

SHORE STATIONS.

GENERAL NOTES ON SHORE STATIONS.

Detectors.—All stations now have Crystalite Detectors.

Low Power Stations.—With reference to the "Remarks" column of the "Details of Naval Shore Stations," on page 6 of W.T. Appendix to Annual Report, 1909, the following additional information may be of interest:—

Felixstowe.—Looks out on "R" wave during the first half of each hour.

Culver Cliff.—Is completed.

Rosyth.—Communicates with Scilly (425 miles) by night, but not by day.

Wick, Scarborough, Bunbeg.—Will be completed about July 1911.

EXPERIMENTS AT HORSEA.

As a result of the trials at Horsea, referred to on pages 8 and 57 of W.T. Appendix to Annual Report, 1909, it was decided to effect certain improvements at Horsea and to carry out further trials with the improved apparatus at that Station with a view to introducing similar alterations at the other High Power Stations if they proved satisfactory. Some of the proposed improvements to Transmitting Apparatus were referred to on page 8 of the W.T. Appendix to Annual Report, 1909.

The action taken as regards these and further improvements is briefly outlined below.

1. **Auto-transformer.**—An experimental Auto-transformer has been in use for some time, and a large number of experiments with Gibraltar have been carried out with this apparatus. It has been found that when using the auto-transformer and the wedge-shaped spark plugs referred to in paragraph 10, a good 500 cycle note can be obtained with a 6 or 8 mm. spark. Stronger signals, with the 250 cycle note, can be obtained with the 14 mm. spark on the old arrangement, not using auto-transformer.

These two arrangements are being standardised, and auto-transformers and wedge-shaped plugs are being supplied to Cleethorpes and Gibraltar.

2. **Magnetic Key.**—A Magnetic Key, of the type in use at Clifden, was obtained from the Marconi Wireless Telegraphy Company, and has been given exhaustive trials. As a result of these experiments an improved design of key has been brought out. The new design includes a general rearrangement of parts so as to allow of rapid and easy inspection of all internal mechanism and windings, non-inflammable material throughout, and improved contacts and air-blast arrangements.

Meanwhile, the Marconi Company have themselves introduced a much improved design of key which they claim embodies most of the improvements included in "Vernon's" design. The Marconi design will be examined, and either this or the "Vernon" key will be introduced forthwith. Two of the improved keys will be supplied to each High Power Station.

3. **Improved Primary, Mutual, and Aerial Coils.**—In order to avoid the great loss of energy at present resulting from the heating of the Primary and the end coils of the Aerial and Mutual Coils, these coils are now being wound to a new design with special stranded wire.

The Primary Coil is being wound with wire built up of about 12,960 separately insulated strands, and so designed that all the strands will be of the same length and similarly placed relatively to one another. Thus, whilst perambulating the periphery of the solenoid, each strand follows a path identical with that of its neighbour.

The Aerial and Mutual Coils are being wound with similarly stranded wire of about 1,296 parts upon Pertinax drums.

4. **Earth Wires.**—The galvanized iron Earth Wires at Horsea have been replaced with copper wires.

5. **Earth Plates.**—New Earth Plates have been erected at Horsea, and have been so arranged that each plate projects at least 6 inches clear of the earth or water at any state of the tide. This arrangement, which was included in the original design but was not carried out very satisfactorily when the station was erected, affords a better path to earth, and avoids the changes in the conditions which formerly took place when the water rose above the plate. Improved connections between the earth wires and earth plates have also been provided.

6. **Earth Ring in Tower.**—The Earth Ring at the top of the tower has been brought down to the bottom, and the principle upon which the Operating Switch is based will probably be employed. It is hoped that the Mark II. Operating Switch can be adapted for this purpose. The number of earth wires leading down from the top of the tower inside have been considerably increased, respaced, and more carefully insulated.

7. **Receiving Circuit.**—A special design of Receiving Circuit, more suitable for use with the large aerial employed at High Power Stations, is in hand, but further experiments will be required in connection with this circuit.

8. **Deck Insulator.**—Considerable trouble having been experienced with the Deck Insulators at the High Power Stations, a new design is being prepared. The new insulator will probably

consist of some form of glazed stoneware of tubular form and about 4 feet 6 inches in height and 3 feet 10 inches in diameter. The aerial feeders will be connected to a brass casting resting on the top of the tube of stoneware, and this casting will be connected to the aerial coil by a 3-inch copper pipe.

9. *Aerial Feeders*.—To minimise the brushing from the feeders it is proposed to introduce feeders of similar design to that described on page 31.

10. *Spark Balls*.—After a large number of experiments, an improved form of wedge-shaped spark plug has been arrived at, and will be introduced shortly.

MALTA HIGH POWER SHORE STATION.

A general outline of the design of this station is given in W.T. Appendix to Annual Report, 1909. As a result of experience gained in the working of the High Power Stations at Horsea, Cleethorpes, and Gibraltar, it became evident that certain changes would be desirable, and these have been introduced.

As revised, the station at Malta will have a note of 800 sparks per second, which it is anticipated will be very penetrating and easily over-read through atmospherics.

To make this change without loss of range the power supply has been modified. First, it will be at 400 cycles in lieu of 250, and the power will be 250 kw. in lieu of 120 kw. Secondly, the two main alternators supplying the wireless apparatus will be direct driven by turbines at a high speed instead of being motor driven (with the increased power the working of the W.T. Station would otherwise have interfered with the regulation of the Dockyard electrical supply by taking power directly from it). Thirdly, overhead transmission of the supply to the W.T. Station has had to be abandoned, on account of inductive effects, and underground cables will be used in lieu for the whole distance from dockyard to W.T. Station. As a result of this third change the tension used for transmission has been increased from 1,500 volts to 3,000 volts, to keep down the cost of the cables.

The other details of the station will be practically as given previously. More powerful blowers are, however, rendered necessary, also the voltage of the single-phase current will be adjusted by a field regulator in the wireless station to give the best note, &c.; this regulator will control the excitation of the alternators through a small cable.

As the results with the quenched spark system have been so very promising, and as it is anticipated this new system may greatly improve the working and range of the High Power Stations, the new station at Malta is being so arranged that it can be converted without much alteration or delay into a Quenched Spark Station.

The modifications here described will probably delay the completion of the station until late in 1911, but they will undoubtedly result in the station being much superior to what it would have been if the original design had been adhered to.

EXPERIMENTAL QUENCHED SPARK SET FOR HIGH POWER STATIONS.

An experimental quenched spark set for use at High Power Stations is being designed and will be tried at Horsea with a view to its introduction at all High Power Stations. (See also page 45.)

INTERFERENCE BY THE HIGH POWER STATION AT GIBRALTAR WITH THE FORTRESS ELECTRICAL COMMUNICATIONS.

The screening arrangements referred to on page 9 of W.T. Appendix to Annual Report, 1909, have materially lessened the interference with the telephone system, and the High Power Station is now working regularly. As a certain amount of interference is still experienced, the screening is being extended,

OPERATING SWITCHES AND HAND OPERATING KEY.

