



R.M.S. "QUEEN MARY"^{SS}

Radio Souvenir

The "Blue Riband" of Radio.

ON the maiden voyage of the "Queen Mary" the amount of radio traffic handled by the International Marine Radio Co. dwarfed all previous records, and thus won for the I.M.R.C. the "Blue Riband" for ship-shore radio.

Radio traffic handled by the I.M.R.C. equipment on the one voyage included :—

RADIO TELEGRAMS Over 175,500 words.
RADIO TELEPHONE CALLS 291 (including Australia, South Africa, Austria, etc.).

BROADCASTS TO ALL PARTS OF THE WORLD 40 programmes (occupying 16 hours, 19 minutes).

The modern technique and good workmanship which made this achievement possible are available to all users of I.M.R.C. radio equipment, whether for small coastal craft or great ships like the "Queen Mary."

RADIO

on board the

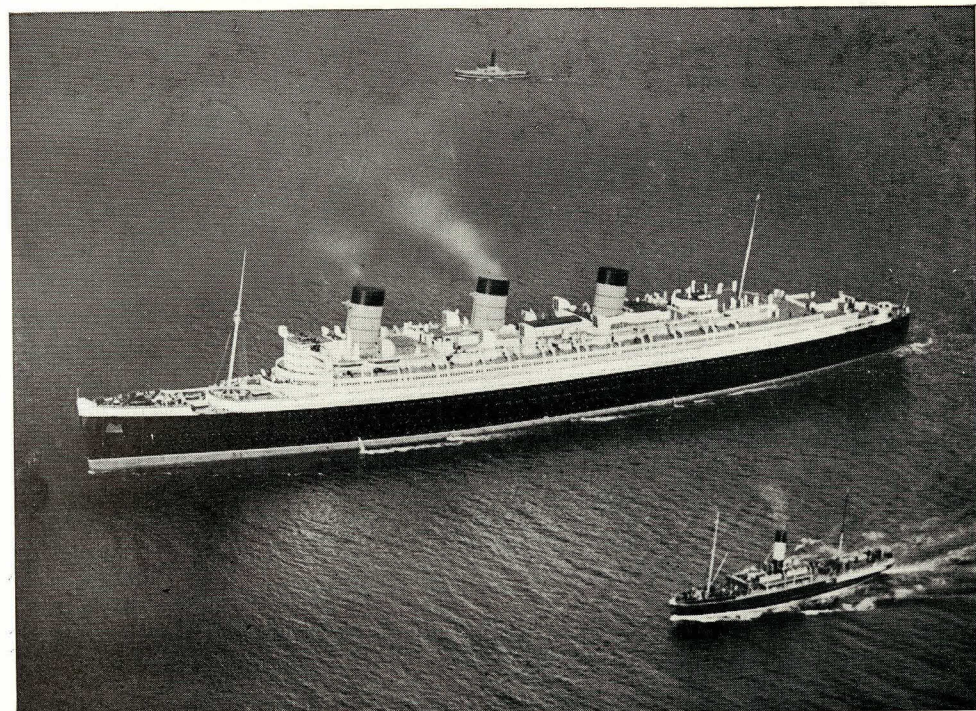
R.M.S. "QUEEN MARY"



INTERNATIONAL MARINE RADIO CO., LTD.,

Connaught House, 63, Aldwych, London, W.C.2

Telephone : Holborn 8765 (15 lines) Telegrams : Intelcomar, Estrand, London



R.M.S. "QUEEN MARY"

Built by John Brown & Company, Ltd., Clydebank, for Cunard White Star, Ltd., and launched on September 26th, 1934 by Her Majesty Queen Mary in the presence of King George V. and King Edward VIII., then Prince of Wales.

Length on Water Line, 1,004 feet. Beam 118 feet. Height: Keel to top of superstructure, 135 feet; keel to top of forward funnel, 180 feet; keel to masthead, 234 feet.

Tonnage, 80,773 tons (gross). Engines: Quadruple screw geared turbines.

RADIO

on board the

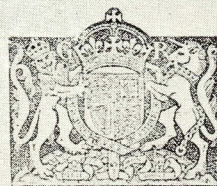
R.M.S. "QUEEN MARY"

THE fleets of Cunard and White Star have always been regarded, not only in Great Britain but throughout the world, as being composed of ships which from the time of launching were outstanding examples of the highest standard of the naval architecture and marine engineering of their day.

These two great shipping companies are now combined under one flag, and may be said to commemorate their fusion in the maiden voyage of the "QUEEN MARY," the finest and most stately liner that has ever been put into service. Built by John Brown and Company, the famous shipbuilders of the Clydebank, she was christened and launched on September 26th, 1934, by Her Majesty Queen Mary in the presence of King George V. and King Edward VIII., then Prince of Wales.

