

~~CONFIDENTIAL~~

COPY No 40

BULLETIN



CONFIDENTIAL BOOK OFFICER
1 OCT 1945
ADMIRALTY SIGNAL
ESTABLISHMENT

REPORTS SECTION

35908

ADMIRALTY SIGNAL
ESTABLISHMENT

Issued by

**ADMIRALTY SIGNAL
ESTABLISHMENT**

R H. 600 (7)

SEPTEMBER, 1945

SEPTEMBER, 1945.

THE MATERIAL IN THIS BULLETIN IS FOR INFORMATION GUIDANCE AND INTEREST ONLY. IT DOES NOT NECESSARILY REPRESENT ADMIRALTY OPINION OR POLICY AND IN NO CIRCUMSTANCES MUST IT BE REGARDED AS SUCH. IT MUST NOT BE QUOTED AS AUTHORITY FOR SUPPLY OR MODIFICATION.

CONTENTS

	Page
Editorial	1
Radar Type 960	4
Gunnery Notes	7
The Future of the Radar Officer	9
Radar Type 930	10
U.S. Navy Fire Control Radar	13
Radar Type 262	19
Reports from abroad	25
Aerial Rotation Speeds - Type 293M	26
Analysis of Waveguide Conditions - Type 293	27
Schelde Radar Navigation Scheme	30
Cosmic Noise	34
Some notes on Aerials for Centimetric Radars	38
Radar in a Modern Cruiser	39
Comparison of Weights of Aircraft and Naval Radar Equipment	43
Radar Fitting and Maintenance Notes	47
Radar Modifications	55
Soldering without Tears.	57
A New Form of Construction for Radio Equipment	61
Installation Specifications and Establishment List	65
Standard Frequency Transmissions	69
Training Radio Mechanics (W/T)	71
H/F Communications on Surface Craft	74
Protecting Devices for Wire Aerials	76
German High Speed W/T Equipment	77
The Shape of W/T Things to Come	80
Any W/T Defects ?	83
Outfit QM	84 - 85

TO BE DESTROYED WHEN SUFFICIENTLY PROMULGATED -
CERTIFICATE OF DESTRUCTION BEING FORWARDED TO
A. S. E.

EDITORIAL

Not even the most pessimistic Editor (nor the most optimistic) could have envisaged being called upon to launch a second Victory Number before the first was fairly afloat. But here is the V.J. Number we promised! We have a rather special hope that you will like it - as you will see!

R.H.600

Radio has made very considerable contribution towards the satisfactory end of the conflict, and we like to think that the Bulletin has made your work easier and more interesting. Indeed, when we consider the many nice things which have been said, it seems to us that this unofficial - and perhaps somewhat unorthodox - journal, has served a very useful wartime purpose.

But what of the future? We would like to quote a signal which we received just before going to press. Not merely because of the bouquet it contains - we are proud and grateful - but rather because it crystallises the views and queries put to us by so many of our readers, and because it has occasioned much serious thought here concerning our future activities.

"S.S.E.
(INFO) ADMIRALTY.

C. IN C. B.P.F.

RESTRICTED QXX.

The A.S.E. bulletin has been much appreciated in this Fleet. Its value would be still further enhanced if it were issued monthly instead of quarterly, and it is felt there is room for expansion in the W/T section.

2. It is considered that with the cessation of hostilities the necessity for this publication will increase rather than decrease.

3. Any tendency to increase the security grading of the bulletin would be a serious drawback in reducing the circulation and in increasing the time-lag which has only recently been reduced from three months to ten days.

250627Z August. "

In discussing the problems raised by this message, it is interesting to recall that the idea of an A.S.E. journal was conceived by Officers returning from sea, and that any success the project has attained has been dependent entirely upon the enthusiasm of these Officers, and a few members of our Civilian Staff, who have undertaken the provision of material for the Bulletin in addition to their already arduous war-time duties, "without hope of recognition or reward". Many of these Officers will be leaving the Service soon, personnel is likely to be drastically reduced, and A.S.E. may well not have staff to continue the Bulletin in its present form - at all - still less monthly!

Then there is the question of official status. During war-time many things are tolerated which cannot be countenanced in the more orderly (sic) times of peace. The Bulletin was an unofficial departmental departure from the orthodox which was apparently doing a good job. Well - in war-time - any means to the end! But the War is over, and the question of authorisation will certainly come up for decision on a higher level. We have our critics!

