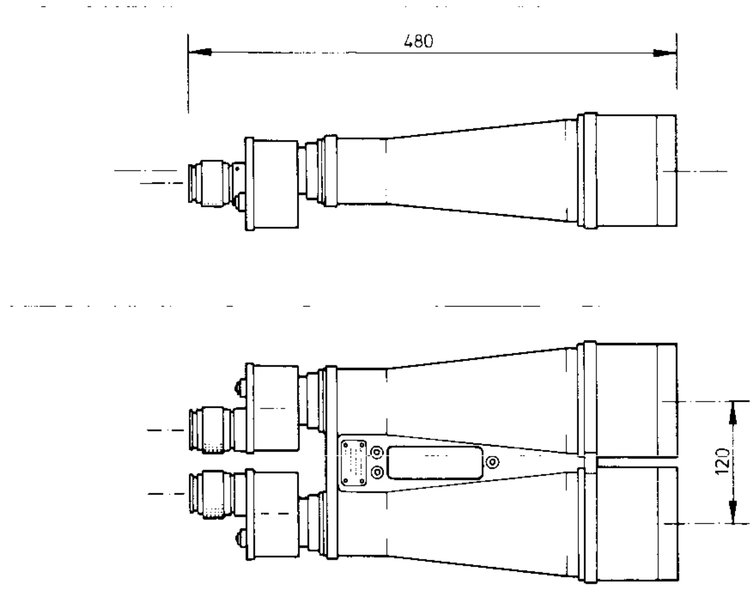
F20/1 12cm binoculars

F20/2 9cm binoculars

F20/1



F20/2

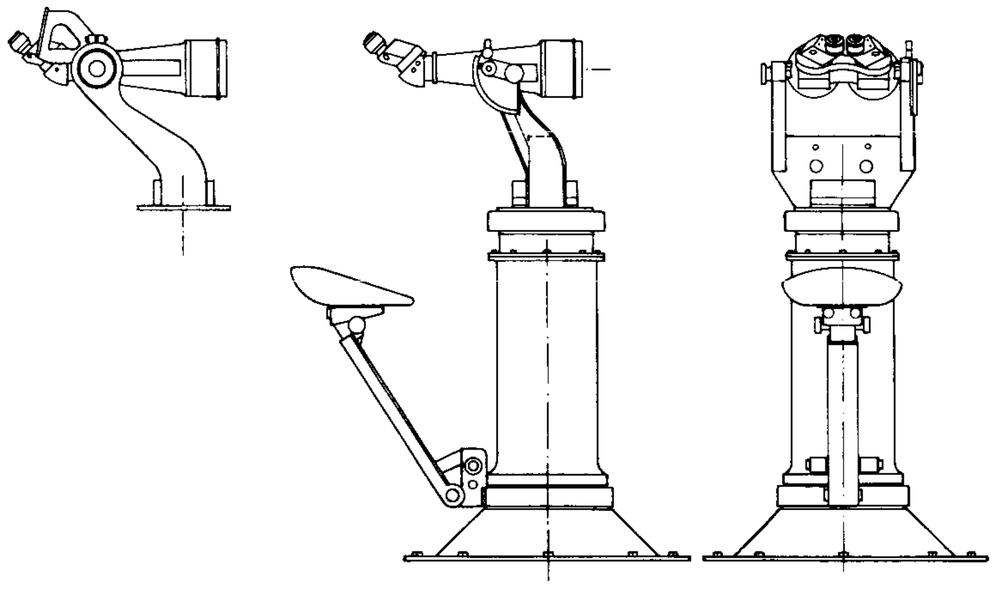


F21 BINOCULAR MOUNTS (1/25 scale)

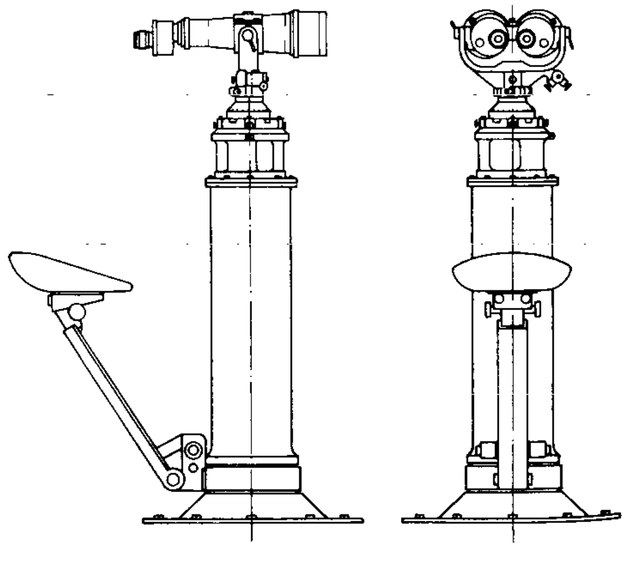
F21/1 12cm

F21/2 9cm

F21/1



F21/2



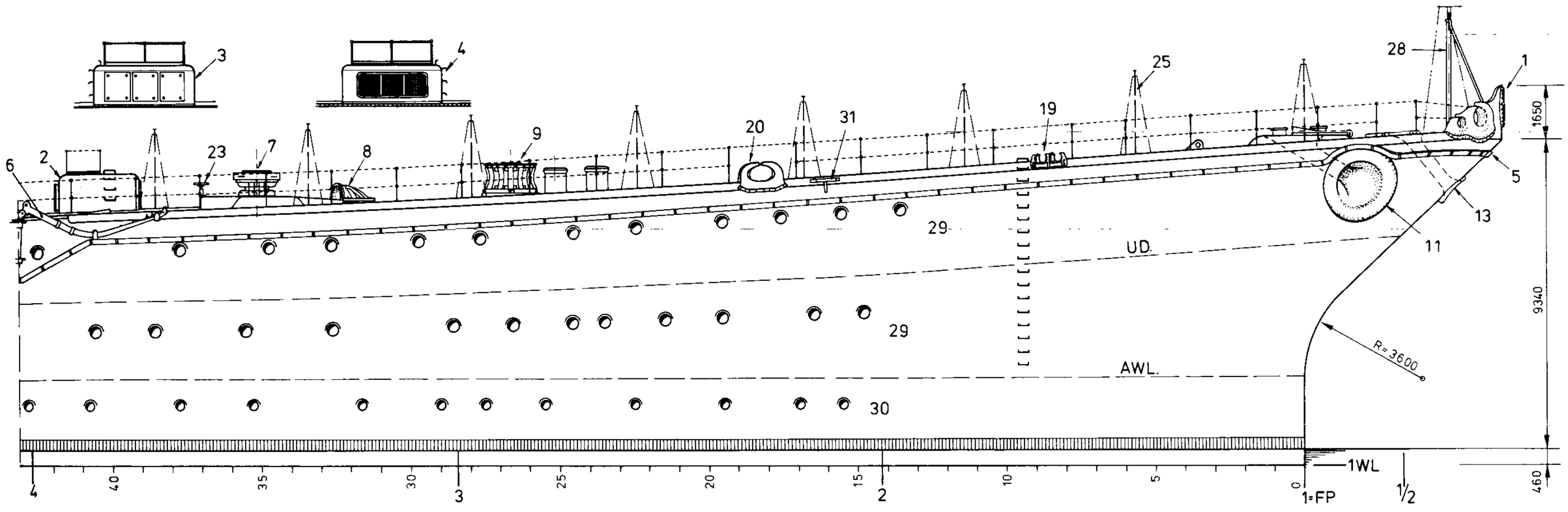
G Ground tackle

G1 FORECASTLE (1/200 scale)

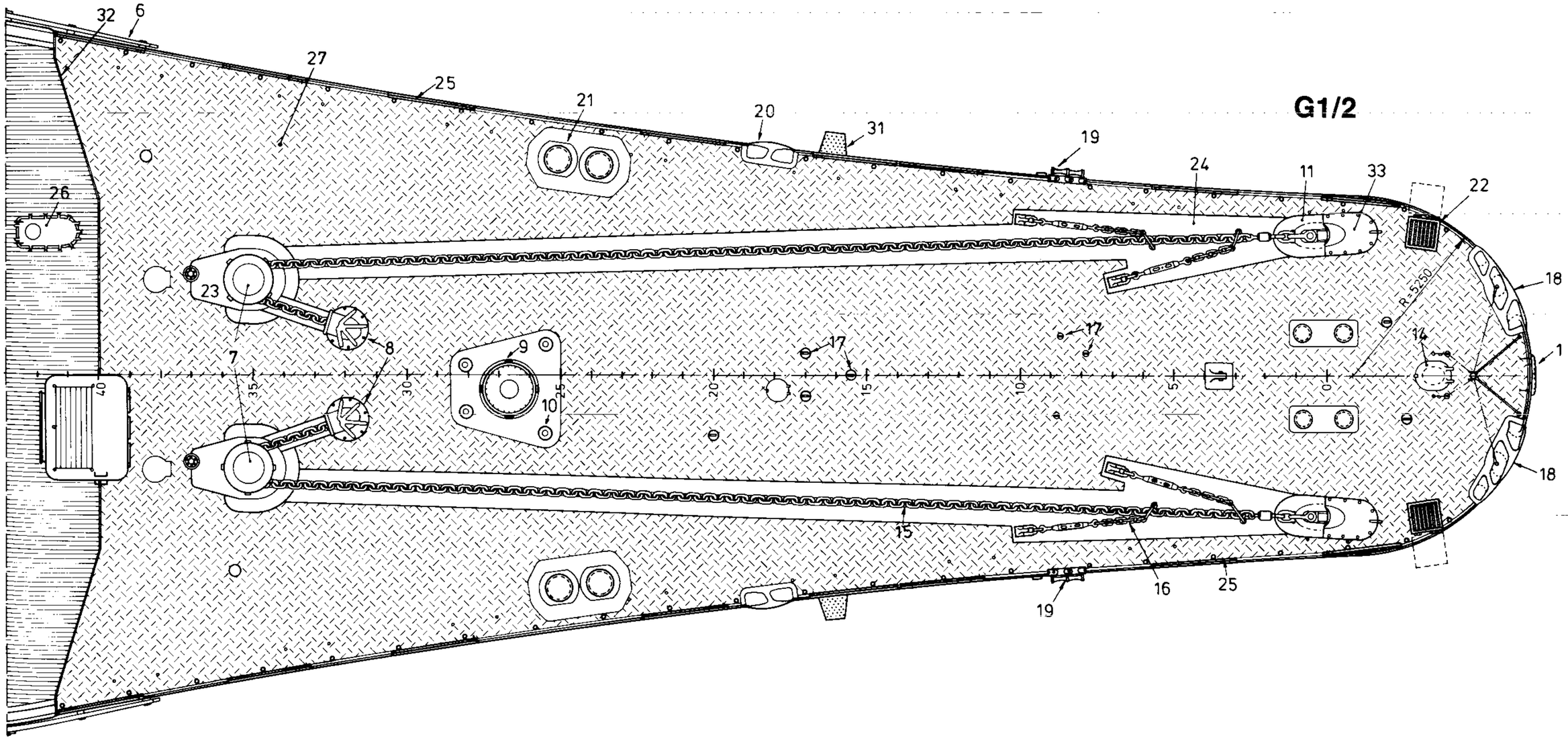
G1/1 Side view — starboard

G1/2 Plan

G1/1



G1/2



G Ground tackle

G1/3 Front view

1 Gold Chrysanthemum crest
2 Ventilator with small wood deck platform
3 Front view of ventilator
4 Rear view of ventilator
5 Degaussing cable (armoured)
6 Davit
7 Cable holder
8 Navel pipe
9 Capstan
10 Position of rollers
11 Hawse pipe
12 15 ton main anchor
13 Bow pipe
14 Cover of bow pipe
15 Anchor cable
16 Stopper
17 Eye plates
18 Towing fairlead
19 Paravane roller fairlead
20 Fairlead
21 Bollards
22 Leadsman's platform
23 Cable holder brake handle
24 Chaffing plate
25 Awning stanchion
26 Hatch
27 Chequer plates of deck
28 Jack staff
29 380mm diameter side scuttle
30 300mm diameter side scuttle
31 Sounding platform
32 100mm high breakwater
33 Hawse pipe cover

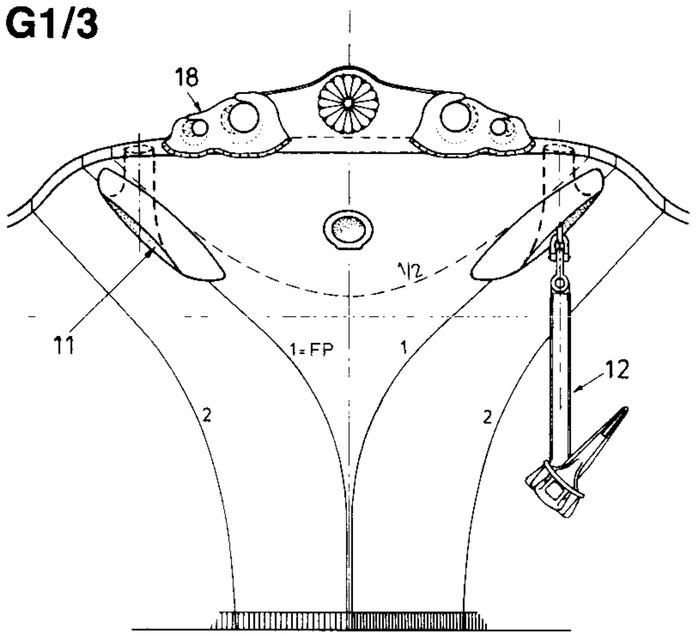
G2 CHRYSANTHEMUM CREST (1/37.5 scale)

G3 SCHEME OF PLATING (1/600 scale)

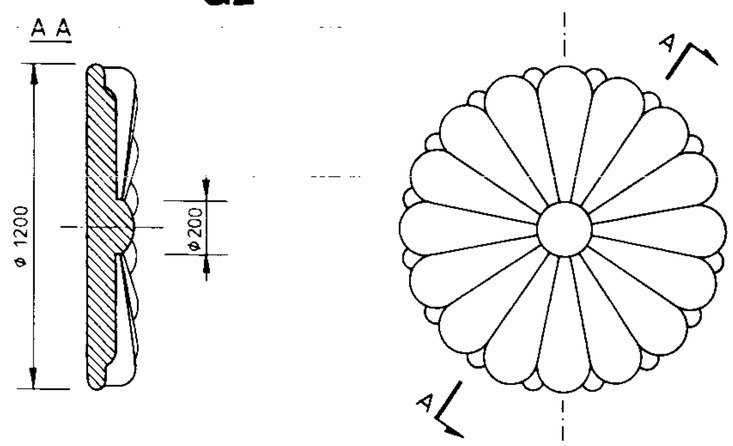
1 Chequer plates
2 Chaffing plate

G4 DETAIL OF CHEQUER PLATE (1/12.5 scale)

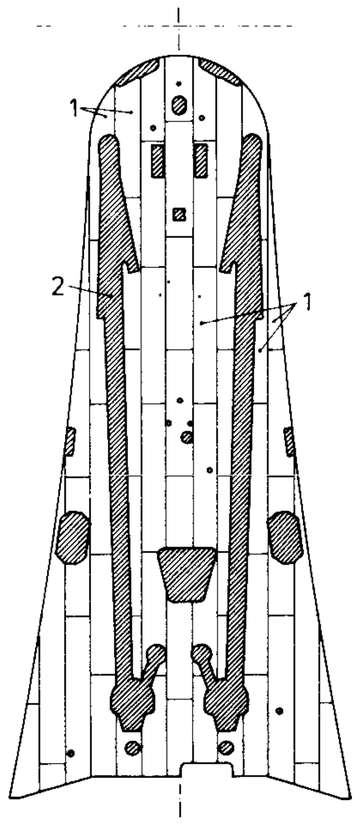
G1/3



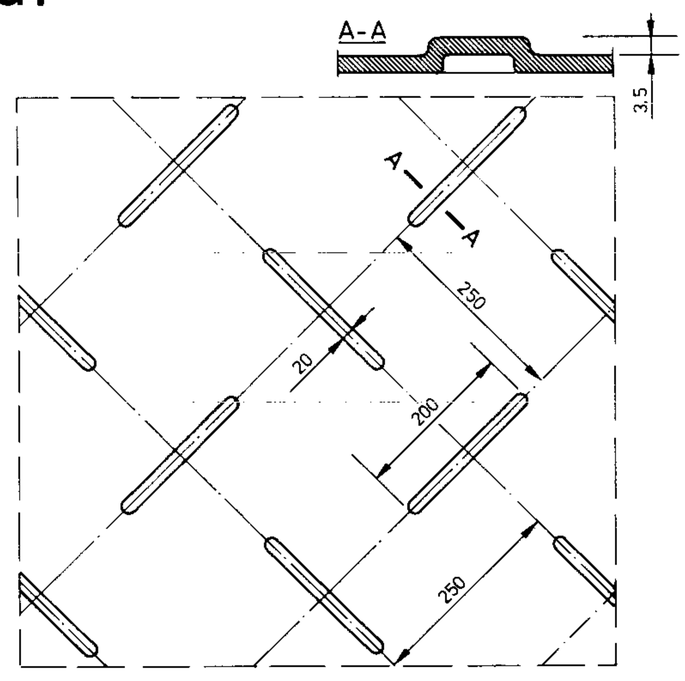
G2



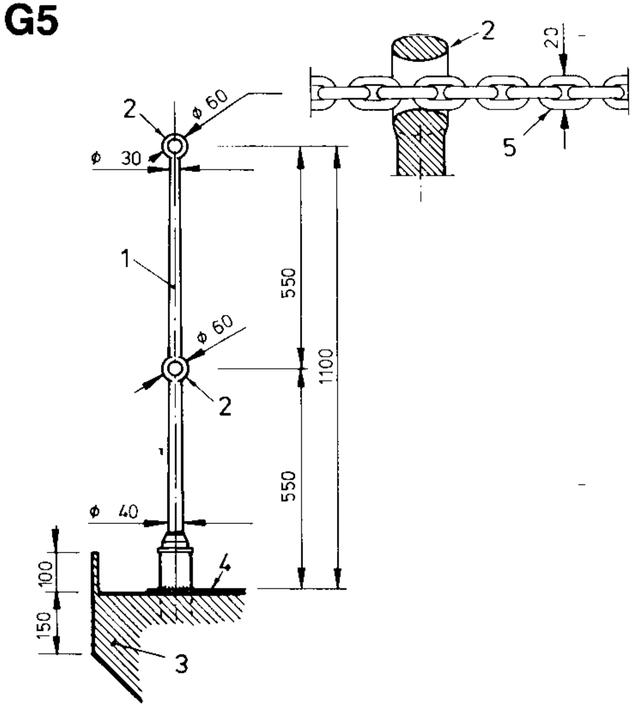
G3



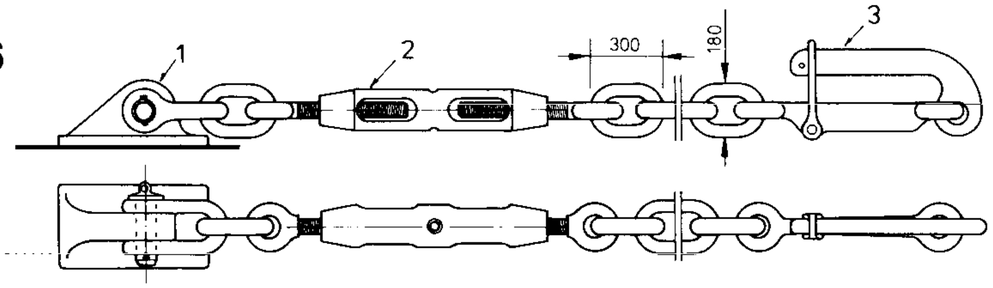
G4



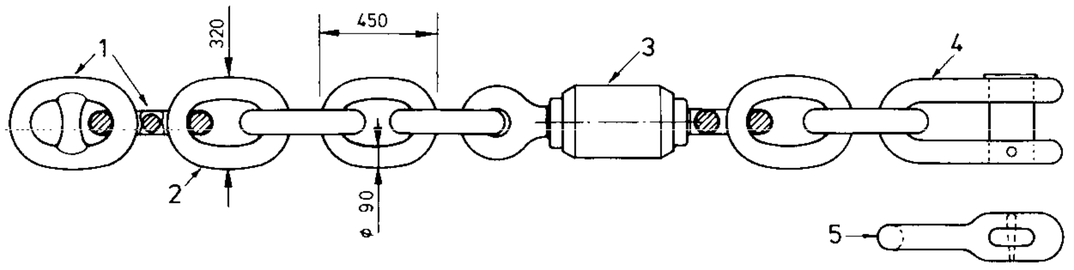
G5



G6



G7



G5 GUARD RAILS (1/25 scale)

1 Standard guard rail stanchion
2 Stanchion eye
3 Ship's hull
4 Chequer plates of deck
5 Guard rails of 20mm chain

G6 DECK STOPPER (two per anchor cable; 1/40 scale)

1 Stopper lug or eye plate
2 Bottle screw
3 Blake's slip

G7 ANCHOR CABLE (1/40 scale)

1 Enlarged stud link
2 Studless long link
3 Swivel
4 Lugged joining shackle
5 Lugged joining shackle — profile

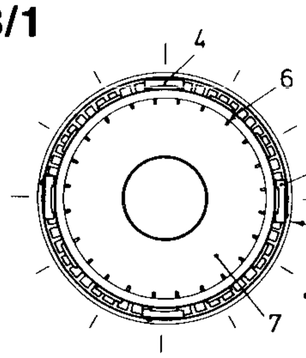
G8 FORECASTLE ELECTRIC CAPSTAN (1/75 scale)

G8/1 Plan

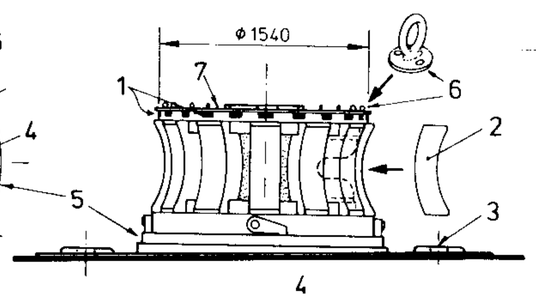
G8/2 Profile

1 Sockets for capstan bars
2 Portable whelp
3 Position of roller
4 Pawl
5 Pawl plate
6 Locating pin for capstan bars and portable whelp
7 Crown plate

G8/1



G8/2



G Ground tackle

G9 ELECTRIC CABLE HOLDER, PORT BOWER (1/75 scale)

G9/1 Profile view

G9/2 Plan

G9/3 Rear view

1 Centre plate
2 Hood plate
3 Sprocket and snugs
4 Cover over brake
5 Ramp to navel pipe
6 Anchor cable navel pipe
7 Brake handwheel

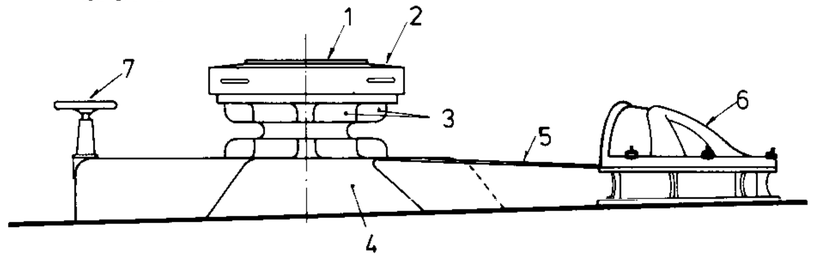
G10 ROLLER FAIRLEAD FOR PARAVANE (1/50 scale)

