WIRELESS TELEGRAPHY APPENDIX, 1908.

CONTENTS.

GENERAL SUMMARY OF WIRELESS TELEGRAPHY PROGRESS DURING THE YEAR 1908.

The Service Mark II. apparatus has been installed in a number of ships, and the practical trials carried out have shown it to be fully capable of communicating to the range for which it was designed.

A handbook giving information with regard to installing and working the apparatus has been issued to the Fleet.

The Mark II. installation, with slight modifications to suit special requirements of the places, has been fitted at certain shore stations, namely, at the Admiralty and at St. Angelo, Malta, and should also be working at the shore stations established at Pembroke, Aberdeen, and Ipswich by the middle of 1909.

The principal feature of the year's work in "Vernon" has been the design of the 100-K.W. sets for Cleethorpes, Horsea, and Gibraltar, from each of which it is expected to obtain a reliable day range of 1,000 miles on the special wave-lengths they will use, the receiving station being a ship with a Mark II. aerial. For smaller ships the range will be proportionally less, according to the size of aerial, and for shore stations with larger aerials than those that can be carried in ships the range will be greater.

Other work that has been carried out in "Vernon" includes the Service Mark I*. design and the design of a short-distance set. The object of the Mark I*. design has been to place the existing Mark I. apparatus, which has been in a more or less extemporised state since its introduction, on a proper footing.

Two rotaries will be supplied, a suitable type of ebonite condenser will replace the Leyden jars, an easily adjustable and efficient primary and secondary will supersede the home-made tuners, an efficient transformer will replace the induction coils, and a spark gap of the rotating type, to enable a musical note to be obtained, will be supplied.

The sets are now being delivered, and ships to which this installation is appropriated should all be fitted during 1909. A handbook to assist the ship's Officers in fitting up the apparatus has been compiled.

Experiments have been carried out in "Vernon" with arc systems and with different types of Wireless Telephones. Generally speaking, the results have not shown the systems to be of a sufficiently reliable character for their introduction into H.M. Service to be seriously considered.

Experiments with portable W.T. sets are in progress, and it is intended shortly to design a compact installation suitable both for equipping torpedo boats or small vessels used for harbour defence purposes, and for transport purposes ashore.

In other directions, much thought has been given to the organisation of Wireless Signalling, and the Wireless Signal Book. The former has been issued to the Fleet in a form suitable for immediate requirements, and for expansion when the shore stations now under construction are completed. The Wireless Signal Book has been arranged to include the Instructions for Conduct of Wireless Signalling, and should be issued to the Fleet by the middle of 1909.

The instruction of men qualifying for P.O. telegraphist (new scale) has been steadily progressing in "Vernon," and the training of boy telegraphists in "Impregnable" is also proceeding at a good pace.

The numbers, however, are still far short of the Service requirements, and with the rapid expansion of Wireless Telegraphy, the problem of personnel becomes daily more serious and difficult to solve.

INSTRUCTIONAL REPORT.

The following number of Officers and other ratings have been instructed in Wireless Telegraphy during the past year :—

Officers.

Lieutenants (T) qualifying	12
Marine Officers' Special Course (A.C.L. No. 5 of 10th January 1908)	8
Marine Officers	23
Coast Guard Officers	4
Gunners (T) (for Scouts)	3
Naval Store Officers	2
Total	52

Other Ratings.

Higher Telegraphist ratings	95
Other Telegraphist ratings	5
Qual. Gunners (T)	8
Qual. Armourers and Electricians	44
Coast Guard ratings for Shore Stations	37
Total	189
Grand Total	241

The following new apparatus has been set up in "Vernon" since last year :— Additional apparatus installed.

A standard Service II. installation is fitted up and can be connected when necessary to the main aerial.

A standard destroyer set has also been installed.

TELEGRAPHIST BRANCH.

The numbers of Telegraphist ratings in the Service on the 21st November 1908 were as follows :—

C.P.O. Telegraphists	15
P.O. Telegraphists	139
Leading Telegraphists	75
Telegraphists	147
Ord. Telegraphists	20
Boy Telegraphists	94
Total	490

Extract from Report by Captain of "Impregnable" on Training of Boy Telegraphists, dated 20th October 1908.

The instruction of boy telegraphists in "Impregnable" has proceeded in accordance with the syllabus laid down in the Admiralty Circular Letter No. 100 of the 26th August 1907, with a slight modification to admit of more Morse instruction being given, which was found to be necessary.

