

*Complete*



**EARTHQUAKES IN NORTHERN CALIFORNIA**

AND

**THE REGISTRATION OF EARTHQUAKES**

AT

**BERKELEY—MOUNT HAMILTON—PALO ALTO**

**SAN FRANCISCO—FERNDALE—FRESNO**

FROM

January 1, 1937, to March 31, 1937

BY

**PERRY BYERLY**

AND

**JOHN N. ADKINS**

BULLETIN OF THE SEISMOGRAPHIC STATIONS

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## EARTHQUAKE INTENSITY SCALE

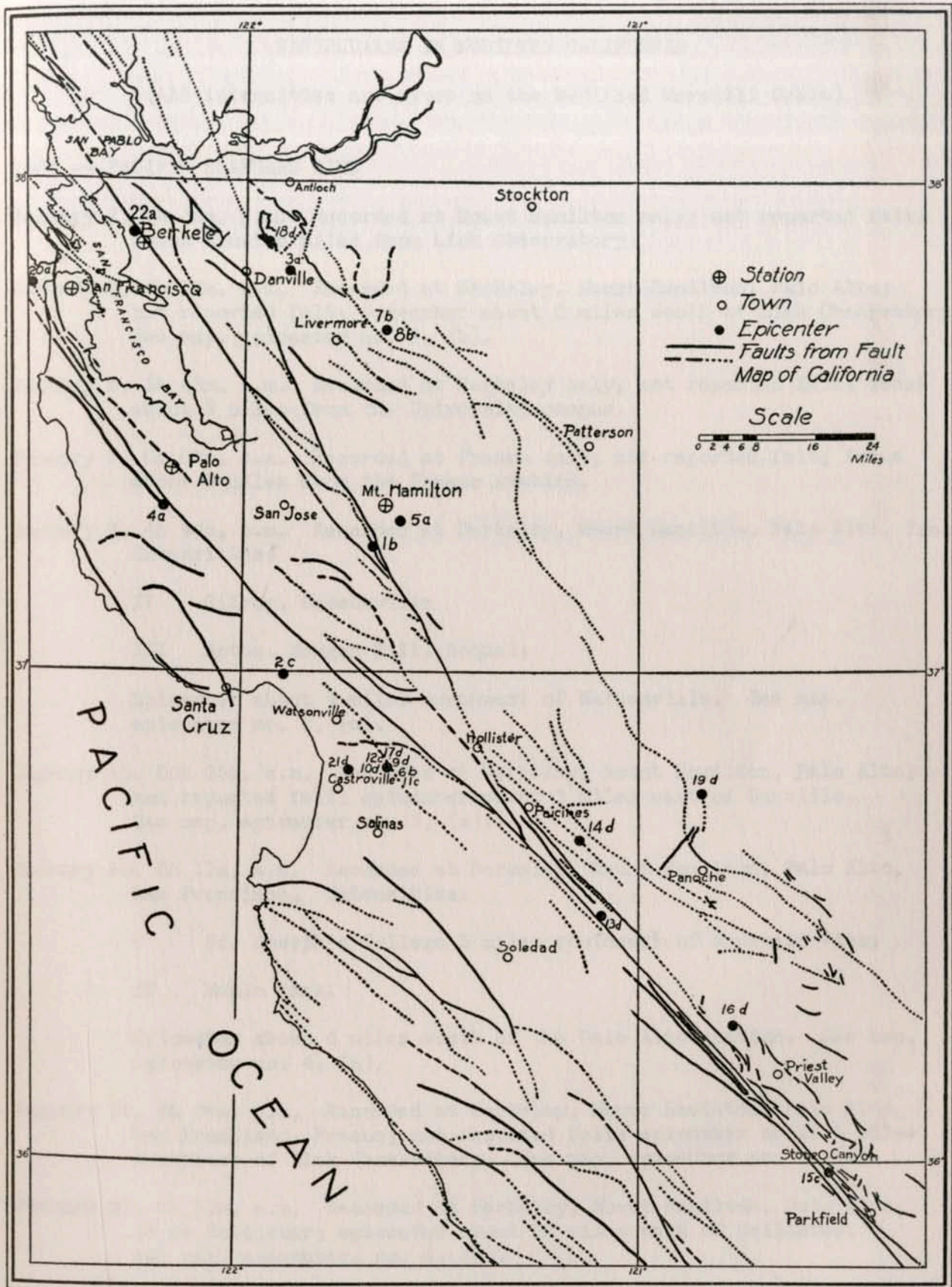
Criteria of the Modified Mercalli Scale which were used to rate the intensities of the earthquakes registered were:

### Intensity

- II Felt by a few people only. Duration or direction not appreciable.
  - III Duration or direction appreciable.
  - IV Rattling of doors and windows; swinging of suspended objects.
  - V Disturbance of movable objects; plaster cracked.
  - VI Overthrow of movable objects; cracking of chimneys and other brickwork.
  - VII Fall of some chimneys; some damage to buildings.
- 

Epicenters located in the following list are plotted on the accompanying map. A number and a letter are given beside each epicenter. The number is that assigned to the earthquake in the list. Only those earthquakes are given numbers for which epicenters were located. The letter represents the excellence with which the epicenter has been located, a indicating excellent, b good, c fair, d poor.





Map showing epicenters, January 1, 1937, to March 31, 1937



## EARTHQUAKES IN NORTHERN CALIFORNIA

(All intensities are given on the Modified Mercalli Scale)

1937 -- PACIFIC STANDARD TIME

January 2, 9h 36m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 6 miles from Lick Observatory.

January 3, 5h 12m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter about 6 miles south of Lick Observatory. See map, epicenter no. 1, (b).

January 5, 3h 43m, p.m. Recorded at Berkeley only; not reported felt; focus about 3 miles from the University campus.

January 7, 6h 03m, a.m. Recorded at Fresno only; not reported felt; focus about 6 miles from the Fresno station.

January 8, 4h 47m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno. Intensities:

IV Gilroy, Watsonville

III Aptos, Morgan Hill, Soquel;

Epicenter about 9 miles northwest of Watsonville. See map, epicenter no. 2, (c).

January 10, 00h 25m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter about 7 miles east of Danville. See map, epicenter no. 3, (a).

January 20, 3h 11m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco. Intensities:

V St. Joseph's College 5 miles southwest of Mountain View;

IV Menlo Park.

Epicenter about 6 miles south of the Palo Alto station. See map, epicenter no. 4, (a).

January 20, 4h 06m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; epicenter about 3 miles southeast of Lick Observatory. See map, epicenter no. 5, (a).

January 23, 6h 31m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; IV at Hollister; epicenter about 12 miles west of Hollister. See map, epicenter, no. 6, (b).

January 24, 3h 03m, p.m. Recorded at Palo Alto only; not reported felt; focus between 3 and 8 miles of the Palo Alto station.



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- January 27, 1h 36m, p.m. Recorded at Palo Alto only; not reported felt; focus between 3 and 8 miles of the Palo Alto station.
- January 29, 7h 26m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 6 miles from Lick Observatory.
- February 2, 2h 12m, a.m. Recorded at Berkeley only; not reported felt; focus about 3 or 4 miles from the University campus. (A foreshock of the earthquake of March 8?)
- February 2, 6h 28m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter about 7 miles east of Livermore. See map, epicenter no. 7, (b).
- February 3, 3h 09m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter same as for previous shock. See map, epicenter no. 8, (b)
- February 5, 10h 02m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno, IV at Hollister and San Juan; epicenter same as for shock of January 23, about 12 miles west of Hollister. See map, epicenter no. 9, (d).
- February 5, 1h 31m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter same as that of shock of January 23. See map, epicenter no. 10, (d).
- February 5, 3h 17m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; IV at Hollister and San Juan; epicenter same as that of previous shock. See map, epicenter no. 11, (c).
- February 5, 4h 09m, p.m. Recorded at Berkeley, Mount Hamilton; not reported felt; epicenter same as that of previous shock. See map, epicenter no. 12, (c).
- February 6, 8h 42m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno, Ferndale. Intensities:
- V-VI Ferndale
  - V Alder Point, Arcata, Happy Camp, Orleans
  - IV Benbow, Blocksburg, Briceland, Bridgeville, Cape Mendocino, Capetown, Etna, Eureka, Fields Landing, Fort Jones, Fortuna, Helena, Humboldt Bay, Klamath, Orick, Scotia, Shively, Smith River, Trinidad, Upper Mattole, Weaverville
  - III Alton, Carlotta, Crescent City Light, Garberville, Piercy
  - II Crescent City, Ettersburg, Harris, Petrolia, Sawyers Bar; epicenter about 50 miles northwest of Ferndale.
- February 6, 9h 06m, p.m. Recorded at Ferndale only; IV at Upper Mattole. Probably an aftershock of previous earthquake.



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- February 7, 4h 50m, a.m. Recorded at Ferndale only; not reported felt; epicenter about 40 miles from Ferndale.
- February 7, 1h 30m, p.m. Recorded at Ferndale only; not reported felt; probably an aftershock of the earthquake of February 6 at 8h 42m.
- February 9, 12h 19m, p.m. Recorded at Fresno only; not reported felt; epicenter probably about 50 miles from Fresno.
- February 11, 00h 53m, a.m. Recorded at Ferndale only; felt in Eureka and Ferndale; epicenter about 25 miles from Ferndale.
- February 11, 5h 56m, a.m. Recorded at Ferndale only; felt in Ferndale and Eureka. Record too slight for distance determination.
- February 12, 1h 18m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 12 miles from Lick Observatory.
- February 12, 10h 04m, p.m. Recorded at Berkeley, Palo Alto, Fresno; not reported felt; epicenter about 14 miles east northeast of Soledad. See map, epicenter no. 13, (d).
- February 16, 7h 33m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; felt at Antelope, Bitterwater, Greenfield, Hollister, King City, Panoche Junction, San Benito; epicenter 9 miles southeast of Paicines. See map, epicenter no. 14, (d).
- February 19, 5h 07m, p.m. Recorded at Berkeley only; not reported felt; focus about 3 miles from the University campus. (A foreshock of the earthquake of March 8 ? )
- February 20, 1h 58m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno. Intensities:
- V Parkfield
  - IV Atascadero, Paso Robles, Templeton; epicenter very near Stone Canyon. See map, epicenter no. 15, (c).
- February 22, 10h 10m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; II at King City; epicenter very near Priest Valley. See map, epicenter no. 16, (d).
- March 4, 9h 14m, a.m. Recorded at Palo Alto only; not reported felt; focus about 6 miles from the Palo Alto station.



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March 5, 4h 48m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno. Intensities:

- V Hollister, San Juan
- IV Loma Mar, Milpitas, Monterey, Morgan Hill, St. Joseph's College, Salinas, San Jose, San Martin, Soquel, Spreckels, Sunnyvale, Watsonville
- III Aptos, Castroville, Chualar, Davenport, Gilroy, Moss Landing, Niles, Pacific Grove, Santa Cruz
- II Carmel, Holy City, Irvington, La Honda; epicenter same as for shock of January 23. See map, epicenter no. 17, (d).

March 8, 2h 31, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno. Intensities:

- VI- Albany, El Cerrito, North Berkeley
- VII
- VI Richmond
- V Alameda, Alcatraz, Alvarado, Benicia, Bolinas, Concord, Hayward, Los Altos, Martinez, Oakland, Piedmont, Rodeo, St. Joseph's College (Mountain View), San Francisco, South Berkeley, Vallejo, Valley Ford, Walnut Creek.
- IV Alviso, Aptos, Atherton, Ben Lomond, Bloomfield, Bodega, Boulder Creek, Burlingame, Centerville, Colma, Cowell, Daly City, East Brother Island Light Station, Fairfax, Guerneville, Inverness, Lafayette, La Honda, Los Gatos, Martinez, Menlo Park, Milpitas, Montara, Moraga, Morgan Hill, Napa, Novato, Palo Alto, Petaluma, Pescadero, Pleasanton, Redwood City, San Anselmo, San Francisco, San Jose, San Martin, San Rafael, San Ramon, Santa Cruz, Saratoga, Sausalito, Sebastopol, Soquel, South San Francisco, Sunnyvale, Tiburon, Woodacre.
- III Arroyo Sanitarium (Livermore), Byron, Clayton, Corte Madera, Cotati, Diablo, El Granada, Isleton, Livermore, Manor, Mission San Jose, Mount Eden, Newark, Occidental, Penngrove, San Lorenzo, Santa Rosa.
- II Concord, Cordelia, Coyote, Forestville, Gilroy, Graton, Sonoma, Tomales, Vacaville; epicenter 1 mile north of the University campus. See map, epicenter no. 22, (a).

March 8, 2h 33m, a.m. Recorded at Berkeley only; not reported felt; aftershock of previous earthquake.

March 8, 2h 52m, a.m. Recorded at Berkeley and San Francisco; not reported felt; aftershock of previous earthquake.



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- March 8, 3h 23m, a.m. Recorded at Berkeley only; not reported felt; after-shock of previous earthquake.
- March 8, 3h 36m, a.m. Recorded at Berkeley only; not reported felt; after-shock of previous earthquake.
- March 8, 3h 41m, a.m. Recorded at Berkeley and San Francisco; not reported felt; aftershock of previous earthquake.
- March 8, 3h 42m, a.m. Recorded at Berkeley only; not reported felt; after-shock of previous earthquake.
- March 8, 6h 57m, a.m. Recorded at Berkeley and San Francisco; not reported felt; aftershock of previous earthquake.
- March 8, 7h 15m, a.m. Recorded at Berkeley only; not reported felt; after-shock of previous earthquake.
- March 15, 5h 41m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 5 miles northeast of Danville. See map, epicenter no. 18, (d).
- March 21, 3h 35m, a.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter about 10 miles north of Panoche. See map, epicenter no. 19, (d).
- March 22, 4h 09m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; IV in San Francisco; epicenter just outside the Golden Gate. See map, epicenter no. 20, (a).
- March 26, 1h 10m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno, (Ferndale station not in operation on this day); not reported felt; epicenter probably off the coast of Humboldt County.
- March 27, 00h 52m, a.m. Recorded at Mount Hamilton and poorly at Palo Alto; not reported felt; focus about 6 miles from Lick Observatory.
- March 27, 11h 52m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter about 3 miles northeast of Castroville. See map, epicenter no. 21, (d). On the tail of these records is recorded another earthquake, probably an aftershock.
- March 29, 12h 22m, p.m. Recorded at Ferndale and Palo Alto; felt weakly in Ferndale; epicenter about 100 miles from Ferndale, probably westerly.

SEISMOLOGICAL NOTATION

Classification of the Earthquakes

- I. Epicentral. II. Subcrustally strong. III. Strong.
- a (terras fortes horizontales) Local shock (origin less than 100 kilometers distant).
- b (terras fortes violentas) Near shock (origin from 100 to 1,000 kilometers distant).
- c (terras fortes remotas) Distant shock (origin from 1,000 to 3,000 kilometers distant).
- d (terras fortes remotas) Very distant shock or teleseism (origin more than 3,000 kilometers distant).

Classification of the Seismograms

THE REGISTRATION OF EARTHQUAKES

- P (waves prima) Waves first phase, or waves preliminary tremors (longitudinal).
- P<sub>1</sub> First preliminary tremors which have penetrated the core of the earth.
- P<sub>2</sub> Waves in time reflected at the earth's surface.
- S (waves secunda) Second phase, or second preliminary tremors (transverse).
- S<sub>1</sub> Waves in time reflected at the earth's surface.
- S<sub>2</sub> Waves emanated from longitudinal to transverse oscillation or vice versa through reflection at the earth's surface.
- S<sub>3</sub> Waves in time reflected at the earth's surface, having been longitudinal or any branches of the path and transverse on one branch.

In general a bar over two letters denoting types of waves indicates reflection. The subscript <sub>1</sub> denotes the boundary at about 2900 km. depth between the core and the mantle which reflects it. Thus:

- P<sub>1</sub>P<sub>2</sub> Waves which have penetrated the core, having been transverse before entering and after leaving the core, and longitudinal within the core.
  - P<sub>1</sub>P<sub>2</sub>P<sub>2</sub> Waves reflected at the core boundary into the mantle, reflected once at the boundary with the core and again reflected out of the core, having remained longitudinal on all branches of the path.
  - L (waves largas) Long waves of surface phase preceding S.
  - R (waves cortinas) Shorter and more regular waves of large amplitude in the surface phase.
  - T<sub>1</sub> Breakers motion in the surface phase.
  - T<sub>2</sub> Fall or end portion.
  - F (flats) End of seismogram.
- The lower earthquakes a special notation is used:
- L<sub>1</sub> The longitudinal wave which has followed its whole path in the surface layer or crust of the earth.
  - L<sub>2</sub> The transverse wave which has followed its whole path in the surface layer of the earth.
  - L<sub>3</sub> The longitudinal wave which has traversed the horizontal portion of the path in the intermediate layer.
  - L<sub>4</sub> The corresponding transverse wave.



## SYMBOLS AND NOTATIONS EMPLOYED

 1. Character of the Earthquake--

	I. Perceptible.	II. Moderately strong.	III. Strong.
d (terrae motus domesticus)	Local shock (origin less than 100 kilometers distant).		
v (terrae motus vicinus)	Near shock (origin from 100 to 1,000 kilometers distant).		
r (terrae motus remotus)	Distant shock (origin from 1,000 to 5,000 kilometers distant).		
u (terrae motus ultimus)	Very distant shock or teleseism (origin more than 5,000 kilometers distant).		

 2. Phases of the Seismogram--

P (undae primae)	Normal first phase, or first preliminary tremors (longitudinal).
P'	First preliminary tremors which have penetrated the core of the earth.
PR <sub>n</sub>	Waves n times reflected at the earth's surface.
S (undae secundae)	Second phase, or second preliminary tremors (transverse).
SR <sub>n</sub>	Waves n times reflected at the earth's surface.
PS	Waves changed from longitudinal to transverse oscillation or vice versa through reflection at the earth's surface.
PPS	Waves twice reflected at the earth's surface, having been longitudinal on two branches of the path and transverse on one branch.

In general a bar over two letters denoting types of waves indicates refraction. The subscript <sub>c</sub> denotes the boundary at about 2900 km. depth between the core and the middle shell which surrounds it. Thus:

$\overline{S_c P_c S}$	Waves which have penetrated the core, having been transverse before entering and after leaving the core, and longitudinal within the core.
$\overline{P_c P_c} \overline{P_c P}$	Waves refracted at the core boundary into the core, reflected once at this boundary while within the core and again refracted out of the core, having remained longitudinal on all branches of the path.
L (undae longae)	Long waves of surface phase preceding M.
M (undae maximae)	Shorter and more regular waves of large amplitude in the surface phase.
M <sub>n</sub>	Greatest motion in the surface phase.
C (coda)	Tail or end portion.
F (finis)	End of discernible movement.
For local earthquakes a special notation is used:	
$\overline{P}$	The longitudinal wave which has traveled its whole path in the surface layer or crust of the earth.
$\overline{S}$	The transverse wave which has traveled its whole path in the surface layer of the earth.
P*	The longitudinal wave which has traveled the horizontal portion of its path in the intermediate layer.
S*	The corresponding transverse wave.

### 3. Nature of the Motion--

i (impetus)	Sudden beginning of the motion.
e (emersio)	Gradual beginning of the motion.
T (period)	Time of one complete oscillation.
A	Trace amplitude measured from the media line, + earth motion toward east, north, or zenith, - toward west, south, or nadir.
A <sub>E</sub>	E-W component of A.
A <sub>N</sub>	N-S component of A.
A <sub>Z</sub>	Vertical component of A.

### 4. Time--

O (origin)	Time of shock at point of origin.
------------	-----------------------------------



## BERKELEY

## THE BERKELEY STATION, UNIVERSITY OF CALIFORNIA

## CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned} \phi &= 37^{\circ} 52'.3 \text{ N.} \\ \lambda &= 122^{\circ} 15.6 \text{ W.} \end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--85 meters (279 feet) above mean sea level.

## CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V		T <sub>0</sub>	ε	$\frac{r}{T_0^2}$	
		K	T			μ <sup>2</sup>	A <sub>1</sub> (cm)
Bosch-Omori 100 kg. ...	E	45		12	10		0.001
	N	45		12	10		0.001
Wiechert 80 kg. ....	Z	44		4	5		0.005
Wood-Anderson .....	E	3,000		0.9	15		
	N	3,000		0.9	15		
Galitzin .....		K	T	T <sub>1</sub>	μ <sup>2</sup>	A <sub>1</sub> (cm)	l (cm)
	E	112	12	11.8	0.00	100	11.3
	N	122	12	12.4	0.03	100	11.2
	Z	109	12	11.9	0.01	130	14.9
Benioff .....	Z	V		Coupled Period		ε	
				0.7	5		

The letter G before a reading designates that the seismogram was from the Galitzin instrument; W, Wiechert; B, Bosch-Omori, A, Wood-Anderson; H, Benioff.

BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks			
						A <sub>E</sub> mm.	A <sub>N</sub> mm.	A <sub>Z</sub> mm.				
						h.	m.	s.	s.			
1	1937 Jan. 2	I	iZ iEN iEN F	G G G G	22 39 07 22 39 12 22 43 44 23 20							
2	Jan. 3	Id	iPZ iZ F	H H H	13 12 13.2 13 12 14.3 13 13							See discussion, p. 5
3	Jan. 4-5	I	eE eE iE F	G G G G	23 35 26 0 19 09 0 27 13 1 40							
4	Jan. 5	I	eE F	G G	5 18 47 6 25							
5	Jan. 5	I	eZ eEN F	H A A	11 20 27.7 11 20 28.6 11 23							
6	Jan. 5	Id	ePZ eFN ePE eSZ F	H A A H H	23 42 52.2 23 42 52.2 23 42 52.5 23 42 53.2 23 43.1							See discussion, p. 5
7	Jan. 7	IIu	eE eN eEN eN eE eE eN iE F	G G A G G B G G G	13 42 08 13 42 33 13 44 08 13 44 58 13 45 08 13 45 44 13 45 52 13 46 16 16 45							U.S.C.&G.S. epicenter: 35°5 N, 97°5 E
8	Jan. 8	I		G	15 54							Trace of distant shock
9	Jan. 9	Id	ePZ iPZ eN eE iSZ iSN iSE iSZ F	H H A A H A A H H	0 47 14.7 0 47 16.4 0 47 16.8 0 47 17.0 0 47 28.0 0 47 30.3 0 47 30.4 0 47 30.6 0 49.5							See discussion, p. 5



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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
10	Jan. 10	Id	iPZ	H	8 25 36.6				See discussion, p. 5
			iPE	A	8 25 36.7				
			iPN	A	8 25 36.9				
			iPZ	W	8 25 37				
			ePE	B	8 25 37				
			iSZ	H	8 25 41.4				
			iSEN	A	8 25 41.9				
			eSZ	W	8 25 42				
			eSEN	B	8 25 42				
			F		8 27				
11	Jan. 11	I	iN	G	13 33 11				See discussion, p. 5
			iE	G	13 33 12				
			iE	G	13 34 28				
			iN	G	13 34 51				
			F		14 05				
12	Jan. 19	I	eE	B	22 27 23				See discussion, p. 5
			eN	B	22 27 28				
			eEN	A	22 27 48				
			F		23 30				
13	Jan. 20	I	ePN	A	11 11 19.0				See discussion, p. 5
			iPZ	H	11 11 19.1				
			ePE	A	11 11 19.3				
			iz	H	11 11 25.4				
			eEN	B	11 11 26				
			iN	A	11 11 26.1				
			iE	A	11 11 26.2				
			iSZ	H	11 11 27.1				
			iSN	A	11 11 27.1				
			F		11 12.5				
14	Jan. 21	Id	ePE	A	0 05 51.6				See discussion, p. 5
			ePZ	H	0 05 51.7				
			ePN	A	0 05 52.1				
			eSE	A	0 06 03.6				
			iSN	A	0 06 03.8				
			F		0 08.5				
15	Jan. 22	I		G	5 18			Trace of distant shock	
16	Jan. 23	I		G	10 25			Trace of distant shock	
17	Jan. 23	I	ePZ	H	11 08 47				
			ePZ	G	11 08 49				
			eE	G	11 08 53				
			eE	B	11 08 54				
			eZ	H	11 08 56				

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
23	Feb. 3	Id	iPZ	H	2 28 39.4				See discussion, p. 6
			ePN	A	2 28 39.5				
			ePE	A	2 28 39.7				
			iSN	A	2 28 47.5				
			iSE	A	2 28 47.6				
			F		2 31				
24	Feb. 3	Id	iPZ	H	23 08 58.5				See discussion, p. 6
			ePN	A	23 08 58.5				
			eN	A	23 09 06.0				
			iSE	A	23 09 06.7				
			iSN	A	23 09 06.8				
			F		23 10.5				
25	Feb. 4	I	iz	G	10 35 42				
			eN	G	10 35 45				
			eE	G	10 35 52				
			F		11 10				
26	Feb. 5	Iv	ePN	A	18 02 16.3				See discussion, p. 6
			eN	A	18 02 31.8				
			eE	A	18 02 32.8				
			F		18 04				
27	Feb. 5	Iv	iPZ	H	21 31 40.9				See discussion, p. 6
			iSZ	H	21 31 57.1				
			eSN	A	21 31 57.1				
			eSE	A	21 31 57.2				
			F		21 33.5				
28	Feb. 5	Iv	ePZ	H	23 17 00.7				See discussion, p. 6
			ePN	A	23 17 02.9				
			ePE	A	23 17 03.0				
			iPZ	H	23 17 03.0				
			ez	W	23 17 03				
			iN	A	23 17 12.0				
			eSN	A	23 17 18.5				
			eSE	B	23 17 19				
			iSN	A	23 17 19.5				
			iSZ	H	23 17 19.5				
			eSN	B	23 17 20				
			eSZ	W	23 17 20				
			F		23 19.5				



BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks	
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>		
	1937			h. m. s.	s.	mm.	mm.	mm.		
29	Feb. 7	Iv	ePz	H	4 42 28.8				See discussion, p. 6	
			ePN	A	4 42 28.8					
			iPENZ	G	4 42 29	3	-2.5	+4		-4
			iPE	A	4 42 29.2					
			iPz	H	4 42 29.4					
			iPN	A	4 42 29.6					
			ePz	W	4 42 30					
			ePN	B	4 42 30					
			ePE	B	4 42 31					
			iENZ	G	4 42 34					
			iz	H	4 42 58.5					
			eSz	H	4 43 08.3					
			eSEN	A	4 43 08.5					
			eSEZ	G	4 43 10					
			eN	A	4 43 35.0					
			ez	H	4 43 41.3					
			F		6 00					
30	Feb. 12	I	ePz	H	22 27 49.2				North of Bishop (Pasadena)	
			ePN	A	22 27 49.2					
			ePE	A	22 27 50.6					
			eE	A	22 27 57.8					
			ez	H	22 27 57.9					
			eN	A	22 27 55.7					
			F		22 31					
31	Feb. 13	Iv	iP*Z	H	6 04 36.7				See discussion, p. 7	
			iz	H	6 04 39.2					
			iz	H	6 04 40.2					
			iS*Z	H	6 04 57.6					
			ez	H	6 04 59.0					
			F		6 06					
32	Feb. 17	Iv	ePN	A	3 33 45.2				See discussion, p. 7	
			ePz	H	3 33 45.3					
			ePE	A	3 33 45.4					
			ePz	W	3 33 46					
			eN	B	3 33 53					
			eE	B	3 33 58					
			eSN	A	3 34 12.2					
			iSz	H	3 34 13.1					
			F		3 42					
33	Feb. 17	I		G	23 25			Trace of distant shock		
34	Feb. 19	I	ePz	W	9 10 32				Felt at Hawthorne, Nevada	
			ePE	B	9 10 32					
			ePN	B	9 10 35					
			eEN	B	9 11 17					
			ez	W	9 11 17					
			F		9 17					

BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
35	Feb. 19	I	eZ	H	23 08 42.1				
			iz	H	23 08 47.1				
			eN	A	23 08 47.2				
			eE	A	23 08 48.4				
			F		23 10				
36	Feb. 20	Id	iPZ	H	1 06 31.7				See discussion, p. 7
			eSN	A	1 06 32.7				
			iSZ	H	1 06 32.8				
			eE	A	1 06 33.3				
			F		1 07				
37	Feb. 20	Iv	ePN	A	9 58 51.3				See discussion, p. 7
			ePZ	H	9 58 51.9				
			F		10 02				
38	Feb. 21	IIIu	ePZ	H	7 13 13	6	+3	-1.5	U.S.C.&G.S. epicenter: 45° N, 148° E
			ePZ	W	7 13 14				
			ePN	B	7 13 14				
			iPNZ	G	7 13 17				
			eE	G	7 13 19				
			iPR1Z	G	7 15 46				
			eSE	G	7 21 45				
			eSZ	G	7 21 46				
			eSN	G	7 21 47				
			eScSZ	H	7 23 16				
			eZ	H	7 37 13				
			eN	A	7 37 16				
			eE	A	7 37 18				
			eN	A	7 37 28				
			eZ	H	7 37 29				
			F		12 30				
39	Feb. 21	I		G	22 57			Trace of distant shock	
40	Feb. 22	I		G	1 32			Trace of distant shock	
41	Feb. 22	I	e	G	3 13 16				
			F		4 10				
42	Feb. 22	I		G	13 43			Trace of distant shock	
43	Feb. 22	Iv	ePZ	H	18 10 40.9				See discussion, p. 7
			ePN	A	18 10 41.1				
			eE	A	18 10 44.9				
			eSEN	A	18 11 07.6				
			iSZ	H	18 11 07.6				
			F		18 15				



## BERKELEY

No.	Date	Char-acter	Phase	Time			Period	Amplitude			Remarks
				U.T.				A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h.	m.	s.	s.	mm.	mm.	mm.	
	1937										
44	Feb. 23	I	iP <sub>Z</sub>	G	0	58	46				
			eP <sub>N</sub>	G	0	58	46				
			eP <sub>E</sub>	G	0	58	49				
			eE	G	1	07	17				
			eN	G	1	07	18				
			F		3	30					
45	Mar. 5	IV	eP <sub>N</sub>	A	12	47	52.2				See discussion, p. 8
			iP <sub>Z</sub>	H	12	47	52.3				
			eE	A	12	47	54.3				
			iZ	H	12	47	54.5				
			eZ	W	12	47	55				
			iZ	H	12	47	59.6				
			eN	B	12	48	01				
			eE	B	12	48	02				
			iZ	H	12	48	11.0				
			iEN	A	12	48	11.2				
			iN	A	12	48	12.7				
			F		12	50.5					
46	Mar. 8	IIId	iP <sub>Z</sub>	H	10	31	13.7				See discussion, p. 8
			iP <sub>N</sub>	A	10	31	13.7				
			iP <sub>E</sub>	A	10	31	13.8				
			iP <sub>E</sub>	G	10	31	14				
			iP <sub>Z</sub>	W	10	31	14				
			iP <sub>N</sub>	B	10	31	14				
			iP <sub>E</sub>	B	10	31	14				
			F		10	40					
47	Mar. 8	Id	iP <sub>Z</sub>	H	10	32	59.9				Superposed on end of previous shock
			iS <sub>Z</sub>	H	10	33	00.9				See discussion, p. 8
48	Mar. 8	Id	iP <sub>EN</sub>	A	10	52	02.9				See discussion, p. 8
			iP <sub>Z</sub>	H	10	52	03.0				
			iP <sub>N</sub>	B	10	52	03				
			iS <sub>EN</sub>	B	10	52	04				
			iS <sub>Z</sub>	H	10	52	04.1				
			iS <sub>EN</sub>	A	10	52	04.4				
			F		10	53					
49	Mar. 8	Id	iP <sub>Z</sub>	H	11	22	52.7				See discussion, p. 9
			eP <sub>E</sub>	A	11	22	52.7				
			eS <sub>EN</sub>	A	11	22	53.7				
			iS <sub>Z</sub>	H	11	22	54.0				
			F		11	23.5					

BERKELEY

No.	Date	Character	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
0	1937 Mar. 8	Id	iPZ ePEN iSZ F	H 11 36 18.6 A 11 36 18.6 H 11 36 19.9 11 37					See discussion, p. 9
1	Mar. 8	Id	iP <sub>E</sub> iP <sub>N</sub> iPZ iP <sub>N</sub> iS <sub>E</sub> iS <sub>N</sub> iSZ iS <sub>EN</sub>	A 11 41 31.2 A 11 41 31.5 H 11 41 31.6 B 11 41 32 A 11 41 32.6 A 11 41 32.7 H 11 41 32.8 B 11 41 33					See discussion, p. 9  F lost in next shock
2	Mar. 8	Id	iPZ iSZ iS <sub>E</sub> eS <sub>N</sub> F	H 11 41 52.2 H 11 41 53.5 A 11 41 53.5 A 11 41 53.6 11 42.5					See discussion, p. 9
3	Mar. 8	Id	eP <sub>N</sub> iPZ eS <sub>E</sub> iSZ F	A 14 56 59.0 H 14 56 59.2 A 14 57 00.0 H 14 57 00.3 14 57.5					See discussion, p. 9
4	Mar. 8	Id	iPZ eEN iSZ F	H 15 15 06.0 A 15 15 06.7 H 15 15 07.6 15 15.5					See discussion, p. 9
5	Mar. 9	Iu	iPZ eP <sub>E</sub> ePR <sub>1</sub> EZ eE eZ eS <sub>E</sub> Z F	G 15 48 41 G 15 48 41 G 15 50 23 G 15 51 13 G 15 51 15 G 15 55 30 18 00	6		+3.5		U.S.C.&G.S. epicenter: 8°9 N, 83°8 W
6	Mar. 10	I		G 5 07					Trace of distant shock
7	Mar. 14	Iu	eP <sub>N</sub> ePZ ePZ eP <sub>N</sub> iPZ eP <sub>E</sub> eP <sub>E</sub>	G 12 07 50 H 12 07 51 W 12 07 52 B 12 07 52 G 12 07 52 G 12 07 52 A 12 07 53	4		-4		U.S.C.&G.S. epicenter 25° S, 70° W



BERKELEY

o.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
7	Mar. 14 (Contd)	Iu	eZ	H	12 07 53				
			eN	A	12 07 54				
			iS <sub>C</sub> P <sub>C</sub> SE	G	12 17 48				
			iS <sub>C</sub> P <sub>C</sub> SN	G	12 17 50				
			iSN	G	12 18 16				
			eSE	G	12 18 17				
			F		14 15				
8	Mar. 16	Id	eP <sub>N</sub>	A	1 41 09.5				See discussion, p. 9
			iPZ	H	1 41 09.6				
			eP <sub>E</sub>	A	1 41 09.7				
			iS <sub>EN</sub>	A	1 41 13.6				
			F		1 43				
59	Mar. 17	I		G	14 15				Trace of distant shock
60	Mar. 22	Id	iPZ	H	12 08 59.3				See discussion, p. 9
			eP <sub>E</sub>	A	12 08 59.3				
			eP <sub>N</sub>	A	12 08 59.4				
			iSZ	H	12 09 03.2				
			eSE	A	12 09 03.2				
			eSN	A	12 09 03.6				
			F		12 10.5				
61	Mar. 23	I	iPZ	G	0 56 22	4			-2
			iZ	G	0 59 34				
			e <sub>EN</sub>	G	1 06 18				
			e <sub>N</sub>	G	1 11 18				
			F		2 10				
62	Mar. 24	I		G	1 35				Trace of distant shock
63	Mar. 25	IIv	ePZ	H	16 50 42				U.S.C.&G.S. epicenter: 33°4 N, 116°7 W
			eP <sub>E</sub>	A	16 50 42				
			iPZ	G	16 50 45				
			eZ	W	16 50 46				
			e <sub>N</sub>	B	16 50 51				
			iZ	G	16 50 52				
			iZ	G	16 51 12				
			eS <sub>N</sub>	G	16 52 07				
			eS <sub>E</sub>	G	16 52 08				
			F		17 30				
64	Mar. 26	IIv	ePZ	G	21 10 10				See discussion, p. 9
			eP <sub>EN</sub>	G	21 10 11				
			ePZ	H	21 10 12				
			eP <sub>EN</sub>	A	21 10 12				
			eZ	W	21 10 14				
			iZ	H	21 10 21				

## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
	1937								
64	Mar. 27 (contd)	IIv	eE eZ eE iSEN iSZ iN iE F	A 21 10 21 W 21 10 21 B 21 10 22 A 21 10 57 H 21 10 57 G 21 11 21 G 21 11 28 22 00					
65	Mar. 27	Iv	eN eN F	A 19 52 41.2 A 19 52 56.7 19 55				See discussion, p. 9	
66	Mar. 29	I		G 7 34				Trace of distant shock	
67	Mar. 29	I	iZ iZ eEN iN F	G 8 00 59 G 8 01 30 G 8 10 22 G 8 11 09 8 55					



MOUNT HAMILTON

THE LICK OBSERVATORY STATION, UNIVERSITY OF CALIFORNIA  
MOUNT HAMILTON, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned} \phi &= 37^{\circ} 20'.4 \text{ N.} \\ \lambda &= 121^{\circ} 38'.6 \text{ W.} \end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--1281.7 meters (4205 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15

MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks	
				U. T.		
				h. m. s.		
1	1937 Jan. 3	Id	iP <sub>EN</sub>	5 36 07.9	See discussion, p. 5	
			iS <sub>N</sub>	5 36 10.2		
			iS <sub>E</sub>	5 36 10.4		
			F	5 37		
2	Jan. 3	Id	iP <sub>EN</sub>	13 11 59.6	See discussion, p. 5	
			iS <sub>N</sub>	13 12 01.6		
			F	13 13		
3	Jan. 7	Iu	e <sub>N</sub>	13 38 30	U.S.C. & G.S. epicenter: 35°5 N, 97°5 E	
			e <sub>E</sub>	13 38 32		
			e <sub>N</sub>	13 45 42		
			e <sub>E</sub>	13 45 55		
			F	15 40		
4	Jan. 9	Id	iP <sub>EN</sub>	0 47 06.4	See discussion, p. 5	
			eS <sub>N</sub>	0 47 12.3		
			i <sub>N</sub>	0 47 14.8		
			F	0 50		
5	Jan. 10	Id	iP <sub>EN</sub>	8 25 41.6	See discussion, p. 5	
			iS <sub>N</sub>	8 25 49.7		
			iS <sub>E</sub>	8 25 50.0		
			F	8 27		
6	Jan. 19	I	e <sub>EN</sub>	22 26 52	Trace of distant shock	
			F	22 56		
7	Jan. 19	I	e <sub>E</sub>	23 58 10	Near Weldon (Pasadena)	
			e <sub>N</sub>	23 58 34		
			e <sub>E</sub>	23 59 05		
			e <sub>N</sub>	23 59 11		
			F	0 01		
8	Jan. 20	Id	eP <sub>EE</sub>	11 11 17.5	See discussion, p. 5	
			eP <sub>NI</sub>	11 11 18.0		
			eS <sub>E</sub>	11 11 24.5		
			iS <sub>N</sub>	11 11 25.7		
			F	11 13		
9	Jan. 21	Id	iP <sub>N</sub>	0 05 38.4	See discussion, p. 5	
			iP <sub>E</sub>	0 05 39.0		
			F	0 08		
10	Jan. 23	Id	iP <sub>N</sub>	14 30 54.0	See discussion, p.	
			iP <sub>E</sub>	14 30 54.1		
			iS <sub>E</sub>	14 31 02.0		
			iS <sub>N</sub>	14 31 02.1		
			F	14 32.5		



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
11	Jan. 25	Iu	eP <sub>N</sub>	6 46 37	U.S.C. & G.S. epicenter: 12° S, 164° E
			eP <sub>E</sub>	6 46 38	
			eS <sub>E</sub>	6 57 13	
			eS <sub>N</sub>	6 57 15	
			F	8 45	
12	Jan. 29	Id	eP <sub>EN</sub>	15 25 54	See discussion, p. 6
			iS <sub>EN</sub>	15 25 56	
			F	15 26.5	
13	Feb. 3	Id	eP <sub>EN</sub>	2 28 36.6	See discussion, p. 6
			i <sub>N</sub>	2 28 40.3	
			eS <sub>E</sub>	2 28 41.7	
			i <sub>N</sub>	2 28 42.2	
			i <sub>N</sub>	2 28 43.4	
			F	2 30	
14	Feb. 3	Id	eP <sub>N</sub>	23 08 55.5	See discussion, p. 6
			eP <sub>E</sub>	23 08 55.8	
			iS <sub>N</sub>	23 09 01.0	
			eS <sub>E</sub>	23 09 01.1	
			i <sub>N</sub>	23 09 02.4	
			i <sub>N</sub>	23 09 05.1	
			F	23 10	
15	Feb. 5	Id	e <sub>EN</sub>	18 02 03.6	See discussion, p. 6
			i <sub>E</sub>	18 02 09.0	
			e <sub>N</sub>	18 02 09.8	
			eS <sub>E</sub>	18 02 12.0	
			eS <sub>N</sub>	18 02 12.2	
			iS <sub>N</sub>	18 02 13.6	
			F	18 04	
16	Feb. 5	Id	eP <sub>EN</sub>	21 31 29	See discussion, p. 6
			iS <sub>EN</sub>	21 31 37	
			F	21 33	
17	Feb. 5	Id	iP <sub>N</sub>	23 16 50.7	See discussion, p. 6
			eP <sub>E</sub>	23 16 50.9	
			eS <sub>E</sub>	23 16 58.5	
			eS <sub>N</sub>	23 16 58.9	
			F	23 20	
18	Feb. 5	I	e <sub>N</sub>	23 20 27	
			e <sub>EN</sub>	23 20 36	
			F	23 21.5	

MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
19	Feb. 6	Id	eP <sub>N</sub>	0 08 41.2	See discussion, p. 6
			eS <sub>E</sub>	0 08 49.7	
			eS <sub>N</sub>	0 08 49.9	
			F	0 10	
20	Feb. 7	I	eP <sub>E</sub>	4 42 39.7	See discussion, p. 6
			eP <sub>N</sub>	4 42 39.9	
			iP <sub>EN</sub>	4 42 40.3	
			iEN	4 42 44.3	
			F	4 01.5	
21	Feb. 12	Id	iP <sub>EN</sub>	9 17 40.2	See discussion, p. 7
			eS <sub>E</sub>	9 17 43.2	
			iS <sub>N</sub>	9 17 43.6	
			F	9 18.5	
22	Feb. 12	Iv	eP <sub>E</sub>	22 27 41.5	North of Bishop (Pasadena)
			eP <sub>N</sub>	22 27 42	
			eS <sub>N</sub>	22 28 15.5	
			eS <sub>E</sub>	22 28 16	
			e <sub>N</sub>	22 28 18	
			F	22 30.5	
23	Feb. 16	I	e <sub>N</sub>	17 41 54	Off Point Arguello (Pasadena)
			e <sub>E</sub>	17 41 56	
			F	17 44	
24	Feb. 17	Id	eP <sub>E</sub>	3 33 36.5	See discussion, p. 7
			iP <sub>N</sub>	3 33 36.5	
			eS <sub>E</sub>	3 33 48.5	
			eS <sub>N</sub>	3 33 50.5	
			F	3 38.5	
25	Feb. 19	Iv	eP <sub>N</sub>	9 10 19	Felt at Hawthorne, Nevada
			eEN	9 10 22	
			e <sub>N</sub>	9 10 27	
			i <sub>N</sub>	9 10 49	
			i <sub>N</sub>	9 10 57	
			eS <sub>E</sub>	9 11 00	
			iS <sub>N</sub>	9 11 01	
			F	9 15.5	
26	Feb. 19	I	eEN	23 08 00	
			e <sub>N</sub>	23 08 35	
			e <sub>E</sub>	23 08 36	
			F	23 10.5	



MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
27	Feb. 20	Iv	eF <sub>N</sub>	9 58 45	See discussion, p. 7
			eP <sub>E</sub>	9 58 47	
			e <sub>N</sub>	9 59 03	
			e <sub>EN</sub>	9 59 09	
			e <sub>N</sub> F	9 59 13 10 02	
28	Feb. 21	Iu	e <sub>E</sub>	7 13 21	U.S.C. & G.S. epicenter: 45° N, 148° E
			e <sub>N</sub>	7 13 22	
			e <sub>SE</sub>	7 21 50	
			e <sub>SN</sub>	7 21 54	
			e <sub>N</sub> F	10 12	
29	Feb. 22	Iv	eP <sub>EN</sub>	18 10 32	See discussion, p. 7
			e <sub>N</sub>	18 10 50	
			e <sub>E</sub>	18 10 55	
			e <sub>N</sub>	18 10 56	
			e <sub>N</sub> F	18 13	
30	March 5	Id	iP <sub>N</sub>	12 47 43	See discussion, p. 8
			eP <sub>N</sub>	12 47 43	
			eS <sub>EN</sub>	12 47 51	
			e <sub>N</sub> F	12 52	
31	March 8	IIId	eP <sub>E</sub>	10 31 27.3	See discussion, p. 8
			iP <sub>N</sub>	10 31 27.4	
			iS <sub>N</sub>	10 31 39.3	
			iS <sub>E</sub>	10 31 39.8	
			e <sub>N</sub> F	10 38	
32	March 9	Iv	eP <sub>EN</sub>	15 42 14	Near Benton (Pasadena)
			iS <sub>EN</sub>	15 42 42	
			e <sub>N</sub> F	15 45	
33	March 9	Ir	eP <sub>EN</sub>	15 48 36	U.S.C. & G.S. epicenter: 89° N, 83° 8 W
			eS <sub>N</sub>	15 55 17	
			eS <sub>E</sub>	15 55 20	
			e <sub>N</sub> F	17 30	
34	March 14	Iu	eP <sub>E</sub>	12 07 47	U.S.C. & G.S. epicenter: 25° S, 70° W
			iP <sub>N</sub>	21 07 48	
			e <sub>N</sub>	12 17 37	
			e <sub>N</sub>	12 18 03	
			e <sub>E</sub>	12 18 07	
			e <sub>N</sub> F	13 00	

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
35	March 16	Id	eN	1 41 19.3	See discussion, p. 9
			eE	1 41 19.5	
			eSE	1 41 26.0	
			iSE	1 41 27.0	
			iSN	1 41 27.1	
			F	1 42	
36	March 21	Id	ePN	11 35 22	See discussion, p. 9
			eSN	11 35 35	
			eSE	11 35 35.5	
			F	11 37	
37	March 23	I	eN	0 56 13	
			eE	0 56 20	
			F	0 58	
38	March 25	Ir	e <sup>PN</sup> EN	16 50 33	U.S.C. & G.S. epicenter: 33 <sup>o</sup> .4 N, 116 <sup>o</sup> .7 W
			iE	16 50 45	
			i <sup>EN</sup> EN	16 50 52	
			iN	16 51 08	
			eE	16 51 09	
			iN	16 51 14	
			iE	16 51 27	
			eN	16 51 45	
			eE	16 51 55	
			eE	16 52 01	
			e <sup>N</sup> F	16 52 05	
			F	17 15	
			39	March 26	
e <sup>PE</sup> E	21 10 25				
iN	21 10 55				
iSN	21 11 16				
iSE	21 11 17				
F	21 30				
40	March 27	I	eN	7 44 20	
			eE	7 44 28	
			eN	7 45 16	
			eE	7 45 19	
			F	7 47	
41	March 27	Id	e <sup>PE</sup> E	8 51 52	See discussion, p. 9
			i <sup>PN</sup> N	8 51 52	
			e <sup>SEN</sup> EN	8 51 54	
			F	8 53	



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
42	March 27	Id	eP <sub>N</sub>	19 52 29.8	See discussion, p. 9
			iP <sub>N</sub>	19 52 30.3	
			iS <sub>EN</sub>	19 52 38.0	
43	March 27	Id	eP <sub>N</sub>	19 53 18.3	See discussion, p. 9
			iS <sub>N</sub>	19 53 26.1	
			F	19 54	

PALO ALTO

THE BRANNER STATION, STANFORD UNIVERSITY  
PALO ALTO, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude of the seismographic station:

$\phi = 37^{\circ} 25' N$  Lat.  
 $\lambda = 122^{\circ} 11' W$  from Greenwich

Time.--All determinations are reduced to Universal Time.

Altitude.-- 83 meters (272 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	$T_0$	e
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15



PALO ALTO

No.	Date	Char-acter	Phase	Time U.T.	Remarks
	1937			h. m. s.	
1	Jan. 3	Id	e $\bar{P}$ <sub>N</sub> i $\bar{P}$ <sub>E</sub> eS*N iS*E i $\bar{S}$ <sub>E</sub> F	13 12 09.6 13 12 09.7 13 12 16.6 13 12 16.8 13 12 18.6 13 14	See discussion, p. 5
2	Jan. 7	Iu	e $\bar{E}$ <sub>N</sub> F	14 02 15 00	U.S.C. & G.S. epicenter: 35°5 N, 97°5 E
3	Jan. 9	Id	i $\bar{P}$ <sub>N</sub> i $\bar{P}$ <sub>E</sub> eS <sub>E</sub> iS <sub>N</sub> F	0 47 08.5 0 47 08.6 0 47 18.5 0 47 19.1 0 49.5	See discussion, p. 5
4	Jan. 10	Id	e $\bar{P}$ <sub>EN</sub> eS <sub>N</sub> iS <sub>E</sub> F	8 25 39.8 8 25 46.8 8 25 47.1 8 27	See discussion, p. 5
5	Jan. 19	I	e $\bar{N}$ e $\bar{E}$ F	22 23 51 22 23 52 22 45	Trace of distant shock
6	Jan. 20	Id	i $\bar{P}$ <sub>EN</sub> iS <sub>N</sub> F	11 11 10.3 11 11 12.3 11 13	See discussion, p. 5
7	Jan. 21	Id	i $\bar{P}$ <sub>EN</sub> e $\bar{N}$ i $\bar{N}$ iS <sub>E</sub> F	0 05 45.5 0 05 49 0 05 50.5 0 05 53 0 09	See discussion, p. 5
8	Jan. 23	I	e $\bar{E}$ <sub>N</sub> F	11 35 11 50	Trace of distant shock
9	Jan. 23	Id	e $\bar{P}$ <sub>EN</sub> e $\bar{N}$ eS <sub>E</sub> F	14 30 59 14 31 05 14 31 10.5 14 33	See discussion, p. 5
10	Jan. 24	Id	e $\bar{P}$ <sub>N</sub> i $\bar{P}$ <sub>E</sub> i $\bar{N}$ i $\bar{N}$ F	23 03 17.1 23 03 17.2 23 03 18.3 23 03 19.3 23 04	See discussion, p. 5

PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
11	Jan. 25	Iu	ePEN	6 46 38	U.S.C. & G.S. epicenter: 12° S, 164° E
			eSE	6 57 05	
			eSN	6 57 06	
			F	8 15	
12	Jan. 25	I	eE	7 42 50	
			eN	7 42 51	
			eE	7 43 49	
			F	7 44.5	
13	Jan. 27	Id	iPE	21 35 32.9	See discussion, p. 6
			iPN	21 35 33.0	
			iN	21 35 34.2	
			iN	21 35 35.1	
			F	21 36	
14	Feb. 3	Id	ePE	2 28 39.9	See discussion, p. 6
			ePN	2 28 40.2	
			iSEN	2 28 47.9	
			F	2 30	
15	Feb. 3	Id	ePE	23 08 59.8	See discussion, p. 6
			iS*E	23 09 06.9	
			iSE	23 09 08.8	
			eE	23 09 11.1	
			F	23 10	
16	Feb. 5	Id	ePE	18 02 08	See discussion, p. 6
			iPEN	18 02 10	
			eSN	18 02 20	
			eEN	18 02 21	
			iSE	18 02 22.5	
			F	18 04.5	
17	Feb. 5	Id	ePE	21 31 33.0	See discussion, p. 6
			ePN	21 31 33.3	
			iSEN	21 31 45.3	
			F	21 33	
18	Feb. 5	Id	ePEN	23 16 54.9	See discussion, p. 6
			iPE	23 16 55.4	
			iN	23 17 00.9	
			iN	23 17 03.9	
			eE	23 17 04.4	
			eSN	23 17 05.9	
			eN	23 17 06.9	
			F	23 19.5	



## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
19	Feb. 6	Id	ePE	0 08 45.9	See discussion, p. 6
			eE	0 08 48.9	
			eSE	0 08 57.9	
			eN	0 09 02.5	
			eN F	0 09 05.9 0 10	
20	Feb. 7	Iv	ePE	4 42 34.2	See discussion, p. 6
			iPE	4 42 35.1	
			ePN	4 42 35.3	
			iPN	4 42 35.8	
			iE	4 43 05.3	
			iN	4 43 16.1	
			iE	4 43 19.5	
			eE	4 43 34.5	
			iN F	4 43 52.6 4 57	
21	Feb. 12	I	eEN	22 26 47	North of Bishop (Pasadena)
			eE	22 26 55	
			F	22 29	
22	Feb. 13	Iv	iPE	6 04 28.8	See discussion, p. 7
			ePN	6 04 29.2	
			iSE	6 04 43.3	
			iSN	6 04 44.0	
			F	6 06	
23	Feb. 17	Iv	iPN	3 33 41.4	See discussion, p. 7
			iPE	3 33 41.7	
			iSN	3 33 57.3	
			iE	3 33 58.3	
			F	3 37.5	
24	Feb. 19	Iv	ePEN	9 10 31.0	Felt at Hawthorne, Nevada
			iE	9 11 12.5	
			iE	9 11 16.7	
			iSN	9 11 17.1	
			F	9 14.5	
25	Feb. 20	Iv	eEN	9 58 50	See discussion, p. 7
			eE	9 58 56	
			eN	9 59 18	
			eE	9 59 19	
			F	10 00	

## PALO ALTO

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
				h.	m.	s.	
	1937						
26	Feb. 21	Iu	ePE eN eE eSE eN F	7	13	23 29 30 46 53 00	U.S.C. & G.S. epicenter: 45° N, 148° E
27	Feb. 22	Iv	eEN eE eN eE eEN F	18	10	37 43 51 54 02 13	See discussion, p. 7
28	March 4	Id	ePN iPE iSN iSE iN F	17	14	09.2 09.3 11.2 11.3 11.7 15	See discussion, p. 7
29	March 5	Id	iPEN iSN iSE F	12	47	46.9 59.3 59.4 52	See discussion, p. 8
30	March 8	IIId	iPN iPE iN iSN F	10	31	22.4 22.6 25.2 28.6 41	See discussion, p. 8
31	March 9	I	ePEN iEN F	15	42	20 53 44	Near Benton (Pasadena)
32	March 9	Ir	ePN ePE F	15	48	39 41 30	U.S.C. & G.S. epicenter: 89° N, 83° 8 W
33	March 16	Id	ePE eN F	1	41	15 22 42	See discussion, p. 9
34	March 21	Id	eEN eN eE F	11	35	30.0 50.0 50.5 36.5	See discussion, p. 9



## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
35	March 22	Id	e <sub>PE</sub> i <sub>SE</sub> F	12 09 03.4 12 09 10.7 12 10	See discussion, p. 9
36	March 25	Iv	e <sub>PE</sub> e <sub>PN</sub> e <sub>E</sub> i <sub>N</sub> e <sub>E</sub> e <sub>N</sub> F	16 50 40 16 50 42 16 51 06 16 51 07 16 52 15 16 52 16 17 11	U.S.C. & G.S. epicenter: 33°4 N, 116°7 W
37	March 26	Iv	e <sub>PE</sub> i <sub>PN</sub> e <sub>SN</sub> i <sub>E</sub> i <sub>SN</sub> i <sub>SE</sub> F	21 10 15.7 21 10 17.4 21 11 04.7 21 11 05.7 21 11 07.7 21 11 08.3 21 26	See discussion, p. 9
38	March 27	Id	i <sub>PN</sub> i <sub>SN</sub> F	8 51 54.6 8 51 59.6 8 52.7	See discussion, p. 9
39	March 27	Id	e <sub>PEN</sub> e <sub>SE</sub> i <sub>SE</sub>	19 52 33 19 52 44 19 52 45	See discussion, p. 9 F lost in next shock
40	March 27	I	e <sub>E</sub>	19 53 34	See discussion, p. 9 F off end of record
41	March 29	Iv	e <sub>PN</sub> i <sub>PE</sub> i <sub>EN</sub> F	20 22 43 20 22 43 20 23 33 20 25	See discussion, p. 9

SAN FRANCISCO

THE SAN FRANCISCO STATION, UNIVERSITY OF SAN FRANCISCO  
 SAN FRANCISCO, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude of the seismographic station:

$\phi = 37^{\circ} 46'$  N. Lat.  
 $\lambda = 122^{\circ} 27'$  W. from Greenwich

Time.--All determinations are reduced to Universal Time.

Altitude.-- 100 meters (328 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	$T_0$	$\epsilon$
Wood-Anderson .....	E $15^{\circ}$ S	1500	1	15
	N	3000	1	15



## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Jan. 20	Id	eP <sub>N</sub>	11 11 17.6	See discussion, p. 5
			iS* <sub>EN</sub>	11 11 23.2	
			F	11 12	
2	Jan. 21	Id	eP <sub>N</sub>	0 05 52.7	See discussion, p. 5
			i <sub>EN</sub>	0 06 02.7	
			iS <sub>E</sub>	0 06 04.7	
			F	0 07	
3	Feb. 5	Iv	eP <sub>EN</sub>	23 17 00	See discussion, p. 6
			eS <sub>N</sub>	23 17 17	
			eS <sub>E</sub>	23 17 18	
			F	23 19	
4	Feb. 17	Iv	iP <sub>N</sub>	3 33 47.4	See discussion, p. 7
			eP <sub>E</sub>	3 33 47.6	
			iS <sub>N</sub>	3 34 11.2	
			eS <sub>E</sub>	3 34 11.6	
			F	3 36.5	
5	Feb. 19	Iv	eP <sub>N</sub>	9 10 30	Felt at Hawthorne, Nevada
			eP <sub>E</sub>	9 10 32	
			i <sub>N</sub>	9 11 16	
			i <sub>EN</sub>	9 11 19	
			F	9 14	
6	Feb. 21	Iu	e <sub>EN</sub>	7 13 26	U.S.C. & G.S. epicenter: 45° N, 148° E
			e <sub>N</sub>	7 21 41	
			e <sub>N</sub>	7 21 51	
			F	9 00	
7	March 5	Iv	eP <sub>N</sub>	12 47 52.3	See discussion, p. 8
			e <sub>E</sub>	12 47 53.5	
			eS <sub>E</sub>	12 48 10.5	
			eS <sub>N</sub>	12 48 10.8	
			F	12 50.5	
8	March 8	IId	iP <sub>EN</sub>	10 31 17.1	See discussion, p. 8
			i <sub>E</sub>	10 31 20.2	
			F	10 41	
9	March 8	Id	eP <sub>N</sub>	10 52 09.2	See discussion, p. 8
			eP <sub>E</sub>	10 52 09.3	
			iP <sub>N</sub>	10 52 09.5	
			i <sub>N</sub>	10 52 11.0	
			F	10 53	

## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
10	March 8	Id	eP <sub>N</sub>	11 41 37.5	See discussion, p. 9
			iP <sub>EN</sub>	11 41 37.8	
			iS <sub>N</sub>	11 41 39.2	
			F	11 42.5	
11	March 8	Id	eP <sub>E</sub>	14 57 05.3	See discussion, p. 9
			iP <sub>N</sub>	14 57 05.5	
			iS <sub>N</sub>	14 57 06.9	
			F	14 58	
12	March 16	Id	e <sub>N</sub>	1 41 14.5	See discussion, p. 9
			iS <sub>N</sub>	1 41 18.0	
			iS <sub>E</sub>	1 41 18.2	
			F	1 42	
13	March 22	Id	iP <sub>EN</sub>	12 09	No clock correction S-P = 1.5 See discussion, p. 9
			F	12 11	
14	March 25	Iv	eP <sub>EN</sub>	16 50	No clock correction U.S.C. & G.S. epicenter: 33°4 N, 116°7 W
			F	17 15	



## FERNDALE

 THE FERNDALE STATION  
 FERNDALE, CALIFORNIA

---

 CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude of the center of the seismographic  
 station:

$$\varphi = 40^{\circ} 34' \text{ N. Lat.}$$

$$\lambda = 124^{\circ} 16' \text{ W. from Greenwich}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 17 meters (55 feet) above mean sea level.

The seismographs are Bosch-Omori 25 km. horizontal pendulums.  
 They are oriented to record N-S and E-W motion. The station is  
 operated by Mr. Joseph Bognuda, of Ferndale, in cooperation with the  
 University of California.

## FERNDALE

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Jan. 7	Iu	eE	14 00	U.S.C. & G.S. epicenter: 35°5 N, 97°5 E
			eN	14 00	
			F	14 50	
2	Jan. 20	I	eE	10 26 03	Trace of distant shock
			eEN	10 31	
			F	10 55	
3	Feb. 7	IIId	iPEN	4 41 48	See discussion, p. 6
			F	5 04	
4	Feb. 7	Id	ePEN	5 05 51	See discussion, p. 6
			eSEN	5 05 59	
			F	5 09	
5	Feb. 7	Id	ePN	12 50 24	See discussion, p. 7
			iSN	12 50 31	
			F	12 52	
6	Feb. 7	Id	ePEN	21 29 38	See discussion, p. 7
			eSN	21 29 46	
			F	21 31	
7	Feb. 11	Id	ePEN	8 52 45	See discussion, p. 7
			iSEN	8 52 51	
			F	8 55	
8	Feb. 11	I	eE	13 55 51	See discussion, p. 7
			eN	13 55 55	
			F	13 58	
9	Feb. 20	Iu	ePE	19 13 16	
			ePN	19 13 19	
			eN	19 21 13	
			eE	19 21 18	
			F	21 00	
10	March 2	I	eEN	16 06	Trace of distant shock
			F	16 25	
11	March 8	I	eEN	10 32	See discussion, p. 8 No minute marks
			F	10 43	
12	March 29	Iv	iPEN	20 22 03	See discussion, p. 9
			iSEN	20 22 21	
			F	20 26	



## FRESNO

THE FRESNO STATION, FRESNO STATE COLLEGE  
FRESNO, CALIFORNIA

## CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned}\phi &= 36^{\circ} 46'.1 \text{ N} \\ \lambda &= 119^{\circ} 47'.8 \text{ W}\end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--88.4 meters (290 feet) above mean sea level.

## CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	N	3000	0.9	15

## FRESNO

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
	1937			h.	m.	s.	
1	Jan. 3	I	e <sub>N</sub> F	10	38	21	
				10	43		
2	Jan. 7	Iu	e <sub>N</sub> F	13	38	41	U.S.C. & G.S. epicenter: 35°5 N, 97°5 E
				14	45		
3	Jan. 7	Id	e <sub>P<sub>N</sub></sub> i <sub>S<sub>N</sub></sub> F	14	03	19.3	Superposed on record of previous shock
				14	03	21.5	See discussion, p. 5
				14	04		
4	Jan. 8	I	e <sub>N</sub> F	12	49	16	
				12	52		
5	Jan. 9	Iv	e <sub>P<sub>N</sub></sub> i <sub>N</sub> i <sub>S<sub>N</sub></sub> F	0	47	24.7	See discussion, p. 5
				0	47	44.1	
				0	47	47.2	
				0	51		
6	Jan. 10	I	e <sub>N</sub> F	14	42	14	
				14	44		
7	Jan. 15	I	e <sub>N</sub> F	18	36	36	San Pedro Channel (Pasadena)
				18	41		
8	Jan. 19	I	e <sub>N</sub> F	22	22	52	
				22	40		
9	Jan. 19-20	Iv	e <sub>P<sub>N</sub></sub> i <sub>P<sub>N</sub></sub> i <sub>S<sub>N</sub></sub> F	23	58	00.4	Near Weldon (Pasadena)
				23	58	01.2	
				23	58	26.6	
				0	01.5		
10	Jan. 21	Iv	e <sub>N</sub> F	0	06	24.4	See discussion, p. 5
				0	08		
11	Jan. 25	Iu	e <sub>N</sub> F	6	46	48	U.S.C. & G.S. epicenter: 12° S, 164° E
				7	45		
12	Jan. 25	I	e <sub>N</sub> e <sub>N</sub> F	10	11	30.4	Sierra West of Haiwee (Pasadena)
				10	11	44.4	
				10	13		
13	Feb. 3	Iv	e <sub>P<sub>N</sub></sub> F	2	29	02.5	See discussion, p. 6
				2	31		
14	Feb. 4	I	e <sub>N</sub> F	10	36	08	
				10	45		



## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
15	Feb. 5	Iv	eP <sub>N</sub> iS <sub>N</sub> F	18 02 16.4 18 02 37.5 18 07	See discussion, p. 6
16	Feb. 5	Iv	eP <sub>N</sub> iS <sub>N</sub> F	23 17 00.2 23 17 24.7 23 22.5	See discussion, p. 6
17	Feb. 6	I	e <sub>N</sub>	2 53 31	Vicinity of Indian Wells (Pasadena) F off end of record
18	Feb. 7	IIv	eP <sub>N</sub> iP <sub>N</sub> i <sub>N</sub> i <sub>N</sub> F	4 43 00.6 4 43 02.2 4 44 12.2 4 44 16.6 5 05	See discussion, p. 6
19	Feb. 9	Id	eP <sub>N</sub> ? iS <sub>N</sub> F	20 19 36.4 20 19 47.4 20 21.5	See discussion, p. 7
20	Feb. 11	I	e <sub>N</sub> F	11 38 51 11 41.5	
21	Feb. 12	Iv	eP <sub>N</sub> iP <sub>N</sub> iS <sub>N</sub> F	22 27 21.5 22 27 22.6 22 27 38.1 22 32.5	North of Bishop (Pasadena)
22	Feb. 13	Iv	eS <sub>N</sub> F	6 04 48.0 6 08.5	See discussion, p. 7
23	Feb. 16	I	e <sub>N</sub> F	17 41 29.9 17 47	Off Point Arguello (Pasadena)
24	Feb. 17	Iv	eP <sub>N</sub> iP <sub>N</sub> iS <sub>N</sub> F	3 33 40.8 3 33 43.0 3 33 56.0 3 41	See discussion, p. 7
25	Feb. 19	Iv	eP <sub>N</sub> iP <sub>N</sub> iS <sub>N</sub> i <sub>N</sub> F	9 10 08.2 9 10 11.1 9 10 34.8 9 10 37.1 9 21	Felt at Hawthorne, Nevada
26	Feb. 19	I	e <sub>N</sub> F	16 43 35 16 45	Southwest of Haiwee (Pasadena)

## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
27	Feb. 19	Iv	eP <sub>N</sub>	23 07 42.1	
			iP <sub>N</sub>	23 07 44.7	
			eS <sub>N</sub>	23 08 09.7	
			i <sub>N</sub>	23 08 12.5	
			F	23 11	
28	Feb. 20	Iv	iP <sub>N</sub>	9 58 32.4	See discussion, p. 7
			iS <sub>N</sub>	9 58 45.8	
			F	10 06	
29	Feb. 21	Iu	eP <sub>N</sub>	7 13 28	U.S.C. & G.S. epicenter: 45° N, 148° E
			e <sub>N</sub>	7 37 43	
			F	8 46	
30	Feb. 22	Iv	iP <sub>N</sub>	18 10 25.8	See discussion, p. 7
			iS <sub>N</sub>	18 10 38.8	
			F	18 16	
31	Feb. 23	I	e <sub>N</sub>	0 59 15.5	
			F	1 03	
32	Feb. 25	Iv	eP <sub>N</sub>	18 21 42.8	South of Haiwee (Pasadena)
			iS <sub>N</sub>	18 22 05.6	
			F	18 23.5	
33	Feb. 26	Iv	eP <sub>N</sub>	1 28 11.5	
			iS <sub>N</sub>	1 29 22.0	
			F	1 36	
34	Feb. 27	Iv	eP <sub>N</sub>	1 30 42.8	Off coast of Lower California (Pasadena)
			e <sub>N</sub>	1 31 02.2	
			eS <sub>N</sub>	1 32 08.4	
			F	1 41	
35	Feb. 28	I	i <sub>N</sub>	18 18 12.0	
			F	18 20.5	
36	March 5	Iv	eP <sub>N</sub>	12 47 54.1	See discussion, p. 8
			iS <sub>N</sub>	12 48 15.5	
			i <sub>N</sub>	12 48 18.7	
			F	12 57	
37	March 8	Iv	eP <sub>N</sub>	10 31 51.2	See discussion, p. 8
			iS <sub>N</sub>	10 32 18.1	
			F	10 45	
38	March 9	Iv	eP <sub>N</sub>	15 41 58.1	Near Benton (Pasadena)
			iS <sub>N</sub>	15 42 12.3	
			F	15 47	



## FRESNO

No.	Date	Char- acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
39	March 9	Ir	eP <sub>N</sub>	15 48 26	U.S.C. & G.S. epicenter: 8 <sup>o</sup> 9 N, 83 <sup>o</sup> 8 W
			eS <sub>N</sub>	15 54 50	
			F	16 12	
40	March 14	Iu	eP <sub>N</sub>	12 07 40	U.S.C. & G.S. epicenter: 25 <sup>o</sup> S, 70 <sup>o</sup> W
			F	12 17	
41	March 19	I	iN	1 25 22	Felt in San Bernardino
			F	1 27	
42	March 21	Id	eN	11 35 29	See discussion, p. 9
			iS <sub>N</sub>	11 35 32.5	
			F	11 38	
43	March 23	I	eN	0 56 09	
			F	1 03	
44	March 26	Iv	eP <sub>N</sub>	21 10 44	See discussion, p. 9
			eS <sub>N</sub>	21 11 58	
			iS <sub>N</sub>	21 12 00	
			F	21 25	
45	March 27	Iv	eP <sub>N</sub>	19 52 47.3	See discussion, p. 9
			iS <sub>N</sub>	19 53 03.5	
			iN	19 53 09.0	
			F	19 54.5	
46	March 27	I	eN	21 52 17	
			F	21 53.5	
47	March 29	I	eN	8 00 48.4	
			F	8 05	

EARTHQUAKES IN NORTHERN CALIFORNIA

AND

THE REGISTRATION OF EARTHQUAKES

AT

BERKELEY—MOUNT HAMILTON—PALO ALTO

SAN FRANCISCO—FERNDALE—FRESNO

FROM

April 1, 1937, to June 30, 1937

BY

PERRY BYERLY

AND

JOHN N. ADKINS

BULLETIN OF THE SEISMOGRAPHIC STATIONS

VOLUME 7, No. 2, pp. 47-97



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PARTICIPATION IN EARTHQUAKE RECORDING

THE REGISTRATION OF EARTHQUAKES

CAMBRIDGE UNIVERSITY PRESS

LONDON, ENGLAND

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## EARTHQUAKE INTENSITY SCALE

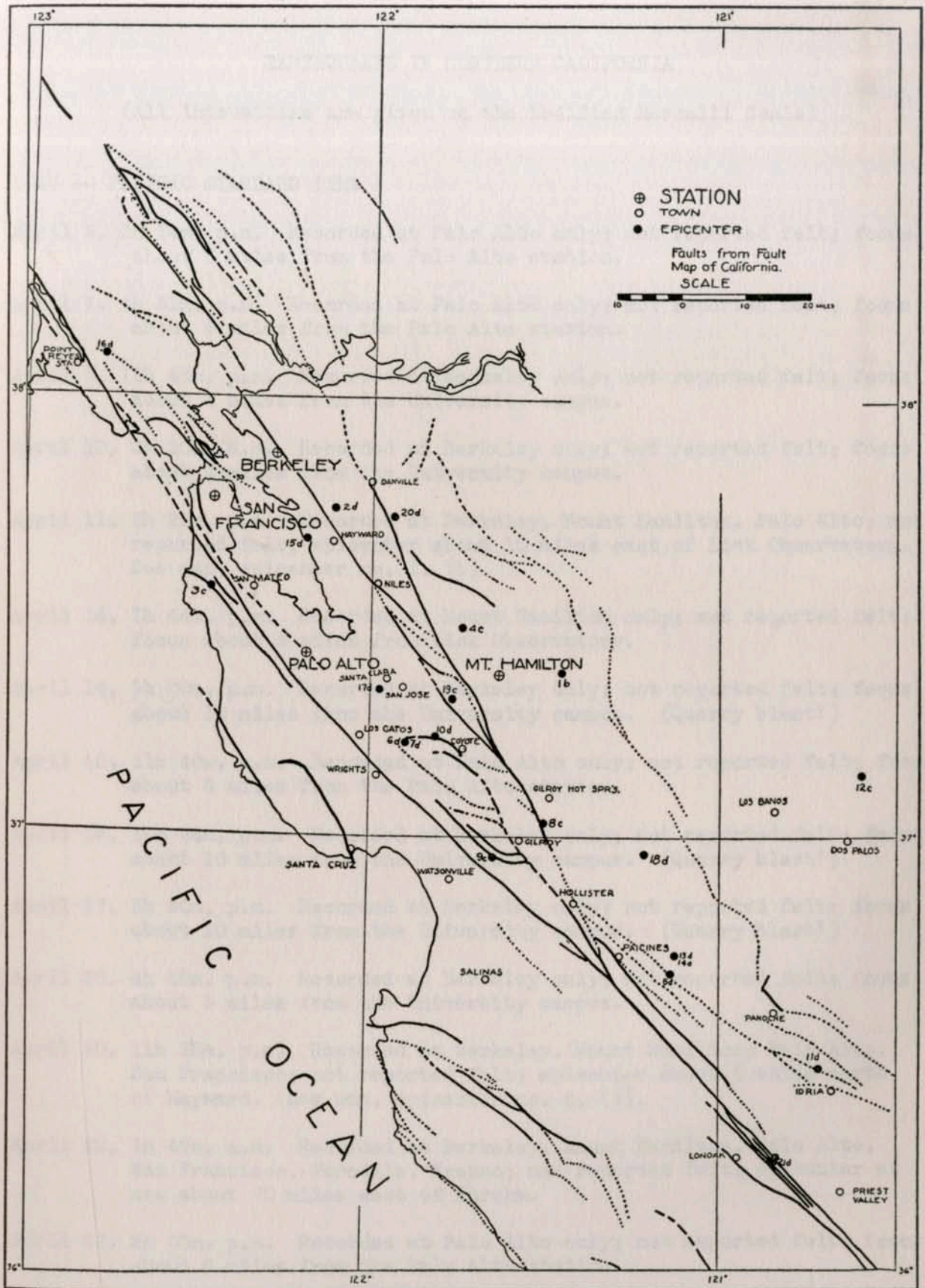
Criteria of the Modified Mercalli Scale which were used to rate the intensities of the earthquakes registered were:

Intensity

- II Felt by a few people only. Duration or direction not appreciable.
  - III Duration or direction appreciable.
  - IV Rattling of doors and windows; swinging of suspended objects.
  - V Disturbance of movable objects; plaster cracked.
  - VI Overthrow of movable objects; cracking of chimneys and other brickwork.
  - VII Fall of some chimneys; some damage to buildings.
- 

Epicenters located in the following list are plotted on the accompanying map. A number and a letter are given beside each epicenter. The number is that assigned to the earthquake in the list. Only those earthquakes are given numbers for which epicenters were located. The letter represents the excellence with which the epicenter has been located, a indicating excellent, b good, c fair, d poor.





Map showing epicenters, April 1, 1937, to June 30, 1937



## EARTHQUAKES IN NORTHERN CALIFORNIA

(All intensities are given on the Modified Mercalli Scale)

1937 -- PACIFIC STANDARD TIME

- April 5, 2h 54m, p.m. Recorded at Palo Alto only; not reported felt; focus about 7 miles from the Palo Alto station.
- April 7, 4h 31m, p.m. Recorded at Palo Alto only; not reported felt; focus about 6 miles from the Palo Alto station.
- April 9, 11h 48m, p.m. Recorded at Berkeley only; not reported felt; focus about 3 miles from the University campus.
- April 10, 2h 20m, a.m. Recorded at Berkeley only; not reported felt; focus about 3 miles from the University campus.
- April 11, 5h 20m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter about 10 miles east of Lick Observatory. See map, epicenter no. 1, (b).
- April 14, 7h 44m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 3 miles from Lick Observatory.
- April 14, 9h 00m, p.m. Recorded at Berkeley only; not reported felt; focus about 10 miles from the University campus. (Quarry blast?)
- April 15, 11h 40m, a.m. Recorded at Palo Alto only; not reported felt; focus about 6 miles from the Palo Alto station.
- April 16, 10h 54m, p.m. Recorded at Berkeley only; not reported felt; focus about 10 miles from the University campus. (Quarry blast?)
- April 17, 3h 50m, p.m. Recorded at Berkeley only; not reported felt; focus about 10 miles from the University campus. (Quarry blast?)
- April 20, 4h 56m, p.m. Recorded at Berkeley only; not reported felt; focus about 3 miles from the University campus.
- April 20, 11h 26m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 5 miles north of Hayward. See map, epicenter no. 2, (d).
- April 22, 1h 47m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Ferndale, Fresno; not reported felt; epicenter at sea about 70 miles west of Eureka.
- April 22, 2h 00m, p.m. Recorded at Palo Alto only; not reported felt; focus about 8 miles from the Palo Alto station.



1937 -- P.S.T.

- April 24, 2h 41m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 4 miles from Lick Observatory.
- April 24, 5h 51m, p.m. Recorded at Palo Alto only; not reported felt; focus about 4 miles from the Palo Alto station.
- April 28, 5h 03m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter 7 miles west of San Mateo. See map, epicenter no. 3, (c).
- April 29, 2h 32m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; IV at San Jose and Mountain View; epicenter 9 miles northwest of Lick Observatory. See map, epicenter no. 4, (c).
- May 4, 6h 59m, p.m. Recorded at Palo Alto only; not reported felt; focus about 4 miles from the Palo Alto station.
- May 6, 6h 47m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno, Ferndale; felt "by many through Humboldt County;" epicenter about 70 miles west of Cape Mendocino.
- May 6, 5h 34m, p.m. Recorded at Berkeley only; not reported felt; focus probably about 25 miles from the University campus.
- May 8, 12h 21m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 3 miles from Lick Observatory.
- May 9, 9h 59m, a.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.
- May 10, 6h 44m, p.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter 8 miles southeast of Paicines. See map, epicenter no. 5, (d).
- May 13, 1h 46m, p.m. Recorded at San Francisco only; not reported felt; focus probably within 4 miles of the University of San Francisco campus.
- May 14, 1h 36m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about half way between Los Gatos and Coyote. See map, epicenter no. 6, (d).
- May 14, 1h 37m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; another shock from the same epicenter as previous quake. See map, epicenter no. 7, (d).
- May 15, 10h 45m, a.m. Recorded at Palo Alto only; not reported felt; focus about 6 miles from the Palo Alto station.
- May 20, 5h 10m, p.m. Recorded at Mount Hamilton and Palo Alto; not reported felt; epicenter about 4 miles northeast of Gilroy. See map, epicenter no. 8, (c).



1937 -- P.S.T.

May 22, 3h 08m, p.m. Recorded at Palo Alto only; not reported felt; focus about 7 miles from the Palo Alto station.

May 25, 6h 11m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco. Intensities:

V Gilroy

IV Mountain view; epicenter about 5 miles southwest of Gilroy. See map, epicenter no. 9, (c).

May 27, 0h 37m, a.m. Recorded at Berkeley and Ferndale; not reported felt; epicenter probably about 60 or 70 miles west of Cape Mendocino.

May 27, 7h 26m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.

May 28, 4h 12m, p.m. Recorded at Mount Hamilton and poorly at Palo Alto; not reported felt; epicenter probably about 4 miles northwest of Coyote. See map, epicenter no. 10, (d).

May 28, 5h 05m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.

May 29, 7h 51m, a.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter probably about 4 miles northwest of Idria. See map, epicenter no. 11 (d).

May 31, 7h 33m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter about 10 miles north of Dos Palos. See map, epicenter no. 12, (c).

June 2, 7h 08m, a.m. Recorded at Palo Alto only; not reported felt; focus probably about 7 miles from the Palo Alto station.

June 5, 1h 39m, a.m. Recorded at Mount Hamilton, Palo Alto, San Francisco/<sup>Fresno;</sup> not reported felt; epicenter about 10 miles east of Paicines. See map, epicenter no. 13, (d).

June 5, 11h 29m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno, San Francisco; not reported felt; from same epicenter as previous quake. See map, epicenter no. 14, (d).

June 5, 11h 52m, a.m. Not recorded; IV at Caribou.

June 5, 10h 34m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter on bayshore west of Hayward. See map, epicenter no. 15, (d).

June 7, 10h 51m, a.m. Recorded at Palo Alto only; not reported felt; focus about four miles from the Palo Alto station.



1937 -- P.S.T.

- June 9, 1h 04m, p.m. Recorded at Berkeley, San Francisco, Ferndale; not reported felt; epicenter about 40 miles at sea from Ferndale.
- June 12, 7h 07m, a.m. Recorded at Berkeley only; not reported felt; focus between 5 and 10 miles from the University campus.
- June 12, 8h 57m, a.m. Recorded at Berkeley, Mount Hamilton, Fresno; IV at Caribou; records too weak for any location of epicenter.
- June 12, 11h 24m, a.m. Recorded at Palo Alto only; not reported felt; focus probably about 6 miles from the Palo Alto station.
- June 12, 7h 16m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 5 miles northeast of Point Reyes Station. See map, epicenter no. 16, (d).
- June 12, 7h 17m, p.m. Recorded at Berkeley, Palo Alto; not reported felt; aftershock of previous quake.
- June 13, 6h 32, a.m. Recorded weakly at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter very near Santa Clara. See map, epicenter no. 17, (d)
- June 13, 9h 01m, a.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter about 13 miles northeast of Hollister. See map, epicenter no. 18, (d).
- June 13, 4h 15m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter half way between San Jose and Lick Observatory. See map, epicenter no. 19, (c).
- June 13, 4h 29m, p.m. Recorded at Mount Hamilton and Palo Alto; not reported felt; aftershock of above quake.
- June 16, 8h 29m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 6 miles south-east of Danville. See map, epicenter no. 20, (d).
- June 18, 1h 08m, a.m. Recorded at all stations (at Reno S-P = 19.5 sec.). Intensities:
- V Gerlach (Nev.), Lovelock (Nev.), Mill City (Nev.), Pulga, Ravendale, Vya (Nev.)
  - IV Adin, Davis Creek, Denio (Ore.), Eagleville, Fort Bidwell, Jungo (Nev.), Likely, Madeline, Red Rock, Susanville, Sulphur (Nev.), Wendel.
  - III Cedarville, Doyle, Flanigan (Nev.), Nixon (Nev.).
  - I-II Hazen (Nev.), Paradise Valley (Nev.), Quincy; epicenter near south end of Lower Lake in Modoc County.

