



17 APR 1969

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 - JANUARY 1968

-----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	
1	1	iP <sub>Z</sub> iS <sub>n</sub>	14 23 08.6 <sup>D</sup> 23 17.1		0.3	10.8	△ = 42 miles
2	3	iP <sub>ZZ</sub> iS <sub>e</sub>	06 39 46.2 <sup>G</sup> 40 38.6		0.4	15.8	△ = 252 miles
3	3	iP <sub>Z</sub> iS <sub>n</sub>	17 03 22.8 <sup>G</sup> 03 25.8		0.3	12.2	Cut Widening Blast △ = 15 miles
4	4	eP <sub>Z</sub> eS <sub>n</sub>	10 05 43.6 <sup>G</sup> 07 17.6		0.6	2.1	USCGS: 12.1 N 86.3 W Nicaragua △ = 575 miles
5	4	iP <sub>Z</sub> iS <sub>e</sub>	21 40 25.2 <sup>G</sup> 40 28.2		0.3	15.8	Cut Widening Blast △ = 15 miles
6	5	eP <sub>Z</sub> eS <sub>n</sub>	20 04 56.7 <sup>G</sup> 05 03.4		0.3	5.0	△ = 34 miles
7	6	iP <sub>Z</sub> iS <sub>e</sub>	12 03 57.4 <sup>G</sup> 04 00.4		0.3	16.6	Cut Widening Blast △ = 15 miles
8	6	iP <sub>Z</sub> iS <sub>n</sub>	16 59 23.7 <sup>G</sup> 59 26.4		0.3	9.7	Cut Widening Blast △ = 15 miles
9	6	iP <sub>Z</sub> iS <sub>E</sub>	23 34 35.6 <sup>D</sup> 40 26.4				USCGS: 27.8 S 71.1 W Near coast of Northern Chile △ = 2620 mile
10	6	iP <sub>Z</sub> iS <sub>n</sub>	16 59 23.7 <sup>G</sup> 59 26.4		0.3	9.7	Cut Widening Blast △ = 14 miles
11	6	iP <sub>Z</sub> iS <sub>E</sub>	23 34 35.6 <sup>D</sup> 40 26.4				
12	10	iP <sub>Z</sub> iS <sub>e</sub>	13 38 28.3 <sup>G</sup> 38 43.3		0.3		△ = 72 miles

## SEISMOLOGICAL BULLETIN - JANUARY 1968


No.	Date	Phase	Time		Amplitude mm	Remarks
			G.C.T.	Period		
13	11	iP <sub>zZ</sub> eS <sub>E</sub>	09 39 05.4 <sup>C</sup> 40 33.6	0.8	16.1	△ = 1175 miles
14	11	iP <sub>z</sub> iS <sub>n</sub>	23 14 13.4 <sup>D</sup> 14 35.2	0.3	4.2	△ = 104 miles
15	13	iP <sub>z</sub> iS <sub>e</sub>	12 05 41.7 <sup>C</sup> 05 44.7	0.3	13.2	Cut Widening Blast △ = 15 miles
16	13	iP <sub>z</sub> iS <sub>n</sub>	14 01 47.9 <sup>C</sup> 01 51.2	0.3	7.6	Cut Widening Blast △ = 16 miles
17	13	iP <sub>z</sub> iS <sub>n</sub>	16 00 21.0 <sup>C</sup> 00 24.2	0.3	8.1	Cut Widening Blast △ = 16 miles
18	13	iP <sub>zZ</sub> eS <sub>N</sub>	16 13 43.3 <sup>D</sup> 15 58.8	1.0	8.5	△ = 825 miles
19	14	iP <sub>zZ</sub> iS <sub>nN</sub>	11 23 57.6 <sup>D</sup> 25 26.8	0.5	19.2	△ = 545 miles
20	14	iP <sub>zZ</sub> eS <sub>E</sub>	12 44 48.8 <sup>D</sup> 53 44.4	1.2	6.5	USCGS: 37.8 N 13.1 E Sicily
21	14	eP <sub>z</sub> iSKSN eS <sub>N</sub>	17 55 38.8 18 06 04.4 06 52.4			USCGS: 52.7 N 171.2 W Aleutian Islands
22	15	eP <sub>z</sub>	04 37 28.3 <sup>C</sup>	0.4	1.5	
23	15	iP <sub>z</sub> iS <sub>n</sub>	12 09 43.2 <sup>C</sup> 09 46.1	0.3	16.2	Cut Widening Blast △ = 15 miles
24	16	eP <sub>z</sub>	06 22 33.4 <sup>C</sup>	0.5	3.1	
25	16	iP <sub>z</sub> iS <sub>n</sub>	14 56 26.1 <sup>C</sup> 56 29.3	0.3	5.0	Cut Widening Blast △ = 16 miles
26	17	iP <sub>z</sub> iS <sub>n</sub>	11 55 39.8 <sup>C</sup> 55 42.8			Cut Widening Blast △ = 15 miles
27	18	iP <sub>z</sub> iS <sub>n</sub>	18 12 16.3 <sup>C</sup> 12 19.5	0.3	9.6	Cut Widening Blast △ = 15 miles
28	19	iP <sub>z</sub> iX <sub>E</sub>	06 23 44.8 <sup>C</sup> 30 38.0			

## SEISMOLOGICAL BULLETIN - JANUARY 1968

No.	Date	Phase	Time		Amplitude mm	Remarks
			G.C.T.	Period		
29	19	iP <sub>Z</sub> iS <sub>e</sub>	11 57 04.3 <sup>G</sup> 57 07.3	0.3	15.8	Cut Widening Blast △ = 15 miles
30	19	iP <sub>Z</sub> iS <sub>n</sub>	12 30 10.7 <sup>G</sup> 30 13.6	0.3	9.8	Cut Widening Blast △ = 15 miles
31	19	iP <sub>Z</sub> iS <sub>e</sub>	15 47 40.4 <sup>D</sup> 48 04.8	0.6	12.5	△ = 117 miles
32	19	eP <sub>Z</sub>	18 23 11.7 <sup>D</sup>	1.6	11.8	
33	20	iP <sub>Z</sub> iS <sub>n</sub>	14 14 14.3 <sup>G</sup> 14 17.5	0.3	4.4	Cut Widening Blast △ = 15 miles
34	20	iP <sub>Z</sub> eS <sub>e</sub>	16 17 40.9 <sup>G</sup> 17 43.9	0.4	14.2	Cut Widening Blast △ = 15 miles
35	21	eP <sub>Z</sub> iS <sub>E</sub> iL <sub>E</sub>	16 53 09.4 <sup>D</sup> 17 02 07.6 14 26.8	1.3	3.4	
36	21	iP <sub>Z</sub> eS <sub>E</sub>	23 48 00.0 <sup>G</sup> 52 15.6	0.8	6.4	USCGS: 15.6 N 92.3 W Mexico-Guatemala Border
37	23	iP <sub>Z</sub> iS <sub>n</sub>	21 37 34.2 <sup>G</sup> 37 37.4	0.3	8.4	Cut Widening Blast △ = 16 miles
38	25	iP <sub>Z</sub> iS <sub>n</sub>	13 59 31.7 <sup>G</sup> 59 34.9	0.3	7.2	Cut Widening Blast △ = 16 miles
39	26	eP <sub>Z</sub>	05 05 48.0 <sup>G</sup>	1.2	3.6	
40	27	iP <sub>ZZ</sub> iS <sub>eE</sub>	16 57 05.0 <sup>G</sup> 57 08.0	0.3	8.3	Cut Widening Blast △ = 15 miles
41	27	iP <sub>ZZ</sub> iS <sub>eE</sub>	02 37 20.7 <sup>D</sup> 37 45.8	0.4	39.2	△ = 120 miles
42	27	iP <sub>Z</sub> iS <sub>e</sub>	03 10 47.0 <sup>G</sup> 11 13.8	0.5	3.5	△ = 131 miles
43	28	eP <sub>Z</sub> eS <sub>e</sub>	01 52 34.9 <sup>D</sup> 52 57.6	0.7	4.1	USCGS: 2.4 N 74.9 W Colombia
44	29	iP <sub>Z</sub> iS <sub>n</sub>	00 41 13.7 <sup>G</sup> 47 37.2	0.4	7.3	

## SEISMOLOGICAL BULLETIN - JANUARY 1968

No.	Date	Phase	Time		Period	Ampli- tude mm	Remarks
			G.C.T.				
45	29	iP <sub>Z</sub> iSK <sub>S</sub> <sub>N</sub> eS <sub>E</sub>	10 33 45.2 <sup>C</sup> 44 10.4 44 56.4			USCGS: 43.6 N 146.7 E Kurile Islands	
46	30	iP <sub>Z</sub> iS <sub>n</sub>	04 40 50.9 <sup>C</sup> 42 05.0	0.6	8.5	USCGS: 6.8 N 73.1 W Northern Colombia	
47	30	iP <sub>Z</sub> iS <sub>n</sub>	17 04 19.9 <sup>C</sup> 04 23.2	0.3	12.3	Cut Widening Blast	△ = 16 miles
48	30	iP <sub>Z</sub> eS <sub>n</sub>	17 17 03.9 <sup>C</sup> 17 07.1	0.3	3.6	Cut Widening Blast	△ = 16 miles

  
 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 - FEBRUARY 1968

-----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	1	iP <sub>Z</sub> iS <sub>n</sub>	10 07 38.2 <sup>G</sup> 08 02.6		0.4	17.5	△ = 117 miles
2	1	iP <sub>Z</sub> eS <sub>n</sub>	19 06 04.3 <sup>G</sup> 06 07.6		0.3	4.3	Cut Widening Blast △ = 16 miles
3	1	iP <sub>Z</sub> iS <sub>n</sub>	20 29 16.1 <sup>G</sup> 29 19.2		0.3	8.9	Cut Widening Blast △ = 15 miles
4	3	iP <sub>ZZ</sub> iS <sub>N</sub>	05 40 58.0 <sup>G</sup> 44 52.4		0.9	4.5	USCGS: 16.7 N 99.4 W Near Coast of Mexico
5	3	eP <sub>ZZ</sub>	15 44 16.5 <sup>G</sup>		0.7	2.5	USCGS: 16.6 N 93.5 W Chiapas, Mexico
6	5	iP <sub>Z</sub> iS <sub>n</sub>	12 05 44.5 <sup>G</sup> 05 47.4		0.3	25.9	Cut Widening Blast △ = 15 miles
7	5	eP <sub>Z</sub> iS <sub>n</sub>	13 36 42.6 <sup>D</sup> 37 13.3		0.4	2.1	△ = 148 miles
8	5	eP <sub>Z</sub> iS <sub>n</sub>	21 58 51.7 59 25.5		0.5	11.4	△ = 162 miles
9	6	eP <sub>Z</sub> iS <sub>N</sub>	22 53 07.6 <sup>D</sup> 57 34.0				USCGS: 10.2 N 103.7 W Off Coast of Mexico
10	7	iP <sub>Z</sub> iS <sub>n</sub>	11 59 13.4 <sup>D</sup> 59 16.3		0.3	10.5	Cut Widening Blast △ = 15 miles
11	7	iP <sub>Z</sub> iS <sub>n</sub>	14 14 19.0 <sup>G</sup> 14 22.0		0.3	8.2	Cut Widening Blast △ = 15 miles
12	7	iP <sub>Z</sub> iS <sub>n</sub>	18 38 08.6 <sup>G</sup> 38 11.8		0.3	8.1	Cut Widening Blast △ = 16 miles
13	7	iP <sub>Z</sub> iS <sub>e</sub>	19 05 37.2 <sup>G</sup> 05 40.4		0.3	12.7	Cut Widening Blast △ = 16 miles



SEISMOLOGICAL BULLETIN - FEBRUARY 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
14	9	iP <sub>Z</sub> iS <sub>n</sub>	17 08 45.6 <sup>C</sup> 08 48.4	0.3	9.8	Cut Widening Blast △ = 16 miles
15	12	eP <sub>Z</sub> eS <sub>E</sub>	06 00 32.0 <sup>D</sup> 10 48.0			USCGS: 5.5 S 153.2 E New Ireland Region
16	13	iP <sub>Z</sub> iS <sub>e</sub>	14 56 01.9 <sup>C</sup> 56 05.0	0.3	8.1	Cut Widening Blast △ = 15 miles
17	13	iP <sub>Z</sub> iS <sub>n</sub>	16 53 47.8 <sup>C</sup> 56 51.3	0.3	7.7	Cut Widening Blast △ = 17 miles
18	16	iP <sub>Z</sub> iS <sub>e</sub>	18 13 54.3 <sup>C</sup> 13 57.4	0.3	14.9	Cut Widening Blast △ = 15 miles
19	19	iP <sub>Z</sub> iS <sub>E</sub> iL <sub>E</sub>	22 59 12.8 <sup>D</sup> 23 10 26.8 35 09.2			USCGS: 39.4 N 25.0 E Agean Sea
20	20	iP <sub>Z</sub> iS <sub>n</sub>	17 12 45.7 <sup>C</sup> 12 48.8	0.3	7.5	Cut Widening Blast △ = 15 miles
21	23	iP <sub>Z</sub> iS <sub>n</sub>	11 54 12.1 <sup>C</sup> 54 15.0	0.3	9.4	Cut Widening Blast △ = 15 miles
22	23	eP <sub>Z</sub> eS <sub>n</sub>	20 03 51.5 04 38.7	0.8	3.9	△ = 227 miles
23	24	iP <sub>Z</sub> iS <sub>e</sub>	14 59 04.2 <sup>C</sup> 59 07.4	0.3	8.4	Cut Widening Blast △ = 16 miles
24	26	iP <sub>Z</sub> eS <sub>N</sub> iL <sub>E</sub>	11 09 46.8 <sup>C</sup> 18 50.0 31 46.0			
25	29	iP <sub>Z</sub> iS <sub>n</sub>	14 07 42.8 <sup>C</sup> 07 45.8	0.4	13.1	Cut Widening Blast △ = 15 miles

*T. G. Henter*  
T. G. 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 - MARCH 1968

