

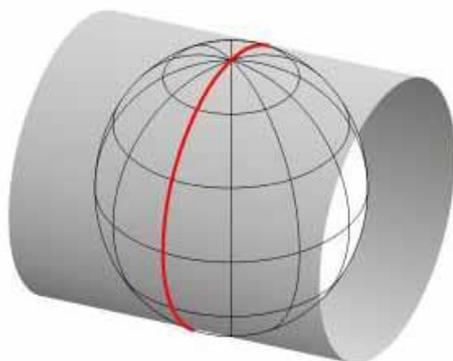
**UNDERSTANDING GRID REFERENCES for Australian topographic maps and GPS devices.**  
 Prepared for WICEN NSW Inc. by Chris Meagher VK2ACD 2017

A universal method of describing an exact location on the earth, is by giving co-ordinates of latitude and longitude.

When working from maps, especially of a small area, this can be very inconvenient and error-prone. The lines of 'lat and long' are usually not marked except at the edges. Also the system is awkward when it comes to a precise location, because degrees of lat and long are divided up into 1/60ths (minutes) and again into 1/60ths (seconds).

So for maps on a scale of 1:250,000 down to 1:25,000, the common system is to mark the whole map with a grid of squares, using horizontal and vertical grid lines at equal intervals. The intervals are chosen to suit the scale of the map.

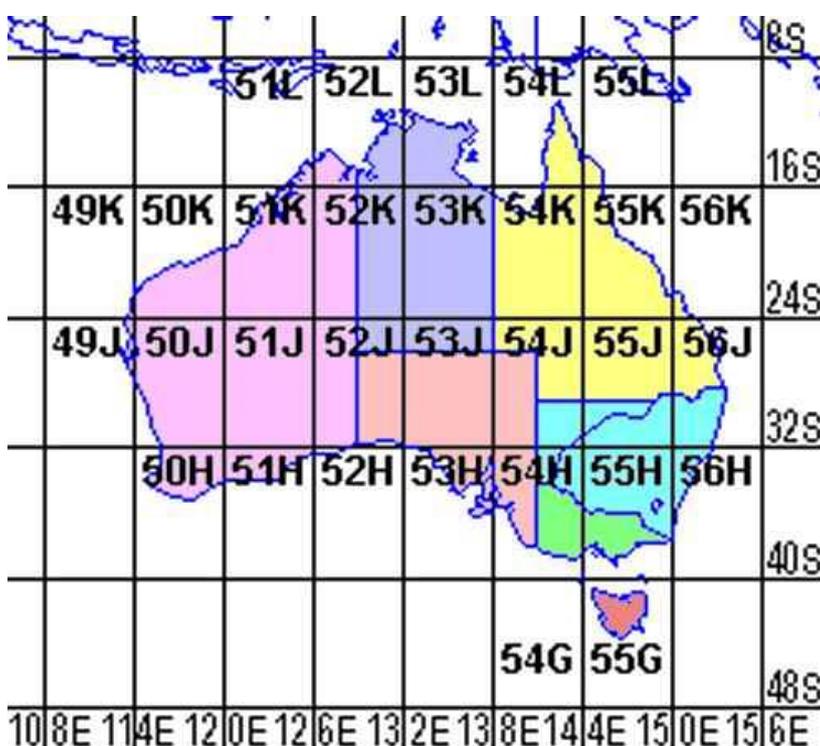
Map grids were developed by the military during WW2, and became standardised as the Australian Map Grid (AMG). This was originally in miles and yards, but eventually was metricated.



The grid has seen some adjustments, and is now called the Map Grid of Australia (MGA). This is based on the Universal Transverse Mercator Projection, which is one of many methods of showing the curved surface of the earth on a flat map. Each map sheet is made by lining up the central line of longitude (in red) for the map and the sphere is 'projected' outwards onto a cylindrical surface (grey) arranged sideways or 'transverse' to the meridian.

