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BULLETIN

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ADMIRALTY SIGNAL ESTABLISHMENT

R.H.600(4) DECEMBER, 1944

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EDITORIAL

The undoubted popularity of the Bulletin is a source of Editorial gratification - and embarrassment. The stream of requests for copies which has flowed in since the appearance of No.1, leaves no doubt that a requirement is being met. To accede to these requests would involve a circulation far beyond the resources of the Establishment in present circumstances, and so - regret it as we do - we must base our circulation upon the assumption that each copy will be read and passed on quickly. It should be noted then, that our circulation is to Flotilla Leaders and above, Escort Group Commanders and Senior Naval Officers ashore who have a P.W/T.O or P.R.A.D.O. on their staffs and that only in very special circumstances can exceptions be made.

Quite apart from our inability to cope with an increase in circulation, security regulations also impose limitations upon us. This also is a matter for regret since we feel that much of the information in the Bulletin would be of interest and importance to the more senior technical ratings, including those in ships without a qualified officer.

We have heard of one squadron where the Squadron Officer concerned calls an occasional meeting of the senior specialised ratings of the ships in his squadron to discuss current problems and uses the information in the Bulletin to put them in the picture both as regards hints on present equipment and news on future sets. This seems an admirable plan and is confidently recommended to all concerned.

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A.S.E.'s geographical separation from C.S.S. and C.R.T. has many disadvantages; not the least being that we don't get as many visits from Signal and Radar Officers as we did at Portsmouth.

Such visits are of great assistance to us; and we think of great interest to you.

There is usually a half day down South which can be filled in either at the beginning or end of a long leave or on a duty trip. Do not hesitate to let us know when you can come, giving if possible a couple of days notice and also if possible an idea of what you particularly want to see or discuss, or whether you want a general look round. Address your letter for the attention of Commander 'A' for W/T matters, Commander 'B' for Radar, and Commander 'M' if your visit concerns ship-fitting activities.

RADIOLOCATION

For all the umpteen centuries
In which Britannia's ruled the seas
The pilot's art
Performed a part
Beyond exaggeration.
His skill it was divined the truth
From gadgets like the azimuth
It was his hand
Kept sea and land
In safe inter-relation.
But now that hand, that skill are vain
The Navy ploughs the purple main
And finds its way
By night or day,
By Radiolocation.

Our gunners too in bygone days
Received their modicum of praise
For speed of eye
Assisted by
Ballistic calculation.
Our battles couldn't have been won
Unless the man behind the gun
Had had the brain
To lay and train
With nice discrimination.
But nowadays all that is changed -
The guns are willy-nilly ranged,
Come shine, come blitz,
Upon the Fritz,
By Radiolocation.

Electrical complexity
Now governs everything at sea;
The wiry mess
That's called wireless
Controls the situation.
No more need sailors stream the log.
No need for look-outs in a fog,
The new A.B.
Adjusts a key
Or sets some calibration.
In fact why have a Fleet at all?
Let's run the party from Whitehall -
The First R. Lord
Will top the Board.
(R = Radiolocation)

J.R.

FALL OF SHOT SETS

A programme has now been embarked on to provide fall of shot sets in addition to Type 274 to be fitted in certain capital ships and cruisers.

Owing to the lack of time and the limited effort available to complete a production equipment, two projects are under way to provide a small number of workshop models of each, which will be available for fitting during the second half of 1945.

The first of these projects is to convert a number of the Army set, "William", for naval use. This is an equipment designed by R.R.D.E. primarily for coast artillery fire control and observation of fall of shot and which also has another application for field artillery work. When converted this set will be known as Type 930 and 20 equipments will eventually be provided.

The second project, is being developed in Canada by N.R.C. and consists of an equipment which will be known as Type 931, and of which 12 workshop models have so far been ordered.

Both these equipments will mount the R/F parts of the sets in the D.C.T. in place of the inclinometer. Displays, which in all cases consists of range/azimuth presentations, will be fitted in the D.C.T. for the Control Officer and in the T.S. for both range and bearing operators. In the case of Type 931 there will also be a display in the Bridge Plotting Room for L.A. Target Indication purposes.

