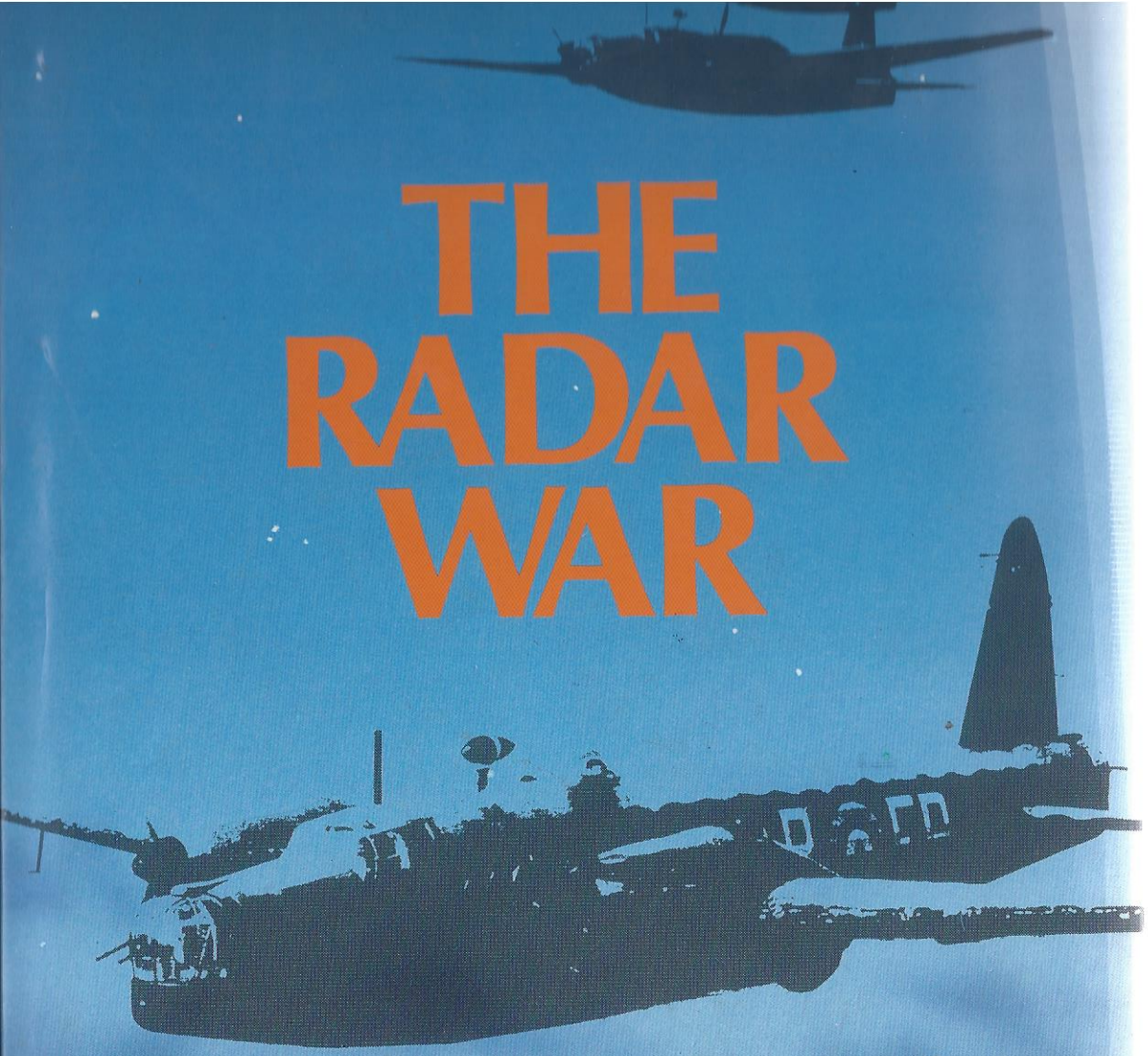

THE RADAR WAR

Germany's Pioneering Achievement 1904-45

DAVID PRITCHARD

Foreword by Prof R.V. Jones CB CBE FRS

features on the 1904 demonstrations.

Above all I owe special thanks to Fritz Trenkle, Germany's leading authority and historian on radar and radionavigation systems, whose published works extend over many years, and without whose generous help on points of detail this book would never have been written. I am particularly grateful to him for permission to use photographs from his personal library of some 5,000 pictures, possibly the world's most comprehensive private collection of German systems. For the gift of friendship I owe a greater debt which I prefer to leave unpaid.