No difficulty has, up to the present, been experienced in obtaining suitable volunteers for the branch, from the large number of lads entered this year, and since the first class was formed in September 1907, regular monthly classes have been obtained. Up to the present, 259 boys have been classed up for this instruction, and of these, 44 have subsequently been discharged from the classes for failure, misconduct, invaliding, discharge by purchase, &c. The first class of 14 boy telegraphists was drafted to the Channel Fleet and 1st Cruiser Squadron on the 1st June last. A class of 15 boys was drafted to the Home Fleet at the Nore and the 5th Cruiser Squadron on the 26th

June. Owing to the midsummer vacation no boys were drafted in July and August, but a class of 22 boys, which completed in September last, is still awaiting draft to the Mediterranean Station, and will proceed in H.M.S. "Bacchante" about the 24th instant.

A class of 20 boys who have just completed, is waiting draft to the Atlantic Fleet.

Excluding the two classes awaiting draft, 144 boy telegraphists remain under instruction.

Extract from A.L. M. 01132 of 21st September 1908 on Wireless Telegraphy Conference held on Board H.M. Ship "Vernon" on the 12th August 1908.

Communication between short-distance set and bridge.

Voice-pipe communication should be arranged for between the short-distance Wireless office and the fore bridge; also there should be some means available for repeating signals on the bridge so that in the case of manœuvring by wireless the signals can be checked on the bridge while they are actually being made.

Operator's handbook and Wireless Telegraphy order book not required.

It is unnecessary to issue an operator's handbook, as it is considered possible to make the revised instructions for the conduct of Wireless Signalling sufficiently comprehensive to render this and Fleet Wireless Telegraphy order books unnecessary.

Appliance for recording signals actually transmitted.

It is considered that a record of signals actually transmitted would be useful as a check on the telegraphists' acuracy, and would help to prevent mistakes. Endeavour is to be made to devise some simple arrangement possibly combined with the instrument referred to in paragraph below.

Radiation indicator.

It is considered desirable that some form of indicator should be introduced by which it can be seen, while sending, whether the aerial is radiating efficiently or not. It is suggested that some form of vacuum tube be obtained for trial as a radiation indicator.

Signal pads.

No alteration should be made in Form S. 1322, as this was designed for the use of the operator in the silent cabinet, and is arranged in a manner suitable for writing down the message as it comes in. The wireless signal log is also arranged on the same principle.

Organisation of wave-lengths.

The organisation of wave-lengths has recently been decided by a committee, and no further instructions than are embodied in the memorandum of 15th August are necessary for the present.

"Red plug" to be kept out in a fog.

Pending the introduction of short-distance wireless, the only special arrangement necessary for communication between battleships in company in a fog is that the red plug should be kept out while the fog lasts. Each ship should continue to look out on the wave-length for which she is detailed, but with the red plug out she will be able to read signals from the flag or any ship within reasonable distance on any of the Fleet wave-lengths.

"Red plug" to be kept in as a rule.

Except as mentioned in the previous paragraph, the red plug should be kept in, and the ship thus made selective on its own particular wave-length.

Inter-Fleet exercises to cease.

Instructions will shortly be issued laying down a uniform procedure for Wireless Signalling in all fleets. The exercises ordered to be carried out between the Channel, Atlantic, and Home Fleets are to be discontinued (A.L. M. 01424 of 21st November 1907 to Commanders-in-Chief, Channel, Atlantic, and Home Fleets).

Hours for tuning.

The hours of 11 a.m. to 3 p.m. should be used instead of 11 a.m. to 12 noon and 2 p.m. to 4 p.m.

The directions contained in A.L. M. 01509 of 24th April 1907 are cancelled.

Recording Instrument.

Inker.

It has been decided to supply an automatic inker to ships fitted with the following installations:—

