

MINISTRY OF SHIPPING & TRANSPORT
(Shipping Wing)

New Delhi, the 7th January, 1983

NOTIFICATION
(Merchant Shipping)

G.S.R. 15(E)—In exercise of the powers conferred by section 296, read with sections 291 and 457, of the Merchant Shipping Act, 1958 (44 of 1958), and in supersession of the Indian Merchant Shipping (Radio) rules, 1956, the Central Government hereby, makes the following rules namely :--

PART-I

GENERAL

1. Short title, commencement and application.---**(1) These rules may be called the Merchant Shipping (Radio) Rules, 1983.**

(2) They shall come into force on the date of their publication in the Official Gazette.

(3) They shall apply to ships which are-

(a) Sea-going Indian ships;

(b) Sea going ships other than Indian ships while they are within India, including the territorial waters thereof, but are not--

(i) troop-ships not registered in India;

(ii) ships not propelled by mechanical means;

(iii) Pleasure yachts;

(iv) fishing vessels; or

(v) cargo ships of less than 300 tons gross.

2. Definitions .---In these rules, unless the context otherwise requires,-

(i) "Act" means the Merchant Shipping 1958 (44 of 1958);

(ii) "Class A1" in relation to classes of emission means telegraphy by on-off keying without the use of a modulating audio frequency;

(iii) "Class A2" in relation to classes of emission means telegraphy by on-off keying of an amplitude-modulating audio frequency or audio frequencies, or, as the case may be, by the on-off keying of the modulated emission;

(iv) "Class A3" in relation to classes of emission means double side band amplitude modulated telephony;

(v) "Class B" in relation to classes of emission means damped waves;

(vi) "connected" means electrically connected.

(vii) "existing installation" means—

(a) an installation wholly installed before the 25th day of May, 1965; and

(b) an installation part of which was installed before the 25th day of May, 1965 and the rest of which consists either of parts installed in replacement of identical parts or parts which comply with the relative requirement of these rules;

(viii) "interference" means any emission, radiation or induction which endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radio communication service operating in accordance with these rules, or as the case may be, the Radio Regulations, Geneva, 1959;

(ix) "mile" means a nautical mile of 1853, 144 metres;

(x) "operating position" in relation to any equipment means the position normally occupied by a person when operating that equipment;

(xi) "pleasure yacht" means a ship which, howsoever propelled, is exclusively used for pleasure cruises and does not carry any passengers on payment of his fare;

- (xii) "radio telegraph operator" means a person who has had experience at sea as an operator of radio telegraph apparatus on board a fishing vessel or any other ship to which these rules do not apply;
- (xiii) "radio telegraph ship" means a ship, being a ship to which these rules apply, which is provided with a radio telegraph installation and which is not a radio telephone ship;
- (xiv) "radio telephone ship" means a ship, being a ship to which these rules apply, of not less than 800 tons gross but less than 1600 tons gross, the owner of which has given the Central Government a notice in writing that the ship is provided with a radio telephone installation in compliance with these rules and such notice has not been withdrawn;
- (xv) radio watch—
 - (a) in relation to radio telegraph ship means listening for signaling on the international distress frequency of 500 KHz; and
 - (b) in relation to a radio telephone ship, means listening for signaling on the international distress frequency of 2182 KHz;
- (xvi) "Schedule" means a Schedule annexed to these rules ;
- (xvii) "silence periods",---
 - a. in relation to radio telegraph, means period of three minutes each beginning at 15 minutes and 45 minutes of each hour determined according to Greenwich Mean Time; and
 - b. in relation to radio telephony, means periods of 3 minutes each beginning at each hour and 30 minutes of each hour determined according to Greenwich Mean Time;
- (xviii)"steamer" includes a ship propelled by electricity or other mechanical means of propulsion.

3. Classification of ships.—The ships to which these rules apply shall be classified as follows. namely :-

- Class I---
 - (a) Indian ships, carrying more than 250 passengers or which are in possession of a valid certificate issued by the Central Government or any other person authorized by it in this behalf to the effect that such ships are fit to carry more than 250 passengers for voyages extending to 16 hours or more between two consecutive ports.
 - (b) Ships other than Indian ships carrying more than 250 passengers or which are in possession of a certificate issued by the appropriate authority in the country in which they are registered to the effect that they are fit to carry more than 250 passengers, being ships which arrive at port or place in India after having been at sea for 16 hours or more since leaving last port or being ships which seek clearance or transire from a port or place in India for a voyage requiring 16 hours or more at sea before reaching the next port of call.

- Class II--
 - (a) Passenger ships other than those of Class I.
 - (b) Cargo ships of 1600 tons gross or upwards.

Class III.---Cargo ships of 500 tons gross or upwards but less than 1600 tons gross.

Class IV.----Cargo ships of 300 tons gross and upwards but less than 500 tons gross.

4. Provision of radio installations.---(1)Every ship of Class I and Class II shall be provided with a radio telegraph installation which shall include the equipments specified in the **First Schedule**.

(2) Every ship of Class III and Class IV shall be provided with a radio telephone installation which shall include the equipment specified in the **Second Schedule** or with a radio telegraph installation which shall include the equipment specified in the **First Schedule** :

Provided that the main and reserve radio telegraph transmitters in such ships may be combined into a single instrument, if that instrument is capable of complying with the requirements of Parts I and III of the **First Schedule**

(3) Notwithstanding anything contained in sub-rules (1) and (2), Central Government may exempt any ship of Classes I, II, III and IV from all or any of the requirements of the foregoing provisions of this rule, subject to the following conditions, namely :-

- (i) where it is shown to the satisfaction of the Central Government that the length of the voyage, the maximum distance of the ship from the shore, the absence of navigational hazards and other conditions affecting safety are such as to render full or, as the case

may be, partial application of sub-rules (1) and (2) unreasonable or unnecessary;

- (ii) where it is shown to the satisfaction of the Central Government that exemption from any of the requirements of sub-rules (1) and (2) shall not affect the general efficiency of the distress service for the safety of all ships ;
- (iii) where exemption is sought for in the case of ships of Class I or class II which are provided with radio telephone installation as required under sub-rule (2).

5. Climatic and durability tests.--- (1) Every equipment the requirements in respect of which have been specified in these rules, excepting test measuring instruments provided in accordance with rule 14 or clause (f) of rule 24, shall be such that it shall be free of mechanical defects and comply with the specified for it in the **Third Schedule**---

- (a) while undergoing the vibration test, the dry heat test and the low temperature test,
- (b) when subjected to the damp heat test, and
- (c) while undergoing such of the other tests as are applicable to the equipment.

(2) Any such equipment which is intended for use in the open or in an open boat shall be such that after undergoing the mould growth test required by the Third Schedule, no mould growth shall be present on it.

6. Interference with reception.---(1) At no time while the ship is at sea the interference or mechanical noise produced by the radio installation or by or by any other equipment in the ship shall be such as to prevent the effective reception of radio signals by means of the radio installation provided on board the ship.

(2) Any ship which is provided with a radio telegraph installation, not being an existing installation, shall also be provided with a communal aerial system for all broadcast receivers in respect of which it is impracticable to effect and properly installed aerials which do not interfere with the efficiency of such radio telegraph installation.

7. High Voltage parts.---(1) All parts and wiring of the equipment specified in these rules in which the direct and the alternating voltages (other than radio frequency voltages) combine at any time to give an instantaneous voltage greater than 50 volts shall be protected from accidental access.

(2) All parts and wiring of the equipment specified in these rules (other than the parts and wiring of a rotating machine) in which the direct and the alternating voltage other than radio frequency voltages combine at any time to give an instantaneous voltage greater than--

- (a) 50 volts in the case of equipment specified in the **Second Schedule** and the **Fourth Schedule**; and
- (b) 250 volts in the case of other equipment, shall be isolated automatically from all sources of electrical energy when the means of protection are removed.

8. Charging of batteries.---(1) If on any ship batteries are provided as a source of electrical energy for any part of the equipment required by these rules, means shall be provided on board every such ship for the charging of such batteries from the ship's main sources of electrical energy.

(2) Such batteries, whether they form part of the main installation or the reserve installation, shall be brought up to the normal fully charged condition daily while any such ship is at sea.

PART-II

RADIO TELEGRAPHY

9. Electrical independence of main and reserve radio telegraph equipments.---The main and reserve radio telegraph ship shall be electrically independent of each other.

10. Radio telegraph room---(1)(a) Every radio telegraph installation provided on board a radio telegraph ship shall be installed in one or more radio telegraph rooms.

(b) The radio telegraph rooms shall not be used for purposes other than those associated with the functions and duties of a radio officer.

(c) The radio telegraph rooms shall not be used for purposes other than those associated with the functions and duties of radio officer.

- (a) in such a position that there shall be no disturbance either extraneous or otherwise to the effective reception of radio signals;
- (b) as high in the ship as practicable so that the greatest possible degree of safety may be achieved;
- (c) of such dimensions as shall be sufficient to enable efficient operation, at all times, of the radio telegraph equipment installed therein; and
- (d) adequately ventilated.

(2) Every radio telegraph installation provided on board a radio telegraph ship shall be installed in such a position that it will be protected against disturbance to its effectiveness by water or by extremes of temperature and shall, at all times when the ship is at sea, be readily accessible both for immediate use and repairs.

(3) Every radio telegraph room shall be provided with:-

(a)(i) an efficient two-way means of calling and voice communication with the bridge and any other place from which the ship is normally navigated.

(ii) such means of communication shall be a telephone or some other means equally efficient;

(b)(i) a reliable clock, equipped with a dial of not less than 12.5 centimetres in diameter and a concentric second hand, the face of which shall be marked to indicate the silence periods.

(ii) it shall be securely mounted in such a position that the entire dial can be easily and accurately visible from the radio telegraph operating position and, if the ship is provided with a radio telegraph auto-alarm equipment, from the position normally occupied by a person for testing the radio telegraph auto-alarm receiver;

(c)(i) an electrical lamp, operated from the reserved source of electrical energy required by sub-rule (2) of rule 13, and permanently arranged so as to be capable of providing adequate illumination of the operating controls of the main and reserve radio telegraph installations and of the clock required by clause (b);

(ii) such lamp shall be controlled by two way switches placed respectively at the entrance of the radio telegraph room and at the radio telegraph operating position;

(iii) the switches shall be clearly labeled to indicate their purpose;

(d) an inspection lamp which shall either be an electrical lamp or a flash light and if it is an electrical lamp, it shall be operated from the reserve source of electrical energy required by sub-rule (2) of rule 13 and shall be provided with a flexible lead of adequate length to enable all parts of the radio telegraph installation to be easily seen.

(e) a chair capable of being fixed at the radio telegraph operating position.

(4) A complete list of spare equipment and spare parts carried on board the ship in accordance with rule 14 shall always be available in every radio telegraph room and such list shall indicate the location on board of such spare equipment and parts.

(5) A calibration table or calibration curve for each transmitter and receiver forming part of the radio telegraph installation shall always be available in every radio telegraph room, unless the transmitter or, as the case may be, the receiver is directly calibrated.

(6) A complete diagram of the wiring of the Radio telegraph installation shall always be available in every radio telegraph room;

Provided that nothing in this sub-rule shall apply to an existing radio telegraph installation in any ship of Class IV.

(7) If a separate room is provided on board any ship for operating the reserve radio telegraph equipment, it shall be provided with equipments, articles and fittings as required by sub-rules (2) and (3).

(8) Every radio telegraph room shall be provided with a manual containing circuit diagrams and other relevant data required for the maintenance of every part of the radio telegraph installation together with instructions on the use, operation and maintenance of every such part.

(9) In every radio telegraph room there shall be displayed a card of instructions prescribing the procedure to be followed in transmitting automatically the radio telegraph alarm signal and the distress call by using--

(i) the reserve telegraph transmitter specified in Part III of the **First Schedule** ; and

(ii) the automatic keying device specified in Part V of the **First Schedule** .

(10) In every radio telegraph room there shall be displayed a card of instructions giving a summary or radio telegraph distress procedure for immediate reference in the event of an emergency.

11. Aerials---(1) Every radio telegraph ship shall be fitted with a main aerial and reserve aerial.

Provided that the Central Government or any other Officer authorized by it in this behalf may exempt any ship from the requirement of a reserve aerial if that Government or the officer is satisfied that the fitting of such an aerial is impracticable or unreasonably and any ship so exempted shall carry---

(a) if the main aerial is a supported wire aerial, a spare aerial completely assembled for rapid replacement of the main aerial ; or

(b) if the main aerial is not a supported wire aerial, a spare aerial complete with supporting structures which shall be capable of rapid erection while the ship is at sea.

(2)(a) In the case of a ship of Class I, Class II or Class III each of the halyard used for supporting such main aerial shall be fitted with a safety loop between the masthead or other aerial support and an aerial insulator.

(b) Such safety loop shall consist of part of the halyard not less than 92 centimetres long, the loop being closed by a link, not more than 38 centimetres long, with a breaking load of not more than one-third of the breaking load of the aerial or of the halyard, whichever is less.

(3) A rigging plan of aerials shall always be available in the radio telegraph room and it shall show the following, namely :-

(a) elevation and plan views of the aerials ;

(b) the measurements of the aerials; and

(c) the height of the aerials in metres measured in the manner specified in the Fifth Schedule.

(4) Means shall be provided for quickly connecting---

(a) either the main aerial or the reserve aerial, if any, to the main transmitter and also to the reserve transmitters; and

(b) the main and reserve receivers, the radio telegraph auto alarm equipment and the loud speaking watch keeping receivers, to any aerial with which they may be required to be used.

12. Range of transmitters—(1) The normal ranges of radio telegraph transmitters provided in accordance with the foregoing provisions of these rules, which connected to the main aerial, shall not be less than the range specified below:-

(a) in the case of a ship of Class I—282 kilometres for the main transmitter and 242 kilometres for the reserve transmitter.

(b) in the case of a ship of Class II ---242 kilometres for the main transmitter and 161 kilometres for the main transmitter and 161 kilometres for the reserve transmitter.

(c) in the case of a ship of Class III--- 161 kilometres for the main transmitter and 121 kilometres for the reserve transmitter; and

(d) in the case of a ship of Class IV---121 transmitter for the purposes of these rules shall be determined at the option of the owner of the ship, either by calculation or by test.

(2) The normal range of a radio telegraph transmitter for the purposes of these rules shall be determined at the option of the owner of the ship, either by calculation or by test.

(3) For the purposes of these rules, the normal range of a radio telegraph transmitter, when determined by calculation on a frequency of 500 KHz, shall be calculated in the manner specified in the **Fifth Schedule**.

(4) For the purposes of these rules, the normal range of a radio telegraph transmitter, when determined by test, shall be the distance to which signals can be transmitted by such transmitter over the sea by day under normal conditions on a frequency of 500 KHz so as to set up at the receiver a total root mean square field strength of at least 50 micro volts per metre.

13. Supply of electrical energy---(1)(i) In every radio telegraph ship a supply of electrical energy shall be available from the ship's main source of electrical energy at all times while such ship is at sea and at all reasonable times while it is in port and such supply of electrical energy shall be adequate for---

(a) the operation of the main radio telegraph equipment in accordance with these rules.

(b) testing purposes; and

(c) the charging of any batteries which are a source of electrical energy for the radio telegraph installation.

(ii) The voltage of the supply for the main installation shall be maintained within plus or minus 10 per cent of the rated voltage.

(iii) The supply of electrical energy shall, if it is a direct current supply be of correct polarity and a metre to indicate this shall be fixed in the radio telegraph room unless otherwise provided :

Provided that in the case of any ship not engaged on an international voyage, the aforesaid supply of electrical energy may be derived from a battery, in which case a duplicate shall also be provided for that purpose.

(2)(a) The reserve equipment shall be provided with a source of electrical energy independent of the propelling power of the ship and the ship's electrical system.

(b) such reserve equipment and all parts thereof shall be placed as high in the ship as practicable.

(3)(a) The source of electrical energy provided for the reserve equipment shall preferably consist of accumulator _____ shall be capable of being charged from the ship's main source of electrical energy and it shall under all circumstances, be capable of being brought into immediate operation by means of a switchboard.

(b) The switch board so provided shall be capable of being illuminated by an electric lamp and it shall be situated in the radio telegraph room or as near thereto as possible so as to be readily accessible from radio telegraph room.

(c) The source of electrical energy so provided for the reserve equipment shall be of such capacity and shall be so maintained at all times that it shall be able to supply electrical energy for six hours, continuous operation of the following consumption requirements whether or not it is in use for any other purpose, namely:---

(a) the current required to operate the reserve transmitter with the key up ;

(b) three-fifths of the difference between the current required to operate the reserve transmitter with the key down and the current required to operate it with the key up ;

(c) the current required to operate the reserve receiver; and

(d) the current consumed by the lamps required by clause (c) of sub-rule (3) of rule 10 and by the foregoing provisions of this sub-rule.

(4) The reserve source of electrical energy provided in pursuance of sub-rule (2) shall not be used at any time except for the operation of ---

(a) the reserve transmitter and receiver;

(b) the lamps required by clauses (c) and (d) of sub-rule (3) of rule 10 and by sub-rule (3) of this rule.

(c) the automatic keying device;

(d) the radio telegraph auto-alarm equipment; and

(e) the direction finder.

(5) Notwithstanding the provisions of sub-rule (4), the Central Government may permit in any ship of Class III or Class IV the reserve source of electrical energy being used to supply electrical energy to any low power emergency circuits which are wholly confined to the upper part of the ship if it is satisfied that such circuits are capable of being readily disconnected and the reserve source of electrical energy is capable of supplying the additional load to such circuits without falling below the capacity required by sub-rule (3).

14. Tools, measuring instruments, spare parts etc.---Every radio telegraph ship shall be provided with the tools, measuring instruments, spare parts and other materials specified in Part I of the **Sixth Schedule**.

15. Provision of radio officers.---(1) Every radio telegraph ship which upon proceeding to sea is not provided with a radio telegraph auto alarm equipment complying with the requirements specified in the **Seventh Schedule**, shall be provided with radio officers as specified below---

(a) Ships of Class I three radio officer.

(b) Ships of Class II (i) two radio officers if the ship is expected to remain at sea for not more than 48 hours between two consecutive ports; or
(ii) three radio officers if the ship is expected to remain at sea more than 48 hours at sea between two consecutive ports.

