

2009

Chris Towers 3060420



[SUMMARY OF REPORT; “SIR THOMAS MITCHELL’S ANGULAR OBSERVATIONS AND FIELD-NOTE SKETCHES OF NEWCASTLE”]

Within the summary it discusses the methods used in determining the accuracy of Sir Thomas Mitchell’s field-note sketches of Newcastle together with the accuracy achieved. It also shows accuracy comparisons to an Artists painting of Newcastle.

The aim of this student project was to decipher the field notes and observations of Thomas Mitchell (later Sir Thomas Mitchell) when he performed a survey in Newcastle in 1828. Another aim was to determine the accuracy of Thomas Mitchell's drawings on his field notes of the Newcastle area.

Mitchell was appointed Surveyor-General of NSW in 1828 and continued this role until his death in 1855. Sir Thomas Livingston Mitchell was born in the Parish of Falkirk, County of Stirling, Scotland on 15 June 1792, and baptised on 18 June 1792. Mitchell was a man of many talents, becoming a talented artist and writer, and he was also a geologist and botanist.

He went to the Peninsular War in 1811 at the age of 19, as 2nd Lieutenant, 1st Battalion, and 95th Regiment (of Rifles). He went to battle and was engaged in topographical intelligence. Mitchell returned to England in 1819 a very different person to complete his plans of the Peninsular Battles and was determined to make the illustrations to the Peninsular Plans examples of skilful artistry.

Mitchell was promoted to Major in 1826 and in 1827 travelled to Australia where in 1828 was appointed Surveyor-General of New South Wales in replacement of the late John Oxley. Whilst performing his duties as Surveyor-General, Mitchell completed four major expeditions into eastern Australia with one of these expeditions passing through Newcastle, drawing remarkable sketches and surveying the landscape of the town.

Orientation of 1830 Armstrong Plan

Armstrong's 1830 plan of Newcastle was orientated within AutoCAD by adopting a couple of points on the plan. It was then scaled and orientated to be on a current MGA coordinate system. The points used to fix the plan were;



Figure 1 - Location of Orientation Points

NW Cnr Burial Ground	E 385 950.485
NW Cnr Great Northern Hotel/Ship Inn, 1830	N 6 356 039.776
	E 386 375.526
	N 6 356 133.054

This process of fixing Armstrong's plan had already been completed in a previous student project completed by John Wilson and Alex Widgery in 2006. The process of how these coordinates were calculated along with the accuracies obtained can be found within their report.

To orientate the plan the two points mentioned above were used to shift, rotate and scale the image within AutoCAD with the Armstrong plan as a raster image. It was orientated by using the transformation function within AutoCAD and entering the aforementioned points as site coordinates and entering the MGA coordinates of each point to shift, rotate and scale the image to MGA coordinates. The process was then checked to ensure it had orientated correctly. The accuracy of the orientation of the plan was found to be approximately 0.1m in easting, and 2.9m in northing.

Resection

To calculate the positions of the stations, easily identifiable common points between Mitchell's observed points and points on Armstrong's map that could be fixed more accurately plan were used. With the plan put onto MGA in AutoCAD it gave relevance with today's current coordination network and by sliding the cursor over the desired points MGA coordinates could be found.

The derived angles from Mitchell's observations could be used between these fixed points to perform a resection calculation to find his station setup locations. Using this setup location Mitchell's radiations could be entered as now directions and from using multiple resections to find all of Mitchell's setup locations with the directions observed from each station setup location the observed sites could be coordinated by intersections.

