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M500.

STAFF REQUIREMENTS FOR W/T

GENERAL.

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1. Transmission Requirements.

The general requirement for Transmitters is that all Transmitters fitted in a ship should be capable of being worked simultaneously. The only exception to this is that certain I. P. Transmitters which are fitted as alternatives to H. P. Sets usually employ the same aerial trunks and therefore cannot be used simultaneously with their respective H. P. Sets.

2. Mutual interference.

Maximum possible freedom from mutual interference between transmitters and receivers is a requirement in every ship subject to the limitations imposed by the rig.

3. Wavefrequency limits.

The normal wavefrequency limits for general purpose W/T transmission are 100-20,000 kc/s. The lower limit is set so as to cover M/F Station waves.

So far as the upper limit is concerned, 20,000 kc/s is desirable. Where this cannot be obtained without unduly complicating the sets a limit of 18,000 kc/s can be accepted.

4. W/T sets in small craft.

When small craft are working with the Fleet difficulty is often caused by their limited wave-frequency range, which prevents them using Station M/F waves or auxiliary waves. The essential requirement is M/F only but this should be extended, when sets are available, to 100-15,500 kc/s.

5. International obligations and Board of Trade requirements.

G.C.I.R. regulations for mobile stations must be complied with, as must also the Board of Trade regulations for emergency sets.

6. Wave-changing.

The operation of wave-changing should not take more than one minute on any set. In the case of G/C sets the change between the two waves required must not take more than four seconds.

7. Simplicity.

Simplicity of operation and maintenance is to be aimed at in all sets.

8. Low Power Sets.

Separate L. P. sets to be fitted (Proposals to this effect are circulating on S. D. O. 285/36.)

9. Spark Sets.

Hitherto a spark set has been incorporated as an attachment to main and second M/F sets. Proposed policy (S. D. O. 285/36) is to fit a separate spark set on the ships fitted with the C.W.S. system, purely for deliberate jamming or anti-jamming use. (C.W.S. ships commence with K.G.V. Class, "Illustrious"

Class and "Tyne", future depot ships, 1938 Cruisers and later.

10. Vessels not fitted with W/T.

Vessels not normally fitted with W/T will be supplied with transportable or semi-portable W/T sets for sea passages.

11. Vessels fitted with D/F.

D/F is a requirement in certain classes of ship only. Where it is a requirement the following is intended. -

(i) Facilities for taking D/F bearings on one M/F and one H/F wave simultaneously, where space and rig permit.

(ii) Where (i) is impracticable, to provide facilities for constant listening watch on one M/F and one H/F wave and for taking D/F bearings on one at a time, where space for two complete receivers is available.

(iii) Where (ii) is impracticable to provide facilities for listening on and taking D/F bearing on one wave, either H/F or M/F.

The vessels in which D/F is a requirement, are:-

Capital ships.	Tribals.
Aircraft carriers.	Flotilla leaders.
Cruisers.	Escort vessels.
Depot and repair ships.	Fast minelayer (small).
	Anti-Aircraft cruisers.

D/F is not at present a requirement in submarines.

12. Vessels fitted with R/T.

R/T is a requirement in certain classes of ships only. The classes at present affected are:-

(i) Aircraft carriers (see Transmission requirements of Aircraft carriers, Section B).

(ii) Fishery Protection vessels (N.S. 7329/36).

(iii) All vessels likely to be used for A/S purposes (S.D. 0422/37).

(iv) M.T.B's

Memorandum on Staff Requirements for various  
classes of vessel.

A	Capital Ships	L	Controlled Loop Minelayer
B	Aircraft Carriers	M	Trawlers
C	Cruisers	N	Tugs
D	Depot and Repair Ships.	O	Boom Defence Vessels
E	Tribals	P	M.T.B's
F	Flotilla Leaders	Q	River Gunboat
G	Destroyers	R	Armed Merchant Cruiser
H	Escort Vessels	S	Examination Vessel
I	Minesweepers and Patrol Vessels	T	Local Patrol Vessel
J	Netlayers	U	Submarines
K	Fast Minelayer (small)	V	R.F.A's
		W	Anti-Aircraft Ships
		X	Auxiliary and Anti-Aircraft Ships.
		Y	Destroyer Anti-Aircraft Escort Vessel.
		Z	Liners converted to Aircraft Carriers.

