

COMMONWEALTH OF AUSTRALIA

DIVISION OF NATIONAL MAPPING

**GROUND CONTROL
TRAVERSE**

FIELD BOOK No. 12855

Survey at

NMB 348

Scheme: NMB 278 TRAVERSE CONNECTION

State: QUEENSLAND

Refer to Field Book No.: 12853

Please return to
Division of National Mapping
Rialto Building
497 Collins Street, Melbourne, 3000
or to Police Station or Public Office.

I _____, certify
 that these original field notes consisting of pages nos. _____
 _____ which have been Initialled by me,
 are the original correct and complete record of the observations and
 measurements made by me or under my close personal direction and
 supervision in the field by:

_____ and are in
 strict accordance with standards specified in Contract No. _____

signed _____

Surveyor

_____ 19 _____

VERIFICATION OF FIELD NOTESVERTICAL ANGLES:

- Angles reduced & checked.
- Height of Instr. & targets above station mark calc. & checked.
- Angles summarised on page 3; including the following:—
- (a) Height of Instr. above station mark.
- (b) Height, above station mark, of targets *shown* to other stations.
- (c) Day, date & time of observations.
- (d) Vertical angles compared with distant stations by radio.

HORIZONTAL ANGLES:

- Angles reduced & checked.
- Random arc reduced & checked.
- Angles corrected for eccentric Instr., targets or station adjustment, if necessary.
- Description of targets *sighted* entered on horizontal angle pages.
- Diagram of rays observed with directions.
- Note any targets *shown on eccentric* for horizontal angles.
- Magnetic bearing to observed stations, or eccentric station.

AZIMUTH

- Observations reduced and checked.
- Stopwatch checked against pocketwatch for 30 sec. difference.
- Position of light shown to distant station recorded.

REFERENCE MARKS:

- Reference marks calculated & checked.
- Eccentric corrections calculated & checked.
- Description of station mark & reference marks placed.
- Full description of beacon, cairn, or manner of marking station.

TELLUROMETER:

- Coarse sets broken out and checked for anomalies.
- Atmospherics checked and compared to required limits.
- Baro. readings corrected for latest calibration.
- Met. & Topo. conditions entered.
- Eccentric corrections calculated & checked. Diagram drawn.
- Height of Instr. *above station mark* recorded.
- Fine readings reduced, and checked by machine.
- Fine readings graphed and description of trace entered.
- Slope distances compared to required degree of accuracy.

GENERAL:

- P.R.P. diagram completed and photo numbers entered.
- Photo's pricked through and full details noted on back. } If applicable,
- Terrestrial photo information entered.
- Access information entered and checked.

SUMMARY OF DIRECTIONS, VERTICAL ANGLES & MEASUREMENTS AT:—

NM/B/91

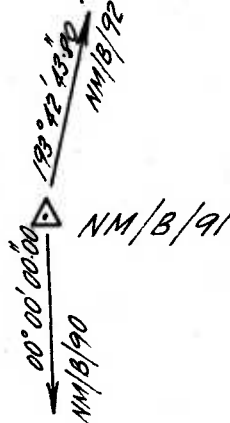
STATION	DIRECTION
NM/B/90	00° 00' 00"00
NM/B/92	193° 42' 43"80

Compilation by: *H Jones*

Checked by: *R Smith*

These directions are all corrected for any eccentricity of either Target or Observing Station. Where station adjustment is required these results are after such adjustment.

TRAVERSE DIAGRAM



Show Rays & Directions to Distant Stations.

SUMMARY OF VERTICAL ANGLES

All Heights shown are Above or Below Station Mark.

Day & Date	Time	Station Observed	Type of Tgt. Obs.	Ht. of Tgt. Shown	Ht. of Instr.	Angle ±
Thu. 4 th Aug. '66	1443	NM/B/90	Helio	4'86	5'82	-00° 09' 51"4
" " " "	1550	" " "	"	4'86	5'82	-00° 09' 43"3
Fri. 5 th Aug. '66	1415	NM/B/92	"	5'02	5'82	+00° 04' 37"7
" " " "	1515	" " "	"	5'02	5'82	+00° 04' 29"7

Compilation: *H Jones*
Checked: *R Smith*

SUMMARY OF SLOPE DISTANCES MEASURED

To Station: *NM/B/90* Slope Distance: *74 203.42 ft.*
 To Station: *NM/B/92* Slope Distance: *50 938.42 ft.*
 To Station: Slope Distance:
 To Station: Slope Distance:

Show Slope Distances measured FROM THIS STATION ONLY:

Compilation by: *H Jones*

Checked by: *R Smith*

VERTICAL ANGLES

At Station: *NM/B/91*
 Day & Date: *Thu. 4th Aug. 1966*
 Station Observed: *NM/B/90*
 Ht. Instr. Above Ecce.: *—*
 Ht. Target Shown Above: *—*

Simultaneous Reciprocal
~~Non-Simultaneous Reciprocal~~
~~Single Ray~~ } Delete Two
 Time: *1443*
 Target Observed: *Helio*
 Ht. Instr. Above Stn. Mk.: *5'82*
 Ht. Target Shown Above Stn. Mk.: *4'86*

L	89	54	30.1 30.3	89	55	00.4	- 00° 09' 51".9
R	90	04	25.9 26.4	90	04	52.3	
L	89	54	32.0 31.8	89	55	03.8	- 00° 09' 49".7
R	90	04	27.4 26.1	90	04	53.5	
L	89	54	30.6 30.6	89	55	01.2	- 00 09 52.6
R	90	04	26.5 27.3	90	04	53.8	

Reduced: *H Jones* 3)154.2
 Checked: *R Smith* Mean: *- 00° 09' 51".4*

At Station: *NM/B/91*
 Day & Date: *Thu. 4th Aug. 1966*
 Station Observed: *NM/B/90*
 Ht. Instr. Above Ecce.: *—*
 Ht. Target Shown Above: *—*