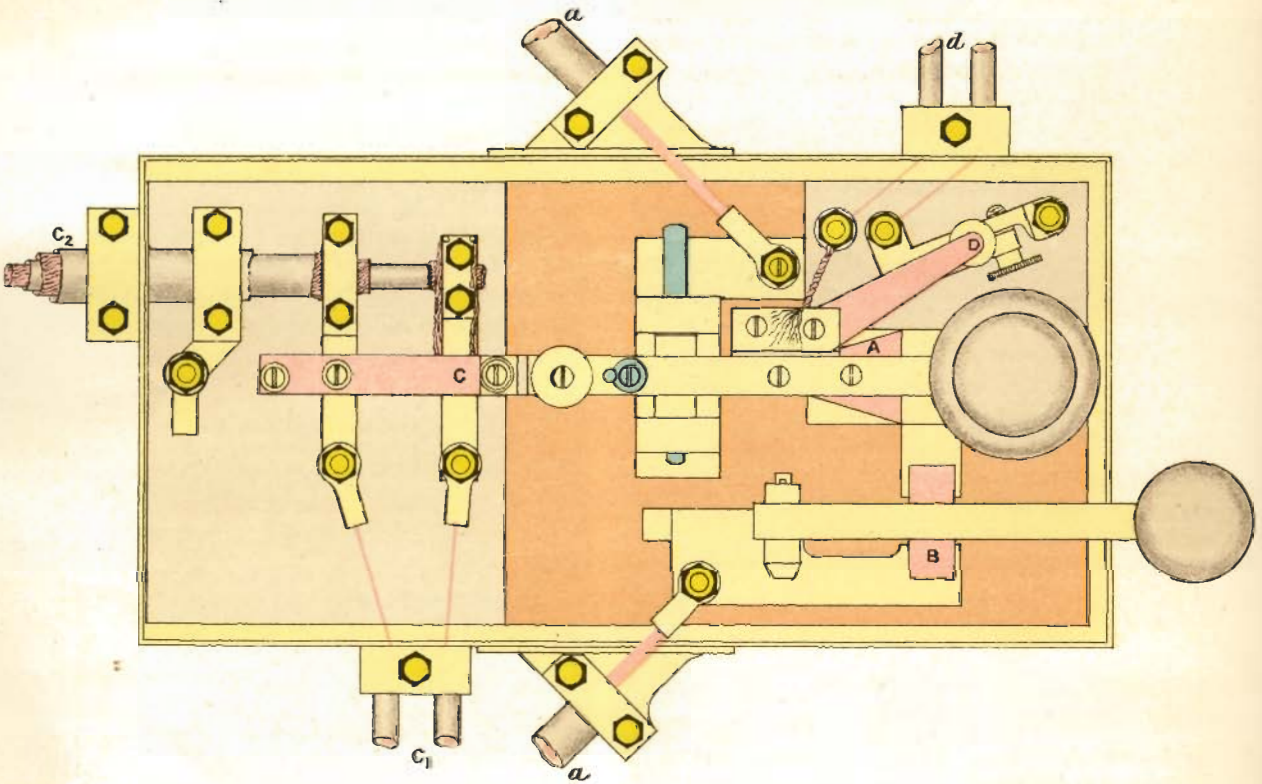
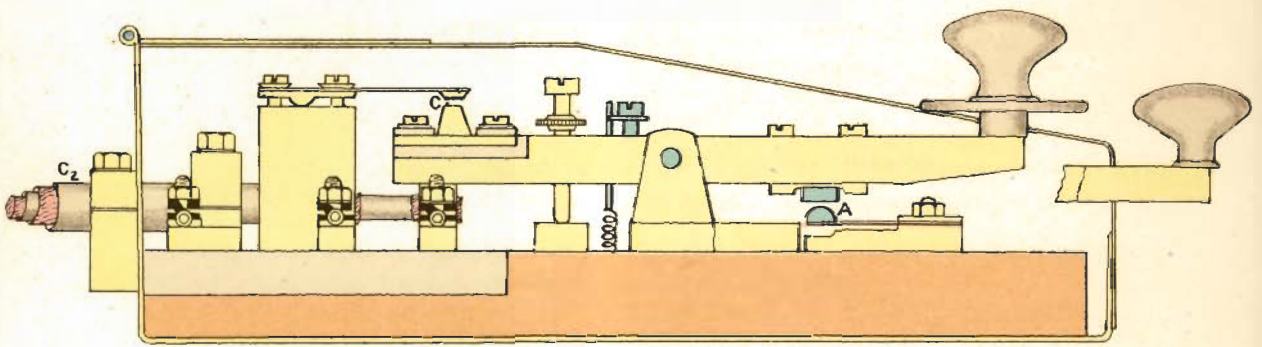
The Operating Switches for Mark II., Mark I*, and Short Distance Sets, described in A.R., W.T. Appendix, 1909, have been issued to ships. They are working satisfactorily, though in one or two cases difficulty has been experienced with the Mark I* Operating Switch.

HAND OPERATING KEY.

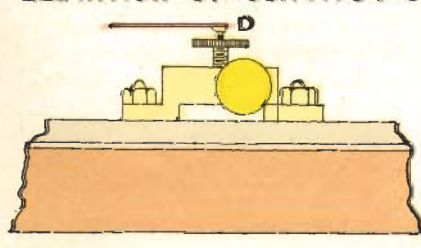
A new instrument, known as the Hand Operating Key, has now been introduced for new Mark I* Sets and Destroyers.

This instrument performs all the functions of a sending key and an Operating Switch. The idea of this key was obtained during a visit to the "Balsillie" Company's works, where a Morse key used by that firm attracted attention.

HAND OPERATING KEY.



ELEVATION OF CONTACT "D"

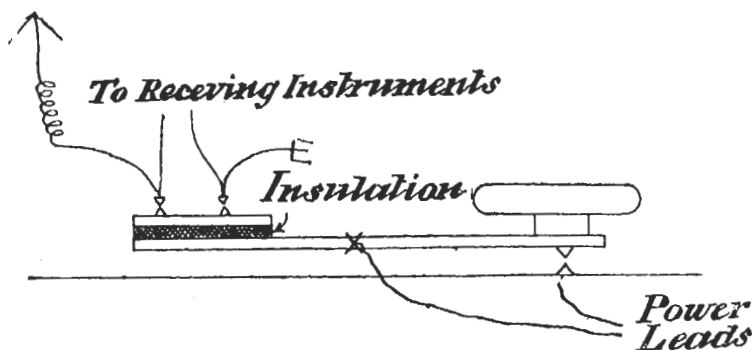


REFERENCE	
A	CONTACT FOR SENDING CIRCUIT.
a	ALTERNATING MAINS.
B	SAFETY CONTACT FOR SENDING CIRCUIT.
C	CONTACT FOR RECEIVING CIRCUIT.
C ₁	LEADS TO RECEIVING CIRCUIT.
C ₂	CONCENTRIC TO EARTH RING FITTING.
D	CONTACT FOR PROTECTING SWITCH.
d	D C. TO PROTECTING SWITCH.

The key seen carried an extension, which, when the key was pressed, short-circuited the receiving instruments.

This system appeared to afford a very simple solution of the operating switch problem for small powers, and experiments were therefore carried out in "Vernon" with a similar key. Fig. 1 shows the principle diagrammatically.

FIG. 1.



It will be seen that it is necessary to bring the aerial to the key before it goes to earth.

It would be impracticable to do this with the Mark II. installation, but the experiments in "Vernon" showed that it was quite safe for Mark I* and Destroyer Sets. An improved design was therefore brought out and keys to this design were purchased and issued under the name of "Pattern 1241, Hand Operating Key."

This key is being issued to all new Mark I* sets and to all new Destroyers. Old Destroyers will also get it as their Send and Receive Switches become defective. (A.L. N.S. 3375/6938 of 10.5.10.)

Since the first issue of this key it has been found necessary to introduce "additional fittings" for the key to allow of it being used with the new "C" type receiving sets (see page 22).

These additional fittings, which are more fully described below, will be included in all Hand Operating Keys ordered in future. The key so fitted will be known as Pattern 2483.

