

TRANSLATION FROM THE SWEDISH ORIGINAL BY
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OF AN ARTICLE APPEARING IN THE
MARINE RUNDSCHAU
COVERING THE SERVICE OF RADIO INTELLIGENCE
AND RADIO SECURITY
IN THE BRITISH AND GERMAN NAVY
DURING THE WORLD WAR.

THE USE OF WIRELESS TELEGRAPHY IN THE WORLD WAR,
MORE ESPECIALLY FROM THE NAVAL STRATEGICAL POINT OF VIEW

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"A wise old owl lived in an oak;
The more he heard, the less he spoke;
The less he spoke, the more he heard;
Why can't we be like that wise old bird?"

Lord Fisher, Admiral of the Fleet, and First Seelord for the greater part of the war, uses the above verse from an old English poem in his "memories" as a motto for a chapter on the British Admiralty Staff. That old verse absolutely hits the nail on the head, when it becomes a question of dealing with the question of the use of wireless telegraphy from the strategical point of view. Elsewhere in the same chapter Lord Fisher wrote:

"The First Seelord and the Commander in Chief of the Fleet have to be Siamese twins. And when war comes, the Admiralty Staff at the Admiralty - by listening every moment to the wireless messages of the enemy (in so far as the latter dares to use them - puts the First Seelord in a position to let his twin brother at sea know exactly what is going on. He picks up the wireless messages, and not necessarily the Commander in Chief, as a wireless installation on shore has far more powerful receivers than an installation on board ship. When you look at that spider's web of wires on the roof of Admiralty, then thank God, that England is more or less free, because that net of wires was rigged up by a crowd of bluejackets before anybody smelt a cat. A German naval letter intercepted at that time was a source of great personal joy to me, because it revealed the truth, that wireless telegraphy is the strong navy's weapon. For it is the development of wireless telegraphy that has rendered it possible to determine

the direction of which somebody is telegraphing and to go straight for it. Consequently, the German is afraid to open his mouth. If he does so nevertheless, the message is of course in cipher; that the Admiralty succeeded in deciphering that code in one of its glorious achievements in the late war. During my time it never failed once in deciphering. Yes, wireless telegraphy is the strong man's weapon."

Thus far Lord Fisher. - But wireless telegraphy is a dangerous weapon, rightly used: dangerous for the enemy; but carelessly used much more dangerous for one's self. The English recognized that fact, but not so the German, even at beginning of the war, and that is why their wireless organization became something entirely different from that of the Germans. It is with these facts forming the background that the whole question of the use of wireless telegraphy in the war should be reviewed.

I. THE ENGLISH WIRELESS SERVICE ORGANIZATION

A. ORGANIZATION FOR LISTENING-IN TO THE ENEMY.

From the very beginning of the world war the listening-in to the wireless communications of the enemy, prepared in advance by the English, was in working order. In order that not a single message should be missed, no matter on what wave length, they had a large number of receivers, to each of which was assigned a certain wave section. Everything received was sent direct to the Admiralty, where a special de-coding office for the Allies had been established. Thanks to this arrangement of paying attention to everything received, an enormous and extensive mass of material became available, and before long the Associated Nations were masters of the German Code just as much as German themselves. This knowledge was however for the greater part augmented by the chance discovery of German secret documents. Thus, for instance, the Russians, after the stranding of the small cruiser "Magdeburg" near Odensholm, are said, to have found an iron safe sunk near the cruiser, containing several German secret documents and books, including inter alia the key to the Code, signal books and charts. The collection was increased still further by nine-charts of the North Sea and English coast, when about January 1915 the "U-31" was driven ashore at Yarmouth, undamaged but with the crew all dead.

B. DIRECTIONAL STATIONS

Apart from the listening-in stations already referred to, the English, as far back as the Fall of 1914 were setting good results from wireless "directional stations" established for the purpose of working hand in hand with the former. The "directional stations" were established at suitable points on the English coast line, and their duty was to get the bearings, the directions of every German sender. These bearings were then forwarded direct to

the Admiralty, where they were collated, part of them with each other, by which means the positions of the sender was located, and part of them with the message picked up by listening-in, whereby it was usually discovered who the sender was.

As to how the organization was worked in details, so that one could be sure that the bearings determined, notwithstanding the vast number of messages, referred to one and the same sender, and also as to how it was possible to fit the bearings to the right message, I have not been able to find any information. But it is hinted, that great skill and training on the part of the personnel were essential, and that especially during the first year of the war many mistakes were made. But, thanks to energetic work and far-sighted vision the information furnished by the directional stations gradually became absolutely reliable, and Jellicoe observes on this point, inter alia, that in consequence he was able to reduce considerably the scouting forces which the Grand Fleet was obliged to keep at sea. German warships or craft at sea almost invariably betrayed themselves by their wireless signals. All German attacks on a larger scale were preceded by a lively wireless conversation, as the Germans, never dreaming of anything wrong, generally issued their preparatory orders by wireless. Consequently, as a general rule, the British mostly knew in advance where the German warships were, and also what they had to expect!

In course of time the English operators at the listening-in and directional stations become so familiar with the peculiar features of the various German ships with the respect to sound, etc., that as a rule, as soon as they hear a German wireless message they were at once able to name the class of the sending vessels and frequently its name as well.

C. ORGANIZATION OF THE HOME WIRELESS SERVICE AND COMMUNICATIONS.

From the very beginning of the war, the British had been cautious in their wireless communications, and the more they learnt to profit by the German system, the more clearly they saw the necessity of avoiding wireless telegraphy for the transmission of orders and intelligence.

