TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 5th January, 1967 To: 11th January, 1967.
SULPHUR CREEK	(SUL) -	Not operational.
KERAVAT	(KRT) -	Not operational.
ESA'ALA	(ESA) -	From: 14th December, 1966 To: 20th December, 1966.
AGENAHAMBO	(AGE) -	From: 21st November, 1966 To: 26th November, 1966
		From: 25th December, 1966 To: 31st December, 1966.
TABELE	(TBL) -	No records received.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

CENTRAL OBSERVATORY RABAUL

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Bedrock: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL)-HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY:

S.P. Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Bedrock: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING-COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2 S., Longitude 150°48'50".7 E., Elevation 46m.
Bedrock: granite.

STATION INSTRUMENTATION

		To sec	Tg sec.
SEISMOMETER 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000.
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E, Elevation 303m.
Bedrock: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

Attenuator setting $\frac{1}{10}$, drum speed 60 mm/min. 0.6 0.25
S.P.Z. magnification 1,000.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Bedrock: basalt flow.

STATION INSTRUMENTATION

		To sec	Tg sec.
SEISMOMETER 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

— coupled to Willmore Recorder 0.25
attenuator setting 1/100, **drum speed 60 mm/min.**
S.P.-Z_W magnification 860

PRESENTATION OF DATA:

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only. At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals.

At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION;

"c" or "d" indicates initial compression or dilation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south or west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATION OF EPICENTRES:

Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by

E.A. Flinn and E.R. Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization", Seismic Data Laboratory Report No. 101, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A	Peak-to-Trough trace amplitude in millimetres.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal Depth in Km.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
5th January							
iP	Z	00 25 36.5	0.4	2.5	d	70°	
i	Z/	26 00.6					
eS	N/	34 38					
iP	Z	00 53 09.5	0.5	2.0	d	Teleseism, overlapped by preceding shock.	
i	Zh	02 42 09.5	0.5	4.0			ship moving in harbour.
F	Z	46 21					
iP	Z	06 20 19.8	0.8	8.0	c	29¼°	-
[illegible]	E/	25 49					
eP	Z	10 39 33	0.5	2.0	d	15½°	
e(S)	N/	42 27½					
iP	Z	18 26 08.0	0.5	2.2	d	5°	H=18 24 53
iS	E	27 05.5					
iP	Z	22 31 19.2	0.4	1.5	d	2½°	H=22 30 37
iS	E	51.4					
6th January - Microseisms increasing from 052340 - 060615 hrs.C.P							
eP	Z	00 12 13½	0.5	2.0	d	36½°	Teleseism
eS	N/	19 16					
eL	Z/	25 14					
eP	Z	04 12 56	0.5	3.0	d		
e	Z/	05 30 09			-		Traces
iP	Z	09 13 31.2	0.5	3.7	c	2°	H=09 12 59
i	Z	33.1					
iS	N/	55.5					
iP	Z	09 19 04.2	0.4	2.0	d	1½°	H=09 18 38
	N	24					
iP	Z	10 08 34.5	0.4	3.8	d	24¼°	
eS	E/	13 05					
eP	Z	10 51 35½	0.4	1.2	c	3½°	H=10 50 42
eS	E	52 16					
e	Z/	13 45 19			-		Traces
iP	Z	14 32 56.2	0.4	8.5	d	2°	H=14 32 24
iS	N	33 20.5					
iP	Z	17 06 30.2	0.3	1.0	d	2¼°	H=17 05 5[illegible]
iS	N	57.5					
eiP	Z	21 08 54	0.4	1.0		9½°	H=21 08 27
i	Z	55.0					
iS	N	09 14.2					
e	Z/	22 58 42			-		Traces
[illegible] January - Microseisms increasing between 0315 - 0930 hrs.							
[illegible]	Z	00 37 02	0.4	1.0	c	36¼°	
eS	E/	43 50					
eL	N/	55 22					
iP	Z	04 09 15.3	0.5	60.0	d	¾°	H=04 09 01
iS	N/	26.0					
eiP	Z	05 07 03	0.4	18.5	d	2°	H=05 06 29
i!	Z	04.2					
iS	E/	28.5					
e	Z/	07 22 07			-		Traces

RABAUL (cont.)
7th January (cont.)

			T sec	A mm	GM	Dist	Remarks
e	Z/	09 45 40			-		Traces
eP	Z	11 36 45	0.5	1.0	d	16¼°	[illegible]
S	N/	39 47					
eLQ	N/	51					
iP	Z	13 39 03.4	0.8	3.0	d	18¼°	[illegible]
i	Z	08.5					
eS	N/	42 29					
eLQ	N/	33½					
eSS	N/	52½					
eP	Z	15 58 03	0.5	1.2	c	26¼°	
eS	N/	16 02 54					
eP	Z	16 44 44	0.5	1.0	d	24°	
e	Z/	45 52					
eS	N/	49 11					
iP	Z	18 25 59.5	0.3	1.1	c	2½°	H=18 25 19
iS	N	26 30.5					
e	Z	20 49 48	0.4	1.0	d		Traces
8th January							
iP	Z	00 31 51.5	0.4	2.0	c	15½°	
i(S)	N	34 43.0					
	Z/	05 20 53			+		traces
iP	Z	13 59 12.0	0.4	7.0	d	1½°	H=13 58 48
iS	N	30.0					
eP	Z	15 31 09	0.3	1.0	d	17°	
i	Z	23.0					
i	Z	50.3					
eS	N/	34 19					
eiP	Z	21 48 23	0.4	2.0	-	1¾°	H=21 47 53
i	Z	27					
i	Z	37.5					
iS	N	45.5					
9th January							
iP	Z	05 38 34.0	0.5	4.0	d	1½°	H=05 38 08
eS	N/	54					
iP!	Z	15 11 18.0	0.4	44.2	dNW	1¼°	H=15 10 57
iS	N/	33.5					
iP	Z	16 26 13.6	0.5	1.5	d	1¾°	H=16 25 44
iS	E	35.5					
e	Z/	17 51 32			+		Traces
e	Z/	19 10 19			+		Traces
eP	Z	19 50 35	0.5	0.5	d	17½	
eS	N/	53 52					
iP	Z	20 42 33.2	0.5	2.9	c	2°	H=20 42 00
iS	N	58.5					
eP	Z	21 00 05½	0.5	1.5	d		Deep
i	Z	06.4					
e(S)	E/	13½					
10th January							
iP	Z	07 50 15½	0.5	1.0	d	6¾°	H=07 48 36
i	Z	16.2					
eS	E/	51 33					
iP	Z	08 15 00.2	0.3	13.0	c	½°	H=08 14 48
iS	N	09.0					
e(P)	Z	10 11 58	0.5	1.0	d		(Teleseism)

			T sec	A mm	GM	Dist	Remarks
RABAUL (cont.)							
10th January (cont.)							
eP	Z	10 14 05	0.5	1.2	c	3°	H=10 13 16
i	Z	13.5					In coda of preceding shock.
eS	E/	42					
eP	Z	13 40 03½	0.5	3.2	c	2¼°	H=13 31 26
i	Z	40					
iS	N/	31.5					
iP	Z	15 17 07.0	0.4	7.0	c	2°	H=15 16 33
i	Z	09.5					
iS	N	33					
iP	Z	15 21 27.0	0.5	3.8	d	1°	H=15 21 11
iS	E	39.0					in coda of preceding shock.
e	Z/	19 03 52			–		Traces
iP	Z	22 40 13.5	0.5	2.5	d	3½°	H=22 39 21
eS	N	53					
11th January							
e	Z/	01 28 22			–		Traces
iP	Z	06 00 30.0	0.5	5.5	c		Teleseism
i	Z	45.2					
e	Z/	05 49					
e	Z/	07 34 39			+		Traces
iP	Z	08 10 34.0	0.4	7.0	d		Local shock
iS	N	38					
eP	Z	11 34 22	0.5	1.0	d		Teleseism
i	Z	26.2					
e	Z	36 04					
iP	Z	11 51 41.0	0.5	3.2	d		Teleseism
iP	Z	13 20 49.8	0.4	1.0	c	1¼°	H=13 20 27
iS	N	31 07.0					
iP	Z	15 10 40.9	0.5	12.5	d	1°	H=15 10 22
iS	E	55.0					
iP	Z	15 36 38.0	0.5	1.5	d	¼°	H=15 36 30
i	Z	40.5					
eS	E	34					
e	Z/	17 00 42			+		Traces

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							DEC
14th December	-	short period records unreadable.					
iP	Z/	21 09 48.0			d	9½°	H=21 07 31
iS	E/	11 35.0					3°S., 142°E.
iScS	N/	23 23.0					near nth. coast of NG
15th December							
iP	Z	09 28 08.3	0.4	2.5	c	3¾°	H=09 26 48
iS	Z/	29 18.0					10°S., 155°E.
							D'Entrecasteaux Is. Region.
eP	Z/	13 44 39½					Teleseism.
iP!	Z	14 33 40.0				5½°	5°S., 146°E.
~~i~~	~~Z~~	~~49.0~~					East N.G. Region
iS	Z/	34 40.0					
16th December							
iP	Z	20 53 10.2					Local shock.
iS!	E/	13.0					
iP!	Z	20 57 21.0					Local shock.
i	Z	59 04.1					
iP	Z	21 04 16.0	1.0	2.2	c	53°	
eS	Z/	13 09½					
17th December	-	harmonic shocks between 2242 - 0500 hrs. Average A* = 0.5, T = 0.5.					
eiP	Z	04 39 22					
eP	Z	06 39 58	0.6	0.3			Regional.
eP	Z	07 50 49	0.6	0.1		23°	H=07 45 42.
i	Z	12.2					Banda Sea.
i	Z	26.2					
iS	N/	55 12.0					
eP	Z	13 33 17½	0.6	0.5		(1°)	H=13 33 (61)
i(S)	Z	29.6					
18th December							
eP	Z	09 46 27	0.5	0.5			Local.
i	Z	47 26.0					
iP	Z	09 50 56.0	0.6	1.0			In coda of previous shock.
19th December							
eP	Z	11 32 47	0.5	0.3			Local
iP	Z	11 46 00.0	0.6	1.1		3°	H=11 45 13
iS	N	35.6					
eP	Z	13 24 50½	0.4	0.5		5°	H=13 23 35
eS	N	25 48½					
eP	Z	20 14 13					Local shock.
20th December	-	short period records unavailable.					
iP	Z/	12 43 24.0				1¼°	H=12 47 03
iS	N/	40.5					
iP	Z/	15 43 44.0					Regional.
iP	Z/	16 24 57.1			c	¾°	H=16 24 34
iS	N/	29 49.0					
iP	Z/	18 46 56.0				37°	
eS	E/	53 41					

		T sec	A* mm	GM	Dist	Remarks

AGENAHAMBO

21st November - shocks with Harmonic form between 0300 hrs and 0446 hrs. Average T = 0.3, Average A* = 1.0.

22nd November - record unreadable until 0200 hours. Microseismic Activity with Harmonic tremor between 0200 hrs and 0600 hrs approx.

Microseismic activity (Average T = 0.4. (Average A*= 0.8.

Harmonic Tremor (A erage T = 0.5 (Average A*= 0.9

23rd November - No record available

24th November - Microseismic activity between 2144 hrs and 0653 hrs.

25th November - Harmonic shocks btween 2154 hrs and 0836 hrs. Average T = 0.3. Average A* = 1.2

		T sec	A* mm	GM	Dist	Remarks
iP Z	20 59 07	0.3	4.5	d		Regional
26th November						
eP Z	04 24 19			(d)		Teleseism
e Z	36½					
e Z	25 34					
25th December						
iP Z	11 07 36½	0.2	3.0	d		Regional
eiP Z	14 28 54½	0.4	1.2	d		Regional
iP Z	15 43 37½	0.5	1.1	d		Regional
26th December -	No Record Available					
27th December -						
eP Z	05 44 15	0.6	0.3	(d)		Teleseism
eP Z	15 58 02					Teleseism
28th December						
eP Z	08 38 17½	0.8	0.6	+		Teleseism
29th December						
e(P)Z	09 52 19					Regional
e(P)Z	13 14 40	0.6	0.3	+		Teleseism
30th December -	Nil Recorded.					
31st December -	No Record.					

G.W.D'ADDARIO
Vulcanologist-in-Charge.

Central Observatory
RABAUL.

13th January, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)		From: 11th January, 1967 To: 18th January, 1967
SULPHUR CREEK	(SUL)	-	Not Operational.
KERAVAT	(KRT)	-	Not Operational.
ESA'ALA	(ESA)	-	From: 20th January, 1967 To: 30th January, 1967
AGENHAMBO	(AGE)	-	From: 31st December, 1967 To: 2nd January, 1967
TABELE	(TAB)	-	Nil Recorded.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
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CENTRAL OBSERVATORY RABAUL

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Bedrock: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL)-HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY:

S.P. Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Bedrock: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING-COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2 S., Longitude 150°48'50".7 E., Elevation 46m.
Bedrock: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
SEISMOMETER: 1 Geotech Mod. 1051 vertical; 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000.
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E, Elevation 303m.
Bedrock: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

	To sec.	Tg sec.
VERTICAL WILLMORE SEISMOGRAPH. Attenuator setting $\frac{1}{10}$, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Bedrock: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec.
SEISMOMETER: 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min. S.P.-Z_W magnification 860			0.25

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

PRESENTATION OF DATA:

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only. At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals.

At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION;

"c" or "d" indicates initial compression or dilation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south or west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

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Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by

E.A. Flinn and E.R. Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization", Seismic Data Laboratory Report No. 101, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A	Peak-to-Trough trace amplitude in millimetres.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal Depth in Km.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

12th January

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 41 31.5	0.5	1.5	d	3°	H=02 40 45
eS	E	42 06½					
iP	Z	03 36 50.0	0.5	3.0	c		Regional
iP!	Z	03 44 54.2	0.5	55.0	dSE	1¼°	Aftershock
iS	N/	45 10.0					H=03 44 33

Felt: Rabaul Int. I - 04°10'S, 152°10'E.

			T sec	A mm	GM	Dist	Remarks
iP	Z	04 06 45.3	0.5	3.3	d	1¼°	H=04 06 23
iS	E	07 02.0					aftershock
eP	Z	05 21 37	0.4	1.2	d	1¼°	H=05 21 16
iS	N	53.5					aftershock
iP	Z	08 05 36.2	0.4	7.0	c	1¼°	H=08 05 1[illegible]
iS	N	53.5					
iP	Z	10 42 30.6	0.4	1.0	d	2°	H=10 41 57
iS	N	55.5					
iP	Z	22 33 18.3	0.5	1.0	d	1½°	H=22 32 54
iS	E	36.0					

13th January

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 11 45.0	0.5	1.5	c		Regional?
iP	Z	11 54 01.0	0.4	3.8	c	1½°	H=11 53 33
iS	N	21.5					
eP	Z	13 40 15	0.5	1.5	d	2½°	H=13 39 37
iS	N	44.0					
e(P)	Z	13 50 51½	0.5	1.0	(d)	12°	
i	Z	51 02.0					
eLQ	N/	52 58					
eS	N/	53 11					
eSS	N/	21					
eSSS	N/	31½					
e	Z/	16 59 47			-		Traces
e	Z/	18 00 15			-		Traces
eP	Z	18 48 05	0.5	1.0	c	2¼°	H=18 47 30
iS	N	30.2					

14th January

			T sec	A mm	GM	Dist	Remarks
eP	Z	00 57 29½	0.4	1.5	c	1½°	H=00 57 03
iS	N	49.5					
e	Z/	03 17 27			-		Traces
iP	Z	05 42 01.4	0.4	1.0	c	1½°	H=05 41 3[illegible]
iS	E	19.0					
iP	Z	09 25 09.4	0.4	3.7	c	1°	H=09 24 49
iS	E	24.5					
e	Z	12 14 36			c		Traces
e	Z/	12 29 38			+		Traces
iP	Z	13 38 57.0	0.5	2.8	c		Regional
i	Z	39 03.4					
e(P)	Z	14 17 15	0.8	1.0	(d)	21½°	
ePP	Z/	39					
eS	E/	21 10					
eLQ	N/	21½					
eSS	N/	49					
eScS	N/	28 39					

			T sec	A mm	GM	Dist	Remarks
RABAUL							
14th January (cont.)							
iP	Z	21 07 01.6	0.3	1.5	c	1½°	H=21 06 36
iS	E	21.0					
eiP	Z	21 54 51	0.5	1.5	c	1½°	H=21 54 25
i	Z	51.5					
iS	N	55 10.5					
15th January							
e	Z/	01 37 06			+		Traces
iP	Z	02 12 45.4	0.5	10.8	d	1½°	H=02 12 20
iS	E	13 04.8					
iP	Z	03 10 52.5	0.5	36.0	d	3¾°	H=03 09 54
iS	E	11 37.0					
eP	Z	15 12 26½	0.5	2.0	d	4½°	H=15 11 22
iP	Z	15 35 09.5	0.5	2.0	d	1¾°	H=15 34 40
16th January							
iP	Z	00 10 52.2	0.5	2.5	d	1°	H=00 10 32
iS	E	11 07.5					
iP	Z	02 22 40.5	0.4	1.5	d	3½°	H=02 21 47
iS	N	23 21.0					
eP	Z	04 48 02½	0.5	2.0	d	21°	
ePP	Z/	29					
ePPP	Z/	40½					
eS	E/	51 53					
ePcP	Z/	04 52 12					
eSS	E/	52 29					
eSSS	E/	44½					
eP	Z	11 11 48½	0.5	0.8	d	12½°	
eLQ	N/	13 57					
eS	N/	14 05					
eSS	N/	22					
iP	Z	13 53 19.5	0.4	11.0	c	2½°	H=14 52 42
iS	N	48.0					
eP	Z	14 29 59	0.5	0.8	c	16°	
ePP	Z/	30 14					
ePPP	Z/	24					
eLQ	N/	33 02					
eS	N/	05					
eP	Z	14 45 19	0.8	1.0	d		Teleseism overlapped by pre[illegible] shock.
eP	Z	14 52 24½	0.5	1.0	c		Teleseism [illegible] coda of preceding sh[illegible]
iP	Z	15 49 46.3	0.5	32.0	d	1°	H=15 49 30
eS	N/	58½					
eP	Z	16 05 55½	0.5	1.0	d	17½°	
iS	N/	09 12					
eP	Z	19 23 28	0.5	1.0	d	2¼°	H=19 22 5
iS	N	56					
iP	Z	19 39 38.8	0.5	13.0	d	1°	H=19 39 21
iS	N/	51.5					
17th January							
iP	Z	01 21 28.2	0.5	1.2	d	(23°)	
e(S)	E/	25 37					
i	Z	26 06.5					
iP	Z	01 28 21.5	0.5	2.4	d	18°	in coda of [illegible]ceding sh[illegible]
i	Z	40.0					
eS	N	31 54					

RABAUL

			T sec	A mm	GM	Dist	Remarks
17th January (cont.)							
eiP	Z	03 00 46	0.5	1.0	d		Telesiesm
i	Z	52.4					
iP	Z	05 58 44.5	0.4	16.5	d	2^{o}	C.B.M.
eS	N/	59 11					H=05 58 09
iP	Z	06 57 41.8	0.5	1.6	d	1^{o}	H=06 57 24
iS	N	54.5					
iP	Z	09 44 47.3	0.4	4.0	c	$2\frac{1}{4}^{o}$	H=09 44 12
i	Z	50.4					
iS	N	45 14.5					
eP	Z	12 07 $13\frac{1}{2}$	0.8	1.1	c	$43\frac{1}{2}^{o}$	
ePP	Z/	09 09					
ePcP	Z/	14					
ePPP	Z/	44					
ePcS	Z/	13 10					
iS	E/	54.5					
eSS	N/	17 05					
eScS	N/	23					
eLQ	N/	40					
iP	Z	18 12 51.3	0.4	0.8	c	2^{o}	H=18 12 21
i	Z	52.0					
iS	N	13 14.0					
iP	Z	19 31 02.8	0.5	1.0	d	$1\frac{1}{2}^{o}$	H=19 30 38
iS	N	22.1					
iP	Z	21 24 19.0	0.4	4.0	d	$2\frac{1}{2}^{o}$	H= 21 23 41
iS	N	48.0					
eiP	Z	23 13 07.3	0.4	14.0	c	$2\frac{1}{2}^{o}$	H=23 12 29
iS	E	36.0					
18th January		C.M.B.					
iP	Z	05 45 20.6	0.7	10.5	c	67^{o}	Deeper than usual.
iPcP	Z	51.5					
ePP	Z/	47 42					
ePPP	Z/	49 23					
eS	N/	54 11					
eSS	E/	58 25					
eSSS	N/	06 01 47					
eLq	E/	03 15					
eLr	Z/	05 43					
iP!	Z	07 20 37.0	0.3	25.0	c	$\frac{1}{4}^{o}$	H=07 20 25
iS	E/	44.2					
iP!	Z	07 55 12.4			c	$1/3^{o}$	H=07 55 01
iS	E/	20.0					
iP!	Z	07 58 50.0			c	$\frac{1}{4}^{o}$	H=07 58 40
iS	E/	57.0					
iP	Z	08 04 14.2	0.3	15.0	c	$\frac{1}{4}^{o}$	H=08 04 05
iS	E/	21.5					
iP	Z	08 11 10.0			c	$\frac{1}{4}^{o}$	H=08 11 00
iS	E/	17.0					
iP!	Z	08 39 34.2	0.3	33.5	c	$\frac{1}{4}^{o}$	H=08 39 25
iS	E/	41.0					
iP	Z	08 41 19.7	0.3	18.0	c	$\frac{1}{4}^{o}$	H=08 41 10
iS	E/	26.5					

			T sec	A* mm	GM	Dist	Remarks

ESA'ALA

21st December

eiP	Z	01 13 58	0.1	1.1			Regional
eP	Z	06 17 07					Regional
i	Z	09.5					
i	Z	13.5					
eiP	Z	08 56 26				20°	18°S.,166°E., New Hebrides Region
iS	E/	09 00 09.5					
SS	E/	44.5					
e	E/	10 52					
e	E/	13 10					

22nd December

iP!	Z	16 43 32.9					Teleseism

Microseismic activity between 2240 and 0700 hours.
Average T= 2.9, Average A* = 2.7.

23rd December

iP	Z	01 16 47.5	1.5	5.0	d		Teleseism
iP	Z	02 24 28.3	0.5	1.1	d		Local
iP	Z	03 24 50.5			d	¾°	H=03 54 28
iP!	Z	15 02 24.9					Teleseism
iP!	Z	15 51 16.2			dNE	3½°	Normal Depth 7°S., 149°E., East New Guinea Region
iP	Z	16 15 54.5			d	(5¼°)	H=16 14 (37)
iS	N	16 (35.0)					
iP	Z	16 57 06.7			d	3½°	H=16 56 13
iS	N	47.6					

24th December

iP	Z	11 02 33.9					Local
iS	E	36.2					
iP	Z	11 16 27.5				3¾°	H=11 15 31
iS	N	17 11.7					
eP	Z	21 22 19					Local
i	E	23 06.5					

25th December

iP	Z	22 41 12.0	0.9	4.0	c		Deep Shock
i	Z	15.1					
eiP	Z	11 07 03½	0.5	2.1	d	3½°	H=11 06 10
iS	E/	44.6					
iP	Z	14 08 10.7					Local Shock
iLQ	Z	14.2					
eiP	Z	14 27 46	0.5	1.4	d	4¾°	H=14 26 33
iS	E/	28 41.7					
eP	Z	15 43 07				5½°	H=15 41 45
i	Z	09.9					
iS	E/	44 09.7					
iP	Z	20 23 55.8	0.7	1.5	d	9°	H=20 21 47
iS	E/	25 35.8					

26th December

iP	Z	01 09 30.0				4½°	H=01 08 22
iS	E/	10 22.0					
eP	Z	17 19 49½				16¾°	13°S., 165°E., New Hebrides
e	N/	24 17½					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
27th December							
eP	Z	01 30 54	1.0	0.4		1°	H=01 30 35
iS	N/	31 07.9					
i	Z	17.4					
eP	Z	05 43 51½	0.7	0.5		8½°	H=05 41 49
i	Z	54.1					
iS	N/	45 26.4					
eP	Z	15 58 28½	0.5	0.5		3¼°	H=15 57 39
iS	E	59 06.9					
28th December							
e(P)	Z/	08 33 54					Teleseism
e	Z	37 11					
i(PKP)	Z	16.0					
i	Z/	20.5					
i	Z/	39 06.0					
i	Z	49 30.8					
i	Z/	54 04.6					
29th December							
iP	Z	00 21 47.5			d		Local
iS	E	22 40.2					
iP	Z	09 51 50.5	0.3	o.3	c		Regional
eP	Z	15 00 02					Teleseism
iP	Z	16 45 30.0	0.5	2.0	d	4½°	H=16 44 27
iS	E/	46 20.0					
30th December							
eiP	Z	07 33 17					Local

			T sec	A* mm	GM	Dist	Remarks
AGENHAMBO							
1st January							
iP	Z	22 16 52			d		
iS	Z	17 04½					
eP	Z	22 19 30½	0.6	0.3	(c)		Teleseism
e	Z	48					
e	Z	20 18½					
2nd Janaury							
eP	Z	00 25 21½			(c)		Teleseism
e	Z	32					

Seismograph U/S from 3rd January,1967 due to electrical storm.

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Central Observatory
Rabaul.

20th January, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
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VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 18th January, 1967 To: 25th January, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	Not operational
ESA'ALA	(ESA)	From: 30th December, 1966 To: 7th January, 1967
AGENAHAMBO	(AGE)	Seismograph unserviceable.
TABELE	(TBL)	From: 9th January, 1967 To: 17th January, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
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CENTRAL OBSERVATORY RABAUL

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Bedrock: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL)-HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15 kg.

L.P.-No	~~Static magnification 12, air damping 10:1~~	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44"S., Longitude 152°11'48"E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY:

S.P. Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING-COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2 S., Longitude 150°48'50".7 E., Elevation 46m.
Bedrock: granite.

STATION INSTRUMENTATION

Instrumentation	Recorder	To sec	Tg sec.
	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
SEISMOMETER 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000.
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E, Elevation 303m.
Bedrock: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec	Tg sec
Attenuator setting $\frac{1}{10}$, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Bedrock: basalt flow.

STATION INSTRUMENTATION

Instrumentation	Recorder	To sec	Tg sec
	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
SEISMOMETER 1 Geotech 1051 vertical			
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

	To sec	Tg sec
— coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min. S.P.-Z_W magnification 860		0.25

PRESENTATION OF DATA:

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only. At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals.

At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION;

"c" or "d" indicates initial compression or dilation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south or west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATION OF EPICENTRES:

Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by

E.A. Flinn and E.R. Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization", Seismic Data Laboratory Report No. 101, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A	Peak-to-Trough trace amplitude in millimetres.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal Depth in Km.

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CENTRAL OBSERVATORY RABAUL

			T sec	A mm	CM	Dist	Remarks
RABAUL							
19th January - Strong microseismic activity associated with heavy sea							
eP	Z	01 02 25	0.5	1.5	d		Teleseism
iP	Z	05 10 58.4	0.5	2.8	d	$\frac{3}{4}^{o}$	H=05 10 43
eS	N	09					
eP	Z	12 42 09	0.5	1.0	c	16^{o}	overlapping traces
e	Z	11					
ePP	Z/	27					
eS	N	45 $15\frac{1}{2}$					
ePcP	Z/	47 11					
iP	Z	13 45 32.2	0.5	33.5	c	$\frac{1}{4}^{o}$	H=13 45 23 - in
eS	E/	39				coda of preceding shock	
iP	Z	18 04 24.9	0.5	9.0	c	$\frac{1}{4}^{o}$	H=18 04 15
iS	N	31.5					
iP	Z	18 28 21.8	0.4	15.2	c	$\frac{1}{4}^{o}$	H=18 28 12
iS	N	28.5					
20th January - strong microseismic activity associated with heavy sea. L.P. E.W. record paper upside down.							
iP	Z	00 19 12.5	0.5	41.5	cS(E)	$1\frac{1}{4}^{o}$	H=00 18 50
iS	No	29.0					
Numerous aftershocks - largest only are listed. Felt: Rabaul Int. III, 04°10'S, 152°10'E.							
iP	Zh	00 23 01.4			c	$\frac{1}{2}^{o}$	H=00 22 52 - i
iS	No	08.0				coda of preceding sho	
Felt: Rabaul Int. III, 04°10'S, 152°10'E							
iP	Z	00 55 11.0	0.3	33.0	c	$\frac{1}{2}^{o}$	H=00 55 01
iS	N/	18.0					
iP	Z	01 33 43.0	0.5	20.5	c	$\frac{1}{2}^{o}$	H=01 33 34
iS	N/	49.5					
iP	Z	02 08 18.0	0.8	2.0	c	15^{o}	
i	Z	18.7					
iPP	Z/	31.5					
eLq	N/	10 59					
iS	N/	11 04					
eSS	N/	17					
ePcP	Z/	13 $28\frac{1}{2}$					
eScP	N/	17 $03\frac{1}{2}$					
eP	Z	04 04 $27\frac{1}{2}$	0.5	1.5	c	$\frac{1}{2}^{o}$	H=04 04 17
iS	N/	35.0					
eP	Z	04 37 20	0.4	2.0	d	1^{o}	H=04 37 02
iS	N/	33.0					
iP	Z	05 41 41.5	0.5	8.0	d	$1\frac{1}{2}^{o}$	H=05 41 14
iS	N/	42 02.5					
iP	Z	06 28 56.2	0.4	2.2	d	3^{o}	H=06 28 10
eS	N/	29 31					
iP	Z	06 35 27.3	0.4	8.5	c	$\frac{1}{2}^{o}$	H=06 35 16
eS	N/	$35\frac{1}{2}$					
iP	Z	06 55 39.0	0.3	27.0	c	$\frac{1}{4}^{o}$	H=06 55 31
iS	N/	45.0					
iP	Z	08 15 33.8			c	$\frac{1}{4}^{o}$	H=08 15 26
eS	N/	40					superimposed shock
iP	Z	08 26 07.7			c	$\frac{1}{2}^{o}$	H=08 25 58
iS	N/	14.5					superimposed sho

RABAUL

20th January (cont.)

			T sec	A mm	GM	Dist	Remarks
iP	Z	09 05 30.0	0.5	1.2	c	$\frac{3}{4}^{\circ}$	H=09 05 15
eS	N/	41					
iP	Z	09 38 09.6	0.4	4.0	c	$\frac{1}{2}^{\circ}$	H=09 38 00
iS	N	16.5					
iP	Z	10 48 46.2	0.5	4.0	c	$\frac{1}{2}^{\circ}$	H=10 48 37
iS	N	53.0					
iP	Z	12 38 48.3	0.5	4.0	c	$\frac{1}{2}^{\circ}$	H=12 38 39
iS	N	55.0					
iP	Z	12 40 49.7	0.5	3.8	c	$\frac{1}{2}^{\circ}$	H=12 40 37
iS	N/	58.5					
iP	Z	14 21 12.0	0.5	2.5	c	$\frac{1}{2}^{\circ}$	H=14 21 02
iS	E	19.0					
iP	Z	20 33 05.2	0.4	1.0	d	$\frac{1}{4}^{\circ}$	H=20 32 57
iS	E	11.3					

21st January - C.B.M.

			T sec	A mm	GM	Dist	Remarks
eP	Z	03 06 $51\frac{1}{2}$	0.5	1.0	d		Teleseism
eS	N/	17 48					
iP	Z	05 03 04.3	0.5	9.0	c	$\frac{1}{2}^{\circ}$	H=05 02 55
eS	E/	11					
e(P)	Z	05 53 $48\frac{1}{2}$	0.5	1.0	d	6°	H=05 52 32
eS	N	54 47					
e	Z/	13 55 34			+		
eP	Z	14 22 $41\frac{1}{2}$	0.5	1.0	c		
i	Z	44.0					
iP	Z	15 37 16.3	0.4	1.8	c	$\frac{1}{2}^{\circ}$	H=15 37 02
eS	N/	$26\frac{1}{2}$					
eP	Z	17 02 $56\frac{1}{2}$	0.5	1.5	c	2°	H=17 02 25
iS	N	03 20.5					
eiP	Z	23 11 43	0.5	1.7	(d)		
i	Z	44.1					

22nd January - strong microseismic activity associated with heavy seas

			T sec	A mm	GM	Dist	Remarks
e	Z/	04 30 37			-		Traces
eL	N/	32 14					
e	Z/	10 57 51			-		Traces
e	Z/	12 35 37			+		Traces
iP	Z	13 42 42.0	0.5	6.5	c	3°	H=13 41 56
eS	Eo	33 17					
iP	Z	14 23 08.0	0.5	1.0	c	$5\frac{1}{2}^{\circ}$	H=14 21 45
i	Z	08.5					
eS	N/	24 12					
e(P)	Z	18 45 07	0.5	1.0	(c)		(Teleseism)
iP	Z	19 47 44.8	0.5	8.0	d	$1\frac{1}{2}^{\circ}$	H=19 47 08
iS	N/	55.0					

23rd January

			T sec	A mm	GM	Dist	Remarks
e	Z/	03 43 48			-		Traces
eiP	Z	08 08 $08\frac{1}{2}$	0.5	7.0	(c)	$1\frac{1}{2}^{\circ}$	H=08 07 42
i	Z	09.2					
eS	E/	28					
e	Z/	09 30 31			-		Traces
iP	Z	10 10 43.5	0.5	3.5	d	$1\frac{1}{4}^{\circ}$	H=10 10 22
iS	N/	59.5					
e	Z/	11 24 10			+		Traces
eiP	Z	11 51 22	0.5	1.6		$1\frac{1}{2}^{\circ}$	H=11 50 54
i	Z	22.5					
iS	N/	43.5					

RABAUL

23rd January (cont.)

			T sec	A mm	GM	Dist	Remarks
iP	Z	12 39 46.5	0.5	1.2	d	$1\frac{1}{2}^{\circ}$	H=12 39 20
eS	N	40 06					
eP	Z	18 36 $06\frac{1}{2}$	0.5	1.5	c	$9\frac{1}{2}^{\circ}$	H=18 33 46
i	Z	16.6					
eS	N/	37 49					
e(P)	Z	20 07 $06\frac{1}{2}$	0.5	1.0	(c)		
e	Z/	20 51 23			-		
eL	Z/	21 09 22					

24th January - strong microseismic activity associated with heavy sea

			T sec	A mm	GM	Dist	Remarks
e(P)	Z/	03 13 $12\frac{1}{2}$			(d)	(52°)	
eS	N/	20 45					
e(P)	Z/	09 49 53			(d)	(17°)	
e(S)	N/	53 06					
iP	Z	12 58 29.4	0.5	2.2	d	$3\frac{1}{4}^{\circ}$	H=12 57 58
eS	N/	59 09					
iP	Z	15 20 30.0	0.3	2.0	d	1°	H=15 20 11
eS	E/	$44\frac{1}{2}$					
i	E/	54.0					
iP	Z	16 31 57.2	0.3	1.5	d	2°	H=16 34 24
iS	E/	35 22.5					
e	Z/	20 20 52			+		Traces

25th January - strong microseismic activity between 2330-1015 hrs.

			T sec	A mm	GM	Dist	Remarks
eP	Z/	02 02 34			(d)		Teleseism
e	Z/	03 32					
e	Z/	05 37 $31\frac{1}{2}$			+		Traces
e	Z/	08 21 06			+		Traces
eP	Z	10 53 38	0.3	1.0	c	2°	H=10 53 04
i	Z	39.6					
iS	N/	34 04.0					
e	Z/	06					
iP	Z	10 56 24.3	0.3	2.8	c	2°	H=10 55 50
i	Z	26.0		in coda of preceding shock.			
eS	N/	50					
e	Z/	52					
iP	Z	11 04 32.8	0.3	2.5	c	2°	H=11 03 59
iS	N	58.0					
iP	Z	11 27 18.0	0.3	1.5	d	$2\frac{1}{4}^{\circ}$	H=11 26 42
i	Z	20.0					
iS	N	25.0					
eiP	Z	11 51 $19\frac{1}{2}$	0.3	1.0	c	3°	H=11 50 33
i	Z	20.5					
iS	E	54.5					
eiP	Z	12 37 $26\frac{1}{2}$	0.3	1.0	c	2°	H=12 36 52
i	Z	28.0					
iS	E	52.3					
iP	Z	12 47 24.2	0.5	3.0	d		Local.
iS	N	28.0					
eiP	Z	13 20 52	0.4	1.3	c	2°	H=13 20 17
i	Z	53.2					
iS	N	21 18.5					
iP	Z	14 35 13.3	0.3	4.8	c	2°	H=14 34 40
iS	N	38.5					
iP	Z	17 11 21.0	0.5		cNE		Deep shock
i	Z	21.5					

TABELE

10th January - Seismometer unserviceable.

11th January - No record.

12th January - Nil recorded.

13th January - Nil recorded.

14th January - Nil recorded.

15th January - Continuous tremor between 1755-1814 hrs.
Average T=0.3, Average A*=0.6

			T sec	A* mm	GM	Dist	Remarks
16th January							
e(P)	Z	11 11 04	0.4	0.6	+		
i	Z	10½					
i	Z	12½					
i	Z	19					
i(P)	Z	14 31 19½	0.5	0.3	(d)		
i	Z	25					
i	Z	48½					
iP	Z	17 26 36½	0.6	0.6	c	(2°)	H=17 26 (03)
i	Z	57½					
i(S)	Z	27 02					
17th January							
iP	Z	02 59 39	0.5	2.0	d		
i	Z	44½					
i	Z	57					
i	Z	03 00 04½					
i	Z	09½					
i	Z	22½					
i	Z	33					
iP	Z	05 37 14½	0.5	1.2	c	$(\frac{3}{4}^{\circ})$	H=05 37 01
i	Z	16					
i(S)	Z	24½					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
31st December.							
e(P)	Z	05 37 11				5°	H=05 35 36
e	Z	14					
eS	N	38 09.9					
iP	Z	12 10 05.7				3½°	H=12 09 10
iS	E/	47.8					
iP	Z	16 41 55.0			d	4½°	H=16 40 48
eP	Z	18 26 47½	1.5	0.7	d		Teleseism
i	Z	50.0					Large surface waves until 2200 hours.
L.P.E/W Galvanometer hung up.							
iP	Z	19 00 08.0	1.5	4.5	d		After shock
iP	Z	19 02 16.6	1.4	5.2	d		After Shock
iP	Z	19 04 48½	1.4	2.5	d		After shock
iP	Z	19 13 14.7	1.7	2.5	d		After shock
eP	Z	19 52 04.5	1.4	3.6	d		After shock
iP	Z	20 27 56.8	0.2	0.5	d		Local
eP	Z	20 51 19½	1.5	0.5	d		After shock
eP	Z	20 57 12					After shock
eiP	Z	21 03 24½	1.0	3.5			(After shock?)
eP	Z	21 33 38	1.0	0.5			(After shock?)
1st January.							
Onset of this shock lost in changing of the record.							
eiP	Z (-1) ESA	22 58 04½	1.2	2.5	d		In coda of previous shock
eiP	Z	00 ~~24 45~~	1.4	4.5	d	16°	~~13½°N., 166°E., New Hebrides Islands Region~~
eP	Z	03 16 57½	0.6	0.9	c		Local
i	Z (1) ESA	17 12.7					
eiP	Z	04 07 05½	1.5	2.5	d	20°	~~23½°S., 165°E., Loyalty Islands, Normal depth.~~
~~i~~	~~Z~~	~~43~~					
iS	E/	10 50.0					
eP	Z	07 12 43	1.0	0.4	d		Teleseism
eiP	Z	07 49 32	1.5	2.6	d		Regional
iP	Z	08 55 14.1	0.3	0.9	d	4¾°	H=08 54 00
iS	E	56 11.5					
eP	Z	08 57 49			d	5½°	H=08 56 28
iS	E	58 52.5					
iP	Z	12 57 05.2	1.6	1.5	c		Local
iP	Z	13 21 55.5	0.9	1.0	c		Regional
eip	Z	14 22 36	1.9	3.0	d		Teleseism
eP	Z (1) ESA	20 49 03	0.9	0.2	d		Regional
eP	Z	22 02 26	1.9	1.2	d	16½°	~~13°S., 164°E., Torres Is. New Hebrides~~
iS	E/	05 30.6					
i(PcP)	N/	07 26.2					
2nd January.							
iP	Z	23 01 58.6			c		
eP	Z	00 59 14½			d		Regional
eP	Z	03 46 40			c		Local
iP	Z	07 35 30.2	0.2	0.9	d		Teleseism
eP	Z	15 14 47	1.0	1.0	c	(2¼°)	H=15 14 (12)
i(S)	N/	15 14.2					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA ESA							
2nd January Cont.							
iPn	Z	20 03 37.1	1.9	7.0	d	$16\frac{1}{4}^{\circ}$	~~15°S 166°E New Hebrides.~~
~~iPx~~	~~Z~~	~~38.0~~					
iS	E/	06 40.0					
iP	Z	21 22 59.0					Local
3rd January.							
iP	Z	23 59 00	1.0	0.9	d		Regional
eP	Z	05 27 10			d		Local
eP	Z	05 39 13	1.0	0.6	c	$(16\frac{1}{4}^{\circ})$	
i(S)	E/	42 16.0					
eP	Z	05 56 19			c	In coda of previous shock	
i	Z	22.7					
eP	Z	06 05 07	1.1	0.5	d	In coda of shock	
eP	Z	10 46 46	1.0	0.5	c		Local
eP	Z	11 08 40	1.1	0.6	d		Regional
i	Z	43					
eP	Z	11 35 00	1.0	0.6			Local
eP	Z	12 35 $34\frac{1}{2}$	1.0	1.0	c		Local
eP	Z	20 46 27	0.5	0.4	d		Regional
iP	Z	21 27 02.0	1.5	4.5	c		Regional
4th January.							
eP	Z	00 18 05	1.0	0.6	d		Local
eP	Z	01 58 $35\frac{1}{2}$	1.6	0.6	d		Local
eP	Z	02 55 09	0.9	1.0	d	7°	H=02 53 24
i	Z	16.3					
iS	E	56 30.5					
eP	Z	03 49 $32\frac{1}{2}$	0.7	0.7	d		Regional
iP	Z	12 32 41.9	0.3	1.8	d	$2\frac{1}{4}^{\circ}$	H=12 32 14
iS	E	33 16.5					
eP	Z	13 10 25	1.2	1.0	d		Regional
iP	Z	16 33 00.5	0.3	2.0	d	$10\frac{1}{4}^{\circ}$	
iS	E	34 55.2					
iP	Z	16 57 39.8	0.4	1.0	d	4°	H=16 56 38
iS	N	58 28.6					
iP	Z	20 35 34.0	0.5	2.2	d.		Local
5th January.							
iP	Z	00 25 59.5	0.6	2.3	c		Teleseism
i	Z	26 07.4					
iP	Z	00 55 33.2	1.1	2.1	d	In coda of previous sh	
eP	Z	02 13 45.9	1.0	1.0	c		After shock
iP	Z	06 20 34.8	0.5	2.0	c		Teleseism
iP	Z	10 39 28.9	0.5	2.0	c		Local
iP	Z	18 25 30.4			c	2°	H=18 24 57
iS	E	55.9					
6th January.							
eP	Z	00 09 $39\frac{1}{2}$	0.6	0.6	d		Local
iP	Z	00 13 10.9	0.5	0.6	c		Local
i	Z	21.9					
eP	Z	04 12 $53\frac{1}{2}$			-		Local
eP	Z	05 26 $48\frac{1}{2}$	1.3	1.3	c		Local
iP!	Z	05 33 10.9					Deep shock
iP	Z	05 54 22.1			d		Deep shock
i	Z	23.0					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA.							
6th January Cotn.							
eP	Z	08 18 04½	0.7	0.6	c		Local
iP	Z	09 14 57.5	0.5	0.6	c		Local
eP	Z	10 08 32	2.1	2.9	d	24¼°	
iS	E/	13 03					
iP	Z	17 07 46.0	0.2	0.4	d		Local
7th January.							
eP	Z ESA	00 36 22	1.5	1.1	d		Regional
eP	Z	11 36 37	0.9	1.2	d	(26½)	13°S, 165°E, New Hebrides
e(S)	E/	41 32½					
eP	Z ESA	13 39 50½	0.6	1.1	d	19½°	3°S, 170°E, East of Solomon Islands
eS	E/	43 28					
LQ	E/	44 05					
eP	Z	15 57 18½	1.5	0.8	d		Regional
eP	Z	16 44 39½	0.8	1.0	d	16¾°	
i	Z	41					
eS	E/	47 49					

G.W.D'ADDARIO
Vulcanologist-in-Charge.

Central Observatory
RABAUL

27th January, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 25th January, 1967 To: 1st February, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	Not operational
ESA'ALA	(ESA)	From: 7th January, 1967 To: 14th January, 1967.
TABELE	(TBL)	From: 16th January, 1967 To: 23rd January, 1967.
AGENAHAMBO	(AGE)	Seismograph unserviceable.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:

		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E. Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD.4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD.2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18"2S., Longitude 150°48'50".7 E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Film Recorder System. (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z.	Magnification 36,000.
S.P.N.	Magnification 18,000.
S.P.E.	Magnification 17,000.
L.P.-Z/N/E/	Magnification - to be determined.

AGENHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec.	Tg sec
Attenuator setting $\frac{1}{10}$, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg 1 Geotech 1051 vertical			
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min S.P.-Z_W magnification 860		0.25

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT.,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATION OF EPICENTRES:

Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R.Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data Laboratory Report No. 101, U.I.D., Inc., Alexandria, Virginia, 1964, adopted by the U S C.G S. for computer requirements.

SYMBOLS:

A,A* Peak-to-Trough trace amplitude in millimetres.
A Amplitude from W.W.S.S.
A* Amplitudes from seismographs with different response to the W.W.S.S.
T Period in seconds
C.B.M. Confused by microseisms
Dist. Distance in central angle degrees.
H Origin time.
h Focal depth in Km.

REMARKS:

Local. Typical signature of an earthquake with epicentre within 0.9°.
Near Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism-typical signature of an earthquake with epicentre more than 45°.
Traces Any recorded disperse waves or very weak unknown earthquake phases.

NOTE:

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if signature still typical but unidentifiable shear waves.

G.W.D'ADDARIO
Vulcanologist-in-Charge.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
26th January - strong microseismic activity associated with heav							
e	Z/	01 46 25			-		traces
eiP	Z	03 59 02	0.5	2.0	d	$(1\frac{3}{4}^{\circ})$	H=03 58 (
e(S)	N/	24					
e	Z/	06 50 10			+		traces
iP	Z	09 56 38.6	0.5	6.2	d	$2\frac{1}{2}^{\circ}$	H=09 55 5
eS	N/	57 08					
iP!	Z	15 32 27.0	0.3	68.0	d	$1\frac{1}{2}^{\circ}$	H=15 32 0
iS	N/	46.0					
e	Z/	17 02 50			-		Teleseism
eL	Z/	03 52					
eP	Z	20 24 $43\frac{1}{2}$	0.5	2.0	d	$2\frac{3}{4}^{\circ}$	H=20 23 5
eS	E/	25 17					
e	Z/	20 32 49			-		traces
e	N/	37 $37\frac{1}{2}$					
iP	Z	21 06 48.7	0.3	28.0	c	$\frac{1}{4}^{\circ}$	H=21 06 41
iS	N/	54.5					
iP	Z	21 09 10.5	0.5	17.0	c	$\frac{1}{2}^{\circ}$	H=21 09 01
eS	E/	$17\frac{1}{2}$				coda of precedin	
eiP	Z	21 28 33	0.5	2.0	c	$\frac{1}{2}^{\circ}$	H=21 28 24
i	Z	33.3					
iS	N/	39.5					
iP	Z	21 42 37.6	0.4	2.0	c	1°	H=21 42 20
i	Z	39.5					
eS	E/	$51\frac{1}{2}$					
iP	Z	21 45 27.0	0.4	2.0	c	$\frac{1}{4}^{\circ}$	H=21 45 19
eS	E/	33				coda of preceding	
27th January - strong microseismic activity associated with heavy							
e	Z/	04 13 02			+		traces
iP	Z	12 59 59.0	0.4	12.0	c	1°	H=12 59 41
e(S)	E/	13 00 12					
eiP	Z	16 37 $47\frac{1}{2}$	0.3	1.5	c	$4\frac{1}{2}^{\circ}$	H=16 36 34
i	Z	49.0					(Deep shock)
eS	E/	38 44					
iP	Z	19 46 36.0	0.3	7.5	c	$\frac{1}{2}^{\circ}$	H=19 46 27
eS	N	$42\frac{1}{2}$					
iP	Z	21 10 29.2	0.3	6.0	c	$(\frac{1}{2}^{\circ})$	H=21 10 (20)
e(S)	N	36					
28th January							
e	Z/	02 39 20			-		traces
eP	Z	02 59 25	0.5	1.3	c	3°	H=02 58 37
eS	E/	00 $01\frac{1}{2}$					
iP	Z	05 02 26.5	0.5	2.5	c		Regional
e	Z/	06 25 08			+		traces
iP	Z	13 51 37.6	0.3	13.0	d	$2\frac{1}{2}^{\circ}$	H=13 50 5
iS	N/	52 08.0					
eP	Z	14 03 34	0.5	1.0	c	$65\frac{1}{2}^{\circ}$	
eS	E/	12 15					
eScS	N/	13 27					
eSS	N/	16 29					
eSSS	E/	19 30					
eLq	N/	20 16					

			T sec	2A mm	GM	Dist	Remarks
RABAUL							
29th January							
iP	Z	00 23 36.0	0.4	1.0	c	$2\frac{1}{2}^{\circ}$	H=00 22 58
iS	N						
e	Z/	01 24 47					Traces
eiP	Z	01 41 21	0.3	1.0	d	$1\frac{1}{2}^{\circ}$	H=01 40 57
i	Z	23.3					
iS	E/	39.0					
iP	Z	01 42 52.0	0.4	3.0	c	$1\frac{1}{4}^{\circ}$	H=01 42 31
iS	E	43 08.0				in coda of preceding shock.	
e	Z/	05 33 19			-		Traces
iP	Z	05 41 54.1	0.5	1.0	c	$1\frac{1}{2}^{\circ}$	H=05 41 31
eS	E/	42 12					
eiP	Z	16 38 $50\frac{1}{2}$	0.3	1.0	c		Regional
i	Z	51.2					
i	Z	53.3					
e	Z/	16 55 29			-		Traces
iP	Z	20 37 09.0	0.3	1.8	c	2°	H=20 36 38
iS	N	37 32.0					
30th January							
e	Z/	03 27 $22\frac{1}{2}$			-		Traces
iP	Z	03 29 03.5	0.5	1.5	d	1°	H=03 28 43
iS	N	18.5					
eP	Z	04 03 30	0.5	1.0	c	2°	H=04 02 59
eS	N	53					
e	Z/	11 49 44			-		Teleseism
iP	Z	19 48 17.3	0.4	5.0	c	$\frac{1}{2}^{\circ}$	H=19 48 05
iS	N	26.0					
iP	Z	21 15 50.4	0.8	1.0	d		(Deep shock)
eP	Z	22 01 41	0.5	1.0	c	$1\frac{1}{2}^{\circ}$	H=22 00 14
iS	N	02 01.0					
eP	Z	23 10 59	0.4	1.0	c	$8\frac{1}{4}^{\circ}$	H=23 08 59
31st January							
iP	Z	04 51 57.5	0.5	2.0	d	2°	H=04 51 24
iS	N	52 22.0					
e	Z.	09 19 56			-		Traces
eP	Z	09 31 03	0.5	1.0	c	$1\frac{3}{4}^{\circ}$	H=09 30 33
i	Z	05.0					
iS	N	25.5					
eP	Z	10 03 23	0.5	1.0	c		Regional
i	Z	26.0					
iP	Z	11 28 21.8	0.5	3.5	c	3°	H=11 27 33
iS	E	59.0					
e(P)	Z	20 12 49	0.5	1.0	(c)		(Teleseism)
1st February							
	Z/	06 29 10			-		Traces
eP	Z	11 22 23	0.4	1.0	d	$2\frac{3}{4}^{\circ}$	H=11 21 40
iS	E	55.0					
iP	Z	14 27 48.0	0.3	1.0	d	$\frac{1}{2}^{\circ}$	H=14 27 34
iS	N	58.0					
iP	Z	17 31 31.8	0.5	2.2	c	$2\frac{1}{2}^{\circ}$	H=17 30 54
iS	E	32 01.0					
iP	Z	20 07 56.4	0.3	3.0	c	$2\frac{1}{4}^{\circ}$	H=20 07 22
iS	N	08 22.0					
eP	Z	21 59 $38\frac{1}{2}$	0.3	1.0	d	$2\frac{1}{2}^{\circ}$	H=21 58 59
iS	N	22 00 08.0					

			T sec	A* mm	GM	Dist	Remarks
[illegible]A'ALA							
[illegible]h January							
[illegible]	Z	00 32 07	0.4	4.1	c	4¼°	H=00 31 [illegible]
[illegible]	E/	57					
P	Z	15 31 01½	1.5	1.0	c	16°	14°S 165°E
S	E/	34 10½					New Hebr
[illegible]	Z	18 49 50	0.6	0.7	d		Local
[illegible]h January							
	Z	15 12 15½	0.5	0.3	c	5°	H=15 11
	Z	16½					
	E/	13 12½					
[illegible]	Z	17 51 27½	1.0	0.3	c	16°	Normal [illegible]
[illegible]	E/	54 35½					15°S 165°E
							New He
[illegible]	Z	19 50 32	1.1	04.8	d	16°	Normal [illegible]
	Z	33					14½°S 165°E
[illegible]PP	Z/	47					New Hebr
[illegible]	E/	53 41½					
[illegible]	Z	21 00 14	0.5	1.7	c	4°	H=20 59 [illegible]
iS	E/	01 02					
iP	Z	23 19 12	0.5	3.4	d	4°	H=23 18 10
iS	E	58.6					
10th January							
[illegible]	Z	07 50 15	0.2	1.3	d	3¾°	H=07 49 16
iS	N/	51 00					
	Z	18 07 17½	1.2	0.3	d	16°	13°S 165°E
[illegible]S	N/	10 24					New Hebri
[illegible]P	Z	18 59 23	1.7	0.6	c		(Regional)
[illegible]1th January							
[illegible]P	Z	03 01 31	0.6	1.6	c	15°	
eS	N/	04 16					
[illegible]	Z	06 00 27½	1.0	0.5	c	28°	
[illegible]	E/	05 44					
[illegible]	Z	10 47 07½	1.7	1.1	c		Teleseism
[illegible]	Z	11 51 34.3	0.5	1.3	c	5½°	H=11 50 1
[illegible]	E	52 36.5					
[illegible]	Z	15 37 29	1.4	0.5	c		Local
[illegible]th January							
[illegible]P	Z	03 45 45	0.9	1.1	c	4¾°	H=03 44 3[illegible]
[illegible]S	E/	46 40					
[illegible]th January							
	Z	02 04 04	0.5	0.4	d		(Regional
	Z	05					
[illegible]P	Z	02 11 30	0.5	0.3	c		(Regiona
[illegible]	Z	13 50 44½	1.0	1.0	d	14°	15°S 161°E
	Z	46½					New Heb
sP	N/	51 22					
[illegible]	E/	53 08½					
[illegible]th January							
[illegible]	Z	12 15 31½	1.0	0.4	d		(Region
eP	Z	14 17 11½	1.0	1.3	d	16¼°	

ADDENDA and CORRIGENDA — ESA'ALA

[illegible] January				
[illegible]	Z	12 57 05.2	Under remarks insert -	(Regiona
[illegible]d January				
[illegible]	Z	23 01 58.6	"	Regiona[illegible]
[illegible]Pn	Z	20 03 37.1	should read as iP Z 20 03 37.1	
[illegible]x	Z	38.0	" " as i Z 38.0	

ADDENDA and CORRIGENDA (Cont.) ESA'ALA

6th January, 1967.

eP	Z	04 12 53½	Under Ground Motion insert c.
iP!	Z	05 33 10.9	" " " " c.

TABELE.

			T sec	A* mm	GM	Dist	Remarks
17th January, 1967.							
eP	Zw	11 07 22	0.6	0.5	(d)		(Regional?)
i	Zw	27½					
i	Zw	31½					
i	Zw	37					

18th January, 1967.
Continuous tremor between 0636 hrs and 0800 hrs.
Average T=0.3, Average A* = 1.0.

Continuous tremor between 1306 hrs and 1320 hrs.
Average T = 0.3. Average A* = 2.1.

Continuous tremor between 1325 hrs and 1345 hrs.
Average T = 0.4. Average A* = 2.0.

Continuous tremor between 1457 hrs and 1537 hrs.
Average T = 0.3. Average A* = 1.0.

19th January, 1967.

eP	Zw	02 57 31½	0.4	0.5	(d)		(Regior…
i	Zw	58 21½					
eiP	Zw	07 12 35	0.4	1.6	d		Local
i	Zw	36½					
	Zw	13 08½					
iP	Zw	11 43 20	1.0	1.1	d		Teleseism
i	Zw	44 03					
eP	Zw	19 05 53½	0.4	0.5	c		Regional
i	Zw	19					
i	Zw	27					

20th January, 1967.
Continuous tremor between 1629 hrs and 1705 hrs.
Average T = 0.3. Average A* = 1.6.

21st January, 1967.

iP	Zw	16 01 02	0.3	1.0	d		Local
i	Zw	21					
iP!	Zw	23 10 09			c		Regional

22nd January, 1967.

iP	Zw	04 29 15½	0.4	0.9	c		Regional
i	Zw	48					
i	Zw	30 17					
i	Zw	42½					
iP	Zw	14 22 56	0.5	1.0	c		(Regional?)
i	Zw	23 53½					
iP	Zw	17 03 32	0.3	1.0	c		(Regional…
i	Zw	59					

23rd January, 1967.

eP	Zw	06 27 59½	0.7	0.5	d		Local

Continuous Tremor between 1825 hrs and 1850 hrs.
Average T = 0.3. Average A* = 1.9

iP	Zw	21 05 50	0.6	1.3	c		(Regional)
i	Zw	06 16					
i	Zw	32½					

…th January, 1967.
Nil Record.

CORRIGENDUM - Tabele records of 9th January to 17th January, 1967.
Z refers to Zw (Wilmore seismograph only operational)

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 1st February, 1967. To: 8th February, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	Not operational
ESA'ALA	(ESA)	From: 14th January, 1967. To: 23rd January, 1967.
TABELE	(TBL)	From: 23rd January, 1967. To: 31st January, 1967.
AGENAHAMBO	(AGE)	Seismograph unserviceable.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

CENTRAL OBSERVATORY RABAUL

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Bedrock: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:

		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL)-HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF SEISMOMETER (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY:

S.P. Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Bedrock: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING-COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7 E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Film Recorder System. (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000.
S.P.N. Magnification 18,000.
S.P.E. Magnification 17,000.
L.P.-Z/N/E/ Magnification - to be determined.

AGENHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec.	Tg sec
Attenuator setting 1/10, drum speed 60 mm/min.	0.6	0.25.

S.P.Z. magnification 1,000.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg 1 Geotech 1051 vertical			
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

	Tg sec
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min	0.25

S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT.,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATION OF EPICENTRES:

Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R.Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data Laboratory Report No. 101, U.I.D., Inc., Alexandria, Virginia, 1964, adopted by the U S C.G S. for computer requirements.

SYMBOLS:

A,A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds
C.B.M.	Confused by microseisms
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local.	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.

Teleseism-typical signature of an earthquake with epicentre more than 45°.

Traces	Any recorded disperse waves or very weak unknown earthquake phases.

NOTE:

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if signature still typical but unidentifiable shear waves.

G.W.D'ADDARIO
Vulcanologist-in-Charge.

			T sec	A* mm	GM	Dist	Remarks
RABAUL.							
1st February, 1967.							
iP	Z	23 39 09.0	0.5	18.0	c	1¾°	H=23 38 40
eS	N/	31					
2nd February.							
eiP	Z	01 19 03½	0.5	0.9	c	2¼°	H=01 18 27
i	Z	04.5					
i	Z	06.0					
eS	E/	31					
iP	Z	02 11 48.8	0.4	2.0	d	1¼°	H=02 11 26
iS	N	12 06.0					
iP	Z	04 59 07.6	0.5	1.0	d		(Regional)
iP	Z	06 44 28.0	0.9	1.6	d		Teleseism
e	Z/	54 43½					
e	Z/	12 51 48					Traces
eP	Z	16 32 55	0.5	0.9	d		(Teleseism)
iP!	Z	18 18 55.6	0.5	76.0	dSE	2½°	H=18 18 18
iS!	N/	19 25.0					
3rd February.		Strong microseismic activity between 2300-0728 hours. Short period records unreadable.					
eiP	Zh	10 04 15	0.4	5.0	c		Regional
i	Zh	17.3					
eP	Zh	10 50 32½	0.5	1.6	d		Regional
iP	Zh	10 53 51.5	0.3	10.0	c	½°	H=10 53 40
eS	Zh	59½				In coda of preceding shock	
e(P)	Z/	12 56 48			(d)	21½°	
eS	N/	13 00 47					
iP	Zh	14 09 05.5	0.3	1.5	d	1°	H=14 08 48
iS	Zh	18.5					
i	Zh	14 16 04.0	0.5	4.0		Ship moving in harbour.	
F	Zh	24 40					
iP	Zh	16 29 05.1	0.4	1.3	c		Regional
iP	Zh	17 43 39.0	0.4	1.5	c.	1¾°	H=17 43 10
eS	Zh	44 02					
eip	Zh	20 07 04½	0.3	1.0			Regional
i	Zh	08.5					
4th February.		Microseismic activity increasing from 0215-0845 hrs.					
iP	Zh	02 27 33.8	0.4	1.5	c	2¼°	H=02 26 58
eS	E	28 01					
eip	Z	02 35 26	0.4	1.0	d	2¼°	H=02 34 53
i	Z	30.4					
iS	N	53.5					
i	Z	09 27 09.5	0.5	4.0		Ship moving in harbour.	
F	Z	29 42					
i	Z	09 34 41.5	0.6	1.0		Ship moving in harbour.	
F	Z	35 35					
eiP	Z	12 10 52.0	0.4	9.0	c	1½°	H=12 10 29
i	Z	52.1					
iS	N	11 09.5					
iP	Z	13 31 06.8	0.4	7.0	c		Regional

			T sec	A mm	GM	Dist	Remarks
<u>5th February.</u>		Strong microseismic activity					
iP	Z	10 36 [illegible]3.9	0.4	8.5	d	1°	H=10 36 24
eS	N	59					
eP	Z	14 17 $37\frac{1}{3}$	0.5	1.0	d	2°	H=14 17 02
eS	N	18 04					
e	Z/	20 20 46			+		Traces
<u>6th February.</u>							
iP	Z	08 48 32.0	0.4	0.8	d	$2\frac{1}{2}^{\circ}$	H=08 47 53
iS	E	49 01.5					
eP	Z	10 00 49	0.4	1.0	c	$2\frac{3}{4}^{\circ}$	H=10 00 06
i	Z	57.8					
iS	E	01 22.0					
iP	Z	12 52 37.0	0.5	9.5	d	$5\frac{1}{4}^{\circ}$	H=12 51 19
i	Z	42.2					
eS	N	53 37					
iP	Z	16 31 06.8	0.5	1.0	c	$\frac{1}{2}^{\circ}$	H=16 30 53
iS	E	17.0					
eP	Z	16 50 $51\frac{1}{3}$	0.5	1.0	c	1°	H=16 50 31
iS	N	51 06.0					
iP	Z	17 05 24.6	0.5	2.8	c	$\frac{3}{4}^{\circ}$	H=17 05 09
iS	N	35.0					
<u>7th February.</u>							
eiP	Z	04 46 $07\frac{1}{2}$	0.5	1.0	c	2°	H=04 45 33
i	Z	08.6					
iS	N	32.0					
eP	Z	05 32 14	0.4	3.0	d	1°	H=05 31 55
eS	N	$28\frac{1}{2}$					
eiP	Z	08 33 14	0.5	9.0	d	$19\frac{1}{2}^{\circ}$	
i	Z	15.3					
iPP	Z/	36.0					
iPPP	Z/	48.5					
eS	N/	36 $52\frac{1}{2}$					
eLq	N/	59					
eSS	E/	37 23					
eSSS	N/	35					
eLr	Z/	38 05					
ePcS	Z/	41 12					
eP	Z	08 58 17	0.5	1.0	d	2°	H=08 57 47
eS	E	40					
iP	Z	09 24 09.3	0.4	1.8	c	2°	H=09 23 37
iS	N	33.0					
e	Z/	11 58 07					Traces
eP	Z	14 47 20	0.5	1.5	$\bar{d}$	$1\frac{1}{2}^{\circ}$	H=14 46 54
iS	N	40.0					
iP	Z	15 10 02.0	0.4	0.8	c	$1\frac{1}{2}^{\circ}$	H=15 09 40
i	Z	05.0					
iS	N	22.5					
e	Z/	15 26 38					Traces
iP	Z	18 21 06.3	0.5	2.6	c		(Deep Shock)
iP	Z	18 46 22.9	0.5	2.0	d	2°	H=18 45 50
iS	N	48.0					
i	Z	20 46 57.0	0.5	2.5		Ship moving in harbour.	
F	Z	48 48					
iP	Z	22 20 12.8	0.5	6.0	c	1°	H=22 19 56.
iS	N	24.5					

			T sec	A* mm	GM	Dist	Remarks
RABAUL.							
8th February.							
eP	Z	01 14 37½	0.4	1.0	d	2¼°	H=01 14 03
eS	N	15 05					
iP	Z	01 47 42.3	0.5	2.5	c	1°	H=01 47 23
iS	E	56.5					
eP	Z	02 29 09	0.4	1.0	d	1°	H=02 28 50
iS	N	23.2					
iP	Z	03 01 19.5	0.5	6.0	c	¾°	H=03 01 04
iS	N	31.0					
iP	Z	04 52 29.3	0.5	7.0	d		Regional Superimposed shock
iP	Z	05 07 09.5	0.5	2.0	d	1¼°	H=05 06 48
eS	N	25½					
eP	Z	07 18 33½	0.5	1.0	c	2°	H=07 18 02
iS	N	57.0					
iP	Z	13 29 52.3	0.5	14.0	d	1°	H=13 29 35
iS	E	30 05.0					
iP	Z	13 39 20.6	0.3	1.0	c	1½°	H=13 38 54
iS	N	41.0					
e	Z/	15 08 19			+		Traces
eP	Z	15 55 47	0.5	1.0	d		(Regional)
e	Z	57 37					
i	Z	59 18.5					
e	Z/	16 23 49			+		Traces
iP	Z	17 34 00.3	0.4	4.0	c	¾°	H=17 33 45
iS	N	11.3					
iP	Z	18 21 09.0	0.5	3.0	c	3¼°	H=18 20 18
iS	N	48.0					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
15th January							
eP	Z	01 32 31	1.0	0.5	d	$3\frac{1}{2}^{\circ}$	H=01 31 36
e(S)	N/	33 13					
iP	Z	02 13 30.7	0.5	0.3	d	$4\frac{1}{2}^{\circ}$	H=02 12 24
eS	N	14 22					
eP	Z	03 11 42	0.5	0.5	d	$7\frac{1}{2}^{\circ}$	H=03 09 54
eS	N/	13 06					
eP	Z	15 13 06	0.9	0.2	c	$4\frac{3}{4}^{\circ}$	H=15 11 54
i	Z	09					
iS	E/	14 01.9					
iP	Z	22 00 51.8	0.5	0.8	c		(Regional)
iP!	Z	22 06 22.3			d		(Regional)
16th January.							
iP	Z	00 12 36.1	0.5	0.3	d	($4\frac{1}{2}^{\circ}$)	H=00 10 (28)
i(S)	E	27.9					
iP	Z	01 42 45.9	0.4	0.5	c	($\frac{3}{4}^{\circ}$)	H=01 42 (32)
i(S)	E	56.6					
iP!	Z	01 59 00.3			c	$4\frac{3}{4}^{\circ}$	H=01 57 49
iS	E/	55.0					
iP	Z	02 22 39.4	0.5	0.6	c	$3\frac{1}{2}^{\circ}$	H=02 21 47
iS	N/	23 19.4					
eP	Z	02 40 $46\frac{1}{2}$	1.0	0.6	c		Local
iP	Z	03 08 24.4	0.4	0.5	c	$\frac{1}{2}^{\circ}$	H=03 08 13
iS	E	32.9					
eP	Z	04 47 58	1.0	0.2	c	(22°)	
e(S)	E/	52 $05\frac{1}{2}$					
iP!	Z	04 59 35.4			c	$3\frac{1}{2}^{\circ}$	H=04 58 42
iS	E	05 00 16.4					
iP	Z	06 27 31.7	0.3	1.8	d	$\frac{1}{4}^{\circ}$	H=06 27 22
iS	E	39.0					
eiP	Z	11 11 $39\frac{1}{2}$	1.5	6.6	d	(13°)	13°S., 161°E.,
i	Z	40.2					
e(S)	N/	14 05					
eP	Z	11 48 48	1.0	0.9	c		(Regional)
eP	Z	12 25 05	0.6	0.2	c		(Regional)
iP!	Z	13 01 50.6			d		Local
iP	Z	13 53 44.0	0.3	3.0	c	4°	H=13 52 44
iS	E	54 30.5					
eP	Z	14 30 $54\frac{1}{2}$	1.0	0.3	c	($17\frac{1}{2}^{\circ}$)	14°S., 166°E., New Hebrides Islands Region
e	Z	$57\frac{1}{2}$					
e(S)	E	34 11					
iP	Z	14 45 27.9	1.0	2.1	c		(Aftershock)
eP	Z	14 52 $17\frac{1}{2}$	1.1	3.2	d		(Aftershock)
eP	Z	15 02 $10\frac{1}{2}$	1.0	0.4	c		(Aftershock)
eP	Z	16 05 51	1.0	1.7	d	(26°)	
e(S)	E/	10 43					
iP	Z	18 13 06.4	0.4	1.1	d	$3\frac{3}{4}^{\circ}$	H=18 12 08
i	Z	07.8					
iS	E	50.9					

ESA'ALA.
17th January cont.

			T sec	A* mm	GM	Dist	Remarks
iP	Z/	01 28 16.9				(18½°)	
i(S)	E/	31 45.9					
iP	Z/	03 00 42.9				7½°	H=02 58 54
iS	N/	02 06.9					
iP	Z/	05 59 14.9				4½	H=05 58 10
iS	E/	06 00 05.1					
iP	E/	12 08 (17.9)				(37°)	
		15 12.0					
iP	Z	23 13 (32.4)				(4°)	H=23 12 (32)
		14 18.9					
18th January		Record very faint due to incorrect developement.					
iP	Z	05 45 51.3			d	43°	
iS	N/	55 08.3					
iP	Z	08 29 39.8			c	49°	
eS	N/	38 48					
19th January							
iP	Z	01 02 26.0	0.6	1.1	d		Regional
iP	Z	12 42 09½	1.0	3.0	d	16°	14°S 166°E
iS	E/	45 09½					New Hebrides
iPcP	Z/	46 49					
iScS	N/	53 47					
20th January							
eP	Z	00 20 52	1.0	0.2	d	10¾°	
i	Z	21 01½					
iS	E/	22 51					
eP	Z	02 08 45½	1.0	3.0	c	50¼°	
i	Z	47					
eS	E/	18 08½					
21st January		S.P. records unreadable due to incorrect developement L.P. component record has no time breaksafter 0400 hours					
iP!	Z/	00 41 16					Local
iP	Z/	00 48 00					Local
eP	Z/	03 06 39				57¼°	
eS	N/	17 19					
22nd January							
eP	Z	23 11 (51)				(2¼°)	H=23 11 (17)
iS	E/	12 17					
iP	Z	13 43 22	0.7	1.3	c	4½°	H=13 42 14
iS	E/	44 14					
iP!	Z	14 22 37				3¼°	H=14 21 48
iS	E/	23 14					
iP	Z	17 43 40					Local
23rd January		S.P. records unreadable due to incorrect developement All readings done on the N/S E/W L.P. records because the L.P. Z component has no time breaks.					
iP	E/	00 45 (57)					(Local)
iP	E/	18 35 (47)				(2½°)	H=18 35 (06)
i(S)	E/	36 18					
iP	E/	21 06 (30)				(13°)	
i(S)	E/	08 54					

					T sec	A* mm	GM	Dist	Remarks
TABELE.									
24th January.									
NIL RECORDED.									
25th January.									
iP!	Zw	17	10	39			(c)		Deep
i	Zw		11	05½					
26th January.									
iP!	Zw	01	58	00			(d)		Local
i	Zw			13					
eiP	Zw	03	58	41½	0.6	1.0	d		Regional
i	Zw			43					
i	Zw			51					
i	Zw		59	01½					
i	Zw			11½					
iP	Zw	08	36	45½			(d)		Local
i	Zw		37	04½					
iP	Zw	09	08	35½	0.5	0.9	d		Local
i	Zw			46					
i	Zw		09	08					
i	Zw			17½					
i	Zw			22½					
i	Zw			32					
iP	Zw	14	07	27½	0.4	1.5	d		Local
27th January.									
iP	Zw	00	41	39	0.5	1.0	d		Local
28th January.									
iP	Zw	17	46	25	0.4	2.0	(d)		Regional
i	Zw			48½					
29th January.									
iP	Zw	22	57	32½	0.5	2.2	d		Regional
i	Zw		58	04½					
i	Zw			16					
30th January.									
iP!	Zw	03	14	19½			(c)		Regional
31st January.									
e	Zw	03	44	39					Only beginning of shock recorded.

G.W.D'ADDARIO.
(Vulcanologist-in-Charge.)

Central Observatory
RABAUL

10th Janaury, 1967.

			T sec	A mm	GM	Dist	Remarks
ESA'ALA							
30th January contd.							
iP	E/	11 29 (07)				c	Regional
31st January							
eP	Z	08 05 44	0.5	1.0	d		Regional
eP	Z	10 03 27½	0.5	0.5	d		Regiomal
iP	Z	11 28 55½	0.5	4.0	c	5°	H=11 27 41
iS	N/	29 52					6°S 154°E Solomon Island
iP	Z	14 33 14	1.0	0.5	d		Local
iP	Z	14 35 36½	0.5	2.0	c		Deep shock
TABELE							
31st January		NIL RECORDED					
1st February		NIL RECORDED					
2nd February		NIL RECORDED					
3rd February							
iP	Zw	16 28 30½	0.4	2.2	c		Regional
i	Zw	43					
i	Zw	49½					
i	Zw	29 16½					
i	Zw	36					
iP	Zw	16 42 46½	0.2	1.0	d		Local
i	Zw	55					
4th February							
iP	Zw	22 58 51½	0.3	2.0	d		Local
i	Zw	59 23					
5th February		NIL RECORDED					
6th February		NIL RECORDED					
7th February		NIL RECORDED					

G.W.D'ADDARIO
(Vulcanologist-in-charge)

Central Observatory
RABAUL

17th February, 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 8th February, 1967 To: 15th February, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	From: 23rd January, 1967 To: 31st January, 1967.
TABELE	(TBL)	From: 30th January, 1967 To: 7th February 1967.
AGENAHAMBO	(AGE)	Seismograph unserviceable.
ULAMONA FIELD STATION		From: 9th February, 1967 To: 14th February, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL)-HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E. Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD.4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD.2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7 E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Film Recorder System. (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000.
S.P.N. Magnification 18,000.
S.P.E. Magnification 17,000.
L.P.-Z/N/E/ Magnification - to be determined.

AGENHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec.	Tg sec
Attenuator setting $\frac{1}{10}$, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg 1 Geotech 1051 vertical			
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

	Tg sec
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min S.P.-Z_W magnification 860	0.25

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT.,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATION OF EPICENTRES:

Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R.Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data Laboratory Report No. 101, U.I.D., Inc., Alexandria, Virginia, 1964, adopted by the U S C.G S. for computer requirements.

SYMBOLS:

A,A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds
C.B.M.	Confused by microseisms
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local.	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.

Teleseism-typical signature of an earthquake with epicentre more than 45°.

Traces	Any recorded disperse waves or very weak unknown earthquake phases.

NOTE:

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if signature still typical but unidentifiable shear waves.

G.W.D'ADDARIO
Vulcanologist-in-Charge.

			T sec	A mm	CM	Dist	Remarks
RABAUL.							
9th February.							
iP	Z	15 43 58.4	1.0	5.0	c		Teleseism
i	Z	47 26.4					
10th February.							
iP	Z	06 30 07.0	1.0	23.0	c	$1\frac{1}{2}^{o}$	H=06 29 44
iS	E/	24.6					
iP	Z	10 14 56.1	0.7	13.8	d	2^{o}	H=10 14 23
i(S)	N	15 21.0					
eP	Z	11 34 56	1.0	0.6	d	23^{o}	
eS	N/	39 17					
iP	Z	20 02 02.0	0.5	7.0	c	$1\frac{1}{2}^{o}$	H=20 01 36
iS	N	21.5					
iP	Z	23 11 58.0	1.0	3.0	c	$1\frac{1}{2}^{o}$	H=23 11 32
iS	E	12 18.5					
11th February							
iP	Z	01 52 55.8	0.4	1.0	c		Local
iP	Z	01 56 16.0	0.5	1.6	c		Local
iP	Z	07 59 56.2	0.5	1.7	d		(Regional)
iP	Z	15 34 50.2	0.3	1.0	c	$1\frac{1}{2}^{o}$	H=15 34 26
iS	N	35 08.0					
iP	Z	16 37 50.2	0.7	6.6	d	$1\frac{1}{2}^{o}$	H=16 36 23
iS	N	38 10.5					
iP	Z	16 42 55.0	0.5	1.9	d	$1\frac{1}{2}^{o}$	H=16 42 28
iS	N	43 15.6					
12th February							
iP	Z	23 48 19.9	0.5	3.6	d	(2^{o})	H=23 47 (49)
i(S)	E	42.8					
iP	Z	13 43 57.0	0.4	5.4	c		(Regional)
iPn	Z	17 55 26.0	0.4	3.0	d	3^{o}	H=17 54 40
iPg!	E/	27.0					Deep shock
iSn	E/	56 01.0					
13th February							
iP	Z	13 42 30.9	0.4	21.3	(c)		Local
iP!	Z	15 29 28.9			cNW		Deep shock
iP	Z	21 45 35.3			d		Superimposed shock
iP	Z	22 11 14.7	0.5	8.0	d	$\frac{1}{4}^{o}$	H=22 11 08
iS!	N	20.1					
14th February – heavy microseismic activity between 2109-0700 hrs.							
eP	Z/	01 45 58.0			d	$44\frac{1}{2}^{o}$	
iS.	E/	54 19.5					
iSS	N/	58 14.0					
i	Z/	02 04 44.0					
iP!	Zh	03 07 44.3			(c)	$\frac{1}{4}^{o}$	H=03 07 48
iS?	N	49.5					
iP	Zh	06 14 43.2			(d)	$\frac{1}{4}^{o}$	H=06 14 35
iS	N	50.0					
iP	Zh	06 39 38.3	0.5	10.0	d	$\frac{3}{4}^{o}$	H=06 39 25
iS	N/	48.4					
iP	Zh	07 10 14.5	0.2	6.0	(d)	$\frac{1}{4}^{o}$	H=07 10 07
iS	N/	(20.7)					
iP	Zh	07 19 10.0	0.5	3.1	c	$\frac{3}{4}^{o}$	H=07 18 57
S	N/	20.8					

RABAUL

14th February (cont.)

			T sec	A mm	GM	Dist	Remarks
iP	Zh	09 25 39.4	0.4	4.2	d	2°	H=09 25 09
iS	N/	26 02.5					
iP	Zh	09 34 56.2	0.2	5.0	c	$\frac{1}{4}^{\circ}$	H=09 34 48
iS	N	35 02.3					
iP	Zh	09 36 20.5	0.4	5.0	d	$\frac{1}{4}^{\circ}$	H=09 36 14 in coda of preceding shock
iS	N	25.7					
iP	Zh	11 37 17.5	0.6	9.5	d	$\frac{1}{4}^{\circ}$	H=11 37 08
iS	E/	(25.0)					
iP	Zh	13 14 04.5	0.4	3.2	c	$\frac{1}{4}^{\circ}$	H=13 13 53
iS	N	10.8					
iP	Zh	13 42 12.5	0.5	8.2	c	$\frac{1}{4}^{\circ}$	H=13 42 05
iP	Zh	14 42 51.4	0.5	7.0	c	$\frac{1}{4}^{\circ}$	H=14 42 43
iS	N	56.6					
iP	Z	14 46 06.0	0.3	5.0	c	$\frac{1}{4}^{\circ}$	H=14 46 58
iS	N	12.0					
eP	Zh	15 42 19½	0.5	1.1	d	$1\frac{1}{2}^{\circ}$	H=15 41 56
iS	N	37.9					
iP	Zh	14 58 44.8	0.2	3.8	c	$\frac{1}{4}^{\circ}$	H=14 58 37
iS	N	50.4					
iP	Zh	19 24 24.0	0.2	1.1	d	1°	H=19 24 08
iS	N	36.0					
iP	Zh	19 30 33.5	0.5	17.0	d	1°	H=19 30 15
iS	N	47.3					

15th February

			T sec	A mm	GM	Dist	Remarks
iP	Zh	09 45 09.9	0.4	2.0	c	2°	H=09 44 39
iS	N	32.0					
iP	Z	13 28 34.6	0.7	7.0	d	1°	H=13 28 16
iS	N	48.9					
eP	Z	15 10 56	1.0	1.0	c	20°	
iS	E/	14 40					
eP	Z	16 29 09½	1.0	0.5	d	$15\frac{1}{4}^{\circ}$	
i	Z	14.3					
iPcP	Z/	25.0					
iS	N	32 01.0					
iP	Z	17 29 14.0	0.5	1.1	c	1°	H=17 28 57
iS	N	27.2					

ULAMONA FIELD STATION

			T sec	A* mm	GM	Dist	Remarks

9th, 10th, 11th, 12th February - Nil recorded.

13th February

			GM
iP	Z	27 59 06.3	c

14th February

			GM
iP	Z	05 30 35	d

Approx. Co-ordinates.
04° 59' 24"S, 151° 16' 30"E

ESA'ALA

Time uncertain from 24th January and 31st January, due to faulty crystal chronometer.
L.P. Z component has no time breaks from the same period.
All readings taken to the nearest half second

			T sec	A mm	GM	Dist	Remarks
24th January							
eP	Z	15 21 (13)				(4°)	H=15 19 (58)
iS	E/	59					
25th January							
e	E/	08 27 (06)					Traces
eP	Z	09 54 17	1.0	0.5	d		Traces
iP	Z	17 12 23	0.5	2.5	d	3½°	H=17 10 30
iS	E/	13 06					
iP	Z	19 59 31½	0.5	1.0	d		(Deep shock)
26th January							
iP!	Z	03 58 51½			d	4°	H=03 57 48
iS	E/	59 40					
iP	Z	10 37 39½			c	¾°	H=10 37 24
eS	E/	50					
eP	Z	15 33 07	0.5	1.0	c	8°	H=15 31 11
iS	E/	34 38					
iP	Z	17 53 19	0.5	2.5	d		Local
iS	E/	23					
iP	Z	20 22 21			c		(Regional)
27th January							
eP	E/	16 38 05					Local
eS	E/	10					
28th January							
e(P)	E/	01 43 02				5°	H=01 41 47
eS	E/	44 00½					
e(P)	E/	05 02 08½				5°	H=05 00 56
iS	E/	03 04					
iP	Z	13 34 43	0.5	1.0			Regional
eP	Z	13 52 10	0.8	1.0	d	3½°	H=13 51 07
iS	E/	51					
iP	Z	14 04 15	0.5	1.0	d	70°	
ePcP	E/	37.5					
iS	E/	13 27					
eScS	N/	14 21					
iP	Z	16 42 39	0.8	2.0	c	5¼°	H=16 41 21
e(S)	E/	43 39					
eP	Z	17 53 16	0.5	1.0	d	1½°	H=17 52 53
eS	N/	34					
29th January							
iP	Z	09 57 15					Regional
iP	Z	16 39 11½				4°	H=16 38 09
iS	N/	59½					
30th January							
iP	E/	04 59 (52)			d		Local
iP	E/	05 04 (15)			d		Local

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 15th February, 1967 To: 22nd February 1967
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	From: 31st January, 1967 To: 7th February, 1967.
TABELE	(TBL)	From: 7th February, 1967 To: 14th February, 1967.
AGENAHAMBO	(AGE)	Seismograph unserviceable.
ULAMONA FIELD STATION		From: 5th February, 1967 To: 8th February, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
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VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL)-HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E. Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD.4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD.2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7 E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Film Recorder System. (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical, 2 Geotech Mod. 1101 horizontal		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000.
S.P.N. Magnification 18,000.
S.P.E. Magnification 17,000.
L.P.-Z/N/E/ Magnification - to be determined.

AGENHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec.	Tg sec
Attenuator setting $\frac{1}{10}$, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec
	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg 1 Geotech 1051 vertical			
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

	To sec.	Tg sec
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min S.P.-Z_w magnification 860		0.25

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT.,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to ~~one-tenth of a second, other readings have been made to the~~ nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATION OF EPICENTRES:

Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R.Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data Laboratory Report No. 101, U.I.D., Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds
C.B.M.	Confused by microseisms
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local.	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism-	typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

NOTE:

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if signature still typical but unidentifiable shear waves.

G.W.D'ADDARIO
Vulcanologist-in-Charge.

TERRITORY OF PAPUA-NEW GUINEA
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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

16th February.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	01 20 39	0.4	1.0	d	3½°	H=01 19 43
i	Z	42.3					
iS	E	21 22.0					
eP	Z	05 17 24	0.5	1.0	d		Regional
iP	Z	08 23 56.2	0.5	11.2	d	5°	H=08 22 41
i	Z	56.5					
iS	E	24 54.5					
iP	Z	09 17 15.0	0.5	1.3	c	2°	H=09 16 41
iS	N	41.0					
iP	Z	10 43 08.2	0.4	1.0	c	1°	H=10 42 51
i	Z	09.0					
iS	N	21.3					
iP	Z	13 04 14.3	0.5	1.0		Ship movement at intervals during 1300 hours.	
F	Z	27 48					
iP	Z	13 35 35.5	0.5	1.0	d	¼°	H=13 35 27
iS	N	41.5					
iP	Z	13 46 44.0	0.4	3.2	d	1¼°	H=13 46 22
iS	N	47 00.5					
~~iP~~	~~Z~~	~~17 53 24.0~~	~~0.5~~	~~1.0~~	~~d~~	~~5½°~~	~~H=17 52 01~~
eS	N/	54 28					
iP	Z	19 28 16.5	0.5	1.0	c	1½°	H=19 27 48
iS	N	38.0					
iP	Z	20 02 24.0	0.5	1.2	d	1¾°	H=20 01 55
iS	N	46.0					
iP	Z	21 18 35.6	0.4	0.8	d	1½°	H=21 18 09
iS	N	55.0					
iP	Z	21 28 09.0	0.5	1.0	d	1½°	H=21 27 39
eS	N	32½					
eP	Z	22 11 07	0.5	1.4	d	2¾°	H=22 10 24
eS	N	40					

17th February.

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 43 29.2	0.8	6.0	c	29°	
i	Z	29.8					
ePcP	Z/	46 37					
eS	E/9	48 14					
eLq	E/	49 27					
ePcS	Z/	50 19					
eScS	N/	54 09					
eiP	Z	02 48 09	0.5	1.0	c	6¼°	H=02 46 36
i	Z	13.3					
e(S)	N/	49 21					
iP	Z	04 14 40.8	0.5	6.0	d	1½°	H=04 14 14
eS	N/	15 01					
iP	Z	04 46 03.0	0.5	6.5	d	2°	H=04 44 31
iS	N	27.5					
iP	Z	07 29 19.8	0.5	4.0	c	1¼°	H=07 28 48
iS	N	35.5					
iP	Z	08 36 02.5	0.5	1.0	c	1½°	H=08 35 37
	N	21.5					

RABAUL

17th February cont.

			T sec	A mm	GM	Dist	Remarks
iP	Z	10 18 00.1	0.5	1.0	d	39°	
ePP	Z/	19 21					
iPcP	Z/	20 10.0					
eS	N/	23 52					
eLq	N/	26 50					
eScS	N/	28 08½					
eLr	Z/	46					
eP	Z	11 30 41½	0.4	1.0	d	½°	H=11 30 28
iS	N	51.0					
iP	Z	12 25 06.6	0.3	1.5	d	1½°	H=12 24 40
iS	N	26.0					
iP	Z	15 25 49.0	0.4	2.5	c	1¼°	H=15 25 27
iS	N	26 06.0					
iP	Z	16 04 28.0	0.5	16.5	d	2°	H=16 03 58
iS	N	51.0					
iP	Z	20 52 39.8	0.3	3.5	d	1½°	H=20 52 16
iS	N	57.0					

18th February.

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 21 30.0	0.3	2.0	d	1¾°	H=01 21 01
eS	N	52					
iP	Z	02 39 51.4	0.5	71.0	cNW	2°	H=02 39 18 Felt Ulamona. 04° 59'S., 151°16'E.,
iS	E	40 16.5					
eiP	Z	03 16 06½	0.5	1.0	d	1¼°	H=03 15 45
i	Z	09.0					
iS	N	22.0					
eiP	Z	06 48 14½	0.5	1.0	d	22°	
i	Z	16.5					
eS	N/	52 14					
ePcP	Z/	15					
eLq	N/	33					
eLr	Z/	53 42					
eiP	Z	09 18 42	0.5	1.0	d	3¼°	H=09 17 51
i	Z	47.6					
iS	N	19 21.3					
iP	Z	11 10 35.2	0.4	24.0	d	1½°	H=11 10 10
iS	N/	54					
eiP	Z	13 43 56	0.3	1.0	d	2½°	H=13 43 16
i	Z	57.3					
iS	N	44 26.7					
iP	Z	15 58 30.5	0.3	1.0	d	1°	H=15 58 13
iS	N	43.2					
iP	Z	18 13 45.3	0.3	0.8	c	1¾°	H=18 13 16
iS	N	14 07.5					
e	Z	19 11 47			–		Traces
eP	Z	21 56 03½	0.3	1.0	c	1½°	H=21 55 36
iS	N	24.0					

19th February.

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 11 01.0	0.4	1.0	d	1¼°	H=01 09 40
iS	N	17.3					
eP	Z	08 46 47	0.3	1.5	c	1°	H=08 46 31
iS	N	59.2					
eP	Z	10 42 05	0.5	1.0		1½°	H=10 41 40
iS	N	24.2					
e	Z/	46 23			+		(Teleseism)

RABAUL

			T sec	A mm	GM	Dist	Remarks
19th February contd.							
iP	Z	01 11 01.0	0.4	1.0	d	$1\frac{1}{4}^{\circ}$	H=01 09 40
iS	N	17.3					
eP	Z	08 46 47	0.3	1.5	c	1°	H=08 46 31
iS	N	59.2					
eP	Z	10 42 05	1.0	1.0		$1\frac{1}{2}^{\circ}$	H=10 41 40
iS	N	24.2					
e	Z/	10 46 23			+		(Teleseism)
iP	Z	11 49 13.1	0.3	2.0	c	$\frac{1}{2}^{\circ}$	H=11 49 00
iS	N	23.5					
e	Z/	14 37 41			–		traces
iP	Z	16 35 10.0	0.5	1.0	d	$6\frac{1}{2}^{\circ}$	H=16 33 32
i	Z	17.6					
eS	N/	36 26					
iP	Z	22 21 57.0	0.8	3.0	d	39°	
ePP	Z/	23 23					
eS	N/	27 $49\frac{1}{2}$					
eLq		30 38					
eScS	N/	31 57					
iP	Z	23 34 13.5	0.5	4.0	d		Teleseism
eS	E/	38 58					
20th February.							
e	Z/	03 28 49			+		traces
iP	Z	08 16 14.2	0.4	1.5	d	$1\frac{3}{4}^{\circ}$	H=08 15 45
iS	N	36.0					
e	Z/	12 31 28			–		traces
iP	Z	12 44 24.5	0.4	30.0	c	$\frac{1}{2}^{\circ}$	C.B.M.
eS	E/	32					H=12 44 13
e	Z/	15 56 34			–		traces
iP	Z	16 22 49.2	0.3	3.5	d	$\frac{1}{2}^{\circ}$	H=16 22 36
iS	N	59.5					
iP	Z	18 25 47.0	0.3	1.2	d		Regional
iP	Z	19 17 01.4	0.5	4.0	d	6°	H=19 15 32
e(S)	E/	18 10					
iP!	Z	20 00 07.7	0.5	114.0	cNW	2°	H=19 59 37
iS!	N/	30.5					
eP	Z	22 45 25	0.5	1.0	d		Teleseism
21st February.							
e	Z/	05 27 23			+		traces
iP	Z	07 16 35.8	0.3	2.8	d	$1\frac{1}{2}^{\circ}$	H=07 16 09
iS	N	55.0					
eP	Z	09 16 08	0.5	1.0	d		Teleseism
iP	Z	11 14 23.0	0.4	2.3	d	2°	H=11 13 53
iS	N	46.0					
iP	Z	13 42 25.3	0.3	1.0	d	1°	H=13 42 06
iS	N	39.0					
iP!	Z	14 04 55.4	0.5	154.0	cNE	$1\frac{1}{4}^{\circ}$	H=14 04 34
iS!	N/	05 11.0					
iP	Z	15 24 22.0	0.3	1.0	c	$\frac{3}{4}^{\circ}$	H=15 24 07
iS	N	33.5					
iP	Z	17 01 36.5	0.5	1.0	c	1°	H=17 01 16
iS	N	51.5					

			T sec	A mm	GM	Dist	Remarks

RABAUL

21st February contd.

eP	Z	18 47 26	0.7	1.5	c		Teleseism
e	Z/	19 46 19			+		traces

22nd February.

iP	Z	03 09 05.0	0.5	68.0	d	$\frac{1}{4}^{\circ}$	H=03 08 51
iS	E/	11.0					Felt-Rabaul Int1
							04° 10'S 152°10'E
e	Z/	04 22 18			–		traces
iP	Z	10 40 12.2	0.4	1.8	d	1°	H=10 39 52
iS	N	27.6					
iP	Z	10 59 55.5	0.3	3.0	c	$\frac{3}{4}^{\circ}$	H=10 59 40
iS	N	11 00 06.5					
iP!	Z	11 45 43.5	0.4	19.5	d	$2\frac{1}{4}^{\circ}$	H=11 54 06
iS	E/	46 11.0					
eiP	Z	13 58 18.0	0.5	1.0	c	$15\frac{3}{4}^{\circ}$	
i	Z	22.0					
eS	N/	14 01 20					
iP	Z	14 16 25.5	0.5	12.0	d	$3\frac{1}{2}^{\circ}$	H=14 15 33
i	Z	26.0					
iS	N	17 15					
eP	Z	18 31 37	1.0	2.0	d	$22\frac{1}{2}^{\circ}$	
i	Z	38.5					
ePcP	Z/	35 36					
eS	N/	39					
e	Z	43					
e	Z	42 54					
eiP	Z	19 59 52	0.5	1.8		6°	H=19 58 24
i	Z	54.1					
iS	N	20 00 59.8					

			T sec	A mm	GM	Dist	Remarks
ESA'ALA		Secondary time used from the 1st to the 5th February therefore reading taken to the nearest ½ second.					
1st February		L.P.Z component has no time breaks					
eiP	Z	23 39 56½	0.5	0.4	c	4½°	H=23 38 51
iS	E	40 47					
2nd February							
eP	Z	01 20 35	0.4	0.2	c	3¾°	H=01 19 40
iS	E	21 17½					
iP	Z	04 59 09½	0.9	0.5	d	(7½°)	H=04 57 (19)
i(S)	N/	05 00 36					
eiP	Z	11 53 14	0.4	2.0	d	4¾°	H=11 52 03
i	Z	14½					
iS	E	54 09					
iP	Z	15 11 37	0.2	1.9	c	5¼°	H=15 10 19
eS	E	12 38½					
eP	Z	16 33 43½	1.0	0.4	c	4½°	H=16 32 33
eS	N	34 37					
iP	Z	18 19 57½	0.9	29.0	cSE	6¼°	H=18 18 26 4°S 154°E Solomon Islands
iS	E/	21 08					
3rd February		L.P.Z component has no time breaks.					
iP!	Z	03 39 22					Regional
iP	Z	06 24 25	0.7	2.0	d	1½°	H=06 24 01
i	Z	29					
iS	E	43					
eP	Z	12 55 01	0.7	1.0	c	29½°	
eS	N/	13 00 30					
eiP	Z	16 29 09½	0.5	3.5	d	6½°	H=16 27 33
i	Z	10					
iS	E	30 23					
4th February							
eP	Z	06 24 04	1.0	0.6	c		Local
eP	Z	17 56 02½	0.8	0.6	c		(Regional)
5th February							
iP	Z	07 09 28	0.4	0.9	c		(Regional)
iP!	Z	08 05 19			d		Local
6th February							
iP	Z	11 52 41.4	0.4	0.3	c	4°	H=11 51 44
iS	E	53 25.5					
iP	Z	17 49 58.9			d	¾°	H=17 49 45
iS	E	50 09.1					
7th February							
iP	Z	08 34 03.1	0.5	3.3	d	14¾°	
iS	E/	38 40.2					
iP	Z	18 21 09.5	0.4	2.1	d	5½°	H=18 19 48
iS	N	22 12.0					

TABELE.

7th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	18 20 34	0.6	0.7	d		Regional
i	Zw	21 06½					
i	Zw	18					

8th February.

			T sec	A* mm	GM	Dist	Remarks
eP	Zw	03 02 47	0.5	0.3	c		Regional
i	Zw	53					
iP	Zw	13 43 26½	0.4	0.2	d		Regional
i	Zw	36½					
i	Zw	44 12					
i	Zw	34					
iP!	Zw	19 56 29½			d		Local
i	Zw	53					
i	Zw	58					
i	Zw	57 03					

9th February.

Microseismic activity between 1552 hrs and 1732 hrs.
Average T=0.2, Average A*=1.5

10th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	21 16 39	0.2	3.0	d		Local
i	Zw	45½					

11th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	05 32 09½	0.2	0.8	d		Local
i	Zw	40½					
i	Zw	50					

12th February.

			T sec	A* mm	GM	Dist	Remarks
iP!	Zw	15 03 06½			(c)		Regional
i	Zw	18½					
iP!	Zw	17 55 45½			(c)		Regional

13th February.- Nil recorded

14th February.- Nil recorded

ULAMONA FIELD STATION.

Approx. Co-ordinates: 4° 59' 24"S., 151° 16' 30"E.

5th February.- Nil recorded.

6th February.

			T sec	A* mm	GM	Dist	Remarks
iP!	Z	00 33 40			c		Local
i	Z	47½					

7th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	14 29 31½	0.4	1.2	c		Local

Time breaks irregular - reading approximate.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	16 56 09	0.1	0.9	(c)		Local
i	Z	17½					

8th February.- Nil recorded.

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

Central Observatory
RABAUL

22nd February, 1967.

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TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLGOICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 22nd February, 1967 To: 1st March, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	Not operational
ESA'ALA	(ESA)	From: 7th February, 1967 To: 13th February, 1967.
TABELE	(TBL)	From. 14th February, 1967. To: 21st February, 1967.
AGENHAMBO	(AGE)	Seismograph unservicable.
ULAMONA FIELD STATION		From: 15th February, 1967. 26th February, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0 S., Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.P.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E. Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD.4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD.2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7 E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION — To sec. — Tg sec

BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg.
1 Geotech Mod. 1051 vertical
2 Geotech Mod. 1101 horizontal

Film Recorder System. (Geotech Mod. 1301-A) drum speed 15 mm/min. — To: 1.0 — Tg: 0.2

Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min. — Tg: 60.0

S.P.Z. Magnification 36,000.
S.P.N. Magnification 18,000.
S.P.E. Magnification 17,000.
L.P.-Z/N/E/ Magnification - to be determined.

AGENHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

Attenuator setting 1/10, drum speed 60 mm/min. — 0.6 — 0.25.
S.P.Z. magnification 1,000.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg
1 Geotech 1051 vertical

Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min. — Tg: 0.02.

Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min. — To: 1.0 — Tg: 90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

coupled to Willmore Recorder — 0.25
attenuator setting 1/100, drum speed 60 mm/min
S.P.-Z_w magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT.,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At (ESA) and (TBL) time signal is marked every minute on the records from crystal chronometer and a second mark from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATION OF EPICENTRES:

Where no source is cited the determination of epicentre, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R.Engdahl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data Laboratory Report No. 101, U.I.D., Inc., Alexandria, Virginia, 1964, adopted by the U S C.G S. for computer requirements.

SYMBOLS:

A,A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds
C.B.M.	Confused by microseisms
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9^{o}.
Near	Typical signature of an earthquake with epicentre between 0.9^{o} and 9^{o}.
Distant	Typical signature of an earthquake with epicentre between 9^{o} and 45^{o}.
Teleseism	typical signature of an earthquake with epicentre more than 45^{o}.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

NOTE:

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if signature still typical but unidentifiable shear waves.

G.W.D'ADDARIO
Vulcanologist-in-Charge.

RABAUL

25th February cont.

			T sec	A mm	GM	Dist	Remarks
iP	Z	11 44 33.5	0.8	1.5	d	29°	
eS	E/	49 19					
eLq	N/	50 35½					
eScP	N/	51 24					

26th February

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 35 20.8	0.3	52.5	cSW	½°	H=01 35 11
iS	E/	27.5					
eiP	Z	02 36 35	0.4	3.5	d	2°	H=02 36 02
i	Z	38.5					
iS	N	37 00.5					
iP	Z	10 30 09.8	0.5	2.0	c	3½°	H=10 29 12
eS	N/	53.5				Felt Talasea Int.111 05°20'S., 150° 05'E., Lagenda Int. 1. 05° 34'S., 150° 05'E. Kilengi Int.1. 05° 30'S., 148° 20'E.	
iP	Z	14 46 53.3	0.3	3.0	d	1°	H=16 26 16
iS	N	47 07.6					
iP	Z	16 28 41.2	0.4	1.8	d	1½°	H=16 28 16
iS	N	29 00.2					
iP	Z	17 20 11.8	0.5	1.0	d	4½°	H=17 19 05
eS	E/	21 03					
iP	Z	18 37 59.2	0.5	1.0	c	2¼°	H=18 37 23
iS	N	38 26.0					

27th February.

			T sec	A mm	GM	Dist	Remarks
		23 33 14.2	0.5	7.0	c	1½°	H=23 32 49
iS	N	33.5					
iP	Z	05 06 19.3	0.3	1.8	d	2¼°	H=05 05 45
iS	N	45.5					
iP	Z	08 45 10.0	0.3	3.5	d	½°	H=08 44 57
iS	N	19.5					
eiP	Z	12 42 55	0.3	2.2	d	1½°	H=12 42 29
i	Z	56.7					
iS	N	43 14.8					
iP	Z	13 07 46.0	0.4	2.0	c	1½°	H=13 07 21
iS	N	08 05.2					
iP	Z	15 51 49.5	0.5	1.0	d	4°	H=15 50 49
iS	N	52 35					
eP	Z	22 14 21½	0.4	1.0	d	3°	H=22 13 35
eS	N	56					

28th February.

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 11 02.0	0.3	4.0	c	1½°	H=00 10 38
iS	N	20.0					
iP	Z	02 21 56.5	0.4	1.0	d	½°	H=02 21 44
iS	N	05.5					
iP	Z	05 53 30.2	0.5	21.8	c		Regional Deep
iP	Z	07 22 33.2	0.3	1.4	c	1°	H=07 22 14
iS	N	47.0					
e(P)	Z	09 44 35	0.8	1.0	c	37¾°	
eS	N/	50 19					
iP	Z	10 04 23.0	0.5	1.5	c	1½°	H=10 03 55
iS	N	44.5					
iP	Z	11 43 35.8	0.5	1.0	d		Regional
iP	Z	11 59 13.0	0.5	3.8	d		Teleseism
eS	N/	12 04 48					

TERRITORY OF PAPUA NEW GUINEA
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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
23rd February 1967							
iP	Z	01 02 57.0	0.4	2.0	d	(2°)	H=01 02 (24)
i	Z	58.8					
e(S)	E/	03 22					
iP	Z	03 15 00.2	0.5	2.0	c		Regional
iP	Z	04 53 40.0	0.5	2.0	dSE	1°	H=04 53 24 Felt: Rabaul Int.1 04oS 152oE Ulamona Int.1 04°S 151°E Upper Warangoi Int.2
iS	N/	52.0					
iP	Z	05 33 01.8	0.4	31.0	d	1°	H=05 32 44
iS	N	15.0					
eiP	Z	09 49 35	0.4	1.5	d	1°	H=09 49 16
i	Z	36.0					
iS	N	49.5					
e	Z/	11 54 48			–		traces
e	Z/	14 39 34			+		traces
eP	Z	15 49 03	0.5	1.0	c	1¼°	H=15 48 40
iS	N	20.0					
iP	Z	18 56 52.3	0.5	1.2	c	1¾°	H=18 56 23
eP	Z	20 46 11½	0.5	1.0	d		Teleseism
eiP	Z	23 48 02½				4½°	H=23 46 33
i	Z	04.0					
e(S)	N/	56					
24th February							
iP	Z	00 42 19.6	0.5	3.0	d	4½°	H=00 43 11
eS	N/	43 13					
iP	Z	00 55 25.2	0.5	57.0	dNE	2¼°	H=00 54 49
iS	N	52.0					
iP	Z	10 09 31.2	0.4	4.0	d		Regional
iP	Z	11 34 10.8	0.4	2.5	d	1¼°	H=11 33 48
iS	N	27.5					
iP	Z	13 13 41.6	0.4	2.1	d	3°	H=13 12 57
iS	N	14 16.0					
e	Z/	17 12 04			–		traces
e	Z/	19 53 45			–		traces
iP	Z	23 05 34.0	0.5	2.0	c	3°	H=23 04 48
iS	E	06 09.0					
25th February							
e	Z/	05 46 06			–		traces
iP	Z	11 26 39.1	0.5	18.0	cSSE	28°	Deep
S	Z/	52½					
iPP	Z/	28 27.0					
eS	E/	31 [illegible]					
eLg	E/	32 30					
eScP	E/	33 36					

			T sec	A mm	GM	Dist	Remarks
RABAUL							
25th February cont.							
iP	Z	11 44 33.5	0.8	1.5	d	29°	
eS	E/	49 19					
eLq	N/	50 35½					
eScP	N/	51 24					
26th February							
iP	Z	01 35 20.8	0.3	52.5	cSW	½°	H=01 35 11
iS	E/	27.5					
eiP	Z	02 36 35	0.4	3.5	d	2°	H=02 36 02
i	Z	38.5					
iS	N	37 00.5					
iP	Z	10 30 09.8	0.5	2.0	c	3½°	H=10 29 12
eS	N/	53.5					Felt Talasea Int.111 05°20'S., 150° 05'E., Lagenda Int. 1. 05° 34'S., 150° 05'E. Kilengi Int.1. 05° 30'S., 148° 20'E.
iP	Z	14 46 53.3	0.3	3.0	d	1°	H=16 26 16
iS	N	47 07.6					
iP	Z	16 28 41.2	0.4	1.8	d	1½°	H=16 28 16
iS	N	29 00.2					
iP	Z	17 20 11.8	0.5	1.0	d	4½°	H=17 19 05
eS	E/	21 03					
iP	Z	18 37 59.2	0.5	1.0	c	2¼°	H=18 37 23
iS	N	38 26.0					
27th February.		23 33 14.2	0.5	7.0	c	1½°	H=23 32 49
iS	N	33.5					
iP	Z	05 06 19.3	0.3	1.8	d	2¼°	H=05 05 45
iS	N	45.5					
iP	Z	08 45 10.0	0.3	3.5	d	½°	H=08 44 57
iS	N	19.5					
eiP	Z	12 42 55	0.3	2.2	d	1½°	H=12 42 29
i	Z	56.7					
iS	N	43 14.8					
iP	Z	13 07 46.0	0.4	2.0	c	1½°	H=13 07 21
iS	N	08 05.2					
iP	Z	15 51 49.5	0.5	1.0	d	4°	H=15 50 49
iS	N	52 35					
eP	Z	22 14 21½	0.4	1.0	d	3°	H=22 13 35
eS	N	56					
28th February.							
iP	Z	00 11 02.0	0.3	4.0	c	1½°	H=00 10 38
iS	N	20.0					
iP	Z	02 21 56.5	0.4	1.0	d	½°	H=02 21 44
iS	N	05.5					
iP	Z	05 53 30.2	0.5	21.8	c		Regional Deep
iP	Z	07 22 33.2	0.3	1.4	c	1°	H=07 22 14
iS	N	47.0					
e(P)	Z	09 44 35	0.8	1.0	c	37¾°	
eS	N/	50 19					
iP	Z	10 04 23.0	0.5	1.5	c	1½°	H=10 03 55
iS	N	44.5					
iP	Z	11 43 35.8	0.5	1.0	d		Regional
iP	Z	11 59 13.0	0.5	3.8	d		Telescism
eS	N/	12 04 48					

RABAUL.

28th February contd.

			T sec	A mm	GM	Dist	Remarks
eP	Z	16 43 30	0.5	1.0	c		Regional
iP	Z	18 15 25.2	0.5	1.2	c	$1\frac{1}{2}^{o}$	H=18 15 00
iS	N	44.3					
eiP	Z	19 29 32	0.5	1.0	c	$3\frac{3}{4}^{o}$	H=19 28 34
i	Z	35.0					
iS	N	30 17.0					
iP	Z	19 53 42.2	0.5	1.0	(d)	1^{o}	H=19 53 23
iS	N	56.0					

1st March.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	00 39 27	0.4	2.0	d	$1\frac{3}{4}^{o}$	H=00 38 58
i	Z	28.0					
iS	N	49.0					
iP	Z	04 39 17.5	0.5	15.0	d	4^{o}	H=04 38 16
eS	N/	40 04					
iP	Z	12 57 55.8	0.5	4.0	d	$\frac{1}{2}^{o}$	H= 12 57 45
iS	N	58 03.0					
iP	Z	14 24 25.3	0.3	4.0	c	1^{o}	H=14 24 09
iS	N	37.0					
iP	Z	14 30 00.6	0.5	2.3	d	24^{o}	
eS	E/	34 $29\frac{1}{2}$					
eiR	Z	18 25 57	0.3	6.5	d	$1\frac{1}{2}^{o}$	H=18 25 34
i	Z	58.1					
iS	N	26 15.1					
iP	Z	19 15 42.0	0.3	1.0	c	3^{o}	H=19 14 56
iS	N	16 17.2					
iP	Z	19 52 52.6	0.3	2.0	c	1^{o}	H=19 52 36
iS	N	53 04.0					
iP	Z	21 02 26.2	0.5	5.0	d	$1\frac{1}{2}^{o}$	H=21 02 01
iS	N	44.3					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
8th February.							
eiP	Z	01 52 14	0.4	7.5	d	$2\frac{1}{4}^{\circ}$	H=01 51 37
i	Z	15.1					
iS	E/	28.0					
eP	Z	15 04 23	1.1	0.9	c		Teleseism
eP	Z	18 22 22	0.5	0.1	d	5°	H=10 21 07
iS	N	23 20.0					
iP	Z	18 35 46.9	0.3	3.0	c		Local
9th February.							
iP	Z	00 12 20.1	0.4	4.0	c		Local
iP	Z	10 47 30.9	0.5	5.0	c	$\frac{3}{4}^{\circ}$	H=10 47 16
iS!	N	42.0					
iP!	Z	10 55 35.2			c		Local
eP	Z	15 44 54	1.0	0.3	c		Teleseism
i	Z/	47 46.5					
10th February.							
eP	Z	06 31 59.8	0.4	0.2	d		Regional
eiP	Z	10 15 $10\frac{1}{2}$	0.4	3.5	d	$3\frac{1}{2}^{\circ}$	H=10 14 17
i	Z	10.9					
iS	N	51.5					
eP	Z	11 34 $45\frac{1}{2}$	0.9	0.8	d	23°	
i	E	56.0					
eS	N/	39 03					
iP	Z	23 31 07.0	0.4	2.8	c		Local
11th February.							
eiP	Z	12 46 $06\frac{1}{2}$	0.2	1.5	c	$2\frac{1}{2}^{\circ}$	H=12 45 28
i	Z	07.0					
iS	E	35.5					
iP	Z	23 08 54.1			d		Local
iS	N	55.3					
12th February.							
eP	Z	12 01 46	1.2	0.3	c		(Regional)
eP	Z	14 27 29	1.0	1.0	d		(Regional)
iP!	Z	17 55 41.1			c	$3\frac{3}{4}^{\circ}$	H=17 54 44
iS!	E/	56 24.7				6°S., 149°E., New Britian Region.	
13th February.							
iP	Z	05 19 15.5					Local
i(S)	N	19.0					
iP	Z	05 21 42.9			d		Local
i(S)	N	43.5					
eP	Z	15 30 $25\frac{1}{2}$	0.5	0.3	d	5°	H=15 29 11
iS	N	31 22.3				New Britian Region	

			T sec	A* mm	GM	Dist	Remarks
ULAMONA FIELD STATION							
16th February.							
iP!	Z	17 20 58			(d)		Local
17th February	- Nil recorded						
18th February	- Nil recorded						
19th February	- Nil recorded						
20th February	- Nil recorded						
21st February	- Nil recorded						
22nd February	- Nil recorded						
23rd February	= No time breaks on record. Reading approx to nearest min.						
iP	Z	19 52 00	0.7	2.4	d		Local
24th February	- Nil recorded						
25th February	- Nil recorded						
26th February							
eP	Z	16 07 35½	0.5	0.5	c		Local
i	Z	55					

Co-ordinates: 4° 59' 24"S., 151° 16' 30"E.

Instrumentation: Wilmore Seismograph.

Attenuation: 1/100.

			T sec	A* mm	GM	Dist	Remarks
TABELE							
15th February.							
iP	Zw	21 57 49			c		Local
16th February.							
iP!	Zw	14 11 14½			(c)		Local
eP	Zw	19 39 37½	0.4	0.4	d		Local
17th February.							
eP	Zw	00 53 23½	1.0	0.4	d		Local
iP	Zw	02 47 48	0.6	1.0	c		Regional
18th February.							
eP	Zw	02 41 20	0.5	0.3	c		Teleseism
i	Zw	23½					
i	Zw	32½					
i	Zw	39					
iP	Zw	06 47 01	0.6	2.2	c		Regional
i	Zw	11					
iP	Zw	19 09 52	0.5	0.8	c		Regional
i	Zw	10 08					
i	Zw	32½					
19th February.							
iP	Zw	06 00 31½	0.2	1.5	c		Local
i	Zw	43½					
iP	Zw	15 20 50½	0.4	1.0	d		Near Shock
i	Zw	56					
i	Zw	58					
i	Zw	21 18½					
iP	Zw	22 36 25½	0.4	1.0	c		Near Shock
i	Zw	27½					
i	Zw	35½					
i	Zw	57					
eP	Zw	23 32 18	0.6	0.8	d		Teleseism
i	Zw	31					

20th February - Nil recorded

21st February - Nil recorded

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

Central Observatory
RABAUL

3rd March, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 1st March, 1967. To: 8th March, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	No records received.
TABELE	(TBL)	From: 21st February, 1967 To: 28th February, 1967.
AGENAHAMBO	(AGE)	Seismograph unservicable.
ULAMONA FIELD STATION		From: 26th February, 1967 To: 6th March, 1967.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB).

Latitude 04°11'33".0S, Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRAMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec	1,0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL-) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P Zh	Maximum magnification 3,240 at 1.0 sec	1.0	0.02

Heat sensitive recordimg paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-No	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E Elevation 3m
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELECORDER (GEOTECH MOD.2484)AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0sec	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical, 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
FOUNDATION: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. magnification 1,000.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
FOUNDATION: basalt flow.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

coupled to Willmore Recorder 0.25
attenuator setting 1/100, drum speed 60 mm/min.
S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE.) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL time signal is marked every minute on the records from crystal chronometer and a decond mark from Radio VNG Australia daily.

DIRECTIO OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS :

When readings are given with a decimal they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTERS:

Where no source is cited the determination of epicenters, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinatesand normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data Report No. 101, U.I.D., for computer requirements.

SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitude from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	Typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections unidentifiable.

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

TERRITORY OF PAPUA NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

2nd March, 1967.

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 05 02.4	0.4	1.0	d	$1\frac{1}{4}^{\circ}$	H=01 04 41
iPx	Z	04.0					
iPg	Z	08.0					
iS	E	18.5					
e	Z/	01 51 46			+		Traces
iP	Z	03 44 26.5	0.4	2.0	d	1°	H=03 44 06
iS	E	41.5					
e	Z/	04 12 05			+		Traces
iP	Z	06 24 29.0	0.3	2.4	c	$2\frac{1}{2}^{\circ}$	H=06 23 50
iS	E/	59.5					
iP	Z	11 22 19.0	0.5	3.5	c		Regional
iP	Z	12 20 41.0	0.3	3.0	d	$1\frac{1}{2}^{\circ}$	H=12 20 18
eS	N	59					
iP	Z	13 17 33.5	0.4	1.0	c	2°	H=13 17 00
iS	N	58.0					
iP	Z	14 01 11.0	0.5	2.0	d	$1\frac{1}{4}^{\circ}$	H=14 00 48
iS	N	28.0					
e	Z/	14 08 28			+		Traces
~~iP~~	~~Z~~	~~15 17 44.3~~	~~0.5~~	~~1.0~~	~~d~~		~~Regional~~
iP	Z	17 49 55.5	0.4	1.3	d	$2\frac{1}{2}^{\circ}$	H=17 49 16
iS	N	50 25.5					
iP	Z	19 06 10.5	0.4	3.0	d	$\frac{3}{4}^{\circ}$	H=19 05 55
iS	N	21.5					
e	Z	20 57 $23\frac{1}{2}$			+		Traces
iP	Z	21 08 40.3	0.3	3.0	d	2°	H=21 08 07
iS	N	09 05.0					
e	Z/	21 14 05			+		Traces
e	Z/	23 28 12			–		Traces

3rd March.

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 52 47.0	0.3	3.0	d	$1\frac{1}{2}^{\circ}$	H=02 52 22
iS	N	59.8					
eP	Z	08 57 $47\frac{1}{2}$	0.8	2.0	c	$24\frac{1}{2}^{\circ}$	
i	Z	51.6					
eS	E/	09 02 $04\frac{1}{2}$					
eP	Z	09 27 $27\frac{1}{2}$	0.6	1.0	d		Regional, Deep
iP	Z	09 43 51.6	0.4	4.8	c	$2\frac{1}{2}^{\circ}$	H=09 43 11
iS	N	44 22.2					
iP	Z	12 31 05.8	0.5	2.0	d	$1\frac{1}{4}^{\circ}$	H=12 30 43
iS	N	23.0					
e	Z/	13 05 06			–		Traces
iP	Z	13 40 30.0	0.3	2.3	c	$1\frac{1}{4}^{\circ}$	H=13 40 07
iS	N	47.2					
e	Z/	14 59 30			–		Traces
iP	Z	21 32 02.2	0.4	5.5	d	1°	H=21 31 45
[illegible]	[illegible]	14.5					

			T sec	A mm	GM	Dist	Remarks
RABAUL. 4th March.							
eiP	Z	00 30 15	0.4	3.0	d		Regional
i	Z	18.0					
iP!	Z	01 38 16.2	0.3	82.0	cWSW	$\frac{3}{4}^{o}$	H=01 38 01, Deep
iS	N	27.0					
eiP	Z	02 48 29	0.5	1.0	d	2^{o}	H=02 47 57
i	Z	33.0					
iS	N	53.5					
iP	Z	05 15 41.5	0.5	5.0	d	39^{o}	
i	Z	42.0					
i	Z	44.0					
eS	N/	22 35					
e	E/	25 42					
eiP	Z	06 22 50	0.5	2.0	c	38^{o}	
i	Z	51.5					
ePP	Z/	24 06					
ePcP	Z/	58					
i	Z	25 22.8					
eS	N	28 46.6					
ePcS	Z	48.0					
eSS	N/	31 08½					
e	Z/	10 49 42			–		Traces
iP	Z	12 16 53.3	0.5	12.0	c	$1\frac{1}{2}^{o}$	H=12 16 27
eS	N/	17 13					
eiP	Z	14 52 15½	0.4	1.0	d	$1\frac{1}{2}^{o}$	H=14 51 47
i	Z	16.2					
iS	N	37.0					
iP	Z	16 02 18.6	0.3	2.0	c	$1\frac{3}{4}^{o}$	H=16 01 49
i	Z	19.1					
iS	N	40.5					
iP	Z	16 29 07.0	0.5	2.0	c	1^{o}	H=16 28 49
iS	N	21.0					
eP	Z	18 16 57	0.5	1.0	d	80^{o}	
eS	N/	26 29					
iP	Z	19 09 10.4	0.4	2.0	d	$2\frac{1}{2}^{o}$	H=19 08 30
iS	N	41.0					
iP	Z	22 29 13.5	0.4	1.0	c	$4\frac{1}{2}^{o}$	Multiple shock
iP	Z	34.5					H=22 28 06
eS	N/	30 05					
eiP	Z	22 44 25	0.3	1.0		13½	H=22 42 30
i	Z	28.8					
eS	N/	46 54					
5th March.							
iPw	Z	00 32 24.6	0.4	15.5	d	1^{o}	H=00 32 08
iPg	Z	28.8	0.5	17.2			
iSn	N	36.0					
iSg	N	42.0					
iP!	Z	05 21 45.1	0.5	51.0	c	5^{o}	Deep
eS	N/	22 45					H=05 20 28
iP	Z	05 55 56.0	0.5	6.0	d	4½	H=05 54 47
eS	N/	56 49					
6th March.							
iP	Z	01 34 26.5	0.5	4.5	d	1^{o}	H=01 34 06
iS	N	41.0					
iP	Z	04 46 47.8	0.5	1.0	c		Regional, Deep
eP	Z	05 16 30	0.4	1.5	c		Regional

R.BAUL.