All keys Pattern 1241 in store will be converted and issued as Pattern 2483 to ships having keys Pattern 1241. These vessels, on receipt of the keys so fitted, will return their keys Pattern 1241 for similar alteration.

Plate I. shows the Hand Operating Key with "additional fittings."

The tail of the key carries on its upper side an insulated platinum contact, which is connected by a short length of flexible to the inner conductor of the concentric cable. When the key is pressed this makes contact with an adjustable platinum point above it, which is connected to the outer conductor of the concentric cable; the receiving instruments are then short-circuited (see Fig. 2).

The main contacts of the key carry alternating current, and are made of silver. It will be seen from the plate that the upper contact is fixed to the underside of the key, while the lower contact is carried on a phosphor-bronze spring strip.

The action here is that when the key is pressed there is a rubbing contact, as the lower contact is displaced by the pressure on it. It is found that with this arrangement the points do not burn away and pit so unevenly as when the lower contact is fixed.

The alternating current terminals of this key are clearly shown on the plate, and it will be noticed that both the keys have to be pressed to allow current to pass. The small key on the left is called the "Safety Switch," and is provided to reduce the risk of anyone getting a shock due to accidentally touching or pressing the key, and in this respect it performs the same duty as the side lever in the side lever key. This safety switch carries a copper brush to make contact between the left-hand terminal and the lower contact. It is kept up by a flat spring mounted underneath it.

The extra pair of contacts on the right of the key, are for energising the coils of the protecting switch when the type "C" receiving set (see page 22) becomes available.

In all Mark II. and Mark I* sets, which have operating switches, the coils of the protecting switch are arranged to be wound so as to be put in series with the main bobbin of the magnetic key. The Morse key then works all these switches (magnetic key, operating switch, and protecting switch) at the same time. It has been seen, however, that the contacts of the hand operating key carry only alternating current. Therefore an extra pair of contacts have had to be added to work the protecting switch, which in this case is put in series with a 32-c.p. lamp. The metal cover over the key still further screens and protects the detectors from the effects of the sparking at the key contacts.

The circuit is shown diagrammatically in Fig. 2 and the connections are shown in Fig. 3.

FIG. 2.

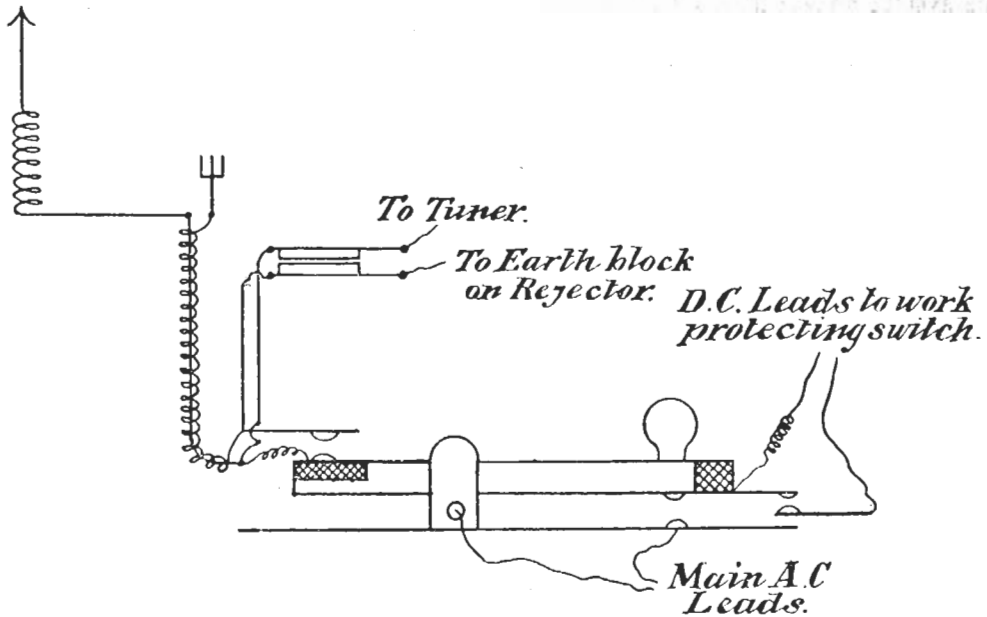
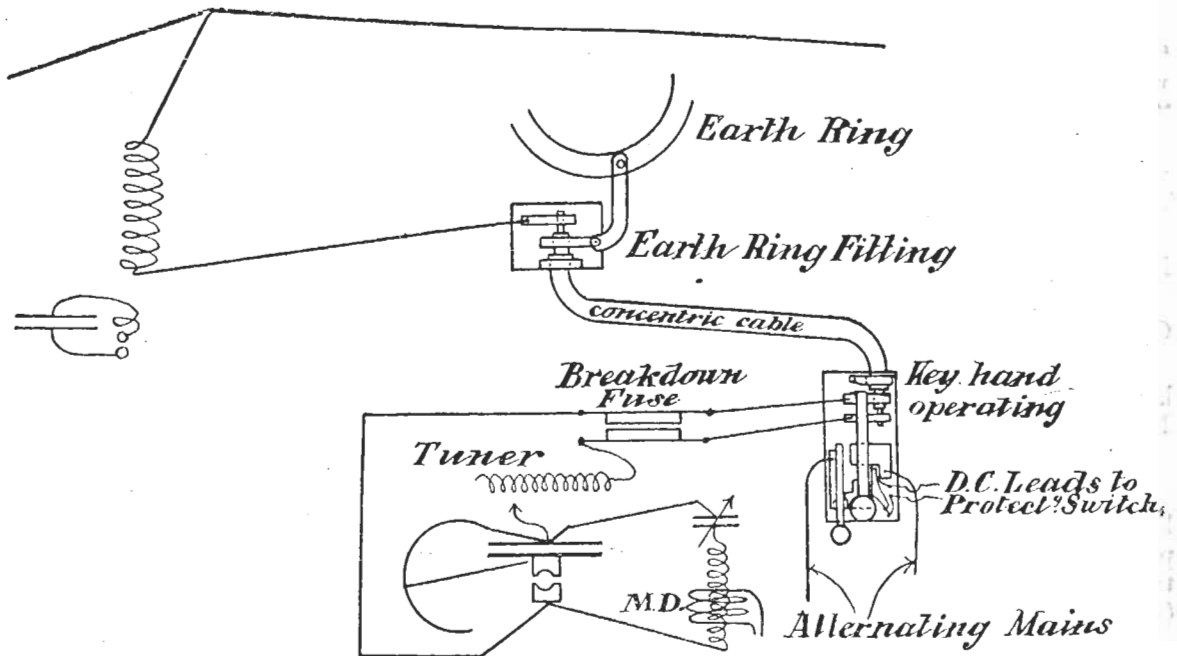


FIG. 3.



The wiring for the key is shown on Plate III. for Mark I*. Sets, and on Plate IV. for Destroyers. The coils of the protecting switch and the lamps are clearly shown in both these plates.

Adjustments of Hand Operating Key.

The main current end of the key is first adjusted to the required beat in the usual manner by adjusting the stop screw as in an ordinary Morse key. The upper platinum contact at the tail of the key is carried on a rocker for adjusting purposes, and should be adjusted so that it is just clear of the lower contact when the key is at rest, and so that it makes contact well before the main current contacts at the other end of the key do so. The upper platinum contact is carried on a spring finger so that after it has made contact the key will continue to move and finally make the main contacts. If the upper platinum contact is too low it will always touch the lower contact, and no signals will be received. If it is too high the receiving gear will not be short-circuited soon enough, or for long enough, and sparks will puncture the breakdown fuze and, if allowed to continue, will injure the platinum contacts. The additional contacts at the right of the key must then be adjusted by screwing the lower contact up or down, first seeing that the locking screw is eased back, till the clearance is about the same, with the key at rest, as that between the contacts on the tail of the key. If any sparking on the tail contacts, or puncture of the breakdown fuze, is observed, the key should immediately be readjusted. When the key is in adjustment the action on pressing the key is as follows:—

The receiving gear is short-circuited and the coils of the protecting switch are energised almost simultaneously, and then the main sending current is allowed to pass.

