

55/76
3

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,
GEOLOGY AND GEOPHYSICS.

RECORDS
1955, No.76

INITIAL INVESTIGATION FOR AIRCRAFT COMPASS-SWINGING SITE,
AVALON AIRFIELD, VICTORIA,

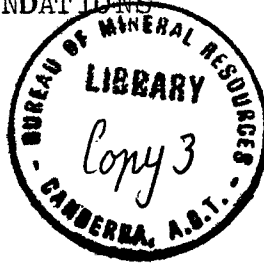
by



J.A. BROOKS AND C.S. ROBERTSON.

C O N T E N T S

	<u>Page</u>
1. INTRODUCTION	1
2. WORK DONE AND RESULTS OBTAINED	1
3. CONCLUSIONS AND RECOMMENDATIONS	2



T A B L E S

1. Magnetic Declination Measurements, Area A
2. Magnetic Declination Measurements, Area B

I L L U S T R A T I O N S

- Plate 1. Plan of site and locality map.
2. Geophysical grid and variations in magnetic declination, Area A.

1. INTRODUCTION

Preliminary investigations were made at Avalon Airfield, Victoria (Plate 1), on 9th June, 1955, by J.A. Brooks and C.S. Robertson (geophysicists, Bureau of Mineral Resources) to test whether a selected area (Area A, Plate 1) is magnetically suitable for an aircraft compass-swinging site.

The work was done at the request of the Department of Works, which is undertaking the construction of the site on behalf of the Department of Defence Production. The specification calls for an area 600 feet in diameter having a variation in magnetic declination of not more than 0.1 degree over its area.

The tests showed that the area selected was unfavourable. The results were discussed at a conference between officers of the Government Aircraft Factory, Commonwealth Aircraft Corporation, and the Bureau of Mineral Resources, held on 5th September, 1955, in the Bureau's offices. Following this discussion, further investigations were requested by G.A.F., and were carried out at Avalon on Area B (Plate 1) on 15th September, 1955, by C.S. Robertson and K.B. Lodwick, geophysicists, Bureau of Mineral Resources.

2. WORK DONE AND RESULTS OBTAINED

The first investigation comprised observations at a total of 28 stations along 4 traverses (Plate 2). The equipment used was the declination head, circle and tripod of Askania field magnetometer No. 508813.

Observations were made at each station to determine the difference in magnetic declination from the value at the reference station. The differences thus obtained are listed in Table 1, and are shown on Plate 2. They show a total variation exceeding two degrees over the area measured. Variations of a degree or more occur between some successive stations at intervals of about 100 feet.

As these anomalies were far greater than the specified variation, it was apparent that a site conforming to the specifications would not be found in the area selected. Further work was therefore suspended, and the Department of Works was advised of the unsatisfactory conclusion.

As mentioned previously, the results were discussed with officers of G.A.F. and C.A.C. The C.A.C. officer (Mr. Richardson) preferred a site close to their hangar (Area B, Plate 1), and stated that he had made preliminary tests with a landing compass which showed that this site was anomaly free within about half a degree, and that this accuracy might be sufficient for their purposes.

Mr. Sanderson of the Government Aircraft Factory, stated that they required more accuracy than this, but he thought that a tolerance of a quarter of a degree would be adequate. G.A.F. also required a larger area than C.A.C.

2.

In the compass swinging tests, observations are made at eight points spaced at 45° around a circle. It was suggested that the difference between the declination at each of these points and at the centre of the circle could be determined readily, and it was agreed that this would be the most satisfactory procedure. Mr. Frazer of G.A.F. asked that arrangements be made to carry out these tests in the near future, at both proposed sites.

On arrival at Avalon, Messrs. Robertson and Lodwick were informed by Messrs. Sanderson and Richardson that the plan to determine the corrections at individual points had been abandoned owing to difficulties anticipated in carrying out compass swinging tests under these conditions, and that an anomaly-free area was still sought. After some discussion, it was decided to make preliminary tests on Area B.

A traverse was laid out approximately at right angles to the front of the C.A.C. hangar. Stations were located at intervals of 25 feet, beginning at a distance of 75 feet from the hangar, and ending at 375 feet.

The results of these observations are given in Table 2. From 150 feet to 225 feet the variations are less than 5 minutes. If variations up to 20 minutes can be tolerated, readings along the traverse from 150 feet to 325 feet from the hangar are within the range. Readings nearer to the hangar than 150 feet are decidedly influenced by the magnetic material in the hangar. Readings beyond 325 feet are apparently influenced by ground anomalies.

