

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF METEOROLOGY AND HYDROGRAPHY

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month **JANUARY** Year **1930**

Latitude 8° 57' 39" north. **EW & NS 100 K**

Longitude 79° 33' 29" west.

Greenwich mean time midnight to midnight.

**Magnification - 35**

MR 73363

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
7													
8													
9													
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22													
23													
24													
25													
26													
27													
28													
29													
30													
31													

3:11:47 3:12:06 3:12:16 3:12:37 3:15:01 0.2 20 Distance 105 miles. Direction?

EW time marker not working. Above is for NS instrument.

P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. **659** Date **January 8**, 192**0** Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
First preliminary tremors began	h. m. s. <b>3:12:45</b>	h. m. s. <b>3:12:45</b>
Second preliminary tremors began	<b>3:12:06</b>	<b>marker</b>
Long waves began	<b>3:12:16</b>	<b>not</b>
Maximum	<b>3:12:37</b>	<b>working.</b>
End of principal portion	<b>3:13:17</b>	
End of earthquake	<b>3:15:01</b>	
	mm.	mm.
Maximum amplitude	<b>0.2</b>	<b>0.2</b>
Average period of waves	s.	s.
First preliminary tremors	<b>-</b>	<b>-</b>
Second preliminary tremors	<b>3</b>	<b>1</b>
Long waves	<b>4</b>	<b>2</b>
Maximum	<b>4</b>	<b>2</b>
End of principal portion	<b>2</b>	<b>1</b>
End portion	<b>-</b>	<b>-</b>
Period of pendulum	<b>20</b>	<b>20</b>
Magnification	<b>35</b>	<b>35</b>

REMARKS: **100 K Bosch Omori instruments; damping medium. Distance 105 miles,**

**direction ?**

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF METEOROLOGY AND HYDROGRAPHY

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z. (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month FEBRUARY Year 1930

Latitude 8° 57' 39" north.

Longitude 79° 33' 29" west. **NS & EW 100 K**

Greenwich mean time midnight to midnight.

MR 73363

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END	MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.				
1												
2												
3												
4												
5												
6												
7												
8	NO EARTHQUAKES											
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
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28												
29												
30												
31												

P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month MARCH Year 1930

Latitude 8° 57' 39" north.  
Longitude 79° 33' 29" west.

NS 25 K

Greenwich mean time midnight to midnight.

Magnification - 10

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													Slight tremors from seismic disturbance 11:21:00 to 11:29:00 (See 100 K records)
4													Slight tremors from local disturbance 22:04:13 to 22:05:00 (See 100 K records)
5													
6													
7													
8													Distance 60 miles. Direction NE.
9	3:45:53		3:46:05		3:46:05		3:46:09		4:06:50		23.0	20	Intensity VI. Generally felt, few walls cracked.
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
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25													
26													
27													
28													
29													
30													
31													

P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL  
DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)

Month MARCH Year 1930

Latitude 8° 57' 39" north.  
Longitude 79° 33' 29" west.

~~300~~ N S 100 K

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

Magnification - 35

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3	11:21:00		11:21:45		11:22:10		11:22:30		11:29:00		0.6	20	Direction ? Distance 275 mi.
4	22:04:13		22:04:16		22:04:16		22:04:17		22:06:00		1.2	20	Epi-center very near but not felt.
5													
6													
7													
8													
9	Pens thrown off at beginning of secondary tremors (See 25 K reports)												
10													
11													
12													
13													
14													
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16													
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26													
27													
28													
29													
30													
31													

P. T. Preliminary tremors, L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month MARCH Year 1950

Latitude 8° 57' 39" north.  
Longitude 79° 33' 29" west.

B V 25 K

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

Magnification - 10

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													See 100 K re cards)
4													see 100 K re cards)
5													
6													
7													Distance 60 m. 1100.
8													Direction NE
9	5:46:00		5:46:12		5:46:12		3:46:12		4:08:00		19	20	Intensity VI
10													Generally felt, some walls cracked.
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
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31													

P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time.

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



**REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.**  
 (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)

Month MARCH Year 1920

Latitude  $8^{\circ} 57' 39''$  north. NW, 100 E

Longitude  $79^{\circ} 33' 29''$  west.