Simultaneous Reciprocal
~~Non-Simultaneous Reciprocal~~
~~Single Ray~~ } Delete Two
 Time: *1550*
 Target Observed: *Helio*
 Ht. Instr. Above Stn. Mk.: *5'82*
 Ht. Target Shown Above Stn. Mk.: *4'86*

L	89	54	33.1 34.2	89	55	07.3	- 00° 09' 42".8
R	90	04	24.3 25.8	90	04	50.1	
L	89	54	33.6 32.6	89	55	06.2	- 00 09 42.4
R	90	04	23.9 24.7	90	04	48.6	
L	89	54	32.8 32.6	89	55	05.4	- 00 09 44.6
R	90	04	25.1 24.9	90	04	50.0	

Reduced: *H Jones* 3)129.8
 Checked: *R Smith* Mean: *- 00° 09' 43".3*

At Station: *NM/B/91*
 Day & Date: *Fri. 5th Aug. 1966*
 Station Observed: *NM/B/92*
 Ht. Instr. Above Ecce.: *—*
 Ht. Target Shown Above: *below inst. 0'80*

Simultaneous Reciprocal
~~Non-Simultaneous Reciprocal~~
~~Single Ray~~ } Delete Two
 Time: *1415*
 Target Observed: *Helio*
 Ht. Instr. Above Stn. Mk.: *5'82*
 Ht. Target Shown Above Stn. Mk.: *5'02*

L	90	02	07.4 08.3	90	02	15.7	+ 00° 04' 37".5
R	89	56	48.5 49.7	89	57	38.2	
L	90	02	07.9 08.6	90	02	16.5	+ 00 04 37.8
R	89	56	49.0 49.7	89	57	38.7	
L	90	02	07.1 07.6	90	02	14.7	+ 00 04 37.7
R	89	56	48.4 48.6	89	57	37.0	

Reduced: *H Jones* 3)113.0
 Checked: *R Smith* Mean: *+ 00° 04' 37".7*

VERTICAL ANGLES

At Station: *NM/B/91*
 Day & Date: *Fri. 5th Aug. 1966*
 Station Observed: *NM/B/92*
 Ht. Instr. Above Ecce.: *-*
 Ht. Target Shown Above: *below Inst. 0'80*

Simultaneous Reciprocal
~~Non-Simultaneous Reciprocal~~
~~Single Ray~~ } Delete Two
 Time: *1515*
 Target Observed: *Helio*
 Ht. Instr. Above Stn. Mk.: *5'82*
 Ht. Target Shown Above Stn. Mk.: *5'02*

L	90	02	06.5 06.9	90	02	13.4	+ 00° 04' 30.4
R	89	56	50.9 52.1	89	57	43.0	
L	90	02	06.2 07.1	90	02	13.3	+ 00 04 30.7
R	89	56	51.3 51.3	89	57	42.6	
L	90	02	06.6 04.6	90	02	11.2	+ 00 04 28.1
R	89	56	51.9 51.2	89	57	43.1	

Reduced: *H Jones*
 Checked: *R Smith* *99.8*
 Mean: *3) 89.2*
+ 00° 04' 29.7

At Station:
 Day & Date:
 Station Observed:
 Ht. Instr. Above Ecce.:
 Ht. Target Shown Above:

Simultaneous Reciprocal
 Non-Simultaneous Reciprocal } Delete Two
 Single Ray:
 Time:
 Target Observed:
 Ht. Instr. Above Stn. Mk.:
 Ht. Target Shown Above Stn. Mk.:

Reduced:
 Checked: Mean:

At Station:
 Day & Date:
 Station Observed:
 Ht. Instr. Above Ecce.:
 Ht. Target Shown Above:

Simultaneous Reciprocal
 Non-Simultaneous Reciprocal } Delete Two
 Single Ray:
 Time:
 Target Observed:
 Ht. Instr. Above Stn. Mk.:
 Ht. Target Shown Above Stn. Mk.:

Reduced:
 Checked: Mean:

HORIZONTAL ANGLES

At Station: *NM/B/91* } Eccc. Stn.
 Observer: *H. Jones* } Stn. Mark Day & Date: *Fri. 5th August 1966* Time Started: *1712*
 Recorder: *R. Smith* } (Delete one) Weather: *Warm, clear, N.E. breeze* Time Finished: *1728*
 Visibility: *Good* Theodolite: *Wild T3 29886*

<i>NM/B/90 (Light)</i>				<i>NM/B/92 (Light)</i>				
<i>00</i>	<i>00</i>	$\frac{05.9}{06.2}$	<i>12.1</i>	<i>193</i>	<i>42</i>	$\frac{26.7}{26.4}$	<i>53.1</i>	<i>41.0</i>
<i>180</i>	<i>00</i>	$\frac{02.8}{02.9}$	<i>05.7</i>	<i>13</i>	<i>42</i>	$\frac{25.3}{25.1}$	<i>50.4</i>	<i>44.7</i>
<i>240</i>	<i>00</i>	$\frac{25.6}{25.8}$	<i>51.4</i>	<i>42</i>		$\frac{48.1}{48.6}$	<i>36.7</i>	<i>45.3</i>
<i>60</i>	<i>00</i>	$\frac{30.1}{30.1}$	<i>00.2</i>	<i>42</i>		$\frac{50.4}{51.8}$	<i>42.2</i>	<i>42.0</i>
<i>120</i>	<i>00</i>	$\frac{45.4}{44.9}$	<i>30.3</i>	<i>44</i>		$\frac{06.9}{07.7}$	<i>14.6</i>	<i>44.3</i>
<i>300</i>	<i>00</i>	$\frac{42.2}{43.2}$	<i>25.4</i>	<i>44</i>		$\frac{04.9}{04.0}$	<i>08.9</i>	<i>43.5</i>

Mean: *00° 00' 00"* Sum *6* Mean: *193° 42' 43.47"* Sum *6* $\frac{260.8}{43.47}$

