

W/T EQUIPMENT IN SUBMARINES

Until recently the W/T equipment in submarines consisted of :-

Transmitter Type 55.
Receiver Outfits CDC/2.
Receiver Outfit CDF.
D/F Outfit FM11 or FM4.
Wavemeter Outfit GK.
A.C. Supply Outfit DDD.

With the present trend of the war this equipment requires extending and revising to bring it more into line with the facilities given by surface ships. The proposed equipment is as follows :-

TYPE 55.

- (i) Is being converted to Type 55M, in which the old M/F panel covering 100-1400 Kc/s is removed and at the same time facilities for low power transmission between 1.5 and 3.0 Mc/s are provided. This results in an overall reduction in size of the set by one panel.
- (ii) Existing Type 55's will also be supplied with the necessary coils and accessories to extend their frequency range as in Type 55M.
- (iii) Modulator and power units are being developed to enable R/T to be used. These two units fit into a small rack about 2 feet high, 15 inches wide and 20 inches deep. This can easily be accommodated in the space saved by fitting Type 55M.

TCS.

Pending the production of the modulator for Type 55M, the transmitter of TCS is being supplied to all submarines as a temporary measure.

TYPE 86M.

To provide communications with aircraft and short range inter-submarine communications, it has been decided to fit Type 86M. Pending design and production of a special pressuretight aerial, an aerial and screened feeder is being provided locally as follows :-

A screened cable is brought through a normal pressure hull gland, up the periscope standard to a point roughly midway between the two periscopes. The cable is then cut short, the screening removed from the last 16 inches and the end sealed by vulcanising. This unscreened portion is then supported in a vertical position by securing to a bakelite or wooden vertical spur fitted to the periscope standard. The periscope standard acts as an efficient reflector.

RECEIVERS.

These remain as CDC/2 and CDF. One CDC is connected to four loudspeakers distributed through the submarine for entertainment purposes; this loudspeaker network is the responsibility of D.E.E. who handles all entertainment audio equipment.

One loudspeaker (Patt. 8888A) is now to be fitted in the W/T office with switching facilities, enabling it to be connected to either Receiver B28.

The CDF is being removed where the Captains S/M find that its use is not of value, as is the case in many areas of the Far East.

D/F OUTFITS

The existing D/F Outfits FM4 and FM11 are to be replaced by FM14 in due course. It is a "bantam" edition of FM11 and embodies the technical improvements which have been developed since FM11 was designed. Its submerged performance will be at least equal to Receiver B29 and this latter receiver will probably be finally removed when FM14 is installed.

WAVEMETER OUTFITS.

It has been decided to replace Wavemeter Outfit GK by Wavemeter Outfit GR, with a view to saving space. Wavemeter Outfit GR is based on the R.A.F. Type 2 Crystal Monitor, and is a portable battery operated unit using standard crystals on their fundamental frequencies or harmonics as necessary. It will be replaced by the smaller mains operated Wavemeter Outfit GY when it becomes available towards the end of the year. Ships with D/F outfit FM4 will not be able to get full value from this change until they can give up their Patt. 1204 Rectifier when D/F Outfit FM14 is fitted. A supply of about 20 crystals is being issued with the GR.

A.C. SUPPLY

The increased demand for A.C. supplies has resulted in the development of Power Outfit DXA which gives common supplies for both W/T and Radar. This Outfit is being generally fitted in new construction but it is not yet certain that it will be fitted retrospectively owing to the difficulty in finding space. The existing A.C. Supply Outfit DDD is not now large enough to cater for all requirements, but it can be accepted that the entire W/T equipment will not be in operation at one time.

LORAN

Loran is now being fitted in submarines operating in areas where it can be of use. At present the standard APN-4 Outfit is being installed but when the smaller APN-9 becomes available it will be used.

Loran, being used by the navigator, is fitted in the control room, near to the chart table. It uses one of the normal submarine aerials.

AERIALS

Experimental aerial rigs are being tried with a view to obtaining H/F reception at periscope depth. This is most desirable in the Far East as submerged reception from stations in U.K. is not practicable in large parts of that area.

A V.H/F aerial capable of standing up to the water pressures encountered by submarines is also a requirement, and is in the early stages of development.