As the marine radio company which has been honoured with the contract for the provision and operation of the radio equipment, we are dealing in our own souvenir of this historic occasion with the Radio Telegraph and Radio Telephone equipment of the ship, and we believe that the installation which we have provided will prove to be worthy of the event.

Eight of the ten British trans-Atlantic liners so far fitted with a subscriber's radio-telephone service have been equipped by the I.M.R.C., and the valuable experience thus gained in the design and operation of high grade marine radio equipment has enabled the



UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND.



Licence to establish Wireless Telegraph Ship Station.

Issued by virtue of the Wireless Telegraphy Acts, 1904 to 1926, and in conformity with the International Telecommunication Convention.

CUNARD WHITE STAR LIMITED,
CUNARD BUILDING,
LIVERPOOL

is hereby licensed to establish and work a wireless telegraph sending and receiving station in the ship specified below, subject to the conditions stated on the back hereof.

PARTICULARS OF STATION.

Name of Ship - - - - - QUEEN MARY

Call Sign - - - - - GBTT

Class of Station under the Telecommunication Convention - - - - - I

The Licensee is authorised to use the power, frequencies and types of emission which for the time being appear against the name of the ship in the International List of Coast Stations and Ship Stations published by the Bureau of the International Telecommunication Union and also any additions which shall have been notified in conformity with clause 12 of the conditions overleaf. This authority does not include the use of frequencies above 6000 kc/s (waves below 50 metres) unless particulars have been entered hereunder before the issue of the licence.

* Installation for use of frequencies above 6000 kc/s.

Frequencies (waves)	8254(36.35), 8305.5(36.12), 8430(35.34), 8800(34.09), 11020(27.22), 12384(24.22), 12470(24.06), 13350(22.47), 16470(18.21)	8830(33.98), 8860(33.86), 13210(22.71), 13320(22.52), 17600(17.05), 17640(17.01)
Type(s) A1	A3.	

* NOTE.—If an installation for the use of frequencies above 6000 kc/s is not authorised, the words "not authorised for working on frequencies above 6000 kc/s" are entered in place of the particulars.



By Order of the Postmaster General.

K 360

(218)11451-11047) W4 22070-11807 2000 470 B & S

This reproduction of the "QUEEN MARY'S" radio-licence shows the large number of wavelengths required for the efficient operation of the radio service on the world's finest liner.

Company to supply an installation for the "QUEEN MARY" which they feel confident is the finest example of modern radio practice to be found on board ship anywhere in the world.

Two special features are embodied in this installation which are of great importance in connection with the successful handling of the heavy radio traffic experienced on board a large Atlantic liner. The first of these features—multiplex working, as it is called—involves one of the most difficult problems that presents itself to the marine radio engineer.

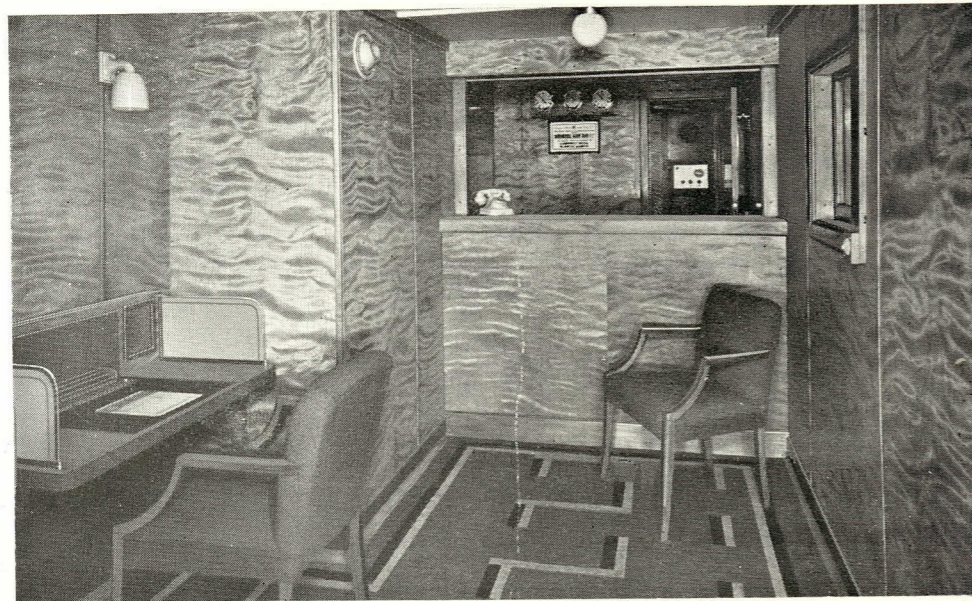
It is a comparatively simple one on land where the receivers are usually placed twenty or thirty miles away from the transmitters, but on a ship the radio engineer has to face a situation in which he has to receive signals from a distant station, whilst the transmitters on board his own ship, only a few yards away at most, are in full operation.

