

Figure 13. Simplified cross section of the turret which shows the gun in loading position and behind it the hydraulic ramrod.

The turret was electrically/hydraulically manoeuvred. The ammunition was brought up to the gun platform from the shell and cartridge platforms via hydraulic lifts. The shell, charge-bag and case were loaded into the gun by means of hydraulic ramrods.

Empty cases were taken out of the turret through hatches in the turret's rear wall. Along the rear wall there were racks for placing up to 12 shells (2 x 6 shells). Block and tackle and trolleys were used to get the shells into the loading trough behind the barrel. A strong fan and duct system with smoke hatches over the gun's breech drew the gunsmoke out of the turret during firing.

The turret commander stood on a platform in the rear left side of the turret. There was an internal loudspeaker, telephone and voice-tube connection to all the operator stations in the turret and the machine station. The machine station had four engine units, two were 35 kw, one was 100 kw and the other one was 250 kw.

Some of the necessary machinery and most of the controls for manoeuvring the turret were placed on the machine platform (see figure 12).

As mentioned above, the battery's fire-control centre was in Lørbærn. The target data could be taken from the direction-finding pillar and the range finder in the fire control centre or from the forward tracking stations. This «raw data» was processed by instruments in the fire-control centre so that both corrected bearing and distance were transmitted to the gun turret.

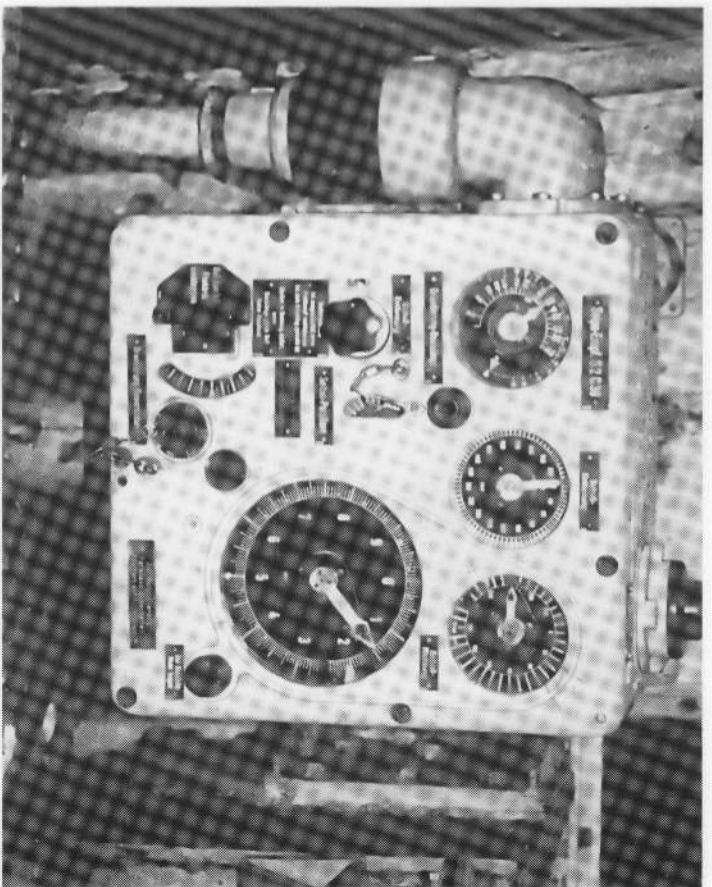


Figure 14. The M1939 Azimuth receiver (In Norwegian SIPA).  
(Photo, the author, May 1990).

The turret's side adjuster followed the movements and held two sets of indicators one over the other. The one indicator set gave the correct values for the turret's side movement. The other indicator set was fixed to the turret's traversing. It followed the sideways rotation of the turret. When the two indicator sets were held one over the other, the turret followed the target. On the range receiver (LEPA) the right height was read and thereafter set on the appropriate gun's height adjusting arc.

The fire control centre had a special instrument — the M1939 modified ballistic correction board to correct the bearings for impact to apply as a correction for the shot, calculated from the fire control centre. The corrections were set on the instruments in the fire control centre and transmitted to the turret's SIPA and LEPA correctors (see figures 14 and 15).

The battery had a warning radar in order to give a warning about targets at great distances. This gave values which were accurate enough for an over-view so that the shooting radar could be sighted on the target.

