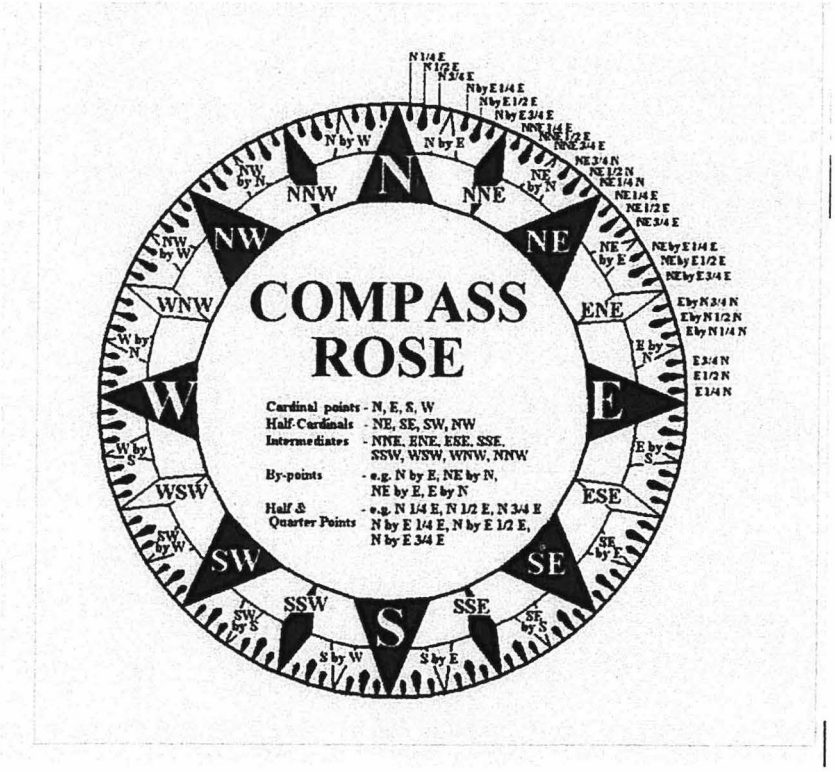
CRITERIA FOR DETERMINING THE ROUTE OF MAJOR MITCHELL'S EXPEDITIONS

1. A general principle is to work from the "whole" to the "part";
2. Another principle is to work from the "known" to the "unknown" or from the "certain" to the "uncertain".;
3. Corroborated and /or more reliable evidence / facts should be accepted before less reliable and uncorroborated evidence / facts;
4. Another practice is to try to put yourself in the position / mind of the explorers as they determined the route forward.
5. Regard should be given to the make up of the exploring party and its needs. Mitchell surveyed and mapped the area surrounding the route of exploration which required a larger than otherwise field party and their provisions. This, in turn, required further men to attend to the provisions and travelling stock. The party used light and heavy carts drawn by oxen or bullocks [because they were cheaper and easier to obtain than horses] and was accompanied by a flock of sheep. Hence, consideration should be given to:
   - The need for pasture and water. The route followed grasslands for pasture and camped in the proximity of a river, creek or waterhole for watering the stock.
   - The party avoided timbered areas as the open country made for easier travel and there was less danger of aboriginal attack.
   - The route avoided soft alluvial soils and preferred harder ground so the carts did not get bogged.
   - Regard had to be given to the ease [or otherwise] of crossing streams. Streams that were difficult to cross were avoided and, conversely, fording places often determined the direction of the party.
   - It was Mitchell's practice to ride ahead first thing in the morning to select the next camp site. He would then undertake surveying and mapping work while the camp moved up. The camp was often selected outside the tree line along streams for ease of setting up camp and for defensive reasons. Also, the camp was usually set up before the creek or river crossing. It makes sense that stock was taken downstream to drink and water for the camp collected upstream.
6. A number of methods were used to plot the route and camp sites:
   - a reconnaissance trigonometrical method used by Mitchell for rapidly mapping the country. Observations were often made with theodolite from the top of mountains and the camp site to nearby mountains, hills and other features.
   - Astronomical observations using Theodolite and / or Terrestrial Sextant, were taken for latitude, longitude and magnetic variation of the compass. Unlike longitude, which relied on the accuracy of a chronometer, latitude was comparatively more precise.
   - Height determination using a Mercurial Barometer.
   - a compass and chain survey following the route of the party traversed by his Assistant Surveyor.. The chainages were often longer than actual because of deviations from a straight line. Compass readings, using maritime notation rather than degrees, could be out up to six degrees either way.
   - Horse and pacing. Mitchell counted 960 horse paces to a mile and transferred a token from one pocket to another each 1oo paces. Pacing by foot was also used for lesser distances.
7. Precision of readings:
   - **Compass readings** were read to the nearest 11.25^{o}.in a 32 point compass. This means that the precision could be 5.625^{o} either way. This could give a variation of 100 metres in a kilometre either way.
   - **Compass variation** precision of 1 minute could be 30" either way giving a precision of 0.15 metres in a kilometre.
   - **Latitude** was calculated by Mitchell to the nearest second from star observations although this precision was very unlikely. Mitchell used a relatively precise Terrestrial Sextant but also had to rely on the accuracy and precision of the Star Tables. One second of a degree of latitude measured 31m;
   - **Distances** were measured to the nearest mile. This means the precision could be ½ miles either way, being 800 metes either way. This difference in precision could accumulate or cancel out over a number of measurements, acknowledging that because of the variation from a straight line and slope, the stated distance would be overstated, if anything.