6th March contd.

Phase	Comp	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	05 19 45.3	0.4	4.0	c	$1\frac{1}{2}^{\circ}$	H=05 19 18
eS	N/	20 06					
iP	Z	06 33 28.0	0.3	12.8	d		Local
iS	N	32.5					
eiP	Z	13 19 25	0.4	1.0	c	2°	H=13 18 55
iS	N	48.0					
iP	Z	17 50 34.0	0.4	1.0	c	$1\frac{1}{2}^{\circ}$	H=17 50 11
iS	N	51.5					
iP	Z	19 32 35.0	0.4	5.5		1°	H=19 32 19
iS	E	47.5					
eiP	Z	20 21 38	0.4	1.5		1°	H=20 21 22
i	Z	39.0					
iS	N	50.3					
eP	Z	20 40 $11\frac{1}{2}$	0.5	1.0	d		(Teleseism)

7th March: L.P.E. Faulty attenuators from 0117.

Phase	Comp	Time	T sec	A mm	GM	Dist	Remarks
e	Z/	03 51 11			–		Traces
eiP	Z	06 53 $32\frac{1}{2}$	0.5	1.5	d		C.B.M. Regional
i	Z	38.2					Deep?
iP	Z	10 11 59.5	0.3	1.0	d	1°	H=10 11 39
iS	N	12 14.0					
i	N	10 14 40.0	0.7				Harmonic Wave
M	N	18					
F	N	23					
iP	Z	11 08 00.2	0.4	1.6	d	$1\frac{1}{4}^{\circ}$	H=11 07 38
iS	N	17.5					
iP!	Z	13 22 26.6	0.5	6.5	c	2°	H=13 21 55
iS!	N	50.5					
eP	Z	13 52 28	0.5	1.0	d		Regional
iP	Z	16 26 55.4	0.5	7.0	d		Regional, Deep
e	Z/	17 31 52			+		Traces
iP	Z	19 46 45.5	0.4	2.0	d	1°	H=19 46 33
eS	E	54.5					
iP	Z	21 34 45.8	0.3	1.5	c	1°	H=21 34 33
iS	N	54.0					

8th March.= S.P. E.W. Componant paper upside down. L.P. E.W. faulty attenuator till 0340. Strong microseismic activity associated with strong wind.

Phase	Comp	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	07 53 13.8	0.3	6.0	d	$2\frac{1}{2}^{\circ}$	H=07 52 36
iS	N	42.8					
iP	Z	07 59 33.8	0.3	3.0	c	1°	H=07 59 16
iS	N	46.0					
iP	Z	09 38 32.5	0.4	3.0	d	$1\frac{1}{2}^{\circ}$	H=09 38 06
iS	N	52.0					
iP	Z	13 04 18.8	0.4	10.0	c	1°	H=13 04 02
eS	N	30					
iP	Z	17 28 58.5	0.5	58.0	c	$1\frac{1}{2}^{\circ}$	H=17 28 35
iS	N	29 16.0					
eP	Z	18 28 28	0.5	3.0	c		Regional

			T sec	A* mm	GM	Dist	Remarks

TABELE Contd.

27th February.

Continuous tremor between 0918 hours and 1010 hours.
Average T=0.5, Average A*=2.3.
Due to magma movement in main vent.

28th February - Nil recorded.

			T sec	A* mm	GM	Dist	Remarks

ULAMONA FIELD STATION.

Co-ordinates 4° 59' 24"S., 151° 16' 30"E.

Instrumentation: Wilmore Seismograph.

Attenuation: 1/100.

CORRIGENDUM: Previous readings from this station are all 10 hours behind G.M.T. The following are the correct ones as from 15th February to 26th February.

16th February - Nil recorded.

17th February - Nil recorded.

iP!	Z	03 20 58			(d)		Local

18th February - Nil recorded.

19th February - Nil recorded.

20th February - Nil recorded.

21st February - Nil recorded.

22nd February - Nil recorded.

23rd February - Nil recorded.

24th February: No time breaks on record. Reading approx to nearest min.

iP	Z	05 52	0.7	2.4	d		Local

25th February - Nil recorded.

26th February - Nil recorded.

27th February.

eP	Z	02 07 35½	0.5	0.5	c		Local
i	Z	55					

27th February.

iP	Z	10 30 54½	0.8	C.9	d		Local
i	Z	16½					Felt: Kilenge.

28th February: No record.
2 felt shocks at 2240 and 0620 hours

1st March.- Nil recorded.

2nd March - Nil recorded.

3rd March.

Continuous tremor between 0816 and 0837.
Average T=0.2, Average A*=0.7.

4th March - Nil redorded.

[illegible] - [illegible] recorded.

TABELE.

			T sec	A* mm	GM	Dist	Remarks

21st February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	18 45 30½	0.5	1.0	d		Teleseism
i	Zw	33					

22nd February.

			T sec	A* mm	GM	Dist	Remarks
eP	Zw	15 20 27	0.3	0.5	d		Local
i	Zw	37					
i	Zw	39					
i	Zw	40½					
eP	Zw	18 31 46	0.2	0.5	c		Local
iP	Zw	21 29 55	0.4	2.1	d		Local
i	Zw	30 13½					

23rd February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	12 09 41	0.4	2.0	d		Local
i	Zw	48					
i	Zw	10 00½					
eP	Zw	23 47 25	0.2	0.5	d		Teleseism
i	Zw	30½					
i	Zw	37½					
i	Zw	42					

24th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	00 41 43½	0.5	1.0	(c)		Teleseism
iP!	Zw	10 08 07					Regional
iP	Zw	10 51 39	0.6	1.0	d		Local
i	Zw	40					
i	Zw	43					
i	Zw	56					
i	Zw	52 08					
i	Zw	11					
iP	Zw	14 12 12½	0.2	1.0	c		Local
i	Zw	13½					
i	Zw	20					
i	Zw	24½					

25th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	07 46 06½	0.4	2.0	d		Local
i	Zw	21½					
eP	Zw	11 24 44			c		(Teleseism)

Continuous tremor between 1541 hours and 1556 hours.
Average T=0.3, Average A*=1.1.
Due to magma movement in main vent.

26th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	04 39 36	0.5	2.2	c		Local
iP	Zw	10 29 36	0.4	2.0	d		Regional
i	Zw	42½					
i	Zw	53½					
eP	Zw	14 22 22	0.3	0.5	d		Local
i	Zw	39½					

Continuous tremor between 1948 hours and 2003 Hours.
Average T=0.4, Average A*=0.9.
Due to magma movement in main vent.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	22 28 26	0.5	0.8	d		Local
i	Zw	48					

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

<u>RABAUL</u>	(RAB)	From: 8th March, 1967 To: 15th March, 1967.
<u>SULPHUR CREEK</u>	(SUL)	Not operational.
<u>KERAVAT</u>	(KRT)	Not operational.
<u>ESA'ALA</u>	(ESA)	From: 13th February, 1967 To: 27th February, 1967.
<u>TABELE</u>	(TBL)	From: 27th February, 1967 To: 7th March, 1967.
<u>AGENAHAMBO</u>	(AGE)	From: 1st March, 1967 To: 5th March, 1967.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0S, Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRAMENTATION

WORLD WIDE STANDARD SYSTEM:			To sec.	Tg sec.
S.P.-Z	Maximum magnification	12,500 at 0.6 sec	1,0	0.74
S.P.-N&E	Maximum magnification	6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E/	Maximum magnification	750 at 25.0 sec	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL-)
HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P Zh	Maximum magnification	3,240 at 1.0 sec	1.0	0.02

Heat sensitive recordimg paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-No	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E Elevation 3m
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL)
TELEMETERED BY LINE TO A HELECORDER (GEOTECH MOD.2484)AT THE
CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification	3,240 at 1.0sec	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
FOUNDATION: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

	To sec.	Tg sec.
VERTICAL WILLMORE SEISMOGRAPH Attenuator setting 1/10, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
FOUNDATION: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

		Tg sec.
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min. S.P.-Z_W magnification 860		0.25

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behimd Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE.) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL time signal is marked every minute on the records from crystal chronometer and a decond mark from Radio VNG Australia daily.

DIRECTIO OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS :

When readings are given with a decimal they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTERS:

Where no source is cited the determination of epicenters, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinatesand normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data . Report No. 101, U.I.D., for computer requirements.

SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitudes from seismographs with different response to the W.W.S.S.
T	Period in seconds
C.B.M.	Confused by microseisms
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local.	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

NOTE:

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if signature still typical but unidentifiable shear waves.

G.W.D'ADDARIO
Vulcanologist-in-Charge.

TERRITORY OF PAPUA=NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
9th March		S.P. components strong microseismic activity associated with strong wind.					
eP	Z/	03 27 58			c		Teleseism
e(P)	Z/	05 45 24			+		Teleseism
eP	Z/	05 56 10			(d)	22°	
eS	N/	06 00 19					
eP	Z/	07 02 05			c	17°	
eS	N/	05 05					
eP	Z/	18 06 23			c	$16\frac{1}{4}^{\circ}$	
eS	N/	09 28					
10th March		Strong microseismic activity associated with strong wind.					
iP	Z	09 18 50.5	0.4	3.0	c	$1\frac{1}{2}^{\circ}$	H=09 18 28
eS	N	19 11					
eP	Z	11 09 04	0.5	1.0	d	$3\frac{1}{4}^{\circ}$	H=11 08 13
eS	N	43					
iP	Z	16 14 35	0.4	3.0	d	1°	H=16 14 17
iS	N	49.0					
iP	Z	16 36 03.0	0.4	4.0	c		Regional
iP	Z	17 33 13.5	0.5	2.0	d	$1\frac{3}{4}^{\circ}$	H=17 32 44
iS	N	35.5					
iP	Z	19 38 09	0.4	4.0	d	C.B.M.	Regional
11th March		Strong microseismic activity associated with winds.					
eP	Z/	08 37 03			d	22°	
eS	N/	41 09					
e	Z/	14 19 10			-		Traces
e	Z/	15 37 31			-		~~Teleseism~~ Traces
12th March		Very strong micriseismic activity associated with strong wind					
e	Z/	00 37 27			-		Traces
eP	Z	05 21 57½	0.4	4.5	d	C.B.M.	Regional
iP	Z	15 19 24.5	0.3	16.0	d	1°	H=15 19 07
iS	N/	37.5					
13th March		WWSS OFF 13th-15th March for maintenance.					
iP	Zh	00 33 16.0	0.4	4.0	c	$4\frac{1}{2}^{\circ}$	H=00 32 09
eS	Zh	34 08					
iP	Zh	04 10 50.5	0.4	3.8	d	$\frac{1}{4}^{\circ}$	H=04 10 39
iS	Zh	58.5					
eP	Zh	04 54 38	0.4	2.0	d		Teleseism
eP	Zh	12 30 53	0.5	3.0	d		Regional
iP	Zh	21 59 40.0	0.3	2.0	c	3°	H=21 58 52
eS	Zh	22 00 17					
14th March		Strong microseismic activity associated with strong wind					
eP	Zh	05 57 05½	0.3	3.0	c	$\frac{1}{4}^{\circ}$	H=05 56 57
iS	Zh	11.5					

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

30 MAR 1967

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From:	16th March, 1967.
		To:	21st March, 1967.
SULPHUR CREEK	(~~KRT~~ SUL)	Not operational	
KERAVAT	(KRT)	From:	6th March
		To:	18th March
ESA'ALA	(ESA)	From:	28th February
		To:	14th March
TABELE	(TBL)	From:	7th March
		To:	14th March
AGENAHAMBO	(AGE)	From:	5th March
		To:	11th March

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB).

Latitude 04°11'33".0S, Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRAMENTATION

WORLD WIDE STANDARD SYSTEM:

		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec	1,0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL-) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P Zh	Maximum magnification 3,240 at 1.0 sec	1.0	0.02

Heat sensitive recordimg paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-No	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E Elevation 3m
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELECORDER (GEOTECH MOD.2484)AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0sec	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
FOUNDATION: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec.	Tg sec.
Attenuator setting 1/10, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
FOUNDATION: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

	Tg sec.
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min. $S.P.-Z_W$ magnification 860	0.25

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behimd Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE.) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

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ACCURACY OF READINGS :

When readings are given with a decimal they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTERS:

Where no source is cited the determination of epicenters, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

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SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitude from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	Typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections unidentifiable.

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL			T sec	A mm	GM	Dist	Remarks
16th March, 1967.							
eiP	Z	05 56 23	0.3	1.8	c	2°	H=05 55 52
eS	N	46½					
eP	Z	12 15 00½	0.4	1.0	c	25°	
i	Z	02.5					
eS	E/	19 23					
iP	Z	14 16 19.5	0.3	1.0	d	1½°	H=14 15 53
iS	N	39.0					
eP	Z	15 00 09½	0.3	1.0	d	1¾°	H=14 59 42
iS	N	33.0					
iP!	Z	15 39 17.6	0.4	15.5	d	1°	H=15 39 00
iS!	N	30.0					
e	Z/	19 10 21			–		Traces
17th March. L.P.N.S. Galvanometer jammed between 1125 hours.							
iP	Z	00 53 38.0	0.5	34.0	dSE		Regional
eiP	Z	02 20 46	0.5	1.0	c	3°	H=02 19 58
i	Z	49.5					
iS	N	21 23.5					
iP	Z	06 18 06.6	0.3	6.5	d	2½°	H=07 17 26
i	Z	09.6					
eS	E/	38					
iP	Z	07 13 14.8	0.5	2.8	d	1°	H=07 12 57
iS	N	27.5					
iP	Z	11 25 05.0	0.3	3.0	c	(2°)	H=11 24 (35) Main Shock
e	No	20					
e(S)	No	28					
eP	Z	11 46 22½	0.5	1.5	c	in coda of preceding shock.	
eiP	Z	12 08 02	0.5	1.0	c		Regional
eiP	Z	13 49 29	0.5	2.0	d	5½°	H=13 48 06
i	Z	30.5					
eS	N	50 33½					
eP	Z	14 36 38	0.5	1.0	d		
iP	Z	14 39 24.5	1.0	17.0	d	2¼°	Aftershock H=14 38 48
i(S)	N	52.0					
iP	Z	16 45 36.0	0.3	1.5	c	2°	Aftershock H=16 45 02
iS	N	46 02.0					
iP	Z	17 18 59.8	0.5	1.0	d	2¼°	Aftershock H=17 18 23
iS	N	19 27.0					
eiP	Z	18 10 31	0.5	1.0	d		Regional
iP	Z	19 33 46.5	0.5	3.0	c	2¼°	Aftershock H=19 33 11
iS	N	34 13.0					
18th March.- LP N.S. Galvonometer jammed.							
iP	Z	01 19 35.2	0.4	4.5	d	1°	H=01 19 17
iS	N	49.0					
iP	Z	01 20 55.3	0.4	31.5	c	1½°	H=01 20 32
iS	N	21 13.0					

RABAUL.

18th March contd.

			T sec	A mm	GM	Dist	Remarks
eP	Z	02 07 25	0.5	1.0	d		Regional
iP	Z	04 51 25.2	0.4	1.8	c		Regional
iP	Z	05 08 15	0.5	1.0	d		Regional
iP	Z	05 53 57.8	0.4	2.5	c	1°	H=05 53 41
iS	N	54 09.5					
iP	Z	06 25 53.2	0.5	1.5	c	$4\frac{1}{2}^{\circ}$	H=06 24 44
iS	N	26 46.5					
iP	Z	07 36 55.2	0.4	3.0	d	$1\frac{1}{2}^{\circ}$	H=07 36 30
iS	N	37 14.5					
iP	Z	08 21 08.0	0.3	1.0	d	$1\frac{3}{4}^{\circ}$	H=08 20 39
iS	N	30.0					
iP	Z	08 50 03.8	0.5	1.0	c	2°	H=08 49 32
iS	N	27.0					
eP	Z	09 33 22	0.4	1.0	c		Regional
iP	Z	16 44 04.8	0.5	10.5	c	3°	H=16 43 20
eS	E/	38					
eP	Z	17 39 $30\frac{1}{2}$	0.5	1.0	d		Regional
iP	Z	17 57 32.2	0.8	1.0	c		Regional, Deep
iP	Z	19 02 57.2			d	$4\frac{1}{2}^{\circ}$	Superimposed
eS	E/	03 48				shock.	H=19 01 51
iP	Z	19 17 06.0	0.4	15.0	c	$4\frac{1}{2}^{\circ}$	H=19 16 59
eS	E/	58				Felt Shock Int.4.	
						6° 50'S., 145° 55'E.	
iP	Z	21 03 28.8	0.5	1.5	d	$1\frac{1}{2}^{\circ}$	H=21 03 02
iS	N	48.0					
iP	Z	21 16 52.6	0.4	4.0	d	1°	H=21 16 34
iS	N	17 06.5					
iP	Z	22 02 29.5	0.4	3.0	c	$1\frac{1}{4}^{\circ}$	H=22 02 08
iS	N	45.0					

19th March.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	00 12 17	0.3	1.0	d		Regional
i	Z	20.2					
i	Z	24.5					
eiP	Z	01 15 40	0.5	1.0	d	22°	
i	Z	41.5					
eS	N/	19 41					
iP	Z	03 33 53.0	0.5	3.0	d	$1\frac{1}{2}^{\circ}$	H=03 33 28
iS	N	34 12.2					
eP	Z	04 10 $26\frac{1}{2}$	0.5	1.5	(d)	$49\frac{1}{4}^{\circ}$	
e	Z	$27\frac{1}{2}$					
eS	N/	19 31					
iP	Z	10 27 11.5	0.5	1.0	c	2°	H=10 26 38
iS	N	36.5					
iP	Z	14 30 52.5	0.5	13.0	d	$1\frac{1}{4}^{\circ}$	H=14 30 25
iS	N	31 09.0					
iP	Z	18 20 49.3	0.5	7.0	c	$1\frac{1}{4}^{\circ}$	H=18 20 25
iS	N	21 06.8					
iP	Z	22 22 42.0	0.4	21.0	c	$\frac{3}{4}^{\circ}$	H=22 22 27
iS	N	52.8					

20th March

			T sec	A mm	GM	Dist	Remarks
iP	Z	08 48 52.5	0.4	32.0	d	$4\frac{3}{4}^{\circ}$	H=08 47 41
eS	N/	49 $47\frac{1}{2}$					

RABAUL

20th March (cont.)

			T sec	A mm	GM	dist.	Remarks
iP	Z	11 20 07.2	0.3	2.5	d	1°	H=11 19 51
iS	N	19.0					
eP	Z	13 40 21½	0.8	2.0	c		Teleseism
eS	N/	47 30					
eP	Z	13 49 40	1.0	1.0	d		Deep shock
eP	Z	14 00 52½	0.5	1.0	c		(Regional & deep)
i	Z	01 09.3					
iP	Z	15 55 14.0	0.8	1.0	c		Regional & deep
i	Z	27.5					
iP	Z	16 16 55.0	0.3	1.0	c		Regional
eiP	Z	16 31 40	0.5	1.0	c		Regional
i	Z	46.8					
iP	Z	16 42 31.6	0.4	13.0	c	¾°	H=16 43 16
iS	N	42.3					
eP	Z	17 20 24	0.5	1.0	c		Regional
e	Z	37½					
eP	Z	19 12 50	0.5	1.0	d		Teleseism
eS	E/	17 17					
iP	Z	21 07 21.0	0.4	1.0	d	2½°	H=21 06 41
iS	N	51.5					
iP	Z	21 15 22.3	0.4	10.0		1½°	H=21 14 56
iS	N	42.0					

21st March

			T sec	A mm	GM	dist.	Remarks
iP	Z	03 18 19.5	0.4	3.0	c	1°	H=03 18 [illegible]2
iS	N	32.5					
e	Z/	03 36 46½			+		Traces
iP	Z	07 46 15.0	0.5	1.0	d	2¼°	H=07 45 40
iS	N	42.0					
iP	Z	08 08 25.0	0.5	5.0	d	1½°	H=08 07 58
iS	N	46.0					
iP	Z	11 07 55.0	0.4	9.0	d	1¾°	H=11 07 26
iS	N	08 16.8					
e	Z/	11 40 35½			+		Traces
iP	Z	08 34 01.0	0.5	1.0	c		Regional
eP	Z	19 10 03	0.8	1.0	d	16°	
eS	N/	13 05					
eiP	Z	19 48 06	0.5	1.5	d	8°	H=19 46 10
i	Z	07.5					
iS	E	49 36.5					
eP	Z	21 42 51	0.4	1.8	d		Regional

KERAVAT

From 6th March to 18th March seismograph on test. Time uncertain. Records unreliable.

ESA'ALA L.P.Z faulty time break circuit.

			T sec	A* mm	GM	Dist	Remarks
28th February, 1967.							
iP	Z	05 54 45.1	0.3	0.7	d		Regional
eP	Z	09 35 20	0.4	0.3	c		(Regional)
eP	Z	09 45 16½			d	32½°	
e(PcP)	Z	20					
eS	N/	51 22					
iP	Z	11 44 31.4	0.3	0.5	c		Regional
iP	Z	11 59 03.9			d	(20¼)	
e(S)	N/	12 02 50					
eP	Z	16 33 23½			c	1½°	H=16 32 57
iS	N/	43.7					
iP	Z	16 43 24.7	0.5	1.5	d	5¼°	H=16 42 08
iS	N/	44 23.7					
iP	Z	16 47 35.7	0.5	2.0	d	2½°	H=16 46 59
iS	N/	48 03.7					
iP	Z	19 30 59.2	0.6	0.3	d		Local
1st March							
iP	Z	04 39 17.4	0.5	2.0	c	3¾°	H=04 37 18
iS	E	40 02.4					
eP	Z	14 30 04	1.0	1.1	c	24½°	
eS	N/	34 38					
2nd March							
eP	Z	06 24 50	0.9	0.7	d	3½°	H=06 23 54
i	Z	50.4					
iS	N	25 32.4					
eP	Z	11 23 27½	0.2	0.5	d	4½°	H=11 22 18
eS	E	24 20.4					
iP	Z	15 17 33.3	0.2	0.6	d	6°	H=15 16 05
iS	N	18 41.5					
3rd March							
eP	Z	08 57 52	0.9	0.9	d	55°	
eS	E/	09 02 06.0					
eP	Z	09 27 29½	0.9	0.4	c		Regional
eP	Z	09 36 13½	1.5	0.3	c		Regional
e(P)	Z	14 46 41½	0.9	0.2	c		Teleseism
iP	Z	19 51 58.3	0.5	0.1	c	2¼°	H=19 51 25
eS	N/	52 24					
4th March							
eP	Z	05 17 06½	1.0	0.5	d	32½°	
eS	E/	23 14					
e	Z	35½					
eP	Z	06 22 47½	1.0	2.0	c	43°	
i	E/	24 28.6					
i(S)	N/	30 58.9					
eP	Z	10 46 48			d		Regional
eP	Z	16 04 09	0.4	0.1	d		Regional
eiP	Z	17 52 29			c	1¼°	H=16 22 26
i	Z	30.7					
iS	E	45.4					
eP	Z	18 17 05	1.0	0.4	d	10½°	
eS	N	19 03					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
4th March contd.							
eP	Z	19 10 28	0.5	0.7	c	3½°	H=19 09 32
iS	N	11 11.7					
eP	Z	22 30 57	0.5	0.6	d	3½°	H=22 30 01
iS	N	31 39.5					
eP	Z	22 45 28½	0.5	1.5	c	18½°	
eS	N/	48 56					
5th March							
eiP	Z	02 18 02½	0.6	0.4	d	1¼°	H=02 17 40
i	Z	05.5					
iS	N	19.9					
iP	Z	05 21 49.5			d	3½°	H=05 20 56
iS	N	22 30.5					
eP	Z	05 55 30	0.5	0.1	c		Local
i	Z	51.2					
eP	Z	15 28 39	0.5	0.3	d		Regional
6th March							
eP	Z	01 35 22	0.5	0.2	c	2¼°	H=01 34 45
eS	E	50					
eiP	Z	04 47 30½			d	30¾°	
i	Z	31.2					
e(ScP)	Z	52 10					
eS	E	53 15					
eP	Z	05 03 21½	0.8	0.4	c	8½°	H=05 01 20
eS	E/	04 56½					
eP	Z	05 15 18	0.9	0.4	d	10½°	
eS	E	17 15					
eP	Z	08 18 14	0.4	0.6	d		Regional
eP	Z	13 38 16	0.5	0.5	d	(2°)	H=13 37 (44)
e(S)	N	40½					
eP	Z	20 56 48			c		Regional
eP	Z	23 51 43½	0.5	0.4	d	12¾°	
iS	E/	54 05.5					
7th March							
iP	Z	00 56 10.1	0.3	2.0	C	¾°	H=00 55 51
iS	N	20.3					
eP	Z	03 47 48	0.9	0.4	d		Regional
eP	Z	06 53 32	0.5	0.6	d	4½°	H=06 52 23
iS	N	54 24.9					
eP	Z	13 23 06½	0.7	0.5	c	4½°	H=13 22 03
iS	N	55.4					
8th March							
iP	Z	07 54 36.8	0.5	4.0	c	4°	H=07 53 37
iS	E	55 23.1					
9th March							
eP	Z	03 27 57	1.0	1.2		17½°	11°S 166°E New Hebrides
eS	N/	31 11					

ESA'ALA			T sec	A* mm	GM	Dist	Remarks
9th March contd.							
eP eS	Z N/	05 55 01 31 11	1.5	1.0	d	17¼°	13°S 167°E New Hebrides Islands Region
eP iS	Z N/	07 02 16 05 12.0	0.6	1.2	c	15½°	12°S 165°E New Hebrides Island Region
eP iS	Z N/	18 06 21½ 09 26.8	1.0	1.0	c	16½°	
10th March		NIL RECORDED					
11th March							
iP i(S) iS	Z N N/	08 37 03.1 39 05.8 06.9	1.0	1.0	c	11°	
12th March							
eiP i i(S)	Z Z N	19 42 22 23.5 59.2	0.5	0.2	c	3°	H=19 41 32
13th March							
iP iS	Z N	00 33 36.7 34 43.6	0.8	4.4	c	6°	H=00 32 10
eP iS	Z E/	04 55 20 58 25.7			c	17°	
14th March.							
iP iS	Z E	05 57 09 47.2	0.3	0.5	c	2½°	H=05 56 19
iP iS	Z E	07 56 53.5 57 57.4	0.4	2.9	c	5½°	H=07 55 30

ESA'ALA contd.
25th February contd.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	11 44 36	0.5	1.6	d	25¾°	H=11 38 23
iS	N/	49 25.0					

26th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	04 10 48.5	0.7	4.0	c		Regional
iP	Z	10 30 14.6			c	2°	H=10 29 44
iS	E/	58.0					
eiP	Z	17 20 32	0.4	1.3	c	5°	H=17 19 19
i	Z	32.6				Solomon	Islands Region.
iS	E	21 29.1					

27th February - Nil Recorded.

G.W.D'ADDARIO.
(Vulcanologist-in-Charge)

Central Observatory.
RABAUL

17th March, 1967.

RABAUL
14th March (cont.)

			T sec	A mm	GM	Dist	Remarks
iP	Zh	14 00 19.5	0.3	1.8	d	$1\frac{1}{4}^{o}$	H=14 59 58
iS	Zh	35.5					
iP!	Zh	17 06 24.0	0.3	6.5	c		Regional
eP	Zh	20 33 12	0.3	1.8	c		Regional
iP	Zh	20 54 21.0	0.3	2.0	d	$2\frac{1}{2}^{o}$	H=20 53 43
iS	Zh	50.0					
iP!	Zh	21 45 05.0	0.3	10.0	d		Regional

15th March

			T sec	A mm	GM	Dist	Remarks
eiP	Zh	00 09 37	0.3	2.0	c		Regional C.B.M.
iP	Zh	05 41 29.5	0.3	13.0	c		Regional C.B.M.
iP	Zh	07 09 32.0	0.3	6.0	c		Regional
iP	Zh	09 11 04.0	0.3	3.0	c	2^{o}	H=09 10 31
iS	Zh	29.0					
iP	Zh	10 13 57.5	0.3	2.5	d		Regional
iP	Zh	14 57 12.5	0.3	4.0			Regional
eiP	Zh	16 51 $25\frac{1}{2}$	0.3	1.5		1^{o}	H=16 51 05
i	Zh	36.0					
eS	Zh	40.0					
iP	Zh	20 21 43.0	0.3	12.0	c		Regional
iP	Zh	20 41 10.0	0.4	2.0	d	$1\frac{1}{2}^{o}$	H=20 40 46
eS	Zh	$28\frac{1}{2}$					

TABELE

			T sec	A* mm	GM	Dist	Remarks
28th February, 1967.							
iP	Zw	11 42 19½	0.4	1.0	c		Regional
i	Zw	43 07½					
iP	Zw	16 42 04	0.3	2.0	(d)		Regional
1st March							
iP	Zw	01 51 24	0.6	5.9	d		Regional
i	Zw	35					
2nd March							
iP!	Zw	02 15 37			d		Local
i	Zw	51½					
iP	Zw	15 16 09½	0.2	0.4	c		Regional
i	Zw	10½					
i	Zw	43					

3rd March Nil recorded.

4th March Nil recorded.

5th March Nil recorded

6th March Nil recorded

7th March Nil recorded

AGENAHAMBO

1st March

Continous tremor between 2209 hours and 2400 hours.
Average T=0.3, Average A=1.4

2nd March

Continous tremors between 0029 hours and 0120 hours
Average T=0.3, Average A=2.0

3rd March

Continous tremor between 0326 hours and 0405 hours
Average T=0.3, Average A=1.6

			T sec	A* mm	GM	Dist	Remarks
iP	Z	04 34 03	0.8	6.1	c		Regional
i	Z	35.5					
3rd March							
iP	Z	06 25 47.0	0.5	1.0	c		Local
i	Z	51					
eP	Z	12 47 02.0	0.4	0.3	d		Local
i	Z	30.0					
i	Z	34.5					
iP	Z	15 17 01.0	0.3	0.4	c		Regional
i	Z	37.0					
i	Z	41.5					
i	z	50.5					
i	Z	52.5					

4th March Nil recorded.

5th March Nil recorded.

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
13th February, 1967.							
eP	Z	23 33 57	1.2	0.1	c	(17½°)	
e(S)	N/	37 16½					
14th February							
eP	Z	01 46 11½	1.0	2.0	d	(46½°)	
e(PP)	Z/	48 35					
e(S)	N/	54 54					
iP	Z	03 14 29.9			c		local
eP	Z	05 06 45½	0.7	2.9	d	(18°)	
e(S)	N	10 08					
eP	Z	12 58 42½				5°	H=12 58 15
eS	N	59 30½					
iP	Z	19 04 58.6			d	¼°	H=19 04 52
iS	N	05 03.9					
iP	Z	19 42 44.5	0.3	2.5	d	¼°	H=19 42 36
iS	N	50.2					
eiP	Z	20 15 12	0.5	7.0	d	¼°	H=20 15 04
iS	E/	17.1					
iP	Z	20 29 12.3			c		Local
iP	Z	23 10 49.8			c	¼°	Local
iS	N	56.1					H=23 10 48
15th February.							
eP	Z	06 08 07	1.0	0.8	d		Regional
eP	Z	15 10 42½	0.5	4.0	d	(24°)	
e(S)	N	15 40					
eP	Z	16 29 20	1.0	0.3	d	16°	
i	Z	37.4					
e	Z	31 53					
i	Z	32 08.3					
iS	N/	13.8					
i	E/	35 29.8					
i	E/	38 13.7					
16th February.							
eP	Z	01 21 11	0.5	3.0	c		Local
i	Z	11.9					
iP	Z	03 01 48.1			c		Local
iS	E	49.3					
eP	Z	03 55 04.3	0.5	0.3	d	5½°	H=03 54 46
iS	E	56 06.0					
eP	Z	08 24 27.5	0.7	1.4	c		Regional
eP	Z	17 06 22	0.4	1.5	d		(Local)
iP	Z	17 53 27.5	0.5	3.9	c	2½°	H=17 53 07
iS	E	54 35.5					
17th February.							
iP	Z	00 43 37.3	0.6	2.5	c	26°	
eS	N/	48 29					
eiP	Z	02 47 58			c	4½°	H=02 46 52
i	Z	59.3					
iS	N	48 49.7					
eiP	Z	10 17 49.0	0.6	1.5	c	(10½°)	
i(S)	N	19 44.6					
i(pPcS)	N/	26 26.4					
i([illegible])	E/	29 57.9					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA contd.							
17th February contd.							
eP	Z	16 05 02½	0.6	0.1	d	3¾°	H=16 04 49
eS	N	47					
iP	Z	20 05 16.2					Local
18th February.							
eiP	Z	00 12 12½			d		Local
i	Z	13.0					
iS	E	15.3					
eiP	Z	02 40 27½	0.4	5.5	c	4½°	H=02 39 21
i	Z	28.7					
iS	E/	41 19.0					
iP	Z	03 12 01.9	0.3	5.0	c		Local
iS	E	03.2					
iP	Z	04 17 39.5			c	1°	H=04 17 21
iS	E	53.7					
iP	Z	05 38 06.7					Local
iS	N	07.3					
iP	Z	06 48 07.9	0.8	6.0	d	17¼°	
eS	E	51 53					
iP	Z	07 41 35.7	0.2	1.5	d		
iP	Z	08 01 36.4	0;2	1.4	c	¾°	H=08 01 21.3
iS	N	47.6					
iP	Z	09 24 55.3	0.6	1.5	c		Local
eP	Z	13 32 04	1.0	0.8	c		(Regional)
eiP	Z	14 17 24	0.2	1.5	d	2¼°	H=14 16 50
i	Z	24.4					
eS	N	50½					
eiP	Z	19 21 34½	0.2	2.5	d		Local
i	Z	34.6					
iS	N	44.0					
19th February.							
eP	Z	10 42 27	1.0	1.3	d		Local
e	Z/	14 40 12.0					Traces
eP	Z	16 36 22	0.5	0.2	c		Local
iP	Z	18 57 05.7	0.2	1.3	c	¼°	H=18 56 57.5
iS	E	12.0					
eP	Z	22 21 46½	0.6	9.0	c	30¾°	
iS	N/	27 31.0					
eP	Z	22 34 19½	0.9	1.7	c	25¼°	
eS	E	39 04					
20th February.							
iP	Z	03 31 20.0	0.4	1.0	d	4°	H=03 30 20
iS	E	32 05.8					
iP	Z	03 56 02.9			d	¾°	H=03 55 49
iS	Z	12.8					
iP	Z	07 49 27.6	0.2	1.1	c	½°	H=07 49 15
iS	E	36.2					
iP	Z	07 58 20.8	0.3	1.0	c	¼°	H=07 58 10
iS	E	29.2					
eP	Z	09 52 10	0.5	[illegible]	c		
iP	Z	15 31 08.5	0.7	[illegible]	[illegible]		(Regional)

ESA'ALA contd.

			T sec	A* mm	GM	Dist	Remarks
20th February contd.							
iP	Z	19 16 23.9	0.2	0.4	c		Regional
i	Z	26.0					
eP	Z	20 01 18	0.4	1.0	d	5°	H=20 00 03
iS	E/	02 15.9					
eP	Z	22 45 24	0.8	1.4	d	16½°	New Hebrides
iS	N/	48 28.8					Islands Region.
eP	Z	23 07 15½	1.5	1.0	d	(16½)	
e(S)	N	10 20					
21st February.							
eP	Z	09 17 06	1.0	0.4	c		(Regional)
eiP	Z	14 05 44½	0.4	1.7	d	4½°	H=14 04 38
iS	Z	44.9					
iS	E/	06 35.7					
iP	Z	18 47 33.4	1.0	2.5	c	½°	H=18 47 25
iS	E/	39.9					
22nd February.							
iP	Z	11 46 05.7	0.4	2.0	d	3¾°	H=11 45 09
iS	E	48.7					
iP	Z	13 48 26.6	0.4	2.5	c	1°	H=13 48 11
iS	E	38.3					
eP	Z	13 58 09½	1.5	4/0	c	6¼°	H=13 54 03
i	Z	17.5				12.5°S., 166.4°E.,	
eS	E/	14 01 21				New Hebrides Is. Region.	
iP	Z	14 17 29.5	0.4	1.5	d		(Local)
eP	Z	18 31 19	1.5	1.6	d	19°	H=18 26 22
iS	N/	35 09.8				19.5°S., 167°E., New	
						Hebrides Is. Region.	
iP	Z	20 00 05	0.6	2.5	d	5½°	H=19 58 43
iS	N/	21 08.4					
iP	Z	23 54 49.3			d		Local
iS	N	53.8					
23rd February.							
iP	Z	01 02 53.5	0.2	2.0	d	3½°	H=01 01 56
iS	E	03 37.0					
iP	Z	03 14 55.7	0.3	1.0	d	4½°	H=03 13 45
iS	N	15 49.7					
iP	Z	04 54 34.2			d	3½°	H=04 53 24
iS	N	55 27.5					
eP	Z	11 50 11	1.0	0.6	c		Regional
iP	Z	23 47 58.7	0.3	1.2	d		Local
24th February.							
iP	Z	00 42 15.4	0.3	2.0	d	3¾°	H=00 41 07
iS	N	59.9					
iP	Z	00 56 27.1	0.6	1.7	d	6¾°	H=00 54 49
iS	E/	57 43½					
iP	Z	10 09 25.4	0.3	1.5	d	5°	H=10 08 10
iS	N	10 23.3					
25th February.							
eP	Z	05 43 50	1.0	1.0	c	½°	H=05 43 40
eS	N/	57					
eP	Z	11 26 41½	0.5	2.9	c	½°	H=11 26 35
iS	N/	41.0					

5 APR 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From:	21st March, 1967
		To:	28th March, 1967.
SULPHUR CREEK	(SUL)	Not operational.	
KERAVAT	(KRT)	From:	18th March, 1967
		To:	28th March, 1967.
ESA'ALA	(ESA)	No records received.	
TABELE	(TBL)	No records received.	
AGENAHAMBO	(AGE)	From:	12th March, 1967
		To:	19th March, 1967.
ULAMONA FIELD STATION.		From:	15th March, 1967
		To:	17th March, 1967.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0S, Longitude 152°10'16".0E, Elevation 184m.
Foundation: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM

		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-Eo	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E., Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
Foundation: Granite.

STATION INSTRUMENTATION

Seismometer	Recorder	To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

~~Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25~~
S.P.Z. magnification 1,000.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

Seismograph	Recorder	To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

coupled to Willmore Recorder
attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB the time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL the time signal is marked every minute on the records from a crystal chronometer and a second marks from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.

"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second; other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTRES:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalisation", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
22nd March.							
eP	Z	00 14 26	0.5	0.6	c		Teleseism
e	Z/	02 05 17			+		Traces
iP!	Z	05 53 15.6	0.6		dSSE	1°	H=05 52 57
iS!	E/	29.5				Felt Ulamona Int. III	
						4° 59' 24"S, 151° 16' 30"E	
iP	Z	13 01 51.8	0.4	9.2	c	$6\frac{3}{4}^{\circ}$	H=13 00 12
iS	N/	03 09.0					
eiP	Z	13 42 13	0.5	2.2	d	$2\frac{1}{2}^{\circ}$	H=13 41 32
iS	E/	44.0					
e	Z	19 17 43			+		Traces
iP	Z	21 01 39.0	0.4	3.9	c	$1\frac{1}{2}^{\circ}$	H=21 01 12
iS	N	59.2					
e	Z/	21 37 25½			+		Traces
23rd March.							
iP	Z	00 29 42.0	0.3	4.5	c	$\frac{1}{2}^{\circ}$	H=00 29 30
iS	N	51.0					
eP	Z	00 30 56	0.5	1.0	c	$1\frac{1}{4}^{\circ}$	H=00 30 34
iS	N	31 13.0				in coda of preceding shock	
eiP	Z	00 37 09	0.4	1.0	c		Local
i	Z	09.2					
e	Z/	00 48 12			-		Traces
e	N/	50 48					
e	Z/	53 20					
e	Z/	15 20 48			+		Traces
e	Z/	16 38 32			-		Traces
24th March.							
iP!	Z	04 04 34.0	0.3	47.8	c	$\frac{1}{2}^{\circ}$	H=04 04 25
iS	N/	41.0					
iP	Z	09 07 04.0	0.8	2.0	c	43°	h= 150Km
ipP	Z	33.4					
isP	Z	50.0					
(iPcP (or PP	Z-Z/	08 45.7					
iPcS!	N/E/	12 24.0					
eScP	Z/	36					
eS	N/	13 17					
e(ScS)	N/E/	15 28					
eiP	Z	19 26 32.1	0.5	1.5	d	$1\frac{3}{4}^{\circ}$	H=19 26 03
i	Z	36.3					
iS	N	54.1					
iP	Z	22 28 42.1	0.3	2.5	c	$1\frac{1}{2}^{\circ}$	H=22 28 16
iS	N	29 02.0					

			T sec	A mm	GM	Dist	Remarks
RABAUL.							
25th March							
iP	Z	11 39 54.6	2.0	0.6	d	$1\frac{1}{2}^{\circ}$	H=11 39 30
iS	N	40 13.4					
iP	Z	14 20 20.5	0.4	3.8	c	$4\frac{3}{4}^{\circ}$	H=14 19 11
iS	N	21 14.2					
M	E/	22 22					
eP	Z	22 56 39	0.7	1.6	d	50°	
eS	E/	23 03 52					
26th March.							
iP	Z	10 01 29.7	0.6	12.0	d	1°	H=10 01 10
iS	N	44.8					
iP!	Z	12 19 15.2	0.5	18.0	c	$5\frac{1}{2}^{\circ}$	H=12 17 55
iS	E/	20 18.0					
eP	Z	12 50 06	0.5	0.6	d		(Bismark Sea.)
M	N/	$53\frac{1}{2}$					Very Shallow.
eP	Z	13 34 $32\frac{1}{2}$	0.7	0.5	d	5°	(Bismark Sea)
M	N/	44					Very shallow.
iP	Z	16 37 44.0	0.4	16.8	d	$1\frac{1}{2}^{\circ}$	H=16 37 19
iS	N	38 03.4					
iP	Z	19 46 14.8	0.4	11.6	d	$1\frac{3}{4}^{\circ}$	H=19 45 47
iS	N/	36.2					
iP	Z	22 40 33.9	0.4	4.1	d	$10\frac{3}{4}^{\circ}$	H=27 38 00
iS	E/	42 34.0					
27th March.		Strong microseismic activity.					
e	Z/	09 07 $17\frac{1}{2}$			+		Traces
eP	Z/	10 06 11				(22°)	Very large
e	Z/	18					surface waves.
e	Z/	22					
eLq	N/	10 47					
M	E/	13.1					
eP	Z	20 05 $28\frac{1}{2}$	0.5	3.0	d		Regional
28th March,							
iP	Z	06 33 45.8	0.5	3.5	d	$2\frac{1}{2}^{\circ}$	H=06 33 05
eS	N/	34 17					
e	Z/	12 48 $04\frac{1}{2}$			-		Traces
eP	Z	19 39 26	0.5	1.5	c		Regional
e	Z/	19 49 33			-		Traces
eiP	Z	20 38 40	0.5	1.0	c	$2\frac{1}{4}^{\circ}$	H=20 38 03
i	Z	47.0					
eS	N	39 08					
eiP	Z	21 58 28	0.4	1.0	c	2°	H=21 57 58
iS	N	51.0					

KERAVAT.

From 18th March to 28th March seismograph on test. Time uncertain. Records unreliable. Open galvo circuit.

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
12th March - No record.							
13th March - Nil recorded.							
14th March.							
iP	Z	07 56 24	0.2	1.0	c		Regional
i	Z	57 03					
15th March - Nil recorded.							
16th March - Nil recorded.							
17th March.							
iP	Z	11 26 11½	0.5	1.8	c		(Teleseism)
18th March.							
iP	Z	16 44 29	0.3	2.0	c		Regional
i	Z	45 11½					
i	Z	14½					
iP	Z	17 16 44½	0.2	0.5	d		Regional
i	Z	17 12					
i	Z	17					
iP	Z	19 05 39	0.4	1.0	d		Teleseism
iP	Z	19 16 26	0.4	2.8	d		Regional

			T sec	A* mm	GM	Dist	Remarks
ULAMONA FIELD STATION.							
16th March.							
iP	Z	10 13 42	0.7	1.0	c		Local
i	Z	57					
i	Z	14 03					
17th March.							
iP!	Z	11 29 25½			(d)		Regional

G.W.D'ADDARIO.
(Vulcanologist-in-Charge)

Central Observatory.
RABAUL

30th March, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

30 MAR 1967

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From:	16th March, 1967.
		To:	21st March, 1967.
SULPHUR CREEK	(~~KRT~~ SUL)	Not operational	
KERAVAT	(KRT)	From:	6th March
		To:	18th March
ESA'ALA	(ESA)	From:	28th February
		To:	14th March
TABELE	(TBL)	From:	7th March
		To:	14th March
AGENAHAMBO	(AGE)	From:	5th March
		To:	11th March

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0S, Longitude 152°10'16".0 E., Elevation 184m.
Foundation : Basalt flow

STATION INSTRAMENTATION

WORLD WIDE STANDARD SYSTEM:		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec	1,0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL-) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P Zh	Maximum magnification 3,240 at 1.0 sec	1.0	0.02

Heat sensitive recordimg paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-No	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E Elevation 3m
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELECORDER (GEOTECH MOD.2484)AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0sec	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E
Foundation: coastal alluvium

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
FOUNDATION: granite.

STATION INSTRUMENTATION

Seismometer	Recorder	To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical, 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30"S., Longitude 148°06'12"E., Elevation 303m.
FOUNDATION: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25
S.P.Z. magnification 1,000.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
FOUNDATION: basalt flow.

STATION INSTRUMENTATION

Seismograph	Recorder	To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60mm/min., drum speed adjustable to 120mm/min., 180mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

coupled to Willmore Recorder
attenuator setting 1/100, drum speed 60 mm/min. 0.25
S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE.) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At (RAB) time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL time signal is marked every minute on the records from crystal chronometer and a decond mark from Radio VNG Australia daily.

DIRECTIO OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS :

When readings are given with a decimal they are to one-tenth of a second, other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTERS:

Where no source is cited the determination of epicenters, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinatesand normally follow well known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalization," Seismic Data Report No. 101, U.I.D., for computer requirements.

SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitude from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	Typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections unidentifiable.

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL			T sec	A mm	GM	Dist	Remarks
16th March, 1967.							
eiP	Z	05 56 23	0.3	1.8	c	2°	H=05 55 52
eS	N	46½					
eP	Z	12 15 00½	0.4	1.0	c	25°	
i	Z	02.5					
eS	E/	19 23					
iP	Z	14 16 19.5	0.3	1.0	d	$1\frac{1}{2}^{\circ}$	H=14 15 53
iS	N	39.0					
eP	Z	15 00 09½	0.3	1.0	d	$1\frac{3}{4}^{\circ}$	H=14 59 42
iS	N	33.0					
iP!	Z	15 39 17.6	0.4	15.5	d	1°	H=15 39 00
iS!	N	30.0					
e	Z/	19 10 21			-		Traces
17th March.L.P.N.S. Galvanometer jammed between 1125 hours.							
iP	Z	00 53 38.0	0.5	34.0	dSE		Regional
eiP	Z	02 20 46	0.5	1.0	c	3°	H=02 19 58
i	Z	49.5					
iS	N	21 23.5					
iP	Z	06 18 06.6	0.3	5.5	d	$2\frac{1}{2}^{\circ}$	H=07 17 26
i	Z	09.6					
eS	E/	38					
iP	Z	07 13 14.8	0.5	2.8	d	1°	H=07 12 57
iS	N	27.5					
iP	Z	11 25 05.0	0.3	3.0	c	(2°)	H=11 24 (35) Main Shock
e	No	20					
e(S)	No	28					
eP	Z	11 46 22½	0.5	1.5	c	in coda of preceding shock.	
eiP	Z	12 08 02	0.5	1.0	c		Regional
eiP	Z	13 49 29	0.5	2.0	d	$5\frac{1}{2}^{\circ}$	H=13 48 06
i	Z	30.5					
eS	N	50 33½					
eP	Z	14 36 38	0.5	1.0	d		
iP	Z	14 39 24.5	1.0	17.0	d	$2\frac{1}{4}^{\circ}$	Aftershock H=14 38 48
i(S)	N	52.0					
iP	Z	16 45 36.0	0.3	1.5	c	2°	Aftershock H=16 45 02
iS	N	46 02.0					
iP	Z	17 18 59.8	0.5	1.0	d	$2\frac{1}{4}^{\circ}$	Aftershock H=17 18 23
iS	N	19 27.0					
eiP	Z	18 10 31	0.5	1.0	d		Regional
iP	Z	19 33 46.5	0.5	3.0	c	$2\frac{1}{4}^{\circ}$	Aftershock H=19 33 11
iS	N	34 13.0					
18th March.- LP N.S. Galvonometer jammed.							
iP	Z	01 19 35.2	0.4	4.5	d	1°	H=01 19 17
iS	N	49.0					
iP	Z	01 20 55.3	0.4	31.5	c	$1\frac{1}{2}^{\circ}$	H=01 20 32
iS	N	21 13.0					

RABAUL.

18th March contd.

			T sec	A mm	GM	Dist	Remarks
eP	Z	02 07 25	0.5	1.0	d		Regional
iP	Z	04 51 25.2	0.4	1.8	c		Regional
iP	Z	05 08 15	0.5	1.0	d		Regional
iP	Z	05 53 57.8	0.4	2.5	c	1°	H=05 53 41
iS	N	54 09.5					
iP	Z	06 25 53.2	0.5	1.5	c	4½°	H=06 24 44
iS	N	26 46.5					
iP	Z	07 36 55.2	0.4	3.0	d	1½°	H=07 36 30
iS	N	37 14.5					
iP	Z	08 21 08.0	0.3	1.0	d	1¾°	H=08 20 39
iS	N	30.0					
iP	Z	08 50 03.8	0.5	1.0	c	2°	H=08 49 32
iS	N	27.0					
eP	Z	09 33 22	0.4	1.0	c		Regional
iP	Z	16 44 04.8	0.5	10.5	c	3°	H=16 43 20
eS	E/	38					
eP	Z	17 39 30½	0.5	1.0	d		Regional
iP	Z	17 57 32.2	0.8	1.0	c		Regional,Deep
iP	Z	19 02 57.2			d	4½°	Superimposed
eS	E/	03 48				shock.	H=19 01 51
iP	Z	19 17 06.0	0.4	15.0	c	4½°	H=19 16 59
eS	E/	58				Felt Shock Int.4.	
						6° 50'S., 145° 55'E.	
iP	Z	21 03 28.8	0.5	1.5	d	1½°	H=21 03 02
iS	N	48.0					
iP	Z	21 16 52.6	0.4	4.0	d	1°	H=21 16 34
iS	N	17 06.5					
iP	Z	22 02 29.5	0.4	3.0	c	1¼°	H=22 02 08
iS	N	45.0					

19th March.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	00 12 17	0.3	1.0	d		Regional
i	Z	20.2					
i	Z	24.5					
eiP	Z	01 15 40	0.5	1.0	d	22°	
i	Z	41.5					
eS	N/	19 41					
iP	Z	03 33 53.0	0.5	3.0	d	1½°	H=03 33 28
iS	N	34 12.2					
eP	Z	04 10 26½	0.5	1.5	(d)	49¼°	
e	Z	27½					
eS	N/	19 31					
iP	Z	10 27 11.5	0.5	1.0	c	2°	H=10 26 38
iS	N	36.5					
iP	Z	14 30 52.5	0.5	13.0	d	1¼°	H=14 30 25
iS	N	31 09.0					
iP	Z	18 20 49.3	0.5	7.0	c	1¼°	H=18 20 25
iS	N	21 06.8					
iP	Z	22 22 42.0	0.4	21.0	c	¾°	H=22 22 27
iS	N	52.8					

20th March

			T sec	A mm	GM	Dist	Remarks
iP	Z	08 48 52.5	0.4	32.0	d	4¾°	H=08 47 41
eS	N/	49 47½					

			T sec	A mm	GM	dist.	Remarks
RABAUL							
20th March (cont.)							
iP	Z	11 20 07.2	0.3	2.5	d	1°	H=11 19 51
iS	N	19.0					
eP	Z	13 40 21½	0.8	2.0	c		Teleseism
eS	N/	47 30					
eP	Z	13 49 40	1.0	1.0	d		Deep shock
eP	Z	14 00 52½	0.5	1.0	c		(Regional & deep)
i	Z	01 09.3					
iP	Z	15 55 14.0	0.8	1.0	c		Regional & deep
i	Z	27.5					
iP	Z	16 16 55.0	0.3	1.0	c		Regional
eiP	Z	16 31 40	0.5	1.0	c		Regional
i	Z	46.8					
iP	Z	16 42 31.6	0.4	13.0	c	$\frac{3}{4}^{\circ}$	H=16 43 16
iS	N	42.3					
eP	Z	17 20 24	0.5	1.0	c		Regional
e	Z	37½					
eP	Z	19 12 50	0.5	1.0	d		Teleseism
eS	E/	17 17					
iP	Z	21 07 21.0	0.4	1.0	d	$2\frac{1}{2}^{\circ}$	H=21 06 41
iS	N	51.5					
iP	Z	21 15 22.3	0.4	10.0		$1\frac{1}{2}^{\circ}$	H=21 14 56
iS	N	42.0					
21st March							
iP	Z	03 18 19.5	0.4	3.0	c	1°	H=03 18 [illegible]2
iS	N	32.5					
~~e~~	~~Z/~~	~~03 36 46½~~			~~+~~		~~Traces~~
iP	Z	07 46 15.0	0.5	1.0	d	$2\frac{1}{4}^{\circ}$	H=07 45 40
iS	N	42.0					
iP	Z	08 08 25.0	0.5	5.0	d	$1\frac{1}{2}^{\circ}$	H=08 07 58
iS	N	46.0					
iP	Z	11 07 55.0	0.4	9.0	d	$1\frac{3}{4}^{\circ}$	H=11 07 26
iS	N	08 16.8					
e	Z/	11 40 35½			+		Traces
iP	Z	08 34 01.0	0.5	1.0	c		Regional
eP	Z	19 10 03	0.8	1.0	d	16°	
eS	N/	13 05					
eiP	Z	19 48 06	0.5	1.5	d	8°	H=19 46 10
i	Z	07.5					
iS	E	49 36.5					
eP	Z	21 42 51	0.4	1.8	d		Regional

KERAVAT

From 6th March to 18th March seismograph on test. Time uncertain. Records unreliable.

ESA'ALA L.P.Z faulty time break circuit.

28th February, 1967.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	05 54 45.1	0.3	0.7	d		Regional
eP	Z	09 35 20	0.4	0.3	c		(Regional)
eP	Z	09 45 16½			d	32½°	
e(PcP)	Z	20					
eS	N/	51 22					
iP	Z	11 44 31.4	0.3	0.5	c		Regional
iP	Z	11 59 03.9			d	(20¼)	
e(S)	N/	12 02 50					
eP	Z	16 33 23½			c	1½°	H=16 32 57
iS	N/	43.7					
iP	Z	16 43 24.7	0.5	1.5	d	5¼°	H=16 42 08
iS	N/	44 23.7					
iP	Z	16 47 35.7	0.5	2.0	d	2½°	H=16 46 59
iS	N/	48 03.7					
iP	Z	19 30 59.2	0.6	0.3	d		Local

1st March

			T sec	A* mm	GM	Dist	Remarks
iP	Z	04 39 17.4	0.5	2.0	c	3¾°	H=04 37 18
iS	E	40 02.4					
eP	Z	14 30 04	1.0	1.1	c	24½°	
eS	N/	34 38					

2nd March

			T sec	A* mm	GM	Dist	Remarks
eP	Z	06 24 50	0.9	0.7	d	3½°	H=06 23 54
i	Z	50.4					
iS	N	25 32.4					
eP	Z	11 23 27½	0.2	0.5	d	4½°	H=11 22 18
eS	E	24 20.4					
iP	Z	15 17 33.3	0.2	0.6	d	6°	H=15 16 05
iS	N	18 41.5					

3rd March

			T sec	A* mm	GM	Dist	Remarks
eP	Z	08 57 52	0.9	0.9	d	55°	
eS	E/	09 02 06.0					
eP	Z	09 27 29½	0.9	0.4	c		Regional
eP	Z	09 36 13½	1.5	0.3	c		Regional
e(P)	Z	14 46 41½	0.9	0.2	c		Teleseism
iP	Z	19 51 58.3	0.5	0.1	c	2¼°	H=19 51 25
eS	N/	52 24					

4th March

			T sec	A* mm	GM	Dist	Remarks
eP	Z	05 17 06½	1.0	0.5	d	32½°	
eS	E/	23 14					
e	Z	35½					
eP	Z	06 22 47½	1.0	2.0	c	43°	
i	E/	24 28.6					
i(S)	N/	30 58.9					
eP	Z	10 46 48			d		Regional
eP	Z	16 04 09	0.4	0.1	d		Regional
eiP	Z	17 52 29			c	1¼°	H=16 22 26
i	Z	30.7					
iS	E	45.4					
eP	Z	18 17 05	1.0	0.4	d	10½°	
eS	N	19 03					

ESA'ALA

4th March contd.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	19 10 28	0.5	0.7	c	$3\frac{3}{4}^{\circ}$	H=19 09 32
iS	N	11 11.7					
eP	Z	22 30 57	0.5	0.6	d	$3\frac{1}{2}^{\circ}$	H=22 30 01
iS	N	31 39.5					
eP	Z	22 45 $28\frac{1}{2}$	0.5	1.5	c	$18\frac{1}{2}^{\circ}$	
eS	N/	48 56					

5th March

			T sec	A* mm	GM	Dist	Remarks
eiP	Z	02 18 $02\frac{1}{2}$	0.6	0.4	d	$1\frac{1}{4}^{\circ}$	H=02 17 40
i	Z	05.5					
iS	N	19.9					
iP	Z	05 21 49.5			d	$3\frac{1}{2}^{\circ}$	H=05 20 56
iS	N	22 30.5					
eP	Z	05 55 30	0.5	0.1	c		Local
i	Z	51.2					
eP	Z	15 28 39	0.5	0.3	d		Regional

6th March

			T sec	A* mm	GM	Dist	Remarks
eP	Z	01 35 22	0.5	0.2	c	$2\frac{1}{4}^{\circ}$	H=01 34 45
eS	E	50					
eiP	Z	04 47 30			d	$30\frac{3}{4}^{\circ}$	
i	Z	31.2					
e(ScP)	Z	52 18					
~~eS~~	~~E~~	~~53 15~~					
eP	Z	05 03 $21\frac{1}{2}$	0.8	0.4	c	$8\frac{1}{2}^{\circ}$	H=05 01 20
eS	E/	04 $56\frac{1}{2}$					
eP	Z	05 15 18	0.9	0.4	d	$10\frac{1}{2}^{\circ}$	
eS	E	17 15					
eP	Z	08 18 14	0.4	0.6	d		Regional
eP	Z	13 38 16	0.5	0.5	d	(2°)	H=13 37 (44)
e(S)	N	40					
eP	Z	20 56 48			c		Regional
eP	Z	23 51 $43\frac{1}{2}$	0.5	0.4	d	$12\frac{3}{4}^{\circ}$	
iS	E/	54 05.5					

7th March

			T sec	A* mm	GM	Dist	Remarks
iP	Z	00 56 10.1	0.3	2.0	C	$\frac{3}{4}^{\circ}$	H=00 55 51
iS	N	20.3					
eP	Z	03 47 48	0.9	0.4	d		Regional
eP	Z	06 53 32	0.5	0.6	d	$4\frac{1}{2}^{\circ}$	H=06 52 23
iS	N	54 24.9					
eP	Z	13 23 $06\frac{1}{2}$	0.7	0.5	c	$4\frac{1}{2}^{\circ}$	H=13 22 03
iS	N	55.4					

8th March

			T sec	A* mm	GM	Dist	Remarks
iP	Z	07 54 36.8	0.5	4.0	c	4°	H=07 53 37
iS	E	55 23.1					

9th March

			T sec	A* mm	GM	Dist	Remarks
eP	Z	03 27 57	1.0	1.2		$17\frac{1}{2}^{\circ}$	11°S 166°E New Hebrides
eS	N/	31 11					

ESA'ALA

			T sec	A^* mm	GM	Dist	Remarks
9th March contd.							
eP eS	Z N/	05 55 01 31 11	1.5	1.0	d	$17\frac{1}{4}^{\circ}$	13°S 167°E New Hebrides Islands Region
eP iS	Z N/	07 02 16 05 12.0	0.6	1.2	c	$15\frac{1}{2}^{\circ}$	12°S 165°E New Hebrides Island Region
eP iS	Z N/	18 05 $21\frac{1}{2}$ 09 26.8	1.0	1.0	c	$16\frac{1}{2}^{\circ}$	
10th March		NIL RECORDED					
11th March							
iP i(S) iS	Z N N/	08 37 03.1 39 05.8 06.9	1.0	1.0	c	11°	
12th March							
eiP i i(S)	Z Z N	19 42 22 23.5 59.2	0.5	0.2	c	3°	H=19 41 32
13th March							
iP iS	Z N	00 33 36.7 34 43.6	0.8	4.4	c	6°	H=00 32 10
eP iS	Z E/	04 55 20 58 25.7			c	17°	
14th March.							
iP iS	Z E	05 57 09 47.2	0.3	0.5	c	$2\frac{1}{2}^{\circ}$	H=05 56 19
iP iS	Z E	07 56 53.5 57 57.4	0.4	2.9	c	$5\frac{1}{2}^{\circ}$	H=07 55 30

ESA'ALA contd.
25th February contd.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	11 44 36	0.5	1.6	d	25¾°	H=11 38 23
iS	N/	49 25.0					

26th February.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	04 10 48.5	0.7	4.0	c		Regional
iP	Z	10 30 14.6			c	2°	H=10 29 44
iS	E/	58.0					
eiP	Z	17 20 32	0.4	1.3	c	5°	H=17 19 19
i	Z	32.6				Solomon Islands Region.	
iS	E	21 29.1					

27th February - Nil Recorded.

G.W.D'ADDARIO.
(Vulcanologist-in-Charge)

Central Observatory.
RABAUL

17th March, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From:	28th March, 1967
		To:	4th April, 1967.
SULPHUR CREEK	(SUL)	Not operational.	
KERAVAT	(KRT)	From:	28th March, 1967
		To:	2nd April, 1967.
ESA'ALA	(ESA)	No records received.	
TABELE	(TBL)	From:	14th March, 1967
		To:	28th March, 1967.
AGENAHAMBO	(AGE)	From:	20th March, 1967
		To:	27th March, 1967.

TABELE

<u>7th March</u> - Nil recorded.
<u>8th March</u> - Nil recorded.

<u>9th March</u>.

			T sec	A* mm	GM	Dist	Remarks
eP	Zw	14 34 13	0.3	0.8	(d)		Local
i	Zw	21½					
iP	Zw	17 47 04½	0.5	1.0	d		Local
i	Zw	12					
i	Zw	15½					

<u>10th March</u> - Nil recorded.

<u>11th March</u>.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	21 06 38			(d)		Local

<u>12th March</u> - Nil recorded.

<u>13th March</u>

			T sec	A* mm	GM	Dist	Remarks
eP	Zw	04 54 33½	0.5	0.5			Teleseism
i	Zw	45½					
i	Zw	56					
i	Zw	55 01½					
iP	Zw	04 55 03½	0.4	0.8	(d)		Local
i	Zw	30½					

<u>14th March</u> - Nil recorded.

AGENAHAMBO.

<u>5th March</u> - Nil recorded.

<u>6th March</u>.

			T sec	A* mm	GM	Dist	Remarks
iP!	Z	05 22 35½			d		Regional
i	Z	46					
i	Z	49½					

<u>7th March</u> - Nil recorded.

<u>8th March</u> - Nil recorded.

<u>9th March</u> - Nil recorded.

<u>10th March</u> - Nil recorded.

<u>11th March</u> - Nil recorded.

G.W.D'ADDARIO.
(Vulcanologist-in-Charge)

Cenntral Observatory
<u>RABAUL</u>

24th March, 1967.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0S, Longitude 152°10'16".0E, Elevation 184m.
Foundation: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM

		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-Eo	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E., Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
Foundation: Granite.

STATION INSTRUMENTATION

Seismometer	Recorder	To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

~~Attenuator setting 1/10, drum speed 60 mm/min.~~ 0.6 0.25
S.P.Z. magnification 1,000.

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 19
Foundation: basalt flow.

STATION INSTRUMENTATION

Seismograph	Recorder	To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

coupled to Willmore Recorder 0.25
attenuator setting 1/100, drum speed 60 mm/min.

S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB the time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL the time signal is marked every minute on the records from a crystal chronometer and a second marks from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.
"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second; other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTRES:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalisation", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitude from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	Typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections unidentifiable.

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
29th March, 1967.		L.P. drums speed reduced to 15mm/min.					
iP	Z	01 50 14.2	0.4	4.0	c	$\frac{1}{2}^{\circ}$	H=01 50 03
iS	N	22.2					
iP	Z	04 26 48.5	0.3	2.0	c	$2\frac{1}{2}^{\circ}$	H=04 26 08
iS	N	27 19.5					
eiP	Z	04 47 50	0.4	1.3	d	5°	H=04 46 34
i	Z	51.5					
eS	N/	48 $49\frac{1}{2}$					
iP	Z	10 02 27.6	0.3	2.0	d	$1\frac{1}{2}^{\circ}$	H=10 02 04
iS	N	45.5					
eP	Z	10 36 55	0.6	1.0	d	5°	H=10 35 40
eS	N/	37 43					
iP	Z	11 39 21.1	0.4	11.0	d	$1\frac{1}{2}^{\circ}$	H=11 33 56
eS	E/	40					
iP	Z	12 07 57.5	0.5	1.5	c	$1\frac{1}{2}^{\circ}$	H=12 07 31
iS	N	17.3					
e	Z/	12 59 06			+		Traces
eP	Z/	13 17 12			d	22	
eS	E/	21 19					
e	Z/	17 01 08			+		Traces
30th March		Strong microseismic activity.					
eP	Z	02 15 $16\frac{1}{2}$	0.5	2.5	c		Teleseism C.B.M.
e	Z/	07 29 38			+		Traces
iP	Z	15 58 27.6	0.5	4.5	c		Regional
iP	Z	22 13 09.2	0.4	15.0	d	2°	H=22 12 38
iS	N/	33.5					
31st March							
iP	Z	00 33 33.0	0.3	78.0	d	2°	H=00 33 00
iS	N/	58.5					
i	Z	02 46 48	0.4	2.8		Ship moving in habour.	
F		48 09					
iP	Z	14 19 47	0.5	1.2	c	2°	H=14 19 14
iS	N	20 12.0					
iP	Z	15 00 32.0	0.5	10.0	c	2°	H=15 00 02
iS	N/	55.0					
iP	Z	20 09 31.0	0.5	3.0	c	22°	
eS	N/	12 58					
e	N/	13 $05\frac{1}{2}$					

RABAUL

1st April

			T sec	A mm	GM	Dist	Remarks
iP	Z	06 03 08.1	0.6	1.0	d	50°	
i	Z	32.5					
i(PPP)	Z/	06 25.0					
eS	N/	10 17					
eScS	N/	13 02					
eLq	E/	14 41					
iP	Z	10 34 51.5	0.3	4.8	d	1°	H=10 34 35
iS	N	35 03.0					
e	Z/	11 22 08			–		Traces
eP	Z	12 32 25	0.8	2.0	d	50°	
i	Z	37.7					
ePP	Z/	35 09					
eS	E/	39 32					
eSS	N/	42 59					
eLq	E/	43 52					
eP	Z	14 09 18	0.5	1.0	d		Teleseism
i	Z/	39.[illegible]					
e	Z/	17 39 46			+		Traces
iP	Z	20 54 38.6			c	¼°	H=20 54 27
iS	N	46.5					

2nd April

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 11 07.0	0.8	1.5	d		Teleseism
iP	Z	00 44 40.0	0.4	1.0	c		Regional
eP	Z	02 09 16	0.5	1.0	d		(Regional)
eP	Z	03 23 15½	0.5	1.0	d	9½°	H=03 20 56
eS	N/	25 03					
eiP	Z	05 24 00½	0.5	1.0	d	1°	H=05 22 43
i	Z	02.1					
iS	E	13.5					
eP	Z	06 04 21	0.5	1.0	d		Regional
eiP	Z	07 36 36	0.5	1.0	d	3¼°	H=07 35 47
i	Z	37.6					
eS	N	37 14					
e	Z/	08 33 16			+		Traces
iP	Z	10 30 51.5	0.5	5.5	c	2½°	H=10 30 13
iS	N	31 20.5					
e	Z/	10 35 19			–	–	Traces
eP	Z	10 53 47½	0.5	1.0	d		Regional
eiP	Z	17 41 38	0.4	3.0	c	4¾°	H=17 40 27
i	Z	39.0					
i	Z	39.8					
eS	Eo	42 33					

3rd April

L.P. N-S Galvonometer jammed between 03 0804 and 04 0200 hours

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 40 44.2	0.4	3.0	c		Regional
eP	Z	00 53 28½	0.4	2.5	d		Regional
iP	Z	00 57 49.3	0.3	6.0	c		Regional
i	Z	02 34 52.5	0.5	5.0			Ship moving in harbour
F	Z	36 50					

RABAUL

			T sec	A mm	GM	Dist	Remarks
3rd April contd.							
iP	Z	08 04 48.3	0.4	33.0	cNE	2¾°	H=08 04 05
i!	Z	50.0					Felt Ulamona
i	Z/	58.0					no intensity
i	Z/	49.9					given.
eS	No	05 21					
iP	Z	08 41 53.0	0.3	4.5	c	2¼°	H=08 41 18
eS	E	42 20					
eP	Z/	13 05 47			d	40°	C.B.M.
eS	E/	11 49					
iP	Z	15 58 45.5	0.4	11.0	d	1°	H=15 58 28
iS	N	58.5					
iP	Z	19 59 20.2	0.4	4.5	c	2¼°	H=15 58 08
iS	E	48.5					
4th April.							
iP	Z	00 40 41.5	0.5	2.0	c	15¼°	C.B.M.
eS	E/	43 30					
e	Z/	03 58 09½			+		Traces
iP	Z	05 17 17.2	0.3	4.0	d	1½°	H=05 17 49
eS	N	38					
iP	Z	08 22 55.5	0.4	1.5	c	1½°	H=08 22 29
iS	N	23 15.5					
iP	Z	12 29 54.5	0.4	10.0	d	2¼°	H=12 29 17
iS	N	30 22.0					
iP	Z	15 19 28.4	0.3	1.5	c	2½°	H=15 18 46
iS	N	59.8					
iP	Z	18 28 40.8	0.5	88.0	dESE	1°	H=18 28 24
iS	N/	50.0					Felt: Rabaul
							Int. III-IV
							04°11'S 152°10'E
iP	Z	22 40 17.3	0.3	2.0	d	3°	H=22 39 30
iS	N	53.0					
iP	Z	23 27 22.2	0.3	1.0	c	2¼°	H=23 26 47
iS	N	49.6					
iP	Z	23 40 26.0	0.4	4.0	c	¾°	H=23 40 11
iS	N	37.0					

			T sec	A* mm	GM	Dist	Remarks
KERAVAT							
28th March, 1967.							
iP iS	Z E	06 33 43 34 07	0.3	1.6	d	2°	H=06 33 11 C.B.M.
iP iS	Z N	20 38 44 39 18	0.2	2.0	d	$2\frac{3}{4}^{\circ}$	H=20 38 00
iP iS	Z N	21 36 26½ 37 28	0.3	3.2	d	$5\frac{1}{4}^{\circ}$	H=21 35 08
iP iS	Z N	21 58 32 51	0.2	1.2	d	$1\frac{1}{2}^{\circ}$	H=21 58 07
29th March							
iP iS	Z E	04 26 48 27 15½	0.3	3.8	d	$2\frac{1}{4}^{\circ}$	H=04 26 13
iP	Z	04 47 50			d		C.B.M. Regional
iP!	Z	11 39 20½	0.2		d		Regional
iP iS	Z E	10 02 26 42	0.2	5.0	d	$1\frac{1}{4}^{\circ}$	H=10 02 05
iP iS	Z E	12 07 56½ 08 12½	0.2	11.0	d	$1\frac{1}{4}^{\circ}$	H=12 07 36
30th March		Nil recorded.					
31st March		Galvo light off until 0604 hours.					
iP	Z	15 00 30	0.3	20.0	d		Regional
iP	Z	17 50 38	0.4	0.8	c		(Regional)
1st April							
iP iS	Z E	10 34 52½ 35 (06)	0.2	2.5	d	1°	H=10 34 35
i(P) iS!	Z E	12 32 17 40				2°	H=12 31 47
iP	Z	14 09 27½	1.0	0.3	d		Teleseism
e(P)	Z	20 54 44½			c		Regional
2nd April							
eP	Z	00 11 07			c		Teleseism
eP	Z	03 23 17	0.2	1.4	c		Distant
iP iS	Z N	05 24 03 17	0.2	9.0	d	1°	H=05 23 46
eP	Z	06 04 33	0.4	1.2	d		Teleseism
iP iS	Z E	07 36 40 37 19	0.3	1.3	d	3°	H=07 35 49
eiP i!	N N	17 41 36 40	0.4	2.0	c		Regional

TABELE

			T sec	A* mm	GM	Dist	Remarks

14th March; Continuous tremor between 1807 hours and 1824 hours due to Magma movement in main vent. Average T=0.5, Average A*=1.7.

15th March: Nil recorded.

16th March.

			T sec	A* mm	GM	Dist	Remarks
iP!	Zw	04 13 35			d		Regional
i	Zw	48					
iP	Zw	07 33 06	0.5	1.0	c		Local
i	Zw	11½					
i	Zw	17½					
i	Zw	19½					

Continuous tremor between 1619 hours and 1658 hours due to Magma movement in main vent. Average T=0.4, Average A*=2.1.

17th March.

			T sec	A* mm	GM	Dist	Remarks
eP	Zw	11 27 32	0.4	0.5	d		Teleseism
iP	Zw	22 44 24	0.4	2.0	c		Regional
i	Zw	47½					

18th March.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	19 16 31½	0.5	16.5	d		Regional
i	Zw	17 36					

19th March.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	01 16 59	0.6	0.6	d		Teleseism
i	Zw	42					
iP	Zw	18 42 35	0.5	2.7	c		Local
i	Zw	43 00					

20th March.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	08 51 03	0.4	2.8	c		Regional
i	Zw	08½					
i	Zw	31					
i	Zw	42½					

21st March.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	23 14 04	0.5	4.0	d		Local
i	Zw	09					
i	Zw	18					
i	Zw	25½					
i	Zw	31½					

22nd March.

			T sec	A* mm	GM	Dist	Remarks
iP!	Zw	13 01 09½			c		Regional

Continuous tremor between 1502 hours and 1523 hours due to Magma movement in main vent. Average T=0.3, Average A*=1.5.

23rd March.

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	15 50 12	0.5	4.0	c		Local
i	Zw	30					

24th March: Continuous tremor between 1655 hours and 1849 hours due to Magma movement in main vent. Average T=0.3, Average A*=1.5.

25th March: Nil recorded.

			T sec	A* mm	GM	Dist	Remarks
TABELE Contd.							
26th March.							
iP	Zw	22 41 48	0.5	1.0	c		Regional
i	Zw	53½					
27th March:		Nil recorded.					
28th March:		Nil recorded.					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
20th March:		Nil recorded.					
21st March.							
iP!	Z	08 48 26½			c		Regional
22nd March:		Nil recorded.					
23rd March.							
iP	Z	05 54 18	0.4	2.0	c		Local
i	Z	55 18					
eiP	Z	13 01 22½	0.4	1.0	d		(Regional)
i	Z	23½					
24th March:		Nil recorded.					
25th March.							
iP	Z	09 06 30	0.6	1.2	d		Teleseism
i	Z	32½					
eP	Z	11 52 24	0.5	0.2	d		Teleseism
i	Z	25½					
26th March:		Nil recorded.					
27th March:		No record.					

G.W.D'ADDARIO
(Vulcanologist-in-Charge.)

Central Observatory,
RABAUL.

6th March, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 4th April, 1967 To: 11th April, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	From: 2nd April, 1967 To: 9th April, 1967.
ESA'ALA	(ESA)	No records received.
TABELE	(TBL)	From: 28th March, 1967 To: 4th April, 1967.
AGENAHAMBO	(AGE)	No records received.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0S, Longitude 152°10'16".0E, Elevation 184m.
Foundation: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL)
HELICORDER (GEOTECH MOD. 2484) SYSTEM.

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-Eo	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E., Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL)
TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
Foundation: Granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical, 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

	To sec.	Tg sec.
VERTICAL WILLMORE SEISMOGRAPH. Attenuator setting 1/10, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

		To sec.	Tg sec.
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min.			0.25

S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRP, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB the time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL the time signal is marked every minute on the records from a crystal chronometer and a second marks from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.

"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second; other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTRES:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalisation", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitude from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	Typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections unidentifiable.

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL.

5th April, 1967.

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 39 26.6	0.5	1.0	d	25°	
i	Z	29.2					
ePP	Z/	40 03					
ePcP	Z/	43 02½					
eS	N/	48					
eLq	N/	44 25					
iP	Z	02 53 11.5	0.5	4.0	d		Teleseism
iP	Z	06 37 39.8	0.3	1.5	d	½°	H=06 37 26
iS	N	49.3					
iP	Z	06 33 58.5	0.4	2.5	d		Regional
iP	Z	06 54 51.3	0.4	1.0	d	2¼°	H=06 54 16
iS	N	55 17.5					
e	Z/	10 00 19			+		Traces
e	Z/	12 00 19			–		Traces
iP	Z	12 21 42.0	0.3	3.5	d	2¼°	H=12 21 06
eS	E/	22 09					
iP	Z	12 33 31.8	0.4	23.5	c	2½°	H=12 32 52
iS	N/	34 02.0					
iP	Z	12 56 07.3	0.3	23.5	c	2½°	H=12 55 28
i	Z	10.6					
iS	E	37.5					
iP	Z	12 57 48.6	0.4	3.8	c	2½°	H=12 57 06
iS	N	58 20.2					In coda of previous shock.
iP	Z	13 04 11.4	0.3	1.6	d	2½°	H=13 03 29
eS	E/	43					
iP	Z	13 59 52.5	0.3	2.8	c	2½°	H=13 59 44
iS	N	14 00 21.0					
iP	Z	14 01 15.6	0.3	4.0	d	2½°	H=14 00 39
iS	N	44.0					In coda of preceding shock

6th April.

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 41 51.6	0.5	1.0	d		Teleseism
iP	Z	05 05 43.0	0.4	3.0	d	1¼°	H=05 05 20
iS	N	06 00.5					
e	Z/	06 33 27			–		Traces
iP	Z	08 12 53.0	0.5	2.0	d	2½°	H=08 12 11
iS	N	13 25.0					
e	Z/	09 08 24			–		Traces
iP	Z	12 02 07.0	0.5	4.0	c	4¼°	H=12 01 03
i	Z	08.6					
eS	N/	56					
iP	Z	12 27 16.8	0.5	5.0	d		Teleseism
							In coda of preceding shock
iP	Z	12 55 44.5	0.4	2.0	c	2½°	H=12 55 05
iS	N	56 14.0					
iP	Z	13 29 13.2	0.5	4.0	c		Regional
i	Z	15.5					

RABAUL Contd.
6th April, Contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	14 22 20.8	0.5	2.0	d	7°	H=14 20 36
i	Z	23.2					
iPg	Z	31.4					
eS	E/	23 42					
iP	Z	19 20 31.3	0.5	1.3	c	$\frac{1}{2}^{\circ}$	H=19 20 17
iS	N	41.0					
iP	Z	19 21 38.2	0.5	1.5	c	$\frac{1}{2}^{\circ}$	H=19 21 25
iS	N	48.0					In coda of preceding shock
iP	Z	18 26 04.0	0.4	1.0	d	$2\frac{3}{4}^{\circ}$	H=18 25 21
i	Z	09.0					
iS	N	37.3					
iP	Z	20 58 33.3	0.5	1.0	c		Regional
i	Z	45.3					Deep
i	Z	59 24.5					
i	Z	29.0					
e	Z/	21 03 05			+		Traces
iP	Z	22 08 22.0	0.4	1.0	d	$1\frac{3}{4}^{\circ}$	H=22 07 53
i	Z	22.2					
iS	N	44.0					
e	Z/	23 36 04			+		Traces
7th April:		Strong microseismic activity.					
iP	Z	04 01 38.0	0.4	3.8	d		Regional
eiP	Z	06 36 38	0.4	2.2	d		Regional
i	Z	41.5					
iP	Z	10 38 46.5	0.5	3.0	c	$2\frac{1}{2}^{\circ}$	H=10 38 07
eS	N/	39 16$\frac{1}{2}$					
iP	Z	18 35 30.8	0.4	4.0	c	$2\frac{1}{4}^{\circ}$	H=18 34 55
iS	N	58.0					
eP	Z	19 35 34$\frac{1}{2}$	0.5	1.0	c	$2\frac{3}{4}^{\circ}$	H=19 34 50
i	Z	37.2					
eS	N	36 08					
iP	Z	20 28 47.2	0.5	26.0	d	$4\frac{1}{2}^{\circ}$	H=20 27 37
eS	N/	29 41					
iP	Z	20 40 42.0	0.5	10.5	d	$1\frac{1}{2}^{\circ}$	H=20 40 17
iS	N	41 01.5					
iP	Z	20 43 35.0	0.5	1.0	d		In coda of preceding shock
8th April.							
eP	Z	05 41 00$\frac{1}{2}$	0.5	2.0	d		Teleseism
iP	Z	09 25 43.5	0.5	1.8	c	$1\frac{1}{2}^{\circ}$	H=09 25 16
iS	N	26 04.0					
iP	Z	17 16 29.3	0.5	1.5	c	$1\frac{1}{2}^{\circ}$	H=17 16 03
iS	N	49.5					
iP	Z	17 36 58.3	0.5	1.0	c	$6\frac{1}{4}^{\circ}$	H=17 35 25
iS	N	38 10.5					
iP	Z	19 02 29.2	0.3	2.0	c	$\frac{3}{4}^{\circ}$	H=19 02 14
iS	N	40.2					
iP	Z	21 34 25.6	0.5	3.5	c	1°	H=21 34 09
iS	N	38.6					

9th April: At Buin, south Bougainville Island, numerous earth tremors felt between the 9th and 11th April. Intensity from I-IV, duration 30-40 seconds.

At Aropa, S.E.Bougainville Island, tremors felt on the 9th April, lasting 20-40 seconds. Intensity I-IV.

RABAUL Contd.
9th April, contd.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	00 08 57.5	0.6	1.3	c	17°	(24° HNR)
iPP	Z/	09 15.0					
iPPP	Z/	24.0					
iS	N/	12 04.0					
eLq	E/	08					
eLr	Z/	57					
eP	Z	01 26 43	0.5	1.0	d	$6\frac{1}{2}^{\circ}$	H=01 25 09
i	Z	51.2					(5° HNR)
eS	N	27 56½					
iP	Z	01 44 24.0	0.5	3.5	c	$1\frac{1}{2}^{\circ}$	H=01 44 02
iS	N/	44.5					
iP	Z	01 51 12.6	0.5	1.5	c	$3\frac{1}{4}^{\circ}$	H=01 50 23
eS	N	51					
iP	Z	02 03 07.5	0.4	1.3	c	2°	H=02 02 37
iS	N	30.0					
iP	Z	02 49 15.0	0.5	2.0	d	2°	H=02 48 41
iS	N	41.3					
iP	Z	05 59 39.9	0.5	2.5	c	6°	H=05 58 12
eS	E/	06 00 48					
iP	Z	06 13 20.0	0.5	2.5	d	$1\frac{1}{2}^{\circ}$	H=06 12 52
eS	E/	41					
iP	Z	06 31 44.0	0.4	6.0	c	$1\frac{1}{2}^{\circ}$	H=06 30 38
iS	N/	32 04.0					
iP	Z	08 02 45.5	0.3	3.0	d	$1\frac{1}{2}^{\circ}$	H=08 02 19
i	Z	46.6					
eS	N/	03 15½					
eiP	Z	08 30 40	0.5	1.5	c	6°	H=08 29 10
eS	E/	31 50½				Felt Buin Int.II	
						06° 51'S, 155° 44'E.	
iP	Z	08 58 00.8	0.5	1.0	d	$5\frac{3}{4}^{\circ}$	H=08 56 34
i	Z	02.2					
eS	N/	59 08					
iP	Z	14 03 48.5	0.5	1.0	c	$4\frac{1}{4}^{\circ}$	H=14 02 43
iS	N	04 38.5					
iP	Z	16 51 54.2	0.5	1.5	c	$1\frac{3}{4}^{\circ}$	H=16 51 25
iS	N	52 16.5					
iP	Z	17 46 46.5	0.5	2.5	c		(Regional)
iP	Z	18 52 17.2	0.5	2.5	d	6°	H=18 50 48
eS	E/	53 26					
iP	Z	19 23 11.8			d	1°	H=19 22 55
iS	E/	24.0					Superimposed shock
iP	Z	21 19 40.8	0.5	1.4	c	$6\frac{1}{2}^{\circ}$	H=21 18 02
i	Z	54.4				Felt: Buin Int. II	
eS	N/	20 56				06° 51'S., 155° 44'E.	

10th April.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
e	Z/	00 04 29			-		Traces
eiP	Z	05 01 05	0.5	1.0	d	7°	H=04 59 20
i	Z	12.4				Felt: Buin Int. III.	
i	Z	15.2				06° 51°S., 155° 44'E.	
eS	Eo	02 26					
eiP	Z	05 12 18½	0.4	1.5	d	$5\frac{1}{2}^{\circ}$	H=05 10 54
i	Z	22.4				Felt: Buin Int. I	
iS	N	13 23.0				06° 51'S, 155° 44'E.	
iP	Z	08 28 48.1	0.5	1.9	d	6°	H=08 27 20
iS	N	29 56.0				Felt: Buin Int. I	
						06° 51'S, 155° 44'E.	

RABAUL Contd.
10th April, Contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	10 47 43.0	0.5	1.0	d	5°	H=10 46 26
eS	N	48 41½				Felt: Buin Int. I	
						06° 51'S, 155° 44'E.	
iP	Z	12 33 08.0	0.4	1.0	d	6½°	H=12 31 32
eS	N	34 19.4				Felt: Buin Int. I	
						06° 51'S, 155° 44'E.	
iP	Z	15 03 58.8	0.5	1.5	d	6¼°	H=15 02 27
eS	No	05 11				Felt: Buin Int. IV	
						06° 51'S, 155° 44'E.	
eiP	Z	15 43 06	0.5	1.0	d	6¼°	H=15 41 33
i	Z	08.4				Felt: Buin Int. I	
iS	N	44 17.5				06° 51'S, 155° 44'E.	
iP	Z	15 51 57.5	0.4	1.3	d	2¾°	H=15 51 15
iS	N	52 29.0					
iP	Z	16 00 40.5	0.4	1.2	c	2½°	H=16 00 00
iS	N	01 11					
eP	Z	16 58 35½	1.0	1.0	d		Teleseism
i	Z	41.2					
eiP	Z	18 04 18	0.5	1.0	d	6½°	H=18 02 41
iS	N	05 33.0					
iP	Z	18 21 08	0.4	1.0	d	5½°	H=18 19 45
iS	E	22 12.0				Felt Buin Int. II	
						06° 51'S, 155° 44'E.	
iP	Z	18 26 03.5	0.5	1.0	c	6¼°	H=18 24 30
i	Z	06.0					
i	Z	13.2					
eS	E/	27 14					
iP	Z	20 35 59.3	0.3	1.0	c	5½°	H=20 34 35
eS	N/	37 03½					
iP	Z	20 46 57.0	0.3	1.0	d	6°	H=20 45 28
i	Z	59.8				Felt Buin Int. II	
eS	E/	48 06				06° 51'S, 155° 44'E.	
iP	Z	21 09 00.2	0.5	1.5	c	5¾°	H=21 07 35
i	Z	02.8				Felt: Buin Int. III	
eS	E/	10 06				06° 51'S, 155°44'E.	
eiP	Z	21 50 38½	0.5	1.0	d	6½°	H=21 49 03
eS	E/	51 52				Felt Buin Int. III	
						06° 51'S, 155° 44'E.	
iP	Z	23 15 17.3	0.3	1.0	d	10°	H=23 12 49
eS	N/	17 12					

11th April. S.P.E.W. Component paper upside down.

iP	Z	04 49 36.5	0.4	4.0	d	1¼°	H=04 49 14
iS	N	53.5					
eiP	Z	04 54 01	0.4	1.0	d	5½°	H=04 52 38
i	Z	03.8					
eS	N/	55 05					
iP	Z	05 29 24.5	0.5	6.0	d	1½°	H=05 29 02
eS	N/	41					
iP	Z	14 54 32.4	0.4	1.0	c	6°	H=14 ~~XX~~ 53 02
eS	N	55 42					
iP	Z	15 19 36.1	0.3	1.0	d	1¾°	H=15 19 07
iS	N	58.0					
iP	Z	16 26 31.6	0.4	10.0	d	1¼°	H=16 26 09
iS	N	48.0					

RABAUL Contd.
11th April contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	18 56 57.1	0.4	2.0	c	2°	H=18 56 23
iS	N	57 23					
eiP	Z	19 15 49.2	0.3	1.0	d	$2\frac{1}{4}^{\circ}$	H=19 15 12
i9	Z	50.2					
iS	N	16 17.0					
eiP	Z	22 47 48	0.5	1.0	d	6°	H=22 46 19
i	Z	53.8					
eS	N/	48 57					

KERAVAT

			T sec	A mm	GM	Dist	Remarks
3rd April, 1967.		Recorded trace contrast poor.					
iP	Z	08 04 46	0.2	2.4	c		Regional
iP	Z	08 41 51	0.4	2.8	c	(2°)	H=08 41 (21)
iS	E	42 $(14\frac{1}{2})$					
eP	Z	13 05 41					Teleseism
iP	Z	15 58 44	0.2	2.4	c	$\frac{3}{4}^{\circ}$	H=15 58 29
iS	E	55					
iP	Z	18 24 39	0.2	1.8	d	4°	H=18 23 38
iS	E	25 26					
iP	Z	19 59 18				2°	H=19 58 44
iS	N	42					
4th April							
iP	Z	00 40 $45\frac{1}{2}$	0.4	1.6	c		Teleseism
iP	Z	05 17 06			c		Regional C.B.M.
iP	Z	08 22 25	0.2	1.0	c		Regional
eiP	Z	12 29 54	0.3	3.8	d	(2°)	H=12 29 (20)
i	Z	$54\frac{1}{2}$					
iS!	E	30 (20)					
iP	Z	15 19 27	0.2	1.0	c	$2\frac{3}{4}^{\circ}$	H=15 18 45
iS	E	59					
iP	Z	18 28 44			d		Regional
i(P)	Z	22 40 19				$(2\frac{3}{4}^{\circ})$	H=22 39 (38)
e(S)	E	$50\frac{1}{2}$					
5th April							
eP	Z	02 39 $29\frac{1}{2}$	0.4	1.0	d		Teleseism
iP	Z	12 21 40				(2°)	H=12 21 (16)
i(S)	E	22 $06\frac{1}{2}$					
iP	Z	12 33 $29\frac{1}{2}$	0.2	6.8	c.		Regional
iP	Z	12 56 05	0.3	0.8	d	$2\frac{1}{4}^{\circ}$	H-12 55 29
iS	E	32					
iP	Z	12 57 $46\frac{1}{2}$	0.4	1.9	d	2°	H=12 57 15
iS	E	58 10				In coda of previous shock.	
iP	Z	13 04 $09\frac{1}{2}$	0.2	2.8	c		Regional
iP	Z	13 59 $50\frac{1}{2}$	0.2	1.8	d	$(2\frac{1}{4}^{\circ})$	H=13 59 (14)
iS	E	14 00 (18)					
6th April.							
eiP	Z	12 02 $03\frac{1}{2}$	0.8	0.7	d		Regional
i	Z	12 54 $42\frac{1}{2}$	0.2	1.0	c		Regional
iP	Z	12 19 11	0.2	1.4	c		Local
eP	Z	12 26 $18\frac{1}{2}$	0.5	0.6	c		Teleseism
eP	Z	14 22 $18\frac{1}{2}$	0.4	0.4	d		(Teleseism)
i	Z	$26\frac{1}{2}$					
iP	Z	18 26 02			d		Regional
iP	Z	20 37 $(21\frac{1}{2})$			c	$1\frac{3}{4}^{\circ}$	H=20 36 52
iS!	E	44					
7th April		S.P.Z records faulty lamp from 1525 hours.					

KERAVAT

			T sec	A mm	GM	Dist	Remarks
8th April							
iP	Z	05 41 03	0.2	2.2	d		Teleseism
iP	Z	17 16 30½	0.3	1.4	c	1¾°	H=17 16 03
iS	E	51½					
eP	Z	17 37 03	0.4	0.3	d	6°	H=17 35 32
i	Z	16					
iS	N	38 13					
i	Z	14½					
9th April							
eP	Z	00 08 58½	0.4	0.6			Teleseism
iP	Z	01 26 49	0.3	0.9	c	6°	H=01 25 21
iS	E	27 57½					
iP	Z	01 44 27	0.3	13.0	d		Regional
iP	Z	01 51 10½	0.2	0.4	c		Regional
e(P)	Z	02 03 (08)				(2°)	H=02 02 (36)
iS	E	32.6					C.B.M.
iP	Z	02 49(18)				1½°	H=02 48 (54)
iS	E	36					C.B.M.
iP	Z	05 59 40½	0.3	2.0	d	6°	H=05 58 09
iS	E	06 00 50½					
iP	Z	06 31 41½	0.1	2.8	c	1¼°	H=06 81 18
iS	E	59					
iP	Z	08 02 42½	0.2	2.4	d		Regional
eP	Z	08 30(47)	0.6	1.4	c	(5½°)	H=08 29 (24)
iS	E	31 51					Felt Buin Int.III
							06°51"S,155°44'E
iP	Z	08 58 02½	0.3	0.9	d		Regional Felt Buin Imt.III 06°51'S,155°44'E
eP	Z	14 03 58½	0.5	0.2	c	4½°	H=14 02 54
iS	E	04 47½					
iP	Z	16 51 56	0.2	1.0	c	1¾°	H=16 51 27
iS	E	52 26½					
eP	Z	17 46 45½	0.9	0.5	c		Teleseism
eP	Z	18 52 18	0.5	0.9	d	6¼°	H=18 50 44
i	Z	29					
iS	E	53 30½					
iP	Z	19 23 11			d		Regional Superimposed shock
i(P)	Z	21 19 52½	0.3	1.2	c	(5¾°)	H=21 18 (25)CBM.
i	E	20 03					Felt Buin Int.III
i(S)	E	60					06°51'S,155°44'E
eP	Z	23 33 49½	0.3	0.8	d	5¾°	H=23 33 21
iS	E	34 56					

			T sec	A* mm	GM	Dist	Remarks

TABELE.

28th March, 1967: Nil recorded.

29th March.

iP	Zw	10 35 23	0.5	0.2	d		Local

Continuous tremor between 1859 hrs and 1939 hrs, due to magma mo ement in main conduit. Average T=0.4, Average A*=2.2.

30th March.

iP	Zw	11 42 55	0.2	2.0	d		Local
i	Zw	43 12½					
iP	Zw	23 44 17½	0.5	1.0	d		Local
i	Zw	35½					

31st March.

iP	Zw	14 56 47½	0.2	1.5	c		Local
i	Zw	57					

1st April: Continuous tremor between 1313 hrs and 1526 hrs due to magma movement in main conduit. Average T=0.4, Average A*=2.0,

2nd April.

iP	Zw	17 42 01½	0.6	2.0	d		Regional
i	Zw	06½					

3rd April.

eP	Zw	08 06 14					Teleseism
i	Zw	25					
iP	Zw	20 38 14	0.3	1.2	c		Local
i	Zw	31½					
iP	Zw	23 28 34	0.6	0.1	c		Local
i	Zw	36					
i	Zw	40					
i	Zw	42					
i	Zw	44½					

4th April.

iP	Zw	00 39 12	0.6	0.1	d		Regional

G.W.D'ADDARIO.
(Vulcanologist-in-Charge)

Central Observatory
RABAUL.

12th April, 1967.

26/4/67

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 11th April, 1967 To: 18th April, 1967
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	From: 9th April, 1967 To: 16th April, 1967.
ESA'ALA	(ESA)	No records received.
TABELE	(TBL)	From: 4th April, 1967 To: 11th April, 1967.
AGENAHAMBO	(AGE)	No records received.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".0S, Longitude 152°10'16".0E, Elevation 184m.
Foundation: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-Eo	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude 152°11'48".E., Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
Foundation: Granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec.	Tg sec.
Attenuator setting 1/10, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec.
	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical			
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

	Tg sec.
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min.	0.25

$S.P.-Z_W$ magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB the time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL the time signal is marked every minute on the records from a crystal chronometer and a second marks from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.

"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second; other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTRES:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalisation", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A, A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitude from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	Typical signature of an earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections unidentifiable.

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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

12th April, 1967

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 15 10.3	0.4	1.0	d	$2\frac{1}{2}^{\circ}$	H=01 13 32
i	Z	12.6					
eS	N/	39½					
iP	Z	01 53 16.0	0.5	2.0	d	2°	H=01 52 42
iS	N	42.0					
iP	Z	02 01 17.6	0.4	2.6	c		(BismarcK Sea)
i	Z	22.2					
M	E/	02 08.0					
eiP	Z	04 36 21½	0.6	1.0	d		(Regional)
i	Z	28.7					
iP	Z	05 01 18.8	0.5	1.0	d		Teleseism Traces overlapping long period difficult to read.
i	Z	27.6					
iP	Z	06 15 01.4	0.5	2.5	c		Distant shock.
iP	Z	07 47 44.8	0.3	6.0	d	$\frac{1}{2}^{\circ}$	H=07 47 31
iS	N	55.5					
eiP	Z	10 48 25½	0.5	4.0	c	$1\frac{1}{2}^{\circ}$	H=10 48 00
i	Z	26.4					
eS	N	44					
iP	Z	13 47 17.5	0.7	1.5	d	$6\frac{1}{2}^{\circ}$	H=13 45 42
i	Z	20.3					
i	Z	23.2					
eS	E/	48 31½					
eiP	Z	13 56 11	0.5	2.0	d		Long period hard to read overlapping traces.
i	Z	12.5					
i	Z	15.7					
iP	Z	14 05 49.8	0.4	1.0	c		In coda of preceding shock
iP	Z	14 53 08.4	0.6	1.0	c		Overlapping traces long period records hard to read.
i	Z	12.3					
i	Z	14.2					
e	Z/	18 15 55			–		Traces
iP	Z	18 46 23.5	0.5	1.0	c	$6\frac{1}{2}^{\circ}$	H=18 44 49
i	Z	28.4					
i	Z	35.2					
iS	N	47 36.2					
eiP	Z	21 23 48	0.5	1.0	c	6°	H=21 22 17
i	Z	51.5					
iS	N	24 58.5					
eiP	Z	22 27 32½	0.4	1.0	c	$6\frac{1}{4}^{\circ}$	H=22 25 59
i	Z	36.3					
iS	N	28 44.5					
iP	Z	22 51 59.5	0.4	2.5	d	6°	H=22 50 29
eS	N	53 09					
eiP	Z	23 23 32	0.4	1.0	d	$5\frac{1}{2}^{\circ}$	H=23 22 10
i	Z	34.8					
i	Z	39.0					
iS	E	24 35.0					
iP	Z	23 31 29.5	0.5	2.0	d	$5\frac{1}{2}^{\circ}$	H=23 30 08
iS	N	32 32.5					

			T sec	A mm	GM	Dist	Remarks
13th April 1967							
iP	Z	02 54 13.6	0.5	7.5	c	¼°	H=02 54 07
iS	N	20.5					
iP!	Z	02 55 37.6	0.5	21.5	c	¼°	H=02 55 30
iS	N/	33.5					
eP	Z	04 54 07½	0.5	1.2	d		Regional, C.B.M.
iP	Z	07 39 02.6	0.4	1.0	c	2½°	H=07 38 25
i	Z	04.4					
eS	E	32½					
e	Z/	08 53 33			+		Traces
iP	Z	09 51 04.2	0.4	2.0	d	1½°	H=09 50 39
iS	N	23.0					
iP	Z	13 56 23.8	0.6	1.0	c	5°	H=13 55 07
eS	N	57 22½					
iP	Z	17 12 38.6	0.4	4.0	d		Regional
iP	Z	17 19 20.8	0.5	3.0	c		Regional
i	Z	23.0					
iP	Z	17 38 24.3	0.5	2.0	d		Regional
iP	Z	18 49 45.0	0.8	4.0	d		Regional (Deep)
iP!	Z	20 01 05.3	0.5	10.0	d		(Regional)
e	Z/	20 47 22½			+		Traces
~~iP~~	Z	21 37 33	0.3	1.5	c	1¾°	H=21 37 04
i	Z	34.1					
iS	N	55.0					
14th April, 1967							
iP	Z	04 00 54.4	0.5	2.3	c	2¼°	H=04 00 18
eS	N	01 23					
iP	Z	05 39 21.8	0.4	4.0	c	1½°	H=05 38 58
iS	N	40.2					
iP	Z	09 04 39.3	0.4	5.0	c	2½°	H=09 03 57
iS	N	05 11.0					
eP	Z	09 43 49	0.5	0.8	c		Regional
iP	Z	10 13 11.1	0.5	1.0	c	6½°	H=10 1135
iS	N	14 25.2					
eP	Z	10 24 45	0.5	1.3	c	3¼°	H=10 23 54
i	Z	46.0					
i	Z	49.2					
iS	E	25 24.5					
eP	Z	12 21 44½	0.5	1.0	c	6°	H=12 20 16
eiP	Z	13 32 01	0.5	1.0	d	5¾°	H=13 30 34
i	Z	11.5					
i	Z	15.1					
iS	E	33 08.0					
eP	Z	14 31 21	0.4	1.0	d	6½°	H=14 29 44
iS	N	32 36.3					
iP	Z	14 42 27.5	0.7	1.8	d	6°	H=14 40 55
i	Z	31.8					
iS	E	43 38.0					
iP	Z	21 38 29.0	0.5	11.0	d	1°	H=21 38 10
iS	N	43.0					

RABAUL

			T sec	A mm	GM	Dist	Remarks
15th April							
eiP	Z	01 14 05	0.4	1.0	d	$5\frac{1}{2}^{\circ}$	H=01 12 42
i	Z	07.5					
eS	E	15 09					
iP	Z	04 46 00.3	0.5	1.4	d		Regional
iP	Z	07 42 42.0	0.5	2.0	d	$(4\frac{3}{4}^{\circ})$	H=07 41(29)
e(S)	N	43 38					
eP	Z	09 08 31	0.5	1.0	c		Regional
iP	Z	09 21 46.5	0.4	2.0	d	$2\frac{1}{2}^{\circ}$	H=09 21 08
eS	E/	22 15					
eiP	Z	09 25 15	0.5	1.0	d		Regional
i	Z	18.8					
eiP	Z	12 02 40	0.5	1.5	d	$6\frac{1}{4}^{\circ}$	H=12 01 07
i	Z	43.2					
iS	E	03 42.6					
e	Z/	15 47 $46\frac{1}{2}$			+		Traces
eP	Z	16 00 14	0.5	2.0	d	21°	
i	Z	45.0					
eS	E/	04 28					
e(Lq)	E/	42					
ePcP	Z/	$50\frac{1}{2}$					
e(Lr)	Z/	05 46					
iP	Z	17 47 35.5	0.4	1.0	d	$5\frac{1}{2}^{\circ}$	H=17 46 13
iS	E	48 38.0					
iP	Z	21 12 20.0	0.4	2.8	d	1°	H=21 12 03
iS	N	32,5					
iP	Z	22 07 39.0	0.5	1.0	d	$2\frac{1}{4}^{\circ}$	H=22 07 02
iS	N	08 07.0					
16th April							
iP	Z	03 42 14.5	0.5	4.0	c	$3\frac{1}{4}^{\circ}$	H=03 41 25 C.B.M.
eS	N	52					
iP	Z	04 24 25.4	0.4	6.0	d	$2\frac{1}{2}^{\circ}$	H=04 23 47
iS	N	54.5					
iP	Z	04 33 11.5	0.4	4.0	d	$(2\frac{1}{4})$	H=04 32(36)
i	Z	14.8					
i(S)	N	38.0					
iP	Z	04 49 58.4	0.5	2.6	c	$1\frac{1}{4}^{\circ}$	H=04 47 36
iS	N	50 15.5					
eiP	Z	05 52 52	0.4	1.0	c	5°	H=05 51 38
iS	N	53 49.2					
e	Z/	07 23 46			–		Traces
iP	Z	08 27 21,8	0.4	1.0	c	$5\frac{1}{2}^{\circ}$	H=08 26 00
iS	N	28 25.3					
iP	Z	09 40 35.1	0.4	15.0	d	$1\frac{1}{4}^{\circ}$	H=09 40 04
iS	N	41.2					
iP	Z	10 19 05.1	0.6	1.2	c		Teleseism
eiP	Z	12 01 $07\frac{1}{2}$	0.5	1.0	d	$7\frac{1}{4}^{\circ}$	H=11 59,30
i	Z	17.0					
i	Z	21.4					
iS	E	02 30.5					
e	Z/	18 33 38			+		Traces
eP	Z	20 27 48	0.4	1.0	d		Regional

RABAUL

			T sec	A mm	GM	Dist	Remarks
16th Aprilcontd							
iP	Z	20 29 16.2	0.4	34.5	d	2°	H=20 28 42
iS	E/	42.5				In coda of preceding shock	
eiP	Z	23 49 23	0.5	1.0	d	1½°	H=23 49 03
i	Z	28.5					
iS	N	47.0					
17th April							
eP	Z	11 22 05½	0.88	1.0	c	16°	
i	Z	22.0					
i	Z	48.3					
eS	N/	25 10					
iP	Z	16 39 43.8	0.5	5.0	d	1½°	H=16 39 16
i	Z	47.2					
iS	N	40 04.5					
iP	Z	18 11 03.0	0.5	4.0	d	2½°	H=18 10 21
iS	E	34.5					
iP	Z	20 28 58.0	0.4	3.0	d	1¼°	H=20 28 35
iS	E	29 15.0					
iP	Z	22 28 06.5	0.4	2.0	d	1½°	H=22 27 46
iS	N	26.4					
iP	Z	22 59 44.5	0.5	1.0	d		Regional
i	Z	45.4					
iP	Z	23 22 44.5	0.5	1.0	d	3¼°	H=23 21 53
i	Z	48.5					
iS	E	23 23.6					
18th April		W.W.S.S. commenced running on secondary time from 172326 S.P. N-S component paper upside down.					
iP	Z	00 41 12.2	0.4	1.0	c	5½°	H=00 39 52
iS	E	42 14.0					
iP	Z	00 49 00.1	0.4	2.0	c	1½°	H=00 48 35
iS	E	18.8					
iP	Z	04 12 30.5	0.5	1.5	d	3°	H=04 11 45
iS	E	13 05.4					
iP	Z	05 27 08.0	0.4	7.8	d	1°	H=05 26 50
iS	E	20.8					
eP	Z	05 30 40	0.5	1.0	d	1¾°	H=05 30 12
iS	E	31 02					
e	Z/	06 31 42			–		Traces
e	Z/	09 26 21			–		Traces
i	Z	09 43 26.0	0.3	3.5		Ship moving in harbour.	
F	Z	51 12					
iP	Z	15 44 15.6	0.4	5.0	c	1½°	H=15 43 49
i	Z	16.1					
i	Z	24.2					
iS	E	35.1					
iP	Z	15 54 08.5	0.5	2.5	d	1½°	H=15 53 43
i	Z	09.6					
iS	E	27.1					
iP	Z	16 00 37.4	0.5	5.5	c	1½°	H=16 00 12
iS	E	56.1					
iP	Z	21 03 56.7	0.3	1.5	d	½°	H=21 03 45
iS	E	04 03.1					

KERAVAT

10th April

			A sec	T mm	GM	Dist	Remarks
i(P)	Z	05 01 13					Regional
i	E	16½					Felt: Buin Int. III 06°51'S 155°44'E
i(P)	Z	05 12 18				(6½°)	H=05 10 (42)
i(S)	E	13 34					
iP	Z	08 28 48			c	6°	H=08 27 22
iS	N	29 55					Felt: Buin Int. I 06°51'S,155°44'E
i(P)	Z	10 47 45			d		Regional Felt: Buin Int.I 06°51'S,155°44'E
eP	Z	12 33 04½	1.0	0.3	c	6°	H=12 31 35
e	Z	10½					Felt: Buin Int. I 06°51'S,155°44'E
i(S)	N	34 14					
eP	Z	15 03 56	0.2	0.5	c		Regional
i	Z	04 02½					Felt: Buin Int. IV 06°51'S,155°44'E
i(P)	Z	15 34 10			c	5¼°	H=15 32 53
iS	N	35 10½					
e(P)	Z	15 43 08½	0.4	0.7	d	(6°)	H=15 41 (40)
iS	N	44 16½					Felt: Buin Int. I 06°51'S,155°44'E
eP	Z	15 49 22½	0.7	0.6	d	5¾°	H=15 47 57
iS	N	50 28					
iP	Z	15 51 54½				3°	H=15 51 11
iS	N	52 28½					
eP	Z	16 00 36½	0.8	0.6	c	2¼°	H=16 00 00
iS	N	01 05					
eP	Z	18 04 20½	0.4	0.3	c	6¼°	H=18 02 45
i	Z	21					
iS	N	05 29					
iP	Z	18 21 09½	0.4	0.6	c	5¾°	H=18 19 45
iS	N	22 17					Felt: Buin Int. II 06°51', 155°44'E
eP	Z	18 26 04			c	6½°	H=18 24 29
i	Z	08½					
iS	E	27 18					
iP	Z	20 36 02			c	5½	H=20 34 40
iS	N	37 06					
iP	Z	20 46 57½				(5½°)	H=20 45(35)
i(S)	E	48 03					Felt Buin Int. II 06°51'S, 155°44'E
iP	Z	21 08 59½			d	5½°	H=21 07 32
iS	E	10 09					Felt: Buin Int. III 06°51'S, 155°44'E
eP	Z	21 50 32½	0.4	0.4	d		Regional
i	Z	43					Felt: Buin Int. III 06°51'S, 155°44'E
iP	Z	23 15 16	0.4	0.4	d		Teleseism
i	Z	20					
i	Z	26					

			T sec	A* mm	GM	Dist	Remarks
KERAVAT							
11th April							
iP	Z	04 49 35			d	1°	H=04 49 15
iS	E	50½					
i(P)	Z	04 54 02			d	(5¾°)	H=04 52(35)
i	Z	18					
i(S)	E	55 09½					
iP!	Z	05 29 23			d		Regional
iP	Z	14 54 31½	0.5	0.7	d	6½°	H=14 53 01
i	Z	42					
iS	E	55 42½					
i	Z	53½					
i	Z	56 52					
eP	Z	15 19 37½			c	1½°	H=15 19 10
iS	E	58½					
i	Z	20 01½					
iP	Z	16 26 30			d	1°	H=16 26 18
iS	E	44½					
eP	Z	18 56 54				2°	H=18 56 24
i	Z	55					
iS	E	57 17					
ϕ2th April							
iP	Z	01 15 10	0.1	2.4	d	(1½°)	H=01 14(42)
i(S)	E	32					
iP	Z	01 53 13½	0.2	0.8	d	(2°)	H=01 52(30)
i(S)	E	(38½)					
iP	Z	02 01 17	0.3	[illegible]			(Bismark Sea)
iP	Z	04 36 23	0.3	0.6	d		Regional
e(P)	Z	05 01 17					Teleseism C.B.M.
iP	Z	07 47 46				1°	H=07 47 28
iS	N	59					
iP	Z	10 48 26½	0.4	1.2	d	(¾°)	H=10 48(12)
e(S)	N	38½					
eP	Z	13 47 16					Regional
iP	Z	13 56 11	0.3	1.1			(Shallow shock)
iP	Z	14 05 48	0.2	0.3	d	6¼°	H=14 04 16
iS	E	07 00½				In coda of previous shock	
eP	Z	14 53 04½	0.5	0.8	d		(Shallow shock)
eP	Z	18 46 25	0.4	0.4	d	(6°)	H=13 44(57)
e	Z	30					
i(S)	E	47 35					
iP	Z	22 51 59	0.3	1.4	d	6°	H=22 50 27
iS	N	53 10					
eP	Z	22 27 33½			d	6½°	H=22 25 58
iS	E	28 47					
iP	Z	23 23 36½			c	5½°	H=23 22 13
iS	E	24 40					
13th April							
e(P)	Z	02 54 18				(¾°)	H=02 54903)
iS	N	27					
iP	Z	02 55 39				¼°	H=02 55 32
i(S)	E	42					

KERAVAT

			T sec	A* mm	GM	Dist	Remarks
13th April contd.							
eP	Z	07 39 03			d	2½°	H=07 38 23
i	Z	08					
i(S)	N	33					
iP	Z	09 51 02½	0.2	6.5	d	1½°	H=09 50 39
i	Z	20					
iS!	N	20½					
eP	Z	13 56 25	0.5	0.4	c	5¾°	H=13 55 00
i(S)	N	57 31					
e(P)	Z	17 12 32					Regional
eP	Z	17 19 21½	1.1	0.5	c		Regional
eP	Z	17 38 24	0.7	0.6	c		Regional
eP	Z	18 49 45½	1.0	0.6	d		Regional (Deep)
eP	Z	20 01 05½			d		Teleseism
iP	Z	21 37 31				1½°	H=21 37 07
iS	E	50					
iP	Z	23 16 23½			d	(7½°)	H=23 14(34)
i(S)	E	17 47½					C.B.M.
14th April							
i(P)	Z	04 00 57				(1½°)	H=04 00(29)
iS	E	01 19					
iP	Z	09 04 35½	0.2	1.3	c	(2½°)	H=09 03(55)
i(S)	E	05 06					
eP	Z	09 43 47	0.8	0.4	d		Regional
eP	Z	10 13 14½	0.5	0.4	d	6¼°	H=10 11 43
iS	E	14 26					
iP	Z	10 24 41	0.2	0.5	c		Regional
eP	Z	12 21 44½	0.6	0.2	c	5½°	H=12 20 22
iS	E	22 49					
eP	Z	13 32 04	0.4	0.3	c	5½°	H=13 30 41
iS	E	33 09					
eP	Z	14 31 22	0.5	0.2	c	6½°	H=14 29 46
iS	E	32 38½					
iP	Z	14 42 25½	0.7	0.5	d	6°	H=14 40 56
i	Z	30½					
iS	E	43 35					
iP	Z	21 38 28	0.2	1.2	d	1¼°	H=21 38 07
iS!	E	45					
15th April							
e(P)	Z	01 14 10½			d	5¼°	H=01 12(51)
iS	E	15 10					
iP	Z	04 46 03½	0.3	0.5	d		Regional
e(P)	Z	07 42 37½			d	(6¼°)	H=07 41(03)
i(S)	E	43 50					
i(P)	Z	09 08 45½	0.3	0.7	d		Regional
iP	Z	09 21 49			d		Regional
eP	Z	09 25 15	0.5	0.4	d		Regional
eP	Z	12 02 38½	0.7	0.1	d		Regional

KERAVAT

			T sec	A mm	GM	Dist	Remarks
15th April contd.							
eP	Z	16 00 39	0.8	0.2	d		Teleseism
e(P)	Z	17 47 37½	0.6	0.3	d		Regional
e(P) iS	Z E	21 12 20½ 34½				(1^{o})	H=21 12(03) C.B.M.
iP iS	Z N	22 07 36 08 01			c	2^{o}	H=22 07 04
16th April		S.P. records have no minute breaks from 2248 to 0805 hours.					
eP iS	Z N	08 27 24 28 19½			c	$4\frac{3}{4}^{o}$	H=08 26 13
iP iS	Z E	09 40 24 40½	0.3	1.0	d	$1\frac{1}{4}^{o}$	H=09 40 02
eP	Z	10 19 04½	0.5	0.4	c		Teleseism
eP i(S)	Z E	12 01 12 02 26½	0.9	0.2	c	($6\frac{1}{2}^{o}$)	H=11 59(37)
e(P)	Z	20 27 49½			d		Regional
iP!	Z	20 29 12			d		Regional In coda of preceding shock

			T sec	A* mm	GM	Dist	Remarks
TABELE.							
4th April:		Nil recorded.					
5th April.							
iP	Zw	05 44 50	0.5	14.0	c		Local
eiP	Zw	06 39 42½	0.8	1.0	c		Regional
i	Zw	43½					
i	Zw	40 06					

Continuous tremor between 1925 hours and 1956 hours due to torrential rain.
Average T=0.4, Average A*=1.0.

6th April.							
eiP	Zw	12 02 24½	0.7	0.6	d		Regional
i	Zw	26					
i	Zw	32½					
7th April:		Nil recorded.					
8th April:		Nil recorded.					
9th April.							
iP	Zw	00 07 38½	0.4	0.7	d		Teleseism

Continuous tremor between 1247 hours and 1355 hours associated with heavy rain.
Average T=0.4, Average A*=2.1.

10th April.							
eiP	Zw	23 13 48½	0.5	1.0	d		Regional
i	Zw	49½					
i	Zw	57½					
i	Zw	14 13½					
i	Zw	29					
11th April.							
eiP	Zw	01 52 42	0.3	0.6	d		Local
i	Zw	42½					
i	Zw	43½					
i	Zw	46					
i	Zw	48					
i	Zw	58½					

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(A/Vulcanologist-in-Charge)

Central Observatory
RABAUL.

18th April, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 18th April, 1967 To: 25th April, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	From: 16th April, 1967 To: 23rd April, 1967.
ESA'ALA	(ESA)	No records received.
TABELE	(TBL)	From: 11th April, 1967 To: 18th April, 1967
AGENAHAMBO	(AGE)	From: 26th March, 1967 To: 16th April, 1967.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT
CENTRAL OBSERVATORY RABAUL

STATIONS

RABAUL (RAB)

Latitude 04°11'33".OS, Longitude 152°10'16".OE, Elevation 184m.
Foundation: Basalt flow.

STATION INSTRUMENTATION

WORLD WIDE STANDARD SYSTEM

		To sec.	Tg sec.
S.P.-Z	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) HELICORDER (GEOTECH MOD. 2484) SYSTEM:

S.P. Zh	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

STRONG MOTION TWO-COMPONENT OMORI SEISMOGRAPH 15kg.