At Station: *NM/B/91* } Eccc. Stn.
 Observer: *H. Jones* } Stn. Mark Time Started: *1729*
 Recorder: *R. Smith* } (Delete one) Weather: Time Finished: *1740*
 Visibility: Theodolite:

<i>NM/B/90 (Light)</i>				<i>NM/B/92 (Light)</i>				
<i>210</i>	<i>02</i>	$\frac{15.1}{14.6}$	<i>29.7</i>	<i>43</i>	<i>44</i>	$\frac{37.1}{36.2}$	<i>13.3</i>	<i>43.6</i>
<i>30</i>	<i>02</i>	$\frac{18.5}{19.7}$	<i>38.2</i>	<i>223</i>	<i>44</i>	$\frac{39.4}{40.2}$	<i>19.6</i>	<i>41.4</i>
<i>90</i>	<i>02</i>	$\frac{35.4}{35.8}$	<i>11.2</i>	<i>44</i>		$\frac{56.8}{57.3}$	<i>54.1</i>	<i>42.9</i>
<i>270</i>	<i>02</i>	$\frac{31.8}{31.5}$	<i>03.3</i>	<i>44</i>		$\frac{53.7}{53.9}$	<i>47.6</i>	<i>44.3</i>
<i>330</i>	<i>02</i>	$\frac{55.9}{55.3}$	<i>51.2</i>	<i>46</i>		$\frac{18.1}{18.4}$	<i>36.5</i>	<i>45.3</i>
<i>150</i>	<i>02</i>	$\frac{57.6}{57.3}$	<i>54.9</i>	<i>46</i>		$\frac{22.0}{20.2}$	<i>42.2</i>	<i>47.3</i>

Mean: *00° 00' 00"* Sum *6* Mean: *193° 42' 44.13"* Sum *6* $\frac{264.8}{44.13}$

Reduced: *H. Jones* Checked: *R. Smith*

HORIZONTAL ANGLES

At Station: *NM/B/91* } Eccc. Stn.
 Observer: *H. Jones* } Stn. Mark
 Recorder: *R. Smith* } (Delete one)
 Day & Date: *Fri. 5th Aug 1966*
 Weather: *Warm, clear, N.E. breeze*
 Visibility: *Good*
 Time Started: *1742*
 Time Finished: *1751*
 Theodolite: *Wild T3 29886*

NM/B/90 (Light)

NM/B/92 (Light)

11	46	<u>05.2</u> 05.9	11.1	} Random	204	28	<u>28.3</u> 27.5	55.8	44.7
191	46	<u>03.8</u> 04.5	08.3	} Arc	24	28	<u>26.1</u> 25.6	51.7	43.4
250	02	<u>24.5</u> 25.4	49.9		83	44	<u>46.3</u> 46.1	32.4	42.5
70	02	<u>27.6</u> 27.9	55.5		44		<u>49.5</u> 48.7	38.2	42.7
130	02	<u>44.9</u> 44.1	29.0		46		<u>06.9</u> 06.7	13.6	44.6
310	02	<u>41.2</u> 42.2	23.4		46		<u>02.9</u> 02.5	05.4	42.0
Sum					Sum				
Mean: 00° 00' 00"					Mean: 193° 42' 43.32"				

At Station: *NM/B/91* } Eccc. Stn.
 Observer: *H. Jones* } Stn. Mark
 Recorder: *R. Smith* } (Delete one)
 Day & Date: *Fri. 5th Aug 1966*
 Weather: *Good, slight shimmer*
 Visibility: *Good*
 Time Started: *1751*
 Time Finished: *1805*
 Theodolite: *Wild T3 29886*

NM/B/90 (Light)

NM/B/92 (Light)

220	02	<u>15.5</u> 16.1	31.6		53	44	<u>38.8</u> 39.1	17.9	46.3
40	02	<u>17.2</u> 17.9	35.1		233	44	<u>39.8</u> 39.2	19.0	43.9
100	02	<u>35.1</u> 35.8	10.9		44		<u>58.0</u> 57.4	55.4	44.5
280	02	<u>32.5</u> 33.1	05.6		44		<u>54.1</u> 54.3	48.4	42.8
340	02	<u>54.8</u> 55.5	50.3		46		<u>17.8</u> 17.2	35.0	44.7
160	02	<u>57.8</u> 58.3	56.1		46		<u>19.5</u> 20.1	39.6	43.5
Sum					Sum				
Mean: 00° 00' 00"					Mean: 193° 42' 44.28"				

Reduced: *H. Jones.*

Checked: *R. Smith*

REFERENCE MARKS AT: *NM/8/91*

DATE: *Fri. 5th Aug 1966*

Object Sighted	<i>NM/8/90</i>	<i>RM1</i>	<i>RM2</i>	<i>Witness Post</i>
Horizontal F.L.	<i>00 00⁰⁶</i>	<i>00 00⁰⁶</i>	<i>193 42³¹</i>	<i>270 02¹⁰</i>
F.R.	<i>180 00⁰¹</i>	<i>180 00⁰¹</i>	<i>13 42²⁶</i>	<i>90 02⁰⁶</i>
Direction	<i>00° 00'</i>	<i>00° 00'</i>	<i>193° 43'</i>	<i>270° 02'</i>
Vertical F.L.		<i>81 00³¹</i>	<i>81 08⁰³</i>	
F.R.		<i>98 58¹⁹</i>	<i>98 50⁵¹</i>	
Elevation + Depression -		<i>-17° 58'</i>	<i>-17° 44'</i>	
Slope Distance (Instr. - Object)		<i>15'.76</i>	<i>15'.80</i>	
Horizontal Distance		<i>14'.99</i>	<i>15'.05</i>	<i>20'.05</i>
Ht. mark Above or Below Station mark		<i>0'.15 above</i>	<i>0'.20 above</i>	

Ht. Instr. Above: *5'.01 above Stn. Mark* Mag. Bearing to: *NM/8/90 178°; NM/8/92 11°*

