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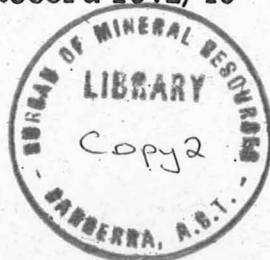
COMMONWEALTH OF AUSTRALIA

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



Record 1972/45

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**INVESTIGATIONS OF CRUSTAL STRUCTURE IN THE
RABAU REGION, NEW BRITAIN 1967; LOGISTICS AND DATA**

Editor

D.M. Finlayson

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LIST OF PARTICIPATING ORGANIZATIONS

The organizations and departments listed below took an active part in the field work connected with the 1967 Rabaul Crustal Investigation.

Commonwealth of Australia

Department of National Development : Bureau of Mineral Resources, Geology & Geophysics, Canberra

Department of External Territories : Administration of Papua New Guinea -

- a) Rabaul District Administration
- b) Department of Trade and Industry;
Customs and Marine Division
- c) Department of Lands, Surveys and Mines;
Survey Division and Geological and
Volcanological Branch
- d) Department of Posts and Telegraphs

Queensland State Government

Geological Survey of Queensland

University of Hawaii

Hawaii Institute of Geophysics

University of Queensland

Department of Geology

SUMMARY

The 1967 Crustal Investigation of the Rabaul region was largely a seismic refraction survey organized by the Bureau of Mineral Resources (BMR) in cooperation with the Papua New Guinea (PNG) Administration, the University of Queensland, and the Hawaii Institute of Geophysics.

In this Record the background of the survey is set out in the context of the necessity for providing crustal seismic information for use in the Rabaul Volcanological Observatory eruption warning system, which incorporates a local seismic station network.

The logistics of the survey are described and the seismic arrival data and associated magnetic profiling are assembled for use as a reference source. The emphasis in this Record is on data collation in a form which can be used in future interpretative papers.

Because of unforeseen delays, this Record was not prepared until after a number of other geophysical and geological surveys had been conducted in the region during 1969 and 1970. Thus interpretative papers on the 1967 work will now have to take into account a much greater quantity of data, and these are referenced here.

1. INTRODUCTION

The town of Rabaul in New Britain is situated on the floor of a youthful volcanic caldera, one side of which is breached allowing entry of the sea. The resultant inlet, with its extensive area, deep water, and protective walls, is one of the finest harbours of the Pacific. The caldera contains, however, four dormant volcanic centres, whose potential reactivation constitutes a threat to the community. Within the last 100 years eruptions have occurred in 1878, 1937, and 1941-42. The eruption of Vulcan in 1937 was the most severe of these events; it caused some loss of life, and the port was closed and the town evacuated for a few days.

To safeguard the community against the occurrence of such events without warning, and to mitigate their effects, the PNG Administration established a volcanological observatory at Rabaul soon after the 1937 eruption. This institution was destroyed during the Second World War, and was subsequently rebuilt in the early 1950s. In recent years steps have been taken to improve the instrumentation of the Rabaul Observatory by installing a telemetered seismic network.

A normal precursor to large-scale eruption is the occurrence of local earthquakes. These are caused by sudden movements in the conduit chambers beneath the volcano, as the highly pressurized lava and hot gases disrupt the confining rock and begin working their way towards the surface. If the foci of these earthquakes can be located accurately it is possible to trace the upward advance of the magma, and it becomes practicable to predict the time and place of eruption with some precision. The essential requirement for such determinations is a network of at least four well-spaced seismic stations with extremely good time control. If such a network is supplemented by experimentally derived information on local seismic velocities and crustal structure, its effectiveness is enhanced.

The current crustal study project was undertaken primarily to supply information for this purpose, as well as to shed light on the broader problems of earth science in this complex and interesting region.

2. GEOLOGY

The geology of the area being investigated (Plate 1) has been described by Macnab (1970) and Hohnen (1970) who have enlarged on earlier work by French (1966) and by Fisher & Noakes (1942).

Essentially, the land masses of New Britain and New Ireland are made of volcanic products and limestones which have been intruded by intermediate and basic magmas ranging from gabbro to diorite. Acid rocks are poorly represented.

Structure

The dominant structural feature of the region is the northwest-trending faulting, which is expressed in the Gazelle Peninsula by the Central Baining Fault and its subparallel neighbour, a partially obscured fault, cutting the peninsula

in the valleys of the Warangoi and Keravat Rivers. In New Ireland the conspicuous Weitin River Fault and, south of it, a smaller parallel fault which crosses the island and connects with one striking parallel to the coast, have the same general trend.

French (1966) suggests, on the basis of deranged drainage and coral terrace movement, that the eastern side of the Weitin River Fault has moved north a few kilometres, and that its vertical movement is about 400 m.

A notable feature of southern New Ireland is the absence of a platform on the western coast. The eastern coast, however, has many coral terraces and local harbours. This area may have shallowed in historic time.

Such observations, together with the high level of tectonic earthquakes in the region, suggests that the orogenic movements which began in the Tertiary are still in progress.

Gazelle Peninsula

The basement of the Gazelle Peninsula, according to Macnab (1970), consists of highly indurated Eocene marine sedimentary rocks which are derived from an intermediate volcanic province. They are interbedded with submarine lavas. The rocks were deformed about a west-northwesterly axis and metamorphosed along a narrow zone. Extensive intrusion by basic and intermediate magmas occurred before, during, and after the deformation.

The Eocene rocks were intruded by magmas of the dioritic and granitic type during the Oligocene, and the resultant plutons crop out on either side of the dominant Central Baining Fault which crosses the peninsula.

Thick deposits of limestone were laid down in the north and west of the peninsula during the Neogene. Elsewhere the sedimentary rocks are essentially derived from andesitic, basic, and acid volcanism which in the central area may have continued into the Pleistocene.

Pleistocene deposition is represented mainly by uplifted limestone in the coastal areas and by a sequence of poorly consolidated sandstone, mudstone, conglomerate, and pyroclastics in the area northeast of the Central Baining Fault. Recent deposition is dominated by the extensive pyroclastic deposits from the Rabaul volcanoes.

New Ireland

French (1966) believes that New Ireland has a plutonic basement of diorite and granodiorite on which chalky limestone was deposited in early Oligocene. Vigorous volcanic activity throughout most of the Oligocene laid down a thick sequence of pyroclastics, which was intruded by dioritic and gabbroic magmas. These Oligocene volcanics constitute the dominant formation in the central region of southern New Ireland.

Volcanic activity of reduced intensity continued in the Neogene; limestone was deposited widely during this period and, towards the end of it, sandstone, siltstone, and clay were laid down in a sequence which included coal measures.

Deposition during the Quaternary consisted mainly of clastic fan material and coral terraces, which are developed on the eastern coast of the island.

A geological summary of the whole of New Britain and New Ireland is given by Ryburn (in Brooks, 1971) for the reporting of the extended seismic refraction work done by BMR in 1969.

3. HISTORY OF GEOPHYSICAL INVESTIGATIONS

Geophysical work in the Gazelle Peninsula area can be divided into five main groups: (a) observatory seismological recording, (b) investigations for engineering projects, (c) gravity studies, (d) magnetic studies, and (e) crustal investigations.

Seismological recording

After the 1937 eruptions at Rabaul, the Volcanological Observatory, established by Dr N.H. Fisher (then Chief Geologist and Volcanologist of the Mandated Territory of New Guinea), carried out a volcano surveillance routine which included: (a) continuous recording of seismic disturbances of both tectonic and volcanic origin, (b) regular checking of variations in temperature and gas composition in the thermal areas, and (c) regular checking of strand-line changes by means of a tide gauge, water-level markers, and precise theodolite surveys.

As a result of this work clear warning of the 1941 eruption of Tavurvur was obtained (Fisher, 1951), and remarkable tilt trends were revealed before the major tectonic earthquake of January 1941 which preceded the eruption (Fisher, 1944). Joint studies on seismicity in the Territory were carried out with Riverview College Observatory, Sydney.

In the years following the Second World War, beginning in 1950, the Rabaul Observatory was re-established and surveillance of the Territory volcanoes was resumed and extended to include Papuan centres. Most of the work of the Observatory staff was confined to volcano studies because of urgent commitments with large-scale and widely dispersed eruptions in other parts of the Territory.

Since 1954, however, regular contributions to international seismic data centres have been maintained by weekly bulletins, and some detailed studies of earthquake distributions in the Territory were carried out by Taylor (1955) and Latter (1966).

Other work on Territory seismicity has been done by the staff of the Geophysical Observatory at Port Moresby:

Brooks (1962) analysed arrival times of 185 earthquakes and determined the velocities of the P waves to a depth of 500 km

Brooks (1965) presented an analysis of seismic activity during the last 50 years: his intensity zone map indicates that the area of the present survey has an expectancy of more than one earthquake of magnitude 7.5 or greater per century

Denham (1968a) gave a detailed analysis of earthquakes in the Bougainville-Buka region during the period 1960-1966. The area is southeast of Rabaul, but the northwesterly trend of the epicentres in the region studied, if extended, passes through St Georges Channel

Denham (1968b) calculated the thickness of the crust under Papua and New Guinea by a study of P-wave spectra from deep earthquakes at three locations, using the technique developed by Fernandez (1965). The thickness of the crust near the Rabaul Volcanological Observatory was estimated at 50.0 km

Denham (1969) examined the distribution of earthquakes in the New Guinea/Solomon Islands region in the light of the tectonic theory of Isacks Oliver & Sykes (1968)

Johnson (1970) made an examination of the spatial distribution of earthquakes along the Bismarck Volcanic Arc and their relation to active volcanic centres.

Investigation of engineering projects

Two engineering geophysical surveys have been made in the area:

Hydrothermal field at Rabaul. The purpose of the survey was to determine whether the field can be used as a source of geothermal power for electricity generation. A geological appreciation of the field was given by Studt (1961). In the geophysical investigation seismic refraction, resistivity, magnetic, and temperature measurements were made (Wiebenga & Polak, 1962). Seismic refraction observations indicated alternate layers of lower velocity (1.5-2.0 km/s) material, probably volcanic ash, and higher velocity (2.3-3.8 km/s) lava flows. No rocks of high velocity were recorded.

Warangoi hydro-electric scheme. The purpose of the survey (Cifali et al, 1968) was to determine the foundation conditions for a dam about 32 km from Rabaul, using seismic refraction and magnetic methods. The rocks consist of alternate layers of lava flows, with a seismic velocity of up to 4.5 km/s, and lower-velocity agglomerate.

Gravity studies

In 1963-64 the University of Wisconsin established gravity stations at several airports in Papua New Guinea, including several closely spaced stations in the Rabaul area (Laudon, 1968).

A more extensive network of stations was established in 1963-64 by St John and Shirley (St John, 1964). In 1967 Milsom (in prep) incorporated these stations into the EMR Isogal Network which extends over the Territory and is tied to the Australian Isogal Network.

In 1969 a complete gravity reconnaissance survey of New Britain and New Ireland was conducted by BMR (Brooks ed., 1971). In 1970 the marine geophysical survey of the Bismarck Sea by BMR included seaborne gravity measurements (Willcox, 1971).

Magnetic studies

Rose (1966) published a total magnetic intensity map of the Solomon Sea obtained by the British hydrographic survey vessels H.M.S. Dampier in 1965 and H.M.S. Cook in 1958.

In 1970 the marine geophysical survey of the Bismarck Sea (Willcox, 1971) included magnetic profiling. Some marine magnetic profiling was also carried out during the BMR 1969 seismic refraction survey (Brooks, 1971).

Crustal investigations

Several crustal study investigations have been made in other areas of the Pacific (e.g. Officer, 1955; Raitt, 1956; Rose et al, 1968).

A preliminary survey was carried out in 1966 in the Rabaul area (Cifali et al., 1969). In this survey small charges were detonated at short distances from the Volcanological Observatory and recorded by the observatory seismographs and by a mobile geophone spread. The spread party occupied five different positions during the survey. The short distances between shots and recording stations made it possible to plot only the top of the basaltic layer. The velocity in this layer was found to be nearly 7.0 km/s.

The major crustal study work conducted by BMR in the New Britain - New Ireland region has been reported by Brooks (1971). This work was an extension of the work carried out during 1967 by BMR and reported in this Record.

4. BATHYMETRY

The general bathymetry of the New Britain - New Ireland region shown in Plate 2 has been compiled from the following sources:

- (i) Royal Australian Navy charts
- (ii) BMR marine geophysical survey of the Bismarck Sea (Willcox, 1971)
- (iii) Hawaii Institute of Geophysics and Royal Navy marine geophysical survey of the Solomon Sea (Rose et al., 1968)
- (iv) BMR 1969 seismic refraction survey New Britain - New Ireland region (Brooks, 1971; Brooks et al., 1971).

Comment on the bathymetry is well documented in the references mentioned above.

5. POSITIONING

In addition to the necessity for developing a technique for locating the position of a drifting buoy precisely at shot-time, the problem of fixing the positions of shot-points and recording sites presented particular difficulties

because only the New Ireland part of the region had been mapped accurately. Uncorrected wartime maps covered the remainder of the area, which contained, however, accurate trig points established by former Government and army surveys.

The task of solving these difficulties was undertaken by surveyors of the Territory Department of Lands, Surveys and Mines under the leadership of B.J. Mennis. As a first step, a base map of the study region, on a scale of 1:250 000, was drafted, using the known trig points. On this map were plotted the planned positions of shot-points and recording sites. Locations for survey instruments were then chosen and cleared before field operations began. These were selected so that shot-points could be seen from appropriate trig points or from locations easily connected to trig points.

Survey instruments consisting of tellurometers, model MRA2, and theodolites were used to obtain distance and bearing to the ship. One surveyor with a tellurometer and sextant was stationed on the bridge of the ship; two surveyors equipped with a tellurometer and theodolite occupied the land stations. Portable transceivers maintained communications between them.

At the shot instant bearings were taken by the respective survey parties, and, at the same time, the ship's captain measured the distance and bearing to the shot buoy by radar. In conditions of poor visibility, a 7-inch quartz-iodide spotlight on board ship served as a visible target for the surveyors at the land stations.

Co-ordinates of the shot-points were computed by the surveyor on the ship as soon as the shot was completed. Subsequently, the survey data were processed by the IBM 1130 computer in Port Moresby, giving co-ordinates and distances from shot-points to recording stations.

The accuracy of the co-ordinates, using the local grid as reference, is estimated as within ± 100 m. The locations of the shot-points and recording stations are given in Tables 1 and 2 and indicated in Plate 3. The shooting programme was organized in three stages to allow recording stations to change positions and thus record over a wider survey area overall.

The base-station information used to position the 1967 stations and shots was essentially pre-War information, which was superseded by the time of the 1969 seismic refraction survey (Brooks, 1971). Thus the positions of the Rabaul Seismic Network stations are 5" less in south latitude than the 1969 data and 25" greater in east longitude. However, the distances computed on the 1967 datum can still be taken as accurate within the limits of the triangulation methods used. All 1969 co-ordinates were adjusted to the Australian National Spheroid; the 1967 co-ordinates are adjusted to the International Spheroid.

Most of the recording stations were situated near sea level and no corrections to the seismic arrival data for the height of station above sea level have been made.

6. SEISMIC EQUIPMENT, TECHNIQUES, AND DATA

The party organization of the survey is shown in Table 3.

Equipment

(i) Base

A base was established at the Volcanological Observatory at Rabaul:

- a) To maintain communication between the shooting ship and recording stations and to keep all stations closely advised on progress in the firing of each shot. A Department of Posts & Telegraphs transceiver was used on frequency 4 990 KHz at a power output of 200 watts
- b) To broadcast continuously a time signal from a Labtronics crystal clock by means of a 100 watt AMT 150 transmitter on a frequency of 4 525 KHz
- c) To monitor earthquake activity to ensure that shots did not coincide with earthquakes, and to relay information on shot instants and recordings
- d) To supply the parties with spare parts and equipment when required, and to co-ordinate movements of parties and vessels.

(ii) Shooting Ship

The Administration's cadet-training ship M.V. Arcturus, 153 ft long and equipped with radar, served as the shot-firing ship. The ship had a spacious hold used for storage and explosives and equipment, and generous aft deck space. During the shooting operations at sea, crew and cadets assisted by providing the required labour force.

The T.N.T. explosive was packed in 54-lb tins, half of these being supplied with primer. The average charge size was about 750 lb; the last shot northwest from Lihir Island was 1 750 lb.

After some trials an effective shooting procedure was developed as follows:

- (1) The charge is placed on a plywood platform hinged to the afterdeck rail where it is packed and tied in a nylon net
- (2) The net is attached to a polystyrene buoy by means of 350 feet of rope. The buoy is thrown overboard and pulled in close to the ship
- (3) The shotline is shorted out to eliminate induced voltages and all radio transmitters on the ship are switched off
- (4) Two marine detonators are inserted in the charge and connected in series to the shotline
- (5) The charge is dumped over the stern of the ship and the shotline and the rope attached to the charge are paid out simultaneously

- (7) Meanwhile, the ship moves slowly forward into the wind, and balloons are tied to the shotline to keep it afloat
- (8) The shot-firing routine begins when the ship is about 3 000 ft away from the buoy.

The equipment used in the shot-firing routine provides:

- (a) an accurate record of the shot instant
- (b) a radio broadcast to the field stations of the shot instant
- (c) a hydrophone record of waterborne energy.

Two points in the shooting operation deserve particular mention:

- (a) The optimum shot depth (D) was calculated as 340 ft from the formula:
(THE SEA, Vol. 3, p.22) $\log D = \log T/5 + 1.95$
where D = depth in feet and T = the T.N.T. charge in lb
- (b) The shotline, a military twin-telephone line, was stored in boxes and paid out and recovered by hand. This reduced the likelihood of kinking and shotline failure which may occur when a winch is used. Winches tend to over-run and are difficult to control.

Shot instant was provided by a Tone Sequence Generator (TSG). The output from the TSG was connected to the ship's communications transceiver on the network frequency of 4 990 KHz, with the blaster wired in to the circuit so that its firing pulse would cut off the tone signal. Manually started, the TSG produced 1 000 Hz sine wave tone which was produced, initially, as a pulse train with 1 second intervals. Ten seconds before the shot the output changed to a continuous tone which ceased at the instant the blaster impulse entered the circuit. All shots were scheduled to be fired at ten minutes and ten seconds before the hour (Table 4).

The 12 hydrophones in the streamer were connected in parallel, and the output was amplified with an S.I.E. amplifier, type GA-19R. From the hydrophone record the water depth was computed, and various reflections were noted.