It will be found that the minimum air gap between the platinum points on the tail of the key will be less than the minimum gap at the additional contacts, because at the latter contacts there will always be a slight spark due to the inductive kick from the coil of the protecting switch. A 32-c.p. lamp is joined in parallel with the bobbins to take the inductive kick.

The following spares will be provided with each key :—

Pattern No. 1242.	Spare upper platinum contact "R" (Receiving, tail of key).
" " 1243.	" lower " " " " " " " " " " " "
" " *	" upper " " " " " " " " " " " "
" " *	" lower " " " " " " " " " " " "
" " 2427.	" upper silver contact.
" " 2428.	" lower " " " " " " " " " " " "
" " 1244.	" brush for safety switch.

SERVICE MARK II. INSTALLATION.

(See also New Morse Key, page 29; Buzzer Transmitter, page 29; Tuning Clips, page 30; Improved Feeders, page 31; Earth Rings and Earth Wires, page 32; Porcelain Insulators, page 33; Insulation of Rigging, page 33; and Quick Method of Tuning, page 34.)

SILVER SPARK PLUGS.

The Silver Spark Plugs, mentioned on page 13 of the W.T. Appendix to Annual Report of 1909, were tried in various ships towards the end of last year.

The majority of these ships reported that the silver plugs were rather more durable and wore more smoothly than the existing copper type, but the results obtained were not such as to warrant the general introduction of the silver plugs in view of their far greater cost as compared to the copper type.

The trials have been closed. (A.L. N.S. 3868/6801, 4.5.10.)

EXPERIMENTS TO IMPROVE NOTE.

A series of experiments were carried out between "Vernon" and "Furious" in May and June, with a view to obtaining a 700 cycle note from the Mark II. installation. Details and results of these trials are contained in report of "Furious" trials on page 38.

Many new forms of spark plug have been tried.

Some interesting experiments carried out in the Mediterranean are referred to on page 35.

QUICK STARTING OF BLOWER.

The time taken to start up the Blower by means of the Blower Starter was considerable, and frequently caused delay in answering calls and signals. It has been found, however, that the current is not excessive when the motor is started with a single switch, without any rheostat, and this form of switch will be supplied in future sets.

INKER RECORDER.

The Inker Recorder mentioned on page 12, W.T. Appendix, Annual Report, 1909, has now been supplied to all ships fitted with Mark II. installations.

MUTUAL TABLE FOR MARK II. SETS.

The following table shows the number of turns of mutual coil in Mark II. Sets, which will give, approximately, 1 per cent. coupling when the mutual coil is "right out" :—

Q tune - - -	2 turns.	U tune - - -	6 turns.
R " - - -	3 "	V " - - -	7 "
S " - - -	4 "	W " - - -	8 "
T " - - -	5 "		

When tuned in this way, it is easy to see at a glance whether a coupling of 1 per cent. is being used, since the mutual should always be "right out."

TUNING WITH BUZZER TRANSMITTER.

It is found that the full length of concentric flexible cable, supplied with the Buzzer Transmitter, has considerable inductance, which must be allowed for by reducing the Primary Oscillator Inductance.

* Pattern numbers not yet assigned.

The following table of adjustments, obtained in "Vernon," may be useful as showing the approximate allowance for each tune in Mark II. :—

Tune.	Primary Adjustment.	
	Power.	Buzzer Transmitter.
"Q" - - - -	A 15*	A 1*
"R" - - - -	A 18**	A 4**
"S" - - - -	C 5*	B 14*
	A 8½	B 11**
	B 20**	D 12*
"T" . - - -	D 19*	
	B 9½	A 13
"U" - - - -	C 7½	B 16
"V" - - - -	C 22	C 13
"W" - - - -	D 22	D 14

Note.—Adjustments marked * are with 40 jars.
Adjustments marked ** are with 80 jars.
Adjustments not marked are with 160 jars.

FOUR BEARING MOTOR ALTERNATOR.

Description.—The Four Bearing Motor Alternator, mentioned in last year's Annual Report (page 16 of W.T. Appendix) as being under consideration, has now been adopted.

The motor and alternator of the new machine are each self-contained, and are easily separately removed for repair or for convenience in striking down hatchways.

The flexible coupling between the motor and alternator consists of a cast-iron flange on each shaft, one flange being fitted with pins, with leather sleeves, which engage in holes in the flange on the other shaft.

The new machines are 3¼ inches longer than the three bearing type, and are all for 220 volt supply.

The spares for the new machines are identical with those for the present machines, with the exception of the armatures and shafts.

The brush holders have been strengthened.

It is under consideration to supply Remote Control Auto-Starters for use with future machines. This will do away with the necessity for the long leads of heavy cable which are at present run from the alternator to the starter in the wireless office.

These auto starters, operated by a push button in the wireless office, will be capable of starting the motor alternator from a standstill to full speed in 30 seconds.

MARK I*. INSTALLATION.

(See also New Morse Key, page 29; Buzzer Transmitter, page 29; Tuning Clips, page 30; Improved Feeders, page 31; Earth Rings and Earth Wires, page 32; Porcelain Insulators, page 33; Insulation of Rigging, page 33; and Quick Method of Tuning, page 34.)

IMPROVED SPARK GAP.

A Spark Gap of an improved pattern, as suggested and used by H.M.S. "Suffolk," has been introduced for all new Mark I* installations.

Plate II. shows the construction. The spark gap is very similar to the old type, but is fitted with three studded spark plugs, instead of single stud spark plugs. It will be seen that, with the new type, 18 sparks are obtained for each revolution, as against 6 sparks for each revolution with the old type. This allows of a slower running motor being used to get the same note as previously obtained; grease lubrication is possible, and a silent running spark wheel, which does not interfere with the reception of signals, is thus obtainable.

In order to ensure a good, clear note, great care must be taken in adjusting the studs to exactly the same distance from the wheel.