1937 -- P.S.T.

- June 26, 12h 14m, p.m. Recorded at Palo Alto only; not reported felt; focus about 7 miles from the Palo Alto station.
- June 26, 8h 27m, p.m. Recorded at Berkeley, Palo Alto, Mount Hamilton, Fresno; not reported felt; epicenter about 80 miles probably southerly from Fresno.
- June 28, 8h 44m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 3 miles from Lick Observatory.
- June 28, 3h 20m, p.m. Recorded at Mount Hamilton and Fresno; not reported felt; epicenter probably about 5 miles east of Lonoak. See map, epicenter no. 21, (d).
- June 30, 4h 55m, a.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.
- June 30, 12h 18m, p.m. Recorded at Palo Alto only; not reported felt; focus about 6 miles from the Palo Alto station.



STRESS AND STRAIN THEORY

1. Classification of the Earthquake

- 1. Classification 12. Intensity 13. Duration
- 1. Surface wave 14. Local shock (origin less than 100 kilometers distant).
- 2. Deep wave 15. Far shock (origin from 100 to 1,000 kilometers distant).
- 3. Intermediate wave 16. Global shock (origin from 1,000 to 10,000 kilometers distant).
- 4. Surface wave 17. Very distant shock or teleseism (origin more than 10,000 kilometers distant).

THE REGISTRATION OF EARTHQUAKES

- 1. Types of waves 18. Local first wave, or first preliminary tremor (longitudinal).
- 2. Types of waves 19. First preliminary tremors which have penetrated the core of the earth.
- 3. Types of waves 20. Waves which are reflected at the earth's surface.
- 4. Types of waves 21. Waves which, at two or three preliminary tremors (transverse), have been reflected at the earth's surface.
- 5. Types of waves 22. Waves which have longitudinal or transverse oscillation or have been through reflection at the earth's surface.
- 6. Types of waves 23. Waves which are reflected at the earth's surface, having been longitudinal in the branches of the path and transverse at the branch.

In general a far over the latter reaching type of waves indicated reflection. (The subscript indicates the boundary at about 2900 km. exists between the core and the mantle shell which surrounds it. These

- 7. Types of waves 24. Waves which have penetrating the core, having been transverse before entering and after leaving the core, and longitudinal within the core.
- 8. Types of waves 25. Waves reflected at the core boundary into the core, reflected once at this boundary while within the core and again reflected out of the core, having remained longitudinal in all branches of the path.

- 9. Types of waves 26. Long waves of surface phase preceding B.
- 10. Types of waves 27. Surface and core similar waves of large amplitude in the surface zone.
- 11. Types of waves 28. Waves similar to the surface waves, but of small period.
- 12. Types of waves 29. Waves of discernible movement.

- 13. Types of waves 30. The local earthquake a special condition is used.
- 14. Types of waves 31. The longitudinal wave which has traveled the whole path in the outside layer or part of the earth.
- 15. Types of waves 32. The transverse wave which has traveled the whole path in the surface layer of the earth.
- 16. Types of waves 33. The longitudinal wave which has traveled the horizontal portion of the path in the transverse layer.
- 17. Types of waves 34. The corresponding transverse wave.

## SYMBOLS AND NOTATIONS EMPLOYED

 1. Character of the Earthquake--

	I. Perceptible.	II. Moderately strong.	III. Strong.
d (terrae motus domesticus)	Local shock (origin less than 100 kilometers distant).		
v (terrae motus vicinus)	Near shock (origin from 100 to 1,000 kilometers distant).		
r (terrae motus remotus)	Distant shock (origin from 1,000 to 5,000 kilometers distant).		
u (terrae motus ultimus)	Very distant shock or teleseism (origin more than 5,000 kilometers distant).		

 2. Phases of the Seismogram--

P (undae primae)	Normal first phase, or first preliminary tremors (longitudinal).
P <sup>*</sup>	First preliminary tremors which have penetrated the core of the earth.
PR <sub>n</sub>	Waves n times reflected at the earth's surface.
S (undae secundae)	Second phase, or second preliminary tremors (transverse).
SR <sub>n</sub>	Waves n times reflected at the earth's surface.
PS	Waves changed from longitudinal to transverse oscillation or vice versa through reflection at the earth's surface.
PPS	Waves twice reflected at the earth's surface, having been longitudinal on two branches of the path and transverse on one branch.

In general a bar over two letters denoting types of waves indicates refraction. The subscript <sub>c</sub> denotes the boundary at about 2900 km. depth between the core and the middle shell which surrounds it. Thus:

$\overline{S_c P_c S}$	Waves which have penetrated the core, having been transverse before entering and after leaving the core, and longitudinal within the core.
$\overline{P_c P_c} \overline{P_c P}$	Waves refracted at the core boundary into the core, reflected once at this boundary while within the core and again refracted out of the core, having remained longitudinal on all branches of the path.
L (undae longae)	Long waves of surface phase preceding M.
M (undae maximae)	Shorter and more regular waves of large amplitude in the surface phase.
M <sub>n</sub>	Greatest motion in the surface phase.
C (coda)	Tail or end portion.
F (finis)	End of discernible movement.
For local earthquakes a special notation is used:	
$\overline{P}$	The longitudinal wave which has traveled its whole path in the surface layer or crust of the earth.
$\overline{S}$	The transverse wave which has traveled its whole path in the surface layer of the earth.
P*	The longitudinal wave which has traveled the horizontal portion of its path in the intermediate layer.
S*	The corresponding transverse wave.



3. Nature of the Motion--

- i (impetus) Sudden beginning of the motion.
- e (emersio) Gradual beginning of the motion.
- T (period) Time of one complete oscillation.
- A Trace amplitude measured from the media line, + earth motion toward east, north, or zenith, - toward west, south, or nadir.
- A<sub>E</sub> E-W component of A.
- A<sub>N</sub> N-S component of A.
- A<sub>Z</sub> Vertical component of A.

4. Time--

- O (origin) Time of shock at point of origin.

*Note.--All observations are reduced to Universal Time.*

*Altitude.--All heights (2 1/2 feet) above mean sea level.*

CHARACTERISTICS OF THE SEISMOGRAMS

Station	Component	T	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	A <sub>1</sub> (cm)	A <sub>2</sub> (cm)
Barrage-Point 180 ft.	E	45	12	10	10	0.201	
	N	45	12	10	10	0.201	
	Z	45	4	4	4	0.201	
Barrage-Point 200 ft.	E	0.770	0.19	20			
	Z	0.200	0.17	16			
Barrage-Point 220 ft.	E	112	12	12.5	0.70	100	11.5
	N	120	12	12.5	0.65	100	11.5
	Z	120	12	12.5	0.61	100	11.5
Barrage-Point 240 ft.	E				Region not loc		
	Z				0.5		5

The location of the epicenter is indicated by a small square on the map. The station is located at Barrage-Point, 180 ft. above mean sea level.

## BERKELEY

 THE BERKELEY STATION, UNIVERSITY OF CALIFORNIA  
 BERKELEY, CALIFORNIA

## CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude:

$$\varphi = 37^{\circ} 52'.3 \text{ N. Lat.}$$

$$\lambda = 122^{\circ} 15'.6 \text{ W. from Greenwich.}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--85 meters (279 feet) above mean sea level.

## CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V		T <sub>0</sub>	ε	$\frac{r}{T_0^2}$	
		K	T			A <sub>1</sub> (cm)	l (cm)
Bosch-Omori 100 kg. ...	E	45	12	12	10		0.001
	N	45	12	12	10		0.001
Wiechert 80 kg. ....	Z	44	4	4	5		0.005
Wood-Anderson .....	E	3,000	0.9	0.9	15		
	N	3,000	0.9	0.9	15		
Galitzin .....	E	112	12	11.8	0.00	100	11.3
	N	122	12	12.4	0.03	100	11.2
	Z	109	12	11.9	0.01	130	14.9
Benioff .....	Z	V		Coupled Period		ε	
				0.7	5		

The letter G before a reading designates that the seismogram was from the Galitzin instrument; W, Wiechert; B, Bosch-Omori, A, Wood-Anderson; H, Benioff.



## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
1	Apr. 1	I	e	G 3 47					Trace
2	Apr. 1	I	eE	G 17 41 09					
			eZ	G 17 41 17					
			eN	G 17 41 19					
			eN	G 17 49 46					
			eE F	G 17 49 55 18 15					
3	Apr. 2	I	iE	G 5 50 45					
			iN	G 5 50 50					
			eZ	G 5 50 53					
			F	6 10					
4	Apr. 3	I	eE	G 4 18 11					
			eE	G 4 35 18					
			eZ	G 4 39 26					
			eN	G 4 49 38					
			F	5 30					
5	Apr. 5	Iu	iPZ	G 7 10 26					
			iE	G 7 10 30					
			iZ	G 7 14 36					
			eE	G 7 14 39					
			eE	G 7 21 05					
			eSEN	B 7 23 36					
			iSE	G 7 23 37					
			iSZ	G 7 23 40					
			eSN	G 7 23 42					
			F	10 00					
6	Apr. 10	Id	iPZ	H 7 47 44.2					See discussion, p. 51
			iSZ	H 7 47 45.3					
			iSEN	A 7 47 45.3					
			F	7 48.5					
7	Apr. 10	Id	iPZ	H 10 20 01.3					See discussion, p. 51
			iSZ	H 10 20 02.4					
			iSEN	A 10 20 02.4					
			F	10 20.5					
8	Apr. 12	Id	iPZ	H 1 19 56.0					See discussion, p. 51
			iSZ	H 1 20 08.2					
			eSE	A 1 20 08.2					
			F	1 21					

## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub> mm.	A <sub>N</sub> mm.	A <sub>Z</sub> mm.	
	1937			h. m. s.	s.				
9	Apr. 15	Id	iPz eSE eSN eSz iSz F	H A A H H F	4 59 54.5 4 59 57.1 4 59 57.3 4 59 57.6 4 59 57.9 5 00.5				See discussion, p. 51
10	Apr. 16	Iu	ePz ePE iPz ePN ePEN ePz iPEN iPz iPE iPz iz ez eSEN eSEN eSz eSz eEN ez iEN F	H G G G B W A H B W G W B A G H G W B F	3 12 57 3 12 57 3 12 58 3 12 58 3 12 59 3 12 59 3 12 59 3 13 00 3 13 01 3 13 01 3 14 26 3 14 33 3 22 21 3 22 26 3 22 28 3 22 28 3 22 33 3 22 41 3 22 44 6 00				J.S.A. epicenter: 2292 S, 17990 E  Felt in Northern California from Los Angeles to Reno
11	Apr. 17	Id	iPz eSEN iSz F	H A H F	6 54 04.9 6 54 07.4 6 54 07.6 6 54.5				See discussion, p. 51
12	Apr. 17	Id	iPz eE eSz iSz eSN F	H A H H A F	23 50 26.4 23 50 28.2 23 50 29.0 23 50 29.2 23 50 29.2 23 51				See discussion, p. 51  Trace of distant shock
13	Apr. 21	Id	ePN iPz eSE iSz F	A H A H F	0 56 16.1 0 56 16.2 0 56 17.1 0 56 17.2 0 57				See discussion, p. 51  Trace of distant shock  Felt in next shock



## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks				
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>					
1937						mm.	mm.	mm.					
				h. m. s.	s.								
14	Apr. 21	Id	iPZ	H	7 26 27.2				See discussion, p. 51				
			iPN	A	7 26 27.2								
			ePE	A	7 26 27.6								
			iSZ	H	7 26 30.4								
			iSN	A	7 26 30.5								
			iSE	A	7 26 30.6								
			F		7 28								
15	Apr. 22	Iv	ePE	A	9 47 53.9				See discussion, p. 51				
			iPZ	H	9 47 54.0								
			ePN	A	9 47 54.4								
			eSE	A	9 48 38.7								
			iSZ	H	9 48 39.9								
			iSN	A	9 48 40.0								
			F		9 49.5								
16	Apr. 25	Iv	iPZ	H	4 28 46				Felt in Western Nevada from Lovelock to Mina				
			eEN	A	4 28 51								
			iZ	H	4 28 51								
			iZ	G	4 28 52								
			eE	G	4 28 53								
			eN	G	4 29 21								
			eN	B	4 29 23								
			eZ	W	4 29 23								
			eN	A	4 29 24								
			iN	A	4 29 25								
			eSN	B	4 29 34								
			eSE	A	4 29 34								
			eE	B	4 29 36								
			iSN	G	4 29 36								
			iSN	A	4 29 36								
			iSEZ	G	4 29 37								
			eSZ	W	4 29 37								
			F		4 45								
			17	Apr. 25	I	eN	G	10 37 31					Trace of distant shock
						eE	G	10 38 21					
eZ	G	10 39 26											
F		11 00											
18	Apr. 28	Id	iPZ	H	13 03 25.0				See discussion, p. 52				
			F		13 04								
19	Apr. 29	I	eE	G	18 41 11				Trace of distant shock F lost in next shock				
			eN	G	18 41 21								
			eZ	G	18 44 26								

## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks	
						A <sub>E</sub> mm.	A <sub>N</sub> mm.	A <sub>Z</sub> mm.		
	1937			h. m. s.	s.					
20	Apr. 29	Ir	ePZ	H	18 58 56	5			-2.3	U.S.C.&G.S. epicenter: 53° N, 161° W
			ePN	A	18 58 57					
			iPZ	G	18 58 57					
			ePZ	W	18 58 59					
			eN	B	18 59 01					
			eE	A	18 59 04					
			eZ	H	18 59 08					
			eE	B	18 59 11					
			eN	G	18 59 11					
			eE	G	18 59 15					
			eSN	A	19 04 01					
			eSE	A	19 04 03					
			eSN	B	19 04 03					
			iSE	G	19 04 08					
			iSZ	G	19 04 09					
			eSE	B	19 04 09					
			eZ	W	19 04 21					F lost in next shock
21	Apr. 29	I	iN	G	20 29 19					
			iE	G	20 29 21					
			iZ	G	20 29 32					
			eE	A	20 29 32					
			eZ	H	20 29 32					
			eN	A	20 29 33					
			F		22 34					
22	Apr. 29	Id	ePE	A	22 32 28.1					See discussion, p. 52
			iPN	A	22 32 28.1					
			iPZ	H	22 32 28.6					
			iSZ	G	22 32 37					
			eSN	A	22 32 37.3					
			iSN	A	22 32 38.5					
			eE	A	22 32 39					
			eZ	H	22 32 39.8					
			iN	G	22 32 40					
F		22 41								
23	May 1	I	e	G	15 35.5					Trace of distant shock
			F		16 00					
24	May 4	Ir	eE	A	5 14 54					U.S.C.&G.S. epicenter: 59°5 N, 154° W
			eS	G	5 19.5					
			eSE	A	5 19 38					
			eZ	H	5 19 45					
			F		7 00					



## BERKELEY

No.	Date	Char-actor	Phase	Time U.T.	Period s.	Amplitude			Remarks
						A <sub>E</sub> mm.	A <sub>N</sub> mm.	A <sub>Z</sub> mm.	
	1937			h. m. s.					
25	May 6	Iv	ePz	H	14 47 43.5				See discussion, p. 52
			iPz	H	14 47 44.2				
			iP <sub>EN</sub>	A	14 47 44.2				
			eE	G	14 47 40				
			eN	G	14 47 59				
			eN	A	14 48 03.7				
			iN	A	14 48 34.7				
			eE F	A	14 48 37.7				
			F		15 08				
26	May 7	Id	eP <sub>E</sub>	A	1 34 01.4				See discussion, p. 52
			iPz	H	1 34 01.7				
			eN	A	1 34 03.2				
			iS <sub>N</sub>	A	1 34 07.3				
			eE F	A	1 34 12.4				
			F		1 35.5				
27	May 7	I	eE	G	14 22 30				Trace of distant shock
			eN	G	14 22 31				
			F		15 30				
28	May 9	I	iE	G	15 05 47				
			eN	G	15 05 48				
			iN	G	15 13 21				
			F		17 00				
29	May 12	I	eZ	H	2 58 11				
			e <sub>EN</sub>	A	2 58 11				
			F		3 02				
30	May 13	I	e	G	8 33 26				Trace of distant shock
			F		8 50				
31	May 14	Id	iP*Z	H	21 36 43.3				See discussion, p. 52 F lost in next shock
			eS* <sub>EN</sub>	A	21 36 53.6				
32	May 14	Id	iP*Z	H	21 37 11.8				See discussion, p. 52
			eS* <sub>EN</sub>	A	21 37 21.5				
			eS*Z	H	21 37 21.6				
			F		21 38.5				
33	May 16	I	iP <sub>E</sub>	G	12 01 38	12	-1.8		
			eP <sub>N</sub>	G	12 01 41				
			iN	G	12 01 47				
			eZ	G	12 02 11				
			eN	G	12 12 13				
			eE	G	12 12 14				
			eN	G	12 14 57				
			iE	G	12 14 57				
			F		14 00				

## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period s.	Amplitude			Remarks
						A <sub>E</sub> mm.	A <sub>N</sub> mm.	A <sub>Z</sub> mm.	
	1937			h. m. s.	s.	mm.	mm.	mm.	
34	May 19	I	eEN F	G 19 07 59 19 13					
35	May 21	I	e F	G 2 34 3 15					Trace
36	May 21	Iu	ePZ ePEN iPNZ iPE iSN eSE F	H 13 21 40 A 13 21 40 G 13 21 41 G 13 21 42 G 13 29 13 G 13 29 17 14 00					U.S.C.&G.S. epicenter: 2°5 N, 78°7 W
37	May 25	I	eE iz eN F	A 5 36 05.5 H 5 36 23.5 A 5 36 54.5 5 41					
38	May 26	Iv	ePZ iPZ iPN ePE iSZ eSEN iz iEN F	H 2 11 48.7 H 2 11 49.1 A 2 11 49.3 A 2 11 49.3 H 2 12 03.3 A 2 12 03.3 H 2 12 05.3 A 2 12 05.3 2 14					See discussion, p. 53
39	May 27	Iv	iPZ iSZ eSE iz F	H 8 37 35.9 H 8 38 17.0 A 8 38 17.2 H 8 38 18.7 8 40.5					See discussion, p. 53
40	May 28	I	e F	G 9 28 10 00					Trace
41	May 28	I	iPN iPE eE iN iE F	G 15 48 26 G 15 48 28 G 15 51 53 G 15 53 30 G 15 55 31 16 20	3		+4.8		
42	May 28	I	ePZ iPZ ePEN eZ	G 20 07 21 H 20 07 21 A 20 07 21 H 20 09 16					



## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub> mm.	A <sub>N</sub> mm.	A <sub>Z</sub> mm.	
	1937			h. m. s.	s.				
42	May 28 (Contd)	I	eN iz eE eN iE eN iEZ iN F	A 20 09 16 G 20 09 16 G 20 09 27 A 20 14 44 G 20 15 52 A 20 16 35 G 20 16 37 G 20 16 38 21 00					
43	May 31	Iv	ePN eS*EN F	A 15 33 53 A 15 34 09 15 35.5				See discussion, p. 53	
44	May 31	I	iPZ eN eE eE F	G 15 45 38 G 15 54 03 G 15 54 27 G 16 11 29 17 15					
45	May 31	I	ePE iPNZ iEZ iN F	G 21 09 17 G 21 09 18 G 21 16 39 G 21 16 40 23 00					
46	June 2	Ir	ePN iPZ ePE eSE eSN iz ez F	G 21 08 59 G 21 09 00 G 21 09 01 G 21 13 13 G 21 13 14 G 21 13 42 G 21 16 49 22 20					
47	June 3	I	e F	G 0 40 1 30				Trace of distant shock	
48	June 5	Iv	ePZ ePN iPZ eE eN eZ F	H 9 39 25.3 A 9 39 25.5 H 9 39 25.5 A 9 39 42.5 A 9 39 43.3 H 9 39 44.5 9 41				See discussion, p. 53	
49	June 5	I	e F	G 15 09 42 15 30				Trace of distant shock	





## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub> mm.	A <sub>N</sub> mm.	A <sub>Z</sub> mm.	
	1937			h. m. s.	s.				
55	June 12	Id	eP <sub>Z</sub> eS <sub>Z</sub> iS <sub>N</sub> F	H 15 07 30.0 H 15 07 32.7 A 15 07 34.7 15 08.5					See discussion, p. 54
56	June 12	Id	e <sub>N</sub> e <sub>Z</sub> e <sub>N</sub> F	A 16 58 01 H 16 58 04 A 16 58 15 17 09					See discussion, p. 54
57	June 13	Id	iP <sub>Z</sub> iS <sub>Z</sub> iS <sub>N</sub> F	H 3 15 42.1 H 3 15 49.4 A 3 15 49.5 3 16.4					See discussion, p. 54
58	June 13	Id	iP <sub>Z</sub> eS <sub>Z</sub> iS <sub>N</sub> i <sub>Z</sub> F	H 3 16 38.9 H 3 16 45.5 A 3 16 45.7 H 3 16 46.5 3 17.5					See discussion, p. 54
59	June 13	Id	eS <sub>Z</sub> eS <sub>N</sub> F	H 14 32 36 A 14 32 37 14 33					See discussion, p. 54
60	June 13-14	I	e <sub>Z</sub> e <sub>EN</sub> e <sub>E</sub> i <sub>N</sub> e <sub>Z</sub> e <sub>E</sub> e <sub>N</sub> e <sub>E</sub> e <sub>N</sub> F	G 23 29 57 G 23 30 09 G 23 35 13 G 23 35 14 G 23 35 50 G 23 39 05 A 23 39 44 A 23 40 42 A 23 40 43 0 45					
61	June 14	Id	e <sub>Z</sub> eS <sub>EN</sub> eS <sub>Z</sub> F	H 0 15 09 A 0 15 18 H 0 15 19 0 16.5					See discussion, p. 54
62	June 14	I	e <sub>N</sub> e <sub>EN</sub> F	G 13 01.0 G 13 06.5 14 45					Trace of distant shock

## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
65	June 17	Id	iPz	H	4 29 05.0				See discussion, p. 54
			iz	H	4 29 08.3				
			iSN	A	4 29 09.4				
			iSZ	H	4 29 09.5				
			iSE	A	4 29 09.7				
			F		4 30				
64	June 18	Iv	ePz	H	9 08 23				See discussion, p. 54
			ez	G	9 08 26				
			ie	G	9 08 27				
			ez	W	9 08 31				
			eN	B	9 08 43				
			eE	G	9 09 06				
			eN	A	9 09 07				
			eN	G	9 09 09				
			ez	G	9 09 11				
			eSN	A	9 09 12				
			eSE	A	9 09 13				
			iN	G	9 09 16				
			eN	A	9 09 18				
			eN	B	9 09 24				
			iN	B	9 09 27				
			F		9 23				
65	June 19	I	eEN	A	17 18 55.0				
			iz	H	17 18 55.5				
			F		17 26				
66	June 21	Iu	ePN	B	15 23 11				U.S.C.&G.S. epicenter: 7°8 S, 80°0 W
			ePz	H	15 23 12				
			ePN	A	15 23 13				
			ePE	A	15 23 13				
			iPN	G	15 23 13	6		+5.5	
			ePz	W	15 23 13				
			iPE	G	15 23 14	8		-8.5	
			iPz	G	15 23 14	4		+9.5	
			iPz	H	15 23 14				
			eSEN	A	15 31 30				
			eSN	B	15 31 32				
			eSE	B	15 31 33				
			iSEN	G	15 31 33	12		-23.5 +26	
						eLN	A	15 35 38	
			eP'P'E	A	15 52 42				
			eP'P'Z	H	15 52 42				
			eP'P'N	A	15 52 44				
			F		19 30				
67	June 23	I	e	G	1 03				Trace
			F		1 17				



## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
						mm.	mm.	mm.	
	1937			h. m. s.	s.				
68	June 23	I	e F	G G	7 34 21 8 16				Trace of distant shock
69	June 24	I	iEN eZ eN F	G G G	4 35 34 4 35 37 4 37 49 4 55				
70	June 24	I	iPZ ePE eN iEZ iN iE iN F	G G G G G G G	13 20 01 13 20 02 13 20 07 13 21 54 13 21 55 13 28 40 13 28 46 14 50				U.S.C.&G.S. epicenter: 8° N, 84° W
71	June 24	I	eN iE eEN F	G G G	20 10 52 20 11 00 20 34 55 21 30				Trace of distant shock
72	June 27	Iv	eN eE eN eN eE F	A A A A A	4 27 35 4 27 36 4 27 47 4 28 17 4 28 21 4 30				See discussion, p. 55
73	June 28	I	eE eN eEN F	G G G	19 43 11 19 43 24 19 51.5 20 40				Trace of distant shock
74	June 30	I	eE eN eE iE iN F	G G G G G	18 19 00 18 19 01 18 40 58 18 41 03 18 41 07 19 20				

MOUNT HAMILTON

THE LICK OBSERVATORY STATION, UNIVERSITY OF CALIFORNIA  
MOUNT HAMILTON, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned} \phi &= 37^{\circ} 20'.4 \text{ N.} \\ \lambda &= 121^{\circ} 38'.6 \text{ W.} \end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--1281.7 meters (4205 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Apr. 12	Id	iP <sub>E</sub>	1 19 42.8	See discussion, p. 51
			iP <sub>N</sub>	1 19 43.3	
			F	1 21	
2	Apr. 15	Id	iP <sub>N</sub>	3 44 21.5	See discussion, p. 51
			iS <sub>N</sub>	3 44 22.6	
			F	3 45	
3	Apr. 16	Iu	eP <sub>EN</sub>	3 12 57.4	J.S.A. epicenter: 22°2 S, 179°0 E
			iP <sub>E</sub>	3 13 00.1	
			iP <sub>N</sub>	3 13 00.4	
			i <sub>N</sub>	3 13 05.8	
			i <sub>E</sub>	3 13 06.0	
			eS <sub>N</sub>	3 22 21.4	
			eS <sub>E</sub>	3 22 23.4	
			i <sub>E</sub>	3 22 42.6	
			i <sub>N</sub>	3 22 43.3	
F	4 30				
4	Apr. 21	Id	eP <sub>N</sub>	7 26 36.0	See discussion, p. 51
			eS <sub>EN</sub>	7 26 42.2	
			F	7 27	
5	Apr. 22	Iv	eP <sub>N</sub>	9 48 06	See discussion, p. 51
			eS <sub>EN</sub>	9 48 59	
			F	9 51	
6	Apr. 24	Id	eP <sub>N</sub>	22 40 43.0	See discussion, p. 52
			eS <sub>N</sub>	22 40 44.5	
			e <sub>E</sub>	22 40 45.0	
			F	22 41	
7	Apr. 25	Iv	eP <sub>N</sub>	4 28 44.1	Felt in Western Nevada from Lovelock to Mina
			e <sub>E</sub>	4 28 47.1	
			e <sub>N</sub>	4 29 25.8	
			iS <sup>?</sup> <sub>E</sub>	4 29 31.3	
			i <sub>N</sub>	4 29 33.2	
F	4 34				
8	Apr. 28	Id	eP <sub>N</sub>	13 03 32	See discussion, p. 52
			eS <sub>N</sub>	13 03 43	
			F	13 04.5	
9	Apr. 29	Ir	eP <sub>EN</sub>	18 59 04	U.S.C.&G.S. epicenter: 53° N, 161°W
			eS <sub>EN</sub>	19 04 19	
			F	20 18	
10	Apr. 29	I	eP <sub>E</sub>	20 29 36.7	
			eP <sub>N</sub>	20 29 37.7	
			F	20 31.5	

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
				h. m. s.	
	1937				
11	Apr. 29	IId	iPEN F	22 32 18.3 22 35.5	See discussion, p. 52
12	May 6	Iv	eN eE F	14 47 53.6 14 47 53.7 14 54	See discussion, p. 52
13	May 8	Id	iPE iPN eSE iSN F	20 21 13.2 20 21 13.5 20 21 14.9 20 21 15.0 20 22	See discussion, p. 52
14	May 11	Id	ePN ePE eSEN F	2 44 07.9 2 44 08.0 2 44 19.4 2 46	See discussion, p. 52
15	May 12	I	eN eE F	2 58 09 2 58 12 3 01.5	
16	May 12	I	eN F	3 14 37 3 16.5	
17	May 14	Id	ePEN	21 36 36	See discussion, p. 52 Readings from Wiechert Instruments F lost in next shock
18	May 14	Id	ePN ePE F	21 37 04 21 37 05 21 37.5	See discussion, p. 52 Readings from Wiechert Instruments
19	May 21	Id	iPEN eSE iSN F	1 10 11.1 1 10 16.3 1 10 16.4 1 11	See discussion, p. 52
20	May 21	Iu	eE eN iN F	13 21 34 13 21 35 13 21 38 13 25	U.S.C. & G.S. epicenter: 2°5 N, 78°7 W
21	May 25	I	eN eE iN F	5 36 35 5 37 30 5 37 30 5 38	



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
22	May 26	Id	iPN	2 11 37.1	See discussion, p. 53
			iPE	2 11 37.2	
			iSEN	2 11 43.2	
			F	2 13.5	
23	May 27	Id	ePN	15 26 09.8	See discussion, p. 53
			eSE	15 26 11.5	
			iSN	15 26 11.5	
			F	15 26.5	
24	May 28	Iu	iPEN	20 07 23	
			eEN	20 09 18	
			eE	20 16 37	
			eN	20 16 42	
			F	20 20	
25	May 29	Id	iPN	0 11 54.2	See discussion, p. 53
			iPE	0 11 54.4	
			iSEN	0 11 57.0	
			F	0 12.5	
26	May 29	Id	iPEN	1 05 09.9	See discussion, p. 53
			iSE	1 05 11.2	
			iSN	1 05 11.6	
			F	1 05.5	
27	May 29	Iv	ePN	15 51 17	See discussion, p. 53
			eE	15 51 19	
			eSE	15 51 35	
			eE	15 51 38	
			eE	15 51 41	
			iN	15 51 46	
			F	15 52.5	
28	May 31	Id	ePN	15 33 39	See discussion, p. 53
			eSE	15 33 52	
			eSN	15 33 53	
			eE	15 33 54	
			iSN	15 33 56	
			F	15 36	
29	June 5	Id	ePN	9 39 13.3	See discussion, p. 53
			iPE	9 39 13.7	
			iPN	9 39 13.9	
			iE	9 39 18.1	
			eSN	9 39 24.8	
			iSE	9 39 24.8	
			F	9 42	

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
30	June 5	Id	eP <sub>N</sub>	19 29 03.7	See discussion, p. 53
			iS <sub>N</sub>	19 29 14.9	
			eS <sub>E</sub>	19 29 15.0	
			F	19 31	
31	June 6	Id	eP <sub>N</sub>	6 34 00.4	See discussion, p. 53
			eS <sub>EN</sub>	6 34 09.4	
			e <sub>E</sub>	6 34 10.3	
			e <sub>N</sub>	6 34 10.4	
			F	6 34.5	
32	June 8	Ir	eP <sub>N</sub>	22 36 07	U.S.C. & G.S. epicenter: 16°2 N, 92°4 W
			eP <sub>E</sub>	22 36 08	
			eP <sub>R</sub> LEN	22 36 42	
			eS <sub>EN</sub>	22 41 15	
			F	23 15	
33	June 12	Iv	e <sub>N</sub>	16 57 56	See discussion, p. 54
			e <sub>EN</sub>	16 58 23	
			F	17 00	
34	June 13	Iv	eS <sub>EN</sub>	3 16 13.2	See discussion, p. 54
			F	3 17	
35	June 13	Id	iS <sub>EN</sub>	14 32 25.2	See discussion, p. 54
			F	14 32.5	
36	June 13	Id	eP <sub>EN</sub>	17 00 34.0	See discussion, p. 54
			eS <sub>E</sub>	17 00 43.5	
			iS <sub>N</sub>	17 00 43.6	
			iS <sub>N</sub>	17 00 44.4	
			iS <sub>E</sub>	17 00 45.0	
			F	17 01.5	
37	June 13	I	eP <sub>E</sub>	23 30 04	See discussion, p. 54
			e <sub>E</sub>	23 31 03	
			e <sub>E</sub>	23 39 58	
			e <sub>E</sub>	23 42 31	
			F	23 57	
38	June 14	Id	iP <sub>E</sub>	0 14 58.1	See discussion, p. 54
			iS <sub>E</sub>	0 15 00.0	
			F	0 16	
39	June 14	Id	iP <sub>E</sub>	0 29 24.0	See discussion, p. 54
			iS <sub>E</sub>	0 29 25.9	
			F	0 30	



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
				h.	m.	s.	
	1937						
40	June 17	Iv	eS*N eN iEN F	4 29 13.7 4 29 24.2 4 29 24.9 4 30			See discussion, p. 54
41	June 18	Iv	ePN eE iSE iE iN iN F	9 08 26.9 9 08 30.1 9 09 13.6 9 09 19.6 9 09 22.5 9 09 27.6 9 19			See discussion, p. 54
42	June 19	I	eN eE F	17 18 54.6 17 18 55.1 18 08			
43	June 21	Iu	ePEN eSN eSE eP'P'EN F	15 23 08.5 15 31 17 15 31 19 15 52 43 16 45			U.S.C. & G.S. epicenter: 7°8 S, 80°0 W
44	June 24	Iu	ePEN eE eN F	13 19 57.1 13 21 49.4 13 21 50.1 13 26			U.S.C. & G.S. epicenter: 8° N, 84° W
45	June 24	I	eEN F	15 07 22 15 09			
46	June 27	Iv	ePEN eSEN F	4 27 23 4 28 01 4 30.5			See discussion, p. 55
47	June 28	Id	ePN eSN eSE iSN F	16 43 33.5 16 43 34.6 16 43 35.0 16 43 35.0 16 44			See discussion, p. 55
48	June 28	Iv	ePE ePN eEN eN eE F	23 20 59.8 23 21 01.7 23 21 31.3 23 21 33.6 23 21 33.8 23 22.5			See discussion, p. 55

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time		Remarks
				U.T.	h. m. s.	
	1937					
49	June 30	Iv	e <sub>FE</sub>	6 13	30.6	
			e <sub>FN</sub>	6 13	31.6	
			e <sub>SN</sub>	6 14	08.6	
			i <sub>SN</sub>	6 14	09.4	
			F	6 16		
50	June 30	I	e <sub>N</sub>	6 39	52	
			e <sub>N</sub>	6 40	27	
			F	6 41		



PALO ALTO

THE BRANNER STATION, STANFORD UNIVERSITY  
 PALO ALTO, CALIFORNIA



CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude of the seismographic station:

$\phi = 37^{\circ} 25'$  N Lat.  
 $\lambda = 122^{\circ} 11'$  W from Greenwich

Time.--All determinations are reduced to Universal Time.

Altitude.-- 83 meters (272 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	$T_0$	e
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Apr. 5	Id	ePE	22 54 10.0	See discussion, p. 51
			ePN	22 54 10.1	
			eSN	22 54 12.3	
			eSE	22 54 12.4	
			eEN F	22 54 15.3 22 55	
2	Apr. 8	Id	ePE	0 31 10.4	See discussion, p. 51
			eN	0 31 10.9	
			iSE	0 31 12.4	
			F	0 31.5	
3	Apr. 12	Id	ePEN	1 19 51	See discussion, p. 51
			F	1 21	
4	Apr. 15	Id	iPEN	19 39 44.7	See discussion, p. 51
			iSEN	19 39 46.9	
			F	19 40.5	
5	Apr. 16	Iu	ePEN	3 12 59.2	J.S.A. epicenter: 22°2 S, 179°0 E
			iPEN	3 12 01.3	
			eSEN	3 22 24.9	
			iE	3 22 37.7	
			iN F	3 22 38.4 4 15	
6	Apr. 21	Id	ePE	7 26 32.5	See discussion, p. 51
			iSE	7 26 35.5	
			iN	7 26 36.2	
			F	7 28	
7	Apr. 22	Iv	ePEN	9 48 00.3	See discussion, p. 51
			eSE	9 48 48.5	
			eSN	9 48 49.8	
			F	9 51	
8	Apr. 22	Id	ePN	22 00 05.4	See discussion, p. 51
			iPE	22 00 05.6	
			iSEN	22 00 07.8	
			F	22 01	
9	Apr. 25	Id	ePE	1 50 58.7	See discussion, p. 52
			ePN	1 50 59.1	
			iE	1 51 00.3	
			iN	1 51 01.7	
			F	1 52	



## PALO ALTO

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
	1937			h.	m.	s.	
10	Apr. 25	Iv	ePEN iN eSE iSEN F	4 28 4 29 4 29 4 29 4 36	53.5 27.3 39.5 42.7 36	Felt in Western Nevada from Lovelock to Mina	
11	Apr. 28	Id	ePE iPE iPN iSN eN eE F	13 03 13 03 13 03 13 03 13 03 13 03 13 04	23.1 24.4 24.8 31.1 33.4 33.6 34	See discussion, p. 52	
12	Apr. 29	Ir	ePE ePN iE eSE eSN F	18 59 18 59 18 59 19 04 19 04 19 32	04 07 10 13 16 32	U.S.C. & G.S. epicenter: 53° N, 161° W	
13	Apr. 29	I	ePE iPE ePN iPN F	20 29 20 29 20 29 20 29 20 31	34.7 35.3 35.3 36.3 31	See discussion, p. 52	
14	Apr. 29	Id	iPE iPN eSN F	22 32 22 32 22 32 22 36	23.2 23.3 28.8 36	See discussion, p. 52	
15	May 5	Id	iPE ePN iSEN iN F	2 58 2 58 2 58 2 58 2 59.5	36.5 36.9 38.0 38.9 5	See discussion, p. 52	
16	May 6	Iv	ePEN iPE iE eN F	14 47 14 47 14 48 14 48 14 54	49.0 50.0 43.0 43.0 54	See discussion, p. 52	
17	May 9	Id	iPE iPN iSE F	17 59 17 59 17 59 18 00	16.6 16.8 18.2 00	See discussion, p. 52	

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
18	May 11	Id	eP <sub>EN</sub>	2 44 13.0	See discussion, p. 52
			iS <sub>E</sub>	2 44 29.0	
			F	2 45.4	
19	May 13	Id	eP <sub>EN</sub>	21 46 15.5	See discussion, p. 52
			iP <sub>N</sub>	21 46 15.8	
			iS <sub>N</sub>	21 46 16.7	
			F	21 47	
20	May 14	Id	eP <sub>E</sub>	21 36 36.1	See discussion, p. 52
			eP <sub>N</sub>	21 36 37.8	
			iS <sub>E</sub>	21 36 42.1	
			i <sub>N</sub>	21 36 46.1	
			F	21 37	
21	May 14	Id	iP <sub>N</sub>	21 37 05.9	See discussion, p. 52
			iP <sub>E</sub>	21 37 06.1	
			iS <sub>E</sub>	21 37 10.0	
			i <sub>N</sub>	21 37 14.4	
			F	21 38.5	
22	May 15	Id	iP <sub>EN</sub>	18 44 47.4	See discussion, p. 52
			iS <sub>N</sub>	18 44 49.5	
			F	18 46	
23	May 21	Id	eP <sub>E</sub>	1 10 18.1	See discussion, p. 52
			e <sub>N</sub>	1 10 27.6	
			iS <sub>E</sub>	1 10 38.6	
			F	1 11	
24	May 21	Iu	eP <sub>EN</sub>	13 21 39.8	U.S.C. & G.S. epicenter: 2°5 N, 78°7 W
			F	13 23	
25	May 22	Id	iP <sub>E</sub>	23 07 57.6	See discussion, p. 53
			iP <sub>N</sub>	23 07 57.7	
			iS <sub>E</sub>	23 07 59.9	
			iS <sub>N</sub>	23 08 00.0	
			F	23 09	
26	May 25	I	e <sub>E</sub>	5 36 49	
			e <sub>N</sub>	5 37 36	
			F	5 41	
27	May 26	Id	eP <sub>E</sub>	2 11 42.3	See discussion, p. 53
			eP <sub>N</sub>	2 11 42.5	
			iP <sub>E</sub>	2 11 43.1	
			iS <sub>E</sub>	2 11 52.1	
			iS <sub>N</sub>	2 11 52.8	
			F	2 14	



## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
28	May 28	I	iP <sub>EN</sub> F	20 07 23	
				20 12	
29	May 29	Id	iP <sub>N</sub> iS <sub>N</sub> iE <sub>F</sub> F	0 12 01.4	See discussion, p. 53
				0 12 02.5	
				0 12 03.1	
				0 12.5	
30	May 29	Iv	eP <sub>EN</sub> e <sub>EN</sub> e <sub>N</sub> e <sub>E</sub> e <sub>EN</sub> e <sub>EN</sub> F	15 51 23	See discussion, p. 53
				15 51 28	
				15 51 43	
				15 51 47	
				15 51 54	
				15 51 57	
				15 54	
31	May 31	Iv	eP <sub>E</sub> e <sub>N</sub> iS <sub>E</sub> eS <sub>N</sub> F	15 33 43.3	See discussion, p. 53
				15 33 51.8	
				15 34 02.3	
				15 34 06.3	
				15 35	
32	June 2	Id	iP <sub>E</sub> iE <sub>E</sub> iS <sub>E</sub> iE <sub>F</sub> F	15 08 21.8	See discussion, p. 53
				15 08 23.4	
				15 08 24.4	
				15 08 26.2	
				15 09	
33	June 5	Iv	eP <sub>EN</sub> iE <sub>E</sub> eS <sub>N</sub> iS <sub>E</sub> F	9 39 17.9	See discussion, p. 53
				9 39 23.9	
				9 39 34.0	
				9 39 34.7	
				9 41	
34	June 5	Iv	eP <sub>EN</sub> iS <sub>N</sub> iS <sub>E</sub> F	19 29 08.6	See discussion, p. 53
				19 29 24.2	
				19 29 24.6	
				19 31.5	
35	June 6	Id	eP <sub>EN</sub> i <sub>N</sub> iS <sub>N</sub> iS <sub>E</sub> F	6 33 54.5	See discussion, p. 53
				6 33 56.0	
				6 33 58.8	
				6 33 58.9	
				6 34.5	
36	June 7	Id	iP <sub>E</sub> iS <sub>EN</sub> i <sub>N</sub> iE <sub>F</sub> F	18 51 13.4	See discussion, p. 53
				18 51 14.7	
				18 51 15.7	
				18 51 16.0	
				18 52	

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
37	June 8	Ir	ePE	22 36 11	U.S.C. & G.S. epicenter: 16°2 N, 92°4 W
			eN	22 36 16	
			eN	22 36 47	
			eSN	22 41 22	
			eSE	22 41 24	
			eN	22 46 15	
			eN F	22 46 16 23 00	
38	June 12	Iv	ePE	16 57 54.0	See discussion, p. 54
			eE	16 57 58.0	
			eE	16 58 01.0	
			eSE	16 58 29.5	
			F	16 59.5	
39	June 12	Id	iPE	19 23 57.4	See discussion, p. 54
			iPN	19 23 57.8	
			iN	19 23 59.1	
			iSN	19 23 59.9	
			F	19 24.5	
40	June 13	Id	ePN	3 15 49.1	See discussion, p. 54
			iPE	3 15 49.1	
			iSE	3 16 00.9	
			iN	3 16 02.3	
			F	3 16.5	
41	June 13	Id	ePE	3 16 47.1	See discussion, p. 54
			eSE	3 16 57.9	
			F	3 17.5	
42	June 13	Id	eP?E	14 32 22	See discussion, p. 54
			eS?EN	14 32 24	
			F	14 33	
43	June 13	Iv	ePE	17 00 40.0	See discussion, p. 54
			eN	17 00 43.0	
			iSE	17 00 52.9	
			iSN	17 00 53.0	
			iE	17 00 54.3	
			F	17 02	
44	June 13	I	eE	23 40 17	Trace
			eN	23 40.5	
			F	23 51	



## PALO ALTO

No.	Date	Char-acter	Phase	Time U.T.	Remarks
	1937			h. m. s.	
45	June 14	Id	iPE iPN iE iSEN iN iE F	0 15 03.2 0 15 03.8 0 15 06.0 0 15 08.5 0 15 13.4 0 15 13.6 0 16	See discussion, p. 54
46	June 14	Id	ePEN F	0 29 29.0 0 30	See discussion, p. 54
47	June 17	Id	ePE iPE iN iSN iSE F	4 29 07.2 4 29 08.2 4 29 09.3 4 29 12.8 4 29 13.1 4 30	See discussion, p. 54
48	June 18	Iv	eN eE iSEN iE F	9 08 32.2 9 08 32.7 9 09 24.4 9 09 25.5 9 17	See discussion, p. 54
49	June 19	I	eEN F	17 18 53 17 21	
50	June 21	Iu	ePE ePN eSE eSN eP'P'N eP'P'E F	15 23 12 15 23 13 15 31 25 15 31 26 15 52 58 15 53 00 16 17	U.S.C. & G.S. epicenter: 7°8 S, 80°0 W
51	June 26	Id	iPE iPN iSN F	20 13 57.8 20 13 58.2 20 14 00.3 20 15	See discussion, p. 55
52	June 27	I	ePE eN F	4 27 31 4 27 36 4 30	See discussion, p. 55
53	June 30	I	ePE eN F	6 13 38.1 6 13 47.1 6 16	

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
54	June 30	Id	eP <sub>E</sub>	12 54 53.0	See discussion, p. 55
			eP <sub>N</sub>	12 54 53.5	
			iS <sub>E</sub>	12 54 54.8	
			iS <sub>N</sub>	12 54 55.1	
			F	12 55.5	
55	June 30	Id	iP <sub>EN</sub>	20 17 43.0	See discussion, p. 55
			iS <sub>N</sub>	20 17 45.0	
			iS <sub>E</sub>	20 17 45.1	
			F	20 18.5	



SAN FRANCISCO

THE SAN FRANCISCO STATION, UNIVERSITY OF SAN FRANCISCO  
 SAN FRANCISCO, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude of the seismographic station:

$\phi = 37^{\circ} 46'$  N. Lat.