Station mark: *1/2" dia. copper tube set in pyramidal shaped concrete block 7"x7"x15". Block is reinforced with 24" steel fence post set directly below copper tube.*
 Height of Station mark Above concrete block: *Level*

Beacon: *12' dia. circular trench around station mark*
 Length & Material of Central Pole: *12' dia. circular trench* Vane:

Describe Eccentric mark:

Describe Reference marks: *Two 24" steel star pickets driven to G.L. One Witness Post 4x2 G.L. pipe set in concrete with 2' protruding above G.L.*

General Information:

Concrete block is painted white with station number in black

Height of Spike above top of Pole:

Computed: *H Jones*

Distance Vane below top of Pole:

Checked: *R Smith*

ECCENTRIC CORRECTION AT:

Station			
F.L.			
F.R.			
Log Dist. Ecce. - Stn. Mk.			Computation by Naturals (for checking)
Log Cosc 1"	<i>5 3 1 4</i>	<i>4 3</i>	$K = 206\,264.8 \times \text{Dist. eccentric to Stn. mk.}$
= Log K			Ecce. Corr. = $\frac{K \sin \text{Dir. from true Stn.}}{\text{Dist. to far Stn.}}$
Station			
Distance to far station			
Direction from true stn.			
Log sin direction (0° to 180° +) (180° to 360° -)			
+ Co-log distance			
+ Log K			
= Log correction			
Correction ' & "			
Target ecce. corr. (if any)			
Obs. ecce. direction			
Obs. dir. corr. for ecce.			
Obs. dir. (R.O. reduced to zero)			

Computed:

Checked:

REFERENCE MARKS AT:

Date:

Object Sighted				
Horizontal F.L.				
F.R.				
Direction				
Vertical F.L.				
F.R.				
Elevation + Depression -				
Slope Distance (Instr. - Object)				
Horizontal Distance				
Ht. mark above or below Station mark				
Ht. Instr. above:				Mag. Bearing to:

SUMMARY OF HORIZONTAL ANGLES OBSERVED AT: NM/B/91

Eccentric Station
Station Mark
(Delete one)

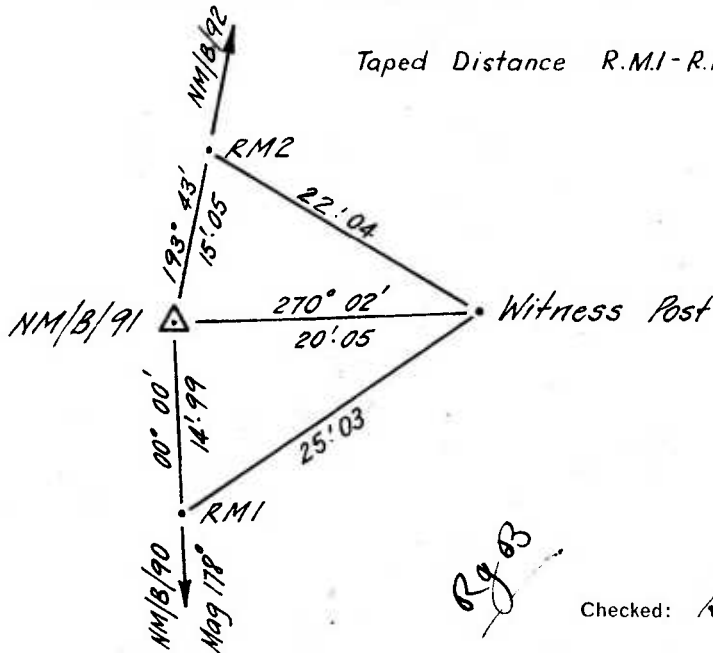
NM/B/90	NM/B/92
00° 00'	193° 42'
00"	43.47
	44.13
	43.32
	44.28
00"	43.80

Compiled: *R. Jones*

Checked: *R. Smith*

ECCENTRIC & R.M. DIAGRAM

Taped Distance R.M.1 - R.M.2 : 29'82



Drawn: *R. Jones*

Rg 83

Checked: *R. Smith*

EXAMPLE AT JUNCTION STATION, FIRST 8

REFERENCE MARKS AT: *Mt. Grattai (Eccentric)*

DATE: *31st October 1966*

Object Sighted	<i>Mt. Grattai Δ</i>	<i>RM 1</i>	<i>Mt. Kaputar</i>	<i>RM 2</i>	
Horizontal F.L.	<i>00 00⁰²</i>	<i>14 26⁰⁸</i>	<i>222 26⁵⁸</i>	<i>307 42⁰⁴</i>	
F.R.	<i>180 00⁰⁴</i>	<i>194 26⁰⁹</i>	<i>42 26⁵⁹</i>	<i>127 42⁰⁷</i>	
Direction	<i>00° 00'</i>	<i>14° 26'</i>	<i>222° 28'</i>	<i>307° 42'</i>	
Vertical F.L.	<i>101 38²⁷</i>	<i>87 20³⁶</i>		<i>83 50¹⁹</i>	
F.R.	<i>78 20³⁰</i>	<i>92 38²⁷</i>		<i>96 08⁴¹</i>	
Elevation + Depression -	<i>+ 23° 18'</i>	<i>- 05° 18'</i>		<i>- 12° 19'</i>	
Slope Distance (Instr. - Object)	<i>15' 54</i>	<i>20' 31</i>		<i>23' 81</i>	
Horizontal Distance	<i>14' 27</i>	<i>20' 22</i>		<i>23' 26</i>	
Ht. mark Above or Below Station mark	<i>(Ecce) 0' 79 below</i>	<i>3' 03 above</i>		<i>0' 17 below</i>	
Ht. Instr. Above:	<i>Eccentric 5' 70</i>		Mag. Bearing to: <i>Stn. Mark 267°</i>		

