The International Seismological Summary.

1949 October, November, December.

INTERNATIONAL GEODETIC AND GEOPHYSICAL UNION.
ASSOCIATION OF SEISMOLOGY.
FORMERLY THE BULLETIN OF
THE BRITISH ASSOCIATION SEISMOLOGY COMMITTEE.

The Director of the I.S.S. wishes to express his thanks to U.N.E.S.C.O. and H.M. Treasury for financial support, which has covered the cost and preparation of this volume.

The last quarter of 1949 contains 171 epicentres, 117 of which are repetitions from previous determinations.

Cases of abnormal focal depth are noted below :—

Oct.	1d. 7h.	Undetermined shock		Suggested deep.
	1d. 16h.	33°9N.	139·6E.	0·020
	3d. 9h.	56·0S.	27·0W.	0·010
	11d. 9h.	42·8N.	144·0E.	0·020
	19d. 21h.	6·5S.	153·2E.	Base of Superficial Layers.
	20d. 12h.	5·1S.	153·5E.	0·010
	21d. 21h.	5·6S.	153·6E.	Base of Superficial Layers.
	25d. 13h.	36·4N.	140·6E.	0·010
	28d. 18h.	20·5S.	179·0W.	0·060
	31d. 17h.	5·6S.	153·6E.	0·010
Nov.	1d. 7h.	5·6S.	153·6E.	0·010
	2d. 2h.	18·0N.	69·5W.	0·020
	3d. 1h.	48·6N.	153·5E.	0·020
	7d. 5h.	14·0S.	167·0E.	0·010
	13d. 0h.	38·2N.	142·0E.	0·010
	13d. 4h.	10·4N.	85·7W.	Suggested Deep.
	14d. 13h.	38·8N.	144·3E.	0·005
	17d. 22h.	32·0N.	137·0E.	0·060
	18d. 7h.	14·0S.	167·0E.	0·010
	19d. 7h.	Undetermined shock		Suggested Deep.
	22d. 0h.	29·3S.	178·2W.	0·025
	25d. 5h.	18·5S.	178·0W.	0·060
	26d. 1h.	18·5S.	178·0W.	0·080
	27d. 8h.	18·0S.	173·0W.	Suggested Deep.

Dec.	3d.	12h.	17·7S.	69·2W.	0·020
	5d.	14h.	40·2N.	142·2E.	0·010
	7d.	18h.	38·4S.	176·5E.	0·020
	18d.	5h.	34·7S.	179·7E.	0·025
	20d.	4h.	22·3S.	179·2W.	0·090
	21d.	12h.	18·5N.	67·0W.	0·010
	21d.	19h.	19·3S.	63·8W.	0·090
	22d.	9h.	15·9N.	93·0W	0·005
	22d.	21h.	32·5S.	69·5W.	0·010
	25d.	21h.	36·2N.	139·9E.	0·005
	25d.	23h. (17m.)	36·7N.	139·7E.	Base of Superficial Layers.
	25d.	23h. (24m.)	36·7N.	139·7E.	Base of Superficial Layers.
	26d.	3h.	45·7N.	26·8E.	0·015
	27d.	8h.	36·7N.	139·7E.	Base of Superficial Layers.
	29d.	16h.	27·0S.	177·0W.	0·020
	29d.	22h.	5·7S.	112·0E.	0·090
	30d.	8h.	35·8N.	140·8E.	0·005

Thanks are also due to the Director of the Meteorological Office and the Superintendent of Kew Observatory for hospitality extended to the staff and assistance with administration.

KEW OBSERVATORY,
Richmond,
SURREY.

July, 1957.

1949 OCTOBER, NOVEMBER, DECEMBER.

Oct. 1d. 7h. Undetermined shock. Western Pacific. Deep focus.

Nagoya eP =5m.18s.
Tokyo e =6m.21s. and 8m.48s., iEN =8m.59s.
Sendai e =6m.52s.
Apia ePEN =13m.49s., eN =19m.6s., eE =31m.0s., eEN =31m.30s. and 43m.24s.
Victoria eZ =14m.32s.
Shasta Dam iP =14m.49s., ipP =15m.36s., iPP =17m.50s.
Mineral iPZ =14m.53s.k, iZ =14m.57s., ipPZ =15m.39s.
Lick iPZ =14m.59s.k, iZ =15m.3s., ipPZ =15m.45s.
Hungry Horse iP =15m.5s., ipP =15m.51s., ePP =18m.9s., eS =24m.59s.
College e =15m.7s.
Tinemaha iPEZ =15m.12s., ipPZ =15m.59s.
China Lake iPZ =15m.17s., ipPZ =16m.3s.
Mount Wilson iPZ =15m.18s., epPZ =16m.2s.
Palomar iPZ =15m.22s., ipPZ =16m.10s., iZ =16m.33s.
Boulder City eP =15m.28s., epP =16m.14s.
Overton iPZ =15m.28s., epPZ =16m.14s.
Pierce Ferry iP =15m.31s., ipP =16m.18s.
Tucson eP =15m.49s., epP =16m.36s.
Long waves were also recorded at Auckland, Christchurch, and Wellington.

Oct. 1d. 16h. 18m. 30s. Epicentre 33°·9N. 139°·6E. Depth of focus 0·020.
(as on 1949, March 17d.).

Intensity IV at Tokyo. Epicentre 34°·1N. 139°·7E.; depth 150km. Macroseismic radius 200-300km.
Seismo. Bull. Cent. Met. Obs., Japan, for 1949, Tokyo, 1950, p. 34.

$A = -\cdot6334$, $B = +\cdot5391$, $C = +\cdot5552$; $\delta = +7$; $h = +1$;
$D = +\cdot648$, $E = +\cdot762$; $G = -\cdot423$, $H = +\cdot360$, $K = -\cdot832$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Osima		0·9	348	0 26k	+ 1	0 44	− 1	—	—
Mera		1·0	11	0 26	0	0 46	0	—	—
Misima		1·3	336	0 30k	+ 1	0 53	+ 2	—	—
Omaesaki		1·3	301	0 30	+ 1	0 52	+ 1	—	—
Shizuoka		1·4	317	0 30	0	0 56	+ 4	—	—
Yokohama		1·5	1	0 34	+ 3	0 56	+ 2	—	—
Hunatu		1·7	336	0 32k	− 1	0 58	0	—	—
Tokyo		1·8	4	0 34a	0	1 0	0	—	—
Kumagaya		2·2	355	0 40	+ 2	1 9	+ 1	—	—
Tukubasan		2·3	10	0 38	− 2	1 8	− 2	—	—
Kakioka		2·4	12	0 41	0	1 10	− 2	—	—
Maebasi		2·5	350	0 45	+ 3	1 13	− 1	—	—
Nagoya		2·5	300	0 43	+ 1	1 20	+ 6	—	—
Mito		2·6	16	0 41	− 2	1 13	− 4	—	—
Gihu		2·8	303	0 45	− 1	1 22	+ 1	—	—
Kameyama		2·8	290	0 45	− 1	1 22	+ 1	—	—
Owase		2·8	273	0 46	0	1 21	0	—	—
Matusiro		2·9	337	0 46	− 1	1 22	− 1	—	—
Nagano		3·0	339	0 50	+ 1	1 26	0	—	—
Hikone		3·1	298	0 50k	0	—	—	—	—
Siomisaki		3·2	262	0 50	− 1	—	—	—	—
Toyama		3·4	326	0 58	+ 4	1 47	+12	—	—
Kobe		3·7	284	0 58	+ 1	1 44	+ 2	—	—
Hukusima		3·9	10	0 59	− 1	1 43	− 3	—	—
Sumoto		3·9	277	1 1	+ 1	1 47	+ 1	—	—
Aikawa		4·2	345	1 3	− 1	—	—	—	—
Sendai		4·5	12	1 5	− 3	1 56	− 4	—	—
Mizusawa	E.	5·4	12	e 1 18	− 2	2 16	− 5	—	—
Morioka		5·9	11	1 26	0	2 30	− 3	—	—
Miyako		6·0	17	1 28	0	2 31	− 5	—	—
Hungry Horse		75·1	42	i 11 25	− 1	—	—	e 11 59	pP
Pierce Ferry		82·2	52	e 12 5	+ 1	—	—	—	—

Oct. 1d. 18h. 0m. 43s. Epicentre 8°·0S. 32°·0E.

A = +·8399, B = +·5248, C = −·1383; $\delta = -3$; $h = +7$;
D = +·530, E = −·848; G = −·117, H = −·073, K = −·990.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pretoria	Z.	18·0	191	i 4 11	− 2	i 7 26	− 6	i 4 27	PP	e 9·3
Johannesburg		18·5	191	e 4 23	+ 4	i 7 53	+ 9	i 8 8	SS	e 9·5
Tananarive		18·6	128	e 4 23	+ 2	e 8 13	+27	e 8 20	SS	10·6
Grahamstown	Z.	25·7	191	i 5 37	+ 4	i 10 15	+24	i 6 33	PP	e 13·6
Helwan	Z.	37·7	359	7 17	− 2	—	—	—	—	—
Tamanrasset	Z.	40·1	320	e 7 39	0	—	—	e 9 14	PP	19·9
Ksara		41·8	4	i 7 54k	+ 1	14 33	+22	—	—	—
Bombay	E.	48·3	56	e 8 5	−40	—	—	—	—	—
Istanbul		48·9	357	e 8 56	+ 6	—	—	—	—	e 34·1
Tiflis		50·8	12	9 5	+ 1	e 16 21	+ 1	—	—	—
Algiers Univ.	Z.	52·2	331	i 9 10	− 5	—	—	—	—	e 27·8
Rome		52·8	342	—	—	e 16 42	− 5	—	—	—
Granada		56·0	326	i 9 43k	0	—	—	—	—	29·9
Samarkand		57·4	32	e 9 52	− 1	—	—	—	—	—
Stalinabad		57·6	34	i 9 55	+ 1	i 17 55	+ 4	—	—	—
Obi-garm		58·0	34	e 9 57	0	—	—	—	—	—
Toledo	Z.	58·1	327	i 9 58	0	e 15 39	?	—	—	—
Zürich		58·9	341	e 10 1k	− 2	—	—	—	—	—
Basle		59·4	341	e 10 5k	− 1	—	—	—	—	—
Clermont-Ferrand		59·4	337	i 10 8	+ 2	—	—	—	—	30·3
Besançon		59·7	340	e 10 9	0	—	—	e 10 23	?	—
Tashkent		59·8	32	i 10 9	0	e 18 22	+ 2	—	—	—
Stuttgart		60·0	343	e 10 9k	− 2	—	—	e 34 17?	Q	36·3
Strasbourg		60·3	342	i 10 12	− 1	—	—	—	—	—
Tchimkent		60·7	31	i 10 14	− 1	—	—	—	—	—
Jena	N.	61·3	345	e 10 18	− 2	—	—	—	—	—
Paris		62·2	338	i 10 26	0	—	—	—	—	e 32·3
De Bilt		64·1	342	e 10 35	− 3	—	—	—	—	e 34·3
Kew		65·4	339	e 10 45	− 2	e 19 31	+ 1	—	—	e 32·3
Sverdlovsk		68·8	16	11 6	− 2	—	—	—	—	—
Semipalatinsk		71·6	30	i 11 23	− 2	—	—	—	—	—
La Paz		97·4	252	e 13 34	− 3	i 24 33	(− 3)	i 17 28	PP	44·8
Hungry Horse		130·6	331	e 19 15	[+ 2]	—	—	—	—	—
Tucson		137·9	310	e 19 30	[+ 3]	—	—	—	—	—
Pierce Ferry		138·2	317	e 19 33	[+ 6]	—	—	—	—	—
Overton	Z.	138·3	318	e 19 32	[+ 5]	—	—	—	—	—
Shasta Dam		140·2	329	e 19 33	[+ 2]	—	—	—	—	—
China Lake	Z.	140·8	320	e 19 34	[+ 2]	—	—	—	—	—
Riverside	Z.	141·7	317	e 19 36	[+ 3]	—	—	—	—	—
Pasadena	Z.	142·2	317	e 19 34	[0]	—	—	—	—	—

Additional readings :—
Pretoria iSSZ = 7m.41s., i = 8m.57s.
Johannesburg e = 7m.35s.
Grahamstown iSSZ = 11m.15s.
Tamanrasset iZ = 7m.53s., ePPPZ = 9m.35s., eP_cPZ = 9m.44s.
Zürich e = 10m.39s.
Basle e = 10m.20s.
Stuttgart eZ = 10m.21s.
Strasbourg e = 10m.22s.
Jena eEN = 10m.29s.
Paris i = 10m.36s.
La Paz iP?Z = 12m.23s., iPPE = 17m.58s., iPS = 26m.20s., SS = 31m.30s.
Hungry Horse i = 19m.27s. and 19m.56s.
Long waves were also recorded at Huancayo, Bogota, Seven Falls, Philadelphia, and other European stations.

Oct. 1d. Readings also at 1h. (Almata, Irkutsk, Obi-garm, Samarkand, Stalinabad (2), Sverdlovsk, and near San Francisco), 2h. (Collmberg, Jena, Paris, Strasbourg, Stuttgart, Ottawa, and near Bogota), 3h. (Mount Wilson, Palomar, China Lake, Tinemaha, Tucson (2), Boulder City (2), Overton (2), Pierce Ferry (2), Lick, Mineral, Shasta Dam, and near Apia), 4h. (near Mizusawa), 5h. (near Basle, Neuchatel, Zürich, and near Antofagasta), 7h. (Mount Wilson, Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, College, and near Rome), 8h. (Collmberg), 9h. (near Stalinabad), 10h. (Frunse, near Andijan, Obi-garm, and Tchimkent), 11h. (Leninakan and near Tiflis), 12h. (near Frunse), 13h. (Victoria and near Copiapo), 14h. (near Istanbul, Sofia, and near Frunse), 17h. (Palomar, Pasadena, China Lake, Pierce Ferry, Tucson, Overton, Shasta Dam, and near Alicante), 18h. (Algiers Univ., Almeria, Tamanrasset, Helwan, Andijan, Tashkent, Tchimkent, near Obi-garm, Samarkand, and Stalinabad), 19h. (Stuttgart, Grahamstown, Pretoria, near Andijan, Obi-garm, Samarkand, Stalinabad, and Tchimkent), 21h. (near Apia), 22h. (Tucson, Pierce Ferry, Victoria, and Rapid City), 23h. (College).

Oct. 2d. 2h. Atlantic median crest.

Fort de France eP =32m.18s., eS? =34m.18s.
La Paz eP?Z =36m.43s.
Paris iP =38m.47s.
Stuttgart ePZ =39m.14s.
Tucson iP =39m.23s., i =39m.33s.
Collmberg eZ =39m.36s.
Pierce Ferry iP =39m.44s.
Hungry Horse iP =39m.46s.
Boulder City iP =39m.47s.
Overton ePZ =39m.47s.
Palomar iPZ =39m.58s., iZ =40m.5s.
Mount Wilson ePZ =40m.3s.
Tinemaha iPZ =40m.5s.
Mineral iPZ =40m.20s.k.
Lick iPZ =40m.22s.k.
Shasta Dam iP =40m.22s., i =40m.29s., eiPP? =42m.34s.
Victoria eZ =40m.27s.
Long waves were recorded at San Juan.

Oct. 2d. 11h. 52m. 12s. **Epicentre** 49°·0N. 8°·3E. (as on 1948, June 19d.).

Intensity IV-V at Karlsruhe.
Epicentre 49°·0N. 8°·4E. (Strasbourg).
Seismischer Bericht des Württembergischen Erdbebendienstes, Stuttgart, 4 Vierteljahr, 1949, p. 37.

$A = +\cdot6517$, $B = +\cdot0951$, $C = +\cdot7525$; $\delta = +1$; $h = -5$;
$D = +\cdot144$, $E = -\cdot990$; $G = +\cdot745$, $H = +\cdot109$, $K = -\cdot659$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Karlsruhe	0·1	—	i 0 2	P_g	e 0 8	S*	—	—	—
Strasbourg	0·5	220	i 0 11	P*	i 0 16	S_g	i 0 20	S*	—
Stuttgart	0·6	109	e 0 11 a	P_g	e 0 19	S_g	i 0 22	S*	—
Ebingen	0·9	150	e 0 18	P_g	e 0 32	S_g	—	—	—
Basle	1·5	198	e 0 29 a	P_g	e 0 50	S_g	—	—	—
Ravensburg	1·5	145	—	—	e 0 48	S*	—	—	—
Zürich	1·6	173	e 0 28	− 2	e 0 52	S_g	e 0 31	P_g	—
Neuchâtel	2·2	204	e 0 42	P_g	i 1 10	S*	—	—	—
Besançon	2·3	221	—	—	i 1 20	S_g	—	—	—
Collmberg	3·8	51	e 1 4	+ 3	e 1 57	S*	e 1 11	P*	—
Clermont-Ferrand	4·8	229	—	—	e 2 28	S*	—	—	i 2·7

Additional readings :—
Stuttgart eP_g =14s., i =20s.
Collmberg eE =2m.0s., eS_gZ =2m.2s.

Oct. 2d. 13h. Indonesian region.

Batavia iPZ = 50m.3s. a, iS = 50m.37s.
Andijan eP = 59m.14s., eS = 67m.18s.
Stalinabad eP = 59m.17s., eS = 67m.18s.
Samarkand eP = 59m.26s.
Tchimkent eP = 59m.31s.
Semipalatinsk eP = 59m.45s.
Sverdlovsk P = 61m.0s., S = 70m.43s.
Istanbul e = 62m.8s. and 62m.38s.
Bombay eEN = 64m.
Irkutsk eS = 67m.34s.
Hungry Horse eP(= PKP) = 68m.23s., i = 68m.34s.
Long waves were recorded at Ksara.

Oct. 2d. Readings also at 0h. (Copiapo), 3h. (Athens, Belgrade, Zagreb, Rome, Istanbul, Stuttgart, Kew, near Taranto, Hungry Horse, Messina, Copiapo, and near Antofagasta), 7h. (near Copiapo, near Ebingen, and Stuttgart), 8h. (Tacubaya), 9h. (Samarkand, near Andijan, Stalinabad, and Tchimkent), 11h. (College, Hungry Horse, Shasta Dam, Boulder City, Overton, Pierce Ferry, Tucson, Mount Wilson, Palomar, China Lake, Tinemaha, Pretoria, Andijan, near Stalinabad, and near Alicante (2)), 12h. (Pretoria, Alicante, and near Mizusawa), 13h. (College), 14h. (Tchimkent, near Stalinabad, Andijan, Samarkand, and near Mizusawa), 15h. (near Fort de France), 18h. (Pretoria and near Balboa Heights), 19h. (near College), 20h. (near Berkeley, San Francisco, Branner, and Lick), 22h. (Bogota, Overton, Pierce Ferry, Tucson, Hungry Horse, Seattle, and near Victoria), 23h. (La Plata).

Oct. 3d. 9h. 15m. 47s. Epicentre 56°·0S. 27°·0W. Depth of focus 0.010.
(as on 1937, Sept. 8d.).

$A = +\cdot5006$, $B = -\cdot2551$, $C = -\cdot8273$; $\delta = +10$; $h = -8$;
$D = -\cdot454$, $E = -\cdot891$; $G = -\cdot737$, $H = +\cdot376$, $K = -\cdot562$.

		△	Az.	P.	O−C.	S.	O−C.			Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Grahamstown	z.	43·0	81	i 7 51	0	—	—	i 8 7		pP	—
Pretoria	z.	49·7	76	i 8 43	− 1	e 13 49	PcS	—		—	—
La Paz		50·3	305	i 8 49k	0	i 15 51	− 1	i 9 24		pP	24·6
Huancayo		57·5	300	e 9 50	+ 9	e 13 54	PPP	(e 17 26)		PS	e 17·4
Bogota	z.	71·6	310	i 11 13	0	—	—	i 13 48		PP	—
Fort de France		76·1	326	e 11 40	+ 1	—	—	—		—	—
Christchurch		79·5	194	e 11 55	− 3	e 21 35	−15	e 22 34		SP	—
Kaimata	N.E.	80·6	194	e 12 1	− 2	—	—	—		—	—
Tamanrasset	z.	83·2	30	e 12 20	+ 3	—	—	e 15 36		PP	—
Bermuda		93·7	328	—	—	e 24 35	+30	—		—	—
Almeria		94·8	20	—	—	e 24 23	+ 9	—		—	e 48·8
Granada		94·9	18	i 13 14k	+ 2	24 29	+14	13 47		pP	47·3
Alicante		96·7	21	—	—	e 24 33	+ 3	—		—	e 48·8
Philadelphia		104·0	323	—	—	e 32 45	SS	—		—	e 56·6
Ksara		104·2	51	—	—	e 26 49	PS	—		—	—
Weston		104·9	327	i 18 20	PP	—	—	i 18 51		pPP	e 54·2
St. Louis		108·4	312	e 18 25	PP	e 24 36	[− 6]	e 25 28		SKKS	—
Ottawa	z.	109·0	326	e 18 16	PP	—	—	i 18 49		pPP	—
Shawinigan Falls	N.	109·2	329	e 18 49	PP	—	—	—		—	—
Kew		109·4	17	—	—	e 28 23	PS	e 29 19		PPS	e 50·2
Bombay		110·9	87	—	—	e 26 13?	SKKS	—		—	—
Tucson		112·8	294	e 18 25	[0]	—	—	e 19 30		PP	—
Palomar		116·8	290	i 17 32	[−61]	—	—	e 19 28		PP	—
Pierce Ferry		117·5	294	i 18 34	[− 1]	—	—	e 19 49		PP	—
Boulder City		117·8	293	e 18 35	[0]	—	—	e 19 56		PP	—
Overton	z.	118·0	294	i 18 35	[− 1]	—	—	e 28 56		PKKP	—
Pasadena		118·1	290	i 18 34	[− 2]	—	—	e 20 3		PP	—
China Lake	z.	119·1	292	e 18 37	[− 1]	—	—	e 28 51		PKKP	—
Tinemaha	z.	120·4	292	i 18 50	[+10]	—	—	e 20 19		PP	—
Lick	z.	122·4	290	i 18 43	[− 1]	—	—	—		—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Berkeley	z.	123·1	290	i 18 44 a	[− 1]	—	—	i 19 5 pPKP	—
Reno	z.	123·1	293	i 18 45 k	[0]	—	—	e 22 47 PPP	—
Shasta Dam		125·3	292	i 18 47	[− 3]	—	—	— —	—
Hungry Horse		126·6	304	i 18 50	[− 2]	—	—	i 21 19 PP	—
Seattle		130·2	299	e 18 58	[− 1]	e 22 37	PKS	e 21 18 PP	—
Victoria		131·2	299	i 18 59 a	[− 2]	—	—	e 21 19 PP	—
College		150·6	313	e 19 31	[− 4]	—	—	— —	—

Additional readings :—
La Paz iPS =16m.33s., iSS =16m.50s.
Tamanrasset iP_cPZ =12m.23s., eZ =12m.56s., iZ =12m.59s.
Granada pPP =17m.41s., PPS =26m.47s., SS =31m.35s.
St. Louis ePS =28m.38s., eSS =34m.44s.
Tucson ePKKP? =29m.14s.
Palomar eZ =18m.46s., iZ =18m.58s.
Overton eZ =32m.15s.
Pasadena eZ =21m.44s., iPKKPZ =28m.54s.
Tinemaha iPKKPZ =28m.47s.
Berkeley iZ =19m.23s., 19m.38s., and 22m.9s.
Reno eZ =20m.31s., iZ =21m.2s.
Hungry Horse e =21m.51s.
Seattle i =19m.9s., e =22m.5s. and 22m.26s.
Victoria i =22m.9s.
College i =19m.38s.
Long waves were also recorded at Wellington, New Kensington, San Juan, Clermont-Ferraud, and Rome.

Oct. 3d. 12h. South-West Pacific.

Brisbane iPZ =49m.36s.a, iN =49m.45s., iZ =49m.52s. and 51m.52s., iSEN =53m.48s.
Riverview iPZ =50m.26s.k, eSN =55m.25s., eRZ =59m.0s.
College iP =56m.58s., e =59m.54s. and 63m.33s.
Lick ePZ =57m.44s., iZ =59m.0s.k, ePPZ =61m.16s.
Reno ePZ =57m.54s., ePPZ =61m.30s.
Shasta Dam iP =57m.55s.
Victoria e =57m.57s.
Pasadena ePZ =57m.58s., iZ =58m.7s.
China Lake eP?Z =58m.3s.
Riverside iZ =58m.7s.
Tinemaha iP?Z =58m.8s.
Hungry Horse eP =58m.9s., i =58m.47s., e =59m.15s.
Boulder City eP =58m.13s., e =58m.52s. and 61m.46s.
Overton ePZ =58m.13s., eZ =61m.46s.
Pierce Ferry eP =58m.16s., i =58m.25s., e =62m.3s.
Tucson eP =58m.22s., e =62m.5s.
Christchurch eSN =58m.40s., eQE =61m.45s., eRNZ =65m.0s.
Palomar iZ =58m.8s.
Stuttgart ePKPZ =63m.44s.
Tamanrasset iZ =64m.16s.k, 64m.31s., and 64m.47s., eZ =64m.51s.
Long waves were also recorded at Wellington.

Oct. 3d. Readings also at 0h. (Samarkand, near Stalinabad and Andijan), 2h. (Mount Wilson, China Lake, Tinemaha, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, Victoria, and College), 3h. (near Istanbul), 5h. (Messina), 6h. (Tucson, and near Istanbul), 7h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson (2), Overton, Pierce Ferry, and near Copiapo), 8h. (College, near Semipalatinsk, near Andijan, Obi-garm, Samarkand, Stalinabad, Tchimkent, and near Alicante), 9h. (Granada and near Copiapo), 12h. (near Frunse), 13h. (Palomar, Pasadena (2), China Lake, Tucson, Boulder City, Overton (2), Pierce Ferry (2), Shasta Dam, Lick, Hungry Horse, Victoria, College (2), Logan, Grahamstown, Pretoria, Samarkand, near Andijan, Obi-garm, and Stalinabad), 15h. (Bogota and La Paz), 16h. (Brisbane, Mount Wilson, Palomar, China Lake, Tucson, Overton, Pierce Ferry, Hungry Horse, College, Ottawa, and near Huancayo), 17h. (Auckland and College), 18h. (Pierce Ferry and near Stalinabad), 21h. (Pierce Ferry, Shasta Dam, and near Apia), 22h. (Pierce Ferry, Andijan, near Obi-garm, Samarkand, Stalinabad, and Tchimkent), 23h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson (2), Boulder City (2), Overton, Pierce Ferry (2), Shasta Dam, Lick, Mineral Hungry Horse, Victoria, Sitka, and College).

Oct. 4d. 9h. 58m. 24s. Epicentre 29°·2S. 69°·4W.

A = +·3076, B = −·8184, C = −·4853; δ = −9; h = +2;
D = −·936, E = −·352; G = −·171, H = +·454, K = −·874.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Copiapo	N.	2·0	336	i 0 34	− 1	—	—	—	—	—
Santa Lucia	N.	4·4	195	e 1 8	− 2	i 2 6	+ 4	1 20	P*	i 2·4
Antofagasta		5·6	350	2 40	S	(2 40)	+ 7	—	—	3·8
Buenos Aires		10·7	123	e 2 39	+ 1	e 4 36	− 3	—	—	—
La Plata		11·3	123	2 45	− 1	4 46	− 8	5 2	—	5·6
La Paz		12·7	5	3 12	+ 7	i 6 0	+32	i 6 24	SS	7·1
Huancayo		17·9	341	e 4 14	+ 2	e 7 43	+13	—	—	e 9·1
Tacubaya		56·2	326	i 9 48	+ 4	—	—	—	—	—
St. Louis		70·2	343	e 11 15	− 2	e 20 27	− 1	—	—	—
Cleveland	N.	71·2	350	e 11 19	− 4	—	—	—	—	—
Tucson		72·7	324	e 11 31	− 1	—	—	—	—	—
Ottawa	z.	74·5	355	e 11 40	− 2	—	—	—	—	—
Palomar	z.	76·8	321	i 11 55	0	—	—	—	—	—
Pierce Ferry		77·3	324	e 11 58	0	—	—	—	—	—
Boulder City		77·6	323	e 11 58	− 2	—	—	—	—	—
Overton	z.	77·9	324	i 12 1	0	—	—	—	—	—
Pasadena	z.	78·1	320	i 12 4	+ 2	—	—	—	—	—
China Lake	z.	79·0	322	e 12 8	+ 1	—	—	—	—	—
Tinemaha	z.	80·3	322	i 12 16	+ 2	—	—	—	—	—
Lick		82·3	320	i 12 27k	+ 2	—	—	—	—	—
Reno	z.	82·9	323	e 12 31k	+ 3	—	—	—	—	—
Mineral	z.	84·5	322	e 12 38k	+ 2	—	—	—	—	—
Shasta Dam		85·1	322	i 12 37	− 2	—	—	—	—	—
Hungry Horse		86·9	332	i 12 47	− 1	—	—	e 16 7	PP	—
Alicante		93·0	47	e 13 19	+ 2	23 59 {− 5}		17 3	PP	—

Additional readings :—
Santa Lucia N = 1m.14s.
Antofagasta i = 3m.45s.
La Plata E = 4m.0s.
Cleveland ePZ = 11m.22s.
Tucson iP = 11m.34s., e = 12m.13s.
Shasta Dam i = 12m.40s.

Oct. 4d. 10h. 20m. 26s. Epicentre 0°·7S. 21°·6W.

A = +·9297, B = −·3681, C = −·0122; δ = −1; h = +7;
D = −·368, E = −·930; G = −·011, H = +·004, K = −1·000.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tamanrasset	z.	35·2	46	i 6 57k	− 1	—	—	i 8 2a	PP	—
Malaga		40·5	21	i 7 42k	0	i 13 52	0	i 9 18	PP	19·4
Lisbon		40·9	15	i 7 48	+ 2	i 13 59	+ 1	9 9	PP	—
Granada		41·2	22	i 7 45k	− 3	i 14 8	+ 6	7 59	pP	20·0
Almeria		41·4	23	i 7 49	− 1	i 14 21	+16	9 11	PP	20·9
Fort de France		42·0	292	i 6 12?	?	i 12 38?	?	—	—	—
Alicante		43·5	24	i 8 18	+11	i 14 41	+ 5	9 46	PP	e 21·0
Toledo		43·5	20	i 8 8	+ 1	i 14 40	+ 4	i 8 16	pP	21·1
Algiers Univ.	z.	43·7	29	i 8 8	0	—	—	e 9 51	PP	—
Tortosa		46·0	24	i 8 26	− 1	i 15 13	+ 1	10 13	PP	22·5
Barcelona		47·1	24	i 8 35	0	15 25	− 3	i 10 24	PP	e 23·2
San Juan		47·7	296	e 8 41	+ 1	e 15 32	− 4	—	—	e 19·2
La Plata		48·0	221	—	—	15 34	− 7	—	—	22·9
Buenos Aires		48·2	221	e 8 44	0	e 15 40	− 3	—	—	—
La Paz		48·4	248	i 8 48	+ 2	i 15 46	0	i 10 0	PcP	23·4
Catania		50·9	38	e 9 8	+ 3	e 16 29	+ 8	—	—	—
Clermont-Ferrand		51·2	22	i 9 8	+ 1	i 16 32	+ 7	i 10 7	PP	24·4
Messina		51·7	37	e 9 9a	− 2	e 16 34	+ 2	e 11 5	PP	—
Rome		52·4	32	i 9 15a	− 1	i 16 46	+ 4	20 23	SS	—
Jersey	E.	52·5	16	e 9 38	+21	e 16 46	+ 3	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bogota	Z.	52·7	276	i 9 19	+ 1	—	—	i 11 16	PP	—
Florence Xim.		53·1	30	i 9 22	+ 1	i 16 52	+ 1	—	—	—
Prato		53·1	30	i 9 20	− 1	i 16 54	+ 3	—	—	—
Pavia		53·2	27	i 9 25a	+ 3	e 14 32?	?	—	—	e 28·5
Besançon		53·5	23	i 9 25	+ 1	—	—	i 10 29	P_cP	—
Paris		53·5	19	i 9 24	0	i 16 55	− 2	i 10 20	PcP	e 26·6
Bologna		53·7	29	i 9 26a	0	i 17 33	+34	e 11 24	PP	—
Neuchatel		53·7	24	i 9 25	− 1	e 16 59	0	—	—	—
Padova		54·0	29	i 9 31	+ 3	i 17 13	+10	11 34	PP	—
Salo		54·1	27	i 9 27a	− 2	17 6	+ 1	—	—	—
Basle		54·4	24	e 9 30	− 1	e 17 10	+ 1	e 11 41	PP	—
Huancayo		54·5	255	e 9 27	− 5	i 17 6	− 4	e 11 42	PP	e 23·1
Galerazamba		54·6	284	—	—	e 21 47	SS	—	—	e 26·6
Chur		54·7	26	e 9 31	− 2	e 17 11	− 2	—	—	—
Zürich		54·7	24	i 9 32a	− 1	e 17 8	− 5	e 11 28	PP	—
Kew		55·0	16	i 9 35a	0	e 17 20	+ 3	e 11 50	PP	e 26·6
Rathfarnham Castle		55·3	11	e 9 46	+ 8	i 17 14	− 7	—	—	—
Strasbourg		55·3	23	i 9 37	− 1	i 17 20	− 1	i 10 41	P_cP	i 27·0
Grahamstown	Z.	55·6	130	i 9 37	− 3	—	—	—	—	—
Triest		55·7	29	i 9 39	− 1	i 17 26	0	i 10 8	pP	—
Karlsruhe		55·9	23	i 9 42	0	i 17 32	+ 3	—	—	—
Stuttgart		56·0	24	i 9 41	− 2	i 17 28	− 2	e 10 23	P_cP	26·6
Santa Lucia	N.	56·4	229	—	—	e 17 44	+ 8	—	—	e 24·6
Zagreb		56·9	31	e 9 49a	0	e 17 44	+ 2	i 13 10	PPP	e 26·9
De Bilt		57·2	19	i 9 50a	− 1	i 17 52	+ 6	i 11 58	PP	e 27·6
Durham		57·7	14	i 16 55	?	i 18 55	+62	i 23 27	SSS	—
Cheb		58·3	15	e 9 53	− 6	e 17 54	− 7	—	—	—
Edinburgh	E.	58·4	12	e 9 56	− 4	17 58	− 4	12 8	PP	—
Halifax		58·5	326	10 2	+ 2	18 7	+ 4	—	—	24·3
Belgrade		58·7	34	i 10 2a	0	i 18 14	+ 8	—	—	e 33·2
Jena		58·7	25	i 10 0	− 2	e 18 4	− 2	e 12 6	PP	e 26·1
Helwan		58·8	54	i 10 1a	− 1	i 18 7	0	e 12 2	PP	—
Kalocsa	N.	59·0	31	10 6	+ 2	e 18 9	− 1	10 49	P_cP	e 37·1
Sofia		59·1	37	i 10 5	+ 1	e 18 23	+12	e 13 35	PPP	—
Prague		59·2	26	i 10 4	− 1	i 18 8	− 4	e 12 18	PP	e 26·6
Ogyalla		59·4	30	e 10 7	+ 1	e 18 18	+ 3	—	—	—
Collmberg		59·5	25	i 10 6a	− 1	e 18 7	− 9	e 12 15	PP	—
Budapest		59·6	31	10 6	− 2	18 17	0	11 9	P_cP	29·6
Aberdeen		59·8	12	e 17 26	?	i 18 19	− 1	23 56	SSS	27·8
Potsdam		60·4	23	i 10 13a	0	i 18 36	+ 8	—	—	e 32·3
Raciborzu		60·9	28	i 10 16	− 1	e 18 34	0	—	—	—
Skalnate Pleso		61·3	30	e 10 19	− 1	e 18 44	+ 5	—	—	—
Bucharest		61·7	37	e 10 22	0	e 18 43	− 1	e 11 16	P_cP	28·6
Istanbul		61·9	41	e 10 30	+ 6	e 18 56	+ 9	—	—	—
Weston		61·9	320	i 10 23	− 1	i 18 51	+ 4	i 11 1	P_cP	—
Harvard		62·1	320	i 10 25	0	i 18 51	+ 2	i 11 2	P_cP	e 26·0
Copenhageu		62·7	20	i 10 27	− 2	i 19 0	+ 3	23 4	SS	—
City College N.Y.		62·9	318	i 10 30	0	e 19 4	+ 4	e 13 10	PP	e 26·1
Fordham		62·9	318	i 10 30	0	i 19 5	+ 5	e 25 40	SSS	29·7
Philadelphia		63·3	316	i 10 30	− 3	i 19 6	+ 2	e 10 49	pP	e 26·2
Ksara		63·8	51	i 10 35a	− 1	19 9?	− 2	—	—	—
Seven Falls	E.	64·1	325	e 10 37	− 1	19 14	0	—	—	26·6
Georgetown		64·2	315	i 10 39	0	i 19 20	+ 4	—	—	—
Bergen		64·4	14	e 10 34?	− 6	19 21	+ 3	—	—	26·9
Shawinigan Falls	N.	64·9	324	10 53	+10	—	—	—	—	—
Ivigtut		65·0	346	—	—	i 19 27	+ 1	26 52	SSS	—
Columbia		65·4	308	e 10 47	0	e 19 36	+ 6	—	—	e 27·7
Pennsylvania		65·6	316	i 10 48	0	i 19 38	+ 5	i 24 10	SS	26·6
Ottawa		66·1	321	10 51k	0	19 44	+ 5	13 7	PP	26·8
Yalta		66·8	40	10 53	− 3	—	—	i 14 54	PPP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Upsala		67·6	20	11 16	+15	i 19 58	+ 1	21 3	ScS	c 29·0
Theodosia		67·8	40	e 11 0	− 2	—	—	—	—	—
Cleveland		68·4	315	e 11 5a	− 1	i 20 8	+ 1	e 20 30	PS	c 32·1
Sotchi		70·1	42	e 11 15	− 1	—	—	—	—	—
Tananarive		70·1	109	e 11 20	+ 4	e 20 36	+ 9	14 8	PP	31·2
Scoresby Sund		71·1	0	—	—	20 44	+ 6	28 46	SSS	—
Leninakan		72·1	46	11 30	+ 2	20 52	+ 2	e 11 52	PcP	—
Erevan		72·4	47	11 32	+ 2	—	—	—	—	—
Chicago		72·8	314	e 11 29	− 3	i 20 59	+ 1	—	—	c 30·9
Tiflis		73·0	46	11 33	0	20 59	− 1	11 53	PcP	—
Moscow		73·8	30	i 11 37	− 1	i 21 9	0	—	—	—
St. Louis		73·9	310	i 11 37	− 2	e 21 9	− 1	i 14 19	PP	—
Grozny		74·2	44	e 11 50	PcP	—	—	e 14 16	PP	—
Baku		76·4	48	—	—	i 21 0	−38	—	—	—
Tacubaya		78·5	289	i 12 8	+ 4	e 22 6	+ 5	—	—	—
Lubbock		82·3	304	12 26	+ 1	—	—	—	—	—
Rapid City	E.	84·4	314	i 12 37	+ 1	i 23 1	0	e 17 13	PPP	c 42·0
Sverdlovsk		86·3	33	i 12 45	0	i 23 12	[+ 3]	16 3	PP	—
Saskatoon		87·5	322	—	—	i 23 34	+ 3	e 29 26	SS	40·6
Samarkand		89·4	50	i 12 59	− 1	—	—	—	—	—
Tucson		89·7	302	i 13 2	+ 1	i 23 38	[+ 7]	e 16 44	PP	c 41·4
Bozeman		90·1	315	—	—	e 23 36	[+ 3]	e 29 57	SS	c 38·8
Logan		90·6	312	e 13 1	− 4	c 23 57	− 3	e 16 26	PP	c 39·6
Salt Lake City		90·6	311	—	—	i 24 6	+ 6	e 29 56	SS	c 41·9
Stalinabad		90·7	51	i 13 8	+ 2	i 23 41	[+ 4]	i 16 45	PP	—
Tashkent		91·1	48	i 13 11	+ 3	i 24 4	0	—	—	—
Butte	N.	91·2	316	—	—	c 24 6	+ 1	—	—	c 41·3
Tchimkent		91·4	48	i 13 10	+ 1	i 24 12	ScS	—	—	—
Hungry Horse		92·1	318	e 13 12	0	—	—	e 17 38	PP	—
Pierce Ferry		92·4	306	e 13 14	0	—	—	e 16 53	PP	—
Overton	Z.	92·7	306	i 13 17	+ 2	e 25 27	PS	e 16 55	PP	—
Boulder City		93·0	306	i 13 18	+ 1	—	—	e 16 58	PP	—
Andijan		93·5	50	e 13 20	+ 1	c 24 33	+ 8	—	—	—
Bombay	E.	94·4	71	e 13 23	0	c 24 3	[+ 5]	—	—	—
Palomar		94·8	303	i 13 26k	+ 1	—	—	i 17 14	PP	—
Frunse		95·0	47	e 13 18	− 8	—	—	—	—	—
China Lake	Z.	95·3	306	e 13 28	+ 1	—	—	—	—	—
Poona		95·4	71	13 29	+ 1	24 34	− 8	17 13	PP	—
Tinemaha	Z.	95·7	307	e 13 54	+25	—	—	i 17 20	PP	—
Pasadena		95·8	304	e 13 28	− 1	c 24 2	[− 3]	c 17 22	PP	c 40·4
Reno	Z.	96·8	309	e 13 34k	0	—	—	c 17 26	PP	c 65·4
Seattle		97·7	318	—	—	c 27 1	PPS	—	—	e 40·6
Mineral		98·1	311	i 13 39k	− 1	—	—	—	—	—
New Delhi	N.	98·1	61	—	—	c 24 20	[+ 2]	—	—	c 47·0
Lick	Z.	98·4	308	i 13 37k	− 4	—	—	i 17 39	PP	—
Victoria		98·4	319	13 41	0	i 24 23	[+ 4]	—	—	43·6
Shasta Dam		98·6	311	e 13 40	− 2	—	—	—	—	—
Santa Clara		98·7	308	e 24 24	SKS	(e 24 24)	[+ 3]	c 27 28	PPS	e 49·8
Berkeley		98·8	308	i 17 46k	PP	i 24 26	[+ 5]	e 25 28	ScS	e 49·0
Kodaikanal	E.	99·0	79	e 16 49	?	c 26 34	PS	27 30	PPS	—
Hyderabad	N.	99·8	73	—	—	32 15	SS	—	—	42·1
Colombo	E.	101·5	84	24 46	SKS	(24 46)	[+12]	—	—	49·6
Calcutta	E.	108·7	66	c 19 10	PP	c 28 22	PS	c 34 52	SS	—
Irkutsk		111·7	33	e 15 6?	P	26 25?	{+ 8}	c 19 20?	PP	—
Riverview		145·0	169	i 19 51k	[+12]	c 41 50	SS	c 47 4	SSS	c 59·8
Brisbane	Z.	151·5	170	e 19 57	[+ 7]	—	—	—	—	—

Additional readings :—
Tamanrasset eZ = 7m.31s., iZ = 7m.56s.a, ePPPZ = 8m.20s.
Malaga iPcPZ = 9m.32s., PPPZ = 9m.50s., ScPZ = 13m.18s.
Lisbon N = 9m.20s., SSEN = 16m.45s., N = 17m.58s.
Granada iPP = 9m.18s., iSS = 16m.59s., ScS = 17m.36s.
Almeria PcP = 9m.47s., PPP = 10m.11s., PcS = 13m.31s., SS = 17m.15s., ScS = 18m.15s.
Alicante PPP = 9m.57s., PPPP = 10m.27s., PcS = 13m.55s., SS = 17m.41s., SSS = 18m.47s.

Continued on next page.

Toledo P_cPN =9m.47s., ePPZ =9m.53s., iE =11m.3s. and 11m.53s., iSSE =17m.53s., QE =18m.47s.
Algiers Univ. iZ =8m.13s. and 8m.23s., eZ =9m.4s. and 9m.23s., ePPPZ =10m.32s., eZ =11m.12s. and 12m.17s.
Tortosa PPPEN =10m.55s., PSEN =15m.17s., PPSEN =15m.27s., iSSE =18m.29s., SSSE =19m.33s.
Barcelona iSS =19m.4s.
La Plata N =15m.46s.
La Paz iPP =10m.42s., iPPP =11m.40s., iPS =15m.58s., iS_cS =18m.40s., iSS =19m.12s.
Clermont-Ferrand iPPP =12m.6s., iP_cS =14m.13s., iPS =16m.51s., iSS =20m.9s., SSS =22m.10s., Q =22·6m.
Messina e =20m.26s.
Rome e =20m.0s., iE =20m.33s.
Besançon i =9m.33s., iPP =11m.23s.
Paris i =9m.31s., 9m.37s., 9m.46s., and 11m.9s., iPP =11m.15s. and 11m.22s., iPPP =12m.22s. and 12m.30s., iP_cS =14m.7s., iPS =17m.7s., iSS =21m.0s., iSSS =23m.7s.
Bologna eSS =21m.14s.
Padova PPP =12m.37s., PS =17m.45s.
Huancayo eSS =20m.44s.
Kew ePPP =12m.46s., eS_cS =19m.21s., eSSEN =21m.2s., eSSS =23m.44s.
Strasbourg i =10m.53s., iPP =11m.38s., iPPP =11m.56s., i =12m.6s., iP_cS =14m.40s., iS_cS =19m.15s., i =19m.57s., iSS =21m.15s., iSSS =22m.59s., iQ =24·3m.
Triest iPP =11m.39s., iPPP =12m.48s., iP_cS =14m.27s., iPS =17m.43s.?, isS =18m.11s., iSS =21m.18s.
Stuttgart e =10m.5s. and 10m.54s., ePP =11m.43s., ePPP =13m.1s., e =13m.34s. and 14m.13s., iPS =17m.57s., eS_cS =19m.12s., eSS =21m.15s., eSSS =23m.34s., eQ =25m.4s.
Zagreb e =9m.54s.
De Bilt iPPP =13m.15s., eSS =21m.34s., eSSS =24m.16s.
Durham iE =17m.7s. and 20m.44s., iSSSE =25m.44s., iE =25m.50s.
Edinburgh S_cSE =19m.39s.
Helwan eZ =13m.28s., eN =19m.50s. and 24m.34s.
Kalossa PPN =12m.8s., ePPPN =13m.29s., eSE =18m.15s.
Prague i =10m.14s., ePPP =13m.2s., eS =18m.14s., ePS =18m.28s., eSS =22m.6s., eSSS =24m.16s.
Collmberg eE =12m.51s., eZ =13m.32s.?, eE =18m.17s., eN =20m.22s., eSSN =21m.46s.
Budapest PPN =12m.11s., PPE =12m.18s., PPPN =13m.29s., PSE =18m.25s., PSN =18m.28s., SKSE =19m.43s., SKSN =19m.58s., SSE =22m.16s., eN =23m.34s.?, eSSSE =23m.51s., SSSN =24m.48s.
Aberdeen PSE =21m.46s., eN =26m.11s.
Potsdam eE =10m.34s.?, iEN =18m.33s., iN =20m.8s.
Raciborzu eSN =18m.28s.?
Bucharest ePPEN =12m.42s., eS_cSE =20m.25s., eSSEN =22m.25s.
Harvard iPP =12m.44s., ePPP =14m.4s., eSS =22m.56s., eQ =25m.26s.
Copenhagen i =10m.44s. and 20m.35s., SSS =25m.52s.
City College, NY., e =20m.23s.
Philadelphia iS_cS =20m.21s.
Pennsylvania eEN =16m.10s., iEN =17m.4s., iN =21m.58s.
Ottawa e =11m.4s.
Upsala SE =19m.55s., eE =21m.51s., eSSN =24m.0s., eE =25m.16s., eN =26m.0s., eQN =27·6m.
Cleveland iE =11m.20s., eSSE =24m.33s.
Tananarive PS =21m.5s., SS =25m.0s.
Tiflis ePP =14m.18s., PPP =16m.1s., ePS =21m.34s., SS =25m.49s., eSSS =28m.47s.
St. Louis i =13m.12s., ePP =14m.24s., e =23m.59s.
Rapid City eSSE =28m.43s.
Sverdlovsk PS =24m.5s.?, SS =29m.4s., SSS =32m.44s.
Tucson e =13m.16s., ePS =25m.3s., eSS =29m.31s.
Bozeman e =34m.57s.
Logan e =20m.25s., eSS =29m.59s.
Stalinabad iPPP =18m.46s.
Hungry Horse e =14m.44s.
Overton iZ =15m.25s.
Poona SKKSE =24m.9s., PSEN =26m.1s., PPSEN =26m.33s., SSN =30m.52s., SSPEN =31m.0s.
Pasadena iSPE =26m.8s.
Reno eE =13m.41s.
Seattle e =30m.53s. and 32m.24s.
Mineral eZ =13m.52s., iZ =14m.14s.
Lick iZ =13m.55s. and 14m.18s.
Shasta Dam e =13m.54s.
Santa Clara eE =32m.16s.
Berkeley eE =26m.34s., ePSN =26m.54s., eZ =26m.58s. and 28m.0s., eE =32m.8s., eN =32m.14s., eZ =32m.20s., eN =42m.58s.
Irkutsk PPP =21m.41s., PS =28m.48s., SS =35m.9s., SSS =39m.6s.
Riverview eZ =20m.30s., iZ =20m.36s.
Long waves were also recorded at Arapuni, Auckland, Christchurch, Wellington, Ukiah, Seattle, Sitka, and College.

Oct. 4d. 17h. 33m. 23s. Epicentre 38°·5N. 21°·8E.

Intensity VII at Thermon in the province of Trichonis.
Epicentre 38°·5N. 21°·8E. (Strasbourg).
35°·5N. 21°·7E. (Athens).
Macroseismic area 20,000 sq.km.

Preliminary Bulletin of the Seismological Institute of the National Observatory, Athens.

$A = +\cdot7285$, $B = +\cdot2914$, $C = +\cdot6199$; $\delta = -10$; $h = -1$;
$D = +\cdot371$, $E = -\cdot928$; $G = +\cdot576$, $H = +\cdot230$, $K = -\cdot785$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Athens		1·6	110	i 0 28	− 2	i 0 55	+ 4	—	—	—
Taranto		4·0	301	e 0 49	−15	e 2 19	S_g	—	—	—
Sofia		4·4	15	1 3	− 7	1 57	− 5	e 1 35	P_g	—
Messina		4·9	268	e 1 32	P*	e 2 8	− 7	e 2 22	S*	—
Istanbul		6·2	63	e 1 40	+ 5	e 3 59	?	—	—	—
Belgrade		6·4	351	e 1 35a	− 3	i 3 30	S_g	—	—	—
Bucharest		6·7	27	e 1 43	+ 1	e 2 59	− 1	e 2 26	P_g	—
Rome		7·9	298	e 1 51	− 8	e 3 28	− 2	4 0	S*	4·4
Kalossa		8·3	346	e 3 0	+56	—	—	—	—	e 4·6
Zagreb		8·5	331	2 11	+ 4	—	—	—	—	e 4·3
Budapest	E.	9·2	348	2 17	+ 1	4 36	S*	3 17	PP	—
	N.	9·2	348	e 2 55	P*	4 53	S_g	6 4	SS	—
Triest		9·3	323	2 41	PP	e 3 16	−49	i 4 53	SS	e 5·1
Padova		9·5	312	—	—	e 4 41	S*	i 5 33	S_g	—
Bologna		9·9	311	e 2 28	+ 3	e 4 22	+ 2	—	—	e 6·5
Salo		11·0	314	e 2 41	− 1	e 4 28	−19	—	—	—
Pavia		11·5	309	—	—	e 4 45	−14	—	—	—
Ksara		12·2	108	i 3 0	+ 2	5 32	+16	—	—	—
Zürich		13·1	317	e 3 16	+ 6	e 5 33	− 5	—	—	—
Stuttgart		13·7	323	e 3 7	−11	e 6 7	+15	e 3 24	PP	e 7·5
Basle		13·8	316	e 4 50	?	e 6 12	+18	—	—	—
Strasbourg		14·3	319	e 3 29	+ 3	e 6 9	+ 3	—	—	e 7·2
Jena		14·4	333	e 3 27	0	e 6 19	+10	—	—	e 7·8
Besançon		14·5	312	i 3 29	+ 1	e 6 6	− 5	—	—	—
Potsdam		15·2	339	—	—	e 6 37?	+ 9	—	—	e 8·6
Clermont-Ferrand		15·6	304	e 3 48	+ 5	—	—	8 37?	Q	10·1
Paris		17·3	313	i 4 0	− 4	—	—	—	—	e 9·6
Alicante		17·5	277	e 5 21	?	e 7 55	+34	—	—	e 9·1
De Bilt		17·9	326	—	—	e 7 12	−18	—	—	e 9·1
Tiflis		17·9	73	e 4 9	− 3	e 7 38	+ 8	—	—	—
Copenhagen		18·3	344	—	—	e 8 16	+37	—	—	11·6
Almeria		19·3	272	e 5 27	+58	—	—	—	—	e 10·0
Granada		20·1	275	4 48a	+10	e 8 22	+ 3	—	—	10·9
Kew		20·2	318	e 3 35	−64	e 8 22	+ 1	e 10 1	SS	e 10·6
Moscow		20·3	27	e 4 33	− 7	e 8 29	+ 6	—	—	—
Tamanrasset	z.	21·0	227	e 4 41	− 6	—	—	—	—	—
Baku		21·8	76	e 4 49	− 7	—	—	—	—	—
Tashkent		36·2	70	e 7 2	− 4	—	—	—	—	—
Tchimkent		36·2	69	e 6 59	− 7	—	—	—	—	—
Hungry Horse		85·0	333	i 12 34	− 4	—	—	—	—	—

Additional readings :—
Sofia e = 2m.6s., S_g = 2m.21s.
Belgrade e = 2m.19s.
Bucharest eN = 2m.53s. and 3m.9s., iE = 3m.13s., iN = 3m.25s.
Rome eZ = 3m.10s.
Kalossa eE = 3m.3s.
Budapest S_gS_gE = 5m.23s.
Padova i = 5m.46s., e = 7m.6s.
Pavia e = 7m.24s.
Basle e = 6m.35s.
Besançon e = 3m.37s., and 4m.34s.
Paris i = 3m.2s.
Tamanrasset iZ = 4m.47s.k.
Long waves were also recorded at Tortosa and Upsala.

Oct. 4d. Readings also at 0h. (Ottawa, Weston, Philadelphia, St. Louis, Seattle, Pretoria, Tashkent, near Almata, Andijan, and Frunse), 1h. (Granada), 2h. (Santa Lucia, near Berkeley, Branner, Lick, and San Francisco), 3h. (Pierce Ferry), 4h. (Palomar, Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Mineral, Lick, Hungry Horse, Victoria, Collmberg, Strasbourg, Stuttgart, and near Apia), 5h. (Ksara, Frunse, Obi-garm, Samarkand, near Andijan, Stalinabad, and Tchimkent), 7h. (Mount Wilson (2), Palomar, China Lake (2), Tinemaha (2), Tucson (2), Boulder City, Overton (2), Pierce Ferry (2), Shasta Dam, Lick, Mineral, Hungry Horse, College, Philadelphia, near Victoria, Collmberg, Ksara, Auckland, Christchurch, Wellington, near Apia and near Mizusawa), 8h. (Seven Falls, Harvard, Weston, and near Pretoria), 9h. (Andijan and near Obi-garm), 10h. (Boulder City, Overton, and Ottawa), 11h. (Almata, Samarkand, near Andijan, Frunse (2), Obi-garm, Stalinabad, Tashkent, and Tchimkent), 12h. (Frunse, Samarkand, Tashkent, Tchimkent, near Andijan, Obi-garm, and near Copiapo), 14h. (Istanbul), 15h. (Shasta Dam, Hungry Horse, La Paz, and Collmberg (2)), 17h. (Overton, and near Pierce Ferry), 20h. (Tucson, and near Messina), 23h. (Overton, Tucson, Bogota, La Paz, near Fort de France, Tchimkent, near Andijan, Obi-garm, Samarkand, and Stalinabad).

Oct. 5d. 2h. 33m. 44s. Epicentre 44°·8N. 70°·5W.

Intensity V in the S.W. part of Maine; IV at Athens, Auburn, Bridgton, Hallowell, Mexico, New Castle, Runford, etc. Macroseismic area 13,500 sq.miles.
Epicentre as adopted.

L. M. Murphy and F. P. Ulrich:
United States Earthquakes, 1949, Serial No. 748, Washington, 1951, pp. 5-6, with macroseismic chart.

$A = +\cdot2376$, $B = -\cdot6711$, $C = +\cdot7023$; $\delta = +5$; $h = -3$;
$D = -\cdot943$, $E = -\cdot334$; $G = +\cdot234$, $H = -\cdot662$, $K = -\cdot712$.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.	
Seven Falls	E.	2·3	354	0 40	0	i 1 12	+ 3	e 1 24	S_g
Harvard		2·4	198	i 0 42	+ 1	i 1 15	+ 3	i 0 48	P*
Shawinigan Falls	N.	2·4	318	0 40	− 1	1 10	− 2	0 42	P*
Ottawa	Z.	3·7	281	e 0 58	− 2	i 1 52	+ 7	i 1 58	S*
Tucson		33·6	263	i 4 49	?	—	—	e 6 2	?
Overton	Z.	34·0	272	i 5 19	?	—	—	—	—
Boulder City		34·5	271	i 5 18	?	—	—	—	—
Tinemaha		36·4	275	i 5 28	?	—	—	i 5 40	?
China Lake	Z.	36·6	273	i 5 21	?	—	—	e 5 33	?
Palomar	Z.	37·3	269	i 5 9	?	—	—	—	—
Pasadena	Z.	37·8	271	i 5 15	?	—	—	i 5 27	pP

Additional readings:—
Seven Falls SE = 1m.8s.
Harvard i = 1m.2s. and 1m.5s., iS = 1m.12s. and 1m.21s.
Ottawa eZ = 1m.4s., eSZ = 1m.42s., iZ = 1m.46s.

Oct. 5d. 15h. 54m. 50s. Epicentre 46°·3N. 7°·5E. (as on 1949 Aug. 16d.).

Intensity IV at Lenk-Montana, Lenk, and Matten; III at Montana, etc. Macroseismic radius 8km. Epicentre as adopted.

Dr. E. Wanner:
Jahresbericht des Erdbebendienstes der Schweiz im Jahre, 1949, Zürich, 1950, p. 3; macroseismic chart, fig. 5.

$A = +\cdot6874$, $B = +\cdot0905$, $C = +\cdot7206$; $\delta = -3$; $h = -4$;
$D = +\cdot131$, $E = -\cdot991$; $G = +\cdot714$, $H = +\cdot094$, $K = -\cdot693$.

	△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.	
Basle	1·3	3	e 0 24	− 1	e 0 42	− 2	—	—
Zürich	1·3	35	e 0 25	0	e 0 44	0	—	—
Besançon	1·4	312	e 0 28	+ 1	—	—	e 0 33	P_g
Chur	1·5	68	e 0 29	+ 1	i 0 51	+ 2	e 0 31	P_g
Ravensburg	2·1	44	e 0 36?	− 1	—	—	e 0 40	P*
Stuttgart	2·7	24	e 0 53?	P_g	e 1 29	S_g	—	—
Clermont-Ferrand	3·1	260	e 1 9	P_g	e 1 48	S_g	e 1 13	?

Additional readings:—
Besançon e = 40s., 1m.0s., 1m.8s., and 1m.19s,
Stuttgart eS_g? = 1m.33s,

Oct. 5d. 16h. 5m. 50s. Epicentre 46°·3N. 7°·5E. (as at 15h.).

Intensity V at Lenk-Montana, Lenk, and Matten.
Macroseismic radius 10km.
Epicentre as adopted.

Dr. E. Wanner.
Jahresbericht des Erdbebendienstes der Schweiz im Jahre, 1949, Zürich, 1950, p.3 ; macroseismic chart, fig. 5.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Basle		1·3	3	e 0 24	− 1	e 0 42	− 2	—	—	—
Zürich		1·3	35	e 0 24	− 1	e 0 44	0	e 0 26	P_g	—
Besançon		1·4	312	e 0 24	− 3	i 0 43	− 3	i 0 28	P_g	—
Chur		1·5	68	e 0 28	0	e 0 50	+ 1	e 0 31	P_g	—
Ravensburg		2·1	44	e 0 33	− 4	e 1 6	+ 2	i 0 40	P*	—
Salo		2·2	108	e 0 45	P_g	e 1 8	+ 2	—	—	—
Strasbourg		2·3	5	e 0 45	P_g	i 1 9	0	i 1 12	S*	—
Stuttgart		2·7	24	e 0 49?	P*	e 0 56	P_g	e 1 20	+ 1	—
Clermont-Ferrand		3·1	260	i 0 58	P*	i 1 24	− 5	i 1 40	S_g	—
Paris		4·2	308	e 1 9	+ 2	i 1 56	− 1	i 1 25	P_g	i 2·5
Jena	E.	5·3	29	—	—	e 2 48	S*	i 2 58	S_g	—
Collmberg		6·2	34	e 1 57	P*	e 3 28	S_g	—	—	—

Additional readings :—
Zürich eS =41s.
Besançon e =40s.
Strasbourg iP_g? =50s., i =55s., iS_g? =1m.21s.
Stuttgart eS =1m.17s., e =1m.24s., i =1m.28s., iS_g =1m.31s., i =1m.36s. and 1m.38s.
Clermont-Ferrand iS_g =1m.48s., e =1m.54s.
Paris i =1m.29s., iS =2m.13s.
Jena iE =2m.52s., iN =3m.14s.
Collmberg eEZ =2m.0s., eE =3m.23s., eS_g?Z =3m.35s.
Long waves were also recorded at Ksara.

Oct. 5d. 16h. 20m. 38s. Epicentre 38°·5N. 21°·8E. (as on 4d.).

Felt in the province of Trichonis. Epicentre as adopted. Preliminary Bulletin of the Seismological Institute of the National Observatory, Athens, Oct., 1949.

A = +·7285, B = +·2914, C = +·6199 ; δ = −10 ; h = −1.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Athens		1·6	110	e 0 31	+ 1	e 0 57	+ 6	—	—	—
Taranto		4·0	301	e 0 48	?	e 2 17	S_g	e 1 13	P*	e 2·4
Sofia		4·4	15	e 1 5	− 5	2 1	− 1	2 34	S_g	—
Messina		4·9	268	—	—	e 2 22?	+ 7	—	—	—
Istanbul		6·2	63	e 1 40	+ 5	e 3 56	+68	—	—	—
Belgrade		6·4	351	—	—	e 3 27	S_g	—	—	—
Bucharest	N.	6·7	27	e 1 28	−14	e 3 11	+11	e 3 41	S_g	i 4·3
Rome		7·9	298	e 1 56	− 3	i 4 7	S*	—	—	e 4·5
Zagreb		8·5	331	2 19?	+12	e 4 16	S*	e 4 46	S_g	—
Triest		9·3	323	e 2 25	+ 8	e 3 26	−39	i 4 40	S*	—
Florence Xim.		9·5	307	e 2 2?	−18	e 4 4?	− 6	—	—	—
Bologna		9·9	311	e 3 14	+49	e 4 14	− 6	—	—	—
Salo		11·0	314	e 3 3	PPP	e 4 36	−11	—	—	—
Zürich		13·1	317	(e 3 14)	+ 4	—	—	—	—	—
Stuttgart		13·7	323	e 3 14	− 4	—	—	—	—	e 7·4
Strasbourg		14·3	319	e 3 38?	PP	—	—	—	—	e 7·4
Collmberg	z.	14·3	335	e 3 30	+ 4	—	—	—	—	—
Besançon		14·5	312	e 3 31	+ 3	—	—	e 3 45	PP	e 7·1
Potsdam	z.	15·2	339	e 4 22?	?	—	—	—	—	e 9·3
Clermont-Ferrand		15·6	304	e 3 48	+ 5	—	—	e 4 7	PPP	8·9
Paris		17·3	313	e 4 3	− 1	—	—	i 4 8	P	e 12·4
Kew		20·2	318	e 7 18	?	e 12 21	P_cS	—	—	—
Tamanrasset	z.	21·0	227	e 4 48	+ 1	—	—	e 5 3	PP	—
Hungry Horse		85·0	333	i 12 39	+ 1	—	—	i 12 43	P_cP	—

For Notes see next page,

NOTES TO OCTOBER 5d. 16h. 20m. 38s.

Additional readings and note :—
Belgrade i = 3m.54s., e = 4m.8s. and 4m.56s.
Bucharest eN = 2m.31s.
Zürich reading has been decreased by 11m.
Besançon e = 4m.15s. and 5m.8s.
Clermont-Ferrand e = 4m.16s.
Tamanrasset iZ = 4m.52s.k.
Hungry Horse i = 12m.56s.
Long waves were also recorded at Padova, Pavia, and De Bilt.

Oct. 5d. 19h. 7m. 2s. Epicentre 6°·2S. 154°·8E. (as on 1949 Sept. 26d.).

$A = -\cdot8996$, $B = +\cdot4233$, $C = -\cdot1073$; $\delta = -2$; $h = +7$;
$D = +\cdot426$, $E = +\cdot905$; $G = +\cdot097$, $H = -\cdot046$, $K = -\cdot994$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		21·2	184	i 4 58a	+ 9	i 8 56	+15	i 5 19	PP	i 13·0
Riverview		27·7	187	e 5 55	+ 3	e 10 37	+ 4	—	—	e 13·9
Auckland	N.	35·6	151	—	—	e 12 55	+17	e 13 34	?	—
Tuai	N.	38·2	152	(7 29?)	+ 6	7 29?	P	—	—	—
Wellington		39·2	156	—	—	e 14 8	+36	e 18 58?	Q	e 19·9
Christchurch		40·3	160	i 7 45	+ 5	13 52	+ 3	e 9 28	PP	20·0
Perth		44·5	230	—	—	i 18 2	SS	—	—	i 20·0
College		82·4	21	e 12 41	+16	—	—	—	—	—
Poona	E.	83·4	290	e 12 27	− 3	—	—	e 13 13	?	—
Almata		85·4	316	e 12 49	+ 9	—	—	—	—	—
Andijan		88·3	311	e 12 47	− 8	23 20	[− 2]	e 23 56	sS	—
Shasta Dam		88·6	49	e 12 43	−13	—	—	e 16 28	PP	—
Tchimkent		90·6	313	e 13 0	− 5	—	—	—	—	—
Stalinabad		90·7	309	e 13 1	− 5	e 23 42	[+ 5]	e 13 24	pP	—
Tashkent		90·7	312	—	—	i 23 43	[+ 6]	i 24 24	sS	—
Pasadena		91·0	56	i 13 7	0	i 23 57	− 6	—	—	e 41·2
Tinemaha	Z.	91·3	53	e 13 8	− 1	—	—	e 13 26	pP	—
Riverside		91·6	56	i 13 35	sP	—	—	—	—	—
Palomar	Z.	92·0	57	i 13 12	0	—	—	i 13 37	sP	—
Hungry Horse		95·4	42	i 13 26	− 2	—	—	e 17 27	PP	—
Tucson		97·0	58	e 14 0	+25	—	—	e 17 35	PP	e 44·5
Sverdlovsk		97·4	327	—	—	e 25 14	+15	—	—	—
St. Louis		113·7	50	e 19 52	PP	e 26 31	{ 0}	e 29 39	PS	—
Potsdam		124·3	333	(e 21 10)	PP	—	—	—	—	e 21·2
De Bilt		127·9	337	e 20 58?	PP	—	—	—	—	—
Stuttgart	Z.	128·6	332	e 19 6	[− 3]	(e 22 58)	PKS	—	—	e 23·0
Kew		130·4	340	e 20 58?	PP	—	—	—	—	—
Rome		131·2	321	e 19 10	[− 4]	e 26 20	[− 3]	—	—	e 59·3
Paris		131·5	336	e 20 6	?	—	—	e 21 26	PP	—
La Paz		131·9	118	e 19 16	[0]	i 27 58	{−33}	i 22 46	PKS	—
Bermuda		134·9	49	e 23 50	PPP	e 34 58	PPS	—	—	e 64·0
Algiers Univ.	Z.	140·1	323	20 38	?	—	—	—	—	—
Alicante		140·9	329	22 12	PP	—	—	—	—	e 65·1
Almeria		143·1	329	20 4	[+28]	29 37	{ − 2}	22 52	PP	—
Granada		143·4	331	20 2a	[+26]	41 16	SS	e 22 43	PP	—
Malaga	Z.	144·2	331	e 20 36	[+58]	30 48	{+63}	22 36	PP	36·2
Tamanrasset	Z.	146·1	303	e 19 37	[− 4]	—	—	e 23 0	PP	—

Additional readings :—
Brisbane iPPPNZ = 5m.27s., iP_cPE = 9m.28s., iSSEN = 9m.34s.
Riverview iZ = 6m.1s., iN = 10m.55s.
Christchurch QEN = 17m.3s.
Shasta Dam i = 12m.59s., e = 13m.19s. and 13m.32s.
Stalinabad esS = 24m.26s.
Pasadena isP?Z = 13m.32s., iZ = 15m.10s.
Tinemaha esP?Z = 13m.32s.
Tucson e = 16m.47s.
St. Louis e = 26m.6s., eS = 27m.12s., eSS = 35m.12s.
Rome e = 20m.20s., eSS? = 38m.0s.
Paris e = 21m.51s.
Almeria PPP = 25m.52s., SS = 40m.52s.
Granada eSKKS = 28m.22s., S = 30m.57s.
Tamanrasset iZ = 19m.41s.k, eZ = 19m.59s. and 20m.13s.
Long waves were also recorded at Philadelphia.

Oct. 5d. Readings also at 0h. (Athens, and near Klyuchi), 1h. (Istanbul, Triest, Alicante, Stuttgart, Belgrade, and Rome), 2h. (La Plata and La Paz), 4h. (Tucson), 5h. (Upsala), 6h. (Pierce Ferry, Tucson, Mount Wilson, Palomar, Tinemaha, Santa Lucia, and near Copiapo), 9h. (near Frunse and near Copiapo), 10h. (Collmberg, Copiapo, Santa Lucia, Pasadena, Riverside, Palomar, Tinemaha, Overton, Pierce Ferry, Tucson (2), Hungry Horse, Shasta Dam, near College, near Salo and near Apia), 11h. (near Bandong and Batavia), 13h. (near Alicante), 15h. (Budapest, and near Istanbul), 18h. (Hungry Horse (2), Shasta Dam (2), Calcutta, Tchimkent, Frunse, Obi-garm, Almata, Tashkent, Stalinabad, near Murgab and Andijan), 19h. (Bombay, Paris, and Clermont-Ferrand), 20h. (Bombay, Calcutta, Hungry Horse (2), Shasta Dam (2), Tucson (2), Kew, Paris, and Stuttgart), 21h. (Hungry Horse, Shasta Dam, Tucson, Calcutta, Upsala (2), Copenhagen, Kew (2), Rome, De Bilt (2), Paris, Clermont-Ferrand (2), Colmberg, Potsdam (2), Stuttgart, Granada, Malaga, and near Mizusawa), 22h. (College, Hungry Horse, Tinemaha, Collmberg, Stuttgart, and Malaga).

Oct. 6d. 9h. Tonga region.
Apia eP =1m.31s., eS? =2m.19s., eL =3·3m.
Auckland iSN =8m.40s., eLN =12m.?
Shasta Dam eP =11m.47s., i =12m.3s.
China Lake eP?Z =11m.51s.
Palomar iP?Z =11m.52s.
Pasadena eP?Z =11m.55s.
Mount Wilson eP?Z =11m.58s.
Overton ePZ =12m.7s.
Tucson e =12m.8s.
Boulder City e =12m.12s.
Pierce Ferry e =12m.38s.
College iP =12m.45s.
Collmberg eZ =19m.49s. and 20m.6s.
Stuttgart eZ =19m.50s.
Jena eE =19m.51s. and 20m.9s.
Ksara ePKP? =19m.53s., PSKS? =33m.16s.
Clermont-Ferrand ePKP =19m.58s., e =20m.17s. and 20m.41s.
Paris ePKP =19m.58s., i =20m.9s.
Strasbourg iPKP =19m.58s.
Besançon ePKP =20m.0s.

Oct. 6d. Readings also at 1h. (near Istanbul), 2h. (La Paz, Victoria, and Tacubaya), 4h. (Boulder City (2), Pierce Ferry, Overton, Tucson, Pasadena, Mount Wilson, Riverside, Collmberg, Stuttgart, Strasbourg, and Paris), 5h. (Tucson, Vera Cruz, Tacubaya, and near Oaxaca), 7h. (Alicante (2)), 9h. (Tchimkent, Samarkand, near Obi-garm, Andijan, and Stalinabad), 11h. (Durham, and near Mineral), 12h. (Brisbane), 14h. (La Paz, Antofagasta, and near Istanbul), 15h. (Seattle), 17h. (Obi-garm, Tchimkent, Samarkand, near Stalinabad, and Andijan), 20h. (Mizusawa), 22h. (near Obi-garm).

Oct. 7d. 12h. 2m. 20s. Epicentre 33°·7S. 57°·7E.