L.P.-No	Static magnification 12, air damping 10.1	3.6
L.P.-Eo	Static magnification 10, air damping 10.1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44".S., Longitude [illegible]".E., Elevation 3m.
Foundation: unconsolidated volcanic ash.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE 14.5kg (GEOTECH MOD. 4681-A VERTICAL) TELEMETERED BY LINE TO A HELICORDER (GEOTECH MOD. 2484) AT THE CENTRAL OBSERVATORY.

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'.S., Longitude 152°00'.E.
Foundation: coastal alluvium.

STATION INSTRUMENTATION

BENIOFF, MOVING COIL 3-COMPONENT, FILM RECORDING SEISMOGRAPH:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
Foundation: Granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

	To sec.	Tg sec.
Attenuator setting 1/10, drum speed 60 mm/min. S.P.Z. magnification 1,000.	0.6	0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

		To sec.	Tg sec.
	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical			
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

	To sec.	Tg sec.
coupled to Willmore Recorder attenuator setting 1/100, drum speed 60 mm/min.		0.25

S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB the time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL the time signal is marked every minute on the records from a crystal chronometer and a second marks from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.

"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second; other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTRES:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalisation", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

SYMBOLS:

A,A*	Peak-to-Trough trace amplitude in millimetres.
A	Amplitude from W.W.S.S.
A*	Amplitude from seismographs with different response to the W.W.S.S.
T	Period in seconds.
C.B.M.	Confused by microseisms.
Dist.	Distance in central angle degrees.
H	Origin time.
h	Focal depth in Km.

REMARKS:

Local	Typical signature of an earthquake with epicentre within 0.9°.
Near	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	Typical signature of àn earthquake with epicentre more than 45°.
Traces	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections unidentifiable.

G.W.D'ADDARIO
(Vulcanologist-in-Charge)

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL World Wide Standardised Seismograph Set running on Secondary time

			T sec	A mm	GM	Dist	Remarks
19th April, 1967.							
iP	Z	03 21 55.1	0.5	2.0	d	$1\frac{3}{4}^{\circ}$	H=03 21 26
iS	N	22 17.1					
eP	Z	03 29 13.1	0.4	1.3	d	$6\frac{1}{2}^{\circ}$	H=03 27 36
eS	N/	30 28					
iP	Z	06 48 13.2	0.5	10.5	c	$2\frac{1}{2}^{\circ}$	H=06 47 35
iS	N	42.4					
iP	Z	09 22 44.7	0.5	12.0	c	$2\frac{1}{4}^{\circ}$	H=09 22 09
iS	N	23 12.2					
iP	Z	10 26 20.1	0.4	12.8	d	$1\frac{1}{2}^{\circ}$	H=10 25 53
iS	N	39.5					
eP	Z	13 42 36	0.5	1.0	d	$7\frac{1}{4}^{\circ}$	H=13 40 49
iS	N	43 58.9					
eiP	Z	16 34 $40\frac{1}{2}$	0.6	2.8	d	6°	H=16 33 10
i	Z	47.9					
iS	N	35 50.6					
iP	Z	19 51 51.5	0.4	1.0	c	2°	H=19 51 20
iS	N	52 15.3					
20th April							
iP	Z	00 06 11.6	0.5	11.5	d	23°	
eS	N/	10 10					
iP	Z	05 46 44.5	0.4	1.0	d	$2\frac{1}{2}^{\circ}$	H=05 46 04
iS	E	47 15.6					
iP	Z	06 23 06.9	0.4	1.5	d	$1\frac{1}{4}^{\circ}$	H=06 22 45
iS	N	24 23.0					
iP	Z	07 12 43.1	0.5	1.0	d	3°	H=07 11 57
i	Z	46.6					
eS	N	13 18					
iP	Z	07 34 06.1	0.5	4.5	c		Regional
iP	Z	09 14 41.2	0.4	3.0	d	$1\frac{1}{4}^{\circ}$	H=09 14 20
iS	N	57.5					
i	Z	11 45 43.2	0.5	2.0		Ship moving in harbour.	
F	Z	50 29					
i	Z	19 57 21.0	0.6	2.0		Ship movihg in harbour.	
F	N	20 01 22					
iP	Z	20 19 21.2	0.5	3.8	c	1°	H=20 19 04
iS	E	34.1					
21st April							
iP	Z	04 28 23.4	0.5	4.0	c	$2\frac{1}{2}^{\circ}$	H=04 27 43
eS	N	54					
iP	Z	08 13 45.8	0.4	4.0	c	$1\frac{1}{4}^{\circ}$	H=08 13 24
iS	N	14 01.4					

RABAUL

			T sec	A mm	GM	Dist	Remarks
21st April contd.							
eP	Z	08 19 50½	0.5	1.0	d	27°	
ePP	Z/	20 33					
eS	N/	24 24					
eLq	E/	25 24½					
eP	Z	08 51 31	0.4	1.0	c	In coda of preceding shock	
iP	Z	09 57 02.4	0.5	1.0	d	6¾°	H=09 55 21
iS	N	58 20.7					
iP	Z	10 11 25.6	0.5	3.0	d		(Teleseism)
iP	Z	10 20 37.0	0.3	2.0	d	½°	H=10 20 25
iS	N	46.0					
eP	Z	11 25 45	0.5	1.0	c		Teleseism
iP	Z	13 29 57.5	0.5	1.5	d	1½°	H=13 29 31
iS	N	30 17.5					
eP	Z	11 25 45	0.5	1.0	c		Teleseism
22nd April							
eP	Z	05 43 12	0.4	1.0	d		Regional
iP	Z	07 23 00.5	0.4	4.8	d	1½°	H=07 22 35
iS	N	19.1					
iP	Z	08 42 51.4	0.5	1.2	d	27°	
ePP	Z/	43 34					
eS	E/	47 22½					
iLq	N/	14.1					
eP	Z	11 59 52½	0.7	1.0	c		Distant shock
eP	Z	13 17 17	0.6	1.0	d		Distant shock
i	Z	24.5					
i	Z	33.0					
iP	Z	14 17 59.6	0.5	6.0	d	1½°	H=14 17 33
iS	N	18 19.3					
eiP	Z	15 38 39½	0.5	2.5	d	7°	H=15 36 56
iS	E	39 59.6					
iP	Z	17 33 34.3	0.6	1.0	c	32°	
eS	E/	38 22					
iP	Z	19 46 54.2	0.6	4.0	d	23°	
eS	N/	50 59					
iP	Z	21 17 27.4	0.6	1.5	d	2¼°	H=21 16 50
eS	E	55½					
23rd April							
iP	Z	01 11 40.6	0.5	69.0	dSSE	1°	H=01 11 23
iS	N/	54.0					
iP	Z	01 18 29.5	0.5	14.0	d	1¼°	H=01 18 08
iS	N	45.0				In coda of preceding shock	
eiP	Z	01 45 12	0.5	1.0	c	½°	H=01 45 02
i	Z	14.2					
i	Z	16.1					
iS	N	19.0					
iP	Z	04 57 15.6	0.3	8.5	d	¼°	H=04 57 08
iS	N/	21.1					
iP	Z	08 51 54.9	0.4	15.0	d	1½°	H=08 51 30
iS	N	52 13.2					
eP	Z	08 58 58½	0.5	1.0	c	6½°	H=08 57 23
eS	E	09 00 12					
e	Z	11 41 52			–		Traces

RABAUL

			T sec	A mm	GM	Dist	Remarks
23rd April contd.							
iP	Z	12 14 28.2	0.5	5.0	d	6°	H=12 12 57
i	Z	29.2					
eS	N/	15 38					
eP	Z	12 56 19	0.6	1.0	d	$29\frac{1}{2}^{\circ}$	
e	Z	$26\frac{1}{2}$					
eS	E/	13 01 08					
iP	Z	17 40 07.5	0.4	25.0	d	2°	H=17 39 33
iS		33.3					
iP	Z	17 51 03.9	1.0	2.5	c	18°	
eS	E/	18 01 31					
iP!	Z	18 21 20.6	0.5	39.0	cNE	$1\frac{1}{4}^{\circ}$	H=18 20 58
iS	N/	38.4					
iP	Z	21 13 53.6	0.5	57.5	dSW	$1\frac{1}{2}^{\circ}$	H=21 13 27
iS	E	14 13.4					
iP	Z	21 42 12.2	0.5	2.0	d	$1\frac{1}{2}^{\circ}$	H=21 41 47
iS	N	31.4					
24th April							
eP	Z	00 18 $57\frac{1}{2}$	0.4	1.0	d	$1\frac{1}{2}^{\circ}$	H=00 18 30
iS	N	19 18.0					
eiP	Z	00 50 44	0.4	[illegible]	d	$4\frac{1}{2}^{\circ}$	H=00 49 34
i	Z	44.9					
eS	N/	51 $38\frac{1}{2}$					
iP	Z	01 35 35.5	0.5	22.0	c	$\frac{1}{2}^{\circ}$	H=01 35 26
iS	N/	42.0					
eP	Z	02 53 $31\frac{1}{2}$	0.5	1.0	d		Teleseism
iP	Z	05 38 29.7	0.5	16.0	c	$\frac{1}{4}^{\circ}$	H=05 38 22
iS	N/	35.1					
e	Z/	08 21 53			+		Traces
iP	Z	12 08 45.7	0.5	1.8	d		Regional
i	Z	48.4					
e	Z/	12 23 44			+		Traces
iP	Z	16 43 48.6	0.3	1.3	d	$1\frac{1}{2}^{\circ}$	H=16 43 25
iS	N	44 06.0					
e	Z/	18 27 36			–		Traces
iP!	Z	18 53 22.6	0.5	76.0	d	4°	H=18 52 21
eS	N/	54 10					
25th April							
i	Z	00 44 43.6	0.5	2.0		Ship moving in harbour.	
F	Z	56 07.2					
iP	Z	04 30 30.5	0.4	1.0	c		Teleseism
iP	Z	07 04 03.1	0.5	3.0	c	$\frac{1}{2}^{\circ}$	H=07 03 51
iS	N	12.5					
iP	Z	08 03 34.4	0.4	2.5	d	$1\frac{1}{4}^{\circ}$	H=08 03 13
iS	E	50.5					
iP	Z	08 47 53.8	0.4	7.0	c	$1\frac{1}{2}^{\circ}$	H=08 47 15
i	Z	55.0					
iS	N	48 22.6					
iP	Z	12 17 01.2	0.4	31.0	c	$\frac{3}{4}^{\circ}$	H=12 16 46
iS	N	12.6					

RABAUL

25th April contd.

			T sec	A mm	GM	Dist	Remarks
iP i	Z Z	12 32 44.2 49.8	0.5	1.0	d		Teleseism
iP iS	Z E/	12 47 12.8 38.2	0.5	38.0	d	2°	H=12 46 39
eP i	Z Z	15 31 11 19.3	0.4	1.0	c		Regional
iP iS	Z N/	17 53 43.5 54 13.3	0.4	2.0	d	$2\frac{1}{2}$°	H=17 53 04
iP iS	Z E	20 03 42.0 58.8	0.4	2.0	d	$1\frac{1}{4}$°	H=20 03 19

			T sec	A* mm	GM	Dist	Remarks
KERAVAT							
16th April, 1967.							
eiP i	Z Z	23 49 26 26½			d		Regional
17th April							
eP	Z	11 22 10			d		Teleseism
iP iS	Z E	16 39 42½ 59½	0.5	1.6	d	1¼°	H=16 39 19
iP	Z	18 11 02			c		Regional
iP iS	Z E	20 28 58½ 29 13	0.2	1.9	d	1°	H=20 28 40
iP	Z	22 59 43½	0.2	1.2	d		Regional
iP iS	Z E	23 22 46½ 23 16			d	2½	H=23 22 07 C.B.M.
18th April							
eP iS	Z E	00 41(18) 42 30			d	(6¼°)	H=00 39(45) C.B.M.
e(P) iS	Z E	05 30 44 31 04				(1½°)	H=05 30 (18) C.B.M.
iP iS!	Z E	15 44 14½ 31½	0.3	2.1	c	1¼°	H=15 43 50
eP iS	Z E	15 54 06½ 29½	0.5	0.3	c	2°	H=15 53 35
iP iS!	Z E	16 00 37½ 54½	0.3	1.0	c	1¼°	H=16 00 13
19th April							
iP iS	Z E	03 21 54 22 11½			d	1¼°	H=03 21 31
e(P) iS	Z E	03 29 13 30 09				(4¾°)	H=03 28(00)
iP	Z	06 48 11½			d		Regional
iP	Z	09 22 42½			c		Regional
iP iS	Z E	10 26 21 43	0.1	0.4	d	1¾°	H=10 25 51
e(P) iS	Z E	13 42 43½ 43 58			d	(6½°)	H=13 41 (07)
iP!	Z	15 59 42			d		Regional
eP iS	Z E	16 34 43 35 53½	1.0	0.2	d	6°	H=16 33 11
20th April							
e(P) iS	Z E	05 46 47 47 12			d	(2°)	H=05 46(14) C.B.M.
eP	Z	07 34 05			d		Regional
iP iS	Z E	09 14 43½ 15 01	0.2	0.5	c	1½°	H=09 14 19
iP iS!	Z E	20 19 19½ 31			c	¾°	H=20 19 03

KERAVAT

			T sec	A* mm	GM	Dist	Remarks
21st April							
iP	Z	08 19 51½					Teleseism C.B.M.
eP	Z	09 57 59½	0.7	0.2	c	2°	H=09 57 27
iS	N	58 22					
eP	Z	10 11 23½	0.5	0.1	d		Teleseism
e(P)	Z	11 25 49½	0.5	0.2	c		Teleseism
iP	Z	13 29 58				1½°	H=13 29 29
iS	E	30 17					
e(P)	Z	13 36 48	0.4	0.1	d		Teleseism
22nd April							
i(P)	Z	06 23 02			d	1½°	H=06 22 37
iS	E	20					
e(P)	Z	07 42 51			c		Teleseism
eP	Z	12 17 16	0.3	1.0	d	(¼°)	H=12 17(07)
i(S)	E	22					
iP	Z	13 17 61	0.2	1.5	c		Regional
eP	Z	14 38 35½	0.2	1.0	c		Regional
i	Z	39					
iP	Z	14 39 37½			c	1¼°	H=14 39 14 in coda of preceding shock
iS	E	55½					
eP	Z	16 33 33½	0.2	1.0	d		Regional
eP	Z	18 23 02½	0.2	0.3	c	1°	H=18 22 41
iS	E	16					
eP	Z	18 46 54	0.9	0.8	c		Teleseism
23rd April							
iP!	Z	01 11 40			d		Regional
iP!	Z	01 18 29			d		Regional
iP	Z	08 51 54			c	1¼°	H=08 51 31
iS	E	52 11					
e(P)	Z	08 59 43			-		Regional
eP	Z	12 14 25½	0.6	0.3	d		Regional
eP	Z	12 56 21	1.0	0.1	c		Teleseism
iP	Z	17 40 05½	0.3		d	2°	H=17 39 34
iS!	E	29½					
eP	Z	17 57 05½	1.0	0.6	c		Teleseism
iP!	Z	18 21 18			d		Regional
iP!	Z	21 13 51			d		Regional
24th April							
e(P)	Z	00 50 42½			d		Regional

TABELE

			T sec	A* mm	GM	Dist	Remarks
11th April:		Nil recorded.					
12th April.							
eP	Zw	02 01 20½	0.6	0.4	c		(Bismark Sea)
i	Zw	48½					
iP	Zw	22 32 33	0.3	2.0	d		(Regional?)
13th April.							
iP	Zw	02 51 34	0.4	3.0	c		Regional
i	Zw	44½					
14th April.							
iP	Zw	07 13 12	0.4	2.0	c		Local
i	Zw	26					
15th April.							
iP	Zw	04 27 54	0.4	1.2	d		Local
i	Zw	28 34½					
i	Zw	51					

16th April: Continuous tremor between 1545 hrs and 1614 hrs associated with heavy rain.
Average T=0.4, Average A*=0.8.

17th April: Continuous tremor between 1547 hrs and 1614 hrs associated with heavy rain.
Average T=0.4, Average A*=1.2.

			T sec	A* mm	GM	Dist	Remarks
18th April.							
iP	Zw	01 26 44	0.2	1.0	d		Local
i	Zw	55½					
i	Zw	27 06					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO.							
26th March.							
iP	Z	23 20 34	0.2	0.7	d		(Harmonic Shock?)
i	Z	43½					
27th March:		Discrete tremors of harmonic form between 0346 hrs and 0404 hours. Average T=0.4, Average A*=3.3.					
eP	Z	10 06 30	1.0	0.3	c		Teleseism
28th March.							
eP	Z	03 23 07	0.4	0.2	d		Local
i	Z	15½					
i	Z	30½					
29th March.							
iP	Z	04 48 03	0.3	1.8	d		Regional
i	Z	44					
eP	Z	10 36 21	0.5	0;2	(c)		Teleseism
i	Z	38½					
30th March.							
iP	Z	02 14 31	0.4	0.4	c		Teleseism
iP	Z	15 58 31½	0.6	0.8	c		Regional
i	Z	59 09					
i	Z	13					
iP	Z	23 42 00½	0.4	1.3	d		Local
i	Z	08					
i	Z	26½					
i	Z	35½					
31st March.							
iP	Z	01 43 59½	0.2	0.8	d		local (Harmonic)
M	Z	3.4					
iP	Z	14 57 36	0.5	0.2	c		(Teleseism?)
i	Z	55					
i	Z	58 35					
iP	Z	15 01 12	0.5	0.8	d		Regional
i	Z	59					
i	Z	02 03					
i	Z	06½					
i	Z	08½					
i	Z	12					
iP	Z	20 09 46	0.8	0.8	c		Teleseism
i	Z	54					
1st April:		Nil recorded.					
2nd April.							
eP	Z	16 13 32½	0.5	0.4	c		Local
i	Z	14 13½					
eiP	Z	17 41 18½			d		Regional
i!	Z	19					
iP	Z	17 46 17½	0.2	2.1	c		(Regional) In coda of preceding shock.
i	Z	44½					
i	Z	48½					
iP	Z	17 53 06			(d)		Local, Overlapping traces
i	Z	34½					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO.							
2nd April, contd.							
iP	Z	18 12 38½	0.2	1.2	c		Local
i	Z	06½					
iP	Z	20 02 37½	0.1	1.2	d		Local
i	Z	09					
i	Z	13½					
3rd April.							
iP	Z	08 05 23½	0.6	1.2	c		Regional
i	Z	09½					
eP	Z	15 54 25	1.0	0.2	(c)		(Teleseism)
e	Z	30					
i	Z	35½					
i	Z	58 04					
i	Z	14					
iP	Z	16 27 23	0.4	0.2	c		Local
i	Z	57½					
iP	Z	16 35 18½	0.2	0.2	c		Local
i	Z	46½					
iP	Z	17 40 22½	0.5	0.4	d		Local
i	Z	53					
4th April.							
iP	Z	00 40 14	1.0	0.5	d		Teleseism
eiP	Z	18 30 00	0.4	1.0	d		Regional
i	Z	00½					
i	Z	15					
iP	Z	18 31 14	0.5	2.0	d		In coda of preceding shock.
i	Z	34½					
5th April:		No record received.					
6th April:		Continuous tremor between 0030 hours and 0800 hours. Average T=0.3, Average A*=1.6.					
iP	Z	12 22 18	0.5	1.0	d		Local
i	Z	23 11					
eiP	Z	12 34 07½	0.4	0.6	c		Local
i	Z	08					
iP	Z	12 34 58	0.3	1 2	c		Local In coda of preceding shock.
i	Z	35 07					
7th April.							
iP	Z	12 01 45½	0.6	13.0	d		Local
i	Z	46					
i	Z	54					
i	Z	02 03					
eP	Z	13 28 50½	0.3	0.5	d		Local
i	Z	29 19					
eP	Z	14 21 58	0.4	0.6	d		Local
i	Z	22 06½					
i	Z	34½					
i	Z	45					
i	Z	53½					

Continuous tremow between 2124 hours and 0100 hours on the 8th April.
Average T=0.2, Average A*=1.5.

AGENAHAMBO.

8th April.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	20 28 56	0.3	2.0	d		Local
i	Z	29 31½					
i	Z	37½					
i	Z	36					
i	Z	42					

9th April: No record until 2254 hours.
Continuous tremor between 2254 hours and 2342 hours.
Average T=0.2, Average A*=1.7.

10th April: Continuous tremor between 6000 hours and 0200 hours .
Average T=0.2, Average A*=1.6.

Continuous tremor between 0241 houra and 0635 hours.
Average T=0.3, Average A*=1.6.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	07 07 08½	0.5	0.3	(c)		Regional
i	Z	25½					
i	Z	27					
e	Z	08 16½					
i	Z	36½					
eP	Z	08 58 39	0.2	0.3	(c)		Local
i	Z	56					
eP	Z	17 46 10	0.5	0.3	d		(Teleseism?)
i	Z	28					
e	Z	49 21					
iP	Z	19 24 18½	0.4	2.0	d		Local
i	Z	25 20½					

Continuous tremor between 2200 hours and 2222 hours.
Average A*=0.2, Average A*=1.4.

11th April.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	21 51 14	0.6	0.8	d		Local
i	Z	52 35½					
i	Z	44					

Interritent trenor.with Harmonic form between 2151 hours and 0600 hours.
Average T=0.3, Average A*=1.3.

12th April.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	18 24 15½	0.5	0.8	c		Local
i	Z	20					
i	Z	25 19					

13th April.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	04 36 34½	1.0	0.6	d		Local
eP	Z	05 00 57½	0.3	0.3	(d)		Local
i	Z	59½					
i	Z	01 03½					
eP	Z	13 47 59½	0.1	0.2	(d)		Local
i	Z	48 02					
i	Z	49 26					
eP	Z	13 55 35	0.4	0.2	(d)		Regional
i	Z	15½					
eP	Z	14 53 46½	0.5	0.3	c		Local
i	Z	54 13½					
i	Z	55 13½					
iP	Z	23 32 14	0.4	0.9	c		Regional
i	Z	10½					
i	Z	19½					

AGENAHAMBO.

			T sec	A* mm	GM	Dist	Remarks
14th April:	Intermitent tremor with harmonic form between 0300 hours and 0904 hours. Average T=0.3, Avergae A*=1.9.						
eiP	Z	12 51 50½			d		Local
i	Z	52 21½					
i	Z	23½					
iP	Z	17 19 43	0.5	0.6	c		Local
i	Z	49					
eP	Z	17 37 55½	0.2	0.2	(c)		Local
i	Z	38 28					

15th April: Nil recorded.

16th April: Nil recorded.

G.A.M. TAYLOR
(A/Vulcanologist-in-Charge)

Central Observatory
RABAUL

28th April, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 25th April, 1967 To: 2nd May, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	From: 24th April, 1967 To: 30th April, 1967.
ESA'ALA	(ESA)	From: 10th April, 1967 To: 16th April, 1967.
TABELE	(TBL)	From: 18th April, 1967 To: 25th April, 1967.
AGENAHAMBO	(AGE)	From: 16th April, 1967 To: 22nd April, 1967.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System

		To sec.	Tg. sec.
S.P. S.P.-N&E	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000.

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_W Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	= Peak-to-Trough trace amplitude in millimetres.
A	= Amplitude from W.W.S.S.
A*	= Amplitude from seismographs with different response to the W.W.S.S.
T	= Period in seconds.
C.B.M.	= Confused by microseisms.
Dist.	= Distance in central angle degrees.
H	= Origin time.
h	= Focal depth in Km.

Remarks:

Local	= Typical signature of an earthquake with epicentre within 0.9°.
Near	= Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	= Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	= Typical signature of an earthquake with epicentre more than 45°.
Traces	= Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

1.5.67

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
26th April, 1967: W.W.S.S. Running on Secondary Time.							
iP	Z	00 42 24.0	0.5	13.5	c	¼°	H=00 42 18
iS	N/	29.5					
iP	Z	02 04 50.0	0.4	1.0	c	¼°	H=02 04 42
iS	N	56.0					
iP	Z	04 36 00.2	0.4	2.0	c	¼°	H=04 35 54
iS	N	05.5					
eP	Z	05 14 12	0.5	1.2	c	4°	H=05 13 12
eS	N	58					
iP	Z	08 24 18.6	0.5	3.2	d	1½°	H=08 23 55
iS	N	36.5					
iP	Z	08 43 25.4	0.4	4.0	d	1½°	H=08 43 01
iS	N	43.2					
iP	Z	10 11 35.7	0.4	3.0	c	1½°	H=10 11 12
iS	N	54.0					
iP	Z	11 31 02.4	0.3	2.0	c	1½°	H=11 30 36
iS	E	22.2					
e	Z/	13 33 21			-		Traces
iP	Z	15 05 10.7	0.4	3.0	d	¾°	H=15 04 56
iS	N	21.3					
iP	Z	16 23 06.3	0.4	5.0	c	1°	H=16 22 49
iS	N/	18.8					
iP	Z	17 07 57.6	0.3	2 0	c	1¼°	H=17 07 36
iS	N	08 13.6					
eP	Z	21 52 04½	0.5	1.0	d		Teleseism
27th April.							
iP	Z	00 24 38.6	0.5	3.0	c	¼°	H=00 24 31
iS	N	44.0					
iP	Z	01 39 33.6	0.4	1.0	d		Regional
iP	Z	01 40 22.0	0.5	4.0	c	¼°	H=01 40 14
iS	N	28.0				In coda of preceding shock.	
iP	Z	04 17 20.2	0.4	1.0	c	3°	H=04 16 34
eS	N	55½					
iP	Z	04 41 07.1	0.4	1.5	c	½°	H=04 40 58
iS	N	14.1					
iP	Z	05 02 50.0	0.3	2.0	c		Regional
iP	Z	05 03 27.6	0.5	3.0	c		Regional
						In coda of preceding shock.	
iP	Z	05 54 19.5	0.3	1.5	d	1½°	H=05 53 54
iS	N	38.6					
eP	Z	08 13 06	0.8	1.0	c	13°	
eS	N/	15 39½					
eP	Z	08 40 06	0.6	1.5	c		Teleseism
[illegible]	Z	11 00 40½	0.5	0.6	c		(Regional)

RABAUL Contd.

27th April Contd.

			T sec	A mm	GM	Dist	Remarks
iP i(S)	Z N	14 27 49.3 28 48.8	0.4	2.0	c	(5°)	H=14 26 (33)
eP	Z	15 15 37	0.6	1.0	d		Regional

28th April.

			T sec	A mm	GM	Dist	Remarks
iP iS	Z N	04 40 24.0 29.4	0.3	1.8	d	$\frac{1}{4}°$	H=04 40 18
iP iS	Z N	05 06 26.9 31.9	0.3	3.0	d	$\frac{1}{4}°$	H=05 06 20
eP	Z	07 22 33½	0.8	1.0	d		Teleseism
e(P)	Z	07 48 15			(c)		Teleseism
e	Z/	10 30 06			-		Traces
iP i iS	Z Z N	13 15 21.7 35.6 16 00.4	0.3	1.5	d	2°	H=13 14 49
iP iS	Z E	13 48 38.6 50.6	0.3	3.7	d	1°	H=13 48 22
iP i eLq M	Z Z E/ E/	15 11 13.8 14.7 23½ (45)	0.4	1.0	c		(Bismark Sea)
iP eS	Z E/	16 10 37.8 54	0.3	5.0	d	$1\frac{1}{4}°$	H=16 10 16
eiP i e(S)	Z Z N	16 42 43½ 48.1 44 31½	0.4	1.0	c	($9\frac{1}{2}°$)	H=16 40 (24)
iP	Z	20 32 26.1	0.5	2.0	d		Regional
iP iS	Z N	22 21 47.7 22 14.8	0.5	2.5	c	$2\frac{1}{4}°$	H=22 21 12
iP iS	Z N	22 46 57.2 47 07.4	0.3	1.0	c	$\frac{3}{4}°$	H=22 46 43

29th April: Strong microseismic activity between 282323 hours and 290600 hours.

			T sec	A mm	GM	Dist	Remarks
e	Z/	00 39 43			+		(Distant Shock)
iP eS	Z E/	01 44 29.5 45	0.4	3.0	c	$1\frac{1}{4}°$	H=01 44 08
iP	Z	03 27 20.0	0.5	2.0	d		Regional
e	Z/	03 37 38			-		(Distant Shock)
e	Z/	04 05 35½			-		Teleseism
e	Z/	06 22 31½			-		Traces
e	Z/	12 46 33			-		Traces
iP	Z	15 31 18.2	0.5	1.0	c		Regional
iP iS	Z N	15 52 44.6 50.6	0.4	2.0	c	$\frac{1}{4}°$	H=15 52 37
iP iS	Z N	15 53 41.5 47.4	0.4	2.8	c	$\frac{1}{4}°$	H=15 53 33
iP iS	Z E	17 42 43.6 49.0	0.4	1.0	d	$\frac{1}{4}°$	H=17 42 37
iP iS	Z N	18 41 26.1 47.6	0.4	1.0	d	$1\frac{3}{4}°$	H=18 40 58

RABAUL Contd.

30th April.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	00 25 58	0.3	2.0	c	$3\frac{1}{2}^\circ$	H=00 25 02
i	Z	26 03.3					
eS	E/	41					
iP	Z	02 56 05.0	0.3	2.0	c	2°	H=02 55 34
eS	N/	$28\frac{1}{2}$					
iP	Z	03 08 21.0	0.3	1.0	d	$2\frac{3}{4}^\circ$	H=03 07 38
iS	E	54.0					
iP	Z	03 10 23.0	0.4	4.0	d	$1\frac{1}{2}^\circ$	H=03 09 57
iS	N	43.3				In coda of preceding shock.	
eP	Z	05 08 14	0.4	1.0	c		Regional
iP	Z	05 09 41.4	0.5	1.8	d	(5°)	H=05 08 (26)
e(S)	E/	10 39				In coda of preceding shock.	
iP	Z	05 31 38.5	0.4	1.5	d	1°	H=05 31 20
iS	N	52.6					
eiP	Z	07 07 42	0.3	1.0	d	(3°)	H=07 05 (53)
i	Z	42.8					
e(S)	E	08 19					
e	Z/	08 24 53			+		Traces
iP	Z	12 53 24.7	0.3	13.0	d	$1\frac{1}{4}^\circ$	H=12 53 02
iS	N	42.1					
iP	Z	13 02 37.6	0.4	1.0	d	$1\frac{3}{4}^\circ$	H=13 02 08
iS	N	59.4					
eP	Z	17 02 13	0.5	1.0	d	$14\frac{1}{4}^\circ$	
i	Z	22.9					
eS	N/	04 52					
e	Z/	21 02 50			−		Traces
iP	Z	23 07 00.3	0.5	2.3	d	3°	H=23 06 14
eS	N/	35					
1st May:		L. P. drum speed reduced to 15mm/min.					
iP	Z	03 00 00.1	0.3	4.0	c	$2\frac{1}{4}^\circ$	H=02 59 23
i	Z	01.2					
iS	N	27.8					
eP	Z	04 03 $51\frac{1}{2}$	0.5	1.0	d	20°	
eS	E/	07 53					
eiP	Z	05 32 01	0.5	2.0	c	5°	H=05 30 47
i	Z	09.5					
eS	N	$57\frac{1}{2}$					
i	Z	06 44 11.5	0.5	4.0		Ship moving in harbour.	
F	Z	46 09					
eP	Z	07 28 $02\frac{1}{2}$	0.5	1.0	c		Teleseism
e	N/	38 20					
e(S)	N/	39 40					
e	N/	47 14					
iP	Z	08 02 31.1	0.5	1.0	d	$2\frac{1}{4}^\circ$	H=08 01 55
iS	N	58.5					
iP	Z	14 10 27.4	0.3	27.0	d	$4\frac{1}{4}^\circ$	H=14 09 23
iS	N	11 16.1					
iP	Z	15 03 57.5	0.3	1.5	d	$\frac{1}{2}^\circ$	H=15 03 44
iS	N	04 07.1					
eiP	Z	17 13 $11\frac{1}{2}$	0.5	1.0	d		Regional
i	Z	12.2					
eP	Z	17 48 26	0.5	1.0	d		Regional
i	Z	31.0					

RABAUL Contd.

1st May.

			T sec	A mm	GM	Dist	Remarks
iP	Z	18 38 15.6	0.4	2.5	c	$\frac{3}{4}^{\circ}$	H=18 38 00
iS	N	26.8					

2nd May: S. P. light bulb burnt out.
P phases read on SUL station test record.

			T sec	A mm	GM	Dist	Remarks
e(P)	Zh	02 55 03	0.3	1.0*	d	1°	H=02 54 47
iS	N	15.0					
eP	Z	09 14 17	0.5	1.0	c	$4\frac{1}{4}^{\circ}$	H=09 13 12
eS	N/	15 07					
iP	Zh	13 47 25.5	0.4	1.0*	d	2°	H=13 46 53
iS	N	50.0					
eP	Zh	17 11 20½	0.5	17.0*	d	5°	H=17 10 05
i	Zh·	21.0					
iS	N/	12 18.0					
eP	Zh	21 08 33	0.4	1.0*	d	$1\frac{1}{2}^{\circ}$	H=21 08 08
iS	E	52					

KERAVAT.

24th April.

			T sec	A mm	GM	Dist	Remarks
i(P)	Z	01 35 45.4	0.4	0.3	d		
i	E	50.8					
i	E	59					

Shock recorded at 0538 hours badly confused by microseisms.

			T sec	A mm	GM	Dist	Remarks
eP	Z	10 08 56	0.6	0.4	d	(3°)	H=10 08 (09)
i(S)	E	09 33.3					
iP	Z	11 34 43.4	0.2	0.8	d	$\frac{3}{4}^{\circ}$	H=11 34 30
iS	E	53.3					
eP	Z	12 08 44	0.7	0.3	d		Regional
iP	Z	16 43 46.2					H=16 43 22
iS	E	44 04.4					
iP	Z	18 28 39.4	0.4	0.5	d		Local
eiP	Z	18 53 17	0.5	4.2	d		Regional
i	Z	18.4					

25th April.

			T sec	A mm	GM	Dist	Remarks
eP	Z	07 04 03.0			c		(Regional)
iP	Z	08 03 32.8	0.2	1.2	c	$1\frac{1}{4}^{\circ}$	H=05 03 10
i	Z	49.6					
iP	Z	08 47 51.5				2°	H=08 47 20
i(S)	E	48 15.6					
iP	Z	12 17 00.2	0.2	0.8	c	$\frac{3}{4}^{\circ}$	H=12 16 45
iS!	E	11.8					
iP	Z	12 47 09.2			d	$1\frac{3}{4}^{\circ}$	H=12 46 40
iS!	E	31.4					
e(P)	Z	12 32 48	0.8	0.1	d		Teleseism
eP	Z	15 31 13	0.7	0.2	d		Regional
iP	Z	17 53 39.6	0.2	2.0	d	2°	H=17 53 (08)
i(S)!	E	54 04.0					

26th April.

Shock recorded at 0514 hpurs badly confused by microseisms.

			T sec	A mm	GM	Dist	Remarks
iP	Z	08 24 06.6			c	$2\frac{1}{4}^{\circ}$	H=08 23 52
iS	N	33.1					
iP	Z	08 43 33				$\frac{1}{2}^{\circ}$	H=08 43 23
i(S)	E	40					
iP	Z	10 11 34			c		Regional
i(P)	Z	11 31 02.1					Regional
iP!	Z	16 23 06.7	0.3	13.0	d	1°	H=16 22 48
iS!	E	20.8					
e	Z	17 06 49					Traces
e	Z	21 53 $04\frac{1}{2}$					C. B. M.
i	Z	16					Teleseism

27th April.

			T sec	A mm	GM	Dist	Remarks
e	Z	04 18					C.B.M. Regional
e(P)	Z	04 42 $07\frac{1}{2}$					Regional
i	Z	16					
iP	Z	05 54 $17\frac{1}{2}$			d	$1\frac{1}{4}^{\circ}$	H=05 53 55
iS	E	$34\frac{1}{2}$					
eP	Z	08 13 $08\frac{1}{2}$	1.2	0.5	c		Distant
i	Z	$10\frac{1}{2}$					

KERAVAT Contd/
27th April Contd.

			T sec	A* mm	GM	Dist	Remarks
e	Z	08 42 06					Teleseism
28th April.							
e	Z	07 48 29½					Teleseism C.B.M.
iP	Z	11 25 28				¾°	H=11 24 49
iS	E	26 19					
e(P)	Z	13 15 18			c	(3°)	H=13 14 (31)
i	Z	16½					
iS	E	54					
eP	Z	13 48 40				1°	H=13 48 20
iS	E	54					
iP!	Z	15 11 13½			c		Regional
iP!	Z	16 10 35½			d		Local
eP	Z	16 42 42½	0.8	0.3	d		Regional
i	E	58					
i	N	44 21					
i(P)	Z	22 21 52			d		Local C.B.M.
e(P)	Z	22 47 02				¾°	H=22 46 (47)
iS	E	13					C. B. M.
29th April.							
iP	Z	01 44 30			c	1¼°	H=01 44 08
iS	E	46½					
i	Z	03 27 17					Regional
eP	Z	15 31 21	0.7	0.3	c	5¾°	H=15 29 56
iS	E	32 26½					
30th April							
eiP	Z	00 25 57	1.0	1.5	c	3½°	H=00 25 01
iS	E	26 40					
eP	Z	02 56 06½	1.0	1.2	d	2°	H=02 55 35
iS!	E	30					
iP	Z	03 08 19	0.5	1.0	d	2¾°	H=03 07 39
iS	N	49					
e(P)	Z	05 09 40½			c	(3¾°)	H=05 08 (42)
iS	N	10 25					C. .B .M.
e	Z	05 32 40					Traces
iP	Z	07 07 40	0.6	1.9	c	(3¼°)	H=07 06 (50)
i	E	08 12					
i(S)	E	18					
iP!	Z	12 53 22½			d	1¼°	H=12 53 02
iS	E	37½					
eP	Z	13 02 35				1¾°	H=13 02 07
iS	N	56					
eP	Z	17 02 13½			c		Distant
i	Z	19					

ESA'ALA

The records from Esa'ala observatory , for the period from the 1?th March to the 16th April were not received in Rabaul until the 2 nd May. The readings for the last week of this period have been incorporated in this weeks bulletin. The readings for the earlier weeks will appear in later preliminary bulletins.

10th April,1967. L.P.Z time break circuit faulty till 15th April.

			T sec	A* mm	GM	Dist	Remarks
eiP	Z	05 01 15½			c	5½°	H=04 59 55 7½°S, 156°E Solomon Is.
i!	Z	16.4					
iS	N	02 17.0					
iP	Z	05 12 24.8	0.5	1.4	c		(Regional)
eP	Z	08 28 51½	0.6	1.0	d	5¼°	H=08 27 32 9°S, 155½°E Solomon Sea
iS	E	29 53					
eiP	Z	15 04 06			d		Teleseism
i!	Z	07.7					
e(P)	Z	15 43 10	1.0	0.4	c	(5¾°)	H=15 41(44)
iS	E	44 15.9					
e(P)	Z	16 57 52	1.2	0.4	c		(Regional)
e	Z	58 15					
iP	Z	18 04 15.1	0.7	2.8	d	6¼°	H=18 02 43 6°S, 156°E Solomon Sea.
iS	N	05 26.4					
eiP	Z	18 26 13			c	5¼°	H=18 24 53 9°S, 156°E Solomon Sea.
i!	Z	13.8					
eS	E	27 14½					
iP	Z	23 15 31.4	0.5	1.4	d	11½°	4°S. 141°E
iS	E	17 39.7					

11th April

			T sec	A* mm	GM	Dist	Remarks
iP	Z	03 14 43.6	0.4	2.5		5½°	H=03 13 22
iS	E	15 46.2					
iP	Z	04 54 19.0	0.4	0.5	c	5¼°	H=04 53 01 5°S, 156°E Solomon Is. Region
iS	N	55 19.4					
e(P)	Z	05 15 47	0.8	0.4	d		Teleseism
eP	Z	14 54 29.1	0.8	2.7	d	5½°	H=14 53 10
iS	E	55 30.9					
eP	Z	23 47 49½			c	5½°	H=23 46 29
i	Z	52.2					
iS	N	48 51.6					

12th April

			T sec	A* mm	GM	Dist	Remarks
eP	Z	02 02 04	0.5	0.5	d	9¾°	H=01 59 44
iS	N/	03 53					
eP	Z	04 36 05½	0.9	2.6	d	20¼°	
iS	E/	39 52.0					
eiP	Z	05 01 18	0.8	2.4	d	56½°	
i	Z	18.3					
iS	N/	09 05½					
eiP	Z	13 47 24½			c	5¼°	H=13 46 05
i!	Z	25.3					
iS	E	48 24.9					
eP	Z	13 56 05½			c		(Teleseism)
i!	Z	06.3					
iP	Z	14 05 51.1	0.4	1.5	d	5½°	H=14 04 30
iS	N	06 53.9					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
12th April contd.							
iP!	Z	14 53 11.8			c		(Teleseism)
iP	Z	18 46 28.3	0.4	1,0	d	5¼°	H=18 45 08
iS	E	47 28.9					
iP	Z	22 52 00.8	0.4	4.6	d	5°	H=22 50 44
iS	E	59.7					7½°S, 156°E
							Solomon Sea
eP	Z	23 23 35			c	5¼°	H=23 22 16
i	Z	35.8					7°S, 156°E
iS	E/	24 35.8					Solomon Sea
13th April							
iP	Z	17 19 13.9	0.5	3.0	d		Local
iP	Z	20 01 38.1	0.9	2.8	c		Regional
iP	Z	23 16 36.2	0.8	4.2	d	5°	H=23 15 19
iS	E/	17 34.8					
14th April							
iP!	Z	01 35 25.6			c		Local
eP	Z	10 25 56	1.0	0.6	d		(Regional)
eP	Z	14 42 31½			c	5¼°	H=14 40 05
i	Z	32.6					7°S, 156°E,
iS	N	43 32.0					Soloman Sea.
iP!	Z	17 44 43.7			d		Regional
iP	Z	17 46 42.6			d		(Aftershock)
iP	Z	22 24 22.2			d		Local
15th April.							
eP	Z	01 14 08	0.3	1.2	c	5¼°	H=01 12 50
eS	N/	15 08					
iP!	Z	07 43 30.5			c		Local
eP	Z	16 00 18½	1.5	0.5	d	22°	
eS	N/	03 46					
16th April.							
eP	Z	05 52 49			d	5¼°	H=05 51 30
i	Z	50.2					
eS	N	53 51½					
eP	Z	08 26 35			c	3½°	H=08 25 39
iS	E/	27 18					
eP	Z/	20 29 35			d	1½°	H=20 29 09
iS	E/	30 14.8				S.P.Z. traces overlapped edge of record.	

TABELE

			T sec	A* mm	GM	Dist	Remarks
18th April:		Nil recorded.					
19th April.							
iP	Zw	23 56 14	0.5	1.2	c		Local
i	Zw	16					
20th April.							
eP	Zw	06 03 39½	0.3	0.7	d		Local
21st April:		Nil recorded.					
22nd April.							
iP	Zw	15 39 27	0.6	2.0	d		Regional
i	Zw	40 11½					
iP	Zw	19 45 58	0.5	1.1	d		Regional
23rd April.							
i(P)	Zw	10 00 (09)	0.4	0.8	c		Regional
iP	Zw	12 14 29	0.5	1.5	c		Regional
i	Zw	15 21					
24th April.							
iP	Zw	18 53 45	0.4	2.0	c		Regional
25th April:		Nil recorded.					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
16th April.							
iP!	Z	08 26 09½			d		Regional
iP	Z	20 29 48½	0.5	2.2	d		Regional
i	Z	30 36½					
17th April.							
eiP	Z	18 11 36	0.4	0.4	d		Regional
i	Z	12 25½					

18th April: Continuous tremor between 0419 hours and 0453 hours. Average T=0.2, Average A*=1.6.

19th April: Continuous tremor between 2337 hours on the 18th and 0700 hours on the 19th April. Average T=0.3, Average A*=1.8.

			T sec	A* mm	GM	Dist	Remarks
eiP	Z	09 23 15	0.4	0.4	c		Regional
i	Z	24 00					
iP	Z	16 00 34½	0.4	1.0	c		Local
i(P)	Z	16 01 10½	0.4	0.6	c		Regional
i	Z	32					
i	Z	35½					

20th April: Continuous tremor between 2133 hours on the 19th and 0557 hours an the 20th. Average T=0.3, Average A*=1.1.

			T sec	A* mm	GM	Dist	Remarks
i(P)	Z	07 34 08			c		Regional
i	Z	49½					
21st April.							
eP	Z	08 19 13	0.4	0.3	d		Teleseism
i	Z	19½					
22nd April.							
eiP	Z	15 37 52	0.2	0.2	(d)		Regional
i	Z	36½					
eiP	Z	19 46 13	0.5	1.0	d		(Teleseism)
i	Z	22					
i	Z	31					
i	Z	59½					
iP	Z	20 14 06½	0.4	1.0	c		Local

G. A. M. TAYLOR
(A/Vulcanologist-in-Charge)

Central Observatory
RABAUL

5th May, 1967.

10 JUL 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY, RABAUL

RABAUL	(RAB)	From: 2nd May, 1967 To: 9th May, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	From: 30th April, 1967 To: 7th May, 1967.
ESA'ALA	(ESA)	From: 16th April, 1967 To: 30th April, 1967.
TABELE	(TBL)	No records received.
AGENAHAMBO	(AGE)	From: 22nd April, 1967 To: 29th April, 1967.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System				To sec.	Tg. sec.
S.P.	Maximum magnification	12,500 at	0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification	6,250 at	0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification	750 at	25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification	3,240 at	1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification	3,240 at	1.0 sec.	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. ~~0.6~~ ~~0.25~~

S.P.Z. Magnification 1,000.

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_W Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB the time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL the time signal is marked every minute on the records from a crystal chronometer and a second marks from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.

"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second; other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTRES:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalisation", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

1.5.67

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sed	A mm	GM	Dist	Remarks
RABAUL. 3rd May, 1967.							
eP	Z	05 06 18	0.4	2.8	c	$\frac{1}{2}^{\circ}$	H=05 06 08
iS	N	24.6					
iP	Z	06 26 47.1	0.4	8.0	d	$1\frac{3}{4}^{\circ}$	H=06 26 19
iS	N	27 08.0					
iP	Z	10 27 51.1	0.4	1.0	c	$\frac{3}{4}^{\circ}$	H=10 27 36
eS	E	28 02.5					
iP	Z	10 29 22.5	0.7	2.0	c	$\frac{3}{4}^{\circ}$	H=10 29 09
iS	E	32.0				In coda of preceeding shock.	
iP	Z	12 38 37.2	0.3	7.1	c		Regional
eP	Z	12 57 45$\frac{1}{2}$	0.4	1.0	d	$1\frac{1}{2}^{\circ}$	H=12 57 21
iS	N	58 03.5					
iP	Z	16 59 02.6	0.4	3.2	c	1°	H=16 58 45
iS	N	15.5					
eP	Z	17 29 38			c	$\frac{3}{4}^{\circ}$	H=17 29 22
iS	E	49.9					
eP	Z	18 47 32	0.6	2.0	d	$\frac{3}{4}^{\circ}$	H=18 47 17
iS	N	42.5					
iP	Z	19 14 16.8	0.6	8.0	c	1°	H=19 13 58
iS	E/	30.8					
eP	Z	23 10 37	0.5	1.0	d	$2\frac{1}{4}^{\circ}$	H=23 09 59
iS	N	56.4					C. B. M..
4TH May.							
iP	Z	04 55 56.9	0.4	3.1	d	2°	H=04 55 23
iS	N	56 23.2					
e	Z/	08 12 48			+		Traces
iP	Z	08 24 44.2	0.6	4.0	d		Regional
iP	Z	08 55 31.0	0.5	3.8	d	1°	H=08 55 13
iS!	N	43.5					
e	Z/	09 12 50			+		Traces
iP	Z	10 11 29.0	0.4	1.0	c	$4\frac{1}{2}^{\circ}$	H=10 11 20
iS	N	12 22.0					
i	N	25.9					
i	N	43.5					
eiP	Z	11 12 50	0.5	2.0	d		Regional
iP	Z	11 25 48.5	0.3	1.0	c	$1\frac{1}{4}^{\circ}$	H=11 25 25
iS	N	26 05.5					
iP	Z	12 07 33.0	0.4	5.0	c	$1\frac{1}{2}^{\circ}$	H=12 06 36
iS	N	51.8					
eiP	Z	13 34 07$\frac{1}{2}$	0.4	2.0	d	1°	H=13 33 40
iS	E	22.0					
eP	Z	15 02 25	0.5	1.0	c	$1\frac{1}{4}^{\circ}$	H=15 02 04
eS	N	39$\frac{1}{2}$					
iP	Z	16 23 25.2	0.7	4.0	c	$6\frac{1}{2}^{\circ}$	H=16 22 49
[illegible]	E	36.5					
[illegible]	N/	24 39.0					

			T sec	A mm	GM	Dist	Remarks
RABAUL.							
4th May Contd.							
eP	Z	16 50 23					Regional
5th May.							
iP	Z	01 00 04.0	0.4	2.0	c	$1\frac{1}{2}^{\circ}$	H=01 59 39
iS	E	23.0					
iP	Z	02 06 05.9	0.4	4.1	(d)	$1\frac{1}{2}^{\circ}$	H=02 05 39
iS	E	26.0					
eiP	Z	14 04 06	0.7	1.0	c		Regional
eiP	Z	15 02 $50\frac{1}{2}$	1.0	0.6	c	$1\frac{1}{2}^{\circ}$	H=15 02 34
iS	N/	05 09.0					
e	Z/	17 55 28			+		Traces
eP	Z	18 09 54	0.6	1.0	c	$2\frac{1}{4}^{\circ}$	H=18 09 27
iS	N	10 15.2					
eP	Z	18 38 20	0.4	0.8	d	$2\frac{1}{4}^{\circ}$	H=18 37 44
iS	N	47					
iP	Z	21 29 50.5		1.9	d	2°	H=21 29 16
iS	N	30 16.5					C. B. M.
i	E	26					
eP	Z	23 52 $41\frac{1}{2}$				$1\frac{3}{4}^{\circ}$	H=23 52 12
iS	N	53 03.2					
6th May.							
eP	Z/	07 44 42				$5\frac{1}{2}^{\circ}$	H=07 44 22
eS	E/	45 44					
M	N/	49 20					
e	Z/	09 37 14			–		Traces
eiP	Z	12 05 45	0.6	2.3	d	$1\frac{1}{2}^{\circ}$	H=12 05 21
iS	E	06 02.9					
iP	Z	12 47 19.0	0.4	12.0	d	$1\frac{1}{2}^{\circ}$	H=12 46 54
iS	N	38.1					
eP	Z	13 09 $16\frac{1}{2}$			c		(Teleseism)
eiP	Z	15 46 31	1.0	1.8	c	$3\frac{3}{4}^{\circ}$	H=15 45 32
i!	Z	32.5					
i	Z	44 .0					
iS	E/	47 16.0					
iP	Z	16 32 36.5	0.3	4.2	c	$3\frac{1}{2}^{\circ}$	H=16 31 42
iS	N	33 18.0					
7th May.							
iP	Z	02 53 16.0	0.4	4.2	c	$2\frac{1}{4}^{\circ}$	H=02 52 38
iS	N	44.9					
eP	Z	08 59 27			–	$1\frac{1}{4}^{\circ}$	H=08 59 06
iS	N	43.0					
iP!	Z	10 17 10.0			d	$\frac{1}{2}^{\circ}$	H=10 16 58
iS	Eo	19.0					Main Shock, felt Rabaul Int. III.
iP	Z	10 22 01.0			d		Aftershock, in coda of main shock
iP	Z	10 23 12.0			d		Aftershock, in coda of main shock.
iP	Z	10 29 58.0	0.7	4.0	d		In coda of Main shock.
iP	Z	11 59 37.0	0.7	2.0	d	$1\frac{1}{4}^{\circ}$	H=11 59 13
iS	E	54.5					
iP	Z	16 20 00.6	0.3	9.0	d	1°	H=16 19 41
iS	E	15.2					(Aftershock)
iP	Z	18 14 06.0	0.5	4.0	d	$\frac{3}{4}^{\circ}$	H=18 13 52
iS	E	16.3					

			T sec	A mm	GM	Dist	Remarks
RABAUL.							
7th May.							
iP	Z	23 42 16.5	0.3	22.0	d	1°	H=23 41 59
iS	N	29.5					
8th May.							
eP	Z	00 52 43½	0.4	5.0	d	1¼°	H=00 52 23
iS	E	58.0					
eP	Z	07 24 41			c		(Teleseism)
iP	Z	18 52 26.1	0.6	5.0	c		Regional
iP	Z	23 09 15.5	0.7	5.1	c	2½°	H=23 08 33
iS	N	47.0					
9th May:		L.P. records unreadable due to faulty developement.					
iP	Z	00 04 04.8	0.3	30.8	d		Regional
iP	Z	01 23 07.9	0.4	4.0	c	1¼°	H=01 22 45
iS	N	24.8					
eP	Z	06 23 33	1.0	2.0	c		Teleseism
eP	ZO	09 04 16	1.0	3.0	c	6¼°	H=09 03 43
iS	E	05 27.8					
eiP	Z	16 01 56½	0.8	1.0	d	¼°	H=16 01 49
iS	E	02 01.0					
iP	Z	20 59 14.0	0.3	4.1	c	2½°	H=20 58 32
iS	E	46.0					
eP	Z	21 35 36	1.0	1.0	d	3°	H=21 34 05
iS	E	36 10.1					

KERAVAT.

Time breaks intermittent due to faulty chronometer relay. Shocks read to nearest minute unless shown otherwise.

			T sec	A* mm	GM	Dist	Remarks
30th April.							
iP	Z	23 06			c		Regional
1st May.							
eP	Z	01 29 29½	0.8	0.6	c		Local
eP	Z	02 20					Regional
iP	Z	02 59	0.3	5.8	c		Regional
eP	Z	04 03 40	2.0	0.4	c		Distant shock
eP	Z	05 31					Regional C.B.M.
iP	Z	14 10	0.4	1.0	c		Regional
e	Z	16 11					Regional
ei	Z	17 12					Regional
eP	Z	17 48	0.6	0.2	c		Regional
e	Z	17 57					Regional
i	Z	58					
e	Z	18 38					Regional
e	Z	20 31					Regional
2nd May.							
e	Z	02 55					Regional C.B.M.
i	E	19.0					
e(P)	Z	09 14 13½					Regional C.B.M.
eP	Z	13 47 25½	0.6	0.4	d	2°	H=13 46 56
iS	N	48					
eP	Z	13 55					Local C.B.M.
iS	E	56 00½					
eP	Z	15 58 20	0.4	0.2		1½°	H=15 58 54
iS	N	40					
iP	Z	17 11 19½	1.0	21.6	d		Regional
e(P)	Z	17 44 08					Regional
eP	Z	19 26 06½			d		Local
iP	Z	21 08 32			d	1°	H=21 08 11
iS	N	47					C. B. M.
3rd May.							
eP	Z	09 27 52½	0.4	0.2	c	(8°)	H=09 25 (54)
eS	N	29 (23½)					
eP	Z	11 57 42½				1¼°	H=11 57 21
iS	E	58½					
eP	Z	15 59 05½	0.7	0.5	c	1¼°	H=15 58 44
iS	E	21½					
iP	Z	16 29 35½	0.2	1.5	c	1°	H=16 29 18
iS	E	46½					
eP	Z	17 47 32	0.6	0.3	c	1°	H=17 47 17
iS	E	43					
iP	Z	19 13 18	0.2	1.4	c		
4th May:		Z component no record due to lamp failure.					
i	E	04 55 56					Regional
i(S)	N	56 (16½)					
e	E	08 55 30					Local
i[illegible]	E	40½					

KERAVAT.

4th May Contd.

			T sec	A* mm	GM	Dist	Remarks
e	E	10 11 33					Regional
i(S)	E	12 18					
e	N	11 12 48½					Regional
i	E	11 25 03					Local
e	E	12 07 29½					Local
i(S)	E	42					
e	E	13 34 07					Local
i	E	15 02 35½					Local
e	E	16 23 18½					Regional
e	E	16 50 27½					Regional
e	N	17 47 17					Regional

5th May.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	01 00 22	0.6	9.4	c		Regional
eP	Z	14 04 06	1.0	0.3	d		Regional
eP	Z	15 02 51	1.2	0.3	c		Regional
eP	Z	18 09 51½			d	(1½°)	H=18 09 (26)
i(S)	E	10 10½					
e	Z	18 38 19			c		Regional
iS	E	42					
e(P)	Z	20 30 50			c	3½°	H=20 29 57
iS	E	32					

6th May: No record due to faulty chronometer relay and service interruption.

7th May: Clock error unknown.

			T sec	A* mm	GM	Dist	Remarks
i(P)	Z	02 53 11					Regional C.B.M.
i(S)	E	37					
e	Z	08 59					Regional
iP	Z	11 59 31			d		Local
iS	E	47					
iP!	Z	10 17 10					
iP	Z	16 19 55			d		Local
iP	Z	23 42			d		Local

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
17th April, 1967.							

L.P.Z faultt time break circuit from the 19th onwards till the end of the month.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	11 21 57.2	1.6	3.4	d	($22\frac{1}{2}^{\circ}$)	
i(S)	N/	25 04.0					
eP	Z	18 11 $29\frac{1}{2}$	0.5	0.4	c	$3\frac{1}{4}^{\circ}$	H=18 10 39
eS	N	12 $07\frac{1}{2}$					
eP	Z	23 22 $53\frac{1}{2}$	0.4	0.3	c	$3\frac{1}{4}^{\circ}$	H=23 22 04
iS	E	23 32.3					
18th April							
eP	Z	00 41 $15\frac{1}{2}$	0.5	0.5	d	$5\frac{1}{4}^{\circ}$	H=00 39 58
eS	E	42 $15\frac{1}{2}$					
19th April							
iP	Z	03 30 $12\frac{1}{2}$	0.4	0.9	d	$4\frac{3}{4}^{\circ}$	H=03 30 03
eS	N	31 $07\frac{1}{2}$					
eP	Z	04 22 $51\frac{1}{2}$	0.5	0.2	d	4°	H=04 21 51
eS	N	23 38					
iP	Z	06 49 35.4			c	$3\frac{3}{4}^{\circ}$	H=06 48 38
iS	E	50 19.4					
eP	Z	09 24 $03\frac{1}{2}$	0.8	0.4	d	$3\frac{1}{2}^{\circ}$	H=09 23 07
iS	N	46.4					
eP	Z	16 01 $26\frac{1}{2}$	0.7	0.3	d	4°	H=16 00 23
iS	N	02 14.8					
eiP	Z	16 35 47	0.4	0.3	c	5°	H=16 34 30
i	Z	48.0					
iS	N	36 45.8					
20th April							
iP!	Z	00 07 03.9			c	$20\frac{3}{4}^{\circ}$	~~22°S, 166½°E New Hebrides Is. Region.~~
iS	N	10 50.0					
eiP	Z	03 46 46			c	$\frac{1}{4}^{\circ}$	H=03 03 38
i!	Z	46.5					
iS!	N	51.8					
iP	Z	07 34 21.6	0.5	1.6	c	$4\frac{1}{2}^{\circ}$	H=07 33 16
iS	N	35 11.6					
21st April							
eiP	Z	08 19 $37\frac{1}{2}$			c	28°	
i	Z	40.4					
iS	E/	24 02.7					
iP	Z	10 11 29.1	0.2	0.6	c	$5\frac{1}{2}^{\circ}$	H=10 10 07
eS	E	12 32.9					
eP	Z	11 26 34	1.0	0.7	d	28°	
eS	N/	29 $56\frac{1}{2}$					
iP!	**Z**	**14 48 13.5**			**c**		**Local**
22nd April							
iP!	Z	00 00 24.5			c		Local
iP!	Z	02 28 52.6			c		Local
eiP	Z	08 42 39	0.6	3.2	c	26°	
i	Z	40.9					
iS	N/	47 05.0					
eP	Z	11 59 53	0.8	1.4	c		Regional
eP	Z	13 17 $15\frac{1}{2}$	0.7	0.7	c		Regional
[illegible]	Z	15 38 $29\frac{1}{2}$			d	5°	H=15 37 13
[illegible]	[illegible]	39 28					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
22nd April contd.							
eP	Z	17 33 49½	1.1	1.6	d		Regional
eiP	Z	19 46 40	1.0	1.4	d	20¼°	25°S, 163°E
eS	E	50 28½					approx.
eP	Z	20 14 03½	0.4	0.4	d	5°	H=20 12 47
eS	E	15 02½					
23rd April							
eP	Z	01 12 27	0.4	0.8	c	4½°	H=01 11 21
i(S)	E	13 17.6					5°S. 152°E
						Near Nth. Coast New Britian.	
eiP	Z	12 14 17	0.3	1.6	c	4½°	H=12 13 09
i	Z	17.1					Huon Gulf
iS	N	15 08.0					6°S, 147°E
eP	Z	12 56 34½	0.7	1.2	d		Regional
eP	Z	17 57 55	1.0	0.6	d	48°	
eS	N/	18 03 54					
eP	Z	18 22 57½	0.8	0.3	d	2½°	H=12 22 19
iS	N	23 26½					
24th April		L.P. E/W component recording intermitantly.					
iP	Z	00 50 47.3	0.3	1.1	d	5¼°	H=00 49 43
iS	E	51 36.8					
eP	Z	02 53 26	1.0	0.2	c		(Regional)
eP	Z	18 27 24	0.6	0.2	d		(Regional)
iP!	Z	18 53 21.3			d	4°	H=18 52 20
iS!	N	54 08.4					6°S, 148°E
							Vitiaz Strait
25th April							
eP	Z	04 30 32	0.8	0.4	c		Regional
eP	Z	07 04 02½	0.8	0.4	c		(Regional)
iP	Z	12 47 43.5	0.5	5.4	d	4½°	H=12 46 39
iS!	E	48 31.1					6°S, 151°E
						Sth. Coast New Britian.	
iP!	Z	13 30 26.3			d		(Deep Shock)
eP	Z	17 54 02½	0.7	0.2	c	3½°	H=17 53 08
iS	E	44.5					
eiP	Z	22 56 05½			d	1°	H=22 55 47
i!	Z	05.9					
iS	N	19.0					
26th April							
eP	Z	13 20 39	0.4	0.4	d	7½°	H=13 18 88
eS	E	22 05					
iP	Z	17 07 59.8					
eS	N	08 09.8					
27th April							
eP	Z	08 13 09½	0.6	0.3	c	(15¾°)	
i	Z	19.9					
e(S)	N/	16 09					
28th April							
eP	Z	07 22 26	1.0	0.7	d		Regional
eP	Z	07 48 0[illegible]	1.[illegible]	1.[illegible]	d		Regional

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
28th April contd.							
eP	Z	15 13 37½			d		Teleseism
29th April							
eP	Z	03 04 52	1.0	1.0	c		Regional
eP	Z	04 06 07½	0.9	1.4	c		Regional
30th April							
iP	Z	00 25 58.5	0.3	3.0	d	$2\frac{3}{4}^{\circ}$	H=00 25 14
iS	E	26 32.5					
iP	Z	07 07 51.9	0.3	3.5	d	$3\frac{1}{2}^{\circ}$	H=07 06 58
iS	N	08 32.6					
iP	Z	13 25 32.5			d		Regional
i	Z	34.5					
eP	Z	17 02 21	1.0	0.4	c	20°	
i	Z	31.8					
eS	N/	05 24					

AGENAHAMBO

			T sec	A* mm	GM	Dist	Remarks
22nd April:	Nil recorded.						
23rd April.							
iP	Z	01 12 41	0.5	2.0	(d)		Regional
i	Z	13 40					
eiP	Z	12 13 54	0.2	0.5	c		Regional
i	Z	57					
i	Z	14 23½					
i	Z	32½					
eiP	Z	17 40 47	0.4	1.2	(c)		Regional
i	Z	34½					
i	Z	37					
eP	Z	17 57 59	1.0	0.3	d		Local
eiP	Z	18 22 17	0.4	1.0	d		Regional
i	Z	32½					
i	Z	23 12					
24th April.							
eiP	Z	00 50 27½	0.3	1.1	d		Regional
i	Z	51 (00½)					

Intermitent tremor between 2154 hours and 0912 hours.
Average T=0.4, Average A*=1.7.

			T sec	A* mm	GM	Dist	Remarks
eiP	Z	10 09 10	0.3	1.6	c		Local
i	Z	48½					
i	Z	50					
iP	Z	19 53 02½	0.4	28.0	c		Regional
i	Z	50					

25th April: Continuous tremor between 0207 hours and 0215 hours.
Average T=0.2, Average A*=1.3.

Intermitent tremor between 0302 hours and 0919 hours.
Average T=0.3, Average A*=1.3.

			T sec	A* mm	GM	Dist	Remarks
eiP	Z	12 47 44	0.2	0.9	d		Regional
i	Z	47					
i	Z	48 32					
i	Z	[illegible]					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
25th April Contd.							
eiP	Z	17 54 11	0.3	0.3	c		Regional
i	Z	51					

26th April: Intermitent tremor between 2157 hours and 0800 hours. Average T=0.4, Average A*=1.5.

eiP	Z	17 07 25½	0.5	0.8	d		Regional
i	Z	08 14½					

Intermitent tremor between 2150 and 2400 hours. Average T=0.2, Average A*=1.3.

27th April: Intermitent tremor between 2400 hours and 0828 hours. Average T=0.3, Average A*=1.3.

28th April: Nil recorded.

29th April: Nil recorded.

R. F. Heming.
(A/Vulcanologist-in-Charge.)

Central Observatory
RABAUL

12th May, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 10 th May, 1967 To: 16th May, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	From: 8th May, 1967 To: 10th May, 1967.
ESA'ALA	(ESA)	From: 1st April, 1967 To: 9th April, 1967.
TABELE	(TBL)	From: 26th April, 1967 To: 9th May, 1967.
AGENAHAMBO	(AGE)	From: 30thApril, 1967 To: 6th May, 1967.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System

		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

Seismometer	Recorder	To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

	To sec.	Tg. sec.
Attenuator setting 1/10, drum speed 60 mm/min.	0.6	0.25

S.P.Z. Magnification 1,000.

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

Seismograph	Recorder	To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_W Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB the time signal is marked every minute on the records from a crystal chronometer and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL the time signal is marked every minute on the records from a crystal chronometer and a second marks from Radio VNG Australia daily.

DIRECTION OF MOTION:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type.

"+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N,E,S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

ACCURACY OF READINGS:

When readings are given with a decimal figure they are to one-tenth of a second; other readings have been made to the nearest half second.

CRUSTAL PHASES:

Px, Sx Crustal phases other than Pn and Sn for local and near earthquakes.

FELT INTENSITY:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

DETERMINATIONS OF EPICENTRES:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

GEOGRAPHICAL DESIGNATION OF EPICENTRES:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A Proposed Basis for Geographical and Seismic Regionalisation", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

1.5.67

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL			T sec	A mm	GM	Dist	Remarks
10th May, 1967.							
e iP iS	Z/ Z N	03 49 10 05 06 23.0 29.0	 0.3	 4.0	+ c	 $\frac{1}{4}^{o}$	Traces H=05 06 15
iP iS	Z E/	07 38 50.0 39 24.0	0.5	3.0	d	3^{o}	H=07 38 05
iP iS	Z N	11 37 48.0 59.5	0.4	1.6	d	$\frac{3}{4}^{o}$	H=11 37 33
eiP i	Z Z	12 38 30 31.4	0.5	1.0	c		Regional
eP	Z	13 32 05	0.8	1.0	d		Regional Deep
iP iS	Z N	14 12 19.3 39.8	0.3	2.8	c	$1\frac{1}{2}^{o}$	H=14 11 57
e	Z/	15 45 34			–		Traces
iP	Z	17 47 47.0	0.5	2.0	c		Regional
e	Z/	17 57 14			+		Traces
iP iS	Z N	18 29 05.3 15.5	0.4	1.2	c	$\frac{1}{2}^{o}$	H=18 28 59
iP iS	Z N	21 02 30.8 37.0	0.3	2.0	c	$\frac{1}{4}^{o}$	H=21 02 23
iP iS	Z N	21 37 50.8 57.0	0.3	08.0	c	$\frac{1}{4}^{o}$	H=21 37 43
11th May S.P.E/W power failure from 11 0634 - 11 23 14hours							
iP iS	Z N	01 02 12.8 36.0	0.4	2.0	c	2^{o}	H=01 01 42
iP iS	Z N	02 08 56.0 09 16.0	0.2	3.2	d	$1\frac{1}{2}^{o}$	H=02 08 30
eiP i iS	Z Z N	02 31 03$\frac{1}{2}$ 08.8 49.8	0.3	1.8	d	4^{o}	H=02 30 01
iP iS	Z N	04 52 53.4 59.4	0.3	10.0	$\frac{1}{4}^{o}$	H=04 52 45	
iP iS	Z N	06 10 36 11 03	0.4	13.0	c	$2\frac{1}{2}^{o}$	H=06 09 57
iP iS	Z N	13 [illegible] 28.2 40.0	0.2	2.0	c	1^{o}	H=13 39 12
e(P)	Z	15 03 29$\frac{1}{2}$	0.5	1.0	d		Distant shock
eP eS	Z N/	15 24 08$\frac{1}{2}$ 28 00	0.5	1.0	d	21^{o}	
iP iS	Z N	23 13 40.8 59.0	0.4	15.0	c	$1\frac{1}{2}^{o}$	H=23 13 17

RABAUL

			T sec	A mm	GM	Dist	Remarks
12th May							
iP iS	Z N	00 52 31.8 45.0	0.4	6.0	c	$\frac{3}{4}^{\circ}$	H=00 52 17
iP i(S)	Z E	04 29 44.0 30 20.0	0.4	4.0	c	(3°)	H=04 28(57)
iP iS	Z N	11 35 35.5 47.6	0.4	1.0	c	1°	H=11 35 19
eP iS	Z N	12 14 07 23.0	0.4	1.0	c	$1\frac{1}{4}^{\circ}$	H=12 13 46
iP	Z	12 25 11.5	0.5	1.8	c		Regional
iP	Z	12 25 11.5	0.5	1.8	d		Regional
iP iS	Z N	15 27 56.6 28 15.0	0.4	1.0	c	$1\frac{1}{2}^{\circ}$	H=15 27 31
eP	Z	17 07 20	0.4	1.0	c		Regional
iP iS	Z N	17 45 55.0 46 10.5	0.3	1.8	d	$1\frac{1}{4}^{\circ}$	H=17 45 34
iP i iS	Z Z E	18 03 06.0 06.5 56.3	0.5	2.0	c	$4\frac{1}{4}^{\circ}$	H=18 02 01
eP iS	Z N	18 49 00$\frac{1}{2}$ 11.5	0.3	1.0	d	$\frac{3}{4}^{\circ}$	H=18 48 45
eiP i iS	Z Z E	19 08 34 40.0 09 22.0	0.4	1.0	d	4°	H=19 07 31
e	Z/	19 31 42			+		Traces
13th May.							
eP	Z	03 02 49	0.3	1.0	d		Regional, (Deep)
iP eS	Z E/	05 40 58.3 41 38	0.4	2.1	d	$3\frac{1}{2}^{\circ}$	H=05 40 06 C. B. M.
iP iS	Z N	06 34 05.1 24.4	0.5	4.0	c	$1\frac{1}{2}^{\circ}$	H=06 33 40
e	Z/	07 08 06			–		Traces
iP iS	Z N	13 03 28.0 48.5	0.4	4.8	d	$1\frac{1}{2}^{\circ}$	H=13 03 06
iP eS	Z N/	16 07 42.5 08 10	0.4	6.0	c	$2\frac{1}{4}^{\circ}$	H=16 07 07
14th May.							
iP	Z	07 09 58.7	0.3	24.0	d		Regional
iP iS	Z N	10 37 41.5 38 07.3	0.4	2.0	c	2°	H=10 37 07
eiP i eS	Z Z N/	12 26 55 27 05.8 29 08	0.5	1.0	d	12°	
eiP i iS	Z Z E	14 38 41$\frac{1}{2}$ 42.0 39 13.2	0.3	1.0	d	$2\frac{1}{2}^{\circ}$	H=14 37 59
i F	Z Z	14 49 39 15 03 52	0.6	3.0			Ship moving in harbour.
iP iS	Z N	15 36 28.0 45.0	0.5	1.8	d	$1\frac{1}{4}^{\circ}$	H=15 36 05
iP iS	Z N	20 07 37.0 46.5	0.4	1.0	d	$\frac{1}{2}^{\circ}$	H=20 07 25

RABAUL

			T sec	A mm	GM	Dist	Remarks
14th May contd.							
iP	Z	22 53 19.3	0.4	2.5	d	$1\frac{1}{2}^{\circ}$	H=22 52 51
iS	N	40.5					
15th May							
e	Z/	01 04 48			–		Teleseism
eP	Z	02 34 $11\frac{1}{2}$	0.5	1.0	c		Teleseism
eS	N/	40 38					
eP	Z	09 11 08	0.5	1.0	d		Regional
eP	Z	12 58 54	0.6	1.0	d	$(7\frac{1}{2}^{\circ})$	H=12 57 (05)
i	Z	58.0					
e(S)	N/	13 00 18					
i	Z	14 13 27	0.6	2.5		Ship moving in harbour.	
F	Z	32 57					
iP	Z	15 59 56.2	0.5	4.0	c	2°	H=15 59 24
iS	N	16 00 20.2					
iP	Z	16 38 56.8	0.4	1.0	d	$1\frac{1}{2}^{\circ}$	H=16 38 33
iS	N	39 15.0					
iP	Z	22 24 27.8	0.4	3.0	d	$1\frac{1}{2}^{\circ}$	H=22 24 04
iS	E	43.0					
16th May		Strong microseismic activity between 15 2347- 16 1800 hours					
iP	Z	06 19 50.8	0.5	0.5	c	$6\frac{1}{2}^{\circ}$	H=06 18 14 C.B.M.
eS	E/	21 06					
e	Z/	08 56 04			+		Traces
iP	Z	09 30 36.0	0.3	23.2	d	1°	H=09 30 20 C.B.M.
eS	N/	48					
iP	Z	19 11 21.8	0.4	2.3	d	$1\frac{3}{4}^{\circ}$	H=19 10 53
iS	N	45.3					
e	Z/	19 31 04			–	Traces.	

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
1st April, 1967.							
eP	Z	06 03 50	0.7	0.4	d		Regional
eiP	Z	12 33 $06\frac{1}{2}$	0.7	0.8	d		(Teleseism)
i	Z	07.4					
2nd April							
eP	Z	03 23 $03\frac{1}{2}$	1.3	1.2	c	3°	H=02 21 07
eS	E/	24 34					
iP!	Z	17 41 33.5			d	$(3\frac{1}{2}^{\circ})$	H=17 40(40)
i(S)	E/	42 14.6					
iP	Z	19 58 07.2	0.2	0.3	c	$3\frac{3}{4}^{\circ}$	H=19 57 09
iS	N/	51.9					
iP	Z	22 28 37.5	0.3	0.4	c	$2\frac{1}{2}^{\circ}$	H=22 27 55
iS	N	29 10.0					
3rd April							
eP	Z	08 05 $11\frac{1}{2}$	0.7	0.9	d	$9\frac{1}{4}^{\circ}$	
i	Z	14.0					
iS	E/	06 58.0					
eP	Z	13 05 36	1.0	0.4	d		Teleseism
eP	Z	15 54 52	0.7	0.6	d		Regional
iP	Z	18 59 01.2	0.3	1.5	d	$\frac{1}{4}^{\circ}$	H=18 58 15
iS	N	09.7					
4th April							
eP	Z	00 40 48	1.0	0.3	c	(26°)	~~3°S, 159°E~~
e(S)	E/	44 48					~~(West Irian)~~
eP	Z	07 51 $23\frac{1}{2}$	1.0	0.9	d		(Regional)
iP	Z	18 29 48.9	0.2	2.1	c	$5\frac{1}{2}^{\circ}$	H=18 28 27
iS	N	30 52.5					4°S, 153°E
						Nth.	Coast New Britian
5th April							
iP	Z	01 50 26.4			c		Local
iS!	N	30.8					
eP	Z	02 40 14	1.0	0.3	d	32°	
eS	N/	45 11					
iP	Z	05 45 40.6	0.2	1.7	c	$5\frac{1}{2}^{\circ}$	H=05 44 17
iS	N	46 45.0					
eP	Z	06 40 $46\frac{1}{2}$	0.5	0.3	d		Regional
eP	Z	12 22 10	0.6	0.3	d	$3\frac{1}{2}^{\circ}$	H=12 21 15
iS	N	51.9					$6\frac{1}{2}^{\circ}$S, 152°E
						Nth.	Coast New Britian
eP	Z	12 33 $56\frac{1}{2}$	0.8	0.4	d	$3\frac{3}{4}^{\circ}$	H=12 32 59
i	Z	34 02.6					$7\frac{1}{2}^{\circ}$S, 153°E
iS	E	40.3				Nth.	Coast New Britian
eP	Z	13 04 $37\frac{1}{2}$	0.7	0.5	d	$3\frac{1}{2}^{\circ}$	H=13 04 18
eS	E	05 20					$6\frac{1}{2}^{\circ}$S, 151°E
						Nth.	Coast New Britiam
iP	Z	14 20 33.2			c		Local
6th April		L.P.Z faulty time break circuit					
eP	Z	02 42 $27\frac{1}{2}$	0.5	0.2	c		(Regional)
eP	Z	06 25 $49\frac{1}{2}$	0.4	0.3	c		(Regional)
[illegible]	Z	08 57 59	0.8	0.3	d		Regional

ESA'ALA

6th April contd.

			T sec	A mm	GM	Dist	Remarks
eP	Z	09 15 03	0.7	0.4	d		(Regional)
iP	Z	12 02 03.5	0.3	7.6	d	3½°	H=12 01 07
iS!	E/	46.9					
eP	Z	12 28 05½	0.5	0.8	c		Regional
eP	Z	13 29 08½	0.2	0.2	c	3¾°	H=13 28 10
iS	N	52.9					
iP!	Z	13 51 46.0			c		Local
iS	E	50.9					
eP	Z	14 22 16	0.3	0.1	c	4½°	H=14 21 10
i	Z	22.9					
iS	N	23 06.3					
eP	Z	14 44 06	0.3	0.2	d	4°	H=14 43 01
iS	E	50.8					
iP	Z	17 30 55.5			c	¾°	H=17 31 41
iS!	E	31 05.9					
eP	Z	20 58 46½	1.0	0.4	d		Regional
eP	Z	23 37 12	0.6	0.3	d		(Regional)
eP	Z	23 40 33½	1.4	1.0	c		(Regional)

7th April.

			T sec	A mm	GM	Dist	Remarks
eP	Z	08 16 54½	0.6	0.2	c	3½°	H=08 15 58
eS	N	17 38					
eP	Z	08 45 44½	0.6	0.4	c	2°	H=05 45 11
i	Z	46.9					
iS	E	46 08.3					
eP	Z	09 10 03	0.3	0.3	c	1½°	H=09 09 35
eS	N	24½					
eP	Z	10 39 15	0.4	0.3	d		(Regional)

8th April.

			T sec	A mm	GM	Dist	Remarks
eP	Z	05 40 51	1.0	1.8	c		
eP	Z	17 37 03	0.5	0.7	c	5½°	H=17 35 41
i	Z	14.1					
eS	E	38 06					

9th April.

			T sec	A mm	GM	Dist	Remarks
eP	Z	00 08 55	0.7	0.4	c	16¼°	
iS	N/	12 04.0					
i(PcS)	E/	15 54.0					
iP	Z	01 51 25.8	0.4	1.2	d	3¼°	H=01 50 30
iS	N	52 04.2					
eP	Z	05 59 43	0.7	5.9	c	2¼°	H=05 58 24
i	Z	43.4					
iS	E	06 00 43.9					
eP	Z	08 03 06	0.8	0.6	c	3¼°	H=08 02 16
iS	E	44					
eP	Z	08 30 45	0.4	0.8	d	5½°	H=08 29 23
i	Z	47.0					
iS	N	31 47.7					
eP	Z	08 58 04	0.5	0.4	c	(7°)	H=08 56 (23)
i	Z	05.4					
i(S)	N/	59 21.9					
eP	Z	17 46 33½	0.6	0.3	d		Regional
i	Z	34.7					
eP							

ESA'ALA.
9th April, Contd.

			T sec	A* mm	GM	Dist	Remarks
eP iS	Z N/	18 52 18 53 33.9	0.7	0.8	d	$6\frac{1}{2}^{o}$	H=18 50 40
eP iS	Z N	19 24 09 25 05.3	0.5	0.8	d	$4\frac{3}{4}^{o}$	H=19 22 56
iP iS	E/ E/	21 19 57 21 00				$5\frac{1}{2}^{o}$	H=21 18 35 Part of shock lost at the end of record.

KERAVAT
8th May.

			T Sec	A* mm	GM	Dist	Remarks
eP e i(S)	Z Z E	18 52 $24\frac{1}{2}$ $26\frac{1}{2}$ $40\frac{1}{2}$	1.0	0.4	c	$(1\frac{1}{4}^{o})$	H=18 52 (03)
i(P) iS	Z E	20 47 56 48 18			d	$(1\frac{3}{4}^{o})$	H=20 47 (27) C. B. M.
e(P)	Z	23 08 $11\frac{1}{2}$					C.B.M.
9th May.							
iP	Z	00 04 06			d		Regional
iP iS	Z E	01 23 06 $18\frac{1}{2}$				1^{o}	H=01 22 48
e(P)	Z	10 26 19			d		Regional
e(P)	Z	16 01 57			d		Regional
e(P)	Z	20 59 12					Regional C.B.M.
e(P)	Z	21 35 $35\frac{1}{2}$					Regional C.B.M.
10th May.							
eP iS	Z E	07 38 46 39 06				$1\frac{1}{2}^{o}$	H=07 38 19 C. B. M.
iP eS	Z E	12 38 $27\frac{1}{2}$ 43				$1\frac{1}{4}^{o}$	H=12 38 06 C. B. M.
e(P) iS	Z E	14 12 26 $43\frac{1}{2}$				$(1\frac{1}{2}^{o})$	H=14 12 (02) C. B. M.
e i	Z E	21 02 43					C. B. M. Regiona
e(P) iS	Z E	21 37 $51\frac{1}{2}$ 38 02				(1^{o})	H=21 37 (35)
eP iS	Z E	23 14 46 15 12				$2\frac{1}{4}^{o}$	H=23 14 12

NOTE: STATION CLOSED DOWN ON 11th MAY FOR MAINTAINANCE.

TABELE.

					T sec	A* mm	GM	Dist	Remarks
26th April.									
iP	Zw	17	07	19½	0.3	9.0	c		Regional
i	Zw			34½					
i	Zw			37½					
i	Zw			40½					
i	Zw			59					
27th April.									
eP	Zw	08	11	47	0.5	0.3	(d)		Teleseism
i	Zw			57					
i	Zw		12	11					
i	Zw			32					
i	Zw		13	14½					
i	Zw			54½					
i	Zw		14	00½					
28th April.									
iP	Zw	18	51	44½	0.4	2.5	c		Local
i	Zw		52	20					
29th April:	Continuous tremor between 1653 hours and 1709 hours associated with heavy rain. Average T=0.3, Average A*=1.2.								
30th April.									
e(P)	Zw	17	00	(48)	0.5	0.6	c		Teleseism
i	Zw		01	22½					
i	Zw			37½					
i	Zw		02	05½					
i	Zw			44½					
i	Zw			55½					
1st May:	Nil recorded.								
2nd May.									
iP	Zw	17	11	04	0.6	14.5	d		Regional
i	Zw			09½					
i	Zw			17½					
i	Zw			45					
i	Zw			58½					
3rd May:	Nil recorded.								
4th May.									
iP	Zw	12	33	33	0.4	2.0	c		(Regional)
i	Zw			46½					
i	Zw			55					
i	Zw		34	10					
i	Zw			22					
eiP	Zw	15	22	51½	0.3	1.9	c		(Regional)
i	Zw			52					
i	Zw		23	02					
i	Zw			20					
i	Zw			31					
i	Zw			39					
eiP	Zw	15	50	49	0.2	1.1	d		(Regional)
i	Zw			49½					
5th May.									
iP	Zw	14	02	31½	0.4	1.8	c		Regional
i	Zw			37½					
i	Zw			40½					
i	Zw		03	08½					
i	Zw			12					

TABELE.

			T sec	A* mm	GM	Dist	Remarks

6thMay: Nil recorded.

7th May: Nil recorded.

8th May: Nil recorded.

9th May: Nil recorded.

AGENAHAMBO.

			T sec	A* mm	GM	Dist	Remarks

30th April.

			T sec	A* mm	GM	Dist	Remarks
eiP	Z	00 25 55½	0.4	2.8	c		Regional
i	Z	56					
i	Z	26 30					
iP	Z	07 07 53½	0.4	2.0	c		Regional
i	Z	08 32½					
eP	Z	15 34 (05½)	0.5	0.2	(d)		Local
i	Z	43½					
i	Z	47½					
i	Z	55½					
eP	Z	17 01 (47)	0.4	0.2	(d)		Teleseism
eP	Z	23 07 45½	1.0	0.5	d		Teleseism

1st May.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	17 13 00	0.4	1.0	c		Regional
i	Z	31½					
i	Z	37½					

2nd May.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	09 14 02½	0.2	1.0	(d)		Regional
i	Z	33					
eP	Z	16 35 04½	0.3	0.2	c		Local
i	Z	42					
eiP	Z	17 10 54	0.5	2.0	c		Regional
i	Z	55					
i	Z	11 32½					

3rd May: Nil recorded.

4th May.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	11 12 50	0.3	3.0	d		Regional
i	Z	13 23					
i	Z	26					
eiP	Z	13 33 31	0.2	0.3	(d)		Regional
i	Z	31½					
i	Z	34 07½					
eP	Z	15 32 19½	0.2	0.2	(c)		Local
i	Z	22½					
i	Z	33 00½					
i	Z	40					
eiP	Z	16 22 49½	0.5	0.6	d		Regional
i	Z	50					
eP	Z	16 49 46½	0.5	0.2	d		Regional
i	Z	50½					

5th May.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	14 03 30½	0.4	0.4	d		Regional
i	Z	04 10½					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO.							
5th May Contd.							
eP	Z	17 45 42½	0.7	0.6	d		Local
6th May.							
iP!	Z	15 46 19			c		Regional
i	Z	50					
i	Z	47 05½					

R. F. Heming.
(A/Vulcanologist-in-Charge)

Central Observatory
RABAUL.

19th May, 1967.

			T sec	A* mm	GM	Dist	Remarks
TABELE							
15th June, 1967 (continued)							
eP	Zw	14 50 04	0.1	0.7			
i	Zw	10.0					
i	Zw	39.0					

16th June, 1967 - Nil recorded

17th June, 1967

iP	Zw	20 07 56.0	0.6	2.0	c		Teleseism

18th June, 1967 - Nil recorded

19th June, 1967 - Nil recorded

R. F. HEMING
A/Vulcanologist-in-Charge.

Central Observatory
RABAUL.

7th July, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 23rd May, 1967 To: 30th May, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	From: 30th April, 1967 To: 15th May, 1967.
TABELE	(TBL)	No records received.
AGENHAMBO	(AGE)	From: 7th May, 1967 To: 17th May, 1967.

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks.
RABAUL							
23rd May, 1967.							
iP	Z	23 43 52.2	0.4	1.8	d	$1\frac{1}{2}^{o}$	H=23 43 26
i	Z	55.0					
iS	N	44 12.3					
24th May							
iP	Z	00 47 03.0	0.3	1.5	d	2^{o}	H=00 46 33
iS	N	26.2					
iP	Z	03 26 07.0	0.3	1.8	d	$1\frac{1}{2}^{o}$	H=03 25 42
iS	N	25.0					
iP	Z	05 42 38.3	0.3	11.0	c	$\frac{3}{4}^{o}$	H=05 42 23
iS	N	49.0					
iP	Z	14 15 54.6	0.4	1.0	c	$4\frac{1}{2}^{o}$	H=14 14 44
iS	E	16 49.0					
iP	Z	15 39 18.3	0.4	1.0	d	$1\frac{3}{4}^{o}$	H=15 38 39
i	Z	32.4					
iS	N	40.0					
iP	Z	16 01 23.0	0.4	3.2	d	$\frac{1}{2}^{o}$	H=16 01 13
iS	E	30.3					
iP	Z	20 50 12.0	0.8	2.5	d		Regional
25th May		Strong microseismic activity at begining and end of record.					
iP	Z	11 13 35.4	0.5	5.4	d	$(1\frac{1}{2})$	H=11 13(09) C.B.M.
iS	N	(55.8)					
iP	Z	12 24 39.0	0.5	2.0	d	$2\frac{1}{4}^{o}$	H=12 24 03 C.B.M.
iS	N	25 06.0					
eiP	Z	14 01 36	0.3	1.0	c	2^{o}	H=14 01 02
i	Z	39.5					
iS	N	02 02.2					
eiP	Z	14 04 29.0	0.5	0.8	d	$2\frac{1}{2}^{o}$	H=14 03 50
i	Z	35.5					
iS	E	59.0					
iP	Z	14 41 54.4	0.5	4.3	d	1^{o}	H=14 41 37
iS	E	42 08.5					
iP	Z	15 17 03.3	0.3	2.0	d	$\frac{3}{4}^{o}$	H=15 17 50
iS	N	13.0					
eP	Z	18 43 $48\frac{1}{2}$	0.3	0.6	d	$1\frac{1}{2}^{o}$	H=18 43 22
iS	N	44 08.5					
iP	Z	18 45 31.8	1.0	3.2	c	$(22\frac{1}{2}^{o})$	
e(S)	N/	49 06					
26th May		S.P. E/W component exposed to light.					
iP	Z	01 51 40.5			d	1^{o}	H=01 51 24 C.B.M.
iS	N/	52.0					
iP	Z	04 41 40.5	0.7	4.0	d	1^{o}	H=04 41 24
iS	N	52.5					

RABAUL

			T sec	A mm	GM	Dist	Remarks
26th May contd.							
eiP	Z	09 47 $17\frac{1}{2}$	0.3	1.0	d	$1\frac{1}{2}^{\circ}$	H=09 46 52
i	Z	18.3					
eS	N/	36					
iP	Z	10 56 50.0	0.4	13.0	d	1°	H=10 56 33
iS	N	57 03.0					
iP	Z	15 18 13.5	0.4	2.5	d	$1\frac{1}{2}^{\circ}$	H=15 17 47
iS	N	33.2					
e	Z/	15 44 34			+		Traces
iP	Z	16 10 49.5	0.4	1.0	c	2°	H=16 10 18
iS	N	11 13.7					
iP	Z	16 15 47.3	0.4	1.0	c	$\frac{1}{2}^{\circ}$	H=16 15 35
iS	N	56.5					
eP	Z	16 38 38	0.3	1.0	c	1°	H=16 38 20
iS	N	50.5					
e	Z/	18 56 34			–		Traces
iP	Z	19 22 32.4	0.5	1.0	c	$1\frac{1}{2}^{\circ}$	H=19 22 07
iS	N	51.7					
iP!	Z	21 22 07.2	0.5	12.0	c	21°	
eS	N/	26 02					
27th May:		Strong microseismic activity.					
e	Z/	09 46 42			+		Traces
iP	Z	16 32 12.2	0.5	4.0	c		Regional C.B.M.
eP	Z	17 33 02	0.6	2.5	d	59°	
iPcP	Z/	48.0					
ePP	Z/	35 14					
eScP	E/	37 50					
eS	E/	41 06					
eScS	N/	42 50					
eSS	N/	45 12					
iLq	N/	47 54.0					
iP!	Z	23 00 16.8	0.5	55.0	d	$2\frac{1}{4}^{\circ}$	H=22 59 40
eS	N/	$44\frac{1}{2}$					
28th May:		Strong microseismic activity from 2329 hours to 282321 hrs.					
e	Z/	01 50 08			+		Traces
iP	Z	09 18 28.0	0.4	4.0	c	$1\frac{1}{2}^{\circ}$	H=09 18 04
iS	E	45.5					
e	Z/	10 00 26					Traces
e	Z/	11 29 46			+		Traces
e	Z/	11 43 26			–		Traces
e	Z/	12 20 05			–		Traces
iP	Z	12 57 33.5	0.4	29.5	d	1°	H=12 57 16
iS	N/	46.0					
iP	Z	16 43 42.8	0.3	17.5	d	$\frac{3}{4}^{\circ}$	H=16 43 28
iS	N/	54.0					
29th May:		Strong microseismic activity from 282332-292306 hours.					
i(P)	Z	04 49 59	0.4	3.0	d	$(22\frac{1}{2}^{\circ})$	Teleseism C. B. M.
i(S)	N/	55 44					
iP	Z	07 34 35	0.8	2.5	c	$15\frac{1}{4}^{\circ}$	
ePP	Z/	44					
ePPP	Z/	35 10					
i(S)	N/	37 09					

RABAUL

29th May contd.

			T sec	A mm	GM	Dist	Remarks
iP iS	Z N/	08 18 47.6 19 08	0.6	1.5	c	$1\frac{1}{2}^{\circ}$	H=08 18 24
iP iS	Z N/	08 23 05 21	0.4	8.5	c	$1\frac{1}{4}^{\circ}$	H=08 22 44
iP eS	Z N/	10 24 05 30	0.3	2.0	c	$1\frac{1}{4}^{\circ}$	H=10 23 45
iP eS	Z N/	20 08 59.0 09 46	0.6	5.0	d	4°	H=20 07 58 C. B. M.
e	Z/	21 10 15.0			-		Traces
e	Z/	21 23 05			-		Traces

30th May. Strong microseismic activity all day.

			T sec	A mm	GM	Dist	Remarks
e	Z/	08 49 06			-		Traces
iP iS!	Z N/	12 42 26.0 42.0	0.5	20.0	d	$1\frac{1}{4}^{\circ}$	H=12 42 05
e	Z/	15 13 26			+		Traces
eiP i	Z Z	15 32 41 42.2	0.3	1.0	d		Regional
iP iS	Z N/	19 46 29.8 46.0	0.4	24.0	d	$1\frac{1}{4}^{\circ}$	H=19 46 08

			T sec	A mm	GM	Dist	Remarks
ESA'ALA							
30th April,1967							
iP	Z	23 07 18.3	0.3	9.5	d	$4\frac{1}{2}^{\circ}$	H=23 06 09
iS	N/	08 10.9					
(M)	N/	12 43.9					
1st May							
iP	Z	17 13 15.9	0.3	2.5	d	$4\frac{1}{4}^{\circ}$	H=17 12 11
iS	E	14 05.9					
2nd May							
iP	Z	09 14 08.2	0.4	3.0	d	$3\frac{1}{4}^{\circ}$	H=09 13 18
iS	E	46.2					
iP	Z	17 11(23.8)				5°	H=17 10 10
iS	E	12 20.9				1°S, $48\frac{1}{2}^{\circ}$E East Coast N.G.	
3rd May							
eiP	Z	10 27 55½	0.4	2.2	c		Regional
i	Z	59.8					
4th May							
eP	Z	11 12 56	0,4	1.5	c	$3\frac{1}{2}^{\circ}$	H=11 12 02
iS	N	13 37.3					
iP	Z	14 34 04.9	0.7	7.0	c	$5\frac{1}{2}^{\circ}$	H=13 32 45
iS	N/	35 07.1					
iP	Z	16 23 22.7	0.5	23.0	c	$5\frac{1}{8}^{\circ}$	H=16 22 01
iS	E	24 26.0				6°S, 146°E East Coast N.G.	
iP	Z	16 50 19.3	0.7	3.0	d	$5\frac{3}{4}^{\circ}$	H=16 48 55
iS	N/	51 24.3					
5th May							
iP	Z	11 04 32	0.4	1.5	c	4°	H=11 03 33
iS	E	05 16.5					
eP	Z	11 08 15½	0.5	1.2	c	$2\frac{3}{4}^{\circ}$	H=11 07 33
iS	E	47.0					
iP	Z	11 23 07.9	0.6	1.6	c	5°	H=11 21 53
eS	E	24 07½					
iP	Z	11 27 05.7	0.4	5.0	c		Local
iS	E	08.9					
iP	Z	12 02 49.7	0.6	3.0	c	$2\frac{1}{4}^{\circ}$	H=12 02 15
iS	E	03 15.3					
e(P)	Z	12 16 22	0.4	1.0	d	(6°)	H=12 14(54)
iS	N/	17 30.1					
iP	Z	12 53 57.9	0.6	2.0	d	$2\frac{1}{4}^{\circ}$	H=12 53 24
iS	E	54 14.5					
eiP	Z	13 56 15.0	0.4	1.8	d	$2\frac{1}{4}^{\circ}$	H=13 55 39
i	Z	21.4					
iS	N	41.8					
14 04 63 iP	Z	14 05 03.6	0.7	8.0	c	$5\frac{1}{2}^{\circ}$	H=14 03 42
− 1 23 iS	N/	06 07.0				$5\frac{1}{2}^{\circ}$S, $147\frac{1}{2}^{\circ}$E East N.G.Reg.	
14:03:40 eiP	Z	15 03 40½	0.5	2.0	d	2°	H=15 03 09
i	Z	42.6					
iS	N	04 04.4					
e	Z	17 34 44			+		Traces
eiP	Z	17 47 05	0.4	1.8	c	1°	H=17 46 48
i	Z	06.5					
iS	E/	18.3					

ESA'ALA

			T sec	A mm	GM	Dist	Remarks
6th May							
eP	Z	07 11 34	0.3	0.3	c		Regional
eP	Z	07 43 20			c	$3\frac{3}{4}^{\circ}$	H=07 42 24
i	Z	29.0					
iS	N/	44 03.5					
iP	Z	08 50 16.5	0.6	0.6	d	2°	H=08 49 44
eS	N/	41.0					
eP	Z	12 49 34½	0.7	0.3	c		(Regional)
eP	Z	15 47 33	0.3	1.3	c	$3\frac{1}{2}^{\circ}$	H=15 46 38
i	Z	34.1					
iS	N	48 15.0					
7th May							
eP	Z	02 16 13			c	1°	H=02 15 56
i	Z	14.1					
iS	N	26.4					
eP	Z	10 19 18			d	$5\frac{3}{4}^{\circ}$	H=10 18 12
i	Z	20.0					
iS	N	20 24.7					
iP	Z	18 32 57.7			c		Local
8th May							
iP	Z	13 00 42.9			d		Local
9th May							
eiP	Z	16 02 42	0.5	1.5	d	1°	H=16 02 25
i	Z	43.4					
iS	E	55.3					
iP	Z	23 59 49.2			c		Local
10th May							
iP	Z	06 54 24.1			c		Local
iS	N	28.9					
iP!	Z	09 32 05.7			d	$\frac{1}{4}^{\circ}$	H=09 3158
iS	E/	12.0					
iP	Z	15 03 35.2			c		Local
11th May							
iP	Z	02 30 23.0	0.4	3.6	c	2°	H=02 29 53
iS	E/	46.0					
iP	Z	06 11 15.9	0.5	04.5	d	$5\frac{1}{4}^{\circ}$	H=06 09 58
iS	E	12 15.9					
eP	Z	15 03 25	1.0	0.3	d		Local
iP	Z	15 24 23.2	1.0	5.0			Local
12th May							
iP	Z	15 54 04.4	0.3	4.5	d	$\frac{3}{4}^{\circ}$	H=15 53 51
iS	N	14.3					
eP	Z	18 02 58½	0.3	0.4	c	$4\frac{1}{4}^{\circ}$	H=18 01 56
i	Z	03 01.0					$7\frac{1}{2}^{\circ}$S., $154\frac{1}{2}^{\circ}$E.,
iS	E	46.5					Soloman Is. Region
13th May.							
eP	Z	03 02 59	1.0	0.7	d		(Regional)
eP	Z	16 08 08	0.9	0.5	d	11°	
e(S)	N/	10 14					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
13th May contd.							
iP	Z	18 30 54.8	0.4	1.5	c	$\frac{3}{4}^{\circ}$	H=18 30 40
iS	E/3	31 05.8					
iP	Z	18 54 16.4	0.2	2.0	c		Local
14th May.							
iP	Z	00 12 28.9	0.2	0.5	d	5°	H=00 11 15
iS	N	13 25.5					
iP	Z	10 10 00.8			c		Local
eP	Z	12 26 43	0.7	1.4	d	2°	H=12 25 14
iS	N/	27 04.9					
15th May							
iP	Z	12 58 50.9	0.3	1.5	d	$5\frac{1}{2}^{\circ}$	H=12.57 29
iS	N	59 53,7					
iP	Z	15 38 35.9	0.3	2.0	c	$\frac{1}{4}^{\circ}$	H=15 38 27
iS	N	42.4					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO.							
7th May.							
iP	Z	02 10 34½					Local
iP	Z	06 53 41					Local
eiP	Z	10 18 30½	0.4	1.0	d		Regional
		Intermitent microseismic activity between 2222 hours and 2400 hours. Average T=0.3, Average A*=1.2.					
8th May:		Intermitent microseismic activity between 0000 hours and 0830 hours. Average T=0.3, Average A*=1.3.					
		Intermitent microseismic activity between 2305 hours and 2400 hours. Average T=0.3, Average A*=1.5.					
9th May:		Intermitent microseismic activity between 0000 hours and 0817 hours. Average T=0.3, Average A*=1.5.					
10th May:		Nil recorded.					
11th May.							
iP	Z	02 30 11					Regional
12th May:		Nil recorded.					
13th May:		Nil recorded.					
14th May.							
eiP	Z	00 10 57½					Local
i	Z	11 35					
15th May:		No record due to lamp failure.					
16th May.							
eiP	Z	06 19 13½	0.3	0.5	d		Regional
i	Z	15½					
17th May:		No record due to lamp failure.					

R. F. Heming
(A/Vulcanologist-in-Charge).

Central Observatory
RABAUL.

2nd June, 1967.

31 MAY 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 16th to 23rd May, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	From: 15th to 31st March, 1967.
TABELE	(TBL)	No records received.
AGENAHAMBO	(AGE)	No records received.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System			To sec.	Tg. sec.
S.P.				
S.P.-N&E	Maximum magnification	12,500 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification	6,250 at 0.6 sec.	1.0	0.74
	Maximum magnification	750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification	3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification	3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longitude 150°48'50".7E., Elevation 46m.
Foundation: Granite.

STATION INSTRUMENTATION

		To sec.	Tg sec.
BENIOFF VARIABLE-RELUCTANCE SEISMOMETER 107.5Kg. 1 Geotech Mod. 1051 vertical 2 Geotech Mod. 1101 horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m.
Foundation: unconsolidated volcanic tuff.

STATION INSTRUMENTATION

VERTICAL WILLMORE SEISMOGRAPH

Attenuator setting 1/10, drum speed 60 mm/min.
S.P.Z. magnification 1,000. 0.6 - 0.25

TABELE (TBL)

Latitude 04°06'S., Longitude 145°02'E., Elevation 197m.
Foundation: basalt flow.

STATION INSTRUMENTATION

BENIOFF VARIABLE-RELUCTANCE SEISMOGRAPH 107.5Kg. 1 Geotech 1051 vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. magnification 1,000
L.P.-Z/N/E/ magnification 700

coupled to Willmore Recorder
attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_W magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to ~~1/10 of a second, other readings have been made to the nearest~~ half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	= Peak-to-Trough trace amplitude in millimetres.
A	= Amplitude from W.W.S.S.
A*	= Amplitude from seismographs with different response to the W.W.S.S.
T	= Period in seconds.
C.B.M.	= Confused by microseisms.
Dist.	= Distance in central angle degrees.
H	= Origin time.
h	= Focal depth in Km.

Remarks:

Local	= Typical signature of an earthquake with epicentre within 0.9°.
Near	= Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	= Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	= Typical signature of an earthquake with epicentre more than 45°.
Traces	= Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

1.5.67

TERRITORY OF PAPUA-NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL			T sec	A mm	GM	Dist	Remarks
17th May, 1967.							
iP iS	Z N	06 01 04.2 26.6	0.5	4.0	c	1¾°	H=06 00 35
iP iS	Z N	08 17 45.6 56.5	0.4	2.8	d	¾°	H=08 17 30
eP eS	Z N/	08 26 43 32 04	0.5	1.0	d	15°	
e	Z/	10 08 06			–		Traces
iP iS!	Z N	12 11 10.8 29.6	0.3	1.5	c	1½°	H=12 10 46
iP iS	Z N	12 17 30.8 50.4	0.3	1.2	d	1½°	H=12 17 04
eP i eS	Z Z N/	12 59 18.3 27.0 13 01 14	0.5	1.0	d	10¼°	H=12 56 49
iP iS	Z N	15 19 14.8 32.5	0.4	1.5	c	1½°	H=15 19 00
eP iS	Z N	16 00 30.8 43.0	0.6	1.0	c	1°	H=16 00 15
e	Z/	18 45 40			+		Traces
eP iS	Z N	19 21 12.2 35.0	0.3	1.0	c	2°	H=19 20 42
18th May							
e	Z/	04 2117			+		Traces
iP iS	Z N	07 00 30.2 48.0	0.4	8.0	d	1½°	H=07 00 06
iP iS	Z N	10 01 10.4 26.5	0.4	4.8	d	1¼°	H=10 00 49
eP e(S)	Z N/	11 30 56 36 38	0.5	1.0	d	(16°)	
iP iS	Z N	12 42 57.6 43 26.0	0.7	2.0	c	2¼°	H=12 42 21
e	Z/	13 47 56			–		Traces
eP	Z	15 44 58½	0.5	0.8	d		Regional
eP	Z	16 08 07	0.8	0.7	c		Teleseism
e	Z/	16 21 14			+		Traces
iP eS	Z N/	16 51 45.5 52 49	0.5	2.3	c	3½°	H=16 50 48
iP iS	Z N/	19 23 52.2 24 04.0	0.4	20.0	d	1°	H=19 23 36 C.B.M.
iP eS	Z N/	20 50 00.8 48	0.5	4.0	d	4°	H=20 49 59 C.B.M.
e	Z/	23 47 06			+		Traces

RABAUL

			T sec	A mm	GM	Dist	Remarks
19th May		Strong microseismic activity between 18.2316-19.1000 hours.					
eP	Z	05 17 03	0.8	2.4	d		Regional Deep
e	Z/	08 01 16			-		Traces
eP	Z	11 19 19	0.4	1.0	d		Regional
iP	Z	11 22 18.5	0.6	3.5	c		(Regional)
e	Z/	12 18 40			-		Traces
e	Z/	13 04 32			-		Distant shock.
iP	Z	14 10 15.7	0.6	2.8	c	$1\frac{1}{2}^{\circ}$	H=14 09 49
iS	N	35.5					
eiP	Z	14 12 34	0.5	2.0	c	$1\frac{3}{4}^{\circ}$	H=14 12 06
i	Z	35.2				In coda of preceeding shock.	
iS!	N	55.0					
20th May							
iP	Z	02 56 27.0	0.7	2.8	d	(23°)	
e(S)	E/	03 00 46					
e	Z/	06 02 42			-		Traces
iP	Z	08 04 29.5	0.3	2.5	d	$1\frac{1}{4}^{\circ}$	H=08 04 07
iS	N	46.5					C.B.M.
eP	Z	09 28 11	0.5	1.0	d		Regional
i	Z	38.5					
e	Z/	13 49 12			-		Traces
iP	Z	15 13 18.5	0.8	2.0	d		Regional
iP	Z	15 25 21.4	0.5	4.0	d	1°	H=15 25 05
eS	E	33					
e	Z/	15 43 22			-		Traces
eip	Z	16 51 53	0.3	1.0	c	$1\frac{1}{2}^{\circ}$	H=16 51 30
i	Z	53.5					
iS	N	52 11.4					
iP	Z	20 21 09.2	0.5	1.0	c	$1\frac{1}{2}^{\circ}$	H=20 20 44
iS	N	28.0					
iP	Z	22 09 13.8	0.5	1.8	c	$1\frac{1}{2}^{\circ}$	H=20 08 49
iS	N	32.5					
21st May							
iP	Z	14 06 45.3	0.4	3.7	c	$\frac{3}{4}^{\circ}$	H=14 06 30
eS	N/	56					
iP	Z	14 09 48.0	0.4	5.8	c	$2\frac{3}{4}^{\circ}$	H=14 09 05
iS	N	10 21.0					
iP	Z	16 03 15.9	0.3	2.5	c	$1\frac{1}{2}^{\circ}$	H=16 02 54
iS	N	36.5					
eP	Z	17 41 58	0.5	1.0	d	(6°)	H=17 40(27)
e(S)	N/	43 08					
iP	Z	18 53 56.2	0.5	6.0	c	(37°)	
i(PP)	Z/	55 09.0					
i(S)	E/	59 18.0					
i!	N	19 00 59.0					
M!	N/	07 10.0					
e	Z/	19 24 05			-		Traces
iP	Z	20 00 34.5	0.3	1.4	d	$1\frac{1}{2}^{\circ}$	H=20 00 08
iS	N	54.8					
iP	Z	21 45 31.6	0.4	4.0	c	$1\frac{1}{2}^{\circ}$	H=21 45 04
iS	N	51.0					

RABAUL

			T sec	A mm	GM	Dist	Remarks
21st May contd.							
iP	Z	01 27 41.0	0.3	5.0	c	$1\frac{1}{2}^{o}$	H=01 27 15
iS	N	28 01.0					
iP	Z	02 56 57.8	0.3	7.5	d	1^{o}	H=02 56 41
iS	N	57 10.0					
e	Z/	04 07 08			–		Traces
e	Z/	05 02 15			–		Traces
e	Z/	05 43 04			–		Distant shock
e	$Z\frac{1}{2}$	08 02 04			–		Distant shock
iP	Z	12 18 47.1	0.7	2.6	c	7^{o}	H=12 17 03
22nd May							
eP	Z	03 23 $30\frac{1}{2}$	0.4	1.0	c		Regional
iP	Z	04 27 43.8	0.4	2.5	c	1^{o}	H=04 27 27
iS	N	58.6					
iP	Z	05 38 13.4	0.5	2.0	d	2^{o}	H=05 37 40
eS	N	38					
iP	Z	08 46 59.5	0.5	5.0	c	$1\frac{1}{2}^{o}$	H=08 46 33
iS	E	47 19.5					
i	Z	14 25 46	0.6	4.0		Ship moving in harbour	
F	Z	32 28					
iP	Z	18 12 27.0	0.4	1.0	c	$\frac{3}{4}^{o}$	H=18 12 13
iS	N	37.5					
~~iP~~	~~Z~~	~~20 31 41.8~~	~~0.3~~	~~5.5~~	~~d~~		~~Regional~~
23rd May							
iP	Z	01 59 50.0	0.4	4.0	c	$1\frac{1}{2}^{o}$	H=01 59 25
iS	N/	02 00 10.0					
e	Z/	09 54 32			+		Traces
iP	Z	12 44 31.8	0.4	1.8	c	2^{o}	H=12 44 02
iS	N	54.8					
e	Z/	13 55 42			–		Traces
e	Z/	15 43 14			–		Traces
eP	Z	17 55 $15\frac{1}{2}$	0.4	1.0	d	$2\frac{1}{2}^{o}$	H=17 54 36
i	Z	18.0					
iS	N	45.2					
eiP	Z	18 21 $41\frac{1}{2}$	0.4	1.0	d	2^{o}	H=18 21 08
i	Z	42.3					
iS	N	22 06.5					
iP	Z	19 28 38.8	0.3	1.5	d		Regional
iP	Z	19 36 32.8	0.6	1.0	c		(Regional)
eiP	Z	20 00 $43\frac{1}{2}$	0.3	0.4	c	$1\frac{1}{2}^{o}$	H=20 00 17
i	Z	44.2					
iS	N	01 03.0					

ESA'ALA

			T sec	A mm	GM	Dist	Remarks
15th March, 1967.		Re-occuring faulty time break on L.P.Z component.					
eP	Z	05 42 01½			d	4½°	H=05 40 54
eS	E	53½					
16th March							
iP	Z	08 43 01.9	0.5	4.5	c	1°	H=08 4243
iS	N	15.5					
iP	Z	12 14 35.8	0.9	2.0	d	1¾°	H=12 14 08
iS	N	57.0					
17th March							
iP	Z	00 54 21.4	0.7	1.5	d	4½°	H=00 53 50
iS	N	55 12.4					
iP	Z	02 21 20.6	0.7	1.0	d	5°	H=02 20 07
iS	N	22 18				6½°S,	154°E Solomon Sea.
iP	Z	06 18 46.8			c	(½°)	H=06 18(39)
i(S)	N	52.5					
iP	Z	07 52 28.1	1.5	3.0	d	4½°	H=07 51 21
iS	N	53 21					
iP	Z	11 26 13	2.0	3.0	c	10°	
iS	E/	28 05.9					
eiP	Z	13 49 30.0	0.5	9.5	d	11¾°	
i	Z	313				6½°S,	155°E Solomon Islands
iS	E/	51 40.9					
eP	Z	16 46 06½	1.1	1.0	d	4°	H=16 45 04
iS	E	52.0					
18th March							
eP	Z	02 07 32½	0.5	0.6	c	4¾°	H=02,07 22
iS	N	08 26.0					
eiP	Z	16 44 28½			d	3½°	H=16 43 24
i	Z	28.7					
iS	N	45 10.2					
eP	Z	17 17 17½	0.3	2.5	c	5¼°	H=17 16 58
i	Z	17.8					
iS	N	18 17.8					
eP	Z	17 58 17	0.6	0.4	c	6°	Regional
iP	Z	19 03 24.4	0.5	2.2	c	6°	H=19 01 44
eS	E	04 34½					
eiP	Z	19 17 01½			d		(Regional)
i!	Z	01.8					
19th March							
iP	Z	00 12 30,8	0.4	1.7	c	3¼°	H=00 11 40
iS	N	13 09.9					
iP	Z	01 15 33.6			c	23°	
iS	N/	19 21.5					
eP	Z	04 11 13	0.7	0.5	c	56°	
iS	N/	18 56					
eP	Z	18 41 22½	0.5	0.3	c	6½°	H=18 39 46
eS	E	42 36					
20th March							
iP!	Z	08 48 55.9			c	3½°	H=08 48 01
iS!	N/	49 47.6				6½°S,	148½°E Vitiaz Strait

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
20th March contd.							
eP	Z	13 41 10	0.5	0.4	d	55¾°	
eS	N/	48 51½					
eP	Z	13 50 28	0.6	0.4	d		(Regional)
eP	Z	14 01 42	0.7	0.3	c		Regional
eP	Z	19 12 33	0.6	0.4	d	28½°	
iS	N/	16 48.0					
e(Lq)	N/	55					
21st March							
eP	Z	08 09 10½	0.4	0.4	d	4¼°	H=08 08 06
iS	E	59.8					5½°S, 151°E New Britian
iP	Z	17 03 28.5			d		Local
eP	Z	19 10 06.0	1.7	1.3	d		Teleseism
eP	Z	19 54 21.5	0.6	0.3	c	3°	H=19 53 34
iS	E	57.9					
22nd March							
eP	Z	00 14 26½	2.7	0.4	d	(36°)	
e(S)	N/	19 10					
e(PcS)	N/	53					
iP	Z	05 54 13.2	0.2	0.2	d	4½°	H=05 53 06
iS	N	55 05.1					
iP	Z	08 31 06.0	0.4	1.6	c	1½°	H=08 30 42
iS	E	23.7					
iP!	Z	13 01 53.9			c	6°	H=13 00 23
iS	N	03 03.6					Lat. 10½°S Long. 156°E Solomon Sea
eP	Z	13 42 50	0.3	0.4	d	4¾°	H=13 41 37
iS	N	43 46.4					Lat. 6°S Long. 154°E Solomon Sea
iP	Z	16 04 24			c		Local
eP	Z	19 15 39½	0.8	0.1	d		(Regional)
23rd March							
eP	Z	14 10 12½	0.4	0.3	d	3°	H=14 09 25
i	Z	13.6					
iS	N	48.2					
iP	Z	14 15 33.5			c		Local
24th March							
eiP	Z	09 06 56	0.8	4.9	d	40°	
i	Z	56.9					
iPcP	Z	08 40.5					
iS	E/	12 09.8					
eP	Z 8	23 05 19	0.5	0.6	d	3°	H=23 04 33.0
eS	N/	54					
iP	Z	23 47 06.4	0.3	0.4	c	2¾°	H=23 46 22
iS	N	40.4					
25th March							
iP	Z	08 01 46.2	0.2	0.7	c		Local
iS	N	47.7					

ESA'ALA

25th March contd.

Phase	Comp.	Time	T sec	A* mm	GM	Dist	Remarks
iP	Z	10 49 18½	0.7	1.0	d	6¾°	H=10 47 37
eS	E	50 37					
iP	Z	14 20 13.2	0.3	1.6	d	3¾°	H=14 19 14
iS	N	56.9					
eP	Z	22 57 26	0.8	0.6	d	(85½)	
eS	N/	23 05 11					

26th March

Phase	Comp.	Time	T sec	A* mm	GM	Dist	Remarks
eiP	Z	22 39 38½	1.0	3.0	c		Regional
i	Z	39.2					

27th March

Phase	Comp.	Time	T sec	A* mm	GM	Dist	Remarks
eP	Z	10 06 02½	1.2	2.0	c	(22¼°)	
i(S)	E/	09 36.0					
M	E/	14.1 00					

28th March: NIL RECORDED.

29th March

Phase	Comp.	Time	T sec	A* mm	GM	Dist	Remarks
iP	Z	04 27 01	0.3	1.5	d	3°	H=04 26 13
iS	N	37.3					
iP!	Z	04 48 03.6			d	3¼°	H=04 47 12
iS	N	42.5					
eP	Z	10 37 02½	0.5	0.7	d	(25°)	
e(S)	N/	40 43½					
eP	Z	13 17 08	1.5	1.0	d	23¼°	
eS	N/	20 32					

30th March

Phase	Comp.	Time	T sec	A* mm	GM	Dist	Remarks
iP	Z	02 14 58.3	0.7	2.0	c	42½	
iS	N/	20 30½					
i	N/	28 48.3					
iP	Z	15 58 30.3	0.4	2.0	d	6¼°	H=15 57 41
iS	E	59 07.9					
iP	Z	19 44 30.5	0.4	1.8	c	2°	H=19 44 00
iS	N/	53.8					
eP	Z	23 11 04½	2.0	0.4	d	(44°)	
e(S)	E/	16 27½					
e	E/	20 10½					

31st March

Phase	Comp.	Time	T sec	A* mm	GM	Dist	Remarks
eiP	Z	00 34 29½	0.5	3.1	c	6½°	H=00 32 54
i	Z	30.0					
i	E	35 36.2					
iS	E	43.5					
eiP	Z	20 09 14½	2.5	9.5	d	20½°	New Hebrides Island Region
i	Z	15.3					
iS	N/	12 38.9					
e(ScS)	N/	19 03					

R. F. Heming
(A/Vulcanologist-in-charge.)

Central Observatory
Rabaul

26th May. 1967.

