SEISMOLOGICAL LABORATORY

or Institution of Washington CALIFORNIA INSTITUTE OF TECHNOLOGY

220 NORTH SAN RAFAEL AVENUE. PASADENA, CALIFORNIA zorgga) almateno) bna jatnagurateni

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).

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The constants of these stations follow. It is a constant and a con

Φ = 32° 51.8′ N., λ = 117° 15.2′ W., h = 7.7 m. m PASADENA SEISMOLOGICAL LABORATORY

Central Station

 $\Phi=34^{\circ}~08.9'~\mathrm{N.},\,\lambda=118^{\circ}~10.3'~\mathrm{W.},\,h=295~\mathrm{m.},$ 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 galvanometricoptical 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) to another add quitsofon 2.108MY2 JADETS

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AUXILIARY STATIONS

Each of the auxiliary stations has equipment as follows:

Apparatus: two horizontal-component torsion seismometers with magnetic damping and optical re-CALIFORNIA INSTITUTE OF cording;

220 NORTH SAW RAFAEL AVENUE.

Instruments, and Constants (approximate). LIAD AMEGARAGE

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Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station Manager to a (signolia) to wise-wield ent to vide and

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

Riverside Seismologic Station and the mountain done in action some value to see an action some services and the second se

 $\Phi = 33^{\circ} 59.6' \text{ N.}, \lambda = 117^{\circ} 22.4' \text{ W.}, h = 250 \text{ m. approx.}, Weathered granite.}$

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

La Jolla (Scripps Institution Seismologic Station)

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

Tinemaha Seismologic Station

 $\Phi = 37^{\circ} 05.7' \text{ N.}, \lambda = 118^{\circ} 15.5' \text{ W.}, h = 1180 \text{ m. approx., Basalt.}$

Haiwee Seismologic Station was allow erstemontales notered the more described that the state of the state of

 $\Phi = 36^{\circ}$ 08.2' N., $\lambda = 117^{\circ}$ 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.

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Mount Wilson Seismologic Station.														- 21						I	IW
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Tinemaha Seismologic Station .			Chin			1		- Por												٠	T
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Riverside Seismologic Station Santa Barbara Seismologic Station		. 03	90.				202 1	0.2		- 27	72		Z							CP
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Tinemaha Seismologic Station			108		2		0.050	B C				120	-	W						T
addition beisinologic Station								1.8							700			100	240	H

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Date	Sta- tion	Phase	G h	. C.	T.	T	A	d	Focal depth	Remarks
Jan 5	PX	ePZ	02	04	15			c	normal	$\triangle = 6860 \text{ km } (61.7^{\circ});$
		eSZ		12	39					0 = 01:55:58
	P6	eLE		19	49	No. of				USCGS: 27°S 112°W
	MM	ePN		04	21					0 = 01:54:09 JSA : 25°S 115°W
	-	eSN		12	48		1			JSA : 25°S 115°W 0 = 01:54:10
	R	ePN		04	14					0 = 01:54:10
	SB	eSE eN		12	21					
	T	ePNE		04	35					
	1	eSE	38	13	18			1		
	H	ePN		04	29					
Jan 5	P	ePNEZ	11	34	30				deep	Caroline Islands ?
0011		eZ	- 330	35	03					
		eZ		35	17					
		iSN	3.8	45	03					
	MW	ePNE	10	34	33	1				
		eSNE		45	04	13.10			1	
	R	e PNE		34	33					
	SB T	ePNE ePNE		34	24 27					
Ten C			0.5	15	36			-		Solomon Islands ?
Jan 6	P	ePNZ eZ	05	16	16					DO TOWN TO THE PARTY OF THE PAR
	T	ePNE	1 8	15	49			1		
		eE		26	05				C. A. Parlie	
	Cheese of	iNE		26	28			1		
	H	ePN		15	47			-		
Jan 6	P	eZ	17	03	30					The latest Tanana
Jan 7	P	iPNEZ	11	39	07				deep	Probably Japan
	MW R	ePE iPWE		39	10					
	SB	ePNE		39	01					
	T	iPNE			00					
Jan 9	P	iPNEZ	10		10	15.75		d	deep	Interpretation of phases by
		iEZ	116	34						Mr.Benioff and Professor Gutenberg, following F.J.
		ipPZ		35	40					Scrase (Proc.Roy.Soc.,A,132,
		ipPPZ iE		39 44	07					p.213)
	- 05	eSN		44					1	Δ = 87° (9700 km)
		iSE		44	36	DET				0 = 12:21.8 h = 0.06
		isSEZ	-	45				-		Florissant gives:
		essz		51	06					h = 0.06, 11°S 170°E
	WM	iPNE		34	12			1		
		eN		34	14					
	Stor Bl.	epPN		35	42	11				
		eNE iSE		44	05 33			1		
	R	ePNE		34	13			-		
		iNE		44	07		1			
		ASNE	1	44	40		1			
	SB	APME	1	34	08		1	1		
		eE iSE		43	59 29		140	1		
	T	e PNE		34	12	1				
		iNE		34	14					
		eE		43 44	47				Harrier I	
		eSNE		44						
-	-		1			1		-		

1932

Da	bet I	ta- ion	Phas	е	G h	. C.	T.	Tesec	A	0		ocal	Remarks
Jan			iPEZ Smal ePNE		16	25	52 aves 33		nm	c	+	rmal	HOMETERS
	T		eN eNE iPE iSE			32 25 25 32	26 53 38 20						\triangle (Tinemaha) = 4910 km (44.2°) 0 = 16:17:22
Jan 1 Jan 2] 15 T		iPNEZ ePNE iPE			49 49	16 17 02				no	rmal?	Probably Aleutian Islands Aleutian Islands?
	T		iPMEZ iZ eZ eSME eME ePE eSE		4	41 41 49 49	51 05 50 01 29 03 24			d	dee	p?	Destructive in Peru 9°S 77°W 0 = 02:30:51 by St.Louis and Pasadena This appears too far north; which, together with the absence of surface waves, suggests somewhat deeper
Jan 23	Н		eNE? eNE eNE	1	3	1 1	34						focus than normal
Jan 24	P6	6 6	ePZ ePR1Z eE ePSE eSR1E eSRZE eLE eE ePME ePME	04 03 04	1 00 0' 08 14 17 24	7 0 0 3 7 2 3 5 4 0 2 4 0 1 1 1 1 1 1 1 1 1	13 19 19 20 6 22 22 22 23 23 23 23 23 23 23 23 23 23				nor	nal	Δ = 9780 km (88°) Probably Solomon Islands
Jan 24	P MW T H	i e e	PNEZ Z PNE PNE E	10	09 10 09 09 09		5			10	leep		
Jan 24	P LJ T	i. e:	PNEZ PE PNE SME	15	31 31 30 36 31	15 55 55 00 03		1		n	o rma	Ti no	hock or shocks reported at eward, Alaska, (60°N 150°W). his shock overlaps the ext; origin probably in the ame region. A(Tinemaha) =
Jan 24	P R LJ T	eN eN	IZ E PNE PNE NE N	15	31 32 31 31 31 36 41 31	41 59 46 55 23 33 09 31						Ov St de	30 km (30°) 0 = 15:24:37 verlaps the preceding.From Louis, Tinemaha, and Pasa- na, 58°N 152°W; 0-15:24:55 Pasadena) = 3630 km(32.7°) Tinemaha) = 3400 km(30.6°)



Date	Sta- tion	Phaso	G.	. C.	T.	T	Amm	c d	Focal depth	Remarks
Jan 26	P	ePZ	10	16	10				normal	Approximately 40°N 130°W
	100	eSNEZ	10.46	19	38					0 = 10:13.5
	1.N	e PNE		16	11	AND PAR				
	SB	eNE eE		19	34			18		
	T	oN		16	08					
		eSNE		18	03			1		
	Н	ePNE		15	30		100			
	**	eSE		18	35					
Jan 27	P	oPNEZ	17	35	13					
Jan 27	PX	eZ	19	51	25					
-	P	iPMEZ	13	54	16				normal	$\Delta = 10000 \text{ km } (90^{\circ})$
Jan 29	PX	oZ	10	57	29	1660			HOTHAL	0 = 13:41:10
	LV	ePRIZ		58	22					USCGS: 7°S 155°E
	P6	isz	14	05	13					0 = 13:40.9
	1	ePSE		06	24	557				J S A: 7°S 156°⊒
		eI		10	41	18				
		03		15	14					
		eLE		22	40	30				
	MM	oPNI	13	54	18	1000	- 1			
	R	ePNE		54	19					
		oSN	14	05	08					
	SB	ONE	13	54	21					
	LJ	oPNE	7.0	54	21					
	T	oE oPNE	14	06 54	42					
	H	ePE	TO		19	00 1000				
Jan 29	P	iPNCZ	14	20	19					Superposed on preceding, but
our no	MW	oPNE	#t.#	20	20					not an aftershock. Surface
	T	oPE		19	58					waves, if any, obscured by
		oN		20	03					proceding.
	H	CO		20	03					
Jan 29	P	iPMEZ	15	52	14				normal	Probably 7°S 156°E
	PX	oZ		54	00					
	1 4 4 7	oLZ	16	24	20	20				
	MW	oPNE	15	52	16					
	R	c PNE		52	18	T'ap				
	T	OPNE	E AND	52	18		23			
T	H	ePME	7.0	52	18				doore	
Jan 29	P	iPNEZ	19	13 13	42				dcop?	
	MW R	oPNE oPNE		13	14					
	T	OPNE		13	(L =					
	H	OPE		13	45					
Jan 29	P	cPZ	22	01	25				doep?	
OCAL NO		oliz	~~	04	07				T.	
	T	oPE		01	30				1-1-1-1	
		oN		01	45	THE S				
Jan 30	P	oZ	03	17	52	THE STATE OF			normal	
		GEZ	357176	17	59					
	P6	cLE		50		25				
	MM	ON	L.V. Tall	17	53					
		GE		18	03					
	T	OE		18	05			100		

PASADENA and auxiliary stations

1932

Dato	Sta- tion	Phase	G. C	. T.	T soc	A	c	Focal dopth	Romarks
Jan 30	1 1000	oPZ	07 25	40				normal	
	sma	ll surfa	co wave	s roc	orded			1101 HELL	
T 77	MM	o PNE	07 25	39			no.		
Jan 31	land a	oPNEZ	04 48	05				normal	
	MV	ll surfa			orded				
	LJ	oPNE ce	04 48	10					
	T	oPE	48	07					
Jan 31	P	ePEZ.	09 26	20					
	PX	oZ	26	34				normal	Approximately 40°N 130°W,
		osz	29	42					0 = 09:23.6 by St.Louis,
		iZ	30	45	and a				Tinomaha, Pasadena, etc.
	MW	OH	26	37					Surface waves indefinite.
	R	ONE	26	32	7				
	T	ON	25	57					
		ON	26 28	01					
Mary !		CN	28	26 38					
	H	ePE	26	08	200				
		oN	26	13				elet.	
Jan 31	P	CEZ	16 14	10			-	normal	
	smol1	l surfac		roco	rded			110 THELL	
			16 14			1	1		

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

SEISMOLOGICAL LABORATORY CARNEGIE INSTITUTION OF WASHINGTON CALIFORNIA INSTITUTE OF TECHNOLOGY

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 Scrase, 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 Pasadona

Pasadona, California, Fobruary 20, 1932.

Apparatus: two horizon

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	To YRO	AL LYBORAL	SEISMOLOGI
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N-S	6 sec.	800	0.8-0.9
E-W	"	"	. nothatel a

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VECTOR AUXILIARY STATIONS

Each of the auxiliary stations has equipment as follows:

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

220 NORTH SAN RAFAEL AVENUE.

Instruments, and Constants (approximate).

	T _o	v	h
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доку за в собрета-Auxiliary stations

The Station Constants follow. The Carnegie Institution of Month the City of Riverside); at Santa Barbara (in conjectation with the City of Riverside); at Sa Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station

Mount Wilson Seismologic Station $\Phi = 34^{\circ} 13.5' \text{ N.}, \lambda = 118^{\circ} 03.4' \text{ W.}, h = 1742 \text{ m.}, Weathered granite.}$

Riverside Seismologic Station delider no notified does to notified to enter your residence of the second your residence of the secon

 $\Phi=33^\circ$ 59.6′ N., $\lambda=117^\circ$ 22.4′ W., h = 250 m. approx., Weathered granite.

Santa Barbara Seismologic Station

 $\Phi=34^\circ~26.6'$ N., $\lambda=119^\circ~42.8'$ W., h=100 m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)

 $\Phi = 32^{\circ}$ 51.8' N., $\lambda = 117^{\circ}$ 15.2' W., h = 7.7 m. approx., Consolidated detrital material. Tinemaha Seismologic Station

 $\Phi = 37^{\circ} 05.7' \text{ N.}, \lambda = 118^{\circ} 15.5' \text{ W.}, h = 1180 \text{ m. approx., Basalt.}$

Haiwee Seismologic Station yam drive restamonates notated the nontrolled restandant American Seismologic Station yam drive restamonates notated the no

 $\Phi = 36^{\circ} 08.2' \text{ N.}, \lambda = 117^{\circ} 58.6' \text{ W.}, h = 1100 \text{ m. approx., Loosely cemented tuff.}$

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

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PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 seconds	P
For routine instruments of period 6 seconds	P.
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)	 L.J
Tinemaha Seismologic Station	 Т
Haiwee Seismologic Station	. н

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.

SEISMOLOGICAL LABORATORY

or leading but gridges CARNEGIE INSTITUTION OF WASHINGTON CALIFORNIA INSTITUTE OF TECHNOLOGY

> 220 NORTH SAN RAFAEL AVENUE. PASADENA, CALIFORNIA (approximation) bug atmenuated

BULLETIN

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The constants of these stations follow. itself of constants of these stations follow.

Ф = 32° 51.8' N., k = 117° 15.2' W., h = 7.7 m. approx SEISMOLOGICAL LABORATORY PASADENA

Central Station

 $\Phi=34^{\circ}~08.9'~\mathrm{N.}$, $\lambda=118^{\circ}~10.3'~\mathrm{W.}$, $h=295~\mathrm{m.}$, 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 galvanometricoptical 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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8	Z	0.3 sec.	5,000	Critical	Riverside Selsmoli Santa Barbara Se
	N-S	6 sec.	800		La Jolla (Scripps l Tinemaha Seismol
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	T _o	v	h		
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on Mount Wilson (a Department of the Carnegle Institution of wolld strategical of the Station Constants follow.

