

TARGET INDICATION

The first Target Indication Units working with Radar Type 293 and Radar Ranging Outfits RTB have now seen service in the Fleet and limited experience has been gained in their use. The information given here is based on this limited experience and may require revision in the light of further trials, but it is thought that such preliminary information may be of value to ships to be fitted with this equipment.

RANGE REQUIREMENTS

It is confirmed in practice that the minimum acceptable range on aircraft for T.I. purposes is 20,000 yards. The staff requirement is still 30,000 yards.

RANGES ACHIEVED AND EXPECTED

Type 293 does not give the minimum range required. A reliable painting range of 15,000 yards on aircraft on clear bearings where no TBS or DF masts cause obstruction should be readily obtainable and set performance should at once be suspected if it is not obtained. This should be true for all aircraft heights up to 20,000 feet.

The new aerial for Type 293M (AQR) is expected to give aircraft ranges to at least 18,000 yards though the high cover will not be as good as with AUR. The beam covers up to 45° instead of 65° .

With Type 293(AUR) reliable surface ranges of at least 21,000 yards should be obtainable on Destroyers, 33,000 yards on large cruisers and 40,000 yards on Battleships and Aircraft Carriers.

USE OF THE MAIN AIR DISPLAY PLOT.

In ships with a Target Indicating Corner situated in the Air Direction Room the lack of Type 293 information can be offset to a certain extent by use of information from the main air display plot. This however requires very close co-operation between the air plot officer and the T.I.O. and also results in an increase of noise in the A.D.R., (which may be serious if aircraft are being directed), due to the T.I.O.'s broadcast loudspeakers and communications on A.D.O. group telephones.

BEARING FAILURES

King George V reports that gyro compass transmissions, particularly to the P.P.I.'s have been a continual source of worry. When the ship alters course the P.P.I.'s are liable to get out of line with the aerials by variable amounts, and unless this trouble is eliminated the whole system breaks down as no trust can be placed in the ability of the T.I.O. to fire the guns in the right direction.

There are two known points of possible error involved here. The first is the "M" type transmission of aerial true bearing to the P.P.I. This will not be satisfactory if the L.P. voltage has been allowed to fall too far below its correct value and the system will also deteriorate if the "M" transmitters are not kept thoroughly clean. To ensure this, the system should be fitted with a suppressor (three condensers connected in star). This point will be dealt with elsewhere.

The second cause of failure of the P.P.I. to follow the aerial is due to the inability of the azimuth stabilisation equipment to compensate for turning speeds greater than 2 degrees per second. It is hoped to introduce modifications to increase the acceptable speed.

The introduction of auto-aligning for P.P.I.'s will reduce the number of places where error can be introduced but until this is available it is essential that operators be instructed to check at frequent intervals that the P.P.I. scan and ship's head lining up lamp agree. If this is done no error should go undetected for long and errors - which are frequently cumulative - should not be large.

INTERSWITCHING ARRANGEMENTS FOR P.P.I.'s

The T.P.I. (as well as certain other P.P.I.'s) is arranged to display Type 277 as an alternative to Type 293. It is reported that the use of this facility is severely handicapped by the necessity for re-aligning after switching. The most satisfactory way of doing this at present appears to be to stop both aeriels on the bearing of the ship's head, change over the switch and re-start the aeriels. A considerable delay is involved in this which in many cases is not acceptable.

The difficulty will however disappear when auto-aligning is fitted to P.P.I.'s and any drill evolved for changing over with existing equipment will be of an interim nature only.

RANGING OUTFIT RTB (PANEL L.37 AND RTU 53)

It is reported that if the sector is selected by reference to the Main air display, plot echoes will appear on the Panel L.37 before they appear on the T.P.I. and will also paint more consistently. This is not borne out by experience in A.S.E. and it is suggested that this is due to failure to set up the T.P.I. in its most sensitive condition. An article on setting up P.P.I.'s appears on page 52.

If more than one paint appears on the T.P.I. on approximately the same bearing but at different ranges there is sometimes difficulty in selecting the correct echo for ranging on the L.37. To overcome this difficulty it has been found desirable to operate with T.P.I. L.37 and strobe generator all on the same range scale. This will normally be 30,000 yards, the usual scale for the T.P.I.