Whilst the history and development of German radar still holds a fascination for many persons, its discovery by the British and their subsequent countermeasures are still worth recalling today, not only as a record of determination and bravery, for these were never lacking on both sides, but in many instances as a lesson on the essential requirements of sound Intelligence work, lessons which, if the modern tendency of the wagging tongue is any criterion, have been sadly forgotten. Thousands played major parts in this field during the war, and of those still alive today many prefer to keep quiet about it. Their work is, I hope, reflected in the names of those who have no objection to appearing in these pages.

Finally, though this book must necessarily deal with technical matters, I have tried to keep these to a minimum by assuming a certain degree of technical knowledge among its readers in keeping with our technological age. The steering of a safe channel between the Charybdis of blinding with science and the Scylla of insulting the reader's intelligence is always a Herculean task, and if I have erred either way I can only take comfort from the words of John Locke: 'All men are liable to error, and most men are, in many points, by passion or interest, under temptation to it.'

David Pritchard
1989

CHAPTER ONE

Christian Hülsmeyer, the Father of Radar

> Radar may be defined as the art of detecting by means of radio echoes the presence of objects, determining their direction and range, recognising their character and employing the data thus obtained in the performance of military, naval or other operations.
>
> *Principles of Radar*,
> Massachusetts Institute of Technology Radar School

The principle of the reflecting qualities of radio waves upon which radar technology is founded was discovered in 1886-87 by Professor Heinrich Rudolf Hertz (1857-1894) at the Karlsruhe Polytechnic. His experiments were based on Maxwell's theory of electricity and magnetism for which experimental verification was lacking in Maxwell's time. Hertz's experiments demonstrated that ordinary light consists of electromagnetic waves, and the equipment he constructed for this purpose was what we would now call a spark transmitter oscillating (unbeknown to Hertz) on a frequency of about 50 MegaHertz (MHz).

Having proved that these electric waves existed, he followed it up by showing that they could be reflected, refracted, diffracted and polarised in the same way as light can. The velocity of propagation was measured and found to be the same as light and radiant heat. Hertz himself could find no practical uses for his discoveries and it was left to other researchers, notably Sir William Crookes, Sir Oliver Lodge, Marconi *et al*, to employ his findings for the development of wireless telegraphy. But his experiments with metal sheets to reflect these waves may readily be seen as the foundation for radar.

It should therefore be no surprise to learn that the world's first practical radar system was successfully demonstrated a few years later in 1904, and the remarkable history of the discoverer of this system is worth recounting.

Christian Hülsmeyer was the youngest of five children born to Johann Heinrich Ernst Hülsmeyer and his wife Elizabeth Wilhemine (née Brenning) at Eydelstedt, Germany, and made his appearance on Christmas Day 1881. From 1887 to 1895 he attended the primary school in Eydelstedt where his teacher, Rudolf Knüppling, was impressed by his enquiring mind. On returning home one foggy evening the boy witnessed a scene that was to haunt him for a long time. His mother was trying to comfort a weeping woman whose son had been drowned when his vessel collided with another on the fogbound Weser. Horrified at the picture his impressionable mind conjured up, he crept up to his bedroom and sought solace among some old books he had found in the attic. One of his favourites was a life history of Benjamin Franklin and his experiments with electricity.

Later, as the memory of the event lost some of its hurt, he would wander round his father's farm in the evenings and wonder how the bats avoided the trees as they swirled round the farmyard before settling in the barns. He put the question to his grandmother, a woman wise in the ways of nature, who told him, 'They have special noses to help them find their way in the dark.'

The bat is still a feature in the Hülsmeyer coat-of-arms.

From 1895 to 1896 Hülsmeyer received special attention from headmaster Erich Bartels at the Elementary School in Donstorf where, besides French and English, his aptitude for physics was soon spotted. Bartels introduced him to Hertz's work and encouraged him to take the Entrance Examination for the Teachers' Training College in Bremen. After passing the examination Hülsmeyer studied at the College between 1896 and 1900.

The Bremen College boasted a fine new physics laboratory, much of which was devoted to research into the Hertzian Waves, and the Physics Master, Richard Klimpert, gave Hülsmeyer extra tuition and encouraged him to carry out experiments in this new field, allowing him the use of the laboratory after normal college hours. His daughter Annelise recalls a story from this period:

> A large oven, something like a kitchen range, occupied one end of the laboratory and my father used its metal surface for his reflection experiments, during which the whole room would be filled with crackles and discharge of sparks from his apparatus. By this means he proved to his own satisfaction that Hertzian Waves could be easily reflected from distant metallic objects.

Encouraged by his results Hülsmeyer devoted much time to the design and construction of more powerful transmitters to increase the range. Impressed, Klimpert took him aside and said, 'Don't waste your time going in for teaching. They need people like you in industry.'

