

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

MR 69138—Panama Canal—2-1-40—200



**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 1.0 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.	V	h	DETERMINED
Wood-Anderson	N-S	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E-W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori	}	Not operating.			
Bosch-Omori					

Month January 1941

Page No. 1

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TITUDE  mm	REMARKS
		h	m	s			
#1 Jan. 1	ePNE	7:	51:	36		15 11	Distance about 25 miles.
	eSE	7:	51:	41			
	LNE	7:	51:	44			
	MN	7:	51:	46			
	ME	7:	51:	47			
	CNE	7:	51:	58			
	FNE	7:	54:				
#2 Jan. 3		9:	19				
		to					
#3 Jan. 5		19:	06				
		to					
#4 Jan. 6	ePNE	9:	50:	15			Distance about 475 miles.
	eSNE	9:	51:	38			
	LN	9:	52:	35			
	LE	9:	52:	37			
	MNE	9:	53:	01			
	FNE	10:	10				
#5 Jan. 6		10:	11				
		to					
#6 Jan. 8	ePNE	00:	04:	42		5.6 9.5	Distance about 80 miles.
	eSNE	00:	04:	57			
	LN	00:	04:	59			
	MN	00:	05:	00			
	ME	00:	05:	04			
	CN	00:	05:	14			
	CE	00:	05:	19			
	FNE	00:	07				
#7 Jan. 11		21:	09				
		to					
		21:	11				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month January 1941Page No. 2

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#8 Jan. 13	eNE	16:	47:	10			Seismic disturbance of distant origin.  Preliminary determination of epicenter by C. and G. S.:— 3°S, 144°E.
	eNE	16:	50:	04			
	eNE	17:	06:	20			
	eNE	17:	26:	00			
#9 Jan. 15	ePNE	22:	32:	57			Distance about 140 miles.
	eSN	22:	33:	22			
	LNE	22:	33:	43	. . . .	2.0	
	MN	22:	33:	50	. . . .	2.0	
	ME	22:	34:	00	. . . .		
	CNE	22:	34:	09			
FNE	22:	36					
#10 Jan. 17	ePN	1:	19:	18			Distance about 135 miles.
	ePE	1:	19:	19			
	eSNE	1:	19:	43			
	LN	1:	20:	05			
	LE	1:	20:	04			
	MN	1:	20:	07		8.0	
	ME	1:	20:	18		8.0	
	CN	1:	20:	30			
	CE	1:	20:	27			
FNE	1:	23					
#11 Jan. 17		12:	40				
		to					
		12:	42				
#12 Jan. 18	PNE	13:	16:	05			
	LNE	13:	16:	41			
	MN	13:	16:	49		1.5	
	ME	13:	16:	53		2.0	
	FNE	13:	18				
#13 Jan. 22		17:	55:	38			
		to					
		17:	57				
#14 Jan. 24		5:	47:	03			
		to					
		5:	54				
#15 Jan. 30	PNE	19:	41:	13			
	LN	19:	41:	45			
	LE	19:	41:	44			
	MN	19:	42:	03		5.5	
	ME	19:	42:	01		6.5	
	CNE	19:	42:	22			
	FNE	19:	45				



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month January 1941

Page No. 3

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#16	PNE	6:	40:	11			
	LN	6:	40:	47			
Jan. 31	LE	6:	40:	45			
	MN	6:	40:	59		4.8	
	ME	6:	40:	54		6.0	
	CN	6:	41:	14			
	CE	6:	41:	20			
	FNE	6:	45				

L. T. CHAPEL  
Acting Chief Hydrographer



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INSTRUMENTS	COMPONENT	T <sub>0</sub>	v	h	DETERMINED
Wood-Anderson	N - S	0.80	2740	8 - 1	Aug. 24, 1939
Wood-Anderson	E - W	0.80	2740	12 - 1	Aug. 24, 1939
Bosch-Omori					
Bosch-Omori					

Month February 1941Page No. 4

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE mm	REMARKS
		h	m	s			
#17 Feb. 1 ✓	ePN	0	49	30	2.8		
	LN	0	49	50			
	MN	0	49	51			
	FN	0	51				
#18 Feb. 2 ✓	ePNE	0	17	52			
	MNE	0	18	27			
	FNE	0	21				
#19 Feb. 3 ✓	ePNE	23	39	24	14.0 17.0		
	LN	23	40	08			
	LE	23	40	07			
	MN	23	40	10			
	ME	23	40	12			
	CNE	23	41	28			
	FNE	23	52				
#20 Feb. 4 ✓	ePN	12	30	35	29.5	Approximate distance about 160 miles.	
	ePE	12	30	36			
	eSNE	12	31	13			
	LN	12	31	20			
	LE	12	31	19			
	MN	12	31	33			
	CN	12	32	40			
	CE	12	32	30			
	FNE	12	45				
#21 Feb. 4 ✓	e	14	21				
	F	to	14	25			



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month February 1941

Page No. 5

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#22 Feb. 5 ✓	e	2:51					
		to					
		2:54					
#23 Feb. 5 ✓	e	21:01					
		to					
		21:06					
#24 Feb. 7 ✓	ePNE LN LE MNE CN CE FNE	16:08:40 16:09:30 16:09:32 16:09:35 16:10:06 16:10:10 16:17					
#25 Feb. 9 ✓	e	9:53:23					Faint trace of distant disturbance
		to					
		10:30					
#26 Feb. 10 ✓	ePN ePE eSNE LNE MNE CN CE FNE	15:49:05 15:49:06 15:49:20 15:49:31 15:49:33 15:49:45 15:49:47 15:51			(N 5.2 (E 5.0		Distance about 80 miles
#27 Feb. 11 ✓	NE NE NE FNE	14:39:33 14:42:40 14:47:10 15:30					Distant disturbance
#28 Feb. 23 ✓		5:55:25					
		to					
		5:58					