G10/1 Profile

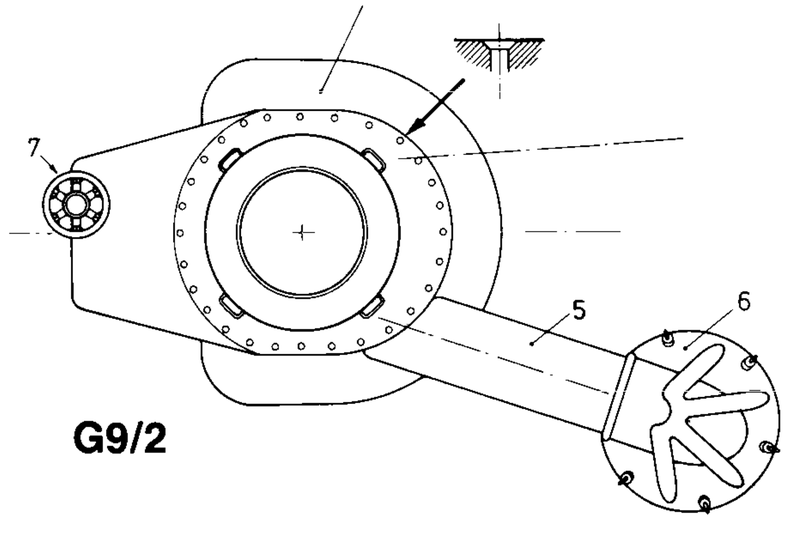
G10/2 Plan

1 Anchor deck

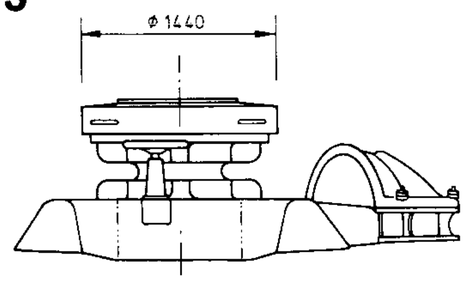
G9/1



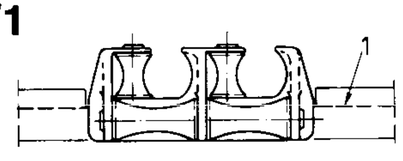
G9/2



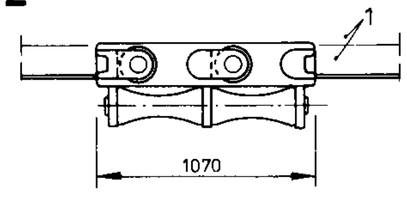
G9/3



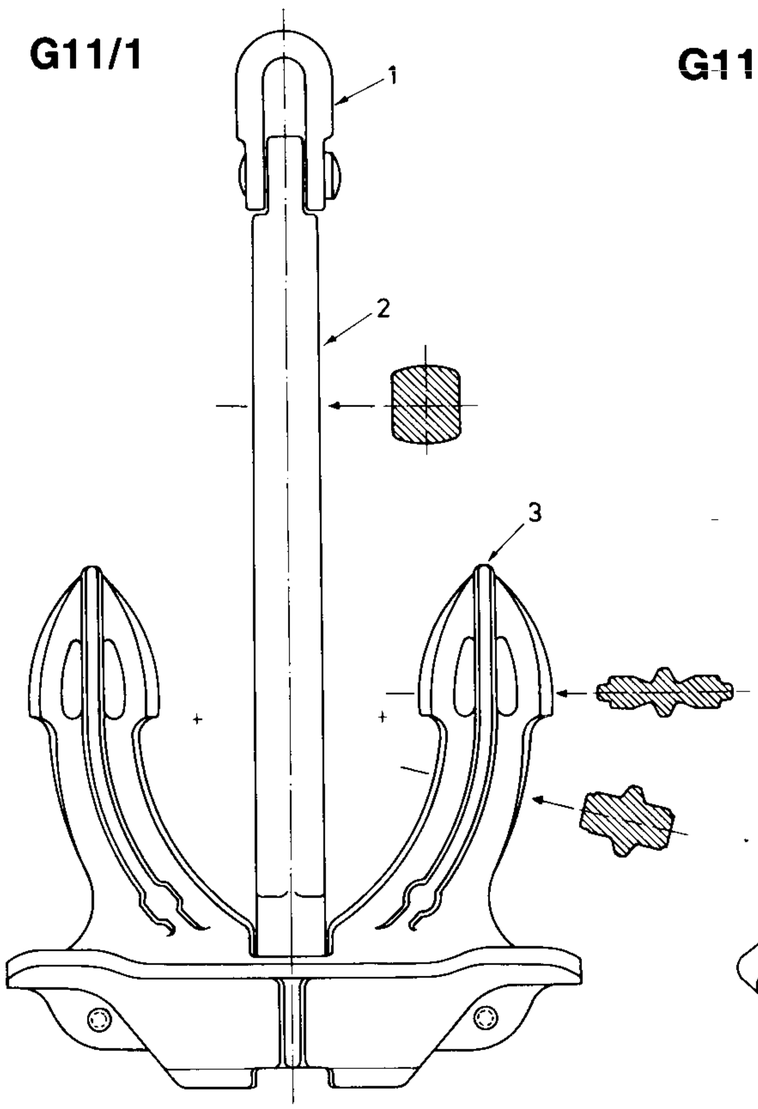
G10/1



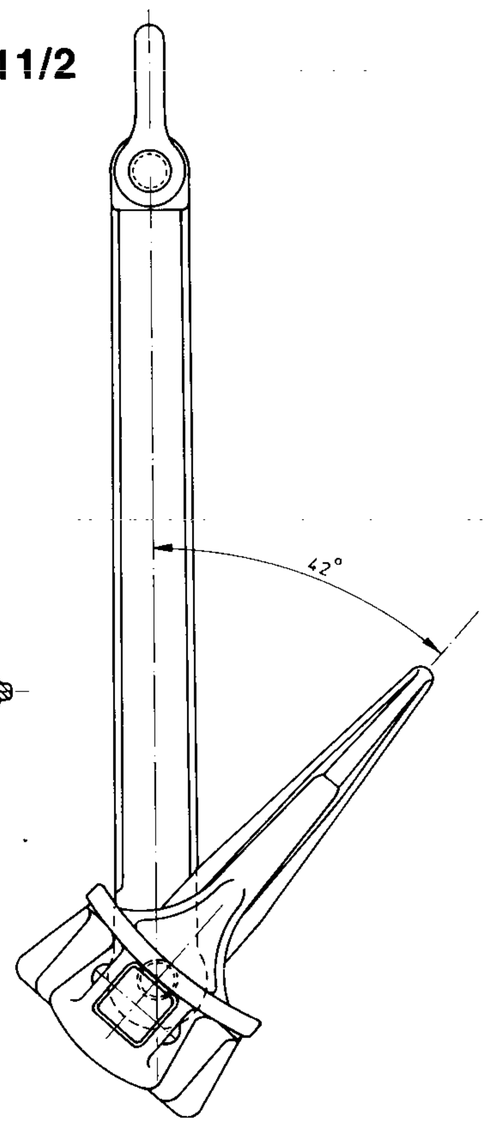
G10/2



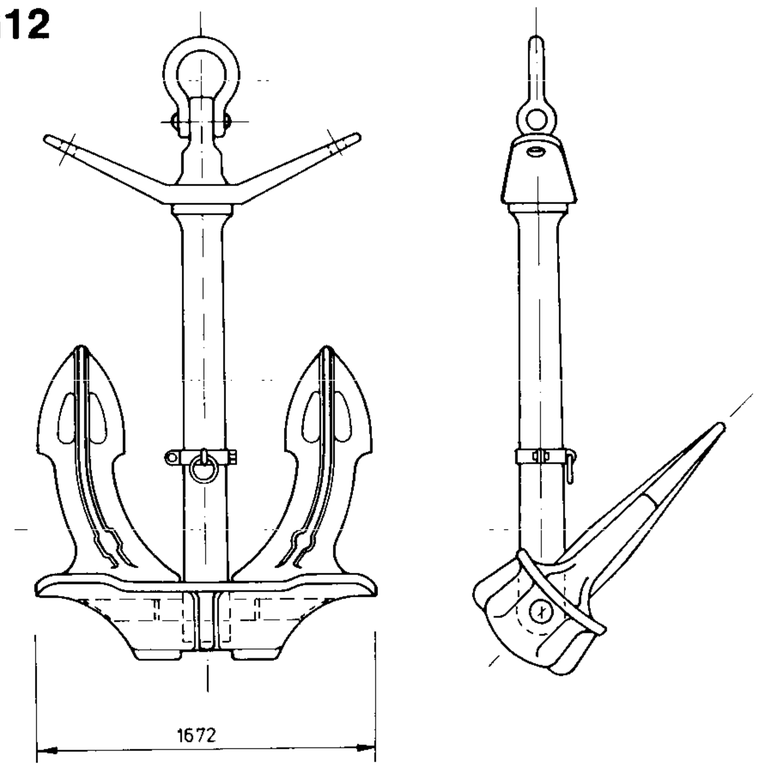
G11/1



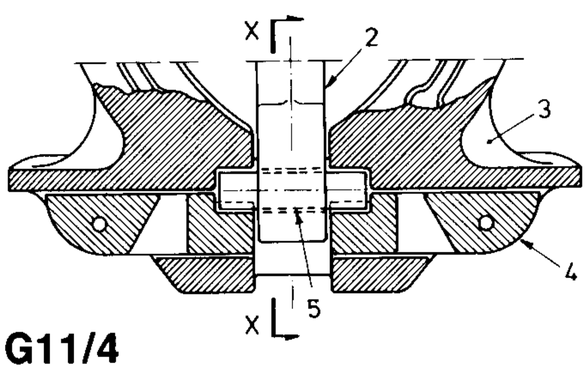
G11/2

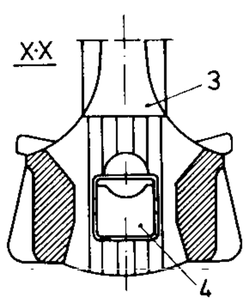


G12

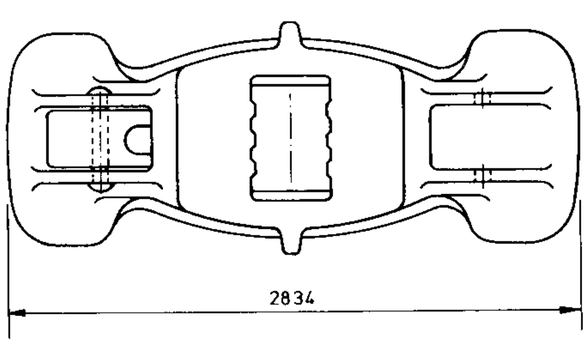


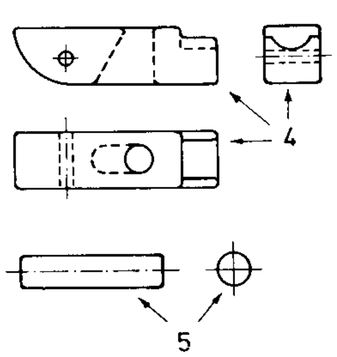
G11/3





G11/4





G11 15-TON MAIN ANCHOR FROM IMPERIAL NAVY OFFICIAL ANCHOR DESIGN, STOCKLESS TYPE (1/50 scale)

G11/1 Front view

G11/2 Profile

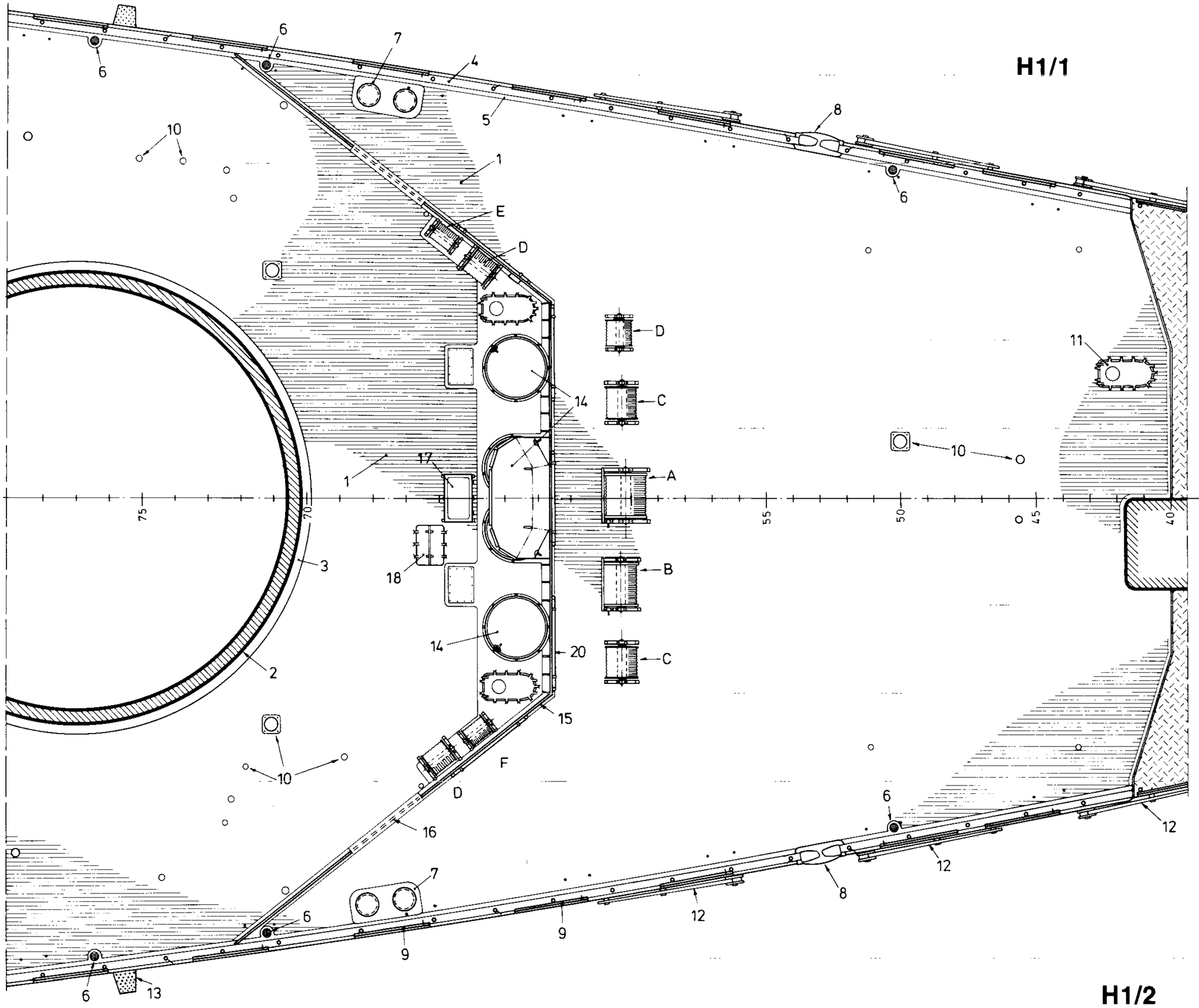
G11/3 Sections

G11/4 Bottom view of anchor head

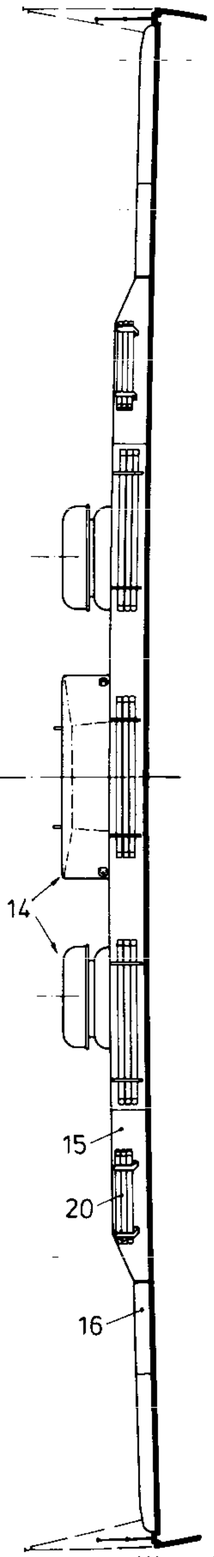
1 Anchor ring
2 Shank
3 Anchor head
4 Block
5 Head pin

G12 STERN ANCHOR (1/50 scale)

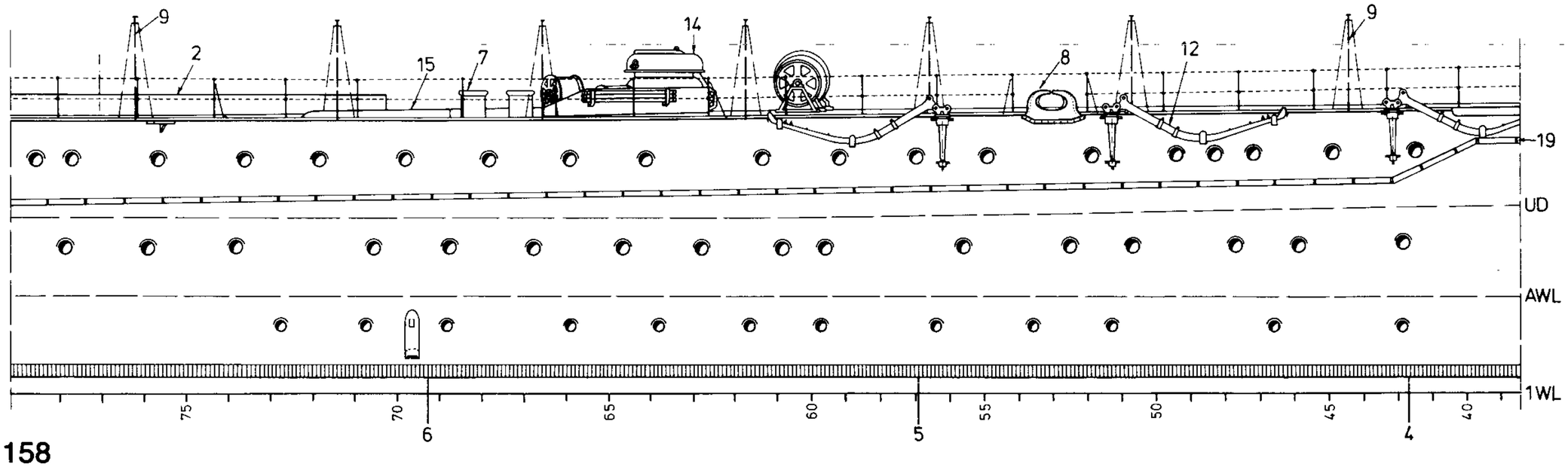
H1/1


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H1/3


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H1/2


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H Fittings

H1 FORECASTLE DECK FITTINGS, FRAMES 40-79 (1/200 scale)

H1/1 Plan

H1/2 Starboard view

H1/3 Main forward breakwater — fore view

1 Deck planking
2 No 1 46cm gun barbette
3 Steel deck ring
4 Spurnwater
5 Waterway
6 Scupper
7 Bollards
8 Fairlead
9 Awning stanchion
10 Closed deck holes
11 Hatch
12 Davits
13 Sounding platform
14 Ventilators
15 Main breakwater
16 Removed part of breakwater (for paravane cables)
17 Wash-deck locker
18 Skylight
19 Degaussing cable (armoured)
20 Containers — pipes

A-E *See H19*

H2 TYPICAL FAIRLEAD (1/100 scale)

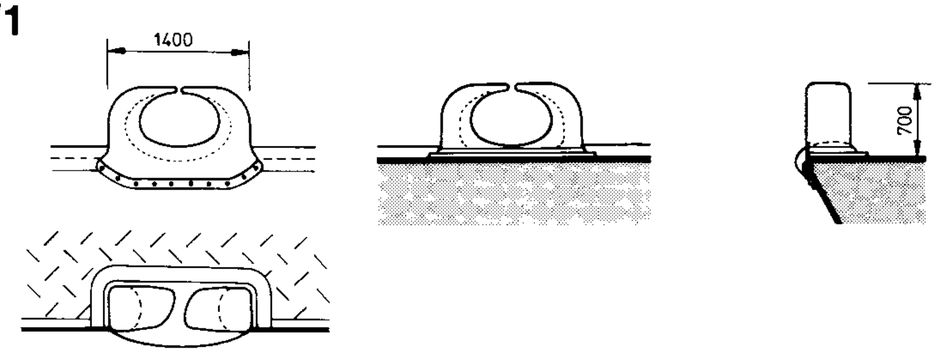
H2/1 On metal deck

H2/2 On wood deck

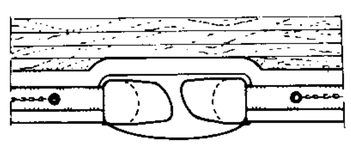
H3 BOLLARDS (1/50 scale)

H4 DAVIT

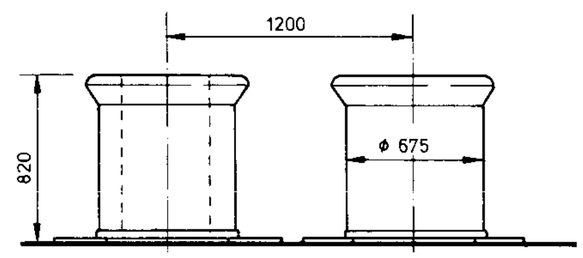
H2/1



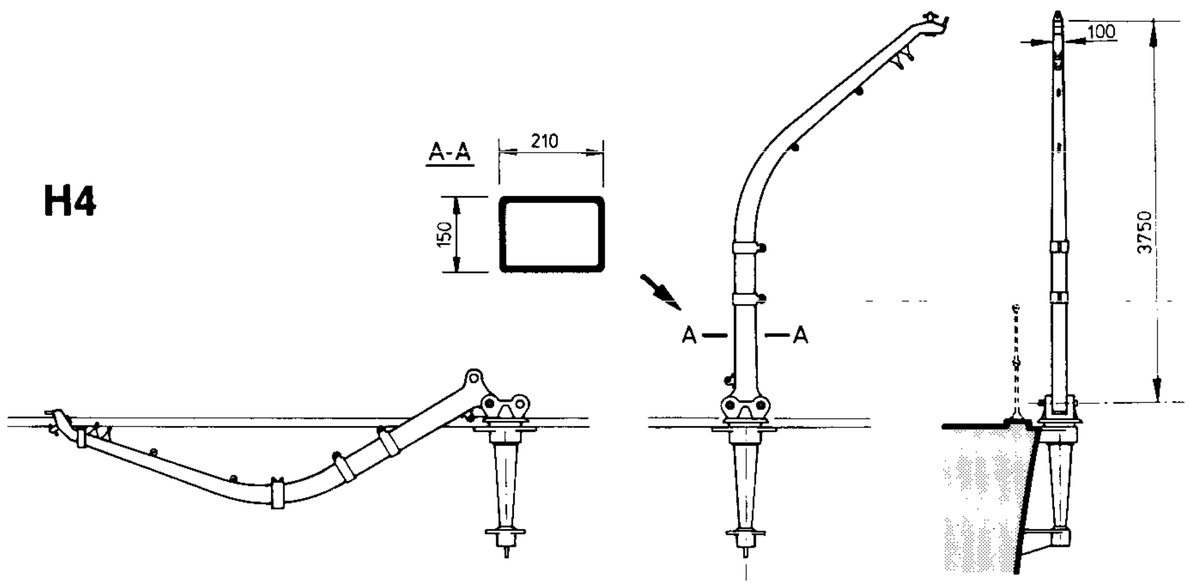
H2/2



H3



H4



H Fittings

H5 VENTILATORS (1/100 scale)

H5/1 Plan

H5/2 Rear view (view from stern)

H5/3 Section X-X

1 Steel plate

H6 EDGE OF BREAKWATER (no scale)

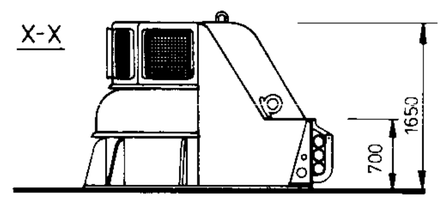
H7 MIDSHIPS DECK FITTINGS, FRAMES 77-124 (1/300 scale)

H7/1 Deck edge, plan view

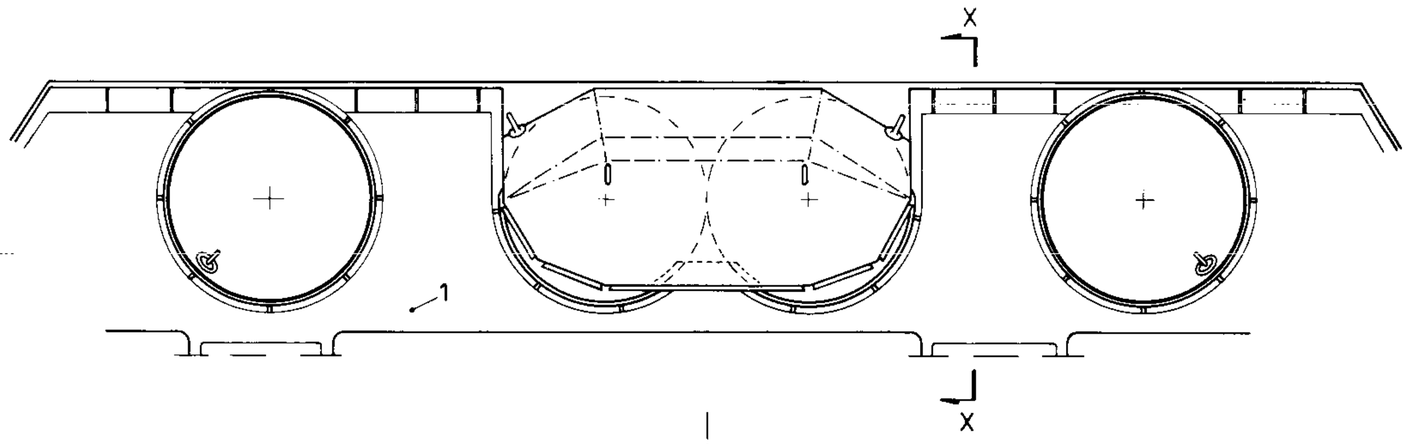
H7/2 Starboard hull profile

1 Scupper
2 Awning stanchion
3 Degaussing cable
4 Scupper pipe
5 Davit

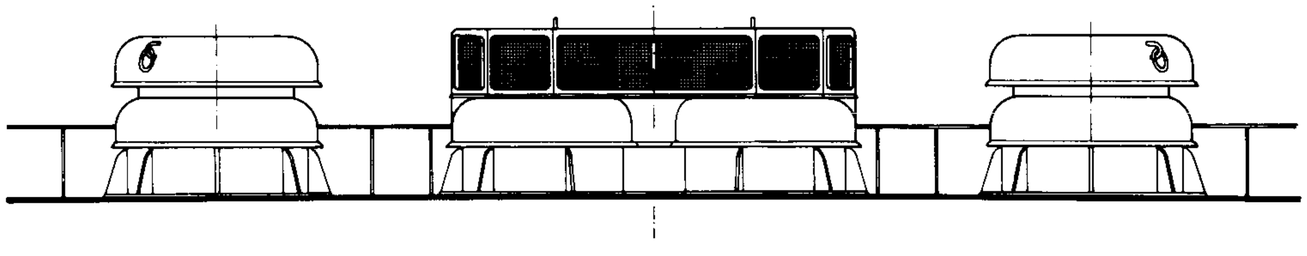
H5/3



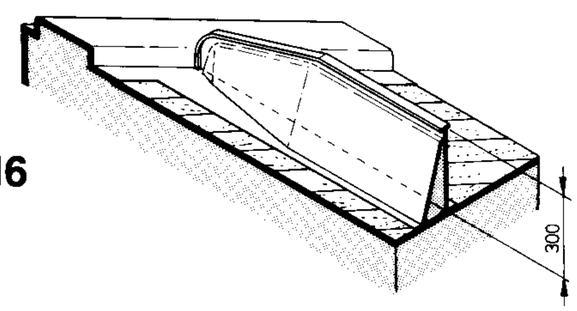
H5/1



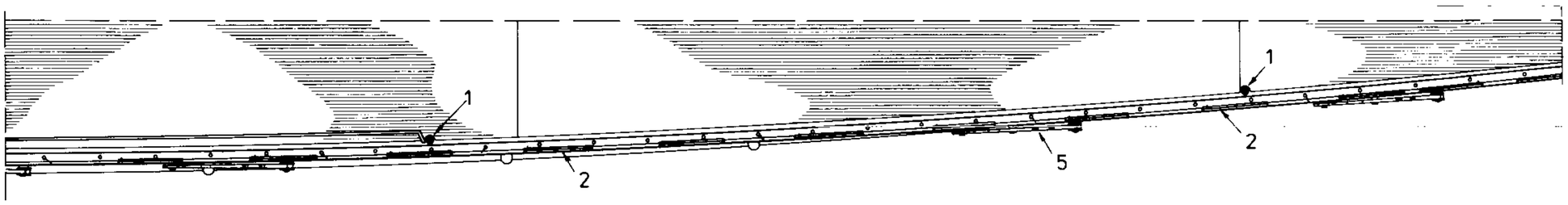
H5/2



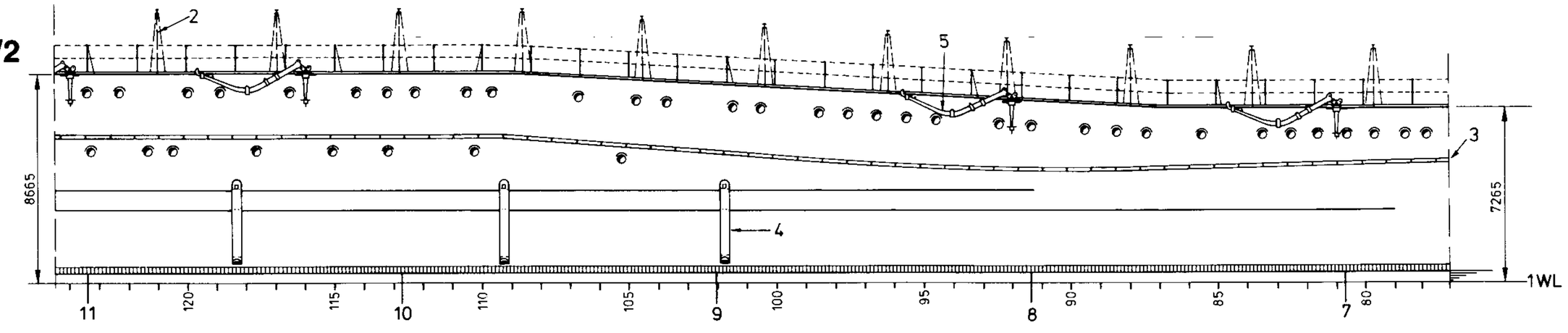
H6



H7/1



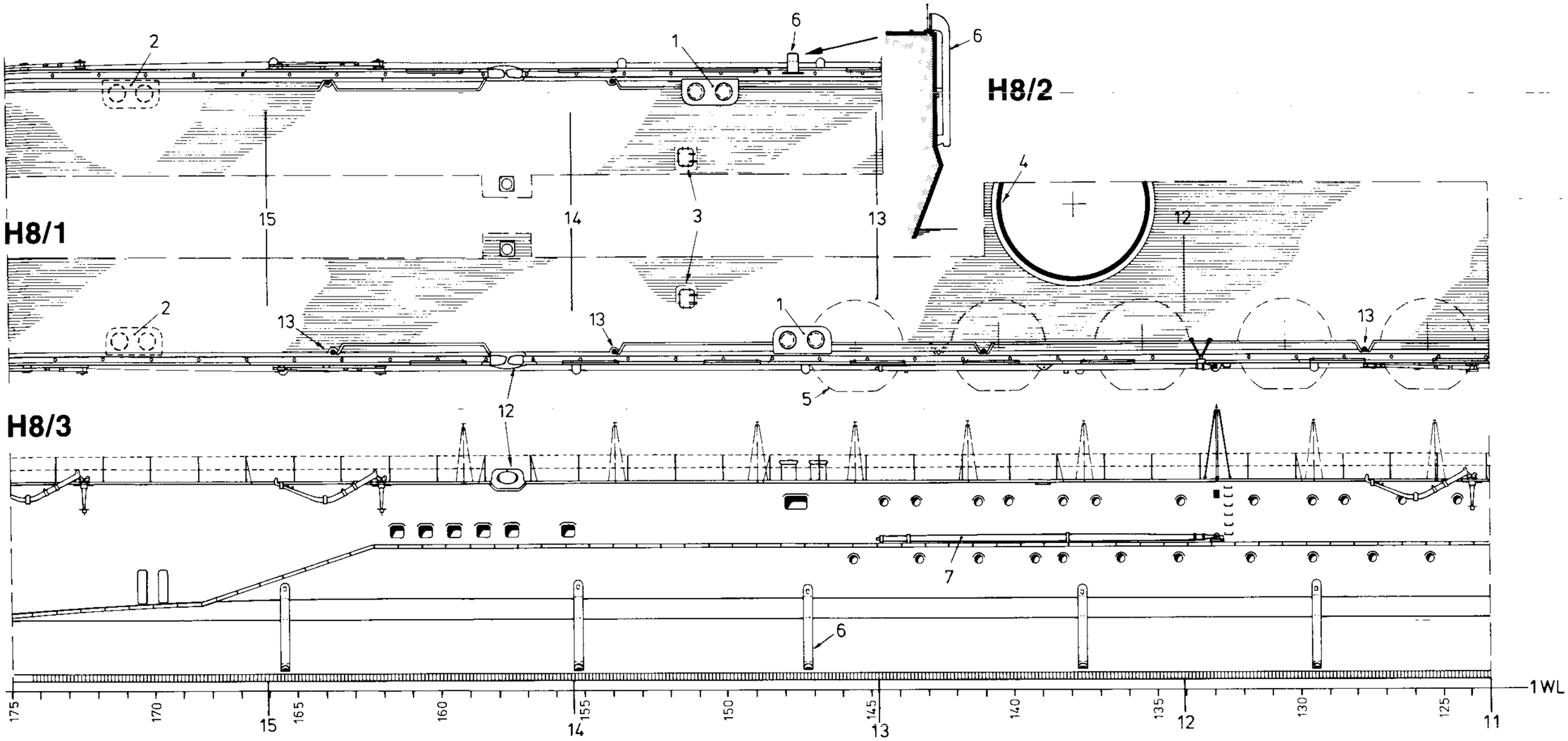
H7/2



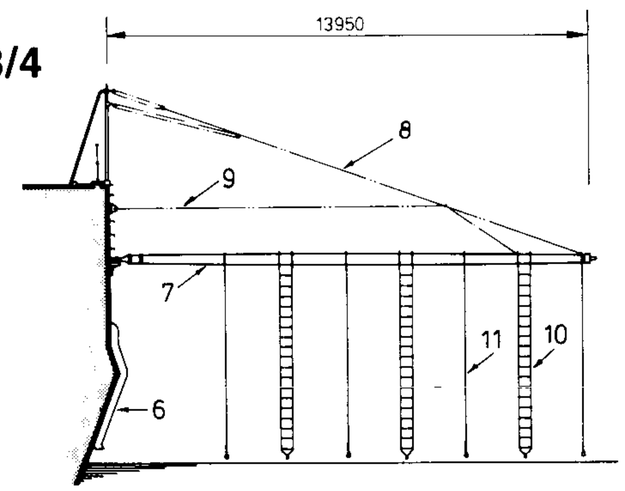
H8/1

H8/2

H8/3



H8/4



H8 MIDSHIPS HULL AND DECK FITTINGS, FRAMES 124-175 (1/300 scale)