Much against his parents' wishes Hülsmeyer applied for and obtained a position with Siemens and Schuckert in Bremen where he supervised installations and carried out the electrical outfitting of battlecruisers. His daughter continues the story:

> In April 1902 my father left the Siemens Company and made his way to Düsseldorf with only two marks in his pocket. There his brother had a thriving textile business and financed Christian in the setting up of an electrical firm that enabled him to carry out further research into reflection techniques, and to build a transmitter and receiver for the purposes he had in mind. But this needed more money than was available. In the end he placed an advertisement in the local paper for a financier to back him in an 'epoch–making discovery'. A Cologne leather merchant saw it and showed interest.

The leather merchant, Heinrich Mannheim, was a leading figure in Cologne business circles and immediately put up the money for a joint venture. Business premises were obtained and the world's first, albeit primitive, radar was put on the market under the name of the *Telemobiloscope*. The Telemobiloscope Company, Hülsmeyer and Mannheim, confidently awaited orders, but none came. Clearly, an advertising stunt was needed.

On the morning of 10 May 1904 two shadowy figures approached the Rhine bridge at Cologne. Both carried wooden boxes[1] and took up positions on a platform under the middle of the bridge. A policeman wondered what they were up to, but on recognising the respectable Mannheim shrugged his shoulders and sauntered away. A group of reporters arrived and lounged over the parapet. And as time went by a crowd of onlookers gathered.

[1] Some critics of Hülsmeyer's early experiments remark on the lack of screening accompanying the use of wooden cases. In fact Hülsmeyer lined them with metal foil and later employed sheet metal exclusively.

'What are you up to down there?'

Hülsmeyer grinned. He tapped the wooden boxes.

'This is an apparatus for preventing collisions at sea. The electric waves given out by this transmitter are reflected back to this receiver by a vessel, so that it can be detected at night or in fog.'

'Go on, pull the other one!'

At that moment a Rhine barge hove into view several hundred yards down river.

'Wait and see!' yelled back Hülsmeyer.

He turned a switch and the bystanders heard a faint buzzing. They watched as Hülsmeyer directed the antennas at the barge, whereupon a bell rang in the receiver. The crowd roared.

'Can you do the Indian rope-trick as well?'

Undeterred, Hülsmeyer swung the antennas to the sky and the bell stopped. On re-directing them at the barge it rang again. The onlookers scratched their heads – they could not know they had just witnessed a demonstration of the world's first radar – while the reporters legged it hot-foot to hand in their copy.

German and other continental papers flashed the news round the whole of Europe and Hülsmeyer was promptly invited to demonstrate his equipment to the representatives of shipping companies. The *Kölnischer Zeitung* of 18 May 1904 carried the report:

> The Telemobiloscope, an invention of engineer Christian Hülsmeyer, was demonstrated to representatives of Norddeutscher Lloyd and the Argo Shipping Company of Bremen and other invited gentlemen at the Dom Hotel yesterday morning at 11 o'clock. The discovery is based on the principle of wireless telegraphy and is intended to locate ships and other metallic objects at sea. The difference between the already existing employment of wireless telegraphy and this discovery is based on an exclusive and constructional change, in that wireless telegraphy employs a transmitter and receiver on separate ships but with the Telemobiloscope the transmitter and receiver are arranged on one and the same vessel. The electrical waves radiated from the transmitter cannot directly reach the receiver, but must be reflected from metallic objects on the sea, logically ships, and thus return to the receiver. The great advantage which the discovery offers lies above all in the fact that ships which are fitted with this system of transmitter and receiver can locate any other ship that does not carry the apparatus. Indeed, the captain on the bridge can be informed of the approach of another vessel and find its bearing up to a range of 5 kilometres, so that should his lights and fog signals fail to work he still has sufficient time to steer his ship on the correct course and thus prevent severe disasters in good time. Research with smaller apparatus calculated for shorter ranges have been perfectly successful. A company for the manufacture of the discovery has been formed under the title of The Telemobiloscope Company, Hülsmeyer and Mannheim.

Emboldened, Hülsmeyer sought more financial help and approached the German Navy. Admiral von Tirpitz's reply was scathing:

'Not interested. My people have better ideas!'

But reports had reached Director Wierdsma of the Holland-Amerika-Line who invited the inventor to demonstrate his discovery at a Technical Nautical Meeting at Scheveningen, and on Thursday, 9 June 1904, assisted by students of Delft University, Hülsmeyer assembled his equipment in the tender *Columbus* and cruised up and down Rotterdam Harbour detecting vessels at up to 5 kilometres' range with unerring accuracy. The only problem was that as eight technical representatives of foreign shipping companies were with him to witness the demonstration he was obliged to take out a similar number of foreign patents, and this cost more money.

The representatives were however enthusiastic about the demonstration and showered Hülsmeyer with praise, and after a lecture in which he explained that even longer ranges were quite possible he waited for orders.