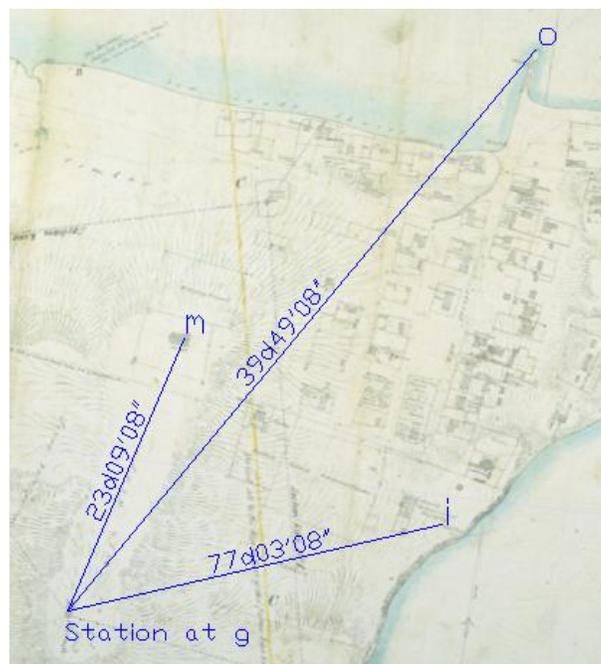
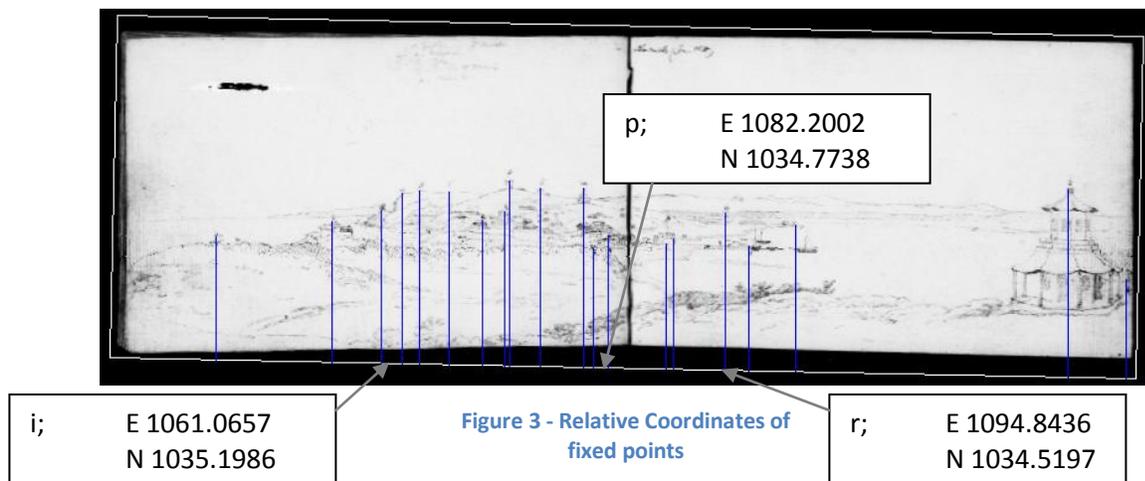


Figure 2 - Directions calculated from resection with resected location of Station at g

Accuracy of Sir Thomas Mitchell's Drawings

"The illustrations... are exquisitely beautiful, and we do not hesitate in publicly stating that Major Mitchell must stand alone in the exploring world" was one comment included in contemporary reviews of the published versions of Mitchell's expeditions (Foster, 1985).

Mitchell's angular observations were used to calculate the accuracy of his field-note sketches by projecting the positions of the observed points on the sketches vertically down to the bottom of the page (used as the baseline) and finding the relative coordinates of these points to perform a resection with Mitchell's observed angles to find the observation point. This was completed within AutoCAD with the images firstly rotated slightly so that any vertical projected lines would not be skewed, and then finding these relative coordinates on the baseline to perform the resection.



Using the located observation point Mitchell's angular observations could be projected to the baseline. The vertically projected lines to the baseline were then projected to the observation point and the angular differences were found to find the field-note sketches accuracy.

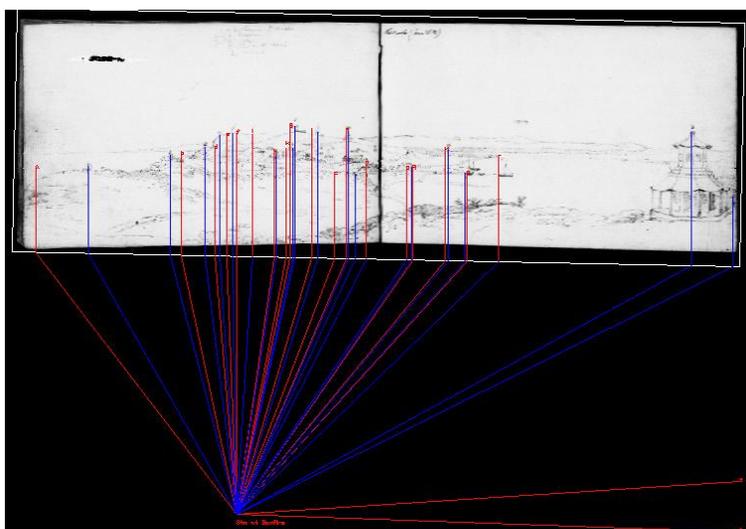


Figure 4 - Projected lines from Observation Point

Several fixes were performed to find which configuration of fixed points used would give the most accurate fix. It was found that the most accurate configuration was with the points spread evenly over the sketch.

