

**THE PANAMA CANAL**  
DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

*100*

**SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE**

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

h = 36 meters.

Lithologic foundation: Basalt.

Time Correction: Within 0.5 sec.

**INSTRUMENTS—FIXED CONSTANTS**

INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED	MASS
Wood-Anderson	I	Photographic	Magnetic	60 mm. per min.	1.3 gr.
Bosch-Omori	II	Smoked Sheet	Air	15 mm. per min.	100 kg.

**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T <sub>0</sub>	V	h	DETERMINED
Wood-Anderson	E-W	0.8	1370	Critical	July 18, 1934
Wood-Anderson	N-S	0.8	1370	Critical	July 18, 1934
Bosch-Omori )	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -
Bosch-Omori )	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -

International  
Seismological  
Centre

Month January, 1935.

Page No. 1

No. and Date	Phase	Time G. M. T.			Period	Amplitude		REMARKS	
		h	m	s		s	E		N
							mm		mm
Jan. 4	No record from 09:19				Jan. 4 to 13:40	Jan. 4.		N-S and E-W light burned out.	
1. Jan. 4	19:39:21 to 19:42:00							Very weak	
2. Jan. 4	20:07:40 to 20:11:00							Very weak	
3. Jan. 9	19:27 to 19:31							Very weak	
4. Jan. 10	06:22 to 06:26							Weak	
5 Jan. 19	ePNE eSNE MI ME FNE	05:39:22 05:40:00 05:40:17 05:40:18 05:45:00					4.3	Distance about 220 miles. Press reports that inhabitants of David, Republic of Panama, were somewhat alarmed.	
6. Jan. 20	✓	Seismic activity, about 05:49							
7 Jan. 21	1PNE 1SNE MI ME FNE	14:58:38 14:59:02 14:59:06 Blurred 15:02:00					10.0	Distance approximately 150 miles.	
8 Jan. 22		Seismic activity about 02:15							
9 Jan. 22		Seismic activity about 07:19							



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month January, 1935.

Page No. 2



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No. and Date	Phase	Time G. M. T. h m s	Period s	Amplitude		REMARKS
				E mm	N mm	
10. Jan. 24		Seismic activity about 09:32				✓
11. Jan. 25	1PNE 1SNE MN ME FNE	00:35:29 00:35:50 00:35:57 Blurred. 00:38:00			5.4	Distance approximately 120 miles
12. Jan. 25	1PNE 1SNE MN ME FNE	10:05:24 10:05:50 10:05:55 Blurred 10:09:00			66 1	Distance approximately 150 miles.
13. Jan. 30		16:03:12 to 16:08:00				Weak.
14. Jan. 31		Seismic activity about 00:14.				

R. Z. KIRKPATRICK.  
Chief of Surveys.



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**SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE**

Lat. 8° 57' 39" N.

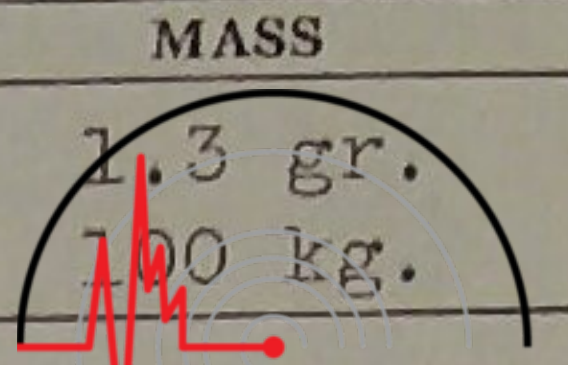
Long. 79° 33' 29" W.

h = 36 meters.

Lithologic foundation: Basalt.

Time Correction: Within 0.5 sec.

INSTRUMENTS—FIXED CONSTANTS

INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED		MASS
				60 mm. per min.	15 mm. per min.	1.3 gr. 100 kg.
Wood-Anderson	I	Photographic	Magnetic	60 mm. per min.		
Bosch-Omori	II	Smoked Sheet	Air	15 mm. per min.		

INSTRUMENTS—DETERMINED CONSTANTS

INSTRUMENTS	COMPONENT	T.	V	h	DETERMINED
					July 18, 1934
Wood-Anderson	E-W	0.8	1370	Critical	July 18, 1934
Wood-Anderson	N-S	0.8	1370	Critical	July 18, 1934
Bosch-Omori	} -----	Not Operating -----			
Bosch-Omori					

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Month February, 1935.