$A = +·4455$, $B = +·7047$, $C = -·5523$; $\delta = +11$; $h = +1$;
$D = +·845$, $E = -·534$; $G = -·295$, $H = -·467$, $K = -·834$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tanararive		17·3	325	i 4 6	+ 2	i 7 15	− 1	i 4 21	PP	7·8
Grahamstown	Z.	25·9	263	(i 5 36)	+ 1	—	—	i 5 55	PP	—
Pretoria	Z.	26·7	281	(i 5 42)	− 1	i 9 4	PcP	i 6 8	PP	—
Colombo	E.	45·5	32	8 30	+ 7	15 15	+10	—	—	22·2
Kodaikanal	E.	47·6	27	i 8 40	+ 1	i 15 55	+20	9 36	PP	23·2
Perth		48·3	105	e 8 25	−20	i 15 48	+ 3	21 10	SSS	25·2
Batavia		53·0	70	i 9 21k	0	i 16 52	+ 2	—	—	—
Bandong		53·2	72	e 9 25	+ 3	i 17 2	+10	—	—	—
Poona		54·2	19	i 9 30	+ 1	i 17 4	− 2	e 11 36	PP	25·2
Bombay		54·3	18	i 9 30	0	i 17 14	+ 7	11 44	PP	24·4
Hyderabad		54·6	25	i 9 25	− 7	i 17 8	− 3	11 36	PP	—
Calcutta	E.	63·1	32	i 10 32	0	i 19 8	+ 6	i 13 8	PP	30·6
New Delhi	N.	64·6	19	i 10 41	0	i 19 14	− 7	i 13 5	PP	i 31·6
Dehra Dun	N.	66·5	19	e 9 46	−68	e 15 22	?	—	—	—
Helwan		68·0	336	i 11 4k	+ 1	20 2	0	13 40	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ksara		70·2	341	i 11 19k	+ 2	20 46?	+18	—	—	—
Ashkabad		71·3	0	11 25	+ 2	20 38	− 3	—	—	—
Stalinabad		72·6	9	i 11 31	0	i 20 54	− 2	—	—	—
Obi-garm		72·9	10	i 11 26	− 7	—	—	—	—	—
Samarkand		73·5	7	i 11 45	+ 9	—	—	—	—	—
Baku		74·1	354	i 11 20?	−20	e 21 0?	−12	—	—	—
Riverview		74·7	121	i 11 44a	+ 1	i 21 19	0	i 11 59	pP	e 35·2
Tamanrasset	z.	75·0	311	i 11 44a	− 1	e 29 44	SSS	i 11 53a	PcP	35·7
Leninakan		75·2	349	11 48	+ 2	e 21 28	+ 3	i 12 2	PcP	—
Andijan		75·3	11	11 46	− 1	i 21 24	− 2	—	—	—
Tashkent		75·4	9	i 11 48	+ 1	i 21 30	+ 3	—	—	—
Tiflis		76·0	350	i 11 51	0	21 41	+ 7	e 12 7	PcP	—
Tchimkent		76·4	9	i 11 54?	+ 1	i 21 40?	+ 2	—	—	—
Grozny		77·4	351	e 11 58	0	21 53	+ 4	—	—	—
Frunse		77·8	13	i 12 0	− 1	e 21 53	0	—	—	—
Athens		78·0	333	i 11 1?	−61	e 21 1?	−54	—	—	—
Almata		78·6	14	e 12 5	0	22 2	0	—	—	—
Sotchi		78·7	347	e 12 7	+ 1	e 22 5	+ 2	—	—	—
Istanbul		78·9	338	i 12 17	+10	e 22 1	− 4	—	—	—
Brisbane		79·4	116	i 12 9a	0	i 22 8	− 2	i 14 21	PP	e 39·6
Yalta		80·7	343	12 17	+ 1	—	—	—	—	—
Theodosia		80·9	344	e 12 19	+ 2	—	—	—	—	—
Catania		81·2	327	e 12 20	+ 1	e 22 44	+15	—	—	—
Sofia		82·3	335	12 27	+ 2	22 53	+13	—	—	—
Taranto		82·7	330	12 26	− 1	e 23 6	+22	—	—	47·1
Bucharest		82·9	338	i 12 28	0	—	—	i 15 49	PP	e 37·7
Christchurch		82·9	138	i 12 29	+ 1	22 48	+ 2	28 2	SS	38·5
Kaimata	N.E.	82·9	137	e 12 32	+ 4	—	—	—	—	—
Belgrade		85·2	334	12 39	0	i 23 14	+ 5	e 18 13	PPP	e 46·2
Wellington		85·6	137	i 12 40	− 1	i 23 7	[+ 2]	e 24 13	PS	39·8
Rome		85·9	328	i 12 43k	0	i 23 11	− 5	i 13 12	pP	i 36·0
Semipalatinsk		86·1	14	i 12 42	− 2	—	—	—	—	—
Algiers Univ.	z.	86·7	319	e 12 49	+ 2	—	—	—	—	—
Kalossa		87·2	335	12 50	+ 1	23 36	+ 8	16 18	PP	—
Zagreb		87·7	333	e 12 53	+ 1	e 23 40?	+ 7	e 16 27	PP	e 51·7
Budapest	E.	87·9	335	12 53	0	23 39	+ 4	16 17	PP	e 48·7
	N.	87·9	335	12 52	− 1	23 34	− 1	16 23	PP	45·7
Florence Xim.		88·0	329	i 12 53	0	i 23 21	[0]	—	—	—
Prato		88·1	329	e 12 50	− 4	i 23 37	0	—	—	—
Arapuni	E.	88·2	136	—	—	e 23 40?	+ 2	—	—	e 41·7
Padova		88·3	330	i 13 4	+ 9	i 23 57	+18	16 33	PP	—
Triest		88·4	331	i 12 55?	0	i 23 37	− 3	i 13 29	pP	e 39·7
Bologna		88·5	329	i 12 58k	+ 2	e 23 34	− 7	—	—	—
Auckland	N.	88·6	134	e 12 52	− 4	e 23 22	[− 2]	e 23 37	S	e 41·5
Ogyalla		88·6	335	e 13 38	+42	e 23 28	[+ 4]	—	—	—
Skalnate Pleso		89·0	337	i 13 1	+ 3	e 23 58	+13	—	—	—
La Plata	N.	89·0	228	—	—	24 22	+37	24 47	PS	39·8
Salo		89·7	329	i 13 2k	+ 1	e 23 56	+ 4	e 16 33	PP	—
Alicante		89·8	318	13 6	+ 4	23 34	[+ 2]	13 11	PcP	e 42·7
Almeria		89·8	316	i 13 3	+ 1	i 23 55	+ 2	16 24	PP	45·2
Pavia		90·0	328	e 13 3k	0	—	—	—	—	—
Sverdlovsk		90·2	2	i 13 1	− 3	i 23 53	− 3	16 36	PP	—
Barcelona		90·5	322	13 7	+ 2	23 40	[+ 4]	16 40	PP	45·6
Raciborzu		90·5	336	e 13 5	0	—	—	e 16 43	PP	—
Moscow		90·7	349	i 13 5	− 1	24 3	+ 2	—	—	—
Granada		90·7	315	i 13 5	− 1	24 10	+ 9	i 16 11	PP	45·1
Malaga		90·9	315	i 13 12	+ 5	i 24 20	+17	16 58	PP	47·0
Tortosa		91·0	320	i 13 11	+ 4	24 14	+11	13 15	PcP	e 38·7
Chur		91·1	329	e 13 8k	0	—	—	—	—	—
Prague		91·8	334	i 13 11	0	i 24 16	+ 5	i 16 54	PP	e 43·2
Zürich		92·0	329	e 13 11	− 1	e 24 7	− 5	e 13 56	pP	—
Neuchatel		92·4	328	e 13 14	0	e 24 29	+13	—	—	—
Basle		92·5	329	e 13 15k	+ 1	e 24 30	+13	e 17 0	PP	—
Stuttgart		92·8	331	e 13 13	− 3	e 24 29	+10	i 13 43	pP	e 52·7
Toledo		92·8	317	i 13 17	+ 1	i 24 29	+10	e 17 5	PP	46·6

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Clermont-Ferrand		93·2	325	i 13 19	+ 2	i 24 34	+11	i 13 26	pP	44·7
Strasbourg		93·2	330	i 13 17	0	e 24 31	+ 8	i 17 5	PP	e 42·2
Collmberg		93·3	333	e 13 16	− 2	e 24 34	+10	e 17 0	PP	e 45·7
Karlsruhe		93·3	330	e 13 17	− 1	—	—	—	—	—
Jena		93·6	333	e 13 18	− 1	e 24 39	+13	e 16 49	PP	e 50·7
Potsdam	z.	94·2	334	i 13 21?k	− 1	i 31 4	SS	i 17 10	PP	e 55·4
Irkutsk		94·8	27	13 23	− 2	24 5	[+ 5]	e 17 15	PP	—
Lisbon		95·0	314	13 21	− 5	—	—	17 18	PP	46·4
Paris		95·7	327	i 13 30	+ 1	i 24 51	+ 7	i 17 19	PP	e 40·7
De Bilt		97·0	331	i 13 36k	+ 1	i 24 22	[+10]	i 17 36	PP	e 47·7
Copenhagen		97·1	336	i 13 35	0	i 24 14	[+ 2]	i 24 23	SKKS	45·7
Helsinki		97·3	344	e 17 30	PP	e 24 14	[+ 1]	e 26 21	PS	e 45·7
Santa Lucia	N.	97·5	222	—	—	e 25 1	+ 2	e 24 23	SKS	—
Jersey		98·1	326	e 13 41	+ 1	e 24 21	[+ 3]	e 17 49	PP	32·2
Kew		98·9	328	i 13 44k	+ 1	e 25 27	+16	i 17 48	PP	e 41·7
Upsala	E.	98·9	341	e 17 14	PP	24 13	[− 9]	e 19 59?	PPP	e 43·7
	N.	98·9	341	e 17 38	PP	24 18	[− 4]	e 19 38	PPP	e 43·7
Durham		101·7	330	e 13 58	+ 2	i 23 50	?	i 18 11	PP	—
Rathfarnham Castle		102·8	327	e 17 48	PP	i 27 31	PS	—	—	—
Bergen		103·1	336	18 16	PP	24 44	[+ 2]	20 18	PPP	—
Edinburgh	E.	103·2	330	e 13 56	− 7	24 31	[−11]	18 13	PP	—
Aberdeen		103·6	332	i 17 53	PP	i 24 43	[− 1]	i 28 14	PPS	e 51·5
La Paz		108·2	236	i 14 32	P	i 25 11	[+ 6]	i 19 18	PP	50·7
Huancayo		116·2	234	e 18 48	[+ 3]	e 26 27	?	e 19 59	PP	e 46·7
Scoresby Sund		118·0	338	19 10	[+21]	26 0	[+17]	29 46	PS	57·7
Ivigtut		126·4	325	e 21 4	PP	43 4	SSS	—	—	63·7
San Juan		127·9	269	e 22 0	PP	e 26 52	[+38]	—	—	e 62·8
Bermuda		132·2	285	e 22 15	PP	e 40 17	SSP	i 23 50	PPP	e 66·1
Halifax		134·1	302	e 23 8	PKS	—	—	—	—	66·7
Seven Falls	E.	139·3	305	e 22 34	PP	—	—	—	—	66·7
Weston		139·4	298	e 19 22	[− 7]	e 34 42	PPS	i 22 27	PP	—
Harvard		139·6	298	i 22 29	PP	i 23 6	PKS	e 40 43	SS	e 73·7
Fordham		141·2	295	i 19 27	[− 6]	i 41 16	SS	i 20 5	sPKP	72·7
City College, N.Y.		141·3	295	i 20 21	?	e 35 7	PPS	i 22 19	PP	e 76·4
Philadelphia		142·1	293	e 19 26	[− 8]	e 35 14	PPS	i 22 40	PP	e 69·8
Ottawa		142·7	303	i 19 32a	[− 3]	31 56	?	22 45	PP	72·7
Pennsylvania		144·2	295	i 19 36	[− 2]	i 35 21	PPS	i 22 57	PP	71·4
College		145·2	19	i 19 38	[− 2]	e 33 10	PSKS	e 23 14	PKS	e 67·7
Columbia		145·9	283	i 19 44	[+ 3]	e 42 5	SS	e 33 20	PS	e 64·8
Honolulu		146·3	103	e 19 49	[+ 8]	e 26 45	[− 4]	—	—	e 72·6
Cleveland		147·0	296	e 19 42	[− 1]	i 42 12	SS	e 23 11	SKP	—
Chicago		151·6	298	i 19 45	[− 5]	—	—	e 23 17	PP	e 59·9
St. Louis		153·7	291	i 19 52	[− 1]	e 26 44	[−14]	i 20 14	pPKP	—
Florissant		153·8	291	e 26 29	?	i 26 40	[−18]	i 30 16	SKKS	—
Sitka		154·6	16	e 20 5	[+11]	e 43 27	SS	e 24 0	PP	e 59·4
Tacubaya		154·6	242	20 0	[+ 6]	i 27 0	[+ 1]	i 23 35	PP	—
Saskatoon		158·4	333	24 7	PP	31 0	[− 4]	27 45	PPP	62·0
Rapid City	E.	161·9	310	i 20 5	[+ 2]	e 24 39	PP	i 20 49	PKP_2	e 81·0
Hungry Horse		164·1	339	e 20 4	[− 1]	i 24 47	PP	i 20 57	PKP_2	—
Bozeman		165·2	327	e 20 8	[+ 2]	e 24 48	PP	e 21 7	PKP_2	e 84·1
Victoria		165·2	2	i 20 6k	[0]	46 22	SS	i 21 4	PKP_2	79·7
Butte	N.	165·6	332	e 20 8	[+ 2]	e 24 46	PP	e 21 4	PKP_2	e 76·8
Seattle		166·1	0	i 20 8	[+ 1]	e 46 40	SSP	i 21 9	PKP_2	—
Logan		168·5	317	e 20 4	[− 4]	e 31 51	[− 4]	i 25 9	PP	e 79·1
Salt Lake City		169·1	313	e 20 10	[+ 1]	e 27 11	[0]	e 25 2	PP	e 90·1
Tucson		170·3	266	i 20 11	[+ 2]	e 27 10	[− 2]	i 20 20	pPKP	e 86·9
Pierce Ferry		172·8	—	i 20 14	[+ 3]	e 32 15	[− 2]	i 21 41	PKP_2	—
Overton	z.	173·0	—	i 20 13	[+ 2]	—	—	i 25 29	PP	—
Shasta Dam		173·0	—	i 20 11	[0]	e 32 17	[− 1]	i 25 29	PP	—
Mineral	z.	173·4	—	e 20 12	[+ 1]	i 25 32	PP	i 20 53	PKP_2	—
Boulder City		173·5	—	e 20 14	[+ 3]	e 32 42	[+22]	e 26 24	PP	—
Reno	z.	173·9	—	i 20 12a	[+ 1]	e 28 48	PcP,PKP	e 25 28	PP	e 92·4
Ukiah		174·5	—	e 20 12	[+ 1]	e 32 20	[− 4]	e 24 48	PP	e 88·5
Tinemaha		175·3	—	i 20 14k	[+ 2]	i 28 45	PcP,PKP	i 25 45	PP	—
Palomar		175·5	—	i 20 14k	[+ 2]	i 32 44	[+14]	i 21 50	PKP_2	—

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Berkeley		175·8	—	i 20 14k	[+ 2]	i 27 48	[+35]	i 21 50	PKP_2	e 89·6
Riverside		175·9	—	i 20 14k	[+ 2]	i 28 56	P_cP,PKP	i 21 53	PKP_2	—
San Francisco		175·9	—	e 25 44	PP	—	—	—	—	—
Branner	z.	176·3	—	i 20 15k	[+ 3]	i 25 30	PP	i 21 54	PKP_2	—
Fresno	z.	176·3	—	i 20 14k	[+ 2]	i 25 47	PP	i 21 55	PKP_2	—
Lick		176·3	—	e 20 14k	[+ 2]	e 25 46	PP	i 21 55	PKP_2	—
Santa Clara		176·3	—	i 20 14	[+ 2]	i 25 50	PP	i 21 56	PKP_2	e 89·5
Pasadena		176·5	—	i 20 14k	[+ 2]	e 27 50	[+37]	i 21 55	PKP_2	e 74·5

Additional readings and note :—
Tananarive e =4m.13s., PPP =4m.27s., eSS =7m.27s., e =7m.33s.
Grahamstown and Pretoria record P and PP as PP and PPP respectively.
Kodaikanal S_cSE =18m.47s., SSSE =20m.55s.,
Perth i =10m.25s. and 18m.40s.
Poona ePPPEN =12m.42s., iP_cSEN =14m.32s., iPSEN =17m.14s., iPPSEN =17m.22s., iS_cSEN =19m.20s., iSSEN =20m.44s., QEN =22·7m.
Bombay SSE =21m.12s.
Hyderabad S_cSN =19m.3s., SSN =20m.53s.
New Delhi iN =10m.49s., 11m.2s., and 13m.52s., iPPPN =14m.35s., P_cSN =15m.21s., iN =19m.43s., PPSN =19m.56s., iN =20m.41s., iSSN =23m.37s., iN =25m.8s. and 27m.41s.
Dehra Dun eN =17m.52s. and 23m.48s.
Helwan eN =13m.10s., PPPNZ =15m.28s., eEN =20m.28s.
Riverview iS_cSE =21m.42s., iPSE =21m.50s., iN =21m.55s., iPPSE =22m.4s., iSSN =25m.55s.
Tamanrasset iZ =11m.47s.k, eZ =12m.50s. and 13m.44s., ePPZ =14m.27s., ePPPZ =16m.20s., iZ =19m.35s., eZ =20m.41s.
Tiflis iPP =14m.39s.?, SS =26m.59s.
Brisbane iZ =12m.23s., iSE =22m.12s., iSKSEN =22m.55s.
Bucharest iPEN =12m.31s., iN =14m.6s.
Christchurch iZ =13m.21s. and 23m.38s., SSSEN =31m.20s., QEN =34m.25s.
Wellington eSS =28m.40s?, Q =36·9m.
Rome PP =16m.16s., e =22m.50s., SS? =29m.11s.?, SSS =32m.40s.?
Algiers Univ. eZ =12m.57s. and 13m.49s.
Kalossa eE =16m.31s. and 26m.2s., eN =26m.47s.
Zagreb eE =15m.11s.
Budapest E. i =16m.58s., SKS =23m.30s., PPS =27m.7s., SSS =32m.18s.
Budapest N. PPP =18m.19s., SKS =23m.23s., PS =26m.48s., PPS =27m.3s., SSS =32m.8s.
Padova PPP =18m.29s., SKS? =23m.34s.
Triest isP =13m.40s., iPP =16m.27s., ipPP =16m.59s., isPP =17m.8s., ePPP =18m.26s., iSKS =23m.23s., isSKS =24m.9s., iPS =24m.27s., iPPS =25m.28s., iSS =30m.3s., iSSS =33m.43s.
La Plata PSE =24m.58s., SSN =29m.46s., SSE =29m.54s., SSSE =35m.4s.
Alicante pP =13m.51s., PP =16m.40s., PPP =18m.44s., S_cS =23m.18s., PS =24m.34s., PPS =25m.6s., SS =29m.28s., SSS =33m.8s.
Almeria PPP =18m.24s., SKS =23m.33s., PS =25m.17s., SS =30m.15s., SSS =33m.55s.
Pavia e =14m.10s.
Granada SKS =23m.40s., SS =30m.23s.
Malaga PPPN =18m.50s., ePSN =25m.34s., iSSZ =32m.42s.
Tortosa PPN =16m.56s., PPPE =18m.50s., SKSEN =23m.51s., PPS =25m.29s.
Prague i =13m.17s., e =20m.4s., iSKS? =23m.38s., SP =25m.16s., ePPS =26m.10s., eSS =30m.16s., eSSS =34m.40s.?
Zürich ePP =16m.54s., eSKS =23m.28s.
Stuttgart iP =13m.16s., eZ =13m.22s., e =15m.6s., ePP =16m.36s., and 17m.4s., ePPP =18m.55s., e =20m.40s., eSKS =23m.44s., eSS =31m.46s.
Toledo iZ =13m.28s., epPPN =17m.29s., PPPN =19m.17s., SKSE =23m.50s., PSN =25m.55s., SSN =30m.53s.
Clermont-Ferrand iPP =17m.6s., ipPP? =17m.15s., ePPP =19m.13s., iSKS =23m.53s., iPS =25m.46s., iPPS =26m.24s., iSS =31m.8s., and other unidentified i readings.
Strasbourg iPPP =19m.12s., iSKS =23m.45s., iPS =25m.41s., iSS =31m.9s., iSSS =34m.25s., and other unidentified readings.
Collmberg eN =13m.19s., eZ =14m.22s., eE =15m.25s. and 16m.6s., eN =16m.11s., eZ =16m.14s., eSKSEN =23m.40s.
Jena eN =16m.16s., ePP?EZ =17m.4s., eSKS?N =23m.48s. and 23m.52s., eS?E =24m.48s.
Potsdam iZ =13m.36s., eN =14m.25s., eE =15m.40s.?, eN =16m.40s.?, iPPPZ =19m.13s., eE =19m.29s., iZ =21m.3s. and 26m.7s.
Irkutsk iPS =26m.1s., SS =30m.52s.
Paris i =13m.36s., iPPP =19m.32s., i =21m.10s., e =22m.21s., iSKS =24m.5s., iSKKS =24m.16s., e =25m.8s., iPS? =26m.10s., i =26m.20s. and 27m.25s., eSS =31m.42s., eSSS =35m.7s.
De Bilt iPPP =19m.37s., ePS =26m.30s., eSS =31m.40s.?
Copenhagen 17m.1s. and 17m.31s., PS =26m.26s., PPS =27m.12s., SS =31m.58s.

Continued on next page.

Helsinki ePPP =19m.35s., e =21m.13s., 23m.7s., and 24m.37s., eSS =31m.20s., e = 31m.48s., and 33m.44s.
Santa Lucia eN =27m.38s.
Kew eZ =15m.38s., ePPP =20m.0s., eSKS =24m.24s., ePPS =26m.52s., eSSEN = 31m.23s., eSSSEN =36m.8s.
Upsala eN =17m.59s., e =24m.29s., ePS =26m.0s., ePPS =26m.40s., eSSN =30m.40s.?, eSSE =31m.40s.?, eSSSN =35m.4s.?, eE =36m.8s.
Durham iEN =18m.17s., 27m.25s., and 28m.11s.
Bergen PPSN =17m.40s.?, SSEN =33m.0s.
Aberdeen iEN =24m.53s., eSSN =33m.20s.
La Paz SKKS =25m.54s., iE =26m.40s., iPS =28m.16s., PPS =29m.22s., SS =34m.12s., SSS =38m.20s., Q =47m.10s.
Huancayo ePS =29m.36s., i =30m.50s., eSS =35m.46s., eSSS =39m.45s.
Scoresby Sund 20m.5s., 24m.46s., 26m.45s., 27m.12s., and 32m.57s., SS =36m.40s.
Weston iPKP =19m.30s.
Harvard ePSS =34m.46s.
Fordham iPP =22m.36s.
City College, N.Y. esSS? =41m.10s.
Philadelphia e =42m.15s., eSSS =45m.40s.
Ottawa e =23m.12s., eSS =41m.20s., e =43m.24s., SSS =46m.12s.
Pennsylvania iEN =37m.59s.
College eSS? =41m.34s.
Cleveland eZ =19m.46s., iN =19m.55s., eN =20m.12s., eE =23m.48s.
St. Louis i =20m.1s., isPKP? =20m.21s., iPP? =23m.29s., isPP =24m.23s., isSKKS = 30m.38s., iPSKS? =34m.6s., iSPP? =36m.36s.
Tacubaya e =28m.2s., eSKKS =30m.6s., eSKSP =34m.13s., e =36m.8s.
Saskatoon PPS =37m.9s., SSS =50m.27s.
Bozeman ePPP =28m.22s.
Victoria i =20m.17s., and 21m.18s., PP =24m.52s., PPP =28m.34s., e =35m.43s., SSS =52m.40s.?
Butte ePPPN =28m.25s.
Seattle i =20m.45s. and 21m.57s., ePP =24m.52s., e =25m.13s., ePPP =28m.51s., e = 29m.10s. and 35m.58s.
Logan e =21m.21s. and 35m.35s., eSS? =46m.32s.
Tucson e =23m.4s., eSKKS =32m.7s., eSS =45m.48s.
Pierce Ferry iPP =25m.31s., e =29m.55s.
Shasta Dam i =21m.38s. and 28m.48s.
Mineral iZ =20m.24s. and 21m.39s., eEN =25m.35s., iZ =26m.43s., iP$_c$P,PKPZ = 28m.50s., ePPPZ =29m.42s.
Boulder City i =21m.43s., ePPP =29m.28s.
Reno iZ =21m.43s., eZ =32m.14s. and 39m.16s.
Palomar iPPNZ =25m.43s., iZ =26m.12s., iP$_c$P,PKP =28m.55s., iZ =29m.12s.
Berkeley iPP =25m.44s., iP$_c$P,PKPNZ =28m.54s., iPPPZ =29m.46s., iSKKSN = 32m.33s., and many other unidentified readings.
Riverside iPPZ =25m.46s., iZ =29m.15s.
Branner eP$_c$P,PKPZ =28m.57s., eZ =31m.29s.
Fresno iPKP$_2$EN =21m.59s., iPPN =25m.51s., ePPPE =28m.34s., iPPPZ =28m.57s., and other unidentified readings.
Lick eEN =20m.17s., eE =25m.52s., ePPPZ =28m.54s., eN =32m.42s.
Santa Clara eEN =47m.20s., 48m.16s., and 55m.12s.
Pasadena iPPEZ =25m.46s., iP$_c$P,PKPZ =28m.58s., iPPPZ =30m.14s., iSKKSE = 32m.36s., eSKSP?E =35m.52s., eSS?E =46m.52s., eSSSE =54m.40s.
Long waves were also recorded at Lubbock.

Oct. 7d. 22h. 36m. 1s. Epicentre 33°·7S. 57°·7E. (as at 12h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tananarive	Z.	17·3	325	4 8	+ 4	7 20	+ 4	—	—	7·7
Grahamstown	Z.	25·9	263	i 5 37	+ 2	—	—	—	—	—
Pretoria	Z.	26·7	281	i 5 45	+ 2	—	—	—	—	—
Poona	E.	54·2	19	e 9 29	0	e 17 4	− 2	—	—	—
Helwan		68·0	336	e 11 1	− 2	e 20 5	+ 3	—	—	—
Ksara		70·2	341	i 11 17	0	e 20 47	+19	—	—	—
Stalinabad		72·6	9	i 11 29	− 2	i 20 58	+ 2	—	—	—
Tamanrasset	Z.	75·0	311	e 11 46	+ 1	—	—	—	—	—
Leninakan		75·2	349	e 11 51	+ 5	—	—	—	—	—
Andijan		75·3	11	11 47	0	e 21 31	+ 5	—	—	—
Tashkent		75·4	9	i 11 46	− 1	e 21 29	+ 2	—	—	—
Tiflis		76·0	350	e 11 48?	− 3	e 21 40	+ 6	—	—	—
Tchimkent		76·4	9	i 11 52	− 1	—	—	—	—	—
Istanbul		78·9	338	e 11 28	−39	—	—	—	—	—
Rome		85·9	328	—	—	e 23 10	[+ 3]	—	—	e 45·3

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Algiers Univ.	z.	86·7	319	e 12 49	+ 2	—	—	—	—	—
Stuttgart	z.	92·8	331	e 13 14	− 2	—	—	—	—	—
Strasbourg		93·2	330	e 13 16	− 1	—	—	—	—	—
Collmberg	z.	93·3	333	e 13 17?	− 1	—	—	—	—	—
College		145·2	19	i 19 38	[− 2]	—	—	—	—	—
Tacubaya		154·6	242	—	—	i 52 26	SSS	—	—	—
Hungry Horse		164·1	339	i 20 4	[− 1]	—	—	—	—	—
Logan		168·5	317	e 20 8	[0]	—	—	—	—	—
Tucson		170·3	266	e 20 11	[+ 2]	e 28 10	[+58]	—	—	—
Shasta Dam		173·0	—	e 20 10	[− 1]	—	—	—	—	—
Boulder City		173·5	—	e 20 8	[− 3]	—	—	—	—	—
Reno	z.	173·9	—	e 20 12a	[+ 1]	—	—	—	—	—
Tinemaha	z.	175·3	—	i 20 14	[+ 2]	—	—	—	—	—
Riverside	z.	175·9	—	e 20 12	[0]	—	—	—	—	—
Fresno	z.	176·3	—	e 20 13a	[+ 1]	—	—	e 25 48	PP	—
Pasadena	z.	176·5	—	i 20 13	[+ 1]	—	—	—	—	—

Additional readings :—
Helwan eZ = 11m.14s. and 14m.2s.
Tamanrasset eZ = 12m.29s.
Istanbul e = 12m.18s.
Hungry Horse e = 20m.20s., i = 20m.59s.
Tucson e = 20m.37s.
Long waves were also recorded at Granada, Alicante, La Paz, and Weston.

Oct. 7d. Readings also at 2h. (Pasadena, Riverside, Tucson, Shasta Dam, Berkeley, Mineral, Hungry Horse, and College), 7h. (near Copiapo), 8h. (Brisbane, Riverview, Tucson, Shasta Dam, Hungry Horse, and College), 9h. (Mount Wilson, Riverside, Tinemaha, Tucson, Puebla, near Tacubaya, and Vera Cruz), 11h. (College and Tacubaya), 12h. (near College), 14h. (Auckland, Tacubaya, Aberdeen, Copenhagen, and Stuttgart), 15h. (Almata, Obi-garm, Samarkand, Tchimkent, near Andijan, Frunse, Stalinabad, and Tashkent), 16h. (Andijan, Frunse, Obi-garm, Stalinabad, Tashkent, and Tchimkent), 17h. (Kew), 19h. (Istanbul, Ksara, Leninakan, Tiflis, Samarkand, Stalinabad, near Andijan, and Obi-garm), 21h. (Stuttgart, and near Obi-garm).

Oct. 8d. 3h. 8m. 49s. Epicentre 36°·3N. 15°·5E.

Intensity VI at Caltagirone (Catania), and Ispica (Ragusa); V at Catania, Mineo, Acireale (Catania), and Sortino (Siracusa); IV at Safferana Etnea, Paterno (Catania), Licata (Agrigento), etc. Epicentre as adopted (Strasbourg).

Monthly seismic bulletin, Rome, Oct., 1949, p. 8.

$A = +\cdot7785$, $B = +\cdot2159$, $C = +\cdot5894$; $\delta = +7$; $h = 0$;
$D = +\cdot267$, $E = -\cdot964$; $G = +\cdot568$, $H = +\cdot158$, $K = -\cdot808$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s	s.	m. s.		m.
Catania	1·3	345	i 0 25	P_g	i 0 41	S*	—	—	—
Messina	1·9	1	i 0 33a	− 1	i 0 57	− 2	i 0 35	P*	—
Taranto	4·4	19	1 5	− 5	e 1 52	−10	e 2 11	S*	—
Tunis	4·4	272	e 1 10	0	—	—	—	—	—
Rome	6·1	338	e 1 36	+ 2	2 41	− 4	2 54	S*	3·2
Florence Xim.	8·1	338	i 2 8	+ 6	i 3 52	+17	—	—	—
Prato	8·3	337	e 2 7	+ 3	e 3 53	+13	—	—	—
Padova	8·6	343	e 2 10	+ 1	e 4 14	SS	—	—	—
Bologna	8·8	340	e 1 59	−12	i 3 10	?	e 2 38	P*	—
Sofia	8·8	41	e 2 8	− 3	e 3 39	−14	—	—	—
Belgrade	9·3	22	e 2 12k	− 5	i 3 53	−12	e 4 46	S*	—
Triest	9·4	353	e 2 47	P*	i 4 16	+ 9	e 4 40	S*	4·9
Zagreb	9·5	2	e 2 17	− 3	—	—	e 2 33	PPP	e 4·2
Algiers Univ. z.	10·0	276	e 2 24	− 3	e 4 35	SS	i 2 36	PP	e 5·4
Salo	10·0	340	e 2 30	+ 3	—	—	e 3 43	?	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pavia		10·1	334	e 2 37	PP	e 4 19	− 6	—	—	—
Bucharest		11·4	42	e 2 47	0	e 3 56	−60	—	—	—
Chur		11·4	339	e 2 46	− 1	e 5 15	SS	—	—	—
Barcelona		11·6	300	—	—	5 59	+58	—	—	—
Istanbul		11·6	62	e 2 48	− 2	e 8 14	P_cP	—	—	—
Zürich		12·2	338	e 2 58	0	e 5 26	+10	—	—	—
Ravensburg		12·3	341	e 3 1	+ 2	—	—	—	—	—
Tortosa	E.	12·6	296	i 3 5	+ 2	—	—	—	—	7·4
Basle		12·7	325	e 3 8	+ 3	e 5 40	+12	—	—	—
Alicante		12·9	284	3 11	+ 4	5 31	− 2	3 22	pP	6·5
Besançon		13·0	330	e 3 7	− 2	—	—	e 3 25	PPP	—
Clermont-Ferraud		13·3	319	e 3 18	+ 5	e 5 46	+ 4	i 3 27	PPP	6·4
Stuttgart		13·3	342	e 3 9	− 4	e 5 37	− 5	e 3 14	P	e 6·2
Strasbourg		13·5	338	i 3 13	− 2	i 5 59	+12	i 3 25	PP	i 6·7
Prague		13·8	357	3 25	+ 6	i 5 56	+ 2	—	—	—
Raciborzu		13·9	7	e 3 19	− 2	—	—	—	—	—
Almeria		14·5	278	i 3 25	− 3	6 9	− 2	3 29	PP	7·6
Helwan		14·7	111	e 3 26	− 5	e 5 53	−23	e 6 31	SS	—
Jena		14·9	350	e 3 30	− 4	—	—	i 3 35	P	e 7·3
Collmberg		15·1	354	e 3 33?	− 3	e 6 45	SS	e 3 43	PP	e 8·4
Granada		15·3	280	i 3 38 a	− 1	i 6 45	SS	i 4 15	PPP	8·9
Paris		15·7	327	e 3 35	− 9	e 6 41	+ 2	i 3 47	P	e 9·2
Toledo		15·8	289	e 3 43	− 2	i 7 7	SS	—	—	9·4
Malaga	Z.	16·0	278	i 3 53 a	+ 5	i 7 6	SS	i 8 22	P_cP	—
Tamanrasset	Z.	16·0	215	e 3 42	− 6	—	—	e 3 57	PP	i 8·3
Potsdam		16·2	355	e 4 11?	PPP	—	—	—	—	9·2
Yalta		16·4	54	e 4 11	PP	—	—	—	—	—
Ksara		16·9	93	e 3 57	− 2	7 13	+ 6	—	—	—
De Bilt		17·4	340	i 4 8 a	+ 2	e 7 35	SS	—	—	9·7
Theodosia		17·4	53	3 53	−13	e 7 26	+ 7	—	—	—
Jersey	E.	18·2	322	e 4 16	0	—	—	—	—	—
Kew		18·9	330	i 4 26	+ 2	e 7 51	− 2	i 4 54	PPP	e 9·2
Copenhagen		19·5	355	i 4 21	−10	—	—	i 4 27	P	10·6
Lisbon		19·7	286	4 17	−17	—	—	4 35	P	10·5
Durham		21·9	334	e 4 52	− 5	e 8 57	+ 3	i 9 34	SS	—
Leninakan		22·6	70	4 56?	− 7	e 9 16	+ 9	—	—	—
Tiflis		23·3	68	5 11	+ 1	i 8 25	−55	—	—	—
Aberdeen		24·0	337	—	—	i 9 36	+ 4	—	—	—
Grozny		24·2	64	5 22?	+ 3	9 38?	+ 3	—	—	—
Moscow		24·6	31	e 5 21	− 2	e 9 31	−11	—	—	—
Sverdlovsk		36·3	41	7 8	+ 1	12 44	− 4	—	—	—
Tashkent		41·6	66	e 7 55	+ 4	e 14 6	− 2	—	—	—
Tchimkent		41·7	65	e 7 45?	− 7	—	—	—	—	—
Weston		64·6	306	i 10 29	−12	—	—	—	—	—
Ottawa		66·0	310	e 10 48	− 2	—	—	—	—	—
College		78·3	354	e 12 4	+ 1	—	—	—	—	—
Hungry Horse		84·5	330	e 12 34	− 2	—	—	e 12 46	P_cP	—
Victoria		88·1	334	e 12 52	− 2	—	—	—	—	—
Shasta Dam		94·2	330	e 11 59	?	—	—	—	—	—
Tucson		95·3	318	e 13 47	+20	—	—	—	—	—

Additional readings :—
Messina iS_gZ = 1m.2s.
Rome e = 2m.19s.
Belgrade e = 3m.43s.
Triest eS = 3m.36s.
Algiers Univ. iZ = 2m.30s., iPPPZ = 2m.45s., eZ = 4m.48s. and 5m.11s.
Alicante PP = 3m.27s., PPP = 3m.31s., SS = 5m.47s.
Clermont-Ferrand eSS = 6m.2s., iSSS = 6m.11s.
Strasbourg eP = 3m.19s., i = 4m.6s. and 4m.32s., e = 5m.41s., and 5m.50s.
Paris i = 3m.54s. and 6m.12s., iSS? = 6m.56s., i = 7m.21s.
Toledo iN = 4m.47s., 5m.15s., and 7m.18s.
Malaga iS_cPZ = 11m.28s., S_cSZ = 14m.44s.
Tamanrasset iZ = 3m.47s.k, ePPPZ = 4m.5s., iZ = 7m.57s.
Kew eSS = 8m.9s.
Durham iEN = 9m.2s., 9m.24s., and 14m.27s.
Hungry Horse e = 14m.33s. and 15m.11s.
Long waves were also recorded at Scoresby Sund.

Oct. 8d. 20h. 34m. 18s. Epicentre 21°·5N. 122°·0E. (as on 1948, Sept. 24d.).

A = −·4935, B = +·7898, C = +·3644; δ = +11; h = +4;
D = +·848, E = +·530; G = −·193, H = +·309, K = −·931.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Osaka		17·7	38	e 4 21	+11	7 0	−26	—	—	8·0
Tokyo		21·0	43	e 4 54	+ 7	8 56	+19	—	—	—
Sendai		23·3	40	e 4 4	−66	8 22	−58	—	—	—
Mizusawa	E.	24·0	39	e 5 13	− 4	9 36	+ 4	—	—	—
Sapporo		26·9	30	e 5 46	+ 1	—	—	—	—	—
Batavia		31·3	210	i 6 27a	+ 3	i 11 37	+ 6	—	—	—
Bandong		31·5	208	e 6 34	+ 8	e 11 49	+15	—	—	—
Irkutsk		33·6	340	e 6 40	− 4	—	—	—	—	—
Hyderabad	N.	41·2	272	—	—	e 14 1	− 1	—	—	—
Almata		43·2	312	e 8 2	− 2	—	—	—	—	—
Semipalatinsk		43·6	322	i 8 1	− 7	—	—	—	—	—
Poona		45·2	275	—	—	e 14 59	− 2	i 18 13	SS	—
Andijan		46·0	307	e 8 25	− 2	e 15 10	− 2	—	—	—
Bombay		46·1	276	e 11 42?	PPP	—	—	—	—	—
Tchimkent		48·2	309	e 8 42	− 2	—	—	—	—	—
Tashkent		48·3	307	e 8 42	− 3	e 15 38	− 7	—	—	—
Stalinabad		48·4	304	i 8 44	− 2	i 15 44	− 2	—	—	—
Samarkand		49·9	303	e 8 56	− 1	—	—	—	—	—
Sverdlovsk		56·7	325	9 42	− 6	17 31	− 9	—	—	—
Tiflis		66·7	307	10 55	0	19 45	− 1	—	—	—
Leninakan		67·6	307	e 11 10?	+ 9	—	—	—	—	—
Moscow		69·4	324	e 11 10	− 2	e 20 10?	− 8	—	—	—
College		70·8	26	e 11 23	+ 3	—	—	—	—	—
Ksara		75·3	300	e 11 49	+ 2	e 21 46	+20	—	—	—
Helwan		80·1	298	i 12 15	+ 2	—	—	e 12 41	P_cP	—
Prague		84·4	323	e 12 36	0	e 23 20	+19	—	—	—
Collmberg		84·6	322	e 12 35?	− 1	—	—	—	—	e 50·7
Zagreb		85·4	317	e 12 42	+ 2	—	—	—	—	—
Triest		86·8	319	e 12 45	− 2	e 23 14	[+ 1]	—	—	—
Stuttgart		88·0	323	e 12 54	+ 1	—	—	e 16 27	PP	e 52·7
Padova		88·5	318	e 12 59	+ 3	e 23 32	{+ 1}	—	—	—
Bologna		88·9	318	e 13 8	+10	e 23 45	+ 1	—	—	—
Strasbourg		88·9	323	e 13 0	+ 2	—	—	—	—	e 43·7
Florence Xiii.		89·3	317	e 13 9	+10	e 23 44	− 4	—	—	—
Rome		89·4	315	e 13 0	0	23 42	{+ 5}	23 12	SKS	—
Besançon		90·7	322	e 13 8	+ 2	—	—	—	—	—
Kew		91·6	328	—	—	e 42 52	?	e 45 42?	Q	e 49·7
Paris		91·7	325	e 13 13	+ 3	—	—	e 12 29	?	e 51·7
Clermont-Ferrand		93·1	322	e 13 18	+ 1	—	—	—	—	53·7
Shasta Dam		94·0	43	e 13 25	+ 4	—	—	—	—	—
Hungry Horse		94·3	34	e 13 22	− 1	—	—	—	—	—
Alicante		99·7	318	—	—	e 25 14	− 4	—	—	e 47·6
Ottawa		111·5	13	e 13 2	?	—	—	—	—	—

Additional readings:—
Mizusawa PN = 5m.38s., SN = 9m.41s.
Rome e = 26m.9s.
Long waves were also recorded at other European stations and at Weston.

Oct. 8d. Readings also at 2h. (La Paz), 3h. (near Algiers Univ.), 5h. (Copiapo, Erevan, near Tiflis, Leninakan, and Grozny), 9h. (Samarkand, near Obi-garm, Stalinabad, and Andijan), 11h. (Triest, Ksara, Bombay, Christchurch, Obi-garm, Andijan, near Samarkand, Tashkent, Stalinabad, Tchimkent, and near Alicante), 12h. (La Paz), 14h., 15h., and 16h. (near Obi-garm), 18h. (Helwan), 19h. (Stuttgart and near Bogota), 20h. (near Obi-garm and Stalinabad), 22h. (Hungry Horse and Shasta Dam), 23h. (Granada, Samarkand, near Obi-garm, Stalinabad, Andijan, and Tchimkent).

Oct. 9d. Readings at 0h. (Obi-garm (2), Samarkand (2), Tashkent, near Andijan (2), Stalinabad (2), and Tchimkent (2)), 1h. (Samarkand, near Andijan, Obi-garm, Stalinabad, Tashkent, and Tchimkent), 2h. (La Paz), 3h. (Apia), 4h. (Pierce Ferry, Shasta Dam, Hungry Horse, College, Collmberg, Jena, Strasbourg, Stuttgart, Besançon, Ksara, and Tamanrasset), 5h. (Andijan, and near Stalinabad), 6h. (Samarkand, near Andijan, Stalinabad, and Tchimkent), 7h. (Huancayo), 9h. (near Alicante (3)), 10h. (Tucson, Pierce Ferry, Shasta Dam, Puebla, Tacubaya, and Vera Cruz), 11h. (Andijan, Samarkand, Tchimkent, near Stalinabad, near Alicante, and near Santa Lucia), 12h. (near Istanbul), 13h. (near Apia, Auckland, Wellington, Christchurch, College, Overton, Pierce Ferry, Shasta Dam, and Hungry Horse), 14h. (Paris, Besançon, Strasbourg, Stuttgart, Ksara, and near Messina), 15h. (Tucson, Pierce Ferry, Hungry Horse, College, Vera Cruz, near Puebla, and Tacubaya), 16h. (near Obi-garm), 17h. (Strasbourg and Stuttgart), 18h. (Strasbourg, Stuttgart (2), near Andijan (2), and near Santa Lucia), 19h. (Brisbane and Tamanrasset), 20h. (Bologna, Andijan, near Rome and near Stalinabad), 21h. (Tucson, Overton, Pierce Ferry, and Shasta Dam), 22h. (Ottawa and near Tacubaya), 23h. (Pierce Ferry).

Oct. 10d. Readings at 1h. (near Alicante and near Mizusawa), 2h. (Hungry Horse and Shasta Dam), 3h. (Stuttgart), 4h. (Istanbul and near Mineral), 5h. (near Istanbul), 6h. (Tucson, and near Mizusawa), 8h. (College, and near Andijan), 10h. (Samarkand (2), near Andijan (2), Obi-garm (2), Stalinabad (2), Tashkent, and Tchimkent), 11h. (La Plata, and near Copiapo), 12h. (Ksara, and near Istanbul), 13h. (Collmberg, Reykjavik, Bombay, Calcutta, Colombo, Sverdlovsk, Tchimkent, near Andijan, and Stalinabad), 14h. (near Stalinabad), 15h. (Frunse, near Andijan (2), and Tchimkent), 16h. (near Reykjavik), 17h. (Ksara, Tiflis, near Andijan, and near Tacubaya), 18h. (near Copiapo), 20h. (La Plata, San Francisco, and near Berkeley), 21h. (Pasadena, Tinemaha, Tucson, Boulder City, Overton, Shasta Dam, Pierce Ferry, Hungry Horse, College, Pretoria, Istanbul, near Bucharest, and near Klyuchi), 23h. (Collmberg, Stuttgart, Pierce Ferry, and College).

Oct. 11d. 9h. 5m. 27s. Epicentre 42°·8N. 144°·0E. Depth of focus 0·020
(as on 1944, July 10d.).

Intensity V at Kusiro ; IV at Hatinohe and Urakawa ; II-III at Nemuro, Miyako, and Morioka. Epicentre 42°·6N. 144°·0E. Depth of focus 100km. Macroseismic radius >300km.

Seismo. Bull., Cent. Met. Obs., Japan, for 1949. Tokyo, 1950, p. 35, with macroseismic chart.

$A = -\cdot5954$, $B = +\cdot4326$, $C = +\cdot6770$; $\delta = -3$; $h = -3$;
$D = +\cdot588$, $E = -\cdot809$; $G = -\cdot548$, $H = +\cdot398$, $K = -\cdot736$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Nemuro		1·3	65	0 24 a	− 5	0 42	− 9	—	—
Sapporo		2·0	278	0 37	+ 1	1 0	− 4	—	—
Mori		2·6	255	0 49	+ 6	1 17	0	—	—
Hatinohe		2·9	224	0 48 a	+ 1	1 23	0	—	—
Aomori		3·1	230	0 49	− 1	1 29	+ 1	—	—
Miyako		3·5	206	0 55 a	0	1 37	0	—	—
Morioka		3·8	215	0 59 a	0	1 43	− 1	—	—
Akita		4·2	225	1 3	− 1	1 59	+ 6	—	—
Mizusawa	E.	4·3	212	i 1 7	+ 2	i 1 55	0	—	—
Sendai		5·1	208	1 19 a	+ 3	2 16	+ 2	—	—
Hukusima		5·7	209	1 27	+ 3	—	—	—	—
Onahama		6·3	203	1 34	+ 2	2 40	− 3	—	—
Aikawa		6·5	225	1 28	− 6	2 49	+ 1	—	—
Mito		7·0	204	1 43	+ 2	—	—	—	—
Kakioka		7·2	205	1 46	+ 2	—	—	—	—
Tukubasan		7·2	205	1 44	0	3 3	− 1	—	—
Maebasi		7·4	212	1 53	+ 7	3 22	+13	—	—
Nagano		7·6	218	1 53	+ 4	3 27	+13	—	—
Wazima		7·7	227	1 53	+ 3	3 19	+ 3	—	—
Tokyo		7·8	206	1 54	+ 2	3 18	− 1	—	—
Yokohama		8·1	206	2 13	+19	3 32	+ 6	—	—
Hunatu		8·3	211	1 54	− 4	3 30	− 1	—	—
Mera		8·5	204	2 1	0	3 33	− 2	—	—
Osima		8·8	206	2 6	+ 1	3 41	− 2	—	—
Shizuoka		9·0	211	2 23	+15	3 46	− 1	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Gihu		9·3	220	2 12	0	3 55	+ 1	—	—
Nagoya		9·4	218	2 4	− 9	4 24	+27	—	—
Kameyama		9·9	219	2 29	+10	—	—	—	—
Osaka		10·5	222	2 25	− 2	5 11	+48	—	—
Irkutsk		28·1	305	5 37	− 2	10 14	+ 4	—	—
College		43·2	35	i 7 45	− 2	—	—	i 8 16	pP
Andijan		51·9	294	e 8 52	− 2	16 8	+ 5	—	—
Sverdlovsk		52·2	316	8 55	− 1	16 8	+ 1	—	—
Tchimkent		53·1	297	i 9 4	+ 1	—	—	—	—
Tashkent		53·7	296	e 9 11	+ 4	—	—	—	—
Shasta Dam		66·1	56	i 10 32	0	—	—	—	—
Hungry Horse		66·3	46	i 10 33	0	—	—	—	—
Mineral	z.	66·8	56	i 10 36a	0	—	—	i 11 10	pP
Berkeley	z.	67·9	58	i 10 43a	0	—	—	—	—
Lick	z.	68·6	58	i 10 48k	0	—	—	—	—
Tinemaha		70·9	57	i 11 2a	0	—	—	i 11 37	pP
Logan		71·7	49	e 11 7	+ 1	—	—	—	—
Pasadena		72·8	59	i 11 12	− 1	—	—	e 11 45	pP
Riverside		73·4	59	i 11 15	− 1	—	—	e 11 34	pP
Overton	z.	73·6	55	i 11 19	+ 2	—	—	e 11 54	pP
Boulder City		73·7	56	i 11 18	0	—	—	e 11 49	pP
Pierce Ferry		74·1	55	i 11 22	+ 2	—	—	—	—
Palomar	z.	74·2	59	i 11 20	− 1	—	—	—	—
Collmberg		77·1	331	e 11 36	− 1	—	—	e 12 11	pP
Tucson		78·7	56	i 11 47	+ 1	—	—	e 12 20	pP
Ksara		79·4	306	e 11 57	+ 7	e 21 52	+16	—	—
Stuttgart	z.	80·5	332	e 11 55	− 1	—	—	—	—
Strasbourg		81·2	332	e 11 55	− 4	—	—	—	—
Paris		82·7	335	i 12 6	− 1	—	—	—	—
Besançon		82·9	333	e 12 9	+ 1	—	—	—	—
St. Louis		85·2	40	e 12 18	− 1	e 22 25	[0]	e 12 53	pP
Ottawa		85·3	27	i 12 19k	− 1	—	—	e 12 53	pP
Weston		89·4	25	i 12 40	0	—	—	—	—
La Paz		142·1	56	e 18 39	[−34]	—	—	—	—

Additional readings :—
Tinemaha iZ = 11m.9s.
Collmberg eEZ = 11m.41s.
Paris i = 12m.15s.
St. Louis eS = 23m.33s.

Oct. 11d. 11h. 36m. 53s. Epicentre 32°·5S. 179°·0W. (as on 1940, June 2d.).

A = −·8449, B = −·0147, C = −·5347 ; δ = −2 ; h = +1 ;
D = −·017, E = +·1·000 ; G = +·535, H = +·009, K = −·845.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	6·7	228	i 1 2	−40	e 2 2	−58	—	—	—
Tuai	N.	7·0	205	1 44	− 2	2 55	−13	i 2 12	P_g	—
New Plymouth	E.	8·6	219	e 2 32	+23	e 3 54	+ 6	—	—	—
Wellington		10·1	208	e 2 19	− 9	i 4 2	−23	—	—	—
Cobb River	E.	10·8	215	—	—	e 4 21	−21	—	—	—
Kaimata	N.E.	12·5	214	e 3 2	0	e 5 0	−23	—	—	—
Christchurch		12·9	209	—	—	e 5 10	−23	—	—	—
Apia		19·7	23	e 5 4	+30	e 8 29	+19	—	—	—
Brisbane		24·7	276	e 5 27	+ 3	e 9 47	+ 3	—	—	—
Riverview		25·0	259	e 5 27	0	i 10 25	SS	i 10 38	SSS	e 11·7
Pasadena	z.	87·5	47	i 12 53	+ 2	—	—	—	—	—
Berkeley	z.	87·7	42	i 12 55a	+ 3	—	—	—	—	—
Lick	z.	87·7	42	i 12 55k	+ 3	—	—	—	—	—
Palomar	z.	87·8	48	i 12 54	+ 2	—	—	—	—	—
Riverside		87·9	47	i 12 55	+ 2	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tinemaha	z.	89·5	44	i 13 3	+ 3	—	—	—	—	—
Shasta Dam		89·6	39	i 13 3	+ 2	—	—	—	—	—
Mineral	z.	89·8	40	i 13 4k	+ 2	—	—	—	—	—
Boulder City		90·8	46	i 13 10	+ 4	—	—	—	—	—
Tucson		91·0	51	i 13 11	+ 4	—	—	—	—	—
Overton	z.	91·4	46	i 13 13	+ 4	—	—	—	—	—
Pierce Ferry		91·4	47	i 13 13	+ 4	—	—	—	—	—
College		100·1	12	e 13 51	+ 2	—	—	—	—	—
Ottawa		121·1	52	e 18 55	[0]	—	—	—	—	—
Ksara		150·8	281	e 19 50	[+ 1]	—	—	35 38	PPS	—
Collmberg	z.	159·2	338	e 20 39	PKP_2	—	—	—	—	—

Additional readings :—
Tuai iN = 3m.0s. and 3m.21s., eN = 4m.19s.
New Plymouth eE = 2m.42s.
Wellington e = 2m.37s.
Brisbane iE = 5m.45s.
Riverview iZ = 5m.47s.
Pasadena iZ = 13m.6s. and 13m.12s.
Riverside iZ = 13m.7s.
Tinemaha eZ = 13m.22s.
Boulder City e = 13m.48s.
Tucson i = 13m.27s.
Overton eZ = 13m.51s.
Pierce Ferry i = 13m.28s.
Collmberg eZ = 21m.20s.
Long waves are also recorded at Autofagasta, Huancayo, Alicante, Clermont-Ferrand, Kew, and Strasbourg.

Oct. 11d. Readings also at 0h. (Tuai, Boulder City, Overton, near Pierce Ferry (3), and near Andijan), 3h. (Haiwee, Mount Wilson, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam (2), and College), 7h. (Apia, Auckland, Wellington, Tucson, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 9h. (near Seven Falls), 10h. (Tucson (2)), 11h. (Lick, near Berkeley, Branner, San Francisco, and near Mineral), 12h. (Tacubaya), 13h. (Andijan and near Stalinabad) 16h. (Pasadena), 17h. (near Stalinabad), 18h. (La Paz), 19h. (Andijan, Frunse, Samarkand, Tchimkent, near Obi-garm, Stalinabad, near Berkeley, and San Francisco), 20h. (Christchurch, Wellington, Ksara, Tacubaya, Pasadena, Riverside, Shasta Dam, College, near Victoria, and near Andijan), 12h. (near Victoria), 22h. (Stuttgart, and near Stalinabad), 23h. (near Berkeley and San Francisco).

Oct. 12d. Readings at 0h. (Riverside, Tinemaha, Boulder City, Shasta Dam, Hungry Horse, College, and Tamanrasset), 1h. (Ksara, Kew, Strasbourg, and Pierce Ferry), 2h. (Almeria, Alicante, Malaga, and La Paz), 3h. (Haiwee, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Overton, Shasta Dam, Mineral, Hungry Horse, Bermuda, San Juan, La Paz, Kew, and Ksara), 5h. (Copiapo, Santa Lucia, and Messina), 7h. (Hungry Horse), 10h. (Copiapo and Tucson), 11h. (Durham, Ksara, Poona, Almata, Ashkabad, Semipalatinsk, Tashkent, near Andijan, Frunse, Murgab, Samarkand, Stalinabad, Tchimkent, and near Bogota), 12h. (La Paz, College, Grozny, and Wellington), 16h. (Jena), 17h. (Tucson, Pierce Ferry, Almata, Frunse, Tashkent, Tchimkent (2), near Andijan (2), Obi-garm, Stalinabad (2), and near Semipalatinsk), 18h. and 20h. (Pierce Ferry), 21h. (Pierce Ferry, and near Tucson), 22h. (Copenhagen, De Bilt, Kew, and Rome), 23h. (Copiapo, and near Branner).

Oct. 13d. 3h. 35m. 24s. Epicentre 20°·1S. 173°·1W. (as on 1946, Nov. 12d.).

$A = -·9330$, $B = -·1129$, $C = -·3416$; $\delta = -7$; $h = +5$;
$D = -·120$, $E = +·993$; $G = +·339$, $H = +·041$, $K = -·940$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		6·4	12	1 39	+ 1	e 2 18	−35	—	—	e 3·0
Auckland	N.	19·8	209	i 4 40	+ 5	i 8 28	+15	e 4 56	PP	10·9
Wellington	z.	23·5	204	5 16	+ 4	e 10 44	SSS	—	—	13·6
Christchurch	z.	26·3	203	4 41	−58	e 10 21	+10	e 9 27	P_eP	12·4
Riverview		34·5	238	e 6 53	+ 1	e 12 24	+ 4	i 8 8	PP	i 17·4
Pasadena		75·1	45	e 11 40	− 6	—	—	e 12 5	P_eP	e 35·6
Riverside	z.	75·5	45	e 11 43	− 5	—	—	—	—	—
Palomar	z.	75·5	47	i 11 45	− 3	—	—	—	—	—
Fresno	z.	75·7	42	e 11 43	− 6	—	—	—	—	—
China Lake	z.	76·5	44	e 11 55	+ 1	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Shasta Dam		76·7	37	e 11 45	−10	—	—	—	—	—
Tinemaha	z.	76·8	43	e 11 51	− 4	—	—	—	—	—
Mineral	z.	76·9	39	e 11 51	− 5	—	—	—	—	—
Boulder City		78·4	45	e 12 1	− 3	—	—	—	—	—
Overton	z.	79·0	45	e 12 4	− 3	—	—	e 12 48	pP	—
Pierce Ferry		79·0	46	e 12 3	− 4	—	—	e 14 33	PP	—
Tucson		79·1	50	e 12 4	− 4	—	—	e 12 29	P_cP	e 37·7
Hungry Horse		86·1	35	e 12 35	− 9	—	—	—	—	—
Huancayo		93·1	104	e 25 49	PS	e 23 58	[+ 7]	e 30 36	SS	e 43·8
St. Louis		97·0	52	—	—	e 24 12	[0]	i 25 1	S	—
La Paz		97·8	111	e 12 45	−53	i 24 24	[+ 8]	14 2	P_cP	46·6
Philadelphia		108·6	53	—	—	e 34 22	SSP	—	—	e 56·3
San Juan		111·6	77	—	—	e 25 12	[− 7]	—	—	e 56·3
Potsdam	z.	147·4	354	i 19 44	[+ 1]	—	—	—	—	e 81·6
De Bilt		148·0	2	e 19 53	[+ 9]	—	—	—	—	e 79·6
Kew		148·2	9	e 20 12	[+27]	e 42 17	SS	—	—	e 77·6
Collmberg	z.	148·5	352	e 19 46	[+ 1]	—	—	—	—	—
Jena		149·0	354	e 19 48	[+ 2]	—	—	e 19 59	PKP_2	—
Prague		149·5	351	e 20 1	[+14]	—	—	e 24 43	PP	—
Ksara		150·9	304	e 19 51	[+ 2]	e 33 48	PSKS	23 32	PP	—
Paris		151·1	8	i 19 54	[+ 5]	—	—	i 23 21	PKS	e 84·6
Stuttgart		151·3	358	e 19 53	[+ 4]	—	—	—	—	e 82·6
Strasbourg		151·6	359	e 19 52	[+ 2]	—	—	—	—	e 79·6
Besançon		152·9	2	e 19 53	[+ 1]	—	—	e 20 36	PKP_2	—
Triest		153·9	350	—	—	e 43 20	SS	e 44 5	SSP	—
Clermont-Ferrand		154·2	8	e 20 14	PKP_2	—	—	—	—	e 85·1
Padova		155·3	351	e 20 21	PKP_2	—	—	—	—	—
Helwan		155·8	299	e 20 7	PKP_2	e 30 51	{+ 1}	e 23 56	PP	—
Rome		157·8	352	e 20 3	[+ 5]	e 49 53	SSS	e 20 31	PKP_2	—
Malaga		160·7	29	i 20 34	PKP_2	—	—	i 25 32	PP	87·6
Tamanrasset	z.	177·0	—	21 2	[+50]	—	—	22 1	PKP_2	—

Additional readings :—
Riverview iPPPEZ =8m.35s., eSSE =14m.39s., eSSSN =15m.10s., eRE =16m.36s.
Tucson e =20m.19s.
St. Louis e =42m.54s.
La Paz iN =24m.0s., and 25m.19s.
Prague i =20m.30s., e =34m.57s.
Paris i =19m.58s., 20m.5s., and 20m.18s.
Strasbourg i =20m.0s., e =20m.12s., i =20m.18s.
Besançon e =20m.9s. and 21m.34s.
Helwan eZ =20m.24s., 21m.3s., 21m.30s., and 25m.0s.
Rome ePSKS? =34m.37s., ePPS =39m.23s., eSS =43m.59s.
Malaga PKP_2Z =21m.42s.
Tamanrasset PPZ =25m.53s.
Long waves were recorded at Alicante, Granada, Copenhagen, Bogota, Galerazamba Tananarive, and other North American stations.

Oct. 13d. 10h. 26m. 30s. Epicentre 36°·6N. 44°·5E.

$A = +·5740$, $B = +·5640$, $C = +·5936$; $\delta = -7$; $h = 0$;
$D = +·701$, $E = -·713$; $G = +·423$, $H = +·416$, $K = -·805$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Erevan	3·6	0	1 4	+ 6	2 1	+19	—	—	—
Leninakan	4·2	353	1 7	0	—	—	—	—	—
Tiflis	5·1	2	1 19	− 1	2 34	+14	—	—	—
Grozny	6·8	8	e 1 48?	+ 4	i 3 17	+14	—	—	—
Ksara	7·6	251	i 1 57	+ 2	4 5?	L	—	—	(4·1)
Sotchi	7·9	334	2 8	+ 9	—	—	—	—	—
Ashkabad	11·1	79	e 2 44	+ 1	6 21	L	—	—	(6·4)
Yalta	11·1	318	e 2 47	+ 4	—	—	—	—	—
Istanbul	12·8	295	e 3 5	− 1	—	—	—	—	—
Helwan	12·9	243	i 3 9a	+ 2	7 26	?	(8 15)	P_cP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sofia		17·4	297	e 4 6	0	—	—	—	—	e 11·1
Stalinabad		19·3	76	i 4 29?	0	i 8 17?	+15	—	—	—
Moscow		19·7	349	4 30	− 4	e 8 8	− 2	—	—	—
Tashkent		19·8	68	i 4 34?	− 1	i 8 24?	+11	—	—	—
Obi-garm		20·1	76	i 4 36	− 2	—	—	—	—	—
Tchimkent		20·2	66	i 4 36	− 3	—	—	—	—	—
Andijan		22·1	71	e 4 59	0	i 9 8	+10	—	—	—
Sverdlovsk		23·0	23	i 5 4	− 3	9 15	+ 1	—	—	—
Zagreb		23·2	303	e 5 6	− 3	—	—	—	—	—
Murgab		23·4	77	5 14	+ 3	9 35	+14	—	—	—
Triest		24·7	302	i 5 27	+ 3	e 9 59	+15	i 6 9	PP	—
Rome		25·3	293	i 5 27	− 3	e 10 1	+ 7	e 11 12	SS	e 12·8
Prague		25·5	312	e 6 43?	PP	e 10 17	+20	—	—	—
Padova		25·9	300	e 5 40	+ 5	—	—	—	—	—
Bologna		26·3	299	e 6 4	+25	—	—	—	—	—
Florence Arc.		26·3	297	e 5 37	− 2	e 10 29	+18	—	—	—
Florence Xim.		26·3	297	i 5 34	− 5	—	—	e 7 44	PPP	—
Salo		27·0	301	e 5 50	+ 5	—	—	e 6 48	PP	—
Chur		27·8	303	e 5 50	− 3	—	—	—	—	—
Stuttgart		28·4	307	e 5 54	− 4	—	—	—	—	e 16·5
Zürich		28·6	304	e 5 56	− 4	—	—	—	—	—
Copenhagen		28·9	322	i 6 5	+ 2	—	—	—	—	16·1
Basle		29·2	304	e 6 4a	− 1	—	—	—	—	—
Strasbourg		29·3	307	e 7 4	PP	e 11 30?	+31	—	—	—
Besançon		30·3	304	e 6 12	− 3	—	—	—	—	—
Clermont-Ferrand		32·2	300	e 6 30	− 2	—	—	—	—	22·0
Tamanrasset	z.	36·3	259	e 7 8	+ 1	e 12 58	+10	e 8 34	PP	—
Almeria		37·3	286	7 12	− 4	12 53	−11	8 40	PP	18·5
Toledo	z.	37·9	290	e 7 19	− 1	e 13 44	+31	9 27	PcP	—
Pretoria	z.	63·9	196	i 10 39	+ 2	—	—	—	—	—
Hungry Horse		93·3	346	i 13 16	− 2	—	—	—	—	—
Shasta Dam		102·1	350	e 13 59	+ 1	—	—	—	—	—
Pierce Ferry		104·9	342	e 18 19	PP	—	—	—	—	—

Additional readings :—
Istanbul e = 2m.20s.
Helwan eZ = 4m.6s. and 5m.12s., PcP = 6m.52s.; true PcP is given as SS.
Triest i = 5m.33s., ePcP = 7m.58s., eSP = 10m.16s., eScP = 12m.26s.
Rome iZ = 5m.48s.
Besançon e = 6m.32s.
Tamanrasset iZ = 7m.14s.k.
Almeria PcP = 9m.8s., PcS = 13m.18s.
Toledo eZ = 14m.8s.
Long waves were also recorded at Bucharest, Upsala, Potsdam, De Bilt, Kew, and Paris.

Oct. 13d. 12h. 47m. 17s. Epicentre 16°·8N. 100°·7W. (as on 1946, July 12d.).

A = −·1778, B = −·9412, C = +·2872; δ = −5; h = +5;
D = −·983, E = +·186; G = −·053, H = −·282, K = −·958.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		3·0	29	0 47	− 3	1 4	−23	—	—	—
Puebla		3·3	47	0 52	− 1	—	—	—	—	1·2
Vera Cruz		5·0	61	1 20	+ 2	—	—	—	—	2·1
Lubbock		16·7	357	3 50	− 7	8 52	L	—	—	(8·9)
Tucson		17·9	331	i 4 12	0	e 7 10	−20	—	—	e 8·5
Palomar	z.	22·0	323	i 4 58	0	—	—	—	—	—
Pierce Ferry		22·6	332	i 5 3	0	—	—	—	—	—
Riverside	z.	22·8	323	i 5 6	+ 1	—	—	—	—	—
Boulder City		22·9	330	e 5 5	− 1	—	—	—	—	—
Overton	z.	23·1	331	i 5 9	+ 1	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pasadena	z.	23·3	323	e 5 14	+ 4	—	—	—	—	—
St. Louis		23·6	20	e 5 8	− 5	e 9 14	−11	—	—	—
China Lake	z.	24·2	326	e 5 24	+ 5	—	—	—	—	—
Tinemaha	z.	25·5	326	e 5 33	+ 1	—	—	—	—	—
Hungry Horse		33·3	344	i 6 33	− 8	—	—	—	—	—
Victoria		36·7	336	e 7 9	− 1	—	—	—	—	—
Paris		85·9	40	i 12 44	+ 1	—	—	—	—	—
Clermont-Ferrand		87·4	43	e 12 52	+ 2	—	—	—	—	—

Additional readings :—
Tucson e = 4m.33s.
Palomar iZ = 5m.1s. and 5m.21s.
Riverside iZ = 5m.25s.
St. Louis i = 5m.14s., e = 5m.25s. and 5m.41s.
Paris i = 13m.7s.
Long waves were also recorded at Lincoln.

Oct. 13d. Readings also at 0h. (Ksara, Rome, Fresno, Tucson, Boulder City, Overton, Pierce Ferry, and Hungry Horse), 1h. (Andijan (2), Frunse, Boulder City, Overton, and Pierce Ferry), 2h. (Pretoria, Overton, Pierce Ferry, Tucson, Frunse, near Andijan (2), Obi-garm (2), Samarkand, Stalinabad, Tashkent, and Tchimkent), 3h. (near Andijan, Murgab, Obi-garm, Stalinabad, and Tchimkent), 4h. (Haiwee, La Jolla, Palomar, China Lake, Tinemaha, near Pasadena, Riverside, Tucson, Boulder City, Overton, Pierce Ferry, Samarkand, near Obi-garm (2), Tashkent, and Tchimkent), 5h. (Kew), 8h. (Strasbourg), 9h. (Overton, Pierce Ferry, near Apia, Collmberg, Chur, Salo, Strasbourg, near Zürich, and Triest), 10h. (Samarkand, near Andijan, Murgab, Obi-garm, and Stalinabad), 12h. (Hungry Horse and near Malaga), 13h. and 14h. (near Zürich), 16h. (Frunse, Samarkand, near Andijan, Murgab, Stalinabad, Tashkent, and Tchimkent), 19h. (near Branner, Lick, and near Stalinabad), 20h. (near Istanbul), 21h. (Pierce Ferry).

Oct. 14d. Readings at 0h. (Andijan, Samarkand, Stalinabad, near Murgab, and Obi-garm, Reno, Boulder City (2), Overton, Lick, Pierce Ferry (2), La Jolla, China Lake, Palomar, near Pasadena, Riverside, Tucson, and near San Francisco), 1h. (Boulder City (2), Overton, Reno, Branner, Lick, near Fresno, Mineral, and near Pierce Ferry (3)), 3h. (Auckland, Christchurch, and Wellington), 4h. (near Mizusawa), 6h. (Tucson), 9h. (Ksara), 10h. (near Istanbul), 11h. (near Antofagasta and Copiapo), 13h. (Andijan, Tchimkent, near Obi-garm, Samarkand, and Stalinabad), 16h. (Bandong, near Batavia, Tchimkent, near Andijan, Obi-garm, and Stalinabad), 18h. (Ksara), 19h. (near Tchimkent and near Leninakan), 20h. (Zürich, Shasta Dam, Tucson, and near Bogota), 21h. (near Batavia and Bandong), 22h. (Tchimkent, near Andijan, Frunse (2), Murgab, Obi-garm, Samarkand, and Stalinabad).

Oct. 15d. Readings at 1h. (Boulder City, Overton, and Pierce Ferry), 3h. (near Istanbul), 4h. (Samarkand, Tchimkent, near Andijan, Obi-garm, and Stalinabad), 5h. (Boulder City, Pierce Ferry, and near Tucson), 8h. (near Obi-garm), 11h. (College, Ashkabad, Frunse, Samarkand, Tchimkent, near Almata, Andijan, Murgab, Obi-garm, Stalinabad, and Tashkent), 12h. (Tashkent, near Andijan, Obi-garm, Samarkand, Stalinabad, Tchimkent, and near Lick), 13h. (near Tacubaya), 15h. (Pierce Ferry), 19h. (near Fort de France), 20h. (Pierce Ferry, Shasta Dam, and Tucson), 21h. (Kew, Frunse, Samarkand, Tchimkent, near Andijan, Murgab, Obi-garm, and Stalinabad), 23h. (Copiapo, Overton, near Boulder City, and Pierce Ferry).

Oct. 16d. Readings at 0h. (near Messina), 2h. (Kew and near Obi-garm), 3h. (near College), 4h. (Riverside, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, near Berkeley, Branner, Lick, San Francisco, near Istanbul (2), and near Frunse (2)), 6h. (near Istanbul), 10h. (Istanbul, Ksara, and near Simferopol), 11h. (Tamanrasset, near Algiers Univ., and near Tchimkent), 12h. (Ksara, Leninakan, Erevan, and near Tiflis), 13h. (College), 15h. (Hungry Horse, Seven Falls, and Ottawa), 16h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Shasta Dam, Hungry Horse, near Overton, Pierce Ferry (2), near Lick, and near College, several shocks), 17h. (Tucson, Overton, Pierce Ferry, Hungry Horse, and College), 18h. (Tamanrasset, Helwan, Ksara, Collmberg, Strasbourg, Stuttgart, near Istanbul, Frunse, near Andijan, and Tchimkent), 20h. (Bogota, La Paz, and near Copiapo), 22h. (Tucson, Shasta Dam, Hungry Horse, College, Leninakan, and near Tiflis), 23h. (Cleveland, Lick, near Branner, Fresno, near Ottawa, Shawinigan Falls, and Seven Falls).

Oct. 17d. 6h. Undetermined shock.

Copiapo iPN =3m.7s.
Santa Lucia ePE =3m.48s., E =4m.14s., iE =4m.23s.
Buenos Aires eP =5m.19s., eS =8m.1s.
Antofagasta ePE =5m.22s., LE =5m.33s.
La Plata SE =5m.24s., E =7m.20s., S?N =7m.30s., eN =7m.44s., LE =8·5m.
La Paz P =7m.44s., S =10m.36s.
St. Louis eP =13m.41s.
Tucson eP =13m.53s.
Palomar iPZ =14m.16s.
Pierce Ferry eP =14m.20s.
Riverside ePZ =14m.20s., eZ =14m.33s.
Boulder City eP =14m.22s.
Overton iPZ =14m.23s., eZ =14m.47s. and 15m.15s.
Mount Wilson ePZ =14m.24s., eZ =14m.35s.
China Lake ePZ =14m.30s.
Tinemaha ePZ =14m.37s.
Hungry Horse iP =15m.10s., e =15m.24s.

Oct. 17d. 19h. Celebes.

Bandong ePEN =25m.14s., iSEN =28m.17s.
Batavia eE =27m.0s., eN =27m.16s.
College eP =36m.40s.
Pierce Ferry eP =41m.47s., e =42m.40s. and 43m.26s.
Stuttgart eZ =42m.2s.
Strasbourg ePP =42m.12s.
Hungry Horse iPKP =42m.16s.
Pasadena iZ =42m.22s.
Riverside iZ =42m.23s.
Tucson ePKP =42m.35s., e =42m.45s.
Ottawa e =42m.55s. and 46m.8s.

Oct. 17d. Readings also at 0h. (Copiapo and near Andijan), 1h. (near Andijan), 2h. (Copiapo, Boulder City, Shasta Dam, near Lick (2), Branner (2), Santa Clara, San Francisco, Berkeley, Fresno, Reno, Mineral, Tchimkent, Andijan, near Samarkand, and Stalinabad), 3h. (Apia, College, Boulder City, Overton, Pierce Ferry, Tucson, Mount Wilson, Riverside, Palomar, China Lake, and Tinemaha), 4h. (Copiapo (2)), Tucson, near Lick (2), Branner (2), Santa Clara, Berkeley, San Francisco, Reno, Fresno, and Mineral), 6h. (near Tchimkent), 8h. (College, Hungry Horse, and Shasta Dam), 10h. (Ksara and Shasta Dam), 11h. (College (3) and near Frunse 2)), 12h. (Mineral, Hungry Horse, Shasta Dam, Overton, Tucson, Mount Wilson, Palomar, China Lake, Tinemaha, Pretoria, Sofia, and near Belgrade), 13h. (near Andijan, near Pierce Ferry, and Overton), 14h. (Copiapo), 15h. (near Tacubaya), 16h. (Zürich and near College), 17h. (Tucson), 19h. (near Semipalatinsk), 21h. (near Obi-garm and near Andijan), 22h. (Bermuda).

Oct. 18d. Readings at 0h. (Hungry Horse (2), Pretoria, Batavia, and Bandong), 5h. (La Paz, Bogota, Tucson, Mount Wilson, Riverside, Palomar, and Tinemaha), 7h. (near Andijan), 8h. (Tashkent, Stalinabad, Bombay, Ksara, and Collmberg), 9h. (Stuttgart, Potsdam, and De Bilt), 10h. (near Obi-garm), 11h. (near Andijan), 12h. (near Lick, Branner, Berkeley, Fresno, San Francisco, Reno, and Mineral), 15h. (Pretoria and Bombay), 17h. (Alicante, Tashkent, Tchimkent, near Frunse, Almata, Obi-garm (2), Andijan (2), Stalinabad, and Samarkand (2)), 18h. (Tashkent and Stalinabad), 22h. (Stuttgart, Sofia, and near Istanbul).

Oct. 19d. 6h. Turkey.

Istanbul iP =8m.4s., iS_g =9m.2s.
Ksara eP? =8m.21s., S =10m.3s.
Simferopol eP =8m.37s.
Tiflis eP =9m.5s., eS =12m.25s.
Leninakan P =9m.55s.
Athens eP =10m.0s.
Yalta P =11m.0s.
Moscow eP =11m.5s.
Collmberg eZ =11m.24s.?
Stuttgart ePZ =11m.34s., eQ =17·9m.
Strasbourg iP =11m.45s., eL =17m.
Rome eQ? =13m.50s.
Zagreb e =15m.0s.

Oct. 19d. 21h. 0m. 22s. Epicentre 6°·5S. 153°·2E. Focus at Base of Superficial Layers.

Tidal wave at Rabaul.