14 JUN 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SIESMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

<u>RABAUL</u>	(R B)	From: 30th May, 1967 To: 6th June, 1967.
<u>SULPHUR CREEK</u>	(SUL)	Not operational.
<u>KERAVAT</u>	(KRT)	Not operational.
<u>ESA'ALA</u>	(ESA)	From: 15th May, 1967 To: 29th May, 1967.
<u>TABELE</u>	(TBL)	No records received.
<u>AGENAHAMBO</u>	(AGE)	No records received.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

31st May, 1967: Strong microseismic activity between 30.2326- 31.0300 hours

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 28 30.5	0.5	2.0	c		Regional C. B. M.
iP	Z	03 59 30.2	0.4	2.8	d		Regional C.B.M.
iP iS!	Z N/	07 37 16.0 26.0	0.5	24.0	c	½°	H=07 37 02
iP	Z	10 00 59.3	0.4	3.0	d		Regional
e	Z/	10 53 10			-		Traces
eP i i	Z Z Z	11 58 17½ 18.4 36.2	0.8	2.0	d		Regional (deep)
e	Z/	13 04 24			-		Traces
e	Z/	16 37 48			-		Traces
iP i i iS	Z Z Z N	17 26 34.5 35.6 39.6 27 13	0.3	1.8	c	3¼°	H=17 25 43
eiP i iS	Z Z N	21 24 28 31.4 25 01.5	0.4	1.0	d	2¾°	H=21 23 44
iP iS	Z N	23 06 11.2 22.4	0.5	2.0	d	¾°	H=23 05 56
1st June.							
iP iS	Z N	03 31 49.2 59.0	0.2	5.0	d	½°	H=03 31 35
e	Z/	04 04 05			+		Traces
eiP i iS	Z Z N	06 40 45 45.8 52.5	0.3	2.0	c	½°	H=06 40 35
eP i	Z N	08 01 35 59.0	0.4	1.8	c		Regional
e	Z/	11 26 06			-		Traces
eiP iS	Z N	14 00 04½ 31.5	0.4	1.0	c	2¼°	H=13 59 29
iP iS	Z N	15 10 26.0 47.3	0.5	3.5	c	1½°	H=15 09 58
e(P) e(S)	Z N/	19 06 16½ 11 06	0/8	1.0	c	(30°)	
eP i iS	Z Z N/	20 48 45 46.0 49 43.0	0.6	1.0	c	5°	H=20 47 30 Main shock, Felt Buin Int. IV-V. 06°50'S, 155°45'E.
eiP iS	Z N	20 54 10 55 07	0.5	2.5	c	5°	H=20 52 56 In coda of preceding shock. Buin Int. 11, 06°50'S, 155°45'E.
eiP i iS	Z Z E/	21 41 26½ 32.0 42 23.0	0.5	1.0	d	5°	H=21 40 12 Aftershock, Felt Buin Int. II. 06°50'S, 155°45'E.

RABAUL.

1st June contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	22 17 25.5	0.3	2.0	d	$1\frac{1}{2}^{\circ}$	H=22 16 59
iS	N	37.0					
2nd June:		S. P. Z. component paper upside down.					
iP	Z	12 00 47.0			d	$2\frac{1}{4}^{\circ}$	H=12 00 11
iS	E	01 14.5					
eP	Z	15 27 22	0.9	1.1	c		Regional
iP	Z	15 49 29.4	0.5	1.0	c	$2\frac{1}{4}^{\circ}$	H=15 48 54
iS	E	56.6					
iP	Z	17 59 13.4			d	$\frac{1}{4}^{\circ}$	H=17 59 05
i(S)	E	19.9					C. B. M.
iP	Z	19 33 34.4			d		Regional
3rd June/							
iP	Z	01 54 48.0	0.5	2.9	c	4°	H=01 53 48
eS	E/	55 34					C. B. M.
eP	Z	02 22 02	0.5	2.0	d		Regional C.B.M.
iP	Z	03 10 50.0	0.5	1.0	c	5°	H=03 09 37
i	Z	57.0					
iS	N	11 46.5					
eiP	Z	03 16 22	0.4	1.0	c	5°	H=03 15 06
i	Z	25.6					
iS	N	17 20.5					
iP	Z	03 20 09.1	0.5	1.5	c	$2\frac{3}{4}^{\circ}$	H=03 19 26
iS	N	42.0					
i	Z	04 40 05	0.5	3.0		Ship moving in harbour.	
F	Z	42 09					
iP	Z	06 09 02.5	0.4	1.5	d	$4\frac{1}{2}^{\circ}$	H=06 07 55
iS	N	54.5					
e	Z/	07 12 06			–		Traces
e(P)	Z9	09 20 43	0.5	1.0	d		(Regional)
eiP	Z	10 08 $43\frac{1}{2}$	0.4	1.0	d	5°	H=10 07 31
i	Z	51.6					
iS	N	09 39.0					
iP	Z	11 20 25.4	0.5	2.1	c	$1\frac{1}{4}^{\circ}$	H=11 20 04
iS	N	[illegible]					
iP	Z	12 37 23.0	0.5	2.0	d		Regional
iP	Z	12 46 42.3	0.4	[illegible]	c	$2\frac{1}{4}^{\circ}$	H=12 46 07
iS!	N	47 09.0					
iP	Z	13 04 20.2	0.4	1.0	d		Regional
iP	Z	13 07 54.0	0.3	2.0	d	1°	H=13 07 33
iS	N	08 09.0					
iP	Z	13 21 41.3	0.3	1.0	c	2°	H=13 21 11
iS	N	22 04.0					
eiP	Z	13 38 03	0.4	1.0	d	5°	H=13 36 46
i	Z	11.2					
iS	N	39 02.0					
iP	Z	13 48 39.0	0.5	1.5	c	$\frac{1}{2}^{\circ}$	H=13 48 29
iS	N	48.0					
eP	Z	13 55 53	0.5	1.0	c	5°	H=13 54 38
eS	N	56 51.5					
eP	Z	14 13 $46\frac{1}{2}$	0.5	1.0	c	$5\frac{1}{2}^{\circ}$	H=14 12 23
i	Z	47.3					
eS	N/	14 50					

RABAUL.

3rd June contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	15 08 36.8	0.4	2.0	d	1°	H=15 08 19
iS!	N	49.5					
eP	Z	17 23 12	0.3	1.0	c	5°	~~H=17 21 55~~
i	Z	21.3					
eS	N	24 11					
iP	Z	21 42 30.0	0.4	3.0	c	1½°	H=21 42 04
iS	N	49.5					
iP	Z	22 57 33.5	0.4	2.3	d	2°	H=22 57 04
iS	N	58.0					
iP	Z	22 49 09.2	0.3	2.0	c		Local
iS	N	14.5					
iP	Z	22 50 54.6	0.3	2.0	c		Local
iS	N	59.8					

4th June.

			T sec	A mm	GM	Dist	Remarks
eP	Z	00 47 23.4	0.4	3.0	d		(Regional)
eP	Z	01 09 38½	0.5	1.0	d	5°	H=01 08 22
eS	E	10 37½					
iP	Z	02 56 24.0	0.6	1.8	d		(Regional)
iP	Z	03 48 35.2	0.5	3.0	d	½°	H=03 48 23
iS	N	44.0					
iP	Z	05 06 14.3	0.5	1.0	d		Regional
eP	Z	05 12 41	0.5	1.0	c	4½°	H=05 11 37
eS	N	13 30					
iP	Z	05 23 56.4	0.4	1.0	d	2½°	H=05 23 14
eS	N	24 28					
eP	Z	05 56 52	0.4	1.0	d	4½°	H=05 55 43
iS	E	57 45.0					
eP	Z	09 57 32	0.4	1.0	d	5°	H=09 56 18
eS	N	58 29					
iP	Z	16 08 05.0	0.5	38.0	c	2°	H=16 07 32
iS	N/	29.0					
eP	Z	18 42 51½	0.4	1.0	c	4½°	H=18 41 45
iS	N	43 42.4					
eiP	Z	20 08 09	0.4	2.0	c	4½°	H=20 06 59
i	Z	11.0					
i	Z	21.0					
eS	E/	09 03					
eP	Z	21 05 29	0.4	1.0	c	5¼°	H=21 04 10
i	Z	36.2					
eS	E/	06 30					
eiP	Z	21 16 01	0.5	3.0	d	2°	H=21 15 28
i	Z	02.8					
i	Z	06.0					
iS	E/	27.0					

5th June.

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 28 28			c	40°	
eS	E/	34 20					
iP	Z	05 26 25.6	0.4	2.0	d	¾°	H=05 26 11
iS	N	38.1					
iP	Z	13 52 06.5	0.5	1.0	c	½°	H=13 51 54
iS	E	15.7					
iP	Z	14 39 36.6	0.8	1.7	d		Teleseism

RABAUL.

5th June contd.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	15 14 57.0	0.7	1.4	c	$7\frac{1}{2}^{\circ}$	H=15 13 08
i	Z	59.3					
iS	N/	16 21.0					
iP	Z	20 44 26.1	0.5	2.0	c	$1\frac{1}{4}^{\circ}$	H=20 44 06
iS	E	45.1					
iP	Z	22 10 50.4	0.7	3.0	c	$1\frac{1}{2}^{\circ}$	H=22 10 26
iS	N	11 08.1					

6th June.

			T sec	A mm	GM	Dist	Remarks
iP	Z	03 02 00.5	0.5	4.2	d		Regional
iP!	Z	06 35 49.1	0.5	101.0	d	$2\frac{1}{4}^{\circ}$	H=06 35 13
iS	No	36 16.0					Felt Rabaul
eP	Z	07 28 $25\frac{1}{2}$	0.5	1.0	c		Regional
eP	Z	09 33 56	0.8	1.2	d	(13°)	
eS	E/	36 29					
eP	Z	11 18 $28\frac{1}{2}$	0.5	1.0	d		Regional
eiP	Z	11 44 $25\frac{1}{2}$	0.4	1.0	d	$6\frac{1}{2}^{\circ}$	H=11 42 49
i	Z	26.0					
eS	N/	45 39					
eP	Z	12 47 23	0.5	2.3	c	$2\frac{1}{4}^{\circ}$	H=12 46 47
iS	N	50.3					
iP	Z	13 47 40.4	0.3	4.9	d	2°	H=13 47 06
iS	N	48 06.1					
iP	Z	16 41 17.4	0.4	2.2	d	2°	H=16 40 46
iS	N	42.0					
eP	Z	17 36 $11\frac{1}{2}$	0.4	1.0	d	4°	H=17 35 10
iS	E	37 58.0					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
16th May, 1967.							
iP	Z	06 19 49.8	0.9	9.5	d	6°	H=06.18 23
iS	E	20 56.5					
17th May							
eP	Z	08 26 29½	0.7	1.5	d	(36°)	
e(S)	N/	31 14					
eiP	Z	12 59 11	0.6	1.5	d	(20¾°)	7°S, 154°E
i	Z	12.0				East New Guinea Region	
e(S)	N/	13 02 46½					
iP	Z	19 03 55.4	0.4	4.0	c	½°	H=19 03 46
iS	N	04 02.2					
18yh May							
iP	Z	16 51 38.4	0.5	3.0	c	3¾°	H=16 50 42
iS	N	52 21,4					6°S, 149°E
						South Coast New Britian.	
19yh May							
eiP	Z	05 52 25	0.7	2.0	c	1¼°	H=05 52 03
i	Z	26.4					
iS	N	41.7					
iP	Z	11 22 21.0	0.4	9.5	c	6¼°	H=11 20 50
iS	N	23 31.0					
20th May							
iP	Z	09 27 10.5			d	¾°	H=09 26 57
iS	E/	20.9					
21st May							
iP	Z	12 18 45.8	0.8	21.5	c	6°	H=12 17 19
iS	E	19 53.3					
iP	Z	14 10 03.4	0.3	3.0	c	3½°	H=14 09 09
iS	E	45.8					
eP	Z	17 42 51½	0.4	1.0	c	5°	H=17 41 39
iS	E	43 47.6					
iP	Z	18 53 51.0			c	53½°	
iPP	Z/	55 55.8					
iPPP	Z/	56 51.8					
iSP	Z/	19 00 44.8					
iS	N/	48.8					
eLq	Z/	05 39½					
22nd May							
e	Z/	07 49 22					Traces
e(P)	Z	23 26 56.6	0.4	1.0	c		Local
23rd May							
e(P)	Z	02 00 32½				4½°	H=01 59 26
iS	E	01 23.2					
e	Z	09 51 [illegible]			+		Traces
eP	Z	15 47 03	0.4	[illegible]	c	[illegible]°	H=15 46 04
eS	E	48½					
iP	Z	15 49 36.4	0.3	3.5	c	1°	H=15 49 14
iS	E	42.2					
24th May	NIL RECORDED.						

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
25th May		Shock lost on the end of S.P. record					
e(P)	Z/	18 45 11			d	35°	
eS	N/	49 43					
26th May							
eP	Z	01 52 38½	0.4	1.9	c	5°	H=01 51 23
iS	N	53 36.8					
27th May							
eP	Z	17 33 37	0.5	1.0	d	66¼°	
e S	N/	42 19½					
iP	Z	18 06 20.0			d		Local
iP	Z	18 09 47.5			c		Local
iP	Z	18 12 38.1			d		Local
iP	Z	18 19 48.5			d		Local
iP	Z	18 22 07.1			d		Local
eP	Z	19 18 09½	0.8	1.5	d		Local
iP	Z	23 00 56.1	0.8	6.0	c	(2¼)°	H=23 00(19)
i(S)	E	01 24.2					
28th May		NIL RECORDED.					
29th May							
iP	Z	04 50 48.4	0.7	3.0	c		Regional
eP	Z	07 34 31½	0.6	1.5	d	7½°	H=07 32 40
iS	N/	35 57.5					
iP	Z	20 08 46.8	0.3	4.5	c		Local

RABAUL
CORRIGENDUM for 21st May.

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 27 41.0	0.3	5.0	c	$1\frac{1}{2}^{\circ}$	H=01 27 15
iS	N	28 01.0					
iP	Z	02 56 57.8	0.3	7.5	d	1°	H=02 56 41
iS	N	57 10.0					
e	Z/	04 07 08			-		Traces
e	Z/	05 02 15			-		Traces
e	Z/	05 43 04			-	-	Distant shock
e	Z/	08 02 04			-		Distant shock
iP	Z	12 18 47.1	0.7	2.6	c	7°	H=12 17 03
i	Z	51.2					
eS	N	20 06.6					
iP	Z	14 06 45.3	0.4	3.7	c	$\frac{3}{4}^{\circ}$	H=14 06 30
eS	N/	56					
iP	A	14 09 48.0	0.4	5.8	c	$2\frac{3}{4}^{\circ}$	H=14 09 05
iS	N	10 21.0					
iP	Z	16 03 15.9	0.3	2.5	c	$1\frac{1}{2}^{\circ}$	H=16 02 54
iS	N	36.5					
eP	Z	17 41 58	0.5	1.0	d	(6°)	H=17 40 (27)
e(S)	N/	43 08					
iP	Z	18 53 56.2	0.5	6.0	c	(37°)	
i(PP)	Z/	55 09.0					
i(S)	E/	59 18.0					
i!	N	19 00 59.0					
M!	N/	07 10.0					
e	Z/	19 24 05			-		Traces
iP	Z	20 00 34.5	0.3	1.4	d	$1\frac{1}{2}^{\circ}$	H=20 00 08
iS	N	54.8					
iP	Z	21 45 31.6	0.4	4.0	c	$1\frac{1}{2}^{\circ}$	H=21 45 04
iS	N	51.0					

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

	To sec.	Tg. sec.
Attenuator setting 1/10, drum speed 60 mm/min.	0.6	0.25

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

	Tg. sec.
coupled to Willmore Recorder Attenuator setting 1/100, drum speed 60 mm/min.	0.25

$S.P.-Z_w$ Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 6th June, 1967 To; 13th June, 1967
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	None received.
TABELE	(TBL)	From: 9th May, 1967 To: 24th May, 1967.
AGENAHAMBO	(AGE)	None received.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

$S.P.-Z_W$ Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings :

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
7th June, 1967.							
i	Z	00 32 46.0	0.5	3.0			Ship moving in harbour.
F	Z	39 13					
eP	Z	02 29 24½	0.4	1.5	d		Regional
eP	Z	02 39 04	0.3	2.0	d		Regional
iP	Z	02 43 05.8	0.4	5.0	d	1½°	H=02 42 43
iS	E	23.3					
iP	Z	05 46 13.8	0.4	12.0	c	1¼°	H=05 45 52
iS!	N	29.5					
iP	Z	05 59 05.0	0.4	5.0	c	1¼°	H=05 58 44
iS!	N	21.0					
iP	Z	07 44 32.3	0.3	1.2	d	1°	H=07 44 12
iS	N	47.0					
e	Z/	07 55 21			+		Traces.
iP	Z	11 47 10.3	0.5	0.8	c	1¾°	H=11 46 41
iS	N	32.6					
iP	Z	13 05 41.8	0.4	1.0	d	3¾°	H=13 04 43
iS	N	06 27.0					
eP	Z	13 59 11½	0.4	1.5	c	2°	H=13 58 41
iS!	N	34.2					
iP	Z	15 39 49.8	0.4	3.0	c	2½°	H=15 39 10
iS	N	40 20.0					
eiP	Z	17 46 10	0.4	0.6	c		Regional
i	Z	18.5					
iP	Z	18 10 31.5	0.6	1.0	c	¾°	H=18 10 17
iS	E	42.0					
iP	Z	18 45 56.5	0.8	8.5	d		Regional
i	Z	46 06.2					
8th June:		S.P. records on upside down.					
e	Z/	01 21 34			−		Traces
e	Z/	07 07 36			+		Traces
eP	Z/	08 20 16			d	5½°	H=08 18 53
eS	E/	21 20					
e(P)	Z/	12 06 07			c	(14°)	
e(S)	E/	08 38					
iP	Z/	13 27 26			c	26°	
iS	N/	31 48					
eP	Z	17 37 02			c	4¼°	H=17 35 57
eS	E/	52					
9th June.							
iP	Z	01 53 34.5	0.5	6.5	cSE	(1¼°)	H=01 53 (13)
i	Z	39.2					(Bismark Sea)
i(S)	N/	50.0					

RABAUL

9th June contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	06 15 03.2	0.4	1.8	d		Regional
iP	Z	10 04 58.5	0.4	1.0	d	$1\frac{3}{4}^{\circ}$	H=10 04 29
iS	E	05 20.5					
eP	Z	11 27 $37\frac{1}{2}$	0.5	1.0	d	$50\frac{1}{2}^{\circ}$	
e	Z	$39\frac{1}{2}$					
eS	N/	35 12					
eP	Z	12 50 $03\frac{1}{2}$	0.4	1.0	d	51°	
eS	N/	57 16					
eP	Z	19 29 43	0.6	1.0	d	27°	
i	Z	44.5					
eS	E/	34 17					

10th June.

			T sec	A mm	GM	Dist	Remarks
iP	Z	03 08 47.0	0.5	2.0	c	$2\frac{1}{4}^{\circ}$	H=03 08 13
iS	N	09 12.8					
iP	Z	06 13 41.5	0.3	6.0	c	$1\frac{1}{2}^{\circ}$	H=06 13 17
iS	N	14 02.5					
e	Z/	06 21 50			–		Traces
e	Z/	07 03 30			–		Traces
iP	Z	09 31 57.0	0.4	3.0	c	$2\frac{1}{2}^{\circ}$	H=09 31 21
iS	E	32 26.4					
eP	Z	10 05 29	0.3	2.5	c	$1\frac{3}{4}^{\circ}$	H=10 05 00
iS	N	50.8					
iP	Z	13 28 53.6	0.3	1.0	c	$1\frac{1}{2}^{\circ}$	H=13 28 26
i	Z	54.0					
iS	N	29 14.4					
eP	Z	14 04 $37\frac{1}{2}$	0.4	2.8	d		Regional
e	Z	09 54					
i	Z	55.2					
iP	Z	14 13 06.3	1.0	1.0	c	(4°)	H=14 12 (08)
i(S)	N	51.5					
eP	Z	17 18 27	0.3	0.5	d	1°	H=17 18 08
iS	E	41.3					
e	Z/	19 18 06			+		Traces
iP	Z	19 32 23.0	0.4	2.0	d	$\frac{1}{2}^{\circ}$	H=19 32 12
iS	E	31.4					
eP	Z	20 05 40	0.3	0.5	c	$5\frac{1}{2}^{\circ}$	H=20 04 20
eS	N	06 $42\frac{1}{2}$					

11th June

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 15 19.8	0.4	1.2	d	$1\frac{1}{4}^{\circ}$	H=01 15 27
iS	N	16 06.3					
iP	Z	02 00 41.8	0.5	4.5	c	2°	H=02 00 09
eS	N	01 06.3					C.B.M.
iP	Z	03 13 32.5	0.4	5.0	c		Regional C.B.M.
i	Z	33					
eP	Z	05 43 03	0.5	1.0	c		Regional
eP	Z	06 07 52	0.5	1.0	c	$\frac{3}{4}^{\circ}$	H=06 07 37
iS	N	08 03.2					
iP	Z	06 40 51.2	0.5	2.0	c	$2\frac{1}{2}^{\circ}$	H=06 40 10
eS	E	41 22					
iP	Z	07 21 49.6	0.5	1.0	d	2°	H=07 21 19
iS	N	22 13.0					
iP	Z	08 20 03.4	0.4	7.0	d	$1\frac{1}{4}^{\circ}$	H=08 19 38

RABAUL

			T sec	A mm	GM	Dist	Remarks
11th June contd.							
iP	Z	09 16 42.6	0.5	1.5	c	$3\frac{1}{4}^{\circ}$	H=09 15 52
i	Z	43.6					
iS	N/	17 22.0					
iP	Z	09 38 02.5	0.4	4.0	d	$1\frac{1}{4}^{\circ}$	H=09 37 41
iS	E	18.0					
12th June	Strong microseismic activity from 11 2333-12 0730 hours.						
e	Z/	00 15 12			–		Traces
e	Z/	00 55 56			–		Traces
e	Z/	03 10 18			+		Traces
e	Z/	05 44 54			–		Traces
iP	Z	07 48 19.4	0.4	7.0	c	$1\frac{1}{2}^{\circ}$	H=07 47 53
iS	N	39.5					
eP	Z	10 42 52	0.5	0.5	d	$4\frac{1}{2}^{\circ}$	H=10 41 46
eS	E	43 43					
eiP	Z	16 17 12	0.5	1.0	c		Regional
i	Z	15.8					
eiP	Z	20 31 44	0.3	1.0	d		Regional
i	Z	45.2					
eP	Z	21 12 $08\frac{1}{2}$	0.4	1.5	d	2°	H=21 11 39
iS	N	32.0					
e	Z/	21 24 54			–		Traces
eP	Z	23 31 48	0.4	1.0	c		Regional
13th June							
iP	Z	00 21 53.2	1.0	1.8	c		Teleseism
i	Z	03 02 28	0.5	3.0		Ship moving in harbour	
F	Z	55					
eiP	Z	04 06 32	0.3	1.0	d	$1\frac{1}{2}^{\circ}$	H=04 06 04
i	Z	34.8					
i	Z	43.0					
iZ	N	53.0					
iP	Z	04 28 41.0	0,4	4.0	c	$1\frac{1}{2}^{\circ}$	H=04 28 16
iS	N	29 00.0					
iP	Z	08 07 03.5	0.4	2.0	d	$2\frac{1}{2}^{\circ}$	H=08 06 24
i	Z	05.0					
iS	N	35.5					
iP	Z	09 07 12.8	0.4	1.0	d	$\frac{1}{2}^{\circ}$	H=09 06 59
iS	N	23.1					
iP	Z	12 53 46.5	0.4	1.0	c	$1\frac{1}{2}^{\circ}$	H=12 53 19
iS	N	54 07.0					
eP	Z	14 47 48	0.8	0.8	d		Regional (Deep)
e	Z	51					
eiP	Z	15 40 35.0	0.5	12.0	c	$4\frac{1}{2}^{\circ}$	H-15 39 29
i	Z	35.5					
iS	N/	41 27.0					Felt at Wau.
iP	Z	17 59 40.0	0.3	1.0	c	$\frac{3}{4}^{\circ}$	H=17 59 25
iS	E	50.2					
eP	Z	20 31 54	0.6	1.0	c		Regioal Deep
i	Z	32 01.0					
iP	Z	20 34 12.5	0.3	2.0	c		Regional In coda of preceeding.
iP	[illegible]	21 [illegible]	[illegible]				[illegible]

TABELE

			T sec	A* mm	GM	Dist	Remarks
9th May:		Nil recorded.					
10th May.							
iP	Zw	18 26 19	0.4	3.0	c		Local
11th May:		Nil recorded.					
12th May.							
iP	Zw	14 04 56	0.6	1.8	d		Local
i	Zw	05 03					
13th May:		Nil recorded.					
14th May:		Nil recorded.					
15th May.							
eiP	Zw	16 58 20½	0.4	1.0	c		Local
i	Zw	21½					
16th May.							
eiP	Zw	06 19 12½	0.5	1.0	d		Regional
i	Zw	13½					
i	Zw	18 41 33	0.5	0.8	c		Local
17th May:		Nil recorded.					
18th May.							
eiP	Zw	15 46 40½	0.5	5.6	d		Regional
i	Zw	41½					
i	Zw	51					
i	Zw	47 02					
19th May:		Nil recorded.					
20th May.							
iP	Zw	12 42 16	0.3		d		Local
21st May.							
iP	Zw	05 39 34	0.3	0.7	c		Local
iP	Zw	12 17 16	0.5	4.5	d		Local
i	Zw	23½					
		Continuous tremor between 1416 hours and 1428 hours. Average T=0.3, Average A*=0.7.					
iP	Zw	17 42 51	0.3	0.9	(d)		Local
i	Zw	43 44½					
eP	Zw	18 53 21	0.5	1.0	d		Teleseism
22nd May.							
iP	Zw	14 43 40½	0.3	1.7	d		Local
i	Zw	54½					
23rd May.							
iP	Zw	05 07 56½	0.4	1.0	c		Local
24th May.							
eP	Zw	08 21 13	0.4	0.6	d		Local

R. F. Heming.
(A/Vulcanologist-in-Charge)

Central Observatory
RABAUL.

1[illegible]th May, 1967.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 13th June, 1967 To: 20th June, 1967
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	From: 29th May, 1967 To: 12th June, 1967.
TABELE	(TBL)	From: 23rd May, 1967 To: 13th June, 1967.
AGENAHAMBO	(AGE)	None received.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_w Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings :

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TERRITORY OF PAPUA AND NEW GUINEA
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RABAUL

			T sec	A mm	GM	Dist	Remarks
14th June, 1967.		Strong microseismic activity from 13.2335- 14.1045 hours.					
eiP	Z	04 44 55½	0.5	3.0	d	2¼°	H=04 43 52
iS	E/	45 44					C.B.M.
e(P)	Z/	05 13 14			c	(6¼°)	H=05 11(41)
e(S)	N/	14 26					
iP	Z	07 13 50.0	0.4	3.5	d	3°	H=07 13 03
eS	E/	14 34					C.B.M.
eP	Z	08 14 44	0.5	2.0	d	55°	
eS	N/	22 22					
eP	Z	09 33 13	0.5	3.0	d		Regional C.B.M.
eiP	Z	09 45 23½	0.5	1.8	d	4°	H=09 44 24
i	Z	24.3					
eS	E/	46 09					
iP	Z	15 42 05.1	0.5	11.0	d	3¾°	H=15 41 08
eS	N	49					
15th June		Strong microseismic activity all day.					
e	Z/	00 19 48			+		Traces
iP	Z	03 13 15.3	0.4	8.0	d	1½°	H=03 11 51
iS	N/	33.0					C.B.M.
e	Z/	04 56 08			+		Traces
iP	Z	07 33 20.6	0.4	5.8	c	2°	H=07 32 50
eS	E/	44					C.B.M.
eP	Z	07 42(22½)	0.5	2.3	d		Regional C.B.M.
iP	Z	12 58 08.8	0.5	6.0	d	1°	H=12 57 51
iS	E	21.3					
eiP	Z	14 10 35	0.5	1.7	d	4°	H=14 09 34
i	Z	36.8					
i	Z	38.2					
iS	N/	11 22					
iP	Z	14 45 51.0	0.5	3.0	d	3¼°	H=14 45 01
eS	N	46 29					C.B.M.
eiP	Z	17 48 37	0.5	2.0	c	4¼°	H=17 47 33
iS	N	49 26					
iP	Z	20 45 13.0	0.5	3.0	d	¾°	H=20 44 58
eS	N/	24					
iP	Z	21 13 14.2	0.5	5.0	c	2¼°	H=21 12 40
iS	E/	40.5					
iP	Z	23 10 54.5	0.5	6.1	d	2°	H=21 10 23
iS	N	11 18.4					
16th June							
eiP	z	00 49 48.9	0.8	2.0	c		Regional C.B.M.
i	Z	51.0					
(iS)	N	50 03.0					
iP	Z	01 23 12.0	0.5	13.0	d	1[illegible]°	H=01 22 46
iS	E/	32.0					C.B.M.

RABAUL

16th June contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 14 57.0	0.4	2.5	d	$2\frac{1}{4}^{\circ}$	H=02 14 21
iS	N	15 24.0					C.B.M.
iP	Z	03 13 57.8	0.3	2.3	d	$1\frac{1}{4}^{\circ}$	H=03 13 30
iS	N	14 18.5					C.B.M.
iP	Z	03 23 48.2	0.5	2.0	d	3°	H=03 23 00
iS	N/	24 25.0					
iP	Z	06 44 43.7			c	1^{i}	~~H=06 44 28~~
eS	E/	56					
iP	Z	06 51 37.0	0.5	8.0	c		Regional C.B.M.
					In coda of preceding shock.		
iP	Z	07 16 23.8	0.4	5.0	d		Regional C.B.M.
iP	Z	11 54 11.2	0.4	6.0	d	$1\frac{1}{2}^{\circ}$	H=11 53 45
eS	N/	31					
iP	Z	14 48 13.1	0.5	13.0	d	$1\frac{1}{4}^{\circ}$	H=14 47 52
eS	N/	29					
iP	Z	17 24 37.5			d	1°	H=17 24 18
iS	E/	52.0					

17th June

			T sec	A mm	GM	Dist	Remarks
e(P)	Z	01 37 04			d		C.B.M.
eP	Z/	05 15 56			c	(33°)	C.B.M.
ePcP	Z/	19 42					
eS	E/	20 05					
eLq	N/	20 27					
iScS	N/	27 15.0					
iP	Z	09 16 15.3	0.5	2.0	c	$1\frac{3}{4}^{\circ}$	H=09 15 47
iS	N	36.0					
iP	Z	10 37 09.2	0.3	1.0	c	2°	H=10 36 36
iS	N	34.1					
iP	Z	12 53 31.0	0.6	2.0	c	1°	H=12 53 13
iS	N	43.5					
eP	Z	15 10 15	1.0	1.0	d	21°	
eS	E/	14 10					
iP	Z	19 26 30.0	0.5	7.0	c	$2\frac{1}{4}^{\circ}$	H=19 25 57
iS	E	57.8					
iP	Z	21 00 32.7	0.5	1.8	d	$2\frac{1}{2}^{\circ}$	H=20 59 55
i	Z	35.0					
iS	N	01 02.0					
iP	Z	22 41 14.5	0.4	10.0	c	1°	H=22 40 56
iS	N	28.0					
iP	Z	23 24 38.3	0.5	4.5	d	1°	H=23 24 21
iS	N	51.0					

18th June

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 15 15.8	0.4	4.0	d	$\frac{3}{4}^{\circ}$	H=02 15 00
iS	N	27.3					
eP	Z	03 23 28	0.5	1.5	d	$1\frac{1}{2}^{\circ}$	H=03 23 06
iS	E	48.5					
iP	Z	06 09 05.1	0.5	2.0	c	$1\frac{1}{2}^{\circ}$	H=06 08 41
iS	N	23.5					
iP	Z	06 32 18.0	0.4	2.0	d	$1\frac{3}{4}^{\circ}$	H=06 31 49
iS	N/	40.0					
iP	Z	06 43 21.1	0.5	2.5	d	$1\frac{3}{4}^{\circ}$	H=06 42 52
	N	43.0					

RABAUL

18th June contd.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	06 46 46.6	0.5	14.0	d	1°	H=06 46 29
iS	N/	59					
iP	Z	07 20 32.8	0.5	1.0	c	1½°	H=07 20 09
iS	N	51.2					
iP	Z	12 03 27.0	0.5	2.8	d	2°	H=12 02 57
i	Z	29.0					
eS	E/	50					
eP	Z	12 21 11	0.5	1.0	c	2¾°	H=12 20 28
eS	N/	43					
iP	Z	12 25 33.8	0.5	3.0		3¼°	H=12 24 44
iS	N/	26 12					(Bismarck Sea)
M	E/	26 43					
eP	Z	13 10 54½	0.6	1.0	d		(Bismark Sea)
e(Lq)	N/	11 30					
eP	Z	13 51 27½	0.5	1.0	c	8¾°	H=13 49 19
iS	N	53 07.3					
M	E/	54 00					
iP	Z	14 38 09.0	0.5	2.0	c		(Bismarck Sea)
e(Lq)	N/	46					
M	N/	39 14					
iP	Z	15 03 42.0	0.4	3.0	c	¾°	H=15 03 27
iS	N	52.5					
iP	Z	16 32 22,8	0.3	2.0	d	1¾°	H=16 31 54
i	Z	23.2					
iS	N	45.0					
eiP	Z	18 29 32.0	0.4	1.0	d	2°	H=18m29 00
i	Z	34.0					
iS	N	56.5					
iP!	Z	20 05 36.6			dSE	2½°	H=20 04 58
iS	N/	06 06.0					
iP	Z	20 35 25.5	0.4	1.0	c		Regional
iP	Z	21 09 09.7	0.4	1.5	c	1½°	H=21 08 46
iS	N	27.5					

19th June.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	00 27 58.2	0.5	2.0	d	2°	H=00 27 24
i	Z	59.0					
e(S)	N	28 24½					
iP	Z	00 32 13.0	0.5	2.0	d	1¾°	H=00 31 44
i	Z	13.8					
iS	N	35.2					
iP	Z	01 25 10½	0.4	4.0	d	1¾°	H=01 24 41
i	Z	13.0					
iS	N	32.0					
eP	Z	05 47 38½	0.4	1.5	d	5½°	H=05 46 17
iS	E	48 41.5					
e	Z/	12 54 06			+		Traces
eP	Z	13 05 15	0.5	1.0	d		(Bismarck Sea)
e(Lq)	N/	06 02					
M	N/	26					
iP	Z	14 00 02.0	0.5	2.5	d		(Bismarck Sea)
iLq	N/	28.0					
M	N/	46					

RABAUL

			T sec	A mm	GM	Dist	Remarks
19th June contd.							
eP	Z	17 18 31	0.6	1.0	c	67°	
eS	E/	27 20					
eiP	Z	20 11 06	0.4	1.8	d	2°	H=20 10 24
i	Z	06.8					
iS	N	29.8					
eP	Z	20 45 18	0.5	1.5	c	2°	H=20 44 44
iS	N	44.0					
iP	Z	20 52 39.5	0.5	1.0	d	2°	H=20 52 05
iS	N	53 05.0					
20th June							
iP	Z	02 15 20.8	0.5	4.0	d	3°	H=02 14 36
iS	N	55.0					
iP	Z	03 44 58.4			dSW	1½°	H=03 44 33
iS	E/	45 17.0			Felt:	Rabaul Int. I/ 04°S, 152°E Rongamatane Int.IP	
iP	Z	04 46 49.6	0.4	4.0	d	2°	H=04 46 18
iS	N/	47 13.0					
eP	Z	05 43 07	0.4	1.0	c		Regional
iP	Z	06 48 17.3	0.4	2.0	c	2°	H=06 47 47 C.B.M.
iS	N/	40.0					
iP	Z	07 34 26.5	0.5	3.5	d	2°	H=07 33 55
iS	N/	50.0					
eP	Z	07 49 23	0.6	1.0	d	(69°)	
e(S)	E/	58 23					
iP	Z	08 04 28.5	0.4	2.8	d	1½°	H=08 04 05
eS	N/	46					
iP	Z	09 04 55.8	0.5	9.0	c	1¼°	H=09 04 33
iS	N	05 12.5					
eP	Z	13 44 12	0.5	1.0	d	16°	
eS	E/	47 08					
iP	Z	15 37 44.5	0.5	1.5	c	2½°	H=15 37 04
i	Z	46.0					
iS	N	38 15					
iP	Z	22 56 39.9	0.4	7.5	d	1½°	H=22 56 16
iS	E	57.6					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
30th May, 1967.							
iP	Z	17 14 40.5	0.2	1.0	c	2°	H=17 14 06
iS	N	15 06.5					
31st May							
eP	Z	10 50 31	1.2	1.1	c		(Teleseism)
eiP	Z	17 26 39.3	0.3	2.2	d	$3\frac{1}{2}^{\circ}$	H=17 25 46
i	Z	39.7					6°S, $149\frac{1}{2}^{\circ}$E
iS	N/	27 19.9					South Coast New Britian.
1st June		Shocks lost at end of record					
iP	Z/	20 49 00.0			c	$4\frac{1}{2}^{\circ}$	H=20 47 50
iS	E/	53.8					$8\frac{1}{2}^{\circ}$S, $155\frac{1}{2}^{\circ}$E
							Solomon Islands Region.
i(P)	Z/	21 41 09.8				$(7\frac{3}{4}^{\circ})$	H=21 39(16)
iS	E/	42 37.8					
2nd June							
iP	Z	02 42 17.3					Local
iP	Z	02 57 58.3					Local
iP	Z	03 57 05.2			d		Local
iP	Z	13 00 55.7	0.3	2.2	c	$5\frac{1}{4}^{\circ}$	H=12 59 48
iS	N	01 55.0					
iP	Z	15 27 28.3	0.6	3.0	d	$4\frac{1}{2}^{\circ}$	H=15 26 18
iS	N	28 22.4					
eP	Z	18 59 $07\frac{1}{2}$	0.5	0.3	d	$4\frac{3}{4}^{\circ}$	H=18 57 56
iS	N	19 00 02.3					
iP	Z	19 13 36.3	0.6	2.5	d	$4\frac{1}{2}^{\circ}$	H=19 12 26
iS	N	14 30.3					
3rd June		L.P. Z faulty time break circuit.					
iP	Z	01 54 53.0	0.2	0.4	c	$4\frac{1}{2}^{\circ}$	H=01 53 43
iS	N	55 47.4					$7\frac{1}{2}^{\circ}$S, 155°E
							Solomon Islands Region.
iP	Z	03 11 02.4	0.4	1.0	c	$4\frac{1}{2}^{\circ}$	H=03 09 52
iS	E	56.1					
iP	Z	03 16 32.9	0.2	0.4	c	$4\frac{1}{2}^{\circ}$	H=03 15 23
iS	E	17 26.4					8°S, $155\frac{1}{2}^{\circ}$E
							Solomon Islands Region.
iP	Z	03 29 08.2	0.3	0.3	c	$4\frac{1}{2}^{\circ}$	H=03 27 58
iS	N	30 02.4					
iP	Z	13 38 16.1	0.3	0.5	c	$4\frac{1}{2}^{\circ}$	H=13 37 06
iS	E	39 09.8					8°S, 155°E
							Solomon Islands Region.
iP	Z	14 13 41.8			d	5°	H=14 12 28
iS	N	14 39.1					
iP	Z	16 11 30.2	0.3	0.4	d	1°	H=16 11 14
iS	E	42.2					
eP	Z	17 23 27	0.4	0.7	d	$4\frac{1}{2}^{\circ}$	H=17 22 17
iS	N	24 20.7					
iP	Z	22 57 58.4	0.4	0.4	d	$3\frac{1}{2}^{\circ}$	H=22 57 03
iS	N	58 41.4					
4th June							
i[illegible]	Z	05 06 27			c	$4\frac{1}{4}^{\circ}$	H=05 05 22
[illegible]	N	07 16.7					[illegible]

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks.
4th June contd.							
iP	Z	16 08 31.3	0.4	0.3	a	$3\frac{3}{4}^{o}$	H=16 07 33
iS	E	09 16.8					
eP	Z	20 08 $14\frac{1}{2}$	0.4	0.2	c		(Regional)
i	Z	16.o					
iP	Z	21 05 40	0.6	1.2	c		Regional
i	Z	06 31.7					
eP	Z	21 16 35			d		Regional
5th June							
eP	Z	01 38 $14\frac{1}{2}$	0.8	0.4	d		Teleseism
iP	Z	14 39 30.8	0.5	0.4	c		(Regional)
iP	Z	15 14 41.3	0.5	3.5	c	$4\frac{3}{4}^{o}$	H=15 13 30
iS	N	15 36.4					
6th June							
iP!	Z	06 36 09.5			d	$3\frac{1}{2}^{o}$	H=06 35 14
iS	E/	51.0					$6\frac{1}{2}^{o}$S, 152^{o}E
							South Coast New Britian
eP	Z	09 33 45	1.0	0.7	d	(26^{o})	
e(S)	N/	38 04					
eP	Z	11 18 05	0.8	0.6	d		Regional
eP	Z	11 44 25	0.4	0.3	d	$5\frac{1}{2}^{o}$	H=11 43 01
eS	E	45 30					
e(P)	Z	13 04 $04\frac{1}{2}$	0.2	0.1	d	$(2\frac{3}{4}^{o})$	H=13 03(21)
eS	E	$37\frac{1}{2}$					
eP	Z	13 48 $02\frac{1}{2}$	0.5	0.4	c	$3\frac{1}{2}^{o}$	H=13 47 09
eS	E	$43\frac{1}{2}$					
iP	Z	15 54 26.8			c		Local
iS	E/	31.9					
eP	Z	16 41 39	0.6	0.2	c	$3\frac{1}{2}^{o}$	H=16 40 45
eS	E	42 20					
7th June							
eiP	Z	15 40 24	0.4	2.1	c	$5\frac{1}{4}^{o}$	H=15 39 06
i	Z	24.4					
iS	N	41 23.8					
eP	Z	17 46 54	1.2	0.3	d		Teleseism
eiP	Z	18 45 54			c	5^{o}	H=18 44 39
eS	N	46 52					
8th June							
iP	Z	07 07 45.9	0.7	1.4	d		Regional
eP	Z	08 20 $25\frac{1}{2}$	0.4	0.7	c	$4\frac{1}{2}^{o}$	H=08 19 15
i	Z	26.7					$8\frac{1}{2}^{o}$S, $155\frac{1}{2}^{o}$E
iS	E	21 19.4					Solomon Islands Region.
eP	Z	12 07 $38\frac{1}{2}$	0.5	0.2	c		Regional
eP	Z	13 27 03	0.6	0.6	c	38^{o}	
iS	N/	30 09.4					
eP	Z	17 37 18	0.3	0.2	c	5^{o}	H=17 36 04
i	Z	18.6					8^{o}S, 155^{o}E
eS	N	38 14					Solomon Islands Region
9th June							
eP	Z	01 54 $47\frac{1}{2}$	0.5	0.2	d		Teleseism

ESA'ALA			T sec	A* mm	GM	Dist	Remarks
9th June							
iP	Z	14 01 48.4			c		Local
iP	Z	19 00 35					Local
10th June							
iP	Z	14 04 29.5	0.5	0.7	d		Regional
11ty June							
iP	Z	09 16 58.4	0.3	1.3	c	3½°	H=09 16 03
iS	E	17 40.5					6°S, 149°E
						South Coast New Britian.	
iP	Z	15 10 19.3	0.5	0.8	d	7½°	H=15 08 29
iS	E	11 24.0					
12th June							
eP	Z	03 09 53½	1.0	0.5	c	18°	

			T sec	A* mm	GM	Dist	Remarks
TABELE							
23rd May, 1967 - Nil recorded							
24th May, 1967 - Nil recorded.							
25th May, 1967 - Nil recorded.							
26th May, 1967 - Nil recorded.							
27th May, 1967 - Continuous tremors between 1400 and 1431 hours. Av. T = 0.3, Av. A* = 1.0.							
28th May, 1967							
iP	Zw	14 24 37.0	0.4	(2.6)	d		Local
i	Zw	43.0					
29th May, 1967 - Nil recorded.							
30th May, 1967 - Nil recorded.							
31st May, 1967 - Nil recorded.							
1st June, 1967 - Nil recorded.							
2nd June, 1967							
eP	Zw	17 37 20½	0.5	0.6	(d)		Local
i	Zw	51½					
3rd June, 1967							
iP	Zw	14 13 26.0			d		Regional
4th June, 1967 - Nil recorded.							
5th June, 1967							
iP	Zw	15 14 50½	0.4	2.0	d		Regional
6th June, 1967 - Nil recorded.							
7th June, 1967							
eiP	Zw	18 45 46	0.4	0.8	d		Regional
i	Zw	51.0					
8th June, 1967 - Nil recorded.							
9th June, 1967							
iP	Zw	07 08 22½			c		Local
i	Zw	38½					
10th June, 1967 - Nil Recorded.							
11th June, 1967 - No record.							
12th June, 1967							
iP	Zw	09 10 44½	0.5	8.0	c		Local
i	Zw	58.0					
13th June, 1967							
iP!	Zw	16 16 17.0			d		Regional
i	Zw	24½					

I. SMITH
for R. F. HEMING
A/Vulcanologist-in-Charge

[illegible]baul Central Observatory
[illegible] 1967.

5 JUL 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 21st June, 1967 To: 27th June, 1967.
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	No records received.
TABELE	(TBL)	No records received.
AGENAHAMBO	(AGE)	From: 11th June, 1967, To: 17th June, 1967

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.			
S.P.-N&E	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000.

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder 0.25
Attenuator setting 1/100, drum speed 60 mm/min.

S.P.-Z_W Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engdahl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	= Peak-to-Trough trace amplitude in millimetres.
A	= Amplitude from W.W.S.S.
A*	= Amplitude from seismographs with different response to the W.W.S.S.
T	= Period in seconds.
C.B.M.	= Confused by microseisms.
Dist.	= Distance in central angle degrees.
H	= Origin time.
h	= Focal depth in Km.

Remarks:

Local	= Typical signature of an earthquake with epicentre within 0.9°.
Near	= Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	= Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	= Typical signature of an earthquake with epicentre more than 45°.
Traces	= Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

1.5.67

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL.							
21st June, 1967.							
iP	Z	03 04 37.4	0.4	2.5	d	$2\frac{1}{4}^{\circ}$	H=03 04 02
iS	E	05 04.0					
eP	Z	05 32 58	0.5	1.5	d	$2\frac{3}{4}^{\circ}$	H=05 32 12
iS	N	33 32.5					
iP	Z	07 12 18	0.3	8.5	d		C. B. M.
e	Z/	07 43 50			-		Traces
iP	Z	08 20 42.0	0.4	10.0	d	$\frac{1}{2}^{\circ}$	H=08 20 30
iS	N/	51.0					
eiP	Z	10 41 $44\frac{1}{2}$	0.5	1.0	d	$2\frac{1}{2}^{\circ}$	H=10 41 03
i	Z	45.5					
i	Z	46.8					
iS	N	42 16.5					
iP	Z	12 45 33.3	0.4	1.2	c	$1\frac{3}{4}^{\circ}$	H=12 45 06
iS	N	54.4					
eP	Z	15 01 41	0.4	1.0	c	$4\frac{1}{2}^{\circ}$	H=15 00 35
i	Z	44.1					
eS	N/	02 32					
eiP	Z	15 30 37	0.5	1.0	d	$4\frac{3}{4}^{\circ}$	H=15 29 24
i	Z	41.1					
i	Z	45.1					
iS	E	31 32.8					
iP	Z	15 52 04.5	0.5	1.0	d	35°	
eS	N/	57 28					
eLq	E/	59 40					
eP	Z	18 17 07	0.8	1.8	d		Regional (Deep)
eP	Z	18 25 20	0.5	1.0	c	(79°)	
e(S)	N/	35 32					
iP	Z	18 37 03.4	0.8	1.0	d		Regional (Deep)
eP	Z	19 16 20	0.5	1.0	d	1°	H=19 16 01
i	Z	23.1					
i(S)	N	34.2					
iP	Z	19 21 44.2	0.5	2.0	d		Regional
eiP	Z	20 28 $36\frac{1}{2}$	0.8	1.0	c	$18\frac{1}{2}^{\circ}$	
i	Z	38.7					
iS	N/	32 05.4					
iP	Z	22 28 19.1	0.5	6.0	d	$1\frac{1}{2}^{\circ}$	H=22 27 57
iS	E	35.6					
iP	Z	23 23 55.1	0.4	3.0	c	2°	H=23 23 23
iS	E	24 19.1					
22nd June:		S.P. N-S Lamp faulty.					
e	Z/	02 44 30			+		Traces
eP	Z	07 14 32	0.5	1.8	c	$4\frac{1}{2}^{\circ}$	H=07 13 22
eS	N/	15 20					
e	Z/	10 58 50			-		Traces
e	Z/	12 17 06			+		Traces
iP	Z	14 03 28.3	0.5	2.0	c		Regional C.B.M.

RABAUL.

22nd June, contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	15 36 51.3	0.6	4.0	d		Regional C.B.M.
iP	Z	17 24 03.3	0.5	3.8	d		Regional C.B.M.
eP	Z	17 43 11½	0.5	1.0	c	2°	H=17 42 28
i	Z	12.2					
iS	N/	36.0					
iP	Z	17 57 09.0	0.5	13.5	c	5½°	H=17 55 44
iS	E/	58 14.5					
iP	Z	18 07 06.0	0.6	1.6	c	2°	H=18 06 34
eS	N/	30					
eiP	Z	19 09 28½	0.6	2.0	c	1¾°	~~H=19 08 59~~
i	Z	31.0				Felt: Emira Island Int.III	
iS	N/	50.5				01°41'S, 149°55'E.	
iP	Z	19 37 02.3	0.5	1.0	d	2°	H=19 36 29
iS	N	27.5					

23rd June.

			T sec	A mm	GM	Dist	Remarks
e(P)	Z/	00 32 38			c		Teleseism
e	Z/	34 08					
eiP	Z	05 09 51	0.6	1.5	c	22°	
i	Z	51.9					
eS	E/	14 42					
eP	Z	07 48 31	0.5	1.0	d	1¾°	H=07 48 02
iS	N	53.0					
eP	Z	11 57 13				60°	
eS	N/	12 05 26					
e	Z/	14 18 05			–		Traces
eP	Z	14 44 19	0.4	1.0	c	(½°)	H=14 44(10)
i(S)	E	26.0					
iP	Z	15 38 37.0	0.5	1.5	d	1¾°	H=15 38 07
iS	E	59.5					
eP	Z	21 34 55½	0.4	1.8	d	22°	
i	N	35 13.2					
eS	E/	38 54					

24th June.

			T sec	A mm	GM	Dist	Remarks
iP	Z	10 44 05.0	0.4	2.0	c	¾°	H=10 43 50
iS	N	16.3					
iP	Z	11 45 49.2	0.5	4.5	d	1¼°	H=11 45 28
eS	E/	46 05					
eP	Z	15 49 24½	0.5	1.0	d	1¾°	H=15 48 55
i	Z	26.5					
iS	N	46.5					
e	Z/	16 48 44			–		Traces
iP	Z	18 09 56.2	0.5	1.8	d		Regional
iP	Z	21 04 55.0	0.8	5.0	d	20°	
iS	N/	08 18.0					
eP	Z	21 37 05	0.8	1.5	d	5¼°	H=21 35 46
iS	N/	38 06					
eP	Z	22 30 39	0.5	0.8	c	3½°	H=22 29 39
eS	E/	31 16					
iP	Z	23 50 00.0	0.4	1.5	c	¾°	H=23 49 46
iS	N	10.2					

25th June.

			T sec	A mm	GM	Dist	Remarks
e	Z/	04 54 26			–		Traces

RABAUL.

25th June, contd.

			T sec	A mm	GM	Dist	Remarks
e	Z/	07 51 16			-		Traces
iP iS	Z N/	07 53 46.5 54 48.0	0.4	1.0	c	$5\frac{1}{2}^{0}$	H=07 52 26
iP iS	Z N	09 18 45.0 19 38	0.5	1.0	c	$4\frac{1}{2}^{0}$	H=09 17 36
eP iS	Z N/	11 27 $05\frac{1}{2}$ 28 07	0.5	2.0	d	$5\frac{1}{2}^{0}$	H=11 25 45
iP iS	Z N	11 30 47.0 31 08.5	0.5	6.5	d	$1\frac{3}{4}^{0}$	H=11 29 18
iP eLq eS	Z N/ N/	13 29 53.5 31 42 54	0.6	1.5	d	11^{0}	
iP iS	Z N	13 37 11.0 23.0	0.5	17.0	c	1^{0}	H=13 36 55
iP iS	Z N	18 44 06.3 23.5	0.5	10.0	d	$1\frac{1}{4}^{0}$	H=18 43 44
iP	Z	23 22 32.0	0;8	1.5	d		(Deep shock)

26th June: No timing for Hi-speed and harbour network, between 260111 and 260119 hours.

			T sec	A mm	GM	Dist	Remarks
e	Z/	03 05 16			-		Traces
eP iS	Z E	12 15 $00\frac{1}{2}$ 07.2	0.5	1.0	d	$\frac{1}{2}^{0}$	H=12 14 51
eiP i iS	Z Z E	13 50 $23\frac{1}{2}$ 24.8 32.0	0.4	0.8	c	$\frac{1}{2}^{0}$	H=13 50 11
iP iS	Z N/	14 05 34.3 06 38.0	0.5	3.0	d	$5\frac{1}{2}^{0}$	H=14 04 11
iP iS	Z N	16 26 52.9 27 04.5	0.4	1.2	d	$\frac{3}{4}^{0}$	H=16 26 37
eP i iS	Z Z N	20 02 22 26.2 03 11.5	0.5	1.0	d	$4\frac{1}{4}^{0}$	H=20 01 17
iP! iS	Z N	21 37 41.0 52.5	0.5	59.0	d	$\frac{3}{4}^{0}$	H=21 37 26
iP iS	Z N	21 55 31.3 (43.4)	0.5	7.0	d	$(\frac{3}{4}^{0})$	H=21 55 (16)
iP iS	Z N	22 25 13.4 26.0	0.5	32.8	d	1^{0}	H=22 24 56
iP iS	Z N	22 27 27.0 39.5	0.5	7.5	d	1^{0}	H=22 27 10 In coda of preceding shock.
eiP i iS	Z Z E	22 32 07 07.8 20.0	0.5	1.5	d	1^{0}	H=22 31 50
iP iS	Z N	22 38 18.0 31.2	0.5	10.8	d	1^{0}	H=22 38 01

27th June.

			T sec	A mm	GM	Dist	Remarks
e	Z/	00 36 18			+		Traces
iP iS	Z N	01 55 48.2 56 01.5	0.4	3.0	d	1^{0}	H=01 55 31
iP iS	Z N	05 43 38.3 59.0	0.4	2.5	c	$1\frac{1}{2}^{0}$	H=05 43 10

RABAUL.

27th June, contd.

			T sec	A mm	GM	Dist	Remarks
iP eS	Z N	06 54 08.2 $33\frac{1}{2}$	0.5	2.0	c	2°	H=06 53 35
e	Z/	08 33 42			–		Traces
iP iS	Z E	11 55 02.5 28.6	0.4	1.5	c	2°	H=11 54 28
iP iS	Z N	14 13 11.0 32.5	0.5	1.6	c	$1\frac{1}{2}^{\circ}$	H=14 12 43
iP! i iS!	Z Z E	14 19 28.0 32.8 47.0	0.5	6.5	dNW	$1\frac{1}{2}^{\circ}$	H=14 19 03
e	Z/	14 58 04			–		Traces
iP	Z	15 15 51.5	0.5	5.0	c		Regional
iP iS	Z N	16 41 42.0 54.2	0.5	11.0	d	1°	H=16 41 26
iP iS	Z N	16 59 33.0 17 00 05.5	0.4	3.0	d	$2\frac{3}{4}^{\circ}$	H=16 58 50
iP iS	Z N	17 00 27.5 58.5	0.5	6.5	d	$2\frac{1}{2}^{\circ}$	H=16 59 49 In coda of preceding shock.
eiP i iS	Z Z N	17 35 47 49.6 36 11.7	0.5	0.8	d	2°	H=17 35 14
e	Z/	19 55 05			+		Traces
eP eS	Z N/	21 48 20 57 04	0.4	1.0	d	47°	
iP	Z	23 10 51.2	0.5	21.0	c		Regional

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
11th June:		Nil recorded.					
12th June.							
eP	Z	14 09 49	0.5	0.5	d		Local
i	Z	10 30					
13th June.							
iP	Z	16 16 39		1.4	c		Local
i	Z	17 28					
14th June.							
iP!	Z	15 20 22½			d		Regional
15th June.							
iP!	Z	15 41 50			c		Regional
i	Z	42 19					
16th June.							
iP	Z	14 45 52	0.5	1.3	d		Local
i	Z	46 29					
eP	Z	15 -2 59	0.4	0.4	c		Local
iP	Z	20 46 12½	0.2	1.0	c		Local
i	Z	47 21					
17th June.							
iP!	Z	11 18 50			c		Local
iP	Z	17 25 44	0.5	1.0	c		Regional

I. Smith
for R. F. Heming.
(A/Vulcanologist-in-Charge)

Central Observatory
RABAUL.

30th June, 1967.

13 JUL 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 27th June, 1967 To: 4th July, 1967
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	From: 12th June, 1967 To: 26th June, 1967
TABELE	(TBL)	From: 13th June, 1967 To: 19th June, 1967
AGENAHAMBO	(AGE)	From: 17th June, 1967 To: 25th June, 1967.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" S., Longitude 150°48'50" E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification [illegible]00

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_W Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

			T sec	A mm	GM	Dist	Remarks
28th June, 1967							
eP	Z	00 16 25	0.5	1.0	c	$10\frac{1}{2}^{\circ}$	H=00 13 52
eS	N/	18 24					
iP	Z	01 18 57.0	0.5	1.5	d		Regional
iP	Z	01 42 03.0	0.5	4.0	c	$5\frac{1}{2}^{\circ}$	H=01 40 43
eS	E/	43 05					
iP	Z	04 33 06.5	0.5	1.5	d	2°	H=04 32 33
iS	N	31.5					
e	Z/	05 41 10			-		Traces
iP	Z	14 33 17.5	0.4	1.5	d	$3\frac{1}{2}^{\circ}$	H-14 32 25
iS	N	57.8					
iP	Z	14 42 12.8	0.6	2.0	c	47°	
eS	E/	48 48					
iP	Z	15 10 35.5	0.3	2.5	d	4°	H=15 09 37
iS	E	11 21.8					
iP	Z	21 39 03.8	0.3	2.0	d		Regional
i	Z	03.5					
29th June							
iP	Z	00 27 55.2	0.4	2.5	d	$2\frac{1}{2}^{\circ}$	H=00 27 16
iS	N	28 25.0					
iP	Z	01 00 59.8	0.4	12.0	c	1°	H=01 00 42
iS	N	01 12.4					
iP	Z	03 46 35.0	0.4	9.0	c	$1\frac{1}{2}^{\circ}$	H=03 46 09
iS	E	55.0					
iP	Z	07 01 34.2	0.4	9.5	d	1°	H=07 02 17
iS	N	47.0					
e	Z/	09 34 24			-		Traces
iP	Z	12 13 50.6	0.5	2.0	d		Regional
i	Z	51.8					
iP	Z	12 52 14.0	0.5	1.5	d	1°	H=12 51 58
iS	N	26.2					
eiP	Z	13 33 42	0.5	5.0	d	1°	H=13 33 24
i	Z	42.8					
iS	N	55.3					
eiP	Z	13 39 10	0.5	1.0	d	$1\frac{1}{2}^{\circ}$	H=13 38 44
i	Z	11.0					
eS	N	- $29\frac{1}{2}$					
iP	Z	15 45 16.0	0.5	1.0	d	$1\frac{3}{4}^{\circ}$	H=15 44 47
iS	N	38.3					
eP	Z	16 00 59	0.5	1.0	d	$1\frac{1}{2}^{\circ}$	H=16 00 34
iS	E	01 18.0					
eiP	Z	16 41 18	0.5	1.0	c	23°	
i	Z	19.0					
ePP	Z/	46					
ePcP	Z/	45 05					
iS	N/	24.0					
[illegible]	[illegible]/	49.0					
		48 46					

RABAUL

			T sec	A mm	GM	Dist	Remarks
29th June contd.							
iP	Z	19 53 15.6	0.5	3.0	d	½°	H=19 53 05
iS	N	24.0					
iP	z	21 11 35.0	0.5	2.5	d		Regional
iP	Z	21 15 51.2	0.5	1.0	c		Regional
eiP	Z	21 39 15	0.5	1.0	d		Regional
i	Z	19.0					
30th June							
iP	Z	00 17 58.0	0.5	1.8	d	3½°	H=00 17 06
eS	E	18 38					
iP!	Z	09 47 36.0	0.5	17.0	c	½°	H=09 47 26
iS	N	43.5					
eiP	Z	17 25 02½	0.2	0.8	c	1½°	H=17 24 37
i	Z	03.0					
iS!	N	21.0					
e	Z/	19 54 10			+		Traces
eP	Z	20 43 50	0.3	1.0	c	1°	H=20 43 33
iS	N	44 02.5					
1st July							
iP	Z	04 53 21.0	0.4	2.5	c		Regional C.B.M.
iP	Z	06 19 57.0	0.5	1.5	c	2°	H=06 19 23
iS	N	20 22.5					
iP	Z	07 38 18.3	0.5	1.5	c	(55°)	
e(S)	N/	45 52					
iP	Z	13 22 32.5	0.5	2.0	c		Regional C.B.M.
eP	Z	23 21 24	0.6	2.0	c	(72°)	
e(S)	N/	30 42					
2nd July							
iP	Z	03 08 16.1	0.4	2.8	d	1¼°	H=03 07 53
iS	N	33.5					
iP	Z	03 24 43.8	0.5	1.5	c		Regional C.B.M.
eP	Z	05 18 20	0.6	2.0	d		Regional C.B.M.
eP	Z	07 13 59	0.5	1.5	c	60°	
eS	N/	22 05					
iP	Z	10 25 45.3	0.4	2.2	d	1¼°	H=10 25 23
iS	E	26 02.5					
e	Z/	13 30 50			+		Traces
iP	Z	21 05 27.2	0.5	2.0	d	½°	H =21 05 15
iS	E	36.1					
iP	Z	22 18 18.5	0.5	15.0	d	1°	H=22 17 59
iS	E/	32.1					
3rd July		ON secodary from 02.2311 to 03.0510. On secondary power from 03.0420 to 03.0509					
iP	Z	00 14 11.9	0.5	3.8	c	4°	H=00 13 08
eS	E/	59					
iP	Z	01 01 37.3	0.3	1.0	c	¼°	H=01 01 29
iS	N	43.0					
eP	Z	03 46 31½	0.5	3.0	c	17¾°	
eS	E/	49 52					
iP	Z	13 04 11.1	0.4	3.0	d	¼°	H=13 04 00
iS	E	[illegible]					

RABAUL

3rd July contd.

			T sec	A mm	GM	Dist	Remarks
iP iS	Z N	17 30 21.3 50.2	0.5	1.0	c	$2\frac{1}{2}^{o}$	H=17 29 43

4th July

Strong microseismic activity from 03.2333 to 04.0800

			T sec	A mm	GM	Dist	Remarks
iP iS	Z E/	02 21 13.5 25.0	0.5	4.5	d	$\frac{3}{4}^{o}$	H-02 20 58
e	Z/	03 21 26			–		Traces
iP	Z	07 32 04.0	0.5	4.0	d		Regional C.B.M.
iP iS	Z N	10 54 37.8 55 05.0	0.5	1.0	c	$2\frac{1}{4}^{o}$	H=10 54 02
iP iS	Z N	11 26 34.5 55.0	0.5	3.0	d	$1\frac{1}{2}^{o}$	H=11 26 12
iP iS	Z N	11 38 16.8 28.0	0.5	7.0	d	$\frac{3}{4}^{o}$	H=11 38 02
iP iS	Z N	11 44 02.0 21.0	0.5	2.0	c	1^{o}	H=11 43 41
iP iS	Z N	13 34 06.2 17.5	0.4	3.0	d	$\frac{3}{4}^{o}$	H=11 33 51
eP	Z/	14 37 14			c		Teleseism.

....

ESA'ALA Z. L.P. faulty time break circuit

			T sec	A* mm	GM	Dist	Remarks
13th June, 1967.							
eP	Z	00 21 31	1.5	1.0	c	(48°)	
i	N/	40.7					
i	N/	25 12.7					
e(S)	N/	27 35					
e(SPP)	E/	50.7					
i	N/	28 46.7					
iP	Z	15 40 43.3	0.5	1.4	c	$4\frac{3}{4}^\circ$	H=15 39 31
i!	Z	44.3				$6\frac{1}{4}^\circ$S,	158°E Solomon Isl.
iS	E/	41 39.2					
14th June							
iP	Z	01 05 48.5			d	1°	H=01 05 30
iS	N	06 01.9					
iP	Z	04 45 11.4	0.4	1.9	c		Regional
eP	Z	05 13 15	1.0	0.8	c		Teleseism
eP	Z	07 13 $59\frac{1}{2}$	0.5	0.3	c	3°	H=07 13 11
iS	N	14 36.4					
iP	Z	15 42 05.9	0.3	1.2	d	$3\frac{1}{2}^\circ$	H=15 41 12
iS	N	46.9					
eP	Z	15 45 47			d	$3\frac{3}{4}^\circ$	H=15 44 50
iS	N	46 30.8					
iP	Z	20 16 13.6			d		(Regional)
15th June							
iP	Z	14 10 47.9	0.3	0.8	c	$4\frac{1}{2}^\circ$	H=14 09 41
eS	N	11 $40\frac{1}{2}$				$7\frac{1}{2}^\circ$S,	$154\frac{1}{2}^\circ$E Solomon Isl.
eP	Z	14 46 $01\frac{1}{2}$	0.3	0.2	c	$3\frac{3}{4}^\circ$	H=14 45 04
iS	N	45.2					
eP	Z	15 13 34	0.6	0.4	c		(Regional)
iP	Z	20 45 54.4	0.3	1.0	c	$4\frac{3}{4}^\circ$	H=20 44 42
iS	N/	46 50.1					
i	N/	47 33.8					
i	N/	48 34.8					
16th June							
iP!	Z	04 33 53.5			c		Local
eP	Z	05 29 $17\frac{1}{2}$	0.2	0.3	d	$5\frac{1}{2}^\circ$	H=05 27 54
iS	N	30 22.0					
eP	Z	06 45 45.5	0.5	0.6	c	$3\frac{3}{4}^\circ$	H=06 44 47
iS	E	46 30.5					
iP	Z	11 04 04.3	0.4	2.0	c	$1\frac{1}{2}^\circ$	H=11 03 42
iS	E	21.4					
iP	Z	11 19 05.0	0.3	0.6	c	$3\frac{3}{4}^\circ$	H=11 18 08
iS	N	49.1					
iP	Z	17 25 36.9			d	$5\frac{1}{4}^\circ$	H=17 24 19
iS	N	26 37.5					
17th June							
eP	Z	05 18 33	1.0	1.0	d		Teleseism
i	N/	25 03					
i	N/	26 06.0					
i	N/	28 54.0					
iP	Z	12 35 24.4	0.5		d		Local
iP	Z	19 26 50.0	0.5	0.8	c	4°	H=19 25 50
iS	N	27 35.7					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
18th June							
eP	Z	12 20 32	0.5	0.3	c		(Regional)
e_2P	Z	12 26 21	1.0	0.4	c	$8\frac{1}{4}^{o}$	H=12 24 21
iS	N/	27 54					$3\frac{1}{2}^{o}$S, 146^{o}E Bismark Sea.
eP	Z	13 53 58	0.7	0.6	d	$7\frac{1}{2}^{o}$	H=13 52 07
iS	N/	55 24					
iP	N/	20 06 24				$6\frac{1}{4}^{o}$	H=20 04 52
iS	N/	07 35					$4\frac{1}{2}^{o}$S, 159^{o}E Bismark Sea.
			Shock lost at end of S.P. record.				
19th June							
eP	Z	14 01 $07\frac{1}{2}$	0.5	0.5	d		(Regional)
eP	Z	17 19 $08\frac{1}{2}$	0.9	1.5	d	($86\frac{1}{4}^{o}$)	
i	Z	09.3					
e(S)	N/	28 31					
e	E/	18 16 24			+		Traces
20th June							
iP	Z	02 01 53.0	0.5	0.4	c	1^{o}	H=02 01 35
iS	E	02 07.5					
iP	Z	03 45 38.0	0.4	1.0	d	4^{o}	H=03 44 37
iS	N	46 25.3					
eP	Z	04 47 $32\frac{1}{2}$	0.5	0.2	c	$4\frac{3}{4}^{o}$	H=04 46 20
iS	N	48 28					
eP	Z	07 50 $08\frac{1}{2}$	0.8	0.3	c		(Regional)
e	E/	07 58 30			-		Traces
iP	Z	13 25 59.1					Local
iP	Z	13 43 59.4	1.0	0.9	d		Local
eS	N/	44 05					
eP	Z	15 38 26	0.7	0.2	c	$4\frac{3}{4}^{o}$	H=15 37 14
eS	N	39 21					$5\frac{1}{2}^{o}$S, $153\frac{1}{4}^{o}$E North Solomon Sea.
iP	Z	18 23 25.5	0.4	0.7	d	$5\frac{3}{4}^{o}$	H=18 21 59
eS	N	24 33					
eP	Z	21 08 43	0.5	0.4	c	2^{o}	H=2108 10
i	Z	43.9					
iS	E/	09 07.9					
21st June							
iP	Z	07 09 56.0	0.2	0.2	c		(Local)
iP	Z	10 42 02.4	0.4	0.4	c	$3\frac{1}{2}^{o}$	H=10 41 09
iS	N	43.4					
iP	Z	15 01 49.4	0.3	0.4	c	$4\frac{3}{4}^{o}$	H=15 00 37
i	Z	51.4					$7\frac{1}{2}^{o}$S, $153\frac{1}{2}^{o}$E Solomon Sea.
iS	N	02 45.4					
iP	Z	15 30 47.5	0.2	0.5	c	$4\frac{1}{2}^{o}$	H=15 29 37
iS	N	31 41.9					
iP	Z	15 52 22.4	0.5	1.3	c	(46^{o})	
e(S)	N/	58 02					
eP	Z	18 17 36	0.7	0.4	d		(Regional)
eP	Z	18 25 $50\frac{1}{2}$	1.0	0.5	c		(Regional)
eP	Z	18 37 $31\frac{1}{2}$	0.7	0.4	d		(Regional)
eiP	Z	19 16 06					(Regional)
i	Z	06.3					
iP	Z	20 08 20.7	0.5	1.5	c	1^{o}	H=20 08 09

ESA'ALA

			T sec	A^{*} mm	GM	Dist	Remarks
22nd June							
iP	Z	07 14 37.5	0.4	.,5	c	$4\frac{3}{4}^{o}$	H=07 13 25
i	Z	38.6					7^{o}S, 154^{o}E Solomon Sea.
iS	N	15 33.6					
eP	Z	15 36 $22\frac{1}{2}$	0.5	0.3	d	$4\frac{1}{4}^{o}$	H=15 35 18
i	Z	27.2					
iS	E	37 11.0					
eP	Z	17 57 52	0.5	0.4	c	$4\frac{3}{4}^{o}$	H=17 56 39
eS	N/	58m48					8^{o}S, 154^{o}E Solomon Sea.
eiP	Z	20 10 $36\frac{1}{2}$	0.5	1.7	c	9^{o}	H=20 08 25
i	Z	37.5					
iS	E/	12 18.0					
23rd June							
iP	Z	05 09 40.7	0.7	5.0	c	$21\frac{3}{4}^{o}$	
eS	N/	13 27					
e	N/	12 04 20					Traces
eP	E/	21 34 32			d		Teleseism
24th June		Shock lost at end of record.					
iP	N/	21 05 40			c	30^{o}	
iS	N/	09 57					
e(P)	N/	21 38 10					Teleseism
iP	Z	23 45 29.5	0.3	0.7	c	$4\frac{1}{4}^{o}$	H=23 44 26
eS	E	46 17.9					
25th June							
eP	Z	09 18 54	0.5	0.2	d	$4\frac{3}{4}^{o}$	H=09 17 43
eS	E	19 49					
eP	Z	11 27 $42\frac{1}{2}$	0.7	0.2	c		Teleseism
eP	Z	13 30 $30\frac{1}{2}$	1.2	0 4	c		Tele eism
iP	Z	23 23 14.4	0.7	0.8	d	$24\frac{1}{4}^{o}$	
iS	N/	27 33.4					
26th June							
eP	Z	07 23 05.5	0.2	0.2	d		Local
iS	E	13.0					
iP	Z	14 05 36.5			c	$5\frac{1}{4}^{o}$	H=14 04 19
iS	E/	06 37					
iP	Z	20 02 39.4	0.3	0.6	d	5^{o}	H=20 01 26
eS	E/	03 36					

AGENAHAMBO

18th June, 1967

			T sec	A* mm	GM	Dist	Remarks
iP	Z	12 19 50	0.2	0.5	d		Regional
e	Z	20 27½					
eP	Z	12 26 9½					Regional (Bismarck Sea)
e	Z	27					
iP	Z	20 06 28.0	0.3	1.0	c		Regional
i	Z	07 33.0					
i	Z	08 26½					

19th June, 1967 - Nil recorded.

20th June, 1967 - No record.

21st June, 1967 - Microseismic activity between 202120 and 210102 hrs. and 212114 and 212200 hrs. Av. T = 0.3, Av. A* = 0.4

22nd June, 1967 - Microseismic activity between 222017 and 230120 hrs. Av. T = 0.3, Av. A* = 1.0

			T sec	A* mm	GM	Dist	Remarks
eP	Z	15 35 40					Regional
i	Z	42.0					
eP	Z	17 45 12					Local
e	Z	18					
i	Z	24.0					
eP	Z	17 58 10					Regional
e	Z	59 12					
i	Z	15½					
eP	Z	19 14 30	0.5	0.5	d		Teleseism

23rd June, 1967 - Microseismic activity between 232250 & 240029 hrs.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	05 09 11.0					

24th June, 1967

			T sec	A* mm	GM	Dist	Remarks
iP	Z	18 09 38½					Regional
i	Z	40½					
i	Z	18.10 06.0					
i	Z	13.0					

25th June, 1967 - Nil recorded.

TABELE

13th June, 1967

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	15 40 29½	0.2	4.8	c		Regional
i	Zw	41 14.0					
i	Zw	32.0					
i	Zw	42 13.0					
eP	Zw	20 29 30	2.8	0.5	c		
i	Zw	30 10½					
i	Zw	43.0					

14th June, 1967

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	15 13 03½	0.2	3.0	d		
e	Zw	35½					
i	Zw	41½					

15th June, 1967

			T sec	A* mm	GM	Dist	Remarks
iP	Zw	05 28 54.0	2.0	4.1			
[illegible]	Zw	29 27.0					

19 JUL 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 4th July, 1967 To: 11th July, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	Not operational
ESA'ALA	(ESA)	From: 26th June, 1967 To: 3rd July, 1967
TABELE	(TBL)	From: 19th June, 1967 To: 26th June, 1967
AGENAHAMBO	(AGE)	No records received.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_w Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
4th July, 1967.							
iP	Z	23 50 39.0	0.5	3.0	c		Regional Deep.
5th July.		Primary time retarded 1 second at 05.0127 hours. Strong microseismic activity.					
iP	Z	07 31 11.5	0.5	7.0	c		Regional
iP eS	Z N/	08 24 14.6 46	0.5	6.0	d	$2\frac{1}{2}^{\circ}$	H=08 23 34
iP	Z	08 42 00.5	0.4	4.0	c		Regional C.B.M.
iP eS	Z N/	10 01 31.0 54	0.5	8.8	d	2°	H=10 01 01
iP	Z	11 56 18.1	0.5	6,0	d		Regional C.B.M.
iP iS	Z N	19 48 17.5 30.0	0.5	4.0	c	1°	H=19 48 01
e	Z/	21 20 04			-		Traces
eP	Z	22 29 44	0.5	1.0	d		Regional
iP	Z	22 39 01.0	0.5	6.0	d		Regional
iP	Z	22 49 15.0	0,5	2.5	d		Regional
6th July		Primary very inaccurate. Very strong microseismic activity.					
eP	Z	03 01 33	0.4	1.5	d		Regional
iP eS	Z N	05 46 35.4 47	0.4	7.0	c	$\frac{3}{4}^{\circ}$	H=05 46 21
iP e(S)	Z N/	07 46 03.4 51 06	0.5	4.0	c	(28°)	
iP iS	Z E/	09 52 58.8 53 17.8	0.5	28.0	c	$1\frac{1}{2}^{\circ}$	H=09 52 34
eP	Z	10 18 $39\frac{1}{2}$	0.5	2.0	c		Regional
iP eS	Z E/	13 53 07.3 14 01 54	0.8	2.8	d	75°	
eP	Z	18 18 04	0.5	2.0	c		Regional
e	Z/	18 51 20			-		Traces
e	Z/	19 23 54			-		Traces
iP eS	Z E/	21 37 44.1 58	0.4	5.0	d	1°	H=21 37 28
7th July		Secondary time failure from 0312 th 0425 hours					
iP eS	Z N	07 34 09.2 37	0.5	1.5	d	$2\frac{1}{4}^{\circ}$	H=07 33 32
iP iS	Z N	10 07 30.1 54.7	0.5	2.5	c	2°	H=10 06 57

RABAUL

			T sec	A mm	GM	Dist	Remarks
7th July contd.							
iP	Z	10 51 15.4	0.5	2.5	d	$1\frac{1}{2}^{\circ}$	H=10 50 50
iS	N	34.1					
iP	Z	11 45 21.3	0.4	14.0	d	1°	H=11 45 04
iS	N	34.4					
iP	Z	12 16 10.4	0.4	2.0	d	$1\frac{1}{2}^{\circ}$	H=12 15 48
iS	N	30.9					
eP	Z	13 34 23	0.4	2.5	d		Regional
i	Z	25.9					
eiP	Z	14 39 $01\frac{1}{2}$	0.5	1.0	d	2°	H=14 38 26
i	Z	02.2					
iS	N	28.0					
iP	Z	15 31 50.8	0.4	3.8	d	$(1\frac{1}{4}^{\circ})$	H=15 31 29
i(S)	N	32 07.3					
eP	Z	16 55 29	0.5	1.0	d		Regional
eP	Z	19 25 $32\frac{1}{2}$	0.5	1.5	c	$(22\frac{1}{2}^{\circ})$	
i	Z	38.1					
e(S)	N/	29 32					
iP	Z	20 19 22.3	0.5	1.6	c	(2°)	H=20 18 50
e(S)	N	47					
8th July		Strong microseismic activity.					
eP	Z	01 03 06	0.6	2.0	d	$17\frac{1}{2}^{\circ}$	C.B.M.
eS	N/	06 28					
e(P)	Z	06 27 14	0.8	2.0	d	19°	C.B.M.
eS	E/	30 48					
iP	Z	12 32 12.5	0.4	21.0	c	1°	H=12 31 57 C.B.M.
iS	N/	25.0					
eP	Z	13 06 19	0.5	2.0	c	$2\frac{1}{4}^{\circ}$	H=13 05 43 C.B.M.
eS	N/	46					
eiP	Z	21 46 $19\frac{1}{2}$	0.5	3.0	d	3°	H=21 45 30
i	Z	20.5					
eS	E/	57					
9th July							
iP	Z	18 06 41.5	0.3	1.0	c	$1\frac{3}{4}^{\circ}$	H=18 06 12
iS	N	07 03.2					
iP	Z	18 50 16.0	0.5	4.0	d	$2\frac{1}{4}^{\circ}$	H=18 49 40
iS	E	42.8					
10th July							
iP	Z	01 51 04.0	0.4	3.8	d	$1\frac{3}{4}^{\circ}$	H=01 50 34
iS	N	26.5					
iP	Z	02 26 06.5	0.5	2.8	c	$1\frac{3}{4}^{\circ}$	H=02 25 37
iS	E	29.0					
iP	Z	04 11 24.4	0.4	1.2	c	2°	H=04 10 53
iS	E	48.8					
iP	Z	09 44 32.0	0.5	1.5	c	$3\frac{1}{4}^{\circ}$	H=09 43 42
eS	N	45 10					
eP	Z	11 01 21	0.5	1.0	d	22°	
i	Z	23.5					
eS	N/	05 21					
eP	Z	12 08 10	0.5	1.0	c	34°	
i	Z	25.8					
eS	N/	13 28					
iP	Z	13 24 45.2	0.5	2.5	c	$1\frac{1}{2}^{\circ}$	H=13 24 21
iS	E	25 03.3					

RABAUL			T sec	A mm	GM	Dist	Remarks
10th July contd.							
iP	Z	17 40 44.4	0.4	1.1	d	$1\frac{1}{2}^{\circ}$	H=17 40 16
eS	N	41 06					
eP	Z	19 23 42	0.8	1.0	c	39°	
eS	E/	29 32					
11th July							
iP	Z	04 18 11.1	0.5	2.0	d	$5\frac{1}{2}^{\circ}$	H=04 16 51
eS	E/	19 13					
eP	Z	18 51 06	0.5	2.0	c	1°	H=18 50 48
iS	N	19.0					
eP	Z	19 32 04	0.5	1.5	c	$4\frac{1}{4}^{\circ}$	H=19 31 00
eS	N	53					

TABELE			T sec	A* mm	GM	Dist	Remarks
20th June							
e	Zw	16 51 23				c	Traces
e	Zw	28					
e	Zw	35					
21st June							
iP	Zw	15 36 $40\frac{1}{2}$			c		Regional
i	Zw	37 $06\frac{1}{2}$					
i	Zw	36					
eP	Zw	21 07 $42\frac{1}{2}$					Local
i	Zw	48					
i	Zw	59					
22nd June							
eP	Zw	05 08 $32\frac{1}{2}$			c		(Teleseism)
23rd June							
e	Zw	21 04 37					Traces
eP	Zw	21 36 $50\frac{1}{2}$					(Teleseism)
eP	Zw	21 39 $15\frac{1}{2}$					In coda of preceeding shock. Local
i	Zw	$30\frac{1}{2}$					
i	Zw	$40\frac{1}{2}$					
24th June							
iP	Zw	06 09 $28\frac{1}{2}$	0.2	3.0	c		Regional
e	Zw	$30\frac{1}{2}$					
i	Zw	$43\frac{1}{2}$					
i	Zw	10 $22\frac{1}{2}$					
eP	Zw	11 43 46					(Teleseism)
e	Zw	44 $06\frac{1}{2}$					
iP	Zw	11 46 24					Local
i	Zw	26					
i	Zw	$34\frac{1}{2}$					
iP	Zw	13 10 $58\frac{1}{2}$	0.1	5.5	c		Regional
i	Zw	11 $06\frac{1}{2}$					
e	Zw	13 39 $29\frac{1}{2}$			-		Traces
25th June							
iP	Zw	14 05 24	0.8	4.3	c		Regional
i	Zw	06 01					
26th June		NIL RECORDED					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
27th June, 1967.							
iP	Z	23 10 58.5			c	$3\frac{1}{2}^{\circ}$	H=23 10 06
iS	E	11 38.3					
28th June							
iP	Z	00 16 16.0	1.0	2.5	c	7°	H=00 14 33
iS	N/	17 36.0					
M	N/	18 28					
eiP	Z	01 41 $02\frac{1}{2}$	0.2	1.8	c	$8\frac{1}{2}^{\circ}$	H=01 38 58
i	Z	03.1					
iS	N/	42 39					
eP	Z	14 41 38	0.5	1.0	c		Teleseism
29th June							
iP	Z	12 13 56.4	0.3	0.5	c	4°	H=12 12 53
iS	E	14 45.0					
iP	Z	13 51 07.6	0.2	1.6	c	$\frac{1}{2}^{\circ}$	H=13 50 57
iS	E	15.4					
iP	Z	16 41 05.0	0.5	1.3	d	$27\frac{1}{2}^{\circ}$	
iS	N/	44 58					
30th June		NIL RECORDED.					
1st July							
iP	Z	07 38 12.0	1.0	2.1	c	(57°)	
e(S)	N/	45 37					
iP	Z	23 21 59.1	1.1	4.5	c	$(82\frac{1}{2}^{\circ})$	
e(S)	E/	31 $45\frac{1}{2}$					
2nd July							
eP	Z	07 14 04	1.0	0.3	c		Teleseism
e	N/	22 25					
iP	Z	08 55 31.0	0.2	0.5	c		Local
iS	E	38.5					
iP	Z	08 59 17.2	0.2	0.6	c		Local
i	Z	18.0					
iS	E	24.5					
iP	Z	09 01 13.2			c		Local
iS	E	20.4					
3rd July							
iP	Z	00 14 26.0	0.6	2.0	c	$4\frac{1}{2}^{\circ}$	H=00 13 16
		15 20					Solomon Sea.
iP	Z	00 46 37.2			c		Local
eP	Z	[illegible]04 51.0	0.2	0.4	c		Local
iP	Z	08 26 [illegible]	1.0	0.3	d		(Teleseism)
					d		Local

R. Heming
A/ Vulcanologist-in-charge

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 11th July, 1967. To: 18th July, 1967
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	No records received.
TABELE	(TBL)	From: 25th June, 1967. To: 3rd July, 1967.
AGENAHAMBO	(AGE)	From: 25th June, 1967. To: 8th July, 1967.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

Seismometer	Recorder	To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000.

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

Seismograph	Recorder	To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

$S.P.-Z_W$ Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

12th July, 1967. Strong microseismic activity

			T sec	A mm	GM	Dist	Remarks
e	Z/	04 40 12			+		Traces
e(P)	Z	05 49 03	0.2	3.0	d	23°	C.B.M.
eS	N/	53 07					
eLq	N/	28					
eLr	Z/	54 37					
ePcS	Z/	56 36					
eP	Z	10 33 09	0.4	2.5	c	1°	H=10 32 53
iS	N	21.0					
eP	Z/	21 20 44			c	(26°)	
e(S)	N/	25 18			Shock lost at end of short period records.		

13th July Strong microseismic activity from12.2336 to 13.1100 hours. Again at 13.1845 to 13.2316 hours.

			T sec	A mm	GM	Dist	Remarks
e(P)	Z/	07 41 55½			c	(32°)	
eS	E/	46 47					
eLr	Z/	50 28					
iP	Z	09 36 48.5	0.5	0.7	d	1½°	H=09 36 25 C.B.M.
eS	N/	37 05					
iP	Z	10 09 30.8	0.7	0.7	c	32°	C.B.M.
iS	N/	14 35					
iP	Z	10 59 27.0	0.4	4.5	d	1°	H=10 59 10
iS	E	39.5					
iP	Z	16 43 02.1	0.2	3.0	d	3¼°	H=16 42 12
iS	E	40.5					

14th July

			T sec	A mm	GM	Dist	Remarks
eP	Z	02 51 32	0.6	1.1	d		Regional
i	Z	35.0					
eiP	Z	08 39 55	0.4	1.0	d	2½°	H=08 39 13
iS	E	40 26.8					
eP	Z	09 12 16½	0.6	0.7	d		Regional
iP	Z	09 39 25.0	0.4	1.0	c	1½°	H=09 39 01
iS	N	43.0					
eiP	Z	21 42 56½	0.5	3.0	c	1¾°	H=21 42 28
i	Z	57.4					
eS	E	43 18					
eiP	Z	22 37 38½	0.5	6.7	c	3½°	H=22 36 57
iS	N/	38 10					

15th July

			T sec	A mm	GM	Dist	Remarks
e	Z/	08 42 40			-		Traces
iP	Z	13 08 06.8	0.5	1.5	c	2½°	H=13 07 26
iS	E	37.5					
iP	Z	14 46 25.0	0.5	4.0	c	31°	
eS	E/	51 06					
eP	Z	18 13 18	0.5	1.0	c		Regional
eP	Z	19 34 23	0.5	1.0	d	5½°	H=19 33 04
[illegible]	[illegible]	35 2[illegible]					

			T sec	A mm	GM	Dist	Remarks
RABAUL							
15th July contd.							
e	Z/	19 54 22			–		Traces
16th July		Strong microseismic activity from 1000 to 2300 hours.					
eP	Z	07 59 30	0.6	1.2	c	$4\frac{1}{2}^{\circ}$	H=07 58 22
iS	E/	08 00 22.0					
iP	Z	09 39 33.0	0.5	5.1	d	$1\frac{1}{4}^{\circ}$	H=09 39 10
iS	N	50.0					
iP	Z	13 39 $01\frac{1}{2}$	0.8	11.0	c	20°	
ePP	Z/	26					
ePPP	Z/	33					
iS	N/	42 46					
eLq	N/	53					
eSSS	E/	43 59					
i(PcS)	N/	46 59					
e	Z/	20 48 14			–		Traces
17th July		Microseismic activity from 16.2333 to 17.1400					
iP	Z	14 16 09.0	0.3	4.0	d	$\frac{1}{4}^{\circ}$	H=14 16 01
iS	N	15.0					
iP	Z	16 11 30.0	0.5	1.5	c	2°	H=16 10 58
iS	E	53.8					
iP	Z	16 49 22.0	0.4	2.5	d	$\frac{3}{4}^{\circ}$	H=16 49 07
iS	N	32.8					
18th July		Very strong microseismic activity.					
e	Z/	00 41 11			+		Traces
iP	Z	08 59 23.0	0.4	2.8	c	$1\frac{3}{4}^{\circ}$	H=08 58 54
iS	N	(42.0)					C.B.M.
eP	Z	10 29 18	0.5	3.0	c	$(2\frac{1}{4}^{\circ})$	H=10 28(42)
iS	E	(45)					
eiP	Z	17 03 $28\frac{1}{2}$	0.5	1.2	d	(2°)	H=17 02(57)
i	Z	31.4					
eS	N	(52)					

			T sec	A* mm	GM	Dist	Remarks

TABELE

26th June

iP	Zw	17 49 30	0.5	1.0	c		Local
i	Zw	35					
i	Zw	44½					
i	Zw	59					

27th June

iP	Zw	05 20 51	0.3	0.6	d		Local
i	Zw	21 08					

28th June

iP	Zw	00 08 48½	0.4	0.4	d		Local
i	Zw	55½					
i	Zw	09 00					
iP	Zw	03 50 28½	0.6	1.2	c		Regional
i	Zw	50½					
iP	Zw	06 32 20½	0.3	1.4	d		Local
i	Zw	28½					
iP	Zw	11 32 17½	0.4	1.6	d		(Local)
iP	Zw	13 23 39	0.4	8.0	c		(Regional)
i!	Zw	45					
eP	Zw	13 52 42	0.4	0.6	d		Local
i	Zw	49					
eP	Zw	16 40 18½	0.5	0.8	c		Teleseism
i	Zw	29½					
i	Zw	43					
i	Zw	57					
e	Zw	42 42½					
e	Zw	43 27					

29th June NIL RECORDED.

30th June

eP	Zw	02 05 54	0.6	0.4	d8		(Regional)
i	Zw	06 14½					
i	Zw	31					

1st July NIL RECORDED.

2nd July

eP	Zw	00 03 41½	0.4	0.3	d		Local
i	Zw	47½					
iZw	Zw	53					
iP	Zw	08 49 09½	0.5	2.4	d		Regional
i	Zw	24½					
i	Zw	39½					

3rd July

iP	Zw	02 33 17½	0.4	1.2	d		Regional
i	Zw	48½					
i	Zw	34 03					

		Time	T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
26th June, 1967.							
eiP	Z	13 05 09½	0.6	0.2	c		Teleseism
i	Z	10½					
i	Z	13					
i	Z	06 37					
27th June							
Microseismic activity between 27.2105-28.1000 hours.							
e	Z	13 20 19½			+		Traces
iP	Z	13 21 04½	0.5	0.1	d		Local
i	Z	10½					
i	Z	11½					
i	Z	14					
i	Z	18½					
eP	Z	14 15 35½			d		Regional
i	Z	16 04½					
i	Z	09					
i	Z	15					
iP	Z	23 10 48½	0.8	3.0	c		(Teleseism)
28th June							
iP	Z	01 42 02½	0.5	2.0	d		Regional
i	Z	35½					
29th June							
eP	Z	16 40 34½	0.5	0.2	c		Teleseism
i	Z	40½					
iZ		42½					
i	Z	49					
e	Z	44 04½					
i	Z	08					
30th June							
Microseismic activity between 30.2055-30.2300 hours. Ave.T=0.5 Ave.A*=1.0							
1st July							
eP	Z	11 50 55½					Local
i	Z	51 06					
2nd July		Galvanometer stopped.					
3rd July		Galvanometer stopped halfway through record.					
4th July							
Microseismic activity between 04.2101-05.0200 hours.							
5th July							
iP	Z	22 49 12	0.5	1.2	d		Regional
i	Z	46					
i	Z	49½					
i	Z	50 02½					
eP	Z	23 49 40½	0.5	0.5	c		Regional
i	Z	50 06					
i	Z	12					
6th July							
iP!	Z	07 45 48½					Regional
eP	Z	09 53 46½	0.4	0.3	d		(Teleseism)
e	Z	39½					
i	Z						

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
6th Julyccontd.							
iP	Z	21 25 30	0.2	0.3	c		Local
i	Z	38					
7th July							
iP	Z	01 09 22	0.3	0.4	c		Local
i	Z	26½					
i	Z	32					
8th July							
Microseismic activity between 0400-0600 hours.							
eP	Z	00 03 20	1.0	0.6	c		Teleseism
eP	Z	14 06 44½	0.5	0.3	c		(Regional)
i	Z	07 00½					

Central Observatory
Rabaul

R. F. Heming.
A/ Vulcanologist-in-charge.

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RABAUL	(RAB)	FROM: 18th July, 1967 To: 25th July, 1967
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	Not operational
ESA'ALA	(ESA)	No records recieved
TABELE	(TBL)	Not operational
AGENAHAMBO	(AGE)	From: 7th July, 1967 To: 13th July, 1967.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System

		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude $09^{\circ}44'18''$ 2S., Longitude $150^{\circ}48'50''$ 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude $08^{\circ}48'30''$ S., Longitude $148^{\circ}06'12''$ E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude $04^{\circ}06'$ S., Longitude $145^{\circ}02'$ E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

$S.P.-Z_W$ Magnification 860

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"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

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T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
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RABAUL

			T sec	A mm	GM	Dist	Remarks
19th July, 1967.		Strong microseismic activity					
eP	Z	00 43 10½	0.5	3.0	c	5°	H=00 41 55 C.B.M.
eS	N/	44 08					
eP	Z	06 40 39½	0.5	2.9	d	3¾°	H=06 39 41 C.B.M.
iS	N/	41 24.0					
eP	Z	07 58 52	0.4	9.0	d		Regional
iP	Z	20 48 45.5	0.4	4.0	c	2½°	H=20 48 06 C.B.M.
eS	N	49 15					
e(P)	Z	22 26 06	0.5	2.0	d		Regional C.B.M.
eP	Z	23 57 57	0.5	2.0	d	3¼°	H=23 57 09
eS	N/	58 34		Felt: Wantoat Int.IV 06°07'S, 146°28'E			
20th July							
eP	Z	00 53 24	0.4	4.0	d	1¼°	H=00 53 01 C.B.M.
iS	N	41.0					
iP	Z	07 21 03.5	0.5	26.5	d	1°	H=07 20 47 C.B.M.
iS	N/	16.0					
eP	Z	09 03 03½	0.5	2.0	c	(2°)	H=09 02(30)
e(S)	N	29					
eP	Z	09 04 21	0.5	2.0	c		Regional
e	Z	22½					
iP	Z	11 42 03.3	0.8	5.0	d	6°	H=11 40 34
eS	N/	43 12					
iP	Z	13 30 30.5	0.8	2.0	c		(Regional, deep)
i	Z	31 34.3					
e	Z	32 42					
i	Z	33 39.3					
eP	Z	15 41 07	0.8	2.0	dNW	22½°	
iS	N/	45 10					
21st July		Microseisms increased from 20.2316 to 21.0800 hours L.P. Vertical and E-W components exposed to light.					
iP	Z	01 29 31.3	0.5	5.0	c		Regional C.B.M.
iP	Z	08 24 57.5	0.5	39.0	d	1°	H=08 24 40 C.B.M.
eS	N/	25 10					
iP	Z	10 44 14.5	0.4	6.0	c	1½°	H=10 43 46
eS	N/	36					
iP	Z	14 51 44.0	0.5	33.5	d	1°	H=14 51 28
eS	N/	56					
22nd July		Strong microseismic activity					
eP	Z	02 06 16	0.5	4.0	c	1¾°	H=02 05 47 C.B.M.
iS	N/	38					
eP	Z	04 05 32			c	41°	C.B.M.
i	Z	35.0					
eS	N/	11 38					
iP	Z	05 43 16.5	0.5	3.0	c		Regional C.B.M.

RABAUL

22nd July contd.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
eP	Z	08 55 27	0.4	1.0	d	3^{o}	H=08 54 40
iS	N	56 03.0					
e(P)	Z	17 11 56			c		Teleseism
i	Z/	16 52					
i	E/	25 33					
M	E/	57 14					
i	E/	18 12 13					

23rd July — L.P. N-S lamp burnt out at 23.0242. Replaced at 24.0412 hours.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
eP	Z	03 13 $08\frac{1}{2}$	$\frac{3}{4}$.5	1.0	d	$19\frac{1}{2}^{o}$	
eS	E/	16 48					
eiP	Z	12 53 33	0.5	1.0	d	$4\frac{1}{4}^{o}$	H=12 52 29
i	Z	35.6					
i	Z	44.0					
iS	N	54 22.0					
eP	Z	13 57 14			c	(57^{o})	
e	Z	30					
e(S)	E/	14 04 46					
iP	Z	15 59 54.6	0.3	4.5	c	$\frac{1}{2}^{o}$ 9	H=15 59 41
iS	N	16 00 05.0					
eP	Z	18 51 02	1.0	1.0	d		Regional

24th July

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
e	Z/	00 37 12			-	Traces	
iP	Z	01 56 49.2	0.4	3.2	d	$1\frac{1}{4}^{o}$	H=01 56 28
eS	N	57 $05\frac{1}{2}$					
iP	Z	05 55 20.5	0.5	6.0	c	$1\frac{1}{4}^{o}$	H=05 54 59
i S	E	36.0					
e	Z/	06 21 52			-		Traces
e	Z/	07 46 30			-		Traces
eP	Z	09 25 $03\frac{1}{2}$	0.5	1.5	d		Regional
e	Z/	09 48 48			+		Traces
iP	Z	11 59 04.0	0.4	2.0	c	$\frac{3}{4}^{o}$	H=11 58 49
iS	N	15.0					
e	Z/	13 46 38			+		Traces

25th July

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	04 07 09.0	0.5	4.0	c	$(7\frac{1}{4}^{o})$	H=04 05(21)
e(S)	N/	08 32			Felt:Lae Int. III		06°43'S,147°00'E
iP	Z	07 55 53.0	0.3	1.5	d	2^{o}	H=07 55 21
iS	E	56 17.3					
iP	Z	17 45 03.0	0.3	8.0	c	$\frac{1}{4}^{o}$	H=17 44 54
iS	N	09.5					

			T sec	A mm	GM	Dist	Remarks

AGENAHAMBO

8th July

iP	Z	22 48 50½					Regional
i	Z	49 29					
i	Z	50 04½					

9th July

Strong microseismic activity from 09.0120 to 09.0320 hours
Av.T=0.5 Av.A=2.0

iP	Z	08 39 44½			d		(Regional)

10th July

Microseismic activity from 09.2057 to 10.0103 hours.
Av.T=0.5 Av. A=1.0

11th July NIL RECORDED.

12th July

Strong microseismic activity from 11.2100 to 12.0820 hours.
Av.T=0.5 Av.A=1.0

13th July

Microseismic activity from 12.2135 to 13.0220 hours.

14th July

Microseismic activity from 13.2140 to 14.0040 hours.

eP	Z	16 30 48	0.5	0.2	c		Regional
e	Z	24					
i	Z	27					
eP	Z	22 38 24			c		Teleseism
e	Z	32½					
e	Z	39					
i	Z	39 37					

Central Observatory
RABAUL.

R.F.Heming
A/Vulcanologist-in-charge.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 25th July, 1967 To: 1st August, 1967
SULPHUR CREEK	(SUL)	Not operational.
KERAVAT	(KRT)	Not operational.
ESA'ALA	(ESA)	From: 11th July, 1967 To: 25th July, 1967.
TABELE	(TBL)	Not operational.
AGENAHAMBO	(AGE)	No records received.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_w Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings :

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds.
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Origin time.
h	=	Focal depth in Km.

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°.
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°.
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TERRITORY OF PAPUA AND NEW GUINEA
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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

			T sec	A mm	GM	Dist	Remarks
26th July, 1967.							
iP	Z	02 54 27.6	0.4	8.0	c	$\frac{3}{4}^{\circ}$	H=02 54 13
i	E	32.3					
iS	E	38.6					
iP	Z	05 38 58.7	0.5	7.0	c	$1\frac{3}{4}^{\circ}$	H=05 38 29
iS	E	39 20.7					
eP	Z	07 37 09	0.5	1.3	d		Local
iP	Z	07 50 59.1	0.5	20.0	c	$\frac{3}{4}^{\circ}$	H=07 50 44
i(S)	N/	51 10					
eP	Z	08 20 18			d	24°	
e(PP)	Z/	55					
eS	E/	24 $42\frac{1}{2}$					
eSS	N/	25 20					
eLr	Z/	26 22					
ePcS	N/	27 $44\frac{1}{2}$					
M	N/	29 32					
eP	Z	16 31 24	1.0	0.7	c		Teleseism
e(P)	Z/	19 10 25			c		Teleseism
e	Z/	21 27					
e(S)	N/	28 18					
e	N/	333 53					
e	N/	37 29					
e	E/	46 $21\frac{1}{2}$					
e	E/	51 51					
iP	Z	23 00 34.6	0.5	1.0	d	2°	H=23 00 02
i	N	54.0					
iS	N	59.2					
27th July							
eP	Z	00 09 $42\frac{1}{2}$	0.6	0.7	c	$3\frac{3}{4}^{\circ}$	H=00 08 43
i	Z	43.2					
i!	Z	47.3					
iS	N/	10 28.0					
iP	Z	11 23 19.0	0.5	5.0	c	$1\frac{1}{4}^{\circ}$	H=11 22 55.3
iS	E	35.1					
iP	Z	12 17 55.0	0.5	59.3	d	$1\frac{1}{2}^{\circ}$	H=12 17 31
iS	E	18 12.9					
iP	Z	13 45 35.0	0.5	1.2	c	$1\frac{1}{2}^{\circ}$	H=13 45 13
iS	E	55.6					
eP	Z	17 31 30	0.3	0.2	d	$2\frac{3}{4}^{\circ}$	H=17 30 47
i	Z	32.7					
iS	N	32 03.0					
iP	Z	23 46 53.0	0.5	5.0	c	$2\frac{1}{2}^{\circ}$	H=23 46 13
iS	E	47 23.4					
28th July							
iP	Z	05 00 48.3	0.5	2.0	c	$1\frac{1}{2}^{\circ}$	H=05 00 24
iS	N	01 06.5					
i	N	.09.2					
e	Z/	05 25 46			+		Traces
iP	Z	08 43 54.8	0.4	2.0	c	$1\frac{1}{2}^{\circ}$	H=08 43 31
iS	N	44 13.[illegible]					

RABAUL

			T sec	A mm	GM	Dist	Remarks
28th July contd.							
e	Z/	10 13 20			+		Traces
iP	Z	14 31 40.0	0.6	1.8	d		Local
iP!	Z	17 39 02.4			dSSE	$1\frac{1}{2}^{\circ}$	H=17 38 36
iS	E/	22					
iP	Z	17 47 28.6	0.5	1.1	d		Local
i	Z	29.3					
eP	Z	18 03 $24\frac{1}{2}$	0.5	0.3	d	$3\frac{1}{2}^{\circ}$	H=18 02 32
iS	E	04 04.7					
eP	Z	23 40 $46\frac{1}{2}$	0.7	1.5	d	$(8\frac{1}{4}^{\circ})$	H=23 38(47)
i	Z	57.2			Felt:	Manam	Int. II-III
i	Z	41 02.8					
i	Z	10.2					
i	Z	19.9					
e(S)	N/	42 19					
29th July							
iP	Z	01 53 22.8	0.5	18.5	d	$\frac{1}{2}^{\circ}$	H=01 53 11
iS	N/	32					
iP	Z	02 06 04.3	0.5	3.2	c	1°	H=02 05 50
iS	N	14.9					
iP	Z	02 08 03.5	0.5	4.2	c		Regional
iP	Z	02 41 40.9	0.5	27.0	d	$(\frac{1}{2}^{\circ})$	H=02 41(28)
i(S)	N	50.2					
iP	Z	04 33 34.2	0.4	3.0	d	$4\frac{1}{4}^{\circ}$	H=04 32 30
iS	N	34 23,6					
iP	Z	05 21 14.6	0.5	6.3	d	$(4\frac{3}{4}^{\circ})$	H=05 20(03)
i(S)	E	22 10,2					
iP	Z	07 04 51.1	0.8	71.0	dSE	$1\frac{1}{4}^{\circ}$	H=07 04 28
iS!	E/	05 08					
iP	Z	10 43 22.6	0.5	1.2	c		Teleseism
i	Z	28					
i	Z	44 42.5					
i	Z	47 55.4					
i	N/	57 37					
i	N/	11 04 12					
e	Z/	20 $10\frac{1}{2}$					
i	Z/	27 28					
eP	Z	14 20 13	0.6	0.4	d	5°	H=14 18 56
i	Z	16.0					
iS	N	21 12.3					
e(P)	Z/	22 00 55					Teleseism
e	N/	18,$23\frac{1}{2}$					
e	Z/	21 54					
30th July							
eP	Z	00 19 27.2			d		Teleseism
iP	Z	01 29 53.0	0.5	6.0	d	1°	H=01 28 35
iS	N	30 10.0					
eiP	Z	02 16 31.8				$2\frac{3}{4}^{\circ}$	H=02 15 48
m	Z	34.8					
iS	N	17 04.7					
iP	Z	02 57 15.0	0.5	11.0	c	$1\frac{1}{4}^{\circ}$	H=02 56 52
iS	N	32.4					
iP	Z	03 32 59.2	1.0	23.4	c	$1\frac{1}{4}^{\circ}$	H=03 32 37
i	N	33 14.1					
iS	E/	15.0					

RABAUL

30th July contd.

			T sec	A mm	GM	Dist	Remarks
e	Z/	09 23 10.0			+		Traces
e(P)	Z	10 58 41.2			c		Teleseism
iP!	Z	13 35 44.5	0.5		cSE	2°	H=13 35 14
i	Z	47.0					Main Shock
iS!	Eo	36 08.0			Felt: Rabaul Int. III.		
iP	Z	13 42 23.0	0.5	5.0	d		In coda of preceding Aftershock.
iP	Z	13 46 40.5	0.5	4.0	c	$1\frac{3}{4}^{\circ}$	H=13 46 11
iS	E	47 03					Aftershock
i	E	11.8					
i	E	17.8					
iP	Z	13 48 23.6	0.5	5.0	c	$1\frac{3}{4}^{\circ}$	H=13 47 55
iS	E	44.8					Aftershock
i	E	51.2					
iP	Z	14 16 06.8			c	2°	H=14 15 32
iS	N	33.3					Aftershock
i	N	39.8					
i	N	40.8					
iP	Z	14 43 36.5	0.5	2.8	c	2°	H=14 43 03
iS	N	44 01½					Aftershock
i	N	08½					
eiP	Z	15 02 12.8	0.8	3.0	d	2°	H=15 01 39
iS	N	38.5					Aftershock
i	N	54.9					
iP	Z	16 13 43.5	0.5	2.5	c	2°	H=16 13 10
iS	N	14 08½					Aftershock
i	N	21					
i	N	22					
iP	Z	17 19 41.5	0.5	3.0	c	2°	H=17 19 08
iS	N	20 06.8					(Aftershock)
i	N	14.8					
iP	Z	18 00 32.2	0.5	4.0	c	2°	H=17 59 59
iS	N	57					
iP	Z	18 23 30.6	0.5	3.0	c	2°	H=18 22 58
iS	N	54.5					
eiP	Z	18 33 21.8	0.5	2.5	c	2°	H=18 32 50
i	Z	23.2					
i	Z	24.5					
iS	N	47					
i	N	34 37.4					
iP	Z	19 01 44.5	0.5	3.8	c	2°	H=19 01 11
iS	N	02 10					
i	N	02 17					
iP	Z	21 13 14.6	0.5	1.2	d	2°	H=21 12 42
iS	N	39.3					
iP	Z	23 08 03.8	0.4	1.0	c	2°	H=23 07 32
iS	N	28.0					
i	N	34.9					
i	N	41.2					

31st July

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 17 08.9	0.9	4.5	d		Regional
eiP	Z	03 13 56.7	0:6	2.0	d	$2\frac{1}{4}^{\circ}$	H=03 13 21
i	Z	58.0			Aftershock of main shock 30/7/67		
iS	E	14 23.2					
iP	Z	04 00 47.2	0.5	1.5	d	2°	H=04 00 15
iS	N	01 [illegible]					

RABAUL

			T sec	4. A mm	GM	Dist	Remarks
30th July contd.							
iP!	Z	04 36 04.0	0.3	18.0	d	$1\frac{1}{2}^{\circ}$	H=04 35 40
iS	E/	22.0					Aftershock
eP	Z	07 27 48	0.6	2.0	d	$2\frac{1}{4}^{\circ}$	H=07 27 12
iS	E	28 15.1					
eP	Z	12 11 18			d	9°	H=12 09 07
iS	N/	13 00					
iP	Z	12 14 09.1	0.4	6.0	d	$1\frac{1}{2}^{\circ}$	H=12 13 35
iS	N	27.1					
iP	Z	13 05 58.0	0.9	4.5	c	$2\frac{1}{4}^{\circ}$	H=13 05 22
iS	N	06 25.1					
iP	Z	14 49 07.9	0.4	2.5	d	2°	H=14 48 36
iS	N	32.0					
iP	Z	19 45 24.8	0.3	12.0	d	1°	H=19 45 09
iS	N	37.3					
iP	Z	23 48 15.0	0.5	2.8	c	$7\frac{1}{4}^{\circ}$	H=23 46 27
i	Z	17.2					
iS	N/	49 38.0					
1st July							
iP	Z	01 20 12.0	0.5	2.0	c	$3\frac{1}{2}^{\circ}$	H=01 19 20
eS	N	52					
iP	Z	02 25 20.1	0.4	1.8	d	$1\frac{1}{2}^{\circ}$	H=02 24 52
iS	N	40.9					
e	Z/	03 39 47				Traces	
eP	Z/	09 22 28				(48°)	
i(S)	E/	29 29					
iP	Z	09 45 19.6	0.4	1.8	d	$2\frac{1}{4}^{\circ}$	H=09 44 42
iS	N	47.5					
eiP	Z	10 13 58.5			d	5°	H=10 12 42
i	Z	59.2					
iS	N	14 57.8					
iP	Z	14 49 21.3	0.4	1.5	d	4°	H=14 48 20
iS	N	50 08.7					
eP	Z	15 09 50	0.5	1.0	c	2°	H=15 09 20
iS	N	10 13.5					
iP	Z	16 21 11.5	0.5	5.8	d	$1\frac{1}{2}^{\circ}$	H=16 20 45
iS	N	31.2					
iP	Z	17 00 06.0	0.5	1.0	c	2°	H=16 59 32
iS	N	31.5					
iP	Z	17 02 11.9	0.4	2.0	c	3°	H=17 01 26
iS	N	47.0					
eiP	Z	19 04 $52\frac{1}{2}$	0.6	1.0	c	$2\frac{1}{4}^{\circ}$	H=19 04 16
i	Z	54					
iS	N	05 20.5					
iP	Z	19 23 40.2	0.3	1.0	c	$1\frac{1}{2}^{\circ}$	H=19 23 15
iS	N	58.8					
iP	Z	19 25 07.8	0.3	3.8	d		Local
iP	Z	21 17 37.2	0.5	3.5	c	$1\frac{3}{4}^{\circ}$	H=21 17 09
iS	N	58.2					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
12th July, 1967.							
eP	Z	02 38 55½			d	1°	H-02 38 37
i	Z	56.0					
iS	N/	39 09					
eP	Z	05 48 45½	1.1	0.4	c		(Teleseism)
iP	Z	06 33 52.4	0.5	0.6	c		Local
e(P)	Z/	21 19 44			d		Teleseism
iS	N/	27 20					
13th July							
iP	Z	09 36 41.0	0.5	0.7	d	3°	H=09 35 54
iS	N	37 17.2					
eP	Z	10 08 57	1.0	0.2	c		Teleseism
i(S)	N/	09 26					
i	N/	12 52					
14th July							
iP	Z	02 51 28.5	1.5	2.6	c	(19°)	
e(S)	E/	54 28					
eP	Z	09 11 59½	1.0	0.8	c		(Regional)
iP	Z	22 38 31.4	0.7	1.1	d	7°	H=22 36 46
eS	E/	39 52				Solomon Isl. Region.	
iP	Z	23 33 19.7	1.0	1.6	c		Regional
15th July							
i(P)	Z	13 15 27.0	0.4	0.5	d	(2°)	H=13 14(55)
i(S)	N	51					
16th July							
eP	Z	07 00 27	0.4	1.0	d	1°	H=07 00 07
i	Z	27.8					
iS	E	41.7					
iP	Z	07 07 53.5			d	1°	H=07 07 36
iS	E	08 06.5					
iP	Z	07 59 44.6	0.3	0.9	d	4½°	H=07 58 34
iS	E	08 00 38.3					
eiP	Z	13 39 03½			c	(16°)	
i	Z	05.2					
i(S)	N/	42 54					
iP	Z	15 49 05.8			c		(Local)
17th July							
iP	Z	05 04 30.7	0.3	0.8	d	5°	H=05 03 15
iS	E	05 28.5					
iP	Z	16 40 57.6			c		Local
18th July							
iP	Z	08 32 46.3	0.4	0.6	c	3½°	H=08 31 50
iS	E	33 29.5					
eP	Z	15 53 54	0.5	0.2	c	(3¾°)	H=15 52(55)
e(S)	E	54 39					
eP	Z	18 57 20	0.5	0.7	d		Regional
19th July							
eP	Z	00 43 17½	0.5	1.5	c		Regional
iP	Z	06 41 24.0	0.5	1.0	d	(7°)	H=06 39(40)
e(S)	E	42 44½					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
19th July contd.							
iP	Z	12 35 58.9	0.5	1.5	d	5½°	H=12 34 37
iS	E	37 02.4					
eP	Z	20 49 22	0.6	0.7	d		Regional
eP	Z	22 25 55½	0.5	1.5	d		Regional
20th July							
eP	Z	07 21 59½	0.5	0.6	d	4¾°	H=07 2[illegible] 48
eS	E	22 54½					
iP	Z	09 04 22.5	0.5	2.0	d	8°	H-09 02 24
i	Z	24.6					
iS	E	05 54.0					
iP	Z	11 41 55.4	0.5	2.5	c	1¼°	H=11 41 34
iS	N/	42 11.1					
eP	Z	14 36 55½	0.5	0.7	d		Regional
iP	Z	15 41 33.9	1,0	2.2	d	23°	
eS	E/	45 51					
eP	Z	19 32 12	0.5	1.0	d		Regional
iP	Z	23 18 28.8	0.6	2.5	c		Regional
21st July							
eP	Z	02 55 14	0.5	1.0	c		Regional
eP	Z	08 26 40½	0.5	0.7	c	1°	H=08 26 22
eS	E	54½					
22nd July							
eP	Z	04 05 10½	0.7	1.8	d		Teleseism
e	Z	22					
iP	Z	07 57 56.0	0.4	1.5	d	3½°	H=07 57 00
iS	E	58 38.5					
e	Z	17 16 30	1.0	1.0	d		Tracew
e	Z	55½					
23rd July							
eP	Z	03 12 46½	1.0	1.0	c	19°	
iS	N/	16 13.0					
iP	Z	15 23 00.3			c		Local
iP	Z	16 50 59.3			c		Regional
eP	Z	19 43 17½	0.4	2.0	d		Regional
24th July							
iP	Z	07 45 18.0	0.5	9.0	c		Regional
iP	Z	20 36 11.5	0.4	0.5	c		Regional
25th July							
iP	Z	04 06 51.0	0.5	6.0	c	3¼°	H=07 19 48
iS	E	07 37.5					
iP	Z	05 26 28.5	0.5	2.5	c	¾°	H=05 26 14
iS	E	39.0					

Central Observatory
Rabaul

R.F.Heming
A/Vulcanologist-in-charge.

21 AUG 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANANLYIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 1st August, 1967 To: 8th August, 1967
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	Not operational
ESA'ALA	(ESA)	From: 3rd July, 1967 To: 11th July, 1967
TABELE	(TBL)	Not operational
AGENAHAMBO	(AGE)	From: 15th July, 1967 To: 22nd July, 1967

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System

		To sec.	Tg. sec.
S.P.			
S.P.-N&E	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.		0.2
		1.0	
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.2[illegible]

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z,N.E. Magnification 1,000
L.P.-Z,N/E/ Magnification 700

couple to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_W Magnification 800

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A*	= Peak-to-Trough trace amplitude in millimetres.
A	= Amplitude from W.W.S.S.
A*	= Amplitude from seismographs with different response to the W.W.S.S.
T	= Period in seconds.
C.B.M.	= Confused by microseisms.
Dist.	= Distance in central angle degrees.
H	= Origin time.
h	= Focal depth in Km

Remarks:

Local	= Typical signature of an earthquake with epicentre within 0.9°.
Near	= Typical signature of an earthquake with epicentre between 0.9° and 9°.
Distant	= Typical signature of an earthquake with epicentre between 9° and 45°.
Teleseism	= Typical signature of an earthquake with epicentre more than 45°.
Traces	= Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
2nd August, 1967.							
e	Z/	06 48 18			+		Traces
iP	Z	08 09 44.2	0.6	1.1	c	$4\frac{1}{2}^{\circ}$	H=08 08 35
i	Z	46.4					
iS	E	10 37.0					
e	Z/	11 52 54			-		Traces
eP	Z	12 29 10	0.5	0.1	d	$3\frac{1}{2}^{\circ}$	H=12 28 17
i	Z	16.5					
iS	N	50.5					
eP	Z	18 51 04	0.5	1.0	d	2°	H=18 50 28
iS!	N	28.2					
eP	Z	19 01 46	0.3	1.0	c		Regional
iP	Z	21 09 31.0	0.3	6.0	c	2°	H=21 08 59
iS	N	55.5					
iP	Z	21 15 55.5	0.3	4.0	c	$2\frac{1}{4}^{\circ}$	H=21 15 18
i~~P~~g	Z	59					
iS	N	16 23.0					
3rd August							
e	Z/	00 26 30			+		Traces
eP	Z	01 59 03	0.5	0.7	d		Regional (deep)
e	Z/	06 50 40			+		Traces
eP	Z	09 00 29	0.4	1.0	d		Regional
iP	Z	11 03 00.5	0.5	14.0	d	1°	H=11 02 24
iS	N	12.5					
eP	Z	12 59 37	0.8	2.0	d		Regional
i	Z	14 16 44	0.5	3.0	Ship moving in harbour.		
F		18 54					
eP	Z	14 42 29	0.5	0.6	d	$1\frac{3}{4}^{\circ}$	H=14 42 00
iS	N	51.0					
e	Z/	22 11 28			-		Traces
4th August							
eiP	Z	05 57 $31\frac{1}{2}$	0.4	1.5	d	$7\frac{1}{4}^{\circ}$	H=05 55 44
eS	E/	58 54					
e	Z/	07 20 10			+		Traces
iP	Z	11 02 52.8	0.5	2.0	d	$1\frac{1}{4}^{\circ}$	H=11 02 30
iS	N	03 09.4					
iP	Z	11 53 06.8	0.4	3.5	c	1°	H=11 53 48
iS	N	21.0					
iP	Z	19 29 16.2	0.4	1.2	c	$2\frac{1}{4}^{\circ}$	H=19 28 40
iS	N	43.0					
iP	Z	20 47 06.0	0.5	16.0	d	$1\frac{1}{2}^{\circ}$	H=20 46 40
iS	E	26.0					
e	Z/	22 40 25			-		(Teleseism)

			T sec	A mm	GM	Dist	Remarks
RABAUL							
5th August							
iP	Z	00 36 59.8	0.5	9.0	c	1½°	H=00 36 33
iS	E	37 19.5					
iP	Z	02 02 09.6	0.4	1.5	d	2°	H=02 01 36
i	Z	10.0					
i	Z	13.0					
iS	N	34.2					
iP	Z	02 28 16.6	0.5	11.0	c	2¼°	H=02 27 41
i	Z	21.0					
iS	N	43.6					
iP	Z	05 19 59.6	0.4	15.0	d	1½°	H=05 19 20
iS	E/	20 20.0					
iP	Z	05 38 08.3	0.3	28.0	d	1½°	H=05 37 42
i S	E/	28.0					
i	Z	07 27 46	0.5	3.0			Ship moving in harbour.
F	Z	33 43.5					
iP	Z	10 31 52.1	0.5	17.0	d	1½°	H=10 31 26
iS	N/	32 12.0		Felt:	Rabaul	Int. I-II	04°11'S, 152°10'E
					Pomio	Int. III	05°30'S, 151°30'E
iP	Z	11 20 57.5	0.5	18.0	d	1½°	H=11 20 31
iS	E/	21 17.0					
iP	Z	11 33 13.2			c	1½°	H=11 32 47
eS	N	33					
iP	Z	11 43 52.0	0.5	3.0	c		Regional
iP	Z	12 13 52,6	0.5	4.0	c		Regional
iP	Z	12 57 31.5	0.5	2.0	c	1½°	H=12 57 04
iS	N	52.5					
iP	Z	14 01 57.8	0.4	4.0	c	1½°	H=14 01 31
iS	N	02 17.5					
iP	Z	15 03 33.5	0.3	12.0	d	1½°	H=15 03 07
iS	E	53.0					
iP	Z	18 08 48.0	0.5	2.0	d	2°	H=18 08 16
iS	E	09 12.0					
iP	Z	18 50 07.8	0.5	1.8	c	1½°	H=18 49 40
iS	E	29.0					
iP	Z	19 42 01.5	0.3	7.0	c	1½°	H=19 41 35
iS	E	21.5					
6th August							
iP	Z	01 16 31.5	0.5	55.0	dSE	1½°	H=01 16 06
eS	N/	50					
iP	Z	04 18 30.3	0.5	3.0	d	1½°	H=04 18 05
iS	E	49.5					
iP	Z	09 14 39.9	0.5	4.0	d	2°	H=09 14 05
iS	E	15 05.5					
iP	Z	10 52 17.0	0.5	2.5	c	2°	H=10 51 43
iS	N	43.0					
iP	Z	11 26 50.5	0.3	4.0	c	1¼°	H=11 26 29
iS	N	27 06.5					
e	Z/	11 37 34			+		Traces
eiP	Z	21 36 49½	0.4	2.0	d	4½°	H=21 35 43
i	Z	55.4					
iS	N/	37 40.0					
iP	Z	21 41 31.5	0.3	1.5	d	3½°	H=21 40 39
iS	E	42 11.0			In coda of preceeding shock.		