The solution of this problem involves not only highly selective receivers, but also very highly stabilised transmitters, and has rarely, if ever, been seriously attempted in the past.

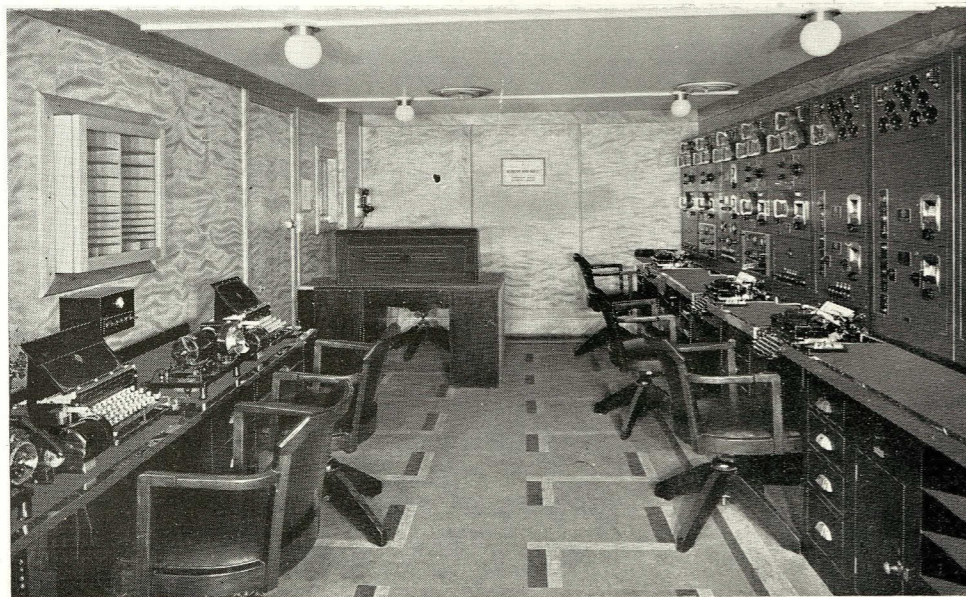
In the "QUEEN MARY" there are four "operating positions," and it is possible to work *eight* separate lines of communication (*i.e.*, 4 in and 4 out), at the same time independently of each other.

The second feature—that of instantaneous wave-change—involves a mechanical problem very similar to that which has been successfully solved in the case of the automatic telephone. This form of wave-change, which is essential if full advantage is to be taken of multiplex working, has never, until now, been incorporated in the radio equipment of a ship.

Two other innovations introduced in the radio equipment of the "QUEEN MARY" are of interest in view of their contribution to the convenience and safety of those on board. One is a secrecy device incorporated in the radio-telephone equipment. This device makes it impossible for unauthorised persons to "listen-in" to radio-telephone conversations between the ship and the shore. The other is the fitting in the ship's lifeboats of a small radio-telephone installation in addition to the regular radio-telegraph equipment specified by the Board of Trade, thus rendering her occupants more or less independent of the services of a skilled radio operator.



View in the Radio Office on board the "QUEEN MARY"



Part of the Radio Control Room on board the "QUEEN MARY" showing some of the receiving equipment.

Sending a Radio Message

If during the voyage you wish to send a message to some friend or relation in Europe or America, you will find that the procedure is very simple. You can either go to the Radio Office, taking the lift from the Main Hall and then asking the lift attendant to direct you, or you can use the ship's telephone service from your cabin, or from one of the public booths. In the latter case the accepting clerk will send a messenger down to you. A supply of the necessary forms will be found on every writing desk.

Should you wish to arrange a radio-telephone call the procedure is even simpler, as the whole transaction can be arranged and conducted by telephone between your cabin and the accepting clerk in the Radio Office.

You can also book accommodation in advance by radio at a large number of hotels free of all charge.

The charges for the various radio services must obviously vary with the distance separating the addressee from the radio land station through which the message is sent. The accepting clerk at the Radio Office should be consulted in each case, but, broadly speaking, there are four kinds of radio-telegrams.