But none came. Not even a trial order.

The list of those present at the demonstration is impressive. The American Line, Leyland Line, and Dominion Line were represented by Captain Fry (Marine Superintendent) and Mr Neville Evans (Superintendent Engineer). The Atlantic Transport Company was supported by Mr Kirkland and Mr Alger, and the Hamburg-Amerika-Line by Mr Klock (Superintendent Engineer) and Inspector Captain Theile. Ober-Inspector Blanke, Ober-Ingenieur Walter, and Ingenieur Struver attended on behalf of Norddeutscher-Lloyd, and Mr Robert Crichton (Marine Superintendent and Superintendent Engineer) for the Red Star Line. Director Wierdsma, Mr van

Helden (Superintendent Engineer), Mr Boldingh (Marine Superintendent), and Mr Muschart (Assistant Marine Superintendent) were present on behalf of the Holland-Amerika-Line.

The minutes of the meeting contain the following report:

> *The Telemobiloscope*
> During the visit of the delegates to the establishment of the Holland-Amerika-Line at Rotterdam, a trial was given on board the tender *Columbus* to the Telemobiloscope, an invention of Christian Hülsmeyer Esq., Engineer at Düsseldorf. This apparatus is based on the principle of wireless telegraphy and is intended to ascertain, when at sea, the direction and also the distance of another vessel. In wireless telegraphy the distributor and the receiver are put apart in different places, in the Telemobiloscope they are placed together on the same spot. The electrical currents of the distributor however cannot be caught by the receiver directly but must strike an object of metal (in this case another vessel) before returning to the receiver.
>
> The opinion of the inventor is that vessels fitted with his apparatus can discover at night or in fog etc., at a distance of up to 3½ miles, other vessels and ascertain the position of these vessels. The trial on board of the *Columbus*, though on a very limited scale and with an unfinished apparatus, proved that the principle of the inventor is correct. Every time when, even at a certain distance, a vessel or drydock (both of course of iron or steel) was passed, the apparatus operated immediately.
>
> The apparatus used in this trial was not yet arranged for the determination of the distance.

The Hülsmeyer story is fairly well known but for several years commentators have dismissed his discovery as virtually worthless. Various reasons have been put forward, such as extraneous reflections from the ship itself affecting the receiver, or the technical knowledge at the time being insufficient to make it a serious contender in the radar story. These are simplistic excuses – often, regrettably, emanating from British sources – and which demonstrate a lack of appreciation of the astonishingly modern concepts in Hülsmeyer's system, concepts worthy of greater study and which will be examined later.

But these ill-considered explanations are often advanced to explain why the system failed to have any impact on the world,

and in particular the world of shipping for which it was originally designed.

The true facts are as simple as they are condemning.

In the first place, world shipping in 1904 was going through a bad patch and expenditure on even the bare essentials of safety procedures was viewed with reluctance. The evidence of the Technical Nautical Meeting speaks for itself:

> ...it is the doubtfully pleasant duty of the technical department to spend money in an ever increasing degree. Although this is true at all times, it gets a double significance in bad times, as he is sorry to say, we are having now, and the responsibility rests heavily on the technical official, who has incessantly to answer the question: which item may be postponed without risk and which must be done at once, whilst precisely at that time he is expected to effect every economy. Add to this that as a matter of course the technical officer is more exposed to criticism, for the reason that although he himself would be loath to pass judgement on the passenger or freight business, everyone connected with a steamship line possesses a certain opinion in technical matters and even allows himself to be seduced to inventions.

Second, and more important, the arrival of wireless telegraphy was a hindrance to the acceptance of Hülsmeyer's discovery. By 1904 it had been installed in a number of vessels which were now able to communicate with others at distances far beyond the range of visual signalling. In emergencies the wireless operator could quickly call for help, and this had been possible as early as 1901. Moreover, direction-finding by the use of cross-bearings from shore stations enabled a master to fix his position with a fair degree of accuracy. Ship-owners were therefore reluctant to part with money for a new-fangled system when they were already paying enough for the present one.

But the least known, yet most obvious reason for the lack of success, lay in the all-important point that most ship-owners could not distinguish between wireless telegraphy and the concept of radio-location. The very fact that all reports and documents referred to Hülsmeyer's discovery as based on a form of wireless telegraphy was enough to convince them that it was one and the same thing, however different its use, and shipping lines using wireless telegraphy in its accepted sense were mostly under contract to the Marconi monopoly. The terms of the Marconi Licence were strict and no one in those competitive times would dare risk a suit for breach of contract.

