RADAR TYPE SG1 AND PANEL L18.

The following is an extract from a report by P.R.A.D.O. Auckland on modifications to enable panel L18 to be used with Type SG1 Radar in H.M.N.Z.S. GAMBIA.

"Modifications were carried out to Type SG1 to allow accurate ranging panel L18 fitted in T.S. to be used in conjunction.

The Type SG1 has no provision for direct transmission of ranges to a remote point, therefore the use of panel L18 in the T.S. in conjunction with Type SG1 would have decided advantages, particularly in view of the rate aiding facilities of Panel L18.

Obtaining this combination presented some problems, in that the Type SG1 repetition rate operates independent of its power supply frequency, which in any case is 60 c.p.s., the repetition rate being determined by an oscillator normally operating over the range 800 - 850 c.p.s. The panel L18 on the otherhand operates normally at 500 c.p.s., (its power supply frequency,) and is locked to its power supply frequency by virtue of the trace separation and calibration scan locking voltage obtained from this source. Adjusting the Type SG1 repetition rate oscillator to 500 c.p.s. would not give the answer because some drift between this and the Panel L18 500 c.p.s. power supply would certainly occur with consequent jitter of the panel L18 traces.

A practical solution which gives entirely satisfactory operation was produced by locking the Type SG1 from the 500 c.p.s. supply feeding the L18 panel, then providing synchronising and signal from Type SG1 to panel L18 in the usual manner. This was done for position A of the Type SG1 repetition rate change switch only, positions B and C remain unaltered and give normal Type SG1 800 - 850 c.p.s. oscillator controlled repetition rate.

The circuit arrangement employed is shown in diagram 1 B on page 28. Diagram 1 A shows the Type SG1 oscillator before modification. Relay K402 was removed from the circuit and two position relay substituted which changes over the oscillator grid circuit from normal to panel L18 locking. It was found that at the normal power supply voltage of 180 volts applied to the grid, the output wave of V1A was insufficiently steep-fronted to provide stable locking. The transformer Tx which develops approximately 600V across the secondary was added, this produces the necessary sharp leading edge output wave of sufficient amplitude and provides stable locking. Grid stopper R1 of .5 megohm protects the valve during positive half cycles of locking voltage. R2 is adjusted to produce stable locking voltage, the required value is about 400 volts. It is necessary to watch the phasing of the 500 cycle locking voltage as in the standard panel L18 - Type 272 arrangement."

A.S.E. COMMENT.

This is a very useful modification. It is suggested that the ranging panel L17/18 should be modified in the same way as when used with Type 284, (see C.A.F.O. 1755/43). The reduced time base length will make the ranging panel less susceptible to slight phase discrepancies. It is presumed that potentiometer R2 has an effect on the phase relationship.

The voltage applied to the grid of valve V1A is large but it is probable that the valve can accept it. Ships carrying out this modification should check that the valve life remains reasonable.

SGI OSCILLATOR STANDARD

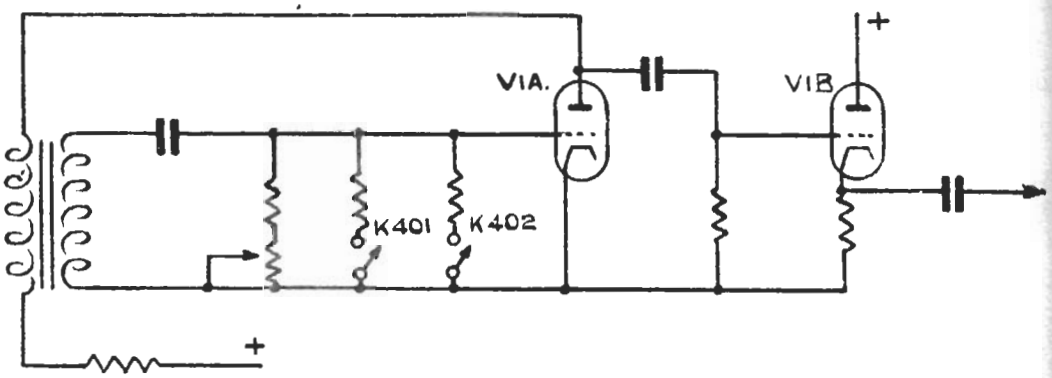


FIG. 1A.