1. Measures for elimination of wireless communications.

In port or at anchor the senior commanders were always in connections with the telegraph system on shore. In Scapa Flow, for instance, a complete telegraph station was established on a ship, which remained at anchor permanently. This was in constant telegraphic communication by wire with all large ships, the ships of the Divisional Chiefs and those in superior command in port. Wireless signals were permitted from one ship only at Scapa, probably the stationary telegraph ship, and then these mostly related to flotillas of small vessels only, guard ships and the

like who did not reply to them. Any discoveries made and important messages were of course communicated by the latter by wireless, picked up by the stationary telegraph ship and passed on. All orders from the Admiralty to the commanders in charge, as also those from Jellicoe to other divisions of the Grand Fleet posted elsewhere than at Scapa Flow were, so long as the ships remained in port, transmitted as coded telegrams by wire.

At sea it was more important still to maintain wireless silence than in port, a fact which was pointed out more than once by Jellicoe and by other commanders in chief.

To keep the Grand Fleet together and well in hand, without using wireless telegraphy, was no light task, however, especially in view of the ever extending guard duties, the constantly increasing distance of the scouting ships and the high speed which had to be kept up at all times on account of the submarine menace. To render this possible, every attention was devoted to optical signalling, using the heliograph in the daytime.

For distances of 1 to 2 nautical miles as rule fixed semaphores were used, and the divisions within themselves frequently used signalling flags. For signalling at night the British used low-candle-power flash lights with beams of very small diameter and a radius of about 500 meters. As these could only be used for direct signalling between two vessels, it was at times necessary, especially during the first year of the war, to have recourse to wireless telegraphy in order to remain in touch with the rest of the ships. That was especially compulsory in the case of a sudden fog coming on. Gradually the Grand Fleet succeeded in preserving practically absolute wireless silence during its scouting expeditions in the North Sea, - even when conditions were unfavourable - namely by issuing in advance minutely exact and to a certain extent detailed general orders for every conceivable eventuality, and by giving orders, before darkness set in, with reference to all movement to be expected during the night, stating the exact time when the same were to be executed (changes of course, of speed, detachments, rendez-vous, etc.).

For the transmission of orders, intelligence, etc. from the shore to warship at sea, obviating the necessity of the latter having to betray themselves by replying at the beginning of the war, the officer in charge of wireless communications on the flagship, Lieutenant Nicholson, invented a first rate and simple plan, which as the years went by was elaborated and perfected more and more. I have not been able to gain any information of the details of its working, but broadly speaking, its main idea was, that the message was to be transmitted from one station to another on shore, with sufficient power to enable the particular commander at sea, for whom it was intended, to pick it up. Immediately after the call, or sometimes at the beginning of the message itself,

certain signals were given indicating the real recipient (usually his military designation signal). In his wireless log an entry would be made both of the transmitting and the receiving station, but at the head of the message there would be a note to the effect, for instance, "For C in C" if the message was intended for the Commander-in-Chief. Messages direct from the Admiralty sender were broadcast, giv[ing] the name of the recipient.

In critically examining the extracts from the signalling and wireless logs of the Skagerrack battle in the Official Publication issued by Admiralty ("Battle of Jutland, Official despatches") it is surprising how brilliantly optical signalling was handled in the fleet. All messages relating to mines sighted, merchant ships overhauled, etc., likewise all orders respecting change of course and speed, evolutions and the likes, were transmitted optically, often with several repetitions. In this way, for example, optical messages were exchanged between two cruisers on the extreme wings of the scouting line, at a distance of about 40 nautical miles, whereas the greatest direct distance for searchlight signals was probably not more than 10 nautical miles at the outside. In cases where optical communications could not be established, they rather sent a destroyer that run the risk of wireless telegraphy, in spite of the loss of time occasional thereby. It is also specially noteworthy that optical signalling appears to have been more reliable than wireless. Notwithstanding a minute search in the aforesaid extracts from the signalling and wireless logs of the Jutland, I have not been able to discover even a single signal which was incorrectly picked up or which did not reach the man it was intended for; and that is more than can be said for wireless messages. Even such an important signal as Beatty's message to Jellicoe, that the German battle fleet was in sight, is to all intents and purpose unrecognizable in the wireless log of the "Iron Duke", a fact which doubtless led Jellicoe astray at first.

2. THE USE OF WIRELESS TELEGRAPHY

We must not however assume that, because the British imposed great restraint upon their wireless service, they were not able to use it when it was necessary, and when "wireless silence" was no longer essential, i.e. when they were already in touch with the enemy. On the contrary, during the war great advance were made in the use of wireless telegraphy in tactical manoeuvres of the battle fleet. Lieutenant Nicholson, already mentioned, in collaboration with several other wireless service officers of the Grand Fleet worked out a practically new plan for the wireless transmission of evolution signals and the like. Since then Jellicoe, according to his statement, was in 1916 able to handle his fleet in evolutions by wireless with the same or even greater degree of safety and accuracy as formerly by optical signalling. Jellicoe himself writes on the subject: At the beginning of the war it took 10 to 15 minutes, as a rule, before I could be certain that all ships had received a wireless manoeuvring message

addressed to the whole fleet. In 1916 the time required was seldom more than 2-3 minutes. This great improvement was due to the new method, and also to incessant practice when in port. Yes, the advance we made in the use of wireless telegraphy, was indeed very considerable"

As a rule the British used a special low-power installation for sending messages within the confines of the several units of the fleet, the ordinary senders being used for long distances only. Every large ship was therefore, as a rule, provided with at least two complete wireless installation, and very frequently also with a reserve outfit to our (i.e. the Swedish Translator) so-called battle wireless outfit. They also used different wave lengths for different purposes with different installations on board in the Grand Fleet, receivers tuned for the reception of messages for each particular purpose. Thus, for instance, the air scouts used one particular wave length, the scouting fleet another, and so on. By this means it was achieved, that the various sections on guard and scout duty never interfered each other in sending the signals and messages, a matter of great importance, especially when getting into touch with the enemy, information on whose approach was generally received from several directions simultaneously. These wireless messages were then passed on with all possible despatch by the recipients to the Commander in Chief by optical signalling.