----- 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 <sub>z</sub> iS <sub>e</sub>	13 10 22.5 11 01.7	0.4	3.1	△ = 188 miles
2	1	iP <sub>z</sub> iS <sub>n</sub>	14 13 47.0 13 50.2	0.4	17.6	Cut Widening Blast △ = 16 miles
3	1	iP <sub>z</sub> iS <sub>n</sub>	16 58 55.0 <sup>C</sup> 58 58.4	0.3	9.5	Cut Widening Blast △ = 17 miles
4	2	iP <sub>z</sub> iS <sub>e</sub>	11 53 04.9 <sup>C</sup> 53 07.9	0.3	15.0	Cut Widening Blast △ = 15 miles
5	2	iP <sub>z</sub> iS <sub>n</sub>	14 07 26.2 <sup>C</sup> 07 29.2	0.3	20.2	Cut Widening Blast △ = 15 miles
6	3	iP <sub>z</sub> iS <sub>n</sub>	08 27 40.8 <sup>C</sup> 29 23.2			USCGS: 3.4 N 84.1 W Off Coast of Central America △ = 615 miles
7	3	eP <sub>z</sub> iS <sub>n</sub>	08 44 22.1 45 01.0	0.5	3.2	USCGS: 10.0 N 83.1 W Costa Rica △ = 187 miles
8	5	iP <sub>z</sub> iS <sub>n</sub> <sup>z</sup>	17 39 01.6 <sup>C</sup> 39 04.7	0.4	20.0	Cut Widening Blast △ = 15 miles
9	5	eP <sub>zZ</sub>	18 36 22.3 <sup>D</sup>	1.0	8.1	
10	6	iP <sub>z</sub> iS <sub>n</sub> <sup>z</sup>	12 16 44.2 <sup>C</sup> 16.4772	0.3	9.0	Cut Widening Blast △ = 15 miles
11	10	iP <sub>z</sub> iS <sub>n</sub> <sup>z</sup>	18 43 28.7 <sup>C</sup> 44 17.4	0.5	4.3	△ = 234 miles



Seismological Bulletin - MARCH 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
12	12	iP <sub>Z</sub> iS <sub>e</sub>	09 34 04.2 <sup>G</sup> 35 26.3	0.4	11.0	USCGS: 13.0 N 72.6 W Caribbean sea △ = 500 miles
13	13	iP <sub>Z</sub> iS <sub>n</sub>	11 59 10.0 <sup>G</sup> 59 13.0	0.4	17.2	Cut Widening Blast △ = 15 miles
14	14	iP <sub>Z</sub> iS <sub>n</sub>	14 58 06.6 <sup>G</sup> 58 09.6	0.3	9.2	Cut Widening Blast △ = 15 miles
15	15	iP <sub>Z</sub>	12 05 59.7 <sup>G</sup> 06 02.8	0.4	8.0	Cut Widening Blast △ = 15 miles
16	19	iP <sub>Z</sub> iS <sub>n</sub>	12 06 09.2 <sup>G</sup> 06 12.1	0.3	13.2	Cut Widening Blast △ = 15 miles
17	20	eP <sub>Z</sub> iS <sub>n</sub>	08 59 51.8 <sup>G</sup> 09 00 16.5	0.4	2.7	△ = 119 miles
18	20	iP <sub>Z</sub> iS <sub>n</sub>	11 58 13.7 <sup>G</sup> 58 17.3	0.3	4.3	Cut Widening Blast △ = 17 miles
19	20	iP <sub>Z</sub> iS <sub>e</sub>	17 02 27.3 <sup>G</sup> 02 30.3	0.3	6.6	Cut Widening Blast
20	22	iP <sub>Z</sub> iS <sub>n</sub>	16 58 19.1 <sup>G</sup> 58 22.2	0.3	13.5	Cut Widening Blast △ = 15 miles
31	24	eP <sub>Z</sub> eS <sub>n</sub>	17 15 09.2 <sup>G</sup> 16 54.4			USCGS: 12.5 N 86.5 W Nicaragua △ = 620 miles
22	26	eP <sub>Z</sub> eS <sub>n</sub>	15 40 58.3 <sup>G</sup> 41 01.3	0.3	5.0	Cut Widening Blast △ = 15 miles
23	28	eP <sub>Z</sub> eS <sub>e</sub>	16 33 05.2 <sup>D</sup> 33 46.5	0.4	7.6	△ = 198 miles
24	29	eP <sub>Z</sub>	13 09 45.7 <sup>G</sup>	0.3	4.2	△ = 184 miles
25	29	iP <sub>Z</sub> iS <sub>e</sub>	16 38 48.7 <sup>G</sup> 38 51.7	0.3	11.8	Cut Widening Blast △ = 15 miles
26	31	iP <sub>Z</sub> iS <sub>e</sub>	04 36 32.3 <sup>D</sup> 37 12.9	0.4	4.2	△ = 195 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 - APRIL 1968









-----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 <sub>Z</sub> iP <sub>S<sub>e</sub></sub> iS <sub>e<sub>z</sub>N</sub> iL <sub>N</sub>	00 58 07.6 <sup>D</sup> 01 11 32.4 18 24.0 36 06.0			USCGS: 32.5 N 132.2E Japan  △ = 7350 miles
2	1	iP <sub>Z</sub> iS <sub>e</sub>	13 56 32.2 <sup>C</sup> 56 35.2	0.3	13.6	Cut Widening Blast △ = 15 miles
3	3	eP <sub>Z</sub> iS <sub>n</sub>	03 10 45.6 11 29.6	0.4	3.2	△ = 210 miles
4	4	iP <sub>Z</sub> iS <sub>n</sub>	09 15 35.5 <sup>D</sup> 16 49.7	0.3	12.5	△ = 435 miles
5	4	iP <sub>Z</sub> iS <sub>n</sub>	12 02 57.4 <sup>C</sup> 03 00.4	0.3	19.1	Cut Widening Blast △ = 15 miles
6	5	iP <sub>Z</sub> iS <sub>e</sub>	14 16 00.9 <sup>C</sup> 16 04.2	0.3	13.4	Cut Widening Blast △ = 15 miles
7	8	iP <sub>Z</sub> iS <sub>n</sub>	14 03 39.8 <sup>C</sup> 03 43.0	0.3	14.2	Cut Widening Blast △ = 15 miles
8	8	iP <sub>Z</sub> iS <sub>n</sub>	16 56 23.4 <sup>C</sup> 56 26.4	0.3	11.1	Cut Widening Blast △ = 15 miles
9	8	iP <sub>Z</sub> iS <sub>n</sub>	22 27 13.5 27 16.8	0.4	10.0	Cut Widening Blast △ = 15 miles
10	9	iP <sub>Z</sub> iS <sub>n</sub> iL <sub>n</sub>	02 36 51.2 <sup>C</sup> 43 07.2 48 10.8			USCGS: 33.1 N 116.1 W H=02 27 36.6 Southern California △ = 2780 miles

Seismological Bulletin - APRIL 1968

No.	Date	Phase	Time		Amplitude mm	Remarks
			G.C.T.	Period		
11	9	iP <sub>Z</sub> iS <sub>n</sub>	23-32-15.0 <sup>G</sup> 32-38.6	0.4	10.1	△ = 113 miles
12	11	eP <sub>Z</sub> iS <sub>e</sub>	09 51 21.8 <sup>G</sup> 52 16.6	0.5	2.4	△ = 263 miles
13	12	iP <sub>Z</sub> iS <sub>e</sub>	15 44 36.6 <sup>G</sup> 45.18.4	0.5	3.1	△ = 200 miles
14	13	eP <sub>ZZ</sub> eS <sub>E</sub>	01 19 15.0 <sup>G</sup> 22 18.8	1.0	6.0	△ = 306 miles
15	14	eP <sub>ZZ</sub> iS <sub>n</sub>	14 26 30.7 <sup>D</sup> 27 42.7	0.7	29.0	USCGS: 6.8 N 73.0 W Northern Colombia Felt at Bogota, Medellin, Bucaramanga and Cali. △ = 430 miles
16	15	iP <sub>Z</sub> iS <sub>n</sub>	01 38 25.9 <sup>D</sup> 39 02.5	0.4	11.1	△ = 156 miles
17	15	eP <sub>Z</sub> eS <sub>e</sub>	01 51 09.2 <sup>G</sup> 54 21.6			△ = 1190 miles
18	16	eP <sub>Z</sub> eS <sub>n</sub>	03 34 49.2 35 31	0.7	6.2	△ = 208 miles
19	18	iP <sub>Z</sub> iS <sub>e</sub>	21 56 46.1 <sup>G</sup> 56 49.4	0.4	4.0	Cut Widening Blast △ = 15 miles
20	20	iP <sub>Z</sub> iS <sub>n</sub>	17 25 30.5 <sup>G</sup> 25 32.6	0.3	18.1	Cut Widening Blast △ = 15 miles
21	23	iP <sub>Z</sub> eS <sub>n</sub>	17 41 53.9 <sup>G</sup> 42 24.9	0.4	3.2	△ = 153 miles
22	23	iP <sub>ZZ</sub> iS <sub>e</sub>	20 40 36.9 40 53.3	1.6	3.8	△ = 78 miles
23	26	eP <sub>Z</sub> eS <sub>cPcSE</sub> eL <sub>E</sub>	01 22 24.8 <sup>G</sup> 31 32.0 49 32.4			△ = 6850 miles

Seismological Bulletin - APRIL 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
24	26	iP <sub>ZZ</sub> iS <sub>n</sub>	15 08 60.4 08 18.0		1.0	3.0	 = 55 miles
25	26	iP <sub>Z</sub> iS <sub>E</sub> iL <sub>E</sub>	17 53 22.0 <sup>G</sup> 59 05.2 18 01 18.0				USCGS: 18.7 N 103.3 W H=17 48 02.3 Near Cost of Michoacan, Mexico  = 2030 miles
26	27	iP <sub>Z</sub> iS <sub>n</sub>	12 12 49.5 <sup>G</sup> 12 53.5		1.0	15.5	Cut Widening Blast  = 15 miles
27	27	iP <sub>Z</sub> iS <sub>n</sub>	13 01 0.4 <sup>G</sup> 01 03.5		0.2	4.5	Cut Widening Blast  = 15 miles
28	27	iP <sub>Z</sub> iS <sub>n</sub>	14 38 44.9 <sup>G</sup> 39 47.5		0.3	10.0	Cut Widening Blast  = 15 miles
29	27	iP <sub>Z</sub> iS <sub>n</sub>	18 29 22.0 <sup>G</sup> 29 25.0		0.3	9.5	Cut Widening Blast  = 15 miles
30	27	iP <sub>Z</sub> iS <sub>n</sub>	19 23 27.2 <sup>G</sup> 23 30.5		0.3	5.0	Cut Widening Blast  = 15 miles
31	30	iP <sub>Z</sub> eS <sub>n</sub>	12 03 28.0 <sup>G</sup> 03 32.3		0.4	11.5	Cut Widening Blast  = 15 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 1968












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 <sub>z</sub> iS <sub>n</sub>	05 32 51.3 <sup>G</sup> 35 14.3	0.4	4.3	USCGS: 18.8 N 69.6 W H=05 29 38.2 Dominican Republic Region Felt in San Juan and Cayey, Puerto Rico △ = 875 miles
2	4	iP <sub>z</sub>	10 58 54.0 <sup>D</sup> 59 32.0	0.3	1.5	△ = 165 miles
3	5	iP <sub>z</sub> iS <sub>n</sub>	18 21 32.4 <sup>D</sup> 22 27.0	0.5	2.9	△ = 262 miles
4	6	iP <sub>z</sub> iS <sub>n</sub>	13 36 16.0 <sup>D</sup> 36 24.5	0.6	6.2	△ = 42 miles
5	6	iP <sub>z</sub> iS <sub>n</sub>	16 45 10.8 <sup>G</sup> 45 13.1	0.3	10.0	Cut Widening Blast △ = 15 miles
6	6	iP <sub>z</sub> iS <sub>n</sub>	17 26 50.7 <sup>G</sup> 26 53.9	0.3	5.8	Cut Widening Blast △ = 15 miles
7	7	iP <sub>z</sub> iS <sub>n</sub>	09 02 04.8 <sup>G</sup> 03 19.6			USCGS: 6.7 N 73.0 W H=09 00 29.0 Northern Colombia Felt at San Cristobal, Venezuela and Bogota, Colombia. △ = 450 miles
8	7	eP <sub>z</sub>	12 26 40.7 <sup>G</sup>	1.0	3.0	
9	9	iP <sub>z</sub> iS <sub>n</sub>	12 40 51.5 <sup>D</sup> 41 01.0	1.0	7.3	△ = 47 miles
10	9	iP <sub>z</sub> iS <sub>n</sub>	18 06 42.2 <sup>G</sup> 06 53.9	0.8	4.1	△ = 57 miles

## Seismological Bulletin - MAY 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
11	10	iP <sub>Z</sub> iS <sub>n</sub>	14 50 15.8 <sup>G</sup> 50 41.0	0.2	18.7	 = 120 miles
12	10	iP <sub>Z</sub> iS <sub>n</sub>	22 27 36.0 <sup>G</sup> 27 39.8			 = 15 miles
13	12	iP <sub>Z</sub> iS <sub>nN</sub>	16 39 31.1 <sup>D</sup> 40 14.5	0.6	31.5	USCGS: 7.3 N 82.0 W South of Panama  = 208 miles
14	12	iP <sub>Z</sub> iS <sub>e</sub>	17 15 29.8 <sup>G</sup> 15 43.3	0.3	3.1	 = 65 miles
15	13	iP <sub>Z</sub> iS <sub>n</sub>	13 55 17.6 <sup>D</sup> 55 36.1	0.3	1.9	 = 89 miles
16	13	iP <sub>Z</sub> iS <sub>n</sub>	19 38 01.6 <sup>G</sup> 39 34.0	0.4	2.7	USCGS: 9.0 N 71.1 W H=19 36 05.2 Lake Maracaibo Felt at Caracas, Maracaibo and San Cristobal  = 550 miles
17	14	eP <sub>Z</sub> iS <sub>n</sub>	14 24 02.2 <sup>G</sup> 27 28.4			 = 1280 miles
18	15	eP <sub>Z</sub> eS <sub>e</sub>	02 32 38.0 <sup>G</sup> 35 24.8			USCGS: 1.4 N 90.6 W H= 02 29 30.1 Galapagos Island Region  = 825 miles
19	16	iP <sub>Z</sub> iPP <sub>Z</sub> iSK <sub>SN</sub>	01 02 10.8 <sup>G</sup> 09 38.0 15 12.8			USCGS: 40.8 N 143.2 E H=00-48-55.4 Off East Coast of Japan 47 Killed, 281 injured, 18,500 homes destroyed or damaged.
20	16	iP <sub>ZZ</sub> iS <sub>n</sub>	08 28 09.4 <sup>G</sup> 30 34.3			USCGS: 3.7 W 76.6 W Northern Peru  = 825 miles
21	16	iP <sub>Z</sub> iPP <sub>Z</sub> SK <sub>SN</sub>	10 54 05.6 <sup>G</sup> 58 58.4 11 04 30.0			 = 8100 miles