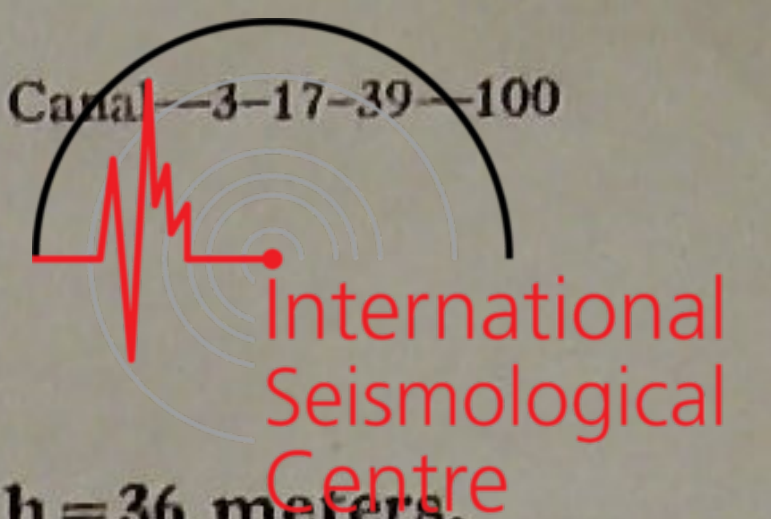
## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month **February 1941**Page No. **6**

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#29 Feb. 27 ✓		10:04 to 10:06					
#30 Feb. 27 ✓	1PN 1SN LN MN CN FN	15:08:34 15:08:52 15:09:09 15:09:26 15:10:01 15:18			51.0		Distance about 100 miles Not reported felt locally
							G. E. MATTHEW Chief Hydrographer.



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Bosch-Omori )		Not operating			
Bosch-Omori )					

Month March 1941Page No. 7

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 31 Mar. 2		18:11 to 18:14					
# 32 Mar. 2		18:14 to 18:17					
# 33 Mar. 3		9:21 to 9:25					
# 34 Mar. 8		21:43 to 21:45					
# 35 Mar. 10	i PNE F	3:47:57 3:54					Intensity I Modified Mercalli Scale Felt locally by many
# 36 Mar. 10	i PNE F lost in 2 following shocks	4:06:11					Intensity III Modified Mercalli Scale. Felt thru-out the Canal Zone.
# 37 Mar. 10	o PNE F	4:12:24 4:14					
# 38 Mar. 10	o PNE F lost in following shock	4:16:08					
# 39 Mar. 10	i PNE F lost in following shock	4:16:41					Intensity II Modified Mercalli Scale Felt locally thru-out the Canal Zone.



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March 1941Page No. 8

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 40 Mar. 10	• PNE LNE F	4:22:49 4:23:13 4:25					
# 41 Mar 10	• PNE • SNE LNE FNE	4:29:42 4:29:55 4:30:04 4:33				Distance about 75 miles	
# 42 Mar. 10	I PNE I SNE LNE CNE F lost in following shock	4:33:21 4:33:34 4:33:46 4:34:41				Distance about 75 miles	
# 43 Mar. 10	I PNE I SNE LNE CNE FNE	4:35:05 4:35:18 4:35:49 4:36:31 4:39				Distance about 75 miles	
# 44 Mar. 10	• PNE MNE FNE	5:06:41 5:07:16 5:08					
# 45 Mar. 10	I PNE • SNE LNE MN CNE FNE	5:10:20 5:10:33 5:10:45 5:10:55 5:11:30 5:14			13.0	Distance about 75 miles	
# 46 Mar. 10	• PNE FNE	5:31:02 5:33					
# 47 Mar. 10	• PNE LNE MNE FNE	5:46:34 5:46:58 5:47:03 5:49			4.0		



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March, 1941Page No. 9

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS		
		h	m	s					
# 48 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>• SNE</li> <li>LNE</li> <li>MN</li> <li>CNE</li> <li>FNE</li> </ul>	6:05:14	6:05:27	6:05:39	6:05:46	6:06:12	6:05:09	17.5	Distance about 75 miles
# 49 Mar. 10	<ul style="list-style-type: none"> <li>1 PNE</li> <li>1 SNE</li> <li><del>LNE</del></li> <li>CNE</li> <li>F lost in following shock</li> </ul>	6:09:31	6:09:44	6:09:58	6:10:31			38.0	Distance about 75 miles Intensity I Modified Mercalli Scale Felt locally by a few.
# 50 Mar. 10	<ul style="list-style-type: none"> <li>LPNE</li> <li>• SN</li> <li>LNE</li> <li>MN</li> <li>CNE</li> <li>FNE</li> </ul>	6:13:00	6:13:13	6:13:25	6:13:30	6:13:54	6:16	8.5	Distance about 75 miles
# 51 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>LNE</li> <li>MN</li> <li>CN</li> <li>FNE</li> </ul>	6:21:04	6:21:29	6:21:35	6:21:48	6:23		3.5	
# 52 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>FNE</li> </ul>	7:28:55	7:30						
# 53 Mar. 10	<ul style="list-style-type: none"> <li>1 PNE</li> <li>• SNE</li> <li>LNE</li> <li>MN</li> <li>CNE</li> <li>FNE</li> </ul>	8:44:13	8:44:27	8:44:38	8:44:45	8:45:32	8:50	18.0	
# 54 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>FNE</li> </ul>	10:06:29	10:08						