RABAUL

			T sec	A mm	GM	Dist	Remarks
7th August							
e	Z/	11 49 36			−		Traces
iP	Z	14 51 27.2	0.4	3.8	d	1°	H=14 51 10
eS	N	40					
iP	Z	17 13 26.0	0.3	3.0	c	$2\frac{1}{4}^\circ$	H=17 12 49
iS	E	54.0					
e	Z/	17 23 10			+		Traces
iP	Z	20 53 09.5	0.3	3.0	c	$1\frac{1}{2}^\circ$	H=20 52 32
iS	E	30.0					
8th August							
iP	Z	02 47 15.8	0.4	5.0	d	$1\frac{1}{2}^\circ$	H=02 46 49
i	Z	16.5					
iS	N/	36.0					
iP	Z	07 47 22.0	0.4	10.0	d		Regional
iP	Z	10 57 00.9	0.4	7.0	d	$\frac{1}{2}^\circ$	H=10 56 49
iS	N	10.4					
eiP	Z	13 40 59	0.3	2.0	d	2°	H=13 40 25
i	Z	41 00.2					
eS	N	25					
iP	Z	16 15 16.0	0.4	10.0	d	$2\frac{1}{2}^\circ$	H=16 14 34
iS	N	48.0					
iP	Z	16 22 42.0	0.5	7.0	d		Regional
i	Z	45.0					
iP	Z	16 29 05.3	0.5	7.0	d	1°	H=16 28 45
i	Z	10.0					
iS	E	20.0					
iP	Z	16 53 12.2	0.3	4.0	d	$(1\frac{1}{2}^\circ)$	H=16 52(46)
e(S)	E/	32					
iP	Z	17 11 07.4	0.5	3.0	d		Regional
i	Z	12.1					
iP	Z	20 05 16.2	0.5	2.0	d	$1\frac{3}{4}^\circ$	H=20 04 47
iS	N	38.0					
iP	Z	21 05 09.2	0.4	2.8	d		Regional
eP	Z	21 13 19	0.4	1.0	d		Regional
iP	Z	21 19 48.2	0.5	2.0	c		Regional
iP	Z	21 26 09.8	0.3	7.0	d	$1\frac{1}{2}^\circ$	H=21 25 42
iS	E	31.0					
eP	Z	21 38 46	0.5	1.0	d		Regional
iP	Z	21 57 25.2	0.3	69.0	cNW	$\frac{1}{4}^\circ$	H=21 57 19
iS	E/	30.0		Felt: Rabaul Int.I $04^\circ 11'$S, $152^\circ 10'$E.			

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
4th July, 1967.							
eP	Z	22 55 55	0.5	0.4	c		Regional
eiP	Z	23 51 17½			d		Regional
i	Z	18.1					
5th July							
eP	Z	22 49 23	0.5	0.3	d	4°	H=22 48 22
i	Z	45.8					
i	E	50 08.3					
iS	E	09.5					
6th July							
iP	Z	07 46 18.5	0.3	0.6	d	$5\frac{1}{4}^{\circ}$	H=07 45 01
iS	E	47 19.0					
eP	Z	13 53 42	0.7	0.8	c	$73\frac{1}{2}^{\circ}$	
i	Z	43.9					
eS	N/	14 03 02					
7th July		NIL RECORDED.					
8th July							
iP	Z	01 02 49.5	0.5	0.7	d	$18\frac{1}{2}^{\circ}$	
i	Z	51.6					
iS	N/	06 07½					
eP	Z	06 26 53½	0.5	0.9	c	$20\frac{1}{2}^{\circ}$	
iS	E./	30 18					
iP	Z	22 50 04.6	0.4	0.5	c	$5\frac{1}{4}^{\circ}$	H-22 48 47
iS	E	51 05.2					
9th July							
iP	Z	08 40 13.6	0.3	0.5	c	$4\frac{1}{2}^{\circ}$	H=08 39 04
i	Z	51.5					
iS	E	41 07.0					
10th July							
iP	Z	04 27 26.6			c		Local
iP	Z	11 01 14.5	0.7	1.4	c		Teleseism
iP	Z	12 07 59.8	0.6	1.2	d	(34°)	
e(S)	E/	13 10					
eP	Z	19 23 55	0.6	0.4	d		Teleseism
11th July							
iP	Z	04 18 23.0		2.5	c	$5\frac{1}{2}^{\circ}$	H=04 17 03
i!	Z	23.6					
iS	N/	19 26					

AGENAHAMBO

			T sec	A* mm	GM	Dist	Remarks
16th July, 1967.							
e(P)	Z	13 38 33½	1.0	0.3	c		Teleseism
17 th July							
iP	Z	05 03 56			c		(Regional)
i!	Z	56½					
18th July							
eP	Z	15 53 47	0.2	0.2	c		Regional
i	Z	47½					
i	Z	54 18½					
e(P)	Z	18 57 32½	0.5	0.2	c		Regional
e	Z	58 19					
i	Z	23					
iP	Z	21 26 31	0.3	1.0	c		Regional
i	Z	27 13					
19th July							
eP	Z	12 34 26½	0.5	0.2	c		Regional
i	Z	35 06½					
20th July							
eP	Z	09 03 49½	1.0	0.1	d		Regional
i	Z	04 54					
iP	Z	11 41 22			c		Regional
i	Z	25					
iP	Z	13 23 11½	0.2	0.6	d		Local
i	Z	22½					
eP	Z	15 41 07	0.7	0.7	c		Teleseism
i	Z	42 04					
eP	Z	15 54 04	0.4	0.1	c		Local
i	Z	16					
21st July							
iP	Z	12 01 05½			c		Local
i	Z	13½					
22nd July							
eP	Z	19 01 50	0.5	0.4	d		Regional
i	Z	58½					
i	Z	02 03					

Central Observatory
RABAUL

R.F.Heming
A/Vulcanologist-in-charge.

<u>ADDENDA and CORRIGENDA---RABAUL.</u>

RABAUL (RAB) From: 25th July to 1st August, 1967.

<u>26th July</u>

ePZ 16 31 24 a phase should read e N/ 33 53

<u>28th July</u>

iP Z 08 43 54.8 T0.4 A2.0 c $1\frac{1}{2}^{\circ}$ H = 08 43 31
iS N 44 13.0

iP Z 14 31 40.0 T0.6 A1.8 d Regional

<u>31st July</u>

iP Z 04 00 47.2 T0.5 A1.5 d 2° H = 04 00 15
iS N 01 11.1

<u>30th July</u> contd. should read <u>31st July</u> continued.

1st July should read <u>1st August</u>

iP Z 19 25 07.8 T0.3 A3.8 d Regional

Recd 29/8/67

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 9th August, 1967 To : 15th August, 1967
SULPHUR CREEK	(SUL)	Not operational
KEREVAT	(KRT)	Not operational
ESA'ALA	(ESA)	From: 25th July, 1967 To : 8th August, 1967
TABELE	(TBL)	Not operational
AGENAHAMBO	(AGE)	From: 23rd July, 1967 To : 5th August, 1967.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'33" O.S., Longitude 152°10'16" O.E. Elevation 184 m.
Bedrock: Basalt flow.

World Wide Standard System		To sec.	Tg. sec.
S.P.	Maximum magnification 12,500 at 0.6 sec.	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec.	1.0	0.74
L.P.-Z/N/E/	Maximum magnification 750 at 25.0 sec.	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh.	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

Strong Motion Two-Component Omori Seismograph 15 kg.

L.P.-No	Static magnification 12, air damping 10:1	3.6
L.O.-Eo	Static magnification 10, air damping 10:1	3.8

SULPHUR CREEK (SUL)

Latitude 04°13'44" S., Longitude 152°11'48" E. Elevation 3m.
Bedrock: unconsolidated volcanic ash.

Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by Line to a Helicorder (Geotech Mod. 2484) at the Central Observatory:

S.P.Zr	Maximum magnification 3,240 at 1.0 sec.	1.0	0.02

Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.

KERAVAT (KRT)

Latitude 04°20'S., Longitude 152°00'E.
Bedrock: coastal alluvium.

Benioff, Moving-coil 3-Component, Film Recording Seismograph:

Z	1.2	0.35
N	1.4	0.26
E	1.4	0.29

Sensitivity set at 20% Z, at 10% N&E, drum speed 15 mm/min.

STATION INSTRUMENTATION (continued):

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46 m.
Bedrock: Granite.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismometer 107.5 Kg. 1 Geotech Mod. 1051 Vertical 2 Geotech Mod. 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A) drum speed 15 mm/min.	1.0	0.2
	Photographic Recorder System (Geotech Mod. 1565-D) drum speed 30 mm/min.		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 17,000
L.P.-Z/N/E/ Magnification - to be determined.

AGENAHAMBO (AGE)

Latitude 08°48'30" S., Longitude 148°06'12" E. Elevation 303 m.
Bedrock: unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60 mm/min. 0.6 0.25

S.P.Z. Magnification 1,000

TABELE (TBL)

Latitude 04°06' S., Longitude 145°02' E. Elevation 197 m.
Bedrock: basalt flow.

		To sec.	Tg. sec.
Benioff Variable-Reluctance Seismograph 107.5 Kg. 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod. 2484) Heat sensitive recording paper 60 mm/min., drum speed adjustable to 120 mm/min., 180 mm/min.		0.02
	Photographic Recorder System (Geotech Mod. 1563-D), drum speed 30 mm/min.	1.0	90.0

S.P.-Z.N.E. Magnification 1,000
L.P.-Z/N/E/ Magnification 700

coupled to Willmore Recorder
Attenuator setting 1/100, drum speed 60 mm/min. 0.25

S.P.-Z_w Magnification 860

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE), is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six-hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings:

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (continued):

Symbols:

A, A* = Peak-to-Trough trace amplitude in millimetres.
A = Amplitude from W.W.S.S.
A* = Amplitude from seismographs with different response to the W.W.S.S.
T = Period in seconds.
C.B.M. = Confused by microseisms.
Dist. = Distance in central angle degrees.
H = Origin time.
h = Focal depth in Km.

Remarks:

Local = Typical signature of an earthquake with epicentre within 0.9°.

Near = Typical signature of an earthquake with epicentre between 0.9° and 9°.

Distant = Typical signature of an earthquake with epicentre between 9° and 45°.

Teleseism = Typical signature of an earthquake with epicentre more than 45°.

Traces = Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G. W. D'ADDARIO
Vulcanologist-in-Charge.

9.6.1967

TORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

			T sec	A mm	GM	Dist	Remarks
9th August, 1967.							
eiP	Z	02 05 36	0.5	1.0	c	1°	H=02 05 20
i	Z	39.0					
iS	N	48.5					
iP	Z	08 24 49.2	0.5	6.0	c	22°	
i	Z	25 10.0					
i	Z	33.5					
i	Z	40.2					
eS	E/	28 44					
eP	Z	13 40 20	0.5	1.0	d	3¼°	H=13 39 30
iS	E	58.5					
iP	Z	15 59 38.0	0.5	2.0	c	1¾°	H=15 59 09
iS	N	59.8					
iP	Z	20 02 09.0	0.5	3.0	d	1½°	H=20 01 42
iS	E	30.0					
eiP	Z	21 42 19	0.4	1.0	d	1¾°	H=21 41 50
i	Z	20.0					
iS	N	41.0					
eiP	Z	23 42 14	0.4	1.0	d	3°	H=23 41 28
i	Z	20.0					
iS	N	49.0					
10th August							
iP	Z	00 30 22.2	0.4	5.0	c	1¾°	H=00 29 53
iS	N	44.0					
iP	Z	05 26 13.2	0.3	7.0	d	2°	H=05 25 41
eS	N	37					
eP	Z	08 15 06	0.3	1.0	d	3¼°	H=08 14 17
eS	N	43½					
eP	Z	11 30 10	0.5	2.0	c	49°	
i	Z	11.5					
i	Z	28.2					
iS	N/	37 17.0					
eiP	Z	19 21 32	0.5	1.0	d	3½°	H=19 20 40
i	Z	35.6					
iS	N	22 12.5					
eiP	Z	23 01 12	0.5	2.2	d	2¾°	H=23 00 29
i	Z	15.3					
iS	E	44.8					
11th August							
e	Z/	07 01 07			+		Traces
iP	Z	07 41 09.0	0.4	3.2	d	½°	H=07 40 57
iS	N	18.0					
e	Z/	11 27 38			+		Traces
e	Z/	13 18 16			–		Traces
iP	Z	14 04 26.2	0.3	11.0	d		Regional
i	Z	32.6					
i	Z	37.0					
i	Z	44.0					

RABAUL

			T sec	A mm	GM	Dist	Remarks
11th August contd.							
iP	Z	14 32 20.5	0.5	1.8	c	$2\frac{3}{4}^{\circ}$	H=14 31 37
i	Z	27.5					
iS	E	53.0					
iP	Z	14 48 09.1	0.4	16.0	d		Regional
iP	Z	15 11 41.0	0.3	6.0	d		Local
iS	E	43.0					
eP	Z	15 15 $44\frac{1}{2}$	0.4	1.5	c	2°	H=15 15 12
i	Z	47.0					
eS	E	16 09					
iP	Z	15 43 25.1	0.4	14.0	d	$\frac{3}{4}^{\circ}$	H=15 43 10
iS	E	36.2					
12th August		W.W.S.S. runing on secondary time.					
iP	Z	04 10 55	0.5	2.0	c	$1\frac{1}{2}^{\circ}$	H=04 10 27
iS	N	11 16					
iP	Z	04 49 33	0.4	3.5	c	$1\frac{1}{2}^{\circ}$	H=04 49 05
iS	N3	54					
i	Z	08 28 11	0.5	3.0	Ship moving in harbour.		
F	Z	35 22					
eP	Z	09 46 30	0.5	2.5	d		
eP	Z	12 25 $09\frac{1}{2}$	0.6	1.0	c	20°	
eS	N/	38 28					
iP	Z	13 44 07	0.6	1.0	d	$1\frac{1}{4}^{\circ}$	H=13 43 47
iS	N	22					
iP	Z	13 59 16	0.5	2.0	d	$1\frac{1}{2}^{\circ}$	H=13 58 50
iS	N	36					
eP	Z	16 14 29	0.4	4.0	c	2°	H=16 13 56
iS	N	54					
iP	Z	21 12 47	0.5	1.0	c	$1\frac{1}{2}^{\circ}$	H=21 12 21
iS	E	13 08					
iP	Z	21 34 22	0.3	6.0	c	2°	H=21 33 50
iS	N/	46					
iP	Z	22 20 03	0.3	1.0	d	$2\frac{1}{4}^{\circ}$	H=22 19 29
iS	N	29					
13th August							
iP	Z	03 11 48	0.3	2.0	d	$1\frac{1}{2}^{\circ}$	H=03 11 22
eS	N	12 $08\frac{1}{2}$					
iP	Z	03 14 55	0.4	2.0	c	$2\frac{1}{2}^{\circ}$	H=03 14 17
iS	N	15 24					
iP	Z	07 17 42	0.4	7.0	c	$1\frac{1}{2}^{\circ}$	H=07 17 16
iS	N	18 02					
iP	Z	10 52 33	0.4	4.0	d	$1\frac{3}{4}^{\circ}$	H=10 52 04
iS	N	55					
iP	Z	11 29 $38\frac{1}{2}$	0.4	1.2	c	$2\frac{1}{2}^{\circ}$	H=11 29 03
iS	N	30 05					
eiP	Z	12 53 20	0.3	1.0	d	$3\frac{1}{2}^{\circ}$	H=12 52 23
i	Z	22					
iS	E	54 04					
iP	Z	12 59 19	0.3	2.0	c		Regional
iP	Z	13 48 16	0.3	1.0	c	$1\frac{1}{2}^{\circ}$	H=13 47 52
i	Z	17					
iS	N	34					

RABAUL

13th August contd. Numerous small aftershocks following the main shock at 1654 hours.

			T sec	A mm	GM	Dist	Remarks
iP	Z	16 54 53	0.5	23.0	dSSE	Local	Main shock
e	N/	55 08					H=16 54 35
Approximate epicentre: 152°17'30"E 04°23'00" S							Felt: Rabaul Int.V-VI Gilalum Int. VII-VIII. Ulamona Int. II Rongamatane Int. VI.
eiP	Z	17 17 33	0.3	2.0	d	2°	H=17 17 03
i	Z	34					
eS	E/	56					
iP	Z	17 43 57½			d		Aftershock.
iP	Z	17 51 55			d		"
iP	Z	18 04 05½			c	¼°	H=18 03 59
iS	N	10					Aftershock.
iP	Z	18 08 46			c	¼°	H=18 08 38
iS	N/	52					Aftershock
iP	Z	18 25 40		c	c		Aftershock
iP	Z	18 44 45.4	0.3	4.0	c		"
iS	N	49.9					
iP	Z	20 14 14.4			d		"
iP	Z	20 28 20.4			cNW		"
iP	Z	20 43 03.4			c		"
iP!	Z	20 50 59.9			c		"
					Felt: Rabaul Int. II-III. Rongamatane Int. III.		
iP	Z	21 02 29.4	0.4	13.8	c		Aftershock
iS/	N	33.6					
ip!	Z	22 11 20			c		Felt:Rabaul Int. IV Londolovit Int. II=III Gilalum Int. VIII.
iS	No	24½					
i	No	41½					
iP!	Z	22 15 18			c		Local
i	Eo	47		Felt:	Rabaul Int. V-VI		
i	Eo	17 21½			Londolovit Int. III-IV		
i	Eo	18 16.0			Rongamatane Int. V-VII		
i	Eo	34½			Gilalum Int.VII-IX		
i	Eo	19 32			Ulamona Int. I		
i	Eo	20 46					
i	Eo	21 40					
******							
iP	Z	23 30 08½	0.4	18.0	c		Aftershock
iP	Z	23 37 45	0.4	21.8	d		"
i(P)	Z	23 38 33	0.4	9.0	d		"
iP	Z	23 52 47			c		"

14th August

iP!	Z	00 14 19			c		"
iP!	Z	00 35 01½			c		"
iP	Z	00 51 30½			c		"

******

13th August.

iP	Z	22 49 59	0.5	27.0	c	¼°	H=22 49 53
iS	E	50 04					
eiP	Z	22 54 23	0.4	6.0	c		Aftershock

RABAUL

			T sec	A mm	GM	Dist	Remarks
13th August contd.							
eP iS	Z N	23 02 41 59	0.5	1.2	c	$1\frac{1}{2}^{\circ}$	H=23 02 17
iP	Z	23 27 $40\frac{1}{2}$			c		(Aftershock)
14th Augustcontd.							
01 07 21		0.4 4.5	d		d		Aftershock
iP	Z	01 14 $13\frac{1}{2}$			d		"
iP	Z	02 05 02			c		"
iP!	Z	02 36 07			c		"
iP iP	Z Z	03 13 02 03 15 32	0.4	13.6	c c		" "
iP	Z	03 58 08			c		"
iP	Z	04 27 18	0.4	38.0	c		"
iP	Z	05 02 43			c		"
iP	Z	05 52 $50\frac{1}{2}$	0.4	32.0	c		"
iP	Z	06 35 01			c		"
iP	Z	08 47 $00\frac{1}{2}$			c		"
iP	Z	10 18 $59\frac{1}{2}$	0.4	20.0	c		"
iP iS	Z N	10 52 42 45.2	0.4	2.2	c		"
iP iS	Z N	12 05 21 25.2	0.3	1.3	d		"
iP iS	Z N	13 15 35 38.4	0.3	12.2	c		"
iP iS	Z N	16 18 42 46	0.3	17.4	c		"
iP i(S)	Z E	16 22 42.2 48	0.4	3.0	c		"
iP	Z	18 15 05.2			d		"
iP!	18 50 00.2						
iP	Z	18 58 58.6	0.4	2.8	c		"
iP iS	Z N/	19 37 21.0 38 32	0.5	4.2	c	$6\frac{1}{4}^{\circ}$	H-19 35 49.0
iP	Z	20 08 11.6	0.5	3.4	d		Aftershock.
15th August		Running on secondary time.·. shocks read to half a second.					
iP iS	Z N	04 48 59 49 04	0.3	34.0	d	$\frac{1}{4}^{\circ}$	H=04 48 52 Aftershock.
iP iS	Z N/	06 59 $17\frac{1}{2}$ 22	0.5	6.5	c	$\frac{1}{4}^{\circ}$	H=06 59 11
iP eS	Z N/	07 26 56 27 00	0.3	38.0	c		Local
e	Z/	08 48 22			t		Traces
iP iS	Z N/	09 56 44 49	0.3	27.0	c	$\frac{1}{4}^{\circ}$	Aftershock H=09 56 38
iP iS	Z E/	12 08 13 24	o.3	21.5	d	$\frac{3}{4}^{\circ}$	H=12 07 58

RABAUL

15th August contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	12 08 13	0.3	21.5	d	$\frac{3}{4}^{\circ}$	H=12 07 58
iS	E/	24					
e	Z/	09 45 47			+		Traces
iP	Z	12 48 44	0.5	1.0	d	1°	H=12 48 27
iS	N	57					
iP	Z	15 18 16	0.5	2.5	c		Local
iS	E	20½					
iP	Z	16 43 24	0.5	5.0	c		Local
iS	N	27					
iP	Z	16 43 45	0.3	4.0	c		Local
i	Z	46					
iP	Z	17 51 55½	0.5	3.5	c	2°	H=17 51 25
iS	N	52 18					
iP	Z	18 01 50	0.5	3.0	c	$\frac{1}{4}^{\circ}$	H=18 01 44
iS	E	55					
iP	Z	19 07 59	0.5	1.0	d	$3\frac{1}{4}^{\circ}$	H=19 07 10
i	Z	08 02					
i	Z	04½					
iS	N	37					
iP	Z	19 33 00½	0.5	6.8	c		Local
eS	E	04½					
iP	Z	20 16 16	0.4	4.0	c		Local
iS	N	18					
eP	Z	21 13 53	0.5	1.0	d	$5\frac{1}{2}^{\circ}$	H=21 02 31
iS	N/	14 56					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
26th July							
iP	Z	03 44 17.8			c		Local
iP!	Z	05 59 03.4			c		(Regional)
eP	Z	07 52 49½	0.5	0.3	c	1°	H=07 52 29
iS	E	53 04.5					
eP	Z	08 19 54	1.0	0.2	d	29½°	
iS	N/	24 03					
eP	Z	12 28 12	0.5	0.4	c	5°	H=12 26 57
iS	E	29 10.0					
27th July							
eiP	Z	00 09 58½			d	5¼°	H=00 08 40
i	Z	59.5					
iS	E/	10 59					
eP	Z	12 18 35.5	0.4	0.4	c	4¼°	H=12 17 32
iS	E	19 24				New Britian Region.	
28th July							
eP	Z	14 31 29½	0.7	0.9	d		Teleseism
eP	Z	17 39 38½	0.7	0.5	c	4¼°	H=17 37 34
eS	E/	40 28					
eP	Z	17 47 28	0.5	0.9	d	6½°	H=17 45 50
eS	N/	48 34					
iP	Z	23 40 47.5	0.5	1.4	c	7°	H=23 39 02
iS	E	42 08.2					
29th July							
iP	Z	04 33 37.2	0.5	0.2	c	4°	H=04 32 37
iS	E	34 23					
iP	Z	05 21 33.7			c		Regional
e(PKP)	Z	10 43 30	0.5	0.5	d	(108°)	
e	Z	31½					
i	Z	33.9					
i(SKP)	Z	44 14.4					
eSKS	E	46 50½					
i(SKKS)	N/	47 26					
e	E	48 06½					
iP	Z	13 26 21.1	0.3	0.7	c	3°	H=13 25 35
iS!	E	56.4					
iP	Z	14 20 24.6	0.5	2.0	d	5½°	H=14 19 04
iS	E/	21 27					
30th July							
eP	Z	00 19 37	0.6	0.4	d		Teleseism
eP	Z	03 33 52½	0.5	0.3	c	4½°	H=02 32 33
iS	E	34 46.0					
eP	Z	10 57 58½	1.0	0.7	d		Teleseism
iP	Z	13 36 28.7	0.6	3.0	d	4½°	H=13 36 20
iS	E/	39 22			Felt:	Rabaul Int. III	
eP	Z	15 24 33½	0.9	1.5	c		(Regional)
31st July							
iP	Z	02 17 13.5	0.4	1.0	c	3¾°	H=02 16 15
iS	E	58.5					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
31st July contd.							
eP	Z	03 14 41½	0.5	1.0	d	4¾°	H=03 13 30
iS	E	15 36.5					
eP	Z	12 08 28	1.0	1.0	c		Teleseism
e	Z	30½					
e	Z	37½					
eP	Z	23 48 13½	0.5	1.5	c	5¾°	H=23 46 46
i	Z	15.2					
iS	E	49 21.2					
1st August							
iP	Z	03 35 03.5	0.7	2.0	d		
iP	Z	03 57 28.5			c	4¼°	H=03 56 23
iS	E	58 18.0					
e	Z	09 14 47			+		Traces
iP	Z	10 14 10.7	0.4	1.0	c	4½°	H=10 13 06
iS	E	15 03.4					
iP!	Z	10 15 54.0			d		Local
iP	Z	10 24 51.4			c		Local
2nd August							
iP	Z	00 53 55.0	0.5	1.5	d		Regional
iP	Z	04 44 41.0	0.3	0.5	c		Regional
iP	Z	05 21 08.2	0.3	0.5	c		Regional
iP	Z	08 09 40.0	0.5	1.5	d	3½°	H=08 08 45
iS	E	10 22.5					
iP	Z	12 29 43.5	0.5	1.5	d	5°	H=12 28 29
iS	E	30 40.0					
eP	Z	18 26 03	0.5	0.5	c		Regional
iP	Z	19 01 53.1	0.4	0.5	c		Regional
3rd August							
iP	Z	01 58 34.0	0.6	1.2	d		Distant shock.
iP	Z	02 00 09.0	0.3	1.2	d		Local
iP	Z	04 17 13.5	0.4	0.8	c	4½°	H=04 16 06
iS	E	18 05.5					
eP	Z	06 46 51	1.0	1.5	d		Teleseism
iP	Z	10 57 51.0	0.3	3.0	c	¾°	H=10 57 36
iS	E	58 01.0					
eP	Z	12 59 32.5	0.5	0.5	c		Regional
i	Z	35.1					
iP	Z	14 42 58.6	0.4	1.0	c	2°	H=14 42 14
iS	E	43 32.6					
4th August							
eP	Z	05 40 13½	0.5	0.5	c		Distant shock
eiP	Z	05 57 03	0.4	1.5	d	3¼°	H=05 56 12
i	Z	04.6					
i	Z	09.8					
iS	E	42.0					
iP	Z	06 03 41.0	0.4	1.0	d	3¼°	H=06 02 49
iS	E	04 20.0					
eP	Z	10 20 34½	0.4	0.6	d		Regional
iP	Z	11 06 21.0	0.4	2.5	d		Local

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
4th Augu t contd.							
iP	Z	11 06 21.0	0.4	2.5	d		Local
iP	Z	11 48 11.0	0.5	2.0	c	1°	H=11 47 51
iS	E	25.7					
5th August							
eiP	Z	02 02 59	0.3	1.0	c	5°	H=02 01 44
i	Z	03 91.0					
eS	E	57					
eP	Z	05 20 38	0.4	0.6	c	6¾°	H=05 19 57
eS	E	21 56½					
iP	Z	10 32 30.0	0.6	1.0	c		Regional
eP	Z	11 21 35	0.5	1.0	c		Regional
iP	Z	14 39 54.0	0.5	1.5	c		Regional
eiP	Z	17 03 15½	0.5	1.5	c		Regional
i	Z	16.0					
eP	Z	18 00 15	0.5	0.7	c		Regional
6th August							
iP	Z	01 17 11.2	0.5	0.7	c	4°	H=01 16 09
iS	E	58.9					
iP	Z	05 56 56.4			d		Local
eP	Z	11 43 40	1.0	0.9	d		Teleseism
e	Z	23 12 15½			+		Traces
7th August							
eP	Z	17 14 16	0.4	0.4	d	5½°	H=17 12 34
eS	E	15 19					
8th August							
iP	Z	02 48 12.6	0.5	1.3	c	5½°	H=02 46 48
iS	E/	49 18					

AGENAHAMBO

			T sec	A* mm	GM	Dist	Remarks
23rd July, 1967.							
iP	Z	03 13 17	1.0	0.8	d		Teleseism
eiP	Z	19 42 06					Regional
i	Z	06½					
i	Z	46					
i	Z	50½					
24th July							
iP	Z	14 53 19½	0.3	1.0	d		Regional
i	Z	50½					
i	Z	57½					
25th July							
iP	Z	04 06 15½	0.3	1.0	d		Teleseism
i	Z	17½					
26th July							
iP	Z	12 27 46½			d		Regional
i	Z	28 20					
27th July							
iP	Z	00 10 28	0.5	3.0	c		Regional
i	Z	11 49½					
eP	Z	01 33 38					Regional
eP	Z	03 59 29					(Regional)
iP	Z	12 18 43	0.5	0.5	d		Regional
i	Z	52					
iP	Z	12 19 36½	0.5	1.0	d		(Aftershock)
28th July							
iP	Z	17 39 50	0.5	1.5	d		Regional
i	Z	51					
e	Z	53½					
iP	Z	17 40 43	1.0	3.0	d		Regional
eP	Z	17 46 55					(Regional)
i	Z	47 38					
eP	Z	23 40 10½			d		Regional
i	Z	15½					
29th July							
eiP	Z	03 21 53½					(Teleseism)
i	Z	22 02½					
iP	Z	13 26 15½	0.5	4.0	c		Regional
i	Z	21½					
i	Z	23½					
i	Z	27					
iP	Z	14 14 54½	0.5	1.0	d		Teleseism
eP	Z	22 05 06					Traces
30th July							
iP	Z	03 35 08	0.5	1.3	d		Regional
i	Z	11½					
iP	Z	13 36 40½	0.7	1.0	d		Teleseism
i	Z	44½					
i	Z	38 45½					

			T sec	A* mm	GM	Dist	Remarks
AGENAHAMBO							
31st July							
eiP	Z	23 47 41	0.6	0.2			Regional
1st August		NIL RECORDED					
2nd August							
iP	Z	08 09 28			d		Regional
iP	Z	13 33 58½			c		Local
i	Z	34 16					
i	Z	28					
iP	Z	21 17 15	1.0	2.0	c		Local
3rd August							
eiP	Z	15 25 35	0.5	1.0	d		Local
i	Z	37					
4th August		NIL RECORDED					
5th August							
iP	Z	05 20 47	0.5	1.0	d		Regional
iP	Z	10 22 38½	1.0	1.0	d		Regional
i	Z	23 42½					
iP	Z	11 21 44½	0.5	1.0	d		Regional
i	Z	22 38					
eP?	Z	17 59 51½				Local	
i	Z	18 00 06					

Central Observatory
RABAUL

R. F. Heming
A/Vulcanologisy-in-charge.

5 SEP 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGIST-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From:	15th August, 1967
		To :	22nd August, 1967
SULPHUR CREEK	(SUL)	Not operational	
KEREVAT	(KRT)	Not operational	
ESA'ALA	(ESA)	From:	8th August, 1967
		To :	15th August, 1967
TABELE	(TBL)	Not operational	
AGENHAMBO	(AGE)	From:	5th August, 1967
		To:	12th August, 1967

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System			To Sec.	Tg Sec.
S.P.	Maximum magnification	12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification	6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification	750 at 25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification	4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations

Instrumentation: Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484) at the Central Observatory. Drum speen 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw   Magnification 24,000 at 4Hz   T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs   Magnification 6,000 at 4Hz   T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr   Magnification 24,000 at 4Hz   To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt   Magnification 24,000 at 4Hz   To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz   To=1.0

STATION INSTRUMENTATION (continued) (2)

		To sec	Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min. 1.0 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min.

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg
1 Geotech 1051 Vertical

Helicorder System (Geotech Mod 248-1 Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

Photographic Recorder System (Geotech Mod 1560-D), drum speed 30mm/min 1.0 60.0

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA,TBL,KRT,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and seeond marks from radio signal VNG (Australia) are recorded on one component accouding with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings;

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near eatthquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of opicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epocentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the ..ll degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Original time
h	=	Focal depth in Km

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°
Near	=	Typical signature of an earthquake with epicentre between 0.9° & 9°
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

(R.F. HEMING)
A/Vulcanologist-in-Charge

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
16th August		W.W.S.S. running on secondary time Strong microseismic activity from 15 2328 to 16 0945 hours.					
iP eS	Z N/	01 54 46.0 55 18	0.5	12.0	d	$2\frac{1}{2}^o$	H=01 54 04 C.B.M.
iP eS	Z E/	02 32 39.5 48	0.3	7.0	c	$\frac{1}{2}^o$	H=02 32 27
eP eS	Z E/	03 02 12 52	0.3	2.0	c	$3\frac{1}{2}^o$	H=03 01 20
eP	Z	03 07 55	0.5	3.0	d		Regional
iP eS	Z N	08 19 28.5 48	0.5	5.0	c	$1\frac{1}{2}^o$	H=08 19 02
iP eS	Z N/	10 12 20.5 26	0.3	20.0	d	$\frac{1}{4}^o$	H=10 12 12
iP iS	Z N	10 48 33.0 38.0	0.5	3.0	c	$\frac{1}{4}^o$	H=10 48 27
eP iS	Z E	12 19 03 08.0	0.3	1.0	d	$\frac{1}{4}^o$	H=12 18 57
iP! iS	Z N	13 27 38.5 53.0	0.3	6.0	c	$\frac{1}{4}^o$	H=13 27 42
iP! eS	Z N	14 19 46.5 52	0.5	21.5	c	$\frac{1}{4}^o$	H=14 19 38
iP iS	Z N	15 07 03.0 07.5	0.5	4.0	c		Local
iP eS	Z N	16 00 47.0 52	0.3	4.0	c	$\frac{1}{4}^o$	H=16 00 41
iP iS	Z N	17 17 50.0 18 11.0	0.5	2.0	c	$1\frac{1}{2}^o$	H=17 17 22
iP	Z	19 28 17.0	0.6	1.0	c		Distant shock.
iP! iS	Z N/	19 44 06.4 12.0	0.3	34.0	c	$\frac{1}{4}^o$	H=19 43 58
iP iS	Z N/	21 40 00.4 20.0	0.5	24.5	d	$1\frac{1}{2}^o$	H=21 39 34
iP eS	Z E/	21 56 02.0 10			d	$\frac{1}{2}^o$	H=21 55 51
eP iS	Z N/	22 36 34 38.0	0.3	5.0	c		Local
17th August		–					
e	Z/	00 44 44			–		Traces
iP	Z	04 40 29.5	0.4	13.0	c		Regional
iP iS	Z E	08 27 29.0 33.0	0.5	5.0	c		Local
iP iS	Z N	10 30 11.0 23.0	0.3	2.8	c	1^o	H=10 29 55
eP eS	Z N	11 38 17 39 $09\frac{1}{2}$	0.4	1.0	c	$4\frac{1}{2}^o$	H=11 37 09

RABAUL

17th August contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	13 50 14.0	0.5	4.0	c		Regional
iP	Z	13 52 43	0.6	1.0	d		Local
i	Z	45.5					
iS	N	47.8					
eP	Z	14 37 49	0.5	2.0	c	$3\frac{1}{2}^{\circ}$	H=14 36 55
iS	E	38 30.0					
eP	Z	17 41 24½	0.5	1.0	c	$2\frac{1}{4}^{\circ}$	H=17 40 47
iS	N	52.0					
iP	Z	17 45 22.0	0.5	1.2	c		Local
iS	N	26.6					
iP	Z	23 49 02.5	0.50	43.0	c		Regional
iP	Z	23 56 52.5	0.5	9.0	c		Regiomal

18th August

			T sec	A mm	GM	Dist	Remarks
eiP	Z	00 16 41	0.5	1.8	c	$1\frac{1}{2}^{\circ}$	H=00 16 17
i	Z	41.5					
iS	N	59.0					
iP	Z	01 13 00.5	0.4	3.0	d		Regional
iP	Z	03 43 04.0	0.5	2.0	d		Distant shock.
e	Z/	09 42 20			-		Traces
iP	Z	12 06 26.0	0.5	18.0	c	$\frac{1}{4}^{\circ}$	H=12 06 20
eS	N/	31					
iP	Z	17 05 30.5	0.4	30.5	c	$\frac{1}{4}^{\circ}$	H=17 05 24
iS	E	35.0					
iP	Z	20 04 44.5	0.3	4.5	d		Regional
iP	Z	21 11 15.0	0.5	2.0	c	$1\frac{1}{2}^{\circ}$	H=21 10 51
iS	E	33.0					

19th August

			T sec	A mm	GM	Dist	Remarks
iP	Z	03 13 17.5	0.5	5.8	c	$\frac{1}{4}^{\circ}$	H=03 1311
iS	N	22.5					
e(P)	Z	05 10 59½	0.5	2.5	d		Bismark Sea.
e(Lq)	N/	11 66					
iP	Z	06 52 52.5	0.5	9.0	c		Regional
e	Z/	08 38 20			+		Traces
iP	Z	10 26 46.5	0.5	8.0	c	$\frac{1}{4}^{\circ}$	H=10 26 40
iS	N	51.0					
iP	Z	13 35 25.2	0.3	17.5	c	$\frac{1}{2}^{\circ}$	H=13 35 16
iS	E	32.0					
eP	Z	15 34 13	1.0	1.0	c	32°	
iS	N/	39 10.0					
eiP	Z	15 45 43	0.5	1.0	c	In coda of preceding shock.	
i	Z	45.0					
i	Z	52.8					
e	Z	48 48					
iP	Z	18 31 14.0	0.4	22.0	d	1°	H-18 30 58
iS	N	26.0					
iP	z	19 36 39.0	0.4	2.8	d		Local
iS	N	43.5					

RABAUL

20th August

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 04 27.4	0.4	2.0	c		Local
iS	E	32.0					

Ship moving near Beehihives between 20 0027 to 20 0200 hours T 0.5 A 4.5

			T sec	A mm	GM	Dist	Remarks
e	z/	02 14 17½			+		Traces
e	Z/	02 39 30			+		Traces
iP	Z	04 39 14.8	0.3	16.0	c	$\frac{1}{4}^{\circ}$	H=04 39 09
iS	E	19.5					
iP	Z	07 00 42.0	0.5	5.5	c	$\frac{1}{4}^{\circ}$	H=07 00 36
iS	E	47.0					
eiP	Z	11 00 35	0.3	2.0	c		Regional
i	Z	36.6					
iP	Z	11 05 32.0	0.3	1.0	c	$1\frac{1}{4}^{\circ}$	H=11 05 11
iS	E	48.0					
iP	Z	12 23 59.9	0.5	17.0	dNE	$1\frac{1}{2}^{\circ}$	H=12 23 31
iS	N	24 22.0					
i(P)	Z	15 22 36.0	1.0	3.0	c		Regional
iP	Z	15 23 12.8	0.3	50.0	cNW		Local
iS	E	17.0					
iP	Z	20 19 19.0	0.5	1.0	d	$1\frac{1}{2}^{\circ}$	H=20 18 53
iS	N	38.5					
e	Z/	20 40 03			+		Traces
iP	Z	21 39 43.5	0.3	15.0	c	$1\frac{1}{4}^{\circ}$	H=21 39 22
iS	N	59.5					

21st August

Long and Short period record paper upside down
All readings taken from Wanliss street

			T sec	A mm	GM	Dist	Remarks
iP	Zw	03 45 43.0	0.3	3.0	c		Local
iP	Zw	07 42 44.8	1.0	1.0	d		Teleseism
iP	Zw	15 05 24.0	0.4	11.0	c	$(1\frac{1}{2}^{\circ})$	H=15 05(00)
i(S)	Zw	42.0					
iP	Zw	17 31 30.5	0.3	1.0	d	$(\frac{1}{2}^{\circ})$	H=17 31(18)
i(S)	Zw	39.5					
iP	Zw	18 45 09.5	0.2	2.0	d	$(\frac{1}{2}^{\circ})$	H=18 44 57
i(S)	Zw	18.0					
eP	Zw	20 23 25	0.3	1.0	d		Regional
iP	Zw	21 37 43.2	0.3	4.0	d		Shallow shock

22nd, August

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 40 23.8	0.3	1.0	d	$3\frac{3}{4}^{\circ}$	H=01 39 25
iS	N	41 09.2					
iP	Z	02 44 54.6	0.5	6.0	c	$1\frac{1}{2}^{\circ}$	H= 02 44 22
iS	E	45 16.0					
iP	Z	02 48 24.5	0.4	10.0	c	$\frac{1}{4}^{\circ}$	H=02 48 18
iS	E	29.0					
iP	Z	04 44 58.8	0.3	12.8	c		Local
iS	N	45 03.5					
eiP	Z	05 24 17	0.3	2.0	c		Local
i	Z	18.0					
iS	N	19.5					
iP	Z	05 47 25.0	0.5	6.0	d	$2\frac{1}{4}^{\circ}$	H=05 46 49
iS	N	52.0					

RABAUL

22nd August contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	07 16 57.5	0.5	11.0	c	$\frac{1}{4}^{o}$	H=07 16 51
iS	N	17 02.0					
iP	Z	07 58 46.0	0.5	5.0	c		Local
iS	N	50.0					
iP	Z	08 29 39.8	0.4	2.5	c		Local
iS	N	44.2					
eP	Z	13 16 07½	0.5	1.0	c		Teleseism
i	Z	49.6					
i	Z/	21 47					
i	Z/	31 54					
i	E/	37 26					
i	E/	48 38					
iP	Z	17 08 39.0	0.3	3.0	d	$1\frac{1}{2}^{o}$	H=17 08 13
iS	N	58.8					
iP	Z	21 34 23.3	0.3	6.0	c	$\frac{1}{4}^{o}$	H=21 34 17
eS	N	28.5					

RABAUL

CORRIGENDA

			T sec	A mm	GM	Dist	Remarks
13th August, 1967.							
iP	Z	23 29 08½	0.4	18.0	c		Aftershock
iP	Z	23 36 45	0.4	21.8	d		"
i(P)	Z	23 37 33	0.4	9.0	d		"
iP	Z	23 51 47			c		"
14th August							
iP!	Z	00 13 19			c		"
iP!	Z	00 34 01½			c		"
iP	Z	00 50 30½			c		"
iP	Z	01 06 21	0.4	4.5	d		"
iP	Z	01 13 13½			D		"
iP	Z	02 04 02			c		"
iP!	Z	02 35 07			c		"
iP	Z	03 12 02			c		"
iP	Z	03 14 32	0.4	13.6	c		"
iP	Z	03 57 08			c		"
iP	Z	04 26 18	0.4	38.0	c		"
iP	Z	05 01 43			c		"
iP	Z	05 51 50½	0.4	32.0	c		"
iP	Z	06 34 01			c		"
iP	Z	08 46 00½			c		"
iP	Z	10 17 59½	0.4	20.0	c		"
iP	Z	10 51 42	0.4	2.0	c		"
iS	N	45.2					
iP	Z	12 04 21	0.3	1.2	d		"
iS	N	25.2					
iP	Z	13 14 35	0.3	12.2	c		"
iS	N	38.4					
iP	Z	16 17 42	0.3	17.4	c		"
iS	N	46					
iP	Z	16 21 42.2	0.4	3.0	c		"
i(S)	E	48					
iP	Z	18 14 05.2			d		"
iP!	Z	18 49 00.2			C		"
iP	Z	18 57 58.6	0.4	2.8	c		"
iP	Z	19 36 21.0	0.5	4.2	c	$6\frac{1}{4}^{\circ}$	H=19 34 49
iS	N/	37 32					
iP	Z	20 07 11.6	d				Aftershock
15th August		Running on secondary time. Shocks read to the half second.					
iP	Z	04 47 59	0.3	34.0	d	$\frac{1}{4}^{\circ}$	H=04 47 52
iS	N	48 04					Aftershock
iP	Z	06 58 17½	0.5	6.5	c	$\frac{1}{4}^{\circ}$	H=06 58 11
iS	N/	22					
iP	Z	07 25 56	0.3	38.0	c		Local
eS	N/	26 00					

RABAUL

CORRIGENDA

15th August contd.

			T sec	A mm	GM	Dist	Remarks
e	Z/	08 47 22			+		Traces
iP iS	Z N/	09 55 44 49	0.3	27.0	c	$\frac{1}{4}^{\circ}$	H=09 55 38 Aftershock
iP iS	Z E/	12 07 13 24	0.3	21.5	d	$\frac{3}{4}^{\circ}$	H=12 06 58
e	Z/	09 44 47			+		Traces
iP iS	Z N	12 47 44 57	0.5	1.0	d	1°	H=12 47 27
iP iS	Z E	15 17 16 20$\frac{1}{2}$	0.5	2.5	c		Local
iP iS	Z N	16 42 24 27	0.5	5.0	c		Local
iP i	Z Z	16 42 45 46	0.3	4.0	c		Local
iP iS	Z N	17 50 55$\frac{1}{2}$ 51 18	0.5	3.5	c	2°	H=17 50 25
iP iS	Z E	18 00 50 55	0.5	3.0	c	$\frac{1}{4}^{\circ}$	H=18 00 44
iP i i iS	Z Z Z	19 06 59 07 02 04$\frac{1}{2}$ 37	0.5	1.0	d	$3\frac{1}{4}^{\circ}$	H=19 06 10
iP eS	Z E	19 32 00$\frac{1}{2}$ 04$\frac{1}{2}$	0.5	6.8	c		Local
iP iS	Z N	20 15 16 18	0.4	4.0	c		Local
eP iS	Z N/	21 12 53 13 56	0.5	1.0	d	$5\frac{1}{2}^{\circ}$	H=21 01 31

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA							
9th August, 1967.							
iP	Z	08 24 36.1	0.7	12.2	d	24°	
i	Z	25 19.0					
i	N/	26 05.1					
i(S)	N/	28 18.1					
iP	Z	18 01 40.7	0.2	0.4	d		Regional
10th August							
eP	Z	08 15 22½	0.5	0.7	d	4½°	H=08 14 15
eS	N	16 14½					
eP	Z	11 30 51½	0.7	0.7	c		Teleseism
iP	Z	13 15 46.5	0.2	1.5	c		Local
iS	N	47.6					
eP	Z	23 01 50	0.6	0.7	d	4¾°	H=23 00 37
iS	E	02 46					
11th August							
iP	Z	04 07 02.6			d		Local
iS	E	07.0					
12th August							
eP	Z	09 46 15½	1.2	1.3	c	40°	
i	Z	19.6					
iPP	Z	47 37.5					
eS	E/	51 26					
iSSSS	E/	54 31.5					
i(ScS)	N/	55 12.0					
iP	Z	12 34 48.0	1.0	3.4	d	(22°)	
e(S)	E/	38 13					
13th August		S.P. Z record went off at 1116 hours.					
eP	N	16 56 08			d	5¾°	H=16 54 41
i	N	09½					
iS!	E/	57 14					
iP	N	20 14 52			c	54°	
eS	N	21 18					
iP	Z	23 16 30.2	0.4	4.0	d	(5¼°)	H=23 15(12)
i(S)	E/	17 30					
eP	Z	23 53 31	0.5	0.6	c	2°	H=23 52 58
i	Z	32.3					
iS	N/	56					
14th August		NIL RECORDED					

			T sec	A* mm	GM	Dist	Remarks

AGENAHAMBO

6th August, 1967.

iP	Z	01 17 20½	0.5	1.0	c		Regional
i	Z	22½					
iP	Z	01 18 16½	0.5	2.0	c		Regional
i	Z	27½			In coda of preceding shock.		

7th August

Microseisms from 06 2139 to 07 0920 hours.

8th August

iP	Z	03 24 20½	0.4	1.0	c		Regional
i	Z	50½					

Microseismic activity from 07 2035 to 08 0940 hours.

iP	Z	02 48 28½	0.9	1.0	d		Regional
i	Z	49 41					

9th August

Microseismic activity from 08 2129 to 09 0800 hours.

iP	Z	08 24 05½	0.8	2.0	c		Teleseism
i	Z	09					
i	Z	27 12.5					
iP	Z	18 01 12			d		Local
i	Z	24½					

10th August

Microseismic activity from 09 2144 to 10 0920 hours.
Av.0.5 Av.1.0

11th August

Microseismic activity from 10 2132 to 11 0940

iP	Z	14 50 20	0.5	1.0	c		Local
i	Z	23					

12th August

Microseismic activity from 11 2202 to 12 1000 hours.

CENTRAL OBSERVATORY

RABAUL

R. F. Heming
A/Vulcanologist-in-charge.

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CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 22nd to 30th August, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	From: 18th to 22nd August, 1967.
ESA'ALA	(ESA)	From: 14th to 22nd August, 1967.
TABELE	(TBL)	Not operational
AGENAHAMBO	(AGE)	From: 11th to 26th August, 1967.

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System			To Sec.	Tg Sec.
S.P.	Maximum magnification	12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification	6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification	750 at 25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification	4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12,	air damping 10:1	3.6
L.O.-Eo.	Static magnification 10,	air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations

Instrumentation: Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484) at the Central Observatory. Drum speen-60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw Magnification 24,000 at 4Hz T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs Magnifiaation 6,000 at 4Hz T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr Magnification 24,000 at 4Hz To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt Magnification 24,000 at 4Hz To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz To=1.0

STATION INSTRUMENTATION (continued) (2)

	To sec	Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min. 1.0 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min.

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg
1 Geotech 1051 Vertical

Helicorder System (Geotech Mod 248-1 Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

Photographic Recorder System (Geotech Mod 1560-D), drum speed 30mm/min 1.0 60.0

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA,TBL,KRT,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and seeond marks from radio signal VNG (Australia) are recorded on one component accouding with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings;

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the all degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A* = Peak-to-Trough trace amplitude in millimetres.
A = Amplitude from W.W.S.S.
A* = Amplitude from seismographs with different response to the W.W.S.S.
T = Period in seconds
C.B.M. = Confused by microseisms.
Dist. = Distance in central angle degrees.
H = Original time
h = Focal depth in Km

Remarks:

Local = Typical signature of an earthquake with epicentre within 0.9°

Near = Typical signature of an earthquake with epicentre between 0.9° & 9°

Distant = Typical signature of an earthquake with epicentre between 9° and 45°

Teleseism = Typical signature of an earthquake with epicentre more than 45°

Traces = Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

(R.F. HEMING)
A/Vulcanologist-in-Charge

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RABAUL

23rd August, 1967

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 39 19.8	0.5	6.8	c		Local
iP	Z	06 33 17.2	0.5	33.0	c	¼°	H=06 33 10
eS	N/	22					
e	Z/	10 20 04			–		Traces
eP	Z	10 49 17	0.4	6.6	d	4½°	H=10 48 11 C.B.M.
eS	E/	50 08					
iP	Z	16 57 32.6	0.5	5.0	c		Regional

24th August

			T sec	A mm	GM	Dist	Remarks
e	Z/	00 14 56			–		Traces
e	Z/	03 30 46			–		Traces
e	Z/	03 42 04			–		Traces
eiP	Z	04 34 47½	0.3	2.0	d		Local
i	Z	38					
iP	Z	05 40 35.5	0.3	4.0	c		Local
iS	N	40.0					
iP	Z	07 50 51.6	0.5	22.0	d	1½°	H=07 50 26
iS	N	51 11.0					
eiP	Z	09 08 48	0.5	1.5	d	1½°	H=09 08 23
i	Z	49.0					
iS	N	09 07.0					
eP	Z	10 37 13	0.6	2.0	c	19°	
eS	N/	40 26					
eLq	N/	38					
eLr	Z/	41 36					
iP	Z	11 42 49.8	0.4	6.0	d	2°	H=11 42 17
iS	N	43 15.3					
eiP	Z	11 45 46.0	0.5	1.0	d		Local
i	Z	14.5					
iS	E	50.2					
eP	Z	17 18 53	0.5	4.0	d		Regional
eiP	Z	18 44 43½	0.4	1.0	c	2°	H=18 44 13
iS	N	45 06.0					
iP	Z	22 28 31.3	0.4	30.8	d	2½°	H=22 27 53
iS	N	29 00.5					
iP	Z	23 48 27.0	0.5	3.0	c		Regional

25th August

			T sec	A mm	GM	Dist	Remarks
iP	Z	04 11 26.0	0.4	3.0	d		Local C.B.M.
iP	Z	04 42 02.0	0.3	1.8	d		Local C.B.M.
i	Z	05 20 43.0	0.5	7.5	Ship moving in harbour.		
F	Z	23 20.5					
e	Z/	15 22 14			+		Traces

RABAUL

			T sec	A mm	GM	Dist	Remarks
25th August contd.							
iP	Z	16 00 21.5	0.4	1.3	d	1¼°	H=15 59 59
i	Z	25.2					
iS	N	38.5					
iP	Z	16 22 06.0	0.4	1.0	d	2¾°	H=16 21 21
iS	E	40.0					
iP	Z	16 54 09.6	0.3	2.5	c	1°	H=16 53 51
iS	N	23.5					
eP	Z	22 58 46	0.4	1.2	d		Regional
eP	Z	23 03 18	0.5	1.0	c		Regional
26th August		Strong microseismic activity from 25,2320 to 26,0600 hours.					
iP	Z	00 41 14.0	0.5	2.6	d	20°	Main shock (New Hebrides Region)
i	Z	15.0					
i	Z/	22.0					
i	Z/	42 12.0					
iS	E/	44 55.0					
iP	Z	02 11 40.5	0.5	3.5	d	21°	
i	Z	41.4					
eS	N/	15 31					
iP	Z	03 34 30.5	0.5	1.0	d	21°	
eS	N/	38 19					
eP	Z	05 29 48½	0.5	1.0	d	20½°	
eS	E/	33 33					
eP	Z	05 51 21½	0.5	1.0	c		Aftershock
iP	Z	07 59 31.0	0.5	1.0	c		"
iP	Z	10 29 45.0	0.6	2.0	c	20°	
iS	N/	33 23.0					
iP	Z	11 04 51.0	0.5	2.5	c		Local
iS	E	55.5					
eP	Z	11 14 21	0.5	1.0	c	21½°	
eS	E/	18 14					
iP	Z	14.03 23.4	0.4	5.0	c	1½°	H=14 02 58
i	Z	23.6					
iS	N	42.0					
iP	Z	17 58 39.0	0.5	5.5	c	¼°	H=17 58 33
iS	N	44.0					
e(P)	Z/	18 27 13	0.5	1.0	c	(45½°)	
e(S)	N/	35 34					
iP	Z	20 00 54.2	0.5	15.8	c	¼°	H=20 00 48
iS	N	59.0					
iP	Z	22 11 12.8	0.4	26.5	c		Local
iS	N	17.5					
iP	Z	22 36 14.1	0.5	6.8	c		Local
iS	N	18.6					
27th August							
iP	Z	01 31 09.1	0.3	8.0	d	1°	H=01 30 53
iS	N	21.0					
iP	Z	01 50 30.0	0.3	6.0	c	¼°	H=01 50 22
iS	N/	36.0					

RABAUL

			T sec	A mm	GM	Dist	Remarks
27th August contd.							
iP!	Z	02 04 49.5			cNW	$\frac{1}{4}^{o}$	H=02 04 41
iS	No	55.0			Felt: Rabaul		Int. II
iP	Z	02 24 37.5	0.4	9.0	d	$\frac{1}{4}^{o}$	H=02 24 29
iS	N/	43.0					
iP	Z	06 20 24.8	0.3	4.0	d	$1\frac{1}{2}^{o}$	H=06 20 00
iS	N	54.0					
eP	Z	07 08 21½	0.6	2.0	c		Distant shock.
iP	Z	11 23 20.0	0.4	9.5	c		Local
iS	E	24.6					
iP	Z	13 30 09.0	0.4	1.5	d	$3\frac{1}{4}^{o}$	H=13 30 21
iS	E	46.5					
eiP	Z	14 22 29½	0.5	1.0	d	31^{o}	
i	Z	31.0					
eS	E/	27 04					
iP	Z	15 01 30.5	0.3	37.0	c		Local
iS	N	35.0					
e	Z/	16 49 40			–		Traces
eP	Z	17 10 02	1.0	1.0	c	21^{o}	
eS	E/	13 51					
iP	Z	21 39 18.0	0.3	12.0	d	1^{o}	H=21 38 59
iS	N/	32.0			Felt: Rabaul		Int. II
e	Z/	22 10 04			–		Traces
eiP	Z	23 10 46	0.3	2.6	c		Local
i	Z	46.5					
iS	N	50.5					
28th August							
iP	Z	01 49 41.0	0.3	1.0	d	$\frac{1}{4}^{o}$	H=01 49 35
iS	N	46.0					
iP	Z	02 08 59.8	0.3	2.5	d	$\frac{1}{2}^{o}$	H=02 08 46
iS	N	09 10.0					
e	Z/	07 35 52			+		Traces
e	Z/	16 03 52			–		Traces
e	Z/	18 32 30			+		Traces
iP	Z	22 51 26.0	0.3	1.8	d	$\frac{1}{2}^{o}$	H=22 51 12
iS	N	45.8					
29th August							
iP	Z	01 44 02.6	0.3	5.0	d	$1\frac{1}{2}^{o}$	H=01 43 38
iS	E	32.0					
iP	Z	04 02 11.8	0.5	1.0	d	2^{o}	H=04 01 40
iS	N	35.5					
eiP	Z	07 33 32½	0.5	1.5	d	33^{o}	
i	Z	35.0					
i	Z	44.2					
eS	E/	38 26					
iP	Z	09 36 14.0	0.3	2.0	c	1^{o}	H=09 25 54
iS	N	29.0					
iP	Z	09 49 37.0	0.5	3.0	d	2^{o}	H=09 49 03
iS	N	50 03.0					

RABAUL

29th August contd.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	10 52 43½	0.5	1.0	d	11°	
i	Z	45.3					
i	Z	49.2					
eS	N/	54 48					
eiP	Z	16 58 21	0.3	1.0	c	1¾°	H=16 57 52
i	Z	27.5					
iS	N	43.0					
iP	Z	20 02 23.6	0.5	2.5	d	1¼°	H=20 02 01
iS	E	40.8					
iP	Z	21 50 48.5	0.3	4.5	d	¼°	H=21 50 42
iS	E	53.0					
iP	Z	22 11 36.4	0.5	15.0	c	¼°	H=22 11 30
iS	N	41.0			Felt: Rabaul Int. I.		

KERAVAT

Gross clock error of 51secs until 19,0655.

19th August

Phase	Comp	h	m	s	TT sec	A* mm	GM	Dist	Remarks
iP	Z	10	26	47.6			d	$\frac{1}{2}^{\circ}$	H=10 26 37 C.B.M.
i	E			$50\frac{1}{2}$					
iS	N			54.5					
iP	Z	13	35	26.7	0.2	3.8	c	$\frac{1}{4}^{\circ}$	H=13 35 19
iS	E			32.3					

**

No traces of both these shocks appear on the Z S.P..

**

Phase	Comp	h	m	s	TT sec	A* mm	GM	Dist	Remarks
eP	E	15	34	$14\frac{1}{2}$	1.2	0.4	d	($24\frac{1}{2}^{\circ}$)	
e	E			36					
e(S)	N		38	47					

**

Phase	Comp	h	m	s	TT sec	A* mm	GM	Dist	Remarks
eP	E	15	45	44	0.8	0.9	c		Teleseism
i	E			50.5					
i	E		46	34					
i	N		48	46.5					
i	N			54					
iP	Z	18	31	13.1	0.2	2.2	d	$\frac{3}{4}^{\circ}$	H=18 30 58
iS	E			24.4					
iP	Z	19	36	41.1	0.2	2.7	d		Local

20th August

Phase	Comp	h	m	s	TT sec	A* mm	GM	Dist	Remarks
iP	Z	00	04	29.5	0.3	1.8	c	$\frac{1}{2}^{\circ}$	H=00 04 20
iS	E			36.6					
iP	Z	04	39	17.6			d		Local C.B.M.
i	E			20.4					
iS	E			22.7					
i(P)	Z	07	00	38.9			c	$\frac{3}{4}^{\circ}$	H=07 00 25 C.B.M.
iS	E			49.0					
eP	E	11	00	39	0.7	0.3	c	$5\frac{1}{4}^{\circ}$	H=10 59 20
iS	N		01	40.1					
iP	Z	11	05	33.1	0.4	0.9	d	1°	H=11.05 14
iS	E			46.9					
iP!	Z	12	23	58.4			d		Regional
eP	N	12	50	30	0.5	0.3	d	$6\frac{1}{2}^{\circ}$	H=12 48 56
eS	E		51	43					
eP	N	15	22	38	1.0	0.3	d		Regional
iP	Z	15	23	14.7			d		Local
eP	N	15	52	$25\frac{1}{2}$	0.5	4.0	c	$5\frac{1}{4}^{\circ}$	H=15 51 09
eS	N		53	$26\frac{1}{2}$					
iP	Z	20	19	19.6	0.3	1.0	d	$1\frac{1}{2}^{\circ}$	H=20 18 53
iS	N			39.2					
iP	Z	21	39	31.1			d	2°	H=21 39 00
iS	E			54.6					

21st August

S.P.Z. record confused by microseism. Shocks read from horizontal components.

Phase	Comp	h	m	s	TT sec	A* mm	GM	Dist	Remarks
iP	E	03	45	44.3			c		Local
eP	Z	07	42	51			c		Teleseism
iP	E	15	05	23.6			d		Regional
iP	E	17	31	35.8	0.2	0.7	c	$\frac{3}{4}^{\circ}$	H=17 31 22
iS	N			46.1					
iP	E	18	45	12.9	0.2	0.8	d	1°	H=18 44 56
iS	E			24.9					

KERAVAT

			T sec	A* mm	GM	Dist	Remarks
21st August contd.							
iP	E	20 23 24.7	0.2	1.1	c	½°	H=20 23 15
iS	N	31.6					
iP	E	21 37 40.2			d		Regional
22nd August							
eP	E	01 40 22½	0.5	0.8	d	(4½°)	H=01 39 (15)
i(S)	N	41 15					
iP	E	02 44 55.0	0.3	3.8	d	2°	H=02 44 23
iS	E	45 19.2					
iP	N	02 48 24.5	0.3	0.5	c	½°	H=02 48 14
iS	N	33					
iP	N	04 45 00.7			c		Local
iS	N	05.5					
iP	N	05 24 17.8	0.4	3.0	d		Local
iS	E	18.3					
iP	N	05 47 25.1	0.4	3.0	d	2°	H=05 46 55
iS	N	47.9					
iP	Z	07 58 48.3			c	½°	H=07 58 39
iS	N	55.1					
iP	N	08 29 42.8			d		Local
iS	N	47.7					
e(P)	N	13 16 25	0.7	0.3	d		Teleseism
e	N	32					
i	N	43.6					
e	N	18 16½					
eP	N	17 08 38				1½°	H=17 08 15
iS	N	54.4					
iP	N	21 34 27.2	0.3	1.2	d		Local
iS	N	31.3					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
15th August							
e(P)	Z	12 08 58	0.5	0.4	d		Regional
iP	Z	19 07 31.2	0.5	2.2	d		Regional
16th August							
iP iS	Z E	01 54 50.4 55 28.6	0.5	2.5	d	$2\frac{1}{4}^{o}$	H=01 54 13
iP iS	Z E	03 02 20.1 57.0			d	3^{o}	H=03 01 32
iP iS	Z E	03 08 02.5 40.5	0.5	0.9	c	$3\frac{1}{4}^{o}$	H=03 07 12
17th August							
iP iS	Z E	11 39 48.6 40 05.6	0.2	2.0	c	$1\frac{1}{2}^{o}$	H=11 39 36
18th August							
iP	Z	13 36 03.0			c		Local
iP iS	Z E	17 08 17.0 09 18.2	0.3	0.5	d	$5\frac{1}{4}^{o}$	H=17 06 58
19th August							
iP iS	Z N/	15 34 30.6 39 36	1.0	2.3	c	27^{o}	
iP iS	Z E/	15 45 35.4 48 14	1.0	3.0	d	$14\frac{1}{4}^{o}$ In coda of preceding shock.	
20th August							
iP iS	Z E	12 24 32.5 25 19.1	0.2	2.1	d	4^{o}	H=12 23 31
21st August							
eP e(S)	Z E	06 55 $57\frac{1}{2}$ 56 23			d	(2^{o})	H=06 55 (24)
iP iS	Z N/	07 42 44.0 51 32	1.0	5.1	c	71^{o}	
eiP i iS	Z Z E	08 50 $01\frac{1}{2}$ 02.5 17.7	0.4	0.4	c	$1\frac{1}{4}^{o}$	H=08 49 40
iP	Z	14 26 01.3	0.2	0.8	c		Local
iP iS	Z E	15 06 08.6 07 02.2	0.6	3.2	c	$4\frac{1}{2}^{o}$	H=15 04 58
22nd August							
eP	Z	13 19 38	0.8	1.7	d		Teleseism

AGENAHAMBO

		Time	T sec	A* mm	GM	Dist	Remarks
12th August							
iP	Z	21 34 56	0.5	1.0	d		Regional
i	Z	58					
i	Z	35 41					
i	Z	45					
i	Z	51					
13th August							
eiP	Z	16 56 15½	0.5	0.7	d		Regional
i	Z9	17					
i	Z	57 26					
iP	Z	20 14 36½	0.8	2.5	d		Teleseism
i	Z	15 12½					
iP	Z	20 52 24	0.5	2.0	c		Regional
iP	Z	22 12 44½	0.5	1.3	c		Regional
i	Z	52½					
i	Z	13 51½					
eiP	Z	22 16 39	0.5	0.9	d		Regional
i	Z	39½					
i	Z	46½					
i!	Z	17 49½					
********							
14th August							
iP	Z	19 37 20½	0.4	2.0	d		Regional
i	Z	54					
15th August							
iP	Z	19 09 05½	0.5	1.0	c		Local
i	Z	08½					
i	Z	19½					
iP	Z	21 13 58½	0.4	2.0	d		Regional
i	Z	14 35					
16th August							
iP	Z	02 54 53½	0.5	3.0	d		(Teleseism)
iP	Z	04 02 23½	0.5	2.2	d		Regional
i	Z	03 00					
iP	Z	21 41 12½	0.8	2.8	c		Regional
i	Z	16½					
i	Z	42 25					
i	Z	29½					
17th August		NIL RECORDED.					
18th August							
eP	Z	18 51 26½	0.4	0.1	c		Regional
e	Z	52 02					
i	Z	06½					
19th August							
eP	Z	15 34 06½	0.6	0.3	c		Teleseism
i	Z	15½					
e	Z	15 46 07½			+		Traces
20th August							
iP	Z	00 58 04½	0.3	0.8	c		(Regional)
i	Z	15½					

AGENAHAMBO

					T sec	A* mm	GM	Dist	Remarks
20th August contd.									
iP	Z	12	18	35	0.3	1.7	c		Regional
e	Z			57					
i	Z		19	22					
i	Z			25½					
iP	Z	14	34	24			c		Local
i	Z			33					
i	Z			36					
eP	Z	16	59	32½					(Regional)
i	Z			36½					
21st August									
Microseismic activity from 20,0225 to 21,0917 hours.									
iP	Z	06	55	36½	0.5	1.0	c		Regional
i	Z			50					
eP	Z	07	42	20	1.0	1.0	d		Teleseism
iP	Z	15	06	12½	0.2	0.8	d		Regional
e	Z			52½					
i	Z		07	04½					
i	Z			09½					
eP	Z	20	39	05	0.5	1.0	c		Teleseism
22nd August	NIL RECORDED.								
23rd August	NIL RECORDED.								
24th August									
eP	Z	10	37	14			+		Traces
iP	Z	22	28	56½	0.5	1.7	c		Regional
i	Z		29	02					
25th August									
iP	Z	05	14	49	0.4	0.6	d		Local
i	Z			52					
26th August									
iP	Z	00	41,	36	0.9	1.7	d		Regional
e	Z		43	41					
eP	Z	00	58	13½			+		Traces
eP	Z	02	12	02½		+		Traces	
********									
iP	Z	23	54	12½	0.4	0.9	c		Regional
e	Z		55	16½					
i	Z			24½					

CENTRAL OBSERVATORY
RABAUL

R. F. Heming
A/Vulcanologist-in-charge.

22 SEP 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 5th September, 1967. To: 12th September. 1967.
KERAVAT	(KRT)	From: 4th September, 1967. To: 10th September, 1967.
ESA'ALA	(ESA)	From: 22nd August, 1967. To: 3rd September, 1967.
[illegible]	([illegible])	From: 22nd August, 1967. To: 5th September, 1967.
AGENAHAMBO	(AGE)	No records received

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL			T sec	A mm	GM	Dist	Remarks
6th September, 1967.			Strong microseismic activity,				
e	Z/	03 38 34			+		Traces
e	Z/	04 49 50			-		Traces
eP	Z	07 07 03	0.5	3.0	c		Regional
e	Z/	07 48 08			-		(Distant shock)
eP	Z	08 07 $06\frac{1}{2}$	0.3	2.0	c		Regional
iP	Z	16 36 22.0	0.3	5.0	c		Regional
iP	Z	17 22 07.1	0.3	10.0	c	$\frac{1}{2}^{\circ}$	H=17 21 57
iS	N/	14.0					
iP	Z	19 44 27.5			d	1°	H=19 44 07
iS	N/	42.0				Felt:	Pomio Int. IV.
							Rongamatane Int.III
							Ulamona Int.II
							Rabaul Int.I-II
7th September			Strong microseismic activity from 06.2324 to 07.1600 hours				
eP	Z	07 18 11	0.5	4.0	d	$26\frac{1}{2}^{\circ}$	
i	Z	13.0					
iS	E/	22 40.0					
e	Z/	09 50 54			-		Traces
iP	Z	11 14 49.3	1.0	4.0	d	34°	
i	Z	54.5					
i	Z	56.5					
eS	N/	20 02					
eP	Z	12 31 $23\frac{1}{2}$	0.5	4.0	c		Regional
iP	Z	14 24 16.0	0.4	2.0	c	1°	H=14 23 57
iS	N	30.5					
iP	Z	17 58 16.2	0.4	5.0	c	2°	H=17 57 44
i	Z	17.0				Felt:	Ula mona Int. I
iS	N/	40.0					
iP	Z	22 14 05.0	0.5	3.0	d	$1\frac{1}{2}^{\circ}$	H=22 13 40
iS	N	24.0					
iP	Z	22 17 21.0	0.3	2.0	c	$1\frac{1}{2}^{\circ}$	H=22 16 56
iS	N	50.0					
iP	Z	23 18 23.0	0.3	3.0	d		Local
iP	Z	23 21 43.0	0.3	3.0	d	$1\frac{3}{4}^{\circ}$	H=23 21 14
eS	E/	22 05					
8th September			Strong microseismic activity from 07.2318 to 08,0830 hours.				
iP	Z	02 49 13.0	0.5	3.0	c		Regional
iP	Z	04 49 11.8	0.3	4.0	d		Regional
e	Z/	08 45 56			-		Traces
e	Z/	10 01 42			-		Traces
iP	Z	11 22 07.0	0.3	1.5	d	$1\frac{3}{4}^{\circ}$	H=11 21 38
iS	N	29.0				Felt:	Pomio Int. II

RABAUL

			T sec	A mm	GM	Dist	Remarks
8th September contd.							
iP	Z	11 46 15.0	0.4	55.0	d	1½°	H=11 45 50
iS	E/	34.0				Felt: Pomio Int.III- IV	
iP	Z	15 03 37.0	0.3	8.0	d	½	H=15 03 23
mS	E	47.0					
e	Z/	15 19 28			+		Traces
eP	Z	22 06 16½	0.4	1.0	d	(21°)	
e(S)	E/	10 04					
iP	Z	22 42 12.5	0.6	4.0	d	22°	
i	Z	21.6					
eS	E/	46 01					
9th September							
e	Z/	05 37 45			+		Traces
iP	Z	06 19 35.5	0.9	1.5	c	20°	
eS	E/	23 14					
iP	Z	08 42 36.0	0.5	6.0	c		Regionl
eP	Z	10 24 46	0.6	1.0	d		Local
eP	Z	10 27 11½	1.0	1.0	d	17°	
i	Z	30.5					
iS	E/	30 20.5					
eP	Z	14 48 29	0.8	1.0	d	20°	
iS	E/	52 13.0					
eP	Z	17 03 48	0.8	1.0	d		Teleseism
eP	Z/	22 04 40			-		Traces
10th September							
e	Z/	06 29 06			-		Traces
iP	Z	07 09 38.0	0.5	8.5	d	2°	H=07 09 05
eS	N	10 03					
iP	Z	15 35 56.5	0.3	23.0	d	1½°	H=15 35 31
iS	E	36 15.5					
e	Z/	21 13 16			+		Traces
i P	Z	22 55 24.0	0.2	1.5	c		Local
iS	E	28.5					
iP	Z	23 12 41.0	0.4	45.8	cNE	1½°	H=23 12 17
iS	E/	59.0					
iP	Z	23 29 41.4	0.3	7.0	c		Regional
11th September	Change frequency standard WWSS and general maintenance. Readings taken from Rabalanakaia station						
iP	Zr	02 01 08.0	0.2	5.0	c		Regional
iP	Zr	10 29 45.1	0.3	2.8	c		Local
iS	Zr	48.0					
iP	Zr	12 39 42.0	0.2	2.2	c		Regional
12th September	Strong microseismic activity.						
e	Z/	00 26 48			-		Traces
e	Z/	01 33 04			+		Traces
iP	Z	01 57 25.2			c	¾°	H=01 57 10
iS	E/	36.0					

RABAUL

12th September contd.

			T sec	A mm	GM(	Dist	Remarks
iP	Z	02 05 54.5			c	½°	H=02 05 40
iS	N/	06 04.0					
iP	Z	11 26 18.5	0.3	2.0	c	2°	H=11 25 45
iS	N	43.0					
e	Z/	12 03 38			-		Traces
e	Z/	12 47 38			-		Traces
iP	Z	21 50 11.0			dSW	1½°	H=21 49 45
iS	Eo	31.0				Felt:	Rabaul Int.II-III
							Pomio Int.IV-V
							Lolobau Int.IV-V
							UlamonaInt.II
iP	Z	21 58 47.0			d		Aftershock
iP	Z	22 09 36.0			d	1½°	H=22 09 10
iS	E/	56.0					overlapping
iP	Z	22 31 01.5			d	2°	H=22 30 31
iS	E/	24.0					Aftershock
iP	Z	22 39 19.8			d	1½°	H=22 38 55
iS	E/	39.0					Aftershock.
iP	Z	23 51 53.1	0.5	5.0	c	1½°	H=23 51 29
iS	E	52 12.7					C.B.M.
iP	Z	23 57 08.8	0.5	2.0	c	1¾°	H=23 56 39
i	Z	11.0					
iS	E	30.6					

			T sec	A mm	GM	Dist	Remarks
KERAVAT							
4th September							
eP	N	03 58 57	1.0	1.2	d	36°	
eS	E	04 04 27½					
iP	Z	13 [illegible] 32.8			c		Regional
eP	E	18 03 27	0.5	0.9	d	8°	
iS	E	04 56.0					H= 18 01 30
eP	N	18 50 20	1.0	0.3	d	7°	
iS	N	51 40					H- 18 48 35
5th September							
eP	N	03 41 46			c		Regional
ep	Z	16 31 46	0.5	0.7	d	5°	H= 16 30 29
iS	N	32 45.2					
iP	Z	17 56 12.5			d		Regional
iP	Z	18 02 15.9			d		Regional
iP	Z	20 13 10.0			d		Regional
6th September							
iP	E	07 07 01.9	0.4	1.5	d	1½°	H=07 06 37
iS	E	21.3					
eP	E	08 46 43	0.5	0.7	d	1½°	H=08 45 15
iS	E	46 04.0					
iP	E	16 36 03.7	0.3	2.0	d	3°	H=16 35 16
i	E	21.3					
iS	E	40.0					
iP	Z	19 44 25.8			d		Regional
7th September							
eP	E	07 18 13	1.2	1.2	d	26½°	
i	E	19 13.2					
iS	E	22 38					
eiP	E	11 14 50	1.0	5.1	c	34°	
i	E	50.5					
eS	N	20 02½					
e(P)	N	12 31 26					Regional
iP	Z	14 24 14.3			d	10°	
iS	E	27.4					H= 14 23 57
iP	Z	17 58 14.0	0.2	3.2	d	1½	
iS	E	34.2					H= 17 57 47
8th September							
iP	Z	02 49 13.0	0.5	1.0	d	1¼°	H=02 48 52
iS	E	29.0					
i(P)	E	11 22 05.8			d	(1½°)	H=11 21(42)
iS	E	24.4					
iP	Z	11 46 12.3			d		Regional
IP	Z	15 03 39.0	0.2	2.0	d	1°	H=1 5 C3 23
iS	N	51.6					
eP	N	22 06 18	1.0	0.8	d		Teleseism
eP	Z	22 42 13	1.0	1.0	d		Teleseism
9th September							
eP	N	06 19 37	1.2	0.8	d		Teleseism

KERAVAT(cont.)

			T sec	A* mm	GM	Dist	Remarks
9th September (cont)							
eP	N	08 42 37	1.0	1.0	c		Regional
eP	N	10 27 13	1.5	0.9	c		Teleseism
i	N	30.5					
eP	N	14 48 31½	1.0	0.8	d		Teleseism
e	N	17 04 09½					Traces
10th September							
iP	Z	07 09 35.3			d		Regional
iP	E	15 35 54.0			d		Regional
iP	E	22 55 25.6	0.2	1.0	c		(Local)
iP	Z	23 12 39.0			c		Regional
iP	Z	23 29 43.0	0.2	4.0	d		Regional

ESA'ALA S.P E/W & N/S have intermitant timing.

			T' sec	A* mm	GM	Dist	Remarks
23rd August, 1967							
eP	Z	10 55 15	0.5	0.4	d	5½°	H=10 53 55
i	Z	16.1					
iS	E/	56 17					
24th August							
eP	Z	10 36 46½	1.1	2.0	d	21¼°	
iS	E/	40 06.1					
eP	Z	14 24 01	0.5	2.8	d		Teleseism
eP	Z	17 19 38½	0.4	1.0	c		Teleseism
iP	Z	22 29 00.6			d	5½°	H=22 27 43
iS	E	30 00.0					
25th August							
eP	Z	22 59 31½	0.5	0.2	c		Regional
eP	Z	23 04 07½	0.7	0.5	d		Regional
26th August							
eP	Z	00 41 00½	0.6	0.5	d	25°	Main Shock (New Hebrides Region)
i	Z	01.4					
iS	E/	46 19.0					
iLq	E/	52 46					
eP	Z	00 55 19½	0.8	1.2	c		Aftershock
eP	Z	00 58 38½	0.7	1.0	d		"
iP	Z	02 12 28.0	0.9	7.5	d	26½°	
eS	E/	16 50					
eP	Z	03 35 17½	0.5	0.8	c		Teleseism
eP	Z	05 30 35½	0.7	1.3	c		Teleseism
eP	Z	05 52 08½	0.8	1.0	d	Teleseism (Aftershock)	
eP	Z	10 29 27½	1.0	1.0	e		Teleseism
iP	z	10 38 31.1			d		Local
iS	E	35.9					
iP	Z	10 39 30.1			d		Local
iS	E/	34.1					
eP	Z	11 15 03	1.0	0.8	c		Teleseism
27th August							
eP	Z	02 06 08	0.2	0.2	d	5½°	H= 02 04 47
iS	E	07 10.4					
eP	Z	07 09 03			t		Traces
eP	z	14 22 32	0.8	1.4	d	32½°	
eS	M	27 04.					
iP	Z	19 16 29.9			d		Local
eP	Z	20 14 15	0.5	0.4	c	5¼°	H= 20 12 57
28th August							
iP	Z	02 13 01.7			d		Local
29th August							
iP	Z	07 43 19.0	0.7	1.8	d	29½°	
eS	M	48 10	eSSS	E/	50 14½		
eSS	E/	24½	eScS	E/	53 33		

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA(cont)							
eP	Z	11 02 47½	1.0	0.6	c	13¾°	
e	E	03 51					
iS	N/	05 11					
eP	Z	1136 20½	0.3	0.3	c		
iS	E	37 03.8					
30th August							
iP	Z	04 32 37.7	0.7	2.6	c		Teleseism
eP	Z	08 45 01½	0.3	0.6	c	4°	H=08 44 02
iS	E	46.9					
eP	Z	13 08 32	0.4	0.2	d	4¼°	H=13 07 28
eS	E	09 21					
iP	Z	14 09 42.5				3¾°	H=14 08 44
iS	N/	10 26.1					
31 August							
eP	Z	10 11 55			d	5½°	
iS	E	12 59.2					H=10 10 34
iP	Z	18 57 45.3	0.6	1.6	c		Teleseism
1st September							
iP	Z	03 32 32.8			d	4¾°	H=03 31 20
iS	E/	33 29.0					
2nd September			NIL RECORDED				
3rd September							
iP	Z	01 24 21.0			d		Regional
4th Spetember							
eP	Z	03 58 33	1.0	1.6	d	Teleseism	
iP	Z	13 01 32.9	0.5	1.2	d		
iS	E	02 29.5					
eP	Z	18 03 14	1.5	0.4	d		Teleseism

			T sec	A* mm	GM	Dist	Remarks
TABELE							
23rd August							
iP	Z	23 49 26.3			c		Regional
24th August							
iP	Z	00 17 18.0	0.3	4.5	d		Regional
iP	Z	23 33 28.7	0.3	6.0	c		Regional
i	Z	46.5					
25th August			NIL RECORDED				
26th August							
iP	Z	00 40 40.9	0.8	3.0	c		Distant shock
eP	Z	02 11 04.	0.2	1.5	c		
27th August							
iP	Z	22 08 44.1	0.3	3.5	c		Regional
i	Z	47.1					
i	Z	58.7					
i	Z	09 02.4					
28th August							
eip	Z	22 42 43.	0.5	2.0	d		Local
i	Z	49.4					
29th August							
ip	Z	10 51 1.6	2.0	0.6	d		Regional
i	Z	17.1					
30th August							
eP	Z	04 29 42			c		Teleseism
iP	Z	14 10 01.2	0.5	2.5	d		Regional
31st August			NIL RECORDED				
1st September							
iP	Z	03 31 57.7			c		Regional
2nd September							
eP	Z	00 22 20			d		Local
i	Z	35.1					
iP	Z	07 37 50.5	0.2	1.5	d		Local
i	Z	38 05.0					
3rd September							
ip	Z	01 24 25.7	0.3	2.5	d		Regional
i	Z	27.7					
4th September							
iP	Z	18 43 09.0	0.2	4.0	c		Local
i	Z	27.0					
5th September							
iP	Z	03 56 03.3					Regional
iP	Z	04 29 32.2			d		Local
iP	Z	05 15 47.4	0.3	2.5	d		Local

CENTRAL OBSERVATORY RABAUL.........(R.F. HEMING; A/Vulc.-in-Charge)

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System			To Sec.	Tg Sec.
S.P.	Maximum magnification 12,500 at	0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at	0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification 750 at	25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification 4,000 at	1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations

Instrumentation: Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484) at the Central Observatory. Drum speen 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw Magnification 24,000 at 4Hz T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs Magnifieation 6,000 at 4Hz T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr Magnification 24,000 at 4Hz To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt Magnification 24,000 at 4Hz To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz To=1.0

STATION INSTRUMENTATION (continued) (2)

	To sec	Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min. 1.0 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min.

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min.
S.P.Z. Magnification 3,000 0.6 0.25

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg
1 Geotech 1051 Vertical

Helicorder System (Geotech Mod 248-1 Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

Photographic Recorder System (Geotech Mod 1560-D), drum speed 30mm/min 1.0 60.0

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA,TBL,KBT,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and seeond marks from radio signal VNG (Australia) are recorded on one component accouding with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings;

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near eathquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of opicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epocentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the small degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	= Peak-to-Trough trace amplitude in millimetres.
A	= Amplitude from W.W.S.S.
A*	= Amplitude from seismographs with different response to the W.W.S.S.
T	= Period in seconds
C.B.M.	= Confused by microseisms.
Dist.	= Distance in central angle degrees.
H	= Original time
h	= Focal depth in Km

Remarks:

Local	= Typical signature of an earthquake with epicentre within 0.9°
Near	= Typical signature of an earthquake with epicentre between 0.9° & 9°
Distant	= Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	= Typical signature of an earthquake with epicentre more than 45°
Traces	= Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

(R.F. HEMING)
A/Vulcanologist-in-Charge

28 SEP 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 12th September, 1967 To: 19th Septeber, 1967
KERAVAT	(KRT)	From: 10th September, 1967 To: 17th September, 1967
ESA'ALA	(ESA)	From: 4th September, 1967 To: 11th September, 1967
TABELE	(TBL)	Records not received.
AGENAHAMBO	(AGE)	Records not received.

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System		To Sec.	Tg Sec.
S.P.	Maximum magnification 12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification 750 at 25.0 sec	15.0	100.00

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Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

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WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw Magnification 24,000 at 4Hz T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs Magnifiaation 6,000 at 4Hz T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr Magnification 24,000 at 4Hz To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt Magnification 24,000 at 4Hz To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz To=1.0

STATION INSTRUMENTATION (continued)

To sec   Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

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Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A
drum speed 15mm/min. 1.0 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D)
Drum speed 30mm/min.

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

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Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

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Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

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All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

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When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

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Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

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Where no source is cited, the determination of opicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

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PRESENTATION OF DATA (Continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Original time
h	=	Focal depth in Km

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°
Near	=	Typical signature of an earthquake with epicentre between 0.9° & 9°
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

(R.F. HEMING)
A/Vulcanologist-in-Charge

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

			T sec	A mm	GM	Dist	Remarks
13th September, 1967.			Strong microseismic activity from 12 2333 to 13 0700 hours.				
e	Z/	00 40 08			+		Traces.
eP	Z	01 04 05	0.3	1.5	c		Regional C.B.M.
iP	Z	02 31 00.1	0.5	39.0	d	$4\frac{1}{4}^{\circ}$	H=02 29 55
eS	N/	50					
iP	Z	04 09 29.0	0.5	10.0	c	$4\frac{1}{4}^{\circ}$	H=04 08 25
iS	E/	10 18.0					
iP	Z	05 14 31.9	0.3	22.0	d	$1\frac{1}{4}^{\circ}$	H=05 14 11
iS	N/	48.0					
iP	Z	09 24 38.2	0.4	25.0	d	$1\frac{1}{2}^{\circ}$	H=09 24 14
iS	N/	56.0					
iP	Z	10 03 39.0	0.3	5.0	d	$\frac{1}{2}^{\circ}$	H=10 03 28
iS	N	47.0					
iP	Z	11 16 30.2	0.5	16.0	d	$1\frac{1}{2}^{\circ}$	H=11 16 05
iS	E	49.0					
eP	Z	17 12 48	1.0	2.0	d	21°	
eS	N/	16 36					
eP	Z	18 51 14	1.0	1.0	c	60°	
eS	E/	59 30					
eP	Z	20 16 21	0.5	1.0	c		Regional
eP	Z	21 53 16	0.5	1.0	d	$11\frac{1}{4}^{\circ}$	
eS	E/	55 22					
iP	Z	23 48 07.0	0.5	3.0	c	$1\frac{1}{2}^{\circ}$	H=23 47 41
iS	E	27.0					
14th September							
eP	Z	00 13 47	0.3	1.0	d	$1\frac{1}{4}^{\circ}$	H=00 13 24
iS	N	14 04					
eP	Z	00 31 02	0.6	1.0	c	$\frac{1}{4}^{\circ}$	H=00 30 54
iS	E/	$07\frac{1}{2}$					
iP	Z	01 14 55.0	0.5	49.0	cNW	$\frac{1}{2}^{\circ}$	H=01 14 41
eS	E	15 05					
i	Z	07 04 58.0	0.5	2.0	Ship moving in harbour		
F	Z	11 57					
iP	Z	08 09 46.3	0.4	3.0	c	$1\frac{1}{2}^{\circ}$	H=08 09 20
iS	N	10 06					
iP	Z	12 35 33.0	0.5	1.0	c	$1\frac{1}{2}^{\circ}$	H=12 35 07
iS	N	53.0					
e	Z/	15 07 04			–		(Teleseism)
eP	Z	15 39 $30\frac{1}{2}$	0.4	1.0	d	(19°)	
e(S)	N/	42 58					
iP	Z	15 59 41.0	0.5	1.7	c	$\frac{1}{4}^{\circ}$	H=15 59 35
iS	N	46.0					
iP	Z	16 07 55.5	0.4	1.0	d		Local
iS	N	08 00.2					

RABAUL

			T sec	A mm	GM	Dist	Remarks
14th September contd.							
eP	Z	19 20 08½	0.5	1.0	c	(15°)	
e(S)	E/	22 56					
iP	Z	20 15 25.5	0.5	2.0	d	1½°	H=17 07 27
iS	N	46.0					
15th September							
eP	Z	00 36 18	0.5	1.0	d		Teleseism
eiP	Z	01 17 58	0.3	1.5	d	2½°	H=01 17 19
i	Z	59.0					
iS	N	18 28.5					
iP	Z	08 26 14.2	0.3	14.0	d	1½°	H=08 25 48
iS	N/	34.0					
eiP	Z	10 06 26½	0.4	1.0	d	1½°	H=10 05 58
i	Z	27.1					
eS	E	47½					
e	Z/	10 57 18			–		Traces
iP	Z	10 43 35.5	1.0	4.0	c		(Regional)
iP	Z	12 10 57.0	0.4	3.0	c	¼°	H=12 10 50
iS	N	11 02.0					
iP	Z	12 56 29.5	0.5	1.0	d	1½°	H=12 56 03
iS	N	49.5					
eP	Z	16 17 53	0.5	1.0	d		Regional
iP	Z	20 15 09.5	0.4	2.5	c	¼°	H=20 15 03
iS	N	14.0					
iP	Z	21 03 27.3	0.5	6.0	d	1½°	H=21 03 02
i	Z	31.0					
iS	E	46.0					
16th September							
iP	Z	01 54 26.0	0.5	2.0	c	2°	H=01 53 53
i	Z	27.0					
iS	N	51.0					
e	Z/	08 42 04			+		Traces
iP	Z	10 07 11.5	0.4	1.0	d	1°	H=10 06 54
i	Z	14.5					
iS	N	24.0					
iP	Z	11 11 20.5	0.3	11.0	d	1½°	H=11 10 55
iS	N	39.0					
iP	Z	12 06 24.5	0.5	2.0	c	¼°	H=12 06 16
i	Z	27.0					
iS	E	30.0					
iP	Z	12 32 48.6	0.4	1.0	d	1½°	H=12 32 23
iS	N	33 07.5					
iP	Z	13 14 39.3	0.4	7.0	d	1½°	H=13 14 14
iS	N	58.0					
e	Z/	22 12 04					
17th September							
eP	Z	00 05 15	0.5	1.8	d		Regional
iP!	Z	02 25 07.0	0.4	29.0	d	1¾°	H=02 25 38
iS	E	29.5					

RABAUL

			T sec	A mm	GM	Dist	Remarks
17th September contd.							
eP	Z	03 46 01½	0.6	3.0	d	24°	
i	Z	02.5					
iS	N/	50 16.0					
iP	Z	07 38 13.0	0.3	3.5	d	¼°	H=07 38 07
iS	E	18.0					
eP	Z	15 15 36	0.8	1.0	d		Teleseism
iP	Z	17 32 21.0	0.5	1.0	c	¼°	H=17 32 13
iS	E	27.0					
iP	Z	18 07 36.5	0.3	1.8	c	2½°	H=18 06 55
iS	N	08 07.5					
iP	Z	18 15 38.0	0.4	13.0	c		Local
iS	N	42.5					
iP	Z	18 35 43.8	0.3	1.0	c	2½°	H=18 35 05
iS	N	36 14.5					
iP	Z	18 39 25.0	0.5	1.0	c	1½°	H=18 38 46
iS	N	55.3					
eP	Z	19 14 54½	0.8	1.0	d	11½°	
i	Z	57.3					
i	Z	15 05.2					
eS	E	17 02					
iP	Z	19 35 36.0	0.3	1.0	d	1½°	H=19 35 14
i	Z	36.6					
iS	N	56.5					
eP	Z	21 08 30	0.5	1.0	c		Regional
iP!	Z	21 32 44.5	0.4	29.0	d	½°	H=21 32 32
iS	N	53.0					
18th September							
iP	Z	01 25 46.0	0.5	7.0	d		Regional
iP	Z	02 03 26.2	0.4	3,0	d	1¼°	H=02 03 05
i	Z	28.0					
iS	N	42.0					
iP	Z	04 50 29.0	0.5	5.0	d	1°	H=04 50 12
iS	N	42.0					
iP	Z	12 01 29.2	0.4	1.0	d	1½°	H=12 01 04
i	Z	32.3					
iS	N	48.0					
eP	Z	15 18 29	0.5	1.0	c		Regional
i	Z	32,0					
eiP	Z	15 34 30½	0.4	1.0	d	6°	H=15 33 02
i	Z	31.5				Felt:	Lae Int. IV
eS	N/	35 38					Bundi Int IV
iP	Z	20 12 40.0	0.5	2.0	c	1¼°	H=20 12 17
iS	N	57.5					
iP	Z	23 58 35.2	0.5	33.0	cNW	(1¼°)	H=23 58(13)
i(S)	Z	52.3					
19th September							
iP	Z	07 44 05.0	0.4	1.5	d		Regional C.B.M.
iP	Z	10 47 40.0	0.5	1.0	d	2°	H=10 47 07
i	Z	42.0					
iS	N	48 05.0					

RABAUL

19th Septembrer contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	10 51 29.0	0.5	1.0	d	2°	H=10 50 59
i	Z	30.9					
iS	N	54.					
iP	Z	11 04 37.0	0.5	31.0	d	48°	
iS	N/	11 26.0					
iP	Z	12 28 00.5	0.5	2.0	d	2°	H=12 27 30
iS	N	23.5					
eP	Z	16 41 34	0.5	1.0	c	2½°	H=16 40 53
eS	N	42 05½					
iP	Z	19 06 14.2	0.5	2.0	c	3°	H=19 05 28
eS	I	49½					
e	Z/	19 22 04			+		Traces
e	Z/	20 14 36			+		Traces
iP	Z	20 55 49.3	0.5	13.0	c	2°	H=20 55 19
iS	N/	56 12.0					

			T sec	A* mm	GM	Dist	Remarks
KEREVAT							
11th September							
e	E	01 28 26					Traces
e	E	04 42 33½					Traces
e	E	06 57 49					Traces
eP	E	10 20 17½	0.7	0.4	c		Teleseism
iP iS	E E	10 29 47.0 52.2			d		Local
eP eS	E N	17 08 54½ 09 54½	0.7	0.3	c	5¼°	H=19 07 34
iP iS	E E	19 11 04.6 12 13.5	0.2	1.0	c	6 °	H=10 09 35
12th September							
iP	Z	01 57 27.3			c		Local
iP	Z	02 05 56.5	0.2	1.2	c		Local
iP iS	Z N	11 26 19.4 45.2	0.2	1.0	c	2 °	H=11 25 45
e	E	12 42 05					Traces
iP	Z	21 25 21.3			d		Regional
iP	Z	21 27 40.9			c		Regional
iP	Z	21 28 44.8			c		Regional
iP	Z	21 51 08.5			d		Regional
iP	Z	22 09 34.2			c		Regional
IP	Z	22 11 07.9			d		Regional
iP iS	Z N	22 21 46.6 22 02.3			c	1¼°	H=22 21 25
iP iS	Z E	22 32 59.1 33 03.0	0.3	3.0	c		Local
iP iS	Z E	22 38 02.7 19.8	0.3	3.0	d	1¼°	H=22 37 40
iP i(S)	Z E	22 39 17.4 35.8	0.2	2.4	c	(1½°)	H=22 38 (53)
iP	Z	22 43 20.3	0.3	2.0	d		Regional
iP iS	Z E	22 47 19.8 35.8			d		H=22 47 01
iP9 iS	Z E	22 54 45.9 55 02.2			c	1¼	H-22 54 25
13th September							
iP iS	E E	01 04 03.3 18.8	0.2	2.0	d	1¼°	H=01 03 43
iP	E	02 30 58	0.3	2.0	d		Regional
iP iS	Z E	04 09 27.7 42.8	0.3	3.4	d	1¼	H=04 09 08
iP iS	E N	05 14 34.0 50.5			c	1¼	H=05 14 12
iP iS	Z E	09 24 37.3 50.9	0.3	7.0	d	1°	H=09 24 21
eP iS	E E	10 03 42½ 46.8	0.5	0.4	d		Local

KEREVAT (cont)

13th September (cont)

			T sec	A* mm	GM	Dist	Remarks
iP	Z	11 16 28.2	0.2	4.7	c	1 °	
iS	E	40.5					H=11 16 12
eP	E	17 12 45	0.9	0.2	c		Teleseism
eP	E	21 53 21½	0.6	0.6	d	9½°	H=21 51 03
eS	E	55 10					
eiP	Z	23 48 08½			d	1½°	H=23 47 46
i	E	09.4					
iS	E	24.7					

14th September

			T sec	A* mm	GM	Dist	Remarks
iP	Z	00 13 46.5			c	1 °	H=00 13 28
iS	N	14 00.8					
iP	N	00 31 56.7	0.3	1.4	c		(Bismark Sea)
iP	Z	01 14 57.4			d		Regional
iP	E	08 09 47.0	0.4	0.7	d	1 °	H=08m09 29
iS	E	10 01.0					
eP	Z	15 39 29	1.0	0.3	d		Teleseism
iP	E	15 59 43.1			c	¼°	H=15 59 35
iS	E	48.8					
iP	Z	17 07 57.0			c	¼°	H=17 07 49
iS	N	08 02.7					
eP	E	20 15 07½	0.8	0.3	c		Regional
e	E	15					
i	E	20.5					

15th September

			T sec	A* mm	GM	Dist	Remarks
eP	E	00 36 18	1.0	0.3	c		Teleseism
iP	N	01 17 56.0			c	2°	H=01 17 23
iS	N	18 21.5					
eiP	N	06 26 12			d		Regional
i	N	12.6					
iP	N	10 06 25½	0.4	0.8	c		Regional
iP	N	12 11 11.7			c	¼°	H=12 11 04
iS	N	17.0					
iP	N	12 56 27.8			d	1½°	H=12 56 05
iS	N	44.2					
eP	N	21 03 29	0.6	0.3		2°	
i	N	31.8					
iS	N	52.2					H=21 02 59

16th September

			T sec	A* mm	GM	Dist	Remarks
iP	E	01 54 25.0	0.4	1.5	c	1½°	H=01 53 57
iS	E	46.5					
iP	Z	10 07 08.4			d	1°	
iS	E	20.2					H=10,06 52
iP	Z	11 11 18.1			d	1¼	H=11 10 56
iS	E	34.5					
iP	Z	12 06 24			d	¼°	H=12 06 16
iS	E	30.4					
iP	Z	12 32 46.4	0.2	3.0	d	1¼°	H=12 32 25
iS	E	33 02.4					
iP	Z	13 14 37.5			c	1¼°	H=13 14 17
iS	E	53.0					

KERVAT (cont)

17th September

			T sec	A* mm	GM	Dist	Remarks
eP	N	02 25 06	0.5	0.7	d	$1\frac{1}{2}^{0}$	H=02 25 40
iS	N	26.0					
e P	N	03 46 02	1.0	0.5	c	$13\frac{1}{4}^{0}$	
i	N	48 29.5					
iP	Z	07 38 13.6	0.2	3.0	d		Local
iS	N	18.7					
e	N	15 15 43					Traces
iP	E	17 32 22.5			d	$\frac{1}{4}^{0}$	H=17 32 16
iS	N	27.2					
eP	E	18 07 34			d	$2\frac{1}{2}^{0}$	H-18.06.53
iS	N	08 05.0					
iP	Z	18 15 39.4			d	$\frac{1}{4}^{0}$	H=18 15 32
iS	N	44.8					
iP	Z	18 35 45	0.38	0.4	d	2^{0}	H=18 35 15
iS	N	36 07.6					
iP	E	18 39 22.2			c		Regional
e(P)	Z	19 14 57	0.3	0.3	c		Teleseism
iP	Z	19 35 34.5			c	$1\frac{1}{4}^{0}$	H=19 35 13
iS	N	51.0					
iP	Z	21 32 46.7			c	$\frac{3}{4}^{0}$	H=21 32 33
iS	N	57.0					

			T sec	A* mm	GM	Dist	Remarks
ESA'ALA-TIME UNCERTAIN							
5th September - Z SP record stopped at 1439 hours							
EP	Z	03 41 53	0.4	0.4	d	$7\frac{3}{4}$	H=03 39 48
i	Z	55					
iS	E	43 22.4					
e	Z	05 10 45					Traces
IP	Z	06 13 28	0.2	0.7	c	$4\frac{1}{2}$	H-06 12 22
e	Z	10 33 51			t		Traces
eP	E	16 26 17	0.4	0.2	d	4	H=16 25 16
eS	E	27 04					
eP	E	16 31 51	0.5	0.5	c	5	H=16 38 34
iS	E	32 50.1					
iP	Z	23 02 22.2	0.3	2.4	d	$5\frac{1}{4}$	H=23 01 02
eS	E	03 $24\frac{1}{2}$					
6th September							
eP	Z	04 49 $33\frac{1}{2}$	0.6	1.2	c	$25\frac{1}{4}^{\circ}$	
eS	N/	53 20					
iP	Z	07 40 29	0.7	2.8	c		(Teleseism)
eP	Z	19 45 13	0.5	1.2	d	$4\frac{1}{2}^{\circ}$	H=19 42 05
iS	E/	46 $05\frac{1}{2}$					
7th September							
iP	Z	07 18 16			d	$32\frac{3}{4}^{\circ}$	
iPP	Z/	19 $20\frac{1}{2}$					
i(sPP)	N/	$23\frac{1}{2}$					
iS	N/	22 46					
iSS	N/	24 37					
i(ScS)	N/	27 18					
i(Lq)	N/	30 58					
eP	Z	11 14 24	0.8	0.7	c		Tekeseism
e(S)	E/	19 23					
eP	Z	23 22 $10\frac{1}{2}$	0.5	0.5	d	$3\frac{3}{4}^{\circ}$	H=23 21 13
iS	E	$54\frac{1}{2}$					
8th September							
iP	Z	03 40 59	0.6	5.0	c		Teleseism
eP	Z	11 46 53	0.5	0.6	d	4°	H=11 45 51
i	E	47 35					
iS	E	41					
iP	Z	22 42 55	0.8	2.8	c	$30\frac{1}{2}^{\circ}$	
iS	E/	47 12					
9th September							
iP	Z	02 49 $33\frac{1}{2}$	0.4	0.8	d		Regional
iP	Z	08 43 $21\frac{1}{2}$	0.7	1.4	d		(Regional)
iP	Z	09 51 22			c		Local
eP	Z	10 24 $52\frac{1}{2}$	0.5	0.4	c	15°	
iS	N/	27 23					
eP	Z	14 49 12	0.8	0.4	c	$31\frac{3}{4}^{\circ}$	
iS	E/	53 39					
eP	Z	19 09 $40\frac{1}{2}$	1.0	1.0	c		(Teleseism)
eP	Z	23 13 13	0.6	0.3	d	$5\frac{1}{2}^{\circ}$	H=23 11 51
iS	E	14 16					

ESA'ALA

10th September NIL RECORDED.

			T sec	A* mm	GM	Dist	Remarks
11th September							
eP	Z	04 42 14½	1.5	0.5	c		Teleseism
e(P)	Z	06 57 37½	0.8	0.5	d		Teleseism
12th September							
eP	Z	01 58 26	0.4	0.2	d	6½°	H=01 56 52
iS	E	59 39					
eiP	Z	07 32 42	0.4	0.4	d	4¼°	H¼07 31 37
i	Z	42½					
iS	N	33 32					
eiP	Z	21 48 55	0.4	0.4	d	4¼°	H=21 47 48
i	Z	55½					
iS	E/	49 45					

CENTRAL OBSERVATORY RABAUL

R.F.Heming
A/Vulcanologist-in-charge.

15 SEP 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 30th August, 1967 To : 5th September, 1967
SULPHUR CREEK	(SUL)	Notoperational
KERAVAT	(KRT)	From: 23rd August, 1967 To : 3rd Septneber, 1967
ESA'ALA	(ESA)	No records received
TABELE	(TAB)	No records received
AGENAIAMBO	(AGE)	No records received

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System		To Sec.	Tg Sec.
S.P.	Maximum magnification 12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification 750 at 25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification 4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations

Instrumentation: Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484) at the Central Observatory. Drum speen 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw Magnification 24,000 at 4Hz T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs Magnifieation 6,000 at 4Hz T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr Magnification 24,000 at 4Hz To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt Magnification 24,000 at 4Hz To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz To=1.0

STATION INSTRUMENTATION (continued)

	To sec	Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min. 1.0 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min.

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg
1 Geotech 1051 Vertical

Helicorder System (Geotech Mod 248-1 Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

Photographic Recorder System (Geotech Mod 1560-D), drum speed 30mm/min 1.0 60.0

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA, TBL, KRT, AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component accouding with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings;

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of opicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epocentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A* = Peak-to-Trough trace amplitude in millimetres.
A = Amplitude from W.W.S.S.
A* = Amplitude from seismographs with different response to the W.W.S.S.
T = Period in seconds
C.B.M. = Confused by microseisms.
Dist. = Distance in central angle degrees.
H = Original time
h = Focal depth in Km

Remarks:

Local = Typical signature of an earthquake with epicentre within 0.9°

Near = Typical signature of an earthquake with epicentre between 0.9° & 9°

Distant = Typical signature of an earthquake with epicentre between 9° and 45°

Teleseism = Typical signature of an earthquake with epicentre more than 45°

Traces = Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

(R.F. HEMING)
A/Vulcanologist-in-Charge

TERRITORY OF PAPUA AND NEW GUINEA
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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
30th August,1967.							
eiP	Z	04 32 18	0.5	1.0	d	63°	
i	Z	19.2					
iS	E$\frac{7}{8}$	40 41.0					
iP	Z	05 20 01.3	0.3	5.0	c	$\frac{1}{2}$°	H=09 19 47
iS	N	11.3					
eiP	Z	08 44 05	0.6	1.0	c	6°	H=08 42 34
i	Z	06/6					
eS	N	45 15.3					
eP	Z	11 19 01	0.5	1.0	c	62°	
eS	N/	27 28					
iP	Z	13 07 50.0	0.3	23.0	d	2$\frac{1}{4}$°	H=13 07 16
iS	E/	08 16.0					
eP	Z/	13 42 28	0.5	1.0	c	48°	H
eS	N/	49 24					
iP	Z	14 09 37.5	0.5	44.0	d	3$\frac{1}{2}$°	H=14 08 42
eS	N/	10 19					
iP	Z	14 44 03.6	0.6	2.0	c	2$\frac{1}{4}$°	H=14 43 28
iS	N	40.0					
eiP	Z	16 45 20	0.5	2.0	d	1$\frac{1}{2}$°	H=16 44 56
i	Z	21.3					
iS	N	38.6					
iP	Z	18 55 58.5	0.3	3.0	c	2°	H=18 55 27
iS	N	56 22.0					
iP	Z	19 09 11.0	0.4	4.8	d		Local
iS	N	15.0					
31st August		Strong microseismic activity till 5th September.					
eP	Z	04 28 10	0.4	4.0	c		Regional C.B.M.
e(P)	Z/3	11 09 28			(c)	9°	H=11 07 17 C.B.M.
eS	N/	11 10					
iP	Z	17 18 08.0	0.5	7.0	d		Regional C.B.M.
eP	Z	15 59 49	0.5	4.0	c		Distant shock
1st September							
iP	Z	03 32 27.0			c	5$\frac{1}{4}$°	H=03 31 08 C.B.M.
iS	N/	33 28.0				Felt:	Wantoat Int.
							Aseki Int.III
							Finschhafen Int.II
iP	Z	04 10 52.0			d	2$\frac{1}{4}$°	H=04 10 18 C.B.M.
eS	E/	11 18					
eP	Z	10 27 56	0.3	2.0	c		Regiomal
e	Z/	23 00 52			+		Traces.

RABAUL

			T sec	A mm	GM	Dist	Remarks
2nd September							
iP eS	Z N/	01 35 07.6 20	0.4	21.0	c	1°	H=01 34 51
e	Z/	01 40 44			–		Traces
e	Z/	07 21 28			+		Traces
iP iS	Z N/	14 20 32.8 42.0	0.3	9.0	c	1½°	H=14 19 57
3rd September							
iP eS	Z E/	01 17 26.0 48	0.3	6.0	d	1¾°	H=01 16 57 C.B.M.
iP iS	Z N/	01 24 48.0 25 56.0	0.5	6.0	d	6°	H=01 23 20 Felt Aseki Int. II Finsch hafen Int. II
e	Z/	04 10 30			–		Traces
eP	Z/	21 23 13			c		(Foreshock)
eP ePcP i(SKS) i(SKKS) i(ScS)	Z Z/ N/ N/ E/	21 26 34 38 36 58.0 37 04.0 38 12.0	0.6	3.0	c	87°	
iP	Z	22 06 14.0	0.4	7.0	d		Regional
4th September							
eP eS	Z E/	03 58 57 04 04 28	0.7	3.0	c	36°	
	Z/	05 54 54			+		Traces
iP iS	Z E/	13 00 32.0 48	0.2	27.0	d	1¼°	H=13 00 11 Felt: Rabaul Int. I-II
e	Z/	16 49 40			–		Traces
eP eS	Z N/	18 03 26 04 56	0.6	2.8	c	8°	H=18 01 30
eP eS	Z E/	18 50 20 51 41	0.6	2.8	c	7°	H=18 48 35
5th September							
iP i eS	Z Z/ E/	03 41 50.5 59.0 43 20	0.5	15.0	d	8°	H=03 39 54
eiP i eS	Z Z N/	16 31 44½ 45.0 32 40	0.4	2.0	d	4¾°	H=16 30 31
iP iS	Z N/	17 56 13.8 28.0	0.3	57.0	d	1°	H=17 55 55
iP i(S)	Z N/	18 02 17.0 32.0	0.3	21.0	d	(1°)	H=18 01(57)
iP iS	Z E/	20 13 12.5 34.0	0.5	7.0	c	1¾°	H=20 12 43

KERAVAT

S.P.Z. often confused by microseisms. Shocks then read from horizontal components.

23rd August, 1967. S.P.Z. records exposed to light.

Phase	Comp	Time	T sec	A mm	GM	Dist	Remarks
iP	E	01 39 24.4	0.4	1.8	d		Local
iS	N	27.6					
iP	E	06 33 19.8	0.3	3.6	c		Local
iS	N	24.8					
eP	Z	10 49 15	0.8	1.2	c	4½°	H=16 48 09
iS	N	50 06.4					
i(P)	E	16 57 35.0	0.3		d		Local
iS	N	40.0					

24th August

Phase	Comp	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	05 40 35.4	0.2	4.0	d	½°	H=05 40 23
iS	E	44.1					
iP	E	07 50 51.4	0.4	1.8	d	1°	H=07 50 33
iS	N	51 05.8					
iP	Z	09 08 46.5	0.3	2.0	c	1½°	H=09 08 24
iS	E	09 02.9					
iP	Z	09 52 33.5	0.4	1.1	c		Local
iS	N	38.7					
eP	E	10 37 07	0.8	0.6	c		Teleseism
iP	E	11 42 49.5	0.3	1.0	d	1½°	H=11 42 22
iS	E	43 10.5					
i(P)	Z	11 45 47.4	0.5	1.0	c		Regional
eP	E	17 18 56½	0.5	0.3	d		Regional
iP	Z	18 14 45½				2°	H=18 14 15
iS	N	15 09.0					
iP	Z	22 28 31.7	0.3	1.9	d	2¾°	H=22 27 50
iS!	N	58.1					

25th August

Phase	Comp	Time	T sec	A mm	GM	Dist	Remarks
i(P)	Z	04 11 27					Local
iS	E	32.6					
iP	Z	16 00 20.3	0.3	3.0	d	1½°	H=15 59 59
iS	E	33.7					
eP	Z	16 22 02.7	0.3	0.4	d	2¾°	H=16 21 21
iS	E	35.0					
iP	Z	16 54 07.7			c	1°	H=16 53 51
iS!	E	20.2					

26th August

Phase	Comp	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	00 41 17	1.0	0.7	d		Teleseism
eP	E	02 11 43½	0.8	1.7	c		Aftershock
e	E	03 34 15			–		Traces
eP	Z	05 29 51	0.9	0.9	c		Aftershock
eP	E	10 27 46½	1.0	1.0	c		Aftershock
iP	Z	11 04 52.7	0.3	1.2	d		Local
iS	E	58.7					
e	N	11 14 19½			+		Traces
iP	Z	14 03 20.5	0.2	2.0	d	1½°	H=14 02 58
iS	E	37.3					

KERAVAT

26th August contd.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	17 58 41.0			d		Local
iS	E	43.8					
iP	Z	20 00 55.9	0.3	2.0	c		Local
iS	E	59.5					
iP	Z	22 11 14.6				L	Local
iS	E	18.7					
iP	Z	22 36 15.8	0.2	2.0	d		Local
iS	E	21.6					

27th August

			T sec	A* mm	GM	Dist	Remarks
iP	Z	01 31 11.0			c		Regional
iP	Z	01 50 31.2			c		Local
iP	Z	02 04 50.6			c		Local
iP	Z	06 20 27.8	0.2	3.0	c	1½°	H=06 20 01
iS	N	48.2					
iP	Z	11 23 22.0	0.2	0.5	d	¼°	H=11 23 14
iS	N	27.9					
eP	Z	13 30 07			c	2½°	H=13 29 27
iS	N	38.3					
eP	Z	14 22 28½	0.8	0.4	c		Teleseism
i	Z	29.6					
iP	Z	15 01 32.5	0.2	7.5	d	¼°	H=15 01 25
iS	N	38.6					
iP!	Z	21 39 18.5			d		Regional

28th August

			T sec	A* mm	GM	Dist	Remarks
eP	E	01 49 43	0.5	0.3			Local
iS	E	48.0					
iP	Z	02 09 01.3			c	1°	H=02 08 44
iS	E	13.9					
iP	Z	22 51 24.0			c	1°	H=22 51 07
iS	E	36.5					

29th August

			T sec	A* mm	GM	Dist	Remarks
iP	Z	01 44 00.3	0.4	1.0	d	1¼°	H=01 43 39
iS	N	16.4					
iP	Z	04 02 14.0			c	1¾°	H=04 01 46
iS	N	34.9					
eP	N	07 33 36½	1.0	0.4	c		Teleseism
iP	Z	09 26 12.1	0.4	4.0	c		Regional
iP	Z	09 49 34.8	0.5	2.2	d	2°	H=09 49 04
iS	N	57.6					
eP	Z	10 52 42½	1.2	0.5	c		Teleseism
eP	Z	16 58 21½	0.5	0.3	d	1¾°	H=16 57 54
i	Z	38.0					
iS	E	42.3					
eP	Z	20 02 24	0.6	0.6	c	1½°	H=20 02 01
i	Z	25.0					
iS	E	41.9					
iP	Z	21 50 50.1			d		Local
iP!	Z	22 11 38.2			d		Local

KERAVAT

			T sec	A* mm	GM	Dist	Remarks
30th August							
eP	Z	04 32 19	1.0	1.6	c	(63°)	
e(S)	N	40 40					
eP	E	05 20 03½			c	1°	H=05 19 47
iS	E	15.4					
eP	Z	08 44 03½	0.6	0.3	d		Regional
eP	E	11 19 09	1.8	0.3	d		Teleseism
iP	Z	13 07 48.2			d		Regional
eiP	Z	14 09 35			d		Regional
i	Z	35.7					
eP	Z	14 44 03			d	2°	H=14 43 33
iS	N	25.9					
iP	Z	16 45 18.1	0.3	2.0	d	1½°	H=16 44 56
iS	E	35.3					
eiP	Z	18 55 57	0.3	2.2	d	1½°	H=18 55 30
i	Z	57.7					
iS	E	56 17.8					
iP	Z	19 09 12.3	0.2	4.0	d	¼°	H=19 09 03
iS	E	18.4					
iP	Z	23 07 13.9			d		Regional
31st August							
iP	Z	04 28 08.2			c	¼°	H=04 27 59
iS	E	16.5					
e(P)	Z	11 09 31			c		Regional
iP	Z	17 18 08.9	0.4	0.8	d	¼°	H=17 18 00
iS	N	14.9					
iP	Z	18 59 49	1.0	0.7	d		Regional
1st September							
eP	Z	03 32 25	0.6	0.6	c		Regional
iP	Z	04 10 58.7			d	¼°	H=04 10 49
iS	E	11 10.9					
2nd September							
iP	Z	00 56 40.1			c		Local
iS	E	44.7					
iP	Z	01 35 10.0			d	1°	H=01 34 54
iS	E	23.0					
iP	Z	02 50 12.7			d		Local
iS	E	17.7					
eP	Z	10 06 55½			c		Local
iS	E	07 00.3					
eP	Z	14 20 22½			c		Regional
i	Z	23.3					
3rd September							
eiP	E	01 17 23	0.6	0.7	c	1½°	H=01 16 56
i	E	24.4					
iS	E	43.6					
iP	E	01 24 47.0	0.7	7.0	d		(Regional)
iP	E	05 26 43.3	0.4	1.5	c	1¼°	H=05 26 21
iS	E	59.8					

KERAVAT

3rd September

			T sec	A* mm	GM	Dist.	Remarks
iP	Z	07 57 04.0	0.3	2.0	d	$\frac{1}{2}^{\circ}$	H=07 56 52
iS	E	13.4					
iP	E	09 26 33.0	0.3	1.2	d	$3\frac{1}{2}^{\circ}$	H=09 25 39
iS	E	27 14.6					
iP	E	12 27 53.0			c	$\frac{3}{4}^{\circ}$	H=12 27 38
iS	E	28 04.1					
eP	E	22 26 35			d		Regional

CENTRAL OBSERVATORY
RABAUL

R. F. Heming
A/Vulcanologist-in-charge

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL (RAB)	From: 19th September, 1967 To : 26th September, 1967
KEREVAT (KRT)	From: 17th September, 1967 To : 24th September, 1967
ESA'ALA (ESA)	From: 11th September, 1967 To : 16th September, 1967
TABELE (TBL)	From: 5th September, 1967 To : 12th September, 1967
AGENHAMBO (AGE)	From: 26th August, 1967 To : 9th September, 1967

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	To :	12th September, 1967
AGENHAMBO (AGE)	From:	26th August, 1967
	To :	9th September, 1967

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System

		To Sec.	Tg Sec.
S.P.	Maximum magnification 12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification 750 at 25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification 4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations

Instrumentation: Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484) at the Central Observatory. Drum speen 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw Magnification 24,000 at 4Hz T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs Magnifiaation 6,000 at 4Hz T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr Magnification 24,000 at 4Hz To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt Magnification 24,000 at 4Hz To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz To=1.0

STATION INSTRUMENTATION (continued)

		To sec	Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min. 1.0 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min.