SGI. OSCILLATOR - MODIFICATION & ADDITIONS FOR LOCKING WITH L18 PANEL

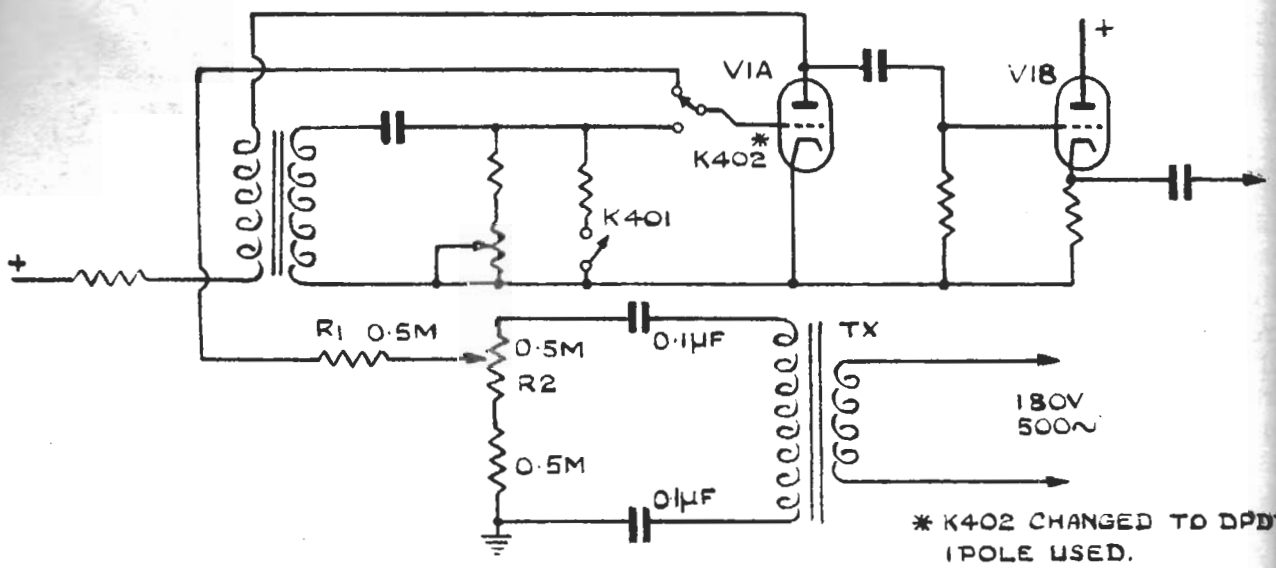


FIG. 1B

RADIO MAINTENANCE ROOMS

(R.M.R.)

Ever since the general fitting of radar to the fleet started in 1942 the question of its maintenance at sea has loomed large in the minds of those responsible for the successful operation of the equipment.

It is not the purpose of this article to touch on the proud story of the Radar Branch, which has yet to be written, but it suffices to say that men were there to meet the emergency and that, in the main, they were given the tools to do the job.

The vexed problem of providing some space in which the necessary tools might be wielded to do the job, while never far from our minds, was not seriously tackled until some fifteen months ago. Then definite action became necessary to provide maintenance facilities for gunnery sets coming forward which would be sited in directors, gun mountings or fire control rooms where servicing would be difficult if not impossible.

There are several reasons for the apparent inactivity on this score before this time, not the least being the natural reluctance to accept yet another commitment for space in ships which were already badly congested. Concrete proposals for a "Radar Workshop" were in fact, put foward in 1942 which met with a measure of approval on paper, but hardly any practical results at sea; while the general requirement was there, it was not strong enough to hold its own against competing interests, the net result being that, in general, the fleet was left to work out its own salvation in the matter.

Many ships did help themselves, with varying degrees of success, either by utilizing surplus space in oversize radar offices or by conjuring an odd corner out of a reluctant Commander. Such help as was possible was given but it was generally realised, as the new and replacement sets went to sea, that the requirement would grow rapidly more urgent. Furthermore, the policy of 'unit replacement', which is necessary for certain sets if staff requirements for operating efficiency are to be met, could not be implemented unless a properly equipped room in which the replacement units could be maintained was available. The days when all the gunnery sets in a ship could be kept intact by - let us admit it - the judicious stripping of a Type 282 were steadily passing and something had to be done about it.

