

PANAMA CANAL COMPANY
 Engineering and Construction Bureau
 Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
 Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - FEBRUARY 1964

----- Standard Seismograph System USC&GS: Sprengnether LP (Z,N,E): Benioff SP (z,n,e) -----

No.	Date	Phase	Time		Period	Ampli- tude mm	Remarks
			G.C.T.				
1	2	iP _Z iS _n	06 32 57 ^D 33 45	0.3	5.5	USCGS: 6.0 N 82.5 W Off South Coast of Panama △ = 230 miles	
2	5	iP _{ZZ}	11 52 16 ^C	0.5	4.5	USCGS: 19.7 S 179.8 W Fiji Island Region	
3	6	iP _Z iS _n	04 37 34 ^D 38 47	0.7	5.8	USCGS: 6.8 N 73.1 W Northern Colombia △ = 500 miles	
4	6	iP _Z	13 19 05			USCGS: 55.7 N 155.8 W Kodiak Island Region	
5	12	iP _Z iS _Z	21 38 25 38 35	0.5	41.0	Felt Force I Balboa Heights, C.Z. △ = 50 miles	
6	14	iP _{ZZ}	16 48 49 ^C	1.0	4.0	USCGS: 5.1 S 151.7 E New Britain	
7	19	iP _Z	15 25 36 ^D	0.25	1.3		
8	19	iP _Z	22 36 41 ^D	0.25	1.0		
9	20	iP _Z iS _n	06 31 27 ^D 32 10	0.25	1.0	△ = 205 miles	



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - FEBRUARY 1964

----- Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E); Benioff SP (z.n.e) -----

No.	Date	Phase	Time		Period	Ampli- tude mm	Remarks
			G.C.T.				
10	20	iP _z	09 55 27	^D			USCGS: 9.5 N 84.6 W West Coast of Costa Rica
11	20	eP _{zZ}	12 06 34	^D			
12	21	iP _{zZ} iS _z	18 31 10 31 25	^C	0.4	19.0	Felt Force I Balboa Heights, C. Z △ = 75 miles
13	23	iP _z iS _n	17 59 29 59 45	^C	0.4	5.5	 △ = 80 miles
14	23	eP _z	23 11 26				
15	25	iP _z iS _n	09 18 57 19 39	^D	0.5	3.8	 △ = 195 miles
16	27	iP _{zZ}	15 31 24	^C	0.9	6.5	
17	29	iP _{zZ}	07 40 54	^D	0.4	3.0	USCGS: 5.9 N 82.5 W Off South Coast of Panama
18	29	iP _z iS _n	14 07 34 08 49	^C	0.3	1.2	USCGS: 7.4 N 73.3 W Northern Colombia △ = 360 miles

W. H. Esslinger
W. H. Esslinger
Chief Hydrographer

Earthquakes Felt at Bambito, R. de P.

February - 1964

Times are EST - add 5 hours for GMT

All shocks are rated intensity I to II on Modified Mercalli Scale unless noted otherwise

DATES

17	Slight quakes from West at 0615
18	Light quake at 1410
22	A small tremor
27	A nice trembling shock
28	Trembling shock, light yesterday

PANAMA CANAL COMPANY
 Engineering and Construction Bureau
 Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
 Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - MARCH 1964

----- Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E); Benioff SP (z.n.e) -----

No.	Date	Phase	Time		Period	Ampli- tude mm	Remarks
			G.C.T.				
1	8	eP _Z	02	24 00			
2	8	iP _Z iS _n	10	10 27 10 36	0.3	1.0	Δ = 45 miles
3	10	iP _{zZ} iS _{zn}	23	44 03 ^D 44 11	0.4	44.0	Felt Force II Balboa Heights, C.Z. Δ = 35 miles
4	11	iP _Z iS _n	12	17 04 17 45	0.25	1.5	Δ = 195 miles
5	13	eP _Z	04	38 10			
6	14	iP _{zZ}	15	15 35 ^C	0.8	2.2	
7	15	iP _{zZ}	22	40 18			USCGS: 36.2 N 7.6 W West of Strait of Gibraltar
8	18	iP _Z iS _n	01	53 48 54 57	0.75	1.8	Δ = 330 miles
9	18	iP _{zZ} iS _n	17	33 47 34 14	0.3	10.2	Δ = 130 miles
10	19	eP _Z	21	57 22			