(c) Ships of Class III and IV (i) one radio officer if the ship Class IV expected to remain at sea for is not more than 12 hours between two consecutive ports; or
(ii) two radio officers if the ship is expected to remain at sea for more than 12 hours but not exceeding 48 hours between two consecutive ports ; or
(iii) three radio officers if the ship is expected to remain at sea for more than 48 hours between two consecutive ports.

(2) Every radio telegraph ship which upon proceeding to sea is provided with a radio telegraph auto-alarm equipment specified in the **Seventh Schedule** shall be provided with radio officers as specified below---

- (a) Ships of Class I---two radio officers.
- (b) Ships of Classes II, III and IV--- one radio officer.

16. Qualification of radio officers.---(1) For the purposes of these rules, no person shall be deemed to be qualified for being appointed as a radio officer on board an Indian ship unless he holds a First or Second Class Radio Telegraph Operators Certificate of Proficiency or Competency or such other equivalent certificate which may have been established by any other law for the time being in force in India and valid license to operate wireless telegraphy granted by---

- (a) the Central Government or any other authority appointed by it in this behalf by a notification in the Official Gazette; or
- (b) an administration of any other country provided that the Central Government has recognized the Certificate of Proficiency as equivalent to a certificate of proficiency issued by it and has issued to the holder an authority to operate radio telegraph ship station of Indian Registry.

(2) In the case of at least one radio officer on board a radio telegraph ship registered in India which is a passenger ship of Class I or Class II the certificate required under sub-rule (1) shall be a first class certificate or such other equivalent certificate which may have been established by any other law for the time being in force in India.

(3) For the purpose of sub-rule (1), no licence to operate wireless telegraphy shall be deemed to be valid at any date unless it satisfied the relevant conditions of validity and revalidation of such licences specified in the Indian Wireless Telegraph (Commercial Radio Operators Certificates of Proficiency and Licence to operate Wireless Telegraphy) Rules, 1954.

(4) At least one of the radio officers on board a ship, registered in India, of Class I or Class II shall be a person who has had experience at sea as a radio officer or radio telegraph operator for a total period of not less than---

- (a) two years in the case of ships of Class I ;
- (b) one year in the case of ships of Class II(a);
- (c) six months in the case of ships of Class II(b) being ships of 3000 tons gross and upwards; and
- (d) three months in the case of ships of class II(b) being ships of 1600 tons gross and upwards but under 3000 tons gross.

(5) In the case of ships other than Indian ships while they are at a port or place in India or within the territorial waters of India, no person shall be deemed to be radio officer unless he holds a valid certificate of proficiency or competency in radio telegraphy granted by an authority recognized in that behalf by the laws of the country in which the ship is registered.

17. Radio watch.---(1) Subject to the provisions of sub-rule (1) of rule 18, radio watch shall be maintained on board every radio telegraph ship as specified below, namely :-

- (a) If, upon proceeding to sea, the ship is not provided with a radio telegraph auto-alarm equipment specified in the **Seventh Schedule**, a continuous watch round the clock for twenty four hours shall be maintained.
- (b) If, upon proceeding to sea, the ship is provided with a radio telegraph auto alarm equipment specified in the **Seventh Schedule**---
 - (i) in the case of ships of Class I a watch of sixteen hours a day shall be maintained at the times specified in the **Eighth Schedule**;
 - (ii) in the case of ships of Classes II, III and IV, watch of eight hours a day shall be maintained at the times specified in the **Eighth Schedule**;

(2) Any radio telegraph auto-alarm equipment provided on board a radio telegraph ship shall be kept in operation at all times at which a radio watch is not maintained :

Provided that nothing in this sub-rule shall apply to ships which are fitted with direction finders in compliance with the Merchant Shipping (Radio Direction Finders) Rules, 1968, during such time when radio bearings are being determined by means of the direction finder if---

- (a) it has been provided by test that the aerial of the radio telegraph auto-alarm equipment, when in operation affects equipment, when in operation affects the accuracy of radio bearings obtained by means of the direction finder; and

- (b) it is impracticable to erect an aerial for the radio telegraph auto-alarm equipment in any position on the ship without affecting the accuracy of these bearings when the equipment is in operation.

18. Watch keeping and other radio duties of radio officers.--- (1) Every radio officer on board a radio telegraph ship shall keep radio watch by means of headphone reception throughout his period of duty except when another radio officer keeps radio watch by headphone receipt :

Provided that when the radio officer is required to perform other duties in compliance with these rules or in compliance with the merchant Shipping (Radio Direction Finders) Rules, 1968, or when he is required to handle traffic on other frequencies radio watch may be maintained by means of loud speaker reception or if loud speaker reception is impracticable radio watch during such period may be dispensed with except during silence periods falling within such period.

(2)(i) Subject to the provisions of rule 17, every radio officer on board a radio telegraph ship, being a ship which is provided with an auto-alarm equipment complying with the requirements of the **Seventh Schedule** shall, whenever, radio watch ceases to be maintained either during or at the end of his period of duty, connect the radio telegraph auto-alarm equipment with the ship's main aerial or with any other efficient aerial and put the radio telegraph auto-alarm equipment into operation.

(ii) Every radio officer who, in compliance with the provisions of this sub- rule leaves the radio telegraph auto-alarm equipment in operation when he goes off duty, shall, before going off duty---

- (a) test the efficiency of the radio telegraph auto-alarm equipment;
- (b) inform the master or the officer in charge of the navigation of the ship immediately if it is found on test that the radio telegraph auto-alarm equipment is not operating effectively.

(3) Every radio officer who on resuming duty finds that the radio telegraph auto-alarm equipment is connected to an aerial, shall immediately test the efficiency of the equipment before making any adjustment thereto.

(4) While a radio telegraph ship is at sea, the radio officer or, if there are more than one such officer on board the ship, the first radio officer, shall cause the following tests to be made :-

- (a) a test, once a day, of the reserve telegraph transmitter connected with the artificial aerial provided in accordance with paragraph 12 of Part III of the **First Schedule** ;
- (b) a test, once during every voyage, if the ship is engaged on international voyages, of the reserve radio telegraph transmitter connected with the reserve aerial, if any ;
- (c) a test, once a day by volt meter, and once a month by hydrometer, of any batteries which are a source of electrical energy for the radio telegraph installation ;
- (d) a test, once a day, of any other source of electrical energy provided for the reserve radio telegraph equipment ;
- (e) a test, once a day, of the audible alarm circuits and of the bells forming part of the radio telegraph auto-alarm equipment; and
- (f) a test, once a day, to check the proper functioning of the radio telegraph auto alarm receiver connected to its normal aerial, by listening to signals received by means of that receiver and by comparing them with similar signals received on frequency of 500 KHz by means of the main receiver; and
- (g) a test, at least once a week, of the transmitter forming a part of the fixed radio equipment for motor lifeboats, if any, or of the portable radio equipment for survival crafts, using its artificial aerial.

(5)(a) While a radio telegraph ship is at sea, the radio officer or, if there are more than one such officer on board the ship, the first radio officer shall take all reasonable and practicable steps to cause the radio telegraph installation and every part thereof to be properly maintained and, where necessary, repaired and adjusted.

(b) The said radio officer shall also arrange for all batteries, being a source of electrical energy for any part of the radio telegraph equipment, which are found not to be fully charged to be brought up to that condition as soon as possible.

19. Restriction in the use of reserve transmitter.--- The transmitter forming part of the reserve radio telegraph equipment shall not be used to transmit messages other than those relating to the safety of life at sea, unless such transmitter complies with the additional requirements specified in paragraph 6 of Part III of the **First Schedule** .

20. Radio Telegraph log.---(1) A radio telegraph log in the form specified in the **Ninth Schedule** shall be kept in the radio telegraph room on board every radio telegraph ship registered in India and it shall be available for inspection by any person authorized in that behalf by the Central Government.

(2) Every radio officer on board a radio telegraph ship registered in India shall when on duty, either following particulars in the radio telegraph log required to be kept under sub-rule (1), namely :-

- (a) his name;
- (b) the hours at which he goes on and off duty;
- (c) the identifying number of each message transmitted or received by him together with date and time of such transmission or receipt, the station to which each message was transmitted or, as the case may be, from where each such messages was received; and
- (d) a record of all incidents occurring during his period of duty which relate to the radio telegraph installation and the operation thereof and which appear to be of importance to the safety of life at sea and in particular the radio officer shall enter the following in the radio log as they occur together with the time of their occurrence namely :-
 - (i) the full of all messages transmitted or received by him which relate to immediate assistance required by person in distress at or above the sea ;
 - (ii) the full text of all messages transmitted or received by him which are preceded by an urgency signal or a Safety Signal if no record of such messages is kept separately;
 - (iii) a record of the radio watch maintained by him during each of the silence periods ;
 - (iv) a record of any incidents occurring during his period of duty which affects the efficiency of the radio telegraph installation; and
 - (v) a record of the tests conducted by him in accordance with the requirements of sub-rules (2) and (3) of rule 18 together with the results of such tests.

(3) The radio officer, or, the first radio officer where there are more than one radio officers on board a ship, shall cause the following entries to be made in the radio telegraph log---

- (a) a record of tests conducted in accordance with the provisions of sub-rule (4) of rule 18 and sub-rule (1) of rule 31 ;
- (b) a record of the charging of any batteries used as a source of electrical energy for the radio telegraph installation as required by sub-rule (5) of rule 18; and
- (c) the details of any failures and repairs of the radio telegraph auto-alarm equipment, if the ship is provided with such an equipment.

(4) The radio officer, or the first radio officer if there are more than one radio officers on board a ship, shall make or cause to make an entry in the radio telegraph log, recording the time shown by the clock in each radio telegraph room in comparison with Greenwich Mean Time and of any correction made in respect of that clock, at least once a day.

(5) The radio officer, or the first radio officer if there are more than one radio officers on board a ship, shall, unless the ships rules require otherwise, make or cause to make an entry in the radio telegraph log recording in longitude and latitude, or by reference to a place, the approximate position of the ship once a day.

(6) The radio officer, or, the first radio officer if there are more than one radio officers on board a ship, the first radio officer shall inspect and sign each day, the entries made in the radio telegraph log, on that day, or, if this is not possible, on the following day.

(7) The master of the ship shall inspect and sign each day entries in the radio telegraph long.

(8) The provisions of sections 215, 216 and 217 of the Act shall apply to radio telegraph log in the same manner as they apply to an official log.

PART – III

RADIO TELEGRAPHY

21. Aerial.--(1) Every radio telephone ship shall be fitted with an aerial and in addition shall carry :-

- (a) a spare aerial completely assembled for rapid replacement of the main aerial, if the main aerial is a supported wire, aerial;
- (b) a spare aerial complete with supporting structures and capable of rapid erection while the ship is at sea, if the main aerial is not a supported wire aerial.

(2) (a) Each of the halyards used for supporting the aerial on a radio telephone ship of Class-III shall be fitted with a safety loop between the masthead or other aerial support and a aerial insulator.

(b) such safety loop shall consist of a part of the halyard not less than 92 centimetres long, the loop being closed by a link not more than 38 centimetres long with a breaking load not more than one-third of the breaking load of the aerial or the halyard, whichever is less.

(3) A rigging plan of the fitted aerial shall be available on board every radio telephone ship and such plan shall show :-

(a) elevation and plan views of the aerial;

(b) the measurements of the aerial; and

(c) the height of the aerial in metres measured in the manner specified in sub-rule (3) of rule 22.

22. Range of transmitters.---(1) The normal range of a radio telephone transmitter provided in accordance with the foregoing provisions of these rules shall not be less than 242 kilometres.

(2) For the purposes of these rules the normal range of a radio telephone transmitter shall be determined at the option of the owner of the ship either by calculation or by test.

(3) (i) For the purposes of these rules, the normal range of a radio telephone transmitter, when determined by calculation on a frequency of 2182 KHz, shall be calculated by ascertaining the product of the root mean square current in amperes at the base of the aerial and the maximum height of the aerial measured from the lead out insulator.

(ii) The transmitting shall be deemed to comply with the requirements of this rule if the product so ascertained is not less than.---

(a) 7.5 metre-amperes if the aerial has a horizontal top-length of not less than one-half of its maximum height measured from the lead-out insulator; or

(b) 12.8. metre-amperes in the case of any other aerial.

(4) The normal range of a radio telephone transmitter, when determined by test, shall be the distance to which signals can be transmitted by such transmitter over the sea by day under normal conditions on a frequency of 2182 KHz so as to set up at the receiver by the unmodulated carrier a total root mean square field strength of at least 25 microvolts per metre.

23. Supply of electrical energy.---(1)(i) In every radio telephone ship a supply of electrical energy shall be available from the ship's main source of electrical energy at all time while such ship is at sea and at all reasonable times while it is in port and such supply of electrical energy shall be adequate for :-

(a) the operation of the radio telephone installation provided in accordance with these rules;

(b) testing purposes; and

(c) the charging of any batteries which are a source of electrical energy for the radio telephone installation.

(ii) Such supply of electrical energy when it is a direct supply shall be of the correct polarity and a metre to indicate this shall be fixed in a radio telephone ship close to the battery charging switch board, unless provided otherwise.

2. (a) A reserve source of electrical energy shall be provided :-

(i) in every radio telephone ship of class-III in which the radio telephone installation is installed on or after the 1st September, 1956; and

(ii) in every radio telephone ship of Class-IV in which the radio telephone installation is other than an existing installation.

(b) Such reserve source of electrical energy shall be placed as high in the ship as practicable unless the main source of electrical energy is so situated and it shall be of such capacity as to be able to supply electrical energy for six hours continuous operation of the following consumption requirements, namely :-

(i) one-half of the current required to operate the radio telephone transmitter for the transmission of speak;

(ii) the current required to operate the radio telephone receiver, and

(iii) the current required by the electric lamp provided in pursuance of rule 24.

(3) (i) If a single battery is provided as a mean of main or reserve electrical energy for operating the radio telephone installation, means shall also be provided for either :-

(a) operating the radio telephone installation from the ship's main source of electrical energy; or

(b) float-charging the battery, in which case there shall be adequate protection against voltage rise.

(ii) Such means shall be so designed as not to require the earthing of the ship's main source of electrical energy and adequate filtering shall, where necessary, be provided to prevent mains borne interference from entering the radio equipment.

(4) The reserve source of electrical energy provided in pursuance of sub-rule (2) shall not be used at any time except for the operation of---

(a) the radio telephone installation; and

(b) the electric lamp provided in pursuance of rule 24.

(5) Notwithstanding the provisions of sub-rule (4), the reserve source of electrical energy provided in compliance with sub-rule (2) may, if the Central Government so permits, be used to supply electrical energy to---

(a) a direction finder, if fitted; and

(b) low-power emergency circuits which are wholly confined to the upper part of the ship.

(6) Any battery provided for the radio telephone installation shall, when not in use, be capable of being fully charged within a period of not more than 16 hours by means of charging provided on board the ship under rule 8.

24. Miscellaneous requirements.---The following provisions shall apply to every radio telephone ship, namely :-

(a) The radio telephone installation shall be installed---

(i) as high in the ship as practicable; and

(ii) in a position where there is least disturbance by extraneous noise or otherwise to the effective reception of radio signals.

(b) An efficient two-way means of a communication independent of the ship's main communication system and of main source of electrical energy, shall be provided between the place at which the radio telephone installation is installed and the place from which the ship is normally navigated.

(c) A reliable clock shall be securely mounted in such a position that the entire dial can be easily and accurately observed from the operating position of the radio telephone installation.

(d) (i) A reliable emergency lamp shall be provided which shall be independent of the main lighting system of the ship, and it shall be so arranged as to be capable of providing adequate illumination, the clock required by clause (C), and the card of instruction required by clause (e).

(ii) Where a reserve source of electrical energy is provided in compliance with rule 23, the emergency lamp shall be an electric lamp operated from the aforesaid emergency source of electric energy and it shall be controlled by two-way switches placed respectively near the entrance to radio telephone room and at the operating position of the radio telephone installation in that room.

(iii) The said switches shall be clearly labeled to indicate their purpose.

(e) A card of instructions giving a clear summary of the radio telephone distress, urgency and safety procedures shall be displayed in full view of the radio telephone operating position.

(f) The tools, the measuring instruments, spare parts and other materials specified in Part II of the **Sixth Schedule** shall be provided and so kept as to be readily available for use at any time while the ship is at sea.

25. Provisions and qualification of radio telephone operators---(1) Every radio telephone ship shall be provided with at least one radio telephone operator.

(2) For the purposes of these rules, no person shall be deemed qualified for being appointed as a radio telephone operator on board an Indian ship unless he holds a First Class or Second Class or Special Class Radio Telegraph Operator's Certificate of Proficiency or Competency or Radio Telegraph Operator's Certificate of Proficiency or Competency and a valid licence to operate wireless telegraphy granted by--

(i) the Central Government or any other person authorized by it in this behalf by a notification in the Official Gazette; or

- (ii) the administration of any other country provided that the Central Government has recognized that Certificate of Proficiency in radio telegraphy or radio telephony as equivalent to Certificate of Proficiency of the same class issued by it and has issued to the holder an authority to operate radio telegraph or radio telephone ship station of Indian Registry.

(3) For the purpose of sub-rule (2), no licence to operate wireless telegraphy shall be deemed to be valid at any date unless it satisfies the relevant conditions of validity and revalidation of such licences specified in the Indian Wireless Telegraph (Commercial Radio Operators Certificate of Proficiency and Licence to operate Wireless Telegraphy) Rules, 1954.

26. Radio watch.---(1) Subject to the provisions of sub-rule (2), a continuous radio watch shall be maintained while a radio telephone ship is at sea, by radio telephone operator or if such station is situated at such position in the ship from which the ship is normally navigated then by the master or such other officer or member of the crew who in either case is a qualified radio telephone operator and is so appointed in this behalf.

(2) The radio watch may be discontinued.---

- (a) when the receiver forming part of the radio telephone installation required by rule 4 is being used for traffic on a frequency other than 2182 KHz and a second receiver complying with the requirements specified in Part III of the **Second Schedule** is not available; or
- (b) when, in the opinion of the master of the ship, the conditions are such that the maintenance of radio watch may interfere with the safe navigation of the ship.

(3) Notwithstanding the provisions of clause (b) of sub-rule (2), the radio watch shall, as far as practicable, be maintained during silence periods.

27. Duties of radio telephone operators.---(1) Every radio telephone operator shall be familiar with the radio telephone distress, urgency and safety procedures as outlined in the card of instructions under clause (e) of rule 24.