The first broadside in the fight to get the R.M.R. recognised as being of similar importance to the Engineer's Workshop or Torpedo Party Shop was fired towards the end of 1943 in a letter suggesting that the "present hole and corner policy" be superceded by officially approved R.M.R's. The details were worked out to meet the needs of both (R) and (W) although, by their nature, the radar gunnery sets were the chief users.

Approval in principle to fit R.M.R's was given near the end of 1944 and C.A.F.O. 24/45 was issued giving details of the purposes to be served by the Main and Auxiliary R.M.R's.

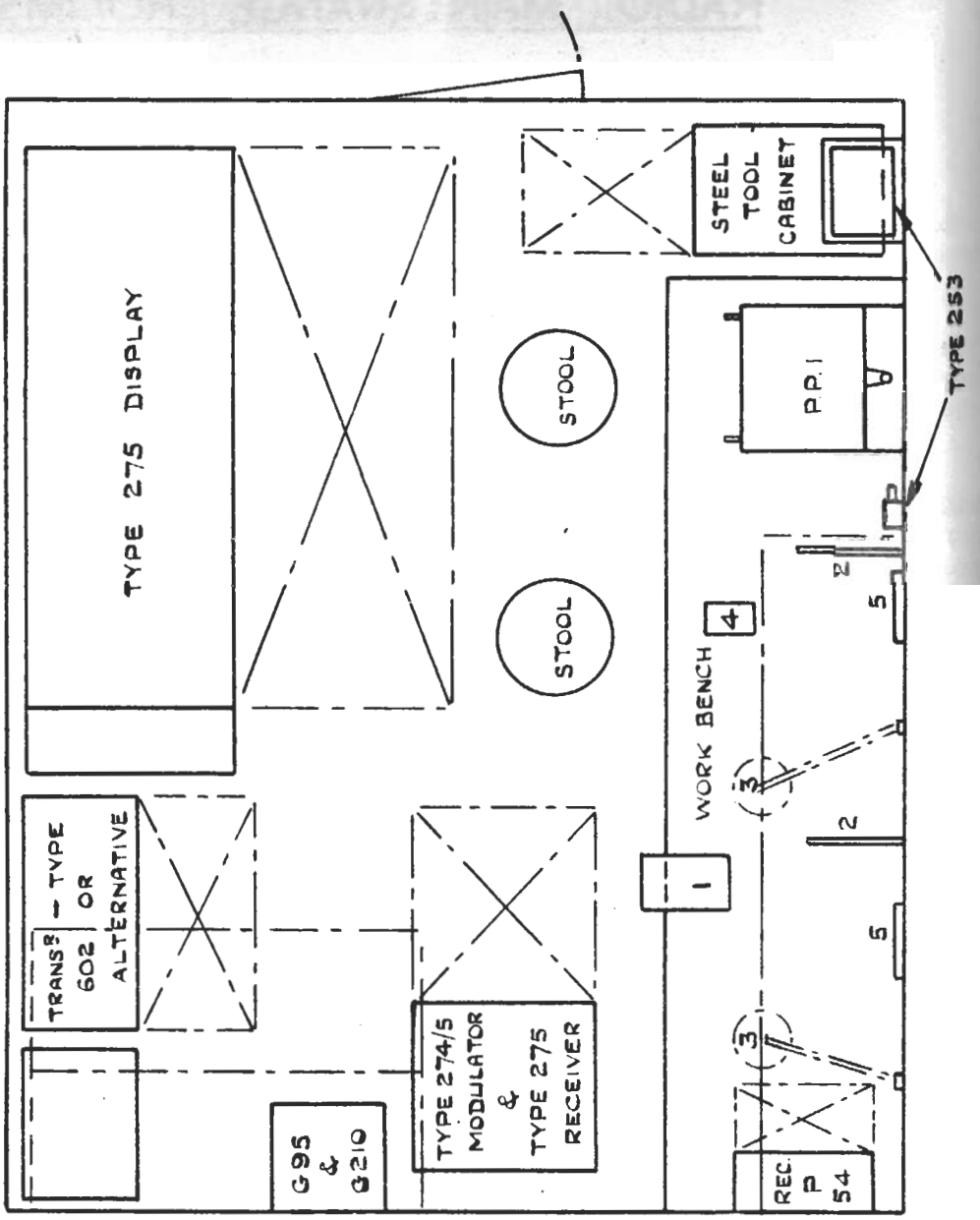
This order is being re-issued to give fuller details of the Type 275 equipment provided and to clarify the instructions to Commanding Officers which are somewhat obscure in the original order.