A. Capital Ships.

References to Admiralty papers

PD04695/34.

SD0285/36.

1. Main M/F set.

Battleship Flagships and Battlecruisers require a range of 800 miles throughout 24 hours under normal conditions. In other Battleships, if constructional advantages can be gained by this reduction, a range of 250-300 miles can be accepted. Set must be suitable for high speed working.

2. Main H /F set.

Range of 1,500 miles required throughout the 24 hours. World wide communication required for as long a period as possible. Set must be suitable for high speed working.

3. Main Low Power set.

Range 80 miles for harbour and short distance working. To use same trunk as main M/F set.

4. Second M/F set.

General M/F standby set. Range 250 miles.

5. Second H /F set.

General H/F standby set. As for A(2).

6. Second L. P. set.

To use trunk of Second M/F set, other-wise as for A(3).

7. Auxiliary (Screen) Wave Set.

Range 30 miles. (S.D. 037/32).

8. Standby Auxiliary (Screen) Wave set.

As for A(7).

9. Short Distance Manoeuvring set.

Range 3 miles with "cut off" beyond this distance to give maximum freedom from D/F and interception. Frequency Range 30-60 Mc/s. (S.D. 037/32 and S.D. 096/34).

10. Fire Control set.

Range 2 miles. 7 channels required. Quick wave change essential. Minimum interference to and from other sets. Maximum immunity from enemy jamming and effects of gunfire. Frequency range 50-75 Mc/s C.A.F.O. 565/35 and S.D. 1061/35.

11. "Immediate" Emergency set.

To be instantly available for use should power or control of any set fail. To be independent of ships mains. (S.D. 654/37).

12. Spark set.

To communicate through or to cause deliberate interference.

To use aerial Trunk of the Main M/F set.

Note. Fleet Flagship - 2nd in Command - one other Capital ship - Depot and Repair ships - H.Q. ship in combined operations are required to be fitted with High Speed Transmission. (M.O.I. 043/34) (S.D. 074/37).

B. Aircraft Carriers. (P.D. 04695/34) S.D. 0321/34  
S.D. 0136/35  
S.D. 0285/36

Requirements are the same as for Capital Ships  
except -

- (1) No Fire Control set is required.
- (2) R/T attachment to be fitted in both main and second H/F sets.
- (3) A Range of 150 miles on R/T and 200 miles on I.C.W. is required from ship to air (4,000 ft.) (S.D. 0321/34).
- (4) An additional H/F Transmitter fitted with R/T attachment is required.
- (5) Homing Beacon set is required. This set is required to give maximum practicable immunity from enemy air or surface D/F and interception. Range 50 miles at 5,000 feet. Frequency range 200-220 mc/s. (S.D. 480/36).

C. Cruisers. (P.D. 04695/34)

Requirements are the same as for Capital Ships  
except -

- (1) The Fire Control set requires a range of 5 miles and 15 communication channels should be provided. A set similar to that fitted in capital ships will not meet the Range requirements. (S.D. 1061/35).

D. Depot and Repair Ships.

T.D. 71/ and S.D. 074/37.  
T.D. 4B/37.

Depot and Repair Ships are to be fitted to enable them to carry out the duties of a W/T Base Ship.

The requirements are the same as for capital ships except -

- (1) Only 1 Low Power set is required and this set must be supplied with a separate trunk so that it can be used for transmitting on the Auxiliary Patrol wave at the same time as the Main sets are working.
- (2) No Fire Control set is required.
- (3) High **Speed** Transmission is required.

E. Tribals.

1. Main W/T set.

M/F range 600 miles throughout 24 hours under normal conditions.

H/F range 1,000 miles throughout 24 hours and world wide range during as long a period as possible.