Lat. 8° 57' 39" N
 Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - MARCH 1964

----- Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E): Benioff SP (z.n.e) -----

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
11	19	iP _z	23	05 29 ^C	0.5	4.8	△ = 270 miles
		iS _n	06	25			
12	20	iP _{zZ}	00	07 00 ^C	0.2	18.5	△ = 125 miles
		iS _n	07	26			
13	20	iP _{zZ}	06	58 06 ^C	0.25	1.8	
14	21	iP _{zZ}	04	01 29 ^D	1.2	2.2	
15	21	eP _{zZ}	15	13 30			
16	22	iP _{zZ}	07	09 01	0.5	3.0	
17	23	iP _z	17	47 02 ^C	0.25	1.8	△ = 65 miles
		iS _n	47	15			
18	25	iP _{zZ}	10	09 11.5 ^C	0.5	6.5	△ = 260 miles
		iS _n	10	05			
19	26	iP _z	01	21 46 ^C	0.3	1.3	△ = 120 miles
		iS _n	22	11			
20	26	iP _z	02	05 29 ^C	0.5	1.5	

PANAMA CANAL COMPANY
 Engineering and Construction Bureau
 Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
 Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - MARCH 1964

----- Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E); Benioff SP (z.n.e) -----

No.	Date	Phase	Time			Period	Amplitude mm	Remarks
			G.C.T.					
21	26	eP _{zZ}	13	27	30			
22	26	iP _z	17	35	02 ^C	0.2	2.0	
		iS _n		35	40			△ = 180 miles
23	27	iP _z	06	15	54 ^D	0.5	1.5	
		iS _n		16	30			△ = 175 miles
24	27	iP _z	06	46	34			
		iS _n		47	45			△ = 340 miles
25	27	iP _z	07	00	07 ^D			
		iS _n		00	43			△ = 175 miles
26	27	iP _{zZ}	17	13	44	0.4	1.75	
		iS _n		14	42			△ = 280 miles
27	27	iP _{zZ}	17	28	42.5	0.7	11.0	
		iS _n		29	40			△ = 280 miles
28	28	iP _{zZ}	03	47	34	1.5	1.8	USCGS: 61.1 N 147.8 W East of Anchorage Alaska. Caused seismic sea wave, extremely destructive

PANAMA CANAL COMPANY
 Engineering and Construction Bureau
 Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
 Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - MARCH 1964

Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E): Benioff (z.n.e)

No.	Date	Phase	Time			Period	Ampli-	Remarks
			G.C.T.				tude	
							mm	
29	28	iP _{ZZ}	12	32	23 ^D	1.2	3.0	
30	28	iP _{ZZ}	14	58	56 ^C	0.25	1.5	
31	28	iP _{ZZ}	20	40	30 ^C	1.1	2.6	
32	29	eP _Z	06	07	10			
33	29	eP _Z	16	52	18			
34	30	iP _Z	02	29	42			Aftershock of Alaskan Earthquake
		PR ₁		32	40			
		PR ₂		34	24			
		iS		39	04			
		SR ₂		42	42			
		L		53	20			
35	30	eP _Z	07	20	46			
36	30	eP _Z	16	23	45			
37	31	eP _Z	00	55	14			
38	31	eP _{ZZ}	09	11	36	1.0	1.3	

W. H. Esslinger
 W. H. Esslinger
 Chief Hydrographer

Earthquakes Felt at Bambito, R. de P.