Page No. 3

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS	
		h	m	s		E	N		
						mm	mm		
Feb. 3		No record from 08:16 to 13:30 N-S and E-W light burned out.							
15 Feb. 9	35	15:16:53			✓			Weak.	
		to 15:20:00							
16 Feb. 9	ePE eSE FE	16:32:38			✓			Weak. Distance approximately 250 miles. N-S time marker not working.	
		16:33:16							
		16:36:00							
17 Feb. 9	iPE iSE ME FE	18:51:06			✓ 0.5	12.0		Felt in David and El Volcan, Rep. of Panama. Apparently same origin as destructive shocks of Last July. Epicenter 7.8° N. Lat., 82.5° W. Long. Distance 250 miles. N-S time marker not working.	
		18:51:44							
		18:52:01							
		18:59:00							
18 Feb. 9		21:08:51			✓			Aftershock. Weak.	
		to 21:13:00							
19 Feb. 9		21:13:11			✓			Aftershock. Weak.	
		to 21:18:00							
20 Feb. 11		10:27:08			✓			Faint.	
		to 10:31:00							
21 Feb. 12		03:34			✓			Faint but certainly seismic.	
		to 03:37							
22 Feb. 15		16:39:52			✓			Very weak.	
		to 16:43:00							
23 Feb. 15.		Very faint seismic activity about 18:03.			✓				
24 Feb. 19		19:24			✓			Faint trace of long period waves.	
		to 19:41							



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month February, 1935.Page No. 4

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
25 Feb. 25		Faint seismic activity about 13:51			✓			
26 Feb. 25		17:34:45	to	17:40:00	✓			Very faint. 2 shocks superposed.
27 Feb. 25		18:07:19	to	18:10:00	✓			Very faint.
28 Feb. 27		13:23:00	to	13:25:00	✓			Very faint but certainly seismic.
29 Feb. 27	1PNE 1SNE MN ME FNE	15:28:11		15:28:57	✓	0.7	23.0	Undoubtedly same origin as No. 17. Was felt distinctly by crew of USS HANNIBAL, in Lat. 7° 58' N., Long. 83° 06' W.
						0.6	22.6	

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Chief of Surveys.



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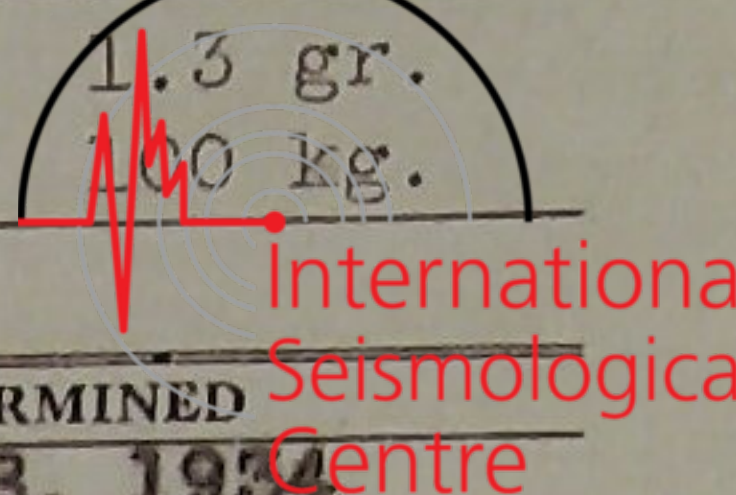
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**INSTRUMENTS—FIXED CONSTANTS**

INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED	MASS
Wood-Anderson	I	Photographic	Magnetic	60 mm. per min.	1.3 gr. 100 kg.
Bosch-Omori	II	Smoked Sheet	Air	15 mm. per min.	

**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T.	V	h	DETERMINED
Wood-Anderson	E-W	0.8	1370	critical	July 18, 1934
Wood-Anderson	N-S	0.8	1370	critical	July 18, 1934
Bosch-Omori	- - - - -	NOT OPERATING			
Bosch-Omori	- - - - -	NOT OPERATING			



Month March 1935 Page No. 5

No. and Date	Phase	Time			Period	Amplitude		REMARKS
		G. M. T.				E	N	
		h	m	s		mm	mm	
30 March 1		13	24	24	✓			weak
		13	29	00				
Instruments not operating from 13:28 March 5 to 13:23 March 6								
31 March 7								Light seismic activity between 17:22 and 17:25 ✓
32 March 8								Very faint seismic activity from 12:02 to 12:07 ✓
33 March 9								Very faint seismic activity from 04:32 to 04:35 ✓
34 March 10								Faint seismic activity from 23:26 to 23:29 ✓
35 March 13								Very faint seismic activity from 23:55 to 23:57 ✓
36 March 17		21:36			✓			Faint trace of long period waves.
		to		21:45				
37 March 19								Very faint seismic activity from 19:01 to 19:04 ✓
38 March 26								Very faint seismic activity from 17:15 to 17:18 ✓
39 March 27		21:35			✓			Weak
		to		21:42				
40 March 30		17:52			✓			Very faint
		to		17:54				
41 March 30		21:57			✓			Weak
		to		22:01				
42 March 31					✓			Faint seismic activity from 23:09 to 23:12

G. E. MATTHEW,  
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*R.D.B.*

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**INSTRUMENTS—FIXED CONSTANTS**

INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED	MASS
Wood-Anderson	I	Photographic	Magnetic	60 mm. per min.	13 gr.
Bosch-Omori	II	Smoked Sheet	Air	15 mm. per min.	100 kg.