(2) While a radio telephone ship is at sea, the radio telephone operator or, if there are more than one such operators on board, the one designated in this behalf by the master of the ship, shall arrange for any batteries which are a source of electrical energy for the radio telephone installation to be tested once a day and brought up to fully charged condition as soon as possible.

(3) While a radio telephone ship is at sea, the radio telephone operator, or, if there are more than one such operators on board, the one designated in this behalf by the master of the ship may make or cause to be made a test, at least once a week, of the transmitter forming part of the portable radio equipment for survival craft using its artificial aerial.

28. Radio telephone log.---(1) A radio telephone log, in the form specified in the **Tenth Schedule**, shall be kept in the radio telephone room or at the place from where radio watch is maintained on board every radio telephone ship registered in India and it shall be available for inspection by any other person authorized in that behalf by the Central Government.

(2) Every radio telephone operator shall, when keeping radio watch under sub-rule (1) or rule 26, enter the following in the radio log as they occur together with the time of their occurrences, namely :-

- (a) his name;
- (b) the times at which he begins and ends his period of radio watch;
- (c) the times at which the radio watch is discontinued and again resumed together with reasons for which the radio watch was discontinued.
- (d) a summary of communication exchanged between the ship station and other stations whether on land or on ships;
- (e) a record of all incidents occurring his period of radio watch which relate to the radio telephone installation and the operation thereof or which appear to him to be of importance to the safety of life at sea; in particular, he shall enter the following in the radio log as they occur together with the time of their occurrence, namely :-
- (i) the general sense of all messages transmitted and received by him which relate to immediate assistance required by persons in distress at or above the sea;
- (ii) the general sense of all messages transmitted and received by him which are preceded by a signal in general international use as an urgency signal or a safety signal;
- (iii) a record of the radio watch maintained by him during each of the silence period;
- (iv) a record of any incident occurring during his period of radio watch which affects, or in his opinion is likely to affect the efficiency of the radio telephone installations; and
- (v) a record in latitude and longitude, or by reference to a place, of the approximate position of the ship at least once a day.

(3) Every radio telephone operator shall enter in the radio telephone log a record of the tests conducted by him in accordance with sub-rule (2) of rule 27 and sub-rule (2) of rule 31.

(4) The master or any other officer or any member of the crew shall, when keeping radio watch under sub-rule (1) of rule 26, enter in the radio telephone log the following particulars, namely :-

- (a) his name;
- (b) the times at which he begins and ends his periods of radio watch;
- (c) the times at which the radio watch is discontinued and again resumed together with the reasons for which radio watch was discontinued;
- (d) a record all incidents occurring during his period of watch which relate to the radio telephone installation and the operation thereof or which appear to him to be of importance to the safety of life at sea; in particular he shall enter the following in the radio log as they occur together with the time of their occurrence, namely :-
 - (i) the general sense of all message received by him which relate to immediate assistance required by persons in distress at or above the sea;
 - (ii) the general sense of all messages received by him which are preceded by a signal in general international use as an urgency signal or a safety signal;
 - (iii) a record of any incident occurring during his period of radio watch which affects the efficiency of the radio telephone installation; and
 - (iv) a record in latitude and longitude, or by reference to a place, of the approximate position of the ship at least once a day when the station is open, if the ship's rules so permit.

(5) The radio telephone operator, or if there are more than one such operators on board, the one designated in this behalf by the master of the ship, shall inspect and sign each day the entries for that day made in the radio telephone log.

(6) The master of the ship shall inspect and sign day's entries in the radio telephone log.

(7) The provisions of sections 215, 216 and 217 of the Act shall apply to radio telephone log in the like manner as they apply to an official log.

PART IV

RADIO REQUIREMENT FOR MOTOR LIFE BOAT AND SURVIVAL CRAFT

29. Fixed radio telegraph installation for motor lifeboat.--- (1) The equipment required by rule 56 of the Merchant Shipping (Life Saving Appliances) Rules, 1982 shall comply with the specifications set forth in Part I of the **Fourth Schedule**.

(2) The battery included in such equipment shall not be used for any purpose other than the operation of the equipment and of the search light provided in compliance with the aforesaid rules.

30. Portable radio equipment for survival craft.--- The equipment required by rule 65 of the Merchant Shipping (Life Saving Appliances) Rules, 1981 shall comply with the specifications set forth in Part II of the **Fourth Schedule**.

31. Test of radio equipment for motor life boat and survival craft---(1) When a radio telegraph ship provided with the equipment referred to in rule 29 or, as the case may be, rule 30, is at sea, the radio officer or, if there are more than one such officers on board the ship, the first radio officer shall, at least once a week, arrange for the transmitter forming part of such installation or equipment to be tested with its artificial aerial and also arrange for any batteries, other than self-priming batteries, which are a source of electrical energy for such installation or equipment, to be tested by voltmeter and hydrometer and brought up to fully charged condition as soon as possible.

(2) When a radio telephone ship provided with the equipment referred to in rule 30 is at sea, the radio telephone operator, or if there are more than one such operators on board the ship, the one designated by the master of the ship in this behalf, shall, at least once a week, arrange for the transmitter forming part of such equipment to be tested with its artificial aerial.

32. Certain contraventions etc. not to be offences---Notwithstanding the retrospective operation of these rules in respect of clause (vii) of rule 2, no contravention of or failure to comply with any of the provisions of these rules, which has relation to the said clause (vii) of rule 2 occurred on or after the 25th day of May 1965, and the date of coming into force of these rules shall render any person guilty of any offence under the Act.

THE FIRST SCHEDULE

(See rules 4, 10(9), 18(4) and 19)

RADIO TELEGRAPH INSTALLATION

PART 1 – MAIN RADIO TELEGRAPH TRANSMITTER

1. General---(1) The main radio telegraph transmitter (hereafter in this Part referred to as "the transmitter") shall be provided with any equipment which may be necessary to enable it to be operated from the supply of energy referred to in rule 13, and shall be capable of being quickly connected with and tuned to be main and reserve aerials referred to in rule 11.

(2) The requirement of this Part shall be met for a range of supply voltage variations of plus and minus 10 per cent relative to the nominal supply voltage.

(3) The transmitter shall not cause the ship's mains to be earthed.

2. Frequency ranges and classes of emissions.---The transmitter shall be capable of adjustment for transmission emissions as may be required in the frequency range 405 KHz to 535 KHz of emissions of the following classes namely :-

Class A 1

Class A 2 Class H (Upper side band only)

3. Transmitting frequencies.--- The transmitter shall be capable of transmitting continuously but not simultaneously, radio telegraph signals on the spot frequencies of 500 KHz, 410 KHz and 513 KHz and on two of the following spots frequencies :-

425, KHz, 454 KHz, 468 KHz and 480 KHz.

4. Range of load impedance.---The transmitter shall be capable of complying with all the requirements of this Part when connected to an artificial load, one side of which is earthed, consisting of a resistance of value R in series with a capacitance of value C in all of the combinations specified in the following Table:---

TABLE

C	300	400	500	600	750	Picofarads
R	3.6	2.8	2.2	2	1.9	Ohms

(non inductive)

5. Power of transmitter.---(1) For the purposes of this paragraph, the expression "the power of the transmitter" means the total power developed in the artificial load specified in paragraph 4 during a period when the transmitting key is depressed and does not include power dissipated in any component forming part of the transmitter.

(2) The maximum power of the transmitter shall not be less than W watts at any frequency within its range, W being determined by the formula :-

$$\begin{array}{lcl}
 W = 100 & \} & \frac{W = 100}{1 + 500} f \\
 & \} & \\
 & \} & \\
 \frac{1 + 500}{f} & \} &
 \end{array}$$

where ' f ' is the frequency in KHz per second at which the test is made.

(3) The transmitter shall be so designed that its powr can be reduced, either continuously or in steps of not more than six decibels to a power 2 watts and 9 watts.

(4) When adjusted to develop maximum power in accordance with sub-paragraph (2) or to reduce power in accordance with sub-paragraph (3), the transmitter shall be capable of.---

- (a) continuous operation for the transmission of radiotelegraph signals at any speed upon the maximum signals at any speed upto the maximum specified in paragraph 8, and
- (b) operation under steady marking or spacing conditions for a period of not less than fifteen minutes.

6. Depth of modulation.--- The depth of modulation when the transmitter is transmitting Class A2 emissions shall be.---

- (1) not less than 80 and not more than 95 per cent when the power of the transmitter is 25 watts or more;

- (2) no less than 70 and not more than 95 per cent when the power of the transmitter is less than 25 watts.

7. Note frequency.--- The note frequency of the transmitter shall not be less than 450 Hz and not more than 1350 Hz.

8. Speed of transmission.---The transmitter shall be capable of transmitting telegraph signals at all speeds upto 30 words without critical relay adjustment.

9. Frequency stability.---The transmitter shall be capable of maintaining a frequency tolerance of 1000 parts in 106 relative to nominal frequency throughout every transmission without adjustment of controls, notwithstanding variations of the impedance of the aerial or any other load to which it is connected, or variation of supply voltage within plus or minus 10 percent.

10. Spurious and Harmonic components in the output signal.---(1) The output power of any spurious emission shall not exceed a level of 40 DB below the carrier power or 20 milliwatts whichever is less. For this purposes, the 'spurious' shall include harmonies of the carrier frequency and intermodulation products but not components which are a result of the modulation process.

(2) When sending more dots at speeds upto 30 words, 95 per cent of the total power radiated shall be within a band not wider, relative to the frequency of the steady-state carrier, than plus and minus 100 Hz for class A 1 emissions and plus and minus 1500 HZ for class HZ emissions.

11. Operating facilities.---(1) The transmitter shall be so arranged that the adjustments necessary to change it from operation on any one of the frequencies required by paragraph 3 to operate on any other of such frequencies can be made by one operator in a period not exceeding 10 seconds.

(2) The transmitter shall be capable of being operated on full power within 60 seconds after any part of the transmitter has been first Switched on.

(3) If the transmitter is so designed and constructed that it is necessary to delay the application of certain voltages for a period after it has been switched on, the delay shall be automatically provided for by a delay switch.

(4) The transmitter shall be capable of being used in conjunction with an automatic keying device specified Part V.

12. Protective arrangement.---The transmitter shall be so designed and constructed that when the transmitting key is depressed the aerial can be disconnected or the output can be short-circuited without damage being caused to any part of the transmitter. Means shall be provided for protecting the transmitters from damage caused by excessive current or voltage.

13. Artificial aerial.---An artificial aerial shall be provided which shall include in indicator or lamp to indicate the passage of radio frequency currents, and shall be suitable for testing the transmitter on full power.

14. Indicating Instruments.---The main transmitter shall be equipped with suitable indicating instruments of approved accuracy to measure (1) the current in the antenna circuit, (2) the potential of the heating current applied to the cathode or cathode heater of each electron tube or a potential directly proportional thereto, and (3) the anode current of the radio frequency oscillator or amplifier which supplied power to the antenna circuit, or, in lieu thereof, the anode current of such oscillator or amplifier plus the anode current of any other radio or audio frequency oscillators(s) or amplifier(s) normally employed as part of the transmitter.

15. Additional safeguards to be incorporated where the transmitter includes Semi-Conductor Devices.---(1) Where semi-conductor devices are incorporated in the transmitter, the following requirements shall be met, namely :-

- (a) Under all conditions of service, the maker's maximum ratings for each type of semi-conductor device shall not in any respect be disregarded. In particular, the maker's recommended maximum junction temperature and never be exceed.
- (b) The semi-conductor devices shall be effectively protected from damage if the power supply is subject to transient voltage changes.
- (c) Means shall be incorporated for the protection of the semi-conductor devices from damage due to the accidental reversal of power supply polarity.

(2) The semi-conductor devices shall be adequately screened and filtered for protection from damage due to Radio Frequency Energy.

PART II – MAIN RADIO TELEGRAPH RECEIVER

1. General.---(1) The main radio telegraph receiver (hereafter in this Part referred to as the "receiver") may consist of a single unit or of separate units, each of which is capable of reception on one or more of sections of the frequency range specified in paragraph 2 of this Part, and shall be capable of being quickly connected with the main and reserve aerials referred in rule 11. The receiver shall be capable of being operated from the source of electrical energy referred to in sub-rule (1), of rule 13 and shall not cause the ship's mains to be earthed.

(2) Each unit of the receiver shall bear a plate stating the frequency range it is intended to cover.

(3) The receiver shall not be constructed for operation in whole or in part from energy supplied by dry batteries.

2. Frequency range and types of emission.---The receiver shall be capable of receiving signals within the frequency ranges and of the types specified in the following Table :-

TABLE

Frequency range (inclusive)	Type of emission
160 to 1500 KHz	A1, A2, A2H
1.5 to 4 MHz (inclusive)	A1, A2, A3, A3H, A3A, A3J
4 to 25 KHz (inclusive)	A1, A2, A3, A3H, A3A, A3J
25 to 275 MHz (inclusive)	A1, A2, A3, A3H, A3A, A3J

3. Reception facilities.---(1) The receiver shall be capable of headphone and loudspeaker reception throughout the frequency ranges specified in paragraph 2 of this Part.

(2) The loudspeaker shall be rendered in operative when reception is by headphones.

4. Controls.--- The receiver shall be provided with---

(1) a separate radio-frequency and audio-frequency gain controls ;

(2) a means for reducing the receiver gain when the transmitting key of the transmitter is depressed, so that signals may be heard without inconvenience to the operator or damage to the receiver when the transmitter is keyed at signaling speeds upto 30 words per minute;

(3) a switch for disconnecting the device, if any, for reducing the effect of impulsive noise signals ;

(4) means and tuning controls which permit---

(a) tuning to any frequency in the same maritime mobile band within 5 seconds and to any other frequency in another maritime mobile band within 15 seconds.

(b) fine tuning by band spread or other method, controlled by a knob of at least two inches diameter, the backlash of which shall not exceed one degree and which shall be so geared that, after any backlash has been taken up , a rotation of one degree will not change the frequency of tune by more than the amount indicated in the following Table :-

TABLE

Frequency range	Change of frequency per degree Parts in 104
100 KHz to 1.5 MHz	3
1.5 MHz to 25 MHz	1

(5) accurate means of resetting tune; if a logging scale is provided for that purpose one inch on the scale shall correspond to a frequency change of not more than one per cent.

(6) a scale for use with the means of rapid tuning referred to in sub-paragraph (4), the scale shall be calibrated directly in frequency.

5. General method of testing.---The receiver shall comply with the requirements of paragraphs 6 to 17, inclusive, when tested in the following manner, except where another manner of testing is specified in the said paragraphs.

(1) An artificial aerial shall be used for the test and shall consist of 75 OHm non-inductive resistor if the test is conducted at frequencies above 4 MHz, and a 10 LHm resistor in series with a capacitor having any value between 200 and 600 picofarads if the test is conducted at frequencies below 4 MHz.

(2) Type A2 signals used in the test shall be modulated to a depth of 30 per cent and shall have a note frequency of 1000 Hz.

(3) The frequency of the interfering or unwanted signals applied shall not be restricted to the frequency range of the receiver.

(4) The standard of audio-frequency output level of the receiver for headphone receipt shall be one milliwatt into a resistance substantially equal to the modulus of the impedance of the headphones at 1000 Hz.

(5) The standard audio-frequency output level for load speaking receipt shall be 50 milliwatt into a resistance substantially equal to the modulus of the impedance of the loudspeaker at 100 Hz.

6. Selectivity.---Selectivity preceding the final detector of the receiver shall be variable, either continuously or in steps, and shall satisfy the following requirements throughout the frequency (ranges specified when the automatic gain control. a.g.c.) is rendered inoperative---

TABLE

Band with setting	wide	Intermediate	Narrow	Very narrow
Frequency range	1.5 MHz to 28 MHz	160 KHz to 28 MHz	100 KHz to 28 MHz	100 KHz to 28 KHz
Discrimination of not more than 6 decibels to be obtained at frequencies removed from tune by	4 KHz	1.5 KHz	0.5 KHz	
Discrimination of at least 30 decibels to be obtained at all frequencies removed from tune by	12 KHz	6 KHz	2.5 KHz	0.75 KHz
Discrimination of at least 60 decibels to be obtained at all frequencies removed from tune by	24 KHz	12 KHz	5 KHz	5 KHz
Discrimination of at least 90 decibels to be obtained at all frequencies from tune by	50 KHz	35 KHz	25 KHz	25 KHz
Provided that the discrimination against an interfering signals of frequency than 1.5 MHz need not exceed 60 decibels.				

(2) In a superheterodyne receiver, when the automatic gain control (a.g.c.) is rendered inoperative :--

(a) the image response ratios thereof shall not be less than the following :-

Frequency of wanted signals	Image response ratio
100 to 1,000 KHz	80 decibels
1 to 1.5 MHz	70 decibels
1.5 to 7 MHz	60 decibels
7 to 15 MHz	40 decibels
above 15 MHz	25 decibels

(b) the intermediate frequency response ratios thereof shall not be less than the following :-

Intermediate frequency	Intermediate frequency response ration
Between 140 and 1,600 KHz	90 decibels
Outside the above limits	60 decibels

(3) Notwithstanding the provisions of subparagraph (1) the very narrow bandwidth setting of the receiver may be provided by an audio-frequency note filter which shall have---

(a) a midband frequency of one kilocycle per second,

(b) a discrimination of atleast 20 decibels at all frequencies outside a band 700 Hz wide,

and shall be capable of being switched in or out of circuit at will.

7. Sensitivity.---The standard radio frequency output levels specified in paragraph 5(4) and 5(5) shall be obtained at all bandwidth settings, and with the automatic gain control both on and off, with an input not exceeding the following levels :-

Frequency	Maximum input for type A1 waves	Maximum input for type A2 waves
100-1600 KHz	30 decibels above one micro volt.	
160-1500 KHz	20 decibels above one micro volt.	30 decibels above one micro volt.
1.5-10 MHz	10 decibels above one micro volt.	20 decibels above one micro volt.
10.25 MHz	20 decibels above one micro volt.	30 decibels above one micro volt

8. Signal noise ratio.--- (1) The signal noise ratio of the receiver shall not be less than the ratio specified in the following table, when receiving any signal being either a type A1 signal of a type A2 signal, of the maximum input specified in paragraph 7 when the receiver gain is adjusted to give the standard output the note filter, if any, is switched out of circuit :-

TABLE

Frequency	Bandwidth setting	Signal/noise ratio
100 KHz to 1.5 MHz	Intermediate	10 decibels
1.5 --- 4 KHz	Wide	10 decibels

4--- 10 MHz	Wide	20 decibels
10--- 25	Wide	26 decibels

(2) For the purposes of this paragraph spurious whistles shall be regarded as noise.