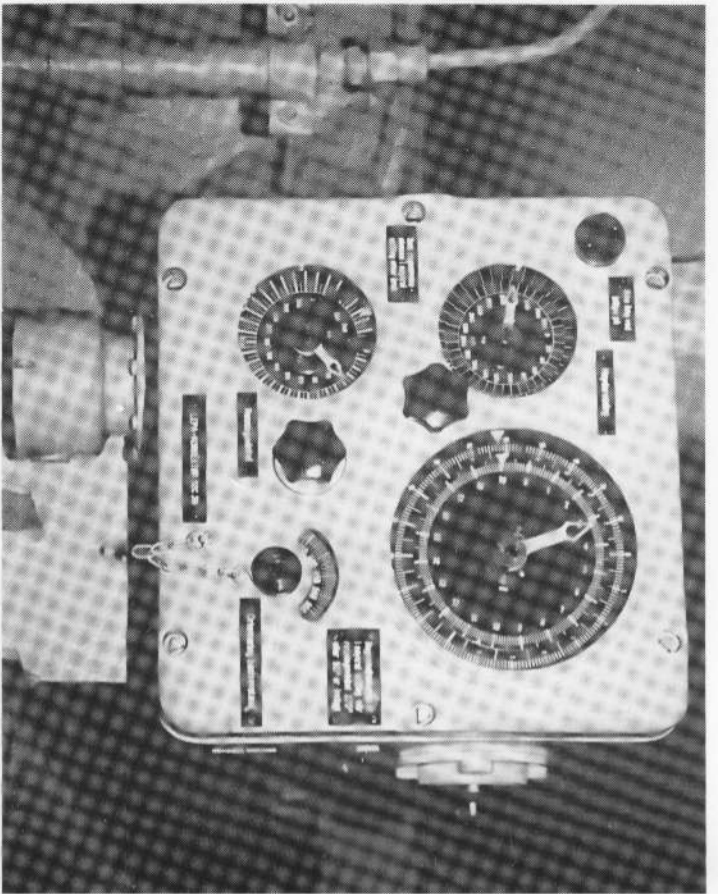


Figure 15. The M1939 range receiver (In Norwegian LEPA).  
(Photo, the author, November 1989).

### The Strategic Importance of the Outer Trondheim Fjord

The area around the outer Trondheim fjord had great strategic importance for the German occupation forces because this area commanded the access to the central areas of the Trøndelag counties. It is a short distance from the inner basin of Trondheim Fjord to the Swedish border. Therefore Norway's north-south connection can easily be severed here. The Trondheim fjord is very deep and clear (without islands, islets or rocks). In the outer part there are several entrances and outlets. The fjord is therefore excellent as a base for a fleet, perhaps especially for submarines. The Germans in fact built a large submarine base in Trondheim and they also had anchoring places for larger surface boats at Asenford. From Trondheim fjord there is direct access to the Norwegian sea, and from there access to several routes in the Atlantic ocean. In the Second World War Trondheim fjord was on the border of the range of allied planes. From here the Ger-

mans thus had a largely uncontested outlet to the sea. The Germans put a lot of effort into the control and defence of the area around the outer part of Trondheim fjord. They obviously valued the area's strategic importance greatly. An airfield was built at Ørlandet. It had a double role. Reconnaissance planes and fighter planes could use the airbase to operate way out over the ocean, including against the allied convoys to Murmansk (the former Soviet Union). At the same time there were planes based there which were responsible for defending the area against enemy attack. Another example of the importance the German occupation forces placed on the area is the very large coastal artillery defences they built here. These defences are probably amongst the largest that any Norwegian fjord inlet has had. There were many lines of defence, the outermost line started in the north with a 28 cm battery at Tarva (the Husøen 3 x 28 cm battery). This was also the first heavy-artillery battery the Germans set up in Norway. The battery was in operation from March 1941. The outermost line continued southward with a three-piece battery of 15 cm (6 inches) guns at Storfosna which was ready in the summer of 1942. This line ended at the south side of the fjord at Løkhaug where there was a four-piece battery of 15 cm cannons. The next line went above Ørlandet with the Hovde (5 x 10.5 cm (4 inches) guns) and Hooeyen (4 x 10.5 cm guns) batteries, as well as the Austrått battery. Further into the fjord there were the old Norwegian 21 cm (8 inches) and 15 cm batteries at Bretingen, Hysnes and Hambora, as well as the German-built batteries at Størdal (3 x 10.5 cm) and Selnes. As you can see the outer areas of Trondheim fjord were well defended.

The German's also had units at Frøya, Hitra and Smøla. After the war the strategic situation for the outer Trondheim fjord changed. The use of the area as a launching port for attacks against the Norwegian sea and the Atlantic ocean by the Germans was no longer a threat. The huge submarine station in Trondheim was also no longer needed. The airbase at Ørlandet was maintained and has been modernized and expanded several times since 1945. The strong coastal artillery defense system in the area was reduced. After an accident during test firing of the 28 cm battery at Tarva in the fall of 1945, this battery was closed down. Later, all the other ex-German batteries were retired except for Løkhaug and Austrått. These are no longer in use today either.

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*Translated to English by John C. Anthony*