A 4-channel Kelvin Hughes recorder with a paper speed of 8 cm/s was used to record shot data as follows:

Channel 1 recorded the output of a Labtronics crystal clock; the clock was checked regularly and synchronized with the time pips of the Rabaul Base

Channel 2 recorded the time signal transmission from the Rabaul base

Channel 3 recorded shot instant from the tone sequence generator

Channel 4 recorded the events picked up by the hydrophone streamer.

The Collins transceiver requires 28V 50 Amps d.c. for transmission, supplied by 12V 19-plate batteries. A variety of chargers was used because

of the inadequacy of the ship's supply of 250V at 50 Hz. Batteries were charged continuously during the night. Whenever possible, a battery charger was working to charge 12V batteries for the power supply of the crystal clock.

(iii) Geophone spread Stations

Three parties (Nos 1, 2, and 8) were equipped with standard seismic refraction sets manufactured by the Southwestern Industrial Electronics Co., Houston, Texas:

- (a) PSU-19E system consisting of amplifiers type Ga-19R. The gain of about 120 dB is provided by nine stages; additional individual gain control is provided for matching of electrical sensitivity. Low pass filtering is provided; during the survey the 'lowest cut', 30 Hz was used
- (b) PRO-11 Oscillograph with a bank of 25 galvanometers of natural frequency of 125 Hz. Paper speed of 6-8 cm/s was used, the timing system providing lines at 10 or 50 millisecond intervals. Observatory time signals were recorded on at least one channel, and some parties also recorded time from a back-up crystal chronometer, set immediately before the shot on observatory time
- (c) PPS-11 power supply
- (d) Geophones - on two parties (Nos 1 and 2), 4.5 Hz vertical geophones in sets of four per channel were used. On some locations 3 Hz geophones were mixed with the 4.5 Hz geophones for experimentation. Party No. 8 used single 4.5 and 2 Hz geophones. For parties Nos. 1 and 2 the geophones were spaced 300 or 200 ft apart along two lines crossing each other (close to perpendicular if the terrain was suitable) with 11 geophones per line. Party 8 employed 12 geophones in a 4 000 ft line array, oriented where possible in the direction of the shot
- (e) Radio. Traeger 25 watts transceivers were used for communication and shot-instant reception. AWA or Labtronics radios were used to receive the time signal from Rabaul
- (f) Power - Power for field equipment was provided by five 12V - 19-plate batteries, charged from 3 000 watt generating sets.

Equipment of the University of Hawaii parties consisted of:

- (a) Seismic amplifiers manufactured by Fortune Electronics, Model T-1. The amplifiers contained high cut and low cut filters; the gain was in steps of 12 db
- (b) The recording instruments were photographic oscillographs. One party used the Dresser-SIE Model VRO-6 type which used 6-inch wide paper, while the other party used the Century Model 409D which used 3-inch wide paper. The records were processed immediately after each shot in a homemade light-tight box

- (c) The geophones were 4.5 Hz Hall Sears type. The hydrophones which were used for some shots were made up of Clevite crystal transducers with homemade pre-amplifiers
- (d) The University of Hawaii parties provided their own transceivers with crystal oscillators for the frequency of the radio net. However, these proved unsatisfactory, as the trimming adjustments were not suited for the frequency.

Single Geophone Stations. With one exception, stations used modified Willmore seismographs with various methods of recording time.

Equipment used by parties Nos 4, 5, 6, 7, 11 consisted of:

- (a) Willmore Mark I seismometer
- (b) Willmore photographic recorder with a paper speed of 212 mm per minute was used. Commonly used magnification is 10 000, maximum 30 000
- (c) Timing system. All parties used time signal from Rabaul. In addition:
Party No. 5: Labtronics type 21 time signal receiver, Labtronics crystal clock and chronoscope. Clock time pulses were recorded on a time channel in the recorder as minute and second marks
Party No. 6: Labtronics type 21 time signal receiver on which broadcasted time signals were directly recorded
A Mercer spring chronometer was used part-time to record minute marks through a galv-channel
- (d) Communication: Crammond CTR25 transceiver
- (e) Power: 12 volt d.c. supply converted to 240 volt 50 Hz by means of a Labtronics inverter. No attempt was made to control the frequency.

Party No. 12 equipment comprised:

- (a) Two HS-10-Z, 2 Hz, vertical geophones
- (b) Two Carnegie-DTM Type TR-2 amplifiers
- (c) Two-channel strip-chart recorder with edge markers for radio time signals and chronometer seconds
- (d) Labtronics Type 21 time signal receiver, Labtronics crystal chronometer
- (e) Communications: Traeger 25 W transceiver
- (f) Power: 12V d.c. supplied by three 9-plate batteries.

Seismic Record Analysis

On completion of the survey, shot instants recorded by the ship and the three geophone spread parties were tabulated (Table 4). For any shot, the mean or most likely value was adopted as the time of detonation. The shot-instant accuracy was generally within the range ± 0.01 second. All recording parties read their seismic records in the field and then sent either the

originals or copies to BMR where they were subsequently re-read by two or three experienced observers. Travel-times were quoted to 0.1 second and an estimate was made of the quality and accuracy of the arrival according to the scales set out below.

<u>Quality</u>	<u>Accuracy</u>
Good = A	Arrival time estimated within ± 0.05 s = 1
Fair = B	" " " " ± 0.1 s = 2
Poor = C	" " " " ± 0.5 s = 3
	" " not known to be better than ± 0.5 s = 4

Table 5 contains the seismic travel-times and the travel-times corrected for water depth by replacing the sea water layer of 1.5 km/s velocity with an equivalent layer of 4.0 km/s.

The travel-time data can be plotted out in a number of configurations on the CSIRO CDC 3600 computer but the plots have not been included in this Record because of their bulk and diversity. Such plots are available through BMR on request as are copies of the card decks containing the basic seismic arrival information.

7. MARINE MAGNETIC PROFILING

Magnetometer traverses were carried out with the object of obtaining data which would assist in defining geological structures beneath the sea. The work was accomplished during idle time of the support ships M.V. Lahara and M.V. Sapphire, and when either of these vessels was transporting personnel and equipment to sites for the seismic survey. The 1 600 km of magnetic profiling carried out in this way, during 3 weeks of operation, involved 140 hours of recording.

Equipment

The equipment consisted of an Elsec proton magnetometer (type 592) tow fish, recording on a Leeds and Northrup Speedomax analogue pen recorder. A Littlemore digital to analogue converter was used. The analogue record was very noisy and reliance was placed mainly on the digital readout of the instrument, the values of which were marked on the analogue records every few minutes. The sensitivity of the analogue records was approximately 30 gammas/cm.

The power supply to the magnetometer was two 12V batteries which were continuously charged by a 1 kw Honda generator. The analogue recorder was driven from the ship's 240V supply.

Survey procedure

The ad hoc use of ship's time led to irregularities in traverse pattern and variations in density of coverage. Traverse plans were further complicated by the need to find overnight anchorages and by bad weather.

The position of the ship during traverses was determined by dead-reckoning and by taking bearings on coastal features by means of a hand compass.

At the worst, the accuracy of the method is believed to be about ± 2 km; this would be the case when the vessel was more than 30 km from the coast. Factors affecting accuracy included condition of the sea, currents, visibility, changes in magnetic declination, and reliability of the provisional maps available for the Gazelle Peninsula and neighbouring islands.

To eliminate magnetic interference by the ship, the magnetometer fish was towed 45 to 60 m behind the ship. Although the magnetic anomalies were generally quite large, the data were, nevertheless, corrected for diurnal variations using continuous recordings from Port Moresby Geophysical Observatory. The maximum daily variation recorded in Port Moresby was 75 gammas, and the average was about 40 gammas.

The adjustment of loop misclosures at crossing-points of traverses was complicated by the inaccuracies in navigation combined with high magnetic gradients. To make magnetic intensity values at traverse intersections agree, it was often necessary to make some positional adjustment (kept within the possible positioning error) of traverses. In view of the low sensitivity setting of the instrument, diurnal variation and instrumental drift were relatively unimportant, although some further adjustment was still required after the positional adjustment.

Plate 4 shows the magnetic traverse plan, and Plate 6 the total magnetic intensity and bathymetric profiles.

Plate 5 shows the total magnetic intensity contour map in absolute values: the interval between the solidly drawn contours is 100 gammas.

It is estimated that the accuracy of the amplitude of an anomaly on the contour plan, along the traverses is ± 20 gammas. However, the location of an anomaly may be in error by 1 or 2 km because of the relatively primitive navigation techniques used.

The regional magnetic elements in the New Guinea area (1968) are: declination 7°E , inclination -20 degrees, total magnetic intensity about 39 300 gammas.

Magnetic features

The following features may be noted from an initial examination of the magnetic data:

1. From a comparison of the total magnetic anomaly map with the bathymetric map it may be observed that the anomalies are smooth and broad where the water is deep, say in excess of 1 km.

Most of the positive and negative anomalies are found in pairs, the amplitude of the positive anomaly being higher than the negative. Some are elongated, and some are circular, positive and negative features. They could be explained by the presence of intrusive bodies or volcanic pipes, tabular or cylindrically shaped, and magnetized under influence of a near-horizontal field.

2. A series of elongated positive and negative anomalies with north-westerly strike is located west of Ulaputur, New Ireland. Using magnetized, vertical tabular bodies as models for intrusives preliminary computations show that the depths to the top of the intrusives are shallow and comparable to the sea depths.

3. The elongated anomalies show a break in continuity along the strike, suggesting the presence of a transverse fault approximately coinciding with the 400 000 longitude grid line.

4. Various circular positive-negative anomalies between Natava and the Duke of York Islands indicate the presence of volcanic pipes or craters; two pronounced anomalies suggesting volcanic pipes are located south of Watom Island, which itself is a volcano.

5. Between Killinwata and Natava, and north of Doilene (northwest Gazelle Peninsula) at the seaward boundary of the coral reef, a zone or strip of positive anomalies could probably be explained by the presence of a tabular body.

6. Plate 5 and the magnetic profiles on Plate 6 show a magnetic intensity decrease of the order of 400 gammas as the New Ireland coast is approached. The explanation of this effect is not clear. Either the susceptibility of the near-surface rocks of New Ireland is lower than the average for crustal material in the area, or the anomaly may be caused by a large, vertical tabular body similar to that found about 20 km to the south.

7. At the Duke of York Islands the surface rocks consist of quaternary limestones. The broad positive anomaly at the Duke of York Islands suggests the foundation of this island to be volcanic.

Detailed interpretations will be carried out later when more magnetic information becomes available farther west in the Bismarck Sea.

8. ACKNOWLEDGEMENTS

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TABLE 1
SHOT-POINT LOCATIONS
adjusted to the International Spheroid
(listed in chronological order)

Shot No.	Latitude				Longitude			Water dept. metres
	Deg.	Min.	Sec.	South	Deg.	Min.	Sec.	East
2	4	14	14		152	16	22	400
3	4	10	37		152	14	02	500
5	4	14	31		152	16	27	540
6	4	11	45		152	14	49	490
7	4	12	06		152	22	05	735
8	4	15	06		152	29	42	550
9	4	13	00		152	33	33	1000
10	4	12	56		152	38	36	540
A	4	15	49		152	11	54	134
B	4	17	30		152	11	47	141
C	4	17	04		152	13	35	236
D	4	15	30		152	13	16	240
11	4	10	15		152	06	47	324
12	4	05	18		152	06	34	167
13	4	09	21		152	01	28	175
14	4	10	04		151	57	54	275
15	4	15	01		151	54	54	287
16	4	10	17		151	49	58	426
17	4	10	18		151	42	34	721
18	4	07	40		151	37	34	704
20	4	13	14		151	27	33	419
19	4	10	34		151	33	25	43
44	3	33	03		151	56	57	427
36	5	01	42		152	10	27	221
35	4	58	20		152	21	30	2509
34	4	50	15		152	24	10	466
33	4	45	36		152	22	52	169
32	4	39	09		152	25	06	445

TABLE 1 (Cont'd)

Shot No.	Latitude				Longitude				Water Depth metres
	Deg.	Min.	Sec.	South	Deg.	Min.	Sec.	East	
31	4	33	27		152	25	06		421
30	4	26	10		152	22	19		203
21	4	18	46		152	23	45		413
22	4	13	21		152	22	18		470
23	4	06	10		152	23	29		541
24	3	59	06		152	23	03		1007
25	3	53	49		152	22	09		1514
27	3	45	26		152	23	40		383
26	3	50	10		152	21	34		1980
25A	3	54	30		152	18	55		1181
47	4	03	53		152	59	44		195
37	3	35	41		152	25	05		415
38	3	27	38		152	27	04		789
48	3	03	09		152	32	21		365
40	3	16	04		152	35	11		447
43	2	59	49		152	48	34		564

Shooting Stage

Shots

1

1 - 44 as listed above

2

36 - 24 " " "

3

27 - 43 " " "

TABLE 2
RECORDING STATION LOCATIONS AND PARTY OCCUPATION
(adjusted to the International Spheroid)

Station	Latitude			Longitude			Party No.		
	Deg.	Min.	Sec.	Deg.	Min.	Sec.	Stage 1	Stage 2	Stage 3
RBL	4	11	29	152	10	11	13	13	13
WAN	4	11	40	152	10	33	17	17	17
SUL	4	13	10	152	11	33	18	18	18
RAL	4	13	13	152	12	07	15	15	15
VUL	4	16	58	152	08	45	14	14	14
TAV	4	13	52	152	13	13	16	16	16
PRAED POINT	4	14	47	152	13	21	1		
WANGARAMUT	4	12	37	152	04	21	2		
LASSUL BAY	4	13	10	151	43	22	4		
DUKE OF YORK ISLANDS	4	13	17	152	26	02	5	5	5
KAMDARU PTY 6	4	12	25	152	41	02	6		
KAMDARU PTY 9	4	12	33	152	41	47		9	9
KILINWATA	4	15	45	151	51	08	7		
NATAVA	4	11	46	152	00	01	8		
KALILI	3	26	31	151	56	32	9		
MULIAMA	4	04	43	152	59	21	10	10	10
DOILENE	4	11	46	151	33	28	11		
WARANGOI	4	27	21	152	14	21	12	12	12
RAPOPO	4	20	50	152	19	25		1	
KAMBUBU	4	35	12	152	22	01		2	
NAMATANAI PTY 4	3	39	56	152	26	37		4	4
NAMATANAI PTY 2	3	39	54	152	26	20			2
SUM SUM	4	45	03	152	22	12		6	6
TALILIS	4	37	50	152	22	48		7	
KABANGA	4	26	37	152	21	24		8	8
ULAPUTUR	3	43	23	152	22	46		11	11
LONDOLOVIT	3	04	03	152	38	01			1
PALIE	3	11	36	152	36	24			7

TABLE 3
PARTY ORGANISATION

Party No.	Organisation	Personnel	Type of Equipment
1	BMR Canberra	E.J. Polak D. Tarlington	Geophone Spread
2	BMR Canberra	P.E. Mann E. Cifali	Geophone Spread
4	BMR Port Moresby	M. Ciszek	Willmore
5	Observatory Rabaul	R.F. Heming	Willmore
6	Observatory Rabaul	I.E. Smith	Willmore
7	BMR Canberra	P.T. Gregson	Willmore
8	University of Queensland	J.P. Webb G. Tweedale	Geophone Spread
9	Hawaii Institute of Geophysics	F. Campbell	Geophone Spread
10	Hawaii Institute of Geophysics	E. Murphy	Geophone Spread
11	BMR Port Moresby		Willmore
12	University of Queensland	E. Lauden	Willmore
13-18	Rabaul Observatory Seismic Network Stations		
Ship <u>Arcturus</u>	BMR Canberra	W.A. Wiebenga D. Morton	Shooting ship; Collins 100W transceiver; 4-ch. recorder; 12-geophone streamer; crystal clock, high-power blaster
Party 3			
Ship <u>Sapphire</u>	BMR Canberra	G. Hart	Elsec magnetometer
Base	BMR Canberra Observatory Rabaul	G.A.M. Taylor G.D. 'Addario N. Myers	150 W communication transceiver; 150W time signal trans- mitter; crystal clock
Survey	Lands of Survey Branch PNG Administration		Tellurometer Type IMRA2; theodolite, portable transceivers

TABLE 4
DETONATION TIMES OF SHOTS

Time is expressed in terms of the time signal broadcast by the Volcanological Observatory on 4990 KH₂ which was approximately Australian Eastern Standard Time.

A graph of the differences between the shot instant read by Party 3 compared with those read by Parties 1, 2, and 8 shows a distribution which is offset by about 7ms from zero i.e. the origin times read by parties 1, 2, and 8 are about 7 ms later than those of party 3. The delay is attributed to the shot instant timing equipment. This correction was then applied to the readings given by 1, 2, and 8. Generally a mean value was computed for each shot and adopted (see final column). However, in some cases when data from one party differed markedly, the records were re-examined and the figures eliminated from the calculation of the mean, if considered unreliable.