March - 1964

Times are EST - add 5 hours for GMT

All shocks are rated intensity I to II on Modified Mercalli Scale unless noted otherwise

Dates

3	2125	Light shock
5	0510	Trembling movement
6	1245	Medium shock
	1410	Light shock
	1825	Light shock
7	0210	Light shock
	2155	Trembling
8	1130	Light shock
9	0220	Tremble
12	0710	Light shock
13	2302	Light shock
16	2210	Light shock
18	0525	Light shock
22	0810	Light shock
27	0210	Light shock
29	0310	Light shock
30	0830	Medium quake

PANAMA CANAL COMPANY
 Engineering and Construction Bureau
 Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
 Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - APRIL 1964

Standard Seismograph System USC&GS: Sprengnether LP (Z,N,E); Benioff SP (z,n,e)

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
1	2	iP _{zZ}	01 31 48			
2	2	iP _z iS _n	14 47 43.5 ^D 48 10	0.5	1.5	△ = 125 miles
3	2	iP _{zZ} iS _n	15 26 29 ^D 27 15	0.5	1.75	USCGS: 9.5 N 82.7 W Costa Rica - Panama Border △ = 215 miles
4	2	iP _z	16 16 26 ^D			
5	3	iP _z iS _n	11 10 20 ^G 10 36	0.25	14.0	△ = 80 miles
6	3	iP _{zZ}	22 45 12 ^G	0.6	1.5	
7	4	eP _{zZ}	05 05 08			
8	4	eP _{zZ}	08 52 05			
9	4	iP _{zZ}	17 57 50			
10	5	eP _z	01 33 50			
11	6	iP _z	16 09 04.5 ^G	0.5	1.9	USCGS: 5.4 N 75.8 W Columbia
12	7	iP _z iS _n	17 16 55 ^D 17 27	0.25	1.0	△ = 155 miles
13	7	iP _z	17 52 03 ^G	0.5	1.2	USCGS: 2.2 N 83.2 W Off West Coast of Columbia △ = 530 miles

SEISMOLOGICAL BULLETIN - APRIL 1964

No.	Date	Phase	Time		Amplitude mm	Remarks
			G.C.T.	Period		
14	8	iP _Z iS _n	03 31 30 ^D 31 05	0.25	1.0	△ = 170 miles
15	8	iP _Z iS _n	07 56 50 5 ^C 57 24	0.75	2.0	△ = 140 miles
16	8	iP _Z	08 27 58 ^C	0.5	1.0	
17	9	EP _{ZZ}	04 17 50			
18	9	iP _Z iS _n	15 51 08 51 49	0.25	1.0	△ = 195 miles
19	12	eP _Z	01 36 05			USCGS: 53.0 N 160.4 E Near East Coast of Kamchatka
20	12	iP _Z	14 03 41	0.5	1.0	
21	15	iP _Z iS _n	00 51 42.5 ^D 52 07	0.75	2.25	△ = 115 miles
22	15	eP _Z	15 46 24			
23	16	EP _Z	19 38 24			
24	17	EP _Z	05 01 08			
25	17	iP _{ZZ} iS _n	19 46 03.5 ^D 47 28	0.5	8.0	△ = 360 miles
26	18	iP _Z	21 29 50	0.3	2.4	
27	19	iP _Z	11 04 24			USCGS: 5.7 N 76.5 W Northern Columbia
28	19	iP _{ZZ}	14 23 39			USCGS: 60.5 S 58.3 W Near South Shetland Islands

SEISMOLOGICAL BULLETIN - APRIL 1964

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
29	20	iP _z iS _n	01 19 50 20 30	0.6	14.0	$\Delta = 190$ miles
30	23	iP _{zZ}	03 52 31 ^D	1.2	6.8	USCGS: 5.3 S 134.0 E
31	24	iP _z	06 15 23 ^D	0.5	3.0	
32	24	iP _z	14 42 51 ^D	0.6	1.0	USCGS: 13.3 N 88.8 W Near Coast of El Salvador
33	28	iP _z iS _n	23 01 22 ^D 02 00	0.25	1.0	$\Delta = 180$ miles
34	30	eP _z iS _n	13 18 41 19 29	0.3	3.0	$\Delta = 230$ miles

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - MAY 1964

Standard Seismograph System USC&GS: Sprengnether LP (Z,N,E); Benioff SP (z,n,e)

