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Long. 61° 52' 11" W	Lat. 17° 52' 11" N	(EUV)	BLACK RIVER, JAMAICA
Long. 76° 42' 01" W	Lat. 18° 27' 11" N	(HOP)	BEVERLY, JAMAICA
Long. 82° 12' 7" W	Lat. 17° 50' 31" N	(SKI)	HOPE, JAMAICA
Long. 89° 32' 8" W	Lat. 17° 07' 4" N	(BRB)	ST. KITTS
Long. 91° 15' 21" W	Lat. 15° 17' 71" N	(DOM)	ANTIGUA
Long. 99° 32' 8" W	Lat. 13° 07' 4" N	(AVI)	DOMINICA
Long. 101° 15' 21" W	Lat. 12° 10' 21" N	(SVI)	BARBADOS
Long. 114° 44' 11" W	Lat. 12° 05' 71" N	(GRB)	ST. VINCENT
Long. 124° 10' 21" W	Lat. 10° 30' 01" N	(TRN)	TRINIDAD

14 MAY 1963

UNIVERSITY OF THE WEST INDIES

EQUIPMENT

SEISMIC RESEARCH UNIT

TRINIDAD

JAN 1963

Preliminary Seismological Bulletin.

University of the West Indies
Preliminary Seismological Bulletin
Trinidad, West Indies
1960-1963

TRINIDAD	(TRN)*	Lat. 10°39.0' N	Long. 61°24.1' W	27m.
GRENADA	(GRE)	Lat. 12°02.7' N	Long. 61°44.1' W	30m.
ST. VINCENT	(SVI)	Lat. 13°10.2' N	Long. 61°15.5' W	10m.
BARBADOS	(BRB)	Lat. 13°07.4' N	Long. 59°35.6' W	70m.
DOMINICA	(DOM)	Lat. 15°17.7' N	Long. 61°23.5' W	40m.
ANTIGUA	(AWI)	Lat. 17°08.6' N	Long. 61°50.1' W	27m.
ST. KITTS	(SKI)	Lat. 17°20.3' N	Long. 62°43.7' W	305m.
HOPE, JAMAICA	(HOP)	Lat. 18°00.9' N	Long. 76°45.0' W	200m.
BEVERLEY, JAMAICA	(BEV)	Lat. 18°27.1' N	Long. 77°18.0' W	123m.
BLACK RIVER, JAMAICA	(BRJ)	Lat. 18°02.0' N	Long. 77°52.1' W	8m.

EQUIPMENT

Trinidad is equipped with Vela Uniform standard seismological instruments. The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 750.

All other stations have Willmore-Watts equipment recording the vertical component of the earth motion only. The seismometer period is 0.8 second and the galvanometer period 0.25 second. The peak magnification is 10,000 (at 3 cycles/sec.) except at Barbados where it is 3,000. All stations record at 60 mm/min. Radio time signals are recorded daily.

CARIBBEAN DISTANCES AND EPICENTRES

Uniform velocities of 7.90 km/sec for P waves and 4.56 km/sec for S waves are assumed. The effects of the crust are ignored.

Where the data are insufficient to define an epicentre, an origin time is calculated from the S and P arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the earthquake.

When three P arrival times only are known a least square process is used to find a surface focus. If one or more S - P intervals are also known, an approximate depth is determined, and then the least square adjustment of the epicentre is carried out for this depth.

If sufficient data are available a least square adjustment of the depth and the epicentre is carried out.

All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake Magnitudes are computed from:

$$M = \text{Log } A/T + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter. *Annali di Geophysica* Volume IX, No. 1, 1956.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:-

From 1st May 1953 to 1st January 1955 at 10°40.1' N 61°31.2' W Port-of-Spain.

From 1st January 1955 to 1st September 1958 at 10°44.7' N 61°33.2' W North Post.

SECTION I - DISTANT EARTHQUAKES

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963 JAN 1	HOP	iP e	04.08.14 04.10.11		11.9°
	GRE	eP	04.08.18		12.3°
	1 TRN	e	20.39.00		
	1 ✓ HOP	eP	23.50.15		70.3°
	✓ TRN	iP e i Lq	23.51.34 23.54.49 00.01.48 ✓ 00.14.	d	85.1°
	2 HOP	eP	00.55.02		5.3°
	TRN	eP	00.58.32		22.0°
	2 TRN	eP'	03.43.15		149.0°
	2 TRN	e Lq	16.12.20 16.34.		
	✓ 3 TRN	iP' iP ₂	09.59.22 09.59.38	c	147.1°
	✓ 4 TRN	e	00.40.20		
	4 TRN	eP	09.25.56		
	4 TRN	e	13.24.00		
	4 HOP	iP e	21.19.55 21.21.52		11.9°
	TRN	eP eS	21.20.00 21.22.12		12.0°

USCGS gives H:04.05.28
E:6.9°N 73.1°W
Depth about 151 km.

USCGS gives H:23.39.06
E:56.6°N 157.7°W
Depth about 50 km.

USCGS gives H:00.53.49
E:17.5°N 82.7°W
Depth about 33 km.

USCGS gives H:03.23.30
E:5.8°S 150.0°E
Depth about 33 km.

New Britain. Felt: Palmalmal,
Pomio, Karlai and Rabaul.
USCGS gives H:09.39.47
E:5.3°S 151.5°E
Depth about 74 km.

USCGS gives H:21.17.10
E:6.9°N 73.1°W
Depth about 160 km.

SECTION I - DISTANT EARTHQUAKES

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 JAN 1	HOP	iP e	04.08.14 04.10.11		11.9°	USCGS gives H:04.05.28 E:6.9°N 73.1°W Depth about 151 km.
	GRE	eP	04.08.18		12.3°	
1	TRN	e	20.39.00			
1	✓ HOP	eP	23.50.15		70.3°	USCGS gives H:23.39.06 E:56.6°N 157.7°W Depth about 50 km.
	✓ TRN	iP	23.51.34	d	85.1°	
		e	23.54.49			
		i Lq	00.01.48 ✓ 00.14.			
2	HOP	eP	00.55.02		5.3°	USCGS gives H:00.53.49 E:17.5°N 82.7°W Depth about 33 km.
	TRN	eP	00.58.32		22.0°	
2	TRN	eP'	03.43.15		149.0°	USCGS gives H:03.23.30 E:5.8°S 150.0°E Depth about 33 km.
2	TRN	e Lq	16.12.20 16.34.			
✓ 3	TRN	iP' iP ₂	09.59.22 09.59.38	c	147.1°	New Britain. Felt: Palmalmal, Pomio, Karlai and Rabaul. USCGS gives H:09.39.47 E:5.3°S 151.5°E Depth about 74 km.
✓ 4	TRN	e	00.40.20			
4	TRN	eP	09.25.56			
4	TRN	e	13.24.00			
4	HOP	iP e	21.19.55 21.21.52		11.9°	USCGS gives H:21.17.10 E:6.9°N 73.1°W Depth about 160 km.
	TRN	eP eS	21.20.00 21.22.12		12.0°	

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963 JAN 17	TRN	eP	04.28.06		27.5° USCGS gives H:04.22.23 E:10.6°S 78.7°W Depth about 46 km.
	24 TRN	iP	02.52.47		2.2° USCGS gives H:02.52.09
	SKI	eP	02.54.20		9.1° E:8.4°N 60.8°W Depth about 66 km.
		iP	02.54.21		
		iS	02.56.06		
	HOP	eP	02.56.21		18.4°
	27 TRN	eP ₁	19.05.50		146.9° New Britain. Felt:Gavit, Karlai and Rabaul.
		eP ₂	19.06.01		USCGS gives H:18.46.15 E:5.2°S 152.3°E Depth about 72 km.
	28 TRN	eP	02.17.43		26.2° USCGS gives H:02.12.14
		ePP	02.18.26		E:10.8°S 76.7°W Depth about 105 km.
28	TRN	eP ₁	12.32.06		148.2° USCGS gives H:12.12.20
—	SKI	e	12.32.52		149.1° Small E:2.6°S 149.9°E Depth about 33 km.
28	HOP	eP	13.12.17		72.5° USCGS gives H:13.00.51
—	SKI	eP	13.13.03		81.1° E: 54.7°N 161.6°W
—	TRN	iP	13.13.34	c	87.5° Depth about 33 km.
29	TRN	e	20.40.11		
		i	20.40.29		
30	TRN	eP	10.21.23		72.1° USCGS gives H:10.10.04
		iS	10.30.40		E:55.6°S 28.3°W
		Lq	10.39.		Depth about 33 km.
		Lr	10.45.		
—	SKI	eP	10.21.56		78.7°
31	TRN	eP	00.41.42		
31	TRN	eP ₁	05.26.12		141.1° USCGS gives H:05.06.46
					E:27.9°N 126.3°E
					Depth about 33 km.

SECTION II		LOCAL EARTHQUAKES			
DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE
1963					
JAN 2	GRE	eP	18.12.		2.3°
	TRN	iP	18.12.43		0.9°
		iS	18.12.52		
4	GRE	eP	10.11.		1.2°
	TRN	eP	10.11.04		1.0°
		eS	10.11.15		
5	TRN	eP	02.43.24		
5	GRE	eP	07.07.		1.4°
	TRN	eP	07.07.50		1.2°
		iS	07.08.03		
5	TRN	iP	08.58.02	c	1.37°
		iS	08.58.14		
	GRE	iP	08.58.04	d	1.55°
		iS	08.58.21		
	SVI	eP	08.58.22		2.73°
	DOM	e	08.58.51		4.60°
					Small
5	AWI	iP	19.06.53		1.48°
	DOM	eP	19.06.59		1.91°
	SKI	eP	19.07.(08)		2.32°
	SVI	eP	19.07.27		3.83°
					H: 19.06.32 E: 16.9° N 60.4° W Depth about 50 km. Magnitude: 4.7
6	AWI	iP	05.18.		
	DOM	eP	05.18.		
6	GRE	iP	09.02.01	d	1.05°
	TRN	iP	09.02.09	c	1.59°
		iS	09.02.26		
	SVI	eP	09.02.14		1.93°
					H: 09.01.47 E: 11.7° N 62.2° W Depth about 100 km. Magnitude: 4.6

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
JAN 6	DOM	iP	22.33.52	c	1.23°	H: 22.33.34 E: 14.8° N 61.1° W Depth about 120 km. Magnitude: 4.9
	SVI	iP	22.34.01	c	1.94°	
		iS	22.34.21			
	BRB	iP	22.34.11	d	2.43°	
		i	22.34.31			
	AWI	iP	22.34.12		2.70°	
	GRE	iP	22.34.16	c	3.01°	
	SKI	iP	22.34.(22)	c	3.21°	
		i	22.34.(31)			
	TRN	iP	22.34.35	c	4.28°	
		iS	22.35.20			
7	GRE	iP	00.19.	c	1.3°	
	TRN	iP	00.19.36		1.1°	
		iS	00.19.48			
	SVI	e	00.20.			Small
7	TRN	eP	03.33.21		1.0°	Small
		eS	03.33.31			
9	GRE	iP	18.07.		1.7°	
	TRN	eP	18.07.07		1.3°	
		iS	18.07.20			
10	TRN	eP	12.26.03		1.4°	
		iS	12.26.17			
10	HOP	iP	15.29.			
12	SKI	iP	02.14.		1.4°	
	AWI	iP	02.14.		1.2°	
12	SKI	eP	03.36.			
	AWI	eP	03.36.			
12	AWI	iP	12.41.		0.5°	
	SKI	iP	12.42.		1.4°	

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
JAN 12	SKI	iP	12.47.		1.5°	
	AWI	iP	12.47.		0.8°	
14	TRN	eP	22.42.23		0.9°	
		iS	22.42.33			
14	TRN	eP	22.56.40		1.2°	
		iS	22.56.53			
16	TRN	eP	07.49.33		0.5°	
		iS	07.49.39			
17	SKI	iP	00.37.45	c	2.81°	Felt: St. Thomas, Intensity V H: 00.37.05 E: 18.6° N 65.4° W Small Magnitude: 6.1
	AWI	iP	00.37.56	c	3.67°	
		iS	00.38.33			
	SVI	e	00.38.49		6.69°	
	TRN	eP	00.39.09		8.80°	
17	SKI	e	01.39.			
17	SVI	eP	11.46.			Small
	BRB	eP	11.46.			Small
17	AWI	iP	20.55.51		0.74°	H: 20.55.40 E: 16.6° N 61.4° W Depth about 45 km. Magnitude: 5.1 (Time for temporary station in Nevis used).
		iS	20.55.58			
	SKI	iP	20.56.01		1.52°	
		iS	20.56.18			
18	AWI	iP	04.59.09		0.80°	H: 04.58.58 E: 17.5° N 61.1° W (Time for Guadeloupe and temporary station in Nevis used).
	SKI	iP	04.59.(21)		1.56°	
		iS	04.59.(39)			

