

EXPLANATORY NOTES

INTRODUCTION

The Australian Air Distances publications are produced and issued on an irregular basis, and are intended to be an adjunct to other publications in the Air Transport Statistics series where distances have been used to calculate or derive statistical information.

2. The airport coordinates shown have been compiled from various sources and are believed to be accurate as at December 2024. Where possible, the coordinates of the aerodrome reference point have been used, however in many cases the coordinates of the township or homestead site have been included when the exact location of the relevant landing area is not available, and accuracy may suffer slightly as a result. The aerodrome reference points are subject to amendment following airport works, and current coordinates may not be reflected in this publication due to the relatively long time between issues. For these reasons, the coordinates and distances should not be used for operational purposes, e.g. flight planning.

COVERAGE

3. The distances selected for inclusion in this publication are those covering routes which are, have been, or are likely to be, used by operators of scheduled commercial air services within Australia and between Australian and overseas airports.
4. Airport-to-airport distances only are listed; distances to or from navigational aids and/or reporting points are excluded from this publication.

DEFINITIONS

5. **Air Distances** are expressed in kilometres (KM), Admiralty nautical miles (NM) and statute miles (SM), and are calculated by means of the Great Circle Distance formula (see below) using the latitudes and longitudes presented in this directory.
6. A **Great Circle Distance** is the shortest distance between any two points on the globe, measured over the Earth's surface.

7. **Distance** listings are alphabetical and unidirectional, the airport name with the earlier alphabetical sequence preceding the second airport.
8. The **Aerodrome Reference Point** is located at the approximate centre and at the average level of an aerodrome. The geographical location of this point and its elevation above mean sea level represent the official position of an aerodrome.

GREAT CIRCLE DISTANCE FORMULA

9. The formula used to calculate the air distances shown in this publication is set out below:

$$S = RQ_{AB} \quad (1)$$

$$\text{where } Q_{AB} = \arccos (\sin \beta_A \sin \beta_B + \cos \beta_A \cos \beta_B \cos \Delta\lambda_{AB}) \quad (2)$$

$$\text{and where } \beta_A = \arctan \{(1 - f) \tan \Theta_A\} \text{ and} \quad (3)$$

$$\beta_B = \arctan \{(1 - f) \tan \Theta_B\}$$

10. Definition of symbols

Θ_A	= geodetic latitude of port 'A', expressed in radians
Θ_B	= geodetic latitude of port 'B', expressed in radians
λ_A	= geodetic longitude of port 'A', expressed in radians
λ_B	= geodetic longitude of port 'B', expressed in radians
$\Delta\lambda_{AB} = \lambda_A - \lambda_B$	
Q_{AB}	= the angle, in radians, subtended by the two ports at the Earth's centre
R	= the radius of the earth = 6,378,160 metres (Australian National Spheroid)
f	= flattening of the Earth = $1/298.25$ (Australian National Spheroid)
S	= great circle distance between ports 'A' and 'B'

11. Using the formula

The latitude and longitude of airports of interest to the Australian air transport industry are given in the following pages. The latitude is given as a six-digit number followed by an 'S' for south or an 'N' for north. The number is in the format DDMMSS, i.e. the first two digits are degrees, the next two are minutes and the last two are seconds. This number must be converted to decimal degrees, thence to radians, for use in the above formula, and should be positive if north of the equator and negative if south.

The longitude is given as a seven-digit number followed by an 'E' for east or a 'W' for west. The number is in the format DDDMMSS; note that three digits are used to specify the number of degrees. The number should be converted to decimal degrees, thence to radians, and made positive if east of Greenwich, negative if west.

Latitudes and longitudes are converted to decimals by using the formula (degrees + minutes/60 + seconds/3600).

Decimal latitudes and longitudes are then converted to radians by using the formula (decimal degrees * $\pi/180$).

Once the latitudes and longitudes of ports 'A' and 'B' have been obtained in radians, equation (3) is used to calculate β_A and β_B . Q_{AB} is then calculated from equation (2), and finally the distance S is calculated from equation (1).

12. Comments

The formula shown above is used by the Department to calculate air route distances, and is based on work carried out in the mid-1970s to obtain an appropriate Great Circle Distance formula optimised for Australian conditions. This is used by the Department in the calculation of distances, passenger kilometre and tonne kilometre data in the Air Transport Statistics series of publications. Use of this formula may give slightly different results to those obtained by using other formulae.

The Australian National Spheroid has been used in the formula. The difference between this spheroid and other standard spheroids, such as the International Spheroid, amount to at most 200 metres in altitude at any point on the Earth's surface. This variation is negligible when applied to the distance calculation.