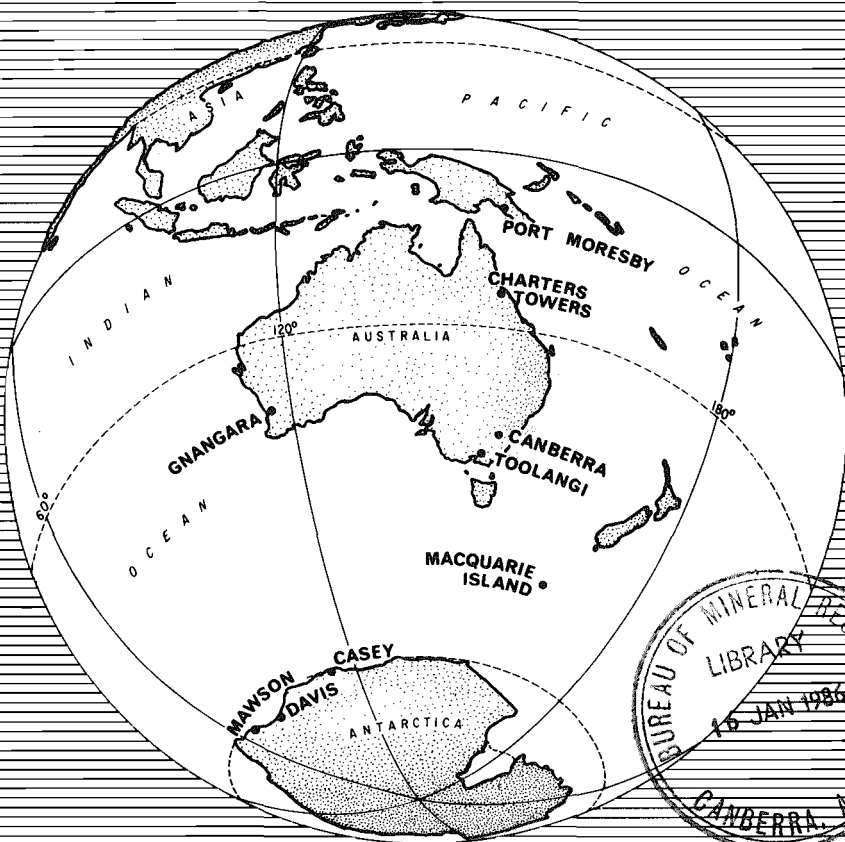


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(LENDING SECTION)



# GEOPHYSICAL OBSERVATORY REPORT



MAGNETIC OBSERVATORIES

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VOLUME 33 No. 6  
JUNE 1985

OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

DEPARTMENT OF RESOURCES AND ENERGY

Minister: Senator The Hon. Gareth Evans

SECRETARY: A J Woods

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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The observers at Casey and Davis are officers of the Antarctic Division (Department of Science and Technology) and their contributions are gratefully acknowledged: they and the BMR geophysicists of Macquarie Island and Mawson are members of the Australian National Antarctic Research Expeditions (ANARE).

The data from the Port Moresby geophysical observatory are contributed by the Geological Survey of Papua New Guinea.

The terminology used in this report is that accepted by IAGA. The units of field intensity, nanotesla (nT), are those of the SI system. All times are in Universal Time. Should further information be required, apply to:

GEOMAGNETISM SECTION  
BUREAU OF MINERAL RESOURCES  
G.P.O. Box 378  
CANBERRA A.C.T. 2601

## CONTRIBUTING OBSERVATORIES

| OBSERVATORY     | OBSERVER<br>IN CHARGE | <u>GEOGRAPHIC</u> |          | <u>GEOMAGNETIC</u> |       |
|-----------------|-----------------------|-------------------|----------|--------------------|-------|
|                 |                       | LAT               | LONG     | LAT                | LONG  |
| PORT MORESBY    | I.D. Ripper           | 9 25'S            | 147 09'E | -18.6              | 217.9 |
| CHARTERS TOWERS | J.M. Millican         | 20 05'S           | 146 15'E | -29.3              | 218.4 |
| GNANGARA        | P.J. Gregson          | 31 47'S           | 115 57'E | -43.3              | 185.8 |
| CANBERRA        | P.A. Hopgood          | 35 19'S           | 149 22'E | -44.0              | 224.7 |
| MACQUARIE I     | W.P. Barnaart         | 54 30'S           | 158 57'E | -61.1              | 243.1 |
| MAWSON          | P.J. Kelsey           | 67 36'S           | 62 53'E  | -73.1              | 102.9 |
| DAVIS           | R. Morris             | 68 35'S           | 77 58'E  | -76.7              | 119.9 |
| CASEY           | J. Smart              | 66 17'S           | 110 32'E | -77.8              | 179.1 |