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg
1 Geotech 1051 Vertical

Helicorder System (Geotech Mod 248-1 Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

Photographic Recorder System (Geotech Mod 1560-D), drum speed 30mm/min 1.0 60.0

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA,TBL,KRT,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and seeond marks from radio signal VNG (Australia) are recorded on one component accouding with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings;

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near eatthquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of opicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epocentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the Full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Original time
h	=	Focal depth in Km

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°
Near	=	Typical signature of an earthquake with epicentre between 0.9° & 9°
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

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A/Vulcanologist-in-Charge

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PRELIMINARY EARTHQUAKE ANALYSIS
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RABAUL

20th September, 1967.

			T sec	A mm	GM	Dist	Remarks
eiP	Z	09 47 41	0.5	1.8	c	50°	
i	Z	43.1					
iS	E/	54 22.0					
iP	Z	09 56 40.5	0.4	4.0	c	¾°	H=09 56 25
iS	N	52.0					
iP	Z	10 39 20.6	0.5	3.5	c	(16½°)	
i(S)	N	42 24.3					
eP	Z	10 49 29½	0.8	2.0	c		(Teleseism)
iP	Z	11 49 14.2	0.4	3.0	c	1°	H=11 48 56
iS!	N	27.0					
iP	Z	12 15 19.2	0.8	1.0	d	(23°)	
e(S)	E/	19 26					
i	Z	14 21 36.5	0.5	3.2	Ship moving in harbour		
F	Z	25 17					
iP	Z	15 06 41.3	0.6	1.5	c		Regional
i	Z	47.2					
iP	Z	18 49 28.0	0.3	2.0	d	1¼°	H=18 49 06
iS	N	44.5					
eP	Z	20 25 24	0.9	2.0	d		Teleseism
iP	Z	20 51 10.3	0.3	1.5	c	(2¼°)	H=20 50(33)
i(S)	E	38.5					

21st September

			T sec	A mm	GM	Dist	Remarks
e	Z/	00 04 04			+		Traces
eiP	Z	03 32 56½	0.4	1.8	c	8½°	H=03 30 52
i	Z	33 01.0					
eS	E/	34 32					
iP	Z	03 43 55.0	0.4	15.5	c	2½°	H=03 43 17
iS	E/	44 24.0					
eP	Z	07 41 41½	0.4	2.0	c	3½°	H=07 40 45
eS	E	42 24½					
iP	Z	09 09 27.0	0.3	5.0	d	1¼°	H=09 09 06
iS	E	43.0					
eP	Z	13 39 56	0;8	1.0	c		(Regional deep)
iP	Z	17 53 34.0	0.6	1.0	d		Regional
iP	Z	17 59 08.5	0.5	2.0	c	1½°	H=17 58 41
iS	N	29.0					
iP	Z	18 03 40.0	0.3	1.0	c	½°	H=18 03 26
eS	N	57½					
eP	Z	19 15 43	1.0	1.0	c		Regional
i	Z	40.0					

RABAUL

			T sec	A mm	GM	Dist	Remarks
22nd September							
eP	Z	10 26 39	0.5	1.0	d	50°	
iS	E/	33 42.0					
iP	Z	11 38 26.1	0.3	25.5	c		Local
iS	N/	30.0					
iP	Z	20 31 33.0	0.5	1.2	c	2°	H=20 30 59
i	Z	35.3					
iS	N	59.5					*Regional
iP	Z	20 48 39.4			dSE		* Felt: Londolovit Int.IV.
iP	Z	21 39 57.0	0.5	1.0	c	1½°	H=21 39 32
iS	N	40 16.0					
iP	Z	22 27 25.0	0.3	1.8	c	2°	H=22 26 53
iS	E	49.5					
eiP	Z	23 11 44 0.4	0.4	1.0	c	3½°	H=23 10 52
i	Z	44.6					
iS	N	12 24.0					
23rd September							
e	Z/	00 38 34			+		Traces
eP	Z	02 00 00½	0.5	1.0	d	(20°)	
e(S)	E/	03 42					
iP	Z	03 28 37.3	0.6	2.2	c		Regional
e(PKP)	Z	07 02 27	0.4	1.0	d	107½°	
i	Z	29.0					
ePP	Z	07 46					
ePKS	N/	10 10					
eSKS	N/	13 08					
iPPS	N/	17 22					
iP	Z	07 43 00.4	0.4	2.0	c	1½°	H=07 43 34
iS	N	20.0					
iP	Z	10 57 29.6	0.5	1.0	c	2½°	H=10 56 52
iS	N	58.0					
iP	Z	16 14 52.4	0.5	1.1	c	1°	H=16 14 35
iS	N	15 05.2					
iP	Z	16 51 29.2	0.4	1.0	c	2°	H=15 50 56
eS	N	54					
i	Z	20 23 08	0.5	4.0	Ship moving in harbour.		
F	Z	29 53					
iP	Z	21 19 49.5	0.4	1.8	d		Regional
24th September							
iP	Z	01 02 32.5	1.8	2.0	c	(49°)	
e(S)	E/	07 04					
iP	Z	03 25 20.0	0.4	1.4	c	6°	H=03 23 49
i	Z	27.8					
eS	E/	26 30					
iP	Z	06 15 18.0	0.5	1.5	c	36°	
i	Z	20.6					
eS	N/	20 46					
iP	Z	07 49 52.0	0.8	19.0	d		Regional
iP	Z	11 58 30.5	0.4	1.00	d	2°	H=11 57 57
iS	N	55.8					
iP	Z	13 44 07.8	0.3	8.0	c		Local
iS	N	12.0					

RABAUL

24th September contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	13 46 11.5	0.3	27.8	c	$\frac{1}{4}^{\circ}$	H=13 46 03
iS	E/	17.0					
iP	Z	17 20 49.0	0.3	2.0	d	$\frac{1}{4}^{\circ}$	H=17 20 41
iS	N	55.0					
eP	Z	20 24 25	0.8	1.2	d		(Teleseism)
iP	Z	20 25 14.2	0.4	3.0	d	1°	H=20 24 56
iS	N	26.8					

25th September

			T sec	A mm	GM	Dist	Remarks
eP	Z	04 55 25	0.5	1.0	c	5°	H=04 54 10
i	Z	33.6					
i	Z	39.5					
i	Z	42.2					
eS	N/	56 23					
iP	Z	06 42 07.0	0.4	1.6	c	$1\frac{1}{2}^{\circ}$	H=06 41 42
iS	E	25.5					
iP	Z	06 59 06.5	0.5	4.5	d	$1\frac{1}{2}^{\circ}$	H=06 58 41
iS	N	25.3					
e	Z/	07 11 28			-		Traces
eP	Z	09 11 22½	0.5	1.0	d		Regional
iP	Z	09 16 12.8	0.5	1.2	d		(Regional)
i	Z	18.0					
i	Z	17 03.5					
e	Z/	09 59 20			+		Traces
iP	Z	10 03 02.2	0.4	5.0	c	$\frac{1}{4}^{\circ}$	H=10 02 56
iS	E	07.0					
iP	Z	11 12 50.8	0.4	2.0	c		Local
iS	E	55.0					
eP	Z	13 12 19½	0.4	1.0	c	(21°)	
e(S)	N/	16 06					
iP	Z	17 09 33.3	0.5	4.0	d	27°	
i	Z	35.4					
eS	E/	14 08					

26th September Strong microse smic activity from 25 2324 to 26 0556 hours.

			T sec	A mm	GM	Dist	Remarks
eP	Z	02 56 11	0.3	1.8	d		Regional C.B.M.
eiP	Z	04 21 23½	0.3	1.5	c	$2\frac{1}{2}^{\circ}$	H=04 20 45
i	Z	24.3					
iS	E/	52.0					
iP	Z	05 45 29.8	0.5	12.0	d	$2\frac{1}{2}^{\circ}$	H=05 44 48
eS	N/	46 02					
iP	Z	05 48 12.2	0.5	2.0	d	$2\frac{3}{4}^{\circ}$	H=05 47 29
i	Z	15.2					
iS	N	45.5					
iP	Z	08 55 23.6	0.5	1.8	d	$2\frac{1}{2}^{\circ}$	H=08 54 45
iZ	N	52.5					
iP	Z	09 33 56.5	0.4	1.2	d	2°	H=09 33 23
iS	N	34 21.0					
iP	Z	10 25 06.5	0.4	2.0	d	$1\frac{1}{2}^{\circ}$	H=10 24 40
iS	N	26.5					
iP	Z	12 11 10.0	0.5	2.8	c	$1\frac{3}{4}^{\circ}$	H=12 10 41
iS	N	32.0					
iP	Z	13 53 05.0	0.3	2.5	d	$2\frac{1}{2}^{\circ}$	H=13 52 24
iS	N	36.0					

RABAUL

26th September contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	13 53 05.0	0.3	2.5	d	$2\frac{1}{2}^{\circ}$	H=13 52 24
iS	N	36.0					
iP	Z	14 14 44.5	0.6	2.0	c	$2\frac{3}{4}^{\circ}$	H=14 14 01
i	Z	45.5					
eS	N/	15 17					
iP	Z	14 19 52.3	0.4	6.0	d	1°	H=14 19 36
iS	N	20 04.0					
iP	Z	14 44 50.6	0.5	2.5	d	$2\frac{1}{2}^{\circ}$	H=14 44 12
iS	N	45 20.0					
iP	Z	14 53 04.0	0.5	1.0	d	$2\frac{1}{2}^{\circ}$	H=14 52 21
i	Z	05.4					
iS	N	36.0					
eP	Z	16 30 $21\frac{1}{2}$	0.7	1.0	d	$(18\frac{1}{2}^{\circ})$	
e(S)	N/	33 43					
eiP	Z	17 07 05	0.5	2.0	d	5°	H=17 05 48
i	Z	07.5					
eS	N/	08 04					

KERAVAT

18th September, 1967.

			T sec	A* mm	GM	Dist .	Remarks
iP	Z	02 03 24.7			d	1°	H=02 03 07
iS	N	37.7					
iP	Z	04 50 28.7			d	¾°	H=04 50 14
iS	N	40.0					
eP	Z	15 34 30½	0.2	0.6	c		Regional
i	Z	34.0					
iP	Z	23 58 36.3			c		Regional

19th September

			T sec	A* mm	GM	Dist .	Remarks
iP	Z	07 44 04.0	0.2	1.2	c	1¼°	H=07 43 41
iS	E	20.7					
eP	E	10 47 42½	0.5	0.3	c	2°	H=10 47 07
eS	N	48 06½					
eP	E	10 51 28½	0.6	0.3	d	1½°	H=10 51 02
iS	N	48.0					
eP	E	11 04 39	1.0	1.2	c		Teleseism
i	E	39.8					
eP	E	12 27 59	0.8	0.6	c		Regional
eP	E	16 41 30½	0.6	0.2	d	3°	H=16 40 44½
e~~P~~	E	36 ~~36~~					
iS	E	42 05.7					
i	E	09.0					
eP	Z	19 06 14½	0.4	0.7	c	3°	H=19 05 28
iS	E	49.0					
iP	Z	20 55 47.8	0.3	4.5	c	2°	H=20 55 18
iS	E	56 10.3					

20th September

			T sec	A* mm	GM	Dist .	Remarks
eP	N	09 47 40½	1.0	0.2	c		Teleseism
i	N	48.0					
eP	N	09 56 39½			c	¾°	H=09 56 26
iS	N	49.5					
eP	N	10 39 20	1.0	0.6	d	16½°	
iS	N	42 24.5					
e	E	12 15 19½			-		Traces
iP	Z	18 49 28.0	0.2	1.5	c	1°	H=18 49 08
iS	N	42.7					
iP	N	20 51 08.2	0.2	1.7	c	1½°	H=20 50 39
iS	E	30.3					

21st September

			T sec	A* mm	GM	Dist .	Remarks
eP	N	03 32 59	1.00	1.7	d		Teleseism
iP	N	03 43 54	0.5	1.0	d	2¼°	H=03 43 18
iS!	E	44 21.0					
eP	Z	07 42 04	0.5	0.4	d	2°	H=07 41 34
i	N	21					
iS	N	27.3					
eP	N	09 09 25	0.4	0.6	c	1½°	H=09 09 00
iS	N	43.7					
eP	N	13 39 56	1.0	0.5	d	4¼°	H=13 38 52
eS	N	40 45½					
iP	Z	17 59 08.0	0.2	0.6	d	1¾°	H=17 58 39
iS	N	30.0					

KERAVAT

			T sec	A* mm	GM	Dist	Remarks
21st September contd.							
iP	Z	18 03 40.0	0.3	0.7	d	1½°	H=18 03 15
iS	N	58.5					
22nd September							
eP	N	10 26 42	1.1	1.5	d		Teleseism
iP!	Z	11 38 27.7			d		Local
iS	E	32.8					
iP	Z	20 31 33.7			c	2°	H=20 31 01
i	N	46					
iS	N	58.5					
iP!	Z	20 48 40.8			c		Regional
iP?	Z	21 39 35			d	3°	H=21 38 48
i S	N	40 11.5					
iP	Z	22 27 22.7	0.4	1.0	c	1¾°	H=22 26 53
iS	N	44.4					
eP	Z	23 11 45			d	3½°	H=23 10 53
iS	N	12 25½					
23rd September							
e	E	02 00 29			+		Traces
eP	E	03 28 39	1.0	1.0	d		Teleseism
e(PKP)	E	07 02 28.0	0.6	1.0	d		Teleseism
eP	E	07 43 58	0.4	0.8	d	1¼°	H=07 43 35
iS	E	44 15.2					
eP	E	10 57 31	0.5	0.5	c	2¼°	H=10 56 35
eS	E	58.6					
iP	E	16 14 50.5			c	¾°	H=16 14 36
iS	N	15 01.5					
eP	E	16 51 30½	1.0	0.4	c	2°	H=16 51 00
iS	E	53.5					
24th September							
eP	E	01 02 36	0.8	1.0	d		Teleseism
eP	E	03 25 18½	0.4	0.8	d	3½°	H=03 24 23
iS	E	26 00.4					
eP	E	06 15 08 ½	0.3	1.0	d		Teleseism
eP	E	07 49 50	0.5	1.0	d		Regional
iP	Z	11 58 28.0	0.3	1.0	d	2°	H=11 57 57
iS	E	51.5					
iP	Z	13 44 09.4			d	¼°	H=13 44 01
iS	E	15.5					
iP	Z	13 46 13.2			d		Regional

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
12th September, 1967.							
eP	Z	22 31 47	0.5	0.2	c	4°	H=22 30 44
iS	E	32 35.0					
eP	Z	22 40 04½	0.8	0.4	c	4°	H=22 39 02
eS	N	52					
13th September		Lamp failure for all SP records.					
eP	Z/	17 12 45			c		(Regional)
eP	Z/	21 53 05			c	14°	
eS	N/	55 40					
iP	Z	23 57 36.4	0.4	1.7	c	5¼°	H=23 56 18
eS	N	58 36½					
14th September							
e	Z	10 47 10½			-		Traces
eP	Z	15 39 12	0.8	0.5	c	15¾°	
eS	E/	42 07½					
eP	Z	19 19 54½	1.0	0.8	c		(Regional)
15th September							
eP	Z	00 36 57½	0.7	0.9	c		Teleseism
eP	Z	08 26 50½	0.9	0.8	d		Regional
16th September							
eP	Z	03 45 01½			c		Teleseism
iP	Z	19 14 51.4	0.9	3.0	c		Teleseism

TABELE

			T sec	A* mm	GM	Dist	Remarks
6th September, 1967.							
iP	Z	07 28 59			d		Local
i	Z	29 04½					
iP	Z	10 27 04½	0.1	1.6	c		Local
iP	Z	16 14 45	0.2	4.8	d		Local
i	Z	51					
7th, 8th, 9th September		NIL RECORDED					
10th September							
iP	Z	14 53 24			d		Local
i	Z	30					
11th &12th September		NIL RECORDED.					

AGENAHAMBO

					T sec	A* mm	GM	Dist	Remarks
27th August, 1967.									Strong microseismic activity from 26 2042 to 17 1400 h hours.
eP	Z	01	00	51½					Regional
i	Z			58½					
28th August									
eP	Z	10	54	52					Regional
i	Z			58					
eP	Z	19	48	21					Regional
i	Z			49					
i	Z			54					
29th August									
eP	Z	10	52	18½					Teleseism
i	Z			58					
iP	Z	11	26	17½			c		Regional
i	Z			56					
30th August									
iP	Z	13	08	55	0.5	1.0	d		Regional
i	Z		09	51					
iP	Z	14	12	03.5	0.7	1.0	d		Regional
i	Z	24							
31st August									
iP	Z	02	53	43½			s		Regional
eP	Z	10	11	36	0.5	1.0	c		Regional
i	Z		12	18					
iP	Z	15	08	00	0.6	1.0	c		Regional
i	Z			28					
1st September									
eiP	Z	03	32	14	0.5	2.0	d		Felt: Wantoat IntIV Asek IntIII Finschafen IntII
2nd September									NIL RECORDED.
3rd September									
iP	Z	01	23	46½			c		Regional Felt: Aseki IntII Finschafen IntIV
4th September									NIL RECORDED
5th September									
eiP	Z	15	24	45½	0.4	0.2	c		Regional
i	Z			51½					
i	Z		25	12½					
eiP	Z	19	13	55	0.5	0.4	d		Regional
i	Z		14	46½					
i	Z			52½					
6th September									
eiP	Z	18	45	22½	0.2	2.0	d		Local Felt: Pomio IntIV
i	Z			23					
i	Z			35					
i	Z		46	20					

			T sec	A* mm	GM	Dist	Remarks
AGENEHAMBO							
7th September							
iP	Z	11 20 34	0.2	1.0	d		Regional
i	Z	44					
iP	Z	13 21 29	0.2	1.0	d		Local
i	Z	39					
iP	Z	17 52 22	0.3	2.0	d		Regional
iP	Z	17 59 55	0.8	2.0	d		Regional
i	Z	59					Felt: Ulamona IntI
8th September		NIL RECORDED.					
9th September							
eiP	Z	02 48 59	0.5	1.5	c		Local
i	Z	49 04					

Central Observatory
RABAUL

R. F. Heming
A½Vulcanologist-in-charge.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANANIYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 26th September To : 3rd October
SULPHUR CREEK	(SUL)	Not operational
KEREVAT	(KRT)	From: 24th September To : 1st October
ESA'ALA	(ESA)	No records
TABELE	(TAB)	From: 4th September To : 25th September
AGENAHAMBO	(AGE)	No records

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System

		To Sec.	Tg Sec.
S.P.	Maximum magnification 12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification 750 at 25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification 4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations

Instrumentation: Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484) at the Central Observatory. Drum speen 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw Magnification 24,000 at 4Hz T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs Magnifiaation 6,000 at 4Hz T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr Magnification 24,000 at 4Hz To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt Magnification 24,000 at 4Hz To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz To=1.0

STATION INSTRUMENTATION (continued) (2)

	To sec	Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
- Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min. 1.0 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min.

S.P.Z.	Magnification 36,000
S.P.N.	Magnification 18,000
S.P.E.	Magnification 18,000
L.P-Z/N/E	Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg
1 Geotech 1051 Vertical

Helicorder System (Geotech Mod 248-1 Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

Photographic Recorder System (Geotech Mod 1560-D), drum speed 30mm/min 1.0 60.0

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA,TBL,KRT,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and seeond marks from radio signal VNG (Australia) are recorded on one component accouding with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings;

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near eatthquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of opicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epocentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Original time
h	=	Focal depth in Km

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°
Near	=	Typical signature of an earthquake with epicentre between 0.9° & 9°
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

(R.F. HEMING)
A/Vulcanologist-in-Charge

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

RABAUL

27th September, 1967. Strong microseismic activity.

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 11 07.2	0.4	18.0	c	$1\frac{1}{2}^\circ$	H=00 10 42
iS	N	26.0					
iP	Z	05 47 57.5	0.6	3.0	d	$2\frac{3}{4}^\circ$	H=05 47 14
eS	N	48 $30\frac{1}{2}$					C.B.M.
eiP	Z	07 55 $28\frac{1}{2}$	0.4	1.8	d	$3\frac{1}{2}^\circ$	H =07 54 36
i Z	Z	31.2					
iS	N	56 08.0					
iP	Z	07 56 55.0	0.4	2.0	d	3°	H=07 56 09
iS	N	57 30.0					
iP	Z	08 39 56.6	0.3	3.5	c	$\frac{3}{4}^\circ$	H=08 39 42
eS	E/	40 08					
eP	Z	09 36 14	0.6	1.0	d		(Teleseism)
iP	Z	14 31 48.0	0.5	4.0	c	$2\frac{1}{4}^\circ$	H=14 31 14
eS	E/	32 14					
iP	Z	15 48 05.9	0.5	1.0	d	$2\frac{1}{2}^\circ$	H=15 47 25
iS	N	36.8					
iP	Z	17 21 40.0	0.5	6.5	d	$(3\frac{1}{4}^\circ)$	H=17 20 (50)
e(S)	E/	22 18					

28th September:

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 29 17.0	0.5	7.0	d	$2\frac{1}{2}^\circ$	H=02 28 36
eS	N/	48					
iP	Z	02 32 26.0	0.4	6.0	d		Regional
iP	Z	02 55 21.3	0.3	5.0	c		Regional
iP	Z	04 57 37.4	0.5	20.0	cNW	3°	H=04 56 51
eS	Eo	58 12				Felt: Rabaul	Int. II
						Sohano	Int. III-IV
						Piva	Int. III
eP	Z	05 33 11	0.5	1.0	d		Regional
iP	Z	06 07 34.2	0.5	4.0	c		Regional
eP	Z	07 18 20	0.5	1.0	c	$2\frac{3}{4}^\circ$	H=07 17 37
eS	N	53					
iP	Z	08 25 33.8	0.5	2.0	d	$2\frac{1}{2}^\circ$	H=08 24 54
iS	N	26 04.3					
eP	Z	08 46 20	0.5	1.0	c	$2\frac{1}{2}^\circ$	H=08 45 38
iS	E	52.0					
iP	Z	10 20 21.5	0.5	2.0	c	$2\frac{1}{2}^\circ$	H=10 19 42
iS	E	51.6					
iP	Z	10 58 35.0	0.5	4.5	d	$2\frac{1}{2}^\circ$	H=10 57 54
iS	N	59 06.0					
eP	Z	11 16 05	0.5	2.0	c	$2\frac{1}{4}^\circ$	H=11 15 31
eS	N	31					
iP	Z	12 11 16.0	0.4	2.5	c	$\frac{1}{2}^\circ$	H=12 11 08
iS	E	22.0					
iP	Z	13 02 04.0	0.5	1.5	c	$2\frac{1}{2}^\circ$	H=13 01 42
iS	N	36.0					
iP	Z	13 34 05.8	0.5	1.0	d	$2\frac{1}{2}^\circ$	H=13 33 26
iS	N	36.5					

RABAUL

			T sec	A mm	GM	Dist	Remarks
28th September contd.							
iP	Z	14 36 04.0	0.5	1.0	c	2½°	H=14 35 22
iS	N	36.4					
iP	Z	14 42 51.3	0.5	1.5	c	2¾°	H=14 42 08
iS	N	43 24.2					
iP	Z	14 49 32.2	0.8	1.0	d		Regional
eP	Z	15 57 05½	0.5	0.8	c	68°	
eS	E/	16 07 04					
iP	Z	16 36 24.0	0.5	1.2	c	2½°	H=16 35 42
iS	N	55.8					
eP	Z	17 33 06½	0.5	1.0	c	2½°	H=17 32 24
iS	N	38					
eP	Z	19 08 31	0.5	0.8	d		Teleseism
iP	Z	19 44 41.3	0.5	1.0	c	2¼°	H=19 44 06
iS	N	45 08.6					
eP	Z	21 32 07½	0.4	1.0	d		Regional
iP	Z	22 08 06.0	0.5	2.0	c	2¾°	H=22 07 23
iS	N	39					
iP	Z	22 59 46.2	0.5	1.0	d	3½°	H=22 58 54
eS	N	23 00 26					
iP	Z	23 52 45.5	0.5	5.8	c	2¾°	H=23 52 02
iS	N	53 18.0					
iP	Z	23 57 33.8	0.5	22.5	d	1°	H=23 57 15
iS	N	48.0					
29th September							
iP	Z	00 55 37.2	0.4	1.5	c	2½°	H=00 54 55
iS	N	56 09.5					
iP	Z	03 22 13.2	0.4	1.0	c	2°	H=03 21 30
iS	E	46.5					
eiP	Z	04 07 49	0.5	2.0	c	2¾°	H=04 07 06
i	Z	50.4					
iS	N	08 22.0					
e	Z/	06 06 06			–		Traces
e	Z/	07 36 54			+		Traces
eP	Z	08 53 30	0.8	2.0	d	d	Regional
iP	Z	10 02 52.3	0.5	1.5	d	2°	H=10 02 22
iS	E	03 15.0					
iP	Z	15 14 06.2	0.5	4.0	c	2½°	H=15 13 27
iS	N	36.0					
iP	Z	16 03 48	0.6	1.2	d		Regional
eP	Z	16 19 42	0.5	1.0	d	5°	H=16 18 28
iS	N	20 39					
iP	Z	16 52 22.0	0.5	1.0	d		Regional
eP	Z	19 35 50	0.5	1.0	d	2°	H=19 35 18
iS	E	36 14.0					
e	Z/	22 30 48			–		Traces
30th September							
iP	Z	00 57 41.5	0.5	30.0	cNW	1°	H=00 57 24
iS	N/	54.0					
iP	Z	01 30 39.0	0.4	1.5	c	1½°	H=01 30 14
iS	N	57.5					

RABAUL

30th September contd.

			T sec	A mm	GM	Dist	Remarks
eP	Z	01 38 29½	0.4	1.0	d	2°	H=01 37 57
iS	N	53.6					
iP	Z	01 42 37.3	0.4	1.0	d	3°	H=01 41 52
iS	N	43 11.0					
iP	Z	01 44 46.5	0.4	1.0	c	1½°	H=01 44 21
iS	N	45 05.0					
iP	Z	03 11 13.8	0.5	1.0	c	2½°	H=03 10 33
iS	N	45.0					
iP	Z	03 38 62.2	0.5	1.2	c	2½°	H=03 37 45
iS	N	57.0					
iP	Z	05 18 56.8	0.5	1.0	d		(Bismark Sea)
eLq	N/	19 33					
eP	Z	07 09 31½	0.5	0.8	c	10°	
eS	N/	11 24					
iP	Z	07 50 12.2	0.5	1.8	c	1°	H=07 49 53
iS	E	26.0					
eP	Z	08 04 41	0.3	1.0	c	40°	
iS	N/	10 50					
iP	Z	09 10 14.5	0.8	2.0	c	2½°	H=09 09 32
iS	N	46.0					
iP	Z	10 30 11.0	0.5	1.2	d	2½°	H=10 29 28
iS	N	43.5					
iP	Z	10 41 31.0	0.5	5.0	d	2½°	H=10 40 49
iS	E	42 02.5					
eiP	ZO	12 34 04	0.5	1.0	c	3°	H=12 33 19
i	Z	05.2					
iS	E	38.5					
eP	Z	13 09 08	0.5	1.0	c	22°	
eS	N/	13 03					
iP	Z	16 51 43,0	0.5	1.5	c	2¾°	H=16 51 00
iS	N	52 16.0					
iP	Z	17 10 37.6	0.5	1.2	c	4½°	H=17 09 27
iS	N	11 31.8					
eP	Z	19 29 17½	0.5	1.0	d	2½°	H=19 28 35
iS	N	49.0					
eiP	Z	21 43 09				2¾°	H=21 42 25
i	Z	12.7					
iS	N	42.5					

1st October

			T sec	A mm	GM	Dist	Remarks
e(P)	Z	02 42 14	0.5	0.5	c		(Distant shock)
i	Z	20.4					
iP	Z	05 12 08,3	0.5	3.2	c	1½°	H=05 11 42
iS	E	28.5					
iP	Z	06 03 20.3	0.3	2.0	d	1¾°	H=06 02 51
iS	E	42.0					
iP	Z	06 26 48.1	0.3	2.5	c	1¾°	H=06 26 19
iS	E	27 10.1					
iP	Z	06 49 00.3	0.5	1.2	c	2¼°	H=06 48 23
iS	N	28.3					
iP	Z	07 15 39.0	0.5	1.0	d	2½°	H=07 14 58
iS	N	16 10.0					

RABAUL

1st October contd.

			T sec	A mm	GM	Dist	Remarks
eP	Z	07 58 55½	0.4	1.0	d	2¼°	H=07 58 20
eS	N	59 22					
eP	Z	09 11 38	0.5	0.6	c		(Distant shock)
eP	Z	09 29 45	0.7	1.0	c	2½°	H=09 29 05
iS	E	30 15.2					
iP	Z	09 59 40.3	0.4	1.0	d	2½°	H=09 59 01
iS	E	10 00 10.4					
iP	Z	11 41 32.0	0.5	1.4	d	2½°	H=11 40 51
iS	N	42 03.0					
iP	Z	15 45 42.5	0.3	1.0	d	2½°	H=15 45 01
eS	N	46 13					
iP	Z	15 48 13.5	0.3	1.0	d	½°	H=15 48 02
iS	N	21.0					
eP	Z	22 37 50½	0.5	1.0	c	2¾°	H=22 37 07
iS	N	38 23.5					

2nd October

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 18 38.6	0.5	2.6	c		Distant shock
eP	Z	01 25 03½	0.5	1.0	d	4°	H=01 24 01
eS	N	51					
e	Z/	04 16 46			+		Traces
iP	Z	05 31 01.3	0.4	2.5	d	2¼°	H=05 30 24
iS	E	29.0					
iP	Z	07 55 11.2	0.5	1,0	d	¾°	H=07 54 56
iS	N	22.0					
e	Z/	08 35 04			−		Traces
iP	Z	08 46 19.0	0.6	2.0	d	2½°	H=08 45 36
iS	N	51.5					
iP	Z	09 02 41.0	0.4	3.5	c		Regional
iP	Z	11 53 59.9	0.5	1.0	c	1¾°	H=11 53 31
iS	N	54 21.5					
iP	Z	12 37 47.7	0.5	13.0	c		Local
iS	N	50.0					
iP	Z	14 39 35.5	0.8	1.0	c	3°	H=14 38 47
eS	N/	40 12					
iP	Z	14 54 51.4	0.5	2.5	c	2¾°	H=14 54 08
eS	Eo	55 24				Felt: Rabaul	Int.III
eP	Z	15 13 39	0.5	1.0	c		Regional
iP	Z	15 47 44	1.0	2.0	c		Regional (deep)
iP	Z	16 25 12,5	0.5	1.0	c	2½°	H=16 24 30
iS	N	45.0					
iP	Z	18 25 36.5	0.5	3.0	d	2½°	H=18 24 55
iS	N	26 07.2					
iP	Z	21 08 14.0	0.5	1.0	d	2¼°	H=21 07 40
iS	N	40.0					

3rd October

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 48 31.3	0.4	2.0	d		Regional
iP	Z	01 38 57.5	0.4	5.0	c	2¾°	H=01 38 14
iS	N	39 30.0					
eiP	Z	04 55 50½	0.5	1.5	d	2¾°	H=04 55 13
i	Z	55.6					
eS	N/	56 18					

RABAUL

3rd October

			T sec	A mm	GM	Dist	Remarks
eiP	Z	04 55 50½	0.5	1.5	d	2¼°	H=04 55 13
i	Z	55.6					
eS	N/	56 18					
iP	Z	06 12 09.2	0.5	2.0	d	1¼°	H=06 11 48
iS	E	24.2					
iP	Z	08 58 41.5	0.5	1.3	d	3°	H=08 57 55
iS	E	59 16.0					
iP	Z	10 05 51.5	0.5	1.5	d	2½°	H=10 05 09
i	Z	53.5					
iS	N	06 23.5					
iP	Z	11 41 45.0	0.5	2.0	d	1½°	H=11 41 20
iS	E	42 04.0					
iP	Z	15 15 33.2	0.5	1.8	c	2½°	H=15 14 52
iS	N	16 02.9					
iP	Z	18 22 06.5	0.5	8.0	c	1¼°	H=18 21 46
iS	N/	21.5					
eP	Z	18 35 00½	0.5	1.0	c		Teleseism
eiP	Z	19 46 16	0.5	0.8	c	2½°	H=19 45 34
i	Z	18.2					
iS	N	48.0					

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25th September

			T sec	A* mm	GM	Dist	Remarks
eP	E	04 55 26½	0.5	0.7	d	(5½°)	H=04 54 (54)
i(S)	E	56 30½					
iP	E	06 42 05.3	0.2	1.5	c	1¼°	H=06 41 45
iS	N	20.4					
iP	Z	06 59 04.1			c	1¼°	H=06 58 43
iS	E	20.4					
e	N	09 16 20			+		Traces
iP	E	10 03 10.0	0.2	1.8	c		Local
iP	Z	11 12 52.1			c		Local
iS	E	57.5					
eP	E	17 09 35	0.6	0.8	c		Teleseism

26th September

			T sec	A* mm	GM	Dist	Remarks
iP	E	02 56 08.0	0.3	1.2	d	2°	H=02 54 36
iS	E	30.4					
eP	E	04 21 24½			c	1¾°	H=04 21 57
iS	N	45.3					
iP	E	05 45 28.4	0.4	3.3	d		Regional
iP	E	08 55 16.0	0.4	0.9	d	3¼°	H=08 54 26
iS	E	53.9					
eP	E	09 33 56	0.5	0.3	d	1½°	H=09 33 28
iS	E	34 17.0					
iP	E	10 25 04.3			d	1¼°	H=10 24 42
iS	E	21.0					
eiP	Z	12 11 07½			d	1½°	H=12 10 42
i	Z	07.7					
iS!	E	27.0					
iP	Z	13 53 04.1	0.3	1.0	d	2½°	H=13 52 26
iS	N	33.4					
eiP	Z	14 14 43	0.3	1.3	c		Regional
i	Z	43.3					
iP	Z	14 19 55.3			c	3¼°	H=14 18 28
iS	E	20 08.0					
iP	E	14 44 50.0			c	2°	H=14 44 17
iS	E	45 15.0					
eP	E	16 30 22½	0.8	0.3	c	7½°	H=16 28 31
iS	E	31 48.5					
iP	Z	17 07 05.3	0.2	1.0	c		Regional
i	Z	11.0					

27th September

			T sec	A* mm	GM	Dist	Remarks
iP	Z	00 11 04.5			d	1¼°	H=00 10 42
iS	E	21.7					
iP	N	05 47 55.5	0.4	1.0	c	2¾°	H=05 47 10
i	E	48 24.0					
iS	E	30.0					
eP	N	07 55 26½	0.2	0.5	c	3½°	H=07 54 34
i	N	30.5					
i	N	56.9					
iS	N	56 06.6					
i(P)	N	07 56 56			d	2¾°	H=07 56 14
i	E	57 22.0					
iS	E	28.0					
iP	Z	08 39 55.9	0.2	2.5	c	1½°	H=08 39 30
iS	N	40 15.1					
eP	N	09 36 22	1.3	0.5	c	(15°)	
e(S)	N	39 17					
eP	B						

KERAVAT

27th September contd.

			T sec	A* mm	GM	Dist	Remarks
eP	N	14 31 48	0.5	0.5	c	1½°	H=14 31 23
i	N	53.8					
iS	E	32 07.0					
eP	N	15 48 03½	0.5	0.6	c	2¼°	H=15 47 26
iS	E	32.0					
iP	Z	17 21 37.6	0.2	1.0	c	3½°	H=17 30 44
iS	E	22 18.3					

28th September

			T sec	A* mm	GM	Dist	Remarks
iP	N	02 32 25.2	0.5	1.2	d	2¼°	H=02 31 50
i	N	50.3					
iS	N	52.0					
iP	Z	04 57 36.9			c		Regional Felt: Rabaul, Sohano. Piva
iP	E	05 33 09½	0.5	1.2	d	2¼°	H=0 5 32 34
iS	E	37.0					
iP	E	06 07 34.7			d	(1½°)	H=06 07 (06)
i(S)	E	56.2					
iP	E	08 25 36.0			c	2¼°	H=08 25 00
iS	E	26 02.8					
eP	E	08 46 23½			d	2¼°	H=08 45 48
i	N	47					
iS	N	51.0					
eP	N	10 20 22	0.5	0.5	d	2¼°	H=10 19 46
iS	N	49.0					
iP	N	10 58 35	0.3	1.1	c	2½°	H=10 57 54
iS	N	59 05.8					
eP	N	12 11 20	0.5	0.5	d	½°	H=12 11 08
iS	N	29					
eP	N	13 02 03½	0.4	0.3	d	2½°	H=13 01 26
iS	N	32,9					
e(P)	E	13 34 06			d	(2°)	H=13 33 (34)
iS	N	30.0					
eP	E	14 36 04	0.4	0.2	d	2½°	H=14 35 25
iS	N	34.0					
eP	N	14 42 51	0.8	0.6	c	(2½°)	H=14 42 (12)
i(S)	N	43 21.5					
eP	E	14 49 32½	0.5	0.4	d	2°	H=14 48 58
iS	N	59.2					
eP	E	16 36 23			c	2°	H=16 35 51
i	N	53.0					
iS	N	57.0					
eP	E	17 33 08	0.6	0.5	c	2¼°	H=17 32 31
iS	N	36.0					
e(P)	E	19 44 40½			c	(2°)	H=19 44 (07)
iS	N	45 06.0					
e(P)	E	21 32 07.4	0.4	0.6	c	5¼°	H=21 30 50
i	N	41.0					
i	N	51.0					
iS	N	33 58.0					
iP	N	22 08 05.8			c	2½°	H=22 07 28
iS	N	35.3					
eP	E	22 59 45½			d	4°	H=22 58 43
i	E	23 00 17.5					
iS	E	34.0					

KERAVAT

			T sec	A* mm	GM	Dist	Remarks
28th September contd.							
eiP	Z	23 52 44	0.5	0.6	c		Regional
i	Z	44.7					
eiP	Z	23 57 31	0.4	0.8	d		Regional
i	Z	31.4					
29th September							
iP	Z	01 23 40.0	0.2	1.0	c	1°	H=01 23 30
iS	N	55.6					
eP	E	03 22 12			c	2¼°	H=03 21 35
i	E	37.2					
iS	E	40.0					
eP	E	04 07 19½			c	5¼°	H=04 06 01
iS	E	08 20.0					
eP	E	08 53 31	1.0	1.0	d		Regional
eP	E	10 02 17			c	5°	H=10 01 05
iS	E	03 12.6					
eP	E	15 14 04½	0.4	0.5	d	2½°	H=15 13 27
iS	E	33.1					
e(P)	Z	16 11 34			d	(1¼°)	H=16 11 (13)
eS	E	50.0					
eP	E	16 20 08	0.5	0.2	c	2½°	H=16 19 29
i	E	36.4					
iS	N	38.0					
eP	E	16 52 20	1.0	0.7	d	8°	H=16 50 23
e	E	37					
eS	E	53 51					
iP	E	19m35 55.0	0.5	1.5	d	1¼°	H=19 35 3 4
iS	E	36 11.5					
30th September							
iP!	Z	00 57 40.0			c		Regional
eP	N	01 38 29			d	1¾°	H=01 38 00
iS	E	51.0					
eP	N	01 42 48	1.0	0.6	d	1½°	H=01 42 20
iS	E	43 09.0					
eP	N	01 44 47			d	2¼°	H=01 44 10
iS	N	45 05.0					
eP	N	03 38 27	1.0	0.3	d	2½°	H =03 37 48
iS	E	57.0					
iP	N	07 09 33.0	0.4	1.5	c		Teleseism
eiP	Z	07 50 10½	0.4	0.3	d	1°	H=07 49 53
i	Z	10.9					
iS!	E	23.4					
eP	N	08 04 42			c		Teleseism
eP	N	09 10 15	0.7	0.3	d	2½°	H=09 09 36
iS	E	45.0					
eP	N	10 30 10½	0.7	0.8	c	2¾°	H=10 29 27
i	N	39.0					
iS	N	43.5					
iP	N	10 41 30.6	0.4	1.0	c	2½°	H=10 40 52
iS	N	59.5					
iP	N	12 34 08.5	0.4	2.0	c	2½°	H=12 33 29
iS	E	38.5					
eP	N	13 09 13½	0.5	0.7	c		Teleseism

KERAVAT

30th September contd.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	16 51 40½			d	3¼°	H=16 50 51
i	N	52 12.5					
iS	N	19.0					
eP	N	17 10 37			c	4¼°	H=17 09 32
i	N	11 16.0					
iS	N	27.2					
eP	N	19 29 48½	0.5	0.5	d	2¼°	H=19 28 42
iS	N	46.0					
i	N	52.0					

1st October

			T sec	A* mm	GM	Dist	Remarks
iP	E	05 12 08.0	0.2	1.9	c	1°	H=05 11 48
iS	E	22.8					
eP	E	06 49 00½	0.4	1.0	c	2¼°	H=06 48 25
iS	N	28.0					
eP	E	07 15 37	0.6	0.6	c	2¾°	H=07 15 49
iS	E	16 10.5					
iP	E	07 58 56.9	0.2	1.0	c	2°	H=07 58 23
e	E	59 09.0					
eS	E	22½					
eP	E	09 29 45½	0.	0.4	c	2¼°	H=09 29 09
iS	E	30 13.0					
iP	E	09 59 39.3	0.3	0.6	d		Regional
i	E	10 00 03.0					
eP	E	11 41 31½	0.4	0.5	d	2½°	H=11 40 52
iS	E	42 01.0					
eP	E	15 45 42	1.0	0.4	c	5°	H=15 44 11
i	E	46 09.5					
iS	E	12.0					
eP	E	22 37 52	0.5	0.4	c	5°	H=22 36 21
iS	N	38 22.0					

TABELE

			T sec	A* mm	GM	Dist	Remarks
5th September, 1967.							
iP	Z	07 28 54½	0.2	4.2	d		Local
i	Z	29 00					
iP	Z	10 28 00	0.2	2.0	c		Local
i	Z	06					
iP	Z	16 14 40½	0.4	4.0	d		Local
i	Z	47					
i	Z	52					
6th, 7th &8th September.			NIL RECORDED.				
9th September							
e	Z	14 47 57½			-		Traces
iP	Z	14 53 19½	0.3	6.0	d		Local
i	Z	25					
i	Z	31					
10th, 11th, 12th13th, 14th & 15th September.						NIL RECORDED.	
16th September							
iP	Z	21 07 40	0.3	1.0	d		Regional
i	Z	08 06½					
17th September			NIL RECORDED.				
18th September							
eiP	Z	15 33 44½			d		Regional
i	Z	45				Felt:	Lae Int.IV
i!	Z	34 02½					Bundi Int.IV
19th September							
iP	Z	11 04 33	1.0	0.9	c		Teleseism
20th September							
e	Z	09 47 55			+		Traces
eP	Z	10 40 56	0.5	0.8	d		Regional
i	Z	41 21					
i	Z	52					
21st September							
iP	Z	03 32 11	0.3	1.0	c		Regional
i	Z	19					
i	Z	33 00					
eP	Z	12 18 35	0.5	0.1	d		Regional
i	Z	37					
i	Z	19 16					
eP	Z	17 59 39	0.5	0.5	d		Teleseism
i	Z	47					
e	Z	18 00 12					
e	Z	33					
e	Z	52					
22nd September							
eP	Z	19 14 05½	0.5	1.0	c		Teleseism
e	Z	15 36					
23rd September							
eP	Z	07 14 47½	0.5	1.0	c		(Local)
i	Z	52½					
i	Z	57½					

TABELE

24th September

					T sec	A* mm	GM	Dist	Remarks
iP	Z	06	14	11	0.5	3.0	d		Teleseism
i	Z			15					
eiP	Z	07	49	20½	0.5	0.8	d		(Regional)
i	Z			21					
i	Z			27½					
i	Z			40					
i	Z		50	05½					

25th September

					T sec	A* mm	GM	Dist	Remarks
eP	Z	06	32	59	0.5	0.1	d		(Teleseism)
e	Z		33	02					
e	Z			42					
iP	Z	16	58	46	0.4	1.5	d		Regional
i	Z			47					
i	Z			52					
i	Z		59	16					

Central Observatory
RABAUL

G. W. D'ADDARIO
Vulcanologist-in-charge.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 4th October, 1967 To : 10th October, 1967
SULPHUR CREEK	(SUL)	Not operational
KEREVAT	(KRT)	From: 2nd October, 1967 To : 8th October, 1967
ESA'ALA	(ESA)	From: 20th September, 1967 To : 2nd October, 1967
TABELE	(TAB)	No records received
AGENAHAMBO	(AGE)	No records received

RABAUL INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m
Foundation: Basalt Flow.

World Wide Standard System			To Sec.	Tg Sec.
S.P.	Maximum magnification	12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification	6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification	750 at 25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification	4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations

Instrumentation: Benioff Seismometer (Geotech Mod. 4681-A Vertical) Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484) at the Central Observatory. Drum speen 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m.
Foundation: Basalt Flow.
S.P. Zw Magnification 24,000 at 4Hz T=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°11'33.3".E., Elevation:8.5m
Foundation: Unconsolidated volcanic ash.
S.P. Zs Magnifiaation 6,000 at 4Hz T=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elevation:91.0m
Foundation: Unconsolidated volcanic ash.
S.P. Zr Magnification 24,000 at 4Hz To=1.0

TAVURVUR(TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation: 60m
Foundation: Andesite flow.
S.P.-Zt Magnification 24,000 at 4Hz To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation:332.3m
Foundation: Unconsolidated volcanic ash.
Magnification 24,000 at 4Hz To=1.0

(2)

STATION INSTRUMENTATION (continued) — To sec — Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longitude 152°00'.E.
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18" 2S., Longitude 150°48'50" 7E. Elevation 46m
Foundation: Mica schist.

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal

Film Recorder System (Geotech Mod. 1301-A
drum speed 15mm/min. — To 1.0 — Tg 0.2

Photographic Recorder System (Geotech Mod. 60.0 1565-D)
Drum speed 30mm/min.

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. — To 0.6 — Tg 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".e., Elevation 179.5m
Foundation: Basalt flow.

Benioff Variable-Reluctance Seismograph 107.5 Kg
1 Geotech 1051 Vertical

Helicorder System (Geotech Mod 248-1
Heat sensitive recording paper 60mm min. drum speed adjustable to 120mm/min; 180mm/min

Photographic Recorder System (Geotech Mod 1560-D), drum speed 30mm/min — To 1.0 — Tg 60.0

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA,TBL,KRT,AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB, ESA, TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and seeond marks from radio signal VNG (Australia) are recorded on one component accouding with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "+" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S and W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Readings;

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

FELT Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals, based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of opicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epocentres:

The regional names which follow the coordinates of epicentres located at the Central Observatory are meant only to supplement the coordinates and normally follow well-known geographical rather than geological features. Use is made of the Full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees.
H	=	Original time
h	=	Focal depth in Km

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°
Near	=	Typical signature of an earthquake with epicentre between 0.9° & 9°
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

23/8/67

(R.F. HEMING)
A/Vulcanologist-in-Charge

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL

4th October, 1967.

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 52 35.5	0.3	17.0	d	1°	H=02 52 19
iS	E	47.5					
eP	Z	06 21 33	0.5	2.0	d	8°	H=06 19 34
eS	N/	23 05					
e	Z/	06 55 46			-		Traces
iP	Z	10 25 08.0	0.5	14.0	d	2°	H=10 24 38
iS	N/	31.0					
e	Z/	11 01 46			-		Traces
iP	Z	15 34 49.6	0.5	1.0	d	1½°	H=15 34 23
iS	N	35 09.5					
iP	Z	17 21 59.0	0.5	10.5	d	3½°	H=17 21 07
eS	Eo	22 41					6.5°S, 154.5°E
					Felt:	Sohano	Int. VI-VII
						Buin	Int. VI
						Piva	Int. VI
						Rongamatane	Int. V
						Karoola	Int. V
						Waramung	Int. IV-V
						Londolovit	Int. IV
						Wakunai	Int. IV
						Pomio	Int. IV
						Numa Numa	Int. IV
						Rabaul	Int. IV
						Kieta	Int. IV
						Fead Is.	Int. III-IV
						Cartaret Is.	Int. III
						Mempha	Int. II
eP	Z	18 56 42	0.5	1.0	c	3¼°	H=18 55 53
i	Z	44.2					
iS	N	57 19.0					
eiP	Z	21 48 27	0.4	1.0	c9	3°	H=21 47 41
i	Z	27.5					
iS	E	49 02.5					
iP	Z	23 15 09.2	0.6	2.0	d	3½°	H=23 14 17
iS	Zw	49.0				Felt:	Rabaul Int. I
							Sohano Int. I-II

5th October

			T sec	A mm	GM	Dist	Remarks
eP	Z	00 19 11½	0.4	1.0	d		Regional
*******							
iP	Z	04 08 20.5	0.5	2.0	d	2½°	H=04 07 42
eS	E/	49				Felt:	Rabaul Int. I
							Sohano Int. III-IV
iP	Z	04 22 20.2	0.5	2.0	c		Regional
iP	Z	07 52 14.0	0.5	1.0	d	3°	H=07 51 24
iS	N	50.0					
iP	Z	08 15 05.8	0.5	4.0	c	5¼°	H=08 13 47
iS	N	16 07.0					

RABAUL

5th October contd.

			T sec	A mm	GM	Dist	Remarks
iP	Z	10 36 34.5	0.3	1.2	c	$2\frac{3}{4}^{o}$	H=10 35 50
eS	N	37 08					
iP	Z	11 05 25.8	0.3	4.0	c	$1\frac{1}{2}^{o}$	H=11 04 58
iS	N	46.5					
eP	Z	12 36 15	0.5	1.0	d	$2\frac{1}{4}^{o}$	H=12 35 39
iS	N/	42.0					
iP	Z	16 55 23.2	0.4	1.0	d	3^{o}	H=16 54 38
iS	N	57.0					
iP	Z	17 54 23.0	0.4	1.0	c		Regional
eiP	Z	17 59 12	0.4	1.0	d	$2\frac{1}{2}^{o}$	H=17 58 33
i	Z	12.8					
iS	E/	42.0					
eiP	Z	19 49 21	0.5	1.0	c	$4\frac{1}{2}^{o}$	H=19 48 15
i	Z	30.0					
iS	E	50 12					

6th October

			T sec	A mm	GM	Dist	Remarks
eP	Z	00 02 29	0.5	1.5	d	5^{o}	H=00 01 15
eS	N	03 26					
eP	Z	00 29 36	0.5	1.0	c	$3\frac{1}{2}^{o}$	H=00 28 40
iS	N	30 19.5					
eP	Z	00 31 47	0.5	2.0	d	$3\frac{3}{4}^{o}$	H=00 36 48
eS	N	32 32					
iP	Z	02 51 03.8	0.4	2.0	c	2^{o}	H=02 50 30
iS	N	29.5					
iP	Z	09 37 37.3	0.5	2.0	c	$1\frac{1}{2}^{o}$	H=09 37 11
iS	N	57.5					
iP	Z	10 11 38.0	0.5	1.0	c	$3\frac{1}{2}^{o}$	H=10 10 44
iS	N	12 19.0					
eP	Z	12 23 22	0.3	1.0	c		Regional
iP	Z	12 59 10.1	0.5	1.0	c	$2\frac{1}{2}^{o}$	H=12 58 28
iS	E	42.5					
iP	Z	13 23 13.5	0.5	28.0	c	$1\frac{1}{2}^{o}$	H=13 22 45
iS	E	35.0					
iP	Z	14 41 28.0	0.5	8.0	c	$1\frac{1}{2}^{o}$	H=14 41 03
iS	N	46.8					
iP	Z	14 44 29.8	0.4	2.0	d	$2\frac{1}{4}^{o}$	H=14 43 53
iS	N	58.0					
iP	Z	15 25 39.0	0.5	2.0	d	$2\frac{1}{2}^{o}$	H=15 25 00
iS	E/	26 09.0					
iP	Z	23 04 06.3	0.5	1.0	d	$5\frac{1}{2}^{o}$	H=23 02 43
iS	E	05 10.3					

7th October

			T sec	A mm	GM	Dist	Remarks
iP	Z	02 27 10.0	0.3	2.0	d	$\frac{3}{4}^{o}$	H=02 26 55
iS	N	21.0					
iP	Z	06 19 19.2	0.5	3.2	d	3^{o}	H=06 18 32
iS	E	55.0					
iP	Z	08 49 40.0	0.5	1.0	d	3^{o}	H=08 48 53
iS	N	50 16.0					
eP	Z	08 52 19½	0.5	1.0	c		Teleseism
iP	Z	10 38 42.0	0.6	3.0	c		Regional

RABAUL

7th October contd.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
eP	Z	10 42 48	0.8	1.0	d		(Distant shock)
eiP	Z	10 49 38½	0.5	1.0	d	3°	H=10 48 54
i	Z	39.5					
iS	N	50 12.6					
iP	Z	11 43 30.3	0.3	17.0	c	1½°	H=11 43 04
iS	N	50.1					
iP	Z	11 45 20.8	0.3	5.8	d	1½°	H=14 44 05
iS	N	40.2				In coda of preceding shock.	
iP	Z	12 01 52.0	0.4	2.0	c	3°	H=12 01 06
iS	N	02 27.0					
iP	Z	14 54 21.0	0.5	1.0	d	3½°	H=14 53 26
i	Z	27.2					
iS	E	55 03.0					
iP	Z	15 01 08.5	0.5	1.0	d	3°	H=15 00 21
iS	N	44.5					
eP	Z	15 03 54	0.5	1.0	d	3°	H=15 03 07
iS	N	04 30.0					
iP	Z	18 57 11.0	0.4	1.5	c	¾°	H=18 56 56
eS	E/	22					
iP	Z	19 11 43.0	0.5	2.8	d	3½°	H=19 10 49
i	Z	49.3					
eS	N/	12 24					
iP	Z	19 52 41.0	0.5	2.0	c	3¼°	H=19 51 50
i	Z	45.2					
eS	No	53 20					
iP	Z	20 47 18.0	0.6	3.0	d	2°	H=20 46 46
iS	N/	42.0					
eP	Z	20 58 10	0.4	1.0	c	3¼°	H=20 57 21
iS	N	46.8					

8th October

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	07 20 28.0	0.4	16.0	d	¾°	H=07 20 13
iS	N/	39.0					
iP	Z	09 27 34.0	0.5	8.0	c		Regional
eiP	Z	13 14 23	0.5	1.0	c	3°	H=13 13 37
i	Z	26.3					
iS	N	58.0					
iP	Z	13 56 30.0	0.4	3.5	d	3°	H=13 55 45
iS	N/	57 04.0					
eP	Z	14 25 07	0.4	1.0	d	3½°	H=14 24 15
iS	E	47					
iP	Z	17 01 07.5	0.5	1.5	c	5¾°	H=16 58 41
eS	N/	02 14					
iP	Z	17 52 08.0	0.5	2.0	d	1°	H=17 51 49
iS	N	22.0					
iP	Z	18 08 55.4	0.6	3.8	d	3½°	H=18 07 58
iS	Eo	09 39			Felt:	Londolovit	Int. II-III
						Sohano	Int. V

9th October S.P N/S record's paper upside down.

Phase	Comp.	Time	T sec	A mm	GM	Dist	Remarks
iP	Z	01 02 45.2	0.5	9.0	d	2°	H=01 02 15
iS	N/	03 08.0					
iP	Z	12 19 05.2	0.4	2.0	d	2°	H=12 18 33
iS	E	29.0					

RABAUL

			T sec	A mm	GM	Dist	Remarks
9th October contd.							
eP	Z	13 16 20½	0.5	0.6	d		Regional
iP	Z	13 28 35.5	0.5	3.0	c	4°	H=13 27 34
eS	No	29 22					
iP	Z	13 35 09.6	0.4	5.0	d	¾°	H=13 34 54
iS	E	21.0					
iP	Z	15 07 05.0	0.5	2.0	d	3¼°	H=15 06 15
eS	E	43					
iP	Z	17 27 30.6	0.5	18.0	dSE	3¼°	H=17 26 42
eS	Eo	28 09					
eP	Z	17 58 39½	1.0	2.0	d		(Deep shock)
iP	Z	18 35 18.3	0.3	4.0	d	1°	H=18 35 01
iS	E	31.0					
iP	Z	18 38 52.5	0.3	1,2	d		(Regional)
eP	Z	23 28 58	0.5	1.0	d	½°	H=23 23 34
iS	E	24 16.0					
10th October							
iP	Z	00 39 42.0	0.4	15.0	c	1½°	H=00 39 16
iS	E	40 02.0					
eP	Z	00 59 40½	0.4	1.5	d	2½°	H=00 58 58
iS	E	01 00 12.0					
iP	Z	02 32 25.2	0.5	35.0	d	1°	H=02 03 09
iS	N/	37.0					
iP	Z	03 03 15.0	0.5	1.0	c	3°	H=03 01 12
eS	N/	04 50					
iP	Z	04 07 25.8	0.4	5.0	d	1½°	H=04 06 59
iS	N	45.5					
iP	Z	05 15 49.3	0.5	2.0	d	3°	H=05 15 03
iS	Eo	16 24					
eP	Z	06 46 540	0.5	1.5	d		(Regional)
iP	Z	08 25 23.8	0.6	1.0	d		Regional
iP	Z	11 01 18.8	0.6	3.0	d		Regional
iP	Z	14 39 33.0	0.3	2.0	d	1°	H=14 39 14
iS	N	47.2					
*******							
iP	Z	00 33 34.5	0.4	10.5	d		Local
iS	N	39.0					
iP	Z	03 59 19.5	0.4	1.5	c		Regional

KEREVAT

2nd October, 1967

			T sec	A* mm	GM	Dist	Remarks
eP	E	01 25 10	0.6	0.7	c	$4\frac{1}{4}^{\circ}$	H=01 24 04
iS	E	26 00.6					
iP	E	05 31 02.1	0.2	1.0	c	$2\frac{1}{4}^{\circ}$	H=05 30 28
iS	E	27.7					
i(P)	Z	07 55 12.5				(1°)	H=07 54 (55)
iS	E	25.1					
iP	Z	08 46 18.2			c	$2\frac{1}{2}^{\circ}$	H=08 45 39
iS	E	48.0					
eP	E	09 02 40	0.4	0.6	c	$2\frac{1}{2}^{\circ}$	H=09 02 01
iS	E	03 10.1					
iP	Z	12 37 45.3			c	$\frac{1}{4}^{\circ}$	H=12 37 39
iS	E	50.2					
eP	E	14 39 $35\frac{1}{2}$	0.5	0.9	c	$2\frac{1}{2}^{\circ}$	H=14 38 56
i	E	54.9					
iS	E	40 05.0					
iP	Z	14 54 50.9	0.2	3.7	c		Regional
eP	Z	15 13 39	0.4	0.4	c	$2\frac{1}{2}^{\circ}$	
i	E	14 00.7					H=15 13 00
iS	E	08.8					
eP	E	15 47 $45\frac{1}{2}$	1.2	0.8	c		Regional
eP	Z	16 25 12	0.4	0.2	d	$2\frac{1}{2}^{\circ}$	H=16 24 43
iS	E	41.8					
eP	Z	18 25 $35\frac{1}{2}$	0.4	0.2	d	$2\frac{1}{2}^{\circ}$	H=18 24 57
iS	E	26 04.9					
iP	E	21 08 11.0	0.2	1.0	d		
i	E	30.1					C.B.M.
i	E	36.0					

3rd October, 1967

			T sec	A* mm	GM	Dist	Remarks
eP	Z	15 15 32	1.0	0.2	d		H=15 14 41
iS	N	16 00.7					
iP	E	18 22 04.0	0.6	1.5	d		Regional
iP	E	19 46 16.5	0.3	1.0	d	2°	H=19 45 43
iS	N	41.9					
iP	E	00 48 30.3	0.2	1.3	c		
eP	E	01 38 55	0.6	0.5	d	$2\frac{1}{4}^{\circ}$	H=18 38 18
iS	N	39 23					
iP	E	04 55 $50\frac{1}{2}$			d		Regional
iS	N	56 07.2					
iP	E	06 12 09.6			c	1°	H=0612 51
iS	N	23.2					
eP	E	08 58 $40\frac{1}{2}$	0.7	0.5	c	$2\frac{1}{2}^{\circ}$	H=08 58 00
iS	N	59 11.0					
iP	E	10 05 51.5			d	$2\frac{1}{4}^{\circ}$	H=10 05 36
iS	N	06 18.2					
eiP	E	11 41 $47\frac{1}{2}$	0.5	0.2	c	$1\frac{1}{4}^{\circ}$	
i	E	48.0					H=11 41 24
iS	N	42 05.8					

4th October, 1967

			T sec	A* mm	GM	Dist	Remarks
iP!	Z	02 52 34			c		Regional
eiP	Z	10 25 $05\frac{1}{2}$			d		Regional
i	Z	05.7					

KERAVAT

			T sec	A* mm	GM	Dist	Remarks
4th October contd.							
eP	E	15 34 51			c	¾°	H=15 34 36
iS	E	35 01.5					
eiP	Z	17 21 58½			d		Regional
i	Z	58.8					
eP	E	18 56 46	0.5	1.0	c	3°	H=18 56 00
iS	E	57 20.6					
iP	E	21 48 28.5	0.3	1.0	c	2¾°	H=21 47 46
iS	E	49 01.5					
iP	Z	23 15 09.8			c		Regional
5th October							
iP***	E	11 05 23.5			c	1¼°	H=11 05 00
iS	E	41.0					
iP	Z	12 36 15.4			c	1¾°	H=12 35 48
iS	E	46.1					
eP	E	16 55 24½	0.9	0.4	c		Regional
eP	E	17 54 19½	1.0	0.5	c		Regional
iP	Z	17 59 11.6				2¼°	H=17 58 36
iS	E	38.6					
iP	Z	19 49 16			d	(4½°)	H=19 48 (06)
i(S)	E	50 10.3					
eP***	E	00 19 07½	0.5	0.2	d	1¾°	H=00 18 38
eS	N	29.3					
iP	E	00 33 35.9			c		Local
i	E	36.4					
eP	E	03 59 24			d	2¼°	H=03 58 47
iS	N	52.4					
iP	E	04 08 21.1			d		Regional
iP	E	04 22 22.6	0.2	1.1	d	¼°	H=04 21 30
iS	N	23 00.1					
eP	E	07 52 34	0.5	1.0	c	¾°	H=07 52 19
iS	E	50.6					
eP	E	08 15 03	0.5	0.3	d	¼°	H=08 14 57
iS	E	16 07.5					
eP	E	10 36 35½	0.7	0.8	d		Regional
6th October	S.P.Z confused by microseisms S.P.N/S & E/W have no records.						
7th October							
eP****	Z	14 54 30½			d	3°	H=14 53 45
iS	N	55 05.5					
eP	N	16 12 34				2°	H=16 12 04
iS	E	56.9					
eP	N	19 11 44			c	3¼°	H=19 10 53
iS	E	12 23.0					
iP	E	19 52 42.0	0.2	1.0	c		Regional
iP	E	20 47 19.2			c		Regional
eP****	N	06 19 19			c	2¾°	H=06 18 36
iS	E	51.9					
eP	N	10 38 44	0.5	0.7	c		Teleseism
e	E	44 10					

KERAVAT

7th October contd.

			T sec	A* mm	GM	Dist	Remarks
eP	Z	10 49 40½			c	2°	H=10 49 09
iS	E	50 04.0					
iP	N	11 43 28.0			d	1¼°	H=11 43 07
iS	N	44.5					
iP	N	12 01 59.0			c	2¼°	H=12 01 25
iS	E	02 25.6					

8th October

			T sec	A* mm	GM	Dist	Remarks
iP	Z	07 20 27.6			c	½°	H=07 20 15
iS	E	35.2					
iP	E	09 27 35½			d	¼°	H=09 27 29
iS	E	40.3					
eP	E	13 14 22			c	3¼°	H=13 13 32
iS	E	15 00.5					
iP	Z	13 56 29.8	0.3	1.3	c	2½°	H=13 56 50
iS	E	59.5					
iP	Z	14 25 22.0	0.2	1.0	c		Regional
iP	E	17 01 06.4	0.4	1.1	d	½°	H=17 00 55
iS	E	02 14.2					
iP	Z	17 52 08.4	0.2	1.0	d	1°	H=17 51 50
iS	E	22.7					
eiP	Z	18 08 54	0.4	0.2	d		Regional
i	Z	54.2					

ESA'ALA

			T sec	A* mm	GM	Dist	Remarks
20th September, 1967.							
eP	Z	09 47 58 0	0.5	0.2	c		Teleseism
i	Z	48 03.3					
iP	Z	10 41 27.3	0.3	1.0	c	5½°	
i	Z	29.0					H=10 40 03
iS	N	42 32.7					
eP	Z	11 38 38½	0.7	0.7	d		Teleseism
21st September, 1967							
eiP	Z	03 38 53			c	5°	
i	Z	53.6					H=03 36 37
iS	N	39 51.5					
iP	Z	11 08 36.5	0.7	1.3	c	2¾°	H=11 07 53
iS	N	09 10.0					
iP	Z	12 18 00.5			d		(Teleseism)
eP	Z	17 59 47	0.5	0.3	d	4½°	H=17 58 40
iS	N	18 00 39.6					
22nd September, 1967							
eP	Z	10 27 20	0.7	0.9	d	(58)°	
e(S)	N/	35 13					
iP	Z	20 49 43.5	0.3	1.5	d	5½°	H=20 48 22
iS	N	50 46.5					
23rd September, 1967							
iP	Z	07 02 13.9	0.7	1.2	d		Teleseism
e	Z	03 50½					
i	Z	07 40.0					
eP	Z	07 09 51	1.0	1.0	d		Teleseism
24th September, 1967			NIL RECORDED				
25th September, 1967							
iP	Z	13 21 11.0			c		Local
eP	Z	16 59 33	0.4	0.4	c	5½°	
eS	E	17 00 38½					H=16 58 09
eP	Z	17 09 38	1.4	0.1	c		Teleseism
i	Z	40.4					
26th September, 1967							
iP	Z	14 15 01.9			d	2¾°	H=14 14 19
iS	N/	34					
e	Z/	16 30 20					Traces
iP	Z	17 07 15.8			d	5½°	H=17 05 55
iS	E	08 18.4					
27th September, 1967			NIL RECORDED				
28th September, 1967							
iP	Z	04 57 53.1			c		Regional
eP	Z	06 07 51			d	4°	H=06 06 51
iS	E	08 37.0					
eP	Z	06 33 42	0.7	0.7	c	4½°	H=06 32 32
iS	N	34 36.1					
iP	Z	08 25 50.7	0.5	1.5	d	4°	H=08 24 50
iS	E	26 37.1					

			T sec	A* mm	GM	Dist	Remarks

ESA'ALA

28th September, 1967 (Cont'd)

			T sec	A* mm	GM	Dist	Remarks
eP	Z	08 46 34			d	4°	H=08 45 33
iS	E	47 21.6					
eP	Z	10 20 39½	0.6	0.8	c	3¾°	H=10 19 41
iS	E	21 24.3					
eP	Z	10 58 52	0.6	0.7	c	3¾°	H=10 57 54
iS	E	59 37.1					
eip	Z	23 53 02			c	4°	
i	Z	02.4					H=23 54 02
iS	E	48.2					

29th September, 1967

			T sec	A* mm	GM	Dist	Remarks
eP	Z	04 07 59	0.5	0.5	d	4½°	
i	Z	08 07.1					H=04 06 49
i	Z	11.5					
iS	E	53.1					

30th September, 1967

			T sec	A* mm	GM	Dist	Remarks
eP	Z	00 58 38½	0.4	0.7	c	4°	H=00 57 39
iS	E	59 25.0					
iP	Z	08 05 21.0	0.5	1.5	d		Teleseism
i	Z	28.0					
iP	Z	09 10 33.1	0.4	1.0	c	4°	H=09 09 33
iS	E	11 18.6					
iP	Z	10 30 28.4	0.4	3.0	c	4°	H=10 29 28
iS	E	31 14.7					
iP	Z	10 41 48.1			c	4½°	H=10 40 38
iS	E	42 32.6					

S.P. E/W & N/S components out of order **1st October, 1967**

			T sec	A* mm	GM	Dist	Remarks
eP	Z	06 49 19	0.4	0.4	c		Regional
eP	Z	15 46 00½	0.5	0.2	d		Regional

2nd October, 1967

			T sec	A* mm	GM	Dist	Remarks
eP	Z	00 18 06	0.9	0.9	d		Teleseism
iP	Z	08 46 50.8			c	2½°	H=08 46 11
iS	N/	47 21					
eP	Z	14 55 05½	0.4	0.4	c		
i	Z	06.6					H=14 54 03
iS	N/	53½					
iP	Z	18 25 06.1	0.4	1.0	d		Regional

(G.W. D'ADDARIO)

CENTRAL OBSERVATORY RABAUL

VULCANOLOGIST-IN-CHARGE

30 OCT 1967

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL.

RABAUL	(RAB)	From: 10th October, 1967. To: 17th October, 1967.
SULPHUR CREEK	(SUL)	Not operational
KERAVAT	(KRT)	From: 8th October, 1967. To: 15th October, 1967.
ESA'ALA	(ESA)	No records received.
TABELE	(TBL)	From: 25th September, 1967. To: 9th October, 1967.
AGENAHAMBO	(AGE)	No records received.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longtitude 152°10'11.4".E., Elevation 183.5m Foundation: Basalt Flow

WORLD WIDE STANDARD SYSTEM

		To Sec	Tg Sec
S.P.	Maximum magnification 12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification 750 at25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification 4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15 Kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations.

Instrumentation: Benioff Seismometer (Geotech Mod.4681-A Vertical Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484 at the Central Observatory. Drum Speed 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m. Foundation: Basalt Flow
S.P. Zw Maximum magnification 24,000 at 0.25 sec To=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°10'32.5".E., Elevation 8.5m Foundation: Unconsolidated volcanic ash.
S.P. Zs Maximum magnification 6,000 at o.25 sec To=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elefation 91.0m Foundation: Unconsolidated volcanic ash.
S.P. Zr Maximum magnification 24,000 at 0.25 sec To=1.0

TAVURVUR (TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation 60m Foundation: Andesite flow.
S.P.-Zt Maximum magnification 48,000 at 0.25sec To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation 332.3m Foundation: Unconsolidated volcanic ash.
Maximum magnification 24,000 at 0.25 sec To=1.0

STATION INSTRUMENTATION (Continued)

		To sec	Tg sec

KEREVAT (KRT)

Latitude $04^{\circ}20'$S., Longtitude $152^{\circ}00'$.E
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

		To sec	Tg sec
	Z	1.2	0.2
	N	1.2	0.2
	E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude $09^{\circ}44'18''$.2S., Longtitude $150^{\circ}48'50''$.7E. Elevation 46m
Foundation: Granite Gneiss

Seismometer	Recorder	To sec	Tg sec
Benioff Variable-Reluctance Seismometer 107.5 Kg 1 Geotech Mod 1051 Vertical 2 Geotech Mod 1101 Horizontal	Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min		0.2
		1.0	
	Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude $08^{\circ}48'30''$.S., Longtitude $148^{\circ}06'12''$.E., Elevation 303m
Foundation: Unconsclidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude $04^{\circ}06'04.67''$.S., Longitude $145^{\circ}00'41.37''$.E., Elevation 179.5m
Foundation: Basalt Flow.

Seismometer	Recorder	To sec	Tg sec
Benioff Variable-Reluctance Seismometer 107.5 Kg 1 Geotech 1051 Vertical	Helicorder System (Geotech Mod 248-1 Amplifier Mod 4983 Heat sensitive recording paper 60 mm/min. Drum speed adjustable to 120mm/min 180mm/min		0.02
		1.0	
	Photographic Recorder System (Geotech Mod 1560-D), Drum speed 60mm/min		0.2

S.P. Zp Magnification 1350 Attenuator set at 30db

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (EAS:TABL:KRT:AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB: EAS: TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "1" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S & W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Reading:

When readings are given with a decimal figure , they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION ", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees
H	=	Original time
h	=	Focal depth in Km

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

(G. W. D'ADDARIO)
Vulcanologist-in-Charge

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PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Records
RABAUL							
11th October							
iP	Z	08 21 00.5	0.5	2.0	d	$1\frac{1}{2}^{\circ}$	H=08 20 32
iS	N	22.0					
iP	Z	10 02 58.5	0.5	22.0	d	$\frac{1}{4}^{\circ}$	H=10 02 52
iS	N	03 03.5					
eP	Z	11 30 $48\frac{1}{2}$	0.5	1.0	d	$2\frac{1}{2}^{\circ}$	H=11 30 08
iS	E	31 19.2					
iPn	Z	13 14 57.0	0.6	3.0	d	3°	H=13 14 11
i	Z	59.5					
iS	N/	15 32.0					
eP	Z	15 59 09	0.5	1.0	c	(37°)	
e(S)	N/	16 04 48					
eP	Z	16 32 46	0.5	1.2	c	5°	H=16 31 32
iS	N	33 43.0					
iP	Z	16 50 03.3	0.3	2.0	d	3°	H=16 49 16
iS		39.0					
iP	Z	20 46 17.3	0.4	1.0	c		Regional
i	Z	25.0					
12th October							
iP	Z	01 22 42.8	0.5	2.0	d	3°	H=01 21 58
i	Z	46.1					
iS	N	23 17.2					
iP	Z	01 45 12.0	0.4	2.0	d	$1\frac{1}{2}^{\circ}$	H=01 44 47
iS	N	31.0					
iP	Z	01 47 47.0	0.4	5.0	c	$1\frac{1}{2}^{\circ}$	in coda of preceeding shocks
iS	N	48 08.0					H=01 47 19
eP	Z	06 40 50	0.5	1.5	c	27°	
i	Z	51.2					
iS	N/	45 19.0					
iP	Z	07 09 15.5	0.4	1.5	c	3°	H=07 08 31
iS	N	49.5					
iP	Z	08 40 02.5	0.6	2.0	c	$6\frac{1}{4}^{\circ}$	H=08 38 28
i	Z	05.5					
eS	N/	41 16					
iP	Z	10 29 11.3	0.4	2.0	c	$1\frac{1}{2}^{\circ}$	H=10 28 46
iS	N	30.5					
iP	Z	11 03 24.0	0.5	1.2		6°	H=11 01 53
eS	N	04 $34\frac{1}{2}$					
iP	Z	13 02 41.5	0.6	1.0	c	$(8\frac{1}{2}^{\circ})$	H=13 00 (35)
i(S)	N	04 20.0					
eP	Z	18 36 34	0.5	1.0	d	$23\frac{1}{2}^{\circ}$	
i	Z	35.0					
iS	E/	40 31.0					

			T sec	A mm	GM	Dist	Records
RABAUL (Cont'd)							
13th October							
iP	Z	02 49 18.4	0.4	6.0	d	$\frac{1}{4}^{\circ}$	H=02 49 12
iS	N	23.5					
eP	Z	07 15 31	0.5	1.0	c	3°	H=07 14 44
iS	N	16 07.5					
eP	Z	07 28 56	0.8	2.0	d	$12\frac{1}{2}^{\circ}$	
eS	E/	31 16					
iP	Z	08 11 59.0	0.5	2.0	d	$1\frac{1}{4}^{\circ}$	H=08 11 38
iS	N	12 14.5					
iP	Z	11 47 19.8	0.4	1.0	d	$1\frac{1}{2}^{\circ}$	H=11 46 52
iS	N	41.2					
iP	Z	12 39 44.8	0.5	23.0	CNW	$\frac{3}{4}^{\circ}$	H=12 39 30
iS	E/	56.0					Felt: Rab 1-11
iP	Z	17 42 31.5	0.4	1.0	c	$4\frac{1}{2}^{\circ}$	H=17 41 24
eS	E/	43 24					
iP	Z	18 59 10.0	0.4	2.0	d	4°	H=18 58 09
iS	E	57.0					
iP	Z	19 40 36.0	0.5	2.8	c	$1\frac{1}{2}^{\circ}$	H=19 40 10
iS	N	55.5					
iP	Z	20 56 17.0	0.4	2.0	c	$2\frac{1}{2}^{\circ}$	H=20 55 36
iS	E	48.0					
14th October							
eiP	Z	01 15 56	0.4	1.0	d	$3\frac{1}{2}^{\circ}$	H=01 15 04
i	Z	59.5					
iS	N	16 36.0					
iP	Z	03 50 42.0	0.5	4.0	d		Regional
e	Z/	04 39 48			–		Traces
eP	Z	10 25 23	0.4	1.0	d	2°	H=10 24 50
iS	N	48.0					
iP	Z	11 45 27.0	0.5	1.0	d		Regional
eiP	Z	11 59 28	0.4	1.5	c	$4\frac{3}{4}^{\circ}$	H=11 58 15
I	Z	30.0					
iS	N	12 00 24.5					
iP	Z	12 48 13.3	0.4	2.0	d	$2\frac{1}{2}^{\circ}$	H=12 47 31
iS	N	45.5					
iP	Z	13 31 14.4	0.5	1.0	c	$3\frac{1}{4}^{\circ}$	H=13 30 25
iS	N	52.5					
iP	Z	13 53 11.8	0.5	2.0	d	$2\frac{1}{2}^{\circ}$	H=13 52 30
iS	N	44.0					
eiP	Z	14 59 57½	0.4	1.0	c	$2\frac{1}{2}^{\circ}$	H=14 59 19
i	Z	59.7					
iS	N	15 00 26.2					
eP	Z	16 12 18	0.5	1.0	d	$21\frac{1}{2}^{\circ}$	
eS	E/	16 11					
iP	Z	18 54 30.6	0.5	3.0	c	2°	H=18 54 00
i	Z	31.5					
iS	E	53.6					
iP	Z	22 23 47.4	0.3	1.0	d		Regional
15th October							
iP	Z	00 57 51.6	0.5	2.8	c	1°	H=00 57 34
iS	N	58 04.2					

RABAUL (Cont'd)

15th October (Cont'd)

			T sec	A mm	GM	Dist	Remarks
iP	Z	01 06 51.0	0.4	3.5	d		Regional
eiP	Z	08 19 27	0.5	3.0	c	(48°)	
i	Z	28					
i	Z	29.8					
e	Z/	21 38					
i(S)	E/	26 19.0					
iP	Z	10 43 50.0	0.4	4.0	c	2°	H=10 43 18
iS	N	44 14.0					
iP	Z	14 55 40.0	0.5	1.2	d	3°	H=14 54 54
i	Z	40.5					
eS	N	56 15					
iP	Z	16 47 40.2	0.5	1.0	d		Regional
iP	Z	21 12 42.5	0.4	2.0	d	2¼°	H=21 12 06
iS	N	13 09.5					
eP	Z	22 54 48	0.5	1.5	d	3¼°	H=22 54 00
iS	N	55 25.0					
e	Z/	23 16 38			-		Traces

16th October

			T sec	A mm	GM	Dist	Remarks
iP	Z	00 44 38.4	0.4	8.0	d	1½°	H=00 44 14
iS	N	56.5					
iP	Z	01 45 55.0	0.5	2.5	c	1¼°	H=01 45 32
iS	E	46 12.1					
eP	Z	04 43 34	0.5	1.8	d	2°	H=04 43 01
iS	N	59.2					
iP	Z	10 40 56.4	0.4	7.0	c	1°	H=10 40 40
iS	N	41 08.4					
iP	Z	13 29 51.1	0.4	3.5	d		
e	Z/	13 51 12			-		Traces
eP	Z	14 41 09	0.5	1.0	c		(Regional)
iP	Z	16 57 28.2	0.3	3.0	d	1¼°	H=16 57 08
iS	E	43.0					
iP	Z	17 03 19.5	0.5	2.0	c	32°	
ES	N/	08 28					
eiP	Z	22 08 54½	0.5	1.5	d	3°	H=22 08 07
iS	N	09 30.5					

17th October

			T sec	A mm	GM	Dist	Remarks
iP	Z	11 21 08.5	0.5	1.0	d	2¼°	H=11 20 31
iS	N	36.5					
iP	Z	11 58 43.6	0.3	1.8	c	2¾°	H=11 58 00
i	Z	45.8					
iS	N	59 17.0					
eP	Z	13 48 41½	0.6	1.0	c	22°	
i	Z	42.2					
eS	N/	52 44					
eP	Z	14 14 42	0.5	1.2	d	27°	
eS	N/	19 12					
iP	Z	18 15 54.4	0.3	1.8	c	¾°	H=18 15 39
iS	N	16 05.5					
e(P)	Z	18 50 46	0.5	1.0	c	(17°)	
i	Z	51.6					
e(S)		53 44					
iP	Z	21 12 30.0	1.0	10.0	d	63°	
eS	E/	20 56					

			T sec	A* mm	GM	Dist	Remarks
KEREVAT							
9th October							
iP	Z	01 02 42.3			c		Regional
iP	Z	12 19 03.0	0.2	2.0	c	$1\frac{1}{2}^{\circ}$	H=12 18 27
iS	E	23.3					
iP	Z	13 16 13.4	0.2	1.1	c	$3\frac{1}{2}^{\circ}$	H=13 15 17
iS		56.0					
iP	Z	13 28 34.0			d		Regional
iP	Z	13 35 10.0	0.2	6.7	d		Local
eP	Z	15 07 06	0.6	0.7	d	$3\frac{1}{2}^{\circ}$	H=15 06 10
iS7	E	49.0					
iP	Z	17 27 31.2	0.3	1.0	d		Regional
eP	Z	17 58 40	0.6	0.4	c		(Teleseism)
iP	Z	18 35 17.0			c	$1\frac{3}{4}^{\circ}$	H=18 34 49
iS	E	27.9					
eP	E	18 38 53½	0.4	0.5	c		Regional
10th October							
iP	Z	00 39 39.4			d	$1\frac{1}{4}^{\circ}$	H=00 39 17
iS	E	56.6					
iP	N	00 59 43.5			c	$2\frac{1}{2}^{\circ}$	H=00 59 05
iS	E	01 00 12.5					C.B.M.
IP!	Z	02 32 37.0			c		Regional
iP	N	03 03 17.5	0.5	2.1	d		Regional
iP	N	04 07 26.4	0.2	1.0	c	1°	H=04 07 09
iS	N	39.3					
iP	N	05 15 11.0			c		Regional
eP	N	11 01 18	1.0	0.4	d		(Teleseism)
eP	N	14 39 32½			d	$\frac{3}{4}^{\circ}$	H=14 39 17
iS	E	43.9					
11th October							
iP	Z	08 20 59.3	0.2	2.7	d	$1\frac{1}{2}^{\circ}$	H=18 20 33
iS 7	N	21 19.3					
iP	Z	10 02 59.8			c	$\frac{1}{4}^{\circ}$	H=10 02 52
iS	N	03 05.5					
iP	N	11 30 50.8	0.2	1.0	d	2°	H=11 30 19
iS	E	31 13.0					
iP	Z	13 14 56.2	0.2	1.2	c	$2\frac{3}{4}^{\circ}$	H=13 14 12
iS	E	15 30.3					
eP	N	15 59 14½	1.0	0.5	c		Teleseism
eP	N	16 32 46	0.7	0.2	c	$4\frac{1}{2}^{\circ}$	H=16 31 40
i	N	33 39.9					
iS	N	37.5					
iP	E	16 50 04.0	0.3	0.6	d	$3\frac{1}{4}^{\circ}$	H=16 49 14
iS	E	42.0					
12th October S.P.Z. badly confused by microseisms							
iP	E	01 22 43	0.5	0.8	d	$2\frac{1}{4}^{\circ}$	H=01 22 06
i	E	49.4					
iS	E	23 11.5					
iP	E	01 45 09.5	0.2	1.0	c	$1\frac{1}{4}^{\circ}$	H=01 44 48
iS	E	25.4					

KEREVAT (CONT'D)

12th October (Cont'd)

			T sec	A mm	GM	Dist	Remarks
iP	N	01 47 47.2			d	1¼°	H=01 47 25
iS	N	48 04.0					
iP	E	06 40 50.5	0.4	1.0	d	27°	
eS	E	45 21					
EP	E	08 40 03	0.5	0.7	d		Regional
iP	E	10 29 10.5	0.2	1.0	c	1¼°	H=10 28 48
iS	E	27.3					
eP	E	11 03 24½	0.6	0.6	c	6½°	H=11 01 46
iS	E	04 41.0					
eP	E	13 02 43.5	1.0	1.1	d	8½°	H-13 00 31
eS	N	04 19					
iP	E	18 36 35.0	0.6	1.8	d		Teleseism

13th October

			T sec	A mm	GM	Dist	Remarks
eP	N	07 15 39			c	3°	H=07 14 53
iS	E	16 14.4					
eP	N	07 28 56	1,0	1,0	c		Teleseism
iP	E	08 11 57.4			c		Regional
iP	Z	12 39 43.5			c		Regional
iP	Z	12 54 19.0	0.2	2.0	d	1°	H=12 54 04
iS	N	30.0					
eP	N	17 42 30	0.5	0.8	d		Regional
iP	N	18 59 10.3			c	2°	H=18 58 37
iS	E	35.0					
eP	N	19 40 33½			d	1¼°	H=19 40 11
iS	E	50.4					
eiP	N	20 56 17½	0.2	1.0	c	3°	H=20 55 31
iS	E	52.0					

14th October

			T sec	A mm	GM	Dist	Remarks
eP	E	01 15 58	0.5	0.5	d		Regional
iP	E	03 50 43.3	0.2	1.0	d		Regional
iP	E	10 25 23.4	0.6	0.8	c	2¼°	H=10 24 49
iS	E	49.0					
iP	E	11 59 30.5	0.2	0.7	c	4¾°	H=11 58 17
eS	E	12 00 26					
iP	E	13 31 25.2			c	1¼°	H=13 31 04
iS	E	41.0					
eP	E	13 53 12.2			c		Regional
eP	E	14 59 57	0.2	0.3	c	3°	14 59 10
iS	E	15 00 33.0					
iP	E	18 54 29.0	0.2	1.5	d		Regional
iP	E	22 23 32	0.3	0.5	c		Regional

15th October

			T sec	A mm	GM	Dist	Remarks
eP	N	00 57 53			d		Regional
iP	N	01 06 51.0	0.2	1.0	c		Regional
eP	N	08 19 29½	1.0	1.0	c		Teleseism
i	N	31.0					

KEREVAT (Cont'd)

15th October (Cont'd)

			T sec	A mm	GM	Dist	Remarks
iP	N	10 43 49.5	0.3	1.0	c	2°	H=10 43 17
iS	E	44 12.0					
iP	E	14 55 38.5	0.2	1.0	d	2¼°	H=14 55 01
iS	E	56 06.5					
eP	E	16 47 41	0.4	0.6	d		Regional

				T. sec	A* mm	GM	Dist	Remarks
TABELE								
25th September, 1967								
eiP	Z	23 53 38½		0.5	0.1	d		Regional
i	Z	39						
i	Z	01 00 00						
26th September				NIL RECORDED				
27th September								
eP	Z	04 59 04		0.8	0.5	c		Teleseism
i	Z	59 12½						
28th September				NIL RECORDED				
29th September				NIL RECORDED				
30th September				NIL RECORDED				
1st October				NIL RECORDED				
2nd October				NIL RECORDED				
3rd October				NIL RECORDED				
4th October								
eP	Z	06 19 51		0.9	1.0	d		Regional
i	Z	20 06.5						
iP	Z	06 21 06		0.5	4.0	d		Regional
i	Z	19						
eP	Z	17 23 31½		0.8	0.9	c		Teleseism
i	Z	38½						
i	Z	55						
i	Z	24 19½						
i	Z	25 59						
5th October				NIL RECORDED				
6th October								
eiP	Z	11 36 13		0.5	1.0	d		Regional
i	Z	13½						
i	Z	24						
i	Z	26½						
iP	Z	23 03 54		0.4	2.0	c		Teleseism
7th October				NIL RECORDED				
8th October								
eP	Z	17 01 13		0.6	0.3	d		Teleseism
e	Z	02 40						
eP	Z	18 10 27		0.9	0.5	d		Teleseism
9th October								
iP	Z	17 28 17½		0.5	3.0	c		
i!		19						

CENTRAL OBSERVATORY RABAUL

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VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL	(RAB)	From: 17th October,1967. To: 24th October,1967.
KEREVAT	(KRT)	From 15th October,1967 To: 22nd October,1967.
ESA'ALA	(ESA)	From 2nd October unserviceable.
TABELE	(TBL)	From 9th October,1967. To: 16th October,1967.
AGENAHAMBO	(AGE)	Not operational.

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longtitude 152°10'11.4".E., Elevation 183.5m Foundation: Basalt Flow

WORLD WIDE STANDARD SYSTEM		To Sec	Tg Sec
S.P.	Maximum magnification 12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification 6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification 750 at25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification 4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15 Kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations.

Instrumentation: Benioff Seismometer (Geotech Mod.4681-A Vertical Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484 at the Central Observatory. Drum Speed 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m. Foundation: Basalt Flow
S.P. Zw Maximum magnification 24,000 at 0.25 sec To=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°10'32.5".E., Elevation 8.5m Foundation: Unconsolidated volcanic ash.
S.P. Zs Maximum magnification 6,000 at o.25 sec To=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elefation 91.0m Foundation: Unconsolidated volcanic ash.
S.P. Zr Maximum magnification 24,000 at 0.25 sec To=1.0

TAVURVUR (TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation 60m Foundation: Andesite flow.
S.P.-Zt Maximum magnification 48,000 at 0.25sec To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation 332.3m Foundation: Unconsolidated volcanic ash.
Maximum magnification 24,000 at 0.25 sec To=1.0

STATION INSTRUMENTATION (Continued) | To sec | Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longtitude 152°00'.E
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

		To sec	Tg sec
	Z	1.2	0.2
	N	1.2	0.2
	E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longtitude 150°48'50".7E. Elevation 46m
Foundation: Granite Gneiss

Film Recorder System (Geotech Mod. 1301-A
Drum speed 15mm/min — 0.2

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal — 1.0

Photographic Recorder System (Geotech Mod. 60.0 1565-D)
Drum speed 30mm/min — 60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longtitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. — 0.6 — 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".E., Elevation 179.5m
Foundation: Basalt Flow.

Helicorder System (Geotech Mod 248-1 Amplifier Mod 4983
Heat sensitive recording paper 60 mm/min. Drum speed adjustable to 120mm/min 180mm/min — 0.02

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech 1051 Vertical — 1.0

Photographic Recorder System (Geotech Mod 1560-D),
Drum speed 60mm/min — 0.2

S.P. Zp Magnification 1350 Attenuator set at 30db

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (EAS:TABL:KRT:AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB: EAS: TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "1" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S & W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Reading:

When readings are given with a decimal figure , they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION ", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	= Peak-to-Trough trace amplitude in millimetres.
A	= Amplitude from W.W.S.S.
A*	= Amplitude from seismographs with different response to the W.W.S.S.
T	= Period in seconds
C.B.M.	= Confused by microseisms.
Dist.	= Distance in central angle degrees
H	= Original time
h	= Focal depth in Km

Remarks:

Local	= Typical signature of an earthquake with epicentre within 0.9°
Near	= Typical signature of an earthquake with epicentre between 0.9° and 9°
Distant	= Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	= Typical signature of an earthquake with epicentre more than 45°
Traces	= Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

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			T sec	A mm	GM	Dist	Remarks
RABAUL							
18th October, 1967.							
eP	Z	01 29 37½	0.5	1.8	d		Teleseism
e	Z/	10 42 52			+		Traces
e	Z/	14 38 51			+		Traces
iP	Z	17 37 59.1	0.3	2.0	c	1½°	H=17 37 34
iS	N	38 18.0					
iP	Z	19 00 43.0	0.5	1.0	d	1½°	H=19 00 15
iS	N	01 04.2					
iP	Z	19 23 12.1	0.4	3.0	d	1½°	H=19 22 47
iS	N	31.0					
iP	Z	22 13 54.8	0.5	2.0	c		(Regional deep)
i	Z	55.3					
i	Z/	14 10.0					
e(P)	Z/	23 39 08			c		Teleseism
19th October							
iP	Z	14 10 15.8	0.8	2.0	c	(4½°)	H=14 09 (05)
i	Z	21.0					
e(S)	N/	11 10					
iP	Z	15 28 39.2	0.5	1.3	d	3½°	H=15 27 43
eS	E	29 22½					
e	Z/	16 01 54			+		Traces
e	Z/	16 42 46			+		Traces
iP	Z	18 33 42.0	0.5	3.0	d	1¼°	H=18 33 22
iS	N	57.0					
iP	Z	18 59 31.0	0.5	2.0	d	2¼°	H=18 58 55
iS	N	58.0					
eP	Z	21 32 38½	0.5	1.0	d	3½°	H=21 31 42
iS	E	33 21.0					

20th October During the Rabaul Crustal Investigation the Labtronic Crystal Clock is used as Primary Time. Time programme has been changed accordingly. The hour mark is reduced by one Second and a six second mark is introduced to identify multiples of six hours. Daily drift ±5 milliseconds.

			T sec	A mm	GM	Dist	Remarks
e	Z/	01 22 38			+		Traces
i(P)	Z	03 57 47.2	0.5	5.0	d	1¼°	H=03 57 24
eS	N/	58 14					
iP	Z	07 32 21.0	0.5	2.0	d	¼°	H=07 32 15
iS	N	26.3					
iP	Z	09 07 42.0	0.4	2.0	d	1½°	H=09 07 14
i	Z	42.8					
i	Z	44.2					
iS	B	08 03.0					
iP	Z	09 34 01.4	0.4	1.0	c	½°	H=09 33 49
iS	N	10.0					
iP	Z	14 56 49.6	0.4	21.8	dSE	1½°	H=14 56 24
iS!	N	57 08.0					

IDESA 3070/10/67.

			T sec	A mm	GM	Dist	Remarks
RABAUL							
20th October contd.							
iP	Z	16 02 25.0	0.5	1.0	d		Regional
iP	Z	21 47 22.5	0.5	2.5	c	$1\frac{1}{4}^{o}$	H=21 47 01
iS	E	38.4					
iP	Z	22 46 51.3	0.4	1.0	d	2^{o}	H=22 46 21
iS	N	47 14.5					
21st October							
eP	Z	02 54 19	0.5	1.0	c		(Regional)
eiP	Z	03 32 $37\frac{1}{2}$	0.4	1.0	d		Teleseism
i	Z	39.0					
i	Z	43.5					
iP	Z	04 38 54.0	0.3	29.5	c		Rabaul crustal investigation.
i	Z	56.0					
i	Z	58.0					
iP	Z	04 57 32.2	0.5	2.0	c		Regional
eP	Z	07 18 21	0.4	1.0	d		Regional
i	Z	29.0					
iP	Z	09 27 11.4	0.4	2.0	c	$1\frac{1}{2}^{o}$	H=09 26 46
iS	N	30.4					
iP	Z	09 32 42.0	0.4	1.0	c	$2\frac{1}{2}^{o}$	H=09 32 00
i	Z	44.0					
iS	N	33 13.6					
iP	Z	10 57 24.2	0.3	1.5	c	$1\frac{3}{4}^{o}$	H=10 56 55
iS	N	46.0					
eP	Z	12 51 $27\frac{1}{2}$	0.5	1.5	d	$3\frac{1}{2}^{o}$	H=12 50 35
i	Z	28.2					
iS!	E/	52 07.0					
iP	Z	14 27 59.5	0.3	1.0	c	$1\frac{1}{2}^{o}$	H=14 27 35
iS	N	28 17.5					
iP	Z	14 47 44.0	0.5	5.0	d	$2\frac{1}{2}^{o}$	H=14 47 03
iS	N	48 15.0					
eP	Z	17 06 09	0.6	1.8	d		Deep shock
i	Z	09.5					
iP	Z	17 44 49.2	0.5	1.5	d	1^{o}	H=17 44 30
i	Z	52.0					
iS	N	45 03.0					
iP	Z	18 09 12.6	0.5	2.0	d	$2\frac{1}{2}^{o}$	H=18 08 31
iS	N	44.0					
iP	Z	19 16 16.2	0.3	1.5	d	$(3\frac{1}{2}^{o})$	H=19 15 (20)
i	Z	27.0					
e(S)	N	59.					
iP	Z	20 08 13.0	0.5	1.0	c	$1\frac{1}{2}^{o}$	H=20 07 45
iS	N	33.8					
iP	Z	21 36 49.8	0.5	20.0	d	$1\frac{1}{2}^{o}$	H=21 36 25
i	Z	50.0					
iS	N/	37 08.0					
22nd October							
iP	Z	00 30 30.5	0.4	1.0	d	$2\frac{1}{2}^{o}$	H=00 29 48
iS	N	31 02.5					
iP	Z	00 39 53.4	0.4	12.0	c		Rabaul crustal investigation
eP	Z	01 14 05	0.5	1.0	d		Regional
i	Z	09.0					
iP	Z	03 09 55.8	0.4	6.0	c		Rabaul crustal investigation

			T sec	A mm	GM	Dist	Remarks
RABAUL							
eP	Z	06 33 44	0.6	1.0	c	15°	
i	Z	49.2					
eS	N/	36 30					
iP	Z	07 10 02.5	0.4	2.5	c	$\frac{1}{4}$°	H=07 09 54
iS	N	08.5					
iP	Z	16 28 58.0	0.4	2.0	c	$1\frac{3}{4}$°	H=16 28 29
iS	N	29 23.0					
iP	Z	21 32 31.5	0.5	9.0	c	$3\frac{1}{4}$°	H=21 31 43
i	Z	33.0					
i	Z	35.3					
iS	E	33 08.0					
eP	Z	22 57 24	0.5	1.5	c		Regional
23rd October							
iP	Z	00 09 58.0	0.4	8.0	c	Rabaul crustal investigation	
iP	Z	02 09 59.9	0.3	12.0	c	Rabaul crustal investigation	
iP	Z	05 10 02.3	0.5	1.5	d	Rabaul crustal investigation	
eP	Z	08 22 13	0.5	1.0	d	$3\frac{1}{2}$°	H=08 21 16
iS	N	57.3					
iP	Z	08 33 20	0.6	1.0	c		Regional
i	Z	21.5					
iP	Z	08 34 51.0	0.5	2.2	c	2°	H=08 34 21
iS	E	35 14.0					
eP	Z	09 43 42	0.5	1.0	c		Regional
iP	Z	11 59 01.0	0.4	1.0	d	3°	H=~~09 42 14~~ 11 58 14
iS	E	36.8					
iP	Z	13 16 53.2	0.3	1.2	d	$1\frac{1}{2}$°	H=13 16 25
i	Z	56.1					
iS	N	17 14.0					
24th October							
iP	Z	00 28 41.5	0.5	1.5	d	$1\frac{1}{2}$°	H=00 28 15
iS	N	29 01.0					
iP	Z	09 50 45.1	0.5	18.5	c	($2\frac{1}{4}$°)	H=09 50 (08)
i(S)	N	51 13,5					
iP	Z	11 47 57.4	0.4	6.0	d	$2\frac{1}{4}$°	H=11 47 22
i	Z	58,0					
eS	N/	48 24					
iP	Z	17 09 45.8	0.5	6.0	d	$\frac{3}{4}$°	H=17 09 31
iS	E	57.0					

KEREVAT

From the 17th October Kerevat went onto Secondary Time.

16th October, 1967.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	10 40 57	0.2	4.0	c	1°	H=10 40 41
iS	N	41 09					
iP	Z	13 29 51			d		Regional
e(P)	Z	14 41 44	1.2	0.5	c		(Teleseism)
iP	Z	16 57 26			d	1°	H=16 57 09
iS	E	39					
eP	Z	17 03 16½	0.8	1.0	c		Teleseism
iP	Z	22 08 58			c	2¾°	H=22 08 13
i	E	09 22					
iS	E	32					

17th October

			T sec	A* mm	GM	Dist	Remarks
iP	Z	11 21 07	0.4	4.0	c	2°	H=11 20 32
iS	E	31½					
iP	Z	11 58 47	0.5	1.3	d	2¾°	H=11 57 59
iS	N	59 21					
eP	Z	13 23 12½	0.3	0.3	c	2¾°	H=13 22 25
iS	N	46					
iP	Z	13 24 15	0.2	2.1	d	1½°	H=13 23 46
iS	E	35½				In coda of preceding shock.	
eP	Z	13 48 41	1.0	2.5	d		Teleseism
iP	Z	14 14 41½	0.5	1.6	c		Teleseism
iP	Z	18 15 53½	0.2	3.0	d	¾°	H=18 15 35
iS!	N	16 05					
eP	Z	18 50 48½	1.3	0.5	d		Teleseism
iP	Z	21 12 31½			c		Teleseism

18th October

			T sec	A* mm	GM	Dist	Remarks
iP	Z	17 37 57	0.2	5.0	c	1¼°	H=17 37 33
iS	N	38 14					
iP	Z	19 00 44½	0.4	1.2	c	1½°	H=19 00 14
iS	N	01 06					
iP	Z	19 23 10	0.2	6.0	d	1¼°	H=19 22 46
iS	N	26½					
iP!	Z	22 13 54			d	-	Regional
eP	Z	23 39 19	1.0	0.5	d		Teleseism

19th October

			T sec	A* mm	GM	Dist	Remarks
eP	Z	14 10 13½	0.5	0.5	c	6°	H=14 08 42
i	Z		20				
iS	E	11 24					
eP	Z	15 28 39	0.5	1.5	d	4°	H=15 27 38
iS	N	29 25					
iP	Z	18 33 42½			d	1°	H=18 33 24
iS	E	56					
eP	Z	21 32 40	0.6	1.0	d	3½°	H=21 31 43
iS	N	33 21½					

20th October

Records damaged in developing, some shocks lost on the Z component.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	09 07 40			c		Regional
i	E	58					

KEREVAT

			T sec	A* mm	GM	Dist	Remarks
20th October contd.							
iP	N	14 56 50	0.7	2.5	d		Regional
eP	N	16 02 26½	1.0	0.4	c		(Teleseism)
i	N	29½					
iP	N	21 47 24			c	1°	H=21 46 59
iS	E	39					
iP	N	22 46 49	0.3	0.5	c	1¾°	H=22 46 16
iS	E	47 10½					

21st October S.P.Z confused by strong microseismic activity till 1200 hours.

			T sec	A* mm	GM	Dist	Remarks
eP	N	02 54 19	0.5	0.2	d		*(Regional)
iP	Z	03 32 35			C		Regional C.B.M.
i	E	33 00½					
iP	Z	04 38 56	0.2	2.0	c		Rabaul crustal investigation.
i	Z	39 03					
eP	E	04 57 30	0.5	0.3	c	4½°	H=04 56 26
eS	E	58 22					
iP	Z	09 27 14	0.3	4.0	c	1¼°	H=09 26 54 C.B.M.
iS	E	32					
iP	Z	09 32 39½	0.2	5.0	c	2¼°	H=09 32 06 C.B.M.
iS	N	33 06					
iP	Z	10 57 22			c	1½°	H=10 56 58
iS	N	44					
iP	Z	12 51 25			d		Regional
i!	Z	25½					
iP	Z	14 28 00	0.3	0.6	d	1½°	H=14 27 35
iS	E	19½					
iP	Z	14 47 43	0.5	4.0	d	2¼°	H=14 47 07
i	E	48 02½					
iS	E	11					
eP	Z	17 06 10½	0.8	1.0	c		Teleseism
iP	Z	17 44 50	0.3	8.0	d	1¼°	H=17 44 29
iS	N	45 05½					
iP	Z	18 09 12½	0.3	1.2	d	2½°	H=18 08 33
iS	E	42					
iP	Z	19 16 13½	0.2	1.8	d	3¼°	H=19 15 22
iS	E	52					
eP	Z	20 08 10½	0.4	0.2	c	2°	H=20 07 37
iS	N	36					

22nd October S.P.Z confused by strong microseismic activity till 0932 hours.

			T sec	A* mm	GM	Dist	Remarks
iP	N	00 39 57½	0.5	1.5	c		Rabaul crustal investigation
eP	E	01 14 09	0.6	0.5	d		Regional
iP	E	03 09 59½	0.2	1.4	c		Rabaul crustal investigation
i	E	10 08					
i	E	12½					
eP	E	06 33 48	0.5	1.0	c		Teleseism
iP	E	07 10 06	0.2	1.0	d		Local
iS	E	10					
iP	Z	16 28 54½	0.2	1.0	c	1½°	H=16 28 31
iS	E	29 13					
iP	Z	21 32 30			c		Regional
eP	Z	22 57 23	0.5	1.0	d		Regional.

TABELE

			T sec	A* mm	GM	Dist	Remarks
10th October,1967.							
iP	Z	08 23 46½	0.2	28.0	d		Regional
i	Z	56					
i	Z	24 26					
iP	Z	11 00 41	0.3	2.0	c		Regional
i	Z	01 19½					
i	Z	31					
11th October							
eP	Z	16 59 47½	0.4	1.0	c		Regional
i	Z	03 00 35½					
12th October							
eP	Z	08 38 38	0.5	1.0	d		Regional
i	Z	39 17½					
i	Z	41½					
eP	Z	17 34 11½	1.0	1.5	c		(Teleseism)
i	Z	13½					
i	Z	18½					
13th October							
eP	Z	07 27 11½			d		Distant Shock
i	Z	34½					
i	Z	28 13½					
i	Z	39½					
Continous tremor from 1844 to 1924 due to magma movement in main vent			~~Ave~~=0.3	2.5			
Again from 1952 to 2008 "			0.4	2.5			
14th October							
Continous tremor from 1352 to 1412			~~Ave~~=0.4	1.0			
15th October							
eiP	Z	16 30 02	0.5	1.0	c		Regional
i	Z	02½					
i	Z	03½					
16th October							
eP	Z	17 02 09	0.5	0.2	c		Teleseism
i	Z	10½					

Central Observatory
RABAUL
27th October 1967.

G. W. D'Addario.
Vulcanologist-in-charge.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY

RABAUL (RAB) From: 24th October, 1967
To : 1st November, 1967

KERAVAT (KRT) From: 22nd October, 1967
To : 29th October, 1967

ESA'ALA (ESA) Not operational

TABELE (TAB) From: 17th October, 1967
To : 24th October, 1967

AGENAHAMBO (AGE) Not operational

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m Foundation: Basalt Flow

WORLD WIDE STANDARD SYSTEM			To Sec	Tg Sec
S.P.	Maximum magnification	12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification	6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification	750 at25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification	4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component [illegible] Seismograph 15 Kg

L.P.-No.	Static magnification 12, air damping 10:1		3.6
L.O.-Eo.	Static magnification 10, air damping 10:1		3.8

RABAUL HARBOUR NETWORK

Consisting of five stations.

Instrumentation: Benioff Seismometer (Geotech Mod.4681-A Vertical Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484 at the Central Observatory. Drum Speed 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'32.5".E., Elevation 25.0m. Foundation: Basalt Flow
S.P. Zw Maximum magnification 24,000 at 0.25 sec To=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°10'32.5".E., Elevation 8.5m Foundation: Unconsolidated volcanic ash.
S.P. Zs Maximum magnification 6,000 at o.25 sec To=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elefation 91.0m Foundation: Unconsolidated volcanic ash.
S.P. Zr Maximum magnification 24,000 at 0.25 sec To=1.0

TAVURVUR (TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation 60m Foundation: Andesite flow.
S.P.-Zt Maximum magnification 48,000 at 0.25sec To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation 332.3m Foundation: Unconsolidated volcanic ash.
Maximum magnification 24,000 at 0.25 sec To=1.0

STATION INSTRUMENTATION (Continued) To sec Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longtitude 152°00'.E
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at 10% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longtitude 150°48'50".7E. Elevation 46m
Foundation: Granite Gneiss

Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min — 0.2

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech Mod 1051 Vertical
2 Geotech Mod 1101 Horizontal — 1.0

Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min — 60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longtitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

Attenuator setting 1/10, drum speed 60mm/min. 0.6 0.25
S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".E., Elevation 179.5m
Foundation: Basalt Flow.

Helicorder System (Geotech Mod 248-1 Amplifier Mod 4983 Heat sensitive recording paper 60 mm/min. Drum speed adjustable to 120mm/min 180mm/min — 0.02

Benioff Variable-Reluctance Seismometer 107.5 Kg
1 Geotech 1051 Vertical — 1.0

Photographic Recorder System (Geotech Mod 1560-D), Drum speed 60mm/min — 0.2

S.P. Zp Magnification 1350 Attenuator set at 30db

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (EAS:TABL:KRT:AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB: EAS: TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "1" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S & W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Reading:

When readings are given with a decimal figure , they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION ", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (Continued):

Symbols:

A, A*	=	Peak-to-Trough trace amplitude in millimetres.
A	=	Amplitude from W.W.S.S.
A*	=	Amplitude from seismographs with different response to the W.W.S.S.
T	=	Period in seconds
C.B.M.	=	Confused by microseisms.
Dist.	=	Distance in central angle degrees
H	=	Original time
h	=	Focal depth in Km

Remarks:

Local	=	Typical signature of an earthquake with epicentre within 0.9°
Near	=	Typical signature of an earthquake with epicentre between 0.9° and 9°
Distant	=	Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	=	Typical signature of an earthquake with epicentre more than 45°
Traces	=	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

(G. W. D'ADDARIO)
Vulcanologist-in-Charge

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL UNIT

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
25th October, 1967.							
iP	Z	01 07 00.1	0.5	8.0	c	43°	
i	Z/	17.0					
iS	N/	13 12.0					
iP	Z	01 18 59.5	0.4	2.0	d	5½°	H=01 17 38
i	Z	19 01.1					
iS	N	20 02.0					
iP	Z	02 21 14.5	0.3	3.0	d	¾°	H=02 20 59
iS	E/	25.0					
iP	Z	02 39 53.0	0.2	3.0	c		Rabaul crustal investigation
iP	Z	04 09 53.5	0.3	4.0	c		Rabaul crustal investigation
iP	Z	05 39 53.9	0.4	2.0	c		Rabaul crustal investigation
iP	Z	09 02 18.3	0.7	3.0	c		Regional deep
iP	Z	09 23 35.0	0.4	2.0	c		Regional
iP	Z	09 37 40.0	0.4	1.0	d	¾°	H=09 37 25
i	Z	40.2					
iS	N	51.0					
iP	Z	10 53 17.5	0.4	20.0	c	1°	H=10 53 00
iS	N	30.5					
e	Z/	15 25 48			-		Traces
e	Z/	16 23 52			-		Traces
eP	Z	19 41 47	0.5	1.0	c	2°	H=19 41 17
iS	E	42 09.8					
iP	Z	21 09 52.6	0.4	27.0	c		Rabaul crustal investigation
iP	Z	23 39 54.1	0.3	11.0	c		Rabaul crustal investigation
26th October		S.P.Z galvo lamp off from 26.0346 to 27.0051 hours.					
iP	Z	00 29 59.2	6.6	1.0	c	43°	
eS	N/	36 07					
iP	Z	01 39 55.0	0.3	24.0	c		Rabaul crustal investigation
i	N	05 09 56	0.3	2.0			Rabaul crustal investigation
e	Z/	09 32 03			+		Traces
eP	N	12 20 13			(c)	1½°	H=12 20 02 C.B.M.
iS	N/	51.0					
e	Z/	13 30 46			-		Traces
e	Z/	14 49 18			-		Traces
eP	Z	17 27 49	0.5	1.0	c	27°	
eS	E/	32 22					
iP	N	21 41 26.6	0.3	5.0			Local
27th October							
iP	Z	01 25 56.3	0.4	2.0	d		Regional
i	Z	26 02.2					
iP	Z	03 09 57.2	0.3	9.0	c		Rabaul crustal investigation
iP	Z	03 48 42.6	0.3	6.0	c	1°	H=03 48 24
iS	N	56.3					
iP	Z	05 09 58.3	0.3	10.0	c		Rabaul crustal investigation.

RABAUL

			T sec	A mm	GM	Dist	Remarks
27th October contd.							
iP	Z	07 52 54.8	0.5	2.8	d		Regional C.B.M.
i	Z	57.5					
eP	Z	15 59 32½	0.4	1.0	d	2¼°	H=15 58 55
i	Z	33.3					
iS	N	16 00 00.5					
iP	Z	16 08 55.4	0.5	2.0	d	2¼°	H=16 08 20
iS	N	09 22.6					
eP	Z	17 35 44	0.5	1.3	c		Regional
i	Z	51.5					
iP	Z	18 42 04.0	0.5	2.0	d	2½°	H=18 41 22
iS	E	36.0					
eP	Z	20 49 09.0	0.4	1.0	c		Regional
iP	Z	21 40 04.5	0.5	3.0	d		Regional
28th October	Strong microseismic activity from 27.2323 to 28.1530 hours associated with heavy rain.						
e	Z/	00 25 28			–		Traces
eP	Z	03 48 45½	0.4	2.0	c		Regional C.B.M.
iP	Z	07 32 19.3	0.5	7.0	c	2°	H=07 31 49
iS!	N/	42.0					
iP	Z	10 15 19.6	0.3	8.0	d	½°	H=10 15 10
iS	E/	27.0					
iP	Z	11 47 05.2	0.5	9.0	c	2¼°	H=11 46 29
iS!	N/	32.0					
iP	Z	11 59 03.0	0.4	4.0	d	2¼°	H=11 58 26
iS	N	31.5					
eP	Z	19 02 11½			c		(Regional)
e	Z/	19 53 24			–		Traces
iP	Z	23 40 04.3	0.3	5.0	c	Rabaul crustal investigation	
29th October	S.P.N galvo lamp off from 29.2323 to 30.0402 hours.						
iP	Z	00 12 46.5	0.4	3.0	d	2°	H=00 12 16
iS	E	13 09.5					
iP	Z	05 26 39.5	0.4	1.5	c	(10¾°)	
i	Z	46.2					
i(S)	E	28 41.0					
e	Z/	07 58 16			+		Traces
iP	Z	10 49 35.0	0.3	1.6	d	2°	H=10 49 04
iS	E	50 00.5					
iP	Z	11 05 27.2	0.4	2.6	d	1½°	H=11 05 02
iS	E	46.2					
iP?	Z	16 28 28.0	0.4	8.0	c	1¼°	H=16 28 06
iS	E	44.5					
iP	Z	19 27 24.5	0.4	2.0	c	1½°	H=19 26 56
iS	E	46.0					
iP	Z	19 50 29.2	0.3	2.0	d	2¼°	H=19 49 52
eS	E	57					
eP	Z	20 39 11½	0.4	1.3	d	6¾°	H=20 37 30
i	Z	26.3					
eS	N/	40 30					
iP	Z	22 26 54.2	0.4	2.0	d		Regional

			T sec	A mm	GM	Dist	Remarks
RABAUL							
30th October		S.P.Z no record between 30.0144 and 30.0322 hours					
iP	Z	01 19 55.1	0.3	2.0	d	2°	H=01 19 23
iS	E	20 19.5					
e(P)	Z/	02 42 05			c	27°	
eS	N/	46 38					
iP	Z	08 24 15.0	0.4	2.0	c	2°	H=08 23 42
iS	N	40.0					
iP	Z	09 10 00.3	0.5	5.0	d	4¼°	H=09 08 55
eS	N/	50					
eR	Z	16 49 44	0.3	1.0	c		Regional
31st October							
eiP	Z	01 19 17	0.5	1.0	d		Teleseism
i	Z	21,3					
i	Z	23.9					
eP	Z	10 20 43½	0.6	1.0	d		Teleseism
iP	Z	13 04 40.0	0.5	1.5	d	3°	H=13 03 53
i	Z	44.0					
i	Z	45.3					
iS	E	05 16.0					
iP	Z	13 30 44.5	0.5	1.5	d	3¼°	H=13 29 55
iS	N	31 22.0					
iP	Z	13 36 46.0	0.6	2.0	d	3¼°	H=13 35 57
iS	E	37 23.5					
iP	Z	16 09 32.0	0.6	3.0	d		(Regional)
iP	Z	16 15 40.6	0.5	1.0	d	1½°	H=16 15 15
i	Z	41.0					
iS!	N	59.5					
iP	Z	16 54 10.0	0.3	2.0	d	¼°	H=16 54 02
iS	N	16.0					
iP	Z	21 26 13.5	0.5	8.0	d	¼°	H=21 26 05
iS!	N	19.5					

KEREVAT

23rd October, 1967. S.P.Z confusrd by strong microseismic activity from 0158 to 0856 hours.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	02 10 03	0.3	8.0	c		Rabaul crustal investigation C.B.M.
i	Z	08					
i	Z	15					
i	E	05 10 10½	0.4	2.0	c		Rabaul crustal investigation C.B.M.
eP	E	08 22 16	0.6	1.0	d	3½°	H=08 21 20
i	E	39					
iS	N	59½					
eP	E	08 33 24	0.6	1.1	d	1½°	H=08 39 58
iS	E	44.1					
iP	Z	08 34 52½	0.4	5.0	d	2°	H=08 24 31
iS	E	35 16					
eP	N	09 43 44	0.8	0.4	d		Teleseism
iP	Z	11 58 59½	0.2	2.0	d	4½°	H=11 57 53
iS	E	59 51½					
iP	Z	13 16 51	0.3	2.9	d	1½°	H=13 16 27
iS	E	17 09½					

24th October S.P.Z confused by strong microseismic activity from 23.2318 to 24.1138 hours. And again from 24.1928 th 25.0227 hours

			T sec	A* mm	GM	Dist	Remarks
iP	Z	00 28 36	0.3	2.2	d	1½°	H=00 28 11
iS	N	55½					
iP	Z	09 50 44	0.3	9.1	c	1¼°	H=09 50 24
i	N	59					
iP	Z	11 47 55½	0.2	1.2	d	2°	H=11 47 24
i!	Z	56					
iS	E	48 19½					
iP	Z	17 09 47			d	1°	H=17 09 30
iS!	E	59½					

25th October S.P.Z confused by strong microseismic activity from 25.0240 to 1200 hours. And again from 25.1952to 26.0522 hours.