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Mount Wilson Seismologic Station and amen't to controlled to vitere will edit to vitere and the vitere and the

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Mount Wilson Seismologic Station				MW
Riverside Seismologic Station			 	. R
Santa Barbara Seismologic Station .000.d	0.0	2	 	. SB
La Jolla (Scripps Institution Seismologic Station)				
Tinemaha Seismologic Station				
Haiwee Seismologic Station				

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Date	Sta- tion	Phase	G.	. C.	T.	sec	A	d	Focal depth	Remarks
		4 7077977	07		47	560	IIIII	C	deep	
Feb 2	P	iPNEZ ePNE	07	10	47				doop	
	T	iPE			57					
	H	ePNE			55					
Feb 3	P	ePNEZ	06	23	36				normal	$\Delta = 4420 \text{ km.} (39.8^{\circ})$
	PX	ePRIZ		25	19					0 = 06:15:54 USCGS: 19.3°N 76.0° W
		eZ		28	32 48					0 = 16:15.8
	P6	eSN eE		29 33	03					JSA: 19.2°N 76°W
		eLE		39	26	20				0 = 06:15:51
	MM	ePNE		23	38			1	ALE TO	Destructive in Santiago
	R	ePNE			34			1		de Cuba
	SB	iPNE			55 26	ALK.				
	LJ	ePN eSN		29	29					
	T	iPNE		23	42					
		iSN		30	00					
	H	ePN	1 3 1	23	46					
	-	eSN	-	29	53	-		-		
Feb 3	P	iPNEZ	07	46	19			d	deep	
		eNEZ iSNE		47 56	52					
	MW	ePNE	1	46	20					
	414.1	eSE		56	01					
	R	ePNE		46	21					
	an a	eNE		48 56	09	100				
	SB LJ	eSNE ePN		46	22	1 1	La Mis			
	Lo	eN			29	1				
		eSN	1	56	08					
	T	iPNE		46	12				District of	
		eNE eSN		55	45 53	A COR				
	H	ePNE		46	15				Carlotte Land	
		eE			53	1				
		eE		47	52					
		eSE		55	56			-		
Feb 3	P	ePMEZ	09	24	56			C	normali	
		eZ		25	05				E. Walle	
	MW	eZ ePE		24	56					
	R	ePNE		25	01					
	T	ePNE		25	10					
	H	eE	-		05					
Feb 3	The same of	eZ	04	44	25	18				
	T	eNE			21				1	
Feb 13		iPWEZ	18	29	17				deep?	
	T	eNE eE			19	1				
T0 e 3 e 7 e			19	25				-	normal	?
Feb 13	PX T	ePZ eE	13	20	11				- The state of the	
	H	eE	1		15	- 1				

***												1932
	5:	icn Ph	ase	G h	. C.	T.	T	T	A m	d	Foca	
Feb	16 1	ePl iM		14	00	41		1		c	norm	
		eFF			05	51 35		1				0 = 13:48:48
		1 7 7 7 7 1			10 11 23 00	27 16 50 46 55	30					USCGS: 14°S 179°W 0 = 13:48.9 JSA : 13°S 180°W
	TH	iN ePM ePM			01	24 53 49						0 = 13:48:50
Feb 1	7 P	iPN	Z	01		11			-+	c	deep	
	R LJ T H	iZ ePNE ePNE iPNE ePME			2 5	51 16 26 58					deeb	
Fel 17		eEZ		-	5 3	2			-	-		
Feb 19	LJ P	€N €E			3	8				1	norma]	Emergence very indefinite
100 13	RTH	i PNE eN iPNE iE	Z	5 3	7 2 3.				1	i	deep?	JSA:13 %71 -W.0=16:06:37
Feb 20		i.PME2	10	9 1	24	-			1			
Hely or	T	iPE		2 1	36				1	r	ormal	?
Feb 21	P R SB T H	e PNEZ iZ e PNE e PNE i PNE e PNE	0.	1 4]	05 27 07 03 14 13					d	eep?	Probably South Pacific region. Azimuth roughly 225°
Feb 21	P	iPMEZ	01	46		-	-+-		-	+		
	R SB T H	iZ ePNE iPN ePNE iPNE		47					С		eep?	Azimuth roughly 280°. North Pacific.
Feb 21	P T H	iZ eE eD	11	48	5C 55							
Feb 23	P PX	eZ iPNZ	00	32 33	49 00		+	1		ו סמי	rmal	
		eZ iZ iZ		34 35 38	50 00 09							
	P6 LJ T	ele?		52 32 33	1,3700	20						
	н	eN eN eN		33 35 33	05 15 11 13							

PASADENA and auxiliary stations

1932

Date	Sta- tion	Phase	h	. C.	T.	T	A mm	c d	Focal depth	Remarks
Feb 23	P P6 R SB LJ T	iPMEZ eLE ePME ePME iPME oPME oPME	20	24 52 24	04 18 07 01 07 09	20			normal	
Feb 27	P R LJ T	iPNZ iNEZ oPNE oNE eN ePNE eN	09	01 00 01	03 33 00 30 57 14 46			ď	deap	

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

PUBLICATIONS -- SEISHOLOGICAL 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 Carnogic Institution of Washington in 1921. Soveral 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.Scis.Soc.Amor., 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.Sois.Soc.Amor., VIII, 1, 28-33, 1918.
- 4) On a Piozo-electric Accelerograph,

Bull.Seis.Soc.Amor., 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.Gool.Soc.Amer., XXXIII, 303-316, 1922. Bull.Scis.Soc.Amer., XIV, 1, 60-68, 1924. 7) Earthquake Reports,
- 8) A Torsion Seismometer, Journ.Opt.Soc.Am.and Rov.Sci.Inst., VIII, No.6, 817-822, 1924.
- 9) Description and Theory of the Torsion Seismometer, Bull.Sois.Soc.Amor., XV,1,1-72,1925.
- 10) The Practical Lesson of the Santa Barbara Earthquake, Allied Architects Assoc. Bull., August 1, 1925.

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.Scis.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 Beitrage zur Geophysik, XXXI, 155-157, 1931.

17) Aufbau und Temperatur der Stratosphäro,

Gorlands Beitrage zur Geophysik, XXXII, 87-94, 1931.

18) Modified Mercalli Intensity Scale of 1931,

Bull.Scis.Soc.Amor., XXI, 4, 277-283, 1931.

- 19) Earthquake of January 28,1931, Bull. Scis. Soc. Amer., XXI, 4,284,1931.
- 20) Travel Time Curves at Small Distances and Wave Velocities in Southern Calif-Gerlands Beitrago 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.

Apparatus: two herizon

SEISMOLOGICAL LABORATORY

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Central Station

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Instruments, and Constants (approximate). In an in the analysis of the manufacture of the constants of the constant of the

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Haiwee Seismologic Station	 100	. Н

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PASADENA and auxiliary stations

1932

Date	Sta- tion	Phase	h	r. C.	T.	Sec	A	d	Focal depth	Remarks
Mar 1	P	ePNZ	19	13	49				normal?	
	MW	ePNE			49					
	R	ePNE			48					
	LJ	iPNE			42					
	T	iPNE ePNE		14	00 57					
Mar 2			70					-		
Mar Z	P T	eZ eΞ	12	00	29 45					
Mar 2	P	iPNEZ	17	43	46		-	-	normal	Probably near 43°N 126°W.
mar h	MW	oPNE	1.1	40	47	1			mai	riobably hear 40 N 120 W.
	T	iPNE			25				5.13	
		oN		44	52					
	1	eLN		46	09					
	H	ePNE		43	34					
		eE =		45	24		Profes			
Mar 6	P	eLNE	10	46 51	49			-	doons	
Mar b	P	eZ iZ	10	52	17				decp?	
	T	eE		51	14		10			
		eE		52	14					
War 6	P	oPNEZ	12	05	44		NI ALLENSIA		deep?	
illat 0	T	ePNE	12	05	50		1		docp.	
	H	oPE			49				ED LL (ES	
Mar 8	P	iPNZZ	02	42	04				deep?	
Tar 8	P	ePNEZ	03	24	15				deep?	
		iZ			30				7.01	
	MM	oPNE			16					
	R SB	oPE eN			19					
	LJ	oPN			20				,	
	T	ePE			16					
	H	ePNE			16				Salat in	
far 8	P	oPNEZ	04	37	57			100	normal	$\Delta = 4940 \text{ km.} (44.5^{\circ})$
		oSN		44						0 = 04:29:38
	The state of the s	long wa								Probably Alcutian Islands,
	MW	GPNE	04	37	57					about 51°N., 176°W.
	R	oPNE		44 38	40					
	11	oSN	1	45						
	SB	esn	1 1	44	25					
	LJ	oPN		38	07					
		oSN		45	20	P. A.				
	T	oPNE		37		FIRE			A PARTY	
	T.F	ise		44	15					A NUMBER OF STREET
	H	ePNE oSE		37	47					
ar 8	P	oPNEZ	18		14	1			normal	
		indefin				vavos				
	MW	ONE	18	13	17	1				
	R	0E			24					
	T	oPNE	Peg/		30				NI PLANT	
	H	ePNE			24	1	1000	1		

Date	Sta- tion	Phase	G. C h m		T sec	A mm	c d	Focal depth	Remarks
Mar 9	P	GPNEZ	02 53	56				normal?	
	MM	OPME		55					
	R	ONE	54	02					
	SB	œE	53	46					
	T	ope opne		23					
Mar 10	P	cPNZ	05 30	34	-				
THEFT TO	T	cLN	05 30 59.5	47				normal	
	T	cE	31	01					
	Н	eΞ	30	57		4.0			
Mar 10	P	oPNZ	23 06	54				deep?	
		cN	07	40		J. 19			
	MW	0E	06	53					
	T	ePNE	07	12					
	Н	osn oe	16	20					
Mar 12	P		-					10	
HAI IK	MV	iPNZ ePNE	12 59	20				normal?	
	T	oPNE		33					
Mar 14	P	iPNEZ	04 09	33			c	normal	USCGS: 20.5°N 109°W
		oN	12	23				1101 max	0 = 04:05.8
		eEZ		43			-		J S A: 20.5°N 110°W
	P6	cLN	14	40					0 = 04:05:38
	MM	oPNE	09	33					
		OE ·	12	L.L.					
	R	oPN	09	28					
		oN iE	12	41 07					
	SB	cPNE	09	47					
	DD	CE	13	01	1				
	- 100	oN		10					
	LJ	OPNE	09	12			100		
		oLE	12	17		-1-1-1			
	T	GPNE	10	05					Tinomaha: \triangle = 2080 km(18.79
		GM	13	08					0 = 04:05:42
	77	iSE	00	34					
	H	iPNE oSE	09 13	52 09					
far 14	P			45			c	normal	USCGS: 07°N 73°W
		face wav						HOTHELL	0 = 22:42:34
	MW I	iPE	22 51	44					J S A: 09.5°N 74°W
		eSNE	58	50					0 = 22:43:00
	R	ePNE	51	41		741.			
The state of		eSE	58						
	LJ	iPNE	51			482			
	T	iSNE iPNE	58 51		THE P	US .			Minamaka A = 5550 1 / 10 001
5	-	iSNE	59	11		1			Tinemaha: $\triangle = 5530 \text{ km}(49.8^{\circ})$ 0 = 22:42:56
	H	ePE		49					U - 22:42:00
		eSN	59	04					
ar 15	P		04 45	18					
		l surface		A PROPERTY OF THE PARTY OF THE	ded				
	IMW	eNE	04 45	17	1		-2		
11-12	R	eE over		21		i su		3.8	
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	H	ePNE eE		11 14					
		-	1	7.7				200	The same of the sa

International Seismological Centre From the ISC collection scanned by SISMOS

No. 10

Date	Sta- tion	Phase	G h	. C.	T.	T sec	A mm	C d	Focal depth	Remarks
Mar 16	P T H	iZ iZ eE eNE eE	05	39 38	13 52 23 04 21					Interpretation doubtful. Either two shocks or one deep focus shock.
Mar 19	P P6 MW R LJ T	eE iPNEZ iN eLN ePNE iPNE iPNE iPNE iPNE iPNE ePNE	11	39 12 22 34 12 22 12 22	01 13 39 00 15 17 21 10 33 14 37			đ	normal	
Mar 19	P	ePNEZ	23	23	19				normal	
		ll surfac		ves	reco	rded				
Mar 22	P	eNZ	14	10	54					
75 00	T	eNE	14	19	51 38		-			
Mar 23	TH	ePNZ ePNE eN	14	19	55 55					
Mar 25	P MW T H	eEZ eE eE eN	21	41	52 48 39 57				normal?	
Mar 26	P MW R SB LJ T	ePNEZ ePNE ePE iSE? iPNE ePNE ePNE iE	00	01 07 01 02 01	52 54 57 51 52 09 33 36 42				normal	Overlaps the following shock. Surface waves not identified. Epicenter probably same as the next, in which case: 0 = 23:54:38
Mar 26	P6 MW R SB LJ T H	iPNEZ iSE iLE eN iSNE ePN eSNE iPN ePNE iPNE iSNE iPNE iPNE eSN	00	05 11 14 05 11 05 11 05 10 05 10	33 21 05 41 20 36 21				normal	Δ = 4060 km (36.5°) 0 = 23:58:19 (March 25) USCGS: 63°N 155°W 0 = 23:58.5 J S A: 61°N 151°W 0 = 23:58:29 Alaska. Damage reported about 63°N 149°W.

From the ISC collection scanned by SISMOS

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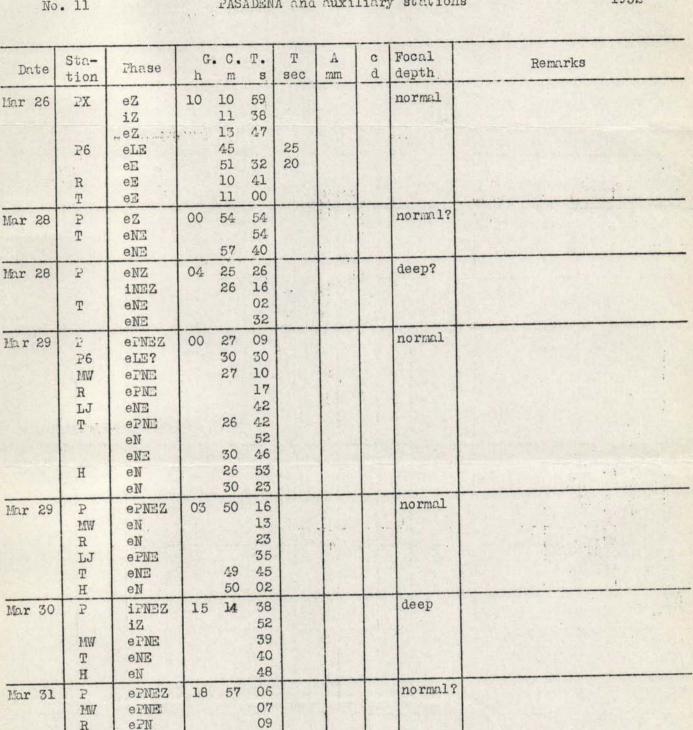
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Harry O. Wood, Research Associate, in Charge.

Charles F. Richter, Assistant.

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Newschitch Associates in Charge.

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Apparatus: two horizon

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SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON CALIFORNIA INSTITUTE OF TECHNOLOGY

220 NORTH SAN RAFAEL AVENUE, HE STRATEGO DE STERMENTENI

PASADENA, CALIFORNIA

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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

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The constants of these stations follow. S m 001 = d . W P.St. PII = A . M 3.38 18 = 0

0.8 - 0.9

damping and optical re-

PASADENA SEISMOLOGICAL LABORATORY Central Station

 $\Phi=34^\circ~08.9'~N.,\,\lambda=118^\circ~10.3'~W.,\,h=295~m.,$ 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). Ф = 36° 08.2° N., λ = 117° 58.6° W., b

Instruments, and Constants (approximate);

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tation of E. J.	hquakes the ne	deep-focus ear sion an dilatat	tional practice. For the phases of c, d are abbreviations for dompres
N-S	0.8 sec.	2,800	0.8-0.9 The measure med W
E - W	ated and are th	ton clearly indic	although such complications are of
N — S	hote 6 sec.	fit to 800 tate s	SPECIAL SYMBO S 11 6.0-8.0 g th
E — W			PASADENA SEISMOLOGIC For routine instruments o

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

inertia-mass 100 kg. T₀=0.5 sec. Damping critical or slightly less;

galvanometers: (1) T1=0.2 sec. Damping critical. Acidal Disclosure and Manual Company of the Com

(2) T₁=10 to 14 sec. Damping critical, noting algolometer elienwish

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. mrolini and the meloque of vino naving ed like

YSOTAS AUXILIARY STATIONS IOMEISE

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); ATAR MAR HTROM OSS

	T _o	v	h
N — S	0.8 sec.	2,800	0.8-0.9
E - W	sendena Califor	ORATORY, P	OGICAL LAB

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

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

galvanometer: T_i=0.2 sec. Damping critical.

ography of the University of California); at Tinemaha, and at Haiwee, in the Owins Valley Cooperation with the Department of Water and Power of the City with t

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Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station of the restablished the brand to be broken this fellowed visuals

 $\Phi=34^\circ~13.5'~{
m N.},\,\lambda=118^\circ~03.4'~{
m W.},\,h=1742{
m m.},$ Weathered granite.

