SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON
CALIFORNIA INSTITUTE OF TECHNOLOGY

220 NORTH SAN RAFAEL AVENUE,
PASADENA, CALIFORNIA

BULLETIN

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The constants of these stations follow.

PASADENA SEISMOLOGICAL LABORATORY **Central Station**

$\Phi = 34° 08.9'$ N., $\lambda = 118° 10.3'$ W., h = 295 m., Deeply weathered granitic rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

a vertical-component short-period seismometer with oil damping and galvanometric-optical recording.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given below are significant.

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Instruments, and Constants (approximate).

	T_o	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
Z	0.3 sec.	5,000	Critical
N — S	6 sec.	800	0.8-0.9
E — W	"	"	"

AUXILIARY STATIONS

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Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jan 5	PX	ePZ	02	04	15			c	normal	△ = 6860 km (61.7°);
		eSZ		12	39					0 = 01:53:58
	P6	eLE		19	49					USCGS: 27°S 112°W
	MW	ePN		04	21					0 = 01:54:09
		eSN		12	48					JSA : 25°S 115°W
	R	ePN		04	14					0 = 01:54:10
		eSE		12	30					
	SB	eN		04	21					
	T	ePNE		04	35					
		eSE		13	18					
	H	ePN		04	29					
Jan 5	P	ePNEZ	11	34	30				deep	Caroline Islands ?
		eZ		35	03					
		eZ		35	17					
		iSN		45	03					
	MW	ePNE		34	33					
		eSNE		45	04					
	R	ePNE		34	33					
	SB	ePNE		34	24					
	T	ePNE		34	27					
Jan 6	P	ePNZ	05	15	36					Solomon Islands ?
		eZ		16	16					
	T	ePNE		15	49					
		eE		26	05					
		iNE		26	28					
	H	ePN		15	47					
Jan 6	P	eZ	17	03	30					
Jan 7	P	iPNEZ	11	39	07				deep	Probably Japan
	MW	ePE		39	08					
	R	iPNE		39	10					
	SB	ePNE		39	01					
	T	iPNE		39	00					
Jan 9	P	iPNEZ	10	34	10			d	deep	Interpretation of phases by Mr.Benioff and Professor Gutenberg, following F.J. Scrase (Proc.Roy.Soc.,A,132, p.213)
		iEZ		34	12					△ = 87° (9700 km)
		ipPZ		35	40					0 = 12:21.8 h = 0.06
		ipPPZ		39	07					Florissant gives:
		iE		44	04					h = 0.06, 11°S 170°E
		eSN		44	31					
		iSE		44	36					
		isSEZ		45	47					
		eSSZ		51	06					
	MW	iPNE		34	12					
		eN		34	14					
		epPN		35	42					
		eNE		44	05					
		iSE		44	33					
	R	ePNE		34	13					
		iNE		44	07					
		eSNE		44	40					
	SB	ePNE		34	08					
		eE		43	59					
		iSE		44	29					
	T	ePNE		34	12					
		iNE		34	14					
		eE		43	47					
		eN		44	07					
		eSNE		44	40					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jan 13	P	iPEZ	16	25	52			c	normal	
		Small surface waves								
	MW	ePNE	16	25	33					
		eN		32	26					
	R	eNE		25	53					
	T	iPE		25	38					
		iSE		32	20					Δ(Tinemaha) = 4910 km (44.2°)
										0 = 16:17:22
										Probably Aleutian Islands
Jan 18	P	iPNEZ	17	49	16				normal?	Aleutian Islands?
	NW	ePNE		49	17					
	T	iPE		49	02					
Jan 20	P	iPNEZ	02	40	51			d	deep?	Destructive in Peru
		iZ		41	05					9°S 77°W 0 = 02:30:51 by
		eZ		41	50					St.Louis and Pasadena
		eSNE		49	01					This appears too far north;
		eNE		49	29					which,together with the
	T	ePE		41	03					absence of surface waves,
		eSE		49	24					suggests somewhat deeper
										focus than normal
Jan 23	T	eNE?	16	30	34					
		eNE		31	14					
	H	eNE		31	21					
Jan 24	P	ePZ	03	57	03				normal	Δ = 9780 km (88°) Probably
		ePR1Z	04	00	39					Solomon Islands
	P6	eE		07	22					
		ePSE		08	56					
		eSR1E		14	02					
		eSR2E		17	22					
		eLE		24	02					
	LJ	eE	04	00	38					
	T	ePNE	03	57	12					
	H	ePNE		57	12					
		ePR1NE	04	00	48					
Jan 24	P	iPNEZ	10	09	50				deep	
		iZ		10	05					
	MW	ePNE		09	50					
	T	ePNE		09	53					
	H	eE		09	53					
Jan 24	P	iPNEZ	15	31	15				normal?	Shock or shocks reported at
	LJ	iPE		31	55					Seward,Alaska,(60°N 150°W).
	T	ePNE		30	55					This shock overlaps the
		eSNE		36	00					next;origin probably in the
	H	eNE		31	03					same region. Δ(Tinemaha) =
										3330 km (30°) 0 = 15:24:37
Jan 24	P	iPNZ	15	31	41					Overlaps the preceding.From
		eNZ		32	59					St.Louis,Tinemaha, and Pasa-
	R	eNE		31	46					dena, 58°N 152°W; 0-15:24:55
	LJ	ePNE		31	55					Δ(Pasadena) = 3630 km(32.7°)
	T	ePNE		31	23					Δ(Tinemaha) = 3400 km(30.6°)
		eSN		36	33					
		eE		41	09					
	H	ePNE		31	31					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jan 26	P	ePZ	10	16	10				normal	Approximately 40°N 130°W
		eSNEZ		19	38					O = 10:13.5
	MW	ePNE		16	11					
	SB	eNE		19	34					
	T	eE		15	42					
		eN		16	08					
		eSNE		18	03					
	H	ePNE		15	30					
		eSE		18	35					
Jan 27	P	ePNEZ	17	35	13					
Jan 27	PX	eZ	19	51	25					
Jan 29	P	iPNEZ	13	54	16				normal	Δ = 10000 km (90°)
	PX	eZ		57	29					O = 13:41:10
		ePR1Z		58	22					USCGS: 7°S 155°E
	P6	iSE	14	05	13					O = 13:40.9
		ePSE		06	24					J S A: 7°S 156°E
		eE		10	41					
		eE		15	14					
		eLE		22	40	30				
	MW	ePNE	13	54	18					
	R	ePNE		54	19					
		eSN	14	05	08					
	SB	eNE	13	54	21					
	LJ	ePNE		54	21					
		eE	14	06	42					
	T	ePNE	13	54	18					
	H	ePE		54	19					
Jan 29	P	iPNEZ	14	20	19					Superposed on preceding, but not an aftershock. Surface waves, if any, obscured by preceding.
	MW	ePNE		20	20					
	T	ePE		19	58					
		eN		20	03					
	H	eE		20	03					
Jan 29	P	iPNEZ	15	52	14				normal	Probably 7°S 156°E
	PX	eZ		54	00					
		eLZ	16	24	20	20				
	MW	ePNE	15	52	16					
	R	ePNE		52	18					
	T	ePNE		52	18					
	H	ePNE		52	18					
Jan 29	P	iPNEZ	19	13	42				deep?	
	MW	ePNE		13	42					
	R	ePNE		13	44					
	T	ePNE		13	44					
	H	ePE		13	45					
Jan 29	P	ePZ	22	01	25				deep?	
		eNZ		04	07					
	T	ePE		01	30					
		eN		01	45					
Jan 30	P	eZ	03	17	52				normal	
		eEZ		17	59					
	P6	eLE		50		25				
	MW	eN		17	53					
		eE		18	03					
	T	eE		18	05					

PASADENA and auxiliary stations 1932

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jan 30	P	ePZ	07	25	40				normal	
	small surface waves recorded									
	MW	ePNE	07	25	39					
Jan 31	P	ePNEZ	04	48	05				normal	
	small surface waves recorded									
	MW	ePNE	04	48	10					
	LJ	eE		48	07					
	T	ePE		48	09					
Jan 31	P	ePEZ	09	26	20				normal	Approximately 40°N 130°W, O = 09:23.6 by St.Louis, Tinemaha, Pasadena, etc. Surface waves indefinite.
	PX	eZ		26	34					
		eSZ		29	42					
		iZ		30	45					
	MW	eE		26	37					
	R	eNE		26	32					
	T	eEE		25	57					
		eN		26	01					
		eN		28	26					
		eN		28	38					
	H	ePE		26	08					
		eN		26	13					
Jan 31	P	eEZ	16	14	10				normal	
	small surface waves recorded									
	MW	eNE	16	14	11					

Harry O. Wood,
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Charles F. Richter,
Assistant.

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With the issue of this Bulletin for January,1932, a number of small departures from the standard form,used during 1931, have been introduced.

In view of increasing interest in the considerable group of earthquakes which appear to originate at exceptionally great depths, care has been taken to separate these,when possible,from normal shocks. A column has been added, in which the notation "normal" or "deep" is entered for each case. Doubtful decisions are duly questioned; or in very uncertain cases the notation is omitted.

It is recognized that errors will occur in drawing such conclusions from the data of a limited group of stations, especially for the smaller or more distant shocks. It is hoped, however, that other investigators will find these data of value. Corrections, confirmations, or suggestions will be welcomed.

In every instance surface waves,when found,will be reported (at the Pasadena station only), either as L or by an explicit statement. Omission of such report will indicate definitely that normal surface waves are not found. The small waves of long period which occur on seismograms of the larger deep focus earthquakes,such as that of January 9, 1932, will ordinarily not be reported.

Decisions for deep focus are based partly on absence of surface waves, but largely on the occurrence of the supplementary reflected waves studied by Sezawa, and on the intervals between times at the several stations.

A column has been added in which "c" or "d" indicates that the first motion at Pasadena was a compression or dilatation (rarefaction).

In the station column, P refers to the short-period instruments (torsion horizontal, Benioff vertical); P6 to the long-period torsion instruments; and PX to the long-period Benioff vertical instruments -- all located at Pasadena

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TIME: At all these stations the minute-marks on the seismograms are coördinated directly by means of auxiliary records written at each station on which the minute-marks are registered closely parallel with recorded dot-and-dash radiotelegraphic signals sent in ordinary course from a powerful transmitting station. This permits direct correlation of the minute-marks at all the stations of the group at practically all times with an accuracy of one second, and usually of one-fifth second.

The constants of these stations follow.

PASADENA **SEISMOLOGICAL LABORATORY** **Central Station**

$\Phi = 34° 08.9'$ N., $\lambda = 118° 10.3'$ W., h = 295 m., Deeply weathered granitic rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

a vertical-component short-period seismometer with oil damping and galvanometric-optical recording.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given below are significant.

Experimental seismographs of various kinds are in process of development from time to time, and are used for intervals of variable duration. Information concerning these will be given when necessary.

Instruments, and Constants (approximate).

	T_o	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
Z	0.3 sec.	5,000	Critical
N — S	6 sec.	800	0.8-0.9
E — W	"	"	"

AUXILIARY STATIONS

Each of the auxiliary stations has equipment as follows:

Apparatus: two horizontal-component torsion seismometers with magnetic damping and optical recording;

Instruments, and Constants (approximate).

	T_o	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
Z			

The Station Constants follow.

Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station
$\Phi = 34° 13.5'$ N., $\lambda = 118° 03.4'$ W., h = 1742 m., Weathered granite.

Riverside Seismologic Station
$\Phi = 33° 59.6'$ N., $\lambda = 117° 22.4'$ W., h = 250 m. approx., Weathered granite.

Santa Barbara Seismologic Station
$\Phi = 34° 26.6'$ N., $\lambda = 119° 42.8'$ W., h = 100 m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)
$\Phi = 32° 51.8'$ N., $\lambda = 117° 15.2'$ W., h = 7.7 m. approx., Consolidated detrital material.

Tinemaha Seismologic Station
$\Phi = 37° 05.7'$ N., $\lambda = 118° 15.5'$ W., h = 1180 m. approx., Basalt.

Haiwee Seismologic Station
$\Phi = 36° 08.2'$ N., $\lambda = 117° 58.6'$ W., h = 1100 m. approx., Loosely cemented tuff.

SYMBOLS AND NOTATION: in general the symbols and notation conform with the usual international practice.

However, when measurements referring to **local** earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between $\overline{P}$, P*, and P_n, although such complications are often clearly indicated and are the subject of study.

AMPLITUDES, (half-ranges), are measured in millimeters of the seismographic trace.

SPECIAL SYMBOLS indicating the stations of this coördinated group are as follows:

PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 seconds . . . . . P
For routine instruments of period 6 seconds . . . . . P_6
For instruments of different period analogous notation will be employed.