Greenwich mean time midnight to midnight.

Magnification = 35

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3	11:30:55		11:31:43		11:31:51		11:31:59		11:32:37		0.8	20	Distance 375 mi. Direction ?
4	22:04:13		22:04:21		22:04:21		22:04:32		22:05:30		1.0	20	Epi-center very near (20 mi.) but not felt. Direction?
5													
6													
7													
8													
9	Pens thrown off at beginning of secondary tremors (see 25 & reports)												
10													
11													
12													
13													
14													
15													
16													
17													
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31													

P. T. Preliminary tremors. L. W. Large waves.  
 Greenwich mean time five hours faster than 75th meridian time.



# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. **660** Date **MARCH 5**, 192**30** Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
First preliminary tremors began	11:21:00	11:20:35
Second preliminary tremors began	11:21:43	11:21:43
Long waves began	11:22:10	11:21:51
Maximum	11:22:30	11:21:59
End of principal portion	11:22:58	11:22:57
End of earthquake	11:29:00	11:29:37
	mm.	mm.
Maximum amplitude	0.6	0.8
	/	/
Average period of waves	s.	s.
First preliminary tremors	-	-
Second preliminary tremors	-	-
Long waves	3	3
Maximum	4	4
End of principal portion	2	2
End portion	1	-
Period of pendulum	20	20
Magnification	35	35

REMARKS: **100 - K Bosch Omori instruments; damping medium. Distance 275 miles**  
**direction ?**



# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 661 Date March 4, 1930 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began.....	22:04:13	22:04:18
Second preliminary tremors began.....	22:04:16	22:04:21
Long waves began.....	22:04:16	22:04:21
Maximum.....	22:04:17	22:04:22
End of principal portion.....	22:04:49	22:04:53
End of earthquake.....	22:06:00	22:05:50
	mm.	mm.
Maximum amplitude.....	1.2	1.0
Average period of waves.....	'	'
	s.	s.
First preliminary tremors.....		
Second preliminary tremors.....		
Long waves.....		
Maximum.....		
End of principal portion.....		
End portion.....		
Period of pendulum.....	20	20
Magnification.....	35	35

REMARKS: 100 K Bosch Omori instruments; damping medium. Quake epi-center  
evidently within a radius of 20 miles but was not felt. Period of waves  
too short to measure.

*Handwritten scribbles*

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 662 Date March 8, 1930 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began.....		
Second preliminary tremors began.....		
Long waves began.....		
Maximum <u>Pens thrown off at beginning of secondary tremors (See 25 K records)</u>		
End of principal portion.....		
End of earthquake.....		
	mm.	mm.
Maximum amplitude.....		
Average period of waves.....	s.	s.
First preliminary tremors.....		
Second preliminary tremors.....		
Long waves.....		
Maximum.....		
End of principal portion.....		
End portion.....		
Period of pendulum.....		
Magnification.....		

REMARKS: 100 K Boscé Onori instruments, damping medium. (See 25 K records)

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 662 Date March 8, 1930 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	3:45:53	3:46:00
Second preliminary tremors began	3:46:05	3:46:12
Long waves began	3:46:05	3:46:12
Maximum	3:46:09	3:46:12
End of principal portion	3:50:29	3:50:29
End of earthquake	4:06:30	4:06:00
	mm.	mm.
Maximum amplitude	23	19
Average period of waves	s.	s.
First preliminary tremors	5	5
Second preliminary tremors	5	5
Long waves	6	6
Maximum	5	5
End of principal portion	6	4
End portion	-	-
Period of pendulum	20	20
Magnification	10	10

REMARKS: 25 X Bosch Omori instruments; damping heavy. Distance 60 miles  
direction NE approximately. Intensity VI. Quake felt by all residents  
of Zone and Panama in vicinity of Zone. Cracks opened in walls of  
some buildings on Zone.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF METEOROLOGY AND HYDROGRAPHY

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.

(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month APRIL Year 1930

Latitude 8° 57' 39" north. **EW & NS 100) K**  
Longitude 79° 33' 29" west.

Greenwich mean time midnight to midnight.