Shot No.	Date	Hours Min. Sec.			Milliseconds recorded by party				Accepted for calculation
					1	2	3 (SHIP)	8	
2	20 Oct	11	39	50	NR	NR	289	NR	289
3	"	14	39	50	NR	NR	210	NR	210
5	21 Oct	14	38	50	070	087	062	073	064
6	22 Oct	10	39	50	380	374	367	378	370
7	"	13	09	50	442	440	444	447	438
8	23 Oct	10	09	50	406	407	407	NR	402
9	"	12	09	50	587	586	586	591	582
10	"	15	09	51	175	179	175	183	173
OA	25 Oct	12	39	50	020	025	018	03	016
OB	"	14	09	50	051	052	050	054	046
OC	"	15	39	50	055	052	052	060	049
OD	"	16	39	50	208	102	203	208	202
11	26 Oct	07	09	50	102	088	109	NR	100
12	"	09	39	50	006	001	001	006	001
13	"	11	39	50	172	NR	230	174	167
14	"	15	09	50	225	222	NR	228	218
15	27 Oct	13	09	49	973	999	964	975	966
16	"	15	09	50	096	13	082	102	088
17	28 Oct	07	39	54	353	340	320	350	343
18	"	10	09	50	070	073	060	075	064
20	"	13	09	46	250	NR	228	246	241

TABLE 4 (Cont'd)

Shot No.	Date	Hours Min. Sec.			Milliseconds recorded by party				Accepted for calculation
					1	2	3 (SHIP)	8	
19	28 Oct	15	39	49	980	25	974	980	974
44	29 Oct	09	39	50	013	008	018	013	005
36	2 Nov	07	09	50	NR	125	128	122	120
35	"	09	39	50	NR	070	038	062	038
34	"	14	39	50	076	071	065	075	066
33	"	16	39	50	142	140	133	148	136
32	3 Nov	06	39	50	110	105	111	112	104
31	"	09	39	50	097	096	089	093	088
30	"	13	39	50	140	NR	131	141	133
21	"	16	09	50	039	035	029	039	030
22	4 Nov	06	39	50	140	142	137	14	135
23	"	08	39	50	394	383	391	394	388
24	"	10	39	50	187	166	165	18	165
25	"	12	39	50	152	150	147	153	145
27	9 Nov	08	09	50	NR	070	068	069	064
26	"	10	09	50	140	NR	137	140	134
25A	"	14	09	49	NR	NR	984	992	984
47	10 Nov	09	09	49	937	933	932	939	930
37	"	15	39	50	027	022	018	031	019
38	"	07	09	50	108	102	105	111	102
48	"	13	09	50	070	054	061	072	060
40	"	16	39	50	016	024	022	030	018
43	12 Nov	09	39	50	025	027	009	027	009

Shooting Stage	Shots as listed above
1	1 - 44
2	36 - 25
3	27 - 43

TABLE 5

SEISMIC ARRIVAL DATA

PAGE	SHOT-	PARTY	LOCATION	DELTA KM.	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MBL SEE
1	0A	1	PRAED 89	3,31	54,7	1,80 1,90	Z Z	GOOD 1 GOOD 1	1,81 1,91
1	0A	2	WANG 89	15,14	292,9	4,20 5,30	Z Z	GOOD 1 POOR 3	4,21 5,31
1	0A	8	NATAVA67	23,20	288,8	5,30 5,50 7,90	Z Z Z	GOOD 1 POOR 1 FAIR 3	5,31 5,51 7,91
1	0A	11	DOILNE67	71,69	278,8	14,00 15,80 20,00	Z Z Z	GOOD 2 POOR 2 FAIR 2	14,81 15,81 20,81
1	0A	12	WRNGO169	21,74	169,9	5,80 6,30 6,90	Z Z Z	GOOD 1 POOR 2 POOR 2	5,81 6,31 6,91
1	0A	13	RBL 89	8,41	838,9	2,80 4,40	Z Z	GOOD 2 FAIR 2	2,81 4,41
1	0A	14	VUL 89	6,20	258,8	2,40	Z	GOOD 2	2,81
1	0A	15	RAL 89	4,82	8,9	2,20	Z	GOOD 2	2,21
1	0A	16	TAV 89	4,35	34,2	1,80	Z	GOOD 2	1,81
1	0A	17	WAN 89	8,06	348,8	2,50 3,80	Z Z	GOOD 2 FAIR 2	2,51 3,81
1	0A	18	SUL 89	4,94	352,7	2,20	Z	GOOD 2	2,21
1	0B	1	PRAED 89	5,78	38,9	3,60	Z	GOOD 2	3,81
1	0B	2	WANG 89	16,41	303,2	4,40 6,40	Z Z	GOOD 2 POOR 2	4,41 6,41
1	0B	5	D.YORM69	27,50	78,8	6,30	Z	GOOD 2	6,51
1	0B	6	KAMDRU69	54,93	88,2	11,10 13,60 14,40	Z Z Z	FAIR 2 POOR 3 POOR 3	11,21 13,61 14,41
1	0B	7	KHATA 89	38,32	274,8	8,10 10,70 12,50	Z Z Z	GOOD 2 FAIR 3 FAIR 2	8,21 10,71 12,91
1	0B	8	NATAVA67	24,18	299,9	5,50	Z	GOOD 2	5,51
1	0B	11	DOILNE69	71,67	278,8	12,80 14,00 15,60 19,70 20,80 22,60	Z Z Z Z Z Z	GOOD 2 FAIR 2 FAIR 2 FAIR 2 FAIR 2 FAIR 2	12,81 14,81 15,81 19,71 20,81 22,81
1	0B	12	WRNGO169	18,79	169,3	4,70	Z	GOOD 1	4,71

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
	08	12				5,00	Z	FAIR 2	5,01
						5,20	Z	POOR 3	5,21
						6,00	Z	POOR 3	6,01
						6,50	Z	POOR 3	6,51
						7,00	Z	POOR 3	7,01
1	08	13	RBL 67	11,47	345,1	3,50	Z	GOOD 2	3,51
1	08	14	VUL 67	5,70	279,7	2,40	Z	GOOD 2	2,41
1	08	15	RAL 67	7,91	4,5	2,80	Z	GOOD 2	2,81
						4,10	Z	GOOD 2	4,11
1	08	16	TAV 67	7,18	21,7	2,50	Z	GOOD 2	2,51
						4,00	Z	GOOD 2	4,01
1	08	17	HAN 67	10,99	348,0	3,20	Z	GOOD 2	3,21
						4,30	Z	FAIR 2	4,31
1	08	18	SUL 67	7,99	857,0	3,20	Z	GOOD 2	3,21
1	0C	1	PRAED 67	4,24	354,8	1,70	Z	GOOD 2	1,67
						2,70	Z	GOOD 2	2,67
1	0C	2	HANG 67	18,93	295,6	5,00	Z	FAIR 2	4,97
						6,10	Z	POOR 3	6,07
1	0C	7	KHATA 67	41,59	273,8	8,60	Z	GOOD 2	8,57
						11,10	Z	FAIR 3	11,07
1	0C	8	NATAVA 67	26,93	291,3	6,10	Z	GOOD 1	6,07
						7,40	Z	POOR 2	7,37
1	0C	11	DOILNE 67	74,86	277,5	12,90	Z	FAIR 3	12,87
						14,20	Z	GOOD 2	14,17
						16,20	Z	POOR 3	16,17
						19,30	Z	POOR 3	19,27
						21,70	Z	FAIR 3	21,67
1	0C	12	WRNGD 167	19,01	175,7	4,70	Z	POOR 2	4,67
						5,20	Z	GOOD 1	5,17
						7,00	Z	POOR 2	6,07
1	0C	13	RBL 67	12,07	328,7	3,30	Z	GOOD 2	3,27
						5,00	Z	FAIR 2	4,97
1	0C	14	VUL 67	8,95	271,2	2,90	Z	GOOD 2	2,87
						4,20	Z	FAIR 2	4,17
1	0C	15	RAL 67	7,60	339,1	2,10	Z	GOOD 2	2,07
						4,10	Z	GOOD 2	4,07
1	0C	16	TAV 67	5,94	359,5	2,00	Z	GOOD 2	1,97
						2,60	Z	FAIR 2	2,57
1	0C	17	HAN 67	11,44	330,6	3,10	Z	FAIR 2	3,07
						4,70	Z	FAIR 2	4,67
1	0C	18	SUL 67	8,12	332,5	2,90	Z	GOOD 2	2,87

PAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MBL SEC
	DC	18				4,60	Z	FAIR 2	4,87
1	OD	1	PRAED 57	1,33	7,0	0,70	Z	GOOD 1	1,87
1	OD	2	WANG 57	17,32	287,0	4,50 5,00	Z Z	GOOD 2 POOR 2	4,87 4,97
1	OD	8	NATAVA 57	25,46	285,7	5,30 5,60 7,00	Z Z Z	POOR 3 POOR 3 FAIR 2	5,27 5,57 6,97
1	OD	11	DOILNE 57	73,96	279,3	12,00 14,90 16,00 17,10 22,80 28,40	Z Z Z Z Z Z	FAIR 2 POOR 3 POOR 3 POOR 3 POOR 3 POOR 3	11,97 14,87 15,97 17,87 22,77 28,57
1	OD	12	WRNGO 57	21,94	174,7	5,20 5,80 7,10	Z Z Z	GOOD 1 POOR 2 POOR 2	5,37 5,77 7,87
1	OD	13	RBL 57	9,35	328,5	3,70 4,70	Z Z	GOOD 2 FAIR 2	3,87 4,87
1	OD	14	VUL 57	8,79	252,1	3,00 4,50	Z Z	FAIR 2 GOOD 2	2,97 4,47
1	OD	15	RAL 57	4,72	838,2	1,60 2,00	Z Z	GOOD 2 GOOD 2	1,97 1,97
1	OD	16	TAV 57	3,01	858,2	1,20	Z	GOOD 2	1,37
1	OD	17	WAN 57	8,68	324,6	2,60	Z	FAIR 2	2,97
1	OD	18	SUL 57	5,35	323,7	2,00	Z	GOOD 2	1,97
1	2	2	WANG 57	22,43	277,6	5,60 8,20	Z Z	FAIR 2 POOR 3	5,50 8,10
1	2	7	KHATA 57	46,77	268,5	10,00 11,30	Z Z	GOOD 2 POOR 3	9,90 11,80
1	2	8	NATAVA 57	30,60	278,5	6,70	Z	GOOD 2	6,80
1	2	12	WRNGO 57	24,47	188,0	5,90	Z	GOOD 1	5,80
1	2	15	RBL 57	12,52	294,0	4,00	Z	GOOD 2	3,90
1	2	15	RAL 57	8,09	288,4	2,90	Z	GOOD 2	2,80
1	2	16	TAV 57	5,88	276,5	2,20	Z	GOOD 2	2,10
1	2	17	WAN 57	11,77	293,8	3,80 4,60	Z Z	GOOD 2 FAIR 2	3,70 4,90
1	2	18	SUL 57	9,13	288,5	3,50	Z	GOOD 2	3,40
1	3	2	WANG 57	18,28	258,4	4,80	Z	FAIR 3	4,86

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM HSL SEC
	3	2				5,70	Z	POOR 3	5,36
1	3	7	KWATA 59	43,40	259,4	8,80 9,60 11,30	Z Z Z	GOOD 2 POOR 3 POOR 3	8,86 9,86 11,86
1	3	8	NATAVA69	26,01	269,3	5,90 6,30 6,60	Z Z Z	GOOD 1 POOR 2 POOR 2	5,96 6,26 6,46
1	3	12	WRNGO159	30,84	170,9	7,00	Z	GOOD 1	6,86
1	3	13	RBL 59	7,28	259,5	2,60	Z	GOOD 2	2,46
1	3	15	RAL 59	5,95	210,5	2,30	Z	GOOD 2	2,16
1	3	16	TAV 59	6,17	194,2	2,40	Z	GOOD 2	2,26
1	3	17	WAN 59	6,72	258,5	2,40	Z	GOOD 2	2,26
1	5	1	PRAED 59	5,74	269,1	2,40	Z	GOOD 1	2,24
1	5	2	WANG 59	22,64	270,9	5,80 6,10	Z Z	GOOD 2 POOR 3	5,84 5,94
1	5	4	LAS, B, 59	61,27	272,3	11,10 19,50	Z Z	POOR 4 POOR 4	10,94 19,34
1	5	6	KAMDRU69	45,66	89,2	9,60 13,90	Z Z	GOOD 3 POOR 4	9,84 13,74
1	5	7	KWATA 59	46,88	269,2	9,60 14,00	Z Z	GOOD 2 FAIR 3	9,84 13,84
1	5	8	NATAVA59	30,81	270,5	6,80 7,30	Z Z	GOOD 1 POOR 3	6,84 7,14
1	5	11	DOILNE69	79,69	275,6	14,30 15,00 17,60 23,20	Z Z Z Z	GOOD 2 GOOD 2 GOOD 2 GOOD 2	14,34 14,84 17,44 23,04
1	5	12	WRNGO159	23,97	189,3	5,00 5,70 7,50	Z Z Z	GOOD 1 GOOD 1 GOOD 1	4,84 5,34 7,34
1	5	13	RBL 59	12,86	299,0	3,80 6,20	Z Z	GOOD 2 FAIR 2	3,84 6,04
1	5	15	RAL 59	8,36	286,7	2,80	Z	GOOD 2	2,64
1	5	16	TAV 59	6,09	281,3	2,30	Z	GOOD 2	2,24
1	5	17	WAN 59	12,12	299,0	3,50 5,10	Z Z	GOOD 2 GOOD 2	3,34 4,94
1	5	18	SUL 59	9,39	289,4	3,20	Z	GOOD 2	3,04
1	6	1	PRAED 59	6,21	209,9	2,50	Z	GOOD 1	2,37

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FRBM MSL SEC
1	6	2	WANG 67	19,63	269,2	4,90 5,60 6,30	Z Z Z	GOOD 1 FAIR 2 POOR 3	4,77 5,47 6,17
1	6	4	LAS,B,67	58,27	269,4	10,80	Z	GOOD 2	10,67
1	6	5	D,YORK67	20,95	97,8	5,10	Z	GOOD 2	4,97
1	6	6	KAMDRU67	48,53	91,5	10,60 14,20	Z Z	GOOD 2 POOR 3	10,47 14,87
1	6	7	KHATA 67	44,43	260,4	8,90 9,70 14,70	Z Z Z	GOOD 2 FAIR 2 FAIR 2	8,77 9,57 14,57
1	6	8	NATAVA67	27,38	269,9	6,10	Z	GOOD 1	5,97
1	6	11	DOILNE67	76,52	269,9	13,50 14,60 17,70 20,10 20,60 21,90	Z Z Z Z Z Z	GOOD 2 FAIR 3 FAIR 3 POOR 3 FAIR 3 POOR 3	13,37 14,47 17,57 19,97 20,47 21,77
1	6	12	WRNGOI67	28,77	181,7	6,40 6,70 7,50 9,00	Z Z Z Z	FAIR 1 GOOD 1 POOR 2 POOR 2	5,27 6,57 7,37 8,87
1	6	13	RBL 67	8,58	278,4	2,90	Z	GOOD 2	2,77
1	6	15	RAL 67	5,68	241,6	2,20	Z	GOOD 2	2,07
1	6	16	TAV 67	4,91	217,2	2,00	Z	GOOD 2	1,87
1	6	17	WAN 67	7,90	271,2	2,50	Z	GOOD 2	2,37
1	6	18	SUL 67	6,58	246,7	2,50	Z	GOOD 2	2,87
1	7	1	PRAED 67	16,90	253,0	4,50 6,20 8,10	Z Z Z	GOOD 2 POOR 4 POOR 4	4,27 5,97 7,87
1	7	2	WANG 67	32,82	268,3	7,00 7,20 7,90 8,30	Z Z Z Z	FAIR 1 GOOD 1 POOR 2 POOR 2	6,77 6,97 7,67 8,87
1	7	4	LAS,B,67	71,69	268,4	13,10 14,90 16,40 19,30	Z Z Z Z	GOOD 3 FAIR 3 POOR 3 FAIR 3	12,87 14,67 16,17 19,07
1	7	5	D,YORK67	7,63	106,6	2,10 8,60	Z Z	GOOD 2 POOR 3	1,87 8,87
1	7	6	KAMDRU67	35,07	91,0	7,90 9,70 12,70	Z Z Z	GOOD 2 POOR 4 POOR 4	7,67 9,47 12,47

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SE8
1	7	7	KWATA 67	57,66	263,3	10,90 20,10	Z Z	GOOD 2 POOR 3	10,87 19,87
1	7	8	NATAVA 67	40,84	278,9	8,10 8,40	Z Z	GOOD 1 GOOD 1	7,87 8,17
1	7	10	MLIAMA 67	70,30	78,9	13,80 14,90	Z Z	FAIR 3 POOR 3	13,37 14,67
1	7	11	DOILNE 67	89,97	278,4	15,40 16,80 17,80 23,60 24,40 28,10	Z Z Z Z Z Z	GOOD 2 FAIR 3 FAIR 3 POOR 3 FAIR 3 POOR 3	15,17 16,37 17,37 23,37 24,17 27,87
1	7	12	WRNGO 167	31,54	207,0	6,80 7,40 7,90 9,50 10,40	Z Z Z Z Z	GOOD 1 FAIR 2 FAIR 2 POOR 2 POOR 2	6,37 7,17 7,67 9,27 10,17
1	7	13	RBL 67	2,05	273,0	5,20 11,30	Z Z	GOOD 2 GOOD 2	4,97 11,87
1	7	15	RAL 67	18,56	263,7	4,60 8,40 11,60	Z Z Z	GOOD 2 GOOD 2 GOOD 2	4,37 8,17 11,37
1	7	16	TAV 67	16,74	258,8	4,30 8,50 10,60	Z Z Z	GOOD 2 FAIR 2 FAIR 2	4,87 8,27 10,37
1	7	17	WAN 67	21,37	272,2	4,90 8,50	Z Z	GOOD 2 FAIR 2	4,87 8,27
1	7	18	SUL 67	19,59	264,3	4,80	Z	GOOD 2	4,37
1	8	1	PRAED 67	30,25	271,1	6,70 7,00	Z Z	GOOD 1 POOR 2	6,24 6,84
1	8	2	HANG 67	47,12	275,6	9,70	Z	GOOD 2	9,54
1	8	4	LAS, B, 67	85,82	272,4	16,00	Z	POOR 3	15,84
1	8	6	KANDRU 67	21,55	76,7	5,90 9,00 12,10	Z Z Z	GOOD 2 POOR 3 FAIR 2	5,74 8,84 11,94
1	8	7	KWATA 67	71,35	269,0	12,80 15,10 18,60	Z Z Z	GOOD 2 POOR 3 POOR 3	12,64 14,94 18,44
1	8	11	DOILNE 67	104,23	273,4	17,50 18,50 19,90 24,00 26,10	Z Z Z Z Z	GOOD 2 FAIR 2 FAIR 3 FAIR 3 POOR 3	17,34 18,34 19,74 23,84 25,94