Station mark: *Steel pin set in concrete block* Height of Station mark Above concrete block: *0' 45*
 Beacon: *Natmap steel beacon in rock cairn 5 1/2' high & 10" diameter*
 Length & Material of Central Pole: *11' 0" x 2" square steel* Vanes: *36" x 21" steel*
 Describe Eccentric mark: *303 brass cartridge case set in concrete*
 Describe Reference marks: *1/2" dia. copper tube in concrete & NSW Lands SSM N° 1607*
 General Information: *Station established by NSW Lands Dept; Beacon & cairn replaced by National Mapping 1966.*
 Height of Spike above top of Pole: *0' 21* Computed: *W. Alanson*
 Distance Vanes below top of Pole: *0' 25* Checked: *L. Deane*

eccentric CORRECTION AT: *Mt. Grattai*

Station	<i>Mt. Grattai Δ</i>	<i>Mt. Kaputar</i>	<i>NM/C/59</i>	
F.L.	<i>00 00⁰⁴</i>	<i>222 28⁰⁶</i>	<i>310 42³²</i>	
F.R.	<i>180 00⁰⁶</i>	<i>42 28⁰⁷</i>	<i>130 42³⁴</i>	
Log Dist. Ecce. - Stn. Mk.	<i>1. 154 42</i>	<i>(14' 27)</i> Computation by Naturals (for checking)		
Log Cosec I"	<i>5. 3 1 4 4 3</i>	K = 206 264 . 8 × Dist. eccentric to Stn. mk.		
= Log K	<i>6. 468 85</i>	Ecce. Corr. = $\frac{K \sin \text{Dir. from true Stn. Dist. to far Stn.}}{\text{Dist. to far Stn.}}$		
Station	<i>Mt. Kaputar</i>	<i>NM/C/59</i>		
Distance to far station	<i>73 669 ft.</i>	<i>178 140 ft.</i>		
Direction from true stn.	<i>222° 28'</i>	<i>310° 43'</i>		
Log sin direction ($\frac{0^\circ \text{ to } 180^\circ +}{180^\circ \text{ to } 360^\circ -}$)	<i>-9. 829 41</i>	<i>-9. 879 64</i>		
+ Co-log distance	<i>5. 132 72</i>	<i>4. 749 24</i>		
+ Log K	<i>6. 468 85</i>	<i>6. 468 85</i>		
= Log correction	<i>1. 430 98</i>	<i>1. 097 73</i>		
Correction ' & "	<i>- 26. 98</i>	<i>- 12. 52</i>		
Target ecce. corr. (if any)	<i>(ecce right) - 17. 15</i>			
Obs. ecce. direction	<i>00 00 00</i>	<i>88 14 44. 43</i>		
Obs. dir. corr. for ecce.	<i>359 59 15. 87</i>	<i>88 14 31. 91</i>		
Obs. dir. (R.O. reduced to zero)	<i>00° 00' 00"</i>	<i>88° 15' 16". 04</i>		

Computed: *W. Alanson*
W. Alanson

Checked: *L. Deane*

SECOND ORDER TRAVERSES (ECCENTRIC SET UP)

REFERENCE MARKS AT: *Mt. Grattai (RM2)*

Date: *31st October 1966*

Object Sighted	<i>Mt. Grattai</i> Δ (Top of Spike)	<i>Ecco.</i> (Top of Cartridge)	<i>RM1</i> (Top of Tube)		
Horizontal F.L.	<i>00 00 ⁰⁵₀₅</i>	<i>37 50 ¹⁵₁₅</i>	<i>347 14 ⁰²₀₂</i>		
F.R.	<i>180 00 ¹⁰₁₀</i>	<i>217 50 ¹²₁₂</i>	<i>167 14 ⁰⁷₀₇</i>		
Direction	<i>00° 00'</i>	<i>37° 50'</i>	<i>347° 14'</i>		
Vertical F.L.	<i>99 10 ²⁷₂₇</i>	<i>83 04 ⁰¹₀₁</i>	<i>87 42 ²⁶₂₆</i>		
F.R.	<i>80 48 ²⁹₂₉</i>	<i>96 54 ⁵⁸₅₈</i>	<i>92 16 ²⁸₂₈</i>		
Elevation + Depression -	<i>+18° 22'</i>	<i>-13° 52'</i>	<i>-04° 34'</i>		
Slope Distance (Instr. - Object)	<i>19'.40</i>	<i>23'.95</i>	<i>24'.12</i>		
Horizontal Distance	<i>18'.41</i>	<i>23'.25</i>	<i>24'.04</i>		
Ht. mark above or below Station mark	<i>-0'.17</i>	<i>-0'.79</i>	<i>+3'.03</i>		

Ht. Instr. above: *RM2, 5'.12*

Mag. Bearing to: *Str. Mark 357°*

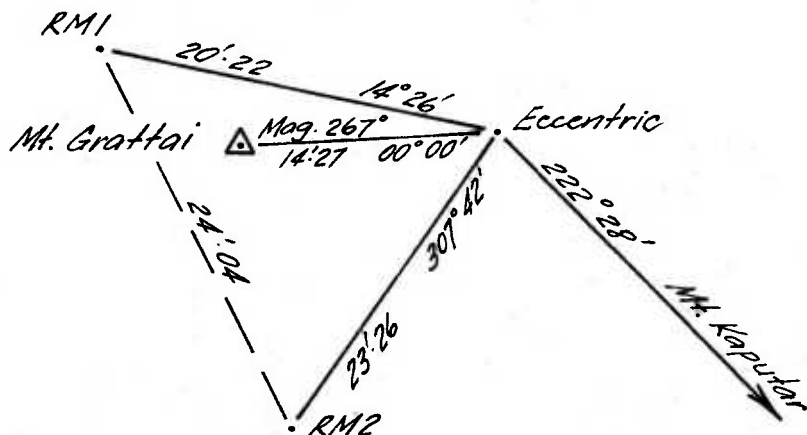
SUMMARY OF HORIZONTAL ANGLES OBSERVED AT: *Mt. Grattai* } Eccentric Station
Station Mark
(Delete one)