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
1	1	eP _Z	14 07 04 ^D			
2	2	eP _Z	16 30 00			USCGS: 54.5 N 150.3 E Kurile Islands
3	2	iP _Z iS _e	19 54 24 ^D 55 49	0.5	1.8	USCGS: 9.5 N 84.5 W Near West Coast of Costa Rica
4	4	iP _Z	12 59 46 ^D	0.5	1.5	
5	4	iP _Z iS _n	13 08 19 ^C 08 38	0.7	2.0	△ = 90 miles
6	5	iP _Z	02 54 42 ^D	0.5	1.6	
7	5	iP _Z iS _n	03 41 35 ^D 42 00	0.4	2.0	△ = 120 miles
8	5	iP _Z iS _n	22 52 09 ^C 52 56	0.25	1.2	△ = 225 miles
9	6	iP _Z iS _n	01 43 42 ^D 44 29	0.3	3.0	△ = 225 miles
10	6	iP _Z iS _n	13 17 53 ^C 17 58	0.4	1.25	△ = 25 miles
11	6	eP _Z	15 38 00			
12	7	eP _Z	06 07 22			

SEISMOLOGICAL BULLETIN- MAY 1964

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
13	7	iP _{ZZ} iS _n	11 25 38 ^D 26 11.5	0.5	1.3	△ = 160 miles
14	7	eP _Z	20 32 30			USCGS: 40.5 N 139.0 E Off West Coast of Japan
15	10	iP _Z iS _e	08 35 39 ^C 36 33	0.25	1.0	USCGS: 7.7 N 75.3 W Northern Columbia △ = 260 miles
16	11	iP _Z iS _n	04 32 04 ^C 32 40	0.5	1.25	△ = 175 miles
17	12	eP _Z	18 28 12			
18	13	eP _Z ¹	05 49 58			
19	14	iP _Z iS _n	19 02 00 ^D 02 24	0.25	3.0	△ = 115 miles
20	15	eP _{ZZ}	12 11 56			
21	16	iP _Z iS _n	05 41 47 ^D 43 01	0.6	2.0	USCGS: 7.1 N 143.9 W Venezuela △ = 355 miles
22	16	eP _Z	16 02 20			
23	17	eP _Z	01 01 20			
24	17	eP _Z	19 34 55			USCGS: 46.9 N 152.6 E Kurile Islands
25	19	iP _{ZZ} iS _n	23 06 02 ^D 07 50	1.0	10.0	USCGS: .7 S 80.2 W Near Coast of Ecuador △ = 640 miles
26	21	eP _{ZZ}	22 34 50 ^C			
27	22	iP _{ZZ} iS _n	00 38 24 ^D 39 43.5	0.4	3.0	△ = 500 miles



SEISMOLOGICAL BULLETIN- MAY 1964

<u>No.</u>	<u>Date</u>	<u>Phase</u>	<u>Time</u> <u>G.C.T.</u>	<u>Period</u>	<u>Ampli-</u> <u>tude</u> <u>mm</u>	<u>Remarks</u>
28	26	iP _{zZ}	11 10 56 ^C	0.5	2.7	USCGS: 56.2 S 27.8 W Sandwich Islands
29	26	iP _z iS _n	11 53 09 ^C 53 38	0.25	12.8	Felt Force I △ = 140 miles
30	26	iP _z	01 08 29.5 ^C	0.25	4.0	
31	26	iP _z iS _n	01 16 25.5 ^D 16 56	0.25	4.8	 △ = 150 miles
32	27	iP _{zZ} iS _n	11 07 59.5 ^C 08 11	0.4	7.5	 △ = 60 miles
33	28	iP _z	12 54 55 ^C	0.5	1.8	USCGS: 13.4 S 74.9 W Southern Peru
34	31	eP _z	00 55 14			USCGS: 43.5 N 146.8 E Kurile Islands

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - JUNE 1964

Standard Seismograph System USC&GS: Sprengnether LP (Z,N,E); Benioff SP (z,n,e)