**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T <sub>0</sub>	v	h	DETERMINED
Wood-Anderson	N.S.	0.8	1370	Critical	July 18, 1934
Wood-Anderson	E-W.	0.8	1370	Critical	July 18, 1934
Bosch-Omori		- Not	operating		
Bosch-Omori					

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Month April 1935

Page No. 6

No. and Date	Phase	Time G. M. T.			Period	Amplitude		REMARKS	
		h	m	s		s	E		N
							mm		mm
43									
April 2								Faint seismic activity from 23:10:47 to 23:13:00	
44									
April 5								Faint seismic activity from 05:03 to 05:05	
45		06.41							
April 10		to						Very faint	
		06.46							
46	ePNE	12:34:08							
April 10	eSNE	12:34:37						Weak	
	FNE	12:39:00							
47		21:04							
April 10		to						Weak	
		21:10							
48									
April 13								Faint seismic activity from 05:19 to 05:22	
49		04:40							
April 17		to						Barely discernible	
		04:47							
50									
April 17								Very faint seismic activity from 19:33 to 19:36.	
51		14:45							
April 19		to						Long period waves, barely discernible	
		15:15							



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

April 1935

7

Page No. ....

Month .....

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E	N	
						mm	mm	
52 April 23	ePNE	07:21:54					Distance approximately 250 miles	
	iSNE	07:22:22						
	MN	07:22:24				8.5		
	ME	07:22:32			9.5			
	FNE	07:28:00						
53 April 26	ePNE	00:13:10					Distance approximately 150 miles	
	iSNE	00:13:35						
	MN	00:13:42				8.1		
	ME	00:13:44			10.0	<del>10.0</del>		
	FNE	00:17:00						
54 April 27		Slight seismic activity from 16:58 to 17:01						
55 April 28		18:25:55 to 18:31:00					Weak	
56 April 29	iPNE	02:36:46					Intensity II - distance approximately 75 miles	
	iSNE	02:36:58						
	MN	02:37:03				22.3		
	ME	02:37:04			15.2			
	FNE	02:41:00						
57 April 29		Slight seismic activity from 17:30 to 17:33						



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MR 35865—Panama Canal—7-19-33—200  
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## INSTRUMENTS—FIXED CONSTANTS

INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED		MASS
				60 mm. per min.	15 mm. per min.	13 gr. 100 kg.
Wood-Anderson	I	Photographic	Magnetic	60 mm. per min.		13 gr. 100 kg.
Bosch-Omori	II	Smoked Sheet	Air	15 mm. per min.		

## INSTRUMENTS—DETERMINED CONSTANTS

INSTRUMENTS	COMPONENT	T.	V	h	DETERMINED
					July 18, 1934 July 18, 1934
Wood-Anderson	N-S	0.8	1370	Critical	July 18, 1934
Wood-Anderson	E-W	0.8	1370	Critical	July 18, 1934
Bosch-Omori)	.....	NOT OPERATING .....			
Bosch-Omori)	.....	.....			

Month MAY 1935Page No. 8

No. and Date	Phase	Time			Period	Amplitude		REMARKS
		G. M. T.				E	N	
		h	m	s		mm	mm	
58 May 1	• PNE • SNE FNE	03:41:45 03:42:07 03:44:00						Weak Distance approx. 125 miles
59 May 12								Very faint seismic activity from 19:44 to 19:47 ✓
								There were no records from 02:00 to 13:14, May 13 - Rectifier bulb burned out.
60 May 14		23:35 to 23:44						Faint trace of 1.0 second period waves. ✓
61 May 15								slight seismic activity from 18:49 to 18:53. ✓
62 May 16								slight seismic activity from 01:11 to 01:13. ✓
63 May 18	1PE 1SE ME FE	08:22:00 08:22:36 08:23:05 08:29:00					5.5	Distance approx. 200 miles. N-S time marker not working.
64 May 23								slight seismic activity from 05:06 to 05:09 ✓
65 May 24								slight seismic activity from 05:58 to 06:00:00 ✓
66 May 24		13:43 to 13:47						Faint ✓







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INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED		MASS
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## INSTRUMENTS—DETERMINED CONSTANTS

INSTRUMENTS	COMPONENT	T <sub>c</sub>	V	h	DETERMINED
Wood-Anderson	E-W	0.8	1370	Critical	July 18, 1934
Wood-Anderson	N-S	0.8	1370	Critical	July 18, 1934
Bosch-Omori	} Not operating				
Bosch-Omori					

Month June 1935Page No. 10

No. and Date	Phase	Time			Period	Amplitude		REMARKS
		G. M. T.				E	N	
		h	m	s		mm	mm	
68 June 2								Slight seismic activity from 00:14 to 00:16
69 June 8	e PNE i SNE MN ME FNE	07:00:44 07:01:13 07:01:16 07:01:23 07:04:00				7.1	10:2	Distance approximately 170 miles
70 June 9								Very faint seismic activity from 16:54 to 16:57
71 June 10								Light seismic activity from 18:38 to 18:41
72 June 11		21:57:27 to 22:12:00						
73 June 16	i PNE i SNE MN ME FNE	19:29:00 19:29:16 19:29:19 19:29:17 19:31:00				8.0	15:5	Distance approximately 90 miles. Intensity II
74 June 21		23:02 to 23:06						Weak
75 June 24		23:42 to 23:47						
76 June 29		<sup>54</sup> 6:45:20 to 7:22:00						