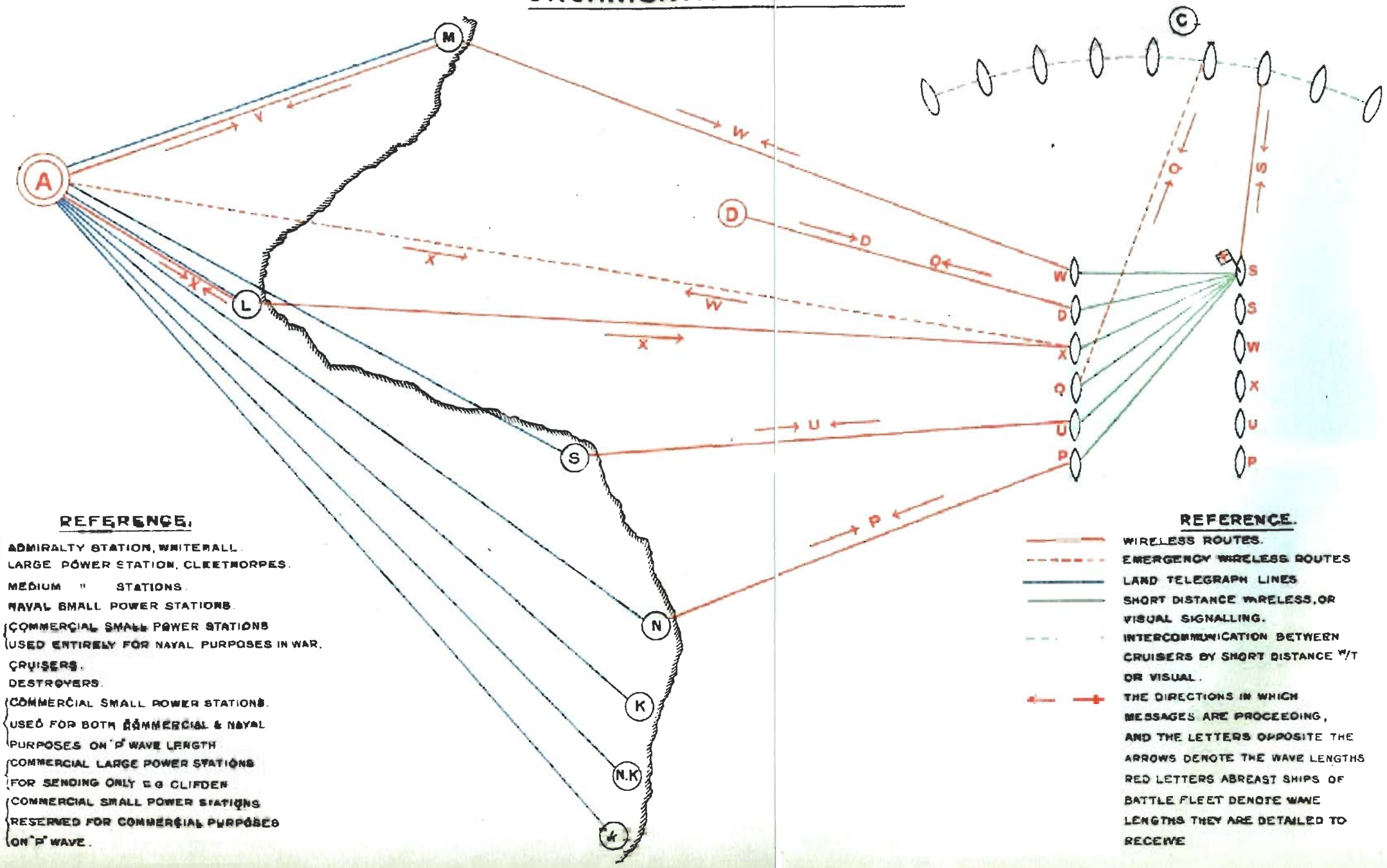
Service Mark II.
"C" tune.
Short-distance.

(A.L. G. 15584/08/22208 of 11th November 1908.)

Except in the case of the short-distance sets, they are to be fitted by the ship's staff.

The inker will be fitted on a shelf in the chart house, or other convenient position, and joined up in such a way that each signal transmitted by the ship will be simultaneously recorded in the chart house, thus forming a useful check on the accuracy of the signals and of the spacing of letters and signs.

ORGANISATION DIAGRAM.