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
1	2	iP _{zZ} iS _n	15 12 34.5 ^D 13 16	0.75	0.7	△ = 200 miles
2	2	iP _{zZ} iS _n	17 39 42.5 ^D 40 19	0.5	1.9	△ = 180 miles
3	3	iP _z iS _n	17 16 10.5 ^D 16 34	0.5	1.5	△ = 115 miles
4	4	eP _Z	04 33 50			USCGS: 17.5 N 100.8 W Near Coast of Guerrero, Mexico
5	4	iP _{zZ}	11 50 14 ^C	1.8	3.8	USCGS: 9.6 S 76.1 W Central Peru
6	4	iP _z iS _n	15 42 22 ^D 42 34	0.5	3.5	△ = 60 miles
7	6	iP _{zZ}	19 16 37 ^D	0.25	0.5	USCGS: 26.6 S 114.4 W Easter Island REgion
8	6	iP _z iS _n	23 46 52 ^C 47 39	0.5	1.2	△ = 225 miles
9	7	iP _{zZ}	20 17 03 ^D	1.2	1.8	USCGS: 30.4 S 76.6 W La Rioja Province, Argentina
10	9	iP _z iS _e	10 56 58 ^C 57 36	0.5	1.4	△ = 180 miles
11	9	iP _z	18 18 26 ^D	0.5	1.0	

SEISMOLOGICAL BULLETIN- JUNE 1964

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
12	10	iP _z	22 36 12.5 ^D	0.5	1.5	
13	12	iP _{zZ}	16 15 46 ^D	0.25	1.0	
14	12	iP _z	16 46 27.5 ^D	0.25	1.5	USCGS: 2.2 N 83.0 W Off Coast of Ecuador
15	13	eP _z	18 45 23			
16	15	iP _z	00 25 27 ^C			
17	16	iP _z	04 17 10 ^D			USCGS: 38.3 N 139.1 E Near West Coast of Honshy, Japan 25 killed, many injured, exten- sive property damage at Niigata
18	17	iP _{zZ} iS _n	06 39 01 ^D 40 06	0.5	3.5	Δ = 310 miles
19	17	iP _z iS _n	20 18 12.5 ^D 18 33.5	0.5	2.0	Δ = 100 miles
20	18	iP _{zZ} iS _n	02 55 31 ^C 56 23	0.75	1.2	USCGS: 7.2 N 76.3 W Colombia Δ = 250 miles
21	20	iP _z	05 03 50 ^C	0.5	1.4	USCGS: 9.2 N 84.4 W Near West Coast of Costa Rica
22	21	iP _z	10 08 56 ^D	0.9	15.0	USCGS: 3.7 N 82.8 W South of Panama
23	22	iP _z	19 49 51 ^C	0.5	1.2	
24	22	iP _z	20 06 49 ^C	0.3	1.0	
25	23	iP _z	01 41 07 ^C			
26	27	iP _z iS _n	19 06 00 ^D 06 14	0.3	8.0	Δ = 70 miles
27	28	eP _z	13 10 48			USCGS: 1.7 S 149.6 E New Ireland Region



SEISMOLOGICAL BULLETIN - JUNE 1964

No.	Date	Phase	Time		Ampli- tude mm	Remarks
			G.C.T.	Period		
28	28	eP _Z	17 36 31			USCGS: 4.0 N 23.4 W North Atlantic Ocean
29	29	iP _Z	19 13 38.5 ^C	0.3	2.5	
30	30	iP _Z	04 49 22 ^C	0.3	1.0	
31	30	iP _{ZZ}	14 06 12 ^C	0.25	1.0	
32	30	iP _{ZZ}	22 24 25 ^C	0.75	1.2	

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - JULY 1964

Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E); Benioff SP (z.n.e)

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
1	1	iP _{zZ}	22 54 29 ^D	1.2	2.5	USCGS: 14.3 S 73.1 W Southern Peru
2	4	iP _z	12 19 11 ^D	0.5	1.8	USCGS: 15.5 S 72.5 W Southern Peru
3	5	iP _{zZ}	19 14 40 ^D	0.75	1.5	USCGS: 26.2 N 110.2 W Gulf of California
4	5	eP _z	23 15 12			
5	6	eP _{zZ}	02 21 20			USCGS: 26.2 N 110.4 W Gulf of California
6	6	iP _{zZ}	07 27 02 ^D	1.7	6.0	USCGS: 18.3 N 100.4 W Guerrero, Mexico
		S _E	08 01 10			
7	8	iP _z	12 15 07.5 ^D	1.1	8.0	△ = 45 miles
		iS _n	15 17			
8	8	iP _z	23 44 15 ^D	0.5	1.75	
9	9	iP _z	08 44 58.5 ^C	0.5	1.4	
10	9	eP _z	11 35 30			USCGS: 23.3 S 175.7 W Tonga Islands
11	9	iP _{zZ}	16 58 15 ^C	0.75	1.8	
		iS _n	59 14			△ = 185 miles
12	13	iP _z	21 10 41 ^C	1.0	2.3	
13	13	iP _z	23 20 13.5 ^D	0.25	5.0	
		iS _n	20 35.5			△ = 105 miles