Riverside Seismologic Station

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

Santa Barbara Seismologic Station

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

La Jolla (Scripps Institution Seismologic Station)

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

Tinemaha Seismologic Station wy vlosed am 508 H A W 8.01 811 H A W 6.80 18 = 0

Themana Seishborgie Station $\Phi=37^\circ~05.7'~\mathrm{N.},~\lambda=118^\circ~15.5'~\mathrm{W.},~h=1180~\mathrm{m.}$ approx., Basalt.

Haiwee Seismologic Station

 $\Phi=36^{\circ}$ 08.2′ N., $\lambda=117^{\circ}$ 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 coordinated group are as follows:

PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 second	P
For routine instruments of period 6 seconds	P.
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	X
Mount Wilson Seismologic Station Application of the Section of the	W
Riverside Seismologic Station	R
Santa Barbara Seismologic Station	SB
La Jolla (Scripps Institution Seismologic Station)	LJ
Tinemana 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	Sta- tion	Phase	h	G. C m		T	A	c d	Focal depth	Remarks
Apr. 3	P	iPNEZ	20		39			C	normal	
	MW	ePNE			39		143	1		
	T	ePNE			50		1			
	H	ePNE	-		41					
Apr. 4	P	ePNEZ	19	28				C	deep!	Clear and characteristic
	1	iNEZ	1		22		643	1		case of deep focus.Accord-
		iZ		70	30			1		ing to Prof.Wadati 30°N.,
	IW	iSNEZ iPNE	-	38	05					141°E., approximately.
	17174	eE		28	22 57					0 = 19:17, h = 300 km. or
	West Te	eSNE		38		E33				more.
		iE	1	00	06			1		
	R	iPNE		28	24		N. C		1 1 1 1 1 1	
		eSNE		38		185			TEST	
	SB	iPNE		28	20					
		eSNE		37	53					
		iSN			55	1				
	LJ	ePNE		28	27			18		
		iNE		70	29					
10.		eE eSE		30 38	05		The second		10 mg 2 mg	
1		iSN		30	13					
7		iE			16			1		
	T	iPNE		28	17					
		iSNE		37	51	2.50			- V.	
	H	iPNE		28	17					
		eSE		37	51					
		iSN	7.5		58			-		
	P	iPNEZ iZ	13	06	21 24			C	deep	
	MW	ePN			21					
	T	iPNE			31					
	H	iPNE			27					
Apr. 8	P	ePNZ	12	04	37				normal	
6.00	P6	eLE	9.8	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	18	7.0	41				THE COLUMN	
	P6	eSE eLE	TE ST	16	10	95				
TE COL	MW	ePNE	40	05	40	25			18 18 18	
	R	ePNE	1	00	47					
		eSNE		16	13				(AGLEST)	
	T	eN		05	47					
		iSNE		16	12	STEP I				
THE !	H	ePN		05	53	1				
nn 14	pv	iSE	00	16	12				openies.	
pr.14 pr.16	PX P	eLZ	02	14	FF	15			normal	
br. TO	P6	eNEZ eLE	03	00	53	107			normal	
	MM	en		01	38	13	Te Pay			
	R	eNE		00	39				THE REAL PROPERTY.	
	T	ePNE		01	08	5	E. T			
	H	ePN	y day	00	58		5 7			
pr.22	P	iPZ	05		22 38			C		Possibly two shocks.
	8 11	eZ iZ		20	38	1				
35		eZ		25	36		A PA			
	MW	eN		20	45 52		100			
	7474	eE		~0	10	1				

PASADENA and auxiliary stations

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	Lav		-						Ty Buau.	1932
Date	Sta-	I MAGGA			. T.	T	A	C	Focal	Remarks
100	tion		l			sec	mm	d	depth	Remarks
Apr.22	RT	ntinued for the second	os Os	Page 20 17 20 17 20	34 18 40 28 39					
Apr.24	P66 PX MW R SB LJ T H	iPNEZ iLE eS ePNE eLN ePNE eLNE eE eN eSNE iPNE eLN ePNE eLN	06	13 15 13 15 13 15 13 15 14 17 13 17	57 33	30 2			normal	Long periods (L) precede short periods at Pasadena. J S A: 26°N 112°W 0 = 06:10:59
Apr.25	P MW R	iPNEZ eE eNE	17	59	42 42 43			d	deep	
Apr. 26	P MW R LJ T	iPNEZ iZ eSN ePNE ePNE ePNE eNE eSNE eSNE eE iN eSNE	08	06 16 06	26 41 02 26 22 18 31 39 26 34 38 16			c	deep	
Apr.29	P MW R LJ	ePNE ePNE eSNE ePE eN eE eSNE ePNE iSNE	18	26 27 26 27 33 26 33	48 50 32 08 54 00 53 36 08				normal	Probably Aleutian Islands. $\triangle = 4740 \text{ km. } (42.7^{\circ})$ $0 = 18:18:31$

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.

Each of the auxilia

Apparatus: two horizon



SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON CALIFORNIA INSTITUTE OF TECHNOLOGY

220 NORTH SAN RAFAEL AVENUE, (and Constants (and Junaya Las Anna (and Las Anna) and Constants (and Las PASADENA, CALIFORNIA

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The constants of these stations follow.

damping and optical re-

PASADENA SEISMOLOGICAL LABORATORY

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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);

the usual interna- Screen is adopted.	a conform with	nquake nd notation nd Ton.	eperal the syml deep-forus car sion and dilata	orallon: in a clic phases of a cord name of	SVMBOLS AND RE- fional practice. Fd c, d are abbreviate
Il be used without sen E, P*, and P.,	N-S	0.8 sec.	2,800	0.8-0.9	When measure index or subscript,
ly.	E — W	ated our are th	ten clearly indi-	Heatlons are or	although such comp
: SWO	N — S	6 sec.	800	0.8-0.9	AMPLITUDES, (h) SPECIAL SYMBOL
9	E — W	" THE	AL LARORAT	SELISMENTOGIC	PASADENA For routin

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

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

galvanometers: (1) T₁=0.2 sec. Damping critical.

(2) T1=10 to 14 sec. Damping critical. Talket algological elicity of

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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	sadena, Californ	RATORY, Pa	OGICAL LAB

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

cooperation with the Department of Water and Power of the Cit

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 $\Phi=34^\circ~13.5'~{
m N.},\,\lambda=118^\circ~03.4'~{
m W.},\,{
m h}=1742{
m m.},$ Weathered granite.

Riverside Seismologic Station

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

Santa Barbara Seismologic Station $\Phi=34^{\circ}$ 26.5′ N., $\lambda=119^{\circ}$ 42.9′ W., h = 100 m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)

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

Tinemaha Seismologic Station

 $\Phi = 37^{\circ}$ 05.7′ N., $\lambda = 118^{\circ}$ 15.5′ W., h = 1180 m. approx., Basalt.

Haiwee Seismologic Station

 $\Phi=36^{\circ}~08.2'~\mathrm{N.}, \lambda=117^{\circ}~58.6'~\mathrm{W.}, \, h=1100~\mathrm{m.}$ approx., Loosely cemented tuff.

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SEISMOLOGICAL LABORATORY PASADENA

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	For routine instruments of period 6 seconds
record-	For instruments of different period analogous notation will be employed.
	For routine vertical component, galvanometer period 0.2 second
	For routine vertical component, galvanometer period 10 to 14 seconds PX
Mount V	Wilson Seismologic Station
Riversid	le Seismologic Station D. H. D. C. L. C. C. B. D. O. T. (S.)
	arbara Seismologic Station
La Jolla	(Scripps Institution Seismologic Station)
	na Seismologic Station
Haiwee	Seismologic Station

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.

Sta- tion	Phase	1				A			Remarks
P	eZ eNE eNEZ eNZ iZ	19	17	44 06 24 34				normal	
MW	eLE eE iN		13	39					
	eN		17	04					
In	eN			41					
T	iPNE			00					Δ = 1200 km (22°)
H	ePNE eSNE		13	53			1		0 = 19:19:01
P R	ePNEZ ePNE	16	03	06				deep?	, a
T H	ePNE iPNE			17 15					
PX	iPNEZ eZ	04	22 26	46			c	deep	
SB	ePNE		LL	40					
T H	iPN ePE			38					
P	iNE eZ	23	12	42			-		
P	iPNEZ eZ	19	33 34	29			c	deep	
R	ePNE		33	29 25					
	iE			44					
TH	ePME ePE			41					
P	iPNEZ eZ	12	05	07 46			С	deep	
R	ePNE ePNE			08					
T	iPNE		05	59 18					
MW	eE	07	05	41					
P	ePZ	13	25 29	36			1	normal	USCGS: 03°N 129°E
	eLN		57.3		56				0 = 13:11.3 J S A: 01°N 124°E approx.
	iPZ iZ			36			c		Surface waves large. Phases
	P6 MW R LJ T H P PX MW SB LJ T H P P MW R SB LJ T H P P MW R SB LJ T H P P MW R SB LJ T H P MW R LJ T P MW T P	Phase Phase Pez Pene Pene Pene Pene Pene Pene Pene	Tion Phase 1 Phase Phase	tion Phase h n P eZ 19 13 eNE eNE 17 eNE iZ 17 eNE iZ 18 mW eE 13 iN 17 17 R eN 12 iNE 17 13 eN 16 13 eN 13 25 eN 12 14 eN 16 13 eN 17 17 eN 17 17 eN 17 22 eN 12 23 eN 12 23 eN 12 12 eN	tion Phase h m s P eZ 19 13 36 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 10 eSNE 18 11 14 00 eSNE 18 11 12 53 12	tion Phase h m s sec P eZ 19 13 36 eNE 44 44 44 eNEZ 17 06 44 eNZ 24 12 34 P6 eLE 18 45 MW eE 13 39 iN 17 19 R eN 12 57 ine iNE 17 04 L LJ eN 13 12 eN 16 41 10 eSNE 18 11 H ePNE 17 52 P ePNE 09 17 H ePNE 19 33 29 <td>tion Phase h m s sec mm P eZ 19 13 36 em em</td> <td>tion Phase h m s sec mm c P eZ 19 13 36 emm c eNE 44 44 44 emm c eNZ 12 24 c c c iZ 34 45 c c c iZ 34 45 c c c iZ 34 45 c c c iZ 33 39 c c c iZ 33 39 c c c iN 17 19 c<</td> <td> Phase</td>	tion Phase h m s sec mm P eZ 19 13 36 em em	tion Phase h m s sec mm c P eZ 19 13 36 emm c eNE 44 44 44 emm c eNZ 12 24 c c c iZ 34 45 c c c iZ 34 45 c c c iZ 34 45 c c c iZ 33 39 c c c iZ 33 39 c c c iN 17 19 c<	Phase

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

	Sta-		1 0	. C.	m	T	A	c	Focal	
Date	tion	Phase	h	m	s		mm	d	depth	Remarks
May 14	PX	iPR2Z	-				om pa	-		Phases about 13:29:40 may be
, LI		iPSZ		39	47					P of another shock, possibly
		iZ		40	04					deep.
	P6	iZ ePE		25	49					Damage reported in North- eastern Celebes.
	10	iPRIE		30	24					0000000
		eScPcSE		36	07					
		iE ePSE		38 39	14					
		iE	100	40	02					
		eE		44.3						
		eE		45	05					
	P12	eSR1E iN		30.5	58					Pl2 refers to experimental
	112	iSRIN		46.2				In S		instrument at Pasadena,
		iN		56.6						period 12 seconds.
		iN	1.0	57		55 67				
	MM	iLN ePE	14	03 25	14 42	07				
		eE		29	39					
	D	eE	Nº	30	24					
	R	ePN eE		25	45 48					
	LJ	ePNE		25	54					
		iNE		29	48					
	T	iNE ePE		30 25	40 34					
	1	ine		29	38					
	H	ePNE		25	39					
35 371		iNE	377	29	39				da 0	
May 17	P	iPNEZ eZ	13	15	20				deep?	
	T	eЕ		17						
	H	eNE		15	20	1				
May 18	P	eE eZ	19	17	05	-	-		normal?	
ing 10	MW	eE	-		09					
		eN			19					
	T	eE eN			13					
	H	eE			13					
		eN	-		28	-	-	_	,	
May 20	P MW	iPNEZ ePNE	09	47	17 18 19			C	deep	
	RTH	ePNE ePNE ePN			19				a Fun	
	Ĥ	iPNE	-		27 26	-				
May 21	P	ePZ iPNEZ	10	16	51 54 12		1	cd	normal	USCGS: 13°N 88°W 0 - 10:10:11
		ePRIN iPcPZ		18	12 27	1				J S A: 13.8 % 88.5 W 0 - 10:10:17
		eE		21	54		1	1		Destructive in San Salvador.
		eSNE		22 23	16					PcP,ScP,ScS,extraordinarily
		iScPZ eN		25	02					large and sharp.
	P6	iScSNEZ iLNE		27	09	35		1		
	MW	iPNE		16	53	90		1		
	1	eSE _		22	16	ned or	n page	1 16		
			-	- 00	110 111	uou 0	T bake	TC		