A = −·8870, B = +·4480, C = −·1125; δ = +13; h = +7;
D = +·451, E = +·893; G = +·100, H = −·051, K = −·994.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		20·9	181	i 4 41 a	− 1	i 8 52	SS	—	—	i 11·7
Riverview		27·2	183	e 5 45	+ 2	i 10 37	sS	i 6 18	pP	e 12·6
Melbourne		32·1	192	i 6 37	pP	i 10 52	sS	—	—	—
Apia		35·2	104	6 41	−12	e 13 13	+50	e 6 51	pP	e 17·1
Auckland	N.	36·1	149	e 7 6	+ 5	—	—	i 7 38	?	17·6
Arapuni	E.	37·4	150	e 7 56	+44	13 38?	+41	—	—	16·7
New Plymouth	E.	37·5	152	e 6 48	−24	—	—	—	—	—
Tuai	N.	38·8	150	e 7 45	?	14 3	+45	e 8 1	?	—
Kaimata	N.E.	39·3	159	e 7 28	+ 1	e 14 9	+43	—	—	—
Wellington		39·6	155	i 7 28	− 2	i 13 31	+ 1	e 13 5	PcP	17·1
Christchurch		40·6	158	i 7 33	− 5	e 13 49	+ 4	17 28	SSS	20·4
Siomisaki		43·0	340	e 8 41	+43	14 7	−14	—	—	18·0
Perth		43·1	229	i 8 16	pP	15 20	+58	9 52	PP	22·4
Owase		43·4	340	7 57	− 4	—	—	(17 43)	SS	17·7
Miyazaki		43·5	333	e 7 52	−10	14 1	−27	—	—	17·6
Muroto		43·5	337	8 19	pP	17 30	SS	—	—	20·3
Shizuoka		43·5	343	e 7 42	−20	13 25	−63	(16 25)	?	16·4
Kagosima		43·6	331	8 12	+ 9	14 34	+ 4	8 43	pP	20·2
Simidu		43·6	336	e 10 49	?	16 6	?	17 51	SS	30·0
Tokyo		43·8	344	e 8 10	+ 6	14 16	−16	(17 28)	SS	17·5
Hunatu		43·9	344	7 57	− 8	—	—	—	—	25·9
Koti		44·0	337	7 58	− 8	14 59	+24	9 6	pP	—
Kakioka		44·2	346	7 58	−10	14 25	−13	—	—	—
Nagoya		44·2	342	e 8 17	+ 9	16 1	?	—	—	18·2
Osaka		44·2	340	e 8 13	+ 5	13 48	−50	10 36	PPP	(17·5)
Sumoto		44·2	339	e 8 12	+ 4	13 40	−58	—	—	—
Mito		44·3	346	e 8 11	+ 3	—	—	(17 34)	SS	17·6
Kumagaya		44·4	344	e 8 7	− 2	—	—	—	—	20·5
Kameyama		44·5	341	8 10	0	—	—	(17 20)	SS	17·3
Kyoto		44·5	340	8 16	+ 6	14 5	−37	(16 55)	?	16·9
Kumamoto		44·6	333	8 7	− 4	14 42	− 2	(18 44)	SSS	18·7
Matuyama		44·6	336	8 13	+ 2	14 26	−18	10 1	PP	20·1
Onahama		44·7	347	8 28	+16	16 21	?	—	—	—
Hirosima		45·1	336	8 6	− 9	18 38	SSS	—	—	—
Matusiro		45·1	343	8 19	+ 4	14 41	−10	—	—	20·3
Bandong		45·2	268	e 8 17	+ 1	e 15 5	sS	—	—	—
Nagano		45·2	343	8 17	+ 1	(18 46)	SSS	—	—	18·8
Toyooka		45·2	339	8 17	+ 1	—	—	—	—	—
Hukuoka		45·3	334	8 7	− 9	13 39	−75	(18 11)	SS	18·2
Toyama		45·5	342	8 17	− 1	18 16	SS	—	—	21·7
Hukusima		45·6	347	e 8 21	+ 2	18 15	SS	—	—	—
Hamada		45·8	335	8 50?	+30	15 4?	+ 3	18 20?	SS	21·0
Sendai		46·0	348	e 8 11	−11	14 37	−27	10 8	PP	—
Batavia		46·1	269	i 8 27 k	+ 4	i 15 23	sS	—	—	22·6
Mizusawa		46·8	348	8 42	pP	e 14 41	−34	(18 34)	SS	18·6
Miyako		47·1	349	e 8 34	+ 3	14 54	−26	—	—	—
Morioka		47·3	348	e 8 33	+ 1	14 54	−29	—	—	—
Akita		47·5	348	e 9 5	+31	15 52	+27	(19 5)	SS	19·1
Hatinohe		48·0	349	e 8 27	−11	(19 8)	SS	—	—	19·1
Zi-ka-wei		48·2	324	e 8 38	− 1	e 15 28	− 7	—	—	—
Mori		49·7	349	e 8 26	−25	(19 1)	SS	—	—	19·0
Nemuro		50·1	353	e 9 6	+12	15 56	− 6	—	—	—
Nanking		50·4	322	e 8 37	−19	e 15 51	−15	i 9 15	?	—
Sapporo		50·5	350	9 3	+ 6	15 49	−18	20 26	Q	25·0
Honolulu		55·4	58	e 9 43	pP	e 16 59	−15	e 11 32	PP	e 23·3

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	E.	69·7	297	e 11 10	+ 2	i 20 11	− 3	i 24 34	SS	—
Irkutsk		71·8	331	e 11 11?	−10	i 20 40	+ 2	14 11	PP	—
Colombo	E.	74·4	279	11 48	pP	21 33	PS	—	—	37·4
Kodaikanal	E.	77·2	283	i 11 52	0	i 21 52	sS	14 52	PP	37·1
Hyderabad		77·5	290	i 11 43	−11	i 21 50	+ 9	22 17	PS	i 33·4
Dehra Dun	N.	80·6	302	e 14 30	PP	e 21 36	−38	18 34	?	—
New Delhi	N.	80·9	300	i 12 13	+ 1	i 22 11	− 6	i 27 36	SS	i 37·4
Poona		82·0	290	e 12 19	+ 1	e 22 26	− 3	15 20	PP	37·1
Bombay		83·1	290	e 12 20	− 4	i 22 38	− 2	15 32	PP	38·9
College		83·3	21	e 13 38?	?	—	—	e 17 10	PPP	e 42·8
Almata		84·5	315	12 29	− 2	22 47	− 7	—	—	—
Sitka		85·7	31	i 12 49	pP	i 22 38	[−19]	e 28 18	SS	e 34·7
Frunse		86·1	314	—	—	e 22 58	[− 1]	—	—	—
Andijan		87·3	311	e 12 43	− 2	23 11	[+ 5]	—	—	—
Ferndale	E.	88·5	49	—	—	e 22 58	[−16]	—	—	e 39·8
Obi-garm		89·0	309	i 12 51	− 2	i 23 31	− 5	—	—	—
Ukiah		89·1	51	e 13 5	pP	e 22 57	[−21]	e 25 17	PPS	e 36·2
Branner	Z.	89·6	52	e 13 10k	pP	—	—	i 13 25	?	e 40·8
Tchimkent		89·6	313	i 12 52	− 4	—	—	—	—	—
Berkeley		89·7	52	i 12 50k	− 6	i 23 31	[+ 9]	i 13 0	pP	e 40·4
Stalinabad		89·7	309	i 12 54	− 2	i 23 35	− 8	i 16 23	PP	—
Tashkent		89·7	312	e 12 46	−10	i 23 30	[+ 8]	i 24 30	PS	—
Santa Clara		89·8	52	e 12 55	− 1	e 23 7	[−15]	—	—	e 42·8
Shasta Dam		90·0	49	e 12 52	− 5	e 24 19	PS	e 16 33	PP	e 40·6
Lick		90·1	52	i 12 49k	− 9	e 23 2	[−22]	—	—	e 41·2
Victoria		90·4	41	12 44a	−15	23 31	[+ 5]	25 5	PS	40·6
Mineral		90·5	50	e 13 22	sP	e 23 34	[+ 7]	—	—	e 41·5
Seattle		91·0	42	e 12 55	− 7	e 23 33	[+ 3]	i 16 51	PP	e 40·6
Samarkand		91·2	310	e 12 58?	− 5	—	—	—	—	—
Fresno	Z.	91·5	53	e 12 56	− 8	e 24 30	sS	e 13 14	sP	e 41·3
Pasadena		92·5	56	e 12 56	−13	e 23 49	SKKS	e 17 11	PP	e 36·9
Tinemaha		92·7	53	i 12 57	−13	—	—	—	—	—
China Lake	Z.	93·1	54	e 12 57	−15	—	—	i 17 19	PP	—
Riverside		93·1	56	e 12 56	−16	—	—	—	—	—
Palomar	Z.	93·5	57	i 13 3	−11	—	—	—	—	—
Boulder City		95·4	54	e 13 10	−12	e 24 44	+11	e 13 31	pP	—
Overton	Z.	95·7	54	i 13 17	− 7	—	—	i 17 13	PP	—
Pierce Ferry		96·0	54	e 13 16	− 9	e 26 8	PS	e 13 36	pP	—
Hungry Horse		96·7	42	i 13 13	−15	—	—	i 13 38	pP	—
Sverdlovsk		96·8	326	e 13 20	− 9	24 41	− 4	i 17 38	PP	—
Butte	N.	97·6	44	e 14 45	?	e 24 26	[+20]	e 32 2	PSS	e 40·1
Ashkabad		97·8	307	e 13 38	+ 5	—	—	16 54	PP	—
Salt Lake City		97·9	50	e 13 12	−22	e 31 17	SS	e 17 11	PP	e 39·6
Tucson		98·5	58	e 13 30	− 6	e 24 54	− 5	e 13 45	pP	e 40·3
Bozeman		98·6	45	e 14 1	+24	e 23 56	[−15]	e 17 31	PP	e 41·2
Saskatoon		101·3	38	18 10	PP	27 5	PS	32 35	PSS	46·4
Tananarive		102·6	249	e 18 39	pPP	24 28	[− 2]	25 25	S	48·2
Baku		104·3	310	e 13 45	−17	—	—	i 18 6	PP	—
Lubbock		106·0	57	e 14 45	?	—	—	e 18 45	pPP	—
Grozny		107·1	313	e 14 46	pP	i 25 44	−27	28 29	PPS	—
Tiflis		108·0	311	i 14 31?	P	i 26 7	−11	e 28 16	PS	—
Tacubaya		108·7	72	e 18 59	PP	e 25 26	SKKS	e 27 40	PS	e 51·0
Piatigorsk		108·9	314	e 20 40	PPP	—	—	—	—	—
Lincoln	E.	109·5	49	e 18 51	PP	e 26 0	SKKS	—	—	e 50·5
Moscow		109·6	327	e 14 22	P	25 36	SKKS	e 18 12	PKP	—
Vera Cruz		111·6	72	e 20 43	?	e 30 31	PPS	—	—	—
Helsinki		113·9	335	e 20 11	pPP	e 26 49	[+91]	e 30 32	PPS	e 48·6
Theodosia		114·1	317	—	—	e 21 50	SKP	—	—	—
Florissant		114·6	50	i 20 16	pPP	e 26 24	SKKS	i 21 40	PPP	e 56·9
St. Louis		114·7	50	e 16 6	?	e 25 12	[−10]	e 18 45	PKP	—
Simferopol		115·0	317	e 19 32	PP	—	—	—	—	—
Yalta		115·1	316	e 19 10	PP	—	—	—	—	—
Grahamstown	Z.	115·8	228	e 18 58	[+19]	—	—	e 29 26	PKKP	—
Chicago		115·9	46	e 19 40	PP	e 26 50	SKKS	i 29 26	PS	e 49·6
Ksara		116·2	304	e 14 54	P	29 48	PS	19 47	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Upsala		117·1	337	e 20 38	?	e 26 38?	SKKS	35 50	SS		e 47·6
Pretoria	z.	117·8	237	e 18 58	[+15]	—	—	e 28 56	PKKP		—
Cincinnati		118·9	49	e 19 10	pPKP	i 28 38	sS	20 16	pPP		e 52·6
Lwow		119·5	325	e 18 24	[−23]	30 27	PS	e 20 2	PP		—
Istanbul		119·7	314	e 19 5	[+18]	—	—	e 20 12	PP		—
Cleveland	E.	120·4	45	e 15 51	P	e 25 59	[+17]	e 20 18	PP		—
Bucharest		120·5	318	e 19 44	?	e 30 18	PS	e 31 46	PPS		49·6
Helwan		120·8	301	e 19 8	pPKP	30 14	PS	20 14	PP		—
Bergen		121·0	342	—	—	e 30 18	PS	36 42	SS		48·6
Copenhagen		121·9	335	21 2	pPP	30 23	PS	36 53	SS		—
Reykjavik		122·4	358	—	—	e 37 2	SS	e 51 14	Q		e 57·0
Santa Lucia		122·5	137	i 20 53	pPP	31 7	PPS	—	—		60·4
Raciborzu		122·6	328	e 18 8	[−44]	e 22 38?	PKS	e 20 38?	PP		—
Columbia		123·0	53	e 20 56	pPP	e 30 21	SP	e 37 12	SS		e 52·7
Ottawa		123·0	39	15 1	PP	25 36	[−15]	18 38	PKP		56·6
Ivigtut		123·1	12	22 45	PKS	30 26	PS	37 8	SS		59·6
Sofia		123·1	318	e 19 47	PP	—	—	—	—		—
Pennsylvania		123·2	45	i 19 20	PP	—	—	—	—		48·8
Budapest	E.	123·5	324	19 43	[+49]	28 38	SKKS	e 32 38	PPS		50·6
	N.	123·5	324	e 19 41	[+47]	28 8	SKKS	e 37 28	SS		50·6
Potsdam		123·8	332	e 19 14	[+19]	i 30 15	SP	e 20 38?	PP		e 41·6
Belgrade		124·0	321	e 19 33k	[+38]	e 30 29	PS	e 37 17	SS		e 51·3
Kalossa	E.	124·0	324	e 19 49	?	—	—	—	—		e 56·1
Collmberg		124·5	331	e 15 48	P	e 22 34	PKS	e 18 47	PKP		e 50·6
Athens		124·6	312	e 18 42	[−14]	e 25 40	[−15]	—	—		—
Prague		124·6	329	e 16 44	?	e 22 19	SKP	e 20 38	PP		e 50·6
Seven Falls	E.	124·8	35	19 29	[+32]	30 31	SP	21 7	pPP		50·0
Philadelphia		125·4	45	e 20 56	PP	e 25 46	[−12]	i 30 58	PS		e 50·3
Jena		125·5	331	e 19 25	[+27]	e 30 48	PS	e 20 58	PP		—
Cheb		125·6	331	e 20 38	PP	e 26 23	[+25]	—	—		—
Aberdeen		125·9	344	i 30 2	?	i 31 4	PS	—	—		e 48·4
Fordham		125·9	43	e 19 25	pPKP	i 38 12	sSS	i 21 26	pPP		56·6
Zagreb		126·2	324	e 19 22	[+23]	—	—	e 21 4	PP		e 51·6
Harvard		126·7	40	i 19 34	pPKP	e 32 35	PPS	i 20 58	PP		e 57·3
Weston		126·9	40	i 19 14	[+13]	e 37 58	SS	i 21 18	PP		—
De Bilt		127·5	336	e 21 26	pPP	e 30 38?	SP	e 37 38?	SS		e 54·6
Triest		127·6	325	e 19 57	[+55]	i 26 50	[+46]	i 21 26	PP		—
Durham		127·8	342	i 21 58	?	i 31 22	PS	i 38 28	SS		—
Stuttgart		128·1	331	e 18 50	[−13]	e 25 54	[−11]	i 21 27	PP		e 57·6
Taranto		128·1	318	29 38	PKKP	—	—	—	—		—
Huancayo		128·3	111	e 19 39	[+36]	e 25 48	[−18]	e 31 11	PS		e 51·0
Karlsruhe		128·3	332	e 18 47	[−16]	—	—	—	—		e 52·6
Strasbourg		128·9	332	e 19 22	[+17]	e 26 22	[+14]	e 21 2	PP		e 54·6
Padova		129·3	325	19 33	[+27]	i 22 39	PKS	i 21 54	pPP		58·1
Zürich		129·3	330	e 19 30	[+24]	e 23 26	?	e 21 50	pPP		—
La Plata	E.	129·4	147	22 8	pPP	31 32	PS	38 50	SS		64·8
	N.	129·4	147	17 2	?	31 58	sPS	59 26	Q		65·0
Salo		129·4	327	e 19 19	[+13]	—	—	i 23 14	?		e 58·6
Bologna		129·6	326	e 19 39	[+33]	23 49	?	e 19 46k	pPKP		e 57·6
Basle		129·7	331	e 19 26	[+20]	e 31 41	PS	e 21 51	pPP		—
Florence Arc.		130·1	325	i 19 52	[+45]	e 26 37	[+26]	e 21 44	pPP		e 57·6
Kew		130·1	339	e 19 3	[− 4]	e 22 29	PKS	e 21 16	PP		e 47·6
Prato		130·1	325	e 19 30	[+23]	i 22 47	PKS	—	—		—
Halifax		130·3	34	e 29 2	PKKP	e 38 54	SS	—	—		46·8
Messina		130·4	316	e 19 53	[+45]	e 22 35	PKS	—	—		—
Neuchatel		130·4	330	e 19 21	[+13]	—	—	—	—		—
Pavia		130·4	327	e 19 33	[+25]	—	—	—	—		—
Rome		130·5	322	e 19 25	[+17]	i 38 57	SS	e 21 13	PP		58·3
Besançon		130·7	331	e 19 18	[+10]	—	—	e 19 33	pPKP		—
Catania		131·0	316	e 19 58	[+49]	e 22 18	SKP	—	—		—

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		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Paris		131·1	335	i 19 39	[+30]	e 22 28	SKP	i 38 52	SS	62·6
Galerazamba		131·9	81	i 21 54	pPP	e 23 4	PKS	e 34 38	?	e 46·6
Jersey	E.	132·6	338	e 19 8	[− 3]	e 23 8	PKS	—	—	62·6
Bogota		132·9	89	e 19 35	pPKP	e 22 15	SKP	e 32 11	sPS	64·6
Clermont-Ferrand		133·1	332	e 17 14	?	i 22 19	SKP	i 39 33	SS	61·6
La Paz		133·2	120	e 19 4	[− 8]	i 26 14	[− 4]	21 45	PP	65·4
Bermuda		136·4	48	e 20 58	?	e 26 38	[+14]	e 23 18	PKS	e 56·1
Barcelona		136·7	328	e 20 14	[+55]	23 11	PKS	i 43 48	?	61·5
Tortosa		138·0	328	e 19 42	[+20]	25 42	[−45]	34 59	PPS	61·6
Algiers Univ	z.	139·4	322	19 18	[− 6]	e 26 25	[− 4]	e 22 20	PP	—
San Juan		139·9	69	e 19 57	[+32]	e 40 53	SS	e 22 24	PP	e 56·7
Alicante		140·3	327	19 40	[+14]	26 52	[+22]	22 52	pPP	e 64·4
Toledo		141·0	332	e 19 31	[+ 4]	e 40 47	SS	i 22 37	PP	62·8
Almeria		142·5	327	i 19 20	[−10]	26 26	[− 8]	22 30	PP	65·2
Granada		142·9	329	i 19 44 a	[+14]	26 54	[+19]	20 3	pPKP	70·7
Malaga	z.	143·6	329	i 19 21 a	[−11]	26 41	[+ 5]	26 3?	PPP	68·1
Lisbon		144·2	336	19 55 a	[+23]	—	—	59 38?	Q	68·6
Tamanrasset	z.	144·9	301	i 19 28 k	[− 6]	e 42 4	SS	e 22 46	PP	70·6
Fort de France		145·3	74	e 19 28	[− 6]	—	—	e 20 5	pPKP	—

Additional readings and notes :—
Brisbane iPN =4m.44s., iN =5m.48s., iZ =9m.42s.
Riverview iPNZ =5m.53s.k, iPP?Z =6m.49s., iP$_e$PZ =9m.4s., isSN =11m.21s., iS$_e$S?E =16m.18s., and other readings without phase.
Apia e =7m.18s. and 7m.37s., eE =7m.53s., 9m.3s., 13m.33s., and 15m.8s.
Kaimata eNE =8m.5s., iS?NE =14m.39s.
Wellington iPP =8m.6s., e =14m.10s., i =14m.24s.
Christchurch i =7m.42s., iEZ =8m.10s., i =9m.58s., SSZ =18m.3s.
Perth i =9m.6s., PPP =10m.36s., i =13m.50s. and 14m.54s., SS =18m.2s.
Kagosima Q =17m.48s.
Koti PP =10m.3s., PPP =11m.2s., SS =17m.22s.
Osaka PP =8m.51s., SS is given as L.
Sendai i =8m.59s.
Mizusawa PE =8m.46s., eSN =14m.44s.
Honolulu i =10m.8s., ePPP =12m.44s., eSS =20m.54s.
Irkutsk PPP =15m.54s.?, S$_e$S =21m.11s., PS =21m.25s.
Kodaikanal PSE =22m.38s., SKKSE (△ >180°) =37m.52s.
Hyderabad SSE =26m.48s.
New Delhi iN =12m.34s., PPN =15m.11s., iN =21m.25s. and 22m.22s., iPSN =22m.43s., iN =28m.10s. and 34m.17s.
Poona P$_e$PE =12m.31s., PPPE =17m.14s., iPSEN =23m.8s., PPSN =23m.32s., SSEN =27m.38s., QEN =33m.38s.
Bombay iSSN =28m.32s.
College ePPP =19m.22s., eQ =36m.38s., ePKP,PKP? =39m.6s.
Ukiah e =14m.49s.
Berkeley iZ =13m.10s., 13m.16s., 13m.26s.k 13m.29s., and 13m.37s., iPPN =17m.22s., iSKSN =22m.47s., eN =24m.22s., iN =24m.36s.
Stalinabad iPPP =18m.19s.
Tashkent eSS =29m.25s.
Shasta Dam iP =12m.58s., ePPP? =18m.23s., iPKKP? =31m.2s., e =32m.41s., ePKP,PKP =39m.7s.
Lick iZ =13m.16s., eEN =13m.31s.
Victoria PP =17m.11s., e =23m.53s., PS =24m.35s'. SS =29m.44s.
Seattle e =13m.27s., 13m.45s., 14m.4s., 14m.14s., 15m.46s., and 17m.28s. PPP =18m.28s., e =22m.22s. and 22m.49s., eSKS =23m.21s., ePS =24m.30s., ePPS =24m.48s., e =25m.28s. and 25m.58s., eSS =29m.23s.
Fresno eN =13m.17s., iZ =13m.29s., eE =13m.37s., eN =13m.42s., iN =15m.22s., eE =17m.0s. and 18m.56s.
Pasadena iZ =13m.23s. and 13m.39s., eE =23m.58s.
Tinemaha iZ =13m.27s. and 13m.42s.
Riverside iZ =13m.27s., i =13m.44s.
Palomar iZ =13m.31s., 13m.39s., and 13m.46s.
Overton eZ =19m.55s., ePSZ =25m.15s.
Pierce Ferry e =18m.3s. and 25m.7s.
Hungry Horse i =13m.55s., ePP? =17m.50s.
Sverdlovsk iSKS =24m.26s., iPS =26m.12s., iSS =31m.20s.
Butte ePPN =18m.33s., eS?N =25m.43s.
Salt Lake City e =20m.37s. and 23m.1s.
Tucson iPP =17m.32s., e =17m.55s., ePPP =19m.29s., eSKS? =23m.49s., ePS =26m.9s., ePKKP =30m.29s., eSS =31m.31s., eSSS =35m.2s.
Bozeman ePPP =19m.52s., eS =25m.17s., ePS =26m.34s., eSS =31m.46s., eSSS =35m.34s.

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Saskatoon i =18m.40s. and 19m.55s., e =24m.5s., SSS =36m.25s.
Tananarive PPS =27m.51s., SS =33m.25s., SSS =36m.15s.
Grozny ePP =18m.0s.?
Tiflis i =19m.9s. and 27m.41s.
Tacubaya i =22m.42s., e =30m.20s., eSS =33m.26s.
Lincoln eSSE =33m.6s., eSSSE =37m.48s.
Moscow iPS =28m.16s.
Helsinki e =28m.38s., and 34m.50s., eSS =35m.53s., eSKKS =38m.49s., eSKKKS = 42m.8s., e =47m.25s.
Florissant i =20m.38s., eS =27m.2s., e =27m.50s., ePPS =29m.53s., iSS =35m.9s., eSSS =39m.12s.
St. Louis ipPP =19m.43s., i =20m.30s., eSKS =25m.7s., e =26m.17s., i =26m.21s., eS = 27m.2s., e =27m.23s., i =28m.1s., e =29m.2s., iSP =29m.34s., iPPS =29m.53s., e =30m.33s. and 31m.10s., eSS =35m.9s., esSS =36m.5s.
Chicago e =24m.22s., eSS =35m.20s., eSSS =40m.6s.
Upsala eN =23m.19s., PPSN =30m.14s., iE =31m.9s., eE =34m.38s.?, eSSE = 35m.39s.?, eN =38m.43s., eSSSE =40m.33s., eQ =43·6m.
Lwow ePPP =23m.17s.
Cleveland iPKPZ =19m.22s., iPPEN =20m.46s., eE =25m.26s., iSKKSE =27m.22s., iPSE =30m.13s., iN =36m.10s., iE =36m.29s., eSSN =36m.41s., iSSSE =41m.1s.
Bucharest eN =22m.29s., iN =36m.52s.
Helwan eZ =19m.31s., 20m.44s., 20m.59s., 21m.26s., 21m.59s., and 23m.8s., eN = 27m.48s., 28m.44s., 29m.8s. and 31m.2s., eEN =32m.32s. and 33m.18s., eN = 35m.18s.
Bergen PPSEN =30m.57s., eN =32m.12s., eE =40m.8s., eN =40m.28s. and 42m.8s.
Copenhagen 26m.52s., SSS =42m.41s.
Santa Lucia iN =23m.54s., N =33m.57s., E =36m.21s. and 38m.25s., N =46m.58s. and 59m.38s.?
Raciborzu eZ =19m.26s.?
Ottawa i =18m.53s., 19m.13s., and 19m.24s., PP =20m.58s., e =21m.6s.. PPP =22m.4s., SKKS =26m.51s., PS =29m.48s., PPS =31m.4s., SS =36m.50s., SSS =41m.8s., Q =49·6m.
Ivigtut SSS =40m.50s.
Budapest PPE =21m.27s., PPN =21m.30s., PPPE =24m.17s., PSN =31m.14s., PSE = 31m.22s., ePPSN =33m.10s., SSE =38m.10s., SSSEN =42m.38s.?
Potsdam iZ =21m.0s. and 21m.20s., iPKPE =21m.51s., iE =22m.48s., iZ =24m.6s., 25m.51s., 35m.22s., and 36m.20s.
Belgrade e =24m.5s., 27m.7s., and 34m.0s.
Kalossa eN =20m.4s. and 21m.31s., eE =21m.34s.
Collmberg ePKPZ =19m.20s. and 19m.30s., ePPE =21m.9s. and 21m.20s., eSSN = 37m.38s., eSSE =37m.56s., eSSSE =43m.2s., and other readings without phase.
Prague epPKP? =19m.28s., e =19m.47s., ePPP =23m.18s., e =23m.50s., eSKS = 26m.36s., eSKKS? =27m.38s., ePS =30m.38s., e =33m.56s. and 36m.53s., eSS = 37m.38s., eSSS =42m.8s., e =42m.44s.
Seven Falls SKKSE =27m.43s., PPSE =32m.2s., SSE =37m.9s., SSSE =41m.38s.
Philadelphia e =26m.19s. and 32m.6s., eSS =36m.49s., eSSS =42m.23s.
Jena e =19m.30s. and 19m.58s., ePP?EZ =21m.18s., eN =37m.46s.
Aberdeen eE =36m.52s., iSSN =38m.52s., eSSSN =44m.47s.
Fordham e =33m.51s.
Harvard e =34m.8s., eSS =37m.42s.
Weston ePPS =32m.34s.
Triest epPP =21m.44s., iSKP =22m.23s., iPPP =24m.16s., iSKKS =28m.16s., iS = 29m.11s., iPS =31m.18s., iPSKS =31m.44s., iSS =38m.15s., iPSS =39m.2s.
Durham iEN =23m.3s., iN =23m.10s., iEN =37m.8s., iN =38m.44s.
Stuttgart ePP =20m.58s., ePPP =24m.8s., eS? =28m.38s., ePSKS =31m.8s., ePS = 32m.4s., and other readings without phase.
Huancayo i =21m.56s., 27m.3s. and 31m.45s., iSS =38m.53s.
Strasbourg iPPP =24m.12s. and 24m.16s., eSKKS =28m.11s., ePS =31m.17s., ePPS = 32m.14s., eSKKS($\triangle$ >180°) =36m.29s., iSS =38m.30s., iSSS? =43m.6s., and numerous other readings without phase.
La Plata EN =23m.2s., E =33m.20s., N =37m.56s., E =41m.20s., N =42m.3s. and 44m.50s., E =46m.14s., 51m.8s. and 54m.8s., QE =60m.26s.
Florence Arc. eSKP? =23m.32s., ePPS? =33m.43s.
Kew eSKKSZ =28m.9s., ePS =31m.21s., ePPS =33m.45s., eSSEN =38m.55s., eEN = 40m.53s., eSSS =44m.39s.
Rome i =21m.44s., e =22m.27s., eS =29m.10s., i =32m.19s., eSS =37m.31s., e =42m.47s.
Besançon i =19m.42s.
Paris iSSS =43m.13s., eQ =57·6m., and other readings without phase.
Bogota eEN =19m.45s., ePPPEN =23m.23s.
Clermont-Ferrand i =20m.3s., iPPP =25m.7s., ePS? =32m.26s., eSSP =40m.5s., iSSS = 44m.23s., Q =54·6m.
La Paz iN =20m.8s., ipPP =22m.35s., isPP =23m.19s., SKKS =28m.32s., iPPS = 33m.38s., iSS =39m.26s., iE =40m.46s., SSS =44m.38s., Q =62m.50s.
Bermuda ePPS =34m.8s., i =35m.54s., eSS =39m.56s., i =41m.18s.
Tortosa PP?N =20m.42s., PPPEN =23m.53s., SKKS?N =27m.34s., SS?N =38m.51s.
Algiers Univ. eZ =19m.43s. and 20m.3s., ePKSZ =22m.53s., eZ =32m.10s.
San Juan i =20m.29s.

Continued on next page,

Alicante PKS = 23m.28s., PPP = 25m.56s., SKKS = 29m.52s., PS = 33m.24s., SS = 41m.8s., SSP = 41m.44s., SSS = 46m.20s.
Toledo iZ = 20m.24s., iPKSZ = 23m.23s., SSSE = 46m.14s.
Almeria PKP = 23m.18s., PPP = 25m.38s., SKKS = 29m.18s., PPS = 33m.46s., SS = 40m.50s., SSS = 46m.18s.
Granada PP = 23m.21s., SKSP = 33m.3s., PPS = 35m.48s., eSS = 42m.44s., Q = 64·5m.
Malaga iPPZ = 24m.9s., PPSZ = 35m.3s., SSZ = 42m.5s., QZ = 59m.33s.
Tamanrasset iZ = 19m.33s.k, 19m.48s.a, and 23m.18s.a, ePPPZ = 26m.10s., eSSSZ = 46m.52s., eZ = 47m.46s.
Long waves were also recorded at San Francisco and Puebla.

Oct. 19d. Readings also at 0h. (Belgrade and La Paz), 3h. (near Basle and Zürich), 5h. (Zürich and near Lick), 6h. (College), 7h. (Hungry Horse (2), Shasta Dam, Tucson, China Lake, Tinemaha, and near Irkutsk), 8h. (Brisbane and College), 9h. (Copenhagen), 10h. (College), 13h. (Brisbane, College, Andijan, and near Obi-garm), 14h. (Brisbane), 15h. (Berkeley, near Lick, San Francisco, Fresno, near Obi-garm and near Andijan), 16h. (Vera Cruz, and near Tacubaya), 18h. (Branner), 19h. (near Victoria), 20h. (near Obi-garm and near Branner), 21h. (Besançon, Paris, Strasbourg, and near Apia), 22h. (College (2), and Tamanrasset (2)), 23h. (Wellington).

Oct. 20d. 2h. 21m. 24s. Epicentre 46°·0N. 94°·0E.

Approximate.

A = −·0486, B = +·6954, C = +·7170; δ = +3; h = −4;
D = +·998, E = +·070; G = −·050, H = +·715, K = −·697.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Irkutsk		9·2	43	2 48?	+32	4 37?	+34	—	—	—
Almata		12·4	264	3 8	+ 1	5 34	+13	—	—	—
Frunse		14·2	264	—	—	e 6 12	+ 8	—	—	—
Andijan		16·6	259	e 3 57	+ 1	—	—	—	—	—
Tashkent		18·4	264	e 4 18	0	i 7 43	+ 2	—	—	—
Obi-garm		19·3	257	i 4 30	+ 1	i 8 8	+ 6	—	—	—
Stalinabad		20·0	258	i 4 35	− 2	i 8 18	+ 1	—	—	—
Samarkand		20·7	262	e 4 42	− 2	—	—	—	—	—
Sverdlovsk		23·2	310	5 8	− 1	9 19	+ 1	—	—	—
Calcutta	E.	23·9	193	—	—	i 9 41	+11	—	—	e 13·0
Ashkabad		27·5	266	6 0	+10	—	—	—	—	—
Bombay		32·2	220	e 10 13	?	e 11 36?	− 9	—	—	—
Baku		32·3	277	—	—	17 25	SeS	—	—	—
Grozny		34·0	283	—	—	14 33	SS	—	—	—
Tiflis		35·3	282	e 6 58	− 1	e 14 49	SS	—	—	—
Moscow		35·9	307	e 7 4	0	—	—	—	—	—
Leninakan		36·3	281	e 7 18	+11	—	—	—	—	—
Ksara		45·3	275	e 5 37	?	e 13 21	?	—	—	—
Collmberg		51·2	307	e 9 5	− 2	—	—	—	—	—
Stuttgart		54·6	306	e 9 30	− 2	—	—	—	—	e 29·1
Zürich		55·7	305	e 9 37	− 3	—	—	—	—	e 29·4
Basle		56·2	305	e 9 41	− 3	—	—	—	—	—
Rome		56·4	297	—	—	e 21 5	SS	—	—	e 29·1
College		59·5	26	e 10 6	− 1	—	—	—	—	—
Tamanrasset	Z.	72·9	285	—	—	e 20 16	−43	—	—	—
Victoria		80·4	24	i 12 14k	− 1	—	—	—	—	—
Hungry Horse		82·9	18	e 12 27	− 1	—	—	—	—	—
Shasta Dam		87·8	27	i 12 53	+ 1	—	—	e 17 56	PPP	—
Pretoria	Z.	93·0	235	e 13 17	0	—	—	—	—	—

Additional readings:—
Collmberg eZ = 9m.15s. and 9m.24s.
Long waves were also recorded at other European stations.

Oct. 20d. 3h. 26m. 35s. Epicentre 37°·5N. 118°·5W. (as on 1949, April 13d.).

A = −·3795, B = −·6989, C = +·6062; δ = −4; h = −1;
D = −·879, E = +·477; G = −·289, H = −·533, K = −·795.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fresno	Z.	1·3	233	i 0 22	− 3	i 0 36	− 8	—	—	—
Reno		2·3	334	i 0 42a	+ 2	e 1 14	+ 5	—	—	—
Lick		2·5	266	i 0 41a	− 2	i 1 11	− 3	—	—	—
Branner	Z.	2·9	268	i 0 48a	0	i 1 21	− 3	i 0 57	P_g	—
Boulder City		3·3	117	e 1 4	P_g	e 1 53	S_g	—	—	—
Overton	Z.	3·4	106	e 1 0	P*	e 1 47	S*	e 1 7	P_g	—
Mineral		3·7	320	e 1 11	P_g	i 1 52	S*	—	—	—
Pierce Ferry		3·9	110	e 1 4	+ 2	e 1 15	P_g	e 2 5	S*	—
Shasta Dam		4·4	318	e 1 41	P_g	—	—	—	—	e 2·2

Reno gives also eSN −1m.18s.

Oct. 20d. 12h. 45m. 7s. Epicentre 5°·1S. 153°·5E. Depth of focus 0·010.
(as on 1948, April 15d.).

A = −·8914, B = +·4445, C = −·0883; δ = −3; h = +6;
D = +·446, E = +·895; G = +·079, H = −·039, K = −·996.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	N.	22·3	181	i 4 51a	+ 1	i 8 50	+ 6	i 5 13	pP	i 11·2
Riverview		28·7	184	i 5 50a	0	i 10 32	+ 1	i 6 24	pP	13·9
Melbourne		33·5	192	i 6 40	+ 8	i 11 58	+12	—	—	—
Apia		35·3	106	e 3 34	?	—	—	—	—	—
Auckland	N.	37·2	150	i 7 5	+ 2	i 12 46	+ 3	i 7 35	pP	—
Arapuni	E.	38·5	151	—	—	e 13 5	+ 3	—	—	—
New Plymouth	E.	38·6	153	e 7 16	+ 1	—	—	—	—	—
Cobb River	E.	39·8	157	e 7 24	− 1	—	—	—	—	—
Kaimata	N.E.	40·5	159	e 7 31	0	e 13 30	− 2	—	—	—
Wellington		40·7	155	i 7 29	− 3	i 13 22	−13	i 7 53	pP	e 16·9
Christchurch		41·8	159	i 7 40	− 1	i 13 47	− 5	9 6	PP	19·5
Tokyo		42·6	344	7 43	− 5	14 37	+34	—	—	17·0
Osaka		43·0	339	e 8 33	+42	10 36	PPP	—	—	—
Hukuoka		44·2	333	e 8 2a	+ 1	13 43	−43	—	—	20·1
Perth		44·2	228	8 3	+ 2	14 41	+15	10 29	PPP	—
Sendai		44·7	347	e 8 0	− 5	e 14 22	−12	9 59	PP	20·7
Mizusawa	E.	45·5	347	e 8 8	− 3	e 14 40	− 5	—	—	—
Bandong		45·6	266	8 7	− 5	—	—	—	—	—
Batavia		46·4	267	i 8 17	− 1	e 15 1	+ 3	—	—	—
Sapporo		49·2	348	e 9 10	pP	15 36	− 1	—	—	—
Honolulu		54·5	59	e 9 22	+ 2	i 16 46	− 4	e 11 19	PP	e 22·3
Klyuchi		61·5	5	10 36	+27	—	—	—	—	—
Calcutta	E.	69·3	296	i 11 1	+ 2	i 20 4	+ 8	i 13 39	PP	—
Irkutsk		70·7	330	11 6	− 1	20 14	+ 2	—	—	—
Colombo	E.	74·2	278	11 40	+12	21 13	+21	—	—	36·9
Kodaikanal	E.	77·2	282	i 11 53	+ 8	i 21 46	+21	i 14 53	PP	36·1
Hyderabad		77·3	289	i 11 39	− 7	i 21 21	− 5	26 19	SS	36·9
Dehra Dun	N.	80·1	302	e 20 3	?	e 24 59	?	—	—	—
New Delhi	N.	80·5	300	e 12 1	− 2	i 21 59	− 1	e 15 8	PP	—
Poona		81·8	290	i 12 9	− 1	i 22 15	+ 2	e 15 6	PP	37·9
College		81·9	22	e 12 6	− 4	i 22 6	− 8	e 12 26	pP	e 32·6
Bombay		82·9	290	i 12 17	+ 2	i 22 28	+ 4	15 28	PP	39·8
Almata		83·7	315	i 12 19	0	i 22 37	+ 5	—	—	—
Sitka		84·3	31	e 12 23	+ 1	i 22 36	− 2	e 28 1	SS	e 37·6
Frunse		85·4	314	e 12 30	+ 2	—	—	—	—	—
Andijan		86·6	311	e 12 35	+ 1	i 23 4	+ 3	—	—	—
Ukiah		88·0	51	e 12 43	+ 3	i 23 3	[+ 5]	e 28 21	SS	e 36·1
Obi-garm		88·3	308	i 12 42	0	i 23 21	+ 4	—	—	—
Berkeley		88·6	52	i 12 42a	− 1	i 23 4	[+ 3]	e 16 18	PP	e 39·8
Santa Clara		88·7	52	e 11 35	−69	e 23 0	[− 2]	—	—	e 40·4

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Shasta Dam		88·8	49	e 12 50	+ 6	e 23 1	[− 1]	e 16 40	PP	e 40·9
Lick	z.	89·0	52	i 12 53a	+ 8	e 24 29	PS	—	—	—
Stalinabad		89·0	308	i 12 46	+ 1	i 23 26	+ 3	—	—	—
Tashkent		89·0	312	i 12 44?	− 1	i 23 28?	+ 5	—	—	—
Victoria		89·2	42	12 43k	− 3	e 23 26	+ 1	e 13 9	pP	40·6
Seattle		89·8	43	e 12 47	− 2	e 23 23	− 7	e 23 11	SKS	e 39·9
Fresno	z.	90·4	53	e 12 51	− 1	e 24 43	PS	e 13 15	pP	—
Reno		90·7	51	e 12 51a	− 2	i 23 31	− 7	i 13 17	pP	e 41·6
Tinemaha		91·6	53	e 12 57	0	—	—	i 13 21	pP	—
Pasadena		92·0	56	e 12 54	− 5	i 23 27	[+ 6]	i 13 21	pP	e 37·1
Riverside		92·1	56	e 12 59	− 1	—	—	i 13 24	pP	—
Palomar	z.	92·5	57	i 13 0	− 1	—	—	i 13 14	pP	—
Boulder City		94·3	54	e 13 10	0	e 24 48	PS	e 16 56	PP	—
Overton	z.	94·7	53	e 13 4	− 7	e 24 49	PS	i 13 21	pP	—
Pierce Ferry		95·0	54	e 13 12	− 1	e 24 55	PS	e 13 35	pP	—
Hungry Horse		95·4	42	e 13 11	− 4	e 25 32	PS	i 13 32	pP	—
Sverdlovsk		95·8	326	i 13 13	− 3	i 24 19	− 3	—	—	—
Butte	N.	96·4	44	—	—	e 23 49	[+ 3]	e 24 47	S	e 39·4
Salt Lake City		96·8	49	—	—	e 23 49	[+ 1]	e 25 51	PS	e 43·9
Logan		96·9	47	e 13 16	− 5	i 23 48	[0]	i 25 56	PS	e 39·9
Bozeman		97·4	45	e 18 13	?	i 23 53	[+ 2]	i 24 56	S	e 40·4
Tucson		97·5	58	e 13 28	+ 4	e 23 38	[−13]	e 17 14	PP	e 41·1
Tananarive		103·3	249	18 0	PP	24 21	[+ 2]	27 18	PS	48·4
Tiflis		107·3	312	e 14 2?	P	i 26 1	+ 2	i 27 52	PS	—
Lincoln	E.	108·3	48	e 18 33	PP	e 24 38	[− 4]	e 27 53	PS	e 48·4
Florissant		113·4	50	e 14 53	P	e 25 4	[+ 2]	e 19 20	PP	—
St. Louis		113·6	50	e 15 1	pP	i 25 2	[− 1]	e 18 14	PKP	—
Yalta		114·3	317	e 18 28	[0]	—	—	—	—	—
Chicago		114·7	46	e 19 43	PP	e 26 17	S	e 28 51	PS	e 52·8
Ksara		115·7	304	e 14 46	P	30 46	PPS	19 38	PP	—
Upsala		115·9	337	e 19 53?	PP	e 29 23	PS	e 35 27	SS	e 50·9
Pretoria	z.	118·8	238	e 19 8	[+31]	—	—	—	—	—
Istanbul		118·9	315	e 18 43	[+ 6]	—	—	e 19 55	PP	—
Cleveland		119·2	44	e 19 51	PP	e 25 20	[− 4]	e 26 48	SKKS	55·0
Bergen	E.	119·8	342	e 30 5	PS	—	—	e 37 21	SSP	—
Helwan		120·3	301	e 19 5	[+25]	e 24 59	[−29]	e 20 11	PP	—
Copenhagen		120·8	336	30 5	PS	37 10	SSP	40 15	SSS	56·9
New Kensington	E.	120·8	45	e 20 26	PP	e 29 50	PS	e 36 54	SS	e 49·0
Ottawa		121·4	38	e 18 42	[0]	25 27	[− 4]	20 9	PP	50·9
Ivigtut		121·7	12	36 41	SS	41 53	SSS	—	—	56·9
Columbia		122·0	53	—	—	e 25 35	[+ 2]	e 30 12	PS	e 55·4
Pennsylvania	N.	122·0	43	i 21 20	?	—	—	—	—	—
Budapest		122·5	325	—	—	e 27 53?	?	e 29 53	PS	e 54·4
Potsdam		122·7	332	i 20 27a	PP	e 30 17	PS	—	—	e 36·9
Belgrade		123·1	321	e 20 41	PP	e 30 28	PS	e 31 50	PPS	e 73·1
Washington		123·3	45	—	—	e 34 7	?	i 35 58	SS	e 56·9
Collmberg		123·5	331	—	—	e 37 5	SS	—	—	e 55·9
Prague		123·5	329	e 20 35	PP	i 22 4	PKS	e 20 43	pPP	59·9
Seven Falls	E.	123·6	34	e 20 53	pPP	e 25 35	[− 3]	e 30 11	PS	52·4
Philadelphia		124·2	44	e 20 35	PP	e 25 39	[− 1]	e 28 14	SKKS	e 57·1
Aberdeen	E.	124·6	343	—	—	e 28 0	SKKS	e 35 28	?	e 65·4
Cheb		124·6	331	e 20 38	PP	e 26 5	[+24]	i 22 4	SKP	—
Fordham		124·7	42	e 20 36	PP	e 25 42	[0]	i 37 24	SS	61·3
Harvard		125·4	39	e 21 7	PP	e 31 54	PPS	e 37 24	SS	e 58·9
Weston		125·7	39	21 2	PP	37 27	SS	29 59	PKKP	58·9
De Bilt		126·3	336	e 18 53	[+ 2]	—	—	e 20 46	PP	e 54·9
Triest		126·6	326	e 18 56	[+ 4]	i 22 7	PKS	e 20 51	PP	e 50·9
Stuttgart		127·0	331	e 18 55	[+ 2]	e 28 17	SKKS	e 20 43	PP	62·9
Strasbourg		127·8	332	e 18 56	[+ 2]	e 28 0	SKKS	i 21 1	PP	e 56·9
Zürich		128·2	330	e 18 55	[0]	—	—	e 20 52	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Padova		128·3	326	e 18 47	[− 8]	—	—	—	—	—
Salo		128·4	328	e 19 24	[+28]	—	—	e 23 20	PKS	—
Huancayo		128·5	110	e 19 53	?	e 30 33	PS	e 20 53	PP	e 52·0
Basle		128·6	331	e 19 40	?	—	—	e 21 1	PP	—
Bologna		128·7	326	e 19 51	?	e 22 26	PKS	e 21 24	PP	—
Kew		128·9	339	e 18 52	[− 4]	e 27 34	SKKS	e 21 5	PP	e 49·9
Halifax		129·0	33	e 22 15	PKS	e 31 1	PS	e 38 45	SSP	58·1
Florence Xim.		129·1	326	e 19 14	[+17]	e 29 25	?	—	—	—
Pavia		129·4	328	e 19 27	[+30]	—	—	—	—	—
Besançon		129·6	332	e 19 42	[+44]	e 22 31	PKS	e 21 7	PP	—
Rome		129·6	323	i 18 54 s	[− 4]	i 29 10	?	i 22 22	PKP	e 56·9
Paris		129·9	335	e 18 48	[−10]	e 22 26	PKS	e 20 58	PP	e 57·9
Clermont-Ferraud		132·0	333	e 19 4	[+ 2]	i 22 36	PKS	e 21 28	PP	61·4
La Paz		133·6	119	i 19 7	[+ 2]	i 39 25	SS	21 33	PP	62·9
Bermuda		135·2	48	e 23 7	PKS	e 27 53	SKKS	e 32 58	PPS	e 56·4
Tortosa	N.	137·0	330	20 1	[+49]	29 8	SKKS	22 52	PP	e 55·9
Algiers Univ.	Z.	138·4	322	e 19 15	[+ 1]	—	—	e 22 8	PP	—
San Juan		139·1	67	e 20 11	[+56]	e 40 25	SS	e 22 43	PP	e 61·8
Alicante		139·3	328	19 7	[− 9]	26 31	[+16]	22 15	PP	e 64·2
Toledo		129·9	332	e 19 51	[+34]	e 42 2	SSP	i 22 57	PP	e 62·0
Almeria		141·5	328	19 15	[− 5]	26 19	[+ 1]	22 51	PP	69·8
Granada		141·8	330	20 14 k	[+54]	—	—	40 23	SS	65·0
Malaga	Z.	142·6	331	i 19 16 k	[− 6]	—	—	i 22 26	PP	—
Tamanrasset	Z.	144·4	304	i 19 27 k	[+ 2]	46 53?	SSS	e 22 53	PP	—
Fort de France		144·6	72	e 19 20	[− 5]	—	—	—	—	—

Additional readings and note :—
Brisbane iSSN =9m.22s., iZ =9m.31s.
Riverview iNZ =6m.0s. and 6m.17s., iPP?N =6m.56s., iZ =6m.59s., iPPP?NZ =7m.10s. iN =10m.12s., 10m.44s., and 11m.7s., iEZ =11m.12s., isS?EZ =11m.31s., iSS?NZ = 12m.15s., iE =13m.1s.
Apia eE =3m.58s., e =4m.15s., eN =5m.32s. and 7m.31s. ; the time-keeping appears to be in error.
Auckland PPN =8m.17s., isSN =13m.25s.
Wellington iPP =9m.37s., e =11m.18s., isS =14m.10s.
Christchurch iNZ =7m.16s., eEN =12m.9s., iEN =14m.25s., QEN =16m.48s., SSZ = 16m.57s.
Perth i =17m.37s.
Sendai S_eS? =17m.23s., SS =17m.56s.
Mizusawa eSN =14m.44s.
Honolulu ePPP =12m.24s., eS =16m.40s., eS_eS =19m.11s., eSS =20m.24s.
Calcutta iPPPE =15m.19s.
Kodaikanal PSE =22m.23s., SSE =26m.38s., SKKSE (△ >180°) =37m.53s.
New Delhi iPSN =22m.38s., iPPSN =22m.59s.
Poona PSEN =23m.1s., PPSEN =23m.23s.
College e =22m.53s., eSS? =27m.23s.
Bombay iSSE =28m.7s., SSN =28m.29s.
Berkeley iPZ =12m.46s., iZ =12m.56s. and 13m.54s., iN =14m.34s., 22m.41s. and 23m.1s., eSE =23m.23s., iPSE =24m.21s., iZ =26m.57s. and 27m.42s., eE = 29m.4s., iE =29m.22s.
Shasta Dam e =13m.28s. and 14m.11s., ePS =24m.26s., ePKKP? =30m.22s., ePKP, PKP? =37m.51s.
Victoria SKS =23m.4s., PS =24m.0s., SS =29m.23s.
Seattle e =13m.7s., 16m.57s., and 17m.27s., ePS =24m.23s., ePPS =24m.50s., e = 25m.18s., eSS =29m.38s., e =31m.9s.
Reno iE =13m.38s. and 23m.5s., iPSN =24m.34s.
Pasadena iZ =15m.57s.
Palomar iEZ =13m.24s.
Boulder City i =13m.33s., ePPP =18m.49s., ePS =25m.29s., eSS =30m.12s.
Overton ePPZ =16m.44s., ePPPZ =18m.56s.
Pierce Ferry ePP =16m.57s., ePPP? =19m.13s.
Hungry Horse i =14m.9s.
Salt Lake City eSS =31m.17s.
Logan e =17m.49s. and 21m.23s., eSS =30m.58s., e =34m.1s.
Bozeman eSS =31m.37s., eSSS =35m.35s.
Tucson i =14m.36s., e =20m.5s., iS =24m.50s., ePS =25m.57s., eSS =31m.24s., eSSS? = 34m.59s.
Tananarive SS =33m.0s.
Tiflis ePP =18m.40s.
Lincoln eSE? =25m.35s., eSSE =33m.53s., eSSSE =38m.3s.
Florissant iSKKS =26m.15s., iS =27m.8s., eSP =28m.45s., ePS =29m.2s., iPPS = 30m.2s., iSS =34m.57s., iSSS =39m.26s.

Continued on next page.

St. Louis ePP =19m.18s., e =21m.23s., iSKKS =26m.14s., iS =27m.11s., iSP =28m.41s., iPS =29m.3s., iSS =34m.58s.
Chicago eSS =34m.38s., eSSS =39m.29s.
Upsala eSS?N =34m.53s.?, eSSS?N =38m.53s.?
Cleveland ePPZ =19m.55s., eE =20m.1s. and 20m.15s., eZ =20m.19s., eN =20m.52s., eE =20m.55s. and 26m.30s., eSN =27m.43s., eN =28m.45s., eE =29m.24s., ePSN =29m.38s., eE =30m.8s., ePPSN =31m.17s., eN =36m.6s., eSSE =36m.15s.
Helwan eZ =19m.33s., 20m.36s., 20m.56s., 21m.35s., and 22m.42s., eN =28m.41s., eZ =30m.3s. and 30m.41s., eN =31m.33s.
Ottawa SKKS =27m.2s., S =28m.5s., PS =29m.37s., SS =36m.43s.
Columbia eSS =36m.0s.
Budapest eE =36m.53s.?, eN =37m.3s.
Potsdam iZ =21m.38s., eE =29m.53s.?
Prague isSKP =22m.23s., ePPP =23m.10s., eSKKS =27m.13s., eSP? =29m.59s., esSP =31m.5s., ePPS =31m.41s., eSS =36m.58s., eSSS =41m.40s., e =50m.53s.?
Seven Falls eE =27m.23s., 35m.51s., and 45m.23s.
Philadelphia e =27m.16s., ePS =31m.4s., eSS =37m.28s., eSSS =41m.4s.
Cheb e =21m.15s., epPPP =23m.34s., e =24m.11s., eSKKS =27m.41s., esSP =31m.23s., e =31m.28s., ePPS =32m.17s., e =36m.11s., eSS =37m.11s., e =40m.6s., eSSS? =42m.53s.
Fordham epPPS? =32m.24s.
Triest iPSKS =30m.45s., iSS =37m.48s., iPSKS$_2$ =40m.29s.
Stuttgart eZ =19m.17s. and 19m.38s., eSKP =22m.27s., ePSKS =30m.53s., eSS =37m.53s., eQ =57·9m.
Strasbourg e =19m.40s. and 20m.0s., iPP =21m.4s., iSKP? =22m.14s., i =23m.23s., ePPP =23m.33s. and 23m.38s., i =29m.0s. and 30m.27s., ePS =31m.0s., i =32m.19s., ePPS? =32m.28s., iSS =38m.7s., iSSS =42m.35s., e =49m.3s., i =49m.25s.
Huancayo e =28m.3s., eSS? =38m.17s., e =49m.35s.
Kew ePKS =22m.18s., eEZ =29m.3s., ePSEN =31m.36s., eSSEN =38m.18s., eSSSE =42m.44s.
Rome e =20m.54s., i =21m.8s., eSS =38m.12s.
Paris e =19m.15s., 19m.44s., 22m.11s., and 23m.7s., ePS =31m.24s., ePPS? =33m.48s., e =40m.48s.
Clermont-Ferrand ePPP =24m.16s., ePS =31m.40s., ePPS =33m.10s., eSS =39m.4s., eSSP =39m.41s., eSSS =44m.6s., Q =55·9m.
La Paz pPP =22m.32s., sPP =23m.19s.
Bermuda e =40m.55s.
Tortosa PPP?N =25m.53s.
Algiers Univ. eZ =19m.49s. and 23m.40s.
Alicante PKS =22m.51s., PPP =25m.27s., SKKS =29m.17s., SS =40m.39s., Q =56·8m.
Toledo iZ =22m.46s.
Almeria PPP =25m.31s., SKKS =29m.11s., PPS =34m.35s., SS =40m.43s., SSS =46m.3s.
Malaga PPPZ =25m.36s., P$_c$P,PKPZ =27m.20s.
Tamanrasset eZ =19m.54s. and 20m.42s., ePPP =26m.10s.

Oct. 20d. 18h. Undetermined shock probably originating in the region of Fiji.

Apia eP =14m.53s., eS? =16m.29s., eS =16m.33s., e =24m.7s. and 24m.24s.
Kaimata ePNE =17m.21s., eSNE =20m.49s.
Brisbane iPZ =17m.52s.k, iZ =21m.57s.
Pasadena iPZ =23m.59s.
Riverside iPZ =24m.2s.
Palomar iPZ =24m.3s.
Shasta Dam iP =24m.6s., e =26m.4s.
Tinemaha iPZ =24m.9s.
Boulder City e =24m.18s.
Pierce Ferry iP =24m.21s., i =24m.34s., e =26m.8s. and 37m.45s.
Tucson iP =24m.23s.
Victoria i =24m.27s.
College eP =24m.45s.
Hungry Horse iP =24m.50s.
Stuttgart ePKPZ =31m.38s., eZ =31m.44s. and 31m.54s.
Jena eN =31m.39s.
Strasbourg iPKP =31m.57s.

Oct. 20d. Readings also at 1h. (near La Paz (2)), 6h. (Frunse (2)), 7h. (Collmberg, near Chur, Zürich, Ravensburg, Stuttgart, and near Andijan), 8h. (Brisbane, Hungry Horse, College (2), Tamanrasset, Collmberg, and near Port-au-Prince), 10h. (Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City (2), Overton, Pierce Ferry (2), Hungry Horse, Tacubaya, Clermont-Ferrand, and near Reykjavik), 11h. (Brisbane (2), Tinemaha, Overton, Pierce Ferry, Hungry Horse, College (2), and Ksara (2)), 12h. (La Paz), 14h. (Andijan, and near Obi-garm (2)), 15h. (College and Hungry Horse), 16h. (near Victoria and near Mizusawa), 17h. (Collmberg and Frunse), 19h. (Pretoria, and near Obi-garm).

Oct. 21d. 3h. Aleutian Islands.

College eP =35m.55s., eS? =40m.0s., eL =41m.46s.
Victoria e =38m.11s. and 41m.49s.
Shasta Dam iP =38m.56s., eP_cP? =40m.45s., e =45m.29s., eL? =48m.0s.
Hungry Horse eP =39m.1s., i =39m.11s. and 39m.27s., e =40m.11s.
Berkeley iPZ =39m.13s.a
Reno iPZ =39m.16s.k, iN =41m.1s., iP_cPNZ =41m.51s.
Lick iPZ =39m.19s.
Fresno iPZ =39m.32s.k
Tinemaha iP =39m.39s.k, i =39m.49s.
China Lake iPZ =39m.48s.k
Pasadena iP =39m.55s.k, iZ =40m.4s.
Riverside iPZ =39m.59s.
Boulder City iP =40m.2s.
Overton iPZ =40m.3s., iZ =41m.23s. and 42m.8s.
Pierce Ferry iP =40m.5s., e =41m.17s. and 50m.10s.
Palomar iP =40m.6s., iZ =40m.18s.
Tucson iP =40m.42s., i =41m.3s. and 42m.41s.
St. Louis iP =41m.39s., e =61m.
Ottawa e =42m.14s.
Weston iP =42m.46s.
Pretoria iPKP_3Z =52m.29s., iZ =52m.40s.

Oct. 21d. 6h. 9m. 0s. Epicentre 21°·5N. 122°·0E. (as on 8d.).

A = −·4935, B = +·7898, C = +·3644; δ = +11; h = +4;

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		10·9	345	—	—	e 4 41	− 3	—	—	c 7·0
Hukuoka		14·1	30	e 3 25	+ 2	—	—	—	—	—
Osaka		17·7	38	e 4 16	+ 6	7 54	SS	—	—	—
Nagoya		18·9	41	e 4 30	+ 6	e 8 12	SS	—	—	—
Tokyo		21·0	43	e 4 52	+ 5	8 0?	−37	—	—	—
Sendai		23·3	40	e 5 15	+ 5	—	—	—	—	—
Mizusawa	E.	24·0	39	5 19	+ 2	9 32	0	—	—	—
Batavia		31·3	210	e 6 22	− 2	e 11 30	− 1	—	—	—
Bandong		31·5	208	e 6 25	− 1	e 11 35	+ 1	—	—	—
Poona	E.	45·2	275	e 8 18	− 2	i 18 16	SS	—	—	—
Andijan		46·0	307	e 8 24	− 3	e 15 6	− 6	—	—	—
Bombay		46·1	276	e 8 27	− 1	—	—	—	—	—
Tashkent		48·3	307	e 8 40?	− 5	i 15 41	− 4	—	—	—
Stalinabad		48·4	304	e 8 45	− 1	e 15 41	− 5	—	—	—
Sverdlovsk		56·7	325	9 43	− 5	17 30	−10	—	—	—
Ashkabad		56·9	302	e 9 46	− 3	—	—	—	—	—
Tiflis		66·7	307	e 10 53	− 2	e 20 28?	PPS	—	—	—
Moscow		69·4	324	e 11 12	0	—	—	—	—	—
College		70·8	26	e 11 21	+ 1	—	—	—	—	—
Ksara		75·3	300	e 11 49	+ 2	e 22 9?	PS	—	—	—
Collmberg	Z.	84·6	322	e 12 35	− 1	—	—	—	—	—
Triest	N.	86·8	319	e 12 52	+ 5	—	—	—	—	—
Stuttgart		88·0	323	e 12 51?	− 2	—	—	—	—	e 51·0
Bologna		88·9	318	e 13 25	+27	—	—	—	—	—
Victoria		89·2	37	e 13 1	+ 2	—	—	—	—	—
Rome		89·4	315	e 12 59	− 1	i 23 45	− 4	e 23 21	SKS	—
Paris		91·7	325	e 13 29	+19	—	—	—	—	—
Shasta Dam		94·0	43	e 13 24	+ 3	—	—	—	—	—
Hungry Horse		94·3	34	e 13 25	+ 2	—	—	—	—	—
Tamanrasset	Z.	104·1	302	22 21	PKS	—	—	—	—	—
Bogota	Z.	149·6	33	i 19 49	[+ 2]	—	—	—	—	—

Long waves were also recorded at other European stations and at Weston and Harvard.

Oct. 21d. 21h. 34m. 21s. Epicentre 5°·6S. 153°·6E. Focus at Base of Superficial Layers. (as on 1946, May 23d.).

A = −·8915, B = +·4426, C = −·0969; δ = +6; h = +7;
D = +·445, E = +·896; G = +·087, H = −·043, K = −·995.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		21·8	182	i 4 50k	− 1	i 8 52	+ 7	i 5 5	pP	—
Riverview		28·2	184	i 5 54a	+ 2	i 10 37	+ 3	i 6 8	pP	e 13·4
Melbourne		33·0	192	e 6 54	+20	i 12 5	+16	—	—	—
Auckland	N.	36·7	152	e 7 3	− 3	e 12 39	− 7	—	—	16·6
Arapuni	E.	38·0	152	—	—	e 13 27	+21	—	—	e 17·6
Kaimata	N.E.	40·0	160	e 7 39	+ 6	—	—	—	—	—
Wellington		40·3	156	i 7 35	− 1	i 13 39	− 2	e 9 24	PP	18·6
Christchurch		41·3	159	i 7 44	0	13 53	− 3	9 27	PP	e 19·8
Perth		44·0	228	—	—	i 14 31	− 4	i 18 9	SSS	i 21·6
Bandong		45·7	266	e 8 12	− 8	i 14 51	− 9	—	—	—
Mizusawa		46·0	347	8 24	+ 2	15 3	− 1	15 17	sS	—
Batavia		46·5	267	e 8 22	− 4	e 15 8	− 3	—	—	—
Calcutta	E.	69·6	297	e 11 11	+ 3	i 20 23	+11	e 13 49	PP	—
Irkutsk		71·2	330	11 17	− 1	20 32	+ 1	—	—	—
Colombo	E.	74·6	278	11 39	+ 1	21 24	sS	—	—	39·6
Kodaikanal	E.	77·4	282	e 11 52	− 1	i 21 44	+ 4	14 41	PP	36·6
New Delhi	N.	80·8	300	e 12 16	+ 4	i 22 14	− 2	e 22 44	SeS	—
Poona	N.	82·1	290	e 12 21	+ 2	i 22 24	− 6	23 9	SP	—
College		82·3	21	i 12 16	− 4	e 22 40	+ 8	i 12 40	pP	e 30·8
Bombay		83·1	290	e 12 29	+ 5	i 22 42	+ 2	—	—	—
Almata		83·8	315	12 31	+ 4	22 51	+ 4	—	—	—
Semipalatinsk		83·8	322	i 12 37?	+10	e 22 57?	+10	—	—	—
Sitka		84·7	31	e 12 53	+21	—	—	—	—	e 37·6
Frunse		85·8	313	i 12 39	+ 2	e 23 10	+ 4	—	—	—
Andijan		87·0	311	12 43	0	—	—	—	—	—
Ukiah		88·0	51	—	—	e 23 37	+10	—	—	e 36·6
Obi-garm		88·5	308	i 12 52	+ 2	—	—	—	—	—
Berkeley		88·8	52	i 12 55k	+ 3	e 23 33	− 2	i 16 21	PP	e 40·2
Santa Clara	E.	89·0	52	—	—	e 23 56	sSsS	e 40 54	Q	e 47·1
Shasta Dam		89·1	49	e 12 52	− 1	—	—	e 16 32	PP	e 42·9
Lick	z.	89·2	52	e 12 55	+ 1	—	—	e 16 38	PP	—
Stalinabad		89·4	309	i 12 55	0	e 23 21	[+ 1]	i 23 44	S	—
Tashkent		89·4	311	i 12 58	+ 3	i 23 44	+ 4	—	—	—
Victoria		89·5	42	12 55	0	23 25	[+ 4]	24 0	sS	41·6
Seattle		90·1	43	—	—	e 23 59	sS	e 25 11	PS	e 42·6
Fresno	z.	90·6	53	e 12 55	− 5	—	—	i 16 20	PP	e 47·6
Reno	z.	90·9	51	e 13 11	pP	—	—	—	—	e 43·0
Samarkand		90·9	309	e 13 4	+ 2	—	—	—	—	—
Pasadena		91·6	56	e 13 4	− 1	e 24 9	sS	i 13 23	pP	e 38·2
Tinemaha		91·9	53	i 13 7	+ 1	—	—	—	—	—
Riverside		92·3	56	e 13 7	− 1	—	—	i 13 27	pP	—
Palomar	z.	92·6	57	i 13 10	0	—	—	i 13 25	pP	—
Boulder City		94·6	54	e 13 30	pP	—	—	e 17 1	PP	—
Overton	z.	94·6	54	i 13 19	0	—	—	i 13 59	pP	—
Pierce Ferry		95·2	54	e 13 21	0	—	—	e 13 32	pP	—
Hungry Horse		95·7	42	e 13 26	+ 2	—	—	e 13 37	pP	—
Sverdlovsk		96·3	327	13 24	− 2	i 24 51	+11	17 20	PP	—
Logan		97·1	48	e 14 2	+32	e 26 22	PS	e 32 9	PSS	e 45·0
Ashkabad		97·5	308	e 13 35	+ 3	—	—	—	—	—
Bozeman		97·7	45	e 17 31	PP	e 24 9	[+ 3]	—	—	e 46·1
Tucson		97·7	59	e 13 52	pP	e 25 3	sS	e 17 31	PP	e 41·8
Baku		104·0	310	e 18 32	PP	e 27 32	PS	—	—	—
Tiflis		107·7	312	e 13 18?	?	e 24 19?	[−34]	e 18 45?	PP	—
Moscow		109·1	328	e 18 56	PP	e 28 20	PS	—	—	—
St. Louis		113·8	50	e 19 27	PP	e 26 48	sSKS	e 19 38	pPP	—
Yalta		114·7	317	e 19 37	PP	—	—	—	—	—
Ksara		116·0	305	e 14 52?	P	29 50	PPS	i 19 48	PP	—
Upsala		116·4	337	—	—	—	—	e 47 39?	Q	e 51·6
Istanbul		119·3	315	e 20 10	PP	e 28 5	?	—	—	—
Cleveland		119·4	44	—	—	e 25 42	[+ 3]	e 30 3	PS	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Copenhagen		121·3	336	20 26	PP	30 11	PS	—		—	55·6
Pennsylvania		122·3	43	i 20 26	PP	i 30 28	PS	e 37 5		SS	60·5
Potsdam	z.	123·2	333	e 20 33	PP	—	—	i 20 36		PP	e 50·6
Seven Falls	E.	123·8	35	—	—	e 30 27	SP	e 37 45		SSP	53·5
Collmberg		123·9	331	e 18 57	[+ 2]	—	—	e 19 15		pPKP	e 62·6
Prague		124·0	330	e 30 7	?	e 30 52	PS	e 46 51		Q	e 63·6
Philadelphia		124·5	44	e 30 32	PS	e 37 46	SS	e 42 58		sSSS	e 56·1
Jena		124·9	332	e 20 46	PP	—	—	—		—	—
Fordham		125·0	43	e 20 47	PP	37 47	SS	—		—	—
Harvard		125·7	40	e 20 32	PP	e 32 41	PPS	e 29 35		PKKP	e 51·0
Weston		126·0	40	20 31	PP	32 33	PPS	38 13		PSS	—
De Bilt		126·8	337	e 20 59	PP	—	—	—		—	e 55·6
Triest		127·1	326	—	—	e 32 29	PPS	e 45 23		Q	—
Stuttgart		127·5	331	e 18 59	[− 3]	e 22 18	SKP	e 21 2		PP	e 72·6
Huancayo		128·3	110	—	—	e 36 6	?	e 38 48		PSS	e 61·2
Strasbourg		128·3	332	e 21 9	PP	e 22 23	SKP	e 38 32		SS	e 59·6
Salo		128·9	328	e 18 59	[− 6]	—	—	—		—	—
Bologna		129·1	326	e 21 56	PP	—	—	—		—	—
Kew		129·4	340	e 22 27	SKP	e 30 58	PS	e 42 26		sSSS	e 60·6
Florence Xim.		129·6	325	e 21 21	PP	e 31 23	PS	—		—	—
Pavia		129·9	328	e 20 29?	PP	—	—	—		—	—
Rome		130·0	323	i 19 6a	[− 1]	i 22 33	PKS	i 21 19		PP	e 66·6
Paris		130·4	335	—	—	e 22 33	PKS	—		—	e 71·6
Bogota		132·5	89	—	—	e 22 34	SKP	—		—	69·6
Clermont-Ferrand		132·5	332	e 19 5	[− 6]	i 22 44	PKS	e 21 38		PP	63·6
La Paz		133·3	119	e 19 15	[+ 2]	—	—	i 21 59		pPP	63·6
Bermuda		135·5	48	e 23 51	PPP	e 33 2	PPS	e 40 4		SS	e 58·3
Algiers Univ.	z.	138·9	322	19 25	[+ 2]	—	—	22 9		PP	—
San Juan		139·2	68	e 21 58	PP	—	—	—		—	e 58·2
Almeria		142·0	328	19 23	[− 6]	26 31	[− 2]	22 31		PP	75·1
Granada		142·3	330	20 41k	[+71]	—	—	23 38		PP	—
Malaga	z.	143·0	331	i 19 27a	[− 3]	26 21	[−14]	i 22 41		PP	75·4
Tamanrasset	z.	144·8	304	i 19 25k	[− 9]	—	—	e 22 56		PP	—

Additional readings :—
Brisbane iZ =8m.10s.
Riverview iZ =6m.11s., isSNZ =11m.2s., iE =11m.51s., eQE =12m.3s.
Wellington e =9m.34s., eZ =13m.3s., e =13m.13s., eSS =16m.51s.
Christchurch eZ =8m.18s., e =12m.7s., QEN =16m.59s., SSZ =17m.16s.
Perth i =19m.19s.
Calcutta eSSE =24m.54s.
Kodaikanal PPPE =16m.33s., SSE =26m.37s.
College ePP =15m.31s., e =16m.13s., eS =22m.10s., e =24m.38s.
Berkeley iPSE =24m.59s., eQN =35·4m.
Shasta Dam iP =12m.58s., e =13m.53s. and 20m.52s.
Victoria e =13m.21s.
Seattle eS =24m.14s., ePPS =25m.29s.
Fresno eZ =18m.32s.
Overton iPPZ =17m.7s.
Pierce Ferry e =16m.36s., ePP =17m.27s.
Hungry Horse ePP? =17m.25s., ePKP,PKP =38m.24s.
Sverdlovsk SS =31m.31s.
Logan e =16m.14s.
Tucson eSS? =31m.44s., eSSS? =35m.28s.
St. Louis esSP =29m.9s., e =36m.34s.
Cleveland ePPS?E =31m.35s., eSSE =36m.33s.
Pennsylvania iPPN =20m.51s., eE =25m.27s., iSSSN =42m.27s.
Prague e =33m.4s.
Weston PPS =33m.39s.
Stuttgart eZ =21m.31s., ePPP =23m.39s. and 24m.45s., ePPS =33m.33s., eSS = 38m.21s., eSSS =43m.39s., eQ =62·6m.
Strasbourg ePPS? =32m.47s., eSS =42m.56s., eSSS =43m.49s.
Rome e =31m.29s., PPS =32m.49s., SS =38m.49s.?, SSS =44m.19s.
Clermont-Ferrand ePPP =24m.35s., ePS =31m.54s., ePPS =33m.32s., eSS =39m.8s.
Almeria PKS =24m.19s., PPP =25m.39s., PPS =34m.59s., SS =40m.55s.
Malaga PPPZ =25m.53s., PPSZ =35m.1s., SSZ =41m.7s.
Tamanrasset eZ =19m.11s. and 20m.46s.
Long waves were also recorded at Apia, Honolulu, Tananarive, Galerazamba, Ivigtut, and at other North American and European stations.

Oct. 21d. Readings also at 1h. (Harvard), 2h. (Berkeley), 3h. (Hungry Horse), 4h. (College), 8h. (Victoria), 9h. (La Paz and near Antofagasta), 10h. (Hungry Horse), 12h. (Seattle, Samarkand, near Obi-garm, Stalinabad, and Andijan), 16h. (near Messina), 17h. (near Alicante), 18h. (Brisbane, College, and near Mizusawa), 20h. (Brisbane, Berkeley, near Branner, and Lick), 21h. (near College).

Oct. 22d. 1h. 6m. 8s. Epicentre 11°·9N. 128°·5E.

A = −·6093, B = +·7660, C = +·2049 ; δ = −1 ; h = +6 ;
D = +·783, E = +·623 ; G = −·128, H = +·160, K = −·979.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bandong		27·9	230	e 5 35	−19	—	—	—	—	—
Batavia		28·1	232	e 5 55	0	—	—	—	—	—
Brisbane	Z.	45·8	149	i 8 25k	0	—	—	—	—	—
Riverview		50·3	156	e 9 0	0	e 16 11	− 2	i 11 3	PP	e 24·0
Bombay	E.	54·0	285	—	—	e 16 21	−42	—	—	—
Stalinabad		59·1	309	e 10 5	+ 1	e 18 8	− 3	—	—	—
Tashkent		59·2	312	e 10 0?	− 5	e 18 6?	− 6	—	—	—
Sverdlovsk		68·0	327	e 11 6	+ 3	e 20 3	+ 1	—	—	—
College		76·6	26	e 12 8	+14	—	—	—	—	—
Ksara		85·6	303	e 12 41	0	23 19?	+ 6	—	—	—
Istanbul		89·3	312	—	—	e 23 47	− 1	e 23 29	SKS	—
Collmberg	Z.	96·0	325	—	—	e 31 16	SS	—	—	—
Tinemaha	Z.	100·7	48	i 23 56	?	—	—	—	—	—
China Lake	Z.	101·7	49	e 23 54	?	—	—	—	—	—
Mount Wilson	Z.	102·0	51	i 24 4	?	—	—	—	—	—
Tucson		108·3	50	e 24 10	?	—	—	—	—	—

Additional readings :—
Riverview ePSEN = 16m.23s., eE = 18m.54s., eSSEN = 19m.34s.
Collmberg eZ = 31m.23s.
Long waves were also recorded at Potsdam and Rome.

Oct. 22d. 3h. 42m. 30s. Epicentre 40°·6N. 126°·4W. (as on 1947, November 2d.).

A = −·4519, B = −·6129, E = +·6482 ; δ = +2 ; h = −2 ;
D = −·805, E = +·593 ; G = −·385, H = −·522, K = −·761.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Shasta Dam		3·0	88	e 0 51	+ 1	i 1 25	− 2	—	—	i 2·8
Mineral		3·7	93	i 1 0	0	i 1 41	− 4	i 1 10	P_g	—
Berkeley		4·2	130	i 1 5	− 2	e 2 13	S*	i 1 20	P_g	—
San Francisco		4·2	132	e 1 4	− 3	e 1 52	− 5	—	—	—
Branner	Z.	4·6	133	i 1 10k	− 2	i 2 2	− 5	—	—	—
Lick	Z.	4·9	130	i 1 15k	− 2	i 2 10	− 5	—	—	—
Reno		5·2	100	e 1 32	P*	e 2 20	− 2	—	—	—
Tinemaha	Z.	7·3	117	i 1 53	+ 3	—	—	—	—	—
China Lake	Z.	8·4	122	e 2 6	0	—	—	—	—	—
Mount Wilson	Z.	9·2	132	e 2 14	− 2	—	—	—	—	—
Riverside	Z.	9·7	130	i 2 23	+ 1	—	—	—	—	—
Tucson		15·0	119	e 3 39	+ 4	—	—	—	—	—

Additional readings :—
Mineral iE = 1m.45s.
Berkeley iZ = 1m.11s.
Reno eZ = 1m.35s., 2m.27s., and 3m.22s.

Oct. 22d. 3h. 47m. 34s. Epicentre 36°·7N. 121°·1W. (as on 1937 Oct. 3d.).

A = −·4151, B = −·6881, C = +·5951 ; δ = −7 ; h = 0 ;
D = −·856, E = +·517 ; G = −·308, H = −·509, K = −·804.

	△	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Lick	0·8	325	i 0 16	− 2	i 0 27	− 4	—	—
Santa Clara	0·9	314	—	—	e 0 31	− 3	—	—
Branner	1·1	310	e 0 22a	0	i 0 38	− 1	—	—
Fresno	1·1	88	i 0 23a	+ 1	i 0 38	− 1	—	—
Berkeley	1·5	321	i 0 27k	− 1	i 0 46	− 3	—	—
San Francisco	1·5	315	e 0 28	0	i 0 48	− 1	—	—
Reno	3·0	20	e 0 55	P*	e 1 36	+ 9	e 0 58	P_g

Additional readings :—
Branner iN = 41s.
Fresno eN = 3m.3s., eZ = 3m.26s.
Berkeley iZ = 43s., iE = 50s.
San Francisco iE = 42s.