The use of the Panel L.37 has been found of value for estimating speed of approach and for deciding the correct moment to open Blind Fixed Range fire. It is also reported that the classification of echoes (aircraft - land - ship etc.) is easier on the L.37 than on the T.P.I.

Complaints have been received on the difficulty of reading range on the RTU 53. The drum range scale on the RTU is difficult to read and has two range scales, the correct one to use being shown by the lamp indicating box. A more satisfactory method is to use a paper range scale on the L.37. This was omitted in the early panels but is now being supplied. One ship has also suggested a bank of range receivers from the RTU's in front of the T.I.O.

RANGE TRANSMISSIONS TO THE ARMAMENT

Provision is at present made for range transmissions from the T.I.R. to H.A. or dual purpose armament Radar (Types 275/285) and to C.R. armament Radar when this is Type 262. No range transmissions are at present provided for Low Angle Radar (Types 274/284) and it has been suggested that this is desirable. For bearing, these Radars can be controlled from sector selector No. 3 via the P.C.O.'s sight

and this selector also controls the Interrogator outfit JH1. If a requirement for Range Transmission is confirmed, it is possible to supply a strobe generator and RTU 53 to display on the scan of Panel L.43 in outfit JH1. This has already been arranged for certain classes of destroyers with two or more Type 262 in addition to Type 275 and is known as Ranging Outfit RTF. In these destroyers sector selectors 1 and 3 and associated RTU 53 in outfit RTB transmit to Port and Starboard C.R. Radars and selector 2 and associated RTU 53 in outfit RTF transmits to Type 275.

BEARING REPEATERS IN THE T.I.R.

It is reported that a main armament training repeat back to the T.I.U. is most desirable. It is suggested that this should appear on No. 3 sector selector.

It is also suggested that repeat training should be provided to the other T.I.U. bearing indicators from starshell guns in addition to that from the H.A. system.

METHODS OF CONTROL FOR ANTI-AIRCRAFT FIRE

The following is the arrangement at present in use in one ship :-

- (a) By day and in good visibility. H.A. and C.R. armaments are controlled from the A.D.P.; the T.I.O.'s duty being to provide information.
- (b) By day in low visibility, the control of the H.A. armament is transferred to the T.I.O. while the A.D.O. retains control of the C.R., as with the experience so far gained it has been found that target indication from below is not quick enough for close range work, nor is a clear enough picture of the attack presented.
- (c) By night the control of both armaments is transferred to the T.I.O. but with pom-pom and Type 282 no attempt is at present made to do more than indicate an appropriate bearing about which the pom-pom fires when ordered.

An alternative system in use in another ship centralises all Target Indication in the A.D.P. even when engaging targets blind. The method used is for the A.D.O. sights to follow the T.I.U. and thus indicate T.I.U. bearing to the appropriate directors. This system has the following advantages:-

- (a) When ordered by signal to follow, the H.A. directors do not know whether they are following T.I.U. or A.D.O. When following blind, the A.D.O. sets a suitable elevation after consultation with the T.I.O. There is thus no danger of the T.I.U. transmitting bearing of one raid while the A.D.O. transmits elevation of another.
- (b) The complication of changeover from blind target indication to visual target indication is avoided.
- (c) The A.D.O. is able to group the guns according to the situation and the Captain can see at a glance where the sights are pointing.
- (d) There is no indication in the T.I.R. to show to which side the H.A./L.A. director is switched. It is possible for the T.I.O. to try to indicate a port side target to this director when it is switched to starboard or vice versa.
- (e) In this particular ship there are no transmissions from the T.I.U. to Pom-Pom and Barrage directors. These directors therefore have to be put on target by the A.D.O.

Endeavour is made to indicate the target to the H.A. armament as soon as possible after the aircraft has reached 20,000 yards both by day and by night. At present this is done initially from the WA set displayed on the main air plot rather from Type 293.

Target indication to Pom-Poms has been limited to the provision of bearing in which to open deterrent fire by night.

A considerable reduction in time taken is noticed when the target appears on the T.P.I. at sufficient range.

LOOK BEFORE YOU LEAN

Horatio James Cholmondley Beck, -
 H.O., U.A., and Radio Mech., -
 Had served ashore and served at sea,
 And even (except latterly)
 Had spent some time high in the air
 With ne'er a fear and not a care -
 Drying pyro by the mile,
 And sweating dipoles with a smile.