$\lambda = 122^{\circ} 27'$  W. from Greenwich

Time.--All determinations are reduced to Universal Time.

Altitude.-- 100 meters (328 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	$T_0$	$\epsilon$
Wood-Anderson .....	E $15^{\circ}$ S	1500	1	15
	N	3000	1	15

## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
				h.	m.	s.	
	1937						
1	Apr. 13	I	eN eE F	20	23	48.9 48.7 24	
2	Apr. 16	Iu	ePN ePE iPN eSN eSE eE iN F	3	12	57 00 01 19 24 39 40 15	J.S.A. epicenter: 22°2 S, 179°0 E
3	Apr. 21	Id	eSN eE iN eN F	7	26	33.1 33.5 35.1 37.5 27	See discussion, p. 51
4	Apr. 22	Iv	ePN iN eN eSE eSN iSN F	9	47	54.1 57.1 09.6 37.6 39.1 41.1 50	See discussion, p. 51
5	Apr. 25	Iv	ePEN eE eN iN F	4	28	56 40 41 43 33	Felt in Western Nevada from Lovelock to Mina
6	Apr. 28	Id	iPN eSE iSN iE iN F	13	03	22.3 25.8 25.8 26.2 26.3 04	See discussion, p. 52
7	Apr. 29	Ir	ePEN eSE eSN F	18	58	58 07 09 45	U.S.C. & G.S. epicenter: 53° N, 161° W
8	Apr. 29	I	eEN F	20	29	33 31	



## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks	
				U.T.		
	1937			h. m. s.		
9	Apr. 29	Id	iP <sub>EN</sub>	22 32 29.1	See discussion, p. 52	
			i <sub>N</sub>	22 32 37.0		
			i <sub>N</sub>	22 32 38.8		
			iS <sub>EN</sub>	22 32 39.3		
			F	22 34.5		
10	May 6	Iv	eP <sub>E</sub>	14 47 44	See discussion, p. 52	
			eP <sub>N</sub>	14 47 45		
			e <sub>N</sub>	14 48 32		
			F	14 54		
11	May 14	Id	e <sub>N</sub>	21 36 49.9	See discussion, p. 52	
			iS* <sub>E</sub>	21 36 53.1		
			e <sub>E</sub>	21 36 53.7		F lost in next shock
			i <sub>N</sub>	21 36 53.9		
12	May 14	Id	e <sub>N</sub>	21 37 18.7	Beginning in end of previous shock	
			eS* <sub>N</sub>	21 37 21.9		
			iS* <sub>N</sub>	21 37 22.2	See discussion, p. 52	
			F	21 38		
13	May 21	Iu	e <sub>E</sub>	13 21 39	U.S.C. & G.S. epicenter: 2 <sup>0</sup> .5 N, 78 <sup>0</sup> .7 W	
			e <sub>N</sub>	13 21 44		
			F	13 28		
14	May 25	I	e <sub>EN</sub>	5 37 36		
			F	5 40		
15	May 26	Iv	eP <sub>E</sub>	2 11 48.4	See discussion, p. 53	
			iP <sub>N</sub>	2 11 48.7		
			eS <sub>N</sub>	2 12 04.0		
			iS <sub>E</sub>	2 12 04.2		
			F	2 14		
16	June 5	Iv	eP <sub>N</sub>	9 39.4	S-P = 19 <sup>s</sup> .4	
			eS <sub>N</sub>	9 39.7		
			F	9 41		See discussion, p. 53
17	June 5	Iv	eP <sub>N</sub>	19 29.2	S-P = 20 <sup>s</sup> .4	
			eS <sub>N</sub>	19 29.5		
			F	19 30.5		See discussion, p. 53
18	June 7	I	e <sub>EN</sub>	10 25.5		
			i <sub>N</sub>	10 25.5		
			e <sub>N</sub>	10 25.6		
			F	10 26		

## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
19	June 8	Ir	eN	22 37 07	U.S.C. & G.S. epicenter: 16°2 N, 92°4 W
			eN	22 41 26	
			eN	22 46 15	
			F	23 00	
20	June 9	Iv	eN	21 05 04	See discussion, p. 54
			eE	21 05 15	
			F	21 08	
21	June 13	Id	eEN	3 15.8	See discussion, p. 54
			iN	3 15.8	
			F	3 16.5	
22	June 17	Id	iPN	4 29 08.8	See discussion, p. 54
			iPE	4 29 08.9	
			F	4 30	
23	June 18	Iv	ePN	9 08 30.2	See discussion, p. 54
			eN	9 09 17.0	
			eN	9 09 19.0	
			F	9 16	
24	June 19	I	eN	17 18 54	
			eE	17 18 59	
			F	17 19.5	
25	June 21	Iu	ePEN	15 23 14	U.S.C. & G.S. epicenter: 7°8 S, 80°0 W
			oSEN	15 31 32	
			F	16 45	
26	June 27	Iv	eE	4 32 06.0	See discussion, p. 55
			eN	4 32 10.0	
			F	4 34	



## FERNDALE

THE FERNDALE STATION  
FERNDALE, CALIFORNIA

## CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude of the center of the seismographic  
station:

$\phi = 40^{\circ} 34'$  N. Lat.

$\lambda = 124^{\circ} 16'$  W. from Greenwich

Time.--All determinations are reduced to Universal Time.

Altitude.-- 17 meters (55 feet) above mean sea level.

The seismographs are Bosch-Omori 25 km. horizontal pendulums.

They are oriented to record N-S and E-W motion. The station is  
operated by Mr. Joseph Bognuda, of Ferndale, in cooperation with the  
University of California.

## FERNDALE

No.	Date	Char-acter	Phase	Time		Remarks		
				U.T.				
				h.	m.	s.		
				1937				
1	Apr. 16	Iu	eP <sub>E</sub>	3	13	01	J.S.A. epicenter: 22°2 S, 179°0 E	
			eP <sub>N</sub>	3	13	05		
			iE	3	13	29		
			eS <sub>EN</sub>	3	22	26		
			iE	3	22	39		
			i <sub>N</sub> F	3 4	22 15	49		
2	Apr. 22	Iv	iP <sub>N</sub>	9	47	16	See discussion, p. 51	
			iP <sub>E</sub>	9	47	18		
			eS <sub>E</sub>	9	47	34		
			F	10	10			
3	Apr. 29	Ir	eP <sub>E</sub>	18	58	34	U.S.C. & G.S. epicenter: 53° N, 161° W	
			e <sub>N</sub>	18	58	38		
			eS <sub>E</sub>	19	03	25		
			e <sub>N</sub>	19	03	30		
			eL <sub>E</sub>	19	05	40		
			e <sub>E</sub> F	19 20	38 20	15		
4	May 6	Id	eP <sub>E</sub>	14	47	07	See discussion, p. 52	
			eP <sub>N</sub>	14	47	08		
			iS <sub>N</sub>	14	47	20		
			iS <sub>E</sub>	14	47	21		
			F	14	57			
5	May 27	Id	iP <sub>E</sub>	8	37	02	See discussion, p. 53	
			eP <sub>N</sub>	8	37	02		
			iS <sub>E</sub>	8	37	13		
			eS <sub>N</sub>	8	37	13		
			F	8	40			
6	June 8	Ir	eP <sub>E</sub>	22	36	38	U.S.C. & G.S. epicenter: 16°2 N, 92°4 W	
			e <sub>E</sub>	22	36	48		
			e <sub>E</sub>	22	41	56		
			eS <sub>E</sub>	22	42	10		
			F	23	00			
7	June 9	Id	eP <sub>N</sub>	21	04	04	See discussion, p. 54	
			iP <sub>E</sub>	21	04	05		
			eS <sub>N</sub>	21	04	13		
			iS <sub>E</sub>	21	04	13		
			iS <sub>N</sub>	21	04	14		
			F	21	08			
8	June 13	I	e <sub>E</sub>	23	45	18	Trace of distant shock	
			F	23	55			



FERNDALE

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
9	June 18	Iv	e <sub>E</sub>	9 08 27	See discussion, p. 54
			e <sub>N</sub>	9 08 29	
			e <sub>E</sub>	9 09 12	
			e <sub>N</sub>	9 09 19	
			F	9 15	
10	June 21	Iu	e <sub>P<sub>E</sub></sub>	15 23 36	U.S.C. & G.S. epicenter: 7°8 S, 80°0 W
			e <sub>P<sub>N</sub></sub>	15 23 37	
			e <sub>S<sub>E</sub></sub>	15 32 09	
			e <sub>S<sub>N</sub></sub>	15 32 10	
			F	16 20	
11	June 23	I	e <sub>E</sub>	1 02 48	
			e <sub>N</sub>	1 02 50	
			F	1 15	

FRESNO

THE FRESNO STATION, FRESNO STATE COLLEGE  
 FRESNO, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\phi = 36^{\circ} 46'.1 \text{ N}$$

$$\lambda = 119^{\circ} 47'.8 \text{ W}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--88.4 meters (290 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	N	3000	0.9	15



## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Apr. 11	Iv	eP <sub>N</sub>	20 30 10.9	Panamint Valley (Pasadena)
			iS <sub>N</sub>	20 30 38.8	
			i <sub>N</sub>	20 30 40.9	
			F	20 32.5	
2	Apr. 14	I	e <sub>N</sub>	21 46 42	
			e <sub>N</sub>	21 46 44	
			i <sub>N</sub>	21 46 59	
			F	21 47.5	
3	Apr. 16	IIu	eP <sub>N</sub>	3 13 05	J.S.A. epicenter: 22°2 S, 179°0 E
			eS <sub>N</sub>	3 22 47	
			F	4 00	
4	Apr. 22	Iv	eP <sub>N</sub>	9 48 26.9	See discussion, p. 51
			iP <sub>N</sub>	9 48 29.2	
			eS <sub>N</sub>	9 49 43.6	
			F	9 51	
5	Apr. 25	Iv	eP <sub>N</sub>	4 28 30.0	Felt in Western Nevada from Lovelock to Mina
			e <sub>N</sub>	4 28 34.0	
			iP <sub>N</sub>	4 28 35.5	
			iS <sub>N</sub>	4 29 11.0	
			i	4 29 21.8	
			i	4 29 29.5	
6	Apr. 25	I	eP <sub>N</sub>	7 27 56	
			e <sub>N</sub>	7 28 33	
			F	7 30	
7	Apr. 25	I	e <sub>N</sub>	10 34 18	
			e <sub>N</sub>	10 37 07	
			F	10 51	
8	Apr. 28	I	iP <sub>N</sub>	22 05 25.5	
			e <sub>N</sub>	22 05 29.0	
			F	22 07	
9	Apr. 29	Ir	e <sub>N</sub>	18 59 19	U.S.C. & G.S. epicenter: 53° N, 161° W
			F	19 30	
10	Apr. 29	I	e <sub>N</sub>	20 29 48	
			e <sub>N</sub>	20 37 40	
			F	20 46	

## FRESNO

No.	Date	Char-acter	Phase	Time			Remarks
				U. T.			
				h.	m.	s.	
11	Apr. 29	Iv	eP*N	22	32	43.6	See discussion, p. 52
			e <sub>N</sub>	22	32	57.1	
			iS <sub>N</sub>	22	33	06.1	
			i <sub>N</sub>	22	33	07.7	
			i <sub>N</sub>	22	33	10.9	
			F	22	39		
12	May 1	I	e <sub>N</sub>	15	29	48	
			F	15	45		
13	May 6	Iv	eP <sub>N</sub>	14	48	15	See discussion, p. 52
			e <sub>N</sub>	14	48	20	
			F	15	02		
14	May 7	I	e <sub>N</sub>	14	17	54	
			F	14	22		
15	May 11	I	e <sub>N</sub>	2	44	15.8	See discussion, p. 52
			iS <sub>N</sub>	2	44	27.2	
			e <sub>N</sub>	2	44	29.7	
			F	2	45	5	
16	May 21	Iu	eP <sub>N</sub>	13	21	23	U.S.C. & G.S. epicenter: 2 <sup>o</sup> .5 N, 78 <sup>o</sup> .7 W
			F	13	31		
17	May 25	Iv	eP <sub>N</sub>	5	36	30.8	
			i <sub>N</sub>	5	37	07.0	
			iS <sub>N</sub>	5	37	28.8	
			i <sub>N</sub>	5	37	30.3	
			F	5	46		
18	May 26	Iv	e <sub>N</sub>	2	11	56	Very doubtful beginning See discussion, p. 53
			iS <sub>N</sub>	2	12	14.2	
			F	2	13.5		
19	May 28	I	e <sub>N</sub>	15	42	02	Trace
			F	15	50		
20	May 28	I	eP <sub>N</sub>	20	07	32	
			e <sub>N</sub>	20	09	33	
			e <sub>N</sub>	20	17	00	
			F	20	30		
21	May 29	Id	eP <sup>2</sup> <sub>N</sub>	15	51	08.9	See discussion, p. 53
			iS <sub>N</sub>	15	51	22.6	
			i <sub>N</sub>	15	51	23.6	
			i <sub>N</sub>	15	51	26.1	
			i <sub>N</sub>	15	51	27.4	
			F	15	56		



## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
22	June 2	I	eN F	21 08 37 21 30	
23	June 5	Iv	ePN iSN iN F	9 39 19.1 9 39 34.1 9 39 38.4 9 44	See discussion, p. 53
24	June 5	I	eN F	15 07 19 15 27	
25	June 5	Iv	ePN iSN iN F	19 29 10.0 19 29 25.5 19 29 29.0 19 33	See discussion, p. 53
26	June 8	Ir	ePN eSN F	22 35 54 22 40 51 22 58	U.S.C. & G.S. epicenter: 16°2 N, 92°4 W
27	June 12	Iv	ePN eSN eN eN F	16 58 14.6 16 58 57.1 16 59 04.6 16 59 07.6 17 00	See discussion, p. 54
28	June 13	I	iSN F	17 01 03.8 17 02	See discussion, p. 54
29	June 13-14	I	ePN F	23 39 52 0 00	
30	June 18	Iv	ePN iN iN F	9 08 34 9 08 50 9 09 46 9 23	See discussion, p. 54
31	June 21	Iu	ePN eP'P'N F	15 22 57 15 52 46 16 14	U.S.C. & G.S. epicenter: 7°8 S, 80°0 W
32	June 24	Iu	eN eN eN eN F	13 19 47 13 20 38 13 21 37 13 23 46 13 34	U.S.C. & G.S. epicenter: 8° N, 74° W
33	June 27	Iv	iPN iSN F	4 27 04.3 4 27 21.4 4 32	See discussion, p. 55

## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
34	June 28	Iv	ePN	23 20 42	See discussion, p. 55
			iSN	23 20 55	
			F	23 37	
35	June 30	Iv	ePN	6 13 12.2	
			iPN	6 13 13.7	
			iSN	6 13 28.3	
			F	6 17	
36	June 30	Iv	ePN	6 39 31	
			eSN	6 39 47	
			iSN	6 39 51	
			F	6 41	
37	June 30	I	eN	6 46 09	
			F	6 47	
38	June 30	I	eN	8 38 43	
			iSN	8 38 58	
			F	8 40	



EARTHQUAKES IN NORTHERN CALIFORNIA

AND

THE REGISTRATION OF EARTHQUAKES

AT

BERKELEY—MOUNT HAMILTON—PALO ALTO

SAN FRANCISCO—FERNDALE—FRESNO

FROM

July 1, 1937, to September 30, 1937

BY

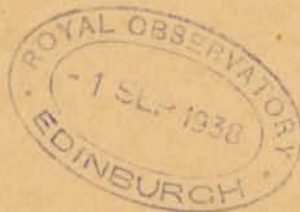
PERRY BYERLY

AND

ROBERT L. GEYER

BULLETIN OF THE SEISMOGRAPHIC STATIONS

Volume 7, No. 3, pp. 98-150



UNIVERSITY OF CALIFORNIA PRESS  
BERKELEY, CALIFORNIA

1938

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AND

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AT

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SAN FRANCISCO--FERNDALE--FRESNO

FROM

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## EARTHQUAKE INTENSITY SCALE

Criteria of the Modified Mercalli Scale which were used to rate the intensities of the earthquakes registered were:

### Intensity

- II Felt by a few people only. Duration or direction not appreciable.
- III Duration or direction appreciable.
- IV Rattling of doors and windows; swinging of suspended objects.
- V Disturbance of movable objects; plaster cracked.
- VI Overthrow of movable objects; cracking of chimneys and other brickwork.
- VII Fall of some chimneys; some damage to buildings.

---

Epicenters located in the following list are plotted on the accompanying map. A number and a letter are given beside each epicenter. The number is that assigned to the earthquake in the list. Only those earthquakes are given numbers for which epicenters were located. The letter represents the excellence with which the epicenter has been located, a indicating excellent, b good, c fair, d poor.

EARTHQUAKES IN NORTHERN CALIFORNIA

(All intensities are given on the Modified Mercalli Scale)

1937 -- PACIFIC STANDARD TIME

- June 30, 4h 47m, p.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.
- July 1, 9h 52m, a.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.
- July 1, 9h 54m, a.m. Recorded at Palo Alto only; not reported felt; focus probably about 5 miles from the Palo Alto station.
- July 1, 10h 29m, a.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.
- July 7, 1h 45m, p.m. Recorded at Palo Alto only; not reported felt; focus about 7 miles from the Palo Alto station.
- July 12, 7h 12m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 7 miles from Lick Observatory.
- July 12, 9h 46m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.
- July 18, 3h 59m 10s, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco. Intensities:
  - IV Burlingame, Larkspur, Los Altos, Mile Rock, Redwood City, San Francisco, San Mateo.
  - III Bolinas, Fort Baker, Fort Barry, Mill Valley, Tiburon.
  - II Colma, Daly City, Irvington, Lagunitas, Montara, Petaluma, San Geronimo, Stinson Beach, Walnut Creek; epicenter near Hunter's Point. See map, epicenter no. 1 (a).
- July 19, 1h 12m, p.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.
- July 21, 8h 58m, a.m. Recorded at Palo Alto only; not reported felt; focus about 10 miles from the Palo Alto station.
- July 23. A swarm of shocks was recorded at San Francisco on this date. Most of them were also recorded at Palo Alto. All of them probably originated from the same focus, about 6 miles northwest of San Mateo. See map, epicenter no. 2 (d). None of these shocks were reported



1937 -- P.S.T.

felt. The times were:

3h 22m, a.m.
3 30 "
3 32 "
3 33 "
3 40 "
3 42 "
3 54 "
4 06 "
4 12 "
4 14 "

July 23, 2h 34m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 4 miles south of Gilroy. See map, epicenter no. 3 (c).

July 23, 11h 07m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 7 miles from Lick Observatory.

July 24, 8h 45m, a.m. Recorded at Mount Hamilton and Palo Alto; not reported felt; epicenter doubtfully located about 6 miles southwest of Gilroy. See map, epicenter no. 4 (d).

July 29, 9h 00m, a.m. Recorded at Fresno, Mount Hamilton, Palo Alto; felt in Kern River Canyon and at the Clough Cave Ranger Station.

July 29, 10h 01m, a.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.

July 29, 11h 03m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.

August 4, 9h 23m, p.m. Recorded at Berkeley only; not reported felt; focus about 3 miles from the University campus.

August 5, 7h 38m, a.m. Recorded at Berkeley and San Francisco; III in Rockridge district, Oakland; epicenter about 4 miles southeast of the University campus. See map, epicenter no. 5 (c).

August 5, 7h 24m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno. Intensities:

V Bear River, Camp Connell, Salt Springs.

IV Angels Camp, Blue Lakes, Camino, Coleville, Garden Valley, Jackson, Lake Alpine, Longbarn, Mather, Minden (Nevada), Mokelumne, Topaz, Tuolumne.

III Dardanelle, Meeks Bay, Sonora.

II Columbia, Emigrant Gap, Gardnerville, Glenbrook, Pinecrest; "felt" at Camp Sacramento, Meyers Station, Tallac, Twin Bridges, Truckee; epicenter not far from Lake Alpine.



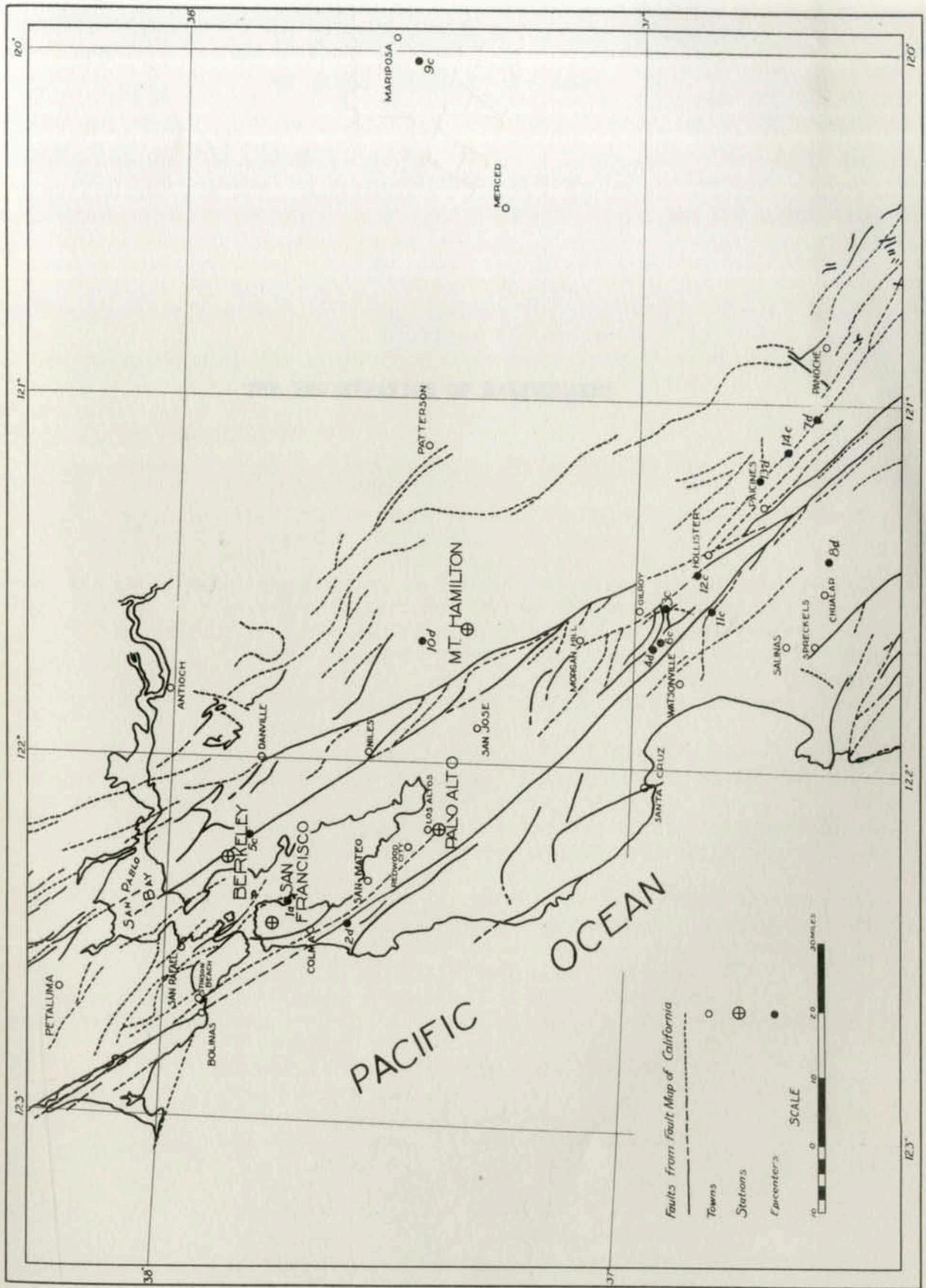
1937 -- P.S.T.

- August 5, 11h 00m, a.m. Recorded at Ferndale only; not reported felt; focus very near Ferndale station. (No apparent S-P interval.)
- August 8, 11h 15m, p.m. Not recorded at Bay stations; IV at Spring Garden, II at Taylorsville.
- August 9, 8h 16m, a.m. Recorded at Mount Hamilton, Palo Alto, San Francisco, Fresno; IV at Moss Landing; epicenter about 6 miles southwest of Gilroy. See map, epicenter no. 6 (c).
- August 10, 10h 59m, a.m. Recorded at Palo Alto only; not reported felt; focus within 7 miles of the Palo Alto station.
- August 11, 12h 24m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.
- August 11, 11h 31m, p.m. Recorded faintly at Berkeley, Mount Hamilton, Palo Alto, San Francisco (Ferndale station not in operation); V at Fernbridge, IV at Cape Mendocino, Ferndale, Korbel.
- August 15, 11h 01m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 12 miles west of Panoche. See map, epicenter No. 7 (d).
- August 15, 11h 36m, p.m. Recorded at Mount Hamilton and Fresno; not reported felt; epicenter about 10 miles west of Bishop.
- August 20, 5h 12m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 6 miles from Lick Observatory.
- August 20, 6h 51m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; III at Chualar; epicenter about 7 miles east of Chualar. See map, epicenter no. 8 (d). The seismograms suggest two shocks about 27 seconds apart.
- August 21, 5h 56m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter at sea about 6 miles southwest of San Simeon.
- August 22, 4h 33m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; III-IV at El Portal, Tuolumne Meadows, Yosemite; epicenter about 10 miles west of Mariposa. See map, epicenter 9 (c).
- August 28, 9h 19m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; IV at San Jose, Black Mountain (5 miles southwest of Mountain View), II-III at Ben Lomond; epicenter about 9 miles north of Lick Observatory. See map, epicenter no. 10 (d).
- August 28, 9h 22m, p.m. Recorded at Mount Hamilton and Palo Alto; not reported felt; probably aftershock of quake at 9h 19m.
- August 28, 9h 26m, p.m. Recorded at Mount Hamilton only; not reported felt; probably aftershock of quake at 9h 19m.



1937 -- P.S.T.

- Septmeber 3, 9h 25m, a.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.
- September 5, 1h 10m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter about 9 miles west of Hollister. See map, epicenter no. 11 (c).
- September 5, 7h 09m, a.m. Recorded at Berkeley only; not reported felt; focus about 4 miles from the University campus.
- September 8, 7h 21m, a.m. Recorded at Palo Alto only; not reported felt; focus about 3 miles from the Palo Alto station.
- September 11, 1h 50m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; IV at San Juan Bautista; epicenter about 3 miles northwest of Hollister. See map, epicenter no. 12 (c).
- September 17, 10h 20m, a.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter about 4 miles east of Paicines. See map, epicenter no. 13 (d).
- September 18, 5h 29m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; IV at Salinas, Spreckels, felt at Chualar; epicenter about 9 miles southeast of Paicines. See map, epicenter no. 14 (c).
- September 18, 9h 03m, a.m. Recorded at Berkeley only; not reported felt; focus about 9 miles from the University campus.
- September 22, 9h 57m, a.m. Recorded at Ferndale only; not reported felt; epicenter about 40 miles from Ferndale.
- September 22, 10h 13m, a.m. Recorded at Ferndale only; not reported felt; epicenter about 40 miles from Ferndale.
- September 23, 00h 42m, a.m. Recorded at Ferndale only; not reported felt; epicenter about 40 miles from Ferndale.
- September 24, 8h 18m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.
- September 25, 4h 21m, a.m. Recorded at Mount Hamilton and Fresno; not reported felt; epicenter about 20 miles east southeast of Camp Curry.
- September 25, 10h 11m, a.m. Recorded at Ferndale only; felt at Petrolia; epicenter about 25 miles from Ferndale.
- September 28, 6h 39m, p.m. Recorded at Ferndale only; felt in Ferndale and Petrolia; epicenter about 30 miles from Ferndale.



MAP SHOWING EPICENTERS, JULY 1, 1937, TO SEPTEMBER 30, 1937



SYMBOLS AND NOTATIONS EMPLOYED

1. Character of the Earthquake—

- I. Perceptible. II. Mechanically strong. III. Strong.
- s (terras motus sensitivus) Local shock (origin less than 100 kilometers distant).
  - m (terras motus vicinus) Near shock (origin from 100 to 1,000 kilometers distant).
  - r (terras motus remotus) Distant shock (origin from 1,000 to 5,000 kilometers distant).
  - u (terras motus ultimus) Very distant shock or teleseism (origin very distant).

THE REGISTRATION OF EARTHQUAKES

2. Phases of the Seismogram—

- P (unde prima) First first phase, or first preliminary tremors (longitudinal).
- P' First preliminary tremors which have penetrated the core of the earth.
- P<sub>1</sub> Waves a time reflected at the earth's surface.
- S (unde secunda) Second phase, or second preliminary tremors (transverse).
- S<sub>1</sub> Waves a time reflected at the earth's surface.
- S<sub>2</sub> Waves changed from longitudinal to transverse oscillation or vice versa through reflection at the earth's surface.
- S<sub>2</sub>' Waves twice reflected at the earth's surface, having been longitudinal on two branches of the path and transverse on one branch.

In general a bar over two letters denoting types of waves indicates refraction. The subscript <sub>1</sub> denotes the boundary at about 2900 km. depth between the core and the middle shell which surrounds it. Thus:

- P<sub>1</sub>P<sub>1</sub> Waves which have penetrated the core, having been transverse before entering and after leaving the core, and longitudinal within the core.
  - P<sub>1</sub>P<sub>1</sub>' Waves refracted at the core boundary into the core, reflected once at this boundary while within the core and again refracted out of the core, having remained longitudinal on all branches of the path.
  - 1 (unde longa) Long waves of surface phase preceding P.
  - 2 (unde maxima) Shorter and more regular waves of large amplitude in the surface phase.
  - 3 (unde) Greatest motion in the surface phase.
  - 4 (unde) Tail or end portion.
  - 5 (unde) End of discernible movement.
- For local earthquakes a special notation is used:
- P The longitudinal wave which has traveled the whole path in the surface layer or crust of the earth.
  - S The transverse wave which has traveled its whole path in the surface layer of the earth.
  - P<sub>1</sub> The longitudinal wave which has traveled the horizontal portion of its path in the intermediate layer.
  - S<sub>1</sub> The corresponding transverse wave.

## SYMBOLS AND NOTATIONS EMPLOYED

 1. Character of the Earthquake--

I. Perceptible.    II. Moderately strong.    III. Strong.

d (terrae motus domesticus)	Local shock (origin less than 100 kilometers distant).
v (terrae motus vicinus)	Near shock (origin from 100 to 1,000 kilometers distant).
r (terrae motus remotus)	Distant shock (origin from 1,000 to 5,000 kilometers distant).
u (terrae motus ultimus)	Very distant shock or teleseism (origin more than 5,000 kilometers distant).

 2. Phases of the Seismogram--

P (undae primae)	Normal first phase, or first preliminary tremors (longitudinal).
P'	First preliminary tremors which have penetrated the core of the earth.
PR <sub>n</sub>	Waves n times reflected at the earth's surface.
S (undae secundae)	Second phase, or second preliminary tremors (transverse).
SR <sub>n</sub>	Waves n times reflected at the earth's surface.
PS	Waves changed from longitudinal to transverse oscillation or vice versa through reflection at the earth's surface.
PPS	Waves twice reflected at the earth's surface, having been longitudinal on two branches of the path and transverse on one branch.

In general a bar over two letters denoting types of waves indicates refraction. The subscript <sub>c</sub> denotes the boundary at about 2900 km. depth between the core and the middle shell which surrounds it. Thus:

$\overline{S_c P_c S}$	Waves which have penetrated the core, having been transverse before entering and after leaving the core, and longitudinal within the core.
$\overline{P_c P_c} \overline{P_c P}$	Waves refracted at the core boundary into the core, reflected once at this boundary while within the core and again refracted out of the core, having remained longitudinal on all branches of the path.
L (undae longae)	Long waves of surface phase preceding M.
M (undae maximae)	Shorter and more regular waves of large amplitude in the surface phase.
M <sub>n</sub>	Greatest motion in the surface phase.
C (coda)	Tail or end portion.
F (finis)	End of discernible movement.
For local earthquakes a special notation is used:	
$\overline{P}$	The longitudinal wave which has traveled its whole path in the surface layer or crust of the earth.
$\overline{S}$	The transverse wave which has traveled its whole path in the surface layer of the earth.
P*	The longitudinal wave which has traveled the horizontal portion of its path in the intermediate layer.
S*	The corresponding transverse wave.



3. Nature of the Motion--

- i (impetus) Sudden beginning of the motion.
- e (emersio) Gradual beginning of the motion.
- T (period) Time of one complete oscillation.
- A Trace amplitude measured from the media line, + earth motion toward east, north, or zenith, - toward west, south, or nadir.
- AE E-W component of A.
- AN N-S component of A.
- AZ Vertical component of A.

4. Time--

- O (origin) Time of shock at point of origin.

The following observations are recorded by Universal Time.  
 Latitude--45 meters (150 feet) above mean sea level.

CONSTANTS OF THE INSTRUMENTS

Apparatus	Component	$T_1$	$T_2$	$T_3$	$T_4$	$T_5$	$T_6$
Woodward 100 kg. ...	E	45	15	10			
	N	45	15	10			
	Z	45	4	8			
Woodward 100 kg. ...	E	1,000	0.5	15			
	Z	1,000	0.5	15			
Woodward 100 kg. ...	E	115	15	11.5	0.55	100	11.5
	N	122	12	11.5	0.55	100	11.5
	Z	107	12	11.5	0.55	100	11.5
				Coupled Period			

The letter O before a reading designates that the instrument was from the original instrument; W, Woodward; S, South-West; A, Woodward; Z, Zenith.

Location of the instrument recorded in this report was determined approximately as follows:

BERKELEY

THE BERKELEY STATION, UNIVERSITY OF CALIFORNIA  
BERKELEY, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned} \varphi &= 37^{\circ} 52'.3 \text{ N.} \\ \lambda &= 122^{\circ} 15'.6 \text{ W.} \end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--85 meters (279 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V		T <sub>0</sub>	ε	$\frac{r}{T_0^2}$	
Bosch-Omori 100 kg. ...	E	45		12	10	0.001	
	N	45		12	10	0.001	
Wiechert 80 kg. ....	Z	44		4	5	0.005	
Wood-Anderson .....	E	3,000		0.9	15		
	N	3,000		0.9	15		
Galitzin .....		K	T	T <sub>1</sub>	μ <sup>2</sup>	A <sub>1</sub> (cm)	l (cm)
	E	112	12	11.8	0.00	100	11.3
	N	122	12	12.4	0.03	100	11.2
	Z	109	12	11.9	0.01	130	14.9
Benioff .....		V		Coupled Period		ε	
	Z			0.7		5	

The letter G before a reading designates that the seismogram was from the Galitzin instrument; W, Wiechert; B, Bosch-Omori; A, Wood-Anderson; H, Benioff.

Operation of the Benioff vertical seismograph was discontinued temporarily on September 20.



BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
1	July 1	I	eN	G	6 05 28				
			eE	G	6 05 32				
			eZ	G	6 05 34				
			eN	G	6 09 10				
			iE	G	6 09 16				
			eZ	G	6 10 52				
			F		7 00				
2	July 1	I	eZ	G	12 10 36				
			eN	G	12 10 40				
			eE	G	12 11 30				
			eN	G	12 17 45				
			iE	G	12 18 32				
			eZ	G	12 20 58				
			F		14 46				
3	July 2	Iu	ePN	G	2 49 42				
			iPZ	G	2 49 42				
			iPE	G	2 49 43				
			eN	A	2 49 47.6				
			eE	A	2 49 51.6				
			eSE	G	2 59 18				
			iSEN	G	3 00 01				
			eSZ	G	3 00 02				
			eLENZ	G	3 11 52				
			F		5 40				
4	July 4	Iu	ePEZ	G	6 07 51				
			eN	G	6 08 01				
			eSE	G	6 17 56				
			iSE	G	6 18 13				
			eSN	G	6 18 16				
			eZ	G	6 18 28				
			F		6 31				
5	July 11	I	eN	G	14 00 44				S? Trace of distant
			eE	G	14 00 46				S? shock.
			F		15 00				
6	July 11	Ir	ePN	G	17 24 14				J.S.A. epicenter
			ePN	B	17 24 14				20°7 N. 108°3 W.
			ePZ	W	17 24 14.5				
			ePE	A	17 24 14.6				
			iPE	G	17 24 16				
			iPN	G	17 24 20				
			iSE	G	17 28 04				
			iSN	G	17 28 04				
			eSE	A	17 28 20				
			eSN	B	17 28 23				
			F		18 50				

BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						AE	AN	AZ	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
7	July 14	Iv	ePE	G	4 20 46				
			ez	G	4 21 53				
			iSE	G	4 24 46	2.5	-1.75		
			eSN	G	4 24 46	1.6		-1.1	
			eLE	G	4 26 19				
			F		4 42				
8	July 14 & 15	Iu	ePZ	G	22 40 18				
			ePE	G	22 40 20				
			eSE	G	22 49 35	2.7	+2		
			eSNZ	G	22 49 36				
			F		01 30				
9	July 16	Iu	iPE	G	10 30 15				
			eN	G	10 38 41				
			eSE	G	10 39 49				
			ez	G	10 42.0				
			F		12 22				
10	July 17	I	eEN	G	1 13 16				
			ez	G	1 13 24				
			F		2 10				
11	July 18	Iu	eE	G	3 01 56				
			eE	G	3 16 54				
			eN	G	3 17 28				
			ez	G	3 37.0				
			F		5 22				
12	July 18	Id	iPN	A	11 59 13.0				See discussion, p. 102
			iPE	A	11 59 13.1				
			iSN	A	11 59 17.0				
			iSE	A	11 59 17.1				
			iSZ	H	11 59 17.1				
			F		12 01				
13	July 19	Iu	eN	G	10 03 10				
			eE	G	10 03 48				
			ez	G	10 24.0				
			F		12 52				
14	July 19	Iu	ePE	A	19 45 01.3				J.S.A. epicenter 19°5 N. 77°5 W.
			ePE	G	19 45 03	6	+1.7		
			ePN	A	19 45 03.3				
			ePZ	G	19 45 04	6		-1.5	
			ePE	A	19 45 04.8				
			ePN	G	19 45 05				
			ipPNZ	G	19 45 41	7		-5.5	
			ipPE	G	19 45 43	7	-3	-18.5	



BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks	
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>		
				h. m. s.	s.	mm.	mm.	mm.		
14	July 19 (cont'd)	Iu	epPz	W	19 45 44					
			epPE	A	19 45 44.3					
			ipPEN	B	19 45 46					
			ipPz	W	19 45 46					
			ipPE	A	19 45 46.5					
			iz	G	19 49 58					
			iSEZ	G	19 52 50	12	+20		-5	
			eSEN	A	19 52 50.3					
			eSEN F	B	19 52 51 22 22					
15	July 22	Iu	ipNZ	G	17 15 45	6.5		+1	+1	J.S.A. epicenter 64°5 N. 145°1 W.
			ePE	A	17 15 47.7					
			ePN	A	17 15 47.9					
			ePz	W	17 15 48.5					
			iPEZ	G	17 15 50	4	+1.5		+9.5	
			ePEN	B	17 15 50					
			iSE	G	17 20 45					
			eSE	B	17 20 47					
			eSE	A	17 20 55.7					
			eSN	A	17 20 56.7					
			iSN	B	17 20 59					
			eLN F	B	17 23 10 20 00					
			16	July 23	I	eE	G	0 05 34		
eZ	G	0 06 30								
eN F	G	0 10 43 0 47								
17	July 23	Ir	ePE	G	7 16 22					
			eN	G	7 16 29					
			eSE	G	7 20 23					
			eN	G	7 20 37					
			eLE	G	7 22 41					
			eLN F	G	7 22 59 8 32					
18	July 23	I	eN	A	22 34 12.8				See discussion, p. 103	
			eE	A	22 34 14.6					
			eSN	A	22 34 27.7					
			eSE	A	22 34 27.8					
			F		22 36					
19	July 24	I	eN	G	9 14 02					
			eE	G	9 15 52					
			eZ	G	9 19 50					
			eN F	G	9 20 15 9 32					

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks	
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>		
				h. m. s.	s.	mm.	mm.	mm.		
20	July 24	I	eE	G	16 15 47					
			eN	G	16 16 30					
			eE	G	16 18 32					
			eN	G	16 19 00					
			eZ	G	16 19 02					
			F		16 37					
21	July 25	I	eZ	G	13 18 59					
			eN	G	13 19 01					
			eE	G	13 19 17					
			eE	G	13 23 12					
			eN	G	13 23 45					
			F		14 32					
22	July 26	Ir	iP <sub>EN</sub>	G	3 53 15	7.5	+20.5	-12.5	J.S.A. epicenter 18°6 N. 95°8 W.	
			iPZ	G	3 53 15	4		-20		
			iPZ	W	3 53 15					
			iPN	A	3 53 15.4					
			iPE	A	3 53 15.5					
			ePE	B	3 53 15.5					
			eN	B	3 53 24					
			ipPN	A	3 54 02.4					
			ipPE	A	3 54 03					
			ipPZ	W	3 54 09					
			iPR <sub>3Z</sub>	G	3 54 56					
			esPR <sub>1N</sub>	A	3 56 13					
			esPR <sub>1Z</sub>	W	3 56 15					
			esPR <sub>1E</sub>	A	3 56 15.5					
			eSN	A	3 58 02					
			eSE	A	3 58 08					
			eSE	B	3 58 08					
			eSN	B	3 58 09					
			iSE	G	3 58 09	11	+34.0			
			iSN	G	3 58 14	9		-48.0		
iZ	G	3 59 08								
F		7 00								
23	July 26	I	eZ	G	8 19 46					
			eE	G	8 20 16					
			eN	G	8 20 46					
			F						F lost in next shock.	
24	July 26	I	eN	G	8 49 46					
			eZ	G	8 50 28					
			eE	G	8 51 52					
			F		9 52					



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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
25	July 26	Iu	ePN	G 21 07 58	12 6	-16			U.S.G. & G.S. epicenter 40° N. 141° E.
			ePE	G 21 08 00					
			iPZ	G 21 08 00					
			ipPZ	G 21 08 12					
			epPN	G 21 08 14					
			eSN	G 21 17 02					
			eSE	G 21 17 08					
			iSEZ	G 21 17 18					
			iSN	G 21 17 21					
F	23 30								
26	July 30	I	eEN	G 14 26 08					
			ez	G 14 26 09					
			F	16 20					
27	July 31	Iu	ePE	G 20 48 30	9			4	
			ePZ	G 20 48 45					
			eSE	G 20 59 16					
			eSZ	G 20 59 43					
			iSN	G 20 59 43					
			eLN	G 21 16.0					
			F	23 40					
28	Aug. 1	I	eN	G 10 13.9					
			ez	G 10 15.0					
			F					F lost in next shock.	
29	Aug. 1	I	ePZ	G 8 54 04					
			iSN	G 9 04 58					
			eSZ	G 9 05 01					
			F	12 35					
30	Aug. 5	Id	iPN	A 5 22 52.7					See discussion, p. 103
			iPZ	H 5 22 52.9					
			iSEN	B 5 22 53.3					
			iSN	A 5 22 53.5					
			iSE	A 5 22 53.6					
			iEN	B 5 22 54.5					
			iE	A 5 22 56.6					
			F	5 24					
31	Aug. 5	I	ePZ	G 14 56 47					
			ePN	G 14 57 03					
			eN	G 15 06 49					
			ez	G 15 07 31					
			eN	G 15 07 47					
			iz	G 15 08 52					
			F	16 33					

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
1937									
32	Aug. 5	Id	iPz	H	15 37 39.6				See discussion, p. 103
			iPN	A	15 37 39.6				
			ePN	B	15 37 39.6				
			ePE	B	15 37 39.8				
			iSN	B	15 37 40.2				
			iSN	A	15 37 40.4				
			iSN	B	15 37 41				
			F		15 39				
33	Aug. 6	Iv	ePEN	A	3 24.1				Pasadena epicenter near Lake Tahoe. See discussion, p.
			ePz	H	3 24.1				
			ePz	W	3 24.1				
			iPN	G	3 24.0				
			iSz	H	3 24.6				
			iSN	A	3 24.6				
			eSE	A	3 24.6				
			eSEN	B	3 24.6				
F		3 29							
34	Aug. 6	I	eN	G	9 05 03				
			F		9 23				
35	Aug. 8	I	iE	G	8 30 58				
			F		9 33				
36	Aug. 9	I	eN	G	15 02 12				
			eE	G	15 02 24				
			F		15 48				
37	Aug. 10	I	eEN	G	19 53.3				
			F		20 15				
38	Aug. 11	I	eE	G	1 15 01				
			eNZ	G	1 15 05				
			eEZ	G	1 18 07				
			eN	G	1 18 09				
			F		3 33				
39	Aug. 12	I	eE	G	0 53.4				
			eN	G	0 53.5				
			F		1 35				
40	Aug. 12	Iv	ePN	A	7 31 36.6				See discussion, p. 104
			eSN	A	7 32 08.9				
			F		7 35				



## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
41	Aug. 15	Iv	e <sub>N</sub>	A	19 01 50				See discussion, p. 104
			e <sub>E</sub>	A	19 02 04.9				
			F		19 05				
42	Aug. 17	I	i <sub>E</sub>	G	13 31 26				
			e <sub>N</sub>	G	13 31 33				
			F		14 33				
43	Aug. 19	Iv	ePz	G	7 04 41				Epicenter in Esmeralda Co., Nevada. V at Gilbert (Nev.), IV at Benton, Bishop, Bodie, Law, II at Bigpine.
			ePe	A	7 04 41.1				
			ePn	A	7 04 42.1				
			eSz	G	7 05 20				
			eSe	A	7 05 20.1				
			eSe	G	7 05 21				
			iSn	A	7 05 22.7				
			iSn	G	7 05 25				
F		7 13							
44	Aug. 20	I	e <sub>N</sub>	G	5 58.0				See discussion, p. 104
			F		8 43				
45	Aug. 20	Iu	ePn	A	12 13 06				
			iPz	G	12 13 10				
			eE	A	12 13 16.5				
			iN	G	12 13 31				
			eZ	B	12 17 26				
			eN	B	12 21 01				
			eSn	A	12 23 45.5				
			eSe	B	12 23 46				
			eSe	A	12 23 50.5				
			iN	G	12 23 57				
			iN	A	12 30 49.5				
			eE	A	12 30 50.5				
F		16 30							
46	Aug. 20	I	e <sub>EN</sub>	G	14 51.7				See discussion, p. 104
			F		14 54.				
47	Aug. 22	I	e <sub>EN</sub>	A	1 57 05.5				See discussion, p. 104
			eE	A	1 57 32				
			eN	A	1 57 33.5				
			F		1 58				
48	Aug. 22	I	eE	G	0 23 33				
			eN	G	0 23.6				
			eN	G	0 34 51				
			eZ	G	0 38.2				
			F		1 48				

## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
49	Aug. 23	Iv	e <sub>N</sub>	A 00 33 06.7					See discussion, p. 104
			e <sub>SE</sub>	A 00 33 27.4					
			i <sub>SN</sub>	A 00 33 27.5					
			F	00 35					
50	Aug. 24	Iu	e <sub>PN</sub>	G 18 43 19					
			e <sub>PE</sub>	G 18 43 22					
			e <sub>PZ</sub>	H 18 43 24					
			e <sub>SZ</sub>	H 18 52 50					
			e <sub>SE</sub>	A 18 52 55					
			e <sub>SN</sub>	A 18 52 57					
			e <sub>LN</sub>	A 19 02.0					
			F	21 45					
51	Aug. 27	I	e <sub>EN</sub>	A 0 02 12.6					
			e <sub>N</sub>	A 0 06 20					
			e <sub>EN</sub>	G 0 54.0					
			F	1 35					
52	Aug. 29	Id	e <sub>EN</sub>	A 5 19 27.8					See discussion, p. 104
			e <sub>Z</sub>	H 5 19 28					
			e <sub>SE</sub>	A 5 19 37.2					
			e <sub>SN</sub>	A 5 19 37.6					
			i <sub>E</sub>	A 5 19 38.2					
			e <sub>Z</sub>	H 5 19 39.3					
			e <sub>N</sub>	A 5 19 39.4					
			F	5 22					
53	Aug. 31	I	e <sub>E</sub>	G 2 51 47					Trace of distant quake.
			e <sub>N</sub>	G 3 03.2					
			e <sub>Z</sub>	G 3 07.0					
			e <sub>N</sub>	G 3 07.3					
			F	4 00					
54	Aug. 31	I	e <sub>EN</sub>	B 4 07.5					Surface waves of distant quake.
			F	4 30					
55	Aug. 31	I	e <sub>N</sub>	G 14 40 02					
			i <sub>E</sub>	G 14 40 07					
			e <sub>LZ</sub>	G 15 18.5					
			F	16 45					
56	Sept. 1	Iu	e <sub>PE</sub>	B 8 51 26	3.5				U.S.C. & G.S. epicenter 31° S. 179° W.
			e <sub>PE</sub>	A 8 51 33					
			e <sub>PN</sub>	A 8 51 34					
			i <sub>PNZ</sub>	G 8 51 34					
			i <sub>N</sub>	G 8 52 30					
			e <sub>E</sub>	G 8 52 48					



## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks	
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>		
1937						mm.	mm.	mm.		
				h. m. s.	s.					
56	Sept. 1 (Cont'd)	Iu	eN	B	9 01 49					
			eE	B	9 01 58					
			iSE	G	9 02 01					
			iSN	G	9 02 06	11		+19		
			eZ	G	9 02 15					
			iEN	A	9 02 18					
			iN	G	9 02 19					
			F		10 24					
57	Sept. 1	Iv	eN	A	13 49 25.5				Pasadena epicenter near Alta Loma; felt in Southern California.	
			eE	A	13 49 48.5					
			F		13 54					
58	Sept. 1	Iu	iPZ	G	21 54 01					
			ePE	A	21 54 01.7					
			ePN	A	21 54 02.2					
			iSE	G	22 04 46					
			eSZ	G	22 05 14					
			F		23 00					
59	Sept. 3	Ir	iPE	G	18 55 47	6	+12.5			U.S.C. & G.S. epicenter 52°5 N. 177°5 W. Probable depth 160 km.
			ePE	A	18 55 47.5					
			ePE	B	18 55 47.6	4	+0.4			
			ePZ	W	18 55 47.8	5			+0.3	
			iPNZ	G	18 55 48	5		-9.5	+13.5	
			ePN	B	18 55 48.1					
			iE	B	18 57 49	5	-1			
			iz	W	18 57 49.1	3			+0.8	
			ePcPN	B	18 57 59.1	3		+0.8		
			eN	B	19 01 42.1					
			eSE	B	19 01 51.1	12	-1.2			
			eSE	A	19 01 51.2					
			eSN	B	19 01 52	9		+0.6		
			eSZ	W	19 01 53.1	5			+0.2	
			eLE	A	19 04 06					
F		23 35								
60	Sept. 4	Iu	ePZ	G	6 26 44					
			eN	G	6 27 49					
			eSE	G	6 36 53					
			eSN	G	6 36 57					
			F		8 20					
61	Sept. 5	Iv	ePE	A	9 10 33.0				See discussion, p. 105	
			ePN	A	9 10 33.1					
			eSN	A	9 10 49.8					
			eSE	A	9 10 50.0					
			F		9 12					

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
62	Sept. 5	Id	iPZ	H	15 08 40.0				See discussion, p. 105
			iPEN	A	15 08 40.1				
			iSZ	H	15 08 41.2				
			iSN	A	15 08 41.2				
			iSE	A	15 08 41.3				
			F		15 10				
63	Sept. 8	Iu	eE	G	0 53.7				U.S.C. & G.S. epicenter South Atlantic region between Sandwich Is. and Cape Horn.
			ez	G	0 58 44				
			ePR <sub>1</sub> E	G	1 00 18				
			ePR <sub>2</sub> Z	G	1 00 27				
			iS <sub>C</sub> P <sub>C</sub> S <sub>N</sub>	G	1 05 36				
			iSR <sub>1</sub> N	G	1 18 00				
F		3 45							
64	Sept. 11	Iv	ePN	A	21 50 32.5				See discussion, p. 105
			eN	A	21 50 46.9				
			F		21 52				
65	Sept. 15	Iu	ePN	A	12 40 08.0				U.S.C. & G.S. epicenter 9° S. 161° E.
			iPZ	G	12 40 08	5		+11.0	
			ePN	A	12 40 08.4				
			iPEN	G	12 40 09	5	+6.5	+2	
			ePZ	W	12 40 12	2.2		+0.4	
			ePEN	B	12 40 12	3	+0.25		
			iPR <sub>1</sub> E	G	12 43 42				
			eSZ	G	12 50 26				
			iSE	G	12 50 29				
			eSN	A	12 50 29.9				
			eSE	B	12 50 30				
			eSN	B	12 50 32				
			eSE	A	12 50 33.9				
			iSN	G	12 50 37				
			eE	B	12 50 38				
			iPSZ	G	12 51 26				
eLN	B	13 03 20							
F						F lost in next shock.			
66	Sept. 15	I	eE	G	14 39 57				
			eN	G	14 40 00				
			eLZ	G	14 51.8				
			F		15 40				
67	Sept. 15	I	eSEN	G	19 45 57				
			eLE	G	19 51.0				
			eLN	G	19 51.5				
			ez	G	19 52 35				
			F		20 53				



## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
	1937			h. m. s.	s.	mm.	mm.	mm.	
68	Sept.15 & 16	Ir	eP <sub>N</sub>	G	23 55 50				U.S.C. & G.S. epicenter 14° N. 92° W.
			eP <sub>Z</sub>	G	23 55 51				
			eP <sub>E</sub>	A	23 55 51.7				
			eP <sub>E</sub>	G	23 55 52				
			eP <sub>N</sub>	A	23 55 54.7				
			eP <sub>EN</sub>	B	23 55 56				
			eP <sub>Z</sub>	W	23 55 57				
			eS <sub>N</sub>	G	0 01 22				
			eS <sub>E</sub>	A	0 01 32.7				
			eS <sub>Z</sub>	G	0 01 34				
			iS <sub>EN</sub>	G	0 01 34	10.5	-15	+3	
			eS <sub>N</sub>	A	0 01 35.7				
			eS <sub>E</sub>	B	0 01 53				
			eS <sub>N</sub>	B	0 01 54				
			eL <sub>E</sub>	B	0 06 18				
eL <sub>N</sub>	A	0 06 23							
F		2 00							
69	Sept.17	I	eE <sub>N</sub>	G	6 05 59				
			eZ	G	6 06 22				
			F		6 19				
70	Sept.17	I	eZ	G	9 51 21				
			eE	G	9 52 03				
			eN	G	9 56 46				
			eN	G	10 02 59				
			F		12 20				
71	Sept.18	Iv	eP <sub>E</sub>	A	13 29 30.9				Pasadena reports felt in Salinas.
			eP <sub>N</sub>	A	13 29 31.7				
			eP <sub>E</sub>	B	13 29 33				
			eP <sub>Z</sub>	W	13 29 33				
			eP <sub>Z</sub>	H	13 29 33.1				
			eP <sub>N</sub>	B	13 29 34				
			eS <sub>E</sub>	B	13 29 50				
			eS <sub>N</sub>	A	13 29 50.9				
			eS <sub>N</sub>	B	13 29 52				
			eS <sub>N</sub>	A	13 29 52.3				
			eS <sub>Z</sub>	H	13 29 52.4				
			F		13 33				
72	Sept.18	Id	iP <sub>N</sub>	A	17 03 24				S-P = 2.0 s. See discussion, p. 105
			iP <sub>E</sub>	A	17 03 24				
			iS <sub>N</sub>	A	17 03 26				
			F		17 04.5				

## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
						mm.	mm.	mm.	
						h. m. s.	s.		
73	Sept.20	I	eE	G	7 08 45				
			eZ	W	7 09 03				
			eN	B	7 09 03				
			eE	B	7 09 05				
			e <sub>NZ</sub>	G	7 09 05				
			eE	G	7 13 29				
			eN	B	7 13 35				
			eLZ	G	7 16.0				
			eLN F	B	7 16 05 8 17				
74	Sept.21	Ir	ePNZ	G	10 09 07				
			eSE	G	10 13 07				
			eN	G	10 13 31				
			eLEZ	G	10 16.1				
			F		11 20				
75	Sept.23	I	eN	A	8 42 13.4				
			eE	A	8 42 15.4				
			F		8 46				
76	Sept.23	Iu	ePE	A	13 18 55				U.S.C. & G.S. epicenter 6° S. 154° E.
			ePE	B	13 18 55				
			eZ	W	13 18 59				
			eN	B	13 19 09				
			eE	B	13 19 10				
			eE	B	13 22 31				
			eE	A	13 22 33				
			eSE	A	13 29 26				
			eSE	B	13 29 31				
			eN	B	13 29 45				
			eLE	B	13 46 11				
			F		16 00				
			77	Sept.27	I	iPZ	G	9 14 12	
eN	G	9 15 50							
eE	G	9 16 05							
iE	G	9 21 14							
F		12 30							
78	Sept.28	I	ePN	G	6 27 52				
			ePE	G	6 27 54				
			iPZ	G	6 27 55				
			eN	B	6 28 24				
			ePR <sub>1</sub> EZ	G	6 29 16				
			ePR <sub>1</sub> N	G	6 29 19				
			eSN	G	6 33 36				
			eSN	B	6 33 36				

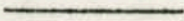


## BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
78	Sept.28 (contd)	I	iSE	A	6 33 40				
			eE	B	6 34 20				
			eLE	B	6 39 20				
			F		8 05				
79	Sept.28	I	eSN	G	18 32 05				
			eLENZ	G	18 36.8				
			F		19 20				
80	Sept.29	I	eN	B	11 32 22				
			eE	B	11 32 24				
			eEN	A	11 33 15				
			iz	G	11 33 18				
			eE	G	11 33 21				
			iEN	G	11 33 23				
			ez	G	11 35 46				
			iN	G	11 35 47	16	-13		
			eE	B	11 44 52				
			F		12 55				
81	Sept.30	I	iPE	G	21 56 11				
			iPN	G	21 56 13	10	-4.5		
			F		23 25				

MOUNT HAMILTON

THE LICK OBSERVATORY STATION, UNIVERSITY OF CALIFORNIA  
MOUNT HAMILTON, CALIFORNIA



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Latitude and longitude:

$$\begin{aligned} \phi &= 37^{\circ} 20'.4 \text{ N.} \\ \lambda &= 121^{\circ} 38'.6 \text{ W.} \end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--1281.7 meters (4205 feet) above mean sea level.

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Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
						mm.	mm.	mm.	
						h. m. s.	s.		
1	July 9	I	e <sub>N</sub>	17 38 39.9					
			e <sub>E</sub>	17 38 41.4					
			F	17 40					
2	July 11	Ir	eP <sub>EN</sub>	17 24 07.0					J.S.A. epicenter 20°7 N. 108°3 W.
			e <sub>E</sub>	17 28 06.0					
			eS <sub>N</sub>	17 28 17.0					
			F	17 53					
3	July 12	Id	iP <sub>N</sub>	15 11 36.4					S-P = 1 <sup>s</sup> .9 See discussion, p. 102
			iP <sub>E</sub>	15 11 36.5					
			iS <sub>E</sub>	15 11 38.2					
			iS <sub>N</sub>	15 11 38.3					
			F	15 12					
4	July 13	Id	eP <sub>N</sub>	5 45 32.7					See discussion, p. 102
			eP <sub>E</sub>	5 45 33.1					
			iS <sub>N</sub>	5 45 34.2					
			iS <sub>E</sub>	5 45 34.5					
			F	5 46					
5	July 18	Id	eP <sub>N</sub>	11 59 23.6					S-P = 12 <sup>s</sup> .7 See discussion, p. 102
			eP <sub>E</sub>	11 59 24.2					
			iS <sub>N</sub>	11 59 36.4					
			iS <sub>E</sub>	11 59 36.6					
			F	12 01					
6	July 19	Iu	eP <sub>N</sub>	19 44 57.3					J.S.A. epicenter 1°5 N. 77°5 W. Probable depth 175 kms.
			eP <sub>E</sub>	19 44 59.8					
			iP <sub>N</sub>	19 45 42.3					
			iP <sub>E</sub>	19 45 43.5					
			eS <sub>EN</sub>	19 52 41.3					
			F	20 23					
7	July 22	IIr	eP <sub>N</sub>	17 15 47.7					J.S.A. epicenter 64°5 N. 145°1 W.
			eP <sub>E</sub>	17 15 49.2					
			iP <sub>N</sub>	17 15 55.9					
			iP <sub>E</sub>	17 15 56.2					
			eL <sub>EN</sub>	17 24 17					
			F	19 24					
8	July 23	Id	eP <sub>E</sub>	22 33 59.9					See discussion, p. 103
			eP <sub>N</sub>	22 34 00.1					
			iS <sub>E</sub>	22 35 06.5					
			F	22 35					

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
9	July 24	Id	iPEN	7 07 27.7					See discussion, p. 103
			iSE	7 07 29.4					
			iSN	7 07 29.5					
			F	7 08					
10	July 24	Id	ePN	16 45 08.2					See discussion, p. 103
			ePE	16 45 08.8					
			eSE	16 45 13.8					
			eSN	16 45 14.8					
			F	16 46.5					
11	July 26	Ir	iPE	3 53 08.8					J.S.A. epicenter 18°6 N. 95°8 W.
			ePN	3 53 08.8					
			eE	3 57 58.6					
			F	4 54					
12	July 26	Iu	ePE	20 08 03					U.S.C. & G.S. epicenter 40° N. 141°E.
			ePN	20 08 04					
			eN	20 17 24					
			F	20 49					
13	July 29	Iv	eN	17 00 46.5					See discussion, p. 103
			eE	17 00 51					
			iN	17 00 54.6					
			eN	17 01 28.2					
			F	17 03					
14	July 29	Id	iPE	19 03 15.1					See discussion, p. 103
			iPN	19 03 15.3					
			iSE	19 03 16.3					
			iSN	19 03 16.5					
			F	19 04					
15	Aug. 6	Iv	ePE	3 24 06.6					Pasadena reports epi- center near Lake Tahoe.
			ePN	3 24 06.8					
			eSE	3 24 33.9					
			eSN	3 24 34.5					
			F	3 28					
16	Aug. 9	Iv	iPN	16 16 35.9	0.5		-0.3		See discussion, p. 104
			iPE	16 16 36.1					
			iN	16 16 40.8					
			iSE	16 16 41.6					
			iN	16 16 42.8					
			iE	16 16 43.3					
			F	16 18					



## MOUNT HAMILTON

No.	Date	Character	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
17	Aug. 11	I	iE	1 13 38					
			eN	1 13 38					
			iEN	1 13 41					
			F	1 23					
18	Aug. 11	Id	ePE	20 24 21.8					See discussion, p. 104
			ePN	20 24 21.9					
			eSE	20 24 23.3					
			eSN	20 24 24					
			F	20 25					
19	Aug. 12	Iv	eE	7 31 46.6				See discussion, p. 104	
			eN	7 31 46.8					
			F	7 36					
20	Aug. 15	Id	ePE	19 01 35.6				See discussion, p. 104	
			ePN	19 01 35.8					
			eSE	19 01 48.1					
			iSN	19 01 49.3					
			F	19 04					
21	Aug. 16	Iv	ePE	7 36 45				See discussion, p. 104	
			eN	7 36 47					
			eN	7 37 24					
			F	7 40					
22	Aug. 19	Iu	eEN	7 04 32.4				Epicenter in Esmeralda Co., Nevada. V at Gilbert (Nev.), IV at Benton, Bishop, Bodie, Law. II at Bigpine.	
			eE	7 05 08.8					
			eN	7 05 09.4					
			F	7 10					
23	Aug. 20	Iu	ePN	12 13 14					
			eE	12 13 15					
			F	14 20					
24	Aug. 20	Id	iPE	13 12 21.8				See discussion, p. 104	
			ePN	13 12 21.8					
			iSN	13 12 23.4					
			iSE	13 12 23.6					
			F	13 13					

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
	1937								
25	Aug. 20	I	ePN ePE iN iE eE eN iN iE F	14 51 28.2 14 51 28.7 14 51 39.3 14 51 39.4 14 51 55.2 14 51 55.3 14 52 06.3 14 52 06.4 14 55					May be two shocks. See discussion, p. 104
26	Aug. 22	Iv	ePN iPN ePE eSE eSN F	1 56 50.4 1 56 51.1 1 56 51.9 1 57 13.4 1 57 14.1 1 59					See discussion, p. 104
27	Aug. 23	Iv	ePN ePE iPN iSEN F	0 32 58.1 0 32 59.0 0 32 59.5 0 33 16.8 0 34					See discussion, p. 104
28	Aug. 24	I	eEN F	20 21 33 20 25					
29	Aug. 27	I	eEN F	00 03 24 00 12					
30	Aug. 29	Id	iPE iPN F	5 19 17.3 5 19 17.7 5 21					See discussion, p. 104
31	Aug. 29	Id	iPN iPE F	5 22 25.3 5 22 25.5 5 23.5					S-P = 1.8 s. ca. See discussion, p. 104
32	Aug. 29	Id	iPN iN F	5 25 53.5 5 25 55.1 5 26					S-P = 1.8 s. See discussion, p. 104
33	Sept. 1	Iu	ePE ePN eSN F	8 51 34 8 51 35 9 02 20 9 56					U.S.C. & G.S. epicenter 31° S. 179° W.



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
34	Sept. 1	Iv	eE	13 49 18					Pasadena epicenter near Alta Loma; felt in Southern California.
			eN	13 49 19					
			F	13 55.5					
35	Sept. 1	I	eN	16 36 39					
			eE	16 36 41					
			F	16 42.5					
36	Sept. 3	Ir	eP <sub>E</sub>	18 55 53					U.S.C. & G.S. epicenter 52°5 N. 177°5 W.
			eP <sub>N</sub>	18 55 53.8					
			iP <sub>N</sub>	18 56 01.2					
			eS <sub>E</sub>	19 02 04					
			eS <sub>N</sub>	19 02 06					
F	20 25								
37	Sept. 5	Id	iP <sub>N</sub>	9 10 21.6					See discussion, p. 105
			iS <sub>N</sub>	9 10 29.0					
			F	9 12.5					
38	Sept. 9	I	eN	00 21 56					
			eE	00 22 00					
			eN	00 22 24.3					
			eE	00 22 25					
			F	00 24					
39	Sept. 11	I	eP <sub>E</sub>	21 50 19.1					See discussion, p. 105
			iE	21 50 26.2					
			iS <sub>N</sub>	21 50 27.1					
			F	21 51.4					
40	Sept. 15	Iu	eP <sub>E</sub>	12 40 08					U.S.C. & G.S. epicenter 9° S. 161° E.
			eS <sub>N</sub>	12 50 29					
			eS <sub>E</sub>	12 50 31					
			F	13 41					
41	Sept. 15 & 16	Ir	eP <sub>E</sub>	23 56 42					U.S.C. & G.S. epicenter 14° N. 92° W.
			eP <sub>N</sub>	23 56 44					
			eS <sub>E</sub>	00 01 20					
			F	00 26					
42	Sept. 17	I	eN	6 05 02					Trace.
			eE	6 05 04					
			F	6 08					

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
43	Sept.17	I	eN	14 55 32					Very small.
			eE	14 55 34.3					
			eEN	14 56 12					
			F	14 58					
44	Sept.17	Id	ePN	18 20 17.2					See discussion, p. 105
			ePE	18 20 17.4					
			eSN	18 20 26.9					
			iME	18 20 28.4					
			iMN	18 20 28.5					
			F	18 22					
45	Sept.18	Id	eFN	13 29 17.9					See discussion, p. 105
			iSN	13 29 28.9					
			iSE	13 29 29.2					
			F	13 33					
46	Sept.20	I	ePN	7 08 59					Faint trace.
			ePE	7 09 02					
			F	7 41					
47	Sept.23	Iu	ePE	13 19 00					U.S.C. & G.S. epicenter 6° S. 154° E.
			ePN	13 19 04					
			eSE	13 29 34					
			eSN	13 29 38					
			F	15 25					
48	Sept.25	Id	iPE	04 18 06.6					See discussion, p. 105
			iPN	04 18 06.9					
			iSEN	04 18 08.0					
			F	04 19.5					
49	Sept.25	Iv	ePN	12 21 31.5					See discussion, p. 105
			eE	12 21 32.5					
			eSN	12 21 59.5					
			eSE	12 22 00.5					
			F	12 23.5					



PALO ALTO

THE BRANNER STATION, STANFORD UNIVERSITY  
PALO ALTO, CALIFORNIA



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Latitude and longitude:

$$\varphi = 37^{\circ} 25' \text{ N.}$$

$$\lambda = 122^{\circ} 11' \text{ W.}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 83 meters (272 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
				h. m. s.	
	1937				
1	July 1	Id	iPE iPN iSE iSN F	0 47 06.2 0 47 06.3 0 47 07.8 0 47 07.9 0 48	See discussion, p. 102
2	July 1	Id	ePE iN iSE F	17 51 44.5 17 51 45.4 17 51 45.9 17 52.5	See discussion, p. 102
3	July 1	Id	iE iN F	17 54 03.6 17 54 03.7 17 55	See discussion, p. 102
4	July 1	Id	ePE iSE iSN F	18 28 56.3 18 28 57.0 18 28 58.0 18 29.5	See discussion, p. 102
5	July 7	Id	iPE iPN iN iSN F	21 44 56.9 21 44 57.4 21 44 58.5 21 44 59.5 21 46	See discussion, p. 102
6	July 11	Ir	ePE ePN eSE eSN F	17 24 12.4 17 24 13.6 17 28 14.4 17 28 19.4 17 47	J.S.A. epicenter 20°7 N. 108°3 W.
7	July 18	Id	ePE iPN iPE iE iSN iE F	11 59 17.8 11 59 18.0 11 59 18.4 11 59 19.1 11 59 25.1 11 59 25.4 12 02	See discussion, p. 102
8	July 19	Iu	ePEN ipPE ipPN eSE eSN F	19 45 00.2 19 45 43.2 19 45 43.4 19 52 46.2 19 52 50.2 19 57	J.S.A. epicenter 1°5 N. 77°5 W. Probable depth 175 km.



## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
9	July 19	Id	iP <sub>E</sub>	21 12 28.8	See discussion, p. 102
			iS <sub>N</sub>	21 12 30.2	
			eS <sub>E</sub>	21 12 30.2	
			F	21 13	
10	July 21	Id	eP <sub>N</sub>	16 58 11.7	See discussion, p. 102
			eP <sub>E</sub>	16 58 12.6	
			iE	16 58 15.5	
			iN <sub>F</sub>	16 58 15.6	
			F	16 59	
11	July 22	Iu	eP <sub>EN</sub>	17 15 51.7	J.S.A. epicenter 64°5 N. 145°1 W.
			eE	17 20 36.7	
			eN <sub>F</sub>	17 20 59.7	
			F	19 00	
12	July 23	Id	eE	11 40 07.7	See discussion, p. 102
			eN	11 40 09.3	
			eE	11 40 09.4	
			iE <sub>F</sub>	11 40 12.6	
			F	11 41	
13	July 23	Id	eE <sub>F</sub>	11 41 49.3	See discussion, p. 102
			F	11 42.5	
14	July 23	Id	eE	11 54 13.0	See discussion, p. 102
			eN <sub>F</sub>	11 54 13.3	
			F	11 55	
15	July 23	Id	eP <sub>EN</sub>	12 05 59.3	See discussion, p. 102
			F	12 07	
16	July 23	Id	eP <sub>E</sub>	12 12 13.8	See discussion, p. 102
			F	12 13	
17	July 23	Id	eE	12 13 48.3	See discussion, p. 102
			eN <sub>F</sub>	12 13 58.3	
			F	12 15	
18	July 23	Id	eP <sub>E</sub>	22 34 06.6	See discussion, p. 103
			eP <sub>N</sub>	22 34 06.9	
			iS <sub>E</sub>	22 34 15.5	
			eS <sub>N</sub>	22 34 15.6	
			iE <sub>F</sub>	22 34 17.0	
			F	22 35	

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
				h. m. s.	
19	July 24	Id	eEN F	16 45.3 16 46.5	S-P = 9 s. See discussion, p. 103
20	July 26	Ir	ePN ePE F	3 53 13 3 53 14 4 20	J.S.A. epicenter 18°6 N. 95°8 W.
21	July 29	Iv	eE eE eN F	17 00 57 17 01 02.8 17 01 38.8 17 03	See discussion, p. 103
22	July 29	Id	iPE iN F	18 01 05.3 18 01 06.7 18 02	S-P = 1.2 s. See discussion, p. 103
23	Aug. 6	Iv	ePEN eN iE iN F	3 24 12.3 3 24 35.3 3 24 40.7 3 24 42.2 3 29	See discussion, p. 103
24	Aug. 9	Id	iPE iN iSE eE eN iN F	16 16 41.4 16 16 42.3 16 16 50.6 16 16 52.2 16 16 54.1 16 16 54.8 16 34	See discussion, p. 104
25	Aug. 10	Id	iPE ePN iN iSN F	18 58 57.4 18 58 57.8 18 58 59.0 18 59 00.0 19 00	See discussion, p. 104
26	Aug. 11	I	eE eN iE F	1 13 36.7 1 13 40 1 13 46.2 1 15	
27	Aug. 12	Iv	ePN iPE F	7 31 42.2 7 31 42.2 7 35	See discussion, p. 104



## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
28	Aug. 15	Iv	iPE	19 01 40.6	See discussion, p. 104
			iPN	19 01 40.8	
			iE	19 01 57.9	
			iN	19 01 58.0	
			F	19 04	
29	Aug. 19	Iv	ePE	7 04 40.3	Epicenter in Esmeralda Co., Nevada. V at Gilbert (Nev.), IV at Benton, Bishop, Bodie, Law, II at Bigpine.
			eN	7 04 47.4	
			eSE	7 05 23.4	
			eSN	7 05 25.3	
			F	7 09	
30	Aug. 20	I	eEN	12 39.6	Surface waves of distant quake.
			F	14 00	
31	Aug. 20	I	ePN	14 51 32.9	Perhaps two shocks. See discussion, p. 104
			ePE	14 51 33.1	
			iE	14 51 46.7	
			iN	14 51 47.8	
			iE	14 52 12.9	
			F	14 57.5	
32	Aug. 22	Iv	ePN	1 56 53.5	See discussion, p. 104
			iPE	1 56 55.6	
			iSE	1 57 19.6	
			F	1 59	
33	Aug. 23	Iv	ePE	0 33 02.4	See discussion, p. 104
			eN	0 33 05.6	
			eSEN	0 33 26.6	
			F	0 35	
34	Aug. 24	I	iE	0 03 18.5	
			eN	0 03 19.2	
			eE	0 04 10.3	
			iN	0 00 11.6	
			F	0 12	
35	Aug. 29	Id	iPE	5 19 23.2	See discussion, p. 104
			iPN	5 19 23.5	
			iSE	5 19 28.9	
			F	5 22	

## PALO ALTO

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
				h.	m.	s.	
	1937						
36	Aug. 29	Id	iPN iPE iSE iN iE F	5	22	31.3 31.4 36.8 44.7 44.8 24	See discussion, p. 104
37	Sept. 1	Iu	ePN eSN eLN F	8	51	34.8 18.5 28.5 00	U.S.C. & G.S. epicenter 31° S. 179° W.
38	Sept. 1	Iv	eN F	13	49	28.3 54	Pasadena epicenter near Alta Loma; felt in Southern California.
39	Sept. 1	I	eN F	16	36	48 41	Trace of quake.
40	Sept. 1	I	eEN F	21	54	03 58	Faint trace of quake.
41	Sept. 3	Id	iPE iSEN iN F	17	25	15.6 16.8 17.8 26	See discussion, p. 105
42	Sept. 3	Ir	iPEN ePCPE iSEN F	18	55.8	57.8 01.9 12	U.S.C. & G.S. epicenter 52°3 N. 177°5 W.
43	Sept. 5	Id	iPN iPE eSEN iSEN F	9	10	26.3 26.5 37.1 38.3 13	See discussion, p. 105
44	Sept. 8	Iu	eEN F	0	58	47.5 04	U.S.C. & G.S. epicenter South Atlantic.
45	Sept. 8	Id	iPE iN iSE iN F	15	20	41.3 42.3 42.6 43.4 22	See discussion, p. 105



## PALO ALTO

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
				h.	m.	s.	
	1937						
46	Sept. 11	Id	ePE	21	50	24.9	See discussion, p. 105
			eN	21	50	26.4	
			eSE	21	50	36.4	
			iN	21	50	38.7	
			F	21	51.4		
47	Sept. 15	Iu	ePE	12	40	08.6	U.S.C. & G.S. epicenter 9° S. 161° E.
			ePN	12	40	09.6	
			iPN	12	40	10.5	
			iPE	12	40	10.7	
			eE	12	50	30.6	
			eN	12	50	39.6	
			F	13	45		
48	Sept. 15 & 16	Ir	ePE	23	55	51.9	U.S.C. & G.S. epicenter 14° N. 92° W.
			ePN	23	55	55.4	
			eLN	00	06.3		
			F	00	32		
49	Sept. 17	I	eE	6	05	01	
			eE	6	06	02	
			eN	6	06	04	
			F	6	08.5		
50	Sept. 17	Iv	iPEN	18	20	23.9	See discussion, p. 105
			iSE	18	20	39.4	
			iE	18	20	43.5	
			iN	18	20	43.8	
			F	18	23.5		
51	Sept. 18	Iv	iPE	13	29	23.9	See discussion, p. 105
			iPN	13	29	24.5	
			iPE	13	29	25.0	
			iN	13	29	37.7	
			iE	13	29	38.8	
			iSE	13	29	41.1	
			iSN	13	29	41.3	
			F	13	32.5		
52	Sept. 23	I	eE	8	42	22	Trace of quake.
			eN	8	42	51	
			F	8	45.5		

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
53	Sept. 23	Iu	eP <sub>E</sub>	13 19 01	U.S.C. & G.S. epicenter 6° S. 154° E.
			eP <sub>N</sub>	13 19 02	
			eS <sub>N</sub>	13 29 28	
			eS <sub>E</sub>	13 29 33	
			eSR <sub>3N</sub>	13 41.2	
			e <sub>F</sub> <sup>EN</sup>	13 46.2	
			F	16 00	
54	Sept. 29	I	eP <sub>E</sub>	11 33 25	Trace of distant quake.
			eP <sub>N</sub>	11 33 30	
			e <sub>N</sub>	11 38 25	
			F	12 00	



## SAN FRANCISCO

THE SAN FRANCISCO STATION, UNIVERSITY OF SAN FRANCISCO  
 SAN FRANCISCO, CALIFORNIA

---

 CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude:

$$\varphi = 37^{\circ} 46' \text{ N.}$$

$$\lambda = 122^{\circ} 27' \text{ W.}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 100 meters (328 feet) above mean sea level.

## CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	E 15° S	1500	1	15
	N	3000	1	15

## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time U.T.	Remarks
	1937			h. m. s.	
1	July 11	Iu	ePN ePE eSE eSN F	17 24 24 17 24 26 17 28 31 17 28 32 17 50	J.S.A. epicenter 20 <sup>o</sup> .7 N. 108 <sup>o</sup> .3 W.
2	July 18	Id	iPN iPE iSE F	11 59 11.0 11 59 11.1 11 59 13.2 12 00	See discussion, p. 102
3	July 22	Ir	ePN eE F	17 15 20 17 15 49 19 10	J.S.A. epicenter 64 <sup>o</sup> .5 N. 145 <sup>o</sup> .1 W.
4	July 23	Id	iSE iSN F	11 22 31.7 11 22 31.8 11 23	See discussion, p. 102
5	July 23	Id	iE iN F	11 30 19.2 11 30 19.6 11 31	See discussion, p. 102
6	July 23	Id	iPN iSN iSE F	11 31 49.9 11 31 52.9 11 31 53.2 11 32.5	See discussion, p. 102
7	July 23	Id	ePN F	11 32 53.5 11 33.2	S-P = 3 s See discussion, p. 102
8	July 23	Id	iPN iSEN iE F	11 40 06.2 11 40 09.5 11 40 14.7 11 41	See discussion, p. 102
9	July 23	Id	iPN iSEN F	11 41 46.4 11 41 49.9 11 42.5	See discussion, p. 102
10	July 23	Id	iPN iSE iSN F	11 54 10.9 11 54 14.0 11 54 14.1 11 55	See discussion, p. 102



## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
11	July 23	Id	iP <sub>E</sub>	12 05 57.8	See discussion, p. 102
			iP <sub>N</sub>	12 05 57.9	
			iS <sub>E</sub>	12 06 00.9	
			iS <sub>N</sub>	12 06 01.2	
			F	12 06.5	
12	July 23	Id	iP <sub>N</sub>	12 12 12.8	See discussion, p. 102
			iS <sub>EN</sub>	12 12 16.0	
			F	12 13	
13	July 23	Id	iS <sub>E</sub>	12 13 48.8	See discussion, p. 102
			iS <sub>N</sub>	12 13 48.9	
			i <sub>E</sub>	12 13 58.3	
			F	12 14.5	
14	July 23	Id	i <sub>EN</sub>	22 34 27.9	See discussion, p. 103
			i <sub>N</sub>	22 34 28.7	
			F	22 35.5	
15	July 26	I	eP <sub>EN</sub>	3 53 16.1	J.S.A. epicenter 18°6' N. 95°8' W.
		F	4 40		
16	Aug. 5	Id	i <sub>N</sub>	15 37 43.4	See discussion, p. 103
			iS <sub>N</sub>	15 37 46.1	
			iS <sub>E</sub>	15 37 46.3	
			F	15 39	
17	Aug. 6	Iv	eP <sub>E</sub>	3 24 10.9	See discussion, p. 103
			eP <sub>N</sub>	3 24 13.1	
			i <sub>N</sub>	3 24 40.2	
			e <sub>E</sub>	3 24 40.4	
			F	3 28	
18	Aug. 9	Iv	eP <sub>N</sub>	16 16 47.7	See discussion, p. 104
			eP <sub>E</sub>	16 16 48.2	
			iS <sub>N</sub>	16 17 02.8	
			iS <sub>E</sub>	16 17 03.8	
			F	16 18	
19	Aug. 12	Iv	e <sub>N</sub>	7 31 44.3	See discussion, p. 104
			e <sub>E</sub>	7 32 08.3	
			F	7 34.5	
20	Aug. 15	Iv	e <sub>N</sub>	19 01 57	See discussion, p. 104
			e <sub>E</sub>	19 01 58	
			F	19 04	

## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
21	Aug. 19	Iv	ePN	7 04 47.7	Epicenter in Esmeralda Co., Nevada. V at Gilbert (Nev.), IV at Benton, Bishop, Bodie, Law, II at Bigpine.
			ePE	7 04 48.3	
			eN	7 05 23.9	
			iSE	7 05 28.7	
			iSN	7 05 29.6	
			F	7 09	
22	Aug. 20	I	eEN	12 17.0	
			eEN	12 24.0	
			F	13 50	
23	Aug. 27	I	eN	0 03 13	
			F	0 12	
24	Aug. 29	Id	iPN	5 19 27.7	No E-W record. See discussion, p. 104
			iSN	5 19 37.5	
			F	5 21	
25	Sept. 1	Iu	ePE	8 57 01	
			ePN	8 57 05	
			eSN	9 07 26	
			F	12 15	
26	Sept. 3	Ir	ePN	18 55 47.3	U.S.C. & G.S. epicenter 52°5 N. 177°5 W.
			ePE	18 55 47.8	
			eSN	19 01 37	
			eSE	19 01 50.8	
			F	20 30	
27	Sept. 11	Iv	ePE	21 50 32.4	See discussion, p. 105
			eE	21 50 46.0	
			eN	21 50 46.4	
			F	21 52	
28	Sept. 15	Iu	ePE	12 40 06.4	U.S.C. & G.S. epicenter 9° S. 161° E.
			ePN	12 40 08.4	
			eSEN	12 50 27.4	
			F	13 45	
29	Sept. 18	Iv	ePN	13 29 30.5	See discussion, p. 105
			ePE	13 29 31.5	
			iN	13 29 33.6	
			eSN	13 29 48.3	
			iSN	13 29 50.1	
			eSN	13 29 50.3	
			F	13 32	



## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
30	Sept. 23	Ir	eP <sub>N</sub>	13 19 03.4	U.S.C. & G.S. epicenter 6° S. 154° E.
			eP <sub>E</sub>	13 19 05.4	
			eS <sub>N</sub>	13 29 32.4	
			eS <sub>E</sub>	13 29 33.4	
			F	15 00	
31	Sept. 29	I	eP <sub>N</sub>	11 33 21	Trace of distant quake.
			eP <sub>E</sub>	11 33 23	
			F	12 00	

## FERNDALE

THE FERNDALÉ STATION  
FERNDALÉ, CALIFORNIA

---

CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude:

$$\varphi = 40^{\circ} 34' \text{ N.}$$

$$\lambda = 124^{\circ} 16' \text{ W.}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 17 meters (55 feet) above mean sea level.

The seismographs are Bosch-Omori 25 kg. horizontal pendulums. They are oriented to record N-S and E-W motion. The station is operated by Mr. Joseph Bognuda, of Ferndale, in cooperation with the University of California.



## FERNDALE

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
				h. m. s.	
1	July 11	Ir	eEN F	17 35 17 50	J.S.A. epicenter 20°7 N. 108°3 W.
2	July 19	Iu	ePE ePN eN eE eSE eSN F	19 45 26 19 45 30 19 46 10 19 46 12 19 53 26 19 53 36 20 10	J.S.A. epicenter 1°5 N. 77°5 W.
3	July 22	Iu	ePE ePN eE eN F	17 15 26 17 15 35 17 20 13 17 20 32 18 30	J.S.A. epicenter 64°5 N. 145°1 W.
4	July 26	Ir	ePE ePN F	3 53 40 3 53 45 4 30	J.S.A. epicenter 18°6 N. 95°8 W.
5	Aug. 5	Id	iPN iPE F	19 00 28.5 19 00 29.8 19 01.5	See discussion, p. 103  Station not in operation Aug. 9 to 12 inclusive.
6	Aug. 19	I	eE eE eMN F	15 17 16 15 23 56 15 40.0 16 40	Trace of distant shock. Beginning obscured by microseisms.
7	Aug. 27	I	iEN iEN F	0 02 36 0 02 54.5 0 18	
8	Sept. 3	Ir	ePN ePE eN iE iN F	18 55 28 18 55 30 18 55 39 19 01 14 19 01 15 20 30	U.S.C. & G.S. epicenter 52°5 N. 177°5 W.

## FERNDALE

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
				h. m. s.	
9	Sept. 15	Iu	ePEN	12 40 14	U.S.C. & G.S. epicenter 9° S. 161° E.
			eSE	12 50 28	
			eSN	12 50 32	
			F	13 30	
10	Sept. 15 & 16	Ir	ePE	23 56 16	U.S.C. & G.S. epicenter 14° N. 92° W.
			ePN	23 56 30	
			eSEN	00 02 16	
			F	00 30	
11	Sept. 16	I	eN ?	18 04 10	
			eE	18 04 14	
			eN	18 04 16	
			iEN	18 04 36	
			F	18 36	
12	Sept. 22	Id	ePE	17 57 16	See discussion, p. 105
			ePN	17 57 18	
			eSN	17 57 25	
			eSE	17 57 26	
			F	18 01	
13	Sept. 22	Id	ePE	18 12 37	See discussion, p. 105
			eSE	18 12 45	
			eSN	18 12 47	
			F	18 16	
14	Sept. 23	Id	ePE	8 41 40	See discussion, p. 105
			eSE	8 41 49	
			eSN	8 41 50	
			F	8 45	
15	Sept. 23	Iu	ePN	13 18 40	U.S.C. & G.S. epicenter 6° S. 154° E.
			ePE	13 19 00	
			eSE	13 29 44	
			eSN	13 29 48	
			F	15 00	
16	Sept. 25	Id	ePN	18 11 27	See discussion, p. 105
			ePE	18 11 28	
			eSN	18 11 33	
			iSE	18 11 34	
			F	18 13	

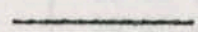


## FERNDALE

No.	Date	Char-acter	Phase	Time U.T.	Remarks
	1937			h. m. s.	
17	Sept. 29	Id	eE ePN iSEN F	2 38 46 2 38 48 2 38 52 2 40	See discussion, p. 105
18	Sept. 29	Id	eN eE F	11 32 44 11 32 46 12 10	

FRESNO

THE FRESNO STATION, FRESNO STATE COLLEGE  
FRESNO, CALIFORNIA



CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned} \phi &= 36^{\circ} 46'.1 \text{ N.} \\ \lambda &= 119^{\circ} 47'.8 \text{ W.} \end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 88.4 meters (290 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	N	3000	0.9	15



FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	July 11	Ir	ePN F	17 23 29.8 17 48	J.S.A. epicenter 20°7 N. 108°3 W.
2	July 19	Iu	ePN epPN F	19 44 48.1 19 45 29.8 20 00	J.S.A. epicenter 1°5 N. 77°5 W.
3	July 22	Iu	ePN eN F	17 16 03.6 17 27 37.6 18 34	J.S.A. epicenter 64°5 N. 145°1 W.
4	July 26	Ir	iPN F	3 52 55.7 4 49	J.S.A. epicenter 18°6 N. 95°8 W.
5	July 29	Iv	iPN iSN F	17 00 23.6 17 00 41.9 17 02	See discussion, p. 103
6	Aug. 6	Iv	ePN iPN iSN F	3 24 03.4 3 24 04.8 3 24 30.1 3 32	See discussion, p. 103
7	Aug. 9	Iv	iSN F	16 17 13.8 16 18	See discussion, p. 104
8	Aug. 15	Iv	ePN iSN F	19 01 39.4 19 01 54.0 19 06	See discussion, p. 104
9	Aug. 16	Iv	iPN iSN F	7 36 28.9 7 36 44.8 7 39	See discussion, p. 104
10	Aug. 19	IIv	iPN iN F	7 04 16.1 7 04 40.1 7 12	Epicenter in Esmeralda Co., Nevada. V at Gilbert, (Nev.), IV at Benton, Bodie, Law, II at Bigpine.
11	Aug. 19	Iv	iN F	7 49 32.6 7 51	Aftershock of previous quake.
12	Aug. 20	I	eN F	12 17 41.6 13 26	

FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
13	Aug. 20	Iv	i $\overline{S}$ <sub>N</sub>	14 51 54	Probably two shocks. See discussion, p. 104
			i <sub>N</sub>	14 52 21.9	
			F	14 55	
14	Aug. 22	Iv	i <sub>N</sub>	1 56 48	See discussion, p. 104
			i $\overline{S}$ <sub>N</sub>	1 57 06.4	
			F	2 01	
15	Aug. 23	Iv	i $\overline{P}$ <sub>N</sub>	0 32 40.7	See discussion, p. 104
			i $\overline{S}$ <sub>N</sub>	0 32 52.2	
			i <sub>N</sub>	0 32 52.9	
			F	0 36	
16	Aug. 27	I	e <sub>N</sub>	0 03 49	
			F	0 10	
17	Aug. 29	Iv	e <sub>N</sub>	5 19 57.0	See discussion, p.104
			e $\overline{S}$ <sub>N</sub>	5 20 05.0	
			e <sub>N</sub>	5 20 09.0	
			F	5 22	
18	Sept. 1	Iu	e $\overline{P}$ <sub>N</sub>	8 51 38.2	U.S.C. & G.S. epicenter 31° S. 179° W.
			e $\overline{S}$ <sub>N</sub>	9 02 23.8	
			F	9 07	
19	Sept. 1	Iv	i $\overline{P}$ <sub>N</sub>	16 36 21.7	Pasadena epicenter near Alta Loma, felt in Southern California.
			e <sub>N</sub>	16 37 06.2	
			F	16 41	
20	Sept. 1	I	e $\overline{P}$ <sub>N</sub>	21 54 06.7	
			F	21 58	
21	Sept. 3	Ir	e $\overline{P}$ <sub>N</sub>	18 56 06.5	U.S.C. & G.S. epicenter 52°5 N. 177°5 W.
			i $\overline{P}$ <sub>N</sub>	18 56 10.2	
			i <sub>N</sub>	18 56 20.5	
			i $\overline{S}$ <sub>N</sub>	19 02 26.6	
			F	20 08	
22	Sept. 9	Iv	i $\overline{P}$ <sub>N</sub>	22 12 34.5	Pasadena epicenter Owens Valley, vicinity of Little Lake.
			i $\overline{S}$ <sub>N</sub>	22 12 56.8	
			F	22 14	
23	Sept. 11	Iv	e <sub>N</sub>	21 50 40.6	See discussion, p. 105
			i $\overline{S}$ <sub>N</sub>	21 50 54.3	
			F	21 51.8	



## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
24	Sept. 15	Iu	eP <sub>N</sub>	12 40 17.0	U.S.C. & G.S. epicenter 9° S. 161° E.
			e <sub>N</sub>	13 05 53.0	
			F	13 25	
25	Sept. 15 & 16	Ir	eP <sub>N</sub>	23 55 49	U.S.C. & G.S. epicenter 14° N. 92° W.
			e <sub>N</sub>	00 06 04	
			F	00 38	
26	Sept. 16	Id	iP <sub>N</sub>	2 48 20.3	Pasadena epicenter near Parkfield.
			iS <sub>N</sub>	2 48 31.3	
			F	2 53	
27	Sept. 17	Iv	iS <sub>N</sub>	18 20 42	See discussion, p. 105
			F	18 22	
28	Sept. 18	Iv	iP <sub>N</sub>	13 29 31.6	See discussion, p. 105
			iS <sub>N</sub>	13 29 47.0	
			F	13 35	
29	Sept. 23	Iu	eP <sub>N</sub>	13 19 05	U.S.G. & G.S. epicenter 6° S. 154° E.
			F	14 39	
30	Sept. 25	Id	eP <sub>N</sub>	12 21 11.7	See discussion, p. 105
			iP <sub>N</sub>	12 21 12.5	
			iS <sub>N</sub>	12 21 26.5	
			F	12 24	
31	Sept. 25	I	e <sub>N</sub>	20 04 29	
			e <sub>N</sub>	20 04 44	
			F	20 06	
32	Sept. 27	I	eP <sub>N</sub>	9 15 18	
			F	9 40	
33	Sept. 29	I	eP <sub>N</sub>	11 33 43.0	
			e <sub>N</sub>	11 41 48	
			F	11 00	

EARTHQUAKES IN NORTHERN CALIFORNIA

AND

THE REGISTRATION OF EARTHQUAKES

AT

BERKELEY—MOUNT HAMILTON—PALO ALTO

SAN FRANCISCO—FERNDALE—FRESNO

FROM

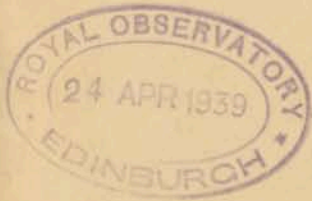
October 1, 1937, to December 31, 1937

BY

PERRY BYERLY

AND

JOHN N. ADKINS



BULLETIN OF THE SEISMOGRAPHIC STATIONS

VOLUME 7, No. 4, pp. 151-216

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BERKELEY, CALIFORNIA

1939



EARTHQUAKES IN NORTHERN CALIFORNIA

AND

THE REGISTRATION OF EARTHQUAKES

AT

BERKELEY--MOUNT HAMILTON--PALO ALTO  
SAN FRANCISCO--FERNDALE--FRESNO

FROM

OCTOBER 1, 1937 to DECEMBER 31, 1937

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And

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UNIVERSITY OF CALIFORNIA PRESS  
BERKELEY, CALIFORNIA  
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### EARTHQUAKE INTENSITY SCALE

Criteria of the Modified Mercalli Scale which were used to rate the intensities of the earthquakes registered were:

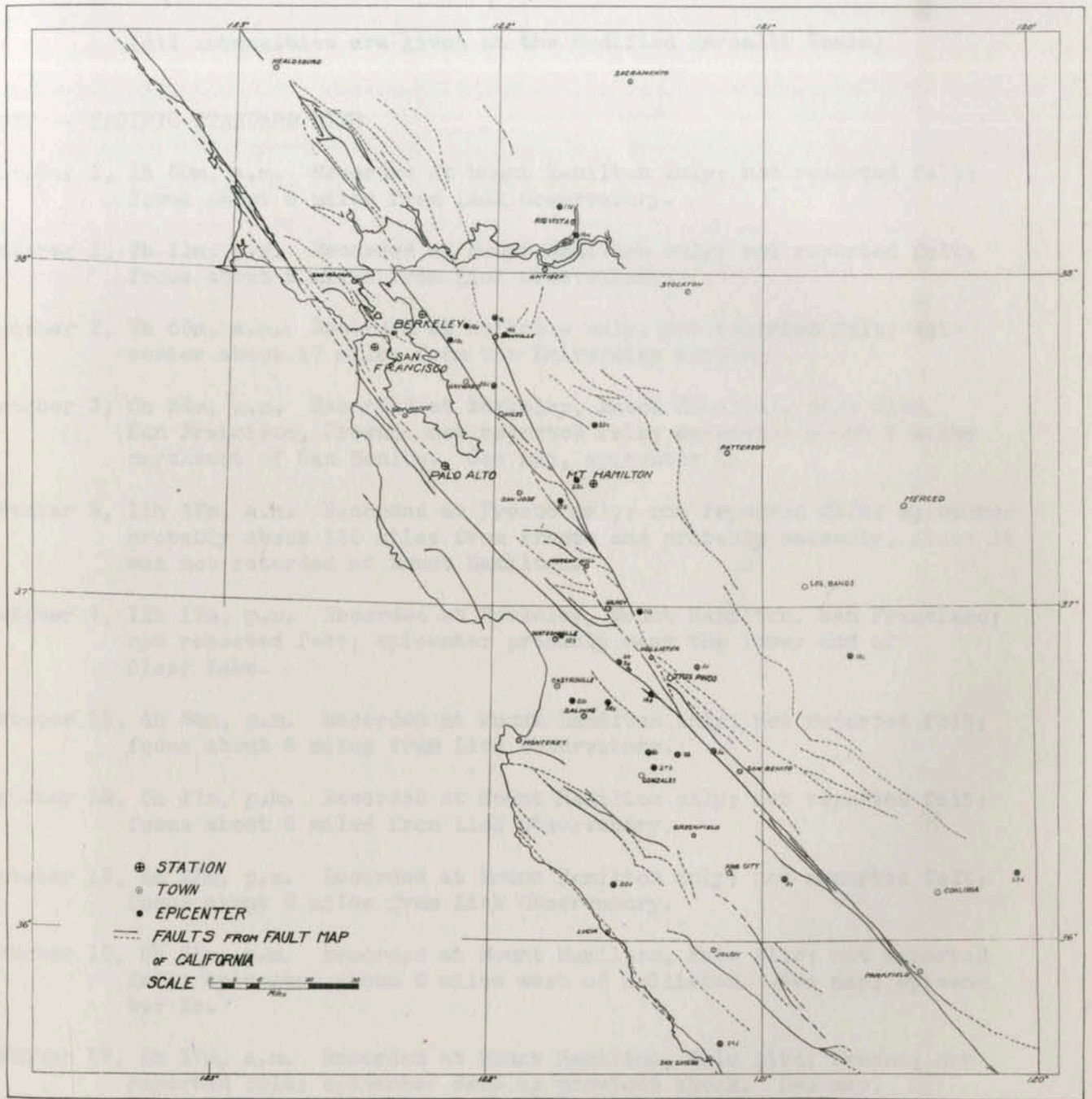
Intensity

- II Felt by a few people only. Duration or direction not appreciable.
- III Duration or direction appreciable.
- IV Rattling of doors and windows; swinging of suspended objects.
- V Disturbance of movable objects; plaster cracked.
- VI Overthrow of movable objects; cracking of chimneys and other brickwork.
- VII Fall of some chimneys; some damage to buildings.

---

Epicenters located in the following list are plotted on the accompanying map. A number and a letter are given beside each epicenter. The number is that assigned to the earthquake in the list. Only those earthquakes are given numbers for which epicenters were located. The letter represents the excellence with which the epicenter has been located, a indicating excellent, b good, c fair, d poor.





MAP SHOWING EPICENTERS, OCTOBER 1, 1937, TO DECEMBER 31, 1937.



## EARTHQUAKES IN NORTHERN CALIFORNIA

(All intensities are given on the Modified Mercalli Scale)

## 1937 -- PACIFIC STANDARD TIME

- October 1, 1h 50m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.
- October 1, 2h 11m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 5 miles from Lick Observatory.
- October 2, 1h 59m, a.m. Recorded at Berkeley only; not reported felt; epicenter about 17 miles from the University campus.
- October 3, 0h 24m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno: not reported felt; epicenter about 7 miles northwest of San Benito. See map, epicenter 1a.
- October 6, 11h 47m, a.m. Recorded at Fresno only; not reported felt; epicenter probably about 135 miles from Fresno and probably easterly, since it was not recorded at Mount Hamilton.
- October 7, 12h 17m, p.m. Recorded at Berkeley, Mount Hamilton, San Francisco; not reported felt; epicenter probably near the lower end of Clear Lake.
- October 13, 4h 54m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 3 miles from Lick Observatory.
- October 13, 5h 17m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 8 miles from Lick Observatory.
- October 13, 5h 22m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 8 miles from Lick Observatory.
- October 15, 9h 55m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; epicenter about 6 miles west of Hollister. See map, epicenter 2c.
- October 17, 6h 17m, a.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter same as previous shock. See map, epicenter 3c.
- October 18, 3h 11m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 4 miles north of Danville. See map, epicenter 4c.
- October 19, 11h 35m, a.m. Recorded at San Francisco only; not reported felt; focus about 5 miles from the University of San Francisco campus.
- October 19, 11h 48m, a.m. Recorded at Berkeley and poorly at San Francisco; not reported felt; focus about 7 miles from the University campus.



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October 19, 5h 18m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 12 miles from Lick Observatory.

October 22, 3h 08m, a.m. Recorded at Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; epicenter about 9 miles east of Hollister. See map, epicenter 5d.

October 26, 9h 25m, a.m. Recorded at Palo Alto only; not reported felt; focus about 5 miles from the Palo Alto station.

October 27, 7h 41m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco and poorly at Fresno. Reports of felt area confused with those of next shock. Epicenter about 6 miles north of Gonzales. See map, epicenter 6b. This was a foreshock of the next earthquake.

October 27, 7h 53m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno. Intensities:

IV Aptos, Ben Lomond, Big Sur, Boulder Creek, Chualar, Gonzales, Hollister, King City, Pinnacles, Salinas, San Juan Bautista, San Lucas, Santa Cruz, Tres Pinos, Watsonville;

III Gilroy, San Jose, San Martin;

II Seaside; epicenter same as that of previous shock. See map, epicenter 6b.

October 27, 7h 58m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco and poorly at Fresno. Reports of felt area confused with those of previous shock. Aftershock of that earthquake.

October 27, 8h 06m, a.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m.

October 27, 8h 25m, a.m. Recorded at Mount Hamilton, Palo Alto, San Francisco; not reported felt; aftershock of earthquake at 7h 53m, a.m.

October 27, 9h 36m, a.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m.

October 27, 12h 25m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno. Intensities:

IV Gonzales, Greenfield, Salinas, Spreckels;

III Monterey;

II Ben Lomond, Hollister, King City, Seaside, Tres Pinos; aftershock of earthquake at 7h 53m, a.m.



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- October 27, 12h 30m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt. This was a double shock, the second earthquake being about 23 seconds after the first and superposed on it; aftershock of earthquake at 7h 53m, a.m.
- October 27, 12h 35m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m.
- October 27, 12h 46m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; aftershock of earthquake at 7h 53m, a.m.
- October 27, 3h 53m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m.
- October 27, 7h 31m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m.
- October 28, 1h 03m, a.m. Recorded at Mount Hamilton only; II at Hollister; probably aftershock of earthquake at 7h 53m, a.m., October 27.
- October 28, 4h 27m, a.m. Recorded at Mount Hamilton, Palo Alto, San Francisco, Berkeley; II at Hollister; aftershock of earthquake at 7h 53m, a.m., October 27.
- October 28, 3h 46m, p.m. Recorded at Palo Alto only; not reported felt; focus about 7 miles from the Palo Alto station.
- October 28, 6h 10m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m., October 27.
- October 28, 7h 35m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m. October 27.
- October 28, 9h 57m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m., October 27.
- October 29, 6h 02m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; IV at Hollister; aftershock of earthquake at 7h 53m, a.m., October 27.
- October 29, 7h 26m, p.m. Recorded at Ferndale only; felt by a few people in Ferndale; epicenter about 25 miles from Ferndale.
- October 30, 2h 03m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock of earthquake at 7h 53m, a.m., October 27.
- October 30, 9h 46m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; aftershock of earthquake at 7h 53m, a.m., October 27. Probably two earthquakes 20 seconds apart.



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October 31, 10h 27m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 6 miles west of Hollister. See map, epicenter 7c.

October 31, 1h 56m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 9 miles northeast of Gonzales. See map, epicenter 8b.

October 31, 3h 49m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; aftershock of earthquake of October 27, 7h 53m, a.m. There is superposed on the coda at Mount Hamilton and Palo Alto what is probably the record of another aftershock.

October 31, 3h 55m, p.m. Recorded at Mount Hamilton, Palo Alto, not reported felt; aftershock from epicenter 8b.

October 31, 4h 02m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; aftershock from epicenter 8b or 6b.

November 1, 1h 40m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; another shock from epicenter 6b.

November 3, 2h 00m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno. Intensities:

V San Lucas;

IV King City;

III Lonoak, San Ardo; epicenter about 10 miles east of King City. See map, epicenter 9c.

November 3, 3h 22m, p.m. Recorded at Mount Hamilton, Palo Alto; not reported felt; another shock from epicenter 6b.

November 5, 6h 43m, a.m. Recorded at Berkeley, San Francisco; I in Berkeley; epicenter about 8 miles east southeast of the University campus. See map, epicenter 10d.

November 6, 11h 39m, p.m. Recorded at Palo Alto only; not reported felt; focus about 9 miles from the Palo Alto station.

November 8, 9h 58m, a.m. Recorded at Palo Alto only; not reported felt; focus about 10 miles from the Palo Alto station.

November 8, 3h 11m, p.m. Recorded at Mount Hamilton only; not reported felt; epicenter about 25 miles from Lick Observatory.



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November 9, 3h 50m, a.m. Recorded at Mount Hamilton only (Palo Alto record illegible); not reported felt; epicenter about 40 miles from Lick Observatory.

November 9, 7h 10m, a.m. Recorded at Mount Hamilton only; not reported felt; focus about 10 miles from Lick Observatory.

November 9, 9h 18m, a.m. Recorded at Mount Hamilton, Fresno (Palo Alto record illegible); not reported felt; probably a foreshock of earthquake of November 10 at 4h 32m, a.m.

November 9, 2h 43m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 8 miles from Lick Observatory.

November 9, 4h 31m, p.m. Recorded at Berkeley only; not reported felt; focus about 7 miles from the University campus. (blast?)

November 10, 4h 32m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno. Intensities:

IV Aptos, Gilroy, Mountain View, San Martin, Soquel;

III Watsonville;

II Ben Lomond; felt in Santa Cruz, Monterey and Carmel valley; epicenter about 6 miles east of Gilroy. See map, epicenter 11b.

November 10, 6h 29m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno. Intensities:

IV Aptos, Castroville, Gilroy, Hollister, Moss Landing, Watsonville;

III King City, Madrone, Soquel;

II Ben Lomond; felt in Carmel Valley, Monterey, Salinas; epicenter very near Watsonville. See map, epicenter 12b.

November 10, 4h 59m, p.m. Recorded at Berkeley only; not reported felt; focus about 5 miles from the University campus.

November 12, 10h 03m, a.m. Recorded at Palo Alto only; not reported felt; focus about 10 miles from the Palo Alto station.

November 12, 10h 23m, a.m. Recorded at Palo Alto only; not reported felt; focus about 9 miles from the Palo Alto station.

November 12, 5h 05m, p.m. Recorded at Ferndale only; not reported felt; focus about 25 miles from Ferndale.



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- November 12, 10h 46m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 7 miles from Lick Observatory.
- November 12, 11h 30m, p.m. Recorded at Berkeley, San Francisco; pile of valves collapsed in factory at 24th and Peralta Streets, Oakland; epicenter 7 miles southeast of the University campus. See map, epicenter 13c.
- November 13, 6h 51m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; III at Hollister; epicenter about 5 miles southwest of Tres Pinos. See map, epicenter 14d. There is probably a second shock superposed on the tail of this one.
- November 18, 6h 48m, a.m. Recorded at Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; probably an aftershock from epicenter 6b.
- November 18, 6h 53m, a.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; an aftershock from epicenter 8b.
- November 18, 12h 21m, p.m. Recorded at Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 6 miles west of Lick Observatory. See map, epicenter 15d.
- November 22, 11h 01m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 2 miles east of Danville. See epicenter, 16b.
- November 24, 9h 32m, p.m. Recorded at Berkeley only; not reported felt; focus about 6 miles from the University campus.
- November 25, 10h 20m, a.m. Recorded at Berkeley, Palo Alto, San Francisco; not reported felt; probably another shock from epicenter 16b.
- November 25, 3h 40m, p.m. Recorded at Berkeley, Mount Hamilton, San Francisco; not reported felt; epicenter about 3 miles northeast of Rio Vista. See map, epicenter 17d.
- November 28, 10h 00m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; another shock from epicenter 8b.
- November 28, 2h 55m, p.m. Recorded at Berkeley only; not reported felt; focus about 15 miles from the University campus.
- November 29, 9h 58m, a.m. Recorded at Palo Alto only; not reported felt; focus about 11 miles from the Palo Alto station.
- December 1, 7h 14m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; another shock from epicenter 6b.
- December 1, 4h 04m, p.m. Recorded at Berkeley only; not reported felt; focus about 9 miles from the University campus.



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- December 2, 9h 43m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; epicenter 10 miles north-east of Antioch. See map, epicenter 18a.
- December 4, 4h 16m, p.m. Recorded at Berkeley only; not reported felt; epicenter about 14 miles from the University campus. (May not be an earthquake.)
- December 4, 5h 36m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno. Mercy Hot Springs reports an earthquake of intensity IV at 5:45 p.m. and Los Banos one of intensity V at 6:15 p.m. These reports probably refer to this or the next shock which was superposed on it. Epicenter about 19 miles southeast of Los Banos. See map, epicenter 19c.
- December 4, 5h 37m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; epicenter same as that of previous shock which was smaller and therefore a foreshock.
- December 4, 6h 05m, p.m. Recorded at Mount Hamilton, Fresno; not reported felt; aftershock of previous earthquake.
- December 6, 4h 22m, p.m. Recorded at Berkeley only; not reported felt; focus about 4 miles from the University campus.
- December 6, 4h 35m, p.m. Recorded at Berkeley only; not reported felt; focus about 8 miles from the University campus.
- December 7, 9h 52m, a.m. Recorded at Palo Alto only; not reported felt; focus about 6 miles from the Palo Alto station.
- December 10, 8h 40m, p.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter 10 miles north of Lucia. See map, epicenter 20d.
- December 13, 2h 15m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, Fresno; III at Hollister; epicenter about 4 miles southeast of Castroville. See map, epicenter 21b.
- December 13, 8h 37m, a.m. Recorded at Mount Hamilton and poorly at Palo Alto; not reported felt; probably an aftershock from epicenter 21b.
- December 14, 2h 40m, p.m. Recorded at Berkeley only; not reported felt; focus about 6 miles from the University campus.
- December 14, 9h 57m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 9 miles from Lick Observatory.
- December 15, 5h 23m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 4 miles northwest of Lick Observatory. Depth of focus about 10 miles. See map, epicenter 22c.



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- December 19, 10h 01m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto; not reported felt; epicenter about 15 miles north of Lick Observatory. See map, epicenter 23c.
- December 19, 3h 11m, p.m. Recorded at Berkeley only; not reported felt; focus about 6 miles from the University campus.
- December 20, 2h 25m, p.m. Recorded at Palo Alto only; not reported felt; focus about 7 miles from the Palo Alto station.
- December 20, 2h 44m, p.m. Recorded at Berkeley only; not reported felt; focus about 9 miles from the University campus.
- December 22, 11h 24m, a.m. Recorded at Fresno and weakly at Mount Hamilton; IV at Navelencia; epicenter probably near Auberry.
- December 24, 7h 35m, p.m. Recorded at Mount Hamilton, Palo Alto, Fresno; not reported felt; epicenter probably about 4 miles northeast of San Simeon. See map, epicenter 24d.
- December 25, 5h 01m, a.m. Recorded at Mount Hamilton, Fresno; not reported felt; epicenter probably about 17 miles northeast of Coalinga. See map, epicenter 25d.
- December 25, 8h 25m, p.m. Recorded at Berkeley only; not reported felt; focus about 12 miles from the University campus.
- December 25, 9h 00m, p.m. Recorded at Berkeley only; not reported felt; focus about 3 miles from the University campus.
- December 26, 1h 24m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco, Fresno; not reported felt; epicenter about 6 miles northeast of Salinas. See map, epicenter 26c.
- December 27, 8h 35m, p.m. Recorded at Mount Hamilton only; not reported felt; focus about 7 miles from Lick Observatory.
- December 29, 7h 09m, a.m. Recorded at Berkeley, Mount Hamilton, Palo Alto, San Francisco; not reported felt; epicenter about 4 miles northeast of Gonzales. See map, epicenter 27b.
- December 29, 11h 09m, a.m. Recorded at Berkeley, Palo Alto; not reported felt; epicenter probably about 6 miles east of Hayward. See map, epicenter 28d.

STRUCTURE AND EVOLUTION OF THE EARTH

1. Structure of the Earth

- 1. (Surface) ...
- 2. (Crust) ...
- 3. (Mantle) ...
- 4. (Core) ...

THE REGISTRATION OF EARTHQUAKES

2. Types of the Earthquake

- 1. (Surface) ...
- 2. (Crust) ...
- 3. (Mantle) ...
- 4. (Core) ...

In general a lot of ...

- 1. (Surface) ...
- 2. (Crust) ...
- 3. (Mantle) ...
- 4. (Core) ...



## SYMBOLS AND NOTATIONS EMPLOYED

 1. Character of the Earthquake--

I. Perceptible.    II. Moderately strong.    III. Strong.

d (terrae motus domesticus)	Local shock (origin less than 100 kilometers distant).
v (terrae motus vicinus)	Near shock (origin from 100 to 1,000 kilometers distant).
r (terrae motus remotus)	Distant shock (origin from 1,000 to 5,000 kilometers distant).
u (terrae motus ultimus)	Very distant shock or teleseism (origin more than 5,000 kilometers distant).

 2. Phases of the Seismogram--

P (undae primae)	Normal first phase, or first preliminary tremors (longitudinal).
P'	First preliminary tremors which have penetrated the core of the earth.
PR <sub>n</sub>	Waves n times reflected at the earth's surface.
S (undae secundae)	Second phase, or second preliminary tremors (transverse).
SR <sub>n</sub>	Waves n times reflected at the earth's surface.
PS	Waves changed from longitudinal to transverse oscillation or vice versa through reflection at the earth's surface.
PPS	Waves twice reflected at the earth's surface, having been longitudinal on two branches of the path and transverse on one branch.

In general a bar over two letters denoting types of waves indicates refraction. The subscript <sub>c</sub> denotes the boundary at about 2900 km. depth between the core and the middle shell which surrounds it. Thus:

$\overline{S_C P_C S}$	Waves which have penetrated the core, having been transverse before entering and after leaving the core, and longitudinal within the core.
$\overline{P_C P_C} \overline{P_C P}$	Waves refracted at the core boundary into the core, reflected once at this boundary while within the core and again refracted out of the core, having remained longitudinal on all branches of the path.
L (undae longae)	Long waves of surface phase preceding M.
M (undae maximae)	Shorter and more regular waves of large amplitude in the surface phase.
M <sub>n</sub>	Greatest motion in the surface phase.
C (coda)	Tail or end portion.
F (finis)	End of discernible movement.
For local earthquakes a special notation is used:	
$\overline{P}$	The longitudinal wave which has traveled its whole path in the surface layer or crust of the earth.
$\overline{S}$	The transverse wave which has traveled its whole path in the surface layer of the earth.
P*	The longitudinal wave which has traveled the horizontal portion of its path in the intermediate layer.
S*	The corresponding transverse wave.

### 3. Nature of the Motion--

- i (impetus) Sudden beginning of the motion.  
 e (emersio) Gradual beginning of the motion.  
 T (period) Time of one complete oscillation.  
 A Trace amplitude measured from the media line, + earth motion toward east, north, or zenith, - toward west, south, or nadir.  
 A<sub>E</sub> E-W component of A.  
 A<sub>N</sub> N-S component of A.  
 A<sub>Z</sub> Vertical component of A.

### 4. Time--

- O (origin) Time of shock at point of origin.

CONTENTS OF THE RECORDS

Apparatus	Direction	V	%	n	A <sub>1</sub> (mm)	A <sub>2</sub> (mm)
Woodward's Magn. ...	1	42	72	10	0.003	
	2	45	11	10	0.001	
Woodward's Magn. ...	1	44	4	5	0.000	
	2	2,200	0.2	15		
		2,070	0.2	15		
Woodward's Magn. ...	1	112	12	12.5	0.001	150
	2	122	12	12.5	0.01	150
	3	148	12	11.5	0.01	150
		V	Coupled Period			
				6.7		

The letter A before a reading designated that the amplitude was from the Galvani instrument; B, Bismarck; C, South-America; D, South-America; E, Pacific.

Operation of the coupled instrument was started November 2, 1917.