## MAGNETOGRAPHS

| OBSERVATORY     | CODE | TYPE                                   | ELEMENT/SCALE-VALUE |      |      |
|-----------------|------|----------------------------------------|---------------------|------|------|
| PORT MORESBY    | PMG  | La Cour (A)                            | H/3                 | D/5  | Z/4  |
| CHARTERS TOWERS | CTA  | EDA/ELSEC digital (D1/1)               |                     |      |      |
| GNANGARA        | GNA  | Eschenhagen (A)                        | H/3                 | D/7  | Z/6  |
| CANBERRA        | CNB  | Elsec digital (D1/0.1)                 |                     |      |      |
| MACQUARIE I     | MCQ  | Photo-electronic magnetometer (D1/0.1) |                     |      |      |
| MAWSON          | MAW  | La Cour (A)                            | H/21                | D/13 | Z/22 |

Scale values are in nT/mm

A = analogue, 20 mm/hr

D1/0.1,1 = digital/1 min readings/0.1 or 1 nT resolution

## MAGNETOMETERS

Absolute data are based on observations made with QHM's BMZ's, fluxgate-theodolites, declinometers and proton precession magnetometers.

Errors in preliminary values obtained from magnetograms are not likely to exceed 5 nT or 0.5 minutes.

# PORT MORESBY

## MAGNETIC K-INDICES - JUNE 1985

Range for lower limit of K = 9 is 300 nT.

| <u>DAY</u> | <u>K-INDICES</u> |   |   |   |   |   |   |   | <u>K-SUM</u> |
|------------|------------------|---|---|---|---|---|---|---|--------------|
| 01         | 3                | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 26           |
| 02         | 2                | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 14           |
| 03         | 1                | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 13           |
| 04         | 2                | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 15           |
| 05         | 2                | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 10           |
| 06         | 1                | 3 | 2 | 2 | 4 | 4 | 2 | 4 | 22           |
| 07         | 3                | 5 | 4 | 2 | 3 | 3 | 3 | 1 | 24           |
| 08         | 3                | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 21           |
| 09         | 1                | 2 | 2 | 1 | 1 | 2 | 3 | 5 | 17           |
| 10         | 4                | 4 | 5 | 5 | 3 | 2 | 2 | 2 | 27           |
| 11         | 2                | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 20           |
| 12         | 2                | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 18           |
| 13         | 1                | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 11           |
| 14         | 1                | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 12           |
| 15         | 1                | 3 | 1 | 2 | 1 | 2 | 1 | 1 | 12           |
| 16         | 1                | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 08           |
| 17         | 1                | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 15           |
| 18         | 1                | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 08           |
| 19         | 1                | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 09           |
| 20         | 1                | 2 | 1 | 2 | 3 | 4 | 2 | 3 | 18           |
| 21         | 2                | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 14           |
| 22         | 2                | 2 | 2 | 3 | 1 | 1 | 0 | 2 | 13           |
| 23         | 2                | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 15           |
| 24         | 2                | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 12           |
| 25         | 3                | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 18           |
| 26         | 3                | 2 | 3 | 5 | 5 | 3 | 4 | 3 | 28           |
| 27         | 3                | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 20           |
| 28         | 3                | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 21           |
| 29         | 3                | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 20           |
| 30         | 2                | 1 | 1 | 3 | 1 | 2 | 2 | 3 | 15           |

Mean of K-Sum is 16.5

### Frequency of K-indices

|     |   |    |    |    |    |   |   |   |   |   |   |
|-----|---|----|----|----|----|---|---|---|---|---|---|
| K : | 0 | 1  | 2  | 3  | 4  | 5 | 6 | 7 | 8 | 9 | - |
| f : | 1 | 75 | 94 | 53 | 11 | 6 | 0 | 0 | 0 | 0 | 0 |

# GNANGARA

## MAGNETIC K-INDICES - JUNE 1985

Range for lower limit of K = 9 is 450 nT.