The cylinder is then unwrapped into the flat map, which is then marked with grid lines (the UTM grid).

This system uses zones, each 6 degrees of longitude and 8 degrees of latitude. These are designated by two numbers plus one letter. Each of these areas is further subdivided into squares of 100,000 metres, which are identified by two letters.



This diagram shows the zones for Australia.

For example – the 1:250,000 scale map of the area around Alice Springs, is in grid zone 53K, and covers parts of 6 different 100,000 metre squares – LP, LQ, MP, MQ, NP and NQ. The town of Alice itself is in square 53K LP.

Once you know which big square you are in, the exact location is given by reading the numbers from the map's grid lines that tell you how far east and north you are from the SW corner of the square – these are called 'eastings' and 'northings'.

## How to give a full grid reference

The first step is to identify the general area by one of two methods:

**Method 1** – Give the UTM grid designation of the 100,000 metre square, = 2 numbers and 3 letters (as shown above for Alice Springs). It is conventional to put a space after the first letter.

Most topo maps have a small diagram which tells you the grid zone(s) for the map. Sheets covering more than one square may have the borders of the squares marked within the map, using coloured lines.

**Method 2** – the most common, is to give the map name and/or the sheet number. This is of course ought to be printed somewhere on the map sheet. A complication is that different systems are used for various scales of maps.

For example – you are in Alice Springs, where only the 1:250,000 topo map is available.

This is designated Alice Springs SF53-14. Note: this NOT the same as the UTM grid zone, the longitude subdivision is the same (53), but the latitude indicator (SF) is based on 4 degree divisions.

The number 14 identifies the map sheet as one of 16 sheets within the area SF53.

Or, for example, you are at Evans Head, NSW where topo maps are available at 3 different scales.

The designations are:

1:250,000 – Lismore Special SH56-7 (a special vertical format map for the narrow coastal strip)

1:100,000 - Woodburn 9539

1:25,000 – Tabbimoble 9539-1S.(one of 8 maps that cover the area within the 9539 sheet).

Below is the grid reference information box for the Tabbimoble sheet,

This type of box is found on most Australian topo maps, commonly in the bottom left hand corner..

Note that the 100,000 metre square designation (arrowed) is INCORRECT, it should be NP

So take care, you can't always trust the information on a map!

### GRID REFERENCES

UNIVERSAL GRID REFERENCE																					
<p><b>GRID ZONE DESIGNATION:</b> 56H</p> <p><b>100 000 METRE SQUARE IDENTIFICATION</b></p> <div style="border: 1px solid black; width: 100%; height: 100%; display: flex; align-items: center; justify-content: center; margin: 5px 0;"> <span style="font-size: 2em;">NN</span> </div> <p><b>IGNORE the SMALLER figures of any grid number, these are for finding the full coordinates. USE only the LARGER figures of the grid number, for example:</b> 325000</p>	<p style="text-align: center;"><b>TO GIVE A STANDARD REFERENCE TO THE NEAREST 100 METRES</b></p> <p><b>SAMPLE POINT:</b> Olive Gap ▲ 136</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%; padding: 2px;">1. Read the letters identifying 100 000 metre square in which the point lies.</td> <td style="width: 5%; text-align: center; padding: 2px;">NN</td> <td style="width: 5%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="padding: 2px;">2. Locate the first VERTICAL grid line LEFT of the point and read the LARGE figures labelling the line in either the top or bottom margin;</td> <td style="text-align: center; padding: 2px;">37</td> <td style="text-align: center; padding: 2px;">5</td> <td></td> </tr> <tr> <td style="padding: 2px;">3. Estimate tenths from the grid line to the point.</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding: 2px;">4. Locate the first HORIZONTAL grid line BELOW the point and read the LARGE figures labelling the line in either the left or right margin;</td> <td></td> <td style="text-align: center; padding: 2px;">75</td> <td></td> </tr> <tr> <td style="padding: 2px;">5. Estimate tenths from the grid line to the point.</td> <td></td> <td></td> <td style="text-align: center; padding: 2px;">6</td> </tr> </table> <p><b>SAMPLE REFERENCE:</b> <span style="float: right;">NN375756</span></p> <p style="font-size: 0.8em; padding: 5px 0;">The 100 000 Metre Square Identification repeats every 18°. If reporting beyond 18° in any direction, prefix the reference with the Grid Zone Designation, for example: 56HNN375756</p> <div style="background-color: #fff9c4; padding: 5px; font-size: 0.8em; margin-top: 5px;"> <p>Before giving a grid reference civilian users should state the number and name of this map, for example: 9539-1S Tabbimoble 375756</p> </div>	1. Read the letters identifying 100 000 metre square in which the point lies.	NN			2. Locate the first VERTICAL grid line LEFT of the point and read the LARGE figures labelling the line in either the top or bottom margin;	37	5		3. Estimate tenths from the grid line to the point.				4. Locate the first HORIZONTAL grid line BELOW the point and read the LARGE figures labelling the line in either the left or right margin;		75		5. Estimate tenths from the grid line to the point.			6
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## Completing the grid reference