1932



Date	Sta- tion	Phase	G h	. C.	T.	T	A	c	Focal depth	Remarks
						nued				
May 21	R	ePNE	10	16	47	1	1	1.00		
		INE		27	07					
	SB	ePE		17						
	THE STATE OF	iNE		27	04 16	N. S.				
	LJ	iPNE	139	16	43					
	T	iNE ePNE		27 17 27 17	02	787				
		iNE ePN		27	19					
	H									
	-	eN	-	27	19		-			D. J. C. Dill Talanda
May 22	P	ePNEZ	11	41	09	NI B			normal	Region of Fiji Islands
		iZ			10					(using data of Washington).
	P6	eLE	12	12	10	14				
	MW	eNE	11	41	10	19-17				
	R	ePNE		-0	11					
	T. T	eN		50	56					
	LJ	eNE		41	04	11-11				$\Delta = 8520 \text{ km} (76.7^{\circ})$
	T	iPNE eSN		51	10					0 = 11:29:23
	H	ePNE		41	17					0 11.20.20
	-	-				-	+	-	mamma 1	J S A: 14°N 88.5°W
May 22	P	ePNZ	22	46	28				normal	0 = 22:40:04
	MM	eNE			30 48					0 - 22.40.04
	R	eN	1	56	44					
	T	eNE		57	04					
	Н	eE		46	37					
75 00			16	21	08	-		c	deep!	USCGS: 16°S 173°E
May 26	P	iPNEZ iZ	10	ET	11			1	deeb.	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	1				on basis of $\Delta = 9100 \text{ km.}$
		eE		30	41	1				(82°), h = 0.09 or slightly
		eE			55					greater.
		eN			59			Est	pecially	in the vertical component, the
		eSNE		31	08			nre	liminary	nhases are recorded at Pasa-
		eN			32	18		der	a with	amplitudes in excess of those revious distant shocks, which
		eSPZ		32		1		in	dicates	exceptionally great energy.
		eSPN			07			Exc	ent for	amplitude the seismograms
	PX	iPZ		21				clo	sely res	semble those of the earthquake
		iZ			11			01	1931,00	tober 18, 04h G.C.T. The re- umerous stations for this Oct-
		iZ			13			obo	er shock	are quite consistent with an
		iZ!		077	26			ep:	icenter 1	not far from that assigned by
		ipPZ		23				the	U.S.Coa	est and Geodetic Survey to the
		eZ		24	19					This is distant 81°45° from The distance from the epicenter
		isPZ:	1		43			Pel	ren by th	ne Jesuit Seismological Asso-
		eSNE		31				ci	ation is	81° 56'. Comparison of the
	The state of	iZ		O.L	17			COL	mponents	shows that the whole motion
	1	iSPZ		32		1		abo	out the	time of the S phase was pol-
	P6	ePNE	1	21				ar	zed near	rly in the plane of propaga-
	120	iE			13	-				phase sS at Pasadena is very eding SS both in period and
		iNE			27			-		amplitude. Surface waves
		iPPE		24		1		1	The second secon	nite or absent.
		iE		30				ar	3 Indel1	nine or absent.
		iN		31		10		1		
		iSNE	1		07			The second		

PASADENA and auxiliary stations

1932

		ta- ion	Phase	G.	C.T.	T		A m	c d	Foca	
May	26 I	P6	in ispn ie isse isse isse inse ine ine ine ine ine ine ine ine ine in	16	contim 31 33 32 07 34 38 35 10 37 13 21 09 26 31 12 21 10 20 30 46 59 31 14 32 09 35 25 1 10 24 0 51 10 52 25 1 10 53 25 1 10 54 25 1 10 55 25 1 10 56 25 1 10 57 25 1 10 58 25 1 10 59 25 1 10 50 25 1 10 1 10	THE SHARE VALUE AND	From	pag	d	depti	Remarks
May 26	H	oF oE	PE I	31	1 20 29 1 04						
	MW R T H	iZ iN eN eE eE eE	E	39						cap?	
May 26	P MW R T	iEZ eNZ eZ eNE eNE eNE		16 47 49 47	10 39 59 39 28 39 12				de	sep?	
May 26	P T H	inz oe on	1	.7 08	00 10 27						
May 26	P R T	inz ene ee en	1	8 46	20 22 22 29 29				ded	эр	
May 26	P MW R SB T H	iPNE cN cPNE cN cPNE cNE cPNE cPNE cPNE c		43 33 43 33 43 33 43 33 43 33	24 08 25 10 26 00 23 00 23 07 33 08			d	doc	p	

PASADENA, LOCAL SHOCKS

August, 1932.

Data		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		Los Angeles district.
31	04:25	34 ?	118 ?	D	0.5	Los Angeles district.
31	09:05:42	34 ?	118 ?	D		Los Angeles district.
	09:29:13		116 20	C		North of Little San Bernardino Mountains.
	12:09:58		116 35	В	2.5	Near PalmSprings, Riverside County.
	13:30:50	34 ?	1118 ?	D	1	Los Angeles district
31	20:53:25	33 51	116 35	В	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.

PASADENA and auxiliary stations

1932

Date	Sta-	Phaso		. C.		T	A	C	Focal	Remarks
May 27	P MW R	iPMEZ oPNE oPNE oPNE eME eNE ePNE oPNE oPNE oPN	h 01	50 51 41 51 41 50 51	21 21 22 46 07 29 19 28 54 19	soc	mm	d	depth	
May 27	P MW R T	iPNEZ OPE OPNE OPNE	06	06	49 50 52 58 00			đ	dcep	
May 28	P MW R T	ePNEZ eZ eSNE ePNE eNE ePNE eN ePNE eN	02	34 37 45 34 44 34 37	12 43 00 13 22 06 33 11 35			đ	deep	
May 30	P MW R T	iPNEZ oZ oPNE oPNE ePNE eN	00	33 34 33 44	44 24 45 41 56 04			d	deep	

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

Each of the auxilian

SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON CALIFORNIA INSTITUTE OF TECHNOLOGY

> 220 NORTH SAN RAFAEL AVENUE, man atmetered bus atmemurian! 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

 $\Phi=34^\circ~08.9'~N.,\,\lambda=118^\circ~10.3'~W.,\,h=295~m.,$ 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);

the usual interna-	t conform with	olason bee alo	Imys edt briens	o ni : MOITATO	SYMBOLS AND N
Sernee la adopted.		hqualion the no	deep-forus ear	to sea dompres	tional practice. For
the used without, yen F. P., and P.,		0.8 sec.	2,800	0.8-0.9	When measure index or subscript a
.v	E — W	ated and are the	ten eleastly indicate	lications are of	although such com-
18770	N - Spor	hoja 6 sec.	di 10 800	0.8-0.9	AMPLITUDES, (b) SPECIAL SYMBOL
9	E — W	" YHE	AL LARORAT	EISMGLOGIC	PASADENA For routin

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

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

WM galvanometers: (1) T₁=0.2 sec. Damping critical. Tolkale objectional model model to the control of the con

(2) T₁=10 to 14 sec. Damping critical moltale algorous shipsovist

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 for records of the other stations will be given only

YROTARAUXILIARY STATIONS IOMEIRE

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); AMAR MAR HTMOM OSS

	T _o	v	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	edena, Californ	DRATORY, PA	OGICAL LAB

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

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

galvanometer: T₁=0.2 sec. Damping critical.

The Station Constants follow. Will and to rawo'l bug radaw to Justing and after mother agency

Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station and a selection deal-bar deal-bar tob believe distributed and the selection of the selection $\Phi=34^\circ$ 13.5' N., $\lambda=118^\circ$ 03.4' W., h=1742m., Weathered granite.

Riverside Seismologic Station

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

Santa Barbara Seismologic Station (SEV) silogamA mort tres elamps and other habitoper $\Phi=34^{\circ}$ 26.5' N., $\lambda=119^{\circ}$ 42.9' W., h = 100 m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)

 $\Phi=32^\circ$ 51.8' N., $\lambda=117^\circ$ 15.2' W., h = 7.7 m. approx., Consolidated detrital material. Tinemaha Seismologic Station wydgodd , m de2 = 11.8 W 8.01 811 = A , M 8.80 848 = 4

 $\Phi = 37^{\circ} 05.7' \text{ N.}, \lambda = 118^{\circ} 15.5' \text{ W.}, h = 1180 \text{ m. approx., Basalt.}$

ters with magn

Haiwee Seismologic Station

 $\Phi=36^{\circ}~08.2'~\mathrm{N.}$, $\lambda=117^{\circ}~58.6'~\mathrm{W.}$, $h=1100~\mathrm{m.}$ 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 P, P*, and Pn, 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 coordinated group are as follows:

SEISMOLOGICAL LABORATORY PASADENA

			D
For routine instruments of period 0.8 second	•		. I
For routine instruments of period 6 seconds	٠		. P ₆
For routine instruments of period 6 seconds			
For routine vertical component, galvanometer period 0.2 second			. P
For routine vertical component, galvanometer period 10 to 14 seconds			PX
			3/1377
Mount Wilson Seismologic Station			MW
Piverside Seismologic Station			. R
Santa Barbara Seismologic Station	CTP-15	out!	. SB
La Jolla (Scripps Institution Seismologic Station)	1/2	-	. LJ
La Jolla (Scripps Institution Seismologie Station).	200		T
Tinemaha Seismologic Station	51.0		II
Haiwee Seismologic Station	EXT	507	. n
TOWN A RESIDENCE TO THE PROPERTY OF THE PROPER	Contract Car		

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.



Da	ate	Sta- tion	Phase	h	3. C.	T.	T	A mm	c d	Focal depth	Remarks
Jun	2	P	iPZ ePNE	13	24	01				deep?	
Jun	3	P	iPNEZ iN eZ	10	41 45	15 36 26			С	normal	USCGS: 17°N 104°W 0 = 10:36.6 J S A: 16°N 104°W
		PX MW	iE eLZ LN MN iZ iZ iZ ePNE		47 50.5 41	46 23 35 15 37 44 16	22 23 11	17 120			0 = 10:36:25 Largest earth displacement thus far recorded at Pasadens (1923-1932).Water oscillations of several feet reported in local wells. Very destructive in Mexico.
		R SB LJ T	ePNE ePNE iPNE iPNE iSE		45	09 33 00 41 59					Δ(Tinemaha) 2710 km (24.4°) 0 = 10:36:24
Jun	3	P T	eZ eE	13	12 13	42 16				normal	
Jun	3	P T	eZ eNE	15	00	40 05				normal	Aftershock
Jun	3	P MW	eZ eN	1.5	13	10				normal	Aftershock
		R LJ T	eN eN eNE		12	55 59 29					
Jun	3	P MW R SB LJ T	eNZ iNEZ eLE eNE eN iN eN iNE	16	32 43 32	29 30 30 24 27 47 14 55			c	normal	Aftershock
Jun	3	P P6 MW LJ T	eNEZ iE eLE eNE eE ePNE ePNE	17	44 48 51 44 48 44	30 21 30 31 21 13				normal	Aftershock
Jun	3	PX T	eZ eNE	20	04	11 42				normal	Small surface waves recorded
Jun	3	P MW R SB LJ T	ePNEZ eNE eNE eNE eNE eNE	20	16	23 23 18 42 13 50				normal	Surface waves doubtful Aftershock; Mexico
Jun	4	P MW R T	iPNEZ eNE eN eNE	02	12	23 22 26 14				normal	Small surface waves recorded
Jun	4	P	ePNEZ	05	24	41				normal	Small surface waves recorded



Da	te	Sta- tion	Phase	h	G. C m		T	A m m	c d	Focal depth	Remarks
Jun	4	PX T	eN eNE	10	43 44	54 23				normal?	
Jun	4	P	eZ	13	54	44				normal?	
		R	eN eN			37					
		SB	eNE eNE		55	54 08					
Jun	4	P	ePNEZ	19	05	53			-		Mexico
		MW	eNE			53					
		R	ePNE	- 65		48					
		SB LJ	ePNE eNE		06 05	06 35					
		T	ePNE		06	20					
Jun	4	P	iPNEZ	21	43	49			d	normal	Mexico
		PX	eLNZ		50	30					
		MW	eNE		43	48		-			
		R SB	eNE eNE		44	42 25	No.				
	No.	LJ	eNE		43	26					
		T	ePNE		44	15					
Jun	5	P	ePNEZ	09	09	02				normal	Mexico
		P6	eN eLE		12	51 29				1.45	
		MW	ePNE		09	03					
		R	ePNE		08	59					
			eN		12	34		N. CO			
		SB	ePNE		09	17					
		LJ	ePNE eN		08	42				1500	
		Ţ	ePNE		09	26					
un	5	P	eNEZ	18	44	00	1				
un	6	P	eNE iPNEZ	06	44	25				1 0	
ui.		MM	eNE	00	44	08				deep?	
Jun	6	P	iPNEZ	08	46	22					USCGS: 42°N 123°W
			iNEZ iNZ			24				Sale A	0 = 08:44.2
			iSNEZ		48	01					JSA: 41.2°N 124°W Pasadena:
			eLNE		10	22	4 5				$\Delta = 980 \text{ km}(8.8^{\circ})$
		MINE	ePNE		46	21					0 = 08:44:10
			iNE	TE		27	Trip			S (NE)	Destructive at and near
			eSNE eLNE	THE REAL PROPERTY.	48	01 29					Eureka, California.
		R	ePNE		46	31					
			iNE		1	35					
			eN		48	17					
			eLE			46					
		SR	O ME		AC	71			1	-	
		SB	eNE iN		46	14 38					
			iN iNE		46 47	14 38 43					
		LJ	iN iNE eNE		47 46	38 43 48					
			iN iNE eNE ePN		47 46 45	38 43 48 58					
		LJ	iN iNE eNE		47 46 45 46	38 43 48 58 08					
Jun	6	LJ T	iN iNE eNE ePN iN	09	47 46 45	38 43 48 58					
	6 6	LJ T	iN iNE eNE ePN iN iN eN	09	47 46 45 46 47	38 43 48 58 08 21 00					
Jun Jun	6	LJ T	in ine ene epn in in	-	47 46 45 46 47 09	38 43 48 58 08 21					A = 980 km (8 80)
Tun	6	LJ T P T P	iN iNE eNE ePN iN iN eN eN eZ eN iPNEZ eNE	09	47 46 45 46 47 09 20	38 43 48 58 08 21 00 17 30 21 22					$\Delta = 980 \text{ km } (8.8^{\circ})$ $0 = 09:26:09$
Tun	6	LJ T P T	iN iNE eNE ePN iN iN eN eN eZ eN	09	47 46 45 46 47 09 20	38 43 48 58 08 21 00 17 30					Δ = 980 km (8.8°) 0 = 09:26:09 Aftershock

D:	ate	Sta- tion	Phase	1		. Т.	T	A	3	Fooal	Remarks
Jun	6	P	eZ	h	-	1200	sec	mm	d	derth	USCGS: 18.5°N 76°W,0=11:49.8
		2	eN			40					JSA: 18.6°N 76.1°W,0=11:49:5
Jun	8	P	ePNEZ	02	45						
		MW R	eNE eNE			48	Marie 1		La C		
		T	eN			59					
-			eN		48	22					
Jun	8	P	ePNEZ	05	00	200					Alaska, 55°N 155°W approx.
		MW R	eNE eNE			52 49		1919			(using St.Louis).
		LJ	eNE	1		49		all the			
		T	ePNE			26			1		Δ = 3660 km (32.9°)
T	-		eSNE	-	05				-		0 = 04:53:43
Jun	8	PT	eZ eN	06	26	56 49					Region of Japan. Osaka gives $P=06:15:18.4$, $\triangle = 443$ km.
Jun	8	T	eN	07	28	30					
June	8	P	iPNEZ	07	59	43			c	normal?	Small surface(?) waves
		MW R	eNE ePNE			44					recorded. Alaska, 55°N
		II.	eSNE	08	05	28	PORT				155°W (using Osaka and St.Louis.) Approx.
		SB	eNE	07		39					bollowis. / Approx.
		LJ	eNE	08	00	01					
		T	iPNE iSNE	07	59 04	22 46					$\triangle = 3700 \text{ km } (33.3^{\circ})$ 0 = 07:52:35
Jun	8	P	ePNEZ	10	41	22			+	normal	Small surface waves record-
		PX	eZ		49	53			1		ed.
		P6	eN eE		50	11					
		1/W	eNE		41	32 25				4	
		R	eNE			16					
		T	ePN		4.0	48	-73				
Jun	8	P	eN ePNEZ	18	14						
J 041		R	eN	10	7.4	31					
		T	eN			44					
Jun	8	T	eN	21	49	41					
Jun	9	MW	eE	03	29	33					
		R T	eN eN			20 51					
Jun	9	PX	eZ	04	39	59				normal	Small surface waves
		15.5	eNZ		40	03					recorded.
			eNZ.		43	39 04					
		MW	eE		40	03					
		D	eE .		43	41					
		R SB	ePN eNE		39 40	54 27					
		LJ	eNE		39	46				1555	
-	1	T	ePN		40	28					
Jun	9	P	eNEZ	06	42	24					
		MW R	cE eNE			26					
		T	ePN			23 38					
Tun	9	P	eNEZ	14	45		1				
		IMW R LJ	eE eNE eNE			21 27 27 51					
	1	T	eNE			51			1	- III W	