## Seismological Bulletin - MAY 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
22	16	ePZ eSK <sub>SN</sub> eLe	23 24 16.8 <sup>G</sup> 34 23.2 00 01 18.8			 = 5450
23	18	eP <sub>Z</sub> eSK <sub>SE</sub> eL <sub>E</sub>	01 14 21.2 <sup>D</sup> 24 13.2 47 42.0			USCGS: 55.4S 27.7W South Sanwich Island Region  = 5450 miles
24	20	iP <sub>Z</sub> eS <sub>e</sub>	07 40 14.8 <sup>D</sup> 48 54.8			 = 4950 miles
25	20	iP <sub>Z</sub> iS <sub>n</sub>	15 02 15.5 <sup>G</sup> 02 18.3	0.3	13.2	Cut Widening Blast  = 15 miles
26	20	iP <sub>Z</sub> iS <sub>n</sub>	17 22 16.1 <sup>G</sup> 22 19.3	0.3	19.8	Cut Widening Blast  = 15 miles
27	20	iP <sub>Z</sub> iS <sub>N</sub> iL <sub>E</sub>	20 19 42.8 <sup>G</sup> 30 14.0 53 24.8			USCGS: 30.7 S 178.4 W Kermadec Island Region Felt at Raoul  = 6000 miles
28	23	iP <sub>Z</sub> iS <sub>n</sub>	15 24 45.2 <sup>G</sup> 24 48.3	0.3	5.6	Cut Widening Blast  = 15 miles
29	23	ePZ iP <sub>SE</sub> iS <sub>R</sub>	17 38 52.0 <sup>G</sup> 53 05.2 59 22.4			USCGS: 41.7 S 171.9 E South Island, New Zealand one dead, 14 injured, extensive damage on northwest coast of South Island, felt throughout New Zealand.  = 7850 miles
30	27	iP <sub>Z</sub> iS <sub>e</sub>	19 51 01.8 <sup>G</sup> 51 04.7	0.3	5.4	Cut Widening Blast  = 15 miles
31	28	iP <sub>Z</sub> iPP <sub>E</sub> iS <sub>N</sub>	13 46 32.8 <sup>G</sup> 49 47.6 55 33.2			 = 4700 miles
32		iP <sub>Z</sub> iS <sub>n</sub>	13 01 51.0 <sup>G</sup> 01 54.1	0.3	18.2	Cut Widening Blast  = 15 miles



Seismological Bulletin - MAY 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
33	29	eP <sub>Z</sub> iS <sub>N</sub>	13 20 08.4 21 46.4				△ = 590 miles
34	29	iP <sub>Z</sub> iS <sub>e</sub>	13 26 26.0 <sup>C</sup> 26 36.5	0.7	21.0	USCGS: 3.9 N 82.3 W	△ = 50 miles
35	29	iP <sub>Z</sub> iS <sub>e</sub>	14 20 02.6 <sup>D</sup> 20 15.8	0.5	21.5	USCGS: 3.9 N 82.5 W South of Panama	△ = 65 miles
36	29	eP <sub>Z</sub> iS <sub>n</sub>	21 38 05.6 <sup>C</sup> 40 20.4			USCGS: 3.1 N 83.7 W Off Coast of Central America	△ = 840 miles
37	30	eP <sub>Z</sub> iP <sub>SE</sub>	19 56 15.6 20 09 33.2			USCGS: 31.0 S 177.6 W Kermadec Island Region	△ = 7150 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 - JUNE 1968

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 <sub>Z</sub> iS <sub>n</sub>	00 03 20.2 <sup>C</sup> 03 59.4	0.5	1.1	= 187 miles
2	5	iP <sub>Z</sub> iS <sub>n</sub>	13 11 55.7 <sup>C</sup> 11 58.5	0.3	12.2	Cut Widening Blast = 15 miles
3	5	iP <sub>Z</sub> iS <sub>n</sub>	14 07 49.4 <sup>C</sup> 07 52.7	0.3	10.0	Cut Widening Blast = 15 miles
4	6	iP <sub>Z</sub> iS <sub>n</sub>	13 29 11.1 <sup>C</sup> 29 14.1	0.3	16.5	Cut Widening Blast = 15 miles
5	7	iP <sub>Z</sub> iS <sub>N</sub> iL <sub>N</sub>	12 17 29.2 26 08 41 40			= 4900 miles
6	11	iP <sub>Z</sub> iS <sub>e</sub>	20 31 22.8 <sup>C</sup> 31 34.4	0.5	2.8	= 56 miles
7	12	iP <sub>Z</sub> iS <sub>e</sub>	12 11 11.2 <sup>C</sup> 11 14.0	0.4	2.5	Cut Widening Blast = 15 miles
8	12	eP <sub>Z</sub> iS <sub>n</sub> iP <sub>SN</sub>	13 57 02.0 <sup>C</sup> 14 09 14.4 11 52.4			USCGS: 39.5 N 142.7 E Near East Cost of Japan = 8000 miles
9	12	iP <sub>Z</sub> iS <sub>n</sub>	15 25 26.2 <sup>C</sup> 25 29.3	0.3	17.7	Cut Widening Blast = 15 miles
10	12	iP <sub>Z</sub> iS <sub>n</sub>	16 58 05.4 <sup>C</sup> 58 08.6	0.3	3.9	Cut Widening = 15 miles
11	12	iP <sub>Z</sub> iS <sub>e</sub>	22 24 51.2 <sup>C</sup> 27 32.8			USCGS: 0.2 S 91.4 W Galapagos Islands = 1000 miles



Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
12	13	iP <sub>Z</sub> iS <sub>E</sub>	07 37 22.8 <sup>D</sup> 40 18.8			USCGS: 0.3 S 91.5 W Galapagos Islands △ = 1100 miles
13	13	iP <sub>Z</sub> iS <sub>e</sub>	17 00 25.2 <sup>C</sup> 00 29.4	0.3	10.3	Cut Widening Blast △ = 15 miles
14	13	eP <sub>Z</sub> iS <sub>e</sub>	21 42 11.1 <sup>C</sup> 42 51.4	0.4	1.7	△ = 250 miles
15	14	iP <sub>Z</sub> iS <sub>N</sub>	16 27 05.6 <sup>D</sup> 31 11.6			△ = 1600 miles
16	14	iP <sub>Z</sub> iS <sub>E</sub>	22 31 16.0 <sup>D</sup> 34 39.2			USCGS: 0.3 S 91.2 W Galapagos Islands △ = 1275 miles
17	15	iP <sub>Z</sub> iS <sub>E</sub>	04 23 34.8 <sup>D</sup> 26 29.6			USCGS: 0.4 S 91.4 W Galapagos Islands △ = 1075 miles
18	15	iP <sub>ZZ</sub> iS <sub>eN</sub>	07 09 57.6 <sup>D</sup> 11 05.2	0.8	33.5	USCGS: 5.6 N 82.6 W South of Panama △ = 400 miles
19	15	iP <sub>Z</sub> iS <sub>E</sub>	13 18 09.6 <sup>D</sup> 21 27.6			USCGS: 0.3 S 91.1 W △ Galapagos Islands = 1240 miles
20	15	iP <sub>Z</sub> iS <sub>E</sub>	17 43 48.4 <sup>D</sup> 46 55.2			USCGS: 0.2 S 91.4 W Galapagos Islands △ = 1150 miles
21	15	eP <sub>Z</sub> iS <sub>E</sub>	21 28 36.4 <sup>D</sup> 31 52.0			USCGS: 0.1 S 91.4 W Galapagos Islands △ = 1240 miles
22	16	eP <sub>Z</sub> iS <sub>E</sub>	00 34 34.4 <sup>D</sup> 37 54.8			USCGS: 0.2 S 91.3 W Galapagos Islands △ = 1250 miles
23	16	eP <sub>Z</sub> iS <sub>E</sub>	03 50 38.4 <sup>D</sup> 53 50.4			USCGS: 0.2 S 91.3 W Galapagos Islands △ = 1200 miles
24	16	eP <sub>Z</sub> iS <sub>N</sub>	07 16 47.2 <sup>D</sup> 19 42.8			USCGS: 0.2 S 91.2 W Galapagos Islands △ = 1080 miles












Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time		Amplitude mm	Remarks
			G.C.T.	Period		
25	16	eP <sub>Z</sub> iS <sub>N</sub>	10 15 46.0 <sup>D</sup> 18 42.0		USCGS: 0.3 S 91.3 W Galapagos Islands	 = 1080 miles
26	16	iP <sub>Z</sub> iS <sub>N</sub>	13 03 48.4 <sup>D</sup> 06 40.0		USCGS: 0.3 S 91.7 W Galapagos Islands	 = 1070 miles
27	16	iP <sub>Z</sub> iS <sub>E</sub>	16 23 53.6 <sup>D</sup> 27 06.0		USCGS: 0.4 S 91.4 W Galapagos Islands	 = 1200 miles
28	16	eP <sub>Z</sub> iS <sub>N</sub>	18 48 55.2 <sup>D</sup> 52 15.2		USCGS: 0.2 S 91.4 W Galapagos Islands	 = 1250 miles
29	16	iP <sub>Z</sub> iS <sub>E</sub>	20 55 26.0 <sup>D</sup> 58 30.4		USCGS: 0.5 S 91.5 W Galapagos Island	 = 1150 miles
30	16	eP <sub>Z</sub> iS <sub>N</sub>	23 14 11.2 <sup>D</sup> 17 40.0		USCGS: 0.6 S 91.8 W Galapagos Islands	 = 1320 miles
31	17	eP <sub>Z</sub> iS <sub>N</sub>	01 11 21.2 <sup>D</sup> 14 36.0		USCGS: 0.4 S 91.5 W Galapagos Islands	 = 1220 miles
32	17	iP <sub>Z</sub> iS <sub>E</sub>	02 18 28.8 <sup>D</sup> 21 42.4		USCGS: 0.7 S 91.8 W Galapagos Islands	 = 1210 miles
33	17	iP <sub>Z</sub> iS <sub>E</sub>	04 31 58.0 <sup>D</sup> 34 09.6			 = 800 miles
34	17	eP <sub>Z</sub>	06 49 09.2 <sup>D</sup> 52 26.0		USCGS: 0.3 S 91.3 W Galapagos Island	 = 1180 miles
35	17	eP <sub>Z</sub> iS <sub>E</sub>	08 54 44.4 <sup>D</sup> 58 02.0		USCGS: 0.1 N 91.3 W Galapagos Islands	 = 1240 miles

## Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
36	17	eP <sub>Z</sub> iS <sub>E</sub>	10 37 49.6 <sup>D</sup> 40 06.4			USCGS: 0.6 S 91.5 W Galapagos Islands △ = 840 miles
37	17	iP <sub>Z</sub> iS <sub>E</sub>	14 58 18.4 <sup>D</sup> 15 01 31.2			USCGS: 0.3 S 91.2 W Galapagos Islands △ = 1210 miles
38	17	iP <sub>Z</sub> iS <sub>E</sub>	17 40 35.6 <sup>D</sup> 43 50.4			USCGS: 0.4 S 91.5 W Galapagos Islands △ = 1225 miles
39	17	eP <sub>Z</sub> iS <sub>N</sub>	19 54 46.0 <sup>D</sup> 58 09.2			USCGS: 0.3 S 91.8 W Galapagos Islands △ = 1275 miles
40	17	iP <sub>Z</sub> iS <sub>E</sub>	22 09 18.8 <sup>D</sup> 12 30.8			USCGS: 0.4 S 91.1 W Galapagos Islands △ = 1190 miles
41	18	iP <sub>Z</sub> iS <sub>E</sub>	00 12 25.2 <sup>D</sup> 15 35.2			USCGS: 0.2 S 91.2 W Galapagos Islands △ = 1180 miles
42	18	iP <sub>Z</sub> iS <sub>e</sub>	01 11 37.2 <sup>G</sup> 11 45.2			△ = 78 miles
43	18	iP <sub>Z</sub> iS <sub>E</sub>	02 26 22.4 <sup>D</sup> 29 34.4			USCGS: 0.2 S 91.5 W Galapagos Islands △ = 1200 miles
44	18	iP <sub>Z</sub> iS <sub>E</sub>	03 56 38.4 <sup>D</sup> 59 48.8			USCGS: 0.5 S 91.4 W Galapagos Islands △ = 1180 miles
45	18	eP <sub>Z</sub> eS <sub>E</sub>	05 30 54.0 <sup>D</sup> 34 06.0			USCGS: 0.6 S 91.1 W Galapagos Islands △ = 1200 miles
46	18	iP <sub>Z</sub> iS <sub>E</sub>	07 16 36.0 <sup>D</sup> 19 48.0			USCGS: 0.4 S 91.8 W Galapagos Islands △ = 1200 miles

## Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time		Amplitude mm	Remarks
			G.C.T.	Period		
47	18	eP <sub>Z</sub> iS <sub>E</sub>	08 59 47.6 <sup>D</sup> 09 03 02.0		USCGS: 0.2 S 91.3 W Galapagos Islands	 = 1220 miles
48	18	iP <sub>Z</sub> iS <sub>N</sub>	10 33 52.0 <sup>D</sup> 36 47.2		USCGS: 0.4 S 91.7 W Galapagos Islands	 = 1080 miles
49	18	iP <sub>Z</sub> iS <sub>e</sub>	10 53 48.8 <sup>D</sup> 54 14.4			 = 125 miles
50	18	iP <sub>Z</sub> eS <sub>N</sub>	14 46 10.8 <sup>D</sup> 49 07.6		USCGS: 0.3 S 91.5 W Galapagos Islands	 = 1100 miles
51	18	iP <sub>Z</sub> eS <sub>N</sub>	16 20 55.6 <sup>D</sup> 23 48.0		USCGS: 0.3 S 91.2 W Galapagos Islands	 = 1075 miles
52	18	eP <sub>Z</sub> eS <sub>N</sub>	21 52 20.0 <sup>D</sup> 55 36.0		USCGS: 0.4 S 91.7 W Galapagos Islands	 = 1225 miles
53	18	eP <sub>Z</sub> eS <sub>N</sub>	23 41 07.2 <sup>D</sup> 44 32.0		USCGS: 0.6 S 91.5 W Galapagos Islands	 = 1280 miles
54	19	eP <sub>Z</sub> eS <sub>E</sub>	04 09 16.8 <sup>D</sup> 12 28.0		USCGS: 0.2 S 91.2 W Galapagos Islands	 = 1200 miles
55	19	iP <sub>Z</sub> iS <sub>E</sub>	05 51 20.4 <sup>D</sup> 54 32.0		USCGS: 0.5 S 91.7 W Galapagos Islands	 = 1200 miles
56	19	iP <sub>ZZ</sub> iS <sub>E</sub>	08 17 02.0 <sup>D</sup> 19 30.8		USCGS: 5.6 S 77.2 W Northern Peru	 = 920 miles
57	19	iP <sub>Z</sub> iS <sub>N</sub> iS <sub>RN</sub>	12 40 20.0 <sup>D</sup> 44 20.0 45 28.0		USCGS: 0.5 S 91.6 W Galapagos Islands	 = 1700 miles

## Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
58	19	iP <sub>Z</sub>	13 48	12.0 <sup>D</sup>			USCGS: 0.9 S 91.9 W Galapagos Islands △ = 1500 miles
		iS <sub>N</sub>	51	20.0			
		iL <sub>N</sub>	53	28			
59	19	iP <sub>Z</sub>	16 51	16.0 <sup>D</sup>			USCGS: 0.1 S 91.7 W Galapagos Islands △ = 1400 miles
		eS <sub>N</sub>	54	28.0			
		iL <sub>N</sub>	56	42.0			
60	19	iP <sub>Z</sub>	18 00	22.0 <sup>D</sup>			USCGS: 0.1 S 91.2 W Galapagos Islands △ = 1500 miles
		eS <sub>N</sub>	03	40.0			
		iL <sub>N</sub>	05	48			
61	19	iP <sub>Zz</sub>	19 23	10.0 <sup>D</sup>	.8	1.8	USCGS: 0.4 S 91.5 W Galapagos Islands △ = 1480 miles
		eS <sub>N</sub>	26	20.0			
		iL <sub>N</sub>	28	20.0			
62	19	eP <sub>Z</sub>	21 19	24.0			USCGS: 0.7 S 91.6 W Galapagos Islands △ = 1500 miles
		iS <sub>N</sub>	23	20.0			
		iL <sub>N</sub>	25	32.0			
63	19	iP <sub>Z</sub>	22 14	56.0 <sup>D</sup>			USCGS: 0.4 S 91.3 W Galapagos Islands △ = 1500 miles
		iS <sub>N</sub>	18	12			
		iL <sub>N</sub>	20	20			
64	19	iP <sub>Z</sub>	23 35	28.0 <sup>D</sup>			USCGS: 0.2 N 91.1 W Galapagos Islands △ = 1480 miles
		iS <sub>N</sub>	38	52.0			
		iL <sub>N</sub>	41	00			
65	20	iP <sub>Z</sub>	01 36	20.0 <sup>D</sup>			USCGS: 0.5 S 91.5 W Galapagos Islands △ = 1450 miles
		iS <sub>N</sub>	39	36			
		iL <sub>N</sub>	41	24			
66	20	iP <sub>Zz</sub>	02 42	04.3 <sup>D</sup>	1.3	15.0	△ = 2150 miles
		iS <sub>N</sub>	47	20.0			
		iL <sub>N</sub>	50	48.0			
67	20	iP <sub>Z</sub>	04 59	00.0 <sup>D</sup>			△ = 4500 miles
		iS <sub>E</sub>	05 08	00			
68	20	iS <sub>E</sub>	07 18	34.1 <sup>D</sup>			USCGS: 0.3 S 91.5 W Galapagos Islands △ = 1300 miles
			21	40.0			
		iL <sub>E</sub>	24	00.0			

## Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
69	20	eP <sub>Zz</sub> iS <sub>E</sub>	08 14 38.0 <sup>D</sup> 17 24.0	1.0	3.4	USCGS: 5.8 S 77.3 W Northern Peru △ = 1100 miles
70	20	iP <sub>Z</sub> iS <sub>N</sub> iL <sub>N</sub>	09 15 06.0 <sup>D</sup> 18 16.0 20 08.0			USCGS: 0.3 S 91.8 W Galapagos Islands △ = 1300 miles
71	20	eP <sub>Z</sub> eS <sub>N</sub> iL <sub>N</sub>	13 54 06.0 <sup>D</sup> 57 08.0 59 16.0			USCGS: 0.7 S 91.8 W Galapagos Islands △ = 1300 miles
72	20	iP <sub>Z</sub> iS <sub>e</sub>	14 15 01.2 <sup>C</sup> 15 04.8	0.5	4.2	Cut Widening Blast △ = 15 miles
73	20	iP <sub>Z</sub> eS <sub>e</sub>	15 06 55.6 <sup>C</sup> 06 58.4	0.3	4.3	Cut Widening Blast △ = 15 miles
74	20	iP <sub>Z</sub> iS <sub>N</sub> iL <sub>N</sub>	16 12 42.0 <sup>D</sup> 16 00.0 18 00.0			USCGS: 0.4 S 91.6 W Galapagos Islands △ = 1300 miles
75	20	iP <sub>Z</sub> iS <sub>E</sub> eL <sub>E</sub>	20 39 46.0 <sup>D</sup> 43 00.0 45 22.0			USCGS: 0.2 S 91.6 W Galapagos Islands △ = 1300 miles
76	20	iP <sub>Zz</sub> iS <sub>N</sub> iL <sub>N</sub>	23 29 03.0 <sup>D</sup> 32 16.0 34 20.0			USCGS: 0.1 S 91.7 W Galapagos Islands △ = 1350 miles
77	21	iP <sub>Zz</sub> iS <sub>E</sub> iL <sub>E</sub>	00 29 37.2 <sup>D</sup> 32 22.0 34 24.0	1.2	4.8	USCGS: 5.7 S 77.3 W Northern Peru △ = 1300 miles
78	21	iP <sub>Zz</sub> iS <sub>N</sub> iL <sub>N</sub>	05 51 04.0 <sup>D</sup> 53 52.0 56 00	1.2	2.0	USCGS: 0.4 S 91.8 W Galapagos Islands △ = 1300 miles
79	21	iP <sub>Zz</sub> iS <sub>E</sub>	07 34 42.3 <sup>D</sup> 38 24.0	1.2	1.1	USCGS: 5.5 S 77.2 W Northern Peru △ = 1300 miles

## Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
80	21	iP <sub>Z</sub> iS <sub>N</sub> iL <sub>N</sub>	09 36 11.0 <sup>D</sup> 39 08.0 41 06.0			USCGS: 0.2 S 91.8 W Galapagos Islands △ = 1300 miles
81	21	iP <sub>Zz</sub> iS <sub>N</sub> iL <sub>N</sub>	11 08 10.0 11 24.0 13 20.0			USCGS: 0.1 S 01.6 W Galapagos Islands △ = 1300 miles
82	21	eP <sub>Z</sub> eS <sub>e</sub>	11 47 08.6 <sup>C</sup> 47 12.0	0.4	7.5	Cut Widening Blast △ = 15 miles
83	21	eP <sub>Z</sub> iS <sub>E</sub>	20 54 42.0 <sup>C</sup> 57 42.0			USCGS: 0.2 S 91.5 W Galapagos Islands △ = 1250 miles
84	22	eP <sub>Z</sub> iS <sub>E</sub>	00 25 34.4 <sup>C</sup> 28 50.8			USCGS: 0.1 S 91.6 W Galapagos Islands △ = 1400 miles
85	22	eP <sub>Z</sub> iS <sub>E</sub>	09 50 23.2 <sup>C</sup> 53 36.8			USCGS: 0.1 S 91.5 W Galapagos Islands △ = 1230 miles
86	23	eP <sub>Z</sub> iS <sub>E</sub>	03 47 02.0 <sup>C</sup> 50 15.2			USCGS: 0.2 S 91.5 W Galapagos Islands △ = 1350 miles
87	25	eP <sub>Z</sub> iS <sub>N</sub>	01 22 44.0 <sup>C</sup> 26 08.8			USCGS: 0.0 S 90.9 W Galapagos Islands △ = 1270 miles
88	25	iP <sub>Z</sub> iS <sub>e</sub>	05 59 32.3 <sup>C</sup> 59 40.5	0.3	14.5	△ = 88 miles
89	25	iP <sub>Z</sub> iS <sub>e</sub>	07 43 51.3 44 42.1	0.4	1.4	△ = 245 miles
90	27	iP <sub>Z</sub> iS <sub>e</sub>	16 02 43.3 <sup>C</sup> 02 46.4	0.3	9.7	Cut Widening Blast △ = 15 miles



Seismological Bulletin - JUNE 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
91	27	iP <sub>z</sub> iS <sub>e</sub>	16 34 07.3 <sup>C</sup> 34 10.2	0.3	11.1	Cut Widening Blast △ = 15 miles	
92	29	eP <sub>z</sub> iS <sub>e</sub>	05 06 28.6 06 50.8			△ = 105 miles	
93	29	iP <sub>z</sub> eS <sub>e</sub>	23 26 32.2 <sup>C</sup> 27 30.2	0.6	31.5	USCGS: 8.9 N 77.3 W Panama-Colombia Border Region △ = 280 miles	
94	30	eP <sub>z</sub> iS <sub>e</sub>	05 38 20.0 <sup>C</sup> 38 41.3	0.3	1.6	△ = 100 miles	
95	30	eP <sub>z</sub> iS <sub>e</sub>	08 27 14.7 <sup>D</sup> 27 39.3	0.3	1.8	△ = 75 miles	
96	30	iP <sub>z</sub> iS <sub>e</sub>	13 11 03.2 <sup>C</sup> 11 28.0	0.6	26.6	△ = 120 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 - JULY 1968

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 <sub>ZZ</sub>	03 49 42.3 <sup>G</sup>		1.0	4.3	USCGS: 17.6 N 100.3 W Guerrero, Mexico △ = 1600 miles
		iS <sub>N</sub>	53 44.0				
		iL <sub>N</sub>	56 12.0				
2	2	iP <sub>ZZ</sub>	16 16 39.2 <sup>G</sup>		0.8	9.0	USCGS: 9.0 N 82.9 W Panama-Costa Rica Border Region △ = 28 miles
		iS <sub>N</sub>	16 45.0				
3	4	iP <sub>Z</sub>	05 02 39.2 <sup>G</sup>		0.5	5.3	△ = 25 miles
		iS <sub>e</sub>	02 44.2				
4	4	iP <sub>Z</sub>	15 17 09.2 <sup>G</sup>		1.0	3.9	USCGS: 10.5 N 84.1 W Costa Rica △ = 267 miles
		iS <sub>n</sub>	18 04.5				
5	4	iP <sub>Z</sub>	17 13 58.6 <sup>G</sup>		0.4	5.7	△ = 30 miles
		iS <sub>e</sub>	14 04.5				
6	5	eP <sub>Z</sub>	11 48 32.0 <sup>D</sup>				USCGS: 38.5 N 142.0 E Near East coast of Honshu, Japan △ = 5200 miles
		iP <sub>RIN</sub>	51 28.0				
		iS <sub>N</sub>	58 00.0				
7	5	iP	14 44 05.9 <sup>G</sup>		0.3	6.3	Cut Widening Blast △ = 15 miles
		iS <sub>n</sub>	44 09.5				
8	5	iP <sub>Z</sub>	15 45 57.6 <sup>G</sup>		0.3	3.5	Cut Widening Blast △ = 15 miles
		iS <sub>e</sub>	46 00.8				
9	6	iP	19 48 38.2 <sup>G</sup>		0.8	2.8	Cut Widening Blast △ = 80 miles
		iS <sub>e</sub>	48 54.7				
10	7	eP <sub>Z</sub>	23 10 29.2 <sup>D</sup>				USCGS: 8.5 N 103.3 W Off Coast of Mexico
		iS <sub>N</sub>	14 43.0				

Seismological Bulletin - JULY 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
11	7	iP <sub>ZZ</sub> eS <sub>N</sub> eL <sub>N</sub>	23 51 37.6 <sup>D</sup> 54 40.0 56 24.0			USCGS: 5.8 S 77.1 W Northern Peru △ = 1300 miles
12	8	eP <sub>Z</sub> eS <sub>e</sub>	15 53 56.7 54 02.7			△ = 30 miles
13	10	iP <sub>Z</sub> eS <sub>E</sub>	11 36 24.0 <sup>D</sup> 44 28.0			△ = 4000 miles
14	11	iP <sub>Z</sub>	15 11 47.0 <sup>G</sup> 11 50.2	0.3	2.4	Cut Widening Blast △ = 15 miles
15	11	iP <sub>Z</sub> iS <sub>e</sub>	15 35 59.9 <sup>G</sup> 36 03.4	0.3	8.1	△ = 18 miles
16	12	iP <sub>Z</sub> iS <sub>N</sub>	01 04 40.0 <sup>D</sup> 14 20.0			USCGS: 39.5 N 143.2 E Off East Coast of Honshu, Japan △ = 5100 miles
17	13	eP <sub>Z</sub> iS <sub>e</sub>	10 57 46.1 <sup>G</sup> 58 40.4	0.4	3.2	△ = 263 miles
18	14	iP <sub>Z</sub> eS <sub>E</sub> eL <sub>E</sub>	03 58 06.0 <sup>D</sup> 04 00 56.0 02 16.0			USCGS: 15.2 N 88.8 W Honduras △ = 1300 miles
19	14	iP <sub>Z</sub> iS <sub>n</sub>	22 01 15.7 <sup>G</sup> 01 23.6	0.6	9.0	△ = 38 miles
20	15	eP <sub>Z</sub> iS <sub>n</sub>	17 01 02.1 <sup>G</sup> 01 05.3	0.4	3.0	Cut Widening Blast △ = 15 miles
21	16	iP <sub>Z</sub> iS <sub>n</sub>	03 39 44.9 <sup>G</sup> 40 08.5	0.5	2.3	△ = 113 miles
22	17	iP <sub>ZZ</sub> iS <sub>N</sub>	06 24 10.7 <sup>D</sup> 26 11.2	0.8	1.2	USCGS: 10.4 N 83.4 W Costa Rica △ = 800 miles
23	18	iP <sub>ZZ</sub> iS <sub>E</sub>	09 20 51.2 <sup>G</sup> 21 48.0	1.0	4.0	USCGS: 0.9 N 85.2 W Off Coast of Ecuador △ = 273 miles

