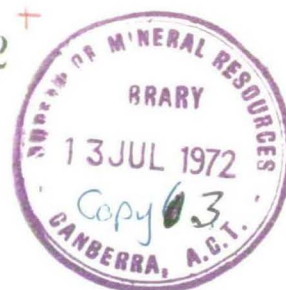


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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF
NATIONAL DEVELOPMENT
**BUREAU OF MINERAL
RESOURCES, GEOLOGY
AND GEOPHYSICS**



Record 1971/131

**INVESTIGATIONS OF CRUSTAL STRUCTURE IN THE NEW
BRITAIN/NEW IRELAND REGION, 1969. GEOPHYSICAL
AND GEOLOGICAL DATA**

Edited by

J.A. Brooks

The information contained in this report has been obtained by the Department of National Development as part of the policy of the Commonwealth Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology & Geophysics.

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|----|---|---|---|---------------------|
| 16 | " | " | " | No. 2 (0220-0727) |
| 17 | " | " | " | No. 3 (1130-1250) |
| 18 | " | " | " | No. 4 (1544-2102) |
| 19 | " | " | " | No. 4 (2102-0600) |
| 20 | " | " | " | No. 5 (2017-2400) |
| 21 | " | " | " | No. 6,7 (0852-1400) |
| 22 | " | " | " | No. 8 (1400-2011) |
| 23 | " | " | " | No. 9 (0940-1500) |
| 24 | " | " | " | No. 10 (000-0700) |
| 25 | " | " | " | No. 11 (1107-1500) |

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27	"	"	"	No. 13 (0908-1308)
28	"	"	"	No. 14 (2042-0020)
29	"	"	"	No. 15 (0948-1500)
30	"	"	"	No. 16 (0920-1430)
31	"	"	"	No. 17 (0708-2015)
32	"	"	"	No. 18 (1218-1800)
33	"	"	"	No. 19 (1725-1853)

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40	"	"	"	"	No. 23 (1505-1820)
41	"	"	"	"	No. 24 (0902-1243)
42	"	"	"	"	No. 24 (1243-1823)
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LIST OF PARTICIPATING ORGANIZATIONS

COMMONWEALTH OF AUSTRALIA

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DEPARTMENT OF TERRITORIES
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DEPARTMENT OF DISTRICT ADMINISTRATION	DEPARTMENT OF TRADE & INDUSTRY
RABAU AND HOSKINS	CUSTOMS & MARINE DIVISIONS
	PORT MORESBY AND RABAU

DEPARTMENT OF LANDS, SURVEYS & MINES

SURVEY DIVISION	GEOLOGICAL & VOLCANOLOGICAL BRANCH
PORT MORESBY AND RABAU	PORT MORESBY AND RABAU

UNIVERSITY OF HAWAII	UNIVERSITY OF QUEENSLAND
HAWAII INSTITUTE OF GEOPHYSICS,	DEPARTMENT OF GEOLOGY,
HONOLULU	ST LUCIA

AUSTRALIAN NATIONAL UNIVERSITY
DEPARTMENT OF GEOPHYSICS,
CANBERRA

SUMMARY

The 1969 Crustal Investigation of the New Britain and New Ireland area was a multidisciplinary venture organized and co-ordinated by the Bureau of Mineral Resources and involving the Hawaii Institute of Geophysics, the University of Queensland, and the Australian National University.

The observed data are assembled in reasonably compact form in this Record, the first of a series of reports and papers which will arise from the work. The emphasis here is on data collation and not on interpretation, which is expected to result from analysis of the information presented here.

Some interpretation has been necessary, for example in presenting the geology and bathymetry. The geological features of New Britain and New Ireland, dating back no earlier than Eocene, are discussed in outline with special emphasis on Quaternary tectonics and volcanism. This outline provides an essential setting for any regional interpretation of the geophysical data.

The large bathymetric variations required preparation of special photo-reduced composite plates to which the magnetic data were also added. The form of a bathymetric trough between New Britain and New Ireland is identified clearly for the first time on these plates.

Seismic travel-time and path-distance data provided in the tables are also available as a punched card set together with listing and plotting programs.

1. INTRODUCTION

1.1 AIMS OF INVESTIGATION

In 1967 the Bureau of Mineral Resources (BMR) conducted a magnetic and seismic refraction survey in New Britain, observing the profiles shown in Plate 1. The preliminary interpretation of the results of this survey proved unsatisfactory and it was decided that further field work was desirable.

The 1969 survey comprised a multidisciplinary investigation of northern and central New Britain, southern New Ireland, and surrounding oceanic areas to re-examine the area in more detail and extend the area studied during 1967.

It included four marine/land deep refraction stages, marine magnetic and sparker profiling for 1650 km and 2500 km respectively, together with a land gravity reconnaissance of New Britain and New Ireland.

Field work was undertaken between February and May, and involved personnel from both Geological and Geophysical Branches of BMR, the Department of the Interior, the Hawaii Institute of Geophysics, the Australian National University, and the University of Queensland.

The refraction program was designed to:

- (1) Seek more structural detail beneath the Rabaul caldera.
- (2) Determine the boundary between continental and oceanic type structure east of New Ireland.
- (3) Explore the extent and structural form beneath St George's Channel.
- (4) Evaluate velocities and interface depths beneath the volcanic, oceanic, and mountain areas of central and eastern New Britain.

Shooting and sparker profiling were conducted from the 32 metres long survey ship MV 'Coral Queen' and magnetic work was shared with the small supply vessel MV 'Lahara'. Surveying work was undertaken by the Department of the Interior together with a contractor who supplied land based 'Hi-fix' mobile radio location beacons.

A total of 18 field recording parties occupied 47 sites and observed 54 shots ranging in size from 45 to 750 kg of TNT. Observations were also made at six permanent stations of the Rabaul Volcanological Observatory's volcanic surveillance network. Refracted events were recorded beyond 350 km in some instances. Data recovery of 84% included about 4000 readable arrivals.

1.2 SCOPE OF RECORD

This Record is a repository of observed data from the survey. It presents basic geophysical information, observations, and results in a comprehensive form to provide primary source material for subsequent detailed evaluation, interpretation, and structural analysis.

A geological reconnaissance map of New Britain and New Ireland incorporating the results of the 1969 field season provides an essential framework for interpretation of geophysical data. An outline of the geology in Chapter 4 interprets the geological history of New Britain and New Ireland in the light of the 1969 field data.

Gravity data are presented in the form of a simple Bouguer anomaly map. Refraction arrivals are listed in tabular form and some preliminary travel time profiles are presented. Plates showing some typical field records have also been included. Composite sparker and magnetic profiles have been compiled on a common time base.

1.3 PREVIOUS WORK

1.3.1 Geological

Early geological observations in New Ireland by Sapper (1910) and in New Britain by Stanley (1923) were followed by broad reconnaissance of the geology of New Britain by Noakes (in Fisher & Noakes, 1942).

Recent field work by Canberra and Port Moresby based geologists has been directed primarily towards regional mapping: the Gazelle Peninsula of New Britain was mapped by Macnab (1970) at intervals between 1966 and 1969, Southern New Ireland was reconnoitred in 1964-65 by French (1966) and the 1:250,000 maps covering the whole of New Ireland are being compiled by P.D. Hohnen following field work in 1969.

In both New Britain and New Ireland information of use for map compilation has been obtained by mineral and oil exploration companies, principally Continental Oil, C.R.A. Exploration, and Swiss Aluminium Mining.

The geology and volcanology of the Rabaul volcanoes is described by Fisher (1939). Summaries of the active volcanoes of New Britain appear in Fisher (1957). Recent volcanic-petrological work includes that of Lowder & Carmichael (1970) on the volcanoes of the Talasea area, and D.H. Blake and others on the Hoskins volcanoes (to be published).

1.3.2 Geophysical

A short review of geophysical work in this area prior to 1967 is being prepared by W.A. Wiebenga and others in a BMR Record describing the 1967 crustal project.

Since this project began, additional contributions have appeared. Denham (1969) discussed the seismicity of the New Guinea/Solomon Islands region from the point of view of distribution of earthquake foci with depth. He indicated a northwesterly dipping focal zone beneath New Britain, and related his findings to recently conceived hypotheses of 'the new global tectonics' expounded by Isacks, Oliver & Sykes (1968) who developed concepts proposed by Sykes (1966).

Two works on palaeomagnetism also provide useful background information. Green & Pitt (1967) published a tentative interpretation of a small number of palaeomagnetic measurements on samples collected in New Guinea which suggested a change in the pole azimuth since the early Tertiary. Manwaring (1971) has provided a little more data tending to support these ideas, but many age determinations were doubtful and the number of samples was still too small to allow statistically acceptable conclusions. However, current feeling is that anticlockwise rotation of New Guinea has occurred. Whether or not relative movement between the main island of New Guinea and New Britain has taken place remains a matter of conjecture at this stage.

Marine geophysical work in the Solomon Islands region by the Hawaii Institute of Geophysics was reported by Furumoto et al. (1970) and Rose, Woollard & Malahoff (1968). This included sparker profiling as well as magnetic, gravity, and refraction work, but did not overlap the areas covered by the 1969 survey.

2. OPERATIONS

2.1 PROGRAM

Tenders were called for a ship suitable for use in setting off explosions at sea in August 1968, and the 'Coral Queen' was accepted in January 1969.

Some 30 sites were visited in October 1968 to obtain information on access, terrain characteristics, accommodation, availability of fuel, power, local transport, and any other factors which would affect the operation.

Discussions were undertaken with the survey branch of the Department of the Interior regarding their requirements for fixing the position of shot-points and recording stations.

With the assistance of the resident geological staff, approaches were made to the Papua New Guinea Administration to help with marine and road transport, accommodation, communications, and the handling of stores. The feasibility of moving parties and their equipment at short notice was taken up with local air transport companies and with Marine Division of the Department of Trade & Industry. Firm assurances were obtained on this important aspect of the operation.

Frequency allocations for inter-party communications and for time signal transmissions were discussed and settled with the Department of Posts & Telegraphs.

Shortly after this information was collected, details of the range, capacity, and speed of the shooting ship became available and it was practicable to settle questions of explosive storage and draft an initial shot-firing program. The final operations program (BMR, 1969) was prepared when the Department of the Interior and Decca Surveys notified their transport requirements and timing schedules for the various phases of the project.

The Rabaul Volcanological Observatory office was used as the headquarters for field operations and a radio communications centre was maintained there (Control).

2.1.1 Geological

The New Britain geological party was formed in 1969 to carry out regional mapping over New Britain excluding the Gazelle Peninsula. The major portion of this area was covered by a large party in the period February to May. A turbine helicopter (Bell 206A) was used to position traverse parties out of base camps at Pomio, Hoskins, and Kandrian. (For those participating refer to Appendix 4). The helicopter was concurrently utilized for the New Britain gravity survey and to position and supply inland seismic stations at Pakia, Au'Una, and Kulu River.

A smaller party revisited the north coast by boat from August to November to examine the volcanoes in detail and to complete regional mapping. The latter was aided by ten days helicopter (Bell 47G3B1) usage in the Whiteman Ranges.

The 1:250,000 geological maps of New Britain and a BMR Record on the geology are being compiled by R.J. Ryburn and others. The detailed petrology of the volcanoes is being studied by R.W. Johnson of BMR.

2.1.2 Geophysical

The seismic refraction program was the prime consideration in determining ship movements; magnetic and sparker profiling was carried out as a subsidiary operation when feasible. The gravity observation program was integrated on an ad hoc basis, according to helicopter and aircraft availability, with the geological field work and supply operations.

Refraction. Plates 1 and 2 illustrate the distribution of shots and stations. Logistics involved in positioning the field parties are discussed in sections 2.3, 2.4, and 2.5 below.

Seismic operations were divided into four stages between each of which recording field parties were moved to new locations. Eighteen mobile land recording stations were supplemented by the six-station permanent network of the Rabaul Volcanological Observatory.

Stage 1 was designed to check the results of work done in the 1967 investigation and extend it to oceanic structure east of New Ireland and west of the Gazelle Peninsula. Sixteen shots were fired.

Stage 2 was intended chiefly as a refraction reconnaissance of crustal characteristics along the New Britain volcanic arc including structures beneath the central New Britain area, and used fifteen shots.

Stages 3 and 4 consisted of NE-SE and E-W refraction traverses of length 150 and 130 km respectively, which were designed to provide more detailed information concerning structure beneath the Rabaul Caldera.

Shallow marine reflection. A 14000-joule spark array system was installed on 'Coral Queen' for the whole survey. Recordings were made in the areas indicated in Plates 1 and 3.

Magnetic. An Elsec proton magnetometer was towed, first by the supply vessel 'Lahara' during shooting operations, and subsequently by the main survey vessel 'Coral Queen'. Profiles measured are shown in Plates 34 to 48.

Gravity. A reconnaissance survey was designed to provide a provisional map of the gravity field over land areas of New Britain and New Ireland. Only isolated readings had previously been made. The field operations for both geological and refraction programs required helicopters, which provided a convenient opportunity to make gravity observations.

2.1.3 Pre- and post-survey conferences

Pre-survey conference. All participants attended a pre-survey conference in Rabaul to be briefed on the program before moving to their stations for stage 1 of the project. Points covered included:

- (1) Survey requirements in the fixing of the location of each station were explained and pro formas for the recording of this information were distributed to party members.
- (2) Procedure in reporting arrival times to Control was outlined and queries were answered.
- (3) Allocation of frequencies for communication, time signal and shot instant was explained and a request was made that routine communication with Control should be notable for its brevity. Operating instruction manuals were supplied to those unfamiliar with BMR transceivers.
- (4) Repair and replacement procedures for faulty equipment was outlined briefly.
- (5) Finally attention was drawn to the importance of maintaining good public relations with all members of the Territory community. Among other things their co-operation was essential to the success of the project.

Post survey conference. Comments on the logistics of the operation and suggestions for improving the operating of future surveys were sought. The following points were raised.

- (1) Non-stop operation difficulties: The continuous nature of the operation had placed severe demands on participants. While this was not unexpected, it also placed demands on "uninvolved" people of the government and private community when transport, stores and services were required at short notice during public holidays. The response of the local people generally had been very good but some difficulties did arise.

At one point the native crew of the government vessel 'Lahara' refused duty because they had had too little time off. The efforts of the Harbourmaster resolved this situation, with difficulty.

(2) **Equipment and tropical conditions:** Some parties had underestimated the severity of the tropical conditions, which commonly produced 100% humidity on their equipment. They and others had experienced difficulties which had been countered by various methods brought to light in discussion at the meeting. It is clear that many manufacturers of electronic equipment are unaware of equatorial climatic conditions. The attention of participants could be drawn to this point when planning future surveys. Many personnel were also unaware that the locally manufactured batteries used in the survey used acid electrolyte of lower specific gravity than is normal elsewhere, to compensate for the local high prevailing temperatures. Some conventional hydrometers therefore gave misleading readings which affected charging routines.

(3) **Stores delivery and distribution:** The delivery of project stores from Australia and their distribution to parties could be improved. Stores should be packed in small cases with a weight limit of about 25 kg to facilitate delivery from Australia and handling in the field. In the current project large cases containing critical equipment were not delivered on time because airfreight personnel avoided loading them.

(4) **Communications:** All communication frequencies used in the project were allocated after close study of the predicted ionospheric conditions prevailing at the time of the project. Everybody agreed that the time signal transmissions on two frequencies were excellent. Day to day communications on 4525 kHz were effective although some difficulties were experienced near midday and in some locations. It was suggested that two frequencies should be used in future surveys for voice communications. The main weakness in project communications was, once again, contact with the shooting ship. Control had frequent difficulty in contacting the vessel and a low percentage of shot instants was recorded by the field stations. This failure was attributed to the use of an inadequate transceiver (Collins) on the ship, and noisy electronic conditions on the ship.

(5) **Navigation:** It was suggested that in future surveys tender specifications for the ship should include provision of a radar with 80 km range, and a gyrocompass.

(6) **Staff:** The experimental operation of reflection profiling equipment between shot firing indicated that it is not practicable to combine these operations without increased staff. Additional staff is also required for the effective operation of Control.

2.2 LIAISON

One of the most encouraging aspects of the operation was the co-operation received from all sectors of the Papua New Guinea community. Without this support the exercise might not have been mounted at all. Much of the liaison with Administration departments was carried by the local resident geological staff, particularly that concerning transport, stores handling, and accommodation.

Away from the larger settlements, accommodation and local assistance were provided by missions, government officers, plantation owners and managers, and village groups. Particular attention was paid in the early stages to informing people of the aims and objects of the exercise and the results of earlier surveys. This appeared to assist considerably in kindling co-operative interest in the project.

With respect to public relations, contact with local people is aided considerably if the project receives sufficient publicity from the news services. Fortunately radio coverage was moderately good and this was particularly helpful in contact with country people, both European and indigenous. However, the newspapers tended to shy away from the project because of its highly technical nature, and coverage was correspondingly poor.

2.3 COMMUNICATIONS

As the project ranged over an area of some 116,000 sq km and included 18 field parties, each of which required a timing count-down for each explosion, effective communication was of critical importance. The Department of Posts & Telegraphs lent one of their high-power transmitters for the duration of the project. This was connected by landline to the Rabaul Volcanological Observatory. The frequency of 4525 kHz was satisfactory for the project area and was used for distances up to about 320 km. On odd days when reception conditions were bad some stations were unreadable, but it was usually possible to work these difficult stations through others which were more favourably placed for reception. The most consistently difficult link was from ship to Control owing to high noise levels and other factors on the ship.

To ensure good timing control, signals from the central observatory clock at Rabaul were broadcast continuously on two frequencies, 3164 and 6815 kHz. These signals were used by the field parties for checking chronometers or were directly recorded on the seismograms. The lower frequency was allocated for close, and the higher for distant, stations. These frequencies were adequate for the ionospheric conditions prevailing at that time, and except for the peculiarities of reception in odd localized areas, reception was satisfactory.

2.4 TRANSPORT

The main difficulty in organizing transport was the intermittent nature of requirements. The need for transport ebbed and flowed throughout the project, reaching peaks at the beginning and end of stages during the positioning and repositioning of recording parties in the field.

The MV 'Coral Queen' was chartered by BMR as a shooting and profiling ship. Its contribution to the movement of recording parties was a minor one. The MV 'Lahara', an Administration vessel supplied by courtesy of the Department of Lands, Surveys & Mines, was used for

reconnaissance of survey points by the surveyors, for transport of the advance party which prepared geophone line sites, for magnetic traverses, for positioning parties during all stages of the project, and as a general support vessel. The Administration also supplied a workboat during peak movement periods, and other small boats were hired from time to time. A few plantation owners assisted with small boats and road transport for which they made no charge.

The bulk of party positioning was carried out by aircraft chartered by BMR. Twin-engined Piper Aztecs, which carried a load of roughly 454 kg plus two passengers, were used extensively. The capacity of these aircraft to operate on small landing strips under a variety of weather conditions saved many days of operating time. The weather was poor during much of the project and strips were closed from time to time to larger aircraft. At the end of stage 2, two Aztecs were substituted for the proposed DC.3 to return recording parties to Rabaul. This was done without change of program and without additional expense.

The three recording sites in the mountainous backbone of New Britain were occupied by parties transported by a helicopter on full-time charter to the regional geological mapping party. A considerable risk of delay was involved in the positioning and return of the recording and survey parties into and from these mountain sites because of the unseasonable weather. The normal doldrum period which usually produces clear weather in March and April failed to arrive, and it was fortunate that the movements proceeded without a serious delay in the program.

Demands for road transport during stages 3 and 4 were high. Vehicles were obtained from the Administration, from the Commonwealth Department of Works, and from hire car firms, and it was necessary to charter a small bus for the daily positioning of recording parties whose sites lay within 24 km of Rabaul.

2.5 MARINE OPERATIONS

Marine operations were carried out on board MV 'Coral Queen' (chartered for the survey) and MV 'Lahara' (made available by the PNG Administration to assist the project).

The MV 'Coral Queen', a steel hulled vessel 32 metres long, 7.3 metres beam, and 2.1 metres draft, with a cruising speed of 14 km/hr, deployed the seismic charges and carried shooting, seismic, and Spark-array profiling equipment, explosives, generator, Decca navigation equipment, and magnetic profiling equipment. Whenever practicable the ship transferred Decca stations and, occasionally, recording parties.

The MV 'Lahara', a wooden hulled vessel 15.3 metres long, 4.6 metres beam, and 1.8 draft with a cruising speed of 15 km/hr, placed parties during the survey and concomitantly undertook magnetic profiling until completion of the logistic duties. The magnetic profiling equipment was then transferred to the MV 'Coral Queen'.

Details of the equipment and its performance and operation are given in Appendix 1.

Outfitting the scientific equipment onboard the MV 'Coral Queen' required about eight days. Outfitting the vessel itself was carried out simultaneously because it had just come off the slipway and had to pass navigation checks for seaworthiness certification. Because of the time required for outfitting, the commencement date was postponed one week from 15 to 22 March. However, as the initial shooting program provided for only one shot per day it was possible subsequently to regain the lost time by firing more than one shot on some days.

On 20 April at 2 a.m. the MV 'Coral Queen' struck a log in St George's Channel and bent its propeller. The damage was inspected by divers and it was considered that the vessel could proceed at reduced speed. Later at a conference it was decided to continue rather than slip the vessel for repairs, in order to save time. For the remainder of the survey engines were run at a maximum of 1000 rev/min. This did not extend the charter period, because time was gained from the shooting program. However, it did limit manoeuvrability of the ship in St George's Channel in poor weather.

A description of the techniques used and arrangements made to fire shots is contained in Appendix 2.

3. POSITIONING

3.1 GENERAL PREPARATIONS

All relevant available marine charts, military maps, trigonometrical station data and diagrams and aerial photographs were obtained from the respective Commonwealth and State authorities.

The military maps of the New Ireland area were available on the International Spheroid and a block adjustment was required to bring them to the Australian National Datum for this survey.

The available maps of New Britain were produced during World War II, and co-ordinate connexions to the Australian National Datum were achieved by replotting recent trigonometrical stations based on the above datum and adjusting accordingly.

Most of the nautical charts were also prepared from older survey information; because of obvious discrepancies between various plans and charts, a series of 1:250,000 sheets was produced in the Survey Branch of the Department of the Interior. These plots agreed with the sheet extremities of the Australian Map Grid area. Control was plotted and the coast line was adjusted from existing maps. Ten sheets were prepared on this scale.

A base map of the Gazelle Peninsula of New Britain was also compiled on Coronaflex at a scale of 8 inches = 50,000 metres. This map was used to facilitate plotting of the shot-points from stages 3 and 4.

3.2 LAND OPERATIONS

3.2.1 Hi-fix sites

Selection stations. The program required the use of Decca 'Hi-fix' in determining the position of the ship at the following shot-points: 5 to 7; 9 to 19; 23 to 27. In order to achieve this, baselines were selected and 'Slave' stations were co-ordinated at the following locations: Kereware Island and Kamdaru (New Ireland); Hoskins and Pondo; Agir Island and the Awul Mission.

Co-ordinates of slave stations. Surveyors of the Survey Branch, Department of the Interior, Canberra, carried out the surveys to co-ordinate the proposed Decca 'Hi-fix' Slave stations in February and March 1969.

Precision of co-ordinates. The stations were co-ordinated to the existing trig. networks. These connexions attained an estimated accuracy of ± 1.5 metres relative to the existing network.

3.2.2 Seismic stations

Co-ordinations of sites (Table 3). Because of difficulties of terrain and limited access, the survey to provide co-ordinates for proposed seismic recording stations was carried out using a variety of survey methods, namely:

1. Stadia connexions to trig. stations supplemented by short baseline checks.
2. Compass and chain traverses.
3. Theodolite and chain traverses.
4. Resections and intersections.
5. Sun and star observations.
6. Photo identification and scaling from a known trig. station.
7. Point identification on military maps with scaled geographical co-ordinates.

Relative accuracies of positions. Methods of survey for co-ordination of each site are shown in Table 5. The following are the estimated accuracies of the survey methods listed above:

1. Stadia: ± 0.5 metres per 100 metres of connexions.

2. Compass and chain traverses - uncontrolled compass traverses: ± 19 metres per km of traverse.
3. Theodolite and chain traverses: ± 1 metre.
4. Resection and intersection: ± 1.5 metres.
5. Sun and star observations: ± 4 seconds of arc (124 metres) in latitude and 15 seconds (457 metres) in longitude.
6. Photo identification: ± 62 metres.
7. Identification on military maps: ± 92 metres.

Survey problems. The following were the main problems encountered during the course of the seismic recording stations.

1. Weather: the recording station co-ordination survey commenced towards the latter part of the northwest monsoon season. Sea transportation proved to be uncomfortable and ship-to-shore landings difficult. Heavy rain was practically continuous throughout the first half of this part of the survey.
2. Many stations were photo identified because of the lack of survey control in the immediate area. Some marks had been destroyed by foreshore erosion.
3. Transportation and site accessibility. Survey progress was slow because of the location of some recording station sites. Difficult terrain and general lack of roads made it necessary to move the survey parties by ship and by air (fixed wing and helicopter).

Data processing. All necessary computations were processed on the following computer programs:

1. Latitude-longitude. Australian Geodetic Datum program on the IBM 1620 computer at the Department of the Interior.
2. Transverse Mercator Co-ordinate Program on the Commonwealth Scientific & Industrial Research Organization's CDC 3600.
3. Robbins Program on the CDC 3600.

3.3 MARINE OPERATIONS

The position fixing for this project was completed using the Decca Hi-fix system and normal shipboard navigation equipment.

3.3.1 Navigation

Shipboard navigation equipment. Shipboard navigation equipment consisted of:

1. Decca Hi-fix system for about one month of the survey.

2. A Kelvin & Hughes Type 17 marine radar with 38-km range capability.
3. Magnetic steering compass.
4. Magnetic navigation compass on the flying bridge, equipped with a prism type compass ring.

The deviation of the ship's compasses was determined prior to the commencement of the survey.

The orientation of the radar display was relative to the ship's head and corrections for magnetic declination, ship's deviation and ship's heading were made to each observed radar bearing.

Decca Hi-fix system. Hi-fix is a highly mobile light-weight electronic positioning system which provides positional control regardless of visibility. Operations may be carried out in either a two-range or a hyperbolic mode depending on survey requirements. The two-range version was selected for the survey because it is more economical and easier to operate. The power was supplied by a 24-volt battery system. The master station transmitted from the ship on a frequency within the 1,700 to 2,000 kHz range.

The receiver was installed aboard the 'Coral Queen' displaying an instantaneous digital output of the range lane count. Movement of the ship towards or away from the slave stations was indicated by a change in phase of the received signal.

Determination of Decca lane width is made by:

$$L = v/2f \text{ metres}$$

where L = lane width on the baseline of a hyperbolic pattern or lane width in a two-range system.

v = propagation velocity in kilometres/sec.
(normally 299,776 km/sec)

f = transmission frequency in kHz.

The selected frequency on this survey resulted in a lane width of 77.2839 metres of 253.553 feet.

Calibration of Decca Hi-fix. Because Hi-fix is a single-frequency measuring system, it was necessary to determine the range lanes from the shore slave stations to the ship. The computed distance was converted to range lanes and the value set manually on the receiver. Accuracy to ± 36 metres was necessary, so calibration was normally made from a position adjacent to a previously determined and marked shore station.

Reference readings were recorded at various locations for re-calibration as required.

Range of Decca Hi-fix. During the survey, the equipment was used for ranges of up to approximately 160 km.

Problems experienced with Hi-fix. Generally speaking, the Decca equipment operated well within the standard required for this survey. The system proved to be extremely stable during daylight hours although loss of signal strength was experienced during night time. The possible causes of this were:

1. Electrical interference from the ship's d.c. power generators.
2. Changes of topography along the transmission path due to the movement of the ship.
3. Local electrical and thunderstorm activity.

A warning light on the receiver indicated loss in signal reception. Re-calibration of Decca course readings was made each day the system was used.

3.3.2. Shot positioning

Determination of the ship station at shot instant. During the survey, co-ordinate values for the following ship stations were provided using the Decca Hi-fix navigation system:

Shot-points	5, 5A, 9, 10, 11, 12A,
	13, 15, 16, 17, 18, 19,
	20, 23, 24, 25, 26, 27.

The ship stations at all other shot-points were fixed using radar bearings and distances and magnetic compass bearings on the coastline and adjacent islands. These fixes were plotted on the best available charts or maps.

Co-ordinates of the shot-points. The actual shot or firing positions were determined relative to the ship using:

1. Radar bearings and distances.
2. Magnetic compass bearings.
3. The elapsed time from explosion to the arrival recorded from the hydrophone nearest the shot to determine the distance between firing point to ship's position.

The distance was computed using this time interval and the velocity of the shot sound wave through the water. The geographical position of the shot point was then computed from the position of the ship.

Shipboard calculations and plotting. Ship positions determined from Decca co-ordinates were computed geodetically using formulae for computations on the Australian National Datum. The shot-points and recording station sites were plotted on suitable control sheets, and distances were determined by scale. These provisional results were progressively handed to the Party Geophysicist.

3.3.3 Seismic sparker profiling

Sparker traverses were conducted during the shooting program and continued for approximately two weeks after shooting was complete. Twenty-seven traverse lines were surveyed and plotted on the 1:250,000 maps of the area. A schedule was also given of the time and geographical position of each traverse fix.

3.3.4 Precision of shipboard navigation

Decca Hi-fix. It is considered that the Decca Hi-fix system gave results better than 10 metres.

Navigation using ship's radar. The accuracy of this navigation depended on the scale and accuracy of the available charts. Distance from ship to shore also affected the precision of the results. Accuracy should be within ± 300 metres on all shot-points on the survey, with the exception of shot-points 6 and 7, which may have an accuracy of ± 800 metres. Survey positions of the ship in Rabaul Harbour were considered accurate to ± 60 metres.

Overall precision. The overall precision was also determined by the accuracy of the connexion between the ship and the shot-point.

3.4 CONCLUSIONS

Provision of co-ordinates for recording station sites. The accurate determination of geographical co-ordinates of recording stations was not necessary until final computations were carried out on the CDC 3600 computer at the Commonwealth Scientific & Industrial Organization. Scaled distances were used for preliminary computations. Survey of these sites would be preferable after the site was occupied.

Problems in shipboard navigation. The following requirements not available on this survey would be desirable standard equipment on all vessels under charter or contract for similar geophysical survey work in future:

1. Gyro compass.
2. Automatic pilot.
3. Radar with 80 km capability coupled with a radar range expander.
4. Gyro repeat on the flying bridge, fitted with a direct reading azimuth ring with 360-degree visibility.
5. Air-conditioning in the chart room for comfort during plotting.

4. GEOLOGY

New Britain and New Ireland have a history of volcanism and tectonism dating back to Lower Tertiary times. Their geology resembles that of the Solomon and New Hebrides Islands and to some extent that of the Huon Peninsula in mainland New Guinea.

New Britain has many characteristics of an island arc. It has an elongated arcuate shape, an oceanic trench parallel to the south coast (Planet Deep), a zone of earthquake foci dipping steeply northwards under the island to a depth of over 500 kilometres (Denham, 1969; Johnson, 1970) and a belt of active volcanism along the north coast. New Ireland does not have a closely associated trench and has no active volcanoes. The chain of volcanic islands parallel to the northeast coast are probably of Quaternary age.

In many respects the geology of the two islands is similar (Plate 4). However, New Ireland and the Gazelle Peninsula seem to have been modified by Quaternary crustal movements associated with the north-west Solomon Islands trend and now constitute a separate tectonic province from the rest of New Britain.

4.1 NEW BRITAIN

4.1.1 Geological history

The geological evolution of New Britain appears to have started in the Eocene with an episode of island arc volcanism. This resulted in the accumulation of a thick pile of volcanic rocks and derived sediments which now underlie much of the island. These rocks, for which Macnab (1970) has proposed the name Baining Volcanics, are exposed in parts of the Gazelle Peninsula and in eastern and central New Britain. Rock types are principally basic to intermediate lava and pyroclastics, volcanic conglomerate, greywacke, siltstone and shale, the proportions of which vary considerably. Eocene foraminifera have been identified from rare limestone lenses and from limestone clasts in conglomerates. The thickness of the sequence cannot be measured, but is undoubtedly greater than 2000 m. The provenance is entirely volcanic and the environment of deposition partly terrestrial, partly marine. Pillow lavas, however, are rare.

Following their deposition in the Eocene, the Baining Volcanics were subject to folding, faulting, uplift, and erosion; younger rocks, the oldest of which are Upper Oligocene, rest with marked unconformity on an irregular erosion surface. Unlike the younger volcanics, the Baining Volcanics are very indurated and extensively jointed. There are signs of incipient metamorphism in many outcrops, and in the central Baining Mountains of the Gazelle Peninsula there is a narrow zone of actinolite and biotite schist. Owing to the scarcity of bedding exposures little is known of the style of deformation but, where seen, dips are generally moderate to steep (in some instances overturned). Faulting and shearing are common in many outcrops.

Intrusive rocks of basic to intermediate composition are widely distributed in the Baining Volcanics. The larger plutons, up to 15 kilometres across, tend to occur along the axis of the island. They are composed of diorite, gabbro, tonalite, granodiorite, adamellite, and monzonite. Some of the hypabyssal intrusions may have been emplaced before or during deformation of the Baining Volcanics as they show signs of alteration. Most of the larger bodies are relatively fresh and are probably post-orogenic but older than overlying Middle Miocene limestones. Dykes, sills, and minor intrusions of equivalent but finer grained lithologies are widespread.

A further period of volcanism in the Upper Oligocene and Lower Miocene is represented by interbedded pyroclastics, tuff, volcanic conglomerate, lava, calcareous sediments, and impure limestone which occur in the Open Bay area and in West New Britain southwest of the Willaumez Peninsula. These rocks are similar to the Baining Volcanics but they are less indurated, less jointed, and are tilted only gently to moderately. They unconformably overlie the Baining Volcanics and are overlain by Middle Miocene limestone. The marine sediments have yielded foraminifera of Upper Oligocene and Lower Miocene ages (e stage).

In Middle Miocene times New Britain underwent a period of slow subsidence during which considerable thicknesses of reef limestone were deposited over much of the island. Large areas of cream to white, compact limestone are preserved as cappings in the Whiteman Ranges of West New Britain, in the Nakanai Mountains north and west of Jacquinot Bay, and in the northwestern Gazelle Peninsula. The thickness, which varies considerably, is commonly greater than 300 m but in places it exceeds 1500 m. Extensive sampling for microfauna has shown the bulk of the limestone to be Middle Miocene (f₁₋₂ stage). Locally the base and top of the limestone extend into the Lower and Upper Miocene respectively.

Following Middle Miocene limestone deposition, volcanic activity recommenced in the Upper Miocene. In the Gazelle Peninsula, andesitic and basaltic lava, agglomerate, and tuff with horizons of tuffaceous marine sediments containing Upper Miocene to Pliocene microfauna crop out over a large area east of the southern portion of the Baining Fault (see Plate 4). These rocks are semi-consolidated, poorly jointed, and widely disturbed by faulting. West of the Baining Fault, rocks of equivalent age, comprising a sequence of up to 500 m of poorly consolidated terrestrial and marine tuffaceous sediments of intermediate volcanic derivation, dip gently southwestwards from a height of 1700 m on Mount Sinewit in the central Baining Mountains. In the Mevlo River headwaters, a basal ash-flow tuff member rests unconformably on Baining Volcanics. In the Wide Bay/Open Bay isthmus the sequence overlies 'e stage' volcanics and is overlain by Pliocene limestone.

In Central New Britain, to the south of Kimbe Bay, occur unconsolidated intermediate to acid tuffs and tuffaceous sediments, which are tentatively correlated with the Upper Tertiary Gazelle Peninsula volcanics. Here the sequence is at least 300 m thick and overlies Baining Volcanics or, in places, Middle Miocene limestone. Since deposition these rocks have been uplifted to a maximum of 600 m above sea level.

Volcanics of Upper Tertiary age (not shown in Plate 4) may overlie the 'e stage' volcanics on the north coast, west of the Willaumez Peninsula. In the same vicinity volcanic plugs of probable Upper Tertiary age (Plate 16) form the prominent twin peaks of Mount Penk.

4.1.2 Post-Tertiary tectonics

Much of the present mountainous topography of New Britain is the result of block faulting and regional uplift, which seems to have started in the late Pliocene or early Pleistocene and is probably continuing today. Evidence of uplift is to be seen in the presence of Upper Tertiary marine sediments now exposed at considerable altitudes in central New Britain and the Gazelle Peninsula. Southeast of Open Bay, soft calcareous sediments of Pliocene or younger age lie on the down-thrown, northern side of a major fault which bounds the uplifted mountains to the south. The lack of coarse detritus in these sediments shows that the vertical uplift of the southern mountain block has occurred since their deposition.

Thick wedges of fanglomerate and alluvium deposited on the downthrown, northeast side of the Wide Bay Fault (see map) were derived from the rising mountain block to the southwest. Continued movement on the fault has tilted these to a maximum angle of 60 degrees northeast in close proximity to the fault and to progressively smaller angles away from the fault. Similarly tilted conglomerates lie to the northeast of the Baining Fault in the central Gazelle Peninsula. Here the conglomerates grade into finer, terrestrial sediments away from the fault with pumiceous and tuffaceous detritus from the Rabaul volcanoes appearing towards the top of the sequence.

Regional uplift of the south coast of New Britain and the east coast of the Gazelle Peninsula has in many places produced series of raised coral reefs. Up to six terrace levels can be recognized in places. The uplift has not been uniform along the length of the coast as terrace altitudes vary laterally. In Jacquinot Bay reef terraces can be recognized up to a height of 500 m. In many places recently formed reefs have been elevated a few metres above sea level, clearly indicating that uplift is still occurring.

Unlike the south coast, the north coast does not display evidence of Quaternary uplift and may in fact have been sinking. Coral reefs are now forming over large areas off the north coast, and it is likely that considerable quantities of volcanic detritus are also being deposited in the same region.

4.1.3 Post-Tertiary volcanism

At about the same time as the renewal of tectonism in the late Pliocene or early Pleistocene, volcanism once again broke out in New Britain. Quaternary volcanic rocks are found in three areas: at Rabaul, in the east; along the north coast and on Willaumez Peninsula; and at the western end of the island, south of Cape Gloucester. For the most part these rocks are the products of central-type stratovolcanoes, many of which are still active (Fisher, 1957). Rock compositions range

from tholeiitic basalt to rhyolite, and the most abundant lava type appears to be of intermediate composition (53-63 weight percent SiO_2). These intermediate rocks show similar petrographic and chemical characteristics to 'andesites' (sensu lato) described from several island-arc areas in the Western Pacific region.

At Rabaul a caldera, open to the sea on its southeastern side, exposes lava flows and air-fall and ash-flow pyroclastic materials (Heming, in prep.). These deposits were erupted from several centres, many of which are preserved as remnant cones on the caldera rim. Post-caldera volcanoes are also present; two of these - Tavurvur and Vulcan - erupted in 1937 causing the temporary evacuation of Rabaul township (Fisher, 1939).

Most of the Quaternary volcanoes in New Britain are found in an east-west arc along the north coast and on Willaumez Peninsula. The peninsula is an north-south chain of volcanoes which probably delineates a major fracture at right-angles to the long axis of New Britain. The volcanoes range from small cones, only a few tens of metres in height, to towering peaks over 2000 m above sea level. Calderas are present on at least four volcanoes. Ulawun, Lolobau, and Pago volcanoes have all erupted this century, Ulawun producing lava flows and nuees ardentes when it last erupted in January 1970 (Davies, 1970).

Most of the Quaternary volcanic rocks at the western end of New Britain are the products of the stratavolcanoes Tangi and Talawe, both of which rise over 1500 m above sea level. There are smaller eruptive centres on the saddle between these two cones, and the crater cluster of Langila has erupted explosively several times this century (for a description of activity between 1952 and 1956, see Taylor, Best & Reynolds, 1957).

East of Tangi and Talawe volcanoes lie two extensive volcanic centres, Schrader in the west and Andewa in the east. Dissection is much more advanced on both these volcanic complexes than on any of the other Quaternary volcanoes in New Britain, suggesting an early Pleistocene age. It is doubtful if either centre has been active in Recent times, and both may have commenced activity at the end of the Pliocene. However, for convenience, Schrader and Andewa are grouped with the rest of the Quaternary volcanoes on the accompanying geological map.

4.2 NEW IRELAND

4.2.1 General geology

Like New Britain, New Ireland is underlain by a thick sequence of agglomerate, tuff, and volcanoclastic sediments (Jaulu Volcanics, French 1966). However, the microfauna from this volcanic 'basement' indicates Lower to Upper Oligocene ages of deposition. Eocene faunas, such as are found in the volcanic 'basement' underlying New Britain, have not been recognized. The sequence, which is at least 2000 m thick, is the product of a major episode of island-arc type volcanism. The volcanic detritus is largely of andesitic composition.

Along much of the length of New Ireland the Oligocene volcanic 'basement' is intruded by numerous stocks and dykes of gabbro, norite, diorite, and tonalite, together with hypabyssal equivalents. These intrusives are older than overlying Miocene limestones and are probably related to the Oligocene volcanism (Hohnen, 1970). Only the larger bodies are shown on the accompanying geological map (Plate 4).

In the Lower Miocene, New Ireland underwent orogenesis during which the Oligocene volcanics were intensively faulted and tilted (up to 70°). Orogenesis ceased in the late Lower Miocene and was replaced by a long continued but intermittent period of subsidence.

In the northern half of the island and in central-southern New Ireland, biostromal limestone began to accumulate in the late Lower Miocene. Limestone deposition continued into the Pliocene; in some areas into the Pleistocene. These limestones now form plateau-like cappings up to 1400 m thick over large areas of New Ireland.

In central New Ireland the Oligocene 'basement' is unconformably overlain by Upper Miocene to Pliocene water-laid tuff, volcanic arenite, and lutite up to 500 m thick. The volcanic components are of andesitic to dacitic composition (Hohnen, 1970). Limestones are absent in this area.

4.2.2 Post-Tertiary tectonics

In the late Pleistocene the whole of New Ireland was rapidly uplifted; the greatest rate of emergence took place at the southern extremity and along the western coast, resulting in tilting to the northeast. The extensive plateau limestones now dip at about $5-10^{\circ}$ to the northeast. Horizontal, Quaternary foraminiferal chalks and raised coral platforms occur in a narrow strip along the length of the northeast coast and in parts of the southwest coast.

Southern New Ireland is flanked by poorly consolidated, Quaternary fanglomerates and raised beach gravels derived from the actively rising volcanic landmass.

Southern New Ireland is cut by a major, northwest-trending fault (Weitin Fault) which lies in a linear depression containing the Weitin and Kamdaru Rivers. French (1966) gives evidence for anti-clockwise strike-slip movement of several kilometres since the beginning of the Quaternary. This fault undoubtedly continues to the northwest, parallel to the southwest coast of northern and central New Ireland, and is probably responsible for the remarkable linearity of New Ireland today. The northeast coast also appears to be fault bounded, at least in part, but the escarpments have largely been concealed by Quaternary deposits (Hohnen, 1970). Numerous smaller faults have disrupted the surface of the plateau limestones.

5. SEISMIC REFRACTION

5.1 GENERAL COMMENTS

The field refraction program was a major undertaking involving 24 recording stations and 54 shots over distances ranging out to 400 km. The project aimed to gather travel-time data, but not amplitude data.

Viewed in terms of percentage data recovery the program was successful.

<u>Stage</u>	<u>Stations</u>	<u>Shots</u>	<u>First arrivals</u>		
			<u>Possible</u>	<u>Actual</u>	<u>%</u>
1	24	16	384	295	77
2	22	15	330	274	83
3	21	16	336	299	89
4	21	7	147	135	92
<u>Total</u>		54	1197	1003	84

5.2 EQUIPMENT

Appendix 3 lists the equipment used by each recording party. Response calibrations of most of the systems are either poorly known or not known at all. Five parties operated large geophone spreads and the remaining stations used single- or three-component geophone systems. Recording speeds ranged from 3 to 600 mm per second and consequently the appearance of records varied greatly as did the precision of reading. Photographic sheet or roll paper and a variety of strip chart recorders were used, employing both ink and electrostatic writing methods. Photographic processing was undertaken at each field station, under a variety of field and laboratory conditions.

Plates 9 to 14 have been reproduced to illustrate the range of recording facilities employed. All records made for shots 1, 22, and 40 and which could be reproduced, are presented in these plates, chiefly to illustrate reading criteria and recording quality.

5.3 TIMING

Shooting and recording were monitored on absolute time using a time signal transmitted at 1-second intervals from the Rabaul Observatory on 6815 and 3164 kHz and fed directly to recorders at most stations.

Shot firing sequences were broadcast from 'Coral Queen' on 4525 kHz but were not usually recorded. These broadcasts were clearly received only at close distances and under good radio conditions. Moreover several recorder film magazines held insufficient film to start recording early enough to record shot sequences at times 40-50 seconds before the first-arrival time.

Shots were fired at 09, 19, 29, 39, or 49 minutes plus 50 seconds so that a 1-minute time signal would be available 10 seconds after firing time, and would be free of any superimposed shot sequence broadcasts on the same recording channel.

5.4 DATA PROCESSING

5.4.1 Shot data

Table 1 comprises a self explanatory listing of shot parameters. A card deck of these data is available. Water depths were computed from direct and reflected arrivals at the nearest hydrophone to the shot, assuming a velocity of 1.52 km/sec.

In Plate 8, H is the hydrophone and S the shot.

t_1 is the direct arrival SH

t_2 is the reflected arrival SRH

V is the velocity of sound in water

A is the geometrically constructed image point of the hydrophone.

The major assumption is that the sea floor is plane and horizontal. In this case the water depth $HB = AS \sin \theta/2 \sin \delta$ where θ and δ are expressed in terms of the shot depth SS', V, t_1 and t_2 . Travel times t_1 and t_2 were not recorded for the shot 'Test A', and the water depth listed² was scaled from Admiralty charts.

Greatest errors in water depth determinations occur for shots where bottom topography dips steeply. Separate water corrections in these cases should, strictly speaking, be computed for different shot azimuths. As the total water depth corrections to travel times are less than one second for most shots, variations with azimuth due to varying bottom topography will be very much less than this. Shot-points, located in Plates 1 and 2 and identified with traverses shown in Plates 1 and 3, can be plotted on corresponding sections shown in Plates 15 to 48 to indicate the bottom topography beneath most shots. Sparkarray sections are not available for some shots, notably shots 1 to 4 and 9 to 19.

5.4.2 Refraction arrivals

Initial readings. First interpretations of field recordings were made by operators in the field. Arrivals were generally read to 0.1 sec and transmitted to the project control centre. These data comprised first arrivals supplemented by any multiple arrivals listed at the discretion of the observer.

Revised readings. Records were completely reinterpreted after the conclusion of field work. Arrival times were listed to .01 seconds for convenience, checked against the first interpretations, and the following accuracy indicators assigned:

- | | | | | |
|---|---|---------------------|-------|---------------|
| 1 | = | Arrival time within | $\pm$ | .05 sec |
| 2 | = | " | " | $\pm$ 0.1 sec |

- 3 = Arrival time within ± 0.5 sec
4 = " " not known to better than ± 0.5 sec.

In addition, subjective quality assessments 'good', 'fair' or 'poor' were assigned.

Listing of data. Refraction arrivals and associated data were coded on punched cards in the manner described in Appendix 5. Table 2 is a self explanatory listing of all travel times from these cards. Normalized travel times adjusted to a surface source with the water layer substituted by a 4.0 km/sec pseudo-layer are given in the right hand margin. This velocity was chosen after a study of provisional structure from the 1967 refraction data.

The program used, RCSPDATA, is itself listed in Appendix 5. Plate 52 contains a flow chart to help interpret the program.

Plotting of data. Appendix 5 contains a listing of the plotting program GRAPLOTT to allow time:distance plots of data selected either by specifying individual shots and stations or those within a given range of azimuths from a given station or shot as origin. Plate 53 contains a flow chart for this program. Travel times were initially plotted in complete stages from a common origin. Points which appeared inconsistent with the general trend were rechecked on the original records.

Examples of travel time plots are given by Plates 5, 6, and 7 showing a common origin plot for stage 3 and arrivals into party 6 (stage 3) and away from shot 35 (stage 3). First arrivals are plotted with 'error' bars corresponding to the tabulated precision of the reading.

6. SPARKER AND GENERAL BATHYMETRY

6.1 GENERAL COMMENTS

Operation of the seismic reflection (sparkarray) equipment is outlined in Appendix 1, where reference is made to Plates 54 and 55. Traverses in the survey are shown in Plates 1 and 3.

The area between New Britain and New Ireland including St George's Channel and the extreme eastern end of the Bismarck Sea was covered by a series of traverses at 5 to 10 km spacing. The precision of these traverses is variable and not well known. In section 3.3.4, precision of shot-point positions is given as generally ± 300 m. The Decca system used as control for these was not generally used for traverse plotting. Thus the accuracy of any given point on a traverse is considerably lower as, at best, it depended on radar which was effective only within 38 km of a coastline.

Elsewhere only isolated traverses were recorded, without an attempt at uniform coverage. Traverses 9 to 15 along the northern and western coasts are conveniently grouped for discussion, and Traverses 16, 17, and part of 4 along the southern and eastern coasts of New Britain comprise a third region.

Bathymetry is extremely variable throughout the region, and depths ranged to 300 m along these traverses. It was necessary to prepare composite plates at one-quarter scale from the original records so that bottom topography could be seen clearly. These are shown in Plates 15 to 48.

Only shallow bottom penetration to a hundred metres or so is shown on most profiles. This is partly due to the shallow depth of the source, which at 1 metre approximately (Plate 54) was probably too shallow for optimum penetration (Edelmann, 1968).

Insets are shown in several plates. These have been drawn, where evidence is reasonably clear on the original records, to clarify details of sub-bottom structure including, for example: sedimentary layering (Plate 46); sediment filled troughs and outlines of projecting hard rock structures (Plate 16); and boundaries of troughs (Plates 36, 38). Examples of migration of topographical boundaries due to non-vertical scanning are common and result for example in the overlapping boundaries at the junction of the bottom and steeply dipping side walls of a feature (see examples shown in the insets in Plates 38 and 42).

6.2 ST GEORGE'S CHANNEL/BISMARCK SEA REGION

A series of radiating traverses numbers 6, 8, 18, 20, 21, 22, 23, 24, 26, and 27 with additional tie traverses in the southwestern portion, numbers 2, 3, and 4 have provided a good reconnaissance of this region.

The major bathymetric feature in this area is a prominent arcuate trough reaching 2000 metres' depth. The outline of this feature is plotted in Plate 3. The trough has the following prominent characteristics:

- (a) A very narrow central portion occurs northeast of Ulu Island (Plate 36), distinguishing the northern and southern segments.
- (b) The western wall of the southern segment and the eastern wall of the northern segment are sharply discontinuous with the trough floor. This is clearly shown, for example in Plates 34, 35, 36, 38, 39, 42, and 45.
- (c) The topography of the trough floor is most disturbed where it is narrowest, as shown in Plate 37 (traverse 22), Plate 38 (traverse 23), and Plates 44 and 45 (traverse 26). This might indicate a post formative disturbance of the trough morphology in this area.
- (d) There is no clear expression of a continuation of the Weitin River fault (Plate 4) in the bottom topography shown in Plate 37 (traverse 22) or in the outline of the trough wall plotted in Plate 3. Evidence

of sinistral transcurrent movement is mentioned in section 4.2.2. This might be hard to distinguish in the few profiles available unless it reflected large-scale movement which postdated the formation of the trough.

- (e) The trough widens at its northern end. The southern wall decreases in height and several apparently block faulted steps can be seen in Plates 22, 32, and 46.

One minor feature of the region is a small northwest-trending trough off Tavui Point in Plates 16 and 18. The trough is filled to a depth of 400 metres.

The navigation on traverse 1 (Plate 15) seems to be in error. The location of the trough wall exhibited in this plate is not consistent with its location shown in Plate 39 (traverse 23).

6.3 NORTHERN AND WESTERN REGION

Relevant plates are 23 to 29 and call for brief comment only.

The relatively sharp bathymetric discontinuity intersected in two places on traverse 9 (Plate 2) apparently strikes NW-SE. There is no evidence here of a northwest continuation of the Open Bay/Wide Bay fault system shown in Plate 4. Plate 23 (traverse 12) shows the floor of the Bismarck Sea gradually rising from 2000 m to Vitu Island. The bathymetry off the north coast, east of Willaumez Peninsula, shows some small structural features at a fairly constant depth of about 1400 metres.

6.4 SOUTHERN AND EASTERN REGION

This is represented by three traverses: 16, 17 and the southern end of No. 4. These are shown in Plates 30, 31, and 19.

Plate 19 calls for most attention as the discontinuities that form the northern and southern walls of a depression may represent submarine extensions of fault systems between Wide Bay and Open Bay in Plate 4. Plate 30 shows some small troughs in three places. Plate 31 shows the deepest bathymetry recorded (to 2900 metres) on the slope of the western arm of the Planet Deep.

7. MAGNETIC

7.1 EQUIPMENT

Total magnetic field was measured with an Elsec proton precession magnetometer Type 592/N. The detecting element was a standard two-bottle fish towed on 160 m of cable at an estimated depth of about 2 m.

The magnetometer was set to automatically recycle at the longest period (about 1 minute), and its output was monitored on a Moseley No. 680 chart recorder operating at 20 cm/hr. The chart recorder was equipped with automatic reset and adjusted to about 300 gammas full scale.

No difficulty was encountered in tuning the magnetometer although a sudden loss of signal strength when the ship was turning or the water depth varied rapidly created spurious readings. Minor tuning adjustments to restore signal strength usually remedied this situation although on occasions faulty connexions were found to cause the erroneous values.

7.2 OBSERVATIONS AND PROCESSING

7.2.1 MV 'Lahara'

No usable magnetic records were obtained while the magnetometer was installed on board MV 'Lahara'.

7.2.2 MV 'Coral Queen'

The magnetometer and sparker equipment were run simultaneously wherever possible from Traverse 21 onwards.

Timing marks were placed manually on the magnetic chart at about 15-minute intervals or when reset occurred. As the output of the magnetometer is meter counts rather than gammas, a conversion graph was drawn using the standard formula. When a timing mark was placed on the chart the magnetometer was read, converted to gammas, and also written on the chart. This process required the constant attention of an operator, especially when the field was changing rapidly.

Magnetic field values between the timing marks were scaled directly off the chart and tabulated as a record of magnetic field versus time. These readings were later reproduced in profile form as the ship positions became available.

The average speed of the ship was about 11 km/hr; thus the magnetic field was sampled at about 200-m intervals. Where the field was smooth every second reading was scaled from the record. The error of scaling is within ± 5 gammas.

Magnetic field values were not corrected for diurnal variation and this produced considerable error. The average diurnal variation measured at Rabaul during May 1969 was about 70 gammas (D.M. Finlayson, pers. comm.).

The overall error of the magnetic work is estimated at about ± 40 gammas.

Table 4 contains a listing of magnetic anomaly values computed by subtracting the total regional field, interpolated from data given by Parkinson & Curedale (1962), from observed values.

Anomaly profiles are displayed on a common time scale with bottom topography in Plates 34 to 48.

Appendix 6 contains a listing of the magnetic data reduction program RABMAG.

8. GRAVITY

8.1 OBJECTIVES

A regional reconnaissance gravity survey by helicopter of New Britain and New Ireland was programmed as part of current work in New Guinea, in order to assess major geological features and boundaries and to investigate crustal structure and geoid behaviour.

In addition, interest in the Earth's crust and in the volcanoes around Rabaul prompted the making of a detailed survey as part of the geophysical investigation of the Rabaul area.

8.2 EQUIPMENT

LaCoste & Romberg gravity metre G132.
Mechanisms Ltd microbarometers Nos. 1173, 579, 294
Thermometers, centigrade, wet and dry bulb
Aerial photography, USAF, Adastral
Topographic mapping 1:250,000 (or 1 inch = 4 miles)
1: 50,000 where available.

8.3 PROGRAM

8.3.1 Regional survey

A pilot scheme of preplanned locations at approximately 11-km spacing was carried out, but as it was soon recognized that the topography, primary forest, and climate of the islands placed severe limits on this scheme, no further widespread station grid preplanning was undertaken. Hence the station density was decreased in unfavourable terrain or dense forest where landing sites could not be found. Where possible, in areas with interesting gravity features further work was carried out. Station locations are shown in Plate 49.

The cell technique of observation was employed; this provides a network of gravity and barometer readings for a least-squares adjustment (Vale, 1962; Hastie & Walker, 1962).

8.3.2 Detailed survey in Rabaul area

Station locations are shown in Plate 51. Commonwealth Department of Works benchmarks with reduced levels provided convenient, accurate and relocatable survey points in the Rabaul area. With road access to all points, the work was most efficient and all stations were read in four days. Additional stations with barometer heightings were occupied then by helicopter.

8.3.3 Field operations

The greater part of the gravity survey operated in conjunction with the New Britain Geological Party. Logistic co-operation and efficient helicopter utilization proved most satisfactory.

All gravity observations and intervals were determined using the manufacturer's calibration factors. The meter remained on heat throughout the survey and its drift (uncorrected for each tide) was less than 0.14 mgal over two hours. Base stations established in 1967 by J.S. Milsom gave adequate control to the Australian Isogal datum, May 1965.

Except at benchmarks, heights corrected for temperature and humidity were obtained with Mechanisms microbarometers. Base temperature and pressure records were maintained unless frequent reading of the field barometer at known levels, being sea level in most cases, rendered them unnecessary. Meteorological data recorded at Rabaul airfield were provided by the Bureau of Meteorology and used extensively in height calculation. Barometer drift was less than 3 metres for a two-hour period. Station altitudes were reduced to mean sea level datum with the aid of Admiralty tide tables. A correction to benchmark stations was applied because M.S.L. = 0.76 metres on Commonwealth Department of Works (CDW) datum.

The position of each gravity station was recorded by pin-prick on available aerial photography, viz:

- (i) New Britain and New Ireland: USAF MM series
- (ii) Gazelle Peninsula and Rabaul: Adastral.

This position was transferred to topographic mapping for the scaling of geographic co-ordinates.

<u>Location</u>	<u>Mapping</u>	<u>Estimated position error</u>
New Ireland	1:250,000, excellent	0.1 min
Rabaul	1:50,000, good	0.05 min
New Britain	1 inch = 4 miles, poor	0.5 min

8.4 PROCESSING

In the field, approximate preliminary Bouguer anomalies were calculated so that gravity features could be assessed.

All observations were recorded in format for immediate transfer to a computer input system. BMR operates on CSIRO's CDC 3600 computer, and card input is used for the gravity data reduction programs.

A tidal correction program operating on observed data was used for flights that involved a long drift interval, to produce a corrected input card deck. Existing programs were used for the computation of gravity meter drift, corrected barometer height reduction, station value difference, network least-squares adjustment, and production of a final sorted and permanent list of principal facts, and Bouguer anomalies for desired rock densities were tabulated.

All observed gravity values quoted are based on the Australian Isogal datum, May 1965. Computer results for Bouguer anomalies with density of 2.67 g cm⁻³ were used for all preliminary mapping.

8.5 PRELIMINARY BOUGUER ANOMALIES

Preliminary Bouguer anomaly contours are shown in Plates 50 and 51. In Plate 51 the figures at each point are the station number, station elevation above M.S.L., and Bouguer anomaly for 2.67 g cm^{-3} .

Results from previous surveys by USNCO and USAMSFE are included where they fall within 1:250,000 map areas.

8.5.1 Terrain corrections

For the detailed Rabaul segment, Hubbert terrain corrections have been applied to stations of extreme relief. On the regional series, some stations require the application of Hammer charts for an estimate of their associated terrain correction, because of rapidly changing topography and its effect over long distances. Calculation of these corrections has not been finalized.

8.5.2 Reliability of results

The errors involved with gravity and position measurements are much less than the associated errors in elevation. The standard deviations of height networks ranged from 2.1 metres in New Ireland to 4.0 metres in Central New Britain. Thus the simple Bouguer anomaly values are considered accurate to within 1 mgal.

8.5.3 Prominent features

Large positive anomalies are associated with regions of topographic relief throughout the Bismarck Archipelago, and except for some regions in New Britain the contour trend follows the land form.

The Kamdaru fault is well expressed in the gravity results, and a severe negative anomaly indicates a probable crustal depression in southern New Ireland.

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APPENDIX 1

SHIPBORNE EQUIPMENT

The following is a summary of the equipment installed on the MV 'Coral Queen' and MV 'Lahara' for the survey, with some notes on its operation and performance. The on-board arrangement for the MV 'Coral Queen' is shown in Plate 54.

Seismic profiling equipment

The continuous seismic profiling equipment comprised:

- (a) Three Edgerton, Germeshausen and Greer, Inc., (E.G. & G.) 'Spark-arrays' Model 267 assembled in a single nine-electrode array transducer.
- (b) An energy source for the transducer made up from an E.G. & G. Model 232 power supply, a Model 231 triggered capacitor bank, and a Model 233 capacitor bank in numbers sufficient to give the required power. Generally an output of 7000 joules was used although the power could be varied from 2000 to 14,000 joules. At an output of 7000 joules the firing rate was approximately every four seconds.
- (c) An E.G. & G. Model 243 facsimile recorder to display the continuous seismic profiles and control the profiling equipment.
- (d) A Subot Hydrostreamer cable Model 24257 and associated depth and control unit Model 25643 manufactured by the Geotech Division of Teledyne Industries, U.S.A. A Geotech cable reel and winch Model 26170 were used to handle the cable. The cable had a 183-metre tow leader and a 12-metre active section. The active section of 0.32 cm diameter oil-filled P.V.C. tube contained two sets of Geospace MP-7 crystal element hydrophones each spaced 0.46 metres apart and connected to two separate preamplifiers. One set contained 28 hydrophones connected in parallel-series; the other six hydrophones were connected in parallel in the centre of the active section. Depth of the active section was monitored and controlled from 0 to 10.7 metres with a pneumatic control system on board. The system had a frequency response of 35-2500 Hz and was designed for towing at speeds of 5.5 to 18.4 km/hr.

The nine-electrode 'Spark-array' was towed amidship on the port side (Plate 54). It trailed from a 1 metre long 5-cm hemp rope held by 5-cm reinforced water pipe 3.7 metres long pivoted at the hull, and a wire rope from a derrick slung over the side. Under tow the array was about 1.8 to 2.1 metres from the hull and about 1.0 to 1.3 metres below the water surface. Even in the largest seas encountered the array remained submerged and no adjustment had to be made to the setup. It was impracticable to tow the array deeper alongside or from the stern of the vessel. The electrodes were replaced after normal wear, and were occasionally reseated in order to maintain the discharge at all of the three electrodes being used. One nine-electrode array was carried as spare. The heavy duty neoprene covered electrical connecting cable trailed alongside.

E.G. & G. power supplies, capacitor banks, and triggered capacitor banks were mounted in racks 76 x 84 x 162 cm for transport and installation. Five racks were set up in a bank on deck against the hatch well on the port side (Plate 54) and chained and braced into position. Individual units were interconnected to give two 7000-joule sources i.e. one operating, one spare. Maximum power of 14,000 joules was used only over the Planet Deep, Traverse 17.

On deck the equipment was exposed to the humid salt laden atmosphere. In windy conditions and sudden tropic rain squalls the problem of keeping the equipment dry increased. Although under a canopy and covered whenever necessary by extra covers, moisture probably caused the major breakdowns encountered. In any future survey it is recommended that a special air-conditioned enclosure would be desirable for the equipment if the vessel does not have suitable space for its operation.

Major trouble occurred with the Model 232 power supply which supplied high voltage d.c. at 3500 to 4000 volts to the capacitor banks.

Communications equipment

A Collins high-frequency transceiver Model 185-4C including Type 180K-3 antenna matching network and Type 314S-4 remote control panel was installed in the operations room. It was used to transmit the standard shot firing sequence and for general communication between Control at the Rabaul Observatory and the recording parties. A spare transceiver was carried on board. The equipment (about 16 years old) had one major breakdown which delayed the shooting program one day. On this occasion, 2 April 1969, the spare unit did not work reliably. After repairing the transceiver it was too late to reach the next shot location of the program.

Throughout the program recording parties reported that the signal from the ship was poor. Probably this was due to interference from the ship's electrical system. This was in a poor condition and lacked suppression. Although the vessel had only just been recommissioned prior to the survey a complete rewiring apparently had not been carried out. Throughout the survey the ship's electrical system gave trouble and faulty circuits were replaced. It is recommended that if the contractor wishes to tender for survey of this nature in the future he should renew the electrical wiring and add suppressors to different units to bring the ship up to survey standard.

A frequency of 4525 kHz was used for general communications and 3164 and 6815 kHz for time signals from the observatory. The frequencies were recommended by the Posts and Telegraph Department, Papua New Guinea Administration. Field tests with these frequencies were carried out by BMR in November 1968. Generally the frequencies proved satisfactory during the hours of operation. In poor conditions signals were relayed but this did not affect the shooting program.

Probably the use of a vertical antenna rather than the horizontal one installed would have given a better performance. However, this would have necessitated extending the ship's mast.

Timing equipment (Plate 55)

The timing equipment was used to

- (a) Maintain the common time scale for operations.
- (b) Initiate the detonation of the explosive charge at a predetermined time.
- (c) Accurately time the instant of detonation.
- (d) Time direct and reflected (and refracted) seismic signals from the explosion recorded by the 12-channel marine cable.

An EMI digital crystal clock was used to keep accurate time. It operated from a 12-volt battery and performed reliably throughout the survey. It was compared daily with time signals transmitted from the observatory and its rate was maintained within 10 milliseconds per day. Comparisons were also made a short time before and after a shot. When poor conditions prevented either or both comparisons the rate was sufficiently small to permit interpolation between the daily comparisons.

Observatory time signals were received by an A.W.A. Ranger 9 Model B33 portable radio. After passing through a filter Type STA3 (designed by BMR) the time signals together with those from the EMI clock were displayed on the RS-4 oscillograph shot-firing equipment.

Explosive charges were manually detonated at the programmed time with an South Western Industrial Electronics S.I.E. Model SD-2000 high-voltage blaster.

After clearance was obtained from the Observatory a firing sequence was broadcast from the ship as a warning to recording parties one minute before an imminent shot. The sequence consisted of a 1000-Hz signal which modulated the transmitter from a tone generator programmed from the crystal clock. It consisted of:

- (a) Pulses at one-second intervals from one minute before detonation.
- (b) A continuous tone from ten seconds before detonation.
- (c) Interruption of the continuous tone at the instant of detonation, produced by a pulse from the high-voltage blaster quenching the tone generator.

It was expected that parties would be able to record the firing sequence and so be able to check the shot instant with the time recorded on board ship. Several parties successfully recorded some shot instants but only when conditions were good.

Seismic recording

A 12-channel Vector marine hydrophone cable 183 metres long fitted with MP-8E hydrophones 7.6 metres apart, manufactured by Geospace, was towed behind the ship to record the direct and reflected (and refracted) seismic signals from the explosion. The signals were amplified and displayed on an S.I.E., RS-4, 13-channel direct-writing oscillograph. Ten channels were used for seismic signals and the remaining channels to display the observatory time signal, the EMI clock signal, and the firing sequence signal. This arrangement allowed accurate comparisons to be made. However, interference from the transmitter marred the quality of the recorded observatory time signal except in good conditions.

Decca navigation system

Amalgamated Decca Surveys Pty Ltd supplied one AM Hi-fix chain comprising one Master and two Slave stations, to locate accurately the positions of 17 explosions at sea. The Master station, comprising a transmitter, receiver, antenna, and ancillary units, was installed and operated on board by an engineer.

The 10.7-metre high 6.4-cm diameter tubular alloy mast had to be erected on a special base at the prow of the vessel. Originally it was mounted on the upper work area used to deploy the marine cable and firing line. Tests with a meter indicated that the induced R.F. current in the firing line was about 0.10 ampere and it was considered that this constituted a hazard (S.A.A. Explosives Code CA23-1967). Six metres from the mast the induced current could not be detected with the meter. At the prow the distance between the mast and firing line was about 21 metres.

Several breakdowns of the Master transmitter which occurred were due to moisture. The transmitter had to be placed in an exposed position at the base of the mast, and although it was enclosed as far as practicable in waterproof covers, moisture penetrated into the unit. These breakdowns did not delay the shooting program. All the other units were mounted in the bridge.

Frequently the Hi-fix system required recalibration. This was due to two main causes, namely the influence of natural electric storms and interference arising from the ship's electrical system. The first cause is inherent in the Hi-fix system but the second cause, already referred to regarding communication equipment, proved more troublesome. About two days were lost in the shooting program because of the necessity to recalibrate the system.

Power supplies

The primary power source for the equipment installed on the MV 'Coral Queen' was a skid-mounted three-phase 415-V, 25-kVA Pumalux generator driven by a Paxman diesel on loan from the Papua New Guinea Administration Electricity Authority for the survey. It was mounted on the starboard deck against the hatch well braced in position and protected by a canopy. Twice, seismic profiling had to be stopped to carry out servicing to the generator brushes. The unit was replaced with a similar unit on 23 April 1969. The second generator failed on 13 May when the rectifier supplying the field current burnt out. After replacing the rectifiers the generator worked successfully until the end of the survey.

A 1.75-kVA Lister generator was mounted alongside the 25-kVA generator. Its main use was to charge the batteries for the Hi-fix equipment and other battery-operated equipment.

A Hewlett Packard power supply Model 6269 was used for the Collins transceiver.

Batteries used for the RS-4 oscillograph, EMI clock, and other equipment were trickle charged.

Magnetometer

The Elsec type TD magnetometer detector head trailed astern of the ship on the port side. The maximum separation of 160 m between ship and 'fish' was maintained in all traversing. Probably as a result of pulling in and paying out the 'fish' daily during the later traverses twisting of the cable became very severe. Fortunately the cable did not break internally during use but it is suggested that for future work the 'fish' should be redesigned to achieve a better hydrodynamic shape to eliminate cable twist.

Radar

The Kelvin & Hughes radar worked satisfactorily until Traverse 22, when the main display decreased in intensity and bearings were difficult to obtain. No replacement could be obtained immediately and it was necessary to finish the traversing with the radar in this condition.

APPENDIX 2

PREPARATION, HANDLING, AND DETONATION OF CHARGES

Explosives

The explosive used was TNT packed during manufacture in thin sheet metal cans 23 x 23 x 28 cm, each weighing nominally 23 kg. Each can had a small hole capable of receiving one I.C.I. seismic No. 8 detonator. Roughly half the number of cans contained a priming charge to assist detonation; the others were unprimed. The primed cans were colour-coded red, the unprimed cans blue. Colour-coding proved useful for the native crew manhandling the charges from the magazine when preparing a charge.

Storage

On board ship the explosives were stored in a wooden magazine approximately 6.0 x 3.6 x 2.4 metres specially built in the main forward hold for the survey. Detonators were stored in the Captain's cabin.

Launching

Prepared charges were dropped overboard at the stern of the ship using a specially constructed ramp and sliding platform. The ramp consisted of six steel rollers 10.2 cm in diameter set in a frame which projected about 1 metre over the stern of the vessel. The platform was 7-ply wood approximately 1.3 x 1.3 metres normally held by a chock on the ramp. To launch a prepared charge the chock was released and the platform and netted charge gently rolled forward. At the end of the ramp the platform tilted and the charge slid off into the sea. Later the platform was recovered with the aid of two permanently attached ropes. The vertical drop from the ramp to the sea was about 5 m.

Buoys

Charges were detonated at a depth of 90 metres. This was achieved by suspending the netted charge by a suspension rope from a buoy. Polystyrene blocks 56 x 61 x 81 cm formed the basic buoy. A block this size has a buoyancy of about 250 kg and is capable of supporting a 360-kg charge. To ensure buoyancy and provide sufficient freeboard for larger charges, buoys with two or three blocks were used.

A steel post passed through the centre of the polystyrene block(s). One end was fitted with a steel ring to attach the suspension rope. At the other end metal plates at right angles to each other were attached to the steel post to act as a radar reflector. A reinforced metal plate 56 x 61 cm was bolted to the steel post about midway between the ends. Cemented by Araldite LC135 to this plate or each other were the polystyrene block(s). Polypropylene rope with a breaking strain of about 680 kg was used to suspend the charge from the buoy.

Handling nets

Nylon nets of either 3.0 or 3.7 m diameter were used to contain the larger charges. Small charges detonated in Simpson Harbour were lashed together with polypropylene rope.

Firing line

Charges were detonated using a firing line between the ship and the suspended charge. The line was 7/0116 twin twisted polythene-insulated nylon-sheath D10 field telephone cable in nominal lengths of 900 metres. Although attempts were made to keep the firing line length to 900 metres, prevailing conditions often prevented this. Generally about 1800 metres of line were used for firing but the length in the seawater was kept whenever practicable to a minimum.

Preparation

A net was laid out on the launching platform and the number of cans of explosive required to make up the charge were stacked on it. These were lashed together firmly with polypropylene rope to obtain as close a rigid packing as possible. Whenever possible, cubic packing or as close to cubic packing as possible was adopted. This eliminated misfires. The net was wrapped tightly around the cans and firmly tied at the neck. One end of the polypropylene rope was tied firmly to the neck of the net and the other to the ring in the steel post through the polystyrene block(s).

Three detonators in parallel were inserted one each into the holes in three different primed cans in the packing and held inside by heavy plastic insulating tape. The short-circuited firing line was joined to the detonators and tied to the lashings. It was very important to ensure that the firing line was tied firmly to the packed charges but was free elsewhere.

Launching

About 10 to 15 minutes (depending on prevailing sea conditions) before the scheduled charge detonation the buoy was trailed at the ship's stern and a free running loop between buoy and charge was created. The launching platform was gently rolled to the edge of the ramp and the charge slid off the platform into the sea. Instantly the firing line was quickly pulled out from a free running layout as the charge sank quickly in the water. Simultaneously the suspension rope was being pulled out and after about 30 seconds the buoy freed. The buoy and suspended charge soon reached equilibrium and the ship steamed slow ahead with the firing line being payed out. After the initial rush it was possible to attach coloured polythene bags to buoy the firing line. This assisted observation of the position of the buoy and later the recovery of the firing line and buoy.

Detonation

The ship was positioned at a safe distance from the charge and just maintaining way a short time before the clearance to detonate the shot was notified by Control at the Rabaul Observatory. Once this was obtained the charge was detonated manually using an S.I.E. High Voltage Blaster at the scheduled time registered by the ship's digital clock which was synchronized with the Observatory's clock.

APPENDIX 3

SEISMIC REFRACTION EQUIPMENT

Party Locations Stages in brackets	Geophones with configurations shown opposite locations	Recorder	Paper Speed	Time Marks
2	Twelve 2 Hz geophones	S.I.E.	15.2 cm/sec	Rabaul Observatory time signals via radio and 1000-Hz filter Plus 10 millisecond internal time marks
Ulu (1)	Cross	25 channels		
Hoskins (2)	L shape			
Nonga (3 & 4)	Cross	S.I.E. Amplifiers		
1	Twelve 3.5 Hz geophones	S.I.E.	15.2 cm/sec	Rabaul Observatory time signals via radio time signals and 1000-Hz filter Plus 10 millisecond internal time marks
Feni Is (1)	Cross	25 channels		
Kardran (2)	L shape	S.I.E.		
Raluana (3 & 4)	Cross	Amplifiers		
4	Six 2 Hz geophones	S.I.E.	10.2 cm/sec	Rabaul Observatory time signals via radio and 1000-Hz filter Plus internal time marks
Doilene (1 & 2)		PRO-11-6		
Kabanga (3)		S.I.E.		
Ulu (4)		Amplifiers		
5	Six 2 Hz geophones	S.I.E.	10.2 cm/sec	Rabaul Observatory time signals via radio and 1000-Hz filter Plus internal time marks
Pondo (1 & 2)		PRO-11-6		
Vulcan (3 & 4)		S.I.E.		
		Amplifiers		
6	Twelve 4 Hz geophones Three 1 Hz geophones	University of Hawaii	15.2 cm/sec	Rabaul Observatory time signals via radio and 1000-Hz filter Plus internal time marks
Manga (1)				
Talasea (2)				
Ravalein (3)				
Kalenurata (4)	Double armed Cross			

Party Locations Stages in brackets	Geophones with configurations shown opposite locations	Recorder	Paper Speed	Time Marks
7 Ulamona (1 & 2) Kurabubail (3 & 4)	Four 4.5 Hz geophones L shaped	S.I.E. 12 channel	15.2 cm/sec	Rabaul Observatory time signals via radio and 1000-Hz filter Plus 10 millisecond internal time marks
3 Palmalmal (1 & 2) only)	Three Straight line	Japanese Visicorder	1 cm/sec	Rabaul Observatory time signals via radio and 1000-Hz filter
8 Party 18 during stage 1. Lamborn Is (1) Bialla (2) Burma Rd (3 & 4)	Two 1 Hz geophones 152 metres apart 152 metres apart	Brush 4 channel DTM TR-2 Amplifiers	5.1 cm/sec	Rabaul Observatory signals via radio and 1000-Hz filter
9 Kavieng	NOT RECORDING			
10 Natava (1 only) 2, 3 and 4 see party 13	Willmore Mark II Vertical	E.R. 230	3 mm/sec	N.C.D. 2 corrected to Rabaul Observatory before the shot
11 Rapopo (1, 2, 3 and 4)	Three Willmore Mark II one vertical two horizontal	Mid-Western Oscillograph, BMR Amplifiers	8.33 mm/sec	Rabaul Observatory via radio and 1000- Hz filter Plus 20 millisecond internal time marks
12 Powell Harbour (1 & 2 only)	Willmore Mark II Vertical	Willmore	3.05 mm/sec	B.M.I. crystal clock, corrected to Rabaul Observ- atory before the shot
13 Boany Is (1 only) number changed to 10 for 2, 3 & 4. Lindenhafen 2 Praed Pt (3 & 4)	Willmore Mark II Vertical	Willmore	3.4 mm/sec	Rabaul Observatory via radio and 1000-Hz filter

Party Locations Stages in brackets	Geophones with configurations shown opposite locations	Recorder	Paper Speed	Time Marks
14 Narum (1) Bulu Mari (2) Watem Is (3) Nordup (4)	Willmore Mark II Vertical	Willmore	3.4 mm/sec	Rabaul Observatory via radio and 1000-Hz filter

Party Locations Stages in brackets	Seismometer	Recorder	Paper Speed	Time Marks
15 Nissan Is Shots 1-5 Tol Karlai Shots 5-12A C.R.A. (2) Tavui (3 & 4)	Willmore Mark II Vertical	Brush	5.6 mm/sec	Rabaul Observatory via radio and 1000-Hz filter

16 Pakia (1 & 2) Vinakakar (3 & 4)	Willmore Mark II Vertical	Willmore	3.4 mm/sec	Rabaul Observatory via radio and 1000-Hz filter
---	------------------------------	----------	------------	---

17 Au'una (1 & 2) Mt Varzin (3 & 4)	Two Willmore Mark II one vertical one horizontal	Willmore	3.4 mm/sec	Rabaul Observatory via radio and 1000-Hz filter
---	---	----------	------------	---

18 Party 8 during stage 1 Kamdorū (1) Vitu Is (2) Malupau (3 & 4)	Willmore Mark II Vertical	Moseley	3.4 mm/sec	Rabaul Observatory via radio. No 1000-Hz filter
--	------------------------------	---------	------------	---

Parties 18-24	Benioff Vertical	Heli- corders, Geotech Amplifiers	3.0 mm/sec	Rabaul Observatory direct
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APPENDIX 4

List of scientific personnel engaged in New Britain Crustal Investigations
1969

<u>1. Operations Headquarters and Control</u>	<u>Organization</u>
W.A. Wiebenga (Party Leader)	BMR
G.A.M. Taylor	"
<u>2. Geological Field Party</u>	
R.J. Ryburn (Party Leader)	BMR
D.E. Mackenzie	"
R.W. Johnson	"
C.E. Maffi	"
J.G. Binnekamp	"
<u>3. Gravity Survey Operations</u>	
B.C. Barlow	BMR
R.J. Harrison	"
<u>4. M.V. Coral Queen</u>	
P.E. Mann	BMR
D.M. Morton	"
D. Tarlington	"
V. Ingham	Dept Interior
<u>5. M.V. Lahara</u>	
G.F. Hart	BMR
<u>6. Refraction Field Stations</u>	
A.S. Furumoto	H.I.G.
F. Campbell	"
E. Harvey	"
Murphy	"
J.F. Webb	Qld. Univ.
J. Curtiss	"
E. Laudon	A.N.U.
H.A. Doyle	"
E.J. Polak	BMR
J.A. Brooks	"
J.R. Wilkie	"
I.D. Ripper	"
E.P. Paull	"
J.B. Connelly	"
G. Cifali	"
R. Heming	"
M. Mancini	"
K. Jurello	"
R.J. Whiteley	"
M.S. Jones	"
M. Ciszek	"

APPENDIX 5

REFRACTION ARRIVAL LISTING PROGRAMS

'RCSPDATA' AND 'GRAPLOTT'

Program RCSPDATA was written to list the data shown in Table 2 from the following format which allowed a maximum of seven arrivals per station per shot per card:

A = alphabetic character
a = alphanumeric character
D = digit 0 - 9
. = decimal point

Card Columns	Information	Code
1-2	Station number	DD
3-4	Shot number	DD
5	Shot qualification A, B, or X	A
6-11	Shot distance in km	DDD.DD
12-16	Shot-to-station azimuth in degrees, clockwise from north	DDD.D
17-72	Up to 7 arrivals each occupying 9 columns, remainder blank filled Where a = component of motion, for example Z (vertical) H (horizontal) T (transverse) R (radial)	aDD.DDAD
	DD.DD = travel time in seconds A = arrival quality A, B or C D = accuracy code 1-4	
73-80	Station name. Up to eight characters, remainder blank filled	aaaaaaaa

Plate 52 comprises a flow chart which is self explanatory.

A program GRAPLOTT was written using RCSPDATA as a basis; this plots travel times as shown in the examples, viz. Plates 5, 6, 7. Plate 53 contains a flow chart for this program, a listing of which also follows these notes. The first part of Plate 53 is the same as Plate 52.

The data deck structures are as follows:

RCSPDATA

Up to 1296 cards with the format given in the first chapter of this appendix can be accommodated. The deck should be assembled in sets of cards, each set relating to arrivals from one station whose name need only be specified in the first card of the set. Then follows an EOF card and then two sets of cards containing, respectively, shot depths and water depths in format 16 F5.3.

The deck is terminated by an EOF card and an EOD card.

GRAPLOTT

Arrival data and water connexion data are used in compilation in the same manner as in program RCSPDATA.

GRAPLOTT requires the 30-inch Calcomp plotter.

Plot specification data:

One card containing the following data is placed immediately after the water correction data.

SA: This is a southerly azimuth 90° - 270° which specified a line of shots and stations to be plotted.

AR: (0-90) gives the range of azimuths (about SA) in which arrivals will be plotted.

ST: is the stage number, the arrivals of which are to be plotted.

PY: is a control number, If PY = Z a new graph page is taken for plotting all arrivals at any one station or shot. If PY = I all arrivals from every shot or station specified are plotted on the one graph page.

Note: if PY = I and AR = 90 the plotted points will not be labelled.

IAC: This determines if I or J values are to be fed in the data. If IAC = I then arrivals from stations at specified shots are to be plotted. If IAC = J arrivals from shots at specified stations are plotted.

Card Format: SA AR ST PY IAC
(F3.0, F2.0, F1.0, F1.0, A1)

J (or I) data deck

Depending if IAC = I (Shot) or J (station), a series of data cards each containing one shot or station number, at which arrivals are to be plotted, follows the plot specification data. When each J (or I) is read, arrivals from all I (or J) are checked and plotted if they fall within the azimuth limits.

If J (or I) is specified to be 99 then a new plot specification card follows immediately after the 99 card and new J (or I) data may follow.

An EOF card must follow these data even if no J (or I) are specified.

Card Format: (I 2)

(I, J) data deck

When the EOF card is read in the J (or I) data deck, further arrivals between specific shots and stations may be plotted on the same graph as the preceding J (or I) plot.

The shot and station required are specified on one card, with I first. The data card has the format (2I2).

If I is specified as 99 then a new graph page is taken and a new plot specification card is required. Then J (or I) data and/or the (I, J) data may be fed in as before. An EOF card must follow the (I,J) data deck even if no (I,J) are specified. An EOD card follows this last EOF card.

Notes:

For first arrivals - A quality arrivals are denoted by an X within a circle, B and C arrivals are plotted as X. Error bars are drawn through all first arrivals.

Any arrivals later than 60 seconds are not plotted.

The distance axis is self-adjusting between stages to allow for the greater distances in stage 1 and 2.