G. E. MATTHEW,  
Acting Chief of Surveys.

GEM\*rhg



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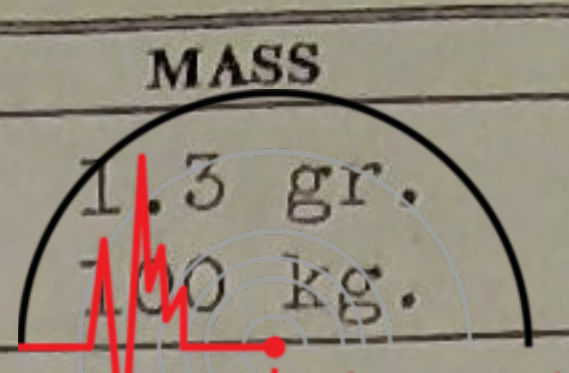
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**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T	V	h	DETERMINED
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Wood-Anderson	E-W	0.8	1370	critical	July 18, 1934
Wood-Anderson	N-S	0.8	1370	critical	July 18, 1934
Bosch-Omori	not operating				
Bosch-Omori	not operating				

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Month JULY 1935

Page No. 11

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E	N	
		mm	mm	mm		mm	mm	
77 July 1		00:01:48			✓			weak
78 July 4					✓			Faint seismic activity from 11:05 to 11:07
79 July 7		10:27:55			✓			weak
80 July 14		06:19:57			✓			weak
81 July 17		10:58			✓			very faint
82 July 22	1PNE 1SNE FNE	00:33:50.5			✓			Very sharp and abrupt. Apparently within 10 mile radius from Balboa Heights.
83 July 23					✓			very faint seismic activity from 07:51 to 07:53
84 July 26	1PNE 1SNE ME MN CE CN FNE	04:44:13 04:44:58 04:45:10 04:45:09 04:46:33 04:46:35 04:59:00			✓	58.0	53.0	Intensity II to III (Modified Mercalli scale) at Balboa Heights. Distance to epicenter 250 miles. This shock was noticeably felt throughout Chiriqui Province, Republic of Panama. Apparently same epicenter as shocks of July last year that did so much damage at David and Pt. Armuelles.
85 July 26					✓			very faint seismic activity from 13:53:41 to 13:55:00
86 July 27					✓			very faint seismic activity from 03:38 to 03:40
87 July 28					✓			very faint seismic activity from 08:35 to 08:37

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**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T <sub>0</sub>	V	h	DETERMINED
Wood-Anderson	N - S	0.8	1370	Critical	July 18, 1934
Wood-Anderson	E - W	0.8	1370	"	" " "
Bosch-Omori	) NOT OPERATING				
Bosch-Omori					

Month **AUGUST 1935**Page No. **12**

No. and Date	Phase	Time G. M. T.			Period	Amplitude		REMARKS
		h	m	s		E	N	
88 Aug. 1	ePNE	16:09:47						Approximate distance from Balboa - 460 miles Epicenter (U.S.C. & G.S.) 10 degrees N. Lat., 86 degrees W. Long.
	eSN	16:11:04						
	eSE	16:11:08						
	LN	16:11:30			1.3			
	LE	16:11:36			1.4			
	MN	16:11:40			1.6		4.5	
	ME	16:11:51			1.6	6.5		
	CN	16:14:25						
CE	16:14:35							
	FNE	16:30:00						
89 Aug. 2	1PN	12:45:12.0						Very weak - distance from 10 to 20 miles.
	1PE	12:45:11.5						
	1SN	12:45:14.5						
	1SE	12:45:13.5						
	FNE	12:45:45						
90 Aug. 4		Very faint seismic activity from 04:34 to 04:36						
91 Aug. 5	1PE	03:57:09						N-S clock stopped Distance approx. 230 miles. No doubt epicenter is 7.8 degrees N. Lat., 82.5 degrees W. Long.
	1SE	03:57:50						
	ME	03:57:57						
	FE	04:00:03						
92 Aug. 5		Very faint seismic activity from 18:05 to 18:07.						
93 Aug. 7		09:04:19						Weak. U.S.C. & G.S. epicenter - 10 degrees N. Lat., 77 degrees W. Long.
		to 09:20:00						
94 Aug. 9	1PNE	00:46:26						Very weak - distance approx. 25 miles.
	1SNE	00:46:31						
	FNE	00:47:00						
95 Aug. 14		15:01:00						Faint but certainly seismic. Ev- idently within 20 miles radius of Balboa Heights.
		to 15:02:00						
96 Aug. 16		12:26:47						Same as #95.
		to 12:27:30						
97 Aug. 16	ePNE	16:23:16						Very weak - distance approx. 140 miles
	eSNE	16:23:41						
	FNE	16:25:00						
98 Aug. 16	1PNE	18:08:24						Distance approx. 130 miles.
	1SNE	18:08:47						
	MN	18:08:54					7.6	
	ME	18:08:56				7.7		
	FNE	18:11:00						