In order to meet the ever increasing demand for wireless operators, and to keep those already trained in practice and up-to-date, a complete wireless telegraphy school was established at Scapa Flow.

As regards wireless communication with the Colonies and the rest of the world, England never had the slightest difficulty, adhering in this case also to the general principle of giving preference to coded cablegrams for military purposes.

II. THE GERMAN WIRELESS SERVICE ORGANIZATION

It has unfortunately been a very difficult matter for me to obtain a few authentic particulars relative to the organization of the German Wireless Service. This much however is certain, that the Germans in this respect were very much on the leeward side of their opponents, at any rate from the point of view of strategy. That is to be gathered as clearly as one could possibly desire from a remark by Admiral Scheer in his book: "Germany's High Seas Fleet in the world war", published in 1920. He writes there, having establishing the fact that the British in 1914 had received information in advance of a German advance on the East Coast of England: "The British had obtained this information through their "directional stations", which they had at their disposal even at that time, whereas we did not have this organization until much later. These are wireless telegraphy stations for taking bearings,

which are able to designate the direction from which a wireless message picked up has been received, and which can consequently locate the position of the ship on which the sender is. If this is done simultaneously by several stations sufficiently far apart, the point of intersection of the lines of these bearings is the exact position of the ship which has sent the message. The extent of the English East Coast permits of the establishment in favourable position of these "directional stations". In them the British possessed a considerable advantage in the conduct of the war, as by this means they were able to obtain absolutely exact information of the whereabouts of the enemy, whenever the latter sent out wireless signals of any kind. In the case of a big fleet, the divisions of which are separated from each other and dependent upon intercommunication with each other, absolute "wireless silence" is a very difficult thing to maintain". This statement is remarkable as a German confirmation of the great benefit of these directional stations, after the war many a time and often strongly emphasized by the British themselves.

A. LISTENING-IN TO THE ENEMY ETC.

At the beginning of the war the Germans had no organized listening-in service at all, but they gradually recognized the necessity of collecting at one center all messages picked up by every vessel and station. A decoding station of this kind had been established in Neumunster in 1916, but owing to the great caution of the British it was not of much use. Only by chance did I find out that it was able to give some information to the High Seas Fleet, namely before the Jutland Battle, but even then the message it sent was not particularly definite.

B. DIRECTIONAL STATIONS.

When finally and very late in the day the Germans got their directional stations into working order, they could only in very rare instances be used for taking the bearings of enemy forces or individual ships, thanks to the precautions of the British. Instead of that they were used to send orders for the movements of their own ships and especially airships. That however is a dangerous sport which, as far as we know, was never indulged in by the British. Owing to lack of training and practice on the part of the airships in taking exact observations, the British were nearly always warned in advance of their approach and impending attack, and were able to prepare themselves in every possible way for the reception of the unbidden guests. In order to find out the position of the attacking airships they frequently did not even have to use their own directional stations, but merely required to listen for the reply of the German stations, as soon as they had overheard the message asking for a bearing.

C. HOME ORGANIZATION OF THE WIRELESS AND INTELLIGENCE SERVICE.

At the outbreak of the war wireless telegraphy was incomparably the most important military means of intelligence in Germany, not only as regards communication with the naval forces and between the latter themselves, but also in a very high degree for the transmission of orders etc. between the various naval authorities on shore. Then, when the German began to have a foreboding of the danger of wireless communications at sea, they certainly did try to reduce the practice as far as possible, at the same time using very low power installations for wireless communications when indispensable between the several units of the naval forces. They also appear to have used the closed aerial circuit for short distance signalling. The British listening-in stations on shore were however fitted with such extremely sensitive receivers, that they were apparently able to pick up even the buzzer signals of the Germans, that is to say, to pick up the messages of a few dry batteries at a distance of several hundred nautical miles, which to my mind is almost incredible.

These limitations to wireless intercourse were effected mainly for the purpose of not betraying the position of the ships to the British directional stations. That the British were even in possession of the German system of codes etc., appears to be a fact which the German did not grasp until a much later date, or about the beginning of 1916, and that is why wireless conversations in port and between the naval authorities continued quite unconcernedly for a long time.

The German submarines operating in the North Sea, gradually learned the wisdom of maintaining almost complete "wireless silence", except of course for specially important messages. The submarines on the west coast of England, on the other hand, felt themselves much safer, and practically every night sent home more or less unnecessary messages, whereby they were many a time located to their own detriment. For the transmission of orders and information to submarines and other vessels, scattered about abroad, the German used the high power station at Nauen. From there, at certain stated times and on certain wave lengths, known to all German vessels of war, and which they had to look out for as far as possible, such orders and information were sent out as might be necessary at the moment. No answers were to be given even when a certain order was only intended for a certain ship.

Communication with the outer world, that is to say, in the early days of the war with the Colonies and the cruisers in foreign waters, likewise throughout the war with the Neutrals, also went by way of Nauen, which was regarded as indispensable by the German Admiralty Staff, above all probably for the submarine war against merchant shipping. It was the foresight of the Admiralty Staff that even provided for the dispatch by Nauen of press news twice in every 24 hours, work which the German

themselves in view of their isolated blockaded position looked upon as most important, not only for the information of the Neutrals, but also to keep up the courage of the Colonies and ships cut off from home, as long as possible.