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928 IF(A(K*7).EQ.1MC)931,932
931 PRINT 118,A(K*14) $ GO TO 929
932 PRINT 123,A(K*14)
929 CONTINUE
END

```

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SURROUTINE TEST
COMMON LINES,NM,II,4,1,J,13,A,N,L
DIMENSION IO(54,24,22),A(22),M(80)
IF(II.GT.24) 1,2
1 KK=47/II + 40/II + 39/II + 18/II + 7/II + 28/II + 29/II $ GO TO 9
2 IF(II.GT.6)3,4
3 KK=7 - 12/II + 11/II $ GO TO 9
4 IF(II.EQ.6)5,6
5 KK=9 $ GO TO 9
6 IF(II.GT.2) 7,8
7 KK=9 - 9/II + 3/II $ GO TO 9
8 KK= 12 - II + 11/2
9 JK=0 $ IF(A(22).EQ.1MA) JK=1 $ IF(A(22).EQ.1MB) JK=2
GO TO (11,12,13,13,14,14,15,15,16,16,17) KK
11 II=II + 7 $ GO TO 18
12 II=II + 6 * JK $ GO TO 18
13 II=II + 5 * JK $ GO TO 18
14 II=II + 4 * JK $ GO TO 18
15 II=II + 3 * JK $ GO TO 18
16 II=II + 2 * JK $ GO TO 18
17 II=JK
18 CONTINUE
RETURN
END

```

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SURROUTINE COUNTLIN
COMMON LINES,NM,II,4,1,J,10,4,N,L
DIMENSION IO(54,24,22),A(22),M(80)
TYPE BYTES(76) IO,4
TYPE INTEGER A
A00 FORMAT(=1: STAGE SHOT PARTY LOCATION DELTA
1 AZIMUTH TRAVEL TIME COMP REMARKS=)
801 FORMAT(53X,2MK,27X,3MSEC)
013 FORMAT(1MB,5X,11,9X,12)
021 FORMAT(1W,18X)
022 FORMAT(1W,17X,A1)
023 FORMAT(7X,A1)
LINES=LINES+1
IF(LINES.GE.63)802,806
802 LINES=3
IF END PAGE PRINT HEADING, FIRST HALF OF DATA LINE
PRINT 800
PRINT 801
IF(L.EQ.1)805,807
807 PRINT 013,V,11
IF(A(22).EQ.1MX) 803,804
803 PRINT 021 $ GO TO 805
804 PRINT 022,A(22)
805 NM=1
806 RETURN
END

```



```

C
80 DO 323 N=1,7
  H=DATA (1,J,4)
  IF (H.LT..001)323,327
C
C CHECK TO SEE IF SHOT IS IN AZIMUTH RANGE
322 AZ=DATA(1,J,9)
  IF (AZ.LT.90)12,13
  12 AZ=AZ-360
  13 CONTINUE
  NA=SA-180
  IF (AZ.GT.(SA-AR).AND.AZ.LT.(SA+AR))324,329
324 Y=DATA(1,J,3)
  SHOTS TO NORTH OF STATION GIVE POSITIVE DISTANCE
  GO TO 327
325 IF (AZ.GT.(SA-AR).AND.AZ.LT.(SA+AR))328,323
326 Y=-DATA(1,J,3)
327 CONTINUE
  IF (H.GT.99)323,360
306 CONTINUE
  CALL PLOT (X,Y,3)
  Q1=0
  H1(1:9)=10(1:J,4) 0 9(1:19)=10(1:J,4*7) 0 9(1:10)=10(1:J,4*8)
  IF (H-1)323,329,330
C
320 CONTINUE
  CALL TEXT (14X,0,1)
  FOR ALL STNS-ALL SHOTS PLOT, PUT ARROW, ARRIVAL NOT LABELED
C
  IF (PY.EQ.1) 89,90
  89 IF (AR-90)99,323,90
  90 CONTINUE
  DECODE(1,139,H1(4:2)14(4:7))
  IF (4(4:7)-144)109,103,109
  103 CALL TEXT (140,0,1)
C
  109 DECODE(1,139,H1(4:2)14(4:14))
  CALL ERBAR
  ERBAR DRAWS ERROR BAR AND LABELS POINTS
C
  GO TO 323
330 CALL TEXT (14X,0,1)
C
323 CONTINUE
  TEX=-18
  IF (ATN-1) 301,349,349
  301 IF (PY-1) 342,342,306
  306 CALL PLOT (0.,TEX,3) 0 35 TO 308
  349 CONTINUE
  ATN=1
  READ 331,1,J
  IF (EOF,60)334,132
  332 IF (1-99)400,133,133
  333 CALL PLOT (0.,TEX,3) 0 35 TO 020
  334 CONTINUE
  END

SUBROUTINE AXIS
COMMON NAME,A,M,10,AR,OT,101,SA,AR,PY,IAC,11,1,J,H,Q,V,ATN
DIMENSION I2(54,24,22),A(22),H(100),NAME(94,24,8)
TYPE BYTE(1:6) I2,4
TYPE INTEGER A
C
  AXIS DRAWS AND LABELS AXIS
  CALL PLOT (2.,10.,2)
  IF (ST.GE.3) 29,26
  29 CALL PLOT (0.,-190.,1) SIC1=9 SIC10=190 000 TO 09
  26 CALL PLOT (0.,-400.,1) SIC1=40 SIC10=400
  87 DO 97 I=1,ICI
    ZK=181-I*180
    CALL PLOT (0.,ZK,3)
    CALL PLOT (0.5,24,4)
    ENCODE (4,98,BUF)24
  98 FORMAT (F4,0)
  97 CALL TEXT (9UF,4,2)
    CALL PLOT (0.,0.,3)
    DO 96 I=1,125
      ZM=2-I*98
      CALL PLOT (ZM,0.,4)
      CALL PLOT (ZM-1.,4)
      ENCODE (2,95,BUF)24
  99 FORMAT (F2,0)
    CALL TEXT (9UF,2,2)
  96 CALL PLOT (ZM,0.,3)
    CALL PLOT (3.,-60.,3)
    CALL PLOTSET (4)
    CALL TEXT (10H AZIMUTH = 10.0)
    ENCODE (3,16,BUF)34
  16 FORMAT (F3,0)
    CALL TEXT (9UF,3,2)
    CALL PLOTSET (1)
    CALL PLOT (2.,-60.,3)
    CALL PLOTSET (4)
    CALL TEXT (10H RANGE = 0.2)
    ENCODE (2,95,BUF)43
    CALL TEXT (9UF,2,2)
    CALL PLOTSET (1)
    IF (PY-1) 332,332,303
  303 CALL PLOT (4.,-60.,3)
    CALL PLOTSET (4)
    IF (IAC.EQ.1)333,333
  333 CALL TEXT (9H STATION ,9,2)
    ENCODE (2,88,BUF)13
  88 FORMAT (I2)
    CALL TEXT (9UF,2,2) 0 35 TO 88
  339 CALL TEXT (7H SHOT = 7,2)
  91 ENCODE (3,92,BUF)NAME(1,J,7),A(22)
  92 FORMAT (I2,A1)
    CALL TEXT (9UF,3,2)
  82 CALL PLOTSET (1)
  332 ASM=1
  RETURN
END

```

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SUBROUTINE ERBAR
COMMON NAME, A, 4, 10, 494, 07, 101, 54, 40, PV, IAC, 11, 1, J, R, X, Y, ATN
DIMENSION I(154, 24, 22), A(22), 4(100), NAME(94, 24, 2)
TYPE BYTE9(4) 12, 4
TYPE INTEGER 4
02 FORMAT (12, A1)
03 FORMAT (12)
04 ERBAR DATA ERBAR DATA AND LABELS POINTS
05 TO (373, 347, 348, 304, 300), A(K-14)*4
307 ICA=0.05 333 TO 391
380 ICA=0.10 333 TO 391
389 ICA=0.90 333 TO 391
390 ICA=1.00 333 TO 391
091 CALL PLOT (X+2CA, Y, 3)
CALL PLOT (X-2CA, Y, 4)

06
07 LABEL FIRST ARRIVALS
IF (X, LY, 3, 60) 14, 107
14 CALL PLOT (0., Y, 3) 0 03 TO 19
107 BAR=3.60-J/30.00
CALL PLOT (X-BAR, Y, 3)
15 IF (ATN-1) 19, 20, 20
20 ENCODE (5, 21, BUF) NAME(1, J, 2), A(22), J
21 FORMAT (12, A1, 12)
CALL TEXT (BUF, 5, 1) 0 03 TO 303
29 IF (IAC, EQ, 144) 17, 10
30 ENCODE (2, 99, BUF) J
CALL TEXT (BUF, 2, 1) 0 03 TO 323
27 ENCODE (3, 92, BUF) NAME(1, J, 2), A(22)
CALL TEXT (BUF, 3, 1) 0 03 TO 323
323 CONTINUE
RETURN
END

```

```

SUBROUTINE TEST
COMMON NAME, A, 4, 10, 494, 07, 101, 54, 40, PV, IAC, 11, 1, J, R, X, Y, ATN
DIMENSION I(154, 24, 22), A(22), 4(100), NAME(94, 24, 2)
TYPE BYTE9(4) 10, 4
TYPE INTEGER 4
06 TEST ADDS PSEUDO SHOT NUMBERS TO ALLOW FOR A AND 0 SHOTS
IF (11, 07, 24) 1, 2
1 KK=47/11 + 40/11 + 39/11 + 30/11 + 37/11 + 80/11 + 29/11 0 00 TO 0
2 IF (11, 07, 6) 3, 4
3 KK=7 + 12/11 + 11/11 0 00 TO 9
4 IF (11, EQ, 6) 5, 6
5 KK=0 0 00 TO 9
6 IF (11, 07, 2) 7, 8
7 KK=9 + 9/11 + 3/11 0 00 TO 9
8 KK=12 - 11 + 11/2
9 JK=0 0 IF (A(22), EQ, 144) JK=1 0 IF (A(22), EQ, 140) JK=0
00 TO (11, 12, 12, 13, 13, 14, 14, 15, 15, 16, 16, 17) KK
11 IF (11, 7) 0 00 TO 18
12 IF (11, 6) 0 JK 0 00 TO 10
13 IF (11, 9) 0 JK 0 00 TO 10
14 IF (11, 4) 0 JK 0 00 TO 10
15 IF (11, 3) 0 JK 0 00 TO 10
16 IF (11, 8) 0 JK 0 00 TO 10
17 IF (11, JK)
30 CONTINUE
RETURN
END

```

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APPENDIX 6

Magnetic Data Reduction Programme "RABMAG".