The Type 931 aerial displaces the Type 274 aerial which is then mounted in front of the D.C.T., but the Type 931 aerial can be fitted under the Type 274 aerial as at present sited.

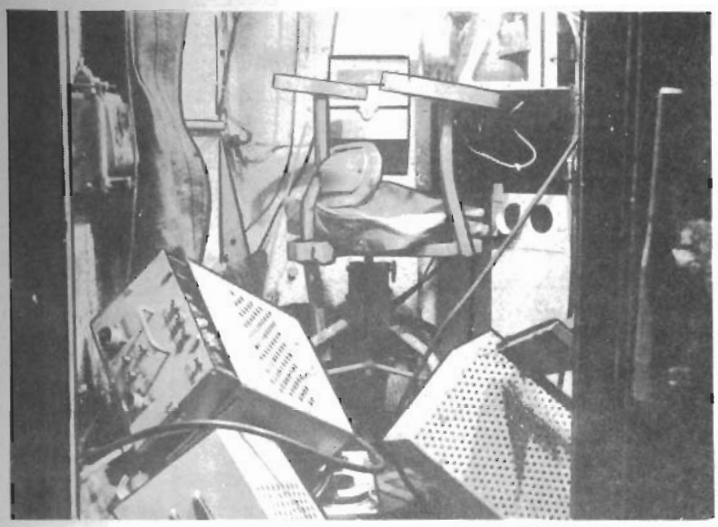
Further details of these two sets will be given in a later issue of the Bulletin; for the present all that will be said is that this addition will provide:-

(i) Plan Presentation of the Target and Fall of Shot.

(ii) A standby G.S. set in case of breakdown or jamming of Type 274.

AN OBJECT LESSON

(How not to return valuable Radio Equipment).



The above photograph is not, as might be thought, a Radar office suffering from the effects of a near miss, it is merely a picture of a Type 271Q P.F. Hut returned to Messrs. W.H. Smith, Electrical Contractors, Manchester, for reconditioning. The photograph is in no way faked and was taken immediately the door of the office was opened (oddly enough in the presence of officers from D.R.E. and A.S.E.), and it only shows a portion of the havoc and damage inside. This office was hoisted out of a ship, in good condition, and was returned to Messrs. W.H. Smith for a complete reconditioning before re-issued to another service.

All of the following equipment suffered damage and in certain cases complete re-building or new units will be necessary:-

Panel L.20 (indicator tray hanging out of cabinet)
Type 242 Transmitter)
Type 242 Modulator) (loose on floor)
Type 242 Responsor)
Panel 3A.P. (baffle plate of chamber containing gas-filled relays loose on floor).
G.82 Wavemeter (loose on floor)
Transmitter Cover (loose on floor of aerial house)
Type 242 Driving Bracket (loose on floor of aerial house.)

The following gear was missing altogether:-

1 External Canvas Black-out Screen.
1 Clock.
1 Radiator.
1 P.51 Receiver. A.P. W3940.
1 Meter A.P. W3990.
1 Meter A.P. W4409.
1 Meter A.P. W2878.

There was also a most interesting collection of miscellaneous articles the loss of some of which will cause annoyance (and rightly so) to their original owner:-

1 pair brass parallel rulers.
1 perspex rule.
1 seamanship manual.
1 enamel jug and mug.
2 tin helmets.
1 pair gloves.
1 lifebelt.
1 knife scabbard.
1 china cup.
A variety of pieces of pumice stone, metal brackets, bolts, padding from chairs, empty wooden crate.
And last but not least,
1 sardine tin (contents missing)

Now all the above may sound funny , but it is'nt - it is pitiful that valuable apparatus should be returned in such condition and that a considerable number of man hours should have to be put in to rectify the results of a few minutes carelessness. It would have been so easy to see that the hut was properly stowed on the lorry and that everything was secure before sending off by road to Messrs. W.H. Smith. Will everyone who reads this please treat this as an object lesson and remember that although you may have finished personally with the apparatus in question, there are a lot of very good uses for it later. Please, therefore, do all that you can when returning gear to ensure that not only does it leave your hands undamaged but that it has a reasonable chance of arriving in the same good condition at the other end of its journey.