			T sec	A* mm	GM	Dist	Remarks
iP	Z	01 06 58½	0.7	12.0	c		Teleseism
iP	Z	01 19 02	0.3	3.0	c	4¾°	H=01 17 49
i	N	47					
iS	E	57½					
iP	Z	02 06 17	0.2	4.0	d	1½°	H=02 05 52.5
iS	N	35½					
iP	Z	02 21 12½	0.3	8.0	c	1°	H=02 20 56
iS	N	25					
iP	E	04 09 55	0.3	3.0	c		Rabaul crustal investigation
i	E	58					
iP	E	05 39 53½	0.3	1.0	c		Rabaul crustal investigation
i	E	59					
i	E	40 01½					
eP	E	09 02 21½	1.0	1.1	d		Regional
eP	E	09 23 34½	1.0	1.5	d		Regional
iP	Z	09 37 41			d	½°	H=09 37 29
iS	N	50½					
iP	Z	10 53 16			c		Regional C.B.M.
i(P)	Z	19 41 46½	0.2	1.0	c	(2°)	H=19 41 (15)
iS	E	42 10½					

KEREVAT

			T sec	A* mm	GM	Dist	Remarks
25th October contd.							
iP	E	21 09 56	0.2	3.0	c		Rabaul crustal investigation
i	E	59					
iP	N	23 09 58	0.3	4.0	c		Rabaul crustal investigation
26th October							
iP	E	00 29 04	0.4	2.0	d		Teleseism
iP	E	01 39 57	0.4	2.5	c		Rabaul crustal investigation
i	E	58½					
iP	N	05 09 57	0.2	3.0	c		Rabaul crustal investigation
iP	Z	12 20 27½			d	1½°	H=12 20 03
iS	E	45½					
iP	Z	17 27 46½	0.3	2.0	c		Teleseism
27th October S.P.Z confused by strong microseismic activity from 27.0220 to 27.1146 hours. And again from 27.1941 to 28.0348 hours							
eP	E	01 25 57½	0.5	0.5	d	3½°	H=01 25 03
iS	E	26 39½					
iP	Z	03 09 55½			c		Rabaul crustal investigation
i	E	58½					
iP	Z	03 48 45	0.2	4.8	c	1°	H=03 48 24
iS	E	59½					
i(P)	E	05 09 59	0.2	5.0	c		Rabaul crustal investigation
iP	Z	07 52 57½	0.2	4.0	c	[illegible]°	H=07 52 56 C.B.M.
eP	Z	15 59 31½	0.5	0.6	d	(1½°)	H=15 59 (09)
i	Z	34					
i(S)	E	58½					
iP	Z	16 08 52½	0.4	1.0	c	2¼°	H=16 08 12
i	Z	55					
iS	E	09 20					
i	N	28½					
iP	Z	17 35 50	0.5	1.3	c		(Teleseism)
i	Z	36 04					
iP	Z	18 42 09½	0.2	1.7	d	2°	H=18 41 31
iS	E	35½					
iP	Z	21 40 03	0.2	4.0	c		Rabaul crustal investigation
i	E	09½					
28th October S.P. Z confused by strong microseismic activity from 28.0450 to 28.1219 hours, and again from 28.2006-29.0138hours.							
iP	Z	03 48 51	0.2	5.0	d	2½°	H=03 48 09
i	E	49 16					
iS	E	22½					
iP	Z	07 32 18			c		Regional
iP	Z	10 15 23	0.3	4.0	d	[illegible]°	H=10 15 11
iS	N	32					
iP	Z	11 47 04			d		Regional
iP	Z	11 59 01½	0.2	4.0	d	2°	H=11 58 18
iS	E	26					
e	N	23 40 12½	0.5	0.3	c		Rabaul crustal investigation
i	N	58					

KEREVAT

29th October

			T sec	A* mm	GM	Dist	Remarks
eP	N	00 12 45½	0.4	0.2	c	1[illegible]°	H=00 12 18
iS	N	13 06½					
eP	N	05 26 42½	0.5	0.5	c	11°	
iS	N	28 45					
i(P)	Z	10 49 38½	0.2	1.0	d		Regional C.B.M.
iP	Z	11 05 25½	0.3	2.0	d		Regional
iP	Z	16 28 29½	0.3	3.5	c		Regional
iP	Z	19 27 41	0.2	1.2	c		Regional
iP	Z	19 50 32	0.3	2.0	c		Regional
i	Z	55½					
eP	E	20 39 19	0.5	1.0	d		Regional
i	E	33					
eP	E	22 26 54½	0.4	0.7	d	2½°	H=22 26 15
i	E	27 12					
iS	E	24½					

KEREVAT			T sec	A* mm	GM	Dist	Remarks
18th October							
iP	Z	05 47 54	0.5	1.0	c		Regional
i	Z	48 19					
19th October							
iP	Z	03 58 51	0.3	1.0	d		Regional
i	Z	51½					
i	Z	59 06½					
eP	Z	14 10 15½	0.5	0.2	d		Regional
i	Z	18					
i	Z	22½					
i	Z	11 37½					
20th October							
eiP	Z	16 03 17	0.5	0.2	d		Teleseism
i	Z	17½					
eP	Z	16 35 39½	0.5	0.2	c		Teleseism
i	Z	46					
i	Z	36 42½					
eP	Z	20 13 21	0.5	0.1	c		Regional
i	Z	35½					
i	Z	14 07½					
i	Z	10½					
21st October							
eP	Z	07 01 21	0.4	0.1	c		Teleseism
i	Z	33½					
i	Z	44½					
i	Z	02 49½					
iP	Z	12 51 49½	0.4	0.5	c		Teleseism
i	Z	53					
i	Z	52 05					
i	Z	26½					
22nd October		NIL RECOREDE					
23rd October							
eiP	Z	22 56 14	0.5	0.4	c		Regional
i	Z	14½					
i	Z	16					
i	Z	32					
24th October							
eiP	Z	00 45 58½			c		Regional
i	Z	59					
i	Z	46 03					
i	Z	23½					
i	Z	32					
i	Z	37					

Central Observatory
RABAUL

G.W.D'ADDARIO
Vulcanologist-in-charge.

TERRITORY OF PAPUA AND NEW GUINEA
RESIDENT GEOLOGICAL SECTION
VULCANOLOGICAL-SEISMOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

RABAUL (RAB)	From: 31st October, 1967 To : 7th Nobember, 1967
KEREVAT (KRT)	From: 29th October, 1967 To : 5th November, 1967
ESA'ALA (ESA)	Not operational
TABELE(TBL)	From: 23rd October, 1967 To : 30th October, 1967
AGENHAMBO (AGE)	Not operational

STATION INSTRUMENTATION

RABAUL (RAB)

Latitude 04°11'28.6".S., Longitude 152°10'11.4".E., Elevation 183.5m Foundation: Basalt Flow

WORLD WIDE STANDARD SYSTEM			To Sec	Tg Sec
S.P.	Maximum magnification	12,500 at 0.6 sec	1.0	0.74
S.P.-N&E	Maximum magnification	6,250 at 0.6 sec	1.0	0.74
L.P.-Z/N/E	Maximum magnification	750 at25.0 sec	15.0	100.00

Benioff Seismometer (Geotech Mod. 4681-A Vertical) - Helicorder (Geotech Mod. 2484) System:

S.P. Zh	Maximum magnification	4,000 at 1.0 sec	1.0	0.02

Heat sensitive recording paper 180mm/min., drum speed adjustable to 60mm/min., and 120mm/min.

Strong Motion Two-Component Omori Seismograph 15 Kg

L.P.-No.	Static magnification 12, air damping 10:1	3.6
L.O.-Eo.	Static magnification 10, air damping 10:1	3.8

RABAUL HARBOUR NETWORK

Consisting of five stations.

Instrumentation: Benioff Seismometer (Geotech Mod.4681-A Vertical Telemetered by land line (except TAVILIU, which is telemetered by radio) to a Helicorder (Geotech Mod 2484 at the Central Observatory. Drum Speed 60mm/min., adjustable.

WANLISS STREET

Latitude 04°11'39.6".S., Longitude 152°10'~~32.5~~ 33.3".E., Elevation 25.0m. Foundation: Basalt Flow
S.P. Zw Maximum magnification 24,000 at 0.25 sec To=1.0

SULPHUR CREEK (SUL)

Latitude 04°13'09.8".S., Longitude 152°10'32.5".E., Elevation 8.5m Foundation: Unconsolidated volcanic ash.
S.P. Zs Maximum magnification 6,000 at o.25 sec To=1.0

RABALANAKAIA (RAL)

Latitude 04°13'13.0".S., Longitude 152°12'07.0".E., Elefation 91.0m Foundation: Unconsolidated volcanic ash.
S.P. Zr Maximum magnification 24,000 at 0.25 sec To=1.0

TAVURVUR (TAV)

Latitude 04°14'12.0".S., Longitude 152°13'18.0".E., Elevation 60m Foundation: Andesite flow.
S.P.-Zt Maximum magnification 48,000 at 0.25sec To=1.0

TAVILIU (VUL)

Latitude 04°16'58.2".S., Longitude 152°08'44.6".E., Elevation 332.3m Foundation: Unconsolidated volcanic ash.
S.P.-Zv Maximum magnification 24,000 at 0.25 sec To=1.0

STATION INSTRUMENTATION (Continued)

		To sec	Tg sec

KEREVAT (KRT)

Latitude 04°20'S., Longtitude 152°00'.E
Foundation: Alluvium

Benioff, Moving-coil 3 Component, Film Recording Seismograph:

	To sec	Tg sec
Z	1.2	0.2
N	1.2	0.2
E	1.2	0.2

Sensitivity set at ~~1~~20% Z, at 10% N&E, drum speed 15mm/min.

ESA'ALA (ESA)

Latitude 09°44'18".2S., Longtitude 150°48'50".7E. Elevation 46m
Foundation: Granite Gneiss

	To sec	Tg sec
Film Recorder System (Geotech Mod. 1301-A drum speed 15mm/min		0.2
Benioff Variable-Reluctance Seismometer 107.5 Kg 1 Geotech Mod 1051 Vertical 2 Geotech Mod 1101 Horizontal	1.0	
Photographic Recorder System (Geotech Mod. 60.0 1565-D) Drum speed 30mm/min		60.0

S.P.Z. Magnification 36,000
S.P.N. Magnification 18,000
S.P.E. Magnification 18,000
L.P-Z/N/E Magnification - Attenuator set at 50%

AGENHAMBO (AGE)

Latitude 08°48'30".S., Longtitude 148°06'12".E., Elevation 303m
Foundation: Unconsolidated volcanic tuff.

Vertical Willmore Seismograph

	To sec	Tg sec
Attenuator setting 1/10, drum speed 60mm/min.	0.6	0.25

S.P.Z. Magnification 3,000

TABELE (TAB)

Latitude 04°06'04.67".S., Longitude 145°00'41.37".E., Elevation 179.5m
Foundation: Basalt Flow.

	To sec	Tg sec
~~Helicorder System (Geotech Mod 248-1 Amplifier Mod 4983 Heat sensitive recording paper 60 mm/min. Drum speed adjustable to 120mm/min~~ 180mm/min		~~0.02~~
Benioff Variable-Reluctance Seismometer 107.5 Kg 1 Geotech 1051 Vertical	1.0	
Photographic Recorder System (Geotech Mod 1560-D), Drum speed 60mm/min		0.2

S.P. Z~~p~~ **Magnification 1350 Attenuator set at 30db**

PRESENTATION OF DATA

All times are reduced to Greenwich Mean Time (G.M.T.), which is 10 hours behind Eastern Standard Time.

The recording drum of seismographs is driven by a synchronous motor. Alternating current with the accurate frequency of 60 cycle/sec. (RAB), 50 cycle/sec. (ESA:TBL:KRT:AGE) is supplied by an electronic A.C. generator. A.C. generators have crystal frequency regulation at RAB: ESA: TBL only.

At RAB, the time signal is marked every minute on the records from a crystal chronometer, and second marks from radio signal VNG (Australia) are recorded on one component according with the W.W.S.S. programme at six hour intervals. At ESA and TBL, the time signal is marked every minute on the records from a crystal chronometer, and second marks from Radio VNG Australia daily.

Direction of Motion:

"c" or "d" indicates initial compression or dilatation of the ground, respectively, from a wave of the compressional type. "1" or "-" indicates upward or downward motion of the ground, respectively, from a wave not known to be of the compressional type. N, E, S & W indicates that the initial horizontal direction of the ground motion was towards the north, east, south, west respectively.

Accuracy of Reading:

When readings are given with a decimal figure , they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases:

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity:

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale of 1931.

Determinations of Epicentres:

Where no source is cited, the determination of epicentres, origin time, focal depth, and distance in central angle degrees for local and regional earthquakes are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres:

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION ", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

PRESENTATION OF DATA (cont):

MAGNITUDE DEFINITION AND DETERMINATION

M_L - Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millemetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the nearest half unit.

The station correction factor is assumed to be zero until better known.

M_S - (Gutemberg & Richter, 1956) calculated from the amplitude of surface waves of 20 second period for shallow distant earthquakes.

M_B - Calculated from the ratio of amplitude over period for body waves on S.P. -Z of World-Wide Seismograph System only when depth known. The magnification factor for the standard seismograph is taken into account.

m - Unified magnitude (Gutemberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8\ M_L - 0.01\ M^2_L$$

$$m = M_B \text{ (without correction)}$$

$$m = 2.5 + 0.63\ M_S$$

Symbols:

A, A* = Peak-to-Trough trace amplitude in millimetres.
A' = Amplitude from W.W.S.S.
A* = Amplitude from seismographs with different response to the W.W.S.S.
T = Period in seconds
C.B.M. = Confused by microseisms.
Dist. = Distance in central angle degrees.
H = Origin Time
h = Focal depth in Km.
GM = Ground Motion

Remarks:

Local = Typical signature of an earthquake with epicentre within 0.9°

Near = Typical signature of an earthquake with epicentre between 9° and 0.9°

Distant = Typical signature of an earthquake with epicentre between 9° and 45°

Teleseism = Typical signature of an earthquake with epicentre more than 45°

Traces = Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

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TERRIT RY OF PAPUA AND NEW GUINEA
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VULCANOLOGICAL-SEISMOLOGICAL UNITS

PRELIMINARY EARTHQUAKE ANALYSIS
CENTRAL OBSERVATORY RABAUL

			T sec	A mm	GM	Dist	Remarks
RABAUL							
31st October, 1967							
iP	Z	23 47 32	0.5	2.0			Regional
1st November							
eiP	Z	06 14 28	0.4	2.0	d	2½°	H=06 13 46
iS	N	15 00.5					
iP	Z	09 39 44.0	0.3	2.0	d	1½°	H=09 39 19
iS	N	40 03.0					
iP	Z	09 46 27.2	0.5	10.0	d	1½°	H=09 46 02
iS	N	46.0					
eP	Z	15 06 42	0.3	1.0	d		Regional
eP	Z	16 18 25			d		Teleseism
eP	Z	16 40 06	0.5	1.0	d		Aftershock
iP	Z	17 07 28.2	0.5	3.0	d	3°	H=17 06 42
iS	E	08 03.0					
iP	Z	17 12 07.5	0.4	8.0	d	1¼°	H=17 11 46
iS	N	23.0					
eP	Z	17 26 01½	0.5	1.0	c		Regional
eP	Z	17 30 04			c		Regional
[illegible]P	Z	19 00 45½	0.3	1.0	d	17½	
iP	Z	48.5					
sP	Z/	58					
iS	N/	03 53.0					
i	N/	05 28.0					
iP	Z	19 19 16.8	0.5	3.5	d	1°	H=19 19 00
iS	N	29.0					
2nd November							
e	Z/	07 11 30			←		Traces
iP	Z	10 10 03.5	0.5	2.0	d	2¼°	H=10 09 26
iS	E	31.0					
iP	Z	13 55 24.0	0.4	5.0	c	¼°	H=13 55 18
iS	N	30.0					
iP	Z	15 22 53.5	0.5	1.8	c	2¼°	H=15 22 18
iS	N	23 20.5					
iP	Z	17 44 14.0	0.5	2.5	c		Regional
eP	Z	22 05 11½	0.4	1.0	d		(Bismarck Sea)
iP	Z	23 25 03.2	0.3	6.0	c	1¾°	H=23 24 34
iS	N	25.0					
3rd November							
iP	Z	00 14 19.0	0.3	3.0	d		~~LOCAL~~ Local
iS	N	23.0					
iP	Z	02 19 40.0	0.4	3.0	c	1½°	H=02 19 15
iS	N	59.0					

RABAUL (cont.)

			T sec	A mm	GM	Dist	Remarks
3rd November (cont)							
iP	Z	03 26 48.6	0.5	5.0	c	$3\frac{1}{4}^{\circ}$	H=03 25 59
i	Z	52.0					
iS	E	27 26.5					
iP	Z	03 48 40.8	0.5	6.0	c	$1\frac{1}{2}^{\circ}$	H=03 48 17
iS	N	59.0					
iP	Z	04 38 03.0	0.4	5.0	c	$1\frac{1}{2}^{\circ}$	H=04 37 37
iS	N	22.5					
iP	Z	06 09 56.5	0.3	5.0	d	1°	H=06 09 38
iS	N	10 10.0					
eP	Z	07 37 27	0.8	2.8	d		Teleseism
iP	Z	29.5					
i	Z	38 04.0					
i	Z	36.0					
i	N/	41 11.0					
i	N/	20.0					
i	N/	48.0					
i	N/	42 56.0					
i	N/	43 50.0					
iS	N/	44 10.0					
i	N/	35.0					
iP	Z	10 59 07.8	0.3	2.0	d	$4\frac{1}{2}^{\circ}$	H=10 57 56
eS	N	11 00 02.8					
iP	Z	20 39 55.5	0.4	11.0	c	Rabaul Crustal Investigation	
iP	Z	22 39 56.5	0.4	10.0	c	Rabaul Crustal Investigation	
e	Z/	22 55 52			+		Traces
4th November							
iP	Z	00 39 58.0	0.4	2.0	c	$\frac{1}{2}^{\circ}$	H=00 39 46
eS		40 07½					
iP	Z	02 39 59.5	0.4	5.0	c	$1\frac{1}{4}^{\circ}$	H=02 39 37
eS	N	40 16½					
e	Z/	05 21 08			+		Traces
eiP	Z	10 22 50	0.6	1.0	d	(27°)	
iP	Z	51.7					
e		25 28½					
e	Z/	26 55					
e	N/	27 16					
e	Z	28 19½					
e	N/	30 20					
i	Z/	31 26					
i	N/	32 20.0					
i	Z	32 23.0					
e(P)	Z	13 34 49	0.5	1.0	d	(44°)	
eP	Z	53					
e(S)	N/	40 54					
e	E/	44 12					
e(ScS)	N/	24					
e	Z/	30					
iP	Z	14 39 16.5	1.0	2.0	c	(49°)	
i(s)	E/	46 18.0					
eP	Z	14 54 41	0.5	1.0	d		Teleseism
iP	Z	15 30 57.2	1.0	2.0	d		Teleseism
iP	Z	16 45 48.0	1.6	1.0	d		Teleseism deep
iP	Z	18 06 06.0	0.3	1.5	c	$1\frac{1}{2}^{\circ}$	H=18 05 40
iS	N	20.5					

RABAUL (cont)

			T sec	A mm	GM	Dist	Remarks
5th November, 1967		S.P.Z No record due to light failure					
iP	N	07 47 01.8	0.4	4.0	(c)	$\frac{3}{4}^{\circ}$	H=07 46 47
iS	N/	13.0					
e	Z/	10 23 08				-	Traces
iP	N	10 41 13.0	0.3	1.5	(d)	$\frac{3}{4}^{\circ}$	H=10 40 58
iS	E	24.0					
eP	N	13 33 13½	0.5	1.0	(d)	$2\frac{1}{2}^{\circ}$	H=13 32 33
iS	E	44.5					
eP	N	13 53 43	0.3	1.0	(d)	$2\frac{1}{2}^{\circ}$	H=13 53 05
eS	E/	54 12					
iP	N	20 04 11.0	0.5	1.0	(d)	1°	H=20 03 55
iS	E	23.0					
eP	N	21 13 52	0.5	1.0	(c)	$3\frac{1}{2}^{\circ}$	H=21 12 55
eS	N/	14 36					
6th November		From 0603 to 0605 hours no records secondary time power failure					
e	Z/	05 33 30				-	Traces
iP	Z	09 27 23.0	0.3	3.0	d	1°	H=09 27 06
iS	N	36.0					
iP	Z	13 09 17.0	0.4	1.0	d	$1\frac{1}{2}^{\circ}$	H=13 08 52
iS	N	36.0					
7th November		W.W.S.S. off from 2209 on 7th to 0446 on 8th due to installation of Wood-Anderson Seismographs in the Observatory vault. S.P.-Z. Benioff-Helicorder system: Drum speed adjusted 180mm per second. Magnification 16k.					
eP	Zh	01 20 57	0.2	1.0	d		Regional
iP	Zh	03 00 39.4	0.3	1.0	d		Regional
eP	Zh	03 41 51	0.4	1.0	d		Regional
eP	Z	10 25 45½	0.8	1.0	d	(16°)	
i	Z	50.0					
e(S)		28 52					
iP	Z	12 35 22.6	0.5	2.5	c	1°	H=12 35 02
iS	N	37.5					
iP	Z	13 39 09.0	0.5	6.0	c	2°	H=13 38 09
iS	N	32.0					
eP	Z	16 42 11½	0.4	1.0	c	1°	H=16 41 54
iS	E	24.5					
iP	Z	17 07 09.3	0.5	2.0	d	$2\frac{1}{4}^{\circ}$	H=17 06 36
iS	N	35.0					

KEREVAT KRT

30th October, 1967. S.P.Z confused by strong microseismic activity from 30.0350 to 30.0936 hours and from 30.2032 to 30.2307 hours.

			T sec	A* mm.	GM	Dist	Remarks
iP	Z	01 19 51½	0.2	2.2	c	2°	H=01 19 17
iS	N	20 16					
eP	N	02 42 19	0.9	1.0	d		Teleseism
iP	Z	09 09 59½	0.5	2.5	c	5¼°	H=09 08 43
i	E	10 20½					
i	E	42½					
iS	E	11 00					
eP	Z	16 48 23	0.6	0.2	c	(7°)	H=16 46 (39)
e(S)	N	49 43½					

31st October S.P.Z confused by strong microseismic activity from 30.2311 to 31.0900 and from 31.1916 to 01.0026.

eP	N	01 19 24	1.0	1.0	d	17°	
eS	N	22 35½					
e	Z	10 20 53			–		Traces
iP	Z	13 04 39½	0.2	2.0	d	2¼°	H=13 04 03
iS	E	05 08					
iP	Z	13 30 46½	0.1	1.0	c	3°	H=13 29 59
i	Z	31 13					
iS	N	23					
iP	Z	13 36 45	0.2	0.8	d	2½°	H=13 36 08
i	E	52½					
iS	E	37 15					
eP	Z	16 09 29½	0.5	0.9	c		Teleseism
eiP	Z	16 15 38			d	1¼°	H=16 15 16
i	Z	38½					
iS!	N	54½					
iP	Z	16 54 13½			c		Local
iP	Z	21 26 15½	0.2	2.0	d	½°	H=21 26 04
iS	N	25					
iP	Z	21 52 03½	0.2	4.0	d	1°	H=21 51 47
iS	E	16½					
iP	Z	23 47 30½	0.2	1.0	d	2°	H=23 46 47
iS	N	56½					

1st November S.P Z confused by microseismic activity from 01.0045 to 01.1249 and from 01.1933 to 02.0110.

iP	Z	06 14 30½			c	1¾°	H=06 14 02 C.B.M.
iS	E	15 02					
iP	Z	09 39 42½	0.3	1.0	c	1¼°	H=09 39 23
iS	E	58					
iP	Z	09 46 25½			d	1¼°	H=09 46 03
iS!	E	42½					
iP	Z	10 21 31½	0.4	1.2	c		(Regional)
iP	Z	15 06 43	0.5	1.0	d		Regional
e	Z	16 18 26½			–		Traces
iP	Z	17 07 28.0	0.3	1.0	d	2¾°	H=17 06 45
iS	N	08 02					
eiP	Z	17/12 18	0.5	0.6	d	½°	H=17 ~~07~~ 12 14
i	Z	18½					
iS	E	26					
eP	Z	17 26 03	0.3	0.9	d		(Teleseism)

KEREVAT KRT

			T sec.	A* mm	GM	Dist	Remarks
1st November contd.							
e(P)	Z	17 30 27	1.0	0.5	d		(Teleseism)
iP	Z	19 00 42	0.4	1.7	d		Teleseism
i	Z	47					
iP	Z	19 19 17	0.2	1.0	d	1¼°	H=19 18 58
i	Z	25					
iS	N	32½					
2nd November	S.P. Z confused by strong microseismic activity from 02.0134 to 02.0900 and from 02.1952 to 03.0023.						
iP	Z	10 10 10			d	2°	H=10 09 32
iS	E	32½					
iP	Z	13 55 33	0.5	2.5	d	¾°	H=13 55 13
iS	E	43					
iP	Z	15 22 56	0.3	1.5	d	2°	H=15 22 17
iS	E	23 21					
iP	Z	17 44 16½	0.4	1.5	c	2°	H=17 43 38
iS	E	42					
eP	E	22 05 47½	0.4	0.3	d		(Bismark Sea)
iP	Z	23 25 02½	0.3	5.0	d	1½°	H=23 24 36
iS	E	22					
3rd November	S.P. Z confused by strong microseismic activity from 03.0131 to 03.1154 and from 03.1914 to 03.2304						
iP	Z	02 19 37	0.4	3.0	d	1¼°	H=02 19 17
iS	E	53					
eP	E	03 26 49½	0.5	1.0	c	2¾°	H=03 26 06
i	E	51½					
iS	E	27 22½					
iP	Z	03 48 38½			d	2°	H=03 48 06 C.B.M.
iS	E	53½					
i(P)	E	04 37 55			c	(2°)	H=04 37 (25)
iS	E	38 18					
i(P)	Z	07 37 37			d		Regional C.B.M.
iP	Z	10 59 06	0.2	2.0	d	4¾°	H=10 57 53
iS	N	11 00 02½					
iP	Z	20 39 59	0.2	2.2	c		Rabaul crustal investigation
i	E	40 15					
iP	Z	22 40 02	0.3	3.0	c		Rabaul crustal investigation
i	E	12					
i	E	19½					
4th November	S.P. Z confused by strong microseismic activity from 03.2316 to 04.1000.						
iP	Z	10 22 50	0.5	4.0	d		Teleseism
i	Z	51					
i	Z O	23 24½					
i	N	32 21					
e	Z	37 22½					
iP	Z	14 39 19	1.1	5.7	d		Teleseism
iP	Z	14 54 45	0.2	1.0	d		Teleseism
eP	Z	16 45 48.	0.4	0.7	c		Teleseism
e	N	49 16					
iP	Z	18 06 00	0.2	8.0	d	1¼°	H=08 05 41
iS	N	15½					

KEREVAT KRT.

			T sec	A mm	GM	Dist	Remarks
5th November		S.P. Z confused by strong microseismic activity from 04.2228 to 05.1145 and from 05 1913 to C6.0047.					
iP	Z	07 47 01			c	$\frac{3}{4}^{o}$	H=07 46 45 C.B.M.
iS	E	12½					
iP	Z	10 41 13			c		Local C.B.M.
eP	Z	13 33 15½	0.4	0.8	c	$2\frac{1}{2}^{o}$	H=13 32 32
i	E	43					
iS	E	48					
iP	Z	13 53 46½	0.5	1.5	d	$2\frac{3}{4}^{o}$	H=13 53 03
i	E	54 11½					
iS	E	19½					
iP	E	21 13 51	0.5	1.7	d	$4\frac{1}{2}^{o}$	H=21 12 43
iS	E	14 43½					

....

TABELE TBL

			T sec	A* mm	GM	Dist	Remarks
24th October, 1967.							
Microseismic activity from 1613 to 1628 associated with heavy rainfall.							
iP	Z	19 19 17.0	0.4	12.5	d		Regional
25th October							
eP	Z	11 06 20½	1.3	0.3	d		Teleseism
26th October							
Continuous tremor from 1300 to 1325 associated with magma movement in main vent AV.T 0.3 Av. A* 2.0							
eiP	Z	14 16 14½	0.5	0.2	d		Regional
i	Z	15					
i	Z	20½					
i	Z	38					
iP	Z	22 13 43½	0.3	1.2	c		Regional
i	Z	45½					
i	Z	58½					
i	Z	14 02½					
i	Z	09					
27th October		NIL RECORDED					
28th October		NIL RECORDED					
29th October							
iP	Z	14 48 03½			d		Regional
i	Z	17½					
eP	Z	20 38 12½	0.4	0.4	c		Distant shock
i	Z	23½					
i	Z	48½					
i	Z	40 00					
30th October							
eiP	Z	15 48 39			c		Regional
i	Z	40					
i	Z	41					
i	Z	49 04					

10th November, 1967.
Central Observatory RABAUL

G. W. D'Addario
Vulcanologist-in-charge.

28 NOV 1967

P.E.A. Nov-67

TERRITORY OF PAPUA AND NEW GUINEA
GEOLOGICAL AND VOLCANOLOGICAL BRANCH
VOLCANOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY
1967

Rabaul	RAB	From: 8th November, 1967 To : 14th November, 1967
Keravat	KRT	From: 6th November, 1967 To : 14th November, 1967
Esa'ala	ESA	From: No records received To :
Tabele	TBL	From: 31st October, 1967 To : 6th November, 1967
Agenahambo	AGE	From: No records received To :
Waris	WAA	Not operational
Ulamona	ULA	Not operational
Piva	PIV	Not operational

STATION PERSONNEL

Central Observatory, Rabaul RAB	
Vulcanologist-in-Charge	G.W. D'Addario
Vulcanologist	R.F. Heming
Seismogram Readers	P.M. Leitao; M. Gaiam
Vulcanological Assistants	L. Topue; V. Kaita
Trainee Vulcanological Assistants	B. Talai; M. Salaiau
Senior Technical Officer	N.O. Myers
Technical Officer	[redacted]
Technical Assistant	P. Daimbari
Kerevat Outstation KRT	
Observer (part-time)	G.E. Chorick
Tabele Observatory TBL	
Observer	E. Ravian
Esa'ala Observatory	
Observer	F. Dira
Agenahambo Out-station	
Observer (part-time)	Br. B. Hughes

The Rabaul Preliminary Earthquake Analysis (P.E.A.) is produced by the staff under the direction of the Vulcanologist-in-Charge, Central Observatory Rabaul from whom additional information and photo copies from all stations may be obtained on request.

Please address all communications to:-

Vulcanologist-in-Charge,
Central Observatory,
P.O. Box 386,
RABAUL, T.P. & N.G.

SEISMOGRAPH STATIONS

Station	Code	South Latitude	East Longitude	Elev.	Foundation
NEW GUINEA					
Rabaul	RAB	04°11'28.6"	152°10'11.4"	183.5	Basalt Flow
Wanliss Street	WAN*	04°11'39.6"	152°10'33.3"	25.0	Basalt Flow
Sulphur Crddk	SUL*	04°13'09.8"	152°10'32.5"	8.5	Unconsolidated Volcanic Ash.
Rabalanakaia	RAL*	04°13'13.0"	152°12'07.0"	91.0	Unconsolidated Volcanic Ash
Tavurvur	TAV*	04°14'12.0"	152°13'18.0	60.0	Andesite Flow
Taviliu	VUL*	04°16'58.2"	152°08'44.6"	332.3	Unconsolidated Volcanic Ash
Kerevat	KRT	04°20'00	152°00'00	20	Alluvium
Ulamona	ULA	04°59'24.0"	151°16'30.0"		Lapilli Tuff
Tabele	TBL	04°06'04.67"	145°00'41.37"	179.5	Basalt Flow
Waris	WAA	04°07'00	145°06'00"	48	Lapilli Tuff
Piva	PIV	06°12'00"	155°03'30"	60	Alluvium
PAPUA					
Agenahambo	AGE	08°48'30"	148°06'12"	303	Uncolsolidated Volcanic Ash
Esa'ala	ESA	09°44'18"	150°48'50"	46.4	Granite-Gneiss

* Rabaul Harbour Network

STATION INSTRUMENTATION

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx.relat Magnification	Approx damping
New Guinea						
Rabaul Central Observatory						
W.W.S.S.S.	Z	1.0	0.74	60	12,500	critical
	N,E	1.0	0.74	60	6,250	critical
	Z/N/E/	15.0	100.0	15	750	critical
Benioff VRS 14.7Kg	Zh	1.0	0.02	180*	4,000	critical

* Recording is triggered by the onset of any earthquake with pre-determined minimum amplitude. Recorder is stopped auto matically by hour break pulse.

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx.relat Magnification	Approx damping
Omori 15Kg	No	3.6	-	24	12	10.1 air
	Eo	3.8	-	24	10	10.1 air
Wood-Anderson	Na,Ea	0.8	-	60	2,800	critical

Rabaul Harbour Network

Readings from the Harbour Network are entered in the P.E.A. only for large earthquakes.

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx.relat Magnification	Approx damping
WAN** Benioff VRS 14.7Kg	Z	1.0	0.02	60	5,240	critical
SUL** Benioff VRS 14.7Kg	Z	1.0	0.02	60	2,850	critical
RAL** Benioff VRS 14.7Kg	Z	1.0	0.02	60	8,075	critical
TAV** Benioff VRS 14.7Kg	Z	1.0	0.02	60	20,900	critical
VUL***Benioff VRS 14.7Kg	Z	1.0	0.02	60	5,000	critical

STATION INSTRUMENTATION

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx. Magnification	Approx damping
Rabaul Harbour Network (Cont'd)						

** Signals from these stations are telemetered by land line to Helicorder (Geotech Mod. 2484) at the Central Observatory.

*** Signals from this station are telemetered via VHF to its Helicorder at the Central Observatory

Keravat Out-station	KRT					
Benioff MCS 50Kg	Z	1.2	0.2	15	20% sensitivity. critical	
Benioff MCS 50kg	N,E	1.2	0.2	15	10% sensitivity. critical	
Ulamona Field Station	ULA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Piva Field Station	PIV					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Waris Field Station	WAA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

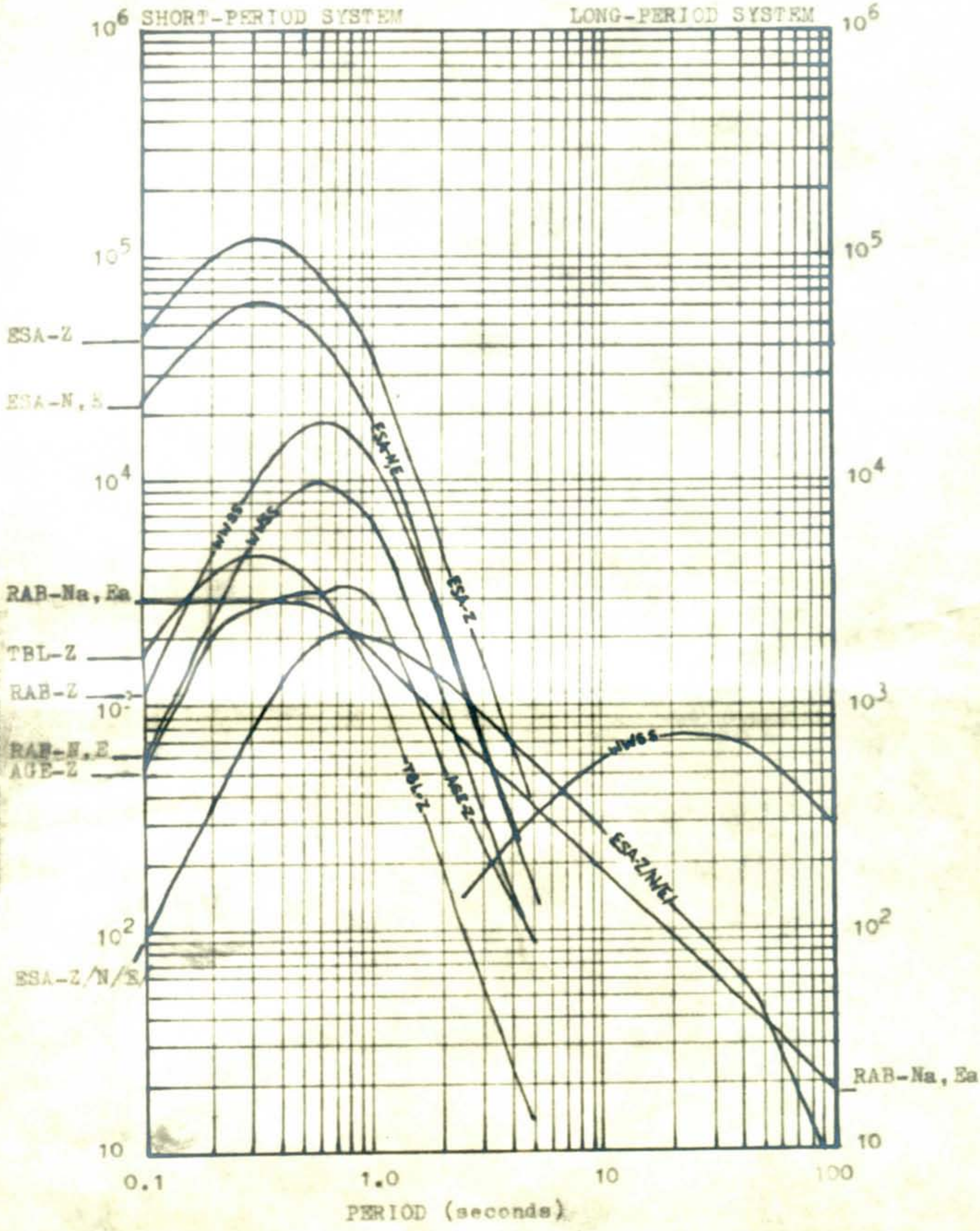
N.B These field stations consist of a permanent building in which ins-trunents are installed when necessary.

Details of emergency field stations, within the Territory will be listed when in operation.

Tabele Observatory	TBL					
Benioff VRS 107.5Kg	Z	1.0	0.2	60	1,350	critical
Papua						
Esa'ala Observatory	ESA					
Benioff VRS 107.5Kg	Z	1.0	0.2	15	36,000	critical
Benioff VRS 107.5Kg	N,E	1.0	0.2	15	18,000	critical
Benioff VRS 107.5Kg	Z/N/E/	1.0	60.0	30	50% sensitivity. critical	
Agenahambo Station	AGE					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

V.R.S. Variable Reluctance Seismometer
M.C.S. Moving-coil Seismometer

Relative magnification curves of all seismograph systems under the control of the Rabaul Central Observatory have been listed on the following page.



FREQUENCY RESPONSE CURVES OF THE INSTRUMENTS.

GWDA Nov.67

PRESENTATION OF DATA

(reviewed in November 1967)

All times are reduced to Greenwich Meam Time (GMT), which is 10 hours behind Eastern Standard Time.

At RAB and Harbour Network, the time signal is marked every minute on each seismogram record from the Observatory crystal chronometer, ~~and~~ Second marks from radio signal VNG (Australia) are recorded on W.W.S.S. S.P.-N component only according with the W.W.S.S. programme, at six hour intervals. Primary time is provided by W.W.S.S. equipment and secondary time by a Labtronic crystal chronometer with the accuracy of ± 5ms per day compared with VNG (Australia) with the aid of a chronoscope.

At TBL and AGE, the time signal is derived from a spring driven chronometer (Mercer) and marked each minute on records. Time accuracy is determined by comparison with signals from W.W.V.H. dailt. Linear correction is applied to the daily drift.

On all seismogram records time increases from left to right and time break is upward.

At RAB* and Harbour Network the recording drum of each seismograph is driven by a 110VAC 60Hz synchronous motor. The 110VAC is frequenoy regulated by a crystal chronometer.

* The Omori recording drum is driven by a nonregulated 50Hz frequency supply.

At ESA and KRT power for recorder motors is frequency regulated by a crystal chronometer at 50Hz. Power for AGE and TBL and field Stations is supplied by a 50Hz free running oscillator.

Direction of Motion

Upward direction of ground motion corresponds to upward trace motion on vertical seismogram records. Direction of component of ground motion to North or East corresponds to upward trace motion on horizontal seismogram records.

Vertical trace motion from impulsive onset of longitudinal waves of compressional or dilatational ground movement is indicated by "u" or "d" accompanied by N,S,E, or W, as per trace motion amplitude on horizontal seismogram records to represent vectorially the direction of ground motion. "+" or "-" indicate upward or downward motion of the ground respectively, from a wave not known to be of the longitudinal type.

Accuracy of Readings

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half second.

Crustal Phases

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale, of 1931.

PRESENTATION OF DATA (CONT'D)

Determinations of Epicentres

Where no source is cited, the determination of epicentres, origin time, focal depth and distance in central angle degrees from the pertinent station for local and regional earthquakes, are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

Magnitude Definition and Determination

M_L - Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millimetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the nearest half unit.

The station correction factor is assumed to be zero until better known.

M_S - Surface Wave Magnitude (Gutenberg & Richter, 1956) is calculated from the amplitude of surface waves of period near 20 seconds for shallow distant earthquakes.

M_B - Body Wave Magnitude is calculated from the ratio of amplitude over period for body waves on S.P.-Z of World-Wide Seismograph System only when depth is known. The magnification factor for the standard seismograph is taken into account.

m - Unified magnitude (Gutenberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8 M_L - 0.01 M^2_L$$
$$m = M_B \text{ (without correction)}$$
$$m = 2.5 + 0.63 M_S$$

Symbols

T - Period in seconds

A,A* - Peak-to-Trough trace amplitude in millimetres.

A - Amplitude from W.W.S.S.

A* - Amplitude from seismograph with different response to the W.W.S.S.

GM - Ground Motion

Dist - Distance in central angle degrees.

H - Origin Time

L - Focal depth in Kilometres

i - impulsive

e - emergent

CBM - Confused by microseisms

PRESENTATION OF DATA (CONT'D)

Remarks

Local	- Typical signature of an earthquake with epicentre within 0.9°
Near	- Typical signature of an earthquake with epicentre between 0.9° and 9°
Distant	- Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	- Typical signature of an earthquake with epicentre more than 45°
Traces	- Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G.W. D'ADDARIO
Vulcanologist-in-Charge

			T sec	A mm	A* mm	GM	Dist	H	Remarks
8th November, 1967									
RAB	iPZ/	061131.0	0.8	2.0		d	19½°		M_L=4.2
	iZ	35.0							
	ePPZ/	48							
	eSN/	02							
KRT	iPZ	061136½	0.5		2.0	u			
RAB	iPZ	105052.8	0.3	1.0		u	1½°	105029	M_L=3.9
	iZ	53.4							
	iSE	5111.0							
KRT	iPZ	105055½	0.2		2.0	d	1½°	105030	
	iSE	5114							
RAB	iPZ	141238.5	0.4	1.0		u	2°	141205	M_L=3.8
	iSE	1303.2							
KRT	ePZ	141237½	0.5		0.6	u	2°	141204	
	iSE	1303½							
RAB	iPZ	153426.5	0.5	2.0		d	1°	153409	M_L=3.2
	iSE	39.5							
KRT	iPZ	153425½				d	¾°	153411	
	iSE	36							
RAB	iPZ	161539.4	0.5	3.0		u	1½°	161514	M_L=3.9
	iSN	58.0							
KRT	ePZ	161540	0.2		0.3	u			
RAB	e(P)Z/	171934				d	60°		
	eSE/	2744							
RAB	iPZ	190123.0	0.4	2.0		u	1¼°	190103	M_L=3.2
	iSN	38.2							
KRT	Z	190125				u	1¼°	190103	
	N	42½							
RAB	iPZ	221001.0	0.4	4.0		d	2°	220928	M_L=4.9
	iSN	26.0							
KRT	iPZ	221003½	0.2		3.0	u	(3½°)	2209(11)	
	iE	37							
	i(S)E	44							
9th November									
RAB	iPZ	001000.8	0.5	3.0		d			Regional
RAB	iPZ	022357.0	0.5	2.0		d	23°		
	iZ	58.5							
	iZ	2651.5							
	eSE/	2805							
	eLqE/	22							
	eScSE/	3510							
KRT	i(P)Z	022355½				u			CBM
RAB	ePZ	040957½	0.5	2.0		d			Regional CBM
RAB	iPZ	062455.5		2.0		d			Regional CBM
KRT	iPE	062458½	0.3		1.0	d	2°	062426	
	iE	2521							
	iSE	23½							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
9th November (cont'd)									
RAB	iPZ	100802.0	0.4	7.0		u	2°	100730	M_L=4.5
	iSE	26.0							
KRT	i(P)E	100805	0.2		1.2		(2°)	1007(35)	CBM
	iSE	27½							
RAB	iPZ	202042.8	0.5	14.0		u	1½°	202016	M_L=5.3
	iSN	2102.5							
KRT	iPZ	202044				u	2°	202014	CBM
	iSE	2106½							
KRT	iPZ	231818	0.3		3.1	d	2°	231746	
	iSE	42							
KRT	iPZ	232722	0.2		1.2	u	3½°	232627	
	iZ	27½							
	iSE	2804½							
10th November									
RAB	e(P)Z/	114104				d			Teleseism CBM
RAB	iPZ	133853.0	0.4	5.5		d			Regional CBM
KRT	iPZ	133852	0.2		1.0	d	¾°	133836	
	iSN	3902							
RAB	iPZ	151727.0	0.5	3.0		d			Regional CBM
KRT	iPZ	151722	0.2		1.1	u	1¾°	151655	
	iZ	37½							
	iSE	43							
RAB	eZ/	191344				+			Traces
RAB	iPZ	191641.5	0.5	3.8		u	1½°	191615	
	iSE	1701.0							
RAB	iPZ	195833.6	1.0	2.0		d			(Regional deep)
	iZ	35.0							
KRT	iPZ	19 58 28	0.4		5.0	u			
11th November									
RAB	iPZ	015454.0	1.0	5.0		u			Regional
KRT	iPZ	015450½	0.4		3.0	u			
RAB	iPZ	075048.9	0.5	2.0		u			Regional
RAB	iPZ	112806.0	0.5	4.0		d	1½°	112746	M_L=3.6
	iSN	21.0							
KRT	iPZ	112805				d	1°	112747	
	iSE	19							
RAB	ePZ/	115540				u			Teleseism
RAB	iPZ	165918.6	0.4	16.0		d	1½°	165856	M_L=4.6
	iSN	39.0							
KRT	iPZ	165920	0.3		2.0	d	(1½°)	1658(52)	
	i(S)E	41½							
KRT	ePZ	174434½	0.2		0.3	d	2½°	174353	
	iSE	4504							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
11th November (cont'd)									
RAB	iPZ iSN	180635.0 0714.0	0.5	1.8		u	$3\frac{1}{4}^{o}$	180544	M_L=4.6
KRT	ePZ iZ i(S)E	$180627\frac{1}{2}$ 38 0717	0.2		0.3	u	$(4\frac{1}{4}^{o})$	1805(24)	
RAB	iPZ	190605.0	0.8	2.0		d			Regional
RAB	iPZ iSN	204629.0 47.0	0.5	3.0		u	$1\frac{1}{2}^{o}$	204605	
KRT	iPZ iSE	204630 47				d	$1\frac{1}{4}^{o}$	204607	
RAB	iPZ	215340	0.4	2.0		u	$2\frac{3}{4}^{o}$	215253	M_L=5.0
KRT	iPZ iSE	215340 5416	0.2		1.3	d	3^{o}	215252	
RAB	iPZ	221902.0	0.5	6.0		d			Regional
KRT	iPE	$221901\frac{1}{2}$	0.2		1.0	u			Regional
12th November									
RAB	iPZ iZ iSN/	024029.5 32.0 34.0	0.4	38.0		d	$\frac{1}{4}^{o}$	024023	M_L=3.8 Felt:Rabaul Int I-II
KRT	iPZ	024031				u			
RAB	iPZ iSN	033738.5 52.5	0.4	2.0		u	1^{o}	033720	M_L=3.7
KRT	iPE iSE	$051507\frac{1}{2}$ 18	0.2		1.0	d	$\frac{3}{4}^{o}$	051454	
RAB	ePZ eSE/	104404 4952	1.0	1.0		d	38^{o}		
KRT	iPZ	104408	0.7		1.3	u			
RAB	iPZ iSN	113430.5 45.0	0.5	1.6		d	1^{o}	113410	M_L=3.6
KRT	iPZ iSE	113430 50	0.2		1.5	u	$1\frac{1}{2}^{o}$	113403	
RAB	ePZ	$131232\frac{1}{2}$	0.5	1.0		u			Regional
RAB	ePZ eSN/	$173005\frac{1}{2}$ 3442	1.0	2.0		d	28^{o}		
KRT	ePZ	173004	1.0		0.7	u			
RAB	iPZ iSN	182700.8 20.0	0.3	1.8		d	$1\frac{1}{2}^{o}$	182636	M_L=4.0
KRT	iPZ iSN	$182657\frac{1}{2}$ $2715\frac{1}{2}$	0.2		4.0	d	$\frac{1}{2}^{o}$	182647	
RAB	iPZ iZ	190037.0 39.0	0.6	1.6		u			Regional
KRT	iPZ	$190036\frac{1}{2}$	0.5		1.0	u			
RAB	iPZ iSN	191926.3 48.0	0.4	3.0		u	$1\frac{3}{4}^{o}$	191854	M_L=4.2
KRT	iPZ iSE	$191927\frac{1}{2}$ $53\frac{1}{2}$	0.5		1.0	d	2^{o}	191854	

			T sec	A mm	A* mm	GM	Dist	H	Remarks
12th November									
RAB	iPZ	192232.2	0.4	4.0		d	1½°	192204	
	iSN	52.8							
KRT	iPZ	192230½	0.2		3.0	d	½°	192220	
	iSE	48½							
RAB	iPZ	212038.0	0.5	2.0		u	1¼°	212016	M_L=3.7
	iSE	54.5							
KRT	iPZ	212037	0.2		4.0	d	1¼°	212015	
	iSN	54							
RAB	iPZ	231841.8	0.5	4.0		u			Regional
	iZ	43.0							
KRT	iPZ	231841	0.3	3.0		u			
13th November									
RAB	iPZ	085625.5	0.5	3.0		d			Regional
KRT	eZ	085625							Traces
RAB	iPZ	125243.5	0.5	1.8		u	(6½°)	1251(06)	M_L=3.5
	iZ	5307.0							
	e(S)N	58							
KRT	e(P)Z	125245	0.5		1.0	d	6½	1251(10)	
	iZ	5312							
	iN	54							
	iSN	58½							
RAB	ePZ	134123	0.5	1.8		d	3°	134037	M_L=4.1
	eSE	58							
KRT	ePZ	134123½	0.5		0.5	u			
	eN	56							
RAB	iPZ	162629.6	0.4	3.0		u	2½°	162550	M_L=4.3
	iSN	59.0							
KRT	iPZ	162627	0.2		1.2	d	2½°	162549	
	iEE	54							
	iSE	56							
RAB	iPZ	192437.2	0.3	3.0		u	1¼°	192416	M_L=3.3
	iSE	53.5							
KRT	iPZ	192436½	0.2		3.2	d	1¼°	192416	
	iSE	51							
RAB	eiPZ	202145	0.5	3.0		d	3°	202059	M_L=4.9
	iZ	46.0							
	iZ	51.5							
	iZ	54.5							
	iSN	2220.0							
KRT	iPZ	202144½				u	2¼°	2021(08)	CBM
	i(S)E	2212½							
RAB	iZ	202725	0.3	4.0					Ship moving in harbour
	FZ	3258							
RAB	iPZ	222334.5	0.4	2.0		d	1°	222318	M_L=3.5
	eSN	47							
KRT	iPZ	222334	0.2		1.5		¾°	222317	
	eSE	44							
RAB	iPZ	225754.5	0.4	3.0		d	2½°	225714	M_L=5.0
	iZ	55.8							
	iSN	5825.5							
KRT	iPZ	225751½				u	2½°	225713	
	iSE	5820½							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
14th November									
RAB	iPZ iSN	052955.6 3044.5				uENE	$4\frac{1}{4}^{\circ}$	052852	M_L=5.6(RAB);6(PMG) Epicentre: 7°S.,149°30'E(RAB) 5.6S.,147°E (PMG)
WAN	iPZ	052955.8				u			
SUL	iPZ	052956.0	0.8		2.0	u			
RAL	iPZ	052955.9	0.8		12.0	u			
KRT	i(P)E iE	052654 55							
RAB	iPZ	055614.0	0.5	2.8		d			Regional
KRT	i(P)E	$055639\frac{1}{2}$							
RAB	iPZ iSN	125546.5 5600.2	0.3	3.0		u	1°	125528	M_L=3.3
KRT	iPZ iSE	125546 5600				d		125528	
KRT	iPZ iSE	132845 51	0.2		1.0	u	$\frac{1}{2}^{\circ}$	132842	

KERAVAT

6th November

		T sec	A mm	A* mm	GM	Dist	H	Remarks
iPZ iSN	$092725\frac{1}{2}$ $40\frac{1}{2}$	0.3		3.0	d	1°	092707	
iPZ eN	213833 4303	0.2		2.0	d			Teleseism

7th November

		T sec	A mm	A* mm	GM	Dist	H	Remarks
iPZ	102551	0.5		2.0	u			Teleseism
iPZ iSN	$123522\frac{1}{2}$ $34\frac{1}{2}$				d	1°	123506	
iPZ iSN	133908 $27\frac{1}{2}$				u	$1\frac{1}{2}^{\circ}$	133843	
ePZ iZ iZ iSZ	170738 39 $07\frac{1}{2}$ $0826\frac{1}{2}$	0.3		0.1	u	4°	170634	

12th November

			T sec	A mm	A* mm	GM	Dist	H	Remarks
KRT	iPZ iSE	$204709\frac{1}{2}$ $24\frac{1}{2}$	0.3		3.0	d	$1\frac{1}{4}^{\circ}$	204650	

TABELE

		Time	T sec	A mm	GM	Dist	Remarks
31st Oct.1967							
eP	Z	15 07 57½	0.4	0.2	d		Regional
i	Z	08 36½					
i	Z	42					
i	Z	52					
1st Nov							
eiP	Z	03 20 38½	0.5	1.4	d		Regional
i	Z	50					
i	Z	21 04					
eP	Z	06 08 08½	0.5	0.4	d		Regional
i	Z	15					
i	Z	28					
i	Z	34					
iP	Z	17 28 44	0.3	15.5	c		Regional
i	Z	29 04					
eP	Z	18 59 11	1.0	0.3	d		Teleseism
e	Z	14					
i	Z	19 01 14					
		02 14					
2nd Nov.							
iP	Z	13 01 23½	0.4	2.0	d		Local
i	Z	36					
eP	Z	22 04 09	1.0	0.4	d		Regional
i	Z	10					
i	Z	28½					
i	Z	05 30½					
3rd Nov.							
iP	Z	22 53 42	0.5	0.4	c		Regional
i	Z	47½					
i	Z	54 55					
4th Nov.		Nil recorded.					
5th Nov.		Nil recorded.					
6th Nov.		Nil recorded.					

Central Observatory
RABAUL

G. W. D'ADDARIO
Vulcanologist-in-charge.

17th November 1967.

P.E.A. Nov-67

TERRITORY OF PAPUA AND NEW GUINEA
GEOLOGICAL AND VOLCANOLOGICAL BRANCH
VOLCANOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY
1967

Rabaul	RAB	From: To :	14th November, 1967 21st November, 1967
Keravat	KRT	From: To :	14th November, 1967 21st November, 1967
Esa'ala	ESA	From: To :	NOT OPERATIONAL
Tabele	TBL	From: To :	6th November, 1967 14th November, 1967
Agenahambo	AGE	From: To :	NOT OPERATIONAL
Waris	WAA	Not operational	
Ulamona	ULA	Not operational	
Piva	PIV	Not operational	

STATION PERSONNEL

Central Observatory, Rabaul	RAB	
Vulcanologist-in-Charge		G.W. D'Addario
Vulcanologist		R.F. Heming
Seismogram Readers		P.M. Leitao; M. Gaiam
Vulcanological Assistants		L. Topue; V. Kaita
Trainee Vulcanological Assistants		B. Talai; M. Salaiau
Senior Technical Officer		N.O. Myers
Technical Officer		~~R.J. Conway~~
Technical Assistant		P. Daimbari
Kerevat Outstation	KRT	
Observer (part-time)		G.E. Chorick
Tabele Observatory	TBL	
Observer		E. Ravian
Esa'ala Observatory	ESA	
Observer		F. Dira
Agenahambo Out-station	AGE	
Observer (part-time)		Br. B. Hughes

The Rabaul Preliminary Earthquake Analysis (P.E.A.) is produced by the staff under the direction of the Vulcanologist-in-Charge, Central Observatory Rabaul from whom additional information and photo copies of records from all stations may be obtained on request.

Please address all communications to:-

Vulcanologist-in-Charge,
Central Observatory,
P.O. Box 386,
RABAUL, T.P. & N.G.

SEISMOGRAPH STATIONS

Station	Code	South Latitude	East Longitude	Elev.	Foundation
NEW GUINEA					
Rabaul	RAB	04°11'28.6"	152°10'11.4"	183.5	Basalt Flow
Wanliss Street	WAN*	04°11'39.6"	152°10'33.3"	25.0	Basalt Flow
Sulphur Creek	SUL*	04°13'09.8"	152°10'32.5"	8.5	Unconsolidated Volcanic Ash
Rabalanakaia	RAL*	04°13'13.0"	152°12'07.0"	91.0	Unconsolidated Volcanic Ash
Tavurvur	TAV*	04°14'12.0"	152°13'18.0	60.0	Andesite Flow
Taviliu	VUL*	04°16'58.2"	152°08'44.6"	332.3	Unconsolidated Volcanic Ash
Kerevat	KRT	04°20'00	152°00'00	20	Alluvium
Ulamona	ULA	04°59'24.0"	151°16'30.0"		Lapilli Tuff
Tabele	TBL	04°06'04.67"	145°00'41.37"	179.5	Basalt Flow
Waris	WAA	04°07'00	145°06'00"	48	Lapilli Tuff
Piva	PIV	06°12'00"	155°03'30"	60	Alluvium
PAPUA					
Agenahambo	AGE	08°48'30"	148°06'12"	303	Uncolsolidated Volcanic Ash
Esa'ala	ESA	09°44'18"	150°48'50"	46.4	Granite-Gneiss

* Rabaul Harbour Network

STATION INSTRUMENTATION

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx.relat Magnification	Approx damping
New Guinea						
Rabaul Central Observatory						
W.W.S.S.S.	Z	1.0	0.74	60	12,500	critical
	N,E	1.0	0.74	60	6,250	critical
	Z/N/E/	15.0	100.0	15	750	critical
Benioff VRS 14.7Kg	Zh	1.0	0.02	180*	4,000	critical

* Recording is triggered by the onset of any earthquake with pre-determined minimum amplitude. Recorder is stopped auto matically by hour break pulse.

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx.relat Magnification	Approx damping
Omori 15Kg	No	3.6	-	24	12	10.1 air
Omori 15Kg	Eo	3.8	-	24	10	10.1 air
Wood-Anderson Torsion	Na,Ea	0.8	-	60	2,800	critical

Rabaul Harbour Network

Readings from the Harbour Network are entered in the P.E.A. only for large earthquakes.

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx.relat Magnification	Approx damping
WAN** Benioff VRS 14.7Kg	Z	1.0	0.02	60	5,240	critical
SUL** Benioff VRS 14.7Kg	Z	1.0	0.02	60	2,850	critical
RAL** Benioff VRS 14.7Kg	Z	1.0	0.02	60	8,075	critical
TAV** Benioff VRS 14.7Kg	Z	1.0	0.02	60	20,900	critical
VUL***Benioff VRS 14.7Kg	Z	1.0	0.02	60	5,000	critical

STATION INSTRUMENTATION

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx. Magnification	Approx damping
Rabaul Harbour Network (Cont'd)						

** Signals from these stations are telemetered by land line to Helicorder (Geotech Mod. 2484) at the Central Observatory.

*** Signals from this station are telemetered via VHF to its Helicorder at the Central Observatory

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx. Magnification	Approx damping
Keravat Out-station	KRT					
Benioff MCS 50Kg	Z	1.2	0.2	15	20% sensitivity critical	
Benioff MCS 50kg	N,E	1.2	0.2	15	10% sensitivity critical	
Ulamona Field Station	ULA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Piva Field Station	PIV					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Waris Field Station	WAA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

N.B These field stations consist of a permanent building in which ins-trunents are installed when necessary.

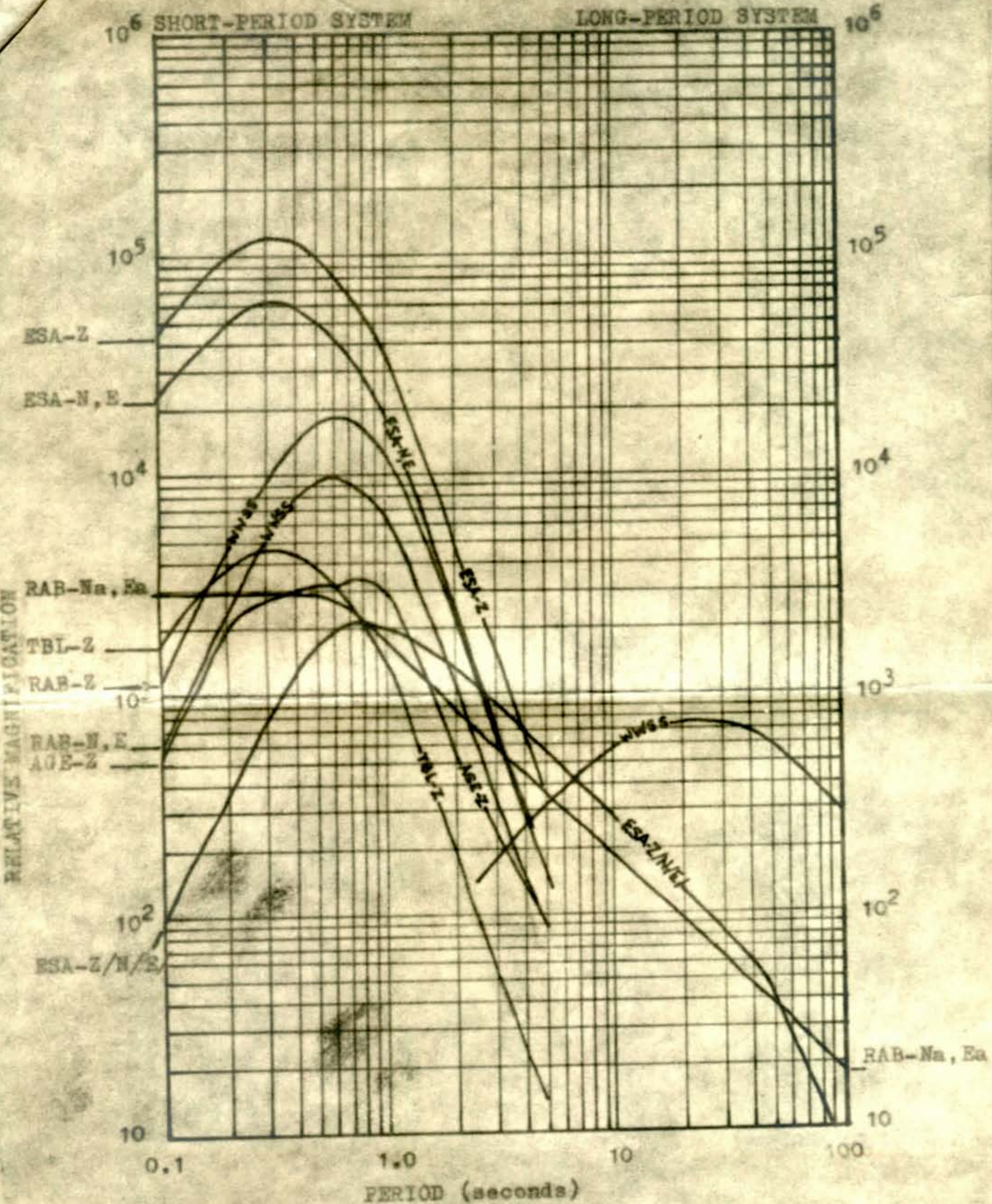
Details of emergency field stations, within the Territory will be listed when in operation.

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx. Magnification	Approx damping
Tabele Observatory	TBL					
Benioff VRS 107.5Kg	Z	1.0	0.2	60	1,350	critical
Papua						
Esa'ala Observatory	ESA					
Benioff VRS 107.5Kg	Z	1.0	0.2	15	36,000	critical
Benioff VRS 107.5Kg	N,E	1.0	0.2	15	18,000	critical
Benioff VRS 107.5Kg	Z/N/E/	1.0	60.0	30	50% sensitivity critical	
Agenahambo Station	AGE					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

V.R.S. Variable Reluctance Seismometer

M.C.S. Moving-coil Seismometer

Relative magnification curves of all seismograph systems under the control of the Rabaul Central Observatory have been listed on the following page.



FREQUENCY RESPONSE CURVES OF THE INSTRUMENTS.

GWDA Nov.67

PRESENTATION OF DATA

(reviewed in November, 1967)

All times are reduced to Greenwich Mean Time (GMT), which is 10 hours behind Eastern Standard Time.

At RAB and Harbour Network, the time signal is marked every minute on each seismogram record from the Observatory crystal chronometer, ~~and~~ Second marks from radio signal VNG (Australia) are recorded on W.W.S.S. S.P.-N component only according with the W.W.S.S. programme, at six hour intervals. Primary time is provided by W.W.S.S. equipment and secondary time by a Labtronic crystal chronometer with the accuracy of ± 5ms. per day compared with VNG (Australia) with the aid of a chronoscope.

At TBL and AGE, the time signal is derived from a spring driven chronometer (Mercer) and marked each minute on records. Time accuracy is determined by comparison with time signals from W.W.V.H. or W.W.V. daily. Linear correction is applied to the daily drift.

On all seismogram records time increases from left to right and time brake is upward.

At RAB* and Harbour Network the recording drum of each seismograph is driven by a 110VAC 60Hz synchronous motor. The 110VAC is frequency regulated by a crystal chronometer.

* The Omori ~~seismograph~~ recording drum~~s~~ is driven by a nonregulated 50Hz frequency supply.

At ESA and KRT power for recorder motors is frequency regulated by a crystal chronometer at 50Hz. Power for AGE and TBL and Field Stations is supplied by a $50H_Z$ free running oscillator.

Direction of Motion

Upward direction of ground motion corresponds to upward trace motion on vertical seismogram records. Direction of component of ground motion to North or East corresponds to upward trace motion on horizontal seismogram records.

Vertical trace motion from implusive onset of longitudinal waves of compressional or dilatational ground movement is indicated by "u" or "d" accompanied by N,S,E, or W, as per trace motion amplitude on horizontal seismogram records to represent vectorially the direction of ground motion. "+" or "-" indicated upward or downward motion of the ground respectively, from a wave not known to be of the longitudinal type.

Accuracy of Readings

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale, of 1931.

PRESENTATION OF DATA (CONT'D)

Determinations of Epicentres

Where no source is cited, the determination of epicentres, origin time, focal depth and distance in central angle degrees from the pertinent station for local and regional earthquakes, are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

Magnitude Definition and Determination

M_L - Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millimetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the nearest half unit.

The station correction factor is assumed to be zero untill better known.

M_S - Surface Wave Magnitude (Gutemberg & Richter, 1956) is calculated from the amplitude of surface waves of period near 20 seconds for shallow distant earthquakes.

M_B - Body Wave Magnitude is calculated from the ratio of amplitude over period for body waves on S.P.-Z of World-Wide Seismograph System only when depth is known. The magnification factor for the standard seismograph is taken into account.

m - Unified magnitude (Gutemberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8\ M_L - 0.01\ M^2_L$$
$$m = M_B \text{ (without correction)}$$
$$m = 2.5 + 0.63\ M_S$$

Symbols

T - Period in seconds
A,A* - Peak-to-Trough trace amplitude in millimetres.
A - Amplitude from W.W.S.S.
A* - Amplitude from seismograph with different response to the W.W.S.S.
GM - Ground Motion
Dist - Distance in central angle degrees.
H - Origin Time
L - Focal depth in Kilometres
i - impulsive
e - emergent
CBM - Confused by microseisms

PRESENTATION OF DATA (CONT'D)

Remarks

Local	- Typical signature of an earthquake with epicentre within 0.9°
Near	- Typical signature of an earthquake with epicentre between 0.9° and 9°
Distant	- Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	- Typical signature of an earthquake with epicentre more than 45°
Traces	- Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G.W. D'ADDARIO
Vulcanologist-in-Charge

15th November.1967.

			T sec	A mm	A* mm	GM	Dist	H	Remarks
RAB	iZ	023413.0	0.5	4.0					Ship moving in harbour.
	FZ	4740							
RAB	iPZ	044844.0	0.5	2.0		d			Regional
	iZ	45.0							
	iZ	50.5							
KRT	iPE	044844							
RAB	iPZ	053340.0	0.5	1.8		u	4½°	053230	M_L=5.4
	iZ	49.0							
	iSE	3434.0							
KRT	iPE	053340½					4½°	053230	
	iSE	3434							
RAB	eZ/	070746				+			Traces
RAB	iPZ	074204.0	0.5	2.0		u	25°		
	eSN/	4628							
KRT	ePE	074206							
RAB	iPZ	161312.3	0.5	3.0		u	1½°	161246	M_L=4.1
	iSN	32.0							
KRT	iPZ	161310½				d	1½°	161246	
	iSE	27½							
RAB	eZ/	193506				+			Traces
RAB	iPZ	210543.4	0.5	8.0		u	½°	210534	M_L=3.3
	iSE	50.3							
KRT	iPZ	210542½				u	½°	210534	
	iSE	48.5							
RAB	iPZ	215056.5	0.5	5.0		d	(18°)		
	iZ	5101.0							
	iZ	10.3							
	e(S)E/	5420							
KRT	ePZ	215056				d			

16th November

			T sec	A mm	A* mm	GM	Dist	H	Remarks
RAB	eZ/	052238				+			Traces
RAB	iPZ	105329.6	0.4	3.0		d			(Regional)
KRT	iPZ	105334½	0.2		2.5	d			CBM.
RAB	iPZ	105448.0	0.5	4.0		d	(1¼°)	1054(28)	M_L=3.9
	e(S)N/	5503							
KRT	i(P)Z	105447½				u	(1°)	1054(29)	CBM.
	iE	55							
	iSE	5502							
RAB	iPZ	111545.0	0.8	3.0		u	½°	111531	M_L=3.8
	iSE	55.0							
KRT	iPE	111544					(1°)	1115(27)	
	iE	47							
	i(S)E	58							
RAB	ePZ	112522	0.5	1.5		u			Regional, Superimposed shock
KRT	iPE	112530							
	iE	32½							
RAB	ePZ	113920	0.5	2.5		u			Regional CBM

16th November contd.

			T sec	A mm	A* mm	GM	Dist	H	Remarks
KRT	iPE	113924							
RAB	iPZ	115854.5	0.4	2.0		d			Regional
KRT	iPE	115856							
	iE	5905½							
RAB	eiPZ	122220	0.5	3.0		d	4°	122117	M_L=5.1
	iZ	22.4							
	eSN/	2208							
KRT	ePZ	122219				d			CBM
RAB	iPZ	123645.1	0.5	3.0		u	1¼°	123625	M_L=4.1
	iZ	47.4							
	iSN/	3700.4							
KRT	ePE	123031					2½°	122915	
	iSE	3131							
RAB	iPZ	124146.0	0.5	4.0		d	1¼°	124125	M_L=4.4
	iZ	49.5							
	iSN/	4202.0							
KRT	i(P)Z	124147	0.3		4.0	u			CBM
RAB	iPZ	145442.5	0.3	3.0		d	¾°	145428	M_L=3.5
	iZ	47.3							
	iSN	53.0							
KRT	iPZ	145444	0.4		1.6	u			
	iZ	48½							
RAB	iPZ	201353.5	0.5	9.0		d	1°	201335	M_L=4.2
	iSN/	1408.0							
KRT	iPZ	201352½	0.2		3.0	u			CBM
RAB	eZ/	204205				-			Traces

17th November

			T sec	A mm	A* mm	GM	Dist	H	Remarks
RAB	eZ/	002238				-			Traces
RAB	eZ/	044948				+			Traces
RAB	iPZ	052301.1	0.5	21.0		d	1°	052243	M_L=4.9
	iS!E/	14.0							
RAL	iPZ	052300.8				d			
VUL	iPZ	052300.0				d			
WAN	iPZ	052301.0				d			
SUL	iPZ	052300.9				d			
KRT	i(P)Z	052259½				d			CBM
RAB	eZ/	060906				-			Traces
RAB	iPZ	085519.2	0.5	5.0		d	1°	085500	M_L=4.1
	iSN	33.0							
RAL	iP	085519.0							
KRT	eiPZ	085521				d	1¼°	085500	CBM
	iZ	22							
	iSE	37							
RAB	eiPZ	092016	0.5	2.0		u	4°	091913	M_L=6.6
	iZ	20.0							Felt:Poka Int.IV
	iZ	21.8							
	iSE/	2104.0							
RAL	ePZ	092014	1.0	1.2		u			

			T sec	A mm	A* mm	GM	Dist	H	Remarks
17th November contd.									
VUL	iPZ	092014.6	0.3	2,0		u			
WAN	ePZ	092015				d			
SUL	iPZ	092018				d			
KRT	i(P)Z	092016				u			CBM
RAB	iPZ	131359.0	0.5	6.0		u	1°	131340	M_L=3.4
	iSN	1412.9							
KRT	ePZ	131359	0.3		3.0	u	1°	131340	
	iSE	1412½							
RAB	iPZ	135843.2	0.5	1.8		d	$2\frac{3}{4}^{\circ}$	135859	M_L=4.6
	iSN	5916.0							
KRT	ePZ	135842				d	$2\frac{3}{4}^{\circ}$	135758	
	iZ	46½							
	iSE	5915½							
RAB	eZ/	144748				+			Traces
RAB	iPZ	150452.3	0.4	3.0		d	$2\frac{1}{4}^{\circ}$	150415	
	iSN	0520.0							
KRT	iPZ	150451	0.5		3.7	d	$2\frac{1}{4}^{\circ}$	150414	
	iSE	0519							
RAB	iPZ	183458.8	0.5	4.0		d	$\frac{3}{4}^{\circ}$	183444	
	iSE	3509.8							
KRT	iPZ	183455½				d			
RAB	eZ/	201634				-			Traces
RAB	iPZ	211825.0	0.5	5.0		u	2°	211754	
	iZ	31.0							
	iSN	48.5							
KRT	i(P)Z	211824	0.2		3.5	d	($1\frac{3}{4}^{\circ}$)	2117(53)	
	iSE	45							
18th November									
RAB	eZ/	011634				+			Traces
RAB	iPZ	053347.0	0.8	3.0		u	20°		
	eSE/	3730							
KRT	iPZ	053347½				d			CBM
RAB	iPZ	084528.5	0.4	1.0		d	2°	084455	M_L=4.3
	iSN	54.0							
KRT	iPZ	084527	0.2		3.0	d			
RAB	iPZ	122731.3	0.4	1.4		d	$2\frac{1}{4}^{\circ}$	122656	M_L=4.5
	iSN	58.5							
KRT	i(P)Z	122733					($1\frac{3}{4}^{\circ}$)	1227(03)	
	iE	54							
	iSE	55½							
RAB	iPZ	131534.0	0.3	2.0		u	$2\frac{3}{4}^{\circ}$	131452	M_L=4.6
	iZ	36.2							
	iSN	1606.0							
KRT	i(P)Z	131538½	0.3		3.0	u	($2\frac{1}{2}^{\circ}$)	1314(59)	
	iE	1604½							
	iSE	08½							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
18th November contd.									
RAB	iPZ iSN	133445.0 3511.5	0.3	2.0		d	$2\frac{1}{4}^{\circ}$	133410	M_L=4.7
KRT	iPZ iSE	133443 3507				u	2°	133411	
RAB	iPZ iSN	143653.0 3711.0	0.5	2.5		u	$1\frac{1}{2}^{\circ}$	143629	M_L=4.0
KRT	iPZ iSE	143651 3705½				d	$1\frac{1}{2}^{\circ}$	143630	
RAB	ePZ eZ	145511 15	0.5	1.0		d			Teleseism
KRT	ePZ eZ	145450½ 5509	0.6		1.5	d			
RAB	iPZ iSN	231205.3 23.0	0.3	2.8		u	$1\frac{1}{2}^{\circ}$	231141	
KRT	iPZ iSE	231205 21½	0.2		2.5	u	$1\frac{1}{4}^{\circ}$	231143	
19th November									
RAB	iPZ iSE/	021213.2 32.0	0.3	13.0		dNW	$1\frac{1}{2}^{\circ}$	021148	M_L=5.5
WAN	iPZ	021213.0				d			
SUL	iPZ	021213.2	0.3		3.0	u			
RAL	iPZ	021213.2	0.4		2.8	u			
VUL	iPZ	021212.3				d			
KRT	iPZ	021211½				d			
RAB	iPZ iSN	043522.3 42.0	0.4	2.0		d	$1\frac{1}{2}^{\circ}$	053456	M_L=4.0
KRT	iPE iSE	043521 38					$1\frac{1}{4}^{\circ}$	053458	
RAB	iPZ	052510.4	0.4	6.0		d			Regional
KRT	ePE iSE	052508 54½					4°	052407	
RAB	iZ FZ	071924.0 2418	0.6	3.0					Ship moving in harbour.
RAB	ePZ e(S)E	100715 57½	0.4	1.0		d	$(3\frac{1}{2}^{\circ})$	1006(19)	M_L=4.9
KRT	i(P)Z iSE iN	100720 0800 12				d	$(3\frac{1}{2}^{\circ})$	1006(27)	CBM
RAB	ePZ eSE/	121447½ 2056	0.5	1.0		d	42°		
KRT	ePZ	121432½	1.0		0.7	d			
RAB	iPZ iSN	123457.5 3508.0	0.4	1.2		d	$\frac{3}{4}^{\circ}$	123444	M_L=3.4
KRT	iPZ iSN	123459 3511	0.2		2.0	d	$\frac{3}{4}^{\circ}$	123444	
RAB	iZ FZ	143130 3829	0.5	4.0					Ship moving in harbour.

			T sec	A mm	A* mm	GM	Dist	H	Remarks
19th November contd.									
RAB	iPZ	165745.0	0.4	7.0		d	1½°	165721	M_L=4.4
	iSN	5803.0							
WAN	iPZ	165745.0	0.2		1.2	d			
SUL	ePZ	165745	0.3		1.0	u			
RAL	ePZ	165745	0.3		1.0	d			
VUL	iPZ	165744.2	0.3		3.0	d			
KRT	eiPZ	165743	0.5		0.2	u	1¼°	165721	
	iZ	44							
	iSN	58							
RAB	ePZ	173450				uNW	28°		
	iZ	52.0							
i	iSN/	3924.0							
	eLqE/	4034							
	eScPN/	4144							
KRT	ePZ	173459	1.0		0.8	d			
20th November									
RAB	e(P)Z	021813½	0.5	1.0		u			Teleseism
RAB	iPZ	105540.5	0.6	1.2		d			(Regional)
RAB	iPZ	133943.2	0.5	2.0		d			Regional
	iZ	45.0							
KRT	iPZ	133945½	0.5		3.0	u			
RAB	iPZ	164524.4	0.4	9.0		d	1½°	164500	M_L=4.6
	iZ	27.3							
	iZ	30.0							
	iSN	42.0							
WAN	iPZ	164524.3	0.3		2.0	d			
SUL	iPZ	164524.4	0.4		1.2	u			
RAL	iPZ	164524.2	0.5		1.5	u			
VUL	iPZ	164523.2	0.3		3.0	d			
KRT	iPZ	164523				d	(1¼°)	1645(03)	
	i(S)E	38							
RAB	iPZ	201323.0	0.4	2.0		d	2½°	201243	M_L=4.4
	iSN	53.0							
KRT	iPE	201324½					2½°	201243	
	iSN	56							
21st November									
RAB	eZ/	031546				-			Traces
RAB	iPZ	123216.5	0.4	1.5		d	3½°	123119	M_L=4.8
	iSN	3300.1							
RAL	ePZ	123216	0.5		1.0	d			
KRT	iPZ	123216½	0.2		1.0	d	3½°	123120	
	iSE	3300							
RAB	eiPZ	132317½	0.4	1.0		u	1½°	132251	M_L=4.4
	iZ	19.0							
	iZ	22.0							
	iZ	28.0							
	iSE	37.0							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
21st November contd.									
WAN	ePZ	132317	0.2		1.0	d			
RAL	ePZ	132316½	0.4		1.0	u			
VUL	iPZ	132316.0	0.4		2.0	d			
KRT	iPZ	132318	0.2		3.0	u	1½°	132252	
	iSE	38							
RAB	iPZ	184839.3	0.4	1.2		d	1°	184822	M_L=3.3
	iSE	52.5							
KRT	iPZ	184838	0.3		1.0	d	1°	184821	
	iSE	51							
RAB	ePZ	200326½	0.5	1.0		d			Teleseism
RAB	iPZ	201438.0	0.5	1.5		d	2½°	201356	M_L=4.6
	iSN	1510.0							
KRT	iPZ	201435½	0.3		2.0	e	(2¾°)	2013(50)	
	i(S)E	1510½							

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TABELE

			T sec	A mm	A* mm	GM	Dist	H	Remarks
7th November, 1967									
TBL		Nil recorded.							
8th November		Microseismic activity from 0257 to 0323 hours							
TBL	ePZ	0t·1001½	1.0	.	0.3	u			Telese·sm
	eZ	1239½							
	eZ	1304½							
9th November									
TBL	eiPZ	210309	0.8		0.4	u			Regional
	iZ	09½							
	iZ	20							
	iZ	30							
10th November									
TBL	e(P)Z	055210½	1.0	.	0.1	d			(Teleseism)
	eZ	40½							
11th November									
TBL	iPZ	222126½	0.4		27.0	u			Regional
	iZ	41½							
	iZ	43½							
12th November									
TBL		Microseismic activity from 1606 to 1652 hours							
13th November									
TBL		Nil recorded							
14th November									
TBL	iPZ	052915	0.5		35.0	u			Regional
	iZ	42							

Central Observatory
RABAUL

G. W. D'ADDARIO
Vulcanologist-in-charge.

8 DEC 1967

PEA Dec-67

TERRITORY OF PAPUA AND NEW GUINEA
GEOLOGICAL AND VULCANOLOGICAL BRANCH
VULCANOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY
1967

Rabaul	RAB	From 21st November, 1967 To 28th November, 1967
Keravat	KRT	From 21st November, 1967 To 28th November, 1967
Esa'ala	ESA	From: To : NOT OPERATIONAL
Tabele	TBL	From: NO RECORDS RECEIVED To :
Agenahambo	AGE	From: NOT OPERATIONAL To :
Waris	WAA	Not operational
Ulamona	ULA	Not operational
Piva	PIV	Not operational

STATION PERSONNEL

Central Observatory, Rabaul RAB	
Vulcanologist-in-Charge	G.W. D'Addario
Vulcanologist	R.F. Heming
Seismogram Readers	P.M. Leitao; M. Gaiam
Vulcanological Assistants	L. Topue; V. Kaita
Trainee Vulcanological Assistants	B. Talai; M. Salaiau
Senior Technical Officer	N.O. Myers
Technical Officer	~~R.J. Conway~~
Technical Assistant	P. Daimbari
Kerevat Outstation KRT	
Observer (part-time)	G.E. Chorick
Tabele Observatory TBL	
Observer	E. Ravian
Esa'ala Observatory ESA	
Observer	F. Dira
Agenahambo Out-station AGE	
Observer (part-time)	Br. B. Hughes

The Rabaul Preliminary Earthquake Analysis (P.E.A.) is produced by the staff under the direction of the Vulcanologist-in-Charge, Central Observatory Rabaul from whom additional information and photo copies of records from all stations may be obtained on request.

Please address all communications to:-

Vulcanologist-in-Charge,
Central Observatory,
P.O. Box 386,
RABAUL, T.P. & N.G.

SEISMOGRAPH STATIONS

Station	Code	South Latitude	East Longitude	Elev.	Foundation
NEW GUINEA					
Rabaul	RAB	04°11'28.6"	152°10'11.4"	183.5	Basalt Flow
Wanliss Street	WAN*	04°11'39.6"	152°10'33.3"	25.0	Basalt Flow
Sulphur Creek	SUL*	04°13'09.8"	152°10'32.5"	8.5	Unconsolidated Volcanic Ash
Rabalanakaia	RAL*	04°13'13.0"	152°12'07.0"	91.0	Unconsolidated Volcanic Ash
Tavurvur	TAV*	04°14'12.0"	152°13'18.0	60.0	Andesite Flow
Taviliu	VUL*	04°16'58.2"	152°08'44.6"	332.3	Unconsolidated Volcanic Ash
Keravat	KRT	04°20'00	152°00'00	20	Alluvium
Ulamona	ULA	04°59'24.0"	151°16'30.0"		Lapilli Tuff
Tabele	TBL	04°06'04.67"	145°00'41.37"	179.5	Basalt Flow
Waris	WAA	04°07'00	145°06'00"	48	Lapilli Tuff
Piva	PIV	06°12'00"	155°03'30"	60	Alluvium
PAPUA					
Agenahambo	AGE	08°48'30"	148°06'12"	303	Uncolsolidated Volcanic Ash
Esa'ala	ESA	09°44'18"	150°48'50"	46.4	Granite-Gneiss

* Rabaul Harbour Network

STATION INSTRUMENTATION

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx.relat Magnification	Approx damping
New Guinea						
Rabaul Central Observatory						
W.W.S.S.S.	Z	1.0	0.74	60	12,500	critical
	N,E	1.0	0.74	60	6,250	critical
	Z/N/E/	15.0	100.0	15	750	critical
Benioff VRS 14.7Kg	Zh	1.0	0.02	180*	4,000	critical

* Recording is triggered by the onset of any earthquake with pre-determined minimum amplitude. Recorder is stopped auto matically by hour break pulse.

Omori 15Kg	No	3.6	-	24	12	10.1 air
Omori 15Kg	Eo	3.8	-	24	10	10.1 air
Wood-Anderson Torsión	Na,Ea	0.8	-	60	2,800	critical

Rabaul Harbour Network

Readings from the Harbour Network are entered in the P.E.A. only for large earthquakes.

WAN** Benioff VRS 14.7Kg	Z	1.0	0.02	60	5,240	critical
SUL** Benioff VRS 14.7Kg	Z	1.0	0.02	60	2,850	critical
RAL** Benioff VRS 14.7Kg	Z	1.0	0.02	60	8,075	critical
TAV** Benioff VRS 14.7Kg	Z	1.0	0.02	60	20,900	critical
VUL***Benioff VRS 14.7Kg	Z	1.0	0.02	60	5,000	critical

STATION INSTRUMENTATION

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx. Magnification	Approx damping

Rabaul Harbour Network (Cont'd)

** Signals from these stations are telemetered by land line to Helicorders (Geotech Mod. 2484) at the Central Observatory.

*** Signals from this station are telemetered via VHF to its Helicorder at the Central Observatory

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx. Magnification	Approx damping
Keravat Out-station	KRT					
Benioff MCS 50Kg	Z	1.2	0.2	15	20% sensitivity. critical	
Benioff MCS 50Kg	N,E	1.2	0.2	15	10% sensitivity. critical	
Ulamona Field Station	ULA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Piva Field Station	PIV					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Waris Field Station	WAA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

N.B These field stations consist of a permanent building in which ins-truments are installed when necessary.

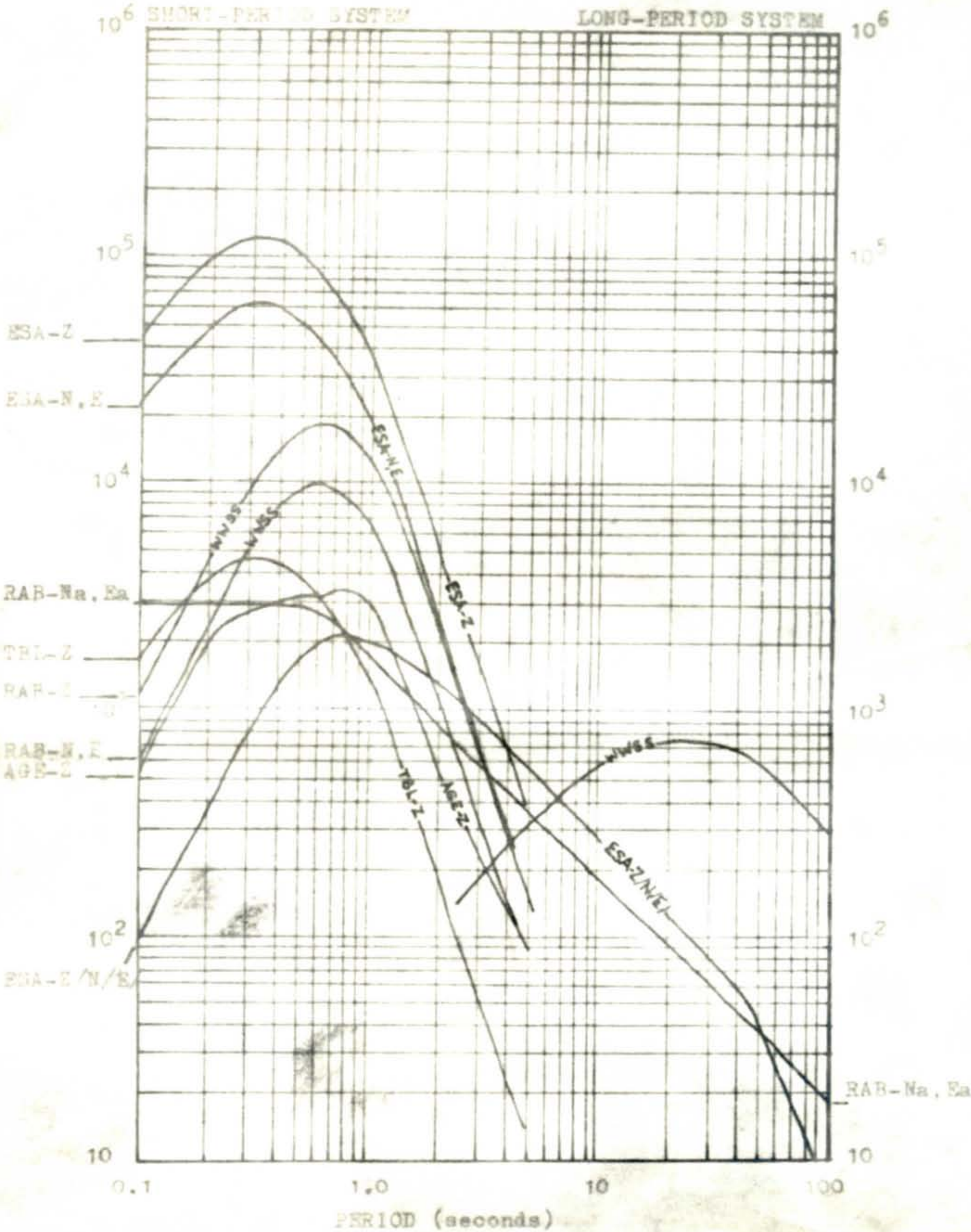
Details of emergency field stations, within the Territories will be listed when in operation.

Station & Instruments	Components	To	Tg	Trace Speed mm/min	Approx. Magnification	Approx damping
Tabele Observatory	TBL					
Benioff VRS 107.5Kg	Z. ~~N~~	1.0	0.2	60	1,350	critical
Papua						
Esa'ala Observatory	ESA					
Benioff VRS 107.5Kg	Z	1.0	0.2	15	36,000	critical
Benioff VRS 107.5Kg	N,E	1.0	0.2	15	18,000	critical
Benioff VRS 107.5Kg	Z/N/E/	1.0	60.0	30	50% sensitivity. critical	
Agenahambo Station	AGE					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

V.R.S. Variable Reluctance Seismometer

M.C.S. Moving-coil Seismometer

Relative magnification curves of all seismograph systems under the control of the Rabaul Central Observatory have been listed on the following page.



FREQUENCY RESPONSE CURVES OF THE INSTRUMENTS.

GWDA Nov.67

PRESENTATION OF DATA

(reviewed in November, 1967)

All times are reduced to Greenwich Mean Time (GMT), which is 10 hours behind Eastern Standard Time.

At RAB and Harbour Network, the time signal is marked every minute on each seismogram record from the Observatory crystal chronometer. ~~and~~ Second marks from radio signal VNG (Australia) are recorded on W.W.S.S. S.P.-N component only according with the W.W.S.S. programme, at six hour intervals. Primary time is provided by W.W.S.S. equipment and secondary time by a Labtronic crystal chronometer with the accuracy of ± 5ms. per day compared with VNG (Australia) with the aid of a chronoscope.

At TBL and AGE, the time signal is derived from a spring driven chronometer (Mercer) and marked each minute on records. Time accuracy is determined by comparison with time signals from W.W.V.H. or W.W.V. daily. Linear correction is applied to the daily drift.

On all seismogram records time increases from left to right and time brake is upward.

At RAB* and Harbour Network the recording drum of each seismograph is driven by a 110VAC 60Hz synchronous motor. The 110VAC is frequency regulated by a crystal chronometer.

* The Omori ~~seismograph~~ recording drums is driven by a nonregulated 50Hz frequency supply.

At ESA and KRT power for recorder motors is frequency regulated by a crystal chronometer at 50Hz. Power for AGE and TBL and Field Stations is supplied by a $50H_Z$ free running oscillator.

Direction of Motion

Upward direction of ground motion corresponds to upward trace motion on vertical seismogram records. Direction of component of ground motion to North or East corresponds to upward trace motion on horizontal seismogram records.

Vertical trace motion from implusive onset of longitudinal waves of compressional or dilatational ground movement is indicated by "u" or "d" accompanied by N,S,E, or W, as per trace motion amplitude on horizontal seismogram records to represent Vectorially the direction of ground motion. "+" or "-" indicates upward or downward motion of the ground respectively, from a wave not known to be of the longitudinal type.

Accuracy of Readings

When readings are given with a dedimal figure, they are to 1/10 of a second, other readings have been made to the nearest half a second.

Crustal Phases

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale, of 1931.

CBM - Confused by microseisms.

PRESENTATION OF DATA (CONT'D)

Determinations of Epicentres

Where no source is cited, the determination of epicentres, origin time, focal depth and distance in central angle degrees from the pertinent station for local and regional earthquakes, are carried out at the Central Observatory Rabaul.

Geographical Designation of Epicentres

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in " A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

Magnitude Definition and Determination

M_L - Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millimetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the nearest half unit.

The station correction factor is assumed to be zero until better known.

M_S - Surface Wave Magnitude (Gutemberg & Richter, 1956) is calculated from the amplitude of surface waves of period near 20 seconds for shallow distant earthquakes.

M_B - Body Wave Magnitude is calculated from the ratio of amplitude over period for body waves on S.P.-Z of World-Wide Seismograph System only when depth is known. The magnification factor for the standard seismograph is taken into account.

m - Unified magnitude (Gutemberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8\ M_L - 0.01\ M^2_L$$
$$m = M_B \text{ (without correction)}$$
$$m = 2.5 + 0.63\ M_S$$

Symbols

T - Period in seconds

A,~~A*~~ - Peak-to-Trough trace amplitude in millimetres.

~~A - Amplitude from W.W.S.S.~~

~~A* - Amplitude from seismograph with different response to the W.W.S.S.~~

GM - Ground Motion

Dist - Distance in central angle degrees.

H - Origin Time

h - Focal depth in Kilometres

i - impulsive

e - emergent

CBM - confused by microseisms.

PRESENTATION OF DATA (CONT'D)

Remarks

Local	- Typical signature of an earthquake with epicentre within 0.9^{o}
Near	- Typical signature of an earthquake with epicentre between 0.9^{o} and 9^{o}
Distant	- Typical signature of an earthquake with epicentre between 9^{o} and 45^{o}
Teleseism	- Typical signature of an earthquake with epicentre more than 45^{o}
Traces	- Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G.W. D'ADDARIO
Vulcanologist-in-Charge

22nd November

			T sec	A mm	A* mm	GM	Dist	H	Remarks
RAB	ePZ	015551	0.3	1.8		d	$4\frac{1}{4}^{o}$	015447	M_L=4.7
	iSE	5640.0							
KRT	iPZ	$015550\frac{1}{2}$				d			CBM
RAB	ePZ	095129	0.5	1.2		d	$2\frac{3}{4}^{o}$	095045	M_L=5.2
	iZ	34.5							
	iZ	37.5							
	iSE	5202.0							
WAN	ieP	095129	0.5	1.2		d			
RAL	iPZ	5129.0	0.5	1 8		d			
KRT	iPZ	$095128\frac{1}{2}$				d	$2\frac{3}{4}^{o}$	095044	CBM
	iZ	$34\frac{1}{2}$							
	iSE	$5202\frac{1}{2}$							
RAB	iPZ	104603.6	0.5	1.8		d	$2\frac{1}{4}^{o}$	104528	M_L=3.8
	iZ	07.0							
	eSN	31							
KRT	i(P)N	104558					$(3\frac{1}{4}^{o})$	1045(07)	
	iSN	31							
	iN	4637							
RAB	eiPZ	$112400\frac{1}{2}$	0.5	1.0		d	$2\frac{1}{2}^{o}$	112321	M_L=4.2
	iZ	04.3							
	iSN	30.5							
KRT	ePN	112401					$(3\frac{1}{2}^{o})$	1124(07)	
	iN	22							
	i(S)N	42							
RAB	iPZ	123629.0	0.5	8.0		u	1^{o}	123613	M_L=3.7
	iSE	41.0							
WAN	iPZ	123629.0	0.4	2.0		u			
	iZ	38.5							
RAL	ePZ	3629	0.5	1.0		d			
KRT	iPZ	123630				d	1^{o}	123613	
	iSN	43							
RAB	iPZ	144938.0	0.5	1.0		d			Teleseism
KRT	ePZ	$144938\frac{1}{2}$	1 0		0.3	d			
RAB	iPZ	151342.0	0.6	1.6		d	$1\frac{3}{4}^{o}$	151313	M_L=3.8
	iSN	1404.2							
KRT	ePZ	151344				u	2^{o}	151314	
	iSN	1407							
RAB	ePZ	152456	0.8	2.0		d	28^{o}		
	eSE/	2932							
KRT	ePZ	152458				d			
	eZ	2525							
RAB	iPZ	163502.6	0.4	1.5		d	5^{o}	163347	M_L=5.7
	iZ	04.5							
	iZ	13.2							
	iSN	3601.0							
KRT	iPZ	$163502\frac{1}{2}$	0.5		1.0	u	5^{o}	163346	
	iZ	$04\frac{1}{2}$							
	iZ	27							
	iSN	$3601\frac{1}{2}$							

			T sec	A mm	A* mm	GM	Dist	H	Remarks

22nd November (cont'd)

			T sec	A mm	A* mm	GM	Dist	H	Remarks
RAB	iPZ	172808.8	0.3	1.0		d			Regional
	iZ	10.8							
KRT	iPZ	172802	0.5		1.0	d	$4\frac{1}{2}^{o}$	172653	
	iSN	55							
RAB	iPZ	200336.7	0.4	1.5		d	2^{o}	200304	M_L=3.7
	iSN	0401.5							
KRT	iPZ	200337	0.3		1.0	d			
RAB	iPZ	204305.0	0.5	2.5		u	2^{o}	204231	M_L=4.9
	iZ	05.6							
	iSN	30.5							
WAN	ePZ	204305	0.5	1.0		u			
RAL	iPZ	4305.0	0.5	1.0		u			
KRT	iPZ	$204308\frac{1}{2}$	0.5		17.0	u	$2\frac{1}{4}^{o}$	204231	
	iSE	37							
RAB	ePZ	220833	0.4	2.0		d			Regional
KRT	ePN	$220842\frac{1}{2}$					3^{o}	220754	
	eSN	$0919\frac{1}{2}$							
KRT	iPE	223547	0.5		1.8	d	$1\frac{3}{4}^{o}$	223519	
	iSE	3608							
RAB	iPZ	230810.0	0.5	1.8		d	1^{o}	230750	
	iSN	25.5							
KRT	iPZ	$230812\frac{1}{2}$	0.2		4.0	u	$1\frac{1}{2}^{o}$	230749	
	iSE	30							

23rd November S.P. Z and E galvonometers replaced
Galvonometers drift adjustment from 23rd to 27th

			T sec	A mm	A* mm	GM	Dist	H	Remarks
RAB	ePZ	051948	0.5	3.0		d			Regional
KRT	iPE	051948							
	iN	$53\frac{1}{2}$							
RAB	ePZ/	085358				d	(68^{o})		
	e(S)E/	090254							
KRT	ePZ	$133352\frac{1}{2}$	0.5	0.6		u	3^{o}	133305	
	iZ	$59\frac{1}{2}$							
	iSN	$3428\frac{1}{2}$							
RAB	e(P)Z/	140912				(u)			Teleseism
RAB	iPZ	150913.0	0.5	3.0		d	$1\frac{1}{2}^{o}$	150848	M_L=4.2
	iSN	31.5							
KRT	eiPZ	150912				u	$1\frac{1}{2}^{o}$	150849	
	iZ	$12\frac{1}{2}$							
	iSE	$29\frac{1}{2}$							
KRT	iPZ	$165645\frac{1}{2}$				u	$1\frac{1}{2}^{o}$	165622	
	iSE	5703							
RAB	ePZ	180524	0.4	2.0		d	$2\frac{3}{4}^{o}$	180441	M_L=4.4
	iSE	57							
KRT	ePZ	180524	0.5	0.3		d	3^{o}	180437	
	iZ	30							
	iZ	$54\frac{1}{2}$							
	iSE	$0600\frac{1}{2}$							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
23rd November (cont'd)									
RAB	ePZ	190100½				d	1½°	190036	M_L=4.0
	iSN	19.0							
KRT	iPZ	190100	0.2		4.0	d	1½°	190037	
	iSE	17							
RAB	iPZ	202141	0.3	3.0		u	3°	202055	M_L=5.2
	iSN	2216.0							
KRT	iPZ	202142	0.3		3.5	d	3°	202055	
	iE	2207½							
	iSE	17½							
RAB	iPZ	205953	0.3	2.0		d	1°	205934	M_L=4.4
	iSN	210007.0							
WAN	iPZ	5953.0	0.3	1.0		d			
SUL	iPZ	53.0	0.3	1.5		u			
RAL	iPZ	53.0	0.5	1.0		d			
VUL	iPZ	52.3	0.5	2.0		d			
KRT	iPZ	205952				u	1°	205936	
	iSE	210004							
KRT	iPZ	222423				d	1¼°	222403	
	iSE	38							
KRT	iPZ	232729	0.2		2.1	d	1¼°	232708	
	iSE	45							
24th November									
RAB	iPZ	110315.0	0.5	1.5		d	1¼°	110254	M_L=3.6
	iSN	31.4							
KRT	iPE	110316½					1¼°	110253	
	iSE	34							
RAB	eZ/	112836				–			(Traces)
RAB	iPZ	181608.6	0.5	19.0		uNNW	1°	181551	M_L=4.6
	iSN/	22.0							Ulamona Int.
WAN	iPZ	08.5	0.5	5.0		u			I-II
SUL	iPZ	08.8	0.4	1.0		u			05°00'S, 151°15'E
RAL	iPZ	08.0				u			
VUL	iPZ	08.0				u			
RAB	iPZ	205218.0	0.4	1.8		d	¼°	205211	M_L=2.0
	iSN	23.0							
KRT	iPZ	205217	0.5		2.7	d	(¾°)	2052(04)	
	i(S)E	27							
RAB	eiPZ	211017½	0.5	2.0		u	2°	210944	M_L=4.9
	iZ	18.1							
	iSE	43.0							
KRT	iPZ	211018½				u	(1½°)	2109(52)	
	i(S)E	38							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
24th November (cont'd)									
RAB	iPZ iSN	222445.0 2510.0	0.5	5.0		d	2°	222412	M_L=4.3
RAB	ePZ eSN	230328 42	0.5	1.0		d	1°	230309	M_L=3.5
25th November	L.P. N/S paper upside down								
RAB	iPZ iSE	023903.0 15.0	0.4	3.0		d	1°	023847	M_L=3.5
KRT	iPE	023901½							
RAB	iPZ iSE	040130.5 0204.0	0.4	3.0		u	2¾°	040046	M_L=5.2
RAL	iPZ	0133.0				u			
VUL	iPZ	0130.3	0.3	1.5		d			
KRT	iPZ iE iSE	040132 57 0200					2½°	040055	CBM
RAB	ePZ eSN	120827 0907	0.5	1.0		d	3½	120735	M_L=4.6
KRT	e(P)E iSE	120828½ 0906½					3¼°	120728	
RAB	iPZ iSN	123541.5 49.0	0.3	2.0		d	½°	123530	M_L=3.7
RAB	eZ/	130912				+			Traces
RAB	iPZ iSN	140934.0 48.0	0.4	1.2		d	1°	140915	M_L=3.5
RAB	ePZ iSN	165347 5407	0.5	2.0		u	1½°	165320	M_L=3.7
KRT	iPZ iSE	165345 5403½	0.3	1.0		d	1½°	165321	
RAB	iPZ iSN	173117.5 29.8	0.5	2.0		d	1°	173101	M_L=3.2
KRT	eiPZ iZ iSE	173119 19½ 35	0.5		0.8	u	1¼°	173058	
RAB	eZ/	201110				–			Traces
RAB	ePZ eSN	215652 5811½	0.6	1.5		u	7°	215510	
KRT	iPZ	215653				u			
26th November									
RAB	iPZ iZ eSN/	001535.0 43.5 2134	1.0	2.8		u	41°		
WAN	ePZ	001534½	1.0	1.0		u			
RAL	iPZ	001535.0	1.0	1.0		u			
VUL	iPZ	001535.4	1.0	1.2		u			
KRT	iPZ eN	001536 2138½	0.3	2.5		u			

			T sec	A mm	A* mm	GM	Dist	H	Remarks
26th November (cont'd)									
RAB	iPZ	010154.0	0.4	4.0		u	$1\frac{1}{2}^{\circ}$	010129	M_L=4.0
	iSN	0213.0							
WAN	iPZ	010153.4	0.3	1.0		u			
VUL	iPZ	010152.0	0.4	1.5		d			
KRT	iPZ	010152				d	$1\frac{1}{4}^{\circ}$	010131	CBM
	iSE	$0207\frac{1}{2}$							
RAB	iPZ	024425.0	0.5	2.0		u	2°	024355	M_L=4.4
	iSN	48.0							
RAL	iPZ	024424.6	0.2	2.4		u			
VUL	iPZ	024425.1	0.7	7.2		u			
KRT	iPZ	024424				u	2°	024352	CBM
	iSN	48							
RAB	ePZ	030120	0.8	1.5		u	38°		
	eS	0709							
RAB	eZ/	084318				–			Traces
RAB	iPZ	093524.1	0.5	2.5		d	$3\frac{1}{2}^{\circ}$	093430	M_L=5.2
	iSN	3605.2							
RAL	ePZ	093524	0.5	0.6		u			
VUL	ePZ	093523	0.4	0.4		u			
KRT	iPE	093524					$3\frac{1}{2}^{\circ}$	093432	CBM
	iSE	3606							
RAB	ePZ	105844	0.5	1.0		u	$(26\frac{1}{2}^{\circ})$		
	e(S)E/	110306							
WAN	ePZ	115844	1.0	8.8		d			
SUL	ePZ	115844	0.2	2.0		d			
RAL	ePZ	115844	1.0	1.0		d			
VUL	iPZ	115844.0	0.5	1.0		d			
KRT	ePZ	105846							
RAB	ePZ	150516	1.0	2.0		d	$(9\frac{1}{4}^{\circ})$	1502(54)	
	e(S)N/	0706							
KRT	ePZ	$150514\frac{1}{2}$	1.0	0.5		d			
RAB	iPZ	211108.0	0.5	1.0		u	$\frac{3}{4}^{\circ}$	211053	M_L=3.1
	eSN	19							
KRT	i(P)Z	$211108\frac{1}{2}$				–	$(\frac{3}{4}^{\circ})$	2110(55)	CBM
RAB	iPZ	222746.3	0.5	1.8		u	2°	222713	M_L=4.5
	iZ	47.5							
	iSE	2811.0							
SUL	iPZ	222746.2	0.3	0.8		d			
RAL	iPZ	222746.0	0.4	5.0		u			
VUL	iPZ	222746.2	0.3	3.0		u			
KRT	iPZ	222745				d	$(1\frac{1}{2}^{\circ})$	2227(18)	
	i(S)E	$2805\frac{1}{2}$							
RAB	iPE	223723.0	0.5	1.5		u	2°	223650	M_L=4.6
	iSE	48.0							

			T sec	A mm	A* mm	GM	Dist	H	Remarks
26th November (cont'd)									
VUL	eiPZ	223721½	0.3	0.4		d			
KRT	iPZ	223721				d	(1¾°)	2236(53)CBM	
	i(S)E	42½							
RAB	iPZ	235848.0	0.5	1.5		d	2°	235814	M_L=4.2
	iSN	5913.5							
KRT	iPZ	235845½				d	(1¾°)	2358(17)	
	i(S)E	5906½							
27th November									
KRT	iPZ	143400	0.3		1.0	u.	3¼°	143211	
	iSN	37							
RAB	iPZ,	172753.0	0.5	2.0		d	1¼°	172732	M_L=3.5
	iSN	2808.8							
KRT	iPZ	172750½	0.2		4.0	d	1½°	172732	
	iSE	2812							
RAB	iPZ	173235.5	0.5	1.0		d	3°	173148	M_L=4.6
	iSE	3311.5							
KRT	ePZ	173236½	0.3		0.3	u	3°	173149	
	iSE	3312½							
	iE	20							
RAB	iPZ	181243.0	0.5	1.0		u	2°	181209	M_L=4.0
	iSN	1308.5							
KRT	iPZ	181240½	0.3		2.5	u	2°	181210	
	iSE	1302							
RAB	iPZ	212759.0	0.5	2.0		d	2°	212727	M_L=4.0
	iSN	2823.0							
KRT	iPE	212757½					1½°	212731	
	i(S)E	2818							
RAB	iPZ	221152.4	0.8	1.5		u	2½°	221110	
	iSN	122[illegible].0							
KRT	ePE	221151							
KRT8	iPE	233752½					½°	233741	
	iSE	3801							

Central Observatory Rabaul
1st December, 1967

G.W. D'ADDARIO
Vulcanologist-in-Charge

PEA Dec-67

TERRITORY OF PAPUA AND NEW GUINEA
GEOLOGICAL AND VULCANOLOGICAL BRANCH
VULCANOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY
1967

Rabaul	RAB	From: To :	28th November, 1967 5th December, 1967
Keravat	KRT	From: To :	28th November, 1967 5th December, 1967
Esa'ala	ESA	From: To :	Not operational
Tabele	TBL	From: To :	14th November, 1967 27th November, 1967
Agenahambo	AGE	From: To :	Not operational
Waris	WAA	Not operational	
Ulamona	ULA	Not operational	
Piva	PIV	Not operational	

STATION PERSONNEL

RAB Central Observatory, Rabaul.

Vulcanologist-in-Charge	G.W. D'Addario
Vulcanologist	R.F. Heming
Seismologist	Position Vacant
Senior Technical Officer	N.O. Myers
Technical Officer	R.J. Conway
Seismogram Readers	P.M. Leitao; V. Hunt
Vulcanological Assistants	L. Topue; M. Gaiam V. Kaita
Technical Assistant	P. Daimbari
Trainee Vulcanological Assistants	B. Talai; M. Salaiau; Position Vacant
Secretary	G. Chant

KRT Keravat Outstation

Observer (part-time)	G.E. Chorick

TBL Tabele Observatory

Observer	E. Ravian

ESA Esa'ala Observatory

Observer	F. Dira

AGE Agenahambo Out-station

Observer (part-time)	Br. B. Hughes

The Rabaul Preliminary Earthquake Analysis (PEA) is produced by the staff under the direction of the Vulcanologist-in-Charge from whom additional information and photocopies of seismogram records from all stations may be obtained on request.

Please address all communications to:-

Vulcanologist-in-Charge,
Central Observatory,
P.O. Box 386,
RABAUL, T.P. & N.G.

SEISMOGRAPH STATIONS

Station	Code	South Latitude	East Longitude	Elev. (m)	Foundation
NEW GUINEA					
Rabaul	RAB	04°11'28.6"	152°10'11.4"	183.5	Basalt Flow
Wanliss Street	WAN*	04°11'39.6"	152°10'32.5"	25.0	Basalt Flow
Sulphur Creek	SUL*	04°13'09.8"	152°10'33.3"	8.5	Unconsolidated Volcanic Ash
Rabalanakaia	RAL*	04°13'13.0"	152°12'07.0"	91.0	Unconsolidated Volcanic Ash
Tavurvur	TAV*	04°14'12.0"	152°13'18.0	60.0	Andesite Flow
Taviliu	VUL*	04°16'58.2"	152°08'44.6"	332.3	Unconsolidated Volcanic Ash
Keravat	KRT	04°20'00"	152°00'00"	20.0	Alluvium
Ulamona	ULA	04°59'24.0"	151°16'30.0"	17.0	Lapilli Tuff
Tabele	TBL	04°06'04.67"	145°00'41.37"	179.5	Basalt Flow
Waris	WAA	04°07'00"	145°06'00"	48.0	Lapilli Tuff
Piva	PIV	06°12'00"	155°03'30"	60.0	Alluvium
PAPUA					
Agenahambo	AGE	08°48'30"	148°06'12"	303.0	Unconsolidated Volcanic Ash
Esa'ala	ESA	09°44'18.2"	150°48'50.7"	46.4	Granite Gneiss

* Rabaul Harbour Network

STATION INSTRUMENTATION

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
NEW GUINEA						
Rabaul Central Observatory						
WORLD-WIDE STANDARD	Z	1.0	0.74	60	12,500	critical
	N,E	1.0	0.74	60	6,250	critical
	Z/N/E/	15.0	100.0	15	750	critical
Benioff VR 14.7Kg	Zh	1.0	0.02	180*	4,000	critical

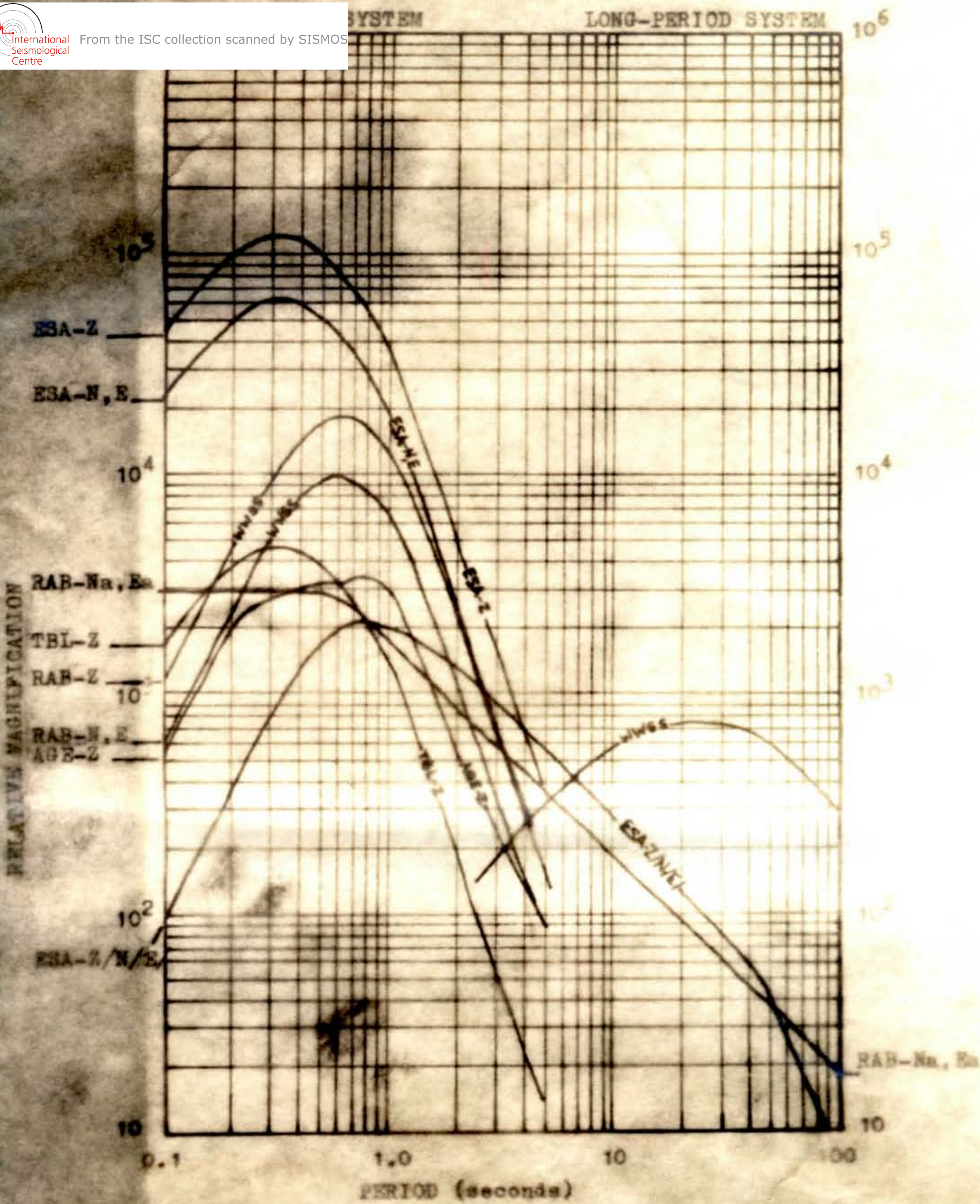
* Recording is triggered by the onset of any earthquake with pre-determined minimum amplitude. Recorder is stopped automatically by hour break pulse.

Omori 15Kg	No	3.6	-	24	12	10.1(air)
Omori 15Kg	Eo	3.8	-	24	10	10.1(air)
Wood-Anderson Torsion	Na,Ea	0.8	-	60	2,800	critical

Rabaul Harbour Network

Readings from the Harbour Network are entered in the PEA only for large earthquakes.

WAN** Benioff VR 14.7Kg	Z	1.0	0.02	60	5,240	critical
SUL** Benioff VR 14.7Kg	Z	1.0	0.02	60	2,850	critical
RAL** Benioff VR 14.7Kg	Z	1.0	0.02	60	8,075	critical
TAV** Benioff VR 14.7Kg	Z	1.0	0.02	60	20,900	critical
VUL***Benioff VR 14.7Kg	Z	1.0	0.02	60	5,000	critical



FREQUENCY RESPONSE CURVES OF THE INSTRUMENTS.

GWDA Nov.67

STATION INSTRUMENTATION

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Rabaul Harbour Network (Cont'd)						

** Signals from these stations are telemetered by land line to Helicorders (Geotech Mod. 2484) at the Central Observatory.

*** Signals from this station are telemetered via VHF to its Helicorder at the Central Observatory.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Keravat Out-Station KRT						
Benioff MC 50Kg	Z	1.2	0.2	15	20% sensitivity	critical
Benioff MC 50Kg	N,E	1.2	0.2	15	10% sensitivity	critical
Ulamona Field Station	ULA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Piva Field Station	PIV					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Waris Field Station	WAA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

N.B. These field stations consist of a permanent building in which instruments are installed when necessary.

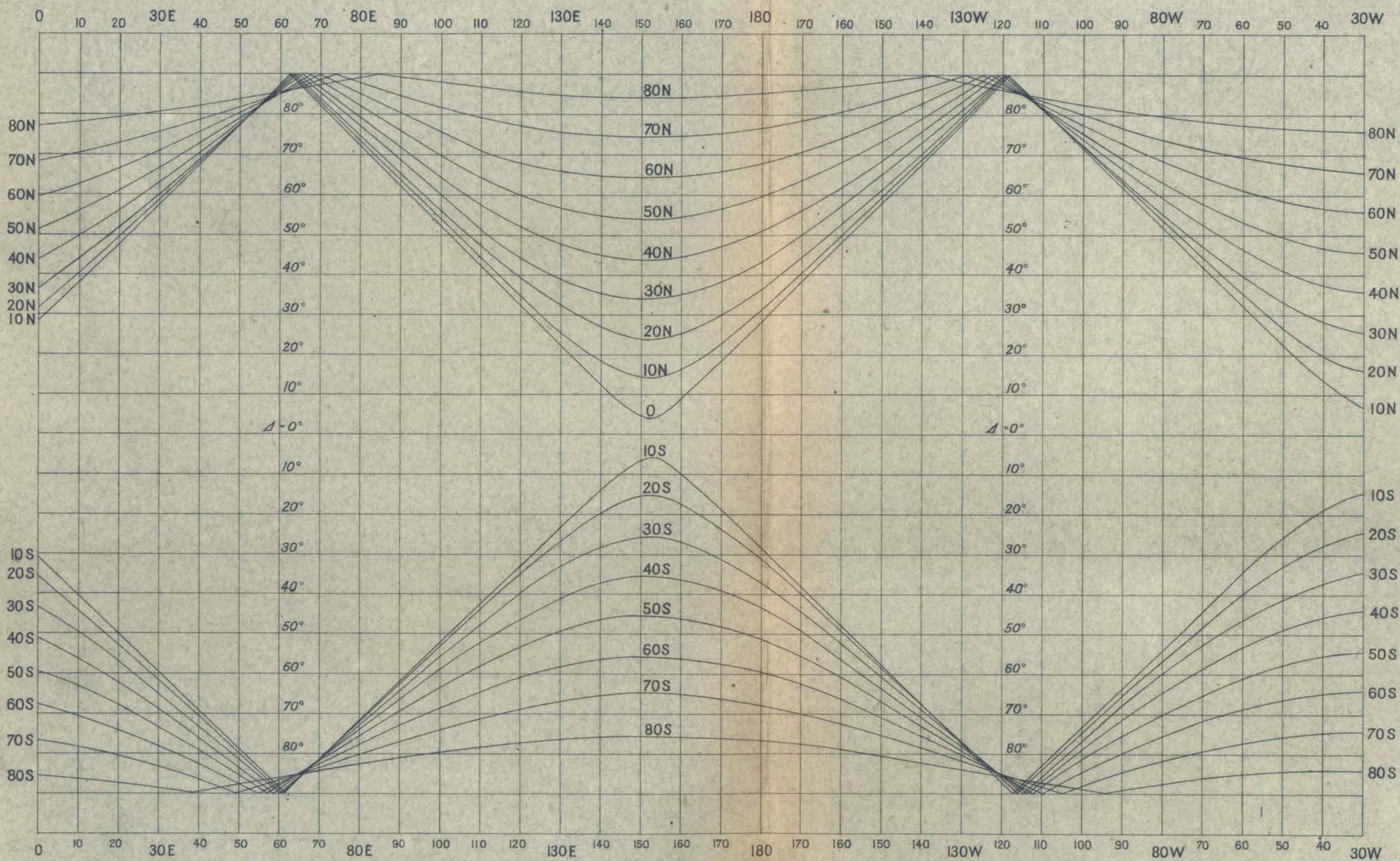
Details of emergency field stations, within the Territory will be listed when in operation.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Tabele Observatory	TBL					
Benioff VR 107.5Kg	Z	1.0	0.2	60	1,350	critical
PAPUA						
Esa'ala Observatory	ESA					
Benioff VR 107.5Kg	Z	1.0	0.2	15	36,000	critical
Benioff VR 107.5Kg	N,E	1.0	0.2	15	18,000	critical
Benioff VR 107.5Kg	Z/N/E/	1.0	60.0	30	50% sensitivity	critical
Agenahambo Station	AGE					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

VRS Variable Reluctance

MCS Moving-coil

Relative magnification curves of seismograph systems installed in stations controlled by the Rabaul Central Observatory have been listed on the following page.