Mount Wilson Seismologic Station . . . . . MW
Riverside Seismologic Station . . . . . R
Santa Barbara Seismologic Station . . . . . SB
La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
Tinemaha Seismologic Station . . . . . T
Haiwee Seismologic Station . . . . . H

In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Feb 2	P	iPNEZ	07	10	47			c	deep	
	MW	ePNE			47					
	T	iPE			57					
	H	ePNE			55					
Feb 3	P	ePNEZ	06	23	36				normal	Δ = 4420 km.(39.8°)
	PX	ePRIZ		25	19					0 = 06:15:54
		eZ		28	32					USCGS: 19.3°N 76.0° W
	P6	eSN		29	48					0 = 16:15.8
		eE		33	03					JSA : 19.2°N 76°W
		eLE		39	26	20				0 = 06:15:51
	MW	ePNE		23	38					Destructive in Santiago
	R	ePNE			34					de Cuba
	SB	iPNE			55					
	LJ	ePN			26					
		eSN		29	29					
	T	iPNE		23	42					
		iSN		30	00					
	H	ePN		23	46					
		eSN		29	53					
Feb 3	P	iPNEZ	07	46	19			d	deep	
		eNEZ		47	52					
		iSNE		56	01					
	MW	ePNE		46	20					
		eSE		56	01					
	R	ePNE		46	21					
		eNE		48	09					
	SB	eSNE		56	08					
	LJ	ePN		46	22					
		eN			29					
		eSN		56	08					
	T	iPNE		46	12					
		eNE		55	45					
		eSN			53					
	H	ePNE		46	15					
		eE			53					
		eE		47	52					
		eSE		55	56					
Feb 3	P	ePNEZ	09	24	56			c	normal?	
		eZ		25	05					
		eZ			12					
	MW	ePE		24	56					
	R	ePNE		25	01					
	T	ePNE		25	10					
	H	eE			05					
Feb 3	P	eZ	04	44	25					
	T	eNE			21					
Feb 13	P	iPNEZ	18	29	17				deep?	
	T	eNE			19					
	H	eE			17					
Feb 13	PX	ePZ	19	25	13				normal?	
	T	eE			11					
	H	eE			15					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Feb 16	P	ePNEZ	14	00	41			c	normal	△ = 8440 km (76.0°)
		iNEZ			51					0 = 13:48:48
		ePR2E		05	35					
	PX	iSZ		10	27					USCGS: 14°S 179°W
	P6	eE		11	16					0 = 13:48.9
		eLE		23	50	30				
	R	ePE		00	46					JSA : 13°S 180°W
	SB	eE			55					0 = 13:48:50
		iN		01	24					
	T	ePNE		00	53					
	H	ePNE			49					
Feb 17	P	iPNEZ	01	03	11			c	deep	
		iZ			51					
	R	ePNE			16					
	LJ	ePNE			26					
	T	iPNE		02	58					
	H	ePNE		03	02					
Feb 17	P	eEZ	16	15	30				normal	Emergence very indefinite
	LJ	eN			38					Emergence very indefinite
	T	eE			35					JSA:13°N71°W.0=16:06:37
Feb 19	P	iPNEZ	05	37	29			d	deep?	
	R	eN			31					
	T	iPNE			21					
	H	iE			24					
Feb 20	P	iPNEZ	09	15	49				normal?	
	T	iPE			36					
Feb 21	P	ePNEZ	01	41	05				deep?	Probably South Pacific region.
		iZ			27					Azimuth roughly 225°
	R	ePNE			07					
	SB	ePNE			03					
	T	iPNE			14					
	H	ePNE			13					
Feb 21	P	iPNEZ	01	46	35			c	deep?	Azimuth roughly 280°.North
		iZ		47	00					Pacific.
	R	ePNE		46	38					
	SB	iPN			30					
	T	ePNE			33					
	H	iPNE			35					
Feb 21	P	iZ	11	48	50					
	T	eE			55					
	H	eE			52					
Feb 23	P	eZ	00	32	49				normal	
		iPNZ		33	05					
	PX	eZ		34	50					
		iZ		35	00					
		iZ		38	09					
	P6	eLE?		52	00	20				
	LJ	eN		32	49					
		eN		33	15					
	T	eN		33	05					
		eN		35	15					
	H	eNE		33	11					
		eN		35	13					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Feb 23	P	iPNEZ	20	24	04				normal	
	P6	eLE		52	18	20				
	R	ePNE		24	07					
	SB	ePNE			01					
	LJ	iPNE			07					
	T	ePNE			09					
	H	ePNE			09					
Feb 27	P	iPNZ	09	01	03			d	deep	
		iNEZ			33					
	R	ePNE			00					
		eNE			30					
	LJ	eN		00	57					
	T	ePNE		01	14					
		eN			46					

Harry O. Wood,
Research Associate in Charge.
Charles F. Richter,
Assistant.

PUBLICATIONS --SEISMOLOGICAL LABORATORY LIST

Certain papers surveying the seismic status, stating the problem and urging the establishment of seismologic research in California, were published prior to the inauguration of this work by the Carnegie Institution of Washington in 1921. Several other papers bearing on the work in one way or another were published later while the program was getting under way. Distribution of these papers was incomplete. Separate reprints of most of these are still available, in some cases in considerable number, in others a few copies only. So far as available copies of these papers will be furnished upon request as long as the supply on hand permits. The following list enumerates these papers:

1) California Earthquakes - A Synthetic Study of Recorded Shocks, Bull.Seis.Soc.Amer.,VI,2-3,55-180,1916.
2) The Earthquake Problem in the Western United States, Bull.Seis.Soc.Amer.,VI,4,197-217,1916.
3) The Study of Earthquakes in Southern California, Bull.Seis.Soc.Amer.,VIII,1,28-33,1918.
4) On a Piezo-electric Accelerograph, Bull.Seis.Soc.Amer.,XI,1,15-57,1921.
5) "Regional" versus "World" Seismology in relation to the Pacific Basin, Spec.Publ.Bernice P.Bishop Museum,No.7,378-391,1921.
6) Some Considerations Touching on Isostasy, Bull.Geol.Soc.Amer.,XXXIII, 303-316, 1922.
7) Earthquake Reports, Bull.Seis.Soc.Amer.,XIV, 1, 60-68, 1924.

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8) A Torsion Seismometer, Journ.Opt.Soc.Am.and Rev.Sci.Inst.,VIII, No.6, 817-822, 1924.
9) Description and Theory of the Torsion Seismometer, Bull.Seis.Soc.Amer.,XV,1,1-72,1925.

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10) The Practical Lesson of the Santa Barbara Earthquake, Allied Architects Assoc.Bull., August 1, 1925.

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11) Microseisms in North America, Bull.Seis.Soc.Amer.,XXI, 1, 1-24, 1931.
12) A Study of Blasting Recorded in Southern California, Bull.Seis.Soc.Amer.,XXI, 1, 28-46, 1931.
13) Operating Frequency of Regenerative Oscillatory Systems, Proc.Inst.Radio Engrs.,XIX,7,1274-1277,1931.
14) Recent Earthquakes near Whittier, California, Bull.Seis.Soc.Amer.,XXI, 3, 183-203, 1931.
15) On Supposed Discontinuities in the Mantle of the Earth, Bull.Seis.Soc.Amer.,XXI,3, 216-222, 1931.
16) Pseudoseisms Caused by Abnormal Audibility of Gunfire in California, Gerlands Beiträge zur Geophysik,XXXI,155-157,1931.
17) Aufbau und Temperatur der Stratosphäre, Gerlands Beiträge zur Geophysik,XXXII,87-94,1931.
18) Modified Mercalli Intensity Scale of 1931, Bull.Seis.Soc.Amer.,XXI,4,277-283,1931.
19) Earthquake of January 28,1931,Bull.Seis.Soc.Amer.,XXI,4,284,1931.
20) Travel Time Curves at Small Distances and Wave Velocities in Southern California, Gerlands Beitrage zur Geophysik,XXXV,1,6-45,1932.
21) Mit welcher Genauigkeit lässt sich die Schallgeschwindikeit in der Stratosphäre finden? Gerlands Beiträge zur Geophysik,XXXV,1,46-50,1932.

SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON
CALIFORNIA INSTITUTE OF TECHNOLOGY

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La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
Tinemaha Seismologic Station . . . . . T
Haiwee Seismologic Station . . . . . H

In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Mar 1	P	ePNZ	19	13	49				normal?	
	MW	ePNE			49					
	R	ePNE			48					
	LJ	iPNE			42					
	T	iPNE		14	00					
	H	ePNE		13	57					
Mar 2	P	eZ	12	00	29					
	T	eE			45					
Mar 2	P	iPNEZ	17	43	46				normal	Probably near 43°N 126°W.
	MW	ePNE			47					
	T	iPNE			25					
		eN		44	52					
		eLN		46	09					
	H	ePNE		43	34					
		eE		45	24					
		eLNE		46	49					
Mar 6	P	eZ	10	51	16				deep?	
		iZ		52	17					
	T	eE		51	14					
		eE		52	14					
Mar 6	P	ePNEZ	12	05	44				deep?	
	T	ePNE			50					
	H	ePE			49					
Mar 8	P	iPNEZ	02	42	04				deep?	
Mar 8	P	ePNEZ	03	24	15				deep?	
		iZ			30					
	MW	ePNE			16					
	R	ePE			19					
	SB	eN			20					
	LJ	ePN			21					
	T	ePE			16					
	H	ePNE			16					
Mar 8	P	ePNEZ	04	37	57				normal	Δ = 4940 km. (44.5°)
		eSN		44	41					0 = 04:29:38
	small long waves recorded									Probably Aleutian Islands,
	MW	ePNE	04	37	57					about 51°N., 176°W.
		eSNE		44	40					
	R	ePNE		38	06					
		eSN		45	01					
	SB	eSN		44	25					
	LJ	ePN		38	07					
		eSN		45	20					
	T	ePNE		37	43					
		iSE		44	15					
	H	ePNE		37	47					
		eSE		44	30					
Mar 8	P	ePNEZ	18	13	14				normal	
	small indefinite surface waves									
	MW	eNE	18	13	17					
	R	eE			24					
	T	ePNE			30					
	H	ePNE			24					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Mar 9	P	ePNEZ	02	53	56				normal?	
	MW	ePNE			55					
	R	eNE		54	02					
	SB	eE		53	46					
	T	ePE			23					
	H	ePNE			34					
Mar 10	P	ePNZ	05	30	47				normal	
		eLN		59.5						
	T	eE		31	01					
	H	eE		30	57					
Mar 10	P	ePNZ	23	06	54				deep?	
		eN		07	40					
	MW	eE		06	53					
	T	ePNE		07	12					
		eSN		16	20					
	H	eE		07	15					
Mar 12	P	iPNZ	12	59	20				normal?	
	MW	ePNE			23					
	T	ePNE			33					
Mar 14	P	iPNEZ	04	09	33			c	normal	USCGS: 20.5°N 109°W
		eN		12	23					0 = 04:05.8
		eEZ			43					J S A: 20.5°N 110°W
	P6	eLN		14	40					0 = 04:05:38
	MW	ePNE		09	33					
		eE		12	44					
	R	ePN		09	28					
		eN		12	41					
		iE		13	07					
	SB	ePNE		09	47					
		eE		13	01					
		eN			10					
	LJ	ePNE		09	12					
		eLE		12	17					
	T	ePNE		10	05					Tinemaha: Δ = 2080 km(18.7°)
		eN		13	08					0 = 04:05:42
		iSE			34					
	H	iPNE		09	52					
		eSE		13	09					
Mar 14	P	iPNEZ	22	51	45			c	normal	USCGS: 07°N 73°W
	surface waves recorded									0 = 22:42:34
	MW	iPE	22	51	44					J S A: 09.5°N 74°W
		eSNE		58	50					0 = 22:43:00
	R	ePNE		51	41					
		eSE		58	44					
	LJ	iPNE		51	35					
		iSNE		58	37					
	T	iPNE		51	55					Tinemaha: Δ = 5530 km(49.8°)
		iSNE		59	11					0 = 22:42:56
	H	ePE		51	49					
		eSN		59	04					
Mar 15	P	eNEZ	04	45	18					
	small surface waves recorded									
	MW	eNE	04	45	17					
	R	eE			21					
	LJ	eNE			18					
	T	ePNE			11					
	H	eE			14					

Date	Station	Phase	G. C. T. h m s	T sec	A mm	C d	Focal depth	Remarks
Mar 16	P	iZ	05 38 13					Interpretation doubtful.
		iZ	52					Either two shocks or one
	T	eE	23					deep focus shock.
		eNE	39 04					
	H	eE	38 21					
		eE	39 01					
Mar 19	P	iPNEZ	11 12 13			d	normal	
		iN	22 39					
	P6	eLN	34 00					
	MW	ePNE	12 15					
	R	iPNE	17					
	LJ	iPNE	21					
	T	ePNE	10					
		iNE	22 33					
	H	iPNE	12 14					
		eNE	22 37					
Mar 19	P	ePNEZ	23 23 19				normal	
	small surface waves recorded							
Mar 22	P	eNZ	14 10 54					
	T	eNE	51					
Mar 23	P	ePNZ	14 19 38					
	T	ePNE	55					
	H	eN	55					
Mar 25	P	eEZ	21 41 52				normal?	
	MW	eE	48					
	T	eE	39					
	H	eN	57					
Mar 26	P	ePNEZ	00 01 52				normal	Overlaps the following shock.
	MW	ePNE	54					Surface waves not identified.
	R	ePE	57					Epicenter probably same as
		iSE?	07 51					the next, in which case:
	SB	iPNE	01 52					0 = 23:54:38
	LJ	ePNE	02 09					
	T	ePNE	01 33					
		iE	36					
	H	iPN	01 42					
Mar 26	P	iPNEZ	00 05 33				normal	Δ = 4060 km (36.5°)
		iSE	11 21					0 = 23:58:19 (March 25)
	P6	iLE	14 05	25				USCGS: 63°N 155°W
	MW	eN	05 41					0 = 23:58.5
		iSNE	11 20					J S A: 61°N 151°W
	R	ePN	05 36					0 = 23:58:29
		eSNE	11 21					Alaska. Damage reported
	SB	iPN	05 31					about 63°N 149°W.
	LJ	ePNE	49					
		eSE	11 45					
	T	iPNE	05 13					
		iSNE	10 43					
	H	iPN	05 22					
		eSN	10 53					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Mar 26	PX	eZ	10	10	59				normal	
		iZ		11	38					
		eZ		13	47					
	P6	eLE		45		25				
		eE		51	32	20				
	R	eE		10	41					
	T	eE		11	00					
Mar 28	P	eZ	00	54	54				normal?	
	T	eNE			54					
		eNE		57	40					
Mar 28	P	eNZ	04	25	26				deep?	
		iNEZ		26	16					
	T	eNE			02					
		eNE			32					
Mar 29	P	ePNEZ	00	27	09				normal	
	P6	eLE?		30	30					
	MW	ePNE		27	10					
	R	ePNE			17					
	LJ	eNE			42					
	T	ePNE		26	42					
		eN			52					
		eNE		30	46					
	H	eN		26	53					
		eN		30	23					
Mar 29	P	ePNEZ	03	50	16				normal	
	MW	eN			13					
	R	eN			23					
	LJ	ePNE			35					
	T	eNE		49	45					
	H	eN		50	02					
Mar 30	P	iPNEZ	15	14	38				deep	
		iZ			52					
	MW	ePNE			39					
	T	eNE			40					
	H	eN			48					
Mar 31	P	ePNEZ	18	57	06				normal?	
	MW	ePNE			07					
	R	ePN			09					
	T	ePE		56	45					
	H	ePNE			51					

Harry O. Wood,
Research Associate, in Charge.

Charles F. Richter,
Assistant.

SEISMOLOGICAL LABORATORY

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BULLETIN

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$\Phi = 34° 08.9'$ N., $\lambda = 118° 10.3'$ W., h = 295 m., Deeply weathered granitic rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
N — S	6 sec.	800	0.8-0.9
E — W	"	"	"

vertical component seismometers with oil damping and galvanometric-optical recording. (Details shortly to be published.)