SEISMOLOGICAL BULLETIN- JULY 1964

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
14	14	eP _{zZ}	09 59 13 ^C			USCGS: 19.0 N 66.5 W Puerto Rico
15	16	iP _{zZ} iS _n	17 52 41 ^C 53 30	0.25	0.75	USCGS: 8.5 N 82.9 W Panama Costa Rica Border Region △ = 235 miles
16	17	iP _z iS _n	03 12 36 ^C 13 38	0.25	0.75	△ = 300 miles
17	17	iP _z iS _n	03 17 24 ^C 18 20	0.25	0.50	△ = 270 miles
18	18	iP _z iS _n	10 24 46 ^C 25 35	0.6	1.0	△ = 235 miles
19	20	eP _z	18 55 56			USCGS: 19.8 N 109.0 W Revilla Gigedo Islands Region
20	21	eP _z	01 15 24			USCGS: 19.8 N 108.8 W Off Coast of Jalisco, Mexico
21	21	iP _z	07 04 19 ^C	0.3	0.75	USCGS: 13.1 N 88.4 W Near Coast of El Salvador
22	23	iP _z	04 59 03 ^C	0.5	3.0	USCGS: 10.5 N 83.9 W Costa Rica
23	24	eP _z	07 09 10			USCGS: 46.9 N 153.9 E Kurile Islands
24	24	eP _z	17 20 20			
25	25	iP _{zZ}	19 38 22	0.25	0.5	USCGS: 27.9 S 70.9 W Northern Chile
26	25	iP _{zZ}	21 49 24	0.25	1.0	
27	26	iP _z	13 57 13 ^D	0.25	0.5	USCGS: 2.6 N 78.5 W Ecuador
28	27	iP _{zZ}	21 45 24.5 ^C	0.6	1.0	USCGS: 7.7 N 82.3 W Near South Coast of Panama
29	28	iP _{zZ}	04 41 47 ^C	0.3	0.5	USCGS: 7.6 N 82.3 W South of Panama



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - JULY 1964

----- Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E): Benioff SP (z.n.e) -----

No.	Date	Phase	Time	Period	Ampli-	Remarks
			G.C.T.		tude	
					mm	
30	28	iP _Z	04 57 54 ^C	0.4	1.0	
31	28	eP _Z	19 01 09			USCGS: 51.2 S 139.0 E About 1,000 KM Southwest of Tasmania
32	28	iP _{ZZ}	21 38 48.5 ^C	0.75	4.0	USCGS: 6.7 N 73.1 W Northern Colombia
33	29	iP _{ZZ} iS _n	16 37 40 ^D 37 54	0.5	9.0	USCGS: 7.3 N 77.3 W Panama-Colombia Border Region Felt Force I Balboa Heights = 67 miles
34	30	iP _{ZZ}	05 17 46 ^D	0.9	1.5	USCGS: 11.1 N 86.2 W Near West Coast of Costa Rica Felt Force I Balboa Heights.

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat.. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - AUGUST 1964

Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E); Benioff SP (z.n.e)