H8/1 Starboard deck edge, plan view

H8/2 Port side deck edge, plan view

H8/3 Starboard hull profile

H8/4 Section

1 Bollards — as at 1941-44
2 Bollards — as at 1944
3 Hatch
4 15.5cm gun barbette
5 25mm triple guns, 1944-45
6 Scupper pipe
7 Swinging boom
8 Topping lift
9 Life line
10 Jacobs ladders
11 Lizards
12 Fairlead
13 Scupper

H Fittings

H9 GUARD RAILS AND EDGE OF WOOD DECK (1/25 scale)

H9/1 Profile view

H9/2 Section

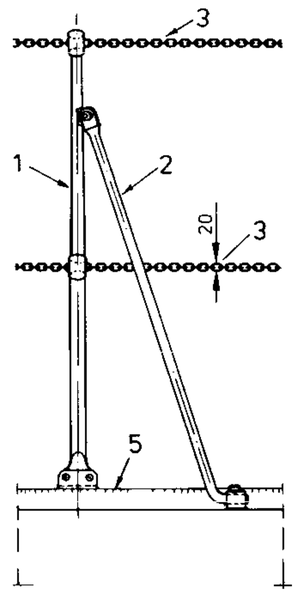
H9/3 Plan of deck planking

H9/4 Axonometric

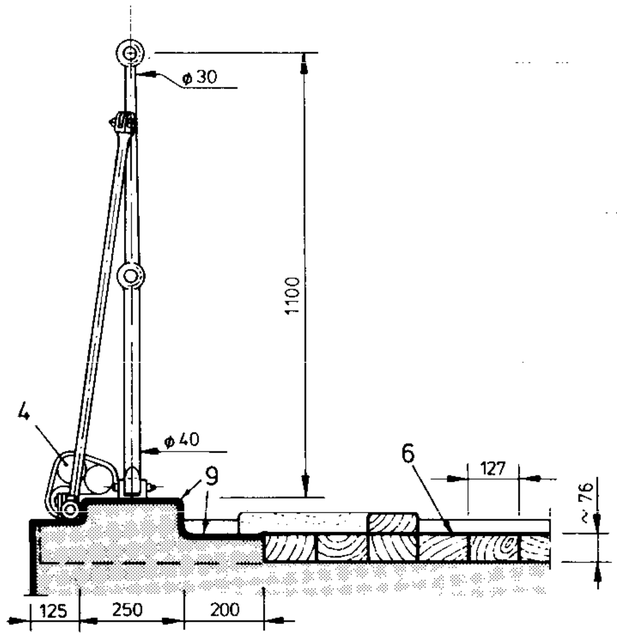
1 Guard rail stanchion
2 Stay
3 Guard rail of chain
4 Awning stanchion
5 Spurnwater
6 Deck planking — 127mm × 76mm 'hinoki' cypress wood
7 Waterway
8 Scupper
9 Steel sheet

H10 SCUPPER PIPE (no scale)

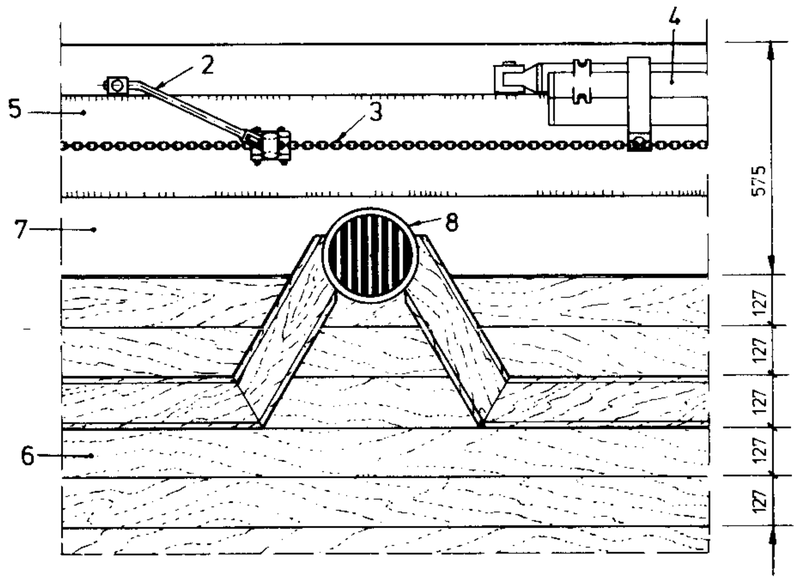
H9/1



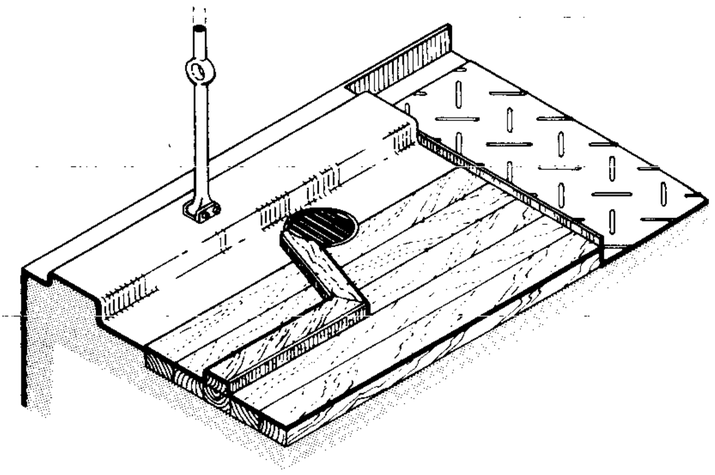
H9/2



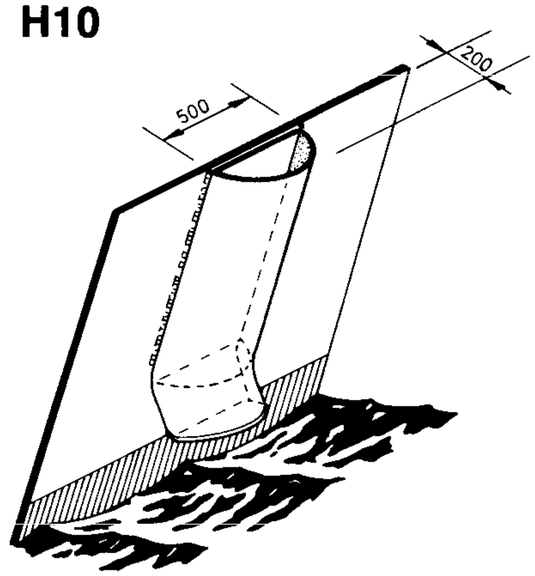
H9/3



H9/4



H10



H11 HATCH, FRAME 88-89 (1/50 scale)

1 Escape manhole cover

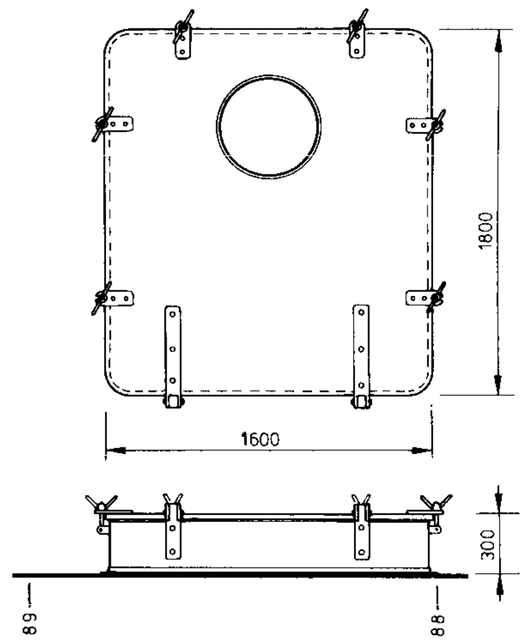
H12 HATCH (note typical scheme of planking (1/25 scale)

H13 ARMOURED DEGAUSSING CABLE (1/25 scale)

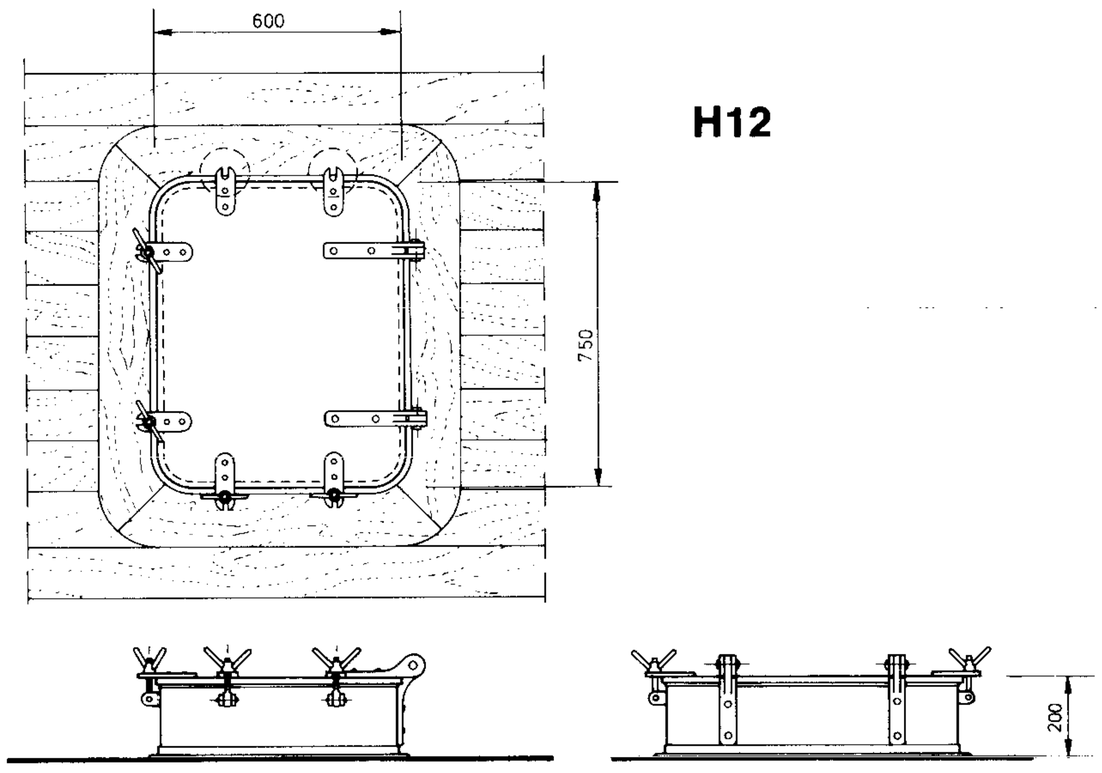
H13/1 Section

H13/2 Side view

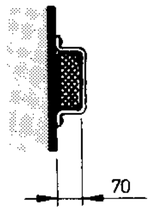
H11



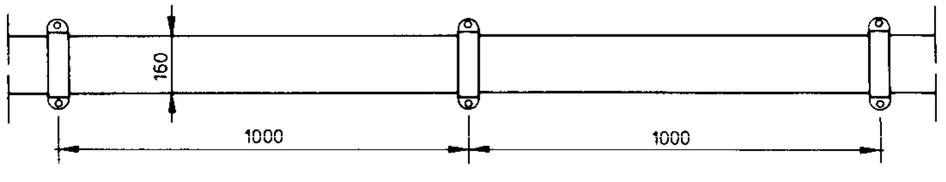
H12



H13/1



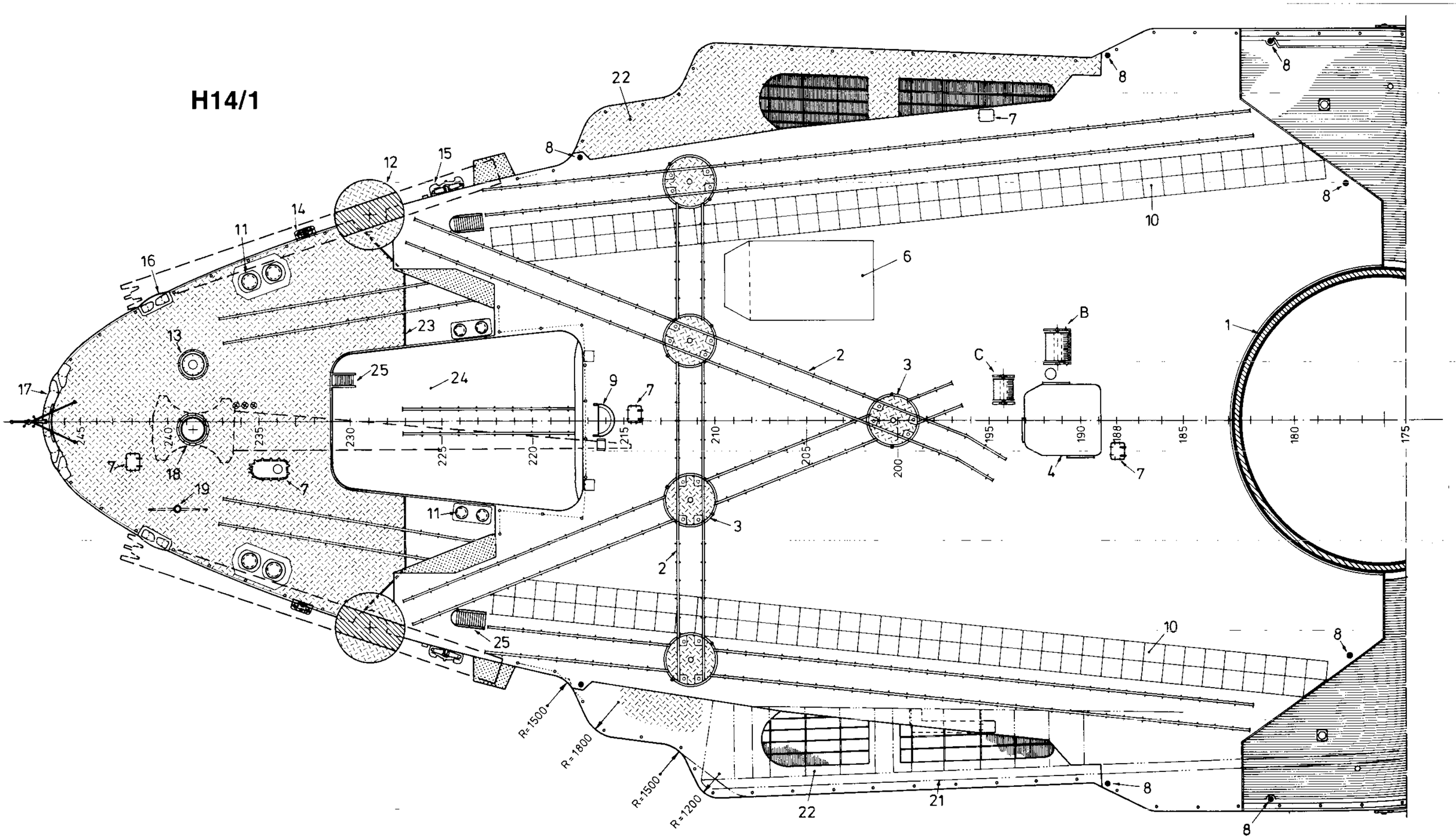
H13/2



H Fittings

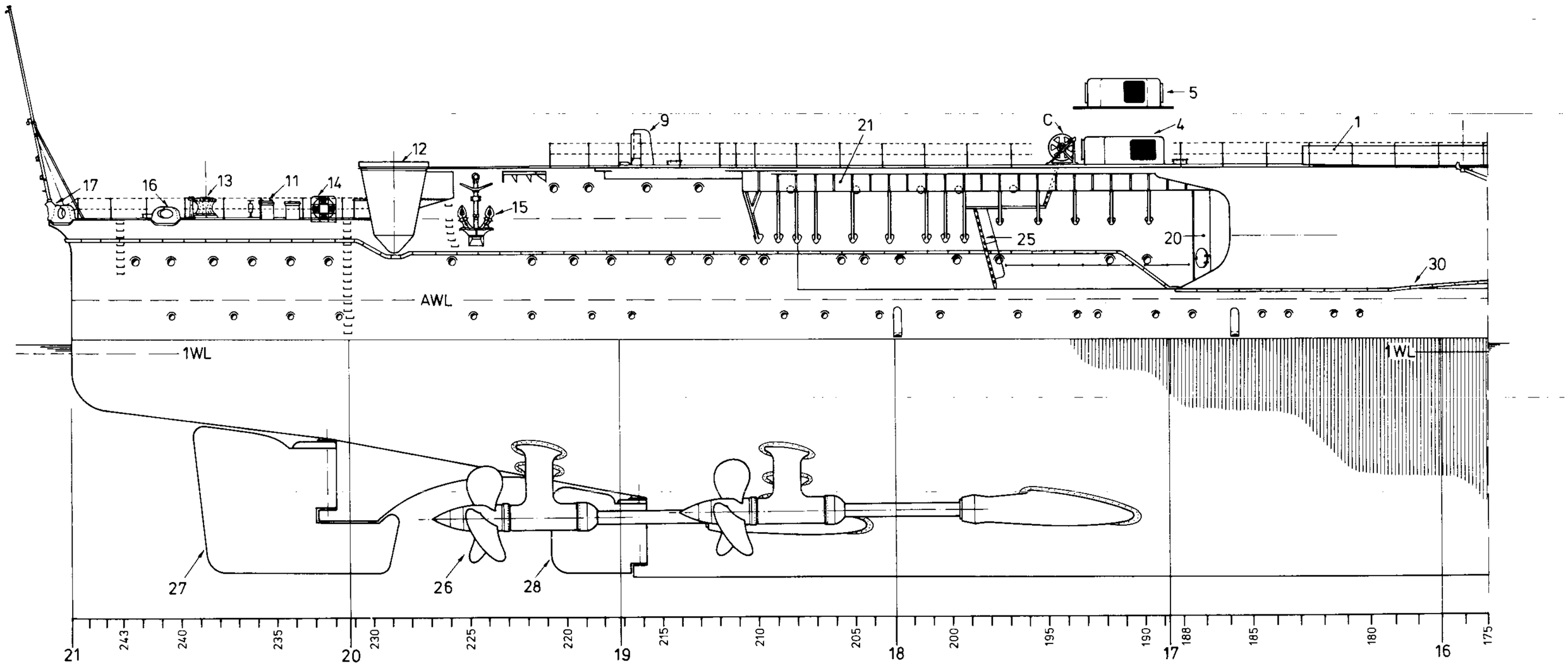
H14 AIRCRAFT DECK AND QUARTERDECK FITTINGS, 1941 (1/300 scale)

H14/1 Plan view



H14/2 Starboard profile, after part of hull

H14/2



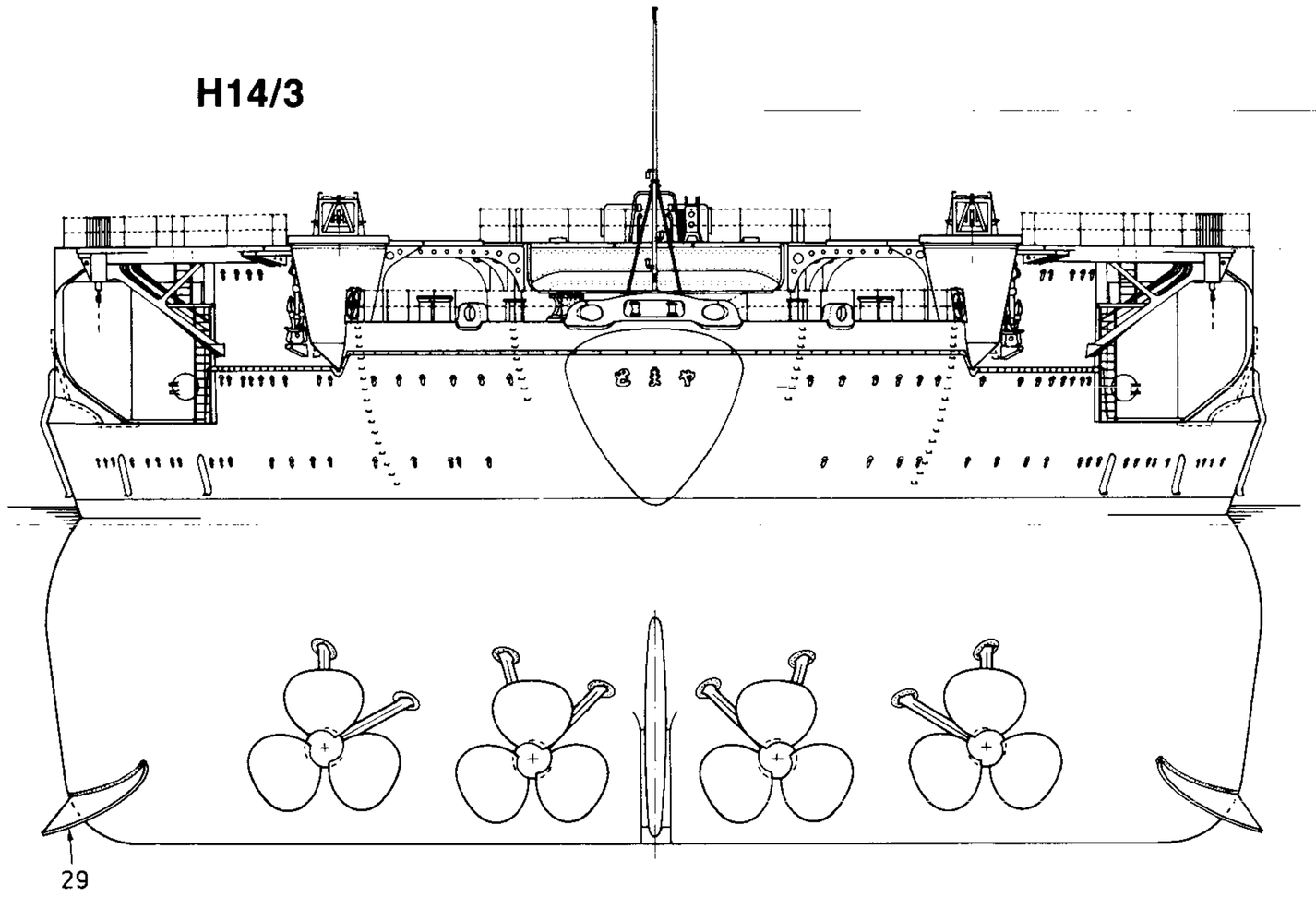
H Fittings

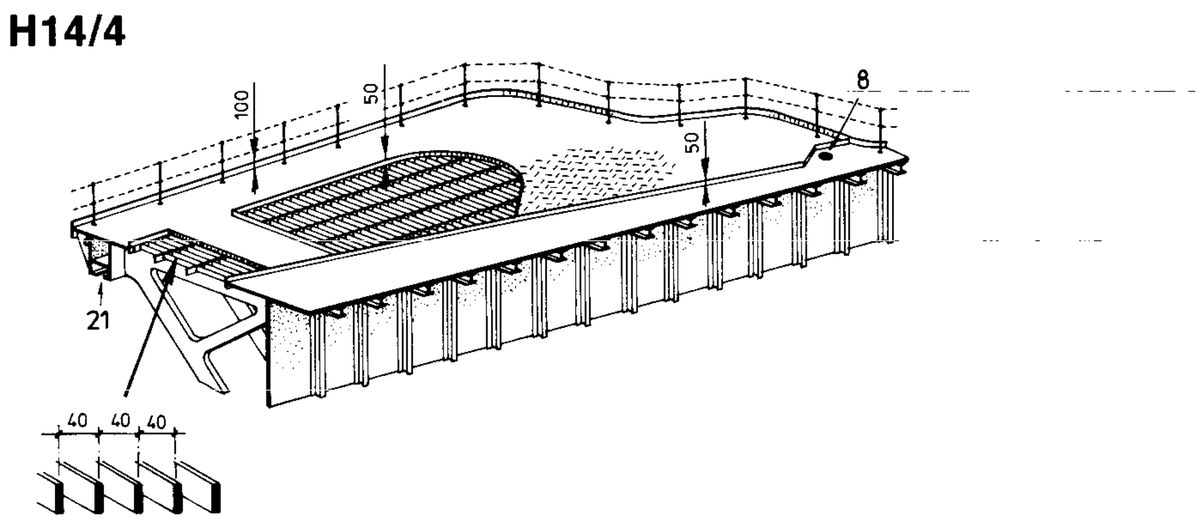
H14/3 Stern elevation

1 No 3 46cm turret barbette
2 Deck rails
3 Rail turntable
4 Ventilator
5 Ventilator — view from stern
6 Aircraft engine tuning bay
7 Hatch
8 Scupper
9 Anti-blast cover
10 Non-slip linoleum sheets with brass inset strips on concrete deck surface. Stern deck from frame 227 forward also concrete surface (possibly asphalt)
11 Bollards
12 Catapult ring
13 After capstan
14 Life buoy
15 After anchor
16 Fairlead
17 After towing fairlead
18 Base of aircraft and boat 6-ton crane
19 Crane capstan
20 Boat hangar door
21 Boat overhead (travelling) crane
22 Platform above travelling crane — chequer plates
23 100mm high breakwater
24 Aircraft hangar platform (middle deck)
25 Ladder
26 5m diameter propeller
27 Main rudder
28 Auxiliary rudder
29 Bilge keel
30 Degaussing cable

B, C Reels

H14/4 Platform deck above travelling crane (no scale)





H15 ANTI-BLAST COVERS, AFTER 1944 REFIT (1/100 scale)