Oct. 22d. 21h. 45m. 21s. Epicentre 36·7N. 121°·1W. (as at 3h. 47m.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Lick		0·8	325	i 0 15	− 3	i 0 27	− 4	—	—	—
Branner		1·1	310	i 0 20	− 2	i 0 37	− 2	—	—	—
Fresno		1·1	88	i 0 22a	0	i 0 38	− 1	—	—	—
Berkeley		1·5	321	i 0 25a	− 3	i 0 44	− 5	—	—	—
San Francisco	N.	1·5	315	e 0 26	− 2	i 0 44	− 5	—	—	—
Tinemaha		2·3	81	i 0 43	+ 3	i 1 18	+ 9	—	—	—
Santa Barbara		2·5	154	i 0 43	0	i 1 16	+ 2	i 0 57	P_g	—
Haiwee		2·6	103	i 0 47	+ 3	i 1 27	S_g	i 0 57	P_g	—
Ukiah		2·9	326	—	—	e 1 47	S_g	—	—	e 2·1
China Lake	z.	3·0	107	e 0 49	− 1	i 1 36	S_g	i 0 58	P_g	—
Reno		3·0	20	e 0 51	+ 1	i 1 21	− 6	i 1 1	P_g	—
Pasadena		3·5	136	i 0 51	− 6	i 1 47	S*	—	—	—
Mineral		3·7	354	e 0 58k	− 2	e 1 48	+ 3	i 1 9	P_g	—
Riverside	z.	4·1	130	i 1 4	− 1	i 2 3	S*	—	—	—
Shasta Dam		4·1	343	e 1 6	+ 1	e 2 1	+ 6	—	—	e 2·1
Palomar	z.	4·8	132	i 1 16	+ 1	—	—	—	—	—
Boulder City		5·1	96	e 1 23	+ 3	—	—	i 1 45	P_g	e 2·9
Overton	z.	5·3	90	i 1 26	+ 4	—	—	—	—	i 4·7
Pierce Ferry		5·7	94	i 1 32	+ 4	—	—	i 1 51	P_g	e 3·2
Logan		8·8	52	i 2 13	+ 2	e 4 19	S*	—	—	e 4·8
Tucson		9·6	114	e 2 23	+ 2	e 3 55	−17	e 3 13	P_g	e 4·7
Hungry Horse		12·8	22	i 3 10	+ 4	—	—	—	—	e 6·8

Additional readings :—
Branner iN = 23s.
Berkeley iEN = 30s., iN = 37s. and 40s.
San Francisco iN = 30s., 41s., and 48s.
Reno iZ = 1m.11s., iN = 1m.35s.
Mineral iNZ = 1m.2s., iE = 1m.18s., iN = 1m.57s.
Boulder City i = 1m.29s.
Pierce Ferry i = 1m.45s.
Tucson i = 2m.30s.
Long waves were also recorded at Bozeman and Salt Lake City.

Oct. 22d. Readings also at 0h. (near Leninakan (2)), 5h. (Brisbane, Pierce Ferry, Victoria, Hungry Horse, College, Stuttgart, Murgab, Samarkand, near Andijan, Obi-garm, and Stalinabad), 6h. (College), 7h. (Boulder City, Overton, Pierce Ferry, and near Andijan), 8h. (Auckland, near Apia, near Andijan, and near Balboa Heights), 9h. (Tacubaya (2), Santa Lucia, Tucson, Shasta Dam, Hungry Horse, College, Collmberg, Clermont-Ferraud, Stuttgart, Ksara, and near Frunse), 12h. (near Obi-garm), 14h. (Besançon, Strasbourg, Stuttgart, Murgab, Stalinabad, near Andijan (2), Obi-garm, and near Tamanrasset), 16h. (Auckland, Christchurch, Wellington, Berkeley, near Branner, and Lick), 18h. (near Antofagasta), 20h. (near Apia), 21h. (Brisbane, Collmberg, and Stuttgart), 23h. (near Hungry Horse).

Oct. 23d. 5h. Undetermined shock. Pacific.
Riverview eZ =19m.6s., eS?N =23m.44s., esS?N =24m.44s., iN =25m.31s.
Bandong iPE =19m.41s., eSEN =20m.43s.
New Plymouth eE =19m.52s.
Kaimata ePNE =20m.27s.
Tuai PN =20m.30s.
Batavia eS =20m.49s.
Irkutsk eP =23m.6s., S =31m.32s.
Stalinabad P =24m.25s., PS =34m.25s.
College iP =24m.41s., epP =25m.25s., ePKKP =42m.51s.
Sverdlovsk eP =25m.7s., eS =35m.20s.
Victoria i =25m.28s. a, e =26m.3s.
Shasta Dam iP =25m.31s., epP? =26m.0s., ePP =29m.21s.
Berkeley iPZ =25m.32s. a, ipPZ =26m.6s.
Mineral iPZ =25m.34s. a, iZ =25m.45s.
Seattle iP =25m.34s., ipP =26m.9s., isP =26m.22s.
Lick iPZ =25m.34s. a, ePPZ =29m.28s.
Pasadena iP =25m.45s. a, ipPZ =26m.20s., ePPZ =29m.53s.
Tinemaha iPEZ =25m.47s.
China Lake ePZ =25m.48s., epPZ =26m.24s., ePPZ =29m.58s.
Riverside iPZ =25m.49s. a, epPZ =26m.23s., ePPZ =29m.59s.
Palomar iPZ =25m.51s., iPPZ =29m.54s.
Hungry Horse iP =25m.57s.
Boulder City eP =25m.59s., ePP =30m.17s.
Pierce Ferry iP =26m.2s., iPP =30m.13s.
Tucson eP =26m.16s., ePP =30m.26s.
Overton iZ =27m.32s. and 28m.5s.
Collmberg eZ =30m.53s.
Stuttgart ePKPZ =31m.0s., epPKPZ =31m.32s.
Ottawa e =31m.8s.
Ksara e =31m.13s. and 40m.15s.
Algiers Univ. PZ =31m.19s., iSKPZ =34m.35s.
Tamanrasset PZ =31m.20s.
Bogota iPKPZ =31m.35s.
La Paz PKP =31m.37s.
St. Louis ePP =32m.20s., e =35m.19s., 40m.52s., and 42m.17s.

Oct. 23d. Readings also at 1h. (La Paz, Fresno, and Lick), 3h. (Samarkand, near Andijan, Obi-garm, and Stalinabad), 4h. (Messina), 5h. (Tucson, Overton, Pierce Ferry, College, near Apia, near Obi-garm, Samarkand, and Stalinabad), 7h. (near Bologna (2)), 9h. (Tucson, near Berkeley, Branner, and Lick), 10h. (Basle and near Alicante), 12h. (College), 13h. (near Andijan), 15h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Shasta Dam, Berkeley, Lick, Collmberg, Jena, Strasbourg, Stuttgart, and Chur), 17h. (Andijan, Murgab, near Obi-garm, and Stalinabad), 19h. (near Andijan), 20h. (Collmberg, Jena, and near Istanbul), 21h. (Tacubaya, Hungry Horse, Victoria, and near Santa Clara).

Oct. 24d. 1h. 53m. 6s. I
2h. 22m. 38s. II
Epicentre 37°·5N. 118°·5W. (as on 20d.).

			△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Fresno		1·3	233	i 0 22	− 3	i 0 40	− 4	—	—	—
II			1·3	233	i 0 22k	− 3	i 0 41	− 3	—	—	—
I	Reno		2·3	334	i 0 41k	+ 1	e 1 8	− 1	—	—	—
II			2·3	334	i 0 40	0	i 1 3	− 6	—	—	—
I	Lick	z.	2·5	266	i 0 42a	− 1	i 1 19	+ 5	i 0 48	P_g	—
II			2·5	266	i 0 43a	0	i 1 17	+ 3	i 0 52	P_g	—
II	Branner		2·9	268	i 0 49a	+ 1	i 1 26	+ 2	i 0 58	P_g	—
II	Berkeley		3·0	277	i 0 51	+ 1	i 1 29	+ 2	i 0 59	P_g	—
II	San Francisco		3·2	275	e 1 2	P_g	e 1 35	+ 3	e 1 42	S_g	—
I	Boulder City		3·3	117	i 0 56	+ 3	e 1 39	+ 4	—	—	—
I	Overton	z.	3·4	106	i 0 59	+ 4	i 1 39	+ 2	—	—	—
II		z.	3·4	106	i 0 58	+ 3	i 1 41	+ 4	—	—	—
I	Mineral	z.	3·7	320	i 1 0k	0	i 1 42	− 3	i 1 9	P*	—
II			3·7	320	i 1 2a	+ 2	e 1 42	− 3	i 1 12	P_g	—
I	Pierce Ferry		3·9	110	e 0 56	− 6	i 1 57	+ 7	i 1 9	P*	—
II			3·9	110	i 0 57	− 5	—	—	i 1 6	P*	i 2·0
I	Shasta Dam		4·4	318	—	—	e 2 13	S*	—	—	—
II			4·4	318	e 1 11	+ 1	e 2 3	+ 1	e 1 41	P_g	e 2·3
II	Tucson		8·2	128	e 1 59	− 4	—	—	e 2 33	P_g	e 4·4

Additional readings :—
Lick I eE =1m.15s., II iZ =47s. and 1m.20s.
Berkeley II iZ =1m.2s. and 1m.33s.
San Francisco II eN =1m.20s.
Mineral I iEN =2m.6s., II iZ =1m.8s., iE =1m,49s, and 1m,58s,
Pierce Ferry I i =1m,5s. and 2m.23s,

Oct. 24d. 16h. 47m. 29s. Epicentre 41°·7N. 15°·4E. (as on 1941, Aug. 20d.).

A = +·7219, B = +·1989, C = +·6627 ; δ = −13 ; h = −2 ;
D = +·266, E = −·964 ; G = +·639, H = +·176, K = −·749.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Taranto		1·9	131	0 7?	?	0 30?	P	—	—
Rome		2·2	275	e 0 33	− 5	i 1 2	− 4	e 0 41	P
Messina		3·5	178	e 1 7	P_g	i 1 22	−18	—	—
Florence Arc.		3·7	305	e 1 7	P*	e 1 49	+ 4	e 2 13	S_g
Florence Xim.		3·7	305	e 1 0	0	e 1 59	S_g	—	—
Bologna		4·1	314	e 1 5	0	e 2 3	+ 8	—	—
Triest		4·1	346	e 1 31	PP	i 1 49$_a$	− 6	—	—
Zürich		7·5	321	e 1 50	− 3	e 3 15	− 5	—	—
Basle		8·0	319	e 2 32	P_g	e 3 21	−12	—	—
Stuttgart	z.	8·3	330	e 2 11?	+ 7	—	—	—	—
Prague		8·4	356	—	—	e 3 56	+13	i 4 40	S_g
Collmberg		9·7	351	e 2 39?	+17	e 4 20?	+ 5	—	—

Rome gives also e = 52s., iS_g = 1m.14s.
Long waves were recorded at Padova.

Oct. 24d. Readings also at 2h. (Overton (2), Pierce Ferry (2), Shasta Dam, Boulder City, Mineral, Hungry Horse, Seattle, Victoria, and College), 4h. (Overton, Pierce Ferry, Shasta Dam, and near Mizusawa), 6h. (Andijan, and near Obi-garm), 8h. (near Bogota), 10h. (Frunse, Samarkand, Tchimkent, near Andijan, Murgab, Obi-garm, and Stalinabad), 12h. (near Istanbul), 14h. (Bologna), 15h. (Auckland, Kaimata, Wellington, College, and Lick), 16h. (Kew), 19h. (Boulder City, Overton, Pierce Ferry, and near Obi-garm), 20h. (near Andijan and Obi-garm), 21h. (Boulder City, Overton, Pierce Ferry (2), and near Obi-garm), 23h. (Santa Lucia, Pierce Ferry, and near Mineral).

Oct. 25d. 13h. 7m. 44s. Epicentre 36°·4N. 140°·6E. Depth of focus 0·010.
(as on 1949, May 12d.).

Intensity VI at Miyamoto (Hukusima pref.) ; V at Kakioka and Mito ; IV at Onahama, Hukusima, Tyosi, Sirakawa, Tukubasan, Maebasi, Hunatu, Kumagaya, Tokyo, and Titibu ; II-III at Oiwake, Sendai, Yokohama, Kohu, and Morioka. Macroseismic radius >300km. Epicentre 36°·6N. 140°·6E. Depth 95km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1949, Tokyo, 1950, p. 36, with macroseismic chart.

A = −·6235, B = +·5121, C = +·5908 ; δ = +4 ; h = 0 ;
D = +·635, E = +·773 ; G = −·457, H = +·375, K = −·807.

	△	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Mito	0·1	261	0 17	+ 3	0 28	+ 4	—	—
Kakioka	0·4	244	0 18	+ 3	0 29	+ 2	—	—
Tukubasan	0·5	246	0 18k	+ 2	0 26	− 2	—	—
Onahama	0·6	24	0 18k	+ 1	0 32	+ 3	—	—
Kumagaya	1·0	256	0 23k	+ 3	0 39	+ 3	—	—
Tokyo	1·0	224	0 25k	+ 5	0 41	+ 5	—	—
Maebasi	1·3	270	0 20a	− 4	0 36	− 6	—	—
Yokohama	1·3	219	0 29	+ 5	0 49	+ 7	—	—
Hukusima	1·4	356	0 24	− 1	0 39	− 5	—	—
Mera	1·6	203	0 32	+ 4	0 53	+ 4	—	—
Hunatu	1·8	239	0 33	+ 3	0 57	+ 4	—	—
Misima	1·8	226	0 36	+ 6	1 0	+ 7	—	—
Matusiro	1·9	274	0 33a	+ 1	0 53	− 2	—	—
Osima	1·9	211	0 35	+ 3	1 0	+ 5	—	—
Sendai	1·9	7	0 29k	− 3	0 51	− 4	—	—
Yamagata	1·9	354	0 31	− 1	0 52	− 3	—	—
Nagano	2·0	278	0 32a	− 1	0 53	− 4	—	—
Shizuoka	2·3	231	0 42	+ 5	1 12	+ 7	—	—
Aikawa	2·5	311	0 37	− 3	1 2	− 8	—	—
Misusawa	2·8	9	i 0 41	− 3	i 1 9	− 8	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Wazima		3·1	288	0 44	− 4	—	—	—	—
Nagoya		3·2	247	0 54	+ 4	1 29	+ 2	—	—
Gihu		3·3	252	0 50	− 1	1 27	− 2	—	—
Morioka		3·3	8	0 49k	− 2	1 25	− 4	—	—
Akita		3·4	355	0 49	− 3	1 23	− 9	—	—
Miyako		3·4	18	0 49	− 3	1 17	−15	—	—
Hikone		3·7	253	0 59	+ 3	1 30	− 9	—	—
Kameyama		3·7	247	1 0	+ 4	1 53	+14	—	—
Hatinohe		4·2	10	1 0	− 3	1 43	− 8	—	—
Kyoto		4·2	252	1 5	+ 2	2 0	+ 9	—	—
Owase		4·3	238	1 4	− 1	2 12	+18	—	—
Osaka		4·5	249	1 10	+ 3	2 13	+14	—	—
Kobe		4·7	250	1 13	+ 3	—	—	—	—
Toyooka		4·8	261	1 12	+ 1	—	—	—	—
Siomisaki		4·9	235	1 29	+16	2 38	+29	—	—
Sumoto		5·1	247	1 17	+ 1	2 18	+ 4	—	—
Mori		5·7	0	1 23	− 1	—	—	—	—
Koti		6·4	246	2 3	+30	3 20	+34	—	—
Matuyama		6·9	251	1 42	+ 2	3 35	+37	—	—
Hamada		7·1	259	2 10	+27	—	—	—	—
Hukuoka		8·8	254	2 6	0	4 12	+28	—	—
College		50·0	32	i 8 44	− 2	—	—	i 9 8	pP
Victoria		67·3	46	i 10 46	0	—	—	—	—
Shasta Dam		71·9	53	i 11 14	0	—	—	e 11 43	pP
Hungry Horse		72·7	42	i 11 18	− 1	i 11 50	sP	i 11 43	pP
Reno	z.	74·3	53	i 11 28k	0	—	—	i 11 55	pP
Berkeley	z.	74·5	55	i 11 24	− 6	—	—	i 11 51	pP
Tinemaha	z.	76·7	55	i 11 42k	0	—	—	i 12 8	pP
Pasadena	z.	78·5	57	i 11 51	− 1	—	—	i 12 17	pP
Riverside	z.	79·1	57	i 11 54	− 1	—	—	e 12 23	pP
Overton	z.	79·5	53	i 11 58	0	—	—	i 12 25	pP
Boulder City		79·6	53	e 11 58	0	—	—	e 12 19	pP
Pierce Ferry		80·0	52	i 12 1	+ 1	—	—	i 12 28	pP
Collmberg	z.	81·3	330	e 12 4	− 3	—	—	e 12 30	pP
Tucson		84·5	54	i 12 24	+ 1	—	—	i 12 51	pP
Stuttgart	z.	84·8	331	e 12 23	− 2	—	—	e 12 49	pP
La Paz	z.	147·7	60	e 19 36	[+ 5]	—	—	—	—

Additional readings :—
Hungry Horse i = 12m.26s. and 12m.45s.
Pasadena iZ = 12m.13s.
Overton eZ = 15m.56s.

Oct. 25d. Readings also at 0h. (Boulder City and Pierce Ferry), 3h. (Boulder City, Overton, and Pierce Ferry), 4h. (Fort de France, College, Hungry Horse, Shasta Dam (2), Boulder City, Overton, Pierce Ferry, Tucson, Mount Wilson, Riverside, Tinemaha, Arcata, near Mineral, Berkeley, Branner, and Lick; more than 1 shock), 5h. (Tananarive, and near Apia), 8h. (Algiers Univ., Tamanrasset (intensity VI in Algeria), Copiapo, and near Apia), 9h. (Shasta Dam and Berkeley), 10h. (Pierce Ferry and near Stalinabad), 11h. (near Murgab, Stalinabad, Samarkand, Andijan (2), and Tchimkent (2)), 12h. (La Paz (2) and near Apia (2)), 13h. (College, Frunse, Almata, near Stalinabad, Andijan, Tashkent, Murgab, Samarkand, and Tchimkent), 15h. (Pierce Ferry), 16h. (Shasta Dam), 18h. (Pierce Ferry, near Obi-garm, and near Victoria), 19h. (Victoria), 22h. (Victoria and Istanbul), 23h. (near Istanbul (2)).

Oct. 26d. 0h. 2m. 32s. Epicentre 10°·5N. 41°·0W. (as on 1949, April 13d.).

$A = +·7423$, $B = -·6452$, $C = +·1811$; $\delta = +9$; $h = +6$;
$D = -·656$, $E = -·755$; $G = +·137$, $H = -·119$, $K = -·984$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Juan		25·5	291	e 5 35	+ 3	e 9 53	− 4	—	—	e 11·2
Bogota		33·3	263	i 6 43	+ 2	e 12 6	+ 4	e 13 9	PcS	—
Galerazamba		33·7	275	e 7 13	+28	e 12 23	+15	e 13 13	PcS	—
La Paz		38·0	225	i 7 20a	− 1	i 13 16	+ 2	9 4	PP	20·1
Tamanrassett	z.	46·1	68	e 8 33	+ 5	—	—	e 10 25	PP	23·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Algiers Univ.	z.	47·5	50	i 8 30	− 8	—	—	—	—	—
St. Louis		52·0	312	e 9 12	− 1	e 16 32	− 4	—	—	—
Stuttgart	z.	56·5	38	e 9 45	− 1	—	—	—	—	—
Tucson		67·5	301	i 11 0	0	e 19 53	− 3	e 13 42	PP	e 37·6
Istanbul		68·3	50	e 11 4	− 1	—	—	—	—	—
Helwan	z.	69·5	63	e 11 13	+ 1	—	—	—	—	—
Pierce Ferry		70·2	305	i 11 18	+ 1	—	—	—	—	—
Overton	z.	70·5	306	i 11 20	+ 2	—	—	—	—	—
Boulder City		70·9	305	e 11 18	− 3	—	—	—	—	—
Hungry Horse		70·9	318	i 11 20	− 1	—	—	—	—	—
Palomar	z.	72·5	302	i 11 32	+ 2	—	—	—	—	—
Riverside		72·9	303	e 11 33	0	—	—	—	—	—
China Lake	z.	73·1	305	e 11 34	0	—	—	—	—	—
Ksara		73·4	58	e 11 32	− 4	e 21 49	PS	—	—	—
Pasadena	z.	73·6	303	i 11 38	+ 1	—	—	—	—	—
Tinemaha	z.	73·6	306	e 11 38	+ 1	—	—	—	—	—
Fresno	z.	74·8	306	e 11 44a	0	—	—	—	—	—
Reno	z.	74·8	308	i 11 45k	+ 1	—	—	e 17 1	PPP	—
Mineral	z.	76·1	310	i 11 52k	+ 1	—	—	—	—	—
Lick	z.	76·3	307	i 11 54a	+ 2	—	—	i 12 1	pP	—
Pretoria	z.	76·3	119	i 11 50	− 2	—	—	—	—	—
Shasta Dam		76·7	310	i 11 53	− 2	—	—	—	—	—
Victoria		77·2	318	e 11 55	− 2	—	—	—	—	—
College		87·6	337	e 12 53	+ 2	—	—	—	—	—

Additional readings :—
Bogota eSSEN =14m.31s.
La Paz iSS =16m.2s.
Tamanrasset eZ =8m.47s.
Algiers Univ. iZ =8m.22s.
Istanbul e =11m.24s.
Helwan eZ =12m.31s.
Boulder City iP =11m.22s.
Hungry Horse i =11m.27s.
Palomar iNZ =11m.39s.
Riverside iZ =11m.40s.
Pasadena eZ =11m.44s.
Mineral iZ =11m.59s.
Shasta Dam e =12m.27s.
College e =13m.25s.
Long waves were also recorded at Bermuda and Huancayo.

Oct. 26d. 9h. 13m. 10s. Epicentre 5°·6S. 153°·6E. (as on 21d.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		21·8	182	i 4 55k	− 1	i 8 55	+ 3	i 5 16	PP	i 11·0
Riverview		28·2	184	e 5 58	+ 2	i 10 45	+ 4	i 11 4	sS	e 13·9
Auckland	N.	36·7	152	—	—	e 13 0	+ 6	—	—	e 19·8
Wellington		40·3	156	(e 7 48)	+ 8	i 13 42	− 7	e 9 12	PP	e 22·8
Christchurch		41·3	159	e 8 30	+41	e 14 5	+ 1	e 17 15	SS	e 22·5
Perth		44·0	228	e 13 50	?	15 2	+19	18 40	SSS	21·9
Bandong		45·7	266	e 8 18	− 6	e 15 0	− 8	—	—	—
Batavia		46·5	267	e 8 28a	− 3	e 15 15	− 4	—	—	—
Irkutsk		71·2	330	11 25	+ 2	20 44	+ 4	—	—	—
College		82·3	21	e 12 24	− 1	—	—	—	—	—
Bombay		83·1	290	e 15 8	PP	e 22 28	−20	—	—	—
Frunse		85·8	313	e 12 43	+ 1	—	—	—	—	—
Andijan		87·0	311	i 12 50	+ 2	i 23 28	+ 1	—	—	—
Shasta Dam		89·1	49	e 13 10	+12	—	—	e 16 44	PP	—
Stalinabad		89·4	309	e 13 5	+ 5	i 23 55	+ 6	—	—	—
Tashkent		89·4	311	i 13 3	+ 3	i 23 51	+ 2	—	—	—
Samarkand		90·9	309	e 13 9	+ 2	—	—	—	—	—
Mount Wilson	z.	91·7	56	e 13 10	0	—	—	—	—	—
China Lake	z.	92·3	54	e 13 32	+19	—	—	—	—	—
Riverside	z.	92·3	56	e 13 32	+19	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O − C.	S.	O − C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Boulder City		94·6	54	e 17 14	PP	—	—	—	—	—
Overton	z.	94·6	54	e 15 4	?	—	—	—	—	—
Pierce Ferry		95·2	54	e 14 5	+38	—	—	—	—	—
Hungry Horse		95·7	42	e 13 45	+16	—	—	—	—	—
Ksara		116·0	305	e 19 50	PP	36 34?	SS	—	—	—
Cleveland	E.	119·4	44	—	—	e 31 43	PPS	—	—	—
La Paz		133·9	119	i 19 27	[+ 8]	26 38	[+ 9]	i 22 53	PKS	66·1
Tamanrasset	z.	144·8	304	e 19 43	[+ 4]	—	—	—	—	—

Additional readings and note :—
Brisbane ePE = 5m.3s., iZ = 5m.30s., iSE = 8m.59s., iSSE = 9m.24s.
Riverview iSSN = 12m.11s., iN = 12m.25s.
Wellington eSS = 17m.5s., eSSS = 18m.57s., eQ = 21m.0s., P and PP are given as PP and PPP respectively.
College e = 12m.54s., i = 13m.5s.
Shasta Dam e = 13m.36s.
Mount Wilson eZ = 13m.37s. and 13m.46s.
China Lake eZ = 14m.0s.
Tamanrasset eZ = 19m.53s. and 21m.4s.
Long waves were also recorded at Arapuni, Honolulu, Bermuda, and other American stations.

Oct. 26d. Readings also at 0h. (Stuttgart), 1h. (Christchurch, College, Tamanrasset, and near Andijan), 2h. (Stuttgart), 4h. (Arapuni, Wellington, Mizusawa, Tchimkent, and near Andijan), 5h. (Tacubaya and near Garm), 6h. (near Istanbul, near Mineral, and Reno), 7h. (Brisbane), 8h. (College, Shasta Dam, and Stuttgart), 10h. (Samarkand, Tchimkent, near Andijan, Garm, Obi-garm, and Stalinabad), 11h. (Bogota, and near Alicante (2)), 12h. (near Garm), 13h. (near Andijan), 15h. (Istanbul, Ksara, Erevan, near Leninakan, Tiflis, and near Alicante), 16h. (near Alicante), 17h. (near Andijan and near Frunse), 18h. (Santa Lucia), 19h. (Boulder City, Overton, and near Pierce Ferry), 20h. (College and Shasta Dam), 22h. (Tchimkent, near Andijan, Obi-garm, Samarkand, and Stalinabad), 23h. (Frunse, Samarkand, Tchimkent, near Andijan, Murgab, Obi-garm, Stalinabad, and Tashkent).

Oct. 27d. 4h. Nevada-Mexico border.
Tucson eP = 38m.20s., i = 38m.34s. and 38m.41s., iL? = 38m.58s.
La Jolla ePZ = 39m.2s., iS = 40m.16s.
Palomar ePNZ = 39m.4s., iSNZ = 40m.24s.
Pierce Ferry e = 39m.8s., i = 39m.20s., e = 40m.4s., iL = 40m.25s.
Boulder City eP? = 39m.12s., eL = 41m.32s.
Overton eZ = 39m.14s., iZ = 39m.26s., iLZ = 41m.54s.
Riverside ePZ = 39m.16s., eSZ = 40m.45s.
Mount Wilson eS = 41m.1s.
Berkeley eE = 44m.0s.
Bermuda e = 49m.12s.
Long waves were also recorded at Salt Lake City.

Oct. 27d. 8h. 24m. 13s. Epicentre 30°·0N., 113°·0W.

Suggested epicentres : 30°N., 112°W. (U.S.C.G.S.).
29°·9N., 113°·0W. (J.S.A.).

A = −·3390, B = −·7985, C = +·4975 ; δ = +3 ; h = +2 ;
D = −·920, E = +·391 ; G = −·194, H = −·458, K = −·868.

		△	Az.	P.	O − C.	S.	O − C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		2·9	39	e 0 45	− 3	e 1 18	− 6	i 0 56	P_g	i 3·0
La Jolla		4·6	309	i 1 24	P*	i 2 8	+ 1	—	—	—
Palomar		4·7	316	i 1 16	+ 2	i 2 14	+ 4	i 2 31	S_g	—
Riverside		5·4	318	e 1 42	P_g	i 3 15	S_g	—	—	—
Pasadena		6·0	315	e 1 36	+ 4	e 3 14	S_g	—	—	e 3·0
Boulder City		6·1	346	e 1 34	0	—	—	—	—	—
Pierce Ferry		6·2	353	i 1 33	− 2	i 2 55	+ 7	—	—	i 3·9
Overton	z.	6·6	350	i 1 39	− 2	—	—	i 2 9	P_g	i 3·8
China Lake	z.	7·0	328	e 1 43	− 3	—	—	—	—	—
Fresno		8·8	322	e 2 10	− 1	e 4 50	S_g	e 4 55	Q	e 6·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Lick	Z.	10·3	318	e 2 34	+ 2	—	—	—	—	—
Santa Clara		10·5	317	—	—	e 4 2	−33	—	—	e 5·5
Berkeley		11·0	318	i 2 41k	− 1	i 4 37	−10	—	—	e 6·0
Reno		11·0	332	i 2 47k	+ 5	i 6 14	?	e 2 53	PP	e 5·9
Logan		11·8	4	e 2 47	− 6	e 5 20	+ 4	—	—	e 6·5
Mineral		12·5	328	e 3 16	PP	—	—	—	—	e 7·0
Shasta Dam		13·1	327	e 3 12	+ 2	—	—	e 4 0	?	e 7·0
Bozeman		15·7	5	e 3 47	+ 3	e 7 14	SSS	—	—	e 8·8
Butte	N.	16·0	1	—	—	e 7 25	SSS	—	—	e 9·6
Tacubaya		16·4	127	e 3 49	− 4	e 7 0	+ 4	—	—	—
Hungry Horse		18·3	358	e 4 11	− 6	i 8 8	SS	i 4 15	P	e 10·7
Victoria		20·1	340	e 4 35	− 3	—	—	—	—	11·8
St. Louis		20·7	58	e 4 46	+ 2	e 8 31	0	—	—	e 10·4
Saskatoon		22·6	9	—	—	e 9 33	+26	—	—	e 13·0
Cleveland	E.	27·9	56	—	—	e 10 44	+ 7	—	—	—
New Kensington	E.	29·0	58	—	—	e 11 32	+38	—	—	e 13·3
College		41·1	338	e 7 42	− 5	—	—	e 6 43	?	—

Additional readings :—
Tucson i =1m.40s. and 1m.52s.
Palomar i =2m.19s.
Berkeley eZ =4m.6s. and 4m.27s.
Reno iSN =6m.21s.
Hungry Horse e =4m.22s.
Long waves were also recorded at other North American stations and at Scoresby Sund.

Oct. 27d. 10h. South-west Pacific. Data inconsistent.

Apia iP =5m.23s., e =6m.58s., S =7m.0s.
Brisbane iPZ =7m.27s.a.
Riverview iE =10m.20s., iZ =10m.23s., iS?E =13m.16s.
Berkeley iPZ =14m.26s.k.
Lick iPZ =14m.27s.k.
Pasadena iP =14m.28s.
Fresno iPZ =14m.31s.k, eZ =16m.26s.
Riverside iPEZ =14m.31s.k.
Palomar iPEN =14m.32s.k.
China Lake iPZ =14m.35s.k.
Shasta Dam iP =14m.35s., e =15m.56s., 16m.31s., and 19m.36s.
Mineral iPZ =14m.36s.k, iZ =14m.40s. and 14m.50s.
Tinemaha iPEN =14m.37s.k.
Reno iPZ =14m.40s.k, eSZ =24m.6s.
Tacubaya eP =14m.46s.
Boulder City iP =14m.47s.
Pierce Ferry iP =14m.48s.
Overton iPZ =14m.49s., iZ =15m.15s., epPZ =15m.44s.
Tucson iP =14m.52s., e =17m.16s. and 33m.12s., eL =41m.21s.
Victoria i =14m.56s.k.
Logan eP =15m.7s.
College iP =15m.14s., e =17m.10s., eSKS? =25m.13s.
Hungry Horse iP =15m.18s., i =15m.29s., e =15m.45s.
Collmberg eZ =22m.3s., iZ =22m.7s., eZ =22m.11s. and 22m.15s.
Ksara ePKP =22m.4s., ipPKP? =24m.14s., PP =24m.40s.
Jena eN =22m.5s. and 22m.9s.
Istanbul e =22m.6s. and 22m.18s.
Stuttgart ePKPZ =22m.8s., iPKPZ =22m.15s.k, ePKPZ =22m.25s.
Chur ePKP =22m.10s.
Prague i =22m.11s., e =22m.34s. and 22m.54s., i =23m.33s.
Strasbourg iPKP =22m.15s., i =22m.26s. and 22m.49s.
Paris iPKP? =22m.16s., i =22m.26s.
Besançon iPKP? =22m.18s., i =22m.33s.
Alicante PP =27m.15s., Q =66m.25s., eL =77m.58s.
New Kensington eE =31m.47s., eSS?E =38m.17s.
Long waves were also recorded at Ukiah,

Oct. 27d. 10h. 5m. 32s. Epicentre 30°·0N., 113°·0W. (as at 8h.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		2·9	39	e 0 45	− 3	i 1 30	+ 6	i 0 58	P_g	e 1·6
La Jolla		4·6	309	i 1 25	P*	i 2 44	S_g	—	—	—
Palomar		4·7	316	e 1 17	+ 3	i 2 56	S_g	i 1 30	P_g	—
Riverside	z.	5·4	318	e 1 42	P_g	i 3 5	S_g	—	—	—
Mount Wilson		6·0	316	e 1 39	P*	i 3 32	S_g	—	—	—
Boulder City		6·1	346	e 1 36	+ 2	e 2 32	−13	—	—	i 3·9
Pierce Ferry		6·2	353	e 1 33	− 2	—	—	i 2 10	P_g	i 4·0
Overton	z.	6·6	350	i 1 40	− 1	—	—	i 2 8	P_g	i 4·3
China Lake	z.	7·0	328	e 1 51	+ 5	—	—	—	—	—
Shasta Dam		13·1	327	e 3 15	+ 5	—	—	—	—	—
Hungry Horse		18·3	358	e 4 15	− 2	—	—	—	—	—

Tucson also gives i = 1m.0s., eS? = 1m.7s., iS? = 1m.10s.
Long waves were also recorded at Berkeley, Reno, and Salt Lake City.

Oct. 27d. 18h. 36m. 2s. Epicentre 49°·5N. 155°·5E. (as on 1947, November 20d.).

A = − ·5933, B = + ·2704, C = + ·7582 ; δ = −1 ; h = −5 ;
D = + ·417, E = + ·910 ; G = − ·690, H = + ·314, K = − ·652.

		△	Az.	P.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	
College		33·0	41	i 6 41	+ 2	—	—
Hungry Horse		55·9	54	i 9 42	0	i 19 37	S_eS
Shasta Dam		55·9	66	i 9 43	+ 1	e 14 12	P_eS
Mineral	z.	56·6	66	i 9 47a	0	—	—
Berkeley	z.	57·8	69	i 9 55a	0	—	—
Lick	z.	58·5	69	i 10 0a	0	—	—
Tinemaha		60·7	67	i 10 15	0	—	—
China Lake	z.	61·9	67	i 10 23a	− 1	—	—
Pasadena		62·7	69	i 10 28a	− 1	i 10 44	pP
Riverside	z.	63·3	69	i 10 32	− 1	—	—
Overton	z.	63·3	65	i 10 33	0	i 10 47	pP
Boulder City		63·5	65	i 10 34	0	—	—
Pierce Ferry		63·9	65	i 10 38	+ 1	i 10 50	pP
Palomar	z.	64·1	69	i 10 38	0	—	—
Tucson		68·5	65	i 11 6	0	—	—
Collmberg	z.	74·6	337	e 11 40	− 3	e 11 46	pP
Ottawa		75·5	35	e 11 46	− 2	—	—
Stuttgart	z.	77·9	338	e 11 59	− 2	—	—
Strasbourg		78·4	339	i 12 3	− 1	—	—
Paris		79·4	343	i 12 8	− 1	—	—
Besançon		80·1	340	i 12 12	− 1	e 12 22	pP
Clermont-Ferrand		82·1	341	i 12 23	− 1	—	—

Additional readings :—
Hungry Horse i = 18m.57s.
Overton iZ = 11m.28s.
Pierce Ferry i = 11m.15s.
Besançon e = 12m.37s.

Oct. 27d. 20h. 8m. 38s. Epicentre 42°·6N. 12°·9E. (as on 1948, December 31d.).

Felt at Teme (Province of Rieti). Epicentre 42°·N. 12°·6E. (Rome). Monthly Seismic Bulletin, Rome, October, 1949, p. 16.

A = + ·7198, B = + ·1649, C = + ·6744 ; δ = +12 ; h = −3 ;
D = + ·223, E = − ·975 ; G = + ·657, H = + ·151, K = − ·738.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Rome	0·8	203	i 0 14k	P_g	i 0 27	S_g	—	—	—
Florence Arc.	1·7	315	e 0 33	P_g	e 0 53	S*	i 1 1	S_g	—
Florence Xim	1·7	315	i 0 34	P_g	i 0 58	S_g	—	—	—
Prato	1·8	315	i 0 36	P_g	i 0 59	S_g	—	—	—
Padova	2·0	339	0 34?	− 1	1 23?	S_g	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bologna		2·3	331	i 0 44k	+ 4	i 1 12	+ 3	e 0 50	P_g	—
Triest		3·1	11	e 1 1	P_g	i 1 29	0	i 1 46	S_g	—
Salo		3·4	331	e 1 2	P*	i 1 39	+ 2	—	—	—
Pavia		3·7	315	e 1 14	P_g	e 1 52	S*	—	—	—
Taranto		3·9	121	0 57	− 5	1 47	− 3	—	—	—
Zagreb		3·9	34	e 1 14	P_g	e 1 50	0	e 2 4	S*	—
Chur		4·8	331	e 1 18	+ 3	e 2 14	+ 2	—	—	—
Ravensburg		5·7	337	e 1 31	+ 3	—	—	e 1 48	P_g	—
Zürich		5·7	329	e 1 28	0	e 2 30	− 5	—	—	—
Belgrade		5·9	66	e 2 8	P*	e 3 18	S_g	—	—	—
Basle		6·2	325	e 1 35	0	e 2 44	− 4	e 3 22	S_g	—
Stuttgart		6·7	339	e 1 45	+ 3	e 2 57	− 3	e 1 59	P*	—
Besançon		6·8	316	e 1 52	P*	—	—	—	—	e 3·8
Strasbourg		7·0	331	i 1 45	− 1	e 3 31	S*	i 3 50	S_g	—
Prague		7·5	8	—	—	e 3 14	− 6	e 4 20	S_g	—
Clermont-Ferrand		7·7	298	e 2 16	P*	—	—	—	—	—
Jena	N.	8·4	354	—	—	e 3 38	− 5	e 4 45	S_g	—
Collmberg	Z.	8·7	1	e 2 13	+ 3	e 3 33	−17	—	—	—
La Paz		94·6	252	(e 13 22)	− 2	—	—	—	—	—

Additional readings and note :—
Florence Arc. iZ = 39s.
Bologna e = 59s.
Triest eP_gP_g = 1m.5s., i = 1m.12s.
Zagreb e = 1m.26s., 2m.14s., and 2m.30s.
Ravensburg e = 1m.39s.
Belgrade e = 3m.31s. and 4m.4s.
Jena eE = 4m.54s.
La Paz reading has been increased by 2m.

Oct. 27d. Readings also at 0h. (Overton, Pierce Ferry, Stalinabad, and near Obi-garm), 2h. (Berkeley, Fresno, near Lick, Branner, and Mineral), 5h. (Boulder City, Overton, Pierce Ferry and near Tucson), 6h. (near Tacubaya), 7h. (Samarkand, near Stalinabad, and Obi-garm), 8h. (near Garm), 9h. (College, Shasta Dam, Lick, Boulder City, Overton, Pierce Ferry, and Tucson (2)), 11h. (La Paz), 12h. (Murgab, Samarkand (2), Frunse, near Garm (3), Stalinabad (2), Andijan (2), Tashkent, and Tchimkent), 13h. (near Mizusawa), 14h. (Brisbane, College (2), Samarkand, Frunse, near Garm, Stalinabad, Andijan, and near Santa Lucia), 15h. (Pretoria), 19h. (Lick and near Branner), 20h. (Ksara, Mount Wilson, China Lake, Tinemaha, Shasta Dam, Overton, Pierce Ferry, and Tucson), 21h. (Ottawa, Seattle, Shasta Dam, Hungry Horse, China Lake, Riverside, Logan, Boulder City, Overton, Pierce Ferry, and Tucson), 23h. (near Istanbul and near Apia).

Oct. 28d. 2h. 29m. 18s. Epicentre 40°·4N. 124°·2W. (as on 1949, May 4d.).

A = −·4293, B = −·6316, C = +·6456 ; δ = +2 ; h = −2 ;
D = −·827, E = +·562 ; G = −·363, H = −·534, K = −·764.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ferndale		0·2	343	i 0 14	+ 4	i 0 20	+ 4	—	—	—
Shasta Dam		1·4	78	i 0 21	− 6	e 0 34?	−12	—	—	e 0·8
Mineral		2·0	91	i 0 30_a	− 5	i 0 54	− 8	i 0 36	P	—
Berkeley	Z.	2·9	149	i 0 51k	+ 3	i 1 24	0	i 1 0	P_g	—
San Francisco		3·0	153	e 1 10	P_g	e 2 14	?	—	—	—
Branner		3·4	152	i 0 58k	+ 3	e 1 32	− 5	e 1 46	S*	—
Reno		3·5	103	i 0 53	− 4	i 1 42	+ 2	i 1 16	P_g	—
Lick		3·6	146	i 1 0k	+ 2	i 1 54	S*	e 1 3	P*	—
Fresno		5·0	135	e 1 18	0	i 2 43	S_g	i 1 28	P_g	—
Tinemaha	Z.	5·7	124	e 1 31	+ 3	i 2 49	S*	—	—	—
China Lake	Z.	6·9	129	e 1 48	+ 3	—	—	—	—	—
Pasadena	Z.	7·9	140	i 1 59	0	e 3 59	S*	—	—	—
Overton	Z.	8·6	114	e 2 6	− 3	—	—	i 2 59	P_g	—
Boulder City		8·6	118	e 2 10	+ 1	—	—	—	—	—
Pierce Ferry		9·1	115	e 2 13	− 1	e 3 6	−54	—	—	—
Hungry Horse		10·8	39	e 2 32	− 7	—	—	—	—	—
Tucson		13·5	123	e 3 15	0	—	—	—	—	e 7·5

For Notes see next page.

NOTES TO OCTOBER 28d. 2h. 29m. 18s.

Additional readings :—
Mineral iN = 58s.
Berkeley eN = 56s., iZ = 1m.14s., eE = 1m.22s., eN = 1m.33s.
Reno i = 57s., iE = 1m.45s., iN = 1m.49s.
Lick iZ = 1m.8s.
Fresno ePN = 1m.21s., ePE = 1m.24s., iN = 2m.7s. and 2m.38s., eZ = 5m.27s.
Overton iZ = 2m.21s.
Tucson e = 3m.23s.

Oct. 28d. 16h. 26m. 16s. Epicentre 5°·6S. 153°·6E. (as on 26d.)

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		21·8	182	i 4 52	− 4	e 8 57	+ 5	i 5 20	pP	—
Riverview		28·2	184	i 5 59a	+ 3	e 10 37	− 4	—	—	e 13·7
Cobb River	E.	39·3	157	e 7 32	0	—	—	—	—	—
Kaimata	N.E.	40·0	160	e 7 41?	+ 3	—	—	—	—	—
Wellington		40·3	156	e 7 40	0	—	—	—	—	—
Christchurch		41·3	159	e 7 22	−27	e 14 34	+30	e 9 19	PP	e 20·0
College		82·3	21	i 12 22	− 3	—	—	e 14 58	PP	—
Andijan		87·0	311	e 12 52	+ 4	i 23 28	+ 1	—	—	—
Berkeley	z.	88·8	52	i 12 56k	− 1	—	—	—	—	—
Shasta Dam		89·1	49	e 12 56	− 2	—	—	e 16 21	PP	—
Lick	z.	89·2	52	i 12 57a	− 2	—	—	—	—	—
Tashkent		89·4	311	e 13 4	+ 4	i 23 45	− 4	—	—	—
Pasadena		91·6	56	i 13 10	0	—	—	—	—	—
Tinemaha	z.	91·9	53	i 13 10	− 1	—	—	—	—	—
China Lake	z.	92·3	54	i 13 10	− 3	—	—	—	—	—
Riverside	z.	92·3	56	i 13 11	− 2	—	—	—	—	—
Palomar	z.	92·6	57	i 13 14a	− 1	—	—	—	—	—
Boulder City		94·6	54	i 13 24	0	—	—	—	—	—
Pierce Ferry		95·2	54	i 13 26	− 1	—	—	—	—	—
Hungry Horse		95·7	42	i 13 27	− 2	—	—	—	—	—
Ottawa		121·7	39	e 18 55	[− 1]	—	—	—	—	—
Tamanrasset	z.	144·8	304	e 19 40	[+ 1]	—	—	—	—	—

Additional readings :—
Brisbane iPN = 4m.59s.a, ePE = 5m.3s., iZ = 5m.24s., iSSE = 9m.24s.
Riverview eZ = 6m.21s., iZ = 6m.33s., iN = 11m.17s.
Wellington e? = 6m.58s.
Christchurch eQN = 17m.4s.
College e = 12m.43s.
Pierce Ferry e = 14m.12s.
Tamanrasset eZ = 19m.56s. and 20m.11s.

Oct. 28d. 18h. 47m. 55s. Epicentre 20°·5S. 179°·0W. Depth of focus 0·060.
(as on 1948, March 18d.).

A = −·9373, B = −·0164, C = −·3481 ; δ = −3 ; h = +5 ;
D = −·017, E = +1·000 ; G = +·348, H = +·006, K = −·937.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Apia		9·6	47	e 2 14	0	e 3 56	− 5	—	—
Brisbane	z.	26·4	250	i 5 10k	+ 7	—	—	i 6 28	pP
Riverview		29·6	237	i 5 35a	+ 4	e 10 0	+ 4	e 12 34	sS
Branner	z.	78·6	43	i 11 18k	0	—	—	e 12 51	pP
Berkeley	z.	78·8	43	i 11 18a	− 2	—	—	—	—
Lick	z.	78·9	43	i 11 20k	0	—	—	i 13 1	pP
Pasadena		79·4	47	i 11 21k	− 2	—	—	i 13 1	pP
Fresno	z.	79·7	45	i 11 24k	0	—	—	e 13 6	pP
Palomar		79·8	48	i 11 25k	0	e 20 23	−29	i 13 6	pP
Riverside		79·8	47	i 11 23k	− 2	—	—	e 13 5	pP
Shasta Dam		80·4	39	i 11 28	0	—	—	e 13 9	pP
China Lake	z.	80·7	46	i 11 28k	− 2	—	—	i 13 10	pP
Mineral	z.	80·7	40	e 11 29k	− 1	—	—	e 13 11	pP
Tinemaha		80·9	45	i 11 30k	− 1	—	—	i 13 14	pP
Reno		81·3	42	i 11 33k	0	—	—	i 12 55	pP

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Boulder City		82·7	47	i 11 40	0	i 21 23	+ 1	i 13 23	pP
Overton	Z.	83·2	47	i 11 41	− 1	—	—	i 13 26	pP
Pierce Ferry		83·3	47	i 11 43	0	—	—	i 13 25	pP
Tucson		83·6	52	i 11 44	0	—	—	i 13 30	pP
College		88·4	13	i 12 6	− 1	e 22 17	SKKS	e 13 53	pP
Hungry Horse		89·7	37	i 12 12	− 1	—	—	i 14 4	pP
Pretoria		127·0	211	—	—	e 28 15	?	—	—
Copenhagen		143·8	351	i 18 48	[+ 1]	—	—	—	—
Ksara		146·4	301	e 18 55?	[+ 4]	—	—	20 49	pPKP
Collmberg		147·8	347	e 18 53	[0]	—	—	e 20 50	pPKP
Istanbul		148·6	317	e 18 56	[+ 1]	—	—	e 20 55	pPKP
Stuttgart	Z.	151·0	350	e 18 59	[+ 1]	—	—	e 20 55	pPKP
Strasbourg		151·4	351	e 19 0	[+ 1]	—	—	—	—
Paris		151·7	358	i 19 0	[+ 1]	—	—	—	—
Triest		152·8	342	i 21 8	pPKP	—	—	—	—

Additional readings :—
Apia e =3m.53s.
Riverview eS_eS?N =15m.14s.
Branner iZ =11m.33s., eZ =13m.3s., ePPZ =14m.42s.
Lick iZ =11m.29s. and 13m.5s.
Shasta Dam ePP =14m.49s., epP =16m.18s.
Pierce Ferry i =12m.13s.
Tucson i =14m.20s.
Hungry Horse i =12m.39s.
Ksara PP =22m.30s.
Collmberg $iPKP_2$?Z =18m.58s.a, eZ =19m.4s., $epPKP_2$?Z =20m.55s.
Stuttgart iZ =19m.6s.k, eZ =19m.17s.
Strasbourg i =19m.7s. and 19m.19s.
Paris i =19m.7s. and 19m.19s.

Oct. 28d. Readings also at 0h. (Antofagasta, La Paz (2), Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City (2), Overton (2), Pierce Ferry (2), Shasta Dam (2), Berkeley, Fresno, Lick, Mineral, Reno, Hungry Horse (2), College, Granada, Stuttgart, Collmberg, and Ksara), 1h. (Alicante and Pierce Ferry), 2h. (near Garm), 8h. (Branner, Fresno, Mineral, near Berkeley, and Lick), 9h. (Alicante (2)), 11h. (Sverdlovsk and Potsdam), 12h. (Santa Lucia and near Istanbul), 13h. (near Overton (2) and Pierce Ferry (2)), 14h. (Samarkand, near Andijan, Garm, Obi-garm, Stalinabad, Tashkent, and Tchimkent), 15h. (Mount Wilson, Palomar, China Lake, Tinemaha, Tucson, Shasta Dam, Hungry Horse, College, Samarkand, Tashkent, Tchimkent, near Andijan, Garm, Obi-garm, and Stalinabad), 16h. (Alicante), 18h. (Frunse, Tashkent, near Andijan, Garm, Murgab, Obi-garm, Samarkand, Stalinabad, and Tchimkent), 19h. (Kaimata and near Ksara), 21h. (Paris, Harvard, and near Leninakan), 22h. (Brisbane, Riverview, Christchurch, Bandong, Batavia, Pasadena, China Lake, Tinemaha, Boulder City, Pierce Ferry, Hungry Horse, College, Harvard, La Paz, Stuttgart, and near Tiflis), 23h. (near Clermont-Ferrand).

Oct. 29d. 0h. 6m. 17s. Epicentre 37°·0N. 121°·5W. (as on 1949, March 14d.).

$A = -·4183$, $B = -·6826$, $C = +·5992$; $\delta = -4$; $h = -1$;
$D = -·853$, $E = +·522$; $G = -·313$, $H = -·511$, $K = -·801$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Lick		0·4	340	i 0 14a	+ 1	i 0 23	+ 2	—	—	—
Santa Clara		0·5	314	e 0 17	+ 3	e 0 36	+13	—	—	—
Branner		0·7	307	i 0 21	+ 4	i 0 35	+ 7	—	—	—
Berkeley		1·1	325	i 0 23a	+ 1	i 0 38	− 1	—	—	—
San Francisco	N.	1·1	315	e 0 25	+ 3	i 0 42	+ 3	—	—	—
Fresno		1·4	101	i 0 27a	0	i 0 39	− 7	—	—	—
Reno		2·9	22	i 0 46a	− 2	i 1 23	− 1	i 1 19	P_g	—
Mineral		3·4	359	i 0 52k	− 3	i 1 36	− 1	i 1 3	P*	—
Shasta Dam		3·8	349	e 0 58	− 3	e 1 34	−13	e 1 20	P_g	e 1·8
Boulder City		5·5	99	e 1 43	P*	—	—	—	—	—
Overton	Z.	5·7	92	e 1 42	P*	i 2 52	S*	i 1 47	P_g	—
Pierce Ferry		6·1	96	e 1 48	P*	e 2 53	+ 8	i 3 21	S_g	—

For Notes see next page.

NOTES TO OCTOBER 29d. 0h. 6m. 17s.

Additional readings :—
Lick iN =17s., iE =32s.
Branner iE =31s.
Berkeley iZ =29s., iN =32s.
San Francisco eE =30s., iE =39s. and 51s.
Reno iZ =1m.2s., iN =1m.9s., iNZ =1m.27s., iE =1m.31s.
Mineral iZ =55s., e =58s., iE =1m.33s.
Shasta Dam e =1m.5s.

Oct. 29d. 0h. Samoa.

Apia P =22m.40s., e =23m.15s., S =23m.19s.
Auckland iPN =26m.36s., eSN =30m.35s., eLN =33·1m.
Lick eZ =33m.12s.
Mount Wilson ePZ =33m.15s.
Tucson e =33m.23s. and 33m.28s.
Shasta Dam eP =33m.24s.
Tinemaha ePZ =33m.26s'
Boulder City eP =33m.35s.
Pierce Ferry eP =33m.36s., i =33m.54s.
Overton iPZ =33m.38s., iZ =34m.8s.
College iP =34m.12s.
Hungry Horse iP? =34m.12s., e =34m.36s.
Collmberg eZ =41m.15s., 41m.24s., 41m.32s., and 41m.39s.
Jena eE =41m.22s.
Istanbul e =41m.31s.
Strasbourg iPKP =41m.31s., i =41m.43s.
Stuttgart eZ =41m.32s.
Ksara eP? =41m.32s., e =45m.3s.
Long waves were also recorded at Christchurch and Wellington.

Oct. 29d. Readings also at 0h. (Mount Wilson, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, College, and near Balboa Heights), 1h. (Harvard and Pierce Ferry (2)), 3h. (College and near Garm), 4h. (Pierce Ferry, Obi-garm, Samarkand, near Andijan, Garm, Murgab, Stalinabad, and Tchimkent), 6h. (Auckland, Christchurch, Wellington, Brisbane, Riverview (2), Huancayo, La Paz (2), Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Reno, Mineral, Shasta Dam, Berkeley, Lick, Hungry Horse, College (2), Ksara (2), Bombay, Murgab, Samarkand, Tchimkent, near Andijan, Garm, Obi-garm, and Stalinabad ; numerous shocks), 7h. (Weston, Clermont-Ferrand, De Bilt, Potsdam, Stuttgart, Rome, and near College), 9h. (near Mineral and Reno), 10h. (Auckland, Christchurch, Wellington, near Mizusawa, near Alicante, and near Tchimkent), 11h. (Vera Cruz, Murgab, Tchimkent, near Andijan (2), Garm, and Obi-garm), 12h. (Tamanrasset, Strasbourg, Collmberg, Clermont-Ferrand, Stuttgart, Potsdam, Rome, Florence Xim., near Messina, and near Obi-garm), 13h. (Batavia), 14h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson (2), Boulder City, Overton, Pierce Ferry, Shasta Dam, Lick, Mineral, Hungry Horse, College (2), Collmberg, Stuttgart, and near Apia (2)), 15h. (College and Overton), 16h. (near Apia), 17h. (near Andijan, Obi-garm, Samarkand, and Stalinabad), 19h. (Pierce Ferry), 20h. (near Andijan and Tchimkent), 22h. (Boulder City, near Pierce Ferry, near Andijan, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent).

Oct. 30d. 5h. 33m. 19s. Epicentre 20°·2S. 169°·5E. (as on 1948, November 6d.).

$A = -\cdot9235$, $B = +\cdot1712$, $C = -\cdot3432$; $\delta = -5$; $h = +5$;
$D = +\cdot182$, $E = +\cdot983$; $G = +\cdot337$, $H = -\cdot063$, $K = -\cdot939$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane		16·7	241	i 3 58k	+ 1	i 7 9	+ 6	— —	—
Auckland	N.	17·2	165	e 3 26	?	—	—	— —	e 6·7
Apia		19·0	73	e 4 34	+ 8	—	—	— —	—
Riverview		21·2	227	i 4 55	+ 6	i 8 51	+10	i 5 5k pP	e 10·4
Wellington	Z.	21·5	170	i 5 6	+14	—	—	— —	e 11·7
Kaimata	N.E.	22·3	177	e 5 26	+25	—	—	— —	—
Christchurch		23·4	174	—	—	e 9 51	+30	— —	e 11·9
Lick	Z.	86·4	48	i 12 44k	− 1	—	—	— —	—
Shasta Dam		87·5	45	i 12 49	− 2	—	—	— —	—
Pasadena	Z.	87·6	53	i 12 47	− 4	—	—	— —	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverside	z.	88·0	53	i 12 52	− 1	—	—	—	—	—
Palomar	z.	88·1	54	i 12 52	− 2	—	—	—	—	—
China Lake	z.	88·6	50	i 12 57	+ 1	—	—	—	—	—
Tinemaha	z.	88·7	50	e 12 53	− 4	—	—	—	—	—
Boulder City		90·7	52	i 13 6	0	—	—	—	—	—
Victoria		90·8	39	e 13 4	− 2	—	—	—	—	—
College		90·9	17	e 13 15	+ 8	—	—	—	—	—
Overton	z.	91·2	51	i 13 7	− 1	—	—	—	—	—
Pierce Ferry		91·4	53	i 13 8	− 1	—	—	—	—	—
Tucson		92·2	57	i 13 13	0	—	—	—	—	—
Ottawa		121·4	47	e 18 47	[− 8]	—	—	—	—	—
Harvard		124·6	51	—	—	i 31 25	PKKS	—	—	—
Ksara		136·8	298	e 17 9	?	e 30 47	PS	—	—	—
Collmberg	z.	143·9	334	e 19 31	[− 6]	—	—	—	—	—
Stuttgart	z.	147·4	336	e 19 42	[− 1]	—	—	—	—	—
Strasbourg		148·1	337	i 19 44	[0]	—	—	i 19 57	PKP_2	—
Besançon		149·8	337	i 19 48	[+ 1]	—	—	i 20 2	PKP_2	—
Chur		149·8	334	e 19 45	[− 2]	—	—	—	—	—
Tamanrasset	z.	164·9	283	21 0	PKP_2	—	—	—	—	—

Additional readings :—
Brisbane iZ = 4m.12s., eSE = 7m.15s.
Apia e = 4m.47s.
Riverview iPPZ = 5m.23s., iP_cPZ = 8m.54s., iZ = 9m.3s., iEN = 9m.18s.
Riverside iZ = 13m.9s.
Palomar iZ = 13m.14s.
Overton eZ = 13m.56s., iZ = 14m.29s.
Pierce Ferry e = 14m.11s.
Tucson e = 14m.47s.
Collmberg eZ = 19m.36s.
Stuttgart iZ = 19m.55s.k, eZ = 20m.6s.
Strasbourg i = 20m.27s., e = 20m.35s. and 21m.20s.
Besançon i = 20m.22s., e = 21m.3s.

Oct. 30d. 7h. 42m. 43s. Epicentre 41°·8N. 48°·8E. (as on 1948, July 4d.).

$A = +·4925$, $B = +·5626$, $C = +·6641$; $\delta = +10$; $h = -2$;
$D = +·752$, $E = -·659$; $G = +·437$, $H = +·500$, $K = -·748$.

	Δ	Az.	P.	O−C.	S.	O−C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Grozny	2·7	305	e 0 51	+ 6	e 1 31	+12	—
Tiflis	2·9	268	0 46	− 2	1 26	+ 2	—
Erevan	3·6	245	e 0 59?	+ 1	1 50	+ 8	—
Leninakan	3·9	257	1 0	− 2	1 52	+ 2	—
Piatigorsk	4·8	300	1 10	− 5	—	—	—
Sotchi	6·9	288	—	—	e 3 25?	S*	—
Ashkabad	8·3	114	e 2 4?	0	3 43	+ 3	—
Ksara	12·9	236	e 3 16?	+ 9	7 11	L	(7·2)
Stalinabad	15·6	95	e 3 53	+10	—	—	—
Moscow	15·7	336	e 3 42	− 2	e 6 39	0	—
Sverdlovsk	16·9	23	e 3 55	− 4	e 6 59	− 8	—
College	72·9	8	e 11 30	− 3	—	—	—
Hungry Horse	89·0	349	i 12 55	− 3	—	—	—
Tucson	104·0	342	(i 14 14)	+ 8	—	—	—

Tucson reading has been increased by 5 minutes.

Oct. 30d. 23h. 53m. 57s. Epicentre 33°·5S. 179°·0W. (as on 1945, March 18d.).

A = −·8355, B = −·0146, C = −·5493 ; δ = 0 ; h = +1 ;
D = −·017, E = +1·000 ; G = +·549, H = +·009, K = −·836.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	6·1	235	1 38	+ 4	2 47	+ 2	—	—	—
Tuai	N.	6·2	209	i 1 33	− 2	i 2 39	− 9	i 1 48	P*	—
New Plymouth	E.	7·9	223	e 1 53	− 6	i 3 30	0	—	—	—
Wellington		9·2	211	e 2 11	− 5	i 3 47	−16	—	—	i 4·9
Cobb River	E.	10·0	218	—	—	e 4 9	−13	—	—	—
Kaimata	N.E.	11·8	217	e 2 52	− 1	e 4 51	−15	—	—	—
Christchurch		12·0	211	—	—	i 4 33	−38	i 5 0	S	—
Apia		20·7	22	e 4 45	+ 1	e 8 21	−10	—	—	e 11·2
Brisbane		24·8	277	i 5 31	+ 6	i 14 37	L	—	—	(i 14·6)
Riverview		24·8	261	i 5 19a	− 6	e 9 31	−15	i 9 4	P_cP	e 10·8
Honolulu		58·1	24	e 9 53	− 5	—	—	—	—	e 26·6
Pasadena		88·2	46	i 12 56	+ 2	—	—	e 16 22	PP	e 39·8
Lick	Z.	88·4	42	i 12 57k	+ 2	—	—	—	—	—
Berkeley	Z.	88·5	42	i 12 58a	+ 2	—	—	—	—	—
Palomar		88·5	48	i 12 57	+ 1	—	—	—	—	—
Riverside	Z.	88·6	46	i 12 58	+ 2	—	—	—	—	—
Fresno	Z.	89·1	43	e 13 1a	+ 3	—	—	e 16 39	PP	—
China Lake	Z.	89·7	45	i 13 4	+ 3	—	—	—	—	—
Tinemaha	Z.	90·2	44	e 13 7	+ 3	—	—	—	—	—
Shasta Dam		90·4	39	e 13 6	+ 2	—	—	—	—	—
Mineral	Z.	90·6	39	e 13 7a	+ 2	—	—	—	—	—
Reno	Z.	91·0	41	e 13 9k	+ 2	—	—	—	—	—
Boulder City		91·5	46	i 13 13	+ 3	—	—	—	—	—
Tucson		91·6	51	i 13 13	+ 3	—	—	i 13 28	pP	—
Overton	Z.	92·1	46	i 13 17	+ 5	—	—	i 16 49	PP	—
Pierce Ferry		92·1	47	i 13 15	+ 3	—	—	e 16 53	PP	—
La Paz		97·5	114	e 13 19	−18	24 15	[+ 1]	26 31	PS	50·8
Hungry Horse		100·0	37	e 13 29	−19	—	—	—	—	—
College		101·0	12	e 13 57	+ 4	—	—	e 14 12	pP	—
Ottawa		121·7	53	e 18 56	[0]	—	—	—	—	—
Weston		123·8	58	i 19 12	[+12]	—	—	—	—	e 65·8
Ksara		151·0	281	e 18 18	?	—	—	e 20 5	PKP_2	—
Potsdam	Z.	159·2	340	e 28 15	PPP	—	—	e 28 44	?	81·0
Collmberg	Z.	160·2	336	e 20 18?	[+17]	—	—	e 20 44	PKP_2	—
Jena	N.	160·9	338	e 20 49	PKP_2	—	—	—	—	—
Stuttgart	Z.	163·6	341	e 20 8?	[+ 4]	—	—	e 21 0	PKP_2	—
Strasbourg		164·1	343	e 20 53	PKP_2	—	—	—	—	—
Paris		164·7	357	i 20 15	[+ 9]	—	—	i 21 3	PKP_2	—
Basle		165·0	342	e 21 7	PKP_2	—	—	—	—	—
Zürich		165·0	340	e 21 7	PKP_2	—	—	—	—	—
Besançon		165·7	344	e 21 14	PKP_2	—	—	—	—	—
Tamanrasset	Z.	168·6	200	20 17	[+ 9]	—	—	25 13	PP	—
Malaga	Z.	174·5	52	i 20 23k	[+12]	i 21 47	PKP_2	i 25 43	PP	—
Granada		174·7	44	21 23k	PKP_2	29 25	PPP	26 3	PP	87·2

Additional readings :—
Apia eS? =8m.32s. and 8m.42s.
Riverview eN =6m.0s.
Honolulu iP =9m.57s.
Pasadena iZ =13m.14s.
Lick iZ =13m.21s.
Berkeley iZ =13m.12s. and 13m.22s.
Tinemaha iZ =13m.23s.
Tucson e =14m.20s.
Overton iZ =13m.24s. and 14m.51s.
Pierce Ferry i =14m.19s.
La Paz SS =31m.18s.
Collmberg eZ =20m.58s.
Strasbourg e =21m.9s.
Paris i =20m.29s., 21m.16s., and 21m.36s.
Besançon e =22m.13s.
Long waves were also recorded at Arapuni, Ukiah, Santa Clara, Harvard, and Philadelphia.

Oct. 30d. Readings also at 0h. (Mount Wilson, Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 2h. (Hungry Horse and near Shasta Dam), 3h. (College and near Stalinabad), 5h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Lick, Hungry Horse, Victoria, College, Ottawa, Harvard, Weston, Collmberg, Paris, Strasbcurg, Stuttgart, near Bandong, and Batavia), 7h. (Mount Wilson, Palomar, China Lake, and Tinemaha), 8h. (Grozny, Erevan, Leninakan, near Tiflis, and near Alicante (3)), 10h. (Harvard, near Andijan, Murgab, Obi-garm, Samarkand, Stalinabad, and near Tchimkent), 11h. (near Algiers Univ., near Alicante, near Obi-garm, and near Tchimkent), 12h. (Mount Wilson, Palomar, Tucson, and near Algiers Univ.), 13h. (Andijan, near Obi-garm, and near Algiers Univ.), 14h. (near Obi-garm), 15h. (Andijan, near Obi-garm, and near Alicante), 17h. (Tacubaya, Mount Wilson, China Lake, Tucson, Pierce Ferry, near Andijan, and Obi-garm), 19h. (Bogota), 20h. (Mizusawa, Hungry Horse, Shasta Dam, near Tacubaya, near Ottawa, Shawinigan Falls, and near Frunse), 21h. (near Obi-garm), 22h. (Galerazamba).

Oct. 31d. 0h. Very few observations were available from stations situated near the epicentre of this shock. Confusion probably arose due to the proximity in time to the previous earthquake.

Apia eP? =4m.14s., e =4m.24s., eS? =5m.15s.
Wellington iZ =6m.10s., e =6m.44s., eZ =9m.15s., L =14·0m.
Riverview iS?N =14m.20s., iZ =15m.21s., iSS?N =16m.43s., eLZ =17·3m.
Berkeley ePZ =14m.20s., eE =14m.25s. and 24m.54s., eN =25m.0s. and 34m.0s., e =38m.0s.
Lick eZ =14m.22s.
Pasadena ePZ =14m.22s., iZ =14m.29s.
Branner eZ =14m.23s.
Fresno iPZ =14m.25s.a, ePN =14m.30s., iN =15m.0s.
Riverside iPNZ =14m.26s.
Shasta Dam eP =14m.29s.
China Lake iPZ =14m.30s.
Mineral ePZ =14m.31s.k, iZ =14m.37s.
Palomar iPEN =14m.33s.
Reno ePNZ =14m.34s.
Tinemaha ePZ =14m.34s., iZ =14m.40s.
Boulder City iP =14m.42s., i =15m.6s.
Overton iPZ =14m.45s., iZ =14m.53s., eZ =15m.29s.
Pierce Ferry iP =14m.46s., i =14m.51s.
Tucson eP =14m.48s., e =16m.5s., ePP =18m.5s., eL =38m.37s.
Victoria e =14m.55s.
Seattle eP =15m.5s., e =15m.21s. and 15m.39s.
Logan eP =15m.6s., ePP? =18m.15s.
College iP =15m.15s., e =15m.57s.
Hungry Horse eP =15m.18s., i =15m.32s., ePP =18m.37s.
Perth i =21m.18s., 22m.12s., 28m.14s., and 32m.0s.
De Bilt ePKP =22m.12s., eL =72m.
Zürich e =22m.14s.
Collmberg eZ =22m.14s. and 22m.24s., LZ =79m.
Basle e =22m.15s.
Prague ePKP? =22m.18s.
Paris ePKP =22m.20s., iPKP =22m.23s., i =22m.28s., 22m.33s., and 23m.14s., e =23m.18s., eL =84m.
Jena eN =22m.20s. and 23m.17s.
Stuttgart ePKPZ =22m.21s., eZ =22m.27s., eL =76m.
Strasbourg ePKP =22m.23s., i =22m.29s., e =23m.21s., 23m.28s., 24m.30s., and 24m.56s., eL =78m.57s.
Chur e =22m.25s.
Besançon ePKP =22m.25s., i =22m.37s., ePKP$_2$ =22m.50s.
Clermont-Ferrand ePKP =22m.29s., iPKP =22m.36s., L =80m.
Ksara eP =22m.29s., PPS =38m.29s.
Rome PKP =22m.48s., SKS =29m.46s., PSKS =37m.7s., SS =47m.11s.
Algiers Univ. Z =22m.50s.
Malaga iPKPZ =23m.16s.k, iPKP$_2$Z =23m.54s., PP?Z =27m.2s., LZ =86m.42s.
Bombay eE =23m.30s., eN =23m.35s.
Istanbul e =23m.38s. and 39m.22s.
Huancayo e =25m.50s., eS? =27m.40s., eSS =34m.17s., eL =43m.13s.
Bogota ePSE =28m.47s., LE =51m.0s.
La Paz PS =29m.36s., L =50m.42s.
Scoresby Sund 41m.0s., L =60m.
Bergen eN =49m.22s.
Long waves were also recorded at Arapuni, Auckland, Christchurch, New Plymouth, Copenhagen, and Upsala.

Oct. 31d. 1h. 39m. 28s. Epicentre 56°·0N. 136°·0W.