**Magnification - 35**

MR 73363

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
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27													
28													
29													
30													
31													

**NO EARTHQUAKES**

P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF METEOROLOGY AND HYDROGRAPHY

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month MAY Year 1930

Latitude 8° 57' 39" north. **NS & EW 100-K**  
Longitude 79° 33' 29" west.

Greenwich mean time midnight to midnight.

Magnification - 35

MR 73363

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													Distance and direction: Doubtful if tremors are from Persian quake of this date.
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
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26													
27													
28													
29													
30													
31													

P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time,

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. **663** Date **May 5**, 19**30** Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began		
Second preliminary tremors began		
Long waves began		
Maximum <b>Slight tremors from distant disturbance from 15:05:00</b>		
End of principal portion <b>to 16:10:00</b>		
End of earthquake		
	mm.	mm.
Maximum amplitude		
Average period of waves	s.	s.
First preliminary tremors		
Second preliminary tremors		
Long waves		
Maximum		
End of principal portion		
End portion		
Period of pendulum		
Magnification		

REMARKS: **100 K Bosch Omori instruments; damping medium. Distance and direction ?**

**Doubtful if tremors are from Persian quake of this date.**

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)

Month **JUNE** Year **1930**

Latitude 8° 57' 39" north. **NS & EW 100-K**  
Longitude 79° 33' 29" west.

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

Magnification = 35

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													Probably trace of Peruvian quake.
25	21:26:46		21:31:26		21:33:46		- - -		22:00:00		0.4	20	Distance 1800 miles.
26	10:33:22		10:33:57		10:34:14		10:34:20		10:39:50		0.4	20	Direction - South.
27													Distance 200 miles
28													Direction ?
29	Above data is from NS component; trace on EW component too indistinct to detect phases.												
30													
31													

P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 664 Date June 25, 1926 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	21:36:46	21:35:54 ?
Second preliminary tremors began	21:51:26	— — —
Long waves began	21:53:46	— — —
Maximum	— — —	— — —
End of principal portion	21:49:06	— — —
End of earthquake	22:00:00	21:47:00
	mm.	mm.
Maximum amplitude	0.6	0.2
Average period of waves	S.	S.
First preliminary tremors	2	
Second preliminary tremors	2	
Long waves	13	
Maximum	—	
End of principal portion	14	
End portion	—	
Period of pendulum	20	20
Magnification	35	35

REMARKS: 100 E Bosch Omori instruments; damping medium. Distance - 1500 miles  
direction probably South. Probably trace from previous quake of this date.  
Trace on E W instrument very indistinct.





# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 665 Date Jan 26, 1920 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began.....	10:53:22	10:53:20
Second preliminary tremors began.....	10:53:57	-----
Long waves began.....	10:54:14	-----
Maximum.....	10:54:20	-----
End of principal portion.....	10:55:12	-----
End of earthquake.....	10:59:50	10:59:50
	mm.	mm.
Maximum amplitude.....	0.4	---
Average period of waves.....	s.	s.
First preliminary tremors.....	-	-
Second preliminary tremors.....	-	-
Long waves.....	-	-
Maximum.....	-	-
End of principal portion.....	-	-
End portion.....	-	-
Period of pendulum.....	20	20
Magnification.....	55	55

REMARKS: 100 K Bosch Geori instruments; damping nullum. Distance 200 miles

Distance and direction?

**THE PANAMA CANAL**  
 DEPARTMENT OF OPERATION AND MAINTENANCE  
 SECTION OF SURVEYS  
**REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.**  
 (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month July Year 1930

Latitude  $8^{\circ} 57' 39''$  north.  
 Longitude  $79^{\circ} 33' 29''$  west.

N S 100 K

Greenwich mean time midnight to midnight.