And what of the Editorial problems ? Surprisingly it has not always been easy to gather sufficient suitable material for a quarterly publication, even under the extraordinary conditions of war-time high speed Radio development. Particularly is this true of the W/T section. Radar sets appear in great variety, are handled by a larger staff. Compared with Communications, Radar is in its infancy - subject to more rapid development - and to more teething troubles ! Even so, it has sometimes been difficult to fill the Radar section with the right stuff, and we know only too well that the (C)s - as keen as any - have had difficulty in keeping their end up. And this under abnormal conditions of equipment development. Frankly we can see considerable difficulty in producing a Bulletin confined to A.S.E. applications of technical development, even on a quarterly basis, and we do not think it is within the province of A.S.E. to compete with the commercial technical press in the dissemination of general technical information. They will do it so much better anyway !

True it is that - owing to the inconsiderate capitulation of the Japanese, so close to our press date - no firm decisions have been taken. Yet it must be clear from the above that R.H.600 is unlikely to continue in its present form.

In any event there is almost certain to be an Editorial change of head-gear, so this is a time for farewell and thank you. Thank you readers, for the nice things you have said and contributors for support so unstintingly given. Thank you also all those members of A.S.E. who have worked hard in the task of illustrating, producing and despatching the Bulletin and in guiding its policy.

NOTE BY THE CAPTAIN SUPERINTENDENT :-

As stated in the Editorial this is probably the last issue of the Bulletin in its present form.

I shall do my best however to preserve it in some guise, as I am convinced that it meets a very definite and important need in the Fleet and in the Ports. Probably the answer will be a technical News Letter. This, however, like many other A.S.E. activities must depend on the staff allowed.

I do not intend therefore to write an Epitaph for the A.S.E. Bulletin, but I do want to pay tribute to the ability and enthusiasm of its Editor - Lieutenant F.J. North, R.N.V.R., and to all those who have contributed to its very real success.

W. S. Workman



V. J. K. ROSE '95

“... and now for the Peace ”

RADAR TYPE 960

Of the two WA sets at present in use, Type 79 is of pre-war design while Type 281 was introduced in the first year of the war. In spite of continuous improvement by a series of modifications, including the conversion to single aerial working, continuous aerial rotation and the recent "Bubbly" modifications, the rapid development of radar technique has rendered these sets more and more obsolete. Moreover the organisation and presentation of radar information have been entirely changed since the early days and Types 79 and 281 were not designed to make the best possible use of the centralised organisation provided by the A.I.C. and R.D.R.

Type 960 has been designed to meet the need for a long range WA set, with a rather better general performance than 281BQ, and a display and operational control system suitable to the new R.D.R. organisation. While the improvement in range performance is quite substantial (maximum 200 miles compared with 150 miles for 281BQ on medium bomber), the chief advantages lie in the ease of operation obtained by U.D.U. display and complete remote control of the set from the R.D.R., full A.J. facilities including remote frequency control, reliability, compactness and ease of servicing and tuning.

MODULATOR AND TRANSMITTER.

The modulator has been designed to give two alternative pulse lengths 5 or 15 μ secs. at a repetition rate of 250 cycles. Power for the modulator is provided by a special alternator comprising one 250 and two 500 cycle machines synchronised mechanically by driving on a single shaft. The 250 cycle generator voltage is varied by remote control at the modulator in such a way that the modulator pulse voltage can be varied between 6 kV and 18 kV and is maintained stable at any desired value between these limits. The modulator uses a CV12 thyatron to discharge a condenser and inductance network, and it can be fired either from an internal trigger unit or an external trigger unit providing master synchronisation with other sets such as Types 277/293 or 980/981.

The transmitter which is mounted on the same base plate as the modulator comprises an oscillator stage, amplifier stage, T.R. switch, aerial filter and dummy aerial lamp load. The tuning of the transmitter is gauged so that the frequency can be varied over the frequency range 80 to 90 Mc/s by a manually operated selsyn either in the R.D.R. or at the U.D.U. in the Type 960 office. The transmitter uses a pair of CV240 oxide coated cathode valves for both oscillator and amplifier, giving a peak power output of 400 to 450 kW on both pulse lengths. The separate oscillator stage ensures frequency stability and avoids frequency jumps due to aerial mismatch when tuning over the frequency band. Initial setting-up of the transmitter is very much simpler than with Type 281. The T.R. switch employs Tungsten spark gaps and covers the entire frequency band without tuning; the spark gaps require re-setting every 24 hours to allow for wear, but no other maintenance is necessary. The aerial filter is of the band-pass type and is provided to eliminate the radiation of modulation and harmonic frequencies from the transmitter and to reduce interference to the receiver.