| <u>DAY</u> | <u>K-INDICES</u> |   |   |   |   |   |   |   | <u>K-SUM</u> |
|------------|------------------|---|---|---|---|---|---|---|--------------|
| 01         | 3                | 3 | 3 | 4 | 4 | 3 | 3 | 1 | 24           |
| 02         | 1                | 1 | 1 | 1 | 3 | 2 | 3 | 1 | 13           |
| 03         | 0                | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 07           |
| 04         | 1                | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 09           |
| 05         | 1                | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 08           |
| 06         | 2                | 2 | 2 | 2 | 3 | 6 | 3 | 5 | 25           |
| 07         | 3                | 4 | 4 | 3 | 5 | 4 | 4 | 3 | 30           |
| 08         | 3                | 3 | 4 | 4 | 2 | 3 | 1 | 2 | 22           |
| 09         | 2                | 3 | 2 | 1 | 0 | 2 | 5 | 6 | 21           |
| 10         | 4                | 3 | 5 | 5 | 4 | 3 | 3 | 2 | 29           |
| 11         | 2                | 2 | 2 | 2 | 1 | 3 | 1 | 2 | 15           |
| 12         | 1                | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 17           |
| 13         | 0                | 1 | 0 | 0 | 2 | 3 | 1 | 2 | 09           |
| 14         | 0                | 0 | 2 | 1 | 1 | 0 | 0 | 1 | 05           |
| 15         | 1                | 1 | 0 | 0 | 2 | 2 | 2 | 1 | 09           |
| 16         | 0                | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 03           |
| 17         | 0                | 0 | 1 | 0 | 3 | 3 | 2 | 1 | 10           |
| 18         | 1                | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 04           |
| 19         | 1                | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 07           |
| 20         | 1                | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 13           |
| 21         | 1                | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 06           |
| 22         | 0                | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 04           |
| 23         | 2                | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 07           |
| 24         | 0                | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 03           |
| 25         | 2                | 2 | 2 | 2 | 1 | 1 | 4 | 2 | 16           |
| 26         | 3                | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 27           |
| 27         | 2                | 2 | 2 | 1 | 3 | 3 | 3 | 3 | 19           |
| 28         | 4                | 3 | 3 | 2 | 3 | 3 | 3 | 4 | 25           |
| 29         | 3                | 2 | 2 | 4 | 3 | 3 | 3 | 1 | 21           |
| 30         | 1                | 0 | 0 | 3 | 1 | 2 | 4 | 3 | 14           |

Mean of K-Sum is 14.0

### Frequency of K-indices

|     |    |    |    |    |    |   |   |   |   |   |   |
|-----|----|----|----|----|----|---|---|---|---|---|---|
| K : | 0  | 1  | 2  | 3  | 4  | 5 | 6 | 7 | 8 | 9 | - |
| f : | 46 | 72 | 52 | 43 | 20 | 5 | 2 | 0 | 0 | 0 | 0 |

# CANBERRA

## MAGNETIC K-INDICES - JUNE 1985

Range for lower limit of K = 9 is 450 nT.

| <u>DAY</u> | <u>K-INDICES</u> |   |   |   |   |   |   |   | <u>K-SUM</u> |
|------------|------------------|---|---|---|---|---|---|---|--------------|
| 01         | 2                | 2 | 2 | 5 | 3 | 4 | 3 | 1 | 22           |
| 02         | 0                | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 06           |
| 03         | 0                | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 03           |
| 04         | 0                | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 04           |
| 05         | 1                | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 06           |
| 06         | 1                | 2 | 1 | 2 | 3 | 4 | 3 | 4 | 20           |
| 07         | 3                | 5 | 5 | 4 | 4 | 4 | 3 | 1 | 29           |
| 08         | 2                | 3 | 4 | 4 | 3 | 2 | 1 | 1 | 20           |
| 09         | 1                | 2 | 2 | 1 | 0 | 1 | 3 | 5 | 15           |
| 10         | 2                | 4 | 5 | 5 | 4 | 2 | 1 | 2 | 25           |
| 11         | 2                | 3 | 2 | 2 | 2 | 2 | 1 | 0 | 14           |
| 12         | 1                | 2 | 2 | 2 | 1 | 3 | 1 | 0 | 12           |
| 13         | 0                | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 05           |
| 14         | 0                | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 02           |
| 15         | 0                | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 04           |
| 16         | 0                | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00           |
| 17         | 1                | 0 | 1 | 0 | 2 | 3 | 1 | 1 | 09           |
| 18         | 0                | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 02           |
| 19         | 0                | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 01           |
| 20         | 1                | 1 | 0 | 2 | 3 | 3 | 0 | 1 | 11           |
| 21         | 0                | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 05           |
| 22         | 0                | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 06           |
| 23         | 2                | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 07           |
| 24         | 0                | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 02           |
| 25         | 1                | 2 | 2 | 2 | 1 | 1 | 3 | 2 | 14           |
| 26         | 2                | 2 | 2 | 5 | 5 | 2 | 4 | 2 | 24           |
| 27         | 1                | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 17           |
| 28         | 1                | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 18           |
| 29         | 2                | 2 | 3 | 4 | 3 | 2 | 2 | 0 | 18           |
| 30         | 0                | 0 | 0 | 3 | 0 | 2 | 2 | 3 | 10           |