III. EXAMPLES.

I now pass on to attempt, with a few specimen cases taken from different periods of the war, to illustrate with I have already said about the use of wireless telegraphy under various circumstances.

THE "GOEBEN" AND "BRESLAU".

The power of the wireless messages sent by German cruisers "GOEBEN" and "BRESLAU" betrayed to the scouting enemy forces the fact, that their prey was in Messina on Aug. 4, 1914, whereupon the Straits of Messina were promptly bottled up. As we know, the Germans nevertheless succeeded in making their escape, but after breaking through the blockade they were discovered by the small British cruiser Gloucester, which stuck to them like a shadow, and merely kept the pursuing forces informed by wireless of their position from time to time. The Germans did nothing to prevent that, and consequently the British ascertained that they were setting a course for the Adriatic and probably for Pola. - Suddenly they swung round to starboard towards the Aegean Sea and at the same time started sending out disturbing wireless waves at a terrific rate, which made it impossible for the Gloucester to signal the sudden change of course in good time. Here we have a concrete example of one of the rare opportunities where interruption of wireless can be of use, namely where it upsets the enemy without interfering with one's wireless communications.

THE GERMAN EAST ASIATIC SQUADRON AND OTHERS.

One of the first acts of the British after the outbreak of war was the destruction or seizure of all German telegraph cables and all telegraph stations, wireless included. For the first time we are confronted with absolute "wireless silence" and made to understand what it implies, during Admiral Jerram's expedition against the big German wireless station at Yap, which was of special importance for the maintenance of communications between the Germans and the cruisers in East Asiatic and Australian waters. During this expedition Admiral Jerram was repeatedly called up by wireless by another British Admiral in these waters, but he never replied, because "the undertaking called for absolute wireless silence".

During the first few weeks of the war the only indication that Admiral Count Spee had left Australian waters was the fact, that wireless messages picked up from him became more and more indistinct in Australia. The fact of the German squadron's cruise

across towards the American side was its turn likewise brought to the knowledge of the British solely by a few wireless messages picked up. One of these, picked up by the station at Suva on October 4th, was from the "Scharnhorst" and in all probability intended for one of her colliers. It was in the German secret commercial code, at that time already known to the British, and ran: "Scharnhorst on the road between Marquesas and Easter Island". The other, picked up by another station was in plain language and said: "Attention! Australia and all big English ships have left Rabaul on an easterly course. The Japanese squadron is in the vicinity. Today the British have established wireless connection with Rabaul. Attention!" - Owing to this information, which in view of all circumstances appeared to be quite genuine, the British cruisers made their way over towards the American side.

As a curiosity it should be mentioned that towards the end of November and the beginning of December 1914 the wireless station at La Plata in South America daily picked up calling signals intended for the German battle cruisers "Seydlitz", "Moltke" and "von der Tann", which were sent out by the neutral wireless station at Montevideo. Rumours began to circulate, that the Germans intended sending out these battle cruisers, in order to strike a blow against enemy trade in the Atlantic, to supply Spee's squadron with fresh ammunition etc., and finally to help him to force a way home.

Although the English knew that German battle cruisers were still in the North Sea, those rumours undoubtedly contributed towards their decision to send out their own battle cruisers against Count Spee. That led to the rapid destruction of Spee's squadron, for the sake of which Germany was planning a battle cruiser undertaking, which was bound to have a specially paralyzing effect upon British trade, and would have called for energetic British counter action, which in turn would have weakened the Grand Fleet considerably.

The German so-called pirate cruisers in general very soon learned the wisdom of "silence in the air", so as not to betray themselves by the power of their wireless signals, in the event of enemy craft being anywhere in the vicinity. That this plan was not always successful we have seen in the foregoing examples. In several published statements, both in German and English literature on the world war, one seems to gather the impression that the British cruisers on the lookout for raiders on merchant shipping - and also some of the latter - were fitted with apparatus, enabling them to determine, at any rate approximately, the direction of a ship from which they were receiving wireless signals. We have an example, among others, during the chase after the "Goeben" and "Breslau" in August 1914, when an entire scouting line changed its course by 180°, because "German colliers were distinctly heard sending wireless signals in a northerly

direction". - Other examples of the same fact are found in the chase after the "Karlsruhe" and in the story of the "Emden", when she sent one of the colliers in a certain direction, because the signals of a British cruiser had been heard in another direction. As to the explanation, it is difficult to say anything, as these ships, especially the German, can hardly have been fitted with wireless direction finders of any kind.

THE NORTH SEA

Meanwhile the real naval theater of war had been transferred to the North Sea, and here too it was that wireless telegraphy achieved its greatest triumphs, both from a strategical and tactical point of view. As I said before, the British generally knew beforehand when the German fleet was putting out to sea, partly owing to their well-organized wireless listening-in, but mostly owing to careless use of wireless telegraphy by Germans.

THE BOMBARDMENT OF SCARBOROUGH AND OTHER PLACES

In the middle of December 1914 five German battle cruisers, accompanied by five small cruisers and three torpedo boat flotillas made an attack on the East Coast of England, and at daybreak on December 16th bombarded several small sea-side towns, including Scarborough. As support on the homeward journey the greater part of the High Sea Fleet put out to sea.