9. Automatic gain control.---(1) The receiver shall be provided with an automatic gain control, capable of operating efficiently on types A1, A2, A3H, A3A and A3J waves of all frequencies between 1,500 KHz and 28 MHz and which can be switched out of circuits.

(2) When the receiver is adjusted to give the standard output with a type A2 input signal 10 decibels above the appropriate maximum input specified in paragraph 7 on any frequency between 1.5 and 25 MHz.

(a) an increase in input of 20 decibels shall result in an improvement in the signal noise ratio of at least 15 decibels ; and

(b) an increase in input of 60 decibels shall not increase the output by more than 10 decibels.

(3) The charge time constant of the automatic gain control system shall be between .05 and .2 seconds and the discharge time constant thereof shall be between 0.5 and 2 seconds.

10. Output limiting.--- An increase in the input to the receiver by 60 decibels when---

(1) the automatic gain control is switched off ; and

(2) the receiver is adjusted to give the standard output with a type A1 input signal 20 decibels above the appropriate maximum input specified in paragraph 7 shall not increase the output by more than 10 decibels.

11. Blocking.--- The change in the output of the receiver shall not exceed 3 decibels when---

(a) (i) the bandwidth is set at "intermediate",

(ii) the automatic gain control is in operation,

(iii) standard output with an input wanted signal of type A2 at a level of 60 decibels above one microvolt and of any frequency between 160 KHz and 28 MHz, and

(iv) a type A1 input signal of a level of 100 decibels above one microvolt and at a frequency 10 KHz above or below the wanted frequency is then simultaneously applies ; or

(b) (i) the bandwidth is set at "narrow",

(ii) the automatic gain control is switched off.

(iii) the receiver is adjusted to give the standard output with an input wanted signal of type A1 at a level 30 decibels above one microvolt and of any frequency between 100 and 160 KHz, and

(iv) a type A1 input signal of a level of 70 decibels above the microvolt and at a frequency 5 KHz above or below that of the wanted frequency is then simultaneously applied.

12. Cross Modulation.---The receiver shall not produce an output of level higher than 30 decibels below the standard output when---

(1) the bandwidth is set at "intermediate",

(2) the automatic gain control is in operation,

(3) the receiver is adjusted to give the standard output with an input wanted signal of type A1 at a level 30 decibels above one microvolt and of any frequency between 160 KHz and 28 MHz.

(4) the modulation of the signal is switched off, and

(5) a type A2 input signal of level 90 decibels above one microvolt and frequency 10 KHz above or below the wanted frequency is then simultaneously applied.

13. Intermodulation and Harmonic Production.--- An output exceeding the standard output shall not be produced by the receiver when---

(a) (i) the band width is set at "intermediate",

(ii) the automatic gain control is switched off,

(iii) the receiver is adjusted to give the standard output with an input wanted signal of type A2 at a level 30 decibels above one microvolt and at any frequency between 160 KHz and 550 KHz.

- (iv) the input wanted signal has been removed, and
 - (v) any two interfering signals, one of type A1 and the other of type A2 each of a level 110 decibels above one microvolt and such frequency as to give no appreciable output when applied alone and of which the frequency difference or frequency sum is the sum as the frequency of the wanted signal, are then simultaneously applied; or
- (b)
- (i) the bandwidth is set at "intermediate",
 - (ii) the automatic gain control is switched off,
 - (iii) the receiver is adjusted to give the standard output with an input wanted signal of type A2 at a level 30 decibels above one microvolt and at any frequency between 280 KHz and 550 KHz.
 - (iv) the input wanted signal has been removed, and
 - (v) a type A2 signal, the frequency of which is half that of the wanted signal and at a level. 116 decibels above one microvolt, is applied.

14. Fidelity.--- The maximum change in level of the output of the receiver shall be less than eight decibels while the modulation frequency of an input signal of constant level and modulation depth is varied continuously from 300 Hz to 2,500 Hz when the bandwidth is set at "wide" for the reception of type A3 waves having a frequency above 1,500 KHz. The receiver shall comply with the foregoing requirements when the level and modulation depth of the input signal are such that the output of the receiver does not exceed the standard output.

15. Non-Linear Distortion.--- With the automatic gain control switched on the total harmonic content of the audio-frequency output of the receiver at any output not exceeding the standard output shall not exceed---

- (1) 5 per cent with an input signal of a frequency of one megacycle per second at any level between 30 decibels and 80 decibels above one microvolt and simultaneously modulated to a depth of 30 per cent at 400 Hz.
- (2) 15 per cent with such input signal modulated to a depth of 80 per cent, at 400 Hz.

16. Tuning drift and stability.--- The tuning drift and stability of the receiver shall comply with the following requirements---

- (b) After the receiver has been switched on for 5 minutes the changes of tune frequency during any period of 5 minutes shall not exceed the value shown in the second column of the following Table within the frequency ranges shown in the first column thereof---

TABLE

Frequency ranges	Maximum change (parts in 104)
100 KHz to 1.5 MHz	3
1.5 MHz to 28 MHz	1

(b) A change of 5 per cent in any one of the Assembly voltages to the receiver shall not produce a maximum change of tune frequency exceeding the value shown in the second column of the following Table within the frequency ranges shown in the first column thereof--

TABLE

Frequency ranges	Maximum change (parts in 104)
100 KHz to 1.5 MHz	3
1.5 MHz to 28 MHz	1

(c) A change in ambient temperature of 5° within the range of 0°C to 5°C applied after the receiver has been switched on for one hour shall not produce a maximum change of tune frequency exceeding the value shown in the second column of the following Table within the frequency ranges shown in the first column thereof--

TABLE

Frequency ranges	Maximum change (parts in 104)
100 KHz to 1.5 MHz	10
1.5 MHz to 28 MHz	3

17. Heterodyne note stability.---The heterodyne note stability of the receiver shall be such that.---
- (1) the frequency of a heterodyne note which is initially one kilocycle per second shall not vary by more than 100 c/s when the appropriate input level specified in sub-paragraph (2) of paragraph 10 is increased by not more than 60 decibels ;
 - (2) it is possible at all input levels within the range specified in sub-paragraph (1) to obtain a best note of 200 Hz when tuning either towards or away from zero beat.
18. Radiation.---(1) The receiver when in use shall not produced a field exceeding 0.1 microvolt per metre when measured at a distance of one mile from the receiver.
- (2) The receiver shall be deemed to comply with the requirements of sub-paragraph (1) if, when---
- (a) the receiver is placed centrally in a screened earthed enclosure of dimensions at least 1.83 metres cube,
 - (b) the earth terminal of the receiver is connected to the inside of the screen,
 - (c) the serial terminal is connected through in unscreened fourturn rectangular search coil situated within the said enclosure and of dimensions 30.5 centimetres square and an unscreened lead to a resistive measuring instrument mounted outside the enclosure and having its other terminal earthed, and
 - (d) the receiver is then energized and unscreened headphones are connected thereto, the power measured by the measuring instrument does not exceed 4×10^{-10} watts whatever the resistance of the measuring instrument or the adjustment of the receiver, notwithstanding that the search coil be short circuited or moved in any way, provided that it does not approach within 152 millimetres of the receiver case.

PART ---III--- The Reserve Radiotelegraph Transmitter.

1. General.---(1) The reserve radio telegraph transmitter in this Part referred to as "the transmitter", shall be provided with all equipment necessary to enable it to operate from the reserve source of energy referred to in sub-rule (2) of rule 13, and shall be capable of being quickly connected with and turned to the main and reserve aerials referred to in rule 11.

(2) The requirement of this Part of this Schedule shall be met for a range of battery voltage variations of plus 5 and minus 10 per cent relative to the nominal battery voltage.

(3) The transmitter shall not cause the ship's mains to be earthed.

(4) No vibrators or primary cells shall be employed.

2. Frequency and class of emission.---The transmitter shall be capable of transmitting class A2 or A2H emissions of the frequency of 500 KHz.

3. Range of load impedance.---When connected to an artificial load side of which is earthed consisting of a resistance of value R in series with a capacitance of value C, the transmitter shall meet the requirements of this Part of this Schedule with all combination of R and C specified in the following Table---

TABLE

C	250	300	400	500	600	750	Picofarads
R (Non-inductive)	4	3.6	2.8	2.2	2	1.9	Ohms

4. Power of transmitter.---(1) For the purpose of this paragraph the power of the transmitter shall be taken to be the mean power developed in the artificial load during a period when the transmitting key is depressed, and shall not include power dissipated in any component forming part of the transmitter.

(2) The power of the transmitter shall not be less than 15 watts when the source of energy is developing 90 per cent of its rated voltage.

(3) When adjusted to develop its maximum power, the transmitter shall be capable of---

(a) continuous operation for the transmission of telegraph signals at any speed up to the maximum specified in paragraph 7,

(b) operation under steady marking or steady spacing conditions for a period of not less than 15 minutes.

5. Modulation.---(1) The carrier wave shall be modulated to a depth of not less than 80 per cent and more than 95 per cent.

(2) The harmonic content of the modulating envelope shall not be less than 450 Hz or more than 1350 Hz.

6. Note frequency.---The note frequency of the transmitter shall not be less than 450 Hz or more than 1350 Hz.

7. Speed of transmission.---The transmitter shall be capable of transmitting telegraph signals at all speeds upto 25 words without critical adjustment relays.

8. Frequency Stability.---The transmitter shall be capable of maintaining frequency tolerance of plus or minus 1000 parts in 106 throughout every transmission without adjustment of controls notwithstanding variation of the impedance of the aerial or of any other load to which it is connected or variation of supply voltage within plus 5 and minus 10 per cent.

9. Operating Facilities.---(1) The transmitter shall be capable of being operated on full power within six seconds after it has been switched on

(2) The transmitter shall be capable of being used in conjunction with the automatic keying device specified in Part V of this Schedule.

10. Protective arrangements.---The transmitter shall be so designed and constructed that when the transmitter is adjusted to develop its maximum power and when the transmitting key is depressed the aerial can be disconnected or the output can be short-circuited without damage being caused to any part of the transmitter.

11. Artificial aerial.---An artificial aerial shall be provided which shall include an indicator or lamp to indicate the passage of radio-frequency currents and shall be suitable for testing the transmitter on full power.

12. Meter.---The transmitter shall be provided with an aerial ammeter. Other meters shall be included as necessary to enable the transmitter to be checked and adjusted.

13. Use for Normal Communications.---If the transmitter is used otherwise than in an emergency or for the tests required by sub-rule (4) of rule 20 paragraphs 3,6,8,9,10 and 11 of Part I shall apply in relation to main transmitter.

Part---IV---Reserve Radio telegraph Receiver.

1. General.---The reserve radio telegraph receiver (hereafter in this Part referred to as "the receiver") shall be capable of being rapidly connected to the reserve aerial referred to in rule 11.

2. Frequency ranges and classes of emission--- The receiver shall be capable of receiving---

(a) Class A1, A2 and A2H emissions on frequencies in the range 250 KHz to 535 KHz;
and

(b) Class A1, A2, A3, A3H and A3J emissions on frequencies in the range.---

1605 KHz	to	3800 KHz
4063 KHz	to	4238 KHz
6200 KHz	to	6357 KHz
8195 KHz	to	8476 KHz
12339 KHz	to	12714 KHz
16460 KHz	to	16952 KHz
22000 KHz	to	22400 KHz
25000 KHz	to	27500 KHz

3. Reception facilities.---(1) The receiver shall be capable of headphone receipt and loudspeaker reception throughout the frequency range specified in paragraph 2.

(2) The loudspeaker shall be rendered inoperative when reception is by headphone.

4. Source of energy.---(1) The receiver shall be capable of operation both from the main source of electrical energy required by sub-rule (1) of rule 13 and the reserve source of electrical energy required by sub-rule (2) of that rule. Arrangements for rapidly changing from one source of supply to the other shall be incorporated.

(2) The receiver shall comply with the requirements of paragraphs 7 to 15 notwithstanding variations in the supply voltage within the range of---

- (i) plus 5 per cent and minus 10 per cent of the nominal voltage when operated from the reserve source of electrical energy required by sub-rule (2) of rule 13, and
- (ii) plus and minus 10 per cent of the nominal voltage when operated from the main source of electrical energy required by sub-rule (1) of rule 13; and
- (iii) the receiver shall not cause the ship's mains to be earthed.

5. Controls.---The receiver shall be provided with---

- (1) manual controls as necessary for the adjustment of radio and/or intermediate frequency gain and of audio frequency gain;
- (2) a switch for changing the receiver from operation from the main source of electrical energy referred to in sub-rule (1) of rule 13 to the reserve source of electrical energy referred to in sub-rule (2) of that rule ;
- (3) a selectivity switch suitably marked; and
- (4) means for switching off the automatic gain control and such means may be combined with, the functions of a service switch.

6. Method of Testing.---The receiver shall comply with paragraphs 7 to 15 inclusive when tested in the following manner except where another manner of testing is specified in the said paragraphs :-

- (1) An artificial aerial shall be used for the test and shall consist of a 10 ohm non-inductive resistor in series with a capacitor having any value between 200 and 600 picofarads for frequencies below 4 MHz and a 75 ohm non-inductive resistor for frequencies above 4 MHz.
- (2) Type A2 signals used in the test shall be modulated to a depth of 30 per cent and shall have a note frequency of 1000 Hz.
- (3) The standard audi-frequency output level (hereafter in this Part referred to as "the standard output") of the receiver shall be---
 - (a) for headphone receipt one milliwatt into a resistance substantially equal to the modulus of the impedance of the headphones at 1000 Hz.

- (b) for loudspeaker reception 500 milliwatts into a resistance substantially equal to the modulus of the impedance of the loudspeaker at 1000 Hz.

7. Selectivity.---(1) The selectivity preceding the final detector shall satisfy the following requirements and the "wide" and "Narrow" conditions shall be selected by a switch :-

Bandwidth condition	Wide	Narrow
Not more than 6dB discrimination to be obtained at frequencies removed from tune by	4KHz (does not apply to frequencies below 1605 KHz	1 KHz
Discrimination of at least 6dB to be obtained at frequencies removed from tune by	----	2 KHz
Discrimination of at least 30dB to be obtained at frequencies removed from tune by.	10KHz	7 KHz
Discrimination of at least 60dB to be obtained at frequencies removed from tune by	6020 KHz	20 KHz

(2) The image discrimination and intermediate frequency repose ratios of superheteodyne receivers shall be not less than the following values :-

(a) Frequency of wanted signal	Image Discrimination
250 KHz to 535 KHz	50 d B
1605 KHz to 3800 KHz	50 d B
4,6,8 and 12 MHz bands	30 d B
16 and 22 MHz bands	20 d B
(b) Intermediate Frequency	Minimum I.F. Response Ratio
140 KHz to 1600 KHz	7 dB
outside the above limits	50 d B

8. Sensitivity.---The standard output levels shall be obtained at both bandwidth settings and with automatic gain control both on and off, with inputs at the under mentioned levels

Frequency	Input for class A1 emissions	Input for Class A2 emission
250 KHz to 5235 KHz	30 d B above 1 microvolt	40 d B above 1 microvolt
1605 KHz to 3800 KHz	20 d B above 1 microvolt	30 d B above 1 microvolt
4,6 and 8 MHz bands	10 d B above 1 microvolt	30 d B above 1 microvolt
12, 16 and 22 MHz bands	30 d B above 1 microvolt	40 d B above 1 microvolt

9. Signal/Noise Ratio.---With an input signal either class A1 or A2, of the level specified in paragraph 8 and the receiver gain adjusted to give standard output, the signal/noise ratio shall be not less than the under mentioned values irrespective of the bandwidth setting.

Frequency	Minimum signal/Noise ratio
250 KHz to 535 KHz	10 d B
1605 KHz to 3800 MHz	20 d B
4,6 and 8 MHz bands	20 d B
12, 16 and 22 MHz bands	25 d B

10. Blocking.---With the bandwidth set to "Wide" and the automatic gain control switched on the change in the out put of the receiver shall not exceed 3 decibels when---

- (1) the receiver is adjusted to give the standard output when an input wanted signal of type A2 at a level of 60 decibels above one microvolt and of any frequency in the ranges specified in paragraph 2, and
- (2) a type A1 input signal at a level of 90 decibels above one microvolt and at a frequency of 20 Hz above or below that of the wanted signal is then simultaneously applied.

11. Cross modulation .--- The receiver shall not produce an output of level higher than 20 decibels below the standard output when---

- (1) the receiver is adjusted to give the standard output with an input wanted signal of type A2 at a level of 60 decibels above one microvolt and of any frequency in the ranges specified in paragraph 2.
- (2) the modulation of the signal is switched off, and
- (3) a type A2 signal at a level of 90 decibels above one microvolt and at a frequency 20 KHz above or below that of the wanted signal.

12. Intermodulation.--- With the bandwidth set to "wide" and the automatic gain control switched off, and output exceeding the standard output shall not be produced by the receiver when---

- (1) the receiver is adjusted to give the standard output with an input wanted signal of type A2 at a level of 40 decibels above one microvolt and of any frequency between 250 KHz and 535 KHz.
- (2) the input wanted signal has been removed, and
- (3) any two interfering signals one of type A1 and the other of type A2, each at a level of 100 d B above one microvolt and of such frequency as to give no appreciable output when applied along, are then simultaneously applied.

13. Automatic gain control.---(1) The receiver shall be provided with an automatic gain control capable of operating efficiently on signals, of types A2 and A3 at all frequencies in the ranges between 1605 KHz and 23 MHz.

(2) With a type A2 input signal at the appropriate level specified in paragraph 8 and of any frequency within the ranges between 1605 KHz and 23 KHz,--

- (a) when the receiver is adjusted to give standard output, an increase in input of 20 dB shall result in an improvement in the signal noise ratio to a value at least 15 dB above the appropriate minimum signal noise ratio specified in paragraph 9, and
- (b) when the receiver is adjusted to give an output 10 dB below standard output an increase in input of 50 dB shall not increase the output by more than 10 dB.