ME G.M.T. MOTION DISTANCE

1968

DATE	STATION	MOTION	TIME	MOTION	DISTANCE	DETAILS	
JAN 19	DOM	iP	19.42.39	d	0.86°	H: 19.42.27 E: 16.1° N 61.2° W Magnitude: 5.0	
		iS	19.42.48				
	AWI	iP	19.42.44	c	1.19°		
		iS	19.43.00				
	SKI	iP	19.42.55	c	1.92°		
		iS	19.43.19				
	SVI	eP	19.43.14		2.95°		
GRE	eP	19.43.26		4.10°			
TRN	e(P)	19.43.50		5.47°			
	eS	19.44.51					
20	SKI	iP	10.54.		1.1°		
	AWI	iP	10.54.		1.2°		
21	TRN	iP	02.14.52	d	0.5°		
		iS	02.14.57				
	GRE	eP	02.15.		1.7°		
21	AWI	eP	04.13.53	d	1.90°	H: 04.13.28 E: 15.5° N 60.9° W Depth about 50 km. Magnitude: 5.0	
		eS	04.14.18				
	SVI	iP	04.14.01	d	2.42°		
		iS	04.14.31				
	SKI	iP	04.14.(04)	c	2.57°		
	BRB	eP	04.14.08		2.75°		Small
	GRE	eP	04.14.17		3.59°		
		iP	04.14.19				
TRN	eP	04.14.36		4.91°			
21	AWI	eP	08.57.17	c	2.19°	H: 08.56.46 E: 15.6° N 60.5° W Depth about 100 km. Magnitude: 3.6	
	SVI	eP	08.57.24		2.68°		
	SKI	eP	08.57.27		2.88°		
21	SKI	iP	19.15.		0.2°		

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
JAN 22	DOM	iP	16.28.50		1.25°	H: 16.28.33
		iS	16.29.04			E: 15.0° N 60.2° W
	SVI	iP	16.29.02		2.08°	Magnitude: 5.3
		iS	16.29.23			
	GRE	eP	16.29.(06)		3.28°	
	SKI	iP	16.29.22		3.45°	
		iS	16.29.59			
	TRN	e	16.29.38		4.47°	
		e	16.30.18			
24	TRN	e	03.04.14			
		i	03.04.24			
25	TRN	iP	04.20.29	c	0.7°	
		iS	04.20.36			
25	TRN	iP	11.10.36	c	0.3°	
		iS	11.10.39			
25	BEV	iP	20.11.		0.9°	
	HOP	e(P)	20.11.			
25	BEV	iP	20.13.		0.9°	
	HOP	iP	20.13.	d	0.4°	
25	DOM	iP	23.12.55	d	1.37°	H: 23.12.35
		iS	23.13.09			E: 16.4° N 61.2° W
	SKI	iP	23.13.02	c	1.93°	Depth about 90 km.
		iS	23.13.21			Magnitude: 4.6
	BRB	eP	23.13.(28)		3.70°	Small
	GRE	eP	23.13.38		4.44°	
	TRN	eP	23.13.(58)		5.79°	
		e	23.15.06			
26	GRE	eP	10.59.			
	TRN	iP	10.59.02		0.6°	
		iS	10.59.08			

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1962					
JAN 26	TRN	iP	20.45.21		0.8°
		iS	20.45.29		
26	SKI	eP	23.27.		
27	HOP	eP	02.06.		
27	BEV	eP	03.15.		
	HOP	eP	03.15.		
27	BEV	iP	20.25.		1.6°
	HOP	eP	20.25.		2.1°
28	TRN	iP	09.10.06	c	0.9°
		iS	09.10.15		
28	BEV	iP	09.40.		1.7°
	HOP	eP	09.40.		
28	GRE	iP	20.01.	c	
28	TRN	iP	22.36.19		1.5°
		iS	22.36.35		
31	TRN	eP	04.03.44		
		e	04.20.15		

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57m	Long: 61° 52' W	Lat: 10° 39' N	(TRN)	TRINIDAD
70m	Long: 61° 44' W	Lat: 12° 02' N	(GRE)	GRENADA
10m	Long: 61° 15' W	Lat: 13° 10' N	(SVI)	ST. VINCENT
70m	Long: 59° 38' W	Lat: 13° 02' N	(BRB)	BARBADOS
40m	Long: 61° 53' W	Lat: 13° 17' N	(DOM)	DOMINICA
37m	Long: 61° 50' W	Lat: 17° 03' N	(AWI)	ANTIGUA
305m	Long: 62° 43' W	Lat: 17° 20' N	(SKI)	ST. KITTS
300m	Long: 76° 45' W	Lat: 18° 00' N	(HOP)	HOPKINS JAMAICA
137m	Long: 77° 18' W	Lat: 18° 27' N	(BBV)	BEVERLY JAMAICA
8m	Long: 77° 52' W	Lat: 18° 02' N	(BRJ)	BLACK RIVER JAMAICA

UNIVERSITY OF THE WEST INDIES

EQUIPMENT

SEISMIC RESEARCH UNIT

Trinidad is equipped with 12 seismological instruments. The peak magnification of the most period instruments is 25,000 and that of the long period instruments is 750. All other stations have Willmore-Watts equipment recording the vertical component of the earth motion only. The setpoint is 0.8 second and the galvanometer period 0.25 second. The peak magnification is 10,000 (at 2 cycles/sec.) except at Barbados where it is 5,000. All stations record at 60 mm/min. Ratio time signals are recorded daily.

TRINIDAD

Preliminary Seismological Bulletin.

Uniform velocities of 7.00 km/sec for P waves and 3.50 km/sec for S waves are assumed. The effects of crustal structure are neglected. Where the data are insufficient to determine epicentre, an origin time is calculated from the S and P arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the earthquake. When three P arrival times only are known a least square process is used to find a surface focus. If one or more S-P intervals are also known, an approximate depth is determined, and then the least square adjustment of the epicentre is carried out for this depth. If sufficient data are available a least square adjustment of the depth and the epicentre is carried out. All least square adjustments are confined until the root mean square of the residuals is less than 0.5 seconds.

$$M = \log A \sqrt{T} + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter, Annals of Geophysics Volume IX, No. 1, 1956.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:-

From 1st May 1955 to 1st January 1956 at 10° 40' N 61° 57' W Fort-a-St-James
From 1st January 1955 to 1st September 1955 at 10° 44' N 61° 52' W North Point

-TRINIDAD	(TRN)*	Lat. 10°39.0' N	Long. 61°24.1' W	27m.
-GRENADA	(GRE)	Lat. 12°02.7' N	Long. 61°44.1' W	30m.
ST. VINCENT	(SVI)	Lat. 13°10.2' N	Long. 61°15.5' W	10m.
BARBADOS	(BRB)	Lat. 13°07.4' N	Long. 59°35.6' W	70m.
DOMINICA	(DOM)	Lat. 15°17.7' N	Long. 61°23.5' W	40m.
ANTIGUA	(AWI)	Lat. 17°08.6' N	Long. 61°50.1' W	27m.
ST. KITTS	(SKI)	Lat. 17°20.3' N	Long. 62°43.7' W	305m.
HOPE, JAMAICA	(HOP)	Lat. 18°00.9' N	Long. 76°45.0' W	200m.
BEVERLEY, JAMAICA	(BEV)	Lat. 18°27.1' N	Long. 77°18.0' W	123m.
BLACK RIVER, JAMAICA	(BRJ)	Lat. 18°02.0' N	Long. 77°52.1' W	8m.

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Trinidad is equipped with Vela Uniform standard seismological instruments. The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 750.

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Where the data are insufficient to define an epicentre, an origin time is calculated from the S and P arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the earthquake.

When three P arrival times only are known a least square process is used to find a surface focus. If one or more S - P intervals are also known, an approximate depth is determined, and then the least square adjustment of the epicentre is carried out for this depth.

If sufficient data are available a least square adjustment of the depth and the epicentre is carried out.

All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake Magnitudes are computed from:

$$M = \text{Log } A/T + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter. Annali di Geophysica Volume IX, No. 1, 1956.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:-

From 1st May 1953 to 1st January 1955 at 10°40.1' N 61°31.2' W Port-of-Spain.

From 1st January 1955 to 1st September 1958 at 10°44.7' N 61°33.2' W North Post.

SECTION I - DISTANT EARTHQUAKES

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
FEB 2	TRN	eP L	04.37.26 04.51.			
2	HOP	iP iS	19.33.21 19.34.17	d	4.7°	USCGS gives H: 19.32.15 E: 18.8°N 81.5°W
	SKI	eP	19.36.22		18.1°	Depth about 71 km.
	TRN	eP Lr	19.36.56 19.42.		21.2°	
3	TRN	L	08.37.			
✓	✓ TRN	iP iS	12.54.52 12.56.51		10.9°	USCGS gives H: 12.52.14 E: 7.6°N 72.1°W
✓	✓ HOP	eP	12.54.56		11.5°	Depth about 33 km.
✓	✓ SKI	eP	12.55.28		13.7°	Small
✓	✓ SKI	eP'	01.36.45		147.2°	USCGS gives H: 01.17.03 E: 6.3°S 149.1°E
✓	✓ TRN	eP'	01.36.51		149.5°	Depth about 36 km.
✓	✓ TRN	eP iPP iS Lq Lr	20.48.13 20.50.12 20.55.26 21.04. 21.07.		50.1°	USCGS gives H: 20.39.22 E: 38.4°S 73.2°W
✓	✓ TRN	eP ePP Lq Lr	01.30.23 01.32.20 01.46. 01.50.		50.2°	USCGS gives H: 01.21.29 E: 38.4°S 73.6°W
6	HOP	eP eS	03.30.47 03.32.42		11.8°	USCGS gives H: 03.27.56 E: 6.8°N 73.2°W
	TRN	eP i iS	03.30.49 03.30.57 03.33.10		12.5°	Depth about 108 km.
	SKI	eP	03.31.(13)		14.5°	Small

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE
1963 FEB 6	HOP	eP	07.04.38		12.0°
	TRN	eP	07.06.33		21.2°
		eS	07.10.22		
		Lq	07.12.		
		Lr	07.15.		
					USCGS gives H: 07.01.47 E: 7.4° N 82.6° W Depth about 61 km.
12	HOP	eP	07.37.04		
		e	07.37.42		
13	SKI	e	09.09.20		138.2°
	TRN	eP'	09.09.37		145.0°
		ePP	09.13.14		
		ePkS	09.13.20		
		Lq	09.50.		
		Lr	09.58.		
					Very small Felt: Northern Formosa. Three killed and fifteen injured; widespread but moderate damage. USCGS gives H: 08.50.02 E: 24.5° N 121.8° E Depth about 33 km.
13	TRN	eP'	18.33.18		138.7°
		ePP	18.36.08		
					Solomon Is. Felt: Honiara. USCGS gives H: 18.13.55 E: 9.9° S 160.8° E Depth about 29 km.
14	SKI	e	07.24.14		165.3°
	HOP	eP'	07.24.18		153.5°
	TRN	iP'	07.24.29		170.1°
		i	07.24.38		
		ePP	07.29.36		
					Banda Sea, Felt: Darwin, Australia. USCGS gives H: 07.04.41 E: 7.2° S 128.2° E Depth about 197 km.
14	TRN	eP	12.15.51		33.0°
		eS	12.21.04		
	SKI	eP	12.16.05		36.3°
					Very small Depth about 33 km.
14	SKI	e	22.27.38		150.5°
	TRN	eP'	22.27.39		153.7°
					Very small USCGS gives H: 22.07.54 E: 5.0° S 144.6° E Depth about 80 km.
19	HOP	eP	00.52.34		
	TRN	eP	00.53.42		
19	HOP	eP	00.59.11		

SECTION I - DISTANT EARTHQUAKES

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
FEB 2	TRN	eP L	04.37.26 04.51.			
2	HOP	iP iS	19.33.21 19.34.17	d	4.7°	USCGS gives H: 19.32.15 E: 18.8°N 81.5°W
	SKI	eP	19.36.22		18.1°	Depth about 71 km.
	TRN	eP Lr	19.36.56 19.42.		21.2°	
3	TRN	L	08.37.			
✓	✓ TRN	iP iS	12.54.52 12.56.51		10.9°	USCGS gives H: 12.52.14 E: 7.6°N 72.1°W
✓	✓ HOP	eP	12.54.56		11.5°	Depth about 33 km.
✓	✓ SKI	eP	12.55.28		13.7°	Small
✓	✓ SKI	eP'	01.36.45		147.2°	USCGS gives H: 01.17.03 E: 6.3°S 149.1°E
✓	✓ TRN	eP'	01.36.51		149.5°	Depth about 36 km.
✓	✓ TRN	eP iPP iS Lq Lr	20.48.13 20.50.12 20.55.26 21.04. 21.07.		50.1°	USCGS gives H: 20.39.22 E: 38.4°S 73.2°W
						Depth about 41 km.
✓	✓ TRN	eP ePP Lq Lr	01.30.23 01.32.20 01.46. 01.50.		50.2°	USCGS gives H: 01.21.29 E: 38.4°S 73.6°W
						Depth about 33 km.
6	HOP	eP eS	03.30.47 03.32.42		11.8°	USCGS gives H: 03.27.56 E: 6.8°N 73.2°W
	TRN	eP i iS	03.30.49 03.30.57 03.33.10		12.5°	Depth about 108 km.
	SKI	eP	03.31.(13)		14.5°	Small