In the forenoon of the day preceding the bombardment Beatty received for the Commander-in-Chief a coded telegram worded as follows: "German squadron, consisting of four battle cruisers (in reality there were 5 of them) five light cruisers, and 3 flotillas left the Jade this morning at daybreak, returning Wednesday night" Then followed detailed orders for several divisions of the Grand Fleet, relative to times of sailing, course, speed, rendezvous etc. and some tactical instructions. A few hours later all were under way. During the night the two enemy fleets passed each other at short range, without either of them being aware of the fact. Absolute wireless silence had been ordered on the German side, and no doubt in the Grand fleet also, although on this occasion I have not been able to trace any specific order to that effect. - In the wireless log of the small German cruiser "Stralsund" there is an entry under date December 16th 2.45 am English sender, distance 30 nautical miles.

Determination of distance of such exactitude on the basis of messages received from a transmitter is in reality hardly possible, but in this particular instance was probably correct. However that may be, at any rate the entry shows, that British wireless discipline still left much to be desired. But, in spite of the order forbidding wireless signals, the Germans were no better. Soon after 1 o'clock at night, and a particularly dark night, the German destroyer "S.33" got out of touch with her

companions and began sending wireless signals to the cruiser "Stralsund"; the latter however did not reply until the signal had been repeated four times, when the Commander lost his patience, and signalling with as low power as possible ordered the "S.33" to "shut up".

On this episode we read in "North Sea" Volume III: "Through these wireless signals "S.33" might easily have endangered the safety of the entire expedition, because as the chief point was to take the enemy by surprise, the maintenance of strict wireless discipline was of the utmost importance. To nothing but the fact that the enemy evidently was not keeping a sharp lookout do we owe it, that the repeated calls sent out by "S.33" were not noticed by him, and therefore did not draw his attention to the approach of German forces and so induce him to take counter measures in good time.

A few hours before daybreak on the 16th there were several more or less casual skirmishes between the destroyers of both fleets, which fact was reported to the commanders in chief by wireless. At dawn the same morning German cruisers were discovered to the north-east of the British forces, so Beatty veers off in that direction and puts on more speed. Warrender with the II battleship squadron followed at a slower gait. At the same time Admiral Ingenohl with the bulk of the High Seas Fleet makes from home, again without knowing the strength of the forces arrayed against him, but worried on account of repeated reports from his destroyers and cruisers about encounters with enemy destroyer flotillas. The British also had not the faintest idea of the strength of the forces opposed to them, but thought themselves superior in strength, as of course they knew nothing about the German battle fleet being out, but only about the battle cruisers. Beatty had just taken up the chase of the German cruisers sighted, and as matter of fact had practically the entire High Seas fleet in front of him, when both he and Admiral Warrender were suddenly taken by surprise by a most disquieting wireless message which had picked up. It was sent by the "Patrol", the ship of the Commander of the Hartlepool flotilla, telling the guardship "Jupiter" on the Tyne, that she was being chased by two enemy battle cruisers. Admiral Warrender turned at once in order to cut off the retreat of the latter, but Beatty wavered. In the first place, the "Patrol" was about 150 nautical miles further westward, whereas he himself was quite close to the enemy, who was towards the East, and then after all it was only a stray message picked up. Within a few minutes, however, he receives a communication from the Admiralty about the bombardment of the Coast towns, and then he at once turns off westward. As we know, the British did not succeed this time in cutting off the retreat of the attacking forces, although they got in touch with their small cruisers and destroyers. That the battle cruisers were able to find their way home without being seen is probably due to the fact, that they noticed by the specially powerful and active British wireless

messages, that strong British forces were in their vicinity. To avoid these the Commander of the "Derrflinger" suggested going home by the way of Skagen (as a matter of fact Admiral Hipper made the detour northwards on his own initiative: "Derrflinger's suggestion came much later and did not influence him in anyway. - Transl.) It is true nothing came of it, but after all the German's course was laid much more northerly than the British expected.

The British forces learnt of their failure by wireless from the Admiralty at 2.43 pm. The message stated, that the German battle cruisers squadron and a small cruisers were stationed 12 n. miles outside the extreme edge of the British mine-field at 1.15 pm. on a course East by South and at speed of 23 knots. This information was however not-based upon any bearings taken by the directional stations, but solely upon a coded message from the "Seydlitz" to the commander in chief of the fleet, despatched at 1.20 pm., and which according to the wireless log of the German flag-ship, after decoding, ran as follows: "Seydlitz 1.15 pm 008 B, additional number 5 East by South, 23 nautical miles I B.d.A." From the British communication we see as plainly as anybody could wish for, that the German method of coding and net of squares were not by any means secrets as far as the British were concerned.

About 3 pm. the Admiralty sent another message to the effect, that the German battle fleet was at sea: this information was based upon bearings taken by the directional stations, as also another message on the following day, stating that the German fleet had returned to its home ports again.

It is a noteworthy fact, that in studying the extracts from the wireless logs of the High Sea Fleet during this advance we find, that the order with respect to "Wireless silence" only applied to the attacking forces themselves, and was not implicitly obeyed even by them. Besides the above-mentioned signals sent out by "S.33", several ships reckonings were compared on the 15th at 5 pm, and again at 4.34 am, on the 16th. And in the High Seas Fleet there was plenty of lively signalling going on the whole time of the advance, (a mass of reports on drifting mines, fishing-boats overhauled etc.) As notwithstanding all this wireless activity no bearings were taken by the British directional stations, and the listening-in stations did not even notice that the German fleet was at sea until 2 pm on December 16th, we can understand, that their organization and reliability still left much to be desired. I have dealt at such length with this advance against the English Coast, partly because it gives a good insight into the way in which wireless was used in the early days of the war, and partly because, on account of favorable opportunity let slip by Germans, it is discussed with special wealth of detail both in English and in German writings.