## Seismological Bulletin - JULY 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
24	18	iP <sub>Z</sub> iS <sub>n</sub>	13 39 51.7 <sup>C</sup> 39 55.3		0.3	4.5	Cut Widening Blast △ = 15 miles
25	18	iP <sub>Z</sub> iS <sub>n</sub>	14 15 29.6 <sup>C</sup> 15 33.1		0.3	3.5	Cut Widening Blast △ = 15 miles
26	19	iP <sub>Z</sub> iS <sub>e</sub>	13 51 34.9 <sup>C</sup> 51 38.5		0.3	7.4	Cut Widening Blast △ = 15 miles
27	19	iP <sub>Z</sub> iS <sub>e</sub>	14 28 16.0 <sup>C</sup> 28 19.4		0.2	5.7	Cut Widening Blast △ = 15 miles
28	19	iP <sub>Z</sub> iS <sub>e</sub>	19 18 05.0 <sup>C</sup> 18 07.9		0.3	3.4	Cut Widening Blast △ = 15 miles
29	20	iP <sub>Z</sub> iS <sub>n</sub>	15 58 25.7 <sup>C</sup> 58 56.5		0.5	2.7	△ = 148 miles
30	21	iP <sub>Z</sub> iS <sub>n</sub>	04 29 45.0 <sup>D</sup> 31 01.5		0.6	1.7	USCGS: 6.8 N 72.9 W Northern Colombia △ = 450 miles
31	21	iP <sub>Z</sub> iS <sub>n</sub>	05 31 11.1 <sup>D</sup> 31 37.0		0.6	2.3	△ = 125 miles
32	22	eP <sub>Z</sub> iS <sub>N</sub>	05 33 30 39 40				△ = 2800 miles
33	23	eP <sub>Z</sub> iS <sub>N</sub> iL <sub>N</sub>	18 34 12.0 38 48.0 42 12.0	18.0 11.2 10.4	5.5 5.2 3.7		USCGS: 18.7 N 107.0 W Off Coast of Jalisco, Mexico △ = 1860 miles
34	24	eP <sub>Z</sub> iS <sub>E</sub> iL <sub>E</sub>	04 12 30.0 <sup>D</sup> 17 30.0 20 12.0	22.0 20.0 22.0	5.5 5.0 5.2		USCGS: 18.1 N 106.0 W Off Coast of Jalisco, Mexico △ = 1900 miles
35	25	iP <sub>Z</sub> iS <sub>N</sub> iS <sub>RIN</sub>	07 36 50.0 <sup>D</sup> 47 25.0 53 20.0				USCGS: 30.8 S 178.4 W Kermadec Island Region △ = 6200 miles
36	25	iP <sub>Z</sub> iS <sub>E</sub>	13 45 42.3 <sup>C</sup> 45 46.5		0.3	5.4	Cut Widening Blast △ = 15 miles

Seismological Bulletin - JULY 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
37	26	iP <sub>Z</sub>	06 37	23.2 <sup>D</sup>			USCGS: 14.4 N 93.0 W Near Coast of Chiapas, Mexico △ = 2500 miles
		iS <sub>E</sub>	42	40.0			
		iS <sub>R</sub> IE	45	0.0			
38	26	iP <sub>Z</sub>	18 31	29.6 <sup>D</sup>	0.6	7.3	USCGS: 6.8 N 73.0 W Northern Colombia △ = 450 miles
		iS <sub>N</sub>	32	43.9			
39	29	eP <sub>Z</sub>	12 05	16.3 <sup>D</sup>	0.3	2.0	△ = 220 miles
		iS <sub>n</sub>	06	0.0			
40	30	iP <sub>Zz</sub>	00 11	56.2 <sup>G</sup>	1.0	4.0	△ = 260 miles
		iS <sub>N</sub>	12	44.0			
41	30	iP <sub>Z</sub>	16 58	18.3 <sup>G</sup>	0.4	6.5	Cut Widening Blast △ = 15 miles
		iS <sub>n</sub>	58	22.0			
42	30	iP <sub>Z</sub>	20 12	00.9 <sup>G</sup>	0.3	4.5	Cut Widening Blast △ = 15 miles
		iS <sub>n</sub>	12	04.3			
43	30	iP <sub>Z</sub>	20 33	51.1 <sup>G</sup>	0.3	1.6	△ = 105 miles
		iS <sub>e</sub>	34	13.2			
44	30	iP <sub>Zz</sub>	20 42	25.5 <sup>G</sup>	0.8	6.9	△ = 1100 miles
		iS <sub>E</sub>	45	24.0			
45	31	iP <sub>Z</sub>	20 08	42.4 <sup>D</sup>			△ = 173 miles
		iS <sub>N</sub>	09	18.0			

*T. G. Henter*  
T. G. 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 1968

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

No.	Date	Phase	Time		Ampli- tude mm	Remarks
			G.C.T.	Period		
1	..2	iP <sub>Z</sub> iS <sub>N</sub>	19 28 29.8 <sup>G</sup> 28 33.6	0.3	3.1	Gut Widening Blast △ = 15 miles
2	1	iP <sub>Z</sub> iS <sub>N</sub>	20 17 46.5 <sup>G</sup> 17 50.0	0.3	2.3	Gut Widening Blast △ = 15 miles
3	1	iP <sub>ZZ</sub> iS <sub>N</sub>	20 39 05.3 <sup>G</sup> 40 12.0	0.8	4.3	△ = 410 miles
4	2	iP <sub>ZZ</sub> iS <sub>N</sub>	14 11 07.0 <sup>D</sup> 14 48.0	1.1	7.0	△ = 1500 miles
5	3	eP <sub>ZZ</sub> iS <sub>N</sub>	05 13 51.5 <sup>D</sup> 17 32.0	0.8	1.5	△ = 1500 miles
6	4	iP <sub>ZZ</sub> iS <sub>e</sub>	12 01 04.6 <sup>D</sup> 01 56.3	1.0	6.0	△ = 250 miles
7	5	iP <sub>Z</sub> eS <sub>N</sub> iP <sub>SE</sub> iS <sub>SE</sub>	16 36 07.0 <sup>C</sup> 49 00.0 52 12.0 17 37 36.0			USCGS: 33.3 N 132.2 E. Shkoku, Japan Manila △ = 9800 miles
8	6	eP <sub>Z</sub> iS <sub>N</sub>	03 30 48.8 <sup>G</sup> 34 34.8			USCGS: 17.2 N 92.6 W Chiapas, Mexico △ = 1500 miles
9	6	iP <sub>Z</sub> iS <sub>n</sub>	16 33 54.3 <sup>G</sup> 33 56.2	0.3	4.5	△ = 10 miles
10	8	iP <sub>Z</sub> iS <sub>n</sub>	05 02 34.4 <sup>G</sup> 03 04.7	0.5	2.8	△ = 147 miles

## Seismological Bulletin - AUGUST 1968

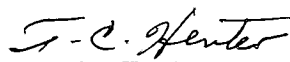
No.	Date	Phase	Time		Period	Ampli-	Remarks		
			G.C.T.			tude			
						mm			
11	9	iP <sub>zZ</sub>	03 16 22.8 <sup>D</sup>		1.0	1.8	USCGS: 22.4 S 113.0 W	Easter Island Region	
		iS <sub>N</sub>	23 07.6						△ = 3400 miles
		iS <sub>SN</sub>	26 38.0						
12	9	iP <sub>z</sub>	12 07 29.4 <sup>C</sup>		0.3	5.6	Cut Widening Blast	△ = 15 miles	
		iS <sub>n</sub>	07 31.9						
13	9	iP <sub>z</sub>	17 22 29.3 <sup>C</sup>		0.3	3.9	Cut Widening Blast	△ = 15 miles	
		iS <sub>n</sub>	22 33.0						
14	10	iP <sub>zZ</sub>	02 24 52.8 <sup>D</sup>		0.9	3.3		△ = 130 miles	
		iS <sub>N</sub>	27 0.0						
15	10	eP <sub>z</sub>	04 25 38.5 <sup>D</sup>		1.0	1.2			
16	10	eP <sub>z</sub>	06 11 35.7 <sup>C</sup>		1.2	2.5			
17	10	iP <sub>z</sub>	10 14 19.8 <sup>C</sup>		0.4	2.5		△ = 130 miles	
		iS <sub>n</sub>	14 46.5						
18	11	iP <sub>zZ</sub>	02 47 08.5 <sup>D</sup>		1.5	7.1	USCGS: 15.2 S 74.0 W	Near Coast of Peru	
		iS <sub>N</sub>	52 20.0						△ = 2250 miles
19	11	iP <sub>zZ</sub>	08 20 32.1 <sup>D</sup>		1.7	5.1		△ = 230 miles	
		eS <sub>n</sub>	21 19.5						
20	12	iP <sub>z</sub>	16 21 36.2 <sup>C</sup>		0.6	3.4		△ = 205 miles	
		iS <sub>n</sub>	22 19.2						
21	12	eP <sub>z</sub>	23 15 18.2 <sup>C</sup>		0.7	3.1		△ = 225 miles	
		iS <sub>n</sub>	16 04.7						
22	13	iP <sub>z</sub>	13 16 07.1 <sup>C</sup>		0.3	7.5	Cut Widening Blast	△ = 15 miles	
		iS <sub>n</sub>	16 10.6						
23	13	iP <sub>z</sub>	13 42 19.0 <sup>C</sup>		0.3	8.5	Cut Widening Blast	△ = 15 miles	
		iS <sub>n</sub>	42 22.2						
24	13	iP <sub>z</sub>	14 44 48.0 <sup>C</sup>		0.3	3.9	Cut Widening Blast	△ = 15 miles	
			44 51.0						

## Seismological Bulletin - AUGUST 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
25	14	iP <sub>ZZ</sub> iS <sub>N</sub>	08 44 02.7 <sup>C</sup>		1.4	2.5	USCGS: 18.5 N 102.8 W Michoacan, Mexico  △ = 2000 miles
			48 50.8		20.8	15.0	
			51 44.0		16.8	9.3	
					22.0	13.5	
26	14	iP <sub>Z</sub>	21 59 36.8 <sup>C</sup>		.5	5.5	Cut Widening Blast △ = 15 miles
			59 38.8				
27	14	iP <sub>Z</sub> eS <sub>e</sub>	22 33 53.7 <sup>C</sup>		0.3	2.0	△ = 132 miles
			34 21.2				
28	14	iP <sub>Z</sub> iS <sub>E</sub>	22 34 16.0 <sup>C</sup>		22.4	22.5	△ = 1600 miles
			38 00.0		12.8	9.3	
			40 50.0		10.4	7.0	
29	15	iP <sub>Z</sub> iS <sub>e</sub>	02 07 05.2 <sup>C</sup>		.5	2.4	△ = 225 miles
			07 52.1				
30	16	iP <sub>Z</sub> iS <sub>e</sub>	12 34 18.9 <sup>C</sup>		.3	6.0	Cut Widening Blast △ = 15 miles
			34 22.0				
31	17	iP <sub>ZZ</sub>	04 20 24.8 <sup>D</sup>		0.5	2.4	
32	17	iP <sub>Z</sub> iS <sub>e</sub>	05 56 32.1 <sup>D</sup>		0.5	4.5	△ = 85 miles
			56 49.7				
33	18	iP <sub>ZZ</sub> eS <sub>E</sub>	18 56 23.9 <sup>D</sup>		1.3	6.2	△ = 650 miles
			58 12.0				
34	18	iP <sub>ZZ</sub>	19 16 38.4 <sup>C</sup>		1.0	1.8	
35	19	iP <sub>Z</sub> iS <sub>e</sub>	20 31 51.7 <sup>C</sup>		0.3	3.0	△ = 30 miles
			31 57.7				
36	20	iP <sub>Z</sub> iS <sub>e</sub>	12 13 07.2 <sup>C</sup>		0.3	5.5	Cut Widening Blast △ = 16 miles
			13 11.5				
37	20	iP <sub>Z</sub> iS <sub>N</sub>	12 38 14.0 <sup>C</sup>		0.3	4.6	Cut Widening Blast △ = 16 miles
			38 17.5				
38	20	iP <sub>Z</sub> eS <sub>e</sub>	14 16 14.9 <sup>C</sup>		0.4	2.2	△ = 67 miles
			16 28.6				