3. CONCLUSIONS AND RECOMMENDATIONS

An area 600 feet in diameter fulfilling the conditions of a compass swinging site with magnetic declination constant within 0.1 degree, does not exist in either Area A or B.

Outcropping rocks in the surrounding areas are basaltic, and this type of rock generally gives rise to anomalous magnetic conditions. The results of tests at Laverton, Point Cook and Avalon lead to the conclusion that it is unlikely that the above specifications will be met anywhere in this district. It is possible that some degree of freedom from magnetic anomalies may be found in areas where the basaltic rocks are covered by a reasonable thickness of alluvium. However, as the alluvium is probably derived from basaltic hills, it may also contain magnetic material, and it is very doubtful whether the tolerance of 0.1 degree will be met.

It is understood from discussions with the officers concerned, that the specifications can be relaxed, and that an area 300 feet in diameter with the declination constant within 15 minutes might be satisfactory. Such an area might be found, within Area A or elsewhere.

It is recommended that further preliminary tests be made with landing compasses, to locate areas which are free of large anomalies, before another site is selected for detailed testing.

3.

It is recommended that any further request for testing a site be accompanied by advice whether the area required can be reduced, or the tolerance in magnetic anomaly increased, from the original specifications.

If a site cannot be located to suit the required accuracy, it is recommended that corrections to compass readings be determined at selected points in an anomalous area.

T A B L E 1.

Magnetic Declination Measurements, Area A.

Station	Departure from reference value (Degrees)
1	+0.5
2	0
3	+0.1
4	-0.5
5	-0.8
6	-0.9
7	-0.2
8	+0.8
9	-0.2
10	-0.2
11	-0.7
12	-0.5
13	-0.1
14	-0.1
15	+0.1
16	+0.4
17	+0.1
18	+0.2
19	-0.1
20	-0.5
21	-0.6
22	0
23	+0.3
24	-1.5
25	-1.0
26	-0.5
27	-1.0

T A B L E 2.

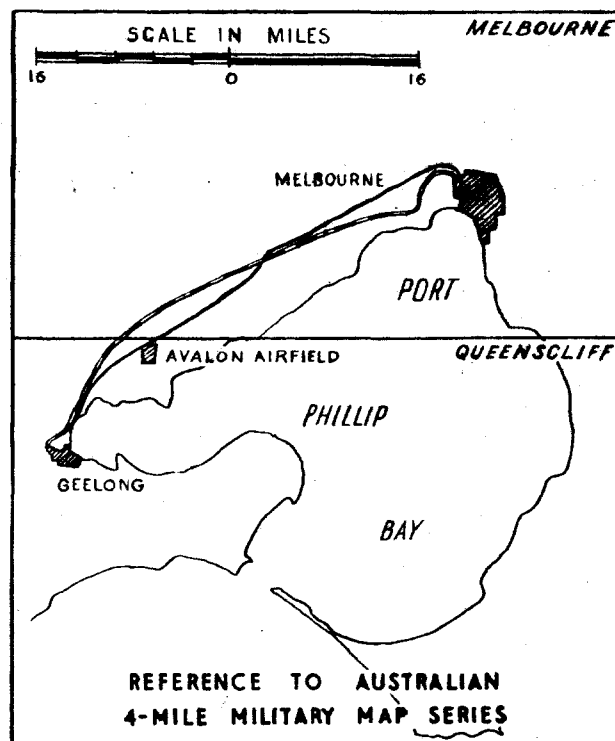
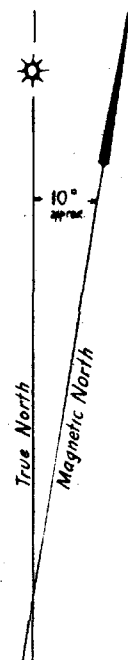
Magnetic Declination Measurements, Area B.

Distance from gangar	Departure from reference value (Minutes)
375 ft.	-38.0
350 "	-31.8
325 "	- 8.5
300 "	+12.0
275 "	- 8.3
250 "	- 8.8
225 "	+4.3
200 "	0.0
175 "	+1.8
150 "	+1.0
125 "	-28.0
100 "	- 60.3
75 "	-118.7

BEACH

ROAD

PRINCES
HIGHWAY



SEE PLATE 2

G.A.F. hangar

C.A.C. hangar

AREA "B"

FENCE

REFERENCE

AREA "A"