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometers: (1) T_1=0.2 sec. Damping critical.
(2) T_1=10 to 14 sec. Damping critical.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given are significant.

Experimental seismographs of various kinds are in process of development from time to time, and are used for intervals of variable duration. Information concerning these will be given when necessary.

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Each of the auxiliary stations has equipment as follows:

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Instruments, and Constants (approximate);

	T_0	V	h
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E — W	"	"	"

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$\Phi = 33° 59.6'$ N., $\lambda = 117° 22.4'$ W., h = 250 m. approx., Weathered granite.

Santa Barbara Seismologic Station
$\Phi = 34° 26.5'$ N., $\lambda = 119° 42.9'$ W., h = 100 m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)
$\Phi = 32° 51.8'$ N., $\lambda = 117° 15.2'$ W., h = 7.7 m. approx., Consolidated detrital material.

Tinemaha Seismologic Station
$\Phi = 37° 05.7'$ N., $\lambda = 118° 15.5'$ W., h = 1180 m. approx., Basalt.

Haiwee Seismologic Station
$\Phi = 36° 08.2'$ N., $\lambda = 117° 58.6'$ W., h = 1100 m. approx., Loosely cemented tuff.

SYMBOLS AND NOTATION: in general the symbols and notation conform with the usual international practice. For the phases of deep-focus earthquakes the notation of F. J. Scrase is adopted. c, d are abbreviations for compression and dilatation.

When measurements referring to **local** earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between $\overline{P}$, P*, and P_n, although such complications are often clearly indicated and are the subject of study.

AMPLITUDES, (half-ranges), are measured in millimeters of the seismographic trace.

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PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 second . . . . . P
For routine instruments of period 6 seconds . . . . . P_6
For instruments of different period analogous notation will be employed.
For routine vertical component, galvanometer period 0.2 second . . . . . P
For routine vertical component, galvanometer period 10 to 14 seconds . . . . . PX

Mount Wilson Seismologic Station . . . . . MW
Riverside Seismologic Station . . . . . R
Santa Barbara Seismologic Station . . . . . SB
La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
Tinemaha Seismologic Station . . . . . T
Haiwee Seismologic Station . . . . . H

In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Apr. 3	P	iPNEZ	20	51	39			c	normal?	
	MW	ePNE			39					
	T	ePNE			50					
	H	ePNE			41					
Apr. 4	P	ePNEZ	19	28	20			c	deep!	Clear and characteristic case of deep focus. According to Prof. Wadati 30°N., 141°E., approximately. O = 19:17, h = 300 km. or more.
		iNEZ			22					
		iZ			30					
		iSNEZ		38	05					
	MW	iPNE		28	22					
		eE		29	57					
		eSNE		38	04					
		iE			06					
	R	iPNE		28	24					
		eSNE		38	07					
	SB	iPNE		28	20					
		eSNE		37	53					
		iSN			55					
	LJ	ePNE		28	27					
		iNE			29					
		eE		30	05					
		eSE		38	10					
		iSN			13					
		iE			16					
	T	iPNE		28	17					
		iSNE		37	51					
	H	iPNE		28	17					
		eSE		37	51					
		iSN			58					
Apr. 6	P	iPNEZ	13	06	21			c	deep	
		iZ			24					
	MW	ePN			21					
	T	iPNE			31					
	H	iPNE			27					
Apr. 8	P	ePNZ	12	04	37				normal	
	P6	eLE		37						
	T	eNE		04	53					
	H	eE			47					
Apr.10	P	eNEZ	06	54	03					May not be seismic.
Apr.13	P	ePZ	00	05	39				normal	
		ePNE			41					
		eSE		16	10					
	P6	eLE		34		25				
	MW	ePNE		05	40					
	R	ePNE			47					
		eSNE		16	13					
	T	eN		05	47					
		iSNE		16	12					
	H	ePN		05	53					
		iSE		16	12					
Apr.14	PX	eLZ	02	14		15			normal	
Apr.16	P	eNEZ	03	00	53				normal	
	P6	eLE		08	38	13				
	MW	eN		01	00					
	R	eNE		00	39					
	T	ePNE		01	08	5				
	H	ePN		00	58					
Apr.22	P	iPZ	05	17	22			c		Possibly two shocks.
		eZ		20	38					
		iZ		21	02					
		eZ		25	36					
	MW	eN		20	45					
		eE			52					

(Continued on Page 13)

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Apr.22	(Continued from Page 12)									
	R	eE	05	20	34					
	T	eE		17	18					
		eN			40					
		eE		20	28					
		eN			39					
	H	eE		17	16					
		eNE		20	33					
Apr.24	P	iPNEZ	06	13	27				normal	Long periods (L) precede short periods at Pasadena.
	P6	iLE		15	23	30				J S A: 26°N 112°W
	PX	eS			57	2				0 = 06:10:59
	MW	ePNE		13	33					
		eLN		15	47					
	R	ePNE		13	26					
		eLNE		15	43					
	SB	eE		13	38					
	LJ	eN			08					
		eSNE		15	12					
	T	iPNE		14	02					
		eLN		17	38					
	H	ePNE		13	51					
		eLNE		17	04					
Apr.25	P	iPNEZ	17	59	42			d	deep	
	MW	eE			42					
	R	eNE			43					
Apr.26	P	iPNEZ	08	06	26			c	deep	
		iZ			41					
		eSN		16	02					
	MW	ePNE		06	26					
	R	ePNE			22					
	LJ	ePNE			18					
		eNE			31					
	T	ePNE			39					
		eSNE		16	26					
	H	eE			34					
		iN			38					
		eSNE		16	16					
Apr.29	P	ePNE	18	26	48				normal	Probably Aleutian Islands.
	MW	ePNE			50					
		eSNE		33	32					
	R	ePE		27	08					
	LJ	eN		26	54					
		eE		27	00					
		eSNE		33	53					
	T	ePNE		26	36					△ = 4740 km. (42.7°)
		iSNE		33	08					0 = 18:18:31

Corrections to previous reports:

For Feb. 3 04:44, read 12:44
19 05:37, read 13:37
Mar. 6 10:51, read Mar. 4 10:51
23 14:19, read 12:19

Note: With this issue of the Bulletin is enclosed a revised issue of the printed sheet of information.

Harry O. Wood,
Research Associate in Charge.
Charles F. Richter,
Assistant.

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May 1	P	eZ	19	13	36				normal	
		eNE			44					
		eNEZ		17	06					
		eNZ			24					
		iZ			34					
	P6	eLE		18	45					
	MW	eE		13	39					
		iN		17	19					
	R	eN		12	57					
		iNE		17	04					
	LJ	eN		13	12					
		eN		16	41					
		iN			59					
	T	iPNE		14	00					Δ = 1200 km (22°)
		eSNE		18	11					0 = 19:19:01
	H	ePNE		13	53					
		eSNE		17	52					
May 2	P	ePNEZ	16	03	06				deep?	
	R	ePNE			09					
	T	ePNE			17					
	H	iPNE			15					
May 5	P	iPNEZ	04	22	46			c	deep	
	PX	eZ		26	00					
	MW	ePNE		22	45					
	SB	ePNE			40					
	LJ	iPE			53					
	T	iPN			38					
	H	ePE			40					
		iNE			42					
May 7	P	eZ	23	12	15					
May 8	P	iPNEZ	19	33	29			c	deep	
		eZ		34	07					
	MW	ePNE		33	29					
	R	ePNE			25					
	SB	eN			31					
		iE			44					
	LJ	ePNE			21					
	T	ePNE			41					
	H	ePE			37					
May 10	P	iPNEZ	12	05	07			c	deep	
		eZ			46					
	MW	ePNE			08					
	R	ePNE			03					
	LJ	ePNE		04	59					
	T	iPNE		05	18					
May 11	P	eZ	07	05	36					
	MW	eE			41					
	T	eE			31					
May 14	P	ePZ	13	25	36				normal	USCGS: 03°N 129°E
		iNZ		29	36					0 = 13:11.3
		iZ			46					J S A: 01°N 124°E approx.
		eLN		57.3		56				
	PX	iPZ		25	36			c		Surface waves large. Phases
		iZ			48					interpreted on basis of
		iZ		29	37					Δ(Pasadena)=12450 km (112°)
		iPR1Z		30	17					

- - - - - - continued on page No.15 - - - - - -

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
		- - - - continued from page 14 - - - -								
May 14	PX	iPR2Z	13	33	03					Phases about 13:29:40 may be P of another shock, possibly deep.
		iPSZ		39	47					
		iZ		40	04					
		iZ			49					Damage reported in North-eastern Celebes.
	P6	ePE		25	37					
		iPR1E		30	24					
		eScPcSE		36	07					
		iE		38	14					
		ePSE		39	47					
		iE		40	02					
		eE		44.3						
		eE		45	05					
		eSR1E			58					
	P12	iN		30.5						P12 refers to experimental instrument at Pasadena, period 12 seconds.
		iSR1N		46.2						
		iN		56.6						
		iN		57	17	55				
		iLN	14	03	14	67				
	MW	ePE	13	25	42					
		eE		29	39					
		eE		30	24					
	R	ePN		25	45					
		eE		29	48					
	LJ	ePNE		25	54					
		iNE		29	48					
		iNE		30	40					
	T	ePE		25	34					
		iNE		29	38					
	H	ePNE		25	39					
		iNE		29	39					
May 17	P	iPNEZ	13	15	20				deep?	
		eZ			41					
	T	eE		17	03					
	H	eNE		15	20					
		eE		17	05					
May 18	P	eZ	19	13	00				normal?	
	MW	eE			09					
		eN			19					
	T	eE			13					
		eN			24					
	H	eE			13					
		eN			28					
May 20	P	iPNEZ	09	47	17			c	deep	
	MW	ePNE			18					
	R	ePNE			19					
	T	ePN			27					
	H	iPNE			26					
May 21	P	ePZ	10	16	51			c	normal	USCGS: 13°N 88°W 0 - 10:10:11
		iPNEZ			54			d		J S A: 13.8°N 88.5°W 0 - 10:10:17
		ePR1N		18	12					
		iPcPZ		19	27					Destructive in San Salvador. PcP, ScP, ScS, extraordinarily large and sharp.
		eE		21	54					
		eSNE		22	16					
		iScPZ		23	07					
		eN		25	02					
		iScSNEZ		27	09					
	P6	iLNE			00	35				
	MW	iPNE		16	53					
		eSE		22	16					

- - - - continued on page 16 - - - -

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
		- - - - continued from page 15 - - - -								
May 21	R	ePNE	10	16	47					
		iNE		27	07					
	SB	ePE		17	04					
		iNE		27	16					
	LJ	iPNE		16	43					
		iNE		27	02					
	T	ePNE		17	07					
		iNE		27	19					
	H	ePN		17	07					
		eN		27	19					
May 22	P	ePNEZ	11	41	09				normal	Region of Fiji Islands (using data of Washington).
		iZ			10					
	P6	eLE	12	12	10	14				
	MW	eNE	11	41	10					
	R	ePNE			11					
		eN		50	56					
	LJ	eNE		41	04					
	T	iPNE			21					Δ = 8520 km (76.7°)
		eSN		51	10					0 = 11:29:23
	H	ePNE		41	17					
May 22	P	ePNZ	22	46	28				normal	J S A: 14°N 88.5°W
	MW	eNE			30					0 = 22:40:04
	R	eN		56	48					
	T	eNE		46	44					
		eN		57	04					
	H	eE		46	37					
May 26	P	iPNEZ	16	21	08			c	deep!	USCGS: 16°S 173°E
		iZ			11					0 = 16:09:33
		iNEZ			24					J S A: 23°S 180°E
		iZ			30					0 = 16:09:40
		ePPE		24	52					Pasadena phases interpreted
		iZ!		26	16					on basis of Δ = 9100 km.,
		eE		30	41					(82°), h = 0.09 or slightly
		eE			55					greater.
		eN			59					
		eSNE		31	08					Especially in the vertical component, the preliminary phases are recorded at Pasadena with amplitudes in excess pf those for most previous distant shocks, which indicates exceptionally great energy. Except for amplitude the seismograms closely resemble those of the earthquake of 1931, October 18, 04h G.C.T. The reports of numerous stations for this October shock are quite consistent with an epicenter not far from that assigned by the U.S.Coast and Geodetic Survey to the May shock. This is distant 81°45' from Pasadena. The distance from the epicenter given by the Jesuit Seismological Association is 81° 56'. Comparison of the components shows that the whole motion about the time of the S phase was polarized nearly in the plane of propagation. The phase sS at Pasadena is very large, exceeding SS both in period and registered amplitude. Surface waves are indefinite or absent.
		eN			32					
		eSPZ		32	03					
		eSPN			07					
	PX	iPZ		21	08					
		iZ			11					
		iZ			13					
		iZ!			26					
		ipPZ		23	31					
		eZ		24	19					
		isPZ!			29					
		iZ			43					
		eSNE		31	09					
		iZ			17					
		iSPZ		32	05					
	P6	ePNE		21	08					
		iE			13					
		iNE			27					
		iPPE		24	53					
		iE		30	44					
		iN		31	00					
		iSNE			07					

- - - - - continued on page 17 - - - - -

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
		- - - - continued from page 16 - - - -								
May 26	P6	iN	16	31	33					
		iSPN		32	07					
		iE		34	38					
		isSE		35	10	25	13			
		iSSE		37	13					
	MW	ePNE		21	09					
		iN			26					
		iNE		31	12					
	R	ePNE		21	10					
		iNE			20					
		iNE		30	46					
		iNE			59					
		iNE		31	14					
		eNE		32	09					
		eE		35	25	30				
	SB	iN		21	10					
		iE			24					
		iNE		30	51					
	T	iNE		21	19					
		eE		30	52					
		iN		31	29					
	H	ePE		21	20					
		iE			29					
		eE		31	04					
May 26	P	iNEZ	16	38	57				deep?	
		iZ		39	07					
		iNZ			34					
	MW	eNE			34					
	R	eN			25					
		eE			31					
	T	eE			23					
	H	eE			24					
May 26	P	iEZ	16	47	10				deep?	
		eNZ			39					
		eZ		49	59					
	MW	eNE		47	39					
	R	eN			28					
	T	eNE			39					
	H	eE			12					
May 26	P	iNZ	17	08	00					
	T	eE			10					
	H	eN			27					
May 26	P	iNZ	18	46	20					
	R	eNE			22				deep	
	T	eE			22					
		eN			29					
	H	eN			29					
May 26	P	iPNEZ	22	33	24					
		eN		43	08			d	deep	
	MW	ePNE		33	25					
		eN		43	10					
	R	ePNE		33	26					
		eNE		43	00					
	SB	ePNE		33	23					
		eN		43	02					
	T	ePNE		33	33					
		eNE		43	07					
	H	ePN		33	33					
		eN		43	08					

No.18 PASADENA, LOCAL SHOCKS August, 1932.