14. Tuning drift and stability.--- The tuning drift and stability of the receiver shall comply with the following requirements :-

- (a) After the receiver has been switched on for 5 minutes , the changes of tune frequency during any further period of 5 minutes shall not exceed the value shown in the second column of the following table within the frequency of the ranges shown in the first column thereof--

TABLE

Frequency	Maximum change
(parts in 104)	

250 KHz to 535 KHz	5
1605 KHz to 23 MHz	2

- (b) A change of 5 percent in any one of the supply voltages to the receiver, or, to a power supply unit associated therewith, shall not produce a maximum change of tune frequency exceeding the value shown in the second column of the following Table within the frequency ranges shown in the first column thereof :-

TABLE

Frequency	Maximum Range (Parts in 104)
250 KHz to 535 KHz	5
1605 KHz to 23 MHz	2

- (c) A change in ambient temperature of 5° C within the range 0° C to 50 C, applied after the receiver has been switched on for one hour shall not produce a maximum change of tune frequency exceeding the value shown in the second column of the following Table with the frequency ranges shown in the first column thereof--

TABLE

Frequency	Maximum Range (Parts in 104)
250 KHz to 535 KHz	15
1605 KHz to 23 MHz	5

15. Fidelity.---The fidelity of the receiver shall be such that a change in the audio-frequency output shall be less than 8 decibels when the modulation frequency of the input signal is varied continuously from 300 Hz to 30000 Hz, the level and modulation depth of the input signal being kept constant. For the purposes of this paragraph the input signal may have any level and depth of modulation provided the output of the receiver does not exceed the standard output with the bandwidth set to "wide".

16. Heterodyne Note Stability.--- The heterodyne note stability of the receiver shall be such that---

- (1) the frequency of a heterodyne note which is initially one KHz shall not vary by more than 220 KHz for an input signal which is varied over the range of 40 to 90 db above one microvolt.
- (2) it shall be possible for all input levels within the range specified in sub-para (1) of this paragraph to obtain a beat note of 200 Hz, when tuning either towards or away from zero beat.

17. Radiation.---(1) The receiver when in use shall not produce a field exceeding 0.1 microvolt per metre when measured at a distance of one mile from the receiver.

(2) The receiver shall be deemed to comply with the requirement of sub-paragraph (1) if, when---

- (a) the receiver is placed centrally in a screened earthed enclosure of dimensions at least 1.83 metres cube,
- (b) the earth terminal of the receiver is connected to the inside of the screen.
- (c) the aerial terminal is connected through an unscreened fourturn rectangular search coil situated within the said enclosure and of dimensions 30.5 centimetres square and an unscreened lead to a resistive measuring instrument mounted outside the enclosure and having its other terminal earthed, and
- (d) the receiver is then energized and unscreened headphones are connected thereto, the power measured by the measuring instrument does not exceed 4×10^{-10} watts whatever the resistance of the measuring instrument or the adjustment of the receiver, and notwithstanding that the search coil is short circuited or moved in any way, without approaching within 152 millimetres of the receiver case.

PART V—AUTOMATIC KEYING DEVICE

1. General.---The automatic keying device (hereafter in this Part referred to as "the device") shall be capable of---

- (1) Being connected in place of the manual transmitting key by efficient means, to
 - (a) the main radio telegraph transmitter.
 - (b) the reserve radio telegraph transmitter, and
 - (c) the auto-alarm test signal generator referred to in paragraph 1 of the **Seventh Schedule**
- (2) When connected to any of the aforesaid equipment
 - (a) keying automatically the alarm signal specified in paragraph 3 and immediately thereafter stopping and opening the keying circuit unless re-set or re-wound ; and
 - (b) keying automatically the distress call specified in paragraph 4 in such manner that if the device is used without attention the automatic keying of the distress call will be repeated once every twelve minutes.

The device shall not be capable of keying any signals other than those specified in paragraphs 3 and 4.

- (3) When switched out of circuit after transmission of the distress call, the device shall be capable of being re-set by automatic or manual means so that after the device has again been switched into circuit keying shall commence within ten seconds at the beginning of the distress call.

If the re-setting is by manual means the device shall include a means for indicating when re-setting is necessary.

2. Alarm Signal.--- The alarm signal referred to in sub-paragraph (2) of paragraph 1 shall consist of twelve-four second dashes separated by one second space, the length of the dashes and spaces being maintained within a tolerance of plus or minus 0.2 second.

3. Distress Call- (1) The distress call referred to in sub-paragraph (2) of paragraph 1 shall consists of the following signals in the following order:-

- (a) the radio telegraph distress signal SOS (3 times) ;
- (b) the more characters for the word DE;
- (c) the more characters for the Ship's Call Sigh (3 times) ; and
- (d) the characters of the distress call shall be keyed at 10 to 16 words per minute, and the total duration of the distress call shall not exceed 90 seconds.

4. Source of Electrical Energy.--- (1) If the device is electrically operated, the source of electrical energy by which it is operated shall be the reserve source of electrical energy referred to in sub-rule (2) of rule 13.

- (2) The device shall be suitable for operation by an unskilled person.

THE SECOND SCHEDULE

[See rules 4(2), 7(2) and 26(2)]

RADIO TELEPHONE INSTALLATION

PART-I

MAIN RADIO TELEPHONE INSTALLATION

1. Definition:- In this Schedule the expression " the equipment" includes a radio telephone transmitter and receiver, and all other equipment necessary for the operation of the installation, but does not include an aerial or a source of electrical energy

(2) Frequency Ranges and Classes of Emission:- (1) The equipment shall be capable of transmitting class A3, AH, A3A and A3J emissions on a frequency of 2182 KHz and 2191 KHz and on at least six other frequencies within the frequency range 1600 KHz to 3800 KHz.

(2) The equipment shall be capable of receiving class A3, A3H, A3A and A3J, on a frequency of 2182 KHz and other frequencies in the range 1605 to 3800 KHz.

3. Operating Frequencies :- (1) The transmitter shall not be capable of being operated otherwise than on spot frequencies specified in the Maritime Mobile Station Licence.

(2) The receiver shall be continuously tunable to frequencies in the ranges 1605 to 3800 KHz in addition to spot frequency reception 2182 KHz.

(3) Independent selection of transmit and receive frequencies shall be provided.

4. Power Supply :- (1) The equipment shall be capable of being operated from the supply of electrical energy required by rule 23.

(2) The equipment shall not cause the ship's mains to be earthed.

(3) If the equipment is designed for operation from ship's mains, the requirements of this Part shall be met for a range of supply voltage variations of plus and minus 10 per cent relative to the nominal mains voltage.

(4) If the equipment is designed for operation from accumulator battery, the requirements of this Part shall be met for a range of supply voltage variations of plus 5 and minus 10 per cent relative to the nominal battery voltage.

5. Transmitter :- (1) Selection of any of the transmitter frequencies referred to in paragraph 3 shall be by a single switch or push button.

(2) The transmitter shall comply with the requirements specified in this Schedule when connected to each of the artificial aerials specified in the following Table :-

TABLE

Frequency range	Artificial aerials		
	Resistance Ohms	Capacitance Picofaradas	Inductance Microhenrys
Below 3 MHz	6	250	..
Above 3 MHz	10	250	..
	40	250	8

(3) The total carrier power delivered by the transmitter to the aforesaid artificial load (not including power dissipated in an aerial tuning inductor or any other component forming part of the transmitter) shall on any frequency between 1600 KHz and 3800 KHz be not less than 15 watts and not more than 100 watts, and means shall be provided for reducing such power to a power between 5 watts and 10 watts.

(4) A peak limiter shall be provided to prevent over-modulation of the transmitter.

(5) That speck modulation of the transmitter shall be such that ---

(a) the frequency response of the microphone and transmitter together shall not vary by more than 7.5 decibels from value which rises at the rate of 6 decibels per octave from 250 Hz to 2500 Hz.

(b) the response relative to the peak response shall not be higher than---

- (i) minus 20 decibels at all frequencies above 3500 Hz, and not above 5000 Hz; and
- (ii) minus 40 decibels at all frequencies above 5000 Hz.

(6) The modulating system shall be such that the peak modulation of the transmitter lies between 80 and 95 per cent for any sound pressure the root mean square value of which measured in the plane of the microphone mouthpiece with a pure wave of 1000 Hz., lies between 25 dynes and 100 dynes per square centimetre.

(7) With the transmitter operating at its rated power or below and modulated to a depth of 90 per cent by a sinusoidal to a depth of 90 per cent by a sinusoidal wave of frequency 1000 Hz applied to the microphone terminals and with the peak limiter rendered inoperative, the harmonic content of the modulated output voltage shall not exceed 10 per cent.

(8) The transmitter shall be capable of maintaining a frequency tolerance of ---

- (i) 200 parts in 10 for DSB operatives;
- (ii) 100 Z for SSB operations.

throughout every transmission within the range of 1605 KHz to 3800 KHz without adjustment of any control notwithstanding variations of the impedance of the aerial or other lead to which it is connected, or variations of supply voltage within plus or minus 10 per cent.

(9)(a) The radio-frequency output of the transmitter shall be free from frequency components due to spurious oscillations in any port of the equipment;

(b) The output power at any harmonic of the radio frequency shall not exceed 2.1 watt;

(c) With the microphone open or short circuited---

- (i) the total noise and hum power in the output wave shall be at least 40 decibels below the carrier power;
- (ii) the total noise and hum power contained in the side-bands corresponding to audio-frequencies between the limits of 250 Hz and 300 Hz shall be at least 40 decibels below the carrier power.

(10) The transmitter shall be such that ---

- (a) in not more than 10 seconds one operator can carry out all such adjustments as are necessary to change the transmitter from operation on any one of the frequencies referred to in paragraph 3 to operation on any other such frequencies.
- (b) if the transmitter is so designed and constructed that it is necessary to delay the application of certain voltages for a period after it has been switched on, the delay shall be automatically provided by a delay switch; and
- (c) an indicator shall show when the transmitter is ready for operation.

(11) The transmitter shall be so designed and constructed that when it is adjusted for maximum power the aerial may be disconnected or the out put short circuited without damage being caused to any part of the installation. means shall be provided for protecting the transmitter from damage caused by excessive current or voltage.

(12) The transmitter shall be provided with an aerial ammeter. Other meteres shall be included, as necessary, to enable the transmitter to be checked and adjusted.

6. Receiver:--(1) means shall be provided to enable each of the receiver spot frequencies referred to in paragraph 3 to be selected by a single operation.

(2) The receiver shall be capable of both telephone and loud-speaker reception.

(3) The receiver shall be provided with ---

- (a) a manual audio-frequency gain control; and
- (b) an automatic gain control capable of efficient operation on type A2 and type A3 waves.

(4) An peak limiter or other device included in the detector or output circuits of the receiver for the purpose of reducing the effect of impulsive noise signals shall be capable of being disconnected by means of a switch.

(5) The receiver shall comply with the requirements of sub-paragraphs (6) to (14), inclusive, of this paragraph when tested in the following manner, except where another manner of testing is specified in the said sub-paragraphs :-

- (a) artificial aerials with the characteristics specified in the table set forth in sub-paragraph (2) of paragraph 5 shall be used for the test;

- (b) type A2 signals used for the test shall be modulated to a depth of 30 per cent, with a note frequency of 1000 Hz.
- (c) the standard audio-frequency output of the receiver (in this paragraph referred to as the "standard output") shall be ---
 - (i) for telephone receiver reception one millwatt into a resistance which is substantially equal to the modulus of the impedance of the telephone at 1,000 Hz;
 - (ii) for loud-speaker receipt,. 50 milliwatts into a resistance substantially equal to the modulus of the impedance of the loudspeaker at 1000 Hz.

(6)(a) The selectivity of the receiver measured at a point immediately the final detector shall satisfy the following requirements at the relative frequencies specified :-

Discrimination of not more than 6 decibels to	3 KHz
be obtained at frequencies removed from tune by	
Discrimination of at least 30 decibels to be	7.5 KHz
obtained at frequencies remove 1 from tune by	
Discrimination of at least 60 decibels to be	15 KHz
obtained at frequencies removed from tune by	
Discrimination of at least 80 decibels to be	30 KHz
obtained at frequencies removed from tune by	

(b) If the receiver is a superheterodyne receiver---

- (i) the image discrimination shall not be less than 35 decibels at frequencies above 3 MHz and not be less than 40 decibels at frequencies below 3 MHz; and
- (ii) the intermediate frequency response ratio shall be less than the following :---

(7) The signal noise ratio of the output of the receiver shall be at least 20 decibels when the receiver is adjusted to give the standard output with an input signal of type A2 at a level of 30 decibels above one microvolt.

(8) The automatic gain control shall be such that when the receiver is adjusted to give, the standard output with an input signal of type A2 at a level of 30 decibels above one microvolt---

- (a) an increase in input of 20 decibels will result in an improvement in the signal noise ration of at least 15 decibels; and
- (b) an increase in input of 50 decibels will not increase the output by more than 10 decibels.

(9) The change in output of the receiver shall not exceed 3 decibels when the receiver is adjusted to give the standard output with an input wanted signal of type A2 at a level of 60 decibels above one microvolt and a type A1 input signal is simultaneously applied at a level of 100 decibels above one microvolt and at a frequency of 20 KHz above or below the wanted frequency.

(10) An output of level higher than 30 decibels below the standard output shall not be produced when the receiver is adjusted to give the standard output with an input wanted signal of type A2 at a level of 60 decibels above one microvolt, the modulation of the signal generator has been switched off, and a type A2 input signal is simultaneously applied at a level of 90 decibels above one microvolt and at a frequency of 20 KHz above or below the wanted frequency.

(11) An output exceeding the standard output shall not be produced when the receiver is adjusted to give the standard output with an input signal of type A2 at a level of 30 decibels above one microvolt, the wanted signal has been removed, and two interfering signals are simultaneously applied one of type A1 and one of type A2 each of level 10 decibels above one microvolt of which the frequency sum of difference is the same as the frequency of the wanted signal but neither of which will give an appreciable output when modulated and applied alone.

(12) The maximum change in level of the audio-frequency output shall be less than 8 decibels when the modulation frequency of the input signal is varied continuously from 250 Hz to 3,000 Hz, the input signal remaining constant in level and depth of modulation. When the modulation frequency is increased above 3,000 Hz the output shall fall rapidly. The input signal may have any level and depth of modulation provided the output of the receiver does not exceed the standard output.

(13) The total harmonic content of the audio frequency output voltage of the receiver at any output not exceeding the standard output shall not exceed---

- (a) 5 per cent with an input signal at any level between 40 and 80 decibels above one microvolt and sinusoidally modulated to a depth of 30 per cent at 1000 Hz; or
- (b) 15 per cent with an input signal as prescribed in (a) but modulated to a depth of 80 per cent at 1000 Hz.

(14) Each frequency of tune referred to in paragraph 3 shall be maintained within one Hz per second of its nominal value notwithstanding variation in the supply voltage of plus or minus 10 per cent and notwithstanding ambient temperature changes from minus 10°C to plus 40°C.

(15) (a) The receiver shall not in normal service produce a field exceeding 0.1 microvolt per metre when measured at a distance of one mile from the receiver.

(b) The receiver shall be deemed to comply with the requirement of sub-paragraph (a) of this paragraph, when---

- (i) the receiver is placed centrally in a screened earthed enclosure of dimensions 1.83 metres cube;
- (ii) the earth terminal of the receiver is connected to the inside of the screen;
- (iii) the aerial terminal is connected through an unscreened four-turn rectangular search coil situated within the said enclosure of dimensions 30.5 centimetres square and an unscreened lead to a resistive measuring instrument mounted outside the enclosure and having its other terminal earthed; and

- (iv) the receiver is then energized and unscreened headphones are contended thereto, the power measured by the measuring instrument does not exceed 4×10^{-3} watts whatever the resistance of the measuring instrument or the adjustment of the receiver, and notwithstanding that the search coil is short-circuited or moved in any way without approaching within 152 millimetres of the receiver case.

7. Facilities for two-way communication---

(1) The equipment shall be capable of changing instantaneously from transmitted to receiving and vice versa by means of a pressel or other single switch, aerial change-over relays, and such other devices as are necessary for that purpose. If, in addition, a voice operated device is provided for that purpose the operating lag shall not be less 10 milli-seconds, and the release lag shall not be less than 150 milli-seconds and not more than milli-seconds.

(2) Means shall be provided for protecting the receiver from damage when the equipment is transmitting.

(3) Means shall be provided to assure automatically that at all times when the microphone is in use the loud-speaker is disconnected.

8. Size of Controls.--- All controls on the receiver shall be of such size as to permit normal adjustment being performed by a person wearing thick gloves.

PART -II

RADIO TELEPHONE ALARM SIGNAL GENERATING DEVICE

1. General.---(1) The Radio telephone Alarm signal Generating Device (hereafter in this Part referred to as "the device") shall be capable of generating the radio telephone alarm signal specified in paragraph 3 and of being suitable connected to a Radio telephone transmitter referred to in Part I of this Schedule.

(2) The device, if designed for operation from the ship's mains shall meet the requirements for a range of supply voltage variations of plus and minus 10 per cent relative to the nominal mains voltage.

(3) The device, if designed for operation from batteries shall meet the requirements of this Part for a range of supply voltage variations of plus 5 and minus 10 per cent relative to the nominal battery voltage.

(4) The device shall not cause the ship's mains to be earthed.

2. Performance.---(1) The device shall be ready generate the radio-telephone alarm signal within a period of 30 seconds from the time the device is energized and shall be capable of generating for a period of not less than 30 and not more than 60 seconds.

(2) After generating the signal the device shall be ready to repeat the signal after an interval of not more than two minutes.

(3) Means shall be provided so that the device can be taken out of service at any time.

(4) It shall be possible to test the device without the generation of radio-frequency energy and shall include a sound reproducer to give an audible reproduction of the generated signal.

(5) The device shall be capable of modulating the ship's radio telephone transmitter by each referred to in paragraph 3 to 9 depth in the range 80 to 95 per cent.

3. Radio Telephone Alarm Signal. The radio telephone alarm signal referred to in sub-paragraphs (1) of paragraph 1 shall consist of two substantially sinusoidal tones, one having a frequency of 2200 Hz plus or minus 1.5 per cent and the other of 1300 Hz plus or minus 1.5 per cent produced alternatively, the duration of each tone shall be 250 milli-seconds plus or minus 50 milli-second; the interval between successive tones shall not exceed 50 milliseconds. The ratio of the amplitude of the stronger tone to that of the weaker shall be within the range 1 to 1.2.

