

Survey of Crib y Ddysgl

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1) Introduction

Crib y Ddysgl (Hill Number 1964, Section 30B, OS 1:50000 Map 115, OS 1:25000 Map 17W, Grid Ref. SH610551) is listed as a Nuttall, a Hewitt, a Sim and a Furth (a hill that is 3000ft or over in England Wales or Ireland as given in Munro's Tables) in the Database of British and Irish Hills (DoBIH). It is also the second highest mountain in Wales with a map height of 1065m, closely followed by Carnedd Llewelyn (1064m). On 5th June 2014 G&J Surveys was filming on Snowdon with CREAD and SLAM Media in preparation for a programme for ITV Wales to be shown later in the year. This gave the team the opportunity to obtain an accurate height for Crib y Ddysgl.

2) Equipment used and Conditions for Survey

A Leica NA730 Professional Automatic level (X30 telescopic system)/tripod system and a "1m" E-staff extendable to 5m were used to determine the positions of the bwlch and summit.

Absolute heights were measured using a Leica Viva GS15 receiver. This receiver is a dual-frequency, multi-channel instrument, which means it is capable of locking on to a maximum of 12 GPS and 8 GLONASS satellites as availability dictates, and receiving two signals (at different frequencies) from each of these satellites. The latter feature reduces inaccuracies that result from atmospheric degradation of the satellite signals. As a stand-alone instrument it is capable of giving position and height to an accuracy of about two metres and five metres respectively. Note that small hand-held GPS receivers used for general navigation can only receive up to 12 GPS satellites and each at a single frequency and therefore these instruments have a poorer positional accuracy of +/-5metres and a height accuracy of no better than +/-10 metres. Some recently produced hand held GPS Garmin receivers can also receive signals from GLONASS satellites which greatly improve the speed at which these units can achieve a satellite "fix". Despite the on-board features of the GS15 receiver, there are still sources that create residual errors. To obtain accurate positions and heights, corrections were made to the GNSS (Global Navigation Satellite System) data via imported RINEX data from Ordnance Survey which were post-processed using Leica GeoOffice 8.3. Repeated measurements with the GS15 instrument made on the same point give a height precision +/-0.05m.

Conditions for the survey, which took place between 15.00hr and 17.00hr BST, were good. The weather was warm, 15 degrees Celsius, with sunshine for most of the survey. The wind was light and visibility was excellent.

3) The Survey

3.1) Character of Hill

Crib y Ddysgl lies on the Snowdon Horseshoe which has the deserved reputation of being the finest ridge walk in England and Wales. With a map height of 1065m it is no surprise that the views from

the summit are breath-taking. Dominating the scene is Snowdon itself with sheer cliffs rising to its pointed summit. To the South the ground falls precipitously to Glaslyn and Llyn Llydaw, while in the distance to the East Moel Siabod dominates the scene. The Glyderau and the other Welsh ‘three thousanders’ stretch off to the North-East and in the opposite direction the Lley Peninsula disappears into the haze. Anglesey lies North and every so often whistles and puffs of smoke from far below herald the approach of a train from Llanberis on the Snowdon Railway. The summit of Crib y Ddysgl is rocky and crowned by a trig point. The latter is in a poor state of repair and regrettably has had its flush bracket removed.

3.2) Summary of Survey Method

Upon arrival at the summit the first task was to locate the highest point using the Leica NA730. Once established the Leica GS15 would then be set up over this position and data collected.

3.3) The Summit

The summit ridge is shown in the photographs in the appendix. The area around the trig point is rocky and about 50m West along the ridge towards Snowdon the ground also rises before falling towards the bwlch that separates Crib y Ddysgl from its higher neighbour. The Leica NA730 was set up at a convenient position and staff measurements were taken at all these positions. The highest point of the mountain was found to be a rock about 6m SW of the trig point.

Next the tripod was set up over the summit position and the Leica Viva GS15 fixed to it with a clamp and tribrach (the “short tripod” configuration). The height of the receiver above the ground was then measured with the integral tape. The vertical offset from measuring point to the ground was 0.314m (see photograph in Appendix) plus 0.255m for the tribrach/hook system. GNSS data were collected for two hours with an epoch time of 15 seconds.

The data for the Leica Viva GS15 were processed in Leica GeoOffice 8.3 using the six nearest base stations and the result is given in the table below:-

System	Easting	error(1SD)	Northing	error(1SD)	Height(m)	error(1SD)
GS15	261079.334	0.002	355154.621	0.002	1065.334	0.007

The height of Crib y Ddysgl = 1065.33m

When there is a trig point in the summit area of a hill it is standard practice to obtain a measurement of the flush bracket to compare with the Ordnance Survey value. As described above, in this case the trig point is in a poor state of repair and its flush bracket has been removed (see appendix). Regrettably, therefore we were unable to make a measurement of the flush bracket height.

4) Summary of Operating Conditions

GS15	
Data collection summit (min)	123
Number of Base Stations used in Processing for all points	6
Epoch Time (sec)	15
Tropospheric Model	Computed
Cut off Angle (degs)	15

5) Discussion of Results

For the GNSS results from the Leica Viva GS15, a two hour data collection time gives results with a measurement uncertainty of +/-0.05m. In addition the measurement uncertainty in height associated with the location of the summit is +/-0.01m as determined by the staff measurements. Therefore the overall measurement uncertainty for the GNSS determination of the summit is +/- 0.05m.

6) Summary and Conclusions

The **summit** of **Crib y Ddysgl** is at grid reference * SH 61082 55158 and is a rock about 6m SW of the trig point. Its height is **1065.33+/-0.05m**.

- NB: Grid references “corrected” to Garmin are quoted in the summary.

John Barnard, Graham Jackson and Myrddyn Phillips, 18 October 2015

Appendix 1



Snowdon from Crib y Ddysgl



Tea time!



Setting up the Leica Viva GS15 on the summit



Photograph showing summit position with respect to the trig point



Offset for Leica Viva GS15 set up at summit



The team on the summit of Crib y Ddysgl