THE CRUISER BATTLE ON THE DOGGER BANK IN 1915

Events preceding the cruiser battle on the Dogger Bank on January 24, 1915 developed approximately on the same lines as in advance on December 16th. This time however the Admiralty despatched the whole Grand Fleet, whereas the Germans kept the battle fleet at home. The preliminary order from the Admiralty to Jellicoe, Beatty and the Chief of the III Battle-ship squadron was a coded cablegram relative to intercepted German wireless messages, and read "Four German battle cruisers, six light cruisers and 22 destroyers will put to sea this evening, to reconnoiter in the direction of the Dogger Bank. Return probably tomorrow evening". Then followed a number of general orders to the various British forces. The order concluded: "After weighing anchor wireless may be used only when enemy is in sight, or to reply to the Admiral". The British in fact succeeded very well in preserving "wireless silence". According to German wireless logs, however, the German ships picked up British wireless signals from the Grand Fleet, at first at 3 AM. and then again at 5 AM. on January 24th. The Grand Fleet however seemed to be a long way off, so that the Germans felt themselves secure in their advance, and that they would not meet the Grand Fleet this time.

Towards 6 o'clock in the morning, however, the wireless officer on the light cruiser "Graudenz" reported that there must be a British destroyer wireless station quite close to the ship. At the same time a ray of light was espied, so that the "Graudenz" made for it at top speed and aimed its searchlight, only however to discover a steam trawler. Whether the wireless signals intercepted came from the latter was not clearly ascertained, but was thought to be quite possible, so that the ships moved ahead.

In the German wireless logs there are no entries of wireless messages between 6.37 PM. on the 23rd and 5.45 AM. on the 24th of January, but the British assert that here and there during the night they heard German wireless signals, indicating that some serious business or other was going on. When the two forces got into touch with each other towards 8 o'clock in the morning, it was a complete surprise for the Germans, whereas the British had reckoned on a meeting precisely at that time.

As soon as the opposing forces sighted each other the wireless operators on both sides started to work with all their might. Reports flew from scouts to battle cruisers, and from the latter to the commanders in chief (in the German case at home port).

From this battle of the signals Hipper gathered that the whole of the Grand Fleet was out, and therefore he asked by wireless for the High Seas Fleet to put out to sea, and also endeavoured to draw the coming inevitable battle as much as possible over into German bay. His first message to the High Seas

Fleet was 2047 (-8.47 AM. according to German regulations), and reported the presence of the British battle cruisers. His next (9.05) ran: "Judging by wireless signals II British squadron in the vicinity". At 10.55 he states his position: "Urgently require assistance", to which the reply is received 8 minutes later: Main body and flotillas coming as soon as possible.

This information which appears to have been sent in plain language, was picked up by the British battle cruisers, and no doubt greatly contributed towards their abandonment of the pursuit so soon. The British never stopped to think, that "as soon as possible" meant, amongst other things, at least two hours to get up steam. However, that High Seas Fleet did not turn up. The result was, as we know, the sinking of the "Blucher". Nothing else happened of any consequence as regards to subject of wireless, which we are discussing.

THE JUTLAND BATTLE

The next time the two fleets met in conflict was at the Jutland Battle on May 31st and June 1st, 1916. As this action has not yet been dealt with in the volumes hitherto published by the Naval Archive, I have had to rest content mainly with British descriptions. These, however, are exceptionally comprehensive for our present purpose, and show as plainly as anyone could desire, that during the long interval great advances had been made on both sides in the handling of wireless telegraphy. The organization of British wireless service, however, continues to be most distinctly superior to the German.

SAILING OF THE GRAND FLEET WITH ORDERS RELATIVE TO WIRELESS

On the morning of May 30th, thanks to their directional stations, the British noticed that the High Seas Fleet had run out of Wilhelmshaven in the Jade, which shows how sensitive the instruments at the directional stations were by that time.

From this fact, and also from the great number of submarines reported off the English naval ports during the last few days it is concluded that the Germans have some important scheme in view. The Admiralty therefore prepares for the sailing of the Grand Fleet, by notifying the various commanders by coded cablegrams, that the High Seas Fleet is preparing to put out to sea next morning, that is to say on May 31st.

Shortly after 5 PM. however a wireless message was intercepted, to all intents and purposes an important one, addressed to all chiefs of divisions in the High Seas Fleet. As the signal was in a recently adopted code it could not be deciphered; but as everything pointed to its referring to an order respecting a plan of operation, the good old rule was adhered to: Better a little too soon than to let others steal a march on you.

At 5.40 PM., that is to say, about half an hour later, Admiral Jellicoe received the following telegram from the Admiralty, which he immediately repeated (as a coded cablegram) to Viceadmiral Beatty: "Assemble eastward of Long Forties ready for all eventualities". Within five hours all divisions of the Grand Fleet were out at sea on the road to the above mentioned rendezvous, which almost coincided with the spot towards which the High Seas Fleet was steering at dawn the next morning (in actual fact the Grand Fleet was making for a meeting place just to the west of Skagerrack.) Wireless silence was ordered as usual and was maintained by both fleets practically throughout. One of Beatty's wireless stations was to watch the wave length of the advanced scouts, another (together with the airplane mother ship) watched that of the aircraft, and so on.

Some of the ships, according to extracts from the signalling - and wireless logs appear to have been entrusted with the duty of trying to intercept German messages. Whenever anything suspicious was picked up, it was at once reported by optical means to the Commander in Chief, stating the wireless name of the sender and of recipient, the wave length used and also the approximate strength. Should the scouts see the enemy, the report was to be sent with all the power available, in order to deceive the Germans as to the distance of the British main forces. For the same reason no reply was to be sent to a signal of this kind.