TAGE	SPOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MS, SEC
1	8	12	WRNGO159	36,26	235,5	7,60	Z	GOOD 1	7,44
						7,30	Z	POOR 2	7,74
						8,70	Z	POOR 2	8,54
						9,60	Z	POOR 2	9,44
						10,70	Z	POOR 2	10,54
1	8	13	RBL 69	36,71	288,9	7,50	Z	GOOD 2	7,34
1	8	14	VUL 69	38,92	264,9	8,20	Z	GOOD 2	8,04
						9,60	Z	GOOD 2	9,44
1	8	15	RAL 69	32,72	276,1	6,80	Z	GOOD 2	6,64
1	8	16	TAV 69	30,59	274,3	6,50	Z	GOOD 2	6,34
						8,60	Z	FAIR 2	8,44
						9,60	Z	FAIR 2	9,44
1	8	17	HAN 69	36,00	288,2	7,20	Z	GOOD 2	7,04
						7,70	Z	FAIR 2	7,54
1	8	18	SUL 69	33,76	276,2	7,20	Z	GOOD 2	7,04
1	9	1	PRAED 69	37,50	265,0	8,60	Z	GOOD 2	8,26
1	9	2	WANG 69	54,02	270,7	11,40	Z	POOR 3	11,06
						12,90	Z	POOR 3	12,56
1	9	4	LAS,B:69	92,86	260,0	16,70	Z	GOOD 2	16,36
						18,60	Z	FAIR 3	18,26
						22,30	Z	POOR 4	21,96
1	9	5	D,YORK69	13,90	267,0	6,10	Z	GOOD 2	5,76
						7,40	Z	POOR 3	7,06
1	9	6	KAMDRU69	13,90	89,0	4,60	Z	GOOD 2	4,26
						5,20	Z	FAIR 3	4,86
1	9	7	KWATA 69	78,63	266,3	14,60	Z	GOOD 2	14,26
						17,20	Z	GOOD 2	16,86
1	9	8	NATAVA69	62,07	272,1	12,20	Z	GOOD 2	11,06
1	9	11	DOILNE69	111,19	271,1	19,10	Z	GOOD 2	18,76
						21,70	Z	FAIR 3	21,36
						23,60	Z	FAIR 3	23,26
						25,30	Z	FAIR 2	24,96
1	9	12	WRNGO169	44,27	235,3	9,50	Z	GOOD 1	9,16
						9,80	Z	POOR 2	9,46
						10,30	Z	POOR 2	9,96
						12,20	Z	FAIR 2	11,06
1	9	13	RBL 69	43,31	273,7	9,20	Z	GOOD 2	8,86
1	9	14	VUL 69	46,47	266,9	10,10	Z	GOOD 2	9,76
						11,50	Z	FAIR 2	11,16
1	9	15	RAL 69	39,65	260,4	8,60	Z	GOOD 2	8,26

NO	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM HSL SEC
1	9	16	TAV 67	37,65	269,3	8,20 9,00	Z Z	GOOD 2 FAIR 2	7,86 8,66
1	9	17	HAN 67	42,62	273,3	9,00	Z	GOOD 2	8,66
1	9	18	SUL 67	40,69	269,6	8,80	Z	GOOD 2	8,46
1	10	1	PRAED 67	46,64	269,8	10,30 11,50	Z Z	GOOD 2 POOR 3	10,15 11,35
1	10	2	WANG 67	63,37	270,5	12,80 20,10	Z Z	POOR 4 POOR 3	12,05 19,95
1	10	4	LAS.B.67	102,22	269,7	17,90 21,30	Z Z	POOR 4 POOR 4	17,75 21,15
1	10	5	D.YORK67	23,26	268,4	5,80 8,40 11,60	Z Z Z	GOOD 2 POOR 3 POOR 3	5,65 8,25 11,45
1	10	6	KAMDRU67	4,60	78,2	2,30 9,40 10,50	Z Z Z	GOOD 2 POOR 4 POOR 4	2,15 9,25 10,35
1	10	7	KWATA 67	87,98	266,6	16,30 19,60 22,00 24,60	Z Z Z Z	GOOD 2 FAIR 3 FAIR 3 POOR 3	16,15 19,45 21,85 24,45
1	10	8	NATAVA67	71,42	271,7	14,20 18,20	Z Z	FAIR 2 GOOD 2	14,05 18,05
1	10	10	MLIAMA67	41,28	68,5	9,00 10,20 10,60	Z Z Z	GOOD 1 FAIR 2 POOR 2	8,85 10,85 10,45
1	10	11	DOILNE67	120,55	271,0	20,90 24,80 26,60	Z Z Z	GOOD 2 FAIR 3 FAIR 2	20,75 24,65 26,45
1	10	12	WRNGOI67	52,14	239,3	11,10 11,30 12,30 13,30 13,60	Z Z Z Z Z	POOR 2 GOOD 1 FAIR 2 FAIR 2 POOR 2	10,95 11,15 12,15 13,15 13,45
1	10	13	RBL 67	52,64	272,9	10,70 18,00 17,70	Z Z Z	FAIR 2 FAIR 3 FAIR 2	10,55 17,85 17,55
1	10	14	VUL 67	55,75	262,3	11,70 18,00	Z Z	GOOD 2 GOOD 2	11,55 17,85
1	10	15	RAL 67	49,01	269,4	10,30 14,70 16,50	Z Z Z	GOOD 2 FAIR 3 FAIR 2	10,15 14,55 16,35
1	10	16	TAV 67	47,01	267,9	10,00 13,10	Z Z	GOOD 2 FAIR 2	9,85 12,95

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MSL SEC
	10	16				15,90	Z	FAIR 2	15,75
1	10	17	WAN 67	51,96	272,6	13,70 15,40	Z Z	FAIR 2 FAIR 2	13,35 15,25
1	10	18	SUL 67	50,09	269,5	8,00	Z	FAIR 2	7,85
1	11	1	PRAED 67	14,76	124,5	4,10	Z	GOOD 1	4,84
1	11	2	WANG 67	6,26	225,7	2,30	Z	GOOD 1	2,24
1	11	4	LAS,B,67	43,66	262,9	8,70	Z	GOOD 2	8,64
1	11	5	D,YORK67	36,08	98,9	7,30	Z	GOOD 2	7,24
1	11	6	KAMDRU67	63,52	93,6	12,90 15,40	Z Z	GOOD 2 POOR 4	12,84 15,34
1	11	7	KWATA 67	30,66	250,7	6,80 10,90 13,80	Z Z Z	GOOD 2 FAIR 3 FAIR 3	6,74 10,64 13,74
1	11	10	MLIAMA67	97,84	84,8	17,30	Z	POOR 4	17,24
1	11	11	DOILNE67	61,70	267,4	11,10 12,60 14,60 17,60 19,60 20,00	Z Z Z Z Z Z	GOOD 2 POOR 3 FAIR 2 FAIR 2 POOR 3 POOR 3	11,84 12,34 14,34 17,34 19,34 19,94
1	11	12	WRNGO167	34,50	156,8	7,40 7,90 8,40	Z Z Z	FAIR 2 GOOD 1 POOR 2	7,34 7,84 8,34
1	11	13	RBL 67	6,71	109,7	2,40	Z	GOOD 2	2,34
1	11	14	VUL 67	12,91	163,6	3,60	Z	GOOD 2	3,34
1	11	15	RAL 67	11,29	119,8	6,20 4,30	Z Z	GOOD 2 FAIR 2	6,14 4,24
1	11	16	TAV 67	13,65	119,3	3,60 5,80	Z Z	GOOD 2 GOOD 2	3,34 5,74
1	11	17	WAN 67	7,49	118,4	2,40	Z	GOOD 2	2,34
1	11	18	SUL 67	10,34	121,3	3,20	Z	GOOD 2	3,14
1	12	1	PRAED 67	21,52	144,3	5,50	Z	GOOD 2	5,30
1	12	2	WANG 67	14,09	196,8	4,30	Z	GOOD 1	4,30
1	12	4	LAS,B,67	45,31	251,3	9,50 10,00 10,80 12,80	Z Z Z Z	GOOD 2 FAIR 2 POOR 3 POOR 3	9,30 10,80 10,80 12,80
1	12	5	D,YORK67	38,93	112,2	8,20	Z	GOOD 2	8,20

TAGE	SHOT	PARTY	LOCATION	DELTA KM	ALTIMETER	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
	12	5				9,10	Z	FAIR 5	9,10
						11,70	Z	POOR 3	11,70
1	12	6	KAMPONG 67	65,13	101,5	12,50	Z	GOOD 2	12,50
						14,80	Z	POOR 3	14,80
						14,70	Z	FAIR 2	14,70
						15,60	Z	POOR 3	15,60
1	12	7	KWATA 67	34,43	234,0	7,60	Z	GOOD 2	7,60
						10,70	Z	POOR 3	10,70
						12,90	Z	POOR 3	12,90
						18,30	Z	POOR 3	18,30
1	12	8	NATAYA 67	16,98	229,5	4,50	Z	GOOD 1	4,50
1	12	11	BOILNE 67	67,39	259,0	11,40	Z	GOOD 2	11,40
						12,30	Z	GOOD 2	12,30
						13,20	Z	POOR 3	13,20
						14,20	Z	GOOD 2	14,20
						17,00	Z	GOOD 2	17,00
						18,50	Z	POOR 3	18,50
1	12	12	KRANGO 67	43,12	168,5	9,90	Z	GOOD 2	9,90
1	12	13	REL 67	13,21	148,4	4,10	Z	GOOD 2	4,10
1	12	14	VUL 67	21,88	169,4	5,50	Z	GOOD 2	5,50
1	12	15	RAL 67	17,84	144,8	4,70	Z	GOOD 2	4,70
						6,20	Z	FAIR 2	6,20
1	12	16	TAV 67	20,02	142,0	5,00	Z	GOOD 2	5,00
1	12	17	HAN 67	13,84	147,8	4,00	Z	GOOD 2	4,00
1	12	18	SUL 67	17,18	147,5	4,50	Z	GOOD 2	4,50
						5,60	Z	GOOD 2	5,60
1	13	1	PRAC 67	24,18	114,5	5,80	Z	GOOD 1	5,80
						6,50	Z	FAIR 2	6,50
1	13	4	LAS, B, 67	34,23	258,1	7,30	Z	GOOD 2	7,30
						13,10	Z	FAIR 3	13,10
1	13	5	D, YORK 67	46,05	96,1	9,60	Z	GOOD 2	9,60
						11,90	Z	POOR 3	11,90
						13,60	Z	FAIR 2	13,60
						15,80	Z	POOR 3	15,80
1	13	6	KAMPONG 67	73,45	94,5	14,30	Z	GOOD 2	14,30
						15,40	Z	POOR 4	15,40
						16,00	Z	POOR 4	16,00
						19,40	Z	POOR 4	19,40
1	13	7	KWATA 67	22,46	238,2	5,30	Z	GOOD 2	5,30
						9,90	Z	FAIR 3	9,90
1	13	8	NATAYA 67	5,20	210,9	2,00	Z	GOOD 1	2,00

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
1	13	11	DOILNE67	52,00	265,1	9,50 11,00 13,00 20,80 21,40	Z Z Z Z Z	GOOD 2 POOR 3 FAIR 3 FAIR 3 POOR 3	9,50 11,00 13,00 20,80 21,40
1	13	12	WRNGO167	40,87	144,3	8,30 8,80	Z Z	FAIR 1 GOOD 1	8,30 8,80
1	13	13	RBL 67	16,62	103,7	4,30	Z	GOOD 2	4,30
1	13	14	VUL 67	19,47	136,2	4,80	Z	GOOD 2	4,80
1	13	15	RAL 67	20,17	109,9	4,90 7,00	Z Z	GOOD 2 FAIR 2	4,90 7,00
1	13	16	TAV 67	23,29	111,0	5,10 6,00 7,20	Z Z Z	GOOD 2 FAIR 2 FAIR 2	5,10 6,00 7,20
1	13	17	WAN 67	17,35	104,2	4,30	Z	GOOD 2	4,30
1	13	18	SUL 67	19,96	110,6	4,80 5,60	Z Z	GOOD 2 FAIR 2	4,80 5,60
1	14	1	PRAED 67	29,88	106,9	6,60	Z	GOOD 1	6,96
1	14	2	WANG 67	12,83	111,6	3,50	Z	FAIR 1	3,46
1	14	4	LAS,B,67	27,52	258,0	5,90 7,00 10,50	Z Z Z	GOOD 2 POOR 3 POOR 3	5,86 6,96 10,46
1	14	5	D,YORK67	52,39	96,5	10,10 17,40	Z Z	GOOD 2 POOR 3	10,86 17,36
1	14	6	KAPDRU67	79,92	93,1	15,20 16,40 17,00 19,40	Z Z Z Z	GOOD 2 POOR 3 FAIR 2 POOR 4	15,16 16,36 16,96 19,36
1	14	7	KWATA 67	16,34	230,0	4,00	Z	GOOD 2	3,96
1	14	8	NATAVA67	5,02	128,7	1,90	Z	GOOD 1	1,86
1	14	11	DOILNE67	45,33	266,0	8,50 9,50 13,20 14,90	Z Z Z Z	GOOD 2 POOR 3 FAIR 3 POOR 3	8,46 9,46 13,16 14,86
1	14	12	WRNGO167	44,07	136,3	8,80 9,00 10,20	Z Z Z	FAIR 2 GOOD 1 POOR 2	8,76 8,96 10,16
1	14	13	RBL 67	22,88	96,5	5,40	Z	GOOD 2	5,36
1	14	14	VUL 67	23,75	122,4	5,50	Z	GOOD 2	5,46
1	14	15	PAL 67	26,93	102,5	5,80	Z	GOOD 2	5,76

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
1	14	16	TAV 67	29,18	103,9	6,10	Z	GOOD 2	6,86
1	14	17	WAN 67	23,58	97,2	5,20	Z	GOOD 2	5,16
1	14	18	SUL 67	25,89	102,8	6,80	Z	GOOD 2	6,76
1	15	1	PRAED 67	34,13	89,3	8,70 9,40	Z Z	FAIR 3 FAIR 3	8,65 9,35
1	15	2	WANG 67	18,03	79,8	4,00 4,40	Z Z	GOOD 1 POOR 2	3,95 4,35
1	15	4	LAS, B. 67	21,64	279,1	5,10 8,60	Z Z	GOOD 2 FAIR 3	5,85 8,75
1	15	5	D. YORK 67	57,69	86,8	11,20 12,00 12,30 13,00	Z Z Z Z	POOR 3 GOOD 2 POOR 3 POOR 3	11,15 11,35 12,25 12,95
1	15	6	KAMDRO 67	85,48	86,8	16,60 16,90 17,20 21,00	Z Z Z Z	FAIR 2 GOOD 2 POOR 3 POOR 3	16,55 16,85 17,15 20,95
1	15	7	KWATA 67	7,10	258,9	2,60 3,90 5,90 13,80	Z Z Z Z	GOOD 2 FAIR 3 POOR 3 POOR 3	2,55 3,85 5,45 13,75
1	15	8	NATAYA 67	11,20	59,7	3,80	Z	GOOD 1	3,75
1	15	11	DOILNE 67	40,12	278,6	7,50 9,20 10,90 13,50 15,00 16,30	Z Z Z Z Z Z	GOOD 2 POOR 3 POOR 3 POOR 3 FAIR 3 POOR 3	7,45 9,15 10,85 13,45 14,95 16,25
1	15	12	WRNGOI 67	42,56	122,3	9,10 9,90	Z Z	GOOD 1 POOR 2	9,85 9,85
1	15	13	RBL 67	29,02	77,0	7,00	Z	GOOD 2	6,95
1	15	14	VUL 67	25,85	98,0	6,60 8,30	Z Z	GOOD 2 FAIR 2	6,55 8,25
1	15	15	RAL 67	32,02	84,1	7,50	Z	GOOD 2	7,45
1	15	16	TAV 67	33,94	86,4	7,70 8,60	Z Z	GOOD 2 FAIR 2	7,45 8,55
1	15	17	WAN 67	29,60	77,9	7,00	Z	GOOD 2	6,95
1	15	18	SUL 67	30,99	83,7	7,10 8,70	Z Z	GOOD 2 FAIR 2	7,35 8,65
1	16	1	PRAED 67	44,07	100,8	10,70 11,10	Z Z	POOR 3 FAIR 3	10,59 10,99

DATE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
1	16	2	WANG 67	26,93	99,2	6,20 6,50	Z Z	GOOD 1 POOR 1	6,89 6,39
1	16	4	LAS,B,67	13,31	246,6	3,30 6,10	Z Z	GOOD 2 POOR 4	3,19 5,99
1	16	5	D.YORK 67	66,98	94,7	12,40 13,10 13,90 15,60	Z Z Z Z	GOOD 2 POOR 3 FAIR 2 POOR 3	12,29 12,99 13,79 15,49
1	16	6	KAMDRU 67	94,59	92,4	17,60 21,80	Z Z	GOOD 2 FAIR 3	17,49 21,69
1	16	7	KWATA 67	10,31	167,8	2,90 4,50 6,30	Z Z Z	GOOD 2 POOR 2 FAIR 2	2,79 4,39 6,19
1	16	8	NATAVA 67	18,81	98,3	4,80 5,00	Z Z	GOOD 1 POOR 2	4,69 4,89
1	16	10	MLIAMA 67	128,83	85,5	23,00	Z	FAIR 3	22,89
1	16	11	DOILNE 67	30,64	264,9	6,10 7,90 9,70 10,40 11,20 13,10	Z Z Z Z Z Z	GOOD 2 FAIR 3 FAIR 3 POOR 3 POOR 3 FAIR 3	5,99 7,79 9,59 10,29 11,09 12,99
1	16	12	WRNGOI 67	55,01	124,9	10,90 12,70	Z Z	GOOD 1 POOR 2	10,79 12,59
1	16	13	RBL 67	37,50	93,4	8,10	Z	GOOD 2	7,99
1	16	14	VUL 67	36,87	109,5	8,00	Z	GOOD 2	7,89
1	16	15	RAL 67	41,35	97,5	8,50	Z	FAIR 2	8,39
1	16	16	TAV 67	43,53	98,7	9,00 9,40	Z Z	GOOD 2 FAIR 2	8,89 9,29
1	16	17	WAN 67	38,18	93,8	8,10	Z	GOOD 2	7,99
1	16	18	SUL 67	40,31	97,6	8,40	Z	GOOD 2	8,29
1	17	1	PRAED 67	57,55	98,3	10,90 15,00	Z Z	POOR 4 POOR 4	10,68 14,76
1	17	2	WANG 67	40,53	96,1	8,00 8,60	Z Z	GOOD 1 POOR 1	7,78 8,38
1	17	4	LAS,B,67	5,49	164,6	1,90 4,10 10,50	Z Z Z	GOOD 3 POOR 3 POOR 4	1,68 3,88 10,28
1	17	6	KAMDRU 67	106,25	92,1	19,00 19,60 21,10	Z Z Z	GOOD 2 POOR 3 POOR 4	18,78 19,38 20,88