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PROGRAM RABMAG
DIMENSION FORS(50)
DIMENSION FS(50)
200 FORMAT(13F6.0)
201 FORMAT(4(F3.0,F9.0),13)
202 FORMAT(4F3.0,2F6.0)
203 FORMAT(20F4.0)
204 FORMAT(F4.0)
100 FORMAT(1X,13,F9.1,113,F9.1,F12.0,F3.0,F19.3,9F19.0)
101 FORMAT(1X0, LATITJDS=,9X, LONGITUDE=,7X, TIME (EST)=,8X, AKHS=,10X,
1=OBSERVED=,7X, REGIONAL=,9X, DIURNAL=,9X, STORM=,8X, RESIDUAL=)
102 FORMAT( DEG MIN =,9X, DEG MIN=,41X, FIELD=,10X, FIELD=,12X,
1=FIELD=,10X, FIELD=,9X, FIELD=)
103 FORMAT(6X, QAMHAS=,9X, QAMHAS=,11X, SAMHAS=,9X, QAMHAS=,9X,
1=QAMHAS=)
104 FORMAT(=)
109 FORMAT(60X, LINE =,F4.0)
C-----
10 PRINT 101 9PRINT 102 8 PRINT 103 8 PRINT 104
READ 204,ALINE
PRINT 109,ALINE
200 PRINT 104
READ 201,AA,A,8B,0,CC,C,DD,D,M
IF(EOF,60)96,90
90 IF(AA.EQ.0)10197
97 READ 202, TMS,TMS,TME,TME,RS,RS
READ 200,(FOBS(I),I=1,N)
READ 203,(FS(JS),JS=1,N)
ADEC=A/60.0
BDEC=B/60.0
CDEC=C/60.0
DDEC=D/60.0
E=AA+ADEC
F=BB+BDEC
G=CC+CDEC
H=DD+DDEC
TMSDEC=TMS/60.0 8 TMEDEC=TME/60.0
TS=TMS-TMSDEC 8 TE=TME-TMEDEC
C-----
DO 99 I=1,N
P=I-1 8 Q=N-1
ALAT=P*(G-E)/Q+E
ALONG=P*(H-F)/Q+F
IALAT=ALAT
IALONG=ALONG
AMINLAT=(ALAT-IALAT)/60.0
AMINLONG=(ALONG-IALONG)/60.0
FREGION=P*(RE-RS)/2+RS
TIME=P*(TE-TS)/Q+TS
IF(TIME.GT.7.0.AND.TIME.LT.17.0)1,9
8 FDIURNAL=0
GO TO 7
1 FDIURNAL=60.0+12.0*(ABS(TIME-12.0))
7 FSTORM=FS(I)
AKHS=P*(SORT((E-Q)*(E-Q)+(F-M)*(F-M))/11.9)/Q
FRES=FOBS(I)-FREGION-FDIURNAL-FSTORM
C-----
IF(I.EQ.1)3,4
3 PRINT 100,IALAT,AMINLAT,IALONG,AMINLONG,TMS,TMS,AKHS,FOBS(I),
FREGION,FDIURNAL,FSTORM,FRES
GO TO 99
4 TMS=TMS-0
PRINT 100,IALAT,AMINLAT,IALONG,AMINLONG,TMS,TMS,AKHS,FOBS(I),
FREGION,FDIURNAL,FSTORM,FRES
C-----
99 CONTINUE 4
GO TO 300
96 CONTINUE
0 END

```

TABLE 1

SHOT INFORMATION

(Time, location, size and water depths)

SHOT	DATE 1969	SHOT TIME A.E.D.T.	NEW ORLEANS S. LAT	CRUSTAL S. LAT	STUDY E. LONG	PROJECT INFORMATION	1969 MATCH TRAVEL TIMES DIRECT REFLECTED (SEC)	WATER DEPTH (feet, meters)	SHOT DEPTH	SHOT SIZE
TEST A	23 MARCH	10 09	30.382	4 03 00	152 26 00	*	0	505	107	114
TEST D	23 MARCH	14 20	30.452	4 02 00	152 31 00	0.555	2.644	2115	107	136
1	25 MARCH	09 09	30.233	4 19 19	154 04 05	0.333	2.396	1857	107	801
2	26 MARCH	09 09	30.231	3 50 53	153 50 39	0.855	1.746	1211	107	801
3	26 MARCH	15 09	30.275	4 10 32	153 32 12	0.831	3.311	2253	107	891
4	27 MARCH	09 39	30.275	4 03 56	153 04 53	0.995	2.340	1478	107	891
5	28 MARCH	13 09	30.344	4 27 18	152 35 26	0.502	2.491	1905	107	891
5A	29 MARCH	00 19	30.336	3 51 36	151 54 20	0.992	2.322	1816	107	434
6	07 APRIL	12 09	30.192	4 53 28	152 21 16	0.832	2.134	1547	107	813
7	07 APRIL	00 09	30.261	9 18 37	152 19 46	0.575	3.650	2749	107	813
8	31 MARCH	00 39	30.230	9 43 51	151 36 42	1.190	3.249	2351	107	841
9	04 APRIL	15 09	30.197	3 58 18	151 24 19	0.991	2.443	1751	107	813
10	05 APRIL	16 09	30.177	3 40 03	151 31 54	1.148	3.616	2557	107	813
11	05 APRIL	08 09	30.351	3 57 25	151 09 36	0.800	2.642	2107	107	813
12	03 APRIL	13 09	30.350	4 51 20	151 34 59	0.862	1.233	745	107	01
12A	06 APRIL	00 09	30.251	4 30 21	150 57 10	0.772	3.018	2271	107	813
13	11 APRIL	16 09	30.255	4 25 43	151 40 38	0.993	2.663	1937	107	813
14	12 APRIL	16 09	30.220	4 48 07	151 16 21	0.770	1.736	1237	107	813
15	13 APRIL	08 09	30.038	9 20 44	150 25 23	0.627	0.822	481	107	813
16	13 APRIL	16 09	30.410	4 59 33	150 13 29	0.900	1.528	977	76	891
17	14 APRIL	12 09	30.320	4 32 29	150 27 11	0.723	2.936	2193	107	891
18	14 APRIL	17 41	30.420	4 18 11	150 06 07	0.745	2.651	2169	107	734
19	14 APRIL	07 39	30.219	4 52 39	150 05 38	0.637	2.274	1713	107	501
20	15 APRIL	08 09	30.302	4 47 12	149 35 39	0.570	2.332	1535	107	501
21	15 APRIL	14 39	30.372	5 16 37	149 52 48	0.690	1.100	704	107	501
22	17 APRIL	09 39	30.165	6 13 46	149 27 35	0.663	1.325	849	107	591
23	18 APRIL	09 09	30.264	6 19 04	150 17 40	0.683	1.093	704	107	881
24	18 APRIL	15 09	30.255	6 26 29	150 30 00	0.787	4.257	1756	107	891
25	19 APRIL	37 50	30.293	6 14 20	150 50 47	0.660	3.658	2746	107	891
26	19 APRIL	13 29	30.346	6 22 38	151 32 45	0.798	9.295	7721	107	891
27	19 APRIL	16 39	30.229	6 02 20	151 32 36	0.859	6.110	4651	107	881
28	26 APRIL	12 00	30.352	3 50 18	151 53 04	0.408	2.729	2124	107	454
28A	26 APRIL	09 24	30.310	3 47 15	151 51 39	0.814	2.913	2170	107	545
29	26 APRIL	14 09	30.250	3 57 50	151 59 19	1.007	2.012	1372	107	343
30	26 APRIL	16 09	30.323	4 05 15	152 06 32	0.738	1.270	782	107	272
31	26 APRIL	17 04	30.241	4 08 28	152 08 27	0.460	0.553	297	107	136
32	29 APRIL	00 39	30.333	4 14 10	152 09 49	0.343	0.343	73	73	45
33	29 APRIL	09 39	30.243	4 15 15	152 10 51	0.385	0.450	236	107	45
34	29 APRIL	10 49	30.257	4 16 56	152 11 25	0.571	0.623	257	107	81
35	29 APRIL	11 39	30.351	4 17 18	152 12 43	0.382	0.599	408	107	81
36	29 APRIL	12 49	30.247	4 18 30	152 14 47	0.317	0.344	168	107	81
37	28 APRIL	16 39	30.259	4 20 19	152 17 24	0.302	0.332	91	81	136
38	28 APRIL	08 39	30.222	4 29 35	152 24 13	0.410	1.696	1300	107	132
38A	28 APRIL	11 39	30.286	4 36 15	152 29 36	0.921	2.873	2127	107	272
39	27 APRIL	14 09	30.333	4 43 09	152 32 10	0.254	4.135	3197	107	343
40	27 APRIL	11 39	30.321	4 46 52	152 19 07	0.695	2.850	2154	107	454
40A	27 APRIL	09 14	30.253	4 52 25	152 46 01	0.677	1.630	1181	107	545
41	30 APRIL	13 39	30.153	4 19 56	152 38 31	0.376	1.676	1311	107	227
42	30 APRIL	16 09	30.543	4 14 49	152 20 41	0.463	0.590	324	107	132
43	01 MAY	00 39	30.246	4 15 16	152 19 49	0.485	0.620	351	107	135
44	01 MAY	10 19	30.251	4 15 43	152 12 15	0.315	0.375	206	81	48
45	01 MAY	16 14	30.258	4 15 25	152 00 41	0.629	0.719	323	107	257
46	02 MAY	15 39	30.302	4 17 10	151 53 18	0.621	3.568	246	107	316
47	02 MAY	00 39	30.474	4 14 33	151 27 15	0.717	1.427	992	107	749

SURVEY STAGE

SHOTS DETONATED

1	A	to	12A
2	13	to	27
3	28	to	40A
4	41	to	47

TABLE 2

REFRACTION ARRIVALS

A list of refraction travel times for each of the four stages. Entries within each stage are in the sequence of shot number, and entries for each shot are in the sequence of party numbers

AMMENDMENTS TO TABLE 3

NEW BRITAIN-NEW IRELAND CRUSTAL SURVEY 1969

REVISED DISTANCES AND AZIMUTHS FROM STAGE 1 AND 2

SHOTS TO STATIONS PALMALMAL AND CRA

Because of an error in positioning recording stations Palmalmal and CRA, the distances and azimuths to these stations were revised on 17.3.72.

The corrected positions for these stations are,

Palmalmal lat. $5^{\circ} 37' 56''$ S
 long. $151^{\circ} 29' 30''$ E

CRA lat. $5^{\circ} 44' 10''$ S
 long. $150^{\circ} 04' 20''$ E

The corrected distances (km) and azimuths from the shots (degrees E of N) to the stations are listed below.

Shot	Palmalmal		CRA	
	distance	azimuth	distance	azimuth
A	200.62	211		
B	210.21	213		
1	320.36	243		
2	318.37	235		
3	278.20	235		
4	247.20	225		
5	178.31	223		
5A	201.28	193		
6	125.95	229		
7	99.43	249		
8	17.19	309		
9	183.88	177		
10	217.31	181		
11	190.45	167		
12	86.48	187		
12A	138.15	154		
13	137.85	173	204.68	223
14	94.98	165	168.45	232
15	122.58	105	58.11	222
16	157.36	116	83.93	192
17	166.86	136	138.82	198
18	212.97	133	158.51	181
19	176.00	118	94.98	181
20	230.20	114	117.61	153
21	182.87	102	55.06	157
22	234.48	74	87.04	51
23	152.70	60	68.87	339
24	141.63	51	91.24	329
25	98.01	47	102.17	303
26	83.07	7	162.78	296
27	45.33	353	166.31	281

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
1	TEST A	2	ULU	14.25	189.2	3.86 5.44 6.34 7.38 8.52 9.71 13.04	Z Z Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 GOOD 1 GOOD 1 FAIR 2 FAIR 2	3.69 9.27 6.17 7.21 8.35 9.54 12.87
1	TEST A	4	DOILENE	98.80	262.5	16.16 16.32 18.14 19.26 20.95	Z Z Z Z Z	POOR 1 POOR 1 POOR 1 POOR 1 FAIR 1	19.99 16.18 17.97 19.09 20.78
1	TEST A	5	PONDO	104.28	239.9	17.81 18.49 19.27 19.60	Z Z Z Z	POOR 1 POOR 1 POOR 1 POOR 1	17.64 18.32 19.10 19.43
1	TEST A	6	HANMO	62.78	92.9	12.74	Z	GOOD 1	12.57
1	TEST A	11	RAPOPO	30.82	203.6	6.69	Z	GOOD 1	6.52
1	TEST A	13	BOANG	121.68	50.6	21.64 23.93	Z Z	FAIR 2 FAIR 2	21.47 23.76
1	TEST A	17	AU UNA	240.28	220.0	61.64	Z	GOOD 4	61.47
1	TEST A	18	LAMBON	92.82	149.5	17.82 18.09	Z Z	FAIR 2 FAIR 2	17.68 17.92
1	TEST A	19	RABAUL	32.38	248.1	6.97 8.14	M M	POOR 3 FAIR 3	6.80 7.97
1	TEST A	20	RAL	30.57	240.0	6.31 10.87	Z Z	GOOD 1 FAIR 3	6.14 10.70
1	TEST A	21	BUL	31.43	241.1	6.54 10.04 11.21 14.77	Z Z Z Z	POOR 2 FAIR 2 POOR 3 FAIR 2	6.37 9.87 11.04 14.60
1	TEST A	22	TAV	29.47	236.0	6.27 7.37 9.04	Z Z A	GOOD 1 GOOD 2 FAIR 3	6.10 7.80 8.87
1	TEST A	24	MAN	32.90	247.1	6.34 8.33 11.64	Z Z Z	GOOD 1 GOOD 2 GOOD 3	6.17 8.14 11.67
1	TEST B	4	DOILENE	108.78	280.2	20.12 21.94 23.29	Z Z Z	POOR 1 POOR 1 FAIR 1	19.37 21.19 22.54
1	TEST B	9	PONDO	115.05	239.8	20.86 23.18	Z Z	FAIR 1 POOR 1	20.11 22.43
1	TEST B	6	HANMO	94.07	98.5	11.00 13.38	Z Z	GOOD 1 FAIR 1	10.25 12.63
1	TEST B	11	RAPOPO	40.07	212.6	9.18 12.80	Z Z	FAIR 1 GOOD 1	8.43 12.08
1	TEST B	13	BOANG	111.03	49.7	20.12	Z	POOR 3	19.37
1	TEST B	14	NARUH	81.89	132.8	15.81 18.84	Z Z	FAIR 2 POOR 2	15.06 18.09
1	TEST B	19	RABAUL	43.06	249.9	9.85 12.09	M M	FAIR 3 FAIR 3	9.10 11.34
1	TEST B	20	RAL	41.34	239.7	9.59 11.79	Z Z	GOOD 2 FAIR 3	8.84 11.04
1	TEST B	21	BUL	42.21	240.6	9.85 11.45 12.12 13.25	Z Z Z Z	POOR 3 POOR 3 POOR 3 POOR 3	9.10 10.70 11.97 12.50
1	TEST B	22	TAV	40.24	236.8	9.22 10.19	Z Z	FAIR 2 FAIR 2	8.47 9.44
1	TEST B	24	MAN	42.61	249.1	9.45 11.19 12.29	Z Z Z	GOOD 2 FAIR 3 FAIR 3	8.70 10.44 11.50
1	1	1	FENI IS	97.52	302.7	11.14 12.18	Z Z	GOOD 1 GOOD 1	10.48 11.69
1	1	3	RALMALHL	319.85	242.7	49.10	Z	POOR 3	48.41
1	1	4	DOILENE	279.74	272.7	42.92 43.92 45.00	Z Z Z	POOR 2 POOR 2 POOR 1	41.83 43.23 44.31
1	1	5	PONDO	272.87	264.5	44.75	Z	POOR 3	44.08
1	1	6	HANMO	121.14	281.4	20.54 23.01 25.30 27.82 30.89	Z Z Z Z Z	GOOD 1 FAIR 2 FAIR 2 FAIR 2 FAIR 2	19.85 22.32 24.61 27.13 30.20
1	1	7	ULAMONA	319.48	256.5	47.62 49.17	Z Z	POOR 3 POOR 3	46.93 48.48
1	1	8	KAMDARU	153.38	274.5	25.98 27.98 32.80 38.78 44.97 47.05 48.95	Z Z Z Z Z Z Z	GOOD 3 FAIR 2 GOOD 3 FAIR 3 GOOD 3 GOOD 3 GOOD 3	25.89 27.89 32.11 38.09 44.28 46.36 48.26
1	1	10	NATAVA	230.54	273.4	36.77 38.73	Z Z	POOR 4 FAIR 3	36.08 38.04

LPIGGA

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
1	1	11	RAPOPO	193,80	269,4	31,40 32,30 33,37	Z Z Z	POOR 2 POOR 2 POOR 1	30,71 31,61 32,68
1	1	13	BOANO	135,80	319,8	24,09	Z	FAIR 3	23,40
1	1	14	NARUM	114,58	258,0	19,80	Z	FAIR 2	19,11
1	1	15	NISSAN	21,75	139,8	6,10 7,60	Z Z	GOOD 2 GOOD 2	5,41 6,91
1	1	17	AU UNA	370,93	244,7	55,21 64,65 68,01	Z Z Z	POOR 2 GOOD 2 GOOD 2	54,52 63,96 67,32
1	1	18	LAMBON	144,56	248,2	24,50 45,27	Z Z	GOOD 1 FAIR 1	23,81 44,58
1	1	20	RAL	208,23	273,0	33,47 41,67	Z Z	POOR 3 FAIR 3	32,78 40,98
1	1	21	SUL	209,28	273,0	32,10	Z	POOR 3	31,41
1	1	22	TAV	206,13	272,7	32,97 34,27	Z Z	FAIR 2 FAIR 3	32,28 33,58
1	1	23	VUL	214,22	271,0	34,10 35,44	Z Z	POOR 3 POOR 3	33,41 34,75
1	1	24	WAM	211,33	278,7	34,37	Z	POOR 2	33,68
1	2	1	FENI IS	24,36	254,3	5,48 5,76	Z Z	GOOD 1 FAIR 1	5,06 5,34
1	2	2	ULU	160,82	260,9	27,35 28,70 30,20 31,60 33,60 34,40 35,80	Z Z Z Z Z Z Z	POOR 2 FAIR 3 FAIR 3 POOR 3 POOR 3 FAIR 3 FAIR 3	26,93 28,28 29,78 31,18 33,18 33,98 35,38
1	2	5	PONDO	254,78	259,9	41,22 43,10 46,94	Z Z Z	POOR 2 POOR 2 POOR 1	40,80 42,68 46,52
1	2	6	HANGA	94,80	261,7	17,56 18,11 18,61 26,07	Z Z Z Z	POOR 2 POOR 2 POOR 2 POOR 2	17,14 17,69 18,19 25,65
1	2	7	ULAMONA	306,96	248,9	46,49	Z	POOR 3	46,07
1	2	10	NATAVA	206,52	263,4	33,41 34,87	Z Z	POOR 3 FAIR 2	32,99 34,45
1	2	11	RAPOPO	173,41	256,8	30,10 31,09 38,10	Z Z T	GOOD 2 GOOD 1 GOOD 2	29,68 30,67 37,68

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
1	2	12	POWELL M	259,28	249,0	40,97	Z	POOR 2	40,95
1	2	15	NISSAN	66,84	144,3	13,20 17,60	Z Z	FAIR 2 FAIR 2	12,78 17,18
1	2	17	AU UNA	367,14	237,8	54,10	Z	FAIR 3	53,68
1	2	18	LAMBON	142,39	230,1	17,44 24,07	Z Z	FAIR 1 FAIR 2	17,02 23,65
1	2	20	RAL	184,91	261,7	30,47 33,37 34,54	Z Z Z	FAIR 3 POOR 3 FAIR 3	30,05 32,95 34,12
1	2	21	SUL	185,94	261,8	31,17 34,47	Z Z	POOR 3 POOR 3	30,75 34,05
1	2	22	TAV	183,08	261,2	30,27 33,74	Z Z	FAIR 2 FAIR 2	29,85 33,32
1	2	23	VUL	192,19	259,9	32,77 33,90 36,47	Z Z Z	POOR 3 POOR 3 FAIR 3	32,35 33,48 36,05
1	3	1	FENI IS	18,25	35,4	6,33 6,62	Z Z	GOOD 1 FAIR 1	5,48 5,77
1	3	2	ULU	124,84	268,2	22,74 23,25 23,65 25,04 26,81 31,22 34,41	Z Z Z Z Z Z Z	GOOD 1 FAIR 2 FAIR 2 GOOD 2 GOOD 2 GOOD 2 POOR 2	21,89 22,40 22,80 24,19 25,96 30,37 33,56
1	3	3	PALMALML	277,97	234,1	49,40	Z	POOR 3	44,55
1	3	4	DOILENE	220,46	269,2	35,10 35,70 36,42 37,34 38,41	Z Z Z Z Z	POOR 2 POOR 4 POOR 2 POOR 2 POOR 2	34,25 34,85 35,57 36,49 37,56
1	3	5	PONDO	216,81	258,7	35,56 37,00 38,42	Z Z Z	POOR 2 POOR 3 POOR 1	34,71 36,15 37,57
1	3	6	HANGA	60,27	277,4	13,78 17,40	Z Z	GOOD 1 GOOD 1	12,93 16,55
1	3	7	ULAMONA	267,54	250,2	42,85 43,50 44,33 45,20	Z Z Z Z	POOR 2 FAIR 2 FAIR 2 FAIR 2	42,00 42,65 43,48 44,35
1	3	8	KANDARU	93,99	267,5	17,94 20,41 24,04 25,99	Z Z Z Z	GOOD 2 GOOD 2 GOOD 2 GOOD 2	17,09 19,56 23,19 25,14

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	3	8				28.19 31.99 35.81	Z Z Z	FAIR 1 FAIR 2 FAIR 3	27.30 31.14 34.96
1	3	10	NATAVA	171.15	269.3	29.92 31.30 32.88 33.97	Z Z Z Z	GOOD 1 FAIR 3 POOR 3 FAIR 2	28.67 30.45 32.03 33.12
1	3	11	RAPOD	136.02	262.3	24.63 25.48 26.29	Z Z Z	POOR 1 POOR 1 FAIR 1	23.76 24.63 25.44
1	3	12	POWELL M	215.96	251.1	35.90 36.90 39.70	Z Z Z	FAIR 2 FAIR 2 POOR 2	35.05 36.05 38.85
1	3	13	BOANO	92.11	341.9	17.00 19.70	Z Z	GOOD 1 FAIR 3	16.15 18.85
1	3	14	NARUM	66.44	238.1	14.44 15.93	Z Z	FAIR 2 FAIR 2	13.59 15.08
1	3	15	NISSAN	80.05	114.2	15.10 17.20	Z Z	GOOD 2 GOOD 2	14.29 16.35
1	3	16	PAKIA	269.70	242.1	44.54	Z	GOOD 2	43.69
1	3	17	AU UNA	326.91	237.8	40.41	Z	GOOD 2	47.56
1	3								
1	3								
/		18	LAMBON	102.66	227.2	19.96 20.16 24.08	Z Z Z	GOOD 1 FAIR 1 FAIR 2	19.11 19.31 23.23
1	3	20	RAL	149.04	268.0	26.70 28.90	Z Z	GOOD 1 POOR 2	25.85 28.09
1	3	22	TAY	147.05	267.5	26.40 28.00 29.30	Z Z Z	GOOD 1 FAIR 1 FAIR 2	25.55 27.15 28.48
1	3	23	VUL	155.68	265.5	28.03 29.60 31.00 32.37	Z Z Z Z	GOOD 1 FAIR 2 FAIR 2 POOR 3	27.18 28.75 30.12 31.52
1	3	24	WAN	151.90	260.1	27.03 28.70 30.57	Z Z Z	POOR 4 POOR 2 POOR 3	26.18 27.85 29.72
1	4	1	FENI IS	61.19	87.5	13.44 14.00	Z Z	GOOD 1 GOOD 1	12.94 13.50
1	4	2	ULU	75.95	257.8	14.40 15.60 16.70 18.82 21.17 22.12	Z Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 FAIR 1 FAIR 1 GOOD 1	13.90 15.30 16.20 18.32 20.67 21.62

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	4	2				23,50	Z	FAIR 2	23,00
1	4	3	PALMALHL	247,29	229,0	41,00	Z	POOR 3	40,90
1	4	4	DOILENE	170,96	269,0	28,48	Z	POOR 2	27,98
1	4	5	PONDO	170,99	251,5	28,31 30,53	Z Z	POOR 2 FAIR 1	27,81 30,03
1	4	6	HANGA	10,22	244,9	3,91 5,40 9,13	Z Z Z	GOOD 1 GOOD 1 FAIR 2	3,41 4,90 8,63
1	4	7	ULAMONA	225,93	242,9	36,92 39,38	Z Z	FAIR 2 FAIR 2	36,42 38,88
1	4	8	KANDARU	46,28	249,6	10,28 13,83 16,10 21,48 29,49 33,79 42,39	Z Z Z Z Z Z Z	GOOD 4 FAIR 4 POOR 4 FAIR 4 FAIR 4 GOOD 4 POOR 4	9,78 13,33 15,60 20,98 28,99 33,29 41,89
1	4	10	NATAVA	121,43	263,2	21,70 23,20 24,99 28,11	Z Z Z Z	GOOD 8 GOOD 3 FAIR 2 GOOD 2	21,20 22,70 24,49 27,61
1	4	11	RAPOPO	89,93	290,3	17,10 20,20	Z Z	GOOD 1 POOR 3	16,60 19,70
1	4	12	POWELL M	174,34	241,9	29,40 32,76	Z Z	GOOD 2 FAIR 2	28,90 32,26
1	4	13	BOANG	78,91	18,8	15,02 18,14 19,26	Z Z Z	GOOD 1 FAIR 2 GOOD 1	14,92 17,64 18,76
1	4	14	NARUH	92,13	182,8	10,99 12,99	Z Z	GOOD 2 POOR 3	10,49 12,49
1	4	15	NISSAN	131,49	118,0	24,20 25,70	Z Z	FAIR 2 GOOD 2	23,70 25,20
1	4	16	PAKIA	233,94	238,9	39,61	Z	POOR 2	39,11
1	4	17	AU UNA	292,99	238,9	43,70 55,39	Z Z	FAIR 2 POOR 2	43,20 54,89
1	4	18	LAMBON	85,99	196,8	16,93 17,13	Z Z	POOR 2 FAIR 1	16,03 16,63
1	4	19	RABAU	102,96	262,1	19,33 21,57 22,37	Z Z Z	POOR 2 POOR 2 POOR 2	18,83 21,07 21,87
1	4	20	RAL	99,92	260,0	18,43 20,47	Z Z	GOOD 1 FAIR 2	17,93 19,97

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	4	20				23,37	Z	POOR 2	22,87
1	4	21	SUL	100,94	260,2	19,40 20,33	Z Z	FAIR 1 POOR 1	18,90 19,83
1	4	22	TAV	98,13	259,1	18,40 19,20 22,47 31,47	Z Z Z Z	GOOD 1 FAIR 2 FAIR 3 FAIR 2	17,90 18,70 21,97 30,97
1	4	23	VUL	107,43	257,0	20,00 21,50 23,00 26,30 27,90 29,73	Z Z Z Z Z Z	GOOD 2 FAIR 2 FAIR 4 FAIR 0 GOOD 2 GOOD 2	19,50 21,00 22,50 25,80 27,00 29,23
1	4	24	WAN	102,36	261,9	18,87	Z	GOOD 1	18,37
1	5	2	ULU	33,47	323,9	8,43 9,43 10,69 12,43 14,93 17,19 19,20	Z Z Z Z Z Z Z	GOOD 1 GOOD 1 FAIR 1 GOOD 2 FAIR 3 GOOD 3 GOOD 4	7,73 8,73 9,99 11,73 14,23 16,49 18,90
1	5	3	PALMALHL	178,90	222,4	31,04 33,50 42,90	Z Z Z	FAIR 2 POOR 3 POOR 3	30,34 32,80 42,80
1	5	4	DOILENE	118,79	283,7	21,09	Z	FAIR 1	20,39
1	5	5	PONDO	108,23	264,0	20,43 20,98 23,68	Z Z Z	POOR 2 POOR 1 POOR 1	19,73 20,28 22,98
1	5	6	HANGA	59,94	49,8	12,74 14,83 17,49 20,44	Z Z Z H	GOOD 1 GOOD 1 FAIR 2 GOOD 1	12,04 14,13 16,79 19,74
1	5	7	ULAMONA	158,40	247,9	28,38 31,41	Z Z	POOR 2 POOR 2	27,60 30,71
1	5	10	NATAVA	72,10	293,6	14,74 19,36 29,66 27,11	Z Z Z Z	GOOD 2 FAIR 2 GOOD 2 FAIR 2	14,04 16,68 24,96 26,41
1	5	11	RAPOPO	32,44	293,0	8,37 9,66 10,30 12,39	Z Z Z Z	GOOD 1 GOOD 1 FAIR 2 GOOD 1	7,67 8,96 9,60 11,69
1	5	12	POWELL M	106,70	248,6	19,76 22,65 25,46	Z Z Z	FAIR 2 FAIR 2 FAIR 2	19,06 21,09 24,76

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
1	9	13	BOANG	140,97	32,9	23,34	Z	POOR 3	22,64
1	9	19	NISSAN	178,02	98,7	29,66 31,66 34,36	Z Z Z	POOR 2 GOOD 0 FAIR 8	28,96 30,96 33,66
1	9	16	PAKIA	164,50	232,9	27,87 30,22	Z Z	FAIR 3 FAIR 2	27,17 29,92
1	9	18	LAMBON	48,90	142,6	11,76 13,19 14,14	Z Z Z	GOOD 1 GOOD 1 FAIR 0	11,06 12,49 13,44
1	9	20	RAL	90,93	308,4	11,13 13,49 16,49 19,46 23,66	Z Z Z Z Z	POOR 8 FAIR 2 POOR 8 POOR 3 FAIR 8	10,43 12,79 15,79 18,76 22,96
1	9	21	SUL	51,88	299,9	14,03 15,36	Z Z	POOR 8 POOR 8	13,33 14,66
1	9	22	TAV	48,97	308,4	10,96 11,66 14,66 16,06 17,36 19,69	Z Z Z Z Z Z	GOOD 8 POOR 0 FAIR 8 GOOD 1 FAIR 2 POOR 8	10,26 10,96 13,96 15,36 16,66 18,99
1	9	23	VUL	53,60	290,6	11,99 12,23 16,73	Z Z Z	POOR 3 POOR 2 FAIR 3	11,29 11,93 16,03
1	9	24	WAN	94,93	301,9	12,66 13,93 15,96	Z Z Z	POOR 2 POOR 2 POOR 2	11,96 12,83 15,26
1	9A	2	ULU	68,37	120,6	12,86 16,99 18,84 21,70 25,80	Z Z Z Z Z	GOOD 1 GOOD 2 FAIR 1 POOR 3 POOR 3	12,19 15,98 18,17 21,03 25,13
1	9A	3	PALMALML	202,42	192,7	33,01 38,10	Z Z	GOOD 2 POOR 3	32,34 37,43
1	9A	4	DOILENE	94,41	226,3	10,45 10,90 13,39	Z Z Z	FAIR 1 GOOD 1 FAIR 2	9,78 9,83 12,68
1	9A	5	PONDO	83,23	202,3	14,71 15,10 17,12	Z Z Z	FAIR 1 GOOD 1 POOR 1	14,04 14,43 16,49
1	9A	6	MANGA	124,39	102,0	21,31 22,06 24,79 33,02	Z Z Z H	GOOD 1 FAIR 1 GOOD 2 FAIR 2	20,64 21,39 24,12 32,35

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
1	9A	7	ULAMONA	143,99	208,4	24,68 31,25	Z Z	GOOD 2 FAIR 2	24,01 30,98
1	9A	8	KANDARU	99,48	114,2	16,89 18,92 20,05 21,24 23,83 25,66 26,81	Z Z Z Z Z Z Z	GOOD 1 GOOD 1 FAIR 2 GOOD 1 FAIR 2 GOOD 2 FAIR 2	16,22 18,25 19,38 20,57 23,16 24,99 26,14
1	9A	10	NATAVA	38,27	164,9	8,92 10,47 13,64 14,97 20,14 26,23 32,98	Z Z Z Z Z Z Z	GOOD 2 GOOD 2 FAIR 2 GOOD 2 GOOD 3 GOOD 3 GOOD 3	7,85 9,80 12,97 14,30 19,47 25,56 32,31
1	9A	11	RAPOPO	70,30	138,9	13,65 16,00	Z Z	GOOD 1 FAIR 1	12,98 15,33
1	9A	12	POWELL H	107,31	192,6	20,01 22,66 24,33	Z Z Z	GOOD 2 FAIR 2 FAIR 2	19,34 21,99 23,66
1	9A	13	BOANG	161,40	71,0	26,21	Z	POOR 3	25,54
1	9A	14	NARUM	148,21	120,3	26,04	Z	POOR 2	25,37
1	9A	16	PAKIA	173,87	198,6	28,47	Z	FAIR 2	27,80
1	9A	19	RABAU	46,56	142,2	9,97 10,27 11,97 14,11 16,94	Z Z Z Z Z	FAIR 3 GOOD 1 FAIR 3 GOOD 3 GOOD 2	9,30 9,60 11,30 13,44 16,27
1	9A	20	RAL	51,31	141,2	10,61 11,97 17,94 18,44	Z Z Z Z	GOOD 1 POOR 8 POOR 2 POOR 8	9,94 11,30 17,27 17,77
1	9A	21	SUL	50,58	142,1	10,44 10,64 11,94 13,64	Z Z Z Z	POOR 3 GOOD 1 POOR 2 GOOD 1	9,77 9,97 11,27 12,97
1	9A	22	TAV	53,52	140,3	10,93 13,31 14,97	Z Z Z	GOOD 1 FAIR 2 FAIR 2	10,26 12,64 14,30
1	9A	23	VUL	53,57	151,1	11,11 15,77 17,77	Z Z Z	GOOD 1 FAIR 3 POOR 3	10,44 15,10 17,10
1	9A	24	WAN	47,22	141,8	9,94 11,27 15,64	Z Z Z	GOOD 1 GOOD 2 GOOD 2	9,27 10,60 14,97

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STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
	54	24				18.64 21.14	Z Z	GOOD 2 FAIR 3	17.97 20.47
1	6	2	ULU	75.53	4.9	14.15 15.26 16.00 17.52 18.48 20.40	Z Z Z Z Z Z	GOOD 1 GOOD 1 POOR 1 FAIR 2 GOOD 2 POOR 2	13.59 14.70 15.44 16.96 17.92 19.84
1	6	3	PALMALML	125.92	228.5	22.80 23.24 24.10	Z Z Z	GOOD 2 FAIR 2 FAIR 2	22.24 22.68 23.54
1	6	4	DOILENE	117.44	310.6	20.02 20.17 20.34 21.14 37.25	Z Z Z Z Z	FAIR 1 FAIR 1 FAIR 1 FAIR 1 FAIR 1	19.46 19.61 19.78 20.58 36.69
1	6	5	PUNDO	89.49	294.4	16.18 16.33	Z Z	FAIR 1 GOOD 1	15.62 15.77
1	6	6	HANGA	112.51	39.5	20.09 20.48 20.70 21.26 22.40 23.17 36.09	Z Z Z Z Z Z H	GOOD 1 FAIR 2 FAIR 2 FAIR 2 FAIR 2 FAIR 2 GOOD 2	19.53 19.92 20.14 20.70 21.84 24.61 36.13
1	6	7	ULAMONA	121.08	264.6	21.50 22.34 24.27	Z Z Z	GOOD 1 FAIR 1 FAIR 1	20.94 21.78 23.71
1	6	8	KAMDARU	83.90	26.4	16.48 21.49 22.54 23.44 25.47 28.47	Z Z Z Z Z Z	GOOD 1 FAIR 2 FAIR 2 FAIR 2 GOOD 2 GOOD 1	15.92 20.93 21.98 22.88 24.91 27.91
1	6	10	NATAVA	86.77	332.6	16.08 17.48 19.92	Z Z Z	FAIR 2 POOR 2 FAIR 2	15.52 16.92 19.36
1	6	11	RAPOPO	61.20	396.6	12.14 13.70 16.07 18.90	Z Z Z Z	GOOD 1 FAIR 2 POOR 2 FAIR 2	11.58 13.14 15.51 18.34
1	6	12	POWELL M	73.70	277.2	13.96 16.84	Z Z	GOOD 2 FAIR 2	13.40 16.28
1	6	13	BOANG	195.74	31.7	31.24 35.59 38.59	Z Z Z	GOOD 3 GOOD 1 GOOD 1	30.68 35.03 38.03
1	6	14	NARUH	87.36	63.4	17.18	Z	POOR 2	16.62

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
	6	14				17.85 19.36	Z Z	POOR 2 FAIR 2	17.29 18.80
1	6	15	KARLAI	46.69	249.1	9.90 11.80	Z Z	GOOD 2 GOOD 2	9.34 11.24
1	6	16	PAKIA	116.77	244.8	17.66 21.10 21.86	Z Z Z	POOR 3 GOOD 2 FAIR 2	17.10 20.54 21.10
1	6	18	LAMBON	56.64	80.5	11.69 12.22 13.75	Z Z Z	FAIR 2 GOOD 1 GOOD 1	11.13 11.66 13.19
1	6	19	RABAU	80.13	344.6	17.02 18.62 22.15	H H H	FAIR 2 POOR 3 FAIR 2	16.46 18.06 21.59
1	6	20	RAL	76.11	346.9	15.42 18.25	Z Z	FAIR 3 POOR 2	14.86 17.69
1	6	21	SUL	76.45	345.8	15.22 17.09	Z Z	FAIR 2 FAIR 2	14.66 16.53
1	6	22	TAV	74.49	347.9	14.42 16.49 17.99	Z Z Z	GOOD 2 FAIR 2 POOR 2	13.86 15.98 17.43
1	6	23	VUL	71.26	348.4	13.69	Z	GOOD 1	13.13
1	6	24	HAN	79.63	345.8	14.49 15.15 18.92	Z Z Z	POOR 3 FAIR 2 FAIR 2	13.93 14.59 18.36
1	7	1	FENI IS	201.45	45.7	33.05 34.39	Z Z	GOOD 2 GOOD 2	31.98 33.32
1	7	2	ULU	121.96	4.4	22.42 23.19 23.87 27.20 33.40 35.50 37.20	Z Z Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 FAIR 2 POOR 3 POOR 3 POOR 3	21.35 22.12 22.80 26.13 32.38 34.43 36.13
1	7	3	PALMALML	98.74	247.9	19.39 21.10	Z Z	GOOD 2 FAIR 3	18.32 20.03
1	7	4	DOILENE	150.12	324.9	25.84 26.43 26.69 29.16 32.36	Z Z Z Z Z	FAIR 1 FAIR 1 FAIR 1 FAIR 1 POOR 1	24.77 25.36 25.62 28.09 31.29
1	7	5	PONDO	114.62	316.7	21.00 31.21	Z Z	POOR 1 POOR 1	19.93 30.14
1	7	6	HANGA	152.52	29.1	27.28 27.64	Z Z	GOOD 1 GOOD 1	26.21 26.97

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
	7	6				30.84 31.09 43.96	Z Z M	FAIR 2 FAIR 8 FAIR 2	89.77 30.02 42.89
1	7	7	ULAMONA	122.85	286.5	22.43 24.82 25.96 32.99	Z Z Z M	GOOD 1 FAIR 1 FAIR 1 FAIR 1	21.36 23.75 24.89 31.92
1	7	8	KAMDARU	127.93	18.3	24.28 26.69 31.38 36.24	Z Z Z Z	GOOD 2 POOR 2 GOOD 8 FAIR 3	23.21 25.62 30.31 35.17
1	7	11	RAPOPO	107.45	359.6	20.60 22.20 23.45	Z Z Z	GOOD 1 POOR 2 FAIR 1	19.53 21.13 22.38
1	7	12	POWELL M	89.67	308.3	17.16 18.32 25.66	Z Z Z	FAIR 2 FAIR 2 GOOD 2	16.09 17.25 24.59
1	7	13	BOANG	237.66	26.4	40.28 46.74	Z Z	GOOD 3 GOOD 2	39.21 45.67
1	7	14	NARUM	117.70	43.4	22.74	Z	GOOD 2	21.67
1	7	15	KARLAI	50.50	306.0	11.60 14.10 18.00	Z Z Z	GOOD 2 GOOD 2 GOOD 2	10.53 13.03 16.93
1	7	17	AU UNA	150.83	251.3	25.59 29.35 46.05	Z Z Z	FAIR 2 POOR 2 POOR 2	24.92 28.28 44.98
1	7	18	LAMBON	80.88	46.5	17.25	Z	GOOD 1	16.18
1	7	19	RABAU	124.98	351.5	24.74	Z	POOR 3	23.67
1	7	20	RAL	121.30	352.9	22.60 23.41 25.24 28.31	Z Z Z Z	POOR 3 GOOD 1 POOR 2 POOR 2	21.53 22.34 24.17 27.24
1	7	21	SUL	121.53	352.4	23.24	Z	FAIR 2	22.17
1	7	22	TAV	119.86	358.8	22.41 26.11 29.01	Z Z Z	GOOD 1 POOR 2 POOR 2	21.34 25.04 27.94
1	7	23	VUL	115.43	349.4	21.64 22.74 27.41 31.11	Z Z Z Z	FAIR 1 POOR 1 FAIR 1 FAIR 2	20.57 21.67 26.34 30.04
1	7	24	WAN	124.55	351.8	23.27	Z	POOR 3	22.20
1	8	2	ULU	190.19	27.9	32.30 34.00	Z Z	POOR 2 GOOD 2	31.41 33.11

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
	8	2				36.30 38.20 39.10 41.80 43.90	Z Z Z Z Z	POOR 2 FAIR 3 FAIR 3 FAIR 3 POOR 3	35.41 37.31 38.21 40.91 43.01
1	8	3	PALMALML	15.24	308.2	6.05 8.80	Z Z	GOOD 1 FAIR 3	5.16 7.91
1	8	4	DOILENE	169.45	357.7	28.97 30.91 32.25	Z Z Z	POOR 1 POOR 1 POOR 1	27.68 30.02 31.36
1	8	6	HANGA	236.97	40.6	37.91 40.29 41.02 45.68 46.24 53.16	Z Z Z Z Z M	FAIR 1 GOOD 2 GOOD 2 FAIR 2 FAIR 2 GOOD 2	37.02 39.40 40.13 44.79 45.35 52.27
1	8	7	ULAMONA	90.84	334.9	18.07 18.68 21.49 23.72	Z Z Z Z	GOOD 1 FAIR 1 FAIR 1 FAIR 1	17.18 17.79 20.60 22.83
1	8	8	KAMDARU	206.27	35.5	35.82 36.59 38.27 39.86 40.79 44.13 45.54	Z Z Z Z Z Z Z	POOR 2 FAIR 2 GOOD 2 GOOD 2 FAIR 3 GOOD 1 GOOD 2	34.93 35.70 37.38 38.97 39.90 43.24 44.65
1	8	11	RAPOPO	172.95	27.1	30.27 31.21 32.86 36.17 47.30	Z Z Z Z T	POOR 1 GOOD 1 FAIR 1 FAIR 1 POOR 2	29.38 30.32 31.97 35.28 46.41
1	8	12	POWELL M	102.56	5.2	19.72 22.72 29.38	Z Z Z	GOOD 1 FAIR 2 FAIR 2	18.83 21.83 28.49
1	8	13	BOANG	318.72	35.6	43.46 55.32	Z Z	POOR 2 FAIR 2	42.57 54.43
1	8	14	NARUM	207.76	50.6	34.38	Z	POOR 2	33.49
1	8	15	KARLAI	85.49	27.0	17.22 19.52	Z Z	GOOD 2 GOOD 2	16.33 18.63
1	8	16	PAKIA	47.85	331.6	11.01	Z	FAIR 3	10.12
1	8	17	AU UNA	63.35	268.3	13.38 16.27 28.34	Z Z Z	GOOD 2 POOR 2 POOR 2	12.49 15.38 27.45
1	8	18	LAMBON	171.87	53.6	30.22 37.02	Z Z	POOR 2 FAIR 2	29.33 31.13

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM HSL SEC
1	8	19	RABAU	180,76	19,8	32,32 34,72 37,39 38,39	Z Z Z Z	POOR 3 POOR 3 POOR 3 POOR 3	31,43 33,83 36,90 37,90
1	8	20	RAL	178,99	21,2	31,72	Z	POOR 2	30,83
1	8	21	SUL	178,70	20,9	31,82 35,39 41,09	Z Z Z	FAIR 2 POOR 3 FAIR 2	30,93 34,90 40,20
1	8	22	TAV	178,62	22,0	32,12 35,05 39,95	Z Z Z	FAIR 1 FAIR 2 POOR 2	31,23 34,16 39,06
1	8	23	VUL	170,32	20,1	30,12 31,12 32,72	Z Z Z	FAIR 3 POOR 2 POOR 3	29,23 30,23 31,83
1	8	24	WAN	180,66	20,0	31,75 33,72 38,02	Z Z Z	FAIR 2 FAIR 3 FAIR 1	30,86 32,83 37,13
1	9	2	ULU	114,99	105,3	19,37 20,90 22,90 25,36 27,95 29,75 31,10	Z Z Z Z Z Z Z	POOR 2 GOOD 2 GOOD 2 FAIR 3 FAIR 3 POOR 2 POOR 2	18,73 19,86 21,86 24,72 27,31 29,11 30,46
1	9	3	PALMALHL	185,42	176,6	30,90	Z	POOR 3	29,86
1	9	4	DOILENE	29,97	147,3	6,99 6,83 11,06	Z Z Z	GOOD 1 GOOD 1 POOR 1	9,99 6,19 10,42
1	9	5	PONDO	68,91	199,7	59,69 57,63 59,08	Z Z Z	POOR 1 POOR 1 POOR 1	59,09 56,99 58,44
1	9	6	HANGA	177,92	94,8	28,15 29,62 32,47 42,04	Z Z Z Z	POOR 3 POOR 2 FAIR 2 FAIR 2	27,51 28,98 31,83 41,40
1	9	7	ULAMONA	114,01	187,7	19,11 21,30 24,19 33,68	Z Z Z Z	GOOD 1 FAIR 2 FAIR 2 FAIR 1	18,47 20,66 23,55 33,04
1	9	10	NATAVA	69,98	110,6	13,20 14,21 16,13 22,78	Z Z Z Z	FAIR 2 GOOD 2 FAIR 3 FAIR 3	12,96 13,97 15,49 22,14
1	9	11	RAPOPO	109,60	111,8	19,44	Z	GOOD 1	18,80
1	9	12	POWELL H	97,84	168,8	17,90	Z	GOOD 2	16,86

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM HSL SEC
	9	12				19,14	Z	GOOD 2	18,90
1	9	13	BOANG	218,09	72,7	33,17 37,16	Z Z	GOOD 2 POOR 3	32,53 36,92
1	9	15	KARLAI	133,44	152,9	23,70 24,65 29,00	Z Z Z	GOOD 2 GOOD 2 GOOD 2	23,06 24,01 28,36
1	9	17	AU UNA	200,48	191,6	35,30 40,98 44,06	Z Z Z	POOR 4 FAIR 4 POOR 2	34,66 39,94 43,42
1	9	18	LAMBON	185,80	119,8	24,63	Z	POOR 2	23,99
1	9	19	RABAU	87,99	106,2	16,13 18,60 22,80	Z Z Z	FAIR 2 POOR 2 POOR 2	15,49 17,96 22,16
1	9	20	RAL	91,94	107,9	16,67 17,27 18,30	Z Z Z	GOOD 2 POOR 2 POOR 2	16,03 16,63 17,66
1	9	21	SUL	90,92	107,7	16,67 18,90 20,10	Z Z Z	GOOD 1 POOR 3 POOR 1	16,03 17,86 19,46
1	9	22	TAV	94,29	107,8	17,10 18,67 19,83	Z Z Z	GOOD 1 FAIR 2 GOOD 3	16,46 18,03 19,19
1	9	23	VUL	88,45	113,0	16,43 19,07 22,90	Z Z Z	GOOD 1 FAIR 3 FAIR 3	15,79 18,43 21,86
1	10	2	ULU	114,81	121,6	21,41 24,55 26,90 28,30 32,10 37,60 44,70	Z Z Z Z Z Z Z	POOR 2 POOR 3 FAIR 2 FAIR 3 GOOD 3 FAIR 3 POOR 3	20,40 23,54 29,40 27,29 31,09 36,59 43,69
1	10	4	DOILENE	98,89	177,9	11,97 11,62 12,07 20,29	Z Z Z Z	FAIR 1 GOOD 1 FAIR 1 FAIR 1	10,96 10,61 11,06 19,28
1	10	5	PONDO	98,76	174,3	18,02 19,49 23,17	Z Z Z	POOR 1 POOR 1 POOR 1	17,01 18,48 22,16
1	10	7	ULAMONA	149,92	191,3	25,32 32,18	Z Z	FAIR 1 FAIR 2	24,31 31,17
1	10	8	KAMDARU	142,10	119,1	24,44 30,96 33,72 36,22	Z Z Z Z	POOR 2 POOR 3 GOOD 3 GOOD 2	23,43 29,99 32,71 35,21

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STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
1	10	8	NATAVA	77,74	138,5	37,80	Z	GOOD 3	36,79
	10	10				14,65	Z	GOOD 2	13,64
						17,11	Z	GOOD 2	16,10
						19,68	Z	GOOD 2	18,67
						25,63	Z	POOR 2	24,62
						27,81	Z	FAIR 8	26,80
1	10	11	RAPPO	114,95	130,2	20,80	Z	GOOD 2	19,79
1	10	12	POWELL M	127,33	171,8	20,82	Z	FAIR 2	19,01
						22,44	Z	GOOD 2	21,43
						30,71	Z	GOOD 2	29,70
1	10	13	BOANG	196,65	80,9	36,32	Z	POOR 2	35,31
1	10	19	RABAU	91,01	129,7	19,49	Z	POOR 3	18,48
						21,82	Z	POOR 2	20,81
						22,69	Z	FAIR 2	21,66
						26,52	Z	FAIR 2	25,51
						28,79	Z	FAIR 2	27,78
						31,32	Z	FAIR 0	30,31
1	10	20	RAL	95,82	129,8	18,49	Z	POOR 3	17,48
						21,82	Z	FAIR 3	20,81
						24,42	Z	POOR 0	23,41
						25,82	Z	FAIR 2	24,81
1	10	21	SUL	94,96	130,1	19,22	Z	POOR 2	18,21
						24,92	Z	FAIR 0	23,91
						27,92	Z	POOR 2	26,91
1	10	22	TAV	98,16	129,6	18,22	Z	POOR 0	17,21
						21,12	Z	FAIR 2	20,11
						26,62	Z	POOR 2	25,61
						28,15	Z	FAIR 2	27,14
1	10	23	VUL	95,88	135,4	17,15	Z	FAIR 2	16,14
						20,12	Z	FAIR 3	19,11
						21,89	Z	FAIR 2	20,88
1	10	24	WAN	91,73	129,6	16,25	Z	FAIR 3	15,24
						21,15	Z	GOOD 1	20,14
						23,22	Z	POOR 3	22,21
						25,82	Z	POOR 2	24,81
1	11	2	ULU	149,16	100,9	25,07	Z	POOR 2	24,32
						27,25	Z	FAIR 3	26,50
						31,77	Z	FAIR 3	31,02
						34,20	Z	GOOD 8	33,45
						38,15	Z	GOOD 3	37,40
						41,72	Z	FAIR 3	40,97
						51,12	Z	GOOD 3	50,37
1	11	4	DOILENE	97,49	117,9	10,78	Z	FAIR 1	10,03
						11,02	Z	FAIR 1	10,27
						11,92	Z	FAIR 1	11,17
1	11	5	PONDO	88,41	138,6	16,21	Z	POOR 2	15,46
STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
1	11	5				59,13	Z	POOR 1	58,38
						59,61	Z	POOR 1	58,86
						62,82	Z	FAIR 1	62,07
1	11	6	MANGA	212,18	94,9	35,83	Z	POOR 2	35,08
						46,96	Z	FAIR 2	46,21
						55,12	Z	FAIR 2	54,37
1	11	7	ULAMONA	116,22	170,4	19,47	Z	FAIR 1	18,72
						19,86	Z	POOR 2	19,11
						24,86	Z	GOOD 1	24,11
						26,85	Z	GOOD 1	26,10
1	11	8	KAMDARU	179,61	99,1	31,60	Z	FAIR 3	30,85
						35,65	Z	GOOD 2	34,90
						39,05	Z	GOOD 2	38,30
						40,63	Z	GOOD 2	39,88
1	11	10	NATAVA	103,93	104,7	18,15	Z	GOOD 2	17,40
						19,89	Z	GOOD 2	19,14
						20,65	Z	FAIR 2	19,90
						23,25	Z	POOR 3	22,90
						25,56	Z	GOOD 2	24,81
						35,57	Z	GOOD 2	34,82
1	11	11	RAPPO	142,82	107,8	24,25	Z	GOOD 2	23,90
1	11	12	POWELL M	115,35	144,6	18,96	Z	POOR 2	18,21
1	11	16	PAKIA	157,94	167,3	25,32	Z	FAIR 2	24,57
						26,96	Z	FAIR 3	26,21
						28,23	Z	POOR 3	27,48
						30,65	Z	POOR 3	29,90
1	11	18	LAMBON	217,23	119,7	34,54	Z	POOR 2	33,79
1	11	19	RABAU	121,97	102,4	21,35	Z	FAIR 2	20,60
						23,65	Z	POOR 2	22,90
						26,28	Z	POOR 0	25,53
1	11	20	RAL	129,78	103,5	21,30	Z	FAIR 2	20,55
						25,48	Z	POOR 0	24,73
						28,28	Z	POOR 2	27,53
1	11	21	SUL	124,74	103,6	21,65	Z	FAIR 1	20,90
						22,75	Z	POOR 2	22,00
						24,25	Z	POOR 2	23,50
						26,35	Z	FAIR 2	25,60
						28,32	Z	FAIR 1	27,57
1	11	22	TAV	126,04	103,8	21,85	Z	FAIR 2	21,10
						22,98	Z	POOR 2	22,23
						24,25	Z	POOR 2	23,50
						25,95	Z	FAIR 2	25,20
1	11	23	VUL	121,97	107,4	20,95	Z	POOR 3	20,20
						21,25	Z	FAIR 1	20,50
						22,68	Z	POOR 2	21,93
						25,28	Z	FAIR 3	24,53

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
1	12	1	FENI IS	244.58	68.9	37.20 38.60	Z Z	FAIR 2 FAIR 2	36.97 38.37
1	12	2	ULU	116.47	92.3	20.03 21.64 23.03 24.14 29.73 32.35	Z Z Z Z Z Z	POOR 2 POOR 1 FAIR 1 POOR 3 FAIR 1 GOOD 1	19.80 21.41 22.80 23.91 29.50 32.12
1	12	3	PALMALML	87.80	185.8	16.29	Z	FAIR 2	16.06
1	12	4	DOILENE	72.61	397.8	13.30 13.93	Z Z	POOR 2 POOR 2	13.07 13.30
1	12	5	PONDO	33.37	7.2	7.88	Z	POOR 1	7.65
1	12	6	MANGA	177.64	62.2	30.32	Z	POOR 1	30.09
1	12	7	ULAMONA	38.17	246.9	8.47 11.56 12.37 13.91 16.32	Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 GOOD 2 GOOD 2	8.24 11.33 12.14 13.68 16.09
1	12	11	RAPOPO	99.98	59.2	18.14	Z	GOOD 2	17.91
1	12	12	POWELL H	13.55	68.8	4.48	Z	GOOD 2	4.25
1	12	15	KARLAI	46.71	116.2	11.00 14.30	Z Z	GOOD 2 GOOD 2	10.77 14.07
1	12	16	PAKIA	58.12	199.9	11.65 13.85 22.52 23.71	Z Z Z Z	GOOD 2 FAIR 2 FAIR 2 FAIR 2	11.42 13.62 22.29 23.48
1	12A	1	FENI IS	301.83	80.3	38.08	Z	POOR 4	37.22
1	12A	3	PALMALML	140.05	194.2	23.45 30.00	Z Z	POOR 3 POOR 3	22.59 29.14
1	12A	4	DOILENE	74.54	63.0	13.27 13.33 13.47 46.64	Z Z Z Z	FAIR 1 FAIR 1 FAIR 1 POOR 1	12.41 12.47 12.61 45.78
1	12A	5	PONDO	74.31	94.8	13.71 13.78 16.25 16.93 22.06 49.97 50.15	Z Z Z Z Z Z Z	POOR 1 FAIR 1 FAIR 1 POOR 1 FAIR 1 GOOD 1 GOOD 1	12.85 12.92 15.39 16.07 21.22 49.11 49.29