Mean of K-Sum is 11.0

## Frequency of K-indices

|     |    |    |    |    |    |   |   |   |   |   |   |
|-----|----|----|----|----|----|---|---|---|---|---|---|
| K : | 0  | 1  | 2  | 3  | 4  | 5 | 6 | 7 | 8 | 9 | - |
| f : | 85 | 51 | 60 | 24 | 12 | 8 | 0 | 0 | 0 | 0 | 0 |

# MAWSON

## MAGNETIC K-INDICES - JUNE 1985

Range for lower limit of K = 9 is 1500 nT.

| <u>DAY</u> | <u>K-INDICES</u> |   |   |   |   |   |   |   | <u>K-SUM</u> |
|------------|------------------|---|---|---|---|---|---|---|--------------|
| 01         | 5                | 6 | 4 | 5 | 2 | 4 | 5 | 5 | 36           |
| 02         | 5                | 2 | 2 | 2 | 2 | 3 | 5 | 4 | 25           |
| 03         | 2                | 2 | 1 | 2 | 1 | 3 | 4 | 5 | 20           |
| 04         | 5                | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 17           |
| 05         | 4                | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 21           |
| 06         | 3                | 4 | 2 | 1 | 3 | 7 | 3 | 7 | 30           |
| 07         | 3                | 6 | 5 | 4 | 3 | 4 | 7 | 6 | 38           |
| 08         | 4                | 6 | 5 | 5 | 3 | 3 | 4 | 3 | 33           |
| 09         | 4                | 4 | 4 | 2 | 1 | 2 | 6 | 8 | 31           |
| 10         | 6                | 6 | 6 | 5 | 3 | 3 | 5 | 6 | 40           |
| 11         | 4                | 4 | 3 | 4 | 3 | 3 | 2 | 5 | 28           |
| 12         | 5                | 4 | 4 | 4 | 3 | 2 | 6 | 6 | 34           |
| 13         | 3                | 2 | 2 | 3 | 2 | 3 | 5 | 6 | 26           |
| 14         | 3                | 2 | 3 | 1 | 1 | 1 | 1 | 5 | 17           |
| 15         | 4                | 4 | 2 | 1 | 1 | 2 | 5 | 4 | 23           |
| 16         | 3                | 4 | 3 | 1 | 0 | 0 | 0 | 4 | 15           |
| 17         | 4                | 2 | 2 | 1 | 2 | 2 | 3 | 4 | 20           |
| 18         | 3                | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 15           |
| 19         | 2                | 1 | 2 | 1 | 0 | 1 | 2 | 3 | 12           |
| 20         | 1                | 3 | 3 | 1 | 3 | 3 | 2 | 2 | 18           |
| 21         | 3                | 4 | 2 | 3 | 2 | 3 | 1 | 4 | 22           |
| 22         | 3                | 4 | 3 | 3 | 2 | 1 | 1 | 2 | 19           |
| 23         | 6                | 6 | 3 | 2 | 2 | 2 | 0 | 1 | 22           |
| 24         | 1                | 1 | 2 | 3 | 1 | 1 | 2 | 5 | 16           |
| 25         | 5                | 4 | 5 | 3 | 2 | 1 | 6 | 4 | 30           |
| 26         | 6                | 3 | 4 | 4 | 4 | 4 | 7 | 6 | 38           |
| 27         | 5                | 4 | 5 | 3 | 3 | 5 | 5 | 6 | 36           |
| 28         | 4                | 6 | 6 | 6 | 4 | 4 | 5 | 6 | 41           |
| 29         | 5                | 4 | 5 | 5 | 3 | 3 | 6 | 4 | 35           |
| 30         | 4                | 2 | 3 | 2 | 4 | 2 | 6 | 7 | 30           |