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March 1941Page No. 10

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 55 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>• SNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CN</li> <li>FNE</li> </ul>	14:14:54					Distance about 75 miles
		14:15:07				9.0	
		14:15:19				8.2	
		14:15:25					
		14:15:21					
		14:15:44					
		14:18					
# 56 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>FNE</li> </ul>	14:16:33					
		14:18					
# 57 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>• SNE</li> <li>LNE</li> <li>MNE</li> <li>CNE</li> <li>FNE</li> </ul>	14:18:11					Distance about 35 miles
		14:18:17					
		14:18:22					
		14:18:23			(N 12.2		
		14:18:44			(E 11.0		
		14:20					
# 58 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CNE</li> <li>FNE</li> </ul>	17:23:50					
		17:24:12				2.0	
		17:24:22				2.0	
		17:24:18					
		17:24:28					
		17:26					
# 59 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>• SNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CNE</li> <li>FNE</li> </ul>	18:38:16					Distance about 75 miles
		18:38:29					
		18:38:41				4.0	
		18:38:49				5.0	
		18:38:45					
		18:39:03					
		18:41					
# 60 Mar. 10	<ul style="list-style-type: none"> <li>• PNE</li> <li>• SNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CNE</li> <li>FNE</li> </ul>	19:45:23					Distance about 90 miles
		19:45:40					
		19:45:52				4.5	
		19:46:02				3.5	
		19:46:01					
		19:46:09					
		19:48					
# 61 Mar. 11	<ul style="list-style-type: none"> <li>• PNE</li> <li>FNE</li> </ul>	2:28:34					
		2:40					



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March 1941Page No. 11

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 62 Mar. 11	• PNE	2	40	38		3.0 3.0	
	LNE	2	41	02			
	MN	2	41	10			
	ME	2	41	05			
	CNE	2	41	18			
	FNE	2	43				
# 63 Mar. 11	• PNE	22	31	34			
	FNE	22	33				
# 64 Mar. 11	• PNE	22	46	52		3.5 2.0	Distance about 75 miles
	• SNE	22	47	05			
	LNE	22	47	16			
	MN	22	47	23			
	ME	22	47	17			
	CNE	22	47	32			
	FNE	22	49				
# 65 Mar. 12	• PNE	00	02	47			
	FNE	00	04				
# 66 Mar. 12	• PNE	2	57	49			
	FNE	2	59				
# 67 Mar. 12	• PNE	23	37	34			
	FNE	23	39				
# 68 Mar. 13	• PNE	13	09	55	(N (E	1.5 2.5	
	LNE	13	10	19			
	MNE	13	10	25			
	FNE	13	12				
# 69 Mar. 13	• PNE	22	46	08			
	FNE	22	48				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March, 1941Page No. 12

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 70 Mar. 13	● PNE LNE FNE	23:16:25 23:17:10 23:19					
# 71 Mar. 14	● PNE ● SNE LNE MN ME CN CE FNE	14:38:27 14:38:40 14:38:52 14:38:57 14:38:59 14:39:22 14:39:28 14:42			13.0 12.5	Distance about 75 miles	
# 72 Mar. 14	● PNE FNE	15:28:51 15:30					
# 73 Mar. 14	● PNE FNE	19:07:10 19:09					
# 74 Mar. 15		15:31 to 15:32					
# 75 Mar. 16	● PNE ● SNE LNE MN ME CNE FNE	3:53:02 3:53:15 3:53:27 3:53:34 3:53:30 3:53:55 3:56			5.0 7.5	Distance about 75 miles	
# 76 Mar. 16	<sup>e</sup> ● PNE FNE	22:54:29 22:57					
# 77 Mar. 16	● PNE LNE MN ME CN CN <sup>E</sup> F lost in following quake	23:53:01 22:53:26 22:53:37 22:53:36 22:53:51 22:53:46			3.8 5.0		



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March 1941Page No. 13

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 78 Mar 16	<ul style="list-style-type: none"> <li>• PNE</li> <li>• LNE</li> <li>MN</li> <li>ME</li> <li>CNE</li> <li>FNE</li> </ul>	Lost in F of preceding quake					
		23:54:18				3.5	
		23:54:22				5.5	
		23:54:20					
		23:54:37					
		23:56					
# 79 Mar. 17	<ul style="list-style-type: none"> <li>• PNE</li> <li>SN</li> <li>SE</li> <li>LN</li> <li>LE</li> <li>MN</li> <li>Me</li> <li>CN</li> <li>CE</li> <li>FN</li> </ul>	00:05:22					Distance about 75 miles
		00:05:36					
		00:05:37					
		00:05:47					
		00:05:46					
		00:06:01				6.5	
		00:05:48				9.0	
		00:06:04					
		00:06:05					
		00:09					
#80 Mar. 17	<ul style="list-style-type: none"> <li>• PNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CNE</li> <li>FNE</li> </ul>	00:30:01				3.0	
		00:30:25					
		00:30:39				3.0	
		00:30:26					
		00:30:41					
		00:33					
#81 Mar. 17	<ul style="list-style-type: none"> <li>• PNE</li> <li>FNE</li> </ul>	3:56:47					
		3:58					
#82 Mar. 17		11:02 to 11:04					
#83 Mar. 19	<ul style="list-style-type: none"> <li>e PNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CNE</li> <li>FNE</li> </ul>	13:56:25				5.0	
		13:56:47				4.8	
		13:56:54					
		13:56:50					
		13:57:04					
		14:00					
#84 Mar. 19	<ul style="list-style-type: none"> <li>• PNE</li> <li>LNE</li> <li>ME</li> <li>CN</li> <li>CE</li> <li>FNE</li> </ul>	15:22:07					
		15:22:31					
		15:22:34					
		15:22:46					
		15:22:48					
		15:24					