ACCESS ROAD TO CONTROL TOWER

DRAIN

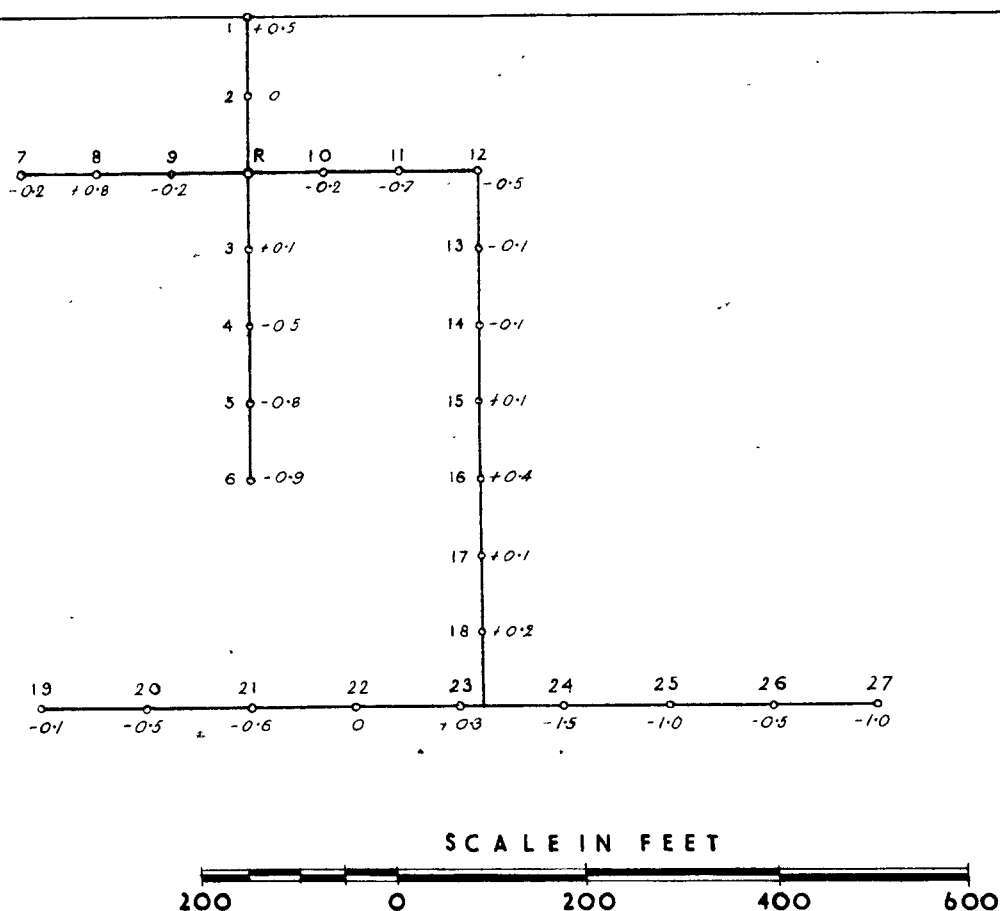
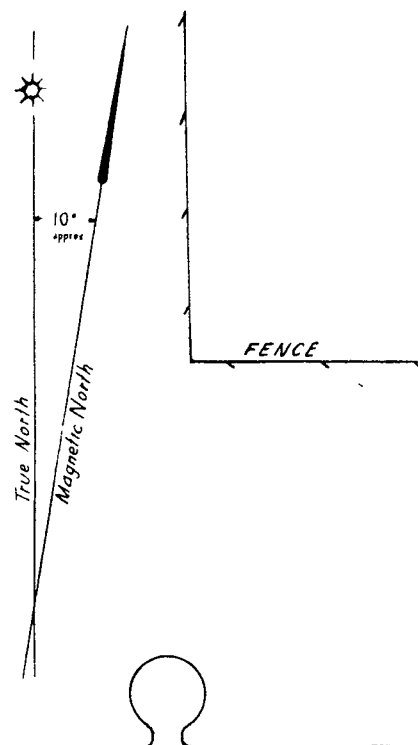
CONTROL TOWER

INITIAL INVESTIGATION FOR AIRCRAFT COMPASS
SWINGING SITE AT AVALON AIRFIELD, VICTORIA

PLAN OF SITE AND LOCALITY MAP

LEGEND

- o R. Reference Point
- o 3 Station and No.
- 15 Magnetic Declination
(variation from reference point
in degrees)



INITIAL INVESTIGATION FOR AIRCRAFT COMPASS
SWINGING SITE AT AVALON AIRFIELD, VICTORIA

GEOPHYSICAL GRID AND VARIATIONS IN MAGNETIC DECLINATION AREA "A"