Mean of K-Sum is 26.2

## Frequency of K-indices

|     |   |    |    |    |    |    |    |   |   |   |   |
|-----|---|----|----|----|----|----|----|---|---|---|---|
| K : | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7 | 8 | 9 | - |
| f : | 5 | 32 | 51 | 50 | 43 | 29 | 24 | 5 | 1 | 0 | 0 |

JUNE 1985  
PRINCIPAL MAGNETIC STORMS

| OBSERVATORY     | COMMENCEMENT |    |     |      | SSC  | AMPLITUDES |       | MAX 3h K-INDEX  |   | RANGES |       |       |    | UT END |  |
|-----------------|--------------|----|-----|------|------|------------|-------|-----------------|---|--------|-------|-------|----|--------|--|
|                 | d            | h  | min | TYPE | D(') | H(nT)      | Z(nT) | d (3h-PERIOD)   | K | D(')   | H(nT) | Z(nT) | d  | h      |  |
| Port Moresby    | 06           | 05 | 44  | ssc  | 0    | -14        | -11   | 07(2)           | 5 | 4      | 90    | 40    | 08 | 13     |  |
|                 | 09           | 17 | 15  | ssc  | 0.4  | +10        | +8    | 09(8),10(3,4)   | 5 | 9      | 140   | 60    | 10 | 15     |  |
| Charters Towers | 06           | 11 | ..  | ...  | ..   | ..         | ..    | 07(2)           | 5 | 7.4    | 86    | 22    | 08 | 11     |  |
|                 | 09           | 17 | 16  | ssc  | +0.2 | +10        | -2    | 09(8),10(1,3,4) | 5 | 13.7   | 161   | 22    | 10 | 15     |  |
| Gnangara        | 06           | 12 | ..  | ...  | ..   | ..         | ..    | 06(6)           | 6 | 25     | 100   | 100   | 08 | 13     |  |
|                 | 09           | 17 | 16  | ssc  | +0.9 | +7         | +6    | 09(8)           | 6 | 28     | 140   | 230   | 10 | 20     |  |
| Canberra        | 06           | 11 | ..  | ...  | ..   | ..         | ..    | 07(2,3)         | 5 | 14.8   | 120   | 43    | 08 | 13     |  |
|                 | 09           | 17 | 16  | ssc  | +0.4 | +8         | +1    | 09(8),10(3,4)   | 5 | 28.9   | 150   | 50    | 10 | 16     |  |

JUNE 1985

PRELIMINARY MONTHLY MEAN VALUES

| OBSERVATORY     | H<br>nT | D<br>deg min | Z<br>nT | F<br>nT |
|-----------------|---------|--------------|---------|---------|
| PORT MORESBY    | 35946   | 06° 34.1'E   | -23713  | 43063   |
| CHARTERS TOWERS | 31785   | 07° 43.0'E   | -38274  | 49752   |
| GNANGARA        | 23258   | 03° 17.8'W   | -53772  | 58586   |
| CANBERRA        | 23712   | 12° 20.2'E   | -53725  | 58726   |
| MACQUARIE I     | 12612   | 29° 10. 'E   | -63619  | 64857   |
| MAWSON          | 18457   | 63° 40.0'W   | -46339  | 49879   |
| DAVIS           | 16602   | 76° 39 'W    | -52126  | 54706   |
| CASEY           | 9641    | 90° 49 'W    | -63972  | 64694   |

The values are derived from magnetograms for selected quiet days except at Davis and Casey where they are derived from semi-weekly absolute measurements.

SUDDEN COMMENCEMENTS AND OTHER RAPID VARIATIONS

| OBSERVATORY     | DAY | TYPE AND<br>QUALITY | TIME  | SENSE AND AMPLITUDE<br>OF CHIEF MOVEMENT |       |       |
|-----------------|-----|---------------------|-------|------------------------------------------|-------|-------|
|                 |     |                     |       | H(nT)                                    | D(nT) | Z(nT) |
| PORT MORESBY    | 06  | ssc B               | 05 44 | -14                                      | 0     | -11   |
|                 | 09  | ssc B               | 17 15 | +10                                      | +4    | +8    |
| CHARTERS TOWERS | 09  | ssc B               | 17 16 | +10                                      | +2    | -2    |
| GNANGARA        | 09  | ssc B               | 17 16 | +7                                       | +7    | +6    |
| CANBERRA        | 09  | ssc B               | 17 16 | +8                                       | +4    | +1    |

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