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Page No. 13

Month AUGUST 1935

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
99 Aug. 16	ePNE eSNE ENE	21:39:51 21:40:14 21:42:00						Very weak - distance approx. 130 miles.
100 Aug. 17	ePNE eSNE ENE	21:03:00 21:03:12 21:04:00						Distance approx. 65 miles - very weak.
101 Aug. 21		21:22 to 21:25						Very weak.
102 Aug. 28		14:01 to 14:02						Very weak.
103 Aug. 29	iPNE iSNE ENE	12:36:12 12:36:15 12:37:00						Weak. Epicenter within 20 miles radius.
104 Aug. 30		17:09:40 to 17:13:00						Weak.
105 Aug. 30		18:50:55 to 18:54:00						Weak.
106 Aug. 31		11:53 to 11:56						Very weak.

R. Z. KIRKPATRICK  
Chief of Surveys



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Lithologic foundation: Basalt.

Time Correction: Within 0.5 sec.

**INSTRUMENTS—FIXED CONSTANTS**

INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED		MASS
				60 mm. per min.	15 mm. per min.	13 gr. 100 kg.
Wood-Anderson	I	Photographic	Magnetic	60 mm. per min.		13 gr. 100 kg.
Bosch-Omori	II	Smoked Sheet	Air	15 mm. per min.		

**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T.	V	h	DETERMINED
					July 18, 1934 July 18, 1934
Wood-Anderson	E - W	0.8	1370	Critical	July 18, 1934 July 18, 1934
Wood-Anderson	N - S	0.8	1370	Critical	
Bosch-Omori	- - - - -	NOT OPERATING			
Bosch-Omori	- - - - -	NOT OPERATING			

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Month SEPTEMBER - 1935

Page No. 14

No. and Date	Phase	Time			Period	Amplitude		REMARKS
		G. M. T.				E	N	
		h	m	s		mm	mm	
107 Sept. 1		00:50:53			✓			Very weak.
108 Sept. 1		Faint seismic activity from 15:16 to 15:18.						
109 Sept. 5	ePNE eSNE PNE	15:15:42 15:16:18 15:18:00			✓			Weak. Distance about 200 miles.
110 Sept. 5		Faint seismic activity from 17:03 to 17:06.						
111 Sept. 5		20:03:38 to 20:07:00			✓			Very weak.
112 Sept. 8		11:13:40 to 11:14:24			✓			Very weak.
113 Sept. 12		12:37:56 to 12:38:30			✓			Very slight tremor.
114 Sept. 13		2:59:00 to 2:40:00			✓			Very weak.
115 Sept. 15		4:05:00 to 4:11:00			✓			Very weak.
116 Sept. 16		11:26:45 to 11:27:14			✓			Very weak.
117 Sept. 16		14:18:00 to 14:48:00			✓			Very weak distant tremors.
118 Sept. 16		4:23:00 to 4:25:00			✓			Very weak.
119 Sept. 16		23:05 to 23:07			✓			Very weak.
120 Sept. 17		12:45 to 12:47			✓			Very weak.
121 Sept. 18	HPE ISE LE NE CE FE	4:59:16 5:00:29 5:00:42 5:00:50 5:01:27 5:21:00			✓	6.0		N-S-clock stopped. Distance approx. 400 miles.
122 Sept. 19		10:01 to 10:05			✓			Very weak.
123 Sept. 19		12:42 to 12:43			✓			Very weak.



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month SEPTEMBER-1935

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
124 Sept. 20		2:06			✓			Waves from very distant disturbance. A cable dispatch advises that this earthquake was reported by the Carnegie Institution and the California Institute of Technology.
125 Sept. 21		6:51			✓			Very weak.
126 Sept. 21		11:42			✓			Very weak.
127 Sept. 21		11:44:48			✓			Very weak. after shock from.
128 Sept. 21		13:50			✓			Very weak.
129 Sept. 21		13:55:15			✓			Very weak.
130 Sept. 21		15:38			✓			Very weak.
131 Sept. 21		16:28			✓			Weak.
132 Sept. 24		10:39:45			✓			Weak. Epicenter probably 200 miles.
133 Sept. 24		12:50:41			✓			Very faint trace.
134 Sept. 26		20:59			✓			Very faint trace.
135 Sept. 26		16:39:32			✓			Very weak
136 Sept. 26		18:44:43			✓			Weak -
137 Sept. 27		21:54						Weak -
138 Sept. 28		12:29:44						Weak -

CORRECTED COPY - This supersedes previous September report.

R. Z. KIRKPATRICK,  
Chief of Surveys.

RZP\*rm



**THE PANAMA CANAL**  
DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

**SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE**

Lat. 8° 57' 39" N.

