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AIR DEFENCE OF GREAT BRITAIN

INSTRUCTIONS

FOR

OBSERVER POSTS

1941

THE AIR MINISTRY.

Revised April, 1941

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INSTRUCTIONS FOR OBSERVER POSTS, 1941

1. **The System.**—One of the first necessities in air defence is constant information of the number, course and height of hostile aircraft. In order to obtain this information, observer posts are organised over the whole country; these posts communicate their information by direct telephone lines to observer centres.

The system further provides that the information shall be quickly passed from the observer centres to the various air defence commanders.

It also provides the information needed for air raid warnings, but the issue of warnings is not an Observer Corps responsibility.

2. **The Observer Post.**—Each observer post is called by a letter and number—A1, A2, A3, B1, B2, etc.

The strength of each post should be sufficient to ensure continuous manning by two observers, working in reliefs.

3. **Equipment.**—Each observer post is equipped with the articles shown in Appendix.

Should any of them require **repair** or **replacement**, a **postcard** stating what is required should be sent direct to:—

The Observer Group Officer, in whose group the Post lies.

N.B.—Small repairs to the telephone instrument can be arranged for by the Head Observer direct with the local Post Office authority.

4. **Setting up of the Observer Instrument.**—In war-time, the Instrument Table is permanently set up in the look-out.

When set up, the top of the table should be level, and it is most important that the chart should be oriented true North and South. To do this, the bearing of a distant prominent object is marked by an arrow on the chart. In order to set the chart, the circular table should be moved round until the arrow is pointing to this prominent object. The table should then be clamped in this position.

The setting of the chart may be checked by reference to the sun at noon (G.M.T.) or the Pole Star at night.

A nearby object on the line of bearing of the aiming mark should be noted, so that on a dark night (when no stars are visible) the Chart can be re-set if turned accidentally.

5. The states of readiness of the Observer Corps in war-time are :—

Stage 1—“ Readiness.”

This stage will represent the full manning of all Centres and Posts, the two men at the Posts being actually on the look-out.

Stage 2—“ Available.”

In this stage the crew of two men should be at each Post, but one may be resting in the shelter or elsewhere, provided he remains within earshot of the telephone bell. The Observer Instrument should be erected and covered, and one man must be on the look-out.

All communications remain switched through.

The conditions under the AVAILABLE must be such that the Group can be at READINESS within the number of minutes ordered.

6. (a) The telephone is permanently connected up in war-time.

Make sure that the microphone switch is kept in the off position except when speaking.

Note.—The microphone switch is operated by moving the mouthpiece. The switch is “on” when the mouthpiece is opposite the mouth for speaking, and “off” when the mouthpiece is turned downwards to its fullest extent. (See instructions contained inside the telephone.)

(b) The telephone is placed on the ground underneath the observer instrument. The front of the box should be closed except when it is necessary to ring the centre.

(c) The ringing arrangements to the centre should be tested regularly. The plotter will say “Test ring please” and No. 2 will then turn the generator handle on the front of the telephone sharply. The plotter at the centre will report if his bell has rung correctly.

The plotter at the centre will then test the ringing at the observer post and No. 2 observer will report whether the bell has rung correctly.

(d) Should it not be possible to communicate with the centre, use should be made of the nearest available telephone to ring up the centre whose telephone number is given on the chart and inform the centre that the line to the post is out of order. The centre will then be responsible for taking action with the Post Office and, if necessary, will arrange for a Post Office linesman to be sent out to put matters right.

The cost of the telephone call will be refunded on being reported to the Observer Group Officer.

(e) **Action in the event of thunderstorms :—**

A short piece of single cable, with the ends bared, will be kept in the telephone box.

In the event of a thunderstorm near the post, one end of this cable will be pushed into the ground beside the instrument and the other end will be connected to the screw terminal on the telephone marked "E." As this lightning protector lead is liable to cause a fault, it will only be connected when required.

In a severe storm No. 2 will remove his headphones and place them on the ground : the centre will be informed before this is done.

(f) **Maintenance of telephone apparatus.**

The telephone apparatus issued to each post will be checked from time to time by the G.P.O. linesman who will take steps to ensure that the telephone instrument, flexible telephone cable supplied to the Post, and circuit to the Post Office telephone system are up to the required standard of efficiency. The linesman will replace any parts of the apparatus which are faulty.