Data	P.S.T.	Lat.	Long.	Q	M	Remarks
31	02:18:41	34 ?	118 ?	D	1	Los Angeles district
31	02:23:35	34 ?	118 ?	D	0	Los Angeles district.
31	03:11:26	34 ?	118 ?	D	0.5	Los Angeles district.
31	04:25	34 ?	118 ?	D	0.5	Los Angeles district.
31	09:05:42	34 ?	118 ?	D	1	Los Angeles district.
31	09:29:13	34 17	116 20	C	2.5	North of Little San Bernardino Mountains.
31	12:09:58	33 51	116 35	B	2.5	Near PalmSprings, Riverside County.
31	13:30:50	34 ?	118 ?	D	1	Los Angeles district.
31	20:53:25	33 51	116 35	B	3.5	Near Palm Springs, Riverside County.

On August 16, 19, and 20, a total of 29 small shocks originating near Olancha, at 36°13'N., 117°58'W., were registered. Only two of these, on August 16 at 17:13, and on August 19 at 01:21 were as large as magnitude 2.

Blasts near Pasadena were recorded: August 4, 12:00; 9,10:53, 12:01; 18,19:24.

Blasts near Mt. Wilson: Aug.8,11:56; 13,14:25; 14,20:08; 18,11:52; 20,11:48; 24,12:08; 27,12:08; 27,23:29; 30,21:09; 31,13:29, 13:45.

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
May 27	P	iPNEZ	01	41	21			d	deep	
	MW	ePNE			21					
	R	ePNE			22					
		eNE		50	46					
		eNE		51	07					
	T	ePNE		41	29					
		eNE		51	19					
	H	ePN		41	28					
		eN		50	54					
		eN		51	19					
May 27	P	iPNEZ	06	06	49			d	deep	
	MW	ePE			50					
	R	ePNE			52					
	T	ePNE			58					
	H	ePN		07	00					
May 28	P	ePNEZ	02	34	12			d	deep	
		eZ		37	43					
		eSNE		45	00					
	MW	ePNE		34	13					
	R	eNE			22					
	T	ePNE			06					
		eN		44	33					
	H	ePNE		34	11					
		eN		37	35					
May 30	P	iPNEZ	00	33	44			d	deep	
		eZ		34	24					
	MW	ePNE		33	45					
	R	ePNE			41					
	T	ePNE			56					
		eN		44	04					

Harry O. Wood,
Research Associate in Charge.
Charles F. Richter,
Assistant.

SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON
CALIFORNIA INSTITUTE OF TECHNOLOGY

220 NORTH SAN RAFAEL AVENUE,
PASADENA, CALIFORNIA

BULLETIN

The SEISMOLOGICAL LABORATORY, Pasadena, California, is maintained and operated by the Carnegie Institution of Washington and the California Institute of Technology as a coöperative undertaking. This laboratory is the **central station** of a coördinated group. Auxiliary stations in southern California are maintained and operated as follows: At the Mount Wilson Observatory on Mount Wilson (a Department of the Carnegie Institution of Washington); at Riverside (in coöperation with the City of Riverside); at Santa Barbara (in coöperation with the Santa Barbara Museum of Natural History); at La Jolla (in coöperation with the Scripps Institution of Oceanography of the University of California); at Tinemaha, and at Haiwee, in the Owens Valley (in coöperation with the Department of Water and Power of the City of Los Angeles).

TIME: At all these stations the minute-marks on the seismograms are coördinated directly by means of auxiliary records written at each station on which the minute-marks are registered closely parallel with recorded dot-and-dash radiotelegraphic signals sent in ordinary course from a powerful transmitting station. This permits direct correlation of the minute-marks at all the stations of the group at practically all times with an accuracy of one second, and usually of one-fifth second.

Standard time is determined at Pasadena by comparing the station clock with automatically recorded radio time signals, sent from Annapolis (NSS), three to five times daily.

The constants of these stations follow.

PASADENA SEISMOLOGICAL LABORATORY Central Station

$\Phi = 34° 08.9'$ N., $\lambda = 118° 10.3'$ W., h = 295 m., Deeply weathered granitic rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
N — S	6 sec.	800	0.8-0.9
E — W	"	"	"

vertical component seismometers with oil damping and galvanometric-optical recording. (Details shortly to be published.)

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometers: (1) T_1=0.2 sec. Damping critical.
(2) T_1=10 to 14 sec. Damping critical.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given are significant.

Experimental seismographs of various kinds are in process of development from time to time, and are used for intervals of variable duration. Information concerning these will be given when necessary.

AUXILIARY STATIONS

Each of the auxiliary stations has equipment as follows:

Apparatus: two horizontal-component torsion seismometers with magnetic damping and optical recording;

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"

one vertical component seismometer with oil damping and galvanometric-optical recording to be installed at each station;

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometer: T_1=0.2 sec. Damping critical.

The Station Constants follow.

Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station
$\Phi = 34° 13.5' N., \lambda = 118° 03.4' W., h = 1742m.$, Weathered granite.

Riverside Seismologic Station
$\Phi = 33° 59.6' N., \lambda = 117° 22.4' W., h = 250 m.$ approx., Weathered granite.

Santa Barbara Seismologic Station
$\Phi = 34° 26.5' N., \lambda = 119° 42.9' W., h = 100 m.$ approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)
$\Phi = 32° 51.8' N., \lambda = 117° 15.2' W., h = 7.7$ m. approx., Consolidated detrital material.

Tinemaha Seismologic Station
$\Phi = 37° 05.7' N., \lambda = 118° 15.5' W., h = 1180 m.$ approx., Basalt.

Haiwee Seismologic Station
$\Phi = 36° 08.2' N., \lambda = 117° 58.6' W., h = 1100 m.$ approx., Loosely cemented tuff.

SYMBOLS AND NOTATION: in general the symbols and notation conform with the usual international practice. For the phases of deep-focus earthquakes the notation of F. J. Scrase is adopted. c, d are abbreviations for compression and dilatation.

When measurements referring to **local** earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between $\overline{P}$, P*, and P_n, although such complications are often clearly indicated and are the subject of study.

AMPLITUDES, (half-ranges), are measured in millimeters of the seismographic trace.

SPECIAL SYMBOLS indicating the stations of this coördinated group are as follows:

PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 second . . . . . P
For routine instruments of period 6 seconds . . . . . P_6
For instruments of different period analogous notation will be employed.
For routine vertical component, galvanometer period 0.2 second . . . . . P
For routine vertical component, galvanometer period 10 to 14 seconds . . . . . PX

Mount Wilson Seismologic Station . . . . . MW
Riverside Seismologic Station . . . . . R
Santa Barbara Seismologic Station . . . . . SB
La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
Tinemaha Seismologic Station . . . . . T
Haiwee Seismologic Station . . . . . H

In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jun 2	P	iPZ	13	24	01				deep?	
	T	ePNE			12					
Jun 3	P	iPNEZ	10	41	15			c	normal	USCGS: 17°N 104°W
		iN			36					0 = 10:36.6
		eZ		45	26					J S A: 16°N 104°W
		iE			46					0 = 10:36:25
		eLZ		47	23	22				
		LN			35	23	17			Largest earth displacement
		MN		50.5		11	120			thus far recorded at Pasadena
	PX	iZ		41	15					(1923-1932).Water oscilla-
		iZ			37					tions of several feet report-
		iZ			44					ed in local wells.
	MW	ePNE			16					Very destructive in Mexico.
	R	ePNE			09					
	SB	ePNE			33					
	LJ	iPNE			00					
	T	iPNE			41					△(Tinemaha) 2710 km (24.4°)
		iSE		45	59					0 = 10:36:24
Jun 3	P	eZ	13	12	42				normal	
	T	eE		13	16					
Jun 3	P	eZ	15	00	40				normal	Aftershock
	T	eNE		01	05					
Jun 3	P	eZ	15	13	10				normal	Aftershock
	MW	eN			11					
	R	eN		12	55					
	LJ	eN			59					
	T	eNE		13	29					
Jun 3	P	eNZ	16	32	29				normal	Aftershock
		iNEZ			30			c		
		eLE		43						
	MW	eNE		32	30					
	R	eN			24					
		iN			27					
	SB	eN			47					
	LJ	iNE			14					
	T	iNE			55					
Jun 3	P	eNEZ	17	44	30				normal	Aftershock
	P6	iE		48	21					
		eLE		51	30					
	MW	eNE		44	31					
		eE		48	21					
	LJ	ePNE		44	13					
	T	ePN			55					
Jun 3	PX	eZ	20	04	11				normal	Small surface waves recorded
	T	eNE			42					
Jun 3	P	ePNEZ	20	16	23				normal	Surface waves doubtful
	MW	eNE			23					Aftershock; Mexico
	R	eNE			18					
	SB	eN			42					
	LJ	eNE			13					
	T	ePNE			50					
Jun 4	P	iPNEZ	02	12	23				normal	Small surface waves recorded
	MW	eNE			22					
	R	eN			26					
	T	eNE			14					
Jun 4	P	ePNEZ	05	24	41				normal	Small surface waves recorded

Date	Station	Phase	G.C.T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jun 4	PX	eN	10	43	54				normal?	
	T	eNE		44	23					
Jun 4	P	eZ	13	54	44				normal?	
	R	eN			37					
	SB	eN			54					
	T	eNE		55	08					
Jun 4	P	ePNEZ	19	05	53					Mexico
	MW	eNE			53					
	R	ePNE			48					
	SB	ePNE		06	06					
	LJ	eNE		05	35					
	T	ePNE		06	20					
Jun 4	P	iPNEZ	21	43	49			d	normal	Mexico
	PX	eLNZ		50	30					
	MW	eNE		43	48					
	R	eNE			42					
	SB	eNE		44	25					
	LJ	eNE		43	26					
	T	ePNE		44	15					
Jun 5	P	ePNEZ	09	09	02				normal	Mexico
		eN		12	51					
	P6	eLE		14	29					
	MW	ePNE		09	03					
	R	ePNE		08	59					
		eN		12	34					
	SB	ePNE		09	17					
	LJ	ePNE		08	42					
		eN		12	19					
	T	ePNE		09	26					
Jun 5	P	eNEZ	18	44	00					
	T	eNE			25					
Jun 6	P	iPNEZ	06	44	06				deep?	
	MW	eNE			08					
Jun 6	P	iPNEZ	08	46	22					USCGS: 42°N 123°W
		iNEZ			24					0 = 08:44.2
		iNZ			27					J S A: 41.2°N 124°W
		iSNEZ		48	01					Pasadena:
		eLNE			22					Δ = 980 km(8.8°)
	MW	ePNE		46	21					0 = 08:44:10
		iNE			27					Destructive at and near
		eSNE		48	01					Eureka, California.
		eLNE			29					
	R	ePNE		46	31					
		iNE			35					
		eN		48	17					
		eLE			46					
	SB	eNE		46	14					
		iN		47	38					
		iNE			43					
	LJ	eNE		46	48					
	T	ePN		45	58					
		iN		46	08					
		iN		47	21					
Jun 6	T	eN	09	09	00					
Jun 6	P	eZ	09	20	17					
	T	eN			30					
Jun 6	P	iPNEZ	09	28	21					Δ = 980 km (8.8°)
	MW	eNE			22					0 = 09:26:09
	R	eNE			30					Aftershock
	T	eN			00					
		iN		29	48					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jun 6	P	eZ	11	57	32					USCGS: 18.5°N 76°W, 0=11:49.8
	E	eN			40					JSA: 18.6°N 76.1°W, 0=11:49:52
Jun 8	P	ePNEZ	02	45	45					
	MW	eNE			48					
	R	eNE			49					
	T	eN			59					
		eN		48	22					
Jun 8	P	ePNEZ	05	00	46					Alaska, 55°N 155°W approx. (using St.Louis).
	MW	eNE			52					
	R	eNE			49					
	LJ	eNE			49					
	T	ePNE			26					Δ = 3660 km (32.9°)
		eSNE		05	47					0 = 04:53:43
Jun 8	P	eZ	06	26	56					Region of Japan. Osaka gives
	T	eN			49					P=06:15:18.4, Δ = 443 km.
Jun 8	T	eN	07	28	30					
June 8	P	iPNEZ	07	59	43			c	normal?	Small surface(?) waves
	MW	eNE			44					recorded. Alaska, 55°N
	R	ePNE			46					155°W (using Osaka and
		eSNE	08	05	28					St.Louis.) Approx.
	SB	eNE	07	59	39					
	LJ	eNE	08	00	01					
	T	iPNE	07	59	22					Δ = 3700 km (33.3°)
		iSNE	08	04	46					0 = 07:52:35
Jun 8	P	ePNEZ	10	41	22				normal	Small surface waves record-
	PX	eZ		49	53					ed.
	P6	eN			11					
		eE		50	32					
	MW	eNE		41	25					
	R	eNE			16					
	T	ePN			48					
		eN		48	48					
Jun 8	P	ePNEZ	18	14	31					
	R	eN			34					
	T	eN			44					
Jun 8	T	eN	21	49	41					
Jun 9	MW	eE	03	29	33					
	R	eN			20					
	T	eN			51					
Jun 9	PX	eZ	04	39	59				normal	Small surface waves
		eNZ		40	03					recorded.
		eNZ		43	39					
		eZ		47	04					
	MW	eE		40	03					
		eE		43	41					
	R	ePN		39	54					
	SB	eNE		40	27					
	LJ	eNE		39	46					
	T	ePN		40	28					
Jun 9	P	eNEZ	06	42	24					
	MW	eE			26					
	R	eNE			23					
	T	ePN			38					
Jun 9	P	eNEZ	14	45	21					
	MW	eE			27					
	R	eNE			27					
	LJ	eNE			51					
	T	eN			11					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jun 9	PX	eNZ	21	56	50					
	R	eNE			56					
	T	eN		57	33					
Jun 10	P	eNEZ	03	16	52					
	MW	eE			52					
	R	eNE			46					
	LJ	eNE			37					
	T	ePN		17	17					
Jun 10	P6	ePNEZ	12	34	56					
	MW	eE			57					
	R	eNE			49					
	LJ	eNE			38					
	T	ePN		35	22					
Jun 10	P	eNEZ	21	33	51				normal	Surface waves recorded. Mexico.
	PX	eNZ		35	36					
	MW	eE		33	48					
	R	eNE			45					
	SB	eNE			56					
	LJ	eNE			37					
		eNE		35	16					
	T	eN		34	16					
Jun 10	PX	eNZ	23	03	24					
	MW	eE			26					
	T	eN			07					
Jun 11	P	iPNEZ	13	23	49			d	deep	
	MW	ePE			50					
	R	ePNE			47					
	LJ	eNE			43					
	T	ePN		24	02					
		eN		34	24					
Jun 11	P	ePNEZ	17	12	41				deep?	
	P6	eE		23	17					
	MW	eE		12	44					
	R	ePNE			45					
		eE		23	26					
	SB	eNE		12	38					
	LJ	ePNE			45					
Jun 14	PX	eNZ	06	17	44				normal?	
		iNZ		24	09					
	MW	eNE			09					
	R	eNE			10					
	SB	eNE			03					
	LJ	eNE		17	48					
		iNE		24	10					
	T	eN		13	27					
		eN		17	19					
		iN		24	00					
Jun 16	PX	eNZ	01	37	46				deep	North Sumatra, according to Batavia.
		iZ		38	08					
		iZ		39	56					
		iNZ		41	04					
	MW	eNE		37	50					
		eNE		41	03					
	R	eN		37	51					
		eN		41	06					
	LJ	eN		38	13					
		iNE		41	40					
	T	eN		37	53					