H15/1 Stern view

H15/2 Plan

H15/3 Profiles

1 MG control position (fitted 1944)
2 Crane arm support

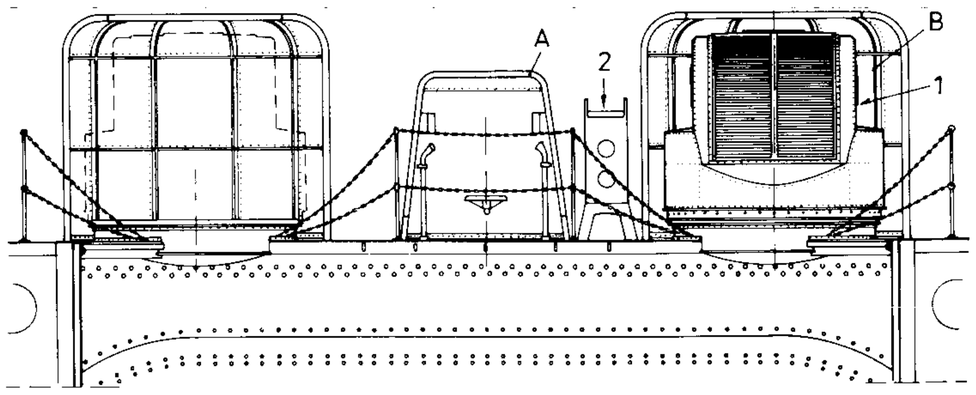
H16 STARBOARD (only) PIPE FITTED 1944 (Note covered side scuttle; 1/300 scale)

H17 TRIPLE 25mm MG FITTED 1944 (1/300 scale)

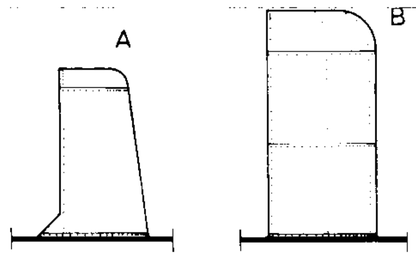
H18 AFTER CAPSTAN

1 Crown plate
2 Capstan bar socket
3 Pawl
4 Pawl plate

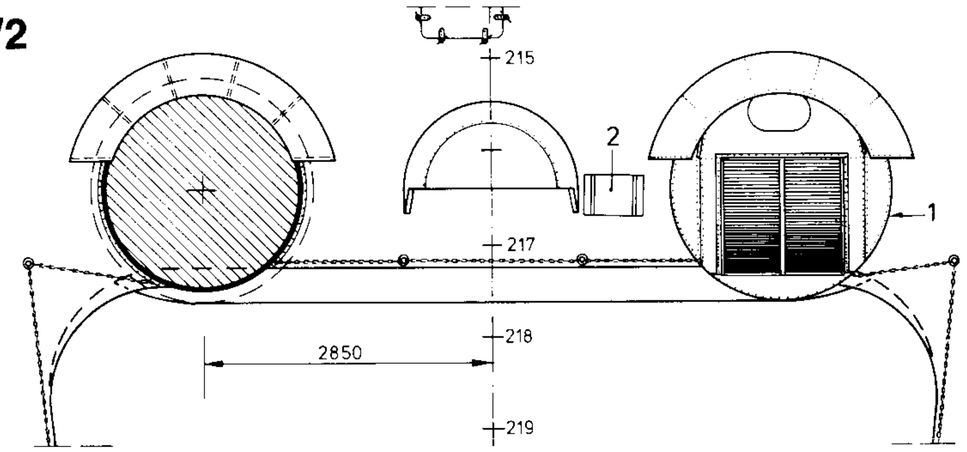
H15/1



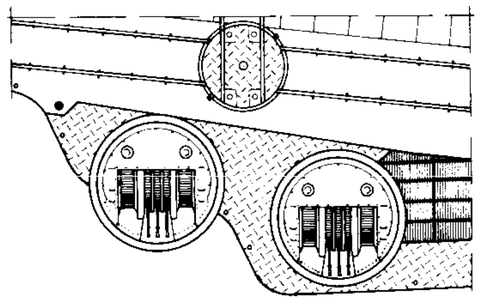
H15/3



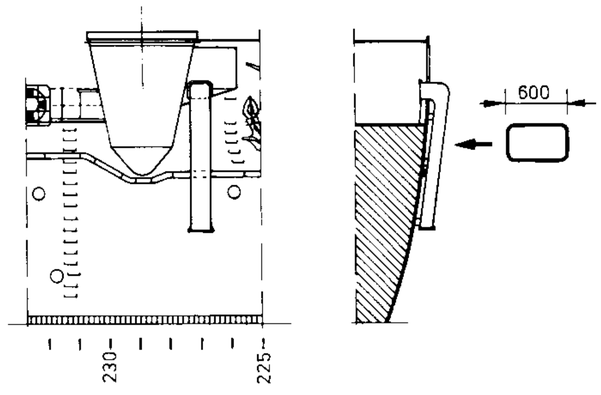
H15/2

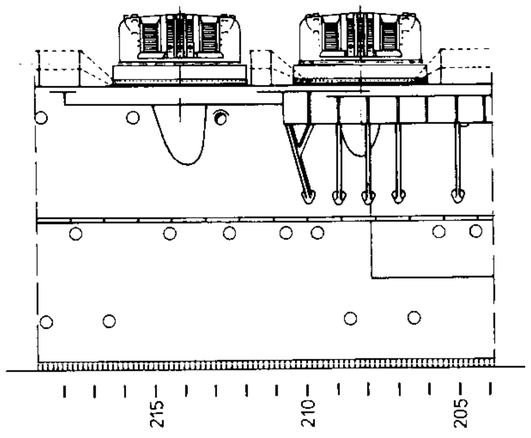


H17

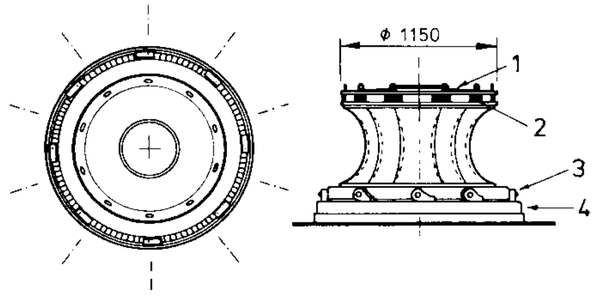


H16

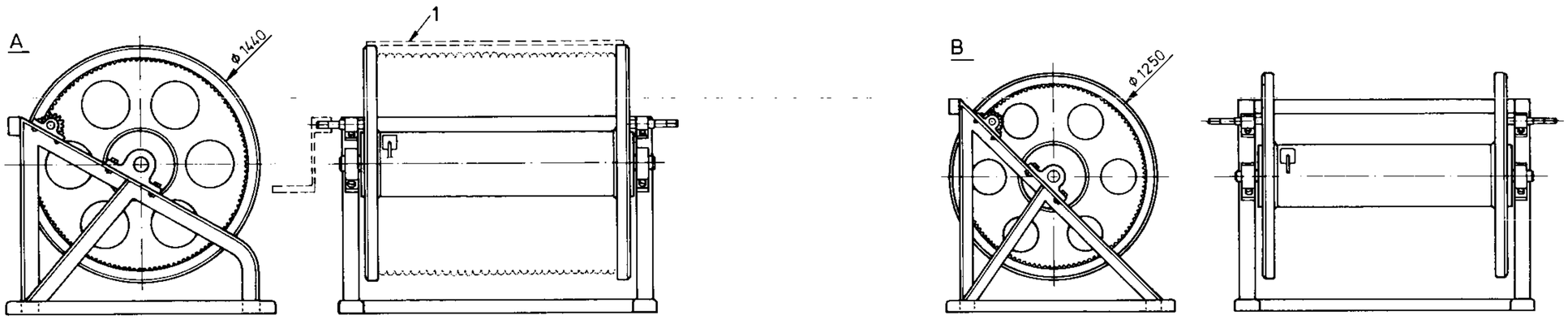




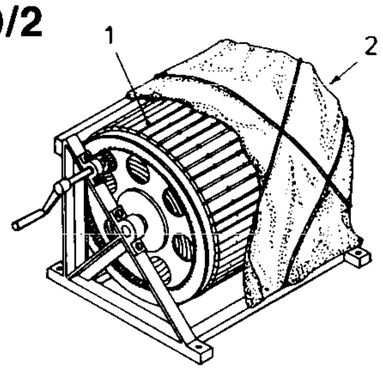
H18



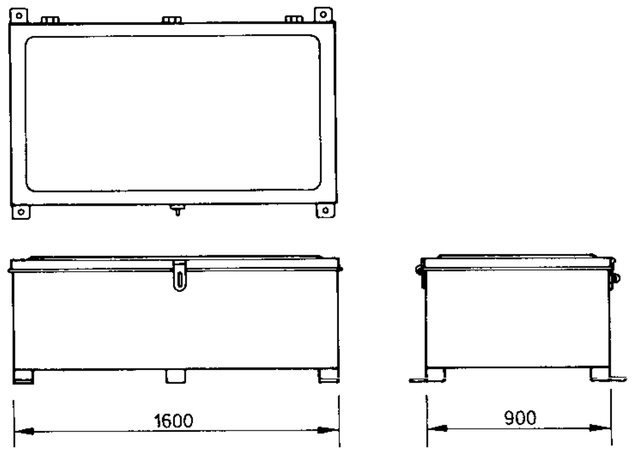
H19/1



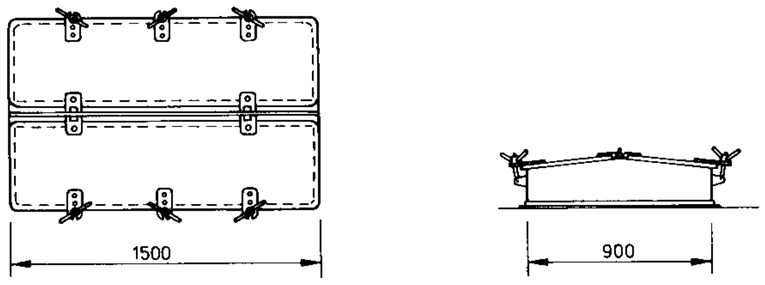
H19/2



H20/1



H20/2



H19 REELS

H19/1 Profiles and end views (1/50 scale)

Note: Designations A-E refer to locations on deck views H1/1 etc

H19/2 Perspective view (no scale)

Note: Reels were normally covered by mats of wooden battens and canvas

1 Wooden battens
2 Canvas covers

H20/1 WASH DECK LOCKER, FRAME 55 (1/50 scale)

H20/2 SKYLIGHT, FRAME 56 (1/50 scale)

H21 DECK HATCH (1/25 scale)

H21/1 Plan

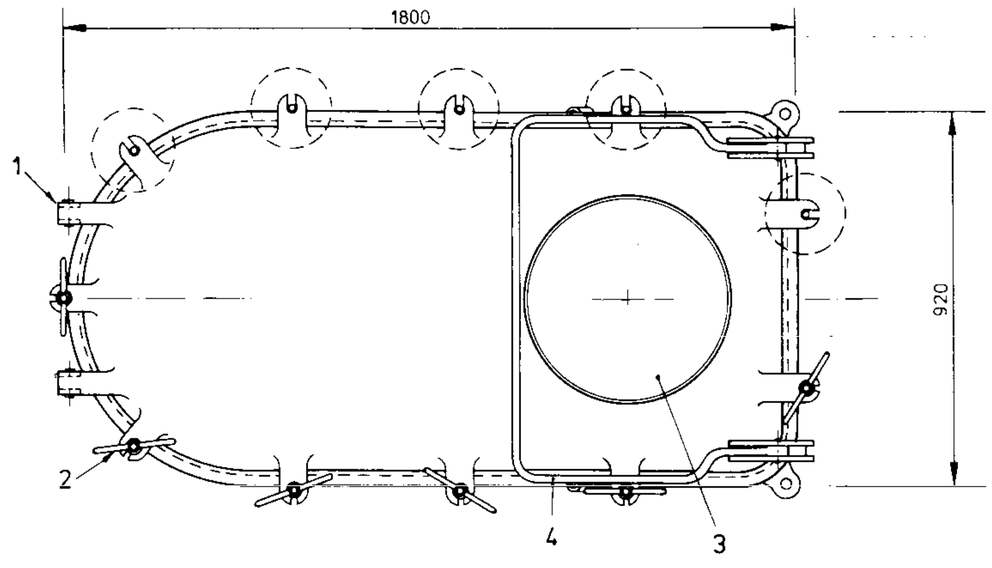
H21/2 Profile

H21/3 Rear view

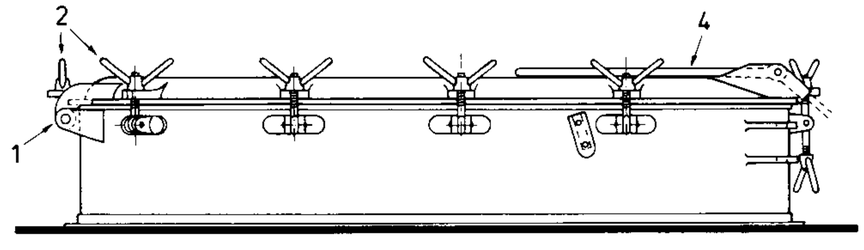
H21/4 Profile — open hatch

1 Hinge
2 Clips
3 Escape manhole cover (closed)
4 Awning's frame
5 Hand rail
6 Hatch cover stay

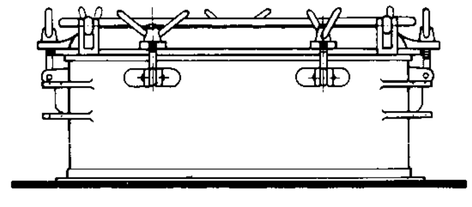
H21/1



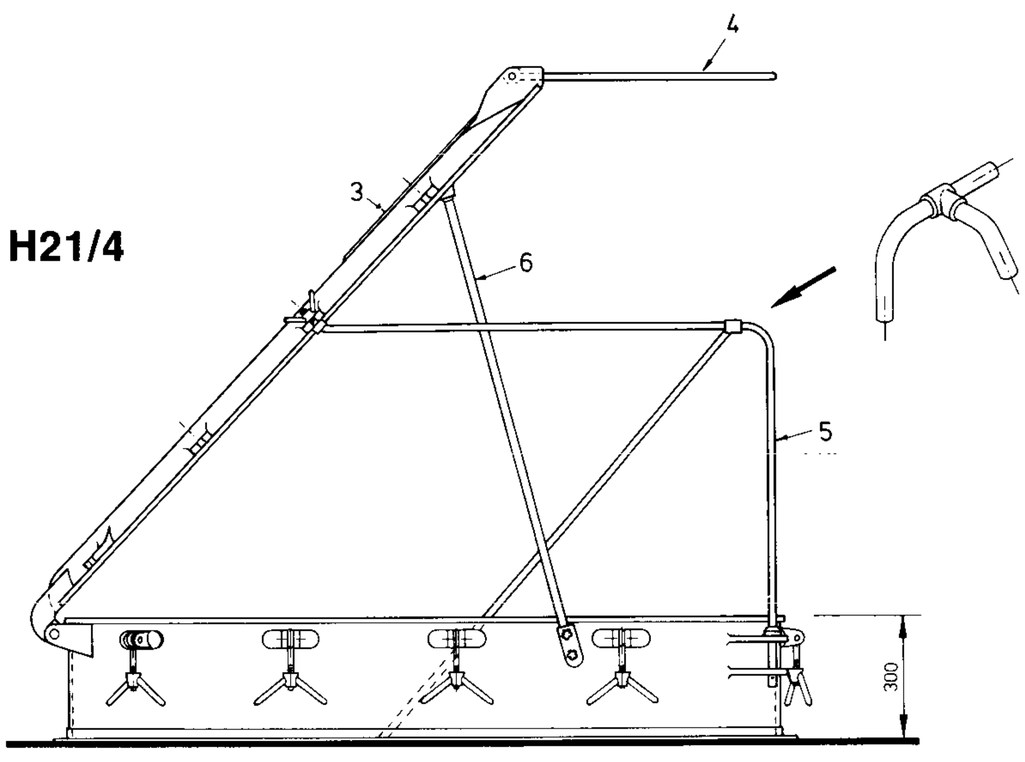
H21/2



H21/3



H21/4



H Fittings

H22 25mm MG AMMUNITION BOX FOR 240 ROUNDS FITTED ON DECK AND 46cm GUNHOUSE, 1943-45 (1/25 scale)

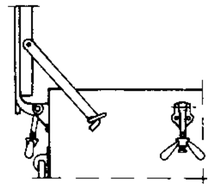
H22/1 Profile

H22/2 Front view

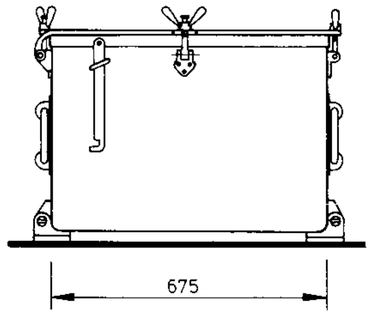
H22/3 Plan

H23/4 Box with open cover (fragment)

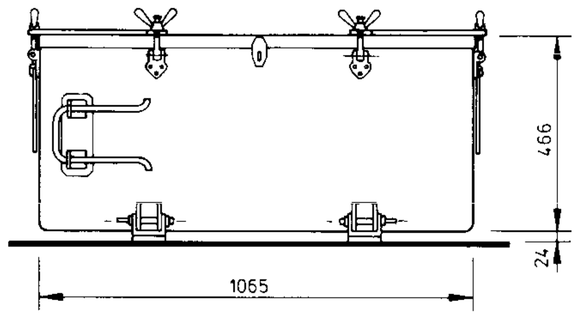
H22/4



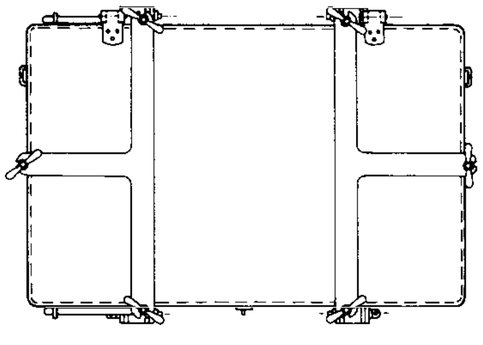
H22/2



H22/1



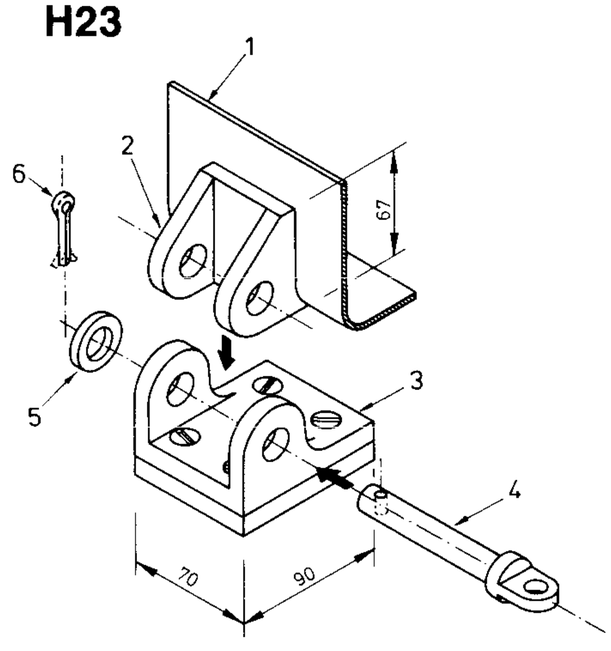
H22/3



H23 BOX DECK FIXTURE (no scale)

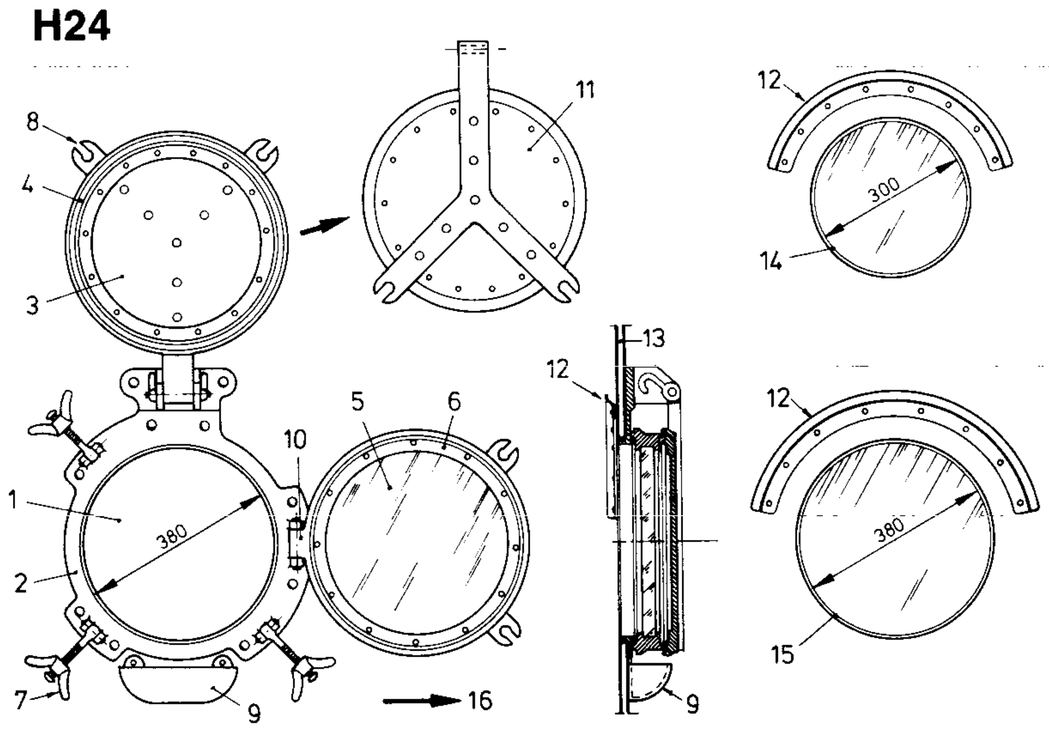
1 Ammunition box (fragment)
2 Box assembly jig
3 Deck assembly jig
4 Pin
5 Round washer
6 Cotter pin

H23



H24 SIDE SCUTTLE (1/20 scale)

1 Scuttle or port
2 Scuttle frame
3 Deadlight
4 Rubber sealing ring
5 Sidelight glass
6 Sidelight frame
7 Butterfly clips
8 Clip lug
9 Save-all
10 Hinge
11 Back of deadlight
12 Rigol
13 Ship's side plating
14 Front view of 300mm side scuttle — superstructure and lower deck compartments of hull
15 Front view of 380mm side scuttle — upper deck and middle deck compartments of hull
16 Arrowing indicating direction of bow

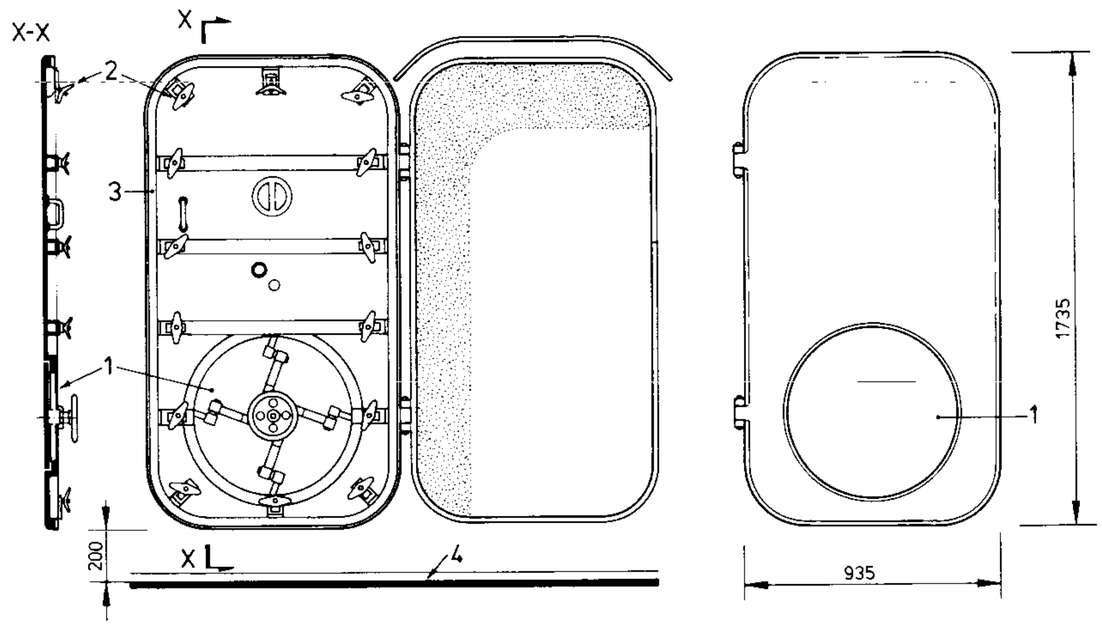


H25 WATER-TIGHT DOOR (type of lower part of superstructure — at main deck; 1/37.5 scale)

H25/1 Open

1 Escape manhole
2 Securing clips
3 Rubber seating
4 Main wood-deck

H25/2 Closed

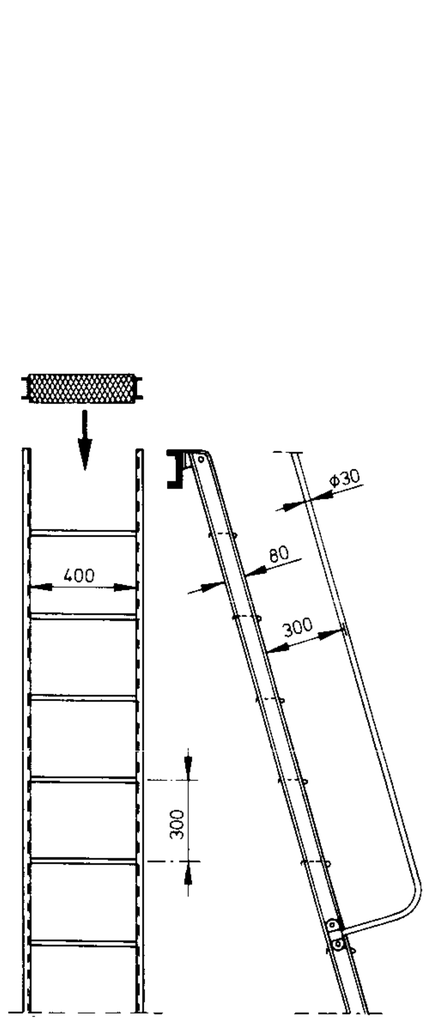


H Fittings

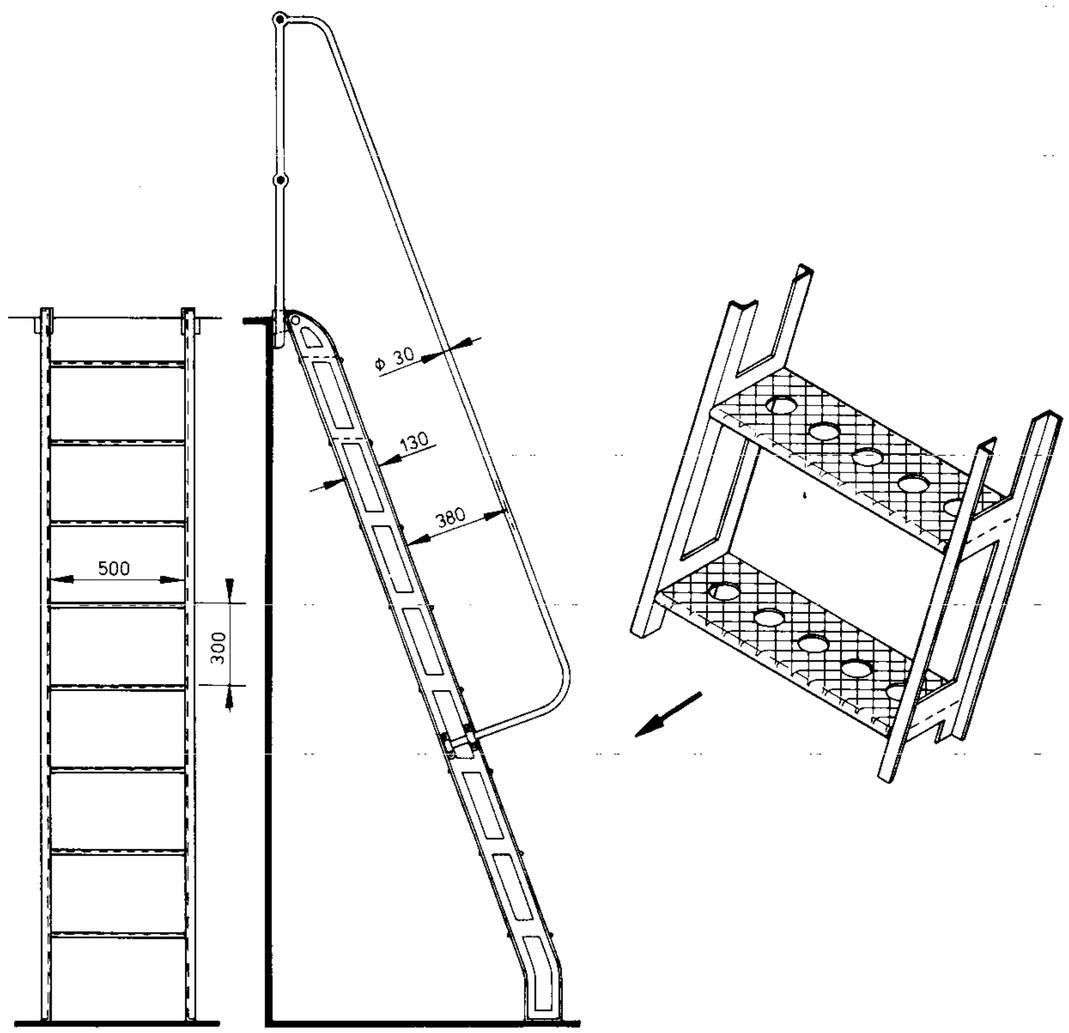
H26 LADDERS (1/37.5 scale)