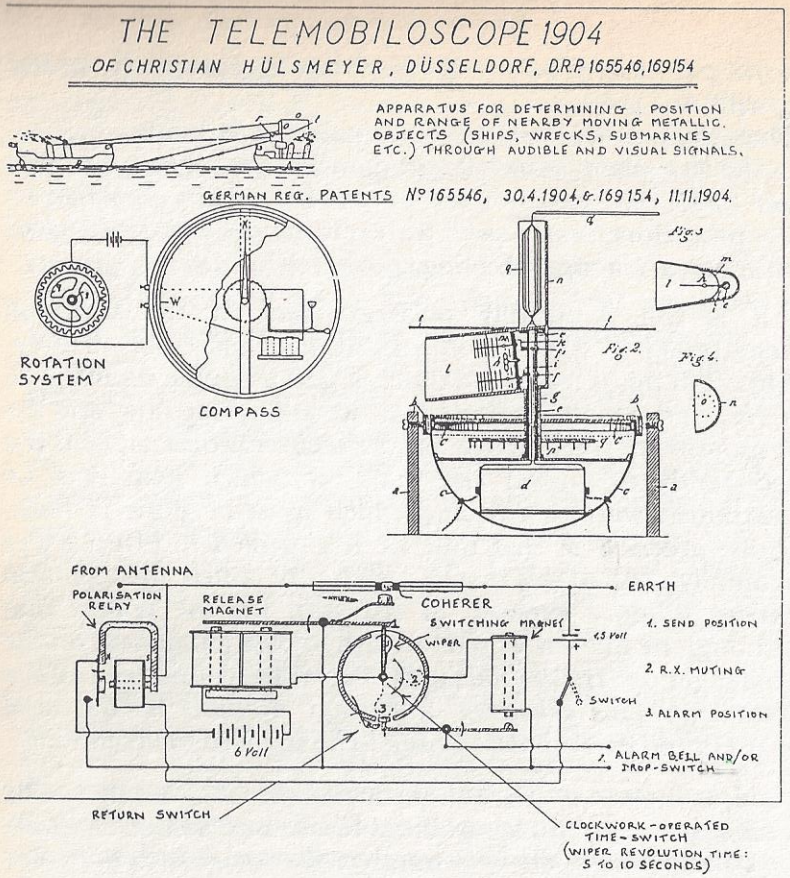

Figure 1 Christian Hülsmeyer's 'Telemobiloscope' of 1904.

The world's first radar just refused to sell.

Anxious to save as much of the situation as possible Mannheim embarked on a sales drive, but the major electrical companies of the time showed no interest. Even Telefunken, then known as The Wireless Telegraphy Company, replied on 21 August 1905:

> Dear Sir,
>
> Please find enclosed the Patent Specifications you kindly offered us a short time ago for 'A System of Reporting Distant Metallic Objects to an Observer' and the addition to Patent No.32910 VIII/74D by Christian Hülsmeyer of Düsseldorf.
>
> We return these with our best thanks as we have no use for the above discovery.
>
> Yours faithfully,
> The Wireless Telegraph Company