Date	Station	phase	G. C. T. h m s	T sec	A mm	c d	Focal depth	Remarks
Jun 16	P	eEZ	23 24 33				deep?	
		eZ	25 23					
	MW	eE	24 35					
	R	eNE	34					
		eNE	25 29					
	T	eN	24 44					
		eN	25 48					
Jun 18	PX	eNZ	00 24 47					
	MW	eE	47					
	R	eN	43					
	T	eN	25 04					
Jun 18	P	iPNEZ	10 16 37			c	normal	Destructive in Mexico.
		iNZ	17 12					USCGS: 19.5°N 104°W
		iE	20 57					0 = 10:12.5
		iN	21 24					J S A: 18.8°N 104.5°W
		eLN	22 08					0 = 10:12:36
	MW	ePNE	16 38					
	R	ePNE	32					
	SB	ePNE	52					
	LJ	iPNE	24					
	T	iPN	17 05					
Jun 18	P	eNEZ	12 30 31					
	T	eN	53					
Jun 18	PX	eZ	21 39 48					
Jun 18	PX	eNZ	22 03 49				normal	Aftershock, Mexico.
		eNZ	07 57					
		eLN	10 16					
	R	eNE	03 49					
		eNE	07 36					
	SB	eN	04 13					
	LJ	eE	03 45					
	T	ePN	04 11					
		eN	11 15					
Jun 19	PX	eNZ	08 46 04				normal?	Mexico
		eNZ	54 16					
	MW	eNE	46 08					
	R	eN	02					
	LJ	eN	45 41					
	T	eN	46 33					
		eN	55 33					
Jun 20	PX	eZ	03 59 38				normal	Small surface waves recorded.
		eN	44					
		eN	04 09 26					
	R	eNE	03 59 46					
	T	eN	04 00 04					
Jun 20	P	iPNEZ	09 08 28			d	normal?	J S A: 13°N 88.5°W
		iZ	11 05					0 = 09:02:00
	PX	eL(?)N	21 44					
	MW	iPNE	08 28					
	R	ePNE	22					
	SB	eNE	45					
	LJ	iPNE	19					
	T	ePN	43					
		eN	15 02					
		eN	19 09					
Jun 20	P	iPNEZ	09 29 20			d	normal	Surface waves recorded
	PX	iN	31 56					J S A: 44°N 126°W
	MW	ePNE	29 20					0 = 09:26:46
	R	iPNE	27					
	SB	eN	12					
	LJ	ePNE	43					
	T	ePN	28 52					
		eN	32 02					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jun 21	PX	ePNZ	04	24	54				normal?	Surface waves obscured by next shock.
		eN		34	32					
	MW	ePE		24	54					Possibly same epicenter as next shock.
	R	ePNE			49					
	LJ	iPNE			44					
	T	ePN		25	13					
		eN		34	21					
Jun 21	PX	ePNZ	04	39	27				normal	15°N 97°W approx. by St.Louis and Pasadena.
		eNZ		44	15					
		eLN		48	46					
	MW	ePE		39	28					
		eE		48	25					
	R	ePNE		39	22					
		eN		44	06					
		eN		48	20					
	SB	eE		39	48					
	LJ	ePN			17					
		eNE		43	53					
	T	ePN		39	49					
		eN		48	52					
		iN		49	12					
Jun 21	PX	eNZ	07	16	18					
	T	eN			31					
Jun 22	P	eZ	00	48	10					
	MW	eN			16					
	R	eN			16					
	SB	eN			03					
	LJ	eNE			24					
	T	eN			01					
Jun 22	P	ePNEZ	13	03	53				normal	USCGS: 19.5°N 104°W
	P6	eE		07	43					0 = 12:59.0
		eE		08	19					J S A: 17.3°N 103.5°W
		eLE		09.0		28				0 = 12:59:18
	MW	ePNE		03	54					
	R	ePNE			50					Destructive in Mexico.
		eSNE		07	37					
	SB	eNE		04	22					
	LJ	ePNE			37					
	T	ePN			20					
		eSN		08	45					
Jun 22	T	eN	15	37	14					
Jun 22	P	eNEZ	16	52	50				normal	Small surface waves recorded.
	MW	eE		53	07					
	R	eN		52	47					Aftershock.
	T	eN		53	19					
Jun 23	P	ePNEZ	02	22	58			d	normal?	
	PX	eZ	03	02						Small surface waves
	MW	eNE		22	59					
	R	eNE		23	00					
	LJ	eN			04					
Jun 23	T	eN	22	03	08					
Jun 24	P	ePNEZ	09	50	19					
	T	eN			34					
Jun 25	PX	eN	20	58	48					
	MW	eNE			49					
	R	eNE			42					
	LJ	eNE			33					
	T	eN		59	13					
		eN	21	06	15					

No. 25 PASADENA and auxiliary stations 1932

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jun 26	PX	eN	19	30	04					
	MW	eNE			06					
	R	eN			01?					
	T	eN		29	51					
Jun 27	T	eN	09	01	10					
Jun 28	T	eN	08	12.9						
Jun 28	P	iPNEZ	10	43	13			d	deep?	
	MW	ePNE			15					
	R	ePNE			15					
	T	ePN			23					
Jun 29	T	eN	02	16	55					
Jun 29	PX	ePNZ	22	28	43					05.5 N 78 W according to St. Louis.
Jun 30	PX	iPNZ	00	14	45			d	deep?	
	MW	eNE			46					
	R	eNE			38					
Jun 30	P	eZ	11	23	53					
	T	eN		24	09					
Addendum:										
Jun 4	PX	eZ	00	25					normal	Small surface waves
	R	eNE		09	20					
	T	eNE		10	01					

Notes:

1- St.Louis report used in identifying Mexican shocks.

2- PX,N refers to new horizontal instrument at Pasadena,
M = 100 kg., T_o = 0.5, T_g = 10

Harry O. Wood,
Research Associate in Charge.

Charles F. Richter,
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SEISMOLOGICAL LABORATORY

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PASADENA SEISMOLOGICAL LABORATORY Central Station

$\Phi = 34° 08.9'$ N., $\lambda = 118° 10.3'$ W., h = 295 m., Deeply weathered granitic rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
N — S	6 sec.	800	0.8-0.9
E — W	"	"	"

vertical component seismometers with oil damping and galvanometric-optical recording. (Details shortly to be published.)

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometers: (1) T_1=0.2 sec. Damping critical.
(2) T_1=10 to 14 sec. Damping critical.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given are significant.

Experimental seismographs of various kinds are in process of development from time to time, and are used for intervals of variable duration. Information concerning these will be given when necessary.

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Each of the auxiliary stations has equipment as follows:

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Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"

one vertical component seismometer with oil damping and galvanometric-optical recording to be installed at each station;

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

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$\Phi = 34° 13.5' N., \lambda = 118° 03.4' W., h = 1742m.$, Weathered granite.

Riverside Seismologic Station
$\Phi = 33° 59.6' N., \lambda = 117° 22.4' W., h = 250$ m. approx., Weathered granite.

Santa Barbara Seismologic Station
$\Phi = 34° 26.5' N., \lambda = 119° 42.9' W., h = 100$ m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)
$\Phi = 32° 51.8' N., \lambda = 117° 15.2' W., h = 7.7$ m. approx., Consolidated detrital material.

Tinemaha Seismologic Station
$\Phi = 37° 05.7' N., \lambda = 118° 15.5' W., h = 1180$ m. approx., Basalt.

Haiwee Seismologic Station
$\Phi = 36° 08.2' N., \lambda = 117° 58.6' W., h = 1100$ m. approx., Loosely cemented tuff.

SYMBOLS AND NOTATION: in general the symbols and notation conform with the usual international practice. For the phases of deep-focus earthquakes the notation of F. J. Scrase is adopted. c, d are abbreviations for compression and dilatation.

When measurements referring to **local** earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between $\overline{P}$, P*, and P_n, although such complications are often clearly indicated and are the subject of study.

AMPLITUDES, (half-ranges), are measured in millimeters of the seismographic trace.

SPECIAL SYMBOLS indicating the stations of this coördinated group are as follows:

PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 second . . . . . P
For routine instruments of period 6 seconds . . . . . P_6
For instruments of different period analogous notation will be employed.
For routine vertical component, galvanometer period 0.2 second . . . . . P
For routine vertical component, galvanometer period 10 to 14 seconds . . . . . PX

Mount Wilson Seismologic Station . . . . . MW
Riverside Seismologic Station . . . . . R
Santa Barbara Seismologic Station . . . . . SB
La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
Tinemaha Seismologic Station . . . . . T
Haiwee Seismologic Station . . . . . H

In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jul 2	PX	eNZ	01	21	26				normal	
		eLNZ		29	03					
	MW	eNE		21	24					
	R	eE			03					
	T	eN			48					
Jul 2	PX	iPNZ	13	36	41			c	deep?	
	MW	ePNE			43					
	R	eE			30					
	T	eN			51					
Jul 3	PX	ePNZ	17	41	07					
	MW	eNE			08					
	R	eN		40	43					
	T	ePN		41	21					
Jul 5	PX	ePNZ	10	11	06				deep?	
		iN		20	31					
	MW	ePNE		11	07					
		eN		17	37					
	R	ePNE		11	00					
	T	iPN			31					
		eN		18	35					
Jul 5	P	eZ	11	11	23				deep?	
	PX	eZ		14	44					
	R	eNE			59					
	T	eN			51					
Jul 6	PX	eZ	15	14	58				normal?	
	MW	eE			57					
	R	eNE			53					
	T	eN		15	03					
		eN		20	24					
Jul 7	P	ePNEZ	16	17	26			d	normal	Δ = 845 km. (7.6°)
	PX	eLNZ		18	52					
	P6	iLE			52	25	short periods superposed			
	R	ePNE		17	19					
		iN			52					USCGS: 27.4°N 113°W
		eLNE		18	30					0 = 16:15.9
	SB	ePNE		17	48					J S A: 28°N 113.5°W
	T	ePN		18	03					0 = 16:15;44
		eLN		19	59					
Jul 9	PX	ePZ	13	08	39				normal	
		eZ		12	00					
	P6	iE		18	54					
	PX	eN		32	15	12				
	MW	ePNE		08	42					
		eNE		18	55					
	R	ePNE		08	54					
		eNE		18	58					
	T	eN		08	46					
		eN			58					
		eSN		19	14					
Jul 10	P	eZ	00	54	32					
	MW	eN			38					
	R	eN			39					
	T	eN			19					
Jul 10	P	iPNEZ	07	56	46			d	normal	
	PX	eLN	08	16	36	S phase conspicuously absent				
	MW	iPNE	07	56	48					
	R	iPNE			50					
	SB	iPNE			41					
	T	iPN			39					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jul 11	PX	eZ	20	53	00					
Jul 12	P	eZ	13	57	06				normal?	
	PX	eN	14	05	11	15				
	MW	eNE	13	57	06					
	R	eNE			08					
	LJ	eN		56	52					
	T	ePN		57	28					
		eN	14	05	27					
Jul 12	P	iPNEZ	19	26	41			d	normal	Δ = 1190 km. (10.7°)
	P6	iLE		28	41					USCGS: 25°N 110°W
	MW	ePNE		26	42					0 = 19:24.1
	R	ePNE			34					J S A: 25.6°N 110.5°W
	SB	ePNE			53					0 = 19:24:10
	LJ	iPNE			22					
	T	iPN		27	15					
Jul 13	PX	eZ	02	33	00				normal	Surface waves recorded
	MW	eE			02					
	R	eNE			13					
Jul 13	PX	eNZ	04	08	20				normal	Aftershock; Mexico.
		eLN		10	44					
	MW	eNE		08	21					
	R	eN			12					
	LJ	eE			03					
	T	ePN			55					
Jul 13	PX	eLNZ	07	08	20				normal	
	R	eNE		07	47					
	T	ePN		06	15					
Jul 14	PX	iPNZ	09	06	11			c	deep	
		eZ		09	41					
	MW	eN		06	12					
	R	eE			12					
	LJ	iPNE			13					
	T	ePN			19					
		eN		09	59					
Jul 15	PX	ePZ	16	03	28			d	deep	
	MW	ePNE			30					
	R	ePNE			31					
	T	eN			49					
Jul 15	PX	eZ	23	29	28					
		eN			32					
	MW	eNE			32					
	R	eN			32					
	T	eN			13					
Jul 16	PX	eNZ	21	22	40					
	P6	eE			40					
	T	eN			43					
Jul 16	PX	eNZ	23	27	22				normal	Small surface waves recorded
	MW	eNE			18					
	R	eN			10					
	T	eN			44					
Jul 17	PX	iPZ	22	19	50				deep?	
	MW	eNE			52					
	R	eN			53					
	T	eN		20	20					
Jul 18	PX	eLZ	00	43	26					
	T	eN		24	52					
Jul 20	PX	iPZ	20	17	58				deep	
		iZ		18	36					
		iSN		28	06					
	MW	ePNE		18	00					
		eNE			38					
		eSNE		28	07					
	R	iPNE		18	00					
		iNE			38					
		iSNE		28	07					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Jul 21	P	ePZ	12	53	54				normal	
		iSNE	13	04	31					
	P6	eLE		26	53	30				
	MW	iSNE		04	34					
	R	iSNE			35					
	SB	iSE			28					
	T	ePN	12	54	18					
		eN		58	36					
		eSN	13	04	34					
Jul 21	PX	eNZ	16	39	36				normal	
		eLN	17	09		18				
	MW	eE	16	39	37					
	R	eE			43					
Jul 23	MW	eNE	00	45	21					
	R	eE			28					
	T	eN			29					
Jul 23	T	eN	06	26	28					
Jul 25	P	iPNEZ	08	36	22			d	deep	Central Japan (using Osaka and Kôti).
	PX	eZ		39	35					
		iSN		46	09					
	MW	iPNE		36	23					
		iSNE		46	10					
	R	iPNE		36	25					
		eSN		46	14					
	SB	ePN		36	18					
	T	iPN			15					
		eSN		45	54					
Jul 25	P	iPNEZ	09	17	20			c	normal	Δ = 2570 km. (23.1°) O = 09:12:09 USCGS: 18.5°N 103.5°W O = 9:12:40 J S A: 17.2°N 104°W
		iSNE		21	26					
	P6	eLE		22.4		25				
	MW	ePNE		17	21					
		iSNE		21	28					
	R	iPNE		17	14					
		eSN		21	07					
	SB	ePNE		17	34					
		iSE		21	45					
	T	iPN		17	45					
		eN		22	02					
Jul 25	P	iPNEZ	09	34	13			c	normal	
	MW	ePNE			14					
	R	ePNE			07					
	SB	ePN			27					
	T	iPN			41					
Jul 25	T	eN	16	27	30					
Jul 26	P	iPZ	17	17	50					
	MW	eE		18	04					
	T	eN			00					
Jul 27	P	iPZ	00	42	36			c	deep?	
	MW	eE			39					
	T	eN			32					
Jul 27	PX	eZ	21	38	05					
		eZ			44					
		iZ		48	04					
	MW	eE		38	43					
	R	eNE			25					
	LJ	eN			37					
Jul 29	PX	iPZ	00	56	18			d	deep	
		iZ			53					
	MW	ePNE			17					
	R	eNE			14					
	LJ	eNE			45					
	T	ePN			31					