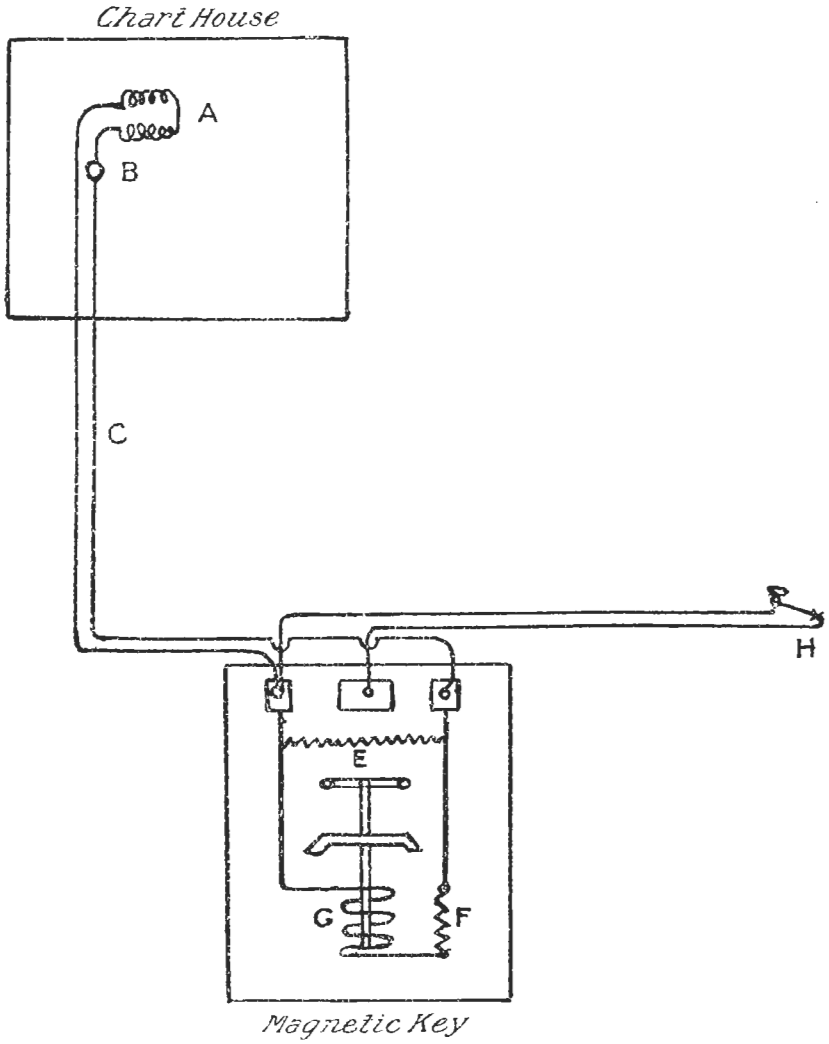
REFERENCE.

- (A) ADMIRALTY STATION, WHITEHALL.
- (L) LARGE POWER STATION, CLEETHORPES.
- (M) MEDIUM " STATIONS.
- (S) NAVAL SMALL POWER STATIONS.
- (N) COMMERCIAL SMALL POWER STATIONS USED ENTIRELY FOR NAVAL PURPOSES IN WAR.
- (C) CRUISERS.
- (D) DESTROYERS.
- (N) COMMERCIAL SMALL POWER STATIONS. USED FOR BOTH COMMERCIAL & NAVAL PURPOSES ON 'P' WAVE LENGTH
- (K) COMMERCIAL LARGE POWER STATIONS FOR SENDING ONLY E.G CLIFDEN
- (H) COMMERCIAL SMALL POWER STATIONS RESERVED FOR COMMERCIAL PURPOSES ON 'P' WAVE.

REFERENCE.

- WIRELESS ROUTES.
- EMERGENCY WIRELESS ROUTES
- LAND TELEGRAPH LINES
- SHORT DISTANCE WIRELESS, OR VISUAL SIGNALLING.
- INTERCOMMUNICATION BETWEEN CRUISERS BY SHORT DISTANCE W/T OR VISUAL.
- THE DIRECTIONS IN WHICH MESSAGES ARE PROCEEDING, AND THE LETTERS OPPOSITE THE ARROWS DENOTE THE WAVE LENGTHS RED LETTERS ABREAST SHIPS OF BATTLE FLEET DENOTE WAVE LENGTHS THEY ARE DETAILED TO RECEIVE

FIG. A.



A. Inker.
B. Switch.
C. Wire, Pattern 798A.
E. Shunt resistance.
F. Series resistance.
G. Bobbin winding.
H. Signalling key.

In Service Mark II. and "C" tune installations the inker will be joined up across the bobbin winding and series resistance of the magnetic key. Method of joining up inker.

In the short-distance installations the inker leads are taken to the terminals of the impedance coils, as shown on Plate X.

In the latter case the cores and armatures of the magnets of these inkers are laminated and the bobbins re-wound to make them suitable for working with alternating current.