A = −·4041, B = −·3903, C = +·8273; δ = +6; h = −8;
D = −·695, E = +·719; G = −·595, H = −·575, K = −·562.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sitka		1·6	13	i 0 23	− 7	i 0 32	P_g	—	—	—
College		10·6	332	i 2 36	0	i 5 4	+27	—	—	e 6·0
Victoria		10·7	129	e 2 37	− 1	5 30	+51	—	—	—
Seattle		11·9	129	e 2 54	0	e 5 2	− 7	e 3 13	PPP	e 6·0
Hungry Horse		15·4	111	e 3 39	− 1	i 6 34	+ 2	—	—	e 7·8
Ferndale	E.	17·3	147	—	—	i 7 30	+14	—	—	e 9·4
Saskatoon		17·6	90	4 10	+ 2	7 29	+ 6	—	—	—
Butte	N.	17·7	113	i 4 10	0	i 7 37	+11	—	—	e 8·8
Shasta Dam		17·7	143	i 4 10	0	e 7 28	+ 2	—	—	e 9·5
Mineral		18·3	142	e 4 18k	+ 1	e 7 52	+13	—	—	e 10·0
Bozeman		18·7	112	i 4 22	0	e 7 42	− 6	—	—	e 9·5
Ukiah		18·9	147	i 4 26	+ 2	e 8 1	+ 8	—	—	e 8·6
Reno		19·7	139	i 4 33a	− 1	e 8 21	+11	—	—	e 11·0
Berkeley		20·4	146	e 4 34a	− 7	e 8 33	+ 8	—	—	e 12·5
San Francisco		20·4	146	e 4 41	0	e 8 40	+15	—	—	e 13·7
Branner		20·8	146	i 4 45a	0	e 8 43	+10	e 5 6	PP	e 11·2
Santa Clara		20·9	146	e 4 48	+ 2	i 8 53	+18	—	—	i 13·0
Lick		21·0	146	i 4 48a	+ 1	e 8 54	+17	—	—	e 12·0
Logan		21·2	121	e 4 45	− 4	e 8 44	+ 3	i 5 22	PP	i 10·7
Salt Lake City		21·9	122	e 5 0	+ 3	i 9 8	+14	—	—	e 11·0
Fresno		22·2	142	i 5 0	0	i 9 7	+ 7	—	—	e 14·5
Tinemaha	z.	22·4	139	e 5 2	0	—	—	—	—	—
China Lake	z.	23·8	139	e 5 16	+ 1	e 9 23	− 5	—	—	—
Overton	z.	24·3	133	i 5 21	+ 1	i 9 33	− 4	—	—	—
Boulder City		24·7	134	i 5 26	+ 2	—	—	—	—	e 11·9
Pierce Ferry		24·9	133	i 5 25	− 1	—	—	—	—	e 10·3
Pasadena		25·1	142	e 5 29a	+ 1	e 9 54	+ 3	—	—	e 10·6
Riverside		25·5	142	i 5 32	0	—	—	—	—	—
Palomar		26·2	140	i 5 41	+ 3	—	—	i 6 8	PP	—
Tucson		29·5	132	e 6 8	0	e 11 8	+ 6	e 7 6	PP	e 12·9
Lincoln	E.	29·7	103	e 6 16	+ 6	i 11 4	− 2	—	—	e 12·8
Chicago		34·1	94	e 6 43	− 5	e 12 3	−11	e 7 59	PP	e 14·0
St. Louis		34·8	100	i 6 49	− 5	e 12 13	−12	i 8 8	PP	16·6
Cincinnati		37·6	94	7 16	− 2	i 16 0	SSS	i 8 39	PP	—
Cleveland		37·7	88	e 7 18	− 1	e 13 9	− 1	i 8 54	PP	i 19·6
Honolulu		38·3	213	e 7 26	+ 2	e 13 40	+21	—	—	e 16·5
Ottawa		38·4	80	7 24a	− 1	13 30	+10	8 43	PP	18·8
Shawinigan Falls	N.	39·3	76	7 31	− 1	13 34	0	9 2	PP	20·5
Seven Falls	E.	40·1	74	7 37	− 2	13 45	− 1	9 9	PP	20·5
Pennsylvania		40·2	87	i 7 39	− 1	i 15 48	+120	i 9 8	PP	e 21·2
Woodstock		41·8	87	e 9 21	PP	i 17 26	SS	e 18 24	SSS	e 21·5
Philadelphia		42·3	85	e 7 59	+ 2	e 14 19	0	e 9 34	PP	e 17·4
Fordham		42·4	83	e 7 59	+ 1	i 14 25	+ 5	e 9 23	PP	i 21·7
Milton		42·5	105	i 8 16	+17	i 14 24	+ 2	—	—	i 22·4
Harvard		42·6	80	i 7 59	0	e 14 20	− 3	i 9 33	P_cP	e 20·5
Weston		42·8	80	e 8 1	0	14 26	0	9 40	PP	—
Ivigtut		42·8	46	e 8 1	0	e 14 32	+ 6	e 9 52	PP	22·5
Columbia		43·2	96	e 9 51	PP	e 14 32	0	—	—	e 17·9
Scoresby Sund		45·4	26	8 24	+ 2	15 7	+ 3	10 12	PP	—
Halifax		45·5	72	8 20	− 3	14 58	− 7	10 16	PP	23·5
Tacubaya		45·8	127	i 8 34	+ 9	e 15 44	+35	i 10 59	PPP	e 23·8
Miami		49·8	104	e 8 59	+ 3	e 16 10	+ 4	e 19 36	SS	—
Bermuda		53·6	84	e 10 32	+67	e 18 9	+71	—	—	e 22·0
Bergen		60·0	21	e 10 8	− 3	18 26?	+ 3	19 46	PS	e 32·5
Aberdeen	E.	61·2	27	—	—	i 18 9	−29	e 25 49	SSS	—
Irkutsk		61·2	322	10 21	+ 2	18 46	+ 8	—	—	—
Upsala		62·6	15	i 10 26a	− 2	i 18 58	+ 2	12 48	PP	e 31·5
Helsinki		63·2	11	e 10 32?	0	e 19 5	+ 2	—	—	e 32·5
Durham		63·5	28	e 10 43	+ 9	i 19 14	+ 7	—	—	—
Rathfarnham Castle		63·5	31	e 10 24	−10	i 19 18	+11	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Juan		63·7	96	e 10 36	0	e 18 53	−17	e 14 28	PPP	e 29·1
Copenhagen		65·7	19	i 10 47	− 1	i 19 39	+ 5	13 19	PP	33·2
Sverdlovsk		66·7	350	i 10 55	0	19 49	+ 3	—	—	—
De Bilt		67·6	25	i 11 1	0	i 20 5	+ 8	i 13 32	PP	e 32·5
Moscow		68·5	4	11 7	+ 1	20 14	+ 6	—	—	—
Potsdam		69·0	20	i 11 11	+ 2	—	—	e 13 33	PP	42·7
Fort de France		69·4	94	e 11 8	− 4	—	—	—	—	—
Collmberg		70·0	21	e 11 16	+ 1	e 21 2	+36	e 13 57	PP	—
Paris		70·0	28	i 11 14	− 1	i 20 28	+ 2	i 13 47	PP	e 31·5
Jena	N.	70·1	22	e 11 15	− 1	—	—	—	—	—
Bogota		70·7	111	e 11 22	+ 2	e 20 35	+ 1	e 14 2	PP	e 34·5
Cheb		71·1	22	e 11 22	0	e 20 55	+17	e 21 27	PS	—
Prague		71·5	19	e 11 26	+ 2	e 20 48	+ 5	e 14 1	PP	e 32·5
Strasbourg		71·5	24	i 11 25	+ 1	i 20 53	+10	i 14 12	PP	e 37·5
Stuttgart		71·6	23	e 11 25	0	e 20 47	+ 3	e 14 10	PP	e 33·7
Besançon		72·3	26	e 11 31	+ 2	—	—	—	—	—
Basle		72·4	25	e 11 29	− 1	—	—	e 13 56	PP	—
Zürich		72·8	24	e 11 32a	0	e 21 10	+12	e 14 2	PP	—
Clermont-Ferrand		72·9	29	e 11 40	+ 7	e 21 10	+11	e 14 18	PP	34·9
Skalnate Pleso		73·3	16	e 11 37	+ 2	e 21 2	− 2	e 12 10	pP	—
Chur		73·5	24	e 11 37a	+ 1	e 21 17	+11	—	—	—
Ogyalla		74·3	18	e 11 50	pP	e 21 48	+33	—	—	—
Budapest		74·8	17	e 11 47	+ 3	e 21 32	+12	—	—	—
Triest		75·6	22	e 12 3	+15	e 22 0	+31	—	—	—
Bologna		76·1	23	e 12 2	+11	—	—	—	—	e 45·5
Toledo		76·1	36	e 11 53	+ 2	e 21 41	+ 6	i 11 58	P_cP	42·2
Padova		76·3	23	11 55	+ 3	21 27	−10	—	—	—
Barcelona		76·7	32	e 11 53	− 2	e 21 45	+ 4	—	—	—
Prato		76·7	23	e 11 53	− 2	e 21 43	+ 2	—	—	—
Florence Arc.		76·8	23	e 11 57	+ 2	e 21 50	+ 8	—	—	—
Florence Xim		76·8	23	e 11 56	+ 1	e 21 51	+ 9	—	—	—
Almata		77·2	336	i 12 1	+ 4	21 53	+ 6	—	—	—
Belgrade		77·6	17	e 12 8	+ 8	e 23 7	+76	e 15 15	PP	e 46·3
Frunse		78·1	338	e 12 1	− 1	22 3	+ 7	—	—	—
Alicante		78·7	34	12 27	+21	22 24	+21	15 25	PP	e 37·4
Granada		78·7	37	i 12 7k	+ 1	i 22 7	+ 4	12 14	pP	37·9
Bucharest		78·8	13	e 11 37	−29	e 22 5	+ 1	—	—	37·5
Malaga	z.	78·9	37	i 12 8k	+ 1	i 22 18	+13	15 2	PP	39·9
Rome		78·9	23	i 12 7	0	i 22 12	+ 7	e 15 3	PP	—
Almeria		79·4	36	12 9	0	22 11	+ 1	15 12	PP	36·1
Yalta		79·5	8	12 12	+ 2	22 17	+ 6	—	—	—
Tchimkent		79·7	341	i 12 12	+ 1	i 22 17	+ 4	—	—	—
Andijan		80·7	339	e 12 18	+ 2	i 22 30	+ 6	—	—	—
Tashkent		80·7	341	i 12 18	+ 2	i 22 31	+ 7	—	—	—
Algiers Univ.	z.	81·2	33	e 12 20	+ 1	—	—	i 12 26	P_cP	—
Istanbul		82·5	11	e 12 24	− 2	e 22 44	+ 2	—	—	—
Tiflis		82·7	0	12 28	+ 1	—	—	—	—	—
Obi-garm		83·2	340	i 12 32	+ 3	i 22 54	+ 5	—	—	—
Stalinabad		83·5	341	e 12 40	+ 9	—	—	—	—	—
Baku		83·9	356	e 12 41	+ 8	e 23 1	+ 5	—	—	—
Huancayo		84·4	121	e 12 44	+ 8	e 23 3	+ 2	e 15 45	PP	e 39·3
Ksara		90·3	7	e 13 5	+ 1	25 9	PS	—	—	—
La Paz		91·7	117	i 13 19	+ 9	i 23 42	[− 1]	i 16 56	PP	45·5
Tamanrasset	z.	95·0	35	17 14	PP	—	—	—	—	—
Riverview	N.	108·7	237	—	—	e 25 12	[+ 5]	e 28 23	PS	e 52·3
Pretoria	z.	147·7	27	i 19 48	[+ 4]	e 23 35	PKS	i 19 56	PKP_2	—
Grahamstown	z.	154·3	35	e 20 26	PKP_2	—	—	—	—	—

Additional readings and note :—
Victoria e = 2m.44s., 3m.2s., and 4m.53s.
Seattle e = 3m.22s., 3m.38s., and 3m.59s.
Hungry Horse i = 4m.24s., e = 6m.44s.
Ferndale iSN = 7m.36s.
Saskatoon e = 4m.18s.
Shasta Dam iS = 7m.48s.
Mineral iZ = 4m.24s., eZ = 8m.7s.

Continued on next page.

Berkeley ePZ =4m.39s., eN =4m.42s., iZ =4m.47s. and 4m.50s., iN =5m.11s., eSZ = 8m.38s., iSNZ =8m.41s., eE =10m.56s.
San Francisco eE =4m.53s.
Branner ePE =4m.49s., eN =6m.40s.
Lick eSN =9m.1s.
Logan i =6m.4s., iS =8m.53s.
Fresno eSN =9m.12s.
Tinemaha iZ =5m.11s.
China Lake iZ =5m.23s.
Overton iZ =8m.20s.
Boulder City i =5m.42s. and 7m.3s.
Pierce Ferry i =5m.29s. and 7m.13s.
Pasadena eEN =7m.46s., iZ =10m.17s.
Riverside eZ =7m.46s.
Tucson e =6m.14s.
St. Louis i =7m.13s., iS =12m.19s., e =14m.3s., iSS =14m.9s., iSSS =14m.45s.
Cincinnati e =7m.55s.
Cleveland i =7m.26s., eN =12m.56s. and 13m.1s., eE =13m.19s., eSSSN =15m.50s. iE =16m.3s., eE =17m.55s.
Seven Falls SSE =16m.8s.
Pennsylvania iEN =16m.31s.
Fordham iSSS =17m.45s.
Harvard iPP =9m.49s., i =13m.29s., eSS =17m.19s.
Weston iP =8m.4s.
Scoresby Sund 18m.20s.
Halifax SS =18m.24s.
Tacubaya eSSS =19m.39s.
Bergen eN =17m.51s.
Upsala eS_cSN =20m.14s., S_cSE =20m.17s., e =21m.9s., eSS?E =22m.58s., eSSN = 23m.32s.?, eSSSE =26m.14s.
Copenhagen 15m.7s., S_cS =20m.50s., SS =24m.1s.
De Bilt eSS =24m.2s., eSSS =27m.56s.
Potsdam iZ =11m.18s.
Collmberg eZ =11m.21s., ePPPZ =15m.47s., eSSEN =25m.8s.
Paris i =11m.21s. and 12m.24s., iPPP =15m.32s., ePS =20m.57s., SS =24m.59s., SSS = 28m.47s.
Jena eN =11m.23s.
Bogota eSSEN =25m.12s.
Cheb eSS? =25m.17s., e =27m.32s., eSSS? =29m.2s.
Prague e =11m.36s., 11m.49s., 12m.49s., and 13m.44s., ePS? =21m.8s., ePPS? = 21m.32s., eSS =25m.44s., eSSS? =28m.50s.
Strasbourg i =11m.32s. and 11m.35s., ePPP =15m.59s., iS =20m.57s., eSS =25m.20s., iSS =25m.24s., iSSS =29m.14s.
Stuttgart ePPP =15m.57s., ePS =21m.12s., eSS =25m.44s., eSSS =28m.38s.
Besançon i =11m.36s., e =11m.55s.
Clermont-Ferrand ePS =21m.48s., eSS =25m.51s., eSSS =29m.23s., Q =30·5m.
Skalnate Pleso ePP =14m.39s., ePS? =21m.32s.
Ogyalla e =12m.57s.
Budapest ePN =11m.55s., i =22m.2s.
Toledo ePPZ =14m.47s., SS?E =26m.48s.
Belgrade ePPP =17m.4s.
Alicante PPP =17m.22s., PS =23m.2s., SS =27m.26s.
Granada P_cP =12m.28s., iPP =14m.58s., epPP =15m.49s., SS =26m.59s., SSS = 30m.46s.
Malaga PPPZ =16m.54s., PS =23m.2s.
Almeria PPP =17m.4s., S_cS =22m.32s., PPS =23m.20s., SS =27m.24s., SSS =30m.44s.
Algiers Univ. ePPZ =15m.16s.
Huancayo e =24m.8s.
La Paz iSKKS =23m.53s., PPS =25m.48s., iSS =30m.24s.
Riverview ePSZ =28m.29s., eSSE =34m.5s., eQE =47m.32s.
Long waves were also recorded at Vera Cruz and Auckland.

Oct. 31d. 2h. 32m. 9s. Epicentre 56°·0N. 136°·0W. (as at 1h.).

		Δ	Az.	P.	O−C.	S.	O−C.		Supp.		L.	
		°	°	m. s.	s.	m. s.	s.	m.	s.		m.	
Sitka		1·6	13	i 0 23	− 7	i 0 37	P_g	—	—		i 1·1	,
College		10·6	332	i 2 37	+ 1	—	—	—	—		e 5·8	
Victoria		10·7	129	2 41	+ 3	5 31	+52	—	—		—	
Hungry Horse		15·4	111	e 3 40	0	e 7 48	L	—	—		(e 7·8)	
Butte	N.	17·7	113	e 4 11	+ 1	—	—	—	—		e 9·2	
Shasta Dam		17·7	143	e 4 11	+ 1	e 7 24	− 2	—	—		—	
Mineral	z.	18·3	142	e 4 17a	0	—	—	—	—		—	
Reno	z.	19·7	139	i 4 33	− 1	—	—	—	—		—	
Berkeley	z.	20·4	146	e 4 41	0	—	—	—	—		—	
Lick	z.	21·0	146	e 4 48	+ 1	—	—	—	—		—	

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Logan		21·2	121	e 4 46	− 3	—	—	—	—	e 11·3
Fresno	E.	22·2	142	i 4 59a	− 1	—	—	—	—	—
Tinemaha	Z.	22·4	139	i 5 3	+ 1	—	—	—	—	—
China Lake	Z.	23·8	139	i 5 15	0	—	—	—	—	—
Overton	Z.	24·3	133	i 5 21	+ 1	—	—	—	—	—
Boulder City		24·7	134	e 5 22	− 2	—	—	—	—	—
Pierce Ferry		24·9	133	i 5 25	− 1	i 6 37	PPP	—	—	—
Pasadena		25·1	142	i 5 29	+ 1	—	—	—	—	—
Riverside	Z.	25·5	142	i 5 31	− 1	—	—	—	—	—
Palomar		26·2	140	i 5 38	0	—	—	—	—	—
Tucson		29·5	132	i 6 8	0	—	—	—	—	—
Chicago		34·1	94	—	—	e 11 54	−20	—	—	e 17·2
Ottawa		38·4	80	i 7 24a	− 1	—	—	—	—	19·8
Weston		42·8	80	i 8 1	0	—	—	—	—	e 22·2
Collmberg	Z.	70·0	21	e 11 16	+ 1	—	—	—	—	—
Paris		70·0	28	e 11 14	− 1	—	—	—	—	—
Strasbourg		71·5	24	e 11 26	+ 2	—	—	e 11 43	P_cP	—
Brisbane	Z.	102·5	239	i 22 26a	PKS	—	—	—	—	—
Riverview		108·7	237	i 22 55k	PKS	e 27 24	?	(e 29 3)	PPS	e 29·0
Pretoria	Z.	147·7	27	i 19 48	[+ 4]	—	—	—	—	—

Additional readings :—
Shasta Dam e = 5m.18s.
Mineral iZ = 4m.25s.
Pierce Ferry e = 7m.32s.
Riverview eN = 27m.24s. and 27m.33s., iE = 27m.37s.
Long waves were also recorded at other American stations.

Oct. 31d. 7h. 44m. 2s. Epicentre 49°·5N. 155°·5E. (as on 27d.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m.	s.
Klyuchi		7·5	24	e 2 31	P_e	e 3 31	+11	—	—
College		33·0	41	i 6 39	0	e 9 16	P_cP	—	—
Victoria		50·7	58	i 9 4a	+ 1	—	—	—	—
Hungry Horse		55·9	54	i 9 40	− 2	i 11 40	PP	i 9 53	pP
Shasta Dam		55·9	66	i 9 42	0	—	—	e 9 54	pP
Mineral	Z.	56·6	66	i 9 47a	0	—	—	i 10 0	pP
Lick	Z.	58·5	69	e 10 0	0	—	—	—	—
Tinemaha	Z.	60·7	67	i 10 16	+ 1	—	—	e 10 29	pP
China Lake	Z.	61·9	67	i 10 23	− 1	—	—	—	—
Pasadena	Z.	62·7	69	i 10 28	− 1	—	—	i 10 41	pP
Riverside	Z.	63·3	69	i 10 32	− 1	—	—	i 10 44	pP
Overton	Z.	63·3	65	i 10 34	+ 1	e 12 35	PP	i 10 48	pP
Boulder City		63·5	65	i 10 35	+ 1	—	—	i 10 49	pP
Pierce Ferry		63·9	65	i 10 37	0	—	—	—	—
Palomar		64·1	69	e 10 58	+20	—	—	—	—
Tucson		68·5	65	i 11 6	0	—	—	—	—
Collmberg	Z.	74·6	337	e 11 43	0	—	—	—	—
St. Louis		74·8	48	e 11 45	+ 1	—	—	e 11 58	pP
Stuttgart	Z.	77·9	338	e 12 3	+ 2	—	—	—	—
Strasbourg		78·4	339	e 12 6	+ 2	—	—	—	—
Paris		79·4	343	i 12 11	+ 2	—	—	i 12 23	pP
Harvard		79·5	34	i 12 11	+ 1	—	—	—	—
Weston		79·7	34	i 12 11	0	—	—	27 38	SS
Besançon		80·1	340	e 12 15	+ 2	—	—	—	—

Additional readings :—
College eS = 9m.31s.
Pierce Ferry i = 11m.2s, and 11m.24s.

Oct. 31d. 17h. 55m. 43s. Epicentre 5°·6S. 153°·6E. Depth of focus 0.010 (as on 28d.).

A = −·8915, B = +·4426, C = −·0969; δ = +6; h = +7;
D = +·445, E = +·896; G = +·087, H = −·043, K = −·995.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		21·8	182	i 4 49a	+ 4	i 8 49	+14	i 5 11	pP	—
Riverview		28·2	184	i 5 48a	+ 2	i 10 28	+ 5	i 6 7	pP	e 13·9
Melbourne		33·0	192	i 6 36	+ 8	i 11 30	− 8	—	—	—
Apia	E.	35·1	106	—	—	e 11 59	−11	—	—	e 14·8
Auckland	N.	36·7	152	i 6 57	− 2	i 12 37	+ 2	e 7 25	pP	16·3
Arapuni	E.	38·0	152	—	—	13 53	+58	—	—	—
Cobb River	E.	39·3	157	e 7 21	0	—	—	—	—	—
Tuai	N.	39·3	154	e 7 23	+ 2	—	—	e 7 41	?	—
Kaimata	N.E.	40·0	160	e 7 32	+ 5	e 14 4	+39	—	—	—
Wellington	Z.	40·3	156	i 7 28	− 1	—	—	—	—	22·3
Perth		44·0	228	e 7 17	−42	14 42	+18	10 5	PPP	—
Bandong	E.	45·7	266	e 8 13	0	i 14 55	+ 7	—	—	—
Mizusawa		46·0	347	e 8 41	+26	15 19	+27	—	—	—
Batavia		46·5	267	e 8 19	0	i 15 4	+ 5	—	—	—
Honolulu		54·6	59	e 9 21	0	e 16 43	− 8	i 9 40	pP	e 23·7
Calcutta	E.	69·6	297	e 11 3	+ 2	e 20 1	+ 1	—	—	—
Irkutsk		71·2	330	i 11 9	− 1	i 20 20	+ 2	e 11 30	pP	—
Colombo	E.	74·6	278	11 47	+17	21 57	+61	—	—	37·0
Kodaikanal	E.	77·4	282	i 11 48	+ 2	i 21 29	+ 2	14 48	PP	37·9
Hyderabad	N.	77·6	289	e 11 48	+ 1	i 21 30	+ 1	22 8	PS	37·4
New Delhi	N.	80·8	300	e 12 7	+ 3	i 22 0	− 3	e 12 33	pP	—
Poona	N.	82·1	290	e 12 3	− 8	i 22 15	− 1	12 15	PeP	37·3
College		82·3	21	e 12 11	− 1	i 22 10	− 8	e 12 33	pP	e 33·6
Bombay		83·1	290	e 12 17	+ 1	i 22 31	+ 5	15 38	PP	39·3
Almata		83·8	315	i 12 24	+ 4	i 22 45	+12	—	—	—
Frunse		85·8	313	e 12 33	+ 3	e 22 58	+ 5	—	—	—
Andijan		87·0	311	12 36	0	i 23 7	+ 3	—	—	—
Ukiah		88·2	51	—	—	e 23 8	− 8	e 29 38	SS	e 35·7
Berkeley		88·8	52	e 12 42	− 2	e 23 21	0	i 13 5	pP	e 39·8
Santa Clara		89·0	52	e 13 46	+61	e 23 57	+34	—	—	e 39·0
Shasta Dam		89·1	49	e 12 46	0	e 23 29	+ 5	e 13 6	pP	—
Lick	Z.	89·2	52	e 12 45	− 1	—	—	i 13 16k	pP	—
Tchimkent		89·3	313	i 12 46	0	—	—	—	—	—
Tashkent		89·4	311	i 12 46	− 1	i 23 28	+ 1	—	—	—
Victoria		89·5	42	e 12 47	0	—	—	e 13 8	pP	—
Mineral	Z.	89·6	49	e 12 47k	− 1	—	—	i 13 11	pP	—
Seattle		90·1	43	e 13 13	pP	e 13 20	sP	—	—	—
Fresno		90·6	53	i 12 53k	0	e 24 45	PS	e 13 15	pP	—
Reno		90·9	51	e 12 55	+ 1	e 23 57	+17	e 13 16	pP	—
Pasadena		91·6	56	i 12 56	− 1	i 23 46	0	i 13 18	pP	e 38·4
Tinemaha	Z.	91·9	53	e 12 57	− 2	—	—	e 13 20	pP	—
China Lake	Z.	92·3	54	e 13 1	+ 1	—	—	i 13 21	pP	—
Riverside		92·3	56	i 13 1	+ 1	—	—	i 13 23	pP	—
Palomar		92·6	57	e 12 55	− 7	—	—	i 13 30	pP	—
Boulder City		94·6	54	e 13 9	− 2	—	—	e 13 29	pP	—
Overton	Z.	94·6	54	i 13 11	0	—	—	i 13 33	pP	—
Pierce Ferry		95·2	54	e 13 36	pP	—	—	—	—	—
Hungry Horse		95·7	42	i 13 13	− 3	—	—	e 13 36	pP	—
Sverdlovsk		96·3	327	13 16	− 3	i 24 24	− 3	—	—	—
Salt Lake City		97·1	50	—	—	e 23 49	[0]	—	—	e 44·2
Bozeman		97·7	45	—	—	i 23 56	[+ 4]	e 31 12	SS	e 38·9
Tucson		97·7	59	e 13 23	− 2	e 24 1	[+ 9]	i 13 49	pP	e 39·5
Tananarive		103·2	250	—	—	e 24 31	[+12]	25 4	SKKS	—
Moscow		109·1	328	18 47	PP	—	—	—	—	—
St. Louis		113·8	50	e 19 17	PP	i 25 3	[− 1]	e 19 38	pPP	—
Scoresby Sund		115·1	359	19 35	PP	29 4	PS	35 17	SS	—
Ksara		116·0	305	e 14 48	P	30 7?	PPS	19 27?	PP	—
Upsala		116·4	337	e 19 36	PP	e 27 59	sS	e 30 5	PPS	e 52·3
Pretoria	Z.	118·6	238	e 19 5	pPKP	—	—	—	—	—
Istanbul		119·3	315	e 20 15	PP	e 29 30	PS	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Cleveland		119·4	44	e 20 20	PP	e 26 4	SKKS	e 30 36	PPS	—
Copenhagen		121·3	336	20 17	PP	30 22	PS	36 11	SS	56·3
Skalnate Pleso		121·4	326	e 20 20	PP	e 22 17	PKS	—	—	—
Ottawa		121·7	39	e 18 42	[− 1]	e 36 53	SS	—	—	67·3
Pennsylvania		122·3	43	e 21 28	?	e 27 15	SKKS	e 30 13	SP	—
Potsdam	Z.	123·2	333	i 20 31	PP	i 24 0	?	—	—	e 60·9
Ogyalla		123·3	325	e 23 56	PPP	e 29 0	sS	e 40 53	SSS	—
Seven Falls	E.	123·8	35	20 11	PP	e 30 14	PS	e 36 50	SS	66·3
Collmberg		123·9	331	e 18 47	[0]	—	—	e 20 59	PP	e 61·3
Prague		124·0	330	e 20 25	PP	e 27 11	SKKS	e 30 19	SP	e 65·8
Philadelphia		124·5	44	e 20 52	PP	e 25 43	[+ 2]	e 37 30	SS	e 52·0
Jena	N.	124·9	332	e 19 52	PP	—	—	—	—	—
Fordham		125·0	43	e 20 35	PP	e 37 24	SS	i 20 58	pPP	61·6
Aberdeen	E.	125·1	345	—	—	e 28 17?	SKKS	—	—	—
Harvard		125·7	40	i 18 52	[+ 2]	e 30 19	SKSP	i 19 17	pPKP	e 50·4
Weston		126·0	40	20 43	PP	37 57	SS	—	—	—
De Bilt		126·8	337	e 18 53	[+ 1]	e 37 47	SS	e 20 54	PP	e 54·3
Triest		127·1	326	e 18 52	[− 1]	e 32 15?	PPS	e 20 52	PP	—
Stuttgart		127·5	331	e 18 51	[− 3]	e 28 29	SKKS	e 19 17	pPKP	e 60·3
Huancayo		128·3	110	e 19 55	[+60]	e 22 19	PKS	e 30 58	PS	e 51·6
Strasbourg		128·3	332	e 19 20	[+25]	e 21 54	SKP	e 20 50	PP	—
Zürich		128·7	330	e 19 12	[+16]	—	—	e 21 39	PP	—
Padova		128·8	326	e 19 5	[+ 9]	—	—	—	—	—
Basle		129·1	331	e 19 31	pPKP	e 28 3	SKKS	—	—	—
Bologna		129·1	326	e 21 20	PP	—	—	—	—	—
Kew		129·4	340	e 21 8	PP	e 30 56	PS	e 38 0	SS	e 58·3
Florence Arc.		129·6	325	e 19 47	[+49]	e 40 3	SSP	e 22 23	PKS	—
Florence Xim		129·6	325	e 18 51	[− 7]	—	—	i 21 21	PP	—
Prato		129·6	325	e 19 29	[+31]	—	—	e 33 4	PPS	—
Rathfarnham Castle		129·7	344	e 21 27	PP	i 22 22	pPP	—	—	—
Pavia		129·9	328	e 18 33	[−25]	—	—	—	—	—
Rome		130·0	323	e 18 59	[0]	e 38 24	SS	e 21 7	PP	e 57·3
Besançon		130·1	331	e 19 22	[+23]	—	—	e 19 50	pPKP	—
Paris		130·4	335	e 19 48	pPKP	i 22 25	PKS	i 21 26	PP	65·3
Galerazamba		131·4	80	e 22 2	PKS	e 24 9	PPP	e 37 12	?	62·3
Clermont-Ferrand		132·5	332	e 19 7	[+ 4]	i 22 39	PKS	e 21 30	PP	62·8
Bogota		132·5	89	e 19 7	[+ 4]	e 23 8	PKS	—	—	—
La Paz		133·3	119	i 19 10	[+ 5]	39 27	SS	21 37	PP	63·8
Bermuda		135·5	48	e 23 20	pPKS	e 34 49	PPS	e 39 59	SS	e 67·6
Tortosa	E.	137·5	329	22 11	PKS	39 10	SS	39 43	SSP	—
Algiers Univ.	Z.	138·9	322	e 19 18	[+ 3]	e 22 37	PP	e 19 51	pPKP	—
San Juan		139·2	68	e 21 45	PP	—	—	—	—	e 57·4
Alicante		139·8	328	e 20 14	[+57]	—	—	—	—	—
Toledo		140·4	333	e 19 45	[+27]	—	—	e 22 36	PP	e 69·1
Almeria		142·0	328	19 17	[− 4]	26 25	[+ 6]	22 9	PP	69·8
Granada		142·3	330	20 1s	[+40]	33 4	SKSP	23 23	PP	67·3
Malaga	Z.	143·0	331	i 19 20	[− 2]	—	—	i 22 32	PP	67·7
Fort de France		144·7	73	e 19 20	[− 5]	—	—	—	—	—
Tamanrasset	Z.	144·8	304	e 19 27	[+ 1]	e 26 17?	[− 6]	i 19 50	pPKP	—

Additional readings :—
Brisbane iZ = 5m.44s., iSN = 8m.53s., iE = 9m.11s., iN = 9m.14s.
Riverview iNZ = 6m.15s., iPPZ = 6m.37s., iPPPZ = 6m.56s., iZ = 7m.47s., iP_cPZ = 9m.0s., isSN = 11m.2s., isSE = 11m.6s., iSSN = 11m.57s.
Auckland isSN = 13m.13s., eSSN = 14m.37s.
Wellington iP = 7m.31s.
Perth SS = 17m.53s.
Honolulu i = 9m.57s.
New Delhi iSKS = 22m.10s., iPS = 22m.36s., iPPS = 22m.48s., eSS = 26m.50s.
Poona S_cSN = 22m.42s., iPSN = 22m.53s., PPSN = 23m.24s., SS?N = 27m.24s., QN = 33m.47s.
College e = 12m.27s., eSS = 26m.41s.
Berkeley iZ = 12m.49s. and 13m.10s., eE = 23m.3s., eZ = 23m.27s. and 24m.3s.
Shasta Dam ePP = 16m.12s., epPP? = 17m.6s., esS? = 24m.12s.
Mineral iZ = 12m.55s. and 13m.26s.
Reno eN = 13m.29s., eE = 24m.14s.
Pasadena eSKSE = 23m.12s., esSE = 24m.13s., iSSEN = 30m.5s.

Continued on next page.

Tinemaha iZ =13m.43s.
Palomar eE =13m.3s.
Boulder City i =13m.59s., ePP =16m.45s.
Overton iZ =14m.59s. and 17m.26s.
Pierce Ferry i =13m.46s.
Hungry Horse iPP =17m.18s., i =17m.34s., ePKKP =30m.28s.
Tucson ePP =17m.22s., ePS =26m.3s., eSS =31m.43s., eSSS? =35m.15s.
Tananarive PS =27m.23s., PPS =27m.50s., SS =33m.2s.
St. Louis ePPP =21m.42s., i =26m.12s. and 27m.15s., iPPS =29m.57s., isSS =35m.0s.
Scoresby Sund 27m.10s.
Upsala eN =20m.34s., eE =20m.45s., eSS =35m.17s.?
Cleveland epPPSN =31m.22s., eSS?N =34m.56s., eN =35m.14s.
Copenhagen 37m.8s.
Skalnate Pleso e =24m.11s.
Pennsylvania iSPP?EN =31m.37s., iE =36m.9s., eSSE =37m.12s.
Seven Falls eE =49m.17s.
Collmberg eZ =18m.50s., 19m.12s., and 19m.24s.
Prague e =21m.5s., eSKP =21m.52s., e =24m.17s., ePPS? =32m.32s., e =33m.10s. and 36m.29s., eSS =37m.5s., esSS =37m.53s., e =41m.41s., eSSS =42m.47s., e = 45m.17s.?
Philadelphia e =27m.25s. and 45m.48s.
Harvard iPP =20m.38s., i =22m.50s., eSS =33m.1s., e =37m.47s.
Triest ePPP =23m.34s., eSS =38m.16s.
Stuttgart eZ =19m.41s., ePP =20m..50s., eSKP? =21m.47s., e =23m.17s. and 24m.27s., ePS =30m.29s., ePPS =32m.21s., e =34m.17s., eSS =37m.53s., eSSS =42m.53s.
Huancayo eSS =37m.18s.
Strasbourg e =19m.24s., 19m.49s., 20m.28s., 20m.38s., 21m.2s., and 21m.8s., iSKP = 22m.11s., eSKP =22m.14s., i =23m.1s., e =24m.39s., 24m.48s., and 26m.25s., ePPS =32m.38s., e =33m.0s., eSS =38m.17s.?
Kew eEN =22m.12s., e =34m.38s., eEZ =49m.15s.
Rome e =19m.37s. and 29m.58s.
Paris i =19m.56s., 20m.48s., 21m.14s., and 21m.45s., e =22m.4s., i =22m.16s., iSKP = 22m.53s., iPKS =22m.59s., e =22m.4s., i =22m.16s., i =23m.8s., eQ =58·3m.
Clermont-Ferrand i =23m.36s., ePPP =24m.15s., ePS =31m.33s., ePPS =33m.28s., eSS =39m.9s., eSSP =39m.42s.
Toledo eZ =22m.51s. and 23m.34s.
Almeria PPP =25m.5s., PPS =34m.6s., SS =40m.1s.
Granada SS =41m.49s.
Malaga PPPZ =25m.44s., QZ =60m.32s.
Tamanrasset iPKPZ =19m.31s., iZ =20m.3s., ePPZ =23m.3s., epPPZ =23m.23s., ePS? =34m.17s.?

Oct. 31d. Readings also at 2h. (College and Collmberg), 3h. (Riverside, China Lake (2), Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, College, Besançon, Clermont-Ferrand, Strasbourg, Stuttgart, Zürich, and near Mizusawa), 4h. (College, Hungry Horse, near Andijan, Obi-garm, and Stalinabad), 5h. (near Alicante and Almeria), 6h. (Ksara), 7h. (Ksara, Tacubaya, Tucson, Shasta Dam, near Victoria, near Yalta, near Bogota, and near Balboa Heights), 8h. (Bogota and Ottawa), 10h. (Tacubaya, near Santa Lucia, and near Tchimkent), 11h. (Alicante), 16h. (near Ashkabad), 18h. (near Alicante and Almeria), 20h. (Grozny, Leninakan, and near Tiflis), 21h. (Mizusawa, Collmberg, Paris, Strasbourg, Stuttgart, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Seven Falls), 22h. (Puebla and near Tacubaya), 23h. (Overton and Pierce Ferry).

Nov. 1d. 7h. 32m. 52s. Epicentre 5°·6S. 153°·6E. Depth of focus 0·010.
(as on October 31d.).

$A = -·8915$, $B = +·4426$, $C = -·0969$; $\delta = +6$; $h = +7$;
$D = +·445$, $E = +·896$; $G = +·087$, $H = -·043$, $K = -·995$.

		△	Az.	P.	O−C.	S.	O−C.		Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Brisbane	N.	21·8	182	i 4 50a	+ 5	i 8 49	+14	i 5	4 pP	—
Riverview		28·2	184	i 5 50a	+ 4	e 10 31	+ 8	i 6	19 pP	e 13·8
Auckland	N.	36·7	152	—	—	i 13 43	?	i 14	18 ?	—
Kaimata	N.E.	40·0	160	e 7 8?	−19	—	—	—	—	—
Wellington		40·3	156	i 7 29	0	e 14 2	sS	e 16	48 SSS	—
Christchurch		41·3	159	i 7 40	+ 3	13 40	− 4	e 9	28 PP	e 19·6
Bandong		45·7	266	e 8 7	− 6	e 14 49	+ 1	—	—	—
Batavia		46·5	267	e 8 19	0	e 15 8	+ 9	—	—	—
College		82·3	21	i 12 9	− 3	e 21 55	−23	e 12	33 pP	—
Almata		83·8	315	e 12 27	+ 7	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Murgab		85·4	309	i 12 31	+ 3	i 20 55	?	—	—	—
Frunse		85·8	313	e 12 42?	+12	e 22 58	+ 5	—	—	—
Andijan		87·0	311	e 12 38	+ 2	e 22 10	[−41]	—	—	—
Lick	z.	89·2	52	e 12 44	− 2	—	—	—	—	—
Tchimkent		89·3	313	i 13 23	+37	i 24 12	+46	—	—	—
Stalinabad		89·4	309	e 13 16	+29	i 23 31	+ 4	—	—	—
Tashkent		89·4	311	i 12 50	+ 3	i 23 31	+ 4	—	—	—
Victoria	z.	89·5	42	e 13 44	+57	—	—	—	—	—
Mineral	z.	89·6	49	e 12 49	+ 1	—	—	e 15 56	PP	—
Fresno	z.	90·6	53	e 12 50	− 3	—	—	—	—	—
Reno	z.	90·9	51	e 12 54	0	—	—	e 13 18	pP	—
Samarkand		90·9	309	e 13 18?	+24	—	—	—	—	—
Pasadena	z.	91·6	56	e 12 56	− 1	—	—	i 13 21	pP	—
Tinemaha	z.	91·9	53	i 12 57	− 2	—	—	i 13 25	pP	—
China Lake	z.	92·3	54	e 13 0	0	—	—	e 13 25	pP	—
Riverside	z.	92·3	56	i 12 59	− 1	—	—	e 13 23	pP	—
Palomar		92·6	57	e 13 5	+ 3	—	—	e 13 30	pP	—
Boulder City		94·6	54	e 13 10	− 1	—	—	e 17 26	PP	—
Overton	z.	94·6	54	e 13 12	+ 1	—	—	e 13 37	pP	—
Pierce Ferry		95·2	54	e 13 13	− 1	—	—	e 13 38	pP	—
Hungry Horse		95·7	42	e 13 15	− 1	—	—	e 13 39	pP	—
Sverdlovsk		96·3	327	—	—	25 26	+59	—	—	—
Tucson		97·7	59	e 13 14	−11	—	—	e 16 49	?	—
Ksara		116·0	305	i 19 44	PP	e 23 25	?	i 20 9	pPP	—
Ottawa		121·7	39	e 18 41	[− 2]	—	—	—	—	—
Stuttgart	z.	127·5	331	e 18 55	[+ 1]	—	—	—	—	—
Tamanrasset	z.	144·8	304	i 19 28k	[+ 2]	—	—	e 22 50	PP	—

Additional readings :—
Brisbane iN =5m.19s., isS?N =9m.29s.
Riverview iN =9m.52s., esS?E =11m.8s.
Christchurch eQ =16m.58s.
Pasadena iZ =13m.34s.
Riverside eZ =13m.38s.
Boulder City epP? =13m.50s.
Overton eZ =14m.0s., ePPZ =16m.56s.
Pierce Ferry i =13m.56s., e =17m.30s.
Hungry Horse e =15m.57s.
Tamanrasset iPKPZ =19m.31s., eZ =19m.48s. and 19m.53s.

Nov. 1d. 11h. 55m. 53s. Epicentre 40°·6N. 126°·4W. (as on October 22d.).

$A = -\cdot4519$, $B = -\cdot6129$, $C = +\cdot6482$; $\delta = +2$; $h = -2$;
$D = -\cdot805$, $E = +\cdot593$; $G = -\cdot385$, $H = -\cdot522$, $K = -\cdot761$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ferndale		1·6	91	e 0 37	+ 7	i 0 57	+ 6	—	—	—
Arcata	z.	1·8	81	e 0 38	+ 6	e 1 0	+ 4	—	—	—
Ukiah		2·9	121	—	—	e 1 24	0	—	—	e 1·7
Shasta Dam		3·0	88	e 0 51	+ 1	i 1 34	+ 7	e 1 15	P_g	e 1·7
Mineral		3·7	93	i 0 59a	− 1	i 1 40	− 5	i 1 4	P*	—
Berkeley		4·2	130	i 1 3	− 4	i 1 55	− 2	i 1 15	P*	—
San Francisco	N.	4·2	132	i 1 3	− 4	i 1 48	− 9	i 1 15	P*	—
Branner		4·6	133	i 1 6a	− 6	i 2 3	− 4	i 1 25	P*	—
Lick		4·9	130	i 1 12k	− 5	i 2 10	− 5	i 1 30	P*	—
Reno	z.	5·2	100	i 1 24	+ 3	i 2 32	+10	i 1 44	P_g	—
Fresno		6·4	125	i 1 32	− 6	e 2 52	− 1	e 3 5	S*	e 3·7
Tinemaha		7·3	117	e 1 51	+ 1	i 3 23	+ 8	i 2 0	P*	—
Seattle		7·6	21	e 2 1	+ 6	—	—	e 2 13	P*	—
Haiwee		8·0	122	i 1 59	− 1	—	—	—	—	—
Victoria	z.	8·2	14	e 1 59	− 4	—	—	—	—	—
China Lake	z.	8·4	122	e 2 3	− 3	—	—	—	—	—
Pasadenz		9·2	132	i 2 12	− 4	i 3 55	− 8	—	—	—
Riverside	z.	9·7	130	i 2 19	− 3	i 4 11	− 4	—	—	—
Boulder City		10·2	114	e 2 31	0	—	—	i 2 49	PPP	—
Overton	z.	10·2	110	i 2 32	+ 1	—	—	i 2 51	PPP	i 5·4

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pierce Ferry		10·7	111	i 2 40	+ 2	—	—	i 2 47	PP	—
Hungry Horse		11·7	45	e 2 51	0	—	—	—	—	—
Tucson		15·0	119	e 3 38	+ 3	—	—	i 3 41	P	—

Additional readings :—
Mineral iN = 1m.8s., iZ = 1m.47s.
Berkeley iZ = 1m.8s., eE = 1m.53s.
Reno iEZ = 1m.31s., iE = 1m.53s., iN = 2m.6s.
Seattle e = 2m.42s.
Overton iZ = 3m.10s. and 4m.1s.
Pierce Ferry i = 3m.33s.

Nov. 1d. 13h. 4m. 17s. Epicentre 46°·1N. 93°·7E.

A = −·0449, B = +·6944, C = +·7182 ; δ = +2 ; h = −4 ;
D = +·998, E = +·065 ; G = −·046, H = +·717, K = −·696.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Irkutsk		9·3	44	i 2 46	PPP	4 8	+ 3	—	—	—
Almata		12·3	263	3 4	+ 5	—	—	—	—	—
Frunse		14·0	264	e 3 24	+ 2	—	—	—	—	—
Andijan		16·4	259	e 3 55?	+ 2	—	—	—	—	—
Murgab		16·5	249	4 0	+ 6	7 8	+10	—	—	—
Tchimkent		17·7	267	i 4 7	− 3	—	—	—	—	—
Tashkent		18·3	264	e 4 17	0	i 7 42	+ 3	—	—	—
Obi-garm		19·2	257	i 4 16	−12	—	—	—	—	—
Stalinabad		19·9	258	i 4 34	− 2	i 8 18	+ 3	—	—	—
Samarkand		20·5	261	e 4 45	+ 3	—	—	—	—	—
New Delhi	N.	21·8	223	e 5 0	+ 4	e 9 8	+16	i 5 22	PP	—
Sverdlovsk		23·0	311	i 5 5	− 2	9 9	− 5	—	—	—
Calcutta	E.	23·9	192	e 5 1	−15	i 9 27	− 3	i 10 30	SS	—
Ashkabad		27·3	265	5 50	+ 2	—	—	—	—	—
Hyderabad	N.	31·3	209	e 6 27	+ 3	e 11 25	− 6	—	—	—
Poona	N.	32·0	217	e 6 37	+ 7	e 11 44	+ 2	—	—	—
Bombay		32·1	220	e 6 38	+ 7	e 13 47	SS	e 9 34	PcP	—
Grozny		33·8	283	e 6 49	+ 3	11 55	−15	—	—	—
Tiflis		35·1	282	e 6 58	+ 1	e 12 30?	0	—	—	—
Moscow		35·7	307	6 59	− 3	12 31	− 8	—	—	—
Sotchi		37·7	287	7 8	−11	—	—	—	—	—
Kodaikanal	E.	38·3	207	—	—	e 12 43	−36	—	—	—
Ksara		45·1	275	e 8 20	0	15 10	+11	—	—	—
Upsala		45·2	317	—	—	—	—	e 20 11	Q	e 22·1
Istanbul		45·9	289	e 8 23	− 3	e 15 1	−10	—	—	—
Bucharest	N.	46·3	294	—	—	e 18 31	SS	e 21 12	Q	i 23·0
Raciborzu	E.	48·6	304	e 8 52k	+ 5	—	—	—	—	—
Budapest		49·2	300	e 8 48	− 4	e 15 56	− 2	e 24 43?	Q	27·0
Copenhagen		49·3	313	8 57	+ 4	i 15 56	− 3	20 7	SS	23·2
Belgrade		49·7	297	—	—	—	—	e 21 33	Q	e 24·7
Potsdam		50·4	309	e 9 1	0	e 20 19	SS	—	—	e 27·2
Helwan		50·5	275	9 3	+ 1	16 19	+ 3	11 0	PP	—
Prague		50·8	306	e 8 56	− 8	—	—	e 11 58	PPP	—
Collmberg	Z.	51·0	307	e 9 3	− 3	—	—	e 10 55	PP	—
Jena		51·9	307	e 9 10	− 2	—	—	e 11 6	PP	e 26·2
Triest		53·3	301	e 11 26	PP	i 17 1	+ 7	i 17 16	PPS	e 29·3
Stuttgart		54·4	306	e 9 29	− 2	e 17 2	− 7	e 11 33	PP	e 27·7
De Bilt		54·8	312	—	—	e 17 13	− 1	—	—	e 25·7
Strasbourg		55·3	307	e 9 33	− 5	e 17 13?	− 8	—	—	e 27·9
Zürich		55·5	305	e 9 33	− 6	e 17 26	+ 2	e 9 43	P	—
Basle		55·9	306	e 9 37	− 5	—	—	e 14 25	?	—
Rome		56·1	298	e 9 42	− 1	e 17 26	− 6	—	—	—
Pavia		56·3	303	e 9 56?	+11	—	—	—	—	—
Besançon		57·0	305	e 9 47	− 3	—	—	e 11 38	PP	—
Kew		58·0	313	—	—	e 17 48	− 9	e 22 46	?	e 30·7

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Paris		58·0	309	i 9 54	− 3	—	—	i 12 1	PP	e 28·7
Clermont-Ferrand		59·5	306	e 10 6	− 1	—	—	e 10 12	P	32·7
College		59·5	26	i 10 5	− 2	—	—	e 16 30	?	e 33·2
Algiers Univ.	z.	65·1	298	e 10 40	− 5	—	—	e 11 7	P_cP	—
Alicante		66·2	301	e 11 53	+61	21 48	?	—	—	e 36·5
Tamanrasset	z.	72·7	285	i 11 32k	0	—	—	e 11 42	PS	—
Victoria	z.	80·4	24	e 12 14a	− 1	—	—	—	—	—
Seattle		81·5	24	e 12 22	+ 1	—	—	—	—	—
Hungry Horse		82·9	18	i 12 27	− 1	—	—	i 12 33	P_cP	—
Shasta Dam		87·8	27	i 12 52	0	—	—	—	—	—
Mineral	z.	88·3	26	e 12 55	0	—	—	—	—	—
Reno	z.	89·6	25	i 13 2a	+ 1	—	—	—	—	—
Berkeley	z.	90·4	28	e 13 5	+ 1	—	—	—	—	—
Pretoria	z.	92·1	236	e 13 18	+ 6	—	—	—	—	—
Fresno	z.	92·2	26	e 13 9	− 4	—	—	—	—	—
Tinemaha	z.	92·4	25	e 13 20	+ 6	—	—	—	—	—
China Lake	z.	93·7	25	e 13 21	+ 1	—	—	—	—	—
Overton	z.	93·9	23	e 13 22	+ 1	—	—	—	—	—
Boulder City		94·4	23	e 13 24	+ 1	—	—	—	—	—
Pierce Ferry		94·4	22	e 12 40	−43	—	—	—	—	—
Pasadena	z.	95·1	26	i 13 27	+ 1	—	—	—	—	—
Tucson		98·9	21	e 13 45	+ 2	—	—	—	—	—

Additional readings :—
New Delhi eSSN = 9m.42s.
Bucharest eN = 18m.52s.
Budapest eE = 18m.43s.?, eN = 23m.13s.
Potsdam eSS?N = 20m.37s., eSSSZ = 23m.3s.
Helwan eZ = 10m.30s., PSZ = 16m.28s., eZ = 18m.6s.
Collmberg eZ = 10m.28s.
Besançon e = 10m.27s., eP_cP = 11m.6s.
Paris i = 10m.9s. and 11m.49s.
Tamanrasset eZ = 11m.38s.
Long waves were also recorded at Scoresby Sund, Columbia, and at other European stations.

Nov. 1d. Readings also at 1h. (near Tananarive, Victoria, Seattle, Mineral, Shasta Dam, Hungry Horse, Pierce Ferry, College, and near Sitka), 4h. (Ksara, and near La Paz), 5h. (near Antofagasta), 7h. (near Andijan), 9h. (near Victoria), 10h. (Wellington, Christchurch, Boulder City, Overton, Pierce Ferry, near Alicante, near Tchimkent, and near Andijan), 11h. (Lick, Mineral, Samarkand, near Obi-garm, Stalinabad, Andijan, Murgab, and near Alicante), 12h. (Bandong, Batavia, College, Hungry Horse, and Shasta Dam), 13h. (near Branner, Lick, Stalinabad, near Obi-garm, and near Istanbul), 14h. (near Apia and near Obi-garm), 15h. (Lick, Pasadena, China Lake, Tinemaha, Boulder City, Pierce Ferry, Tucson, near Victoria, and near Alicante), 16h. (Murgab, Tchimkent, Samarkand, near Obi-garm, Stalinabad (2), and Andijan), 17h. (Tchimkent, Andijan, near Stalinabad, Obi-garm, Samarkand, and Murgab), 18h. (Overton, Pierce Ferry, Seattle, and near Victoria), 19h. (Hungry Horse, Pasadena, Riverside, Palomar, La Jolla, China Lake, Overton, near Boulder City, Pierce Ferry, Tucson, and near Obi-garm), 20h. (near Tamanrasset), 21h. (Tchimkent, Almata, Frunse, near Obi-garm, Murgab, Stalinabad, Andijan, and Tashkent), 23h. (near Lick, Branner, and Berkeley).

Nov. 2d. 2h. 7m. 28s. Epicentre 18°·0N. 69°·5W. Depth of focus 0·020.
(as on 1948, Dec 7d.).

$A = +·3333$, $B = -·8914$, $C = +·3071$; $\delta = -1$; $h = +5$;
$D = -·937$, $E = -·350$; $G = +·108$, $H = -·288$, $K = -·952$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Port au Prince	2·7	282	e 1 19	S	(e 1 19)	0	—	—	—
San Juan	3·1	83	i 0 45	− 5	e 1 19	− 9	—	—	e 1·9
Fort de France	8·6	111	e 2 11	+ 9	—	—	—	—	—
Bogota	14·0	199	i 3 18	+ 6	i 6 0	+16	—	—	—
Weston	24·4	358	i 5 11	+ 6	i 9 13	+ 3	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Harvard		24·5	358	e 5 7	+ 1	e 9 14	+ 2	—	—	—
Pierce Ferry		43·1	304	i 7 46	0	—	—	—	—	—
Overton	z.	43·6	305	i 7 49	− 1	—	—	—	—	—
Boulder City		43·8	304	e 7 51	0	—	—	—	—	—
Riverside	z.	45·5	301	e 8 4	− 1	—	—	—	—	—
China Lake	z.	45·9	303	e 8 7	− 1	—	—	—	—	—
Pasadena	z.	46·1	301	e 8 9	− 1	—	—	—	—	—
Tinemaha		46·7	305	i 8 14	0	—	—	—	—	—
Hungry Horse		47·0	320	i 8 14	− 3	—	—	i 8 38	pP	—
Lick	z.	49·4	305	i 8 35k	0	—	—	i 8 46	pP	—
Shasta Dam		50·5	308	i 8 40	− 4	—	—	—	—	—

Additional readings :—
San Juan e =51s., and 1m.7s.
Overton eZ =8m.11s. and 18m.25s.

Nov. 2d. 2h. 29m. 38s. Epicentre 37°·0N. 113°·5W.

Intensity VI at Rockville and St. George. Very strongly felt at Santa Clara ; less strongly at Cedar City, Gunlock, Hurricane, Leeds, Springdale, and Washington.

L. M. Murphy and F. P. Ulrich.
United States Earthquakes, 1949, Serial 748, Washington, 1951, p. 8. Approximate epicentre as adopted. Macroseismic area, 700 sq.m.

$A = -·3192$, $B = -·7342$, $C = +·5992$; $\delta = -2$; $h = -1$;
$D = -·917$, $E = +·399$; $G = -·239$, $H = -·550$, $K = -·801$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Overton	z.	0·9	238	i 0 20	0	—	—	—	—	—
Pierce Ferry		1·0	204	i 0 18	− 3	—	—	—	—	—
Boulder City		1·5	227	i 0 28	0	i 0 49	0	—	—	i 1·7
China Lake	z.	3·5	251	i 0 57	0	i 2 0	S_g	—	—	—
Tinemaha		3·8	272	i 1 4	+ 3	i 2 11	S_g	—	—	—
Riverside	z.	4·4	227	i 1 6	− 4	i 2 22	S_g	—	—	—
Palomar		4·6	218	i 1 8	− 4	i 2 22	S^*	—	—	—
Pasadena		4·8	234	i 1 13	− 2	i 2 34	S_g	—	—	—
Fresno		5·1	269	i 1 22a	+ 2	i 2 48	S_g	—	—	—
Tucson		5·2	154	i 1 10	−11	i 1 24	P^*	—	—	i 1·8
Reno		5·6	299	e 1 28	+ 1	e 2 24	− 9	i 1 54	P_g	—
Lick	z.	6·5	275	i 1 43k	+ 4	i 3 29	S_g	i 2 8	P_g	—
Shasta Dam		7·8	301	e 2 3	+ 5	e 3 40	+12	—	—	—
Hungry Horse		11·4	358	e 2 48	+ 1	i 6 9	L	—	—	i 6·3

Additional readings :—
Tucson i =1m.36s.
Reno eN =1m.43s., iEZ =2m.1s., e =3m.2s., iEZ =3m.15s.
Lick eN =3m.37s.

Nov. 2d. 2h. 32m. 30s. Epicentre 3°·0S. 134°·8E.

$A = -·7036$, $B = +·7086$, $C = -·0520$; $\delta = -13$; $h = +7$;
$D = +·710$, $E = +·705$; $G = +·037$, $H = -·037$, $K = -·999$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bandong		27·3	262	e 5 52	+ 4	e 10 29	+ 2	—	—	—
Batavia		28·1	263	i 5 55	0	10 37	− 3	—	—	—
Brisbane	N.	30·0	146	e 6 11a	− 1	i 11 7	− 3	i 7 0	PP	i 14·9
Perth		33·9	210	i 7 36	PP	12 18	+ 7	14 13	SS	—
Riverview		34·3	155	i 6 50k	0	i 12 17	0	i 8 9	PP	i 16·2
Melbourne		35·9	166	e 6 48	−16	i 12 47	+ 5	—	—	i 14·6
Auckland	N.	49·9	137	i 8 40	−17	e 16 10	+ 3	e 10 30	PP	23·5
Arapuni	E.	51·1	139	—	—	e 14 57	?	—	—	—
Wellington		52·3	143	e 9 13	− 2	e 16 42	+ 2	e 10 42	P_cP	25·5
Christchurch		52·5	146	i 9 19	+ 2	16 40	− 3	10 43	P_cP	e 25·1

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Colombo	E.	55·7	280	8 35	−65	17 30	+ 4	—	—	26·5
Kodaikanal	E.	58·6	284	i 9 57	− 4	i 17 57	− 7	—	—	—
Hyderabad	N.	59·2	292	e 10 1	− 4	18 2	−10	—	—	28·0
Irkutsk		60·8	339	i 10 15	− 1	e 18 33	0	—	—	—
New Delhi	N.	63·5	305	—	—	e 18 59	− 8	e 20 26	S_cS	—
Poona	N.	63·7	292	e 9 52	−44	e 19 0	−10	—	—	—
Bombay		64·7	292	e 10 43	+ 1	—	—	—	—	—
Almata		69·4	320	11 13	+ 1	—	—	—	—	—
Murgab		69·5	313	i 11 13	+ 1	i 20 20	0	—	—	—
Honolulu		70·2	66	i 11 19	+ 2	—	—	—	—	—
Frunse		70·8	317	e 11 21	+ 1	—	—	—	—	—
Andijan		71·5	315	11 25	+ 1	i 20 43	0	—	—	—
Obi-garm		72·8	312	i 11 31	− 1	i 20 56	− 2	—	—	—
Stalinabad		73·4	312	i 11 37	+ 1	i 21 3	− 2	—	—	—
Tashkent		73·9	315	i 11 38	− 1	i 21 8	− 2	—	—	—
Tchimkent		74·0	316	i 11 38	− 1	i 21 10	− 1	—	—	—
Samarkand		75·0	312	i 11 46	+ 1	e 21 23	0	—	—	—
Ashkabad		81·2	309	12 20	+ 1	—	—	—	—	—
Sverdlovsk		83·9	328	i 12 32	− 1	22 52	− 4	—	—	—
College		87·4	25	e 12 48	− 2	—	—	e 14 16	pP	—
Baku		88·0	310	13 2	+ 9	23 38	+ 2	—	—	—
Tiflis		92·0	312	e 13 9	− 3	e 23 49	[+ 5]	—	—	—
Moscow		96·5	326	e 13 17	−15	e 24 34?	{+ 5}	—	—	—
Ksara		99·1	303	e 13 45	+ 1	—	—	17 55	PP	—
Yalta		99·7	314	—	—	24 50	{− 2}	—	—	—
Shasta Dam		101·7	49	i 13 58	+ 2	—	—	e 15 14	pP	—
Berkeley		102·1	52	i 14 2k	+ 4	—	—	—	—	e 51·1
Lick	Z.	102·6	52	i 14 4k	+ 4	—	—	e 18 16	PP	—
Helwan	Z.	103·1	299	e 17 30	?	—	—	e 18 50	PP	—
Istanbul		103·8	311	e 12 36	?	e 25 42	−10	—	—	—
Tinemaha	Z.	105·3	53	e 14 15	+ 2	—	—	—	—	—
Bucharest	N.	105·4	315	—	—	e 24 34	[−18]	e 27 47	PS	e 47·5
Pasadena		105·8	55	e 15 42	?	—	—	—	—	e 43·0
China Lake	Z.	106·0	53	e 14 17	+ 2	—	—	e 18 14	PKP	—
Upsala		106·0	332	—	—	e 34 30?	SS	e 44 30?	Q	e 49·5
Hungry Horse		106·2	40	e 14 16	0	—	—	i 18 30	PP	—
Boulder City		108·2	53	e 14 28	P	—	—	e 18 34	PKP	—
Overton	Z.	108·4	52	e 20 46	PPP	—	—	—	—	—
Pierce Ferry		108·8	53	e 14 31	P	—	—	e 18 40	PKP	—
Copenhagen		110·2	329	e 19 12	PP	34 48	SS	—	—	48·5
Potsdam	Z.	111·6	326	—	—	e 24 19	?	—	—	e 55·1
Collmberg		111·8	324	e 18 23?	[−14]	e 30 24	PPPS	e 34 42	SS	e 55·5
Tucson		112·1	56	e 18 41	[+ 4]	—	—	—	—	e 51·5
Taranto		112·7	313	19 43	PP	36 43	SS	e 40 30	SSS	53·8
Triest		113·5	319	e 18 38	[− 2]	e 29 7	PS	e 34 37	SS	e 56·5
Stuttgart		115·1	323	e 18 44	[+ 1]	e 26 41	{ 0}	e 19 48	PP	e 57·5
Rome		115·7	315	e 19 51	PP	e 21 23	?	e 37 55	SS	e 55·5
De Bilt		115·7	328	e 19 36	PP	—	—	—	—	e 52·5
Strasbourg		116·0	324	e 19 51	PP	e 26 30	{−17}	e 37 32	SS	e 57·5
Besançon		117·7	323	e 20 3	PP	—	—	—	—	—
Paris		118·9	326	e 18 53	[+ 2]	—	—	e 20 7	PP	e 69·5
Kew		118·9	329	e 20 16	PP	e 29 57	PS	e 38 5	S	e 54·5
Clermont-Ferrand		120·1	323	e 20 24	PP	e 30 25	PS	e 37 44	SS	59·5
Rathfarnham Castle		120·5	334	e 20 15	PP	e 21 54	PKS	—	—	—
Algiers Univ.	Z.	124·4	313	e 19 2	[+ 1]	22 26	PKS	20 41	PP	—
St. Louis		125·8	43	e 20 50	PP	e 32 27	PPS	—	—	—
Alicante		126·2	317	—	—	e 26 32	[+23]	47 14	Q	53·6
Tamanrasset	Z.	127·1	297	e 19 9	[+ 3]	22 29	PKS	e 21 6	PP	—
Toledo		127·7	320	e 21 10	PP	—	—	e 22 44	PKS	e 66·6
Almeria		128·3	316	21 11	PP	28 11	{+ 2}	23 7	PKS	64·9

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Granada		128·9	327	21 9	PP	30 25	?	22 53	PKS	65·6
Malaga	z.	129·7	327	i 21 24	PP	i 32 16	PS	33 42	PPS	50·6
Ottawa	z.	130·0	27	e 19 13	[+ 1]	—	—	—	—	—
Harvard		134·2	26	e 19 24	[+ 4]	—	—	—	—	—
Bermuda		145·5	29	e 20 45	[+65]	—	—	—	—	e 68·7
Huancayo		146·5	117	(i 19 52)	[+10]	(e 42 36)	SS	e 25 36	PPP	e 42·6
La Paz	z.	150·2	131	i 19 54	[+ 6]	—	—	20 10	PKP_2	71·5
Bogota		151·1	85	i 19 53	[+ 4]	—	—	(27 30)	PPP	27·5
San Juan		154·5	51	e 20 15	[+21]	e 44 12	SS	e 23 49	PP	e 77·0
Fort de France		160·4	52	e 20 11	[+10]	—	—	—	—	—

Additional readings :—
Brisbane iN = 11m.59s. and 12m.55s.
Perth SSS = 15m.22s.
Riverview i = 8m.20s., iN = 9m.37s., iEZ = 9m.40s., iN = 13m.55s., iEN = 14m.49s., iSSSZ = 14m.57s.
Auckland PPPN = 11m.30s., iN = 17m.39s., eSSSN = 20m.50s.
Wellington ePPP = 12m.30s., Q = 22·5m.
Christchurch QEN = 20m.50s.
Bombay eE = 12m.12s.
Honolulu i = 12m.47s.
Berkeley iZ = 15m.26s.
Lick iZ = 15m.31s.
Helwan eZ = 17m.56s., 19m.50s., eE = 29m.3s.
Hungry Horse e = 14m.41s., iPPP? = 20m.13s., ePKKP? = 30m.17s., ePKP,PKP = 39m.7s.
Boulder City e = 15m.55s.
Collmberg eZ = 18m.38s. and 20m.4s., eSSS?EN = 40m.54s.
Taranto e = 23m.43s. and 33m.13s.
Triest ePKS? = 21m.2s., ePPS = 30m.5s.
Stuttgart eSKP = 21m.17s., ePS = 30m.30s., ePPS = 31m.36s., eSSS = 42m.0s.
Strasbourg e? = 20m.17s., e = 21m.24s., eSKP? = 21m.51s., eSSS = 40m.30s.
Kew eZ = 21m.50s., ePPS?EZ = 31m.5s., eE = 46m.30s., eEN = 52m.1s.
Clermont-Ferrand iSKP? = 21m.53s.
Tamanrasset eZ = 20m.38s.
Almeria PKS = 24m.42s., PPP = 25m.47s., SS = 40m.19s.
Granada SKP = 25m.15s., PPP = 26m.30s., S = 32m.37s., SS = 39m.39s.
Malaga PPP?Z = 25m.4s.
Huancayo eP = 10m.59s., i = 21m.22s., PKP is given as iS.
La Paz iZ = 21m.14s. and 22m.6s., iPPZ = 23m.38s., iZ = 24m.54s.
Bogota i = 19m.58s., iPKP₂Z = 21m.21s., eSKPEN = 24m.10s.
Long waves were also recorded at Santa Clara, Salt Lake City, Philadelphia, Aberdeen, and Bergen.

Nov. 2d. 18h. 33m. 47s. Epicentre 46°·3N. 13°·1E. (as on 1948, Oct. 12d.).

Intensity V at Tolmezzo, Arta, Verzegnis, Amaro, Staz, Carnia, Gemona, Tarcento, and Udine.

Bulletin of Trieste Seismological station, 4th quarter, 1949.

A = +·6753, B = +·1571, C = +·7206 ; δ = −3 ; h = −4 ;
D = +·227, E = −·974 ; G = +·702, H = +·163, K = −·693.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Triest		0·8	145	e 0 21	+ 3	i 0 32	+ 1	—	—
Chur		2·5	283	e 0 42	− 1	e 1 16	+ 2	—	—
Ravensburg	z.	2·8	302	e 0 53	P*	e 1 38	S_g	—	—
Zürich		3·3	289	e 0 57	+ 4	e 1 38	+ 3	—	—
Stuttgart		3·6	314	e 0 56	− 2	e 1 47	+ 5	e 1 16	P_g
Prague		3·9	13	—	—	e 1 44	− 6	i 2 0	S*
Strasbourg		4·3	304	—	—	e 1 55	− 5	e 2 27	S_g
Jena		4·7	348	—	—	e 2 8	− 2	e 2 30	S_g
Collmberg	z.	5·0	359	e 1 15	− 3	e 2 17	− 1	e 2 34	S_g

Additional readings :—
Stuttgart eP_gZ = 1m.7s. (P*), iS_g = 1m.56s., i = 1m.59s.
Collmberg eP?Z = 1m.19s., eZ = 1m.22s.
Long waves only were recorded at Besançon.

Nov. 2d. Readings also at 1h. (near Berkeley, Branner, and Lick), 3h. (Brisbane, Mount Wilson, Tinemaha, Boulder City, Overton, Pierce Ferry (2), Shasta Dam, College (2), Harvard, Collmberg, Paris, Stuttgart, Tamanrasset, Andijan, and near Copiapo; several shocks), 4h. (Kew), 5h. (near Mizusawa), 6h. (Copiapo and near Murgab), 8h. (Samarkand, near Andijan, Murgab, Obi-garin, Stalinabad, near Bandong, and Batavia), 11h. (near Andijan), 13h. (Tamanrasset, near Berkeley, Branner, Lick, and San Francisco), 14h. (College), 15h. (near Branner, Lick, and near Zürich), 17h. (near Branner and Lick), 20h. (near Obi-garm), 21h. (Tucson, Boulder City, Overton, and Pierce Ferry), 23h. (Boulder City, Pierce Ferry, Fresno, near Lick, Andijan, Stalinabad, near Garm, and Obi-garm).

Nov. 3d. 1h. 12m. 37s. Epicentre 48°·6N. 153°·5E. Depth of focus 0·020.
(as on 1949, May 3d.).

$A = -\cdot5940$, $B = +\cdot2962$, $C = +\cdot7479$; $\delta = -8$; $h = -5$;
$D = +\cdot446$, $E = +\cdot895$; $G = -\cdot669$, $H = +\cdot334$, $K = -\cdot664$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Yuzno-Sakhlinsk		7·5	261	1 50	+ 2	—	—	—	—
Klyuchi		8·9	27	—	—	e 4 22	+37	—	—
Sapporo		10·1	241	e 2 24	+ 2	4 19	+ 6	i 15 11	S_eS
Mizusawa	E.	13·0	228	3 1	+ 1	5 13	− 8	—	—
Sendai		13·8	226	e 3 19	+ 9	5 47	+ 8	—	—
Tokyo		16·4	223	3 47	+ 5	6 47	+ 9	—	—
Nagoya		18·2	229	4 7	+ 4	7 27	+ 9	15 31	S_eS
Osaka		19·3	232	e 4 20	+ 5	e 7 47	+ 7	8 13	P_eP
Hirosima		21·2	236	4 38	+ 4	8 24	+ 9	—	—
Hukuoka		22·9	238	i 4 54	+ 4	8 55	+10	e 5 41	PP
Irkutsk		31·1	296	i 6 5	0	11 1	+ 3	i 6 42	pP
College		34·6	40	i 6 33	− 2	e 11 41	−11	e 7 5?	pP
Sitka		41·8	51	i 7 35	0	i 13 45	+ 5	—	—
Honolulu		47·3	107	i 8 16	− 3	e 18 54	SSS	e 10 0	PP
Almata		51·4	295	8 52	+ 2	—	—	—	—
Victoria	Z.	52·3	57	i 8 56k	− 1	16 12	+ 4	i 9 43	pP
Sverdlovsk		52·7	317	i 8 59	− 1	16 14	0	i 9 37	pP
Frunse		53·1	296	i 9 6	+ 3	—	—	—	—
Seattle		53·4	57	e 9 6	+ 1	e 16 29	+ 6	e 9 43	pP
Andijan		55·7	294	i 9 22	0	16 53	− 1	10 0	pP
Murgab		56·2	292	i 9 27	+ 1	17 5	+ 5	—	—
Arcata	Z.	56·4	64	i 9 28k	+ 1	—	—	i 10 3	pP
Tchimkent		56·4	298	i 9 27	0	—	—	—	—
Tashkent		57·2	298	i 9 33	+ 1	i 18 2	PS	i 10 14	pP
Hungry Horse		57·5	52	i 9 33	− 2	e 17 13	− 4	i 10 23	pP
Shasta Dam		57·5	64	i 9 33	− 2	e 17 19	+ 2	i 10 23	pP
Garm		58·0	295	e 9 37	− 1	i 17 31	+ 7	—	—
Mineral		58·2	64	i 9 38k	− 2	e 18 46	PPS	i 10 27	pP
Obi-garm		58·5	295	i 9 43	+ 1	—	—	—	—
Saskatoon		58·8	46	—	—	i 17 43	+ 9	e 21 35	SS
Stalinabad		59·2	295	i 9 47	0	i 17 43	+ 3	—	—
Berkeley	Z.	59·3	66	i 9 46k	− 1	—	—	i 10 25	pP
Samarkand		59·5	297	i 9 50	+ 2	—	—	—	—
Butte	N.	59·7	53	i 9 53	+ 3	i 17 54	+ 8	i 10 55	pP
Reno		59·8	64	i 9 49	− 1	e 17 51	+ 4	i 10 30	pP
Lick	Z.	60·1	66	i 9 51k	− 2	—	—	i 10 31	pP
New Delhi	N.	60·4	281	i 9 56	+ 1	i 17 53	− 2	i 19 30	SeS
Bozeman		60·7	53	e 9 54	− 3	i 18 1	+ 2	e 10 52	pP
Fresno		61·6	66	i 10 0k	− 3	e 18 13	+ 3	i 10 40	pP
Tinemaha		62·3	65	i 10 7k	0	—	—	i 10 45	pP
Logan		62·9	57	e 10 8	− 3	i 18 23	− 3	i 10 44	pP
Moscow		63·1	326	i 10 11	− 2	i 18 26	− 3	—	—
China Lake	Z.	63·5	65	i 10 14k	− 1	—	—	i 10 54	pP
Helsinki		63·8	335	e 10 17a	0	e 18 38	0	e 11 1	pP
Pasadena		64·3	67	i 10 18k	− 2	i 18 44	0	i 10 58	pP
Overton	Z.	64·9	63	i 10 23	− 1	e 19 29	PS	e 11 9	pP
Riverside		64·9	67	i 10 22k	− 2	—	—	i 11 4	pP
Boulder City		65·1	64	i 10 25	− 1	e 19 2	+ 8	i 11 13	pP
Pierce Ferry		65·5	63	i 10 27	− 1	e 19 0	+ 2	i 11 16	PcP
Palomar		65·6	67	i 10 28k	− 1	i 19 0	0	i 11 8	pP

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ashkabad		65·7	301	10 33	+ 3	19 9?	+ 8	—	—	—
Rapid City	E.	65·9	50	i 10 33	+ 2	i 19 4	+ 1	i 11 25	pP	e 29·4
Upsala		66·1	338	i 10 30	− 2	e 19 0	− 6	i 11 14	pP	—
Batavia		68·1	232	e 10 34	−10	i 19 22	− 8	i 11 16	pP	—
Bandong		68·3	231	10 47	+ 1	e 19 35	+ 3	—	—	—
Bergen		68·3	344	10 45	− 1	19 33	+ 1	12 57	PP	e 33·4
Baku		68·7	308	10 54?	+ 6	e 19 48?	+11	—	—	—
Grozny		68·7	312	10 51	+ 3	i 19 40	+ 3	—	—	—
Apia		69·4	144	10 53	+ 1	—	—	—	—	—
Poona	N.	69·6	275	i 10 56	+ 2	i 19 56	+ 9	i 11 16	pP	29·4
Bombay		70·0	277	i 10 59	+ 3	—	—	—	—	—
Tucson		70·0	64	i 10 56	0	e 19 53	+ 1	i 11 33	pP	e 28·8
Tiflis		70·3	312	i 10 59	+ 1	i 20 0	+ 5	i 11 18	PcP	—
Copenhagen		71·1	338	i 11 2	− 1	i 20 3	− 1	11 45	pP	—
Sotchi		71·4	316	11 9	+ 5	e 20 15	+ 7	—	—	—
Leninakan		71·5	312	11 11	+ 6	—	—	i 11 40	PcP	—
Erevan		71·6	311	11 12	+ 6	i 21 0	PS	—	—	—
Lincoln	E.	71·6	49	—	—	i 20 2	− 8	—	—	e 33·1
Theodosia		72·2	320	i 11 10	+ 1	e 20 20	+ 3	i 11 38	PcP	—
Lwow		72·7	329	e 11 13?	+ 1	e 20 24?	+ 1	—	—	—
Simferopol		72·8	321	11 14?	+ 1	—	—	—	—	—
Yalta		73·2	320	11 15	0	20 27	− 1	—	—	—
Kodaikanal	E.	73·2	268	i 10 5	−70	i 19 21	−67	i 12 45	PP	—
Potsdam		73·9	337	i 11 19a	0	i 20 40	+ 4	i 12 10	pP	—
Colombo	E.	74·0	262	11 38	+18	20 53	+16	—	—	36·4
Raciborzu		74·5	332	i 11 21	− 1	e 20 46	+ 3	i 11 46	PcP	—
Skalnate Pleso		74·6	330	11 23?	0	20 45	+ 1	—	—	—
Collmberg		74·9	336	i 11 24k	− 1	e 20 46	− 1	i 12 13	pP	—
Chicago		75·1	43	—	—	e 20 40	− 9	e 28 43	SSS	e 30·9
Rolphton		75·6	35	e 11 46k	+17	—	—	—	—	—
Jena		75·6	336	e 11 28	− 1	i 20 55	0	e 12 1	pP	—
Prague		75·6	334	i 11 28	− 1	i 20 55	0	i 11 59	pP	e 34·4
Brisbane		75·7	181	i 11 30a	+ 1	—	—	i 12 10	pP	—
De Bilt		76·1	341	i 11 32	0	i 21 4	+ 4	i 12 13	pP	e 38·4
Cheb		76·2	336	i 11 30	− 2	—	—	e 15 7	PP	—
Budapest		76·4	330	11 32	− 1	21 6	+ 2	11 47	PcP	e 30·4
Ogyalla		76·4	331	i 11 38	+ 5	21 13	+ 9	—	—	—
St. Louis		76·4	47	e 11 30	− 3	e 21 2	− 2	i 12 16	pP	—
Bucharest	E.N.	76·5	324	i 11 37	+ 3	i 21 8	+ 3	i 21 34	PS	—
	Z.	76·5	324	i 11 32	− 2	e 21 3	− 2	—	—	—
Ottawa	Z.	77·0	34	i 11 35k	− 2	21 7	− 3	14 29	PP	—
Shawinigan Falls	N.	77·0	31	e 11 38	+ 1	e 21 11	+ 1	—	—	—
Rathfarnham Castle		77·0	348	i 11 40	+ 3	—	—	e 14 34	PP	—
Seven Falls	E.	77·2	29	e 11 40	+ 2	i 21 15	+ 3	i 22 17	PS	26·4
Kalossa		77·3	330	11 40	+ 2	e 21 16	+ 3	11 53	PcP	e 40·9
Kew		77·8	344	e 11 44	+ 3	e 21 21	+ 2	e 12 19	pP	e 40·4
Cleveland		78·0	40	e 11 39	− 3	i 21 21	0	—	—	—
Istanbul		78·1	321	e 11 39	− 4	e 21 21	− 1	—	—	—
Karlsruhe		78·2	338	i 11 41	− 2	i 21 28	+ 5	—	—	—
Stuttgart		78·2	337	i 11 43a	0	i 21 26	+ 3	e 12 26	pP	e 37·4
Belgrade		78·3	328	e 11 46a	+ 2	i 21 27	+ 3	—	—	—
Strasbourg		78·8	338	i 11 46a	0	i 21 32	+ 3	i 12 24	pP	e 38·4
Sofia		79·1	325	i 11 50	+ 2	i 21 33	+ 1	i 12 30	pP	—
Zürich		79·7	337	i 11 52	+ 1	e 21 38	− 1	e 12 32	pP	—
Basle		79·8	338	e 11 48	− 4	e 21 42	+ 2	e 12 47	pP	—
Paris		79·8	342	i 11 51	− 1	i 21 39	− 1	i 12 38	pP	e 46·4
Triest		79·8	333	i 11 52	0	i 21 38	− 2	i 12 27	pP	—
Chur		79·9	336	i 11 53	+ 1	e 21 42	+ 1	—	—	—
Jersey	E.	80·3	345	e 11 56	+ 2	e 21 51	+ 6	—	—	—
Besançon		80·4	338	i 11 56a	+ 1	—	—	e 12 36	pP	—
Neuchatel		80·4	338	e 11 55	0	—	—	—	—	—
Ksara		80·9	312	i 11 59	+ 1	21 57?	+ 6	—	—	—
Harvard		81·0	32	i 11 58	0	—	—	—	—	—
Weston		81·2	32	i 11 58	− 1	i 21 53	− 1	i 12 43	pP	—
Padova		81·4	333	i 12 1	+ 1	i 21 55	− 1	12 54	pP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bologna		81·5	334	i 12 5	+ 4	e 22 0	+ 3	—	—	—
Pavia		81·5	336	e 12 3	+ 2	i 22 3	+ 6	e 12 35	pP	—
Philadelphia		81·9	36	—	—	e 21 59	− 2	e 23 2	PS	e 36·1
Riverview		82·1	182	i 12 6k	+ 2	i 22 9	+ 6	e 12 44	pP	—
Florence Arc.		82·2	333	12 4	0	i 22 11	+ 7	e 13 5	pP	—
Florence Xim		82·2	333	i 12 5	+ 1	i 22 7	+ 3	—	—	—
Prato		82·2	333	i 12 7	+ 3	i 22 5	+ 1	—	—	—
Clermont-Ferrand		82·5	340	i 12 9	+ 3	i 22 13	+ 6	i 12 47	pP	37·4
Rome		83·5	332	i 12 11a	0	i 22 14	− 3	e 13 12	pP	—
Columbia		84·5	43	—	—	e 22 28	+ 1	e 23 30	PS	—
Messina		85·9	328	e 12 25	+ 2	—	—	—	—	—
Helwan		86·4	313	i 12 22a	− 3	i 22 31	[− 2]	i 12 59	pP	—
Tacubaya		86·5	65	e 12 28a	+ 2	e 22 52	+ 5	—	—	—
Barcelona		86·9	340	e 12 30	+ 2	i 22 53	+ 3	—	—	—
Auckland	N.	87·2	163	—	—	i 22 44	[+ 6]	—	—	—
Tortosa	E.	87·8	340	—	—	23 4	+ 5	23 18	ScS	—
Toledo		89·7	343	i 12 41	0	i 22 59	[+ 5]	13 27	pP	—
Alicante		90·4	340	e 12 46	+ 2	i 23 18	− 5	16 18	PP	e 46·4
Algiers Univ.	Z.	91·0	336	i 12 48	+ 1	—	—	e 13 29	pP	—
Wellington		91·5	164	e 12 10	?	e 22 55	[−10]	i 12 49	P	e 41·4
Granada		92·2	343	i 12 54a	+ 1	23 11	[+ 2]	16 38	PP	49·9
Almeria		92·3	342	12 47	− 6	23 39	0	16 21	PP	49·8
Bermuda		92·5	32	e 17 41	pPP	e 24 51	PS	—	—	e 37·4
Malaga	Z.	92·8	344	i 12 53a	− 2	i 23 15	[+ 3]	15 43	PP	40·8
Christchurch		93·3	167	i 13 40	pP	23 14	[− 1]	i 16 45	PP	e 35·4
Tamanrasset	Z.	103·4	331	i 13 44k	+ 1	e 32 25	SS	i 14 21	pP	e 45·4
San Juan		104·5	39	e 13 58	+ 9	e 25 10	−12	18 30	PP	e 42·6
Galerazamba		106·9	50	—	—	e 25 54	S	e 33 46	SS	—
Fort de France		109·8	35	e 18 5	[− 7]	—	—	—	—	—
Huancayo		125·6	66	e 19 30	[+48]	e 27 49	SKKS	e 30 34	PS	—
Pretoria	Z.	132·0	278	i 18 58	[+ 3]	i 21 8	PKS	e 21 22	PP	—
La Paz		133·4	61	i 19 0k	[+ 3]	i 39 7	SS	i 21 31	PP	63·4
Grahamstown	Z.	138·0	272	e 19 9	[+ 3]	—	—	e 21 55	PP	—

Additional readings :—
Tokyo e =6m.37s.
Osaka e =5m.6s., P_cS =11m.49s., S_cS =15m.46s.
Irkutsk sS =12m.2s.
College eP_cP? =8m.51s., eP_cS? =12m.34s., ePKP,PKP =37m.18s.
Honolulu i =8m.31s., e =15m.46s.
Victoria iZ =9m.33s. and 17m.11s., S_cSZ =18m.32s., SSZ =19m.43s.
Sverdlovsk isS =17m.20s.
Seattle e =9m.54s., 10m.50s., 16m.57s., and 17m.58s.
Arcata ePPZ =11m.34s.
Hungry Horse isP =10m.32s., ePP =11m.50s., esS? =19m.6s., eS_cS? =19m.14s., ePKP, PKP? =39m.8s.
Shasta Dam iP_cP? =10m.13s., esP? =10m.45s., ePP? =11m.42s., eP_cS? =15m.17s., esS? =18m.27s., e =20m.5s., ePKP,PKP =39m.8s.
Mineral iZ =10m.7s., iPPZ =11m.48s.
Saskatoon e =18m.45s., i =19m.18s. and 20m.35s.
Berkeley iZ =11m.46s. and 14m.18s.
Butte esS?N =18m.52s.
New Delhi eN =11m.0s. and 18m.49s., iN =20m.38s., eSSN =21m.42s.
Bozeman isS =19m.6s.
Fresno ePN =10m.3s., eZ =16m.53s.
Tinemaha iZ =10m.37s., iPPZ =13m.19s., ePKP,PKPZ =39m.15s.
Logan e =12m.59s., isS =19m.29s., eSS =22m.38s.
China Lake ePKP,PKPZ =38m.59s.
Helsinki epS =19m.38s., isS =19m.52s.
Pasadena iP_cP =10m.37s., iZ =11m.14s., eZ =11m.36s., iPPZ =12m.38s., iS_cSEN = 19m.49s., isSEN =19m.54s., eSSSN =26m.1s., ePKP,PKPZ =39m.11s.
Overton iP_cP?Z =10m.59s., iPPZ =12m.51s., ipPP?Z =13m.41s.
Riverside iP_cPZ =10m.41s., ePKP,PKPZ =39m.2s.
Boulder City i =10m.35s., iP_cP =10m.55s., i =11m.40s., iPP =12m.56s., epPP? = 13m.42s.
Pierce Ferry iPP =12m.53s., ipPP? =13m.29s., esS? =20m.9s.
Palomar iZ =11m.43s., iN =14m.5s., isSEN =20m.8s., ePKP,PKPZ =39m.10s.
Rapid City esSE =20m.13s.
Upsala iP_cPN =11m.1s., iE =11m.56s., ePPPN =14m.48s., eSE =19m.3s., PS =19m.53s., eE =20m.44s., eN =21m.16s., SSN =23m.15s., eE =24m.2s., eSSSE =26m.23s.?, eN =26m.42s.