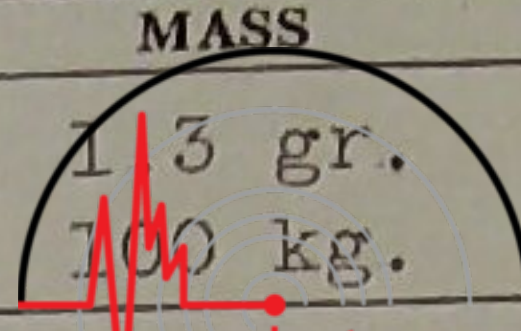
Long. 79° 33' 29" W.

h = 36 meters.

Lithologic foundation: Basalt.

Time Correction: Within 0.5 sec.

**INSTRUMENTS—FIXED CONSTANTS**

INSTRUMENTS	SYMBOL	REGISTRATION	DAMPING	PAPER SPEED		MASS
				60 mm. per min.	15 mm. per min.	13 gr. 100 kg.
Wood-Anderson	I	Photographic	Magnetic	60 mm. per min.		
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**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T.	V.	h	DETERMINED
		0.8	1370	Critical	July 18, 1934
Wood-Anderson	E - W	0.8	1370	Critical	July 18, 1934
Wood-Anderson	N - S	0.8	1370	Critical	July 18, 1934
Bosch-Omori	} - - - - -	- - - NOT OPERATING - - -			- - - - -
Bosch-Omori					

Month October 1935Page No. 16

No. and Date	Phase	Time			Period	Amplitude		REMARKS
		G. M. T.				E	N	
		h	m	s		mm	mm	
139 Oct. 1st		22:40						Weak.
		to						
		22:52						
140 Oct. 3d.		19:15						Very weak.
		to						
		19:17						
141 Oct. 4th.		12:52						Seismic activity weak.
		to						
		12:54						
142 Oct. 4th.		14:33:48						Very weak.
		to						
		14:36:00						
143 Oct. 4th.		15:28:44						Very weak.
		to						
		15:30:00						
144 Oct. 5th.		2:10:38						Seismic activity weak.
		2:11:10						
145 Oct. 5th		13:35						
		to						
		13:36						
146 Oct. 6th.		11:22						
		to						
		11:23						
147 Oct. 8th.	1PN FN	17:25:00						Very sharp and abrupt. Resembles dynamite explosion. E - W Time Marker not working.
		17:25:10						
148 Oct. 9th.	1PN 1SN FN	12:39:57						Distance within 30 miles.  Faint. E - W Time Marker not working.
		12:40:00						
		12:40:45						
149 Oct. 10th.		21:36						Note: Nos. 149, 150, and 151 - ending of quakes lost as one
150 Oct. 10th.		22:06						end of paper worked loose from holder.
151 Oct. 11th.		12:36						N - S clock stopped.
152 Oct. 14th.		17:38:33						Weak.
		to						
		17:47:00						
153 Oct. 18th.		14:32						Faint seismic activity.
		to						
		14:34						



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Page No. 17

Month .....

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
154 Oct. 20th.		15:01:39 to 15:03:00						Very weak.
155 Oct. 21 st.		18:57 to 18:59						Seismic activity.
156 Oct. 22d.		13:23 to 13:29						Seismic activity.
157 Oct. 24th.		14:39:53 to 14:41:00						Seismic activity.
158 Oct. 27th.		01:11 to 01:23						Very weak.
159 Oct. 27th.	1PNE 1 SN 1 SE MN ME FNE	22:06:41 22:07:46 22:07:47 22:07:57 22:07:55 22:14:00					11.5 7.3	Distance 380 miles.
160 Oct. 28th.		22:17 to 22:22						Weak.
161 Oct. 30th.	1 PN 1 PE 1 SN 1 SE FNE	12:35:53 12:35:52 12:35:56 12:35:54 12:36:50						Within 25 mile radius of Balboa. Weak.





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DEPARTMENT OF OPERATION AND MAINTENANCE  
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**SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE**

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

h=36 meters.

Lithologic foundation: Basalt.

Time Correction: Within 0.5 sec.

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Bosch-Omori )					
Bosch-Omori )					
----- N O T O P E R A T I N G -----					

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Month November 1935.Page No 18

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E	N	
						mm	mm	
162 Nov. 2		21: 08 to 21: 11						Slight seismic activity.
163 Nov. 3		6: 53 to 6: 56						Weak.
164 Nov. 5		15: 48: 32 to 15: 50: 00						Weak.
165 Nov. 8		13: 33 to 13 : 34						Seismic activity -
166 Nov. 10		18: 32 to 18: 42						Seismic activity -
167 Nov. 11	1 PNE 1 SNE 1 LNE M N M E CNE FNE	6: 56: 58 6: 57: 15 6: 57: 47 6: 57: 49 6: 57 : 50 6: 58: 16 7: 02: 00				4.5	8.5	Distance about 70 miles
168 Nov. 13		15: 46: 57 to 15: 47: 30						
168 Nov. 13		15: 46: 57 to 15: 47: 30						
169 Nov. 14	1 PNE 1 SNE 1 LNE MNE FNE	00: 18: 39 00: 20: 00 00: 20: 02 00: 20: 06 00: 22: 00				4.0	7.0	Distance about 110 miles
170 Nov. 14		15: 11: 55 to 15: 12: 25						Seismic activity -