PASADENA and auxiliary stations

Date	Sta- tion	Phase	G h	. C.	T.	T	A m m	c d	Focal depth	Remarks
Jun 9	PX R	eNZ eNE	21	56	50 56					
un 10	T P	eN eNEZ	03	57	33 52		-	-		
un 10	MW	eE	05	10	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.
	PX	eNZ		35	36			N. C.		Mexico.
BE 58	MW	eE eNTP		33	48					
	R SB	eNE eNE			45 56					
Y PRES	LJ	eNE			37			1-68		
	110	eNE		35	16					
	T	eN	- dime	34	16					
Jun 10	PX	eNZ	23	03	24					
CENTRAL STATE OF	MW	eE			26				The said of	
	T	eN			07				112, 841,	
Jun 11	P	iPNEZ	13	23	49			d	deep	
	MM	ePE			50					
	R	ePNE			47			-		
F 1 1	LJ	eNE		44170	43					
	T	ePN		24	02					
T 12	D	eN	1777	34	24			-	doom?	
Jun 11	P P6	ePNEZ eE	17	12	41				deep?	
	MW	eE		12	44					
	R	ePNE		-~	45					
		eЕ		23	26					
	SB	eNE		12	38			199		
	LJ	ePNE	-		45					
Jun 14	PX	eNZ	06	17	44				normal?	
	3	iNZ		24	09					
- 10 m	MW	eNE			09			185		
	R SB	eNE eNE			10					
74.18	LJ	eNE	1	17	48					
		iNE		24	10					
	T	eN		13	27					
AL THE		eN	1	17	19					
		iN		24	00				V-Millson	
Jun 16	PX	eNZ	01	37	46				deep	North Sumatra, according to
	THE STATE OF	iZ	1	38	08			-		Batavia.
		iZ		39	56					
	N. STEET	iNZ	E NA	41	04					
1 25 0	MW	eNE eNE		37 41	50 03					
Billian	R	ens	100	37	51					
	11	oN	1	41	06				4.648	
			1		13			1		
	LJ	eN	1	28	1.0					
	LJ	eN iNE		38	40					

PASADENA and auxiliary stations

Dat	tio	nnnag		n s	T sec	A mm	c		Domo wita
Jun 1	6 P	eEZ eZ eE eNE eNE eN	23 24 25 24 25 24 25	5 23 1 35 34 5 29 4 44				deep?	
Jun 18	PX MW R	enz eE en en	00 24	47 47 43					
Jun 18	P MW R SB LJ T	iPNEZ iNZ iE iN eLN ePNE ePNE ePNE iPNE iPN		37 12 57 24 08 38 32 52 24 05			C	norma	Destructive in Mexico. USCGS: 19.5°N 104°W 0 = 10:12.5 J S A: 18.8°N 104.5°W 0 = 10:12:36
Jun 18	TP	eNEZ eN	12 30	31 53					
Jun 18	PX	eZ	21 39	48	-	-	-		
Jun 18	PX R SB LJ T	enz enz ene ene en er er	22 03 07 10 03 07 04 03 04 11	49 57 16 49 36 13 45 11				normal	Aftershock, Mexico.
un 19	PX MW R LJ T	enz enz ene en en en en	08 46 54 46 45 46 55	04 16 08 02 41 33 33				normal	Mexico
un 20	PX R T	ez en en ene en	03 59 04 09 03 59 04 00	38 44 26 46 04				normal	Small surface waves recorded.
n 20	P PX MW R SB LJ T	iPNEZ iZ eL(?)N iPNE ePNE eNE iPNE ePN eN	11 21 08	28 05 44 28 22 45 19 43 02		d	1	normal?	JSA: 13°N 88.5°W 0 = 09:02:00
20	P PX MW R SB LJ	iPNEZ iN ePNE iPNE eN ePNE ePNE eN	09 29 2 31 5 29 2 2 1 4 28 5	20 56 20 27 2 2 3 2		đ	n	ormal	Surface waves recorded J S A: 44°N 126°W O = 09:26:46



Date	Sta- tion	Phase	112	n s	T sec	A mm	c d	Focal depth	Remarks		
Jun 21	PX IMW R	oPNZ eN oPE ePNE	04 2	1 32				normal?	Surface waves obscured by next shock. Possibly same epicenter as next shock.		
	LJ T	iPNE ePN eN	2:								
Jun 21	PX	ePNZ eNZ eLN	04 39	27 1 15 3 46				normal	15°N 97°W approx. by St.Louis and Pasadena.		
	R	ePE eE ePNE eN	39 44 39	3 25							
	SB LJ	eN eE ePN	31	3 20							
	T	eNE ePN eN	45 35 48	49 52							
Jun 21	PX T	iN eNZ eN	07 16								
un 22	P MW	eZ eN	00 48	10							
	R SB LJ T	eN eNE		16 03 24							
Jun 22	P P6	eN ePNEZ eE eE eE	13 03 07 08 09	43	28			normal	USCGS: 19,5°N 104°W 0 = 12:59.0 J S A: 17.3°N 103.5°W 0 = 12:59:18		
	MW R	ePNE ePNE eSNE eNE	03	54 50 37					Destructive in Mexico.		
	LJ T	opne opn opn osn	0.8	37 20							
un 22	T	eN	15 37								
Tun 22	P MW R T	enez ee en	16 52 53 52 53	07 47				normal	Small surface waves recorded. Aftershock.		
Jun 23	P PX MW	oPNEZ eZ eNE	02 22 03 02 22				d	normal?	Small surface waves		
7 20	R LJ	eNE eN	23	00							
un 23	T	oN	22 03								
un 24	P T	ePNEZ eN	09 50								
un 25	PX MW R LJ	ene ene ene	20 58	48 49 42 33							
273	T	eN oN	59 21 06	13							

1932

Date	Sta- tion	Phase	G.	C.	T.	T	A mm	c d	Focal dopth	Remarks
Jun 26	PX MW R	en ene en	19	30 29	04 06 01? 51					
Jun 27	T	eN	09	01	10			-		
Jun 28	T	oN	08	12.9				-	30000	
Jun 28	P MV R	iPNEZ ePNE ePNE ePNE	10	43	13 15 15 23			d	deep?	
Jun 29	T	eN	02	16	55	-		+		05.5 N 78 W according to St. Louis.
Jun 29		oPNZ	22	28	43					St. Louis.
Jun 30	-	iPNZ eNE eNE	00	14	45 46 38			d	deep?	
Jun 30		eZ eN	11	23 24	53 09					
Addend Jun 4	1	oZ oNE eNE	00	25 09 10	20				normal	Small surface waves

. Notes:

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

2- PX,N refers to new horizontal instrument at Pasadena, M = 100 kg., T_0 = 0.5, T_g = 10

Harry O. Wood, Research Associate in Charge.

Charles F. Richter, Assistant.

Apparatus: two horizon

SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON CALIFORNIA INSTITUTE OF TECHNOLOGY

220 NORTH SAN RAFAEL AVENUE, (81) single and bas singured and 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

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.

damping and optical re-

PASADENA SEISMOLOGICAL LABORATORY Central Station

 $\Phi=34^\circ~08.9'~N.$, $\lambda=118^\circ~10.3'~W.$, h=295~m., Deeply weathered granitic rock, with incluxough most sions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with magnetic damping and optical recording. (Cf.Bull.Seis.Soc.Am.,XV,1,1925). Φ = 36° 08.2' N., λ = 117° 58.6' W., h =

Instruments, and Constants (approximate);

eonform with the usual interna-	ols and notation	eneral the sym)	SYMBOLS AND NOTATION: in g
tation of F. J. Scrase is adopted.	To .not	deep-focus earl	tional practice. For the phases of c, d are abbreviations for dompres
ded 2 and without istinguish between P. Pt. and P.,	0.8 sec.	2,800	When measuremen 6.0-8.0 index or subscript as no eccent w
s weet a study.		ten clearly indec	although such complications are of
Ewollol N To Squor	Befa6isec.	16 16 800 Inda	SPECIAL SYMBOLS in 6.0-8.0g th
$\mathbf{E} - \mathbf{W}$			PASADENA SEISMQLOGIC For routine instruments o

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

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

galvanometers: (1) Ti=0.2 sec. Damping critical. Total Displayed mostly through

(2) T1=10 to 14 sec. Damping critical miles? Signification of the second second

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. arrother of the other stations will be given only to supplement the informateressen

YHOTAHAUXILIARY STATIONS OMPIHE

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); ARAR MAE HTROM OSS

	T _o	v	h
N-S	0.8 sec.	2,800	0.8-0.9
ia, W maidiaine	adena, Californ	DRATORY, PS	OGICAL LAB

one vertical component seismometer with oil damping and galvanometric-optical revioleties of cording to be installed at each station; risgo bus beginning our signalland arealises of

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

galvanometer: T_1 =0.2 sec. Damping critical.

The Station Constants follow. Will add to reword bug relaw to memoraged and drive nother agong

Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station industrial to the data has been described by the latter lettering glassic

Mount Wilson Seismologic Station $\Phi=34^\circ~13.5^\prime~N.,~\lambda=118^\circ~03.4^\prime~W.,~h=1742m.,$ Weathered granite.

Riverside Seismologic Station

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

Santa Barbara Seismologic Station (San) eiloganna mort mes alangie emit other hebroser $\Phi = 34^{\circ} 26.5'$ N., $\lambda = 119^{\circ} 42.9'$ W., h = 100 m. approx., Heavy, boulder-laden alluvium.

La Jolla (Scripps Institution Seismologic Station)

 $\Phi=32^{\circ}$ 51.8' N., $\lambda=117^{\circ}$ 15.2' W., h=7.7 m. approx., Consolidated detrital material. Tinemaha Seismologic Station w vlosed , m 382 = n .. W 8.01 811 = A .. N 8.80 348 = 0

 $\Phi = 37^{\circ} 05.7' \text{ N.}, \lambda = 118^{\circ} 15.5' \text{ W.}, h = 1180 \text{ m. approx., Basalt.}$

Haiwee Seismologic Station $\Phi = 36^{\circ}$ 08.2' N., $\lambda = 117^{\circ}$ 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 P, P*, and Pn, 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 coordinated group are as follows:

SEISMOLOGICAL LABORATORY PASADENA

	For routine instruments of period 0.8 second			. P
	For routine instruments of period 6 seconds			. P6
record-				
	For routine vertical component, galvanometer period 0.2 second			. P
	For routine vertical component, galvanometer period 10 to 14 seconds			PX
Mount 1	Wilson Seismologic Station (a) (in the second of the secon	1		MW
	de Seismologic Station Indiana and Alega Toto OL T. (S)			. R
Santa B	Barbara Seismologic Station	min.	AH!	. SB
La Jolla	(Scripps Institution Seismologic Station)	lo a	FILE	. LJ
Tinema	ha Seismologic Station	9.85	ule	T
Haiwee	Seismologic Station	riven.		. 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.

Da	te	Sta-	Phase	1		T.	T	A	1	The state of the s	Remarks
		tion		1			sec	mm	(depth depth	
Jul	. 2	PX	eNZ	01						normal	The second of th
		TOUT	eLNZ		29			1	1		
		MW	eNE		21						
		R	eE			03					
Jul	2	The second second	eN	- 25		48	-				
JUL	6	PX	iPNZ	13	36				C	deep?	
		MW	ePNE			43					
		R	eE			30		Parl I	1		
7.1		T	eN			51				Commence of Commence	
Jul	3	PX	ePNZ	17	41		1				
		MW	eNE			08	1		1		
		R	eN		40						
Jul	-	T	ePN	-	41						
Jui	5	PX	ePNZ	10						deep?	
		Ber	iN		20			1	1		
		MW	ePNE		11				1		
		T	eN		17				3	1,556	
		R	ePNE		11				1		
		T	iPN			31	100		1		
7-7	-	T	eN		18				1		
Jul	5	P	eZ	11		100000				deep?	
		PX	eZ		14						
	1	R	eNE	1 30		59		S LY			
		T	eN		and the Unit	51					
Jul	6	PX	eZ	15	14	58				normal	?
		MW R	eE eNE			57					
		T	eNE		15	53					
		•	eN		20	03					
Jul	7	P	ePNEZ	16	17	26	-		-	1	
	1	PX	eLNZ	10	18	52			d	normal	Δ = 845 km. (7.6°)
		P6	iLE		10		05	-1			
		R	ePNE		17	52 19	25	sno	rt I	periods s	superposed
			iN		TI			200	1		
			eLNE		18	52 30			1	No.	USCGS: 27.4°N 113°W
	1	SB	ePNE								0 = 16:15.9
		T	ePN		17	48					J S A: 28°N 113.5°W
		-	eLN		19	03					0 = 16:15;44
Jul	9	PX	ePZ	13	08	59			_		
			eZ	10		39				normal	
		P6	iE	1	12	00					CONCLETE AND AND AND AND ASSESSMENT
		PX	eN		18	54	20				
		MW	ePNE		32	15	12		1		
			eNE	-	08	42			1		
		R	ePNE		18	55					
			eNE		08	54					
		T	eNE		18	58					
		-	eN		08	46					
					10	58					
ul 10	1	P	eSN eZ	00	19	14					
WL 10		MW		00	54	32					
		R	eN			38			1		
		T	eN			39	0.0				
ul 10		P	eN a DNEAG	0.50	- A	19				10-	
10			iPNEZ	07	56	46			d	normal	
		PX	eLN	08	16	36	S pha	se c	onsi	icuously	absent
		MW	iPNE	07	56	48	1		1 1		
		R	iPNE			50	100				
		SB	iPNE			41					
		16	iPN			39	V 1				

PASADENA and auxiliary stations

	1 0+0	-		0 0	m				(
Date	Sta-	Phase	h	G. C	. Т.	T	Amm	c	Focal	Remarks
Jul 11	PX	eZ	-			586	mm	a	depth	
Jul 12	P	eZ	20	53 57	Carlot Shall	-			normal?	
V 0.1. 2.0	PX	eN	14			15		1	HOT MAL!	
	IIW	eNE	13	57						
	R	eNE			08					
	LJ	eN		56	52			1		
	T	ePN		57	28					
T-2 20		eN	14	05	27					
Jul 12	P P6	iPNEZ iLE	19	26	41	11,61		d	normal	Δ = 1190 km. (10.7°)
	IW	ePNE		28	41					USCGS: 25°N 110°W
	R	ePNE		20	34		100			0 = 19:24.1 J S A: 25.6°N 110.5°W
	SB	ePNE			53					0 = 19:24:10
	LJ	iPME			22					
	T	i.PN		27	15					
Jul 13	PX	eZ	02	33	00				normal	Surface waves recorded
	MW	eE			02					
Jul 13	R PX	eNE eNZ	04	08	13					A Champhagha 15-1-1
OUT TO	IA	eLN	04	10	20		-		normal	Aftershock; Mexico.
	MW	eNE		08	21		113			
	R	eN			12		111 4	1		
	LJ	eE			03	E-25	E-			
	T	ePN			55					
Jul 13	PX	eLNZ	07	08	20				normal	
	R	eNE ePN		07	47					
Jul 14	PX ·	iPNZ	09	06	15		-		door	
OUL IT	-41	eZ	03	09	41			C	deep	
	MW	eN		06	12					
	R	eE			12	1				
	LJ	iPNE			13					
	T	ePN	17.17		19					
Jul 15	PX	eN ePZ	7.0	09	59					
our 10	MW	ePNE	16	03	28			d	deep	
	R	ePNE			31					
	T	eN			49	165				
Jul 15	PX	eZ	23	29	28					
		eN	15.7		32					
	MW	eNE			32					
	R T	eN eN			32	5				
Jul 16	PX	eNZ	21	22	13					
	P6	eE	27	NA	40	19/19		F.		
	T	eN			43			144	FURNITE	
Jul 16	PX	eNZ	23	27	22				normal	Small surface waves recorded
WARDS	WM	eNE			18					
Le hijira	R	eN			10	80				
Jul 17	T PX	eN iPZ	90	19	44				1	
001 17	IM	eNE	22	Ta	50 52				deep?	
S. De la Co	R	eN			53					
	T	eN		20	20				1 5 TO N	
Jul 18	PX T	eLZ	00	43 24	26 52					
Jul 20	PX	eN iPZ	20	77	52		-		door	
	-11	iZ	20	17 18	58 36 06 00				deep	
NEW YORK	MW	iSN ePNE		28	06		16.4		ERRE	
	7.1.14	eNE			38		1997			
1	R	eNE eSNE iPNE		28 18	38 07 00		15 50			
	11	iNE iSNE			38					
		isne	-	28	38 07					
			B. J. C	Tal.	L'art.					