Magnification -35

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													Distance 825 miles Direction W N W
14	22:43:24		22:45:54		22:46:34		22:47:56	23:30:00		6.5	20		
15	10:35:29		10:35:49		10:35:52		10:36:01	Uncertain		3.0	20		Distance about 110 miles. Direction ? Quake not felt.
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30	18:52:09		18:52:21					18:57:29		54	20		Pens thrown off. See 25-K record.
31													

P. T. Preliminary tremors. L. W. Large waves.  
 Greenwich mean time five hours faster than 75th meridian time.

**THE PANAMA CANAL**  
 DEPARTMENT OF OPERATION AND MAINTENANCE  
 SECTION OF SURVEYS  
**REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.**  
 (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month July Year 1930

Latitude  $8^{\circ} 57' 39''$  north.  
 Longitude  $79^{\circ} 33' 29''$  west.

**E W 100 K**

Greenwich mean time midnight to midnight.

**Magnification 35**

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14	22:43:26		22:45:50		22:47:28		22:49:15		23:30:00		3.5	20	Distance 825 miles
15	10:35:29		10:35:49		10:35:53		10:36:03		Uncertain		3.0	20	Distance about <del>110</del> 110 miles.
16													Direction? Quake
17													not felt.
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30	18:52:09		18:52:21						18:55:03		40/		Direction and distance? Pen thrown off.
31													

P. T. Preliminary tremors. L. W. Large waves.  
 Greenwich mean time five hours faster than 75th meridian time.



# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

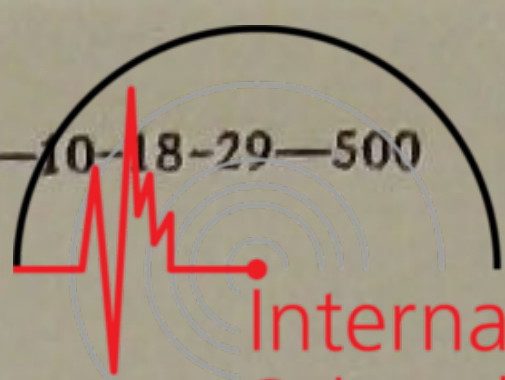
Seismic Record No. 666 Date July 7, 1950 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began		
Second preliminary tremors began		
Long waves began <u>Slight tremors from distant disturbance from approximately</u>		
Maximum <u>13:25:00 to 14:00:00</u>		
End of principal portion		
End of earthquake		
	mm.	mm.
Maximum amplitude		
Average period of waves	s.	s.
First preliminary tremors		
Second preliminary tremors		
Long waves		
Maximum		
End of principal portion		
End portion		
Period of pendulum		
Magnification		

REMARKS: 100 K Bosch Onori instruments; damping medium. Record marred in  
changing sheets. Distance and direction ?

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



International  
Seismological  
Centre

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.


Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 667 Date July 14, 1930 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	22:43:24	22:43:26
Second preliminary tremors began	22:45:54	22:45:50
Long waves began	22:46:34	22:47:28
Maximum	22:47:56	22:49:15
End of principal portion	22:54:00	22:53:27
End of earthquake	23:30:00	23:30:00
	mm.	mm.
Maximum amplitude	6.5	3.5
Average period of waves	s.	s.
First preliminary tremors	3	4
Second preliminary tremors	5	5
Long waves	16	16
Maximum	15	15
End of principal portion	10	11
End portion	12	10
Period of pendulum	20	20
Magnification	35	35

REMARKS: 100 K Bosch Omori instruments; damping medium. Distance 825 miles,  
direction W N W. Epi-center 13° .3 N/ 90° .4 W/ by Jesuit Seismological  
Association.



# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 668 Date July 15, 1930 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began.....	10:35:29	10:35:29
Second preliminary tremors began.....	10:35:49	10:35:49
Long waves began.....	10:35:52	10:35:53
Maximum.....	10:36:01	10:36:03
End of principal portion.....	10:37:17	10:35:41
End of earthquake.....	10:40:04	10:40:29
	mm.	mm.
Maximum amplitude.....	3.0	3.0
Average period of waves.....	s.	s.
First preliminary tremors.....		
Second preliminary tremors.....		
Long waves.....		
Maximum.....		
End of principal portion.....	2	2
End portion.....	4	3
Period of pendulum.....	20	20
Magnification.....	35	35

REMARKS: 100 K Bosch Omori instruments; damping medium. Distance about 110 miles.