For advance information the policy is as follows:-

(a) Main R.M.R's (Cruisers and above).

Insert A and A item and submit proposals now.

RMR (1) TYPICAL LAYOUT FOR CRUISERS & ABOVE -MINUS TYPE 262



ITEM	DESCRIPTION AND PATT. Nº
1	VICE
2	EARTHING STRIPS — 1" COPPER TAPE
3	WORKSHOP UNIVERSAL JOINT BRACKET PATT.9101 WITH LAMPHOLDER PATT. 7993A AND SHADE PATT. 9124A
4	PORTABLE TYPE DRILL STAND
5	POWER DISTRIBUTION PANELS

(b) R.M.R's in Destroyers.

The policy is not to fit until Type 262 is fitted. If, however, the requirement is considered urgent submit proposals through normal channels; such spaces need not be up to the size of R.M.R. required when Type 262 is fitted.

(c) Auxiliary R.M.R's in all ships.

Not to be fitted until close-range weapons with Type 262 are mounted.

The accompanying layout drawings are extracted from Installation Specification B and will assist ships' officers in formulating proposals for the siting of R.M.R's.

Main R.M.R's should be under protection but in a position as easily accessible as possible in all states of readiness.

As the complexity of all types of equipment in use at sea increases, the need for more workshop spaces becomes acute; we are not alone in our need as is shown by the advent of the Optical and Electronic Workshops. Various efforts have been made by Admiralty departments to amalgamate requirements for workshops but difference in training technique, the tools used and siting arrangements required, have stopped any headway in this direction.

The imperative need for utilizing every inch of space in ships to the best advantage is proving to be a strong driving force in such matters, however, and it is rumoured that the whole question of workshop accomodation is to come up for review - this is to be welcomed as heralding the advent of the Electrical Engineers Workshop.

ERRATA

Bulletin No.5.

Page 51. Last para.(5) - for $\frac{1}{2}^{o}$ read 2^{o}.

Page 38. Sub Title (b).- The drawing referred to for output Unit Des. 3 should be that on page 39 and not, as stated, that on Page 43.

REPORT FROM H.M.S. SHROPSHIRE

"Height Finding and Fighter Direction Exercises.

Type 281 was thoroughly overhauled and many components renewed Exercises were then organised and the following conclusions drawn –

(a) The vertical polar diagram was different from that obtained previously. A fourth major lobe was plotted.

(b) There is a 15% reduction in echo strength when in harbour. This was noticeable until bearings were at least 30 degrees clear of prominent land masses.

(c) The reduction was most marked at heights above 15,000 feet when echoes rarely exceed 1x on single aircraft in the main lobe.

This would indicate that harbour radar guardships may have serious limitations unless these factors are taken into account. Communications were often a problem and Fighter Direction Exercises were handicapped as a result."

A.S.E. COMMENT.

The effect is believed to be due to a loss in the reflection coefficient which is caused when the point of reflection is over land. The result will be particularly noticeable in the case of high flying targets for the reasons:

(a) Reduction in coefficient is greatest when the reflection point is near the ship.

(b) The amplitudes of echo which are obtainable are small so that the reduction may considerably reduce the boundary of the coverage diagram.

It is not thought that the effect will exist where the line of sight lies over the sea, in spite of SHROPSHIRE's para. (b). When metric set is operated in harbour the loss in coverage should be remembered, and when heightfinding calibration runs are arranged care should be taken to keep their courses over the sea.