Great care has been taken to maintain complete screening of both transmitter and modulator and all incoming mains leads are provided with filters to reduce interference to other sets. All supplies are switched by a main isolating switch, with a subsidiary H.T. switch both situated on the modulator panel. The thyatrons are supplied direct from the generator and require 30 minutes warming up; provided the generator has been on 30 minutes the transmitter can be switched on in $1\frac{1}{2}$ minutes.

RECEIVER

The receiver is built up of 14 small units mounted in a framework. The units can be withdrawn on runners, for easy servicing, every component being immediately accessible in the withdrawn positions. The whole is mounted on the aerial control unit.

The R/F unit is provided with an electro-mechanical A.F.C. system which searches over the band 80-90 Mc/s until it locks on to the transmitter frequency; it will follow changes of transmitter frequency at any speed up to 1 Mc per second. The noise factor is 4 db. over the frequency band.

Two separate I/F units are provided. The first has a bandwidth of 65 Kc for use with the long pulse; this gives optimum range performance. In addition the attenuation outside the pass band is very great and ensures the maximum protection against jamming and interference. The second I/F unit has 500 Kc bandwidth for use (primarily) with the 5 μ sec. pulse, but it can also be used with the 15 μ sec. pulse when it is desired to examine the echo shape in order to estimate group sizes.

The receiver includes a choice of A.J. devices such as low pass filter, high pass filter, automatic gain control, differentiation. These can all be operated by a switch on the remote control panel, incorporated in the U.D.U. in the R.D.R. In normal operating positions, the receiver gain is preset but on A.J. positions it can be varied at the remote position.

Cathode followers to feed up to 8 P.P.I. lines and 3 sector displays are provided as part of the receiver. It also includes a performance meter, a noise generator for testing receiver performance and checking losses in the T.R. switch, and a crystal calibrator feeding 10 mile pips through the cathode followers to all 960 displays.

AERIAL

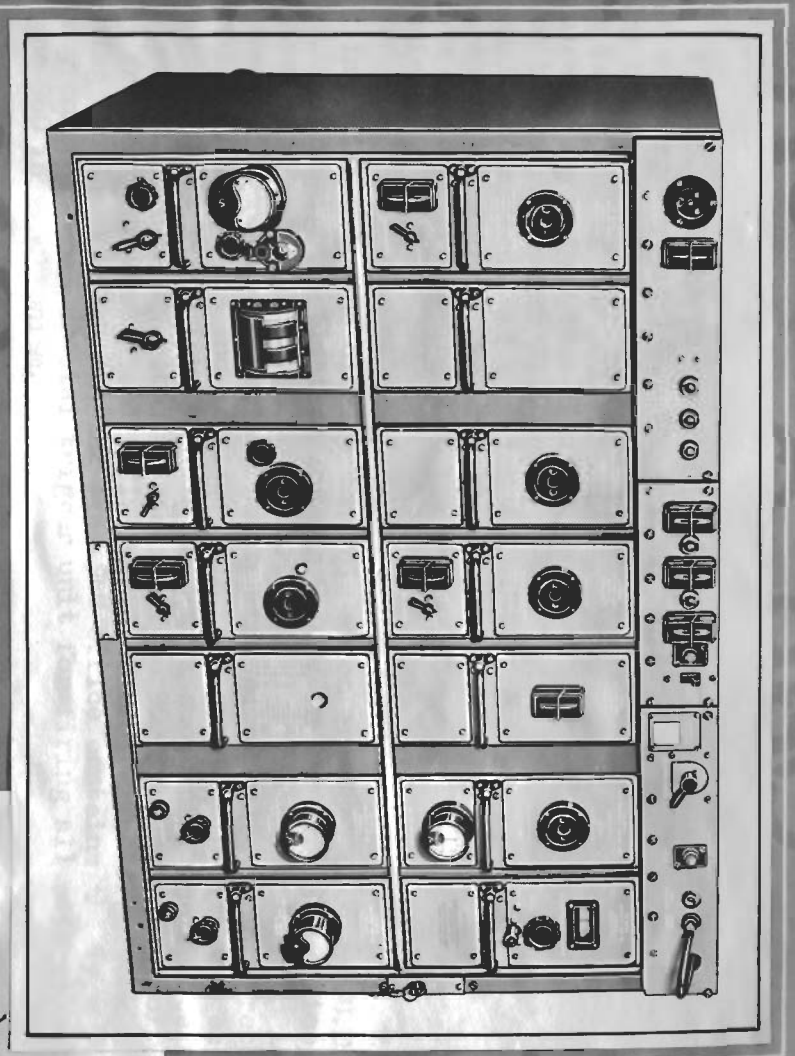
Type 960 employs aerial outfit AQQ which is identical with AQB (used with Type 281BQ) except that rotation is by means of an amplidyne system driving a D.C. motor. The speed of rotation is continuously variable up to 7 r.p.m. and can be controlled either in the 960 office or the R.D.R.