THE NEW RADAR MANUAL

It is hoped that C.B. 4182/44 - "Radar Manual (Use of Radar)" will be distributed before the end of the year to replace the "Radar Operation Manual" of 1942 which has become obsolete.

The Radar Manual is, as its title implies, the standard authority on the use of radar (as opposed to its technical aspects). It is written primarily for the general service (i.e. the non-technical) officer; (in addition it is under consideration to use it for the instruction of higher R.C. and R.P. ratings pending the issue of an abridged volume).

The book is divided into four parts, of which the most important is that dealing with the many uses of radar. There are nearly 140 figures, diagrams, and photographs which should ensure that the book is at least more attractive than its predecessor.

It is hoped that radar and other officers will bring the book to the notice of the persons for which it is intended.

THE R.D.R.

It is difficult to name the day on which R.D.R. was born. Since the summer of 1940 various trends have been at work toward centralisation of information and display. Some of these were as follows:-

The effect of an increasing number of sets.

Types 282's and 5's made their furtive appearance, then Types 271 and 273. Requests were made for omnibus lines so that more positions could cry out at once for the Radar Officer's body. After his first two weeks at sea, the Type 273 operator knew that one of those voices coming down one of those voicepipes was either the Captain, the Gunnery Officer, the Navigator or even the F.D.O. (he had just been born on the day of which we speak.) Soon came the idea of passing all of the Type 273 information to a plotting position where it could be combined with information from other sources and then passed on to the positions which required it. (The process introduced a time delay which would later need to be rectified). But filtering was here to stay and old timers will remember with a tear the beginning of this, the "Chinagraph Age".

The effect of fitting two WA sets.

The fleet began to see many more aircraft, both "ours" and "theirs". The control of ours demanded an increased flow of better information to deal with the new problems involved and the new density of traffic . It was decided that carriers required Types 79 and 281. The telephone lines from the A.D.R. began to ring for the first time with the plaintive cry, "Heights, give us more heights". There was action, and excitment too, then; several radar officers died bravely, passing heights to the last.

Administration and Maintenance.

When a ship left harbour with a number of radar sets fitted, an organisation had to exist to cover the passing of instructions, drills, routines, and to provide maintenance of the equipment during the twenty-four hours of the day. That meant there had to be a headquarters. It might vary in its number and type of state-boards, or in its printed notices, but there was always a headquarters.

THE FUNCTION.

The duties which a complete R.D.R. will fulfil are:-

Long Range Telling.

Throughout the A.I.O. it is considered that information can best be presented at an executive position as the combination of two forms: the long range hand plot and the automatic display, such as P.P.I. The former has the advantage of combining the outputs of many sources in a single filtered stream, but the disadvantage of the human link in speed and accuracy. The automatic display is immediate and accurate, though perhaps distorted and devoid of any kind of selection. The most complete picture is given by the two together. The raw verbal information necessary for the handplots is passed from a single position to the filtering centre. The reason is, that the act of reporting over several lines is made more efficient if it can be first co-ordinated at a source. Complete telling from the R.D.R. will not be undertaken until Type 960 replaced Types 281 and 79.

Heightfinding.

The metric method of using the vertical coverage diagram and the centimetric method of elevating a narrow vertical beam, may result, in the case of some ships, in there being as many as three heightfinding units at hand, e.g., from Types 79B, 281B and 277. The dangers and rigours of heightfinding may only be braved if these units form a team. This means, first that they must be together in the R.D.R., and second, that they be so placed that their method of operation is not only possible but also co-operative. If the layout is not carefully arranged, neither will be true.

The worst two of the problems are the pointing out of targets to each of the units, and the need to combine the results in an easy fashion before they are passed away.

Identification.

Since the ranges, bearings, numbers and heights of targets are being found in the R.D.R., and made into a package, the final label is needed. This will come from the interrogation system which must be able to investigate any detection seen on one of the warning displays. There may be one or more units so equipped. Each will have the means of correlating radar signals with interrogator responses. As with heightfinding, each will face the first task of distinguishing a target which is being designated.

Supervision.