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963					
FEB 20	TRN	eP eS	17.25.36 17.35.16		
22	HOP	eP iP	21.15.22 21.15.22	5.4°	USCGS gives H: 21.14.06 E: 18.1° N 71.3° W
	SKI	eP e e	21.16.(05) 21.24.(55) 21.31.(22)	8.3°	Depth about 50 km.
	TRN	iP iS ePcS	21.16.59 21.19.01 21.26.21	12.3°	
22	HOP	e	22.26.21		
23	TRN	L	07.02.		
24	TRN	eP	05.44.01	28.1°	USCGS gives H: 05.38.21 E: 15.1° S 72.5° W Depth about 105 km.
24	HOP	eP iP	13.37.37 13.37.41	14.3°	Central Guatemala. Felt: Western El Salvador
	TRN	eP iPcP i Lr	13.40.11 13.43.13 13.46.46 13.49.	29.7°	USCGS gives H: 13.34.16 E: 14.6° N 91.4° W Depth about 135 km.
25	TRN	L	08.31.		
25	TRN	e	16.55.15		
25	TRN	iP' i	17.30.36 , 17.30.51	144.8°	USCGS gives H: 17.11.02 E: 24.4° N 123.4° E Depth about 33 km.
26	HOP	eP'	20.33.04	137.0°	USCGS gives H: 20.14.09 E: 7.5° S 146.2° E
	SKI	eP'	20.33.(38)	150.3°	Depth about 171 km.
	TRN	iP' i	20.33.40 20.33.47	152.6°	

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963 FEB 27	TRN	eP	00.14.46		20.8° USCGS gives H: 00.10.08 E: 1.0°S 78.8°W Depth about 89 km.
27 ✓	SKI	eP'	04.49.(43)		146.8° USCGS gives H: 04.30.01 E: 6.0°S 149.4°E
✓	TRN	iP'	04.49.47		149.4° Depth about 52 km.
		Lq	05.32.		
		Lr	05.40.		
27	TRN	eP'	05.43.45		149.7° USCGS gives H: 05.24.02 E: 6.3°S 149.2°E Depth about 59 km.
27	TRN	iP	11.06.37		27.9° USCGS gives H: 11.00.45 E: 14.7°S 73.3°W Depth about 110 km.
27 ✓	TRN	iP'	20.48.06		145.7° New Britain. Felt: Rabaul. USCGS gives H: 20.28.35 E: 4.6°S 152.9°E Depth about 100 km.
27	TRN	eP	21.17.03		24.1° USCGS gives H: 21.11.33 E: 5.6°S 79.3°W Depth about 33 km.
28	TRN	L	02.32.		

SECTION II - LOCAL EARTHQUAKES

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
FEB 2	GRE	eP	00.07.		1.8°	
	TRN	iP	00.07.11.	c	1.2°	
		iS	00.07.24			
2	SKI	iP	09.03.		1.2°	
2	TRN	eP	21.12.31		1.18°	H: 21.12.15
		iP	21.12.33			E: 11.4° N 60.7° W
		iS	21.12.42			Depth about 70 km.
		L	21.42.			Magnitude: 3.5
	GRE	eP	21.12.35		1.41°	
	SVI	iP	21.12.44		2.02°	
		eS	21.13.06			
2	BEV	eP	22.08.			
	HOP	iP	22.08.			
3	SKI	iP	16.11.	c	2.2°	
4	TRN	eP	01.17.44			Small
4	TRN	iP	03.30.28	c	1.73°	H: 03.30.04
		iS	03.30.45			E: 10.7° N 60.7° W
	GRE	eP	03.30.37		2.34°	Depth about 175 km.
	SVI	eP	03.30.47		3.01°	Magnitude: 4.3
		eS	03.31.19			
5	TRN	iP	00.26.47		0.6°	
		iS	00.26.53			
5	DOM	eP	09.13.			Small
5	SKI	eP	09.32.		2.3°	
	DOM	iP	09.32.			
5	BEV	iP	10.09.		1.4°	

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE		
1963							
FEB 5	DOM	eP	14.13.52		(1.3°)		
	SKI	eP	14.14.(07)		(2.4°)		
		eS	14.14.(32)				
5	BEV	iP	15.49.				
5	TRN	iP	17.56.15	c	0.5°		
		iS	17.56.20				
	GRE	eP	17.57.				
5	BEV	iP	20.15.		0.4°		
5	BEV	iP	20.20.		0.6°		
6	BEV	iP	14.30.				
6	BEV	eP	16.31.				
6	DOM	eP	20.39:30		1.35°		
		eS	20.39.43				
	SVI	eP	20.39.44		2.33°		H: 20.39.11 E: 15.2°N 60.0°W (Time for Guadeloupe used).
6	DOM	eP	21.51.				
	SVI	eP	21.51.				
6	BEV	iP	22.58.		0.8°		
8	BEV	iP	09.38.	d	2.1°		
	HOP	eP	09.38.		2.0°		
8	DOM	eP	13.26.				
	SVI	iP	13.26.				
10	SKI	iP	19.28.		1.4°		
11	BEV	iP	11.01.		3.8°		

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
FEB 11	BEV	i(P)	20.52.		0.5°	
11	BEV	iP	21.45.		0.5°	
12	DOM	iP	02.14.			
13	BEV	iP	00.26.			
13	TRN	iP	10.19.35		1.4°	
		iS	10.19.50			
13	TRN	eP	16.25.43		(1.86°)	H: About 16.25.17
		iS	16.26.02			E: About 10.5°N 59.5°W
	GRE	eP	16.25.(57)		(2.68°)	Magnitude: 4.9
		iS	16.26.(27)			
	SVI	eP	16.26.01		(3.19°)	Small
14	SKI	iP	00.33.	c	0.2°	
14	TRN	iP	08.50.42		2.09°	Felt: Port-of-Spain
		iS	08.51.04			Intensity III
	GRE	iP	08.51.(08)		2.83°	H: 08.50.32
						E: 9.8°N 62.8°W
	SVI	eP	08.51.27		3.94°	Depth about 150 km.
		eS	08.52.09			Magnitude 5.1
	DOM	eP	08.51.54		5.83°	
		eS	08.52.53			
	SKI	eP	08.52.20		7.68°	
		eS	08.53.39			
14	BEV	iP	11.02.		0.6°	
	HOP	iP	11.02.	d	0.4°	
14	TRN	eP	13.09.05			
14	HOP	iP	20.48.	d	0.2°	
14	GRE	iP	21.45.		1.8°	
	TRN	iP	21.45.06	c	1.3°	
		iS	21.45.20			



1963 TIME G.M.T. MOTION DISTANCE

1963			TIME G.M.T.	MOTION	DISTANCE	
FEB 15	TRN	eP	03.54.39			
15	TRN	eP	17.22.55		1.8°	
		iS	17.23.14			
16	TRN	eP	19.09.52		1.6°	
		iS	19.10.08			
18	SKI	iP	02.13.27		1.13°	H: 02.13.11
		iS	02.13.38			E: 18.4° N 62.5° W
						Depth about 25 km.
						Magnitude: (5.0)
						(Time for Guadeloupe and temporary station in Nevis used).
18	TRN	eP	03.28.49		1.6°	
		iS	03.29.06			
18	SKI	iP	07.43.		1.1°	
19	TRN	eP	02.00.05			
19	SKI	iP	03.55.43	c	1.12°	H: 03.55.27
		iS	03.55.53			E: 18.3° N 62.2° W
						Depth about 25 km.
						(Time for Guadeloupe and temporary station in Nevis used).
19	GRE	iP	07.46.			
	TRN	iP	07.46.16		1.7°	
		iS	07.46.33			
19	HOP	iP	20.12.	d	1.0°	
20	HOP	iP	02.54.			
20	SKI	iP	03.21.38		0.92°	H: 03.21.25
		iS	03.21.47			E: 18.0° N 62.0° W
						Magnitude: (4.9)
						(Time for Guadeloupe and temporary station in Nevis used).

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963					
FEB 20	TRN	eP iS	07.40.53 07.41.02		0.9°
20	SKI	iP	17.35.		1.9°
22	DOM	e	21.54.		
	SVI	eP	21.55.		
	GRE	e	21.55.		
22	DOM	eP	23.00.		
	GRE	eP	23.01.		
22	DOM	eP	23.06.(50)		
	SVI	e	23.08.03		
	GRE	e	23.08.16		
23	HOP	eP	10.24.		
23	TRN	eP i	19.08.15 19.08.19		
25	DOM	eP	17.04.		
	SVI	eP	17.05.		
	GRE	e(P)	17.05.		
25	TRN	iP iS	18.49.56 18.50.03		0.7°
	GRE	eP	18.50.		1.5°
25	SKI	iP	20.14.	c	0.6°
26	SKI	iP iS	04.16.(31) 04.16.(42)		1.0°
26	GRE	eP	11.26.		1.4°
	TRN	iP iS	11.26.25 11.26.31		0.6°

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
FEB 26	GRE	e	19.25.			Very small
	TRN	eP	19.25.12		1.6°	
		iS	19.25.28			
27	SKI	iP	01.48.	d	1.4°	
27	HOP	iP	04.17.	d		
27	HOP	iP	04.45.	d	0.3°	
27	SKI	iP	05.24.		1.7°	
28	SKI	iP	04.27.		0.3°	
28	SVI	eP	14.40.01		3.10°	H: 14.39.17
		iS	14.40.33			E: 14.3°N 58.3°W
	GRE	iP	14.40.14		4.05°	Magnitude: 5.0
		iS	14.40.56			
	TRN	eP	14.40.24		4.75°	
		iS	14.41.12			
	SKI	e(P)	14.40.35		5.24°	
		eS	14.41.33			

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30m	W	61° 24' 1"	Long.	10° 39' 0"	N	Lat.	(TRIN)	TRINIDAD
30m	W	61° 44' 1"	Long.	12° 02' 7"	N	Lat.	(GRN)	GRANADA
10m	W	61° 15' 2"	Long.	13° 10' 2"	N	Lat.	(VIN)	ST. VINCENT
70m	W	58° 35' 6"	Long.	13° 07' 4"	N	Lat.	(BAR)	BARBADOS
40m	W	61° 23' 2"	Long.	12° 17' 7"	N	Lat.	(DOM)	DOMINICA
37m	W	61° 20' 1"	Long.	11° 08' 6"	N	Lat.	(ANT)	ANTIGUA
30m	W	62° 47' 7"	Long.	17° 20' 3"	N	Lat.	(KIT)	ST. KITTS
300m	W	76° 45' 0"	Long.	18° 00' 9"	N	Lat.	(HOPE)	HOPE, JAMAICA
125m	W	77° 18' 0"	Long.	18° 27' 1"	N	Lat.	(BEV)	BEVERLY, JAMAICA
9m	W	77° 25' 1"	Long.	18° 02' 0"	N	Lat.	(BLK)	BLACK RIVER, JAMAICA

UNIVERSITY OF THE WEST INDIES

EQUIPMENT

SEISMIC RESEARCH UNIT

Trinidad is equipped with four seismic instruments. The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 750. All other stations have similar equipment recording the vertical component of the earth motion only. The seismometer period is 0.8 second and the galvanometer period 0.25 second. The peak magnification is 10,000 (at 5 cycles/sec.) except at stations where it is 3,000. All stations record at 60 mm/min. Radio time signals are recorded daily.

TRINIDAD

MAR 1963

Preliminary Seismological Bulletin.

Where the data are insufficient to define an epicentre, an origin time is calculated from the S and P arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the earthquake. Where there is arrival time only one origin time is used to find a distance factor. If one or more S - P intervals are also known, an approximate distance is determined, and then the least square adjustment of the epicentre is carried out for this distance. If additional data are available a least square adjustment of the depth and the epicentre is carried out. All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake Magnitudes are computed from:

$$M = \log A/T + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter, Annals of Geophysics Volume IX, No. 1, 1958.

Intensities quoted are on the modified Mercalli intensity scale.

*The Trinidad station has been operated in the past at the temporary sites given below:-

- From 1st May 1957 to 1st January 1958 at 10° 40' 1" N 61° 21' 2" W Fort-of-Spain.
- From 1st January 1955 to 1st September 1958 at 10° 14' 7" N 61° 27' 2" W North Fort.

TRINIDAD	(TRN)*	Lat. 10°39.0' N	Long. 61°24.1' W	27m.
GRENADA	(GRE)	Lat. 12°02.7' N	Long. 61°44.1' W	30m.
ST. VINCENT	(SVI)	Lat. 13°10.2' N	Long. 61°15.5' W	10m.
BARBADOS	(BRB)	Lat. 13°07.4' N	Long. 59°35.6' W	70m.
DOMINICA	(DOM)	Lat. 15°17.7' N	Long. 61°23.5' W	40m.
ANTIGUA	(AWI)	Lat. 17°08.6' N	Long. 61°50.1' W	27m.
ST. KITTS	(SKI)	Lat. 17°20.3' N	Long. 62°43.7' W	305m.
HOPE, JAMAICA	(HOP)	Lat. 18°00.9' N	Long. 76°45.0' W	200m.
BEVERLEY, JAMAICA	(BEV)	Lat. 18°27.1' N	Long. 77°18.0' W	123m.
BLACK RIVER, JAMAICA	(BRJ)	Lat. 18°02.0' N	Long. 77°52.1' W	8m.

EQUIPMENT

Trinidad is equipped with Vela Uniform standard seismological instruments. The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 750.