The AQQ aerial was designed for spot frequency working on 86, 88 or 90 Mc. It is hoped that it will be possible to vary the frequency by ± 2 Mc from the mean, but the full facilities of frequency variation provided by the Type 960 panels cannot be utilised with this aerial. A wide band aerial outfit ANB to cover the full 10 Mc band and give a sharper beam is at present under development. This aerial is of the mattress type and will be fitted in aircraft carriers only. The set will then be known as Type 960P.

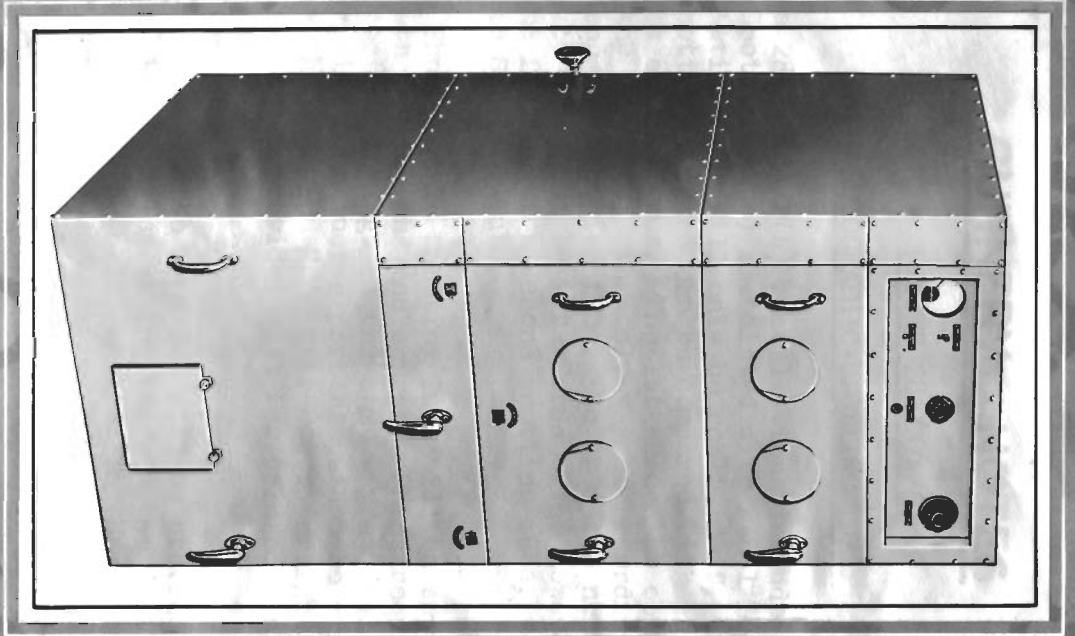
DISPLAY AND REMOTE CONTROL

The display from Type 960 in the A.D.R. will be the same as that at present provided with Type 281. In the R.D.R. the display will be as follows :-

Telling :-	Coupled pair of P.P.I.'s.
Height Estimation :-	U.D.U.
Interrogation :-	U.D.U. interswitchable with Type 277 (Battleships and Cruisers) or Type 980 (Carriers).