- **Height** using the Barometer was subject to atmospheric pressure at the place of observation compared to a base reference point. It was comparatively imprecise and it was used in a relative sense to determine which direction the rivers flowed.

Marine Compass Rose



8. <u>Determining the route. From the foregoing, the following general order should be taken in determining the route of exploration:</u>

1. Commence or work from **reliably located camp sites** and **physical features**; then place yourself in the position of Mitchell and the party's needs in working out where they would go.

2. Use the <u>compass and chain traverse</u>, acknowledging that the expedition party did not travel in straight lines and <u>then give regard to:</u>.

[a] firstly, regard to **physical determinants** such a creeks, etc.. These should be correlated with notes from the Journals.

[b] then, secondly, **chainages** [but adjusted for overstatement]; and then,

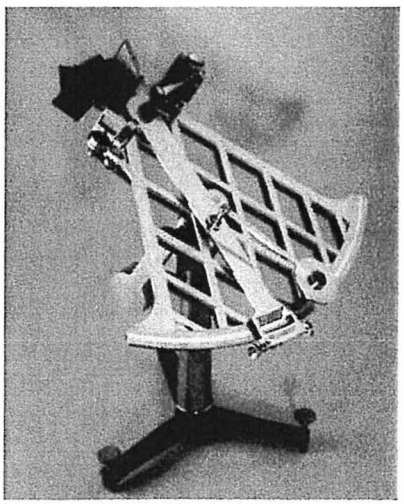
[c] **bearings**, [because compass bearings could be + /- 6° out, greater regard should be given to angles at bends rather than running bearings, unless the magnetic deviation is consistently known];