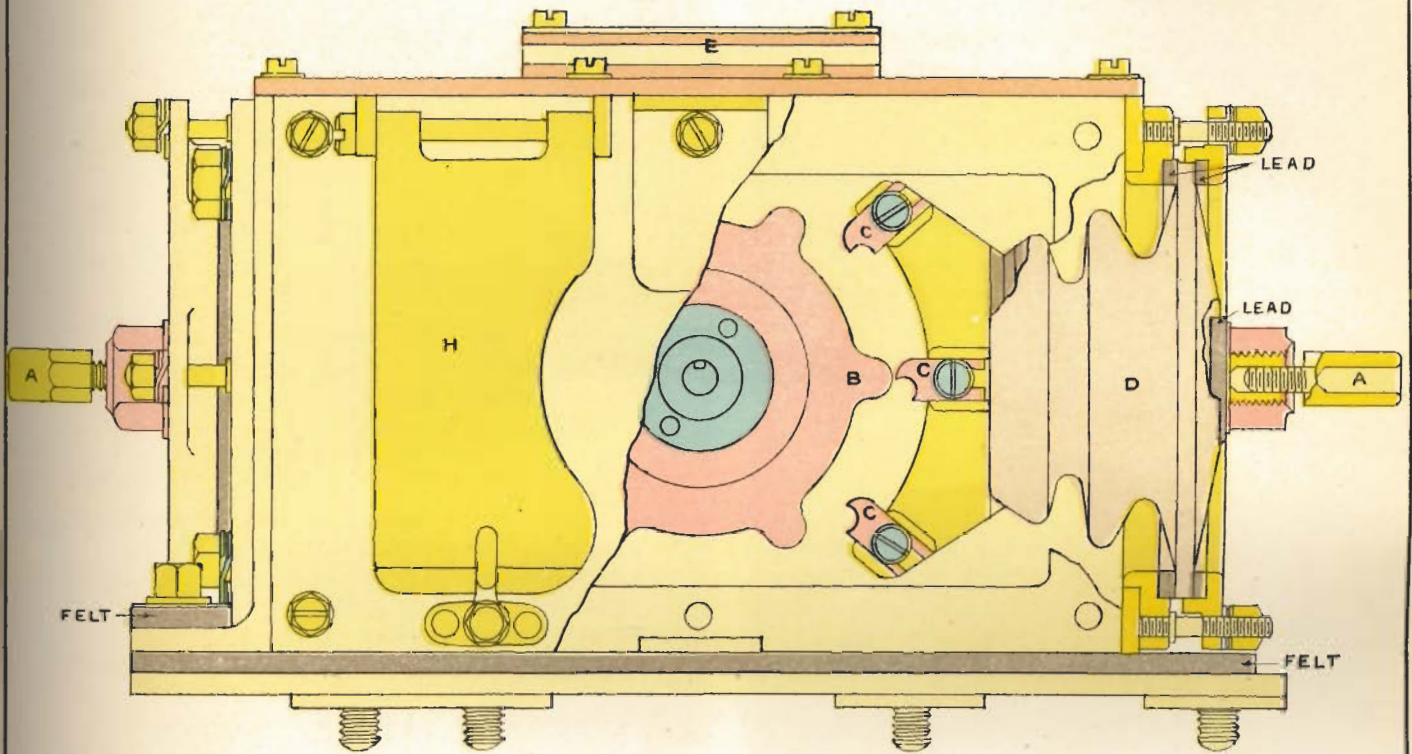
The bearings of the spark wheel are made adjustable in order to prevent the rattle which would otherwise occur in a worn bearing.

The bearings are split down one side and a fibre strip is inserted; this strip can be altered for a thinner strip, or, if necessary, removed as the bearings become worn. In addition, two longitudinal saw cuts, in its outer circumference, provide a certain degree of spring to the bearing, which is closed round the shaft by the screwing up of the nut "N."

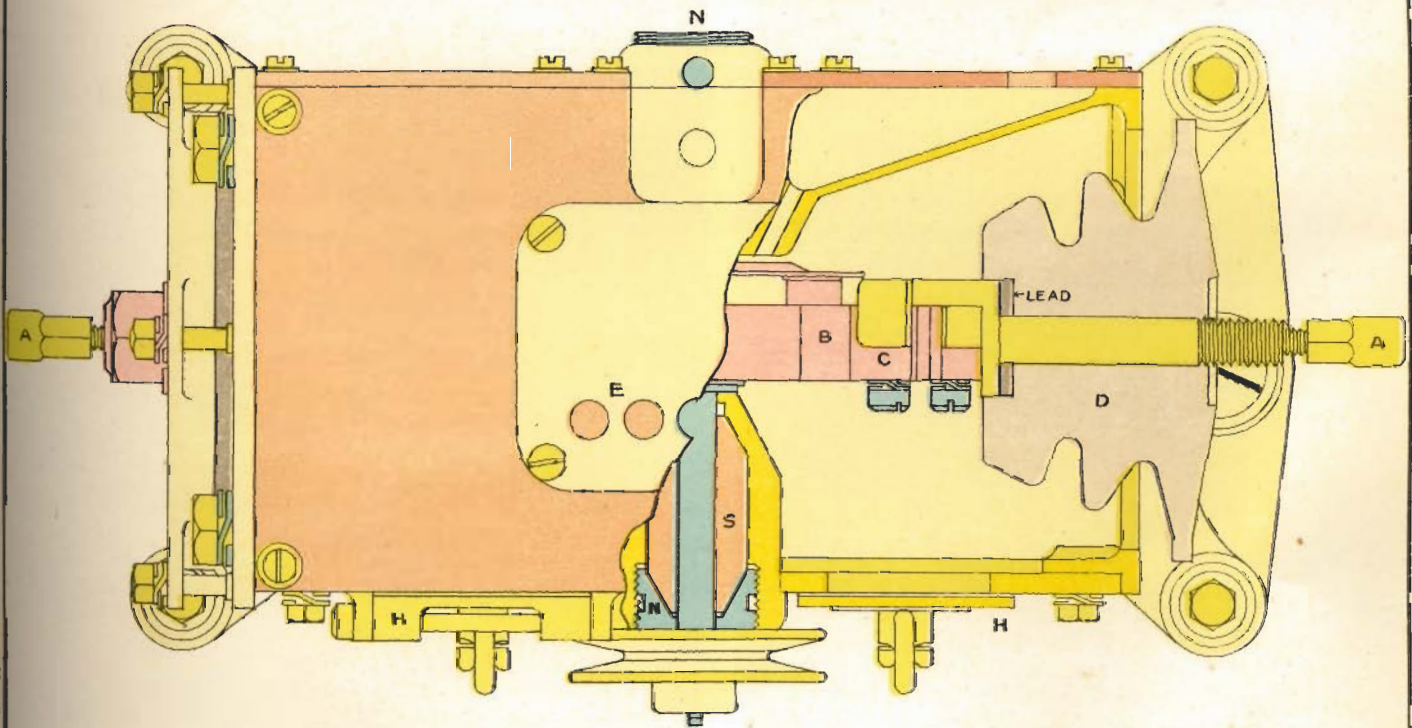
A new type of Auxiliary Motor is being supplied to the new Mark I* installations. This motor is fitted with a 7½-inch pulley, and runs at 1,800 revolutions without noise or vibration.

IMPROVED SPARK GAP FOR MARK 1* SETS.

ELEVATION.



PLAN.



SPLIT BEARING "S"