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March 1941Page No. 14

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 85 Mar. 19	<ul style="list-style-type: none"> <li>● PNE</li> <li>● SNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CN</li> <li>CE</li> <li>FNE</li> </ul>	16:36:53					Distance about 75 miles
		16:37:07					
		16:37:17					
		16:37:31			22.5		
		16:37:22			24.0		
		16:38:20					
		16:38:09					
		16:41					
# 86 Mar. 19	<ul style="list-style-type: none"> <li>● PNE</li> <li>● SNE</li> <li>LNE</li> <li>MN</li> <li>ME</li> <li>CN</li> <li>CE</li> <li>FNE</li> </ul>	22:22:14					Distance about 140 miles
		22:22:39					
		22:22:57					
		22:23:11			21.5		
		22:23:10			21.5		
		22:24:07					
		22:24:12					
		22:30					
# 87 Mar. 19	<ul style="list-style-type: none"> <li>● PNE</li> <li>MN</li> <li>ME</li> <li>FNE</li> </ul>	23:57:12					
		23:58:00					
		23:57:58					
		00:00					
# 88 Mar. 20		3:25					
		to					
		3:27					
# 89 Mar. 20		3:43					
		to					
		3:45					
# 90 Mar. 21	<ul style="list-style-type: none"> <li>i NE</li> <li>i NE</li> </ul>	8:06:08					
		8:10:02					
# 91 Mar. 21		14:04					
		to					
		14:06					
# 92 Mar. 21		15:07					
		to					
		15:08					



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month March 1941Page No. 15

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 93 Mar. 21		16:32 to 16:33					
# 94 Mar. 21		17:02 to 17:03					
# 95 Mar. 22		21:57 to 21:59					
# 96 Mar. 23	● PNE FNE	9:02:41 9:15					
# 97 Mar. 23	● PNE MN ME FNE	10:19:29 10:20:06 10:20:20 10:23			3.0 3.5		
# 98 Mar. 23		23:11 to 23:13					
# 99 Mar. 25	PNE) SNE) LNE FNE	Confused 16:11:45 16:13					
# 100 Mar. 25	● PNE ● SNE LNE ME MN CE CN FNE	19:42:38 19:42:51 19:43:03 19:43:04 19:43:10 19:43:25 19:43:30 19:46			16.5 20.0	Distance about 75 miles	







**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 1.0 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.	V	h	DETERMINED
Wood-Anderson	N-S	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E-W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori	}	Not Operating			
Bosch-Omori					

Month April, 1941Page No. 17

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE mm	REMARKS
		h	m	s			
#106 Apr. 3	eFN	15	28	02		Distance about 2300 miles	
	ePE	15	28	01			
	eSN	15	33	21			
	eSE	15	33	16			
	eN	15	35	04			
	eE	15	34	53			
	LN	15	38	00			
	LE	15	38	02			
	FNE	16	00				
#107 Apr. 5	ePNE	16	31	07			
	FNE	16	34				
#108 Apr. 6		22	57	44		Faint trace of distant disturbance	
		to	23	12			
#109 Apr. 7	ePNE	23	31	27		Distance about 245 miles	
	eSNE	23	32	10			
	LNE	23	32	48			
		Lost in following quake					
#110 Apr. 7		Began approximately 23:33. All phase lost due to superimposition of after shocks from #109. Apparently of distant origin.					
#111 Apr. 7		Began 23:37 (approx.) on combined tail portions of #109 and #110. Probably same source as #109.					
#112 Apr. 7		Began 23:43 (approx.) on combined tail portions of #109, #110 and #111. Probably same source as #109.					



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month April, 1941Page No. 18

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#113 Apr. 8	ePNE MNE FNE	3: 49: 21 3: 50: 43 3: 56			(2.5 2.5	Probably same source as #109.	
#114 Apr. 8	ePNE MN ME FNE	10: 08: 33 10: 10: 24 10: 10: 15 Lost in microseisms			3.0 3.0		
#115 Apr. 11	ePNE MN FNE	17: 36: 41 17: 37: 51 17: 40					
#116 Apr. 13	1PNE MN ME FNE	19: 44: 29 19: 44: 32 19: 44: 34 19: 48			4.5 2.5		
#117 Apr. 15		16: 39: 52 to 16: 42					
#118 Apr. 15	ePN ePE SN SE SR, N E LN LE MN ME F	19: 15: 14 19: 15: 16 19: 19: 45 19: 19: 39 19: 20: 50 19: 20: 35 19: 22: 43 19: 22: 48 19: 25: 31 19: 24: 17 lost in following shock				Distance about 1800 miles. Destructive in Mexico.	
#119 Apr. 15	ePNE SN FNE	19: 51: 22 19: 55: 40 21: 15				Same source as #118.	
#120 Apr. 23		0: 38: to 0: 42					



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month April 1941

Page No. 19

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 121 Apr. 23		22	54				
			to				
		22	57				
# 122 Apr. 24		1	06				
			to				
		1	13				
# 123 Apr. 27		5	36				
			to				
		5	43				