The above duties are becoming more intricate, more interrelated with the advent of new equipment. They require more technical supervision. With the whole process organised from the R.D.R., the radar officer can ensure that heightfinding corrections are properly applied, that setting-up drills and routines are carried out, and in fact that all warning sets are operated in accordance with the control orders given.

The R.D.R. should also prove the most suitable position from which to organise the maintenance of warning equipment. When the rosy day of mechanics' watchkeeping arrives, one will very likely live there. In the meantime, in company with the rest of the A.I.O., the preliminary R.D.R's are beginning to produce many varieties of scoreboard and stateboard on which to record the healths of radar equipments.

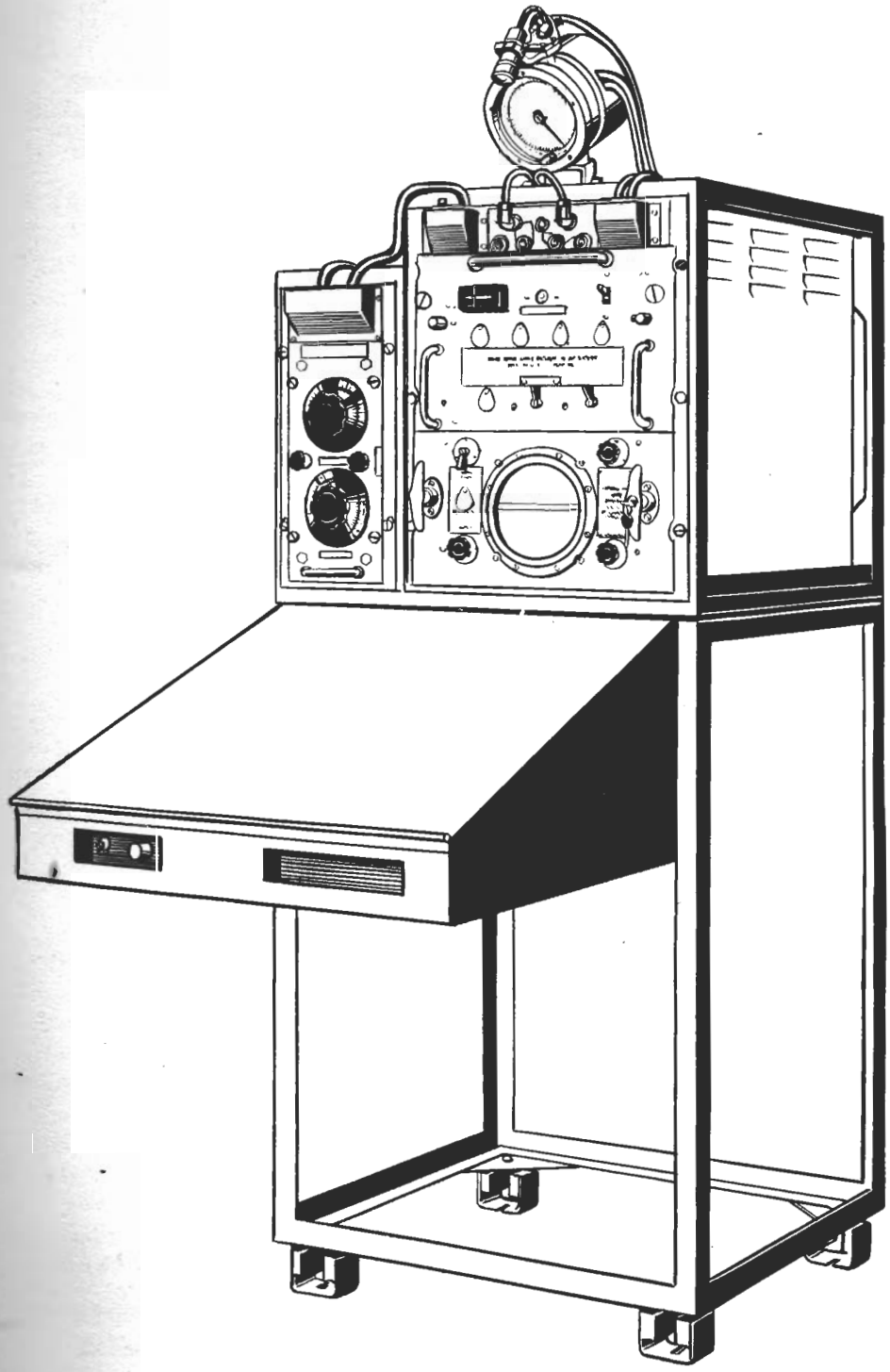
It is probable that the development of the functions of the only room equipped with displays from all the warning sets will result in application not evident at the present time. It may well prove to be the fount of radar interpretation, e.g., in comparing the side lobes of the W.S. and W.C. sets. Certainly, in the days when a considerable portion of the reporting is still done from outlying offices, the R.D.R. should prove a valuable backstop, since the value of a lookout on P.P.I. appears to be much enhanced if two observers are employed. In general, the evolution of the R.D.R. cannot but grant it a key role in the duty of answering the question "How best may all warning radars be manipulated to serve the ship at this minute?".