1. **The Full-Rate Radio-telegram** is an express message delivered to the addressee as soon as possible. The cost of this message to London, for instance, is 11d. per word, and to New York about 1s. 2d. per word, the difference being due to the rate of exchange.

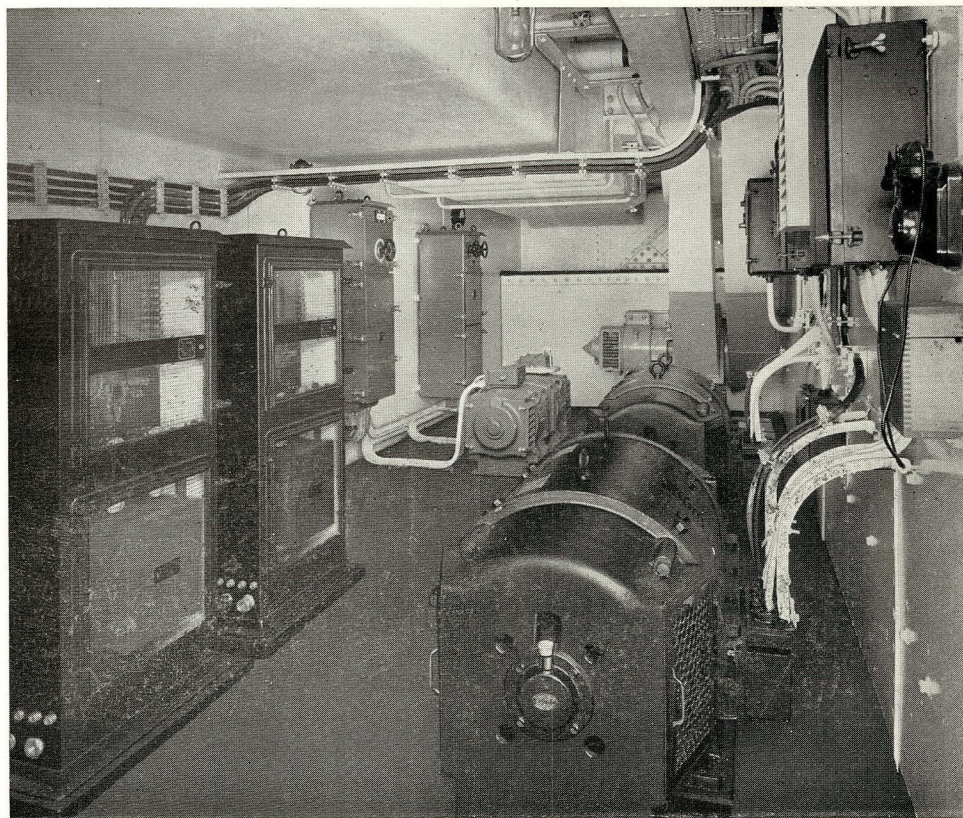
2. **The Ship Letter Telegram** is in the nature of a deferred service. It is sent by radio to a land station and is then forwarded to the addressee by ordinary post. The cost of this service varies in each country. It is 3d. per word, with a minimum charge of 5s. in the case of Great Britain. The accepting clerk will quote the rates for other countries on application.

3. **The Ocean Letter** and (4) **the "Poste" Radio-telegrams** are variations of the ship letter telegram, having advantages over the latter in certain circumstances.

RADIO-TELEPHONE CALLS are divided into two classes—those made when the ship is less than 500 miles from land, and those made when she is over 500 miles from land.

As in the case of radio-telegrams the actual charges depend on the land-line communication which is involved, but the following are the charges for a conversation between this ship and a subscriber in London and New York respectively :—

Under 500 miles :	London,	12/-	per minute.	Minimum	£1/16/-
„	„	New York,	\$3	„	„
Over 500 miles :	London,	24/-	„	„	£3/12/-
„	„	New York,	\$6	„	\$18.00



The special electrical generating plant which supplies power for the "QUEEN MARY" radio installation. This equipment is duplicated against the possibility of a breakdown.

General Description of the Radio Installation

Attention will naturally be drawn in the first instance, to the main *Accepting Office* which is situated on the Sun Deck, immediately under the Sports Deck between the first and second funnels. It can be approached by either staircase from the Main Hall.

RADIO ACCEPTING OFFICE. A passenger desiring to send a radio-telegram or to make arrangements for a radio-telephone call, will find here all the necessary facilities for either. The attendant accepting clerk at the counter is in a position to give any information that may be required in connection with the address and cost of the communication, and will also advise not only as to the quickest, but also the most economical procedure to be followed.