1	12A	6	MANGA	231.35	79.8	33.62 34.69 35.90 39.01	Z Z Z Z	GOOD 2 GOOD 2 FAIR 2 FAIR 2	32.76 33.83 35.04 38.15

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
1	12A	7	ULAMONA	64.23	147.1	12.57 13.57 14.46 16.95	Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 GOOD 1	11.71 12.71 13.60 16.09
1	12A	11	RAPOPO	153.12	83.1	25.85 29.59	Z Z	GOOD 1 GOOD 1	24.99 28.73
1	12A	12	POWELL H	88.87	112.1	19.88 16.55 19.07	Z Z Z	GOOD 2 FAIR 2 GOOD 2	15.02 19.69 18.21
1	12A	13	BOANG	286.58	66.4	47.32	Z	POOR 3	46.46
1	12A	14	NARUM	233.66	90.9	39.65 45.75 48.33	Z Z Z	POOR 3 POOR 2 FAIR 2	38.79 44.89 47.47
1	12A	15	KARLAI	126.58	118.0	21.15 23.45	Z Z	GOOD 2 GOOD 2	20.29 22.59
1	12A	17	AU UNA	137.62	176.0	23.47 33.55 41.05	Z Z Z	POOR 2 FAIR 2 POOR 2	22.61 32.69 40.19
1	12A	19	RABAU	138.71	75.8	25.58 27.05 30.85 33.42	Z Z Z Z	FAIR 3 POOR 3 FAIR 3 FAIR 2	24.72 26.19 29.99 32.56
1	12A	20	RAL	141.42	77.2	23.75 25.72	Z Z	GOOD 1 FAIR 2	22.89 24.86
1	12A	21	SUL	140.42	77.1	24.05 24.85 29.42	Z Z Z	GOOD 2 FAIR 2 POOR 3	23.19 23.99 28.56
1	12A	22	TAV	143.15	77.9	24.15 26.62 28.05 30.82	Z Z Z Z	FAIR 2 FAIR 2 POOR 2 POOR 2	23.29 25.76 27.19 29.96
1	12A	23	VUL	133.88	79.9	23.08 25.08	Z Z	GOOD 1 GOOD 2	22.22 24.22
1	12A	24	WAN	139.25	75.8	23.45 24.16 25.72 30.72	Z Z Z Z	POOR 2 FAIR 2 FAIR 2 POOR 2	22.59 23.32 24.86 29.86
2	13	3	PALMALML	139.48	172.7	23.75 24.01	Z Z	GOOD 1 GOOD 2	23.03 23.29
2	13	4	DOILENE	31.51	46.9	7.19 7.27 10.13 15.76 15.93 16.00	Z Z Z Z Z Z	FAIR 1 FAIR 1 POOR 1 FAIR 1 POOR 1 POOR 1	6.47 6.55 9.41 15.04 15.21 15.28

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
2	13	5	PONDO	35.93	120.2	8.16	Z	FAIR 1	7.44
						9.10	Z	FAIR 1	8.38
						11.64	Z	FAIR 1	10.92
						13.56	Z	FAIR 1	12.84
2	13	6	TALASEA	177.34	236.9	31.12	Z	POOR 2	30.40
						32.29	Z	POOR 2	31.97
						41.49	Z	POOR 2	40.77
2	13	7	ULAMONA	68.77	187.3	12.97	Z	GOOD 1	12.28
						16.59	Z	FAIR 3	15.87
2	13	10	LINDNHEN	229.30	209.9	36.30	Z	FAIR 2	35.58
						38.92	Z	POOR 2	37.80
						40.12	Z	GOOD 1	39.40
2	13	12	POWELL H	60.03	139.9	11.90	Z	GOOD 2	11.18
						12.60	Z	FAIR 2	11.88
						14.82	Z	FAIR 2	14.10
						16.39	Z	FAIR 3	15.67
2	13	16	PAKIA	109.92	176.3	19.64	Z	POOR 3	18.92
2	13	17	AU UNA	193.34	192.9	25.16	Z	FAIR 3	24.44
						26.13	Z	POOR 2	25.41
2	13	18	VITU IS	211.97	260.8	29.82	Z	FAIR 2	29.10
						32.30	Z	FAIR 2	31.98
						34.82	Z	FAIR 2	34.10
						42.90	Z	GOOD 2	41.78
2	13	19	RABAU	93.61	76.2	19.24	Z	FAIR 2	18.92
						20.57	Z	FAIR 2	19.85
						22.01	Z	POOR 2	21.29
						24.07	Z	GOOD 2	23.39
						25.31	Z	POOR 2	24.99
						27.91	Z	GOOD 2	27.19
2	13	20	RAL	96.39	78.6	17.54	Z	FAIR 2	16.82
						19.27	Z	POOR 2	18.55
						26.14	Z	FAIR 2	25.42
2	13	21	SUL	99.38	78.4	17.41	Z	FAIR 2	16.69
						19.37	Z	FAIR 2	18.65
						20.74	Z	POOR 3	20.02
						24.01	Z	POOR 3	23.29
2	13	22	TAV	98.16	79.5	18.07	Z	FAIR 1	17.39
						19.07	Z	GOOD 2	18.35
						21.74	Z	FAIR 2	21.02
						23.74	Z	POOR 2	23.02
2	13	23	VIL	89.06	82.2	16.97	Z	GOOD 2	16.25
						19.11	Z	GOOD 2	18.39
						21.07	Z	POOR 2	20.35
2	13	24	WAN	94.16	76.5	17.64	Z	FAIR 2	16.92
						18.47	Z	FAIR 2	17.75
						19.71	Z	POOR 2	18.99

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
	13	24				21.07	Z	POOR 2	20.35
						25.41	Z	FAIR 3	24.69
						27.04	Z	FAIR 2	26.32
2	14	1	KANDRIAN	246.01	238.8	35.70	Z	POOR 5	35.27
						41.54	Z	FAIR 1	41.11
2	14	3	PALMALML	96.74	166.9	17.60	Z	GOOD 3	17.17
2	14	4	DOILENE	73.42	24.9	12.64	Z	POOR 1	12.21
						12.83	Z	FAIR 1	12.40
						13.09	Z	GOOD 1	12.66
						21.69	Z	POOR 1	21.26
						39.83	Z	POOR 1	39.40
2	14	5	PONDO	47.23	94.9	9.56	Z	FAIR 1	9.13
						9.88	Z	FAIR 1	9.45
						29.69	Z	POOR 1	29.26
						31.32	Z	FAIR 1	30.89
						65.29	Z	FAIR 1	64.86
2	14	6	TALASEA	149.63	249.4	25.06	Z	POOR 2	24.63
						25.97	Z	POOR 2	25.54
2	14	7	ULAMONA	21.17	181.5	6.13	Z	GOOD 1	5.70
						8.21	Z	GOOD 2	7.78
						14.44	M	GOOD 2	14.01
2	14	10	LINDNHEN	181.74	209.9	29.08	Z	FAIR 3	28.65
						32.46	Z	FAIR 3	32.05
						37.08	Z	GOOD 3	36.65
2	14	11	RAPOPO	127.26	66.3	21.90	Z	GOOD 2	21.47
						22.90	Z	GOOD 2	22.47
2	14	12	POWELL H	46.90	98.9	9.78	Z	GOOD 1	9.35
						13.52	Z	FAIR 2	13.09
						14.68	Z	GOOD 2	14.25
						16.60	Z	FAIR 2	16.17
2	14	14	BULUHURI	127.22	259.2	19.78	Z	FAIR 3	19.35
2	14	15	CRA	164.50	230.4	24.60	Z	FAIR 2	24.17
						28.70	Z	FAIR 2	28.27
						32.20	Z	FAIR 2	31.77
2	14	16	PAKIA	67.42	166.3	12.35	Z	GOOD 3	11.92
						14.09	Z	FAIR 3	13.66
2	14	18	VITU IS	201.22	273.2	27.93	Z	POOR 2	27.50
						30.40	Z	POOR 2	29.97
						31.96	Z	FAIR 3	31.53
						39.97	Z	FAIR 2	39.54
						40.71	Z	FAIR 2	40.28
						42.55	Z	FAIR 2	42.12
						46.31	Z	GOOD 3	46.08
2	14	19	RABAU	119.80	99.7	21.51	Z	FAIR 3	21.08
						21.76	Z	FAIR 1	21.35

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	14	19				24,01 26,38	Z Z	POOR 2 POOR 2	23,98 29,99
2	14	20	RAL	120,82	98,0	21,09 22,09 25,09	Z Z Z	FAIR 2 GOOD 0 POOR 2	20,62 21,62 24,62
	14	22	TAV	121,93	98,9	21,18 22,41 24,11 25,98	Z Z Z Z	FAIR 2 GOOD 8 POOR 2 FAIR 8	20,79 21,98 23,68 29,99
2	14	23	VUL	111,88	99,3	19,60 20,60 22,51 24,88	Z Z Z Z	GOOD 1 FAIR 1 POOR 3 POOR 2	19,17 20,17 22,08 24,49
2	14	24	WAN	119,94	98,8	20,88 21,18 23,08	Z Z Z	POOR 3 GOOD 1 FAIR 3	20,49 20,79 22,69
2	15	1	KANDRIAN	139,63	229,4	23,33	Z	GOOD 1	23,21
2	15	2	HOSKINS	13,94	188,9	4,27 6,14 6,98 7,84	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2	4,19 6,02 6,86 7,72
2	15	3	PALMALHL	124,29	109,9	21,24 22,30	Z Z	GOOD 1 FAIR 3	21,12 22,18
2	15	4	DOILENE	178,09	46,7	30,37 32,09	Z Z	POOR 3 POOR 0	30,29 31,97
2	15	5	PONDO	158,93	98,7	27,69 41,19 44,39 46,84	Z Z Z Z	POOR 3 POOR 1 POOR 1 POOR 1	27,97 41,07 44,27 46,72
2	15	6	TALASEA	46,49	279,8	9,34 11,90 14,79	Z Z M	GOOD 1 GOOD 1 GOOD 2	9,22 11,78 14,63
2	15	7	ULAMONA	101,40	67,4	17,90 22,99	Z Z	FAIR 2 FAIR 2	17,38 22,43
2	15	10	LINDNHFM	97,90	177,9	17,19 17,94 19,99 22,29	Z Z Z Z	GOOD 1 GOOD 1 FAIR 2 FAIR 3	17,03 17,82 19,87 22,13
2	15	11	RAPOPO	238,28	62,2	32,79	Z	POOR 3	32,67
2	15	12	POWELL M	193,12	67,2	29,31	Z	POOR 2	29,19
2	15	14	BULUMURI	47,99	319,7	9,79	Z	FAIR 3	9,67
2	15	19	CRA	99,29	218,3	11,00 12,90	Z Z	GOOD 1 FAIR 2	10,88 12,78

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	15	19				19,70	Z	FAIR 2	19,98
2	15	16	PAKIA	108,96	98,3	18,92 31,36	Z Z	GOOD 2 FAIR 2	18,80 31,24
2	15	17	AU UNA	81,92	128,0	14,68 16,49 29,23	Z Z Z	GOOD 0 POOR 3 FAIR 2	14,96 16,37 29,11
2	15	18	VITU IS	128,37	308,0	20,47 23,93 29,96 27,24	Z Z Z Z	FAIR 2 FAIR 2 POOR 2 GOOD 3	20,35 23,41 29,84 27,12
2	15	20	RAL	232,96	97,0	35,32 39,99	Z Z	POOR 4 POOR 3	35,20 39,47
2	15	22	TAV	233,69	98,3	38,66 40,79	Z Z	POOR 3 POOR 3	38,94 40,67
2	15	23	VUL	223,99	98,4	30,99	Z	POOR 4	30,87
2	15	24	WAN	231,67	96,0	37,29	Z	POOR 4	37,17
2	16	1	KANDRIAN	193,91	209,1	25,84 27,10 29,97	Z Z Z	GOOD 1 GOOD 1 GOOD 1	25,49 26,79 29,28
2	16	3	PALMALHL	199,20	117,8	25,30 29,90	Z Z	POOR 3 POOR 3	24,98 29,99
2	16	4	DOILENE	171,42	99,3	24,19 24,39	Z Z	POOR 2 POOR 2	23,84 24,04
2	16	5	PONDO	162,31	72,8	29,99	Z	POOR 3	29,24
2	16	6	TALASEA	39,49	217,0	8,54 11,29 13,29	Z Z M	GOOD 1 GOOD 1 GOOD 1	8,19 10,94 12,94
2	16	7	ULAMONA	119,77	98,1	19,37 20,30 22,26	Z Z Z	FAIR 2 FAIR 2 FAIR 2	19,02 19,99 21,91
2	16	8	BIALLA	94,74	118,1	16,17	Z	FAIR 1	15,82
2	16	10	LINDNHFM	138,87	169,4	22,85 24,86 26,83 28,90 30,12	Z Z Z Z Z	GOOD 1 FAIR 1 GOOD 1 FAIR 3 GOOD 1	22,90 24,91 26,48 28,99 29,77
2	16	12	POWELL M	164,91	82,9	29,86	Z	POOR 2	29,91
2	16	14	BULUMURI	9,06	292,2	3,93	Z	GOOD 1	3,18
2	16	19	CRA	84,29	187,2	15,90 18,60	Z Z	GOOD 2 GOOD 2	15,19 18,29

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
2	16	16	PAKIA	136,94	108,0	22,29	Z	GOOD 2	21,94
						23,92	Z	GOOD 2	23,17
						29,46	Z	FAIR 2	29,11
						39,32	Z	FAIR 2	39,17
2	16	17	AU UNA	123,10	132,9	21,26	Z	GOOD 2	20,91
						23,91	Z	POOR 2	23,94
						29,59	Z	FAIR 2	29,24
2	16	18	VITU IS	90,94	291,0	14,44	Z	POOR 0	14,09
						14,82	Z	FAIR 2	14,47
						29,59	Z	POOR 2	29,24
						31,09	Z	GOOD 2	30,74
2	16	22	TAY	236,24	69,0	36,39	Z	POOR 4	36,04
						41,92	Z	POOR 3	41,57
2	16	23	VUL	226,46	69,0	33,22	Z	FAIR 2	32,87
						34,22	Z	FAIR 2	33,87
2	17	1	KANDRIAN	209,59	208,9	33,15	Z	POOR 2	32,33
						33,40	Z	FAIR 2	32,78
						36,07	Z	FAIR 2	35,25
						39,41	Z	FAIR 2	38,59
2	17	4	DOILENE	127,97	72,9	19,23	Z	POOR 1	18,41
						19,53	Z	FAIR 1	18,71
2	17	9	PONDO	129,97	90,0	20,50	Z	POOR 1	19,68
						20,82	Z	FAIR 1	20,00
						28,35	Z	POOR 1	27,53
2	17	6	TALASBA	99,21	211,1	17,39	Z	GOOD 2	16,93
						21,36	Z	GOOD 2	20,94
						29,84	Z	FAIR 2	29,02
2	17	7	ULAMONA	103,31	110,0	18,20	Z	GOOD 1	17,30
						23,78	Z	GOOD 2	22,96
2	17	8	BIALLA	106,77	144,9	23,80	Z	POOR 0	22,96
						27,29	Z	POOR 2	26,47
2	17	10	LINDHFN	186,49	179,9	28,80	Z	POOR 2	27,98
						30,10	Z	POOR 2	29,28
						32,80	Z	POOR 1	31,78
						35,47	Z	FAIR 3	34,69
2	17	11	RAPOPO	208,65	83,9	31,53	Z	POOR 3	30,71
						33,33	Z	POOR 3	34,51
2	17	12	POWELL M	140,95	102,1	22,36	Z	FAIR 2	21,94
						24,40	Z	FAIR 2	23,98
2	17	14	BULUMURI	62,82	212,0	11,87	Z	GOOD 2	11,05
						13,96	Z	FAIR 2	13,14
2	17	19	CRA	138,40	199,1	28,20	Z	POOR 2	27,30
						32,10	Z	FAIR 2	31,28

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
2	17	16	PAKIA	138,99	130,3	29,18	Z	FAIR 3	28,36
						30,24	Z	FAIR 2	29,48
						32,19	Z	FAIR 0	31,37
						34,22	Z	POOR 0	33,40
2	17	18	VITU IS	111,39	260,9	18,08	Z	GOOD 1	17,26
						20,23	Z	GOOD 2	19,41
2	17	19	RABAU	193,63	78,6	30,58	Z	POOR 2	29,76
						34,68	Z	POOR 2	33,86
2	17	20	RAL	196,93	79,9	30,65	Z	POOR 3	29,83
						31,75	Z	POOR 3	30,93
						34,71	Z	POOR 3	33,89
2	17	21	SUL	199,92	79,9	34,01	Z	POOR 3	33,19
						40,48	Z	POOR 2	39,66
2	17	22	TAY	198,33	80,0	31,21	Z	POOR 3	30,39
						34,35	Z	POOR 2	33,53
						39,98	Z	POOR 2	39,16
2	17	23	VUL	189,21	81,9	30,35	Z	GOOD 1	29,93
						32,58	Z	FAIR 2	31,76
						34,98	Z	FAIR 2	34,16
						39,68	Z	GOOD 1	38,86
2	17	24	WAN	194,20	78,9	30,18	Z	GOOD 1	29,36
						33,25	Z	FAIR 1	32,43
						35,88	Z	POOR 2	39,06
						37,01	Z	POOR 0	36,19
2	18	1	KANDRIAN	219,10	190,2	34,60	Z	POOR 2	33,79
						35,10	Z	POOR 2	34,29
						36,70	Z	POOR 2	39,89
2	18	3	PALMALHL	214,95	138,9	47,90	Z	POOR 3	47,09
						58,90	Z	POOR 3	57,69
2	18	4	DOILENE	161,29	88,8	24,21	Z	POOR 1	23,40
						24,90	Z	POOR 2	24,09
						27,81	Z	POOR 1	27,00
2	18	6	TALASEA	108,22	189,9	17,73	Z	POOR 2	16,92
						19,18	Z	FAIR 2	18,37
						25,05	M	GOOD 2	24,24
						27,08	M	GOOD 2	26,27
2	18	10	LINDHFN	216,29	169,9	32,10	Z	POOR 2	31,29
						33,90	Z	POOR 2	33,09
						36,60	Z	FAIR 2	35,79
2	18	11	RAPOPO	246,49	91,0	37,38	Z	FAIR 2	36,97
						38,98	Z	FAIR 2	38,17
						68,88	T	FAIR 2	68,07
2	18	12	POWELL M	185,39	107,8	28,24	Z	FAIR 2	27,43
						14,58	Z	POOR 3	13,77

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC	(13)
	18	14				14,90 15,80 16,16 19,58	Z Z Z Z	POOR 2 FAIR 2 FAIR 2 GOOD 2	14,09 14,99 15,35 18,77	
2	18	15	CRA	199,88	179,0	29,70 30,80	Z Z	POOR 2 FAIR 2	24,89 29,99	
2	18	17	AU UNA	190,59	147,0	55,82	Z	POOR 4	55,01	
2	18	18	VITU IS	83,46	238,3	15,08 16,44 18,51 21,37 21,20 24,30 28,11	Z Z Z Z Z Z Z	GOOD 1 FAIR 2 GOOD 1 GOOD 1 FAIR 2 FAIR 2 GOOD 1	14,27 15,63 17,70 20,56 22,39 23,49 27,30	
2	18	19	RABAU	229,11	87,0	35,55 37,28	Z Z	POOR 2 POOR 2	34,74 36,47	
2	18	20	RAL	232,53	87,9	32,58 35,68 37,25 38,58	Z Z Z Z	POOR 2 POOR 2 POOR 2 POOR 2	31,77 34,87 36,44 37,77	
2	18	22	TAV	234,52	88,2	35,88	Z	POOR 2	35,07	
2	18	23	VUL	226,10	89,5	35,58 37,81 38,68 40,18	Z Z Z Z	FAIR 2 FAIR 1 POOR 2 FAIR 3	34,77 37,00 37,87 39,37	
2	18	24	HAN	229,74	87,1	32,58 34,68 37,88 39,78	Z Z Z Z	POOR 4 POOR 3 FAIR 2 POOR 2	31,77 33,87 37,07 38,97	
2	19	1	KANDRIAN	198,75	202,5	26,75 28,15 29,47 31,98	Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 FAIR 1	26,12 27,52 28,84 31,35	
2	19	3	PALMALML	177,86	118,6	27,90 28,50 31,40	Z Z Z	FAIR 2 FAIR 3 POOR 3	27,27 27,87 30,77	
2	19	4	DOILENE	178,24	65,2	25,82 26,28 26,45	Z Z Z	POOR 2 POOR 2 POOR 1	24,99 25,65 25,82	
2	19	5	PONDO	173,06	78,2	25,38	Z	POOR 2	24,75	
2	19	6	TALASEA	45,19	192,0	9,88 11,30 14,38	Z Z H	GOOD 1 GOOD 2 GOOD 2	9,25 10,67 13,75	
2	19	7	ULAMONA	130,79	95,7	21,50 25,28	Z Z	GOOD 1 GOOD 3	20,87 24,65	
STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC	
	19	7				28,23	Z	GOOD 3	27,60	
2	19	8	BIALLA	113,13	116,2	18,87	Z	FAIR 2	18,24	
2	19	10	LINDHFN	154,47	165,0	24,83 25,43 27,18 31,63 34,18	Z Z Z Z Z	POOR 2 GOOD 3 GOOD 3 GOOD 2 GOOD 4	24,20 24,80 26,55 31,00 33,55	
2	19	11	RAPOPO	254,34	76,9	37,23	Z	POOR 3	36,60	
2	19	12	POWELL M	177,80	87,6	27,25	Z	POOR 2	26,62	
2	19	14	BULUMUMI	16,52	159,6	6,64	Z	GOOD 3	6,01	
2	19	15	CRA	96,40	177,8	17,30 20,80 21,90 25,80	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2	16,67 20,17 21,27 25,17	
2	19	16	PAKIA	154,61	109,8	25,15 42,78	Z Z	GOOD 2 FAIR 3	24,52 42,15	
2	19	19	RABAU	241,76	71,8	36,85	Z	POOR 4	36,22	
2	19	20	RAL	244,18	72,8	34,45 36,48 43,08	Z Z Z	POOR 2 POOR 2 POOR 2	33,82 35,85 42,45	
2	19	22	TAV	245,77	73,2	36,45 39,48 41,11 43,01 45,11	Z Z Z Z Z	POOR 4 POOR 3 POOR 3 POOR 3 FAIR 3	35,82 38,85 40,48 42,38 44,48	
2	19	23	VUL	236,19	74,0	35,08 37,68 38,98 40,18 47,08	Z Z Z Z Z	FAIR 2 POOR 2 POOR 3 FAIR 2 POOR 3	34,45 37,05 38,35 39,55 46,45	
2	19	24	HAN	242,27	71,9	35,98 41,81	Z Z	POOR 3 POOR 2	35,35 41,18	
2	20	1	KANDRIAN	156,98	181,8	25,97 27,02 28,78	Z Z Z	GOOD 1 GOOD 1 FAIR 1	25,41 26,46 28,22	
2	20	2	HOSKINS	117,60	129,8	21,50 23,56 25,45 28,38 30,22 32,43	Z Z Z Z Z Z	GOOD 2 GOOD 3 GOOD 3 FAIR 3 FAIR 3 FAIR 3	20,94 23,00 24,89 27,82 29,66 31,87	
2	20	3	PALMALML	232,01	114,2	34,90	Z	POOR 3	34,34	
2	20	4	DOILENE	226,67	73,4	31,82	Z	POOR 1	31,26	

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	20	4				34.12	Z	POOR 1	33.96
2	20	5	PONDO	226.27	85.6	32.92 33.93	Z Z	POOR 2 POOR 2	32.36 33.37
2	20	6	TALASSEA	71.14	139.7	12.95	Z	GOOD 1	12.39
2	20	7	ULAMONA	187.01	97.1	28.66 30.80 32.10	Z Z Z	GOOD 1 GOOD 2 GOOD 3	28.10 30.24 31.34
2	20	8	BIALLA	168.02	110.9	26.29	Z	FAIR 1	25.73
2	20	10	LINDHFN	189.62	149.1	30.53 31.70 33.27	Z Z Z	FAIR 1 GOOD 2 GOOD 3	29.97 31.14 34.71
2	20	11	RAPOPO	306.76	60.8	46.95	Z	POOR 2	46.39
2	20	12	PONEL H	233.09	90.6	33.98 35.06	Z Z	POOR 3 POOR 2	33.42 34.90
2	20	14	BULUHURI	66.30	118.7	12.84 15.13	Z Z	GOOD 1 GOOD 1	12.28 14.57
2	20	15	CRA	121.72	150.9	20.10 24.50 26.50 30.50	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2	19.94 23.94 24.94 29.94
2	20	17	AU UNA	192.28	128.6	31.43 34.76 39.70	Z Z Z	FAIR 2 FAIR 3 POOR 3	30.87 34.20 39.14
2	20	18	VITU IS	17.62	303.4	5.73 7.25 12.22 15.75 17.14 21.71 23.32	Z Z Z Z Z Z Z	GOOD 2 FAIR 2 FAIR 1 FAIR 1 FAIR 2 GOOD 2 GOOD 2	5.17 6.49 11.46 15.19 16.58 21.15 22.76
2	20	19	HABAUL	292.54	77.1	42.90 44.00	Z Z	POOR 3 POOR 3	42.34 44.04
2	20	20	RAL	295.32	77.9	46.03 49.37 51.03	Z Z Z	POOR 3 FAIR 2 POOR 2	49.47 48.81 50.47
2	20	21	SUL	294.32	77.8	47.40	Z	FAIR 3	46.84
2	20	22	TAV	297.06	78.2	43.40 48.73 50.60 51.70	Z Z Z Z	POOR 3 POOR 2 POOR 2 FAIR 2	42.84 48.17 50.04 51.14
2	20	24	HAN	293.09	77.2	42.37 43.50 45.03	Z Z Z	FAIR 1 FAIR 2 FAIR 2	41.81 42.94 44.47

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	20	24				48.50	Z	FAIR 2	47.94
2	21	1	KANDRIAN	109.00	199.6	19.17 19.54 20.20	Z Z Z	GOOD 1 GOOD 1 FAIR 2	18.95 19.32 19.98
2	21	2	HOSKINS	62.31	109.8	13.01 14.51 15.81 16.57 17.35 19.88 22.93	Z Z Z Z Z Z Z	GOOD 1 POOR 3 FAIR 2 FAIR 3 GOOD 2 FAIR 3 FAIR 3	12.79 14.29 15.39 16.35 17.13 19.66 22.71
2	21	4	DDILENE	220.37	97.3	32.01	Z	POOR 2	31.79
2	21	5	PONDO	208.86	67.6	31.24 37.24	Z Z	POOR 1 POOR 2	31.02 37.02
2	21	6	TALASSEA	14.32	98.1	4.34	Z	GOOD 1	4.12
2	21	7	ULAMONA	197.00	78.9	29.57 28.95 28.50	Z Z Z	GOOD 2 FAIR 2 GOOD 2	29.39 28.73 28.28
2	21	8	BIALLA	129.38	92.6	21.71	Z	POOR 2	21.49
2	21	10	LINDHFN	122.83	148.8	21.47 24.08 26.14	Z Z Z	FAIR 1 POOR 1 FAIR 1	21.25 23.86 25.92
2	21	11	RAPOPO	290.11	69.1	42.88 43.68	Z Z	POOR 2 POOR 2	42.46 43.46
2	21	12	PONEL H	207.89	75.6	32.15	Z	POOR 3	31.93
2	21	14	BULUHURI	41.13	45.8	8.80 10.80	Z Z	FAIR 1 FAIR 1	8.98 10.98
2	21	15	CRA	98.94	152.3	10.70 14.70	Z Z	GOOD 1 GOOD 1	10.48 14.48
2	21	16	PAKIA	169.36	92.8	31.97 33.63 36.63	Z Z Z	GOOD 2 POOR 3 POOR 3	31.79 33.41 36.41
2	21	18	VITU IS	78.9d	324.0	14.98 17.80 18.99 21.32 21.79 26.08 27.84	Z Z Z Z Z Z Z	GOOD 1 FAIR 2 POOR 2 FAIR 3 GOOD 1 GOOD 2 GOOD 2	14.76 17.58 18.77 21.10 21.97 25.86 27.62
2	21	20	RAL	282.03	65.7	39.63 41.63 46.30	Z Z Z	POOR 2 POOR 2 FAIR 2	39.41 41.41 46.08
2	21	22	TAV	283.49	66.1	41.66	Z	POOR 3	41.44

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STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	21	22				93,20	Z	FAIR 2	92,90
2	21	23	VUL	273,99	66,4	40,93 47,23	Z Z	GOOD 1 FAIR 2	40,71 47,01
2	21	24	WAN	280,69	64,9	42,33 44,80 92,33	Z Z Z	POOR 2 POOR 2 POOR 2	42,11 44,90 92,11
2	22	2	HOSKINS	134,76	91,3	23,99 29,60 26,90 28,00 33,00	Z Z Z Z Z	GOOD 1 GOOD 3 FAIR 3 FAIR 3 POOR 3	23,40 29,41 26,71 27,81 32,81
2	22	4	DOILENE	322,69	46,0	49,32 51,55	Z Z	POOR 2 POOR 1	49,13 51,36
2	22	9	PONDO	302,64	92,4	44,36	Z	POOR 2	44,17
2	22	6	TALABBA	121,62	30,1	21,40	Z	GOOD 1	21,21
2	22	7	ULAMONA	242,48	99,0	39,77 41,67 43,24	Z Z Z	GOOD 2 FAIR 2 FAIR 2	39,98 41,40 43,09
2	22	8	BIALLA	198,96	99,9	32,47 34,73	Z Z	POOR 2 POOR 2	32,28 34,94
2	22	10	LINDHFN	110,19	89,9	19,37 21,24	Z Z	GOOD 1 GOOD 1	19,18 21,09
2	22	11	RAPOPO	379,99	96,0	59,72 61,10	Z Z	POOR 2 FAIR 1	59,53 60,01
2	22	12	POWEL W	293,42	97,9	46,01	Z	POOR 3	45,88
2	22	14	BULUMUDI	194,08	29,0	26,06 28,06	Z Z	GOOD 2 GOOD 2	25,87 27,87
2	22	19	CRA	91,09	94,8	19,30 17,10	Z Z	GOOD 1 FAIR 2	19,11 16,91
2	22	16	PAKIA	236,48	69,0	38,26 39,60 41,08	Z Z Z	GOOD 2 POOR 3 POOR 3	38,07 39,41 40,09
2	22	17	AU UNA	182,91	79,1	29,68 34,22	Z Z	GOOD 2 POOR 2	29,49 34,03
2	22	18	VITU IS	169,26	0,1	26,08 28,97 35,95 38,18 38,98 40,39 49,09	Z Z Z Z Z Z Z	POOR 3 FAIR 2 FAIR 0 FAIR 3 POOR 2 FAIR 2 FAIR 2	25,89 28,70 39,76 37,99 38,79 40,20 44,90
2	22	20	RAL	379,82	98,9	57,03	Z	POOR 3	56,84

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	22	20				59,90	Z	POOR 2	59,31
2	22	21	SUL	379,83	98,0	57,93	Z	FAIR 3	57,34
2	22	22	TAV	376,79	94,3	58,16 61,70 63,36 69,16	Z Z Z Z	FAIR 2 FAIR 2 POOR 2 POOR 3	57,97 61,51 63,17 68,97
2	22	23	VUL	366,68	94,2	56,93 58,13 61,93 69,83	Z Z Z Z	FAIR 2 FAIR 0 POOR 2 FAIR 2	56,34 57,94 61,34 69,64
2	22	24	WAN	379,19	98,3	56,93 57,16 59,93	Z Z Z	POOR 2 POOR 2 POOR 2	56,74 56,97 59,34
2	23	1	KANDRIAR	83,31	278,9	19,20 16,73 18,99 18,94	Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 GOOD 1	14,98 16,91 18,33 18,72
2	23	2	HOSKINS	94,91	7,9	17,26 18,60 20,28 22,08	Z Z Z Z	POOR 1 GOOD 2 FAIR 2 FAIR 3	17,04 18,38 20,06 21,86
2	23	3	PALMALHL	193,13	61,0	29,71 26,00 27,10	Z Z Z	GOOD 1 FAIR 3 FAIR 2	29,49 29,78 26,88
2	23	4	DOILENE	272,92	30,8	42,39 49,97	Z Z	POOR 1 POOR 1	42,17 49,79
2	23	5	PONDO	244,03	37,1	36,90 38,49 42,53 49,42	Z Z Z Z	POOR 1 POOR 1 POOR 1 POOR 1	36,68 38,27 42,31 49,20
2	23	6	TALASEA	119,33	344,6	20,73 22,93 23,62	Z Z Z	POOR 0 POOR 2 POOR 2	20,91 22,71 23,60
2	23	7	ULAMONA	181,86	36,4	30,09 30,90 31,50 32,30 33,10	Z Z Z Z Z	FAIR 1 FAIR 1 FAIR 2 FAIR 2 FAIR 2	29,87 30,68 31,28 32,08 32,88
2	23	8	BIALLA	135,19	39,9	23,49	Z	POOR 2	23,27
2	23	10	LINDHFN	20,42	60,9	5,84 6,62 8,97	Z Z Z	GOOD 2 FAIR 0 FAIR 3	5,62 6,40 8,79
2	23	11	RAPOPO	313,71	49,9	49,15 52,08 93,99	Z Z Z	POOR 2 FAIR 1 FAIR 2	48,93 51,86 93,77

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	23	11				56,25	Z	FAIR 2	56,03
2	23	14	BULUMURI	144,73	393,9	23,61 24,92	Z Z	POOR 0 FAIR 3	23,39 24,70
2	23	15	CRA	69,60	343,7	12,30 19,00	Z Z	GOOD 1 FAIR 2	12,08 18,70
2	23	16	PAKIA	163,11	49,1	27,00 36,23 38,06 46,02	Z Z Z Z	GOOD 3 POOR 3 POOR 3 FAIR 2	26,70 36,03 37,84 45,00
2	23	17	AU UNA	103,89	92,6	17,73	Z	GOOD 2	17,51
2	23	18	VITU IS	211,41	332,9	31,93 33,49 39,27 37,14 38,08 43,79 47,34	Z Z Z Z Z Z Z	GOOD 1 FAIR 2 GOOD 1 FAIR 2 FAIR 2 FAIR 1 GOOD 1	31,71 33,27 33,05 36,92 37,86 43,97 47,12
2	23	19	RABAU	313,23	41,9	49,08 54,75 58,42	Z Z Z	POOR 3 POOR 3 POOR 3	48,06 54,93 58,20
2	23	20	RAL	313,23	42,4	48,15 51,12 54,05	Z Z Z	FAIR 2 FAIR 2 POOR 2	47,93 50,90 53,63
2	23	22	TAV	313,71	48,8	47,12 49,75 51,72 53,06 57,72 59,72 60,75	Z Z Z Z Z Z Z	POOR 3 POOR 2 POOR 2 POOR 2 POOR 2 FAIR 2 POOR 3	46,90 48,53 51,50 52,86 57,50 59,50 60,53
2	23	23	VUL	303,90	42,4	46,18 47,62 49,15 51,42 54,75 56,58	Z Z Z Z Z Z	POOR 2 FAIR 2 FAIR 2 POOR 2 FAIR 2 POOR 2	45,96 47,40 48,93 51,20 54,53 56,36
2	23	24	WAN	313,43	41,6	49,25	Z	FAIR 2	49,03
2	24	1	KANDRIAN	108,30	283,9	21,09 21,55 22,27 22,60	Z Z Z Z	GOOD 2 GOOD 1 FAIR 2 FAIR 2	19,79 20,29 21,01 21,34
2	24	2	HOSKINS	108,19	354,7	21,87 22,52 23,23	Z Z Z	POOR 2 GOOD 3 GOOD 3	20,61 21,24 21,97
2	24	3	PALMALML	141,74	51,9	25,93 26,50	Z Z	GOOD 2 POOR 2	24,27 25,24
STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	24	3				30,30	Z	POOR 4	29,04
2	24	4	DOILENE	273,90	29,2	48,78	Z	POOR 2	47,92
2	24	5	PONDO	242,66	38,0	40,74	Z	POOR 1	39,48
2	24	6	TALASEA	139,75	337,1	24,84	Z	POOR 0	23,90
2	24	7	ULAMONA	181,30	28,0	31,32 33,63 34,63 36,59	Z Z Z Z	GOOD 0 FAIR 2 FAIR 2 FAIR 2	30,06 32,37 33,37 35,33
2	24	8	BIALLA	135,48	26,7	29,39	Z	POOR 2	24,13
2	24	10	LINDHFN	24,26	348,2	7,43	Z	GOOD 3	6,17
2	24	11	RAPOPO	307,99	41,1	50,04 50,98	Z Z	POOR 3 POOR 3	48,78 49,72
2	24	12	POWEL M	224,03	38,3	37,16	Z	POOR 3	35,90
2	24	14	BULUMURI	162,27	340,0	28,16	Z	FAIR 3	26,90
2	24	15	CRA	86,99	332,7	17,30 21,80	Z Z	GOOD 1 FAIR 2	16,04 20,54
2	24	16	PAKIA	156,93	39,0	28,41	Z	POOR 4	27,15
2	24	17	AU UNA	97,29	37,0	18,73 22,20 25,58	Z Z Z	GOOD 1 POOR 2 FAIR 2	17,47 20,94 24,32
2	24	18	VITU IS	224,42	329,1	37,03 43,51 47,63 49,19 51,27 52,49	Z Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 FAIR 3 FAIR 2 FAIR 2	35,77 42,25 46,97 47,93 50,01 51,23
2	24	21	SUL	308,54	37,3	49,53 57,43 63,73	Z Z Z	POOR 4 POOR 4 POOR 2	48,27 56,17 68,47
2	24	22	TAV	309,40	37,9	51,73 53,93 58,53 62,86 67,33	Z Z Z Z Z	POOR 3 FAIR 2 POOR 3 POOR 3 FAIR 2	50,47 52,47 57,87 61,60 66,07
2	24	23	VUL	299,82	37,4	46,73 48,23 52,13 58,43 61,03	Z Z Z Z Z	POOR 4 POOR 2 FAIR 0 FAIR 2 FAIR 2	45,47 46,97 50,07 57,17 59,77
2	24	24	WAN	309,65	36,8	47,70 49,10 56,93	Z Z Z	POOR 2 POOR 2 POOR 2	46,44 47,84 55,67

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STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
2	25	1	KANDRIAN	143,52	271,4	29,77 26,04	Z Z	GOOD 1 GOOD 1	24,70 24,97
2	25	2	HOSKINS	98,12	330,4	19,36 20,45 23,25 25,56 27,43 29,48	Z Z Z Z Z Z	GOOD 1 GOOD 1 FAIR 3 FAIR 2 POOR 2 FAIR 3	18,29 19,36 22,10 24,49 26,36 28,41
2	25	3	PALMALML	97,98	48,0	19,12 20,40 21,30	Z Z Z	GOOD 2 FAIR 2 POOR 4	18,05 19,33 20,23
2	25	4	DOILENE	238,65	19,1	38,13 38,55 43,54	Z Z Z	FAIR 1 FAIR 1 POOR 1	37,06 37,48 42,47
2	25	5	PONDO	204,92	24,8	33,60 34,03	Z Z	POOR 1 POOR 1	32,53 32,96
2	25	6	TALASEA	141,10	318,9	24,78 31,23 34,33	Z Z Z	GOOD 1 FAIR 2 FAIR 2	23,71 30,16 33,26
2	25	7	ULAMONA	145,43	18,7	26,34 27,36 28,90	Z Z Z	GOOD 1 GOOD 2 GOOD 2	25,27 26,29 27,83
2	25	8	BIALLA	102,37	10,2	19,90 21,61 23,54	Z Z Z	FAIR 2 FAIR 2 POOR 2	18,83 20,94 22,47
2	25	10	LINDHFN	43,33	271,8	10,49	Z	GOOD 1	9,62
2	25	11	RAPOPO	266,31	38,0	43,21 48,51	Z Z	POOR 3 FAIR 2	42,14 47,44
2	25	14	BULUMURI	195,76	330,1	26,91	Z	POOR 3	25,84
2	25	15	CRA	96,28	304,2	18,80 20,50 23,00	Z Z Z	GOOD 1 GOOD 2 GOOD 2	17,73 19,43 21,93
2	25	17	AU UNA	58,44	21,9	12,58 15,23	Z Z	GOOD 1 FAIR 2	11,51 14,16
2	25	18	VITU IS	229,23	317,9	36,73 40,12 41,79 45,37 46,93	Z Z Z Z Z	FAIR 3 FAIR 2 FAIR 2 FAIR 2 GOOD 2	35,66 39,09 40,72 44,30 45,86
2	25	20	RAL	268,54	38,9	38,71 42,41 44,04 46,04 48,61	Z Z Z Z Z	POOR 4 POOR 3 POOR 3 FAIR 2 FAIR 2	37,64 41,34 42,97 44,97 47,54

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
2	25	21	SUL	266,03	33,9	44,71	Z	FAIR 2	43,64
2	25	22	TAV	268,68	34,4	43,41 45,71 46,38 47,68 51,41	Z Z Z Z Z	POOR 4 POOR 2 FAIR 2 FAIR 2 GOOD 2	42,34 44,64 45,31 46,61 50,34
2	25	23	VUL	259,31	38,6	43,38 43,24 46,08 48,34 51,21 52,71	Z Z Z Z Z Z	GOOD 1 GOOD 1 FAIR 2 GOOD 2 POOR 2 FAIR 2	42,31 42,17 49,01 47,27 50,14 51,64
2	25	24	WAN	269,34	33,0	43,81 45,44 49,74	Z Z Z	POOR 3 POOR 2 FAIR 2	42,74 44,37 48,67
2	26	1	KANDRIAN	205,13	279,2	34,84 39,75	Z Z	GOOD 1 FAIR 2	32,82 32,93
2	26	2	HOSKINS	148,54	312,0	28,81 31,15 32,50 39,97 43,10 47,03 48,11	Z Z Z Z Z Z Z	POOR 2 POOR 3 POOR 3 GOOD 3 POOR 3 FAIR 3 FAIR 3	29,99 28,33 29,68 37,15 40,28 44,21 45,29
2	26	3	PALMALML	81,79	8,4	19,62 20,40 21,40 22,20 29,60 38,20 45,30	Z Z Z Z Z Z Z	GOOD 2 FAIR 2 FAIR 2 FAIR 2 FAIR 3 FAIR 3 POOR 4	16,80 17,90 18,58 19,38 26,98 35,38 42,48
2	26	4	DOILENE	241,41	4,1	38,91 39,88 40,67 41,07 41,22 53,51	Z Z Z Z Z Z	POOR 2 POOR 1 POOR 1 POOR 1 POOR 1 FAIR 1	36,09 37,06 37,89 38,29 38,40 50,69
2	26	5	PONDO	202,92	7,1	35,22 46,67	Z Z	POOR 2 POOR 1	32,40 43,85
2	26	7	ULAMONA	153,70	354,7	29,97 31,50 32,50	Z Z Z	GOOD 1 FAIR 2 FAIR 2	27,15 28,66 29,60
2	26	8	BIALLA	123,67	339,8	23,40 26,59	Z Z	POOR 2 POOR 2	20,58 23,77
2	26	10	LINDHFN	105,43	279,0	21,68 23,65	Z Z	GOOD 1 GOOD 2	18,86 20,63
2	26	11	RAPOPO	247,72	24,5	40,55	Z	POOR 3	37,73

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	26	11				92,75 72,09	Z 1	FAIR 8 GOOD 2	49,93 69,23
2	26	15	CRA	196,64	296,3	29,40 32,10 39,20	Z Z Z	GOOD 1 FAIR 2 GOOD 1	26,98 20,28 36,38
2	26	16	PAKIA	113,97	8,6	24,04 25,09 27,80 32,71 39,00	Z Z Z Z Z	GOOD 2 FAIR 2 FAIR 2 POOR 3 POOR 3	21,22 22,27 24,98 29,89 32,18
2	26	17	AU UNA	80,03	330,9	19,02 24,69 28,29	Z Z Z	GOOD 1 FAIR 1 POOR 3	16,20 21,83 29,43
2	26	18	VITU IS	283,90	310,0	41,86 43,19	Z Z	FAIR 2 POOR 2	39,04 40,33
2	26	20	RAL	294,30	20,4	44,59 48,98 55,33	Z Z Z	POOR 2 POOR 2 POOR 2	41,73 46,16 52,91
2	26	22	TAV	293,89	20,9	44,19 45,75 47,65 54,48	Z Z Z Z	POOR 4 POOR 3 POOR 2 POOR 2	41,33 42,93 44,83 51,66
2	26	23	VUL	249,66	19,6	39,39 41,49 43,28 49,98 51,82	Z Z Z Z Z	POOR 3 FAIR 2 POOR 2 POOR 2 FAIR 2	36,93 38,63 40,46 43,16 49,00
2	26	24	WAN	296,01	19,8	40,62 45,32 50,05	Z Z Z	FAIR 2 POOR 2 POOR 3	37,80 42,50 47,23
2	27	1	KANDRIAN	221,41	269,1	39,90 37,30 39,60	Z Z Z	GOOD 1 FAIR 2 FAIR 2	34,07 39,47 37,77
2	27	2	HUSKINS	140,63	296,7	27,98 30,93 33,14 35,64 37,40 41,00 42,20	Z Z Z Z Z Z Z	GOOD 3 GOOD 3 GOOD 3 FAIR 3 FAIR 3 POOR 3 POOR 3	29,79 29,10 31,31 33,81 39,57 39,17 40,37
2	27	3	PALMALML	43,72	394,2	12,76 13,30 23,80 28,40	Z Z Z Z	GOOD 1 GOOD 2 FAIR 2 FAIR 3	10,93 11,47 21,97 26,57
2	27	4	DOILENE	203,38	8,2	35,35 36,04 43,71	Z Z Z	FAIR 1 FAIR 1 FAIR 1	33,92 34,21 41,86

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HSL SEC
	27	4				49,04	Z	FAIR 1	47,21
2	27	5	PONDO	164,20	3,0	29,70 30,22	Z Z	POOR 2 POOR 1	27,87 28,39
2	27	7	ULAMONA	119,99	349,2	24,13 24,67	Z Z	GOOD 1 FAIR 2	22,30 22,84
2	27	10	LINDHFN	122,24	260,8	23,23	Z	FAIR 1	21,40
2	27	11	RAPOPO	206,90	24,7	35,44 36,24 38,03 70,27	Z Z Z T	GOOD 2 GOOD 1 GOOD 1 GOOD 1	33,61 34,41 36,20 68,44
2	27	12	POWEL W	137,24	7,1	26,65 29,70	Z Z	POOR 3 FAIR 2	24,82 27,07
2	27	14	BULUMURI	191,67	306,0	32,98	Z	POOR 2	30,79
2	27	15	CRA	160,01	281,9	29,40 31,10 37,00	Z Z Z	GOOD 1 FAIR 2 GOOD 1	27,97 29,27 39,17
2	27	17	AU UNA	64,40	308,0	15,27 16,44 24,09 26,83 32,08 39,77	Z Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 3 GOOD 2 FAIR 1 GOOD 2	13,44 14,81 22,26 25,00 30,29 33,94
2	27	18	VITU IS	274,20	307,6	38,98 39,80 40,95 42,17 49,80 53,00 56,81	Z Z Z Z Z Z Z	POOR 1 FAIR 2 POOR 2 FAIR 2 FAIR 1 POOR 2 FAIR 3	37,18 37,97 39,12 40,34 43,97 51,17 56,90
2	27	19	RAHAUL	215,42	18,6	34,10 38,44 40,10 40,77 41,60 43,60 46,37	Z Z Z Z Z Z Z	POOR 4 POOR 3 POOR 2 POOR 2 POOR 2 POOR 2 POOR 2	32,27 36,61 38,27 39,94 41,77 46,54
2	27	20	RAL	213,59	19,8	37,77 41,10 44,77 47,87	Z Z Z Z	POOR 4 POOR 3 POOR 2 POOR 2	39,94 39,27 42,94 46,04
2	27	21	SUL	713,28	19,9	39,03	Z	POOR 3	37,20
2	27	22	TAV	213,12	20,4	36,27 39,04 40,77 42,10	Z Z Z Z	POOR 3 POOR 2 POOR 2 FAIR 2	34,44 37,21 38,94 40,27
2	27	23	VUL	204,96	18,6	39,70	Z	FAIR 2	33,87

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MBL SEC
2	27	15	GRA	160.01	281.5	29.40	Z	GOOD 1	27.57
						31.10	Z	FAIR 2	29.27
						37.00	Z	GOOD 1	35.17
2	27	17	AU UNA	64.40	300.0	15.27	Z	GOOD 1	13.44
						16.44	Z	GOOD 1	14.61
						24.09	Z	GOOD 3	22.26
						26.83	Z	GOOD 2	25.00
						32.08	Z	FAIR 1	30.25
						35.77	Z	GOOD 2	33.94
2	27	18	VITU IS.	274.20	302.6	38.98	Z	POOR 1	37.15
						39.80	Z	FAIR 2	37.97
						40.95	Z	POOR 2	39.12
						42.17	Z	FAIR 2	40.34
						45.80	Z	FAIR 1	43.97
						53.00	Z	POOR 2	51.17
						58.81	Z	FAIR 3	56.98
2	27	19	RABAUL	215.42	18.6	34.10	Z	POOR 4	32.27
						38.44	Z	POOR 3	36.61
						40.10	Z	POOR 2	38.27
						41.77	Z	POOR 2	39.94
						43.60	Z	POOR 2	41.77
						48.37	Z	POOR 2	46.54
2	27	20	RAL	213.55	19.8	37.77	Z	POOR 4	35.94
						41.10	Z	POOR 3	39.27
						44.77	Z	POOR 2	42.94
						47.87	Z	POOR 2	46.04
2	27	21	SUL	213.28	19.5	39.03	Z	POOR 3	37.20
2	27	22	TAV	213.12	20.4	36.27	Z	POOR 3	34.44
						39.04	Z	POOR 2	37.21
						40.77	Z	POOR 2	38.94
						42.10	Z	FAIR 2	40.27
2	27	23	VUL	204.96	18.8	35.70	Z	FAIR 2	33.87
						37.07	Z	GOOD 2	35.24
						38.84	Z	POOR 2	37.01
						41.14	Z	GOOD 1	39.31
						43.10	Z	POOR 2	41.27
						48.57	Z	FAIR 2	46.74
2	27	24	WAN	215.31	18.6	38.07	Z	POOR 3	36.24
						39.90	Z	POOR 3	38.07
						43.10	Z	POOR 2	41.27
						44.44	Z	POOR 3	42.61
3	28	1	RAUANA	62.61	144.3	13.50	Z	POOR 1	12.71
						14.60	Z	POOR 1	13.81
						15.54	Z	FAIR 1	14.75
						17.89	Z	FAIR 1	17.10
3	28	2	NONGA	45.73	137.0	10.22	Z	GOOD 1	9.43
						16.78	Z	FAIR 3	15.99
						19.60	Z	POOR 3	18.61
3	28	4	KABANGA	84.67	142.4	16.02	Z	FAIR 1	15.23
						21.36	Z	FAIR 1	20.59
3	28	5	VULCAN	56.75	147.6	11.96	Z	FAIR 1	11.17
						12.23	Z	FAIR 1	11.44
						12.36	Z	FAIR 1	11.57
						14.70	Z	FAIR 1	13.91
3	28	6	RAVALIEN	68.72	143.4	13.92	Z	GOOD 1	13.13
						14.69	Z	GOOD 1	13.90
						16.68	Z	GOOD 2	15.89
						17.13	Z	GOOD 2	16.34
						21.70	M	FAIR 2	20.91
3	28	7	KURAKAKL	49.58	147.2	11.05	Z	GOOD 1	10.26
						14.40	Z	GOOD 2	13.61
						17.30	Z	GOOD 3	16.91
3	28	8	BURMA RD	52.70	145.9	11.70	Z	FAIR 2	10.91
3	28	10	PRAED PT	59.50	139.7	12.38	Z	POOR 1	11.59
						13.38	Z	FAIR 2	12.59
3	28	11	NAPOPO	73.64	136.7	14.32	Z	GOOD 1	13.93
						17.15	Z	GOOD 2	16.36
3	28	14	WATON IS	38.35	142.8	8.73	Z	GOOD 1	7.94
						12.86	Z	GOOD 3	12.07
3	28	15	TAVUI	45.48	136.3	10.10	Z	GOOD 1	9.31
						12.40	Z	GOOD 2	11.61
						14.10	Z	GOOD 2	13.31
						16.40	Z	GOOD 2	15.61
3	28	16	VUNAKAKR	52.09	153.1	11.38	Z	GOOD 2	10.59
3	28	17	MTVARZIN	68.70	153.2	12.94	M	GOOD 3	12.15
3	28	18	MALAPAU	66.50	145.1	13.77	Z	GOOD 1	12.98
						19.78	Z	GOOD 1	18.99
						21.09	Z	FAIR 1	20.30
						23.62	Z	POOR 1	22.83
						27.03	Z	POOR 1	26.24
						27.60	Z	FAIR 3	26.81
						35.54	Z	GOOD 1	34.75
3	28	19	RABAUL	49.89	141.7	11.07	Z	FAIR 2	10.28
						14.67	Z	FAIR 2	13.88
						20.30	Z	FAIR 2	19.91
3	28	20	RAL	54.65	140.9	11.37	Z	GOOD 1	10.98
						12.63	Z	POOR 3	11.64
3	28	21	BUL	53.92	141.7	11.63	Z	GOOD 1	10.84
						13.03	Z	POOR 2	12.24
						17.03	Z	POOR 2	16.24
3	28	22	TAV	56.67	140.1	11.73	Z	GOOD 1	10.94
						12.33	Z	FAIR 2	11.54

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
3	28	22	TAV	56.87	140.1	13.00 14.30	Z Z	FAIR 2 GOOD 1	12.21 13.51
3	28	23	VUL	56.81	150.2	11.70 12.07	Z Z	GOOD 1 GOOD 1	10.91 11.28
3	28	24	WAN	50.56	141.4	10.90 13.10	Z Z	GOOD 1 GOOD 2	10.11 12.31
3	28A	2	NONGA	66.70	149.5	12.58 15.55 16.07 19.92	Z Z Z Z	GOOD 1 FAIR 3 POOR 3 POOR 23	11.76 14.73 15.55 19.10
3	28A	4	KABANGA	106.08	149.2	18.33 24.22	Z Z	FAIR 1 POOR 1	17.51 23.40
3	28A	5	VULCAN	79.18	155.3	14.36	Z	POOR 2	13.94
3	28A	6	RAVALIEN	90.42	151.1	17.24 18.51 19.12 20.69 27.69	Z Z Z Z H	GOOD 1 FAIR 2 FAIR 2 FAIR 2 GOOD 3	16.42 18.09 18.30 19.87 26.87
3	28A	7	KURAKAKL	72.05	155.8	14.40 15.55	Z Z	POOR 3 POOR 3	13.58 14.73
3	28A	10	PRAED PT	80.70	149.4	14.84	Z	FAIR 1	14.02
3	28A	11	RAPOPO	94.47	147.2	16.69 21.34	Z Z	POOR 3 FAIR 1	15.87 20.52
3	28A	14	WATOM IS	60.40	154.7	11.53	Z	FAIR 1	10.71
3	28A	15	TAVUI	66.34	149.1	12.80 14.50 18.60	Z Z Z	GOOD 1 GOOD 2 GOOD 2	11.98 13.68 17.78
3	28A	17	MTVARZIN	91.75	158.6	16.78 21.32 24.99 27.34 30.57	Z Z Z Z Z	GOOD 2 FAIR 2 POOR 3 GOOD 2 POOR 2	15.96 20.50 24.17 26.52 29.75
3	28A	18	HALAPAU	88.50	152.7	16.44 17.59 19.44 20.29 23.12 24.63 26.99	Z Z Z Z Z Z Z	GOOD 1 FAIR 2 GOOD 2 GOOD 2 FAIR 3 GOOD 2 GOOD 1	15.62 16.77 18.62 19.47 22.30 23.81 26.17
3	28A	19	RABAU	71.56	152.1	13.69 15.02 17.02 19.36 20.69	Z Z Z Z Z	POOR 3 POOR 2 POOR 2 POOR 2 POOR 2	12.87 14.28 16.20 18.54 19.87
3	28A	20	RAL	76.10	150.8	13.82 15.29 17.49 20.69	Z Z Z Z	FAIR 2 POOR 3 POOR 2 FAIR 3	13.00 14.47 16.67 19.87
3	28A	21	SUL	75.52	151.5	14.02	Z	POOR 4	13.20
3	28A	22	TAV	78.15	149.9	14.16 20.36	Z Z	FAIR 1 FAIR 2	13.34 19.54