All other stations have Willmore-Watts equipment recording the vertical component of the earth motion only. The seismometer period is 0.8 second and the galvanometer period 0.25 second. The peak magnification is 10,000 (at 3 cycles/sec.) except at Barbados where it is 3,000. All stations record at 60 mm/min. Radio time signals are recorded daily.

CARIBBEAN DISTANCES AND EPICENTRES

Uniform velocities of 7.90 km/sec for P waves and 4.56 km/sec for S waves are assumed. The effects of the crust are ignored.

Where the data are insufficient to define an epicentre, an origin time is calculated from the S and P arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the earthquake.

When three P arrival times only are known a least square process is used to find a surface focus. If one or more S - P intervals are also known, an approximate depth is determined, and then the least square adjustment of the epicentre is carried out for this depth.

If sufficient data are available a least square adjustment of the depth and the epicentre is carried out.

All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake Magnitudes are computed from:

$$M = \text{Log } A/T + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter. Annali di Geophysica Volume IX, No. 1, 1956.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:-

From 1st May 1953 to 1st January 1955 at 10°40.1' N 61°31.2' W Port-of-Spain.

From 1st January 1955 to 1st September 1958 at 10°44.7' N 61°33.2' W North Post.

DATE STATION PHASE TIME G.M.T. MOTION DISTANCE

SECTION I - DISTANT EARTHQUAKES

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE
1963					
MAR 2	HOP	eP	19.44.41		11.9°
		eS	19.46.44		
	TRN	eP	19.44.48		12.0°
					USCGS gives H: 19.41.55 E: 6.8°N 73.0°W Depth about 173 km.
✓ 3	HOP	eP	23.28.21		
		e	23.29.42		
	SKI	e	23.28.(49)		
	TRN	eP	23.29.59		
		e	23.32.12		
✓ 4	TRN	e(P)	07.53.37		67.9°
		L	08.22.		
					USCGS gives H: 07.41.51 E: 82.9°N 07.7°W Depth about 33 km.
✓ 4	TRN	eP'	13.58.17		145.2°
		Lq	14.48.		
					USCGS gives H: 13.38.41 E: 24.2°N 121.7°E Depth about 33 km.
✓ 4	HOP	eP	15.48.07		23.2°
	TRN	iP	15.48.28		25.2°
		i	15.48.31		
		iS	15.52.52		
					USCGS gives H: 15.43.04 E: 04.5°S 81.6°W Depth about 33 km.
✓ 5	HOP	eP	07.10.05		23.1°
	TRN	iP	07.10.26		25.2°
		iS	07.14.48		
					USCGS gives H: 07.05.02 E: 04.5°S 81.5°W Depth about 31 km.
✓ 7	TRN	eP	05.32.25		63.0°
		eS	05.40.54		
		L	05.52.		
					USCGS gives H: 05.22.01 E: 27.0°S 113.5°W Depth about 33 km.
✓ 7	TRN	eP	12.26.08		56.3°
					USCGS gives H: 12.16.29 E: 44.3°S 75.3°W Depth about 45 km.
✓ 8	TRN	eP	15.12.44		33.0°
		Lq	15.22.		
		Lr	15.24.		
					USCGS gives H: 15.06.05 E: 1.1°N 29.9°W Depth about 33 km.

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 MAR 10	✓ TRN	eP'	03.13.07		145.9°	USCGS gives H: 02.53.33 E: 24.7° N 122.1° E Depth about 33 km.
10	✓ TRN	eP	10.59.31		41.7°	USCGS gives H: 10.51.48 E: 29.9° S 71.2° W Depth about 70 km.
		ePP	11.01.14			
		eS	11.05.42			
		e	11.09.20			
		Lq	11.12.			
		Lr	11.15.			
	✓ AWI	eP	11.00.19		47.8°	
13	HOP	iP	10.41.03	c	7.3°	USCGS gives H: 10.39.19 E: 19.5° N 69.5° W Depth about 33 km.
		eS	10.42.22			
	AWI	eP	10.41.09		7.8°	
	TRN	iP	10.42.08		12.0°	
		iS	10.44.08			
14	TRN	iP'	08.20.04		150.7°	USCGS gives H: 08.00.16 E: 19.0° N 120.4° E Depth about 51 km.
14	TRN	L	09.12.			
15	✓ HOP	eP'	00.35.29		145.7°	USCGS gives H: 00.16.01 E: 8.4° N 126.4° E Depth about 117 km.
	✓ TRN	eP'	00.35.50		159.8°	
		L	01.32.			
15	TRN	iP	05.50.55		19.1°	USCGS gives H: 05.46.33 E: 21.7° N 45.4° W Depth about 33 km.
		eS	05.55.41			
16	✓ BEV	eP	08.58.(34)		100.0°	USCGS gives H: 08.44.48 E: 46.5° N 154.7° E Depth about 26 km.
	✓ TRN	eP	08.59.41		114.5°	
		ePP	09.04.27			
		iPS	09.14.01			
	✓ AWI	e	09.03.41		107.9°	
20	TRN	eP'	05.00.49		119.3°	USCGS gives H: 04.43.14 E: 19.9° S 179.1° W Depth about 680 km.

STATION TIME DATE MOTION DISTANCE

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE
1963 MAR 20	TRN	iP'	05.03.24		119.7° USCGS gives H: 04.45.50 E: 19.6°S 179.3°W Depth about 680 km.
20	TRN	eP e	10.59.00 10.59.30		112.4° USCGS gives H: 10.44.41 E: 15.8°S 171.7°W Depth about 33 km.
20	TRN	iP'	15.01.28		147.0° USCGS gives H: 14.41.48 E: 11.9°N 93.1°E Depth about 33 km.
20	TRN	L	17.53.		
21	TRN	iP'	04.53.33		146.5° USCGS gives H: 04.33.53 E: 5.5°S 152.2°E Depth about 33 km.
22	AWI TRN	eP eP	01.45.44 01.46.55		5.5° USCGS gives H: 01.44.26 E: 19.3°N 67.0°W 10.3° Small Depth about 39 km.
24	AWI TRN	eP' eP' e i Lq Lr	02.27.22 02.27.24 02.29.11 02.33.09 03.23. 03.40.		172.5° USCGS gives H: 02.07.13 E: 9.7°S 120.4°E 178.1° Depth about 33 km.
24	HOP	eP'	10.02.55		145.3° USCGS gives H: 09.43.20 E: 9.0°N 125.6°E Depth about 51 km.
24	TRN	L	13.31.		
24	HOP SKI TRN	eP eP iP L	21.47.46 21.48.26 21.48.53 22.26.		82.7° USCGS gives H: 21.35.24 E: 51.8°N 178.1°W 91.2° Depth about 57 km. 97.5°
25	TRN	L	21.13.		

G.M.T. MOTION DISTANCE

Date	Station	Type	Time	Motion	Distance	Notes
1963 MAR 25	TRN	eP'	23.06.11	155.3°	USCGS gives H: 22.46.16 E: 0.7° N 96.5° E Depth about 30 km.	
	AWI	e	23.06.11	152.4°		
26	TRN	eP'	09.10.13	145.8°	USCGS gives H: 08.50.45 E: 4.2° S 152.6° Depth about 120 km.	
/ 26	TRN	eP'	10.07.06	118.1°	USCGS gives H: 09.48.20 E: 29.7° S 177.8° W Depth about 45 km.	
		ePP	10.08.20			
		e	10.17.28			
/	AWI	eP'	10.07.12	120.4°		
/ 26	TRN	eP	13.54.48			
		eS	14.01.44			
		L	14.21.			
/ 26	TRN	eP'	21.53.52	130.8°	Felt: Near east coast of Honshu, Japan. Minor damage in central Honshu. USCGS gives H: 21.34.41 E: 36.0° N 135.7° E Depth about 33 km.	
		e	21.57.15			
		Lq	22.33.			
		Lr	22.48.			
27	HOP	eP	02.34.46	11.7°	Small USCGS gives H: 02.31.52 E: 6.8° N 73.8° W Depth about 33 km.	
		eS	02.36.44			
27	HOP	eP	12.34.36	11.9°	USCGS gives H: 12.31.52 E: 6.8° N 73.0° W Depth about 176 km.	
		eS	12.36.40			
	TRN	eP	12.34.40	12.0°		
27	HOP	eP	13.18.20	12.4°	USCGS gives H: 13.15.30 E: 6.3° N 73.1° W Depth about 147 km.	
		eS	13.20.19			
	TRN	e	13.18.25	12.3°		
/ 28	AWI	eP	00.25.27	56.3°	Felt: Iceland. Slight damage and several injured in Northern Iceland. USCGS gives H: 00.15.48 E: 66.3° N 19.6° W Depth about 15 km.	
		eP	00.25.59			
		eP	00.26.13			
		eS	00.34.45			
		Lq	00.42.			
		Lr	00.45.			



G.M.T. MOTION DISTANCE

1900

MAR 28 TRN

L 06.55.

28 TRN

e 23.59.08
e 00.06.20
L 00.26.

30 TRN

iP' 02.12.23 K
ePP 02.14.38
i 02.15.31
Lq 02.52.

d 130.6° New Hebrides Is. Felt: Port Vila, Tanna and Anatom.
USCGS gives H: 01.53.29
E: 19.1°S 169.1°E
Depth about 160 km.

AWI

eP' 02.12.24 131.7°

30 TRN

eP 16.17.21
e 16.22.11
L 17.51

20.5° USCGS gives H: 16.12.01
E: 4.8°S 75.1°W
Depth about 244 km.

31 TRN

iP 04.51.35
iS 04.56.12
i 05.00.29
Lr 05.07.

d 26.0° USCGS gives H: 04.46.01
E: 6.5°S 81.1°W
Depth about 33 km.

31 TRN

eP 05.49.34

Small

31 TRN

eP 05.56.44
e 05.59.55

27.4° USCGS gives H: 05.51.01
E: 10.7°S 78.5°W
Depth about 33 km.

31 TRN

eP' 07.27.17
iP' 07.27.22

149.7° New Britain, Felt: Popondetta, Walindi and Kandrian.

AWI

eP' 07.27.(18) 148.0°

USCGS gives H: 07.07.36
E: 6.1°S 149.0°E
Depth about 60 km.

31 TRN

eP' 17.48.46

155.1° USCGS gives H: 17.28.53
E: 0.8°N 96.6°E
Depth about 33 km.

31 TRN

eP' 19.41.37

118.3° USCGS gives H: 19.22.53
E: 30.0°S 178.0°W
Depth about 50 km.

31 TRN

eP 19.52.39
L 20.19.

31 TRN

eP 23.36.18

Very small

SECTION II - LOCAL EARTHQUAKES

DATE STATION PHASE TIME G.M.T. MOTION DISTANCE

1963

MAR 2	TRN	iP iS	14.46.27 14.46.31		0.5°	
2	TRN	iP iS	15.43.07 15.43.10	d	0.33°	H: 15.43.03 E: 11.0° N 61.4° W
	GRE	eP	15.43.18		1.12°	Magnitude: 5.1.
	SVI	eP	15.43.34		2.18°	
	BRB	e	15.43.(50)		2.77°	
	DOM	eP	15.44.(02)		4.63°	
	SKI	eP	15.44.(28)		6.46°	
3	TRN	iP iS	16.27.43 16.27.49		0.5°	
4	HOP	iP	03.48.	c	0.3°	
4	SKI	e	08.08.			
5	SKI	iP	08.13.	c	0.4°	
5	HOP	iP	13.56.			
8	SVI	eP	15.47.			
10	TRN	eP iS	06.35.40 06.35.51		1.2°	
10	HOP	eP eS	23.00.24 23.02.18		11.1°	
10	TRN	eP iS	23.00.25 23.00.33		0.8°	
	GRE	eP	23.00.(32)		(1.3)°	
11	TRN	eP	09.41.40			
	GRE	e	09.42.(25)			Very small

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963 MAR 11	TRN	eP e	17.16.33 17.16.51		
12	TRN	iP iS	01.28.29 01.28.42	c	1.2°
	GRE	eP iS	01.28.(33) 01.28.(52)		1.9°
12	AWI	eP	09.32.47		0.96°
	DOM	eP eS	09.32.57 09.33.15		1.71°
	SKI	eP eS	09.33.00 09.33.18		1.82°
12	TRN	iP iS	13.21.22 13.21.27		0.5°
12	TRN	e	18.31.04		
13	TRN	e i	12.52.10 12.53.06		
14	GRE	iP	16.31.(25)		
	TRN	e i	16.31.28 16.31.37		
15	DOM	eP eS	05.41.53 05.42.06		1.24°
	AWI	eP eS	05.42.02 05.42.21		1.82°
	SKI	eP	05.42.11		2.50°
15	BRB	e	06.06.16		Very small
	AWI	eP	06.06.22		
	DOM	eP	06.06.38		
16	TRN	iP iS	13.37.54 13.38.05		1.1°

H: 09.32.33
E: 16.9°N 60.9°W
Magnitude: (4.5)