Full confident was Horatio Jim
 With zeal unflagging, endless vim
 He wielded Avo, pliers and file
 And whistled gaily all the while:
 "With soldering-iron and resin-cored,
 How could a fellow e'er be bored?"

Alas! (this tale would ne'er be told
 If James had not been once too bold)
 One day, whilst testing "281",
 With cage-door open, H.T. "on",
 He "fixed" his safety switch with wire
 (Forgetting warnings, grim and dire
 Told long ago in lectures dull;
 When, heavy-eyed and stomach full,
 He succumbed to his "duff" and "tot",
 And "got his head down" on the spot)
 The oscillators brightly glowed,
 As gaily by them Jimmy strode.
 "What could the fault be? Where and how?"
 A row of furrows lined his brow.
 "Now let me see, let's give it thought!
 And as he spoke, his left hand sought
 A firm support to rest his frame
 To give his zealous mind full rein.....
A brilliant flash! A loud report!
 Strange cracklings, sparks of every sort!....
 His shipmates, staring at the wreck,
 Locked round the Office, swept the deck,
 And not one trace of James they found.
 But in the deck-head, neat and round,
 A hole was seen where pale blue skics
 Shone faintly. So, with heavy sighs,
 They left..... One voice was heard "Poor Jim!
 We shall not have to bury him!"

EMBARKATION OF A PRE-FABRICATED

TYPE 277 HUT

Early in 1944 it was decided that Type 277 would be an invaluable set for fighter direction purposes in Escort Carriers, and therefore the requirement for fitting these ships with this set became urgent.

At the same time a scheme for the remote control of Type 277 was being worked out and from all points of view it was quite clear that Escort Carriers should be fitted with a remote controlled Type 277 with the control table and displays contained in a Height Filtering Position (H.F.P.), together with a remote display from the W.A. set. Provision of a plotting table and an Interrogator panel was also required.

The fitting time for this installation was clearly prohibitive, the work requiring three to four months in a good dockyard. (It so happened that the few Fleet Carriers who were similarly affected, were available in Refitting Yards, so the scheme has so far been applied to Escort Carriers only).

Since Type 277 was already being Pre-fabricated into offices for use in small ships there seemed to be no reason why a large office, split into two halves for transportation purposes, should not be pre-fabricated in a factory and fitted complete into the waiting ship. One half contains the transmitter portion of the set, including all power boards, modulator, transmitter and the receiver panels; the other half carries the control table, displays, interrogation gear and the plotting table. All the internal office wiring is completed at the factory and the shipyard are required to connect external power, remote display, aerial, and communications leads to the junction boxes on the sides of the office.

The photographs show the method employed by the Caledon Shipyard at Dundee in embarking and skidding into position the two prefabricated sections of the Type 277 Radar Hut.

No. 1 shows the skidways prepared in the hangar, looking forward, including the wire purchase for hauling the huts down the skids, worked off the electric winch on the port forward sponson.

Nos. 2 and 3 show the method of slinging, the brackets added for jacking up to remove the skids in the final stages, and the skids themselves.

Nos. 4 and 5 show the lower half of the hut with the downhaul and preventative tackle rigged.

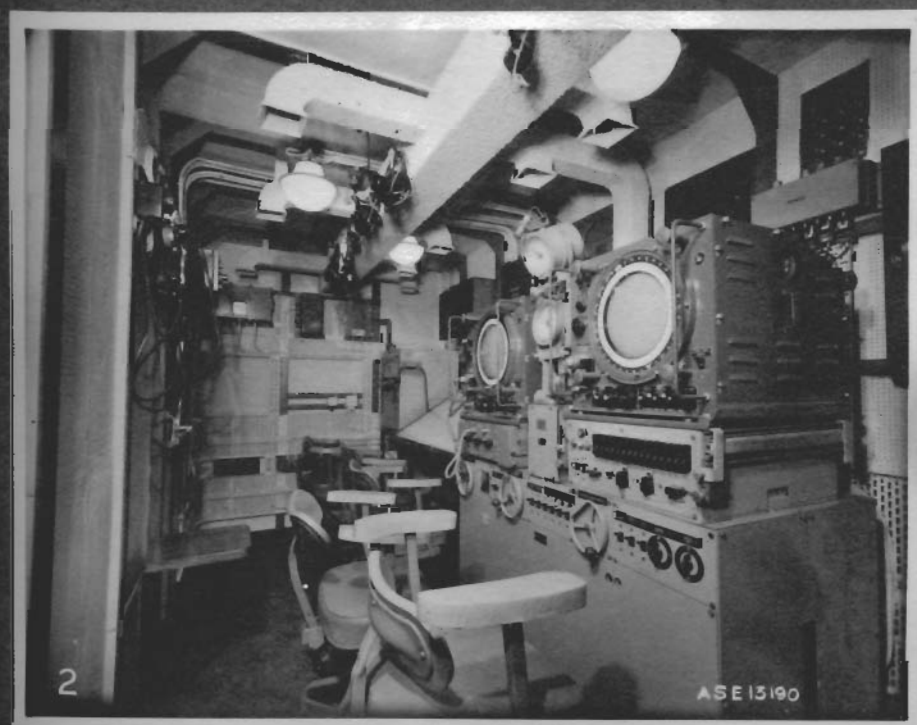
No. 6 shows the placing of the upper half.