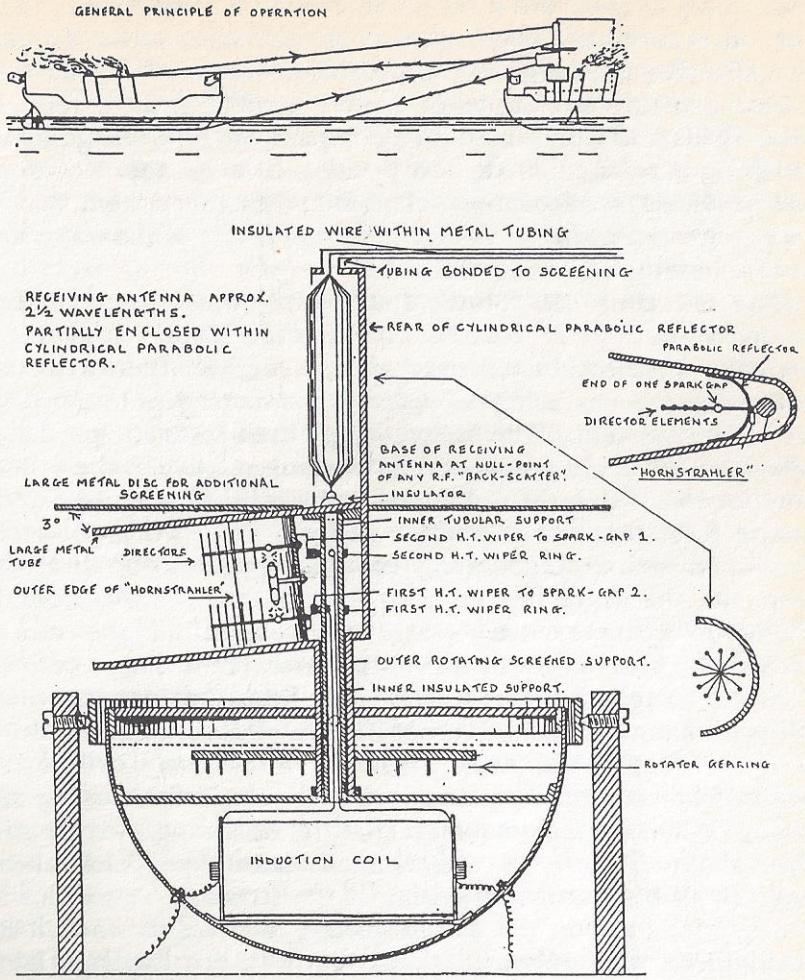

Figure 2 The equipment in more detail.

Annelise Hülsmeyer adds the following:

> Herr Mannheim himself took pains, unfortunately in vain, to obtain orders from industry (Telefunken, Felten, Guillame, etc.) but the answers were unsatisfactory. Clearly no one had given any real thought to it. And in order to eat, my father thrust all the drawings and patents of his first and dearly-loved discovery in a drawer of his desk and turned to other interests.

A study of the Hülsmeyer technique reveals astonishingly modern concepts, many of which were not to see the light of day until another thirty years had elapsed and in some cases

even longer. Even the most cursory examination proves that the inventor was years ahead of his time. The Patent Specification Drawings of even his first design show that the entire structure is completely screened with metal to reduce stray fields and is mounted on a compass-like box, the gimbals ensuring a reasonable vertical position in a seaway. Rotation was provided by a foolproof solenoid and ratchet system, and a repeater compass on the bridge gave the officer of the watch an instant bearing when required.

The induction coil for the spark gaps[1] was housed in the compass box and insulated cables suitably spaced to prevent arc-over were conducted over an insulated shaft in a metal column, the power being delivered to the spark gaps by a brush and ring system. The spark gap itself was a partially oil-immersed Righi model and its position relative to the other components within the radiation system is interesting. Situated at the focal point of a concave reflector the two gaps were furnished with a double array of what appear to be director elements, the whole bearing a strong resemblance to a slotted Yagi-type beam system – an arrangement all the more remarkable since more than twenty years were to elapse before Professor Yagi of Japan introduced the beam antenna that bears his name. The entire antenna array was contained within a funnel-shaped reflector called a *Hornstrahler*, or 'horn-beamer' which in turn was enclosed in a larger cylindrical metal casing. When it is remembered that the operating wavelength was about 50cm[2] (as determined later by Telefunken engineers) it is hardly surprising if the structure resembles a waveguide, a notion not as astonishing as it seems when it is remembered that only a few years earlier Lord Rayleigh had announced that radio waves could be passed along a length of 18-inch metal pipe and emerge at increased strength at the other end.

[1] Although the spark transmitter was the only known method of transmission in those days, it is unwise to relegate it merely to the position of a primitive system and nothing more. Such transmitters were capable of generating large powers, and it is interesting to note that during the Second World War the Germans made use of the technique for their *Grete II* radar which delivered *one megawatt*, i.e. one million watts. See page 195.

[2] It is interesting to note that this wavelength, corresponding to about 600 MHz, was used some thirty years later by engineers who had never heard of Hülsmeyer's work. The employment of centimetric waves for German radar was a distinguishing feature throughout its history, and in 1934 it was laid down that engineers should concentrate on 50 cm. See page 39.

The receiving antenna was a cage of wires of some two and a half wavelengths mounted in a vertical cylindrical reflector bonded to the screening of the entire structure with a large circular metal disc between the two arrays to reduce stray fields to a minimum. It is also interesting to note that the position of the receiving antenna is in a null area of any possible rear lobes. And of greater interest is the provision of coaxial cable bonded to the screening of the assembly by which the received echo was delivered to the receiver, the latter being situated at a convenient point in the ship. Examination of the receiving equipment shows a common coherer system utilising the broadly-tuned antenna system, but the outstanding feature is Hülsmeyer's incorporation of his *Zeitsperre*, or 'time-barrier', which was a motor-driven rotating switch synchronised with the rotation mechanism of the whole assembly, which allowed the receiver to ring a bell or to actuate a drop-switch only on the reception of a second signal. A further refinement was the adoption of a command signal of three morse characters which alone actuated the receiver.

The range of the early system was about 5 km. The assembly was designed for mounting on the foremast of a ship at a pre-determined height, range-finding being carried out by raising or lowering the assembly on reception of an echo and employing triangulation or simple trigonometry with use of a pre-prepared scale of figures. Later, Hülsmeyer employed a system of range-finding that made use of radio lenses of a bitumastic-type dialectric in a double concave assembly – and radio lenses together with horn antennas were not to be seen again until the Second World War!