iternational From the ISC collection scanned by SISMOS eismological centre



Date	Sta-	Phase	G.	C.	T.	T sec	A	c d	Focal depth	Remarks
Jul 21	P P6 MW R SB	ePZ iSNE eLE iSNE iSNE iSE	12 13 (53 04 26 04	54 31 53 34 35 28 18	30			normal	
	T	ePN eN eSN	12	54 58 04	36					
Jul 21	PX MW R	eNZ eLN eE eE	17	09	36 37 43	18			normal	
Jul 23	MW R T	eNE eE eN	00	45	21 28 29					
Jul 23	T	eN	06	26	28					
Jul 25	P PX MW R SB	iPNEZ eZ iSN iPNE iSNE iPNE ePN ePN iPN eSN	08	36 36 36 36 36 36 36 46 45 45	22 35 09 23 10 25 14 18 15 54			d.	deep	Central Japan (using Osaka and Köti).
Jul 25	P P6 MW R SB T	iPNEZ iSNE eLE ePNE iSNE iPNE eSN ePNE iSE iPN eN	09	17 21 22.4 17 21 17 21 17 21 17 21 17 22	20 26 21 28 14 07 34 45 02	25		C	normal	Δ = 2570 km. (23.1°) 0 = 09:12:09 USCGS: 18.5°N 103.5°W 0 = 9:12:40 J S A: 17.2°N 104°W
Jul 25	P MW R SB	iPNEZ ePNE ePNE ePN iPN	09	34	13 14 07 27 41			C	normal	
Jul 25	T	eN	1.6	27	30	-	-	-		
Jul 26	P MW T	iPZ eE eN	17	17	50 04 00					
Jul 27	P MW T	iPZ eE eN	00	42	36 39 32			С	deep?	
Jul 27	PX MV R LJ	eZ eZ iZ eE eNE eN	21	38 48 38	05 44 04 43 25 37					
Jul 29	PX MW R LJ T	iPZ iZ ePNE eNE eNE ePN	00	56	18 53 17 14 45 31			d	deep	

Harry O. Wood, Research Associate in Charge.

Charles F. Richter, Assistant.

SEISMOLOGICAL LABORATORY

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220 NORTH SAN RAFAEL AVENUE, and admirated him structural 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

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

 $\Phi=34^\circ~08.9'~\mathrm{N.}$, $\lambda=118^\circ~10.3'~\mathrm{W.}$, $h=295~\mathrm{m.}$, 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.T to notice	hquaken the n	decp-forus ear sion and dilater	r the phases of
N-S	0.8 sec.	2,800	0.8-0.9
E — W	la sen l a ra bola	ten dearly indi	deathems are of
N — S	6 sec.	800	0.8-0.9
E - W	" YSK	TAROLAI II	SEISMOLOGIC

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

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

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(2) T₁=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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Each of the auxiliary stations has equipment as follows:

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	T ₀	v	h
N-S	0.8 sec.	2,800	0.8-0.9
E - W	"	g voore gr	GAI MANAGA

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Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station

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

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Tinemaha Seismologic Station

 $\Phi = 37^{\circ}~05.7'~{
m N.}$, $\lambda = 118^{\circ}~15.5'~{
m W.}$, $h = 1180~{
m m.}$ approx., Basalt.

Haiwee Seismologic Station

 $\Phi=36^{\circ}$ 08.2' N., $\lambda=117^{\circ}$ 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
For routine instruments of period 6 seconds
For instruments of different period analogous notation will be employed.
For routine vertical component, galvanometer period 0.2 second
For routine vertical component, galvanometer period 10 to 14 seconds PX
Mount Wilson Seismologic Station
Riverside Seismologic Station Janiffer and Control of the Control
Santa Barbara Seismologic Station
La Jolla (Scripps Institution Seismologic Station)
Tinemaha Seismologic Station
Haiwee Seismologic Station

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.

N	0		2	9
4.7	~	•	-	•

Date	Sta-	Phase	G. C.	T.	T	A	d	Focal depth	Remarks
	tion			and the same	860	IIIII	u		Small surface waves recorde
Aug. 2	PX	ePNZ	04 44	03				normal	Small surface waves lective
	2	ΘZ	53 44	59					
	R	eNE eN	44	34		1	1		
Aug. 2	PX	iPNZ	08 06	37		-	d	deep	
aug. 2	MW	eNE	00 00	37		11.00			
Aug. 4	PX	iPNZ	06 47	15			C	deep	
	12	iSN	55	11					
	TUM	iPNE	47	16			1		
	R	iPNE		18					
	SB	ePNE iPNE		08					
	LJ	iPN		01			1		
	-	eSN	54	46					
Aug. 6	PX	eNZ	04 07	04					
	MW	eE		06				L'Estate	
	T	eN		18			-		
Aug. 6	T	eN	08 44	19		-	d	deep?	
Aug.10	PX	iPNZ.	19 45	41			1 4	deeb:	
Aug.12	I/W PX	eE iPNZ	03 31	34		-	d	normal	$\Delta = 4450 \text{ km.} (40.1^{\circ})$
HIG.IS	IA	iSN	37	46					0 = 03:23:51
		eLN	41	29					
	P6	ePE	31	34	BEE				USCGS: 53°N 169°W
		iSE	37	42					0 = 03:23:57 J S A: 52°N 167°W
	WM	ePNE	31	37	1416				0 = 03:24:09
		eSE	37	43					
	R	ePNE	31	46		1 33			
	II.	eSE	37	51					
	LJ	iPNE	31	49	1				
		eSE	38	04					
	T	ePN		23			1		
1 1 7	DT	eSN	37	17	-	-	+	normal	Conspicuous surface waves,
Aug.13	PX R	eLNZ eLN	21 45 47				1	110 111041	no preliminaries.
	T	eLNE	55.	5					
Aug.14	PX	ePZ	04 57	58		1		normal?	USCGS: 27°N 103°E
		iNZ	58	46					0 = 04:39.5
		eN	05 04	32					
	P6	iE	06	10					
		iE	08	42					
	MW	eL?E ePNE	04 57	10 57	-				
	14.144	ine	05 04			12.5			
		iNE	19	26					
1	R	ePN	04 58	00					
		ine	05 04	34			1		
		ine	19	26					
	SB	eNE	04 58	40		1	1		
	T	iNE eNE	05 04 04 54			1			
	1	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 R T	eN eN eNE		40 35 14			-		
	m	ONE.	05	14		1			

PASADENA and auxiliary stations

D	ate	Sta-		e	-	C. T.	T	Amm		c d	Focal	T		Remark	·ø
Aug	15	P	eZ			5 43	300	III III		u	depth			Tomark	
		MIL	GNE			56					normal	1.7			
		T	eF			18	100		1						
	1	TY	eE			. 30			1			1			
		H	eE			28			1						
Aug.	17	P	iPNE:	7 0	0 55	38		W. 100V							
			17	4 0	8 53				0		normal	S	urface	Waves	recorded
	1	WW	ePNE		58 53					1					rccaraea
		R	ePNE		52		-		1	1		1			
		T	ePNEZ		53				1	1		1			
			eEZ		56					1					
7		H	iPNZ		53					1					
Aug.		PX	iPNS	20			-	-	d	+		+-		-	
		MW	ePNE			46			1	1					
		R SB	eNE			40			1						
		ω σα	eN oNe			45				1					
		E	eNE eE			14						1			
Aug.1			ePZ	15	16	24									
		W	eE	10	70	40						-		1	
	1 1	LJ	eNE	1		32						13 5			
		9	eNL			55									
Augel	9 1	IW	eE	18	13	46	-		-	-	075-76	_	media.	Web Es	
	-		eE		22	55				n	ormal?				And the second
	F		eN		13	58									
	T	J	eNE	1		34									
	1		ePME		14	02									
Aug. 20	P		eNE ePZ	100	24	25									
	R		eE	08	52	24				n	ormal?				
	L		eN			24 09									
	T		ePNE			46			1						
-			eE	09	01	25									
Aug. 20	T		eNE	09	39	17				-	-				
Aug.22	100	6	iZ	11	25	43			1	-					
	TH		eNEZ			37		1							
Aug. 23	P	-	eE iPZ	00		43									
	MM		eNE	08		51		T	c					THE RESERVE	
	R		eE			53 06		1							
	T		eE			54		1			1				
Aug.24	PX		ePNZ	03		24		-	1	200	nmo 7	0			
			eN		50	30			1	101	rmal	Smal	1 surf	ace wav	
	MW		eNE		44	53		1						reco	rded
	R		eN eNE		48 5	51									
	11		eNE			57									
-1-03	LJ		iPN			11									
	T		PNE			55			1						
			E			1		1	1						
8113		6	E		54 2										
	H		PE	4	45 0			1	1						
ug. 24	7)		E	4	19 1	9		1	1						
45.24	P MW			04 1	3 4	3		+	-	-	-	17-11-11			
	R		NE NE		4										
	LJ		NEN		38										
	T		EZ	1	4 09				1						
	H	el		1	4 09				1						
		_		A CHARLES	04				1						

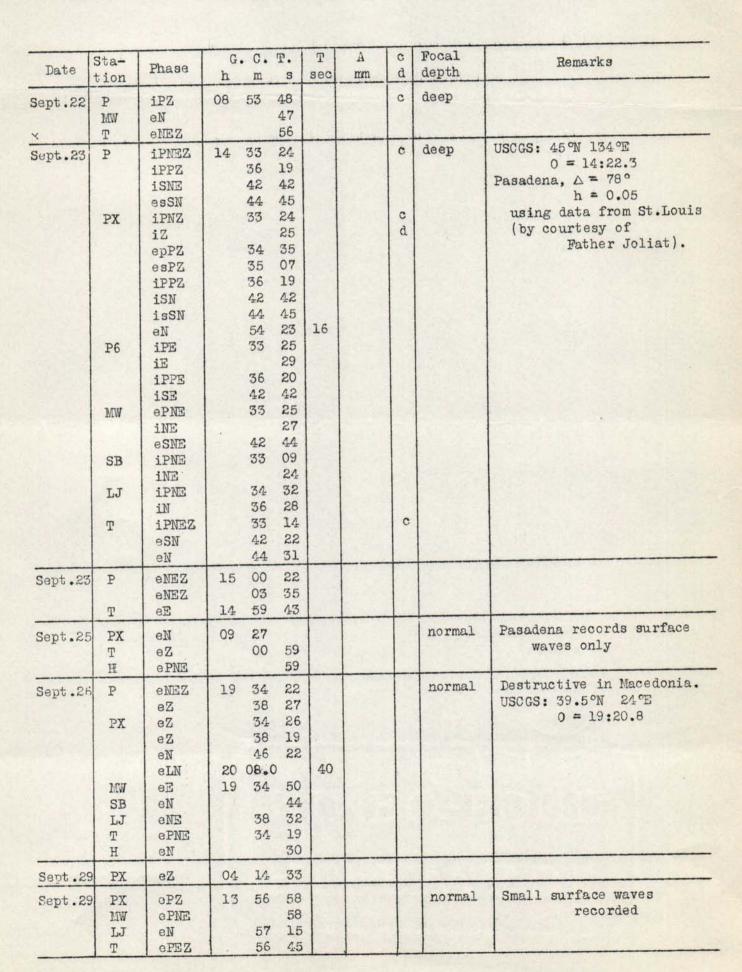


Date	Sta- tion	Phase	G h	. C.	T.	T sec	A mm.	c d	Focal depth	Remarks
ug.24	P	ePNEZ	14	42	32		KI SEE			things and the
	MM	eNE			37					
	T	eN			36					
	H	eE			26					
ug.25	PX	iPNZ	08	09	52				normal	JSA: 18°N 106°W
		eZ		10	14					0 = 08:05:48
		eLNZ		15	18	20				
	MW	ePNE		09	54					
	R	ePNE			46					
	LJ	eN			34			110		
	H	eE		10	16					
		eE		17	18	allone of	e-T-VIV			
ept.1	P	iPNEZ	13	24	16			d	deep	
	MM	ePNE			17					
	R	ePNE			20	1				
	SB	ePNE			09			1 13		
	LJ	ePN			34					
	T	ePNEZ		23	56	The same				
	H	iPEZ	1	24	03				di managana	
Sept.2	P	iPNEZ	13	08	48			c	deep	
	MW	ePNE			49				STATE OF	
	R	eN			51					
	SB	ePNE			42					
	LJ	eNE			57		75			
	T	iPNEZ			43			d		
	1	eSNE	بإشرا	18	49					
	н	iPEZ		10	46			d		
ept.3	PX	iZ	12	10	30			d	deep	
ende.	IA	iZ	12	10	45			d		
		eSN	P F	20	03		H CONTRACTOR			
	200	iPNE		10	31	5				and the second second
	MW			10	33					
	R	e PNE	1		24		Part Tolk			
	SB	ePNE			39					
	LJ	iPNE	2 1		12			d		
	T	iPNEZ	15:24		24	17.15		u	A PROPERTY.	
		iE	23/1	19	46					
	77	eSE	- 3	10	24			d		
	H	iPEZ	A.C.	TO	38		13-4-18	u		
Tomb A	DIF	iZ	15	ON	08			-		
Sept.4	PX	eZ	15	27				c		
	T	iPEZ		26	32			0		
	H	ePEZ	7.0	00	40	-		A	normal?	
Sept.4	PX	iPNZ	19	29	34	7	surface			
		eL(?)Z	20	03	44		surface	wa	1 891	TO BALLING THE RESERVE
	MM	eN	19	29	37			1		Brother State of the State of t
	T	ePNEZ	1		43			d		
	H	ePEZ		10	43				30000	
Sept.5	PX	iPZ	03	19	39				deep?	
	T	ePZ	1		30					
	H	ePE			33					
Sept.5	PX	eNZ	06	33	09	18.				
	MW	eE.	1		13					
	T	eZ			22			-		100 -001
Sept.8	PX	ePNZ	01	45	38			d	normal	$\Delta = 2360 \text{ km.} (21.3^{\circ})$
	1	iPNZ			40			C		0 = 01:40:50
		iZ		47	39					
		iSNZ		49	30					USCGS: 18°N 105°4
		eLZ		51	48	20	100			0 = 01:41.0
	WM	iPNE		45	40				No.	
	R	iPN			34	1	1	1		
	1 222	0 350000				SELECT SELECT	page N	-		