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
1	3	iP _{ZZ} iS _n	01 52 40 ^C 52 24	0.5	3.0	Δ = 220 miles
2	5	eP _Z	11 23 52			USCGS: 39.0 S 74.5 W Off Coast of Central Chile
3	5	iP _{ZZ}	22 32 05 ^D	0.5	3.5	
4	7	eP _{ZZ}	15 34 21			USCGS: 14.0 N 91.9 W Near South Coast of Guatemala
5	7	iP _Z	19 16 56 ^C	0.6	2.3	USCGS: 41.1 S 74.9 W Off Coast of Southern Chile
6	8	iP _{ZZ}	15 47 22 ^C	0.25	1.0	
7	8	iP _{ZZ}	20 09 16 ^D	0.3	1.5	
8	9	iP _{ZZ}	07 01 51 ^C	0.5	6.0	
9	10	iP _{ZZ}	01 13 50 ^D	1.0	2.0	
10	18	iP iS	04 42 02 ^C 53 53	1.4	4.4	Δ = 680 miles
11	27	iP iS	00 31 13 ^C 32 00	0.6	3.5	Δ = 450 miles
12	27	i	12 26 38.7 ^D	0.7	12.7	USCGS: 4.8 N 76.2 W Colombia
13	27	i	12 27 40.6 ^C	0.8	12.9	
14	30	iP iS	03 20 24 20 53	0.5	9.0	USCGS: 6.6 N 82.5 W South of Panama Δ = 140 miles

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - SEPTEMBER 1964

Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E); Benioff SP (z.n.e)

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
1	2	iP iS	15 19 39 21 00	0.6	15.5	USCGS: 7.1 N 78.5 W Panama Δ = 47 miles
2	2	iP iS	18 13 52 15 09	0.7	2.9	USCGS: 7.8 N 73.3 W Northern Colombia Δ = 450 miles
3	2	iP iS	11 37 56 38 11	0.7	1.0	Δ = 73 miles
4	8	iP	19 56 48	1.0	5.5	
5	9	iP iS	01 20 32 21 24	0.5	7.0	Δ = 250 miles
6	12	eP	22 36 32 ^C			
7	15	iP _Z	15 49 31 ^D	1.1	3.5	
8	16	iP _Z	13 13 10 ^C	0.3	10.4	
9	16	iP _Z iS _e	19 18 36 ^C 18 45	0.5	1.0	
10	16	iP _Z iS _e	21 14 27 ^D 14 52	0.5	1.7	Δ = 45 miles
11	17	iP _Z iS _n	18 35 36 ^C 35 55	0.8	7.0	Δ = 90 miles
12	17	iP _Z iS _n	19 46 33 46 45	0.6	2.8	Δ = 58 miles



SEISMOLOGICAL BULLETINS - SEPTEMBER 1964

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
13	19	eP _Z	05 11 58 ^G			USCGS: 15.3 N 94.0 W Near Coast of Oaxaca, Mexico
14	20	iP iS	02 46 07 ^D 47 23	0.6	3.0	Δ = 450 miles
15	20	eP	05 04 50			
16	21	iP	00 11 54 ^G	0.8	11.0	USCGS: 5.0 N 76.0 W Colombia Δ = 370 miles
17	25	iP iS	18 33 08 ^D 33 50	0.5	1.5	Δ = 200 miles
18	30	iP	13 40 35 ^G	0.4	4.0	
19	30	iP	17 11 38 ^D	0.5	1.0	

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - OCTOBER 1964

Standard Seismograph System USCG&GS: Sprengnether LP (Z.N.E): Benioff SP (z.n.e)

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
1	5	iP iS	16 40 46 ^C 41 02		0.4	3.5	△ = 75 miles
2	5	iP iS	19 55 31 ^C 55 47		0.3	3.5	△ = 75 miles
3	6	iP iS	07 26 43 ^D 27 16		1.0	0.75	△ = 130 miles
4	6	iP	14 44 54 ^D		0.3	0.5	
5	6	iP iS	19 28 15.5 ^C 29 28		0.6	8.0	△ = 65 miles
6	11	eP	21 34 57				
7	12	iP	16 02 46 ^C		0.75	1.5	
8	12	iP	22 04 28 ^C		0.75	1.0	
9	13	iP iS	10 32 49 ^C 33 25		0.75	1.0	△ = 175 miles
10	15	iP _{zZ} iS _n	21 05 16 ^C 06 03		0.5	2.5	USCGS: 9.1 N 84.0 W Costa Rica △ = 225 miles
11	15	iP _{zZ} iS _n	22 53 38 ^C 54 26		0.75	5.5	USCGS: 9.6 N 83.7 W Costa Rica △ = 230 miles
12	16	iP _z	01 14 28 ^C		0.5	1.5	