Immediately adjoining the *Accepting Office* is the *Radio Control Room*. The operators' desks will be observed stretching right across this room. During busy hours four operators are employed, each with his headphones, typewriter and telegraph key. In front of each are two receivers—covering between them all wavelengths in use—and the dial of the control unit by means of which he is able to start up or stop the transmitters, or instantaneously change from any one wave to any other without moving from his seat. Special equipment for automatic high speed transmission and reception is available when required if traffic is heavy. At the far end of the room will be seen the Emergency Equipment. This is entirely self-contained, consisting of transmitter, receiver and large accumulator battery. It is entirely independent of the ship's electrical power supply, and more than fulfils all the requirements of the Board of Trade under the regulations of the International Safety of Life at Sea Convention. The range of this Emergency Equipment is about 500 miles.

The Control Room also contains the apparatus connected with the Radio Telephone Service except the actual transmitters themselves, and during a conversation with the shore one of the operators maintains the circuit at maximum efficiency for the speakers.

An interesting feature of the room which is not apparent lies in its construction. The room—walls, ceiling and floor—is completely lined with thin copper sheet, the object of which is to reduce to a minimum any possible interference with reception arising from the presence in the ship of numbers of electrical machines, switches, circuits, etc.

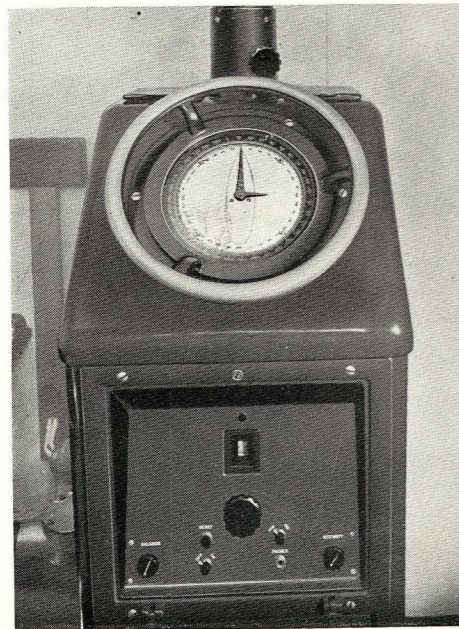
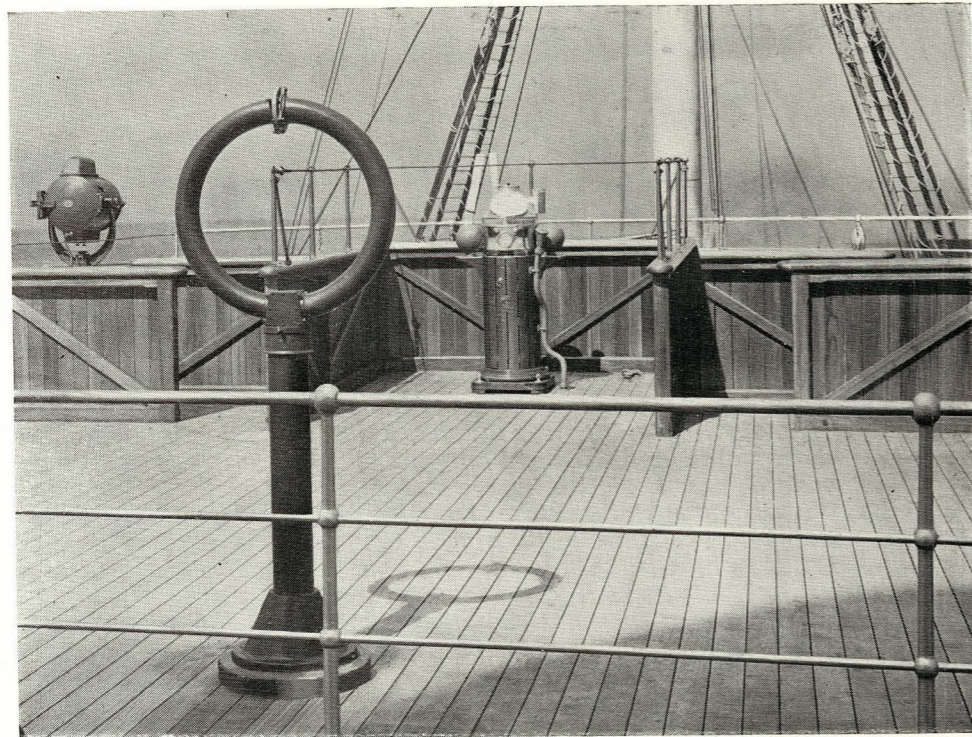
Leaving the Control Room we may next take a look into the *Transmitter Room*, which is situated 400 feet away on the after part of the Sun Deck, near the Verandah Grill and just forward of the main mast. Here will be found the four main transmitters :

RADIO TRANSMITTER ROOM. 1 long wave transmitter, covering all waves between 1875—2725 metres ; 1 medium wave transmitter, covering all waves between 600—800 metres ; 2 short wave transmitters, covering all wavelengths allocated to ship communication between 17 and 96 metres.