LAYOUTS

The problem of accommodating this additional equipment has necessitated a complete re-arrangement of the W/T offices in submarines, and in 'S' and 'T' Classes the entire office has been turned round, with the Type 55M going into the forward end of the office and the receivers aft. There are, however, a number of stages of the turn round which can be done separately, depending on the time and equipment available at the time of refit.

FIGHTER DIRECTION RECEIVERS

P38 AND P104

When the direction of aircraft on V.H/F became of increased importance in H.M. Ships, it was essential to obtain receivers covering the 100 - 150 Mc/s band in the shortest possible time. Admiralty therefore seized an opportunity which offered, to take over the R.A.E. designed R1392. This was given the Naval title of Receiver P38 and became the normal receiver used afloat with Type 87M.

Experience with the P38 showed that it suffered from a number of defects. By far the most serious of these was its frequency instability; this is caused by the use of negative instead of positive coefficient condensers in the I/F circuits, and the effect is that, as the receiver warms up and the inductance of the I/F transformers decreases, the capacity of the negative coefficient condensers also decreases and hence the frequency of the I/F circuits decreases and the receiver goes off tune. These negative coefficient condensers had to be accepted when receivers P38 were originally made, as no positive coefficient substitutes were available. Although the earlier condensers were actually labelled as positive, they had in fact, a very heavy negative coefficient.

The P38's were lined up accurately at manufacturers after running for about one hour and this gives the best all-round performance. Unfortunately, in a number of cases enthusiasts touched up their receivers and aligned them to give their best performance when just switched on, and consequently when fully warmed-up, they were more than ever out of line.

Opportunity was taken of a break in contracts to fit positive coefficient condensers, an aerial trimmer and a series/shunt pulse limiter to alleviate the necessity for RIS. The receiver incorporating these and other modifications is known as Receiver P104 and has only recently come into production. Allocation is at present made by Admiralty as supplies still fall short of demands.

Now that positive coefficient condensers are more easily available, arrangements are in hand to recall all P38's for modification. The work is beyond the capacity of ship's staff and can only be commenced when a pool of P104/P38's has been built up to provide replacements. An Admiralty Fleet Order will be issued in due course and Admiralty will probably allocate the replacement receivers.

OUTFIT QH

Reference to Outfit QH is made in the article "A Letter from Diadem". See Page 34 of this issue.

W/T A.F.O.S.

Just in case you've missed an A.F.O., and to help people in new jobs, we are printing below a list of A.F.O's issued in 1944.

These A.F.O's are in a rough index and well worth checking up. In our next issue we will bring you up to date to the first six months of this year (1945).

(≠ Denotes C.A.F.O.)

Aerials.A.F.O./44.

Modified 1939 "Dido" Class Cruisers - Position of Battle and D/F Sense Finder Aerials.	67
W/T Sets 89, 89M and Transmitter 4TA - Aerials.	70
W/T Receiving Aerial Feeders - Revised Fitting Arrangements.	329
V.H/F Aerial Outfit APH - Tests to be Carried Out.	1371
Flat Roof of Main W/T Aerials Protecting Loops.	1375
H/F W/T Transmitting Aerials and Aerial Tuning.	1969
"S" and "U" Class Submarines - Emergency Aerials.	≠ 785
Rigging Arrangements of Main Aerial Roof when H/F D/F is fitted (Flotilla Leaders, Destroyers and Light Craft).	≠ 735
Spare V.H/F Aerial Equipment.	≠ 989

Aerial Exchange Outfits.

Aerial Exchange Outfit EJ - Introduction (Battleships, Cruisers and Depot Ships).	≠1183
Aerial Exchange Outfit EK - Introduction - A's and A's (Aircraft Carriers).	≠1931

Action Information Organisation.

Action Information Centre - A's and A's (Hunt Class Destroyers).	≠ 618
Action Information Organisation - A's and A's.	≠ 864
Action Information Organisation - A's and A's (Mod. Black Swan, Black Swan Classes).	≠2017

Centralised Wireless Systems.

Centralised Wireless Systems - Responsibility for Maintenance.	4766
CWS Ships - Lighting in the Remote Control Office.	5068
Centralised Wireless System - R/T Facilities - A's and A's.	≠2807

D/F.