No. 7 shows the side preventer gear fitted for keeping the hut from tipping over to starboard in the latter stages when being skidded athwartships. It also shows how very little clearance there is between the top of the hut and the electric leads under the hangar deck. The skidways actually had to be rebuilt at a lower level at the last moment to allow for this.

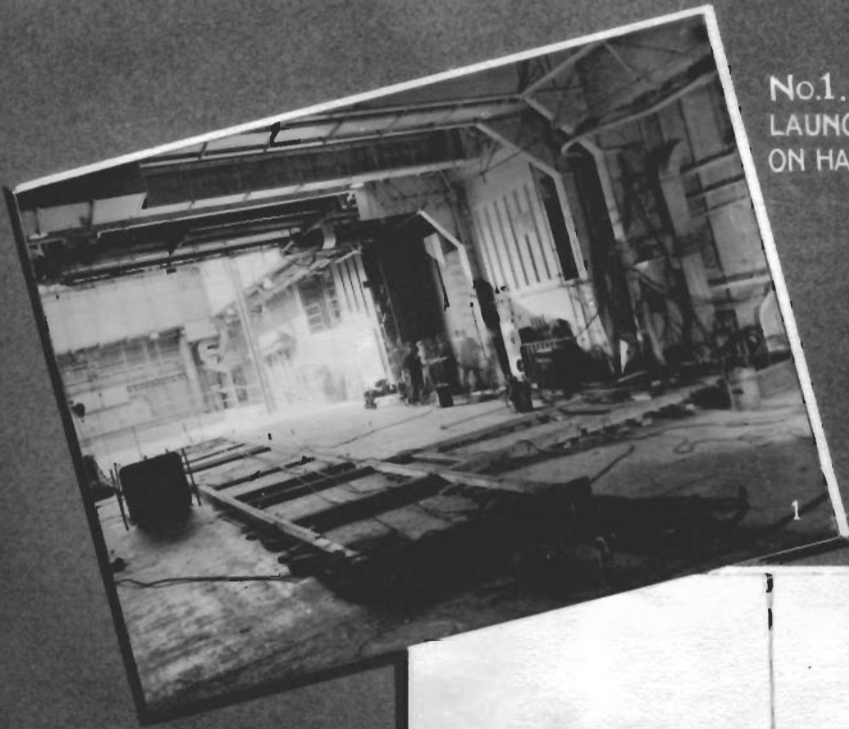
The hut was skidded without difficulty to a position opposite the combing which had been built to house it level, but the athwartships skidding was more difficult as it was against the grain of the skids which tore and had to be jacked up and cleared.



No.1 INTERIOR OF LOWER HALF.