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM RSL SEC
	17	6				24,20	Z	POOR 4	23,98
1	17	7	KWATA 69	18,78	122,4	4,20 5,50 7,90	Z Z Z	GOOD 2 POOR 3 POOR 3	3,98 5,28 7,68
1	17	8	NATAVA 69	32,40	94,8	6,50	Z	GOOD 1	6,28
1	17	11	DOILNE 69	17,07	268,8	3,90 4,50 5,20 7,10 8,20 9,20	Z Z Z Z Z Z	GOOD 2 POOR 3 POOR 3 POOR 3 POOR 3 POOR 3	3,68 4,28 4,98 6,88 7,98 8,98
1	17	12	KRNGOI 69	66,68	118,2	11,20 13,30 15,30 18,60	Z Z Z Z	GOOD 1 POOR 2 POOR 2 POOR 2	10,98 13,88 15,08 18,38
1	17	13	RBL 69	51,15	92,5	9,80 11,50 12,40 14,20	Z Z Z Z	GOOD 2 FAIR 2 FAIR 2 FAIR 2	9,58 11,28 12,18 13,98
1	17	14	VUL 69	49,96	104,3	9,70 11,30	Z Z	GOOD 2 FAIR 3	9,48 11,08
1	17	15	RAL 69	54,93	95,6	10,10	Z	GOOD 2	9,88
1	17	16	TAV 69	57,08	96,7	10,60 13,60 15,00	Z Z Z	GOOD 2 FAIR 2 FAIR 2	10,38 13,38 14,78
1	17	17	WAN 69	51,82	92,8	9,90	Z	GOOD 2	9,68
1	17	18	SUL 69	53,88	95,7	6,50	Z	FAIR 2	6,28
1	18	1	PRAED 69	67,51	101,2	11,40 12,70 14,40	Z Z Z	POOR 4 POOR 4 POOR 4	11,18 12,48 14,18
1	18	2	WANG 69	50,40	100,5	9,40	Z	FAIR 2	9,18
1	18	4	LAS, B: 69	14,75	133,4	3,40 4,70	Z Z	GOOD 2 FAIR 3	3,18 4,48
1	18	6	KAMDRU 69	117,77	94,3	19,50 21,20 25,20	Z Z Z	FAIR 2 FAIR 2 POOR 3	19,28 20,98 24,08
1	18	7	KWATA 69	29,21	120,7	5,80 8,40 10,50	Z Z Z	GOOD 2 FAIR 2 FAIR 3	5,58 8,18 10,28
1	18	8	NATAVA 69	42,23	100,3	8,20 9,30	Z Z	GOOD 1 POOR 2	7,98 9,08
1	18	11	DOILNE 69	10,72	225,1	2,30	Z	GOOD 2	2,08

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
	18	11				4,20 4,80 6,70	Z Z Z	POOR 3 POOR 3 POOR 3	3,98 4,58 6,48
1	18	12	WRNGO167	77,14	118,1	11,90 15,50	Z Z	POOR 3 POOR 3	11,68 15,28
1	18	13	RBL 67	60,77	96,7	11,40 15,50	Z Z	GOOD 2 FAIR 3	11,18 15,28
1	18	14	VUL 67	60,18	106,5	10,90 15,40	Z Z	GOOD 2 GOOD 2	10,68 15,18
1	18	15	RAL 67	64,75	99,1	12,20	Z	FAIR 2	11,98
1	18	16	TAV 67	66,95	99,9	12,50 13,10 14,60 16,00	Z Z Z Z	FAIR 2 GOOD 2 FAIR 2 FAIR 2	12,28 12,88 14,38 15,78
1	18	17	HAN 67	61,47	96,9	11,40 12,20	Z Z	GOOD 2 FAIR 2	11,18 11,98
1	19	1	PRAED 67	74,31	96,0	12,00 13,10	Z Z	POOR 3 POOR 3	11,90 13,80
1	19	2	HANG 67	57,38	93,8	10,40	Z	FAIR 2	10,80
1	19	4	LAS.B.67	19,02	104,6	4,50 4,90 6,10 7,70	Z Z Z Z	GOOD 2 POOR 2 POOR 2 FAIR 3	4,40 4,80 6,00 7,60
1	19	7	KWATA 67	34,17	106,3	6,50 10,50	Z Z	FAIR 3 POOR 3	6,40 10,40
1	19	8	NATAYA67	49,29	92,6	9,10 9,90	Z Z	GOOD 1 FAIR 2	9,00 9,80
1	19	11	DOILNE67	2,23	177,4	0,50 1,40 2,60 6,30	Z Z Z Z	GOOD 2 POOR 3 POOR 3 FAIR 3	0,40 1,30 2,50 6,20
1	19	12	WRNGO167	81,83	112,2	14,00 15,60 16,70	Z Z Z	GOOD 1 FAIR 1 POOR 3	13,90 15,50 18,60
1	19	13	RBL 67	68,08	91,7	12,10 12,80 14,50	Z Z Z	GOOD 2 FAIR 2 FAIR 2	12,00 12,70 14,40
1	19	14	VUL 67	66,43	100,3	12,10 13,50	Z Z	FAIR 2 FAIR 2	12,00 13,40
1	19	15	RAL 67	71,79	93,9	12,70	Z	GOOD 2	12,60
1	19	16	TAV 67	73,90	94,6	13,60 16,00	Z Z	FAIR 3 GOOD 2	13,50 15,90

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TT FROM MSL SEC
1	19	17	WAN 67	66,75	91,7	12,30	Z	GOOD 2	12,20
1	20	1	PRAED 67	64,79	92,0	16,40	Z	POOR 4	18,30
1	20	4	LAS, B 67	29,24	89,6	5,30 10,60	Z Z	GOOD 2 GOOD 2	5,70 10,70
1	20	7	KWATA 67	43,88	96,1	7,20 13,60	Z Z	FAIR 3 FAIR 4	7,10 13,50
1	20	8	NATAVA 67	60,13	87,4	11,40	Z	POOR 2	11,30
1	20	11	DOILNE 67	11,27	75,1	2,10 4,50 5,40 5,60 10,70	Z Z Z Z Z	GOOD 2 POOR 3 FAIR 3 POOR 3 FAIR 3	2,00 4,40 5,30 6,50 10,60
1	20	12	WRNGO 67	90,41	106,6	15,70	Z	GOOD 1	15,60
1	20	13	RBL 67	78,95	87,7	13,90 16,00	Z Z	FAIR 3 FAIR 3	13,80 15,90
1	20	14	VUL 67	76,52	93,2	13,50 15,40 16,20	Z Z Z	GOOD 2 FAIR 2 FAIR 3	13,40 15,30 16,10
2	21	1	RAPOPO 67	8,69	244,6	2,60 3,00 3,30	Z Z Z	GOOD 1 POOR 2 POOR 2	2,50 2,90 3,20
2	21	2	KHBURU 67	30,46	186,1	6,50 8,10	Z Z	GOOD 1 POOR 3	6,40 8,00
2	21	4	NAH, 4 67	71,75	4,2	12,80 14,50 15,70 20,20 24,30 25,70 31,80	Z Z Z Z Z Z Z	GOOD 2 POOR 3 POOR 3 FAIR 3 FAIR 3 POOR 3 POOR 3	12,70 14,70 16,60 20,10 24,20 25,60 31,70
2	21	5	D, YORK 67	10,96	22,7	3,20	Z	GOOD 2	3,10
2	21	6	SUMSOM 67	48,53	183,4	9,40 10,20 10,60 11,30 12,80	Z Z Z Z Z	GOOD 2 POOR 3 FAIR 3 POOR 3 POOR 3	9,30 10,10 10,50 11,20 12,70
2	21	7	TLILIS 67	35,23	182,9	7,20 8,60	Z Z	GOOD 2 FAIR 3	7,10 8,50
2	21	8	KBANGA 67	15,11	196,7	3,70	Z	GOOD 1	3,60
2	21	9	KANDRU 67	35,29	71,0	7,60 10,30 12,90	Z Z Z	GOOD 1 FAIR 2 POOR 2	7,50 9,90 12,80

PAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MSL SEC
2	21	10	MLIAHAB	70,79	68,6	12,90 16,80 17,30	Z Z Z	GOOD 1 POOR 2 POOR 2	12,80 16,70 17,20
2	21	11	ULPTUR	65,23	358,6	12,20 16,00	Z Z	GOOD 2 POOR 3	12,20 15,90
2	21	12	WRNGOIB	23,50	227,7	5,20 5,40 5,60 6,60 7,90	Z Z Z Z Z	GOOD 1 POOR 2 POOR 2 FAIR 2 FAIR 2	5,10 5,30 5,30 6,30 7,80
2	21	13	RBL	28,47	298,2	6,20	Z	GOOD 2	6,10
2	21	14	VUL	27,96	278,8	6,10	Z	GOOD 2	6,00
2	21	15	RAL	23,83	295,4	5,30	Z	GOOD 2	5,20
2	21	16	TAV	21,48	294,8	5,00	Z	GOOD 2	4,90
2	21	17	HAN	27,72	298,2	5,80	Z	GOOD 2	5,70
2	21	18	SUL	24,82	294,8	5,80	Z	GOOD 2	5,70
2	22	1	RAPOPOB	14,80	201,1	3,80 5,90 7,90	Z Z Z	GOOD 1 POOR 1 POOR 3	3,67 5,77 7,77
2	22	2	KMBUBU	40,29	180,7	8,20 9,20 9,80	Z Z Z	GOOD 1 POOR 2 POOR 2	8,87 9,87 9,67
2	22	4	NAM, 4	62,08	7,4	11,20 13,20 17,90 20,60 22,40 26,30	Z Z Z Z Z Z	GOOD 2 GOOD 3 POOR 3 FAIR 3 FAIR 3 FAIR 3	11,07 13,07 17,77 20,47 22,27 26,17
2	22	5	D.YORK	6,92	89,0	1,90	Z	GOOD 2	1,77
2	22	6	SUMSUM	58,44	180,2	10,90 12,10 13,20	Z Z Z	GOOD 2 POOR 3 FAIR 2	10,77 11,97 13,07
2	22	8	KBANGA	24,51	183,9	5,50	Z	GOOD 1	5,37
2	22	9	KAMDRU	36,10	87,7	7,50 9,90 13,40	Z Z Z	GOOD 2 POOR 3 FAIR 2	7,87 9,77 13,87
2	22	10	MLIAHAB	70,40	77,0	12,70 16,80 17,80 19,00	Z Z Z Z	GOOD 1 POOR 2 FAIR 2 FAIR 2	12,77 16,67 17,67 18,87
2	22	11	ULPTUR	55,23	8,9	10,50 11,00	Z Z	GOOD 2 POOR 2	10,37 10,87

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MBL SEC
	22	11				13,20	Z	FAIR 2	13,07
						13,90	Z	FAIR 2	13,77
2	22	12	WRNGO18V	29,70	209,8	6,30	Z	GOOD 2	6,27
						6,90	Z	POOR 2	6,77
						7,90	Z	POOR 3	7,77
						8,90	Z	POOR 3	8,77
2	22	13	RBL 87	22,67	278,7	5,20	Z	GOOD 2	5,07
2	22	14	VUL 87	25,95	255,1	6,00	Z	GOOD 2	5,87
2	22	15	RAL 87	18,84	270,7	4,50	Z	GOOD 2	4,37
2	22	16	TAV 87	16,83	266,7	4,30	Z	GOOD 2	4,17
2	22	17	WAN 87	21,96	278,1	4,90	Z	GOOD 2	4,77
2	22	18	SUL 87	19,88	271,0	4,80	Z	GOOD 2	4,67
2	23	1	RAPOPO67	28,08	195,5	6,10	Z	GOOD 1	5,95
						6,70	Z	POOR 3	6,55
						8,70	Z	POOR 3	8,55
2	23	2	KMBUBU67	53,59	182,9	10,20	Z	GOOD 1	10,05
						10,40	Z	POOR 1	10,25
						11,00	Z	POOR 1	10,85
2	23	4	NAM,4 87	48,67	6,9	9,70	Z	GOOD 2	9,55
						10,90	Z	FAIR 2	10,75
						12,60	Z	FAIR 2	12,45
						15,10	Z	FAIR 3	14,95
						17,90	Z	POOR 3	17,75
						18,90	Z	POOR 3	18,75
						19,90	Z	POOR 3	19,75
2	23	5	D,YORK67	13,95	160,2	3,30	Z	GOOD 2	3,15
						4,50	Z	POOR 3	4,35
2	23	6	SUMSUM67	71,72	181,9	13,00	Z	GOOD 2	12,85
						13,70	Z	POOR 3	13,55
2	23	7	TLILIS67	58,40	181,2	10,50	Z	FAIR 2	10,35
2	23	8	KBANGA67	37,89	185,8	7,70	Z	GOOD 2	7,55
						10,40	Z	POOR 3	10,25
2	23	9	KAMDRU67	35,87	100,2	7,30	Z	GOOD 2	7,15
						10,20	Z	POOR 3	10,05
						12,80	Z	POOR 3	12,65
2	23	10	MLIAMA67	66,45	89,7	12,00	Z	GOOD 1	11,85
						12,70	Z	POOR 2	12,55
						14,50	Z	FAIR 2	14,35
						15,80	Z	POOR 3	15,65
2	23	11	ULPTUR67	42,00	358,2	8,40	Z	GOOD 2	8,25
						8,90	Z	POOR 3	8,75
						9,90	Z	FAIR 3	9,75

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
	23	11				10,80	Z	POOR 3	10,65
2	23	12	WRNGOI 67	42,55	203,4	8,50	Z	GOOD 1	8,35
						9,50	Z	FAIR 2	9,35
						10,20	Z	POOR 2	10,05
						10,60	Z	POOR 2	10,45
						12,00	Z	FAIR 2	11,85
2	23	13	RBL 67	26,47	248,3	5,90	Z	GOOD 2	5,75
2	23	14	VUL 67	33,77	233,8	7,40	Z	GOOD 2	7,25
						8,80	Z	FAIR 2	8,65
						9,70	Z	FAIR 2	9,55
2	23	15	PAL 67	24,72	238,3	5,50	Z	GOOD 2	5,35
						8,50	Z	FAIR 3	8,35
2	23	16	TAV 67	23,72	233,2	5,50	Z	GOOD 2	5,35
						7,00	Z	FAIR 2	6,85
2	23	17	WAN 67	25,98	247,0	5,60	Z	GOOD 2	5,45
2	23	18	SUL 67	25,56	239,7	6,00	Z	GOOD 2	5,85
2	24	1	RAPOPO 67	40,54	189,5	8,90	Z	GOOD 1	8,55
						9,00	Z	POOR 2	8,65
						10,00	Z	POOR 3	9,65
						10,90	Z	FAIR 3	10,55
2	24	2	KMBUBU 67	66,58	181,7	13,00	Z	GOOD 1	12,65
						15,60	Z	POOR 3	15,25
2	24	4	NAM, 4 67	35,91	10,6	6,80	Z	POOR 4	6,45
						7,70	Z	GOOD 2	7,35
						9,30	Z	FAIR 3	8,95
						12,60	Z	FAIR 3	12,25
						16,80	Z	POOR 3	16,45
						18,50	Z	POOR 3	18,15
						21,80	Z	POOR 3	21,45
2	24	5	D, YORK 67	26,73	168,1	5,90	Z	GOOD 2	5,55
						6,90	Z	FAIR 3	6,55
						8,60	Z	POOR 3	8,25
						12,10	Z	FAIR 2	11,75
2	24	6	SUMSUM 67	84,72	181,2	15,70	Z	GOOD 2	15,35
2	24	7	TLILIS 67	71,42	180,4	14,30	Z	FAIR 3	13,95
2	24	8	KBANGA 67	50,82	183,4	10,50	Z	GOOD 1	10,15
						11,70	Z	POOR 3	11,35
2	24	9	KAMDRU 67	42,63	125,6	9,10	Z	GOOD 1	8,75
						10,80	Z	POOR 2	10,45
						14,40	Z	POOR 2	14,05
2	24	10	MLIAMA 67	67,99	98,8	12,90	Z	GOOD 1	12,55
						13,30	Z	POOR 2	12,95
						13,90	Z	POOR 2	13,55

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
	24	10				14,50	Z	FAIR 2	14,15
						16,50	Z	POOR 2	16,15
2	24	11	ULPTUR67	28,95	359,0	6,80	Z	GOOD 2	6,45
						7,60	Z	POOR 3	7,25
						8,30	Z	POOR 3	7,95
						10,50	Z	FAIR 3	10,25
2	24	12	WRNGO167	54,51	197,2	10,70	Z	POOR 2	10,35
						11,30	Z	GOOD 1	10,95
						12,00	Z	POOR 3	11,45
						12,30	Z	FAIR 2	11,95
2	24	13	RBL 67	32,97	226,2	7,60	Z	GOOD 2	7,25
2	24	14	VUL 67	42,26	218,8	9,20	Z	GOOD 2	8,85
2	24	15	RAL 67	32,97	217,9	7,30	Z	GOOD 2	6,95
2	24	16	TAV 67	32,76	213,8	7,50	Z	GOOD 2	7,15
						8,70	Z	FAIR 2	8,35
2	24	17	WAN 67	32,74	223,0	7,30	Z	GOOD 2	6,95
						9,60	Z	FAIR 2	9,25
2	24	18	SUL 67	33,54	219,4	7,70	Z	GOOD 2	7,35
2	25	1	RAPOPO67	50,07	189,8	10,30	Z	GOOD 1	9,75
						11,70	Z	POOR 3	11,15
						16,40	Z	POOR 3	15,85
						22,00	Z	POOR 3	21,45
2	25	2	KMBUSU67	76,28	180,2	14,50	Z	GOOD 1	13,95
						16,20	Z	POOR 3	15,45
2	25	4	NAM,4 67	26,87	17,9	5,60	Z	POOR 4	5,05
						6,90	Z	GOOD 2	6,35
						8,10	Z	POOR 3	7,55
						9,40	Z	FAIR 3	8,85
2	25	5	D,YORK67	36,60	168,7	8,20	Z	GOOD 2	7,65
						9,60	Z	POOR 3	9,85
						10,70	Z	POOR 3	10,15
						11,90	Z	POOR 3	11,35
2	25	6	SUMSUM67	94,44	179,9	16,90	Z	GOOD 2	16,35
2	25	7	TLILIS67	81,15	173,2	14,80	Z	POOR 4	14,25
						17,60	Z	POOR 4	17,05
2	25	8	KRANGA67	60,47	181,3	11,90	Z	GOOD 1	11,35
2	25	9	KAMDRU67	50,14	133,5	10,60	Z	POOR 3	10,85
						11,20	Z	POOR 3	10,65
						12,30	Z	POOR 3	11,75
						15,10	Z	POOR 3	14,55
2	25	10	MLIAMA67	71,74	106,3	13,80	Z	GOOD 1	13,25