D/F Outfit FH4 - Interchangeability of Components and Spares.	1116
D/F Outfit FH4 - Replacement Condensers.	3315
H/F D/F Outfit FH4 - Repairs to Defective Apparatus.	4767
H/F D/F Outfits FH4 and AH6 - Cathode Ray Tubes.	5069
H/F D/F Outfit FH4 - Fitting of Dial Bearing Indicator - Patt. 53036.	5193
H/F D/F Outfit FH4 - Repair of Main Units.	≠ 510

D/F Outfits FH4 and AH6 - Modified Attenuator Scale.	£605
H/F D/F Outfit FH4 - Introduction of Switched Coils in place of Plug-in Coils.	£1329
H/F D/F Outfit FH3 - Modification to permit D/F on Receiver B28.	6442
H/F D/F Outfit FH3 - Receiving Equipment.	£135
H/F D/F in Escort Carriers - Flexible Coupling for Hinged Masts - A's and A's.	£2804
W/T Equipment - Fitting D/F Outfit FM12 and Marconi H/F Transceiver CNS1 etc - "Flower" Class Corvettes.	1387
D/F Outfits FM2/7/11/12 - Adjustment of Inductance Correcting Unit.	3987
Rigging Arrangements for M/F D/F Outfits FM4 and FM11 - A's and A's (Submarines).	3990
D/F Outfit FM4 - Cable Cutters.	£839
D/F Outfit FV3 - Removal of	£2666

Maintenance

W/T Equipment - Maintenance of by Commercial W/T Companies - Report.	1372
W/T and Radar Apparatus - Technical Inspection.	993
W/T and Radar Installations - Cables, Electric.	3559
Centralised Wireless Systems - Responsibility for Maintenance.	4766
Ventilation Trunking to W/T Offices in Destroyers - A's and A's.	4800
Radio Valves, Defective - Return of, for Examination.	5071
Responsibility of Upkeep of V.H/F R/T Equipment.	5323
Test Equipment IE-19-A for 86M V.H/F R/T Equipment - Introduction.	5324
W/T Weston Selective Analyser and Super Oscillator for Test W/T Equipment.	5326
W/T and Radio Battery Cupboards - Electric Heatings - A's and A's.	5786
Unsatisfactory State of W/T Equipment in Ships on Completion of Refit.	6185
W/T Motor Generator Type CLL 21806 and 21807 - Faulty Operation.	6585
American Radio and Sound Signalling Equipment - Supply of Maintenance Spares.	£563

Miscellaneous

Addresses and Telephone Numbers of Various Radio Service Departments.	4931
W/T Crystal Stowage Box - Introduction.	6186
Allocation of R/T Inter-Communication Frequencies.	£ 32
Cypher (Coding) Machines - Establishment, Supply and Fitting.	£ 890

Radio Interference Suppression

Conduit Adaptor for Radio Interference Suppressors - Introduction.	713
R.I.S. (3) Replacement of Valves.	722
Radio Interference (Coastal Force Craft).	1396
Screened Radar and W/T Offices - Insulation (Coastal Force Craft).	4298
Radio Interference Suppressors, A.P. 19449, 19449A - Introduction.	4951
Radio Interference in Coastal Force Craft.	6455
Radio Interference Suppression of Asdic Apparatus in Motor Craft.	£ 739
Suppression of Interference to Type CNY1 in ICG(L)(3) and (4).	£1127
Radio Interference Suppression Equipment (Coastal Force Craft).	£2756

Receivers

Outfits QD and QN - Modifications.	3720
W/T Receivers - Fitting of Patt. W2702 Converter Units (LSH(L) and (S)).	5195
Receivers AR88.	6301
SRE - RBO Receivers.	6445
W/T Receivers - Supply.	× 261
Receiver Outfit QH2 - Faulty Equipment.	× 511
Loran Receiving Apparatus and Nomenclature.	×1052
Outfit QH2 - Power Supply.	×1716
Loran Receiving Equipments LRN1A, LRN1 and DAS1 - Overloading of valves V6.	2431

Transmitters

(including Transceivers and Transmitter Receivers)