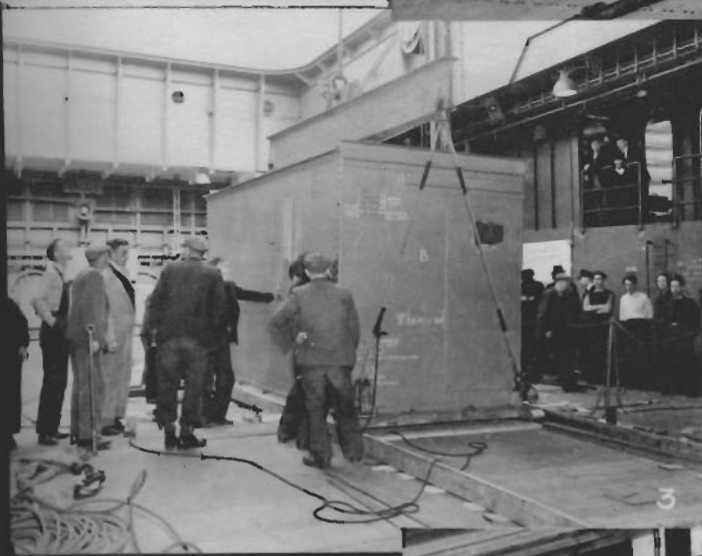
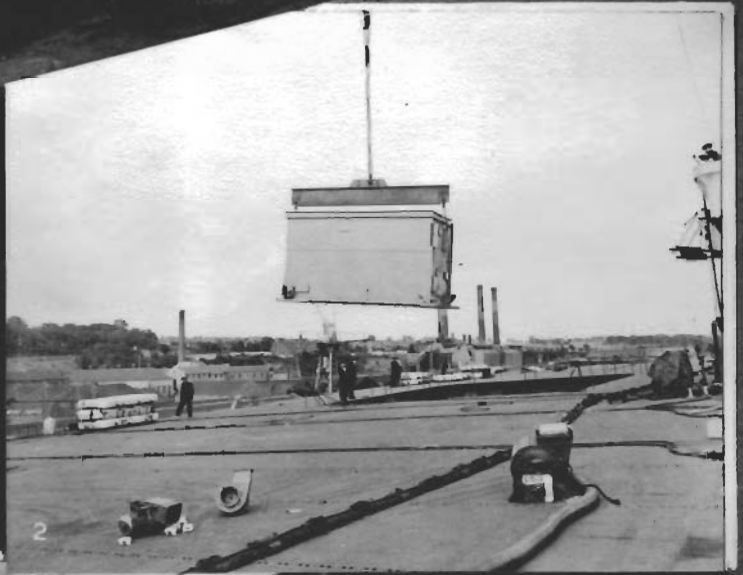


No.2. INTERIOR OF UPPER HALF.



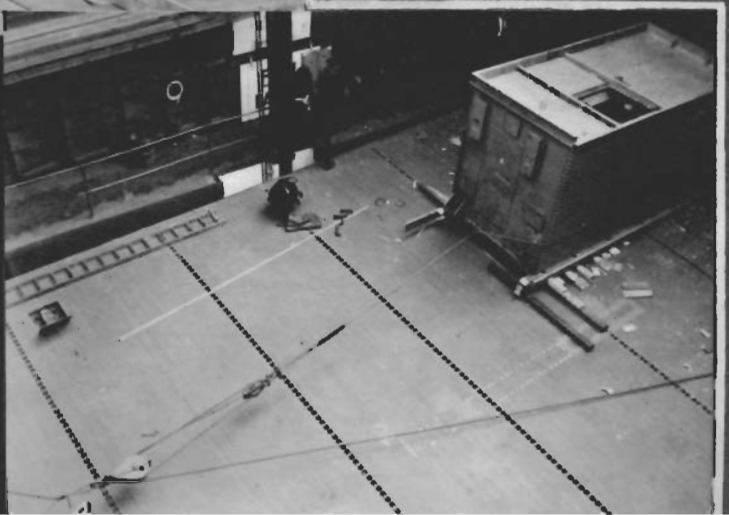
No.1.
LAUNCHING WAYS PREPARED
ON HANGAR DECK
(LOOKING FORWARD)

No.2.
LOWER HALF OF HUT BEING
HOISTED ABOARD



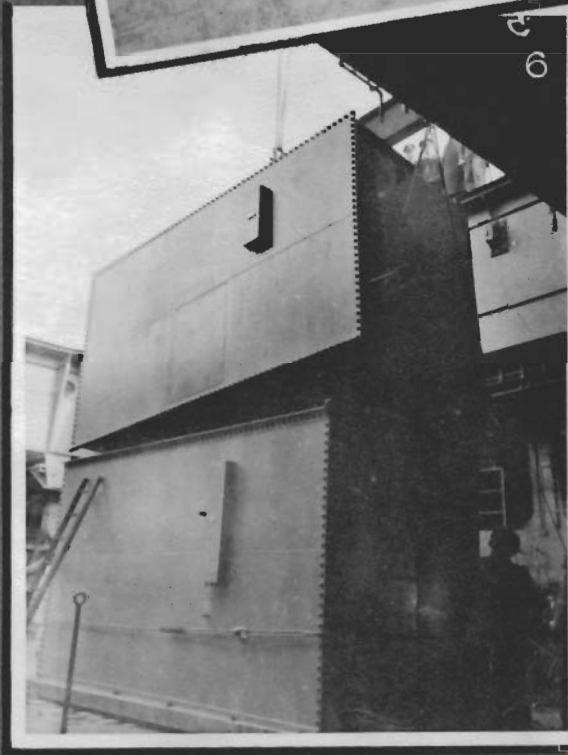
No.3.
LOWER HALF RESTING ON
LAUNCHING WAY