H26/1 From rear wall of bridge tower; hatch ladder

H26/2 Superstructure; signal platform



H26/1



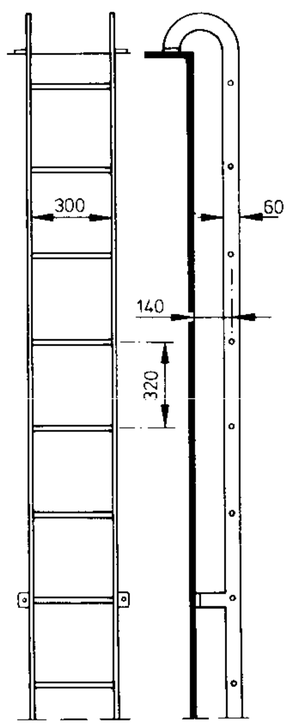
H26/2

H26/3 Typical bar ladder: 46cm gunhouse, rangefinders

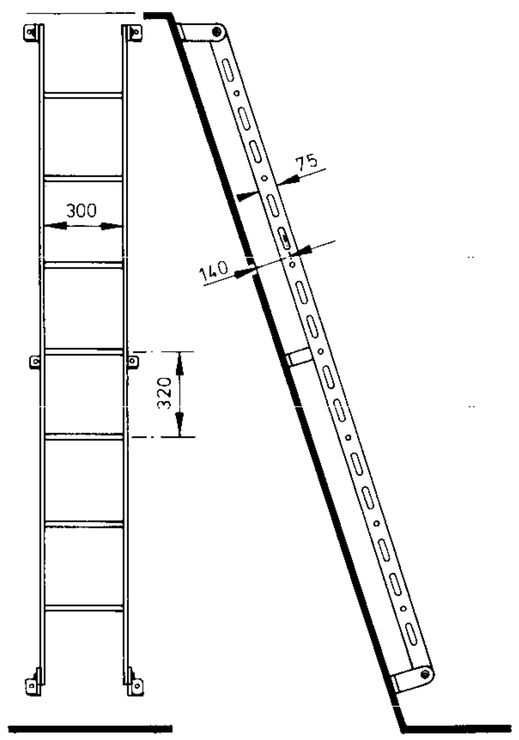
H26/4 Side of lower part of superstructure, decks FD-III

H26/5 Ladder: rear lower part of superstructure, decks FD-I

H26/3

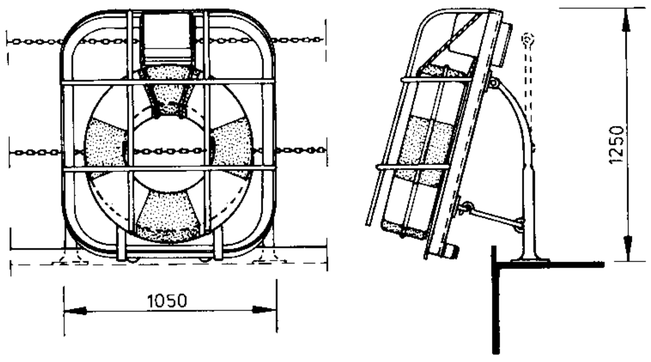


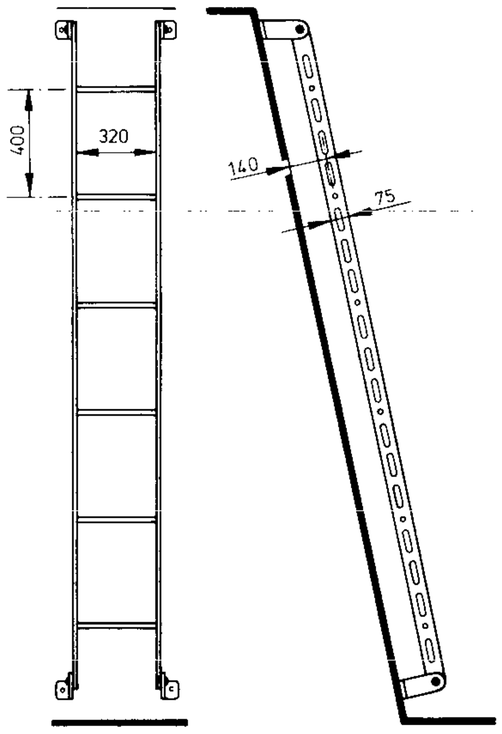
H26/4



H27

H27 LIFE BUOY (1/50 scale)





H26/5

H Fittings

H28 150cm SEARCHLIGHT (1/50 scale)

H28/1 Left profile

H28/2 Front view

H28/3 Right profile

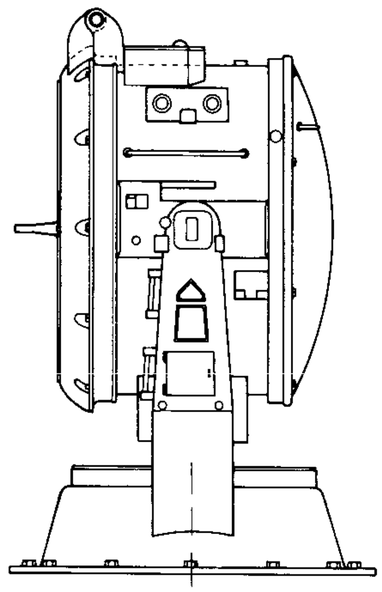
H28/4 Rear view

H28/5 Plan

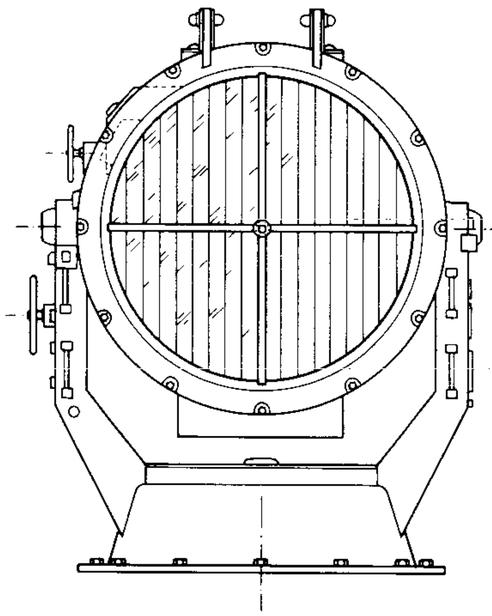
H28/6 Section — schematic

1 Spherical mirror
2 Glass strips of front shield
3 Electric arc

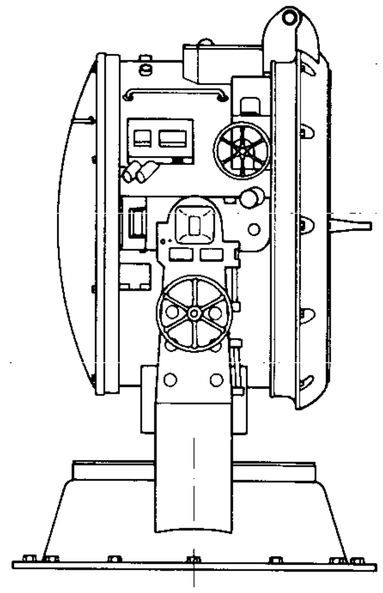
H28/1



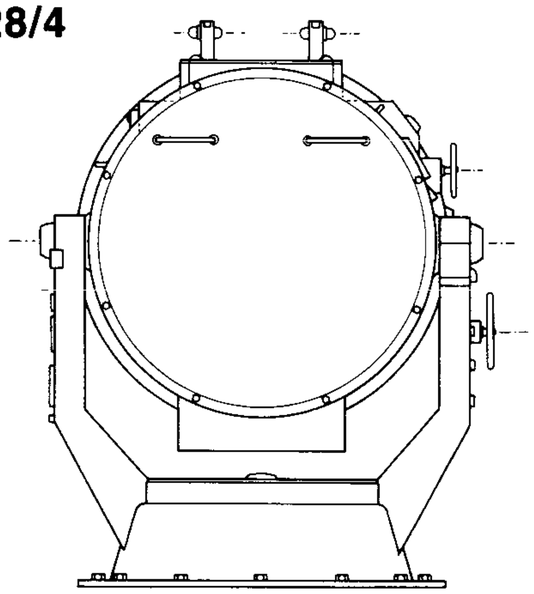
H28/2



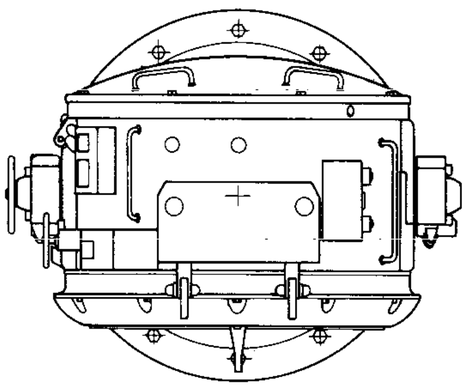
H28/3



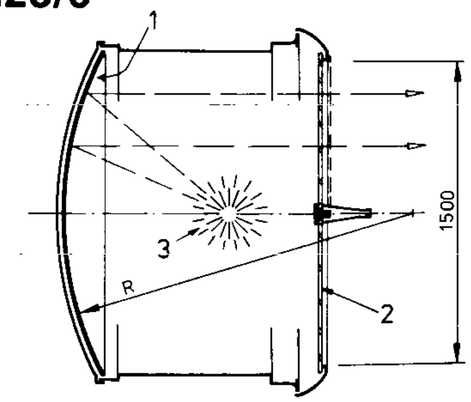
H28/4



H28/5



H28/6



H29 60cm SIGNAL LAMP (1/37.5 scale)

H29/1 Left profile

H29/2 Front view

H29/3 Right profile

H29/4 Plan

H29/5 Rear cover

H30 30cm DECK LAMP (1/25 scale)

H31 TYPICAL LANTERN (1/25 scale)

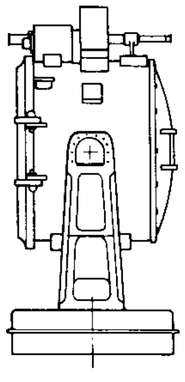
H32 DAYLIGHT SIGNAL LANTERN (fitted on signal yards of tower bridge; 1/25 scale)

H32/1 Rear view — from stern

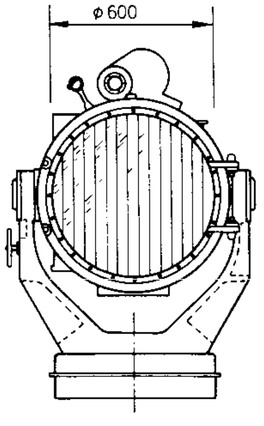
H32/2 Plan

1 Signal yard

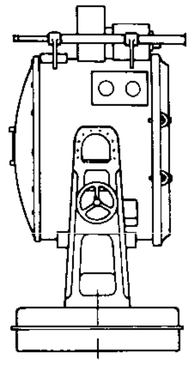
H29/1



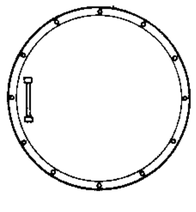
H29/2



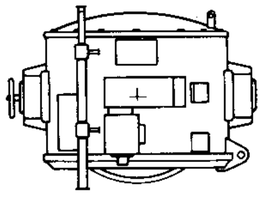
H29/3



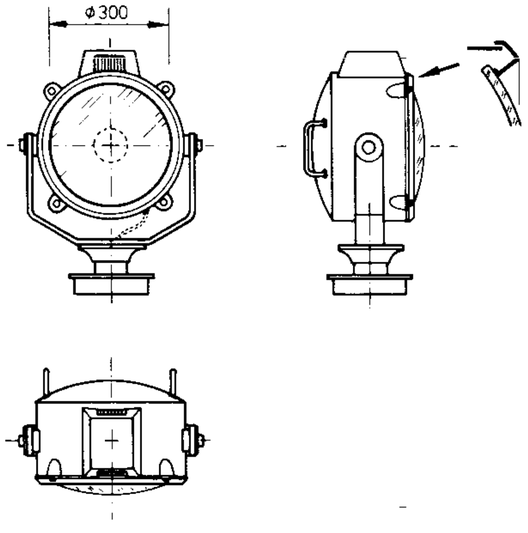
H29/4



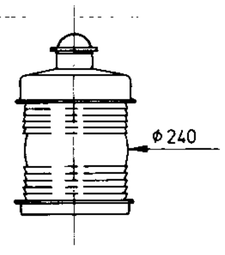
H29/5



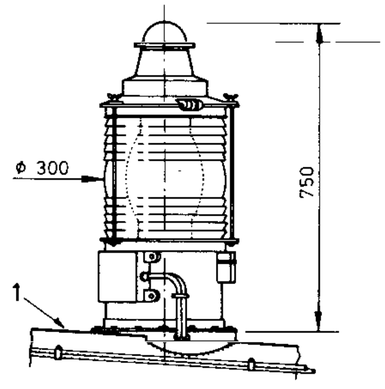
H30



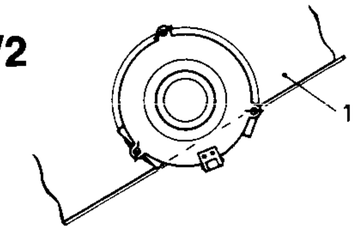
H31



H32/1



H32/2



H Fittings

H33 WIND INTENSITY TRANSMITTER (1/6.25 scale)

H33/1 Front view

H33/2 Plan

1 Robinson cup
2 Casing

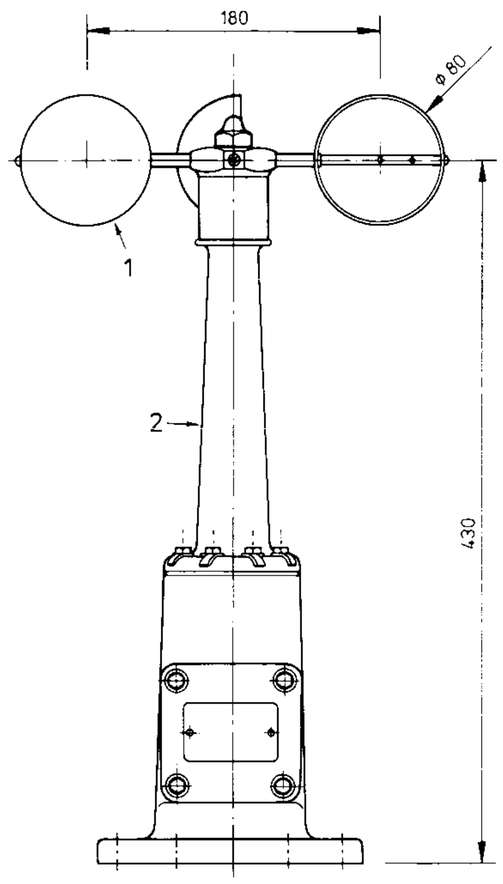
H34 WIND DIRECTION INDICATOR (1/6.25 scale)

H34/1 Front view

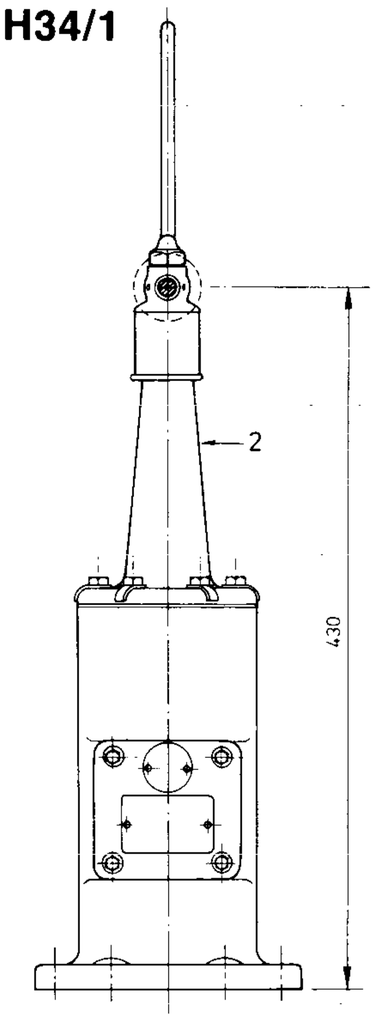
H34/2 Plan

1 Revolving vane
2 Casing

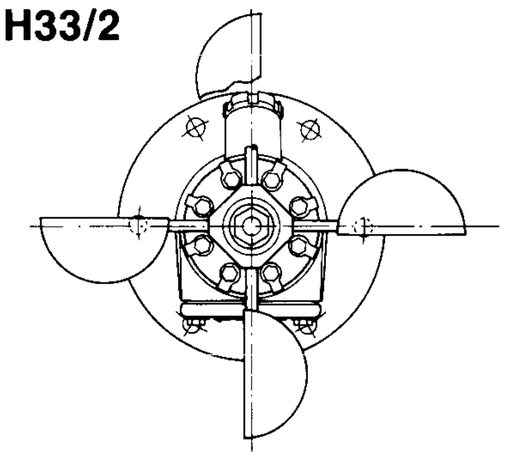
H33/1



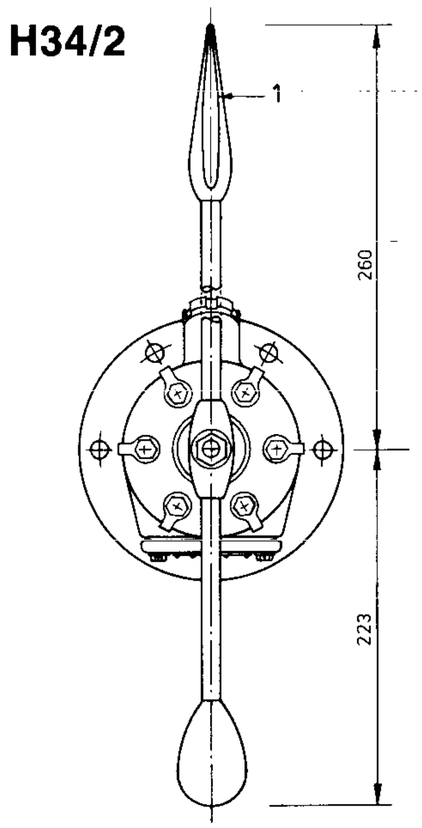
H34/1



H33/2



H34/2



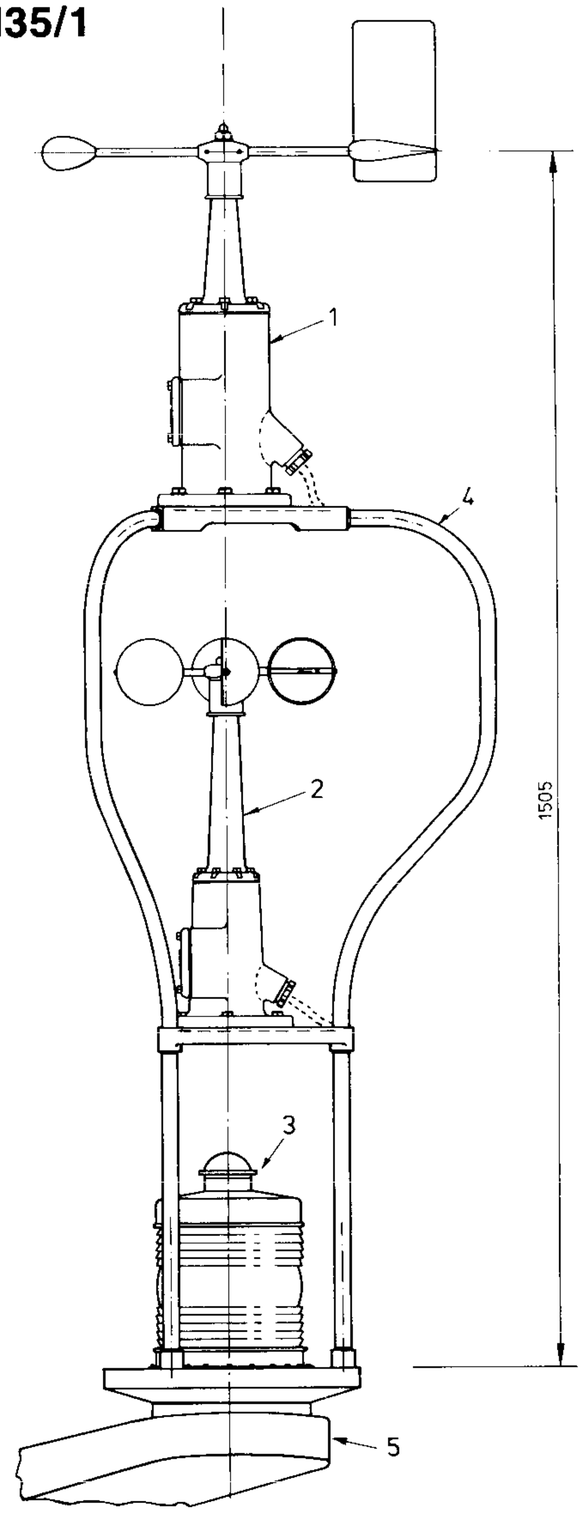
H35 WIND INTENSITY TRANSMITTER AND WIND DIRECTION INDICATOR (fitted on both arms of signal yards, deck XI; 1/12.5 scale)

H35/1 Port side profile

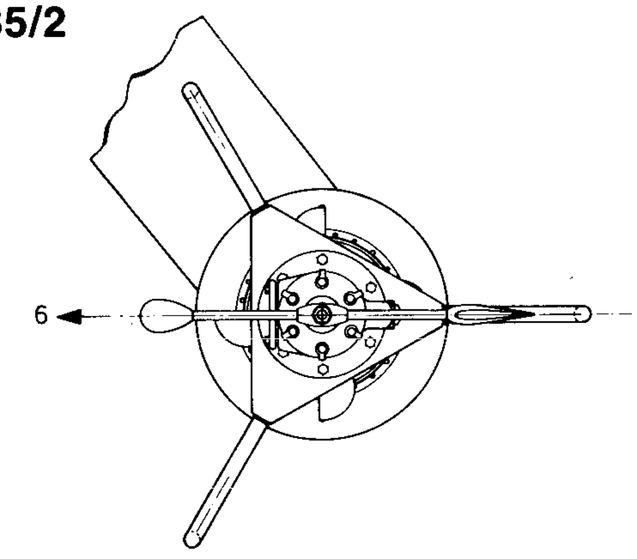
H35/2 Plan view

1 Wind direction indicator
2 Wind intensity transmitter (anemometer)
3 Navigation light
4 Tripod — of 20mm diameter steel pipe
5 Edge of yard
6 Direction of bow

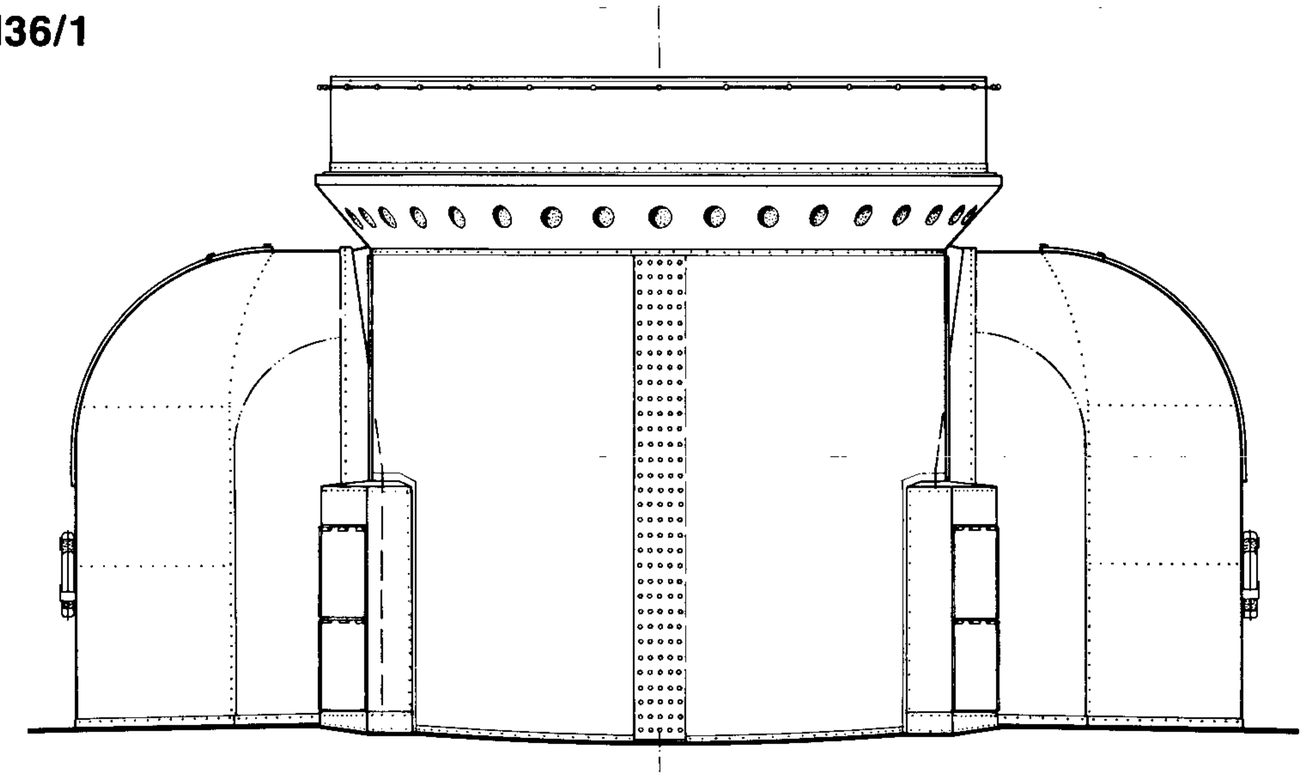
H35/1



H35/2



H36/1



H36 VENTILATORS AT BARBETTE No 1 15.5cm GUN TURRET (1/100 scale)

H36/1 Front elevation

H36/2 Profile

H36/3 Plan

H36/4 Rear elevation

H36/5 Section — inside view

H37 DECK VENTILATOR (starboard) FRAME 103-106 (1/100 scale)