## Seismological Bulletin - AUGUST 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
39	20	iP <sub>Z</sub> iS <sub>n</sub>	14 32 33.4 <sup>G</sup> 32 36.8		0.3	6.0	Cut Widening Blast △ = 15 miles
40	21	iP <sub>Z</sub> iS <sub>e</sub>	21 13 06.2 <sup>G</sup> 13 15.4		0.3	2.0	△ = 48 miles
41	21	eP <sub>Z</sub> iS <sub>N</sub> iL <sub>N</sub>	19 13 36.0 23 28.0 40 00.0	26.0 40.0 29.2	7.2 28.9 14.1		△ = 5500 miles
42	23	iP <sub>ZZ</sub> iS <sub>N</sub>	22 42 54.6 <sup>G</sup> 46 36.4	0.7	4.7	USCGS: 22.0 S 63.5 W Salta Province, Argentina	△ = 2500 miles
43	26	iP <sub>Z</sub> iS <sub>N</sub>	20 17 46.4 <sup>G</sup> 17 49.4	0.3	3.0	Cut Widening Blast	△ = 15 miles
44	27	iP <sub>Z</sub> iS <sub>n</sub>	17 16 19.4 <sup>G</sup> 16 22.4			Cut Widening Blast	△ = 15 miles
45	28	iP <sub>Z</sub> iS <sub>N</sub>	14 24 46.1 <sup>G</sup> 24 49.4	0.3	10.7	Cut Widening Blast	△ = 15 miles
46	28	iP <sub>Z</sub> iS <sub>N</sub>	17 18 30.2 <sup>G</sup> 18 33.2	0.3	6.9	Cut Widening Blast	△ = 15 miles
47	28	iP <sub>Z</sub> iS <sub>N</sub>	18 48 44.1 <sup>G</sup> 48 46.8	0.3	6.8	Cut Widening Blast	△ = 15 miles
48	28	iP <sub>ZZ</sub> eS <sub>N</sub>	21 02 02.0 <sup>D</sup> 03 25.6	1.2	6.3		△ = 500 miles
49	29	iP <sub>Z</sub> iS <sub>e</sub>	21 17 20.1 <sup>G</sup> 18 37.6	0.6	3.3		△ = 475 miles
50	30	eP <sub>Z</sub> iS <sub>e</sub>	08 04 15.0 <sup>G</sup> 04 23.4	0.3	1.2		△ = 40 miles
51	31	eX <sub>Z</sub> iX <sub>N</sub> iX <sub>N</sub>	11 08 12.8 18 28.0 25 18.4			Iran	△ = 7500 miles
52	31	iP <sub>Z</sub> iS <sub>n</sub>	21 48 55.5 <sup>G</sup> 50 02.9	0.6	11.3		△ = 410 miles

  
 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 1968

----- 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	eP <sub>Z</sub> iS <sub>n</sub>	02 53	53.6 43.7			 = 240 miles	
2	3	eP <sub>Z</sub> eP <sub>P</sub> eS <sub>KS</sub> iP <sub>S</sub>	08 33	45.6 45.6 18.0 50.0		USCGS: 41.8 N 32.3 E Turkey	 = 7000 miles	
3	3	iP <sub>Z</sub> iS <sub>E</sub>	15 41	37.3 <sup>G</sup> 20.0	1.6	12.1	USCGS: 20.6 N 62.2 W North Atlantic Ocean	 = 1410 miles
4	4	iP <sub>Z</sub> eS <sub>e</sub>	14 35	00.0 <sup>G</sup> 03.0	0.3	2.6	Cut Widening Blast	 = 15 miles
5	4	iP <sub>Z</sub> iS <sub>n</sub>	17 13	56.1 <sup>G</sup> 59.1	0.3	12.2	Cut Widening Blast	 = 15 miles
6	4	eP <sub>Z</sub> iS <sub>e</sub>	17 15	49.7 <sup>D</sup> 18.4	0.3	1.3		 = 143 miles
7	5	eP <sub>Z</sub> iS <sub>N</sub>	02 52	25.6 <sup>D</sup> 07.2			USCGS: 45.1 S 80.1 W Off Coast of Southern Chile	 = 4000 miles
8	6	eP <sub>ZZ</sub> iS <sub>N</sub>	07 53	11.3 <sup>D</sup> 13.2	0.6	2.2	USCGS: 5.8 S 80.3 W Near Coast of Northern Peru	 = 1125 miles
9	6	iP <sub>Z</sub> iS <sub>N</sub>	19 07	28.4 <sup>G</sup> 31.2	0.3	4.1	Cut Widening Blast	 = 15 miles
10	7	iP <sub>Z</sub> iS <sub>e</sub>	06 24	30.8 <sup>G</sup> 07.7	0.5	2.6		 = 177 miles
11	8	eP <sub>Z</sub> iS <sub>E</sub>	15 31	46.4 <sup>D</sup> 20.0				 = 1350 miles

Seismological Bulletin - SEPTEMBER 1968

No.	Date	Phase	Time		Period	Ampli-	Remarks	
			G.C.T.			tude		
						mm		
12	9	iP <sub>ZZ</sub>	00 39 24.0 <sup>C</sup> 41 52.4		0.7	5.2	USCGS: 8.7 S 74.5 W	Peru-Brazil Border Region △ = 920 miles
13	9	eP <sub>Z</sub> iS <sub>e</sub>	08 07 53.5 <sup>D</sup> 08 25.1		0.3	1.8		△ = 152 miles
14	9	eP <sub>Z</sub> iS <sub>e</sub>	10 27 16.2 <sup>G</sup> 27 34.4		0.3	1.9		△ = 87 miles
15	10	iP <sub>Z</sub> iS <sub>N</sub>	17 47 55.9 <sup>G</sup> 47 58.6		0.3	7.6	Cut Widening Blast	△ = 15 miles
16	10	iP <sub>Z</sub> iS <sub>e</sub>	20 48 40.2 <sup>G</sup> 48 43.0		0.3	8.5	Cut Widening Blast	△ = 15 miles
17	10	eP <sub>Z</sub> eS <sub>E</sub>	23 17 14.0 <sup>D</sup> 20 42.0				USCGS: 14.3 N 92.9 W	Near Coast of Chiapas, Mexico △ = 1375 miles
18	11	iP <sub>Z</sub> iS <sub>n</sub>	17 00 7.8 <sup>G</sup> 00 11.5		0.2	7.0	Cut Widening Blast	△ = 18 miles
19	11	iP <sub>Z</sub> iS <sub>n</sub>	18 48 22.4 <sup>G</sup> 48 25.5		0.3	6.0	Cut Widening Blast	△ = 15 miles
20	11	iP <sub>Z</sub>	19 01 27.2 <sup>D</sup>		0.3	8.0		
21	11	iP <sub>Z</sub>	18 35 44 <sup>D</sup>				USCGS: 43.0 S 75.2 W	Off Coast of Southern Chile
22	13	eP <sub>Z</sub>	07 34 16				USCGS: 15.1 N 93.9 W	Near Cost of Chiapas, Mexico
23	13	iP <sub>Z</sub> iS <sub>n</sub>	21 21 50.8 <sup>G</sup> 22 01.2		0.2	3.2		△ = 50 miles
24	16	iP <sub>ZZ</sub> iS <sub>E</sub>	14 14 46.7 <sup>D</sup> 18 09.7		0.7	3.1		△ = 1250 miles
25	16	iP <sub>Z</sub> iS <sub>n</sub>	17 07 53.2 <sup>G</sup> 07 56.4		0.4	4.1	Cut Widening Blast	△ = 15 miles

## Seismological Bulletin - SEPTEMBER 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
26	17	iP <sub>Z</sub> iS <sub>e</sub>	13 40 25.1 <sup>G</sup> 40 28.1	0.3	7.0	Cut Widening Blast △ = 15 miles	
27	19	iP <sub>Z</sub> iS <sub>e</sub>	00 54 11.2 <sup>G</sup> 54 57.4	1.0	3.9	△ = 223 miles	
28	19	eP <sub>Z</sub> iS <sub>n</sub>	02 05 04.9 05 47.4	0.5	1.7	△ = 205 miles	
29	19	iP <sub>Z</sub> iS <sub>n</sub>	06 56 31.3 <sup>D</sup> 57 12.5	0.5	4.5	△ = 197 miles	
30	19	eP <sub>Z</sub>	16 38 52.0 <sup>G</sup>	0.4	1.7	Cut Widening Blast △ = 15 miles	
31	19	iP <sub>Z</sub> iS <sub>n</sub>	19 36 26.4 <sup>G</sup> 36 29.3	0.3	2.1	Cut Widening Blast △ = 15 miles	
32	19	iP <sub>Z</sub> iS <sub>n</sub>	20 53 06.0 <sup>G</sup> 53 08.5	0.4	2.6	Cut Widening Blast △ = 15 miles	
33	20	eP <sub>ZZ</sub> iS <sub>N</sub>	06 03 49.9 <sup>G</sup> 06 44.0	0.8	2.6	USCGS: 10.7 N 62.7 W Near Coast of Venezuela △ = 1075 miles	
34	20	iP <sub>Z</sub> iS <sub>n</sub>	17 53 58.8 <sup>G</sup> 54 01.8			Cut Widening Blast △ = 15 miles	
34	21	eP <sub>Z</sub> eP <sub>S</sub>	13 21 10.4 <sup>G</sup> 35 41.2			USCGS: 42.2 N 142.6 E Hokkaido, Japan Region △ = 8000 miles	
35	22	eP <sub>Z</sub> iS <sub>n</sub>	21 20 28.2 <sup>G</sup> 21 20.6	0.6	3.5	△ = 253 miles	
36	23	eP <sub>Z</sub> iS <sub>n</sub>	17 08 47.8 <sup>G</sup> 08 51.1			Cut Widening Blast △ = 16 miles	
37	25	iP <sub>Z</sub> iS <sub>n</sub>	06 33 00.0 <sup>G</sup> 33 35.6	0.6	1.9	△ = 172 miles	
38	25	iP <sub>ZZ</sub> iS <sub>E</sub>	10 41 55.2 <sup>G</sup> 44 31.2	0.8	11.0	USCGS: 15.6 N 92.6 W Mexico, Guatemala Border Region = 975 miles	

Seismological Bulletin - SEPTEMBER 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
39	25	eP <sub>Z</sub> iS <sub>n</sub>	20 00 24.9 <sup>G</sup> 00 28.2	0.5	2.3	Cut Widening Blast △ = 16 miles
40	26	iP <sub>Z</sub> iS <sub>E</sub>	18 16 42.0 <sup>G</sup> 27 16.0			USCGS: 30.5 S 178.2 N Kermadec Island Region △ = 6100 miles
41	27	iP <sub>ZZ</sub>	04 18 29.9 <sup>D</sup>			
42	27	iP <sub>Z</sub> iS <sub>n</sub>	17 01 05.5 <sup>G</sup> 01 08.7	0.3	5.2	Cut Widening Blast △ = 15 miles
43	28	eP <sub>Z</sub> iS <sub>n</sub>	11 29 31.2 <sup>D</sup> 30 13.0	0.5	4.1	△ = 200 miles
44	28	eP <sub>Z</sub> eS <sub>n</sub>	12 50 12.7 <sup>G</sup> 51 04.6	0.5	1.6	△ = 250 miles
45	28	iP <sub>Z</sub> iS <sub>E</sub>	13 58 29.2 <sup>D</sup> 14 02 33.6	1.6	20.5	USCGS: 13.2 S 76.4 W Near Coast of Peru △ = 1575 miles
46	30	iP <sub>Z</sub> iS <sub>n</sub>	08 42 30.6 <sup>D</sup> 43 10.8	0.4	3.1	△ = 193 miles
47	30	iP <sub>Z</sub>	14 35 31.9 <sup>G</sup>	0.7	3.6	
48	30	iP <sub>Z</sub> iS <sub>e</sub>	17 00 02.8 <sup>G</sup> 00 05.9	0.4	4.6	Cut Widening Blast △ = 15 miles
49	30	iP <sub>Z</sub> iS <sub>n</sub>	18 59 47.7 <sup>G</sup> 59 50.8	0.3	4.7	Cut Widening Blast △ = 15 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 - OCTOBER 1968

----- 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		
1	1	eP <sub>Z</sub> iS <sub>e</sub>	08 21 56.9 22 41.2		0.3	2.1		△ = 213 miles
2	1	iP <sub>Z</sub> iS <sub>e</sub>	12 12 21.4 <sup>D</sup> 13 08.4		0.2	2.9		△ = 225 miles
3	1	iP <sub>Z</sub> iS <sub>e</sub>	12 16 46.4 <sup>G</sup> 16 51.1		0.2	2.5		△ = 23 miles
4	3	iP <sub>Z</sub> iS <sub>n</sub>	17 09 25.0 <sup>G</sup> 09 28.5		0.2	7.2	Cut Widening Blast	△ = 15 miles
5	3	eP <sub>Z</sub> eS <sub>n</sub>	18 37 31.7 37 33.5				Cut Widening Blast	△ = 10 miles
6	3	iP <sub>Z</sub> iS <sub>e</sub>	19 00 33.0 <sup>G</sup> 00 36.0		0.2	7.2	Cut Widening Blast	△ = 14 miles
7	4	iP <sub>ZZ</sub> iS <sub>E</sub>	06 16 26.6 <sup>G</sup> 26 08.0				USCGS: 52.6 S 27.0 W South Sandwich Island Region	△ = 2600 miles
8	4	iP <sub>Z</sub> iS <sub>n</sub>	17 09 05.7 <sup>G</sup> 09 09.0		0.2	9.2		△ = 17 miles
9	4	eP <sub>Z</sub> iS <sub>e</sub>	21 05 18.8 05 23.0				Cut Widening Blast	△ = 19 miles
10	5	iP <sub>Z</sub> iS <sub>n</sub>	17 29 24.5 <sup>G</sup> 29 27.6		0.3	2.3	Cut Widening Blast	△ = 16 miles
11	6	iP <sub>Z</sub> iS <sub>e</sub>	15 33 01.6 <sup>D</sup> 33 37.6		0.2	7.5		△ = 173 miles
12	7	iP <sub>Z</sub> iS <sub>n</sub>	17 21 59.6 <sup>G</sup> 22 45.0		0.3	6.3		△ = 238 miles