The leads for inker should be Pattern No. 798A, and the lead casing should be earthed at each end. Leads.

A switch should be fitted in the chart house, to enable the inker to be switched off if desired. Switch.

ORGANISATION OF NAVAL WIRELESS TELEGRAPHY COMMUNICATION.

EXTRACT FROM A.L. M. 01135 OF 2ND SEPTEMBER 1908

It is to be observed that this memorandum sets forth the organisation of a system which will place the Admiralty in touch with Fleets and Squadrons and also ships cruising within a certain distance of the British Islands.

At present the equipment of ships and stations will not permit the whole scheme to be carried out, and therefore effect can only be given to it gradually; modifications may also have to be introduced from time to time if this is found necessary.

The basis on which this organisation is made is that the Admiralty is the focus of the whole wireless system of the Fleet and Admiralty shore stations. Admiralty as focus of W.T. signalling.

There are three classes of naval shore stations to be legislated for :— Three classes of naval shore stations.

High power:—At Horsea, Cleethorpes, and Gibraltar.
Medium power:—At Aberdeen, Pembroke, and Ipswich.
Low power:—As at present, with the addition of Rosyth.

Wave-lengths.

The wave-lengths available are as follows :—

D. Destroyers.
P. Commercial wave in general use.
Q. Commercial wave in less general use.
S., U., V., W. Wave-lengths within the limits reserved for naval use in the International Convention.
X., Y., Z. Waves to be used for high-power stations.

Admiralty and Cleethorpes.

Cleethorpes sending to the Fleet.

The Admiralty station will, except as mentioned hereafter, send messages on "X" wave to Cleethorpes (high-power station), which is then to re-transmit the message on the same wave-length. These signals are as far as possible to be made by Cleethorpes at each hour Greenwich mean time. This station will not receive answers. Cleethorpes is always to look out on "X," and will have no further function than to send Admiralty messages.

Hence one ship of the Fleet is always to look out on "X."

Important messages to be acknowledged through medium-power station.

Important messages will be distinguished by a special sign, and in this case the Commander-in-Chief is to acknowledge their receipt through the most convenient medium-power station on "W" wave.

Medium-power station on "W." Admiralty on "V."

Medium-power stations are therefore to look out on "W" wave. The medium-power station is at once to re-transmit the message to the Admiralty on "V" wave. The Admiralty, therefore, is always to look out on "V" wave.

Special sign.

The special sign here mentioned will be "Z U Z U" at the end of the message.

Small-power station on "U."

If the message is not distinguished by this special sign, the acknowledgment should as a rule be sent to a small-power station on "U" wave, and it is to be transmitted thence to the Admiralty by wire.

Small-power stations, therefore, must always look out on "U."

Messages for Admiralty sent by land wire.

In order to act as a check, and also to prevent delay in the event of more than one station wishing to communicate at the same time, every message to be transmitted from any station to the Admiralty by wireless is also to be sent by land wire as soon as possible.

Detached ships.

Every detached ship (including parent ships of destroyers and submarines, but not cruisers spread from a battle fleet) is to look out on "X" wave for a quarter of an hour every four hours, commencing at noon Greenwich mean time. Any messages received are to be acknowledged through a small-power station on "U" wave. At all other times such a detached ship is to look out on "S" wave, except ships detailed for special waves, such as destroyer parent ships. If it is required to send an urgent message to a detached ship at other times than the above, she is to be called up on her own wave by the most convenient station, and the entire communication will take place on that wave.

Detached ships are not, except under very special circumstances, to communicate with medium-power stations, unless ordered to do so by the Commander-in-Chief. The medium-power stations are to be regarded as essentially Commander-in-Chief's stations.

Direct communication between Admiralty and Fleet.

If there is reason to believe that the Fleet are within range of the Admiralty, and an urgent message is required to be sent, the Admiralty will do so on "X" wave, and the "call-up" is to be answered by the Fleet on "W" wave. The ship of the Fleet looking out on "X" is therefore to be prepared to receive a signal on this wave either from Cleethorpes or the Admiralty. In both cases the acknowledgment of the message by the Commander-in-Chief should be made through a medium or low-power station as already laid down.

Messages from Fleet to Admiralty.

With regard to the communication between the Fleet and the Admiralty, the Commander-in-Chief is to send important messages through the medium-power stations on "W." These will be re-transmitted to the Admiralty on "V."

Less important messages should as a rule be sent through the low-power stations on "U," and be re-transmitted by land wire.