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
2	25	11	ULPTUR67	19,25	3,5	5,50 7,00 7,60 8,40	Z Z Z Z	GOOD 2 POOR 3 FAIR 2 POOR 3	4,95 6,45 7,05 7,85
2	25	12	WRNGO167	63,47	195,1	12,40 13,20 13,90	Z Z Z	GOOD 1 POOR 2 POOR 2	11,85 12,65 13,35
2	25	13	RBL 67	39,36	214,2	8,82	Z	GOOD 2	8,27
2	25	15	RAL 67	40,29	207,4	8,70	Z	GOOD 2	8,15
2	25	16	TAV 67	40,49	204,1	8,80	Z	GOOD 2	8,25
2	25	17	WAN 67	39,27	215,1	8,50 10,30	Z Z	GOOD 2 FAIR 2	7,95 9,75
2	25	18	SUL 67	40,69	208,8	9,00	Z	GOOD 2	8,45
3	25A	1	LNDLV767	99,48	20,8	17,90	Z	GOOD 2	17,48
3	25A	2	NAM,2 67	30,21	27,0	6,20 6,60 7,60 8,40 15,60	Z Z Z Z Z	POOR 3 POOR 3 POOR 3 POOR 3 POOR 3	5,78 6,18 7,18 7,98 15,18
3	25A	4	NAM,4 67	30,39	28,0	7,20 8,20 9,00 11,10 13,70 14,80	Z Z Z Z Z Z	GOOD 2 POOR 3 POOR 3 FAIR 3 FAIR 3 FAIR 3	6,78 7,78 8,58 10,68 13,28 14,38
3	25A	6	SUMSUM67	93,36	176,3	16,80	Z	GOOD 2	16,38
3	25A	7	PALIE 67	85,46	22,8	16,40 18,50 22,60	Z Z Z	GOOD 2 POOR 4 FAIR 3	15,98 18,08 22,18
3	25A	8	KBANGA67	59,36	175,6	11,70 12,80	Z Z	GOOD 1 FAIR 2	11,28 12,38
3	25A	9	KAMDRU67	53,82	128,2	10,60 14,70	Z Z	FAIR 2 POOR 3	10,18 14,28
3	25A	10	MLIAMA67	77,17	104,1	14,60 14,80 16,20 17,10	Z Z Z Z	GOOD 1 POOR 2 POOR 2 POOR 2	14,18 14,38 15,78 16,68
3	25A	11	ULPTUR67	21,70	19,2	5,80 7,70 9,40 12,00	Z Z Z Z	GOOD 2 FAIR 3 FAIR 3 POOR 3	5,38 7,28 8,98 11,58
3	25A	12	WRNGO167	61,13	187,9	12,10 13,20	Z Z	GOOD 1 FAIR 1	11,68 12,78

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	FT FROM MSL SEC
	25A	12				13,70	Z	POOR 2	13,28
S	25A	13	RBL 67	35,20	207,3	8,10	Z	GOOD 2	7,68
						9,80	Z	GOOD 2	9,38
						11,20	Z	FAIR 2	10,78
						13,10	Z	FAIR 2	12,68
S	25A	14	VUL 67	45,48	204,5	10,00	Z	GOOD 2	9,58
						10,70	Z	FAIR 2	10,28
						12,10	Z	FAIR 2	11,68
S	25A	15	RAL 67	36,71	208,1	8,00	Z	GOOD 2	7,58
S	25A	16	TAV 67	37,22	198,5	8,30	Z	GOOD 2	7,88
						9,40	Z	FAIR 2	8,98
						10,10	Z	FAIR 2	9,68
S	25A	17	WAN 67	35,21	206,1	8,10	Z	GOOD 2	7,68
						9,50	Z	FAIR 2	9,08
S	25A	18	SUL 67	36,99	201,6	13,80	Z	GOOD 2	13,38
S	26	1	LNDLV67	90,28	19,7	17,20	Z	GOOD 2	16,46
S	26	4	NAH,4 67	21,04	26,3	6,00	Z	GOOD 2	5,26
						8,50	Z	GOOD 2	7,76
						9,10	Z	POOR 3	8,36
						13,40	Z	FAIR 3	12,66
						19,70	Z	POOR 3	18,96
S	26	5	D,YORK67	43,39	169,0	9,70	Z	GOOD 2	8,96
						11,10	Z	POOR 3	10,36
S	26	6	SUMSUM67	101,16	179,3	18,60	Z	GOOD 2	17,86
S	26	7	PALIE 67	76,23	21,1	13,20	Z	POOR 3	12,46
						15,50	Z	GOOD 2	14,76
						16,00	Z	POOR 3	15,26
						18,60	Z	POOR 3	18,86
S	26	8	KBANGA67	67,17	180,3	13,60	Z	GOOD 1	12,86
S	26	9	KAMDRU67	55,68	137,8	11,90	Z	GOOD 1	11,16
						12,50	Z	FAIR 3	11,76
						13,60	Z	FAIR 2	12,86
						14,90	Z	FAIR 2	14,16
S	26	10	MLJAMA67	74,89	111,0	14,70	Z	GOOD 1	13,96
						15,10	Z	POOR 2	14,36
						17,10	Z	POOR 2	16,36
S	26	11	ULPTUR67	12,70	10,1	4,70	Z	GOOD 2	3,96
						5,80	Z	POOR 3	5,06
						6,70	Z	POOR 3	5,96
						7,80	Z	FAIR 2	7,06
S	26	12	WRNGO167	69,81	191,0	14,30	Z	GOOD 1	13,56
						14,70	Z	POOR 2	13,96
						15,40	Z	FAIR 1	14,66

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	FROM MSL SEC
3	26	13	RBL 67	44,56	208,2	10,30 11,90 13,60	Z Z Z	GOOD 2 FAIR 2 FAIR 3	9,56 11,16 12,86
3	26	14	VUL 67	54,80	205,7	12,00 13,50 14,40	Z Z Z	GOOD 2 FAIR 3 FAIR 3	11,26 12,76 13,66
3	26	15	RAL 67	45,93	202,4	10,00	Z	GOOD 2	9,86
3	26	16	TAY 67	46,33	199,3	10,30 12,20	Z Z	GOOD 2 FAIR 2	9,56 11,46
3	26	17	WAN 67	44,55	207,3	10,30	Z	FAIR 2	9,56
3	26	18	SUL 67	46,25	203,6	14,00 16,20	Z Z	FAIR 3 FAIR 2	13,86 15,46
3	27	1	LNDLV767	80,76	19,2	14,20 14,70	Z Z	GOOD 2 FAIR 2	14,31 14,61
3	27	2	NAM,2 67	11,34	28,0	2,90 3,40	Z Z	POOR 3 POOR 3	2,81 3,31
3	27	4	NAM,4 67	11,51	28,4	3,00 3,90 6,10 9,40 11,50 13,00	Z Z Z Z Z Z	GOOD 2 POOR 2 FAIR 2 POOR 3 POOR 3 POOR 3	2,91 3,81 6,01 9,31 11,41 12,91
3	27	5	D,YORK67	51,51	175,1	9,80 11,00 11,60	Z Z Z	GOOD 2 POOR 3 POOR 3	9,71 10,91 11,51
3	27	6	SUMSUM67	109,91	181,4	19,20	Z	GOOD 2	19,31
3	27	7	PALIE 67	66,69	20,7	10,10 11,90 13,20 19,80	Z Z Z Z	POOR 3 POOR 3 GOOD 2 FAIR 3	10,01 11,81 13,11 19,71
3	27	8	KBANGA67	76,01	183,2	13,80	Z	GOOD 2	13,71
3	27	9	KAMDRO67	60,19	148,1	11,50 12,80 14,60 15,10	Z Z Z Z	FAIR 2 FAIR 3 POOR 3 POOR 3	11,41 12,71 14,31 15,01
3	27	10	HLIAMA67	75,02	118,3	13,20 13,90 14,20 16,40	Z Z Z Z	GOOD 2 POOR 2 POOR 2 POOR 2	13,21 13,81 14,21 16,31
3	27	11	ULPTUR67	4,12	336,5	1,50 2,70 3,20 4,10 5,10	Z Z Z Z Z	GOOD 2 POOR 3 POOR 3 POOR 3 POOR 3	1,41 2,41 3,21 4,01 5,01

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
	27	11				5,80	Z	POOR 3	5,71
3	27	12	WRMS0159	79,15	192,6	15,50 16,50	Z Z	FAIR 3 POOR 3	15,41 16,41
3	27	13	RBL 59	54,08	207,4	10,60 12,40 15,80 17,50	Z Z Z Z	GOOD 2 FAIR 2 FAIR 3 GOOD 2	10,51 12,31 15,71 17,41
3	27	14	VUL 59	64,34	205,4	12,60 13,70 15,40	Z Z Z	GOOD 2 FAIR 3 FAIR 2	12,51 13,61 15,31
3	27	15	RAL 59	55,48	202,6	10,70	Z	GOOD 2	10,61
3	27	16	TAV 59	55,86	200,2	10,60 11,80 13,90 17,40	Z Z Z Z	GOOD 2 GOOD 2 FAIR 2 FAIR 2	10,51 11,71 13,81 17,31
3	27	17	WAN 59	54,08	206,7	10,70 13,40 19,40	Z Z Z	GOOD 2 FAIR 2 FAIR 2	10,61 13,31 19,31
3	27	18	SUL 59	55,80	203,7	18,50	Z	FAIR 3	18,41
2	30	1	RAPOPO69	11,19	331,3	3,20 4,70	Z Z	GOOD 1 FAIR 2	3,18 4,68
2	30	2	KMBUBU69	16,67	181,9	4,10 5,80 7,40 9,50	Z Z Z Z	GOOD 1 POOR 3 POOR 3 FAIR 2	4,08 5,78 7,38 9,48
2	30	4	NAM,4 59	85,56	5,3	14,20 15,60 18,80 24,60	Z Z Z Z	POOR 4 FAIR 3 FAIR 3 POOR 3	14,18 15,58 18,78 24,58
2	30	5	D.YORK59	24,72	18,2	5,50 6,70 7,30 7,80	Z Z Z Z	GOOD 2 POOR 3 POOR 3 POOR 3	5,48 6,68 7,28 7,78
2	30	6	SUMSUM59	34,81	188,3	7,20 8,80	Z Z	GOOD 2 POOR 4	7,18 8,78
2	30	7	TLILISS9	21,54	179,6	5,00 5,80 7,10 9,20	Z Z Z Z	GOOD 2 POOR 3 FAIR 2 POOR 3	4,98 5,78 7,08 9,18
2	30	9	KAMDRU59	43,92	55,1	9,40 12,20 13,70	Z Z Z	GOOD 2 POOR 3 POOR 3	9,38 12,18 13,68
2	30	10	MLIAM59	79,12	68,0	13,80 14,30	Z Z	POOR 2 POOR 2	13,78 14,28

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
2	30	11	ULPTUR67	78,89	0,6	14,10	Z	GOOD 2	14,88
						15,40	Z	POOR 3	15,38
2	30	12	WRNGO167	14,88	261,5	3,70	Z	POOR 1	3,68
						3,90	Z	GOOD 1	3,88
						5,40	Z	POOR 3	5,38
						6,70	Z	POOR 3	6,68
						7,70	Z	POOR 3	7,68
2	30	13	RBL 67	35,16	320,3	7,30	Z	GOOD 2	7,28
						9,10	Z	FAIR 2	9,88
						10,00	Z	FAIR 2	9,98
						12,60	Z	FAIR 3	12,58
2	30	14	VUL 67	30,29	304,0	6,40	Z	GOOD 2	6,38
2	30	15	RAL 67	30,42	321,7	6,50	Z	GOOD 2	6,48
2	30	16	TAV 67	28,23	323,4	6,10	Z	GOOD 2	6,08
2	30	17	WAN 67	34,48	320,8	7,10	Z	GOOD 2	7,08
						8,00	Z	FAIR 2	7,98
2	31	1	RAPOPO67	25,52	335,6	6,50	Z	GOOD 1	6,39
						8,30	Z	POOR 3	8,19
						9,50	Z	POOR 3	9,39
						12,80	Z	POOR 3	12,69
2	31	2	KMBUBU67	6,56	240,5	2,40	Z	GOOD 1	2,29
						3,30	Z	FAIR 2	3,19
2	31	4	NAH,4 67	98,66	1,6	16,20	Z	POOR 3	16,09
						17,40	Z	FAIR 3	17,29
						19,20	Z	POOR 3	19,89
						20,90	Z	POOR 3	20,79
						22,70	Z	POOR 3	22,59
						23,90	Z	POOR 3	23,79
2	31	5	D.YORK67	37,21	2,7	26,70	Z	POOR 3	26,59
						8,20	Z	GOOD 2	8,09
						9,10	Z	POOR 3	8,99
						10,20	Z	FAIR 2	10,09
						12,20	Z	POOR 3	12,09
2	31	6	SUMSUM67	22,04	194,1	5,40	Z	GOOD 2	5,29
2	31	7	TLILIS67	9,14	207,8	3,10	Z	GOOD 2	2,99
						5,60	Z	FAIR 2	5,49
						9,80	Z	FAIR 2	9,69
2	31	8	KRANGA67	14,34	331,5	4,20	Z	GOOD 1	4,09
						5,10	Z	POOR 2	4,99
						5,90	Z	POOR 2	5,79
						7,80	Z	POOR 2	7,69
2	31	9	KAMDRO67	49,38	38,7	10,70	Z	GOOD 2	10,59
						13,20	Z	POOR 3	13,09
						14,40	Z	POOR 3	14,29

TAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MSL SEC
2	31	10	MLIAMA59	82,60	50,1	15,40 17,50 18,60 19,90	Z Z Z Z	GOOD 1 FAIR 2 POOR 2 FAIR 2	15,29 17,59 18,49 19,79
2	31	11	ULPTUR69	92,38	359,3	15,90 16,80 20,50 21,60	Z Z Z Z	POOR 3 FAIR 3 POOR 3 POOR 3	15,79 16,69 20,39 21,69
2	31	12	WRNGO169	22,83	290,5	5,30 5,70 6,80 8,00 8,50 9,10	Z Z Z Z Z Z	GOOD 1 FAIR 1 FAIR 2 FAIR 2 POOR 3 POOR 3	5,19 5,59 6,69 7,89 8,59 8,99
2	31	13	RBL 69	49,01	325,7	10,40	Z	GOOD 2	10,29
2	31	14	VUL 69	42,88	315,1	8,90	Z	GOOD 2	8,79
2	31	15	RAL 69	44,36	329,2	9,30 12,70	Z Z	GOOD 2 FAIR 2	9,19 12,59
2	31	16	TAV 69	42,26	328,6	8,90	Z	GOOD 2	8,79
2	31	17	HAN 69	48,36	326,2	9,60 12,70	Z Z	GOOD 2 FAIR 2	9,49 12,59
2	32	1	RAPOPO69	35,34	342,7	7,80 8,00 9,10 11,20 14,20	Z Z Z Z Z	GOOD 1 POOR 3 FAIR 3 POOR 3 POOR 3	7,69 7,89 8,99 11,89 14,89
2	32	2	KMBUBU69	9,24	321,8	2,90 4,10	Z Z	GOOD 1 FAIR 1	2,79 3,99
2	32	4	NAM,4 69	109,15	1,5	17,90 19,20 21,40 22,70 24,40 26,90	Z Z Z Z Z Z	POOR 4 POOR 4 FAIR 3 FAIR 3 POOR 3 POOR 3	17,79 19,69 21,29 22,59 24,29 26,79
2	32	5	D.YORK69	47,69	2,1	9,60	Z	FAIR 2	9,49
2	32	6	S.WSUM69	12,14	206,2	3,70 6,20	Z Z	GOOD 2 POOR 4	3,59 4,89
2	32	7	TLILIS69	4,89	299,4	2,10 4,40 5,80 7,90	Z Z Z Z	GOOD 2 POOR 3 POOR 3 FAIR 3	1,99 4,29 5,69 7,79
2	32	8	KBANGA69	24,88	343,5	5,70 6,80 9,08	Z Z Z	GOOD 2 POOR 2 POOR 2	5,59 6,69 8,89

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MBL SEC
2	32	9	KAHDUR69	97,94	32,2	12,20 14,60 15,50	Z Z Z	FAIR 2 POOR 3 POOR 3	12,89 14,49 15,39
2	32	10	MLIAMA69	89,68	49,8	16,40 17,60 18,50 19,40	Z Z Z Z	GOOD 1 FAIR 2 FAIR 3 POOR 3	16,29 17,49 18,39 19,29
2	32	11	ULPTUR69	102,83	357,6	17,90 20,70 21,90	Z Z Z	FAIR 2 POOR 3 POOR 3	17,99 20,59 21,99
2	32	12	WRNGO169	29,44	317,6	6,70 7,00 8,10 8,70 9,60	Z Z Z Z Z	GOOD 1 POOR 2 POOR 3 FAIR 2 POOR 3	6,59 6,89 7,99 8,59 9,49
2	32	13	RBL 69	97,98	331,6	11,40 12,50 13,80	Z Z Z	GOOD 2 GOOD 2 FAIR 2	11,29 12,39 13,69
2	32	14	VUL 69	90,85	323,5	10,20	Z	GOOD 2	10,89
2	32	15	RAL 69	53,48	333,3	11,30	Z	GOOD 2	11,19
2	32	16	TAV 69	51,51	334,7	10,20	Z	GOOD 2	10,89
2	32	17	WAN 69	57,36	332,0	11,20	Z	GOOD 2	11,89
2	32	18	SUL 69	54,04	332,4	11,40 14,50	Z Z	FAIR 2 FAIR 2	11,89 14,39
2	33	1	RAPOPO69	46,08	358,8	9,30 9,70	Z Z	GOOD 1 POOR 3	9,30 9,70
2	33	2	KMBUBU69	19,23	359,3	4,50 4,80 5,40 7,10	Z Z Z Z	GOOD 1 POOR 2 POOR 2 POOR 3	4,50 4,80 5,40 7,10
2	33	4	NAM,4 69	121,21	3,3	19,10 20,60 21,90 24,90 27,20	Z Z Z Z Z	FAIR 3 POOR 4 POOR 4 FAIR 3 FAIR 3	19,10 20,60 21,90 24,90 27,20
2	33	6	SUMSUM69	1,59	308,3	0,90 2,30 5,00	Z Z Z	GOOD 2 POOR 4 POOR 4	0,90 2,30 5,00
2	33	7	TLILIS69	14,30	359,4	3,90 5,50 8,40	Z Z Z	GOOD 2 POOR 3 POOR 3	3,90 5,90 8,40
2	33	8	KBANGA69	35,10	358,6	7,30 7,90 8,20	Z Z Z	GOOD 1 POOR 2 POOR 2	7,30 7,90 8,20