THE EQUIPMENT.

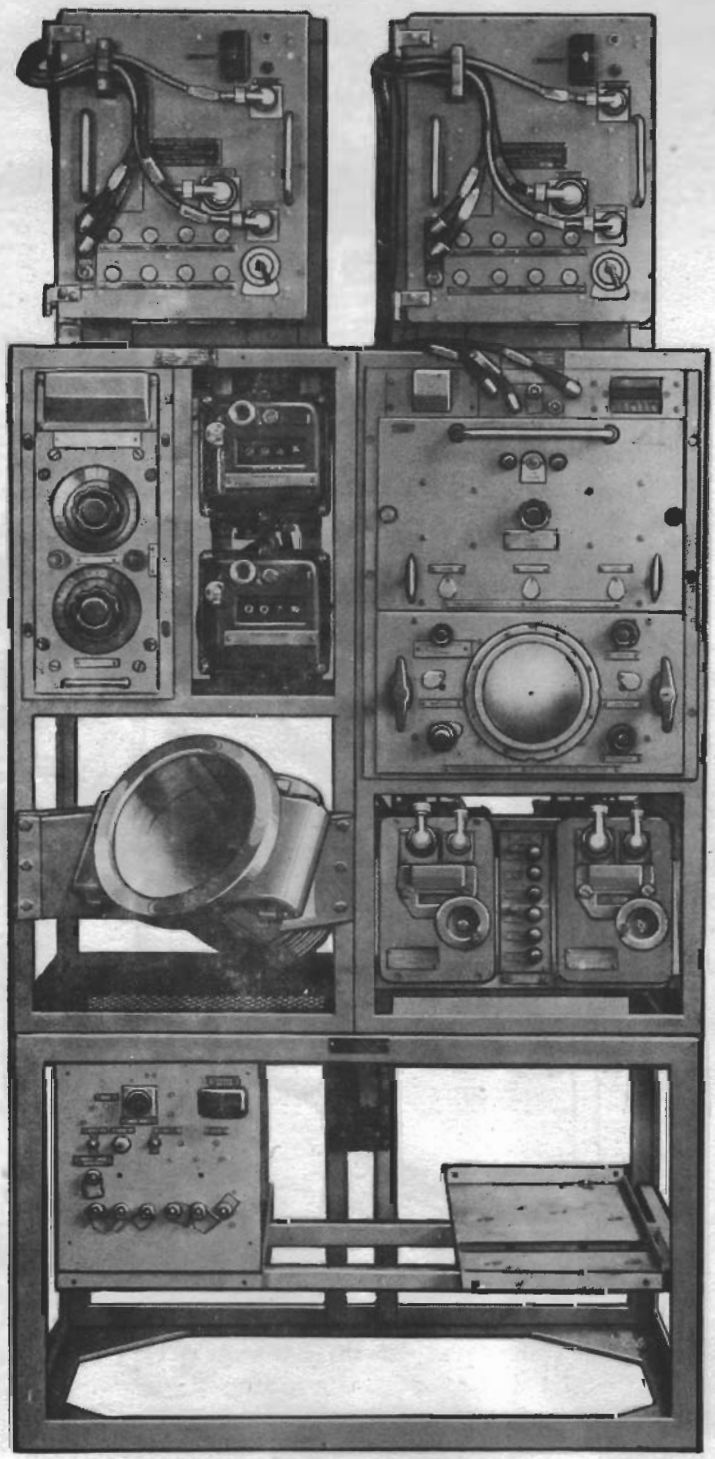
The following notes apply to the standard forms of equipment to be found in a R.D.R.