Direction ? No reports of quake being felt.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. **669** Date **July 27, 1950** Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began		
Second preliminary tremors began		
Long waves began		
Maximum <b>Slight tremors from distant disturbance about 19:02:00</b>		
End of principal portion <b>to about 19:40:00</b>		
End of earthquake		
	mm.	mm.
Maximum amplitude		
Average period of waves	s.	s.
First preliminary tremors		
Second preliminary tremors		
Long waves		
Maximum		
End of principal portion		
End portion		
Period of pendulum		
Magnification		

REMARKS: **100 K Bosch Omori instruments; damping medium. trace very small; distance and direction ?**

# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.


Altitude of Station, 90.5 feet.

Seismic Record No. **670** Date **July 29, 1930** Greenwich mean time, midnight to midnight.

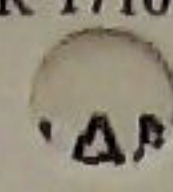
PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began		
Second preliminary tremors began		
Long waves began		
Maximum <del>Slight tremors from nearby disturbance from 6:27:00 to 6:37:00</del>		
End of principal portion		
End of earthquake		
	mm.	mm.
Maximum amplitude		
Average period of waves	s.	s.
First preliminary tremors		
Second preliminary tremors		
Long waves		
Maximum		
End of principal portion		
End portion		
Period of pendulum		
Magnification		

REMARKS: **100 K Bosch Omori instruments; damping medium. Character of waves indicate epi-center to be within 500 miles but trace too indistinct to calculate distance or direction.**





# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.


Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

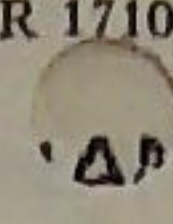
Seismic Record No. **671** Date **July 30**, 19 **30** Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	18:52:09	18:52:09
Second preliminary tremors began	18:52:21	18:52:21
Long waves began		
Maximum		
End of principal portion	18:54:13	
End of earthquake	18:57:49	18:58:03
	mm.	mm.
Maximum amplitude	54 $\frac{1}{2}$	40 $\frac{1}{2}$
Average period of waves	s.	s.
First preliminary tremors		
Second preliminary tremors		
Long waves		
Maximum		
End of principal portion	1	
End portion	3	3
Period of pendulum	20	20
Magnification	35	35

REMARKS: 100-K Bosch Omori instruments; damping medium. Pens thrown off on second preliminary tremors— N S pen returned itself to drum at 18:53:21— E W pen returned to drum at 18:55:25 by observer. See 25K record for phases of quake.



# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 671 Date July 30, 1930 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	18:52:13	18:52:07
Second preliminary tremors began	18:52:25	18:52:19
Long waves began	18:52:25	18:52:19
Maximum	18:52:27	18:52:23
End of principal portion	18:53:19	18:53:11
End of earthquake	18:58:10	18:57:19
	mm.	mm.
Maximum amplitude	8.0	43.1
	s.	s.
Average period of waves		
First preliminary tremors		
Second preliminary tremors		
Long waves		
Maximum		
End of principal portion	2	3
End portion	3	4
Period of pendulum	20	20
Magnification	10	10

REMARKS: 25-K Bosch Omori instruments; damping heavy. Local disturbance

Intensity V to VI on Rossi Forel scale/ Epi-center about 60 miles distant and  
presumably in southwesterly direction. Felt by all residents in the Canal Zone  
and Republic of Panama causing some to leave their houses in terror

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.

(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)

Month August Year 1930

Latitude 8° 57' 39" north.

7-3 25-K

Longitude 79° 33' 29" west.

Magnification 10

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
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4													
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22													
23													
24													
25													
26													
27													
28													
29	8.27.14		8.27.46		8.28.00		8.28.38		8.41.26		7.2	20	Direction WSW Distance 160 miles
30	8.58.00		8.58.36		8.59.04		8.59.08		9.08.26		3.0	20	Direction WSW Distance 160 miles
31													

P. T. Preliminary tremors, L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.

(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month August Year 1939

Latitude  $8^{\circ} 57' 39''$  north. **N-S 100-K**  
Longitude  $79^{\circ} 33' 29''$  west. **Magnification 35**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
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28													
29													
30													
31													

Instrument out of order No record.

