GEOCENTRIC DATUM OF AUSTRALIA

SHEET

# GDA Grid Transformation Using Distortion Modelling

This information sheet explains the grid transformation option and how the distortion model can be used to transform the Australian Geodetic Datum (AGD) to the Geocentric Datum of Australia (GDA). This information sheet aims to help users of spatial data and software developers.

## Background

The Geocentric Datum of Australia (GDA) is a new coordinate system for Australia which is compatible with the Global Positioning System (GPS). GDA supersedes the existing Australian Geodetic Datum (AGD) coordinate system, which has been in use since 1966. Because the centre of the ellipsoid used for the AGD is about 200 metres from the earth's centre of mass, AGD coordinates will differ from GDA coordinates by about 200 metres.

To convert coordinate from one datum to another, a transformation process is required.

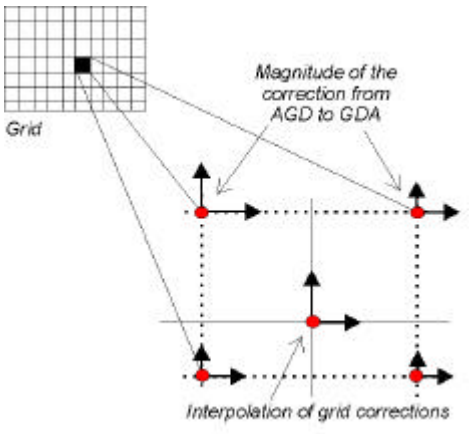
In November 1997, the Intergovernmental Committee on Surveying and Mapping (ICSM) adopted the concept of a unique and standard transformation grid of coordinate differences to model distortion between AGD and GDA. The Canadian National Transformation version 2 (NTv2) data format, developed by the Geodetic Survey of Canada, was chosen to make these transformation grids available to industry.

## What is grid transformation?

NTv2 is a specific format used to distribute grid transformation data.

Grid tranformation is a method of converting coordinates from one datum to another by interpolation within a grid of points.

The transformation grid models the distortion between datums and contains corrections for latitude and longitude to convert from AGD to GDA at each grid node. The change in latitude and longitude from AGD to GDA can be determined for any position by simple interpolation and is then applied to the AGD position to give the GDA position. The following diagram illustrates this process:




ICSM agencies are producing these grid files for their area. When the files are complete, they will be merged to produce a unified national grid file for Australia. In fact there will be two national grids. The first will be an AGD66 to GDA national grid. The second will be an AGD84 to GDA94 grid covering Western Australia, South Australia and Queensland (that is, the jurisdictions which implemented AGD84). Where there is appropriate common data, this transformation method is expected to have accuracy better then 10cm.

In Australia, some transformation grids contain high density sub grids. These grids are used for increased accuracy in areas where there is dense survey control networks, sucha as in metropolitan areas.

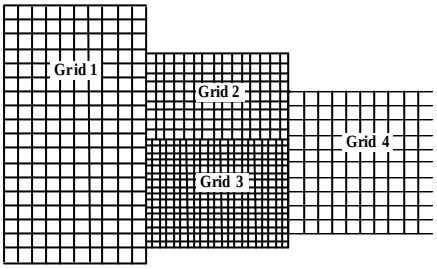
The grid spacing is subject to the particular circumstances of each State and Territory and the relative control network density.

GDA

ICSM Executive Office PO Box 2 BELCONNEN ACT 2616 Australia Toll free call: 1800 800 173
Internet: http://www.anzlic.org.au/icsm/gda/index.htm

ICSM
INTERGOVERNMENTAL COMMITTEE ON SURVEYING & MAPPING

The following diagram represents how the grid sizes could vary according to density of the available common data.




Each grid or sub grid will contain a header file, which will describe the lineage, currency, size and extent of the grid.

## Why use grid transformation?

The grid transformation process is accurate and simple, and caters for existing distortions in the AGD network. It is also used in other countries and has been incorporated in software packages.

The benefits of the NTv2 format are that it is simple to apply and is also able to support variable grid sizes and densities for built up urban areas for increased accuracy.

## Where do I get these grids from?

Links to jurisdiction grids, where available, are freely available from the technical manual located at http://www.anzlic.org.au/icsm/gdatm/chapter7.htm The availability of this high accuracy transformation grid is summarised below.

| Jurisdiction | Current Grid Availability |
|---|---|
| Queensland | **Complete**: Available from http://www.dnr.qld.gov.au/resourcenet/land/landservices/survey/surveyb.html |
| New South Wales | **Complete**: Available from http://www.lic.gov.au/gda/transinf.htm *In the process of amalgamating with Victoria (along the border).* |
| ACT (including the NSW file) | **Complete**: Available from http://www.lic.gov.au/gda/trans.htm |
| Victoria | **Complete**: Available from http://www.osg.vic.gov.au/tools.htm *In the process of amalgamating with NSW (along the border)* |
| Tasmania | **Complete**: Available from http://www.delm.tas.gov.au/osg/Geodetic_transform.htm |
| Northern Territory | **Complete**: Available from http://www.anzlic.org.au/icsm/gdatm/chapter7.htm#high |
| South Australia | Mid 2000 |
| Western Australia | **Complete**: Available from http://www.dola.wa.gov.au/lotl/survey_geodesy/gda1994/index.html |
| National grids | Available from AUSLIG Late 2000 (for both AGD66/AGD84 grids) |

## How do I use grid transformation?

Interpolation software is freely available (GDAit, GDAy) and can be downloaded from the technical manual. Software vendors have also developed software.

## How is the grid file being developed and supported?

The Australian grid files are being developed by each State and Territory jurisdictions which are also responsible for maintaining their own grid. A national grid is being compiled using individual State/Territory grids and will be maintained on behalf of ICSM by AUSLIG. This will be freely available from the ICSM web site (www.anzlic.org.au/icsm/) in early 2001. It is not expected that updates will be required after the national grid is produced.

Most software vendors are building the appropriate transformation routines into their software. In doing this there are two options: the first is to incorporate the individual NTv2 files into their software; and the second option is to allow the user to specify the source of the NTv2 file.

There are a number of software packages currently available which support grid transformations using NTv2. Some of these software companies are listed in the ICSM GDA links web page located at www.anzlic.org.au/icsm/gda/links.htm

## Is the grid method appropriate?

Whilst the grid transformation is the preferred option, there are three other methods available. These should only be used where distortion modelling cannot be used or is impractical to use. They are 3-Dimensional Similarity (also known as seven parameters, accuracy of about 1 metres), Molodensky (accuracy of about 5 metres) and Simple Block Shift (accuracy of about 10 metres).

Whichever method is selected, the metadata for the dataset should contain the method and parameters used to ensure other users of the data are aware of the accuracy and lineage of the data.