2. Low Power and "Immediate" Emergency set.

For short range and harbour working. Independent of ships mains. Quick wave change is essential.

Range 50 miles on 500 Kc/s and at least 20 on other frequencies.

To use same trunks as main W/T set.

3. Second W/T set.

M/F range 100 miles.

H/F range. As for main set.

4. Auxiliary (Screen) Wave W/T set.

5. Fire Control W/T set.

Range 2 miles.

Quick wave change is essential.

6. Short Distance Manoeuvring Set.

(This has not been approved.)

7. Spark Set.

8. R/T

9. For Vessels fitted with R/T see paragraph 12.

F. Flotilla Leaders.

1. Main W/T set.

The requirements are the same as for TRIBALS except that in "J" class the M/F range has been reduced to 150 miles - no mainmast being fitted. (M.F.20230/36).

2. Low Power and Immediate Emergency set.

As for TRIBALS.

3. Second W/T set.

Range 80 miles on M/F.

To cover M/F and H/F Frequency Band.

4. Fire Control and Auxiliary (Screen) Wave set.

As for TRIBALS.

5. Short Distance Manoeuvring set.

(This has not been approved).

6. Spark set.

≡ R/T.

≡ For Vessels fitted with R/T see paragraph 12.

G. Destroyers.

Requirements are the same as for Flotilla Leaders except --

(1) No 2nd W/T set is required.

= R/T.

= For Vessels fitted with R/T see paragraph 12.

H. Escort Vessels.

T.D. 200/36.

1. Main W/T set.

"M/F range of 500 miles throughout 24 hours under normal conditions. To obtain with the same power supply communications within the limits of the station using H/F", H/F requirement is to be taken as being 1,000 miles throughout 24 hours and world wide range for as long a period as possible.

2. Low Power set.

For short range and harbour working. Independent of ships mains as immediate emergency set. Range 50 miles on 500 Kc/s and at least 20 miles on other frequencies. To use the same trunk as the main set.

3. \* R/T.

\* For Vessels fitted with R/T see paragraph 12.

1. Minesweepers and Patrol Vessels. T.D. 3507/31  
T.D. 3564/31.

1. Main W/T set.

An M/F range of 250 miles is required throughout 24 hours under normal conditions. 350 miles is required for Senior Officers' ships.

H/F requirement is the same as for an Escort vessel

2. Low Power set.

As for an Escort Vessel.

3. Patrol Vessels. \* R/T.

\* For vessels fitted with R/T see paragraph 12.

J. Net Layer.

1. Main W/T set.
  2. Lower Power set.
  3. Auxiliary Screen Wave set.
- As for an Escort vessel.
- As for a Capital ship.

K. Fast Minelayer (Small). T.D. 113/37 and T.D. 91/37.

Requirements are the same as for Flotilla Leaders except that no F/O set is required.

L. Controlled Loop Minelayer.

1. W/T set.

Range 50 miles on 500 Kc/s. Frequency Range to cover commercial frequency and auxiliary vessels' frequency band.

To be capable of use independent of ships mains in emergency.

M. Trawlers.

S.D. 0456/36.

P.M. 2768/36.

Requirements are -

- (1) W/T communication with distant Station or Bases.
- (2) Communication within the Flotilla.
- (3) R/T communication with Trawlers in company and with fishing vessels.

One Transmitting set is required W/T - R/T capable of use independent of ships mains in emergency. Remote control of R/T is required on the upper bridge. Since many fishing Trawlers will be taken into service in war, Naval Trawlers should be fitted with similar apparatus. The W/T apparatus should therefore be of an up to date commercial type.

N. Tugs.

1. W/T set.

As for controlled loop minelayers.

O. Boom Defence Vessels.

(S. D. 0323/37).

An M/F Low Power set is required. When acting as a Gate Vessel, telephone is to be considered the primary method of communication.

P. M. T. B., M. A/S. B. and M. M. S.

1. A W/T and R/T set is required capable of transmission on M/F and I/F.

Range 50 miles on 500 Kc/s.

