

S.A. AIR FORCE.  
S.A. LUGMAG.

D.R.

*Theory.*

EXERCISE BOOK  
OEFENBOEK

*E. Neale.*

FOR USE IN  
VIR GEBRUIK BY

AIR FORCE TRAINING SCHOOLS.  
LUGMAGSKOLE.

## Analysis of Air Exercises.

1. To determine the standard of accuracy of air navigation to which it is possible to rely.
2. To isolate those errors of which the errors can be practically eliminated by training & practice.

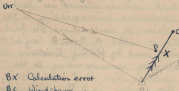
To fly from one point to another the navigator makes various calculations from which he determines the E.T.A. at the terminal point, the difference between the position that he finishes up & his destination is the net error of the flight (the final error.) It is necessary therefore for the purposes of analysis an accurate pinpoint is obtained at or near E.T.A.

There are several errors to be taken into consideration, the result of these may be cumulative or may partially or wholly cancel one another out, thus the final error is

itself may not provide a reliable guide to the accuracy of navigation. Analysis must be made to determine the several errors individually, the sum of these errors named the cumulative error shows the error that would have been obtained in the most unfortunate circumstances with the errors operating in the same direction & sense. Examination of the cumulative error provides an average figure which may be taken as a guide to the accuracy of any particular crew, when on occasion it may be taken as an indication of the accuracy of the sighting report from that crew, or whilst on a bombing sortie the ability to find their way to the target area.

The Errors are divided into the following groups.

1. Calculation error, due to incorrect plotting, calculation of courses to steer, time to alter course & E.C.A.'s etc.
2. Wind change Error, caused by the wind velocity, & wind by the navigator not being the true wind velocity affecting the A/c
3. The other error, composed of errors due to incorrect piloting, faulty instruments etc.



BX Calculation error

BC Wind change ..

CA Other ..

A-C True Wind. A-B Wind Used.



is possible to eliminate by further practice on the part of navigator & pilot is inability to calculate MW; or other courses.

Accepted Standard of accuracy for A/c of Reconnaissance Type (ie Anson).

Calculation Error	2.5%
Wind change	4.0%
Other	4.0%
Cumulative	<u>10.5%</u>
Total Acc Deviation -	



Runways Fix. By Co. & A/c.

Bombard command method.

The advantage of this method is that it can be used to give an accurate running fix when track & g/s are either unknown or not known with sufficient accuracy to give a good fix. i.e. when flying over the sea & unable to check drift. Whilst flying in or above cloud, while flying on a dark night. on these occasions track & g/s would not be known accurately, but the co & a/c would be known.

NOTE.

THIS METHOD CAN ONLY BE USED IF THERE HAS BEEN NO ALTERATION OF COURSE OR T.A.S. SINCE LAST FIX OR RUN POINT.

CONSTRUCTION (a)

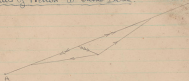
Draw line from CRIP down into (c) & mark in Airborne for time of Bomb line bearing (200). From (A) draw in any line A-B

\* out first from point C. Join D to E although E was a parallel to D-C. A cut AB at F. then F is the point through which to transfer 1st beam line, if 3 beam lines are used first transfer 2d beam line to last of the second beam line to last.

NOTE.

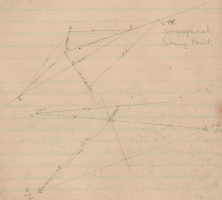
The accuracy of this method depends to some extent on the angle between the course & the line AB which should be the nature of  $10^{\circ} 15'$ . The D.R. track may be used as line A-B if the D.R. drift is sufficiently large as angle between C & A is large enough.

### Radius of Action to Same Base.



The Radius of action can be calculated from a formula, or by putting ground speed out against ground speed & time on banks of computer, then looking for two numbers opposite each other on outer & inner scale the sum of which equals the duration of the flight in minutes. Point to turn is found by measuring distance calculated from G/S out and time for radius of action.

Radius of action to Second or Working Base



06 29 15  
 1882 H 1 7  
 00 30 22  
 110 27  
0 06  
 160 52  
~~4 50~~  
 121 28  
 124 48  
 123 52  
 057 00 360  
 37 33 + 26 90  
 32 54 276  
380  
 110  
 250  
 020.RB.

INT 19°T

2 = 42.  
 2 12  
 = 6° 36' 25" = 11° 36'  
 1130 - 5 = 630  
 2 10 + 5 = 7° 10'  
 0.6° Alt 37.10  
 37.13  
 37.15  
 37.10  
 37.43  
27.53

06 30 20  
 06 31 27 2280  
 154 28  
7 53  
 162 21  
124 27  
 03.8° 00' 360  
~~56.5 25 47~~  
 54 54 25 263  
24 100  
55 18  
 13 T.

50  
 5.29'  
 16 27 1630  
 5.5° 30'  
 +2 55 31'  
 0.R. -4  
55 27  
 +4  
55 31



Reading 19 15 13.

Total 10° 33' (8° + 2°) 21

Single Shot 4° 25' - 5° 2' 25' 7° 15' 12° 15'

11° 33' - 5° 6' 33' = 21° 00' 6  
67° 15'

100 - 7

21 57 18

111 40

1 50

173° 30'

159 27

552 57

15 Mar 1943

22 hrs

W 1 mi Tacon dam

W.R. 06 25 04

06 29 11

266 00

2 18

268 18

140 44

AMAZ 415 02

LONG W 265 02 W 32 N

LAH 291 00

ME I + 4 + 2

= 16

RECBATH 93°

Z = -1

27 ~~38~~ 08 43

27 27 - 5 = 15 22

7° 21' + 5 = 12° 21'

7 24 ÷ 3

2 28 + 5 = 7° 28'

Calc 27° 28'

Z -1

inst 27° 27'

Corr 27° 30'

Pre -6

27 24

Go to coal room & check on all notices published in your absence, particularly your next step by

### Outing Base

1. Exact location.
2. Layout of TERRAIN.
3. Visibility.
4. Previous data in previous raid.
5. Tactial information.
  - a. The visibility of the TERRAIN from different angles of APPROACH.
  - b. Landmarks as an aid to low level attacks.
  - c. Landmarks as an aid to night attack.
  - d. Enemy defenses, if there are any.
  - e. Map Information.

09 26 15

+ 3

09 24 15

18 20 00 114.06

00 20 15 1.03

145.11

209.20

428.31

25 22 3.95

455.26

300.00

09 5 26

Cable Alt. 22.59

Core 23 32

7.8 ✓

Aug 7 041

Aug 7 228

60 48 23.89 +1

TABLE 6 +9

O.R. -7

Good Alt. 25.51

PROCEDURE		SIGNALS		POST FLIGHT	
DATE	TIME	COLOR	CHAL	COLORS	ANS.
14943	0001	GR.	B	RED.	F.
	0600				
	0800	YB	R	WHITE.	G.
	1200				
	1300	RY	Y	GREEN.	B.
	1500				
1800	GY	G	RED.	H.	
2309					

### PROCEDURE. AFTER FLIGHT.

1. Aircraft met by NCO photographer.  
Hand to him your camera magazine  
& note of no. of exposures & light conditions  
over target.
2. Report immediately to the Ops room  
taking with you forms 401, 404 & 1  
your maps & all notes made in the air  
If you are interrogated by S.I.O.  
& may have discuss verbally any susceptibilities.
3. Sign a hand in forms 401 & 404.
4. Complete & sign photographic report  
& bombing report (copy) & combat report (Pilot).