W/T Transceiver CNY1 - Fitting in LCT(5).	202
Marconi Transceiver and Loud Hailer Type CNY1 - Introduction.	326
W/T R/T and Loud Hailer Installation Type CNY1 - Modification.	6589
Suppression of Interference to Type CNY1 in LCG(L)(3) and (4).	×1127
W/T Type 60ER - Remote Control Arrangements.	×1875
W/T Transmitter 4T - Modification to Internal R/T Circuits for use with Single Button Type Carbon Microphones.	1841
W/T Set Type 52 ERT - Replacement of H.T. Battery by Vibrator Unit.	3423
W/T Set Type 65 - Introduction of Master Oscillator Unit.	6582
Test Equipment IE-19-A for 86M V.H/F R/T Equipment - Introduction.	5324
Type 86M Equipment (SCR522A) - Modifications.	3558
W/T Sets 89, 89M and Transmitter 4TA - Aerials.	70
W/T Sets Type 89M - Introduction of New Condensers.	6583
W/T Transmitters - 89M/P - Operation in the Band 1.5 to 2.2 Mc/s.	6588
W/T Set Type 89P - Introduction.	1970
W/T and R/T Set Type 89 - Conversion to Type 89.	× 200
Types 87 and 87M R/T Sets - Method of Modification of Type "M" Switch, A.M. Ref.No. 10F/166.	5194
W/T Installations, Types 607 and 608 - Introductions.	6723
W/T Transceivers TV5 and HT11 - Fitting of 4 in. Aerial Trunk Outfit TF.	203
W/T Set Type TBL - Wavemetering.	6305
W/T Set Type TCS - Modification.	6303
Type YE W/T Set - Fitting of U.S. Naval Receiver ZB/ARA.	× 603
W/T Transmitter Receivers Type TBS - Reports.	{ ×1235 ×1654
W/T Transmitter Receiver Type TBS - Modifications to Installations.	×1592
Emergency Battery-Driven Transceiver Aft - Fitting of - A's and A's.	6584
Additional Low Power W/T Transmitter - A's and A's (Flotilla Leaders and Destroyers).	× 927
W/T Sets Types 89M/P - Security of Valves.	3424

Trunk Outfits

W/T Transceivers TV5 and HT11 - Fitting of 4 in. Aerial Trunk Outfit TF.	203
--	-----

A.F.O./44V.H/F Equipment

Responsibility of Upkeep of V.H/F R/T Equipment.	5323
V.H/F Aerial Outfit AFH - Tests to be Carried Out.	1371
Type 86M Equipment (SCR522-A) - Modifications.	3558
Types 87 and 87M R/T Sets - Method of Modification of Type "M" Switch, A.M. Ref. No. 10F/166.	5194
Test Equipment IE-19-A for 86M V.H/F R/T Equipment - Introduction.	5324
V.H/F R/T Equipment.	6184
Aircraft Direction R/T Control Arrangements.	✕ 441
V.H/F Cables etc. on outside of Island Structure - Removal of (Aircraft Carriers).	✕ 677
Spare V.H/F Aerial Equipment.	✕ 989
W/T Transmitter Receiver Type TBS - Reports.	(✕1235 ✕1654)
Speech Control Outfit KGA - Introduction.	✕1126
V.H/F Sets and Associated Equipment - Failures in.	✕1322
V.H/F Signalling - Possibility of Interception by the Enemy.	✕1538
W/T Transmitter Receiver Type TBS - Modifications to Installations.	✕1592
Spotting Aircraft Fitted with V.H/F R/T Equipment, Communication Facilities for - A's and A's.	✕1928

Wavemeter Outfits

Communication Wavemeter Outfits.	4512
Wavemeter Outfit GN - Modification.	5197
Wavemeter Outfit GR - Introduction.	6065

STOP PRESS

Adverse reports have been received of the short lives of some 5Z4G valves. "Duds" are urgently required for investigation in A.S.E.

Do P24 Receivers go off tune under gun shock or vibration in your Types 282/3/4/5?

Are you sure Patt. 9873C Lamp 110 volt 25 watts is fitted in your Panels L22 and not some 220 volt imposters?

PANEL L43 USED WITH TYPE 79B.

A report has been received from H.M.S. GLORY of difficulty in obtaining a reliable sync. pulse for use with Panel L43. A suitable pulse may be obtained from monitoring position 2 in the Type 79B modulator. Care should be taken to screen the pick-up connection carefully so that the inner conductor is not exposed to R/F.

CARE AND USE OF CRYSTAL VALVES.

The following additions should be made to the Tables given under "Nomenclature and Marking" and "Interchangeability" (p.60 of Bulletin for March, 1945):-

CV Title	Colour Code	Function.
CV291	Not yet decided.	For use in pre-plumbed S-band mixer. High burn-out grade.

Type of Crystal	May be replaced by:-
CV291	CV103 or CV113 may be tried in emergency only; the proper crystal must be fitted as soon as possible.