H: 05.41.36
E: 15.9°N 60.8°W
Depth about 100 km.
Magnitude: 4.8

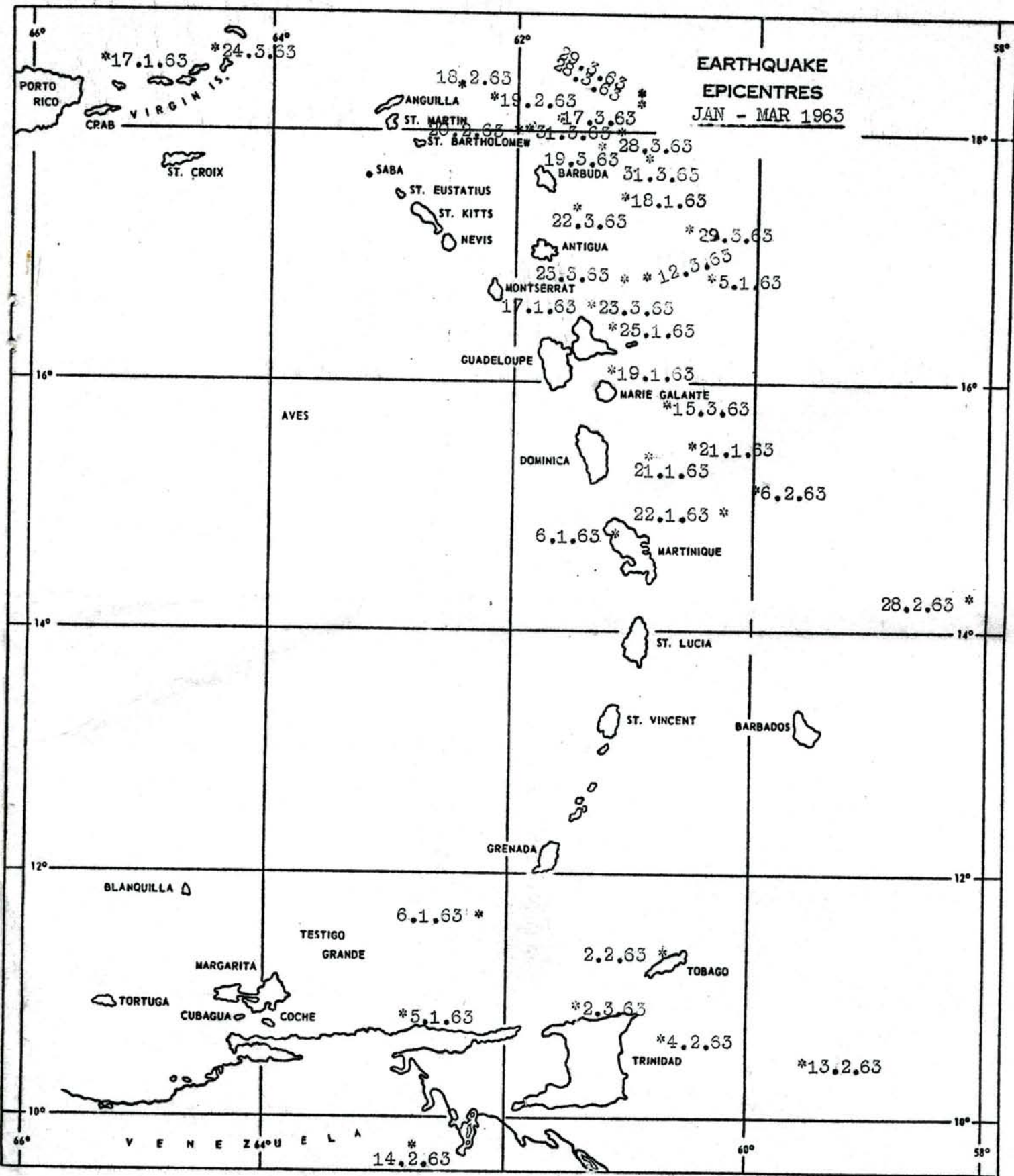
<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
MAR 16	TRN	eP iS	15.00.18 15.00.23		0.5°	
16	HOP	eP eS	15.33.56 15.35.51		11.1°	
	BEV	iP iS	15.34.(06) 15.36.(07)		(11.7°)	
17	SKI	iP iS	09.53.01 09.53.14	d	(1.20°)	H about 09.52.44 E about 18.1° N 61.7°W
9	AWI	iP iS	09.52.57 09.53.06		(0.95°)	Depth about 25 km. Magnitude: (4.6) (Time for Guadeloupe and temporary station in Nevis used).
17	TRN	eP	15.35.35			
17	TRN	eP	15.52.10			
18	TRN	eP iS	07.00.33 07.00.44		1.1°	
	GRE	e	07.00.(40)			Very small
19	AWI	iP	00.06.14		0.94°	H: 00.06.00
	SKI	iP iS	00.06.21 00.06.37		1.47°	E: 17.9° N 61.3°W Magnitude: (4.4) (Time for temporary station in Nevis used).
19	TRN	eP iS	01.17.05 01.17.14		0.9°	
20	TRN	eP iS	07.17.23 07.17.38		1.5°	Very small
20	SVI	eP	10.58.35			
	GRE	eP	10.58.(43)			
22	TRN	iP iS	04.15.42 04.15.49		0.6°	

			<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
MAR 22	GRE	e	08.09.			
	TRN	iP	08.09.36	c	0.7°	
		iS	08.09.43			
22	TRN	eP	08.36.13		0.7°	Very small
		iS	08.36.20			
22	TRN	iP	14.08.29		0.8°	
		iS	14.08.37			
22	AWI	iP	21.14.54		0.70°	H: 21.14.44
	SKI	iP	21.15.02		1.28°	E: 17.5°N 61.5°W
		iS	21.15.15			Depth about 50 km.
						Magnitude: 4.7
						(Time for Guadeloupe and temporary station in Nevis used).
23	AWI	eP	03.21.30		0.82°	H: 03.21.18
		iS	03.21.38			E: 16.9°N 61.1°W
	DOM	eP	03.21.41		1.66°	Depth about 25 km.
		eS	03.21.58			Magnitude: (4.5)
	SKI	iP	03.21.42		1.67°	
		iS	03.22.00			
23	AWI	eP	03.23.08		0.84°	H: 03.22.55
	DOM	e	03.23.(19)		1.43°	E: 16.6°N 61.4°W
						Depth about 60 km.
	SKI	eP	03.23.17		1.53°	Magnitude: 4.1.
		eS	03.23.32			(Time for Guadeloupe used)
23	TRN	iP	10.05.59		0.7°	
		iS	10.06.06			
23	TRN	iP	16.58.53	c	1.3°	
		iS	16.59.06			
	GRE	iP	16.59.	c	1.7°	
23	GRE	iP	18.32.		1.7°	
	TRN	iP	18.32.30	c	1.5°	
		iS	18.32.45			

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
MAR 24	SKI	iP iS	02.34.41 02.35.02	d	2.24°	H: 02.34.10 E: 18.7°N 64.5°W Depth about 50 km. Magnitude: 5.3
	AWI	eP iS	02.34.53 02.35.25		3.03°	
	DOM	eP	02.35.14		4.57°	
24	GRE	iP	12.04.	c	1.6°	
	TRN	iP iS	12.04.26 12.04.39	d	1.3°	
24	GRE	eP	17.52.		1.2°	
	TRN	eP iS	17.52.55 17.53.04		0.9°	
26	GRE	eP	04.57.		1.4°	
	TRN	eP iS	04.57.19 04.57.28		0.9°	
27	HOP	eP	22.33.			
	BEV	iP	22.33.		0.8°	
28	BEV	iP iS	00.59.20 00.59.25		(0.5°)	H about 00.59.10 E about 19.0°N 76.9°W Magnitude: 5.9 (Time for St. Georges College, Jamaica used).
	HOP	iP iS	00.59.24 00.59.35	c	(1.1°)	
28	BEV	iP	01.07.		0.5°	
	HOP	eP	01.07.		1.1°	
28	BEV	iP	01.15.		0.6°	
28	GRE	e	02.16.			
	TRN	iP iS	02.16.38 02.16.50	d	1.1°	
28	BEV	iP	06.11.		0.8°	
	HOP	eP	06.11.		1.1°	

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
MAR 28	AWI	iP	08.16.50	d	1.10°	H: 08.16.35
		iS	08.17.01			E: 18.0° N 61.2° W
	SKI	iP	08.16.58		1.64°	Magnitude: 5.0
		iS	08.17.15			
	DOM	eP	08.17.14		2.75°	
28	HOP	eP	16.07.		1.9°	
	BEV	eP	16.07.		2.0°	
28	AWI	eP	21.58.36		1.34°	H: 21.58.17
		iS	21.57.51			E: 18.2° N 61.0° W
	SKI	iP	21.58.43		1.86°	Magnitude: 4.8
		iS	21.59.01			(Time for temporary station in Nevis used).
29	AWI	eP	08.17.43		1.46°	H: 08.17.22
		eS	08.17.57			E: 18.3° N 61.0° W
	SKI	eP	08.17.50	c	1.93°	Depth about 25 km.
		eS	08.18.09			Magnitude: (4.3)
						(Time for temporary station in Nevis used).
29	AWI	eP	17.04.04		(1.23°)	H about 17.03.45
	SKI	eP	17.04.13		(2.05°)	E about 17.3° N 60.6° W
		eS	17.04.31			Depth about 25 km.
						Magnitude: (4.4)
						(Time for temporary station in Nevis used).
30	HOP	iP	22.41.			
30	AWI	eP	23.54.			
31	AWI	iP	02.09.28		1.60°	H: 02.09.13
	SKI	iP	02.09.37	d	1.69°	E: 18.0° N 61.9° W
		iS	02.09.53			Depth about 150 km.
	DOM	eP	02.09.56		3.05°	Magnitude: 5.0
		eS	02.10.28			
	SVI	eP	02.10.24		5.03°	
	GRE	eP	02.10.40		6.08°	
	TRN	eP	02.11.03		7.45°	
		e	02.12.24			

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
MAR 31	AWI	eP iS	02.15.28 02.15.41		1.17°	H: 02.15.11 E: 17.8°N 60.9°W
	SKI	iP iS	02.15.37 02.15.54		1.82°	Depth about 50 km. Magnitude: 4.9 (Time for temporary station in Nevis used).
31	GRE	eP	03.57.		1.1°	
	TRN	eP iS	03.58.03 03.58.12		0.9°	Small
31	GRE	eP	04.37.		1.3°	
	TRN	eP iS	04.37.07 04.37.19		1.2°	
31	GRE	eP	05.22.		1.7°	
	TRN	iP iS	05.22.57 05.23.08		1.1°	
	SVI	e	05.23.			Small
31	TRN	eP eS	08.34.12 08.34.22		1.0°	Small
31	AWI	eP	11.59.			
31	TRN	iP iS	13.58.36 13.58.50		1.3°	



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ST. VINCENT	(VI)	Lat: 13° 10' N	Long: 61° 12' W
HARRADOS	(RRB)	Lat: 13° 07' N	Long: 61° 55' W
DOMINICA	(DM)	Lat: 15° 17' N	Long: 61° 57' W
ANTIGUA	(AWI)	Lat: 17° 08' N	Long: 61° 50' W
ST. KITTS	(SKI)	Lat: 17° 20' N	Long: 62° 43' W
HOBBS, JAMAICA	(HOB)	Lat: 18° 02' N	Long: 76° 45' W
BEVERLEY, JAMAICA	(BEV)	Lat: 18° 02' N	Long: 77° 18' W
BLACK RIVER, JAMAICA	(BLR)	Lat: 18° 02' N	Long: 77° 52' W

UNIVERSITY OF THE WEST INDIES

SEISMIC RESEARCH UNIT

EQUIPMENT

Trinidad is equipped with Vela Uniform standard seismological instruments. The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 150.

TRINIDAD

APR 1963

Preliminary Seismological Bulletin.

... The effects of the crust are ignored. Where the data are insufficient to define an epicentre, an arrival time is calculated from the P and S arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the event. When three arrival times are known a least square process is used to find a surface focus. If one or more P - S intervals are also known, an approximate depth is determined, and then the least square adjustment of the epicentre is carried out for the depth.

If sufficient data are available a least square adjustment of the depth and the epicentre is carried out.

All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake magnitudes are computed from

$$M = \log A / T + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter. *Annals of Geophysical Volcanology*, No. 1, 1956.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:

From May 1957 to January 1958 at 10° 40' N 61° 21' W Port-of-Spain.

From January 1955 to September 1958 at 10° 44' N 61° 33' W North Park.

M

TRINIDAD	(TRN)*	Lat. 10°39.0' N	Long. 61°24.1' W	27m.
GRENADA	(GRE)	Lat. 12°02.7' N	Long. 61°44.1' W	30m.
ST. VINCENT	(SVI)	Lat. 13°10.2' N	Long. 61°15.5' W	10m.
BARBADOS	(BRB)	Lat. 13°07.4' N	Long. 59°35.6' W	70m.
DOMINICA	(DOM)	Lat. 15°17.7' N	Long. 61°23.5' W	40m.
ANTIGUA	(AWI)	Lat. 17°08.6' N	Long. 61°50.1' W	27m.
ST. KITTS	(SKI)	Lat. 17°20.3' N	Long. 62°43.7' W	305m.
HOPE, JAMAICA	(HOP)	Lat. 18°00.9' N	Long. 76°45.0' W	200m.
BEVERLEY, JAMAICA	(BEV)	Lat. 18°27.1' N	Long. 77°18.0' W	123m.
BLACK RIVER, JAMAICA	(BRJ)	Lat. 18°02.0' N	Long. 77°52.1' W	8m.