Once the map sheet is identified, it is simply a matter of reading the location using the grid lines. These are marked around the edge of the map, and possibly also within the map itself.

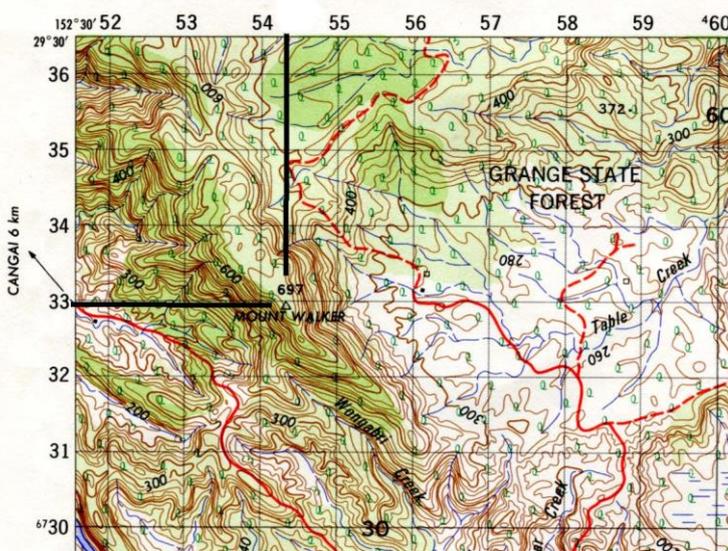
Firstly, numbers are read from the vertical grid lines, going east, then from the horizontal grid lines, going north. There are various ways to remember this – for example, memorise the letter group EN (east-north) or RU (right-up). In any case, most Australian topo maps have instructions at the side of the map in case you forget.

References can be given with 4 or 6 numbers.

At 1:250,000 scale, 4-figure references are given, since it is impractical to try to give any finer division at this scale.

At 1:100,000, 1:50,000 and 1:25,000, 6-figure references are usually given.

Here are 3 examples:

