A selection of clandestine broadcast receivers shown at an exhibition in 1945, formed the base of this and the next two chapters.

Clandestine Midget Receivers #9

Country of origin: Norway (*'Det illegale Norge'* exhibition 1945) Pt I

DATA SUMMARY

Design/Manufacturer: Radio engineers/amateurs.
Year of Introduction: After 1941.
Purpose: Clandestine listening to Allied broadcasts.
Frequency coverage: Depending on constructor and year: 1500M, medium wave or short wave.
Power Supply: Usually AC Mains.

At that time the exhibition had already fulfilled its task. People were tired of war and everything to do with illegal activities, they had more legal things on their minds.
Presently the NTM has in its collection several of these radios and photos of most of the radios that were destroyed when the ship went down. When nowadays looking at these receivers, hidden in the most amazing items such as day bed leg, coffee pot, surgical instrument cooker, cameras and telephones etc., one would wish that at that time they had our more advanced technical solutions available.

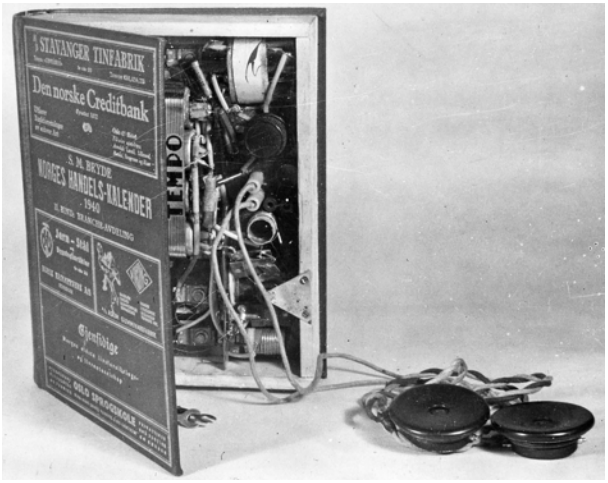
Entrance of the exhibition *'Det illegale Norge'* where, amongst other material, the illegal broadcast receivers shown in WftW Supplement chapters 226-228, was presented in October 1945.

REMARKS

Just after the liberation the Norsk Teknisk Museum (NTM= Norwegian Technical Museum) immediately prepared to collect 'illegal' broadcast receivers with the hope of putting together an exhibition on this topic. This plea was sent out via newspapers and through radio broadcasts. The Norwegian Technical Museum believed that the ingenuity of the Norwegians during the war was a so vital chapter of the technical history of Norway that it should be preserved for posterity.
The collection was well under way when in the late summer of 1945 the former leaders of the resistance decided to put together a wide-reaching exhibition concerning the illegal activities in Norway during the war.
The NTM was invited to participate with their already collected radio receivers, which was gratefully accepted as it was along the lines of what had been planned.
The exhibition *'Det illegale Norge'* (The illegal Norway) was opened in the *'Craftsman's'* premises on the 17th October 1945 by King Håkon the 7th, together with Prince Olav and Princess Martha. The exhibition committee consisted of engineer Eyolf E. Svendsen, chairman, and also Mrs Holst Hemsen, Thorvald Larsen and engineer Arnulf Frog.
The exhibition was a huge success and aroused international attention. It was decided that after the exhibition closed on the 18th November 1945, it would travel around several towns in Norway, Sweden and Denmark. For practical reasons an old boat was modified to house the exhibits. Unfortunately, the ship sank when visiting Denmark. Many of the exhibits were destroyed and the traveling exhibition was abandoned.

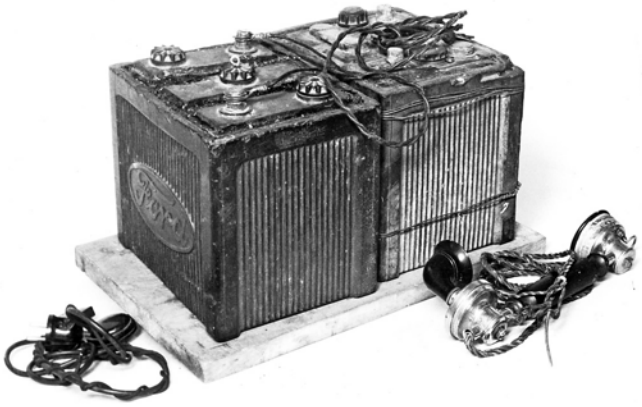
References:

- Many thanks to Gavin Pirie, Norway, for his translation of the 'Illegale radiomottagere' article.
- Permission for the use of photographs was kindly arranged by Tore Moe Namsos, editor of the Norwegian Historic Radio Society; these were published in the NTM Volund 1961, 'Illegale radiomottagere', Rolf A. Strøm, pp 141-166.
- Volund 1956, Norsk Teknisk Museum.
- Teknikk No. 2 and 3, 1945.
- Photographs and information was published with permission of the Norsk Teknisk Museum (NTM Norwegian Museum of Science and Technology) in Oslo. https://tekniskmuseum.no



