Technical Note

Mundaring Weir-Mt Gungin (WA) Gravity Meter Calibration Range

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Some investigation has been carried out, in response to many public enquiries, at the WAIT Department of Physics, to see if the change of water masses in the weir, at Mundaring had any effect on the gravity meter calibration range between Station No. 73910117 at Mundaring, and Station No. 73910217 at Mt. Gungin.

The water in the weir reached its lowest recorded level over two seasons (towards the end of 1976 and beginning of 1977); this was naturally the lowest recorded level since the calibration range was established in 1973.

The water level in the Weir has a possible variation of 14 metres. The Mundaring station lies at the foot of the weir 35.5 metres below the top of the wall and approx. 250 metres from the wall.

The Mt. Gungin station is placed on the lands and survey laplace station mark approx. 3 kilometres from the weir and 257.2 metres above the top of the wall.

The solid angle subtended by the water in the weir at Stn. No. 73910117, was calculated using a graphical method. The worst possible case was applied; that is: taking a slab of 14 metres throughout the weir without considering the topography of the sides of the weir, and assuming all the mass to be at the top of the weir.

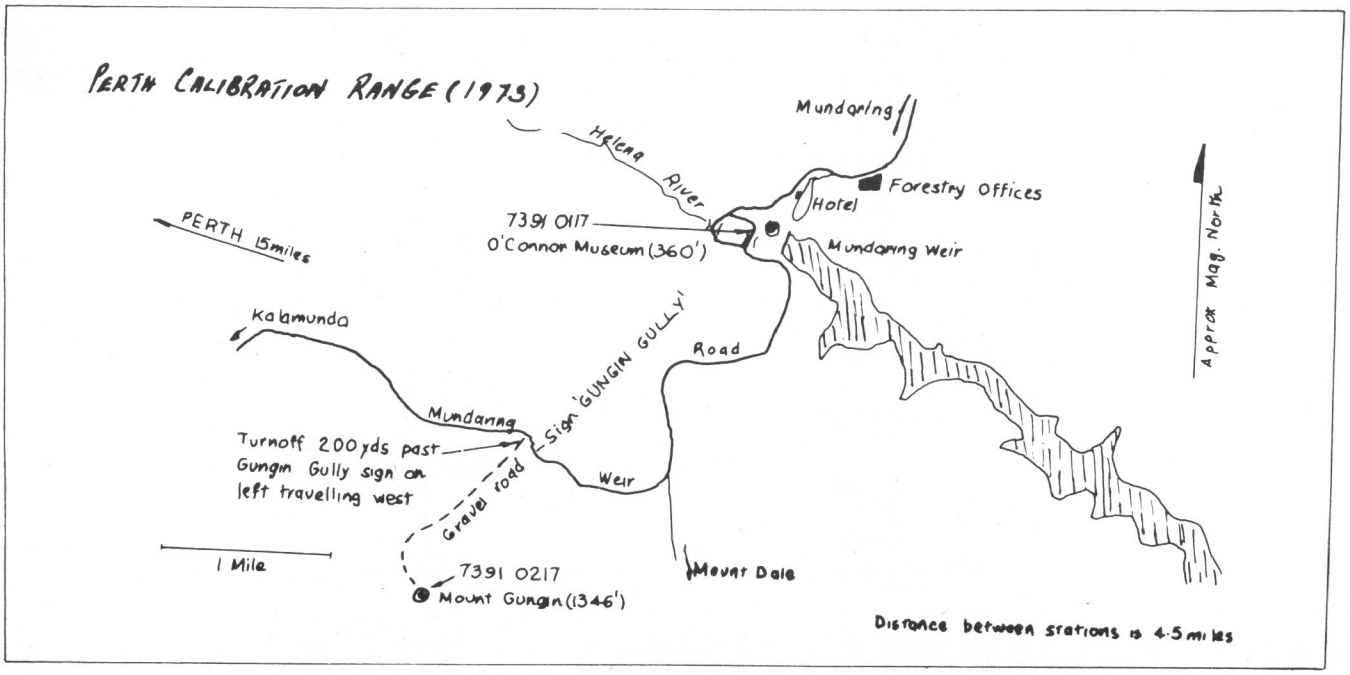
The result obtained showed a solid angle (ω) of 0.07 steradians.

$\therefore$ The change in gravity

$$\Delta g = \omega \rho t G$$
$$= 0.0065 \text{ milligal}$$

The usual gravimeters can only be read to one hundredth of a milligal. Therefore the result indicates that the water level fluctuations are not expected to affect the calibrations of meters using this range.

Note: Whilst the tidal effect is greater than the gravity effect of the water in the Weir, it will not affect the calibration range because it will occur equally at both stations.