Q. River Gunboats (Large).

T. D. 97/57.

T. D. 81/37.

T. S. D. 133/36.

Long range W/T and port to port communication required. A set similar to that fitted in H.M.S. SCORPION (M/F H/F set Type 49) will meet requirements (S.D. 53/37).

Power supply for the main W/T transmission should be provided without necessity of lighting main boilers.

1. W/T set.

M/F range 600 miles. H/F range 1,000 miles throughout 24 hours and world wide during as long a period as possible.

R. Armed merchant cruisers.

(M. O. 5435/35).

In general these vessels will use their existing  
W/T apparatus.

H/F transmission is required.

S. Examination Vessels.

W/T is not required unless specially ordered.  
These vessels normally communicate by V/S.

T. Local Patrol Vessels.

Transportable or portable sets will be installed as required. Sets to be independent of ships power supplies.

U. Submarines.

O.P.R., THAMES and PORPOISE Classes.

1. H/F. World wide communication on the surface during as long a period as possible. Largest possible range from a submarine at periscope depth.
2. M/F. 200 miles range on fixed aerial, 800 miles on kite aerial, throughout 24 hours under normal conditions.
3. L.P.A. 100 miles range.

SWORDFISH Class.

1. H/F. As for O.P.R., THAMES and PORPOISE Classes.
2. M/F. As for O.P.R., THAMES and PORPOISE Classes.
3. Harbour set. 8 miles range.

TRITON Class. 1,000 tons. (T.D. 82/35).

1. H/F. Range 2,500 miles on the surface and at least 100 miles (maximum possible range is desired) from periscope depth. Signals to be as immune as possible from D/F. Directional transmission would be a great advantage.
2. M/F. 50 miles range as fixed aerial, for emergency and for communicating with merchant vessels.

UNITY Class. 500 tons. (T.D. 47/36).

1. H/F. As for TRITON Class, but range reduced to 1,000 miles.
2. M/F. As for TRITON Class.

V. R.F.A's.

(a) Seagoing vessels. (Over 1,000 tons.)  
(C.A.F.O. 783/37)

1. Main W/T set.

A suitable commercial set is to be fitted as standard. As far as possible Naval and commercial M/F - H/F waves are to be covered.

2. Emergency set.

A commercial spark set independent of ships mains to work on 500 Kc/s only.

(b) Harbour Vessels. (1,000 tons and under).

M/F only required. Range 50 miles.

W. Anti-Aircraft Cruisers. (converted "O" class cruisers.)

Duties:-

- (1) Escorting convoys in areas liable to attack from shore based aircraft.
- (2) Escorting Fleet Auxiliaries.
- (3) Assisting in the initial stages with the A.A. defence at a Mobile Naval base. S.D. 0245/37.

Main M/F set.

M/F range, 600 miles throughout 24 hours under normal conditions.

Main H/F set.

H/F range, 1,500 miles required throughout 24 hours. World wide communication required for as long a period as possible.

Main Low Power set.

Second M/F set.

Second H/F set.

Auxiliary Screen Wave set.

Immediate Emergency set.

Spark set.

As for a cruiser.

X. Auxiliary A. A. Ships (converted Merchant Vessels)

S. D. 0245/37.

M. F. 0707/37.

No special type of W/T is desired. Their  
existing W/T sets will suffice.

Y. Destroyer converted to Anti-Aircraft Escort Vessel.

The Staff Requirements are the same as for Escort Vessels.

Z. Liners converted to Aircraft Carriers. (S. D. 0296/37)

These ships are only required for Trade Protection and for operating on the Trade routes.

Requirements are:-

- (a) M/F transmission (800 - 1,000 miles).
- (b) H/F transmission to include R/T.
- (c) Low power transmitter capable of working on the Auxiliary wave band if required.
- (d) 2 M/F or 2 H/F or 1 M/F and 1 H/F transmission simultaneously.

2. Transmitters are to be contained in one transmitter room as adjacent to the after mast as possible. Receivers to be contained in a combined Central Communications Office and Central Receiving Room adjacent to the bridge.