Continued on next page.

Bergen eZ =14m.17s., eN =17m.55s., S_cSN =20m.25s.?
Poona esPN =11m.28s., PPN =13m.35s., PPP?N =15m.8s., esSN =20m.32s., iSKSN = 20m.59s., isSKSN =21m.37s.
Tucson iPP =13m.32s., ePKP,PKP =38m.47s.
Tiflis iPP =13m.38s., PPP =15m.18s., ePS =20m.42s., iSKS =20m.46s., eSS =24m.41s.
Copenhagen 16m.2s., i =20m.17s., 20m.50s., 25m.48s., and 28m.23s.
Theodosia PPP =15m.38s.
Potsdam iE =11m.31s., iZ =15m.6s. and 16m.49s.
Raciborzu iPE =11m.24s., eN =18m.34s.
Collmberg iZ =11m.28s. and 11m.32s., iP_cPZ =11m.40s., eN =11m.59s., eZ =12m.6s. and 12m.30s., eE =13m.5s., esPN =13m.42s., eN =14m.7s., eZ =14m.41s., epPP?Z =15m.6s., eZ =16m.41s., eN =20m.49s., esS?N =22m.23s., eSS?E = 26m.29s., eN =31m.23s.
Jena iZ =11m.37s., ePP?N =14m.34s., eN =15m.40s., iSN =20m.58s., eE =22m.3s.
Prague iP_cP =11m.42s., isP? =12m.26s., e =13m.27s., ePP =14m.31s., iPP =14m.56s., ePPP =15m.37s., iS_cS =21m.23s., ePS? =21m.45s., eSS =25m.23s., e =30m.23s.
De Bilt iPP =14m.23s., ipPP =15m.1s., isS =22m.10s., eSS =27m.1s.,
Budapest P_cPN =11m.50s., eN =15m.3s., SKSN =21m.32s., SKSE =21m.35s., PPSEN =21m.57s., eSSE =25m.53s., SSN =26m.2s., eSSSN =27m.53s.
St. Louis eP_cP =11m.44s., i =13m.4s., ePP =14m.30s., esS =22m.10s., eSS =26m.12s., eSSS =29m.20s.
Bucharest iSSE =25m.19s., iSSN =25m.27s.
Ottawa iZ =11m.44s., SSZ =26m.5s.
Kalossa eE =14m.35s., eSN =21m.25s.
Kew esPE =12m.43s., ePPEZ =14m.36s., ePPP =17m.23s., ePSEN =22m.24s., eSSEN =26m.22s., eEN =33m.54s.
Cleveland eP =11m.42s., iE =11m.51s., 12m.39s., 12m.46s., 21m.35s., and 21m.43s.
Stuttgart iZ =11m.49s., eZ =11m.55s., eP_cP?Z =12m.5s., eZ =12m.47s. and 13m.31s., e =13m.46s., ePP =14m.38s., epPP =15m.26s., epPPP =18m.0s., ePS =22m.48s., eSS =25m.58s., esSS =27m.33s., esSSS? =31m.11s.
Belgrade e =12m.52s., 18m.19s., and 24m.22s.
Strasbourg i =12m.5s., isP =12m.40s., e =13m.31s., i =13m.59s. and 14m.37s., iPP = 14m.45s. and 14m.48s., e =15m.13s., ipPP =15m.28s., iPPP =16m.37s., e =18m.7s., iSP =22m.7s., iPS =22m.23s., iSS? =27m.41s., i =31m.6s. and 31m.13s.
Sofia i =12m.41s.
Paris i =12m.26s. and 12m.50s., ePP =14m.56s., ipPP =15m.35s., iPS =22m.47s.
Triest ePP =14m.59s., ePPP =17m.4s., isS =22m.25s., iPS =22m.49s., eSS =27m.25s.
Besançon e =12m.13s., 13m.4s., 13m.43s., and 14m.36s.
Weston iSP =23m.3s., eSS =27m.21s.
Bologna eE =13m.30s.
Riverview iSN =22m.12s., iS_cSN =22m.28s., isSE =23m.18s., iPSN =23m.28s.
Clermont-Ferrand i =12m.25s., isP =13m.2s., ePP =15m.17s., epPP =16m.3s., i = 23m.1s., iPS =23m.25s., Q =33m.23s.
Rome e =33m.41s. and 34m.23s.?
Messina e =13m.27s.
Helwan PPZ =15m.46s., eZ =16m.22s., 17m.3s., 18m.19s.,and 19m.8s., iPSEN =23m.43s.
Tacubaya e =12m.45s.
Tortosa PS?E =24m.9s.
Toledo sP =13m.49s., ePPNZ =16m.18s., pPP =16m.58s., iE =23m.24s., iN =24m.12s. and 25m.50s.
Alicante PPP =18m.30s., PS =25m.3s., SS =29m.14s.
Algiers Univ. ePPZ =16m.26s., epPPZ =17m.6s.
Wellington eZ =13m.29s., isS =23m.32s.
Granada pPP =17m.25s., PS =25m.23s., iSS =29m.17s., SSS =37m.20s.
Almeria PPP =18m.19s., iSKS =23m.11s., PS =24m.51s., SS =29m.41s., SSS =33m.15s.
Bermuda i =26m.3s.
Malaga PPPZ =17m.53s.
Christchurch eN =22m.45s.
Tamanrasset eZ =13m.48s. and 17m.2s., ePPZ =18m.1s., epPPZ =18m.38s., iZ = 19m.39s., eZ =26m.13s.
San Juan eS =26m.30s., eSS =32m.39s.
Huancayo e =33m.55s., eSS =37m.5s.
Pretoria eZ =18m.42s.
La Paz iZ =22m.7s. and 22m.27s., iN =23m.19s., iEN =40m.11s., iSSS =44m.11s.
Grahamstown eZ =18m.57s.

Nov. 3d. Readings also at 0h. (Brisbane, Riverview, Christchurch, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, College, Collmberg, and Tamanrasset), 1h. (Boulder City, Overton, Pierce Ferry, Mineral, and near Mizusawa), 2h. (Ksara), 3h. (near Ashkabad), 5h. (College and near Copiapo), 7h. (Shasta Dam), 8h. (Murgab, Samarkand, near Garm, Obi-garm, and Stalinabad), 10h. (Tacubaya), 11h. (Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, and College), 12h. (La Paz and near Tchimkent), 13h. (near Messina), 15h. (Obi-garm, near Andijan and Murgab), 16h. (Pierce Ferry), 17h. (Bombay, Calcutta, Stuttgart, Ottawa, and Rolphton), 19h. (Almata, Andijan, Garm, Murgab, Obi-garm, Samarkand, Stalinabad, Tchimkent, Sverdlovsk, Bombay, Shasta Dam, Hungry Horse, and College), 22h. (Andijan, Garm, Obi-garm, Samarkand, Stalinabad, Tashkent, Tchimkent, near Almata, Frunse, and Murgab), 23h. (Ottawa, and near Balboa Heights).

Nov. 4d. 0h. 3m. 30s. Epicentre 50°·3N. 7°·3E.

Felt around Coblenz. Epicentre given by Strasbourg.

Seismischer Bericht des Wurttembergischen Erdbebendienstes, Stuttgart 4, Vierteljahr, 1949, p. 41.

$A = +·6361$, $B = +·0815$, $C = +·7672$; $\delta = -14$; $h = -6$;
$D = +·127$, $E = -·992$; $G = +·761$, $H = +·097$, $K = -·641$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Strasbourg		1·7	170	i 0 28	− 3	i 0 49	− 5	—	—	—
Stuttgart		2·0	141	e 0 30	− 5	e 0 54	− 8	e 1 4	S_g	—
Basle		2·8	176	—	—	e 1 25	+ 3	—	—	—
Jena		2·8	77	e 0 44	− 3	e 1 25	+ 3	e 0 55	P_g	—
Zürich		3·1	164	—	—	e 1 29	0	—	—	—
Besançon		3·2	196	—	—	i 1 41	S*	—	—	e 1·9
Neuchatel		3·3	184	—	—	e 1 31	− 4	e 1 37	S	—
Paris		3·5	246	e 1 2	+ 5	e 1 41	+ 1	—	—	—
Collmberg	z.	3·7	73	i 1 1	+ 1	e 1 49	+ 4	i 1 7	P*	—
Prague		4·6	90	—	—	e 2 16	+ 9	—	—	—
Clermont-Ferrand		5·3	213	—	—	e 2 42	S*	—	—	—

Additional readings :—
Strasbourg $iS_g = 52s.$, $i = 58s.$
Jena $eN = 1m.17s.$
Collmberg $eZ = 1m.52s.$, $eS_gZ = 1m.55s.$

Nov. 4d. 12h. Undetermined shock off coast of South America.

Santa Lucia $eN = 5m.23s.$, $eL?N = 8m.27s.$
Copiapo $eN = 5m.40s.$, $N = 6m.16s.$
La Plata $N = 5m.42s.$, $EN = 5m.54s.$, $N = 6m.50s.$, and $7m.32s.$, $LE = 12m.18s.$
La Paz $iP = 8m.18s.$, $S = 13m.8s.$, $SS = 14m.26s.$, $L = 16m.36s.$
Tucson $e = 14m.9s.$ and $15m.34s.$, $ePP? = 17m.14s.$
Palomar $iPZ = 14m.28s.$, $iZ = 14m.38s.$
Pasadena $ePZ = 14m.30s.$, $iZ = 14m.43s.$
Riverside $ePZ = 14m.32s.$
Pierce Ferry $eP = 14m.34s.$, $i = 14m.47s.$, $e = 15m.26s.$ and $17m.56s.$
Boulder City $eP = 14m.35s.$
Overton $iPZ = 14m.37s.$, $iZ = 14m.50s.$ and $15m.7s.$
China Lake $ePZ = 14m.39s.$
Tinemaha $ePZ = 14m.46s.$
Fresno $iPZ = 14m.46s.$, $iZ = 15m.31s.$, $eZ = 21m.0s.$
Logan $eP = 14m.54s.$
Lick $ePZ = 14m.54s.$, $iZ = 15m.0s.$
Berkeley $ePZ = 14m.57s.$
Reno $iPZ = 15m.2s.k$
Mineral $ePZ = 15m.6s.k$, $iZ = 15m.18s.$
Shasta Dam $eP? = 15m.8s.$
Hungry Horse $eP? = 15m.26s.$
Ksara $e = 19m.2s.?$
Christchurch $eNZ = 19m.10s.$, $eEN = 23m.15s.$, $eE = 27m.20s.$, $eQEN = 31m.46s.$, $eR = 34m.45s.$
College $e = 20m.55s.$
Stuttgart $eZ = 21m.8s.?$
Long waves were also recorded at Wellington.

Nov. 4d. 12h. 35m. 55s. Epicentre 35°·7N. 0°·7W.

Felt along the Oranian coast. Intensity V at La Senia ; IV-V at Oran, Misserghin, and Bou Tlélis ; IV at El Ancor, Bou Sfer, St. Denis du Sig ; III at Mostaganem. Epicentre as adopted.

A. Grandjean.
Séismes de'Algérie de 1940-1950 inclus. Annales de l'Institut de Physique du Globe de Strasbourg, 3e partie, Geophysique, Nouvelle Série T. VII, Le Puy, 1954, p. 54, also 81-82, with macroseismic chart.

$A = +·8139$, $B = -·0099$, $C = +·5810$; $\delta = +9$; $h = 0$;
$D = -·012$, $E = -1·000$; $G = +·581$, $H = -·007$, $K = -·814$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Almeria		1·8	309	e 0 28	− 4	0 57	+ 1	0 34	P_g	—
Alicante		2·6	4	0 46	+ 2	1 7	−10	i 1 15	S	—
Granada		2·8	302	e 0 49	+ 2	i 1 22	0	0 58	P_g	—
Algiers Univ.	z.	3·2	71	e 0 53	+ 1	e 1 35	+ 3	i 1 10	P_g	—
Malaga	z.	3·2	289	e 0 55	+ 3	1 22	−10	—	—	—
Toledo		4·9	328	e 1 12	− 5	i 2 17	+ 2	—	—	—
Tortosa		5·2	10	1 21	0	2 24	+ 2	1 42	P_g	—
Tamanrasset	z.	14·0	156	i 3 14k	− 8	e 6 3	+ 4	i 3 33	PP	e 7·7
Overton		85·4	312	e 12 36	− 4	—	—	—	—	—
Pierce Ferry		85·4	311	e 12 38	− 2	—	—	—	—	—

Additional readings :—
Almeria P_g = 40s. and 47s., P_gS_g = 53s., S_g = 1m.2s., 1m.8s., 1m.26s., and 1m.33s.
Granada S = 1m.30s. and 1m.58s.
Algiers Univ. iPZ = 58s., iZ = 1m.19s., eZ = 1m.40s., iSZ = 1m.44s.
Malaga SPPEN = 1m.0s., SSEN = 1m.28s.
Toledo eZ = 1m.54s.
Tortosa P = 1m.52s., PS = 2m.9s., 2m.16s., 2m.33s., S_gN = 2m.57s., S_gE = 3m.3s., S_g?N = 3m.14s.
Tamanrasset iZ = 3m.26s., eZ = 5m.30s.

Nov. 4d. 20h. 42m. 37s. Epicentre 32°·2N. 116°·6W.

Intensity VI at Alpine, Balboa Park, Coronado, National City, San Diego, Spring Valley; V at Brawley, Jamul, Ocean Beach ; IV at El Centro and Huntington Beach. Macroseismic area 9000 sq. miles. Epicentre as given by Pasadena.

L. M. Murphy and F. P. Ulrich.
United States Earthquakes, 1949, Serial 748, Washington, 1951, p.p. 17, 18. Macroseismic chart, p. 14.

$A = -·3796$, $B = -·7581$, $C = +·5303$; $\delta = +3$; $h = +1$;
$D = -·894$, $E = +·448$; $G = -·237$, $H = -·474$, $K = -·848$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Diego		0·8	313	i 0 15	− 3	—	—	—	—	—
La Jolla		0·9	321	i 0 18k	− 2	—	—	—	—	—
Palomar		1·2	349	i 0 23k	− 1	—	—	—	—	—
Riverside		1·9	340	i 0 34k	0	i 0 58	− 1	—	—	—
Pasadena		2·4	326	i 0 40k	− 1	i 1 8	− 4	i 0 45	P*	—
China Lake	z.	3·7	348	i 1 0k	0	—	—	—	—	—
Boulder City		4·0	21	e 1 7	+ 3	—	—	i 1 20	P_g	—
Pierce Ferry		4·4	28	e 1 12	+ 2	—	—	—	—	—
Overton	z.	4·7	22	i 1 15	+ 1	—	—	—	—	—
Tucson		4·9	88	i 1 15	− 2	e 1 53	−22	i 1 40	P_g	e 2·5
Tinemaha		5·0	345	i 1 20k	+ 2	i 2 44	S_g	—	—	—
Fresno		5·2	331	i 1 22k	+ 1	i 2 45	S_g	i 1 36	P*	—
Lick		6·6	323	i 1 40k	− 1	i 2 54	− 4	—	—	e 4·5
Santa Clara	E.	6·8	321	e 2 17	P_g	e 3 26	S*	—	—	—
Branner		6·9	320	i 1 43a	− 2	i 3 7	+ 2	i 3 56	S_g	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Berkeley		7·3	321	i 1 50	0	—	—	e 2 5	P*	—
San Francisco		7·3	321	e 1 50	0	i 3 13	− 2	e 4 0	S_g	—
Reno		7·8	342	i 2 1k	+ 3	i 3 30	+ 2	i 2 32	P_g	—
Ukiah		8·8	324	e 2 35	P*	—	—	—	—	e 4·2
Mineral		9·1	335	e 2 7	− 7	e 4 1	+ 1	i 4 23	S*	—
Salt Lake City		9·4	23	i 2 14	− 4	e 4 17	+10	i 2 45	P*	e 5·0
Shasta Dam		9·7	333	i 2 28	+ 6	—	—	—	—	i 4·6
Logan		10·3	20	i 2 33	+ 1	i 4 42	+12	—	—	i 5·3
Bozeman		14·1	16	i 3 29	+ 6	e 6 27	+25	—	—	e 7·4
Butte	N.	14·1	12	i 3 29	+ 6	e 6 33	+31	—	—	e 7·7
Seattle		16·0	346	e 3 56	+ 8	e 7 8	+22	e 4 18	PPP	e 8·7
Hungry Horse		16·2	6	i 3 54	+ 4	—	—	—	—	e 8·6
Victoria		17·1	344	4 10	+ 8	8 22	Q	—	—	9·3
Lincoln	E.	18·2	56	i 4 21	+ 5	e 7 53	+16	—	—	e 8·6
Tacubaya		20·2	126	i 4 47	+ 8	8 42	+21	—	—	—
Saskatoon		21·2	17	5 2	+13	9 2	+21	5 30	PP	11·8
St. Louis		22·4	66	i 5 7	+ 5	e 9 16	+12	i 5 32	PP	—
Chicago		25·0	58	e 5 30	+ 3	e 9 47	− 2	—	—	e 12·5
Cincinnati		26·9	66	e 6 1	+16	e 10 53	+33	—	—	—
Cleveland	N.	29·4	62	—	—	e 11 46	+45	—	—	e 14·7
Ottawa		34·1	55	6 48	0	12 23	+ 9	8 7	PP	14·8
Philadelphia		34·2	65	—	—	e 12 18	+ 2	—	—	e 13·7
Seven Falls	E.	37·7	53	e 8 20	+61	—	—	—	—	20·4
Galerazamba		43·6	109	e 7 15	−53	e 13 22	−76	—	—	19·4
Bogota		48·3	115	e 8 47	+ 2	e 15 50	+ 5	e 19 23	SS	e 23·4
La Paz		67·1	128	11 3	+ 6	19 49	− 2	—	—	33·4
Paris		82·8	36	i 12 23	− 4	—	—	e 12 35?	pP	—
Collmberg	Z.	85·8	29	e 12 43	+ 1	—	—	—	—	—
Stuttgart	Z.	86·0	32	e 12 44	+ 1	—	—	—	—	—
Alicante		88·0	45	16 14	PP	23 20	[− 1]	—	—	e 42·7
Ksara		109·4	25	e 18 34	[+ 2]	—	—	—	—	—
Pretoria	Z.	148·6	87	i 19 51	[+ 6]	—	—	—	—	—
Grahamstown	Z.	149·1	102	i 19 52	[+ 6]	—	—	—	—	—

Additional readings :—
Lick iEZ = 2m.35s.
Branner ePEN = 1m.46s., iN = 3m.59s.
Berkeley eN = 2m.42s.
San Francisco eE = 4m.3s.
Reno iNZ = 2m.5s., iE = 2m.21s. and 4m.3s., iN = 4m.9s.
Mineral iZ = 2m.23s., 2m.41s., and 3m.2s., eN = 4m.8s., iNZ = 4m.47s.
Logan i = 2m.51s.
Shasta Dam i = 2m.53s. and 3m.13s.
Seattle e = 4m.44s. and 5m.5s.
Saskatoon PPP = 5m.52s., e = 11m.26s.
St. Louis eSS = 9m.51s.
Ottawa P_cP = 9m.25s., SS = 14m.38s.
Long waves were also recorded at Vera Cruz, Bermuda, Scoresby Sund, De Bilt, Malaga, Granada, Kew, and many other North American stations.

Nov. 4d. Readings also at 0h. (Pierce Ferry, Shasta Dam, Mineral, Hungry Horse, College, Collmberg, and near Stuttgart (2)), 3h. (Copiapo and Messina), 4h. (Overton, Pierce Ferry, Tucson, and Seattle), 5h. (Pierce Ferry, Copiapo, Grozny, Leninakan, and near Tiflis), 6h. (Shasta Dam, Hungry Horse, College, Collmberg, Stuttgart, Samarkand, near Garm, and Obi-garm), 7h. (College, Tacubaya, and Copenhagen), 8h. (Boulder City, Frunse, Obi-garm, Garm, Samarkand, Stalinabad, Tashkent, near Andijan, and Murgab), 9h. (near Berkeley, Branner, and Lick), 10h. (Alicante), 11h. (Bombay), 12h. (Samarkand, Tchimkent, near Andijan, Garm (2), Murgab, Obi-garm, and near Almeria), 13h. (near Mizusawa and near Ashkabad), 14h. (Lick, Shasta Dam, Hungry Horse, and near La Paz), 16h. and 17h. (Tacubaya), 19h. (near Garm), 20h. (Tucson and near Obi-garm), 22h. (Boulder City, Overton (2), and Pierce Ferry (3)).

Nov. 5d. 4h. 35m. 24s. Epicentre 32°·2N. 116°·6W. (as on 4d.).

Intensity VI at Campo, La Jolla, National City, and San Diego; V at Jamul, Mount Laguna, Wildomar, etc.
Epicentre as adopted.

L. M. Murphy and F. P. Ulrich.
United States Earthquakes, 1949, serial No. 748, Washington, 1951, p. 18. Macroseismic chart p. 14.

$A = -\cdot3796$, $B = -\cdot7581$, $C = +\cdot5303$; $\delta = +3$; $h = +1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Jolla		0·9	321	i 0 17k	P_g	i 0 25	S_g	—	—	—
Palomar		1·2	349	i 0 24k	0	—	—	—	—	—
Riverside		1·9	340	i 0 34k	0	i 0 59	0	i 0 37	P_g	—
Pasadena		2·4	326	i 0 39	− 2	i 1 6	− 6	i 0 44	P*	—
China Lake	z.	3·7	348	i 0 59	− 1	—	—	—	—	—
Boulder City		4·0	21	i 1 6	+ 2	i 2 15	S_g	i 1 20	P_g	e 4·6
Pierce Ferry		4·4	28	i 1 11	+ 1	i 2 8	+ 6	—	—	—
Overton	z.	4·7	22	i 1 14	0	—	—	—	—	e 2·5
Tucson		4·9	88	i 1 14	− 3	i 2 28	S*	i 1 26	P*	i 3·1
Tinemaha		5·0	345	i 1 19	+ 1	i 2 41	S_g	—	—	—
Fresno		5·2	331	i 1 21	0	i 2 19	− 3	i 1 45	P_g	—
Lick	z.	6·6	323	i 1 38k	− 3	i 3 10	+12	i 1 49	P*	—
Santa Clara	E.	6·8	321	e 3 4	S	(e 3 4)	+ 1	i 4 7	L	(i 4·1)
Branner		6·9	320	i 1 38k	− 7	i 3 7	+ 2	e 3 46	S_g	i 4·3
Berkeley		7·3	321	—	—	e 4 6	S_g	—	—	e 6·1
Reno		7·8	342	e 2 0	+ 2	i 3 27	− 1	e 2 38	P_g	—
Mineral		9·1	335	e 2 14	0	i 4 9	+ 9	e 4 36	S*	—
Salt Lake City		9·4	23	e 2 27	+ 9	e 4 27	+20	—	—	e 5·0
Shasta Dam		9·7	333	e 2 33	+11	—	—	—	—	e 5·0
Logan		10·3	20	e 2 32	0	e 5 10	SS	e 2 54	PPP	e 5·5
Hungry Horse		16·2	6	e 3 51	+ 1	—	—	—	—	e 8·0
Victoria		17·1	344	e 3 57	− 5	—	—	—	—	—
St. Louis		22·4	66	e 5 6	+ 4	e 9 18	+14	—	—	e 12·0

Additional readings :—
Boulder City i = 1m.37s.
Tucson i = 1m.44s., iS? = 2m.0s., i = 2m.48s.
Fresno iZ = 2m.0s., iE = 2m.6s. and 2m.43s.
Lick eEN = 1m.43s., iZ = 2m.26s., eN = 3m.14s.
Branner eE = 3m.10s., eE = 3m.55s.
Reno ePZ = 2m.3s., iE = 3m.58s., iN = 4m.7s.
Mineral eN = 2m.26s., eZ = 3m.6s., iZ = 3m.36s., iNZ = 4m.44s.
Shasta Dam e = 3m.22s. and 3m.43s.
Long waves were also recorded at Ukiah, Butte, Bozeman, Chicago, and Philadelphia.

Nov. 5d. 13h. Undetermined shock.

Bandong eP = 5m.8s., eSEN = 8m.13s.
Batavia ePEN = 5m.12s.a, iSEN = 8m.21s.
Brisbane iPZ = 8m.33s.
College eP = 13m.46s.
Collmberg eZ = 18m.48s., 19m.5s., and 19m.8s.
Shasta Dam e = 18m.58s.
Stuttgart eZ = 19m.15s.
Hungry Horse iP = 19m.25s.
Overton eZ = 19m.35s., 19m.50s., and 21m.0s.
Pierce Ferry e = 19m.36s.
Tucson eP = 19m.44s., e = 21m.1s, and 21m.15s.
La Paz P = 21m.6s.

Nov. 5d. 15h. 5m. 40s. Epicentre 37°·5N. 55°·0E. (as on 1940, May 4d.).

A = +·4562, B = +·6515, C = +·6062; δ = +5; h = −1;
D = +·819, E = −·573; G = +·348, H = +·497, K = −·795.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ashkabad		2·7	80	i 0 45	0	1 20?	+ 1	—	—	—
Baku		4·9	307	2 29?	+72	e 4 26?	?	—	—	—
Tiflis		8·9	301	i 2 14?	+ 2	e 3 57?	+ 2	—	—	—
Grozny		9·1	312	e 2 25	+11	4 8	+ 8	—	—	—
Leninakan		9·3	294	2 38	+21	4 22	+17	—	—	—
Samarkand		9·6	74	e 2 57	+36	—	—	—	—	—
Stalinabad		10·9	80	e 2 43	+ 3	—	—	—	—	—
Piatigorsk		11·1	309	—	—	4 46	− 3	—	—	—
Obi-garm		11·6	80	e 2 53	+ 3	—	—	—	—	—
Tashkent		11·7	67	e 2 45?	− 6	e 4 53?	−11	—	—	—
Garm		12·1	78	e 2 52	− 5	—	—	—	—	—
Murgab		15·0	81	e 3 31	− 4	—	—	—	—	—
Ksara		15·9	264	i 3 49	+ 2	i 7 0	+16	—	—	—
Simferopol		17·3	302	e 3 10	−54	—	—	—	—	—
Sverdlovsk		19·8	10	i 4 33?	− 2	8 20?	+ 7	—	—	—
New Delhi	N.	20·6	109	—	—	e 8 23	− 6	e 12 14	P_eS	—
Helwan		21·1	256	4 44	− 4	e 8 50	+11	e 12 8	P_eS	e 11·7
Moscow		21·7	333	e 4 59	+ 4	—	—	—	—	—
Bombay		24·2	135	e 5 21	+ 2	e 9 38	+ 3	—	—	—
Poona	E.	25·1	134	i 5 37	+ 9	e 9 40	−11	—	—	—
Calcutta	E.	32·3	108	—	—	e 12 51	P_eS	—	—	e 16·4
Pretoria	Z.	67·8	206	i 10 55	− 7	—	—	—	—	—
Grahamstown	Z.	75·3	204	e 11 20	−27	—	—	—	—	—
College		76·4	10	e 11 53	0	—	—	—	—	—
Hungry Horse		94·0	353	i 13 21	0	—	—	—	—	—

Nov. 5d. Readings also at 0h. (near Murgab), 1h. (Hungry Horse), 2h. (Mount Wilson, Palomar, China Lake, Tinemaha, Shasta Dam, Boulder City (2), Overton (2), Pierce Ferry (2), and Tucson), 4h. (La Paz and near Andijan), 5h. (Samarkand, near Garm, and Obi-garm), 6h. (Boulder City, Overton, Pierce Ferry, Murgab, Samarkand, near Garm, Obi-garm, Andijan, Tchimkent, and near La Paz), 7h. (Pretoria, near Alicante, near Garm (2), and near Ashkabad), 9h. (Reykjavik and near Tchimkent), 10h. (La Plata, Obi-garm, Frunse, near Garm, Andijan, Stalinabad, Murgab, Tashkent, Samarkand, and Tchimkent), 11h. (Almata, near Garm (2), Obi-garm, Stalinabad, Andijan, Samarkand, Murgab, and Tchimkent), 12h. (College and near Obi-garm), 13h. (Mount Wilson, Palomar, China Lake, Tinemaha, Overton, Pierce Ferry, and Tucson), 15h. (near Mizusawa), 17h. (Shasta Dam, Pierce Ferry, near Lick, Branner, Berkeley, Fresno, near Alicante, and near Garm), 19h. (Collmberg, Tinemaha, Boulder City, Overton, and near Pierce Ferry), 20h. (Nanking, Shasta Dam, Hungry Horse, Boulder City, Overtou, and Pierce Ferry (2)), 22h. (Pierce Ferry and near Logan), 23h. (Ksara and near Helwan).

Nov. 6d. 7h. 49m. 28s. (I)
13h. 46m. 54s. (II)
Epicentre 48°·2N. 9°·0E.
(as on 1949, September 15d.).

7h. shock intensity V-VI between Ebingen and Onstmettingen. Macroseismic radius 85km.
Seismischer Bericht des Wurttembergischen Erdbebendienstes, Stuttgart 4, Vierteljahr, 1949, p. 41.

A = +·6609, B = +·1046, C = +·7432; δ = +8; h = −5;
D = +·156, E = −·988; G = +·734, H = +·116, K = −·670.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
I	Ebingen	0·0	—	i 0 6a	− 1	i 0 7	− 4	—	—
II		0·0	—	e 0 6	− 1	i 0 8	− 3	—	—
I	Ravensburg	0·6	135	e 0 16	+ 1	e 0 24	− 2	—	—
I	Stuttgart	0·6	13	e 0 13	− 2	i 0 19	− 7	e 0 14	P_g
II		0·6	13	0 13	− 2	i 0 20	− 6	e 0 14	P_g
I	Strasbourg	0·9	295	i 0 22	+ 2	i 0 33	− 1	i 0 26	P_g
II		0·9	295	—	—	i 0 29	− 5	i 0 34	S_g
I	Karlsruhe	0·9	335	i 0 19	− 1	—	—	—	—
I	Basle	1·2	235	e 0 27	+ 3	e 0 43	+ 2	—	—
II		1·2	235	e 0 27	+ 3	e 0 43	+ 2	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
I Chur		1·4	165	e 0 30	+ 3	e 0 51	+ 5	i 0 31	P_g
I Neuchatel		1·8	229	e 0 39	P_g	e 1 3	S_g	—	—
I Jena		3·2	32	e 1 1	P_g	i 1 40	+ 8	i 1 43	P_g
I Collmberg	z.	4·0	38	1 8	+ 4	e 2 13	S_g	e 1 18	P_g
II	z.	4·0	38	—	—	e 2 11	S_g	—	—
I Paris		4·4	278	—	—	e 2 9	+ 7	—	—
I Clermont-Ferrand		4·7	236	—	—	e 2 42	S_g	—	—

Additional readings :—
Ravensburg I e = 27s.
Stuttgart I i = 18s., 32s., 38s., 48s., and 55s.
Strasbourg II e = 43s. and 50s.
Jena I eEN = 1m.6s.
Collmberg I eZ = 1m.21s. and 2m.9s., II eZ = 2m.14s.

Nov. 6d. Readings also at 0h. (Tamanrasset), 1h. (Sverdlovsk, Bogota, Puebla, Tacubaya, Vera Cruz, Harvard, Weston, Ottawa, Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, and College), 2h. (College, Shasta Dam, Tucson, Irkutsk, Sverdlovsk, Tiflis, and Ksara), 3h. (Collmberg, Stuttgart, and near Raciborzu), 4h. (Hungry Horse), 5h. (near Tortosa), 7h. (Stalinabad, near Garm, Murgab, and Obi-garm), 8h. (near Berkeley (2), Branner (2), and Lick (2)), 9h. (La Paz, Tucson, Shasta Dam, near Berkeley, Branner, and Lick), 11h. (Alicante), 12h. (Tacubaya, Vera Cruz, Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, and College), 14h. (near Alicante), 15h. (La Paz and near Garm), 16h. (Murgab, near Garm, and Obi-garm), 18h. (Ksara), 19h. (Pierce Ferry), 20h. (Tucson, near Andijan, Garm, Murgab, Obi-garm, Stalinabad, and Tchimkent), 21h. (College), 22h. (Merida, Tacubaya, Ottawa, Palomar, Pasadena, Riverside, China Lake, Tucson, Boulder City, and Pierce Ferry), 23h. (Boulder City, Overton, Pierce Ferry, and Tucson).

Nov. 7d. 4h. Mexico.

Vera Cruz iP_g = 31m.35s., iS_g = 31m.56s.
Oaxaca P = 31m.50s., P_g = 31m.59s., S_g = 32m.29s.
Puebla P = 32m.5s., P_g = 32m.13s., S = 32m.43s.
Tacubaya P = 32m.16s., P* = 32m.27s., iP_g = 32m.38s., S = 33m.11s.
Merida P = 32m.21s. and 32m.30s., S = 33m.21s.
Tucson iP = 35m.46s., e = 36m.37s., eS? = 39m.37s., eL = 42m.0s.
Palomar iP = 36m.36s.
Boulder City eP = 36m.38s., ePP = 37m.12s.
Overton iPZ = 36m.40s.
Riverside iPZ = 36m.42s.
Pasadena iPZ = 36m.48s.
Pierce Ferry iP = 36m.49s., i = 36m.55s. and 37m.4s., e = 37m.50s.
China Lake ePZ = 36m.53s.
Tinemaha iPZ = 37m.4s.
Fresno ePZ = 37m.10s.k
Branner iPZ = 37m.29s.a
Mineral ePZ = 37m.39s.k
Hungry Horse eP? = 37m.45s., i = 37m.57s.
College eP? = 41m.10s.

Nov. 7d. 5h. 59m. 49s. Epicentre 14°·0S. 167°·0E. Depth of focus 0·010.
(as on 1948, March 15d.).
Not intended as an approximate determination.

A = −·9458, B = +·2184, C = −·2404 ; δ = +3 ; h = +6 ;
D = +·229, E = +·974 ; G = +·234, H = −·054, K = −·971.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		18·7	222	i 4 8	− 5	i 7 35	0	i 8 0	SS	e 9·3
Apia		20·6	92	4 33	0	e 8 41	sS	—	—	e 10·2
Auckland	N.	23·8	166	i 5 11?	+ 6	i 9 26	+16	i 5 29	pP	—
Riverview		24·4	214	i 5 7a	− 3	i 9 24	+ 4	i 5 30	pP	10·5
New Plymouth	E.	25·7	168	e 5 26	+ 3	—	—	—	—	—
Tuai	N.	26·3	164	e 5 22	− 6	e 9 56	+ 4	—	—	—
Cobb River	E.	27·4	172	e 5 35	− 3	—	—	—	—	—
Wellington		28·0	168	i 5 38	− 6	i 10 26	+ 7	i 6 27	PP	—
Kaimata	N.E.	28·7	174	e 5 47	− 3	—	—	—	—	—
Christchurch		29·8	171	i 6 1	+ 1	i 10 53	+ 5	6 55	PP	14·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Melbourne		30·8	216	i 5 7	−62	i 10 6	−58	—	—	—
Honolulu		49·2	45	e 8 54	+14	e 15 51	+15	i 9 8	pP	e 20·3
Perth		49·9	240	e 9 3	pP	16 21	sS	19 39	SS	23·9
Tokyo		55·7	333	e 9 36	+ 7	17 16	+10	10 38	P_cP	22·3
Kameyama		56·6	331	9 36	+ 1	17 30	+12	—	—	—
Nagoya		56·6	332	e 9 36	+ 1	e 17 26	+ 8	(e 21 14)	SS	e 21·2
Osaka		56·9	330	e 9 38	+ 1	e 14 29	?	(17 42)	sS	17·7
Mizusawa		57·0	324	e 9 38	0	17 15	− 8	—	—	—
Kôti		57·1	327	9 38	− 1	17 41	+17	—	—	—
Sendai	z.	57·5	337	e 9 41	0	—	—	—	—	—
Mizusawa	E.	58·1	337	e 9 48	+ 2	17 39	+ 2	—	—	24·4
Bandong		58·7	271	e 9 48	− 2	i 17 51	+ 6	—	—	—
Hukuoka		58·8	325	e 9 50	0	e 18 3	+17	—	—	24·7
Batavia		59·6	271	i 9 54a	− 2	e 18 3	+ 6	—	—	—
Sapporo		61·5	340	e 10 28	pP	20 22	S_cS	e 11 13	P_cP	e 30·7
Ukiah		83·7	47	e 12 14	− 5	e 22 42	+10	e 23 52	SPP	e 34·6
Branner	z.	83·8	49	i 12 22k	+ 2	e 23 48	PS	—	—	—
Berkeley		83·9	49	e 12 23	+ 3	e 22 38	+ 4	e 15 51	PP	e 39·8
Santa Clara	E.	83·9	49	—	—	e 23 46	PS	—	—	e 38·4
Lick		84·1	49	i 12 24k	+ 3	—	—	i 12 29	pP	e 39·6
Shasta Dam		84·9	46	e 12 24	− 1	e 22 49	+ 5	e 15 55	PP	e 40·0
Irkutsk		85·2	327	i 12 27	0	23 4	+17	—	—	—
Fresno		85·3	50	e 12 26a	− 1	e 24 23	PPS	e 12 31	P_cP	e 39·7
Mineral	z.	85·3	47	i 12 24k	− 3	—	—	i 12 27	P_cP	e 40·6
Sitka		85·3	27	e 12 28	+ 1	e 22 42	[+ 2]	e 28 37	SS	e 35·1
Pasadena		85·6	53	i 12 31	+ 2	e 22 47	[+ 5]	i 12 44	pP	e 35·0
College		85·7	18	i 12 26	− 3	e 22 49	− 3	e 15 52	PP	e 35·5
Riverside		86·2	54	i 12 32	0	—	—	i 12 47	pP	—
Reno		86·3	49	e 12 33	+ 1	—	—	e 16 2	PP	e 40·0
Palomar	z.	86·4	55	e 12 33	0	—	—	—	—	—
China Lake	z.	86·6	52	i 12 36	+ 2	—	—	i 13 7	sP	—
Tinemaha		86·6	51	i 12 36	+ 2	—	—	i 15 49	PP	—
Victoria		87·4	39	12 40k	+ 3	23 28	+20	24 51	PPS	40·2
Seattle		87·7	41	e 12 42	+ 3	e 23 41	sS	e 24 44	PPS	e 40·2
Boulder City		88·8	53	e 12 45	+ 1	—	—	e 16 21	PP	—
Colombo	E.	88·9	277	12 53	+ 8	23 31	+ 9	—	—	33·7
Overton	z.	89·3	53	e 12 47	+ 1	—	—	e 16 38	PP	—
Pierce Ferry		89·5	53	e 12 48	+ 1	—	—	e 16 25	PP	—
Tucson		90·9	57	e 12 55	+ 1	e 23 29	−11	i 13 20	pP	e 41·5
Kodaikanal	E.	92·0	280	e 8 3	?	—	—	—	—	—
Salt Lake City		92·5	49	e 13 29	pP	e 23 47	− 7	e 25 21	PS	e 38·0
Hyderabad	N.	92·8	287	e 12 35	−28	24 6	+ 9	—	—	45·8
Logan		92·8	48	e 12 44	−19	e 25 18	SP	e 16 36	PP	e 39·7
Hungry Horse		93·2	41	e 13 4	− 1	e 23 59	− 1	e 17 11	PP	—
Butte	N.	93·4	43	e 15 15	?	—	—	—	—	e 34·6
Bozeman		94·4	44	e 13 11	+ 1	e 23 39	[+ 4]	—	—	e 43·7
New Delhi	N.	96·4	298	e 17 13	PP	i 23 58	[+12]	i 24 48	S	—
Poona		97·3	287	e 13 25	+ 2	i 24 49	+14	e 17 30	PP	i 48·2
Tacubaya		98·1	72	e 17 48	PP	e 24 8	[+13]	—	—	e 48·0
Bombay		98·3	287	e 13 28	0	i 24 13	[+17]	e 17 39	PP	—
Saskatoon		98·7	39	—	—	e 23 44	[−14]	e 26 35	PS	46·5
Almata		99·5	313	e 13 33	0	—	—	—	—	—
Andijan		102·5	309	e 13 53	+ 6	—	—	—	—	—
Lincoln	E.	103·8	51	e 18 21	PP	e 24 33	[+11]	e 27 29	PS	e 47·4
Tchimkent		104·7	311	e 13 59	+ 2	—	—	—	—	—
Tashkent		104·9	310	i 18 34	PP	—	—	—	—	—
St. Louis		108·5	54	e 18 11	[− 6]	e 25 1	[+18]	e 18 45	PP	—
Chicago		110·6	50	e 19 44	pPP	e 24 54	[+ 3]	e 28 28	PS	e 43·5
Sverdlovsk		110·6	326	e 14 24	P	28 30	PS	i 18 57	PP	—
Tananarive		112·0	243	e 28 49	PS	35 1	SS	39 31	SSS	54·4
Huancayo		113·0	110	e 19 13	PP	e 25 13	[+12]	e 28 43	PS	e 46·0
Cleveland		115·2	51	—	—	e 25 25	[+16]	e 29 31	PS	—
Columbia		115·8	59	—	—	e 29 19	PS	e 35 33	SS	e 47·7
La Paz		117·7	117	14 34	P	i 25 33	[+14]	i 18 28	PKP	55·6
Pennsylvania		118·0	51	i 19 0	pPKP	e 29 30	SP	e 36 7	SS	e 46·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Washington		118·8	53	e 20 0	PP	e 29 46	PS	e 36 21	SS		e 58·8
Ottawa		119·0	45	18 38	[0]	25 37	[+14]	15 46	?		50·2
Bogota		119·2	92	e 18 43	[+ 5]	e 25 41	[+17]	e 31 0	SSP		—
Grahamstown	z.	119·7	218	e 18 42	[+ 3]	—	—	i 18 45	PKP		—
Philadelphia		120·1	52	e 20 8	PP	e 25 34	[+ 7]	e 29 39	SP		e 51·0
Fordham		121·0	50	e 20 27	pPP	e 30 3	PS	e 37 27	sSS		—
Seven Falls	E.	121·9	42	e 20 13	PP	e 29 51	SP	e 37 33	sSS		58·2
Grozny		122·1	312	e 18 48	[+ 4]	e 30 12	PS	e 20 46	PP		—
Harvard		122·4	48	i 18 48	[+ 4]	e 31 55	PPS	e 20 29	PP		e 59·0
Weston		122·6	48	i 18 45	[0]	i 30 31	PS	e 20 23	PP		58·7
Scoresby Sund		123·3	4	—	—	30 35	PS	32 6	PPS		54·2
Pretoria	z.	123·7	226	i 18 46	[− 1]	—	—	—	—		—
Sotchi		126·3	314	e 18 43	[− 8]	e 25 37?	[− 9]	—	—		—
Halifax		127·5	44	—	—	e 32 49	PPS	e 38 49	PSS		—
San Juan		128·9	77	e 19 23	pPKP	e 42 26	SSS	e 22 19	PKS		e 60·4
Upsala		129·0	341	e 21 5	PP	e 22 11?	PKS	e 23 33	PPP		e 57·2
Yalta		129·9	317	e 18 59	[0]	—	—	—	—		—
Ksara		131·7	303	e 19 3	[+ 1]	33 32	PPS	21 26	PP		—
Bergen		131·8	349	e 21 27	PP	e 22 34	PKS	—	—		e 62·2
Fort de France		133·4	83	e 19 10	[+ 5]	e 22 40	SKP	—	—		—
Copenhagen		134·0	341	i 19 11	[+ 5]	39 53	PSS	i 22 36	SKP		62·2
Bucharest		135·0	321	e 20 56	?	i 22 48	PKS	e 21 46	PP		—
Skalnate Pleso		135·6	329	e 21 38	PP	e 22 57	PKS	—	—		—
Aberdeen		136·1	352	—	—	—	—	i 57 2	Q		e 68·4
Helwan	z.	136·2	299	19 11	[+ 1]	22 36	SKP	19 38	pPKP		—
Potsdam	z.	136·4	338	e 19 11?	[0]	i 22 51	PKS	i 22 6	PP		71·0
Collmberg		137·3	336	e 19 5	[− 7]	e 22 49	PKS	e 21 57	PP		e 68·2
Prague		137·6	335	20 29	?	22 51	PKS	22 17	pPP		—
Jena		138·1	337	e 19 16	[+ 2]	e 22 45	PKS	e 22 1	PP		—
Belgrade		138·2	324	e 22 56	PKS	e 27 27	?	e 36 24	?		e 79·8
Cheb		138·5	335	e 22 9?	PP	e 26 50	[+37]	—	—		—
De Bilt		139·3	343	i 18 41	[−35]	e 40 29	SS	i 22 21	PP		e 63·2
Stuttgart		140·8	337	e 19 13	[− 6]	e 26 41	[+24]	e 19 28	pPKP		72·2
Karlsruhe		140·9	339	e 19 10	[− 9]	—	—	—	—		—
Triest		141·2	331	e 19 18	[− 1]	e 22 59	PKS	e 22 28	PP		—
Kew		141·3	348	e 19 21	[+ 2]	e 23 6	PKS	e 22 36	PP		e 57·2
Strasbourg		141·5	338	i 19 19	[− 1]	e 32 56	PS	e 22 31	PP		e 64·2
Chur		142·2	334	e 19 18k	[− 3]	e 22 59	PKS	e 19 22	PKP_2		—
Basle		142·4	338	e 19 17	[− 4]	—	—	e 22 11	PP		—
Taranto		142·7	321	19 14	[− 8]	—	—	—	—		—
Padova		142·9	330	19 24	[+ 2]	22 51	SKP	22 41	PP		—
Paris		143·0	344	i 19 23	[0]	e 41 34	SS	i 22 57	PKS		e 75·2
Besançon		143·2	338	e 19 24	[+ 1]	—	—	—	—		—
Bologna		143·2	331	i 19 24	[+ 1]	e 20 11	sPKP	e 22 38	PP		—
Pavia		143·7	334	e 19 29	[+ 5]	—	—	—	—		—
Florence Arc.		143·8	330	i 19 17a	[− 7]	e 26 0	[−22]	e 22 33	PP		—
Florence Xim.		143·8	330	e 19 28	[+ 4]	—	—	—	—		—
Jersey	E.	143·8	349	—	—	e 28 3	?	—	—		49·2
Prato		143·8	330	i 19 23	[− 1]	—	—	—	—		—
Rome		144·5	324	i 19 23a	[− 2]	e 41 43	SS	e 22 43	PP		—
Messina		145·1	319	e 19 26	[0]	—	—	—	—		—
Clermont-Ferrand		145·6	340	i 19 31	[+ 4]	e 35 23	SPP	i 19 47	PKP_2		67·2
Toledo	z.	153·1	345	e 19 43	[+ 4]	—	—	e 23 39	PP		—
Algiers Univ.	z.	153·2	330	i 19 43	[+ 4]	—	—	e 20 16	PKP_2		—
Alicante		153·3	338	19 24	[−15]	26 14	[−20]	19 48	PKP_2		e 70·5
Tamanrasset	z.	160·3	300	i 19 50k	[+ 2]	e 26 44	[+ 3]	i 20 32	PKP_2		e 85·2

Additional readings :—
Brisbane iZ = 4m.58s., iSN = 7m.30s., iN = 7m.45s.
Apia e = 4m.38s., eE = 8m.32s.
Riverview iP = 5m.12s., iPPEN = 5m.38s., iPPZ = 5m.41s., iPPPE = 5m.49s., iSE = 9m.5s., isSE = 9m.42s., iSSZ = 9m.52s., iSSSEN = 10m.12s., and other unidentified i readings.
Wellington i = 7m.43s.
Christchurch eEN = 9m.56s., QE = 12m.56s.
Honolulu e = 9m.25s.

Continued on next page.

Tokyo PP =11m.24s., PPP =12m.30s., S_eS =19m.40s., SS =21m.15s.
Ukiah eSS? =28m.47s.
Berkeley ePN =12m.27s., iPSN =23m.51s., iPSE =23m.56s., eQE =38m.40s., and other other unidentified readings.
Lick ePPZ =15m.54s.
Shasta Dam iP =12m.27s., e =14m.19s., ePPS =23m.59s., ePKP,PKP? =38m.51s.
Fresno eE =13m.13s., eZ =19m.0s. and 38m.40s.
Mineral eEN =12m.30s., iZ =12m.39s., ePPZ =15m.25s., eE =40m.17s.
Sitka e =23m.52s.
Pasadena ePPZ =15m.51s., epPP?Z =16m.3s., ePSEN =23m.53s., ePPSEN =24m.11s., eSSZ =28m.53s.
College e =20m.19s., eSS? =28m.57s., ePKP,PKP =38m.37s.
Riverside iZ =12m.54s.
Reno iN =12m.41s., eN =19m.54s.
Tinemaha iZ =13m.51s.
Victoria SS =28m.58s., Q =35m.54s.
Seattle e =13m.52s., 14m.59s., 31m.17s., 36m.21s., and 37m.41s.
Overton iZ =13m.5s.
Pierce Ferry iP =12m.51s., e =21m.45s., i =30m.26s., ePKP,PKP =38m.30s.
Tucson i =13m.41s., ePP =16m.46s., eS? =23m.58s., i =25m.22s., eSS? =29m.59s., ePS? =30m.20s., ePKP,PKP =38m.31s.
Hungry Horse i =13m.31s., eSKS =23m.39s., eSS =30m.12s., ePKP,PKP= 38m.19s.
Bozeman eSS =30m.0s., eSS? =30m.18s.
Poona ePPPN =19m.31s., iN =23m.16s., iSKSEN =24m.3s., iPSE =26m.8s., iPSN = 26m.12s., iSSPEN =31m.33s., iSSSEN =35m.32s., iQE =39m.32s.
Bombay eSSEN =32m.21s.
Saskatoon e =31m.26s. and 34m.21s., Q =40·5m.
Lincoln eSSE =32m.41s.
St. Louis epPP =19m.5s., e =22m.15s., isSP =28m.15s., eSS =34m.7s., eSSS =38m.37s.
Chicago eSS =34m.46s.
Sverdlovsk SS =34m.8s., SSS =38m.45s.
Huancayo e =24m.46s., eSS =34m.20s.
Cleveland eSN =27m.29s., eSS?N =35m.59s., eSSSN =39m.5s.
La Paz PPZ =19m.59s., SKKS =26m.59s., iPS =29m.35s., iN =29m.51s., iPPS = 31m.11s., iSS =36m.47s.
Pennsylvania ePSPS?N =37m.29s., ePKP,PKP?E =39m.25s., and other unidentified readings.
Washington e =22m.24s. and 28m.41s.
Ottawa PP =19m.47s., PPP =22m.17s., e =28m.35s., PS =29m.42s.
Bogota e =31m.44s.
Philadelphia e =31m.2s., eSS =36m.26s., e =42m.4s.
Harvard e =26m.41s., ePS =29m.56s., eSS =37m.27s., e =39m.2s., eSSS =41m.30s.
Weston iPPP =22m.59s., iSS =37m.8s., iPSPS =37m.59s.
Upsala eE =33m.36s., 34m.36s., and 45m.36s., eN =47m.11s.?, eQE =52·2m.
Copenhagen 21m.48s., i =31m.29s. and 34m.50s.
Bucharest eZ =21m.19s., iE =22m.32s.
Helwan PPZ =22m.1s., PKSZ =22m.47s., eE =35m.51s., 37m.51s., and 40m.38s.
Potsdam iPKPZ =19m.19s.a, iZ =19m.38s., eE =21m.11s.?, eE =26m.35s., eZ = 34m.11s.?
Collmberg eZ =19m.14s. and 19m.17s., ePPZ =21m.49s., eEN =22m.23s., eZ =22m.29s., ePPP?N =25m.23s., ePPSN =34m.23s., eSSN =40m.23s.
Prague PP =21m.25s., sSKP =23m.4s., 25m.53s., and 26m.29s.
Jena e =19m.21s., ePP?N =22m.48s.
De Bilt iZ =22m.36s.
Stuttgart ePKPZ =19m.17s., iPKP =19m.23s., ePPZ =22m.9s., ePP =22m.28s., eSKPZ =23m.17s., ePPP =25m.52s., ePSKS =32m.42s., ePS? =34m.31s., eSS = 40m.42s., eSSS =46m.41s., eQ =69·2m., and other unidentified readings.
Triest ePPP =25m.48s., eSKKS =28m.39s., ePSKS =32m.44s., eSKKS(Δ >180) = 34m.35s., eSS =40m.22s.
Kew ePPPNZ =27m.18s., ePPSNZ =35m.14s., eN =36m.27s., eSS =40m.58s., eSSSEN =45m.45s., eEN =46m.58s., e =53m.2s.
Strasbourg iPP =22m.34s., iPS =32m.52s., iPPS =34m.52s., iSS =40m.48s. and 40m.59s., eSSS =45m.59s., eQ =56m.23s., and other unidentified readings.
Taranto PP? =21m.54s., e =33m.30s., SS? =39m.38s., SSS? =48m.27s.
Paris i =20m.18s. and 21m.0s., iPP =23m.2s., e =23m.13s., ePPP? =26m.38s., e = 48m.50s., eQ =66·2m.
Rome ePSKS =32m.59s., e =39m.49s.
Messina e =19m.38s. and 20m.37s.
Clermont-Ferrand i =19m.35s., 19m.41s., and 22m.30s., iPP =23m.0s., eSS =42m.18s.
Toledo i =19m.52s. and 20m.2s., e =22m.0s., eE =24m.58s. and 34m.35s.
Algiers Univ. eZ =20m.48s., iZ =21m.20s., ePPZ =23m.56s.
Alicante PP =23m.6s., Q =60m.58s.
Tamanrasset iZ =20m.6s., eZ =20m.48s., ePP =24m.9s., iZ =24m.25s., ePPPZ = 27m.58s.
Long waves were also recorded at Ivigtut, Almeria, Granada, and Tortosa.

Nov. 7d. 12h. 45m. 41s. Epicentre 2°·2N. 126°·9E. (as on 1949, March 29d.).

$A = -\cdot6000$, $B = +\cdot7991$, $C = +\cdot0382$; $\delta = +2$; $h = +7$;
$D = +\cdot800$, $E = +\cdot600$; $G = -\cdot023$, $H = +\cdot031$, $K = -\cdot999$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Brisbane	Z.	38·8	141	i 7 24	− 4	—	—
Almata		60·3	321	i 10 14	+ 1	—	—
Frunse		61·6	318	e 10 32	+10	—	—
Andijan		62·3	316	10 27	+ 1	18 47	− 5
Garm		63·1	313	e 10 33	+ 1	—	—
Stalinabad		64·1	313	i 10 39	+ 1	19 11	− 3
Tchimkent		64·8	317	i 10 44	+ 1	i 19 20	− 3
Samarkand		65·7	313	i 10 46	− 2	—	—
Ashkabad		71·9	309	e 11 29	+ 2	—	—
Sverdlovsk		75·3	329	11 46	− 1	21 16	−10
College		86·0	25	e 12 46	+ 3	—	—

Brisbane also gives iZ = 9m.56s.

Nov. 7d. Readings also at 3h. (Galerazamba and Messina), 4h. (Stalinabad, Tashkent, Andijan, Samarkand, Tchimkent, near Obi-garm, and Garm), 6h. (Boulder City (2), Mineral (2), Stuttgart, and Collmberg), 7h. (Tacubaya), 8h. (La Plata, Seattle, Santa Clara, near Lick, Branner, Berkeley, and Fresno), 9h. (Hungry Horse), 10h. (Stuttgart, and near Basle), 11h. (College, Shasta Dam, Boulder City, Overton (2), Pierce Ferry (2), and near Santa Lucia), 12h. (College and Shasta Dam), 13h. (Apia, Shasta Dam, and Tucson), 14h. (College, Hungry Horse, Overton, Tucson, and near Apia), 17h. (near Malaga), 19h. (Garm, Samarkand, Frunse, near Andijan, Tashkent, Murgab, and Tchimkent), 20h. (Harvard and near La Paz), 21h. (Bogota), 22h. (Hungry Horse).

Nov. 8d. 8h. 45m. 5s. Epicentre 17°·0N. 122°·5E. (as on 1944, August 15d.).

$A = -\cdot5141$, $B = +\cdot8070$, $C = +\cdot2906$; $\delta = 0$; $h = +5$;
$D = +\cdot843$, $E = +\cdot537$; $G = -\cdot156$, $H = +\cdot245$, $K = -\cdot957$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Hukuoka		18·0	22	e 3 32	−41	—	—	—	—	—
Osaka		21·1	31	e 5 0	+12	e 7 57	?	—	—	—
Nagoya		22·2	33	5 5	+ 5	—	—	—	—	—
Tokyo		24·1	36	e 5 10	− 8	10 11	+37	—	—	—
Irkutsk		38·0	342	7 22	+ 1	16 6	SSS	8 49	PP	—
Kodaikanal	E.	44·2	268	—	—	e 14 55	+ 9	—	—	—
Bombay		47·2	280	e 8 39	+ 3	e 15 31	+ 2	—	—	—
Frunse		48·0	313	e 8 55	+12	—	—	—	—	—
Andijan		49·1	309	8 51	0	e 16 0	+ 4	—	—	—
Garm		50·3	307	e 8 59	− 1	—	—	—	—	—
Obi-garm		50·7	307	e 9 3	0	—	—	—	—	—
Stalinabad		51·4	307	i 9 7	− 2	i 16 29	+ 1	e 11 17	PP	—
Tashkent		51·5	310	e 9 10?	+ 1	i 16 28?	− 1	—	—	—
Samarkand		52·9	307	e 9 20	0	—	—	—	—	—
Ashkabad		59·5	304	e 10 10	+ 3	—	—	—	—	—
Sverdlovsk		60·6	327	i 10 14	− 1	18 26	− 4	—	—	—
Grozny		69·0	310	11 10	+ 1	—	—	—	—	—
Tiflis		69·8	309	i 11 13	− 1	e 20 13	−10	—	—	—
Leninakan		70·6	308	11 8?	−11	—	—	—	—	—
Sotchi		73·3	311	e 11 39	+ 4	—	—	—	—	—
Moscow		73·3	324	e 11 34	− 1	—	—	—	—	—
College		74·6	26	e 11 43	0	e 21 20	+ 2	e 14 16	PP	—
Wellington		75·5	142	—	—	e 20 29	−59	—	—	—
Yalta		77·1	313	11 55	− 2	—	—	—	—	—
Ksara		78·0	302	i 12 2	0	23 10	PPS	e 29 40	SSS	—
Helwan		82·7	298	12 25	− 2	e 23 19	PS	—	—	—
Copenhagen		86·9	328	e 12 45	− 3	—	—	—	—	44·9
Collmberg	Z.	88·5	323	e 12 55	− 1	—	—	—	—	—
Stuttgart		91·9	322	e 13 11	0	—	—	—	—	e 49·9
Shasta Dam		96·9	44	e 13 36	+ 2	—	—	—	—	—
Hungry Horse		97·8	34	e 13 37	− 1	—	—	—	—	—

For Notes see next page.

NOTES TO NOVEMBER 8d. 8h. 45m. 5s.

Additional readings :—
Osaka e = 9m.37s.
Tokyo e = 10m.59s.
Helwan eZ = 12m.34s.
Collmberg eZ = 13m.1s. and 13m.6s.
Stuttgart eZ = 13m.19s.
Hungry Horse i = 14m.22s.
Long waves were also recorded at Potsdam, Strasbourg, and Clermont-Ferrand.

Nov. 8d. Readings also at 1h. and 3h. (2) (near Obi-garm), 4h. (Apia (2) and near Ashkabad), 5h. (Mineral), 6h. (Upsala), 7h. (near Garm), 10h. (Garm, Tchimkent, near Andijan, Obi-garm, Samarkand, Stalinabad, and Tashkent), 12h. (Branner, San Francisco, near Berkeley and Lick), 13h. (Riverview, College, and Overton), 14h. (Lick), 15h. (Hungry Horse, Sotchi, Leninakan, Tiflis, Belgrade, Bucharest, Sofia, Ksara, near Istanbul, near Simferopol, Theodosia, and Yalta), 16h. (College), 18h. (Ottawa, Ashkabad, Almata, near Frunse, Obi-garm, Samarkand, Stalinabad, Tashkent, Tchimkent, and near Garm), 19h. (Ottawa), 21h. (Grozny, near Leninakan, and Tiflis), 22h. (Riverview and near Garm), 23h. (Jena, near Collmberg, and Stuttgart).

Nov. 9d. 23h. 3m. 27s. Epicentre 9°·3S. 109°·0W. (as on 1949, August 24d.).

A = −·3213, B = −·9332, C = −·1605 ; δ = −14 ; h = +7 ;
D = −·946, E = +·326 ; G = +·052, H = +·152, K = −·987.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		33·2	98	e 6 39	− 1	e 11 53	− 7	—	—	e 13·9
Bogota		37·5	69	e 7 17	0	e 13 8	+ 1	e 10 1	PP	e 15·7
La Paz		40·4	104	i 7 41	0	i 13 54	+ 4	i 16 59	SS	20·2
Tucson		41·4	358	e 7 51	+ 1	e 14 13	+ 8	—	—	e 19·5
Palomar	z.	43·1	351	i 8 3	− 1	—	—	—	—	—
Riverside		43·8	350	i 8 10	+ 1	—	—	—	—	—
Pasadena		44·1	350	i 8 12	0	e 14 58	+13	—	—	e 18·2
Boulder City		45·4	354	e 8 29	+ 7	—	—	—	—	—
Pierce Ferry		45·4	355	e 8 29	+ 7	—	—	—	—	—
China Lake	z.	45·6	350	e 8 23	− 1	—	—	—	—	—
Tinemaha	z.	47·0	350	e 8 37	+ 2	—	—	—	—	—
Reno	z.	49·6	350	i 8 58k	+ 3	—	—	—	—	—
Shasta Dam		51·3	347	e 9 6	− 2	—	—	—	—	—
Hungry Horse		57·6	356	e 9 46	− 8	—	—	e 12 26	PP	—
Bermuda		59·2	44	—	—	e 19 19	+67	—	—	e 29·8
Ottawa		62·1	26	e 10 16	− 9	—	—	—	—	—
College		79·4	344	e 12 10?	+ 1	—	—	—	—	—
Riverview		92·9	235	—	—	e 24 41	+21	e 31 9	SSP	e 44·0

Additional readings :—
Bogota eS_cP?EN = 13m.47s.
La Paz iS_cS = 17m.50s.
Pasadena iZ = 8m.24s. and 8m.42s.
Pierce Ferry i = 8m.38s.
Hungry Horse e = 9m.52s., i = 9m.55s.
Long waves were also recorded at Copiapo, Guadalajara, Tacubaya, Vera Cruz, San Juan, Harvard, Weston, Seven Falls, Philadelphia, Salt Lake City, Honolulu, Christchurch, Ksara, and Granada.

Nov. 9d. Readings also at 0h. (Ksara), 3h. (near Obi-garm), 9h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Santa Lucia, La Paz, La Plata, Frunse, near Andijan, Murgab, Obi-garm, Stalinabad, and Tchimkent), 10h. (Pierce Ferry, Grozny, near Leninakan, and Tiflis), 11h. (Stuttgart and Collmberg), 13h. (College), 14h. (near Andijan), 15h. (Ksara, Frunse, Murgab, near Andijan, Stalinabad, and Obi-garm), 18h. (Ottawa, near Tacubaya, near Berkeley, Branner, Fresno, and Lick), 20h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Pierce Ferry, Hungry Horse, College, Guadalajara, Vera Cruz, Tacubaya, Huancayo, La Paz, and Algiers Univ.), 22h. (Tacubaya, Andijan, Samarkand, near Garm, Murgab, Obi-garm, Stalinabad, and near Copiapo), 23h. (Ottawa).

Nov. 10d. 5h. 16m. 34s. Epicentre 36°·7N. 121°·1W. (as on October 22d.).

$A = -·4151$, $B = -·6881$, $C = +·5951$; $\delta = -7$; $h = 0$;
$D = -·856$, $E = +·517$; $G = -·308$, $H = -·509$, $K = -·804$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Lick	0·8	325	i 0 17 a	− 1	i 0 29	− 2	—	—	—
Branner	1·1	310	i 0 22	0	i 0 38	− 1	—	—	—
Fresno	1·1	88	i 0 24 a	+ 2	i 0 38	− 1	—	—	—
Berkeley	1·5	321	i 0 28	0	i 0 54	+ 5	—	—	—
San Francisco	1·5	315	i 0 30	+ 2	i 0 50	+ 1	—	—	—
Reno	3·0	20	e 1 2	P_g	e 1 38	S_g	—	—	—
Mineral	3·7	354	i 1 9 a	P*	i 1 41	− 4	e 1 15	P_g	—
Shasta Dam	4·1	343	e 1 2	− 3	e 1 55	0	—	—	e 2·1

Additional readings :—
Lick iE = 23s., iZ = 28s.
Fresno eN = 2m.42s., eZ = 2m.50s.
Berkeley iE = 37s.
Reno eEN = 1m.46s.
Mineral iP*Z = 1m.13s., eEN = 1m.48s., iZ = 2m.6s.

Nov. 10d. Readings also at 0h. (near Ottawa), 3h. (near Tacubaya), 4h. (Frunse, near Andijan, Garm, Murgab, Obi-garm (2), Samarkand, Stalinabad, and Tashkent), 7h. (Tucson), 8h. and 9h. (near Ashkabad), 10h. (College), 11h. (Ksara, near Tacubaya, near Tashkent, and Tchimkent (2)), 13h. (near Copiapo), 15h. (Boulder City), 21h. (Santa Lucia), 22h. (Stuttgart).

Nov. 11d. 15h. 44m. 19s. Epicentre 22°·9N. 121°·5E. (as on 1948, December 6d.).

$A = -·4818$, $B = +·7862$, $C = +·3869$; $\delta = -7$; $h = +4$;
$D = +·853$, $E = +·522$; $G = -·202$, $H = +·330$, $K = -·922$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zi-ka-wei		8·3	356	e 1 41	−23	3 34	− 6	—	—	i 4·4
Hukuoka		13·2	33	e 3 21	+10	e 5 44	+ 4	—	—	7·5
Osaka		17·0	43	e 5 6	+65	e 9 15	L	—	—	(e 9·2)
Nagoya		18·2	45	4 29	+13	e 8 11	+34	—	—	—
Tokyo		20·4	46	e 4 45	+ 4	8 53	+28	e 9 10	SSS	e 13·5
Mizusawa	E.	23·3	42	5 17	+ 7	9 26	+ 6	—	—	—
Calcutta	E.	30·6	276	e 11 11	S	(e 11 11)	− 9	—	—	(e 13·6)
Irkutsk		32·2	340	6 30	− 2	e 11 43	− 2	—	—	—
Batavia		32·3	208	e 6 27	− 6	e 11 37	− 9	—	—	—
Bandong		32·6	207	e 6 39	+ 4	i 11 54	+ 3	—	—	—
New Delhi	N.	40·1	288	—	—	e 16 49	SS	—	—	e 25·1
Hyderabad	N.	40·7	271	—	—	e 13 42	−13	—	—	—
Almata		41·9	311	7 56	+ 2	—	—	—	—	—
Frunse		43·5	308	e 8 5	− 2	—	—	—	—	—
Poona		44·6	273	i 8 16	0	e 14 49	− 3	e 9 52	PP	21·2
Andijan		44·8	305	8 15	− 2	14 57	+ 2	—	—	—
Bombay		45·5	274	—	—	e 14 52	−13	e 15 2	S	—
Obi-garm		46·6	303	i 8 28	− 4	—	—	—	—	—
Tchimkent		47·0	307	i 8 34	− 1	—	—	—	—	—
Tashkent		47·2	306	i 8 34	− 2	i 15 28	− 1	—	—	—
Stalinabad		47·3	302	8 41	+ 4	—	—	—	—	—
Samarkand		48·8	303	e 8 48	− 1	—	—	—	—	—
Sverdlovsk		55·2	324	9 34	− 3	17 17	− 3	—	—	—
Ashkabad		55·5	301	e 9 34	− 5	—	—	—	—	—
Grozny		64·5	308	e 10 47?	+ 6	—	—	—	—	—
Tiflis		65·5	307	i 10 45	− 2	e 19 33?	+ 1	—	—	—
Leninakan		66·3	306	e 10 58?	+ 6	—	—	—	—	—
Moscow		68·0	323	11 0	− 3	19 59	− 3	—	—	—
College		69·8	27	e 11 16?	+ 2	—	—	—	—	—
Theodosia		71·5	312	e 11 14	−10	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ksara		74·2	300	i 11 39	− 1	e 21 37	+23	—	—	—
Istanbul		77·1	310	—	—	e 21 42	− 4	—	—	—
Helwan		79·1	297	12 21	+13	e 22 7	0	—	—	—
Copenhagen		81·5	327	12 19	− 2	e 22 35	+ 3	16 25	PP	42·7
Collmberg	z.	83·3	323	e 12 27	− 3	—	—	e 15 10	PP	—
Jena		84·2	323	e 12 34	0	—	—	—	—	—
Triest		85·5	318	e 12 45	+ 4	i 23 20	+ 8	e 15 53	PP	e 46·7
Stuttgart		86·6	322	e 12 44	− 2	e 23 21	− 2	e 16 0	PP	e 47·7
Padova		86·8	319	e 13 56	+69	e 24 10	+45	—	—	—
De Bilt		87·0	327	—	—	e 23 35	+ 8	—	—	e 47·7
Bologna		87·6	318	e 13 37	+46	—	—	—	—	—
Strasbourg		87·6	323	e 12 50	− 1	e 23 23	[+ 5]	e 16 18	PP	e 47·7
Rome		88·1	315	e 13 52	+58	e 23 22	[+ 1]	e 23 40	S	—
Besançon		89·3	322	e 13 0	+ 1	—	—	—	—	—
Kew		90·1	328	—	—	e 25 8	PS	e 33 21	SSS	e 50·7
Hungry Horse		93·4	34	i 13 18	0	—	—	—	—	—
Algiers Univ.	z.	97·0	314	e 17 12	PP	—	—	—	—	—
Bogota		148·7	31	e 19 52	[+ 7]	—	—	—	—	—

Additional readings :—
Tokyo e =6m.12s.
Mizusawa SN =9m.34s.
Calcutta records S as P and L as S.
Poona ePSN =15m.0s., ePPSN =15m.11s., iSSN =18m.12s.
Istanbul e =23m.17s.
Triest ePS =24m.21s.
Stuttgart ePPP =17m.59s., e =22m.6s.
Strasbourg e =22m.11s.
Hungry Horse i =13m.47s. and 14m.11s.
Bogota eN =21m.10s.
Long waves were also recorded at Kodaikanal, Harvard, Philadelphia, Seven Falls, Scoresby Sund, and other European stations.

Nov. 11d. 16h. 59m. 27s. Epicentre 14°·4N. 93°·7W. (as on 1948, September 6d.).