G. E. MATTHEW  
Chief Hydrographer



**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 1.0 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	N-S	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E-W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori )	Not operating				
Bosch-Omori )					

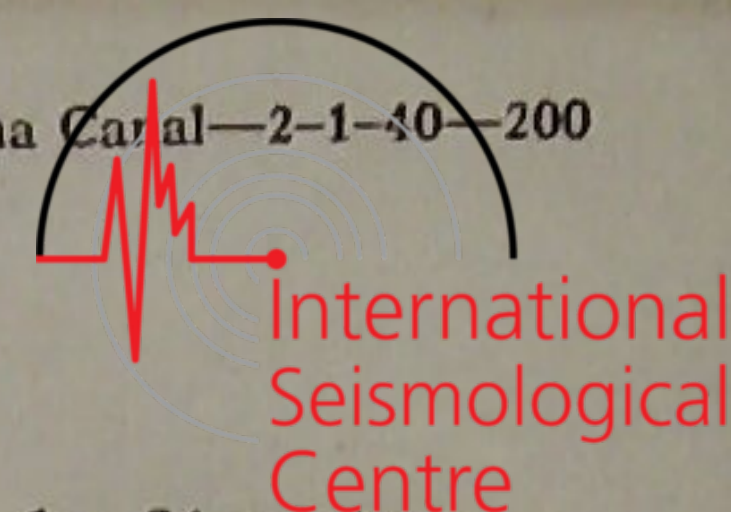
Month May 1941Page No. 20

No. and Date	Phase	Time G. M. T.	Period	AMPLI- TUDE	REMARKS
		h m s		mm	
#124 May 4		9:40:45 to 9:45			
#125 May 11		5:13 to 5:25			Faint
#126 May 11		9:15 to 9:18			
#127 May 16	oPNE MNE FNE	13:09:35 13:11:18 13:22			
#128 May 25		1:04 to 1:07			
#129 May 26	oPNE oSN oSE LN LE MN CN CE FNE	18:02:46 18:03:21 18:03:23 18:03:35 18:03:33 18:03:45 18:04:34 18:04:25 18:15		39	Distance about 200 miles.
#130 May 31		0:03 to 0:06			

G. E. MATTHEW  
Chief Hydrographer



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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 1.0 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	N - S	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E - W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori )	Not operating				
Bosch-Omori )					

Month June 1941

Page No. 21

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE	REMARKS
		h	m	s			
#131 June 1		9:16					
		to					
		9:18					
#132 June 8		2:00					
		to					
		2:02					
#133 June 10		22:45					
		to					
		22:47					
#134 June 13		1:33					
		to					
		1:34					
#135 June 18	ePNE	11:04					
	MNE	11:07:40					
#136 June 18	ePNE	11:31					
	MNE	11:35					
#137 June 19	ePN	10:03:54					
	ePE	10:03:56					
	eSN	10:04:38					
	eSE	10:04:32					
	INE	10:04:42					
	MN	10:04:49			16.5	Approximate distance 250 miles	
	ME	10:04:55			14.0		
	CN	10:05:27					
	CE	10:05:22					
	FNE	10:15					



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

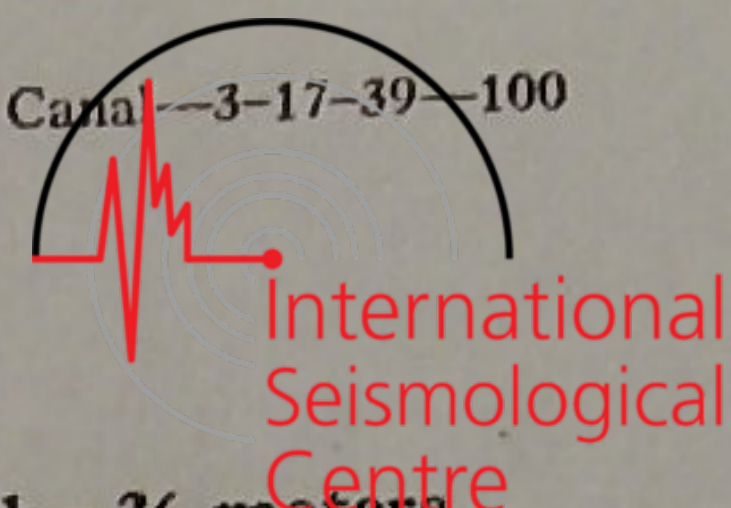
Month JUNE 1941Page No. 22

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#138 June 21	1PNE	9	12	25		8.5 10.5	Approximate distance 35 miles
	1SNE	9	12	36			
	MN	9	12	39			
	ME	9	12	38			
	CN	9	12	52			
	CE	9	12	48			
	FNE	9	14				
#139 June 21		23	16	25 to 23:18			
#140 June 23	ePN	21	35	44		10	Approximate distance 130 miles
	LN	21	36	26			
	MN	21	36	27			
	CN	21	37	06			
	FN	21	44				
#141 June 26		12	12 to 13:15				Distant disturbance
#142 June 27		17	15 to 17:30				
#143 June 28	ePNE	2	33	59		16 11	Approximate distance 130 miles
	LN	2	34	41			
	LE	2	34	42			
	MN	2	34	43			
	ME	2	34	53			
	CNE	2	35	15			
FNE	2	40					
#144 June 29		1	31 to 1:36				