SAILING OF THE HIGH SEAS FLEET AND ORDER RELATIVE TO WIRELESS

The sailing of the High Seas Fleet from the Jade at daybreak on May 31st meant carrying into effect a long cherished plan, which had however to be postponed several times on account of unfavorable weather. As preparatory collaborators a great number of German submarines had been stationed outside British bases of the Fleet, partly for the purpose of being able to attack the Grand Fleet should it put out to sea, and partly so as to be able to report the sailing of the British forces to the German fleet. At 5.30 AM. (Greenwich mean time) on May 31st "U 32" reported 2 big ships, 2 cruisers and several torpedo boat destroyers about 70 nautical miles east of the Firth of Forth on a south-easterly course, and an hour later Scheer received a wireless message from the decoding station at Neumunster, that - judging by British wireless activity - two big ships or units with destroyers complete had left Scapa Flow. Shortly afterwards, or at 6.48 AM. (Greenwich time) a third report was handed in, this time from "U 66", which had sighted eight enemy battle ships with light cruisers and destroyers on a north-easterly course, 60 nautical miles east of Kinnaird Head.

These messages however as yet supplied no information about the intentions of the enemy. The peculiar combination and the course of the enemy forces spreading in all directions neither indicated cooperation on their part nor intentions against the

German bay. Scheer therefore was of the opinion that the British naval forces reported could not in any way be connected with the German advance. He did not change his plans, but hoped under certain conditions to be able to force some part or other of the enemy fleet into a battle at long odds against them.

When the High Seas Fleet weighed anchor, the wireless name or indicating sign of the flagship was taken over by the Wilhelmshaven station, and that is why the British took this station for the main body of the Fleet? The consequence was that the British thought the battle fleet was still in the Jade, but clear, ready to sail in support of the battle cruisers.

FIRST FEELING WITH THE ENEMY

As already stated, practically absolute wireless silence was observed in both fleets, so that neither side knew much about the position of the enemy, before the scouting ships in advance got into touch with each other at 2.20 PM. on May 31st. The surprise in all probability was greatest on the German side, as of course the British had set out with the express purpose of dealing with a possible German advance. The first report with reference to the enemy was made to the British Commander in Chief by the light cruiser "Galatea" at 2.20 PM., followed by several other reports. At 3.10 PM. a communication was received from the Admiralty giving particulars of the positions of a light German cruiser and a destroyer, whose bearings had been taken by the directional stations at 2.30 PM., that is to say, probably about the time they were reporting to their Commander on Chief that the enemy was in sight. The fact that this was the first bearing by wireless which the British had been able to take since the High Seas Fleet had put out to sea, demonstrates better than anything else, how well, at that time, the Germans had learnt to preserve wireless silence.

Feeling with the enemy having been established, Beatty sent up an airplane in order to obtain an exact idea of the situation. The wireless messages of the latter (on its own special wave length) at 3.31 and 3.45 PM. were passed on to the airplane mother-ship, and read by Beatty at the same time, but were not repeated to Jellicoe, who does not appear to have had any installation for the wave length of the air scouts. On this occasion that was surely of little importance, but later on was the cause of a change.

COMING INTO ACTION OF THE BATTLE FLEET

For a long time after the battle cruiser fight had started in real earnest the British believed that the German advance which they had stopped was an ordinary battle cruiser advance, without any real support from the German battle fleet. At 4.38 PM. however a wireless message was sent by the British light cruiser "Southampton" which, worded as follows, came as a complete

surprise for Jellicoe: "Urgent". Precedence. Have sighted enemy battle fleet bearing approximating S E; enemy course N. My position 56° 34' N. Latitude 6° 20' E. Longitude." About five minutes later this signal, (not absolutely verbatim) was repeated by Beatty via "Princess Royal" (Lions wireless apparatus had broken down and was useless), but then got through to the Commander in Chief practically unrecognizable, which at first made Jellicoe hesitate a little. (What "Iron Duke" had picked up was as follows: "26-30 battle ships, probably enemy, direction S.S.E. steering S.E.). Not more than five minutes later, however, Jellicoe, relying on the first message, sent his first communication to the Admiralty. It was overpowering in its simplicity and read: "Urgent. Battle of the fleet impending." This was sent about 2 hours before the commencement of the main action; it was followed barely ten minutes later - 5 PM. - by a communication from the Admiralty giving the position of the German battle fleet, which it had obtained at 4.09 from the directional stations. Even course and speed was stated. In a later similar message at 5.45 corresponding particulars were given for 4.30. One fault in using the bearings taken by the directional stations was that the bearings of the British were not also taken, consequently the German position given was inexact in relation to the British own ships reckoning, which had been affected by tide and currents after practically 24 hours constant zig-zag sailing. That was probably the real reason why, when the battle fleet came into action, Jellicoe did not find the enemy exactly where he had expected him, and consequently was unable to employ his entire striking force at once, a point which has so often been debated since then, both in and outside professional journals.

It is interesting to note how the Admiralty, after receiving Jellicoe's first message, immediately made all preparations by cablegram, with reference to previously issued instructions, for the reception of the Grand Fleet after the battle, so that it may be ready for further fighting as quickly as possible. (Docks, towing, steam tugs, coaling orders etc. are made ready all along the East Coast.)

THE NIGHT AFTER THE MAIN ACTION

As soon as the forces got in touch with the enemy, wireless telegraphy was released, and during the battle, but especially the night following, wireless operations were enormous.

Then it was a question for both fleets to collect their more or less separated units, mainly by wireless, to gather particulars as to damage sustained, fuel supplies, and so on and all this had to be done while light forces on both sides were from time to time reporting the enemy in sight, and were making more or less successful torpedo boat attacks. During the dark hours of the night flashlight signalling was practically banned, to prevent the ships giving themselves away.