These transmitters are normally adjusted to radiate special "spot" waves which have been selected in consultation with the coast station authorities, and provision is made for a change from any one "spot" wave to any other by the operation of the dial on the receiving operator's desk. There are altogether 32 such "spot" waves :—

9 for short wave telephony ; 11 for short wave telegraphy ; 7 for long wave telegraphy ; 5 for medium wave telegraphy.

An interesting and novel feature of the Transmitter Room is the complete absence of noise. There is no running machinery, as gas rectifiers take the place of the motor generators usually employed.



The illustration above shows the rotating loop portion of the I.M.R.C. radio direction finder installed on the bridge of R.M.S. "QUEEN MARY." In the lower picture is seen the rest of the direction finder apparatus fitted in a special compartment situated immediately below the loop. This important aid to navigation enables bearings to be taken under any weather conditions, and is operated by the navigating officer.

The power supply for the entire radio installation consists of a special generating plant in a compartment situated near the engine room of the ship. This supply is duplicated against the possibility of a breakdown.

POWER SUPPLY. It is of general interest to note that the total weight of the transmitters and receivers (not including the power plant) is over eleven tons, and the aerial power supplied is more than sufficient to maintain continuous communication with either continent during the voyage.

Lastly we come to the *Aerial System*, which is unusually elaborate and consists of 9 separate aerials : 4 for transmission, 4 for reception, and 1 special emergency aerial. The most interesting of these is the main transmitting aerial, which is stretched between the mastheads. This aerial consists of twin phosphor bronze wires spaced 12 feet apart and 600 feet in length. This is an unusually long span, and the calculated strain on the mastheads is of the order of one ton.

Two of the motor lifeboats are fitted with radio installations of standard Board of Trade type, but in addition they are equipped with a small radio telephone set similar to those usually supplied to trawlers. The operation of these sets is very simple, and in the event of the illness or absence of the wireless operator, communication can still be maintained by telephony.

The "QUEEN MARY'S" lifeboats are the first ship's boats that have ever been equipped with a radiotelephone in addition to the wireless telegraph installation required by the regulations of the Board of Trade.

The I.M.R.C. Radio Direction Finder will be found in a special compartment on the Bridge, next door to the Sperry Gyro Master Compass Compartment, and near the ship's standard compass.

THE RADIO DIRECTION FINDER. The Gyro Master Compass controls several "repeater" compasses placed in various convenient positions in the ship. One of these "repeaters" is incorporated in the radio direction finder itself, and is directly associated with the scale of the instrument. In this way an observer is able to obtain the compass bearing of a radio station immediately by means of the direction finder, instead of having to compare his observation with that simultaneously obtained by another observer at the standard compass, as is usually the case. The radio direction finder is regarded as an important aid to navigation, as its use is quite independent of atmospheric conditions. Bearings can be taken in fog or storm on radio stations or radio beacons on shore at any distance up to 300 or 400 miles, and by means of these bearings the position of the ship can be accurately fixed on the chart, no matter how thick the weather may be. As it is a navigational instrument the radio direction finder is handled by the navigating officers of the ship, and not by the radio staff.

Radiotelegraph traffic can be roughly divided into two classes, short distance and long distance ; the former through one or other of the many short range Coast Stations disposed along the coasts of all maritime countries and operating on 600—800 metres ; the latter through one or other of certain special stations designed to handle a large volume of traffic at all ranges on wavelengths specially allocated for this purpose.

In the case of the "QUEEN MARY" the bulk of the traffic is passed through the Post Office station at Portishead in Great Britain, and the Mackay Radio and Telegraph Corporation's station at Sayville in the United States.

Both these stations represent the highest standard of modern practice in shore station development, and a short description of the British station will no doubt be of interest.

Portishead Radio consists of a transmitting station at Portishead, near Bristol, and a receiving station at Burnham-on-Sea, about 30 miles distant on the shores of the Bristol Channel. The two stations are connected by land lines, and the actual control of all communication is located at Burnham.



This view in the Radio Transmitter Room on board the "QUEEN MARY" gives some idea of the size of the great transmitters which are remotely controlled from the Radio Control Room 400 feet away.