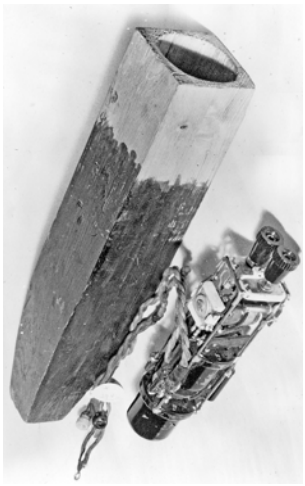
Commercial Directory.

Nobody would suspect this everyday example of Norway's Commercial Directory to be 'illegal'. Normally the directory would be found in the bookshelf, but when the time came to listen to London the book would show its true contents, which was a battery powered 4-valve shortwave receiver. It was made in august 1944 by Arne Bjørnvold in Sandnessjøen for engineer Johannes Storheil who wished to follow his sons' merits. His son was Admiral Storheil who had started to make a name for himself with the Norwegian forces in England.



Car battery.

Radio hidden inside an emptied car battery, built and used by Andr. E. B. Sørestrand, Laviksdal in Sogn. Sørestrand owned a repair shop for radio and car batteries etc., and had three of these car batteries on the workshop bench. One housed the receiver, the other an anode voltage unit and the third provided the filament current.



Day bed leg.

Who would imagine that one of the legs of a day bed would contain a 2-valve shortwave receiver? But it was the case with this day bed used by Aksel Sørra from Sandnessjøen. The mastermind behind this radio receiver and concealment was Alv Bjørkelo from the same town.

False teeth.

Dental technician and first aid ensign Arthur Bergfjord was the man behind this amazing masterpiece, building a receiver inside a set of false teeth. This may well be the world's most amazing receiver and not to mention also one of the smallest. Arthur Bergfjord arrived at the prison camp Schildberg near Wartheland in Poland in February 1944, where he together with other Norwegian officers was interned until the spring of 1945.

A dental technician by profession, he was put to work at the hospital in Schildberg. There were no radios in the hospital or at the camp apart from those used by the Germans.

Being a handyman, he soon started building radio receivers for his fellow Norwegians. He built four midget receivers for the Norwegian officers, so they could listen to the daily news from London. Headphones and crystals were smuggled in from the British camp. The receivers were easily hidden in a pocket and at 9:30 pm every night all the Norwegian Officer's in the camp were updated with the latest news from London. The news service was very well organized and functioned perfectly to the last day. The idea of building a receiver in a set of false teeth came to Bergfjord one day when he repaired the false teeth of the barracks chief.

In an interview just after the war he explained when showing the false teeth 'these false teeth fitted perfectly to Dagen, our Norwegian barracks chief. The three clips at the rear that were made to grip the only molar the chief had left were for attaching the antenna and headphones. The coil with 52 windings were well hidden in the palate…' - '…and here is the detector', when he pulls out the rear molar, and in the hole under the tooth, the small crystal and coil became visible. 'Not even the smartest German would be aware that the barracks chief walked around with a first-class receiver in his mouth' continued Bergfjord.

'Did it work well?', Dagen was asked.