No.4.
THE HATCHWAY ENTRANCE
TO THE LOWER HALF IS
SEEN HERE

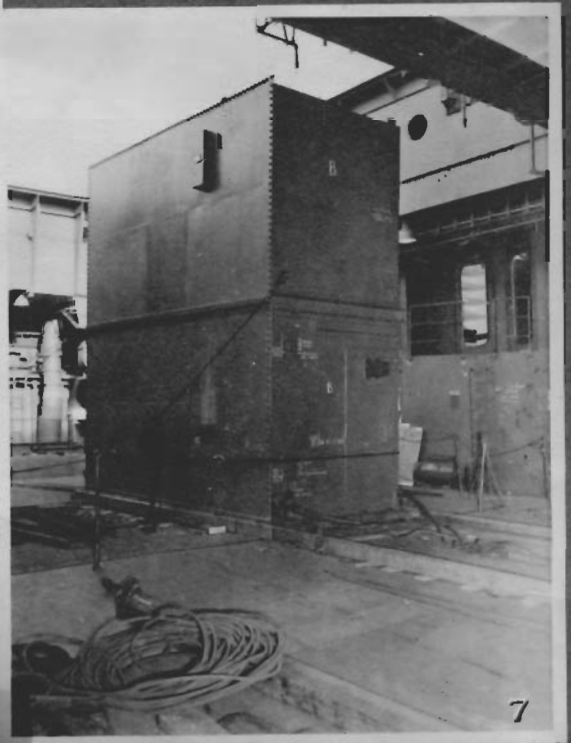




No.5.
DETAILS OF TACKLES
USED FOR MOVING
THE HUT



No.6.
THE UPPER HALF OF THE
HUT ARRIVES



No.7.
ALL READY TO GO.



No.8.
THE COMPLETE UNIT
ARRIVES AT ITS
FINAL POSITION

No. 8 shows the hut in its final position with its skids removed, but not yet lowered onto its combing by the jacks.

The operation of placing the hut by this method was carried out in a few hours and by shoring the lift and hangar deck beforehand, no distortion of these resulted.

Nos. 9 and 10 show internal views of the upper and lower parts of the equipment. The neat method of clipping the leads to the panel L26 (shown at the left-hand side of the transmitter office) is worthy of note. The two photographs well illustrate the clean finish which is obtainable when Radar offices are pre-fabricated, due mainly to the experience gained during the production of a large number of such units.

The fitting of Type 277 into this class of ship is now possible in the normal refit time of the vessel, or less; and although the position of the office in the hangar is not all that could be desired, from the point of view of easy accessibility, it appeared to be the only possible site, and the advantages of such a system far outweigh any faults which it, of necessity, must have.

(Editor's Note: We are indebted to the Commanding Officer of H.M.S. "SPEAKER" for much of the above information and for some of the photographs).

WINDFINDING BY RADAR

An interesting report has been received from H.M.S. Indomitable of the way in which her officers have been able to find accurate and continuous wind speeds and directions to a height of 55,000 feet by tracking a radar target attached to balloons, using her Type SM1.

The method has been tried many times in earlier days but never with the present success, because readings could never be taken sufficiently accurately.

The target consisted of paper backed aluminium foil, mounted on balsa wood stiffening struts constructed in the shape of a diamond. It was flown by attaching it to a bridle which was lashed to a balloon at each end.

The target was held consistently to 30 miles and successful trials were carried out both while the ship was at anchor and while under way. The chief difficulty encountered was that the target tended to drift astern into the blind arc, but this could be overcome by arranging for the release to be made from another ship.

Type 277 though not such an accurate instrument should also prove useful in this connection.