SEISMOLOGICAL BULLETIN - OCTOBER 1964

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
13	16	eP _Z	07 17 50			USCGS: 44.2 N 149.4E Kurile Islands
14	17	iP iS	02 50 50 ^D 52 59	0.4	9.7	
15	18	iP	12 51 16 ^C			
16	19	iP _Z iS _e	15 05 02 ^D 05 27	0.6	4.5	△ = 120 miles
17	20	iP iS	04 12 07 ^C 12 11	0.5	2.0	△ = 20 miles
18	23	iP	02 01 29 ^C	1.4	8.0	USCGS: 19.8 N 56.0 W N. Atlantic Ocean
19	25	iP iS	03 44 33 ^D 45 32	0.5	10.0	△ = 285 miles
20	25	iP iS	06 28 24 ^C 30 28	1.4	11.6	USCGS: 2.0 S 77.2 W Ecuador △ = 625 miles
21	25	iP	22 59 10 ^D	1.0	2.5	USCGS: 2.0 S 79.0 W Ecuador
22	26	iP iS	00 56 58 ^C 59 00	0.8	4.0	USCGS: 8.9 N 83.9 W Costa Rica
23	30	iP iS	05 44 43 ^D 45 52	0.7	9.0	△ = 330 miles
24	30	iP iS	16 49 30 ^C 50 44	0.6	11.4	△ = 355 miles
25	31	iP iS	17 42 04 ^D 42 55	0.6	1.4	△ = 245 miles

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - NOVEMBER 1964

----- Standard Seismograph System USC&GS: Sprengnether LP (Z.N.E); Benioff SP (z.n.e) -----

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
1	1	iP	12 45 52 ^D	0.8	3.5	
2	2	iP iS	06 54 05 ^C 54 42	1.0	5.0	USCGS: 4.1 S 76.9 W Northern Peru
3	12	iP iS	18 24 28 25 21	0.6	1.5	
4	16	iP iS	08 34 46 ^C 38 09	1.4	12.0	
5	19	iP iS	23 54 20 ^D 57 44	1.5	3.7	USCGS: 6.9 S 149.9 E New Britain Region
6	20	iP iS	07 09 33 ^D 10 36	0.8	3.7	

Instruments out of service from November 27, 1964 for routine maintenance. Instruments back in service December 9, 1964.

T. C. Henter
T. C. Henter
Chief Hydrographer



PANAMA CANAL COMPANY
Engineering and Construction Bureau
Meteorological and Hydrographic Branch

Lat. 8° 57' 39" N
Long. 79° 33' 29" W

Balboa Heights, Canal Zone

h: 36 meters

SEISMOLOGICAL BULLETIN - DECEMBER 1964

-----Standard Seismograph System USCG&GS: Sprengnether LP (Z.N.E): Benioff SP (z.n.e)-----

No.	Date	Phase	Time	Period	Ampli-	Remarks
			G.C.T.		tude	
					mm	
1	9	iP iS	13 42 21 ^C 43 18	0.4	29.0	USCGS: 27.5 S 63.2 W Santiago del Estero Province, Argentina
2	10	iP iS	09 23 24 24 14	0.7	2.3	
3	14	eP _Z	02 12 00			USCGS: 54.3 S 2.4 W South Atlantic Ridge
4	15	iP _Z iS _n	08 25 56 ^D 27 09	0.5	4.0	USCGS: 7.1 N 73.2 W Northern Colombia
5	15	iP _{ZZ}	12 16 26 ^C	0.25	1.5	USCGS: 14.7 N 91.7 W Guatemala
6	22	iP iS	08 04 28 ^C 05 48	1.0	38.0	USCGS: 18.4 N 68.8 W Mona Passage
7	25	iP _{ZZ} iS _n	08 06 21 08 07			USCGS: 7.8 N 80.8 W Panama
8	26	eP _{ZZ}	08 21 12			USCGS: 16.7 N 99.6 W Near Coast of Guerrero, Mexico
9	26	iP _Z iS _n	22 50 51 51 16	0.5	1.25	
10	27	eP _Z	18 03 04			USCGS: 12.9 N 125.4 E Samar, Philippine Islands

T. C. Henter
Chief Hydrographer