$A = -\cdot0625$, $B = -\cdot9670$, $C = +\cdot2471$; $\delta = +5$; $h = +6$;
$D = -\cdot998$, $E = +\cdot065$; $G = -\cdot016$, $H = -\cdot247$, $K = -\cdot969$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vera Cruz		5·3	335	e 1 24	+ 2	2 42	SS	—	—	—
Puebla		6·3	318	e 2 28	+52	3 2	+12	—	—	—
Tacubaya		7·2	314	1 54	+ 5	3 33	+20	—	—	—
Bogota		21·6	114	i 4 52	− 2	e 8 58	+ 9	e 5 11	PP	—
Tucson		23·7	322	i 5 14	0	e 9 37	+10	e 6 1	PPP	e 12·4
St. Louis		24·3	7	e 5 18	− 2	—	—	—	—	—
Pierce Ferry		28·2	324	i 5 56	0	—	—	—	—	—
Palomar	z.	28·2	316	e 5 56	0	—	—	i 6 18	PP	—
Boulder City		28·6	323	i 6 0	0	—	—	e 6 59	PP	—
Overton	z.	28·8	324	e 6 1	− 1	—	—	i 6 33	PP	—
Riverside	z.	29·0	316	e 6 12	+ 8	—	—	e 9 9	PcP	e 11·3
Cleveland		29·0	19	e 6 18	+14	e 10 53	− 1	e 6 54	PP	e 12·9
Pasadena	z.	29·6	316	i 6 7	− 2	—	—	—	—	—
China Lake	z.	30·2	320	i 6 13	− 1	—	—	i 9 12	PcP	—
Tinemaha	z.	31·5	320	e 6 24	− 2	—	—	i 9 16	PcP	—
Lick	z.	33·8	318	i 7 39	+53	—	—	—	—	—
Reno	z.	33·9	323	i 6 47a	0	—	—	e 8 51	PPP	—
Mineral	z.	35·5	323	e 6 59a	− 1	—	—	—	—	—
Hungry Horse		37·8	339	i 7 18	− 2	—	—	—	—	—
College		62·2	337	i 10 23?	− 3	e 18 46	− 5	i 11 2	PcP	—

Additional readings :—
Bogota eN =14m.40s. and 18m.5s.
Boulder City i =6m.8s.
Cleveland eSSE =12m.52s.
Mineral iZ =7m.3s. and 7m.7s.
Hungry Horse i =7m.23s.
College ePP? =12m.43s.
Long waves were recorded at San Juan, Scoresby Sund, and other American stations.

Nov. 11d. Readings also at 1h. (near Algiers Univ.), 4h. (Tucson, Pierce Ferry, Hungry Horse, Kodaikanal, Erevan, Leninakan, near Grozny, and Tiflis), 5h. (Boulder City, Overton, and Pierce Ferry), 6h. (Santa Lucia), 8h. (Ottawa and Upsala), 9h. (College), 10h. (Huancayo, La Paz, and Vera Cruz), 11h. (Huancayo, La Paz, Tacubaya, Pasadena, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Lick, Reno, Hungry Horse (2), College, Honolulu, St. Louis, Philadelphia, Harvard, Weston, Christchurch, Scoresby Sund, Durham, Kew, Victoria, and near Seattle), 12h. (Hungry Horse and near Bogota), 13h. (Tucson, Boulder City, Overton, Pierce Ferry, near La Jolla, Pasadena, Palomar, Riverside, and China Lake), 14h. (La Paz, Boulder City, Overton, Pierce Ferry, College, and near Fresno), 15h. (Nanking), 16h. (Pierce Ferry), 17h. (La Paz and Apia), 18h. (Ottawa, Mount Wilson, China Lake, Tinemaha, Boulder City, Pierce Ferry, Lick, Shasta Dam, College, Collmberg, Paris, Stuttgart, and near Andijan), 21h. (Copiapo), 22h. (near Garm), 23h. (near Andijan).

Nov. 12d. Readings at 2h. (near Andijan, Garm, Obi-garm, and Stalinabad), 3h. (Overton, Pierce Ferry, College, La Paz, and near Apia), 4h. (near Florence Xim, Florence Arc., Prato, and Triest), 5h. (Almata, Frunse, Samarkand, near Andijan, Garm, Obi-garm, Stalinabad, Tashkent, and Tchimkent), 7h. (Santa Lucia and near Mizusawa), 11h. (near Zürich), 12h. (Christchurch), 14h. (Obi-garm, near Garm, and Stalinabad), 15h. (Almata, Garm, Tchimkent, near Andijan, Frunse, and Murgab), 16h. (near Obi-garm and near Ottawa), 18h. (Pierce Ferry and near Garm), 19h. (Lick, near Reno and Shasta Dam), 20h. (Bucharest, Istanbul, Stuttgart, Lick, College, near Mineral, Reno, and Shasta Dam), 21h. (Samarkand, Tchimkent, near Garm, Murgab, Obi-garm, Stalinabad, and near Taranto), 22h. (Boulder City, Overton, Pierce Ferry, and near Ashkabad), 23h. (Stuttgart and near Ashkabad (2)).

Nov. 13d. 0h. 48m. 34s. Epicentre 38°·2N. 142°·0E. Depth of focus 0·010.
(as on 1949, May 22d.).
Intensity V at Semaya (Iwate Pref.); IV at Watari (Miyagii Pref.); II-III at Isinomaki, Sendai, Hukusima, Miyako, Morioka, and Kakioka. Macroseismic radius 200-300km.
Epicentre 38°·3N 142°·2E. Depth 80km.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1949, Tokyo, 1950, p.37, with macroseismic chart.

$A = -·6208$, $B = +·4850$, $C = +·6159$; $\delta = -5$; $h = -1$;
$D = +·616$, $E = +·788$; $G = -·485$, $H = +·379$, $K = -·788$.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Isinomaki		0·6	294	0 14	− 3	0 25	− 4
Sendai		0·9	274	0 18k	− 1	0 32	− 2
Hukusima		1·3	250	0 24	0	0 41	− 1
Mizusawa	N.	1·3	324	e 0 23a	− 1	0 35	− 7
Miyako		1·4	0	0 25	0	0 41	− 3
Onahama		1·5	215	0 27	0	0 47	0
Morioka		1·6	337	0 26	− 2	0 44	− 5
Mito		2·2	214	0 36	0	1 4	+ 2
Hatinohe		2·3	351	0 36	− 1	1 2	− 3
Kakioka		2·4	216	0 40	+ 2	1 5	− 2
Utunomiya		2·4	226	0 40	+ 2	1 7	0
Tukubasan		2·5	217	0 42	+ 2	1 11	+ 1
Kumagaya		2·9	225	1 11	+26	—	—
Maebasi		3·0	232	0 49	+ 2	1 24	+ 2
Tokyo		3·1	216	1 19	+31	2 0	+36
Nagano		3·4	245	1 6	+14	—	—
Hunatu		3·8	224	0 51	− 7	1 43	+ 1
Osima		4·0	212	1 30	+30	—	—
Nagoya		5·0	235	1 37	+23	—	—
Hungry Horse		70·6	44	i 11 8	+ 1	—	—

Nov. 13d. 4h. 42m. 31s. Epicentre 10°·4N. 85°·7W. (as on 1941, December 6d.).

Suggested deep by U.S.C.G.S. and J.S.A.

$A = +·0738$, $B = -·9810$, $C = +·1794$; $\delta = -1$; $h = +6$;
$D = -·997$, $E = -·075$; $G = +·013$, $H = -·179$, $K = -·984$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		6·2	104	e 1 48	P*	e 3 11	S*	—	—	—
Tacubaya		15·8	305	i 3 45	0	i 6 46	+ 4	i 3 52	PP	—
Mobile		20·3	354	e 4 40	0	i 8 35	+12	e 5 14	pP	—
San Juan		20·5	66	e 4 49	+ 7	e 8 46	+19	—	—	e 10·6
Columbia		23·0	9	i 5 17	+10	e 9 34	+20	—	—	e 11·5
Fort de France		24·3	78	e 5 28	+ 8	i 10 16	SS	—	—	—
Huancayo		24·6	157	e 5 36	+13	e 9 51	+ 9	e 6 8	PP	—
St. Louis		28·4	353	i 5 54	− 4	e 10 40	− 5	i 6 3	pP	—
Cincinnati		28·6	3	i 5 58	− 2	i 10 55	+ 7	i 6 6	pP	—
Philadelphia		30·9	17	i 6 21	+ 1	e 11 27	+ 3	e 7 12	PP	e 13·6
Pennsylvania	N.	31·0	12	e 6 12	− 9	i 10 37	−49	e 8 34	?	—
Cleveland		31·2	6	e 6 22a	− 1	e 11 38	+ 9	e 7 14	PP	e 15·9
Chicago		31·3	357	e 6 22	− 2	e 11 20	−11	e 7 14	PP	e 13·2
Lincoln	E.	31·8	347	e 7 29	PP	e 13 40	SS	—	—	e 19·2
Tucson		31·8	317	i 6 26	− 2	e 11 51	+13	i 7 39	PP	e 13·3
La Paz		31·9	147	6 37	+ 8	i 11 53	+13	i 13 59	SSS	16·2
City College, N.Y.		32·0	19	i 6 32	+ 2	e 11 56	+14	e 7 41	PP	—
Fordham		32·1	19	i 6 33	+ 2	e 12 6	+23	i 7 38	PP	16·2
Harvard		34·3	20	i 6 51	+ 1	—	—	e 7 59	PP	e 16·4
Weston		34·3	20	i 6 51	+ 1	e 14 29	SS	i 8 20	PPP	16·9
Ottawa		35·9	12	7 3a	− 1	13 1	+19	8 37	PPP	19·3
Pierce Ferry		36·2	320	e 7 5	− 1	—	—	e 9 35	P_cP	—
Rolphton		36·3	11	e 7 5	− 2	—	—	—	—	—
Palomar		36·6	315	i 7 10	0	—	—	i 9 35	P_cP	—
Boulder City		36·7	320	e 7 10	0	—	—	e 9 36	P_cP	—
Overton	Z.	36·8	320	i 7 13	+ 2	e 13 27	+31	e 9 3	PPP	—
Riverside		37·3	314	i 7 14a	− 2	—	—	i 9 36	P_cP	—
Shawinigan Falls	N.	37·7	15	7 20	+ 1	—	—	—	—	—
Pasadena		38·0	314	i 7 20a	− 1	—	—	i 9 38	P_cP	e 17·9
Salt Lake City		38·1	328	e 7 19	− 3	e 12 51	−25	—	—	e 16·6
China Lake	Z.	38·4	318	i 7 21	− 4	—	—	i 9 40	P_cP	—
Logan		38·7	329	i 7 24	− 3	—	—	e 8 50	PP	e 17·4
Seven Falls	E.	38·7	17	7 26	− 1	13 22	− 3	9 4	PP	21·4
Tinemaha		39·6	318	i 7 34	− 1	—	—	i 9 42	P_cP	—
Fresno		40·4	317	e 7 42k	+ 1	—	—	e 11 10	?	e 17·8
Bozeman		41·3	334	e 7 48	− 1	e 13 55	− 9	—	—	e 19·1
Reno		41·9	320	i 7 55a	+ 1	—	—	e 9 56	P_cP	—
Lick	Z.	42·0	316	e 7 53k	− 1	—	—	i 9 54	P_cP	—
Butte	N.	42·2	333	e 7 56	0	—	—	—	—	e 19·0
Santa Clara		42·2	316	e 8 8	+12	e 17 14	SS	—	—	e 28·4
Branner	Z.	42·4	316	i 7 58k	0	—	—	i 9 54	P_cP	—
Berkeley		42·7	316	i 8 0a	0	i 14 30	+ 6	i 9 54	P_cP	e 22·1
Mineral	Z.	43·6	320	i 8 6a	− 2	—	—	i 9 56	PP	—
Shasta Dam		44·3	320	i 8 9	− 4	—	—	i 9 57	PP	—
Hungry Horse		44·7	334	i 8 14	− 2	—	—	i 9 59	PP	—
Saskatoon		45·0	342	e 10 12	PP	e 18 6	SS	—	—	25·1
Seattle		48·2	328	i 8 44	0	—	—	i 8 51	?	—
Victoria		49·4	328	e 8 53k	0	e 15 29?	−31	e 10 15	P_cP	—
College		69·0	337	i 11 6?	− 3	—	—	—	—	—
Malaga	Z.	76·9	55	i 11 57k	+ 1	e 21 39	− 4	e 14 47	PP	36·6
Toledo		77·0	52	e 11 58	+ 2	e 21 46	+ 1	e 26 10	SS	38·6
Granada		77·5	55	i 11 58k	− 1	22 6	+16	12 42	pP	36·4
Almeria		78·5	55	e 12 2	− 2	e 22 10	+ 9	15 6	PP	40·0
Kew		79·1	39	e 15 48	PP	e 27 52	SS	e 33 42	Q	e 38·5
Alicante		79·9	53	e 12 9	− 3	e 23 9	+53	35 13	Q	e 40·8
Clermont-Ferrand		81·8	45	e 12 54?	+32	e 24 21	PPS	e 16 1?	PP	38·5
Strasbourg		84·6	41	e 21 17	?	e 23 11	+ 8	e 24 17	PPS	36·5
Stuttgart		85·5	41	e 12 41	0	—	—	e 13 2	P_cP	e 37·5
Copenhagen		86·1	34	—	—	24 34	PPS	—	—	40·5
Tamanrasset	Z.	87·1	68	e 12 50	+ 1	—	—	e 16 16	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Collmberg	z.	87·3	39	e 12 51	+ 1	—	—	—	—	—
Florence Xim		87·9	46	e 14 42	?	e 25 19	PPS	—	—	—
Rome		89·2	48	e 13 0	+ 1	e 23 30	[+ 2]	e 30 6	SS	e 45·3
Triest		89·2	44	e 13 8	P_cP	e 23 39	(+ 3)	—	—	e 37·5
Taranto		93·0	48	—	—	e 27 29	?	—	—	e 47·5
Ksara		109·2	49	e 19 8	PP	e 28 41	PS	—	—	—
Riverview	E.	123·2	236	—	—	e 30 56	PS	—	—	e 59·9

Additional readings :—
Tacubaya e = 8m.31s. and 11m.46s.
Mobile sS = 12m.27s.
St. Louis isP = 6m.21s., iPP = 6m.47s., ipPP = 6m.55s., esS = 10m.54s., eSS = 12m.6s., esSS = 12m.18s.
Cincinnati i = 6m.17s.
Cleveland ePPPN = 7m.35s., eN = 12m.7s.
Chicago ePPP = 7m.35s.
Tucson ePPP = 7m.56s.
La Paz iPZ = 6m.41s., iSSS = 14m.45s., iS_cS = 16m.49s.
City College, N.Y., eSSS = 14m.23s.
Fordham e = 11m.54s.
Harvard eP_cP = 8m.57s.
Pierce Ferry iPP? = 9m.3s., i = 10m.36s.
Boulder City ePP = 8m.51s.
Overton iZ = 7m.22s. and 8m.10s.
Pasadena i = 7m.29s.
Seven Falls SSE = 16m.11s.
Reno iZ = 8m.2s.
Lick iZ = 8m.4s.
Branner iZ = 8m.5s.
Berkeley iZ = 8m.8s., 8m.31s., and 10m.3s.
Hungry Horse i = 8m.35s.
Malaga PPPZ = 17m.7s.
Toledo eZ = 12m.52s.
Granada PP = 14m.51s., PS = 22m.51s., SS = 26m.36s.
Almeria PPP = 16m.58s., SS = 27m.26s.
Strasbourg eSS = 29m.4s.
Tamanrasset iZ = 12m.52s.
Rome ePS? = 25m.5s., eSSS = 33m.29s.?
Long waves were also recorded at Vera Cruz, Ivigtut, Scoresby Sund, La Plata, Ukiah, Halifax, Sitka, Bermuda, Tortosa, Aberdeen, De Bilt, Potsdam, and Wellington.

Nov. 13d. 5h. 27m. 0s. Epicentre 21°·0N. 95°·0E.

Rough.

$A = -·0814$, $B = +·9308$, $C = +·3563$; $\delta = -4$; $h = +4$;
$D = +·996$, $E = +·087$; $G = -·031$, $H = +·355$, $K = -·934$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	E.	6·4	285	i 3 12	?	i 5 7	?	—	—	—
Hyderabad	N.	16·0	260	e 3 52	+ 4	7 30	+44	—	—	—
New Delhi	N.	17·8	299	—	—	e 7 17	−11	e 12 3	P_cS	e 10·6
Poona		20·0	267	4 56	PP	e 9 5	SSS	—	—	10·0
Bombay	N.	21·0	269	—	—	i 9 7	SS	—	—	—
Murgab		25·1	319	i 5 29	+ 1	e 9 46	− 5	—	—	—
Almata		26·9	331	e 5 45?	0	—	—	—	—	—
Andijau		27·5	321	i 5 52?	+ 2	e 10 40?	+10	—	—	—
Frunse		27·7	327	e 5 42	−10	—	—	—	—	—
Garm		27·8	316	e 5 56	+ 3	e 10 32	− 3	—	—	—
Obi-garm		28·0	315	e 5 57	+ 2	—	—	—	—	—
Stalinabad		28·6	315	6 4	+ 4	—	—	—	—	—
Tashkent		29·7	320	e 6 10	0	—	—	—	—	—
Tchimkent		30·1	321	e 6 13	0	—	—	—	—	—
Samarkand		30·3	314	e 6 10?	− 5	—	—	—	—	—
Ashkabad		35·8	307	e 6 54?	− 9	—	—	—	—	—
Pretoria	z.	79·8	237	i 12 30	P_cP	—	—	—	—	—

Poona also gives eN = 5m.26s., eEN = 5m.41s., eN = 9m.18s., eE = 9m.28s., eSSSE = 9m.34s.
Long waves were also recorded at Batavia and Bandong.

Nov. 13d. 12h. 40m. 24s. Epicentre 7°·6N. 127°·5E. (as on 1943, Aug. 30d.).

A = −·6035, B = +·7865, C = +·1314; δ = +6; h = +7;
D = +·793, E = +·609; G = −·080, H = +·104, K = −·991.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stalinabad		61·0	310	e 10 17	− 1	e 18 39	+ 4			
Tchimkent		61·4	315	e 10 21	+ 1	—	—			
Sverdlovsk		71·1	328	11 24	+ 2	20 41	+ 3			
Grozny		78·8	313	e 12 4	− 2	—	—			
Leninakan		80·3	310	e 12 26	+12	—	—			
College		80·9	25	e 12 17?	0	—	—			
Sotchi		83·2	313	e 12 30	+ 1	—	—			
Moscow		83·8	325	e 12 34	+ 2	—	—			
Overton	z.	107·3	49	e 17 25	?	—	—			

Nov. 13d. 20h. 43m. 17s. Epicentre 15°·0S. 168°·0E. (as on 1949, February 16d.).

A = −·9453, B = +·2009, C = −·2572; δ = +10; h = +6;
D = +·208, E = +·978; G = +·252, H = −·053, K = −·966.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia	E.	19·7	90	e 4 32	− 2	—	—	—	—	—
Riverview		24·2	216	i 5 18a	− 1	i 9 35	0	i 9 50	sS	e 12·2
Branner	z.	83·7	49	i 12 32a	0	—	—	—	—	—
Berkeley	z.	83·8	49	e 12 34a	+ 2	—	—	—	—	—
Lick	z.	84·1	49	e 12 35a	+ 1	—	—	—	—	—
Shasta Dam		84·9	46	i 12 39	+ 1	—	—	—	—	—
Fresno	z.	85·2	50	i 12 41	+ 2	—	—	—	—	—
Mineral	z.	85·3	47	e 12 41a	+ 1	—	—	—	—	—
Pasadena		85·4	53	i 12 40	0	—	—	—	—	—
Riverside		86·0	53	i 12 44a	+ 1	—	—	—	—	—
Palomar	z.	86·2	54	i 12 45a	+ 1	—	—	—	—	—
Reno		86·3	49	e 12 47a	+ 2	—	—	—	—	—
College		86·4	18	i 12 45?	0	—	—	—	—	—
China Lake	z.	86·5	51	i 12 47a	+ 1	—	—	—	—	—
Tinemaha		86·5	51	i 12 46	0	—	—	—	—	—
Boulder City		88·6	53	e 13 12	+16	—	—	—	—	—
Overton	z.	89·1	51	i 13 0	+ 2	—	—	—	—	—
Pierce Ferry		89·3	53	i 13 0	+ 1	—	—	—	—	—
Tucson		90·6	57	i 13 7	+ 2	—	—	—	—	—
Hungry Horse		93·3	40	e 13 17	− 1	—	—	—	—	—
La Paz		116·4	117	19 0a	[+14]	—	—	—	—	—
Paris		144·2	343	i 19 38	[0]	—	—	i 19 43	PKP	—
Besançon		144·5	338	e 19 43	[+ 5]	—	—	—	—	—

Additional readings :—
Riverview iSSN = 10m.31s.
Shasta Dam e = 13m.13s. and 17m.8s.
Mineral iZ = 12m.47s.k.
Reno eNZ = 12m.52s., eE = 14m.48s.
College e = 13m.10s.?
Tinemaha iZ = 12m.58s.
Boulder City iP = 13m.17s.
Overton iZ = 13m.15s., eZ = 13m.53s.
Pierce Ferry e = 14m.30s.
Long waves were also recorded at Wellington.

Nov. 13d. Readings also at 0h. (Sofia, Bucharest, and near Istanbul), 1h. (near Reno), 2h. Galerazamba), 3h. (near Copiapo), 4h. (Messina), 5h. (Granada), 6h. (near Garm), 7h. (Apia), 8h. (near Alicante), 9h. (Istanbul and near Yalta), 10h. (near College, near Alicante and near Apia), 11h. (College and near Alicante), 12h. (near Mizusawa), 14h. (near Berkeley, Lick, Branner, and San Francisco), 15h. (Andijan, near Tchimkent, and near Copiapo), 16h. (near Zürich, near La Paz, near Boulder City, Overton, and Piece Ferry), 17h. (Seattle, Grozny, Erevan, near Tiflis, and Leninakan, near Garm, Obi-garm, and Andijan, near Copiapo, near Zürich, Basle, and Stuttgart), 18h. (Samarkand, Tchimkent, near Garm, Obi-garm, Stalinabad, Murgab, and Andijan, near Ottawa, near Puebla and Tacubaya), 19h. (Hungry Horse (2) and Overton), 20h. (College, Shasta Dan, and Pierce Ferry), 21h. (College, Hungry Horse, Shasta Dam, Boulder City, Pierce Ferry, near Berkeley, Branner, San Francisco, and Lick), 22h. (near Victoria), 23h. (College, Hungry Horse, Shasta Dam, Pierce Ferry, and Lick).

Nov. 14d. 2h. 10m. 0s. Epicentre 1°·7S. 80°·9W. (as on 1946, March 29d.).

$A = +\cdot1581$, $B = -\cdot9870$, $C = -\cdot0295$; $\delta = +3$; $h = +7$;
$D = -\cdot987$, $E = -\cdot158$; $G = -\cdot005$, $H = +\cdot029$, $K = -1\cdot000$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bogota		9·3	47	i 2 18	+ 1	e 3 47	−18	i 2 36	P*	—
Huancayo		11·7	152	e 2 48	− 3	e 4 48	−16	—	—	i 5·9
La Paz		19·3	139	i 4 24	− 5	i 8 0	− 2	i 4 40	PP	10·0
San Juan		24·7	36	(e 5 24)	0	—	—	—	—	e 5·4
Fort de France		25·5	51	e 5 30	− 2	—	—	—	—	—
Tucson		44·1	323	e 8 26	+14	—	—	—	—	—
Ottawa		47·1	6	e 8 42	+ 7	—	—	—	—	—
Palomar	z.	48·6	320	i 9 17	+30	—	—	—	—	—
Pierce Ferry		48·6	325	e 8 23	−24	—	—	—	—	—
Boulder City		49·0	324	e 8 56	+ 6	—	—	—	—	—
Overton	z.	49·2	324	e 9 26	+34	—	—	—	—	—
Riverside	z.	49·4	320	e 8 58	+ 5	—	—	—	—	—
Mount Wilson	z.	49·9	320	e 9 3	+ 6	—	—	—	—	—
China Lake	z.	50·6	323	e 9 20	+18	—	—	—	—	—
Tinemaha	z.	51·9	322	e 9 27	+15	—	—	—	—	—
Lick	z.	54·1	321	e 9 31	+ 2	—	—	—	—	—
Mineral	z.	55·9	324	e 10 46	+64	—	—	—	—	—
Shasta Dam		56·6	324	e 10 3	+16	—	—	—	—	—
Hungry Horse		57·6	335	i 9 57	+ 3	—	—	—	—	—
Tamanrasset	z.	87·3	67	e 12 49	− 1	—	—	—	—	—

Additional readings :—
Bogota eS*EN = 4m.4s., eS_eN = 4m.47s.
La Paz iP_cP = 8m.30s.
Ottawa e = 8m.48s.
Pierce Ferry e = 8m.49s., i = 9m.14s.
Boulder City e = 9m.24s.
Mount Wilson eZ = 9m.17s.
Hungry Horse i = 10m.9s. and 10m.16s.
Tamanrasset eZ = 13m.57s.

Nov. 14d. 10h. 41m. 57s. Epicentre 39°·4N. 119°·7W.
(given by Berkeley and the Californian stations).

$A = -\cdot3839$, $B = -\cdot6730$, $C = +\cdot6322$; $\delta = -1$; $h = -1$;

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Reno		0·2	330	i 0 6a	− 4	—	—	—	—	—
Mineral		1·7	303	i 0 31k	0	i 0 52	− 2	i 0 35	P_g	—
Berkeley		2·5	233	e 0 45a	+ 2	e 1 15	+ 1	i 0 56	P_g	—
Shasta Dam		2·5	302	i 0 44	+ 1	i 1 14	0	—	—	e 1·4
Fresno	z.	2·6	181	i 0 54k	P_g	i 1 28	S_g	—	—	—
Lick		2·6	216	i 0 46k	+ 2	i 1 21	+ 4	i 0 49	P_g	—
Branner		2·8	224	i 0 50k	+ 3	e 1 19	− 3	e 0 56	P_g	—

Additional readings :—
Mineral iE = 45s., iNZ = 48s.
Lick iZ = 1m.25s.
Long waves were also recorded at Overton and Pierce Ferry.

Nov. 14d. 13h. 31m. 28s. Epicentre 38°·8N. 144°·3E. Depth of focus 0·005.

Intensity IV at Yonesato (Iwate Pref.); II-III at Miyako, Morioka, and Tukubasan.
Epicentre as adopted. Depth of focus 80km. Macroseismic radius 200-300km.
Seismo. Bull. Cent. Met. Obs., Japan, for 1949, Tokyo, 1950, pp. 37, 38.

$A = -·6345$, $B = +·4560$, $C = +·6240$; $\delta = -10$; $h = -1$;
$D = +·584$, $E = +·812$; $G = -·507$, $H = +·364$, $K = -·781$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Miyako	E.	2·0	295	0 30	− 2	0 50	− 7
Mizusawa	E.	2·5	278	0 37	− 2	1 5	− 4
Morioka	E.	2·6	290	0 40	− 1	1 8	− 4
Hatinohe	E.	2·6	309	0 38	− 3	0 57	−15
Sendai	E.	2·7	259	0 43	+ 1	1 14	0
Hukusima	E.	3·2	251	0 50	+ 1	1 26	− 1
Onahama	E.	3·3	235	0 47	− 4	1 29	0
Aomori	E.	3·4	307	0 56	+ 4	1 22	−10
Mito	E.	3·9	232	1 0	+ 1	1 47	+ 3
Kakioka	E.	4·2	233	1 2	− 1	1 49	− 3
Tukubasan	E.	4·2	233	1 5	+ 2	1 53	+ 1
Nemuro	E.	4·6	12	1 1	− 8	1 46	−16
Kumagaya	E.	4·7	237	1 19	+ 9	2 5	+ 1
Sapporo	E.	4·8	333	1 6	− 6	1 53	−14
Maebasi	E.	4·8	241	1 13	+ 1	2 9	+ 2
Tokyo	E.	4·8	230	1 20	+ 8	2 7	0
Nagano	E.	5·3	248	1 29	+10	—	—
Hunatu	E.	5·5	235	1 47	+26	—	—
Osima	E.	5·6	226	1 38	+15	—	—
Nagoya	E.	6·9	240	2 0	+19	3 14	+15
College	Z.	46·4	33	i 8 20?	− 2	—	—
Shasta Dam	Z.	68·2	55	i 10 56	0	—	—
Tinemaha	Z.	72·9	56	i 11 25	+ 1	—	—
China Lake	Z.	74·1	57	e 11 31	0	—	—
Pasadena	Z.	74·7	59	i 11 34	0	—	—
Riverside	Z.	75·3	59	i 11 38	0	—	—
Boulder City	Z.	75·8	56	i 11 42	+ 1	—	—
Pierce Ferry	Z.	76·2	55	i 12 14	+31	—	—

College gives also i = 8m.36s.?

Nov. 14d. 17h. 12m. 46s. Epicentre 37°·5N. 118°·5W. (as on October 24d.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fresno		1·3	233	i 0 20a	− 5	i 0 35	− 9	—	—	—
Reno		2·3	334	e 0 46	+ 6	e 1 15	S*	e 1 22	S_g	—
Lick		2·5	266	e 0 40a	− 3	i 1 11	− 3	i 0 48	P_g	—
Branner		2·9	268	i 0 46k	− 2	i 1 23	− 1	—	—	—
Berkeley		3·0	277	i 0 47	− 3	i 1 24	− 3	—	—	—
Boulder City		3·3	117	e 0 58	+ 5	i 1 45	+10	i 1 2	P*	—
Overton	Z.	3·4	106	i 1 2	P*	i 1 30	− 7	i 1 50	S_g	—
Mineral		3·7	320	i 1 2k	+ 2	i 1 52	+ 7	i 1 14	P_g	—
Pierce Ferry		3·9	110	e 0 58	− 4	i 1 42	− 8	i 1 10	P*	e 2·3

Additional readings :—
Lick iZ = 44s. and 1m.14s.
Branner iZ = 55s., iN = 1m.28s., iE = 1m.38s.
Berkeley iEZ = 1m.30s.
Boulder City i = 1m.59s.
Mineral e = 1m.8s., iZ = 1m.58s., iE = 2m.6s.
Pierce Ferry i = 1m.31s. and 2m.2s.

Nov. 14d. Readings also at 0h. (near Boulder City, Overton, Pierce Ferry, Fresno, and Lick), 2h. (Pasadena, Tinemaha, Lick, Mineral, Shasta Dam, and near Apia), 3h. (Weston, Pasadena, China Lake, Tinemaha, Tucson (2), Boulder City, Overton (2), Pierce Ferry (2), Shasta Dam, and College (2)), 4h. (Tamanrasset), 5h. (Pasadena, Tinemaha, La Paz, near Huancayo, and near Reykjavik), 6h. (near Victoria), 7h. (Samarkand, near Andijan, Garm (2), Obi-garm, and Stalinabad), 9h. (College and Overton), 10h. (near Andijan), 11h. (Upsala and near Garm), 12h. (La Paz and Santa Lucia), 13h. (Overton, Pierce Ferry, and Tucson), 14h. (Ottawa, near Garm, and Obi-garm), 15h. (College), 16h. (near Mizusawa), 18h. (near Berkeley, Branner, and Lick), 19h. (near Garm), 20h. (Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, Victoria, Pasadena, Palomar, China Lake, and Tinemaha), 22h. (Harvard and Weston).

Nov. 15d. 13h. Near Apia.

Apia eP =21m.29s., eS? =22m.52s.
Pasadena iPZ =31m.1s.k.
Palomar iP =31m.4s.k.
Riverside iPZ =31m.4s.
Shasta Dam iP =31m.7s.
China Lake iPZ =31m.8s.k.
Mineral iPZ =31m.9s.a.
Tinemaha iPZ =31m.10s.k.
Boulder City eP =31m.19s.
Pierce Ferry iP =31m.22s.
Overton iPZ =31m.23s., eZ =31m.49s., epPZ =32m.52s.
Tucson iP =31m.25s.
College iP =31m.46s.?, epP =33m.17s.?, eS =42m.34s.?
Hungry Horse iP =31m.52s., i =32m.10s.
Almeria PKP =38m.39s., i =39m.19s., PKS =42m.55s.
Collmberg eZ =38m.44s.
Stuttgart ePKPZ =38m.46s.
Alicante PKP =38m.47s., PKP_2 =39m.39s., PP =42m.40s., PPP =46m.43s., eL = 52m.39s.
Strasbourg iPKP =38m.51s.
Granada L =45m.0s.

Nov. 15d. Readings also at 0h. (Harvard, Weston, Obi-garm, Stalinabad, and near Garm), 1h. (La Plata), 3h. (Boulder City, Overton, Pierce Ferry, and Shasta Dam), 4h. (La Paz), 5h. (Bombay, Poona, and Pretoria), 7h. (Bogota and near Andijan), 8h. (Bogota), 9h. (Victoria and near Andijan), 10h. (Samarkand, Tchimkent, near Andijan, Garm, Murgab, Obi-garm, Stalinabad, and Tashkent), 11h. (near Tchimkent, near Garm, and near College), 12h. (Brisbane and near Murgab), 14h. (near Mizusawa), 16h. (near Zürich), 17h. (near Santa Lucia), 18h. (near Branner), 20h. (Samarkand, near Andijan, Garm, Obi-garm, Murgab, Stalinabad, Tashkent, Tchimkent, and near Messina), 22h. (Garm, Samarkand, near Obi-garm, and Stalinabad), 23h. (Ottawa).

Nov. 16d. 8h. 0m. 57s. (I)
8h. 2m. 54s. (II)
8h. 4m. 18s. (III)
} Epicentre 40°·5N. 121°·6W.

Shock III was of magnitude 2.6 at Mineral. 110 after-shocks were recorded near the epicentre during the succeeding eight hours.

$A = -·3996$, $B = -·6495$, $C = +·6469$; $\delta = +1$; $h = -2$;
$D = -·852$, $E = +·524$; $G = -·339$, $H = -·551$, $K = -·763$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
I	Mineral	0·1	—	i 0 4	a P_g	—	—	—	—
II		0·1	—	i 0 5	a P_g	—	—	—	—
III		0·1	—	i 0 5	a P_g	—	—	—	—
III	Shasta Dam	0·6	289	i 0 15	0	e 0 23	− 3	—	—
I	Reno	1·7	125	e 0 33	k + 2	e 0 53	− 1	—	—
III		1·7	125	e 0 31	0	i 0 52	− 2	—	—
III	Arcata	1·9	282	i 0 41	+ 7	i 1 15	S_g	—	—
III	Berkeley	2·7	191	i 0 47	+ 2	i 1 24	+ 5	i 1 0	P_g
III	Branner z.	3·1	188	i 0 53	a + 2	—	—	—	—
I	Lick z.	3·2	181	i 0 52	k 0	i 1 26	− 6	—	—
III		3·2	181	i 0 52	k 0	—	—	i 1 0	P*
III	Fresno	4·0	159	e 1 12	P*	i 2 1	S*	e 2 5	S_g
III	Overton z.	6·9	123	e 2 17	P_g	—	—	—	—

For Notes see next page.

NOTES TO NOVEMBER 16d. 8h. 4m. 18s. (III).

Additional readings to shock III :—
Reno iN =49s., iNZ =57s.
Berkeley iN =1m.21s.
Lick iZ =1m.17s.
Fresno ePE =1m.16s.

Nov. 16d. 18h. 59m. 45s. Epicentre 42°·1N. 45°·9E. (as on 1948, March 5d.).

A = +·5179, B = +·5344, C = +·6679 ; δ = −11 ; h = −2 ;
D = +·718, E = −·696 ; G = +·465, H = +·480, K = −·744.

		△	Az.	P.	O−C.	S.	O−C.		Supp.
		°	°	m. s.	s.	m. s.	s.	m.	s.
Tiflis		0·9	245	i 0 16	− 4	i 0 27	− 7	—	—
Grozny		1·2	359	i 0 24	0	0 35	− 6	—	—
Leninakan		2·0	230	0 39	+ 4	—	—	—	—
Erevan		2·2	209	0 39	+ 1	—	—	—	—
Piatigorsk		2·8	315	0 44	− 3	1 18	− 4	i 1 23	S
Baku		3·5	119	e 1 10?	P_g	2 18?	S_g	—	—
Sotchi		4·8	290	e 1 25	+10	2 22	+10	—	—
Yalta		8·9	289	e 3 48	S	(e 3 48)	− 7	—	—
Ksara		11·4	227	e 2 54	+ 7	—	—	—	—
Moscow		14·7	341	e 3 24	− 7	—	—	—	—
Sverdlovsk		17·5	28	4 4	− 3	7 12	− 9	—	—
Tashkent		17·5	85	e 4 9	+ 2	—	—	—	—
Tchimkent		17·6	82	e 4 12	+ 4	—	—	—	—
Andijan		19·9	85	4 37	+ 1	—	—	—	—
Collmberg	z.	24·2	304	e 5 18	− 1	—	—	—	—
Stuttgart	z.	26·4	299	e 5 31	− 9	—	—	—	—
College		72·8	7	e 11 39?	+ 7	—	—	—	—
Hungry Horse		88·3	347	e 12 37	−18	—	—	—	—
Shasta Dam		96·9	352	e 13 31	− 3	—	—	—	—
Pierce Ferry		100·0	344	e 13 36	−12	—	—	—	—

Additional readings :—
Tiflis i =21s.
Stuttgart eZ =5m.39s.
Hungry Horse i =12m.51s. and 12m.55s.
Shasta Dam i =13m.35s.

Nov. 16d. Readings also at 0h. (near Obi-garm), 3h. (Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 5h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, and Hungry Horse), 6h. (near Mizusawa), 7h. (near Bandong and Batavia), 8h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Overton, and Shasta Dam), 10h. (Overton (2), Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Tchimkent), 14h. (Brisbane and College), 15h. (Pierce Ferry and near Tortosa), 16h. (near Almata, Andijan (2), Frunse (2), Garm (2), Murgab (2), Stalinabad (2), Tashkent (2), Tchimkent (2), and near La Paz), 17h. (Andijan, Murgab, near Garm (2), and Obi-garm), 21h. (near Ottawa), 23h. (Jena, Pierce Ferry, Shasta Dam, Fresno, near Lick, and Mineral).

Nov. 17d. 5h. 8m. 20s. Epicentre 39°·2N. 70°·7E. (as on 1949, September 30d.).

A = +·2568, B = +·7334, C = +·6295 ; δ = +9 ; h = −1 ;
D = +·944, E = −·331 ; G = +·208, H = +·594, K = −·777.

	△	Az.	P.	O−C.	S.	O−C.		Supp.
	°	°	m. s.	s.	m. s.	s.	m.	s.
Obi-garm	0·9	237	i 0 18	− 2	i 0 30	− 4	—	—
Stalinabad	1·6	247	i 0 30	0	i 0 56	+ 5	—	—
Tashkent	2·4	333	i 0 43	+ 2	i 1 20	S_g	—	—
Murgab	2·7	108	0 50	+ 5	1 30	S_g	—	—
Samarkand	2·9	279	e 0 50?	+ 2	i 1 36?	S_g	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Tchimkent		3·1	345	i 0 57	+ 6	i 1 52	S_g	—	—
Frunse		4·7	38	e 1 15	+ 1	—	—	—	—
Almata		6·2	47	e 1 35	0	—	—	—	—
Ashkabad		9·8	267	e 2 21?	− 3	—	—	—	—
Semipalatinsk		13·1	28	e 3 13	+ 3	e 6 37	+59	—	—
Sverdlovsk		18·9	343	e 4 19	− 5	e 7 47	− 6	—	—
Grozny		19·2	290	e 4 29	+ 1	e 8 4	+ 5	—	—
Tiflis		19·8	285	e 4 40?	+ 5	e 8 30	+17	e 8 56	SS
Bombay	N.	20·3	175	e 4 38	− 2	—	—	—	—
Leninakan		20·6	284	e 4 55?	+12	—	—	—	—
Ksara		28·4	269	e 0 31	?	e 8 35	?	—	—
Collmberg	Z.	41·4	308	e 7 46	− 4	—	—	—	—
Stuttgart	Z.	44·2	304	e 8 8	− 4	e 10 51	PPP	—	—
Strasbourg		45·1	304	i 8 17	− 3	—	—	—	—
College		72·0	17	i 11 23	− 5	—	—	—	—
Ottawa		90·5	338	e 13 2	− 3	—	—	—	—
Hungry Horse		92·7	3	i 13 12	− 3	—	—	—	—

Additional readings :—
Collmberg eZ = 7m.52s. and 9m.20s.
Strasbourg i = 8m.20s.
College e = 11m.42s.

Nov. 17d. 19h. 20m. 28s. Epicentre 25°·9N. 96°·8E. (as on 1947, Sept. 9d.).

A = −·1066, B = +·8944, C = +·4344 ; δ = +2 ; h = +3 ;
D = +·993, E = +·118 ; G = −·051, H = +·431, K = −·901.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	N.	8·4	246	e 2 15	PP	i 3 44	+ 1	—	—	—
New Delhi	N.	17·6	283	—	—	e 7 10	−13	e 7 28	SS	8·0
Hyderabad		19·0	246	4 27	+ 1	8 4	+ 9	8 26	SS	10·1
Poona	N.	22·4	255	e 5 2	0	i 9 5	+ 1	e 5 28	PP	10·4
Murgab		22·9	308	i 5 4	− 2	i 9 14	+ 1	—	—	—
Bombay		23·2	256	e 5 12	+ 3	e 9 19	+ 1	—	—	—
Almata		23·7	322	5 14	0	—	—	—	—	—
Kodaikanal	E.	24·0	233	e 3 11	?	—	—	—	—	—
Frunse		24·8	317	e 5 26	+ 1	—	—	—	—	—
Andijan		25·1	310	e 5 27	− 1	9 53	+ 2	—	—	—
Garm		25·8	307	i 5 34	0	i 10 4	+ 2	—	—	—
Obi-garm		26·1	306	i 5 36	− 1	i 10 10	+ 3	—	—	—
Stalinabad		26·8	306	e 5 44	0	10 18	− 1	—	—	—
Irkutsk		26·9	10	5 50	+ 5	e 10 46	+26	—	—	—
Tashkent		27·4	310	e 5 48?	− 1	i 10 22	− 6	—	—	—
Tchimkent		27·7	313	i 5 51	− 1	—	—	—	—	—
Samarkand		28·4	304	e 5 56	− 2	—	—	—	—	—
Ashkabad		34·5	300	e 6 53	+ 1	—	—	—	—	—
Sverdlovsk		40·3	330	7 39	− 1	13 53	+ 4	—	—	—
Grozny		44·7	306	e 8 28	+12	—	—	—	—	—
Tiflis		45·3	303	e 8 20?	− 1	—	—	—	—	—
Leninakan		46·0	302	e 9 3?	+36	—	—	—	—	—
Sotchi		49·1	306	e 8 50	− 1	—	—	—	—	—
Moscow		51·8	321	e 9 10	− 2	—	—	—	—	—
Ksara		52·8	293	e 9 21	+ 2	e 17 53	+66	—	—	—
Collmberg	Z.	66·5	316	e 10 53	− 1	—	—	—	—	—
Stuttgart	Z.	69·5	315	e 11 11	− 1	—	—	—	—	—
College		76·8	23	e 11 57	+ 2	—	—	—	—	—
Pretoria	Z.	83·8	237	i 12 35	+ 3	—	—	—	—	—
Hungry Horse		101·1	20	i 14 20	+27	—	—	—	—	—
Overton	Z.	111·3	27	e 19 38	PP	—	—	—	—	—
Bogota		148·4	342	e 19 57	[+12]	—	—	—	—	—

Additional readings :—
Poona ePPPN = 5m.42s., eN = 9m.19s., QN = 9m.23s., eSSN = 9m.51s.
Stuttgart eZ = 11m.23s.
Long waves were also recorded at Bandong and Batavia.

Nov. 17d. 22h. 29m. 6s. Epicentre 32°·0N. 137°·0E. Depth of focus 0·060.
(as on 1945, May 27d.).

Intensity II-III at Kakioka and Tokyo. Epicentre 32°·0N. 137°·3E. Depth of focus 320 km. Macroseismic radius >300 km.

Seismo. Bull. Cent. Met. Obs., Japan, for 1949, Tokyo, 1950, p. 38.

$A = -·6214$, $B = +·5794$, $C = +·5273$; $\delta = -11$; $h = +1$;
$D = +·682$, $E = +·731$; $G = -·386$, $H = +·360$, $K = -·850$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Siomisaki		1·8	324	1 2	S	1 43	?
Kobe		3·1	331	1 3	− 3	1 50	− 7
Nagoya		3·2	359	1 6	0	1 54	− 4
Hikone		3·3	349	1 6	− 1	1 53	− 7
Gihu		3·4	357	1 5	− 3	1 54	− 8
Osima		3·4	35	0 46	−22	—	—
Mera		3·7	39	1 13	+ 2	2 9	+ 3
Hunatu		3·8	23	0 42	−30	—	—
Matuyama		4·0	298	1 9	− 4	2 2	− 9
Yokohama		4·1	32	1 18	+ 4	2 11	− 2
Tokyo		4·3	31	1 18	+ 2	2 14	− 2
Matusiro		4·6	12	1 17	− 2	2 13	− 9
Maebasi		4·7	21	1 19	− 1	2 18	− 5
Toyama		4·7	2	1 9	−11	1 55	−28
Nagano		4·8	12	1 20	− 1	2 18	− 7
Tukubasan		5·0	31	1 22	− 1	2 22	− 7
Kakioka		5·0	31	1 23	0	2 23	− 6
Utunomiya		5·1	27	0 55	?	1 27	?
Mito		5·2	32	1 25	0	2 27	− 5
Kumamoto		5·4	280	1 28	+ 1	2 32	− 4
Kagosima		5·5	267	1 29k	+ 1	2 38	0
Hukuoka		5·8	288	1 28a	− 4	2 34	−10
Onahama		5·9	32	1 31	− 2	2 41	− 5
Hukusima		6·4	26	1 35	− 3	2 46	− 9
Sendai		7·0	26	1 42	− 3	2 58	−10
Mizusawa	E.	7·9	24	2 49	+54	3 13	−13
Morioka		8·4	22	1 58	− 3	3 27	− 9
College		55·3	29	i 8 53	− 2	—	—
Shasta Dam		77·1	50	i 11 12	+ 2	e 12 48	pP
Mineral	Z.	77·8	50	i 11 16a	+ 2	—	—
Hungry Horse		78·0	39	i 11 14	− 1	—	—
Pierce Ferry		85·1	51	e 11 53	+ 1	—	—

Nov. 17d. Readings also at 2h. (Ottawa), 5h. (Lick, Samarkand, near Andijan, Garm, Obi-garm, Murgab, Stalinabad, Tashkent, and Tchimkent), 6h. (La Paz), 7h. (near Garm), 8h. (College and near Andijan), 9h. (Ksara and near Andijan), 10h. (near Tchimkent), 11h. (Ottawa), 14h. (Ksara and near Alicante), 16h. (College and Strasbourg), 17h. (Ottawa), 19h. (Erevan, near Grozny, Leninakan, and Tiflis), 20h. (Harvard, Obi-garm, Tashkent, Tchimkent, near Andijan, Garm, and Stalinabad), 22h. (Copiapo and Pierce Ferry), 23h. (College).

Nov. 18d. 7h. 58m. 21s. Epicentre 14°·0S. 167°·0E. (as on 7d.). Depth of focus 0·010.

$A = -·9458$, $B = +·2184$, $C = -·2404$; $\delta = +3$; $h = +6$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.
		°	°	m. s.	s.	m. s.	s.	m. s.	
Brisbane		18·7	222	i 4 9k	− 4	i 7 33	− 2	i 4 45	sP
Apia		20·6	92	e 4 35	+ 2	—	—	—	—
Riverview		24·4	214	5 8	− 2	i 9 16	− 4	i 5 47	PP
Wellington		28·0	168	—	—	e 10 39?	+20	—	—
Lick	Z.	84·1	49	i 12 21k	0	—	—	i 12 55	sP
Shasta Dam		84·9	46	i 12 25	0	e 13 3	sP	e 18 34	?
Fresno	Z.	85·3	50	e 12 27	0	—	—	—	—
Mineral	Z.	85·3	47	e 12 27	0	—	—	—	—
Pasadena	Z.	85·6	53	i 12 28	− 1	—	—	—	—
College		85·7	18	e 12 29	0	—	—	e 13 5	sP

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Palomar	z.	86·4	55	i 12 32	− 1	—	—	i 13 22	sP
China Lake	z.	86·6	52	e 12 34	0	—	—	—	—
Tinemaha	z.	86·6	51	i 12 34	0	—	—	i 13 6	sP
Boulder City		88·8	53	e 12 45	+ 1	e 13 15	sP	e 16 17	PP
Overton	z.	89·3	53	e 12 46	0	—	—	i 16 21	PP
Pierce Ferry		89·5	53	i 12 48	+ 1	—	—	e 16 20	PP
Tucson		90·9	57	i 12 55	+ 1	—	—	—	—
Hungry Horse		93·2	41	i 13 2	− 3	—	—	i 13 43	sP
Collmberg	z.	137·3	336	e 19 15	[+ 3]	—	—	—	—
Stuttgart	z.	140·8	337	e 19 16	[− 3]	—	—	e 19 19	PKP
Clermont-Ferrand		145·6	340	i 19 30	[+ 3]	—	—	—	—

Additional readings :—
Brisbane iSZ =7m.39s.
Riverview iPPZ =5m.36s., iEN =9m.24s. and 9m.57s., iZ =10m.0s., iN =10m.10s., iE =10m.13s., iZ =10m.16s., iN =10m.45s., iS_eS?E =16m.3s.
Boulder City e =13m.49s.
Long waves were recorded at Auckland and Christchurch.

Nov. 18d. Readings also at 0h. (Hungry Horse, Pierce Ferry, Murgab, Samarkand, near Garm (2), and Andijan), 1h. (Berkeley, Lick, Fresno, Mineral, Reno, Santa Clara, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, Salt Lake City, Philadelphia, Ottawa, Samarkand, Murgab, Andijan, Tchimkent, Tashkent, near Stalinabad, Obi-garm, and Garm, and near Balboa Heights), 2h. (Samarkand, Andijan, near Obi-garm, and Garm, Stalinabad), 3h. (near Garm, Stalinabad, and Obi-garm), 4h. (near Obi-garm), 5h. (Murgab, Almata, Andijan, Frunse, Obi-garm, Garm, Tashkent, Stalinabad, and College), 6h. (Shasta Dam and Mineral), 7h. (Shasta Dam, China Lake, Pierce Ferry, Tucson, and near Obi-garm), 8h. (near Apia and near Tchimkent), 9h. (near Andijan), 11h. (near Chur), 12h. (Stalinabad, Tchimkent, near Garm, Andijan, Murgab, and Obi-garm), 13h. (Yalta, College, Mount Wilson, China Lake, Overton, Pierce Ferry, Tucson, and Ottawa), 14h. (Mineral, Ottawa, and near Garm (2)), 15h. (Hungry Horse and Shasta Dam), 16h. (near Garm, Obi-garm, and Stalinabad), 17h. (La Paz, near Alicante (2), near Murgab and near Ottawa and La Cave), 19h. (near Berkeley, Lick, Branner, and San Francisco), 20h. (Hungry Horse, Shasta Dam, Overton, Pierce Ferry, and near Ottawa (2)), 22h. (Andijan and near Garm), 23h. (Ottawa, Santa Lucia, near Berkeley, Branner, Lick, and San Francisco).

Nov. 19d. 7h. Region of Samoa. Probably deep.

Apia eP =27m.9s., e =27m.16s. and 27m.36s., S =28m.3s.
Lick iPZ =37m.22s.a, ipP?Z =37m.36s.
Pasadena iPZ =37m.23s., ipPZ =37m.43s.
Palomar iPZ =37m.26s.a, ipPZ =37m.46s.
Riverside iPZ =37m.26s.
China Lake iPZ =37m.31s., ipPZ =37m.51s.
Shasta Dam iP =37m.31s.
Mineral iPZ =37m.33s.k, iZ =37m.41s., and eZ =38m.24s.
Tinemaha iPZ =37m.33s., ipPZ =37m.56s.
Boulder City eP =37m.43s.
Overton iPZ =37m.46s., iZ =38m.6s.
Pierce Ferry iP =37m.46s.
Tucson iP =37m.47s., e =38m.7s.
College iP =38m.19s.
Hungry Horse eP =38m.19s., i =38m.40s.
Collmberg eZ =45m.23s.
Stuttgart ePKPZ =45m.30s.

Nov. 19d. Readings also at 0h. (College), 2h. (Seattle), 4h. (Tchimkent, Garm, Frunse, near Obi-garm, Stalinabad, Murgab, and Tashkent), 5h. (Mineral, Overton, Pierce Ferry, and Collmberg), 6h. (Ottawa, Tucson, Boulder City, Pierce Ferry, and Overton), 8h. (Ashkabad, Tashkent, Andijan, Ksara, Collmberg, near Mineral and Reno), 9h. (College, Hungry Horse, Mineral, and near Tchimkent), 11h. (near Tchimkent and near Tacubaya (4)), 12h. (Murgab, Samarkand, Frunse, near Garm, Stalinabad, Andijan, and near Tacubaya (2)), 13h. (Mount Wilson, Palomar, China Lake, Shasta Dam, Tucson, and near Garm), 14h. (Collmberg), 16h. (near Ottawa), 17h. (College, Hungry Horse (3), Shasta Dam, Boulder City, Pierce Ferry (3), Tucson (2), near Huancayo, near Mizusawa, Christchurch, Samarkand, Frunse, near Garm, Obi-garm, Andijan, Tashkent, Murgab, and Tchimkent), 22h. (near Reno, Mineral, near Granada, and near College), 23h. (Samarkand, near Obi-garm, Garm, and Stalinabad).

Nov. 20d. 4h. 44m. 2s. Epicentre 9°·3S. 74°·1W.

A = +·2704, B = −·9492, C = −·1605; δ = −14; h = +6;
D = −·962, E = −·274; G = −·044, H = +·154, K = −·987.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		3·0	204	i 0 17	−33	i 1 29	+ 2	—	—	i 3·2
La Paz		9·2	142	i 2 17	+ 1	i 4 0	− 3	i 2 30	PP	4·9
Bogota		13·8	0	i 3 37	PP	e 6 32	SSS	i 3 46	PPP	—
St. Louis		50·0	343	e 9 0	+ 2	—	—	—	—	—
Weston		51·5	3	i 9 10	+ 1	e 16 27	− 2	—	—	—
Harvard		51·6	3	i 9 17	+ 7	—	—	—	—	—
Tucson		54·2	322	e 9 30	+ 1	—	—	e 11 42	PP	—
Ottawa		54·5	359	9 36	+ 4	—	—	—	—	—
Shawinigan Falls N.		55·6	2	e 9 46	+ 6	—	—	—	—	—
Pierce Ferry		58·7	323	e 10 4	+ 2	—	—	—	—	—
Palomar	z.	58·8	318	i 10 3	+ 1	—	—	i 10 49	P_cP	—
Boulder City		59·1	322	e 10 5	+ 1	—	—	—	—	—
Overton	z.	59·3	323	e 10 7	+ 1	—	—	e 10 51	P_cP	—
Riverside	z.	59·5	319	i 10 7	0	—	—	i 10 51	P_cP	—
Pasadena	z.	60·1	319	i 10 11	0	—	—	—	—	—
China Lake	z.	60·8	321	e 10 15	− 1	—	—	—	—	—
Tinemaha	z.	61·9	321	i 10 24	0	—	—	—	—	—
Lick	z.	64·3	319	e 10 39a	0	—	—	i 10 45	P	—
Reno	z.	64·4	322	e 10 42	+ 2	—	—	—	—	—
Branner	z.	64·7	319	i 10 43k	+ 1	—	—	—	—	—
Berkeley	z.	65·0	319	i 10 44k	0	—	—	—	—	—
Mineral	z.	66·0	322	e 10 45k	− 5	—	—	—	—	—
Shasta Dam		66·7	322	i 10 53	− 2	—	—	—	—	—
Hungry Horse		67·3	333	i 11 1	+ 2	—	—	—	—	—
Victoria		72·1	328	e 11 27a	− 1	—	—	—	—	—
College		91·5	336	i 13 9	− 1	—	—	—	—	—
Stuttgart	z.	92·5	41	e 13 14	0	—	—	—	—	—

Additional readings :—
La Paz iNZ = 3m.26s., iSS = 4m.18s., iSSS = 4m.30s.
Bogota eSS = 6m.53s., iP_cP = 8m.21s., eS_cPEN = 10m.38s.
St. Louis i = 9m.3s. and 9m.6s.

Nov. 20d. 7h. 9m. 43s. Epicentre 28°·1N. 112°·6W.

Felt in the State of Sonora, Mexico.
Epicentres : 28°N. 112°W. (U.S.C.G.S.).
As adopted (J.S.A.).

Monthly seismic bulletin, Tacubaya, Nov., 1949.

A = −·3397, B = −·8161, C = +·4675; δ = −3; h = +2;
D = −·923, E = +·384; G = −·180, H = −·432, K = −·884.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		4·5	20	i 1 4	− 7	e 1 38	−27	—	—	e 2·1
Chihuahua		5·8	83	1 12	−17	—	—	—	—	2·4
La Jolla		6·3	321	e 1 38	+ 2	—	—	—	—	—
Palomar		6·4	326	i 1 37	− 1	—	—	—	—	—
Riverside		7·2	326	i 1 51	+ 2	—	—	—	—	i 4·1
Mazatlan		7·4	130	e 12 41	P_cS	—	—	—	—	—
Pasadena		7·7	323	e 1 54k	− 2	i 3 29	+ 4	i 1 57	P	i 4·0
Boulder City		8·1	347	e 1 59	− 3	—	—	—	—	i 4·2
Pierce Ferry		8·1	352	i 1 59	− 3	i 4 19	+44	i 2 25	P*	—
Overton	z.	8·6	350	i 2 5	− 4	—	—	—	—	—
China Lake	z.	8·8	333	e 2 10	− 1	—	—	i 2 15	PP	i 4·8
Tinemaha	z.	10·2	333	i 2 31	0	—	—	i 2 38	PP	i 5·6
Fresno		10·6	327	e 2 36k	0	—	—	e 2 39	P	e 4·9
Guadalajara		11·2	129	e 2 38	− 6	e 4 58	+ 6	—	—	5·4
Lick		12·0	323	e 2 55a	0	e 5 44	SSS	i 3 9	PP	e 6·4

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Santa Clara		12·2	322	e 2 59	+ 1	i 4 28	−48	i 3 3	P	e 5·1
Branner		12·3	322	i 3 0a	+ 1	e 5 35	SS	i 3 11	PP	e 6·8
Berkeley		12·7	323	e 3 1	− 4	e 5 29	+ 1	e 3 18	PP	i 6·8
Salt Lake City		12·7	3	e 3 4	− 1	e 5 26	− 2	—	—	e 6·0
San Francisco		12·7	322	e 3 8	+ 3	e 5 30	+ 2	i 3 18	PP	—
Reno		12·9	324	e 3 9k	+ 2	—	—	i 3 31	PPP	e 6·9
Logan		13·7	3	i 3 14	− 4	i 5 38	−14	i 3 45	PPP	i 6·4
Mineral		14·4	331	e 3 29k	+ 2	e 6 26	SS	e 3 33	PP	e 7·2
Shasta Dam		15·0	330	i 3 36	+ 1	e 6 32	+ 9	e 5 20	?	e 7·4
Tacubaya		15·0	122	i 3 41	+ 6	e 6 48	SSS	—	—	—
Ferndale		15·8	325	e 3 49	+ 4	e 6 53	+11	e 3 55	PP	e 7·7
Arcata		15·9	327	e 3 45a	− 2	e 7 5	SS	—	—	e 8·0
Puebla		15·9	121	e 3 37	−10	e 7 1	SS	—	—	e 8·1
Vera Cruz		17·4	116	3 55	−11	7 28	+ 9	—	—	—
Bozeman		17·7	5	i 4 15	+ 5	i 7 43	+17	—	—	e 8·6
Rapid City	E.	17·7	24	e 3 12	−58	e 6 27	−59	—	—	—
Butte	N.	18·0	1	i 4 16	+ 3	e 7 42	+10	—	—	e 9·4
Lincoln	E.	18·3	41	i 4 18	+ 1	i 7 42	+ 3	i 4 54	PPP	e 8·4
New Orleans		19·8	79	6 28	?	—	—	—	—	—
Hungry Horse		20·3	359	i 4 37	− 3	e 8 28	+ 5	e 4 48	PP	e 11·4
Seattle		21·0	343	e 4 50a	+ 3	i 8 36	− 1	i 5 8	PP	e 9·0
Florissant		21·4	54	e 4 48	− 3	—	—	5 9	PP	e 11·1
St. Louis		21·4	54	e 4 48	− 3	e 8 50	+ 5	i 4 58	P	e 11·1
Mobile		21·5	76	e 5 12	PP	i 9 1	+14	—	—	—
Victoria		22·1	342	4 56a	− 3	9 12	+14	6 34	?	12·3
Saskatoon		24·5	10	5 27	+ 5	9 50	+10	6 12	PPP	11·3
Chicago		24·6	48	i 5 25	+ 2	e 9 34	− 8	e 6 0	PP	e 11·7
Cincinnati		25·8	57	5 35	+ 1	i 10 4	+ 2	i 6 1	PP	—
Columbia		27·6	68	e 5 54	+ 3	e 10 35	+ 3	e 6 37	PP	e 14·0
Cleveland		28·7	54	e 5 57	− 4	i 10 51	+ 1	i 12 13	SS	13·4
Pennsylvania	N.	31·2	56	e 5 51	−32	e 11 12	−17	—	—	—
Washington		31·4	60	e 6 24	− 1	—	—	—	—	i 14·4
La Cave		32·3	46	e 6 29	− 4	—	—	—	—	—
Rolphton		32·9	48	e 6 35	− 3	—	—	—	—	e 17·3
Philadelphia		33·0	59	i 6 36	− 3	i 11 53	− 4	e 7 48	PP	e 14·6
Sitka		33·6	338	e 6 39	− 5	i 12 1	− 5	e 7 55	PP	e 14·8
Ottawa		33·9	50	6 43	− 4	12 17	+ 6	e 8 0	PP	18·3
City College, N.Y.		34·1	58	i 6 49	+ 1	i 12 16	+ 2	i 8 14	PP	e 15·0
Fordham		34·1	58	e 6 49	+ 1	i 12 20	+ 6	—	—	i 17·2
Harvard		36·1	55	i 7 7	+ 2	i 12 45	0	i 8 31	PP	e 18·7
Shawinigan Falls	N.	36·2	48	7 16	+10	—	—	—	—	—
Weston		36·3	55	i 7 9	+ 2	i 12 52	+ 4	e 8 24	PP	18·4
Seven Falls	E.	37·7	48	e 7 20	+ 1	16 13	SSS	e 8 47	PP	19·5
Bermuda		41·4	72	(i 7 41)	− 9	(e14 38)	+33	—	—	(i 22·4)
Honolulu		41·5	272	i 7 59	+ 9	e 14 27	+20	e 9 40	PP	e 17·5
College		43·0	339	e 8 3	0	e 14 55	PPS	i 8 7	P	e 22·8
Bogota		43·4	115	i 8 1	− 5	i 14 40	+ 5	e 10 3	PP	21·3
Fort de France		49·4	95	e 8 56	+ 3	i 16 7	+ 7	—	—	e 24·5
Ivigtut		53·6	34	—	—	i 17 6	+ 8	22 17	SSS	25·3
Huancayo		53·8	133	e 9 33	+ 7	e 17 0	− 1	e 20 57	SS	i 23·9
La Paz		61·8	130	i 10 42	+19	i 18 53	+ 7	i 12 45	PP	30·3
Scoresby Sund		64·1	22	—	—	19 19	+ 5	23 23	SS	—
Reykjavik	N.	65·5	29	—	—	e 26 59	SSS	—	—	e 32·8
Aberdeen		77·1	32	i 20 31	?	i 21 37	− 9	e 32 27	Q	e 34·8
Edinburgh	E.	77·2	34	—	—	e 21 38	− 9	—	—	—
Bergen		78·5	27	—	—	e 22 5	+ 4	—	—	e 34·3
Durham	N.	78·6	34	—	—	i 22 12	+10	—	—	—
Kew		81·1	36	i 12 27	+ 9	e 22 31	+ 3	e 23 14	PS	e 32·3
Lisbon		82·5	50	12 35a	+ 9	i 22 52	+10	33 53	Q	39·7
Upsala		83·4	24	e 15 6	?	e 22 48	− 3	15 37	PP	e 38·3

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
De Bilt		83·5	33	i 12 39	+ 8	e 22 57	+ 5	e 28 17	SS	e 34·3
Paris		84·1	37	i 12 41	+ 7	e 22 58	0	e 31 40	SSS	e 40·3
Copenhagen		84·4	28	i 12 45	+ 9	e 23 1	0	28 25	SS	38·3
Toledo		85·3	48	e 12 50	+10	i 22 55	[− 8]	e 38 33	Q	42·4
Helsinki		85·5	20	e 12 50	+ 9	e 23 15	+ 3	e 23 53	PS	e 35·3
Clermont-Ferrand		86·2	40	i 12 55	+11	i 23 29	+10	e 29 9	SS	40·3
Malaga	z.	86·8	50	i 12 55k	+ 8	i 23 1	[−12]	16 12	PP	42·2
Besançon		86·9	37	e 12 58	+10	—	—	e 13 15	?	—
Potsdam		86·9	31	e 12 52	+ 4	e 23 29	+ 3	e 23 17?	SKS	42·3
Granada		87·0	49	i 13 13k	+25	i 23 33	+ 6	16 21	PP	39·2
Karlsruhe		87·0	35	e 13 3	+15	e 28 0	?	—	—	—
Strasbourg		87·0	35	i 12 57	+ 9	e 23 23	− 4	e 16 26	PP	e 41·3
Jena	N.	87·3	32	e 12 59	+ 9	e 23 34	+ 6	—	—	—
Basle		87·6	36	e 13 1	+10	e 23 25	{+ 1}	—	—	e 39·0
Stuttgart		87·6	34	e 12 59a	+ 8	e 23 33	+ 1	e 16 24	PP	42·3
Tortosa		87·6	45	—	—	23 46	+14	24 19	PS	e 37·3
Collmberg		87·7	32	e 12 59	+ 7	e 23 23	[+ 4]	e 16 33	PP	e 41·3
Almeria		88·0	49	e 12 53	0	i 23 33	− 3	16 17	PP	43·0
Cheb		88·2	32	e 13 7	+13	e 23 32	− 6	—	—	—
Zürich		88·2	36	e 13 1a	+ 7	e 23 39	+ 1	e 24 18	PS	—
Barcelona		88·3	43	e 12 1	−54	e 23 42	+ 3	—	—	e 41·2
Alicante		88·4	47	13 17	+22	i 23 45	+ 5	24 37	PS	e 39·3
Prague		89·2	31	—	—	e 23 33	[+ 5]	e 23 52	S	e 41·3
Florence Arc.		92·0	37	e 16 45	PP	e 24 17	+ 5	—	—	—
Florence Xim.		92·0	37	e 16 34	PP	e 25 0	PS	—	—	—
Triest		92·0	34	e 13 24	+12	i 23 48	[+ 4]	e 17 0	PP	e 42·3
Moscow		92·8	16	e 13 22	+ 6	23 49	[0]	24 22	S	—
Zagreb		93·0	33	—	—	e 23 57	[+ 7]	—	—	e 45·3
Budapest		93·2	30	—	—	e 23 55	[+ 4]	e 24 17?	S	44·3
Irkutsk		93·8	338	e 13 28?	+ 8	24 6	{− 4}	17 12	PP	—
Auckland	N.	93·9	230	—	—	e 24 10	{ 0}	e 30 35	SS	38·5
Rome		93·9	38	e 17 14	PP	e 24 38	+ 9	e 25 44	PS	41·3
Sverdlovsk		95·3	3	17 19	PP	24 6	[+ 3]	25 59	PS	—
Belgrade		95·8	31	—	—	e 23 49	[−16]	—	—	e 53·2
Wellington		96·2	227	—	—	i 24 19	[+11]	e 31 22	SS	e 44·1
Bucharest		98·6	28	—	—	e 24 26	[+ 6]	e 32 7	SSP	43·3
Christchurch		98·8	225	—	—	e 31 42	SS	—	—	40·7
Yalta		101·7	23	e 18 10	PP	—	—	—	—	—
Istanbul		102·6	28	—	—	e 26 27	PS	e 32 12	SS	—
Tiflis		107·5	17	e 18 34	PP	i 28 22	PS	—	—	--
Riverview		109·8	242	e 19 24	PP	e 26 57	S	e 28 54	PS	e 51·2
Tashkent		111·0	358	i 19 10?	[+35]	e 25 32?	[+16]	i 19 47?	PP	—
Andijan		111·4	355	19 20?	PP	—	—	—	—	—
Ksara		111·6	28	19 27	PP	29 3	PS	—	—	—
Helwan	N.	112·9	33	25 38?	?	26 44	S	e 34 59	SS	—
Obi-garm		113·6	357	e 19 30	PP	—	—	—	—	—
Stalinabad		113·7	358	e 19 35	PP	—	—	—	—	—
Ashkabad		113·8	8	e 19 22	PP	—	—	—	—	—
New Delhi	N.	122·9	350	—	—	e 30 31	PS	—	—	e 67·2
Bombay	N.	133·1	352	e 21 14	PP	—	—	—	—	—
Poona	N.	133·3	351	e 22 54	PKS	—	—	—	—	i 68·2
Hyderabad	E.	133·6	345	23 38	?	39 45	SS	—	—	—
Kodaikanal	E.	140·7	345	—	—	e 32 17	PS	—	—	—
Colombo	E.	143·3	339	23 17?	PKS	—	—	—	—	69·3
Grahamstown	Z.	144·7	108	e 19 47	[+ 8]	—	—	—	—	—
Pretoria	Z.	145·1	95	i 19 45	[+ 6]	—	—	i 19 51	PKP_2	—

Additional readings and notes :—
Tucson i = 1m.9s., iS = 1m.32s.
Boulder City i = 2m.12s. and 2m.53s.
Pierce Ferry i = 2m.45s.
Lick eEN = 2m.59s., eSE = 5m.54s.
Branner eN = 3m.5s. and 3m.16s., eE = 3m.22s.
Berkeley ePEZ = 3m.5s., iP = 3m.12s.k, eN = 3m.22s., eE = 3m.30s., iZ = 3m.37s., eEN = 5m.41s., iEN = 5m.46s., iZ = 5m.54s.

Continued on next page.

San Francisco eSN =5m.22s.
Logan iP =3m.19s., i =4m.22s., iS =5m.17s.
Ferndale eSN =7m.3s.
Arcata i =3m.53s.
Seattle i =4m.57s., 5m.24s., 5m.41s., 6m.6s., 6m.32s., 6m.42s., 7m.42s., 7m.42s. and 7m.54s., iS =8m.30s.
Saskatoon S =9m.59s.
Chicago e =10m.35s.
Cleveland ePE =6m.2s., iN =11m.39s.
Pennsylvania eN =6m.47s., eEN =8m.17s.
Sitka iP =6m.43s.
Ottawa SS =14m.9s., SSS =14m.53s.
City College, N.Y. eS? =11m.55s.
Fordham eS =11m.50s.
Weston ePcP =9m.19s., iSS =15m.17s., iScS =17m.53s.
Seven Falls eE =9m.27s., eSE =14m.17s.
Bermuda i =(15m.32s.), eSS =(18m.57s.), readings reduced by 3 minutes.
Bogota iZ =8m.14s., iSSEN =18m.30s.
Huancayo i =17m.14s.
La Paz iPPP =14m.13s., iPPS =19m.29s., iScS =20m.25s., iSS =22m.57s., iSSS =25m.47s., Q =28m.29s.
Kew ePPZ =16m.2s., ePPPZ =17m.38s., eSSEN =27m.42s., eSSSEN =31m.14s.
Lisbon SN =22m.58s.
Upsala SN =22m.54s., eN =25m.39s., eSSN =28m.4s., eSSSE =31m.17s.?, eQ =34·3m.
Paris i =12m.49s., e =34m.45s., and 34m.55s.
Copenhagen i =23m.11s., 24m.45s.
Clermont-Ferrand eSSS =32m.30s., Q =36·3m.
Malaga PPPZ =18m.3s., iPSZ =24m.7s.
Granada S =23m.56s., PPS =25m.12s., SSS =32m.57s.
Strasbourg i =13m.7s., 13m.21s., and 13m.58s., ePPP =18m.13s., iS =23m.36s., ePS =24m.38s. and 24m.51s., e =28m.51s., eSS =29m.10s., eSSS =33m.12s., eQ =35m.47s.
Stuttgart e =13m.39s., ePPP =18m.30s., eZ =20m.27s., eSKS =23m.23s., ePS =24m.38s., ePPS =25m.24s., e =26m.47s., eZ =27m.57s., eSS =29m.5s., eSSS =33m.17s., eSSSS? =36m.5s., eQ =40·3m.
Collmberg ePZ =13m.30s., ePPPP?Z =20m.2s.?, eSEN =23m.29s., eSSSE =32m.35s., eE =35m.47s.
Almeria PPP =18m.17s., SKS =23m.17s., PPS =24m.57s., SS =29m.23s.
Alicante PP =16m.49s., PPP =18m.48s., SS =28m.49s., SSS =32m.17s.
Prague eSS =29m.37s., e =34m.11s.
Triest iS =24m.18s.?, ePPS =27m.7s., eSS =30m.11s., eSSS =33m.59s.
Budapest eN =38m.17s.? and 42m.17s.?
Irkutsk ScS =24m.38s., PS =25m.56s.?, SS =31m.5s.
Rome eSKS? =24m.4s.
Sverdlovsk S =24m.43s., SS =30m.19s., SSS =34m.17s.
Belgrade e =25m.17s., 31m.7s., 33m.39s., and 37m.1s.
Wellington e =24m.57s., eQ =38·8m.
Bucharest eN =34m.59s.
Riverview eS?EN =27m.16s., eE =29m.21s., eSS?EN =34m.49s., eQN =46·1m.
Tashkent eS =26m.22s., ePS =28m.46s.?
Helwan eN =36m.5s.
Poona ePKSN =26m.45s., iPPPN =28m.42s., iPSN =36m.13s., ePPSN =38m.1s., eSSPN =44m.39s., eSSSN =48m.49s., readings wrongly identified.
Long waves were also recorded at Dehra Dun, La Plata, Apia, Neuchatel, Taranto, Bologna, and Tananarive.

Nov. 20d. Readings also at 0h. (near Apia), 1h. (Boulder City, Overton, Pierce Ferry, Tucson, Mount Wilson, Riverside, Palomar, China Lake, Tinemaha, Lick, Mineral, Shasta Dam, Hungry Horse, College, and Stuttgart), 2h. (Stuttgart (2), near Batavia, and Bandong), 4h. (Garm, Obi-garm, near Murgab, and near Granada), 5h. (Mineral, Hungry Horse, Andijan, near Garm, Obi-garm, and near Copiapo), 6h. (College, Overton, Garm, Stalinabad, Samarkand, near Andijan, Tashkent, Tchimkent, and near Obi-garm), 7h. (Tucson, Pierce Ferry, near Obi-garm, and near Murgab), 9h. (Wellington, Tacubaya, Puebla, and near Granada), 10h. (Andijan, near Garm, Obi-garm, Stalinabad, near Messina, and near Tchimkent), 11h. (Pasadena, Palomar (2), China Lake, Tinemaha, Pierce Ferry, Tucson (2), College, Andijan, Tchimkent, near Obi-garm, Stalinabad, Murgab, and near Frunse), 12h. (Pasadena and Palomar), 14h. (near Frunse), 16h. (Pierce Ferry), 19h. (Boulder City, Pierce Ferry, Shasta Dam, Tucson, Pasadena, Riverside, Palomar, China Lake, Tinemaha, and near Balboa Heights), 20h. (near Ottawa and near Andijan), 21h. (Tashkent, near Obi-garm, Garm, Stalinabad, Andijan, and Tchimkent), 22h. (Pretoria and Grahamstown).

Nov. 21d. 16h. 31m. 27s. Epicentre 47°·3N. 7°·1E. (given by Strasbourg).