In hindsight it is astonishing that this system failed to interest the maritime world of those days. Some commentators have asserted that this lack of foresight was nothing less than criminal, even hinting that the *Titanic* disaster might have been averted had the vessel been equipped with this discovery – but stable doors had ever been shut on inventions the contemporary world fails to appreciate – and the passing of time often confers on those unrecognised in their own lifetimes a belated recognition even when their original art is overtaken by the advance of technology and science. Only after the end of the Second World War was Hülsmeyer hailed in his own country as the discoverer of the world's first practical radar system, a matter stonily ignored in the United Kingdom.

On reading Churchill's rhetorical question after the war

regarding the '*unknown inventor of radar*', Hülsmeyer's daughter sent a letter to the great man:

Düsseldorf, April 18 1949

To the Rt Hon Winston S. Churchill,

For several months the German press have carried articles under the title 'Churchill's search for the Inventor of Radar'. In these articles the writers refer to a passage in your Memoirs in which you appreciate the work of the unknown inventor of radar. I must tell you that this unknown inventor is my father, the engineer Christian Hülsmeyer of Düsseldorf who was born in 1881.

Shortly after Marconi's invention of wireless telegraphy my father was granted the German Patent No. 165546 on the 30 April 1904 for his apparatus known as the Telemobiloscope, which was tested in May of that year in Cologne. This demonstration was reported around the world, the *New York Times* of 19 May 1904 reporting:

Signal Approach of Ships
German Engineer's Invention
Tested in Cologne

Berlin May 18

An engineer named Hülsmeyer from Düsseldorf gave a demonstration to the shipping interests at Cologne today of an invention called the Telemobiloscope, by which a steamship captain will be able to detect the presence and direction of any other steamship three miles away. The apparatus consists of ...

After this result my father offered his invention to the German Navy in the hope that naval engineers and scientists would give consideration to the system, but the offer was refused. My father then took out patents in all other countries including England where he was granted the following:

Patent No. 13170 dated 10.6.1904 for a 'Hertzian-Wave Projecting and Receiving Apparatus Adapted to Indicate or Give Warning of the Presence of a Metallic Body, such as a Ship or a Train, in the Line of Projection of such Waves.'

Patent No. 25608 dated 24.11.1904 for 'Improvements in Hertzian Wave Projecting and Receiving Apparatus for Locating the Position of Distant Metallic Objects.'

Following the publication in the press of this invention, Director Wierdsma of the Holland-Amerika-Line invited my father to demonstrate his invention at the Technical Nautical Meeting in Rotterdam on 9.6.1904 before technical representatives of eight international shipping lines. The Dutch newspaper *De Telegraaf* on 10.6.1904 informed the world in detail about the demonstration. After this, my father hoped that one of the shipping lines would introduce his apparatus to prevent collisions between ships, but they preferred to use Marconi's wireless telegraphy instead.

The several demonstrations and work on his invention had cost my father nearly 25,000 marks, and as he was unable to bear the costs of maintaining his patents, he allowed them to lapse.

After the technical development of forty years my father's *Telemobiloscope* principle was embodied and completed in the 'Radar' of Sir Robert Watson-Watt. A German invention for the victory of the Allies!

Yours respectfully,
Annelise Hülsmeyer

Not surprisingly perhaps, especially in view of the sentiments in the final paragraph, Churchill sent a terse reply:


KAISERLICHES PATENTAMT.

AUSGEGEBEN DEN 21. NOVEMBER 1905.

PATENTSCHRIFT

— № 165546 —

KLASSE 74 *d*.

CHR. HÜLSMEYER IN DÜSSELDORF.

Verfahren, um entfernte metallische Gegenstände mittels elektrischer Wellen einem Beobachter zu melden.

Patentiert im Deutschen Reiche vom 30. April 1904 ab.

Figure 3 Hülsmeyer's patent, dated 30 April 1904 (*Fritz Trenkle*).

28, Hyde Park Gate, London, S.W.7
28 July 1949

Dear Sir,

I am desired by Mr Churchill to thank you for your letter, which it has given him interest to receive.

Yours truly,
[signed] Private Secretary
Miss Anne-lis Hülsmeyer

which confusion over the sex of the addressee is surely inexcusable. At about this time Hülsmeyer's daughter married the engineer Erich Hecker who, a year later, sent the following letter to Churchill:

Düsseldorf 12 February 1951

To
Lord (sic) Winston S. Churchill
28, Hyde Park Gate, London S.W.7

In our daily paper, the *Rhein-Post* of 9 February 1951, I read that in your country at this time Sir Robert Watson-Watt is to be celebrated and recognised as the discoverer of radar. With full appreciation and acknowledgement of the radar system developed by this outstanding gentleman, I must not fail to draw to your attention once more the Patents already existing in England, numbers 13170 and 25608, of the year 1904, and relating to an equipment known at that time as a Telemobiloscope.