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Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
N — S	6 sec.	800	0.8-0.9
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vertical component seismometers with oil damping and galvanometric-optical recording. (Details shortly to be published.)

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometers: (1) T_1=0.2 sec. Damping critical.
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The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given are significant.

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Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"

one vertical component seismometer with oil damping and galvanometric-optical recording to be installed at each station;

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The Station Constants follow.

Coördinates are geodetic positions referred to the North American Datum.

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$\Phi = 34° 13.5' N., \lambda = 118° 03.4' W., h = 1742m.$, Weathered granite.

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$\Phi = 33° 59.6' N., \lambda = 117° 22.4' W., h = 250$ m. approx., Weathered granite.

Santa Barbara Seismologic Station
$\Phi = 34° 26.5' N., \lambda = 119° 42.9' W., h = 100$ m. approx., Heavy, boulder-laden alluvium.

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$\Phi = 32° 51.8' N., \lambda = 117° 15.2' W., h = 7.7$ m. approx., Consolidated detrital material.

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$\Phi = 37° 05.7' N., \lambda = 118° 15.5' W., h = 1180$ m. approx., Basalt.

Haiwee Seismologic Station
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SYMBOLS AND NOTATION: in general the symbols and notation conform with the usual international practice. For the phases of deep-focus earthquakes the notation of F. J. Scrase is adopted. c, d are abbreviations for compression and dilatation.

When measurements referring to **local** earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between $\overline{P}$, P*, and P_n, although such complications are often clearly indicated and are the subject of study.

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For routine instruments of period 6 seconds . . . . . P_6
For instruments of different period analogous notation will be employed.
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For routine vertical component, galvanometer period 10 to 14 seconds . . . . . PX

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La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
Tinemaha Seismologic Station . . . . . T
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Aug. 2	PX	ePNZ	04	44	03				normal	Small surface waves recorded
		eZ		53	59					
	R	eNE		44	30					
	T	eN			34					
Aug. 2	PX	iPNZ	08	06	37			d	deep	
	MW	eNE			37					
Aug. 4	PX	iPNZ	06	47	15			c	deep	
		iSN		55	11					
	MW	iPNE		47	16					
	R	iPNE			18					
	SB	ePNE			08					
	LJ	iPNE			25					
	T	iPN			01					
		eSN		54	46					
Aug. 6	PX	eNZ	04	07	04					
	MW	eE			06					
	T	eN			18					
Aug. 6	T	eN	08	44	19					
Aug.10	PX	iPNZ	19	45	41			d	deep?	
	MW	eE			43					
Aug.12	PX	iPNZ	03	31	34			d	normal	Δ = 4450 km. (40.1°)
		iSN		37	46					0 = 03:23:51
		eLN		41	29					
	P6	ePE		31	34					USCGS: 53°N 169°W
		iSE		37	42					0 = 03:23:57
	MW	ePNE		31	37					J S A: 52°N 167°W
		eSE		37	43					0 = 03:24:09
		eSN			47					
	R	ePNE		31	46					
		eSE		37	51					
	LJ	iPNE		31	49					
		eSE		38	04					
	T	ePN		31	23					
		eSN		37	17					
Aug.13	PX	eLNZ	21	45					normal	Conspicuous surface waves,
	R	eLN		47						no preliminaries.
	T	eLNE		55.5						
Aug.14	PX	ePZ	04	57	58				normal?	USCGS: 27°N 103°E
		iNZ		58	46					0 = 04:39.5
		eN	05	04	32					
	P6	iE		06	10					
		iE		08	42					
		eL?E		14	10					
	MW	ePNE	04	57	57					
		iNE	05	04	31					
		iNE		19	26					
	R	ePN	04	58	00					
		iNE	05	04	34					
		iNE		19	26					
	SB	eNE	04	58	40					
		iNE	05	04	31					
	T	eNE	04	54	25					
		eNE		58	01					
		eNE	05	19	40					
	H	eNE		04	26					
Aug.14	PX	iPNZ	11	04	44			c	normal?	No surface waves found.
	MW	eN			40					
	R	eN			35					
	T	eNE		05	14					
	H	eNE			02					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Aug. 15	P	eZ	14	55	43				normal?	
	MW	eNE			56					
	T	eF			18					
		eE			30					
	H	eE			28					
		eE			38					
Aug.17	P	iPNEZ	08	53	05			c	normal	Surface waves recorded
		iZ		55	56					
	MW	ePNE		53	06					
	R	ePNE		52	59					
	T	ePNEZ		53	21					
		eEZ		56	03					
	H	iPNE		53	13					
Aug.18	PX	iPNE	20	26	47			d		
	MW	ePNE			46					
	R	eNE			40					
	SB	eN			45					
	T	eNE			14					
	H	eE			24					
Aug.19	P	ePZ	15	16	40					
	MW	eE			39					
	LJ	eNE			32					
	T	eNE			55					
Aug.19	MW	eE	18	13	46				normal?	
		eE		22	55					
	R	eN		13	58					
	LJ	eNE			34					
	T	ePNE		14	02					
		eNE		24	25					
Aug.20	P	ePZ	08	52	24				normal?	
	R	eE			24					
	LJ	eN			09					
	T	ePNE			46					
		eE	09	01	23					
Aug.20	T	eNE	09	39	17					
Aug.22	PX	iZ	11	25	43					
	T	eNEZ			37					
	H	eE			43					
Aug.23	P	iPZ	08	26	51			c		
	MW	eNE			55					
	R	eE		27	06					
	T	eE		26	54					
Aug.24	PX	ePNZ	03	44	24				normal	Small surface waves recorded
		eN		50	30					
	MW	eNE		44	53					
		eN		48	51					
	R	eNE		44	37					
		eN		48	41					
	LJ	iPN		44	35					
	T	ePNE		45	17					
		eE		50	41					
		eE		54	21					
	H	ePE		45	09					
		eE		49	19					
Aug.24	P	ePNEZ	04	13	43					
	MW	eNE			44					
	R	eNE			38					
	LJ	eN			26					
	T	eEZ		14	09					
	H	eE			04					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Aug.24	P	ePNEZ	14	42	32					
	MW	eNE			37					
	T	eN			36					
	H	eE			26					
Aug.25	PX	iPNZ	08	09	52				normal	JSA: 18°N 106°W
		eZ		10	14					0 = 08:05:48
		eLNZ		15	18	20				
	MW	ePNE		09	54					
	R	ePNE			46					
	LJ	eN			34					
	H	eE		10	16					
		eE		17	18					
Sept.1	P	iPNEZ	13	24	16			d	deep	
	MW	ePNE			17					
	R	ePNE			20					
	SB	ePNE			09					
	LJ	ePN			34					
	T	ePNEZ		23	56					
	H	iPEZ		24	03					
Sept.2	P	iPNEZ	13	08	48			c	deep	
	MW	ePNE			49					
	R	eN			51					
	SB	ePNE			42					
	LJ	eNE			57					
	T	iPNEZ			43			d		
		eSNE		18	49					
	H	iPEZ			46			d		
Sept.3	PX	iZ	12	10	30			d	deep	
		iZ			45			d		
		eSN		20	03					
	MW	iPNE		10	31					
	R	ePNE			33					
	SB	ePNE			24					
	LJ	iPNE			39					
	T	iPNEZ			12			d		
		iE			24					
		eSE		19	46					
	H	iPEZ		10	24			d		
		iZ			38					
Sept.4	PX	eZ	15	27	08					
	T	iPEZ		26	32			c		
	H	ePEZ			40					
Sept.4	PX	iPNZ	19	29	34			d	normal?	
		eL(?)Z	20	03	44		surface waves?			
	MW	eN	19	29	37					
	T	ePNEZ			43			d		
	H	ePEZ			43					
Sept.5	PX	iPZ	03	19	39				deep?	
	T	ePZ			30					
	H	ePE			33					
Sept.5	PX	eNZ	06	33	09					
	MW	eE			13					
	T	eZ			22					
Sept.8	PX	ePNZ	01	45	38			d	normal	Δ = 2360 km.(21.3°)
		iPNZ			40			c		0 = 01:40:50
		iZ		47	39					
		iSNZ		49	30					USCGS: 18°N 105°W
		eLZ		51	48	20				0 = 01:41.0
	MW	iPNE		45	40					
	R	iPN			34					

-------- continued on page No.32 --------

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
			----continued from page No.31 ------							
Sept.8	SB	iPNE	01	45	54					
		eNE		48	49					
	LJ	iPNE		45	25					
	T	iPNEZ		46	04			c		
		eSE		50	11					
	H	iPNEZ		45	57			c		
		eSE		49	55					
Sept.8	P	eNEZ	05	03	24					
	T	ePNEZ			52					
	H	ePEZ			43					
Sept.8	P	iPZ	20	57	31			c	deep	
	T	ePNEZ			36					
Sept.9	P	eEZ	13	58.6					normal	
		eLZ	14	34	55	25				
	T	eEZ	13	57	37					
Sept.13	P	eZ	19	11	28					
	T	eNE			31					
Sept.14	PX	iPZ	08	49	55				normal	Δ = 3660 km (32.9°)
		iNZ		50	08					0 = 08:43:23
		iSN		55	16					
		eLZ		59	30	25				USCGS: 61°N 149°W
	MW	ePNE		49	58					0 = 08:43.2
		iNE		50	10					J S A: 60.8°N 145.6°W
		eSNE		55	15					0 = 08:43:29 and
	R	ePE		50	10					08:43:41
		eSE		55	21					
	SB	ePNE		50	02					
		iN			17					
	LJ	ePNE		50	10					
		iNE			22					
		eSNE		55	40					
	T	ePNE		49	35					
		iNE			55					
		iSNE		54	39					
Sept.15	PX	ePZ	14	08	14				normal	Destructive on North Island,
		eSN		19	03					New Zealand.
		eLZ		37	50	30				
	P	ePZ		08	15					USCGS: 39°S 175°W
		ePR1Z		12	14					0 = 13:55.3
	MW	ePE		08	19					
	R	ePN			18					J S A: 0 = 13:54:55
		eN		18	52					
	LJ	ePNE		08	14					
	T	eNE			24					
		eE		12	33					
Sept.16	P	iPEZ	22	10	00					Probably about 41°N 125°W
		iSEZ		11	42					(Off Eureka,California).
	MW	ePNE		10	01					
		eSNE		11	46					
	SB	iPNE		09	38					
		iSNE		11	09					
	T	iEZ		09	38					
Sept.18	P	iPZ	02	28	17					
	MW	eN			46					
	T	ePNEZ		27	50					
		eNE		30	24					
Sept.20	MW	eE	12	51	27					
	LJ	eN			16					
	T	eNEZ			41					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Sept.22	P	iPZ	08	53	48			c	deep	
	MW	eN			47					
×	T	eNEZ			56					
Sept.23	P	iPNEZ	14	33	24			c	deep	USCGS: 45°N 134°E
		iPPZ		36	19					0 = 14:22.3
		iSNE		42	42					Pasadena, Δ = 78°
		esSN		44	45					h = 0.05
	PX	iPNZ		33	24			c		using data from St.Louis
		iZ			25			d		(by courtesy of
		epPZ		34	35					Father Joliat).
		esPZ		35	07					
		iPPZ		36	19					
		iSN		42	42					
		isSN		44	45					
		eN		54	23	16				
	P6	iPE		33	25					
		iE			29					
		iPPE		36	20					
		iSE		42	42					
	MW	ePNE		33	25					
		iNE			27					
		eSNE		42	44					
	SB	iPNE		33	09					
		iNE			24					
	LJ	iPNE		34	32					
		iN		36	28					
	T	iPNEZ		33	14			c		
		eSN		42	22					
		eN		44	31					
Sept.23	P	eNEZ	15	00	22					
		eNEZ		03	35					
	T	eE	14	59	43					
Sept.25	PX	eN	09	27					normal	Pasadena records surface
	T	eZ		00	59					waves only
	H	ePNE			59					
Sept.26	P	eNEZ	19	34	22				normal	Destructive in Macedonia.
		eZ		38	27					USCGS: 39.5°N 24°E
	PX	eZ		34	26					0 = 19:20.8
		eZ		38	19					
		eN		46	22					
		eLN	20	08.0		40				
	MW	eE	19	34	50					
	SB	eN			44					
	LJ	eNE		38	32					
	T	ePNE		34	19					
	H	eN			30					
Sept.29	PX	eZ	04	14	33					
Sept.29	PX	ePZ	13	56	58				normal	Small surface waves
	MW	ePNE			58					recorded
	LJ	eN		57	15					
	T	ePEZ		56	45					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Wocal depth	Remarks
Sept.29	PX	iPNZ	17	57	15				normal	USCGS: 46°N 152°E
		eS?NZ	18	05	55					O = 17:46.6
		eLNZ		16.1						
	MW	ePNE		57	17					
		eNE	18	05	59					
	LJ	eNE	17	57	30					
	SB	ePN			05					
	T	ePNEZ			03					
Sept.29	LJ	eN	23	51	22					
Sept.30	P	iPNEZ	02	02	00			d	deep	
	MW	ePNE			01					
	T	iPNEZ			12			d		
Sept.30	P	iPNEZ	11	06	58			c	deep	
	MW	ePNE			58					
	LJ	iPNE		07	04					
	T	iPNEZ			02			d		

The vertical instruments referred to on the general data sheet have now been installed at Tinemaha and Haiwee. Their readings are indicated by the use of Z at those stations.