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Page No. 19

Month November 1935

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
171 Nov. 16		18: 39 to 18: 40						Seismic Activity
172 Nov. 16		20: 10 to 20: 11						Seismic activity
173 Nov. 17		10: 06 to 10: 08						Seismic activity
174 Nov. 23		7:55 to 8: 10						Light tremors
175 Nov. 23	1 P N 1 S N 1 L N M N F N	12: 30: 11 12: 30: 13 12: 30: 14 12: 30: 16 12: 30: 35				2.2	2.0	Marker on E - W out of adjustment Very sharp
176 Nov. 27		17: 18: 00 to 17: 19: 00						Seismic activity
177 Nov. 27		20: 47: 55 to 20: 48: 04						Short and abrupt
178 Nov. 28	1 P N 1 S N 1 L N M N F N	23: 47: 57 23: 48: 49 23: 48: 58 23: 49: 05 23: 53: 00						Approximate distance about 300 miles E - W marker out of adjustment.
179 Nov. 30	1 P N e M N F N	3: 40: 26 3: 41: 32 4: 09: 00						Approximate distance 70 miles Intensity IV to V (Modified Mercalli scale) at Balboa Heights. This shock was noticeably felt throughout the Canal Zone and Republic of Panama. E - W - Timemarker not working. Principal portion blurred.
180 Nov. 30		4: 09: 47 to 4: 11: 00						Weak
181 Nov. 30		4: 12: to 4: 13:						Weak
182 Nov. 30 6	1 P N 1 S N 1 M N F N	4: 14: 53 4: 15: 02 4: 15: 07 4: 16: 30						Weak
183 Nov. 30		4: 17 to 4: 18						Seismic activity





## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Page No. 20

Month November 1935

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
184 Nov. 30		4: 32: 49 to 4: 33: 00						Seismic activity
185 Nov. 30		4: 59: 00 to 4: 59: 14						Very slight seismic activity.
186 Nov. 30	1 P N 1 S N 1 L N F N	5: 11: 34 5: 11: 43 5: 11: 47 5: 13: 00						Weak
187 Nov. 30		5: 16: 00 to 5: 16: 30						Seismic activity
188 Nov. 30		5: 22: 47 to 5: 23: 05						Very slight seismic activity
189 Nov. 30		5: 26: to 5: 27:						Very slight seismic activity
190 Nov. 30		5: 11: to 5: 12:						Very slight seismic activity
191 Nov. 30		7: 08: 00 to 7: 09: 30						Seismic activity
192 Nov. 30		7:31: 52 to 7: 32: 00						Very slight seismic activity
193 Nov. 30		10: 54: 22 to 10: 55: 00						Seismic activity
194 Nov. 30	1 P N 1 S N M N C N F N	11: 09: 23 11: 09: 34 11: 09: 37 11: 09: 49 11: 12: 00				11	11	Approximate distance about 70 miles.
195 Nov. 30		11: 15: 41 to 11: 16: 35						Weak
196 Nov. 30		11: 41: 00 to 11: 42: 00						Very weak.
197 Nov. 30		12: 07: 52 to 12: 09: 00						Weak

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## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month November 1935Page No. 21

No. and Date	Phase	Time G. M. T.			Period	Amplitude		REMARKS
		h	m	s		E mm	N mm	
198 Nov. 30		12:	14:					Seismic activity
			to					
		12:	15:					
199 Nov. 30		12:	16:					Seismic activity
			to					
		12:	17:					
200 Nov. 30		14:	53:					Weak
			to					
		14:	55:					
201 Nov. 30		16:	30					Weak
			to					
		16:	31					
202 Nov. 30		17:	49:	38				
			to					
		17:	51:	00				
203 Nov. 30		18:	39:					Very slight seismic disturbance.
			to					
		18:	40:					

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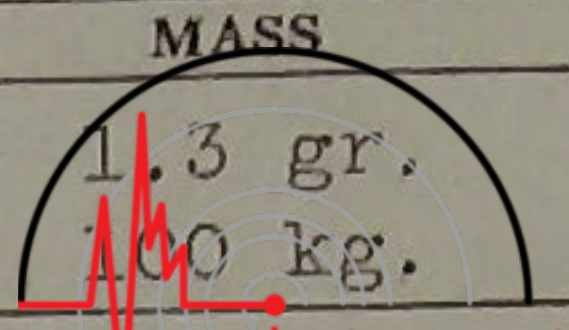
Long. 79° 33' 29" W.

h = 36 meters.

Lithologic foundation: Basalt.

Time Correction: Within 0.5 sec.

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Bosch-Omori	II	Smoked Sheet	Air	15 mm. per min.		