P. T. Preliminary tremors. L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



24

Month August Year 1930

Latitude  $8^{\circ}57'39''$  north. W 100 K  
Longitude  $79^{\circ}33'29''$  west.

Greenwich mean time midnight to midnight.

Magnification 35

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
7													
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18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29	8.27.12		8.27.44		8.27.54		8.28.44		8.41.22		9.0		Distance 221 miles Direction NSW Distance 195 miles Direction NSW
30	8.57.52		8.58.28		8.59.04		8.59.12		9.07.38		4.0		
31													

P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.

(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month August Year 1930

Latitude  $8^{\circ} 57' 39''$  north. **E-W 100 K**  
Longitude  $79^{\circ} 33' 29''$  west. **Magnification 35**

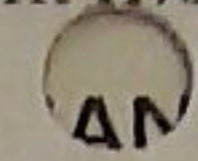
Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
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25													
26													
27													
28	8:27:12	8:27:44	8:27:54	8:28:44	8:41:22	9.0	Distance 221 miles Direction WSW						
29	8:57:52	8:58:28	8:59:04	8:59:12	9:07:38	4.0	Distance 195 miles Direction WSW						
30													
31													

P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N. Long. 79° 33' 29" W. Altitude of Station, 90.5 feet.

Seismic Record No. 672 Date August 20, 19230 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began		8.27.12
Second preliminary tremors began	North-South	8.27.44
Long waves began	Instrument	8.27.54
Maximum	out of order	8.28.44
End of principal portion	See 25-K	8.31.28
End of earthquake	Record	8.41.22
	mm.	mm.
Maximum amplitude		9.0
Average period of waves	s.	s.
First preliminary tremors		4
Second preliminary tremors		2
Long waves		4
Maximum		12
End of principal portion		4
End portion		8
Period of pendulum		20
Magnification		35

REMARKS: 100-K Bosch-Gaori Instrument: damping medium  
Direction WSW; Distance 221 miles (Laska's formula #2)  
Preliminary determination of epicenter by U.S.C. & G.S.; Lat. 8° N, Long 83° W  
(240 miles from Balboa) Press reports from David, R.P. state that inhabitants  
were awakened and panic stricken.

# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

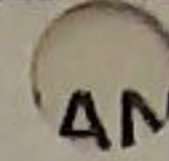
Seismic Record No. 672 Date AUGUST 29, 19230 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	8.27.14	
Second preliminary tremors began	8.27.46	Pen not
Long waves began	8.28.00	recording on
Maximum	8.28.59	East-West
End of principal portion	8.29.10	Instrument
End of earthquake	8.41.26	
	mm.	mm.
Maximum amplitude	7.2	
Average period of waves	s.	s.
First preliminary tremors	2	
Second preliminary tremors	2	
Long waves	4	
Maximum	6	
End of principal portion	4	
End portion	5	
Period of pendulum	20	
Magnification	10	

REMARKS: 25-K Bosch-Omori instruments damping heavy  
Direction WSW; distance 168 miles.



# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

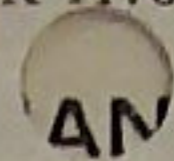
Altitude of Station, 90.5 feet.

Seismic Record No. 675 Date August 29, 1920 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began		8.57.52
Second preliminary tremors began	North-South	8.58.33
Long waves began	Instrument out of order	8.59.04
Maximum		8.59.12
End of principal portion		8.59.26
End of earthquake		9.07.38
	mm.	mm.
Maximum amplitude		4.0
Average period of waves	s.	s.
First preliminary tremors		2
Second preliminary tremors		2
Long waves		6
Maximum		7
End of principal portion		4
End portion		4
Period of pendulum		20
Magnification		35

REMARKS: 100-K Bosch-Guori Instrument: damping medium  
direction NSW: distance 195 miles (Guori's formula)  
Buildings shaken and inhabitants frightened at David, R.P.