Date	Sta-	Phase		C.		T	A	C	Focal	Remarks
Da10	tion	111000	h	m	S	sec	mm	d	depth	
				_	c	onti	nued fr	com	page No.3	31
Sept.8	SB	iPNE	01	45	54			1	1	
		eNE		48	49			Park I		
	LJ	iPNE		45	25					
	T	iPNEZ		46	04			C	The state of	
		eSE		50	11					
	H	iPNEZ		45	57			C		
		eSE		49	55			1.		
Sept.8	P	eNEZ	05	03	24	-				
	T	ePNEZ			52	710				
	H.	ePEZ			43					
Sept.8	P	iPZ	20	57	31			C	deep	
	T	ePNEZ			36			-		
Sept.9	P	eEZ	13 8						normal	
		eLZ		34	55	25				
	T	eEZ	13	57	37			-		
Sept.13	P	eZ	19	11	28	1000				
	T	eNE	00	40	31			-	normal	$\Delta = 3660 \text{ km } (32.9^{\circ})$
Sept.14	PX	iPZ	08	49	55				HOTMAL	$\Delta = 5660 \text{ km} (52.5)$ 0 = 08:43:23
		iNZ		50	08			1		0 - 00. 20. 50
		iSN		55 59	16	25				USCGS: 61°N 149°W
	300	eLZ		49	58	63			1 1 1 2 2	0 = 08:43.2
	MW	ePNE iNE		50	10					J S A: 60.8°N 145.6°W
		eSNE		55	15					0 = 08:43:29 and
	R	ePE		50	10	- V		1		08:43:41
	n	eSE	798	55	21	8 8				
	SB	ePNE		50	02					
	SD	iN		50	17					
	LJ	ePNE		50	10					
	TIO	iNE		00	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				The fact of	USCGS: 39°S 175°W
		ePR1Z		12	14	-				0 = 13:55.3
	MM	ePE		08	19				H. Mark	7 0 4 0 = 10 - 54 - 55
	R	ePN			18	1				J S A: 0 = 13:54:55
		eN		18	52			1	1 1 1 1	
	LJ	ePNE		08	14			-	-	
	T	eNE			24		100			
	-	eE	-	12	33			-	-	Probably about 41 N 125 W
Sept.16	P	iPEZ	22	10	00			1 4		(Off Eureka, California).
		isez	1	11	42			-	E ANGELINIE	(OII Buicka, Odliloilla).
	MW	ePNE		10	01					
		eSNE		11	46	1				
	SB	iPNE		09	38		181 -	10		
		isne		11	09					
	T	iEZ	00	09	38	-		-	-	
Sept.18	P	iPZ	02	28	17	1 3		1 3		TELEVISION OF THE PARTY OF THE
	MW	oN - DWIN	-	ON	46					
	T	oPNEZ		27	50	1			1	
0	100	ONE	10	30 51	24	-		-	-	
Sept.20	MM	eE oN	12	DI	16		111		1	TEN MANAGEMENT
	LJ	eN			41			1		The product of the little and the said
	T	eNEZ	1		.17			1	1	

From the ISC collection scanned by SISMOS



Date	Sta- tion	Phase	h	. C.	T.	T sec	A mm	c d	Focal depth	Remarks
Sept.29	PX MW LJ SB T	iPNZ eS?NZ eLNZ ePNE eNE eNE ePN ePNEZ	17 18 18 17	57 05 16.1 57 05 57	13 55 17 59 30 05 03				normal	USCGS: 46°N 152°E 0 = 17:46.6
Sept.29	LJ	eN	23	51	22					
Sept.30	P MW T	iPNEZ ePNE iPNEZ	02	02	00 01 12			d	deep	
Sept.30	P MW LJ T	iPNEZ ePNE iPNE iPNEZ	11	06 07	58 58 04 02			d	deep	

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. (1) STREET OF BEAUTY SAN PARTY SAN PROPERTY SAN PROPER PASADENA, CALIFORNIA

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N-S	0.8 sec.	2,800	When measure and Week or a short was a second
E - W	ated and are the		although such complications are of
N — S	6 sec.	da to 800 at a	SPECIAL SYMBO S in 0.0-8.0 g the
E - W			PASABENA SEISMOLOGICA For routine instruments of

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

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galvanometers: (1) T1=0.2 sec. Damping critical. sollar algolometers and in the control of the c

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	T _o	v	h
N — S	0.8 sec.	2,800	0.8-0.9
mia E - W ma Hain	andens, Calife	ORATORY, P	OCICAL LAB

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

Tinemaha Seismologic Station W. down and deller A. W. 8.01 BH = A. W. 8.20 Hz = 4

 $\Phi=37^\circ$ 05.7′ N., $\lambda=118^\circ$ 15.5′ W., h = 1180 m. approx., Basalt.

Haiwee Seismologic Station

 $\Phi=36^{\circ}~08.2'~\mathrm{N.},\,\lambda=117^{\circ}~58.6'~\mathrm{W.},\,h=1100~\mathrm{m.}$ 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
For instruments of different period analogous notation will be employed.	-		- 6
For routine vertical component, galvanometer period 0.2 second			D
For morting vertical component, galvanometer period 0.2 second			P
For routine vertical component, galvanometer period 10 to 14 seconds			
Mount Wilson Seismologic Station Landing and . 198. 2.0 T. (I) : saystemonavlay			MW
Riverside Seismologic Station			R
Santa Bardara Seismologic Station			CR
La sona (Scripps institution Scismologic Station).	700	Acres 6	-
Intelliana Seismologic Station	10.781		T
Haiwee Seismologic Station			Н
varial searnbeen has of various finds and an process of development from time to time.	111919	MITOCHT.	11

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.

PASADENA and auxiliary stations

Date	tion	111200		G. h	C. T.		A mm		Focal depth	
Oct. 1	-	ePNEZ	10	1 3					norma	12
Oct. 1	PX T	ePNZ ePNEZ	To	8 1	7 21 33			1	norma	
Oct. 1		iPNZ	1	5 19		and the same to the same of the		-	- 3	
		eZ		2:				10	deep	
	MI	ePNE		19						
	SB	iPN			42		1000	1		
		eN	18	21				1		
	T	iPNEZ		19				1		
		eSE		29						
Oct. 2	P	ePNEZ	0			The Party of the P				1000
		eZ		08				1	norma.	21 00 11
		eN		12						0 = 02:59.3
		eNE	- 0	16			100	10		J S A: 10.9°N 86.5°W
	PX	ePZ		06						0 = 02:59:07
	1	iPNZ		00				C		
		iN		7.5	23			d	-	
		iN		15						
		eLN		16		- Mary		1 0	198	
		eLZ		20	45	45				
	WIM			19		35				
	TILLY	ePNE		06					1	
		eNE		12				1		
	an	eNE		16						
	SB	ePNE		80		COLUMN TO STATE OF THE STATE OF				
		eNE		17						
	LJ	ePNE	1	06	09	MA CONT		N. I		N TEST DE LA CONTRACTOR
		eNE	77.19	16	31			12.5		
	T	ePNEZ		06	36					
		eN		08	16				TO THE	
		iNEZ		16	48					
Oct. 2	P	ePNEZ	04	09	59				normal	
		eZ		12	21					
	MM	eN		10	00		100			
	SB	eE			12					
	LJ	ePNE		09	48					
	T	ePNEZ		10	14	20				
		eSNE		20	25					
Oct. 4	PX	eZ	03	42	07			-	normal?	
	T	eE			35				TIOT HELL	
Oct. 4	P	iPZ	08	54	06		-		deep?	
	T	ePNEZ			30				doch:	
Oct. 5	T	iPZ	00	29	19				deep?	
Oct. 5	P	iPZ	04	01	55				deep?	
	T	iPEZ		- 100	48		1	c	resp:	
Oct. 6	P	iz	00	37	43		-	d	normal?	
	T	eEZ	1		19			4	TOTHET!	
		eE		38	58					
Oct. 6	P	iPZ	10	07	26	-			deep	
	T	iPEZ		1	35			c	reeb	
Oct. 7	P	ePZ	21	47	38			-	deep?	
	MW	eN	10.4		22	3		C	deeb.	
	T	ePEZ			46					
		eEZ		48	04					
oct. 9	PX	eNZ	00	58	06					
	1	eEZ	00	00	35				normal	Small surface waves recorded
	ale .	0110			221					



Date	Sta- tion	Phase	h	. C.	T.	T	A	G d	Focal depth	Remarks
		- T				500	11111	1	CO POLI	
oct. 9	P	eE	14	52	59					
	MW	eNE			53					
	R	eNE		-	43			-		
oct ,10	P	eZ	09	14	17			-		
ot.10	P	iPZ	14	24	03					
	MM	eE			04			1		
	T	eEZ	3.2		16					
Oct.11	P	ePNEZ	19	11	00				normal	USCGS: 24°N 110°W
	PX	oLN		13.5				1		0 = 19:08.2
	MM	eNE		11	04					
	R	eN		10	57					
	SB	eNE		11	22			1		
	LJ	ePNE		10	42					
	110	eN		13	34					
	m		MAN	11	33					
0-1-5-	T	ePEZ	70							
Oct.15	T	eE	19	46	52					
		eE		56	20			-		HOOGO FAON 3 FOOM
Oct.16	P	ePNEZ	12	14	59			1	normal	USCGS: 54°N 158°W
		iNZ		15	10					0 = 12:08.1
		eSNEZ		20	35	SUB		1	100	J S A: 55°N 155°W
		eLNEZ		24	33	23				0 = 12:08:27 and
	MW	eFNE	15 1	14	59		1	100		12:08:35
		eSE		20	36		1	10		
	R	ePNE		15	02		1		N BOLL	
	1.	eSE		20	42					
	SB	ePNE	-	14	49					
	LJ	ePNE		15	12	-				
	Tro.				58					
		eSNE	100	20						
	T	ePEZ	12	14	42	1	13.0			
		eSE		19	05			-		
Oct.16	P	iZ	15	10	35					
	T	eE		11	47					
et.17	P	iZ	09	23	46			1	deep?	
	MW	eNE	MEN		49					
	T	eEZ			49					
Oct.17	P	iPNEZ	13	38	25					
	MW	eNE		223	27					
	R	eN			31	1				
Oct.19	P	iPNEZ	08	01	38	-	+	C	deep	
			11	06	06	-	-	6	deep	
Oct.19	P	iPZ	TT	00			-	0	doop	
-1-65	MW	eNE	7.70	40	10	-	-	-		
ot.20	P	eNEZ	17	49	10			1		
	1	iZ			28	1	1	1		
	MW	eE			30		1			
	R	eN			29				11111111	
	LJ	eNE	1		25		A STATE OF THE PARTY OF THE PAR	1		
	T	eEZ			. 22		1			
	1	eE			39				1 1 1	MATERIA SHIP SHIP SHIP SHIP SHIP
Oct .23	T	eEZ	22	41	21		1			
ct.24	P	eNEZ	12	10	43	1	-	1		
TO . LOT	T	eEZ	1	11	08	1	1			
	1	eE	1	17	52	180				
Oct.24	P	iZ	19	45	19		-	-	-	
UC 11 . 24	1		13	40						
	T	eZ	7 00	7.0	27		-			
Oct.25	PX	ePWZ	17	12	52	1				
		eZ		14	21	1			1.18	
	R	eN	1 3		07	1		1	1 76	
	T	eEZ	1	12	40		-			
	1	eEZ	1	14	09	1-30		1	1 11 32	

PASADENA and auxiliary stations

1990

Date	Sta- tion	Phase	1	G. (n T		A	c d		Remarks
Oct.26	PX	eZ	0:		-		11111		depon	
	T	eEZ		21						
Oct.26	P	eEZ	03					-		
	T	eEZ	1		01				1 7 5 7	
Oct.26	P	ePNEZ	06	3 44				-		
	MM	eNE	100	, 44	15		1			
	T	iPEZ				The second second		1		
Oct.26	P	eNEZ	09	1.0	25					
	MW	eE	05	46						
	T	eEZ			30					
Oct.26	T	iPEZ	100	45						
Oct.27	P		23		Salar Sa	-				
000.27	MW	PNEZ	10	05						
		eNE			18					
	LJ	eME	1		09			1		
Oct.28	T	ePEZ			38			1		
Oct.29	T	eEZ	10	09	06					
106.29	P	iPNEZ	03	41	07		-	C	normal	USCGS: 19 °N 105 °W
		iZ			36					0 = 03:36.3
	P6	eE	1	44	05	1		1		0 - 03:30.3
		iS			41					
1		eL		47	07	20				
	MW	eNE		41	07					
	R	eNE	3		00	1			Marie La	
	T	ePEZ			33					
ct.29	P	eNZ	11	27	13	-	-	-	NO. 22	
		eZ		100	27				normal	
ct.29	P	eZ	14	25	27					
	T	eEZ		~~	36					
ct.30	PX	iPZ	20	53	54			1		
		eZ	~0	55	08			d	normal	USCGS: 54°N 156°W
		iSZ		59	-		1			0 = 20:47.3
		eLZ	27		29	07	1 27			J S A: 54°N 155°W
	IMW	ePNE	21	03	34	27				0 = 20:47:05
	1111		20	53	54					
	R	eSNE		59	33					
	11	eNE		54	06				TEN STATE	
	CD	eNE		59	40		-	1		
	SB	eNE		54	07				116 3 3 7	
		eE		59	05					
	T	ePEZ		53	37					
		eSE		59	00					
t.30	P	eZ	22	40	58			-		
	WIM	eE		41	00					
	T	ePEZ		40	47		26		100	

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

SEISMOLOGICAL LABORATORY

CARNEGIE INSTITUTION OF WASHINGTON CALIFORNIA INSTITUTE OF TECHNOLOGY

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 coöperathe Carnegie Institution of Washington and the California Institute of Technology as a cooperative 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

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. If moor and we get our and again to

PASADENA SEISMOLOGICAL LABORATORY Central Station

 $\Phi=34^\circ$ 08.9′ N., $\lambda=118^\circ$ 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);

the usual interna- scrase is adopted.		hqualeer the ne	desp-forus ear- sion and dilata	r the phases of
l be used without sen P. P., and P.,	N-S	0.8 sec.	2,800	0.8-0.9
, g. coo. , coo.	E — W	ated and are th	ten elenaly indic	io one acolimito
race.	N — S	bala 6 sec.	800	0.8-0.9
	E — W	" YHC	L. I.A. PORAT	SETSMQL/OGIC

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

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

galvanometers: (1) T1=0.2 sec. Damping critical, mildle appolometer mould be mould be a sec.

(2) T₁=10 to 14 sec. Damping critical. The significant of the state of the state

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. The old in the distribution of the many addition and a street response to the st

Y = OTA = 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);

	To	v	h
N — S	0.8 sec.	2,800	0.8-0.9
mintE W	assdena, Califo	ORATORY, P	OCICAL LAB

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

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

galvanometer: T1=0.2 sec. Damping critical.

The Station Constants follow. Will ent to rewort bus usual to the station of the district of the rest of the rest of the station of the stati

Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station

 $\Phi=34^\circ~13.5'~\mathrm{N.}$, $\lambda=118^\circ~03.4'~\mathrm{W.}$, $h=1742\mathrm{m.}$, Weathered granite.