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MSL SEB
	53	8				10,10	Z	POOR 2	10,10
2	33	9	KAMDRU67	70,26	28,9	13,80 16,00 16,50 17,10	Z Z Z Z	GOOD 2 FAIR 2 FAIR 3 POOR 3	13,80 16,80 16,50 17,10
2	53	10	HLIAMA67	101,16	41,9	18,60	Z	GOOD 1	18,60
2	53	11	ULPTUR67	114,66	358,9	19,20 24,10	Z Z	FAIR 3 POOR 4	19,20 24,10
2	33	12	WRNGO167	37,13	334,9	7,70 8,50 9,70 10,80 15,60	Z Z Z Z Z	FAIR 2 POOR 5 POOR 3 POOR 3 POOR 3	7,70 8,90 9,70 10,80 15,60
2	33	13	RBL 67	67,13	338,5	13,00 13,50 14,60	Z Z Z	GOOD 2 FAIR 2 FAIR 5	13,80 13,90 14,60
2	33	14	VUL 67	58,88	338,9	11,10	Z	GOOD 2	11,10
2	33	15	RAL 67	62,92	341,6	11,80 15,40	Z Z	GOOD 2 FAIR 3	11,80 15,40
2	33	16	TAV 67	61,15	343,8	11,60 12,80 14,60 15,60	Z Z Z Z	GOOD 2 FAIR 2 FAIR 2 FAIR 2	11,80 12,80 14,80 15,80
2	33	17	WAN 67	66,58	348,0	12,20 13,60 15,40	Z Z Z	GOOD 2 FAIR 3 FAIR 2	12,20 13,60 15,60
2	33	18	SUL 67	63,34	348,7	12,70	Z	GOOD 2	12,70
2	34	1	RAPOPO67	54,90	350,8	11,50 12,20	Z Z	FAIR 2 GOOD 2	11,83 11,73
2	34	2	KMBUBU67	28,00	351,8	6,60 7,10	Z Z	GOOD 1 GOOD 1	6,33 6,83
2	54	4	NAM,4 67	129,64	2,0	20,60 21,90 26,00 32,40	Z Z Z Z	FAIR 3 POOR 4 POOR 4 POOR 4	20,33 21,63 25,53 31,93
2	34	5	D,YORK67	68,20	2,9	13,20	Z	FAIR 2	12,73
2	34	6	SUMSUM67	10,23	339,1	3,60 6,20	Z Z	GOOD 2 POOR 3	3,33 5,73
2	34	7	TLJLIS67	23,00	353,6	6,00 11,20	Z Z	GOOD 2 POOR 3	5,53 10,73
2	34	8	KBANGA67	43,85	353,8	9,40 10,00	Z Z	GOOD 2 POOR 2	8,93 9,53

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM HSL SEC
	34	8				11,70	Z	POOR 2	11,83
						12,10	Z	FAIR 1	11,83
1	34	9	KAMDRUG	76,74	29,1	15,40	Z	FAIR 3	14,93
						17,20	Z	FAIR 3	16,73
						17,40	Z	POOR 3	16,93
2	34	10	MLTAMAG	106,19	39,0	19,20	Z	GOOD 1	18,73
						21,30	Z	POOR 2	20,83
						21,80	Z	FAIR 2	21,83
2	34	11	ULPTURUG	123,25	396,0	20,10	Z	FAIR 3	19,83
						25,70	Z	POOR 3	25,83
2	34	12	WRNBOIG	45,93	838,7	9,90	Z	GOOD 1	9,83
						10,40	Z	FAIR 2	9,93
						10,60	Z	POOR 3	10,83
						11,90	Z	POOR 3	11,83
						12,40	Z	FAIR 2	11,93
2	34	13	RBL 59	75,99	340,1	14,70	Z	GOOD 2	14,83
						15,60	Z	FAIR 2	15,13
						16,80	Z	GOOD 2	16,83
2	34	14	VUL 59	67,64	339,1	13,20	Z	GOOD 2	12,73
						15,70	Z	FAIR 3	15,83
2	34	15	RAL 59	71,80	842,9	14,70	Z	GOOD 2	14,83
						17,30	Z	GOOD 2	16,83
2	34	16	TAY 59	70,04	343,2	13,50	Z	GOOD 2	13,83
						15,60	Z	FAIR 3	15,13
2	34	17	NAN 59	75,45	848,9	14,50	Z	GOOD 2	14,83
						15,80	Z	FAIR 2	15,83
						16,80	Z	FAIR 3	16,83
						18,90	Z	FAIR 2	18,83
2	34	18	SUL 59	72,22	842,1	14,80	Z	FAIR 2	14,83
2	35	2	KMBUBUG	42,62	3,8	9,50	Z	GOOD 1	8,55
						10,50	Z	POOR 1	9,55
2	35	4	NAH,4 59	144,77	8,7	23,40	Z	POOR 4	22,45
						28,40	Z	POOR 4	27,45
						29,60	Z	POOR 4	28,45
						32,50	Z	POOR 4	31,55
2	35	5	D.YORK 59	83,83	9,8	16,00	Z	GOOD 2	15,05
						17,00	Z	POOR 3	16,05
2	35	6	SUMSUM 59	24,49	9,8	6,80	Z	GOOD 2	5,85
						15,60	Z	POOR 4	14,45
2	35	7	TLILIS 59	37,83	9,8	8,90	Z	GOOD 2	7,95
						15,60	Z	FAIR 3	14,85
						20,10	Z	FAIR 3	19,45
						22,70	Z	POOR 3	21,75

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM MBL SEC
2	35	8	KBANGA69	58,44	359,6	12,10 14,70	Z Z	GOOD 1 FAIR 2	11,15 13,75
2	35	9	KAMDRU69	92,34	24,8	18,10 21,00 21,50	Z Z Z	GOOD 1 FAIR 3 POOR 3	17,15 20,85 20,95
2	35	10	MLIAMA69	121,09	39,3	22,20 23,40 25,10	Z Z Z	GOOD 1 FAIR 2 POOR 3	21,25 22,45 24,15
2	35	12	WRNGO169	58,59	349,0	12,10 12,30 13,90 14,60	Z Z Z Z	GOOD 1 POOR 2 POOR 2 POOR 2	11,15 11,35 12,95 13,65
2	35	13	RBL 69	88,85	346,6	17,10 17,90 20,00	Z Z Z	GOOD 2 FAIR 2 FAIR 3	16,15 16,95 19,05
2	35	14	VUL 69	79,79	342,8	15,00 17,80	Z Z	GOOD 2 FAIR 3	14,85 16,85
2	35	15	RAL 69	84,93	348,2	14,80 18,30	Z Z	FAIR 2 FAIR 3	13,85 17,35
2	35	16	TAV 69	83,36	349,6	16,20 17,60 18,40 19,00	Z Z Z Z	GOOD 2 FAIR 2 FAIR 2 FAIR 2	15,25 16,05 17,45 18,85
2	35	17	HAN 69	88,36	346,7	17,00 18,50	Z Z	GOOD 2 FAIR 2	16,85 17,95
2	36	1	RAPOPO69	77,10	12,6	14,60	Z	GOOD 2	14,50
2	36	2	KMBUBU69	53,50	28,6	10,50 10,70 12,20	Z Z Z	GOOD 1 POOR 2 FAIR 2	10,40 10,60 12,10
2	36	5	D.YORK69	93,76	19,9	17,00 18,60	Z Z	GOOD 2 FAIR 2	16,90 18,90
2	36	6	SUMSUM69	37,58	39,8	10,20 8,10	Z Z	FAIR 2 GOOD 2	10,18 8,98
2	36	8	KBANGA69	67,75	19,4	12,80 15,40	Z Z	GOOD 1 POOR 3	12,78 15,38
2	36	12	WRNGO169	63,71	8,9	12,40 12,60 13,20 14,40	Z Z Z Z	GOOD 1 POOR 2 POOR 2 FAIR 2	12,38 12,58 13,18 14,38
2	36	13	RBL 69	92,56	359,7	17,50 19,40 21,80 23,70 24,60	Z Z Z Z Z	GOOD 2 FAIR 2 GOOD 2 POOR 2 POOR 3	17,48 19,38 21,78 23,68 24,58

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM HSL SEC
2	36	14	VUL 69	82,50	359,8	15,40 18,60	Z Z	GOOD 2 FAIR 3	15,88 18,58
2	37	15	RAL 69	89,41	2,0	17,20 20,70	Z Z	GOOD 2 FAIR 2	17,18 20,68
2	36	16	TAV 69	88,29	3,3	16,80 18,00	Z Z	GOOD 2 GOOD 2	16,98 17,98
2	36	17	WAN 69	92,22	0,1	17,20 20,10	Z Z	GOOD 2 FAIR 2	17,18 20,98
3	57	1	LNDLV769	63,01	22,4	12,10 13,70	Z Z	GOOD 1 FAIR 2	12,00 13,60
3	37	2	NAM,2 69	8,12	163,4	2,40 2,50 4,00	Z Z Z	GOOD 1 POOR 1 POOR 1	2,30 2,40 3,90
3	37	4	NAM,4 69	8,35	160,2	2,50 4,30 6,50 8,50 13,50 19,00	Z Z Z Z Z Z	GOOD 2 POOR 3 POOR 3 POOR 3 POOR 3 POOR 3	2,40 4,20 6,40 8,40 13,40 18,90
3	37	5	D.YORK69	69,33	170,0	12,50 13,60 14,40	Z Z Z	GOOD 2 POOR 3 POOR 3	12,40 13,50 14,30
3	37	7	PALIE 69	49,09	25,3	11,10 15,20 20,40 24,90	Z Z Z Z	GOOD 2 POOR 3 POOR 3 POOR 3	11,00 15,10 20,30 24,00
3	37	9	KAMDRU69	74,64	155,5	13,10 15,10 16,20 12,20	Z Z Z Z	FAIR 2 POOR 3 POOR 3 FAIR 2	13,00 15,00 16,10 12,10
3	37	10	MLJAMA69	82,99	130,2	14,90 15,70 16,20 17,10 18,50	Z Z Z Z Z	GOOD 1 FAIR 2 POOR 2 POOR 2 POOR 3	14,80 15,60 16,10 17,00 18,40
3	37	11	ULPTUR69	14,84	196,0	3,60 4,40 6,30 6,80 10,40	Z Z Z Z Z	GOOD 2 POOR 3 POOR 3 POOR 3 FAIR 3	3,50 4,30 6,20 6,70 10,30
3	37	12	WRNGO169	97,28	191,0	18,00	Z	FAIR 2	17,90
3	37	13	RBL 69	75,51	202,9	13,10 14,80 17,00	Z Z Z	GOOD 2 FAIR 2 POOR 3	13,00 14,70 16,90
3	37	14	VUL 69	81,09	201,7	14,70	Z	GOOD 2	14,80

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MSL SEC
	37	14				19,70	Z	FAIR 3	19,60
3	37	16	TAV 67	73,74	197,8	13,40 16,40	Z Z	GOOD 2 FAIR 3	13,80 16,30
3	38	1	LNDLV769	47,95	23,0	8,80 9,30 11,30 13,90 15,90	Z Z Z Z Z	FAIR 2 POOR 2 POOR 3 POOR 3 POOR 3	8,62 9,12 10,92 13,92 15,12
3	38	2	NAH,2 67	22,65	189,4	6,30 6,40 10,70 13,30	Z Z Z Z	GOOD 1 POOR 1 POOR 3 FAIR 2	5,92 6,02 10,32 12,02
3	38	4	NAH,4 67	22,70	182,1	6,30 7,40 9,60 10,70 13,30	Z Z Z Z Z	GOOD 2 FAIR 3 FAIR 3 POOR 3 POOR 3	5,92 7,02 9,22 10,32 12,92
3	38	5	D,YORK67	84,16	181,3	15,80 18,80	Z Z	FAIR 2 POOR 2	15,02 18,42
3	38	7	PALIE 67	34,25	38,8	10,00 11,10 12,30 15,60 19,30	Z Z Z Z Z	GOOD 2 POOR 3 FAIR 3 FAIR 3 POOR 3	9,82 10,72 11,92 15,22 18,02
3	38	10	MLIAMA67	90,79	138,8	17,30 18,10 19,70	Z Z Z	GOOD 1 POOR 2 FAIR 2	16,02 17,72 19,32
3	38	11	ULPTUR67	30,10	199,3	7,30 8,10 8,80 9,70	Z Z Z Z	GOOD 2 POOR 3 POOR 3 FAIR 3	6,02 7,72 8,42 9,32
3	38	12	WRNGO167	112,55	192,1	19,90 21,60	Z Z	FAIR 2 POOR 3	19,92 21,22
3	38	13	RBL 67	86,63	201,1	13,50 16,10 17,10 18,00	Z Z Z Z	FAIR 3 FAIR 3 FAIR 2 FAIR 3	13,12 15,72 16,72 17,02
3	38	14	VUL 67	97,05	200,9	18,00 18,80	Z Z	FAIR 2 GOOD 2	17,62 18,42
3	38	15	RAL 67	88,46	198,2	16,40 18,10 20,80	Z Z Z	GOOD 2 FAIR 3 FAIR 3	16,02 17,72 20,62
3	38	16	TAV 67	88,99	198,7	16,50 19,00 21,50	Z Z Z	GOOD 2 FAIR 2 FAIR 2	16,12 18,62 21,42

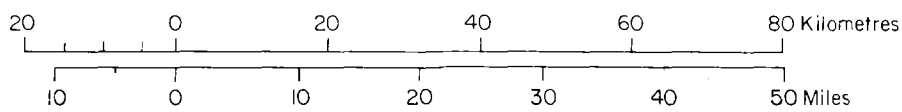
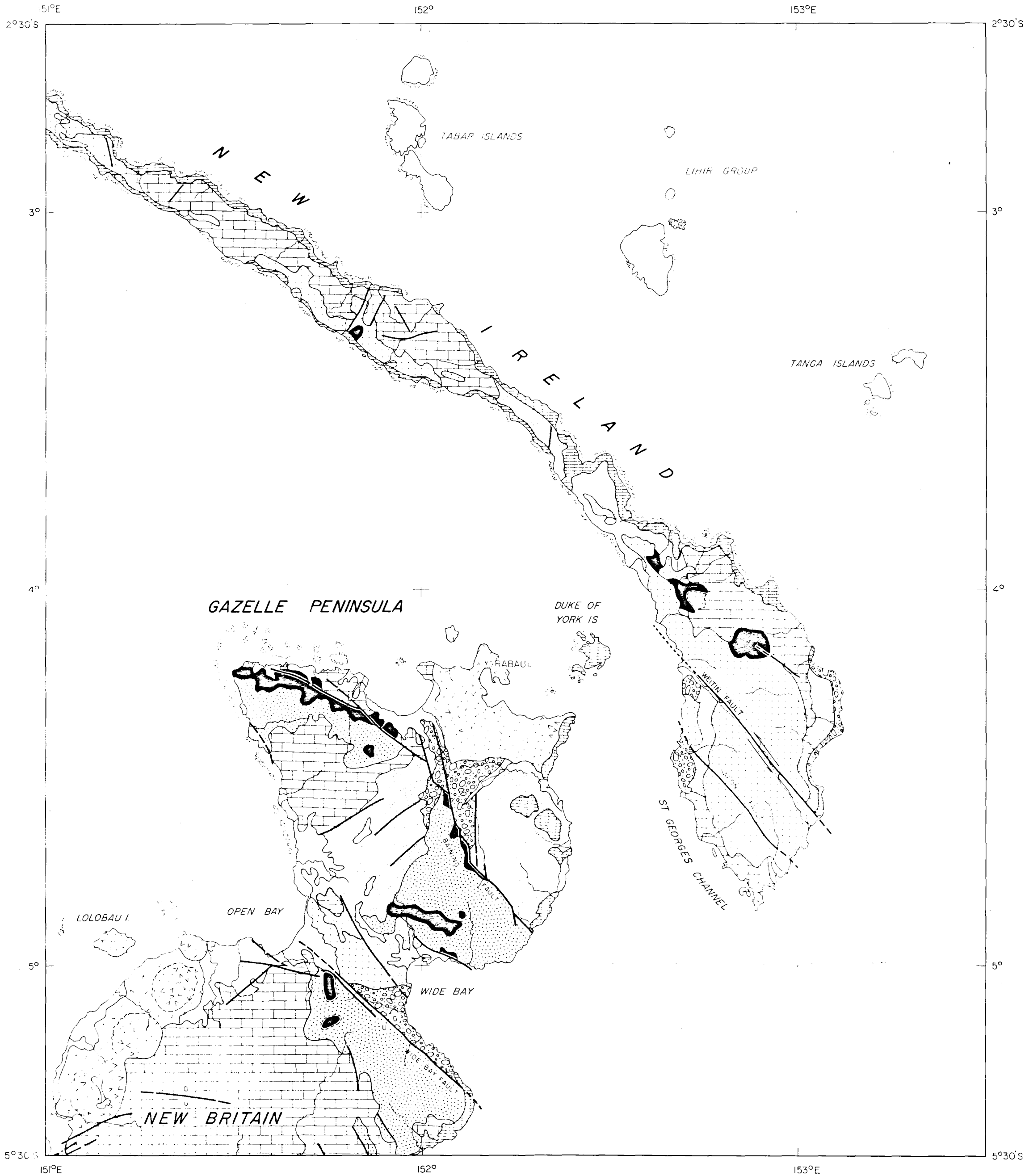
STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM HSL SEC
3	38	17	WAN 67	86,71	200,7	14,40 16,10	Z Z	FAIR 2 GOOD 2	14,82 15,72
3	40	1	LNDLV67	22,74	13,4	5,20 5,70 7,10 8,30	Z Z Z Z	GOOD 1 POOR 2 FAIR 2 POOR 3	4,71 5,21 6,61 7,81
3	40	2	NAM,2 67	46,89	200,4	11,60 12,10 20,00	Z Z Z	GOOD 1 FAIR 1 POOR 4	11,11 11,61 19,51
3	40	4	NAM,4 67	46,78	199,8	11,50 14,00 16,80 18,70 24,00	Z Z Z Z Z	GOOD 2 FAIR 3 FAIR 3 POOR 4 FAIR 3	11,01 13,51 16,31 18,21 23,51
3	40	5	D,YORK67	106,81	189,1	18,90 19,70 21,50	Z Z Z	POOR 3 GOOD 2 POOR 3	18,41 19,21 21,01
3	40	7	PALIE 67	8,55	13,4	3,10 5,80 13,40	Z Z Z	GOOD 2 POOR 3 POOR 3	2,61 5,31 12,91
3	40	10	MLIAMA67	100,22	153,5	19,50 19,90 20,30	Z Z Z	FAIR 2 GOOD 1 POOR 2	19,01 19,41 19,81
3	40	11	ULPTUR67	55,35	204,3	12,50 13,30 15,10 17,40	Z Z Z Z	GOOD 2 POOR 3 FAIR 3 POOR 3	12,01 12,81 14,61 16,91
3	40	12	WRNGOI67	136,93	196,3	25,50 27,70	Z Z	FAIR 3 POOR 3	25,81 27,21
3	40	13	RBL 67	112,12	204,4	20,50 22,50	Z Z	GOOD 2 FAIR 3	20,81 22,01
3	40	14	VUL 67	122,46	208,5	22,90	Z	FAIR 2	22,41
3	40	15	RAL 67	113,66	202,1	21,20 24,20	Z Z	FAIR 3 FAIR 3	20,71 23,71
3	40	16	TAV 67	114,03	200,9	21,10	Z	GOOD 2	20,61
3	40	17	WAN 67	112,15	204,0	20,70	Z	FAIR 2	20,21
3	43	1	LNDLV67	21,05	248,2	5,40 8,10 9,80 10,90	Z Z Z Z	GOOD 1 POOR 3 POOR 3 POOR 3	4,74 7,44 9,14 10,24
3	43	2	NAM,2 67	84,58	209,1	16,10 16,50 25,90	Z Z Z	GOOD 1 FAIR 1 POOR 3	15,44 15,84 25,24