This had been successfully demonstrated in 1904 at the International Shipping Congress in Rotterdam and is therefore the first radar discovery and the forerunner of today's radar. Records and evidence to support the truth of my statements have already been received by you in 1949 from the daughter of the German discoverer, and I am convinced that as an outstanding statesman you will not permit the abstaining of an impartial and critical examination of these facts.

I write as the son-in-law of the 70-year-old discoverer with the hope that a possible recognition of these facts on your part will give great pleasure to him, if only in the short evening of his life.

Very respectfully yours,
Your obedient servant,
Erich Hecker

Churchill's answer had at least the merit of being longer:

House of Commons
London, S.W.1
23rd February 1951

Dear Herr Hecker,

Thank you for your letter of the 12th February which Mr Churchill has asked me to answer on his behalf.

I very much regret that it would not be possible for him to intervene in the question of your (sic) invention. You should take this matter up with your legal adviser.

Yours sincerely,
(signature illegible)
Hon. Secretary.

Nothing daunted, Hecker wrote the following month to the British Patent Office:

Düsseldorf, 5 March 1951

To the President of the Patent-Office
of Great Britain, London.

From our daily paper, the *Rhine-Post*, of 9 February 1951 I note that Sir Robert Watson-Watt is to be honoured and acknowledged as the discoverer of radar and has applied for a Patent for his discovery in 1935. With full appreciation and acknowledgement of his merits in the development of this apparatus, which is one of the major discoveries of the last decade, permit me politely to draw your attention back to the year 1904. It will doubtless interest you that already by that time, thirty years before the patent application by Watson-Watt for his discovery, in almost every European country including England an equipment had been patented that worked on the same principle as today's radar and was known by the name of a Telemobiloscope. This was successfully demonstrated before experts at the International Shipping Congress in Rotterdam in 1904. The established facts of this demonstration are evidenced by the Dutch newspaper *De Courant* of 8 July 1950, which in its account also reproduced an eye-witness report from the year 1904.

Many articles in the world's press furnish unequivocable proof that the Telemobiloscope was the forerunner of today's radar, as do the issued Patent documents:

British Patent No. 13170 of 10 June 1904
A Hertzian Wave Projecting and Receiving Apparatus Adapted to Indicate or Give Warning of the Presence of a Metallic Body, such as a Ship or a Train, in the Line of Projection of such Waves.

and:

British Patent No. 24608 of 24 November 1904
Improvements in Hertzian Wave Projecting and Receiving Apparatus for Locating the Position of Distant Metal Objects.

which were awarded to the applicant as the first discoverer of radar.

It should not be difficult for you to obtain the above-mentioned documents for your examination and to satisfy yourself of the accuracy of my statements.

Today the discoverer, Engineer Christian Hülsmeyer, is already 70 years old and lives in Düsseldorf. In those days he was very much before his time and found, on account of his youth (23 years old) neither comprehension nor support for his discovery.

I am sure you will not refuse the implementation of an absolutely impartial investigation, and give to a German his due esteem and recognition.

Very respectfully yours,
Your obedient servant,
Erich Hecker

Presumably, the clerk at the Patent Office suffered from poor eyesight. The reply was as cold as it was illogical:

The Patent Office
25, Southampton Buildings
London, W.C.2.
3rd April 1951

Sir,

I am directed by the Comptroller to thank you for your letter of the 5th March and for the information contained therein, and to say that he regrets that the matter raised is not one on which he is empowered to take any action.

I should add, however, that in this country the term 'Radar' is used to denote a system which includes means for

determining the position of the distant object, that is, the distance thereof from the observer.

I am, Sir,
Your obedient Servant,
A.V. King.

Obedient to whom, one wonders? Since Hülsmeyer's system most certainly included means for 'determining the position of the distant object', it is debatable whether the old-fashioned notion of British fair play counts for very much ... Even Sir Robert Watson-Watt himself, on meeting Hülsmeyer at an International Radar Conference in 1954 in Germany, seems to have missed the point: '...even my long-awaited meeting with Christian Hülsmeyer, who was introduced to me as "the father of radar", could not cure me of the queer conviction that one parent was enough even for the lustiest of infants.'[1]

At least Hülsmeyer had the satisfaction of receiving honour in his own country where scientists and politicians plied him with distinction, and where a street and a square in Düsseldorf are named after him, together with a modern Army barracks near his home town of Eydelstedt. Rather meagre compensation though for a discovery which, if taken up at the time, might have changed world history.

[1] *Three Steps to Victory*. Robert Watson-Watt, Odham's, London, 1957.