## Seismological Bulletin - OCTOBER 1968

No.	Date	Phase	Time		Period	Ampli-	Remarks	
			G.C.T.			tude		
						mm		
13	7	iP <sub>Z</sub> iS <sub>e</sub>	18 47 41.0 <sup>G</sup> 47 46.4		0.2	8.3	Cut Widening Blast △ = 27 miles	
14	7	iP <sub>ZZ</sub> iS <sub>N</sub>	19 38 28.0 <sup>G</sup> 41 48.0		0.6	20.0	△ = 1250 miles	
15	8	iP <sub>ZZ</sub>	08 03 04.4 <sup>G</sup>					
16	8	iP <sub>ZZ</sub>	15 00 08.4 <sup>G</sup>		0.6	13.2	USCGS: 23.3 S 66.5 W Jujuy Province, Argentina	
17	9	iP <sub>Z</sub> iS <sub>n</sub>	14 20 58.2 <sup>D</sup> 21 03.4		0.2	3.2	Cut Widening Blast △ = 26 miles	
18	9	iP <sub>Z</sub>	16 46 08.4 <sup>G</sup>		0.4	6.4		
19	9	iP <sub>Z</sub> iS <sub>n</sub>	18 35 25.2 <sup>D</sup> 35 28.0		0.2	1.8	Cut Widening Blast △ = 13 miles	
20	9	iS <sub>n</sub> iS <sub>e</sub>	19 38 20.4 <sup>G</sup> 38 22.5		0.2	4.9	△ = 11 miles	
21	10	iP <sub>Z</sub>	15 25 00 <sup>G</sup>		0.5	4.1		
22	10	iP <sub>ZZ</sub>	20 27 53.2 <sup>G</sup>		0.1	10.3		
23	11	iP <sub>Z</sub> iS <sub>n</sub>	16 09 20.1 <sup>G</sup> 09 23.5		0.1	5.4	Cut Widening Blast △ = 17 miles	
24	11	iP <sub>Z</sub> iS <sub>n</sub>	17 01 52.2 <sup>G</sup> 01 55.6		0.2	5.2	Cut Widening Blast △ = 17 miles	
25	11	iP <sub>Z</sub>	18 14 18.0 <sup>G</sup>		0.3	2.8		
26	12	iP <sub>Z</sub>	02 21 31.3 <sup>D</sup>		0.4	9.3	USCGS: 6.9 N 72.8 W Northern Colombia	
27	17	iP <sub>Z</sub>	07 57 07.2 <sup>D</sup>		0.6	3.8	USCGS: 1.6 S 77.6 W Ecuador	
28	14	iP <sub>ZZ</sub>	03 04 45.4 <sup>G</sup>		0.6	6.3		
29	14	iP <sub>Z</sub>	14 32 43.0 <sup>G</sup> 32 46.7		0.2	3.7	Cut Widening Blast △ = 18 miles	

## Seismological Bulletin - OCTOBER 1968

No.	Date	Phase	Time		Period	Ampli- tude mm	Remarks
			G.C.T.				
30	15	eP <sub>Z</sub> iS <sub>n</sub>	13 21 25.0 21 27.8		0.1	3.5	Cut Widening Blast △ = 13 miles
31	15	iP <sub>Z</sub> iS <sub>e</sub>	17 10 56.0 <sup>G</sup> 11 00.0		0.1	3.5	Cut Widening Blast △ = 18 miles
32	15	eP <sub>Z</sub>	20 28 51.0 <sup>G</sup>				
33	16	iP <sub>Z</sub> iS <sub>n</sub>	19 02 08.0 <sup>D</sup> 02 12.1		0.2	2.1	Cut Widening Blast △ = 20 miles
34	16	iP <sub>Z</sub>	19 20 17.2 <sup>D</sup> 20 21.0		0.1	3.2	Cut Widening Blast △ = 18 miles
35	17	iP <sub>Z</sub> iS <sub>n</sub>	17 21 14.5 <sup>D</sup> 21 17.5		0.2	3.6	Cut Widening Blast △ = 14 miles
36	17	iP <sub>Z</sub> iS <sub>n</sub>	19 13 24.5 <sup>D</sup> 13 28.0		0.2	2.4	Cut Widening Blast △ = 17 miles
37	18	iP <sub>Z</sub> iS <sub>n</sub>	13 26 22.5 <sup>G</sup> 26 25.6		0.2	4.7	Cut Widening Blast △ = 15 miles
38	18	iP <sub>Z</sub>	19 27 59.1 <sup>G</sup>		0.2	2.6	
39	21	iP <sub>ZZ</sub>	13 04 35.5 <sup>D</sup>		0.4	2.8	
40	21	iP <sub>Z</sub> iS <sub>n</sub>	20 48 39.5 <sup>G</sup> 48 42.3		0.2	3.0	Cut Widening Blast △ = 13 miles
41	22	eP <sub>Z</sub> eS <sub>E</sub>	07 51 48.0 48 36.0				USCGS: 4.4S 104.9 W Northern Easter Island Cordillera
42	22	iP <sub>Z</sub> iS <sub>n</sub>	16 20 26.4 <sup>D</sup> 20 30.0		0.2	2.5	Cut Widening Blast △ = 18 miles
43	22	iP <sub>Z</sub>	18 03 05.0 <sup>G</sup>		0.3	2.4	Cut Widening Blast △ = 15 miles
44	23	eP <sub>ZZ</sub> eS <sub>N</sub>	21 24 09.7 <sup>D</sup> 27 03.5				△ = 1075 miles
45	24	iP <sub>ZZ</sub>	01 02 04.7 <sup>D</sup>				

## Seismological Bulletin - OCTOBER 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
46	24	iP <sub>zZ</sub>	01 35 46.4 <sup>D</sup>			USCGS: 19.6 S 68.9 N Chile-Bolivia Border Region
47	24	iP <sub>zZ</sub>	16 11 02.9 <sup>D</sup>	0.5	4.5	
48	25	iP <sub>z</sub> iS <sub>n</sub>	17 31 45.2 <sup>C</sup> 31 48.2	0.1	4.9	Cut Widening Blast △ = 14 miles
49	25	iP <sub>z</sub> iS <sub>n</sub>	19 34 57.3 <sup>C</sup> 35 00.0	0.1	2.7	Cut Widening Blast △ = 13 miles
50	27	eP <sub>zZ</sub>	00 21 13.5			USCGS: 11.4 N 72.7 W Near North Coast of Colombia
51	27	iP <sub>z</sub>	19 16 16.4 <sup>C</sup>	0.1	4.0	
52	28	iP <sub>z</sub>	16 40 27.6	0.5	2.5	
53	28	iP <sub>z</sub>	17 53 04.3 <sup>C</sup>	0.1	2.6	
54	28	eP <sub>z</sub>	23 47 20			USCGS: 12.5 S 166.5 E Santa Cruz Islands
55	29	eP <sub>z</sub>	00 23 12.0			
56	29	eP <sub>z</sub> iS <sub>n</sub>	02 57 43.6 57 51.8			△ = 16 miles
57	29	eP <sub>z</sub> iS <sub>e</sub>	12 31 28.8 <sup>D</sup> 31 53.0	0.2	2.1	△ = 117 miles
58	29	iP <sub>z</sub> iS <sub>n</sub>	17 09 26.0 <sup>C</sup> 09 29.0	0.2	2.6	Cut Widening Blast △ = 14 miles
59	29	iP <sub>z</sub> iS <sub>n</sub>	17 56 12.5 <sup>D</sup> 56 16.0	0.2	4.2	Cut Widening Blast △ = 17 miles
60	29	iP <sub>z</sub> iS <sub>n</sub>	20 00 06.7 <sup>C</sup> 00 11.0	0.1	2.5	△ = 21 miles
61	29	iP <sub>zZ</sub> iS <sub>E</sub>	22 27 53.4 37 20.0			USCGS: 65.4 N 150.1 W Alaska △ = 5050 miles



Seismological Bulletin - OCTOBER 1968

No.	Date	Phase	Time		Period	Ampli- tude mm	Remarks
			G.C.T.				
62	29	iP <sub>Z</sub>	22 49	34.5 <sup>D</sup>			
63	30	iP <sub>Z</sub>	20 28	11.4			Quarry Blast
64	31	iP <sub>ZZ</sub>	09 21	16.6 <sup>D</sup>			USCGS: 16.3 S 73.3 W
65	31	iP <sub>ZZ</sub>	09 26	24.2 <sup>C</sup>			
66	31	iP <sub>Z</sub> iS <sub>n</sub>	17 05 05	31.8 <sup>D</sup> 35.5	0.1	1.3	Cut Widening Blast △ = 18 miles
67	31	iP <sub>Z</sub>	18 00	14.0 <sup>C</sup>			Cut Widening Blast △ = 25 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 1968

----- 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	1	iP iS <sub>E</sub> <sup>Z</sup>	04 01 40.0 06 56.0				USCGS: 18.2 N 105.7 W Off Coast of Jalisco, Mexico △ = 2250 miles
2	1	iP <sub>Z</sub> iS <sub>n</sub>	17 21 01.6 <sup>G</sup> 21 05.2	0.1	4.6		Cut Widening Blast △ = 18 miles
3	3	eP <sub>ZZ</sub>	19 54 54.8				USCGS: 7.9 N 85.9 W Off Coast of Costa Rica
4	4	eP <sub>Z</sub>	09 21 08.0 <sup>D</sup>				
5	5	iP <sub>Z</sub> iS <sub>n</sub>	17 24 53.0 <sup>D</sup> 24 55.8	0.1	3.3		Cut Widening Blast △ = 14 miles
6	5	iP <sub>Z</sub> iS <sub>n</sub>	17 37 55.0 <sup>G</sup> 37 58.4	0.1	3.6		Cut Widening Blast △ = 17 miles
7	5	eP <sub>Z</sub>	23 52 02.7				
8	6	iP <sub>Z</sub> iS <sub>n</sub>	17 00 24.9 <sup>D</sup> 00 28.0	0.2	2.4		Cut Widening Blast △ = 15 miles
9	6	iP <sub>Z</sub> iS <sub>n</sub>	17 25 23.5 <sup>D</sup> 25 25.0	0.1	1.5		△ = 7 miles
10	6	iP <sub>Z</sub> iS <sub>n</sub>	19 35 09.2 <sup>D</sup> 35 12.7	0.1	3.7		Cut Widening Blast △ = 18 miles
11	6	iP <sub>ZZ</sub>	20 28 26.7				Quarry Blast
12	7	eP <sub>Z</sub>	03 46 20.0				
13	7	eP <sub>ZZ</sub>	10 19 23.0 <sup>D</sup>				USCGS: 16.4 S 73.5 W Near Coast of Peru
14	7	iP <sub>Z</sub> iS <sub>n</sub>	15 28 13.0 <sup>G</sup> 28 21.0	0.1	3.2		△ = 38 miles

Seismological Bulletin - NOVEMBER 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
15	7	iP <sub>Z</sub> iS <sub>n</sub>	16 08 22.5 <sup>D</sup> 08 27.0		0.1	2.6	Cut Widening Blast △ = 22 miles
16	7	iP <sub>Z</sub> iS <sub>n</sub>	16 30 57.0 <sup>D</sup> 31 01.6		0.2	2.8	Cut Widening Blast △ = 23 miles
17	8	iP <sub>ZZ</sub>	17 07 47.4 <sup>C</sup>		0.3	7.0	
18	8	iP <sub>ZZ</sub>	20 50 35.4 <sup>D</sup>		0.4	3.2	
19	8	iP <sub>ZZ</sub>	23 26 00.5 <sup>C</sup>		0.5	5.5	
20	8	iP <sub>ZZ</sub>	23 27 53.8		0.2	2.5	
21	10	iP <sub>Z</sub>	13 39 11.2 <sup>D</sup>		0.2	2.4	USCGS: 6.9 N 72.8 W Northern Columbia
22	10	iP <sub>Z</sub>	17 21 32.4 <sup>D</sup>				
23	11	eP <sub>ZZ</sub>	03 14 25.0				USCGS: 15.0 N 92.8 W Mexico-Guatemala Border Region
24	11	iP <sub>ZZ</sub>	13 25 01.0 <sup>C</sup>		0.4	21.3	
25	11	eP <sub>Z</sub>	15 01 20.0				
26	12	iP <sub>ZZ</sub>	21 48 48.5 <sup>C</sup>		0.2	8.4	
27	14	iP <sub>Z</sub> iS <sub>n</sub>	16 36 04.9 <sup>D</sup> 36 07.0		0.1	2.0	△ = 10 miles
28	14	iP <sub>Z</sub> iS <sub>n</sub>	17 12 33.6 <sup>D</sup> 12 37.0		0.1	4.3	Cut Widening Blast △ = 16 miles
29	14	iP <sub>ZZ</sub>	19 27 02.3 <sup>C</sup>		0.2	3.6	USCGS: 8.3 N 77.2 W Panama-Colombia Border Region
30	15	iP <sub>Z</sub> iS <sub>n</sub>	17 00 20.9 <sup>C</sup> 00 24.6		0.1	6.0	Cut Widening Blast △ = 17 miles
31	15	iP <sub>Z</sub> iS <sub>n</sub>	19 16 00.2 <sup>C</sup> 16 03.5		0.1	3.5	Cut Widening Blast △ = 16 miles

Seismological Bulletin - NOVEMBER 1968

No.	Date	Phase	Time		Period	Ampli-	Remarks
			G.C.T.			tude	
					mm		
32	15	iP <sub>Z</sub>	19 32	24.8 <sup>C</sup>	0.1	4.3	
33	16	eP <sub>Z</sub> iS <sub>N</sub>	03 36 43 28.0	24.0			USCGS: 35.8 S 102.2 W Southern Pacific Ocean △ = 2100 miles
34	16	eP <sub>Z</sub> eS <sub>N</sub>	08 03 13 36.0	30.0			△ = 2375 miles
35	16	eP <sub>Z</sub>	15 16	10.0			USCGS: 11.1 N 86.9 W Near Coast of Nicaragua
36	16	iP <sub>Z</sub> iS <sub>n</sub>	18 00 00 10.2	09.0 <sup>D</sup>	0.1	1.8	△ = 7 miles
37	17	iP <sub>ZZ</sub> iS <sub>N</sub>	00 17 18 56.0	44.0 <sup>D</sup>			USCGS: 9.6 N 72.6 W Venezuela
38	17	iP <sub>Z</sub> iS <sub>N</sub>	01 52 59 56.0	06.0 <sup>C</sup>			△ = 425 miles
39	18	iP <sub>Z</sub>	15 10	40.0 <sup>C</sup>	0.5	2.2	USCGS: 6.8 N 72.9 W Northern Colombia
40	18	iP <sub>Z</sub> iS <sub>n</sub>	15 35 36 02.5	59.5 <sup>C</sup>	0.1	3.2	Cut Widening Blast △ = 14 miles
41	18	iP <sub>Z</sub> iS <sub>n</sub>	16 29 29 40.0	36.6 <sup>C</sup>			Cut Widening Blast △ = 15 miles
42	18	iP <sub>Z</sub> iS <sub>e</sub>	18 33 33 26.8	23.5 <sup>C</sup>	0.1	6.8	Cut Widening Blast △ = 16 miles
43	19	eP <sub>Z</sub> iS <sub>N</sub>	00 11 14 06.0	20.0			USCGS: 11.3 N 86.7 W Near Coast of Nicaragua
44	19	iP <sub>Z</sub> iS <sub>n</sub>	18 07 07 20.2	18.3 <sup>D</sup>	0.1	2.0	△ = 8 miles
45	20	iP <sub>Z</sub> iS <sub>n</sub>	15 03 03 26.2	23.5 <sup>C</sup>	0.1	4.7	Cut Widening Blast △ = 13 miles
46	20	iP <sub>Z</sub> iS <sub>n</sub>	15 20 20 10.0	06.6 <sup>C</sup>	0.1	5.3	Cut Widening Blast △ = 17 miles