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MBL SEC
3	43	4	NAM, 4 57	84,40	208,8	16,00	Z	GOOD 2	15,34
						16,50	Z	POOR 3	15,84
						18,40	Z	FAIR 3	17,74
						22,00	Z	FAIR 3	21,34
						23,60	Z	POOR 4	22,94
3	43	5	D.YORK 57	141,69	199,1	26,60	Z	POOR 4	25,94
						23,30	Z	GOOD 2	22,64
						24,70	Z	POOR 3	24,84
						30,70	Z	POOR 3	30,84
3	43	6	SUMSUM 57	200,01	194,1	32,30	Z	FAIR 3	31,64
3	43	7	PALIE 57	31,29	228,1	7,50	Z	GOOD 2	6,84
						9,70	Z	FAIR 2	9,84
						10,80	Z	POOR 3	10,14
						13,90	Z	POOR 3	13,24
						19,70	Z	POOR 3	19,84
3	43	8	KBANGA 57	167,70	199,4	27,30	Z	FAIR 3	26,64
3	43	9	KAMDRU 57	134,63	183,3	21,60	Z	FAIR 2	20,94
						23,00	Z	POOR 3	22,84
3	43	10	MLJANA 57	121,27	178,5	21,10	Z	GOOD 1	20,84
						21,70	Z	POOR 2	21,64
						22,20	Z	FAIR 2	21,54
3	43	11	ULPTUR 57	93,44	218,9	16,20	Z	POOR 2	15,34
						17,00	Z	POOR 2	16,34
						18,30	Z	GOOD 2	17,84
3	43	12	WRNGO 57	173,33	201,4	28,30	Z	FAIR 2	27,64
3	43	13	RBL 57	149,98	208,3	25,00	Z	GOOD 2	24,34
						29,00	Z	FAIR 3	28,34
						30,60	Z	FAIR 3	29,94
3	43	14	VUL 57	160,18	209,5	26,70	Z	GOOD 2	26,84
						28,00	Z	FAIR 2	27,34
						30,70	Z	FAIR 2	30,84
3	43	15	RAL 57	151,18	206,6	25,60	Z	FAIR 2	24,94
						28,20	Z	FAIR 3	27,54
3	43	16	TAV 57	151,37	203,6	25,60	Z	GOOD 2	24,94
						26,80	Z	FAIR 2	26,14
						30,80	Z	FAIR 3	30,24
3	43	17	WAN 57	149,96	208,0	25,20	Z	FAIR 2	24,94
						26,00	Z	GOOD 2	25,34
						17,60	Z	FAIR 2	16,94
						31,20	Z	FAIR 3	30,94
1	44	2	HANG 57	74,22	169,4	14,10	Z	POOR 3	13,62
						14,50	Z	POOR 4	14,82
1	44	7	KWATA 57	79,45	189,8	14,40	Z	GOOD 2	13,92
						19,70	Z	POOR 3	19,22

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TV FROM MSL SEC
	44	7				23,40	Z	FAIR 3	22,92
1	44	8	NATAVA 67	71,59	173,4	11,50	Z	POOR 3	11,02
						12,30	Z	POOR 3	11,02
1	44	9	KAMDRO 67	12,07	356,3	4,30	Z	GOOD 2	3,02
1	44	11	DOILNE 67	63,57	211,3	14,80	Z	GOOD 2	14,32
						16,00	Z	FAIR 3	15,52
						18,10	Z	GOOD 2	17,62
						20,20	Z	GOOD 3	19,72
1	44	12	WRNGO 167	105,15	162,2	20,20	Z	POOR 4	19,72
1	44	13	RBL 67	74,95	160,9	14,00	Z	GOOD 2	13,52
						15,70	Z	GOOD 2	15,02
						20,40	Z	FAIR 2	19,92
						22,80	Z	FAIR 3	22,32
						24,50	Z	FAIR 3	24,02
1	44	14	VUL 67	56,88	333,7	15,40	Z	GOOD 2	14,92
						17,60	Z	FAIR 2	17,12
						21,50	Z	GOOD 3	21,02
1	44	15	RAL 67	79,18	159,2	14,50	Z	GOOD 2	14,02
						15,50	Z	FAIR 2	15,02
						19,70	Z	FAIR 3	19,22
						20,60	Z	FAIR 3	20,12
						25,10	Z	FAIR 3	24,62
1	44	16	TAV 67	81,04	158,2	14,80	Z	GOOD 2	14,32
						16,50	Z	FAIR 2	16,02
						18,00	Z	FAIR 2	17,52
						18,80	Z	FAIR 2	18,32
1	44	17	HAN 67	75,49	160,5	14,00	Z	GOOD 2	13,52
						14,80	Z	FAIR 2	14,32
						17,20	Z	FAIR 3	16,72
3	47	1	LADLV 67	117,37	348,0	18,40	Z	POOR 4	18,59
3	47	2	NAK, 2 67	75,99	305,6	13,90	Z	GOOD 1	13,89
						14,70	Z	FAIR 1	14,69
						16,40	Z	POOR 2	16,39
3	47	4	NAH, 4 67	75,53	305,7	13,60	Z	GOOD 2	13,59
						16,40	Z	FAIR 2	16,39
						27,30	Z	POOR 3	27,29
						29,10	Z	POOR 3	29,09
3	47	6	SUMSUM 67	102,83	222,4	16,20	Z	GOOD 2	16,19
3	47	7	PALIE 67	105,62	333,9	18,60	Z	GOOD 2	18,59
						19,70	Z	FAIR 3	19,69
						21,10	Z	POOR 3	21,09
						25,90	Z	POOR 3	25,09
3	47	8	KFANGA 67	82,37	233,4	14,70	Z	GOOD 2	14,69

STAGE	SWOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TIME FROM NBL SEC
3	47	9	KMDARU69	36,83	244,3	7,70	Z	GOOD 2	7,89
						8,30	Z	FAIR 2	8,29
						9,20	Z	POOR 3	9,19
						10,50	Z	POOR 3	10,50
3	47	10	MLIANA69	1,67	204,4	1,20	Z	GOOD 1	4,19
3	47	11	ULPTUR69	78,15	298,9	14,30	Z	GOOD 2	14,89
						15,90	Z	POOR 3	15,89
						16,90	Z	POOR 3	16,89
						17,40	Z	POOR 3	17,89
3	47	12	WRNGO169	94,43	242,7	18,80	Z	POOR 3	18,79
						16,90	Z	GOOD 2	16,89
						17,10	Z	POOR 3	17,89
						18,70	Z	FAIR 3	18,89
3	47	13	RBL 69	92,74	261,3	19,10	Z	POOR 3	19,89
						16,20	Z	GOOD 2	16,19
3	47	14	VUL 69	97,38	255,8	21,10	Z	FAIR 3	21,89
						17,50	Z	FAIR 2	17,89
						18,00	Z	GOOD 2	17,99
3	47	15	RAL 69	89,77	258,9	19,40	Z	GOOD 3	19,89
						17,50	Z	FAIR 3	17,89
3	47	16	TAV 69	88,02	257,9	15,70	Z	GOOD 2	15,89
						17,80	Z	FAIR 2	17,79
						18,90	Z	FAIR 2	18,89
						19,50	Z	FAIR 2	19,89
						20,60	Z	FAIR 2	20,99
3	47	17	HAN 69	92,13	261,8	16,00	Z	FAIR 2	15,99
3	48	1	LNDLV969	10,64	99,1	2,70	Z	GOOD 1	2,81
						4,20	Z	POOR 3	4,21
						5,60	Z	POOR 3	5,91
3	48	2	NAM,2 69	68,66	188,3	13,60	Z	GOOD 1	13,91
						16,60	Z	POOR 3	16,91
						24,00	Z	POOR 3	23,91
3	48	4	NAM,4 69	68,69	188,9	13,60	Z	GOOD 2	13,91
						16,50	Z	FAIR 3	16,81
						21,90	Z	FAIR 3	21,81
						24,20	Z	POOR 3	24,21
						25,90	Z	POOR 3	25,81
3	48	5	D,YORK69	129,80	185,2	21,90	Z	GOOD 2	21,81
						23,20	Z	POOR 3	23,21
						24,70	Z	GOOD 2	24,81
3	48	7	PALIE 69	17,28	154,3	4,00	Z	GOOD 2	3,91
						7,90	Z	FAIR 3	7,81
						11,20	Z	FAIR 3	11,21
3	48	10	MLIANA69	124,00	156,2	20,90	Z	FAIR 3	20,81
						21,60	Z	POOR 3	21,91

STAGE	SHOT	PARTY	LOCATION	DELTA KM	AZIMUTH	TRAVEL TIME SEC	COMP	REMARKS	TY FROM HSL SEC
	48	10				26,20	Z	POOR 3	26,31
3	48	11	ULPTURBP	76,26	193,5	14,70 16,30 17,50	Z Z Z	GOOD 2 FAIR 3 FAIR 5	14,51 16,21 17,41
3	48	16	TAV BP	135,08	198,2	22,80	Z	FAIR 2	22,71



RECENT



Alluvium

PLEISTOCENE
TO RECENT



Raised coral reefs



Reworked volcanic detritus
Basal aprons to volcanic centres



Basic, intermediate, and acid lava and pyroclastic rocks
Volcanic centres and calderas

PLEISTOCENE



Funglomerates and terrestrial sediments

PLIOCENE



Conglomerates, coal measures, marls, and limestone

UPPER MIOCENE
TO PLIOCENE



Basic, intermediate, and acid lava, tuff,
agglomerate, and derived sediments

MIDDLE MIOCENE
TO PLIOCENE



Coralline, algal, and bioclastic limestone
Calcareous siltstone and marl

OLIGOCENE TO
LOWER MIOCENE



Diorite, gabbro, granodiorite, tonalite

OLIGOCENE TO
LOWER MIOCENE



Basic to intermediate volcanic rocks
Volcanogenic sediments and limestone

EOCENE



Basic to intermediate volcanics and
derived conglomerate, greywacke and shale



Geological boundary (position accurate)



Geological boundary (position approximate)



Geological boundary (inferred)



Fault

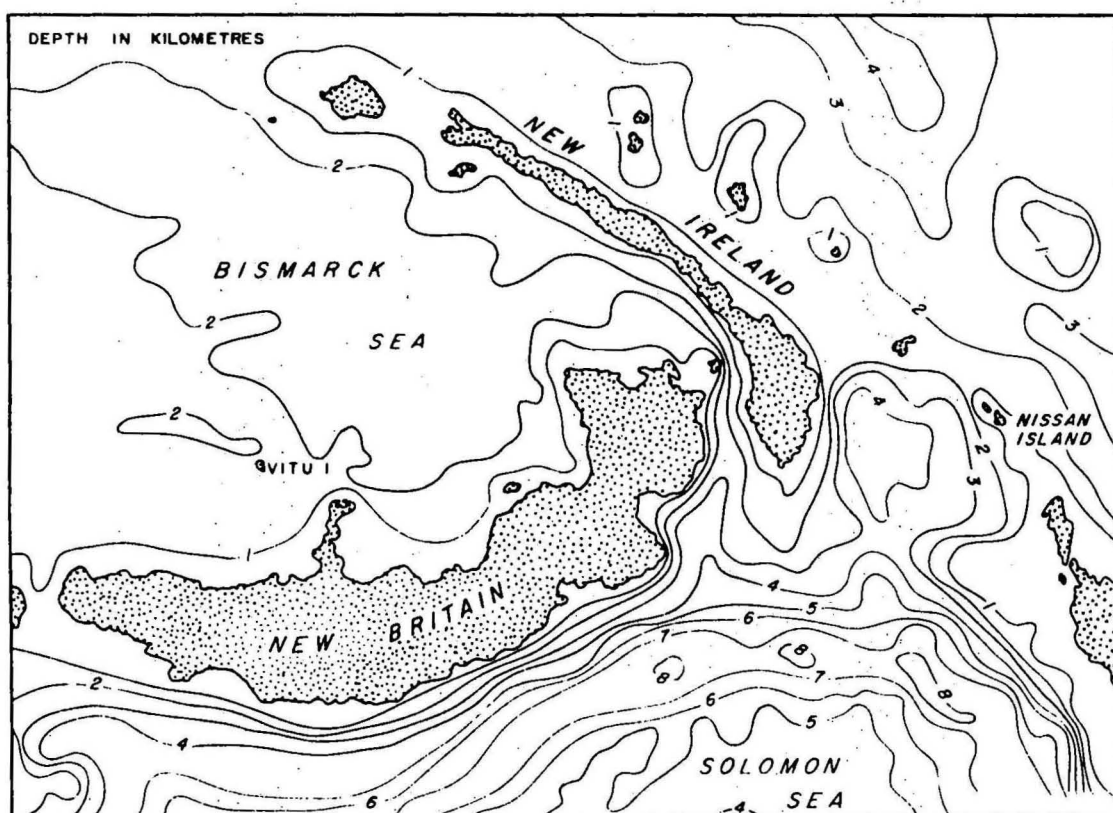


Fault (inferred)

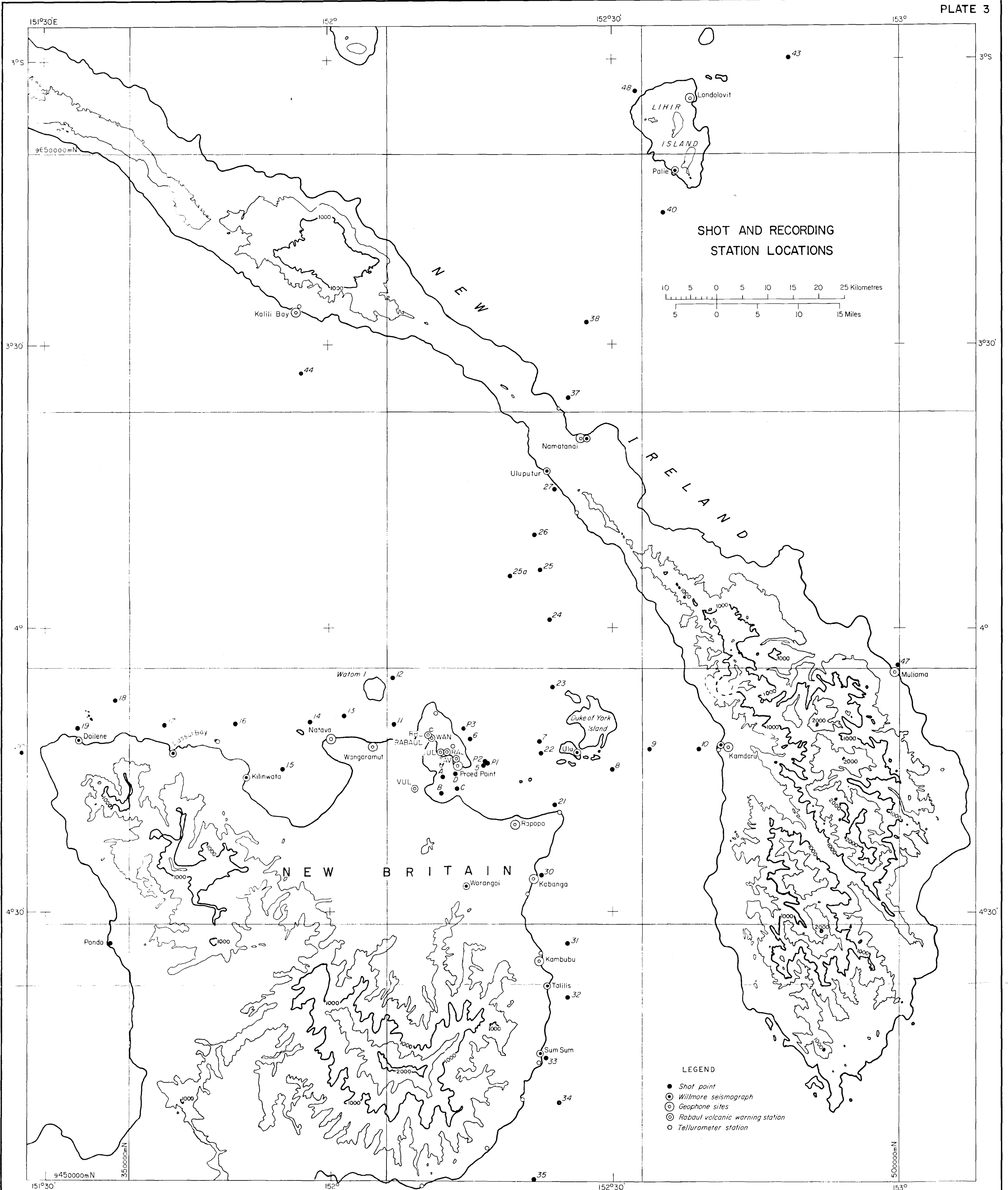


Fault (concealed)

SIMPLIFIED GEOLOGY OF THE GAZELLE PENINSULA OF NEW BRITAIN AND SOUTHERN NEW IRELAND



GENERAL BATHYMETRY OF NEW BRITAIN-NEW IRELAND REGION



To accompany Record No 1972/45

Based on B56/B5-39

B56/B10-81

