

SHORT NOTE

NEW GRAVITY BASE STATIONS IN FALKLAND ISLANDS AND ANTARCTIC PENINSULA

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INTRODUCTION

New absolute gravity values are given for two existing base stations at Port Stanley, Falkland Islands ($51^{\circ} 41.53' \text{ S}$, $57^{\circ} 51.14' \text{ W}$) and Rothera Base, Antarctic Peninsula ($67^{\circ} 34.1' \text{ S}$, $67^{\circ} 07.5' \text{ W}$). A new gravity base station on James Ross Island is also described.

The gravity links described below were all made with a LaCoste and Romberg gravity meter (No. 784) except when stated otherwise. This instrument was calibrated by the manufacturers on purchase in 1985 and subsequently checked along the calibration line in Cheshire between Hatton Heath and Prees (Masson-Smith and others, 1974) which failed to show any significant change in calibration constant.

PORT STANLEY

The absolute value of gravity at primary stations in the Falkland Islands and Antarctic Peninsula were established by ship-borne links using a Worden gravimeter by Griffiths and others (1964). The links were made to international gravity base stations at Buenos Aires (Argentina) and Montevideo (Uruguay) whose values were based on the Potsdam 981274 System. In 1964–65 Kennett (1965) improved the link from South America using a LaCoste and Romberg (No. 2) gravity meter to tie Port Stanley to Punta Arenas (Chile) and Montevideo by ship. No further observations to strengthen these links were made until 1985 when the author linked the British Antarctic Survey (BAS) station in Port Stanley to the National Gravity Reference Net 1973 (NGRN 73) at Wallingford FBM (Masson-Smith and others, 1974). This was achieved by a two-way air tie via Ascension Island using a LaCoste and Romberg gravity meter. Later that year, the Directorate of Military Survey, Ministry of Defence, made a three-way tie with four LaCoste and Romberg gravity meters (Bassett, 1987) thus improving the link between Port Stanley and NGRN 73. A new base station at Mount Pleasant Airport was established in the process which is linked to Port Stanley. The location of the station in Port Stanley (Griffiths and others, 1964) was changed from the warehouse to a more accessible outdoor site (R. G. B. Renner, pers. comm.) (Fig. 1). The values for height and absolute gravity were unchanged.

Gravity values at NGRN 73 stations can be expressed in the International Gravity Standardization Net 1971 (IGSN 71) (Morelli and others, 1974). Table I shows the new ISGN 71 and old Potsdam gravity values at Mount Pleasant Airport and Port Stanley.

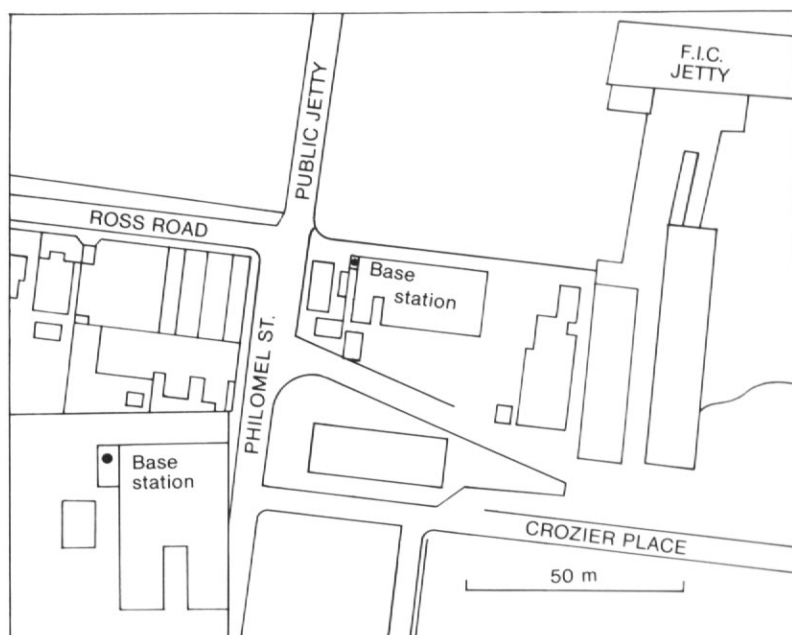


Fig. 1. Location of BAS gravity base station in Port Stanley, Falkland Islands. The station is just inside the entrance porch to the BAS office and is marked by a chiselled cross.

Table I. Summary of primary gravity base stations

Base	Latitude °S	Longitude °W	Height a.s.l. (m)	Potsdam Absolute gravity (gu)	IGSN 71 Absolute gravity (gu)
Mount Pleasant Airport	51 49.35	58 27.85			9812220.6 ¹
Port Stanley	51 41.53	57 51.14	4.2	9812433 ²	9812267.5 ¹
Rothera (indoor base)	67 34.1	67 07.5	12.1	9824816 ⁴	9824660 ⁵
James Ross Island	63 48.1	57 53.8	34.7 ³	9822562	9822397

¹ Bassett (1987).

² Griffiths and others (1964), Kennett (1965).

³ Lt T. Halpike, HMS *Endurance* (pers. comm.).

⁴ Renner (1981).

⁵ Based on one tie; see text.