3	28A	23	VUL	79.57	157.2	14.79 16.59 20.52	Z Z Z	FAIR 2 FAIR 2 FAIR 2	13.97 15.77 19.70
3	28A	24	WAN	72.16	151.7	13.32 15.36	Z Z	GOOD 1 FAIR 2	12.50 14.54
3	29	1	RALUANA	44.60	145.9	11.04 13.02 13.38	Z Z Z	FAIR 3 POOR 3 POOR 3	10.55 12.53 12.89
3	29	2	NONGA	27.71	134.8	6.83 8.68 9.84 12.41 14.43	Z Z Z Z Z	GOOD 1 GOOD 2 FAIR 2 POOR 2 POOR 2	6.34 8.19 9.35 11.92 13.94
3	29	4	KABANGA	66.62	143.0	13.13 13.27 14.05	Z Z Z	FAIR 1 FAIR 1 POOR 1	12.64 12.78 13.56
3	29	5	VULCAN	38.89	151.0	8.60 8.88 12.43 13.12	Z Z Z Z	FAIR 1 FAIR 1 FAIR 1 FAIR 1	8.11 8.39 11.94 12.63
3	29	6	RAVALIEN	50.69	144.5	10.78 11.55 12.77 17.25	Z Z Z H	GOOD 2 GOOD 2 FAIR 2 FAIR 3	10.29 11.06 12.28 16.76
3	29	7	KURAKAKL	31.71	151.1	7.65 9.65 13.90	Z Z Z	GOOD 1 GOOD 2 FAIR 2	7.16 9.16 13.41
3	29	8	BURMA RD	34.76	148.8	8.41	Z	FAIR 2	7.92
3	29	10	PRAED PT	41.43	139.5	9.24 10.46 12.31	Z Z Z	POOR 1 POOR 2 POOR 1	8.75 9.97 11.82
3	29	11	RAPOPO	59.58	138.2	11.30 14.98	Z Z	FAIR 1 FAIR 2	10.81 14.09
3	29	14	WATOM IS	20.32	145.2	5.37 9.37	Z Z	GOOD 1 GOOD 3	4.88 8.88
3	29	15	TAVUI	27.48	133.8	6.85 9.05	Z Z	GOOD 1 GOOD 2	6.36 8.96

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM NSL SEC
3	29	15	TAVUI	27.48	133.8	10.15 12.05	Z Z	GOOD 2 GOOD 2	9.66 11.96
3	29	16	VUNAKAKR	34.72	159.8	8.39	Z	FAIR 2	7.90
3	29	17	MTVARZIN	51.26	157.8	16.90 20.75	Z Z	GOOD 1 FAIR 2	10.01 20.26
3	29	18	HALAPAU	48.52	147.0	10.26 11.36 11.75 12.48 14.39 16.37	Z Z Z Z Z Z	GOOD 2 FAIR 2 POOR 3 FAIR 2 FAIR 2 FAIR 2	9.77 10.87 11.26 11.99 13.90 15.88
3	29	19	RABAUL	31.83	142.6	7.78 9.08 10.95 12.08	Z Z Z Z	FAIR 2 POOR 2 POOR 2 FAIR 2	7.29 8.99 10.46 11.59
3	29	20	RAL	36.98	141.2	8.15 9.75	Z Z	GOOD 1 POOR 3	7.88 9.26
3	29	21	SUL	35.85	142.4	8.25 9.25 11.02 14.92 16.12	Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 FAIR 2 FAIR 2	7.76 8.76 10.93 14.03 15.63
3	29	22	TAV	38.79	140.0	8.65 11.62 13.08	Z Z Z	GOOD 1 FAIR 2 POOR 2	8.16 11.13 12.59
3	29	23	VUL	39.14	154.8	8.55 8.95 9.48 10.25	Z Z Z Z	POOR 2 GOOD 2 POOR 2 FAIR 3	8.06 8.46 8.99 9.76
3	29	24	WAN	32.49	142.0	7.62 9.38	Z Z	GOOD 1 FAIR 2	7.13 8.89
3	30	1	RALUANA	26.01	153.4	6.52 7.42 8.30 9.65	Z Z Z Z	POOR 1 FAIR 1 FAIR 1 FAIR 1	6.27 7.22 8.08 9.40
3	30	2	NONGA	8.60	133.0	3.19	Z	GOOD 1	2.94
3	30	4	KABANGA	47.22	145.9	9.91 11.93	Z Z	FAIR 1 FAIR 1	9.66 11.68
3	30	5	VULCAN	21.07	164.8	5.43 5.81 9.33	Z Z Z	FAIR 1 FAIR 1 FAIR 1	5.18 5.56 9.08
3	30	6	RAYALIEN	31.94	149.7	7.51 8.16 9.19 10.14	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2	7.26 7.91 8.94 9.89
3	30	6	RAYALIEN	31.94	149.7	12.34	H	GOOD 2	12.09
3	30	7	MURAKAKL	14.24	172.0	4.35 5.36 7.63	Z Z Z	GOOD 1 GOOD 1 FAIR 3	4.10 5.13 7.56
3	30	8	BURMA RD	16.23	163.8	4.73 5.67	Z Z	FAIR 2 FAIR 2	4.48 5.62
3	30	10	MRAED PT	22.40	142.8	5.81 7.46 11.03	Z Z Z	FAIR 1 FAIR 2 FAIR 2	5.56 7.21 10.78
3	30	11	RAPOPO	36.50	139.5	7.97 9.78 10.17 11.53 14.13 16.70	Z Z Z Z T T	GOOD 1 FAIR 1 GOOD 1 GOOD 1 GOOD 2 FAIR 2	7.72 9.53 9.92 11.28 13.88 16.49
3	30	14	WATOH IS	3.49	210.3	1.99	Z	GOOD 1	1.34
3	30	15	TAVUI	8.40	129.5	3.10 6.50 8.00	Z Z Z	GOOD 1 GOOD 2 GOOD 2	2.85 6.25 7.75
3	30	16	VUNAKAKR	18.97	184.2	4.25	Z	GOOD 2	4.00
3	30	17	MTVARZIN	34.32	169.9	6.48	Z	POOR 4	6.23
3	30	18	HALAPAU	30.01	154.1	7.33 8.23 9.53 11.26 14.55 16.37 19.50	Z Z Z Z Z Z Z	GOOD 1 POOR 2 POOR 2 FAIR 1 GOOD 1 GOOD 2 GOOD 1	7.08 7.98 9.26 11.01 14.30 16.12 19.25
3	30	19	RABAUL	13.06	152.7	4.18 6.01 12.88	Z Z Z	GOOD 1 GOOD 2 FAIR 3	3.93 5.76 12.63
3	30	20	RAL	17.65	147.2	4.68	Z	GOOD 1	4.43
3	30	21	SUL	17.02	150.0	4.75 5.88 7.38 8.68	Z Z Z Z	GOOD 1 GOOD 1 FAIR 3 POOR 3	4.50 5.63 7.13 8.43
3	30	22	TAV	19.79	144.1	5.05 6.68	Z Z	GOOD 1 GOOD 2	4.80 6.43
3	30	23	VUL	22.00	171.4	5.48 5.68 6.68 7.58	Z Z Z Z	POOR 2 GOOD 1 POOR 2 GOOD 2	5.23 5.43 6.43 7.33
3	30	24	WAN	13.67	151.0	4.01 5.08	Z Z	GOOD 1 POOR 2	3.76 4.83

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
3	30	24	MAN	13.67	151.0	5.68 7.98	Z Z	FAIR 2 FAIR 2	5.43 7.73
3	31	1	RALUANA	19.13	154.9	5.82 6.95 8.51	Z Z Z	GOOD 1 GOOD 1 GOOD 1	5.77 6.90 8.46
3	31	2	NONGA	2.75	88.7	1.35 1.65 4.23	Z Z Z	GOOD 1 GOOD 1 FAIR 2	1.30 1.60 4.18
3	31	4	KABANGA	40.83	149.4	8.41 10.56	Z Z	FAIR 1 FAIR 1	8.36 10.51
3	31	5	VULCAN	14.54	172.2	3.91 3.99 4.12 5.67 47.52	Z Z Z Z Z	POOR 1 FAIR 1 FAIR 1 FAIR 1 FAIR 1	3.86 3.94 4.07 5.62 47.47
3	31	6	RAVALIEN	25.04	149.9	6.17 6.47 7.94 8.86 9.56	Z Z Z Z H	GOOD 1 GOOD 1 GOOD 2 GOOD 2 GOOD 2	6.12 6.42 7.89 8.81 9.51
3	31	7	KURAKAKL	8.32	190.9	3.09 4.16 5.51	Z Z Z	GOOD 1 GOOD 2 GOOD 2	3.04 4.11 5.46
3	31	8	BURMA RD	10.19	173.7	3.53	Z	FAIR 2	3.48
3	31	10	PRAED PT	15.55	140.0	4.17 7.63	Z Z	POOR 1 FAIR 1	4.12 7.98
3	31	11	RAPOPO	29.71	137.3	6.60 9.00	Z Z	GOOD 1 FAIR 2	6.55 8.95
3	31	14	WATOM IS	6.05	298.8	2.26	Z	GOOD 1	2.21
3	31	15	TAVUI	2.99	78.7	1.60 5.40 6.40 8.60	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 FAIR 2	1.55 5.35 6.35 8.55
3	31	16	VUNAKAKR	13.90	200.8	5.69	Z	GOOD 2	5.64
3	31	18	HALAPAU	23.14	155.6	5.94 6.73 9.33 9.78 10.61 12.64 14.77	Z Z Z Z Z Z Z	GOOD 2 GOOD 2 FAIR 2 POOR 2 FAIR 2 POOR 2 GOOD 2	5.89 6.68 9.28 9.73 10.56 12.59 14.72
3	31	19	RABAU	6.18	156.8	2.43 5.16 9.76	Z Z Z	GOOD 1 GOOD 2 GOOD 2	2.38 5.11 9.71
3	31	20	RAL	10.75	146.0	3.13 4.46	Z Z	GOOD 1 GOOD 3	3.08 4.41
3	31	21	SUL	10.12	150.6	3.09 7.29	Z Z	GOOD 1 POOR 3	3.04 7.24
3	31	22	TAV	12.92	141.5	3.73 5.06	Z Z	GOOD 1 GOOD 2	3.68 5.01
3	31	23	VUL	15.82	188.9	4.46 5.43 7.56 9.76	Z Z Z Z	GOOD 1 FAIR 2 POOR 2 POOR 2	4.41 5.38 7.51 9.71
3	31	24	MAN	6.76	152.9	2.43	Z	GOOD 1	2.38
3	32	1	RALUANA	8.81	140.7	3.49 4.19 4.33 5.76	Z Z Z Z	POOR 1 POOR 1 FAIR 1 GOOD 1	3.51 4.21 4.35 5.78
3	32	2	NONGA	10.57	1.2	3.01	Z	GOOD 1	3.03
3	32	4	KABANGA	30.99	138.2	6.84 8.45 10.70	Z Z Z	FAIR 1 FAIR 1 FAIR 1	6.86 8.47 10.72
3	32	5	VULCAN	3.94	188.1	1.50 1.55 1.65	Z Z Z	GOOD 1 GOOD 1 GOOD 1	1.52 1.57 1.67
3	32	7	KURAKAKL	4.72	299.6	1.70	Z	GOOD 1	1.72
3	32	8	BURMA RD	1.47	284.6	1.03	Z	GOOD 1	1.05
3	32	10	PRAED PT	7.60	100.7	2.73 3.97	Z Z	GOOD 1 GOOD 1	2.75 3.99
3	32	11	RAPOPO	20.94	122.8	5.28 7.43 9.30 12.05 13.76	Z Z Z Z Z	FAIR 1 POOR 2 FAIR 2 FAIR 2 GOOD 1	5.30 7.45 9.32 12.07 13.78
3	32	14	WATOM IS	15.54	329.7	3.98 5.76 8.22 9.42	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2	4.00 5.78 8.24 9.44
3	32	15	TAVUI	11.10	2.1	3.20 4.00 5.30	Z Z Z	GOOD 1 GOOD 2 FAIR 2	3.22 4.02 5.32
3	32	16	VUNAKAKR	7.87	251.6	2.79 5.70	Z Z	GOOD 2 POOR 2	2.81 5.72
3	32	19	RABAU	4.82	358.9	1.97 4.40 7.70	Z Z Z	GOOD 2 POOR 2 FAIR 2	1.99 4.42 7.72

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM SEC	MSL
3	32	20	RAL	3.83	65.4	1.70 2.07 2.80	Z Z Z	FAIR 1 FAIR 2 GOOD 3	1.72 2.09 2.82	
3	32	21	SUL	2.96	55.3	1.60	Z	GOOD 1	1.62	
3	32	22	TAV	5.53	85.9	2.03 3.03 4.20	Z Z Z	GOOD 1 GOOD 1 GOOD 1	2.09 3.05 4.22	
3	32	23	VUL	6.00	207.6	2.03 3.10 4.60 5.70	Z Z Z Z	GOOD 1 FAIR 2 POOR 2 POOR 2	2.09 3.12 4.62 5.72	
3	32	24	WAN	4.52	7.1	1.67 2.80 3.60 4.60	Z Z Z Z	FAIR 1 FAIR 2 POOR 2 POOR 2	1.69 2.82 3.62 4.62	
3	33	1	RALUANA	6.06	142.7	2.65 3.14 3.96	Z Z Z	FAIR 1 FAIR 1 GOOD 1	2.62 3.11 3.93	
3	33	2	NONGA	12.68	892.3	3.44 3.86 6.20	Z Z Z	FAIR 1 GOOD 1 GOOD 3	3.41 3.83 6.17	
3	33	4	KABANGA	28.23	138.4	6.65 8.27 9.05 10.93	Z Z Z Z	FAIR 1 FAIR 1 POOR 1 POOR 1	6.62 8.24 9.02 10.90	
3	33	5	VULCAN	3.12	232.3	1.18 1.46 1.94	Z Z Z	FAIR 1 GOOD 1 GOOD 1	1.15 1.43 1.91	
3	33	7	KURAKAKL	7.41	305.8	2.37 3.23 4.16	Z Z Z	GOOD 1 GOOD 2 GOOD 2	2.34 3.20 4.13	
3	33	8	BURMA RD	4.08	309.4	1.76	Z	FAIR 2	1.73	
3	33	10	PRAED PT	5.58	84.0	2.45 3.56	Z Z	GOOD 1 GOOD 2	2.42 3.53	
3	33	11	RAPOPO	18.26	120.8	4.86 6.71 7.56 9.41 12.12	Z Z Z Z Z	POOR 3 POOR 2 FAIR 1 FAIR 2 GOOD 1	4.83 6.68 7.93 9.38 12.09	
3	33	14	WATOM IS	18.24	327.7	4.40 5.94	Z Z	GOOD 1 FAIR 2	4.37 5.91	
3	33	15	TAVUI	13.17	353.4	3.50 7.30	Z Z	GOOD 1 FAIR 2	3.47 7.27	
3	33	16	VUNAKAKR	9.39	867.0	3.01	Z	GOOD 2	2.98	
3	33	19	RABAU	7.11	343.6	2.36 3.96 4.66	Z Z Z	FAIR 2 FAIR 2 GOOD 2	2.33 3.93 4.63	
3	33	20	RAL	3.92	23.0	1.76	Z	GOOD 1	1.73	
3	33	21	SUL	3.72	6.1	1.76 3.06	Z Z	GOOD 1 POOR 3	1.73 3.03	
3	33	22	TAV	4.33	56.4	1.96 2.66 3.09	Z Z Z	GOOD 1 GOOD 2 FAIR 2	1.93 2.63 3.06	
3	33	23	VUL	5.74	234.7	2.09 2.86	Z Z	GOOD 1 FAIR 2	2.06 2.83	
3	33	24	WAN	6.62	348.2	2.06 2.76 3.43 4.36 6.43	Z Z Z Z Z	FAIR 2 POOR 2 FAIR 2 FAIR 2 FAIR 2	2.03 2.73 3.40 4.33 6.40	
3	34	1	RALUANA	3.14	123.3	1.84	Z	GOOD 1	1.81	
3	34	2	NONGA	15.90	350.1	4.26 5.24 6.94	Z Z Z	FAIR 1 GOOD 1 GOOD 1	4.23 5.21 6.91	
3	34	4	KABANGA	25.24	135.5	6.06 6.80 7.31	Z Z Z	FAIR 1 POOR 1 POOR 1	6.03 6.77 7.28	
3	34	5	VULCAN	3.71	288.8	1.48 1.70 1.80	Z Z Z	FAIR 1 GOOD 1 GOOD 1	1.45 1.67 1.77	
3	34	6	RAVALIEN	9.30	130.6	3.43	Z	GOOD 1	3.40	
3	34	7	KURAKAKL	10.25	316.5	3.18 4.43 6.94	Z Z Z	GOOD 1 GOOD 2 GOOD 2	3.15 4.40 6.91	
3	34	8	BURMA RD	7.00	321.3	2.61	Z	GOOD 1	2.58	
3	34	10	PRAED PT	5.82	50.7	2.55 3.94	Z Z	GOOD 1 GOOD 3	2.52 3.91	
3	34	11	RAPOPO	15.92	113.1	4.33 5.65	Z Z	GOOD 1 GOOD 1	4.30 5.62	
3	34	14	WATOM IS	21.44	329.8	5.15 5.95 7.51	Z Z Z	GOOD 1 GOOD 2 POOR 2	5.12 5.92 7.48	
3	34	15	TAVUI	16.39	351.0	4.50 6.10 7.40	Z Z Z	GOOD 1 FAIR 2 FAIR 2	4.47 6.07 7.37	

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
3	34	16	VUNAKAKR	10.74	284.1	3.39	Z	GOOD 2	3.36
3	34	17	MTVARZIN	12.62	193.8	3.93	Z	GOOD 3	3.90
						21.73	Z	GOOD 1	21.70
						22.73	H	GOOD 2	22.70
						30.27	Z	GOOD 2	30.24
						32.73	Z	POOR 2	32.70
3	34	18	MALAPAU	6.82	143.3	2.80	Z	GOOD 1	2.77
						3.73	Z	GOOD 2	3.70
						4.63	Z	FAIR 2	4.60
						5.89	Z	POOR 2	5.86
						7.17	Z	FAIR 3	7.14
3	34	19	RABAUL	10.38	342.9	3.26	Z	FAIR 2	3.23
						4.63	Z	GOOD 2	4.60
						5.80	Z	FAIR 2	5.77
						6.76	Z	GOOD 2	6.73
3	34	20	RAL	6.72	4.5	2.60	Z	FAIR 1	2.57
						3.06	Z	FAIR 2	3.03
						3.73	Z	FAIR 3	3.70
3	34	21	SUL	6.81	355.6	2.73	Z	GOOD 1	2.70
						3.43	Z	FAIR 3	3.40
						11.06	Z	FAIR 2	11.03
3	34	22	TAV	6.06	29.0	2.06	Z	GOOD 1	2.03
3	34	23	VUL	5.74	267.9	2.20	Z	GOOD 1	2.17
3	34	24	MAN	9.88	345.9	2.93	Z	GOOD 2	2.90
						3.76	Z	GOOD 2	3.73
						4.83	Z	POOR 2	4.80
						5.70	Z	FAIR 2	5.67
						8.13	Z	POOR 2	8.10
						9.66	Z	FAIR 3	9.63
3	35	1	RALUANA	1.07	168.3	0.61	Z	GOOD 1	0.51
3	35	2	HONGA	17.13	342.5	5.16	Z	POOR 2	5.06
						6.00	Z	GOOD 3	5.90
						6.77	Z	GOOD 1	6.67
						8.00	Z	FAIR 3	7.90
3	35	4	KABANGA	23.11	138.6	5.54	Z	FAIR 1	5.44
						7.22	Z	POOR 1	7.12
						9.04	Z	POOR 1	8.94
3	35	5	VULCAN	6.21	287.6	2.33	Z	FAIR 1	2.23
						2.58	Z	FAIR 1	2.48
						3.32	Z	FAIR 2	3.22
						3.46	Z	FAIR 1	3.36
3	35	6	RAVALIEN	7.11	139.1	2.78	Z	GOOD 1	2.68
						5.05	H	GOOD 2	4.95
3	35	7	MURAKAKL	12.46	310.6	3.69	Z	GOOD 1	3.59
3	35	7	MURAKAKL	12.46	310.6	5.00	Z	GOOD 2	4.90
						5.68	Z	GOOD 2	5.58
3	35	8	BURMA RD	9.15	312.2	3.21	Z	GOOD 1	3.11
3	35	10	PRAED PT	4.84	25.7	1.97	Z	FAIR 1	1.87
						3.29	Z	GOOD 1	3.19
3	35	11	RAPOPO	13.44	114.4	3.78	Z	GOOD 1	3.68
						4.93	Z	FAIR 2	4.83
						6.82	Z	FAIR 1	6.72
3	35	14	MATOM IS	23.30	325.5	5.65	Z	FAIR 1	5.55
						7.59	Z	GOOD 2	7.49
						10.21	Z	FAIR 3	10.11
3	35	15	TAVUJ	17.58	343.6	6.15	Z	GOOD 1	6.05
						7.65	Z	GOOD 1	7.55
3	35	16	VUNAKAKR	13.24	284.4	4.15	Z	GOOD 3	4.05
3	35	17	MTVARZIN	12.79	205.1	3.38	Z	GOOD 1	3.28
						6.53	H	FAIR 2	6.43
3	35	18	MALAPAU	5.07	160.8	2.15	Z	GOOD 2	2.05
						3.20	Z	FAIR 2	3.10
						6.02	Z	FAIR 2	5.92
3	35	19	RABAUL	11.92	332.7	3.82	Z	POOR 2	3.72
						4.98	Z	POOR 2	4.88
						6.45	Z	FAIR 2	6.35
						7.92	Z	GOOD 2	7.42
3	35	20	RAL	7.61	345.7	2.55	Z	POOR 2	2.45
						3.92	Z	FAIR 2	3.82
						4.35	Z	FAIR 2	4.25
						4.98	Z	FAIR 2	4.88
3	35	21	SUL	8.02	336.6	2.98	Z	FAIR 2	2.88
						4.25	Z	FAIR 3	4.15
						5.65	Z	GOOD 2	5.55
3	35	22	TAV	6.18	1.4	2.15	Z	GOOD 1	2.05
						3.82	Z	GOOD 1	3.72
3	35	23	VUL	8.15	273.2	2.75	Z	GOOD 1	2.65
						3.75	Z	FAIR 2	3.65
						4.25	Z	FAIR 2	4.15
3	35	24	MAN	11.33	334.9	3.28	Z	POOR 3	3.18
						4.65	Z	POOR 2	4.55
						5.65	Z	POOR 2	5.55
						6.25	Z	POOR 2	6.15
						6.98	Z	FAIR 2	6.88
						7.98	Z	FAIR 2	7.88
						9.28	Z	POOR 2	9.18
3	36	1	RALUANA	3.80	287.9	1.86	Z	GOOD 1	1.86
						2.33	Z	GOOD 1	2.33

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MS. SEC
3	36	2	NONGA	20.61	334.2	5.04 7.60 10.00	Z Z Z	POOR 3 FAIR 3 FAIR 3	5.04 7.60 10.00
3	36	4	KABANGA	18.97	142.8	4.79 5.06 5.69 6.70 7.32	Z Z Z Z Z	FAIR 1 FAIR 1 FAIR 1 FAIR 1 FAIR 1	4.79 5.06 5.69 6.70 7.32
3	36	5	VULCAN	10.57	292.7	3.22 3.49 6.15	Z Z Z	FAIR 1 GOOD 1 FAIR 1	3.22 3.49 6.15
3	36	6	RAVALIEN	3.27	165.3	1.78 2.48	Z H	GOOD 1 GOOD 1	1.78 2.48
3	36	7	KURAKAKL	16.83	307.8	4.72 5.20 6.17 8.57 10.90	Z Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2 GOOD 2	4.72 5.20 6.17 8.57 10.90
3	36	8	BURMA RD	13.50	308.2	4.25	Z	GOOD 1	4.25
3	36	10	PRAED PT	6.80	345.3	2.53 4.35	Z Z	FAIR 1 GOOD 1	2.53 4.35
3	36	11	RAPOPO	9.06	111.7	2.98	Z	GOOD 1	2.98
3	36	14	MATOH IS	27.35	321.5	6.33 8.25 10.72	Z Z Z	FAIR 2 FAIR 2 FAIR 3	6.33 8.25 10.72
3	36	15	TAVUI	21.00	335.3	5.25 8.55 10.15	Z Z Z	GOOD 1 GOOD 1 GOOD 1	5.25 8.55 10.15
3	36	16	VUNAKAKR	17.94	288.3	4.91	Z	GOOD 2	4.91
3	36	17	MTVARZIN	13.17	224.6	3.55 3.87 4.94 5.75 9.09 10.96 13.16	Z H H H Z Z Z	GOOD 1 GOOD 3 FAIR 2 FAIR 2 FAIR 1 FAIR 1 FAIR 1	3.55 3.87 4.94 5.75 9.09 10.96 13.16
3	36	18	MALAPAU	3.36	219.9	0.80	Z	GOOD 1	0.80
3	36	19	RABAU	15.82	324.1	4.75 6.32 7.45 9.45 10.85	Z Z Z Z Z	FAIR 2 FAIR 2 POOR 2 POOR 2 GOOD 2	4.75 6.32 7.45 9.45 10.85
3	36	20	NAL	11.15	329.2	3.42 5.15	Z Z	FAIR 2 POOR 2	3.42 5.15
3	36	20	NAL	11.15	329.2	6.08 7.08 8.05	Z Z Z	FAIR 2 FAIR 2 FAIR 2	6.08 7.08 8.05
3	36	21	BUL	11.80	325.1	3.78 4.72 6.05 7.45	Z Z Z Z	FAIR 2 FAIR 2 FAIR 2 GOOD 2	3.78 4.72 6.05 7.45
3	36	22	TAV	9.15	336.4	3.02 4.08 6.38	Z Z Z	GOOD 1 GOOD 1 FAIR 2	3.02 4.08 6.38
3	36	23	VUL	12.26	282.6	3.58 4.15 5.06 7.35	Z Z Z Z	GOOD 2 POOR 2 FAIR 2 FAIR 2	3.58 4.15 5.06 7.35
3	36	24	WAN	15.17	325.3	4.12 5.72 7.75 9.45 11.42	Z Z Z Z Z	POOR 3 POOR 3 FAIR 2 POOR 2 POOR 2	4.12 5.72 7.75 9.45 11.42
3	37	1	RALUANA	9.58	298.1	3.09	Z	GOOD 1	3.11
3	37	2	NONGA	25.89	327.8	5.88	Z	GOOD 1	5.90
3	37	4	KABANGA	13.50	150.6	3.79 3.84 4.07	Z Z Z	FAIR 1 FAIR 1 FAIR 1	3.81 3.86 4.09
3	37	5	VULCAN	16.37	297.0	4.33 4.48 5.85 6.98 10.21 10.86	Z Z Z Z Z Z	FAIR 1 FAIR 1 FAIR 1 FAIR 1 POOR 1 POOR 1	4.35 4.50 5.87 7.00 10.23 10.88
3	37	6	RAVALIEN	4.01	272.6	1.46 2.09	Z H	GOOD 1 GOOD 1	1.48 2.11
3	37	7	KURAKAKL	22.71	307.0	5.59 8.21 10.86	Z Z Z	GOOD 1 FAIR 1 FAIR 2	5.61 8.23 10.88
3	37	8	BURMA RD	19.38	307.1	5.09 7.54	Z Z	FAIR 2 FAIR 2	5.11 7.56
3	37	10	PRAED PT	11.90	326.5	3.62 7.51	Z Z	GOOD 1 GOOD 3	3.64 7.53
3	37	11	RAPOPO	3.58	90.0	1.67 2.45 3.02 4.06 6.46	Z Z Z Z Z	GOOD 1 FAIR 1 GOOD 1 GOOD 1 GOOD 2	1.69 2.47 3.04 4.08 6.48
3	37	14	MATOH IS	33.03	318.5	7.05	Z	FAIR 2	7.07

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HBU SEC
3	37	15	TAVUI	26.24	328.7	6.10 11.50	Z Z	GOOD 1 GOOD 1	6.12 11.52
3	37	16	VUNAKAKR	23.24	292.4	5.98 9.09 19.71 19.98	Z Z Z Z	GOOD 2 POOR 2 FAIR 2 FAIR 3	6.00 9.11 19.73 19.60
3	37	17	MTVARZIN	15.32	246.9	4.01 28.91 33.71	Z Z Z	GOOD 4 GOOD 3 GOOD 2	4.03 28.93 33.73
3	37	18	MALAPAU	7.04	276.3	2.47 4.25 16.46 19.41	Z Z Z Z	GOOD 1 FAIR 2 FAIR 3 GOOD 3	2.49 4.27 16.48 19.43
3	37	19	RABAUL	21.46	318.8	6.01 8.71 7.31 9.18 12.08	Z Z Z Z Z	POOR 4 POOR 3 POOR 2 FAIR 2 FAIR 2	6.03 6.73 7.33 9.20 12.10
3	37	20	RAL	16.69	320.8	4.21 4.91 5.71	Z Z Z	GOOD 1 POOR 2 FAIR 2	4.23 4.93 5.73
3	37	21	SUL	17.44	318.3	5.21 6.44 7.41 8.31 11.04	Z Z Z Z Z	POOR 2 FAIR 3 FAIR 3 FAIR 3 GOOD 2	9.23 6.46 7.43 8.33 11.06
3	37	22	TAV	14.50	324.0	3.91 5.38	Z Z	GOOD 1 FAIR 2	3.93 5.40
3	37	23	VUL	17.85	289.7	4.41 5.18 7.11 8.21	Z Z Z Z	GOOD 1 POOR 2 FAIR 2 POOR 3	4.43 5.20 7.13 8.23
3	37	24	WAN	20.78	319.6	5.11 6.11 7.71 9.11	Z Z Z Z	POOR 2 FAIR 3 FAIR 2 FAIR 2	5.13 6.13 7.73 9.13
3	38	1	RALUANA	30.16	315.7	7.22 9.09	Z Z	GOOD 1 GOOD 1	6.76 8.63
3	38	2	NONGA	47.09	325.9	9.71 10.63 11.60 12.80	Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 FAIR 2	9.25 10.17 11.14 12.34
3	38	4	KABANGA	8.00	311.6	2.85 4.79 37.49 43.06	Z Z Z Z	GOOD 1 POOR 1 POOR 1 FAIR 1	2.39 4.33 37.03 42.60
3	38	5	VULCAN	36.61	312.0	7.98 9.91	Z Z	POOR 1 POOR 1	7.92 9.43
3	38	6	RAVALIEN	23.96	316.1	6.07 7.73 9.23	Z Z H	GOOD 1 GOOD 1 FAIR 2	5.61 7.27 8.77
3	38	7	MURAKAKL	43.48	315.0	9.34 9.78 12.65 13.28	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2	8.88 9.32 12.19 12.82
3	38	8	BURMA RD	40.19	315.7	9.30	Z	POOR 3	8.84
3	38	10	PRAED PT	33.12	324.6	7.64 9.12 10.92 12.43	Z Z Z Z	FAIR 1 FAIR 3 FAIR 3 FAIR 3	7.18 8.66 10.46 11.97
3	38	11	RAPOPO	19.32	332.1	5.16 6.67 12.12	Z Z Z	GOOD 1 GOOD 1 FAIR 1	4.70 6.21 11.66
3	38	14	MATOM IS	54.21	320.5	10.85	Z	FAIR 2	10.39
3	38	15	TAVUI	47.42	326.4	9.80 11.40 14.40	Z Z Z	GOOD 1 GOOD 1 FAIR 2	9.34 10.94 13.94
3	38	16	VUNAKAKR	42.84	307.2	9.51 11.25 13.65 15.15	Z Z Z Z	GOOD 2 GOOD 2 GOOD 2 POOR 3	9.05 10.79 13.19 14.69
3	38	18	MALAPAU	26.51	312.3	6.40 7.55 9.48 10.00 11.93 12.18 13.93	Z Z Z Z Z Z Z	GOOD 2 GOOD 1 GOOD 1 FAIR 1 FAIR 1 FAIR 2 GOOD 2	5.94 7.09 9.02 9.54 11.07 11.72 13.47
3	38	19	RABAUL	42.65	321.2	9.48	Z	POOR 4	9.02
3	38	20	RAL	37.91	322.3	8.11 8.78 9.68 10.78 11.68	Z Z Z Z Z	POOR 2 POOR 3 POOR 3 POOR 2 POOR 3	7.65 8.32 9.22 10.32 11.22
3	38	21	SUL	38.63	321.2	8.58 10.45	Z Z	POOR 3 POOR 3	8.12 9.99
3	38	22	TAV	35.72	323.7	7.78	Z	GOOD 1	7.32
3	38	23	VUL	37.40	308.1	8.11 9.28	Z Z	FAIR 2 GOOD 2	7.65 8.82

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
3	38	24	WAN	41.98	321.6	8.78 10.45 13.98 15.65	Z Z Z Z	POOR 3 POOR 2 POOR 3 POOR 2	8.32 9.99 13.12 15.19
3	38A	1	RALUANA	45.93	317.5	10.37 12.60	Z Z	FAIR 1 FAIR 1	9.57 11.80
3	38A	2	NONGA	62.86	324.6	12.90 14.38	Z Z	GOOD 1 FAIR 1	12.10 13.58
3	38A	5	VULCAN	52.29	314.7	11.54	Z	POOR 1	10.74
3	38A	6	RAVALIEN	39.74	318.0	9.13 10.36 11.71 13.21 17.46	Z Z Z Z H	GOOD 1 GOOD 2 GOOD 2 GOOD 3 GOOD 2	8.33 9.56 10.91 12.41 16.66
3	38A	7	KURAKAKL	59.23	316.6	12.47 15.11 15.86 17.21	Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 GOOD 2	11.67 14.31 15.06 16.41
3	38A	10	BRAED PT	48.91	323.4	10.71 11.50 12.71 15.74	Z Z Z Z	FAIR 1 FAIR 1 FAIR 1 FAIR 1	9.91 10.70 11.91 14.94
3	38A	11	RAPOPO	34.97	327.1	8.35 10.65	Z Z	GOOD 1 FAIR 2	7.55 9.85
3	38A	14	WATON IS	70.02	320.6	13.93 16.21	Z Z	FAIR 2 FAIR 3	13.13 15.41
3	38A	15	TAVUI	63.19	325.0	12.90 15.40	Z Z	GOOD 1 FAIR 2	12.10 14.60
3	38A	16	VUNAKAKR	58.32	310.9	12.35	Z	GOOD 2	11.55
3	38A	19	RABAUL	58.47	321.1	12.81	Z	POOR 4	12.01
3	38A	20	RAL	53.72	321.9	11.68 13.91 14.71 16.38	Z Z Z Z	POOR 2 FAIR 2 FAIR 2 FAIR 2	10.88 13.11 13.91 15.58
3	38A	21	SUL	54.44	321.1	12.06 15.61	Z Z	POOR 3 POOR 2	11.26 14.81
3	38A	22	TAV	51.53	322.9	11.04 13.31	Z Z	GOOD 1 POOR 3	10.24 12.51
3	38A	23	VUL	52.94	311.9	11.31 12.71 13.81	Z Z Z	GOOD 1 GOOD 2 FAIR 2	10.51 11.91 13.01
3	38A	24	WAN	57.80	321.4	12.21 13.38	Z Z	POOR 2 POOR 2	11.41 12.98
3	38A	24	WAN	57.80	321.4	14.64	Z	POOR 2	13.84
3	39	2	NONGA	76.06	327.3	15.21 16.55 18.08 19.27	Z Z Z Z	FAIR 1 POOR 3 FAIR 3 POOR 3	13.98 15.12 16.85 18.04
3	39	5	VULCAN	64.86	319.8	13.46 13.97	Z Z	POOR 2 POOR 1	12.23 12.74
3	39	6	RAVALIEN	52.61	323.5	11.86 12.66 13.56 15.46 16.81	Z Z Z Z H	GOOD 1 GOOD 2 GOOD 3 GOOD 3 GOOD 2	10.63 11.43 12.33 14.23 15.58
3	39	7	KURAKAKL	71.92	320.8	14.66 16.02 18.47	Z Z Z	GOOD 1 GOOD 2 GOOD 2	13.43 14.79 17.24
3	39	8	BURMA RD	68.71	321.5	15.16	Z	FAIR 2	13.93
3	39	10	BRAED PT	62.07	326.9	13.33 13.99 15.07 15.77 17.49	Z Z Z Z Z	FAIR 1 FAIR 2 FAIR 2 FAIR 1 GOOD 2	12.10 12.76 13.84 14.54 16.26
3	39	11	RAPOPO	48.31	330.6	11.25 13.15	Z Z	GOOD 1 POOR 2	10.02 11.92
3	39	14	WATON IS	82.98	323.6	16.33 18.02 18.99	Z Z Z	FAIR 2 FAIR 3 POOR 3	15.10 16.79 17.76
3	39	15	TAVUI	76.40	327.6	15.50 20.70	Z Z	POOR 2 FAIR 2	14.27 19.47
3	39	16	VUNAKAKR	70.54	316.2	14.92 18.27 23.06	Z Z Z	GOOD 2 FAIR 3 FAIR 3	13.69 17.04 21.83
3	39	18	MALAPAU	54.89	321.3	11.97 13.76 15.24 16.51 18.29 21.15 26.00	Z Z Z Z Z Z Z	GOOD 1 GOOD 3 FAIR 2 FAIR 2 GOOD 1 FAIR 2 GOOD 1	10.74 12.53 14.01 15.28 17.06 19.92 24.77
3	39	19	RABAUL	71.47	324.6	15.16 18.03	Z Z	POOR 3 POOR 2	13.93 16.80
3	39	20	RAL	66.78	325.5	13.86 15.16 17.29 20.86	Z Z Z Z	POOR 3 FAIR 2 FAIR 2 FAIR 2	12.63 13.93 16.06 19.63
3	39	21	SUL	67.46	324.8	14.26	Z	POOR 3	13.03

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
3	39	21	SUL	67.46	324.8	14.96 17.96	Z Z	POOR 2 POOR 3	13.73 16.73
3	39	22	TAV	64.65	326.3	13.46	Z	FAIR 3	12.23
3	39	23	VUL	65.27	317.9	13.66 15.14 16.26 17.66	Z Z Z Z	FAIR 1 POOR 2 FAIR 3 FAIR 2	12.43 13.93 15.03 16.43
3	39	24	MAN	70.82	324.8	13.33 16.86 18.96 20.99	Z Z Z Z	POOR 3 POOR 2 POOR 2 POOR 2	12.40 15.43 17.33 19.76
3	40	1	HALUANA	72.25	317.7	15.01	Z	POOR 1	14.20
3	40	2	NONGA	89.06	322.7	17.84 18.72 20.42 22.05	Z Z Z Z	POOR 1 FAIR 1 FAIR 2 GOOD 3	17.03 17.91 19.61 21.24
3	40	4	KABANGA	90.06	317.9	11.47 12.12 16.07 21.23 34.41	Z Z Z Z Z	POOR 1 FAIR 1 FAIR 1 FAIR 1 FAIR 1	10.66 11.31 13.26 20.42 33.60
3	40	6	RAVALIEN	66.06	318.0	14.20 16.13 17.08 18.03 19.48 23.83	Z Z Z Z Z H	POOR 3 FAIR 3 FAIR 3 FAIR 3 POOR 3 FAIR 3	13.39 15.32 16.27 17.22 18.67 23.02
3	40	7	KURAKAKL	85.94	317.0	16.08 18.30	Z Z	POOR 2 GOOD 4	15.27 17.49
3	40	10	DRAED PT	75.19	321.5	16.02 19.68	Z Z	POOR 3 POOR 3	15.21 18.87
3	40	11	RAPOPO	61.10	323.2	13.28 13.78 25.53	Z Z Z	POOR 3 GOOD 2 GOOD 1	12.47 12.97 24.72
3	40	14	WATON IS	96.32	319.9	18.77 20.99 23.70	Z Z Z	POOR 3 FAIR 2 POOR 2	17.96 20.18 22.39
3	40	15	TAVUI	89.36	323.0	18.50 19.10 22.00	Z Z Z	POOR 3 POOR 2 POOR 2	17.69 18.29 21.19
3	40	16	VUNAKAKR	84.90	313.1	18.68 20.22 22.84 24.71 28.43 34.51	Z Z Z Z Z Z	FAIR 2 POOR 3 GOOD 3 GOOD 2 GOOD 3 FAIR 2	17.87 19.41 22.03 23.90 27.62 33.70
3	40	18	HALAPAU	68.52	316.9	14.63 16.36 18.14 20.15 23.15 24.97 31.39	Z Z Z Z Z Z Z	GOOD 1 GOOD 1 FAIR 2 FAIR 3 FAIR 2 FAIR 4 GOOD 1	13.82 15.55 17.33 19.34 22.34 24.16 30.58
3	40	19	RABAU	84.76	320.2	22.58 23.31 24.71	Z Z Z	POOR 3 POOR 2 POOR 2	21.77 22.50 23.90
3	40	20	RAL	79.99	320.6	17.68 19.54	Z Z	POOR 3 POOR 2	16.87 18.73
3	40	21	SUL	80.73	320.1	20.38	Z	POOR 4	19.97
3	40	22	TAV	77.78	321.2	15.88 20.98 22.05	Z Z Z	FAIR 2 POOR 2 POOR 2	15.07 20.17 21.24
3	40	23	VUL	79.15	313.9	17.35 17.98 20.08 21.01 25.05	Z Z Z Z Z	POOR 2 POOR 2 FAIR 2 FAIR 2 POOR 2	16.54 17.17 19.27 20.20 24.24
3	40	24	MAN	84.08	320.3	21.58 22.88 26.58 28.05	Z Z Z Z	POOR 3 POOR 2 POOR 2 POOR 3	20.77 22.07 25.77 27.24
3	40A	1	HALUANA	88.44	316.0	17.01 18.60 20.03 20.99 22.54	Z Z Z Z Z	POOR 3 POOR 3 POOR 1 FAIR 1 GOOD 1	16.60 18.19 19.62 20.58 22.13
3	40A	2	NONGA	105.00	320.5	19.50 20.49 22.53 24.46 26.84	Z Z Z Z Z	POOR 2 GOOD 2 FAIR 2 GOOD 2 FAIR 2	19.09 20.08 22.12 24.05 26.43
3	40A	4	KABANGA	66.25	315.7	13.23 18.94 42.98	Z Z Z	FAIR 1 FAIR 1 FAIR 1	12.82 18.93 42.57
3	40A	5	VULCAN	94.83	314.6	18.13 18.83	Z Z	POOR 1 POOR 1	17.72 18.42
3	40A	6	RAVALIEN	82.24	316.2	16.83 18.65 23.65	Z Z H	GOOD 1 FAIR 2 FAIR 2	16.42 18.24 23.24
3	40A	7	KURAKAKL	101.75	315.7	18.69 19.98 21.75	Z Z Z	POOR 2 FAIR 2 FAIR 2	18.28 19.94 21.34

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL. SEC
3	40A	7	KURAKAKL	101.75	315.7	24.50	Z	FAIR 2	24.09
3	40A	8	BURMA RD	98.47	316.0	19.25 23.65	Z Z	POOR 3 POOR 3	18.84 23.24
3	40A	10	PRAED PT	91.17	319.2	17.07 19.62	Z Z	POOR 2 GOOD 1	16.66 19.21
3	40A	11	RAPOPO	77.04	320.1	14.80 15.60 16.30 18.75 22.07 23.26	Z Z Z Z Z Y	POOR 3 GOOD 2 FAIR 2 POOR 3 FAIR 2 GOOD 1	14.39 15.19 15.89 18.34 21.66 22.85
3	40A	14	HATOM IS	112.41	318.3	20.20 22.96 25.75	Z Z Z	FAIR 2 FAIR 2 POOR 3	19.79 22.55 25.34
3	40A	15	TAVUI	105.29	320.8	18.60 20.07 21.02	Z Z Z	GOOD 1 GOOD 2 GOOD 2	18.19 19.66 20.61
3	40A	16	VUNAKAKR	100.81	312.4	19.44 20.55 25.29	Z Z Z	FAIR 3 FAIR 3 GOOD 3	19.03 20.14 24.88
3	40A	17	MTVARZIN	85.52	308.4	17.16 18.89 20.41 24.40	Z H H H	POOR 2 GOOD 4 GOOD 4 GOOD 4	16.75 18.48 20.00 23.99
3	40A	18	MALAPAU	84.75	315.0	15.81 17.66 18.66 20.75 23.30 25.04 26.95	Z Z Z Z Z Z Z	GOOD 3 FAIR 2 FAIR 2 FAIR 2 POOR 2 FAIR 2 GOOD 3	15.40 17.25 18.25 20.34 22.89 24.63 26.94
3	40A	20	RAL	96.05	318.2	17.55 20.48	Z Z	POOR 3 POOR 2	17.14 20.07
3	40A	21	BUL	96.82	318.2	19.21 23.09	Z Z	POOR 4 POOR 3	18.80 22.68
3	40A	22	TAV	93.81	319.1	17.35 18.05 20.35 22.45 26.05	Z Z Z Z Z	POOR 2 POOR 2 FAIR 2 FAIR 2 POOR 2	16.94 17.64 19.94 22.04 25.64
3	40A	23	VUL	95.45	313.0	18.42 20.08 21.08 23.05 25.45	Z Z Z Z Z	GOOD 1 FAIR 2 FAIR 2 FAIR 2 POOR 2	18.01 19.67 20.67 22.64 25.04
3	40A	24	MAN	100.15	318.4	20.42	Z	POOR 3	20.01
4	41	1	HALUANA	47.67	274.6	9.95 13.17 14.04	Z Z Z	POOR 3 POOR 1 POOR 1	9.49 12.71 13.58
4	41	2	KABIARA	68.32	278.0	14.53 16.70 18.25 26.46	Z Z Z Z	GOOD 2 GOOD 2 FAIR 3 FAIR 3	14.07 16.24 17.79 26.00
4	41	4	ULU	28.81	298.0	6.79 7.80 8.06 9.79 15.22	Z Z Z Z Z	FAIR 1 GOOD 1 GOOD 1 FAIR 1 FAIR 1	6.33 7.34 7.60 9.33 14.76
4	41	5	VULCAN	54.08	277.2	11.65 12.39 14.88 15.25 36.23 36.38	Z Z Z Z Z Z	POOR 2 POOR 2 FAIR 1 FAIR 1 POOR 1 FAIR 1	11.19 11.93 14.42 14.79 35.77 39.92
4	41	6	KLINWATA	88.73	274.9	17.30 18.35 19.75 25.80	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 1	16.84 17.89 19.29 25.34
4	41	7	KURAKAKL	58.67	282.8	13.40 17.05	Z Z	POOR 1 POOR 2	12.94 16.59
4	41	8	BURMA RD	55.63	281.4	13.45	Z	POOR 3	12.99
4	41	11	RAPOPO	35.50	268.9	7.04 9.16	Z Z	POOR 3 FAIR 1	6.58 8.70
4	41	14	NORDUP	49.67	287.3	9.85 11.62 13.42	Z Z Z	GOOD 1 GOOD 2 FAIR 3	9.39 11.16 12.96
4	41	15	TAVUI	57.03	292.4	12.35 17.85 21.15	Z Z Z	GOOD 1 FAIR 2 GOOD 1	11.89 17.39 20.69
4	41	16	VUNAKAKR	61.12	277.7	11.21 13.21 22.75 29.89	Z Z Z Z	FAIR 3 FAIR 3 POOR 2 GOOD 3	10.75 12.75 22.29 29.43
4	41	17	MTVARZIN	53.57	262.8	8.47 11.50 12.22 13.18 13.74	Z Z H Z Z	GOOD 3 GOOD 2 FAIR 2 FAIR 2 GOOD 1	8.01 11.04 11.76 12.72 13.28
4	41	18	MALAPAU	46.07	270.1	10.86 13.52 20.00 23.62	Z Z Z Z	POOR 4 FAIR 1 FAIR 2 FAIR 1	10.40 13.06 19.54 23.16

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
4	41	19	RABAUL	55.41	286.2	12.85 14.35 19.25 21.95	Z Z Z Z	POOR 2 POOR 2 POOR 2 POOR 2	12.39 13.69 18.79 21.49
4	41	20	RAL	51.11	283.9	11.82 21.85	Z Z	GOOD 1 FAIR 2	11.36 21.39
4	41	21	SUL	52.15	283.7	14.58 18.15	Z Z	POOR 4 POOR 3	14.12 17.69
4	41	22	TAV	48.86	283.1	11.22 14.15	Z Z	FAIR 1 POOR 3	10.76 13.49
4	41	23	VUL	56.13	275.5	12.22 12.75 13.92 16.65 17.95 20.75	Z Z Z Z Z Z	FAIR 2 POOR 2 POOR 2 POOR 2 POOR 2 FAIR 2	11.76 12.29 13.06 16.19 17.49 20.29
4	41	24	MAN	54.69	286.1	11.75 16.55 19.22 21.22	Z Z Z Z	FAIR 2 FAIR 2 FAIR 2 FAIR 2	11.29 16.09 18.76 20.76
4	42	2	KABIARA	49.46	270.0	9.73 10.53 12.25 15.94 17.10	Z Z Z Z Z	FAIR 2 FAIR 2 FAIR 3 FAIR 2 POOR 2	9.67 10.47 12.19 15.88 17.04
4	42	4	ULU	8.29	299.0	2.20 2.46 16.18 30.66 32.00 33.35	Z Z Z Z Z Z	GOOD 1 GOOD 1 FAIR 1 FAIR 1 FAIR 1 FAIR 1	2.14 2.40 16.12 30.40 31.94 33.29
4	42	5	VULCAN	35.57	265.6	7.63 8.12 24.25 24.62 26.29 54.48	Z Z Z Z Z Z	POOR 1 FAIR 1 POOR 1 POOR 1 POOR 1 POOR 1	7.57 8.06 24.19 24.56 26.23 54.42
4	42	6	KLINWATA	70.24	268.4	12.90 13.56 14.41 14.91	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 FAIR 2	12.64 13.90 14.35 14.85
4	42	7	KURAKAKL	39.17	275.2	6.16	Z	POOR 3	6.10
4	42	10	BRAED PT	27.45	269.5	6.15	Z	GOOD 1	6.09
4	42	11	RAPOPO	20.05	239.6	4.74	Z	GOOD 1	4.68
4	42	14	NORDUP	29.70	280.2	5.67	Z	GOOD 2	5.61
4	42	15	TAVUI	36.63	289.6	7.40 9.60 12.80	Z Z Z	GOOD 1 FAIR 2 FAIR 2	7.34 9.54 12.74
4	42	16	VUNAKAKR	42.39	268.2	8.98 11.07 14.68	Z Z Z	GOOD 2 GOOD 2 POOR 2	8.92 11.01 14.62
4	42	17	MTVARZIN	38.52	245.2	7.80 12.36 13.36 14.97 17.75 22.02 22.68	Z Z Z Z Z Z Z	GOOD 1 GOOD 1 GOOD 1 FAIR 2 FAIR 3 POOR 2 FAIR 1	7.74 12.30 13.30 14.91 17.69 21.96 22.62
4	42	18	HALAPAU	29.41	251.4	6.64 9.38	Z Z	GOOD 1 POOR 4	6.58 9.32
4	42	19	RABAUL	35.52	279.7	7.06 9.03 12.03	Z Z Z	POOR 4 POOR 4 POOR 3	7.00 8.97 11.97
4	42	20	RAL	31.55	275.1	6.69 8.03 13.69	Z Z Z	FAIR 2 POOR 3 FAIR 2	6.63 7.97 13.63
4	42	22	TAV	29.43	273.1	6.36	Z	GOOD 1	6.30
4	42	23	VUL	37.91	263.8	7.96 9.06	Z Z	FAIR 3 POOR 3	7.90 9.00
4	42	24	MAN	34.82	279.4	7.06 8.06 9.36 12.36 16.69	Z Z Z Z Z	FAIR 2 POOR 2 POOR 3 POOR 2 FAIR 2	7.00 8.00 9.30 12.30 16.63
4	43	1	RALUANA	13.76	249.9	3.97 4.74 5.43	Z Z Z	GOOD 1 GOOD 1 GOOD 1	3.90 4.67 5.36
4	43	2	KABIARA	33.07	271.6	6.86 8.03 9.70 10.87 13.23 14.60 15.86	Z Z Z Z Z Z Z	FAIR 1 GOOD 1 FAIR 2 GOOD 2 POOR 2 FAIR 2 GOOD 2	6.79 7.96 9.63 10.80 13.16 14.53 15.79
4	43	4	ULU	10.39	61.8	2.57 2.92 5.32 21.97	Z Z Z Z	GOOD 1 FAIR 1 FAIR 1 FAIR 1	2.50 2.85 5.25 21.50
4	43	5	VULCAN	19.14	264.6	4.89 5.37 12.01	Z Z Z	POOR 1 POOR 1 POOR 1	4.82 5.30 11.94

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
4	43	5	VULCAN	19.14	264.6	12.69	Z	FAIR 1	12.62
4	43	6	KLINWATA	53.82	268.9	10.26	Z	GOOD 1	10.19
						11.16	Z	GOOD 2	11.09
						11.75	Z	FAIR 2	11.68
						13.25	Z	FAIR 2	13.18
						17.05	Z	GOOD 1	16.98
4	43	7	KURAKAKL	23.03	281.1	5.69	Z	FAIR 1	5.62
						8.80	Z	FAIR 2	8.73
						11.80	Z	GOOD 2	11.73
						13.15	Z	GOOD 2	13.08
4	43	8	BURMA RD	20.07	277.0	11.17	Z	POOR 3	11.10
						14.22	Z	FAIR 2	14.15
						17.75	Z	POOR 3	17.68
4	43	10	PRAED PT	11.06	273.5	2.69	Z	GOOD 1	2.62
						3.69	Z	GOOD 1	3.62
4	43	11	RAPOPO	9.29	185.5	2.48	Z	GOOD 1	2.41
						3.31	Z	GOOD 1	3.24
						4.35	Z	GOOD 1	4.28
						4.89	Z	GOOD 1	4.82
						5.96	Z	FAIR 1	5.89
4	43	14	NORDUP	14.22	295.6	3.99	Z	GOOD 1	3.92
						4.90	Z	GOOD 2	4.83
						5.55	Z	FAIR 3	5.48
						9.37	Z	GOOD 3	9.30
4	43	15	TAVUI	22.39	306.0	5.20	Z	GOOD 1	5.13
						7.10	Z	FAIR 2	7.03
						11.40	Z	GOOD 2	11.33
4	43	16	VUNAKAKR	25.97	269.1	6.23	Z	GOOD 2	6.16
4	43	17	MTVARZIN	24.03	230.6	5.37	Z	GOOD 1	5.30
4	43	18	HALAPAU	14.26	233.5	5.26	Z	POOR 3	5.19
						7.65	Z	POOR 2	7.58
4	43	19	RABAHL	19.84	290.4	5.05	Z	POOR 2	4.98
						5.72	Z	POOR 2	5.65
						7.42	Z	POOR 2	7.35
4	43	20	RAL	15.46	283.8	4.05	Z	GOOD 1	3.98
						5.25	Z	FAIR 2	5.18
						7.38	Z	POOR 2	7.31
						8.65	Z	POOR 3	8.58
						9.45	Z	FAIR 2	9.38
4	43	21	SUL	16.50	283.2	4.42	Z	FAIR 2	4.35
						5.55	Z	POOR 3	5.48
						7.75	Z	FAIR 2	7.68
4	43	22	TAV	13.22	280.8	3.72	Z	GOOD 1	3.65
						4.55	Z	FAIR 2	4.48
						5.95	Z	POOR 2	5.88
4	43	22	TAV	13.22	280.8	6.85	Z	GOOD 2	6.78
						9.05	Z	FAIR 2	8.98
4	43	23	VUL	21.52	261.4	5.35	Z	POOR 2	5.28
						6.38	Z	FAIR 3	6.31
						8.75	Z	GOOD 1	8.68
4	43	24	MAN	19.11	290.1	4.25	Z	POOR 2	4.18
						6.75	Z	POOR 2	6.68
						10.45	Z	GOOD 2	10.38
						13.25	Z	POOR 3	13.18
4	44	1	RALUANA	4.11	164.8	1.97	Z	GOOD 1	1.95
						2.56	Z	GOOD 1	2.54
4	44	2	KABJARA	19.13	275.1	4.65	Z	FAIR 1	4.63
						5.34	Z	FAIR 1	5.32
						5.84	Z	GOOD 1	5.82
						6.31	Z	FAIR 1	6.29
						7.02	Z	GOOD 1	7.00
						7.85	Z	GOOD 2	7.83
						8.67	Z	FAIR 3	8.65
4	44	4	ULU	23.85	76.2	5.48	Z	GOOD 1	5.46
						5.69	Z	FAIR 1	5.67
						6.56	Z	POOR 1	6.54
						7.96	Z	POOR 1	7.94
						14.88	Z	POOR 1	14.86
						21.60	Z	POOR 1	21.58
4	44	5	VULCAN	5.16	258.3	2.11	Z	FAIR 1	2.09
						2.46	Z	FAIR 1	2.44
						2.74	Z	FAIR 1	2.72
4	44	6	KLINWATA	39.81	269.6	8.22	Z	GOOD 1	8.20
						9.70	Z	GOOD 2	9.68
						14.40	Z	GOOD 2	14.38
4	44	7	KURAKAKL	10.05	301.1	3.27	Z	GOOD 1	3.25
						4.15	Z	GOOD 2	4.13
4	44	10	PRAED PT	3.29	64.0	1.75	Z	GOOD 1	1.73
4	44	11	RAPOPO	15.61	122.9	4.24	Z	GOOD 1	4.22
						5.10	Z	GOOD 1	5.08
						5.78	Z	GOOD 1	5.76
						7.03	Z	GOOD 1	7.01
						7.61	Z	FAIR 1	7.59
						8.30	Z	GOOD 1	8.28
4	44	14	NORDUP	7.01	9.6	2.41	Z	GOOD 1	2.39
4	44	15	TAVUI	14.54	343.6	4.10	Z	GOOD 1	4.08
						8.00	Z	FAIR 2	7.98
4	44	16	VUNAKAKR	11.97	271.8	3.93	Z	GOOD 2	3.91
						5.77	Z	FAIR 2	5.75
						12.75	Z	POOR 3	12.73

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
4	44	17	MTVARZIN	15.20	197.5	3.78 5.16 11.28 14.28 15.54	Z Z Z Z Z	GOOD 2 GOOD 1 POOR 2 GOOD 1 GOOD 1	3.76 5.14 11.26 14.26 15.52
4	44	19	RABAU	8.95	329.1	3.12 4.95 5.45	Z Z Z	GOOD 2 POOR 2 GOOD 2	3.10 4.93 5.43
4	44	20	RAL	4.57	347.1	2.05 6.88	Z Z	FAIR 1 POOR 2	2.03 6.86
4	44	21	BUL	4.99	335.6	2.15	Z	GOOD 1	2.13
4	44	22	TAV	3.41	17.4	1.68 3.38	Z Z	GOOD 1 FAIR 2	1.66 3.36
4	44	23	VUL	7.68	251.3	2.75 3.75	Z Z	GOOD 1 FAIR 3	2.73 3.73
4	44	24	WAN	8.34	331.7	2.75 3.72 4.72	Z Z Z	FAIR 2 FAIR 2 FAIR 2	2.73 3.70 4.70
4	45	1	RALUANA	22.93	101.4	5.77 6.26 7.74 10.20	Z Z Z Z	FAIR 1 FAIR 1 GOOD 1 GOOD 1	5.71 6.20 7.68 10.14
4	45	2	KABIARA	2.60	64.1	1.12 2.00	Z Z	GOOD 1 GOOD 1	1.06 1.94
4	45	4	ULU	44.86	83.4	8.76 9.11 11.67 15.77	Z Z Z Z	GOOD 1 FAIR 1 POOR 1 POOR 1	8.70 9.05 11.61 15.71
4	45	5	VULCAN	16.42	95.6	4.34 4.61	Z Z	FAIR 1 FAIR 1	4.28 4.55
4	45	6	KLINWATA	18.43	267.4	4.43 6.33 7.58 9.96	Z Z Z Z	GOOD 1 GOOD 2 GOOD 2 GOOD 2	4.37 6.27 7.92 9.90
4	45	7	KURAKAKI	13.61	70.1	3.72 6.59	Z Z	GOOD 1 FAIR 2	3.66 6.53
4	45	8	BURMA RD	15.71	80.2	4.23 10.49	Z Z	GOOD 1 FAIR 2	4.17 10.43
4	45	10	BRAED. PT	24.38	87.9	5.99	Z	FAIR 1	5.93
4	45	11	NAPDOPO	35.67	104.7	7.51 8.68	Z Z	GOOD 1 GOOD 1	7.45 8.62
4	45	14	NORDUP	23.45	74.3	5.27 9.07	Z Z	GOOD 1 POOR 3	5.21 9.01
4	45	15	TAYOI	21.88	52.3	5.20 7.30 9.70	Z Z Z	GOOD 1 FAIR 2 FAIR 2	5.14 7.24 9.64
4	45	16	VUNAKAKR	9.44	91.1	3.18 6.12 9.33	Z Z Z	GOOD 2 POOR 3 FAIR 2	3.12 6.06 9.27