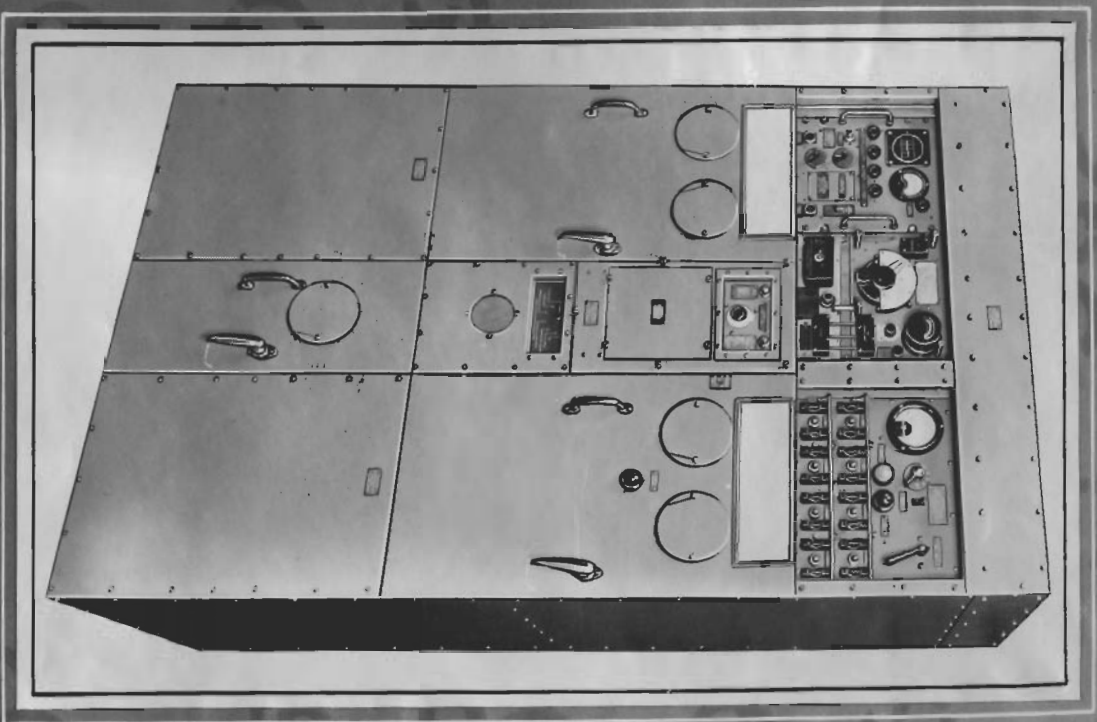
960 RECEIVER



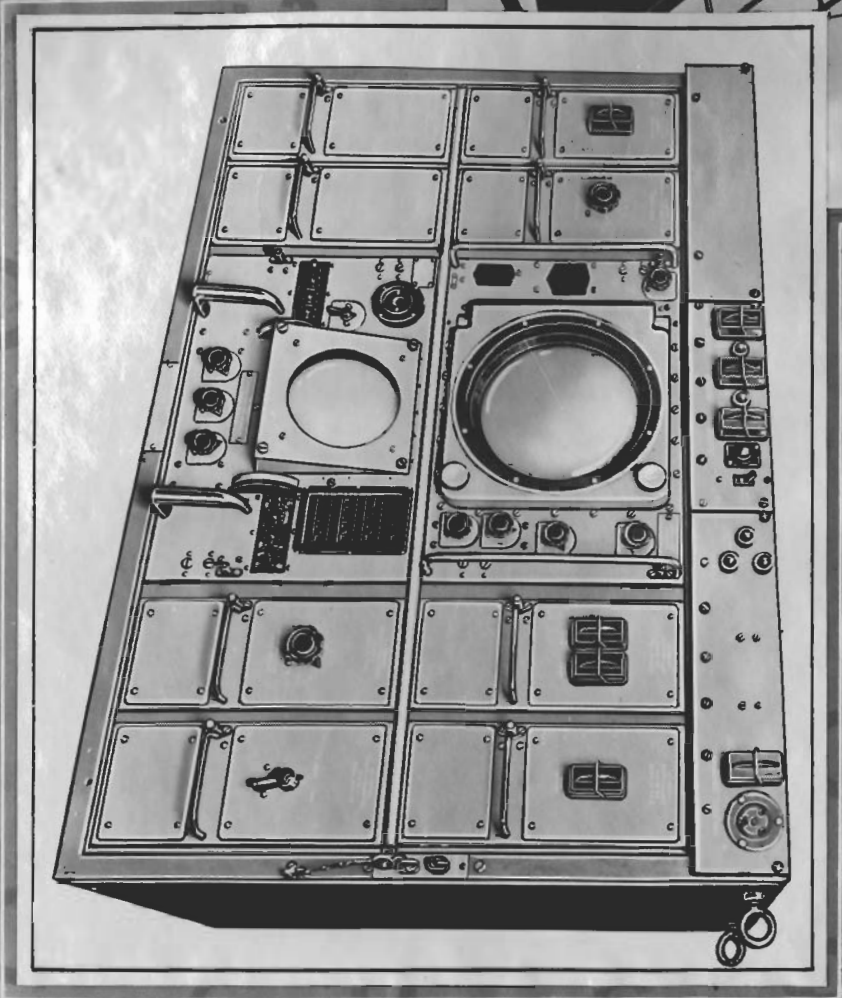
960 TRANSMITTER



960 AERIAL



960 MODULATOR



960 UDU DISPLAY