**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T <sub>0</sub>	V	h	DETERMINED
					July 18, 1934
Wood-Anderson	E - W	0.8	1370	Critical	July 18, 1934
Wood-Anderson	N - W	0.8	1370	Critical	July 18, 1934
Bosch-Omori )	- - - -	Not operating			
Bosch-Omori )					

Month December 1935Page No. 22

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E	N	
						mm	mm	
204 Dec. 1		00	28	30				Very weak
		to						
		00	30	00				
205 Dec. 1		Slight activity at 3:05						
206 Dec. 1		5	17	27				Very weak
		to						
		5	18	00				
207 Dec. 1	i PN i SN LN MN ON FIN	9	40	44			18.5 20	Approximate distance about 45 miles. E-W - time marker not working
		9	40	52				
		9	40	56				
		9	40	59				
		9	41	12				
		9	44	00				
208 Dec. 4		08	52	10				Weak trace of local origin.
		to						
		08	54	00				
209 Dec. 4		17	03	55				Faint trace
		to						
		17	05	00				
210 Dec. 4	1 PN 1 SN MN FN	22	20	08			549	Distance about 50 miles. E-W record partially lost - exposed to light before developing.
		22	20	16				
		22	20	22				
		22	26	00				
211 Dec. 5.		01	28	15				Faint trace from local origin.
		to						
		01	20	30				
212 Dec. 5.		07	54	45				Faint trace - local
		to						
		07	55	30				
213 Dec. 6		04	53	10				Weak - local
		to						
		04	56	00				
214 Dec. 6	e PNE i SNE FNE	15	20	52				Distance about 70 miles. Very weak
		15	21	04				
		12	22	00				
215 Dec. 7		12	20 <sup>9</sup>	54				Faint trace - local
		to						
		12	30	30				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month December 1935Page No. 23

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
216 Dec. 11	i PNE i SNE MN ME FNE	23	36	20 32 34 36 00				Distance about 70 miles. Felt by a few people in the Canal Zone
						5.4	6.6	
217 Dec. 13		Slight seismic activity from 12 : 30 : 51 to 12 : 33 : 00						
218 Dec. 13		16	43	39 to 00				Weak
219 Dec. 14	i PN i PE i N i N i E MN ME FNE	01	35	13 12 40 25 19 26 26 00	2.0 1.7		2.1 4.7	
220 Dec. 14		04	31	to 33				Very faint trace
221 Dec. 14	e PNE e N e E e N e E FNE	22	08	41 11 55 24 13 50				"P" may be earlier
222 Dec. 15		00	35	22 to 30 <sup>9</sup>				Very faint - Barely discernible
223 Dec. 16	e PNE e NE FNE	17	01	23 32 08				Very faint.
224 Dec. 16	i PNE i SN i SE MN MNE FNE	22	09	00 27 28 37 38 13			6.4 6.5	Distance - 150 miles.
225 Dec. 17	e PNE i SNE FNE	22	12	00 11 14				Weak Distance about 60 miles.
226 Dec. 19		06	48	40 to 51				Very faint
227 Dec. 20	i PNE i SNE FNE	12	39	51 53 30				Faint Within 15 mile radius of Balboa
228 Dec. 21		11	54	to 04				Very faint
229 Dec. 21		14	29	to 30				Very faint



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month December 1955Page No. 24

No. and Date	Phase	Time G. M. T.			Period s	Amplitude		REMARKS
		h	m	s		E mm	N mm	
230 Dec. 22		04	03	20 to 04 : 05 :				Barely discernible - but certainly seismic.
231 Dec. 23		08	15	40 to 08 : 17 :				Weak
232 Dec. 23	e PN e PE e N e E e E ME FNE	12	25	46 12 : 25 : 44 12 : 27 : 19 12 : 27 : 17 12 : 28 : 28 12 : 30 : 00 12 : 52	4.0	1.5		
233 Dec. 24		16	14	to 16 : 21				Weak
234 Dec. 25		02	12	58 to 02 : 13 : 40				Very faint
235 Dec. 26		04	14	to 04 : 16				Very faint
236 Dec. 26	e PN e PE e SN e SE MN ME FNE	14	48	11 14 : 48 : 12 14 : 48 : 55 14 : 48 : 55 14 : 49 : 05 14 : 49 : 04 14 : 56 :		5.6 6.2		Distance about 250 miles. Felt in David, Republic of Panama.
237 Dec. 26		23	29	to 23 : 45				Very weak
238 Dec. 28	e E FNE	02	55	45 04 : 44 :				Long period waves of approximately 30 seconds appear intermittently.
239 Dec. 28		03	35	to 03 : 39				Superposed From local origin.
240 Dec. 28		18	55	21 to 18 : 57				Faint. Local.
241 Dec. 29 & 30		23	57	to 00 : 01				Very weak
242 Dec. 30		03	50	to 03 : 52				Very weak
243 Dec. 31	e PNE e SNE MN ME FNE	07	34	18 07 : 34 : 31 07 : 34 : 33 07 : 34 : 32 07 : 37 :		8.0 7.4		Distance about 70 miles.
244 Dec. 31		16	11	11 to 16 : 12 :				Very faint.