EPICENTRAL DISTANCES FROM RABAUL CORRESPONDING TO GIVEN EPICENTRE COORDINATES

PRESENTATION OF DATA

(reviewed in November, 1967)

All times are reduced to Greenwich Mean Time (GMT), which is 10 hours behind Eastern Standard Time.

At RAB and Harbour Network, the time signal is marked every minute on each seismogram record from the Observatory crystal chronometer. Second marks from radio signal VNG (Australia) are recorded on World-Wide Standard System S.P.-N component only according with the W.W.S.S. programme, at six hour intervals. Primary time is provided by W.W.S.S. equipment and secondary time by a Labtronic crystal chronometer with the accuracy of ± 5ms per day compared with VNG (Australia) with the aid of a chronoscope.

At TBL and AGE, the time signal is derived from a spring driven chronometer (Mercer) and marked each minute on records. Time accuracy is determined by comparison with signals from WWVH daily. Linear correction is applied to the daily drift.

On all seismogram records time increases from left to right and time break is upward.

At RAB* and Harbour Network the recording drum of each seismograph is driven by a 110VAC 60Hz synchronous motor. The 110VAC is frequency regulated by a crystal chronometer.

* The Omori recording drum is driven by a nonregulated 50Hz frequency supply.

At ESA and KRT power for recorder motors is frequency regulated by a crystal chronometer at 50Hz.. Power for AGE and TBL and field Stations is supplied by a 50Hz free running oscillator.

Direction of Motion

Upward direction of ground motion corresponds to upward trace motion on vertical seismogram records. Direction of component of ground motion to North or East corresponds to upward trace motion on horizontal seismogram records.

Vertical trace motion from impulsive onset of longitudinal waves of compressional or dilatational ground movement is indicated by "u" or "d" accompanied by N, S, E or W, as per trace motion amplitude on horizontal seismogram records, to represent vectorially the direction of ground motion. "+" or "-" indicates upward or downward motion of the ground respectively, from a wave not known to be of the longitudinal type.

Accuracy of Readings

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half second.

Crustal Phases

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale, of 1931.

PRESENTATION OF DATA (CONT'D)

Determinations of Epicentres

Where no source is cited, the determination of epicentres, origin time, focal depth and distance in central angle degrees from the pertinent station for local and regional earthquakes, are carried out at the Central Observatory, Rabaul.

Geographical Designation of Epicentres

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

Magnitude Definition and Determination

M_L -Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson torsion seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millimetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the tenth of a unit.

The station correction factor is assumed to be zero until better known.

M_S -Surface Wave Magnitude (Gutenberg & Richter, 1956) is calculated from the amplitude of surface waves of period near 20 seconds for shallow distant earthquakes.

M_B -Body Wave Magnitude is calculated from the ratio of amplitude over period for body waves on S.P.-Z of World-Wide Seismograph System only when depth is known. The magnification factor for the standard seismograph is taken into account.

m -Unified magnitude (Gutemberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8\ M_L - 0.01\ M^2_L$$

$$m = M_B \text{ (without correction)}$$

$$m = 2.5 + 0.63\ M_S$$

Local Magnitude of earthquakes recorded at RAB with a clear S-P interval is tabulated on a Day-Distance (in Central Angle Degrees) graph which is added to the PEA monthly.

Symbols

i -impulsive and sharply defined beginning of a phase.

e -emergent and poorly defined emergence of phase.

T -Period in seconds

A -Peak-to-Trough trace amplitude in millimetres.

GM -Ground Motion.

Dist -Distance in central angle degrees.
H -Origin Time
h -Focal depth in Kilometres
CBM -Confused by microseisms.

PRESENTATION OF DATA (CONT'D)

Remarks

Local - Typical signature of an earthquake with epicentre within 0.9°

Near - Typical signature of an earthquake with epicentre between 0.9° and 9°

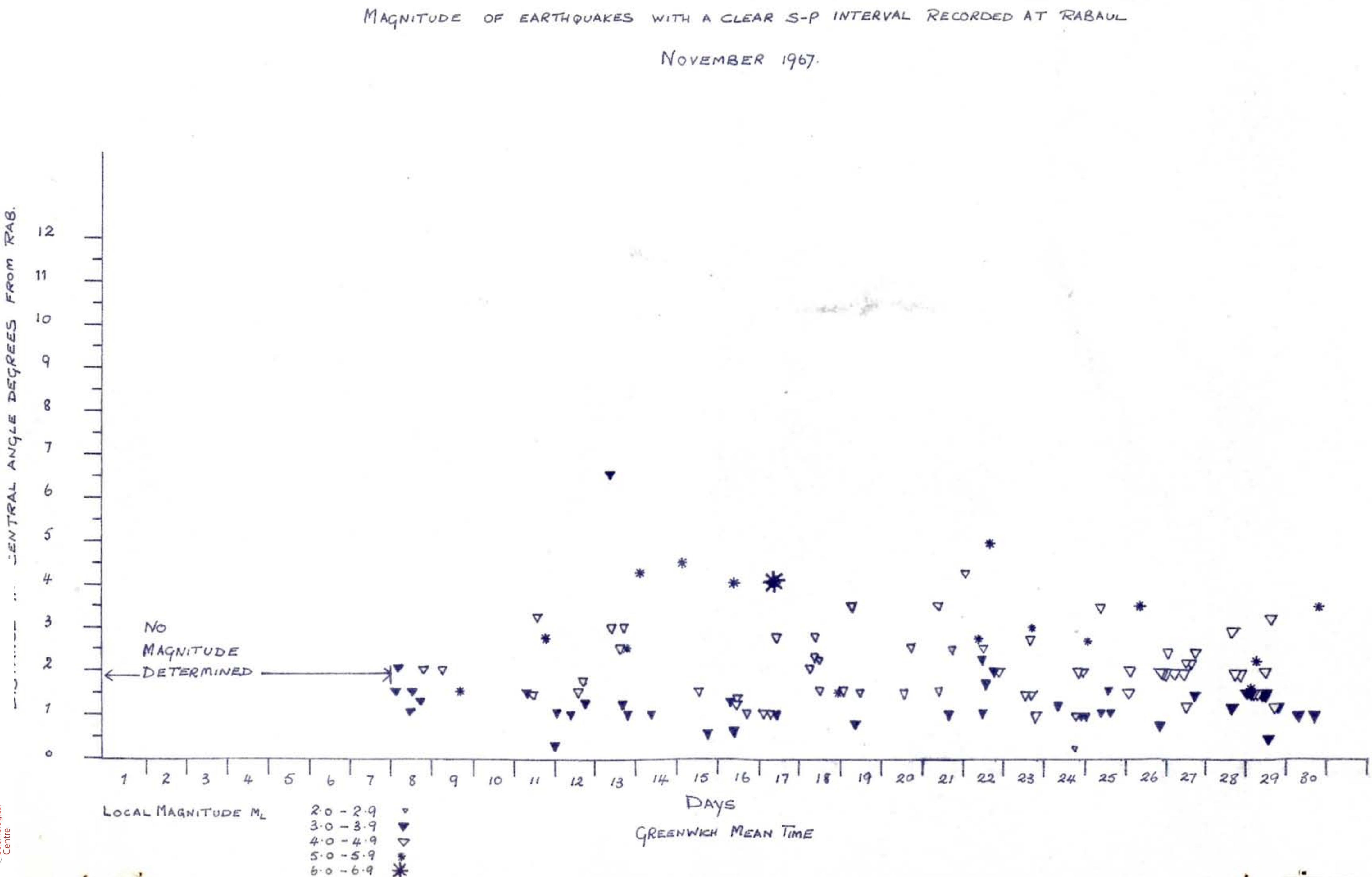
Distant - Typical signature of an earthquake with epicentre between 9° and 45°

Teleseism - Typical signature of an earthquake with epicentre more than 45°

Traces - Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G.W. D'ADDARIO
Vulcanologist-in-Charge


MAGNITUDE OF EARTHQUAKES WITH A CLEAR S-P INTERVAL RECORDED AT RABAUL
NOVEMBER 1967.
CENTRAL ANGLE DEGREES FROM RAB.
0 1 2 3 4 5 6 7 8 9 10 11 12
NO MAGNITUDE DETERMINED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
DAYS
GREENWICH MEAN TIME
LOCAL MAGNITUDE M_L
2·0 - 2·9
3·0 - 3·9
4·0 - 4·9
5·0 - 5·9
6·0 - 6·9

ERRATA CORRIGE
Please note that on previous PEA earthquake phases listed under the 27th Nov. refer to the 28th Nov.. The analysis of shocks recorded on the 27th are included in this PEA.

27 Nov, 1967.

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	011420.0	0.5	2.0	d	2½°	011340	M_L=4.5
	iSE	50.5						
KRT	iPZ	011423				(1¾°)	0113(54)	CBM
	i(S)N	45						
RAB	eZ/	050112			-			Traces
RAB	iPZ	062831.5	0.5	4.0	d	2°	062801	M_L=4.2
	iSN	54.5						
KRT	i(P)N	062834				(1¼°)	0628(13)	
	iSN	49½						
RAB	ePZ	082548½	0.4	1.0	d			Teleseism
KRT	eN	082552						
RAB	iPZ	100013.0	0.5	1.5	d	2°	095940	M_L=4.6
	iZ	17.0						
	iZ	22.0						
	iZ	31.5						
	iSE	38.0						
WAN	ePZ	100013	0.5	1.0	d			
SUL	iPZ	100013.4	0.4	1.0	u			
RAL	iPZ	100013.0	0.5	1.0	d			
VUL	iPZ	100012.0	0.4	1.0	d			
KRT	iPZ	100012½			d	1½°	095944	
	iSE	34						
RAB	eiPZ	103617½	0.5	1.0	d	2¼°	103542	M_L=4.3
	iZ	18.4						
	iSN	44.0						
KRT	iPE	103617½				(1½°)	1035(50)	
	i(S)E	38						
RAB	iPZ	105545.8	1.0	1.0	d			Teleseism
RAB	IPZ	113027.0	0.5	1.5	u	2¼°	112953	M_L=4.4
	eSN	53						
KRT	iPZ	113026½			u			CBM
RAB	iPZ	133025.6	0.4	2.0	d	1¼°	133003	M_L=4.0
	iZ	30.0						
	iSN	43.0						
WAN	ePZ	133025½	0.4	1.0	d			
SUL	iPZ	133026.0	0.4	3.0	u			
RAL	iPZ	133025.5	0.5	1.0	d			
VUL	iPZ	133024.6	0.5	2.5	d			
KRT	iPZ	133024½			d			
RAB	iPZ	181821.3	0.3	1.2	u	2½°	181743	M_L=4.1
	iSE	50.5						
KRT	iPZ	181820	0.5	1.0	d	2½°	181742	
	iSE	49½						

			T sec	A mm	GM	Dist	H	Remarks
27 Nov. contd.								
RAB	iPZ iSN	194545.3 4605.3	0.5	2.0	d	1½°	194519	M_L=3.4
KRT	iPZ	194544	0.3	2.0	u			
29Nov. Keravat not operational due to maintenance, till the 1st Dec..								
RAB	iPZ iSE	024934.1 53.5	0.5	2.0	d	1½°	024909	M_L=3.4
RAB	iPZ iSNo	040759.0 0818.0	0.5	17.0	dSE	1½°	040734	M_L=5.4 Felt:Rabaul Int.I-II
WAN	iPZ	040758.0			d			
SUL	iPZ	040758.5			d			
RAL	iPZ	040758.2			d			
VUL	iPZ	040758.5			d			
RAB	iPZ eSN	041647.2 1705	0.4	4.0	u	1½°	041623	M_L=3.7
RAB	iPZ eSN	043232.2 52	0.5	3.0	d	1½°	043206	M_L=4.4
VUL	iPZ	043232.2	0.5	11.5	d			
RAB	ePZ iSN	044547 4608.5	0.5	2.0	d	1½°	044519	M_L=4.1
VUL	iPZ	044549.0	0.5	8.8	u			
RAB	eiPZ iZ i(S)N	072354 54.6 2420.0	0.5	1.0	d	(2¼°)	0723(20)	M_L=5.0
WAN	iPZ	072354.5	0.5	5.0	u			
SUL	iPZ	072354.0	0.5	2.8	u			
RAL	eiPZ	072353	0.5	3.0	u			
VUL	iPZ	072353.8	0.5	2.5	d			
RAB	iPZ iSN	101632.6 51.0	0.4	2.0	u	1½°	101608	M_L=3.6
RAB	eiPZ iZ iZ iSN	114237 37.6 40.5 4302.5	0.5	1.2	d	2°	114203	M_L=4.2
RAL	iPZ	114236.0	0.6	4.6	u			
VUL	eiPZ	114235½			u			
RAB	iPZ iSN	121458.8 1517.0	0.4	2.0	u	1½°	121435	M_L=3.6
RAB	iPZ iSN	144836.5 44.2	0.4	3.0	u	½°	144825	M_L=3.3
RAB	iPZ iSN	150923.2 1001.5	0.4	2.5	u	3¼°	150833	M_L=4.5
RAB	eZ/	155132			+			Traces
RAB	iPZ iSN/	172613.2 29	0.5	38.0	dSE	1¼°	172552	M_L=4.7

			T sec	A mm	GM	Dist	H	Remarks
29 Nov. contd.								
WAN	iPZ	172613.0	0.5	3.0	d			
SUL	iPZ	172613.0	0.3	5.0	d			
RAL	iPZ	172612.9			d			
VUL	iPZ	172613.8			d			
RAB	iPZ	173235.4	0.4	1.5	d	$1\frac{1}{4}^{o}$	173215	M_L=3.7
	iSN	50.5						
RAB	iPZ	182535.0	0.5	3.0	d			Regional
30 Nov.								
RAB	iPZ	024914.0	0.4	4.0	u	$1\frac{1}{2}^{o}$	024849	
	iSN	33.0						
RAB	iPZ	064729.0	0.5	3.5	d			Regional
RAB	iPZ	070842.8	0.4	2.8	u	1^{o}	070826	M_L=3.2
	iSN	54.5						
RAB	e(P)Z	074248	0.5	0.8	d	(16^{o})		
	eSN/	4548						
RAB	eZ/	114050			+			Traces
RAB	iPZ	122202.0	0.5	4.0	d			Regional
RAL	iPZ	122201.0	0.5	1.0	u			
VUL	ePZ	122201	0.3	1.5	d			
RAB	iPZ	155322.4	0.6	1.5	u	27^{o}		
	eSN/	5754						
RAB	iPZ	171707.0	0.5	1.0	d	1^{o}	171651	M_L=3.2
	iSE	19.0						
RAL	ePZ	171707	0.5	1.0	d			
VUL	ePZ	$171705\frac{1}{2}$	0.3	1.2	d			
RAB	eZ/	190344			–			Traces
RAB	iPZ	202135.5	0.4	1.8	u	$3\frac{1}{2}^{o}$	202043	M_L=5.0
	iZ	39.0						
	iSE	2215.5						
WAN	ePZ	202135			u			
RAL	ePZ	202135			d			
RAB	eZ/	203530			–			Traces
1 Dec.								
RAB	iPZ	062524.5	0.5	7.0	u			CBM Local
KRT	iPN	062524				$\frac{1}{2}^{o}$	062513	
	iSE	32						
RAB	ePZ	$072333\frac{1}{2}$	0.5	2.0	u	28^{o}		
	eSE/	2808						
RAB	e(P)Z	130156	0.7	1.5	d	(22^{o})		
	eSN/	0550						

			T sec	A mm	GM	Dist	H	Remarks
1 Dec. contd.								
RAB	iPZ	140609.9	1.0	19.0	d	52°		h=150Km.
	ipPZ	40.0						M_L=7.1, M_B=6.7
	esPZ/	59						
	iSE/	1332						
WAN	iPZ	140610.3	0.9	2.0	d			
VUL	iPZ	140610.4	1.0	9.0	d			
KRT	iPZ	140610½	1.0	9.0	d			
	iZ	41½						
	iN	56½						
RAB	iPZ	170933.0	0.5	2.0	d	¼°	170927	M_L=2.0
	iSE	38.0						
KRT	iPZ	170934½	0.2	4.0	d	¼°	170928	
	iSN	39½						
RAB	iPZ	203920.0	0.4	3.0	d	3¼°	203830	M_L=5.2
	iZ	21.0						
	iZ	26.2						
	iSE	58.0						
WAN	ePZ	203919½	0.5	1.0	d			
SUL	ePZ	203919½	0.3	1.0	d			
RAL	ePZ	203918½	0.3	1.0	u			
KRT	iPE	203922½				3¼°	203834	
	iSE	4000						
RAB	ePZ	212804	0.4	1.0	u		Regional	
KRT	iPE	212811½				½°	212801	
	iSE	19½						
2 Dec.								
RAB	e(P)Z/	011420			d			Teleseism
RAB	iPZ	023340.8	0.5	5.0	d	1°	023323	M_L=4.4
	iZ	46.2						
	iSN	54.0						
WAN	iPZ	023340.5	0.2	2.0	d			
SUL	iPZ	023340.6	0.3	2.8	u			
RAL	iPZ	023340.4	0.3	5.0	d			
KRT	iPZ	023342½			d	1°	023323	CBM
	iSE	57½						
RAB	iPZ	125253.5	0.4	1.0	u	1½°	125829	M_L=3.6
	iSN	5911.3						
KRT	iPN	125[illegible]55				(¾°)	1258(39)	
	i(S)N	5906½						
RAB	iPZ	135820.2	0.5	6.0	u	¾°	135805	M_L=3.5
	iSN	31.0						
WAN	iPZ	135820.0	0.3	2.0	u			
SUL	iPZ	135819.8	0.4	1.5	u			
RAL	iPZ	135819.6	0.3	3.5	u			
VUL	iPZ	135822.0	0.3	1.2	u			
KRT	iPZ	135823½			u	1°	135805	CBM
	iSE	36½						

			T sec	A mm	GM	Dist	H	Remarks
2 Dec. contd.								
RAB	iPZ	173002.5	0.6	2.0	d			(Regional deep)
RAB	ePZ	201522	1.0	1.5	u			Teleseism
	eZ	28						
KRT	ePZ	201520	1.1	1.0	d			
3 Dec.								
RAB	iPZ	035330.1	0.4	1.3	d	$1\frac{1}{2}^{\circ}$	035306	M_L=4.1
	iZ	33.0						
	iSN	48.0						
KRT	iPZ	035329			d	1°	035311	CBM
	iSN	43						
RAB	iPZ	040919.8	0.4	4.3	d			Local
	iSN	24.2						
KRT	iPE	$040921\frac{1}{2}$				$\frac{1}{4}^{\circ}$	041914	
	iSN	$27\frac{1}{2}$						
RAB	ePZ	$093906\frac{1}{2}$	0.5	1.0	d			Regional
RAB	e(P)Z	$110105\frac{1}{2}$			d			Teleseism
RAB	iPZ	140104.0	0.4	1.0	u	1°	140045	
	iSN	18.1						
KRT	iPZ	140107	0.2	2.0	u	$1\frac{1}{4}^{\circ}$	140044	
	iSN	24						
RAB	iPZ	152410.8	0.3	3.5	d	$2\frac{1}{2}^{\circ}$	152333	
	iSE	40.0						
KRT	iPZ	152409			d	$2\frac{1}{4}^{\circ}$	152335	
	iSE	35						
RAB	iPZ	204643.1	0.4	5.0	u	$2\frac{1}{2}^{\circ}$	2046(02)	M_L=5.5
	i(S)N/	4714.0						
RAL	iPZ	204643.0	0.5	3.5	u			
VUL	iPZ	204642.3	0.5	5.5	u			
KRT	iPZ	204642			u			
	iE	48						
RAB	eiPZ	$225858\frac{1}{2}$	0.5	2.6	u	3°	225811	M_L=4.5
	iZ	59.0						
	eSN/	5934						
KRT	iPE	225859				$2\frac{3}{4}^{\circ}$	225814	
	iE	5929						
	iSN	33						
4 Dec.								
RAB	eZ/	091207			-			Traces
RAB	iPZ	182323.4	0.4	2.7	d	$\frac{1}{2}^{\circ}$	182909	M_L=3.6
	iZ	26.4						
	iSE	33.0						
WAN	iPZ	182323.0			d			
RAL	iPZ	182322.8	0.3	3.0	d			
VUL	iPZ	182323.6	0.5	4.8	d			
KRT	iPZ	$182325\frac{1}{2}$	0.2	7.0	d	$\frac{3}{4}^{\circ}$	182310	
	iSE	37						

			T sec	A mm	GM	Dist	H	Remarks
4 Dec. contd.								
RAB	iPZ iSE	200011.0 26.0	0.5	3.5	u	$1\frac{1}{4}^{\circ}$	195951	M_L=3.9
WAN	iPZ	200010.5	0.2	2.0	u			
RAL	iPZ	200010.0			u			
VUL	iPZ	200010.5	0.3	1.0	d			
KRT	iPZ iSE	200011 27	0.2	2.0	u	$1\frac{1}{4}^{\circ}$	195950	
RAB	ePZ	202429	0.6	1.5	u			Regional
5 Dec.								
RAB	eZ/	070448			–			Traces
RAB	iPZ iSN	082327.2 41.0	0.5	3.0	d	1°	082308	M_L=4.3
WAN	iPZ	082327.3	0.3	3.0	d			
SUL	ePZ	082327	0.4	0.8	d			
RAL	iPZ	082326.6	0.3	1.2	d			
VUL	iPZ	082327.5	0.2	6.0	d			
KRT	ePN iSE	082330 41				$\frac{3}{4}^{\circ}$	082314	
RAB	iPZ iSN	084318.7 31.0	0.5	2.5	u	1°	084302	M_L=3.2
VUL	iPZ	084318.2	0.4	2.5	d			
KRT	ePN iSE	084321½ 32				$\frac{3}{4}^{\circ}$	084305	
RAB	eZ/	115134			–			Traces
RAB	iPZ iSN	184615.5 31.0	0.5	1.8	u	$1\frac{1}{4}^{\circ}$	184554	M_L=3.5
VUL	iPZ	184614.0	0.3	1.0	d			
RAB	eZ/	191754			–			Traces
15 Nov.								
TBL	eiPZ iZ iZ	044838 48 4944	0.8	0.4	d			Regional
16 Nov.								
TBL	Nil recorded							
17 Nov.								
TBL	Nil recorded							
18 Nov								
TBL	Nil recorded							
19 Nov.								
TBL	iPZ iZ	201540½ 41½	0.4	4.0	d			Local

			T sec	A mm	GM	Dist	H	Remarks
20 Nov								
TBL	Nil recorded							
21 Nov								
TBL	iPZ	070126	0.4	2.0	c			(Teleseism)
22 Nov.								
TBL	Nil recorded							
23 Nov.								
TBL	Nil recorde							
24 Nov.								
TBL	Nil recorded							
25 Nov								
TBL	iPZ	200956	0.4	0.5	d			Regional
	iZ	1907						
TBL	iPZ	215524½	0.5	2.0	d			Regional
	iZ	30						
	eZ	5609						
26 Nov.								
TBL	eiPZ	150332		0.5	3.0	u		Regional
	iZ							
	iZ	57						
	iZ	0400						
27 Nov.								
TBL	ePZ	092144	0.6	0.3	d			Regional
	iZ	2204						

Central Observatory
RABAUL

G. W. D'ADDARIO
Vulcanologist-in-charge

PEA Dec-67

TERRITORY OF PAPUA AND NEW GUINEA
GEOLOGICAL AND VULCANOLOGICAL BRANCH
VULCANOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY
1967

Rabaul	RAB	From: DEC. - 5. 1967 To : DEC. 12. 1967
Keravat	KRT	From: DEC. - 5. 1967 To : DEC. 12. 1967
Esa'ala	ESA	From: To :
Tabele	TBL	From: NOV. 27. 1967 To : DEC. - 4. 1967
Agenahambo	AGE	From: To :
Waris	WAA	Not operational
Ulamona	ULA	Not operational
Piva	PIV	Not operational

STATION PERSONNEL

RAB **Central Observatory, Rabaul.**

Vulcanologist-in-Charge	G.W. D'Addario
Vulcanologist	R.F. Heming
Seismologist	Position Vacant
Senior Technical Officer	N.O. Myers
Technical Officer	R.J. Conway
Seismogram Readers	P.M. Leitao; V. Hunt
Vulcanological Assistants	L. Topue; M. Gaiam V. Kaita
Technical Assistant	P. Daimbari
Trainee Vulcanological Assistants	B. Talai; M. Salaiau; Position Vacant
Secretary	G. Chant

KRT **Keravat Outstation**

Observer (part-time) — G.E. Chorick

TBL **Tabele Observatory**

Observer — E. Ravian

ESA **Esa'ala Observatory**

Observer — F. Dira

AGE **Agenahambo Out-station**

Observer (part-time) — Br. B. Hughes

The Rabaul Preliminary Earthquake Analysis (PEA) is produced by the staff under the direction of the Vulcanologist-in-Charge from whom additional information and photocopies of seismogram records from all stations may be obtained on request.

Please address all communications to:-

Vulcanologist-in-Charge,
Central Observatory,
P.O. Box 386,
RABAUL, T.P. & N.G.

SEISMOGRAPH STATIONS

Station	Code	South Latitude	East Longitude	Elev. (m)	Foundation
NEW GUINEA					
Rabaul	RAB	04°11'28.6"	152°10'11.4"	183.5	Basalt Flow
Wanliss Street	WAN*	04°11'39.6"	152°10'32.5"	25.0	Basalt Flow
Sulphur Creek	SUL*	04°13'09.8"	152°10'33.3"	8.5	Unconsolidated Volcanic Ash
Rabalanakaia	RAL*	04°13'13.0"	152°12'07.0"	91.0	Unconsolidated Volcanic Ash
Tavurvur	TAV*	04°14'12.0"	152°13'18.0	60.0	Andesite Flow
Taviliu	VUL*	04°16'58.2"	152°08'44.6"	332.3	Unconsolidated Volcanic Ash
Keravat	KRT	04°20'00"	152°00'00"	20.0	Alluvium
Ulamona	ULA	04°59'24.0"	151°16'30.0"	17.0	Lapilli Tuff
Tabele	TBL	04°06'04.67"	145°00'41.37"	179.5	Basalt Flow
Waris	WAA	04°07'00"	145°06'00"	48.0	Lapilli Tuff
Piva	PIV	06°12'00"	155°03'30"	60.0	Alluvium
PAPUA					
Agenahambo	AGE	08°48'30"	148°06'12"	303.0	Unconsolidated Volcanic Ash
Esa'ala	ESA	09°44'18.2"	150°48'50.7"	46.4	Granite Gneiss

* Rabaul Harbour Network

STATION INSTRUMENTATION

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
NEW GUINEA Rabaul Central Observatory						
WORLD-WIDE STANDARD	Z	1.0	0.74	60	12,500	critical
	N,E	1.0	0.74	60	6,250	critical
	Z/N/E/	15.0	100.0	15	750	critical
Benioff VR 14.7Kg	Zh	1.0	0.02	180*	4,000	critical

* Recording is triggered by the onset of any earthquake with pre-determined minimum amplitude. Recorder is stopped automatically by hour break pulse.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
Omori 15Kg	No	3.6	-	24	12	10.1(air)
Omori 15Kg	Eo	3.8	-	24	10	10.1(air)
Wood-Anderson Torsion	Na,Ea	0.8	-	60	2,800	critical

Rabaul Harbour Network

Readings from the Harbour Network are entered in the PEA only for large earthquakes.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
WAN** Benioff VR 14.7Kg	Z	1.0	0.02	60	5,240	critical
SUL** Benioff VR 14.7Kg	Z	1.0	0.02	60	2,850	critical
RAL** Benioff VR 14.7Kg	Z	1.0	0.02	60	8,075	critical
TAV** Benioff VR 14.7Kg	Z	1.0	0.02	60	20,900	critical
VUL***Benioff VR 14.7Kg	Z	1.0	0.02	60	5,000	critical

STATION INSTRUMENTATION

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Rabaul Harbour Network (Cont'd)						

** Signals from these stations are telemetered by land line to Helicorders (Geotech Mod. 2484) at the Central Observatory.

*** Signals from this station are telemetered via VHF to its Helicorder at the Central Observatory.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Keravat Out-Station KRT						
Benioff MC 50Kg	Z	1.2	0.2	15	20% sensitivity	critical
Benioff MC 50Kg	N,E	1.2	0.2	15	10% sensitivity	critical
Ulamona Field Station	ULA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Piva Field Station	PIV					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Waris Field Station	WAA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

N.B. These field stations consist of a permanent building in which instruments are installed when necessary.

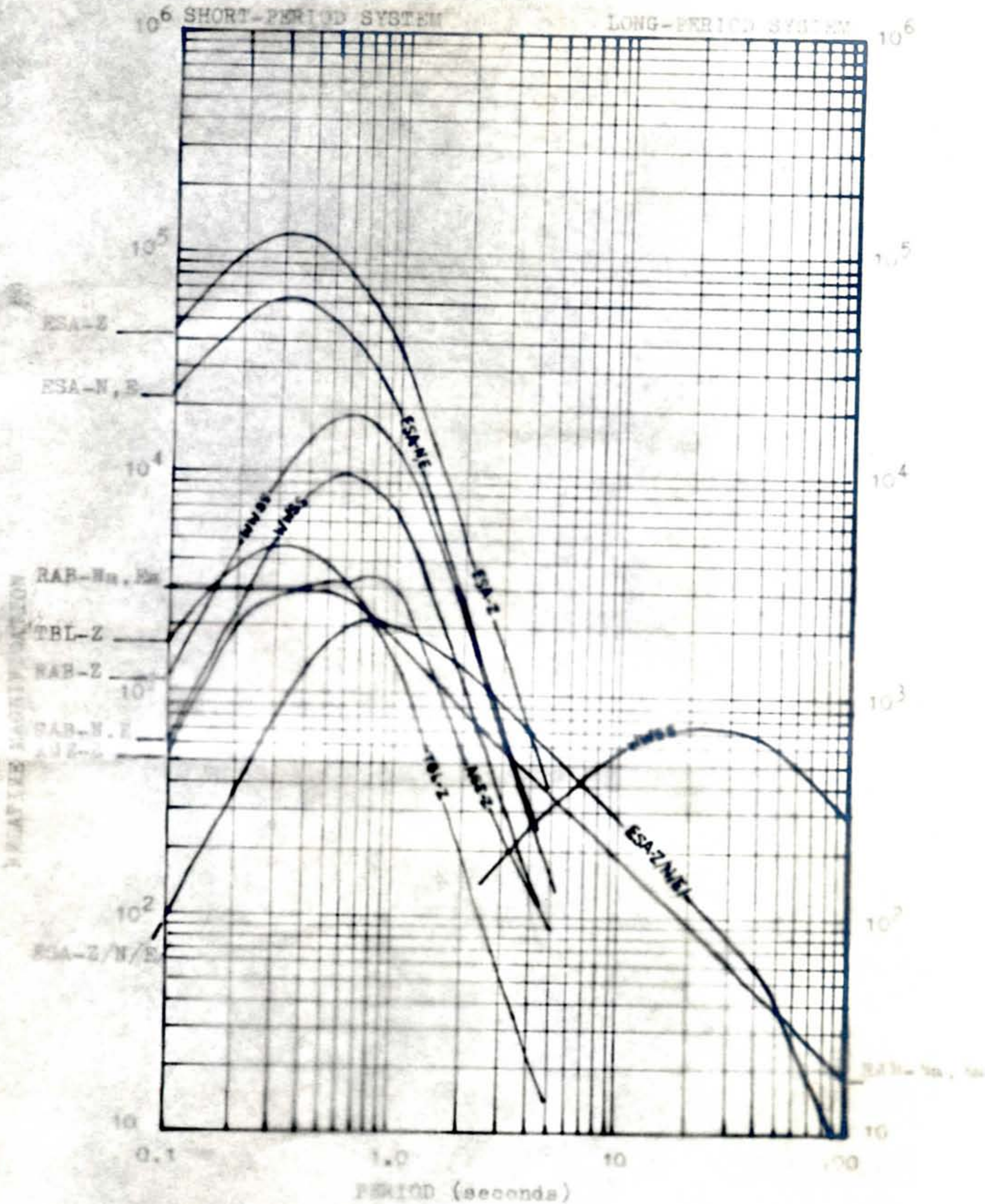
Details of emergency field stations, within the Territory will be listed when in operation.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Tabele Observatory	TBL					
Benioff VR 107.5Kg	Z	1.0	0.2	60	1,350	critical
PAPUA						
Esa'ala Observatory	ESA					
Benioff VR 107.5Kg	Z	1.0	0.2	15	36,000	critical
Benioff VR 107.5Kg	N,E	1.0	0.2	15	18,000	critical
Benioff VR 107.5Kg	Z/N/E/	1.0	60.0	30	50% sensitivity	critical
Agenahambo Station	AGE					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

VRS Variable Reluctance

MCS Moving-coil

Relative magnification curves of seismograph systems installed in stations controlled by the Rabaul Central Observatory have been listed on the following page.



FREQUENCY RESPONSE CURVES OF THE INSTRUMENTS.

PRESENTATION OF DATA

(reviewed in November, 1967)

All times are reduced to Greenwich Mean Time (GMT), which is 10 hours behind Eastern Standard Time.

At RAB and Harbour Network, the time signal is marked every minute on each seismogram record from the Observatory crystal chronometer. Second marks from radio signal VNG (Australia) are recorded on World-Wide Standard System S.P.-N component only according with the W.W.S.S. programme, at six hour intervals. Primary time is provided by W.W.S.S. equipment and secondary time by a Labtronic crystal chronometer with the accuracy of ± 5ms per day compared with VNG (Australia) with the aid of a chronoscope.

At TBL and AGE, the time signal is derived from a spring driven chronometer (Mercer) and marked each minute on records. Time accuracy is determined by comparison with signals from WWVH daily. Linear correction is applied to the daily drift.

On all seismogram records time increases from left to right and time break is upward.

At RAB* and Harbour Network the recording drum of each seismograph is driven by a 110VAC 60Hz synchronous motor. The 110VAC is frequency regulated by a crystal chronometer.

* The Omori recording drum is driven by a nonregulated 50Hz frequency supply.

At ESA and KRT power for recorder motors is frequency regulated by a crystal chronometer at 50Hz.. Power for AGE and TBL and field Stations is supplied by a 50Hz free running oscillator.

Direction of Motion

Upward direction of ground motion corresponds to upward trace motion on vertical seismogram records. Direction of component of ground motion to North or East corresponds to upward trace motion on horizontal seismogram records.

Vertical trace motion from impulsive onset of longitudinal waves of compressional or dilatational ground movement is indicated by "u" or "d" accompanied by N, S, E or W, as per trace motion amplitude on horizontal seismogram records, to represent vectorially the direction of ground motion. "+" or "-" indicates upward or downward motion of the ground respectively, from a wave not known to be of the longitudinal type.

Accuracy of Readings

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half second.

Crustal Phases

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale, of 1931.

PRESENTATION OF DATA (CONT'D)

Determinations of Epicentres

Where no source is cited, the determination of epicentres, origin time, focal depth and distance in central angle degrees from the pertinent station for local and regional earthquakes, are carried out at the Central Observatory, Rabaul.

Geographical Designation of Epicentres

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

Magnitude Definition and Determination

M_L -Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson torsion seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millimetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the tenth of a unit.

The station correction factor is assumed to be zero until better known.

M_S -Surface Wave Magnitude (Gutemberg & Richter, 1956) is calculated from the amplitude of surface waves of period near 20 seconds for shallow distant earthquakes.

M_B -Body Wave Magnitude is calculated from the ratio of amplitude over period for body waves on S.P.-Z of World-Wide Seismograph System only when depth is known. The magnification factor for the standard seismograph is taken into account.

m -Unified magnitude (Gutemberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8\ M_L - 0.01\ M^2{}_L$$

$$m = M_B \text{ (without correction)}$$

$$m = 2.5 + 0.63\ M_S$$

Local Magnitude of earthquakes recorded at RAB with a clear S-P interval is tabulated on a Day-Distance (in Central Angle Degrees) graph which is added to the PEA monthly.

Symbols

i -impulsive and sharply defined beginning of a phase.

e -emergent and poorly defined emergence of phase.

T -Period in seconds

A -Peak-to-Trough trace amplitude in millimetres.

GM -Ground Motion.

Dist -Distance in central angle degrees.
H -Origin Time
h -Focal depth in Kilometres
CBM -Confused by microseisms.

PRESENTATION OF DATA (CONT'D)

Remarks

Local	-	Typical signature of an earthquake with epicentre within 0.9^o
Near	-	Typical signature of an earthquake with epicentre between 0.9^o and 9^o
Distant	-	Typical signature of an earthquake with epicentre between 9^o and 45^o
Teleseism	-	Typical signature of an earthquake with epicentre more than 45^o
Traces	-	Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G.W. D'ADDARIO
Vulcanologist-in-Charge

			T sec	A mm	GM	Dist	H	Remarks
6th Nov.,1967 No records received due to power failure from 2322 to 2340 hrs								
RAB	iPZ	005007.6	0.4	0.8	d	¼°	005001	
	iSE	12.4						
KRT	iPZ	005008½	0.3	5.8	d	¼°	005001	
	iSE	14½						
RAB	iPZ	040511.2	0.4	2.0	u	¾°	040457	3.1
	iSN	21.0						
KRT	iPZ	040510	0.2	2.4	d	¾°	040456	
	iSE	20½						
RAB	iPZ	132049.2	0.4	2.2	u	¼°	132041	2.7
	iSN	55.4						
WAN	iPZ	132049.0	0.3	1.0	u			
RAL	iPZ	132048.8	0.5	1.0	u			
KRT	iPZ	132050½	0.2	3.2	u	¼°	132043	
	iSE	56½						
	iE	58						
7th Nov.								
RAB	eZ/	010250			–			Traces
RAB	iPZ	070410.5	0.3	7.0	u	(1½°)0703(46)4.2		
	e(S)N	29						
VUL	iPZ	070409.4	0.3	6.2	d			
KRT	iPZ	070409			d	1¼°	070349	
	iSN	24½						
RAB	ePZ	095338½	0.5	1.0	d	(19°)		
	e(S)N/	5706						
KRT	i(P)Z	095335½	0.3	2.2	d			
RAB	iPZ	104703.2	0.5	5.0	d	1½°	104638	3.8
	iSN	21.9						
VUL	iPZ	104702.2	0.3	6.0	d			
KRT	iPZ	104701½			u	1¼°	104639	
	iSN	18						
RAB	eZ/	122806			–			Traces
RAB	ePZ	151353½	0.5	0.8	d			Regional
KRT	e(P)Z	151350½	0.5	0.4	u			
RAB	iPZ	183738.0	0.4	2.0	u	½°	183728	2.8
	iSN	45.0						
RAB	records off							
WAN	iPZ	230151.8	0.4	6.0	u			
SUL	iPZ	230152.3	0.3	2.0	u			
RAL	iPZ	230151.5	0.5	1.0	d			
KRT	iPZ	230151	0.4	1.3	u	5°	230037	
	iN	57½						
	iE	0213						
	iSE	48						

			T sec	A mm	GM	Dist	H	Remarks
8th Dec., 1967								
RAB	iPZ	020318.0	0.6	2.0	u			Possible double shock
	iZ	25.6						M_L=(6.6);
	iPZ/	0543						M_B=7.2
	i(S)E/	0621				(10¼°)		
	iZ/	0738						
WAN	ePZ	020318	0.3	1.0	u			
KRT	iPZ	020321			u			
	iPZ	0534						
RAB	iPZ	030304.4	0.6	1.8	u	6¼°	030130	M_L=5.8
	iZ	13.6						
	iZ	23.5						
	iE/	31						
	iS!E/	0417						
KRT	iPZ	030303½	0.3	2.0	d			
	iZ	26						
	i	52						
RAB	iPZ	032059.8	0.4	1.6	u			After shock
	i!Z	2142						
KRT	iPZ	032058½						
	i!Z	2112						
RAB	iPZ	033026	0.4	3.0	u			After shock
	i!Z	30.0						
WAN	ePZ	033026	0.5	1.5	u			
KRT	iPZ	033025½	0.4	2.3	d			
RAB	ePZ	172805½	0.4	0.6	u	3°	172819	
	iSE	40.4						
KRT	ePZ	172758			u			
	eZ	2803½						
RAB	iPZ	193418.6	0.4	1.8	u	1½°	193355	M_L=3.4
	iSE	37.0						
KRT	iPZ	193417½	0.3	3.0	u	1½°	193354	
	iSN	34½						
RAB	iPZ	194453.0	0.5	1,8	d	1½°	194428	ML=3.8
	iZ	53.4						
	iSE	4511.8						
	iE	19.2						
KRT	iPZ	194453	0.3	2.8	u	1½	194427	
	iSE	4512½						
9th Dec., 1967								
KRT	ePN	003223						
	eN	36						
	eSN	0409½						
RAB	eZ/	003436			+			Traces
RAB	iPZ	015620.5	0.4	3.0	u	¾°	015605	M_L=3.8
	iSE	31.8						
KRT	iPZ	015623 -			u			
RAB	iPZ	033914.8			d	(3¼°)	0338(27)	M_L=5.5
	e(S)N/	52						

9th Dec., (cont'd)

			T sec	A mm	GM	Dist	H	Remarks
WAN	ePZ	033914½	0.4	1.0	d			
SUL	iPZ	033916.0	0.4	1.0	u			
RAL	ePZ	033914½	0.6	1.0	d			
KRT	iPZ	033912			u			
RAB	iPZ iSEo	064350.0 4412.0			u	1¾°	064321	M_L=5.0
WAN	iPZ	064349.6	0.4	8.5	u			Felt: Rabaul intensity 11-111 04°11'S 152°10E
SUL	iPZ	064349.5	0.5	8.5	u			
RAL	iP'Z	49.5			u			
KRT	iPZ	064347½			d			
RAB	iPZ iSE	093906.4 36.0			d	2½°	093827	M_L=4.9
WAN	iPZ	093906.0	0.3	1.0	d			
SUL	iPZ	093908.0	0.3	4.0	d			
RAL	iPZ	093908.0	0.3	2.0	u			
KRT	iPZ iSE	093905½ 34			d	2¼°	093828	
RAB	iPZ iSN	100202.0 12.5			d	¾°	100143	M_L=3.8
WAN	iPZ	100202.0	0.2	1.0	d			
SUL	iPZ	100202.3	0.3	1.0	d			
RAL	iPZ	100201.5	0.2	3.0	d			
KRT	iPZ iSN	100204 16½			d	1°	100147	
RAB	ePZ eSN/	105358½ 5654	0.8	1.0	u	16°		
KRT	iPZ	105359			d			CBM
RAB	iPZ eSE/	120929.0 42			d	1°	120911	M_L=4.2
WAN	iPZ	120928.8			u			
SUL	iPZ	120928.5	0.2	28.0	u			
RAL	iPZ	120928.6			u			
KRT	iPZ	120927½			u			
RAB	iPZ	133537.0	0.5	4.0	u			Regional
WAN	iPZ	133536.5	0.6	1.2	u			
RAL	iPZ	133537.0	0.5	1.0	u			
KRT	iPZ iSN	133051 3153	0.5	0.4	d	5½	132931	
RAB	iPZ iSN	161859.2 1919.0	0,4	4.0	d	1½°	161833	M_L=4.4
WAN	ePZ	161859	0.3	1.0	d			
SUL	iPZ	161859.2	0.3	1.0	u			
RAL	iPZ	161858.5	0.2	1.5	d			
KRT	iPZ iN iSN	161858 1915½ 19½			d	1½°	161830	

			T sec	A mm	GM	Dist	H	Remarks
9th Dec., 1967 (cont'd)								
RAB	iPZ iSN/	170050.5 0110.0			d	$1\frac{1}{2}^{\circ}$	170025	$M_L=4.5$
WAN	iPZ	170050.2	0.4	2.0	d			
SUL	ePZ	170050	0.3	1.0	d			
RAL	iPZ	170049.6	0.5	5.0	d			
KRT	iPZ iSE	170052 0114	0.3	10.2	d	$1\frac{3}{4}^{\circ}$	170023	
RAB	iPZ iSN/	200255.5 0316.0			u	$1\frac{1}{3}^{\circ}$	200233	$M_L=4.4$
WAN	iPZ	200255.2	0.2	2.0	u			
RAL	iPZ	200255.4	0.3	1.0	d			
KRT	iPZ iSE	200253 $0310\frac{1}{2}$			d	$1\frac{1}{2}^{\circ}$	200230	
RAB	eiPZ iZ	222049 50.0	0.5	1.0	u			Regional
RAL	iPZ	222048.6	0.6	1.5	u			
KRT	iPZ iSN	$222047\frac{1}{2}$ $2102\frac{1}{2}$			d	$1\frac{1}{4}^{\circ}$	222028	
10th Dec., 1967								
RAB		Records off						
WAN	iPZ	010143.0	0.3	6.1	u			
SUL	iPZ	010143.0	0.4	3.0	u			
RAL	iPZ	010143.0	0.3	4.0	u			
KRT	iP'Z iSE	010139 0153			u			
RAB	iPZ	021126.8	0.5	1.0	u			(Teleseism)
KRT	iPN iSN	021124 $1348\frac{1}{2}$				13°		
RAB	iPZ	030127.0	0.4	2.0	d			Regional
KRT	ePE	030126						
RAB	iPZ iSN	045521.5 42.0	0.5	3.4	u	$1\frac{1}{2}^{\circ}$	045459	$M_L=4.1$
KRT	ePZ iSE	$045523\frac{1}{2}$ 45	0.6	1.0	d	$1\frac{1}{2}^{\circ}$	045455	
RAB	eiPZ iZ iZ iSN	$104337\frac{1}{2}$ 44.5 51.4 4406.0	0.4	1.0	d	$2\frac{1}{2}^{\circ}$	104259	$M_L=4.2$
KRT	iPZ iSE	$104339\frac{1}{2}$ $4409\frac{1}{2}$	0.4	1.2	d	$2\frac{1}{2}^{\circ}$	104300	
RAB	iPZ iSN	121823.2 54.5	0.3	1.0	u	$2\frac{1}{2}^{\circ}$	121742	$M_L=4.3$
KRT	iPZ iSN	$121822\frac{1}{2}$ $53\frac{1}{2}$			d	$2\frac{1}{2}^{\circ}$	121742	CBM
RAB	e(SKS)N/ eN/ eN/	123024 3612 4250						Teleseism

			T sec	A mm	GM	Dist	H	Remarks
10th Dec., 1967 (cont'd)								
RAB	iPZ	141530.0	0.4	6.0	d	$1\frac{1}{4}^{\circ}$	141510	M_L=4.1
	iSN	45.0						
WAN	iPZ	141530.0	0.3	4.0	d			
RAL	iPZ	141530.0			d			
KRT	iPZ	$141526\frac{1}{2}$			d	$\frac{3}{4}^{\circ}$	141511	
	iSE	$37\frac{1}{2}$						
RAB	iPZ	162408.0	0.5	4.5	d	$1\frac{1}{2}^{\circ}$	162342	M_L=4.0
	iSN	28.0						
WAN	iPZ	162408.0			u			
RAL	iPZ	162407.8			u			
KRT	eiPZ	$162409\frac{1}{2}$	0.6	0.3	d	$1\frac{1}{2}^{\circ}$	162343	
	iZ	10						
	iSN	$29\frac{1}{2}$						
RAB	iPZ	185341.0	0.5	2.0	d			Regional
KRT	ePZ	190349	0.5	0.4	d	$1\frac{1}{2}^{\circ}$	190323	
	iSE	$0408\frac{1}{2}$						
RAB	iPZ	193153.2	0.4	2.3	u	$1\frac{1}{2}^{\circ}$	193127	M_L=3.8
	iSN	3213.0						
KRT	iPE	$193152\frac{1}{2}$				$1\frac{1}{4}^{\circ}$	193132	
	iSE	3208						
RAB	eZ/	215240			-			Traces
11th Dec., 1967	Part of the records exposed to light							
RAB	iPZ	064447.0	0.3	2.0	u	$1\frac{1}{2}^{\circ}$	064421	M_L=4.0
	iSE	4507.0						
KRT	iPZ	064449			u	$1\frac{1}{2}^{\circ}$	064421	CBM
	iSE	$4510\frac{1}{2}$						
RAB	ePZ	$073913\frac{1}{2}$	0.4	2.0	u			Regional CBM
KRT	iPZ	073914			d	1°	073855	
	iSN	28						
RAB	iPZ	084915.6	0.4	6.5	d	$1\frac{1}{4}^{\circ}$	084855	M_L=3.5
	iSN	30.5						
KRT	iPZ	$084914\frac{1}{2}$			d	1°	084855	
	iSN	$28\frac{1}{2}$						
RAB	iPZ	123150.4	0.4	2.0	d	$1\frac{1}{2}^{\circ}$	123126	M_L=3.6
	iSN	3208.0						
KRT	iPZ	$123148\frac{1}{2}$			d			
RAB	iP'Z	161841.5	0.5	46.0	unw	$1\frac{1}{4}^{\circ}$	161818	M_L=4.5
	iSE/	59.0						
WAN	iPZ	161841.5	0.5	8.0	u			
SUL	iPZ	161841.4	0.5	5.0	u			
RAL	iPZ	161841.9	0.5	4.0				
KRT	iPZ	161841	d					
RAB	iPZ	172134.2	0.4	2.0	d	$1\frac{1}{2}^{\circ}$	172109	M_L=4.1
	iSN	53.0						
RAL	iPZ	172133.9			u			

			T sec	A mm	GM	Dist	H	Remarks
11th Dec., 1967 (cont'd)								
KRT	eiPZ	172133	0.3	5.0	d	$1\frac{1}{2}^{\circ}$		172109
	iZ	$33\frac{1}{2}$						
	iSE	$51\frac{1}{2}$						
RAB	iPZ	174031.6	0.5	2.8	d	$1\frac{1}{2}^{\circ}$	174008	M_L=3.9
	iSE	49.8						
KRT	iPZ	$174030\frac{1}{2}$			u	$1\frac{1}{2}^{\circ}$	174008	
	iSE	$47\frac{1}{2}$						
RAB	iPZ	174730.2	0.4	1.5	d	$1\frac{1}{2}^{\circ}$	174704	M_L=4.0
	iZ	31.0						
	iSN	50.0						
KRT	iPZ	174730	0.3	3.0	u	$1\frac{1}{2}^{\circ}$	174706	
	iSE	$47\frac{1}{2}$						
RAB	ePZ	194747	0.5	1.0	u			Teleseism
RAB	iPZ	201513.2	0.4	1.2	u	$1\frac{1}{2}^{\circ}$	201447	M_L=3.5
	iSN	31.3						
KRT	iPZ	201512			u	$1\frac{1}{2}^{\circ}$	201449	
	iSE	$29\frac{1}{2}$						
RAB	eiPZ	213157	0.5	1.0	d	$1\frac{1}{2}^{\circ}$	213133	M_L=4.0
	iZ	58.2						
	iSN	3217.0						
RAB	eiPZ	215732.5	0.4	1.8	d	$1\frac{1}{2}^{\circ}$	215707	M_L=3.8
	iZ	33.1						
	iSN	51.0						
KRT	iPZ	$215731\frac{1}{2}$	0.5	6.0	u	$1\frac{1}{4}^{\circ}$	215709	
	iSE	$48\frac{1}{2}$						
RAB	iPZ	221303.0	0.5	2.0	d	$1\frac{1}{2}^{\circ}$	221237	M_L=4.0
	iSN	22.0						
RAL	iPZ	221302.6			d			
KRT	iPZ	221302	0.2	0.3	d	$1\frac{1}{2}^{\circ}$	221237	
	iSE	21						
RAB	iPZ	221952.3	0.4	7.0	d	$1\frac{1}{4}^{\circ}$	221932	M_L=3.9
	iSN	2008.0						
WAN	iPZ	221952.2			d			
RAL	iPZ	221951.6	0.3	5.0	d			
KRT	iPZ	$221952\frac{1}{2}$			d	$1\frac{1}{4}^{\circ}$	221932	
	iSE	08						
12th Dec., 1967								
RAB	iPZ	015835.4	0.4	3.0	u	$1\frac{1}{2}^{\circ}$	015811	M_L=3.6
	iSN	53.6						
KRT	iPZ	015835			d	$1\frac{1}{4}^{\circ}$	015812	
	iSE	52						
RAB	iPZ	042503.8	0.4	7.0	unw	$1\frac{1}{2}^{\circ}$	042440	M_L=4.7
	iS'	22.0						
WAN	iPZ	042503.5			u			
SUL	iPZ	042503.8	0.4	11.0	u			
RAL	iPZ	042503.3			d			
KRT	iPZ	042503			u			

12th Dec.,1967 (cont'd)

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ eSE/	043546.0 3602	0.5	2.0	u	1¼°	043525	M_L=4.8
WAN	iPZ	043545.8	0.3	1.5	u			
SUL	iPZ	043546.0	0.3	9.0	d			
RAL	ePZ	043545.0			u			
KRT	iPZ i(S)E	043545 3601			u	(1¼°)	0435(24)	
RAB	iPZ iSE/	044628.8 47.0			u	1½°	044605	Superimposed M_L=4.5
WAN	iPZ	044628.5	0.3	2.5	d			
SUL	ePZ	044629	0.4	1.0	d			
RAL	iPZ	044628.3			d			
KRT	iPZ i(S)E	044628½ 44½			u	(1¼°)	0446(07)	
RAB	ePZ eSE/	045154 5214			u	1½°	045128	Superimposed
KRT	iPZ iSE	045153 5210½			u	1½°	045130	
RAB	ePZ eSN/	065328 48			u	1½°	065302	M_L=4.8
WAN	iPZ	065328.0	0.4	1.0	u			
SUL	iPZ	065328.2	0.3	7.5	d			
RAL	iPZ	065328.0	0.3	15.0	d			
KRT	iPZ	065327½			u			
RAB	ePZ e(S)N/	081156 1614	0.6	1.2	(26°)			
KRT	ePE	081152						
RAB	iPZ iSN	090249 0308.0	0.5	4.0	d	1½°	090224	M_L=4.8
KRT	iPZ iSE	090248 0306			u	1½°	090224	
RAB	iPZ iSN	091541.5 1600.6	0.6	3.0	d	1½°	091516	M_L=4.8
KRT	iPZ iSE	091541½ 58			d	1¼°	091519	
RAB	iPZ eSE/	110832.5 50	0.5	30.0	u	1½°	110808	
WAN	iPZ	110832.2	0.5	9.0	u			
SUL	ePZ	110832½			d			
RAL	iPZ	110832.0						
KRT	iPZ	110831½			u			
RAB	iPZ iSN	112929.2 56.0	0.3	1.8	u	2¼°	112853	M_L=(5.1)
KRT	iPZ iZ iSE	112926½ 36 53½			d	2¼°	112851	

			T sec	A mm	GM	Dist	H	Remarks
12th Dec.,1967 (cont'd)								
RAB	iPZ	132005.0	0.5	5.0	d	$1\frac{1}{2}^{\circ}$	131940	M_L=4.0
	iSE	24						
KRT	iPZ	132004½			d	$1\frac{1}{2}^{\circ}$	131942	
	iSE	21½						
RAB	ePZ	142623	0.6	2.0	u			Teleseism
RAB	iPZ	144249.0	0.5	6.0	u	$\frac{1}{2}^{\circ}$	144240	M_L=3.7
	iSN	56						
WAN	iPZ	144248.5	0.3	1.0	u			
SUL	ePZ	144248			d			
RAL	iPZ	144248.5	0.3	3.0	u			
KRT	iPZ	14425[illegible]			u			
RAB	iPZ	153635.4	0.5	3.0	u	$1\frac{1}{2}^{\circ}$	153610	M_L=3.8
	iSN	54.5						
KRT	iPZ	153634			d	$1\frac{1}{2}^{\circ}$	153611	
	iSE	51½						
RAB	iPZ	172527.0	0.5	1.0	u	$3\frac{1}{2}$	172430	M_L=5.4
	iZ	29.0						
	iSN	2611.0						
KRT	iPZ	172527	0.4	1.0	u	$3\frac{3}{4}^{\circ}$	172428	
	i(S)E	2612½						
RAB	iPZ	173438.0	0.5	2.0	u	$1\frac{1}{2}^{\circ}$	173413	M_L=4.3
	iSN	57.0						
KRT	iPZ	173438			d	$1\frac{1}{2}^{\circ}$	173414	
	iSE	54½						
RAB	iPZ	192042.2	0.5	2.0	d	$1\frac{1}{2}^{\circ}$	192017	M_L=4.0
	iSN	2101.0						
KRT	iPZ	192041			u	$1\frac{1}{2}^{\circ}$	192017	
	iSE	58½						
RAB	iPZ	192245.5	0.5	1.5	d	$1\frac{1}{2}^{\circ}$	192220	M_L=3.7
	iSN	2304.0						
KRT	iPZ	192244½			d	$1\frac{1}{2}^{\circ}$	192222	
	iSE	2301½						
RAB	iPZ	221252.8	0.5	6.0	u	$1\frac{1}{4}^{\circ}$	221230	M_L=3.6
	iSN	1310.2						
KRT	iPZ	22125[illegible]½			u	$1\frac{1}{2}^{\circ}$	221228	
	iSE	1309						

TABELE (TAB)

		T sec	A mm	GM	Dist	H	Remarks
28th Nov., 1967							
eiPZ	105346	0.5	1.0	u			Regional
iZ	46½						
iZ	57½						
iZ	5405½						
iPZ	221020½	0.5	16.0	u			Regional
iZ	33½						

29th Nov., 1967 Microseismic activity from 1835 to associated with heavy rainfall

		T sec	A mm	GM	Dist	H	Remarks
30th Nov., 1967							
iPZ	064640	0.4	3.0	u			Regional
iZ	4701						
iZ	17						

Microseismic activity from 1535 to 1549, 0211 to 0227 associated with heavy rainfall

		T sec	A mm	GM	Dist	H	Remarks
1st Dec., 1967							
iPZ	031544	C.3	2.0	d			Regional
iZ	53						
iZ	1608						

2nd Dec., 1967 Nil recorded

3rd Dec., 1967 Nil recorded

4th Dec., 1967 Nil recorded

Central Observatory,
Rabaul.

(G.W.D'ADDARIO)
Vulcanologist-in-Charge

PEA Dec-67

TERRITORY OF PAPUA AND NEW GUINEA
GEOLOGICAL AND VULCANOLOGICAL BRANCH
VULCANOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY
1967

Rabaul	RAB	From: DEC. 13, 1967 To : DEC. 19, 1967
Keravat	KRT	From: DEC. 13, 1967 To : DEC. 19, 1967
Esa'ala	ESA	From: -- To :
Tabele	TBL	From: -- To :
Agenahambo	AGE	From: To :
Waris	WAA	Not operational
Ulamona	ULA	Not operational
Piva	PIV	Not operational

STATION PERSONNEL

RAB **Central Observatory, Rabaul.**

Vulcanologist-in-Charge	G.W. D'Addario
Vulcanologist	R.F. Heming
Seismologist	Position Vacant
Senior Technical Officer	N.O. Myers
Technical Officer	R.J. Conway
Seismogram Readers	P.M. Leitao; V. Hunt
Vulcanological Assistants	L. Topue; M. Gaiam V. Kaita
Technical Assistant	P. Daimbari
Trainee Vulcanological Assistants	B. Talai; M. Salaiau; Position Vacant
Secretary	G. Chant

KRT **Keravat Outstation**

Observer (part-time)	G.E. Chorick

TBL **Tabele Observatory**

Observer	E. Ravian

ESA **Esa'ala Observatory**

Observer	F. Dira

AGE **Agenahambo Out-station**

Observer (part-time)	Br. B. Hughes

The Rabaul Preliminary Earthquake Analysis (PEA) is produced by the staff under the direction of the Vulcanologist-in-Charge from whom additional information and photocopies of seismogram records from all stations may be obtained on request.

Please address all communications to:-

Vulcanologist-in-Charge,
Central Observatory,
P.O. Box 386,
RABAUL, T.P. & N.G.

SEISMOGRAPH STATIONS

Station	Code	South Latitude	East Longitude	Elev. (m)	Foundation
NEW GUINEA					
Rabaul	RAB	04°11'28.6"	152°10'11.4"	183.5	Basalt Flow
Wanliss Street	WAN*	04°11'39.6"	152°10'32.5"	25.0	Basalt Flow
Sulphur Creek	SUL*	04°13'09.8"	152°10'33.3"	8.5	Unconsolidated Volcanic Ash
Rabalanakaia	RAL*	04°13'13.0"	152°12'07.0"	91.0	Unconsolidated Volcanic Ash
Tavurvur	TAV*	04°14'12.0"	152°13'18.0	60.0	Andesite Flow
Taviliu	VUL*	04°16'58.2"	152°08'44.6"	332.3	Unconsolidated Volcanic Ash
Keravat	KRT	04°20'[illegible]"	152°00'00"	20.0	Alluvium
Ulamona	ULA	04°59'24.0"	151°16'30.0"	17.0	Lapilli Tuff
Tabele	TBL	04°06'04.67"	145°00'41.37"	179.5	Basalt Flow
Waris	WAA	04°07'00"	145°06'00"	48.0	Lapilli Tuff
Piva	PIV	06°12'00"	155°03'30"	60.0	Alluvium
PAPUA					
Agenahambo	AGE	08°48'30"	148°06'12"	303.0	Unconsolidated Volcanic Ash
Esa'ala	ESA	09°44'18.2"	150°48'50.7"	46.4	Granite Gneiss

* Rabaul Harbour Network

STATION INSTRUMENTATION

Station & Instruments	Comp.	Tp	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
NEW GUINEA						
Rabaul Central Observatory						
WORLD-WIDE STANDARD	Z	1.0	0.74	60	12,500	critical
	N,E	1.0	0.74	60	6,250	critical
	Z/N/E/	15.0	100.0	15	750	critical
Benioff VR 14.7Kg	Zh	1.0	0.02	180*	4,000	critical

* Recording is triggered by the onset of any earthquake with pre-determined minimum amplitude. Recorder is stopped automatically by hour break pulse.

Station & Instruments	Comp.	Tp	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
Omori 15Kg	No	3.6	-	24	12	10.1(air)
Omori 15Kg	Eo	3.8	-	24	10	10.1(air)
Wood-Anderson Torsion	Na,Ea	0.8	-	60	2,800	critical

Rabaul Harbour Network

Readings from the Harbour Network are entered in the PEA only for large earthquakes.

Station & Instruments	Comp.	Tp	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
WAN** Benioff VR 14.7Kg	Z	1.0	0.02	60	5,240	critical
SUL** Benioff VR 14.7Kg	Z	1.0	0.02	60	2,850	critical
RAL** Benioff VR 14.7Kg	Z	1.0	0.02	60	8,075	critical
TAV** Benioff VR 14.7Kg	Z	1.0	0.02	60	20,900	critical
VUL***Benioff VR 14.7Kg	Z	1.0	0.02	60	5,000	critical

STATION INSTRUMENTATION

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Rabaul Harbour Network (Cont'd)						

** Signals from these stations are telemetered by land line to Helicorders (Geotech Mod. 2484) at the Central Observatory.

*** Signals from this station are telemetered via VHF to its Helicorder at the Central Observatory.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Keravat Out-Station KRT						
Benioff MC 50Kg	Z	1.2	0.2	15	20% sensitivity	critical
Benioff MC 50Kg	N,E	1.2	0.2	15	10% sensitivity	critical
Ulamona Field Station	ULA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Piva Field Station	PIV					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Waris Field Station	WAA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

N.B. These field stations consist of a permanent building in which instruments are installed when necessary.

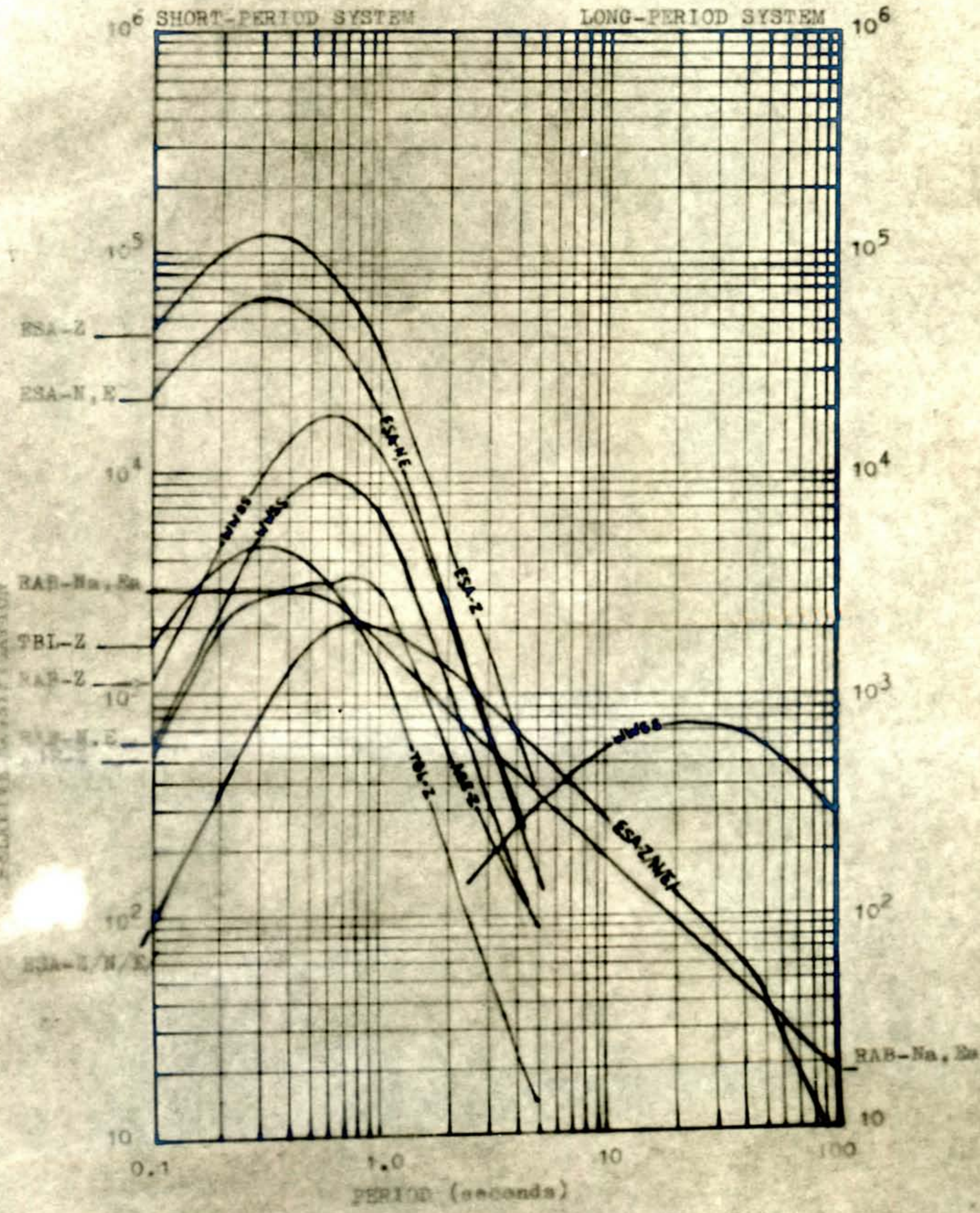
Details of emergency field stations, within the Territory will be listed when in operation.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Tabele Observatory	TBL					
Benioff VR 107.5Kg	Z	1.0	0.2	60	1,350	critical
PAPUA						
Esa'ala Observatory	ESA					
Benioff VR 107.5Kg	Z	1.0	0.2	15	36,000	critical
Benioff VR 107.5Kg	N,E	1.0	0.2	15	18,000	critical
Benioff VR 107.5Kg	Z/N/E/	1.0	60.0	30	50% sensitivity	critical
Agenahambo Station	AGE					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

VRS Variable Reluctance

MCS Moving-coil

Relative magnification curves of seismograph systems installed in stations controlled by the Rabaul Central Observatory have been listed on the following page.



FREQUENCY RESPONSE CURVES OF THE INSTRUMENTS.

PRESENTATION OF DATA

(reviewed in November, 1967)

All times are reduced to Greenwich Mean Time (GMT), which is 10 hours behind Eastern Standard Time.

At RAB and Harbour Network, the time signal is marked every minute on each seismogram record from the Observatory crystal chronometer. Second marks from radio signal VNG (Australia) are recorded on World-Wide Standard System S.P.-N component only according with the W.W.S.S. programme, at six hour intervals. Primary time is provided by W.W.S.S. equipment and secondary time by a Labtronic crystal chronometer with the accuracy of ± 5ms per day compared with VNG (Australia) with the aid of a chronoscope.

At TBL and AGE, the time signal is derived from a spring driven chronometer (Mercer) and marked each minute on records. Time accuracy is determined by comparison with signals from WWVH daily. Linear correction is applied to the daily drift.

On all seismogram records time increases from left to right and time break is upward.

At RAB* and Harbour Network the recording drum of each seismograph is driven by a 110VAC 60Hz synchronous motor. The 110VAC is frequency regulated by a crystal chronometer.

* The Omori recording drum is driven by a nonregulated 50Hz frequency supply.

At ESA and KRT power for recorder motors is frequency regulated by a crystal chronometer at 50Hz.. Power for AGE and TBL and field Stations is supplied by a 50Hz free running oscillator.

Direction of Motion

Upward direction of ground motion corresponds to upward trace motion on vertical seismogram records. Direction of component of ground motion to North or East corresponds to upward trace motion on horizontal seismogram records.

Vertical trace motion from impulsive onset of longitudinal waves of compressional or dilatational ground movement is indicated by "u" or "d" accompanied by N, S, E or W, as per trace motion amplitude on horizontal seismogram records, to represent vectorially the direction of ground motion. "+" or "-" indicates upward or downward motion of the ground respectively, from a wave not known to be of the longitudinal type.

Accuracy of Readings

When readings are given with a decimal figure, they are to 1/10 of a seeond, other readings have been made to the nearest half second.

Crustal Phases

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale, of 1931.

PRESENTATION OF DATA (CONT'D)

Determinations of Epicentres

Where no source is cited, the determination of epicentres, origin time, focal depth and distance in central angle degrees from the pertinent station for local and regional earthquakes, are carried out at the Central Observatory, Rabaul.

Geographical Designation of Epicentres

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

Magnitude Definition and Determination

M_L -Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson torsion seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millimetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the tenth of a unit.

The station correction factor is assumed to be zero until better known.

M_S -Surface Wave Magnitude (Gutemberg & Richter, 1956) is calculated from the amplitude of surface waves of period near 20 seconds for shallow distant earthquakes.

M_B -Body Wave Magnitude is calculated from the ratio of amplitude over period for body waves on S.P.-Z of World-Wide Seismograph System only when depth is known. The magnification factor for the standard seismograph is taken into account.

m -Unified magnitude (Gutemberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8\ M_L - 0.01\ M^2_L$$

$$m = M_B \text{ (without correction)}$$

$$m = 2.5 + 0.63\ M_S$$

Local Magnitude of earthquakes recorded at RAB with a clear S-P interval is tabulated on a Day-Distance (in Central Angle Degrees) graph which is added to the PEA monthly.

Symbols

i -impulsive and sharply defined beginning of a phase.

e -emergent and poorly defined emergence of phase.

T -Period in seconds

A -Peak-to-Trough trace amplitude in millimetres.

GM -Ground Motion.

Dist -Distance in central angle degrees.
H -Origin Time
h -Focal depth in Kilometres
CBM -Confused by microseisms.

PRESENTATION OF DATA (CONT'D)

Remarks

Local	- Typical signature of an earthquake with epicentre within 0.9°
Near	- Typical signature of an earthquake with epicentre between 0.9° and 9°
Distant	- Typical signature of an earthquake with epicentre between 9° and 45°
Teleseism	- Typical signature of an earthquake with epicentre more than 45°
Traces	- Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G.W. D'ADDARIO
Vulcanologist-in-Charge

			T sec	A mm	GM	Dist	H	Remarks
13th Dec., 1967 KRT motor belt broken								
RAB	iPZ iSN	074742.8 4810.0	0.5	2.5	u	2¼°	074707	M_L=4.5
RAB	iPZ eSE/	100556.5 0622	0.5	5.0	u	2¼°	100522	M_L=4.2
WAN	iPZ	100556.4	0.3	1.0	d			
RAL	iPZ	100556.5	0.5	1.0	d			
RAB	iPZ iSN	100848.0 0906.0	0.4	3.0	d	1½°	100824	M_L=4.4
RAB	iPZ iSN/	104718.5 5430.0	0.6	4.0	d	51°		
RAB	iPZ iSE	131210.2 30.0	0.5	3.0	u	1½°	131144	M_L=4.3
RAB	iPZ eSN/	154142.5 4626	1.0	5.0	u	35°		
WAN	iPZ	154142.3	0.8	2.0	u			
RAL	iPZ	154142.6	0.8	1.5	u			
RAB	eP iZ eSN/	191205½ 06.0 1606	0.6	2.0	d	22°		
RAB	iPZ	204859.9	0.5	8.0	d			Regional
WAN	iPZ	204859.9	0.3	4.0	d			
RAL	iPZ	204800.2	0.2	2.0	u			
14th Dec., 1967 Due to clock error six hour break occurs at 0800, 1400 and 2000 hours.								
RAB	iPZ	004815.2	0.6	5.8	d			Regional
RAB	iPZ iSE	125231.8 46	0.4	12.0	d	1°	125213	M_L=3.8
WAN	iPZ	125231.5	0.3	8.0	d			
KRT	iPZ iSE	125230½ 44½			d	1°	125212	
RAB	ePZ	144355	1.0	0.6	d			(Teleseisms)
RAB	iPZ iSE	152320.1 2418.1	0.4	3.0	u	5°	152205	M_L=4.9
KRT	iPZ iSN iN iN	152322 2419 25 31			d	5°	152208	
RAB	i(P)Z	183513.2	1.0	3.0	u			
KRT	ePN e(S)N	183511 3740½				(13¼°)		
RAB	i(P)Z	183735.7	0.5	2.2	u			
RAB	iPZ iSE/	232708.0 30.0			d	1¾°	232639	M_L=5.2
KRT	iPZ	232707			d			

15th Dec.,1967

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	001842.5	0.4	4.0	u	1½°	001816	M_L=4.6
	iSN/	1902.0						
KRT	iPE	001843				1¼°	001822	
	iSE	59						
RAB	ePZ	001955½			u	1½°	001929	double shock
	iSN/	2015.0						M_L=4.8
RAB	iPZ	004509.2	0.3	3.0	d	2½°	004430	M_L=4.2
	iSN	39.0						
KRT	iPE	004507				2¼°	004431	
	iSE	34						
RAB	iPZ	013214.5	0.4	2.0	u	1½°	013149	M_L=4.2
	iSN	33.5						
KRT	iPE	013215½			d	1¼°	013155	
	iSE	31						
RAB	iPZ	024851.0	0.5	2.0	d	1½°	024824	M_L=4.4
	iSE	4911.0						
WAN	iPZ	024851.5	0.2	1.5	d			
RAL	iPZ	024851.2	0.4	2.0	d			
KRT	iPE	024849				1½°	024825	
	iSE	4907						
RAB	iPZ	084606.0	0.5	21.0	u	½°	084557	M_L=3.6
	iSE	13.0						
WAN	iPZ	084606.0			u			
RAL	iPZ	084606.2			u			
KRT	iPZ	084608	0.2	4.9	d	½°	084546	
	iSE	17½						
RAB	iPZ	090443.6	0.4	2.0	u	1½°	090418	M_L=4.4
	iSN	0502.5						
WAN	iPZ	090443.4	0.4	4.0	d			
SUL	iPZ	090443.5	0.2	1.0	d			
RAL	ePZ	090443			d			
KRT	iPZ	090442	0.2	4.0	d	1½°	090419	
	iSE	59½						
RAB	ePZ	194057	0.4	1.0	u	24°		
	eSN/	4514						
RAB	iPZ	220049.0	0.5	1.8	d	1½°	220022	M_L=4.1
	iZ	49.8						
	iSN	0109.0						
RAL	iPZ	220048.6	0.5	1.0	d			
KRT	iPZ	220048	0.2	2.0	d	1½°	220023	
	iSE	0107						
RAB	iPZ	225315.0	0.4	6.0	u	½°	225306	M_L=3.1
	iSN	22.2						
KRT	iPZ	225318½	0.2	5.5	u	¾°	225305	
	iSE	28½						

			T sec	A mm	GM	Dist	H	Remarks
16th Dec.,1967								
RAB	iPZ	020125.0	0.5	9.8	u	$\frac{3}{4}^{\circ}$	020110	M_L=4.0
	iSN	36.0						
WAN	iPZ	020124.5	0.3	3.0	u			
RAL	iPZ	020124.2			u			
KRT	iPZ	020127	0.2	2.0	u	1°	020110	
	iSN	39½						
RAB	ePZ	175727½	0.5	1.0	u	14°		
	eSN/	5954						
KRT	ePZ	175730½	0.5	0.3	d	$9\frac{3}{4}^{\circ}$	175509	
	eZ	40½						
	iSN	5920½						
RAB	iPZ	190754.2	0.5	1.2	d	$1\frac{1}{2}^{\circ}$	190729	M_L=4.2
	iZ	55.0						
	iSN	0813.0						
KRT	iPZ	190753½	0.2	3.0	d	$1\frac{1}{2}^{\circ}$	190730	
	iSN	0811½						
RAB	iPZ	194729.2	0.5	15.0	d	$1\frac{1}{2}^{\circ}$	194704	M_L=4.8
	iSN	48.0						
WAN	iPZ	194729.0	0.3	6.2	d			
SUL	ePZ	194729			u			
KRT	iPZ	194730½	0.5	8.0	d	$1\frac{3}{4}^{\circ}$	194701	
	iSE	53						
RAB	iPZ/	210332.6	0.6	1.8		58°		Deep
	iZ/	34						M_B=5.6
	e(PcP)Z/	47						
	iSN/	1116						
	e(PS)E/	42						
	(L_q)N/	1854						
KRT	ePZ	210335½	1.2	2.3	u			
	iZ	49½						
17th Dec.,1967								
RAB	iPZ	002951.0	0.4	2.0	u	2°	002919	M_L=4.8
	iZ	52.0						
	iSE	3015.0						
KRT	iPZ	002949	0.2	4.0	u	$1\frac{3}{4}^{\circ}$	002919	
	iSE	3011½						
RAB	iPZ	030823.4	0.5	4.0	d	2°	030753	M_L=4.7
	eSE/	46						
WAN	iPZ	030823.0	0.3	1.5	d			
RAL	iPZ	030823.0	0.5	3.0	d			
KRT	iPZ	030822½			d	$1\frac{3}{4}^{\circ}$	030755	
	iSE	43½						
RAB	iPZ	070944.2	0.5	7.0	d	$\frac{3}{4}^{\circ}$	070854	M_L=5.1
	iSE	1022.0						
WAN	iPZ	070944.5	0.5	4.0	u			
KRT	iPZ	070943½	0.2	6.5	d	$3\frac{1}{2}^{\circ}$	070850	
	iSE	1024½						

			T sec	A mm	GM	Dist	H	Remarks
17th Dec., 1967 (contd)								
RAB	iPZ iSN	150603.5 18.0	0.4	32.0	d	1°	150444	M_L=4.2
WAN	iPZ	150603.0			d			
SUL	iPZ	150603.0			d			
RAL	iPZ	150602.5			d			
KRT	iPZ	150602	0.3	11.7	d			
RAB	eiPZ iZ iZ eSE/	155034½ 38.0 40.6 5108	0.4	1.0	d	3°3	154949	M_L=4.9
KRT	iPZ iZ iSE	155033½ 44 5109½			d	3°	154946	
RAB	ePZ	160435	0.6	1.0	u			Teleseism
RAB	iPZ iSE/	162351.0 2422.0	0.5	14.0	u	2½°	162310	M_L=5.2
WAN	iPZ	162350.5	0.6	4.0	u			
SUL	iPZ	162351.0	0.5	1.5	d			
KRT	iPZ	162350	0.5	11.0	u			
RAB	iPZ iZ	215745.0 47.0	0.5	7.0	d			Regional
KRT	ePZ iSN	215743½ 5835½	0.5	0.6	d	4½°	215636	
18th Dec., 1967								
RAB	iPZ iSN	013158.0 3213.0	0.4	5.0	d	1¼°	013138	M_L=4.5
KRT	iPZ iSE	013155 3210	0.2	8.0	u	1½°	013135	
RAB	iPZ iZ eSN/	030058.0 0103.4 22	0.5	3.0	d	2°	030026	M_L=4.6
WAN	iPZ	030058.5	0.2	1.0	d			
RAL	ePZ	030057½						
KRT	-iPZ iN iSN	030057 0102½ 0115½			d	1½°	030033	CBM
RAB	eZ/	062944			+			Traces
RAB	iPZ e(S)E/	102606.5 2958	0.8	2.0	u	(19°)		
KRT	ePN	102707½						
RAB	iPZ iZ eSN/	122815.2 22.0 44	0.5	2.2	d	2½°	122737	M_L=4.9
WAN	ePZ	122815	0.5	1.0	d			
RAL	iPZ	122815.3	0.5	1.0	u			
KRT	iPZ iN iSN	122814½ 29 42	0.2	1.0	d	2¼°	122739	

			T sec	A mm	GM	Dist	H	Remarks
18th Dec., 1967 (cont'd)								
RAB	iPZ	132305.6	0.3	4.0	u			Local
	iSN	10.0						
KRT	iPZ	132307½			d	¼°	132259	
	iSN	13½						
RAB	ePZ	140835	1.0	1.0	u	18°		
	eSE/	1158						
KRT	ePZ	140837	0.5	0.5	d			
19th Dec., 1967								
RAB	iPZ	025903.0	0.5	3.0	u	4°	025802	M_L=5.3
	eSN/	50						
WAN	ePZ	025903	0.5	1.0	d			
RAL	ePZ	025902½	0.5	1.0	d			
KRT	iPZ	025903	0.2	1.0	u			
	iZ	05						
	iZ	11						
RAB	iPZ	033313.0	0.3	2.0	u	1¼°	033250	M_L=4.2
	iSN	30.0						
KRT	iPZ	033311	0.2	5.0	d	1°	033352	
	iSN	25						
RAB9	iPZ	114352.0	0.4	3.5	u	2°	114322	M_L=4.5
	eSN	4415						
WAN	iPZ	114351.5	0.3	1.2	u			
RAL	iPZ	114351.5			d			
KRT	iPZ	114351			u	(1°)	1143(35)	
	i(S)N	4403						
RAB	iPZ	180851.4	0.5	13.0	d	1½°	180826	M_L=3.9
	iSN	0910.4						
WAN	iPZ	180851.0			d			
RAL	iPZ	180851.0			u			
KRT	iPZ	180848½	0.2	5.0	d	1½°	180825	
	iSN	0906						
RAB	iPZ	204358.9	0.5	2.0	d	½°	204347	M_L=3.5
	iSN	4408.5						
WAN	ePZ	204358.9			d			
RAL	ePZ	204359½			d			
KRT	iPZ	204400			u	¾°	204346	
	iSN	10½						

Rabaul Central Observatory

G.W. D'ADDARIO
Vulcanologist-in-Charge

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12/1/68

PEA Dec-67

TERRITORY OF PAPUA AND NEW GUINEA
GEOLOGICAL AND VULCANOLOGICAL BRANCH
VULCANOLOGICAL SECTION

PRELIMINARY EARTHQUAKE ANALYSIS
RABAUL CENTRAL OBSERVATORY
1967

Rabaul	RAB	From: DEC 20 1967 To : DEC 27 1967
Keravat	KRT	From: DEC20 1967 To : DEC 27 1967
Esa'ala	ESA	From: To :
Tabele	TBL	From: To :
Agenahambo	AGE	From: To :
Naris	NAA	Not operational
Ulamona	ULA	Not operational
Piva	PIV	Not operational

STATION PERSONNEL

RAB	Central Observatory, Rabaul.	
	Vulcanologist-in-Charge	G.W. D'Addario
	Vulcanologist	R.F. Heming
	Seismologist	Position Vacant
	Senior Technical Officer	N.O. Myers
	Technical Officer	R.J. Conway
	Seismogram Readers	P.M. Leitao; V. Hunt
	Vulcanological Assistants	L. Topue; M. Gaiam V. Kaita
	Technical Assistant	P. Daimbari
	Trainee Vulcanological Assistants	B. Talai; M. Salaiau; Position Vacant
	Secretary	G. Chant
KRT	Keravat Outstation	
	Observer (part-time)	G.E. Chorick
TBL	Tabele Observatory	
	Observer	E. Ravian
ESA	Esa'ala Observatory	
	Observer	F. Dira
AGE	Agenahambo Out-station	
	Observer (part-time)	Br. B. Hughes

The Rabaul Preliminary Earthquake Analysis (PEA) is produced by the staff under the direction of the Vulcanologist-in-Charge from whom additional information and photocopies of seismogram records from all stations may be obtained on request.

Please address all communications to:-

Vulcanologist-in-Charge,
Central Observatory,
P.O. Box 386,
RABAUL, T.P. & N.G.

SEISMOGRAPH STATIONS

Station	Code	South Latitude	East Longitude	Elev. (m)	Foundation
NEW GUINEA					
Rabaul	RAB	04°11'28.6"	152°10'11.4"	183.5	Basalt Flow
Wanliss Street	WAN*	04°11'39.6"	152°10'32.5"	25.0	Basalt Flow
Sulphur Creek	SUL*	04°13'09.8"	152°10'33.3"	8.5	Unconsclidated Vclcanic Ash
Rabalanakaia	RAL*	04°13'13.0"	152°12'07.0"	91.0	Unconsolidated Volcanic Ash
Tavurvur	TAV*	04°14'12.0"	152°13'18.0	60.0	Andesite Flow
Taviliu	VUL*	04°16'58.2"	152°08'44.6"	332.3	Unconsolidated Volcanic Ash
Keravat	KRT	04°20'00"	152°00'00"	20.0	Alluvium
Ulamona	ULA	04°59'24.0"	151°16'30.0"	17.0	Lapilli Tuff
Tabele	TBL	04°06'04.67"	145°00'41.37"	179.5	Basalt Flow
Waris	WAA	04°07'00"	145°06'00"	48.0	Lapilli Tuff
Piva	PIV	06°12'00"	155°03'30"	60.0	Alluvium
PAPUA					
Agenahambo	AGE	08°48'30"	148°06'12"	303.0	Unconsolidated Volcanic Ash
Esa'ala	ESA	09°44'18.2"	150°48'50.7"	46.4	Granite Gneiss

* Rabaul Harbour Network

STATION INSTRUMENTATION

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approximate damping
NEW GUINEA Rabaul Central Observatory						
WORLD-WIDE STANDARD	Z	1.0	0.74	60	12,500	critical
	N,E	1.0	0.74	60	6,250	critical
	Z/N/E/	15.0	100.0	15	750	critical
Benioff VR 14.7Kg	Zh	1.0	0.02	180*	4,000	critical

* Recording is triggered by the onset of any earthquake with pre-determined minimum amplitude. Recorder is stopped automatically by hour break pulse.

Omori 15Kg	No	3.6	-	24	12	10.1(air)
Omori 15Kg	Eo	3.8	-	24	10	10.1(air)
Wood-Anderson Torsion	Na,Ea	0.8	-	60	2,800	critical

Rabaul Harbour Network

Readings from the Harbour Network are entered in the PEA only for large earthquakes.

WAN** Benioff VR 14.7Kg	Z	1.0	0.02	60	5,240	critical
SUL** Benioff VR 14.7Kg	Z	1.0	0.02	60	2,850	critical
RAL** Benioff VR 14.7Kg	Z	1.0	0.02	60	8,075	critical
TAV** Benioff VR 14.7Kg	Z	1.0	0.02	60	20,900	critical
VUL***Benioff VR 14.7Kg	Z	1.0	0.02	60	5,000	critical

STATION INSTRUMENTATION

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Rabaul Harbour Network (Cont'd)						

** Signals from these stations are telemetered by land line to Helicorders (Geotech Mod. 2484) at the Central Observatory.

*** Signals from this station are telemetered via VHF to its Helicorder at the Central Observatory.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Keravat Out-Station KRT						
Benioff MC 50Kg	Z	1.2	0.2	15	20% sensitivity	critical
Benioff MC 50Kg	N,E	1.2	0.2	15	10% sensitivity	critical
Ulamona Field Station	ULA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Piva Field Station	PIV					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped
Waris Field Station	WAA					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

N.B. These field stations consist of a permanent building in which instruments are installed when necessary.

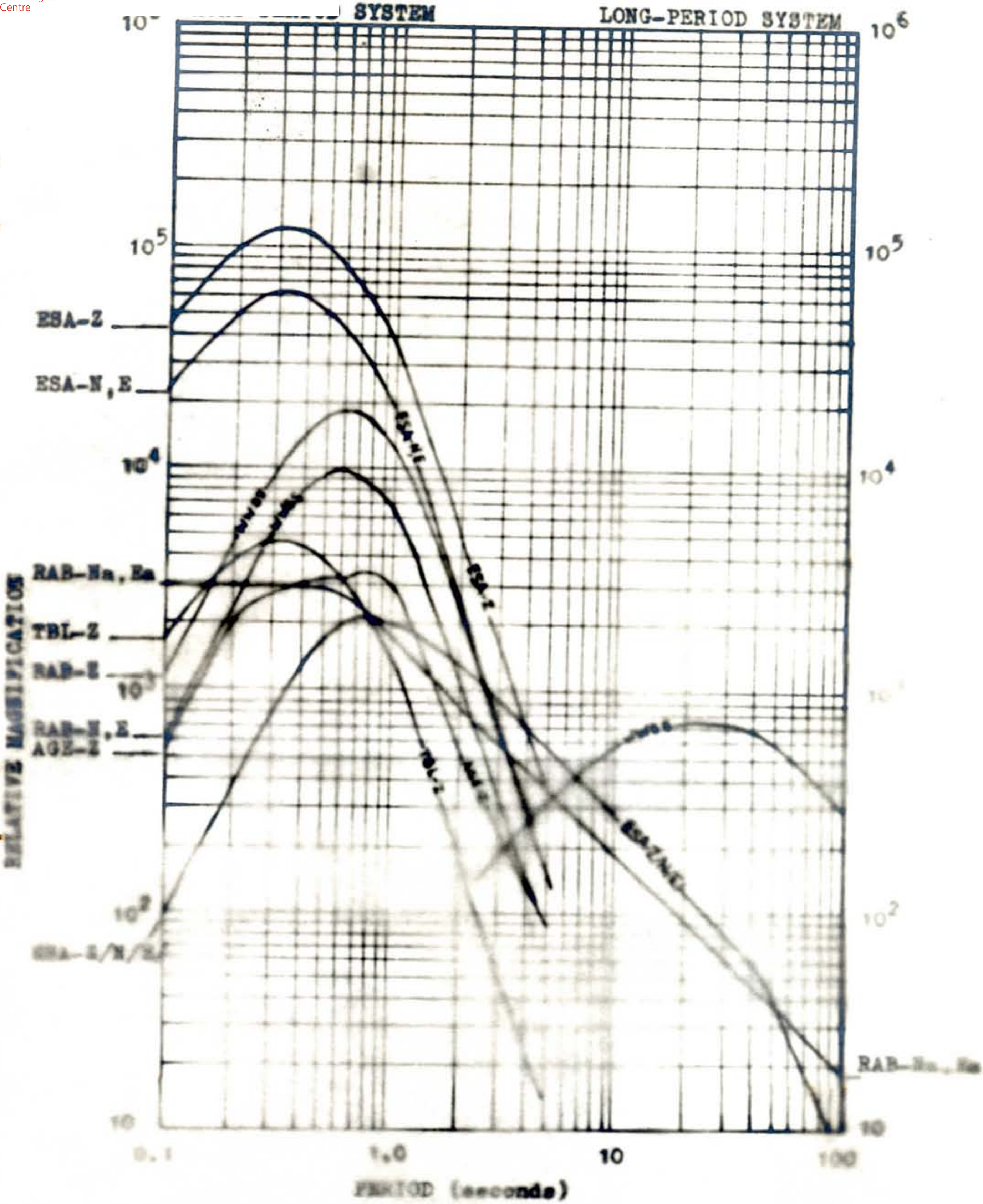
Details of emergency field stations, within the Territory will be listed when in operation.

Station & Instruments	Comp.	To	Tg	Trace Speed mm/min	Approximate relative Magnification	Approx. damping
Tabele Observatory	TBL					
Benioff VR 107.5Kg	Z	1.0	0.2	60	1,350	critical
PAPUA						
Esa'ala Observatory	ESA					
Benioff VR 107.5Kg	Z	1.0	0.2	15	36,000	critical
Benioff VR 107.5Kg	N,E	1.0	0.2	15	18,000	critical
Benioff VR 107.5Kg	Z/N/E/	1.0	60.0	30	50% sensitivity	critical
Agenahambo Station	AGE					
Willmore portable	Z	0.6	0.25	60	3,000	underdamped

VRS Variable Reluctance

MCS Moving-coil

Relative magnification curves of seismograph systems installed in stations controlled by the Rabaul Central Observatory have been listed on the following page.



FREQUENCY RESPONSE CURVES OF THE INSTRUMENTS

PRESENTATION OF DATA

(reviewed in November, 1967)

All times are reduced to Greenwich Mean Time (GMT), which is 10 hours behind Eastern Standard Time.

At RAB and Harbour Network, the time signal is marked every minute on each seismogram record from the Observatory crystal chronometer. Second marks from radio signal VNG (Australia) are recorded on World-Wide Standard System S.P.-N component only according with the W.W.S.S. programme, at six hour intervals. Primary time is provided by W.W.S.S. equipment and secondary time by a Labtronic crystal chronometer with the accuracy of ± 5ms per day compared with VNG (Australia) with the aid of a chronoscope.

At TBL and AGE, the time signal is derived from a spring driven chronometer (Mercer) and marked each minute on records. Time accuracy is determined by comparison with signals from WWVH daily. Linear correction is applied to the daily drift.

On all seismogram records time increases from left to right and time break is upward.

At RAB* and Harbour Network the recording drum of each seismograph is driven by a 110VAC 60Hz synchronous motor. The 110VAC is frequency regulated by a crystal chronometer.

* The Omori recording drum is driven by a nonregulated 50Hz frequency supply.

At ESA and KRT power for recorder motors is frequency regulated by a crystal chronometer at 50Hz.. Power for AGE and TBL and field Stations is supplied by a 50Hz free running oscillator.

Direction of Motion

Upward direction of ground motion corresponds to upward trace motion on vertical seismogram records. Direction of component of ground motion to North or East corresponds to upward trace motion on horizontal seismogram records.

Vertical trace motion from impulsive onset of longitudinal waves of compressional or dilatational ground movement is indicated by "u" or "d" accompanied by N, S, E or W, as per trace motion amplitude on horizontal seismogram records, to represent vectorially the direction of ground motion. "+" or "-" indicates upward or downward motion of the ground respectively, from a wave not known to be of the longitudinal type.

Accuracy of Readings

When readings are given with a decimal figure, they are to 1/10 of a second, other readings have been made to the nearest half second.

Crustal Phases

Px, Sx Crustal phases, other than Pn and Sn for local and near earthquakes.

Felt Intensity

Information on maximum intensities of shocks reported felt is included. Intensities are given in Roman numerals based on the Modified Mercalli Scale, of 1931.

PRESENTATION OF DATA (CONT'D)

Determinations of Epicentres

Where no source is cited, the determination of epicentres, origin time, focal depth and distance in central angle degrees from the pertinent station for local and regional earthquakes, are carried out at the Central Observatory, Rabaul.

Geographical Designation of Epicentres

The regional names which follow the co-ordinates of epicentres located at the Central Observatory are meant only to supplement the co-ordinates and normally follow well-known geographical rather than geological features. Use is made of the full degree blocks according to the method defined by E.A. Flinn and E.R. Engadhl in "A PROPOSED BASIS FOR GEOGRAPHICAL AND SEISMIC REGIONALIZATION", Seismic Data Laboratory Report No. 101, U.I.D. Inc., Alexandria, Virginia, 1964, adopted by the U.S.C.G.S. for computer requirements.

Magnitude Definition and Determination

M_L -Local Magnitude (Richter, 1935) is calculated from the recorded trace amplitude of the Wood-Anderson torsion seismographs of stated physical constants (installed at the Observatory in November, 1967)

Maximum trace amplitude (0 to peak) expressed in millimetres and tenths is measured directly on both components. Magnitude is determined independently and the arithmetic mean taken. M_L values are given to the tenth of a unit.

The station correction factor is assumed to be zero until better known.

M_S -Surface Wave Magnitude (Gutemberg & Richter, 1956) is calculated from the amplitude of surface waves of period near 20 seconds for shallow distant earthquakes.

M_B -Body Wave Magnitude is calculated from the ratio of amplitude over period for body waves on S.P.-Z of World-Wide Seismograph System only when depth is known. The magnification factor for the standard seismograph is taken into account.

m -Unified magnitude (Gutemberg & Richter, 1956) has the following relation to M_L, M_S, and M_B.

$$m = 1.7 + 0.8\, M_L - 0.01\, M^2{}_L$$

$$m = M_B \text{ (without correction)}$$

$$m = 2.5 + 0.63\, M_S$$

Local Magnitude of earthquakes recorded at RAB with a clear S-P interval is tabulated on a Day-Distance (in Central Angle Degrees) graph which is added to the PEA monthly.

Symbols

i -impulsive and sharply defined beginning of a phase.

e -emergent and poorly defined emergence of phase.

T -Period in seconds

A -Peak-to-Trough trace amplitude in millimetres.

GM -Ground Motion.

Dist -Distance in central angle degrees.
H -Origin Time
h -Focal depth in Kilometres
CBM -Confused by microseisms.

PRESENTATION OF DATA (CONT'D)

Remarks

Local - Typical signature of an earthquake with epicentre within 0.9^{o}

Near - Typical signature of an earthquake with epicentre between 0.9^{o} and 9^{o}

Distant - Typical signature of an earthquake with epicentre between 9^{o} and 45^{o}

Teleseism - Typical signature of an earthquake with epicentre more than 45^{o}

Traces - Any recorded disperse waves or very weak unknown earthquake phases.

Local and Near earthquakes will be classified Regional, and Distant earthquakes will be grouped with Teleseisms if sheer waves and their reflections are unidentifiable.

G.W. D'ADDARIO
Vulcanologist-in-Charge

20th December, 1967

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	061253	0.4	2.0	u			(Regional)
RAB	iPZ	131911.2	0.4	18.0	u	½°	131900	$M_L=3.4$
	iSE	19.4						
KRT	iPZ	131914½	0.3	9.0	u	½°	131902	
	iSN	24						
RAB	iPZ	170208.8	0.5	12.0	u	1¾°	172141	$M_L=4.9$; $M_B=4.4$
	iSE/	30						
	iE/	35						
	iZ!	0308						
KRT	iPZ	170208½			u			
RAB	iPZ	171158.3	0.6	1.0	u	17½°		$M_L=4.5$ $M_B=3.1$
	eSN/	1514						
KRT	ePZ	171158	0.8	0.3	d			
RAB	ePZ	183955½	0.4	0.5	d	2¾°	183911	$M_L=6.1$
	iZ	4018.8						
	iSE	29.6						
KRT	iPZ	183954½	0.4	1.0	d	2¾°	183911	
	iSN	4227						
RAB	eiPZ	191530	0.8	0.7	d	2½°	191452	$M_L=4.8$
	iZ	30.6						
	iSE	58.7						
KRT	iPZ	191530	0.2	10.0	u	2½°	191452	
	iN	51						
	iS!N	59						

21st December, 1967

			T sec	A mm	GM	Dist	H	Remarks
RAB	ePZ	024434	0.8	2.5	u	18½		$M_B=4.1$
	iZ/	40						
	eSN/	4754						
KRT	iPZ	024437	0.5	0.8	d	(18¼°)		
	e(S)E	4755						
RAB	eZ/	104744			-			Traces
RAB	iPZ	175332.0	0.4	1.0	d	40°		$M_B=5.2$
	eSN/	5916						
KRT	iPZ	175315½	0.5	4.0	u			Teleseism
RAB	iPZ	195306.8	0.4	3.0	d	3°	195222	$M_L=5.1$
	iZ	09.7						
	iZ	17.2						
	iSE	41.0						
WAN	ePZ	195306½	0.6	1.0	d			
RAL	iPZ	195306.5	0.5	1.0				
KRT	iPZ	195305	0.3	2.1	u	3¼°	195216	
	iE	37						
	iSE	42½						

22nd December, 1967

			T sec	A mm	GM	Dist	H	Remarks
RAB	eZ/	001318			-			Traces

22nd December, 1967 (cont'd)

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	035411:0	0.3	5.0	d	2¼°	035335	M_L=4.6
	iSN	38.0						
WAN	ePZ	035411½	0.3	1.0	u			
RAL	ePZ	035410½	0.5	2.0	d			
KRT	iPZ	035410	0.3	7.0	u	2¼°	035334	
	iE	32						
	iSE	37						
RAB	eiPZ	124506	0.5	1.0	d	6½°	124330	M_L=6.4 M_B=6.4
	iZ	08.2						
	iSN	4620.0						
RAL	iPZ	124506.0	0.6	3.0	d			
KRT	iPZ	124504	0.3	1.0	d	6½°	124328	
	iZ	09						
	iSN	4618						
RAB	iPZ	134839.6	0.5	1.8	u	1¾°	134810	M_L=4.7
	iSN/	4902.0						
WAN	iPZ	134839.6	0.5	1.0	u			
SUL	iPZ	134840.0	0.3	2.0	d			
RAL	iPZ	134839.4	0.5	1.0	u			
VUL	iPZ	134838.6			u			
KRT	iPZ	134837½	0.2	5.2	d			
RAB	iPZ	211240.6	0.5	9.0	u	1½°	211213	M_L=4.1
	iSN	1301.0						
KRT	iPZ	211238	0.3	7.0	d	1½°	211214	
	iSN	56						
RAB	iPZ	223706.2	0.4	1.8	u	1¼°	223646	M_L=3.5
	iSN	21.0						
KRT	i(P)Z	223709				1¼°	223649	CBM
	iN	17						
	iSN	24½						

23rd December, 1967

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	061455.0	0.5	6.0	u	½°	061443	M_L=3.6
	eSN/	1504						
WAN	iPZ	061454.2	0.3	1.5	u			
RAL	iPZ	061453.5	0.5	3.0	u			
KRT	iPZ	061456			d			local
	iSE	1501						
RAB	iPZ	111956.3	0.4	21.0	dse	1½°	111932	M_L=4.8
	iSN/	2014.0						
WAN	iPZ	111955.8	0.5	5.6	d			
SUL	iPZ	111955.8	0.3	1.5	d			
RAL	iPZ	111955.5	0.3	6.0	d			
VUL	iPZ	111955.2			u			
KRT	eiPZ	111955			d			
	iZ	56						

			T sec	A mm	GM	Dist	H	Remarks
23rd December, 1967 (cont'd)								
RAB	iPZ iSNo	132335.0 50.0			dESE	1¼°	132315	Felt:- Rabaul Int.IV Pomio Int.VI Ulamona Int.III-IV
WAN	iPZ	132334.5			d			
SUL	iPZ	132335.0			d			
RAL	iPZ	132334.5			d			
VUL	ipZ	132334.0			d			
KRT	iPZ	132333½			d			
RAB	iPZ iSN	133541.5 51.0	0.3	3.0	d	½°	133527	M_L=3.8
KRT	iPZ iSE	133543½ 56	0.2	3.0	u	1°	133526	
RAB	iPZ iZ	172039.0 41.0	0.8	2.5	d			Regional
KRT	ePZ	172038	1.0	1.0	u			
RAB	iPZ iSN	184913.0 38.0	0.4	2.2	u	2°	184840	M_L=3.9
KRT	iPZ iN iSN	184910 31 37	0.2	1.0	u	2¼°	184834	
RAB	iPZ iSN	191533.6 1601.1	0.4	1.2	d	2¼°	191459	M_L=4.1
KRT	ePZ iZ iSN	191532½ 33½ 1601½	0.2	1.5	d	2½°	191454	
RAB	eiPZ iZ iZ iSN	195437 38.0 41.0 57.2	0.4	2.5	d	1½°	195410	M_L=3.7
KRT	iPZ iSN	195437 59	0.2	1.5	u	1¾°	195408	
RAB	iPZ iZ	213254.2 56.0	0.5	7.0	d			Regional
KRT	ePZ	213251	0.5	0.7	u			
24th December, 1967								
RAB	eZ/	085240			+			Traces
RAB	iPZ iSE	152949.6 56.5	0.3	9.0	u	½°	152940	M_L=3.1
WAN	iPZ	152949.5	0.3	3.0	u			
RAL	iPZ	152949.8	0.5	2.0	u			
VUL	iPZ	152951.0	0.3	6.0	u			
KRT	iPZ iSN	152952 3000	0.2	5.0	u	½°	152941	
RAB	iPZ iSE	153924.8 31.0	0.3	5.0	u	¼°	153917	
KRT	iPZ iSN	153927 36	0.2	2.0	u	½°	153915	

			T sec	A mm	GM	Dist	H	Remarks
24th December, 1967(cont'd)								
RAB	iPZ	155235.5	0.3	3.5	u	1¾°	155206	M_L=4.2
	iZ	37.0						
	iSN	57.0						
WAN	ePZ	155235	0.3	1.0	u			
SUL	iPZ	155235.3	0.4	1.0	u			
RAL	iPZ	155235.2	0.2	4.8	u			
VUL	iPZ	155234.0	0.2	5.0	u			
KRT	iPZ	155233½	0.2	6.2	d	1½°	155210	
	iSN	51						
RAB	iPZ	202248.0	1.0	4.0	u	(24°)		M_L=6.2
	iZ	50.5						
	e(S)N/	2702						
WAN	ePZ	202247½	0.8	1.0	u			
RAL	ePZ	202248	0.6	1.8	u			
KRT	iPZ	202248½	1.0	1.2	u			
	iZ	2300½						
	iZ	36						
RAB	iPZ	203931.3	0.4	21.0	u	1°	203915	
	iSN	43.0						
WAN	iPZ	203931.0	0.4	6.5	u			
RAL	iPZ	203930.8	0.3	8.0	u			
KRT	iPZ	203933	0.2	2.0	u	1¼°	203913	
	iSN	48						
RAB	iPZ	215208.5	1.0	7.0	d			Regional (deeP)
	iZ	09.0						
WAN	iPZ	215208.5	0.8	4.0	u			
RAL	iPZ	215208.5	0.8	4.0	u			
KRT	eiPZ	215209	0.7	0.5	d			
	iZ	10						
25th December, 1967								
KRT	iPZ	012405½	0.3	54.0	d			
RAB	iPZ	023318	0.6	5.8	d	1¾°	023248	M_L=4.1
	iSN	40.5						
KRT	iPZ	023315½	0.2	37.0	u			
	i	16½						
KRT	iPZ	025039½						CBM
	i							
KRT	iPZ	032106½	0.2		u			
	iSE	31						
RAB	i(Pn)Z	032644.9			d			Regional
KRT	iPZ	032645½	0.3	1.0	d			
	iZ	48½						
RAB	iPZ	033342.2	0.4	3.7	u	1¼°	033317	M_L=4.8
	iSN	3401.8						
KRT	iPZ	033344	0.3	3.0	d	1¼°	033319	
	iSE	3403						

25th December, 1967(cont'd)

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	033825.1	0.6	2.3	u	1¾°	033756	
	iSN	47						
KRT	iPZ	033826½	0.2	2.0	d	2°	033753	
	iZ	46						
	iSE	52						
RAB	iPZ	041647	0.7	5.5	u			Regional
KRT	iPZ	041646½	0.2	9.0	d	2°	041614	
	iSE	1711						
RAB	ePZ	042923.4	0.5	3.7	[illegible]	(2½°)	0428(44)	
	i(S)N	53.2						
KRT	iPZ	042925	0.2	7.0	u	2¾°	042840	
	iSE	59						
RAB	ePZ	044721.1	0.5	3.1	u			Regional
KRT	iPZ	044721½	0.2	7.0	u	2½°	044632½	
	iSE	54						
RAB	ePZ	045200						
	iZ	26						
KRT	iPZ	045200½	0.2	5.0	d		045131	
	iSE	23						
RAB	iPZ	051245.7	0.4	3.0	u			Regional
KRT	iPZ	051246½	0.2	5.0	d	1½°	051222	
	iSE	1305						
RAB	ePZ	053124.1	0.5	2.2	u	2¼°	053046	M_L=4.5
	iSN	52.8						
KRT	iPZ	053124½			u	2½°	053044	CBM
	iZ	31						
	iSE	55½						
RAB	iPZ	064041.7	0.3	6.7	u	3⅓°	063951	M^L=5.2
	i(S)N	4120.3						
KRT	iPZ	064038½			d			Superimposed shock
RAB	iPZ	072322.0	0.6	5.0	d	(½°)	0723(12)	
	i(S)N	29.5						
KRT	iPZ	072322½	0.3	3.0	u	2½°	072241	
	iSE	54						
RAB	iPZ	081431.0	0.4	5.8	u	1¾°	081402	M_L=4.8
	i(S)N	53.0						
KRT	eP	081430			d			
	i[illegible]	31½						
RAB	iPZ	093004.0			d			Regional
KRT	iPZ	093004½			d			Superimposed shock
RAB	iPZ	101549.5	3.6	3.7	d			Regional
KRT	iPZ	101549			d			
RAB	iPZ	102428.9	1.5	0.8	u			Regional
KRT	iPZ	102429	0.2	3.0	u			

25th December, 1967 (cont'd)

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	192415.8	0.5	3.0	u			Regional
KRT	iPZ	192415½	0.2	1.0	d	2¼°	192339	
	iE	18½						
	iE	29						
	iSE	43						
RAB	iPZ	195022.0	0.6	4.0	d			Regional
KRT	iP	195022	0.2	5.0	u	1¾°	194953	
	iE	23						
	iSE	44						
RAB	iPZ	200031.2	0.4	2.6	u			Regional
KRT	iP	200031½	0.2	2.0	d	2°	195958	
	iE	34						
	iSE	57						
RAB	iPZ	204010.5	0.4	3.1	u	1½°	203945	M_L=3.8
	iSN	29.9						
KRT	iPZ	204008			d	1¼°	203945	Superimposed
	iSE	25						
RAB	eiPZ	205202.0	0.4	1.9	d			Regional
KRT	iPZ	205202	0.2	4.0	d			
RAB	ePZ	211849.6	0.4	1.0	d	2°	211817	
	iSN	1914						
KRT	iPZ	211849	0.2	3.2	d	2°	212817	
	iSE	1914						
RAB	ePZ	213105.3	0.8	1.1	d	2½°	213028	M_L=5.0
	iSN	34.7						
KRT	iPZ	213104	0.2	1.2	[illegible]	2°	213132	
	iZ	07						
	iSE	28						
RAB	ePZ	213548.3	0.4	1.8	d	4¾°	213437	M_L=4.8
	iSE	3633						
KRT	iPZ	213547½			d			CBM
RAB	iPZ	215405.0	0.2	3.1	d	1½°	215337	M_L=4.1
	iSN	25.8						
KRT	iPZ	215406	0.2	2.0	u	2°	215333	
	iSE	31						
RAB	ePZ	215710.8	0.6	3.0	d	3½°	215616	
	iSN	53.0						
KRT	iPZ	215711	0.2	2.3	u	3½°	215617	
	iE	16						
	iSE	52½						
RAB	iPZ	220437.1	0.5	4.9	u			Regional
KRT	iPZ	220437	0.3	1.6	d	2¾°	220354	
	iE	40						
	iE	0504½						
	iSE	10						
RAB	eiPZ	221852.1	0.4	7.1	u			Regional
	iE	54.4						
KRT	eiPZ	221851½	0.5	0.5	d			
	iE	52						
	iE	54½						

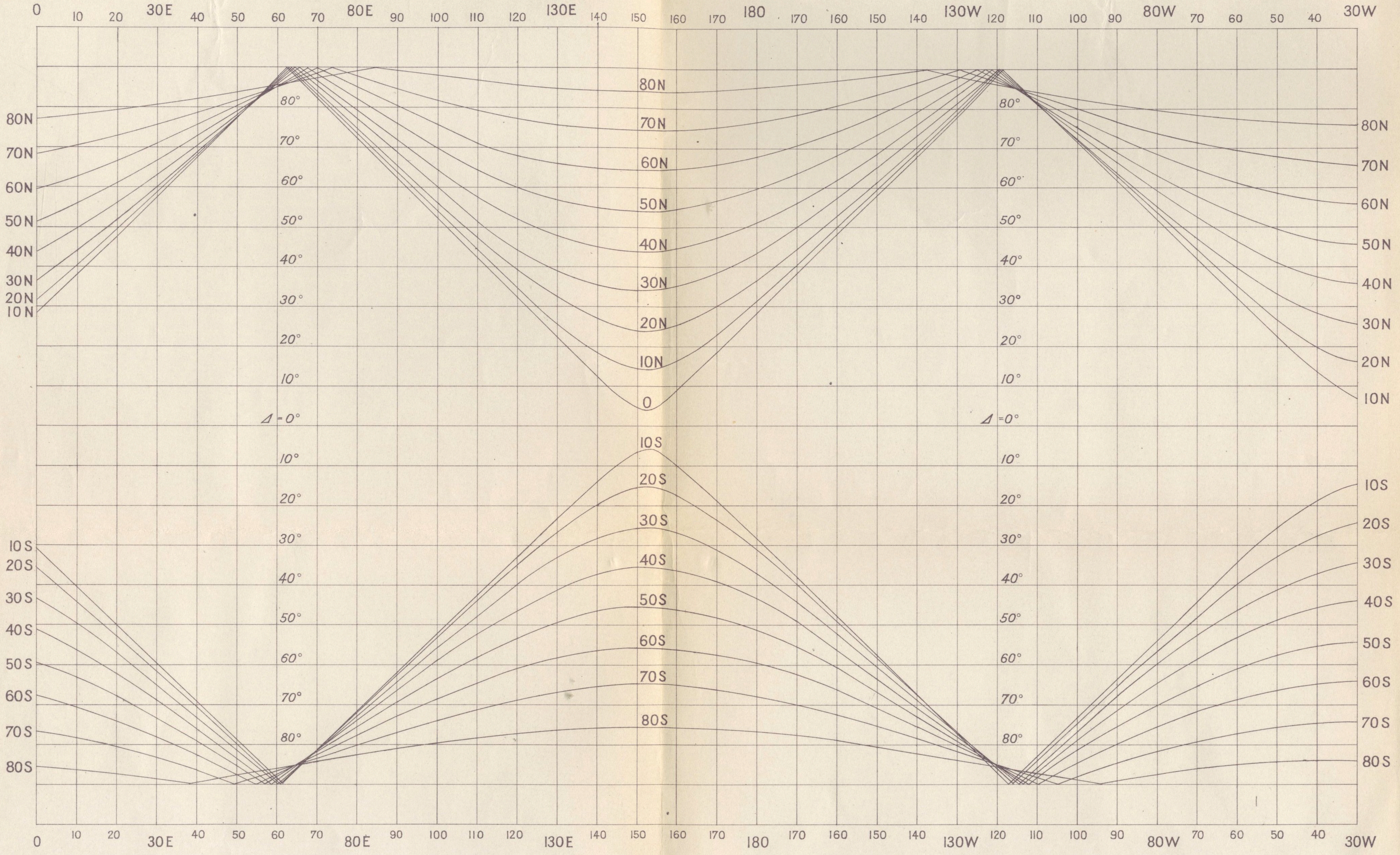
26th, 1967(cont'd)

			T sec	A mm	GM	Dist	H	Remarks
RAB	iPZ	100520.0	0.5	2,0	d	(3°)	1004(35)	M_L=5.2
	iZ	45.5						
	e(S)N/	54						
KRT	eiPZ	100518	0.5	1.5	u			
	iZ	19						
	iE	36						
	iE	43						
RAB	iPZ	102101.4	0.5	1.5	d	3½°	102009	M_L=5.2
	iZ	08.0						
	iSN/	42.0						
KRT	iPZ	102059½			u			
	iE	2125						
RAB	iPZ	103805.5	0.5	1.5	d	2°	103730	
	eSN/	32						
KRT	ePZ	103803½	1.0	0.5	u	2¼°	103728	
	iZ	06						
	iSE	30½						
RAB	ePZ	113839	0,5	1.0	u	2¼°	113803	
	eSN/	3906						
RAB	i(P)Z	114044.0	0.4	5.0	u	(2¼°)	114010)	M_L=4.6
	eSN/	4110						
RAB	iPZ	122814.5	0.4	2,2	u	2¼°	122737	M_L=4.5
	iSN	43.0						
KRT	ePZ	122814	0.5	1.1	u	2°	122742	
	iSE	42						
RAB	iPZ	132317.5	0.5	1.2	d	2½°	132235	
	iZ	18.8						
	iZ	20.6						
	iSE	49.5						
KRT	iPZ	132317	0.4	1.8	d	2½°	132239	
	iE	37						
	iSE	46						
RAB	iPZ	132841.5	0.4	3.7	u		132803	M_L=4.7
	iSE	2911.0						
WAN	iPZ	132841.0	0.5	1.0	u			
RAL	iPZ	132841.0	0.5	1.0	d			
KRT	iPZ	132842	0.8	1.7	u	2¾°	132758	
	iSE	2915½						
RAB	iPZ	154512.0	0.4	1.2	u	2¼°	154438	M_L=4.6
	iZ	12.5						
	iSE	38.0						
KRT	iPZ	154511			d	2¼°	154436	
	iE	32						
	iSE	37½						
RAB	iPZ	193625.3	0.4	1.0	u	3°	193541	M_L=4.5
	iSE	6 59.0						
KRT	iPZ	193626			u	2¾°	193542	
	iSE	59½						
RAB	iPZ	194951.5	0.5	1.2	u	2¼°	194918	M_L=4.2
	iZ	54.0						
	eSE	5019						

			T sec	A mm	GM	Dist	H	Remarks
26th December, 1967 (cont'd)								
KRT	iPZ iSE	194953½ 5020	0.6	1.3	d	2¼°	194918	
RAB	iPZ iSE	210358.8 0427.6	0.5	2.0	u	2½°	210321	M_L=4.5
KRT	iPZ iSE	210358½ 0426½			-	2½°	210321	CBM
RAB	iPZ iSE	211420.2 50.0	0.5	4.0	d	2½°	211341	M_L=5.0
KRT	iPZ iSE	211421 50			u	2½°	211343	
ADDENDUM 25th December, 1967								
RAB	iPZ iSE	012406.0 27.0	0.5	32.0	dSE	1½°	012338	Felt:- Rabaul Int VI 04°11'S,52°10'E Pomio Int V 05°30'S 151°30'E Aniv Is. Int V 04°02'S 153°44'E Ulamona Int III 05°00'S 151°15'E Biwa Int II 02°57'S 150°52'E

Rabaul Central Observatory
4th January, 1968

G.W. D'ADDARIO
Vulcanologist-in-Charge



EPICENTRAL DISTANCES FROM RABAUL CORRESPONDING TO GIVEN EPICENTRE COORDINATES