EQUIPMENT

Trinidad is equipped with Vela Uniform standard seismological instruments. The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 750.

All other stations have Willmore-Watts equipment recording the vertical component of the earth motion only. The seismometer period is 0.8 second and the galvanometer period 0.25 second. The peak magnification is 10,000 (at 3 cycles/sec.) except at Barbados where it is 3,000. All stations record at 60 mm/min. Radio time signals are recorded daily.

CARIBBEAN DISTANCES AND EPICENTRES

Uniform velocities of 7.90 km/sec for P waves and 4.56 km/sec for S waves are assumed. The effects of the crust are ignored.

Where the data are insufficient to define an epicentre, an origin time is calculated from the S and P arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the earthquake.

When three P arrival times only are known a least square process is used to find a surface focus. If one or more S - P intervals are also known, an approximate depth is determined, and then the least square adjustment of the epicentre is carried out for this depth.

If sufficient data are available a least square adjustment of the depth and the epicentre is carried out.

All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake Magnitudes are computed from:

$$M = \text{Log } A/T + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter. *Annali di Geophysica* Volume IX, No. 1, 1956.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:-

From 1st May 1953 to 1st January 1955 at 10°40.1' N 61°31.2' W Port-of-Spain.

From 1st January 1955 to 1st September 1958 at 10°44.7' N 61°33.2' W North Post.

SECTION I - DISTANT EARTHQUAKES

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 APR 1	TRN	eP'	02.39.42		149.6°	Felt: New Britain. USCGS gives H: 02.19.57 E: 6.0°S 149.0°E Depth about 64 km.
2	HOP	eP eS	01.00.30 01.02.32		11.1°	USCGS gives H: 00.57.42 E: 6.6°N 73.2°W Depth about 140 km.
	TRN	eP iP eS e	01.00.41 01.00.42 01.02.46 01.03.01		12.1°	
	AWI	eP	01.01.10		14.9°	
2	BEV	iP	16.29.10			
	AWI	eP	16.31.31			
	TRN	eP	16.31.54			
3	TRN	eP	01.16.48		15.9°	USCGS gives H: 01.13.16 E: 17.0°N 46.5°W Depth about 33 km.
3	TRN	eP	02.13.11		15.8°	USCGS gives H: 02.09.37 E: 16.7°N 46.6°W Depth about 33 km.
3	TRN	eP eS e e Lr	15.00.36 15.11.10 15.12.16 15.16.22 15.33.		85.8°	USCGS gives H: 14.47.56 E: 55.4°S 128.2°W Depth about 33 km.
3	HOP	eP	18.47.44			Small
4	TRN	eP eS e e	06.10.54 06.13.39 06.14.34 06.15.21		14.0°	USCGS gives H: 06.07.15 E: 3.3°N 74.5°W Depth about 31 km.

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963 APR 6	TRN	eP	11.31.27		79.9°	USCGS gives H: 11.19.23 E: 63.4° N 149.5° W Depth about 39 km.
6	AWI	eP'	21.55.02		147.2°	USCGS gives H: 21.35.21
	TRN	iP'	21.55.06	d	149.0°	E: 6.0° S 149.9° E Depth about 49 km.
7	TRN	L	08.06.			
7	AWI	eP'	22.55.59		161.0°	USCGS gives H: 22.36.03
	TRN	iP'	22.56.03		164.0°	E: 4.9° S 103.2° E
		ePP	23.00.42			Depth about 72 km.
		Lq	23.21.			
		Lr	23.54			
	HOP	e	22.57.08		166.8°	
8	AWI	eP	07.25.56		23.1°	USCGS gives H: 07.20.53
	TRN	e	07.27.09		27.6°	E: 31.2° N 41.6° W Depth about 30 km.
8	TRN	iP'	12.12.44	d	146.3°	USCGS gives H: 11.53.21 E: 4.2° S 152.2° E Depth about 158 km.
8	TRN	eP	14.43.34		23.5°	USCGS gives H: 14.38.27
		eS	14.47.45			E: 27.7° N 44.3° W
		i	14.49.36			Depth about 38 km.
10	HOP	eP	06.59.17		11.8°	USCGS gives H: 06.56.33
		eS	07.01.16			E: 6.9° N 73.2° W
	TRN	eP	06.59.22		11.9°	Depth about 144 km.
		iPP	06.59.29			
		eS	07.01.40			
10	TRN	eP'	08.10.41		173.8°	USCGS gives H: 07.50.30 E: 9.2° S 125.0° E Depth about 33 km.

DATE STATION PHASE TIME G.M.T. MOTION DISTANCE

1963

APR 10 TRN. eP' 11.58.41 147.8° USCGS gives H: 11.39.08
E: 3.6° N 148.1° E
Depth about 108 km.

11 TRN e 17.13.10
e 17.15.40

12 TRN e 09.12.12
e 09.32.17

13 TRN iP 02.25.50
iS 02.29.40

AWI e 02.26.00

HOP eP 02.26.07

22.3° USCGS gives H: 02.20.58
E: 6.2° S 76.5° W
Depth about 125 km.

27.5°

24.4°

13 TRN e 14.51.45

16 HOP e 01.49.16
e 01.57.00

SKI eP' 01.49.(24)

TRN eP' 01.49.28
e 01.53.35
e 01.57.08

150.2° USCGS gives H: 01.29.19
E: 0.8° S 128.0° E
Depth about 33 km.

161.8°

166.8°

16 HOP eP' 02.15.07

TRN eP' 02.15.17
ePP 02.20.02
e 02.24.27

SKI e 02.15.(30)

150.1° USCGS gives H: 01.55.11
E: 0.7° S 128.0° E
Depth about 32 km.

166.8°

161.7°

17 TRN L 00.40.

17 TRN eP' 02.30.18
Lq 03.03.
Lr 03.10.

121.5° USCGS gives H: 02.11.26
E: 19.6° S 178.6° E
Depth about 33 km.

17 TRN e 18.36.12
Lq 18.53.
Lr 19.02.



ME G.M.T. MOTION DISTANCE

Date	Station	Type	Time	Distance	Notes
1963 APR 19	TRN	eP'	07.54.32	130.0°	USCGS gives H: 07.35.24
		ePP	07.56.49		E: 35.8°N 96.9°E
		Lq	08.15.		Depth about 33 km.
		Lr	08.36.		
19	TRN	eP	16.27.27.		
		e	16.29.27		
		L	16.53.		
21	TRN	eP'	04.57.57	145.2°	USCGS gives H: 04.38.22
		L	05.34.		E: 24.1°N 122.1°E
					Depth about 33 km.
24	TRN	e	02.44.21		
		L	02.51.		
25	TRN	L	17.57.		
27	TRN	eP'	00.04.37	145.5°	USCGS gives H: 23.45.01
					E: 24.1°N 122.5°E
					Depth about 33 km.
27	TRN	eP	02.33.47		
27	HOP	e(P')	09.02.55	149.9°	Very small
	TRN	e(P')	09.03.15	166.3°	USCGS gives H: 08.42.58
		eP ₂	09.04.04		E: 0.6°S 128.4°E
		L	10.02.		Depth about 33 km.
28	HOP	e	05.36.30		Small
29	TRN	L	15.48.		
29	TRN	eP	22.10.48		
		L	22.40.		
30	HOP	eP	01.18.14		
	TRN	eP	01.18.30		
		e	01.19.29		
		Lq	02.08.		
		Lr	02.16.		
30	HOP	eP	20.07.27		

SECTION II - LOCAL EARTHQUAKES

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 APR 1	HOP	iP	19.35.		0.4°	
1	BEV	iP	21.28.		1.0°	
2	AWI	iP iS	03.05.32 03.05.39		0.74°	H: 03.05.22 E: 17.0° N 61.3° W Depth about 50 km. Magnitude: 4.0
	SKI	iP iS	03.05.44 03.05.59		1.53°	
	DOM	eP eS	03.05.47 03.06.04		1.73°	Small
2	AWI	eP eS	03.26.46 03.26.52		0.78°	H: 03.26.35 E: 17.0° N 61.2° W Depth about 50 km. Magnitude: 3.8
	SKI	iP iS	03.26.57 03.27.12		1.57°	
	DOM	eP eS	03.27.00 03.27.19		1.76°	
2	GRE	eP	04.15.		1.8°	
	TRN	iP iS	04.15.07 04.15.23		1.5°	
2	TRN	eP e	16.42.10 16.42.47			
2	BEV	iP	16.57.		1.3°	
	HOP	eP	16.57.			Small
2	TRN	iP iS	19.11.58 19.12.04	d	0.6°	
2	TRN	eP eS	19.45.25 19.45.59		3.3°	

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
APR 3	DOM	iP	17.33.51		1.71°	H: 17.33.26 E: 15.9°N 61.3°W Depth about 175 km. Magnitude: 4.3
	AWI	iP	17.33.55		2.04°	
		iS	17.34.15			
	SKI	iP	17.34.01		2.51°	
		iS	17.34.27			
	SVI	eP	17.34.11		3.18°	
3	TRN	eP	17.54.36			
		e	17.55.24			
4	GRE	eP	03.35.		1.8°	
	TRN	iP	03.35.29	d	1.3°	
		iS	03.35.42			
4	TRN	eP	04.13.17			
4	SVI	iP	16.25.21		0.71°	H: 16.25.11 E: 13.3°N 61.1°W Depth about 75 km. Magnitude: 3.5
		iS	16.25.29			
	GRE	iP	16.25.33		1.57°	
		iS	16.25.49			
	TRN	eP	16.25.51		2.78°	
		eS	16.26.20			
5	SVI	eP	03.54.		1.3°	
6	TRN	iP	07.06.37		0.8°	
		iS	07.06.45			
	GRE	iP	07.06.		1.5°	
6	TRN	eP	08.04.41		0.6°	Very small
		eS	08.04.47			
6	TRN	eP	11.50.13			
6	SKI	iP	18.30.34		2.67°	H: 18.29.56 E: 19.6°N 64.3°W Magnitude: 5.1 (Time for temporary station in Nevis used.)
	AWI	eP	18.30.44		3.36°	
		eS	18.31.19			
6	SKI	eP	18.36.			

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
APR 7	AWI	e	05.05.			
	TRN	eP	05.06.27			
7	TRN	eP	22.30.12		-1.6°	
		eS	22.30.29			
7	TRN	iP	22.31.34		-1.6°	
		iS	22.31.50			
8	TRN	iP	01.49.44	c	1.77°	H: 01.49.20
		iS	01.50.00			E: 10.8° N 63.0° W
	GRE	eP	01.49.47		1.94°	Depth about 100 km.
		iS	01.50.08			Magnitude: 3.6
	SVI	eP	01.50.03		3.02°	
		e	01.50.40			
	DOM	e	01.50.(41)		4.82°	Small
	AWI	e	01.50.(54)		6.47°	Small
	SKI	eP	01.50.(57)		6.59°	
9	TRN	eP	02.20.13		3.2°	
		eS	02.20.46			
9	TRN	iP	03.47.14	d	1.22°	H: 03.46.56
		iS	03.47.24			E: 10.8° N 62.6° W
	GRE	eP	03.47.19		1.58°	Depth about 50 km.
		iP	03.47.20			Magnitude: 4.9
		iS	03.47.36			
	SVI	iP	03.47.36		2.76°	
		iS	03.48.04			
	AWI	eP	03.48.28		6.42°	
	SKI	eP	03.48.(32)		6.59°	
9	SVI	iP	04.48.08		1.6°	
		iS	04.48.24			
9	AWI	eP	07.36.25		0.99°	H: 07.36.11
		eS	07.36.34			E: 16.5° N 61.1° W
	SKI	iP	07.36.37		1.80°	Magnitude: (4.7)
		eS	07.36.57			(Time for temporary station in Nevis used.)