Harry O. Wood,
Research Associate in Charge.
Charles F. Richter,
Assistant.

SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON
CALIFORNIA INSTITUTE OF TECHNOLOGY

220 NORTH SAN RAFAEL AVENUE,
PASADENA, CALIFORNIA

BULLETIN

The SEISMOLOGICAL LABORATORY, Pasadena, California, is maintained and operated by the Carnegie Institution of Washington and the California Institute of Technology as a coöperative undertaking. This laboratory is the **central station** of a coördinated group. Auxiliary stations in southern California are maintained and operated as follows: At the Mount Wilson Observatory on Mount Wilson (a Department of the Carnegie Institution of Washington); at Riverside (in coöperation with the City of Riverside); at Santa Barbara (in coöperation with the Santa Barbara Museum of Natural History); at La Jolla (in coöperation with the Scripps Institution of Oceanography of the University of California); at Tinemaha, and at Haiwee, in the Owens Valley (in coöperation with the Department of Water and Power of the City of Los Angeles).

TIME: At all these stations the minute-marks on the seismograms are coördinated directly by means of auxiliary records written at each station on which the minute-marks are registered closely parallel with recorded dot-and-dash radiotelegraphic signals sent in ordinary course from a powerful transmitting station. This permits direct correlation of the minute-marks at all the stations of the group at practically all times with an accuracy of one second, and usually of one-fifth second.

Standard time is determined at Pasadena by comparing the station clock with automatically recorded radio time signals, sent from Annapolis (NSS), three to five times daily.

The constants of these stations follow.

PASADENA SEISMOLOGICAL LABORATORY Central Station

$\Phi = 34° 08.9'$ N., $\lambda = 118° 10.3'$ W., h = 295 m., Deeply weathered granitic rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
N — S	6 sec.	800	0.8-0.9
E — W	"	"	"

vertical component seismometers with oil damping and galvanometric-optical recording. (Details shortly to be published.)

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometers: (1) T_1=0.2 sec. Damping critical.
(2) T_1=10 to 14 sec. Damping critical.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given are significant.

Experimental seismographs of various kinds are in process of development from time to time, and are used for intervals of variable duration. Information concerning these will be given when necessary.

AUXILIARY STATIONS

Each of the auxiliary stations has equipment as follows:

Apparatus: two horizontal-component torsion seismometers with magnetic damping and optical recording;

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"

one vertical component seismometer with oil damping and galvanometric-optical recording to be installed at each station;

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometer: T_1=0.2 sec. Damping critical.

The Station Constants follow.

Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station
$\Phi = 34° 13.5' N., \lambda = 118° 03.4' W., h = 1742m.$, Weathered granite.

Riverside Seismologic Station
$\Phi = 33° 59.6' N., \lambda = 117° 22.4' W., h = 250$ m. approx., Weathered granite.

Santa Barbara Seismologic Station
$\Phi = 34° 26.5' N., \lambda = 119° 42.9' W., h = 100$ m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)
$\Phi = 32° 51.8' N., \lambda = 117° 15.2' W., h = 7.7$ m. approx., Consolidated detrital material.

Tinemaha Seismologic Station
$\Phi = 37° 05.7' N., \lambda = 118° 15.5' W., h = 1180$ m. approx., Basalt.

Haiwee Seismologic Station
$\Phi = 36° 08.2' N., \lambda = 117° 58.6' W., h = 1100$ m. approx., Loosely cemented tuff.

SYMBOLS AND NOTATION: in general the symbols and notation conform with the usual international practice. For the phases of deep-focus earthquakes the notation of F. J. Scrase is adopted. c, d are abbreviations for compression and dilatation.

When measurements referring to **local** earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between $\overline{P}$, P*, and P_n, although such complications are often clearly indicated and are the subject of study.

AMPLITUDES, (half-ranges), are measured in millimeters of the seismographic trace.

SPECIAL SYMBOLS indicating the stations of this coördinated group are as follows:

PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 second . . . . . P
For routine instruments of period 6 seconds . . . . . P_6
For instruments of different period analogous notation will be employed.
For routine vertical component, galvanometer period 0.2 second . . . . . P
For routine vertical component, galvanometer period 10 to 14 seconds . . . . . PX

Mount Wilson Seismologic Station . . . . . MW
Riverside Seismologic Station . . . . . R
Santa Barbara Seismologic Station . . . . . SB
La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
Tinemaha Seismologic Station . . . . . T
Haiwee Seismologic Station . . . . . H

In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Oct. 1	T	ePNEZ	01	38	10				normal?	
Oct. 1	PX	ePNZ	08	17	21				normal	Small surface waves recorded
	T	ePNEZ			33					
Oct. 1	PX	iPNZ	15	19	48			c	deep	
		eZ		21	28					
	MW	ePNE		19	49					
	SB	iPN			42					
		eN		21	27					
	T	iPNEZ		19	41					
		eSE		29	17					
Oct. 2	P	ePNEZ	03	06	20				normal	USCGS: 12°N 86°W
		eZ		08	42					0 = 02:59.3
		eN		12	09					J S A: 10.9°N 86.5°W
		eNE		16	37					0 = 02:59:07
	PX	ePZ		06	17			c		
		iPNZ			23			d		
		iN		15	22					
		iN		16	37					
		eLN			45	45				
		eLZ		19	05	35				
	MW	ePNE		06	20					
		eNE		12	08					
		eNE		16	39					
	SB	ePNE		08	54					
		eNE		17	04					
	LJ	ePNE		06	09					
		eNE		16	31					
	T	ePNEZ		06	36					
		eN		08	16					
		iNEZ		16	48					
Oct. 2	P	ePNEZ	04	09	59				normal?	
		eZ		12	21					
	MW	eN		10	00					
	SB	eE			12					
	LJ	ePNE		09	48					
	T	ePNEZ		10	14					
		eSNE		20	25					
Oct. 4	PX	eZ	03	42	07				normal?	
	T	eE			35					
Oct. 4	P	iPZ	08	54	06				deep?	
	T	ePNEZ			30					
Oct. 5	T	iPZ	00	29	19				deep?	
Oct. 5	P	iPZ	04	01	55				deep?	
	T	iPEZ			48			c		
Oct. 6	P	iZ	00	37	43			d	normal?	
	T	eEZ			19					
		eE		38	58					
Oct. 6	P	iPZ	10	07	26				deep	
	T	iPEZ			35			c		
Oct. 7	P	ePZ	21	47	38			c	deep?	
	MW	eN			22					
	T	ePEZ			46					
		eEZ		48	04					
Oct. 9	PX	eNZ	00	58	06				normal	Small surface waves recorded
	T	eEZ			35					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Fccal depth	Remarks
Oct. 9	P	eE	14	52	59					
	MW	eNE			53					
	R	eNE			43					
Oct.10	P	eZ	09	14	17					
Oct.10	P	iPZ	14	24	03					
	MW	eE			04					
	T	eEZ			16					
Oct.11	P	ePNEZ	19	11	00				normal	USCGS: 24°N 110°W
	PX	eLN		13.5						0 = 19:08.2
	MW	eNE		11	04					
	R	eN		10	57					
	SB	eNE		11	22					
	LJ	ePNE		10	42					
		eN		13	34					
	T	ePEZ		11	33					
Oct.15	T	eE	19	46	52					
		eE		56	20					
Oct.16	P	ePNEZ	12	14	59				normal	USCGS: 54°N 158°W
		iNZ		15	10					0 = 12:08.1
		eSNEZ		20	35					J S A: 55°N 155°W
		eLNEZ		24	33	23				0 = 12:08:27 and
	MW	ePNE		14	59					12:08:35
		eSE		20	36					
	R	ePNE		15	02					
		eSE		20	42					
	SB	ePNE		14	49					
	LJ	ePNE		15	12					
		eSNE		20	58					
	T	ePEZ		14	42					
		eSE		19	05					
Oct.16	P	iZ	15	10	35					
	T	eE		11	47					
Oct.17	P	iZ	09	23	46				deep?	
	MW	eNE			49					
	T	eEZ			49					
Oct.17	P	iPNEZ	13	38	25					
	MW	eNE			27					
	R	eN			31					
Oct.19	P	iPNEZ	08	01	38			c	deep	
Oct.19	P	iPZ	11	06	06			c	deep	
	MW	eNE			10					
Oct.20	P	eNEZ	17	49	10					
		iZ			28					
	MW	eE			30					
	R	eN			29					
	LJ	eNE			25					
	T	eEZ			22					
		eE			39					
Oct.23	T	eEZ	22	41	21					
Oct.24	P	eNEZ	12	10	43					
	T	eEZ		11	08					
		eE		17	52					
Oct.24	P	iZ	19	45	19					
	T	eZ			27					
Oct.25	PX	ePNZ	17	12	52					
		eZ		14	21					
	R	eN			07					
	T	eEZ		12	40					
		eEZ		14	09					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Oct.26	PX	eZ	01	26	28					
	T	eEZ		25	19					
Oct.26	P	eEZ	03	30	15					
	T	eEZ			01					
Oct.26	P	ePNEZ	06	44	15					
	MW	eNE			15					
	T	iPEZ			25					
Oct.26	P	eNEZ	09	46	11					
	MW	eE			30					
	T	eEZ		45	52					
Oct.26	T	iPEZ	23	54	47					
Oct.27	P	ePNEZ	10	05	17					
	MW	eNE			18					
	LJ	eNE			09					
	T	ePEZ			38					
Oct.28	T	eEZ	10	09	06					
Oct.29	P	iPNEZ	03	41	07			c	normal	USCGS: 19°N 105°W
		iZ			36					0 = 03:36.3
	P6	eE		44	05					
		iS			41					
		eL		47	07	20				
	MW	eNE		41	07					
	R	eNE			00					
	T	ePEZ			33					
Oct.29	P	eNZ	11	27	13				normal	
		eZ			27					
Oct.29	P	eZ	14	25	27					
	T	eEZ			36					
Oct.30	PX	iPZ	20	53	54			d	normal	USCGS: 54°N 156°W
		eZ		55	08					0 = 20:47.3
		iSZ		59	29					J S A: 54°N 155°W
		eLZ	21	03	34	27				0 = 20:47:05
	MW	ePNE	20	53	54					
		eSNE		59	33					
	R	eNE		54	06					
		eNE		59	40					
	SB	eNE		54	07					
		eE		59	05					
	T	ePEZ		53	37					
		eSE		59	00					
Oct.30	P	eZ	22	40	58					
	MW	eE		41	00					
	T	ePEZ		40	47					

Harry O. Wood,
Research Associate in Charge.
Charles F. Richter,
Assistant.

SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON
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PASADENA, CALIFORNIA

BULLETIN

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The constants of these stations follow.

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$\Phi = 34° 08.9'$ N., $\lambda = 118° 10.3'$ W., h = 295 m., Deeply weathered granitic rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925).

Instruments, and Constants (approximate);

	T_0	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
N — S	6 sec.	800	0.8-0.9
E — W	"	"	"

vertical component seismometers with oil damping and galvanometric-optical recording. (Details shortly to be published.)

inertia-mass 100 kg. T_0=0.5 sec. Damping critical or slightly less;

galvanometers: (1) T_1=0.2 sec. Damping critical.
(2) T_1=10 to 14 sec. Damping critical.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given are significant.

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$\Phi = 33° 59.6' N., \lambda = 117° 22.4' W., h = 250$ m. approx., Weathered granite.

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$\Phi = 34° 26.5' N., \lambda = 119° 42.9' W., h = 100$ m. approx., Heavy, boulder-laden alluvium.

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$\Phi = 32° 51.8' N., \lambda = 117° 15.2' W., h = 7.7$ m. approx., Consolidated detrital material.

Tinemaha Seismologic Station
$\Phi = 37° 05.7' N., \lambda = 118° 15.5' W., h = 1180$ m. approx., Basalt.

Haiwee Seismologic Station
$\Phi = 36° 08.2' N., \lambda = 117° 58.6' W., h = 1100$ m. approx., Loosely cemented tuff.

SYMBOLS AND NOTATION: in general the symbols and notation conform with the usual international practice. For the phases of deep-focus earthquakes the notation of F. J. Scrase is adopted. c, d are abbreviations for compression and dilatation.

When measurements referring to **local** earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between $\overline{P}$, P*, and P_n, although such complications are often clearly indicated and are the subject of study.