BERKELEY

No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
1	Oct. 2	Id	e <sup>-</sup> PEN	A	9 58 45.0				See discussion, p. 155
			iSE	A	9 58 48.5				
			iSN	A	9 58 48.8				
			F		9 59.5				
2	Oct. 3	Iv	e <sup>-</sup> PN	A	8 24 55.8				See discussion, p. 155
			e <sup>-</sup> PE	A	8 24 55.9				
			F		8 27				
3	Oct. 3	I	eN	G	19 34 44				
			eE	G	19 34 54				
			F		20 00				
4	Oct. 4	I	eEN	G	8 02 10				
			eN	G	8 15 42				
			F		10 20				
5	Oct. 5	Ir	ePE	A	6 25 44				U.S.C. & G.S. epi- center: 22°N, 108°W
			ePN	A	6 25 45				
			ePE	B	6 25 45				
			ePZ	W	6 25 45				
			ePZ	G	6 25 45				
			iPN	G	6 25 45	8		-2.4	
			iPE	G	6 25 46	8	+2.1		
			iPZ	G	6 25 49	5		+3.0	
			iSN	G	6 29 16	16		-4.0	
			iSE	G	6 29 17	12	-7.2		
			eSE	A	6 29 18				
			eSN	A	6 29 19				
			eSEN	B	6 29 20				
			iE	G	6 29 24	11	+23.0		
			iN	G	6 29 24	13		+18.0	
eE	A	6 30 24							
F		7 50							
6	Oct. 6	Ir	ePEN	B	9 53 06				J.S.A. epicenter: 17.7°N, 99.0°W
			iPZ	G	9 53 06	5		-3.0	
			iPEN	G	9 53 07	6	+2.6	-2.2	
			ePEN	A	9 53 07				
			iE	G	9 54 25	9	+6.0		
			iN	G	9 54 29	7		+6.0	
			eSE	B	9 57 57				
			eN	A	10 02 52				
			eE	A	10 02 55				
			F		11 00				

## BERKELEY

No.	Date	Char-acter	Phase	Time		Period	Amplitude			Remarks
				U.T.			AE	AN	AZ	
				h.	m.	s.	s.	mm.	mm.	mm.
	1937									
7	Oct. 6	I	ePEZ	G	17	17	45			
			iN	G	17	17	57			
			iE	G	17	21	20			9
			iN	G	17	28	17			
			iE	G	17	28	19		-3.0	
			iN	G	17	28	31			9
			iE	G	17	29	55		-7.0	10
			eE	G	17	45.3				
			F		20	00				
8	Oct. 7	Iv	ePN	A	20	17	14			
			ePE	A	20	17	15			
			eSN	A	20	17	30.5			
			eSE	A	20	17	31			
			F		20	21				
9	Oct. 11	I	eN	G	22	02.0				
			F		22	25				Trace
10	Oct. 12	I	eN	G	5	27.0				
			F		5	40				Trace
11	Oct. 12	I	eN	G	16	08	26			
			eN	G	16	13	41			
			F		16	50				Trace
12	Oct. 12	I	eE	A	21	04	06			
			F		21	06				
13	Oct. 12	I	eN	G	21	12	29			
			F		21	45				Trace
14	Oct. 17	I	eN	G	5	17.9				
			F		5	55				Trace
15	Oct. 18	Id	iPE	A	23	11	24.3			
			iSE	A	23	11	27.8			
			F		23	12.5				See discussion, p. 155
16	Oct. 19	Id	iPN	A	19	47	48.6			
			iPE	A	19	47	48.7			
			iSE	A	19	47	49.9			
			iSN	A	19	47	50.1			
			F		19	48.6				See discussion, p. 155
17	Oct. 24	Ir	ePEN	A	11	41	56			
			ePZ	G	11	41	56			
			iSE	G	11	46	50			
			iSN	G	11	46	52			
			F		12	15				U.S.C.&G.S. epicenter: 62° N, 150° W



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No.	Date	Char-acter	Phase	Time U.T.		Period	Amplitude			Remarks	
							A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>		
				h.	m.	s.	s.	mm.	mm.	mm.	
	1937										
18	Oct. 27	Iv	ePN ePE eE eSN F	A	15	41	55.3				See discussion, p. 156
				A	15	41	56.1				
				A	15	42	14.8				
				A	15	42	16.7				
					15	44					
19	Oct. 27	Iv	ePN ePE iPN iE iSN iE F	A	15	53	45.9				See discussion, p. 156
				A	15	53	46.0				
				A	15	53	48.1				
				A	15	53	48.5				
				A	15	54	05.6				
				A	15	54	09.3				F lost in next shock.
20	Oct. 27	Iv	ePN eE eE eN eE F	A	15	58	16.7				See discussion, p. 156
				A	15	58	19.2				
				A	15	58	37.2				
				A	15	58	37.7				
				A	15	58	39.2				
					16	00.3					
21	Oct. 27	Iv	eN eE eN eE eN eE F	A	20	25	13.7				See discussion, p. 156
				A	20	25	14.1				
				A	20	25	15.9				
				A	20	25	16.2				
				A	20	25	33.1				
				A	20	25	36.8				
					20	28.4					
22	Oct. 27	Iv	ePN ePE eEN F	A	20	30	10.7				See discussion, p. 157
				A	20	30	11.2				
				A	20	30	33.0				
					20	33.4					
23	Oct. 27	Iv	ePN F	A	20	46	25.6				See discussion, p. 157
					20	48.4					
24	Oct. 28	Iv	eE eN eN eE F	A	12	27	17.9				See discussion, p. 157
				A	12	27	18.4				
				A	12	27	32.9				
				A	12	27	36.6				
					12	29.0					
25	Oct. 30	Iv	ePN ePE eSE F	A	2	02	23.7				See discussion, p. 157
				A	2	02	24.7				
				A	2	02	45.1				
					2	05.4					

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
26	Oct. 31	Iv	ePN	A	5 46 55.8				See discussion, p. 157
			ePE	A	5 46 58.6				
			F		5 48.8				
27	Oct. 31	Iv	e <sup>-</sup> PEN	A	18 27 35.6				See discussion, p. 158
			eSE	A	18 27 51.3				
			eSN	A	18 27 51.4				
			F		18 29.5				
28	Oct. 31	Iv	e <sup>-</sup> PN	A	21 56 10.0				See discussion, p. 158
			eE	A	21 56 10.5				
			F		21 58.5				
29	Oct. 31	Iv	ePN	A	23 49 16.7				See discussion, p. 158
			e <sup>-</sup> PEN	A	23 49 18.5				
			eN	A	23 49 35.4				
			eE	A	23 49 38.0				
			F		23 51.5				
30	Nov. 1	Iv	e <sup>-</sup> PEN	A	21 40 11.2				See discussion, p. 158
			e <sup>-</sup> PN	A	21 40 13.5				
			ePE	A	21 40 13.9				
			eN	A	21 40 34.2				
			eSE	A	21 40 35.1				
F		21 43.5							
31	Nov. 2	I	eE	G	11 37.5				Trace
			F		12 21				
32	Nov. 3	Iv	eN	A	10 00 03				See discussion, p. 158
			eE	A	10 00 12				
			eN	A	10 00 13				
			F		10 02.5				
33	Nov. 5	I	eE	G	10 18.2				Trace
			F		10 38				
34	Nov. 5	Id	i <sup>-</sup> PN	A	14 42 59.4				See discussion, p. 158
			i <sup>-</sup> PE	A	14 42 59.7				
			iSE	A	14 43 01.0				
			iSN	A	14 43 01.5				
			F		14 43.7				
35	Nov. 8	I	eE	G	6 20.0				Trace
			F		6 42				
36	Nov. 9	I	eN	G	10 58.6				Trace
			F		11 20				



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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
						mm.	mm.	mm.	
						h. m. s.	s.		
37	1937 Nov. 10	Id	i $\bar{P}$ <sub>N</sub> e $\bar{P}$ <sub>E</sub> i $\bar{P}$ <sub>Z</sub> iS <sub>N</sub> i $\bar{E}$ <sub>F</sub>	A A H A A A	0 31 33.3 0 31 33.6 0 31 33.6 0 31 34.8 0 31 35.6 0 31.8				See discussion, p. 159
38	Nov. 10	I	e $\bar{N}$ <sub>F</sub>	G	7 20 57 8 26				Trace
39	Nov. 10	Iv	e $\bar{P}$ <sub>N</sub> e $\bar{P}$ <sub>E</sub> i $\bar{P}$ <sub>N</sub> iS <sub>EN</sub> F	A A A A	12 32 09.4 12 32 09.8 12 32 10.7 12 32 25.5 12 35				See discussion, p. 159
40	Nov. 10	Iv	e $\bar{P}$ <sub>N</sub> e $\bar{P}$ <sub>E</sub> iS <sub>N</sub> i $\bar{E}$ <sub>F</sub>	A A A A	14 28 51.1 14 28 51.5 14 29 09.9 14 29 11.9 14 30.9				See discussion, p. 159
41	Nov. 11	Id	e $\bar{P}$ <sub>N</sub> i $\bar{P}$ <sub>Z</sub> eS <sub>E</sub>	A H A	0 59 30.9 0 59 30.9 0 59 31.6				See discussion, p. 159
42	Nov. 13	Id	e $\bar{P}$ <sub>N</sub> i $\bar{P}$ <sub>Z</sub> iS <sub>EN</sub> F	A H A	7 30 09.0 7 30 09.0 7 30 10.4 7 31				See discussion, p. 160
43	Nov. 13	I	eZ i $\bar{E}$ <sub>N</sub> e $\bar{N}$ i $\bar{E}$ <sub>F</sub>	G G G G	10 03 10 10 13 58 10 25 58 10 27 30 11 56	11	+3.0	-3.0	
44	Nov. 13	I	i $\bar{E}$ e $\bar{N}$ e $\bar{E}$ e $\bar{N}$ eZ F	G G G G G	18 17 03 18 17 13 18 29 49 18 30 07 18 33 59 19 46				

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks		
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>			
				h. m. s.	s.	mm.	mm.	mm.			
1937											
45	Nov. 14	Iv	iPZ	H	2 51 30.1				See discussion, p. 160		
			eP <sub>E</sub>	A	2 51 30.2						
			eP <sub>N</sub>	A	2 51 32.9						
			iZ	H	2 51 34.8						
			iZ	H	2 52 37.0						
			F		2 56						
46	Nov. 14	Iu	eP <sub>N</sub>	G	11 11 57				J.S.A. epicenter: 35°2 N, 72°8 E		
			ePZ	G	11 12 00						
			eZ	H	11 15 08						
			eEN	A	11 15 23						
			eEN	B	11 16 22						
			iZ	W	11 16 23						
			eP'EZ	G	11 16 24	6		-2.0			
			iP'N	G	11 16 27						
			eE	A	11 22 15						
			eN	B	11 22 16						
			eE	B	11 22 17						
			eN	A	11 22 17						
			iN	G	11 22 24						
			eE	A	11 24 02						
			iN	B	11 24 05						
eE	A	11 28 00									
F		14 00									
47	Nov. 15	I	e <sub>F</sub>	G	22 29.6						Trace
			F		23 26						
48	Nov. 17-18	I	i <sub>F</sub>	G	23 52 43						Trace
			F		00 12						
49	Nov. 19	I	eE	A	0 52 42				Felt in Nevada and Utah		
			eE	A	0 52 48						
			eN	A	0 52 49						
			iZ	H	0 54 22						
			eN	A	0 54 23						
			eE	A	0 54 25						
			eZ	G	0 54 26						
			iZ	G	0 55 09						
F		0 59									
50	Nov. 22	I	iZ	H	4 13 48				IV at Los Alamos. Pasadena reports epi- center off Point Arguello		
			eN	A	4 13 50						
			iZ	H	4 13 55						
			iE	A	4 13 56						
			eN	A	4 13 59						
			iN	G	4 14 24						
F		4 28									



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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
51	Nov. 23	Id	iP <sub>E</sub>	A	7 00 53.6	.3	+3		See discussion, p. 160
			iP <sub>N</sub>	A	7 00 53.7	.3		+2	
			iP <sub>Z</sub>	H	7 00 53.9				
			iS <sub>E</sub>	A	7 00 57.7				
			iS <sub>N</sub>	A	7 00 57.9				
			F		7 03.4				
52	Nov. 23	I	e <sub>N</sub>	G	14 33.4				Trace
			F		15 21				
53	Nov. 24	I	e <sub>N</sub>	G	2 27.3				Trace
			F		2 40				
54	Nov. 25	I	i <sub>E</sub>	G	5 21 01				Trace
			F		6 17				
55	Nov. 25	Id	iP <sub>Z</sub>	H	5 31 57.7				See discussion, p. 160
			iS <sub>Z</sub>	H	5 31 58.9				
			F		5 32.4				
56	Nov. 25	Id	iP <sub>Z</sub>	H	18 20 19.8				See discussion, p. 160
			iP <sub>N</sub>	A	18 20 19.8	.3		+ .6	
			eP <sub>E</sub>	A	18 20 19.9				
			iS <sub>N</sub>	A	18 20 24.1	.3		+5.5	
			iS <sub>E</sub>	A	18 20 24.2				
			F		18 21.4				
57	Nov. 25	Id	eP <sub>E</sub>	A	23 39 55.3				See discussion, p. 160
			iP <sub>Z</sub>	H	23 39 55.5				
			eP <sub>N</sub>	A	23 39 55.6	.4		+ .3	
			iS <sub>N</sub>	A	23 40 03.0	.5		+2	
			iS <sub>E</sub>	A	23 40 03.3				
			F		23 42.5				
58	Nov. 27	Iv	iP <sub>Z</sub>	H	20 40 05.1				Felt in Hawthorne, Nev. Epicenter probably near Candelaria, Nev.
			eP <sub>E</sub>	A	20 40 05.4				
			eP <sub>N</sub>	A	20 40 05.6				
			F		20 42.5				
59	Nov. 28	Iv	i <sub>Z</sub>	H	18 00 46.3				See discussion, p. 160
			e <sub>N</sub>	A	18 00 46.5				
			e <sub>E</sub>	A	18 00 46.7				
			F		18 02.6				
60	Nov. 28	Id	iP <sub>Z</sub>	H	22 54 45.8				See discussion, p. 160
			eP <sub>E</sub>	A	22 54 45.8				
			iP <sub>N</sub>	A	22 54 45.9				
			eS <sub>E</sub>	A	22 54 48.9				
			iS <sub>N</sub>	A	22 54 48.9				
			F		22 55.6				

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
61	Nov. 30	I	e <sub>N</sub> F	G 1 34.9 3 02					Trace
62	Nov. 30	I	e <sub>N</sub> F	G 14 01.0 15 37					Trace
63	Dec. 1	Iv	i <sub>PZ</sub> i <sub>Z</sub> e <sub>E</sub> e <sub>N</sub> F	H 15 14 30.4 H 15 14 53.9 A 15 14 54.1 A 15 14 54.2 15 16.7				See discussion, p. 160	
64	Dec. 2	Id	i <sub>P<sub>N</sub></sub> i <sub>PZ</sub> e <sub>E</sub> i <sub>S<sub>N</sub></sub> i <sub>SZ</sub> F	A 0 04 09.0 H 0 04 09.2 A 0 04 10.5 A 0 04 10.8 H 0 04 10.9 23 04.7				See discussion, p. 160	
65	Dec. 3	IIId	e <sub>P<sub>EN</sub></sub> i <sub>PZ</sub> i <sub>S<sub>EN</sub></sub> F	A 5 43 36.0 H 5 43 36.1 A 5 43 43.9 5 46.8				See discussion, p. 161	
66	Dec. 5	Id	i <sub>PZ</sub> e <sub>P<sub>N</sub></sub> i <sub>SZ</sub> F	H 0 16 07.9 A 0 16 07.9 H 0 16 10.7 0 16.8				See discussion, p. 161	
67	Dec. 5	Iv	i <sub>PZ</sub> e <sub>N</sub> F	H 1 36 48.6 A 1 36 53				See discussion, p. 161 F lost in next shock.	
68	Dec. 5	Iv	i <sub>PZ</sub> i <sub>Z</sub> i <sub>N</sub> e <sub>E</sub> e <sub>N</sub> i <sub>S<sub>N</sub></sub> F	H 1 37 36.3 H 1 37 39.3 A 1 37 41.1 A 1 37 43.8 A 1 37 47.3 A 1 38 09.3 1 42				See discussion, p. 161	
69	Dec. 5	I	i <sub>E</sub> F	G 15 41 35 16 52	11	-2.3		Trace	
70	Dec. 6	I	i <sub>E</sub> F	G 4 55 18 6 27				Trace	
71	Dec. 6	I	e <sub>N</sub> F	G 21 57.7 22 52				Trace	



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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
						mm.	mm.	mm.	
						h. m. s.	s.		
72	Dec. 7	Id	iPz	H	0 21 44.7				See discussion, p. 161
			eSz	H	0 21 45.6				
			eSEN	A	0 21 45.6				
			F		0 21.9				
73	Dec. 7	Id	iPz	H	0 35 07.1				See discussion, p. 161
			eN	A	0 35 08.6				
			iSz	H	0 35 08.8				
			F		0 35.4				
74	Dec. 7	I	eN F	G	18 24.0 18 41			Trace	
75	Dec. 7	I	iz	H	22 48 08.6				
			eN	A	22 48 09.7				
			eE	A	22 48 10.0				
			F		22 49				
76	Dec. 8	Ir	eN F	G	2 44.5 3 19			U.S.C.&G.S. epicenter: General region of 13° N, 82° W	
77	Dec. 8	Iu	ePz	G	8 45 36				U.S.C.&G.S. epicenter: General region of 26° N, 119° E
			iScPcSN	G	8 56 46				
			F		10 52				
78	Dec. 8	I	iz	H	23 49 28.0				
			eEN	A	23 49 28.5				
			eE	A	23 49 29.8				
			F		23 50				
79	Dec. 11	I	iPz	H	4 40 43				See discussion, p. 161
			eN	A	4 40 49				
			eSE	A	4 41 13				
			eSN	A	4 41 14				
			iSz	H	4 41 14				
			F		4 42.1				
80	Dec. 13	Iv	iPz	H	10 15 29.1				See discussion, p. 161
			ePEN	A	10 15 29.1				
			eE	A	10 15 34.1				
			eSE	A	10 15 45.1				
			eSN	A	10 15 45.2				
			F		10 17.2				
81	Dec. 14	Id	iPz	H	22 39 46.6				See discussion, p. 161
			eSE	A	22 39 47.8				
			eSN	A	22 39 47.9				
			iz	H	22 39 48.2				
			F		22 40.2				

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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks	
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>		
1937						mm.	mm.	mm.		
				h. m. s.	s.					
82	Dec. 15	Id	e $\bar{P}$ N	A	13 22 45.5				See discussion, p. 161	
			e $\bar{P}$ Z	H	13 22 45.5					
			e $\bar{S}$ EN	A	13 22 55.1					
			i $\bar{Z}$ <sub>F</sub>	H	13 22 56.8					
						13 24.2				
83	Dec. 18	I	e $\bar{N}$ <sub>F</sub>	G	14 12.2				Trace	
					14 42					
84	Dec. 19	Id	i $\bar{P}$ Z	H	18 01 05.4				See discussion, p. 162	
			e $\bar{N}$	A	18 01 06					
			e $\bar{S}$ EN	A	18 01 14					
			F		18 01.7					
85	Dec. 19	Id	i $\bar{P}$ Z	H	23 10 36.3				See discussion, p. 162	
			i $\bar{S}$ Z	H	23 10 37.6					
			e $\bar{S}$ EN	A	23 10 37.9					
			F		23 11.4					
86	Dec. 20	Id	i $\bar{P}$ Z	H	22 43 43.2				See discussion, p. 162	
			e $\bar{P}$ N	A	22 43 43.4					
			i $\bar{S}$ Z	H	22 43 45.1					
			e $\bar{S}$ EN	A	22 43 45.1					
			F		22 44.4					
87	Dec. 22	IIr	i $\bar{P}$ Z	W	3 42 39				J.S.A. epicenter: 17°2 N, 105°7 W	
			e $\bar{P}$ EN	B	3 42 39					
			e $\bar{P}$ EN	A	3 42 39					
			i $\bar{P}$ Z	G	3 42 39	5				-3.7
			i $\bar{P}$ E	G	3 42 40	5	+3.0			
			i $\bar{P}$ N	G	3 42 40	6		-4.1		
			e $\bar{P}$ Z	H	3 42 40					
			i $\bar{P}$ <sub>c</sub> <sup>PE</sup>	G	3 46 19	11	-4.9			
			i $\bar{N}$	G	3 46 29	10		+4.5		
			e $\bar{S}$ E	A	3 47 10					
			e $\bar{S}$ N	A	3 47 16					
			e $\bar{S}$ N	B	3 47 17					
			e $\bar{Z}$	H	3 47 27					
			e $\bar{L}$ N	B	3 50.2					
			e $\bar{Z}$	H	4 01 58					
			e $\bar{N}$	A	4 02 02					
e $\bar{E}$	A	4 02 04								
e $\bar{E}$	A	4 05 49								
e $\bar{Z}$ <sub>F</sub>	H	4 06 56								
				5 47						
88	Dec. 22	I	i $\bar{N}$ <sub>F</sub>	G	6 45 09				Trace	
					7 04					



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No.	Date	Char-acter	Phase	Time U.T.	Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
1937						mm.	mm.	mm.	
				h. m. s.	s.				
89	Dec. 22	I	eEN ez F	A 7 40 31 H 7 40 31 7 43.5					
90	Dec. 23	IIIr	ePZ ePE iPZ ePN iPEN iPN ePE iPZ eSN eSE eSN iSE eLEN iLE F	H 13 24 06 A 13 24 06 G 13 24 07 A 13 24 09 G 13 24 10 B 13 24 10 B 13 24 11 W 13 24 11 A 13 29 12 A 13 29 15 B 13 29 15 B 13 29 19 A 13 31 32 B 13 32 34 16 28		3 9	-1.5 -26.0	-174	U.S.C.&G.S. epicenter, 15°5 N, 98°5 W
91	Dec. 23-24	Ir	iPZ iSEN F	G 23 27 38 G 23 32 34 0 18	10		-4.6		U.S.C.&G.S. epicenter: 15°5 N, 98°5 W
92	Dec. 24	Iu	iPZ iSN F	G 6 31 22 G 6 40 16 7 58	4 9		-7.5	+1.6	U.S.C.&G.S. epicenter: 10°5 S, 75°5 W
93	Dec. 26	Id	iPZ eE iZ eN iSZ F	H 4 25 27.0 A 4 25 28.6 H 4 25 28.8 A 4 25 29.0 H 4 25 29.5 4 25.6					See discussion, p. 162
94	Dec. 26	Id	iPZ eSN iSZ F	H 5 00 26.0 A 5 00 26.5 H 5 00 26.6 5 00.6					See discussion, p. 162
95	Dec. 26	Iv	ePZ iPZ ePE iSZ F	H 9 24 05.7 H 9 24 07.6 A 9 24 08.0 H 9 24 23.0 9 25.1					See discussion, p. 162
96	Dec. 26	I	eN F	G 18 13.6 18 33					Trace

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No.	Date	Char-acter	Phase	Time U.T.	Period	AMPLITUDE			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
				h. m. s.	s.	mm.	mm.	mm.	
97	Dec. 27	I	e <sub>N</sub> F	G 0 02.9 0 33					Trace
98	Dec. 27	I	e <sub>N</sub> F	G 15 29.3 15 41					Trace
99	Dec. 28	I	e <sub>N</sub> F	G 6 00.1 6 28					Trace
100	Dec. 29	Iv	e <sub>PN</sub> i <sub>PZ</sub> e <sub>N</sub> i <sub>Z</sub> F	A 15 09 48 H 15 09 48 A 15 09 49 H 15 09 50 15 11.8					See discussion, p. 162
101	Dec. 29	Id	i <sub>PZ</sub> e <sub>PN</sub> i <sub>SE</sub> i <sub>SZ</sub> i <sub>SN</sub> F	H 19 09 23.3 A 19 09 23.6 A 19 09 27.5 H 19 09 27.5 A 19 09 27.9 19 10.8					See discussion, p. 162
102	Dec. 30	Ir	e <sub>PZ</sub> e <sub>N</sub> e <sub>E</sub> F	H 11 47 13 G 11 52.4 A 12 00 37 12 23					U.S.C.&G.S. epicenter: 15° 5' N, 98° W
103	Dec. 31	Ir	e <sub>PE</sub> e <sub>PZ</sub> e <sub>PN</sub> i <sub>PZ</sub> i <sub>PN</sub> i <sub>PE</sub> e <sub>N</sub> i <sub>N</sub> i <sub>SE</sub> i <sub>Z</sub> e <sub>LE</sub> e <sub>N</sub> F	A 17 47 36 H 17 47 37 A 17 47 38 G 17 47 38 G 17 47 38 G 17 47 38 B 17 52 24 G 17 52 27 G 17 52 40 G 17 53 00 B 17 56 22 A 17 59 15 18 53		7 8 10 +4.0 8 11 7 15		-4.0 -4.0 +3.5 +5.0 +4.8 +.8	U.S.C.&G.S. epicenter: 15° N, 98° W



MOUNT HAMILTON

THE LICK OBSERVATORY STATION, UNIVERSITY OF CALIFORNIA  
 MOUNT HAMILTON, CALIFORNIA

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CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\varphi = 37^{\circ} 20.4' \text{ N.}$$

$$\lambda = 121^{\circ} 38.6' \text{ W.}$$

Time.--All determinations are reduced to Universal Time.

Altitude.--1281.7 meters (4205 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15

MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Oct. 1	Id	ePN	9 50 26.1	See discussion, p. 155
			iSEN	9 50 27.2	
			F	9 51	
2	Oct. 1	Id	ePEN	22 11 44.3	See discussion, p. 155
			iSEN	22 11 45.6	
			F	22 12.1	
3	Oct. 3	Id	ePN	8 24 42.9	See discussion, p. 155
			ePE	8 24 43.1	
			iN	8 24 46.5	
			iSN	8 24 55.1	
			iSE	8 24 55.3	
			F	8 27	
4	Oct. 5	Ir	ePEN	6 25 37	U.S.C. & G.S. epicenter: 22° N, 108° W
			eSE	6 29 06	
			eLE	6 30 31	
			F	6 47	
5	Oct. 6	Ir	ePEN	9 53 02	J.S.A. epicenter: 17°7' N, 99°0' W
			F	10 10	
6	Oct. 7	Iv	ePN	20 17 26.4	See discussion, p. 155
			eE	20 17 27.0	
			eN	20 17 32.2	
			eE	20 17 32.4	
			F	20 19.6	
7	Oct. 9	I	eN	4 31 13	See discussion, p. 155
			eEN	4 32 06	
			F	4 33	
8	Oct. 12	I	eEN	21 02 54	
			F	21 17	
9	Oct. 14	Id	ePEN	0 54 29.6	See discussion, p. 155
			iSEN	0 54 30.3	
			F	0 54.9	
10	Oct. 14	Id	iPEN	1 16 51.2	See discussion, p. 155
			iSEN	1 16 52.9	
			F	1 18	
11	Oct. 14	Id	ePE	1 21 58.1	See discussion, p. 155
			iSEN	1 21 59.8	
			F	1 22.1	



MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
12	Oct. 16	Id	e $\overline{P}$ N	5 55 34.5	See discussion, p.155
			e $\overline{E}$	5 55 39.7	
			i $\overline{S}$ E	5 55 41.9	
			i $\overline{N}$	5 55 42.9	
			F	5 56.5	
13	Oct. 17	I	e $\overline{B}$ N	4 58 47	
			F	5 01.5	
14	Oct. 17	I	e $\overline{P}$ N	14 16 53.4	See discussion, p.155
			i $\overline{S}$ EN	14 17 01.2	
			F	14 18	
15	Oct. 18	I	e $\overline{P}$ N	23 11 32.4	See discussion, p.155
			e $\overline{E}$ N	23 11 33.9	
			e $\overline{N}$	23 11 40.1	
			e $\overline{S}$ E	23 11 40.9	
			F	23 12.6	
16	Oct. 20	Id	e $\overline{P}$ E	1 18 32.7	See discussion, p.156
			i $\overline{S}$ E	1 18 35.3	
			F	1 19.3	
17	Oct. 22	Id	e $\overline{P}$ E	11 08 27.1	See discussion, p.156
			i $\overline{S}$ E	11 08 36.0	
			F	11 09.4	
18	Oct. 24	Ir	e $\overline{P}$ EN	11 42 02	U.S.C. & G.S. epicenter: 62° N, 150° W
			F	11 53	
19	Oct. 27	Id	e $\overline{P}$ EN	15 41 43.4	See discussion, p. 156
			i $\overline{P}$ N	15 41 44.1	
			i $\overline{E}$	15 41 44.6	
			i $\overline{N}$	15 41 45.4	
			i $\overline{E}$	15 41 47.4	
			i $\overline{S}$ N	15 41 54.5	
			i $\overline{S}$ E	15 41 54.7	
			F	15 44.1	
20	Oct. 27	Id	e $\overline{P}$ E	15 53 35.6	See discussion, p. 156
			i $\overline{P}$ N	15 53 35.7	
			i $\overline{P}$ E	15 53 36.7	
			i $\overline{N}$	15 53 45.9	
			i $\overline{S}$ E	15 53 47.3	
			i $\overline{S}$ N	15 53 47.4	
			F		
21	Oct. 27	Id	e $\overline{P}$ EN	15 58 05.1	See discussion, p. 156
			i $\overline{S}$ EN	15 58 16.5	
			F	16 00.6	

F lost in next shock.

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
22	Oct. 27	Id	ePN	16 06 03.8	See discussion, p. 156
			eSEN	16 06 15.3	
			F	16 07.1	
23	Oct. 27	Id	ePN	16 25 15.0	See discussion, p. 156
			iSN	16 25 26.1	
			eSE	16 25 26.1	
			iSN	16 25 27.5	
			F	16 26.1	
24	Oct. 27	I	eEN F	16 26 57.2 16 27.3	
25	Oct. 27	I	eEN F	16 27 45.5 16 28.1	
26	Oct. 27	Id	ePN	17 36 27.6	See discussion, p. 156
			eSEN	17 36 39.2	
			F	17 37.1	
27	Oct. 27	Id	ePE	20 25 03.3	See discussion, p. 156
			ePN	20 25 03.4	
			iSN	20 25 14.9	
			iSE	20 25 15.0	
			F	20 28.1	
28	Oct. 27	Id	ePN	20 29 58.9	See discussion, p. 157
			ePE	20 29 59.5	
			iSN	20 30 10.4	
			iSE	20 30 10.8	
			iN	20 30 33.3	
			iE	20 30 34.0	
			F	20 32.6	
29	Oct. 27	Id	ePN	20 34 57.5	See discussion, p. 157
			eSEN	20 35 09.0	
			F	20 36	
30	Oct. 27	Id	ePEN	20 46 14.7	See discussion, p. 157
			iSEN	20 46 25.9	
			F	20 48	
31	Oct. 27	I	eEN F	22 40 25 22 40.8	
32	Oct. 27	Id	ePN	23 53 17.3	See discussion, p. 157
			iSE	23 53 28.9	
			iSN	23 53 29.0	
			F	23 54.2	



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
33	Oct. 28	Id	e $\overline{P}$ N	3 31 35.3	See discussion, p. 157
			e $\overline{S}$ EN	3 31 47.0	
			F	3 32.5	
34	Oct. 28	Id	eEN	9 03 26.3	See discussion, p. 157
			F	9 05	
35	Oct. 28	Id	e $\overline{P}$ EN	12 27 06.1	See discussion, p. 157
			i $\overline{P}$ EN	12 27 06.6	
			iE	12 27 14.9	
			i $\overline{N}$	12 27 18.2	
			F	12 29.2	
36	Oct. 28	I	eN	20 45 09.3	See discussion, p. 157
			eEN	20 45 10.1	
			F	20 45.4	
37	Oct. 29	Id	e $\overline{P}$ N	2 10 33.1	See discussion, p. 157
			e $\overline{S}$ E	2 10 44.1	
			i $\overline{S}$ N	2 10 44.9	
			F	2 12.2	
38	Oct. 29	Id	e $\overline{P}$ EN	3 34 58.4	See discussion, p. 157
			i $\overline{S}$ E	3 35 10.0	
			i $\overline{S}$ N	3 35 10.5	
			F	3 37.7	
39	Oct. 29	Id	e $\overline{P}$ N	5 57 11.7	See discussion, p. 157
			e $\overline{S}$ EN	5 57 23.1	
			F	5 58.2	
40	Oct. 29	I	eN	21 50 40	See discussion, p. 157
			F	21 51.2	
41	Oct. 30	I	eN	0 51 27.7	See discussion, p. 157
			F	0 52.3	
42	Oct. 30	Id	e $\overline{P}$ EN	2 02 11.1	See discussion, p. 157
			i $\overline{S}$ N	2 02 22.4	
			i $\overline{S}$ E	2 02 22.6	
			i $\overline{N}$	2 02 24.0	
			F	2 04.3	
43	Oct. 30	Id	e $\overline{P}$ N	22 03 19.1	See discussion, p. 157
			e $\overline{S}$ E	22 03 30.1	
			i $\overline{S}$ N	22 03 31.0	
			F	22 04.8	

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
44	Oct. 31	Id	e <sup>P</sup> <sub>EN</sub>	5 46 42.6	See discussion, p.157
			e <sup>S</sup> <sub>N</sub>	5 46 54.0	
			i <sup>S</sup> <sub>E</sub>	5 46 54.2	
			i <sup>E</sup> <sub>F</sub>	5 47 14.3	
			F	5 49.3	
45	Oct. 31	Id	e <sup>P</sup> <sub>FE</sub>	18 27 22.5	See discussion, p.158
			e <sup>P</sup> <sub>FN</sub>	18 27 22.6	
			i <sup>S</sup> <sub>N</sub>	18 27 29.3	
			i <sup>S</sup> <sub>E</sub>	18 27 30.7	
			i <sup>S</sup> <sub>N</sub>	18 27 30.9	
			F	18 29.3	
46	Oct. 31	Id	e <sup>P</sup> <sub>FN</sub>	21 55 57.3	See discussion, p.158
			i <sup>S</sup> <sub>EN</sub>	21 56 09.2	
			e <sup>N</sup> <sub>F</sub>	21 56 10.4	
			F	21 57.8	
47	Oct. 31	Id	e <sup>P</sup> <sub>FE</sub>	23 49 06.6	See discussion, p.158
			e <sup>S</sup> <sub>SE</sub>	23 49 18.0	
			e <sup>N</sup>	23 51 48.8	
			i <sup>E</sup> <sub>F</sub>	23 51 49.8	
			F	23 52.7	
48	Oct. 31	Id	e <sup>P</sup> <sub>FN</sub>	23 55 45.1	See discussion, p.158
			i <sup>S</sup> <sub>N</sub>	23 55 56.7	
			i <sup>S</sup> <sub>E</sub>	23 55 56.8	
			i <sup>N</sup> <sub>F</sub>	23 55 58.2	
			F	23 57.3	
49	Nov. 1	Id	e <sup>P</sup> <sub>FN</sub>	0 01 57.0	See discussion, p.158
			i <sup>N</sup>	0 02 08.0	
			e <sup>E</sup>	0 02 08.0	
			i <sup>S</sup> <sub>N</sub>	0 02 09.4	
			F	0 03.3	
50	Nov. 1	I	e <sup>N</sup> <sub>F</sub>	0 18 08.3	
			F	0 18.5	
51	Nov. 1	Id	e <sup>P</sup> <sub>FN</sub>	21 40 01.2	See discussion, p.158
			e <sup>S</sup> <sub>N</sub>	21 40 12.4	
			e <sup>N</sup> <sub>F</sub>	21 40 13.1	
			F	21 42.9	
52	Nov. 3	Iv	e <sup>P</sup> <sub>EN</sub>	9 59 55.5	See discussion, p.158
			i <sup>S</sup> <sub>N</sub>	10 00 15.4	
			i <sup>N</sup>	10 00 16.5	
			i <sup>E</sup> <sub>F</sub>	10 00 21.9	
			F	10 01.4	



## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
53	Nov. 3	Id	ePN	23 22 15.5	See discussion, p. 158
			eSE	23 22 26.3	
			iSN	23 22 27.3	
			F	23 23	
54	Nov. 5	I	eEN	22 37 50	
			F	22 38.6	
55	Nov. 8	Id	ePN	23 10 59.1	See discussion, p. 158
			iSEN	23 11 04.1	
			F	23 11.8	
56	Nov. 9	Id	ePN	11 50 22.2	See discussion, p. 159
			iSEN	11 50 30.0	
			F	11 51.1	
57	Nov. 9	Id	iPEN	15 10 02.2	See discussion, p. 159
			iSE	15 10 04.4	
			F	15 10.4	
58	Nov. 9	Id	ePEN	17 18 28.1	See discussion, p. 159
			iSE	17 18 33.4	
			iSN	17 18 33.5	
			F	17 19.9	
59	Nov. 9	Id	ePN	22 43 11.7	See discussion, p. 159
			iSEN	22 43 13.4	
			F	22 43.5	
60	Nov. 10	I	eN	7 21 12	
			eE	7 21 13	
			F	7 59	
61	Nov. 10	Id	ePE	12 31 57.0	See discussion, p. 159
			ePN	12 31 57.1	
			iSEN	12 32 02.5	
			F	12 35	
62	Nov. 10	Id	ePE	14 28 40.4	See discussion, p. 159
			iPEN	14 28 40.8	
			iSEN	14 28 46.8	
			F	14 31	
63	Nov. 13	I	eN	0 14 04.8	
			F	0 14.3	
64	Nov. 13	Id	iPE	6 46 17.1	See discussion, p. 160
			iPN	6 46 17.3	
			iSE	6 46 18.6	
			iSN	6 46 18.8	
			F	6 46.8	

## MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
	1937			h.	m.	s.	
65	Nov. 13	I	e $\overline{\text{EN}}$	10	03	09	
			F	10	05		
66	Nov. 14	Id	e $\overline{\text{PN}}$	2	51	21.2	See discussion, p.160
			i $\overline{\text{SEN}}$	2	51	33.2	
			iN	2	52	35.4	
			iE	2	52	35.6	
			iEN	2	53	46.0	
			F	2	58		
67	Nov. 14	Iu	eP'N	11	16	18	J.S.A. epicenter: 35°2' N, 72°8' E
			e $\overline{\text{EN}}$	11	16	23	
			e $\overline{\text{EN}}$	11	24	07	
			F	11	49		
68	Nov. 17	I	e $\overline{\text{EN}}$	23	51	06.3	
			F	23	52	9	
69	Nov. 18	Id	e $\overline{\text{PN}}$	14	48	35.9	See discussion, p.160
			iN	14	48	41.3	
			i $\overline{\text{SN}}$	14	48	47.5	
			iE	14	48	47.8	
			iEN	14	48	48.8	
			F	14	50	4	
70	Nov. 18	Id	e $\overline{\text{PN}}$	14	52	55.1	See discussion, p.160
			iN	14	53	00.6	
			i $\overline{\text{SE}}$	14	53	06.7	
			i $\overline{\text{SN}}$	14	53	07.7	
			F	14	54	4	
71	Nov. 18	Id	i $\overline{\text{PN}}$	20	21	07.6	See discussion, p.160
			i $\overline{\text{PE}}$	20	21	07.7	
			i $\overline{\text{SN}}$	20	21	08.8	
			i $\overline{\text{SE}}$	20	21	08.9	
			F	20	22		
72	Nov. 19	Iv	e $\overline{\text{PEN}}$	0	52	39.9	Felt in Nevada and Utah
			eN	0	53	06.8	
			e $\overline{\text{SE}}$	0	53	09.0	
			e $\overline{\text{SN}}$	0	53	10.1	
			F	0	59	5	
73	Nov. 22	I	e $\overline{\text{PEN}}$	4	13	38.0	IV at Los Alamos. Pasadena reports epi- center off Pt. Arguello.
			eN	4	14	04.4	
			F	4	27		



MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
74	Nov. 23	Id	e $\bar{P}$ EN	7 00 59.2	See discussion, p. 160
			eSEN	7 01 07.7	
			iSE	7 01 08.6	
			iSN	7 01 08.9	
			F	7 02.8	
75	Nov. 25	Id	e $\bar{P}$ EN	23 40 01.5	See discussion, p. 160
			eSEN	23 40 14.1	
			F	23 42.5	
76	Nov. 27	I	ePN	20 39 59	Felt in Hawthorne, Nev. Epicenter probably near Candelaria, Nev.
			eSN	20 40 35	
			iN	20 40 42	
			F	20 42.5	
77	Nov. 27	Iv	eN	23 33 40	Epicenter near Weldon (Pasadena) F lost in next shock.
			iN	23 34 22	
			F		
78	Nov. 27	Iv	eN	23 35 51	Epicenter near Weldon (Pasadena)
			eE	23 35 55	
			F	23 37	
79	Nov. 28	Id	e $\bar{P}$ EN	18 00 34.1	See discussion, p. 160
			eSN	18 00 45.5	
			iSE	18 00 45.6	
			iSN	18 00 46.7	
			F	18 02.6	
80	Nov. 30	I	eEN	10 18 45	Perhaps near San Miguel
			eEN	10 19 01	
			F	10 20.2	
81	Dec. 1	Id	e $\bar{P}$ EN	15 14 20.2	See discussion, p. 160
			eSN	15 14 32.0	
			iSE	15 14 32.0	
			iSN	15 14 33.0	
			F	15 15.8	
82	Dec. 3	Id	e $\bar{P}$ EN	5 43 41.8	See discussion, p. 161
			iN	5 43 46.7	
			iSEN	5 43 53.8	
			F	5 46.4	
83	Dec. 3	I	eN	15 29 00	Epicenter probably off Point Arguello (Pasadena)
			F	15 33.5	

MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
84	Dec. 5	Iv	e $\overline{PN}$	1 36 35.1	See discussion, p. 161 F lost in next shock.
			e $\overline{SN}$	1 36 48.5	
			F		
85	Dec. 5	Iv	e $\overline{PEN}$	1 37 27.3	See discussion, p. 161
			i $\overline{SN}$	1 37 40.4	
			i $\overline{SE}$	1 37 40.5	
			F	1 41.5	
86	Dec. 5	Iv	e $\overline{PN}$	2 04 51	See discussion, p. 161
			e $\overline{SEN}$	2 05 04	
			F	2 06	
87	Dec. 8	I	e $\overline{EN}$	2 33 18	U.S.C. & G.S. epicenter: General Region of 13.5° N, 82.5° W
			F	2 34	
88	Dec. 11	Iv	e $\overline{PN}$	4 40 37.4	See discussion, p. 161
			i $\overline{PE}$	4 40 38.1	
			e $\overline{SN}$	4 40 55.3	
			F	4 42	
89	Dec. 12	I	e $\overline{EN}$	2 32 38	About 20 Km. east of McKittrick (Pasadena)
			e $\overline{N}$	2 32 41	
			F	2 34.5	
90	Dec. 13	Id	e $\overline{PEN}$	10 15 17.5	See discussion, p. 161
			e $\overline{N}$	10 15 23.8	
			i $\overline{SE}$	10 15 25.2	
			i $\overline{SN}$	10 15 25.5	
			F	10 17	
91	Dec. 13	Id	e $\overline{PN}$	16 37 45.7	See discussion, p. 161
			i $\overline{SN}$	16 37 53.3	
			F	16 38.6	
92	Dec. 15	Id	i $\overline{PEN}$	5 56 48.4	See discussion, p. 161
			i $\overline{SE}$	5 56 50.2	
			i $\overline{SN}$	5 56 50.3	
			F	5 57.2	
93	Dec. 15	Id	i $\overline{PEN}$	13 22 35.6	See discussion, p. 161 $\overline{S} - \overline{P} = 2.2^s$ (ca)
			F	13 23.7	
94	Dec. 19	Id	e $\overline{PN}$	18 00 58.2	See discussion, p. 162
			i $\overline{SEN}$	18 01 01.7	
			F	18 01.7	



MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
95	Dec. 22	Ir	eP <sub>EN</sub>	3 42 32	J.S.A. epicenter: 17 <sup>o</sup> .2 N, 105 <sup>o</sup> .7 W
			eS <sub>EN</sub>	3 46 58	
			F	4 32	
96	Dec. 22	Iv	eP <sub>E</sub>	19 24 30.1	See discussion, p. 162
			e <sub>EN</sub>	19 24 33.0	
			e <sub>E</sub>	19 24 37.4	
			e <sub>E</sub>	19 24 45.9	
			e <sub>N</sub>	19 24 50.9	
			iS <sub>N</sub>	19 24 54.0	
			F	19 26	
97	Dec. 23	IIr	eP <sub>EN</sub>	13 23 57	U.S.C. & G.S. epicenter: 15 <sup>o</sup> .5 N, 98 <sup>o</sup> .5 W
			eS <sub>E</sub>	13 29 01	
			eS <sub>N</sub>	13 29 05	
			eL <sub>E</sub>	13 31.7	
			F	15 00	
98	Dec. 23	Ir	eP <sub>EN</sub>	23 27 21	U.S.C. & G.S. epicenter: 15 <sup>o</sup> .5 N, 98 <sup>o</sup> .5 W
			F	23 57	
99	Dec. 24	Iu	eP <sub>EN</sub>	6 31 20	U.S.C. & G.S. epicenter: 10 <sup>o</sup> .5 S, 75 <sup>o</sup> .5 W
			F	6 37	
100	Dec. 24	Iv	eP <sub>N</sub>	11 57 59	Off Point Arguello (Pasadena)
			iN	11 58 55	
			F	12 02	
101	Dec. 25	Iv	eP <sub>N</sub>	3 35 51.6	See discussion, p. 162
			eS <sub>E</sub>	3 36 12.7	
			iS <sub>N</sub>	3 36 15.0	
			F	3 37.2	
102	Dec. 25	Iv	eP <sub>N</sub>	13 01 54.2	See discussion, p. 162
			eS <sub>N</sub>	13 02 12.1	
			F	13 03.5	
103	Dec. 26	Id	iP <sub>E</sub>	9 23 56.3	See discussion, p. 162
			iS <sub>E</sub>	9 24 05.2	
			F	9 24.9	
104	Dec. 28	Id	iP <sub>EN</sub>	4 34 56.2	See discussion, p. 162
			iS <sub>N</sub>	4 34 57.7	
			F	4 35.6	
105	Dec. 29	Id	eP <sub>N</sub>	15 09 36.6	See discussion, p. 162
			iS <sub>EN</sub>	15 09 48.8	
			iN	15 09 50.1	
			F	15 11.7	

MOUNT HAMILTON

No.	Date	Char-acter	Phase	Time U.T.	Period
	1937			h. m. s.	
106	Dec. 30	Ir	eP <sub>N</sub> F	11 47 07 12 07	U.S.C. & G.S. epicenter: 15° 5' N, 98° W
107	Dec. 31	Ir	eP <sub>EN</sub> F	17 47 29 18 22	U.S.C. & G.S. epicenter: 15° N, 98° W



PALO ALTO

THE BRANNER STATION, STANFORD UNIVERSITY  
PALO ALTO, CALIFORNIA

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\varphi = 37^{\circ} 25.1 \text{ N.}$$

$$\lambda = 122^{\circ} 10.8 \text{ W.}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 83 meters (272 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	$T_0$	$\epsilon$
Wood-Anderson .....	E	3000	1	15
	N	3000	1	15

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Oct. 3	Iv	ePN	8 24 48.0	See discussion, p. 155
			ePE	8 24 48.1	
			iSE	8 25 04.6	
			iSN	8 25 04.7	
			F	8 26.7	
2	Oct. 5	Ir	ePEN	6 25 45	U.S.C. & G.S. epicenter: 22° N, 108° W
			F	6 47	
3	Oct. 6	Ir	ePE	9 53 04	J.S.A. epicenter: 17.7° N, 99.0° W
			ePN	9 53 06	
			F	10 17	
4	Oct. 9	Iv	eN	4 31.1	No minute marks S-P interval = 46.5
			F	4 34.2	
5	Oct. 12	I	eEN	16 06 51	
			F	16 10	
6	Oct. 16	Id	ePEN	5 55 40.2	See discussion, p. 155
			eSE	5 55 51.5	
			eSN	5 55 52.7	
			F	5 56.6	
7	Oct. 17	Id	ePE	14 16 58.2	See discussion, p. 155
			ePN	14 16 58.8	
			eSN	14 17 09.8	
			iSE	14 17 10.8	
			F	14 18.1	
8	Oct. 18	Id	ePEN	23 11 29.3	See discussion, p. 155
			iSEN	23 11 35.7	
			iSN	23 11 36.2	
			F	23 12.4	
9	Oct. 22	Iv	ePN	11 08 32.4	See discussion, p. 156
			ePE	11 08 32.6	
			iE	11 08 44.9	
			iSE	11 08 46.9	
			iN	11 08 48.0	
			F	11 09.8	
10	Oct. 24	Ir	ePE	11 41 58	U.S.C. & G.S. epicenter: 62° N, 150° W
			eN	11 42 03	
			F	11 52	
11	Oct. 26	Id	ePEN	17 25 10.8	See discussion, p. 156
			eSN	17 25 11.9	
			iSE	17 25 12.0	
			iSN	17 25 13.1	
			F	17 25.7	



## PALO ALTO

No.	Date	Char-acter	Phase	Time U.T.	Remarks
	1937			h. m. s.	
12	Oct. 27	Iv	e <sup>-</sup> P <sub>N</sub> e <sup>-</sup> P <sub>E</sub> i <sup>-</sup> P <sub>EN</sub> i <sub>N</sub> i <sub>SE</sub> i <sub>N</sub> i <sub>N</sub> F	15 41 48.0 15 41 48.4 15 41 48.6 15 41 59.1 15 42 02.0 15 42 03.5 15 42 04.4 15 44.8	See discussion, p. 156
13	Oct. 27	Iv	e <sup>-</sup> P <sub>EN</sub> i <sub>SE</sub> i <sub>SN</sub> i <sub>SE</sub> F	15 53 40.1 15 53 53.7 15 53 54.2 15 53 55.9	See discussion, p. 156  F lost in next shock.
14	Oct. 27	Iv	i <sub>PE</sub> i <sub>PN</sub> i <sub>SE</sub> i <sub>E</sub> i <sub>N</sub> F	15 58 09.9 15 58 10.0 15 58 24.1 15 58 25.4 15 58 25.8 16 00.3	See discussion, p. 156
15	Oct. 27	Iv	e <sup>-</sup> P <sub>E</sub> i <sup>-</sup> P <sub>EN</sub> e <sub>SE</sub> e <sub>E</sub> F	16 06 08.5 16 06 08.8 16 06 21.6 16 06 23.6 16 07.3	See discussion, p. 156
16	Oct. 27	Iv	e <sup>-</sup> P <sub>EN</sub> i <sub>SN</sub> i <sub>N</sub> i <sub>E</sub> i <sub>EN</sub> F	16 25 19.9 16 25 33.8 16 25 34.6 16 25 35.0 16 25 35.4	See discussion, p. 156  F lost in next shock.
17	Oct. 27	I	e <sub>E</sub> e <sub>N</sub> F	16 27 05.6 16 27 07.1 16 27.8	
18	Oct. 27	I	e <sub>N</sub> e <sub>E</sub> F	16 27 55.4 16 27 57.9 16 28.3	
19	Oct. 27	Iv	e <sup>-</sup> P <sub>EN</sub> e <sub>SE</sub> F	17 36 33.4 17 36 46.8 17 37.3	See discussion, p. 156

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
20	Oct. 27	Iv	e $\bar{P}$ N	20 25 07.8	See discussion, p. 156
			ePE	20 25 08.6	
			iPN	20 25 08.9	
			iE	20 25 22.3	
			iN	20 25 23.6	
			iEN	20 25 24.6	
			F	20 29	
21	Oct. 27	Iv	e $\bar{P}$ EN	20 30 04.2	See discussion, p. 157
			i $\bar{P}$ EN	20 30 04.9	
			iSE	20 30 17.5	
			i $\bar{S}$ E	20 30 18.6	
			iE	20 30 19.8	
			iN	20 30 20.0	
			F	20 31.3	
22	Oct. 27	Iv	e $\bar{P}$ N	20 35 03.1	See discussion, p. 157
			ePE	20 35 03.3	
			eE	20 35 16.8	
			iE	20 35 18.1	
			iN	20 35 18.4	
			iSE	20 35 22.8	
			F	20 36.8	
23	Oct. 27	Iv	e $\bar{P}$ EN	20 46 19.8	See discussion, p. 157
			eSE	20 46 33.5	
			iSN	20 46 35.4	
			iSE	20 46 35.5	
			F	20 47.8	
24	Oct. 27	Iv	e $\bar{P}$ EN	23 53 21.9	See discussion, p. 157
			eSE	23 53 35.6	
			F	23 54.8	
25	Oct. 28	Iv	ePE	3 31 40.3	See discussion, p. 157
			iSE	3 31 55.3	
			F	3 32.8	
26	Oct. 28	Iv	e $\bar{P}$ EN	12 27 11.6	See discussion, p. 157
			iE	12 27 17.0	
			eN	12 27 23.8	
			iSE	12 27 26.0	
			iN	12 27 27.4	
F	12 29.3				
27	Oct. 28	Id	e $\bar{P}$ EN	23 45 46.2	See discussion, p. 157
			iSEN	23 45 47.3	
			iMN	23 45 49.4	
			F	23 46.3	



## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
28	Oct. 29	Iv	e $\overline{P}$ EN	2 10 37.5	See discussion, p. 157
			eSE	2 10 51.1	
			iSE	2 10 53.3	
			eSN	2 10 53.3	
			iN	2 10 55.6	
			F	2 11.8	
29	Oct. 29	Iv	e $\overline{P}$ EN	3 35 03.5	See discussion, p. 157
			i $\overline{P}$ EN	3 35 04.2	
			eSE	3 35 17.2	
			iSE	3 35 18.7	
			iSN	3 35 19.0	
			F	3 37	
30	Oct. 29	Iv	e $\overline{P}$ E	5 57 15.7	See discussion, p. 157
			e $\overline{P}$ N	5 57 15.8	
			eEN	5 57 31.8	
			iEN	5 57 35.5	
			F	5 58.3	
31	Oct. 30	I	eEN	0 51 35.1	
			eE	0 51 48.6	
			eN	0 51 48.9	
			F	0 52.8	
32	Oct. 30	Iv	e $\overline{P}$ E	2 02 16.1	See discussion, p. 157 Part of record following P in hour mark blank.
			i $\overline{P}$ EN	2 02 16.7	
			F	2 04	
33	Oct. 30	Iv	e $\overline{P}$ N	22 03 23.6	See discussion, p. 157
			e $\overline{P}$ E	22 03 23.8	
			i $\overline{S}$ EN	22 03 39.6	
			F	22 04.5	
34	Oct. 31	Iv	e $\overline{P}$ EN	5 46 48.0	See discussion, p. 157  Probably two shocks.
			iSE	5 47 01.4	
			iEN	5 47 04.1	
			iE	5 47 08.5	
			iE	5 47 23.7	
			iE	5 47 28.1	
			F	5 48.8	
35	Oct. 31	Id	e $\overline{P}$ EN	18 27 28.2	See discussion, p. 158
			iE	18 27 39.3	
			iSN	18 27 39.5	
			iE	18 27 40.5	
			iE	18 27 42.0	
F	18 29.3				

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
36	Oct. 31	Iv	e $\overline{\text{PEN}}$	21 56 03.1	See discussion, p. 158
			e $\overline{\text{EN}}$	21 56 15.4	
			e $\overline{\text{SE}}$	21 56 18.4	
			F	21 57.8	
37	Oct. 31	Iv	e $\overline{\text{PEN}}$	23 49 11.5	See discussion, p. 158
			i $\overline{\text{PEN}}$	23 49 12.3	
			i $\overline{\text{E}}$	23 49 15.2	
			i $\overline{\text{SE}}$	23 49 26.3	
			i $\overline{\text{SE}}$	23 49 27.3	
			i $\overline{\text{SN}}$	23 49 27.5	
			F		
38	Oct. 31	Iv	e $\overline{\text{PE}}$	23 51 43.3	See discussion, p. 158
			i $\overline{\text{SEN}}$	23 51 58.3	
			F	23 52.8	
39	Oct. 31	Iv	e $\overline{\text{PEN}}$	23 55 51.1	See discussion, p. 158
			i $\overline{\text{SN}}$	23 56 06.3	
			i $\overline{\text{SE}}$	23 56 06.4	
			F	23 57.3	
40	Nov. 1	I	e $\overline{\text{PE}}$	0 02 02.6	See discussion, p. 158
			i $\overline{\text{SN}}$	0 02 17.8	
			i $\overline{\text{SE}}$	0 02 17.9	
			F	0 03	
41	Nov. 1	I	e $\overline{\text{E}}$	0 18 12.1	
			F	0 18.3	
42	Nov. 1	I	e $\overline{\text{PEN}}$	21 40 06.2	See discussion, p. 158
			i $\overline{\text{PEN}}$	21 40 06.9	
			i $\overline{\text{SEN}}$	21 40 20.4	
			i $\overline{\text{SE}}$	21 40 21.8	
			i $\overline{\text{N}}$	21 40 22.2	
			F		
43	Nov. 1	I	i $\overline{\text{EN}}$	21 41 59.7	Superposed on tail of previous shock.
			F	21 42.8	
44	Nov. 3	Iv	e $\overline{\text{PEN}}$	10 00 00.1	See discussion, p. 158
			i $\overline{\text{SE}}$	10 00 25.8	
			i $\overline{\text{N}}$	10 00 26.8	
			i $\overline{\text{E}}$	10 00 27.2	
			F	10 01.6	
45	Nov. 3	Iv	e $\overline{\text{PE}}$	23 22 20.2	See discussion, p. 158
			i $\overline{\text{SEN}}$	23 22 35.4	
			F	23 23.4	



## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
46	Nov. 5	I	eN	0 40 15.6	
			iE	0 40 20.1	
			F	0 40.9	
47	Nov. 5	I	eE	22 45 01.5	
			F	22 45.4	
48	Nov. 7	Id	e $\bar{P}$ EN	7 39 07.2	See discussion, p. 158
			iSE	7 39 09.2	
			iSN	7 39 09.4	
			F	7 39.7	
49	Nov. 8	Id	ePE	17 58 28.7	See discussion, p. 158
			iN	17 58 30.0	
			iE	17 58 30.1	
			iSN	17 58 30.9	
			F	17 59.1	
50	Nov. 10	I	e $\bar{P}$ E	12 32 03.8	See discussion, p. 159
			i $\bar{P}$ EN	12 32 04.3	
			iSEN	12 32 15.1	
			F	12 34.5	
51	Nov. 10	I	e $\bar{P}$ EN	14 28 43.7	See discussion, p. 159
			iSEN	14 28 52.6	
			F	14 30.5	
52	Nov. 12	I	iEN	18 00 16.8	
			F	18 01.6	
53	Nov. 12	Id	ePEN	18 03 32.2	See discussion, p. 159
			iSEN	18 03 34.4	
			F	18 04.5	
54	Nov. 12	Id	ePE	18 22 46.1	See discussion, p. 159
			iSEN	18 22 48.1	
			F	18 23.4	
55	Nov. 14	Iv	e $\bar{P}$ E	2 51 27.0	See discussion, p. 160
			eSN	2 51 42.0	
			F	2 55.5	
56	Nov. 14	Iu	eP'EN	11 16 16	J.S.A. epicenter: 35°2 N, 72°8 E
			eEN	11 16 43	
			eE	11 23 07	
			eEN	11 24 05	
			F	11 33	

## PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
57	Nov. 17	I	eE F	23 51 00.4 23 52.1	
58	Nov. 18	Iv	eP <sup>-</sup> EN iS <sup>-</sup> N iN F	14 48 42.2 14 48 57.0 14 48 59.0 14 50.1	See discussion, p. 160
59	Nov. 18	Iv	eP <sup>-</sup> EN iE eS <sup>-</sup> EN F	14 53 01.6 14 53 16.5 14 53 17.3 14 54.1	See discussion, p. 160
60	Nov. 18	Id	eS <sup>-</sup> EN iE F	20 21 18.2 20 21 26.8 20 22.1	See discussion, p. 160
61	Nov. 19	I	eE eE eE F	0 52 56 0 54 27 0 55 07 0 57.5	Felt in Nevada and Utah.
62	Nov. 22	I	eE eN eE iN F	4 13 52 4 13 54 4 14 31 4 14 41 4 23	IV at Los Alamos Pasadena reports epicenter off Point Arguello
63	Nov. 23	Id	eP <sup>-</sup> N eP <sup>-</sup> E iE iS <sup>-</sup> N iS <sup>-</sup> E iN F	7 00 57.6 7 00 57.7 7 00 58.9 7 01 04.6 7 01 04.8 7 01 10.7 7 02.2	See discussion, p. 160
64	Nov. 25	Id	eP <sup>-</sup> EN F	18 20 23.4 18 21.2	See discussion, p. 160
65	Nov. 28	Iv	eP <sup>-</sup> EN iS <sup>-</sup> N F	18 00 39.9 18 00 55.1 18 02	See discussion, p. 160
66	Nov. 29	Id	eP <sup>-</sup> EN iN iE iS <sup>-</sup> N F	17 57 45.5 17 57 46.7 17 57 46.8 17 57 47.7 17 58.2	See discussion, p. 160



PALO ALTO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
67	Dec. 1	Iv	ePN iSEN F	15 14 25.4 15 14 41.4 15 16	See discussion, p. 160
68	Dec. 3	Id	ePN iSE iSN F	5 43 41.8 5 43 53.9 5 43 54.0 5 45.3	See discussion, p. 161
69	Dec. 3	I	eEN eE eN F	15 29 20 15 30 06 15 30 08 14 34	Off Point Arguello (Pasadena)
70	Dec. 5	Iv	ePN eN eSN F	1 36 44.4 1 36 46.5 1 37 00.3	See discussion, p. 161  F lost in next shock.
71	Dec. 5	Iv	ePEN iN iSE iN F	1 37 34.2 1 37 47.4 1 37 53.5 1 37 54.2 1 41	See discussion, p. 161
72	Dec. 7	Id	ePN iSN iN F	17 51 56.2 17 51 57.5 17 51 58.5 17 52.4	See discussion, p. 161
73	Dec. 11	Iv	ePN iSN eN F	4 40 38.6 4 40 58.3 4 41 06.4 4 42.1	See discussion, p. 161
74	Dec. 13	Id	ePN eE eN iSEN iN F	10 15 21.0 10 15 22.3 10 15 23.2 10 15 32.9 10 15 33.7 10 16.9	See discussion, p. 161
75	Dec. 13	Id	eE iN F	16 38 00.7 16 38 01.5 16 38.5	See discussion, p. 161
76	Dec. 15	Id	ePEN eN F	13 22 40.4 13 22 54.5 13 24	See discussion, p. 161

## PALO ALTO

No.	Date	Char-acter	Phase	Time U.T.	Remarks
	1937			h. m. s.	
77	Dec. 19	Id	e $\bar{S}$ N F	18 01 08.5 18 01.5	See discussion, p. 162
78	Dec. 20	Id	e $\bar{P}$ EN i $\bar{S}$ N i $\bar{E}$ N F	22 25 34.8 22 25 36.4 22 25 37.7 22 26.0	See discussion, p. 162
79	Dec. 22	Ir	e $\bar{P}$ EN e $\bar{S}$ E e $\bar{S}$ N e $\bar{N}$ F	3 42 36 3 47 00 3 47 02 4 02 04 4 18	J.S.A. epicenter: 17 $^{\circ}$ 2 N, 105 $^{\circ}$ 7 W  Superposed short period motion lasting 10 s.
80	Dec. 23	Iir	e $\bar{P}$ EN e $\bar{S}$ N e $\bar{S}$ E e $\bar{L}$ EN F	13 24 09 13 29 10 13 29 11 13 31.1 14 18	U.S.C. & G.S. epicenter: 15 $^{\circ}$ 5 N, 98 $^{\circ}$ 5 W
81	Dec. 24	Iu	e $\bar{P}$ EN F	6 31 24 6 35	U.S.C. & G.S. epicenter: 10 $^{\circ}$ 5 S, 75 $^{\circ}$ 5 W
82	Dec. 24	I	e $\bar{P}$ N i $\bar{N}$ F	11 58 04.3 11 59 06.8 12 01.6	Probably off Point Arguello (Pasadena)
83	Dec. 25	Iv	i $\bar{S}$ N F	3 36 19.0 3 36.6	See discussion, p. 162
84	Dec. 26	Id	e $\bar{P}$ EN i $\bar{S}$ N F	9 24 01.0 9 24 13.4 9 25.2	See discussion, p. 162
85	Dec. 29	Iv	e $\bar{P}$ N e $\bar{P}$ E i $\bar{S}$ N i $\bar{S}$ EN F	15 09 42.4 15 09 42.5 15 09 57.9 15 09 58.7 15 11.3	See discussion, p. 162
86	Dec. 29	Id	e $\bar{P}$ N i $\bar{S}$ EN F	19 09 23.5 19 09 27.2 19 10.3	See discussion, p.162
87	Dec. 31	Ir	e $\bar{P}$ N e $\bar{E}$ F	17 47 33 17 47 40 18 33	U.S.C. & G.S. epicenter: 15 $^{\circ}$ N, 98 $^{\circ}$ W



## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Oct. 3	Iv	ePN	8 24 53.6	See discussion, p. 155
			eSE	8 25 17.7	
			eSN	8 25 18.2	
			F	8 26.2	
2	Oct. 5	Ir	ePEN	6 25 50	U.S.C. & G.S. epicenter: 22° N, 108° W
			eSE	6 29 21	
			F	6 42	
3	Oct. 6	Ir	ePEN	9 53 09	J.S.A. epicenter: 17.7° N, 99.0° W
			F	10 12	
4	Oct. 7	Iv	ePEN	20 17 16.8	See discussion, p. 155
			iSEN	20 17 33.7	
			iN	20 17 35.1	
			F	20 19.4	
5	Oct. 18	Id	ePEN	23 11 27.3	See discussion, p. 155
			eSEN	23 11 32.7	
			F	23 11.9	
6	Oct. 19	Id	ePEN	19 35 08.2	See discussion, p. 155
			eSN	19 35 09.9	
			F	19 35.4	
7	Oct. 19	Id	eSEN	19 47 55.2	See discussion, p. 155
			F	19 48.2	
8	Oct. 22	Iv	eSEN	11 08 57.5	See discussion, p. 156
			eE	11 08 58.8	
			F	11 09.6	
9	Oct. 24	Ir	ePEN	11 41 58	U.S.C. & G.S. epicenter: 62° N, 150° W
			F	11 46	
10	Oct. 27	Iv	ePN	15 41 54.4	See discussion, p. 156
			eN	15 41 56.6	
			iN	15 41 59.5	
			eSN	15 42 13.7	
			iSE	15 42 13.8	
			eE	15 42 14.1	
			F	15 43.7	
11	Oct. 27	Iv	ePN	15 53 46.4	See discussion, p. 156
			eN	15 53 47.5	
			eE	15 53 47.7	
			iN	15 53 51.4	
			eSEN	15 54 05.5	
			iSN	15 54 06.4	
			F	15 57.2	

SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
12	Oct. 27	Iv	ePN	15 58 15.0	See discussion, p. 156
			iN	15 58 35.9	
			eE	15 58 36.3	
			iE	15 58 38.9	
			iN	15 58 39.1	
			F	16 00.2	
13	Oct. 27	Iv	eN	16 25 26.2	See discussion, p. 156
			eSN	16 25 45.6	
			eE	16 25 47.0	
			F	16 26.7	
14	Oct. 27	Iv	ePN	20 25 14.4	See discussion, p. 156
			eN	20 25 15.8	
			eE	20 25 18.9	
			eSN	20 25 33.4	
			iE	20 25 34.2	
			F	20 27.7	
15	Oct. 27	Iv	ePN	20 30 11.4	See discussion, p. 157
			iN	20 30 29.0	
			iSN	20 30 30.8	
			iN	20 30 32.8	
			iN	20 30 41.1	
			iN	20 30 42.6	
			iN	20 30 45.6	
			iN	20 30 54.2	
			iN	20 30 56.2	
			F	20 32.2	
16	Oct. 27	Iv	eN	20 46 29.9	See discussion, p. 157
			eN	20 46 44.5	
			iSN	20 46 48.4	
			F	20 47.7	
17	Oct. 28	Iv	ePN	12 27 18.3	See discussion, p. 157
			ePE	12 27 18.5	
			iSN	12 27 35.6	
			iE	12 27 37.3	
			F	12 29.2	
18	Oct. 30	Iv	ePN	2 02 21.7	See discussion, p. 157
			eN	2 02 24.5	
			iSE	2 02 41.6	
			iN	2 02 42.1	
			F	2 03.6	



## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
19	Oct. 31	Iv	ePE	5 46 55.6	See discussion, p. 157 Probably two earthquakes.
			iSN	5 47 14.7	
			eSE	5 47 14.8	
			eE	5 47 35.0	
			F	5 48.6	
20	Oct. 31	Iv	ePN	18 27 34.4	See discussion, p. 158
			eE	18 27 50.6	
			iN	18 27 50.8	
			iSN	18 27 51.9	
			F	18 29.0	
21	Oct. 31	Iv	ePN	21 56.2	See discussion, p. 158
			F	21 57.5	
22	Oct. 31	Iv	ePN	23 49 18.0	See discussion, p. 158
			iN	23 49 25.6	
			iN	23 49 36.2	
			iN	23 49 40.4	
			F	23 51	
23	Nov. 1	Iv	ePN	21 40 11.6	See discussion, p. 158
			iSN	21 40 31.1	
			eSN	21 40 34.8	
			F	21 42	
24	Nov. 5	Id	iSEN	14 43 06.5	See discussion, p. 158
			F	14 43.4	
25	Nov. 10	Iv	ePN	12 32 09.6	See discussion, p. 159
			iE	12 32 11.7	
			iSEN	12 32 26.1	
			F	12 34.2	
26	Nov. 10	Iv	ePEN	14 28 50.6	See discussion, p. 159
			iPEN	14 28 51.1	
			iSN	14 29 05.2	
			F	14 30.2	
27	Nov. 13	Id	eSN	7 30 14.7	See discussion, p. 160
			iN	7 30 16.6	
			F	7 30.6	
28	Nov. 14	Iv	ePN	2 51 31.6	See discussion, p. 160
			iSN	2 51 53.5	
			eSE	2 51 53.6	
			iN	2 52 55.6	
			iE	2 52 55.9	
			F	2 54.6	

## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time		Remarks
				U.T.		
				h.	m.	s.
	1937					
39	Dec. 1	Iv	eP <sub>E</sub> eP <sub>N</sub> eS <sub>EN</sub> F	15 14 32.5 15 14 33.1 15 14 52.3 15 15.8		See discussion, p. 160
40	Dec. 3	Id	eP <sub>N</sub> eE iN iS <sub>EN</sub> F	5 43 39.0 5 43 39.5 5 43 48.7 5 43 49.4 5 45.2		See discussion, p. 161
41	Dec. 3	I	eE F	15 29 47 15 32		Off Point Arguello (Pasadena)
42	Dec. 4	Iv	eP <sub>N</sub> iS <sub>EN</sub> F	1 37 39.7 1 38 09.1 1 41		See discussion, p. 161
43	Dec. 13	Iv	eP <sub>EN</sub> iS <sub>N</sub> iS <sub>E</sub> F	10 15 28.9 10 15 44.3 10 15 44.5 10 16.7		See discussion, p. 161 Clock correction un- certain.
44	Dec. 15	Id	eP <sub>N</sub> eS <sub>N</sub> eE F	13 22 45.6 13 22 56.1 13 22 56.8 13 23.8		See discussion, p. 161 Clock correction un- certain.
45	Dec. 22	Ir	eP <sub>EN</sub> eS <sub>N</sub> F	3 42 39 3 47 15 4 23		J.S.A. epicenter: 17°2 N, 105°7 W
46	Dec. 23	IIr	eP <sub>EN</sub> eS <sub>N</sub> F	13 24 10 13 29 02 15 00		U.S.C. & G.S. epicenter: 15°5 N, 98°5 W
47	Dec. 24	Iu	eE <sub>N</sub> F	6 31 27 6 33		U.S.C. & G.S. epicenter: 10°5 S, 75°5 W
48	Dec. 24	I	eN F	11 58 27 12 00.5		Probably off Point Arguello (Pasadena)
49	Dec. 26	Iv	eP <sub>N</sub> eS <sub>N</sub> eS <sub>N</sub> F	9 24 08.7 9 24 22.2 9 24 26.4 9 24.9		See discussion, p. 162
50	Dec. 27	I	eE <sub>N</sub> F	0 21 57 0 22.4		



## SAN FRANCISCO

No.	Date	Char-acter	Phase	Time U.T.	Remarks
	1937			h. m. s.	
51	Dec. 29	Iv	ePN eSN iSN F	15 09 47.3 15 10 07.1 15 10 11.6 15 11.3	See discussion, p. 162

## FERNDALE

THE FERNDAL STATION  
FERNDAL, CALIFORNIA

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## CONSTANTS

## CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned}\varphi &= 40^{\circ} 34' \text{ N.} \\ \lambda &= 124^{\circ} 16' \text{ W.}\end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 17 meters (55 feet) above mean sea level.

The seismographs are Bosch-Omori 25 kg. horizontal pendulums.

They are oriented to record N-S and E-W motion. The station is operated by Mr. Joseph Bognuda, of Ferndale, in cooperation with the University of California.

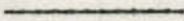


## FERNDALE

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Oct. 5	Ir	ePE	6 26 15	U.S.C. & G.S. epicenter: 22° N, 108° W
			ePN	6 26 18	
			eSE	6 30 12	
			F	7 00	
2	Oct. 6	Ir	eN	9 53 36	J.S.A. epicenter: 17.7° N, 99.0° W
			eE	9 53 41	
			eEN	10 04 38	
			F	10 20	
3	Oct. 30	Id	e <sup>-</sup> PE <sup>-</sup>	3 25 53	See discussion, p. 157
			i <sup>-</sup> SE <sup>-</sup>	3 25 58	
			F	3 27	
4	Nov. 9	I	eE	7 21 01	
			eE	7 22 42	
			F	7 55	
5	Nov. 13	Id	e <sup>-</sup> PE	1 05 07	See discussion, p. 159
			i <sup>-</sup> SN	1 05 13	
			i <sup>-</sup> SE	1 05 14	
			F	1 06	
6	Nov. 14	Iu	eEN	11 23 54	J.S.A. epicenter: 35.2° N, 72.8° E
			F	11 45	
7	Nov. 17-18	I	eE	23 50 48	
			F	0 05	
8	Dec. 22	Ir	eE	3 45 20	J.S.A. epicenter: 17.2° N, 105.7° W
			F	4 20	
9	Dec. 23	IIr	ePE	13 24 41	U.S.C. & G.S. epicenter: 15.5° N, 98.5° W
			eSEN	13 30 13	
			eLEN	13 33.7	
			F	14 45	
10	Dec. 31	Ir	eN	18 00 02	U.S.C. & G.S. epicenter: 15° N, 98° W
			eE	18 01 43	
			F	18 20	

FRESNO

THE FRESNO STATION, FRESNO STATE COLLEGE  
 FRESNO, CALIFORNIA



CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude:

$$\begin{aligned} \phi &= 36^{\circ} 46'.1 \text{ N.} \\ \lambda &= 119^{\circ} 47'.8 \text{ W.} \end{aligned}$$

Time.--All determinations are reduced to Universal Time.

Altitude.-- 88.4 meters (290 feet) above mean sea level.

CONSTANTS OF THE SEISMOGRAPHS

Apparatus	Component	V	T <sub>0</sub>	ε
Wood-Anderson .....	N	3000	0.9	15



## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
1	Oct. 3	Iv	ePN iSN F	8 24 48.1 8 25 03.4 8 28.5	See discussion, p. 155
2	Oct. 5	Ir	ePN F	6 25 22 6 51	U.S.C. & G.S. epicenter: 22° N, 108° W
3	Oct. 6	Ir	ePN F	9 52 47 10 21	J.S.A. epicenter: 17°7 N, 99°0 W
4	Oct. 6	Iv	ePN iSN F	19 47 53.2 19 48 19.5 19 50	See discussion, p. 155
5	Oct. 12	I	eN F	16 06.4 16 11	
6	Oct. 12	I	ePN F	21 02 46 21 16	
7	Oct. 17	I	eN F	13 29 44 13 33	
8	Oct. 17	Iv	eN iSN F	14 17 13.7 14 17 28.5 14 18.5	See discussion, p. 155
9	Oct. 18	I	eN F	4 59.0 5 07	
10	Oct. 22	Iv	ePN iSN F	11 08 39.5 11 08 52.9 11 09.5	See discussion, p. 156
11	Oct. 24	Ir	ePN F	11 42 22 11 52	U.S.C. & G.S. epicenter: 62° N, 150° W
12	Oct. 27	Iv	eN F	15 42.0 15 45	See discussion, p. 156
13	Oct. 27	Iv	iPN F	15 53 46	See discussion, p. 156 F lost in next shock.
14	Oct. 27	Iv	iN F	15 58 31 16 01	See discussion, p. 156
15	Oct. 27	Iv	iN F	20 25 29	See discussion, p. 156 F lost in next shock.

## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
16	Oct. 27	Iv	i <sub>N</sub> F	20 30 27 20 34	See discussion, p.157
17	Oct. 30	Iv	e <sub>N</sub> i <sub>S<sub>N</sub></sub> F	2 02 23.4 2 02 37.3 2 06.1	See discussion, p.157
18	Oct. 31	Iv	e <sub>P<sub>N</sub></sub> e <sub>N</sub> e <sub>N</sub> i <sub>N</sub> e <sub>N</sub> F	5 46 55.6 5 47 01.1 5 47 09.8 5 47 30.3 5 48 55.6 5 51.2	See discussion, p.157
19	Nov. 1	Iv	e <sub>P<sub>N</sub></sub> i <sub>N</sub> i <sub>S<sub>N</sub></sub> F	21 40 11.7 21 40 15.9 21 40 27.6 21 45	See discussion, p.158
20	Nov. 3	Id	e <sub>P<sub>N</sub></sub> i <sub>N</sub> F	9 59 51.7 10 00 05.0 10 04	See discussion, p.158
21	Nov. 9	Iv	i <sub>S<sub>N</sub></sub> F	17 19 04.9 17 20.0	See discussion, p.159
22	Nov. 10	I	e <sub>N</sub> F	7 21 35 7 43	
23	Nov. 10	Iv	e <sub>P<sub>N</sub></sub> i <sub>S<sub>N</sub></sub> i <sub>S<sub>N</sub></sub> F	12 32 16.4 12 32 33.5 12 32 34.6 12 37	See discussion, p.159
24	Nov. 10	Iv	e <sub>N</sub> e <sub>P<sub>N</sub></sub> i <sub>S<sub>N</sub></sub> F	14 28 58.6 14 29 02.8 14 29 20.3 14 32	See discussion, p.159
25	Nov. 13	I	e <sub>N</sub> F	10 03 20 10 03.0	
26	Nov. 14	Iv	e <sub>P<sub>N</sub></sub> i <sub>N</sub> i <sub>N</sub> F	2 51 30.8 2 51 42.8 2 51 46.4 2 57.1	See discussion, p.160



## FRESNO

No.	Date	Char-acter	Phase	Time			Remarks
				U.T.			
				h.	m.	s.	
	1937						
27	Nov. 14	Iu	e <sub>N</sub> eP' <sub>N</sub> e <sub>N</sub> e <sub>N</sub> e <sub>N</sub> F	11	12	09	J.S.A. epicenter: 35°2 N, 72°8 E
				11	16	14	
				11	16	39	
				11	22	24	
				11	24	11	
				11	44		
28	Nov. 16	Iv	e <sub>N</sub> e <sub>N</sub> F	11	00	12	San Jacinto Fault west of Salton Sea, Two shocks (Pasadena)
				11	00	25	
				11	02		
29	Nov. 17	I	e <sub>N</sub> i <sub>N</sub> F	23	51	24	
				23	51	32	
				23	54		
30	Nov. 18	Iv	e <sub>N</sub> i <sub>N</sub> i <sub>SN</sub> F	14	48	46.7	See discussion, p. 160
				14	49	02.6	
				14	49	07.0	
				14	52		
31	Nov. 18	Iv	i <sub>SN</sub> i <sub>SN</sub> F	14	53	22.2	See discussion, p. 160
				14	53	27.0	
				14	54.4		
32	Nov. 19	Iv	ePN i <sub>N</sub> e <sub>SN</sub> i <sub>SN</sub> F	0	52	31.5	Felt in Nevada and Utah
				0	52	47.9	
				0	53	56.2	
				0	53	58.2	
				1	02		
33	Nov. 22	Iv	ePN i <sub>SN</sub> F	4	13	32.1	IV at Los Alamos. Pasadena reports epicenter off Point Arguello.
				4	14	11.3	
				4	30		
34	Nov. 27	Iv	ePN iPN i <sub>SN</sub> F	20	39	44.2	Epicenter probably near Candelaria, Nevada. Felt in Hawthorne, Nev.
				20	39	45.2	
				20	40	09.5	
				20	41.8		
35	Nov. 27	Iv	ePN e <sub>N</sub> i <sub>SN</sub> F	23	33	05.3	Epicenter near Weldon (Pasadena)
				23	33	14.6	
				23	33	32.7	
							F lost in next shock.
36	Nov. 27	Iv	e <sub>N</sub> i <sub>SN</sub> F	23	34	42.6	Epicenter near Weldon (Pasadena)
				23	35	01.4	
				23	36.8		

## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
37	Nov. 28	Iv	eP <sub>N</sub>	18 00 46.0	See discussion, p. 160
			iS <sub>N</sub>	18 01 00.2	
			F	18 04.9	
38	Nov. 30	Iv	eP <sub>N</sub>	10 18 30.0	Perhaps near San Miguel
			i <sub>N</sub>	10 18 34.1	
			i <sub>N</sub>	10 18 38.8	
			iS <sub>N</sub>	10 18 46.9	
			F	10 21.4	
39	Dec. 1	Iv	e <sub>N</sub>	15 14 40.9	See discussion, p. 160
			eS <sub>N</sub>	15 14 46.4	
			i <sub>N</sub>	15 15 02.7	
			F	15 16.0	
40	Dec. 1	I	e <sub>N</sub>	15 16 18.7	
			F	15 16.5	
41	Dec. 3	Iv	eP <sub>N</sub>	5 44 06	See discussion, p. 161
			iS <sub>N</sub>	5 44 35	
			F	5 46.0	
42	Dec. 3	Iv	eP <sub>M</sub>	15 28 52.8	Epicenter off Point Arguello (Pasadena)
			eS <sub>N</sub>	15 29 30.9	
			F	15 35.5	
43	Dec. 5	Id	e <sub>N</sub>	1 36 35.9	See discussion, p. 161
			iS <sub>N</sub>	1 36 41.9	
			F		
					F lost in next shock.
44	Dec. 5	Id	iP <sub>N</sub>	1 37 23.8	See discussion, p. 161
			iS <sub>N</sub>	1 37 34.0	
			F	1 43	
45	Dec. 5	Id	iS <sub>N</sub>	2 04 57.6	See discussion, p. 161
			F	2 06.9	
46	Dec. 6	I	i <sub>N</sub>	4 19 19.9	
			F	4 19.5	
47	Dec. 11	Iv	e <sub>N</sub>	4 40 51.6	See discussion, p. 161
			iS <sub>N</sub>	4 41 00.6	
			F	4 43	
48	Dec. 12	Iv	eP <sub>N</sub>	2 32 05.9	About 20 km. east of McKittrick (Pasadena)
			iP <sub>N</sub>	2 32 07.9	
			iS <sub>N</sub>	2 32 23.3	
			F	2 35	



## FRESNO

No.	Date	Char-acter	Phase	Time	Remarks
				U.T.	
	1937			h. m. s.	
62	Dec. 26	I	eN F	18 11.3 18 17	Surface waves.
63	Dec. 30	Ir	ePN F	11 46 59	U.S.C. & G.S. epicenter: 15°5 N, 98° W F off end of record.
64	Dec. 31	Ir	ePN eLN F	17 47 15 17 56.7 18 47	U.S.C. & G.S. epicenter: 15° N, 98° W