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
APR 9	SVI	iP	14.47.55		1.37°	H: 14.47.37
		iS	14.48.09			E: 13.3° N 61.0° W
	GRE	eP	14.48.04		1.94°	Depth about 150 km.
	TRN	iP	14.48.19		2.96°	Magnitude: 4.4
		eS	14.48.50			
10	TRN	eP	02.35.36		1.3°	Very small
		eS	02.35.49			
	GRE	eP	02.35.		1.6°	Very small
10	TRN	e(P)	03.49.57		1.5°	Very small
		eS	03.50.12			
	GRE	e	03.50.			Very small
10	GRE	iP	08.28.02	c	1.29°	H: 08.27.44
		iS	08.28.16			E: 12.0° N 62.3° W
	SVI	eP	08.28.10		1.92°	Depth about 130 km.
	TRN	iP	08.28.12		2.03°	Magnitude: 3.6
		iS	08.28.32			
10	DOM	eP	10.01.30			
10	DOM	eP	10.47.02			
10	BEV	iP	15.22.		0.9°	
	HOP	iP	15.22.			
11	GRE	eP	11.47.08		2.50°	H: 11.46.33
		iS	11.47.34			E: 13.9° N 61.4° W
	TRN	eP	11.47.24		3.63°	Depth about 190 km.
		iP	11.47.27			Magnitude: 5.0
		eS	11.48.02			
	AWI	eP	11.47.26		3.69°	Small
12	SVI	e	02.16.			
12	DOM	eP	03.47.(56)			
12	DOM	eP	07.36.(27)			

DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	
1963						
APR 12	AWI	iP	16.20.36		0.82°	H: 16.20.25
		iS	16.20.43			E: 16.8°N 61.0°W
	SKI	iP	16.20.49	d	1.69°	Magnitude: 3.9
		iS	16.21.07			(Time for temporary station in Nevis used.)
16	TRN	iP	03.15.25		1.5°	
		iS	03.15.40			
	GRE	eP	03.15.		1.9°	
16	TRN	iP	10.11.36		0.6°	
		iS	10.11.42			
	GRE	e	10.11.			Very small
16	HOP	iP	17.22.			
16	AWI	iP	20.33.59		0.55°	H: 20.33.51
		iS	20.34.04			E: 17.0°N 61.6°W
	SKI	iP	20.34.08		1.26°	Depth about 50 km.
		iS	20.34.22			Magnitude: 4.3
						(Time for Guadeloupe used.)
16	TRN	iP	22.49.57	c	1.5°	
		iS	22.50.12			
	GRE	eP	22.49.		1.7°	
17	AWI	iP	18.44.02		0.48°	H: 18.43.55
		iS	18.44.06			E: 16.7°N 61.8°W
	SKI	iP	18.44.11		1.11°	Depth about 30 km.
		iS	18.44.22			Magnitude: (4.2)
						(Time for Guadeloupe used.)
19	TRN	iP	01.28.00			
19	TRN	eP	05.44.40		1.0°	
		iS	05.44.50			
	GRE	eP	05.44.		1.1°	
19	TRN	eP	09.08.10		1.2°	Small
		eS	09.08.23			
	GRE	e	09.08.			Very small



DATE	STATION	PHASE	TIME G.M.T.	MOTION	DISTANCE	EMIT	REMARKS	LOCATION	AREA
1963									
APR 20	TRN	eP	03.06.37						
		i	03.07.20						
	GRE	e	03.07.				Very small		
21	GRE	iP	18.45.06		1.09°		H: 18.44.50		
		iS	18.45.17				E: 11.7° N 62.3° W		
	TRN	iP	18.45.13		1.63°		Depth about 100 km.		
		iS	18.45.30				Magnitude: 4.0		
	SVI	eP	18.45.18		1.98°				
21	HOP	iP	22.24.	c	2.1°				
21	TRN	eP	23.51.45		0.7°				
		iS	23.51.52						
22	TRN	eP	11.34.00		0.6°				
		iS	11.34.06						
23	GRE	eP	15.24.08		1.12°		H: 15.23.53		
		eS	15.24.18				E: 11.7° N 61.5° W		
	TRN	eP	15.24.13		1.48°		Depth about 115 km.		
		iS	15.24.27				Magnitude: 3.5		
	SVI	eP	15.24.18		1.81°				
		eS	15.24.37						
24	SKI	eP	14.07.						
	AWI	eP	14.07.						
24	AWI	iP	22.01.56		0.78°		H: 22.01.45		
		iS	22.02.04				E: 17.7° N 61.3° W		
	SKI	iP	22.02.06		1.45°		Magnitude: 4.8		
		iS	22.02.21				(Time for temporary station in Nevis used.)		
25	SVI	e	21.32.						
27	TRN	eP	14.11.39		1.2°				
		iS	14.11.51						
	GRE	iP	14.11.	c	1.5°				

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963					
APR 28	TRN	iP	18.43.35		1.2°
		iS	18.43.48		
28	HOP	iP	22.25.		2.3°
29	TRN	e	05.59.58		
29	TRN	eP	07.44.03		1.2°
		iS	07.44.15		
29	HOP	eP	10.34.		
29	HOP	e	10.41.		
30	TRN	iP	07.47.15		0.9°
		iS	07.47.24		
	GRE	eP	07.47.		
30	AWI	iP	16.50.		0.2°
30	HOP	iP	18.49.		1.7°

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SS

Long. 77° 52.1' W	Lat. 18° 02.0' N	(BRD)	BLACK RIVER, JAMAICA
Long. 77° 52.1' W	Lat. 18° 02.0' N	(BEV)	BEVERLY, JAMAICA
Long. 76° 45.0' W	Lat. 18° 00.0' N	(HOF)	HOF, JAMAICA
Long. 75° 45.0' W	Lat. 17° 50.0' N	(SNT)	ST. KITTS
Long. 75° 45.0' W	Lat. 17° 50.0' N	(AWI)	ANTIGUA
Long. 75° 45.0' W	Lat. 17° 50.0' N	(DOM)	DOMINICA
Long. 75° 45.0' W	Lat. 17° 50.0' N	(SAB)	SABADO
Long. 75° 45.0' W	Lat. 17° 50.0' N	(VIN)	ST. VINCENT
Long. 75° 45.0' W	Lat. 17° 50.0' N	(GRE)	GREENADA
Long. 75° 45.0' W	Lat. 17° 50.0' N	(TRN)	TRINIDAD

UNIVERSITY OF THE WEST INDIES

EQUIPMENT

SEISMIC RESEARCH UNIT

TRINIDAD

MAY 1963

Preliminary Seismological Bulletin.

The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 750.

All other stations have 4000 Hz filters and the equipment recording the vertical component of the earth motion only. The sampling period is 0.5 second and the calibration is 10,000 (at 3 cycles/sec) except at Port-of-Spain where it is 2,500. Radio time signals are received only.

Where the data are insufficient to define an epicentre, an origin time is calculated from the P and S arrival times at each station where these are available. The mean of origin times is used to calculate the time for each station recording the earth motion.

When three or more stations are available a least square adjustment of the depth and the epicentre is carried out.

All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake magnitudes are computed from $M = \log A/T + Q$ where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter, *Annals of the Astrophysical Observatory*, Vol. 1, 1952.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:

From 1st January 1955 to 1st September 1955 at 10° 55' N 71° 35' W (North Post).

From 1st May 1957 to 1st January 1958 at 10° 50' N 71° 35' W (Port-of-Spain).

TRINIDAD	(TRN)*	Lat. 10°39.0' N	Long. 61°24.1' W	27m.
GRENADA	(GRE)	Lat. 12°02.7' N	Long. 61°44.1' W	30m.
ST. VINCENT	(SVI)	Lat. 13°10.2' N	Long. 61°15.5' W	10m.
BARBADOS	(BRB)	Lat. 13°07.4' N	Long. 59°35.6' W	70m.
DOMINICA	(DOM)	Lat. 15°17.7' N	Long. 61°23.5' W	40m.
ANTIGUA	(AWI)	Lat. 17°08.6' N	Long. 61°50.1' W	27m.
ST. KITTS	(SKI)	Lat. 17°20.3' N	Long. 62°43.7' W	305m.
HOPE, JAMAICA	(HOP)	Lat. 18°00.9' N	Long. 76°43.0' W	200m.
BEVERLEY, JAMAICA	(BEV)	Lat. 18°27.1' N	Long. 77°18.0' W	123m.
BLACK RIVER, JAMAICA	(BRJ)	Lat. 18°02.0' N	Long. 77°52.1' W	8m.

EQUIPMENT

Trinidad is equipped with Vela Uniform standard seismological instruments. The peak magnification of the short period instruments is 25,000 and that of the long period instruments is 750.

All other stations have Willmore-Watts equipment recording the vertical component of the earth motion only. The seismometer period is 0.8 second and the galvanometer period 0.25 second. The peak magnification is 10,000 (at 3 cycles/sec.) except at Barbados where it is 3,000. All stations record at 60 mm/min. Radio time signals are recorded daily.

CARIBBEAN DISTANCES AND EPICENTRES

Uniform velocities of 7.90 km/sec for P waves and 4.56 km/sec for S waves are assumed. The effects of the crust are ignored.

Where the data are insufficient to define an epicentre, an origin time is calculated from the S and P arrival times at each station where these are available. The mean of these origin times is used to calculate a distance for each station recording the earthquake.

When three P arrival times only are known a least square process is used to find a surface focus. If one or more S - P intervals are also known, an approximate depth is determined, and then the least square adjustment of the epicentre is carried out for this depth.

If sufficient data are available a least square adjustment of the depth and the epicentre is carried out.

All least square adjustments are continued until the root mean square of the residuals is less than 0.5 seconds.

Earthquake Magnitudes are computed from:

$$M = \text{Log } A/T + Q$$

where A is the amplitude of the ground motion in microns, T is the period and Q is taken from Gutenberg and Richter. Annali di Geophysica Volume IX, No. 1, 1956.

Intensities quoted are on the Modified Mercalli Intensity Scale.

*The Trinidad station has been operated in the past at the temporary sites given below:-

- From 1st May 1953 to 1st January 1955 at 10°40.1' N 61°31.2' W Port-of-Spain.
- From 1st January 1955 to 1st September 1958 at 10°44.7' N 61°33.2' W North Post.

ANT EARTHQUAKES

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963 MAY 1	TRN	iP' ePP e Lq Lr	10.22.17 10.24.33 10.26.31 10.59. 11.06.		130.8° Felt: New Hebrides Is. USCGS gives H: 10.03.20 E: 19.0°S 169.0°E Depth about 140 km.
	AWI	eP' e	10.22.18 10.25.30		131.6°
1	TRN	eP eS L	18.48.46 18.53.40 18.59.		
4	TRN	ePP e	04.44.45 04.48.57		13.7° USCGS gives H: 04.41.19 E: 4.7°N 73.8°W Depth about 43 km.
5	TRN	L	15.37.		
7	AWI	eP	03.18.13		
	TRN	eP e	03.19.07 03.21.04		
7	TRN	eP	16.29.41		33.6° USCGS gives H: 16.23.11 E: 22.0°S 68.6°W Depth about 110 km.
7	HOP	eP e	18.02.08 18.09.20		7.7° USCGS gives H: 18.00.22 E: 12.1°N 72.2°W Depth about 33 km.
	TRN	eP	18.02.58		10.7°
8	AWI	eP	09.03.13		83.1° Small
	TRN	eP	09.03.39		88.4° USCGS gives H: 08.50.56 E: 54.9°N 163.9°W Depth about 89 km.
8	TRN	L	11.27.		

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 MAY 9	HOP	eP	15.06.28		11.4°	USCGS gives H: 15.03.41 E: 12.2° N 86.9° W
		e	15.08.26			
	TRN	eP	15.09.07		25.2°	Depth about 34 km.
		L	15.16.			
10	HOP	eP	22.27.20		20.3°	Felt: Ecuador. USCGS gives H: 22.22.42 E: 2.2° S 77.6° W
	TRN	iP	22.27.21	c	20.6°	
		iS	22.31.12			Depth about 33 km.
	AWI	eP	22.28.06		24.7°	
11	TRN	eP'	18.09.18		145.2°	USCGS gives H: 17.49.43 E: 24.2° N 122.5° E
						Depth about 33 km.
12	TRN	L	20.15.			
12	HOP	eP	20.19.44		68.3°	USCGS gives H: 20.08.43 E: 57.4° N 153.9° W
	AWI	e	20.20.02		76.9°	
	TRN	iP	20.20.57	d	82.5°	Depth about 80 km.
		Lq	20.45.			
		Lr	20.55.			
13	HOP	eP	01.35.23		12.2°	USCGS gives H: 01.32.36 E: 6.7° N 73.1° W
		e	01.37.23			
	TRN	i	01.35.34		12.0°	Depth about 140 km.
	AWI	eP	01.36.04		15.2°	
						Small
13	HOP	eP	12.47.47		15.8°	USCGS gives H: 12.44.01 E: 14.5° N 92.9° W
	SKI	e	12.49.(58)		32.3°	
						Depth about 60 km.
13	AWI	eP'	23.07.47		146.9°	Small USCGS gives H: 22.48.10 E: 6.0° S 150.1° E
	TRN	iP'	23.07.51		148.7°	
						Depth about 94 km.
14	TRN	eP	11.27.47		21.3°	USCGS gives H: 11.23.00 E: 0.2° N 80.1° W
						Depth about 33 km.

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 MAY 15	✓ TRN	eP'	03.12.30		151.2°	USCGS gives H: 02.52.40 E: 3.4° S 146.8° E Depth about 33 km.
	✓ AWI	eP'	06.28.56		147.5°	USCGS gives H: 06.09.18 E: 15.7° N 120.1° E Depth about 80 km.
	✓ TRN	eP'	06.29.13		154.0°	
	✓ TRN	eP	05.41.08		40.8°	USCGS gives H: 05.33.25 E: 29.6° S 68.5° W Depth about 29 km.
		eS	05.47.14			
		Lq	05.53.			
		Lr	05.58.			
	✓ AWI	eP	05.41.56		47.2°	Small
	✓ HOP	eP	05.42.06		48.6°	
	18 HOP	eP	06.26.15			Small
	✓ TRN	iP	01.12.58	c	58.3°	USCGS gives H: 01.03.04 E: 46.5° S 75.1° W Depth about 33 km.
		iPS	01.21.09			
	✓ AWI	eP	01.13.36		64.7°	
	✓ AWI	eP	21.39.38		16.4°	USCGS gives H: 21.35.50 E: 23.8° N 45.9° W Depth about 33 km.
		iP	21.39.40			
		T	21.56.			
	✓ TRN	iP	21.40.20		19.9°	
		iS	21.44.07			
	✓ HOP	eP	21.41.52		29.6°	
	✓ TRN	eP	23.37.15		29.6°	USCGS gives H: 23.31.26 E: 17.8° S 69.4° W Depth about 148 km.
	20 HOP	eP	01.38.16		11.5°	USCGS gives H: 01.35.33 E: 8.3° N 83.0° W Depth about 33 km.
	TRN	eP	01.40.20		21.5°	
	20 TRN	eP	02.48.03		21.5°	USCGS gives H: 02.43.16 E: 8.3° N 83.0° W Depth about 33 km.