ROTHERA BASE

The original gravity base station at Rothera (Renner, 1982) was tied to the gravity base at Adelaide Island (Griffiths and others, 1964). Renner (1981) established a further indoor base at Rothera which is no longer accessible since the base was rebuilt in 1986. A new gravity base was established in the boiler room in the main living complex (Fig. 2). It is marked by a small brass plaque inscribed 'British Antarctic Survey - ROTH'. The height and absolute gravity remain unchanged (Table I).

A one-way gravity tie from Port Stanley to Rothera by ship and aircraft was

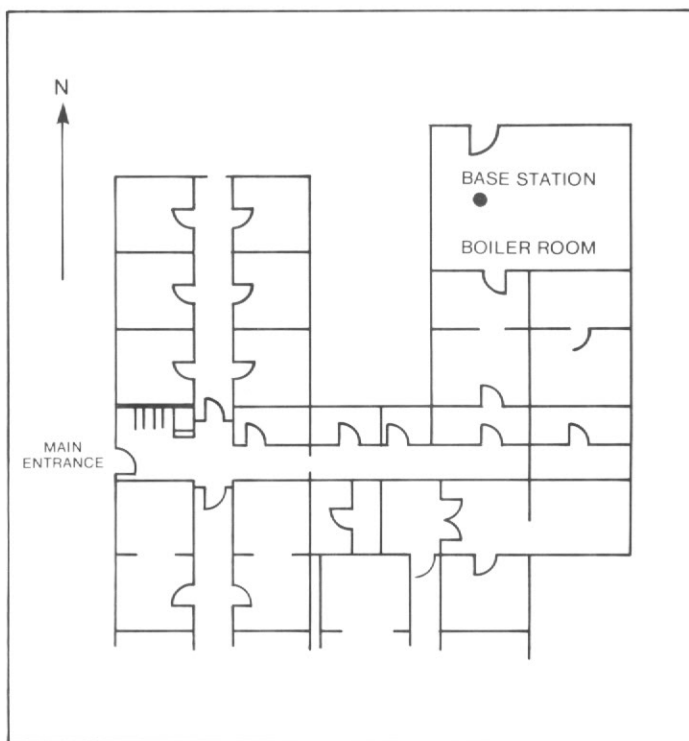


Fig. 2. Location of new gravity base station at Rothera Base. The station is on the concrete walkway and marked by a brass plaque.

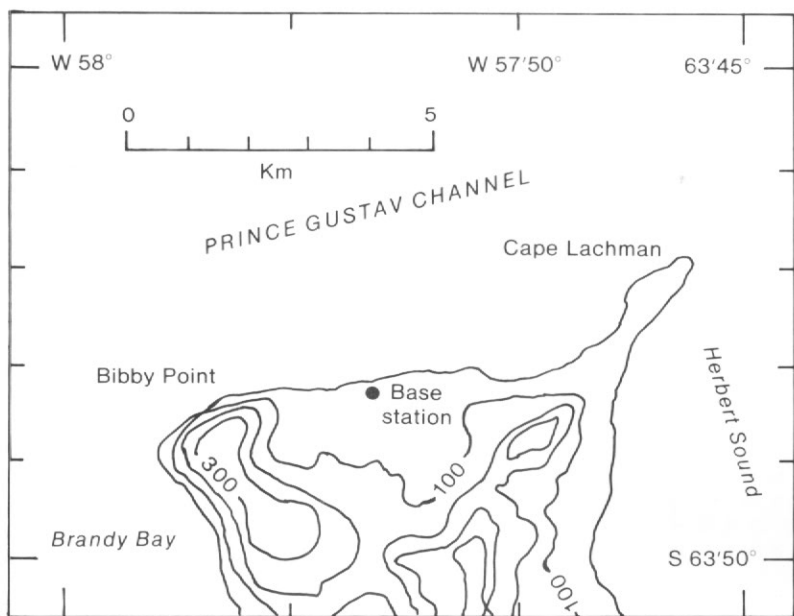


Fig. 3. Location of new gravity base station at James Ross Island. It is marked by a 1-m high wooden trigonometrical pillar.

conducted in 1986 by the author using a LaCoste and Romberg gravity meter. The observed value at Rothera was found to be 9824660 gu relative to the new IGSN 71 station in Port Stanley. This observed difference between Rothera and Port Stanley is 28 gu higher than that previously measured by ship (Griffiths and others, 1964; Renner, 1981). An air tie from McMurdo station, Antarctica (Renner, 1981) found the Rothera value to be 22 gu too low, in agreement with this new tie. In addition, IGSN 71 stations are approximately 180 gu higher than the Potsdam system.

Although many of the Antarctic Peninsula gravity field stations are tied to Port Stanley, the majority are still tied to Rothera and Adelaide stations. Until further ties between Rothera and Port Stanley are made to corroborate these data, the absolute values of BAS gravity stations will still be related to the international links of Griffiths and others (1964) and Kennett (1965).

JAMES ROSS ISLAND

As part of a reconnaissance gravity survey during the 1985-86 field season (McGibbon, in prep.), a new gravity base station was established on James Ross Island. The location is at an old BAS trigonometrical point near Cape Lachman (Fig. 3). It is marked by a 1-m high plywood pillar set in a concrete and rock base constructed by hydrographers of HMS *Endurance* (T. Halpike, pers. comm.). Gravity readings are made at the base of the pillar. The absolute value of gravity was measured during a two-way ship-borne tie to Port Stanley using a LaCoste and Romberg gravimeter. The position, height and gravity values are given in Table I.

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