H37/1 Profile view

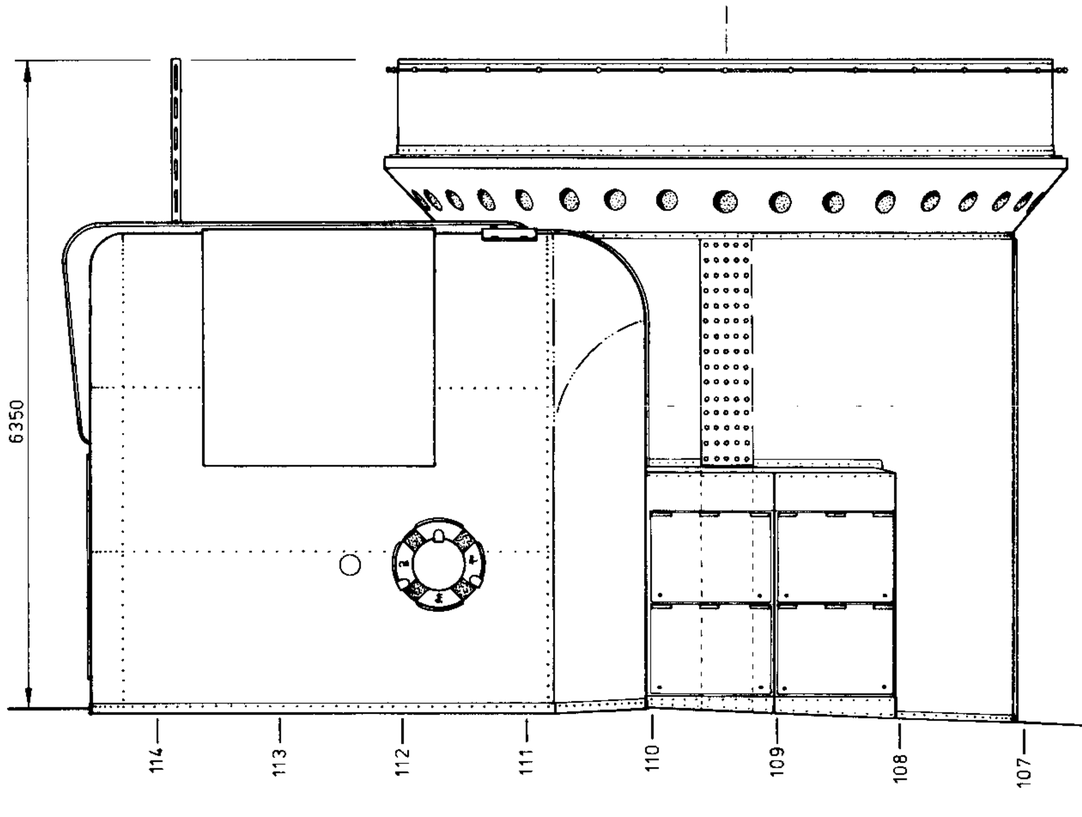
H37/2 Plan

H37/3 Front view

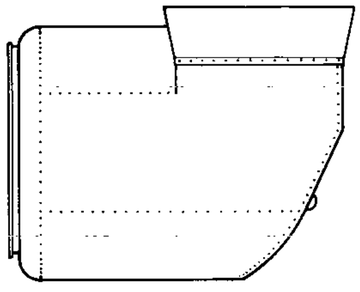
H37/4 Profile view — from ship's centre line

H37/5 Rear view

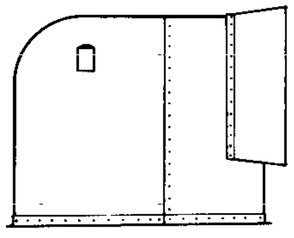
H36/2



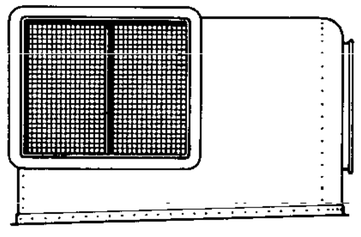
H37/2



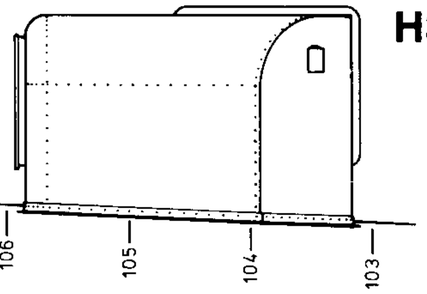
H37/3



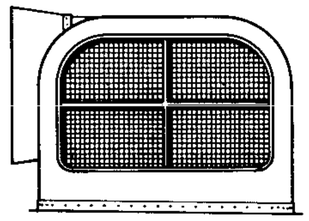
H37/4



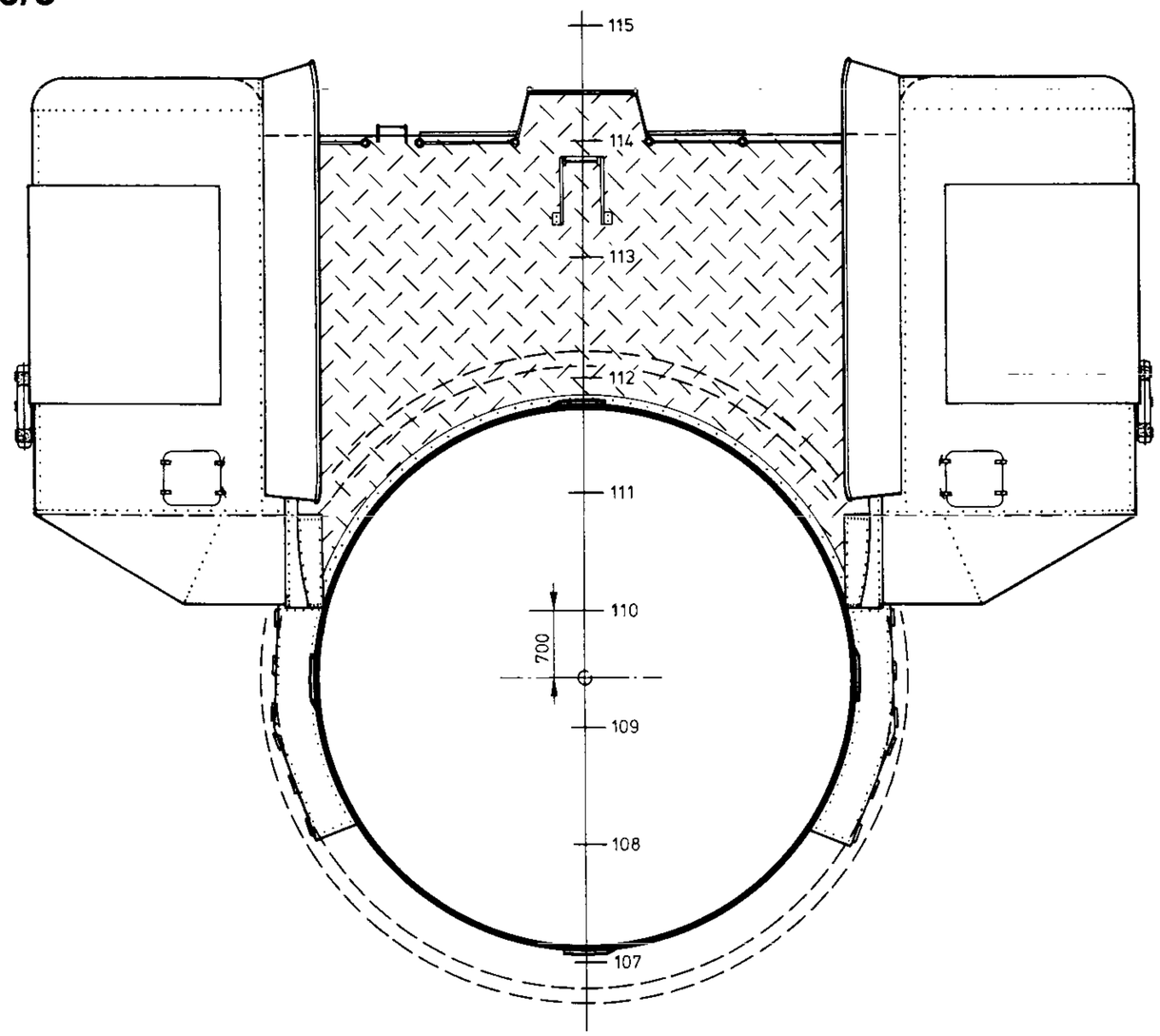
H37/1



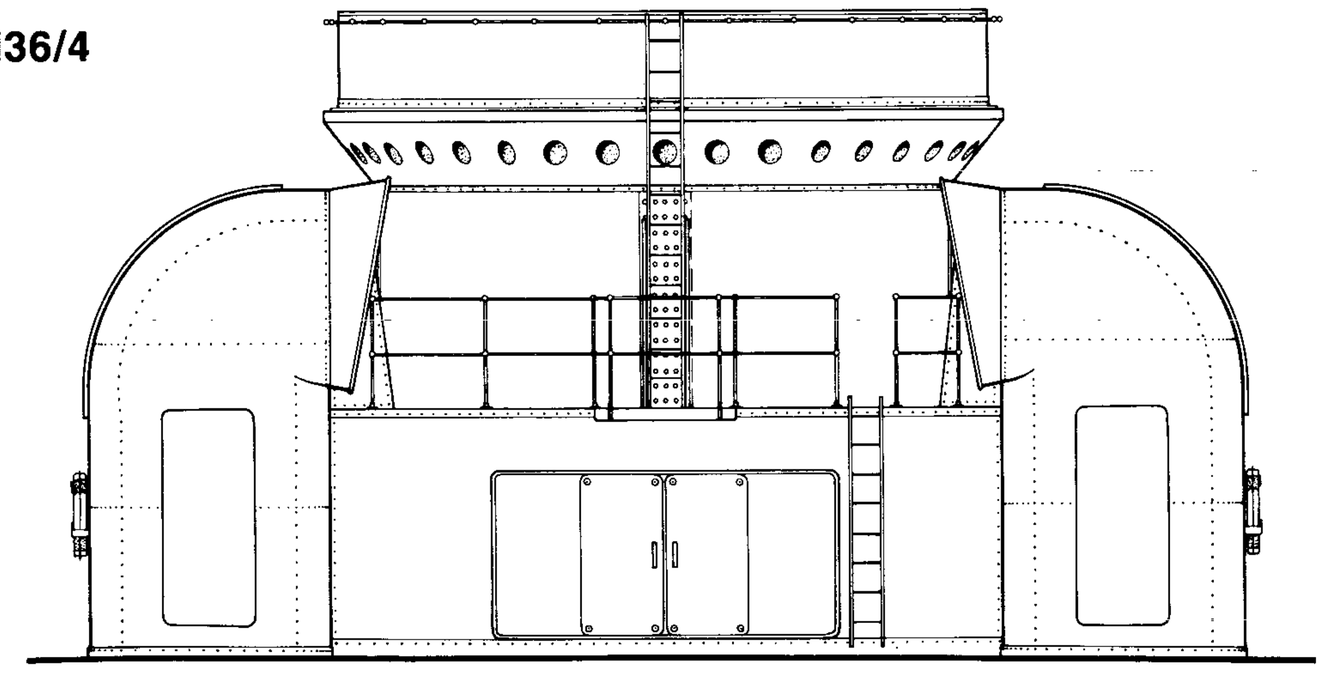
H37/5



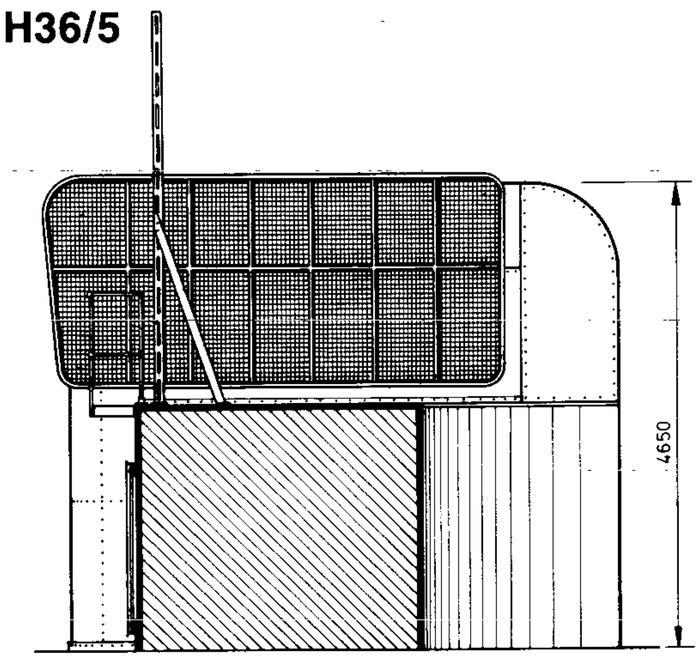
H36/3



H36/4



H36/5



H Fittings

H38 VENTILATORS AT BARBETTE No 4 15.5cm GUN TURRET (1/100 scale)

H38/1 Rear view — from superstructure

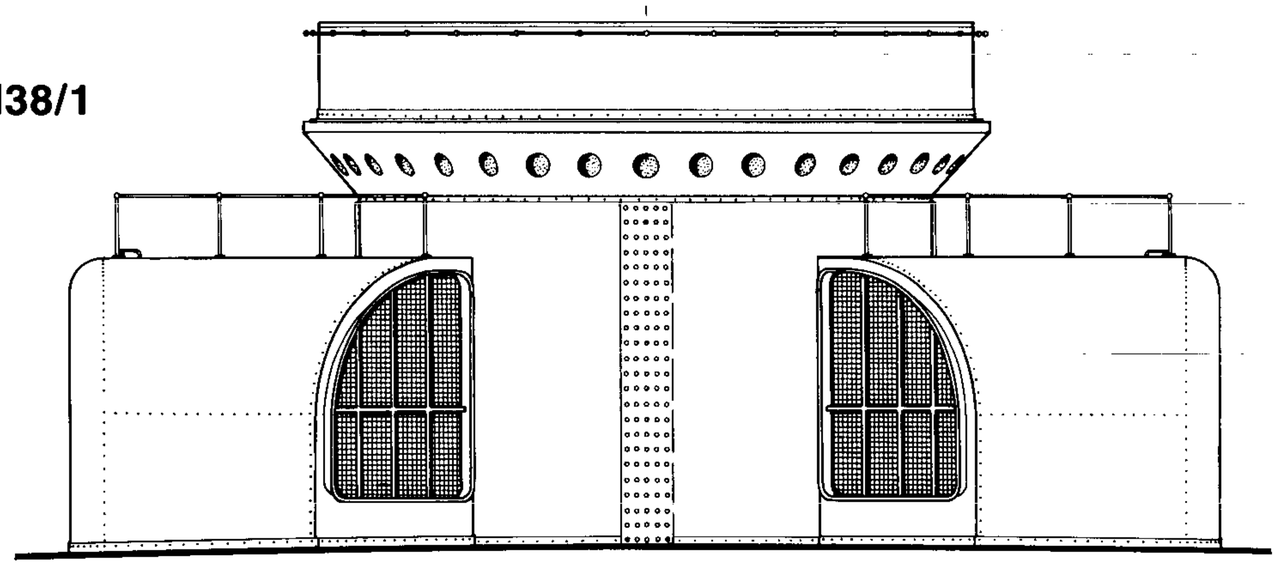
H38/2 Plan

H38/3 Front elevation — view from ship's stern

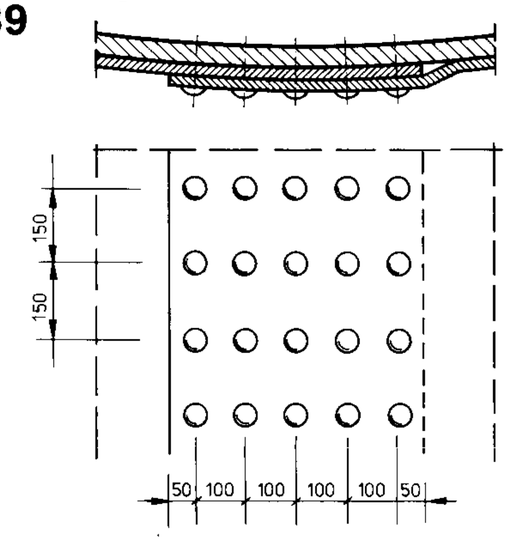
H38/4 Profile view — starboard

H39 RIVETED JOINT OF 15.5cm GUN BARBETTE COVER

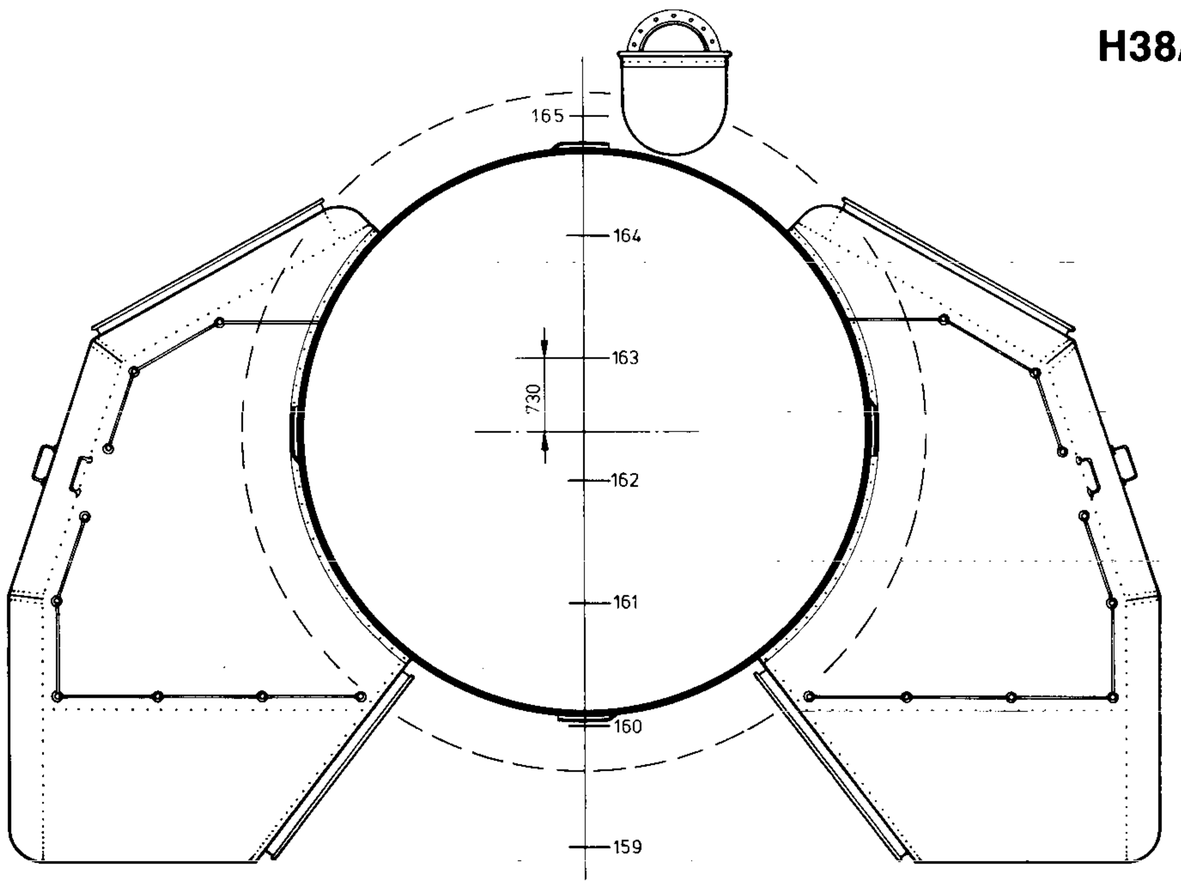
H38/1



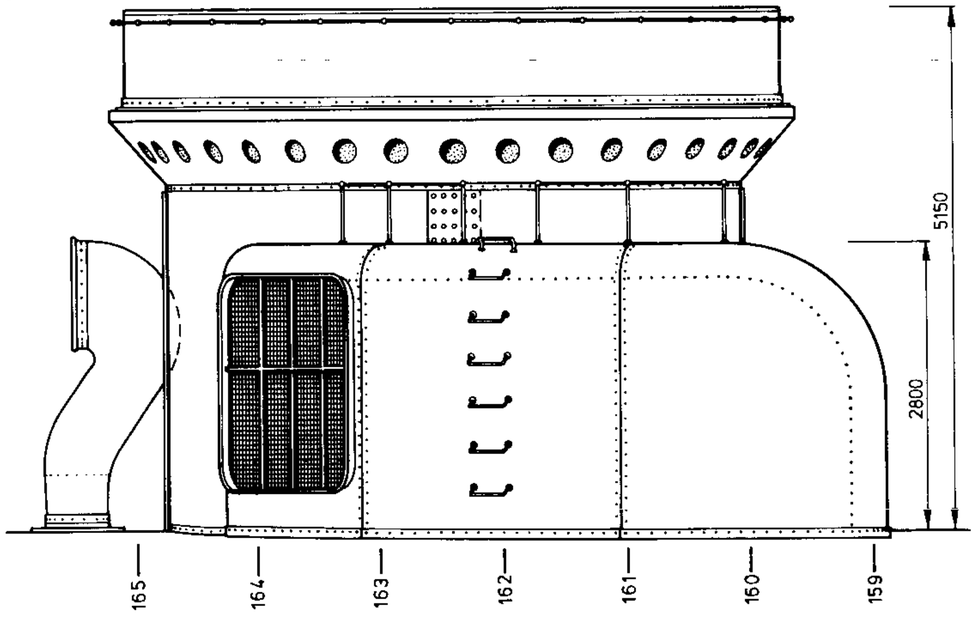
H39



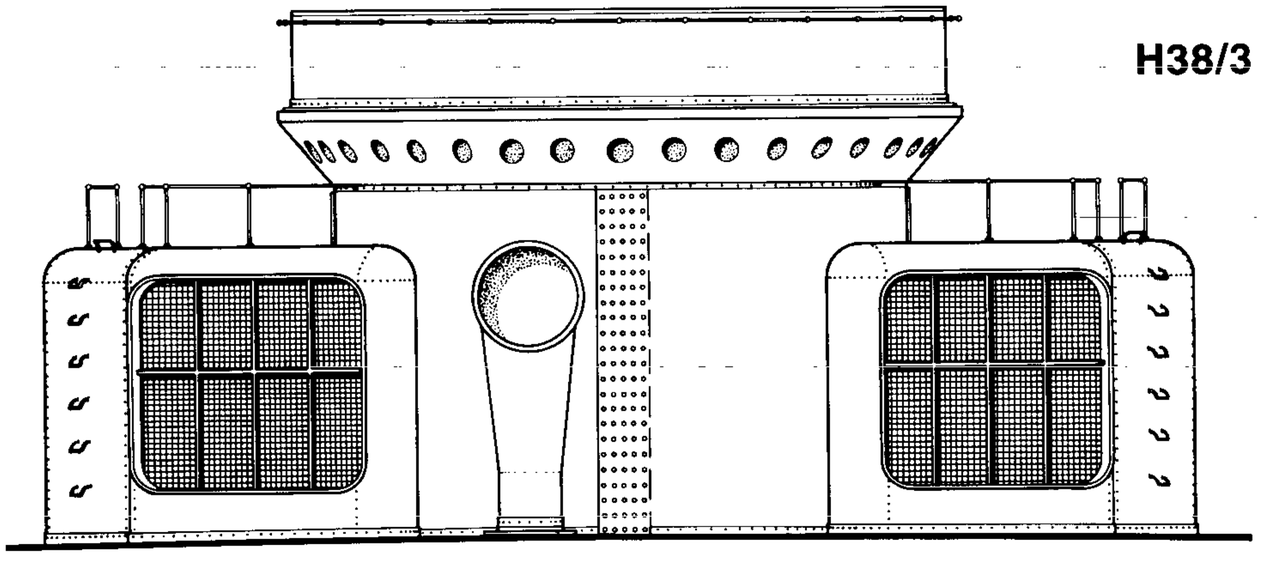
H38/2



H38/4



H38/3



H40 LARGE PARAVANE (stored in closed magazine; 1/50 scale)

H40/1 Profile

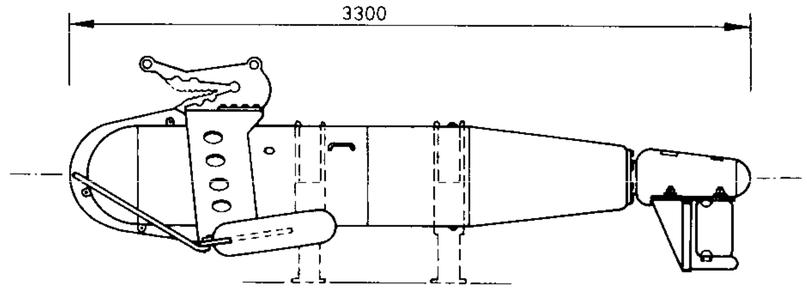
H40/2 Plan

H40/3 Front view

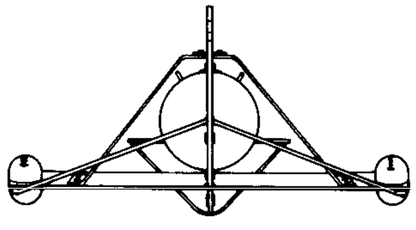
H41 FLAGS

H41/1 Main mast flags as flown on 5-7 April 1945 with Samurai banner (1/400 scale)

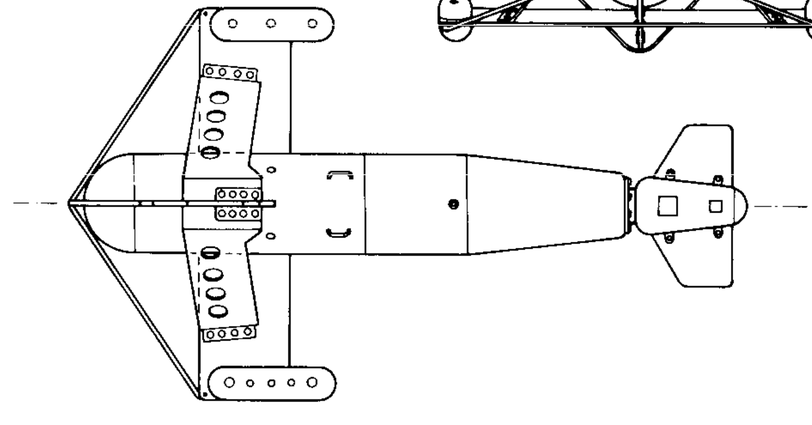
H40/1



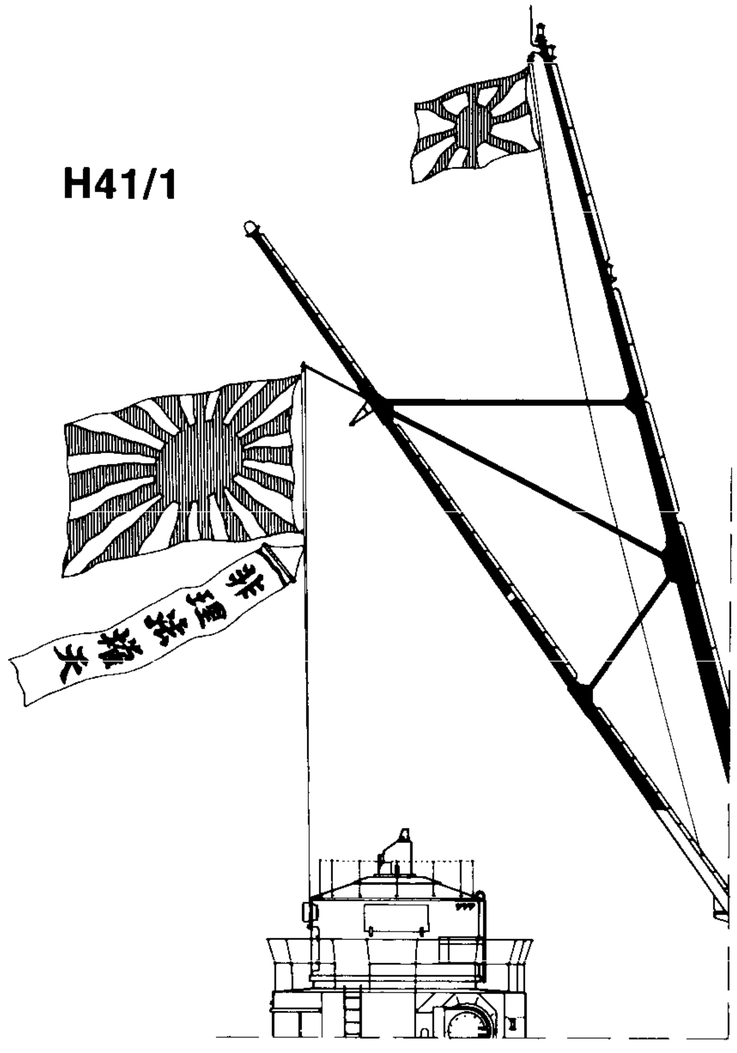
H40/3



H40/2



H41/1



H Fittings

H41/2 'Kanji' inscription of banner

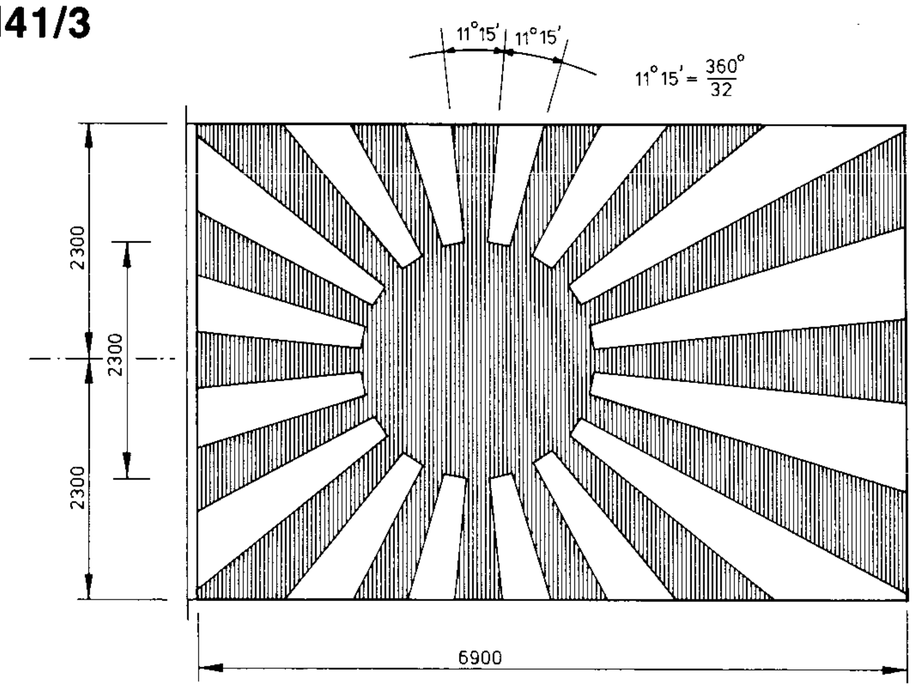
Hi Injustice
Ri Fairness
Ho Law
Ken Power
Ten Heaven