Admiralty communicating with medium- or low-power stations.

Should it be necessary for the Admiralty to communicate with a medium- or low-power station, the wave of that station is to be used entirely.

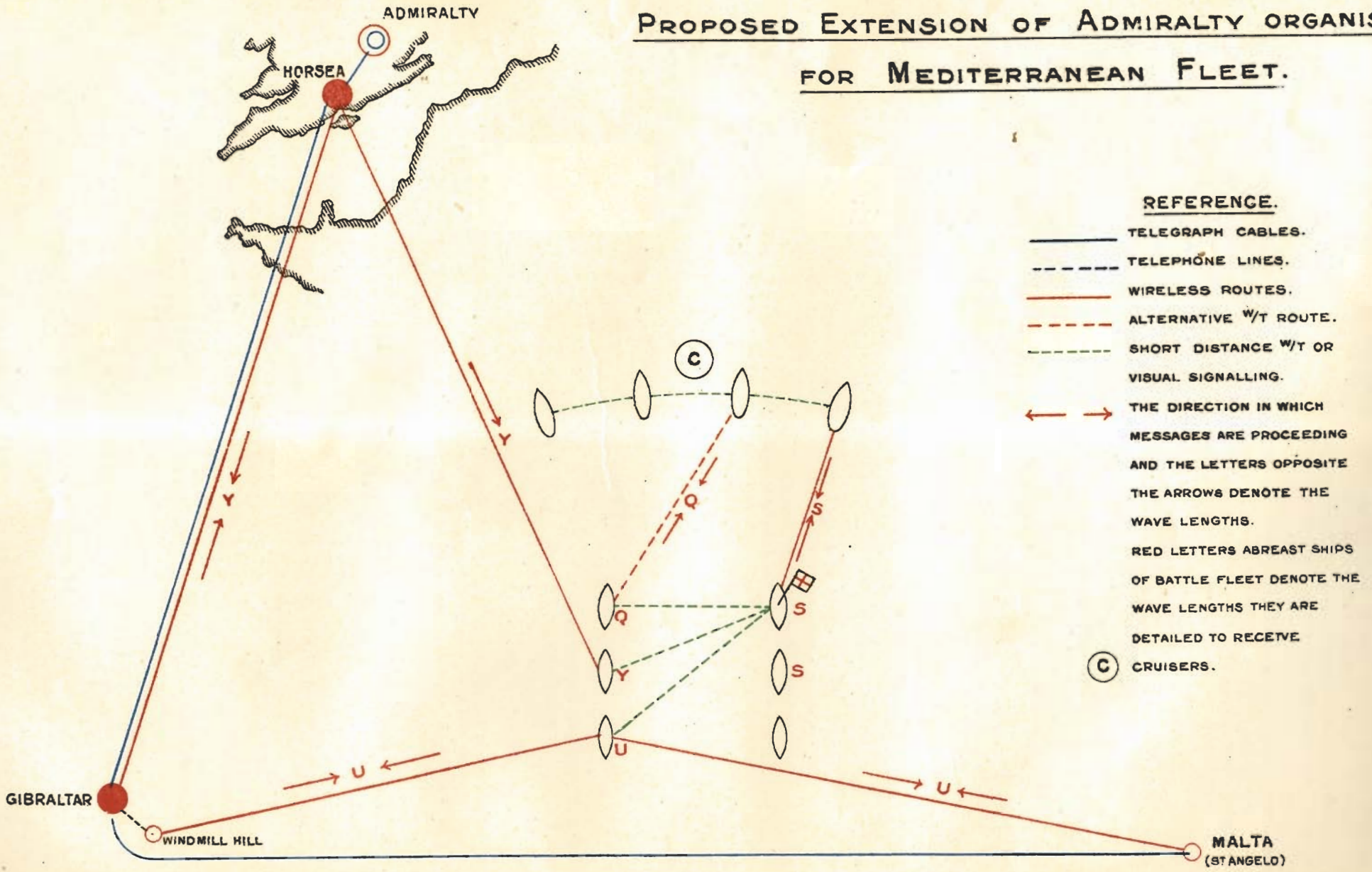
Horsea.

The high-power station at Horsea is to be employed for communicating with the high-power stations at Gibraltar and Malta on "Y" wave, and as a stand-by for Cleethorpes.

Regulation of traffic.

As the shore stations alone are in a position to know the state of the traffic, they will regulate the precedence of messages.