# THE PANAMA CANAL



DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. 675 Date August 29, 1920 Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	8.59.00	
Second preliminary tremors began	8.59.36	East-West
Long waves began	8.59.04	Instrument out of order
Maximum	8.59.08	
End of principal portion	8.59.20	
End of earthquake	9.06.26	
	mm.	mm.
Maximum amplitude	3.0	
Average period of waves	s.	s.
First preliminary tremors	2	
Second preliminary tremors	3	
Long waves	5	
Maximum	6	
End of principal portion	4	
End portion	4	
Period of pendulum	20	
Magnification	10	

REMARKS: 25-K Bosh-Onori Instrument:  
Direction WSW; Distance 180 miles (Onori's formula)

## THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYSREGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)Month September Year 1980Latitude 8° 57' 39" north. **N-S-100-K**  
Longitude 79° 33' 29" west. **Magnification 35**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
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23													
24													
25													
26	23:22:05		23:22:33		23:22:45		23:22:52		23:23:48		2	20	Dist. 166 mile Direct. Unknown.
27	19:50:37		19:50:38		19:50:39		19:50:40		19:51:18		1.5	20	Local-dist. unknown.
28													
29													
30													
31													

P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z. (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month September Year 1930

Latitude 8° 57' 39" north. **E-W-100-K**  
Longitude 79° 33' 29" west. **Magnification 35**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
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26	23:21:43	23:21:52	23:21:56	23:21:59	23:23:35	2	20	Dist. 166 miles Dir. Unknown. Local-Dir. Unknown
27	19:50:43	19:50:51	19:50:56	19:50:57	19:51:33	1	20	
28								

P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time.

## THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE

SECTION OF SURVEYS

## 24 REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.

(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)

Month September Year 1930Latitude  $8^{\circ} 57' 39''$  north.Longitude  $79^{\circ} 33' 29''$  west.

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-23—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2	26	19:50:37	19:50:38	19:50:39	19:50:40	19:50:40	19:51:18	1.5	20	N-S			
3	26	19:50:43	19:50:51	19:50:56	19:50:57	19:51:33	1	20	E-W				
4													
5	27	23:22:05	23:22:33	23:22:43	23:22:52	23:23:48	2	20	N-S				
6	27	23:21:43	23:21:52	23:21:56	23:21:59	23:23:35	2	20	E-W				
7													
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P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. **673** Date **Sept. 26**, 19 **30** Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	<b>23:22:05</b>	<b>23:21:43</b>
Second preliminary tremors began	<b>23:22:33</b>	<b>23:21:52</b>
Long waves began	<b>23:22:43</b>	<b>23:21:56</b>
Maximum	<b>23:22:52</b>	<b>23:21:59</b>
End of principal portion	<b>23:23:07</b>	<b>23:22:61</b>
End of earthquake	<b>23:23:48</b>	<b>23:23:35</b>
	mm.	mm.
Maximum amplitude	<b>2.0</b>	<b>2.0</b>
Average period of waves	s.	s.
First preliminary tremors	<b>4</b>	<b>0.5</b>
Second preliminary tremors	<b>1</b>	<b>1.0</b>
Long waves	<b>4</b>	<b>1.5</b>
Maximum	<b>1<sup>1</sup>/<sub>2</sub></b>	<b>2.0</b>
End of principal portion	<b>4</b>	<b>1.0</b>
End portion	<b>1/8</b>	<b>.5</b>
Period of pendulum	<b>20</b>	<b>20</b>
Magnification	<b>35</b>	<b>35</b>

REMARKS: **100 K Bosch-Omori instrument. Damping medium.**

**Direction unknown. Distance 166 miles.**

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS



## EARTHQUAKE REPORT

SEISMOGRAPH STATION, BALBOA HEIGHTS

Lat. 8° 57' 39" N.

Long. 79° 33' 29" W.

Altitude of Station, 90.5 feet.

Seismic Record No. **6734** Date **Sept. 27**, 19**30** Greenwich mean time, midnight to midnight.