4. Modulation standard.---The device shall be capable of modulating the ship's radio telephone transmitter by each tone referred to in paragraph 3 to 9 depth in the range 80 to 95 per cent.

5. Controls.---(a) Not more than two operating controls shall be available at the exterior of the device. Each control shall be clearly labeled to show its purpose and shall be such as to permit normal operations to be by person wearing thick gloves.

(b) Controls, where provided, for the adjustment of frequency, duration or level of the signal elements shall be present controls not available at the exterior of the device.

PART - III

RADIO TELEPHONE LOUD-SPEAKER WATCH KEEPING RECEIVER

1. General.---(1) The radio telephone Loud-speaker watch keeping Receiver (hereinafter in this Part referred to as "the receiver") shall be fixed in tune on a frequency of 2182 KHz and shall be suitable for the reception of class A3, A3H, A3A and A3J emissions except when the ship's own radio telephone transmitter is radiating on 2182 KHz.

(2) Means shall be provided to prevent damage to the receiver when the ship's transmitter is radiating on 2182 KHz.

(3) The receiver, if designed for operation from the ship's mains, shall meet the requirements of this Part for a range of supply voltage variations of plus and minus 10 per cent relative to the nominal mains voltage.

(4) The receiver, if designed for operation from accumulator batteries, shall meet the requirements of this Part for a range of supply voltage variation of plus 5 and minus 10 percent relative to the nominal battery voltage.

(5) The receiver shall include a loudspeaker.

(6) The receiver shall not cause the ship's mains to be earthed.

2. Controls. The receiver shall be provided with :-

(1) a manual gain control for the adjustment of audio-frequency gain.

(2) a manual gain control for the adjustment of RF and/or IF gain; and

(3) one or two present controls not available at the exterior of the receiver for the adjustment of RF, IF and/or AF gain.

3. Selectivity.---The selectivity preceding the detector shall satisfy the following requirements :-

Frequency (KHz)	Discrimination (relative to maximum response)
2178.5 to 2185.5	Not more than 6 dB
Below 2182 and above 2192	At least 30 dB
Below 2162 and above 2202	At least 60 dB
Below 2142 and above 2222	At least 80 dB

4. Sensitivity.---The receiver shall have sufficient sensitivity to produce signals by means of a loudspeaker when the receiver input is as low as 50 microvolts either when used along or when fitted with any of the filtering units specified in paragraph 5 of this Part.

5. Filtered Loudspeakers.--- (1) The filtering unit used with the loudspeaker shall :-

(a) maintain the output level of the two alarm signal tone frequencies, 1300 Hz and 200 Hz at approximately the speech level normally used for listening and capable of reducing the strength of other audio frequencies.

(b) be such that its effect can be removed when the radio telephone alarm or distress signal is received so as to facilitated listening to the distress message.

(2) The frequencies of maximum response of the filters shall be subject to a tolerance of plus or minus 1.5 per cent.

(3) Any additional device when used in conjunction with the filtering units specified in subparagraphs (1) and (2) shall :-

(a) silence the loudspeaker in the absence of a radio telephone alarm signal specified in paragraph 3 of Part II, and

(b) when switched on, in the absence of noise or interference, and, if a radio telephone alarm signal is received, be capable of setting the loudspeaker in operation as quickly as possible and at most six seconds after receipt of the alarm signal.

6. Radiation.---(1) The receiver when in use shall not produce a field exceeding 0.1 microvolt per metre when measured at a distance of one mile from the receiver.

(2) The receiver shall be deemed to comply with the requirements of sub-paragraph (1) if,---

(a) the receiver is placed centrally in a screened earthed enclosure of dimensions at least 1.83 metres cube;

(b) the earth terminal of the receiver is connected to the inside of the screen;

- (c) the aerial terminal is connected through an unscreened four turn rectangular search coil situated within the said enclosure and of dimensions 305 centimetres square and an unscreened lead to a resistive measuring instrument mounted outside the enclosure and having its other terminal earthed; and
- (d) the receiver is then energized and unscreened headphones are connected thereto, the power measured by the measuring instrument does not exceed 4×10^{-10} watts whatever the resistance of the measuring instrument or the adjustment of the receiver, and notwithstanding that the search coil is short circuited or moved in anyway without approaching within 152 millimetres of the receiver case.

THE THIRD SCHEDULE

(See rule 5)

CLIMATIC AND DURABILITY TESTS

1. In this Schedule --
 - (1) references of Class B equipment shall be construed as references to equipment appropriated for use only below deck or in deckhouse or other similar compartment; and
 - (2) references to Class X equipment shall be construed as references to equipment appropriated for use or storage in the open or in an open boat.
2. (1) Class B equipment shall be subjected to the tests named opposite the letter B in the Table given in sub-paragraph (4) and Class X equipment shall be subjected to the tests named opposite the letter X in that Table.
 - (2) All such tests shall be conducted in order in which they appear in the aforesaid Table.
 - (3) At any time when the equipment is required by the provisions of paragraph 3 to be kept working for the purpose of such tests, power shall be supplied thereto at the voltage at which such equipment is designed to be operated.

(4) TABLE

Nature of Test	Class of equipment to which the test shall be applied
(1) Vibration test	B and X
(2) Bump test	B and X
(3) Dry heat test	B and X
(4) Damp heat test	B and X
(5) Low temperature test	B and X
(6) Rain test	X
(7) Immersion test	X
(8) Corrosion test-salt water	B and X
(9) Corrosion test-acid fumes (if a battery is included in the equipment)	B and X
(10) Mould growth test	X

3. The tests referred to in paragraph 2 shall be conducted respectively as follows :-
 - (1) Vibration Test.--- The equipment, complete with its chasis covers and shock absorbers (if any) shall, in its normal operating position be clamped to a vibration table. The table shall be vibrated at all frequencies between 0 and $12 \frac{1}{2}$ Hz per second at an amplitude of plus or minus 0.1 cm. during which period the equipment shall be kept working continuously. The table shall be so vibrated for three periods each of which shall be of eight minutes duration. Throughout each such period the direction of the vibration shall be perpendicular to the direction of the vibrations during the other two periods.
 - (2) Bump Test.--- The equipment shall be subjected to not less than 500 bumps at a constant rate between one and four bumps per second with a free drop of at least 2.5 cm.
 - (3) Dry Head Test.--- (a) Class B equipment shall be placed in a chamber which is maintained for a period of two hours at constant temperature of 55°C within a tolerance of plus or minus 1°C during which period the equipment shall be kept working continuously.

(b) Class X equipment shall be placed in a chamber which is maintained for a period of ten hours at a constant temperature of 70°C, within a tolerance of plus or minus 1°C during which period the equipment shall not be worked or tested. The said chamber shall then be cooled to a constant temperature of 55°C within a tolerance of plus or minus 1°C, and the equipment shall be kept working continuously at that temperature for a period of two hours.

(4) Damp Heat Test.---The equipment shall be prepared for the damp heat test in the following manners :

(a) The equipment shall be placed in a chamber which within a period not exceeding two hours shall be heated from room temperature to 40°C within a tolerance of plus or minus 1°C and shall be brought to a relative humidity of not less than 95 per cent.

(b) The chamber shall be kept at a temperature of 40°C within a tolerance of plus or minus 1°C for a period of 2 hours, and at a relative humidity of not less than 95 per cent.

(c) At the beginning of the last 69 minutes of such period all accessible surfaces and components shall be wiped dry on any fans or drying lamps provided in the equipment shall be switched on.

(5) Low Temperature Test.---(a) Class B equipment shall be exposed to a temperature of minus 15°C within a tolerance of plus or minus 2°C at normal atmospheric pressure for a period of not less than twelve hours.

(b) Class X equipment shall be exposed to a temperature of 25°C within a tolerance of plus or minus 2°C at normal atmospheric pressure for a period of not less than twelve hours.

(6) Rain Test.---The equipment shall be placed in a chamber fitted with either shower heads, the discharge of which shall consist of flat, non-rustable metal plate, 0.16 cm, thick, having thirty-six holes each of 0.1 cm. diameter evenly spaced in concentric circles in the following manner :--

8 holes on the periphery of a circle of 3.8 cm. diameter.

8 holes on the periphery of a circle of 2.5 cm. diameter.

4 holes on the periphery of a circle of 1.3 cm. diameter.

The said shower heads shall be arranged at a distance of not less than 50 cm. and not more than 80 cm. from the equipment in such a manner that spray from four of such shower heads is directed downwards at an angle of 45° at each of the four uppermost corner of the equipment, and the spray from the other four shower heads is directed horizontally at the center of such area of the four sides of the equipment. Fresh water at room temperature and at a static pressure of not less than 15 or more than 25 pounds per square inch shall be sprayed on to the equipment from the aforesaid shower heads for a period of one hour with the equipment in the position in which it is normally operated. Throughout the test the equipment shall be rotated at between 12 and 20 revolutions per minute about a vertical axis passing through the center of equipment.

(7) Immersion Test.---The equipment in the condition in which it will normally be kept on board ship shall be immersed in water the surface of which is at least 10 cm. above the highest point of the equipment and shall remain for a period of one hour. Upon its removal from the water the equipment shall be drained of water.

(8) Corrosion Test (Salt Water).---The equipment shall be placed in a chamber fitted with apparatus capable of spraying in the form of a fine mist either natural sea water or tap water containing the following salts in solution :-

Sodium Chloride	2.7 per cent.
Magnesium Chloride	0.6 per cent.
Calcium Chloride	0.1 per cent.
Potassium Chloride	0.07 per cent.

The quantity of each salt shall be subject to a tolerance of plus or minus 10 per cent.

The spraying apparatus shall be such that the products of corrosion cannot mix with the sea water or solution contained in the spray reservoir. The equipment shall be sprayed simultaneously on all its external surfaces with the sea water or solution for a period of one hour and shall be kept working continuously for the last thirty minutes thereof. The equipment shall immediately thereafter be stored for a period of seven days at a temperature of 40°C within a tolerance of plus or minus 1°C at a relative humidity of not less than 60 per cent, and not more than 80 per cent. The equipment shall be sprayed and stored as aforesaid on four separate occasions.

(9) Corrosion Test (Acid Fumes)—Any battery included in the equipment shall be fully charged and shall be fitted into the equipment. If the arrangements are such that the battery can be charged without being removed from the equipment the battery shall continue to be charged at a maximum rate appropriate to it for a period of twenty four hours. The equipment shall immediately thereafter be stored for a period of four weeks at a temperature of 40°C within a tolerance of plus or minus 1°C at a relative humidity of not less than 60 per cent and not more than 80 per cent.

(10) Mould Growth Test.--- The equipment shall be inoculated by spraying with an aqueous suspension of mould spores containing all the cultures named in column A or all the cultures named in column B of the following Table :-

TABLE

A	B
Aspergillus niger;	Aspergillus niger;
Aspergillus amstelodami;	Aspergillus amstclodami;
Pacecilomyccs varioti;	Aspergillus versicolor;
Satchybotrys atra;	Stachybotrys atra;
Pencillium brevi-compactum;	Pencillium brevi-compactum;
Peneillium cyclopium;	Caldosporum heaoasum
Chetomium globosum	

Immediately after it has been so sprayed the equipment shall be placed in a chamber, the temperature of which shall be maintained at any fixed value within the range 30°C to 33°C inclusive and controlled to within a tolerance of plus or minus 1°C at a relative humidity of not less than 95 per cent. The equipment shall remain in the said chamber for a period of twenty-eight days.

THE FOURTH SCHEDULE

(See rules 7(2), 29 and 30)

RADIO EQUIPMENT FOR LIFEBOATS AND SURVIVAL CRAFTS

Motor Lifeboat Fixed Radio Equipment

1. General.---(1) The fixed radio equipment for lifeboats (hereinafter in this Part referred to as "the equipment") shall include a radiotelegraph and a radiotelephone transmitter and receiver, an aerial and earth system, a source of energy, and all other equipment necessary for the operation of the installation.

(2) The equipment shall be so designed that an unskilled person can readily cause it to transmit the signals referred to in paragraph 5.

(3) The purpose of all controls not required for transmitting the said singles shall be clearly and permanently indicated.

(4) Simple instructions for the operation of the equipment on the frequencies specified in subparagraphs (1) of paragraph 4 and subparagraph (1) of paragraph 6 shall be affixed in clear and permanent form to or near the equipment.

(5) All controls shall be of such size as will permit normal adjustments to be made by a person wearing thick clothes, and in particular all tuning knobs shall not be less than 5 centimetres in diameter.

(6) For manual radiotelegraph transmission a morsekey of approved design shall be fitted in an approved position.

(7) The change-over from transmitting to receiving and vice-versa, including automatic change of aerial connections, shall be made by means of one switch.

(8) The equipment shall be readily removeable from the life boat.

(9) An electric lamp of power between 3 watts and 15 watts with water-proof casing, shall be provided to illuminate the control panels and the aforesaid instructions.

(10) An electrical heater, connected to the ship's mains shall be provided and shall be capable of maintaining the interior of the case in which the equipment is installed at a temperature at least 10°C above the ambient temperature. The heater shall be so mounted that it will reduce the risk of the controls or cover of the equipment becoming frozen into position but will not cause any part of the installation to become overheated.

(11) All parts other than the aerial and its terminal which are not at earth potential shall be enclosed. The aerial terminal shall be guarded against accidental contact.

(12) The equipment shall be capable of complying with the performance requirements specified in this Part while the lifeboat engine is running and whether or not the battery is being charged.

2. Aerial and earth System.---(1) The equipment shall include.---

- (a) a single---wire aerial of high conductivity standard or braided wire capable of being supported by the lifeboat mast without the use of top-masts at a maximum height of not less than 6.7 metres above the waterline; and
- (b) in addition to the aerial referred to in clause (a), an aerial supported by a kite or bottom may be provided; and
- (c) an earth systems which shall be of the same material throughout and shall consist of at least three independent bolted connection.

- (i) to the hull in the case of metal lifeboat; or
- (ii) to a bare copper plate of area at least 0.55 square metres fixed to the hull below the waterline in the case of a wooden lifeboat.

(2) The aerial system shall be mechanically robust.

(3) All practicable steps shall be taken to reduce aerial losses to a minimum.

(4) All parts of the aerial which may come in contact with the occupants of the lifeboat when the equipment is in use shall be insulated.

3. Source of Energy.---(1) The equipment shall include one 24 volt battery composed of accumulators and of a capacity sufficient to operate the receiver for two hours and the transmitter under full power marking conditions for four hours.

(2) If it is intended to operate a searchlight from the battery, the capacity thereof shall be at least 30 ampere hours in excess of that referred to in sub-paragraph (1)

(3) The battery shall be capable of being completely recharged :-

- (a) in not more than 20 hours from a dynamo working in conjunction with and throughout the normal range of speeds of the lifeboat engine if the battery is not in use at the same time; and
- (b) from the ship's main source of electrical energy without its being removed from the lifeboat.

(4) The battery shall not spill when tilted to an angle of 60° from its normal position in any direction.

(5) The battery shall be electrically isolated from the rest of the equipment when the transmitter and receiver are switched off.

(6) If a vibrator power unit is employed, a reserve vibrator shall be provided and so controlled by a changeover switch that can be put into circuit immediately.

4. Transmitter.---(1) The equipment shall include a transmitter capable of :---

- (a) sending continuously but not simultaneously Class A2 and A2H emissions on the frequencies of 500 KHz and 8.364 KHz and Class A3 and A3H emissions on the frequency of 2182 KHz:
 - (i) by manual operation when using radiotelegraphy at all speeds upto at least 25 bands without critical relay adjustment; and
 - (ii) by means of an automatic keying device complying with the requirements 5 ; and
- (b) maintaining without adjustment of any control, a frequency tolerance throughout every transmission :---
 - (i) plus or minus 0.5 per cent on a frequency of 500 KHz; and
 - (ii) plus or minus 0.02 per cent on a frequency of 8.364 KHz; and
 - (iii) plus or minus 0.02 per cent on a frequency of 2182 KHz.

notwithstanding variations of the impedance of the aerial or of any other load to which it is connected or of supply voltage within plus or minus 10 per cent; and

(2) When class A2 and A2H emissions are being transmitted the carrier wave shall be modulated to a depth of 100 per cent by an approximately rectangular wave of frequency between 450 and 1350 KHz so that the carrier is switched on for 30 to 50 per cent of modulation cycle.

(3) When class A3 and A3H emissions are being transmitted, it shall be possible to fully modulate the carrier by speech.

(4) The facility for transmission on the frequency of 2182 KHz shall include a device for the generation of radio telephone alarm signal specified in Part II of the **Second Schedule** except that the duration of the radio telephone alarm signal may be determined by manual control.

(5) The power of the transmitter :-

- (a) shall not be less than 15 metre-amperes on a frequency when determined in the manner specified in paragraphs 2 and 3 of the **Fifth Schedule**.
- (b) shall not be less than 50 watts on a frequency of 500 KHz when measured into an artificial aerial consisting of a 30 ohm non-inductive resistor in series with a capacitor of every value between 200 and 300 picofards ; and
- (c) shall not be less than 15 watts on a frequency of 8.364 KHz when measured into an artificial aerial simulating the impedance of the aerial specified in paragraph 2.
- (d) On a frequency of 2182 KHz :-
 - (i) shall not be less than 5 watt when measured with an artificial aerial consisting of 15 ohm non-inductive resistor in series with a capacitor having every value from 125 to 200 picofarado, and
 - (ii) ten watts when measured with an artificial aerial consisting of 30 ohm non-inductive resistor in series with a capacitor having every value from 300 to 400 picofarado.

(6) The transmitter shall be so designed and constructed that when it is adjusted for maximum power and the transmitting key is depressed the aerial may be disconnected or the output short circuited without damage being caused to any part of the installation.

(7) There shall be provided:-

- (a) an artificial aerial for testing the transmitter on full power, which shall include an indicator or lamp to indicate the passage of radio-frequency currents; and
- (b) an aerial ammeter, and a visual indicator to indicate the passage of radio frequency current, the failure of either of which shall not disconnect the aerial circuit.

5. Automatic Transmission.---(1) A device automatic keying shall be provided as part of the radio telegraph installation for lifeboats which when switched into circuit with the transmitter, shall be capable of automatically :-

- (a) sending the alarm signal specified in sub-paragraph (2) and immediately thereafter stopping and opening the keying circuit unless reset or re-wound; and
- (b)(i) sending the distress call specified in sub-paragraph (3) in such manner that if the device is used without attention the transmission will be repeated once every twelve minutes; and
- (ii) switching off the electrical energy to the transmitter in the silent interval between such transmission and, so far as is necessary for the protection of the transmitter automatically delaying the application of electrical energy after the device has been switched on.