<i>Mt. Kaputar</i>	<i>NM/C/59</i>
<i>00° 00'</i>	<i>88° 14'</i>
<i>00"</i>	<i>44".22</i>
	<i>44.64</i>
<i>00° 00' 00"</i>	<i>88° 14' 44".43</i>

Compiled: *W Alanson*

Checked: *L. Deane*

ECCENTRIC & R.M. DIAGRAM



Drawn: *W Alanson*

Checked: *L. Deane*

Time	Dry Bulb	Wet Bulb	Corrected		Depn.	Table "A" Correction	V.P.	Altimeters	Mean Baro.	Corr. Baro.
			Dry Bulb	Wet Bulb						
0917			68.0	58.3	9.7	0109 97 x 763 9810 10573 491 385	.385	40 595 550 555 3)1740 580	29.30	29.31
0927			69.1	58.7	10.4	0109 104 436 10900 11336 498 385	.385	40 590 550 545 3)1725 575	29.30	29.31
0939			69.8	58.8	11.0	0109 11 1199 500 380	.380	40 595 545 540 3)1720 573	29.31	29.32
0947			69.6	58.9	10.7	0109 107 763 10900 11663 501 384	.384	40 595 545 540 3)1720 573	29.31	29.32

ATMOSPHERIC READINGS SUPPLIED BY DISTANT STATION

Time	Corrected		Depn.	V.P.	Corr. Baro.
	Dry	Wet			
0940	70.0	59.0	11.0	.382	29.41
0947	72.0	59.7	12.3	.381	29.41

ATMOSPHERIC READINGS TO BE USED IN COMPUTATIONS

Measuring Station	Time	Corrected Dry Bulb	V.P.	Corrected Barometer
		0939	69.8	.380
	0947	69.6	.384	29.32
Distant Station	0940	70.0	.382	29.41
	0947	72.0	.381	29.41
	Mean Readings	70.4	.382	29.36
Reduced:		.H. James		Checked: R. Smith

MEASURING STN.: *NM/B/91* } Ecce. Stn. }
 Stn. Mk. }
 (delete one)

DISTANT STN.: *NM/B/90* } Ecce. Stn. 15 }
 Stn. Mk. }
 (delete one)

Tellur. No.: *MRA2 1189* Date Last Calibration: *May 1966*
 Altimeter No.: *32* Date Last Calibration: *July 1966*
 Ht. Instr. above Ecce.: *—* Ht. Instr. above Stn. Mk.: *4'60*

Tellur. No.: *MRA2 1084* Date Last Calibration: *May 1966*
 Altimeter No.: *27* Date Last Calibration: *July 1966*
 Field Book No.: *5449*
 Operator: *N. Hope* Recorder: *W. Moore*

Ecce. Corr. at Peg (if any): *Nil*
 Met. Conditions: *Warm, clear, S.E. breeze*

Note: Metre Read-Out Instruments have an average refractive index of 1.000325 incorporated in crystals.

Topo. Conditions: *From rocky outcrop across black soil plain & timber to low hill*

To find distance:—apply own computed n, thus:—

$$\text{distance} = \frac{\text{meas. dist.} \times 1.000325}{n}$$

Date: *Thu. 4th August 1966*
 Operator: *H. Jones* Recorder: *R. Smith*

∴ distance =

Co = 299 792.5 Km/sec. *459.7* *29.36*
 = 0.983 571 20 ft/mμs *70.4* *6.15*
 $n-1 = \frac{4730(P+E)}{459.7+t} \times 10^{-6}$ *530.1* *35.51*
 E = $\frac{8540e}{459.7+t} = 6.15$ *316.850 \times 10^{-6}*
 $e = e' - 0.00367P(t-t') \left(1 + \frac{t'-32}{1571}\right)$

Transit time	<u>150 933.547</u>
$\frac{1}{2}$ Transit time	<u>75 466.774</u>
$\frac{1}{2}$ T.T. × K	<u>1 239.83</u>
Measured Dist.	<u>74 226.94</u>
Atmosp. Corr.	<u>23.52</u>
Index Corr.	_____
Ecce. Corr. Meas. Stn.	_____
Ecce. Corr. Dist. Stn.	_____
Slope Distance	<u>74 203.42</u>
Slope Corr.	_____
Sea Level Corr.	_____
Chord to Arc Corr.	_____
Sea Level Distance	_____

where
 n = Refractive Index.
 t = Dry Bulb Temp. °F. *70.4*
 t' = Wet Bulb Temp. °F.
 P = Barometric Pressure. *29.36*
 e = Vapour Pressure. *.382*
 e' = Saturation Pressure at t'.
 Co = Velocity of e.m. wave in vacuo.
 K = 1 - Co = 0.016 428 80. 1 Yd. = 0.9144 metre

Slope corr. = $\frac{\Delta h^2}{2S}$

Δh = Diff. ht.

S = Slope dist.

Sea Level Corr. = $\frac{hS}{R+h}$

h = Mean Ht.

R = 20 880 000

MEASURING STATION ECCENTRIC CORRECTION

Calculation

Diagram

No Correction

No Correction



All Above Calc. by: *H Jones*
 All Above Checked by: *R Smith*

FINE READINGS

Meter Readings

Time Fine Readings Commenced: 0941

Time Fine Readings Completed: 0946

Reg. "A" Mod.