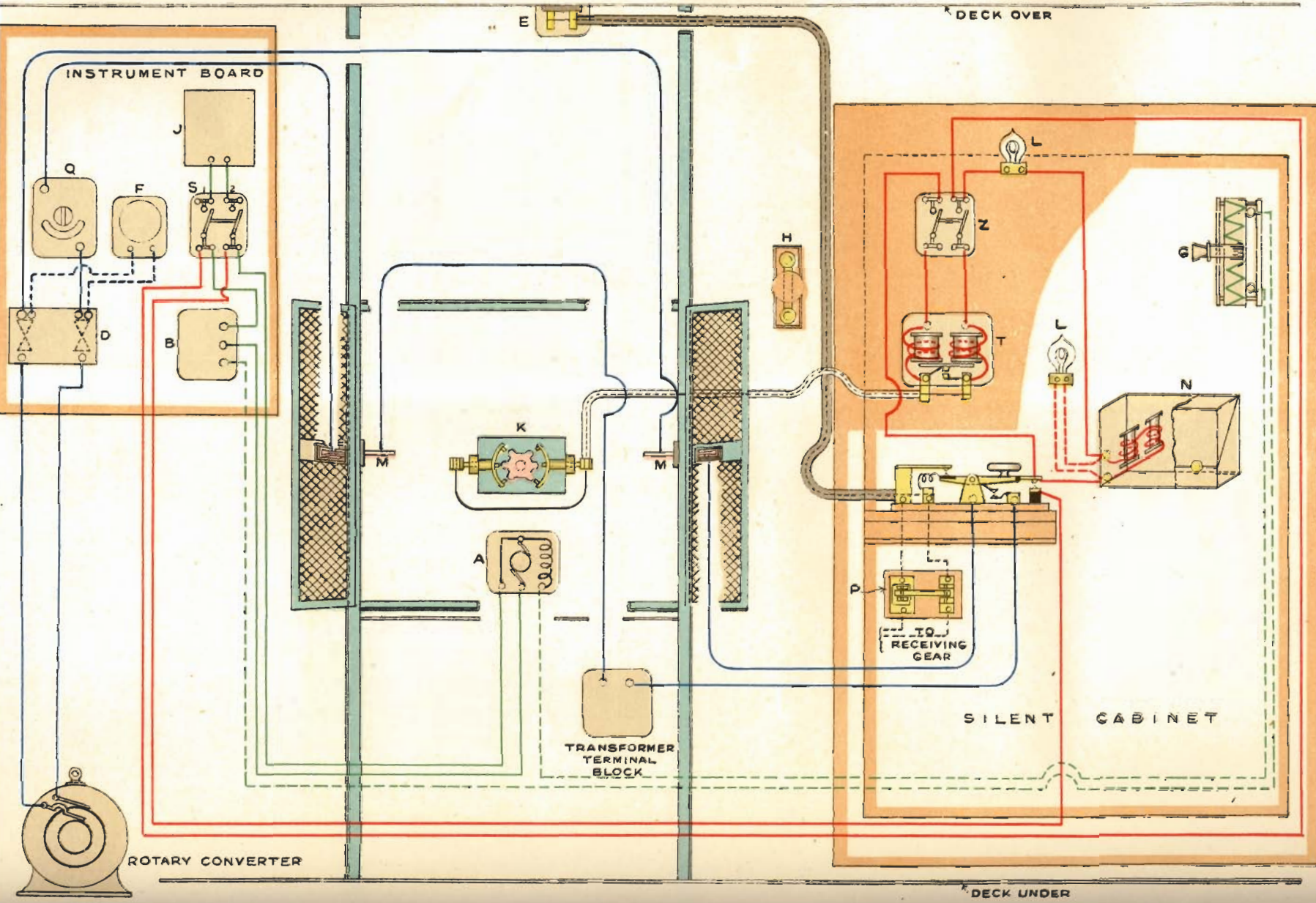


- URALITE SHEETS
- PORCELAIN
- FELT & LEAD

REFERENCE

A	CONTACTS FOR BUZZER TRANSMITTER.
B	REVOLVING WHEEL.
C	ADJUSTABLE SPARK POINTS.
D	PORCELAIN INSULATOR.
E	SILENCER
H	INSFECTION DOOR
N	NUT FOR ADJUSTING BEARING
S	SPLIT BEARING
V	VULCANISED FIBRE

SERVICE MARK I* WIRELESS INSTALLATION DIAGRAM OF WIRING FOR NEW SHIPS.



REFERENCE

A	AUXILIARY MOTOR
B	" " STARTER
D	CUT OUT DOUBLE POLE
E	EARTH RING FITTING
F	FREQUENCY METER
G	RHEOSTAT ADJUST FOR AUXY MTR
H	HOLDER FOR BUZZER CONNCS
J	DISTRIBUTING BOX
K	SPARK GAP
L	LAMPS 32 CANDLE POWER
M	SWITCH SAFETY
N	SWITCH PROTECTING
O	HAND OPERATING KEY
P	BREAK DOWN FUSE
Q	IMPEDANCE COIL
S	SWITCH SUPPLY D. C.
T	BUZZER TRANSMITTER
Z	BUZZER SWITCH.

- ALTERNATE CURRENT CIRCT —
- AUXILIARY MOTOR CIRCUIT —
- OPERATING CIRCUIT —
- FLEXIBLE CONCENTRIC CABLE
- CONCENTRIC CABLE

ROTARY CONVERTER

DECK UNDER

DECK OVER

SILENT CABINET

WIRING OF MARK I*. SETS.

The wiring of Mark I* sets, which are supplied with an operating switch, was shown in Plate VI. in W.T. Appendix to last year's Annual Report. Plate III. shows the wiring in new ships, which are supplied with the hand operating key described on page 12. This plate, in addition to showing all the various wires running to the hand operating key, shows the flexible buzzer connections joined up to the spark gap. When the buzzer transmitter is not in use, the flexible should be housed on the fitting marked "H," which short-circuits the ends of the conductors.

In the new system of wiring the following instruments will not be required :—

- (a) Operating Switch.
- (b) Resistances for Operating Switch.
- (c) Cabinet fittings for Operating Switch.
- (d) Pedal for sending.

The following articles will be required in lieu :—

- (a) Hand Operating Key.
- (b) Two 32-candle-power lamps.

DESTROYERS INSTALLATIONS.

The following destroyers have been fitted during the year :—

"Bulldog."	"Basilisk."
"Harpy."	"Afridi."
"Savage."	"Beagle."
"Scourge."	"Viking."
"Foxhound."	"Scorpion."
"Renard."	"Rattlesnake."
"Pincher."	"Grasshopper."
"Wolverine."	"Mosquito."
"Zulu."	"Raccoon."

All these installations are working satisfactorily.

This brings the total number of destroyers fitted up to 61.

SUMMARY OF A REPORT ON W.T. IN DESTROYERS BY COMMANDER PAYNE OF H.M.S. "CRUSADER."

Aerial Outhauls.—It is recommended that outhauls should be of lengths of destroyers' steel aerial wire with porcelain insulators at intervals. Advantage over hemp outhauls being (1) no shrinkage; (2) less wind surface; (3) not liable to be burnt by heat from funnels.

Insulators.—Recommended that strain insulators similar to Pattern 1224, supplied with Mark I* sets, be substituted for the ebonite rods with hoods; advantage being that they do not break.

Detectors.—Results with the crystalite detector, as used in "Crusader," are so vastly superior to those with magnetic detector that its adoption is recommended in lieu of the magnetic detector.

Buzzer.—A small induction coil worked off 12 Obach cells has been in use for harbour work and for signalling to destroyers in company at sea. It has been most satisfactory, and is recommended for general supply to destroyers.

Internal Arrangement of W. T. Offices.

Hitherto the position of the instruments has been governed by the position of the deck insulator. Experiments carried out in "Crusader" have shown that, provided a clearance of 3 inches is allowed from the sides of the office or other metal work, there will be no fear of leakage. It is therefore recommended that a standard arrangement of office be adopted, the most suitable being one in which the table is athwartships against foremost bulkhead, and the door in after bulkhead port side.

Position of Deck Insulator should be chosen to give the clearest lead to the feeders.

Masts and Rigging.—With a view to reducing the number of insulators and the weight, it is suggested that pole masts might be introduced in lieu of the existing lower and topmast. Experiments so far have shown that short-circuiting the insulators in the lower rigging makes no appreciable difference to the range.

Operator's Chair.—It is suggested that this should be fitted with arms. Owing to the motion of the vessel in a seaway, the effort on the part of the operator to remain seated is apt to distract his attention from his work.

Communication between W. T. Office and Bridge.

In addition to the bell communication, it is recommended that voice-pipe communication be fitted; the object being to enable urgent signals to be reported immediately, and, when steaming without lights, without having to open chart-house doors, where it is often necessary to have a light burning.

Extract from "Vernon's" Remarks.

The recommendations are concurred in generally. All the points raised are receiving attention.