(2) The alarm signal shall consist of twelve four second dashes separated by one second spaces, the length of the dashes and spaces being maintained within a tolerance of plus or minus 0.2 second.

(3) The distress call shall consist of the following signals in the following order namely :-

- (a) the radio telegram distress signal SOS (3 times) ;
- (b) the more characters for the word DE;
- (c) the more characters for the lifeboat's call sign (3 times); and
- (d) two long dashes each of 10 to 15 seconds duration separated by a space of between 0.5 and 1.5 seconds. The total duration of the distress call shall not be more than 90 seconds.

(4) Means shall be provided to ensure that, when the distress signal is sent, the transmission being at the commencement of the signal within 40 seconds after the device for automatic keying has been switched into circuit.

(5) The characters of the distress call specified in sub-paragraph (3) shall be keyed at 10 to 16 words per minute.

(6) Receiver.—(1) The equipment shall include a receiver capable of receiving A1, A2 and A2H emission. The receiver shall also be capable of receiving on a spot frequency of 2182 KHz for reception of A3, and A3H emissions.

(2) The receiver shall be tunable over the frequency ranges 488 to 513 and 8320 to 8745 KHz.

(3) The receiver shall be fitted with a manual gain control.

(4) Headphones which are whether tight shall be provided and shall be shrouded to exclude noise.

(5) The receiver shall comply with the requirements of sub-paragraphs (6) to (9) inclusive when tested in the following manner :-

- (a) An artificial aerial shall be used and shall consist of 40 ohm resistance in series with a 2 microhry inductance and 100 picofarad capacitance;
- (b) A type A2 signal shall, unless otherwise specified, be modulated to a depth of 30 per cent at 100 Hz.
- (c) The standard audio-frequency output shall be one milli-watt into a resistance substantially equal to the modulus of the impedance of the telephone receivers at 100 Hz.

(6) The selectivity preceding the final detector of the receiver shall comply with the following requirements, namely :-

- (a) when tuned to a frequency to 500 KHz and 8364 KHz :-
 - (i) not more than 6 decibels discrimination shall be obtained at frequencies removed from tune by 1 KHz;
 - (ii) at least 6 decibels discrimination shall be obtained at frequencies removed from tune by 4 KHz;
 - (iii) at least 30 decibels discrimination shall be obtained at frequencies removed from tune by 15 KHz;
 - (iv) at least 60 decibels discrimination shall be obtained at frequencies removed from tune by 40 KHz;
- (b) when tuned to a frequency of 2182 KHz.--
 - (i) not more than 60 decibels discrimination shall be obtained at frequencies removed from tune by 3 KHz;
 - (ii) at least 30 decibels discrimination shall be obtained at frequencies removed from tune by 15 KHz;
- (c) in the case of superheterodyne receiver, the image response ration shall be at least 20 decibels.

(7) The sensitivity of the receiver shall be such that the standard audio-frequency output is obtained with an input not exceeding the following level :-

TABLE

Frequencies	Maximum input for A1 emissions	Maximum input for A2 emissions
488 to 513 KHz	30 decibels above 1 micro-volt	40 decibels above 1 microvolt
8320 to 8745 KHz	30 decibels above 1micro-volt	40 decibels above 1micorvolt
2182 KHz	----	30 decibels above above 1 microvolt

(8)(a) The signal noise ratio shall, with the inputs and emissions respectively specified in sub-paragraph (7) and with the rotary converter or vibrator running, be not less than :--

- (i) 15 decibels on a frequency of 500 KHz;
- (ii) 25 decibels on a frequency of 8364 KHz; or
- (iii) 20 decibels on a frequency of 2182 KHz.

(8)(b) The fidelity of the receiver shall be such that the change in level of the audio-frequency output shall when the level and modulation depth in the input signal is kept constant, be less than 8 decibels as the modulation of input signal is varied continuously :--

- (i) from 300 KHz to 1500 Hz for A2 and A2H emission; and
- (ii) from 250 Hz to 3000 Hz for A3 and A3H emission. For this purpose, the input signal may have any level and depth of modulation, provided that the output of the receiver does not exceed the standard audio-frequency output.

9. Connection with the Ships Mains.--- Any connections of the equipment with ship's main source of energy shall be so provided as not to interfere with the launching of the lifeboat.

PART – II

PORTABLE RADIO EQUIPMENT FOR SURVIVAL CRAFT

1. General.---(1) The portable radio equipment for survival crafts (hereinafter in this Part referred to as "the equipment") shall include a hand generator, a transmitter, a receiver and all other apparatus necessary for the operation of the equipment.

(2) Simple instructions for the operation of the equipment on the frequencies specified in sub-paragraph (1) of paragraph 5 shall be affixed in clear and permanent form, to the equipment.

(3) The equipment shall bear a removable plate on which shall be indicated in clear and permanent form the call sign of the lifeboats in letters and numbers and in more characters.

(4) For the purposes of the ~~Third Schedule~~ the equipment shall be deemed to be class X equipment. The immersion test specified in sub-paragraph (7) of paragraph 3 of the said Schedule shall be applied to the equipment when packed in the manner in which it will be stored on board ship.

2. Design and Construction.--- The equipment shall be so designed and constructed that---

(1) the entire equipment is contained in a single unit : provided that the mast referred to in sub-paragraph (2) of paragraph 3 may be attached to the single unit ; and

(2) an unskilled person can erect the aerial system without difficulty and by simple operation and automatic means, transmit the radiotelegraph signals specified in sub-paragraph (4)(a) of paragraph 5.

(3) the equipment is provided with handles and is readily portable by one person;

(4) it is watertight and capable of floating in water;

(5) it can be lowered into the sea or lifeboat from the boat deck ;

(6) it can be lowered into the sea or lifeboat from the boat deck ;

(7) it can be clamped to a lifeboat ;

(8) the number of manual controls are kept to the minimum required to meet the requirements of this Part of this Schedule, but include---

(a) send-receive switching;

(b) a switch for changing transmission from 500 KHz to 2182 KHz and from 2182 KHz to 8364 KHz and vice-versa;

(c) a switch position so that the transmitter valve filaments can be energized continuously whilst the receiver is energized;

(d) a single control of receiver gain;

(e) a more key of approved design fitted to the equipment in an approved position;

(9) all manual controls are of such size as to permit normal adjustments to be made by a person wearing thick gloves; and

(10) the operation of manual controls is not impeded by, and does not impede, the hand generation of electrical energy.

3. Aerial and Earth System---The equipment shall include---

(1) a single-wire aerial consisting of not less than 9.2 metres of high conductivity stranded or braided wire so fitted as to be capable of being supported from the lifeboat mast without the use of top-mast at the maximum practicable height;

(2) a collapsible stayed mast capable of being easily and quickly installed in a lifeboat and of supporting the aerial at a height of at least 4.9 metres above the sea when the base of the mast is resting on the bottom of any lifeboat in which it is intended to be used; and

(3) an earth wire of high conductivity firmly connected to the equipment and loaded in such manner that the wire will sink when placed overboard.

4. Hand Generator.—(1) The hand generator shall be of such design and construction that when the handle of the generator is rotated at any speed within the normal range of handle speeds sufficient electrical energy shall be generated ---

- (a) to enable the transmitter to comply with the requirements of sub-paragraph (4)(a) of paragraph 5; and
- (b) the transmitter shall comply with the requirements of sub-paragraph (4)(a) of paragraph 5 with a torque speed at the handle of not more than 550 expressed in grammes/centimeters multiplied by revolutions per minute; and
- (c) an indicator lamp will be lit.

Explanation.—In this Part the expression "normal range of handle speeds" in relation to a generator means the range of speeds extending from the minimum speed at which the generator enables the transmitter forming part of the same equipment to comply with the requirements of sub-paragraph (4)(c) of paragraph 5 to a speed at least 40 per cent greater than that speed.

(2) The hand generator shall be of such design and construction that ---

- (a) it can be operated by :---
 - (i) one person; or
 - (ii) two persons simultaneously ;
- (b) the handles cannot be rotated in the wrong direction.

5. Transmitter.---(1) The transmitter shall be capable of ---

- (a) sending continuously, but not simultaneously, class A2 and A2H emissions on the frequencies of 500 KHz and 8364 KHz and class A3 and A#H emissions on 2182 KHz---
 - (i) by manual operation at all speeds upto 16 bauds ; and
 - (ii) by automatic means at the speeds specified in sub-paragraph (4) (a).
 - (b) maintaining over the normal range of handle speeds throughout every transmission a frequency tolerance---
 - (i) of plus or minus 0.5 per cent on a frequency of 500 KHz;
 - (ii) of plus or minus 0.02 per cent on a frequency of 8364 KHz; without adjustment of any control, and notwithstanding any variations of the impedance of the aerial or artificial aerial to which it is connected; and
 - (c) operating on full power, when the aerial system or artificial aerial has been connected and the necessary controls have been adjusted, within 30 seconds after the generation of electrical energy has commenced.
- (2)(a) when A2 and A2H emissions are being transmitted, the carrier wave shall be modulated to a depth of 100m per cent by wave of rectangular character so that the carrier wave is switched on for not less than 30 per cent, and not more than 50 per cent of a modulation cycle.
- (b) when A3 and A3H emissions are being transmitted, full modulation of the carrier wave by speech shall be possible with out being over modulated.
- (3) The note frequency shall not be less than 450 Hz or more than 1350 Hz.
- (4)(a) the signal to be sent by the automatic means referred to in sub-paragraph (1)(a)(ii)---
 - (i) when the transmission is on a frequency of 500 KHz shall consist of the alarm signal of twelve four second dashes separated by one-second spaces, followed by the distress signal repeated three times, and two long dashes each of 10 to 15 seconds duration separated by a space of between 0.5 and 1.5 seconds; and
 - (ii) when the transmission is on a frequency of 8.364 KHz shall include the distress signal repeated three times, and two long dashes each of 10 to 15 seconds duration separated by a space of between 0.5 and 1.5 seconds.
- (b) Over the normal range of handle speeds ---
 - (i) the speed of the automatic transmission of the distress signal shall not be less than 8 and not more than 15 words a minute
 - (ii) the tolerance in the timing of the dashes of the alarm signal shall not be more than plus or minus 0.2 seconds.
- (c) The automatic transmission shall cease and open the keying circuit after one complete transmission unless the mechanism is re-set or re-wound.

- (d) Means shall be provided---
 - (i) to ensure that the transmission begins at the commencement of the signal;
 - (ii) to indicate to the operator that the mechanism should be re-set or re-wound.
- (e) The mean power developed by the transmitter in the load during a marking period, shall---
 - (i) on frequency of 500 KHz be not less than $[(3.81 \log 10C0 - 5.5)]$ watts, C being the capacitance of the artificial aerial in picofarads, when measured, with an artificial aerial consisting of a 15 ohm non-inductive resistor in series with a capacitor having any value between a minimum of 10 picofarads less than that of the aerial referred to in sub-paragraph (1) of paragraph 3 and 150 picofamds, and not less than 3.5 watts when measured with an artificial aerial consisting of a 30 ohm non-inductive resistor in series with a capacitor having any value between 200 and 300 picofarads
 - (ii) on a frequency of 8364 KHz be not less than 1.5 watts when measured with an artificial aerial consisting of 20 ohm non-inductive resistor in series with a capacitor having a value between 70 and 100 picofarads.
 - (ii) On a frequency of 2182 KHz be not less than 1.5 watts when measure with an artificial aerial consisting of a 15 ohm non-inductive resistor in series with a capacitor having any value between a minimum of 10 picofarads less than that of the aerial referred to in sub-paragraph (i) of paragraph 3 and a maximum of 110 picofarads and not less than 3.5 watts when measured with an artificial aerial consisting of 30 ohm non-inductive resistor in series with a capacitor having any and every value between 300 and 400 picofarads.
- (f) The aerial circuit shall include ---
 - (i) a tuning control suitable for use with all types of aerial provided; and
 - (ii) a tuning indicator, the failure of which shall not disconnect the aerial circuit..
- (g) There shall be provided ---
 - (i) an artificial aerial within the equipment suitable for testing the transmitter on full power;
 - (ii) means for testing the facilities for automatic transmission without the generation of radio-frequency energy.

(5) The facility or transmission on the frequency of 2182 KHz shall include a device for the generation of radio-telephone alarm signal specified in Part II of the **Second Schedule** except that the duration of the radio-telephone alarm signal may be determined by manual control.

(6) The transmitter shall be so designed and constructed that when it is transmitting and adjusted for maximum power the aerial may be disconnected or the output short-circuit in either case without damage being caused to any part of the equipment.

6. Receiver.---(1) The receiver shall be a fixed tune receiver which shall be capable of receiving A2 emissions over the frequency band 490 to 510 KHz when used with headphones. The receiver shall also be capable of receiving A3 and A3 H missions on the radio-telephone distress frequency of 2182 KHz.

(2) Headphones which are shrouded to exclude external noises shall be provided and shall be permanently attached to the receiver.

(3) The receiver shall comply with the requirements of sub-paragraph (4) when tested in the following manner :-

- (a) artificial aerals shall be used and shall consist of either ---
 - (i) a 15 ohm non-conductive resistor in series with a capacitor having any value between a minimum of 10 picofarads; less than that of the aerial referred to in sub-paragraph (1) of paragraph 3 and a maximum of 110 picofarads; or
 - (ii) a 30 ohm-conductive resistor in series with a capacitor of any value within the range 200 to 400 picofarads;
 - (b) the signals used shall be type A2 signals modulated to a depth of 30 per cent at 1000 Hz.
- (4) Over the normal range of handle speeds---
- (a) the standard audio-frequency output of the receiver into a resistance substantially equal to the modulus of the impedance of the telephone receivers at 1,000 Hz shall be one milliwatt.

- (b) the selectivity preceding the final detector of the receiver shall comply with the following Table :-

TABLE

When operating on frequency	500 KHz	2182 KHz
response to the uniform within 6 decibels over the range of	490-510 KHz	2177-2187 KHz
at least 40 decibels discrimination relative to the response of mid band to be obtained at all frequencies.	below 470 KHz and above 530 KHz.	below 2147 KHz and above 2217 KHz.

- (c) the audio-frequency response of the receiver shall be inform to within 8 decibels over the range of modulation frequencies 400 to 3000 Hz and shall substantially fall for frequencies outside the ranges ;
- (d) the standard output specified in sub-paragraph (a) shall be obtained with a test signal input not exceeding 40 decibels above one microvolt on a frequency of 500 KHz and not exceeding 30 decibels above one microvolt on a frequency of 2182 KHz.
- (e) with the test signal specified in sub-paragraph (d) the signal/noise ratio shall be at least 15 decibels.

THE FIFTH SCHEDULE

[See rules 11(3) and 15(3)]

RANGE OF RADIO TELEGRAPH TRANSMITTERS

1. For the purposes of this Schedule the normal range of a radio telegraph transmitter when determined by calculation on a frequency of 500 KHz shall be calculated in the manner specified in paragraph 2 or, as the case may be paragraph 3.

2. In the case of transmitting aerials of the 'L' and 't' types the product of the root mean square current in amperes at the base of the main aerial and the maximum height in metres of the aerial measured from the load link mark indicating the greatest depth to which the ship may at any time or place be submerged in accordance with the Merchant shipping (Load Line) Rules, 1979, or if there is no such mark on the ship from the mean level of the surface of the water in which the ship is afloat, shall be converted to miles in accordance with the following Table :-

TABLE

Product in metro-amperes	Equivalent in miles
128	200
102	175
76	150
58	125
45	100
34	75
10	25

3.(1) In the case of all types of transmitting aerials except 'L' and 'T' types, the product of ... (le) the effective radiation current in amperes and (He) the effective height in metres of the aerial shall be calculated and converted to miles in accordance with the following Table :-

TABLE

Product in metro-amperes	Equivalent in miles
54	175
44	150
21	100
15	75
5	25

(2)(a) The effective radiation current (Le) shall be obtained by multiplying the root mean square current in amperes fed into the aerial system by a factor which shall be determined by the ratio of the radiation capacitance (Cr) to the total measured capacitance (Ct).

(b) The radiation capacitance (Cr) shall be obtained from the product of the radiation length (Lr) and the capacitance per unit length as given in the following Table :-

Radiation length (Lr) Diameter of aerial	PF per metre
25	15.4
35	14.0
50	12.9
70	11.9
100	11.1
200	9.8
400	8.7
600	8.2
800	7.2
1500	7.2
3000	6.6
6000	6.0
10000	5.7

(c) The radiation length shall be as follows :-

- (i) Single vertical aerial without capacitive loading Radiation Length (Lr) = Measured length of aerial metres.
- (ii) Single vertical aerial with top capacitive loading Radiation Length (Lr) = Measured length on aerial = twice the diameter of loading structure in metres.
- (iii) Other types of aerial---
Radiation length (Lr) = Total length of conductor (Vertical and horizontal)

(d) The radiation capacitance of "n" number of similar vertical aerials jointed in parallel shall be taken to be "N" times the radiation capacitance of one, provided the spacing between them is greater than $\underline{L_r}$

(e) The total capacitance (Ct) of the aerial shall be obtained by measurement.

(3) The effective height of the aerial (He) shall be obtained by measurement of the vertical distance from the load line mark indicating the greatest depth to which the ship may at any time or place be submerged in accordance with the Merchant Shipping (Load Lines) Rules, 1979 or if there is such mark on the ship, from the mean level of the surface of the water in which the ship is afloat, to the base of the aerial, plus half the radiation length (Lr) of the aerial or its physical height whichever is the smaller.

THE SIXTH SCHEDULE

(See rules 14 and 24)

Tools, Measuring Instruments, Spares parts etc.