PHASE	N-S COMPONENT (Azimuth 180° 23')	E-W COMPONENT (Azimuth 90° 07')
	h. m. s.	h. m. s.
First preliminary tremors began	<b>19:50:37</b>	<b>19:50:43</b>
Second preliminary tremors began	<b>19:50:38</b>	<b>19:50:51</b>
Long waves began	<b>19:50:39</b>	<b>19:50:56</b>
Maximum	<b>19:50:40</b>	<b>19:50:57</b>
End of principal portion	<b>19:50:59</b>	<b>19:51:12</b>
End of earthquake	<b>19:51:18</b>	<b>19:51:33</b>
	mm.	mm.
Maximum amplitude	<b>1<sup>1</sup>/<sub>2</sub></b>	<b>1</b>
Average period of waves	s.	s.
First preliminary tremors	<b>?</b>	<b>?</b>
Second preliminary tremors	<b>?</b>	<b>?</b>
Long waves	<b><sup>3</sup>/<sub>4</sub></b>	<b><sup>3</sup>/<sub>4</sub></b>
Maximum	<b>1<sup>1</sup>/<sub>2</sub></b>	<b>1</b>
End of principal portion	<b>?</b>	<b>?</b>
End portion	<b>?</b>	<b>?</b>
Period of pendulum	<b>20</b>	<b>20</b>
Magnification	<b>35</b>	<b>35</b>

REMARKS: **100 K Bosch-Omori Instrument** **Damping medium.**

**Direction unknown.**

**Distance unknown.**

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z. (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month October Year 1930

Latitude  $8^{\circ} 57' 39''$  north. **N-S-100-K**  
Longitude  $79^{\circ} 33' 29''$  west. **Magnification 33**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
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None Recorded.

P. T. Preliminary tremors, L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.



# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z. (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month October Year 1980

Latitude 8° 57' 39" north.

Longitude 79° 33' 29" west.

**N.S. 100 K  
Magnification 35**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
7													
8													
9													No Earthquakes
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P. T. Preliminary tremors, L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z. (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month October Year 1980

Latitude 8° 57' 39" north. **E-W-100-K**  
Longitude 79° 33' 29" west. **Magnification 35**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
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7													None Recorded.
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P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month October Year 1960

Latitude 8° 57' 39" north.

Longitude 79° 33' 29" west.

**E.W. 100 X  
Magnification 35**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													No Earthquakes
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P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month November Year 1930

Latitude 8° 57' 39" north. **N-S 100 K**  
Longitude 79° 33' 29" west. **Magnification**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
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21													
22													Instrument out of order see E-W record
23													
24													
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31													

P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

# THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

## REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z. (AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month November Year 1930

Latitude 8° 57' 39" north.

Longitude 79° 33' 29" west.

**E-W 100 K**  
**Magnification 35**

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
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3													
4													
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18													
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20													
21	1:43:00		1:43:40		1:43:55		?		?		I	20	Dist. 225 miles Dir. unknown.
22													
23													
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31													

P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.

THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYS

REGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)



Month December Year 1930

Latitude 8° 57' 39" north. S-N 100 K  
Longitude 79° 33' 29" west. Magnification 35

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
1													
2													
3													
4													
5													
6													
7													
8													
9													
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11													
12													
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14													
15													Slight tremors from distant disturbance from 11:31 to 11:45
16													
17													
18													
19													
20													
21													Slight tremors from 15:11 to 15:14
22													
23													
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31													

P. T. Preliminary tremors, L. W. Large waves,  
Greenwich mean time five hours faster than 75th meridian time,

## THE PANAMA CANAL

DEPARTMENT OF OPERATION AND MAINTENANCE  
SECTION OF SURVEYSREGISTER OF EARTHQUAKES AT BALBOA HEIGHTS, C. Z.  
(AS RECORDED BY BOSCH-OMORI SEISMOGRAPH)Month December Year 1930

Latitude 8° 57' 39" north. E-W 100 K

Longitude 79° 33' 29" west. Magnification 35

Greenwich mean time midnight to midnight.

MR 9566—Panama Canal—4-4-28—1,000

DATE	P. T. COMMENCE		2D GROUP COMMENCE		L. W. COMMENCE		MAXIMUM		END		MAX. AMPLITUDE	PERIOD OF PENDULUM	REMARKS
	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.			
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15													Slight tremors from distant disturbance from 11:31 to 11:45
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21													Slight tremors from 15:11 to 15:14
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P. T. Preliminary tremors. L. W. Large waves.  
Greenwich mean time five hours faster than 75th meridian time.