Strain Insulators are being supplied in lieu of the ebonite-hooded insulators.

Crystalite Detectors.

It has been approved to supply all destroyers with type "C" receiving sets. For description of this set see page 22 of this Appendix.

Buzzer.—A design has been got out for a transmitter working on these lines (see below, "Exercise Transmitter").

Operator's Chair.—A new design of chair has been submitted for approval.

WIRING OF DESTROYER'S SET.

Plate IV. shows diagrammatically the arrangement of a destroyer's office wired for the hand operating key described on page 12.

In the new system of wiring the side lever key and send-and-receive switch are no longer required, and the following articles are supplied in lieu :—

- One hand operating key, with spares.
- Concentric cable, Pattern 751, as required.
- One breakdown fuze.
- One box of reels of paper for breakdown fuze.
- One earth ring fitting.
- Two 32-candle power lamps.

The spares supplied with the hand operating key are detailed on page 15 of this Appendix. A pamphlet of instructions for fitting hand operating key is issued with each key.

EXERCISE TRANSMITTER.

This apparatus, which will be known as the "Exercise Set Type 4," is being introduced in order to enable destroyers to signal in harbour; its range will be about 3 or 4 miles. It consists

FIG. 1.

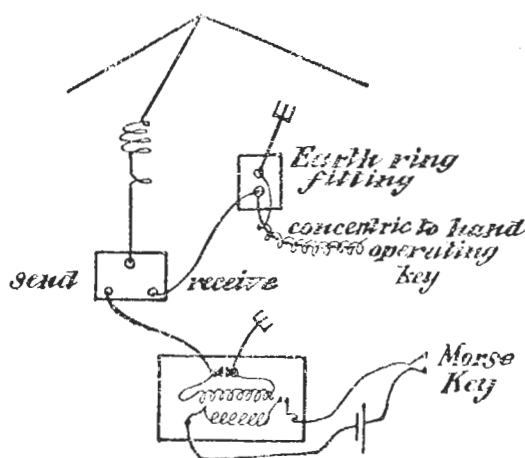
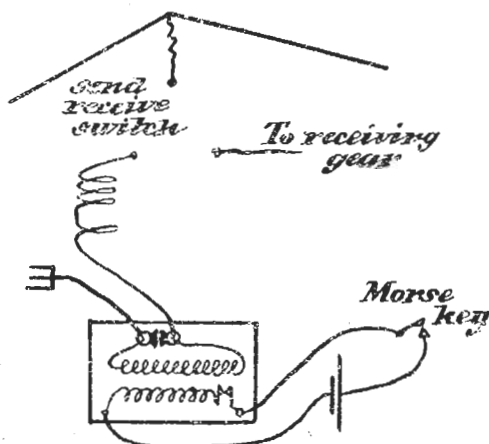
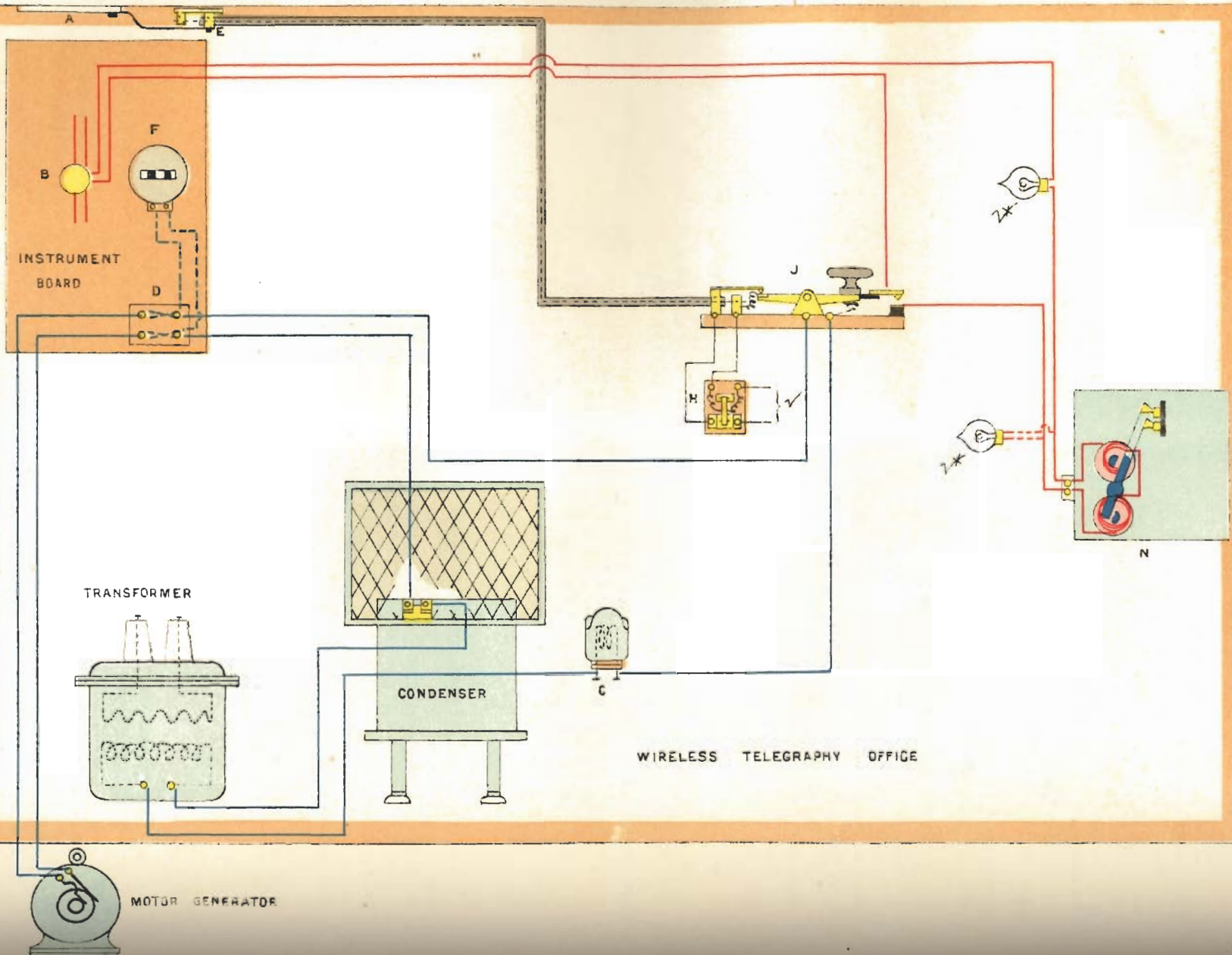


FIG. 2.



DESTROYER WIRELESS INSTALLATION

DIAGRAM OF NEW WIRING



REFERENCE

A	EARTH RING
B	DIRECT CURRENT SUPPLY
C	IMPEDANCE COIL
D	DOUBLE POLE CUT OUT
E	EARTH RING FITTING
F	FREQUENCY METER
H	BREAK DOWN FUSE
J	HAND OPERATING KEY
N	PROTECTING SWITCH

- ALTERNATING CIRCUIT —
- DIRECT CURRENT CIRCUIT —
- RECEIVING CIRCUIT —
- CONCENTRIC CABLE
- ⚡ TO RECEIVING INSTRUMENTS ✓
- ⚡ LAMPS 32 C.P. ⚡

of a small spark coil worked off 12 small Delafon cells joined three in series and four in parallel. It is fitted with a small spark gap, and sparks "plain" into the aerial.

It is proposed to supply to those destroyers which have hand operating keys, a switch receiving type C, which is a single pole two-way switch to be used as a send-and-receive switch when working with the exercise set.