(g) All faults in the telephone apparatus should be reported immediately to the linesman and to the Centre.

7. Method of observing and reporting.

(i) (a) **Duties.**—No. 1 observer on duty is responsible for the general working of the observer post. He is to watch and listen for the aircraft, and, in the case of visible aircraft, will estimate the height and set the estimated height on the height column by turning the milled edged screw.

He will align the sighting arm on the aircraft by sliding or traversing the movable carriage towards or away from him, using either the "open" sight on top of the sighting arm, or tubular cross-wire sight.

No. 2 observer on duty, working under the general direction of No. 1, will act as telephonist and report to the centre the position of the aircraft read from the chart, as shown by the pointer on the sliding carriage.

No. 2 will listen for plots sent in by neighbouring posts and, where possible, use these to obtain "corrected" heights (see para. 8).

When the aircraft cannot be seen, but is only heard, No. 1 will proceed as detailed in sub-para. (iv). It is essential that, in this case, a "sound" plot should be given.

Note.—The work of an observer post equipped with the IIb or c type instrument can, if necessary, be carried out by one observer acting alone, but two observers should always be on duty.

(b) **Low Flying Aircraft.**—When planes are flying below about 2,000 ft. it is not practicable to use the Observer instrument. In such cases No. 1 of the Post must estimate their position and place his finger on the square. No. 2 will report this square as if it had been obtained in the normal manner, and give the estimated direction of flight and height.

(The scale of a Post Chart is :—one inch represents one mile.)

(Each square is 2 km. square. 2 km. = 1½ m. approx.)

(ii) **Form of Reports.**—(a) When No. 1 reports that his sights are “On,” No. 2 will read off the chart the square indicated by the pointer.

(b) No. 2 will then report to the observer centre in the following form, first giving the letter and number of his post :—
“B2 calling, plane (or planes) seen, 6153.”

(c) As soon as it can be ascertained he will report the direction of flight, for example :—“Plane (or planes) seen 6153 flying North.”

(d) If there are more aircraft than one, he will substitute the number of planes as soon as these can be counted, stating whether in formation.

(e) When the main information is through, supplementary information should be given, including the height, whether estimated or corrected (*see* para. 8), at which the aircraft are flying, and, if the post is able to recognise the aircraft as enemy or friendly, this should also be stated. If unable to recognise it or them, the Post should state “unrecognised,” and if thought to be “hostile” should say so.

(f) A typical report would, therefore, be in the following terms :—

“B2 calling, three planes seen 6153 flying North, height 8,000 ft.”

and when through :—

“8,000 ft. is estimated (or corrected) height,” followed by information as to type of plane, e.g., Friendly Bomber or Fighter, Hostile, or unrecognised, and, if recognised :—Wellington or Dornier (for example).

(g) If there is no marked alteration in course or height subsequent reports should be given in the following manner :—

“B2 calling same plane(s) now 6357, corrected height (if obtained) 9,000 ft.” “Recognised as.....”

(iii) **Number and Frequency of Reports.**—Too frequent reporting by posts causes confusion and delay at the centre, and must therefore be avoided. The plotter will regulate the reporting by Posts. Especial care should be taken to make the following reports :—

- (a) On first sighting or hearing an aircraft. This fact should immediately be reported to the centre, together with a plot. Centre will say if plots are required outside the post's area.
- (b) Directly an aircraft comes on to the post chart, regular reporting is to commence.
- (c) Thereafter every alternate square so long as the aircraft remains on a straight course and on the post chart.
- (d) When about to pass overhead and when overhead.
- (e) Immediately before the aircraft passes out of sight or off the post chart, whichever happens first.
- (f) Any marked change in the course or height of the aircraft during its transit.

(iv) **Reporting of Aircraft by Sound.**—(a) Plots *must* be given of aircraft heard although they cannot be seen. The fact that plots thus obtained may be somewhat inaccurate is of no importance compared with the necessity of making an early report to the centre, giving a "sound" plot which shows the **direction** in which the aircraft is **heard** by the post.

(b) The method adopted is the use of a "sound" circle of 5 miles radius marked in blue on the chart and labelled "sound circle." All sound plots other than the "overhead" report are given on this circle. If the post is able to estimate by ear the direction from which the sound appears to come, No. 1 will set the pointer of the instrument on the sound circle and point the instrument in this direction.