Seismological Bulletin - NOVEMBER 1968

No.	Date	Phase	Time		Period	Ampli-	Remarks	
			G.C.T.			tude		
						mm		
47	20	iP <sub>ZZ</sub>	20 28	40.7 <sup>C</sup>			Quarry Blast	
48	21	iP <sub>Z</sub>	17 15	02.5 <sup>D</sup>	0.4	5.0	Cut Widening Blast	
		iS <sub>n</sub>	15 04.0				△ = 8 miles	
49	21	eP <sub>Z</sub>	18 39	04.0			△ = 185 miles	
		iS <sub>n</sub>	39 43.0					
50	22	iP <sub>Z</sub>	09 19	07.0 <sup>C</sup>				
51	22	iP <sub>Z</sub>	17 26	15.0 <sup>C</sup>	0.1	7.0	Cut Widening Blast	
		iS <sub>n</sub>	26 18.0				△ = 15 miles	
52	22	iP <sub>Z</sub>	19 03	15.0	0.1	5.0	Cut Widening Blast	
		iS <sub>n</sub>	03 18.4				△ = 17 miles	
53	24	eP <sub>Z</sub>	21 34	20.0				
54	25	eP <sub>Z</sub>	00 59	20.0			USCGS: 20.3 N 109.3 W	
		eS <sub>N</sub>	01 07	48.0			Revilla Gigedo Island Region	
							△ = 2050 miles	
55	25	iP <sub>Z</sub>	18 56	40.0 <sup>D</sup>				
56	26	iP <sub>Z</sub>	00 15	06.0 <sup>D</sup>				
57	26	iP <sub>Z</sub>	17 50	30.8 <sup>C</sup>			Cut Widening Blast	
		iS <sub>n</sub>	50 32.5				△ = 8 miles	
58	26	iP <sub>Z</sub>	18 09	35.2			△ = 17 miles	
		iS <sub>n</sub>	09 36.5					
59	26	iP <sub>Z</sub>	19 10	36.5 <sup>C</sup>				
60	27	eP <sub>Z</sub>	21 57	00.0				
61	28	iP <sub>ZZ</sub>	10 39	50.0 <sup>C</sup>			USCGS: 15.4 N 94.6 W	
		iS <sub>N</sub>	43 00.0				Near Coast of Oaxaca, Mexico	
							△ = 1450 miles	
62	30	iP <sub>Z</sub>	07 42	05.7 <sup>D</sup>	0.2	7.8		
63	30	iP <sub>Z</sub>	17 39	46.6 <sup>C</sup>	0.1	2.6	△ = 8 miles	
		iS <sub>e</sub>	39 48.4					

*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 1968

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	
1	1	iP <sub>ZZ</sub> iS <sub>N</sub>	13 19 29.6 <sup>D</sup> 23 10.0				USCGS: 10.6 S 74.9 W - Peru △ = 1375 miles
2	1	iP <sub>ZZ</sub> iS <sub>n</sub>	15 18 13.8 <sup>D</sup> 19 29.5				USCGS: 6.9 N 72.9 W Northern Colombia △ = 465 miles
3	2	iP <sub>Z</sub> iS <sub>n</sub>	15 10 39.4 <sup>D</sup> 10 42.5	0.1	3.2		Cut Widening Blast △ = 16 miles
4	2	iP <sub>Z</sub> iS <sub>n</sub>	15 38 34.0 38 36.8	0.1	2.7		Cut Widening Blast △ = 13 miles
5	3	iP <sub>Z</sub> iS <sub>n</sub>	01 34 40.0 <sup>D</sup> 35 10.2	0.1	2.5		△ = 143 miles
6	4	iP <sub>Z</sub> iS <sub>n</sub>	17 46 17.2 <sup>C</sup> 46 19.2	0.1	4.0		△ = 10 miles
7	4	iP <sub>Z</sub> iS <sub>n</sub>	19 00 24.2 <sup>D</sup> 00 27.5	0.1	3.0		Cut Widening Blast △ = 16 miles
8	4	iP <sub>Z</sub> iS <sub>e</sub>	19 40 08.1 <sup>C</sup> 40 11.2	0.2	3.2		Cut Widening Blast △ = 16 miles
9	5	eP <sub>Z</sub>	09 55 20.0				
10	5	iP <sub>Z</sub> iS <sub>n</sub>	17 12 29.7 <sup>C</sup> 12 32.5	0.1	3.8		Cut Widening Blast △ = 14 miles
11	5	iP <sub>Z</sub>	19 05 29.0 <sup>C</sup>	0.1	5.0		
12	5	eP <sub>ZZ</sub>	19 15 42.5 <sup>C</sup>				USCGS: 2.6 N 83.4 W Off Coast of Central America
13	5	iP <sub>Z</sub> iS <sub>n</sub>	21 05 12.4 <sup>C</sup> 05 14.3	0.1	5.0		Cut Widening Blast △ = 10 miles

## Seismological Bulletin - DECEMBER 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
14	6	iP <sub>Z</sub> iS <sub>n</sub>	09 39 15.5 39 39.0			△ = 225 miles
15	6	iP <sub>Z</sub> iS <sub>n</sub>	12 36 54.5 36 58.0			Cut Widening Blast △ = 17 miles
16	7	iP <sub>Z</sub>	05 17 16.0			
17	7	iP <sub>Z</sub>	17 10 55.1 <sup>G</sup>	0.1	3.4	△ = 9 miles
18	8	eP <sub>Z</sub>	20 44 42.0			
19	9	iP <sub>Z</sub> iS <sub>n</sub>	15 14 43.5 <sup>G</sup> 14 46.9	0.1	3.5	Cut Widening Blast △ = 17 miles
20	10	iP <sub>ZZ</sub> iS <sub>N</sub>	06 08 46.9 <sup>D</sup> 10 40.0	0.2	1.7	USCGS: 2.7 N 83.3 W Off Coast of Central America △ = 720 miles
21	10	iP <sub>Z</sub> iS <sub>n</sub>	17 18 46.5 <sup>G</sup> 18 49.7	0.1	5.1	Cut Widening Blast △ = 17 miles
22	11	iP <sub>Z</sub> iS <sub>n</sub>	17 43 02.0 43 06.0	0.1	4.5	Cut Widening Blast △ = 19 miles
23	11	iP <sub>Z</sub> iS <sub>n</sub>	21 04 41.8 <sup>G</sup> 04 45.6	0.1	5.2	Cut Widening Blast △ = 18 miles
24	12	iP <sub>Z</sub>	20 42 14.0 <sup>G</sup>	0.1	4.0	
25	13	iP <sub>Z</sub> iS <sub>n</sub>	16 59 27.2 <sup>G</sup> 59 30.0	0.1	4.0	Cut Widening Blast △ = 13 miles
26	13	iP <sub>Z</sub> iS <sub>n</sub>	17 28 10.3 <sup>G</sup> 28 44.5	0.3	1.8	△ = 164 miles
27	13	iP <sub>Z</sub> iS <sub>n</sub>	17 58 09.4 <sup>G</sup> 58 50.5	0.2	2.9	△ = 197 miles
28	13	iP <sub>Z</sub> iS <sub>n</sub>	18 23 40.4 <sup>G</sup> 23 44.5	0.1	5.1	Cut Widening Blast △ = 21 miles
29	14	eP <sub>Z</sub> iS <sub>n</sub>	12 14 03.4 14 26.3			△ = 109 miles



Seismological Bulletin - DECEMBER 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks	
			G.C.T.					
30	15	eP <sub>Z</sub>	02 27	24.0				
31	15	iP <sub>zZ</sub> iS <sub>n</sub>	20 42 56.5 <sup>D</sup> 43 57.0		0.1	3.7	USCGS: 4.7 N 82.6 W South of Panama	△ = 295 miles.
32	16	iP <sub>zZ</sub> iS <sub>N</sub>	03 08 16.4 <sup>D</sup> 09 20.0		0.5	20.0	USCGS: 7.1 N 82.2 W South of Panama - Force I Felt Panama, Howard, Balboa	△ = 305 miles
33	16	eP <sub>Z</sub> iS <sub>N</sub>	09 02 50.0 03 20.0				USCGS: 3.2 N 84.2 W Off Coast of Central America	△ = 143 miles
34	16	iP <sub>z</sub> iS <sub>n</sub>	20 40 34.4 <sup>C</sup> 40 37.3		0.2	5.6		Cut Widening Blast △ = 14 miles
35	17	iP <sub>z</sub> iS <sub>e</sub>	05 55 03.0 <sup>C</sup> 55 14.3		0.1	1.7		△ = 54 miles
36	17	iP <sub>zZ</sub> iS <sub>N</sub>	12 13 05.0 <sup>C</sup> 23 05.0		0.6	4.6	USCGS: 60.2 N 152.8 W Southern Alaska	△ = 6500 miles
37	17	eP <sub>Z</sub>	19 00 05.0					
38	17	iP <sub>z</sub>	20 27 34.3 <sup>C</sup>					Quarry Blast
39	18	iP <sub>z</sub> iS <sub>e</sub>	15 16 15.4 <sup>D</sup> 16 18.8		0.1	2.1		Cut Widening Blast △ = 17 miles
40	18	iP <sub>z</sub> iS <sub>n</sub>	17 52 01.0 <sup>C</sup> 52 03.8		0.1	4.6		Cut Widening Blast △ = 13 miles
41	19	iP <sub>z</sub>	16 38 06.3 <sup>D</sup>		0.6	3.3	USCGS: 37.2 N 116.5 W Southern Nevada Test Site	
42	19	iP <sub>zZ</sub> iS <sub>N</sub>	23 26 05.7 <sup>C</sup> 27 44.0		0.7	2.8	USCGS: 2.1 N 84.5 W Off Coast of Central America	△ = 650 miles
43	19	eP <sub>Z</sub>	15 27 32.0					
44	20	iP <sub>z</sub> iS <sub>n</sub>	17 15 10.9 <sup>C</sup> 15 14.0		0.1	4.7		Cut Widening Blast △ = 15 miles





Seismological Bulletin - DECEMBER 1968

No.	Date	Phase	Time G.C.T.	Period	Ampli- tude mm	Remarks
45	20	iP <sub>Z</sub> iS <sub>n</sub> <sup>Z</sup>	18 30 58.0 <sup>C</sup> 31 01.8	0.15	5.2	Cut Widening Blast △ = 18 miles
46	20	iP <sub>Z</sub>	18 53 29.4 <sup>C</sup>	0.12	6.5	
47	21	iP <sub>Z</sub> iS <sub>n</sub> <sup>Z</sup>	20 39 44.0 <sup>C</sup> 39 46.9	0.2	4.7	Cut Widening Blast △ = 13 miles
48	22	eP <sub>ZZ</sub>	18 58 56.5			
49	22	eP <sub>Z</sub>	15 49 00.0			
50	23	iP <sub>Z</sub> iS <sub>n</sub> <sup>Z</sup>	20 15 42.9 <sup>C</sup> 15 45.5	1.5	4.1	Cut Widening Blast △ = 13 miles
51	24	eP <sub>Z</sub> iS <sub>E</sub> <sup>Z</sup>	12 45 36.0 55 28.0			USCGS: 9.0 S 108.7 W Northern Easter Island Cordillera △ = 2325 miles
52	24	eP <sub>Z</sub> iS <sub>E</sub> <sup>Z</sup>	16 24 40.0 36 10.0			USCGS: 9.2 S 108.6 W Northern Easter Island Cordillera △ = 2650 miles
53	27	iP <sub>Z</sub> iS <sub>n</sub> <sup>Z</sup>	11 46 11.0 <sup>D</sup> 46 20.2	0.5	2.5	USCGS: 8.5 N 82.9 W Panama-Costa Rica Border Region △ = 43 miles
54	28	iP <sub>Z</sub>	Approx. 14 25 00			
55	28	iP <sub>Z</sub>	Approx. 16 06 00			Cut Widening Blast
56	28	iP <sub>Z</sub>	Approx. 16 48 00			Cut Widening Blast
57	28	iP <sub>Z</sub>	Approx. 17 11 00			Cut Widening Blast
58	30	iP <sub>Z</sub>	14 44 01.3 <sup>D</sup>	1.7	4.3	USCGS: 15.8 S 70.8 W Southern Peru

Seismological Bulletin - DECEMBER 1968

No.	Date	Phase	Time		Period	Amplitude mm	Remarks
			G.C.T.				
59	30	iP <sub>Z</sub>	17 07	08.0 <sup>C</sup>	0.2	7.6	Cut Widening Blast △ = 16 miles
		iS <sub>n</sub>	07 11.1				
60	30	iP <sub>Z</sub>	20 43	12.1 <sup>C</sup>	0.15	6.3	Cut Widening Blast △ = 14 miles
		iS <sub>n</sub>	43 15.0				
61	31	eP <sub>Z</sub>	18 47	44.3	0.4	4.5	△ = 188 miles
		iS <sub>n</sub>	48 23.4				
62	31	iP <sub>Z</sub>	21 26	52.0 <sup>C</sup>	0.1	7.0	

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