P.P.I. and Remote Filtered Plot.

The equipment for heightfinding and interrogation requires to be "put on". The focal point for doing this is the combination of P.P.I.



OUTFIT JJ(I) WITH HEIGHT PLOT



OUTFIT RTE

and plot. The P.P.I. displays Type 281, where fitted, and rests on a stand similar to the H.P.I. stand. The Remote Plot Pattern 57841 is made to attach to the front of the stand. Its top face is a perspex surface two feet square and sloping at twenty degrees; under it is a single bulb, equipped with a dimmer, which illuminates the "spider's web" plot held under the perspex.

Outfit JJ for Heightfinding.

The major components of outfit JJ(1) are:-

(i) Framework.

(ii) Panel L.43.

(iii) Sector Selector W9083.

(iv) Bearing indicator. This may be pattern W5212 at first, but will be replaced in later fittings by a magslip type of indicator. (In the photograph of JJ(1) on page 8 the mounting of the bearing indicator is not standard).

(v) The Height Plot is being produced in two forms. The first is identical with the "Remote Plot" described above, except that the vertical coverage diagrams and correction data replace the "spider's web". It attaches to the framework about six inches below the "A" scan of the L43. A second form, the "Roller" Height Plot, is under development; it will be similar to the two previous plots in size and arrangement, but will incorporate a pair of rollers such that the series of standard range-amplitude curves may be moved under the perspex, and so compared with the curve obtained by plotting echo amplitudes from the L43. The L43 supplies on "A" scan with two traces, and uses a long after-glow tube. The upper trace exhibits radar signals when the aerial is trained to within four degrees of the true bearing set on the sector selector. The lower trace appears continually and serves to illuminate the range scale from behind.

The JJ(1) can be used in conjunction with Types 79 or 281.

Outfit JH(2) for Interrogation.

The major components are:-

(i) Framework. (ii) Panel L.43.

(iii) Sector Selector (W.9084) (iv) Strobe Generator.

In this case, the upper trace exhibits the sector selected signals from Type 281, or Type 277, the lower trace exhibits the responses to the associated Type 243Q or Type 242M. The sector selector W.9084 has two controls; the first simultaneously sets the sector for display and trains the interrogator to that bearing, the other governs the built-in potentiometer unit and determines the position of a strobe on the interrogator trace. To interrogate, a target is first pointed out to the operator from P.P.I. or plot. He sets the selector to the bearing and strobe to the range. The strobe designates the echo and the presence of responses directly below will identify it. The L43, when fitted with the strobe generator as in this instance, may be used to provide an expanded trace of 15,000 yards, beginning at the instant of formation of the strobe. This should prove useful for added discrimination and for number estimation.

WSH Control and Display.

The SM1 console or the Type 277 control table with P.P.I. and H.P.I. (but without panel L.26) are added to the R.D.R. as part of the heightfinding team.

Outfit JN, the Azicated P.P.I.

This is a P.P.I. displaying the WA set and bearing a rotating cursor driven by the aerial of the WSH set. When associated with Type 277, it should be mounted above the Type 277 P.P.I., and tilted downwards; it will normally display Type 281. To find the target the Type 277 bearing operator will train until the cursor bisects the Type 281 echo.

Outfit R.T.E.

The major units are:-

(i) Framework. (ii) Panel L.37.

(iii) Two strobe generators. (iv) Two R.T.U. 52's

(v) Sector Selector W9083.

The outfit is used in the R.D.R.'s of battleships and cruisers to supply accurate tactical ranges. There are four traces; the two central ones are continuous and carry strobes only, the upper and lower ones carry sector selected radar signals. Ranges are passed by correlating strobe to echo. It has been suggested that the unit may prove of value for passing ranges on radar balloons.

Associated Equipment.