Freq. Dial	A+ A-	Diff.	A+R A-R	Diff.	Mean Diff.	Fine Reading	A.V.C.	
							Meas. Stn.	Dist. Stn.
1 10	33.0 65.5	67.5	82.0 15.0	67.0	67.25	33.625	38	33
2 9	33.0 65.5	67.5	82.0 15.0	67.0	67.25	33.625	37	33
3 8	33.0 65.5	67.5	82.5 14.5	68.0	67.75	33.875	35	33
4 7	33.0 65.0	68.0	83.0 14.0	69.0	68.50	34.250	38	37
5 6	32.0 66.0	66.0	82.0 15.5	66.5	66.25	33.125	38	38
6 5	33.0 65.5	67.5	82.5 15.0	67.5	67.50	33.750	39	36
7 4	32.0 66.0	66.0	82.0 16.0	66.0	66.00	33.000	40	39
8 3	32.0 65.5	66.5	81.5 15.5	66.0	66.25	33.125	40	39
9					8) 268.375	33.547		
10	Mean of 8 Cavities 150 933.547 m/us.							
11	Check							
12	261.0 + 800.0 ----- 1061.0	536.5	657.5 120.5 ----- 537.0	537.0 536.5 ----- 2)1073.5	2)536.75 ----- 268.375	8)268.375 ----- 33.547		
13	524.5 ----- 536.5			536.75				
14								
15								
16								
17								
18								

Reduced by: H Jones

[Handwritten signature]

Checked by: R Smith

Cavity: 5

A+ 33 A+ 33 A+ 33 A+ 33
 B 81 C 23 D 39 A- 66
52 10 94 2) 67
 33.5

Cavity: 3

A+ 33 A+ 33 A+ 33 A+ 33
 B 82 C 23 D 39 A- 65
51 10 94 2) 68
 34.0

Cavity: 10

A+ 33 A+ 33 A+ 33 A+ 33
 B 81 C 23 D 39 A- 65
52 10 94 2) 68
 34.0

Approx. Distance: 13 Miles

Coarse Figure: 150 934

Reduced by: H Jones

Checked by: R Smith

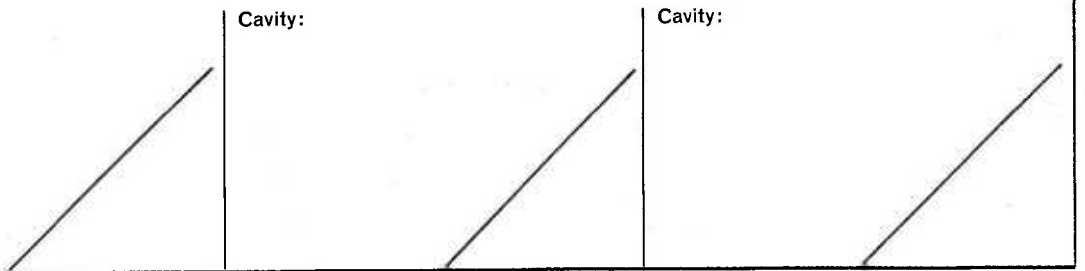
COARSE READINGS — MRA3

Cavity:

Cavity:

Cavity:

A
E
D
C
B

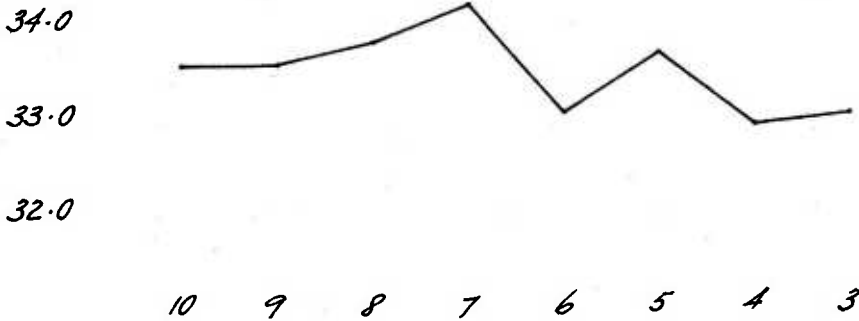


Coarse Figure:

Reduced by:

Checked by:

GRAPH OF TRACE



Maximum ground swing 1-250 m/us

Description of Trace: Clear over all cavities

Drawn by: H Jones
 Checked by: R Smith

RJB

Time	Dry Bulb	Wet Bulb	Corrected		Depn.	Table "A" Correction	V.P.	Altimeters	Mean Baro.	Corr. Baro.
			Dry Bulb	Wet Bulb						
1517			83.3	64.1	19.2	$\begin{array}{r} 0109 \\ 192 \\ \hline 218 \\ 9810 \\ 10900 \\ \hline 20928 \\ .603 \\ \hline .394 \end{array}$.394	$\begin{array}{r} 770 \\ 710 \\ 705 \\ 30 \\ \hline 3 \overline{)2215} \\ 738 \end{array}$	29.13	29.14
1531			85.5	64.7	20.8	$\begin{array}{r} 0109 \\ 208 \\ \hline 872 \\ 21800 \\ \hline 22672 \\ .616 \\ \hline .389 \end{array}$.389	$\begin{array}{r} 765 \\ 705 \\ 700 \\ 30 \\ \hline 3 \overline{)2200} \\ 733 \end{array}$	29.14	29.15
1556			85.4	64.3	21.1	$\begin{array}{r} 0109 \\ 211 \\ \hline 109 \\ 1090 \\ 21800 \\ \hline 22999 \\ .607 \\ \hline .377 \end{array}$.377	$\begin{array}{r} 770 \\ 705 \\ 685 \\ 30 \\ \hline 3 \overline{)2190} \\ 730 \end{array}$	29.14	29.15
1618			83.5	64.0	19.5	$\begin{array}{r} 0109 \\ 195 \\ \hline 545 \\ 9810 \\ 10900 \\ \hline 21255 \\ .601 \\ \hline .388 \end{array}$.388	$\begin{array}{r} 775 \\ 705 \\ 695 \\ 30 \\ \hline 3 \overline{)2205} \\ 735 \end{array}$	29.13	29.14

ATMOSPHERIC READINGS SUPPLIED BY DISTANT STATION

Time	Corrected		Depn.	V.P.	Corr. Baro.
	Dry	Wet			
1516	81.5	63.7	17.8	.403	28.99
1530	82.2	63.5	18.7	.389	28.99

ATMOSPHERIC READINGS TO BE USED IN COMPUTATIONS

Measuring Station	Time	Corrected Dry Bulb	V.P.	Corrected Barometer
		1517	83.3	.394
	1531	85.5	.389	29.15
Distant Station	1516	81.5	.403	28.99
	1530	82.2	.389	28.99
	Mean Readings	83.1	.394	29.07

Reduced: *H. Jones*

Checked: *R. Smith*

MEASURING STN.: NM/B/91

} Ecce. Stn.
Stn. Mk.
(delete one)

Tellur. No.: MRA3 1167
Altimeter No.: 32
Ht. Instr. above Ecce.: —

Date Last Calibration: May 1966
Date Last Calibration: July 1966
Ht. Instr. above Stn. Mk.: 4.73

Ecce. Corrn. at Peg (if any): Nil

Met. Conditions: 1/10 Light cloud, S.E. breeze

Topo. Conditions: From low rocky hill across grassy plain to low timbered ridge.