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Chief Hydrographer



**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 1.0 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.	V	h	DETERMINED
Wood-Anderson	N - S	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E - W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori	} Not operating.				
Bosch-Omori					

Month July - 1941Page No. 23

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 145 July 2	1 FNE	16:	51:	19		N 8.5 E 12.0	Approximate distance 60 miles
	LNE	16:	51:	39			
	MNE	16:	51:	41			
	CN	16:	52:	03			
	CE	16:	52:	06			
	FNE	16:	54				
# 146 July 5	1 FNE	5:	25:	06		11 7	Approximate distance 110 miles
	LNE	5:	25:	42			
	MN	5:	25:	47			
	ME	5:	25:	52			
	CN	5:	26:	16			
	CE	5:	26:	10			
FNE	5:	28					
# 147 July 6		7:	06				
		7:	09				
# 148 July 6	• FNE	19:	34:	27		N 6.0 E 7.5	
	LNE	19:	34:	50			
	MNE	19:	34:	52			
	CN	19:	35:	05			
	CE	19:	35:	13			
	FNE	19:	37				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month July - 1941Page No. 24

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TITUDE mm	REMARKS
		h	m	s			
# 149 July 11	● PNE ● SNE LNE MN ME GN GE FNE	1:	17:	44 13 36 49 58 45 42 38		14.0 11.0	Distance about 165 miles
# 150 July 11	● PN ● PE ● SN ● SE LN LE MN ME GN GE FNE	2:	00:	43 45 13 15 36 39 00 02 18 26 15		6.5 6.0	Distance about 165 miles
# 151 July 11		21:	23 to 26				
# 152 July 13		8:	17 to 21				
# 153 July 14	1 PNE 1 SN ● SE LN LE MN ME ONE FNE	12:	07:	24 35 34 39 37 43 45 02 09		6.5 4.0	Distance about 60 miles
# 154 July 14		16:	25 to 27				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month July - 1941Page No. 25

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 155 July 15	● PH 1 PE 1 SN 1 SE MN ONE FNE	9:	14:	28 29 41 43 51 30 20		32.0	Distance about 75 miles
# 156 July 15		22:	40 to 43				
# 156 July 19	1 FNE 1 SN 1 SE LN LE MN ME ONE FNE	8:	36:	22 52 53 05 06 16 15 44 41		15.5 17.0	Distance about 175 miles
# 157 July 24	● PH ● PE ● SNE LN LE MN ME CN CE FNE	5:	11:	31 32 00 20 22 25 31 59 56 18		5.0 3.9	Distance about 155 miles
# 158 July 25	● PH ● PE ● SE LNE MN ME ONE FNE	00:	29:	43 42 07 27 33 36 53 34		5.0 7.0	Distance about 140 miles

G. E. MATTHEW  
Chief Hydrographer



**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 1.0 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	v	h	DETERMINED
Wood-Anderson	N-S	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E-W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori	Not operating				
Bosch-Omori	Not operating				

**AUGUST - 1941**

Month

Page No. **26**

No. and Date	Phase	Time G. M. T.	Period	AMPLI- TUDE	REMARKS
#159 Aug. 1	ePNE MN ME ONE FNE	13:00:30 <sup>s</sup> 13:01:25 13:01:23 13:01:47 13:05		mm 4.7 6.0	Approximate distance 140 miles
#160 Aug. 1	1PNE 1SNE LNE MN ME ONE FNE	21:52:54 21:53:27 21:53:33 21:53:43 21:53:39 21:54:16 21:59		12.5 9.8	Approximate distance 185 miles
#161 Aug. 2		Principal phase of distant disturbance 12:47			
#162 Aug. 3	ePN ePE MN ME FNE	8:36:51 8:36:50 8:37:41 8:37:40 8:40		2.5 2.5	
#163 Aug. 4	ePN ePE LN LE MN ME FNE	15:13:41 15:13:42 15:14:20 15:14:21 15:14:27 15:14:31 15:16		2.5 3.0	
#164 Aug. 6	ePN eSN	6:26:54 6:27:38			Approximate Distance 250 miles
#165 Aug. 11		21:42 to 21:46			



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month AUGUST 1941Page No. 27

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#166 Aug. 15	PNE LNE FNE	6:18:39 6:26:00 6:42:00					Distant disturbance
#167 Aug. 15		6:47 to 6:50					
#168 Aug. 22		4:18 to 4:20					
#169 Aug. 28		1:05 to 1:07					

G. E. MATTHEW  
Chief Hydrographer



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

MR 64122—Panama Canal—3-17-39—100



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

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

h = 36 meters.

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**INSTRUMENTS—FIXED CONSTANTS**

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**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T <sub>0</sub>	V	h	DETERMINED
Wood-Anderson	N-S	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E-W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori	Not operating.				
Bosch-Omori					

Month September 1941Page No. 28

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE mm	REMARKS
		h	m	s			
#170 Sept. 8	oPN MN FN	11:20:47 11:21:34 11:26					
#171 Sept. 9		6:29 To 6:32					
#172 Sept. 17		10:42 To 10:46					
#173 Sept. 18	oPNE MNE FNE	13:19:18 13:23:20 13:33					
#174 Sept. 27		7:46 To 7:50					

G. E. MATTHEW  
Chief Hydrographer



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

MR 64122—Panama Canal—3-17-39—100



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**INSTRUMENTS—DETERMINED CONSTANTS**