4	45	17	MTVARZIN	22.58	131.8	5.24 8.50 10.19 10.73 19.58 20.35 22.82	Z Z Z Z Z Z H	GOOD 2 FAIR 1 FAIR 2 GOOD 2 GOOD 1 FAIR 1 GOOD 2	5.18 8.44 10.13 10.67 19.52 20.29 22.76
4	45	19	RABAU	18.26	67.0	4.83 5.93 6.56	Z Z Z	FAIR 2 POOR 2 POOR 2	4.77 5.87 6.50
4	45	20	RAL	20.75	79.2	5.06	Z	FAIR 1	5.00
4	45	21	BUL	19.74	78.3	4.90 5.93 8.03 9.53	Z Z Z Z	FAIR 2 FAIR 2 FAIR 3 FAIR 2	4.84 5.87 7.97 9.47
4	45	22	TAV	22.58	83.1	5.33 6.03 8.33 10.36	Z Z Z Z	FAIR 2 POOR 2 POOR 3 FAIR 2	5.27 5.97 8.27 10.30
4	45	23	VUL	14.44	102.0	4.23 5.63 6.13	Z Z Z	GOOD 1 FAIR 2 FAIR 2	4.17 5.97 6.07
4	45	24	WAN	18.73	68.8	4.46 5.33 8.06	Z Z Z	GOOD 2 POOR 2 FAIR 2	4.40 5.27 8.00
4	46	2	KABIARA	16.59	74.8	4.11 5.06 5.82 7.60 8.65	Z Z Z Z Z	FAIR 1 FAIR 1 GOOD 2 GOOD 2 GOOD 3	4.08 5.03 5.79 7.57 8.62
4	46	4	ULU	58.82	81.9	10.93 12.18 12.46 16.16	Z Z Z Z	POOR 1 POOR 1 FAIR 1 POOR 1	10.90 12.15 12.43 16.13
4	46	5	VULCAN	30.05	86.9	6.46 6.70 13.50	Z Z Z	POOR 1 POOR 1 POOR 1	6.43 6.67 13.47
4	46	6	KLINWATA	5.32	296.8	1.39	Z	GOOD 1	1.36
4	46	7	KURAKAKI	27.60	73.5	6.05	Z	GOOD 1	6.02

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
4	46	7	KURAKAKL	27.60	73.5	8.09 8.80	Z Z	FAIR 1 FAIR 2	8.02 8.77
4	46	8	BURMA RD	29.73	78.6	6.48 13.60 19.10	Z Z Z	FAIR 1 FAIR 2 FAIR 2	6.45 13.57 19.07
4	46	10	PRAED PT	38.24	83.8	8.14	Z	POOR 1	8.11
4	46	11	RAPOPO	48.51	96.9	9.31	Z	FAIR 2	9.28
4	46	14	NORDUP	37.48	75.2	7.45 9.11	Z Z	FAIR 2 FAIR 3	7.42 9.08
4	46	15	TAVUI	35.14	61.8	7.50 8.90	Z Z	GOOD 1 GOOD 2	7.47 8.87
4	46	16	VUNAKAKR	23.30	82.5	5.61 7.85	Z Z	GOOD 2 POOR 2	5.58 7.82
4	46	17	MTVARZIN	32.71	111.2	6.68 8.12 14.29	Z H H	GOOD 2 FAIR 3 GOOD 2	6.65 8.09 14.26
4	46	18	HALAPAU	37.92	97.6	7.83 11.27 13.92 15.68 17.88	Z Z Z Z Z	GOOD 3 FAIR 2 GOOD 3 FAIR 2 GOOD 2	7.80 11.24 13.49 15.65 17.85
4	46	19	RABAU	32.18	71.2	7.17 9.20 10.10 11.80	Z Z Z Z	POOR 3 POOR 3 POOR 2 FAIR 2	7.14 9.17 10.07 11.77
4	46	20	RAL	34.78	78.2	7.13 8.80 13.00	Z Z Z	POOR 2 POOR 2 POOR 2	7.10 8.77 12.97
4	46	21	SUL	33.78	77.7	7.17 8.17 10.23 13.17	Z Z Z Z	POOR 3 POOR 2 FAIR 2 FAIR 2	7.14 8.14 10.20 13.14
4	46	22	TAV	36.56	80.7	7.50 8.57	Z Z	FAIR 2 POOR 2	7.47 8.94
4	46	23	VUL	27.78	89.6	6.37 8.60 9.40	Z Z Z	GOOD 1 GOOD 2 POOR 2	6.34 8.57 9.37
4	46	24	MAN	32.69	72.2	6.70 7.50 13.50	Z Z Z	POOR 2 POOR 3 FAIR 2	6.67 7.47 13.47
4	47	1	RALUANA	84.56	94.2	16.97 17.68 18.14 18.70	Z Z Z Z	POOR 1 POOR 1 POOR 1 FAIR 1	16.64 17.35 17.81 18.37
4	47	2	KABIARA	64.21	90.4	11.93 12.77 16.27 29.32 31.33	Z Z Z Z Z	GOOD 1 FAIR 1 FAIR 3 POOR 3 FAIR 3	11.60 12.44 15.94 28.99 31.00
4	47	4	ULU	106.48	88.1	18.13 18.55 18.77 20.48 26.95 37.69	Z Z Z Z Z Z	POOR 1 FAIR 1 POOR 1 POOR 1 POOR 1 POOR 1	17.80 18.22 18.44 20.15 26.62 37.32
4	47	5	VULCAN	78.27	92.4	14.08 14.44 16.68	Z Z Z	FAIR 1 FAIR 1 FAIR 1	13.79 14.11 16.39
4	47	6	KLINWATA	43.52	93.2	8.34 9.88 13.93	Z Z Z	GOOD 1 GOOD 2 GOOD 2	8.01 9.55 13.20
4	47	7	KURAKAKL	74.72	87.7	13.83 16.83	Z Z	GOOD 1 GOOD 1	13.50 16.50
4	47	8	BURMA RD	77.35	89.2	14.09 16.58 19.39 22.43 29.23 32.93	Z Z Z Z Z Z	GOOD 1 GOOD 1 FAIR 2 FAIR 2 FAIR 2 FAIR 2	13.76 16.25 19.06 22.10 28.90 32.60
4	47	10	PRAED PT	86.22	90.5	15.66 19.53	Z Z	GOOD 1 FAIR 1	15.33 19.20
4	47	11	RAPOPO	96.95	96.3	17.02 19.46 22.43	Z Z Z	FAIR 1 POOR 2 POOR 3	16.69 19.13 22.10
4	47	14	NORDUP	84.57	86.8	14.92 17.26	Z Z	GOOD 1 GOOD 2	14.59 16.93
4	47	16	VUNAKAKR	71.32	91.5	13.23 14.15	Z Z	GOOD 2 POOR 2	12.90 13.82
4	47	17	MTVARZIN	80.43	102.0	14.44 17.75 21.47 22.44 23.44 24.53 28.87	Z Z Z H Z Z H	GOOD 2 FAIR 2 FAIR 1 GOOD 1 GOOD 1 FAIR 1 GOOD 3	14.11 17.42 21.14 22.11 23.11 24.20 28.54
4	47	18	HALAPAU	86.35	96.6	15.63 20.28 22.87 33.57 41.38	Z Z Z Z Z	FAIR 3 FAIR 3 POOR 3 POOR 3 FAIR 3	15.30 19.95 22.54 33.24 41.05

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM HBL SEC
4	47	19	BABAUL	78.86	86.0	14.33	Z	POOR 3	14.00
						16.43	Z	POOR 3	16.10
						16.90	Z	POOR 2	16.97
4	47	20	RAL	82.28	88.4	14.60	Z	FAIR 2	14.27
						15.60	Z	POOR 2	15.27
						16.86	Z	FAIR 2	16.93
4	47	21	SUL	81.23	88.3	14.86	Z	POOR 2	14.53
						15.53	Z	POOR 2	15.20
						17.03	Z	FAIR 2	16.70
4	47	22	TAV	84.29	89.3	15.03	Z	FAIR 2	14.70
						16.20	Z	FAIR 2	15.67
						17.30	Z	FAIR 2	17.17
						18.73	Z	POOR 2	18.40
						20.13	Z	POOR 2	19.80
4	47	23	VUL	76.12	93.5	14.03	Z	GOOD 1	13.70
						14.73	Z	POOR 2	14.40
						15.43	Z	FAIR 2	15.10
						15.93	Z	FAIR 2	15.60
						16.93	Z	FAIR 2	16.60
4	47	24	WAN	79.49	86.3	14.20	Z	FAIR 2	13.87
						16.50	Z	GOOD 2	16.17

TABLE 3

STATION INFORMATION

(Location, Recording Party Numbers, Stage Numbers)

STATION NAME	LATITUDE			LONGITUDE			PARTY NUMBER			
	°	'	"S	°	'	"E	Stage 1	Stage 2	Stage 3	Stage 4
Feni Is.	4	02	28	153	37	55	1			
Ulu	4	12	38	152	24	46	2			4
Palmalmal	5	38	44	151	30	13	3	3		
Doilene	4	11	59	151	33	04	4	4		
Pondo	4	33	22	151	37	14	5	5		
Manga	4	06	19	152	59	34	6			
Ulamona	4	49	36	151	16	03	7	7		
Kamdaru	4	12	42	152	41	27	8			
Natava	4	11	39	151	59	43	10			
Rapopo	4	20	19	152	19	20	11	11	11	11
Powell Harbour	4	48	26	151	41	43	12	12		
Boang Is.	3	23	02	153	16	44	13			
Narum	4	32	11	153	03	29	14			
Nissan Is.	4	28	20	154	11	40	15			
Pakia	5	21	01	151	24	22	16	16		
Au'una	5	44	50	151	02	24	17	17		
Lambom Is.	4	48	23	152	51	29	18			
Rabaul Network (RBL)	4	11	33	152	09	46	19	19	19	19
" " (RAL)	4	13	18	152	11	42	20	20	20	20
" " (SUL)	4	13	15	152	11	08	21	21	21	21
" " (TAV)	4	13	57	152	12	48	22	22	22	22
" " (VUL)	4	17	03	152	08	19	23	23	23	23
" " (WAN)	4	11	44	152	10	07	24	24	24	24
Kandrian	6	12	20	149	33	00		1		
Talasea	5	16	38	150	00	33		6		
Lindenhaven	6	13	36	150	27	18		10		
Vitu Is.	4	41	56	149	27	42		18		
Bulumurii	5	01	03	150	08	45		14		
C.R.A.	5	44	55	150	07	40		15		
Hoskins	5	28	02	150	24	33		2		
Bialla	5	19	40	151	00	36		8		
Raluana	4	17	52	152	12	50			1	1
Nonga	4	08	26	152	09	56			2	
Kabanga	4	26	42	152	20	59			4	
Vulcan	4	16	17	152	09	31			5	5
Ravalien	4	20	13	152	15	14		6		
Kurakakaul	4	12	54	152	07	36			7	7
Burma Rd.	4	13	58	152	09	03			8	8

Table 3 (cont)

STATION NAME	LATITUDE			LONGITUDE			Stage 1	Stage 2	Stage 3	Stage 4
	°	'	"S	°	'	"E				
Praed Pt.	4	14	56	152	13	51			10	10
Watom Is.	4	06	53	152	05	35			14	
Tavui	4	08	09	152	10	02			15	15
Vunakakar	4	15	31	152	05	47			16	16
Mt. Varzin	4	23	35	152	09	47			17	17
Malapau	4	19	54	152	13	37			18	18
Kabiara	4	14	48	152	01	57				2
Kilinwata	4	15	52	151	50	44				6
Nordup	4	11	58	152	12	53				14

TABLE 4
OBSERVED AND REDUCED MAGNETIC

TOTAL FORCE DATA								
LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (EST)	KMS	OBSERVED FIELD GAUSS	TUNAL FIELD GAUSS	DIURNAL FIELD GAUSS	STORM FIELD GAUSS	RESIDUAL FIELD GAUSS
LINE 21								
3 46.5	192 21.0	14 0	0.000	38980	39478	30	-0	-534
3 46.6	192 22.0	0 0	0.409	38980	39479	30	-0	-534
3 46.8	192 22.2	0 0	0.818	38980	39480	39	-0	-535
3 46.9	192 22.3	0 0	1.227	38990	39480	39	-0	-525
3 47.0	192 22.5	0 0	1.635	38983	39481	34	-0	-532
3 47.2	192 22.7	0 0	2.044	38974	39482	34	-0	-542
3 47.3	192 22.9	0 0	2.453	38970	39483	33	-0	-546
3 47.4	192 23.0	0 0	2.862	38966	39483	33	-0	-550
3 47.5	192 23.2	0 0	3.271	38969	39484	32	-0	-547
3 47.7	192 23.4	0 0	3.680	38950	39485	32	-0	-567
3 47.8	192 23.6	0 0	4.088	38950	39486	31	-0	-567
3 47.9	192 23.7	0 0	4.497	38947	39486	31	-0	-570
3 48.1	192 23.9	0 0	4.906	38944	39487	30	-0	-574
3 48.2	192 24.1	0 0	5.315	38933	39488	30	-0	-585
14 30								
3 48.2	192 24.1	14 30	0.000	38933	39488	30	-0	-585
3 48.4	192 24.2	0 0	0.397	38928	39489	30	-0	-591
3 48.5	192 24.4	0 0	0.793	38935	39490	29	-0	-583
3 48.7	192 24.5	0 0	1.190	38940	39492	29	-0	-580
3 48.9	192 24.6	0 0	1.587	38950	39493	28	-0	-571
3 49.0	192 24.8	0 0	1.983	38959	39494	28	-0	-547
3 49.2	192 24.9	0 0	2.380	38990	39495	27	-0	-533
3 49.4	192 25.0	0 0	2.776	39005	39497	27	-0	-518
3 49.5	192 25.2	0 0	3.173	39010	39498	26	-0	-514
3 49.7	192 25.3	0 0	3.570	38991	39499	26	-0	-534
14 50								
3 49.7	192 25.3	14 50	0.000	38995	39499	26	-0	-530
3 49.9	192 25.2	0 0	0.393	38990	39501	26	-0	-536
3 50.1	192 25.1	0 0	0.786	39000	39503	25	-0	-528
3 50.3	192 25.0	0 0	1.179	39050	39505	25	-0	-479
3 50.4	192 24.9	0 0	1.572	39078	39508	25	-0	-453
3 50.6	192 24.8	0 0	1.965	39110	39508	24	-0	-423
3 50.8	192 24.7	0 0	2.358	39145	39510	24	-0	-389
3 51.0	192 24.6	0 0	2.751	39162	39512	23	-0	-374
3 51.2	192 24.5	0 0	3.144	39190	39514	23	-0	-347
3 51.4	192 24.4	0 0	3.537	39205	39516	23	-0	-333
3 51.6	192 24.3	0 0	3.930	39224	39518	22	-0	-316
3 51.8	192 24.2	0 0	4.323	39240	39520	22	-0	-302
3 51.9	192 24.1	0 0	4.716	39260	39521	22	-0	-283
3 52.1	192 24.0	0 0	5.109	39273	39523	21	-0	-272
3 52.3	192 23.9	0 0	5.502	39290	39525	21	-0	-256
3 52.5	192 23.8	0 0	5.896	39293	39527	21	-0	-254
3 52.7	192 23.7	0 0	6.289	39312	39529	20	-0	-237
3 52.9	192 23.6	0 0	6.682	39316	39531	20	-0	-234
3 53.1	192 23.5	0 0	7.075	39326	39533	19	-0	-226
3 53.2	192 23.4	0 0	7.468	39331	39534	19	-0	-223
3 53.4	192 23.3	0 0	7.861	39337	39536	19	-0	-218
3 53.6	192 23.2	0 0	8.254	39350	39538	18	-0	-207
3 53.8	192 23.1	0 0	8.647	39352	39540	18	-0	-206
15 30								
3 53.8	192 23.1	15 30	0.000	39352	39540	18	-0	-206
3 54.0	192 23.0	0 0	0.405	39370	39542	18	-0	-189
3 54.2	192 22.9	0 0	0.810	39380	39544	17	-0	-181
3 54.4	192 22.8	0 0	1.215	39394	39545	17	-0	-168
3 54.6	192 22.6	0 0	1.620	39410	39547	16	-0	-154
3 54.8	192 22.7	0 0	2.025	39418	39549	16	-0	-147
3 55.0	192 22.6	0 0	2.430	39427	39551	16	-0	-139
3 55.2	192 22.5	0 0	2.835	39430	39553	15	-0	-138
3 55.4	192 22.4	0 0	3.240	39420	39554	15	-0	-149
3 55.6	192 22.3	0 0	3.646	39405	39556	14	-0	-166
3 55.8	192 22.2	0 0	4.051	39388	39558	14	-0	-184
3 56.0	192 22.1	0 0	4.456	39361	39560	14	-0	-212
3 56.2	192 22.1	0 0	4.861	39347	39562	13	-0	-228
3 56.4	192 22.0	0 0	5.266	39332	39563	13	-0	-244
3 56.6	192 21.9	0 0	5.671	39329	39565	12	-0	-249
3 56.8	192 21.8	0 0	6.076	39332	39567	12	-0	-247
16 0								
3 56.8	192 21.8	16 0	0.000	39332	39567	12	-0	-247
3 57.0	192 21.7	0 0	0.400	39340	39569	12	-0	-241
3 57.2	192 21.6	0 0	0.801	39350	39571	11	-0	-232
3 57.4	192 21.6	0 0	1.201	39354	39573	11	-0	-230
3 57.6	192 21.5	0 0	1.601	39354	39575	10	-0	-231
3 57.8	192 21.4	0 0	2.001	39354	39577	10	-0	-233
3 58.0	192 21.3	0 0	2.402	39357	39579	10	-0	-232
3 58.2	192 21.2	0 0	2.802	39350	39581	9	-0	-240
3 58.4	192 21.2	0 0	3.202	39348	39583	9	-0	-244
3 58.6	192 21.1	0 0	3.603	39346	39585	8	-0	-247
3 58.8	192 21.0	0 0	4.003	39344	39587	8	-0	-251
3 59.0	192 20.9	0 0	4.403	39353	39589	8	-0	-244
3 59.2	192 20.8	0 0	4.804	39346	39591	7	-0	-252
3 59.4	192 20.8	0 0	5.204	39351	39593	7	-0	-249
3 59.6	192 20.7	0 0	5.604	39344	39595	6	-0	-257
3 59.8	192 20.6	0 0	6.004	39332	39597	6	-0	-271
16 30								
3 59.8	192 20.6	16 30	0.000	39332	39597	6	-0	-271
4 0.0	192 20.5	0 0	0.420	39327	39599	6	-0	-277
4 0.2	192 20.5	0 0	0.840	39320	39601	5	-0	-286
4 0.4	192 20.4	0 0	1.259	39316	39603	5	-0	-291
4 0.7	192 20.3	0 0	1.679	39312	39604	4	-0	-297
4 0.9	192 20.2	0 0	2.099	39312	39606	4	-0	-298
4 1.1	192 20.2	0 0	2.519	39320	39608	3	-0	-292
4 1.3	192 20.1	0 0	2.938	39330	39610	3	-0	-283
4 1.5	192 20.0	0 0	3.358	39358	39612	3	-0	-256
4 1.7	192 20.0	0 0	3.778	39374	39614	2	-0	-242
4 1.9	192 19.9	0 0	4.198	39395	39616	2	-0	-222
4 2.2	192 19.8	0 0	4.617	39420	39617	1	-0	-199
4 2.4	192 19.7	0 0	5.037	39452	39619	1	-0	-168
4 2.6	192 19.7	0 0	5.457	39485	39621	0	-0	-137
4 2.8	192 19.6	0 0	5.877	39515	39623	0	-0	-108
17 0								
4 2.8	192 19.6	17 0	0.000	39515	39623	0	-0	-108
4 3.0	192 19.5	0 0	0.428	39543	39625	0	-0	-82
4 3.2	192 19.4	0 0	0.856	39550	39627	0	-0	-77
4 3.4	192 19.3	0 0	1.284	39553	39629	0	-0	-76
4 3.7	192 19.3	0 0	1.712	39560	39631	0	-0	-71
4 3.9	192 19.2	0 0	2.140	39560	39633	0	-0	-43
4 4.1	192 19.1	0 0	2.567	39590	39635	0	-0	-45
4 4.3	192 19.0	0 0	2.995	39595	39637	0	-0	-42
4 4.5	192 18.9	0 0	3.423	39605	39640	0	-0	-35
4 4.7	192 18.8	0 0	3.851	39612	39642	0	-0	-30
4 4.9	192 18.7	0 0	4.279	39620	39644	0	-0	-16
4 5.1	192 18.6	0 0	4.707	39638	39646	0	-0	-0
4 5.4	192 18.6	0 0	5.135	39654	39648	0	-0	6
4 5.6	192 18.5	0 0	5.563	39668	39650	0	-0	10
4 5.8	192 18.4	0 0	5.991	39676	39652	0	-0	24
4 6.0	192 18.3	0 0	6.419	39660	39654	0	-0	6

TABLE 4 II

OBSERVED AND REDUCED MAGNETIC

TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (EST)	KMS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	DJURNAL FIELD GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS
				LINE 21				
4 6.0	152 18.3	17 30	0.000	39660	39654	0	-0	6
4 6.2	152 18.2	0 0	0.403	39644	39656	0	-0	-12
4 6.4	152 18.2	0 0	0.809	39690	39658	0	-0	-8
4 6.6	152 18.1	0 0	1.208	39653	39660	0	-0	-7
4 6.8	152 18.1	0 0	1.610	39660	39661	0	-0	-1
4 7.0	152 18.0	0 0	2.013	39677	39663	0	-0	14
4 7.2	152 17.9	0 0	2.415	39685	39665	0	-0	20
4 7.5	152 17.9	0 0	2.818	39704	39667	0	-0	37
4 7.7	152 17.8	0 0	3.220	39704	39669	0	-0	39
4 7.9	152 17.7	0 0	3.623	39708	39671	0	-0	37
4 8.1	152 17.7	0 0	4.025	39710	39672	0	-0	38
4 8.3	152 17.6	0 0	4.428	39708	39674	0	-0	34
4 8.5	152 17.6	0 0	4.831	39710	39676	0	-0	34
4 8.7	152 17.5	0 0	5.233	39722	39678	0	-0	44
4 8.7	152 17.5	18 0	0.000	39722	39678	0	-0	44
4 8.9	152 17.3	0 0	0.824	39732	39680	0	-0	52
4 9.2	152 17.2	0 0	1.048	39740	39683	0	-0	57
4 9.4	152 17.0	0 0	1.972	39743	39685	0	-0	58
4 9.6	152 16.9	0 0	2.096	39740	39687	0	-0	53
4 9.9	152 16.7	0 0	2.620	39725	39690	0	-0	35
4 10.1	152 16.6	0 0	3.144	39679	39692	0	-0	-17
4 10.3	152 16.4	0 0	3.668	39630	39694	0	-0	-64
4 10.6	152 16.2	0 0	4.192	39593	39697	0	-0	-104
4 10.8	152 16.1	0 0	4.716	39585	39699	0	-0	-114
4 11.0	152 15.9	0 0	5.240	39582	39701	0	-0	-139
4 11.3	152 15.8	0 0	5.764	39569	39704	0	-0	-139
4 11.5	152 15.6	0 0	6.288	39555	39706	0	-0	-191
4 11.5	152 15.6	18 30	0.000	39555	39706	0	-0	-191
4 11.7	152 15.5	0 0	0.499	39530	39708	0	-0	-178
4 12.0	152 15.4	0 0	0.997	39520	39711	0	-0	-191
4 12.2	152 15.2	0 0	1.496	39504	39713	0	-0	-209
4 12.5	152 15.1	0 0	1.995	39482	39716	0	-0	-234
4 12.7	152 15.0	0 0	2.493	39466	39718	0	-0	-292

TABLE 4 III
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (GMT)	KMS	OBSERVED FIELD GAUSS	REDUCED FIELD GAUSS	DIURNAL FIELD GAUSS	STORM FIELD GAUSS	RESIDUAL FIELD GAUSS
LINE 22								
4 17.5	192 17.1	7 9	0.000	39770	39756	1	-0	13
4 17.1	192 17.3	0 0	0.776	39770	39752	2	-0	16
4 16.8	192 17.9	0 0	1.351	39790	39749	3	-0	39
4 16.4	192 17.6	0 0	2.327	39780	39745	4	-0	32
4 16.0	192 17.0	0 0	3.103	39759	39742	5	-0	10
4 15.6	192 10.0	0 0	3.878	39732	39738	6	-0	-10
4 15.2	192 10.2	0 0	4.654	39720	39739	7	-0	-20
4 14.9	192 10.4	0 0	5.430	39700	39731	8	-0	-37
4 14.5	192 10.6	0 0	6.206	39690	39727	9	-0	-44
4 14.1	192 10.0	0 0	6.981	39690	39724	10	-0	-41
4 13.7	192 10.9	0 0	7.757	39708	39720	11	-0	-20
4 13.4	192 19.1	0 0	8.533	39723	39717	12	-0	-2
4 13.0	192 19.3	0 0	9.308	39740	39713	13	-0	10
4 13.0	192 19.3	7 49	0.000	39740	39713	14	-0	10
4 12.6	192 19.5	0 0	0.797	39740	39709	15	-0	21
4 12.3	192 19.7	0 0	1.594	39718	39706	16	-0	2
4 11.9	192 19.9	0 0	2.391	39713	39702	17	-0	-0
4 11.5	192 20.2	0 0	3.187	39745	39698	18	-0	35
4 11.1	192 20.4	0 0	3.984	39788	39695	19	-0	81
4 10.8	192 20.6	0 0	4.781	39790	39691	20	-0	86
4 10.4	192 20.0	0 0	5.578	39755	39688	21	-0	90
4 10.0	192 21.0	0 0	6.375	39723	39684	22	-0	24
4 9.7	192 21.2	0 0	7.172	39710	39680	23	-0	14
4 9.3	192 21.4	0 0	7.969	39727	39677	24	-0	34
4 8.9	192 21.7	0 0	8.766	39729	39673	25	-0	39
4 8.5	192 21.9	0 0	9.562	39686	39669	26	-0	-1
4 8.2	192 22.1	0 0	10.359	39671	39666	27	-0	-13
4 7.8	192 22.3	0 0	11.156	39655	39662	28	-0	-26
4 7.8	192 22.3	0 39	0.000	39655	39662	29	-0	-26
4 7.4	192 22.5	0 0	0.847	39660	39658	30	-0	-10
4 7.0	192 22.7	0 0	1.693	39653	39654	31	-0	-21
4 6.6	192 23.0	0 0	2.540	39628	39650	32	-0	-43
4 6.2	192 23.2	0 0	3.387	39628	39646	33	-0	-40
4 5.8	192 23.4	0 0	4.234	39644	39642	34	-0	-21
4 5.4	192 23.6	0 0	5.080	39680	39638	35	-0	19
4 5.0	192 23.8	0 0	5.927	39717	39634	36	-0	59
4 4.6	192 24.0	0 0	6.774	39750	39630	37	-0	95
4 4.2	192 24.3	0 0	7.620	39763	39626	38	-0	111
4 3.8	192 24.5	0 0	8.467	39715	39622	39	-0	67
4 3.4	192 24.7	0 0	9.314	39670	39618	40	-0	25
4 3.4	192 24.7	0 15	0.000	39670	39618	41	-0	25
4 3.0	192 24.9	0 0	0.828	39617	39614	42	-0	-25
4 2.6	192 25.0	0 0	1.656	39590	39610	43	-0	-49
4 2.2	192 25.2	0 0	2.485	39550	39607	44	-0	-86
4 1.7	192 25.3	0 0	3.313	39460	39603	45	-0	-173
4 1.3	192 25.5	0 0	4.141	39422	39599	46	-0	-208
4 0.9	192 25.7	0 0	4.969	39430	39595	47	-0	-197
4 0.5	192 25.8	0 0	5.798	39470	39592	48	-0	-193
4 0.1	192 26.0	0 0	6.626	39470	39588	49	-0	-150
3 59.7	192 26.2	0 0	7.454	39340	39584	50	-0	-277
3 59.2	192 26.3	0 0	8.282	39290	39580	51	-0	-324
3 58.8	192 26.5	0 0	9.111	39300	39577	52	-0	-311
3 58.4	192 26.6	0 0	9.939	39327	39573	53	-0	-281
3 58.0	192 26.8	0 0	10.767	39345	39569	54	-0	-260
3 57.6	192 26.8	10 0	0.000	39345	39569	55	-0	-260
3 57.1	192 26.9	0 0	0.839	39370	39565	56	-0	-232
3 56.7	192 27.1	0 0	1.678	39382	39561	57	-0	-216
3 56.3	192 27.2	0 0	2.516	39394	39556	58	-0	-201
3 55.9	192 27.4	0 0	3.355	39362	39552	59	-0	-229
3 55.4	192 27.5	0 0	4.194	39350	39548	60	-0	-238
3 55.0	192 27.7	0 0	5.033	39330	39544	61	-0	-294
3 54.6	192 27.8	0 0	5.871	39315	39540	62	-0	-266
3 54.2	192 29.0	0 0	6.710	39270	39536	63	-0	-307
3 53.7	192 28.1	0 0	7.549	39252	39531	64	-0	-322
3 53.3	192 29.3	0 0	8.388	39278	39527	65	-0	-292
3 53.3	192 28.4	0 0	9.224	39310	39523	66	-0	-257
3 53.3	192 28.4	10 40	0.000	39310	39523	67	-0	-257
3 53.5	192 28.5	0 0	0.404	39300	39524	68	-0	-269
3 53.6	192 28.7	0 0	0.807	39307	39526	69	-0	-263
3 53.8	192 28.8	0 0	1.211	39325	39527	70	-0	-247
3 54.0	192 28.9	0 0	1.614	39332	39528	71	-0	-242
3 54.2	192 29.1	0 0	2.018	39336	39529	72	-0	-239
3 54.3	192 29.2	0 0	2.422	39315	39531	73	-0	-262
3 54.5	192 29.3	0 0	2.825	39270	39532	74	-0	-309
3 54.7	192 29.5	0 0	3.229	39251	39533	75	-0	-329
3 54.8	192 29.6	0 0	3.632	39251	39535	76	-0	-331
3 55.0	192 29.7	0 0	4.036	39276	39536	77	-0	-308
3 55.2	192 29.9	0 0	4.439	39311	39537	78	-0	-274
3 55.4	192 30.0	0 0	4.843	39311	39538	79	-0	-276
3 55.5	192 30.1	0 0	5.247	39298	39540	80	-0	-291
3 55.7	192 30.3	0 0	5.650	39275	39541	81	-0	-315
3 55.9	192 30.4	0 0	6.054	39244	39542	82	-0	-346
3 56.0	192 30.5	0 0	6.457	39186	39544	83	-0	-408
3 56.2	192 30.7	0 0	6.861	39160	39545	84	-0	-435
3 56.4	192 30.8	0 0	7.265	39150	39546	85	-0	-447
3 56.6	192 30.9	0 0	7.668	39163	39547	86	-0	-436
3 56.7	192 31.1	0 0	8.072	39165	39549	87	-0	-435
3 56.9	192 31.2	0 0	8.475	39175	39550	88	-0	-427
3 56.9	192 31.2	11 20	0.000	39175	39550	89	-0	-427
3 57.1	192 31.1	0 0	0.406	39213	39552	90	-0	-391
3 57.3	192 31.0	0 0	0.812	39230	39554	91	-0	-377
3 57.5	192 31.0	0 0	1.218	39262	39556	92	-0	-347
3 57.7	192 30.9	0 0	1.624	39279	39558	93	-0	-333
3 57.9	192 30.8	0 0	2.030	39280	39560	94	-0	-334
3 58.1	192 30.7	0 0	2.436	39297	39562	95	-0	-319
3 58.3	192 30.7	0 0	2.842	39306	39564	96	-0	-313
3 58.5	192 30.6	0 0	3.248	39319	39566	97	-0	-302
3 58.7	192 30.5	0 0	3.654	39330	39568	98	-0	-293
3 58.9	192 30.4	0 0	4.060	39344	39570	99	-0	-282
3 59.2	192 30.4	0 0	4.466	39353	39572	100	-0	-275
3 59.4	192 30.3	0 0	4.872	39378	39574	101	-0	-253
3 59.6	192 30.2	0 0	5.278	39380	39576	102	-0	-253
3 59.8	192 30.1	0 0	5.684	39399	39570	103	-0	-240
3 60.0	192 30.1	0 0	6.090	39403	39580	104	-0	-235
4 0.2	192 30.0	0 0	6.496	39410	39582	105	-0	-222
4 0.4	192 29.9	0 0	6.902	39425	39584	106	-0	-217
4 0.6	192 29.8	0 0	7.308	39433	39586	107	-0	-212
4 0.8	192 29.8	0 0	7.714	39445	39588	108	-0	-202
4 1.0	192 29.7	0 0	8.120	39450	39590	109	-0	-200
4 1.2	192 29.6	0 0	8.526	39460	39592	110	-0	-192

TABLE 4 IV
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (GMT)	KMS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	DIURNAL FIELD GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS
				LINE 29				
4 1.2	192 29.6	18 0	0.000	39460	39592	40	-0	-192
4 1.4	192 29.6	0 0	0.407	39450	39594	40	-0	-203
4 1.6	192 29.3	0 0	0.819	39450	39594	39	-0	-203
4 1.8	192 29.3	0 0	1.222	39449	39594	39	-0	-211
4 2.1	192 29.4	0 0	1.629	39435	39599	39	-0	-221
4 2.3	192 29.4	0 0	2.037	39431	39601	39	-0	-220
4 2.5	192 29.3	0 0	2.444	39429	39602	39	-0	-235
4 2.7	192 29.3	0 0	2.851	39431	39604	37	-0	-230
4 2.9	192 29.2	0 0	3.258	39480	39606	37	-0	-163
4 3.1	192 29.2	0 0	3.664	39528	39608	37	-0	-136
4 3.3	192 29.1	0 0	4.073	39577	39609	36	-0	-88
4 3.6	192 29.1	0 0	4.480	39594	39611	36	-0	-73
4 3.8	192 29.0	0 0	4.888	39620	39613	39	-0	-48
4 4.0	192 29.0	0 0	5.299	39618	39614	39	-0	-91
4 4.2	192 28.9	0 0	5.702	39646	39616	39	-0	-25
4 4.4	192 28.9	0 0	6.110	39697	39618	34	-0	25
4 4.6	192 28.8	0 0	6.517	39746	39620	34	-0	72
4 4.8	192 28.8	0 0	6.924	39777	39621	34	-0	102
4 5.0	192 28.7	0 0	7.331	39790	39623	33	-0	114
4 5.3	192 28.7	0 0	7.739	39780	39629	33	-0	102
4 5.5	192 28.6	0 0	8.146	39773	39626	32	-0	94
4 5.7	192 28.6	0 0	8.553	39760	39628	32	-0	80
4 5.9	192 28.5	0 0	8.961	39766	39630	32	-0	84
4 6.1	192 28.9	0 0	9.368	39783	39632	31	-0	100
4 6.3	192 28.4	0 0	9.779	39790	39633	31	-0	106
4 6.5	192 28.4	0 0	10.183	39817	39635	31	-0	131
4 6.8	192 28.3	0 0	10.590	39832	39637	30	-0	145
4 7.0	192 28.3	0 0	10.997	39846	39639	30	-0	158
4 7.2	192 28.2	0 0	11.404	39849	39640	49	-0	155
4 7.4	192 28.2	0 0	11.812	39850	39642	49	-0	159
4 7.4	192 28.2	18 59	0.000	39850	39642	49	-0	159
4 7.3	192 28.7	0 0	1.006	39840	39641	48	-0	151
4 7.2	192 29.3	0 0	2.012	39835	39639	47	-0	149
4 7.1	192 29.6	0 0	3.018	39834	39638	46	-0	150
4 7.0	192 30.3	0 0	4.024	39834	39636	46	-0	152
4 6.8	192 30.9	0 0	5.030	39833	39635	44	-0	154
4 6.7	192 31.4	0 0	6.035	39827	39634	44	-0	150
4 6.6	192 31.9	0 0	7.041	39740	39632	43	-0	45
4 6.5	192 32.4	0 0	8.047	39645	39631	42	-0	78
4 6.4	192 33.0	0 0	9.053	39596	39629	41	-0	74
4 6.3	192 33.5	0 0	10.059	39560	39628	40	-0	-108
4 6.3	192 33.5	18 40	0.000	39560	39628	40	-0	-108
4 6.2	192 34.0	0 0	0.973	39530	39626	39	-0	-135
4 6.1	192 34.9	0 0	1.945	39506	39625	38	-0	-137
4 6.0	192 35.1	0 0	2.918	39500	39623	37	-0	-140
4 6.0	192 35.6	0 0	3.890	39509	39621	36	-0	-148
4 5.9	192 36.1	0 0	4.863	39480	39620	35	-0	-175
4 5.8	192 36.6	0 0	5.835	39400	39618	34	-0	-252
4 5.8	192 36.6	14 10	0.000	39400	39618	34	-0	-252
4 6.4	192 36.8	0 0	1.123	39415	39622	33	-0	-240
4 6.9	192 37.1	0 0	2.245	39440	39626	32	-0	-210
4 7.4	192 37.3	0 0	3.368	39434	39630	31	-0	-227
4 8.0	192 37.6	0 0	4.491	39400	39634	30	-0	-264
4 8.0	192 37.6	10 30	0.000	39400	39634	30	-0	-264
4 8.4	192 37.1	0 0	1.238	39468	39639	29	-0	-200
4 8.8	192 36.9	0 0	2.475	39476	39643	28	-0	-193
4 9.2	192 36.0	0 0	3.713	39540	39648	27	-0	-135
4 9.5	192 35.4	0 0	4.950	39586	39653	25	-0	-92
4 9.9	192 34.9	0 0	6.188	39617	39658	24	-0	-65
4 10.3	192 34.3	0 0	7.425	39620	39662	23	-0	-65
4 10.7	192 33.8	0 0	8.663	39625	39667	22	-0	-64
4 10.7	192 33.8	19 10	0.000	39625	39667	22	-0	-64
4 11.1	192 33.0	0 0	1.615	39638	39672	21	-0	-94
4 11.5	192 32.3	0 0	3.230	39670	39676	19	-0	-86
4 11.9	192 31.5	0 0	4.844	39675	39681	18	-0	-84
4 12.3	192 30.7	0 0	6.459	39665	39686	16	-0	-37
4 12.7	192 29.9	0 0	8.074	39777	39691	15	-0	72
4 13.1	192 29.2	0 0	9.689	39874	39695	13	-0	165
4 13.5	192 28.4	0 0	11.304	39980	39700	12	-0	268
4 13.5	192 28.4	10 0	0.000	39980	39700	12	-0	268
4 13.9	192 29.0	0 0	1.200	39930	39699	11	-0	220
4 13.9	192 29.7	0 0	2.399	39810	39698	10	-0	102
4 13.9	192 30.3	0 0	3.599	39682	39697	9	-0	-24
4 13.9	192 31.0	0 0	4.798	39670	39696	8	-0	-35
4 13.9	192 31.6	0 0	5.998	39667	39695	7	-0	-34
4 13.6	192 32.3	0 0	7.198	39665	39694	6	-0	-47
4 13.6	192 32.9	0 0	8.397	39650	39693	5	-0	-57
4 13.6	192 33.6	0 0	9.597	39638	39692	4	-0	-59
4 13.6	192 34.2	0 0	10.796	39634	39691	3	-0	-76
4 13.6	192 34.9	0 0	11.996	39615	39690	2	-0	-76
4 13.6	192 35.5	0 0	13.195	39615	39689	1	-0	-74
4 13.6	192 35.5	17 0	0.000	39615	39689	0	-0	-74
4 13.3	192 36.0	0 0	1.011	39615	39688	0	-0	-71
4 13.0	192 36.4	0 0	2.021	39610	39682	0	-0	-72
4 12.7	192 36.9	0 0	3.032	39610	39679	0	-0	-69
4 12.4	192 37.3	0 0	4.042	39610	39676	0	-0	-66
4 12.2	192 37.8	0 0	5.053	39587	39673	0	-0	-86
4 11.9	192 38.3	0 0	6.063	39580	39669	0	-0	-109
4 11.6	192 38.7	0 0	7.074	39550	39666	0	-0	-116
4 11.3	192 39.2	0 0	8.084	39555	39663	0	-0	-108
4 11.0	192 39.6	0 0	9.095	39560	39659	0	-0	-99
4 10.7	192 40.1	0 0	10.105	39559	39650	0	-0	-101

TABLE 4 V
OBSERVED AND REDUCED MAGNETIC

TOTAL FORCE DATA									
LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (HST)	OBSERVED GAMMAS	REDUCED GAMMAS	DIFFERENTIAL GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS		
LINE 23									
4 13.0	152 39.8	0 52	0.000	39542	39678	0	-135		
4 13.2	152 39.8	0 0	0.419	39537	39680	0	-143		
4 13.5	152 39.8	0 0	0.839	39531	39681	0	-150		
4 13.7	152 39.8	0 0	1.258	39530	39683	0	-153		
4 13.9	152 39.9	0 0	1.677	39522	39684	0	-162		
4 14.1	152 39.9	0 0	2.096	39531	39686	0	-155		
4 14.4	152 39.9	0 0	2.514	39550	39688	0	-138		
4 14.6	152 39.9	0 0	2.935	39566	39689	1	-124		
4 14.8	152 39.9	0 0	3.354	39576	39691	1	-115		
4 15.0	152 40.0	0 0	3.773	39581	39692	1	-112		
4 15.3	152 40.0	0 0	4.193	39584	39694	1	-111		
4 15.5	152 40.0	0 0	4.612	39576	39695	2	-121		
4 15.7	152 40.0	0 0	5.031	39575	39697	2	-124		
4 15.7	152 40.0	7 10	0.000	39575	39697	2	-124		
4 15.7	152 39.8	0 0	0.390	39590	39698	2	-110		
4 15.7	152 39.6	0 0	0.781	39595	39698	3	-106		
4 15.7	152 39.4	0 0	1.171	39593	39699	3	-109		
4 15.8	152 39.2	0 0	1.562	39585	39699	3	-117		
4 15.8	152 39.0	0 0	1.952	39585	39700	4	-118		
4 15.8	152 38.7	0 0	2.342	39584	39700	4	-120		
4 15.8	152 38.5	0 0	2.733	39578	39701	4	-127		
4 15.8	152 38.3	0 0	3.123	39584	39701	5	-122		
4 15.8	152 38.1	0 0	3.513	39590	39702	5	-117		
4 15.8	152 37.9	0 0	3.904	39594	39702	5	-114		
4 15.8	152 37.7	0 0	4.294	39605	39703	6	-104		
4 15.9	152 37.5	0 0	4.685	39610	39704	6	-99		
4 15.9	152 37.3	0 0	5.075	39610	39704	6	-100		
4 15.9	152 37.1	0 0	5.465	39611	39705	7	-100		
4 15.9	152 36.9	0 0	5.856	39620	39705	7	-92		
4 15.9	152 36.6	0 0	6.246	39620	39706	7	-93		
4 15.9	152 36.4	0 0	6.637	39620	39706	7	-94		
4 15.9	152 36.2	0 0	7.027	39622	39707	8	-93		
4 15.9	152 36.0	0 0	7.417	39630	39707	8	-90		
4 16.0	152 35.8	0 0	7.808	39630	39708	8	-86		
4 16.0	152 35.6	0 0	8.198	39630	39709	9	-87		
4 16.0	152 35.4	0 0	8.589	39637	39709	9	-81		
4 16.0	152 35.2	0 0	8.979	39640	39710	9	-79		
4 16.0	152 35.0	0 0	9.369	39642	39710	10	-75		
4 16.0	152 34.8	0 0	9.760	39650	39711	10	-71		
4 16.0	152 34.5	0 0	10.150	39650	39711	10	-72		
4 16.0	152 34.3	0 0	10.540	39650	39712	11	-75		
4 16.1	152 34.1	0 0	10.931	39650	39712	11	-73		
4 16.1	152 33.9	0 0	11.321	39650	39713	11	-74		
4 16.1	152 33.7	0 0	11.712	39650	39713	12	-75		
4 16.1	152 33.5	0 0	12.102	39655	39714	12	-71		
4 16.1	152 33.5	8 0	0.000	39655	39714	12	-71		
4 16.1	152 33.3	0 0	0.444	39650	39714	12	-77		
4 16.0	152 33.0	0 0	0.889	39650	39714	13	-77		
4 16.0	152 32.8	0 0	1.333	39645	39714	13	-83		
4 16.0	152 32.6	0 0	1.778	39640	39715	14	-86		
4 16.0	152 32.3	0 0	2.222	39643	39715	14	-85		
4 16.0	152 32.1	0 0	2.666	39643	39715	14	-86		
4 16.0	152 31.8	0 0	3.111	39640	39715	15	-90		
4 16.0	152 31.6	0 0	3.555	39640	39715	15	-90		
4 16.0	152 31.4	0 0	4.000	39625	39715	16	-106		
4 16.0	152 31.1	0 0	4.444	39625	39715	16	-106		
4 16.0	152 30.9	0 0	4.889	39625	39716	17	-107		
4 16.0	152 30.7	0 0	5.333	39628	39716	17	-105		
4 16.0	152 30.4	0 0	5.777	39633	39716	17	-100		
4 16.0	152 30.2	0 0	6.222	39652	39716	18	-92		
4 16.0	152 30.0	0 0	6.666	39660	39716	18	-74		
4 16.0	152 29.7	0 0	7.111	39646	39716	19	-69		
4 16.0	152 29.5	0 0	7.555	39636	39716	19	-69		
4 16.0	152 29.2	0 0	7.999	39635	39716	19	-101		
4 16.0	152 29.0	0 0	8.444	39650	39717	20	-86		
4 16.0	152 28.8	0 0	8.888	39674	39717	20	-63		
4 16.0	152 28.5	0 0	9.333	39690	39717	21	-47		
4 16.0	152 28.3	0 0	9.777	39684	39717	21	-54		
4 16.0	152 28.3	8 45	0.000	39684	39717	21	-54		
4 16.0	152 28.1	0 0	0.349	39692	39717	21	-47		
4 16.0	152 27.9	0 0	0.698	39684	39717	22	-55		
4 16.0	152 27.7	0 0	1.048	39688	39718	22	-52		
4 16.0	152 27.6	0 0	1.397	39696	39718	22	-44		
4 16.0	152 27.4	0 0	1.746	39701	39718	23	-59		
4 16.0	152 27.2	0 0	2.095	39706	39718	23	-35		
4 16.0	152 27.0	0 0	2.444	39711	39718	23	-31		
4 16.0	152 26.8	0 0	2.794	39730	39719	24	-12		
4 16.0	152 26.6	0 0	3.143	39744	39719	24	2		
4 16.0	152 26.4	0 0	3.492	39759	39719	24	16		
4 16.0	152 26.2	0 0	3.841	39778	39719	24	34		
4 16.0	152 26.0	0 0	4.191	39780	39719	25	35		
4 16.1	152 25.9	0 0	4.540	39772	39719	25	27		
4 16.1	152 25.7	0 0	4.889	39766	39720	25	21		
4 16.1	152 25.5	0 0	5.238	39757	39720	26	12		
4 16.1	152 25.3	0 0	5.587	39746	39720	26	-0		
4 16.1	152 25.3	9 10	0.000	39746	39720	26	-0		
4 16.1	152 25.1	0 0	0.313	39727	39720	26	-20		
4 16.1	152 25.0	0 0	0.625	39713	39721	27	-34		
4 16.1	152 24.8	0 0	0.938	39710	39721	27	-50		
4 16.1	152 24.6	0 0	1.250	39720	39721	27	-28		
4 16.0	152 24.5	0 0	1.563	39712	39721	27	-37		
4 16.0	152 24.3	0 0	1.875	39709	39722	28	-40		
4 16.0	152 24.1	0 0	2.188	39709	39722	28	-41		
4 16.0	152 24.0	0 0	2.501	39708	39722	28	-42		
4 16.0	152 23.8	0 0	2.813	39690	39722	28	-61		
4 16.0	152 23.6	0 0	3.126	39681	39723	29	-70		
4 16.0	152 23.5	0 0	3.438	39693	39723	29	-59		
4 16.0	152 23.3	0 0	3.751	39712	39723	29	-40		
4 16.0	152 23.1	0 0	4.063	39725	39723	29	-25		
4 16.0	152 23.0	0 0	4.376	39728	39724	30	-23		
4 16.0	152 22.8	0 0	4.689	39712	39724	30	-42		
4 16.0	152 22.6	0 0	5.001	39740	39724	30	-14		
4 16.0	152 22.4	0 0	5.314	39750	39724	30	-5		
4 16.0	152 22.3	0 0	5.626	39750	39725	31	-5		
4 16.0	152 22.1	0 0	5.939	39745	39725	31	-11		
4 16.0	152 21.9	0 0	6.251	39740	39725	31	-16		
4 16.0	152 21.8	0 0	6.564	39747	39725	31	-10		
4 16.0	152 21.6	0 0	6.877	39760	39726	32	3		
4 16.0	152 21.4	0 0	7.189	39773	39726	32	16		
4 16.0	152 21.3	0 0	7.502	39783	39726	32	25		
4 16.0	152 21.1	0 0	7.814	39700	39726	32	32		
4 16.0	152 20.9	0 0	8.127	39744	39727	32	25		
4 16.0	152 20.8	0 0	8.439	39773	39727	33	13		
4 16.0	152 20.6	0 0	8.752	39747	39727	33	-3		

TABLE 4 VI
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (EST)	HMS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	JOURNAL FIELD GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS
LINE 23								
4 14.6	192 20.6	0 49	0.809	39727	39727	33	-0	-3
4 14.6	192 20.4	0 0	0.822	39730	39727	33	-0	-31
4 14.6	192 20.2	0 0	0.809	39737	39728	34	-0	-4
4 14.6	192 20.0	0 0	1.207	39779	39728	34	-0	13
4 14.7	192 19.7	0 0	1.610	39820	39728	34	-0	57
4 14.7	192 19.5	0 0	2.012	39845	39728	39	-0	82
4 14.7	192 19.3	0 0	2.419	39850	39729	39	-0	66
4 14.7	192 19.1	0 0	2.817	39849	39729	36	-0	61
4 14.7	192 18.9	0 0	3.220	39830	39729	36	-0	65
4 14.7	192 18.7	0 0	3.622	39800	39730	36	-0	34
4 14.6	192 18.4	0 0	4.029	39770	39730	37	-0	4
4 14.6	192 18.2	0 0	4.427	39750	39730	37	-0	-17
4 14.6	192 18.0	0 0	4.830	39720	39730	37	-0	-48
4 14.6	192 17.6	0 0	5.232	39714	39731	30	-0	-94
4 14.6	192 17.4	0 0	5.639	39710	39731	38	-0	-59
4 14.6	192 17.1	0 0	6.037	39690	39731	38	-0	-80
4 14.5	192 16.9	0 0	6.440	39660	39731	39	-0	-110
4 14.5	192 16.7	0 0	6.842	39630	39732	39	-0	-141
4 14.5	192 16.5	0 0	7.249	39540	39732	39	-0	-232
4 14.5	192 16.3	0 0	7.647	39510	39732	40	-0	-262
4 14.5	192 16.1	0 0	8.050	39504	39733	40	-0	-269
4 14.5	192 15.8	0 0	8.452	39519	39733	41	-0	-258
4 14.4	192 15.6	0 0	8.855	39525	39733	41	-0	-249
4 14.4	192 15.4	0 0	9.257	39542	39733	41	-0	-233
4 14.4	192 15.2	0 0	9.660	39540	39734	42	-0	-235
4 14.4	192 15.2	0 0	10.062	39530	39734	42	-0	-246
4 14.4	192 15.2	10 30	0.000	0	39734	42	-0	
4 15.9	192 15.2	0 0	2.139	0	39750	46	-0	
4 16.7	192 15.3	0 0	4.278	0	39765	49	-0	
4 16.7	192 15.3	10 50	0.000	0	39750	46	-0	
4 17.5	192 15.3	0 0	1.394	0	39758	47	-0	
4 18.2	192 15.3	0 0	2.788	0	39768	49	-0	
4 18.2	192 15.3	11 5	0.000	0	39765	49	-0	
4 18.2	192 15.5	0 0	0.398	39800	39765	49	-0	-14
4 18.2	192 15.7	0 0	0.796	39813	39764	50	-0	-1
4 18.2	192 15.9	0 0	1.195	39828	39764	50	-0	14
4 18.2	192 16.2	0 0	1.593	39849	39764	51	-0	30
4 18.2	192 16.4	0 0	1.991	39848	39764	51	-0	33
4 18.2	192 16.6	0 0	2.389	39830	39763	52	-0	15
4 18.2	192 16.8	0 0	2.788	39825	39763	52	-0	10
4 18.2	192 16.8	11 20	0.000	39825	39763	52	-0	10
4 18.2	192 17.0	0 0	0.416	39817	39763	52	-0	2
4 18.2	192 17.2	0 0	0.832	39815	39762	53	-0	-0
4 18.2	192 17.5	0 0	1.248	39815	39762	53	-0	0
4 18.2	192 17.7	0 0	1.664	39805	39761	54	-0	-10
4 18.2	192 17.9	0 0	2.080	39790	39761	54	-0	-25
4 18.2	192 18.1	0 0	2.496	39767	39761	54	-0	-48
4 18.2	192 18.4	0 0	2.912	39753	39760	55	-0	-62
4 18.2	192 18.6	0 0	3.328	39740	39760	55	-0	-75
4 18.2	192 18.8	0 0	3.744	39737	39760	55	-0	-78
4 18.2	192 19.0	0 0	4.160	39744	39759	56	-0	-71
4 18.3	192 19.3	0 0	4.576	39756	39759	56	-0	-59
4 18.3	192 19.5	0 0	4.992	39773	39758	57	-0	-42
4 18.3	192 19.7	0 0	5.408	39774	39758	57	-0	-41
4 18.3	192 19.9	0 0	5.824	39775	39758	57	-0	-40