H41/3 Imperial Japanese Navy ensign (flags of these dimensions were flown only from ensign staff; 1/100 scale)

H41/4 Vice Admiral's flag (1/100 scale)

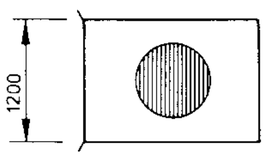
H41/5 Jack (on Jack staff; 1/100 scale)

H41/3

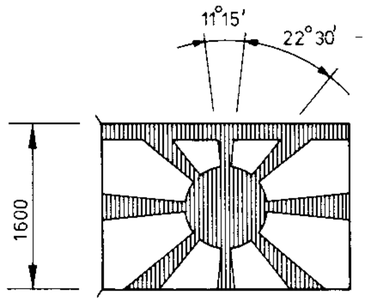


H41/2





H41/5



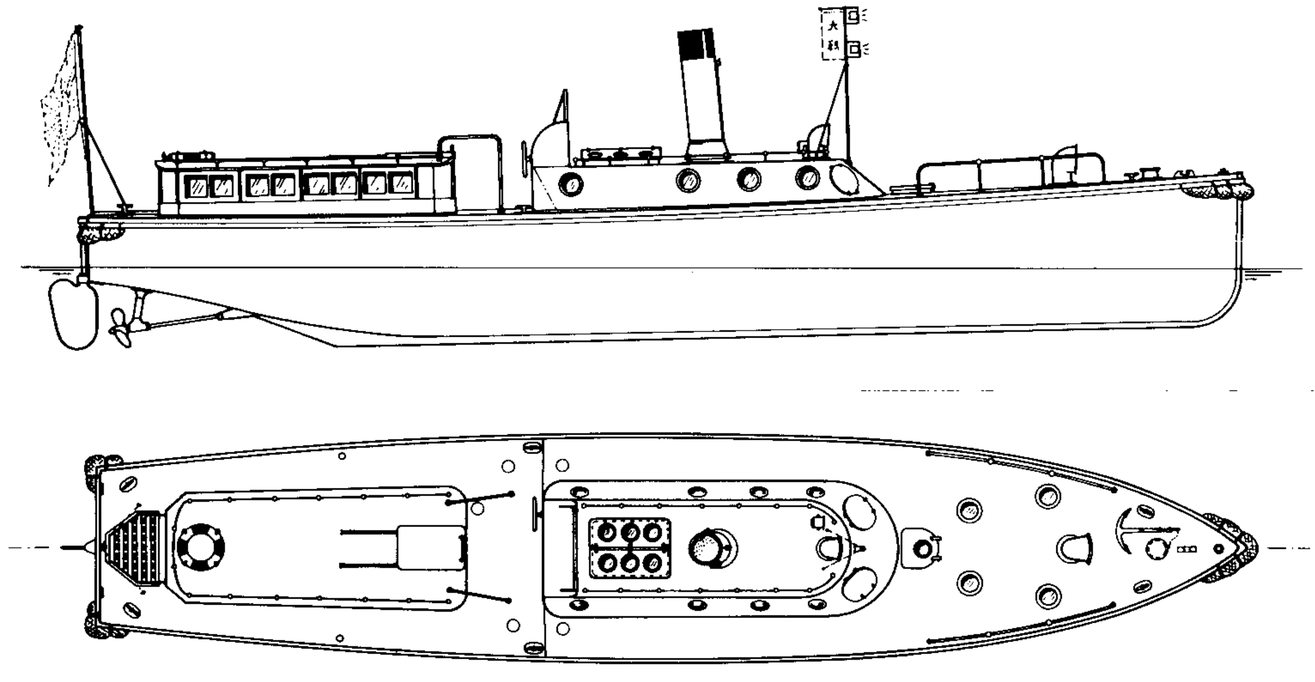
H41/4

I Boats

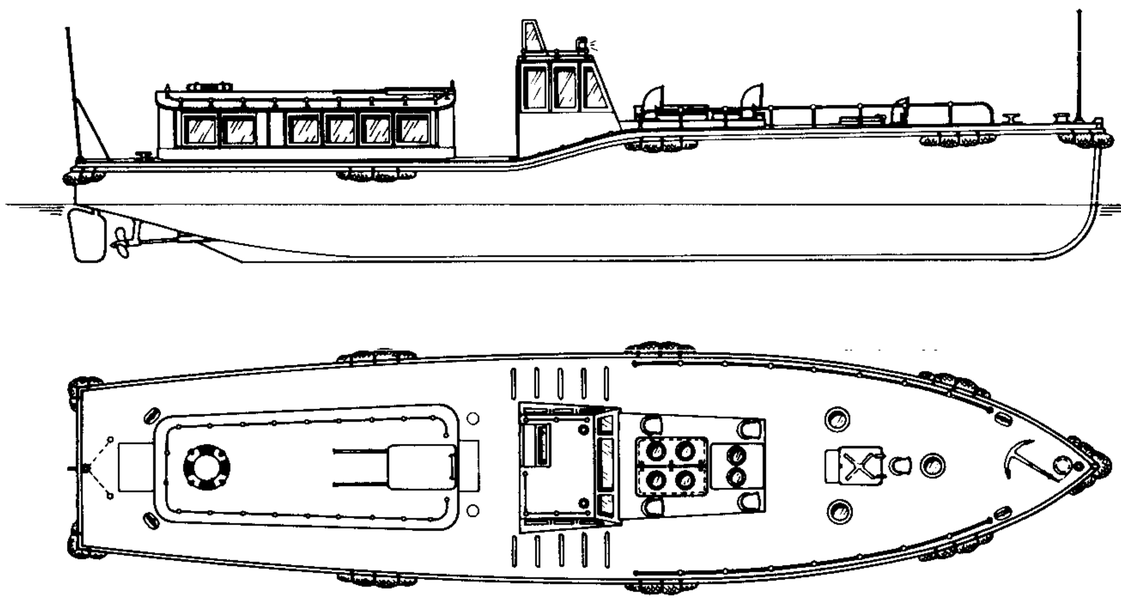
I1 **17m 150hp MOTOR PINNACE — CEREMONIAL BARGE (2 boats; all boat drawings 1/150 scale)**

I2 **15m 150hp MOTOR BOAT — CEREMONIAL BARGE (1 boat)**

I1



I2



I Boats

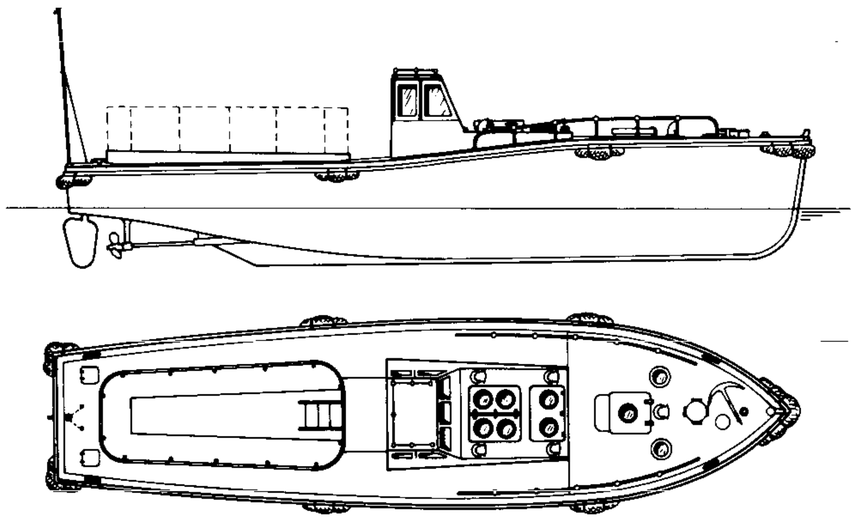
I3 **11m 60hp MOTOR BOAT (1 boat)**

I4 **12m 30hp MOTOR LAUNCH (4 boats)**

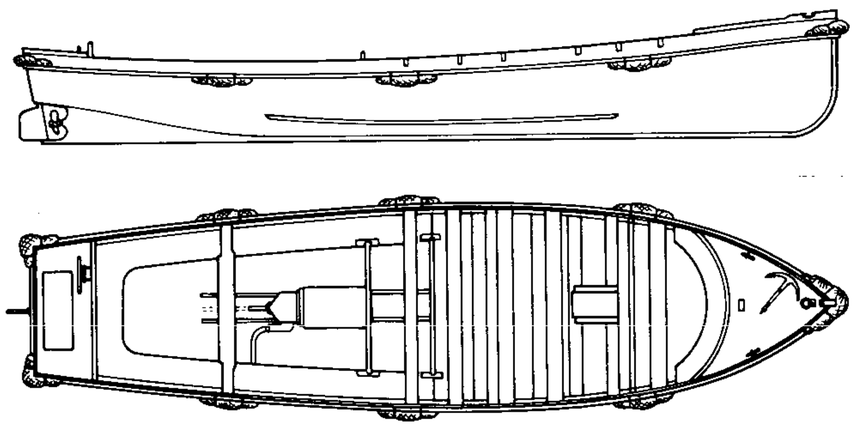
I5 **9m CUTTER (4 boats)**

I6 **6m DINGHY (1 boat)**

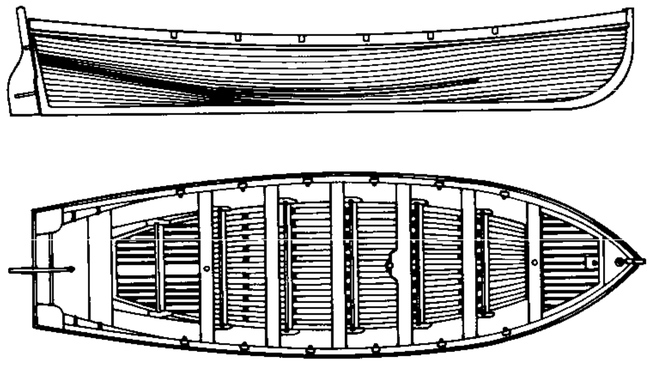
I3



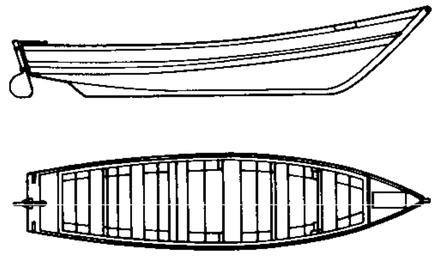
I4



I5



I6



J Aircraft

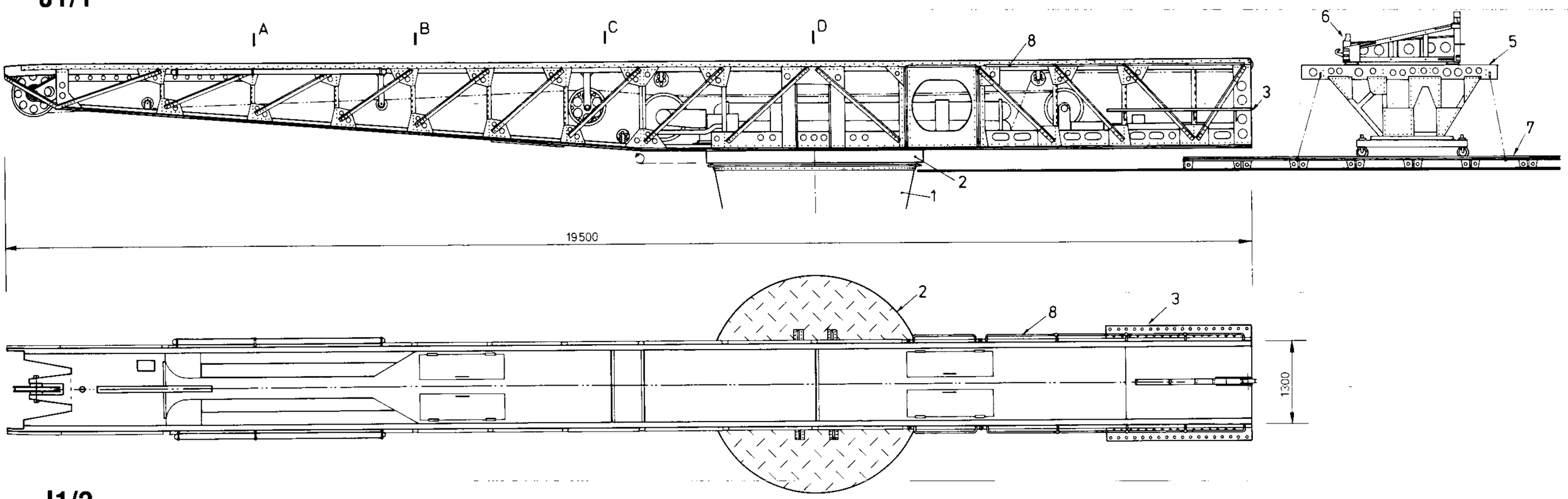
J1 CATAPULT (1/100 scale)

J1/1 Profile (with aircraft trolley)

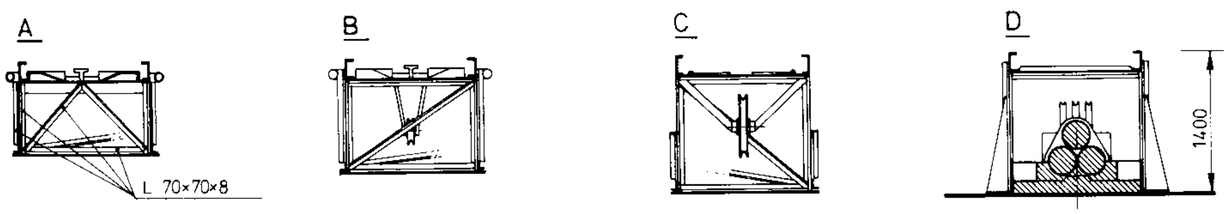
J1/2 Plan and sections

J1/3 Front view

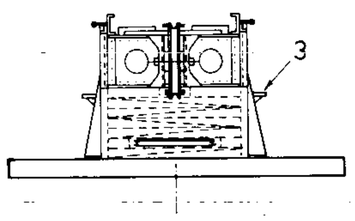
J1/1



J1/2



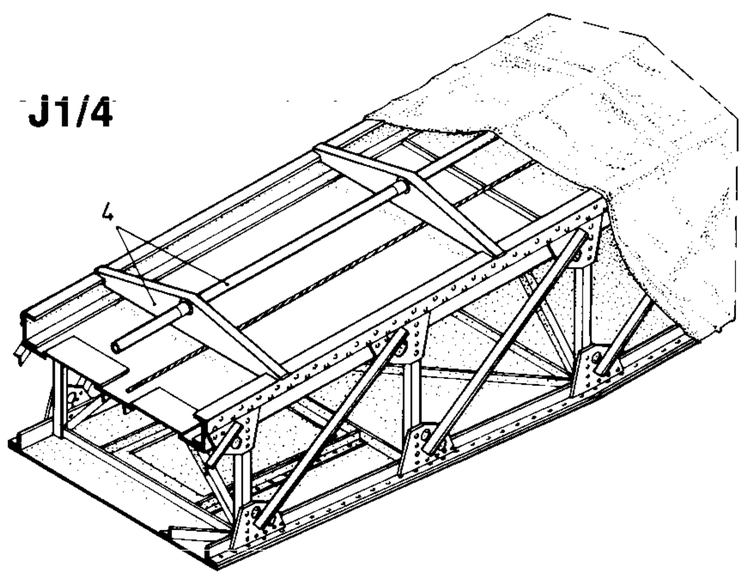
J1/3



J1/4 Covering arrangement (no scale)

1 Base
2 Roller path ring
3 Operating platform
4 Cover — wooden formers under canvas
5 Deck trolley
6 Catapult cradle for float seaplane
7 Rail for trollies
8 Hand rail

J1/4



J Aircraft

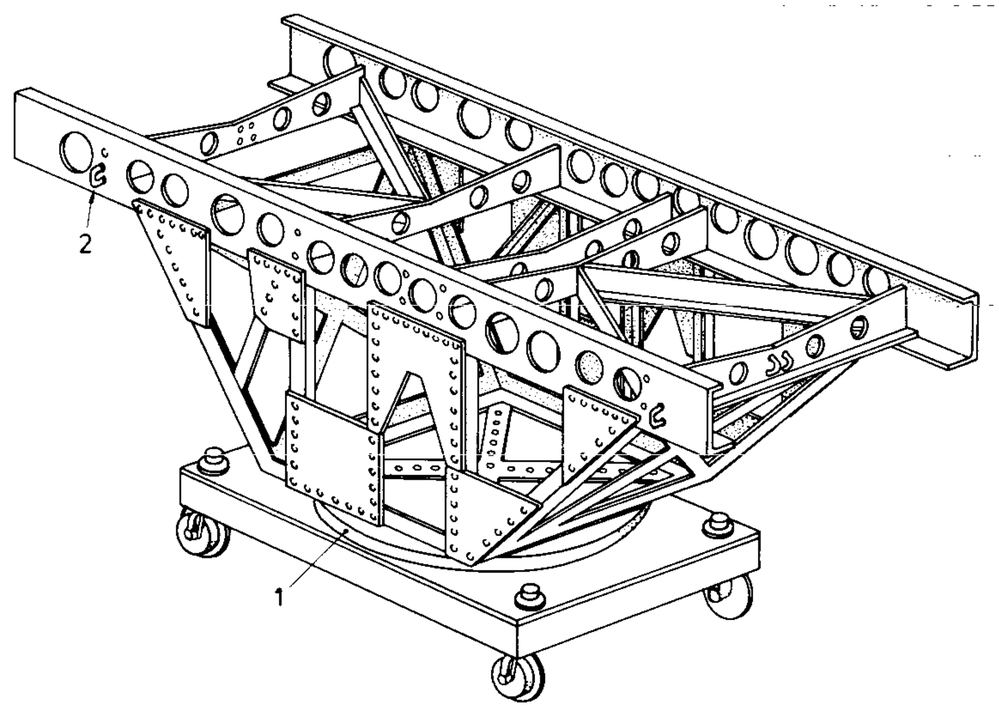
J2 TROLLEY FOR SEAPLANE TRANSPORT ON DECK (no scale)

1 Turntable
2 Eye for lash to deck (with ropes)

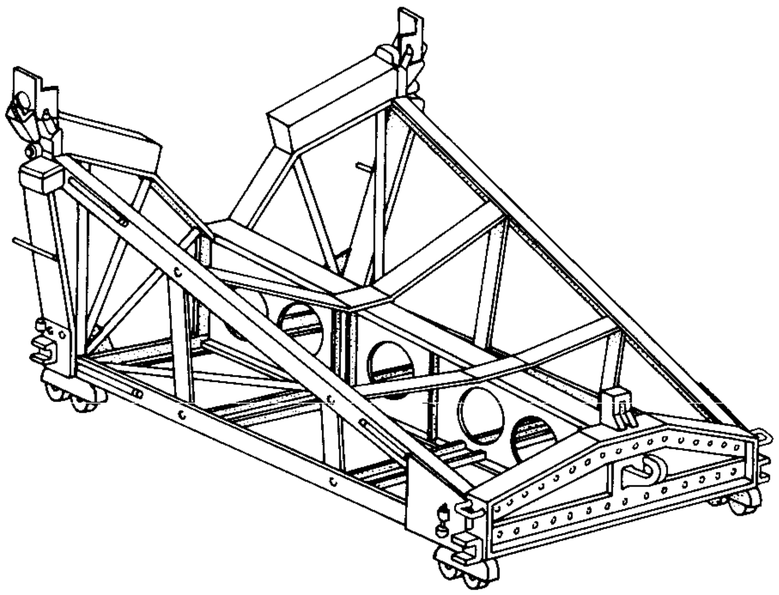
J3 CATAPULT CRADLE FOR SINGLE-FLOAT PLANE ('Pete')

J4 CATAPULT CRADLE FOR TWIN-FLOAT PLANE ('Jake')

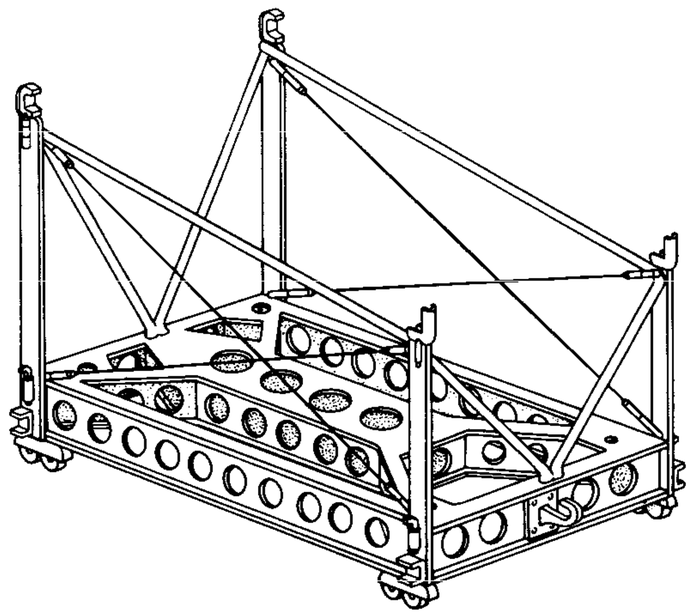
J2



J3



J4



J5 **TURNTABLE FOR AIRCRAFT DECK RAILS (1/50 scale)**

1 Stopper of trolley
2 Stopper of turn
3 Rail
4 Rotating part of turntable
5 Non-rotating girder

J6 **AIRCRAFT DECK RAILS (1/12.5 scale)**

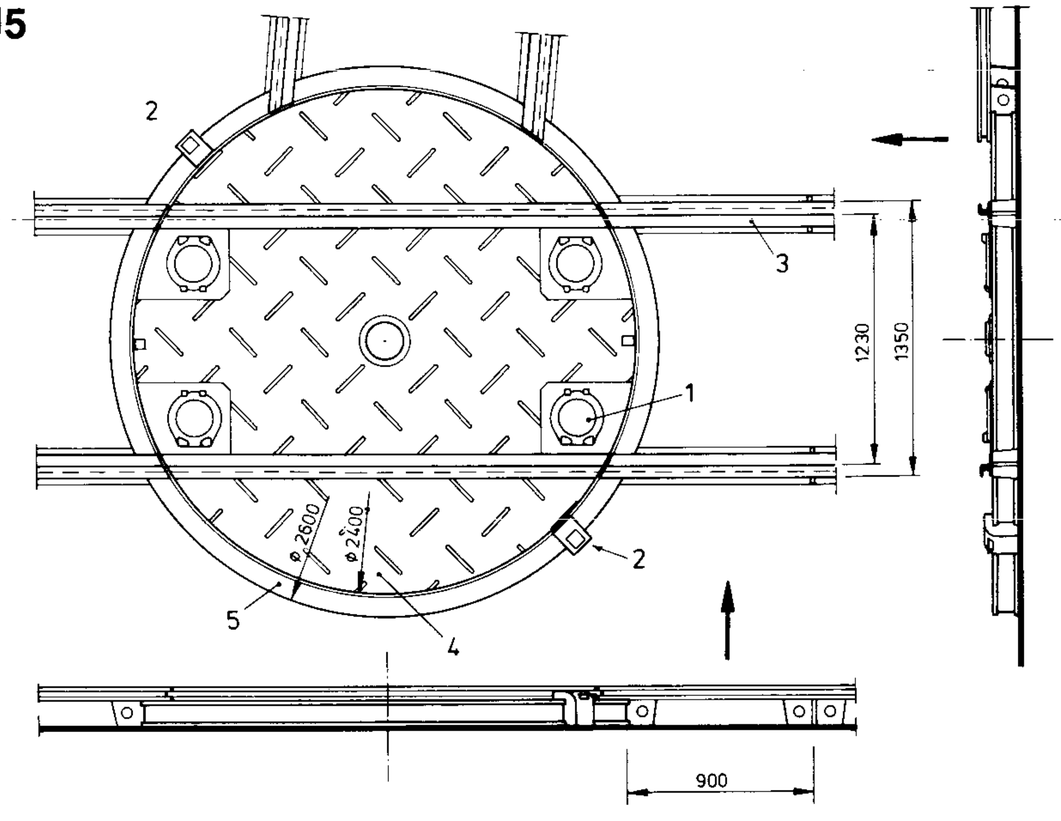
J6/1 **Deck rails — section**

J6/2 **Profile view**

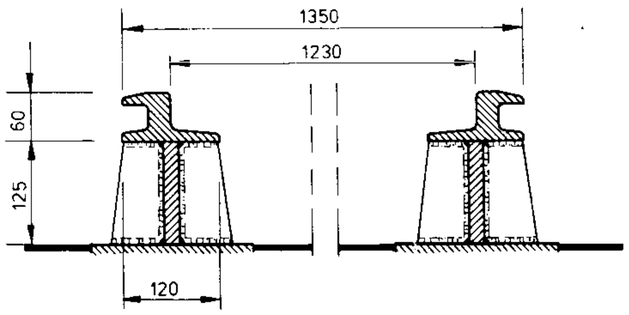
J6/3 **Axonometric view**

1 Rail
2 Rail base
3 Deck — concrete surface

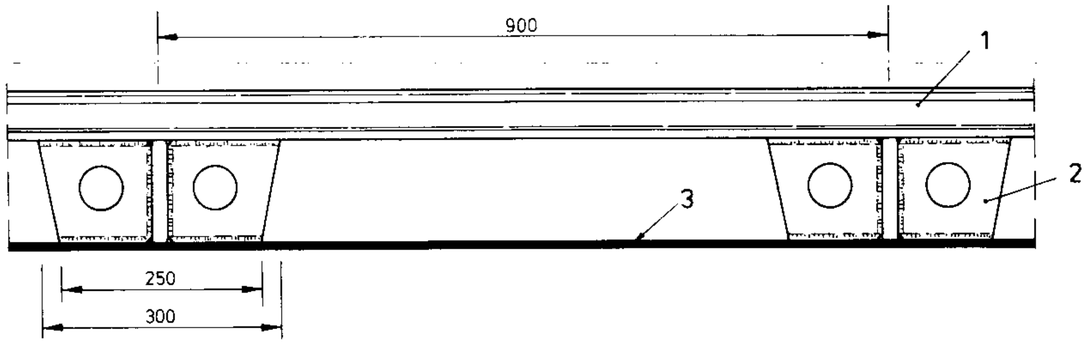
J5



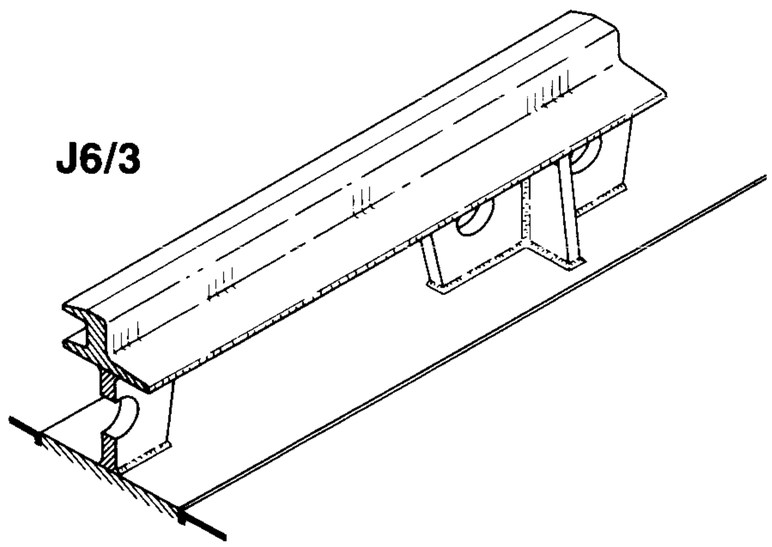
J6/1



J6/2



J6/3



J Aircraft

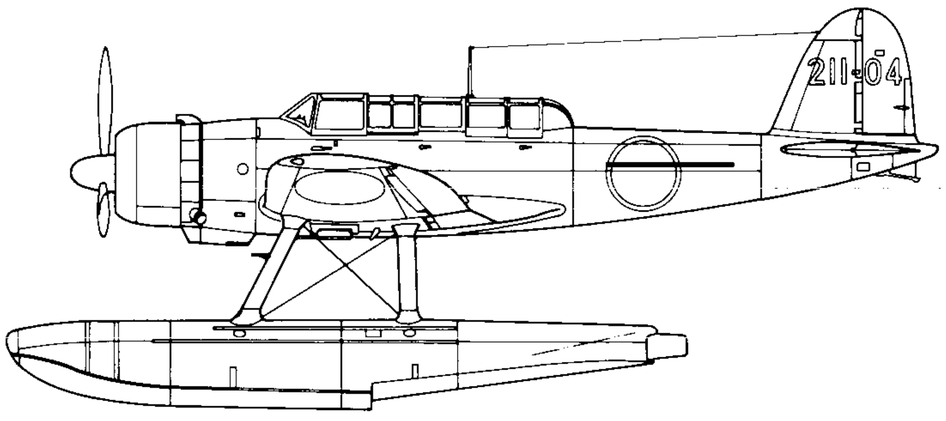
J7 AICHI E13A 'JAKE' FLOATPLANE

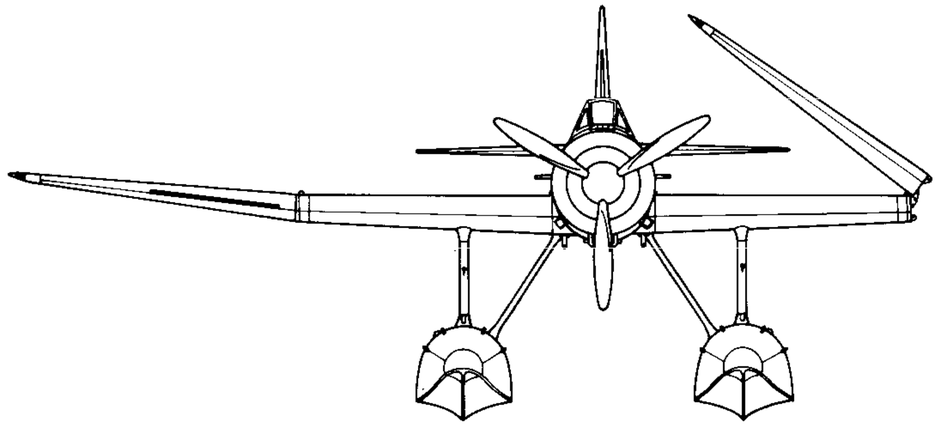
J7/1 General arrangements (1/125 scale)