No. 2 observer will then report a plot **on the sound circle** in this direction, whether the aircraft appears to be far or near, stressing the word "heard," e.g. "plane **heard**, 3.30 at 10,000" (3.30 being the nearest half-hour by the clock code on the sound circle). The actual position of the aircraft, and, in time, its track, is worked out at the centre from the information given by plots from posts.

Therefore, the whole of the time that the plane is audible, reports at regular intervals must be given to the centre unless the plotter at the centre says they are not required. If the direction of sound remains the same, repetition of the same plot indicates to the centre that the plane is flying directly towards or away from the post reporting and this assists the centre in ascertaining the direction of flight.

(v) **Congestion.**—(a) As a rule, there are three observer posts connected by the same telephone line to the observer centre; if more than one post wishes to report at the same time, the plotter at the centre will tell all but one post to wait. For example, the plotter at the centre will say "A1 and A3 wait; A2 report." The three posts on one line will all overhear each other's reports.

(b) It is also possible that more than one post may be reporting the same aircraft. This will be obvious to the plotter at the centre, who will regard the aircraft as belonging to that post to which it is nearest, and he will instruct other posts to cease reporting this particular aircraft.

(c) If two or more posts on the same line are reporting different aircraft at the same time, the number of plots sent in by each post must be regulated so as to allow the other post or posts to get their reports through as well.

(vi) **Priority Message for reporting Low Flying Aircraft.**—As low flying aircraft are only in view or hearing of a Post for a short period it is important that the Post should get its report through without delay. The message "LOW RAID URGENT" is a priority message and the Post transmitting this message will be given priority over other Posts on the same telephone circuit.

8. **Height finding.**—It is of great importance, for the interception of enemy aircraft, that accurate heights should be obtained.

(i) The accuracy of plots obtained from the observer instrument is directly proportional to the accuracy of the setting placed on the height column. Provided the correct height setting is used, the position obtained from the chart will be correct. Conversely, provided the position of the aircraft is accurately known at any moment, its actual height can be obtained. This may be done by means of two or more posts working in conjunction and taking simultaneous observations of the aircraft. It is on this principle that various methods of height finding are based.

(ii) Should an aircraft pass directly overhead at any specified post, its position at that moment is accurately known. It is important, therefore, that this information should be reported to the centre. This should be done in the following terms, e.g. :—

"Plane about to pass overhead at A1"

followed later by :—

"Overhead at A1."

Where possible, there should be not less than 15 seconds interval between these two reports.

Neighbouring posts which can see the aircraft on overhearing these reports, or on receiving the information from the centre, will take the following action on receipt of information that the aircraft is overhead at the specified post :—

(a) Move the sliding carriage until the pointer is over the position of the specified observer post as marked on post's chart.

(b) Align the sighting arm on the aircraft by moving the height setting up or down with the milled edged screw.

The setting thus obtained on the height column is termed *corrected height* and should be communicated immediately to the centre in the following terms :—

“Plane over A1 corrected height 8,000 ft.”

(iii) (a) Frequently, however, the aircraft will not pass directly over an observer post, but between observer posts. Its actual position and correct height can then be obtained by the method detailed below. This method applies the principle of taking simultaneous observations of the aircraft from neighbouring posts which are connected to the centre on the same telephone circuit and consequently can overhear each other's reports.

The actual position of the aircraft at any moment is the point where the line of sight from one observer post cuts the line of sight from another observer post. The line of sight is, of course, the direction of the sighting bar when aligned on the aircraft.

(b) In the diagram, two observer posts, B1 and B2, are shown. The position of B2 is marked on B1's chart, and *vice versa*. B1 can overhear B2 giving plots of an aircraft to the observer centre. The sighting arm at B1 is kept aligned on the aircraft until B2 is overheard giving a plot. The sighting arm at B1 is then kept steady. The direction of the sighting arm will then be the line of sight on the aircraft from B1. Now the line joining the position of B2 to the plot P1 which B2 was overheard reporting is the line of sight on the aircraft from B2. **Where these lines of sight cross at “P2” is the actual position of the aircraft at the moment the plot was given.**

(c) No. 2 observer at B1, on overhearing B2's plot, will tell No. 1 to cease plotting and then move the friction pointer on the sighting arm hinge to Red line; he will then place the ruler (used for plot correction and kept in the instrument's case) on the line joining B2 to B2's plot P1, and will move the sliding carriage carrying the pointer until the pointer comes to the line indicated by the ruler.