4 18.3	192 20.2	0 0	6.240	39750	39757	58	-0	-35
4 18.3	192 20.4	0 0	6.656	39790	39757	58	-0	-25
4 18.3	192 20.6	0 0	7.072	39790	39757	58	-0	-25
4 18.3	192 20.8	0 0	7.488	39805	39756	59	-0	-10
4 18.3	192 21.1	0 0	7.904	39816	39756	59	-0	1
4 18.3	192 21.3	0 0	8.320	39823	39755	60	-0	8
4 18.3	192 21.9	0 0	8.736	39830	39755	60	-0	15
4 18.3	192 21.9	12 0	0.000	39830	39755	60	-0	15
4 18.3	192 21.7	0 0	0.416	39840	39754	60	-0	26
4 18.2	192 21.9	0 0	0.832	39850	39754	59	-0	37
4 18.2	192 22.2	0 0	1.249	39851	39753	59	-0	39
4 18.2	192 22.4	0 0	1.665	39860	39753	58	-0	49
4 18.2	192 22.6	0 0	2.081	39860	39752	58	-0	50
4 18.1	192 22.8	0 0	2.497	39867	39751	57	-0	58
4 18.1	192 23.1	0 0	2.913	39880	39751	57	-0	72
4 18.1	192 23.3	0 0	3.329	39890	39750	56	-0	83
4 18.0	192 23.5	0 0	3.746	39887	39750	56	-0	82
4 18.0	192 23.7	0 0	4.162	39889	39749	56	-0	81
4 18.0	192 23.9	0 0	4.578	39885	39748	55	-0	82
4 18.0	192 24.2	0 0	4.994	39884	39748	55	-0	82
4 17.9	192 24.4	0 0	5.410	39879	39747	54	-0	74
4 17.9	192 24.6	0 0	5.826	39860	39746	54	-0	60
4 17.9	192 24.8	0 0	6.243	39845	39746	53	-0	46
4 17.9	192 25.1	0 0	6.659	39830	39745	53	-0	32
4 17.8	192 25.3	0 0	7.075	39822	39745	52	-0	25
4 17.8	192 25.9	0 0	7.491	39810	39744	52	-0	14
4 17.8	192 25.9	12 40	0.000	39810	39744	52	-0	14
4 17.8	192 25.7	0 0	0.405	39783	39744	52	-0	-12
4 17.8	192 25.9	0 0	0.810	39760	39743	51	-0	-34
4 17.8	192 26.2	0 0	1.215	39738	39743	51	-0	-56
4 17.8	192 26.4	0 0	1.620	39715	39743	50	-0	-78
4 17.9	192 26.6	0 0	2.025	39708	39743	50	-0	-84
4 17.9	192 26.8	0 0	2.430	39693	39742	49	-0	-98
4 17.9	192 27.0	0 0	2.839	39677	39742	49	-0	-114
4 17.9	192 27.2	0 0	3.240	39663	39742	48	-0	-127
4 17.9	192 27.9	0 0	3.645	39644	39741	48	-0	-145
4 17.9	192 27.7	0 0	4.051	39622	39741	47	-0	-166
4 17.9	192 27.9	0 0	4.456	39612	39741	47	-0	-178
4 17.9	192 28.1	0 0	4.861	39585	39740	46	-0	-202
4 18.0	192 28.3	0 0	5.266	39540	39740	46	-0	-246
4 18.0	192 28.9	0 0	5.671	39494	39740	45	-0	-291
4 18.0	192 28.6	0 0	6.076	39480	39740	45	-0	-305
4 18.0	192 29.0	0 0	6.481	39486	39739	44	-0	-298
4 18.0	192 29.2	0 0	6.886	39505	39739	44	-0	-270

TABLE 4 VII
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (GMT)	KRS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	DIURNAL FIELD GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS
LINE 23								
4 18.0	192 29.2	18 00	0.000	39509	39739	44	-0	-270.
4 18.0	192 29.4	0 0	0.380	39524	39739	44	-0	-250
4 18.0	192 29.6	0 0	0.760	39550	39738	43	-0	-232
4 18.1	192 29.0	0 0	1.140	39568	39738	43	-0	-213
4 18.1	192 30.0	0 0	1.520	39581	39738	43	-0	-199
4 18.1	192 30.2	0 0	1.901	39592	39738	42	-0	-180
4 18.1	192 30.4	0 0	2.281	39598	39737	42	-0	-161
4 18.1	192 30.6	0 0	2.661	39600	39737	41	-0	-179
4 18.1	192 30.8	0 0	3.041	39609	39737	41	-0	-173
4 18.2	192 31.0	0 0	3.421	39610	39737	41	-0	-167
4 18.2	192 31.2	0 0	3.801	39613	39736	40	-0	-164
4 18.2	192 31.4	0 0	4.181	39624	39736	40	-0	-152
4 18.2	192 31.6	0 0	4.561	39629	39736	40	-0	-150
4 18.2	192 31.8	0 0	4.941	39630	39736	39	-0	-145
4 18.3	192 32.1	0 0	5.322	39640	39735	39	-0	-134
4 18.3	192 32.3	0 0	5.702	39649	39735	38	-0	-129
4 18.3	192 32.5	0 0	6.082	39647	39735	38	-0	-126
4 18.3	192 32.7	0 0	6.462	39650	39735	38	-0	-122
4 18.3	192 32.9	0 0	6.842	39650	39734	37	-0	-122
4 18.4	192 33.1	0 0	7.222	39650	39734	37	-0	-121
4 18.4	192 33.3	0 0	7.602	39650	39734	37	-0	-120
4 18.4	192 33.5	0 0	7.982	39650	39734	36	-0	-120
4 18.4	192 33.7	0 0	8.362	39650	39733	36	-0	-119
4 18.4	192 33.9	0 0	8.743	39650	39733	35	-0	-119
4 18.4	192 34.1	0 0	9.123	39648	39733	35	-0	-120
4 18.5	192 34.3	0 0	9.503	39644	39733	35	-0	-123
4 18.5	192 34.5	0 0	9.883	39646	39732	34	-0	-121
4 18.5	192 34.7	0 0	10.263	39640	39732	34	-0	-126
4 18.5	192 34.7	14 10	0.000	39640	39732	34	-0	-126
4 18.5	192 34.9	0 0	0.393	39639	39732	34	-0	-130
4 18.6	192 35.1	0 0	0.785	39640	39732	33	-0	-129
4 18.6	192 35.3	0 0	1.170	39638	39732	33	-0	-127
4 18.7	192 35.5	0 0	1.570	39640	39732	32	-0	-126
4 18.7	192 35.7	0 0	1.963	39632	39732	32	-0	-132
4 18.7	192 35.9	0 0	2.355	39630	39732	31	-0	-133
4 18.8	192 36.2	0 0	2.748	39628	39731	31	-0	-134
4 18.8	192 36.4	0 0	3.140	39621	39731	31	-0	-141
4 18.8	192 36.6	0 0	3.533	39616	39731	30	-0	-146
4 18.9	192 36.8	0 0	3.925	39611	39731	30	-0	-150
4 18.9	192 37.0	0 0	4.318	39610	39731	29	-0	-150
4 19.0	192 37.2	0 0	4.710	39608	39731	29	-0	-152
4 19.0	192 37.4	0 0	5.103	39608	39731	29	-0	-152
4 19.0	192 37.6	0 0	5.495	39605	39731	28	-0	-154
4 19.1	192 37.8	0 0	5.888	39605	39731	28	-0	-154
4 19.1	192 38.0	0 0	6.280	39590	39731	27	-0	-168
4 19.2	192 38.2	0 0	6.673	39590	39731	27	-0	-167
4 19.2	192 38.4	0 0	7.069	39590	39731	26	-0	-167
4 19.2	192 38.6	0 0	7.458	39593	39731	26	-0	-164
4 19.3	192 38.8	0 0	7.850	39594	39730	26	-0	-162
4 19.3	192 39.1	0 0	8.243	39580	39730	25	-0	-175
4 19.3	192 39.3	0 0	8.636	39555	39730	25	-0	-176
4 19.4	192 39.5	0 0	9.028	39590	39730	24	-0	-164
4 19.4	192 39.7	0 0	9.421	39592	39730	24	-0	-162
4 19.5	192 39.9	0 0	9.813	39600	39730	23	-0	-154
4 19.5	192 40.1	0 0	10.206	39594	39730	23	-0	-159
4 19.5	192 40.1	19 5	0.000	39594	39730	23	-0	-159
4 19.7	192 40.1	0 0	0.383	39603	39732	23	-0	-152
4 19.9	192 40.1	0 0	0.767	39610	39734	22	-0	-146
4 20.1	192 40.1	0 0	1.150	39579	39736	22	-0	-179
4 20.3	192 40.1	0 0	1.533	39550	39738	22	-0	-210
4 20.5	192 40.1	0 0	1.916	39502	39740	21	-0	-259
4 20.7	192 40.1	0 0	2.300	39490	39742	21	-0	-273
4 20.9	192 40.1	0 0	2.683	39502	39744	20	-0	-262
4 21.2	192 40.1	0 0	3.066	39526	39746	20	-0	-240
4 21.4	192 40.1	0 0	3.450	39543	39748	20	-0	-225
4 21.6	192 40.1	0 0	3.833	39560	39750	19	-0	-209
4 21.8	192 40.1	0 0	4.218	39560	39752	19	-0	-211
4 22.0	192 40.1	0 0	4.599	39560	39754	19	-0	-213
4 22.2	192 40.1	0 0	4.983	39552	39756	18	-0	-222
4 22.4	192 40.1	0 0	5.366	39547	39758	18	-0	-229
4 22.6	192 40.1	0 0	5.749	39549	39760	17	-0	-228
4 22.8	192 40.1	0 0	6.133	39555	39762	17	-0	-224
4 22.8	192 40.1	19 39	0.000	39555	39762	17	-0	-224
4 22.7	192 39.0	0 0	2.046	39535	39763	15	-0	-243
4 22.7	192 37.9	0 0	4.093	0	39765	13	-0	-0
4 22.6	192 36.8	0 0	6.139	0	39766	12	-0	-0
4 22.6	192 39.7	0 0	8.189	0	39767	10	-0	-0
4 22.6	192 34.6	0 0	10.231	0	39769	0	-0	-0
4 22.5	192 33.5	0 0	12.278	0	39770	0	-0	-0
4 22.5	192 33.5	10 30	0.000	0	39770	0	-0	-0
4 22.7	192 31.3	0 0	4.098	0	39776	2	-0	-0
4 22.8	192 29.1	0 0	8.196	0	39781	0	-0	-0
4 23.0	192 29.1	17 9	0.000	39650	39781	0	-0	-131
4 23.0	192 29.8	0 0	0.327	39650	39782	0	-0	-138
4 23.0	192 28.9	0 0	1.053	39692	39782	0	-0	-130
4 23.0	192 28.2	0 0	1.580	39655	39783	0	-0	-126
4 23.0	192 28.0	0 0	2.106	39655	39783	0	-0	-128
4 23.0	192 27.7	0 0	2.633	39697	39784	0	-0	-127
4 23.0	192 27.4	0 0	3.159	39660	39785	0	-0	-125
4 23.0	192 27.1	0 0	3.686	39660	39785	0	-0	-125
4 23.0	192 26.8	0 0	4.212	39669	39786	0	-0	-117
4 23.0	192 26.5	0 0	4.739	39670	39787	0	-0	-117
4 23.0	192 26.3	0 0	5.269	39674	39787	0	-0	-113
4 23.0	192 26.0	0 0	5.792	39675	39788	0	-0	-113
4 23.0	192 25.7	0 0	6.318	39697	39788	0	-0	-91
4 23.0	192 25.4	0 0	6.849	39717	39789	0	-0	-72
4 23.0	192 25.1	0 0	7.371	-0	39790	0	-0	-0
4 23.0	192 24.8	0 0	7.898	-0	39790	0	-0	-0
4 23.0	192 24.6	0 0	8.424	-0	39791	0	-0	-0
4 23.0	192 24.3	0 0	8.951	-0	39791	0	-0	-0
4 23.0	192 24.0	0 0	9.470	-0	39792	0	-0	-0

TABLE 4 VIII
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (GMT)	MHD	OBSERVED FIELD GAMMA	REGIONAL FIELD GAMMA	DIURNAL FIELD GAMMA	DIURNAL FIELD GAMMA	DIURNAL FIELD GAMMA
				LINE 24				
4 16.1	192 14.6	0 30	0.000	0	39791	30	-0	
4 16.2	192 15.0	0 0	0.766	39690	39751	31	-0	-02
4 16.3	192 15.4	0 0	1.932	39730	39751	31	-0	-92
4 16.4	192 15.8	0 0	2.299	39774	39751	32	-0	-9
4 16.5	192 16.2	0 0	3.065	39790	39752	32	-0	6
4 16.6	192 16.6	0 0	3.631	39817	39752	33	-0	32
4 16.7	192 17.0	0 0	4.897	39830	39752	33	-0	49
4 16.8	192 17.4	0 0	9.363	39790	39752	34	-0	4
4 16.8	192 17.4	0 50	0.000	39790	39752	34	-0	4
4 16.9	192 17.9	0 0	1.045	39770	39752	39	-0	-17
4 17.0	192 18.9	0 0	2.090	39780	39752	36	-0	-0
4 17.2	192 19.0	0 0	3.134	39790	39752	37	-0	1
4 17.3	192 19.6	0 0	4.179	39709	39752	38	-0	-60
4 17.4	192 20.2	0 0	9.224	39650	39752	39	-0	-141
4 17.5	192 20.7	0 0	0.269	39689	39752	40	-0	-107
4 17.5	192 20.7	10 20	0.000	39689	39752	40	-0	-107
4 17.7	192 21.5	0 0	1.967	39725	39751	41	-0	-67
4 17.8	192 22.3	0 0	3.134	39785	39750	43	-0	-0
4 18.0	192 23.2	0 0	4.702	39879	39749	44	-0	62
4 18.2	192 24.0	0 0	6.269	39890	39748	46	-0	96
4 18.2	192 24.0	10 50	0.000	39870	39748	46	-0	96
4 18.3	192 24.2	0 0	0.402	39871	39748	46	-0	76
4 18.3	192 24.4	0 0	0.603	39859	39749	47	-0	59
4 18.4	192 24.6	0 0	1.209	39843	39749	47	-0	46
4 18.4	192 24.8	0 0	1.606	39830	39750	48	-0	32
4 18.5	192 25.0	0 0	2.008	39803	39750	48	-0	4
4 18.5	192 25.3	0 0	2.409	39795	39751	49	-0	-4
4 18.6	192 25.5	0 0	2.811	39776	39751	49	-0	-24
4 18.6	192 25.7	0 0	3.213	39761	39752	50	-0	-40
4 18.7	192 25.9	0 0	3.614	39744	39752	50	-0	-56
4 18.7	192 26.1	0 0	4.016	39718	39753	51	-0	-89
4 18.8	192 26.3	0 0	4.417	39700	39753	51	-0	-104
4 18.8	192 26.3	11 19	0.000	39700	39753	51	-0	-104
4 19.0	192 26.2	0 0	0.390	39689	39759	51	-0	-121
4 19.2	192 26.1	0 0	0.781	39670	39757	52	-0	-138
4 19.4	192 26.0	0 0	1.171	39708	39758	52	-0	-103
4 19.6	192 26.0	0 0	1.562	39735	39760	53	-0	-78
4 19.8	192 25.9	0 0	1.952	39745	39762	53	-0	-70
4 20.0	192 25.8	0 0	2.343	39770	39764	54	-0	-47
4 20.1	192 25.7	0 0	2.733	39815	39769	54	-0	-9
4 20.3	192 25.6	0 0	3.123	39843	39767	55	-0	21
4 20.5	192 25.5	0 0	3.514	39835	39769	55	-0	11
4 20.7	192 25.5	0 0	3.904	39823	39771	56	-0	-3
4 20.9	192 25.4	0 0	4.295	39815	39772	56	-0	-14
4 21.1	192 25.3	0 0	4.685	39790	39774	57	-0	-41
4 21.3	192 25.2	0 0	5.076	39768	39776	57	-0	-69
4 21.3	192 25.2	11 49	0.000	39768	39776	57	-0	-69
4 21.7	192 25.0	0 0	0.807	39760	39779	58	-0	-77
4 22.1	192 24.8	0 0	1.619	39764	39783	58	-0	-77
4 22.5	192 24.6	0 0	2.422	39805	39786	59	-0	-40
4 22.8	192 24.4	0 0	3.230	39820	39790	60	-0	-30
4 23.2	192 24.2	0 0	4.037	39815	39793	59	-0	-38
4 23.6	192 24.0	0 0	4.844	39855	39797	59	-0	10
4 24.0	192 23.8	0 0	5.652	39882	39800	58	-0	24
4 24.0	192 23.8	12 10	0.000	39892	39800	58	-0	24
4 24.4	192 23.6	0 0	0.816	39865	39804	57	-0	9
4 24.8	192 23.4	0 0	1.637	39790	39808	55	-0	-73
4 25.2	192 23.2	0 0	2.459	39830	39812	54	-0	-36
4 25.5	192 22.9	0 0	3.273	39920	39815	53	-0	92
4 25.9	192 22.7	0 0	4.091	40005	39819	51	-0	134
4 26.3	192 22.5	0 0	4.91	39950	39823	50	-0	77
4 26.3	192 22.5	12 50	0.000	39950	39823	50	-0	77
4 26.3	192 23.5	0 0	1.859	39870	39821	49	-0	0
4 26.4	192 24.5	0 0	3.718	39825	39819	47	-0	-41
4 26.4	192 25.5	0 0	5.577	39784	39817	46	-0	-79
4 26.4	192 26.5	0 0	7.436	39744	39815	45	-0	-116
4 26.4	192 26.5	13 15	0.000	39744	39815	45	-0	-116
4 26.4	192 27.4	0 0	1.619	39720	39814	43	-0	-137
4 26.4	192 28.2	0 0	3.239	39708	39812	42	-0	-146
4 26.4	192 29.1	0 0	4.858	39703	39811	40	-0	-148
4 26.4	192 30.0	0 0	6.478	39700	39809	38	-0	-148
4 26.4	192 30.9	0 0	8.097	39697	39808	37	-0	-148
4 26.4	192 31.7	0 0	9.717	39692	39806	35	-0	-150
4 26.4	192 32.6	0 0	11.336	39687	39805	33	-0	-151
4 26.5	192 33.5	0 0	12.956	39670	39804	32	-0	-165
4 26.5	192 34.3	0 0	14.579	39669	39802	30	-0	-167
4 26.5	192 35.2	0 0	16.195	39655	39801	29	-0	-174
4 26.5	192 36.1	0 0	17.814	39637	39799	27	-0	-169
4 26.5	192 37.0	0 0	19.434	39627	39798	25	-0	-196
4 26.5	192 37.8	0 0	21.053	39616	39796	24	-0	-204
4 26.5	192 38.7	0 0	22.672	39640	39795	22	-0	-177
4 26.5	192 38.7	15 10	0.000	39640	39795	22	-0	-177
4 26.9	192 38.7	0 0	0.816	39640	39799	21	-0	-180
4 27.4	192 38.6	0 0	1.632	39520	39803	20	-0	-303
4 27.8	192 38.6	0 0	2.448	39465	39807	19	-0	-361
4 28.2	192 38.5	0 0	3.264	39497	39811	18	-0	-332
4 28.7	192 38.5	0 0	4.080	39569	39814	17	-0	-266
4 29.1	192 38.5	0 0	4.896	39565	39818	16	-0	-269
4 29.6	192 38.4	0 0	5.712	39558	39822	15	-0	-279
4 30.0	192 38.4	0 0	6.528	39548	39826	14	-0	-292
4 30.0	192 38.4	15 50	0.000	39548	39826	14	-0	-292
4 29.8	192 37.3	0 0	2.059	39550	39826	12	-0	-288
4 29.5	192 36.2	0 0	4.119	39569	39826	11	-0	-272
4 29.3	192 35.2	0 0	6.178	39590	39826	9	-0	-245
4 29.1	192 34.1	0 0	8.237	39608	39826	7	-0	-225
4 28.8	192 33.0	0 0	10.297	39630	39826	6	-0	-202
4 28.6	192 31.9	0 0	12.356	39655	39826	4	-0	-179
4 28.6	192 31.9	16 40	0.000	39655	39826	4	-0	-179
4 28.7	192 31.3	0 0	1.203	39669	39829	3	-0	-166
4 28.9	192 30.6	0 0	2.405	39650	39831	2	-0	-162
4 29.0	192 30.0	0 0	3.608	39675	39833	0	-0	-159
4 29.1	192 29.4	0 0	4.811	39675	39835	0	-0	-160
4 29.3	192 28.7	0 0	6.014	39695	39838	0	-0	-143
4 29.4	192 28.1	0 0	7.216	39690	39840	0	-0	-140

TABLE 4 IX
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (GMT)	MMS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	DIURNAL FIELD GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS
				LINE 24				
4 29.4	152 26.1	17.45	0.000	39680	39840	0	-0	-160
4 29.4	152 27.9	0 0	1.189	39695	39841	0	-0	-146
4 29.4	152 28.0	0 0	2.379	39685	39842	0	-0	-157
4 29.4	152 28.2	0 0	3.568	39700	39844	0	-0	-144
4 29.4	152 29.9	0 0	4.757	39730	39849	0	-0	-119
4 29.4	152 34.9	0 0	9.947	39770	39846	0	-0	-76
4 29.4	152 34.9	17.45	0.000	39775	39846	0	-0	-71
4 30.3	152 24.4	0 0	1.994	39830	39855	0	-0	-25
4 31.3	152 23.9	0 0	3.908	39855	39865	0	-0	-10
4 32.2	152 23.4	0 0	9.862	39870	39874	0	-0	-4
4 33.1	152 22.9	0 0	7.016	39880	39883	0	-0	-3

TABLE 4 X
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (EST)	DATE	OBSERVED GAMMA	REDUCED GAMMA	JOURNAL GAMMA	STORM FIELD GAMMA	RESIDUAL FIELD GAMMA
				LINE 20				
4 13.2	192 16.3	18 51	0.000	0	39717	46	40	
4 13.0	192 16.4	0 0	0.010	0	39719	47	40	
4 12.8	192 16.5	0 0	0.019	0	39714	47	40	
4 12.6	192 16.7	0 0	1.229	0	39712	47	40	
4 12.5	192 16.8	0 0	1.038	0	39710	48	40	
4 12.3	192 16.9	0 0	2.048	0	39709	48	40	
4 12.1	192 17.0	0 0	2.458	39592	39707	48	40	-123.
4 11.9	192 17.1	0 0	2.867	39611	39705	49	40	-103.
4 11.7	192 17.3	0 0	3.277	39617	39704	49	40	-96.
4 11.5	192 17.4	0 0	3.687	39620	39702	49	40	-91.
4 11.4	192 17.5	0 0	4.096	39620	39700	50	40	-90.
4 11.2	192 17.6	0 0	4.506	39615	39698	50	40	-94.
4 11.0	192 17.8	0 0	4.915	39615	39697	50	40	-92.
4 10.8	192 17.9	0 0	5.325	39610	39695	51	40	-96.
4 10.6	192 18.0	0 0	5.735	39610	39693	51	40	-95.
4 10.4	192 18.1	0 0	6.144	39616	39692	52	40	-87.
4 10.3	192 18.2	0 0	6.554	39622	39690	52	40	-80.
4 10.1	192 18.4	0 0	6.964	39640	39688	52	40	-61.
4 9.9	192 18.5	0 0	7.373	39650	39687	53	40	-49.
4 9.7	192 18.6	0 0	7.783	39665	39685	53	40	-33.
4 9.7	192 18.6	11 29	0.000	39665	39685	53	40	-33.
4 9.3	192 18.9	0 0	0.864	39658	39681	54	40	-37.
4 9.0	192 19.2	0 0	1.728	39670	39678	54	40	-22.
4 8.6	192 19.4	0 0	2.593	39675	39674	55	40	-13.
4 8.2	192 19.7	0 0	3.457	39670	39670	55	40	-15.
4 8.2	192 19.7	11 39	0.000	39670	39670	55	40	-15.
4 8.0	192 19.8	0 0	0.410	39655	39668	55	40	-28.
4 7.8	192 19.9	0 0	0.819	39633	39666	56	40	-49.
4 7.6	192 20.0	0 0	1.229	39620	39664	56	40	-60.
4 7.4	192 20.1	0 0	1.638	39600	39662	57	40	-79.
4 7.2	192 20.2	0 0	2.048	39567	39660	57	40	-110.
4 7.0	192 20.3	0 0	2.458	39560	39658	57	40	-116.
4 6.9	192 20.5	0 0	2.867	39550	39657	58	40	-124.
4 6.7	192 20.6	0 0	3.277	39545	39655	58	40	-128.
4 6.5	192 20.7	0 0	3.686	39542	39653	58	40	-129.
4 6.3	192 20.8	0 0	4.096	39538	39651	59	40	-132.
4 6.1	192 20.9	0 0	4.506	39550	39649	59	40	-118.
4 5.9	192 21.0	0 0	4.915	39555	39647	60	40	-112.
4 5.7	192 21.1	0 0	5.325	39570	39645	60	40	-95.
4 5.7	192 21.1	12 0	0.000	39570	39645	60	40	-95.
4 5.6	192 21.3	0 0	0.374	39572	39644	60	40	-92.
4 5.6	192 21.5	0 0	0.748	39580	39644	59	40	-83.
4 5.6	192 21.7	0 0	1.122	39580	39643	59	40	-82.
4 5.5	192 21.9	0 0	1.496	39584	39642	59	40	-77.
4 5.4	192 22.1	0 0	1.870	39600	39641	59	40	-60.
4 5.4	192 22.3	0 0	2.245	39600	39641	58	40	-59.
4 5.3	192 22.5	0 0	2.619	39607	39640	58	40	-51.
4 5.3	192 22.7	0 0	2.993	39612	39639	58	40	-45.
4 5.3	192 22.9	0 0	3.367	39612	39638	57	40	-44.
4 5.2	192 23.1	0 0	3.741	39600	39638	57	40	-59.
4 5.1	192 23.2	0 0	4.115	39615	39637	57	40	-38.
4 5.1	192 23.4	0 0	4.489	39628	39636	56	40	-24.
4 5.1	192 23.6	0 0	4.863	39643	39635	56	40	-8.
4 5.0	192 23.8	0 0	5.237	39660	39635	56	40	10.
4 5.0	192 24.0	0 0	5.611	39677	39634	56	40	28.
4 4.9	192 24.2	0 0	5.986	39699	39633	55	40	47.
4 4.8	192 24.4	0 0	6.360	39715	39632	55	40	68.
4 4.8	192 24.6	0 0	6.734	39732	39632	55	40	86.
4 4.8	192 24.8	0 0	7.108	39740	39631	54	40	95.
4 4.7	192 25.0	0 0	7.482	39725	39630	54	40	81.
4 4.7	192 25.0	12 30	0.000	39725	39630	54	40	81.
4 4.7	192 25.2	0 0	0.394	39717	39629	54	40	74.
4 4.6	192 25.4	0 0	0.789	39694	39628	53	40	52.
4 4.6	192 25.6	0 0	1.183	39675	39628	53	40	34.
4 4.5	192 25.8	0 0	1.576	39668	39627	53	40	29.
4 4.5	192 26.0	0 0	1.972	39660	39626	52	40	22.
4 4.4	192 26.2	0 0	2.367	39655	39625	52	40	18.
4 4.4	192 26.5	0 0	2.761	39660	39625	52	40	24.
4 4.3	192 26.7	0 0	3.156	39658	39624	51	40	23.
4 4.3	192 26.9	0 0	3.550	39660	39623	51	40	26.
4 4.2	192 27.1	0 0	3.945	39654	39622	50	40	21.
4 4.2	192 27.3	0 0	4.339	39648	39621	50	40	17.
4 4.1	192 27.5	0 0	4.734	39638	39621	50	40	8.
4 4.1	192 27.7	0 0	5.128	39633	39620	49	40	4.
4 4.1	192 27.9	0 0	5.523	39640	39619	49	40	12.
4 4.0	192 28.1	0 0	5.917	39638	39618	49	40	11.
4 4.0	192 28.3	0 0	6.312	39633	39617	48	40	7.
4 3.9	192 28.5	0 0	6.706	39630	39617	48	40	9.
4 3.9	192 28.7	0 0	7.101	39607	39616	48	40	-16.
4 3.8	192 28.9	0 0	7.495	39578	39615	47	40	-44.
4 3.8	192 29.1	0 0	7.890	39545	39614	47	40	-76.
4 3.7	192 29.3	0 0	8.284	39525	39614	47	40	-95.
4 3.7	192 29.6	0 0	8.679	39514	39613	46	40	-105.
4 3.6	192 29.8	0 0	9.073	39502	39612	46	40	-116.
4 3.6	192 30.0	0 0	9.468	39492	39611	45	40	-125.
4 3.5	192 30.2	0 0	9.862	39474	39610	45	40	-141.
4 3.5	192 30.4	0 0	10.257	39470	39610	45	40	-144.
4 3.4	192 30.6	0 0	10.651	39467	39609	44	40	-146.
4 3.4	192 30.8	0 0	11.046	39455	39608	44	40	-157.
4 3.4	192 30.8	13 20	0.000	39455	39608	44	40	-157.
4 3.4	192 31.0	0 0	0.413	39450	39607	44	40	-161.
4 3.3	192 31.2	0 0	0.826	39440	39607	43	40	-170.
4 3.3	192 31.5	0 0	1.239	39440	39606	43	40	-169.
4 3.3	192 31.7	0 0	1.652	39440	39606	43	40	-168.
4 3.3	192 31.9	0 0	2.065	39445	39605	42	40	-162.
4 3.2	192 32.1	0 0	2.478	39450	39604	42	40	-156.
4 3.2	192 32.3	0 0	2.891	39461	39604	41	40	-144.
4 3.2	192 32.6	0 0	3.304	39466	39603	41	40	-138.
4 3.2	192 32.8	0 0	3.717	39477	39602	41	40	-126.
4 3.1	192 33.0	0 0	4.130	39490	39602	40	40	-112.
4 3.1	192 33.2	0 0	4.543	39495	39601	40	40	-106.
4 3.1	192 33.5	0 0	4.956	39500	39601	40	40	-100.
4 3.1	192 33.7	0 0	5.369	39495	39600	39	40	-104.
4 3.0	192 33.9	0 0	5.782	39490	39599	39	40	-108.
4 3.0	192 34.1	0 0	6.195	39485	39599	38	40	-112.
4 3.0	192 34.3	0 0	6.608	39477	39598	38	40	-119.
4 3.0	192 34.6	0 0	7.021	39467	39597	38	40	-128.
4 2.9	192 34.8	0 0	7.434	39457	39597	37	40	-137.
4 2.9	192 35.0	0 0	7.847	39450	39596	37	40	-141.
4 2.9	192 35.2	0 0	8.260	39450	39596	37	40	-148.
4 2.9	192 35.4	0 0	8.673	39460	39595	36	40	-131.
4 2.8	192 35.7	0 0	9.086	39480	39594	36	40	-110.
4 2.8	192 35.9	0 0	9.499	39485	39594	35	40	-106.
4 2.8	192 36.1	0 0	9.912	39485	39593	35	40	-183.

TABLE 4 XI
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (EST)	KMS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	DIURNAL FIELD GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS
LINE 46								
4 2.8	152 36.1	14 9	0.000	39489	39593	39	40	-103
4 2.9	152 36.0	0 0	0.529	39496	39591	38	40	-90
4 2.3	152 35.9	0 0	1.059	39435	39589	34	40	-140
4 2.0	152 35.8	0 0	1.588	39450	39587	34	40	-131
4 2.0	152 35.8	14 12	0.000	39490	39587	34	40	-131
4 1.8	152 35.7	0 0	0.349	39480	39586	33	40	-99
4 1.7	152 35.6	0 0	0.698	39440	39585	33	40	-130
4 1.9	152 35.5	0 0	1.047	39400	39583	33	40	-176
4 1.4	152 35.4	0 0	1.396	39368	39582	32	40	-207
4 1.2	152 35.3	0 0	1.745	39340	39581	32	40	-233
4 1.1	152 35.2	0 0	2.094	39257	39580	32	40	-319
4 0.9	152 35.0	0 0	2.443	39225	39578	32	40	-345
4 0.8	152 34.9	0 0	2.792	39210	39577	31	40	-359
4 0.6	152 34.8	0 0	3.141	39208	39576	31	40	-359
4 0.5	152 34.7	0 0	3.490	39212	39579	31	40	-354
4 0.3	152 34.6	0 0	3.839	39225	39573	31	40	-339
4 0.2	152 34.5	0 0	4.188	39225	39572	30	40	-338
4 0.0	152 34.4	0 0	4.537	39217	39571	30	40	-344
4 0.0	152 34.4	14 30	0.000	39217	39571	30	40	-344
4 0.0	152 34.2	0 0	0.449	39205	39572	30	40	-358
4 0.1	152 33.9	0 0	0.898	39205	39573	29	40	-357
4 0.1	152 33.7	0 0	1.346	39206	39573	29	40	-356
4 0.2	152 33.4	0 0	1.795	39217	39574	29	40	-346
4 0.2	152 33.2	0 0	2.244	39224	39579	28	40	-339
4 0.2	152 33.0	0 0	2.693	39240	39576	28	40	-324
4 0.3	152 32.7	0 0	3.142	39250	39577	28	40	-314
4 0.3	152 32.5	0 0	3.590	39258	39578	27	40	-307
4 0.4	152 32.3	0 0	4.039	39282	39578	27	40	-283
4 0.4	152 32.0	0 0	4.488	39297	39579	27	40	-269
4 0.5	152 31.8	0 0	4.937	39315	39580	26	40	-251
4 0.5	152 31.5	0 0	5.386	39320	39581	26	40	-247
4 0.5	152 31.3	0 0	5.834	39324	39582	26	40	-243
4 0.6	152 31.1	0 0	6.283	39330	39583	25	40	-238
4 0.6	152 30.8	0 0	6.732	39330	39583	25	40	-236
4 0.7	152 30.6	0 0	7.181	39330	39584	24	40	-239
4 0.7	152 30.4	0 0	7.629	39335	39585	24	40	-234
4 0.7	152 30.1	0 0	8.078	39340	39586	24	40	-230
4 0.8	152 29.9	0 0	8.527	39339	39587	23	40	-235
4 0.8	152 29.6	0 0	8.976	39334	39588	23	40	-237
4 0.9	152 29.4	0 0	9.425	39330	39588	23	40	-241
4 0.9	152 29.2	0 0	9.873	39327	39589	22	40	-245
4 1.0	152 28.9	0 0	10.322	39327	39590	22	40	-245
4 1.0	152 28.7	0 0	10.771	39320	39591	22	40	-253
4 1.0	152 28.5	0 0	11.220	39306	39592	21	40	-267
4 1.1	152 28.2	0 0	11.669	39297	39593	21	40	-277
4 1.1	152 28.0	0 0	12.117	39297	39593	21	40	-277
4 1.2	152 27.7	0 0	12.566	39306	39594	20	40	-269
4 1.2	152 27.5	0 0	13.015	39315	39595	20	40	-260
4 1.2	152 27.5	19 20	0.000	39315	39595	20	40	-260
4 1.2	152 27.3	0 0	0.386	39335	39596	20	40	-240
4 1.3	152 27.1	0 0	0.773	39372	39596	19	40	-204
4 1.3	152 26.9	0 0	1.159	39405	39597	19	40	-175
4 1.4	152 26.7	0 0	1.545	39410	39598	19	40	-160
4 1.4	152 26.5	0 0	1.932	39483	39598	18	40	-109
4 1.4	152 26.3	0 0	2.318	39350	39599	18	40	-82
4 1.5	152 26.1	0 0	2.704	39355	39600	18	40	-82
4 1.5	152 25.9	0 0	3.091	39365	39600	17	40	-218
4 1.6	152 25.7	0 0	3.477	39358	39601	17	40	-220
4 1.6	152 25.5	0 0	3.863	39346	39602	17	40	-231
4 1.6	152 25.3	0 0	4.250	39338	39602	16	40	-241
4 1.7	152 25.1	0 0	4.636	39343	39603	16	40	-236
4 1.7	152 24.8	0 0	5.022	39355	39604	16	40	-225
4 1.8	152 24.6	0 0	5.408	39365	39605	16	40	-219
4 1.8	152 24.4	0 0	5.795	39378	39609	15	40	-202
4 1.8	152 24.2	0 0	6.181	39390	39606	15	40	-191
4 1.9	152 24.0	0 0	6.567	39390	39607	15	40	-191
4 1.9	152 23.8	0 0	6.954	39400	39607	14	40	-181
4 2.0	152 23.6	0 0	7.340	39405	39608	14	40	-177
4 2.0	152 23.4	0 0	7.726	39414	39609	14	40	-168
4 2.0	152 23.2	0 0	8.113	39425	39609	13	40	-158
4 2.1	152 23.0	0 0	8.499	39442	39610	13	40	-141
4 2.1	152 22.8	0 0	8.885	39447	39611	13	40	-136
4 2.2	152 22.6	0 0	9.272	39460	39611	12	40	-124
4 2.2	152 22.4	0 0	9.658	39465	39612	12	40	-119
4 2.2	152 22.4	10 0	0.000	39465	39612	12	40	-119
4 2.2	152 22.2	0 0	0.394	39475	39613	12	40	-109
4 2.3	152 22.0	0 0	0.788	39475	39614	11	40	-110
4 2.3	152 21.8	0 0	1.182	39482	39614	11	40	-103
4 2.4	152 21.6	0 0	1.576	39489	39615	11	40	-101
4 2.4	152 21.4	0 0	1.969	39483	39616	10	40	-103
4 2.5	152 21.2	0 0	2.363	39480	39617	10	40	-107
4 2.5	152 20.9	0 0	2.757	39485	39617	10	40	-102
4 2.5	152 20.7	0 0	3.151	39485	39618	10	40	-103
4 2.6	152 20.5	0 0	3.545	39495	39619	9	40	-93
4 2.6	152 20.3	0 0	3.939	39510	39620	9	40	-79
4 2.7	152 20.1	0 0	4.333	39505	39620	9	40	-84
4 2.7	152 19.9	0 0	4.727	39510	39621	8	40	-80
4 2.8	152 19.7	0 0	5.121	39510	39622	8	40	-80
4 2.8	152 19.5	0 0	5.514	39507	39623	8	40	-83
4 2.8	152 19.3	0 0	5.908	39509	39624	7	40	-86
4 2.9	152 19.1	0 0	6.302	39496	39624	7	40	-95
4 2.9	152 18.9	0 0	6.696	39495	39625	7	40	-97
4 3.0	152 18.7	0 0	7.090	39495	39626	6	40	-97
4 3.0	152 18.5	0 0	7.484	39497	39627	6	40	-96
4 3.1	152 18.2	0 0	7.878	39497	39627	6	40	-96
4 3.1	152 18.0	0 0	8.272	39500	39628	6	40	-94
4 3.2	152 17.8	0 0	8.666	39503	39629	5	40	-91
4 3.2	152 17.6	0 0	9.059	39509	39630	5	40	-90
4 3.2	152 17.4	0 0	9.453	39497	39630	5	40	-98
4 3.3	152 17.2	0 0	9.847	39490	39631	4	40	-106
4 3.3	152 17.0	0 0	10.241	39403	39632	4	40	-113

TABLE 4 XII
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (EST)	KMS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	DIURNAL FIELD GAMMAS	STORM FIELD GAMMAS	RESIDUAL FIELD GAMMAS
LINE 24								
4 3.3	152 17.0	16 40	0.000	39483	39632	4	40	-113
4 3.3	152 16.8	0 0	0.388	39472	39633	4	40	-124
4 3.3	152 16.6	0 0	0.777	39456	39633	3	40	-140
4 3.4	152 16.4	0 0	1.165	39452	39634	3	40	-145
4 3.4	152 16.2	0 0	1.553	39450	39634	3	40	-147
4 3.4	152 16.0	0 0	1.942	39433	39635	2	40	-144
4 3.4	152 15.8	0 0	2.330	39454	39635	2	40	-141
4 3.4	152 15.5	0 0	2.718	39460	39636	2	40	-137
4 3.5	152 15.3	0 0	3.107	39455	39636	1	40	-143
4 3.5	152 15.1	0 0	3.495	39450	39637	1	40	-146
4 3.5	152 14.9	0 0	3.883	39435	39637	1	40	-153
4 3.5	152 14.7	0 0	4.271	39405	39638	0	40	-193
4 3.5	152 14.5	0 0	4.660	39377	39638	0	40	-221
4 3.6	152 14.3	0 0	5.048	39338	39639	0	40	-261
4 3.6	152 14.1	0 0	5.436	39335	39639	0	40	-264
4 3.6	152 13.9	0 0	5.825	39332	39640	0	40	-268
4 3.6	152 13.7	0 0	6.213	39320	39640	0	40	-280
4 3.6	152 13.5	0 0	6.601	39318	39641	0	40	-283
4 3.7	152 13.3	0 0	6.990	39280	39641	0	40	-321
4 3.7	152 13.0	0 0	7.378	39250	39642	0	40	-352
4 3.7	152 12.8	0 0	7.766	39255	39642	0	40	-347
4 3.7	152 12.6	0 0	8.155	39290	39643	0	40	-313
4 3.7	152 12.4	0 0	8.543	39342	39643	0	40	-261
4 3.8	152 12.2	0 0	8.931	39370	39644	0	40	-234
4 3.8	152 12.0	0 0	9.320	39390	39644	0	40	-214
4 3.8	152 11.8	0 0	9.708	39405	39645	0	40	-200
4 3.8	152 11.6	17 20	0.000	39405	39645	0	40	-200
4 3.8	152 11.4	0 0	0.424	39415	39646	0	40	-191
4 3.8	152 11.3	0 0	0.848	39417	39646	0	40	-189
4 3.8	152 11.1	0 0	1.271	39450	39647	0	40	-157
4 3.8	152 10.9	0 0	1.695	39500	39647	0	40	-107
4 3.9	152 10.7	0 0	2.119	39558	39648	0	40	-90
4 3.9	152 10.4	0 0	2.543	39623	39648	0	40	15
4 3.9	152 10.2	0 0	2.967	0	39649	0	40	
4 3.9	152 10.0	0 0	3.390	0	39649	0	40	
4 3.9	152 9.7	0 0	3.814	0	39650	0	40	
4 3.9	152 9.5	0 0	4.238	0	39651	0	40	
4 3.9	152 9.3	0 0	4.662	0	39651	0	40	
4 3.9	152 9.1	0 0	5.085	0	39652	0	40	
4 3.9	152 8.8	0 0	5.509	0	39652	0	40	
4 4.0	152 8.6	0 0	5.933	0	39653	0	40	
4 4.0	152 8.4	0 0	6.357	0	39653	0	40	
4 4.0	152 8.2	0 0	6.781	0	39654	0	40	
4 4.0	152 7.9	0 0	7.204	0	39654	0	40	
4 4.0	152 7.7	0 0	7.628	0	39655	0	40	

TABLE 4 XIII
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DEG MIN	LONGITUDE DEG MIN	TIME (EST)	TOTAL FORCE DATA		DIAL FIELD GAMMA	STORM FIELD GAMMA	RESIDUAL FIELD GAMMA
			LOAD	07			
3 50.0	152 7.2	0 30	0.000	0	39539	10	19
3 49.8	152 7.2	0 0	0.017	0	39533	10	19
3 49.6	152 7.1	0 0	0.036	0	39531	19	19
3 49.3	152 7.1	0 0	1.251	0	39530	19	19
3 49.1	152 7.0	0 0	1.068	0	39528	19	19
3 48.9	152 7.0	0 0	2.089	0	39526	19	20
3 48.7	152 6.9	0 0	2.902	0	39524	20	20
3 48.5	152 6.9	0 0	2.918	0	39523	20	20
3 48.2	152 6.8	0 0	3.339	0	39521	20	20
3 48.0	152 6.8	0 0	3.792	0	39519	21	20
3 47.8	152 6.7	0 0	4.169	0	39517	21	29
3 47.6	152 6.7	0 0	4.586	39310	39519	21	29
3 47.4	152 6.6	0 0	5.003	39290	39514	22	29
3 47.1	152 6.6	0 0	5.420	39219	39512	22	29
3 46.8	152 6.6	0 0	5.837	39170	39510	22	29
3 46.7	152 6.9	0 0	6.254	39199	39508	22	30
3 46.5	152 6.9	0 0	6.671	39136	39507	23	30
3 46.3	152 6.4	0 0	7.088	39129	39509	23	30
3 46.0	152 6.4	0 0	7.505	39139	39503	23	30
3 45.8	152 6.3	0 0	7.921	39170	39501	24	30
3 45.6	152 6.3	0 0	8.338	39207	39499	24	35
3 45.4	152 6.2	0 0	8.755	39227	39498	24	35
3 45.2	152 6.2	0 0	9.172	39254	39496	24	35
3 45.0	152 6.1	0 0	9.589	39267	39494	25	35
3 44.7	152 6.1	0 0	10.006	39279	39492	25	35
3 44.5	152 6.0	0 0	10.423	39274	39490	29	40
3 44.3	152 6.0	0 0	10.840	39263	39489	26	40
3 44.1	152 5.9	0 0	11.257	39259	39487	26	40
3 43.9	152 5.9	0 0	11.674	39249	39485	26	40
3 43.6	152 5.9	0 0	12.091	39240	39483	26	40
3 43.4	152 5.8	0 0	12.508	39239	39482	27	45
3 43.2	152 5.8	0 0	12.924	39229	39480	27	45
3 43.0	152 5.7	0 0	13.341	39239	39478	27	45
3 42.8	152 5.7	0 0	13.758	39248	39476	28	45
3 42.5	152 5.6	0 0	14.175	39234	39474	28	45
3 42.3	152 5.6	0 0	14.592	39290	39473	28	50
3 42.1	152 5.5	0 0	15.009	39260	39471	29	50
3 41.9	152 5.5	0 0	15.426	39269	39469	29	50
3 41.7	152 5.4	0 0	15.843	39278	39467	29	50
3 41.4	152 5.4	0 0	16.260	39284	39466	29	50
3 41.2	152 5.3	0 0	16.677	39306	39464	30	55
3 41.0	152 5.3	0 0	17.094	39340	39462	30	59
3 41.0	152 5.3	0 30	0.000	39340	39462	30	59
3 40.8	152 5.3	0 0	0.394	39350	39460	30	55
3 40.6	152 5.3	0 0	0.794	39368	39458	31	55
3 40.4	152 5.4	0 0	1.195	39385	39456	31	55
3 40.1	152 5.4	0 0	1.593	39402	39454	32	55
3 39.9	152 5.4	0 0	1.991	39410	39452	32	60
3 39.7	152 5.4	0 0	2.389	39410	39450	32	60
3 39.5	152 5.4	0 0	2.787	39393	39448	33	60
3 39.3	152 5.5	0 0	3.185	39370	39447	33	60
3 39.1	152 5.5	0 0	3.584	39329	39445	34	60
3 38.9	152 5.5	0 0	3.982	39290	39443	34	60
3 38.7	152 5.5	0 0	4.380	39259	39441	34	60
3 38.4	152 5.5	0 0	4.778	39250	39439	35	60
3 38.2	152 5.6	0 0	5.176	39250	39437	35	60
3 38.0	152 5.6	0 0	5.575	0	39435	36	60
3 37.8	152 5.6	0 0	5.973	0	39433	36	60
3 37.8	152 5.6	10 0	0.000	0	39433	36	60
3 37.4	152 5.5	0 0	0.837	0	39429	37	60
3 36.9	152 5.5	0 0	1.674	0	39429	37	60
3 36.9	152 5.4	0 0	2.511	0	39421	38	60
3 36.0	152 5.4	0 0	3.348	0	39418	39	60
3 35.6	152 5.3	0 0	4.185	0	39414	39	60
3 35.1	152 5.3	0 0	5.023	0	39410	40	60
3 34.7	152 5.2	0 0	5.860	0	39406	41	60
3 34.2	152 5.2	0 0	6.697	0	39402	41	60
3 33.8	152 5.1	0 0	7.534	0	39398	42	60
3 33.3	152 5.1	0 0	8.371	39075	39395	43	60
3 32.9	152 5.0	0 0	9.208	39045	39391	44	65
3 32.4	152 5.0	0 0	10.045	38980	39387	44	65
3 32.0	152 4.9	0 0	10.882	38963	39383	45	65
3 31.9	152 4.9	0 0	11.719	38930	39379	46	65
3 31.1	152 4.8	0 0	12.556	38900	39375	46	70
3 30.6	152 4.8	0 0	13.393	38929	39372	47	70
3 30.2	152 4.7	0 0	14.231	38920	39368	48	70
3 29.7	152 4.7	0 0	15.068	38895	39364	48	70
3 29.3	152 4.6	0 0	15.905	38890	39360	49	70
3 29.3	152 4.6	11 9	0.000	38890	39360	49	70
3 29.5	152 9.2	0 0	1.059	38900	39360	50	70
3 29.6	152 9.7	0 0	2.119	38890	39360	51	70
3 29.6	152 9.7	11 15	0.000	38890	39360	51	70
3 30.0	152 6.2	0 0	1.171	38879	39363	52	70
3 30.4	152 6.7	0 0	2.343	38860	39366	53	70
3 30.8	152 7.1	0 0	3.514	38850	39369	54	65
3 31.2	152 7.6	0 0	4.685	38848	39372	55	65
3 31.7	152 8.1	0 0	5.857	38860	39374	56	65
3 32.1	152 8.6	0 0	7.028	38880	39377	57	60
3 32.5	152 9.0	0 0	8.199	38887	39380	58	60
3 32.9	152 9.5	0 0	9.371	38907	39383	59	60
3 33.3	152 10.0	0 0	10.542	38927	39386	60	59
3 33.3	152 10.0	12 0	0.000	38927	39386	60	59
3 33.6	152 10.3	0 0	0.790	38942	39388	59	59
3 33.9	152 10.6	0 0	1.579	38950	39390	59	50
3 34.1	152 11.0	0 0	2.369	38970	39391	58	50
3 34.4	152 11.3	0 0	3.159	38969	39393	57	50
3 34.7	152 11.6	0 0	3.948	38975	39395	57	60
3 35.0	152 11.9	0 0	4.738	39019	39397	56	60
3 35.3	152 12.2	0 0	5.527	39019	39398	59	70
3 35.6	152 12.5	0 0	6.317	38985	39400	59	70
3 35.9	152 12.9	0 0	7.107	38970	39402	54	60
3 36.1	152 13.2	0 0	7.896	38960	39404	58	00
3 36.4	152 13.5	0 0	8.686	38929	39405	53	00
3 36.7	152 13.8	0 0	9.476	38930	39407	52	00
3 36.7	152 13.8	12 40	0.000	38930	39407	52	00
3 37.0	152 14.2	0 0	0.859	38939	39408	51	60
3 37.3	152 14.5	0 0	1.710	38959	39410	51	70
3 37.9	152 14.9	0 0	2.569	38970	39411	50	80
3 37.8	152 15.3	0 0	3.419	38985	39413	49	80
3 38.1	152 15.6	0 0	4.274	38985	39414	49	100
3 38.4	152 16.0	0 0	5.129	38979	39416	48	110
3 38.6	152 16.4	0 0	5.984	38967	39417	47	120
3 38.9	152 16.7	0 0	6.839	38950	39419	47	130
3 39.2	152 17.1	0 0	7.694	38955	39420	46	130

TABLE 4 XIV
OBSERVED AND REDUCED MAGNETIC
TOTAL FORCE DATA

LATITUDE DD MIN	LONGITUDE DEG MIN	TIME (GMT)	HMS	OBSERVED FIELD GAMMAS	REGIONAL FIELD GAMMAS	DIURNAL FIELD GAMMAS	STORM FIELD GAMMAS	REGIONAL FIELD GAMMAS
				LINE 87				
3 39.2	192 17.1	10 10	0.600	39999	39480	46	130	-301
3 39.6	192 17.0	0 0	0.749	38945	39424	45	130	-394
3 40.0	192 16.9	0 0	1.499	38943	39420	45	130	-379
3 40.3	192 16.7	0 0	2.848	38980	39432	44	120	-376
3 40.7	192 16.6	0 0	2.997	38995	39439	43	120	-364
3 41.1	192 16.5	0 0	3.746	39012	39439	43	120	-350
3 41.9	192 16.4	0 0	4.496	39020	39443	42	110	-355
3 41.9	192 16.2	0 0	5.245	39050	39447	41	110	-328
3 42.0	192 16.1	0 0	5.994	39082	39451	41	110	-290
3 42.6	192 16.0	0 0	6.744	39097	39455	40	110	-288
3 43.0	192 19.0	0 0	7.493	39110	39458	39	119	-273
3 43.4	192 19.7	0 0	8.242	39132	39462	39	119	-294
3 43.0	192 19.0	0 0	0.991	39150	39466	38	119	-239
3 43.0	192 19.4	10 00	0.600	39190	39466	38	119	-239
3 44.2	192 19.5	0 0	0.844	39178	39470	37	119	-214
3 44.7	192 19.3	0 0	1.693	39207	39474	36	120	-183
3 45.1	192 19.2	0 0	2.939	39240	39478	35	120	-154
3 45.9	192 19.0	0 0	3.189	39230	39482	35	120	-147