Portishead Radio does not, of course, deal only with transatlantic shipping. It is in continuous operation with ships in all parts of the world, and the station handles more than 2,000,000 paid words of traffic per annum.

At Portishead there are altogether eight separate transmitters and twelve fixed aerials. There is as well a special short wave aerial possessing very pronounced directional properties, which is mounted on a rotating frame, and which can be trained by remote control from Burnham to give the strongest possible signals to any ship in any part of the world.

There is a similar arrangement at Burnham for the reception of very weak or distant signals. The operator at Burnham first trains his rotating aerial to receive the strongest signals from the ship, and then before replying, trains the Portishead transmitter in the same direction.

At the receiving station at Burnham, there are altogether 15 receiving positions and a staff of over 30 operators. These operators are able to start up, stop or change the wavelengths on the Portishead transmitters by means of remote control, the actual sequence of events when passing a radiotelegram from the ship to the shore being as follows :—

The message is handed in by the sender on board the ship at the Accepting Office, and the accepting clerk gives it to one or other of the operators. This operator then calls the shore station on the general calling wavelength as soon as an opportunity presents itself. The shore station operator replies on the same wave, and either directs the ship station to send the message on one or other of the working waves, or if they are all in use, to await his turn with other vessels. On ships which cannot transmit whilst they are receiving, cannot receive whilst they are transmitting, and are unable to change from one wavelength to another quickly, the passing of traffic to the shore may suffer considerable delay when many ships are endeavouring to send their messages. The advantages possessed by the "QUEEN MARY" in having four quite independent lines of duplex communication combined with almost instantaneous change of wave are obvious in this connection, as her operators are able to take immediate advantage of any opportunity that offers itself.

When the operator at the shore station is satisfied he has received the message correctly, he hands it to the landline operator—after which it is treated as an ordinary telegram.

The equipment and the organization of a radio telephone service on board ship is a more complicated affair than that demanded by radio-telegraphy.

HANDLING A RADIO-TELEPHONE CALL. A passenger desiring to arrange for a telephone call to a friend on shore should consult the clerk at the Accepting Office, either directly or by telephone. He will be told whether or not the call can be put

through at once, but in many cases, especially in the case of a call to a particular individual, it will be necessary for the ship's operator first to get into touch with the shore station operator, as the latter will have to arrange for the attendance of the distant correspondent, and ensure that the necessary local and trunk lines will be kept clear at a certain definite time for the communication from the ship. All this must, of course, take time, and generally speaking the passenger is told that his call will be put through at a specified time at which he will be asked to attend.

Although in the "QUEEN MARY" the same transmitters and receivers are used for both telegraphy and telephony, the transmitters and receivers must have additional and complex stages added before telephony suitable for extension to or from the landline network can be achieved. In the case of telegraphy the dots and dashes of the Morse code which result in a message are produced by the operation of a key. In the case of telephony the voice itself, by means of special and very sensitive apparatus, takes the place of a key, starting and stopping the transmission instantaneously as may be necessary. In a subscriber's radio telephone service, transmission is actually started and stopped with each word.

In the case of the "QUEEN MARY'S" radiotelephone equipment, a "speech-scrambler" secrecy device is added which renders the passenger's conversation completely unintelligible to any "listener-in" not provided with identical equipment.



Further evidence of the complex organisation needed to deal with the radio traffic of the "QUEEN MARY" is afforded by these interior views at the Post Office shore stations at Portishead and Burnham. The upper view shows part of the equipment at Portishead. In the other picture operators are seen handling ships' radio messages at Burnham.

The well-known vagaries of short wave transmission must not be forgotten. The strength of a received signal will sometimes vary from moment to moment, and the effect of these variations is much more important in telephony than in telegraphy. A successful conversation will often depend largely on the skill of the radio operators who are "monitoring" the conversation for the speakers. It may be of interest also to note here that different wavelengths must be used for different distances, and that the best wave to use for any particular distance varies not only with the time of day and the season of the year, but apparently also with an at present undetermined cycle of years. Under these conditions, the practically instantaneous change of wavelength which can be obtained by the automatic control embodied in the "QUEEN MARY'S" transmitters will prove to be of considerable advantage in maintaining a good radio-telephone service when conditions are difficult. The shore end of the ship-shore radio-telephone service is maintained by the Post Office. The transmitting station is at Rugby and the receiving station at Baldock in Hertfordshire.

The receivers include a short wave receiver unit which has been specially designed as a high-class telephony receiver for use in the ship-to-shore telephone service and for the reception of broadcast programmes and their distribution throughout the ship, as well as for multiplex telegraphy operation.

THE RECEIVERS.