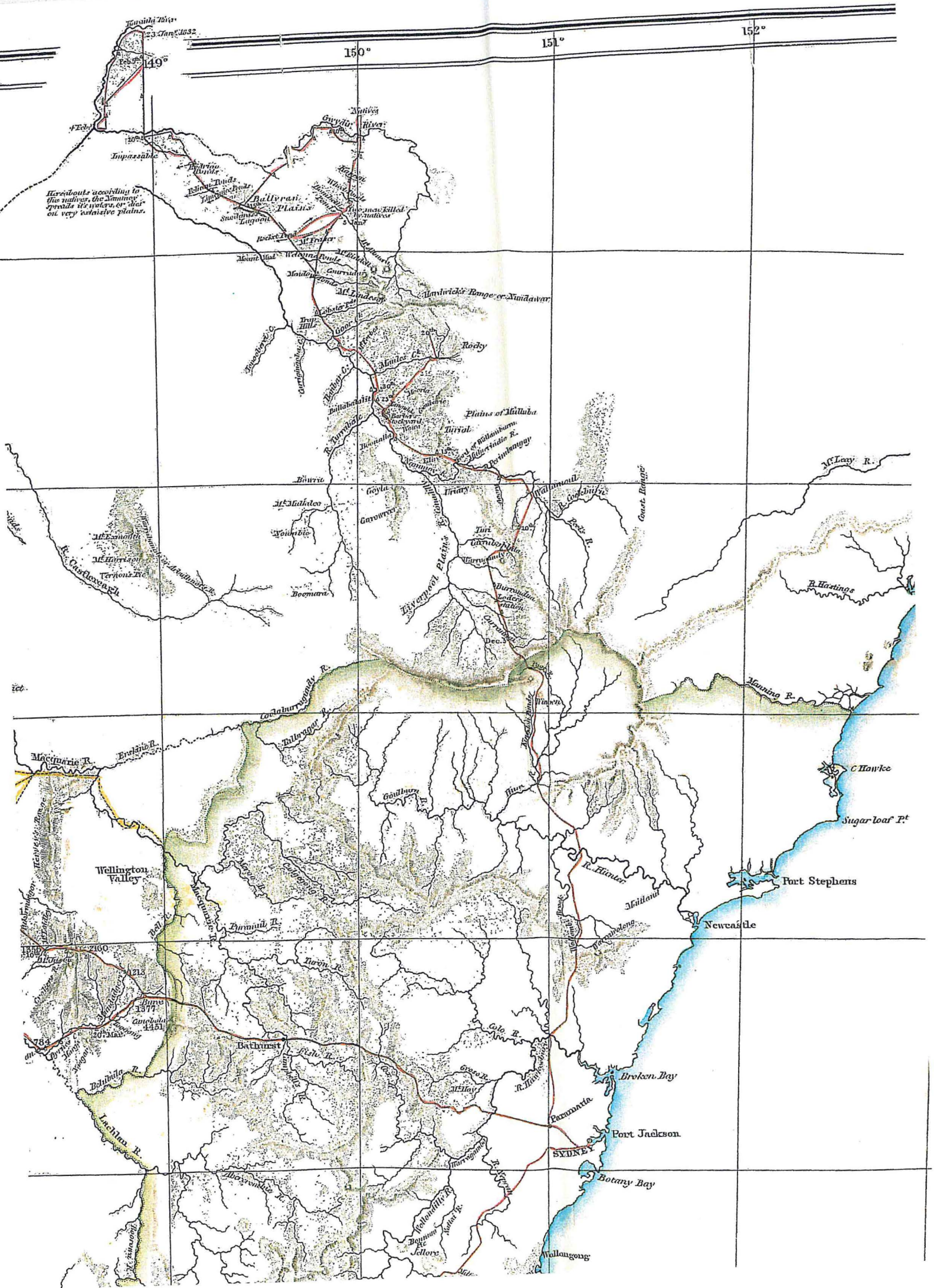
<u>Check this with:</u>

[d] **trig. observations** from known points [relative angles between features are more reliable than bearings]

[e] **latitudes**, and to a lesser extent, **longitudes** [relative comparison rather than absolute readings are more reliable

Mitchell's Terrestrial Sextant consisting of a Stand, the body and lenses and weighing 26Kg with a mercury bath providing an artificial horizon. It is kept in the Australian National Library.




149°
150°
151°
152°
Impassable
Ballyvran Plains
Rocky
Plains of Mulluba
Liverpool Plains
Wellington Valley
Bathurst
Port Stephens
Newcastle
Broken Bay
Port Jackson
SYDNEY
Botany Bay
Wollongong
Sugar loaf Pt
C Hawke
Manning R.
R. Hunter
Macquarie R.
Lachlan R.
Bell R.
Boomara
Boorie
Goyla
Garowra
Turi
Burrundulla
Dec.
Bune
Cunobelin
Fish R.
Coxs R.
Grose R.
Parramatta
Nepean R.
Wollondilly R.
Bombala R.
Jellore
Nadgee R.
Tarwinia
Tumut R.
Goulburn R.
Hawkesbury R.
Hastings R.
McLeay R.
Clarence R.
Macleay R.
Nundawar
Rocky
Mt Lindesay
Mt Fraser
Mt Hay
Mt Harrison
Mt Mulaloo
Mt Kaimoudi
Vernons Pt
Tumbarumba
Tumut
Yass
Gundagai
Cootamundra
Junee
Wagga
Narrandera
Hay
Balranald
Deniliquin
Echuca
Moulamein
Tocumwal
Albury
Corowa
Wodonga
Beechworth
Yass
Goulburn
Bathurst
Orange
Dubbo
Coonabarabran
Gunnedah
Tamworth
Armidale
Inverell
Glen Innes
Tenterfield
Casino
Grafton
Kempsey
Port Macquarie
Taree
Gloucester
Scone
Muswellbrook
Singleton
Maitland
Cessnock
Wyong
Gosford
Windsor
Liverpool
Camden
Bowral
Moss Vale
Braidwood
Cooma
Bega
Eden
Moruya
Nowra
Kiama
Shoalhaven R.
Clarence R.
Macleay R.
Hastings R.
Manning R.
Hawkesbury R.
Nepean R.
Tarwinia
Tumut R.
Goulburn R.
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Narrandera
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Wodonga
Beechworth
Yass
Goulburn
Bathurst
Orange
Dubbo
Coonabarabran
Gunnedah
Tamworth
Armidale
Inverell
Glen Innes
Tenterfield
Casino
Grafton
Kempsey
Port Macquarie
Taree
Gloucester
Scone
Muswellbrook
Singleton
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