3 46.0	192 16.0	0 0	4.232	39235	39486	34	110	-175
3 46.4	192 14.7	0 0	5.078	39235	39490	33	110	-156
3 46.0	192 14.5	0 0	5.924	39220	39494	32	110	-156
3 47.2	192 14.4	0 0	6.770	39147	39498	32	100	-283
3 47.7	192 14.3	0 0	7.617	39055	39502	31	100	-378
3 48.1	192 14.1	0 0	8.463	38990	39506	30	100	-446
3 48.1	192 14.1	14 30	0.600	38990	39506	30	100	-446
3 48.9	192 14.1	0 0	0.803	38965	39510	29	100	-474
3 49.0	192 14.1	0 0	1.605	38960	39514	29	100	-483
3 49.4	192 14.1	0 0	2.408	39005	39518	28	100	-441
3 49.0	192 14.0	0 0	3.210	39040	39522	27	100	-380
3 50.3	192 14.0	0 0	4.013	39075	39525	27	100	-377
3 50.7	192 14.0	0 0	4.815	39105	39529	26	100	-391
3 51.1	192 14.0	0 0	5.618	39130	39533	26	100	-329
3 51.6	192 14.0	0 0	6.420	39160	39537	25	110	-292
3 52.0	192 14.0	0 0	7.223	39212	39541	24	110	-243
3 52.4	192 13.9	0 0	8.025	39250	39545	24	110	-209
3 52.8	192 13.9	0 0	8.828	39272	39549	23	110	-190
3 53.3	192 13.9	0 0	9.631	39283	39553	22	110	-182
3 53.7	192 13.9	0 0	10.433	39285	39557	22	110	-183
3 54.1	192 13.9	0 0	11.236	39275	39561	21	110	-197
3 54.6	192 13.9	0 0	12.038	39250	39564	21	110	-225
3 55.0	192 13.8	0 0	12.841	39222	39568	20	110	-256
3 55.4	192 13.8	0 0	13.643	39204	39572	19	110	-277
3 55.9	192 13.8	0 0	14.446	39182	39576	19	110	-303
3 56.3	192 13.8	0 0	15.249	39180	39580	18	110	-300
3 56.3	192 13.8	19 30	0.600	39180	39580	18	110	-308
3 56.7	192 13.5	0 0	0.825	39225	39583	17	110	-245
3 57.0	192 13.3	0 0	1.650	39270	39586	17	110	-223
3 57.4	192 13.0	0 0	2.475	39304	39590	16	110	-191
3 57.8	192 12.6	0 0	3.299	39327	39593	15	120	-161
3 58.1	192 12.5	0 0	4.124	39320	39596	14	120	-170
3 58.5	192 12.3	0 0	4.949	39310	39599	14	120	-183
3 58.8	192 12.0	0 0	5.774	39304	39602	13	120	-191
3 59.2	192 11.8	0 0	6.599	39344	39605	13	120	-194
3 59.6	192 11.5	0 0	7.424	39375	39609	11	120	-179
3 59.9	192 11.3	0 0	8.249	39350	39612	11	130	-143
4 0.3	192 11.0	0 0	9.074	39290	39615	10	130	-209
4 0.3	192 11.0	16 10	0.600	39290	39615	10	130	-209
4 0.6	192 11.3	0 0	0.815	39325	39617	9	130	-171
4 0.8	192 11.7	0 0	1.630	39345	39619	8	130	-152
4 1.1	192 12.0	0 0	2.445	39375	39621	7	130	-123
4 1.4	192 12.4	0 0	3.260	39425	39623	7	130	-75
4 1.6	192 12.7	0 0	4.075	39437	39625	6	130	-64
4 1.9	192 13.1	0 0	4.890	39455	39627	5	140	-37
4 2.2	192 13.4	0 0	5.705	39455	39628	5	140	2
4 2.5	192 13.8	0 0	6.519	39425	39630	4	140	-69
4 2.7	192 14.1	0 0	7.334	39385	39632	3	140	-110
4 3.0	192 14.5	0 0	8.149	39380	39634	2	140	-117
4 3.3	192 14.8	0 0	8.964	39272	39636	2	145	-221
4 3.5	192 15.2	0 0	9.779	39258	39638	1	145	-236
4 3.8	192 15.5	0 0	10.594	39250	39640	0	145	-249
4 3.8	192 15.5	17 0	0.600	39250	39640	0	145	-245
4 4.2	192 16.0	0 0	1.156	39295	39642	0	145	-202
4 4.6	192 16.5	0 0	2.312	39367	39645	0	149	-133
4 5.0	192 16.9	0 0	3.468	39455	39647	0	150	-62
4 5.4	192 17.1	0 0	4.624	39502	39649	0	150	3
4 5.8	192 17.9	0 0	5.780	39515	39652	0	150	13
4 6.2	192 18.4	0 0	6.936	39515	39654	0	150	11
4 6.5	192 18.9	0 0	8.093	39525	39656	0	150	19
4 6.9	192 19.4	0 0	9.249	39485	39659	0	140	-64
4 7.3	192 19.9	0 0	10.405	39485	39661	0	140	-36
4 7.7	192 20.3	0 0	11.561	39490	39663	0	140	-33
4 8.1	192 20.8	0 0	12.717	39520	39666	0	140	-6
4 8.5	192 21.3	0 0	13.873	39570	39668	0	140	42
4 8.5	192 21.3	10 0	0.600	39570	39668	0	140	42
4 8.9	192 21.7	0 0	0.988	39550	39671	0	140	19
4 9.2	192 22.1	0 0	1.975	39520	39674	0	140	-14
4 9.2	192 22.1	18 10	0.600	39520	39674	0	140	-14
4 9.6	192 21.6	0 0	1.827	39550	39679	0	140	12
4 10.0	192 21.0	0 0	2.853	39580	39683	0	140	17
4 10.4	192 20.5	0 0	3.688	39580	39688	0	140	33
4 10.8	192 20.0	0 0	4.908	39600	39692	0	140	48
4 11.2	192 19.5	0 0	6.133	39575	39697	0	150	29
4 11.6	192 18.9	0 0	7.359	39555	39701	0	150	4
4 12.0	192 18.4	0 0	8.586	39540	39706	0	150	-10
4 12.4	192 17.0	0 0	9.812	0	39710	0	150	

TABLE 5

SURVEY METHODS USED TO FIX CO-ORDINATES OF SEISMIC RECORDING STATIONS

<u>STATION</u>	<u>METHOD OF SURVEY</u>
	<u>STAGE 1</u>
AU'UNA	Star observations
BOANG ISLAND	Identification on 1:50,000 series
DIOLENE	Compass and tape traverse
FENI ISLAND	Compass and chain traverse
KAMDARU	Photo identification
KAVIENG	Theodolite and chain traverse from point identified on marine chart
LAMBOM ISLAND	Photo identification
MANGA	Compass and chain traverse
MATANAKUNAI	Sextant resections and compass bearings from Decca survey plan
NARUM	Photo identification
NATAVA	Compass and chain traverse
NISSAN ISLAND	Theodolite and chain traverse
PAKIA	Star observations
PALMALMAL	Photo identification; co-ordinates scaled
PONDO	Compass and chain traverse from identified point on marine chart
RAPOPO	Theodolite resection and traverse
TOL (KARLAI)	Compass resection on military map
ULAMONA	Photo identification and compass and chain traverse
ULU ISLAND	Compass and chain traverse
RABAU OBS.	Value at Observatory adopted

STATIONMETHOD OF SURVEY

RAL	Administration value adopted
SUL	Administration value adopted
TAV	Administration value adopted
VUL	Administration value adopted
WAN	Administration value adopted

STAGE 2

BIALLA	Photo identification; co-ordinates scaled
BULUMURLI	Photo identification; co-ordinates scaled
C.R.A.	Star observation
HOSKINS	Co-ordinates scaled from Milinch and D.C.A. plan
KANDRIAN	Photo identification; co-ordinates scaled
LINDENHAFEN	Compass and chain traverse from photo identified point
TALASEA	Photo identified; theodolite and stadia traverse
VITU IS.	Identified on military map; co-ordinates scaled

STAGE 3

BURMA ROAD	Photo identified; co-ordinates scaled
KABANGA	Administration value adopted
KOKOPO	Resection and theodolite and chain traverse
KURAKAKAUL	Photo identified; co-ordinates scaled
MALAPAU	Identified on photo and Milinch series co-ordinates scaled
MOUNT VARZIN	Photo identified; co-ordinates scaled
NONGA	Identified on Milinch series; co-ordinates scaled
PRAED POINT	Theodolite resection
RALUANA	Theodolite resection
TAVUI	Compass and chain traverse
VULCAN	Resection and compass and chain traverse

STATIONMETHOD OF SURVEY

VUNAKAKAR

Photo identified. Co-ordinates scaled

WATOM IS.

Identified on Milinch series; co-ordinates scaled

SONAR BUOYS

Surveyed from the ship; co-ordinates scaled from plot

STAGE 4

KABIARA (ATALIKLIKUN)

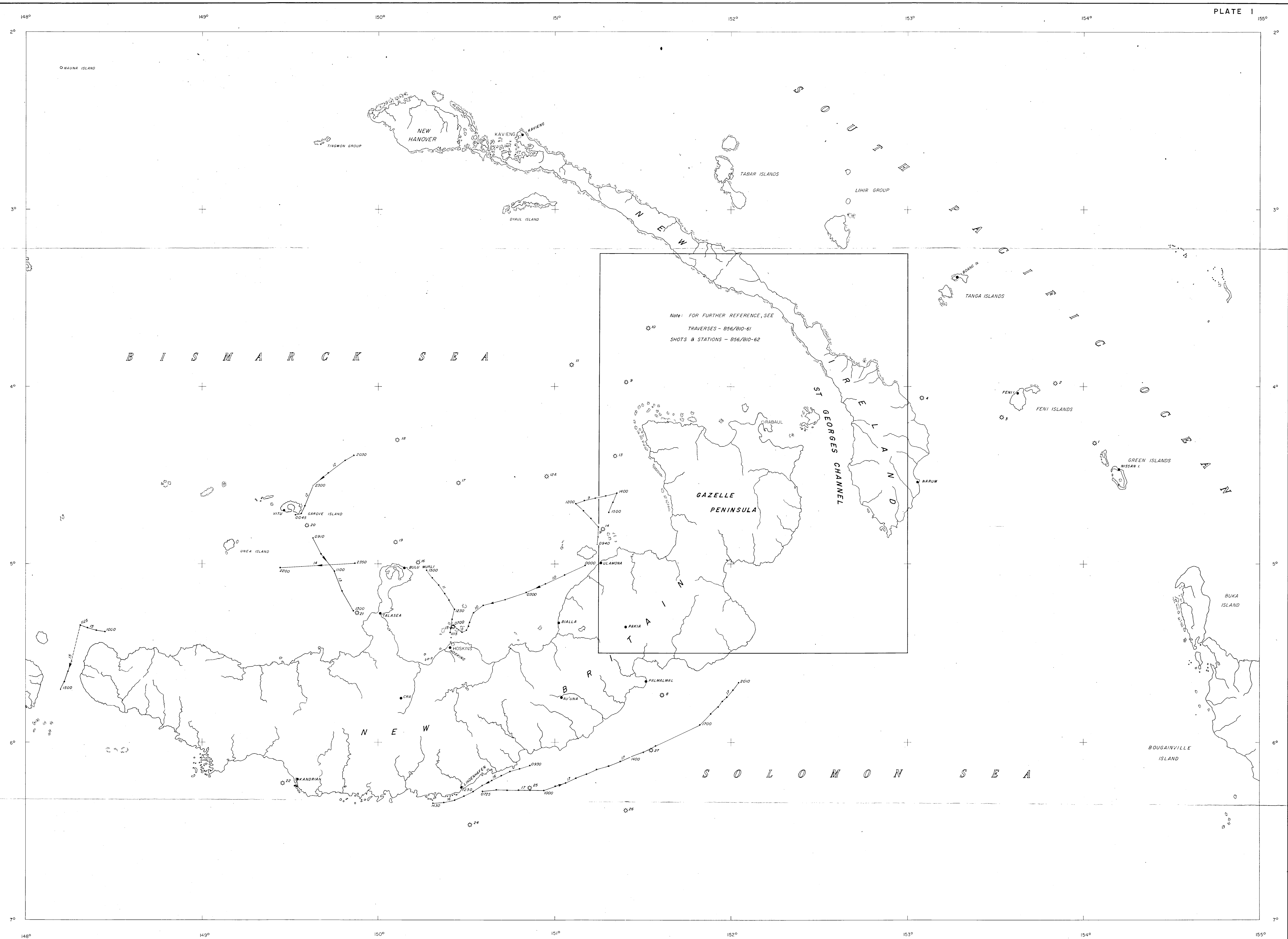
Photo identified; compass and chain traverse

KILINWATA

Administration value adopted

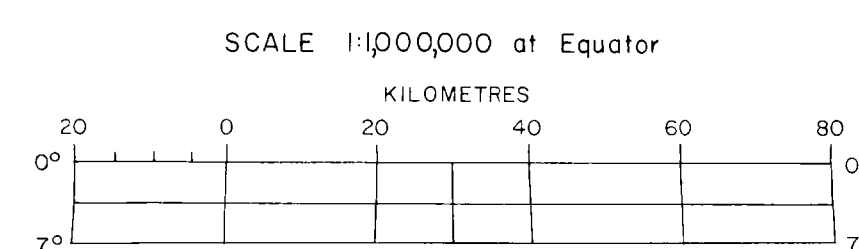
NORDUP

Identified on Milinch series; co-ordinates scaled



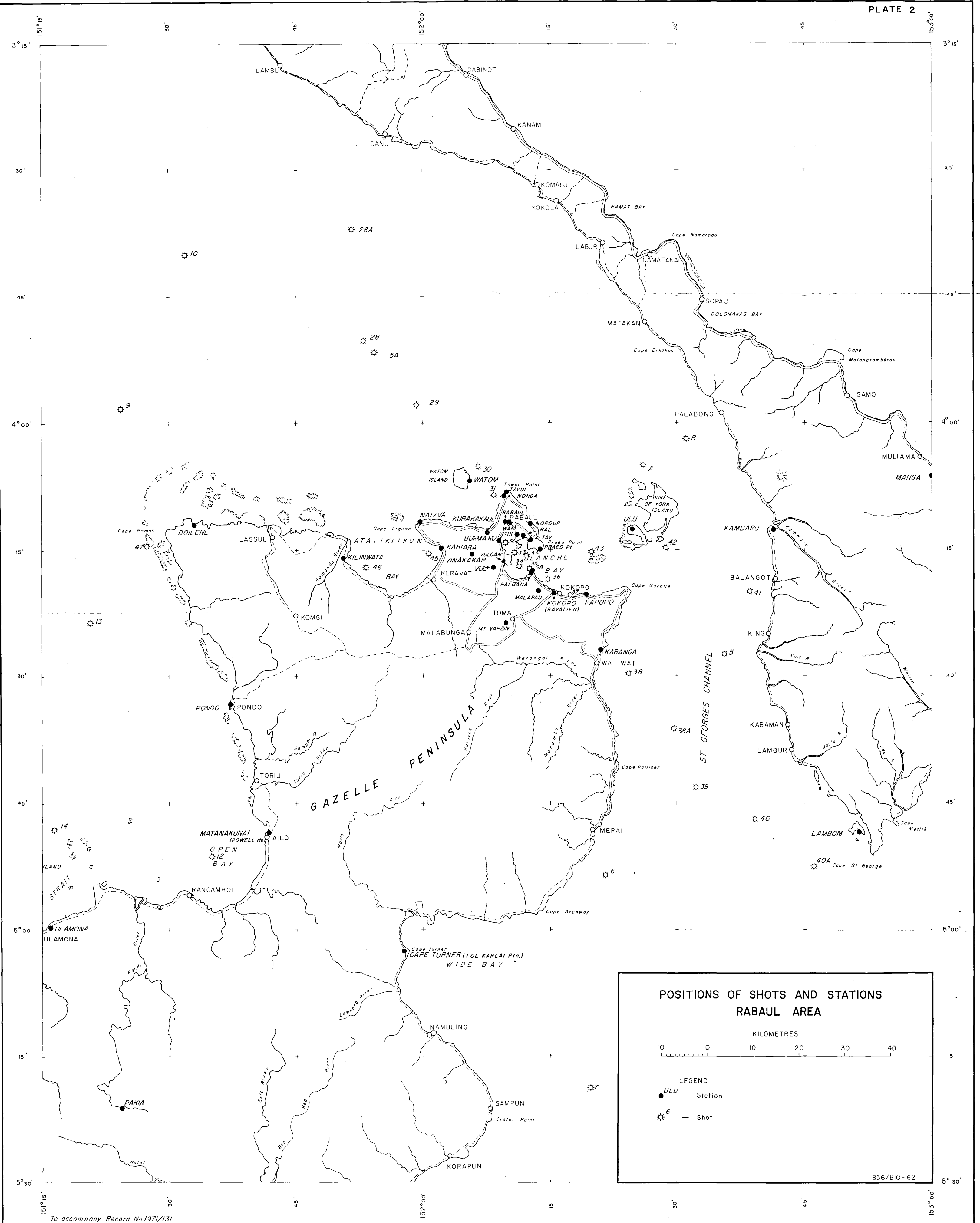
NEW BRITAIN CRUSTAL INVESTIGATION 1969

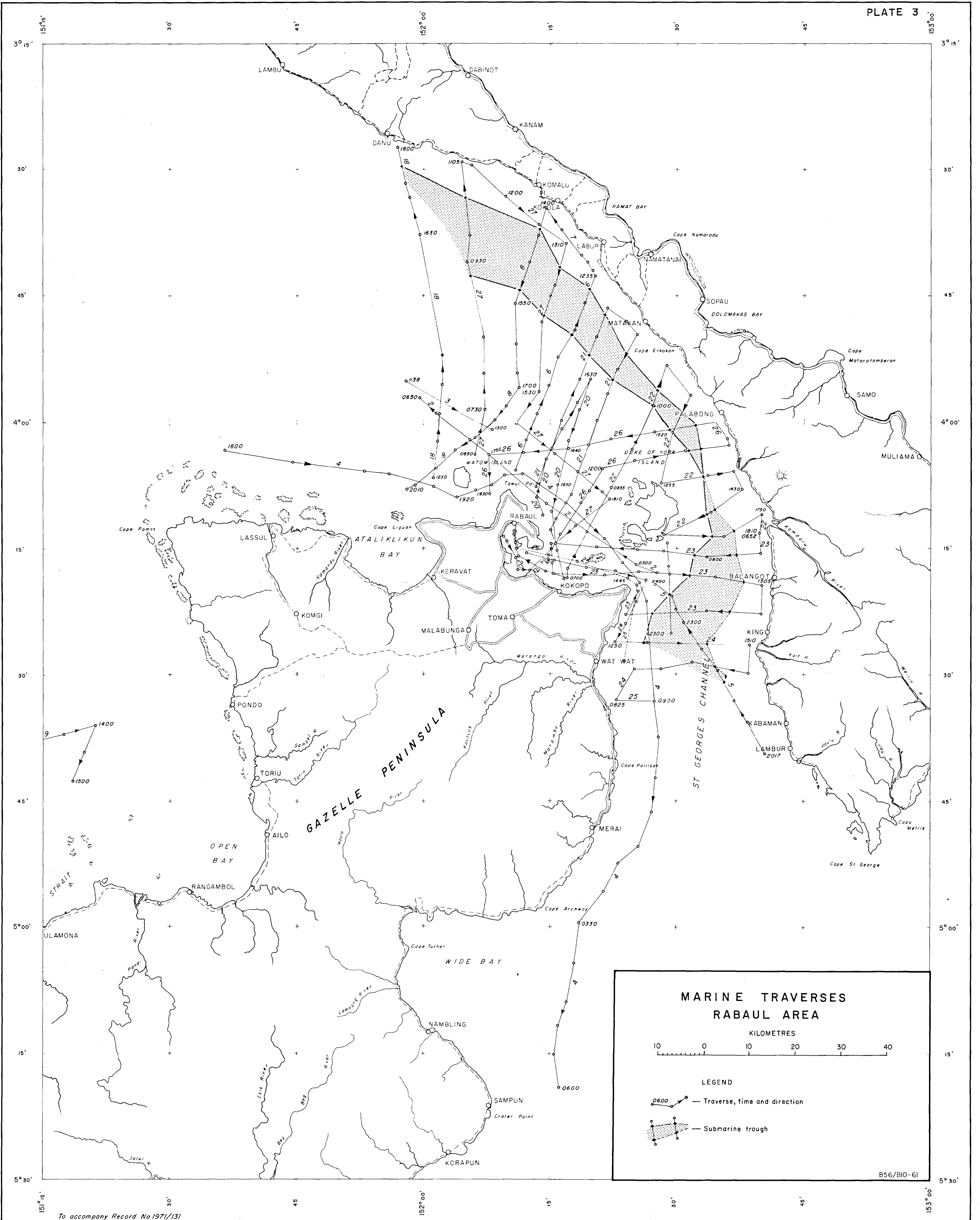
POSITIONS OF SHOTS, STATIONS, AND TRAVERSES

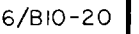


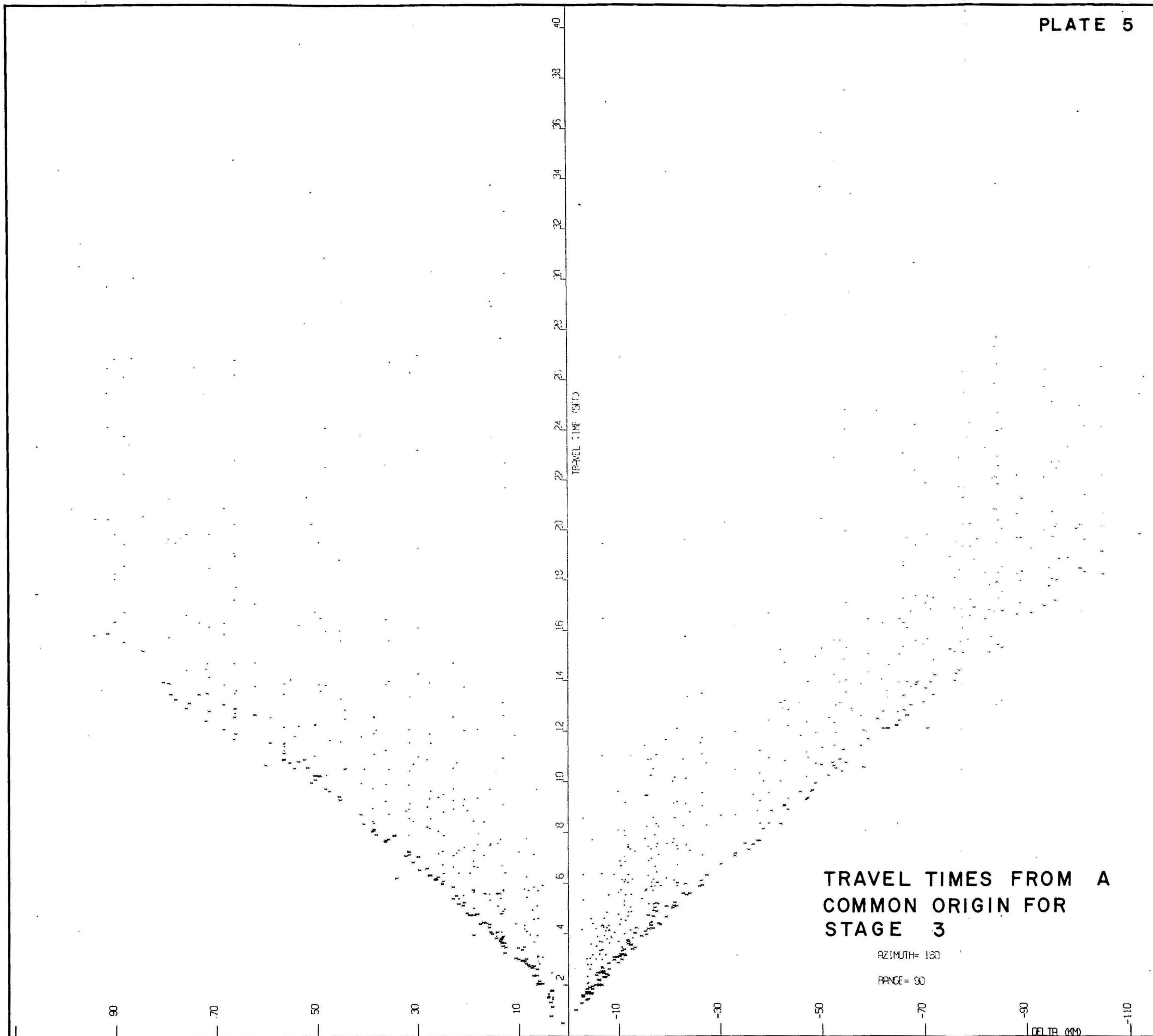
LEGEND

- TRAVERSE
- STATION
- SHOT POINT

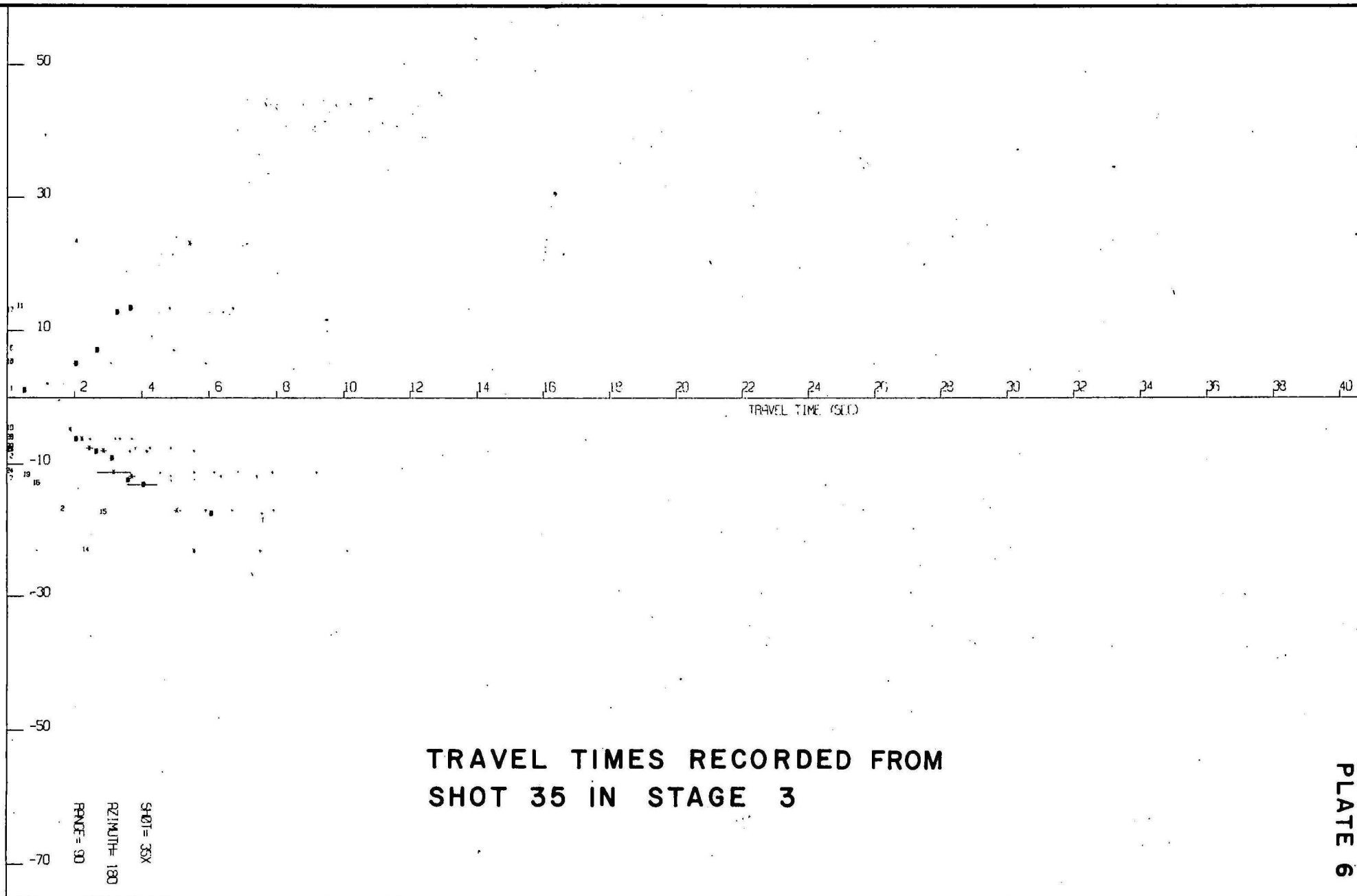








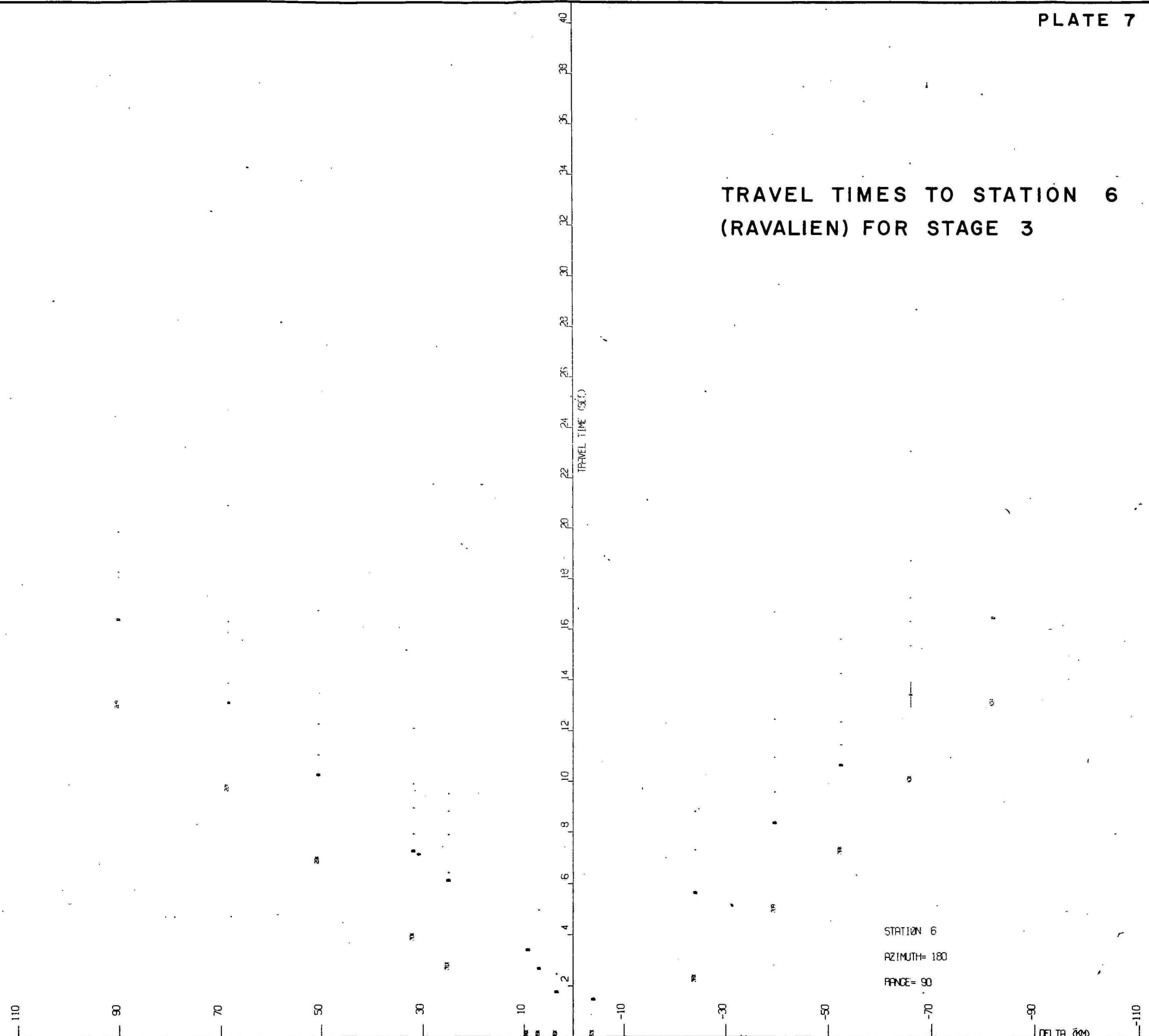
To accompany Record No 1971/131

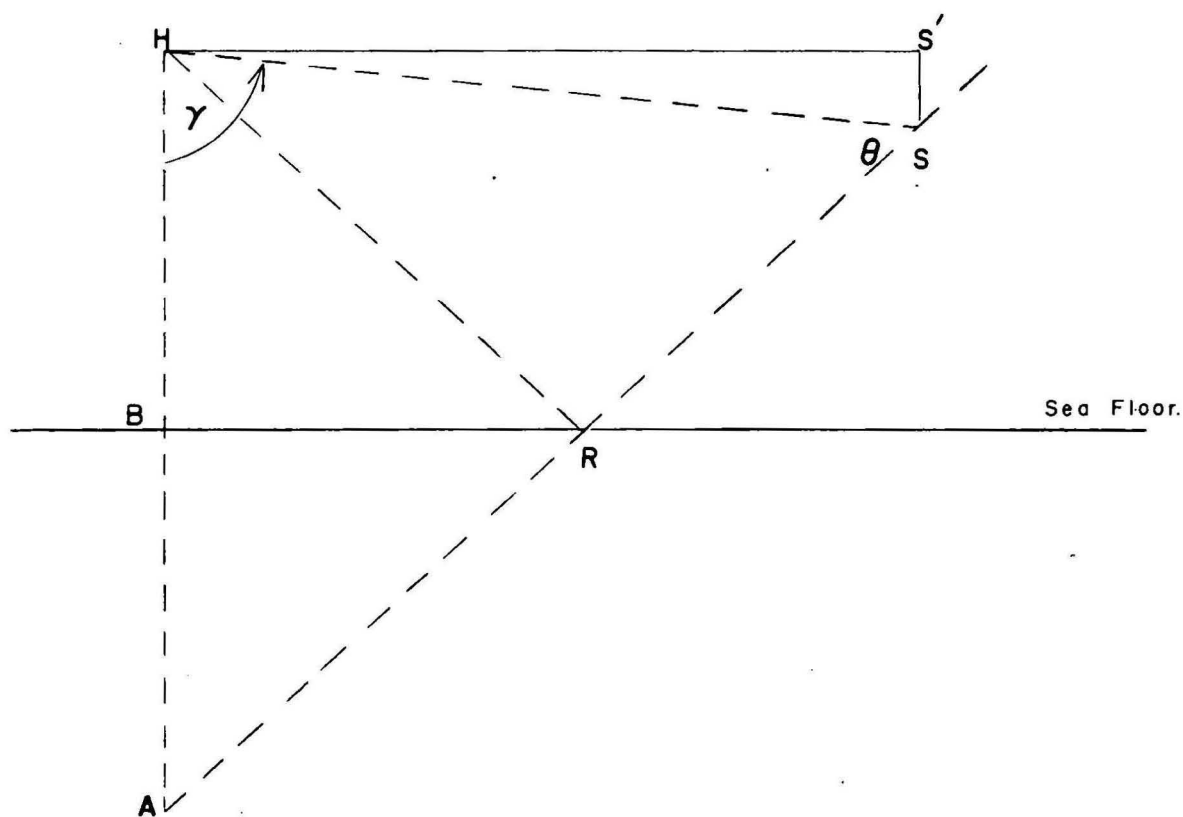


B56/B10-17 A

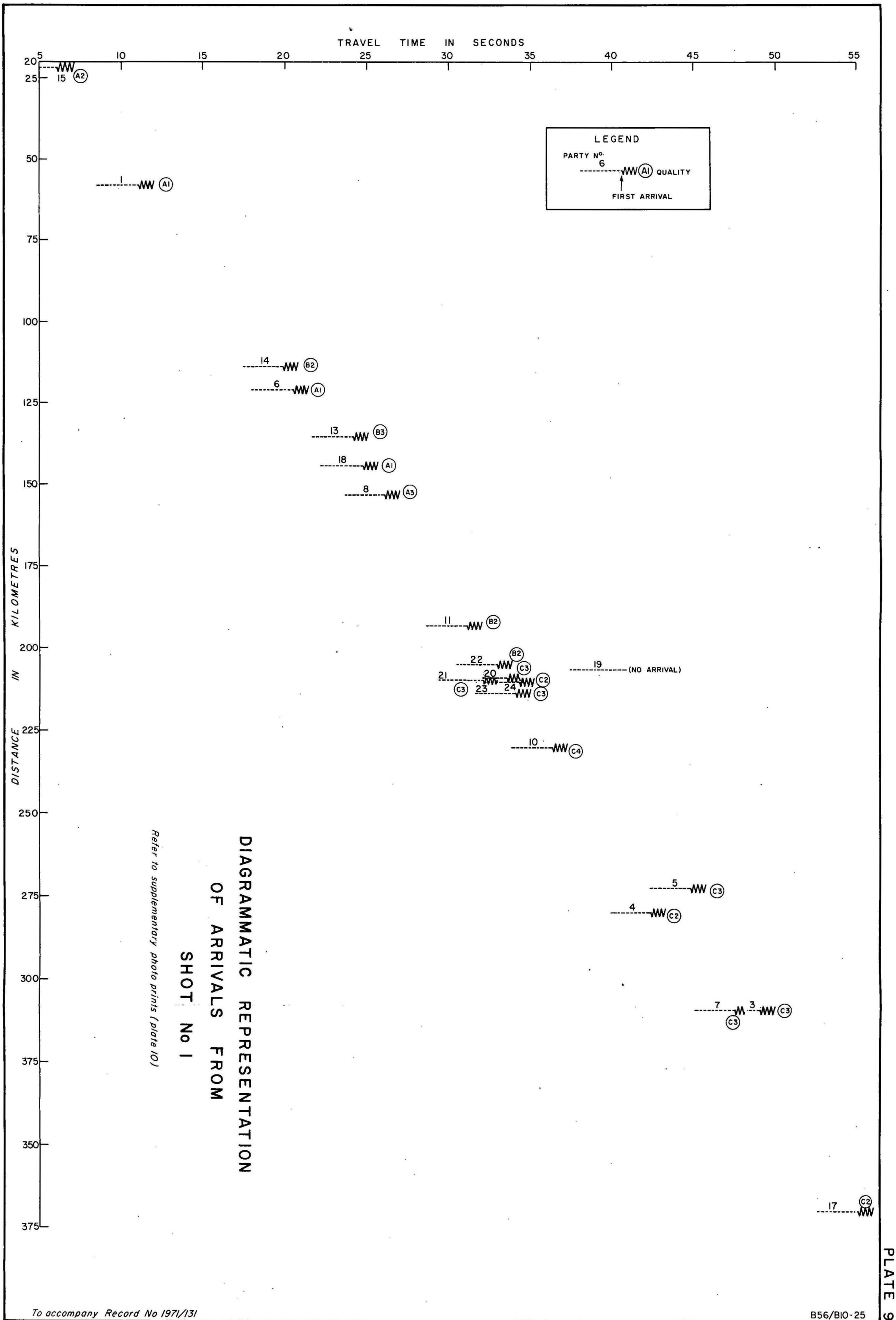
PLATE 6

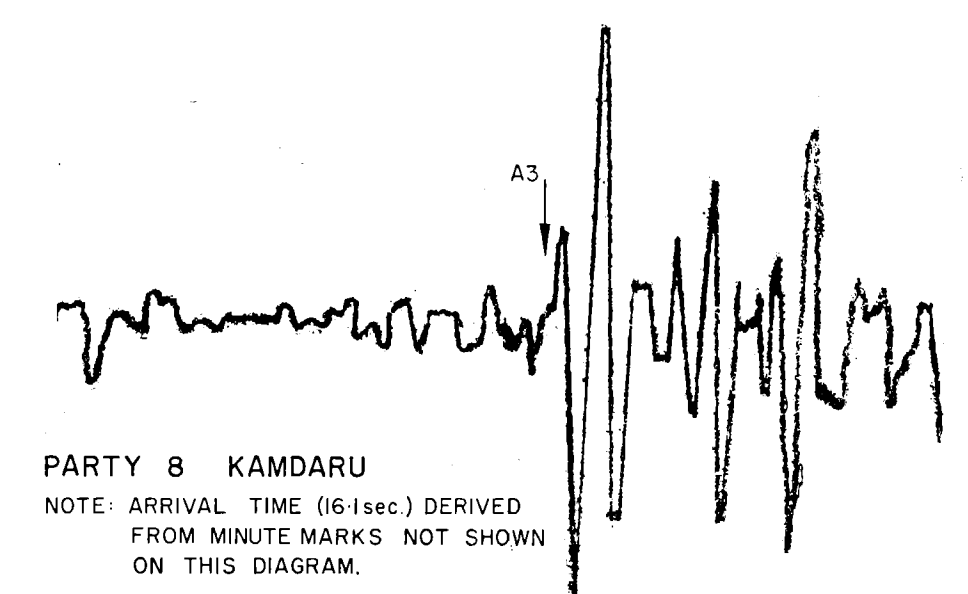
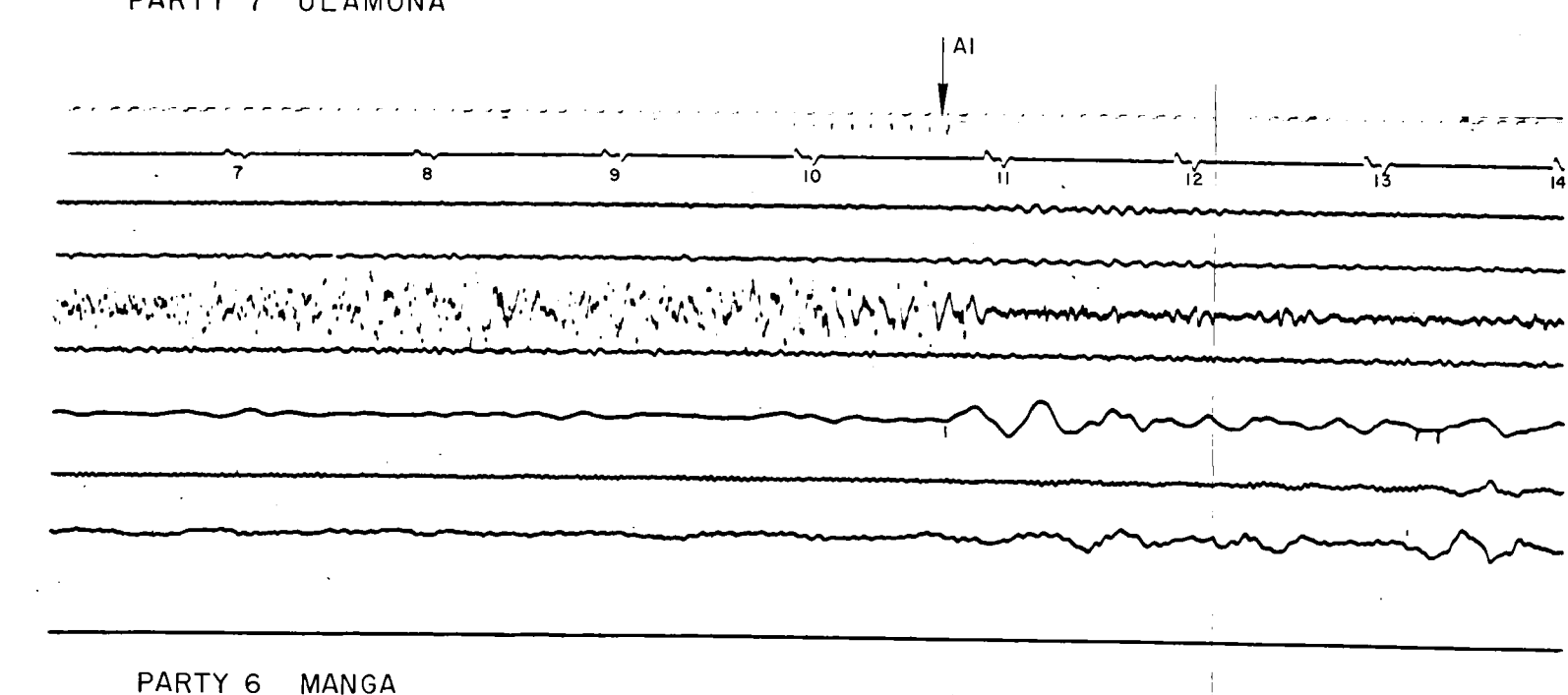
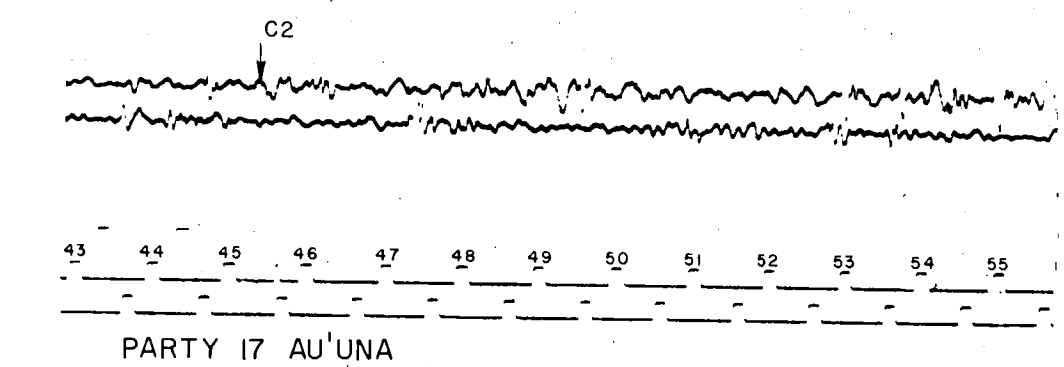
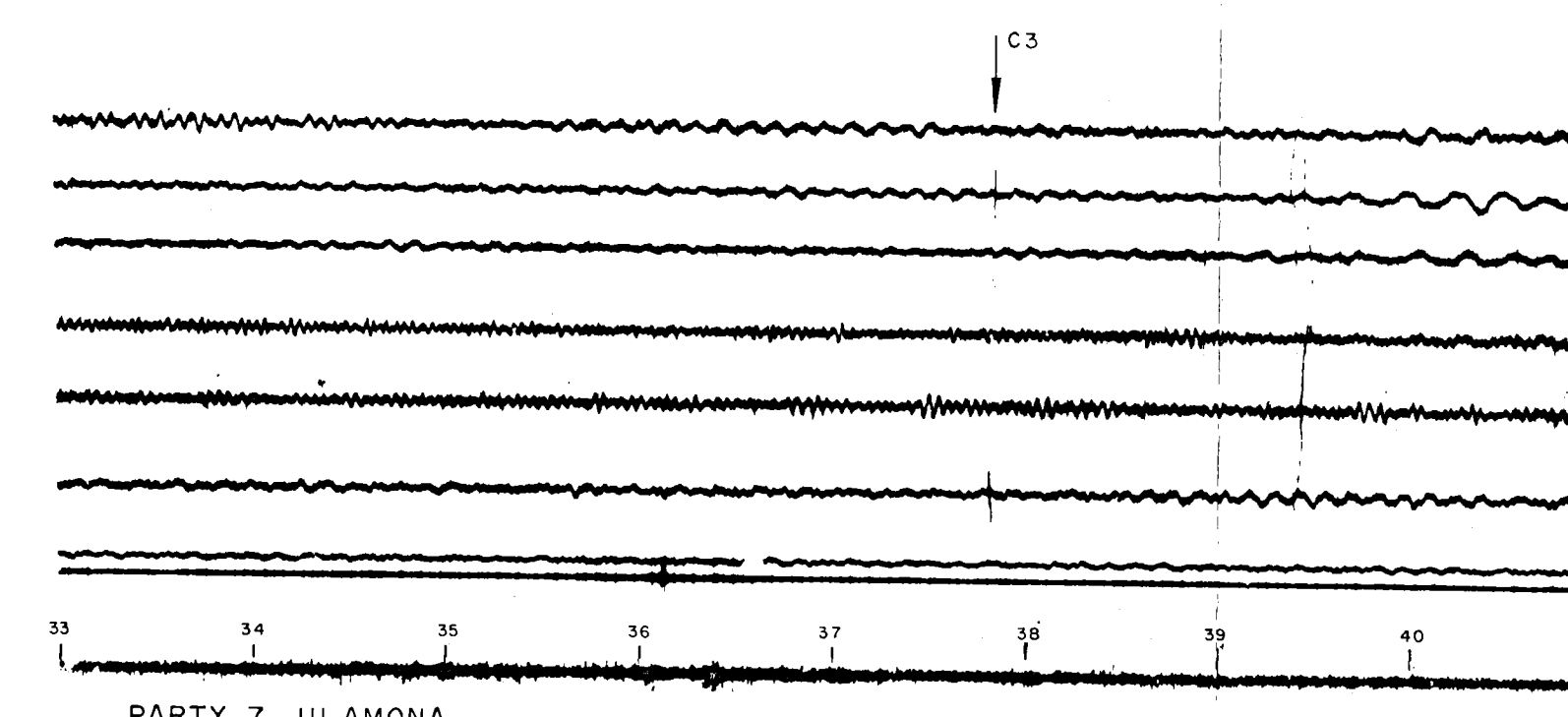
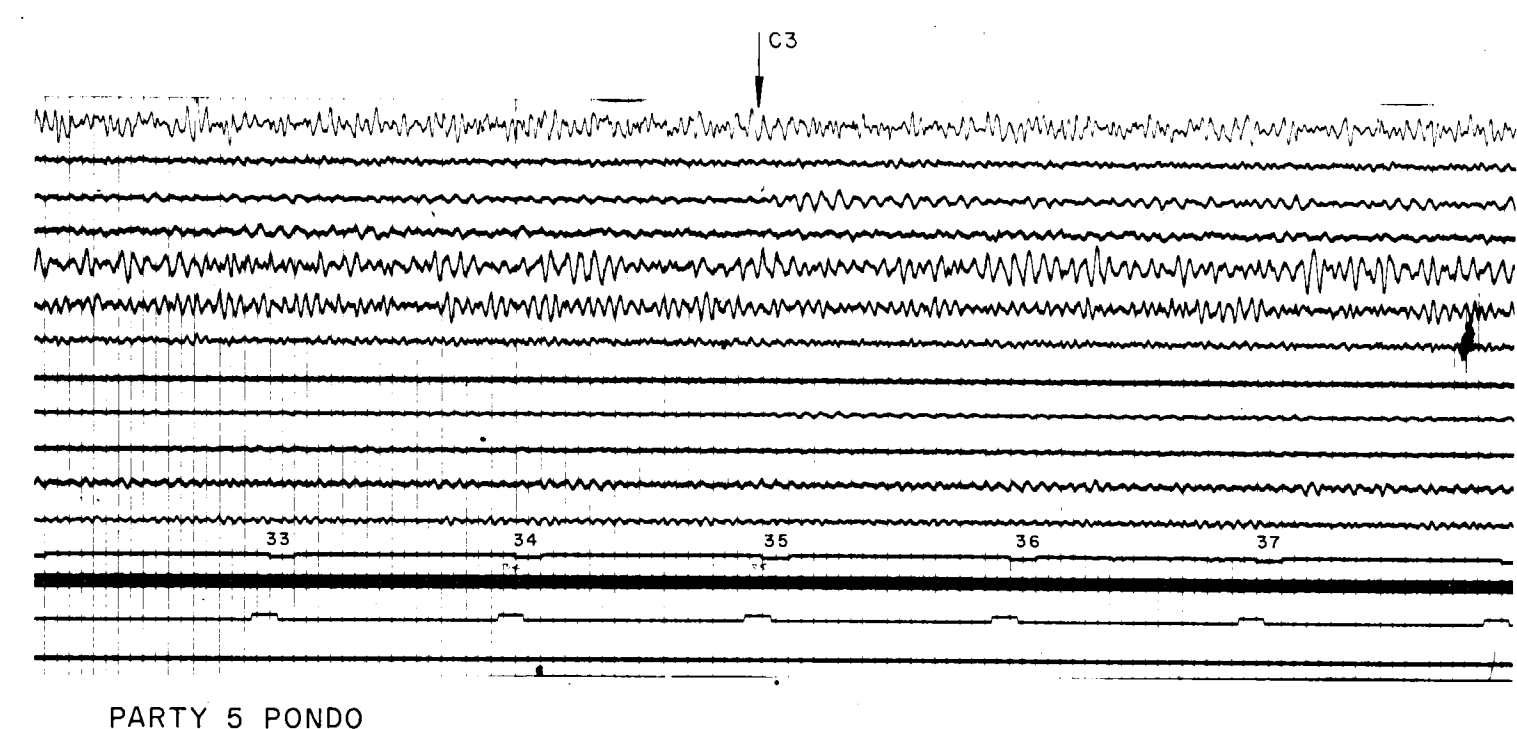
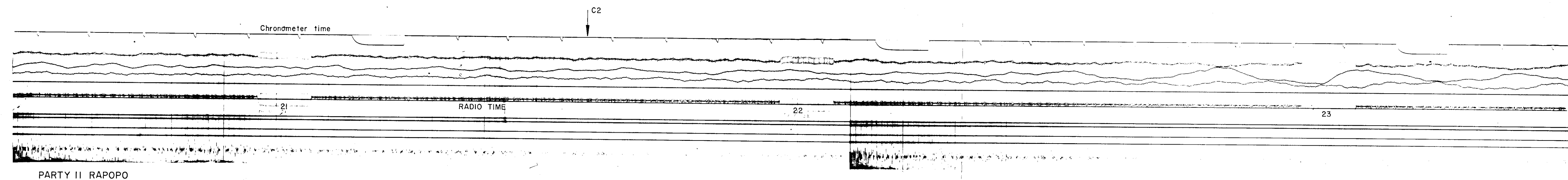
TRAVEL TIMES TO STATION 6 (RAVALIEN) FOR STAGE 3



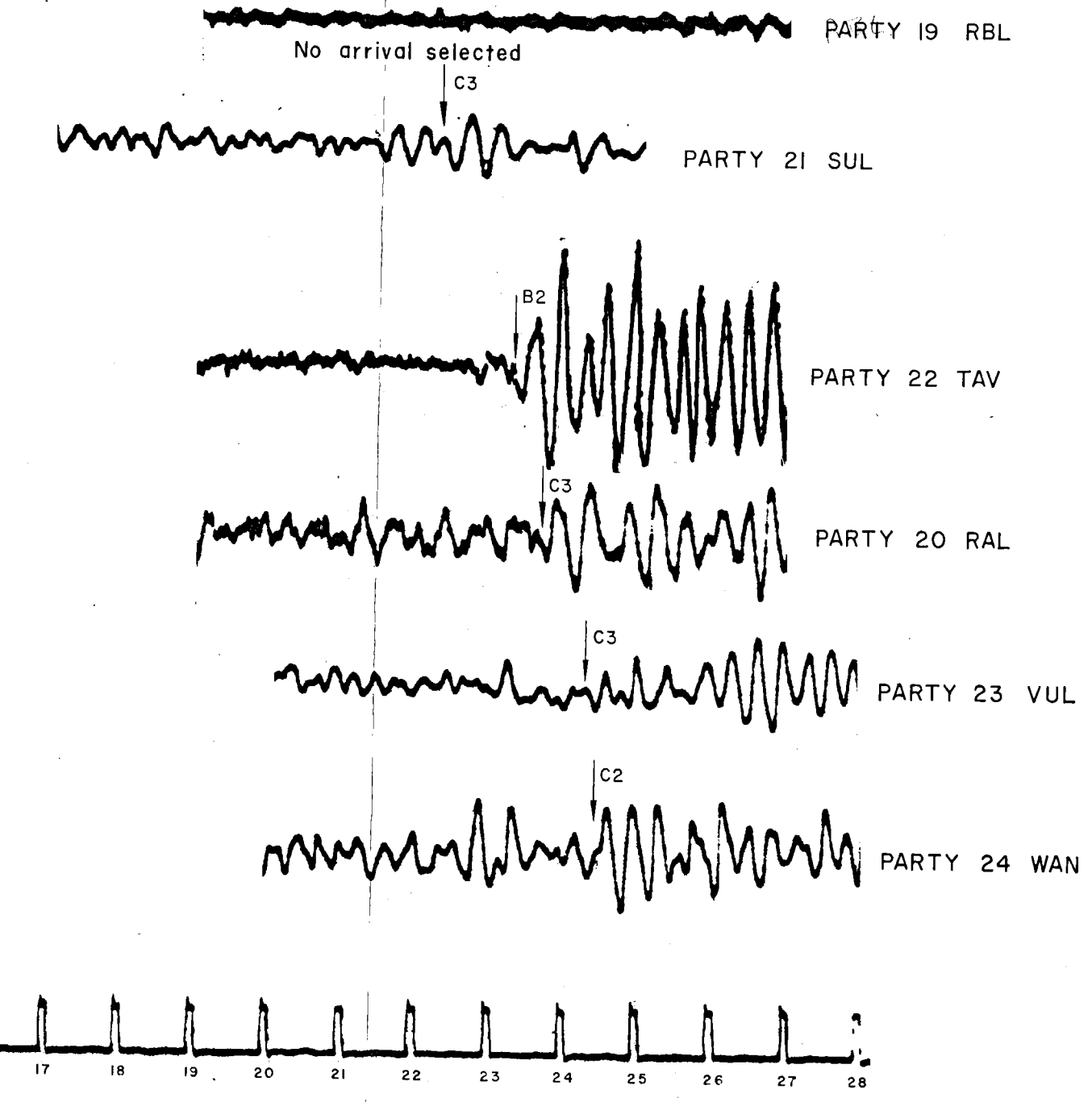
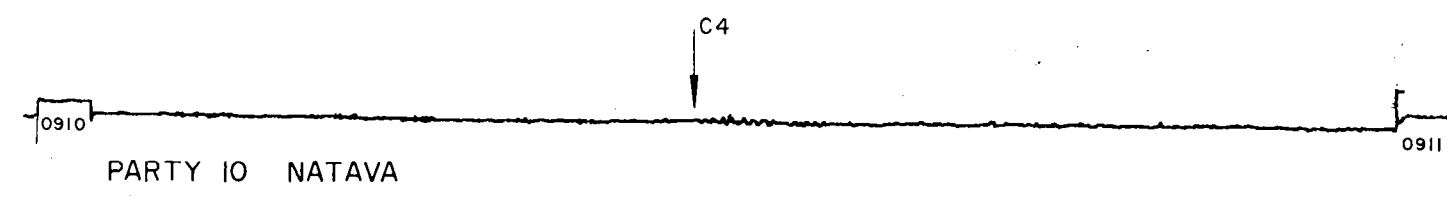
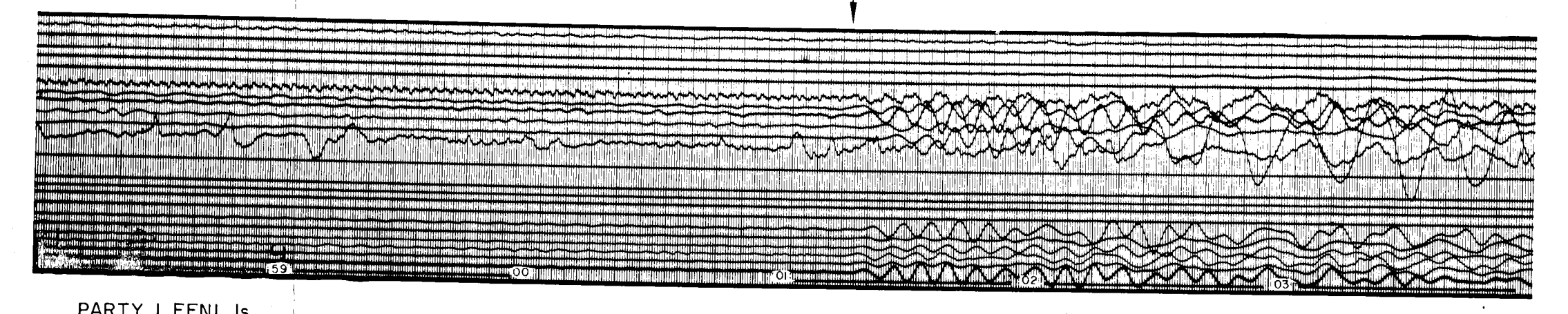
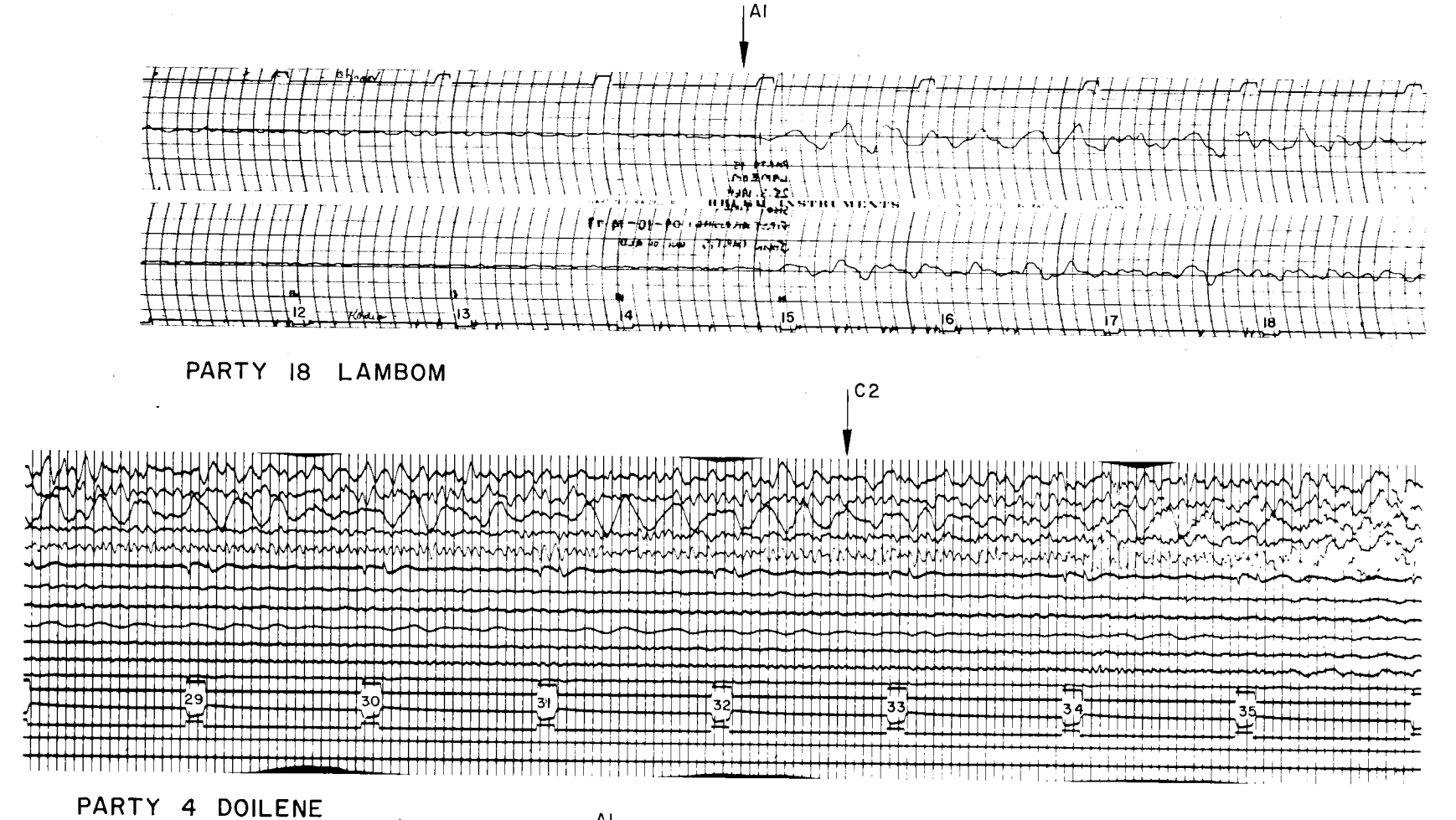
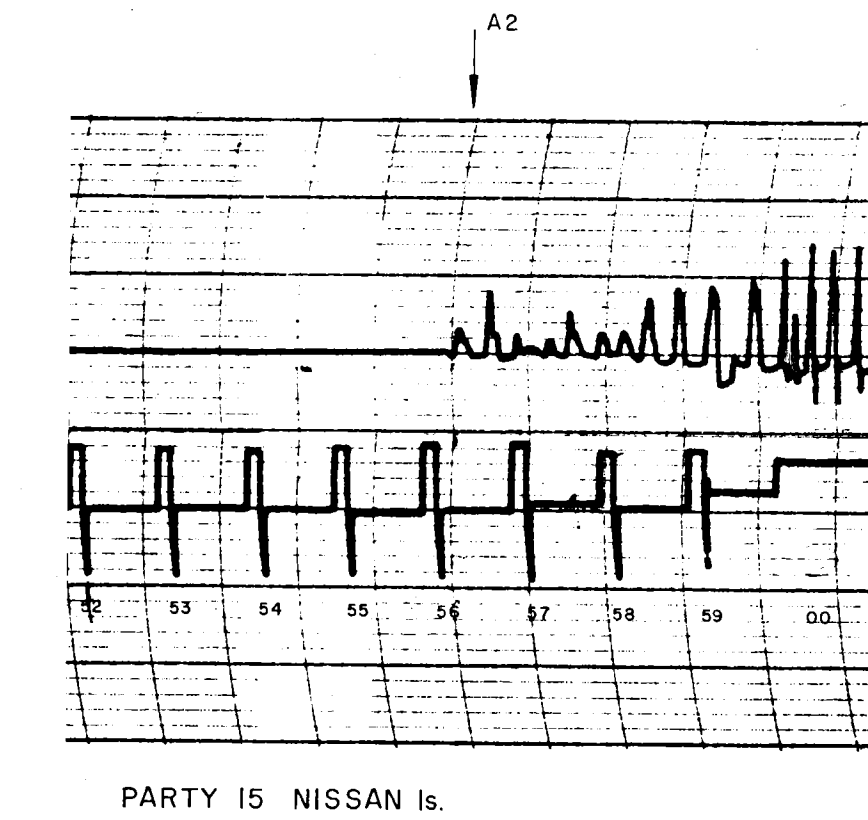
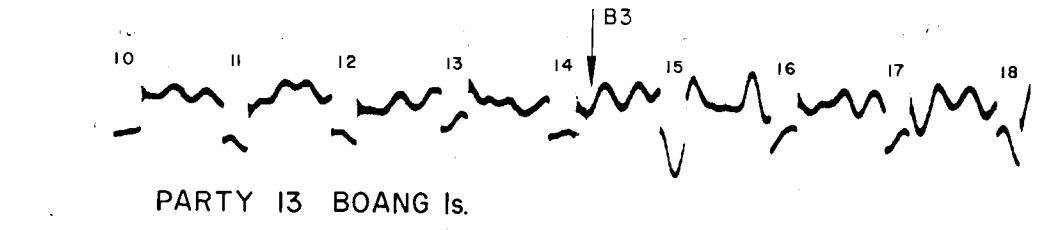
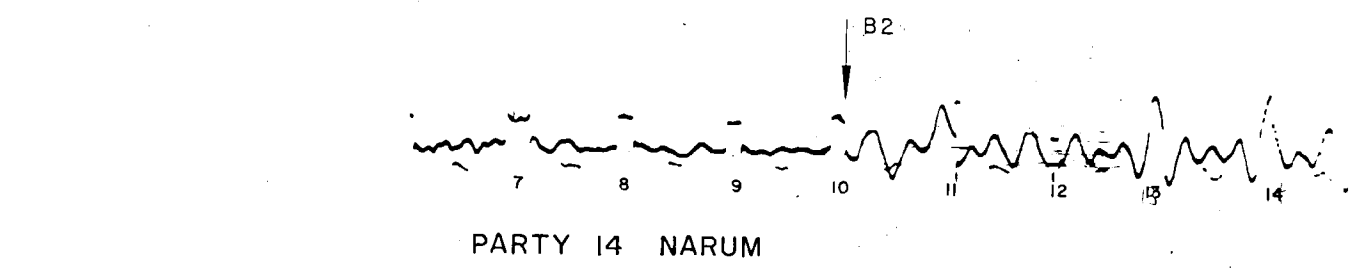


GEOMETRY FOR SIMPLIFIED EVALUATION OF
WATER DEPTH FROM DIRECT AND REFRACTED
WATER ARRIVALS.



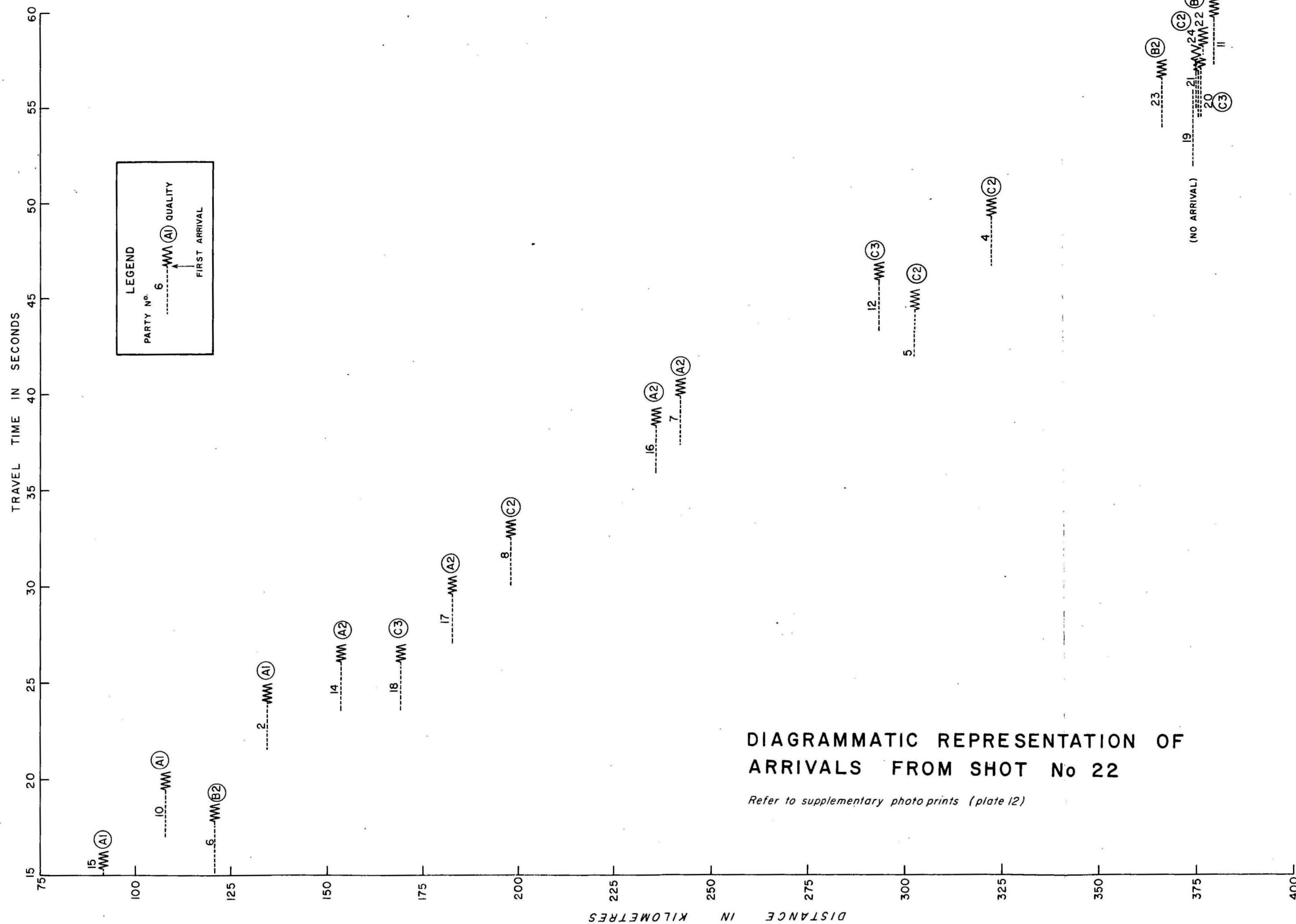


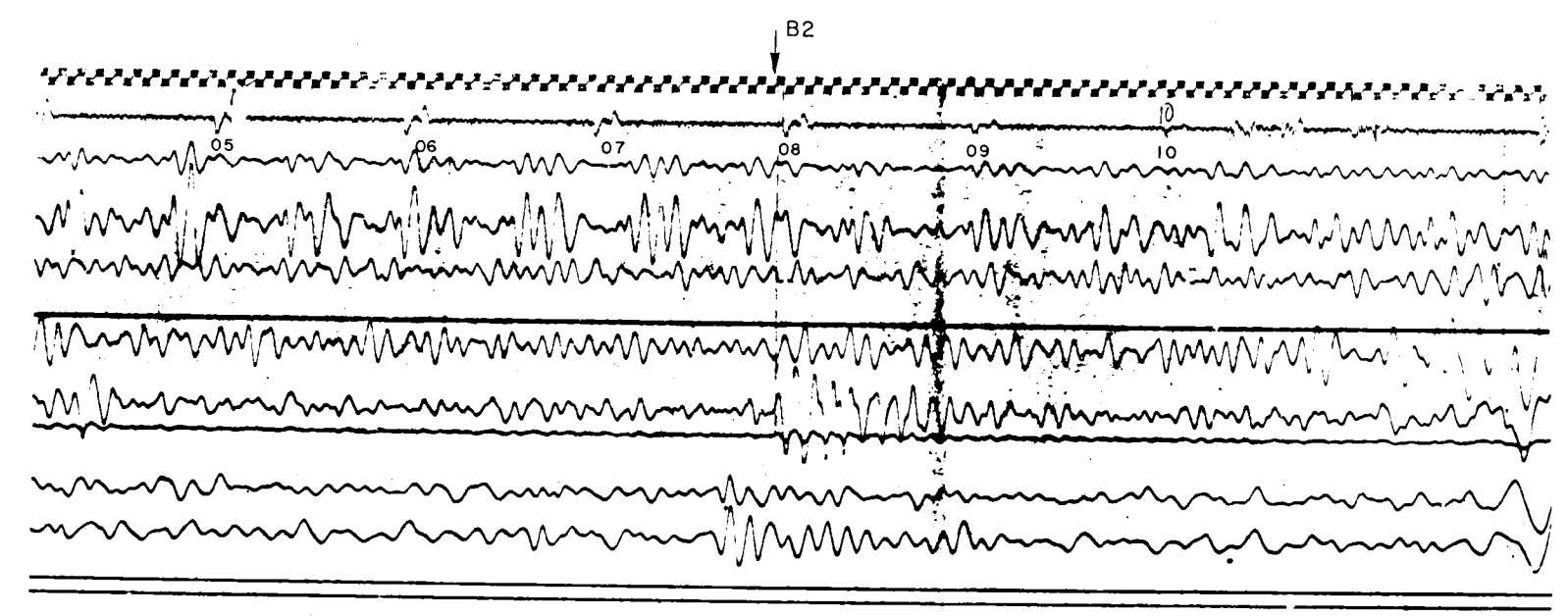
To accompany Record No 1971/131



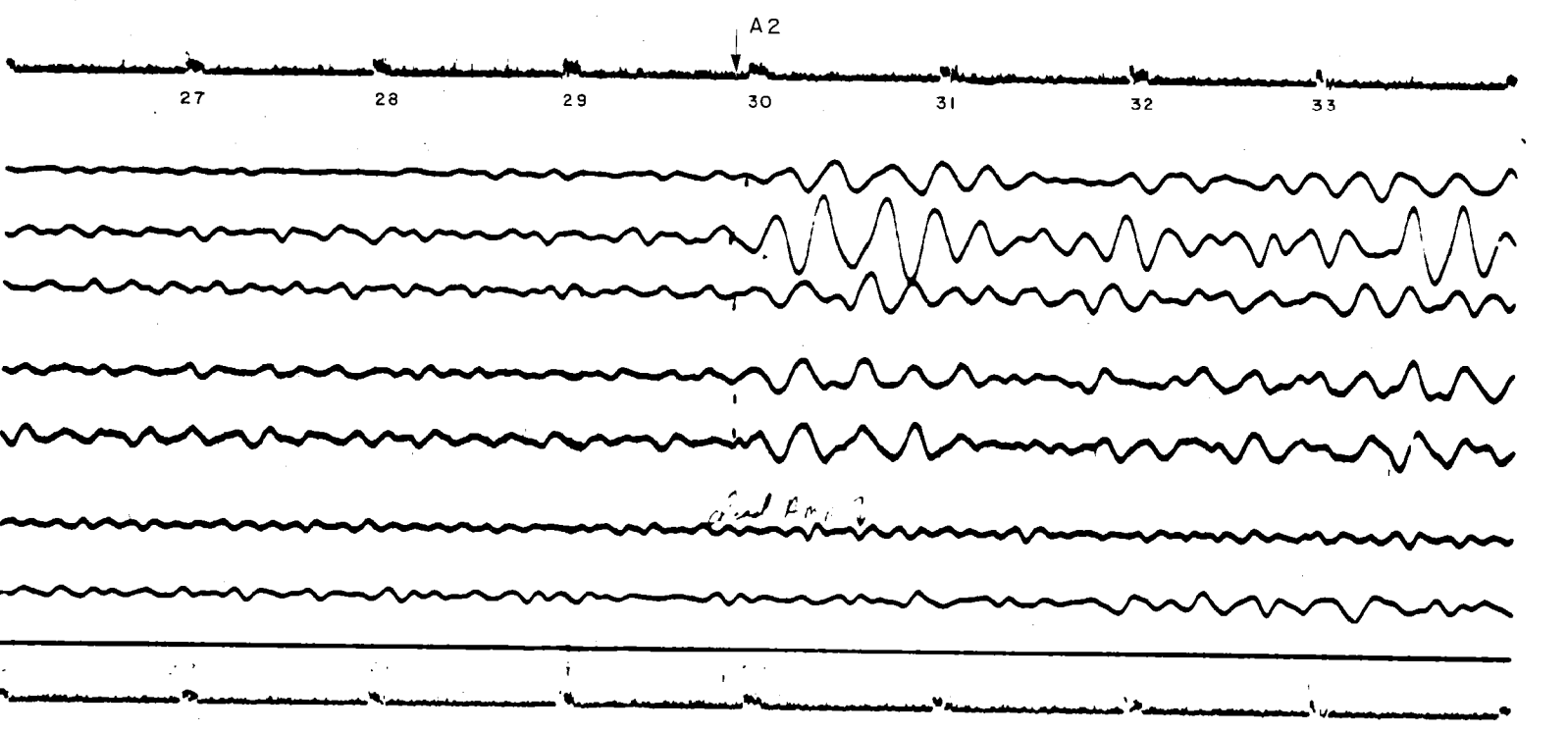
RABOUL NETWORK

ARRIVALS FROM SHOT No 1

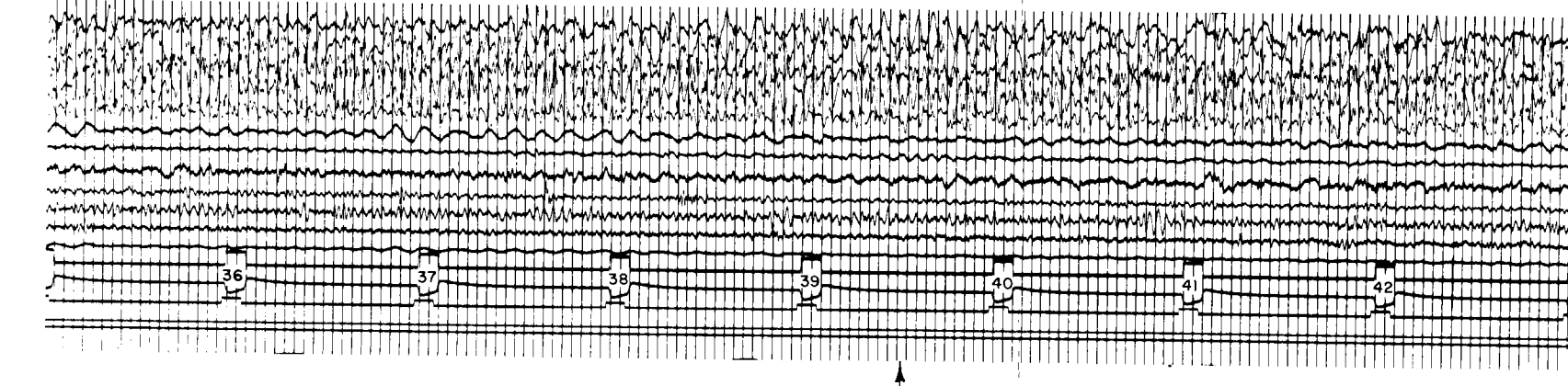




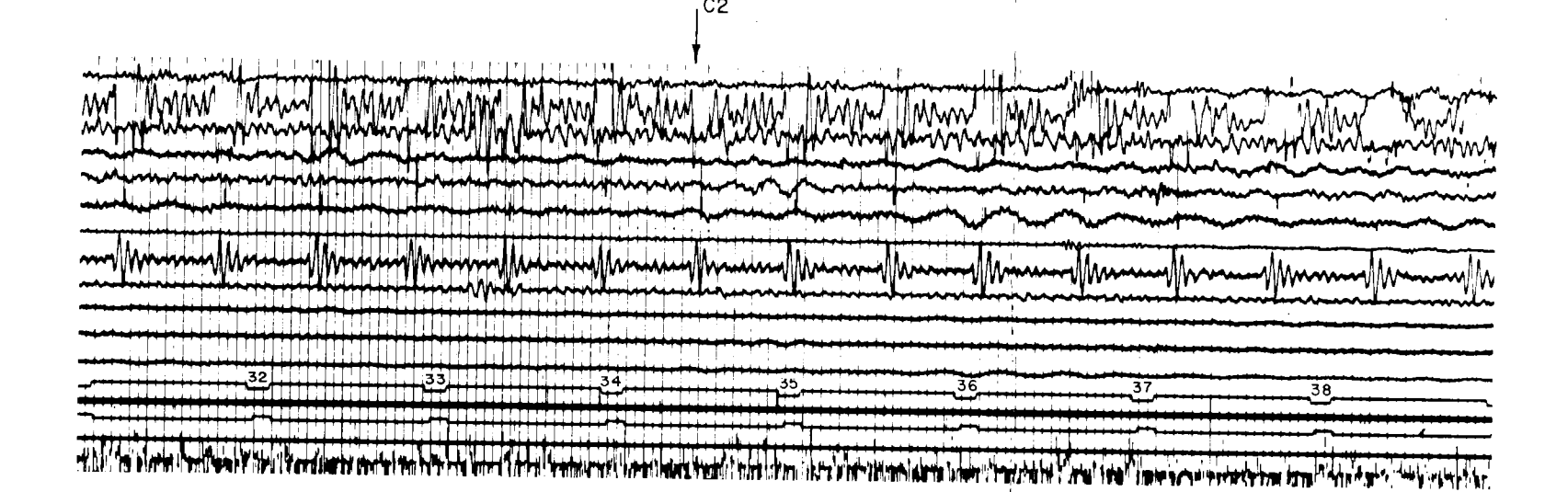
PARTY 6 TALASEA



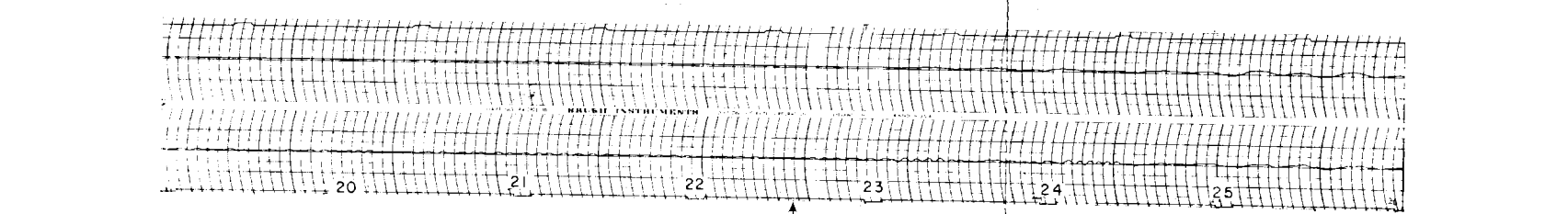
PARTY 7 ULAMONA



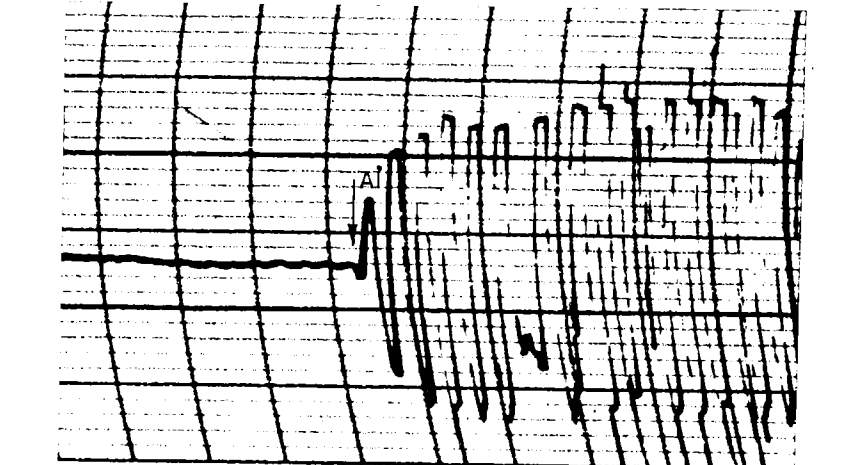
PARTY 4 DOILENE



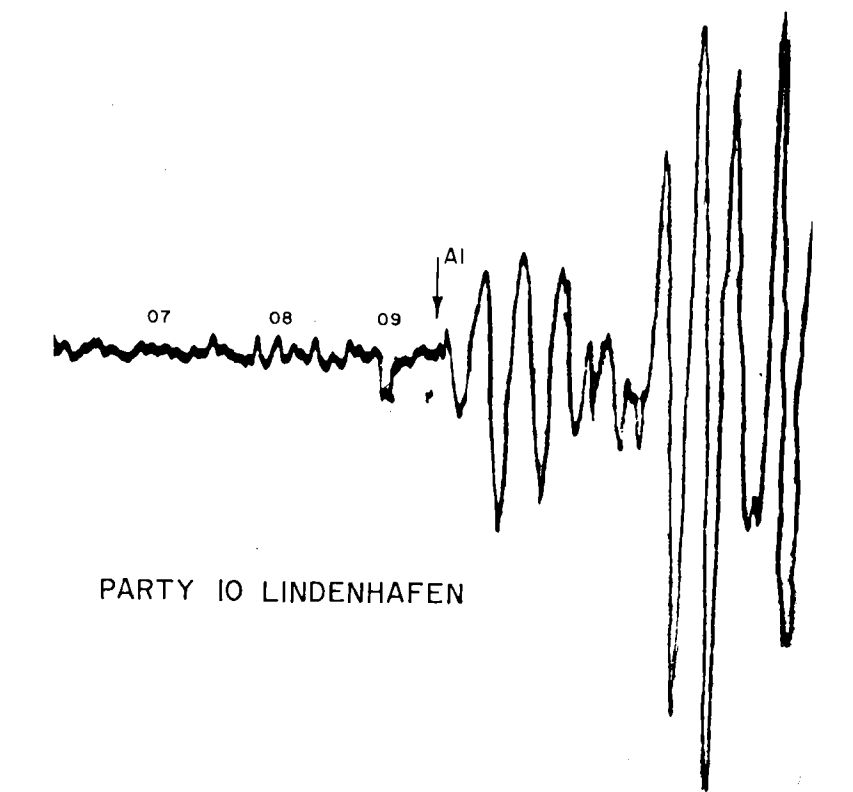
PARTY 5 PONDO



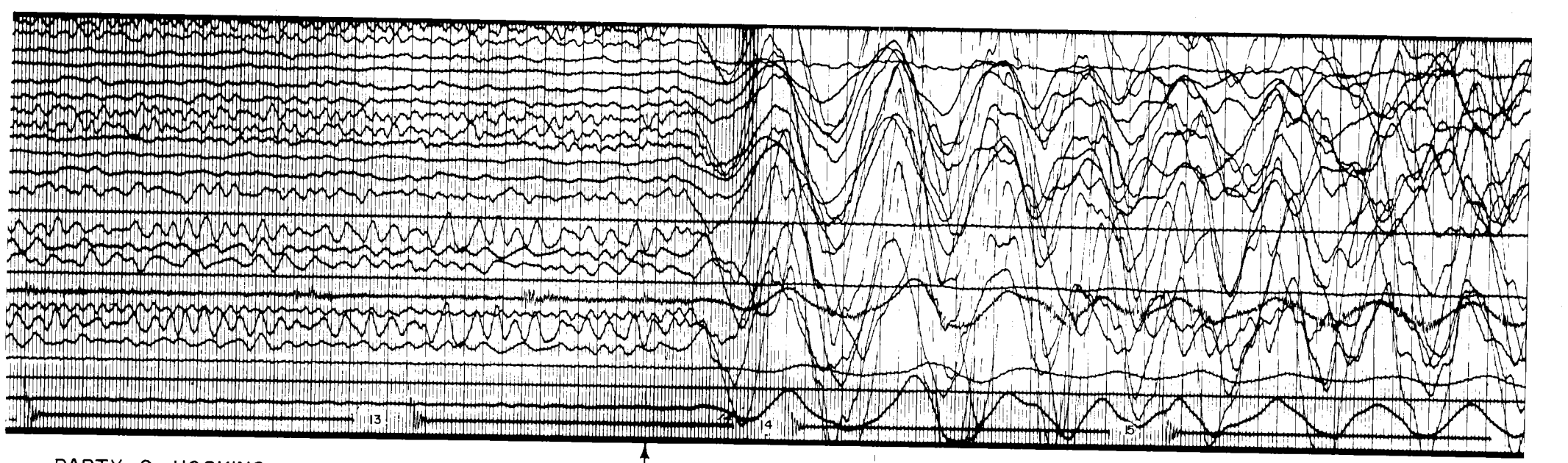
PARTY 8 BIALLA



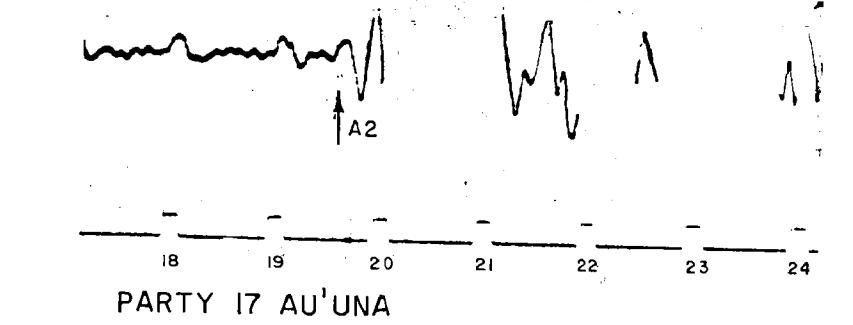
PARTY 15 C.R.A.



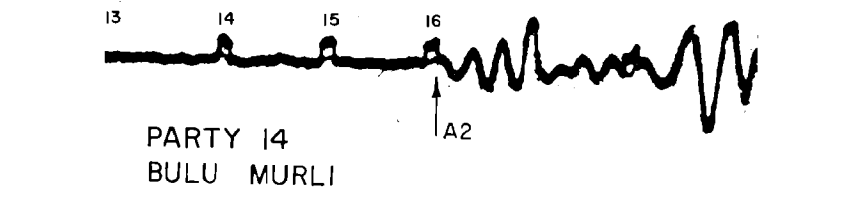
PARTY 10 LINDENHAFEN



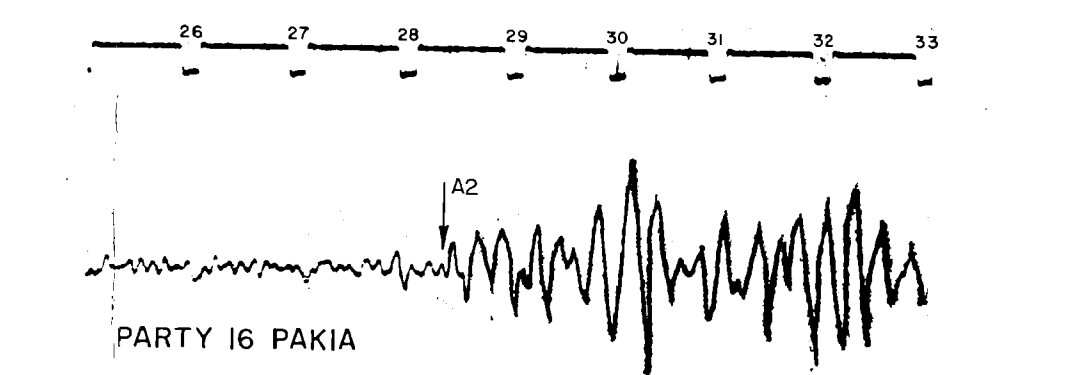
PARTY 2 HOSKINS



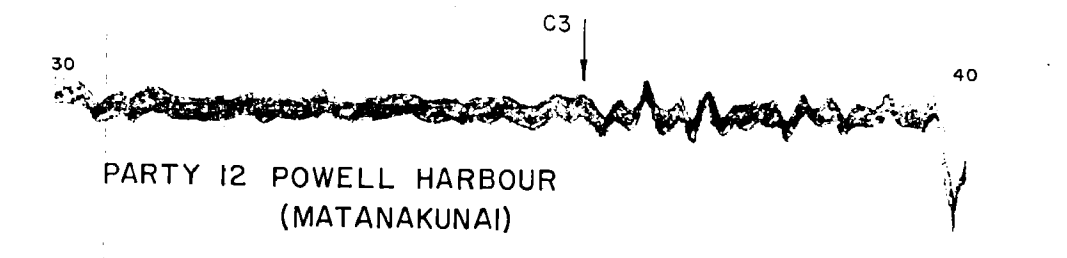
PARTY 17 AU'UNA



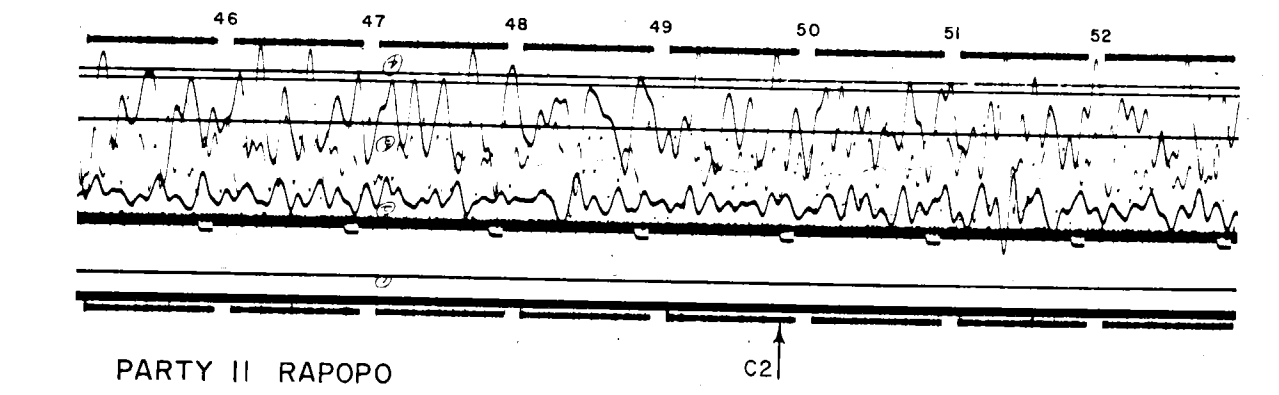
PARTY 14 BULU MURLI



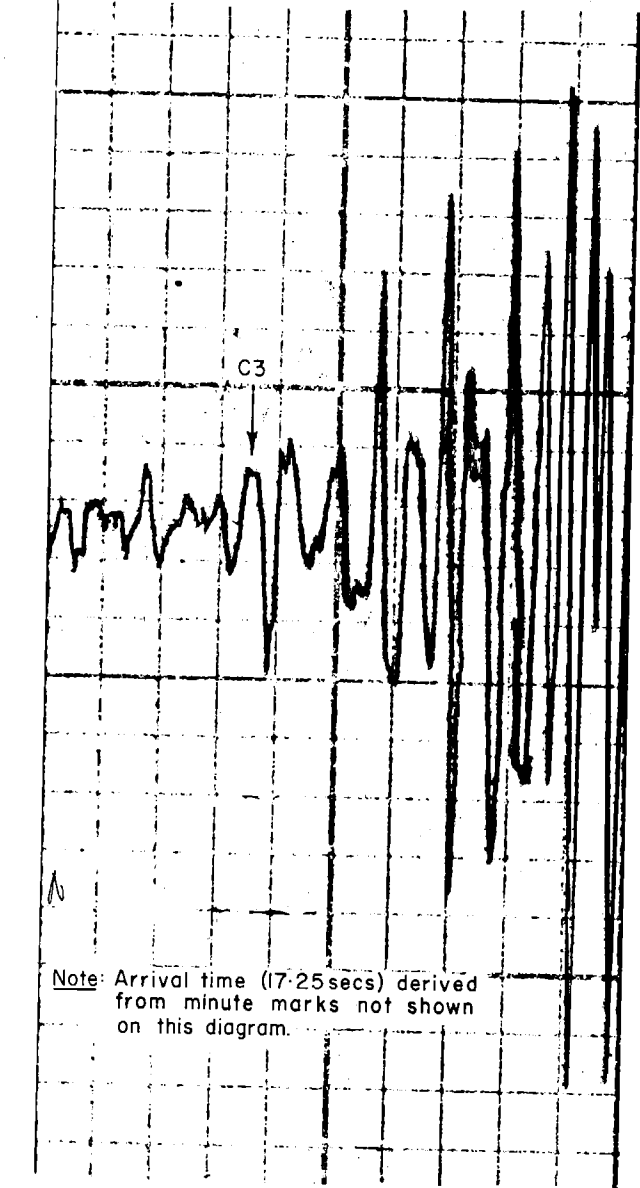
PARTY 16 PAKIA



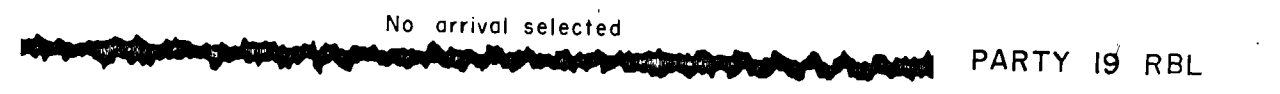
PARTY 12 POWELL HARBOUR (MATANAKUNAI)



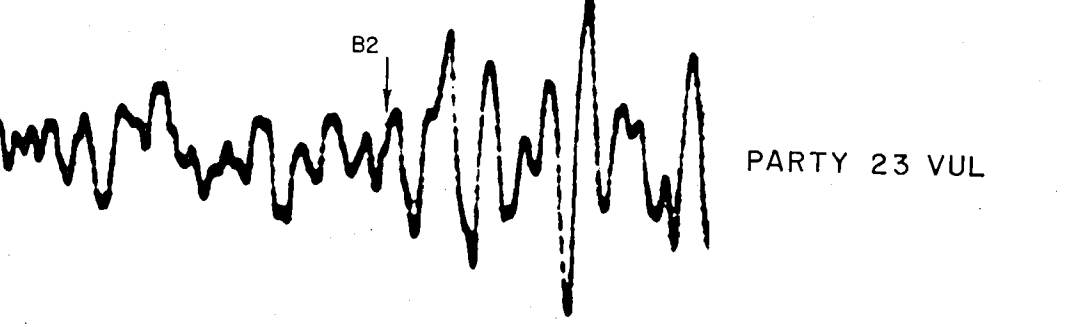
PARTY 11 RAPOPO



PARTY 18 VITU Is.



PARTY 19 RBL



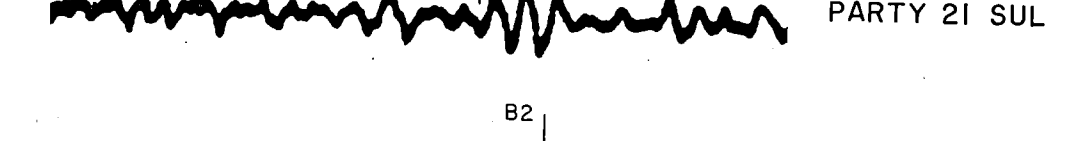
PARTY 23 VUL



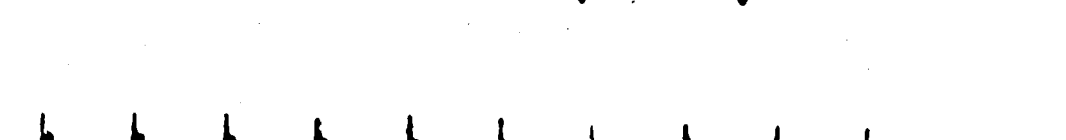
PARTY 24 WAN



PARTY 20 RAL



PARTY 21 SUL



PARTY 22 TAV

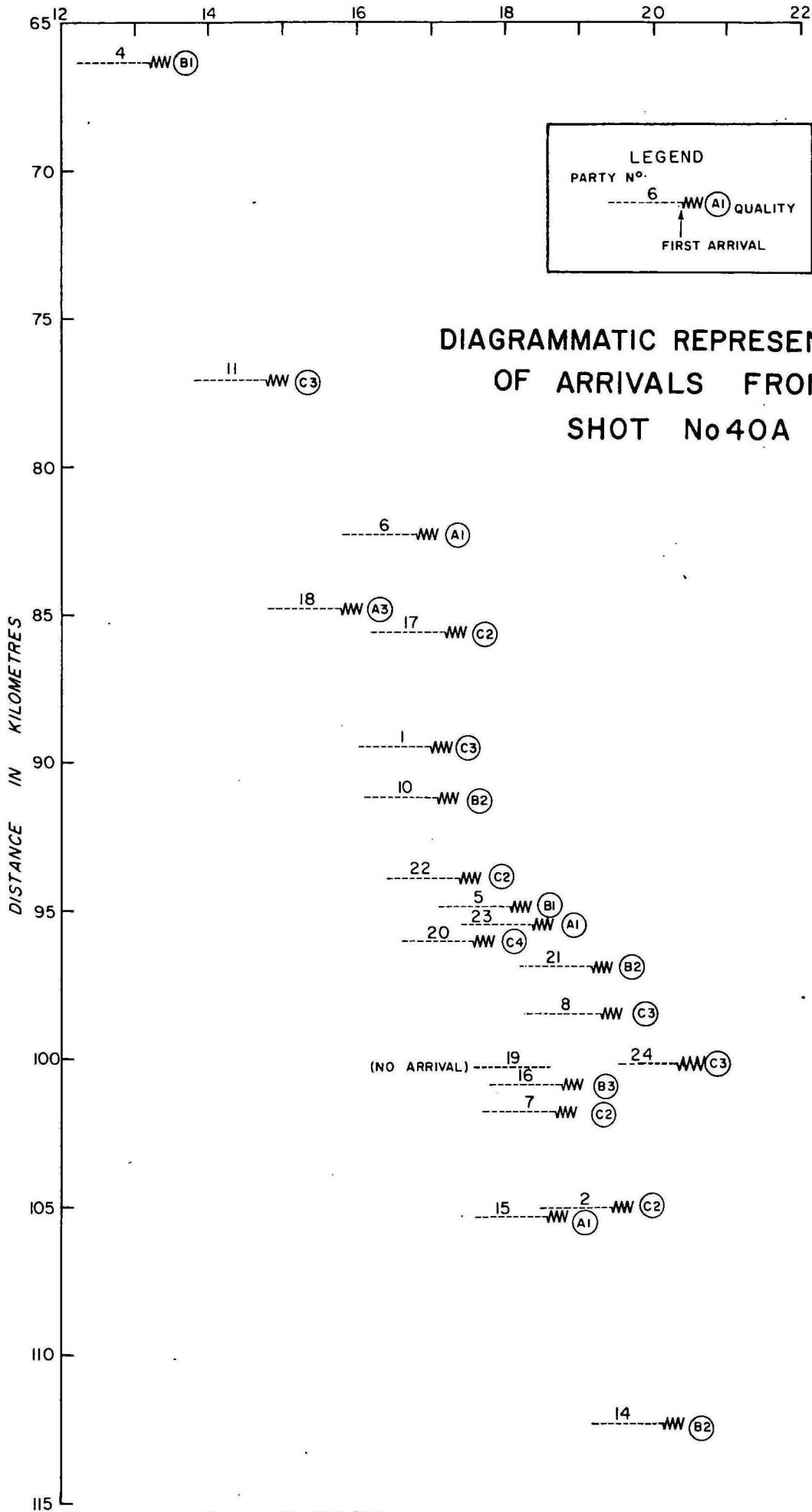


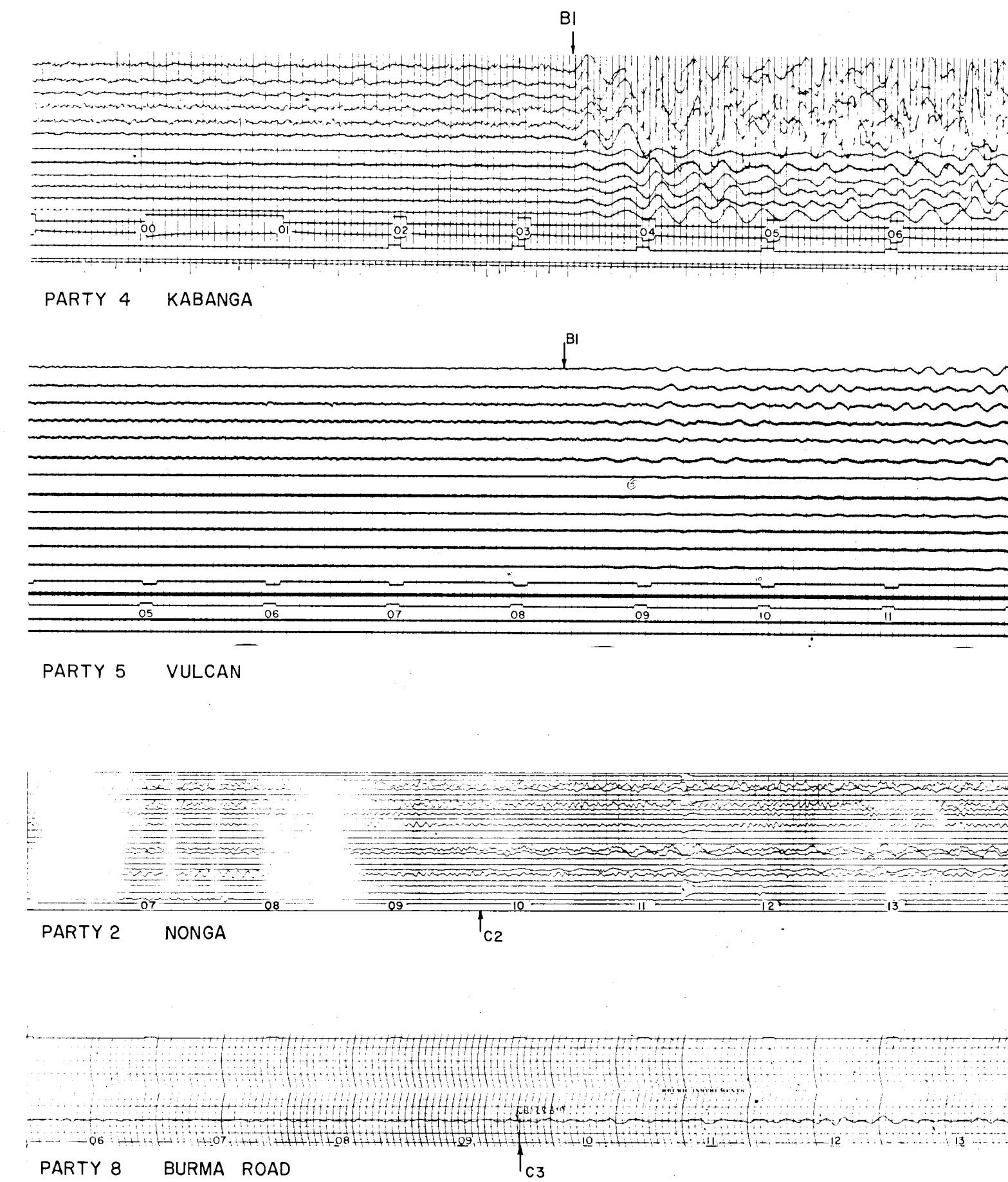
PARTY 19 RBL



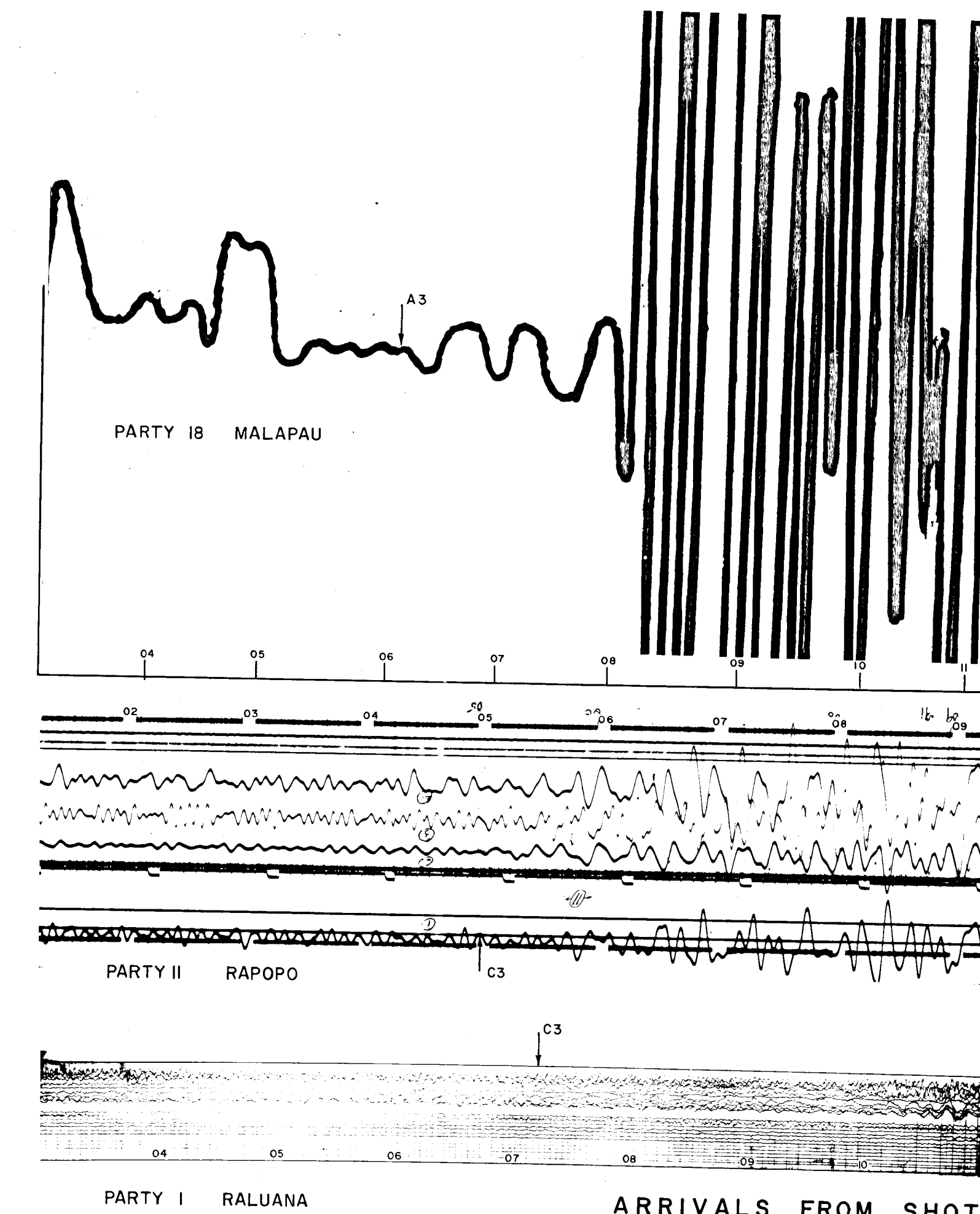
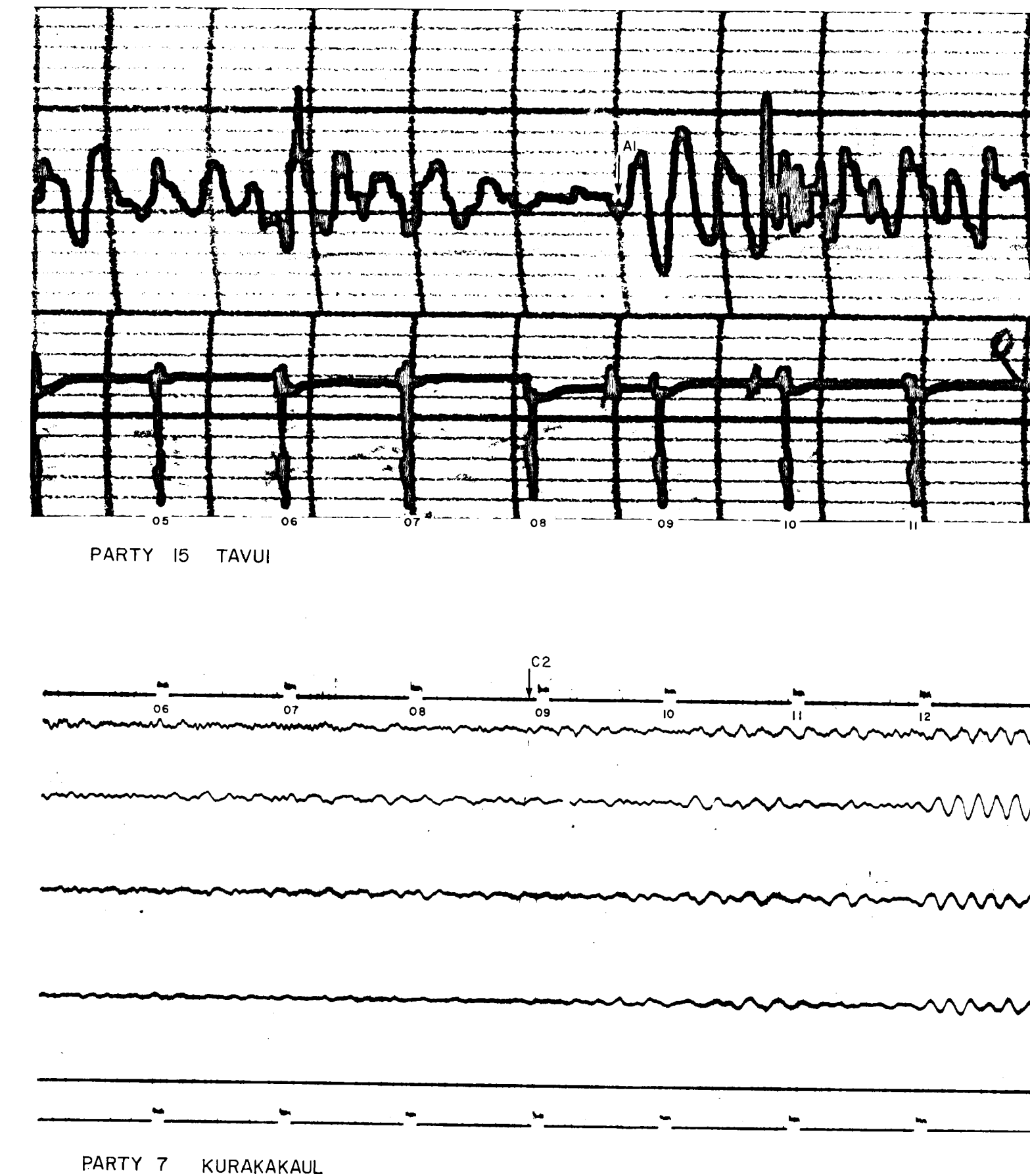
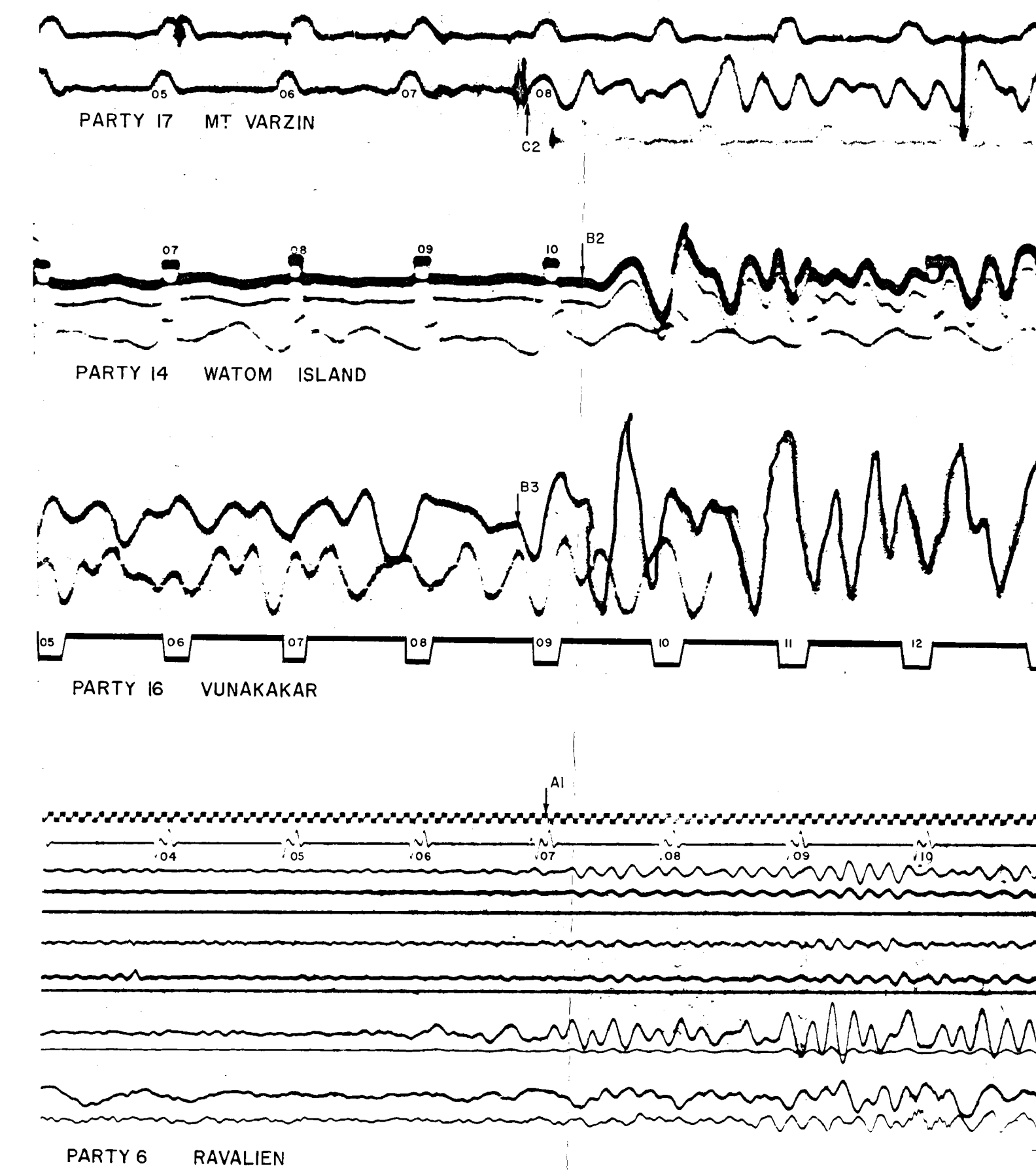
PARTY 19 RBL

TRAVEL TIME IN SECONDS

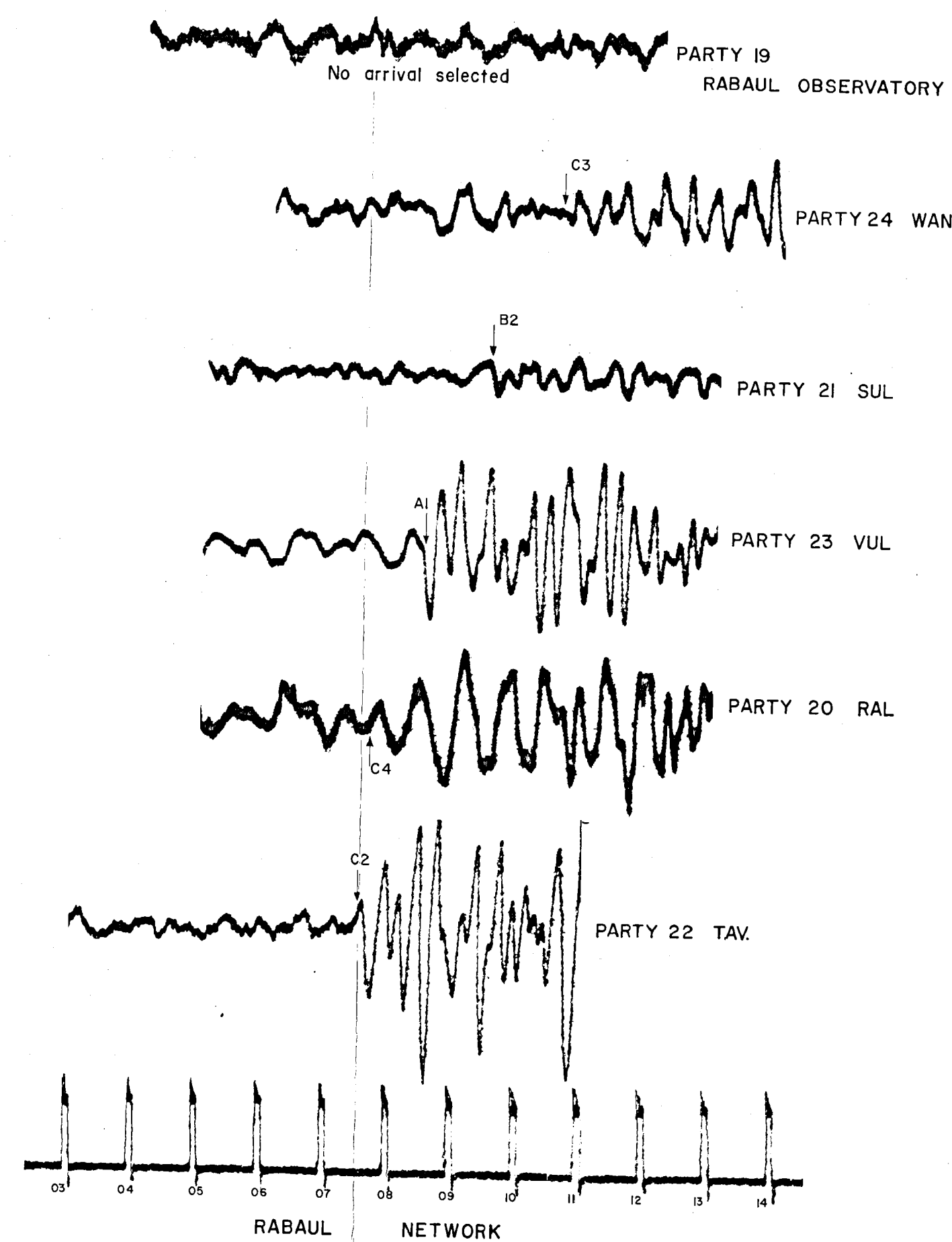




To accompany Record No. 1971/131



ARRIVALS FROM SHOT No 40A



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 1 (2102-2301)

SHIP: M.V. CORAL QUEEN

DATE: 28 March 1969

EQUIPMENT

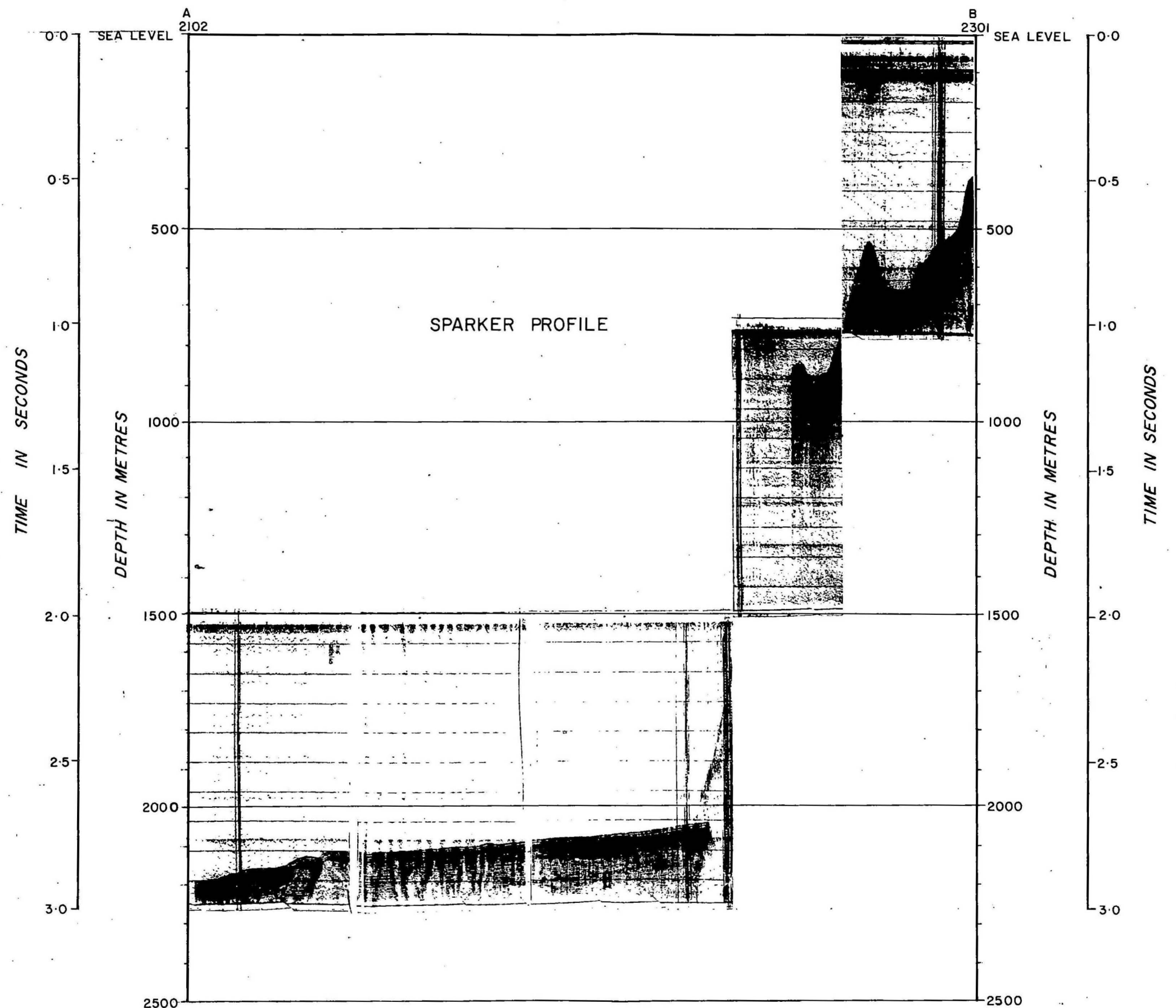
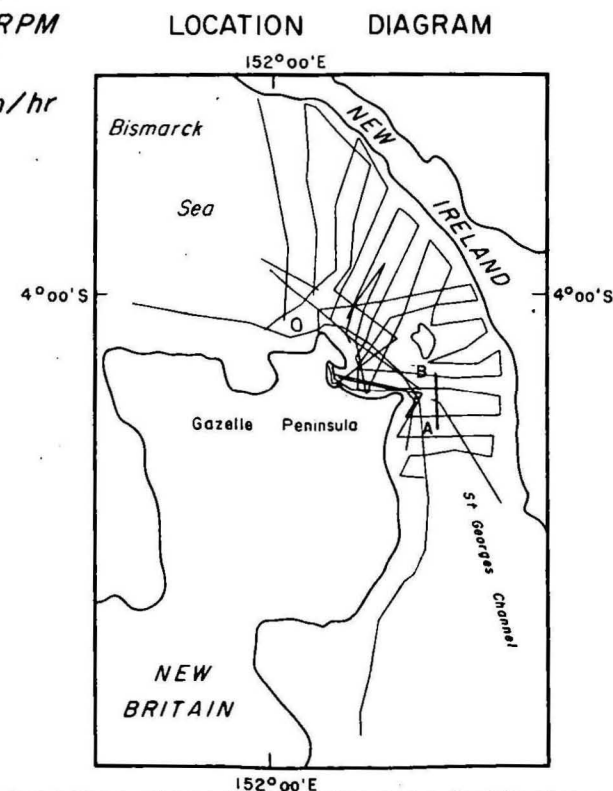
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190m
Source depth: $1\frac{1}{2}$ m
Receiver depth: 3-4m
Gain (i) Process amplifier: X100
Gain (ii) Marking amplifier: 10/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx 45 cm/hr
Ship Engine revs: Approx 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 2 (0220-0727)

SHIP: M.V. CORAL QUEEN

DATE: 29 March 1969

EQUIPMENT

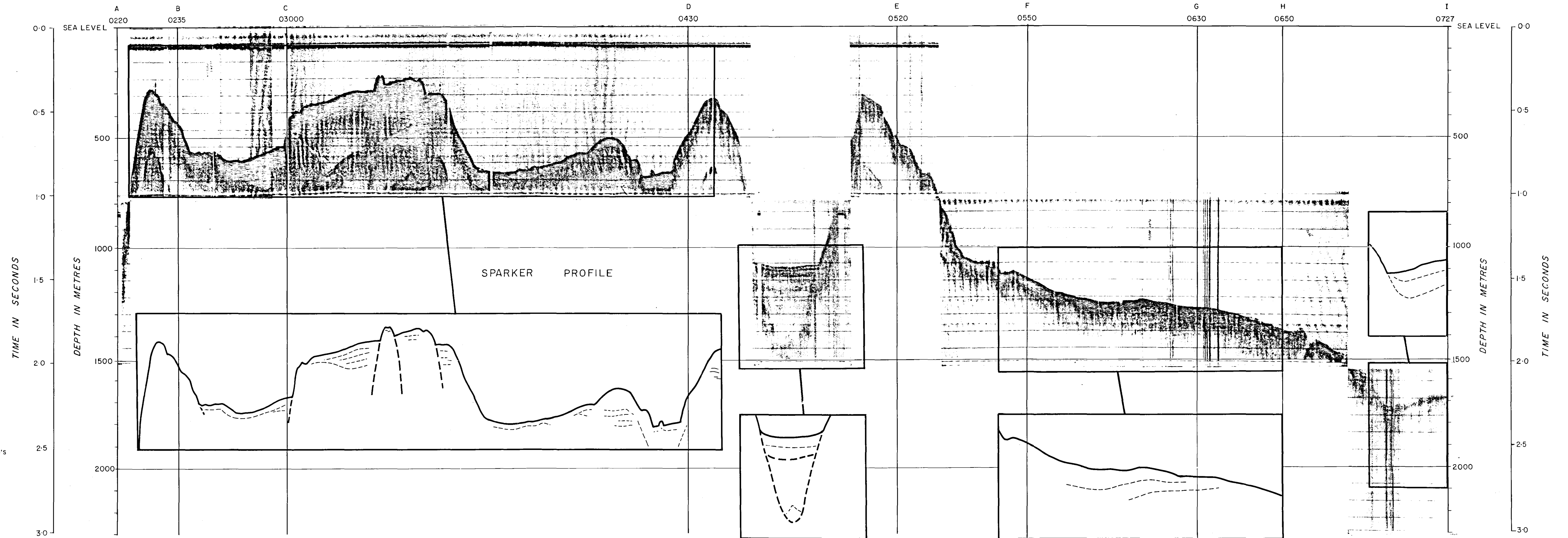
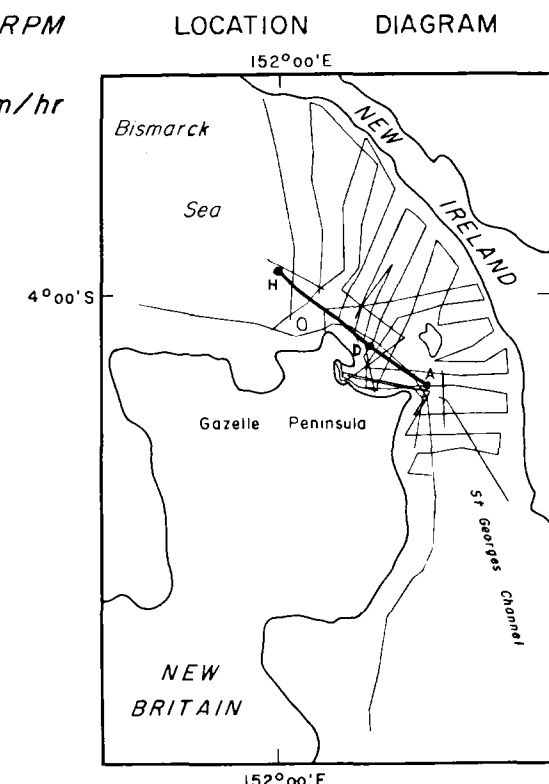
Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx 4sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx 3-4 m
Gain (i) Process amplifier: X 100
(ii) Marking amplifier: 10/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx 55 cm/hr
Ship Engine revs: Approx 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 3 (1138-1250)

SHIP: M.V. CORAL QUEEN

DATE: 29 March, 1969

EQUIPMENT

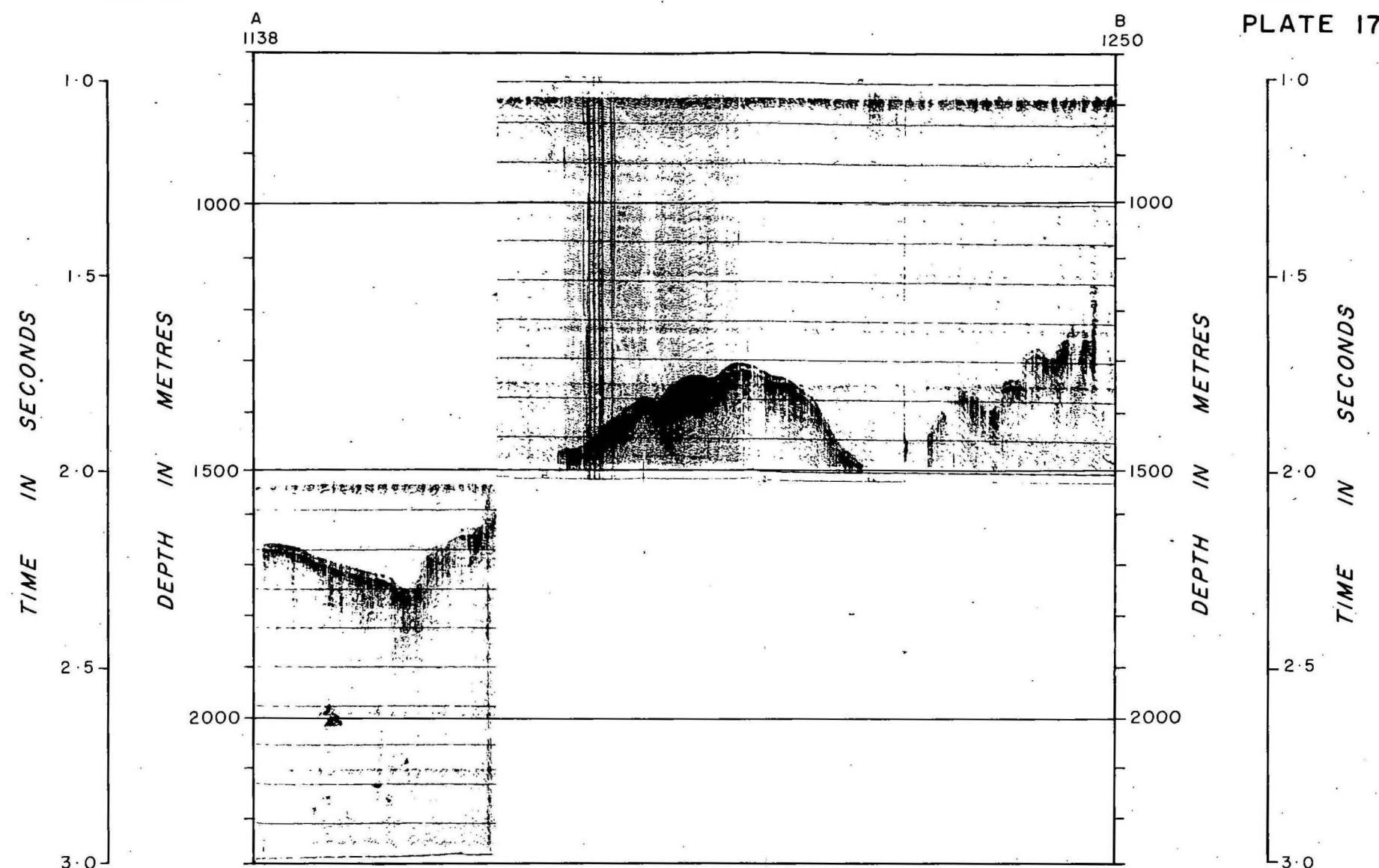
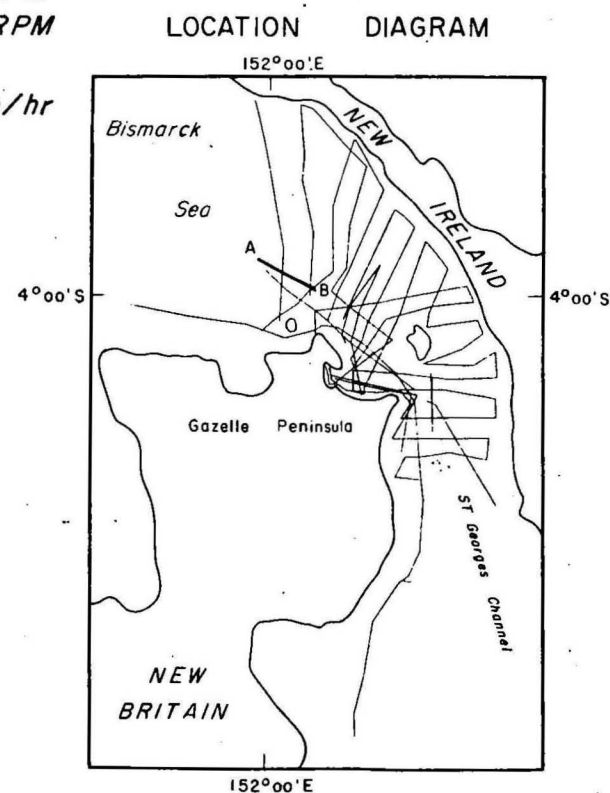
Energy Source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving System: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source Power: 7000 watt-sec.
Firing Interval: Approx. 4 sec.
Hydrophone Array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - Receiver Distance: 190 m
Source Depth: $1\frac{1}{2}$ m
Receiver Depth: Approx. 3-4 m
Gain (i) Process Amplifier: X100
(ii) Marking Amplifier: 10/0
Filters: 20-20 kHz
Print Mode: Positive
Paper Speed: Approx. 50 cm/hr
Ship Engine Revs: Approx. 1000 RPM
Ship Speed through Water: Not Recorded
Ship Speed over Bottom: Approx 13 km/hr

HORIZONTAL: VERTICAL SCALE $\approx 9:1$

REMARKS: Sparkarray broke away
from towing rig



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 4 (1544-2105)

SHIP: M.V. CORAL QUEEN

DATE: 6 April 1969

EQUIPMENT

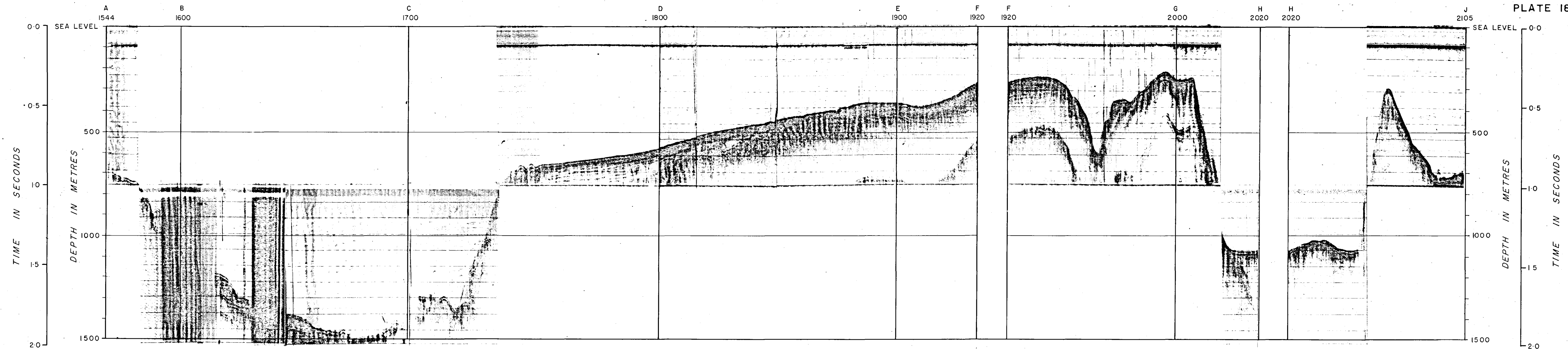
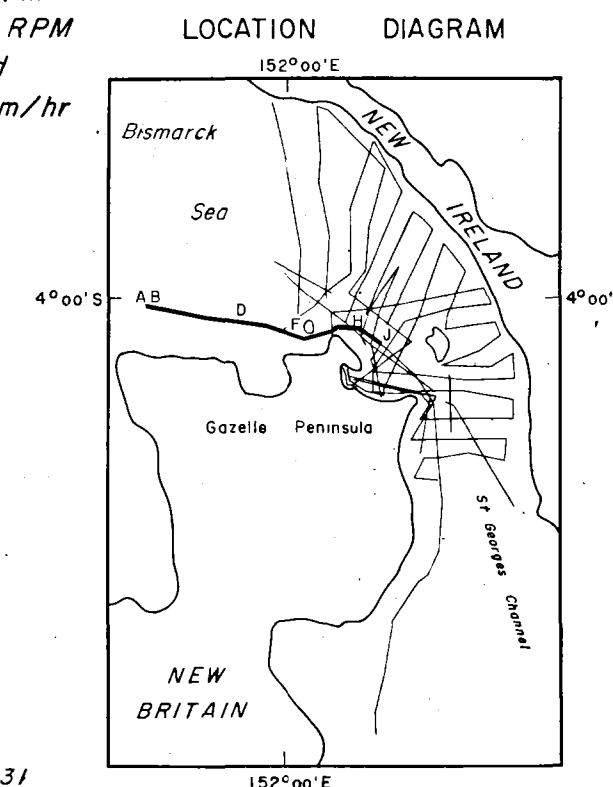
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267-Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: x 100
(ii) Marking amplifier: x 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



Geophysical Branch, Bureau of Mineral Resources,
Geology & Geophysics

NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION
(ONE TO FOUR REDUCTION)
TRAVERSE 4 (2102-0600)

SHIP: M.V. CORAL QUEEN DATE: 6 & 7 April 1969

EQUIPMENT

Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

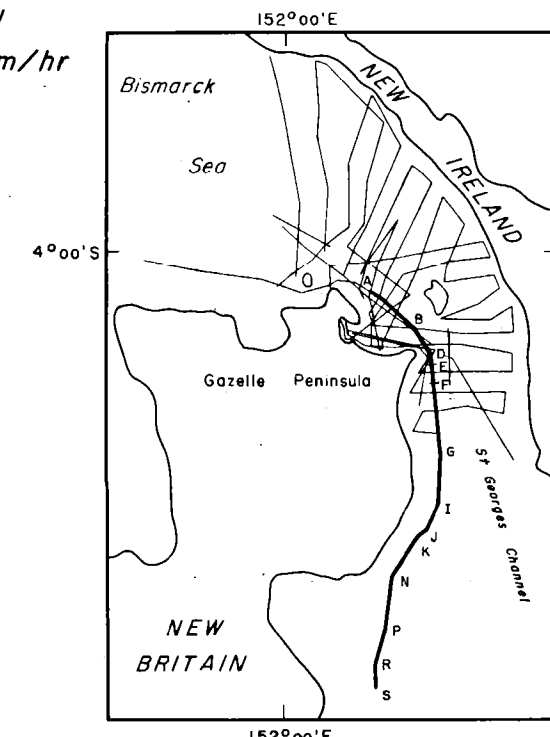
RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: x 100
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

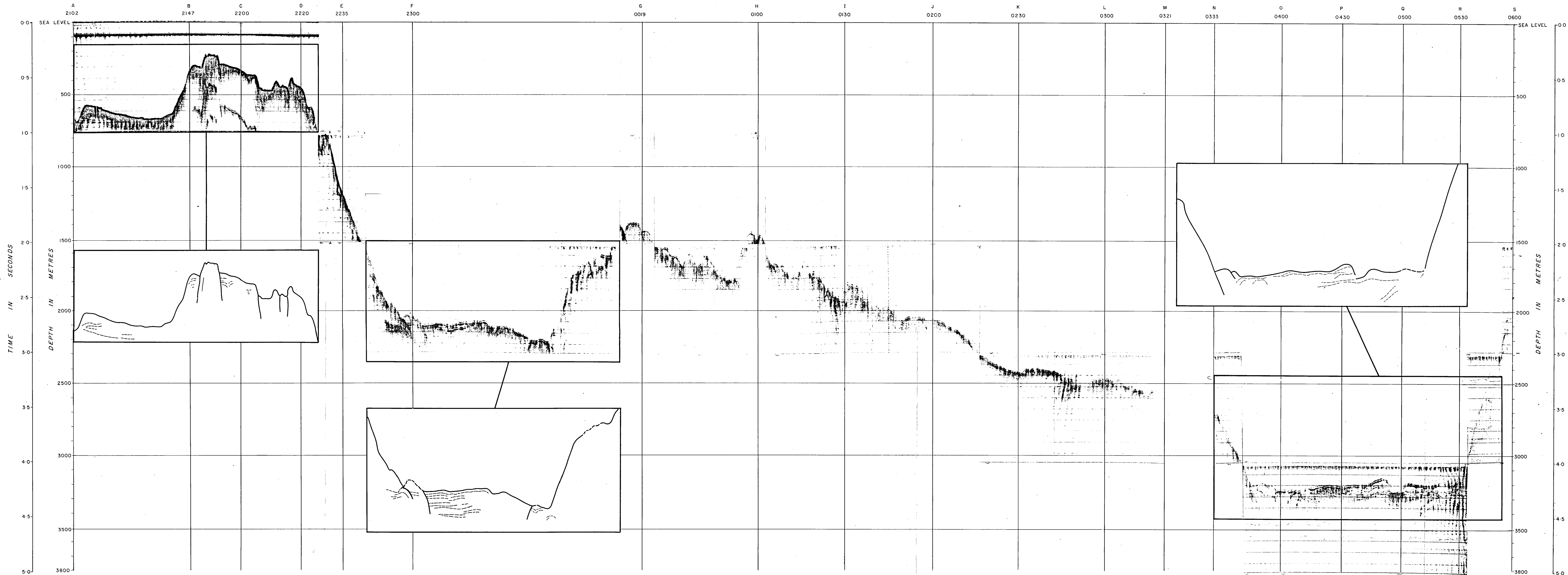
VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:

LOCATION DIAGRAM



(Based on G449 19A)



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 5(2017-2400)

SHIP: M.V. CORAL QUEEN

DATE: 7 April 1969

EQUIPMENT

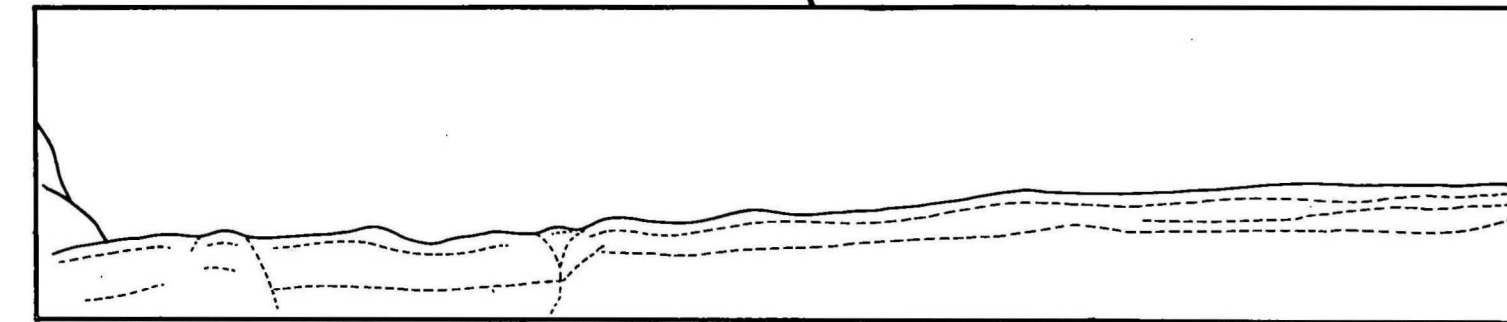
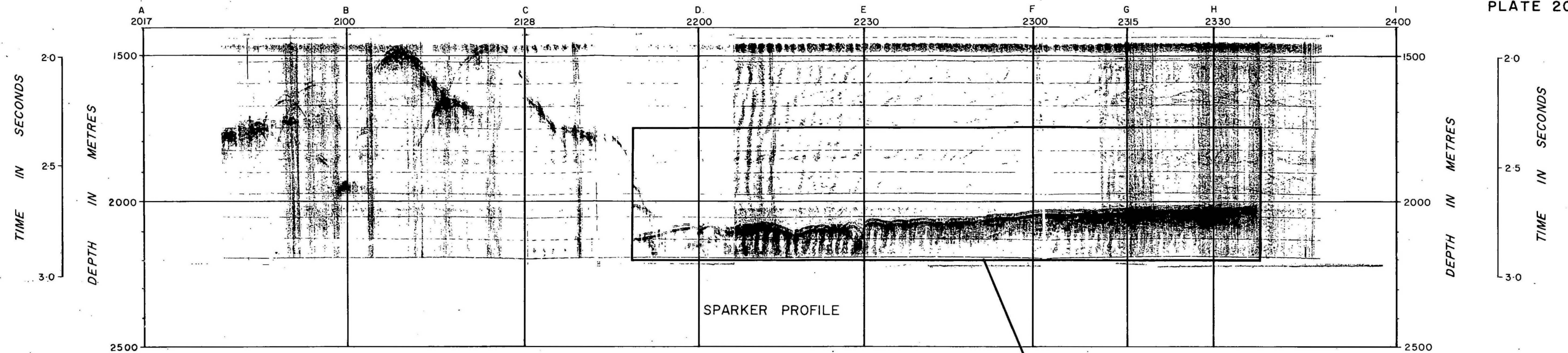
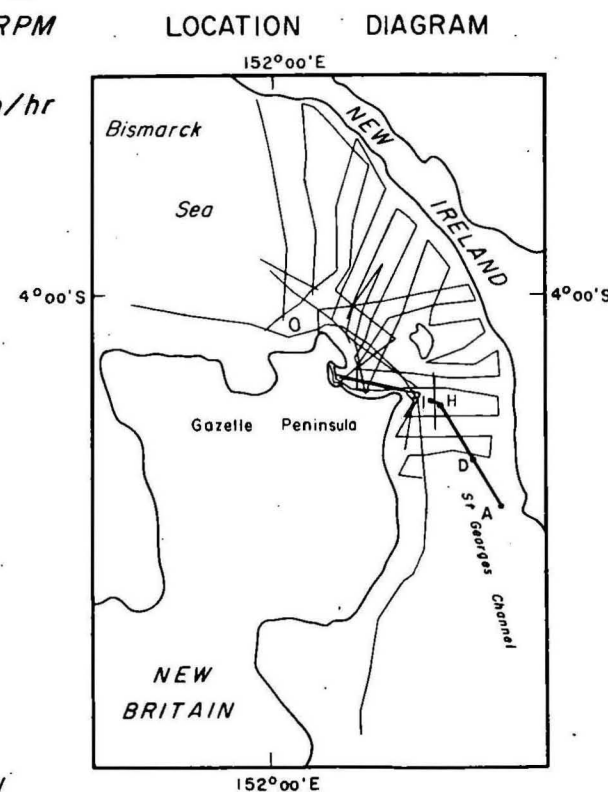
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: X100
(ii) Marking amplifier: 10/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS: Sparker power supply
failure 2340.



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 687(0852-1400)

SHIP: M.V. CORAL QUEEN

DATE: 10 April 1969

EQUIPMENT

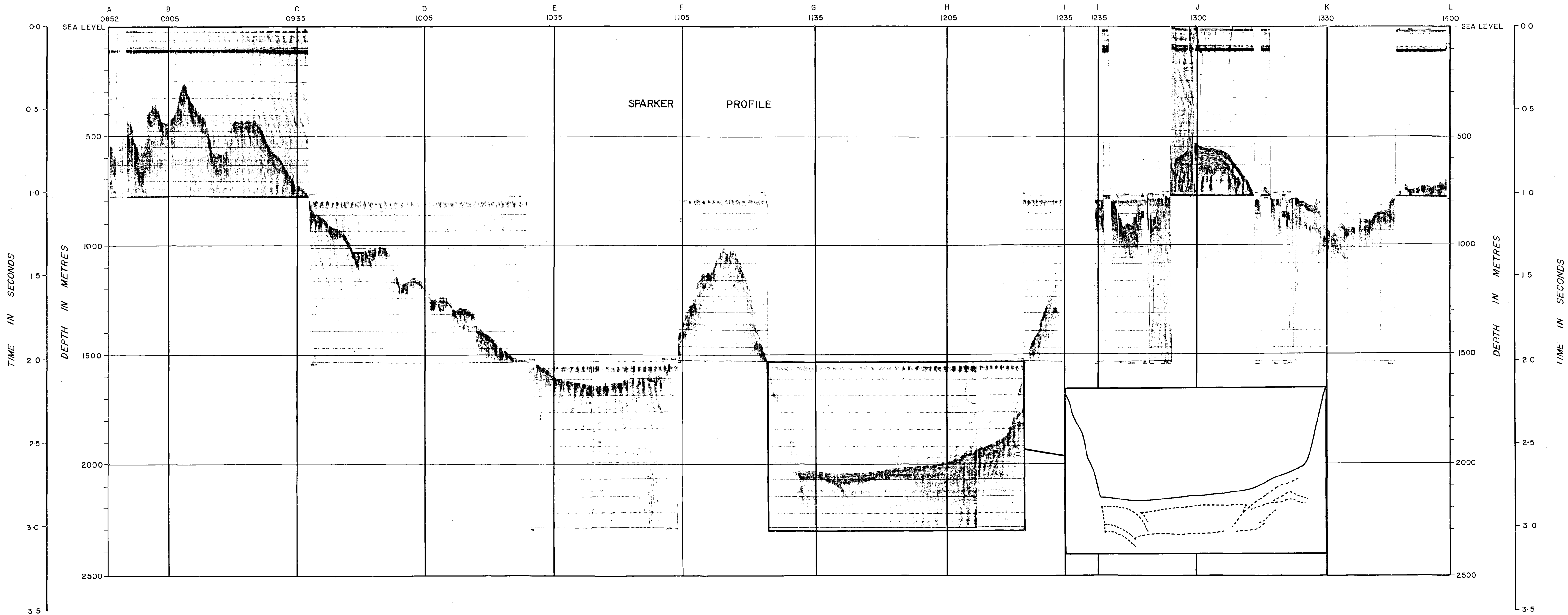
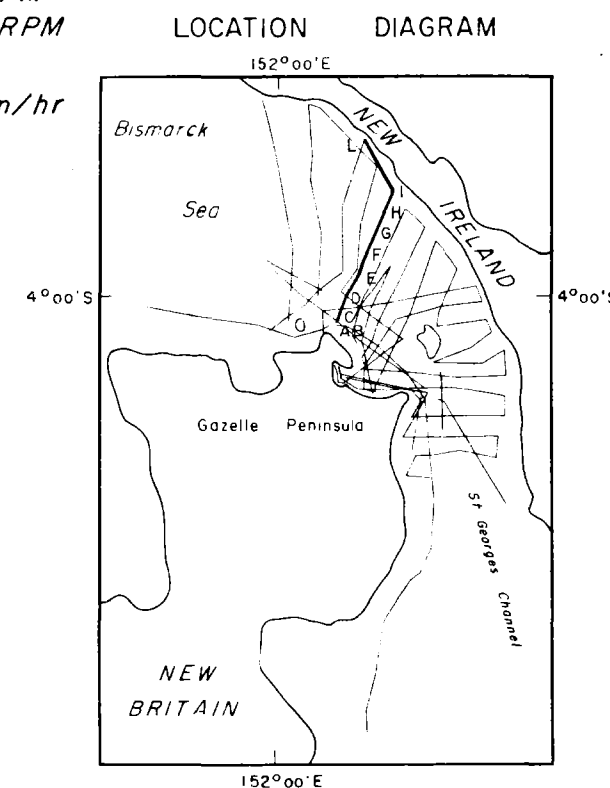
Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 5-6 m
Gain (i) Process amplifier: x100
Gain (ii) Marking amplifier: 9/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



To Accompany Record No 1971/131

Geophysical Branch, Bureau of Mineral Resources,
Geology & Geophysics

NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 8 (1400-2011)

SHIP: M.V. CORAL QUEEN DATE: 10 April 1969

EQUIPMENT

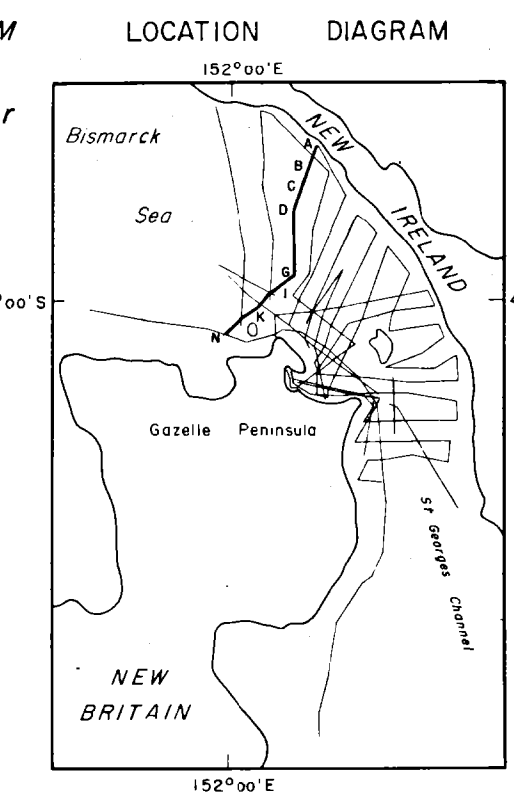
Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

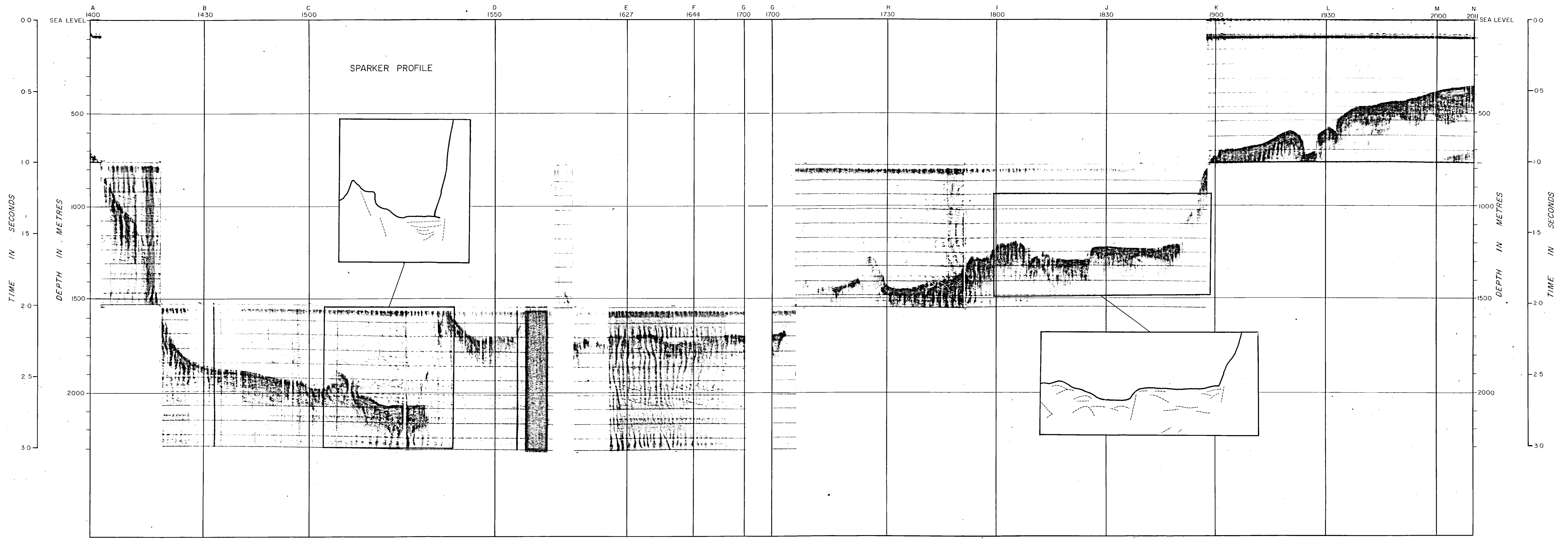
Source power: 7000 watt-sec
Firing interval: Approx 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4m
Gain (i) Process amplifier: x100
(ii) Marking amplifier: 9/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx 55cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



[Based on G449 19A] To Accompany Record No 1971/131



A56/B10-12

NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION
(ONE TO FOUR REDUCTION)
TRAVERSE 9 (0940-1500)

SHIP: *M.V. CORAL QUEEN* DATE: 12 APRIL 1969

EQUIPMENT

Energy Source: *E.G.G. Sparker System*
Transducers: *E.G.G. "Sparkarray" Model 267-Three*
Receiving System: *Geotech Hydrostreamer Cable Model 24257*
Hydrophones: *Geospace MP7*
Recorder: *E.G.G. Model 254*

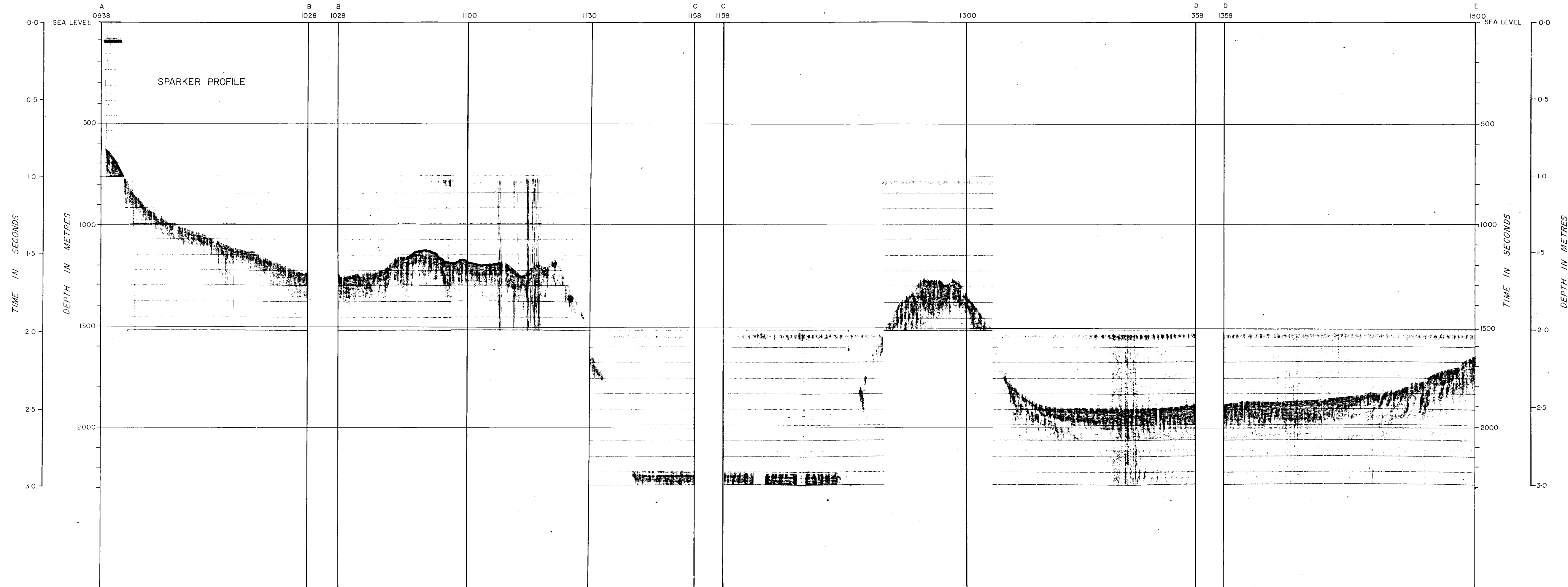
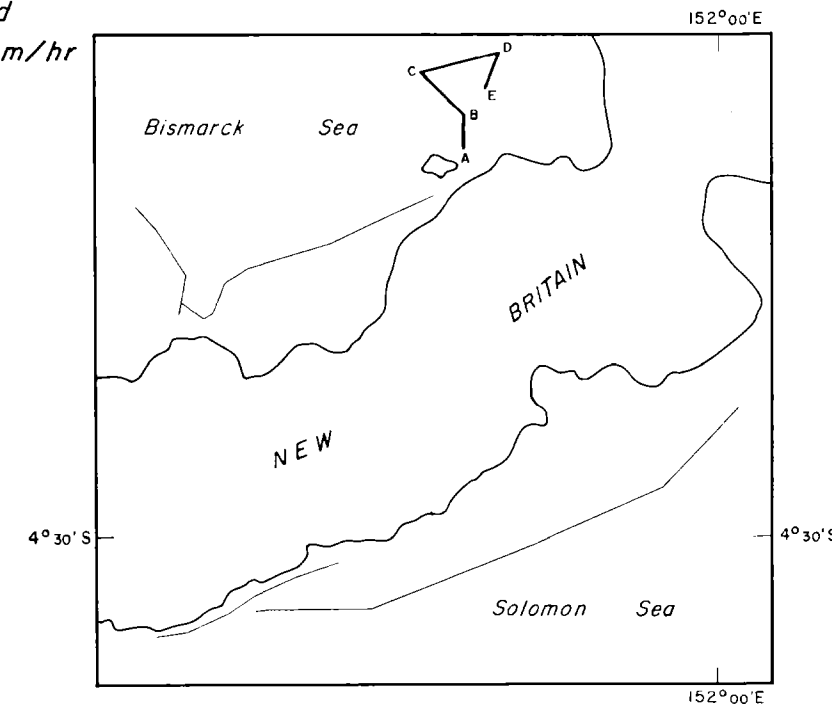
RECORDING INFORMATION

Source Power: *7000 watt-sec*
Firing Interval: *Approx. 4 sec*
Hydrophone Array: *26 MP7 at 1/2 m spacing*
Source - Receiver Distance: *190 m*
Source Depth: *1 1/2 m*
Receiver Depth: *Approx. 3-4 m*
Gain (i) Process Amplifier: *x100*
(ii) Marking Amplifier: *8/0*
Filters: *20-20 kHz*
Print Mode: *Positive*
Paper Speed: *Approx. 55 cm/hr*
Ship Engine Revs: *Approx. 1000 RPM*
Ship Speed through Water: *Not Recorded*
Ship Speed over Bottom: *Approx. 13 km/hr*

HORIZONTAL: VERTICAL SCALE $\approx 9:1$

REMARKS:

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 10 (0000 - 0700)

SHIP: M.V. CORAL QUEEN

DATE: 13 April 1969

EQUIPMENT

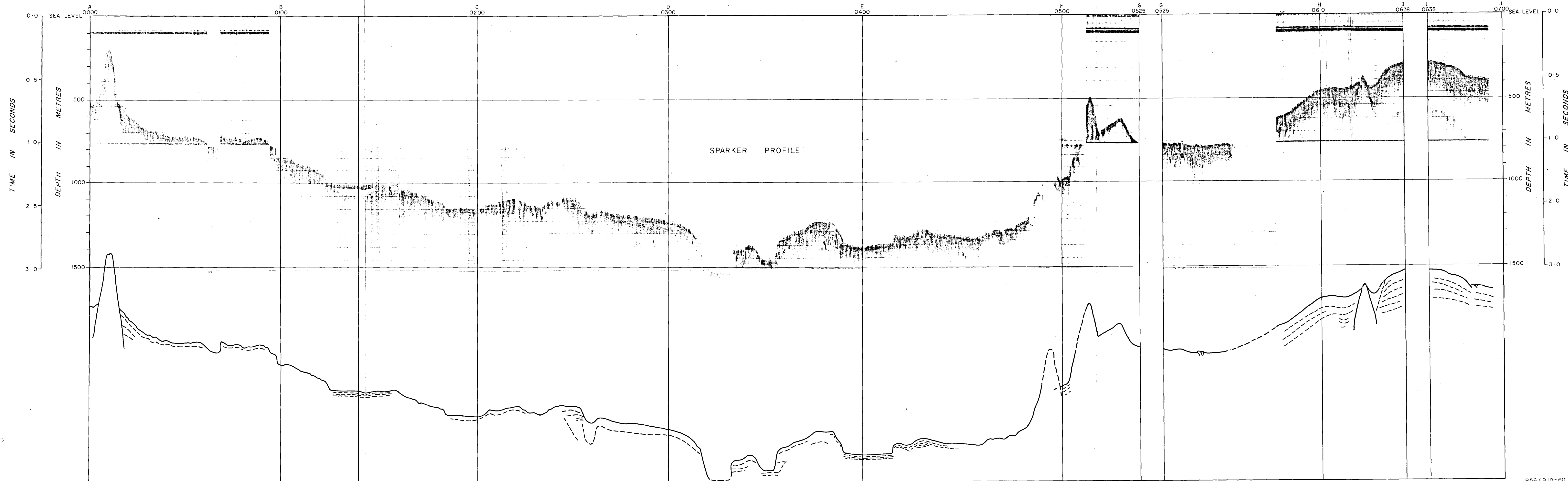
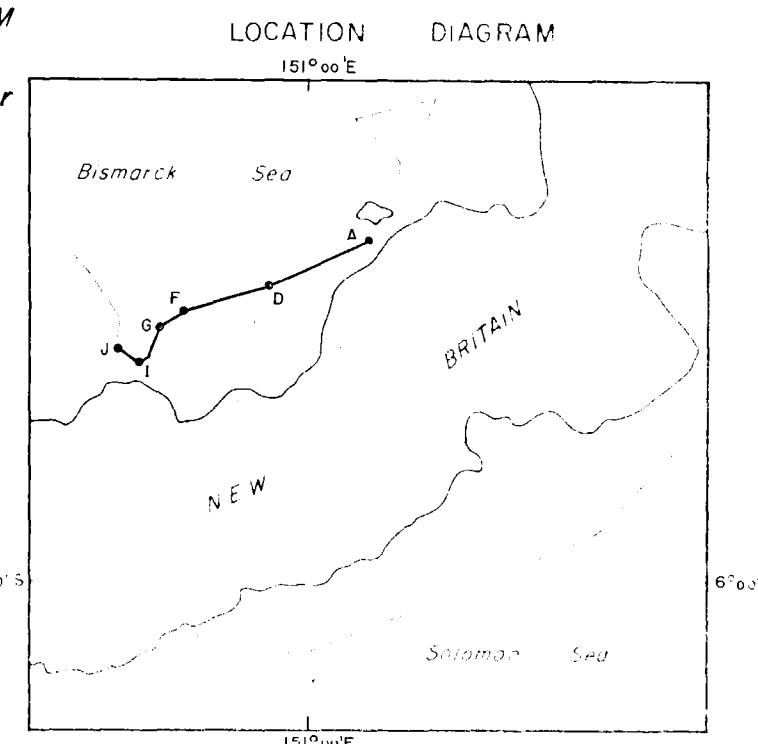
Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190 m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: $\times 100$
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION
(ONE TO FOUR REDUCTION)
TRAVERSE 11 (1107 - 1500)

SHIP: M.V. CORAL QUEEN DATE: 13 April 1969

EQUIPMENT

Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

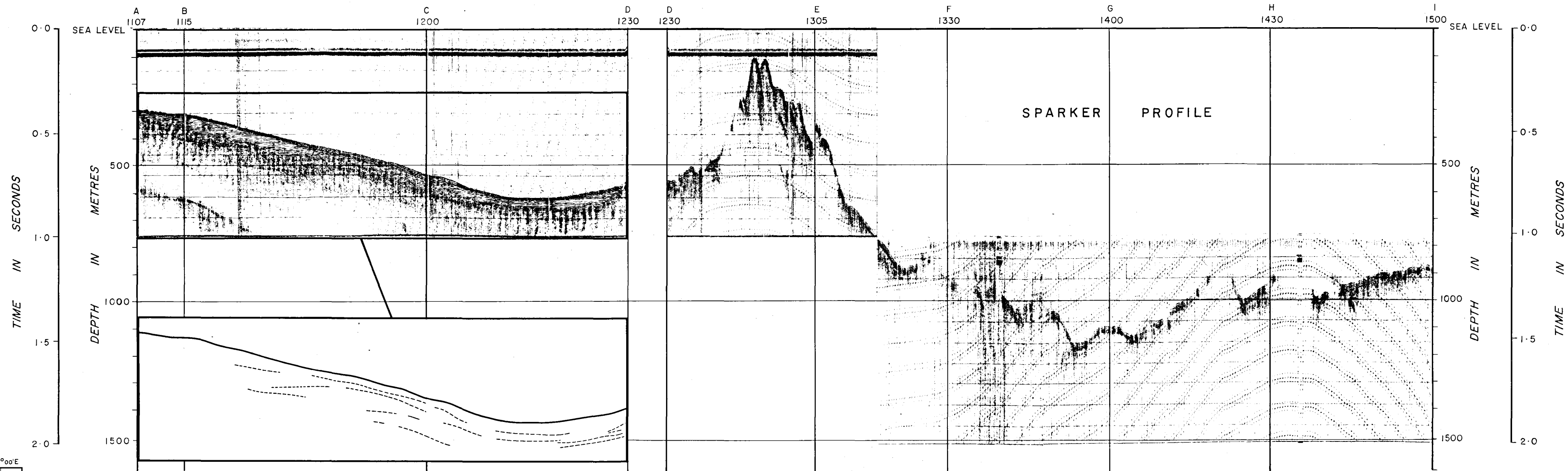
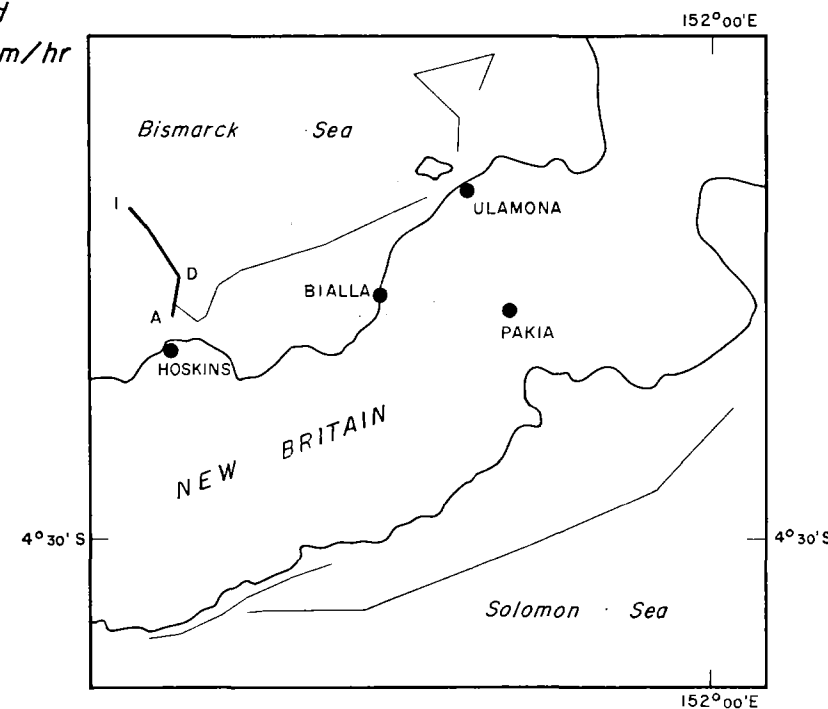
Source power: 7000 watt-sec
Firing interval: Approx 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 4-5 m
Gain (i) Process amplifier: x10
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 m/h
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

HORIZONTAL: VERTICAL SCALE $\approx 9:1$

REMARKS:

Gains frequently adjusted between
1320 and 1445

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 12(2020-0045)

SHIP: M.V. CORAL QUEEN

DATE: 14 April 1969

EQUIPMENT

Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

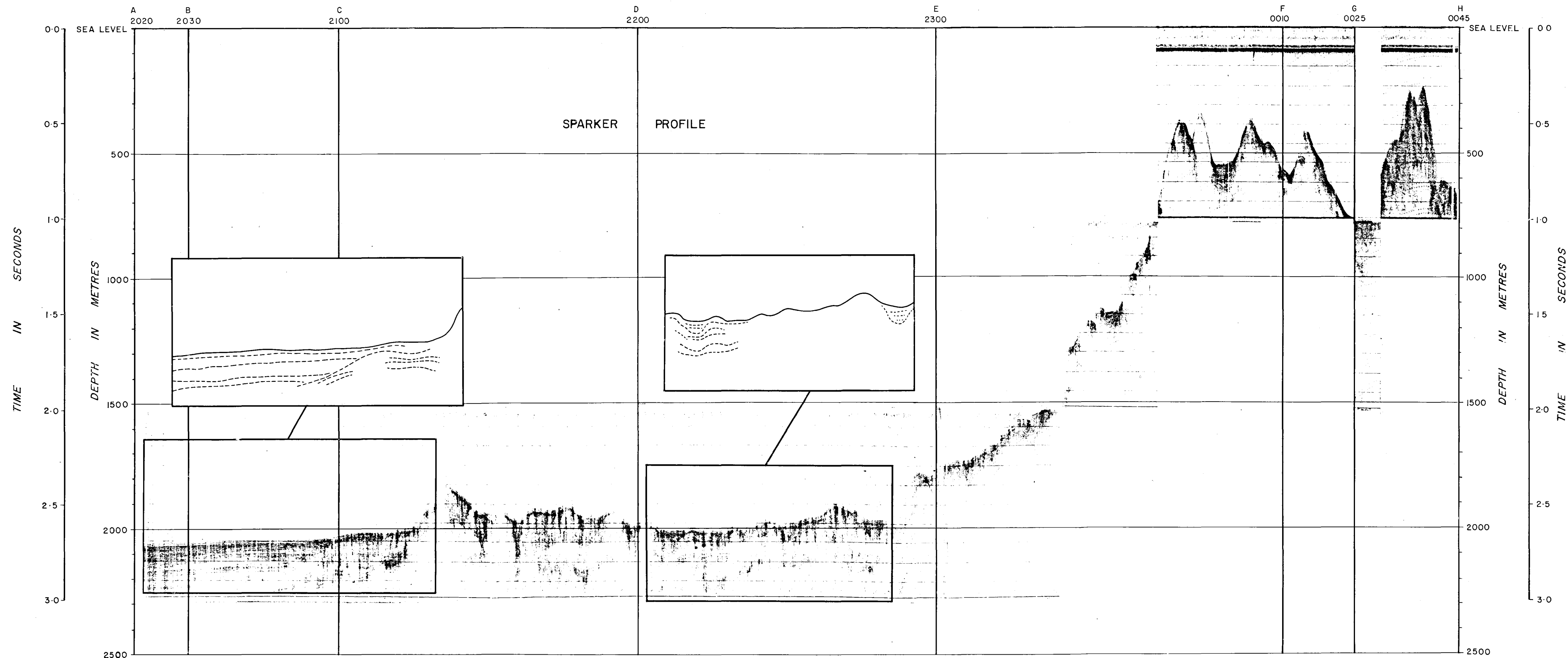
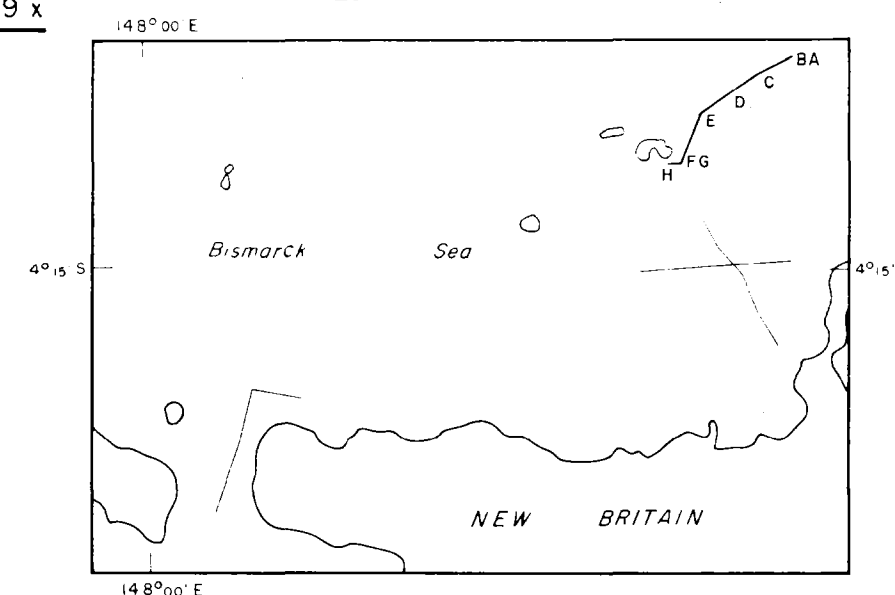
RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: x100
(ii) Marking amplifier: 7/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 13 (0908-1308)

SHIP: M.V. CORAL QUEEN

DATE: 14 April 1969

EQUIPMENT

Energy source: E.G.G. Sparker System

Transducers: E.G.G. "Sparkarray" Model 267 - Three

Receiving system: Geotech Hydrostreamer Cable model 24257

Hydrophones: Geospace MP7

Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec

Firing interval: Approx. 4sec

Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing

Source - receiver distance: 190m

Source depth: $1\frac{1}{2}$ m

Receiver depth: Approx. 3-4m

Gain (i) Process amplifier: x100

Gain (ii) Marking amplifier: 9/0

Filters: 20-20 kHz

Print mode: Positive

Paper speed: Approx. 55cm/hr

Ship Engine revs: Approx. 1000 RPM

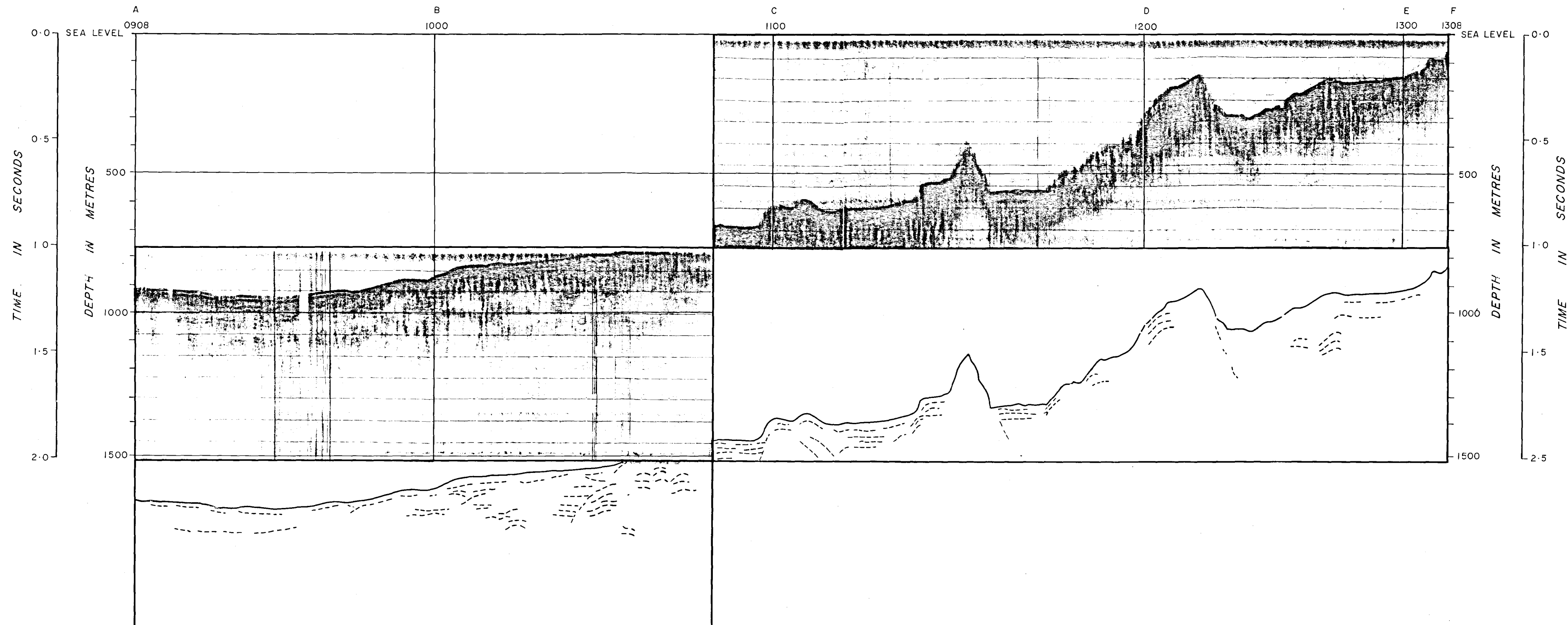
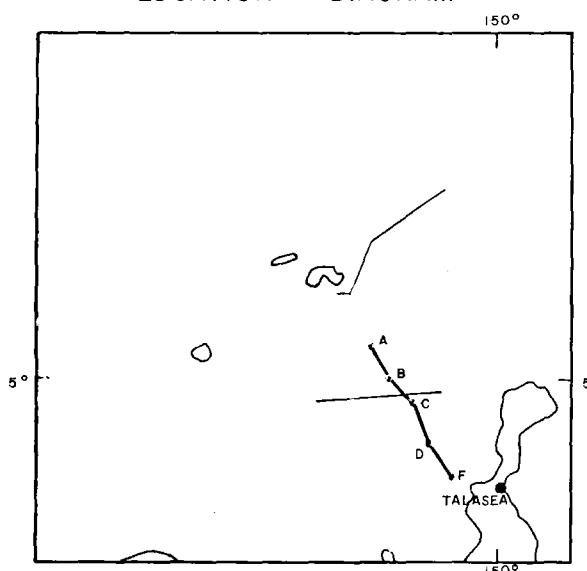
Ship speed through water: Not recorded

Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 14 (2042-0020)

SHIP: M.V. CORAL QUEEN

DATE: 15 April 1969

EQUIPMENT

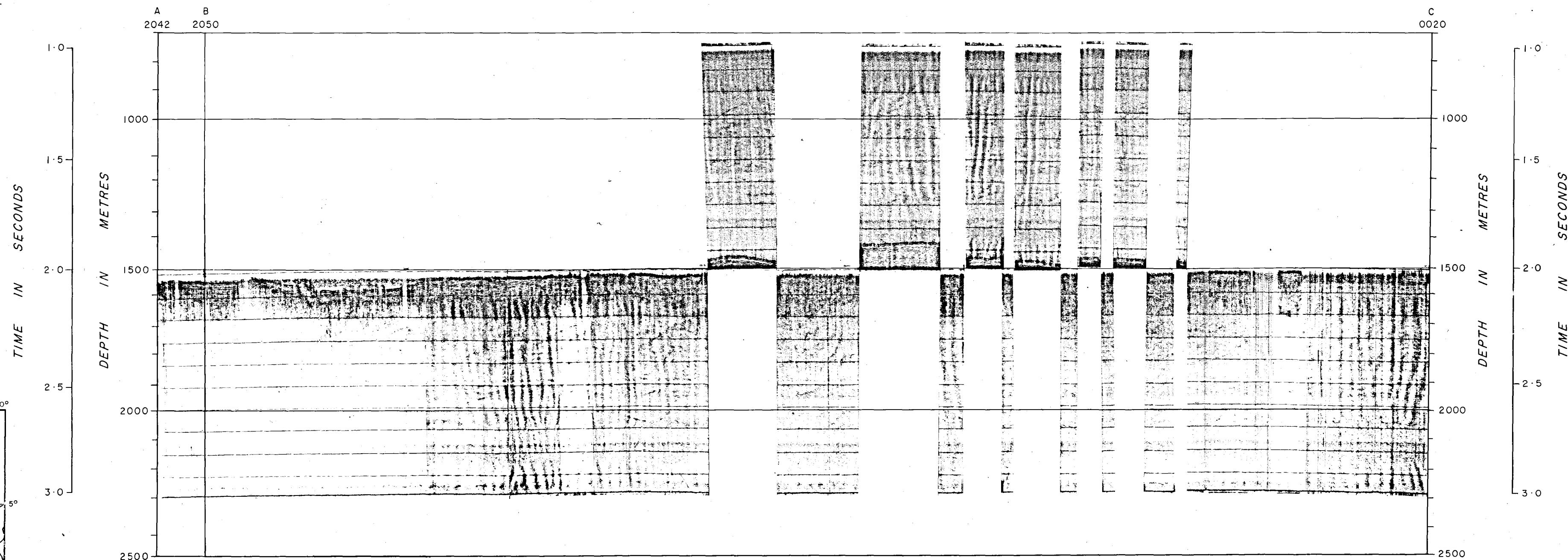
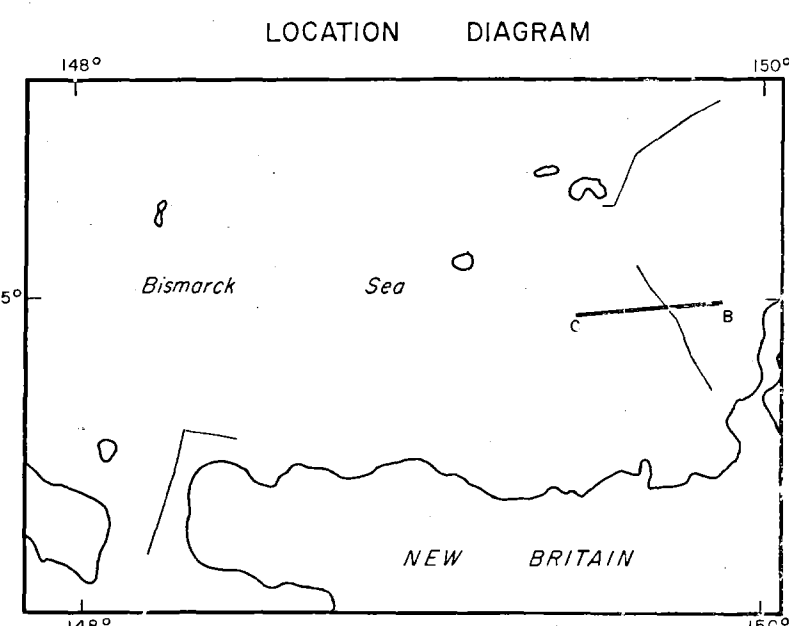
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: X100
Gain (ii) Marking amplifier: X10/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 15(0948-1500)

SHIP: M.V. CORAL QUEEN

DATE: 16 April 1969

EQUIPMENT

Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

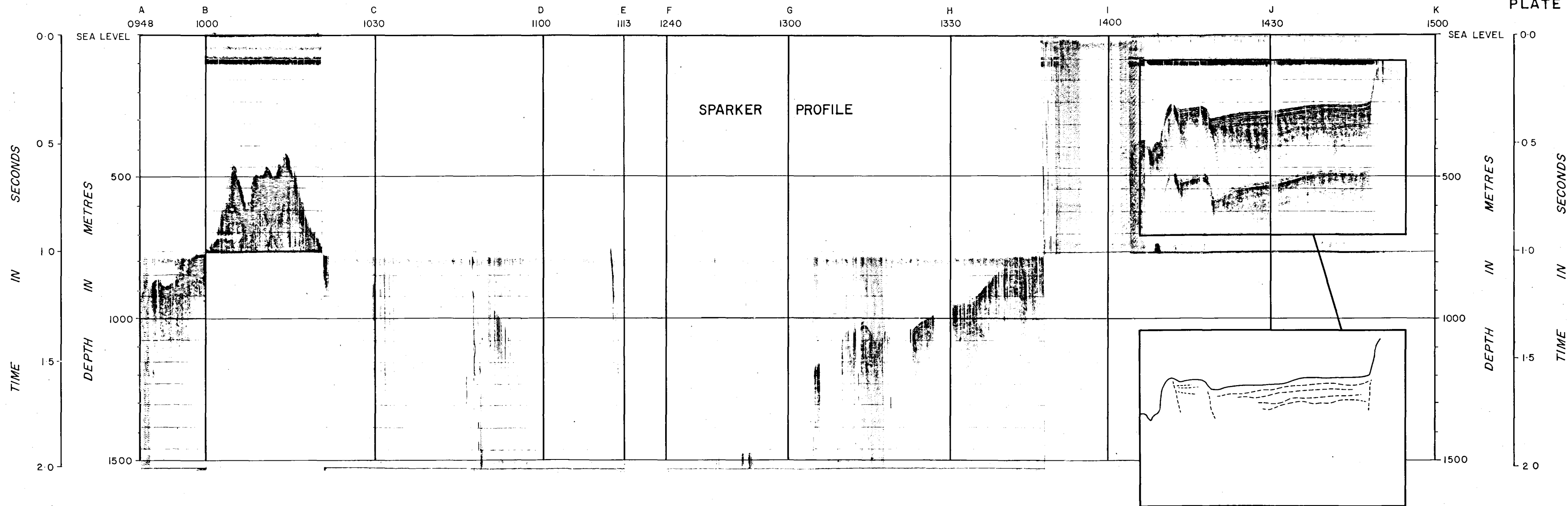
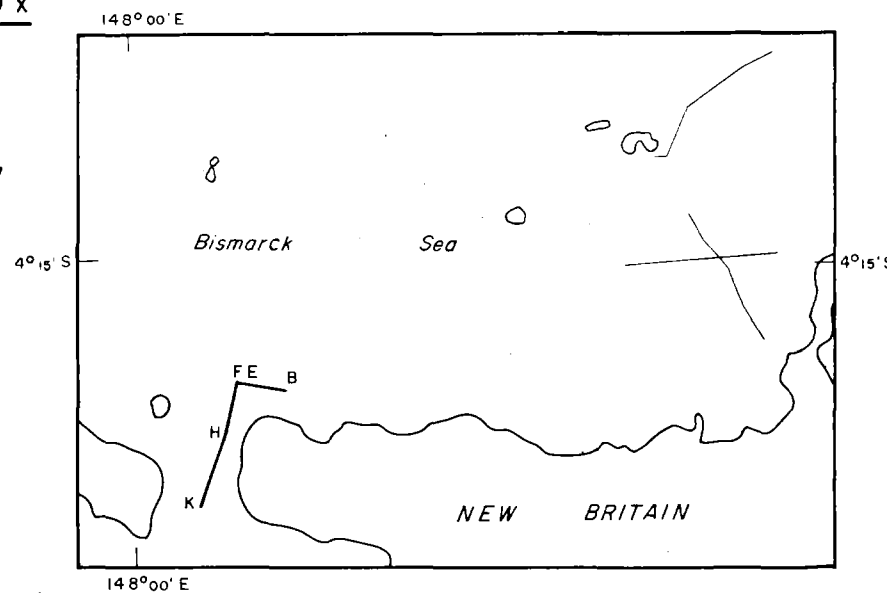
RECORDING INFORMATION

Source power: 7000 watt - sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: x 100
(ii) Marking amplifier: 10/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

LOCATION DIAGRAM

REMARKS: Unreliable triggering of
"Sparkarray" from 1020
to 1400. Repairs carried
out.



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 16 (0920-1430)

SHIP: *M.V. CORAL QUEEN*

DATE: 20 April 1969

EQUIPMENT

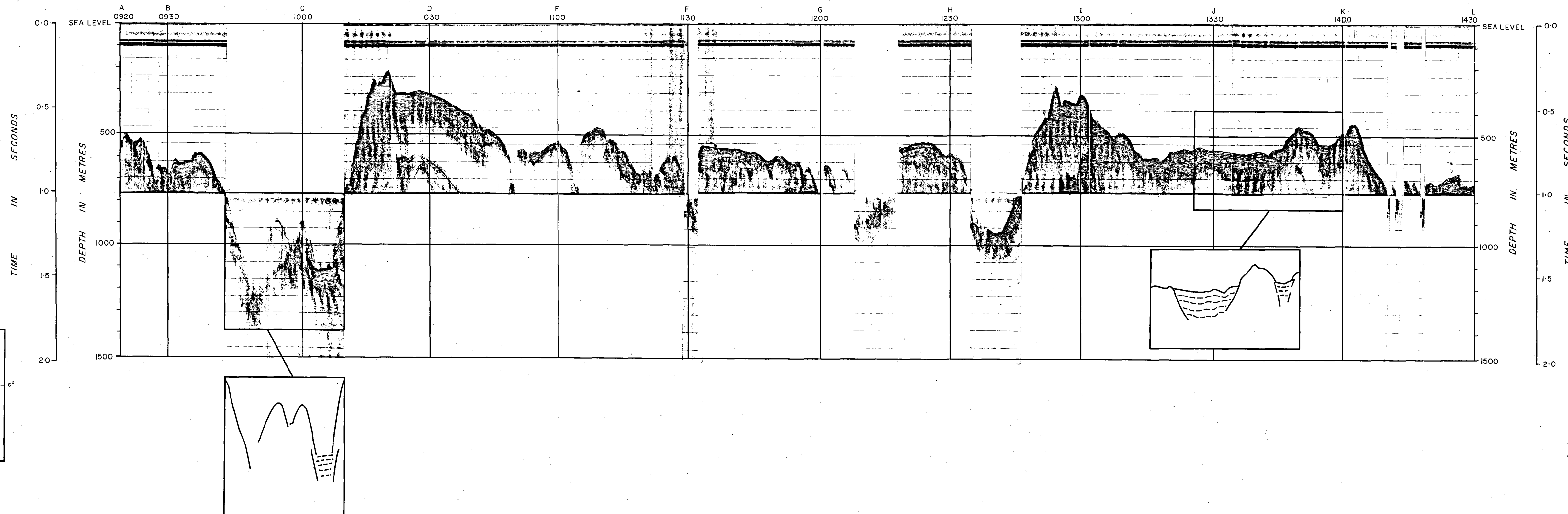
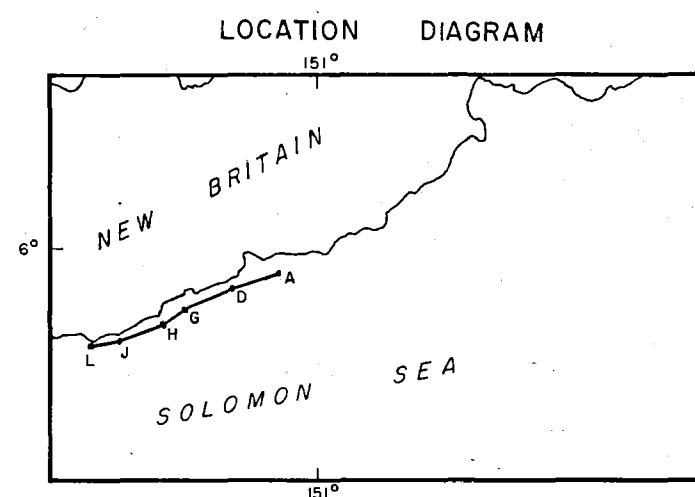
Energy source: *E.G.G. Sparker System*
Transducers: *E.G.G. "Sparkarray" Model 267-Three*
Receiving system: *Geotech Hydrostreamer Cable model 24257*
Hydrophones: *Geospace MP7*
Recorder: *E.G.G. Model 254*

RECORDING INFORMATION

Source power: *7000 watt-sec*
Firing interval: *Approx. 4 sec*
Hydrophone array: *26 MP7 at 1/2 m spacing*
Source - receiver distance: *190 m*
Source depth: *1 1/2 m*
Receiver depth: *Approx. 3-4 m*
Gain (i) Process amplifier: *x 100*
Gain (ii) Marking amplifier: *9/0*
Filters: *20-20 kHz*
Print mode: *Positive*
Paper speed: *Approx. 55 cm/hr*
Ship Engine revs: *Approx. 1000 RPM*
Ship speed through water: *Not recorded*
Ship speed over bottom: *Approx 13 km/hr*

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



Geophysical Branch, Bureau of Mineral Resources,
Geology & Geophysics

NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

TRVERSE 17 (0708-2015)

SHIP: M.V. CORAL QUEEN DATE: 21 April 1969

EQUIPMENT

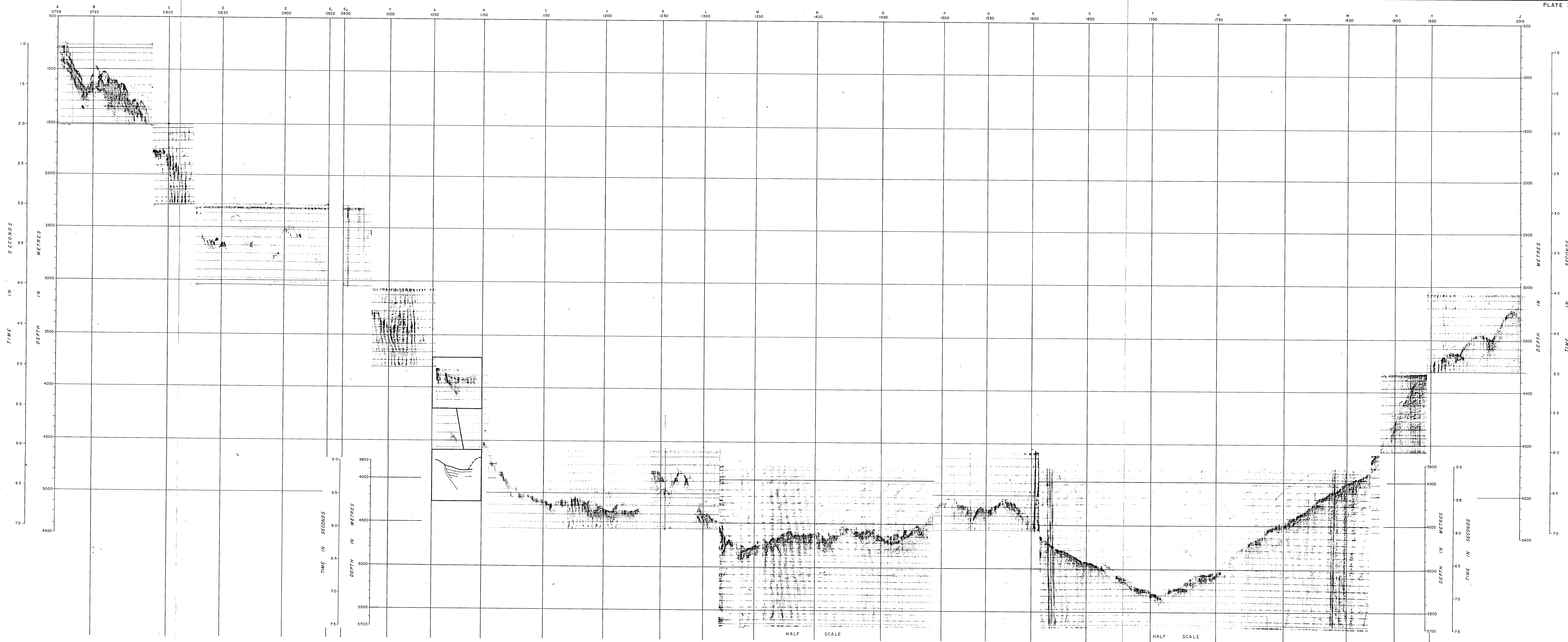
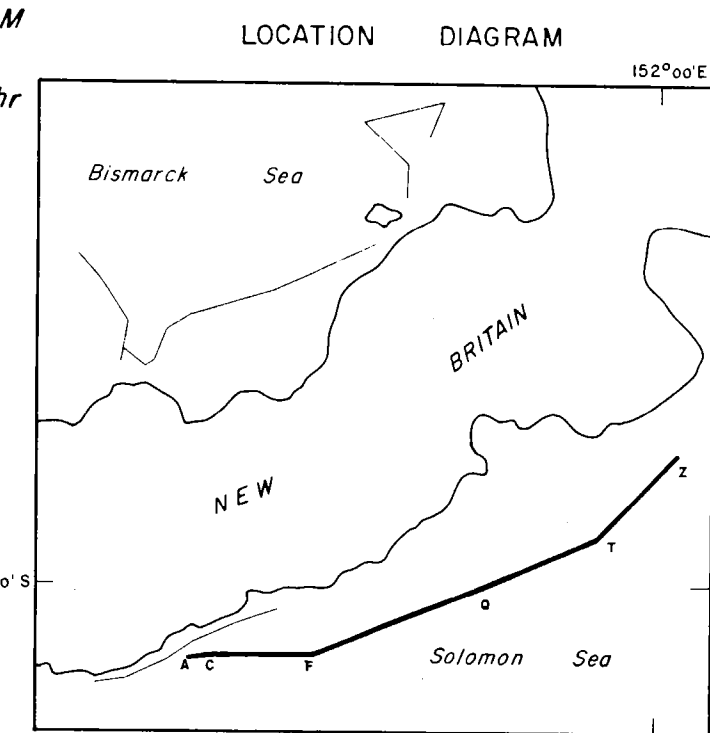
Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267-Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec 14000 watt-sec
Firing interval: Approx. 7 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source-receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain: (i) Process amplifier: x 100
(ii) Marking amplifier: 9.0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION
(ONE TO FOUR REDUCTION)
TRAVERSE 18 (1218-1800)

SHIP: *M.V. CORAL QUEEN* DATE: *25 April 1969*

EQUIPMENT

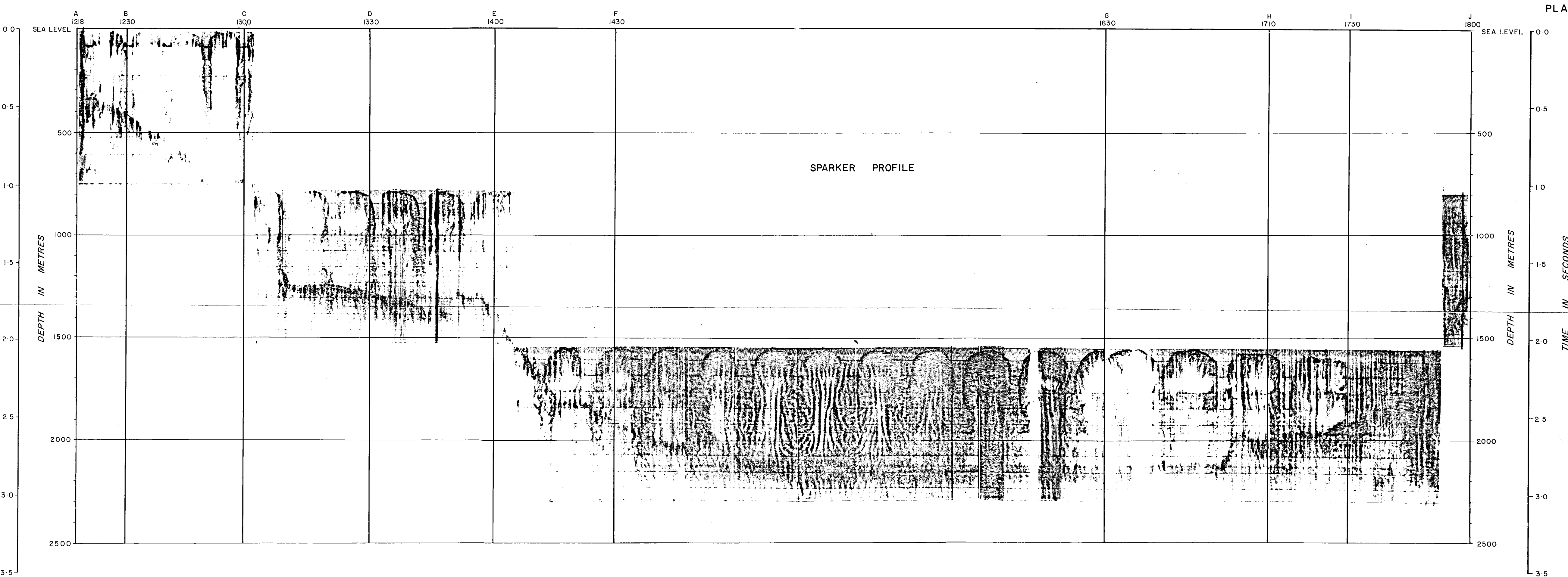
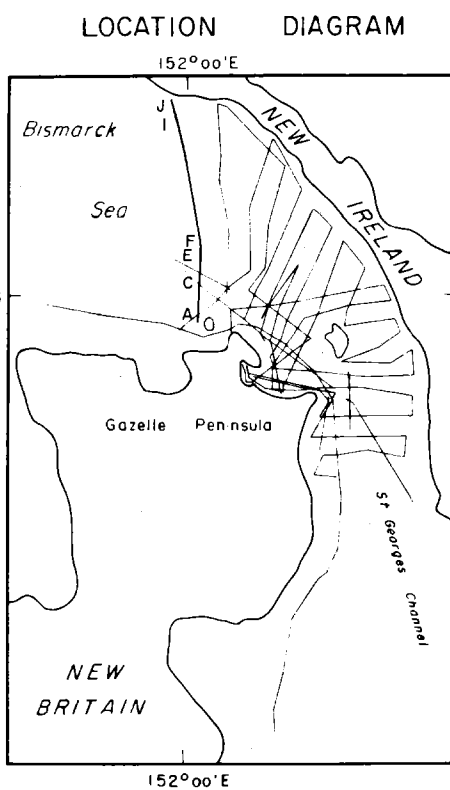
Energy source: *EGG Sparker System*
Transducers: *EGG "Sparkarray" Model 267 - Three*
Receiving system: *Geotech Hydrostreamer Cable model 24257*
Hydrophones: *Geospace MP7*
Recorder: *EGG Model 254*

RECORDING INFORMATION

Source power: *7000 watt-sec*
Firing interval: *Approx. 4 sec*
Hydrophone array: *26 MP7 at 1/2 m spacing*
Source - receiver distance: *190 m*
Source depth: *1 1/2 m*
Receiver depth: *Approx. 3-4 m*
Gain (i) Process amplifier: *X100*
Gain (ii) Marking amplifier: *5/0*
Filters: *20-20 kHz*
Print mode: *Positive*
Paper speed: *Approx. 55 cm/hr*
Ship Engine revs: *Approx. 1000 RPM*
Ship speed through water: *Not recorded*
Ship speed over bottom: *Approx 13 km/hr*

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS: *Record damaged by water*



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 19 (1725-1853)

SHIP: M.V. CORAL QUEEN

DATE: 28 April 1969

EQUIPMENT

Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

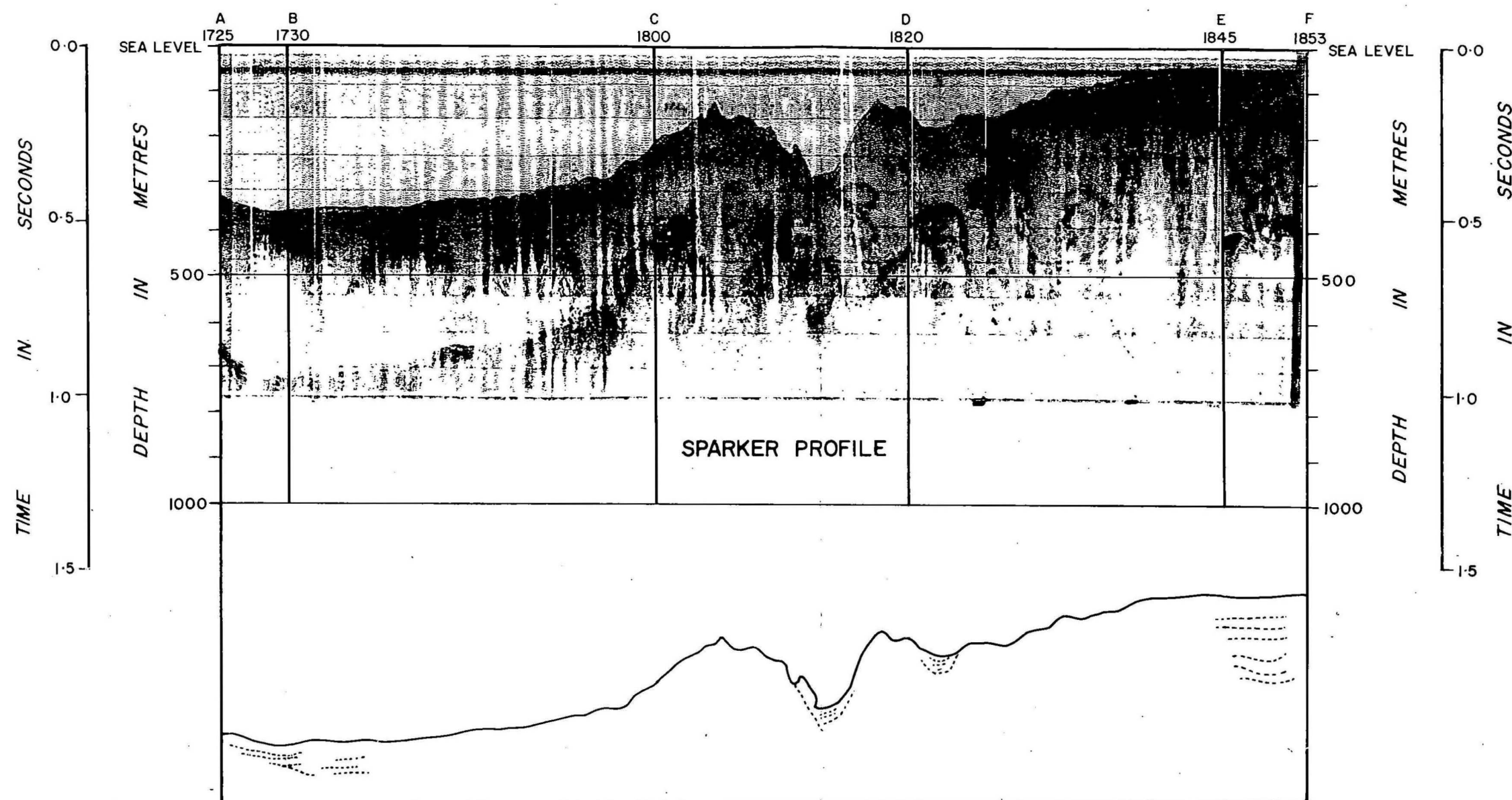
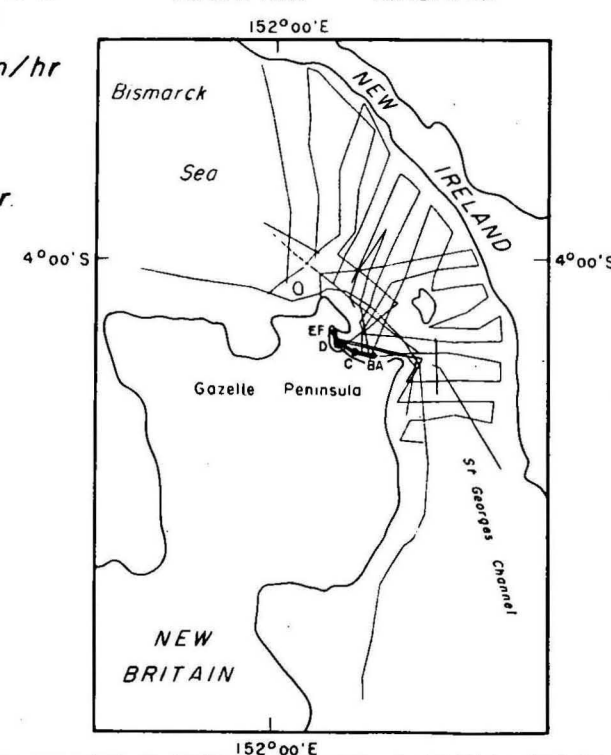
RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190 m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: $\times 100$
Gain (ii) Marking amplifier: 6/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS: Record damaged by water.

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 21 (1108 - 1450)

SHIP: M.V. CORAL QUEEN

DATE: 9 May 1969

EQUIPMENT

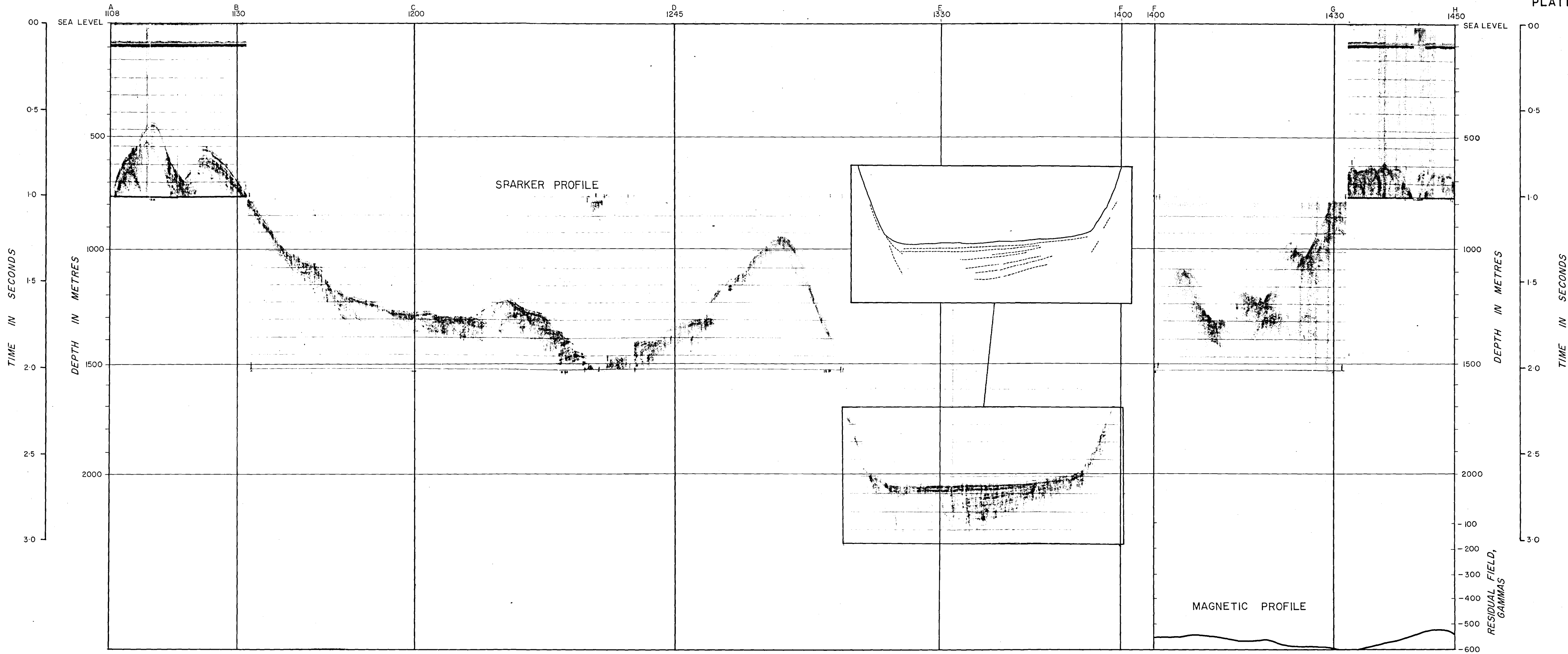
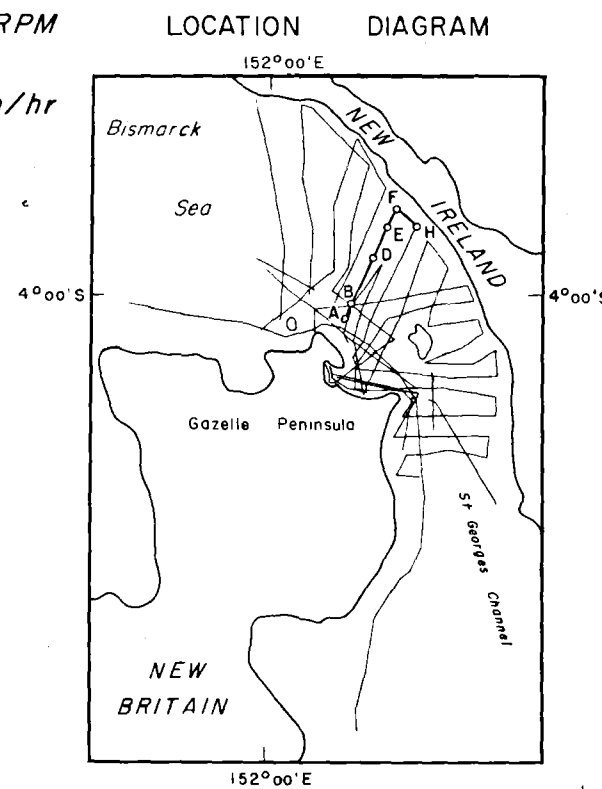
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190 m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 5-6 m
Gain (i) Process amplifier: $\times 10$
(ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 21 (1450-1935)

SHIP: M.V. CORAL QUEEN

DATE: 9 May 1969

EQUIPMENT

Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

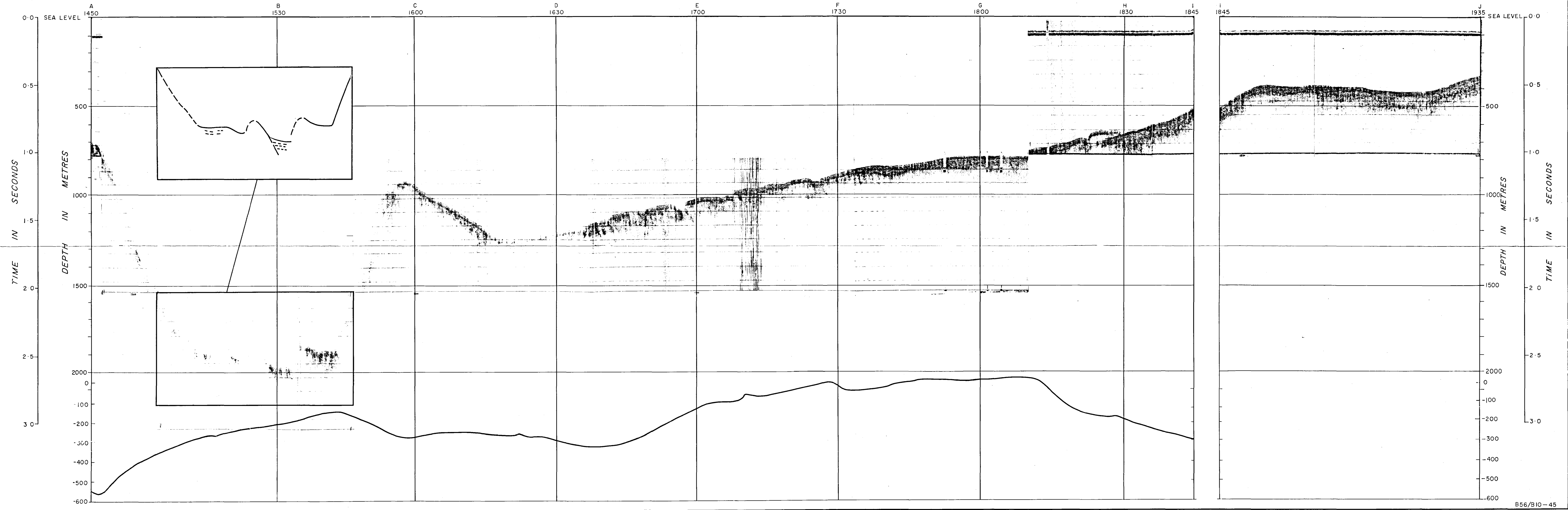
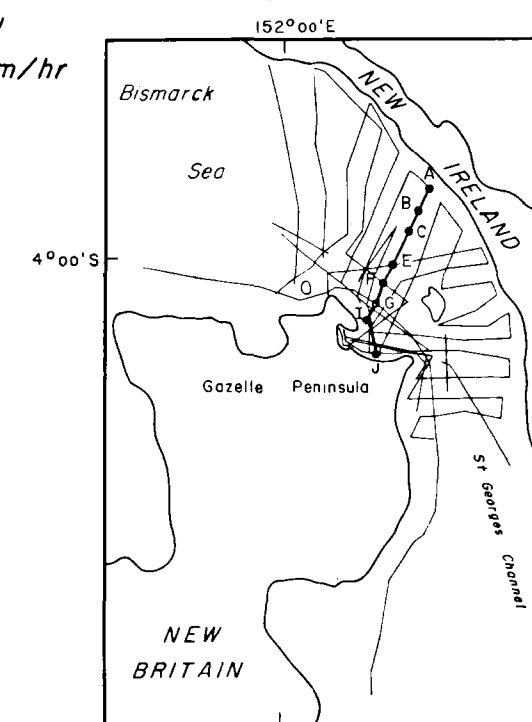
RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 5-6 m
Gain (i) Process amplifier: x 10
(ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 22 (0655-1200)

SHIP: M.V. CORAL QUEEN

DATE: 10 May 1969

EQUIPMENT

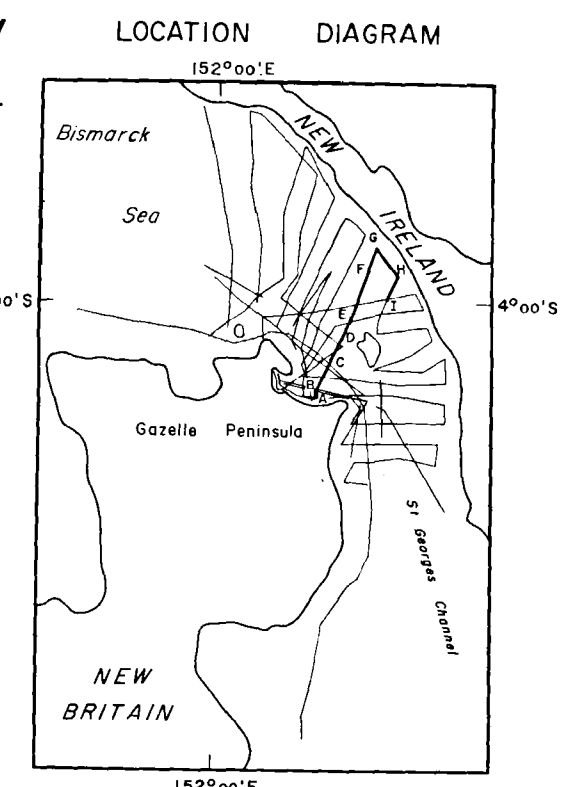
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

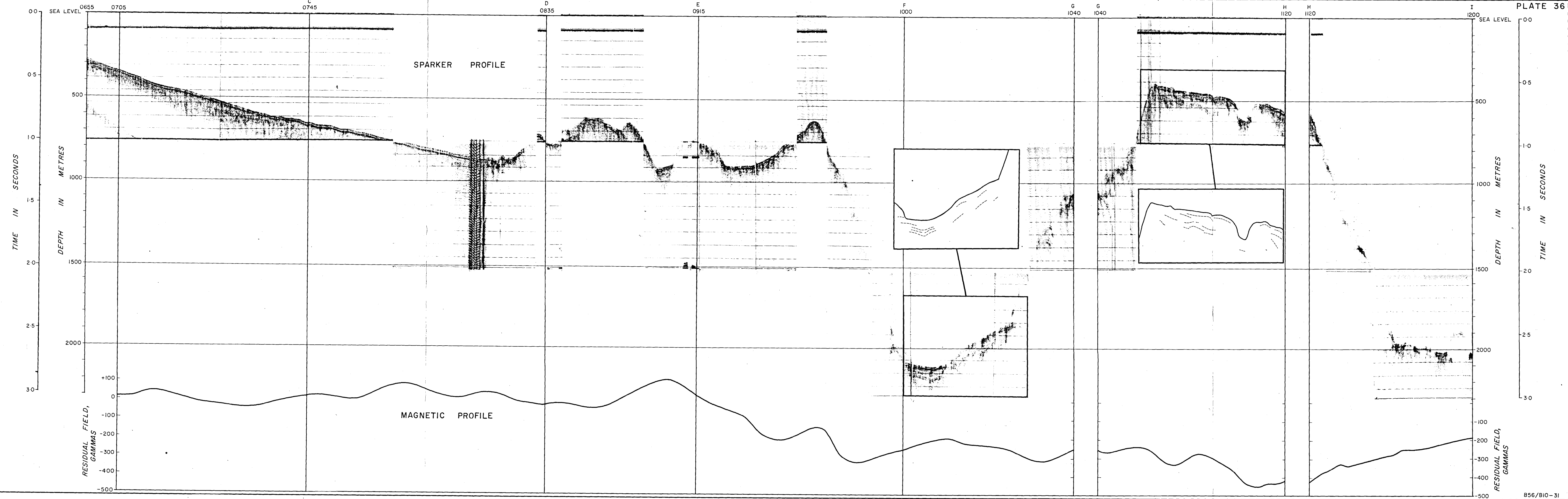
Source power: 7000 watt-sec (5000 watt-sec 0958-1022)
Firing interval: Approx 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: x 10
(ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9x$

REMARKS:



(Based on G449-19A) To accompany Record No 1971/131



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 22 (1200 - 1810)

SHIP: M.V. CORAL QUEEN

DATE: 10 May 1969

EQUIPMENT

Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

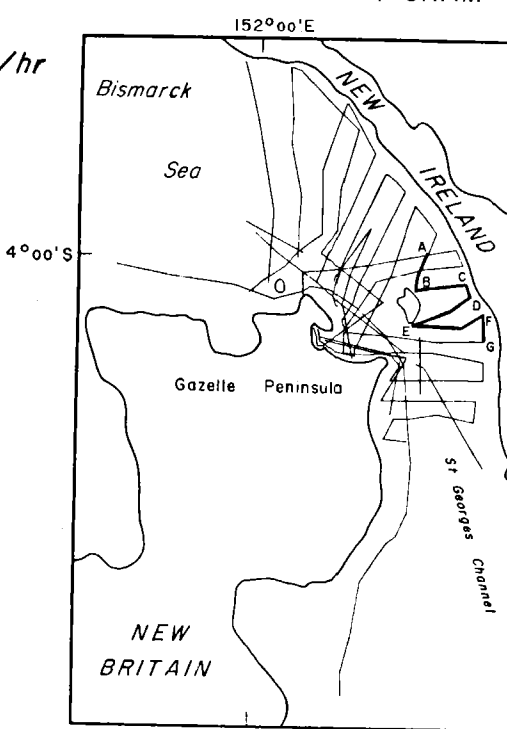
RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 3-4m
Gain (i) Process amplifier: x10
(ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55cm/hr.
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

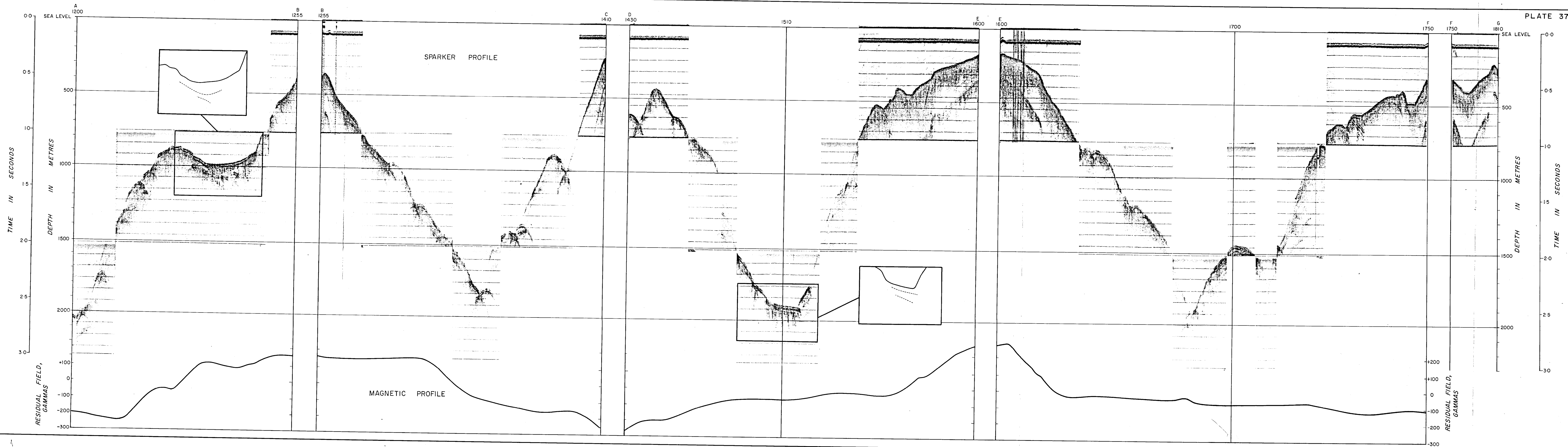
VERTICAL SCALE EXAGGERATION $\approx 9\times$

REMARKS:

LOCATION DIAGRAM



(Based on G449 19A) To accompany Record No 1971/13



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 23 (0650-1032)

SHIP: M.V. CORAL QUEEN

DATE: 11 May 1969

EQUIPMENT

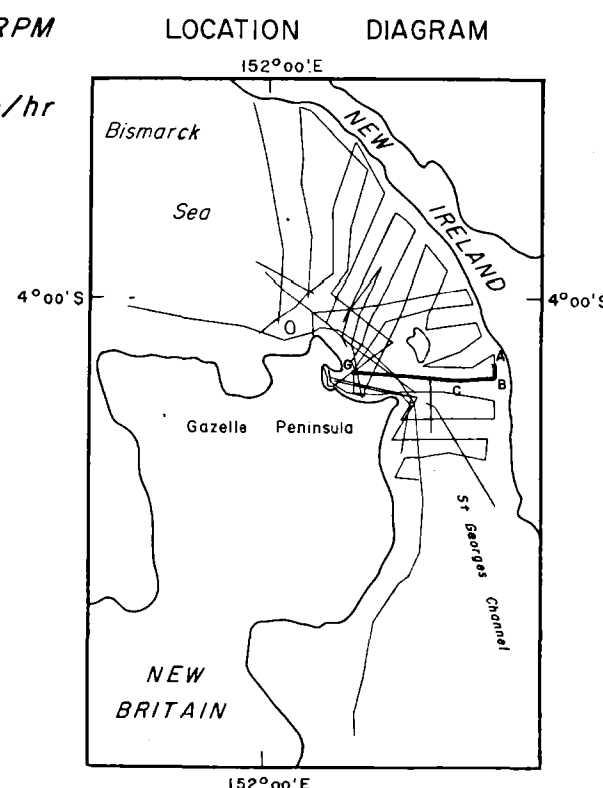
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

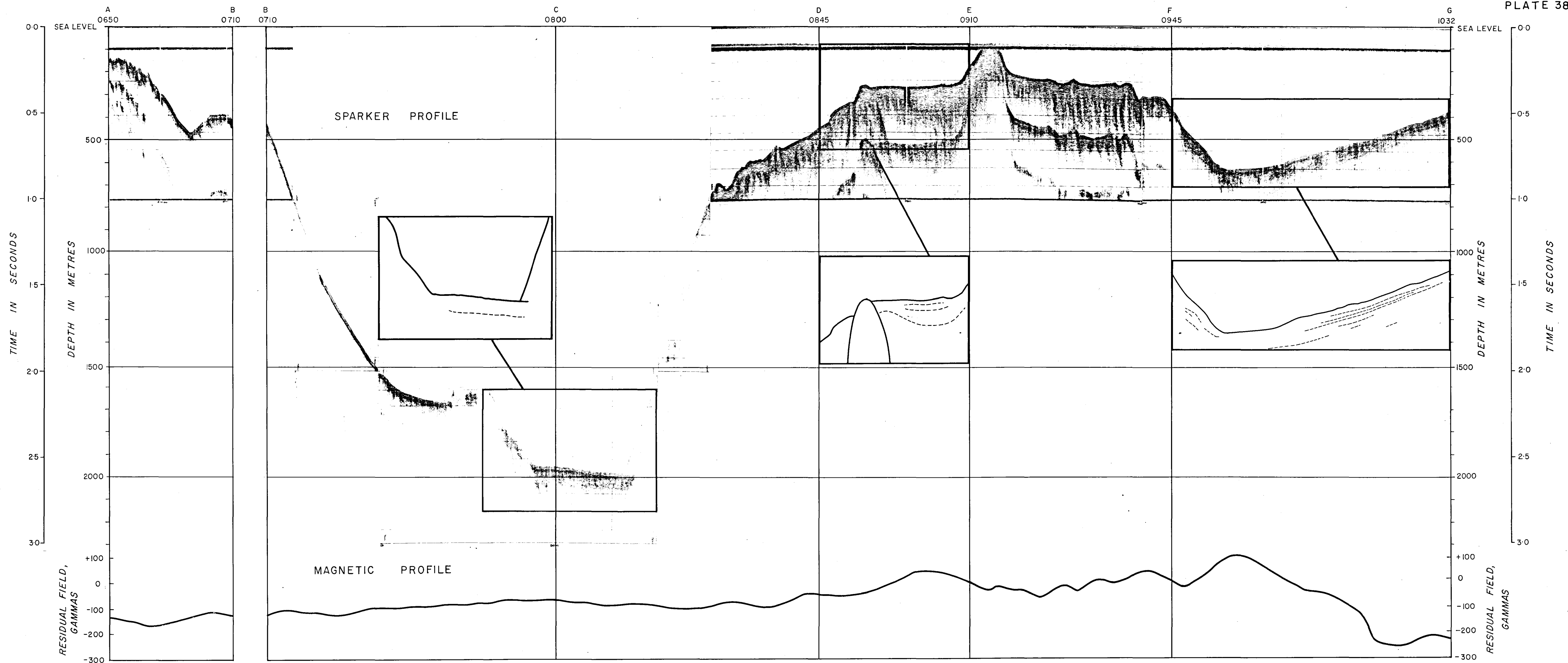
Source power: 7000 watt-sec 5000 watt-sec (0958-1022)
Firing interval: Approx. 4sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 3-4m
Gain (i) process amplifier: x10
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print code: Positive
Paper speed: Approx. 55 cm/hr
Ship engine revs: Approx. 1000 RPM
Ship speed through Water: Not recorded
Ship speed over Bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



(Based on G449-19A) To accompany Record No 1971/131



B56/B10-30

Geophysical Branch, Bureau of Mineral Resources,
Geology & Geophysics

NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 23 (1032-1505)

SHIP: M.V. CORAL QUEEN

DATE: 11 May 1969

EQUIPMENT

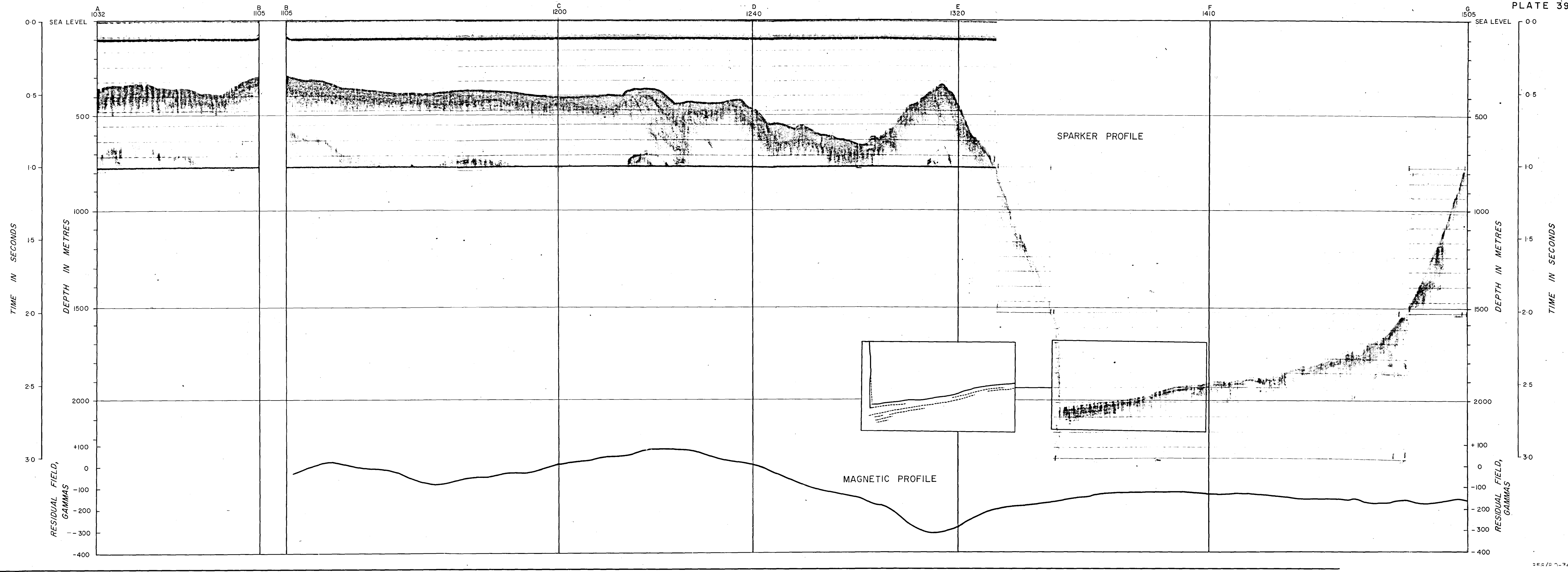
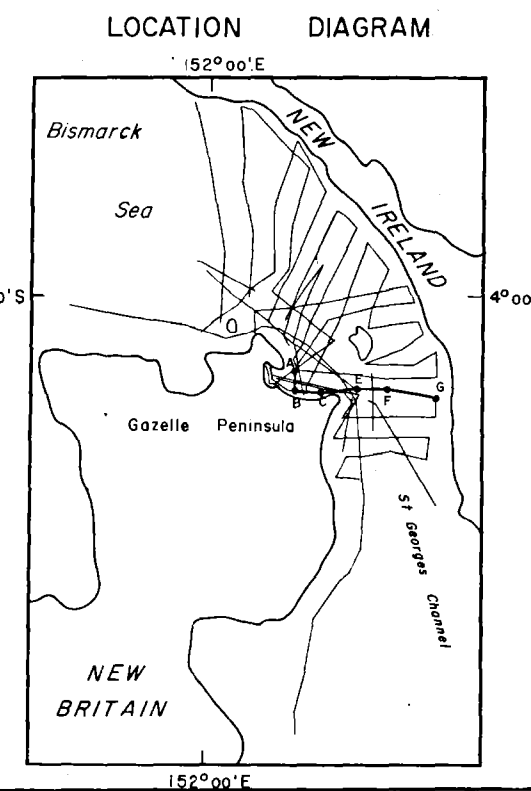
Energy Source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving System: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190 m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: $\times 10$
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship engine Revs: Approx. 1000 RPM
Ship speed through water: Not Recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9\times$

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 23 (1505-1820)

SHIP: M.V. CORAL QUEEN

DATE: 11 May 1969

EQUIPMENT

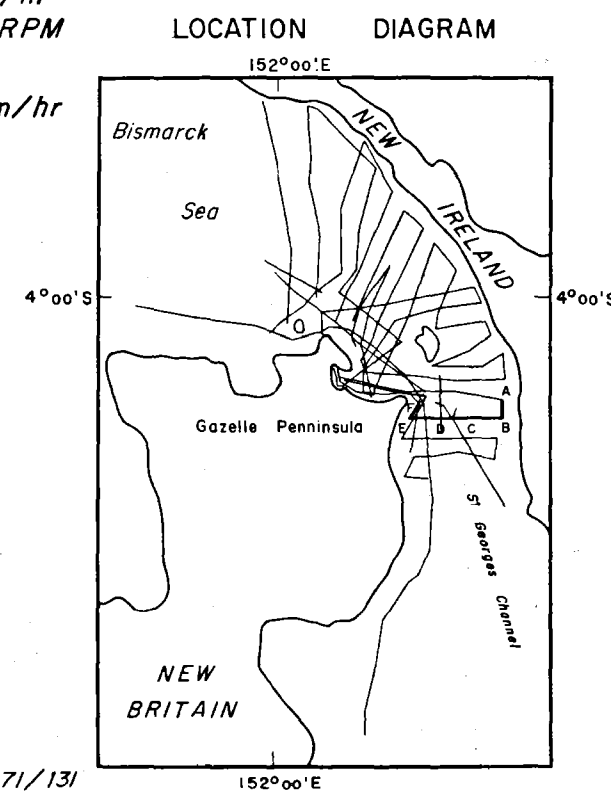
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

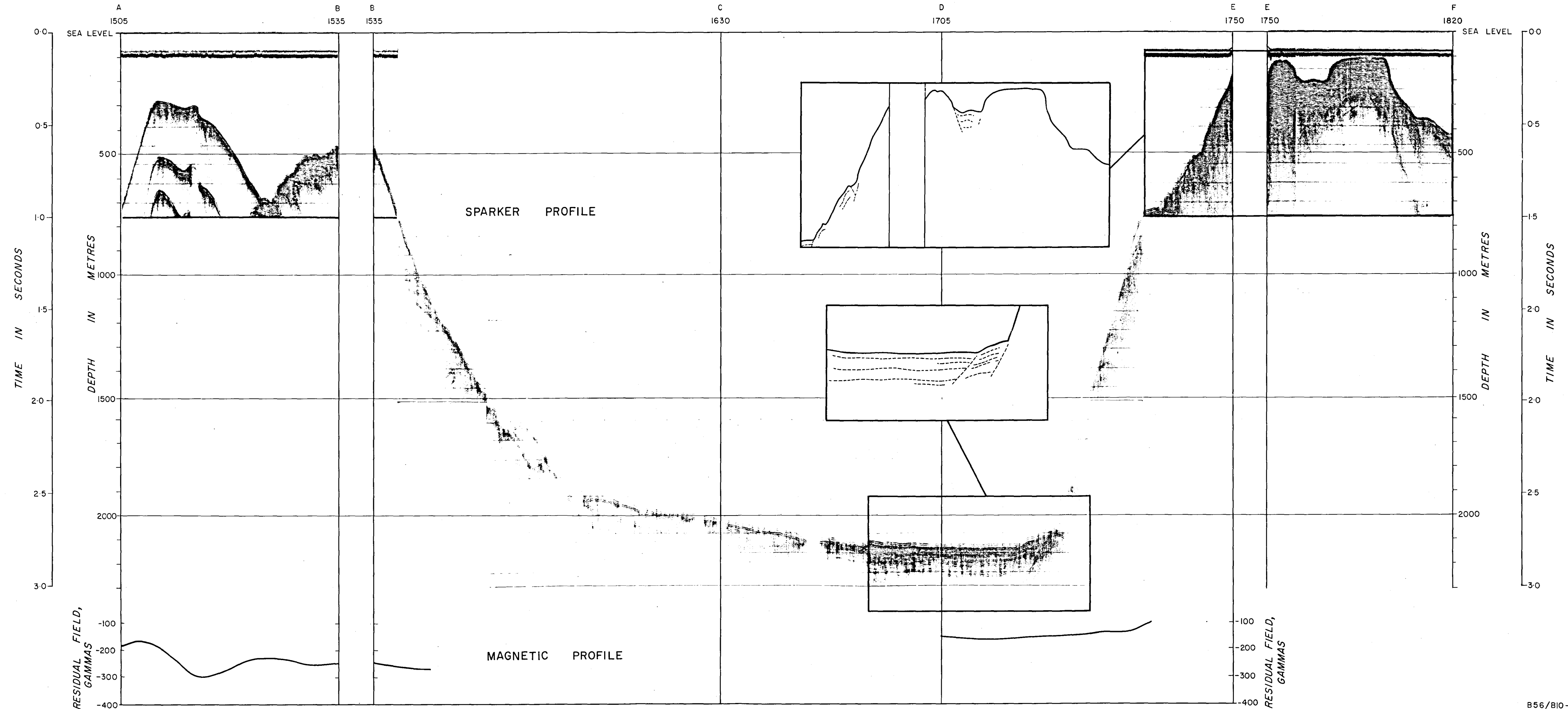
Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 7-8m
Gain (i) Process amplifier: $\times 10$ $\times 100$ } at 1648 $\times 10$ } at 1237
(ii) Marking amplifier: 8/0 $\times 6/0$ } $\times 8/0$ }
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55cm/hr
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9\times$

REMARKS:



(Based on G449-19A) To accompany Record No. 1971/131



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 24 (0902-1243)

SHIP: M.V. CORAL QUEEN

DATE: 12 May 1969

EQUIPMENT

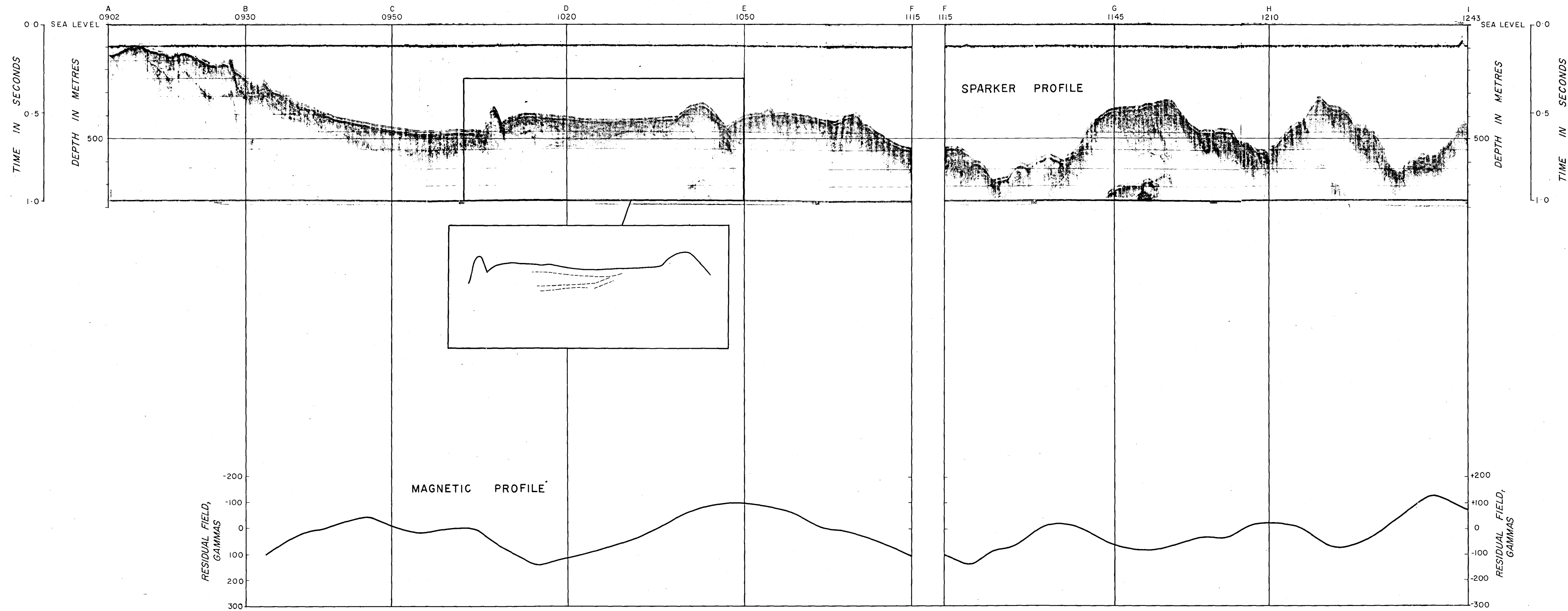
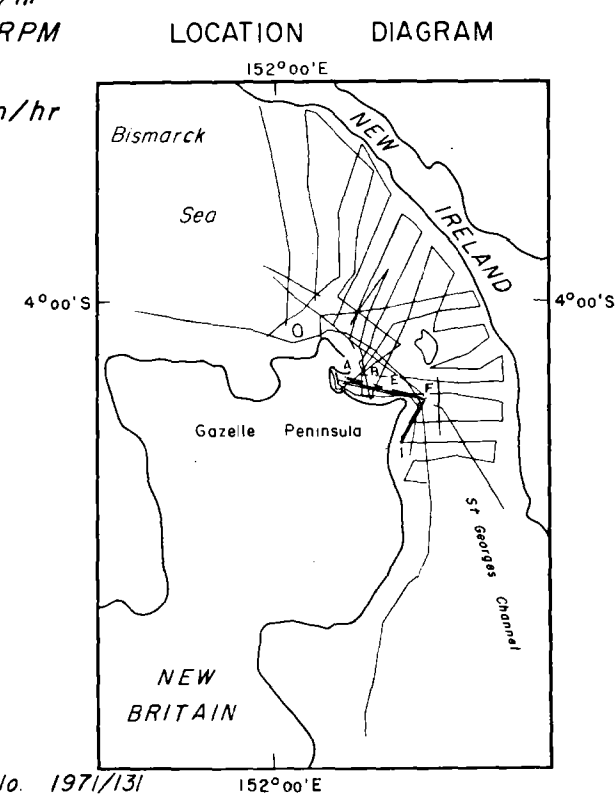
Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at $\frac{1}{2}$ m spacing
Source - receiver distance: 190 m
Source depth: $1\frac{1}{2}$ m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: $\times 10$
(ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 8 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS: Heavy choppy sea.



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)
TRAVERSE 24 (1243-1823)

SHIP: M.V. CORAL QUEEN

DATE: 12 May 1969

EQUIPMENT

Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267-Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

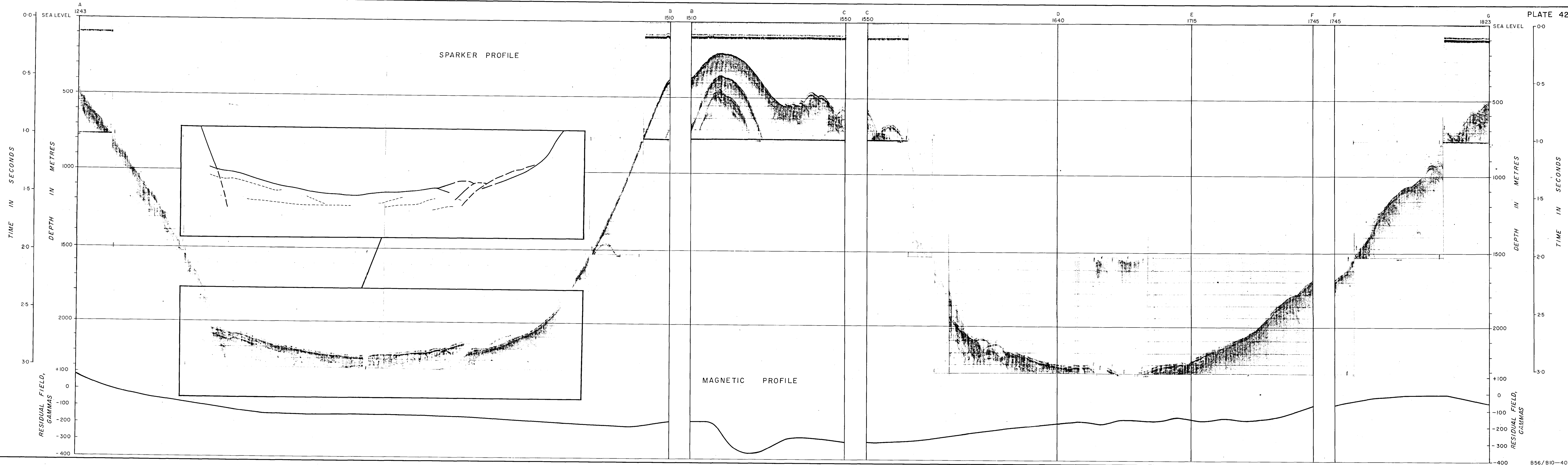
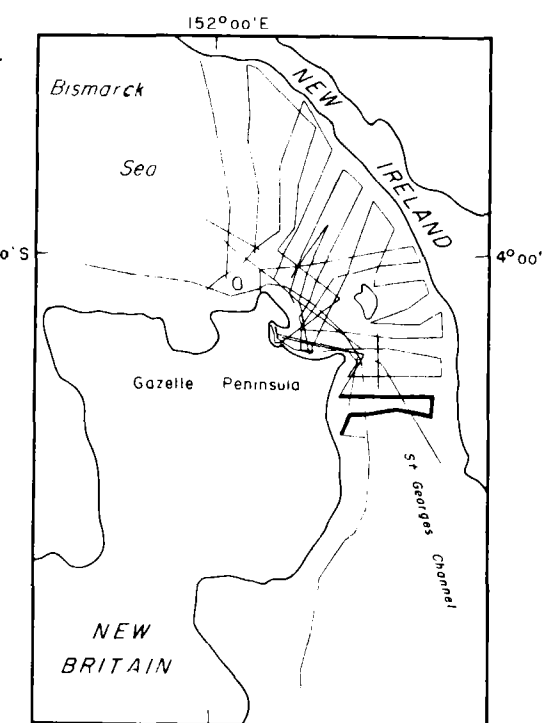
RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source-receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 3-4 m
Gain (i) Process amplifier: x 10
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 25(0810-0910)

SHIP: *M.V. CORAL QUEEN*

DATE: *13 May 1969*

EQUIPMENT

Energy source: *E.G.G. Sparker System*
Transducers: *E.G.G. "Sparkarray" Model 267 - Three*
Receiving system: *Geotech Hydrostreamer Cable model 24257*
Hydrophones: *Geospace MP7*
Recorder: *E.G.G. Model 254*

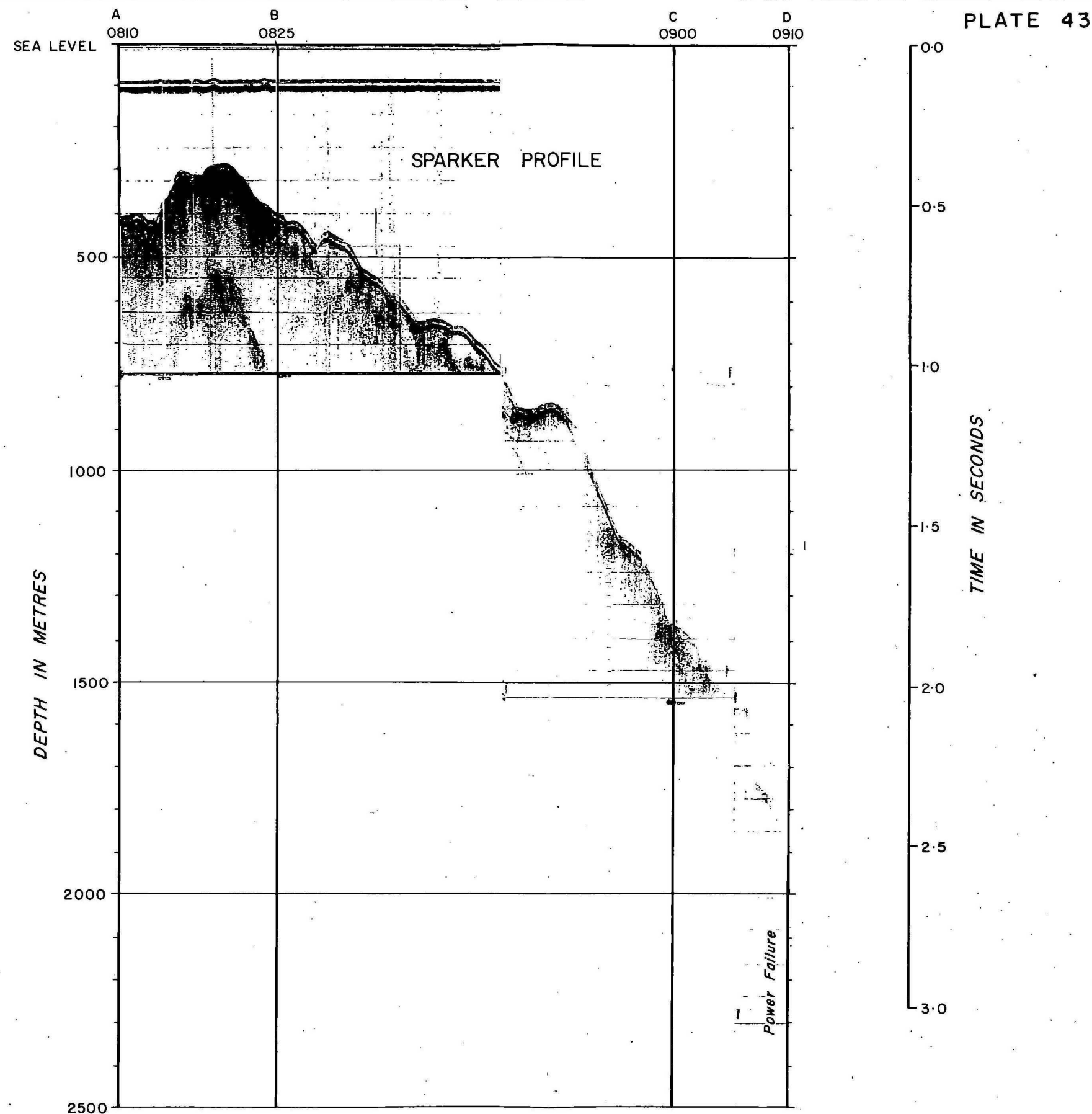
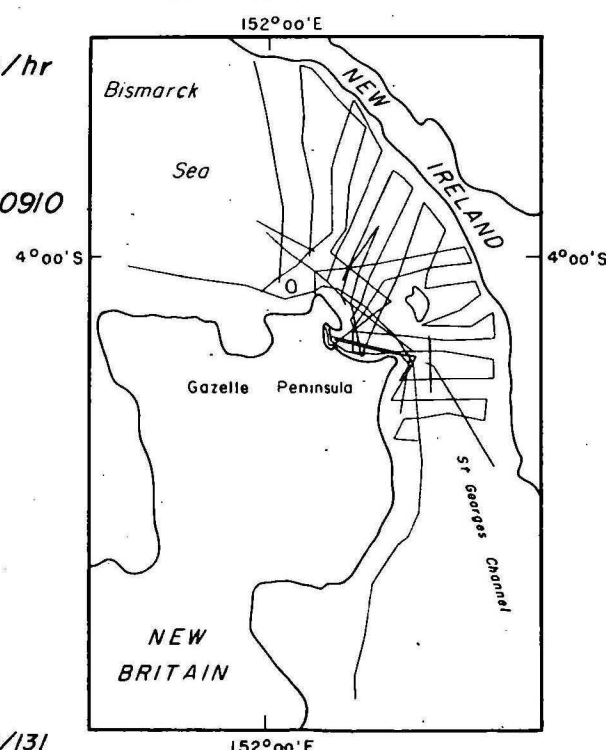
RECORDING INFORMATION

Source power: *7000 watt-sec*
Firing interval: *Approx. 4sec*
Hydrophone array: *26 MP7 at 1/2 m spacing*
Source - receiver distance: *190 m*
Source depth: *1 1/2 m*
Receiver depth: *Approx. 5-6m*
Gain (i) Process amplifier: *x 10*
Gain (ii) Marking amplifier: *8/0*
Filters: *20-20 kHz*
Print mode: *Positive*
Paper speed: *Approx. 55cm/hr*
Ship Engine revs: *Approx. 1000 RPM*
Ship speed through water: *Not recorded*
Ship speed over bottom: *Approx 13 km/hr*

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS: *Power supply failure at 0910*

LOCATION DIAGRAM



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 26 (0918-1405)

SHIP: M.V. CORAL QUEEN

DATE: 14 May 1969

EQUIPMENT

Energy source: EGG Sparker System

Transducers: EGG "Sparkarray" Model 267 - Three

Receiving system: Geotech Hydrostreamer Cable model 24257

Hydrophones: Geospace MP7

Recorder: EGG Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec

Firing interval: Approx. 4 sec

Hydrophone array: 26 MP7 at 1/2 m spacing

Source - receiver distance: 190 m

Source depth: 1 1/2 m

Receiver depth: Approx. 5-6 m

Gain (i) Process amplifier: x10

Gain (ii) Marking amplifier: 8/0

Filters: 20-20 kHz

Print mode: Positive

Paper speed: Approx. 55 cm/hr

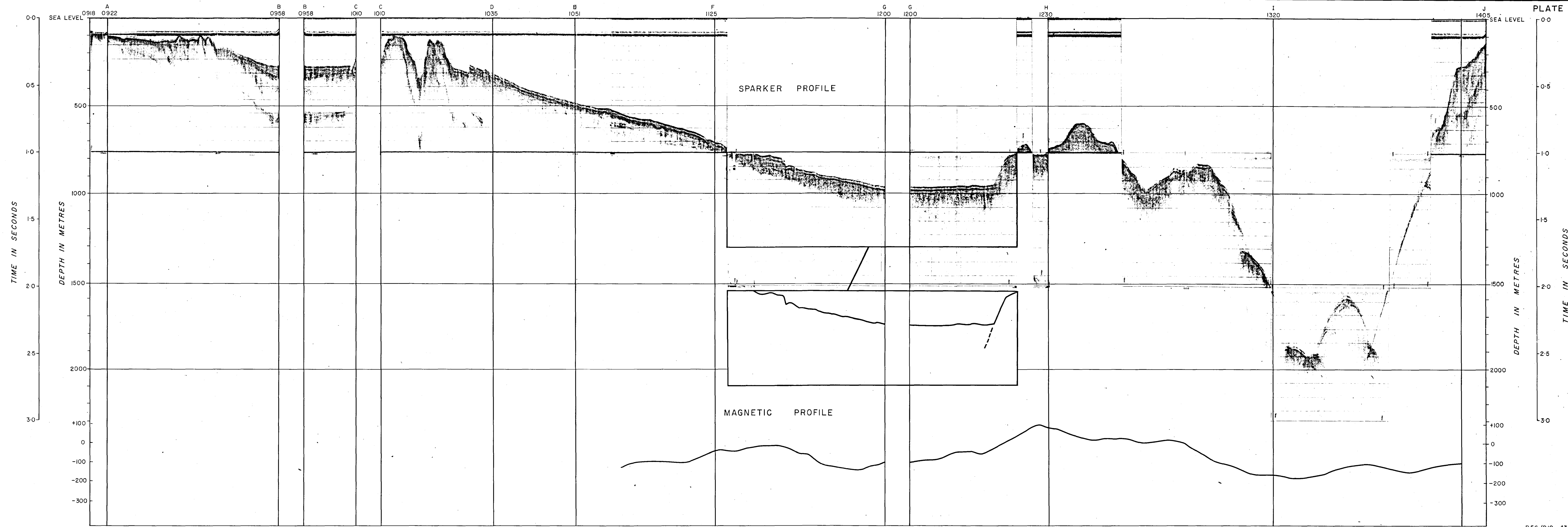
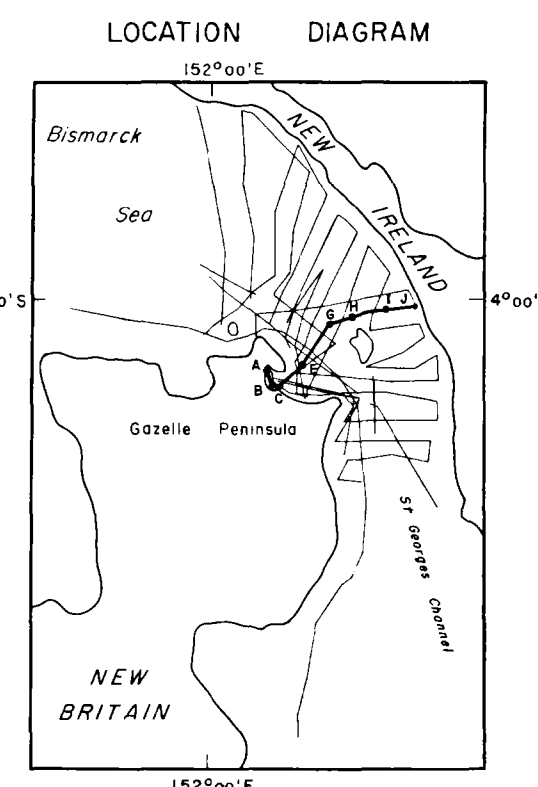
Ship Engine revs: Approx. 1000 RPM

Ship speed through water: Not recorded

Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



Geophysical Branch, Bureau of Mineral Resources,
Geology & Geophysics

NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 26 (1405-1830)

SHIP: M.V. CORAL QUEEN

DATE: 14 May 1969

EQUIPMENT

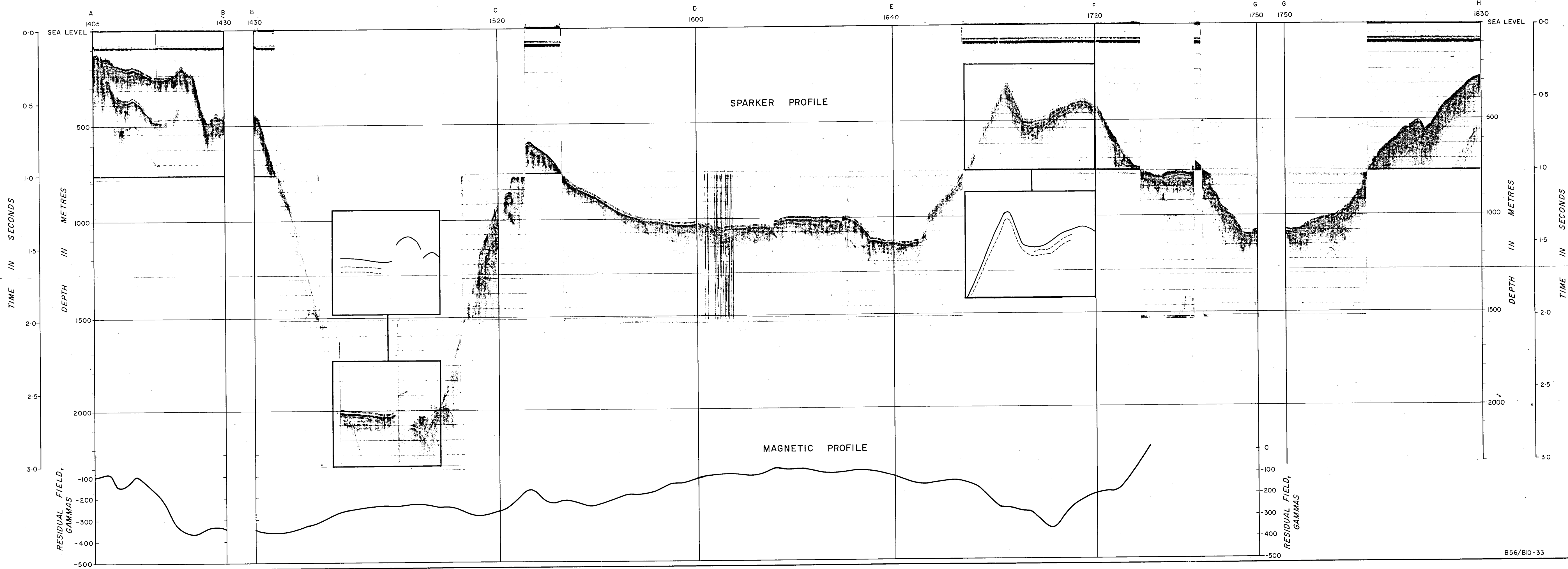
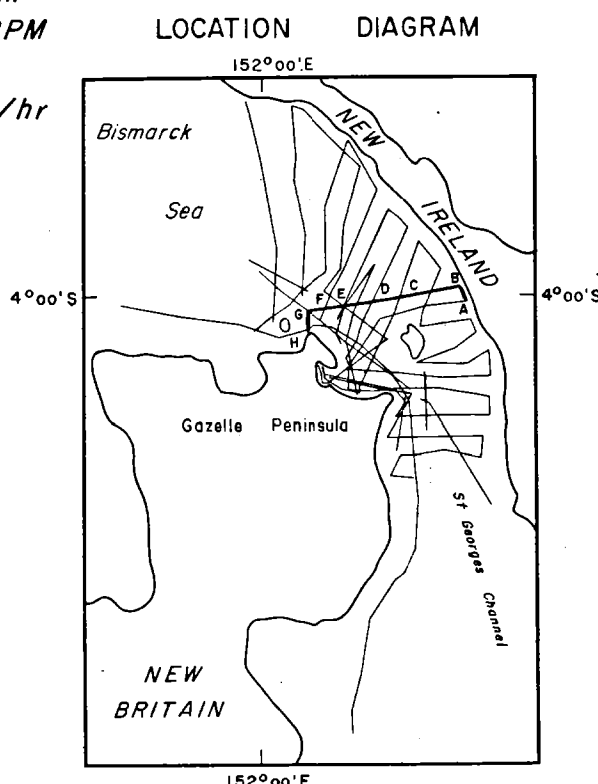
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267-Three
Receiving system: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

Source power: 7000 watt-sec
Firing interval: Approx. 4sec
Hydrophone array: 26 MP7 at 1/2m spacing
Source-receiver distance: 190m
Source depth: 1 1/2m
Receiver depth: Approx. 5-6m
Gain (i) Process amplifier: x10
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55cm/hr
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION ≈ 9x

REMARKS:



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 27 (0640-1105)

SHIP: M.V. CORAL QUEEN

DATE: 15 May 1969

EQUIPMENT

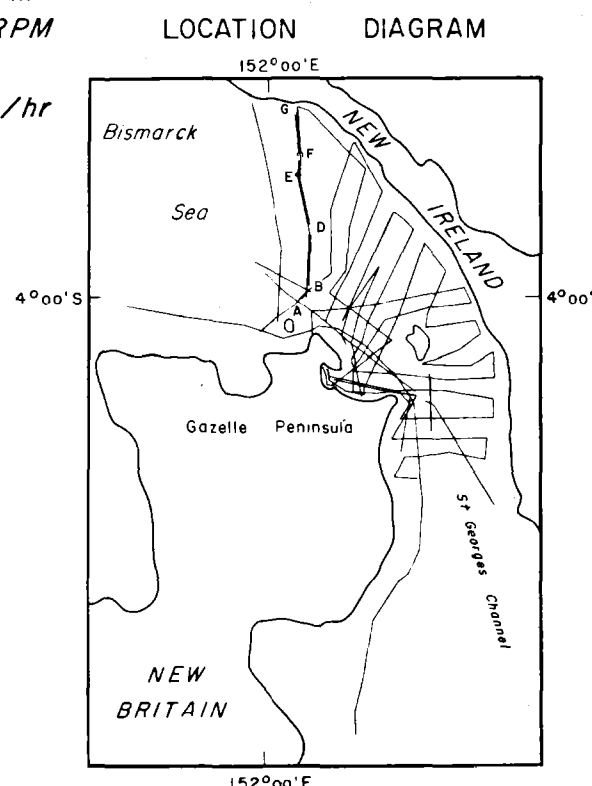
Energy source: EGG Sparker System
Transducers: EGG "Sparkarray" Model 267-Three
Receiving system: Geotech Hydrostreamer Cable model 24257
Hydrophones: Geospace MP7
Recorder: EGG Model 254

RECORDING INFORMATION

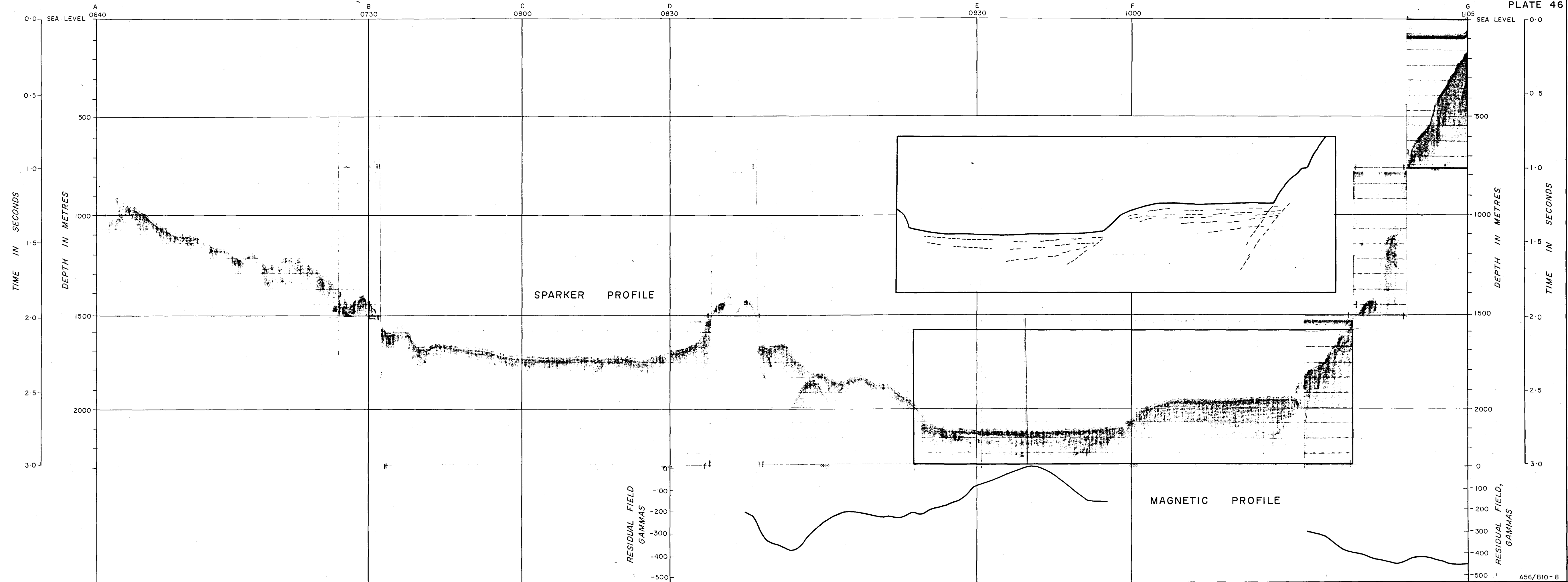
Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source-receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 4-5 m
Gain (i) Process amplifier: x 10
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship Engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx. 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



(Based on G449 19A) To accompany Record No 1971/131



NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 27 (1105-1610)

SHIP: M.V. CORAL QUEEN

DATE: 15 May, 1969

EQUIPMENT

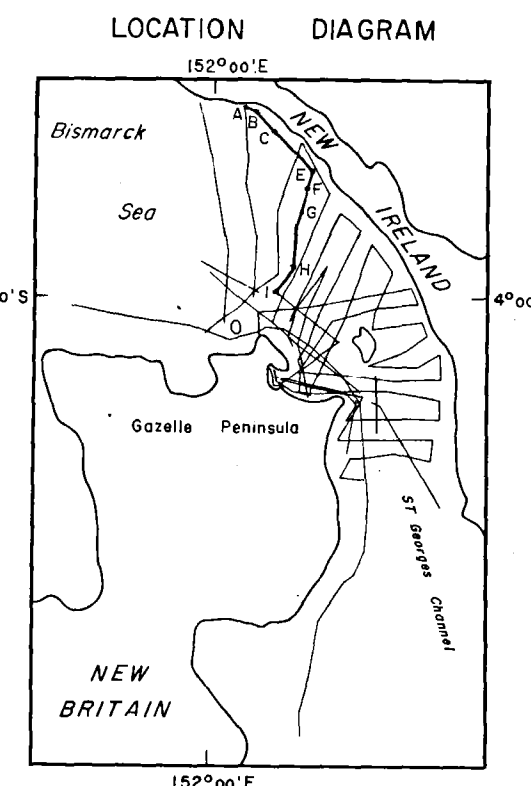
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

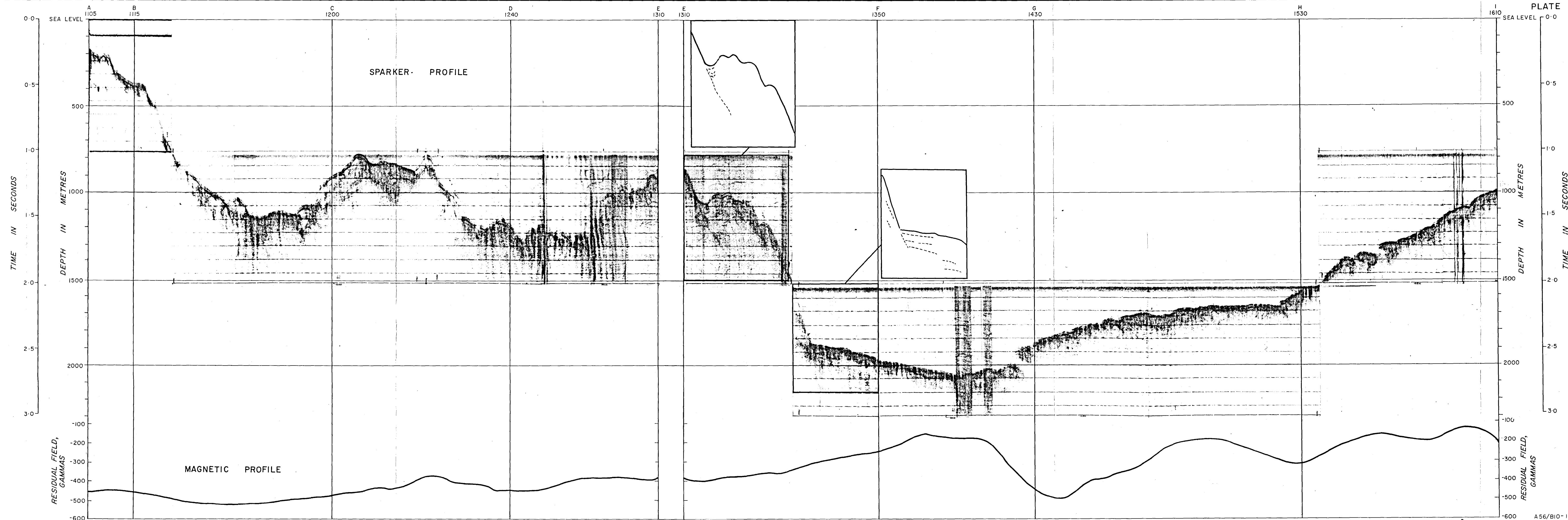
Source power: 7000 watt-sec
Firing interval: Approx. 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 4-5 m
Gain (i) Process amplifier: x10
(ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 cm/hr
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

VERTICAL SCALE EXAGGERATION $\approx 9 \times$

REMARKS:



(Based on G449-19A) To accompany Record No 1971/131



Geophysical Branch, Bureau of Mineral Resources,
Geology & Geophysics

NEW BRITAIN CRUSTAL INVESTIGATION, 1969

MARINE SEISMIC "SPARKARRAY" SECTION

(ONE TO FOUR REDUCTION)

TRAVERSE 27 (1610-1925)

SHIP: M.V. CORAL QUEEN

DATE: 15 May 1969

EQUIPMENT

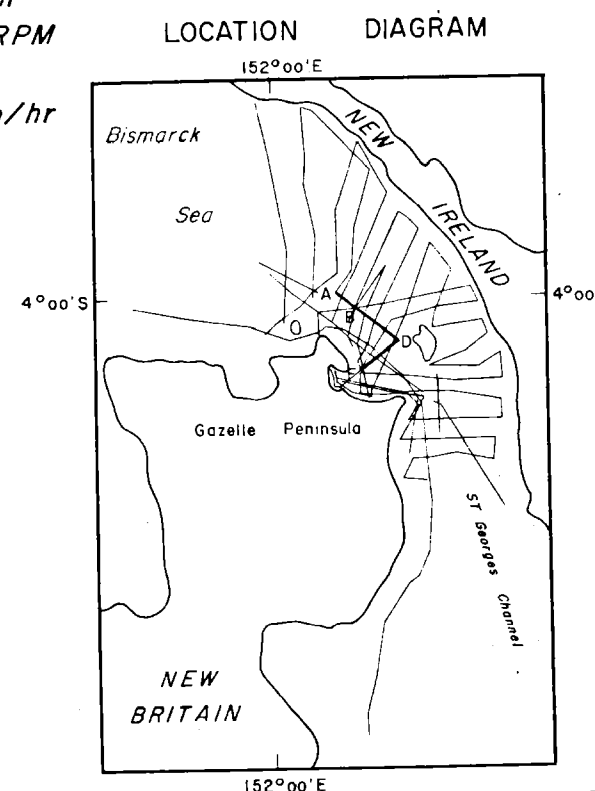
Energy source: E.G.G. Sparker System
Transducers: E.G.G. "Sparkarray" Model 267 - Three
Receiving system: Geotech Hydrostreamer Cable Model 24257
Hydrophones: Geospace MP7
Recorder: E.G.G. Model 254

RECORDING INFORMATION

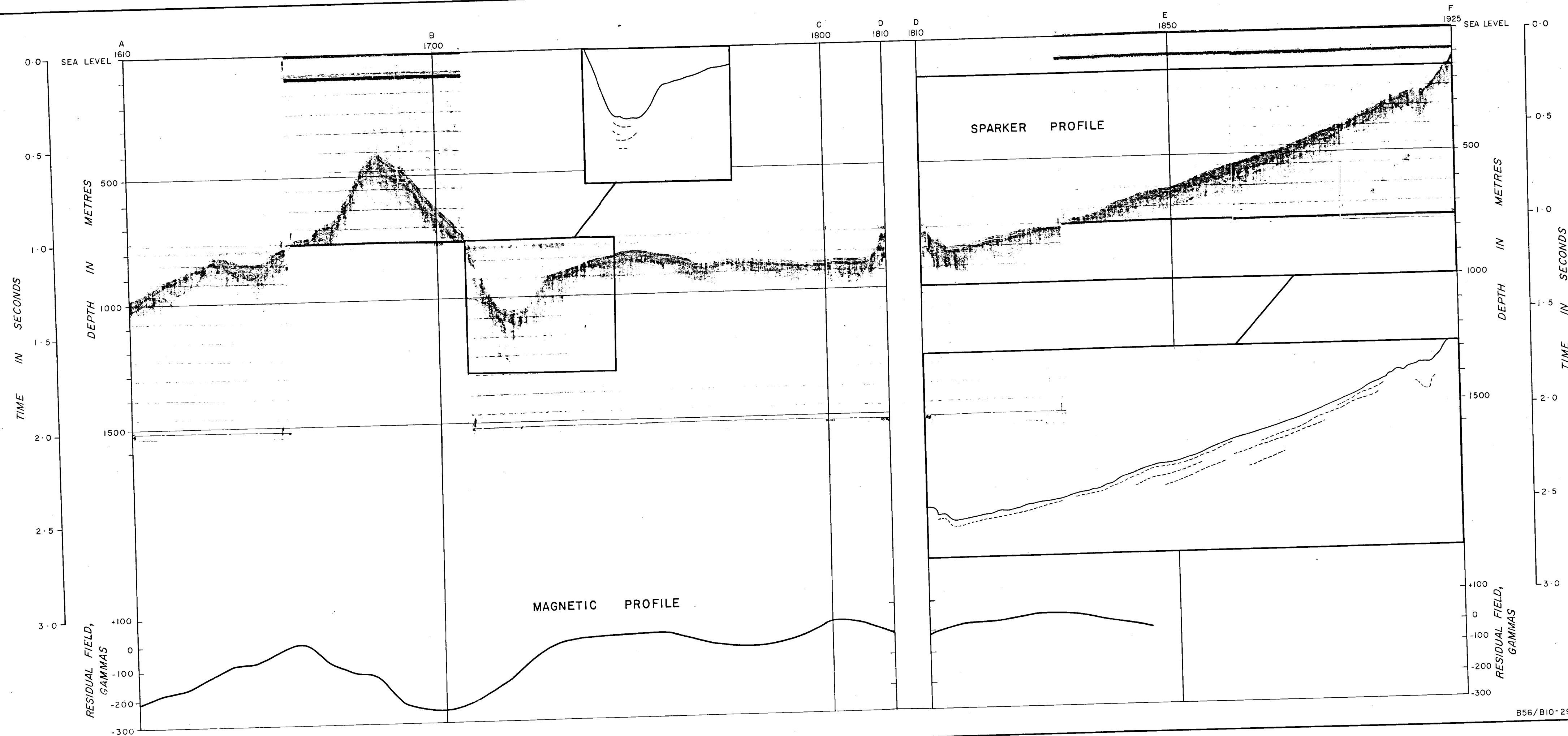
Source power: 7000 watt-sec
Firing interval: Approx 4 sec
Hydrophone array: 26 MP7 at 1/2 m spacing
Source - receiver distance: 190 m
Source depth: 1 1/2 m
Receiver depth: Approx. 4-5 m
Gain (i) Process amplifier: x10
Gain (ii) Marking amplifier: 8/0
Filters: 20-20 kHz
Print mode: Positive
Paper speed: Approx. 55 m/hr
Ship engine revs: Approx. 1000 RPM
Ship speed through water: Not recorded
Ship speed over bottom: Approx 13 km/hr

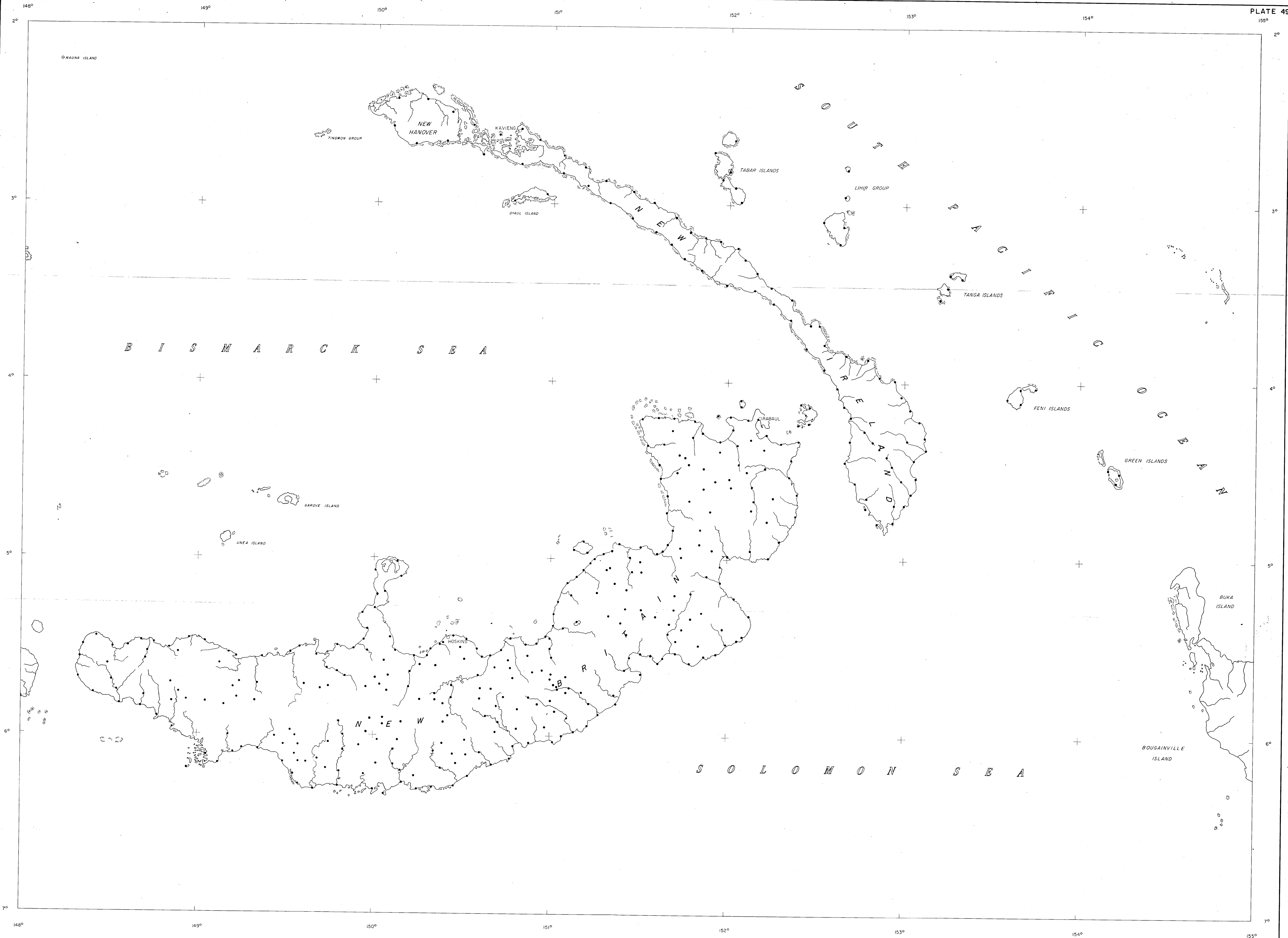
HORIZONTAL: VERTICAL SCALE $\approx 9:1$

REMARKS:



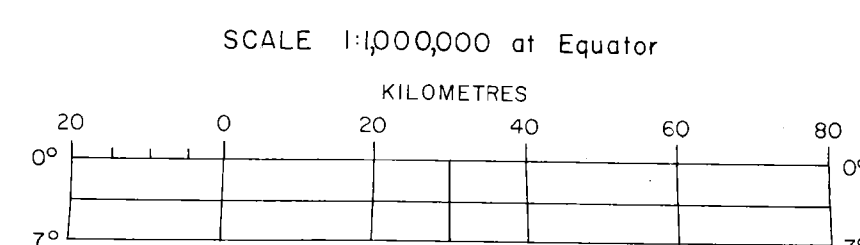
(Based on G449-19A) To accompany Record No 1971/131

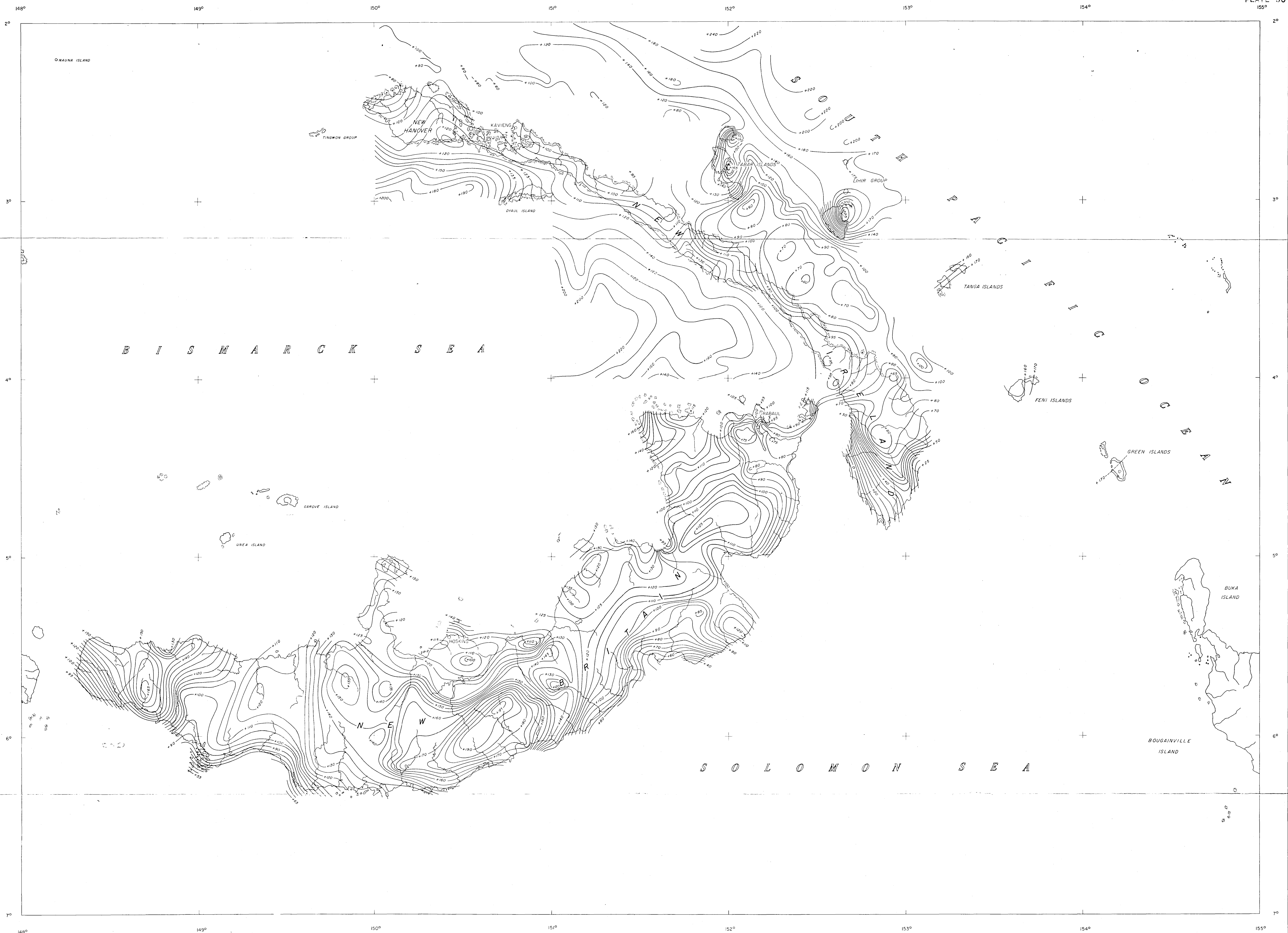




NEW BRITAIN CRUSTAL INVESTIGATION 1969

POSITIONS OF GRAVITY STATIONS

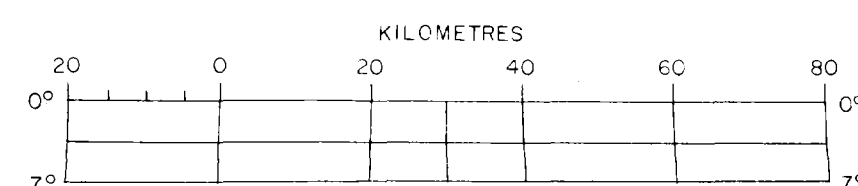


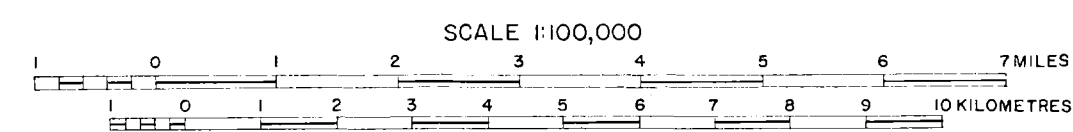
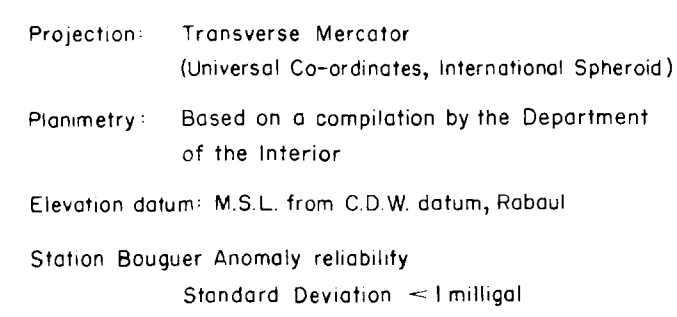


NEW BRITAIN CRUSTAL INVESTIGATION 1969

MERCATOR PROJECTION
BOUGUER ANOMALY CONTOURS

SCALE 1:1,000,000 at Equator





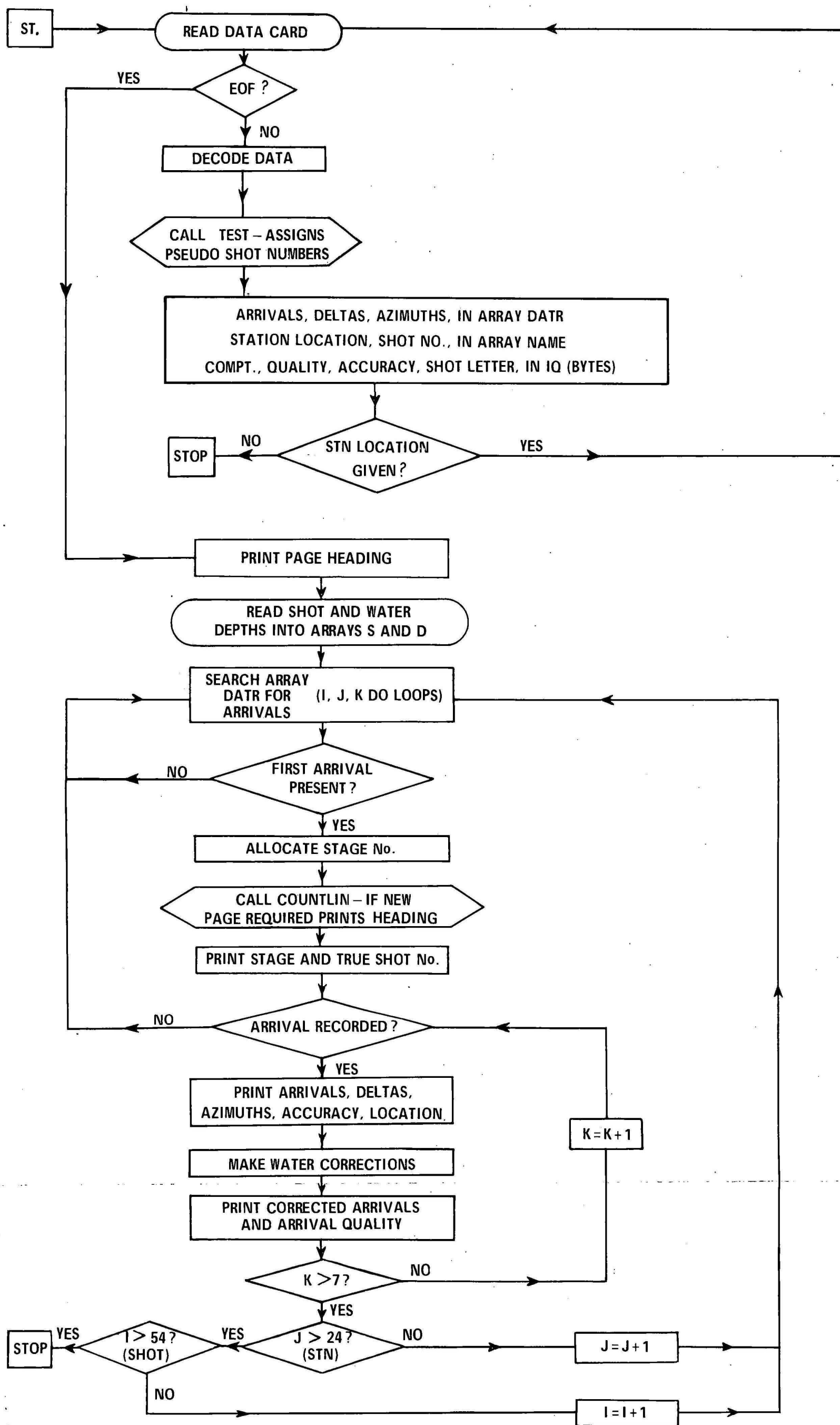
KEY TO GRAVITY STATION NUMBERING
A=6901 B=6903

 Built-up area
 Named place
 Road
 Track

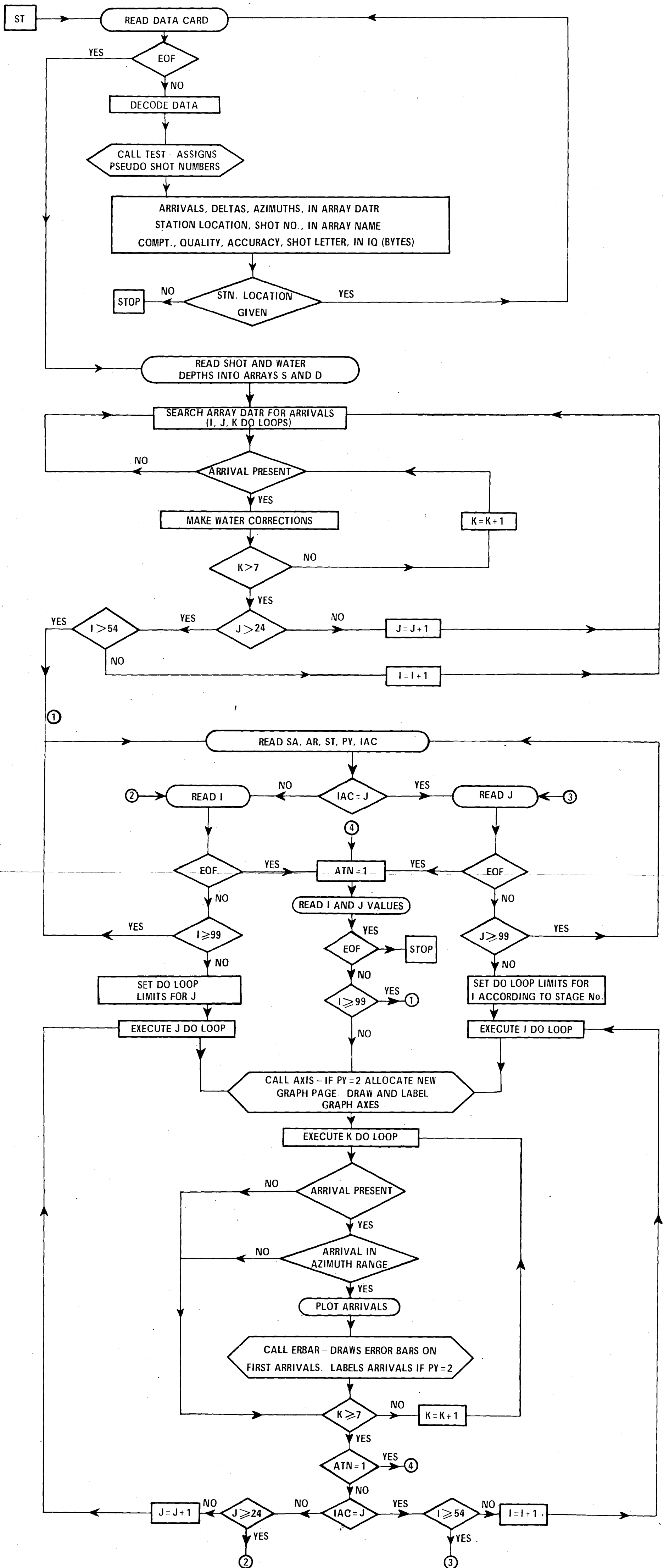
- ▲ Primary base station
- △ Secondary base station
- Gravity station
- ⊗ Permanently marked gravity station

123	Bouguer anomaly (milligals)
625'	Elevation (feet)
—5—	Isogals
	'High' anomaly
	'Low' anomaly

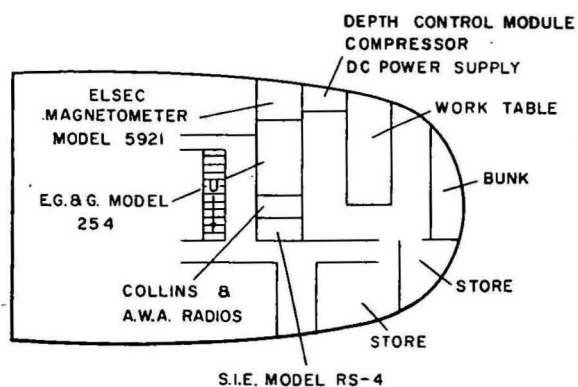
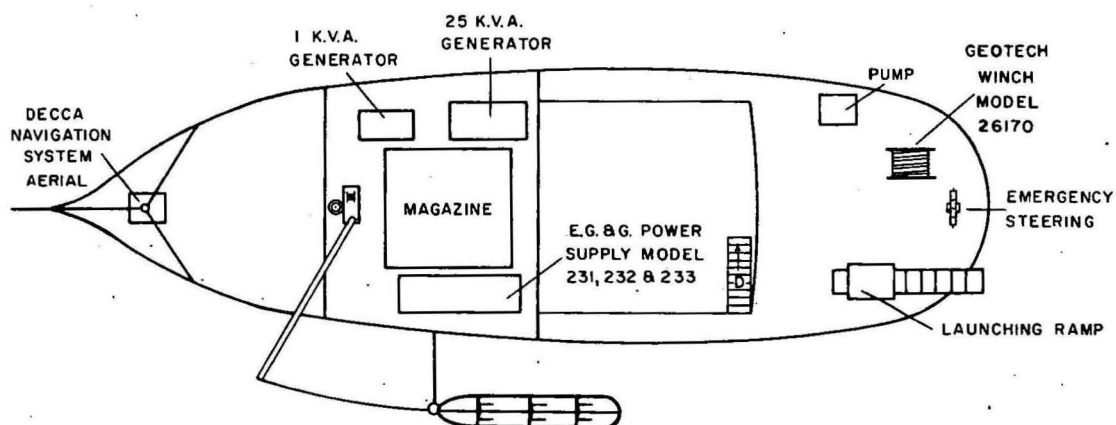
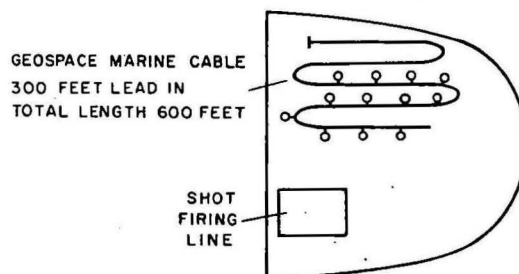
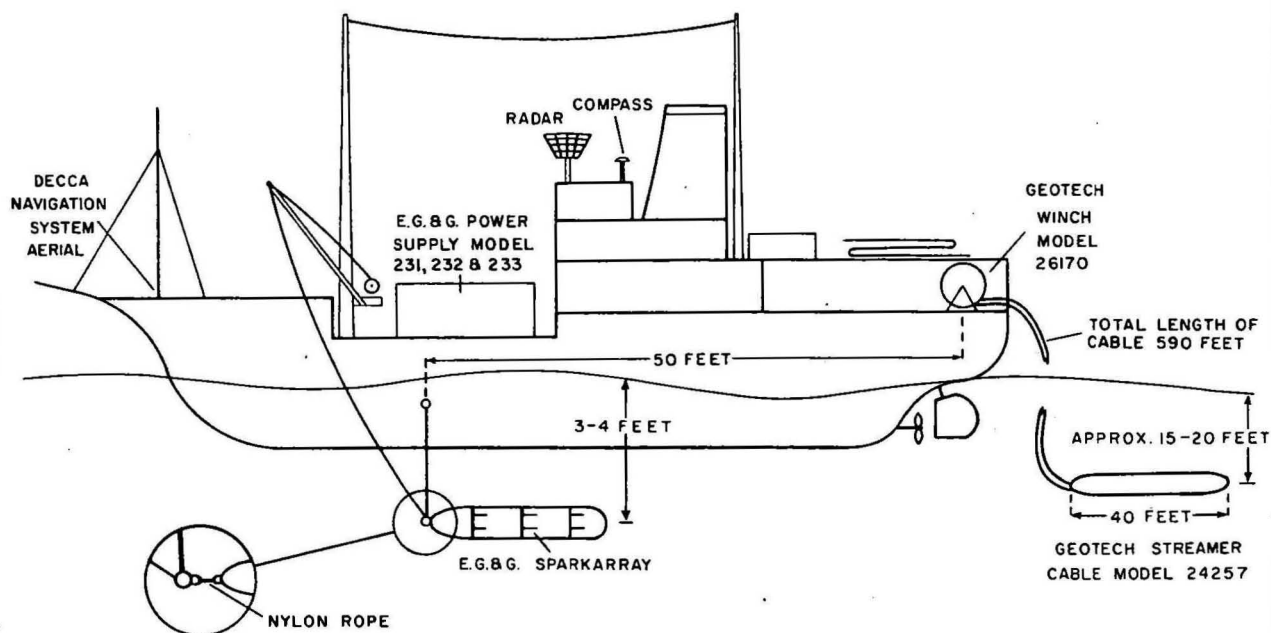
A terrain correction has been applied to stations of extreme relief



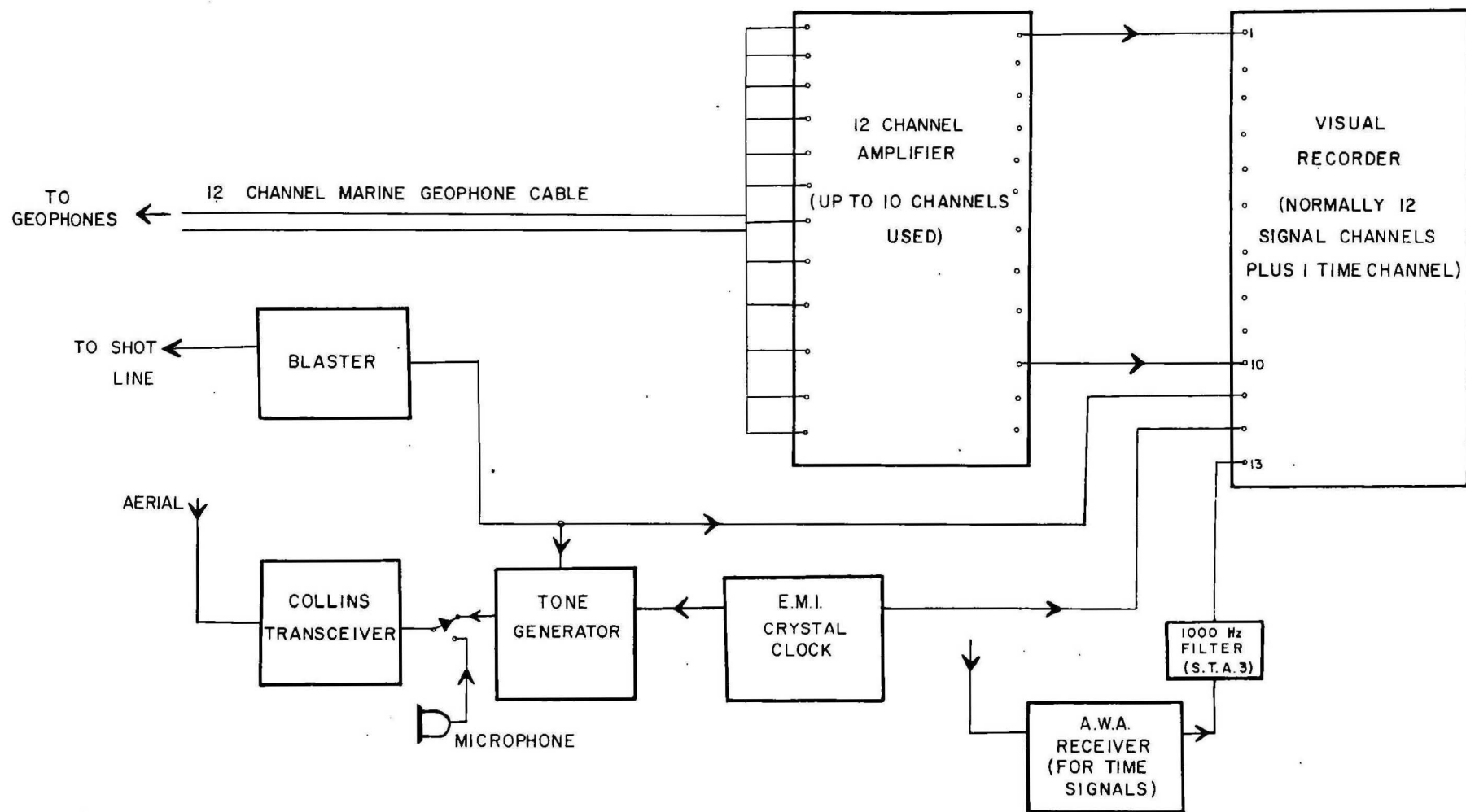
FLOWCHART OF PROGRAM RCSPDATA
FOR LISTING OF ARRIVAL DATA



FLOWCHART OF PROGRAM GRAPLOTT
FOR PLOTTING OF ARRIVAL DATA



DIAGRAMMATIC ARRANGEMENT
OF EQUIPMENT ON
MV "CORALQUEEN"



BLOCK DIAGRAM OF SHIPBOARD
SHOT-FIRING AND TIMING EQUIPMENT.