Proposed Extension of Admiralty organisation for Mediterranean Fleet.



Destroyers can only send "D" wave, but can receive any wave. Destroyers.

In order that destroyers may communicate amongst themselves and also with their parent ship, this latter must be able to transmit on "D" wave, and all destroyer parent ships are to be fitted specially for this purpose. Should the destroyer parent ship wish to communicate with the Battle Fleet she is to do so on "D" wave.

Hence one ship of the Battle Fleet is always to look out on "D."

Should the Battle Fleet wish to communicate with the parent ship it is to do so on "Q" at the half-hour Greenwich mean time, and parent ships are therefore to look out for signals on "Q" at that time.

In view of the importance of Harwich as a destroyer base, and of the fact that Felixstowe cannot be used as a low-power station for fear of interference with Sheerness, Felixstowe will be fitted with a destroyer installation when the medium-power stations are complete.

Battleships and cruisers are to be fitted with short-distance wireless, the range to be five miles and wave-length 400 feet. Short-distance wireless.

For Harbour Defence Communication short-distance wireless is most suitable, and the only one that will cause no interference with the more important stations. The range can be increased if necessary to 15 miles by portable masts and sets. Harbour defence communication.

It is not considered desirable to make any provision for blocking by our own Fleet. Blocking by our own Fleet.

All signals from flag to cruisers, and *vice versâ*, are to be sent on "S" wave; in case of interference cruisers may send to flag on "Q," except at the times for communicating with destroyer parents, *i.e.*, half-hours Greenwich mean time. A ship of the Battle Fleet is, therefore, always to look out on "Q" in addition to the battleship looking out on "S." Communication between Commander-in-Chief and cruisers.

The following commercial stations will be used for naval work only in war-time:—Hunstanton, Cullercoats, Dunnet Head. They will work on "P" wave-length, hence one ship of the Fleet will look out on "P." These stations will be manned by naval operators, and will use the naval procedure. Commercial stations in war-time.

Remarks.

The details as regards the procedure to be adopted in the case of the medium-power stations—Aberdeen, Ipswich, and Pembroke—sending their messages on to the Admiralty has been arranged as follows:—The station having received a message from Commander-in-Chief on "W," puts its receiving instruments to "V" and calls up Admiralty on "V," at the same time sending the message off by land wire. If Admiralty does not answer at once, the medium-power station concludes that Admiralty is engaged on other work, such as sending to Cleethorpes on "X," and therefore immediately reverts to "W," and does not attempt to get the message through by wireless. Procedure for medium-power station.

When the next message is received from Commander-in-Chief the same procedure as regards calling Admiralty is adopted. If Admiralty answers, the latest message received is then sent.

As the messages are all numbered, the Admiralty will know which messages have been missed out and are coming by land wire.

As regards the procedure between the destroyer parent ships and the Fleet, it will be noticed that the ship told off in the Fleet to look out on "D" sends on "Q" at definite times—this procedure is an exception to the general rule of communication both ways being on the same wave-length, and is necessary in the case of the battleships comprising the main fleet all being fitted with Mark II., since this installation is not at present arranged to send the "D" wave-length. It is hoped shortly that arrangements will be made to enable the "D" wave to be sent out from the Mark II., and when this is accomplished the organisation will be modified to allow of the communication both ways being carried out on "D." Procedure for destroyer parent ships.

As regards the wireless procedure to be adopted in the case of fog or at night, when other forms of signalling are not permissible, this has been dealt with and issued in A.L. M. 01132 of 21st September 1908 (*see* page 4). More detailed instructions will be found in the Wireless Signal Book when issued. The cases are as follows:— Procedure in a fog.

Case 1. If all ships in company are fitted with short-distance wireless, the red plug will be kept in, in the main installation, and the short-distance set will be used for all wireless communications between ships in company.

Case 2. If none of the ships in company are fitted with short-distance wireless, the main installation must be used, the red plug being kept out while the fog lasts. Each ship will continue to look out on the wave-length for which she is detailed, but, with the red plug out, she will be able to read signals from the flag, or any ship within reasonable distance, without their having to change tune.

Case 3. **Since it will be some time before all ships are supplied with the short-distance set, it is necessary to consider the case of a number of ships in company, of which some have short-distance wireless and some are not so fitted. Replies from the main installation would not be readable on the short-distance set; therefore, in this case, all ships must use their main installations as in Case 2.**