THE GUNNERY SETS - TYPES 282/3/5.

"These sets have given good service. Type 285 forward has heavy demands placed upon it in the provision of both low angle and high angle fire control. This was most evident during the Suriago Straits action and the surrounding period when the set was operating continuously by day during air raids and was also required for the night action.

Opportunities to use the main armament barrage set were many. A drill was evolved for each turret of firing a 5,000 yard barrage shell from the right gun by Barrage Director on a signal given by Type 283 Office and a 2,500 yard barrage shell from the left gun in A.B.U. control. This enabled many long range deflection shots at aircraft attacking other ships to be fired. By this method a total of thirty one rounds was fired by Barrage Director control and nine rounds by A.B.U. control.

An interesting example of radar tracking and target indication occurred during a night alert. A low flying bogey was detected by Type 281 and subsequently picked up by Sugar George at 15 miles closing on the port bow. At seven miles the port forward Type 283 on lookout bearing commenced tracking and as the aircraft altered course and crossed the bows the starboard forward Type 283 took over. The aircraft altered course again recrossing the bows and slowly closed on a diagonal course down the port side. The port forward Type 283 and Type 282 once again held the aircraft and a 2,500 yard barrage was fired blind with obvious deterrent effect. "

A LETTER FROM "DIADEM"

An interesting letter has been received from Lieutenant J. Wright (H.M.S. DIADEM), extracts from which, together with A.S.E's comments are given below.

" TYPE 272 LOCAL OSCILLATOR.

The modifications as outlined in A.F.O. diagram 87/45 have proved a great success. Up to the time of these modifications being carried out the local oscillator was very unstable. These modifications have also appeared to increase the amount of crystal current, which, with Type 272, is somewhat of a blessing!

While on the subject of Type 272, it would be interesting to know if any modification has taken place in the design of the N.T. 100 valve during the last 6 to 10 months. During this period the life of this valve has steadily decreased until now some of these valves last no longer than 24 hours. A batch of these valves appears very spasmodic in their behaviour since occasionally one finds a valve which has a life of 500 hours."

A.S.E. Comment.

N.T. 100's are no longer being manufactured as enough are in stock to meet the needs of all remaining Types 271/2/3/P still in service.

A number of the later manufactured valves are decidedly weak when fitted as at present but will give normal lives if additional ventilation is provided at the valve base. Details of the best way of doing this are under discussion and, when decided, will be published. One difficulty is the close proximity of - 12,000 volts.

"TYPE 253.

H.M.S. "DIADEM" is fitted with two Type 253 I.F.F. sets, one on the foremast, the other on the mainmast. The for'ard one was installed when the ship commissioned in December, 1943. Using the Type 74A test set, the power output from the Type 253 was up to standard, but the received pulse using the Test Dipole appeared to be far below the required levels.

A complete overhaul of the aerial array was carried out but this did not improve the response from the Test Dipole.

In November, 1944, the after Type 253 was fitted, and using the same test set and Type 253 receiver, the response was approximately equal to that given in the power output test. This caused quite a headache since the length of feeder used with the after aerial array was much longer than that used in the for'ard aerial array.

With assistance from A.S.E. it was decided to make up a "standard" Test Dipole with 100 feet of 13804 telcothene cable. This showed that both sets then gave the same response on the Test Set.

It is considered that if Test Set 74A is to be a success in measuring any decrease in the performance of the I.F.F. set, it should be supplied with a standard length of telcothene cable and Test Dipole, each calibrated against the 74A test set with which it is supplied."

A.S.E. Comment.

One of the reasons for discrepancy in results obtained with Test Set 74A is poor earthing of the braid of the test aerial cable at the probe end. Opportunity should be taken to check this point when such discrepancy occurs and whenever possible Type 253 should be tested directly with an interrogator Type 242.