If space permits there will be a logging table, and around it should be grouped the routine communications, e.g. omnibus and exchange telephone.

The operational telephones (e.g. from A.D.R., Operations Room, Height Filter Group) should be grouped centrally so that the supervising officer may have access to them and at the same time see the displays. All plotting telephones should be made convenient to the reporting operators. In Heightfinding it may prove adavantageous to use a small plot hinged to the bulkhead for recording the filtered output of the heightfinding team.

EXAMPLES.

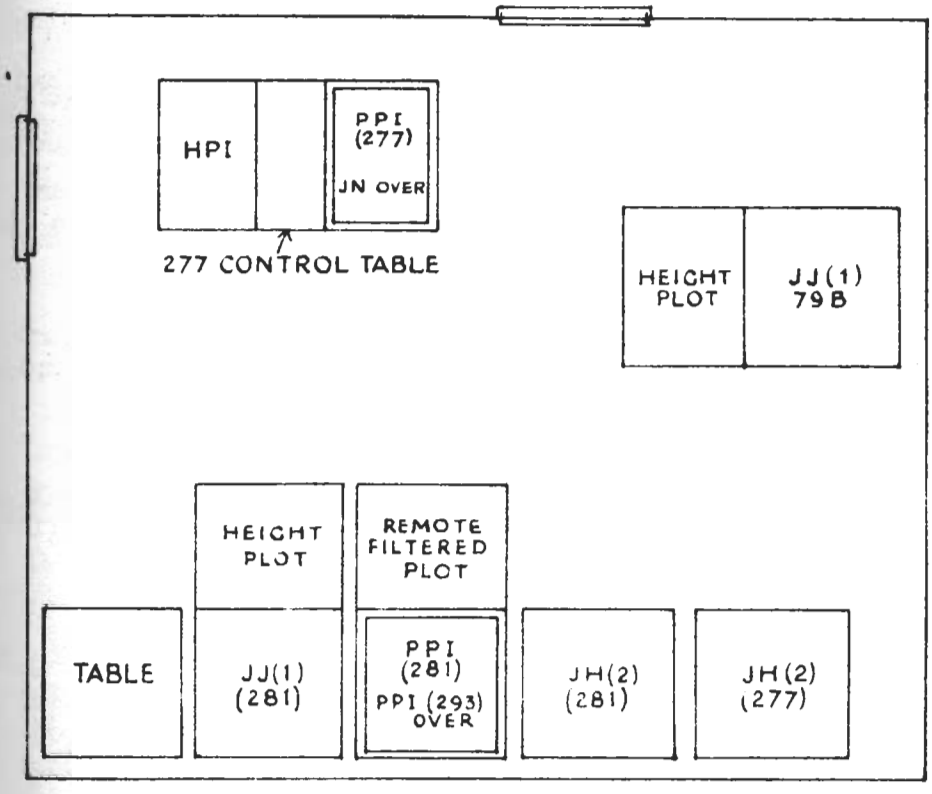
In operating, there are dependencies between units. For this reason their siting must be done carefully. It is probable that the difficulties attending any one fitting will demand individual attention and will make it necessary to accept a compromise in settling the claims of the various units. Two typical layouts are shown on page 12, those of a carrier and a cruiser.

Carrier fitted with Types 79B, 281B, 277, 293.