INSTRUMENTS	COMPONENT	T <sub>0</sub>	V	h	DETERMINED
Wood-Anderson	N - S	0.80	2740	8 to 1	Aug. 24 - 1939
Wood-Anderson	E - W	0.80	2740	12 to 1	Aug. 24 - 1939
Bosch-Omori					
Bosch-Omori					

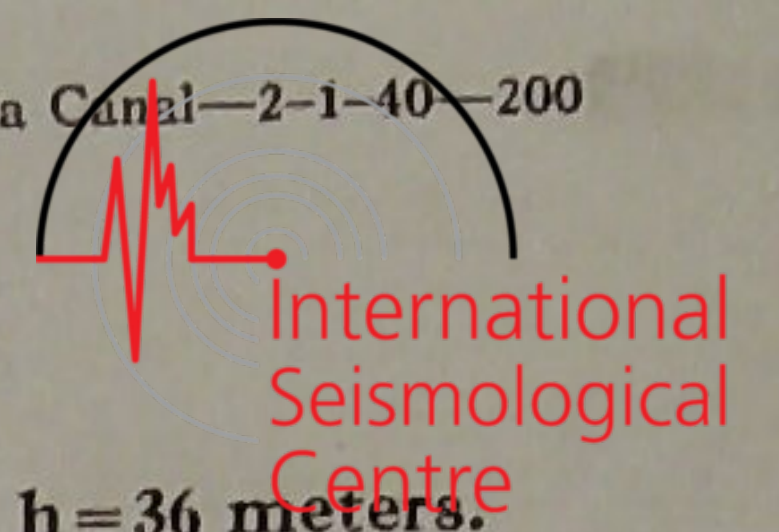
Month October - 1941Page No. 29

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE mm	REMARKS
		h	m	s			
#175 Oct. 2		14	39				
		To					
		14	42				
#176 Oct. 4		10	04				
		To					
		10	06				
#177 Oct. 8		4	24				Possibly of distant origin
		To					
		4	36				
#178 Oct. 12		18	03				
		To					
		18	08				
#179 Oct. 15		9	40				
		To					
		9	45				
#180 Oct. 23		2	35				
		To					
		2	37				
#181 Oct. 25		9	08	40			
		To					
		9	11				
#182 Oct. 31		1	01	46			
		To					
		1	04				

G. E. MATTHEW  
Chief Hydrographer



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DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



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

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h = 36 meters.

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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	0.80	2740	8 to 1	Aug. 24, 1939
Wood-Anderson	E - W	0.80	2740	12 to 1	Aug. 24, 1939
Bosch-Omori					
Bosch-Omori					

Month November 1941

Page No. 30

No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE  mm	REMARKS
		h	m	s			
#183 Nov. 1	ePNE	13:	44:	41	N-12.0		
	<del>ePNE</del>	13:	44:	56			
	MNE	13:	46				
#184 Nov. 3	PNE	9:	52:	43			
	FNE	9:	53				
#185 Nov. 5	PNE	18:	58:	38			
	FNE	19:	04				
#186 Nov. 6	PNE	7:	27:	52			
	FNE	7:	31				
#187 Nov. 8-	PNE	2:	47:	07			
	MN	2:	48:	24			
	ME	2:	48:	17			
	FNE	2:	51				
#188 Nov. 8-9		23:	57			+ trace Faint <del>places</del> from distant quake	
		1:	45				
#189 Nov. 10		9:	45				
		To					
#190 Nov. 14		10:	15				
		4:	32				
#191 Nov. 16		To				Of distant origin	
		4:	40				
		9:	42:	08			
		To					
		9:	50				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month November 1941Page No. 31

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#192 Nov. 16		No time marking Aprox. time 13:38					
Due to Power Failure, the record is broken between 13:38 Oct., Nov. 16 and 14:50, Nov. 17.							
#193 Nov. 17	ePNE	18:19:17					Distance about 55 miles
	eSN	18:19:39					
	eSE	18:19:38					
	LN	18:19:54					
	LE	18:19:53					
	MN	18:20:00			8.0		
	ME	18:20:06			7.5		
	CN	18:20:20					
	CE	18:20:23					
	FNE	18:22					
#194 Nov. 19	PNE	8:09:57					
	MNE	8:10:28					
	FNE	8:12					
#195 Nov. 22	1PNE	5:24:10					Distance about 75 miles  Intensity I, Modified Mercalli Scale.
	1SN	5:24:33					
	1SE	5:24:34					
	LN	5:24:52					
	MN	5:24:57					
	CN	5:26:15					
	CE	5:26:18					
	FNE	5:34					
#196 Nov. 22		8:15:18					
		To					
		8:17					
#197 Nov. 22		9:53:50					
		To					
		9:56					
#198 Nov. - 24		2:15:19					
		To					
		2:18					
#199 Nov. 25	ePNE	18:14:15					Approximate distance 4500 miles
	eSNE	18:22:37					
	MNE	18:30:08					
	FNE	20:30:00					



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month November 1941

Page No. 32

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
#200 Nov. 27	ePHE	12	07	51		7.4	Distance about 70 miles
	eLHE	2	08	14			
	MHE	2	08	23			
	CEH	2	08	43			
	FE	2	10				
#201 Nov. 27		8	56				
		To					
		8	59				
#202 Nov. 27		22	06				
		To					
		22	09				
#203 Nov. 30	ePNE	19	41	15			
	MNE	19	42	13			
	FNE	19	45				

G. E. MATTHEW  
Chief Hydrographer



**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 1.0 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.	V	h	DETERMINED
Wood-Anderson	H-S	0.80	2740	8 to 1	August 24, 1939
Wood-Anderson	H-N	0.80	2740	12 to 1	August 24, 1939
Bosch-Omori					
Bosch-Omori			Not Operating		