Riverside Seismologic Station

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

Santa Barbara Seismologic Station

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

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

Tinemaha Seismologic Station Wallerd Land 602 and W. S.O. Pet A. M. P. SO 183 and 183

 $\Phi=37^\circ~05.7'~\mathrm{N.},\,\lambda=118^\circ~15.5'~\mathrm{W.},\,h=1180~\mathrm{m.\,approx.},\,\mathrm{Basalt.}$

eters with mag

Haiwee Seismologic Station

 $\Phi=36^{\circ}$ 08.2' N., $\lambda=117^{\circ}$ 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 P, P*, and P, although such complications are often clearly indicated and are the subject of study.

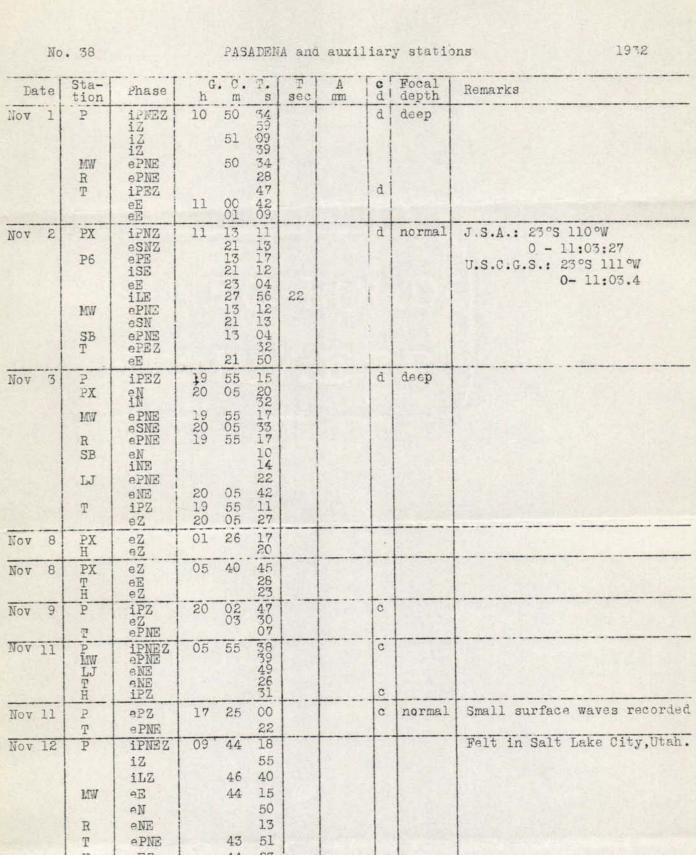
AMPLITUDES, (half-ranges), are measured in millimeters of the seismographic trace.

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

PASADENA SEISMOLOGICAL LABORATORY

For routine instruments of period 0.8 second			P
For routine instruments of period 6 seconds			. D
For instruments of different period analogous notation will be employed.			· 16
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 Legistre Balance T. 198. 20 . T. (1)			7/11/7
Riverside Seismologic Station Jackson and Control of All of Or T. (S			TAT AA
Santa Barbara Seismologic Station			. K
La Jolla (Scripps Institution Seismologic Station).	100	SHIT	. SB
Tinemaha Seismologic Station	10.1	ALL S	LJ.
Tinemaha Seismologic Station	B. St) H	T
and the beautiful beautiful in and some his ten abide a tolerant his advantage beautiful	11000	cov i	. 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.



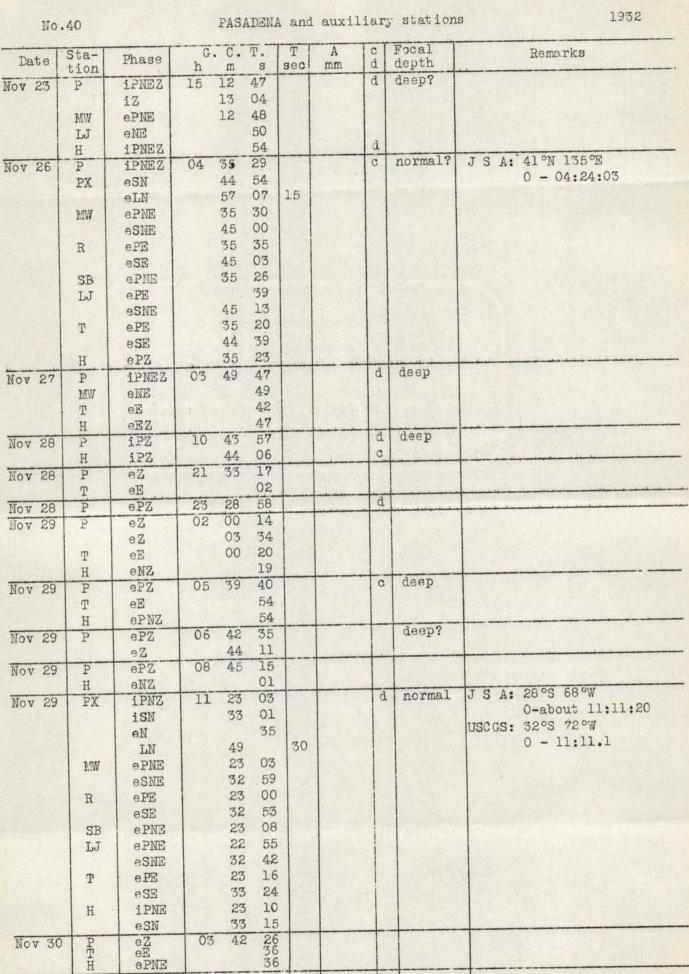
al From the ISC collection scanned by SISMOS

eEZ H 44 23 Nov 12 P aPNEZ 13 41 42 normal eLZ 50 43 41 32 LJ eNE 46 14 eE ePNE 42 02 T 51 eNE 14 eNE 54 13 H ePZ 41 53 09 51 AZ



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

ral From the ISC collection scanned by SISMOS



16

04

P

Nov 30

eZ

		Sta-	TN	1	. C.	T.	T	A	70	Focal	
3(1	te	tion	Phase	h	m	s	sec	mm	d	depth	Remarks
Dec	1	P	iPNEZ	00	55	20			С	deep	
		MIN	ePNE			21					
		T	iPE	1		08					
		H	ePN			13					
Dec	3	P	eNEZ	06	31	10	VA TO			normal	Small surface waves recorded
		MW	eE			13					
		T	ePNEZ			22					
		H	eNE			21					
Dec	3	P	iPNEZ	08	45	56			C	deep?	
		MM	eNE			57					
		T	iPNEZ			42			C		
			iZ			47			1		
			iZ	Ton	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	△ - 114°
			ePZ	7.5		07					Strassbourg gives:02°N 122°E
		-	iP'NEZ		29	54					(according to Zürich)
			iZ		30	17					
			iZ		31	00					
			eZ		33	30					
			iZ	10/18	40	44					
	94	PX	eLNZ		58	30	30				
		MM	eNE		30	03					
		R	eNE			12				Bertal	
		SB	eE		29	47			1		
			eE		30	58					
	- 4	77	eE		40	55					
		LJ	eNE		29	54			-		
	6		eNE		40	39					
		T	eNEZ		29	52			18		
			eNEZ		40						
Dec	4	P	iPZ	10	51	39					
			iZ			58					
		T	eZ		52	32					
Dec	4	P	iPZ	11	02	27			C	deep?	
			eZ			45				100	
-		T	eZ			33					
Dec	5	P	iPNEZ	00	31	03			C	deep?	
	4/1	LJ	ePE			0.7			1		
		T	iPNEZ		30	57			-		
Dec	6	P	iPZ	22	52	30			d		
		MM	eNE			29					
		T	iPNEZ			18	1			-	
70		Н	eNE	-		23					
Dec	6	Ρ.	ePZ	03	34	42			C		
7		T	iPNEZ			56					
Dec	6	P	iPZ	11	07	38			d		TO PERSONAL PROPERTY.
	-	LJ	eNE			19			1		
	1	T	ePNEZ			58					
7	-	H	eNE			54			-		2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -
Dec	7	P	ePNEZ	09	05	49			d	normal	Small surface waves recorded
		MW	eNE			49	1		1		
		R LJ	ene			43 27 21 11				THE PERSON	
		H	eNE eNE ePNEZ ePE		06	21					

SEISMOLOGICAL LABORATORY

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The constants of these stations follow.

PASADENA SEISMOLOGICAL LABORATORY Central Station

PASADENA

 $\Phi=34^{\circ}~08.9'~\mathrm{N.}$, $\lambda=118^{\circ}~10.3'~\mathrm{W.}$, $h=295~\mathrm{m.}$, 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);

the usual interna- scrase is adopted.	Lation of E. J.	houseparthe no	dep-forus enr	r the phases of as for d ompress
be used without on P. P. and P.	N — S	0.8 sec.	2,800	0.8-0.9
YV	E — W	ated and are th	en clearly andic	olications are of
1800s	N-S	6 sec.	800	0.8-0.9
eq	E — W	" YH	L LARORAT	SEISMOLOGICA

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

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

galvanometers: (1) Ti=0.2 sec. Damping critical. not all signification and significant and sig

(2) T₁=10 to 14 sec. Damping critical miles argulomais? aliansvill

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, motor in records of the other stations will be given only to supplement the interpretation records.

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	olife" emshere	y works	OSA I "ADID		

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

inertia-mass 100 kg. T₀=0.5 sec. Damping critical or slightly less;

galvanometer: T_i =0.2 sec. Damping critical.

The Station Constants follow.

Coördinates are geodetic positions referred to the North American Datum.

Mount Wilson Seismologic Station Manual stollar deab-bas-tob bebroser driv tellaring viscola

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

Riverside Seismologic Station

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

Santa Barbara Seismologic Station

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

La Jolla (Scripps Institution Seismologic Station) $\Phi=32^\circ~51.8'~\mathrm{N.},~\lambda=117^\circ~15.2'~\mathrm{W.},~h=7.7~\mathrm{m.}$ approx., Consolidated detrital material. Tinemaha Seismologic Station Wassell and Seismologic Station W

 $\Phi = 37^{\circ}~05.7'~{
m N.}, \lambda = 118^{\circ}~15.5'~{
m W.}, h = 1180~{
m m.}$ approx., Basalt.

Haiwee Seismologic Station

 $\Phi=36^{\circ}~08.2'~\mathrm{N.},\,\lambda=117^{\circ}~58.6'~\mathrm{W.},\,h=1100~\mathrm{m.}$ 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 P, P*, and P, 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 coordinated group are as follows:

SEISMOLOGICAL LABORATORY PASADENA

	For routine instruments of period 0.8 second
	For routine instruments of period 6 seconds
-bros	For instruments of different period analogous notation will be employed
	For routine vertical component, galvanometer period 0.2 second
	For routine vertical component, galvanometer period 10 to 14 seconds PX
Moun	at Wilson Seismologic Station Lobbin and Manager
River	rside Seismologic Station Institute an agranti and Mr. of OI T. (S.)
Santa	Barbara Seismologie Station
La To	a Barbara Seismologic Station
AJILE O'C	Title (Scripps mattendin Scismologic Station).
THICE	mana beismologic station
Haiw	ree Seismologic Station
	A CONTROL OF THE PROPERTY OF T

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.

D	ate	Sta- tion	Phase	h	G. C	. T.	ISA	- 1	A mm	Cd	Focal dapth		Remarks
Dec	7	P P6 MW R	iPNEZ iNEZ iSNZ iSE iLE ePNE eSNE ePNE	16	26 30 31 26 30 26	42 47 42 36 40 43 38 37	24			CC	normal	USCGS:	18°N 103.5°W 0 - 16:22.1 18°N 103.5°W 0 - 16:22:12
		SB LJ T	eE eSN ePNE eNE iPNE eE eN iPNEZ iSN		30 26 30 26 29 30 27 31	25 29 54 59 27 57 17 07 17 24				c			
Dec	8	H PX	ePE eSE eNZ	12	26 31 31	54 03 06							
		T	iPZ	-	-	20							
Dec	8	P	eZ eZ	15	28	05 57							
Dec	9	P	iPNEZ iZ iNE iNE eN	08	45 54 55 45	33 43 07 11 36					deep	100	14°S 74°W 0 - 08:34:57 20.2°S 73.5°W
7		LJ T	eNEZ eNEZ	00		36 39							
Dec	9	P	eEZ eNEZ	09	26	47 13							
Dec	WIROW.	P	iPNZ	04	44	10					deep?		
Dec	14	P MW T	iPEZ eNE eNEZ	06	41	19 21 07				C	deep		
Dec		P	eZ	19	50	54					normal?		
Dec	16	P	ePZ eZ	07	44	15 15							
Dec	16	P	iPZ	11	21	24		-			deep?		
Dec	18	P MW LJ T H	iPNEZ eNE ePN iPNEZ eNE	06	31 32 31 32	59 00 40 25 15				c d	deep?		
Dec	18	P	iPNZ	07	42	07		1	100	-	deep?		
Dec	18	P T	iPNZ iPZ	07	58	11 51 39				c	deep?		
Dec	18	PT	iPNZ eZ	08	23	30 39					deep?		
Dec	19	P P6	iPNEZ iPcPZ iLE	06	35 38 45	03 01 16	25	S	cons	c	normal		12.5°N 93°W 0 - 06:28:31
		MW R LJ T H	eNE eN eNE iPNEZ ePNE		35 34 35	03 52 52 19 13		TOWN COLO		c		JSA:	0 - 06:28:39 and 06:29:01

Date	Sta- tion	Phase	h	. C	. T.	T	A mm	c d	Focal depth	Remarks
Dec 20	P PX MW R LJ T	iPNEZ iSN eLN ePNE eN eN eNE	02	43 47 50 43 44 43	27 43 40 34 21 04	12			normal	
Dec 21	P MW R SB LJ T H	iPNEZ iPNE iPN iPNE iPNE iPNE iPNE	06	10	15.8 15.2 17.6 15.1 34.2 35.1 48.0	: : :	station over a imum ea in E o	wide with composite	9°53'N., e area,a amplitu onent),p	USCGS: 38.7°N 117.8°W 0 - 06:10:15 J S A: 38.1°N 118.5°W 0 - 06:10:08 ination of epicenter at this 117°50'W.,0 - 06:10:04.Felt bout 600 km. in radius. Max- de at Pasadena, about 3+ cm. eriod,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 Lec. 26, 05:03 G.C.T.

	-	Truct J								
Dec 24	P6	iLE	07		32	35	T	T	normal	
Dec 24	P	iPNEZ	23	31	39		100	C	deep?	
	T	iZ			44					
Dec 25	PX R T H	iPNZ iPR1Z iZ iPSNZ iNZ iSR1N iLN ePNE eNE eNE ePNEZ	02	18 22 31 32 37 53 18 30 18	23 28	68		c	normal	USCGS: 38°N 96.5°E 0 - 02:04:33 J S A: 35°N 98°E 0 - 02:04:21 Very destructive in Kansu, China.
Dec 26	P	iPNEZ	21	27	46	-		C	deep	
	T	eZ iPNEZ iZ		31 27 31	30 40 23				usop	
Dec 26	P MW T	iPNEZ ePNE iPNEZ	22	43	09 10 05			c	deep	
Dec 30	P T	iPNEZ iPNEZ	18	54	01			c	deep	
Dec 31	PX P6 R	eP'Z eLE eP'NE iP'NEZ	06 07 06	50 48 50	55 52 57			u -		African shock.

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