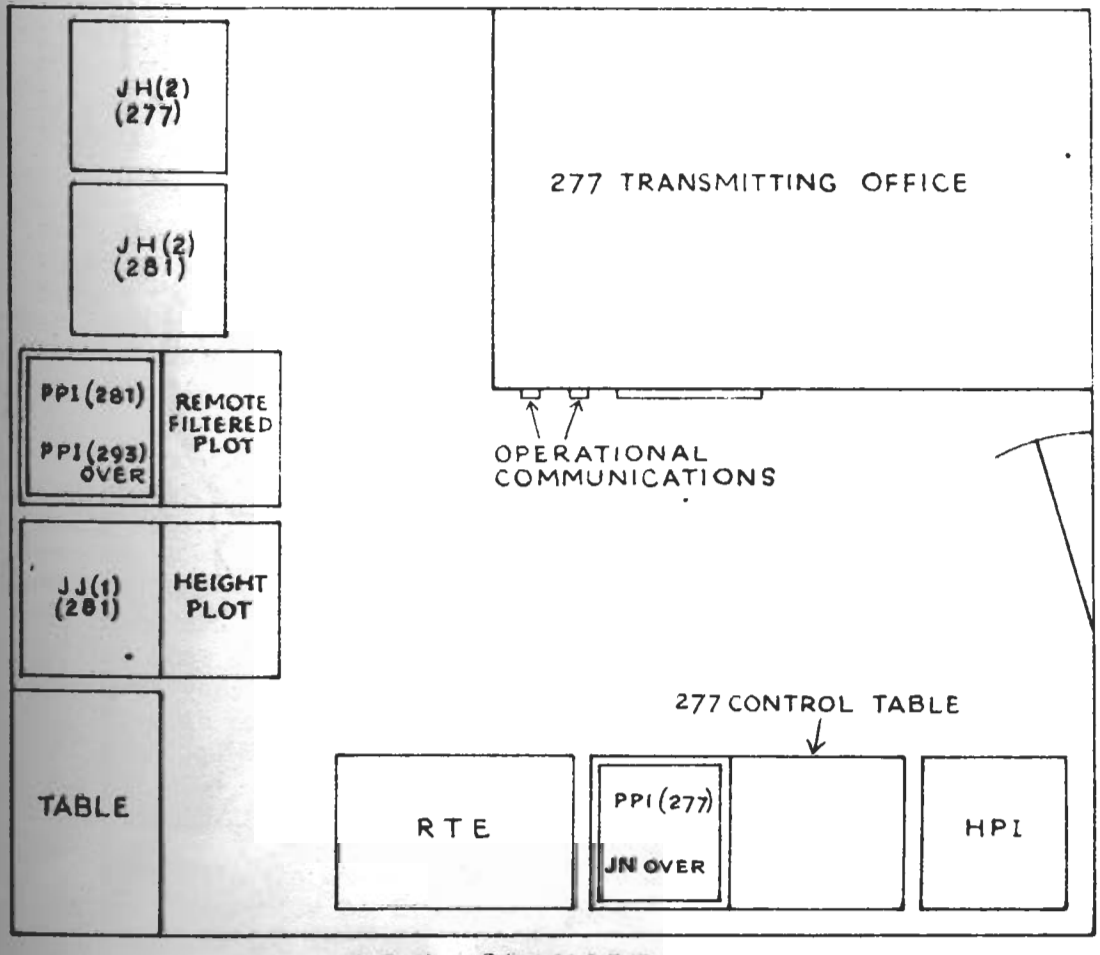
The two JH(2)s are together since they will be operated by one man. They are alongside the Type 281 P.P.I. and plot because targets will be indicated to the operator from this source.

The two JJ(1)'s require to be "put on" in like manner. The Type 281 panel is given preference for the other side of the P.P.I. and plot, because the Type 281 P.P.I. will be of more value in putting it on than in the case of the Type 79 unit. The JJ(1) (79B) is then put off to the side; its operator will need to glance to the side and over the shoulder of the remote filter plotter when a target is being point out.

The Type 277 reporting and heightfinding position with the JN is practically self-contained, and is allowed to move to the other side of the room.



RDR - CARRIER



RDR - CRUISER

There would also be some advantage in having the JJ(1)'s side by side and in allowing the Type 277 bearing operator to have a readier view of the filtered plot.

Cruiser fitted with Types 281B, 277, 293.

The reasons for siting the JH(2)'s, the Type 281 P.P.I. and the JJ(1) are similar to those above. The JJ(1) and the JH(2)'s are interchanged in this case to avoid cramping in the corner and because the JJ(1) operator will probably require more supervision.

The R.T.E. requires to be near the Type 277 P.P.I. in order to correlate the ranges and bearings of a target.

The only objection to the scheme is that the JH(2)'s cannot be reached easily and that the units along the bulkhead are cramped.

THE FUTURE.

No complete R.D.R. has yet gone to sea. Even before that day some of the proposals expressed here may require to be modified. Reports from sea will be gratefully received.

THE R.D.R. 1955