Date: Fri. 5 Aug. 1966

Operator: H. Jones Recorder: R. Smith

Co = 299 792.5 Km/sec.
= 0.983 571 20 ft/m μ s
459.7 29.07
83.1 6.20
542.8 35.27

n-1 = $\frac{4730(P+E)}{459.7+t} \times 10^{-6}$ 307.345 x 10⁻⁶

E = $\frac{8540e'}{459.7+t}$ = 6.20

e = e' - 0.00367P(t-t') (1 + $\frac{t'-32}{1571}$)

where

- n = Refractive Index.
- t = Dry Bulb Temp. °F. 83.1
- t' = Wet Bulb Temp. °F.
- P = Barometric Pressure. 29.07
- e = Vapour Pressure. .394
- e' = Saturation Pressure at t'.
- Co = Velocity of e.m. wave in vacuo.
- K = 1 - Co = 0.016 428 80. 1 Yd. = 0.9144 metre

Slope corrn. = $\frac{\Delta h^2}{2S}$

Δh = Diff. ht.

S = Slope dist.

DISTANT STN.: NM/B/92

19
} Ecce. Stn.
Stn. Mk.
(delete one)

Tellur. No.: MRA3 360
Altimeter No.: 19
Field Book No.: 5453
Operator: W. Nichols

Date Last Calibration: May 1966
Date Last Calibration: July 1966
Recorder: L. Stoddard

Note: Metre Read-Out Instruments have an average refractive index of 1.000325 incorporated in crystals.

To find distance:—apply own computed n, thus:—
distance = $\frac{\text{meas. dist.} \times 1.000325}{n}$

∴ distance =

Transit time 103 610.344

$\frac{1}{2}$ Transit time 51 805.172

$\frac{1}{2}$ T.T. x K 851.097

Measured Dist. 50 954.08

Atmosp. Corrn. 15.66

Index Corrn. _____

Ecce. Corrn. Meas. Stn. _____

Ecce. Corrn. Dist. Stn. _____

Slope Distance 50 938.42

Slope Corrn. _____

Sea Level Corrn. _____

Chord to Arc Corrn. _____

Sea Level Distance _____

Sea Level Corrn. = $\frac{hS}{R+h}$

h = Mean Ht.

R = 20 880 000

MEASURING STATION ECCENTRIC CORRECTION

Calculation

No Correction

Diagram



No Correction

All Above Calc. by: H. Jones
All Above Checked by: R. Smith

FINE READINGS

Meter Readings

Reg. "A" Mod.

Time Fine Readings Commenced: 1518

Time Fine Readings Completed: 1528

Freq. Dial	A+ A-	Diff.	A+R A-R	Diff.	Mean Diff.	Fine Reading	A.V.C.	
							Meas. Stn.	Dist. Stn.
1	120	08.5		09.0		08.75		
2	110	09.0		10.5		09.75		
3	100	09.5		10.5		10.00		
4	090	10.0		11.0		10.50		
5	080	11.0		11.5		11.25		
6	070	10.5		11.5		11.00		
7	060	10.5		10.5		10.50		
8	050	10.5		11.5		11.00		
9						8) 82.75 10.344		
10	Mean of 8 Cavities			103.6		10.344 m/us		
11	Check							
12		79.5		86.0 79.5				
13				2) 165.5				
14				8) 82.75 10.344				
15								
16								
17								
18								

Reduced by: *H Jones*

R.S.

Checked by: *R Smith*

COARSE READINGS - MRA2

Cavity:				Cavity:				Cavity:			
A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
B	C	D	A-	B	C	D	A-	B	C	D	A-
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Approx. Distance:

Coarse Figure:

Reduced by:

Checked by:

COARSE READINGS - MRA3

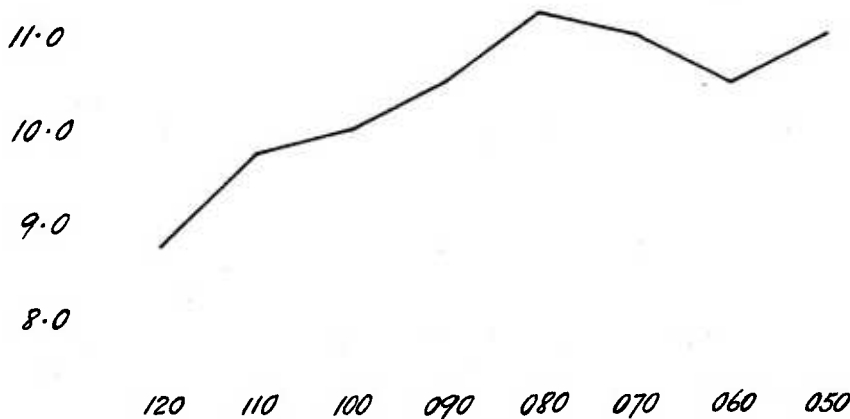
Cavity: 050		Cavity: 080		Cavity: 120	
A	09		08		08
E	61		60		60
D	36		35		35
C	04		03		03
B	10		11		10

Coarse Figure: 103 608

Reduced by: *H Jones*

Checked by: *R Smith*

GRAPH OF TRACE



Maximum ground swing 2.50 mμs

Description of Trace: *Clear*

Drawn by: *H Jones*

Checked by: *R Smith*

RJB