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
MAY 20	X HOP	eP	11.42.35			
	X SKI	eP	11.45.43			
20	AWI	eP'	11.56.52		121.0°	USCGS gives H: 11.38.01 E: 30.7° S 178.3° W Depth about 34 km.
21	HOP	eP	05.08.32			Small
21	HOP	eP	09.17.47			Small
22	TRN	ePP e(PS) L	14.16.08 14.26.08 14.52.		113.1°	USCGS gives H: 13.56.43 E: 48.6° N 154.7° E Depth about 22 km.
22	HOP	eP'	16.02.29		147.2°	USCGS gives H: 15.42.49 E: 4.3° N 127.9° E Depth about 58 km.
	TRN	eP'	16.02.48		162.7°	
22	TRN	e L	22.13.16 22.53.			
23	TRN	eP L	04.02.41 04.12.		22.7°	USCGS gives H: 03.57.41 E: 1.3° S 80.7° W Depth about 33 km.
25	TRN	eP eS Lq Lr	16.19.35 16.29.10 16.44. 16.49.		74.2°	USCGS gives H: 16.08.01 E: 56.8° S 25.0° W Depth about 29 km.
26	TRN	eP	19.19.05		25.4°	USCGS gives H: 19.13.40 E: 5.5° S 81.2° W Depth about 33 km.
27	TRN	L	00.04.			
27	TRN	L	04.51.			
28	HOP	eP e	08.25.32 08.27.30			



<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963					
MAY 30	HOP	eP	01.59.33		
		e	02.01.31		
	TRN	eP	01.59.43		
30	TRN	Lq	07.53.		
		Lr	07.59.		
31	TRN	L	06.58.		



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Date	Station	Type	Time	Phase	Time	Location	Magnitude
MAY 2	TRN	iP	06.48.41		1.10°	H: 06.48.26 E: 11.1° N 62.4° W Magnitude: 4.0	
		iS	06.48.51				
	GRE	iP	06.48.42	d	1.14°		
		iS	06.48.54				
	SVI	eP	06.48.59		2.34°		
2	SKI	iP	07.10.		0.9°		
2	TRN	iP	09.33.18		1.3°		
		iS	09.33.31				
3	TRN	iP	07.48.43		1.3°		
		iS	07.48.57				
3	AWI	eP	08.53.		0.4°		
3	TRN	iP	08.59.54				
	GRE	eP	09.00.				
3	HOP	iP	12.34.	c	2.2°		
3	TRN	iP	17.36.38		1.2°		
		iS	17.36.50				
	GRE	eP	17.37.		1.5°		
3	AWI	iP	23.36.49		1.10°	H: 23.36.34 E: 16.9° N 60.8° W Depth about 25 km. Magnitude: (4.3) (Time for Guadeloupe used)	
		iS	23.36.59				
	SKI	eP	23.37.02		1.96°		
4	TRN	iP	01.42.36		1.8°		
		iS	01.42.55				
	GRE	eP	01.43.				
4	AWI	eP	07.55.59		0.98°	H: 07.55.46 E: 17.0° N 60.8° W Magnitude: (4.4)	
		iS	07.56.09				
	DOM	eP	07.56.11		1.82°		
		eS	07.56.28				
	SKI	eP	07.56.12		1.84°		
		iS	07.56.33				

No.	Station	Type	Time	Code	Delta	Location	
			10.59.		0.3°		
4	TRN	iP iS	12.03.53 12.04.04		1.2°		
4	HOP	iP	17.08.		0.2°		
4	SVI	iP	22.07.42	d	1.43°	H: 22.07.25 E: 13.0°N 59.8°W Depth about 25 km. Magnitude: (6.0)	
	GRE	iP iS	22.07.54 22.08.15	c	2.08°		
	DOM	eP iS	22.08.04 22.08.31		2.76°		
	TRN	iP	22.08.07		2.80°		
	AWI	iP iS	22.08.28 22.09.14		4.49°		
	SKI	iP iS	22.08.38 22.09.31		5.17°		
5	AWI	eP iS	01.46.01 01.46.18		1.75°		H: 01.45.36 E: 16.9°N 60.1°W Magnitude: 5.0
	DOM	eP	01.46.(02)		2.05°		
	SKI	eP iS	01.46.14 01.46.42		2.62°		
	SVI	eP eS	01.46.32 01.47.11		3.90°		
	TRN	e	01.47.10				
5	AWI	eP eS	08.36.36 08.36.45		0.98°	H: 08.36.22 E: 16.7°N 60.9°W Magnitude: (4.1) (Time for temporary station in Nevis used.)	
	SKI	eP eS	08.36.48 08.36.08		1.84°		
5	TRN	iP	19.50.18				
6	AWI	iP iS	10.11.49 10.11.57	d	0.79°	H: 10.11.38 E: 16.8°N 61.5°W Depth about 70 km. Magnitude: 4.2	
	SKI	iP iS	10.12.(03) 10.12.(22)	d	1.44°		
	DOM	iP iS	10.12.00 10.12.17	d	1.62°		
	GRE	eP	10.12.45		4.78°		
	TRN	eP	10.13.05		6.16°		



<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 MAY 6	TRN	iP	21.32.34	c	1.5°	
		iS	21.32.49			
	GRE	eP	21.32.		1.6°	
7	TRN	eP	01.22.37		1.0°	
		iS	01.22.47			
7	TRN	iP	09.15.53		1.3°	
		iS	09.16.06			
	GRE	eP	09.16.		1.6°	
8	TRN	eP	07.23.32		2.1°	
		iP	07.23.33			
		iS	07.23.53			
8	TRN	iP	10.55.27		0.9°	
		iS	10.55.36			
8	BRB	eP	13.51.			
9	TRN	iP	01.19.12		1.5°	
		iS	01.19.27			
9	TRN	iP	01.26.30		0.5°	
		iS	01.26.36			
9	SKI	iP	01.48.36		2.30°	H about 01.48.04 E about 19.4° N 63.8° W Magnitude: (5.3) (Time for Guadeloupe used.)
		iS	01.48.58			
	AWI	eP	01.48.44		2.95°	
9	TRN	iP	11.34.20			
		i	11.35.17			
9	GRE	iP	12.50.15	d	1.24°	H: 12.49.57 E: 11.3° N 62.6° W Depth about 50 km. Magnitude: 4.6
		iS	12.50.28			
	TRN	iP	12.50.17	c	1.42°	
		iS	12.50.30			
	SVI	iP	12.50.30		2.36°	
		iS	12.50.54			

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1953 MAY 13	TRN	iP iS	20.04.19 20.04.20		0.1°	
14	DOM	eP	07.07.			
14	HOP	eP	08.03.		0.3°	
14	TRN	iP iS	08.05.48 08.05.59	c	1.17°	H: 08.05.32 E: 9.8° N 61.9° W Depth about 70 km. Magnitude: 4.3
	GRE	iP iP iS	08.06.05 08.06.06 08.06.29	c	2.34°	
	SVI	eP iP iS	08.06.21 08.06.24 08.06.58		3.48°	
	AWI	eP	08.07.16		7.35°	
	SKI	eP	08.07.20		7.60°	
14	GRE	eP	20.38.			
	TRN	iP iS	20.38.19 20.38.32		1.3°	
14	TRN	eP eS	23.34.22 23.34.40		1.8°	
15	AWI	iP i(S)	08.15.31 08.15.44	d	0.46°	H: 08.15.24 E: 17.3° N 61.4° W Magnitude: (5.0) (Time for Guadeloupe used.)
	SKI	iP i(S)	08.15.42 08.16.03	d	1.26°	
	DOM	eP e(S)	08.15.54 08.16.24		2.02°	
16	TRN	eP iS	16.18.12 16.18.18		0.6°	
7	GRE	eP	16.18.		0.9°	
16	AWI	iP	19.54.		0.8°	
	SKI	iP	19.54.		1.4°	

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>
1963					
MAY 18	GRE	eP	03.22.		Very small
	TRN	eP	03.22.36		
18	AWI	e	04.39.		
18	TRN	eP	12.35.29		
19	SKI	iP	08.06.		
	AWI	iP	08.06.		
19	SKI	eP	09.38.	1.0°	
	AWI	eP	09.38.		
19	TRN	eP	16.00.28		
19	TRN	eP	16.12.58		
19	TRN	eP	16.33.13		
		e	16.33.39		
20	TRN	eP	06.56.13		
		e	06.56.21		
20	SKI	eP	09.36.		
	AWI	eP	09.36.		
20	TRN	iP	12.53.40	1.50°	H: 12.53.18
		iS	12.53.55		E: 11.1° N 62.3° W
	GRE	iP	12.53.40	1.61°	Depth about 130 km.
		iS	12.53.57		Magnitude: 4.2
	SVI	iP	12.53.55	2.60°	
21	AWI	eP	11.52.		
22	SVI	iP	06.36.	1.1°	
22	AWI	eP	12.17.		

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963 MAY 22	AWI	e	13.06.			Very small
	22 TRN	iP iS	21.07.31 21.07.41	d	1.0°	
	GRE	eP	21.07.		1.8°	
	23 AWI	eP	00.12.			
	TRN	e	00.13.31			
	23 GRE	e	02.38.			Very small
	TRN	eP iS	02.38.04 02.38.23		1.8°	
	23 HOP	eP	03.48.		1.6°	
	23 TRN	iP iS	07.39.28 07.39.41		1.2°	
	23 AWI	eP i	07.44.46 07.44.51	c	5.02°	H: 07.43.35 E: 20.9° N 65.4° W Depth about 50 km. Magnitude: 5.9
	DOM	eP	07.45.15		6.73°	
	SVI	eP	07.45.37		8.62°	
	GRE	eP	07.45.47		9.39°	
	BRB	eP	07.45.56		9.51°	Small
	TRN	eP eS	07.46.09 07.48.01		10.88°	
	HOP	e	07.46.40		11.15°	
	23 SKI	eP	12.08.(53)			
	AWI	eP	12.09.(00)			
	DOM	e	12.09.37			
	TRN	eP	12.10.28			
	24 GRE	e	17.44.			Small
	TRN	iP iS	17.44.27 17.44.39		1.2°	

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
MAY 24	SKI	eP	20.43.		2.5°	
25	SKI	eP	04.42.			
25	TRN	eP iS	22.19.03 22.19.14		1.0°	
	GRE	eP	22.19.		1.6°	
26	SKI	iP	11.55.		1.7°	
26	SVI	iP iS	19.07.59 19.08.26		2.64°	H: 19.07.22 E: 15.5°N 59.9°W Magnitude: 5.5
	SKI	iP iS	19.08.08. 19.08.41		3.31°	
	GRE	eP	19.08.16		3.85°	
	TRN	eP	19.08.(34)		5.02°	
26	DOM	iP	21.07.		1.1°	
26	SVI	iP eS	21.09.03 21.09.28	c	2.52°	H: 21.08.27 E: 15.5°N 60.8°W Depth about 100 km. Magnitude: 4.3
	SKI	iP iS	21.09.(10) 21.09.(43)	d	2.66°	
	GRE	eP	21.09.19		3.67°	
	TRN	e	21.09.39		4.87°	
27	SKI	eP	01.38.			
27	TRN	eP	17.36.44			
28	TRN	iP iS	05.40.38 05.40.46		0.8°	
28	TRN	eP iS	08.25.35 08.25.42		0.6°	

<u>DATE</u>	<u>STATION</u>	<u>PHASE</u>	<u>TIME G.M.T.</u>	<u>MOTION</u>	<u>DISTANCE</u>	
1963						
MAY 30	GRE	eP	00.30.		1.1°	Small
	TRN	iP	00.30.52		1.4°	
		iS	00.31.07			
30	SVI	iP	13.40.45		2.1°	
		iS	13.41.07			
30	TRN	iP	18.34.14		1.4°	
		iS	18.34.29			
	GRE	iP	18.34.		1.6°	
30	TRN	iP	19.54.56	c	0.7°	
		iS	19.55.03			
31	GRE	e	04.18.			Small
	TRN	i	04.18.15			
31	TRN	eP	11.33.21			
31	TRN	iP	15.56.18		0.8°	
		iS	15.56.26			
31	SKI	eP	19.18.			
31	TRN	eP	21.13.20		1.62°	H: 21.12.58
		iP	21.13.23			E: 10.0°N 62.4°W
		iS	21.13.37			Depth about 125 km.
	GRE	eP	21.13.32		2.42°	Magnitude: 4.4
		iS	21.13.56			
	SVI	eP	21.13.48		3.54°	
		eS	21.14.23			
31	GRE	iP	21.20.	c		