That in this busy wireless time some of the messages were picked up incorrectly, or even did not reach their addresses at all, is more or less a matter of course, but in certain cases in all probability was of paramount importance in deciding the issue of the action. This, for example, happened in the case of three consecutive messages from "Captain D 12" (Chief of the 12th Destroyer flotilla) who at 1.56 AM. on June 1st signalled by wireless to the Commander in Chief: "Urgent. Precedence. Enemy battle ships in sight. My position 10 nautical miles to the rear of I battleship squadron". At 2.08 he signalled: "Urgent. Am attacking" and five minutes later: "Urgent. Enemy course S.S.W." There is not a word about these messages in the wireless log of the "Iron duke"; on the other hand, portions are to be found in the logs of others which had picked them up.

It is most interesting to note how perfectly, by listening-in and taking bearings through the directional stations, the Admiralty was able to follow up the enemy fleet on its homeward run, and to report its position on other matters to the Grand Fleet. For this reason I append a few extracts from the "Iron Duke" wireless log, giving messages sent by the Admiralty to the Commander in Chief during the night from May 31st to June 1st.

9.58 PM. At 9. PM rear ship of enemy battle forces in $56^{\circ} 33'$ N. Lat. and $5^{\circ} 30'$ E. Longitude on a southerly course.

9.55 PM on May 31: Three destroyers flotillas have received orders to attack you overnight.

10.41 PM. At 10.41 the Admiralty informed the Commander in chief that it was believed the enemy was returning to his base, as his course was S.SE $3/4$ E, and speed 16 knots.

1.48 AM. The Admiralty informed the Commander in Chief, that the enemy submarines were apparently leaving German ports. And that a damaged enemy ship, probably "Lutzow" at midnight was in $56^{\circ} 26'$ N. Latitude and $5^{\circ} 41'$ E. Longitude.

3.12 AM: German light cruiser in $55^{\circ} 45'$ N. Lat. $6^{\circ} 25'$ E. Long damaged. Crew taken off, destroyer standing by 3 AM.

3.20 AM: A communication to the effect, that relief ships are being sent to relieve light cruisers and destroyers who are short of fuel.

3.29 AM. Urgent. At 2.30 German main body in $55^{\circ} 35'$ N. Latitude $6^{\circ} 50'$ E. Longitude. Course SE by S. 16 knots.

5.30 AM. Elbing at 3.47 still afloat, without crew. Position at 3 AM. Etc/Etc.

GERMAN ADVANCE ON THE NORWEGIAN COAST ON APRIL 23/34 1918

The advance towards the north upon the Norwegian coast, made by the High Seas Fleet in April 1918, was its last big undertaking before being handed over to the Allies on the conclusion of peace. The object of the advance was an attack upon the British convoys which sailed across the northern part of the North Sea from Stavanger and thereabouts. A necessary condition for its success therefore was that the British should not have the faintest idea of what was intended, and consequently specially strict orders respecting wireless silence were issued to all Commanders. At 6 AM. on April 23rd the whole High Seas Fleet put out to sea, the battle cruisers, accompanied by some of the light cruisers and torpedo boat destroyers well in advance of the main body, as usual. On the following morning, April 24th, the predetermined turning point on the Norwegian Coast was reached, without any enemy craft having been seen, and everything appeared to be going well, when at 8 AM. the following wireless message from the battle cruiser "Moltke" was received by the Commander in Chief of the High Seas Fleet: "Serious breakdown. Speed is four nautical miles. Position about 40 nautical miles W.S.W. from Stavanger". Two hours previously the "Moltke" had been detached from the battle cruisers for the purpose of joining the battle fleet, as she could not do more than 14 knots. Her wireless to the C. in C. of the High Seas Fleet had not been heard by the battle cruisers, presumably because it was sent from a low power sender. Towards 9 AM. however Vice admiral Von Hipper on the battle cruisers received another message from the "Moltke", saying that the ship would not answer the helm, and that the C. in C. had received no report on the matter, (the latter statement was based on a misunderstanding). Von Hipper thereupon decided to go himself to the aid of the "Moltke", and reported the fact to the main body, without knowing that the latter had already been underway for nearly an hour for the purpose of assisting the broken down ship, and that by this time was probably already in sight of her. Von Hipper was therefore ordered to cruise again across the track usually taken by the convoys, but this expedition was just as abortive as the first.

Meanwhile the "Moltke" had been taken in tow by the battleship "Oldenburg", whereupon the whole battle fleet steered for home at a speed of 10 knots. At 6.30 PM a German submarine sent a message to the effect that eleven enemy cruisers and battle cruisers were about 80 miles behind the High Seas Fleet and standing on the same course as the latter. These were however in all probability not enemy but Von Hipper's forces on the way home after his last advance, but nobody dared to attempt to establish wireless communication with them, in view of the risk of drawing the attention of the British. Towards 7 o'clock in the evening of April 25th, that is to say after about 35 hours of towing, the Moltke was able to continue the voyage under her own engine power at 15 knots, but nevertheless about an hour later 10 miles north

of Heligoland, whilst crossing the English submarines lines, was hit by a torpedo which fact, however, did not prevent her making port under her own stem. The German advance had not achieved its object, but is most remarkable that the British although after so much wireless activity they must have heard that the High Seas Fleet was at sea, did not succeed in taking any counter measures, or perhaps, as far as my researches go, they never even tried.

Another noteworthy fact is that this was probably the sole German expedition of any magnitude of which the British were not cognisant in advance.