(d) This movement will cause the friction pointer to move away from Red line. No. 1 will then restore the friction pointer to Red line by moving the HEIGHT SETTING up or down. When the friction pointer is back at Red line he will read off the height setting on the height bar.

This is the CORRECTED HEIGHT

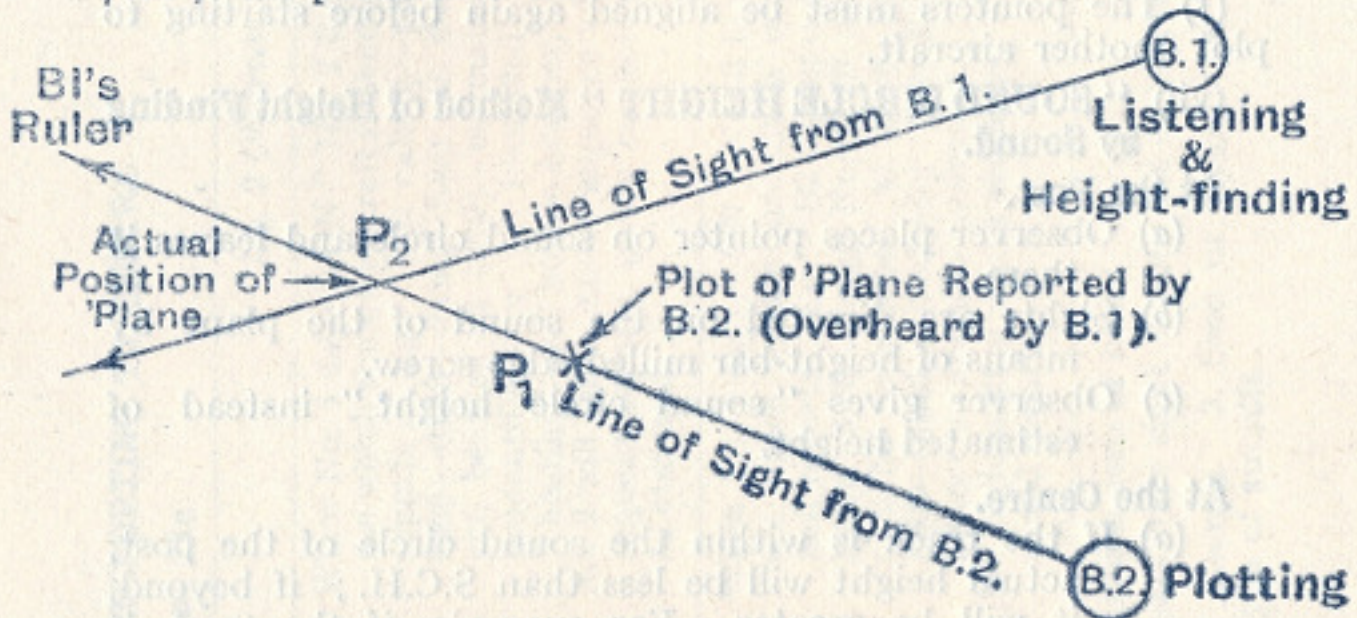
B1 will report in the following terms :—

“The corrected height of plane B2 is reporting is 10,000 ft.”

B2 will overhear this report.

The height column should be re-set to this height at B1 and B2, and the procedure carried out again on the same aircraft in order to check the previous reading.

If the height is now correct, both posts will obtain the same plot of the position of the aircraft.



This procedure may be carried out by any posts overhearing each other. With the assistance of the plotter at the centre, it may also be attempted by neighbouring posts which are not connected on the same telephone circuit.

Plots from an adjacent post for height finding purposes are known, for short, as "cross-plots".

(iv) In order to obtain the corrected height of aircraft successfully, close co-operation is required between neighbouring posts, and it is most important that all charts should be accurately oriented true North and South. Unless these conditions are fulfilled, the results obtained will not be accurate.

(v) When no opportunity occurs to obtain the corrected height of aircraft and No. 1 judges this height for himself, the term *estimated height* should always be used in reporting to the centre.

(vi) **Micklethwait Height Corrector.**—(a) Before starting to plot an aircraft it is necessary to see that the two pointers are aligned.