TECHNICAL NOTE

Omega Field Strengths

The following calculations set upper limits on the field strengths of Omega in Eastern Australia. They show that the signals will not be excessively strong, and that they should not have a serious effect on well designed equipment.

The calculation ignores ohmic loss in the ground. At a distance r from the transmitter the Poynting vector is

$$S = \frac{P}{2\pi r H}$$

where P is the radiated power, and H is the height of the ionosphere. Since

$$S = \frac{1}{\mu_o} E \times B$$

$$E = \left(\frac{c\mu_o P}{2\pi r H}\right)^{1/2}$$

E and B are plotted against r in the Figure, for $P = 10^4$ watts (the reported value) and H = 100 km.

The predominant propagation mode will be TM1, for which **E** is vertical and **B** horizontal. A peak voltage of ωB will be induced in a $1 m^2$ single turn loop that is normal to **B** (i.e. in the vertical plane that passes through the transmitter). This voltage is plotted in the Figure assuming $\omega = 10.35$ kHz (the lowest frequency to be used in the Australian transmitter).

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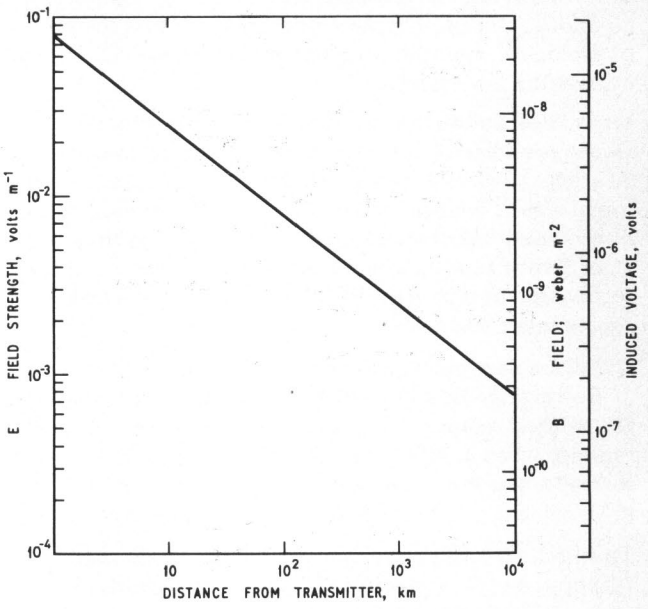
CSIRO



BOOKS

SOLAR AUSTRALIA – Australia at the Crossroads.
J.M. MULA, R.A. WARD, B.S. THORNTON and C. MALANOS.

Published by the Foundation for Australian Resources, 122 pp.
Price $2.95 (paperback).

Pavlova and Passionfruit

Solar Energy is somehow like that famous meringue concoction covered in lashings of fresh cream and passionfruit – you've got to like it or you're un-Australian. So a new publication on this topic (solar, not pavlova), especially one specifically relating to the Australian scene, has got to be an instant success.

As any aficionado of solar energy knows, spaceship Earth subtends about 1.7×10^{17} watts of solar radiation from that great thermonuclear device in the sky. Central Australia's annual share is some 2000 GW km^{-2} and by throwing in degradation factors for dust storms, clouds, efficiency etc., we can power a civilization of . . . But wait, the power freak will get no joy from Solar Australia; neither will the solar technocrat. The authors define their boundary conditions early (page 25) . . . "the present study does not concern itself with [the] technological aspect [of solar energy]."

The book concerns itself exclusively with the socio-economic aspects of the solar energy business – the cost to the nation (and dollars are not the only units) over several hundred years. It is divided into two distinct segments, the first contrasting the modus operandi at which Australians excel (Apathy Policy), with the unfamiliar ground of long term forward planning (Solar Energy Policy). It would be unfair to the authors for this reviewer to reveal the surprising outcome, but the present readership will be fascinated to note that the proposed Solar Energy Policy includes enforced restrictions on coal and uranium mining!

In the second half of the book two additional topics are explored. They are the miserable scenario of Energy Crisis in Australia and, of course, the logical follow-up – a Solar Energy Rescue. Neither are attractive futures for us or our children.

While the book labours under its misnomer, suffers from 'Club of Rome' mentality, tries one's patience with pretentious upper case phrases and irritates with inappropriate units, it is nevertheless a fascinating attempt at proposing a *plan* (or even several plans) and courageously explores the consequences for Australian society, of its implementation. It is not a moveable feast, but for $2.95 it won't do you any harm either.

I leave you with a strange conundrum to ponder – why does Solar Energy result in an increased birth rate? (Answer page 45).

GLEN RILEY