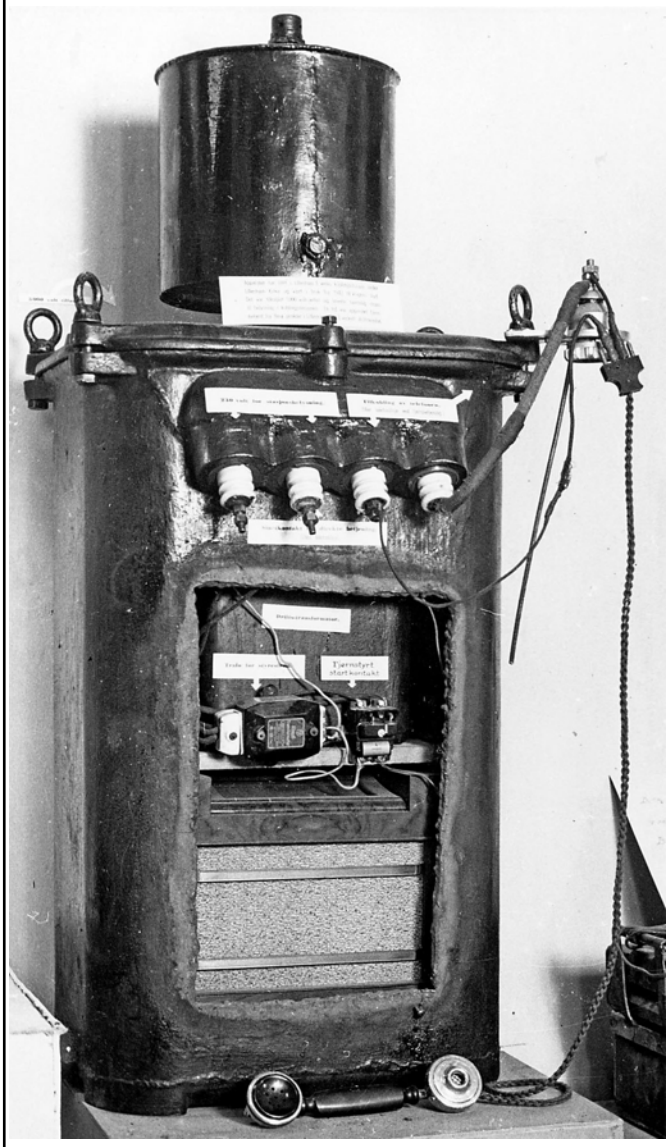
'Yes, it worked very well. We did not connect the earth lead since in doing so we only received German transmissions. Without it we could listen to the BBC world service program clearly'. It must be noted that Bergfjord was the first Norwegian officer who made it back home after a daring escape from captivity. After the war he continued his profession in one of the Norwegian cities.

DESK TELEPHONE.

The person who constructed this radio was unfortunately unknown. The listening problem had been solved in an elegant way without a doubt. The telephone was fully functional for outgoing calls. That it could not receive calls (except for listing to London) because the space of the bell was taken by the radio, was not readily noticeable. On the photo the variable capacitor and valve can be seen.

30kVA TRANSFORMER.

This masterpiece of the camouflage art was a radio receiver hidden in a high voltage transformer. It was Reider Quamme from Lillestrøm electric works who was responsible for this feat.
The receiver, a Phillips mono-knob, was remotely switched on and off, connected to the company's internal telephone system. The transformer had full power of 5000 volts, something that helped keeping inquisitive Gestapo fingers away.
Quamme could, at his leisure, at home or at the office, lift the handset and receive the latest news from London. But it could be nerve-wracking none the less, as the following story confirms.



Once while listening, the NS ('Nasjonal Samling' Quislings party) town mayor of Lillestrøm came in unannounced, and without batting an eye Quamme continued with his innocent 'telephone conversation' with London radio, and rounded off by saying 'yes thank you, we will talk again tomorrow'. Naturally these words had a deeper meaning than the mayor could ever understand.
After the liberation the former town mayor was imprisoned at Ilebu and read about the story in a magazine. Returning home after his sentence, he asked Quamme if this story was true. He remembered the visit and at the time thought that the telephone conversation was quite long.
Quamme explained the technical setup behind the receiver : the goal was to find a hiding place that would be impossible to find even with the most thorough searches. I think I found a solution that would provide the greatest safety possible. In an empty pot belonging to a 30 kVA, 5000-volt transformer I installed a radio receiver. On top of this I connected a single-phase transformer of 1,5 kVA for 5000 volts and connected internally through the tubes inside the large pot. On the frame that supported the small transformer I connected a relay, and a ring transformer with rectifier and fuses (for remote control). The transformer was mounted in a high voltage area in the switching station in Lillestrøms church basement.
To ensure that everyone would believe that this was a normal transformer the lights of the switching station were connected to it. If anyone should take a thorough investigation and disconnect the transformer the lights would go out at the station and would convince all that everything was as it should be.
The principle behind the apparatus was quite simple. The receiver was pre-tuned to a fixed wavelength, usually 42 meters, and connected directly to the telephone line. As an antenna I just used a condenser connected to the power line.
Connecting and disconnecting was controlled by the telephone itself. By connecting 2 wires, the relay would switch and connect to the radio receiver to the mains. Shortly after this the radio signal could be heard in the handset. With practice this could be done so that no onlookers would even be aware.
If I wanted to listen to stations on another wavelength I would have to go to the transformer and listen via headphones. To save myself if anyone came in while listening, or they should find the headphones I invented a new way of controlling the insulation condition on the high voltage grid by listening to the tone of the alternating current. I could demonstrate to a certain extent to professionals in connection with patented apparatus to similar use.
To give creditability I wrote down a comprehensive protocol that lay beside the transformer.
I was able to frequently listen to several transmissions each day and spread the news as rumours, but it was often difficult to keep quiet when mocked for spreading such stupid and untrue rumours.
Just before I prepared to relay the news on a more concrete basis I was arrested and deported to Germany, but not because of the radio. It remained undiscovered until the end of the war and was sometimes put to use by one of my colleagues.