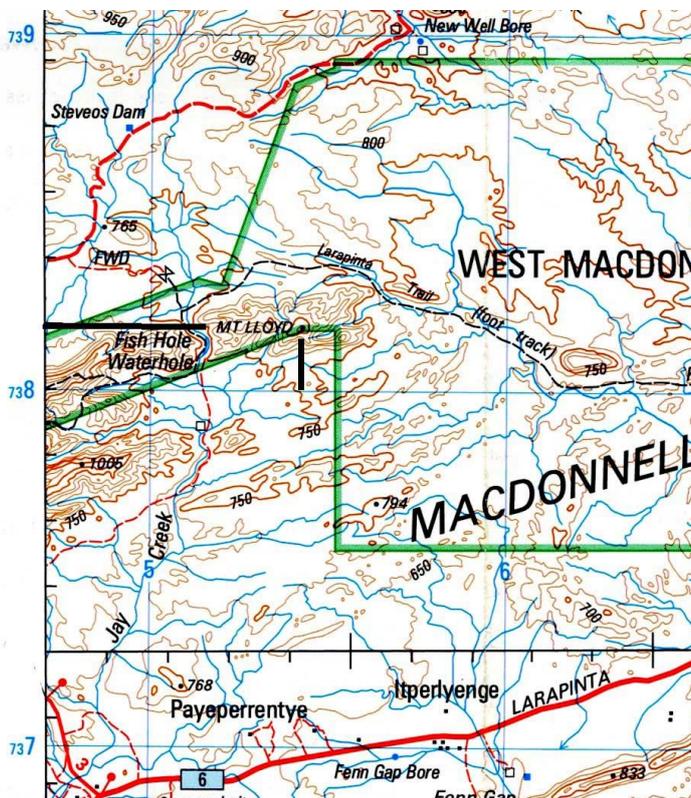


This is a small part of the Grafton (NSW) 1:100,000 topo map. The grid lines are 1 km apart.

To give the 6-figure reference for Mt. Walker - Go across to the right, and read 543 (that is 3 tenths of the way from line 54 to 55). Then go up from line 32, and read 329, (that is 9 tenths of the way from line 32 to 33).

Always estimate the tenths FORWARD in number, not backward.

The reference is then 543329.



This is part of the Alice Springs (NT) SF53-14 sheet at 1:250,000.

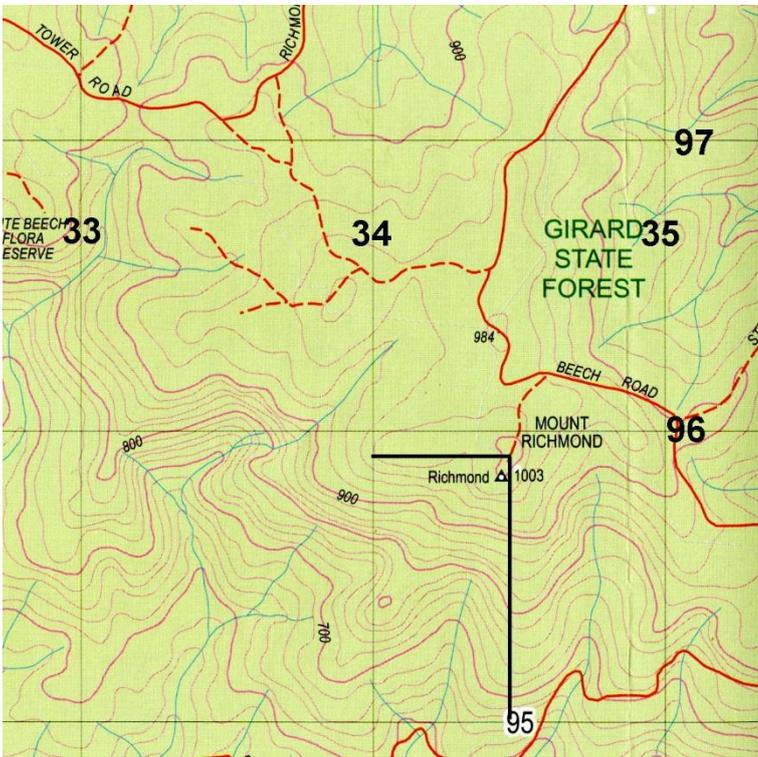
The grid lines are in blue, 10km apart.

To give the 4-figure reference for Mt. Lloyd, go across from the vertical 5 line to 54, then up from the horizontal 8 line to 82.

The reference is then 5482.

NOTE that the small blue numbers on the grid lines are not used, the first number to read is the large number.

The black lines and subdivisions are for latitude and longitude.



This is part of the Drake (NSW) 1:25,000 sheet. The grid lines are 1 km apart. In this example the six-figure reference for the top of Mount Richmond would be 344959.