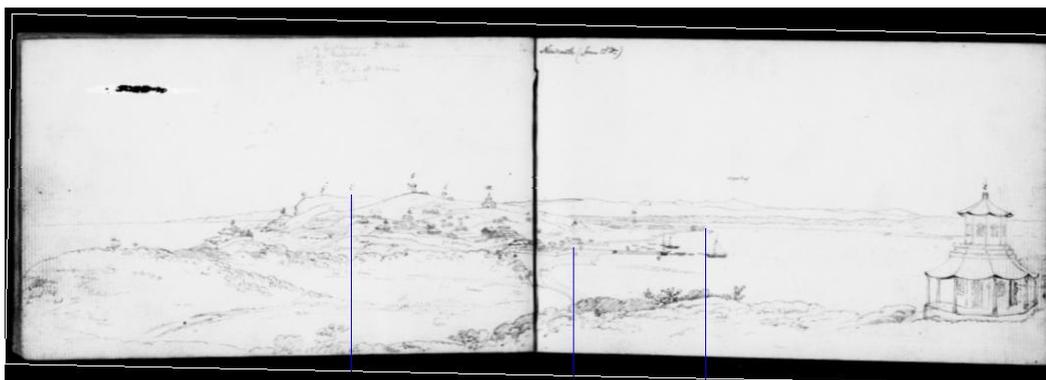


Figure 5 - Fixed Points evenly spread over image

The accuracies obtained from Mitchell's sketches are remarkable as they are simply sketches for his field notes. Accuracies of up to $0^{\circ}36'53''$ were achieved which shows minimal difference and would only make a distance of 2.1mm which is just a bit thicker than a pen stroke. Similar trends were found between the accuracy of the two sketches with the best fix coming from the points that were evenly distributed over the page, and showing that the points at the extremities to be exaggerated and their positions less accurate.

Accuracy of Artists Perspective of Newcastle

The method used to determine the accuracy of Mitchell's field-note sketches was then applied to a well-known early painting of Newcastle. A painting by artist Joseph Cross (shown below) was examined. It was titled "A View from King's Town (late Newcastle)" and dated 1st August 1828. The painting was published by Joseph Cross in Henry Dangar's: *Index and directory to map of the country bordering upon the River Hunter*.



Figure 6 - Joseph Cross' "A View from King's Town"

This painting was used due to the time of its creation as it was very close to the time that Mitchell completed his survey of Newcastle. The painting is also observed from nearly the exact same position as where one of Mitchell's setups were located, the Government Flour Mill, which is now the location of the Obelisk. This location was required to enable the determination of its accuracy as compared to Mitchell's sketches.

Joseph Cross' painting appears to show high accuracy. It shows fine details and this immediately gives the impression of accuracy. Due to minimal common points between Mitchell's observed angles and the point locations on Cross' painting only two fixes were used to determine the accuracy. The accuracy from each fix was found to be of high accuracy, with accuracy of as good as $0^{\circ}36'03''$ which approximates to a scale accuracy of 1:100.

Accuracy of Mitchell's Sketches compared to Joseph Cross' Painting

Mitchell's field-note sketches when compared with Joseph Cross' painting showed similar accuracies, with Cross' painting achieving an accuracy of approximately $0^{\circ}36'$ representing the same scale accuracy of 1:100. In my opinion it is believed that the accuracy of Mitchell's field-note sketches is one of higher accuracy than of Cross' painting. I base this conclusion on the fact that Mitchell's accuracy could be tested right across his field sketches, not only just in the centre as per Cross' painting.

It has been shown that the accuracy of both the field-note sketches by Mitchell and the painting by Cross are of extremely high accuracy, demonstrating that both were very talented artists.