PART - I

RADIO TELEGRAPH SHIPS

Tools

- 1 Contact burnisher;
- 1 6, in smooth file;
- 1 joining knife;
- 1 pair 7 in. wireman's insulated pliers;
- 1 pair 6 in. long nose pliers with side cutters;
- 1 insulated screwdriver. not less than 8 in. in length with $\frac{1}{4}$ in blade.
- 1 insulated grab screwdriver with $\frac{1}{8}$ in., blade ;
- 1 watch screwdriver with $\frac{1}{16}$ in blade;
- 1 set of spanners, sizes 0.2, 4 and 6 B.A.;
- 1 spanner adjustable to 1 in nuts.
- *1 $\frac{1}{4}$ in. hand drill;
- * 1 set of high speed twist drills, sizes $\frac{3}{16}$ in., 26.34 and 44;
- 1 clamp vice;
- 2 electric soldering irons to suit the ship's voltage, one with a power consumption of about 60 watts and the other with a power consumption of not more than 25 watts;
- 1 dusting brush;
- 1 $\frac{1}{2}$ lb. ball-pane hammer ;
- 1 hacksaw and blades
- 1 tool box or compartment for containing the foregoing tools and capable of being locked.
- *1 Jointing Knife;
- *1 pair 6 in. long nose pliers with side cutters;
- *1 insulated screw driver, not less than 8 in. in length, with $\frac{1}{4}$ in. blade.

*Note 1 --- These items need not in ship other than those engaged on International voyages.

*Note 2 –These items are to be provided with spares for the Fixed Radio equipment in a Motor Lifeboat and located in the Radio cabine of the lifeboat.

- 2 Hydrometers;
- 1 dipping fahrenheit thermometers;

An ammeter capable of measuring direct current from 1 milliampere to 500 milliamperes; and voltmeter capable of measuring alternating and direct current voltage from 1 volt to 1000 volts: and an ohm-meter capable of measuring resistance from 10 ohms and 20,000 ohms; provided that a measuring instrument in which the requirements for an ammeter, a voltmeter, and an ohm-meter specified above are combined may be substituted for the said instruments.

SPARE PARTS AND SPARE EQUIPMENT

- 1 set of brushes for each machine installed;
- 2 cartridges for each cartridge fuse in use;
- 1 main aerial made up (wire only);
- 50 per cent of the number of insulators in use (excluding lead-in insulators)
- 100 per cent of the number of shackles and thimbles in use;
- 12 bull dog grips to suit the aerial wire;
- 1 set of telephone and leads (with plugs if used) for each type of telephones and lead in use;
- 1 valve for each two of the first six of each type of valve in use and then 1 valve for each additional 3 valves part of 3 valves of that type in use;
- 3 vibrators for each type of vibrator in use;
- 1 indicator lamp for each indicator lamp in use;
- 1 emergency lamp;
- 1 charging mat if a mat type charging unit is in use
- 2 charging lamps for each type of charging lamp in use
- 1 rectifier if a rectifier-type charging unit is in use.

MISCELLANEOUS ITEMS

- 4 Ozs petroleum jelly;
- 3 sheets glass paper;
- 8 Ozs resin-cored solder;
- 4 Ozs insulating tape;
- ½ pint lubricating oil (where a machine lubricated with oil forms part of the installation) otherwise, 2 ozs lubricating oil for general purposes;
- ½ 1b grease suitable for machine in use;
- 10 yards of each rating of fuse wire, 1 ampere, 5 ampere and 15 ampere;
- 1 length of aerial wire equal to the length of the emergency aerial plus 10 feet (uncut);
- 4 Ozs copper binding wire;
- 6 yards flexible wire (5 amperes) for adjustable connections;
- 4 Ozs trichlorethylene for contact cleaning.

PART - II

RADIO TELEPHONE SHIPS

[See rule 24(f)]

Tools :-

- 1 6 in. smooth file;
- 1 jointing knife;
- 1 Insulated screwdriver, not less than 8 in. in length with ¼ in. blade;
- 1 Spanner adjustable to 1 in. gap;
- 1 Hacksaw and 6 blades;
- 1 Watch Screwdriver with 1/16 in. blade;
- 1 Dusting brush.

MEASURING INSTRUMENTS

- 2. Hydrometers.

Spare parts and spare equipments :

- 50 per cent of the number of insulators
- 3 Vibrators for each type of vibrator in use.
- 1 Indicator lamp for each indicator lamp in use.
- 1 Charging mat if a mat-type charging unit is in use.

Miscellaneous items :

- 10 yards of each rating of fuse wire, 1 amp, 5 amps and 15 amps.
-

THE SEVENTH SCHEDULE

(See rules 15, 17 and 18)

RADIO TELEGRAPH AUTO-ALARM EQUIPMENT

1. General---(1) The auto-alarm shall---

- (a) include a receiver, selector, a test signal generator and an audible alarm system ;
- (b) in the absence of interference of any kind be capable without manual adjustment of giving audible warning of the receipt of a radio-telegraph alarm signal transmitter on a frequency of 500 KHz and consisting of a series of 12 consecutive dashes, each with a duration of 4 seconds and separated by internals of one second in each case subject of the tolerance specified in paragraph 3 :

Provided that the strength of the signal at the receiver input is greater than 100 micro volts and less than one volt.

- (c) be capable of being rapidly connected with the main aerial referred to in rule 11 or to an efficient aerial;
- (d) comply with the requirements of this Schedule notwithstanding variations of the supply voltage of---
 - (i) plus 5 per cent or minus 10 per cent if the equipment is operated from the emergency source of electrical energy required by sub-rule (2) of rule 13 or from batteries ; or
 - (ii) plus or minus 10 per cent of the equipment is operated from the main source of electrical energy required by sub-rule (1) of the said rule.

(2) The receiver, selector and test signal generator shall be installed in radio-telegraph room.

(3) The receiver shall have provision for head phone and loudspeaker reception. The loudspeaker shall be rendered inoperative when reception is being made by headphone.

(4) The auto-alarm shall include a manual resetting device to enable the selector to be re-set after the audible alarm system has been actuated.

2. Receiver.---(1) The receiver forming part of the auto-alarm shall be capable of reception of class A2, A2H and emissions having a note frequency between 400 and 1400 Hz, the carrier wave being in the frequency range 492 KHz to 508 KHz.

(2) All tuning controls and gain controls which affect the operation of the receiver as part of the auto-alarm shall be preset and shall not be capable of operation from the outside of the auto-alarm.

(3) The receiver shall comply with the requirements of sub-paragraphs (4) to (7) inclusive when tested in the following manner, except where another method of testing is specified in the said sub-paragraph---

- (a) an artificial aerial shall be used for the test and shall consist of 10 ohm resistor in series with a capacitor having any value between 300 and 750 picofarads;
- (b) type A2 signals used in the test shall be modulated to a depth of 70 per cent and shall have note frequency of 400 Hz.

(4) The selectivity of the receiver shall be such that.---

- (a) the radio-frequency response is uniform to within 3 decibels in a frequency range 496 to 504 KHz;
- (b) the total variation of audio-frequency response is not more than 3 decibels in the case of note frequencies in the range 400 to 1400 Hz;

- (c) the audio-frequency response falls rapidly in the case of note frequencies below 400 Hz. and above 1400 Hz;
- (d) the auto-alarm gives response to an alarm signal of a frequency of 500 KHz and input level of 42 decibels above one microvolt, in the presence of another signal having the following characteristics :-

Type of emission	Modulation frequency	Modulation depth	Carrier frequency	Input level
A1	---	---		
A2	Any audio frequency in the range 50 Hz to 1400 Hz.	70 per cent	Below 475 KHz and above 525 KHz	120 dB above one microvolt

- (5)(a) The sensitivity of the receiver shall for the purpose of this paragraph be taken to be the minimum input level of the test alarm signal injected at a frequency of 500 KHz which will operate the selector. The sensitivity of the receiver shall be such that the selector will operate by the injection of an alarm signal from the test signal forming part of the auto-alarm.

- (b) The receiver shall be provided with an automatic gain control which shall--

- (i) during periods when the selector is continuously in operation, steadily reduce the sensitivity of the receiver at a rate within the range 7.5 to 15 decibels per minute in the case of a range of sensitivity of 40 to 80 decibels above one microvolt notwithstanding that the input level of an injected signal is at any level above the minimum necessary to operate the selector.
- (ii) during period when the selector is not continuously in operation, steadily increase the sensitivity of the receiver to a maximum level of between 35 and 40 decibels above one microvolt at a rate of increase within the range of 30 to 60 decibels per minute in the case of a range of sensitivity of 40 to 80 decibels above one microvolt, notwithstanding that the input level of an injected signal is at any level below the level corresponding to the threshold selector release.

- (6) The automatic gain control when more interference is simulated by continuous keying of a test signal of a frequency of 500 KHz and an input level of 100 decibels above one microvolt with a mark-to-space ratio of 19 to 1, and variation of frequency of interruption is obtained by varying the speed of transmission, shall be such that ---

- (a) when such test signal produce three interruptions per second, the sensitivity of the receiver is not reduced below that necessary for the reception of a signal of an input level of 40 decibels above one microvolt ; and
- (b) when the speed of such test signal is arranged so that there are three interruptions per period of 2 seconds the sensitivity of the receiver is so reduced after operating for a period of 15 minutes that a signal of at least 70 decibels above one microvolt is required to operate the selector.

- (7) If, in addition to the automatic gain control, a preset manual control of receiver gain is provided the range of sensitivity variations provided by that control shall be not more than 10 decibels.

- (8) The receiver shall be such that the auto-alarm will respond to a test alarm signal transmitted on any frequency in the range 496 KHz to 504 and at an input level of 50 decibels above one microvolt in the presence of an interfering signal with the following characteristics--

Type of Signal	Depth of modulation	Modulation frequency	Input level	Speed transmission
Type A2	7 per cent	400 Hz 1400 Hz	120 decibels above one microvolt	15-40 words per minute

(9) The receiver shall be such that it will not operate the selector upon the simultaneous injection of any two continuous carrier waves, of which the frequency difference sum falls within the range 496 KHz to 504 KHz, being waves with the following characteristics :-

Frequency	Input Level	Modulation
Outside the range 475 KHz to 525 KHz	120 decibels above one microvolt	One unmodulated the other modulated to a depth of 70 per cent at any audio frequency in the range 400 Hz Hz. to 1400

(10)(a) The receiver shall not in normal service produce a field exceeding 0.1 microvolt per metre when measured at a distance of one mile from the receiver, unless the test signal generator is in operation.

(b) the receiver shall be deemed to comply with the requirements of sub-paragraph (a) of this paragraph if, when---

- (i) the receiver is placed centrally in a screened earthed enclosure of dimensions at least 1.83 metres cube;
- (ii) the earth terminal of the receiver is connected to the inside of the screen;
- (iii) the aerial terminal of the receiver is connected through an un-screened search coil situated within the said enclosure and of dimensions 30.5 centimetres square and an unscreened to a resistive measuring instrument mounted outside the enclosure and having its other terminal earthed; and
- (iv) the receiver is energized, the power measured by the measuring instrument does not exceed 4×10^{-10} watts whatever the resistance of the measuring instrument or the adjustment of the receiver and notwithstanding that the search coil is short circuited or moved in any way without approaching within 15.2 centimetres of the receiver case.

3. Selector.--- (1) The selector in conjunction with the receiver shall be capable of :-

(a) accepting---

- (i) dashes of a duration within the tolerance 3.5 to 6.0 seconds;
- (ii) spaces between dashes, being spaces of a duration within the tolerance 0.01 to 1.5 seconds; and

(b) rejecting---

- (i) dashes of a duration of less than 3.4 seconds;
- (ii) dashes of a duration of more than 6.2 seconds; and
- (iii) spaces between dashes, being spaces of a duration of more than 1.6 seconds.

(2) The selector, after accepting three or four consecutive dashes of the alarm signal, shall actuate the audible alarm system. The fourth consecutive dash may be of any duration greater than 3.5 seconds.

(3) Any timing controls provided as part of the selector shall be preset and shall not be capable of being operated from the outside of the equipment.

4. Test signal generator.---(1) The test signal generator shall be capable of :-

(a) generating for purposes, of test a signal with the following characteristics :

- (i) frequency – within plus or minus 3 KHz of 500 KHz
- (ii) type of wave – A2
- (iii) Depth of modulation---within the range of 70 to 100 per cent
- (iv) Modulation of frequency---within the range of 400 to 1400 Hz;
- (v) Input level equivalent to a voltage modulated to a depth of 70 per cent within the range 37 to 43 decibels above one microvolt in series with the artificial aerial; and

(b) injecting into the receiver the alarm signal specified in paragraph 1(b) within the tolerance specified in sub-paragraph (1)(a) of paragraph 3 and the characteristics specified in the foregoing provisions of this paragraph both by means of :-

- (i) a manual key of a non-locking type, and
- (ii) the automatic keying device specified in Part V of the First Schedule to these rules.

(2) The methods of injection shall be such that the test alarm will not operate the audible alarm system when the aerial is disconnected.

(3) The test signal generator shall be so designed and constructed that the input level of the signal specified in sub-paragraph (1)(a) can be increased by approximately 20 decibels by means of a non-locking switch.

5. Audible alarm system.---(1) The audible alarm system shall consist of three alarm bells installed respectively in a radio-telegraph room on the bridge and in the sleeping room of a radio officer. the bells shall be operated from the source of electrical energy required by sub-rule (2) of rule 13 by means of a power circuit taken from an unfused circuit, and so fused that the efficiency of the audible alarm system will not be affected by the rupture of any fuse other than a fuse forming part of that system. the power circuit shall be controlled by a locking switch situated on or near to the receiving forming part of the auto alarm, and clearly and permanently marked to indicate its purpose.

(2) Subject to the provisions of sub-paragraph (3), the alarm bells shall, wherever the auto alarm is in operation as such, give an alarm.

- (a) when actuated by the selector; and
- (b) within 15 seconds after any failure for 9 seconds (subject to tolerance of plus or minus 6 seconds) of---
 - (i) the direct-current voltage feeding the anode of any valve of the receiver forming part of the auto-alarm, if the receiver is not provided with a vibrator;
 - (ii) any vibrator forming part of the receiver;
 - (iii) a circuit of a filament of any directly heated valve forming part of the receiver if it is operated from the main source of electrical energy required by sub-rule (1) of rule 13, and
 - (iv) any continuously rotating mechanism forming part of a selector operated from the said main source of electrical energy ;
- (c) within 15 seconds after the failure of ---
 - (i) a circuit of a filament of a directly heated valve forming part of the receiver if it is operated from batteries;
 - (ii) any continuously rotating mechanism forming part of a selector operated from batteries.

(3) A device shall be provided which will enable the bells situated on the bridge to be disconnected from the aforesaid power circuit. The device may include means for so disconnecting the bell situated in the radio officers sleeping room. The device shall be non-locking and shall not be capable of disconnecting the bell in the radio telegraph room. The device shall be clearly and permanently marked to indicate its purpose.

6. Field test.---If the auto-alarm is in operation for 28 days in connection with an aerial having an effective height of not less than 10 metres and situated at any point within three miles from the coasts of India, the auto-alarm shall not be actuated during that period by signals other than---

- (a) signals locally generated to test the auto-alarm ; and
- (b) signals within the tolerance specified in sub-paragraph 1(a) of paragraph 3.

THE EIGHTH SCHEDULE

(See rule 17)

TABLE OF WATCH HOURS

Ship of class I

- | | | |
|-------|--------------------------|---------------|
| (i) | 000 hours to 0400 hours | (Ship's time) |
| (ii) | 0800 hours to 1200 hours | (Ship's time) |
| (iii) | 1600 hours to 1800 hours | (Ship's time) |
| (iv) | 2000 hours to 2200 hours | (Ship's time) |

- (iv) four more hours which may be decided by the shipmaster at his discretion depending upon propagation conditions, traffic requirements and demand for meeting essential communication needs of the ship.

Ship of class II, III and IV

- (i) 0300 hours to 1200 hours (Ship's time)
- (ii) 1930 hours to 2130 hours (Ship's time)
- (iii) two more hours which may be decided by the shipmaster at his discretion depending upon propagation conditions, traffic requirements and demand for meeting essential communication needs of the ship.

THE NINTH SCHEDULE

(See rule 20)

FORM OF RADIO TELEGRAPH LOG

PART-I

Name of Ship	Official Number and International Call Sig.	Port of	Registry	Gross Tonnage
--------------	---	---------	----------	---------------

Name of Company operating the Radio Service

Port at which which the date when voyage commenced	Nature of the voyage of employment	Port at which and date when voyage terminated
---	---------------------------------------	---

Date

Port.....

Delivered to the Shipping Master of the Mercantile Marine Department at the port of
on the day of 19..... together with Radio telegraph Log Part II,
Serial Number

..... Master

..... Shipping Master..... Address.

SECTION A- PARTICULARS OF RADIO STAFF

Name	Home Address	Certificate Number and Class
------	--------------	------------------------------

SECTION B – PARTICULARS OF BATTERIES ON BOARD

Battery Number	Number of Cells	Type	Date Supplied	Voltage and ampere-hour capacity	Purposes for which used.
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THE TENTH SCHEDULE

(See rule 28)

FORM OF RADIO TELEPHONE LOG

RADIO TELEPHONE LOG

Name of ship	Official Number and call letters	Port of Registry	Gross Tonnage
--------------	----------------------------------	------------------	---------------

Name of Company operating the Radio Service.....

period covered by Log-From..... to

Delivered to the Shipping Master of the Mercantile Marine Department at the Port of
on the day of 19.....

Countersigned

..... Master

..... Shipping Master..... Address

SECTION A – PARTICULARS OF RADIO TELEPHONE OPERATORS

Name	Home Address	Certificate number and Class
------	--------------	------------------------------

S.S.

M.V.

SECTION B – DIARY OF THE RADIO TELEPHONE SERVICE

Date and time (GMT)	Station from	Station to	Frequency used	Record of working as prescribed by rule 30
---------------------	--------------	------------	----------------	---

SECTION C – DAILY EXAMINATION OF BATTERIES

Date	Battery Number	Voltage off load		Voltage on load		Remarks		
<hr/>								
Date	Battery number and Cell Number	Specific Gravity as measured		Remarks	Battery number and Cell Number	Specific Gravity as measured		Remarks
		Before Charge	After Charge			Before Charge	After Charge	

RADIO TELEGRAPH LOG

PART II

Name of Ship	Official number and International Call Sign.	Port of Registry	Gross Tonnage
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Serial Number from..... to.....

Name of Company operating the Radio Service.....

S.S.....

M.V.....

DIARY OF THE RADIO TELEGRAPH SERVICE

From	Station to	Full Details of Call Signals and Distress Working as prescribed by rule 22	Frequency
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[No. SW/5-MSR(9)/74-MA]

S.K. SHARMA

Under Secy.

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