The diagram in Fig. 1 shows the circuit with this transmitter when using the hand operating key, and Fig. 2 shows the circuit when using the old send-and-receive switch.

AUSTRALIAN DESTROYERS.

Two sets of W.T. have been purchased by the Australian Commonwealth Government for their destroyers "Parramatta" and "Yarra." The gear has been installed on board these vessels under the supervision of the Marconi Company, and consists of their ordinary $1\frac{1}{2}$ kw. set.

It is tuned to send out only two waves, viz., 300 and 600 metres. The receiving arrangements include a magnetic detector and a Fleming oscillation valve detector. There is no send-and-receive switch. There is a very short gap in the earth side of the mutual coil, and the receiving instruments are joined across this gap. There is a fitting on the sending key to short-circuit the telephones when the spark is made. The spark across the earth gap does not affect the sensitiveness of the M.D., but if the valve detector is left switched on, the spark renders it insensitive for at least half an hour.

The aerial consists of four parts single between the masts, fed from the foremost end.

SHORT-DISTANCE SETS.

Referring to the W.T. Appendix to Annual Report, 1909, pages 25, 26, the 11 sets have been delivered and issued as follows:—

"Dreadnought."	"Hibernia."
"Bellerophon."	"Dominion."
"Agamemnon."	"Africa."
"Lord Nelson."	"Vernon."
"King Edward VII."	Two sets in reserve.*

Reports sent in from these ships are, with one exception, favourable, and the sets have undoubtedly accomplished what was expected of them.

One of the chief difficulties has been the screening effect of funnels, rigging, &c. owing to which it has been found necessary in several instances to raise the aerial and then to reduce its L.S. value by placing a condenser in series with it. This has in most cases had the desired effect. The best shape and position of the aerial will vary with different types of ships, and in some cases a form of roof aerial over the bridge has been put up with success.

The one exception mentioned above was the "Lord Nelson," who reported immediately after the manœuvres that she experienced complete mutual interference between main and short distance sets; but it was observed that the new set was only put in two days before the commencement of hostilities, and that therefore there had been no time for experiments beforehand.

Proposed new Short Distance Set.

In view of the experience gained during the manœuvres of 1910 with these sets, it appears probable that a slightly increased range of 20 or 30 miles may prove to be necessary. Experiments are therefore in progress with a set to have a 30,000 feet wave, to work either on the quenched spark principle or on the principle of the D.C. commutator system, described on page 48 of W.T. Appendix to Annual Report, 1909, and shown in Fig. 2 on that page.

For further information *re* the working of existing sets, see "Report of Wireless Telegraphy Conference," page 8.

PORTABLE AND HARBOUR DEFENCE SETS.

There has been considerable delay in getting these sets completed, owing to difficulties in obtaining a suitable power generator.

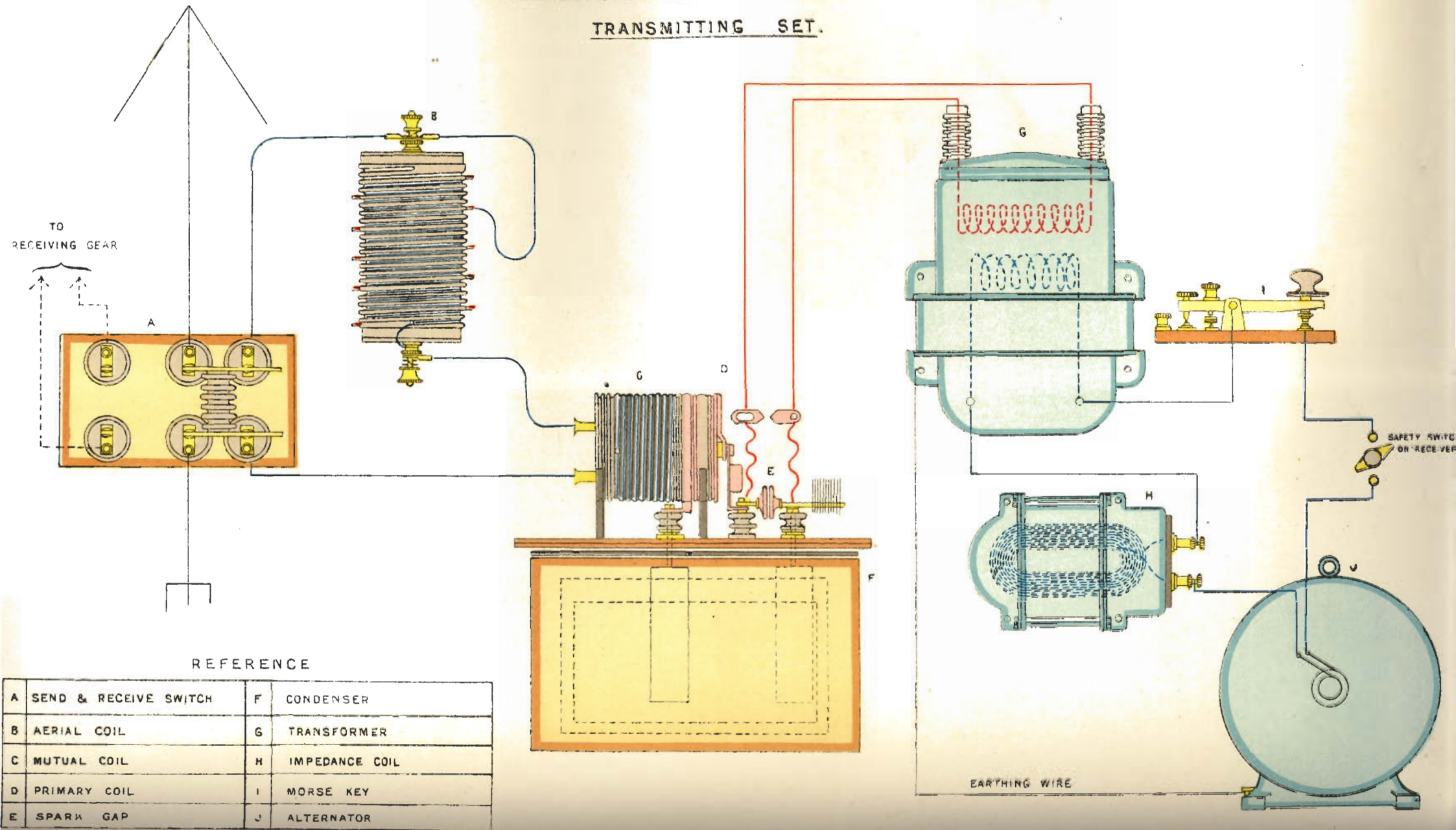
Power Generator.—An engine has not yet been produced which is capable of fulfilling the requirements. The difficulty is to obtain an engine that will give the necessary power for the maximum weight allowable.

Fuel.—Petrol, as a fuel, not being permissible, it was thought that methylated spirits would probably give the best results. Experience has, however, shown that the power obtained with this fuel is very small indeed. Moreover, it was necessary to light up a small fire underneath the carburettor in order to get it to start, and this frequently resulted in the engine being enveloped

* A set has since been supplied to "Neptune." It is understood that no further sets will be purchased at present.

PORTABLE AND HARBOUR DEFENCE

TRANSMITTING SET.



REFERENCE

A	SEND & RECEIVE SWITCH	F	CONDENSER
B	AERIAL COIL	G	TRANSFORMER
C	MUTUAL COIL	H	IMPEDANCE COIL
D	PRIMARY COIL	I	MORSE KEY
E	SPARK GAP	J	ALTERNATOR