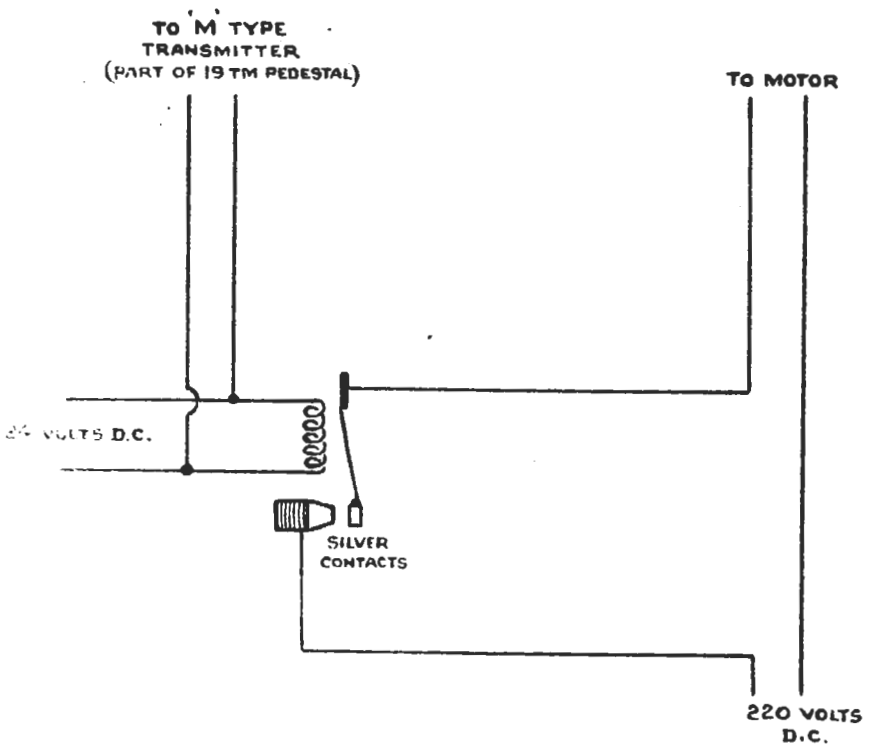
" TYPE 242 AERIAL ARRAY.

A considerable amount of trouble has been experienced with pedestal unit 19 T.M., part of Type 242 aerial array, with 400° rotation. During 18 months in service, the same defect has twice occurred and consists in the key, normally fitted into the keyway in the upright part of the pedestal, becoming adrift due to the holding bolts shearing when the spring loaded stop comes into action. When this defect occurs a block and tackle has to be rigged and the whole pedestal lowered on to the upper deck. This is no easy job and takes at least 48 hours to complete.

The circuit breaker pattern 54312 has not yet been received on board.

To overcome this defect the following system has been used. A relay operating in parallel with the 24 volt D.C. supply has been inserted in series with one side of the 220 volt D.C. supply to the motor as shown in the diagram. Thus, if the 24 volt supply is suddenly cut off the motor will not rotate. The only occasion when the spring loaded stop will come into operation is if the Type 242 aerial is switched on when the W.S. aerials are facing astern, and even then it is considered that the aerial will not bump against its stop with the same effect as if the circuit breaker pattern 54312 was fitted.

So far this has proved a satisfactory arrangement."



A.S.E. Comment.

"OUTFIT Q.H.

The new North Western chain operating on R/F unit No. 24 Position 4, proved extremely useful during passage from Scapa Flow to the Clyde.

It would be interesting to know the reason for siting the stations where a fix cannot be obtained in the channel between the Mull of Kintyre and Rathlin Island and that between Barra Island and Tiree, and also the reason for producing chart L6373 "Barra Island to Tory Island" on a conical ORTHOMORPHIC projection. It is realised that the fitting of a "D" station is probably being investigated to overcome these blank spaces."

A.S.E. Comment.

The stations were sited for the maximum operational coverage of the North Western approaches. It is appreciated that no QH fix can be obtained in the base line extension areas of North Channel and between Barra Island and Tiree, but reasonable single position lines may be obtained from the Islay-Lough Foyle pair in both these areas. A "D" station was considered to assist QH fixing in the Hebrides passage, but power supplies difficulties at Barra Head and shortages of equipment has suspended this project. An orthomorphic projection has been used on chart L6373 to facilitate the drawing of hyperbolas.

Investigation into a complaint that A.S.E. had not allowed enough room for the installation of a set, established that it had been fitted complete with the protective packing framework.

Dink thinks this is "a bad thing".