(b) When the post overhears another post on the same circuit plotting the same aircraft, No. 2 of the post crew joins up, by means of a straight edge, the positions on the post chart of the other post and the plot given by that post.

(c) No. 2 of the post crew moves the sliding pointer to the straight edge.

(d) The corrected height is then shown on the near side scale at the point at which it is intersected by the upper edge of the moving arm.

(e) Until the aircraft is out of sight, plotting can be continued without further adjustment by utilising the sliding pointer.

(f) The pointers must be aligned again before starting to plot another aircraft.

(vii) "**SOUND CIRCLE HEIGHT**" Method of Height Finding by Sound.

At the Post.

- (a) Observer places pointer on sound circle and leaves it there.
- (b) Sights are directed on the sound of the plane by means of height-bar milled-edge screw.
- (c) Observer gives "sound circle height" instead of estimated height.

At the Centre.

- (a) If the track is within the sound circle of the post, actual height will be less than S.C.H. ; if beyond, it will be greater. For example, if the track is 10 miles from the post, the true height is twice the S.C.H. ; again, if the track is 3 miles from the post, the true height is three-fifths of the S.C.H.

- (b) The necessary correction can be made by means of a table or chart, or an approximate figure may be obtained by eye.

9. **Notice of Aircraft over the area.**—The plotter at the centre will give his observer posts information of any aircraft approaching their area and their height. Posts will report if the aircraft are flying at heights obviously different from the heights as given out by the centre, and in this case will use the estimated height for obtaining plots and reporting.

10. **Care of Instrument II b or c.**—Care must be exercised in taking the instrument out of the box and replacing it after use.

Height must be put to zero and the sliding carriage kept in its proper place.

If damp, the instrument should be wiped over with an old piece of chamois leather as used for drying cars. Only fine machine oil should be used to lubricate the sliding parts. On no account must emery or sand paper be used to rub down bars on which the carriage travels.

If the instrument is knocked over it will be damaged, possibly beyond repair. Tripod legs must be cemented in, or otherwise secured to ensure that this cannot happen.

DUTIES OF NOS. 1 AND 2 WHEN REPORTING TO CENTRE
Observer Instrument 11c

No. 1 Observer

Immediately an aircraft is SEEN

Estimates height of aircraft—turns milled edge screw to setting.
 Moves sliding carriage until sights are aligned on the aircraft. Then says "ON."
 No. 1 continues to move sliding carriage to keep sights aligned on plane (or planes).

SEEN

No. 2 Observer

When No. 1 says "ON" No. 2 looks at pointer to see which square aircraft is over—calls Centre and reports: e.g. "B2 calling—plane (or) planes seen—6153—flying East (if direction of flight can be seen at once)—estimated height 9000—unidentified—or (if identified) "friendly" or "hostile," or "hostile bomber," etc.
 No. 2 will follow above sequence when making subsequent reports, giving corrected height as soon as obtained.

Immediately an aircraft is HEARD

Sets the pointer on the reporting circle. Moves the sliding carriage so as to point the sight bar in the direction plane is heard and says "ON."
 No. 1 continues to move sliding carriage to keep sight bar pointed in direction of sound, and give frequent "ON"s even if the bearing does not alter.

HEARD

When No. 1 says "ON" No. 2 looks at pointer to see which square aircraft is over—calls Centre and reports: e.g. "B2 calling—plane (or) planes heard 3.30—flying North (if direction of flight can be determined at once) estimated height 5000—unidentified—(or friendly—or hostile if Observers are able to decide).
 No. 2 (following above sequence) will give frequent sound reports.

The first report must be given as soon as possible after a plane is seen or heard.

The last report must be given just before the plane disappears from sight or gets out of hearing.

N.B.—Correct Sequence.—1. No. of Post. 2. Number of aircraft. 3. Seen or Heard. 4. Grid Reference or clock code hour. 5. Direction of flight. 6. Height. 7. Type of aircraft.

APPENDIX

POST EQUIPMENT

<i>Item</i>	<i>Scale</i>
Telephone	1
Observer Instrument II. C.	1
Table (with celluloid)	1
Tripod legs	1 set
Tripod head	1
Canvas Instrument Cover	1
Canvas tripod cover	1
Tripod shoes	2
Spectacle case	1
Sun glasses	1
Binoculars with case and strap	1
Torches, cylindrical	2