J7/2 White stripes on tailplane, for rear gunner (1/125 scale)

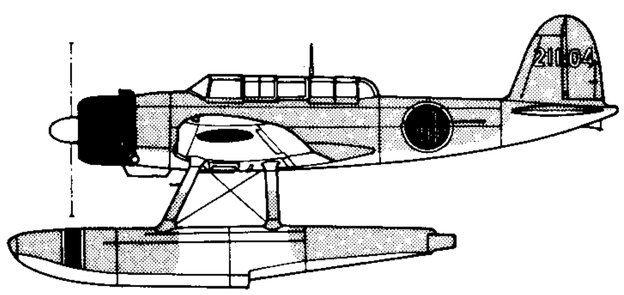
J7/3 Paint scheme (see text; 1/200 scale)

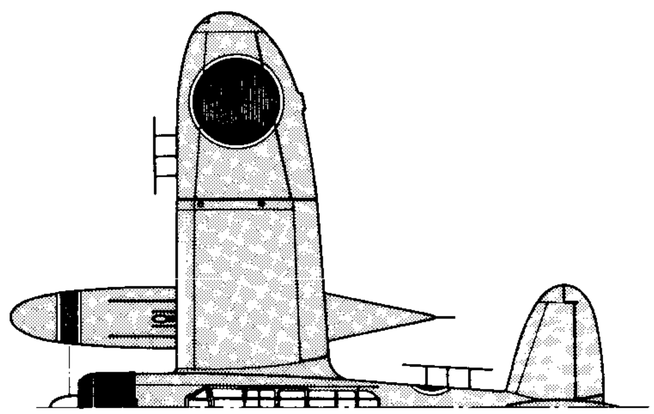
J7/1



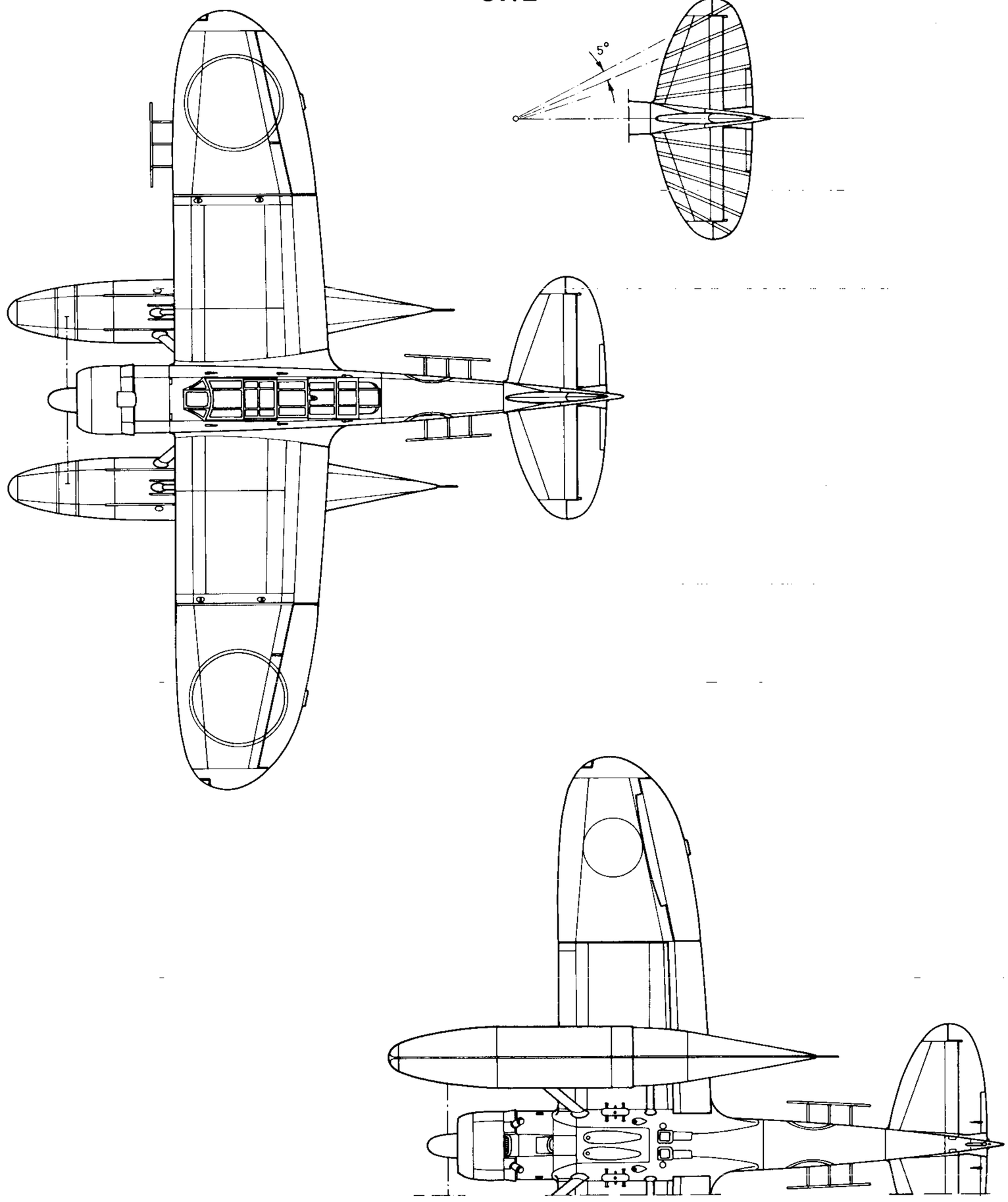


J7/3





J7/2



J Aircraft

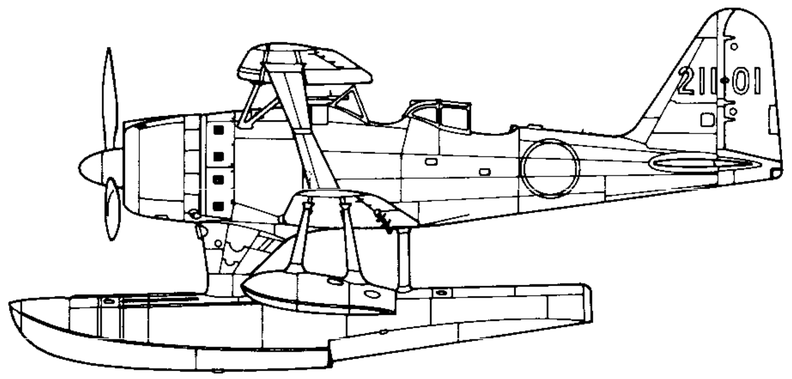
J8 MITSUBISHI F1M2 'PETE' FLOATPLANE

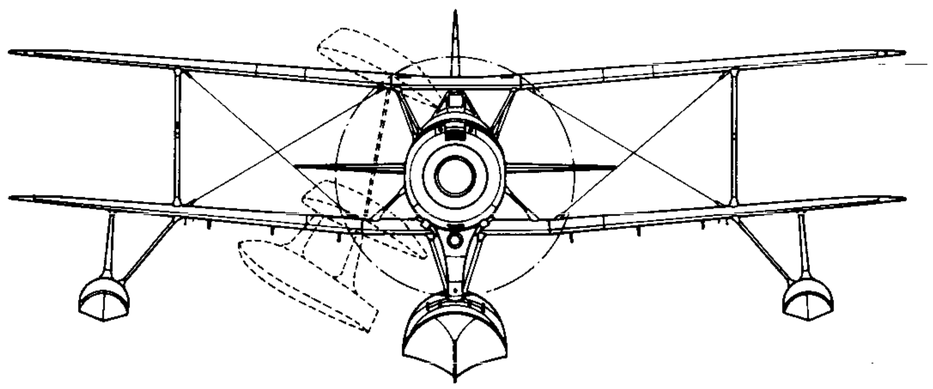
J8/1 Arrangements (1/125 scale)

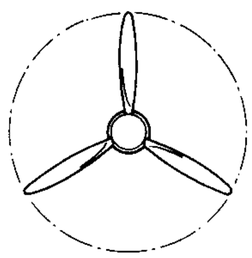
J8/2 White stripes on tailplane, for rear gunner (1/125 scale)

J8/3 Paint scheme (see text; 1/200 scale)

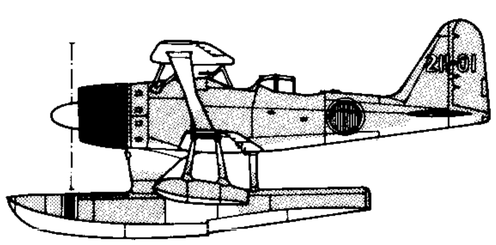
J8/1

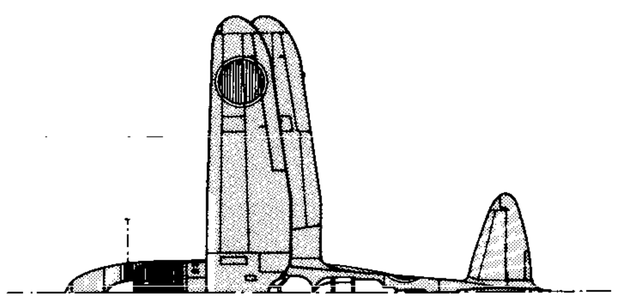




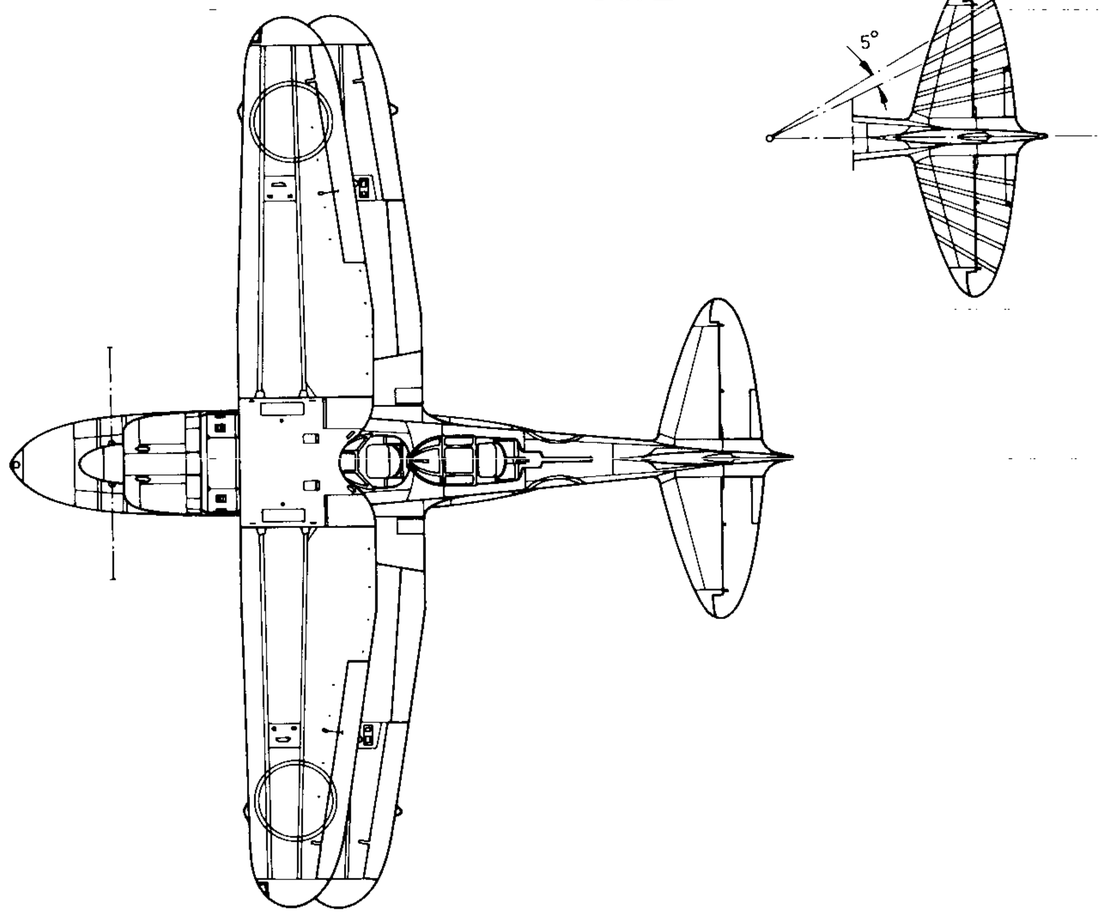


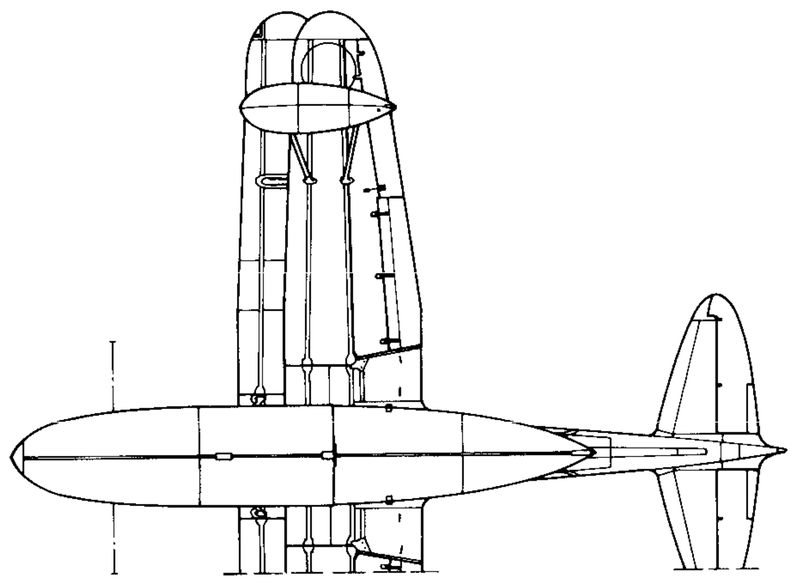
J8/3



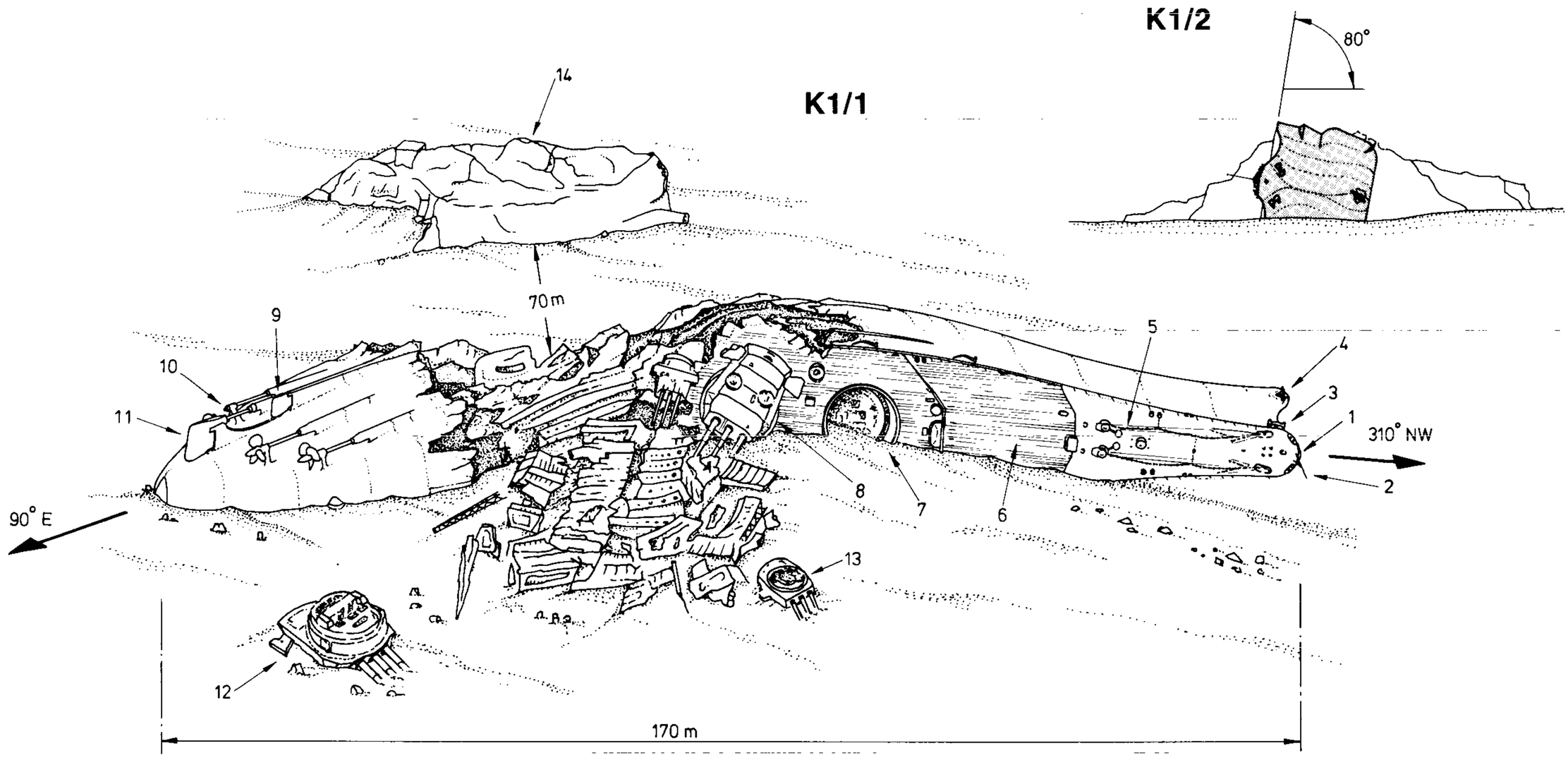


J8/2





K The Wreck



K1 CONDITION OF THE WRECK OF YAMATO AS EXAMINED ON 1 AUGUST 1985 (no scale)

K1/1 Seabed view

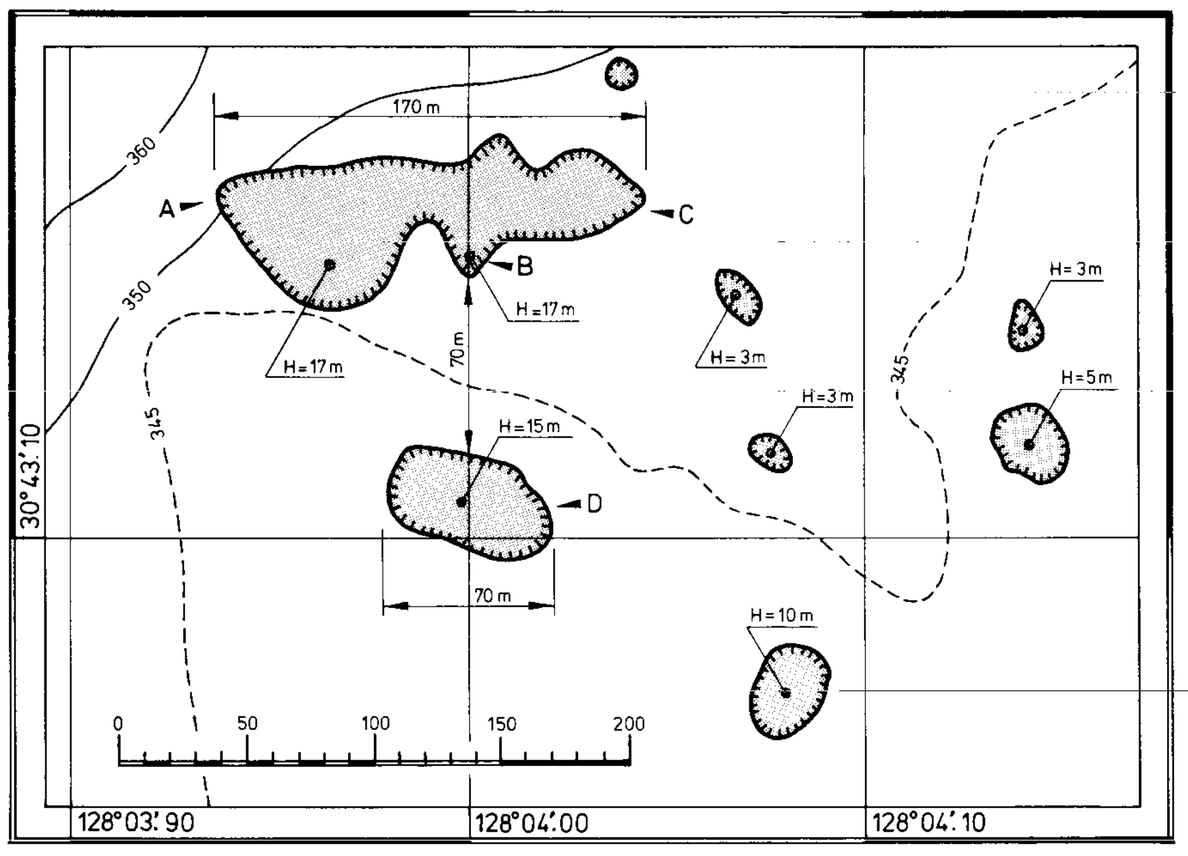
K1/2 Front view of bow section

1 Chrysanthemum crest
2 Jack staff
3 Anchor
4 Bulbous bow — damaged
5 Anchor chain
6 Wood deck
7 No 1 main gun turret barbette
8 No 2 main gun turret
9 Auxiliary rudder
10 Missing starboard side propeller
11 Main rudder
12 No 1 (?) main gun turret
13 15.5cm gun turret
14 Large part of hull structure

K2 MAP
The larger sections of the wreck are shown in grey with the height of the structure above the seabed. The ship is embedded in the sandy bottom

A Bow part of the ship
B Possibly the bridge structure
C Stern
D Large part of hull structure

K2



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Anatomy of the Ship

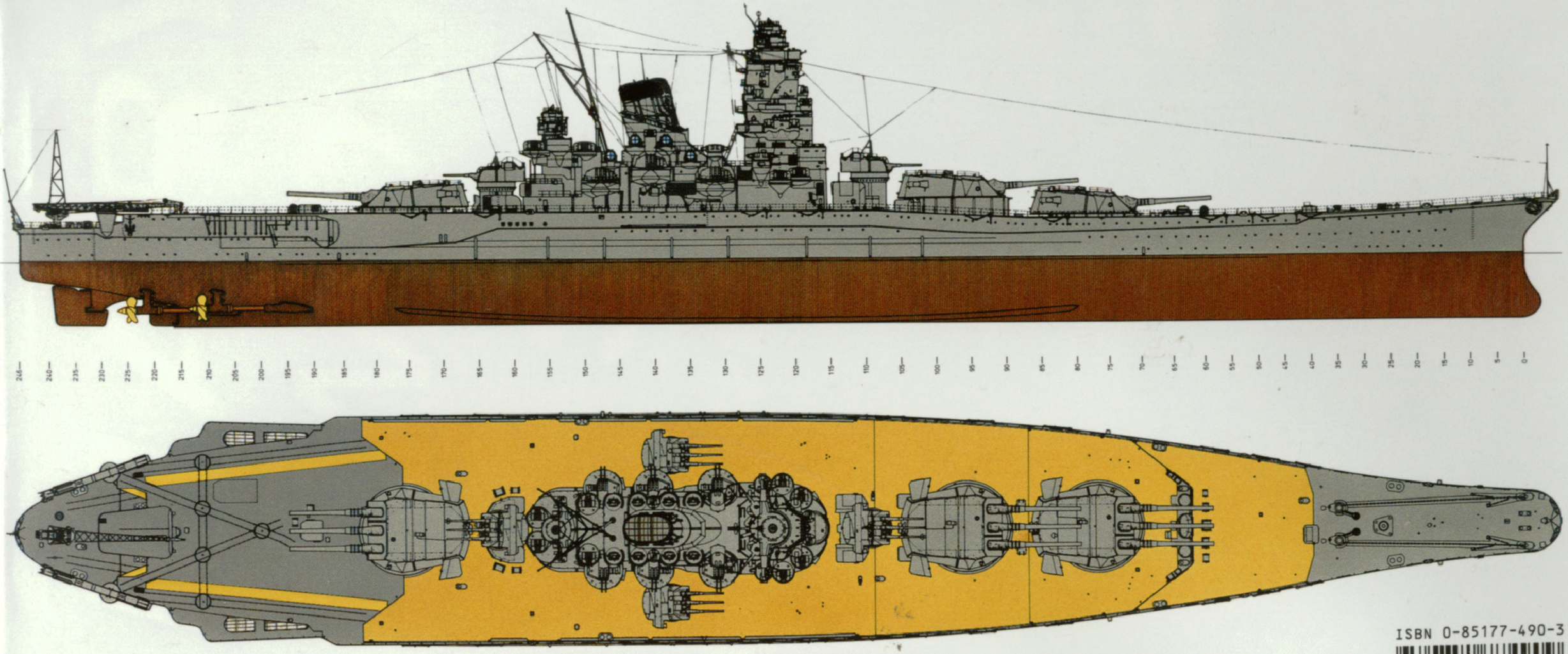
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