The receivers for medium and long waves respectively, are purely for telegraphic use. They have been designed especially for multiplex working, and incorporate a number of special features enabling reception to be carried out at the same time as the transmitters are working. The short wave receiver covers a wave-range of 13.5 to 550 metres; the medium wave receiver covers 500 to 3,000 metres; and the long wave receiver covers 2,000 to 20,000 metres.

In all, eight receivers are used. These are mounted side by side, forming a row about 18 ft. long by 3 ft. high, facing the four operating positions. These positions contain a large amount of operating equipment in addition to the receivers, including remote control apparatus for the transmitters which are in another room about 400 ft. away.

The two short-wave (17-96 metres) transmitters are multi-frequency crystal-controlled transmitters for continuous wave, interrupted continuous wave, or telephone transmission. The method of control is automatic as in the case of the medium and long wave transmitters, and the transmitter can be operated either as a telegraph transmitter by a Morse key, or as a high quality telephone transmitter in conjunction with the special telephone terminating equipment supplied.

The two short-wave transmitters between them provide for the use of 20 waves, 11 for telegraphy and 9 for telephony, the wavelengths being so distributed that at any time both transmitters will be available for telegraphy or telephony.

The stability of the transmitter is assured by means of master oscillator control. Special provision is made for the use of ten pre-determined or "spot" waves, and the telegraphist at the receiving station is able to make a change by remote control from any one of these waves to any other in less than five seconds. In addition he can adjust the frequency of these "spot" waves if required, also by remote control. The "spot" waves at present fitted are the normal ones of 600, 635, 705, 730 and 800 metres. Others will be fitted as and when required.

The long wave transmitter is similar in design and operation to the medium wave transmitter, except that provision is made for the use of 7 waves, viz.: 1925, 2013, 2100, 2150, 2200, 2400 and 2690 metres.

LONG WAVE TRANSMITTER.

Complete operation of the whole of the telegraph and telephone services without the operators having to change their positions or to remove their headphones, has been provided for.



THE INTERNATIONAL MARINE RADIO CO., LTD., supplies modern radio equipment for every class of vessel, from small private yachts and coastal craft to the great trans-Atlantic liners.

The Company also undertakes the servicing and maintenance of ships' radio equipments at home and abroad. For this purpose depots and service agencies are provided at the following places :

HOME DEPOTS : Southampton, Grimsby, Victoria Docks, London, Liverpool, Newcastle-on-Tyne, Glasgow, Cardiff, Hull, Dublin, Milford Haven.

FOREIGN DEPOTS AND AGENCIES : Argentina (Buenos Aires), Australia (Sydney, Melbourne, Brisbane, Adelaide and Perth); Belgium (Antwerp); Brazil (Rio de Janeiro); Burma (Rangoon); Canada (Vancouver, Victoria, Montreal, and Halifax); Canary Islands (Las Palmas, Teneriffe); Ceylon (Colombo); China (Shanghai, Canton, and Hong Kong); Cuba (Havana and Santiago de Cuba); Denmark (Copenhagen, Aarhus, Aalborg, Esbjerg); Dutch East Indies (Curacao); Egypt (Cairo); Esthonia (Tallinn, Reval); Finland (Helsingfors); France (Bordeaux; Boulogne, Havre, Marseilles, Paris, etc.); Germany (Berlin, Bremen, Hamburg, Cuxhaven, etc.); Holland (The Hague and Rotterdam); India (Calcutta, Bombay, and Madras); Italy (Rome, Naples, Genoa and Milan); Indo-China (Saigon); Japan (Tokio, Yokohama, Osaka and Kobe); Manchuria (Dairen and Keelung); Newfoundland (St. Johns); New Zealand (Wellington and Auckland); Norway (Oslo and all Norwegian ports); Philippine Islands (Manila); Poland (Warsaw); Portugal (Lisbon); Roumania (Bucharest, Constantza, Braila, Galatz); South Africa (Johannesburg, Capetown, Durban and East London); Spain (Madrid and all Spanish ports); Straits Settlements (Singapore, Port Swettenham, and Penang); Sweden (Stockholm and Gothenburg); United States of America (New York, Baltimore, New Orleans, San Francisco, Los Angeles, San Diego, Portland, Seattle, etc.); Hawaii (Honolulu).

In addition to the foregoing, owing to our world-wide business associations, service can be arranged for the convenience of customers at almost any port of call.

INTERNATIONAL MARINE RADIO CO., LTD.

Connaught House, 63, Aldwych, London, W.C.2

Telephone : Holborn 8765 (15 lines). Telegrams : Intelcomar, Estrand, London, Cables : Intelcomar, London

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