Month DECEMBER - 1941

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No. and Date	Phase	Time G. M. T.			Period	AMPLI- TUDE mm	REMARKS
		h	m	s			
#204 Dec. 4	PNE	18:	12:	55			
	LNE	18:	13:	45			
	MN	18:	13:	58		9.5	
	ME	18:	13:	53		7.5	
	PNE	18:	20				
#205		20:	48			Principal Shock - Intensity IV Modified Mercalli Scale. Damage reported in western Panama and Eastern Costa Rica. Time marking Clock stopped. Time of beginning of each after-shock shown to nearest minute. Provisional epicenter as determined by C. and G.S. 8°N Lat. and 83°W Long. Time at origin 20h. 46.9 min.	
#206		21:	35				
#207		22:	13				
#208		22:	29				
#209		22:	31				
#210		22:	50				
#211		23:	48				
#212		23:	51				
#213		0:	08				
#214		0:	32				
#215		0:	52				
#216		1:	12				
#217		1:	23				
#218		1:	26				
#219		1:	32				
#220		1:	52				
#221		2:	51				
#222		2:	59				
#223		4:	25				
#224		4:	27				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month December - 1941Page No. 24

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
Dec. 6							
# 225		5	05				
# 226		6	22				
# 227		6	36				
# 228		7	08				
# 229		7	14				
# 230		7	25				
# 231		7	43				
# 232		8	10				
# 233		9	40				
# 234		9	44				
# 235		10	28				
# 236		11	55				
# 237		13	19				
# 238		13	40				
# 239		14	37				
# 240		15	55				
# 241		16	21				
# 242		16	44	11			
# 243		17	26	10			
# 244		17	59	50			
# 245		20	10	48			
# 246		21	38	38			
# 247		22	06	23			
# 248		22	18	45			
# 249		23	14				



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month December - 1941

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No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
Dec. 6							
# 250		23:	29				
# 251		23:	49:	45			
# 252		23:	55:	43			
Dec. 7							
# 253		0:	18				
# 254		0:	25				
# 255		0:	33:	42			
# 256		1:	49				
# 257		2:	07				
# 258		2:	13				
# 259		2:	40				
# 260		3:	04:	57			
# 261		3:	24:	29			
# 262		4:	06:	38			
# 263		4:	24				
# 264		5:	15:	14			
# 265		5:	20				
# 266		6:	17				
# 267		6:	40:	14			
# 268		7:	53:	11			
# 269		8:	14				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month December - 1941Page No. 36

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
Dec. 7							
# 270		10:	53:	18			
# 271		11:	15				
# 272		11:	42:	48			
# 273		12:	36				
# 274		13:	02:	39			
# 275		13:	39				
# 276		13:	44				
# 277		13:	47				
# 278		15:	00:	47			
# 279		16:	02:	46			
# 280		16:	11:	31			
# 281		17:	18				
# 282		18:	24				
# 283		19:	18:	54			
# 284		19:	43:	20			
# 285		20:	47:	44			
# 286		21:	25:	11			
Power off due to Blackout from 23: 42 Dec. 7 to 10:45 Dec. 8, 1941.							
Dec. 8							
# 287		10:	46:	50			
# 288		11:	01:	44			
# 289		11:	45				



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month December - 1941Page No. 37

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
Dec. 8 # 290		12	37	41			
# 291		12	41				
# 292		13	09	33			
# 293		13	16	28			
# 294		13	26	55			
# 295		14	22				
# 296		22	01				
Power off due to blackout from 23:35 Dec. 8 to 6:38 Dec. 9, 1941.							
Dec. 9							
# 297		9	16				
# 298		10	15				
# 299		11	24				
# 300		12	56	40			
# 301		16	39				
# 302		21	58	52			
Dec. 10							
# 303		00	21				
# 304		4	17	14			
Dec. 11							
# 305		13	55				
Dec. 12							
# 306		2	16				
# 307		10	53				
# 308		10	55	50			



## SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

Month December - 1941Page No. 38

No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
Dec. 12							
# 309		22	24	38			
Dec. 13							
# 310		11	06	30			
# 311	PNE	9	56	39			
Dec. 16	MNE PNE	9 10	57 00	40			
# 312	PNE MN	23 23	32 39	49 54		3.0	
Dec. 17	PNE	23	38				
# 313	PNE MN	4 4	51 53	26 26		2.0	
Dec. 18	PNE	4	57				
# 314		7	27				
Dec. 18			to				
		7	30				
# 315	PNE MN	12 12	38 39	33 31		3.0	
Dec. 18	PNE	12	43				
# 316	PNE MN	18 18	49 50	21 18		4.0	
Dec. 18	PNE	18	55				
# 317		14	11				
Dec. 22			to				
		14	14				
# 318		2	32				
Dec. 24			to				
		2	35				
# 319		4	21				
Dec. 24			to				
		4	25				
# 320		5	14				
Dec. 26			to				
		5	18				



SEISMOLOGICAL RECORD AT BALBOA HEIGHTS, CANAL ZONE

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No. and Date	Phase	Time G. M. T.			Period s	AMPLI- TUDE mm	REMARKS
		h	m	s			
# 321 Dec. 28		6	22				
		to 6: 25					
# 322 Dec. 31	• PNE PNE	17	38	50			
		17	54				

L. T. CHAPEL  
Acting Chief Hydrographer