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For routine instruments of period 6 seconds . . . . . P_6
For instruments of different period analogous notation will be employed.
For routine vertical component, galvanometer period 0.2 second . . . . . P
For routine vertical component, galvanometer period 10 to 14 seconds . . . . . PX

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Santa Barbara Seismologic Station . . . . . SB
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In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

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Nov 1	P	iPNEZ	10	50	34			d	deep	
		iZ			59					
		iZ		51	09					
		iZ			39					
	MW	ePNE		50	34					
	R	ePNE			28					
	T	iPEZ			47			d		
		eE	11	00	42					
		eE		01	09					
Nov 2	PX	iPNZ	11	13	11			d	normal	J.S.A.: 23°S 110°W
		eSNZ		21	13					0 - 11:03:27
	P6	ePE		13	17					U.S.C.G.S.: 23°S 111°W
		iSE		21	12					0- 11:03.4
		eE		23	04					
		iLE		27	56	22				
	MW	ePNE		13	12					
		eSN		21	13					
	SB	ePNE		13	04					
	T	ePEZ			32					
		eE		21	50					
Nov 3	P	iPEZ	19	55	15			d	deep	
	PX	eN	20	05	20					
		iN			32					
	MW	ePNE	19	55	17					
		eSNE	20	05	33					
	R	ePNE	19	55	17					
	SB	eN			10					
		iNE			14					
	LJ	ePNE			22					
		eNE	20	05	42					
	T	iPZ	19	55	11					
		eZ	20	05	27					
Nov 8	PX	eZ	01	26	17					
	H	eZ			20					
Nov 8	PX	eZ	05	40	45					
	T	eE			28					
	H	eZ			23					
Nov 9	P	iPZ	20	02	47			c		
		eZ		03	30					
	T	ePNE			07					
Nov 11	P	iPNEZ	05	55	38			c		
	MW	ePNE			39					
	LJ	eNE			49					
	T	eNE			26					
	H	iPZ			31			c		
Nov 11	P	ePZ	17	25	00			c	normal	Small surface waves recorded
	T	ePNE			22					
Nov 12	P	iPNEZ	09	44	18					Felt in Salt Lake City,Utah.
		iZ			55					
		iLZ		46	40					
	MW	eE		44	15					
		eN			50					
	R	eNE			13					
	T	ePNE		43	51					
	H	eEZ		44	23					
Nov 12	P	ePNEZ	13	41	42			c	normal	
		eLZ		50	43					
	LJ	eNE		41	32					
		eE		46	14					
	T	ePNE		42	02					
		eNE		51	14					
		eNE		54	13					
	H	ePZ		41	53					
		eZ		51	09					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Nov 12	P	iPNEZ	20	16	58			c	deep?	
		iZ		19	42					
	MW	eNE		16	59					
	LJ	eNE			47					
	T	eNE		17	12					
Nov 13	P	iPNEZ	04	58	19			c	deep	J S A: 43.4°N 137°E
		iPcPZ			38					0 - 04:46:54
		iZ	05	01	04					USCGS: 45°N 137°E
		iZ			11					0 - 04:46:31
		eZ		02	50					
		iSNEZ		07	39					
		eZ		08	40					
	MW	ePNE	04	58	17					
		eE	05	01	07					
		iSNE		07	37					
	R	iPNE	04	58	20					
		eSNE	05	07	37					
	SB	ePNE	04	58	12					
		eSN	05	07	26					
	LJ	iPNE	04	58	25					
		iNE	05	01	26					
		eSNE		07	53					
	T	iPNE	04	58	07					
		iSNE	05	07	17					
	H	iPNEZ	04	58	11					
		eSNEZ	05	07	21					
Nov 13	P	eZ	05	24	55					
		eZ		28	11					
Nov 13	P	iPNEZ	16	02	14					
	MW	eNE			16					
	H	eNEZ			19					
Nov 15	P	iPZ	10	36	08			c	deep?	
	MW	eE			08					
	LJ	eNE		35	37					
	T	ePNE		36	26					
		eSNE		46	52					
	H	eEZ		36	18					
Nov 17	P	iPNEZ	06	07	27					J S A: 18°N 104°W
	PX	iSNZ		11	24					0 - 06:02:46
		eLZ		14	05					USCGS: 18.0°N 103.6°W
	MW	ePNE		07	27					0 - 06:02:46
		eSNE		11	23					
	R	ePNE		07	22					
		eSN		11	17					
	SB	ePNE		07	36					
	LJ	ePNE			11					
		eSNE		10	53					
	T	ePNE		07	53					
	H	iPNEZ			44					
Nov 18	PX	ePZ	01	05	29				normal	
		eLN		14	58					
	MW	eNE		05	29					
	LJ	eNE			19					
	T	ePNE			46					
Nov 19	PX	iZ	09	03	18					Small surface waves recorded
	MW	eNE			18					
	R	eN			10					
	LJ	eNE			01					
	T	eE			42					
	H	eNEZ			31					
Nov 19	PX	eZ	19	27	37					
Nov 20	PX	eZ	11	32	33					
Nov 22	PX	ePZ	15	09	44			c		Banda Sea, according to Manila.
	T	eE			46					
	H	iPNEZ			47					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	cd	Focal depth	Remarks
Nov 23	P	iPNEZ	15	12	47			d	deep?	
		iZ		13	04					
	MW	ePNE		12	48					
	LJ	eNE			50					
	H	iPNEZ			54			d		
Nov 26	P	iPNEZ	04	35	29			c	normal?	J S A: 41°N 135°E
	PX	eSN		44	54					0 - 04:24:03
		eLN		57	07	15				
	MW	ePNE		35	30					
		eSNE		45	00					
	R	ePE		35	35					
		eSE		45	03					
	SB	ePNE		35	26					
	LJ	ePE			39					
		eSNE		45	13					
	T	ePE		35	20					
		eSE		44	39					
	H	ePZ		35	23					
Nov 27	P	iPNEZ	03	49	47			d	deep	
	MW	eNE			49					
	T	eE			42					
	H	eEZ			47					
Nov 28	P	iPZ	10	43	57			d	deep	
	H	iPZ		44	06			c		
Nov 28	P	eZ	21	33	17					
	T	eE			02					
Nov 28	P	ePZ	23	28	58			d		
Nov 29	P	eZ	02	00	14					
		eZ		03	34					
	T	eE		00	20					
	H	eNZ			19					
Nov 29	P	ePZ	05	39	40			c	deep	
	T	eE			54					
	H	ePNZ			54					
Nov 29	P	ePZ	06	42	35				deep?	
		eZ		44	11					
Nov 29	P	ePZ	08	45	15					
	H	eNZ			01					
Nov 29	PX	iPNZ	11	23	03			d	normal	J S A: 28°S 68°W
		iSN		33	01					0-about 11:11:20
		eN			35					USCGS: 32°S 72°W
		LN		49		30				0 - 11:11.1
	MW	ePNE		23	03					
		eSNE		32	59					
	R	ePE		23	00					
		eSE		32	53					
	SB	ePNE		23	08					
	LJ	ePNE		22	55					
		eSNE		32	42					
	T	ePE		23	16					
		eSE		33	24					
	H	iPNE		23	10					
		eSN		33	15					
Nov 30	P	eZ	03	42	26					
	T	eE			36					
	H	ePNE			36					
Nov 30	P	eZ	04	04	16					

Date	Station	Phase	G. C. T. h m s	T sec	A mm	c d	Focal depth	Remarks
Dec 1	P	iPNEZ	00 55 20			c	deep	
	MW	ePNE	21					
	T	iPE	08					
	H	ePN	13					
Dec 3	P	eNEZ	06 31 10				normal	Small surface waves recorded
	MW	eE	13					
	T	ePNEZ	22					
	H	eNE	21					
Dec 3	P	iPNEZ	08 45 56			c	deep?	
	MW	eNE	57					
	T	iPNEZ	42			c		
		iZ	47					
		iZ	46 01					
	H	eNE	45 47					
Dec 4	P	ePNEZ	04 14 45			c	normal	Small surface waves recorded
	MW	eNE	43					JSA: 38°N 35°W
	LJ	eNE	43					0 - 04:03:59
	T	ePNEZ	33			d		
Dec 4	P	eZ?	08 26 01				normal	Δ - 114°
		ePZ	07					Strasbourg gives:02°N 122°E
	-	iP'NEZ	29 54					(according to Zürich)
		iZ	30 17					
		iZ	31 00					
		eZ	33 30					
		iZ	40 44					
	PX	eLNZ	58 30	30				
	MW	eNE	30 03					
	R	eNE	12					
	SB	eE	29 47					
		eE	30 58					
		eE	40 55					
	LJ	eNE	29 54					
		eNE	40 39					
	T	eNEZ	29 52					
		eNEZ	40 39					
Dec 4	P	iPZ	10 51 39					
		iZ	58					
	T	eZ	52 32					
Dec 4	P	iPZ	11 02 27			c	deep?	
		eZ	45					
	T	eZ	33					
Dec 5	P	iPNEZ	00 31 03			c	deep?	
	LJ	ePE	07					
	T	iPNEZ	30 57					
Dec 6	P	iPZ	22 52 30			d		
	MW	eNE	29					
	T	iPNEZ	18					
	H	eNE	23					
Dec 6	P	ePZ	03 34 42			c		
	T	iPNEZ	56					
Dec 6	P	iPZ	11 07 38			d		
	LJ	eNE	19					
	T	ePNEZ	58					
	H	eNE	54					
Dec 7	P	ePNEZ	09 05 49			d	normal	Small surface waves recorded
	MW	eNE	49					
	R	eNE	43					
	LJ	eNE	27					
	T	ePNEZ	06 21					
	H	ePE	11					

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Dec 7	P	iPNEZ	16	26	42			c	normal	USCGS: 18°N 103.5°W
		iNEZ			47			c		0 - 16:22.1
		iSNZ		30	42					J S A: 18°N 103.5°W
	P6	iSE			36					0 - 16:22:12
		iLE		31	40	24				
	MW	ePNE		26	43					
		eSNE		30	38					
	R	ePNE		26	37					
		eE		30	25					
		eSN			29					
	SB	ePNE		26	54					
		eNE		30	59					
	LJ	iPNE		26	27					
		eE		29	57					
		eN		30	17					
	T	iPNEZ		27	07			c		
		iSN		31	17					
		iN			24					
	H	ePE		26	54					
		eSE		31	03					
Dec 8	PX	eNZ	12	31	06					
	T	iPZ			20					
Dec 8	P	eZ	15	28	05					
	T	eZ		27	57					
Dec 9	P	iPNEZ	08	45	33				deep	USCGS: 14°S 74°W
		iZ			43					0 - 08:34:57
		iNE		54	01					J S A: 20.2°S 73.5°W
		iNE			37					
		eN		55	11					
	LJ	eNE		45	36					
	T	eNEZ			39					
Dec 9	P	eEZ	09	26	47					
	T	eNEZ			13					
Dec 11	P	iPNZ	04	44	10				deep?	
Dec 14	P	iPEZ	06	41	19			c	deep	
	MW	eNE			21					
	T	eNEZ			07					
Dec 15	P	eZ	19	50	54				normal?	
Dec 16	P	ePZ	07	44	15					
	T	eZ			15					
Dec 16	P	iPZ	11	21	24				deep?	
Dec 18	P	iPNEZ	06	31	59			c	deep?	
	MW	eNE		32	00					
	LJ	ePN		31	40					
	T	iPNEZ		32	25			d		
	H	eNE			15					
Dec 18	P	iPNZ	07	42	07				deep?	
	T	eZ			11					
Dec 18	P	iPNZ	07	58	51			c	deep?	
	T	iPZ			39					
Dec 18	P	iPNZ	08	23	30				deep?	
	T	eZ			39					
Dec 19	P	iPNEZ	06	35	03			c	normal	USCGS: 12.5°N 93°W
		iPcPZ		38	01					0 - 06:28:31
	P6	iLE		45	16	25	S conspicuously absent			
	MW	eNE		35	03					
	R	eN		34	52					J S A: 0 - 06:28:39 and
	LJ	eNE			52					06:29:01
	T	iPNEZ		35	19			c		
	H	ePNE			13					

Date	Station	Phase	G. C. T. h	m	s	T sec	A mm	c d	Focal depth	Remarks
Dec 20	P	iPNEZ	02	43	40				normal	
	PX	iSN		47	27					
		eLN		50	43	12				
	MW	ePNE		43	40					
	R	eN			34					
	LJ	eN			21					
	T	ePNE		44	04					
	H	eNE		43	56					
Dec 21	P	iPNEZ	06	11	15.8					USCGS: 38.7°N 117.8°W
	MW	iPNE			15.2					0 - 06:10:15
	R	iPN			17.6					J S A: 38.1°N 118.5°W
	SB	iPNE			15.1					0 - 06:10:08
	LJ	iPNE			34.2					Preliminary determination of epicenter at this
	T	iPNE		10	35.1					station: 38°53'N.,117°50'W.,0 - 06:10:04.Felt
	H	iPNEZ			48.0					over a wide area,about 600 km. in radius. Max-
										imum earth amplitude at Pasadena, about 3+ cm.
										(in E component),period,9 seconds. Strongest
										witnessed effects: collapse of stone cabin at about 38°34'N.,118°02'W.Cracks
										and probable faulting with vertical displacements up to 1 meter are reported
										from the region between 38°15' and 38°50'N.,and 118°00'W., by Professor
										V.P.Gianella, of the University of Nevada, and others. The effects apparently
										center about 38°38'N.,117°52'W.,but the region has not yet been thoroughly
										explored, because of weather conditions. About 2000 aftershocks recorded,
										principally at Tinemaha, a strong one Dec.26, 05:03 G.C.T.
Dec 24	P6	iLE	07	14	32	35			normal	No trace of P or S
Dec 24	P	iPNEZ	23	31	39			c	deep?	
	T	iZ			44					
Dec 25	PX	iPNZ	02	18	13			c	normal	USCGS: 38°N 96.5°E
		iPR1Z		22	19					0 - 02:04:33
		iZ			23					J S A: 35°N 98°E
		iPSNZ		31	28					0 - 02:04:21
		iNZ		32	19					
		iSR1N		37	14					Very destructive in
		iLN		53	22	68				Kansu, China.
	R	ePNE		18	23					
		eNE		30	05					
	T	ePNEZ		18	02					
	H	ePNEZ			07					
Dec 26	P	iPNEZ	21	27	46			c	deep	
		eZ		31	30					
	T	iPNEZ		27	40					
		iZ		31	23					
Dec 26	P	iPNEZ	22	43	09			c	deep	
	MW	ePNE			10					
	T	iPNEZ			05			c		
Dec 30	P	iPNEZ	18	54	01			c	deep	
	T	iPNEZ			17			d		
Dec 31	PX	eP'Z	06	50	55					African shock.
	P6	eLE	07	48						
	R	eP'NE	06	50	52					
	T	iP'NEZ			57					

Harry O. Wood,
Research Associate in Charge.
Charles F. Richter,
Assistant.