$A = +·6754$, $B = +·0841$, $C = +·7326$; $\delta = -6$; $h = -4$;
$D = +·124$, $E = -·992$; $G = +·727$, $H = +·091$, $K = -·681$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Neuchatel		0·3	199	i 0 8	− 3	i 0 14	− 4	—	—	
Basle		0·4	55	0 11	− 2	0 18	− 3	—	—	
Besançon		0·8	266	i 0 19	+ 1	—	—	—	—	
Zürich		1·0	86	e 0 22	+ 1	e 0 37	+ 1	—	—	
Strasbourg		1·4	19	i 0 29	+ 2	i 0 45	− 1	—	—	
Ravensburg		1·8	74	e 0 39	P_g	e 1 4	S_g	—	—	
Stuttgart		2·0	44	e 0 39	+ 4	e 0 59	− 3	e 0 43	P_g	
Clermont-Ferrand		3·1	241	i 1 0	P_g	i 1 45	S_g	—	—	
Paris		3·4	298	e 1 22	P_g	e 1 41	+ 4	i 1 55	S_g	
Jena		4·7	37	—	—	e 2 21	S*	e 2 40	S_g	
Collmberg	Z.	5·5	42	—	—	e 3 0	S_g	—	—	
Prague		5·6	37	—	—	e 3 2	S_g	—	—	

Additional readings :—
Besançon e = 24s.
Strasbourg i = 33s. and 38s.
Ravensburg eZ = 1m.18s.
Stuttgart eZ = 47s., e = 1m.2s., eS*? = 1m.7s., iS_g = 1m.11s.
Paris eS*? = 1m.52s.
Jena eEN = 2m.32s., eE = 2m.54s.
Collmberg eZ = 3m.8s. and 3m.11s.

Nov. 21d. Readings also at 0h. (Riverside, China Lake, Tinemaha, and Pierce Ferry), 1h. (Copiapo), 2h. (Auckland and near Tacubaya), 3h. (near Branner and Lick), 7h. (Hungry Horse, Frunse, Samarkand, near Andijan and Obi-garm), 9h. (Hungry Horse (2), Shasta Dam, and College), 10h. (Hungry Horse, College, Mizusawa, Andijan, Samarkand, near Obi-garm, and Stalinabad), 11h. (Overton, Pierce Ferry, and Hungry Horse), 12h. (Stuttgart), 13h. (Collmberg), 14h. (near Tacubaya), 16h. (near Alicante, and near Garm), 18h. (China Lake, Tucson, Boulder City, Pierce Ferry, Hungry Horse, College, and Stuttgart), 19h. (College and Ottawa), 20h. (near Andijan, near Frunse, and near Garm, separate shocks), 21h. (College, Hungry Horse, Reno, near Arcata, Ferndale, and Mineral), 22h. (College, and near La Paz), 23h. (Pierce Ferry).

Nov. 22d. 0h. 51m. 52s. Epicentre 29°·3S. 178°·2W. Depth of focus 0·025.
(as on 1949, Sept. 20d.).

$A = -·8730$, $B = -·0274$, $C = -·4869$; $\delta = -5$; $h = +2$;
$D = -·031$, $E = +·1·000$; $G = +·487$, $H = +·015$, $K = -·873$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	9·6	216	i 2 14	− 1	i 4 8	+ 7	—	—	—
Wellington		13·3	203	i 2 59	− 3	i 5 19	− 7	15 11	S_eS	—
Christchurch		16·0	207	3 39	+ 3	i 6 19	− 8	i 15 4	S_eS	—
Apia		16·5	23	e 3 36	− 6	e 6 22	−16	—	—	e 9·8
Brisbane		25·4	267	i 5 10	− 1	i 9 36	+14	e 5 44	PP	i 14·1
Riverview		26·4	251	i 5 23a	+ 2	i 9 45	+ 7	i 6 3	PP	e 11·8
Melbourne		31·7	244	e 5 11	−57	i 10 18	−44	i 5 59	P	—
Honolulu		54·0	24	e 9 2	− 4	e 16 18	− 8	e 11 3	PP	e 25·5
Perth		56·0	249	10 22	+61	18 4	+72	12 8	PP	28·4
Bandoeng		72·8	272	i 11 11	+ 2	i 20 14	− 4	—	—	—
Batavia		73·9	272	i 11 19a	+ 3	i 20 28	− 2	—	—	—
Tokyo		75·8	326	e 11 27	+ 1	20 42	− 9	—	—	30·4
Punta Arenas		76·6	145	10 59	−32	i 20 32	−28	—	—	e 31·4
Nagoya		76·8	324	11 32k	0	e 21 4	+ 2	e 11 51	pP	—
Osaka		77·2	322	e 11 34	0	e 21 4	− 2	14 32	PP	—
Sendai		77·3	329	11 33	− 2	e 20 58	− 9	—	—	—
Mizusawa		77·9	330	11 40	+ 2	e 21 12	− 2	—	—	e 32·5
Hiroshima		78·6	320	11 38	− 4	13 53	?	—	—	—
Hukuoka		79·2	318	i 11 44	− 1	21 7	−20	—	—	—
Branner		84·6	42	i 12 14k	+ 1	e 22 20	− 2	e 13 7	pP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Francisco	N.	84·7	42	e 12 14	0	e 22 21	− 2	—	—	—
Santa Clara		84·7	42	e 12 15	+ 1	e 22 18	− 5	—	—	e 34·4
Pasadena		84·8	47	i 12 15k	+ 1	i 22 25	+ 1	i 15 36	PP	e 39·9
Berkeley		84·9	42	e 12 15k	0	e 22 20	− 5	e 15 34	PP	e 35·0
Lick		84·9	42	i 12 16k	+ 1	e 22 26	+ 1	e 15 38	PP	i 38·6
Ukiah		85·2	40	e 12 18	+ 2	e 22 17	[− 2]	e 15 38	PP	e 35·1
Palomar		85·2	48	i 12 18k	+ 2	e 22 20	[+ 1]	i 15 47	PP	—
Riverside		85·3	47	i 12 17k	+ 1	i 22 29	0	i 30 27	PKKP	—
Ferndale		85·6	38	e 12 28	+10	i 22 47	+15	—	—	—
Fresno		85·6	43	i 12 19k	+ 1	e 22 20	−12	i 13 11	pP	—
Arcata		85·9	39	i 12 25k	+ 6	e 22 30	− 5	e 15 46	PP	—
China Lake	Z.	86·3	45	i 12 23k	+ 2	—	—	i 15 48	PP	—
Shasta Dam		86·7	39	i 12 24	+ 1	i 22 30	[+ 1]	e 15 54	PP	—
Tinemaha		86·7	44	i 12 25	+ 2	i 22 35	[+ 6]	i 15 40	PP	—
Mineral		86·9	40	i 12 25k	+ 1	e 22 36	[+ 6]	i 12 30	PcP	—
Klyuchi		87·1	348	e 12 26	+ 1	—	—	—	—	—
Santa Lucia	N.	87·3	128	e 13 14	pP	i 22 36	[+ 3]	e 24 10	PS	—
Reno		87·4	42	i 12 28k	+ 1	i 22 39	[+ 5]	e 17 23	PPP	e 38·5
Boulder City		88·1	46	i 12 32	+ 2	i 22 46	[+ 8]	i 16 5	PP	e 38·3
Tucson		88·5	51	i 12 34	+ 2	i 23 13	+14	i 16 9	PP	e 36·0
Overton	Z.	88·7	46	i 12 35	+ 2	—	—	i 16 12	PP	—
Pierce Ferry		88·7	47	i 12 34	+ 1	e 22 46	[+ 4]	i 16 12	PP	—
Tacubaya		90·2	68	i 12 49k	+ 9	e 23 28	+14	e 16 27	PP	—
Copiapo	N.	90·9	122	e 13 33	pP	23 27	+ 6	22 58	SKS	—
Seattle		91·6	35	i 12 48	+ 2	23 14	−13	i 13 38	pP	—
Victoria		91·7	34	12 45	− 2	23 7	[+ 8]	16 25	PP	36·1
Vera Cruz		92·6	70	e 12 52	+ 1	e 23 18	SKKS	—	—	—
Salt Lake City		92·9	43	e 12 45	− 7	i 23 13	[+ 7]	e 16 41	PP	e 38·4
Logan		93·5	42	e 12 54	− 1	i 23 52	+ 9	i 16 39	PP	e 37·3
Sitka		93·7	22	e 16 24	PP	e 23 20	[+ 9]	e 29 46	SS	e 37·6
Buenos Aires		94·7	135	e 17 2	PP	—	—	—	—	—
La Plata		94·8	135	13 44	pP	31 26	SS	19 25	PPP	—
Huancayo		95·1	107	e 13 14	+12	i 23 32	[+14]	e 16 56	PP	e 40·5
Butte	N.	95·6	40	e 13 10	+ 5	i 23 25	[+ 4]	e 16 58	PP	e 38·7
Bozeman		96·3	40	e 13 13	+ 5	e 24 12	+ 5	e 16 48	PP	e 40·7
Hungry Horse		96·3	37	i 13 7	− 1	e 24 4	− 3	e 16 52	PP	—
College		96·8	13	i 13 7	− 3	i 23 22	[− 5]	e 17 3	PP	e 38·5
La Paz		98·6	115	e 13 36	+18	i 23 44	[+ 8]	i 14 16	pP	46·5
Rapid City	E.	100·1	45	e 13 25	0	i 23 45	[+ 1]	e 16 34	PP	e 42·4
Saskatoon		102·3	37	17 53	PP	25 8	+11	26 38	PS	—
Lincoln	E.	102·7	51	e 17 37	PP	e 24 33	SKKS	e 25 21	S	e 43·2
Calcutta	E.	103·6	288	e 17 55	PP	i 24 6	[+ 6]	—	—	—
Colombo	E.	103·7	270	18 18	PP	28 33	PPS	—	—	44·6
Bogota		104·6	93	e 13 56	P	e 24 11	[+ 6]	i 18 10	PP	e 53·1
Irkutsk		105·5	320	13 50	P	i 24 12	[+ 3]	e 14 42	pP	—
Florissant		106·2	55	e 13 59	P	i 25 45	+16	i 18 24	PP	—
St. Louis		106·2	55	e 13 57	P	i 25 43	+14	e 18 22	PP	—
Galerazamba		106·4	87	e 19 39	pPP	i 24 39	[+26]	i 25 32	SKKS	53·1
Kodaikanal	E.	107·4	272	e 15 15	?	—	—	—	—	—
Chicago		109·3	52	e 18 40	PP	e 25 24	S	e 28 10	PS	e 44·5
Hyderabad	E.	109·7	280	e 17 59	[− 8]	—	—	—	—	—
Columbia		111·2	62	—	—	e 24 37	[+ 4]	e 28 21	PS	e 45·6
Cleveland		113·4	54	e 19 8	PP	e 24 46	[+ 4]	i 29 2	PS	—
Grahamstown	Z.	113·5	203	i 18 17	[+ 2]	—	—	i 19 13	PP	—
Poona		114·2	279	e 17 28	[−48]	i 29 8	PS	i 36 8	SSP	51·1
Tananarive		114·8	228	—	—	e 28 27	PS	e 35 39	SSP	e 47·5
Bombay		115·2	278	e 17 42	?	e 22 56	?	e 30 12	PPS	—
New Delhi	N.	115·2	290	—	—	i 26 2	S	i 29 11	PS	51·4
Pennsylvania	E.	115·8	56	i 19 33	PP	e 24 46	[− 5]	—	—	—
Washington		115·9	58	e 19 19	PP	e 29 1	PS	e 35 12	SS	e 57·3
Rolphton		117·4	50	e 18 24a	[+ 1]	e 28 50	PS	—	—	—
Philadelphia		117·6	57	e 18 53	[+30]	e 24 56	[− 1]	e 19 42	PP	e 46·7
San Juan		117·7	84	e 18 39	[+16]	e 25 13	[+15]	e 19 51	PP	e 48·2
Ottawa		118·6	51	18 25k	[0]	25 4	[+ 3]	19 46	PP	53·1
Fordham		118·8	57	e 18 32	[+ 7]	e 25 9	[+ 7]	i 19 54	PP	50·9

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pretoria	Z.	119·7	208	i 18 29	[+ 2]	i 28 42	PKKP	e 19 24	PP	—
Fort de France		120·5	90	e 19 8	[+39]	e 30 8	SP	—	—	e 49·6
Harvard		120·9	55	i 18 31	[+ 1]	e 29 47	PS	i 20 0	PP	e 60·0
Weston		121·0	55	i 18 30	[0]	i 25 13	[+ 4]	i 19 49	PP	50·1
Frunse		121·3	304	e 18 36	[+ 6]	e 26 38?	SKKS	—	—	—
Seven Falls	E.	122·3	50	20 14	PP	25 20	[+ 7]	30 4	PS	65·0
Andijan		122·5	302	i 18 33	[0]	i 29 27	PS	—	—	—
Bermuda		123·5	68	e 22 27	?	e 28 3	SKKS	e 38 6	SS	e 50·7
Garm		123·7	299	e 18 37	[+ 2]	—	—	—	—	—
Obi-garm		124·1	299	i 18 37	[+ 1]	—	—	i 20 25	PP	—
Stalinabad		124·8	299	i 18 47	[+10]	—	—	—	—	—
Tchimkent		124·8	303	e 18 42	[+ 5]	—	—	—	—	—
Tashkent		124·9	301	i 18 39	[+ 2]	i 36 55	SS	i 19 35	pPKP	—
Samarkand		126·3	299	e 18 41	[+ 1]	—	—	—	—	—
Halifax		126·9	54	e 21 46	pPP	e 26 50	SKKS	—	—	69·1
Sverdlovsk		130·9	322	i 18 49	[0]	27 39	SKKS	i 19 43	pPKP	—
Ashkabad		132·7	296	e 18 55	[+ 3]	e 22 33	PKS	—	—	—
Ivigtut		134·3	30	i 18 59	[+ 4]	i 22 30	PKS	39 8	SS	66·1
Scoresby Sund		136·7	12	19 5	[+ 6]	22 19	PKS	21 44	PP	—
Grozny		142·3	304	19 6	[− 4]	—	—	i 22 8	PP	—
Tiflis		143·2	302	i 19 10	[− 1]	i 31 55	SKSP	i 20 4	pPKP	—
Moscow		143·3	326	19 7	[− 5]	28 51	SKKS	20 2	pPKP	—
Erevan		143·6	298	e 19 17	[+ 5]	—	—	—	—	—
Leninakan		144·0	300	e 19 13	[0]	—	—	—	—	—
Piatigorsk		144·2	306	19 11	[− 2]	e 29 6	SKKS	—	—	—
Helsinki		145·4	341	i 19 15	[0]	e 32 45	SKSP	e 22 37	PKS	e 61·1
Sotchi		146·6	306	19 20	[+ 2]	—	—	—	—	—
Upsala		147·6	344	i 19 21a	[+ 2]	e 33 0	SKSP	i 22 52	PP	e 60·1
Bergen		148·6	355	19 26	[+ 6]	22 50	PKS	26 8?	PPP	60·9
Theodosia		149·2	310	e 19 27	[+ 6]	—	—	i 20 20	pPKP	—
Yalta		150·2	309	19 24	[+ 1]	—	—	—	—	—
Ksara		150·7	287	i 19 25	[+ 2]	—	—	—	—	—
Aberdeen		152·0	4	19 42	[+17]	30 42	PKKP	i 23 56	PP	—
Copenhagen		152·6	347	i 19 31	[+ 5]	33 37	SKSP	i 20 29	pPKP	—
Lwow		153·5	327	e 19 36	[+ 9]	—	—	—	—	—
Helwan		154·3	278	19 35	[+ 6]	35 32	PPS	20 26	pPKP	—
Durham		154·4	4	19 53	[+24]	—	—	—	—	—
Istanbul		154·9	306	e 19 34	[+ 5]	—	—	e 23 35	PP	—
Rathfarnham Castle		155·3	12	i 19 32	[+ 3]	—	—	e 23 34	PP	—
Bucharest		155·5	315	e 19 27	[− 3]	i 22 55	PKS	i 35 3	PPS	44·1
Potsdam		155·5	345	i 19 31k	[+ 1]	i 28 57	SKKS	i 23 32	PP	68·1
Skalnate Pleso		155·7	331	e 19 39	[+ 9]	e 43 2	SS	e 19 58	PKP_2	—
Raciborzu		155·8	335	e 19 29	[− 1]	—	—	e 20 3	PKP_2	—
Collmberg		156·5	342	e 19 31	[0]	e 34 2	SKSP	i 20 1	pPKP	—
De Bilt		157·1	354	i 19 40	[+ 8]	i 34 8	SKSP	i 20 9	PKP_2	—
Jena		157·2	342	e 19 33	[+ 1]	e 26 13	[− 4]	e 20 18	PKP_2	—
Prague		157·2	338	e 19 36	[+ 4]	e 25 27	[−50]	i 20 20	pPKP	e 55·1
Budapest	E.	157·4	329	19 38	[+ 5]	43 33	SS	20 9	PKP_2	e 51·1
	N.	157·4	329	e 19 42	[+ 9]	30 18	SKKS	23 48	PP	e 51·1
Ogyalla		157·5	331	e 19 43	[+10]	e 26 32	[+14]	i 20 14	pPKP	—
Cheb		157·7	343	e 19 38	[+ 5]	e 33 8	SKSP	e 20 26	pPKP	61·6
Kew		157·8	3	i 19 35a	[+ 2]	e 28 15	SKKS	e 36 39	PPS	e 51·1
Sofia		158·1	313	e 19 51?	[+17]	e 33 46	SKSP	i 23 49	PP	71·9
Kalossa	N.	158·2	328	e 19 44	[+10]	e 27 13	[+55]	e 24 34	PP	—
Belgrade		158·6	320	e 19 34k	[0]	e 28 38	SKKS	i 23 52	PP	e 85·6
Karlsruhe		159·7	349	i 19 37	[+ 2]	—	—	—	—	—
Stuttgart		159·7	346	i 19 36k	[+ 1]	e 34 8	SKSP	e 20 16	PKP_2	—
Strasbourg		160·2	348	i 19 37	[+ 1]	i 26 28	[+ 8]	i 20 18	pPKP	e 74·1
Paris		160·5	359	i 19 37	[+ 1]	e 30 36	SKKS	i 20 19	pPKP	e 71·1
Basle		161·2	348	i 19 42	[+ 5]	—	—	e 24 8	PP	—
Zürich		161·2	346	e 19 34k	[− 3]	—	—	e 24 4	PP	—
Triest		161·2	334	e 19 42	[+ 5]	i 33 45	SKSP	i 20 46	PKP_2	e 70·1
Chur		161·5	345	e 19 37k	[0]	—	—	e 24 9	PP	—
Besançon		161·8	351	e 19 38	[0]	—	—	e 20 25	PKP_2	—
Neuchatel		161·9	347	e 19 39	[+ 1]	—	—	e 24 7	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Padova		162·8	336	19 42	[+ 3]	34 45	PSKS	20 31 PKP_2	—
Bologna		163·0	336	i 19 46a	[+ 7]	—	—	i 20 37 PKP_2	—
Pavia		163·1	343	i 19 46a	[+ 7]	—	—	i 20 36 PKP_2	—
Clermont-Ferrand		163·5	354	e 19 44	[+ 5]	e 38 2	PPS	i 20 35 PKP_2	97·1
Florence Arc.		163·7	335	e 19 44	[+ 5]	e 35 20	PSKS	e 20 33 PKP_2	—
Florence Xim.		163·7	335	e 19 38	[− 1]	—	—	i 24 28 PP	—
Prato		163·7	335	e 19 45	[+ 6]	—	—	i 24 30 PP	—
Rome		164·7	328	i 19 40	[0]	i 45 52	SS	i 24 37 PP	—
Messina		165·5	313	e 19 53	[+12]	—	—	e 20 38 pPKP	—
Lisbon		166·9	41	i 19 49k	[+ 7]	45 16	SS	20 40 pPKP	—
Toledo	z.	168·4	22	i 19 47	[+ 4]	e 29 5	SKKS	i 20 56 PKP_2	—
Tortosa		168·5	5	19 54	[+11]	31 15	SKKS	20 58 PKP_2	e 92·1
Alicante		170·8	11	19 56	[+12]	27 38	[+71]	21 8 PKP_2	e 81·3
Granada		170·9	29	i 19 47a	[+ 2]	26 29	[+ 2]	21 2 PKP_2	96·1
Malaga	z.	170·9	34	19 44a	[− 1]	i 27 10	[+43]	i 20 38 PKP_2	68·8
Almeria		171·7	24	i 19 49	[+ 4]	26 42	[+14]	i 21 10 PKP_2	82·1
Algiers Univ.	z.	172·4	252	e 19 48	[+ 3]	--	--	e 21 9 PKP_2	—
Tamanrasset	z.	172·7	208	i 19 49a	[+ 3]	e 31 46	SKKS	i 21 17 PKP_2	—

Additional readingsz:—
Christchurch iPSN =12m.21s.
Apia e =3m.53s., eS =6m.25s., e =6m.37s.
Brisbane ePN =5m.15s., ePPPN =5m.58s., iSSN =10m.38s., iEN =10m.58s., iZ = 11m.57s.
Riverview iPPPEZ =6m.14s., iP_cPNZ =8m.51s., iSN =9m.50s., iSSNZ =10m.48s., iSSSE =11m.5s. and many other unidentified i readings.
Honolulu eSS =20m.34s.
Perth i =16m.54s., PS =18m.28s., SS =22m.8s., SSS =24m.19s.
Tokyo SZ =20m.47s.
Nagoya eZ =11m.37s.
Osaka e =13m.8s. and 15m.58s.
Mizusawa eSE =21m.16s.
Branner ePPN =15m.31s., eSE =22m.24s.
San Francisco eSE =22m.30s.
Pasadena iPSZ =23m.30s., iPPSZ =23m.52s., eSSEN =28m.2s., eSSSZ =31m.35s., iQEN =34·5m., ePKP,PKPZ =38m.35s.
Berkeley iPEN =12m.19s., iZ =13m.8s., iE =13m.30s., iNZ =13m.34s., ePPEZ = 15m.38s., eSNZ =22m.26s., iSE =22m.37s., iPSZ =23m.18s., iPSN =23m.31s., ePSE =23m.44s., eN =27m.2s.
Lick iZ =12m.20s. and 13m.9s., eSZ =22m.31s., eSE =22m.36s., eZ =30m.23s., eEN = 35m.8s.
Ukiah e =23m.50s., eSS =27m.34s.
Palomar iZ =12m.39s., iEZ =13m.9s., iPKP,PKP =38m.30s., e =39m.10s.
Riverside ePKP,PKPZ =38m.17s.
Fresno eSE =22m.30s.
Arcata iZ =13m.18s. and 14m.48s.
China Lake iZ =13m.16s., ePKKPZ =30m.21s., ePKP,PKPZ =38m.19s.
Shasta Dam i =13m.33s. and 22m.51s., ePKKP? =29m.36s., ePKP,PKP? =38m.28s.
Tinemaha ePKKPZ =30m.17s., ePKP,PKPZ =38m.20s.
Mineral iZ =12m.48s. and 13m.19s., iPPZ =15m.52s., eE =22m.52s., eZ =23m.20s.
Santa Lucia eN =14m.58s.
Reno iNZ =12m.33s., eZ =22m.34s., eN =23m.2s.
Boulder City i =13m.35s., e =24m.14s., ePKKP =30m.16s.
Tucson i =12m.40s. and 13m.26s., epPP =18m.19s., iPS =24m.14s., eSS =29m.3s., ePKKP =30m.15s., ePKP,PKP =38m.16s.
Overton iZ =15m.46s., iPKKP?Z =30m.22s.
Pierce Ferry i =13m.54s., ePKKP =30m.18s., ePKP,PKP =38m.22s.
Tacubaya eSKS =23m.0s.
Copiapo eN =15m.8s., N =22m.8s., 24m.32s., and 28m.35s.
Seattle isP =13m.53s., iPP =16m.43s., ipPP =17m.23s., iPPP =18m.33s., iSKS = 23m.8s., ipS =24m.16s.,isS =24m.45s., and many other readings given without phase.
Victoria PS =23m.35s., SS =25m.5s.
Salt Lake City iS =23m.51s., eSS =29m.13s.
Logan i =17m.55s., iSKS =23m.10s., iPS =24m.44s., eSS =29m.57s.
Sitka i =23m.48s.
La Plata EN =20m.55s., N =22m.27s., SN =25m.8s., PPSE =26m.8s.
Huancayo i =24m.16s. and 25m.4s., iSS =30m.51s.
Butte eS?N =24m.16s., eSS?N =30m.28s.
Bozeman eSKS =23m.29s., eSS =30m.29s., eSSS =34m.51s.
Hungry Horse iPP =16m.59s., iSKS =23m.22s., ePKKP =29m.52s., ePKP,PKP? = 40m.37s.
College ePPP =19m.8s.

Continued on next page.

La Paz ipPZ =14m.36s., iPPZ =17m.28s., ipPPZ =18m.14s., iEZ =18m.38s., iSKKS = 24m.0s., iS =24m.11s., isS =24m.42s., iS_cS? =25m.12s., iPS =26m.8s., iPPS = 26m.54s., iSS =31m.28s.
Rapid City iPS?E =25m.23s.
Saskatoon SKS =23m.50s., PPS =28m.0s., SS =32m.18s.
Lincoln eSS?E =31m.51s.
Bogota eE =19m.50s., eSKKSE =24m.57s., iSEN =25m.43s., ePS?EN =27m.33s., ePPSE =28m.35s., eSSEN =33m.9s.
Irkutsk ePP =18m.10s., PKS =21m.29s., eS =25m.31s.
Florissant i =28m.30s., iSS =33m.13s.
St. Louis e =25m.3s., iSS? =33m.11s.
Galerazamba iSSSEN =37m.51s.
Chicago eSS =34m.45s., eSSS =37m.40s.
Columbia eSS =34m.15s.
Cleveland ePPE =19m.14s., eSKKSE =25m.53s., eSEN =26m.48s., eN =34m.23s., eSSN =34m.43s.
Grahamstown iPPPZ =21m.33s., ePKKPZ =29m.2s.
Poona iSKSEN =28m.8s., iPSEN =30m.48s., iPPSEN =31m.41s., SSPEN =36m.29s., QEN =46·1m.
Bombay iEN =31m.33s., iN =36m.24s.
New Delhi iSKKSN =26m.51s., iN =28m.17s., iPPSN =30m.2s., iPKKPN =30m.51s., eSSN =34m.54s.
Pennsylvania eE =26m.8s., iN =26m.28s. and 26m.48s., eE =27m.44s.
Washington ePP =20m.15s.
Phildelphia e =15m.9s. and 25m.56s., eSKS =26m.15s., e =27m.51s., ePS =29m.32s., eSS =35m.35s.
San Juan e =28m.57s., eSS? =35m.25s.
Ottawa e =19m.30s., PPP =21m.48s., SKKS =26m.30s., S? =27m.26s., PS =29m.32s., PPS =30m.44s., SS =35m.44s., SSS =43m.38s.
Fordham iSKKS =26m.33s., iSS =36m.3s.
Pretoria ePPPZ =21m.45s.
Harvard e =26m.52s., ePPS? =30m.54s., eSS =36m.19s., eQ =51m.33s.
Weston iPS =29m.55s., iSS =36m.23s., iSSS =41m.8s.
Seven Falls SKKSE =26m.50s., S?E =28m.22s., SSE =37m.4s., eE =38m.32s.
Bermuda e =32m.26s.
Sverdlovsk eP =15m.47s., ePP =21m.11s., iPPS =33m.2s., eSS =38m.13s.
Ivigtut i =22m.8s., 23m.14s., 23m.39s., 33m.38s., and 47m.26s.
Scoresby Sund 23m.39s., 28m.3s., 31m.22s., 32m.50s. 34m.2s., and 38m.32s.
Tiflis iPP =22m.24s., ePPP =25m.38s., eSPP =34m.50s.
Moscow iPP =22m.24s., i =23m.31s., S =28m.54s., SS =40m.34s., sSS =42m.4s.
Helsinki i =19m.20s., e =20m.20s. and 20m.44s., SKKKS =36m.21s., eSS =41m.8s.
Upsala iPKP =19m.26s., PKSN =23m.21s., eSS =41m.8s.?, eSSSN =46m.44s., and other unidentified i and e readings.
Bergen eZ =20m.24s., eN =33m.8s.?, eE =43m.22s.
Aberdeen iE =20m.26s., iN =21m.5s., iE =21m.43s., iPPPE =26m.51s., PSEN = 33m.26s., PPSE =34m.22s., iEN =40m.9s., SSEN =43m.40s.
Copenhagen i =19m.49s., iPP =23m.19s., 25m.12s., i =26m.48s., 28m.40s., SKKS = 34m.35s., 37m.52s.
Helwan PKP_2E =19m.59s., eN =23m.40s., eE =30m.34s.
Durham iN =21m.2s., iEN =21m.28s.
Bucharest ePZ =19m.35s., iNZ =20m.5s., iE =20m.33s., iZ =20m.53s., iE =22m.3s., iE =35m.9s.
Potsdam iZ =19m.35s., e =19m.38s., iN =20m.1s., iE =20m.7s., iZ =20m.27s., and 21m.10s., iE =22m.9s., iN =23m.38s., iZ =23m.55s., 24m.7s., 24m.46s., and 25m.11s., iPPPZ =27m.7s.
Skalnate Pleso ePP =23m.8s., ePPP =27m.0s., e =28m.11s., and 30m.8s., eSSS = 49m.32s.
Raciborzu ePKP?Z =19m.32s., eZ =19m.37s., eEN =19m.46s., eZ =20m.0s.
Collmberg iPKPNZ =19m.37s., iZ =19m.43s., 19m.48s., and 20m.6s., $ePKP_2Z$ = 20m.28s., ePPNZ =23m.36s., eNZ =24m.54s., ePPPE =27m.44s., ePPSE = 37m.44s., eN =38m.8s.?, SSE =45m.14s.?, SSSN =49m.14s.?
De Bilt iZ =20m.29s. and 21m.8s., iPP =23m.45s., iZ =27m.24s.
Jena eZ =19m.39s. and 20m.5s., eE =20m.9s., $ePKP_2N$ =20m.22s., eE =20m.32s., eN =20m.37s., ePP? =23m.41s., ePP?N =23m.44s., eSKS?N =26m.18s., eN = 29m.40s.
Prague $iPKP_2$ =20m.8s., isPKP =20m.30s., $ipPKP_2$ =20m.43s., ePP =23m.38s., e = 24m.46s.
Budapest PPE =23m.45s., eN =25m.8s.?, PPPN =27m.19s., PPPE =27m.25s., eE = 28m.33s., SKSE =30m.40s., P_cS,PKPN =31m.36s., S_cS,PKPN =35m.6s., PPSN = 37m.14s., SSN =43m.24s., eN =45m.40s., SSSN =49m.25s., eSSSE =49m.38s.
Ogyalla e =21m.23s., eSKP =22m.32s., ePP? =23m.43s., e =24m.45s. and 26m.13s., epPP? =27m.33s., e =28m.31s., eSKSP? =32m.38s., ePPS? =37m.33s., eSS? = 44m.39s.
Cheb PKP_2 =20m.11s., $epPKP_2$ =21m.3s., ePP =23m.48s., e =24m.48s., and 32m.23s., ePPS =36m.46s., e =44m.56s., eSSS =49m.20s.
Kew iZ =20m.12s. and 20m.30s., iPPZ =21m.24s., ePPP =24m.57s., ePS =33m.7s., ePPS =34m.11s., e =38m.27s., ePSS?EZ =42m.23s., eSSS?NZ =45m.59s., eNZ = 47m.15s.

Continued on next page.

Sofia i = 20m.16s., e = 25m.5s., 38m.56s., and 45m.56s.?, iL? = 50m.16s.
Kalossa eE = 19m.50s., eN = 20m.13s., eE = 20m.17s., 24m.50s., 27m.38s., and 30m.22s., eN = 30m.25s.
Belgrade i = 20m.10s., e = 32m.50s. and 43m.21s.
Stuttgart iPKPZ = 19m.41s., epPKP? = 19m.50s., iPKPZ = 20m.20s., e = 21m.9s. and 21m.41s., iPP = 23m.59s., e = 25m.10s., ePPPZ = 27m.30s., eZ = 28m.50s., e = 35m.16s., ePPSZ = 37m.15s., ePPS = 38m.38s., eSS = 45m.14s.
Strasbourg iPKP$_2$ = 20m.22s., isPKP = 20m.33s., ipPKP$_2$ = 21m.2s., iPP = 23m.58s., isPP = 24m.52s., iPPP = 27m.42s., iSKKS = 30m.32s., iPSKS = 33m.43s., iSKKS$_2$? = 34m.29s., iSS? = 42m.32s., isSS = 44m.41s. and 44m.49s., iSSS = 50m.1s., eQ = 56·1m., and many other unidentified readings.
Paris ePKP$_2$ = 20m.24s., esPKP = 20m.33s., ePKS? = 22m.56s., iPP = 23m.32s., iPPP = 27m.37s., ePSKS = 33m.50s., ePPS = 37m.5s., SS = 43m.32s., eSSS? = 51m.23s., and other unidentified readings.
Zürich e = 20m.21s.k.
Triest iPKP = 20m.20s., iPKS = 23m.25s., iPP = 24m.9s., iPPP = 27m.48s., eSS = 44m.4s., iSSS = 49m.41s.
Chur e = 20m.23s.k.
Besançon e = 19m.43s., 21m.23s., and 22m.31s., ePP = 24m.4s.
Padova PP = 24m.10s.
Bologna ePP = 24m.18s.
Clermont-Ferrand iPKP = 19m.49s., isPKP = 20m.49s., i = 21m.4s., 21m.14s., and 21m.49s., ePP = 24m.19s., iPP = 24m.25s., iPPP = 28m.16s., i = 32m.48s., and 35m.7s.
Florence Arc. e = 21m.25s., ePP = 24m.13s., e = 28m.3s., eSS = 45m.23s.?
Rome iZ = 25m.36s. and 39m.19s., SSS? = 52m.25s.
Messina e = 24m.32s.
Lisbon 24m.41s. and 28m.34s.
Toledo iZ = 19m.52s., iPPZ = 24m.45s., PPPZ = 28m.43s.
Tortosa SKPE = 23m.27s., PPEN = 24m.47s., PPPN = 28m.17s., PPPE ($\Delta > 180°$) = 32m.14s., SKSP?N = 35m.19s.
Alicante PKS = 23m.24s., PP = 24m.58s., PPP = 29m.48s., SKKS = 32m.40s., SS = 47m.48s., SSS = 54m.53s., Q = 70m.36s.
Granada PP = 24m.59s., PPP = 29m.32s., SKKS = 31m.25s., SS = 47m.27s., SSS = 54m.14s.
Malaga PKSZ = 22m.58s., PP?Z = 26m.56s., PPPZ = 29m.4s., S$_c$S,PKPZ = 36m.48s., iPPSZ = 41m.10s.
Almeria PKS = 23m.22s., iPP = 25m.2s., iPPP = 29m.10s., SKKS = 31m.46s., SS = 45m.54s., SSS = 52m.54s.
Algiers Univ. iZ = 19m.54s. and 21m.16s., ePPZ = 25m.12s., eZ = 26m.18s., 26m.31s., and 26m.47s., ePPPZ = 29m.7s., eZ = 33m.0s.
Tamanrasset iZ = 19m.54s., eZ = 20m.44s. and 21m.22s., iPPZ = 25m.11s., eZ = 25m.55s., ePPPZ = 28m.46s., eZ = 30m.37s.
Long waves are also recorded at Arapuni.

Nov. 22d. 3h. Undetermined shock, probably off the Coast of Peru.
Huancayo iP = 34m.58s., iS = 35m.28s., iL = 36m.36s.
La Paz P = 36m.12s., S = 38m.22s., SS = 38m.44s., L = 39m.12s.
Bogota iP = 37m.22s., iZ = 37m.30s., iSZ = 40m.36s., iP$_c$PEN = 42m.32s., eS$_c$PEN = 47m.55s.
Shasta Dam e = 41m.18s.
Tinemaha eZ = 41m.55s. and 43m.40s.
China Lake eZ = 42m.4s., iZ = 43m.31s.
Weston iP = 42m.41s., iP$_c$P = 44m.0s.
Tucson eP = 42m.45s.
Pierce Ferry eP = 43m.19s.
Boulder City e = 43m.22s.
Overton eP = 43m.23s.
Mount Wilson eZ = 43m.26s.
College e = 46m.28s.
Long waves were also recorded at Alicante.

Nov. 22d. 6h. 26m. 59s. Epicentre 17°·0N. 122°·5E. (as on Nov. 8d.).

		△	Az.	P.	O − C.	S.	O − C.
		°	°	m. s.	s.	m. s.	s.
Irkutsk		38·0	342	e 7 59	+38	—	—
Bombay		47·2	280	e 8 1	−35	e 15 13	−16
Andijan		49·1	309	e 9 4	+13	—	—
Stalinabad		51·4	307	e 9 9	0	—	—
Tashkent		51·5	310	i 9 7?	− 2	e 16 27?	− 2
Samarkand		52·9	307	e 9 21	+ 1	—	—
Brisbane	z.	53·2	146	i 9 22$_a$	0	—	—
Sverdlovsk		60·6	327	10 15	0	18 27	− 3
Tiflis		69·8	309	11 15	+ 1	—	—
Leninakan		70·6	308	e 11 47	P$_c$P	—	—

Continued on next page.

	△	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Moscow	73·3	324	e 11 34	− 1	—	—
College	74·6	26	e 11 42	− 1	—	—
Shasta Dam	96·9	44	e 13 34	0	—	—
Hungry Horse	97·8	34	e 13 47	+ 9	—	—

Nov. 22d. 15h. 21m. 16s. Epicentre 28°·0N. 57°·0E. (as on 1940, Dec. 16d.).

This epicentre has been independently computed.

$A = +·4816$, $B = +·7416$, $C = +·4670$; $\delta = 0$; $h = +2$;
$D = +·839$, $E = -·545$; $G = +·254$, $H = +·392$, $K = -·884$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ashkabad		10·0	6	i 2 29	+ 2	4 33	+11	—	—	—
Samarkand		14·3	33	e 3 27?	+ 1	—	—	—	—	—
Obi-garm		15·0	42	i 3 32	− 3	—	—	—	—	—
Garm		15·6	42	e 3 41	− 2	—	—	—	—	—
Erevan		15·9	323	3 57	+10	—	—	—	—	—
Leninakan		16·7	323	e 3 57	0	—	—	—	—	—
Tashkent		16·7	34	i 3 54	− 3	—	—	—	—	—
Tiflis		16·9	327	i 3 59	0	—	—	—	—	—
Tchimkent		17·6	33	e 4 6	− 2	—	—	—	—	—
Grozny		17·8	332	e 4 16	+ 5	—	—	—	—	—
Andijan		17·9	41	4 22	+10	—	—	—	—	—
Poona	N.	18·1	118	4 15	+ 1	7 47	+12	—	—	—
Ksara		19·0	291	i 4 29	+ 3	i 8 3	+ 8	—	—	—
Frunse		20·6	40	e 4 40	− 3	e 8 35	+ 6	—	—	—
Sotchi		20·9	323	i 4 48	+ 2	e 8 38	+ 3	—	—	—
Helwan		22·5	281	e 5 4	+ 2	i 9 8	+ 3	e 6 4	PP	e 11·1
Theodosia		24·2	321	e 5 17	− 2	e 9 33?	− 2	—	—	—
Yalta		24·6	318	i 5 20	− 3	i 9 36	− 6	—	—	—
Kodaikanal	E.	26·1	128	—	—	e 9 44	−23	—	—	—
Istanbul		26·3	307	i 5 36	− 3	e 10 2	− 9	—	—	—
Calcutta	E.	28·8	94	—	—	e 12 38	SS	—	—	—
Sverdlovsk		28·9	4	i 5 59	− 4	—	—	—	—	—
Moscow		31·0	339	6 19	− 2	—	—	—	—	—
Triest		38·3	310	i 7 23	− 1	i 13 13	− 6	i 9 29	P_cP	—
Rome		38·6	303	e 6 43	−43	—	—	—	—	e 20·7
Prague		39·0	317	e 7 30	0	—	—	e 10 12	P_cP	—
Florence Arc.		39·7	306	e 7 44	+ 8	—	—	—	—	—
Collmberg	z.	40·3	318	e 7 38	− 2	—	—	e 9 22	PP	—
Jena		41·0	317	e 7 45	− 1	—	—	—	—	—
Chur		41·4	311	e 7 47a	− 3	—	—	—	—	—
Pavia	z.	41·4	309	e 7 51	+ 1	—	—	—	—	—
Stuttgart		42·0	314	e 7 52	− 2	—	—	e 9 29	PP	—
Copenhagen		42·1	324	i 7 55	0	—	—	—	—	—
Zürich		42·2	311	e 7 53	− 3	—	—	e 9 41	P_cP	e 17·7
Basle		42·8	311	e 7 59	− 2	—	—	—	—	—
Strasbourg		42·9	313	e 8 0	− 2	—	—	—	—	—
Besançon		43·9	311	i 8 8	− 2	—	—	—	—	—
Clermont-Ferrand		45·7	308	i 8 27	+ 3	—	—	—	—	—
Paris		46·4	312	i 8 28	− 2	—	—	—	—	—
Tamanrasset	z.	46·5	276	i 8 32k	+ 1	e 15 38	+19	e 10 36	PP	—
Pretoria	z.	60·2	210	i 10 13	+ 1	—	—	—	—	—
Grahamstown	z.	67·5	207	i 11 1	+ 1	—	—	—	—	—
College		85·4	11	e 12 38	− 2	—	—	—	—	—
Hungry Horse		103·6	353	e 13 58	− 6	—	—	—	—	—
Tucson		119·0	347	e 18 52	[+ 1]	—	—	—	—	—

Additional readings :—
Poona N = 6m.18s., 9m.2s., 11m.14s., 13m.7s., iN = 15m.59s. and 16m.15s., N = 28m.0s.
The record is wrongly interpreted as that of a distant earthquake.
Triest iP_cS = 13m.23s., eSS = 15m.29s.
Collmberg eZ = 7m.46s.
Jena eEN = 8m.33s.
Paris i = 8m.35s.
Tamanrasset iZ = 8m.59s.

Nov. 17d. Readings also at 0h. (Reno, near Arcata, Ferndale, Lick, and Mineral), 1h. (Ottawa), 2h. (Almeria and Tacubaya), 4h. (Brisbane, Pasadena, China Lake, Tinemaha, Tucson, Pierce Ferry, Hungry Horse, Harvard, Weston, Pretoria, and Grahamstown), 5h. (near Andijan), 6h. (near La Jolla, Palomar, Pasadena, Riverside, Boulder City, Overton, Pierce Ferry, and Tucson), 7h. (Mineral, Hungry Horse, and near College), 9h. (College, Palomar, Pasadena, Riverside, Boulder City, Overton, Pierce Ferry, and near Tucson), 10h. (College, Hungry Horse (2), Christchurch, and Wellington), 11h. (Ottawa, and near Tchimkent (2)), 12h. (Hungry Horse, Frunse, Garm, near Andijan, Obi-garm, Samarkand, Stalinabad, Tashkent, and near Alicante), 13h. (near Balboa Heights), 14h. (Ottawa), 15h. (Tacubaya), 16h. (Ksara), 17h. (near Ottawa and near Istanbul (2),) 18h. (Ottawa), 19h. (Copiapo), 23h. (near College).

Nov. 23d. 6h. 14m. 35s. Epicentre 18°·5N. 79°·0W. (as on 1941, April 27d.).

$A = +\cdot1811$, $B = -\cdot9316$, $C = +\cdot3154$; $\delta = +15$; $h = +5$;
$D = -\cdot982$, $E = -\cdot191$: $G = +\cdot060$, $H = -\cdot310$, $K = -\cdot949$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Port au Prince		6·3	89	e 1 45	P*	—	—	—	—	—
San Juan		12·2	89	e 2 55	− 3	e 4 55	−21	—	—	e 5·6
Bogota		14·6	160	e 3 45	PP	i 6 39	SS	—	—	—
Mobile		14·6	327	—	—	i 6 24	+11	—	—	—
Columbia		15·5	354	e 4 30	+48	e 7 38	+63	—	—	e 8·1
Fort de France		17·5	99	e 4 3	− 4	—	—	—	—	—
Tacubaya		19·1	277	e 4 43	PP	—	—	—	—	—
Washington		20·4	4	e 4 35	− 6	e 8 15	−10	—	—	e 10·8
Philadelphia		21·6	8	i 4 48	− 6	e 8 47	− 2	—	—	e 11·0
Pennsylvania	E.	22·2	1	—	—	e 8 49	−11	—	—	e 11·6
St. Louis		22·3	335	e 4 57	− 4	e 9 0	− 2	—	—	—
Cleveland		23·0	355	e 5 9k	+ 2	e 9 12	− 2	e 5 14	P	e 10·6
Harvard		24·7	14	e 5 27	+ 3	e 9 25	−19	—	—	e 14·8
Weston		24·7	14	i 5 18	− 6	i 9 32	−12	i 5 47	PP	—
Ottawa		26·9	4	e 5 41a	− 4	—	—	—	—	12·4
Tucson		31·7	302	e 6 31	+ 4	—	—	—	—	—
Pierce Ferry		35·5	307	e 7 14	+14	—	—	i 10 14	?	—
Overton	Z.	35·9	308	i 7 7	+ 3	—	—	—	—	—
Boulder City		36·0	307	e 7 9	+ 4	—	—	—	—	—
Logan		36·3	318	e 7 5	− 2	—	—	—	—	e 21·9
La Paz		36·4	162	e 7 7	− 1	13 0	+10	i 15 25	SS	18·7
Palomar	Z.	36·9	301	i 7 17	+ 5	—	—	—	—	—
Riverside	Z.	37·5	302	i 7 21	+ 4	—	—	—	—	—
China Lake	Z.	38·1	306	i 7 26	+ 4	—	—	—	—	—
Pasadena		38·1	302	e 7 25	+ 3	—	—	e 8 46	PP	e 24·1
Tinemaha		39·0	307	i 7 32	+ 2	—	—	—	—	—
Saskatoon		40·0	334	e 9 3	PP	—	—	—	—	21·1
Fresno	Z.	40·1	306	e 7 40	+ 1	—	—	—	—	—
Reno		40·9	310	e 7 54	+ 8	—	—	—	—	—
Hungry Horse		41·1	325	e 7 44	− 3	—	—	e 9 26	PP	—
Lick	Z.	41·7	306	i 7 56	+ 4	—	—	—	—	—
Mineral	Z.	42·5	310	i 8 0k	+ 1	—	—	e 9 46	PP	—
Shasta Dam		43·2	310	e 8 0	− 4	—	—	e 9 56	PP	—
College		64·6	335	e 10 46	+ 5	—	—	—	—	—
Alicante		69·9	54	e 11 4	−11	20 5	−19	24 27	SS	e 33·4

Additional readings :—
Bogota iZ = 4m.1s., eS_ePEN = 12m.51s
Overton iZ = 7m.15s. and 7m.37s.
Logan e = 7m.39s.
Hungry Horse i = 7m.52s.
Lick iZ = 8m.6s.k.
Mineral iZ = 8m.3s. and 8m.15s.
Shasta Dam i = 8m.7s.
Alicante PP = 12m.41s.
Long waves were also recorded at Bermuda, Huancayo, and at other North American stations.

Nov. 23d. 16h. 50m. 56s. Epicentre 38°·6N. 26°·3E. (as on July 30d.).

Felt in the islands of Chios, Lesbos, Samos, and Ikaria ; intensity VI at Chios and very strong at Kardamyla and on the islet of Oenousse.
Epicentre 38°·75N. 26°·25E. (Strasbourg).

Preliminary Bulletin of the Seismological Institute of the National Observatory of Athens, November, 1949.

$A = +·7024$, $B = +·3472$, $C = +·6213$; $\delta = -7$; $h = +1$;
$D = +·443$, $E = -·896$; $G = +·557$, $H = +·275$, $K = -·784$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Athens		2·1	253	e 0 39	P*	e 1 8	S_g	—	—	—
Istanbul		3·3	40	i 0 54	+ 1	i 1 47	S_g	—	—	—
Sofia		4·7	332	e 1 17?	+ 3	i 2 12	+ 2	i 1 39	P_g	—
Bucharest		5·8	358	e 1 28	− 1	e 2 40	+ 2	i 1 52	P_g	—
Belgrade		7·6	327	e 2 47a	P_g	e 3 23	+ 0	i 3 54	S*	i 4·3
Yalta		8·3	42	2 4?	0	3 48?	+ 8	—	—	—
Simferopol		8·6	40	2 4	− 5	3 37	−11	—	—	—
Ksara		9·1	119	2 14?	0	4 34?	S*	—	—	—
Theodosia		9·3	44	e 2 19	+ 2	—	—	—	—	—
Kalossa		9·6	328	e 3 24	?	e 4 45	SSS	—	—	—
Helwan	z.	9·7	153	—	—	i 4 6	− 9	—	—	—
Budapest		10·4	332	e 2 30	− 4	e 4 34	+ 2	—	—	6·2
Zagreb		10·5	317	2 42	+ 7	5 22	S*	—	—	e 5·9
Lwow		11·2	354	—	—	e 4 9	−45	—	—	—
Sotchi		11·3	59	e 2 53	+ 7	—	—	—	—	—
Skalnate Pleso		11·4	340	e 2 50	+ 3	—	—	—	—	e 6·0
Triest		11·7	311	e 2 44	− 7	e 4 48	−16	i 5 56	S_gS_g	i 6·3
Raciborzu		12·9	336	e 3 6	− 1	e 6 28	+55	e 7 6	Q	e 7·3
Leninakan		13·7	75	e 3 25	+ 7	—	—	—	—	—
Erevan		14·2	77	e 3 56?	+32	—	—	—	—	—
Prague		14·2	328	e 3 34	+10	e 6 42	SSS	—	—	—
Tiflis		14·5	71	i 3 33	+ 5	6 26	+15	—	—	—
Cheb		15·2	324	e 3 49	+11	e 7 10	+42	—	—	—
Ravensburg		15·2	312	e 3 43	+ 5	—	—	—	—	e 8·6
Grozny		15·4	66	3 49	+ 9	—	—	—	—	—
Zürich		15·6	310	e 3 41a	− 2	e 6 50	+13	i 3 47	P	—
Collmberg	N.	15·8	328	e 3 50	+ 5	—	—	—	—	e 8·3
Stuttgart		16·0	315	e 3 46	− 2	—	—	e 3 52	P	e 8·1
Jena		16·1	325	e 3 52	+ 3	—	—	e 4 17	PPP	e 9·1
Basle		16·3	309	e 3 50	− 2	—	—	—	—	e 9·4
Neuchatel		16·5	307	e 3 53	− 1	—	—	—	—	—
Potsdam		16·6	331	e 4 1	+ 5	—	—	e 4 10	PP	10·4
Strasbourg		16·7	313	i 4 0k	+ 3	e 7 18	+15	i 4 23	PPP	e 9·1
Algiers Univ.	z.	18·5	271	i 4 17	− 2	—	—	i 4 39	PP	—
Clermont-Ferrand		18·6	300	i 4 23	+ 2	—	—	e 4 44	PP	9·6
Moscow		18·8	20	4 21	− 2	7 50	0	—	—	—
Copenhagen		19·5	336	i 4 29	− 2	e 8 22	+16	—	—	e 10·6
Paris		19·9	309	i 4 34	− 2	—	—	i 4 59	PPP	—
Helsinki		21·6	357	e 4 52a	− 2	e 8 49	0	—	—	e 12·1
Upsala		22·0	348	—	—	i 8 54	− 2	i 10 32	Q	e 12·1
Kew		22·6	316	e 5 3?	0	e 9 11?	+ 4	—	—	e 11·1
Granada		23·6	277	5 43	PP	10 7	SS	—	—	13·2
Tamanrasset	z.	23·8	235	e 5 15	0	e 9 34	+ 6	e 5 40	PP	11·1
Ashkabad		25·1	81	5 30	+ 2	10 4?	+13	—	—	—
Sverdlovsk		29·0	39	—	—	10 55	+ 1	—	—	—
Samarkand		31·4	75	e 6 25	0	—	—	—	—	—
Stalinabad		33·0	75	6 39	0	—	—	—	—	—
Andijan		35·2	72	6 57	− 1	—	—	—	—	—
Pretoria	z.	64·0	178	i 10 38	0	—	—	—	—	—
College		76·8	358	i 11 53	− 2	—	—	—	—	—
Hungry Horse		86·5	335	i 12 45	− 1	—	—	—	—	—
Mineral	z.	96·1	335	e 13 29k	− 2	—	—	1 13 34	P	—
Shasta Dam		96·1	336	i 13 29	− 2	—	—	—	—	—
Pierce Ferry		97·1	328	i 13 34	− 1	—	—	—	—	—
Tinemaha	z.	97·9	332	i 13 39	0	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
China Lake	z.	98·8	331	i 13 42	− 1	—	—	—	—	—
Tucson		99·0	324	i 13 43	− 1	—	—	—	—	—
Mount Wilson	z.	100·3	330	e 13 50	0	—	—	—	—	—

Additional readings :—
Sofia i = 2m.1s. and 2m.6s., iS = 2m.24s., iS_g = 2m.34s., e = 2m.58s. and 3m.25s.?
Bucharest iS*EZ = 3m.7s., iS_gZ = 3m.21s., iS_gN = 3m.26s.
Kalossa eN = 5m.21s., iN = 6m.2s., eE = 6m.30s.
Budapest eN = 5m.15s., eS?E = 5m.30s., eE = 5m.44s., iS?N = 6m.0s.
Jena ePPP?N = 4m.22s., eZ = 8m.37s., eN = 8m.43s. and 8m.46s.
Potsdam eE = 8m.4s.?, iE = 9m.25s., iZ = 9m.32s.
Algiers Univ. ePPZ = 4m.26s., iZ = 5m.3s.
Clermont-Ferrand ePPP = 4m.51s.
Paris i = 4m.45s. and 5m.57s.
Upsala eE = 11m.34s.
Tamanrasset iZ = 5m.18s.
Long waves were also recorded at Rome, Florence Arc., Pavia, De Bilt, Bergen, and Aberdeen.

Nov. 23d. Readings also at 1h. (College, Copiapo, and near Andijan), 2h. (Copiapo, Bogota, Huancayo, La Paz, Tucson, and near Garm), 4h. (near Garm), 5h. (Messina and Istanbul), 6h. (Boulder City, Pierce Ferry (2), and near Garm), 7h. (Boulder City, Overton, and Pierce Ferry), 8h. (near Klyuchi), 10h. (College, La Paz, Tucson, Hungry Horse, China Lake, Tinemaha, Obi-garm, Samarkand, near Garm, Stalinabad, Tashkent, Andijan, and near Klyuchi), 11h. (College), 14h. (near Garm), 15h. (Grozny, Frunse, Almata, near Obi-garm, Tchimkent, Andijan, Stalinabad, Tashkent, and Samarkand), 17h. (Tchimkent, Frunse, Samarkand, near Garm, Obi-garm, Stalinabad, and Tashkent), 18h. (Ottawa), 19h. (Tortosa, near Garm, and near Istanbul (2)), 22h. (Shasta Dam, Tucson, and Pierce Ferry), 23h. (near Istanbul).

Nov. 24d. Readings at 0h. (near Istanbul), 1h. (Ksara, Tiflis, Leninakan, near Garm, and near Istanbul), 2h. (near Algiers Univ.), 8h. (College and near Obi-garm), 9h. (near Samarkand and Stalinabad), 14h. (near Ashkabad), 16h. (near Alicante (2)), 17h. (Rolphton, near La Cave, Ottawa, and near Bogota), 20h. (near Mizusawa), 21h. (Auckland, Christchurch, Wellington, Brisbane, Riverview, Pasadena, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, and Sverdlovsk).

Nov. 25d. 5h. 44m. 26s. Epicentre 18°·5S. 178°·0W. Depth of focus 0·060.
(as on 1944, July 16d.).

A = −·9484, B = −·0331, C = −·3154 ; δ = +4 ; h = +5 ;
D = −·035, E = +·999 ; G = +·315, H = +·011, K = −·949.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Apia		7·6	53	1 52	0	3 19	− 1	—	—
Brisbane	z.	28·1	246	i 5 15k	− 3	—	—	—	—
Pasadena	z.	77·3	47	i 11 12	0	—	—	e 12 47	pP
Riverside	z.	77·8	47	i 11 15	+ 1	—	—	—	—
Shasta Dam		78·3	40	e 11 19	+ 2	—	—	e 12 55	pP
China Lake	z.	78·6	45	i 11 20	+ 2	—	—	e 12 57	pP
Tinemaha	z.	78·9	45	i 11 22	+ 2	—	—	e 13 3	pP
Boulder City		80·6	47	e 11 31	+ 2	—	—	—	—
Overton	z.	81·2	47	e 11 35	+ 3	—	—	i 13 12	pP
Pierce Ferry		81·3	47	i 11 35	+ 2	—	—	i 12 49	pP
Tucson		81·7	52	i 11 37	+ 2	—	—	e 13 16	pP
College		86·3	12	i 11 59	+ 2	—	—	e 13 38	pP
Hungry Horse		87·5	37	e 12 4	+ 1	—	—	—	—
Stuttgart	z.	149·2	350	e 18 57	[+ 2]	—	—	—	—
Strasbourg		149·6	352	i 19 2	[+ 6]	—	—	—	—
Paris		149·8	359	i 19 4	[+ 8]	—	—	i 19 24	PKP_2
Triest		151·2	342	e 19 5	[+ 7]	e 21 57	PKS	i 19 25	PKP_2

Additional readings :—
Tucson e = 11m.44s.
College e = 12m.17s.
Stuttgart iPKPZ = 19m.3s.
Paris i = 19m.12s.

Nov. 25d. Readings also at 1h. (near Obi-garm), 2h. (Boulder City, Tucson, Vera Cruz, and near Tacubaya), 3h. (Pierce Ferry, Hungry Horse, College, Stuttgart, Simferopol, Sotchi, Yalta, Raciborzu, near Bucharest, and Istanbul), 4h. (Frunse, Samarkand (2), near Andijan (2), Obi-garm (2), Stalinabad (2), Tashkent (2), and Tchimkent (2)), 5h. (College), 6h. (Tucson and Hungry Horse), 7h. (Andijan and near Obi-garm), 8h. (Tacubaya), 9h. (Pasadena, Riverside, China Lake (2), Tinemaha, Tucson (2), Boulder City, Overton (3), and Pierce Ferry (2)), 11h. (Durham, Pavia, and near Andijan), 13h. (near Istanbul), 14h. (Brisbane, Ottawa (3), Istanbul, Hungry Horse, College (3), Tashkent, Stalinabad, and near Obi-garm), 15h. (La Paz and Hungry Horse), 17h. (Stuttgart, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Mizusawa), 18h. (Ashkabad, Grozny, Leninakan, Tiflis, Ksara, and College), 21h. (College), 22h. (near Ottawa).

Nov. 26d. 1h. 10m. 47s. Epicentre 18°·5S. 178°·0W. Depth of focus 0·080. (as on 25d.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Apia		7·6	53	1 56	+ 2	e 3 25	0	—	—
Lick	z.	76·8	42	i 10 58a	+ 1	—	—	—	—
Pasadena		77·3	47	i 10 59a	− 1	—	—	i 13 0	pP
Palomar		77·8	48	i 11 2a	− 1	—	—	i 13 6	pP
Riverside		77·8	47	i 11 1a	− 2	—	—	e 13 5	pP
Shasta Dam		78·3	40	i 11 5	0	—	—	e 13 9	pP
China Lake	z.	78·6	45	i 11 7a	0	—	—	e 13 8	pP
Mineral	z.	78·6	41	e 11 7a	0	—	—	—	—
Tinemaha		78·9	45	i 11 9	+ 1	—	—	—	—
Boulder City		80·6	47	i 11 17	0	—	—	—	—
Overton	z.	81·2	47	i 11 21	+ 1	—	—	e 13 27	pP
Pierce Ferry		81·3	47	i 11 21	0	—	—	—	—
Tucson		81·7	52	i 11 24	+ 1	—	—	e 13 27	pP
College		86·3	12	i 11 45	0	i 21 31	− 4	e 13 57	pP
Hungry Horse		87·5	37	i 11 50	− 1	—	—	—	—
Stuttgart	z.	149·2	350	e 18 49	[+ 7]	—	—	—	—

Additional readings :—
Apia e =2m.27s.
Pasadena esPPP? =13m.55s.
Mineral iZ =11m.11s.
Overton iZ =11m.47s.

Nov. 26d. 4h. 24m. 58s. Epicentre 18°·5N. 95°·7W. (as on 1937, July 26d.).

A = −·0943, B = −·9443, C = +·3154 ; δ = +7 ; h = −5 ;
D = −·995, E = +·099 ; G = −·031, H = −·314, K = −·949.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vera Cruz		0·8	330	e 0 58	?	1 36	?	—	—	—
Oaxaca		1·8	214	0 28	− 4	—	—	—	—	2·6
Puebla		2·4	283	0 59	P_g	1 36	S_g	—	—	—
Tacubaya		3·4	286	1 9	P_g	1 53	S_g	—	—	2·0
Tucson		19·3	318	e 4 34	+ 5	—	—	—	—	e 11·7
St. Louis		20·6	11	e 4 43	0	e 8 41	+12	i 5 9	PP	—
Pierce Ferry		23·8	322	e 5 19	+ 4	—	—	—	—	—
Palomar		24·0	313	i 5 18a	+ 1	—	—	—	—	—
Boulder City		24·3	321	e 5 23	+ 3	—	—	—	—	—
Overton	z.	24·4	322	e 5 12	− 9	—	—	—	—	—
Riverside		24·7	312	i 5 26	+ 2	—	—	—	—	—
Pasadena	z.	25·4	312	e 5 31	0	—	—	—	—	—
China Lake	z.	25·9	318	i 5 35	0	—	—	—	—	—
Lick	z.	29·5	316	i 6 8	0	—	—	—	—	—
Mineral	z.	31·1	320	i 6 23a	+ 1	—	—	—	—	—
Ottawa		31·5	27	6 20k	− 6	—	—	—	—	—
Weston		31·5	36	i 6 23	− 3	—	—	—	—	—
Shasta Dam		31·8	320	e 9 6	P_cP	—	—	—	—	—
Hungry Horse		33·3	338	i 6 42	+ 1	—	—	—	—	—
College		57·7	337	e 9 49	− 6	—	—	—	—	—

For Notes see next page.

NOTES TO NOVEMBER 26d. 4h 24m 58s

Additional readings :—
Tucson iP =4m.37s., e =6m.15s.
Palomar eZ =5m.49s., iZ =5m.55s.
Boulder City e =5m.47s. and 6m.1s.
Overton eZ =6m.14s.

Nov. 26d. 6h. Off Coast of Central America.

Balboa Heights eP =25m.13s., eS =25m.55s.
Bogota iP =26m.27s., eSN =30m.30s., eSSE =31m.8s.
La Paz eP =30m.54s.
Tucson eP =31m.11s., e =31m.44s., eP_cP =32m.47s.
Ottawa P =31m.29s.
Pierce Ferry iP =31m.49s.
Palomar iP =31m.52s. a
Boulder City eP =31m.53s.
Riverside ePZ =31m.58s., eP_cPZ =33m.55s.
Pasadena iPZ =32m.2s.
China Lake ePZ =32m.6s., eP_cPZ =33m.50s.
Tinemaha ePZ =32m.17s., eP_cP =34m.4s.
Lick iPZ =32m.36s. k
Mineral ePZ =32m.46s.
Shasta Dam eP =32m.51s.
Hungry Horse eP =32m.52s., e =32m.57s., i =33m.25s., iP_cP =34m.20s.
College eP? =35m.39s.

Nov. 26d. Readings also at 1h. (Tucson, Overton, Pierce Ferry, and Shasta Dam), 4h. (Palomar, Pasadena, Riverside, China Lake, Boulder City, Overton, Pierce Ferry, and near Tucson), 5h. (Tacubaya, Huancayo, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson (2), Boulder City (2), Overton, Pierce Ferry (2), and Hungry Horse), 6h. (Huancayo, Mount Wilson, Riverside, Tinemaha, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, and Hungry Horse), 7h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry (2), and near Balboa Heights), 11h. (near Andijan), 14h. (Harvard, Erevan, near Grozny, Leninakan, and Tiflis), 15h. (Palomar, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, and Shasta Dam), 16h. (Mount Wilson, and China Lake), 17h. (Christchurch, Copiapo, Santa Lucia, and Tacubaya), 18h. (Harvard, China Lake, Tucson, Boulder City, Pierce Ferry, near Puebla (2), Tacubaya (2), and Vera Cruz), 21h. (College and Istanbul), 22h. (Collmberg, Paris, Stuttgart, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, and Hungry Horse).

Nov. 27d. 8h. 42m. 14s. Epicentre 18°·0S. 173°·0W.

Intensity IV at Apia II at Nukualofa. Epicentre as adopted. Suggested depth 60km.

Apia Observatory, Western Samoa. Preliminary Seismo. Bull., Oct.-Dec., 1949, p.3.

A = −·9446, B = −·1160, C = −·3071 ; δ = +4 ; h = +5 ;
D = −·122, E = +·993 ; G = +·305, H = +·037, K = −·952.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		4·3	16	i 1 2	− 6	1 45	−15	—	—	—
Auckland	N.	21·6	208	i 4 57	+ 3	i 8 50	+ 1	—	—	—
Tuai	N.	22·4	202	e 5 2	0	e 9 5	+ 1	—	—	—
New Plymouth	E.	23·8	206	i 5 22	+ 7	e 9 37	+ 9	—	—	—
Wellington		25·5	203	i 5 29	− 3	10 3	+ 6	—	—	12·0
Cobb River		26·1	207	e 5 12	−25	e 8 47	−80	—	—	—
Kaimata	N.E.	27·8	207	e 5 57	+ 4	e 10 33	− 2	—	—	—
Christchirch		28·2	204	i 5 56	0	10 37	− 4	i 12 55	P_cS	14·3
Brisbane		32·6	247	i 6 31 a	− 4	i 11 43	− 8	i 7 46	PP	e 15·5
Riverview		35·7	237	i 7 0 a	− 2	i 12 28	−11	i 8 18	PP	e 15·5
Honolulu		41·8	22	i 7 49	− 4	e 13 57	−14	e 9 4	PP	e 16·7
Perth		65·0	243	10 56	+12	19 28	+ 2	14 46	PP	30·8
Tokyo		69·7	321	e 11 15	+ 1	21 25	+63	—	—	32·3
Sendai		70·7	324	11 18	− 2	21 25	+51	14 42	PP	e 32·4
Nagoya		71·0	319	11 24	+ 2	—	—	e 15 24	PPP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		71·2	325	e 11 21	− 2	20 41	+ 1	—	—	—
Nagano		71·3	321	11 23	0	21 11	+30	—	—	—
Osaka		71·6	318	i 11 24	− 1	(21 51)	+67	e 15 11	PcS	21·8
Kôti		72·3	316	11 23	− 6	20 49	− 3	14 22	PP	35·0
Miyazaki		72·8	313	11 32	0	20 51	− 7	—	—	—
Branner		73·0	41	i 11 34k	+ 1	c 21 1	+ 1	—	—	e 33·3
San Francisco		73·0	41	e 11 34	+ 1	e 21 1	+ 1	—	—	e 32·6
Santa Clara		73·1	41	i 11 32a	− 2	i 20 54	− 7	—	—	e 33·4
Berkeley		73·2	41	i 11 35k	0	e 21 5	+ 3	e 14 15	PP	e 32·9
Lick		73·3	41	i 11 35k	0	e 21 9	+ 5	e 14 16	PP	e 33·4
Ukiah		73·4	39	e 11 30	− 6	c 21 2	− 3	—	—	e 30·8
Pasadena		73·6	45	i 11 37k	0	e 21 4	− 3	i 11 45	PcP	e 30·8
Sapporo		73·8	328	i 11 38	0	e 21 6	− 3	e 12 2	PcP	37·1
Fresno		74·0	42	i 11 40k	+ 1	e 21 8	− 3	i 14 13	PP	e 33·5
Palomar		74·0	47	i 11 39k	0	i 21 14	+ 3	i 11 56	pP	—
Riverside		74·0	45	i 11 39k	0	c 21 22	+11	i 12 2	PcP	—
Hukuoka		74·4	314	e 11 42	0	e 21 13	− 3	21 53	PS	35·2
China Lake	Z.	74·9	44	i 11 44k	0	i 20 15	−67	i 39 18	P′P′	e 38·9
Shasta Dam		74·9	38	i 11 45	+ 1	—	—	e 14 14	PP	e 33·8
Mineral		75·2	38	i 11 46k	0	e 38 58	P′P′	i 14 33	PP	e 34·5
Tinemaha		75·2	43	i 11 48k	+ 2	e 21 29	+ 4	c 39 16	P′P′	—
Reno	Z.	75·7	40	i 11 50k	+ 1	e 21 16	−14	e 14 38	PP	e 34·9
Boulder City		76·8	46	i 11 56	+ 1	e 21 48	+ 6	e 14 48	PP	e 38·9
Klyuchi		77·2	346	i 11 57	0	—	—	—	—	—
Overton	Z.	77·4	45	e 12 1	+ 3	e 21 55	+ 6	e 14 44	PP	—
Pierce Ferry		77·5	46	i 12 0	+ 1	e 21 57	+ 7	e 14 44	PP	—
Tucson		77·7	50	i 12 1	+ 1	e 21 42	−10	e 14 50	PP	e 34·6
Bandong		77·8	267	i 12 0	− 1	i 21 58	+ 5	—	—	—
Batavia		78·8	267	i 12 6a	0	e 22 9	+ 5	—	—	—
Seattle		79·5	33	e 12 35	+25	—	—	e 12 54	pP	—
Victoria		79·6	31	—	—	21 22	−50	—	—	36·8
Salt Lake City		81·4	43	e 12 19	− 1	i 22 31	0	e 15 23	PP	e 34·3
Tacubaya		81·4	67	e 12 21	+ 1	e 22 37	+ 6	—	—	—
Puebla		82·2	67	e 12 38	+14	—	—	—	—	—
Butte	N.	83·9	38	i 12 34	+ 1	i 22 54	− 2	—	—	e 38·2
Vera Cruz		84·0	68	—	—	e 23 6	+ 9	—	—	—
Hungry Horse		84·4	35	i 12 34	− 2	e 22 57	− 4	i 15 49	PP	—
Bozeman		84·6	39	e 12 36	0	i 22 59	− 4	i 23 59	PS	e 38·6
College		84·8	11	i 12 36	− 1	i 22 56	− 9	e 23 20	ScS	—
Rapid City	E.	88·6	43	e 12 57	+ 1	i 23 27	[+ 3]	e 16 22	PP	e 40·5
Santa Lucia		90·0	126	e 13 4	+ 1	23 58	+ 4	23 34	SKS	41·5
Saskatoon		90·4	35	—	—	23 22	[−13]	e 29 43	SS	42·3
Lincoln	E.	91·7	47	e 16 8	PP	i 23 41	[− 2]	—	—	e 42·3
Huancayo		93·5	104	e 13 24	+ 5	i 23 59	[+ 6]	e 17 22	PP	e 39·8
St. Louis		95·6	52	i 13 28	0	i 23 43	[−21]	i 17 17	PP	—
Chicago		98·4	48	e 13 59	+18	e 24 16	[− 3]	e 26 15	PS	e 45·6
La Paz		98·5	110	e 13 40	− 2	i 25 14	+ 6	i 18 10	PP	45·8
La Plata	E.	99·0	131	—	—	24 22	[0]	—	—	45·7
Irkutsk		99·7	322	i 13 46	− 1	24 25	[− 1]	17 48	PP	—
Bogota		99·9	88	e 13 57	+ 9	e 24 17	[−10]	e 18 2	PP	e 46·8
Columbia		101·4	58	—	—	i 24 34	[0]	—	—	e 46·7
Cleveland		102·8	50	e 18 12	PP	i 25 50	+ 6	e 24 41	SKS	—
Pennsylvania	E.	105·3	51	—	—	i 24 52	[0]	i 27 48	PS	e 50·6
Philadelphia		107·2	53	e 16 9	P	i 25 0	[0]	e 25 30	SKKS	e 43·2
Ottawa		107·6	47	e 18 30	[+ 2]	e 24 58	[− 4]	e 18 48	PP	e 50·8
City College, N.Y.		108·3	52	i 18 55	PP	—	—	—	—	e 53·2
Fordham		108·3	52	e 18 54	PP	i 25 9	[+ 4]	i 28 17	PS	e 52·3
Colombo	E.	108·4	272	25 16	SKS	(25 16)	[+11]	—	—	52·8
Harvard		110·3	50	i 19 8	PP	e 28 35	PS	—	—	e 51·4
Weston		110·4	50	i 14 34	P	i 25 12	[− 2]	e 19 6	PP	51·8

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Juan		111·0	76	e 19 19	PP	e 28 22	PS	—	—	e 50·2
Seven Falls	E.	111·2	45	i 19 10	PP	e 25 6	[−11]	e 27 58	PS	51·8
Kodaikanal	E.	111·6	275	14 45	P	24 58	[−21]	18 35	PKP	54·0
Hyderabad	N.	112·4	282	e 19 21	PP	—	—	—	—	—
Bermuda		114·6	62	—	—	e 26 26	{− 1}	e 35 56	SS	e 47·4
Fort de France		114·8	82	e 19 7	[+24]	e 29 30	PS	—	—	e 47·4
Halifax		116·2	48	—	—	e 26 48	{ 0}	—	—	54·9
Almata		116·6	311	18 50	[+ 4]	25 42	[+ 4]	—	—	—
Poona	N.	116·9	282	16 9	P	25 32	[− 7]	27 54	SKKS	55·3
Bombay		117·9	282	e 15 12	P	e 25 49	[+ 6]	e 18 19	PKP	—
Frunse		118·4	310	e 18 51	[+ 2]	25 42	[− 2]	20 7	PP	—
Andijan		120·1	307	18 54	[+ 1]	i 27 18	{+ 3}	—	—	—
Garm		121·7	305	e 19 0	[+ 4]	—	—	—	—	—
Ivigtut		122·1	28	30 26	PS	37 6	SS	—	—	57·8
Obi-garm		122·2	205	i 18 57	[0]	i 27 37?	{+ 9}	—	—	—
Tashkent		122·4	308	18 59	[+ 2]	i 26 0	[+ 2]	i 20 32	PP	—
Stalinabad		122·9	308	i 19 0	[+ 2]	e 26 6	[+ 6]	—	—	—
Samarkand		124·2	306	e 19 2	[+ 1]	—	—	—	—	—
Sverdlovsk		124·5	328	i 19 2	[+ 1]	27 43	{− 1}	22 39	PKS	—
Grahamstown	z.	125·7	200	i 19 6	[+ 2]	e 22 33	PKS	e 20 59	PP	—
Tananarive		125·8	229	20 53	PP	28 16	{+23}	22 29	PKS	e 59·4
Ashkabad		131·1	305	e 19 19	[+ 5]	e 22 45	PKS	—	—	—
Pretoria	z.	131·9	206	i 19 18	[+ 2]	e 22 49	PKS	e 21 34	PP	—
Moscow		135·8	336	19 24	[+ 1]	28 59	{+ 3}	21 58	PP	—
Helsinki		135·9	348	e 22 0	PP	e 26 53	[+21]	i 22 55	PKS	e 63·8
Baku		136·9	311	19 30	[+ 5]	25 42	[−52]	—	—	—
Upsala		137·5	352	e 22 6	PP	i 23 0	PKS	e 40 6	SS	e 63·8
Bergen		137·6	1	—	—	22 46?	PKS	40 6	SS	66·8
Grozny		138·7	317	19 34	[+ 6]	23 6	PKS	—	—	—
Tiflis		140·1	315	i 19 22?	[− 9]	29 23	{+ 1}	i 22 23	PP	—
Aberdeen		140·3	8	i 22 21	PP	i 33 16	PS	e 40 46	SS	e 68·4
Erevan		140·9	312	e 19 40	[+ 8]	—	—	—	—	—
Leninakan		141·1	314	e 19 31	[− 1]	29 29	{+ 1}	e 22 29	PP	—
Copenhagen		142·1	355	i 19 31	[− 3]	29 46	{+12}	23 17	PKS	—
Sotchi		142·5	320	19 40	[+ 5]	e 29 41	{+ 5}	22 42	PP	—
Durham		142·7	8	i 23 8	PKS	—	—	i 41 16	SS	—
Theodosia		144·1	325	e 19 36	[− 2]	—	—	e 23 18	PP	—
Simferopol		144·9	327	19 31	[− 8]	—	—	—	—	—
Yalta		145·1	325	e 19 39	[0]	—	—	—	—	—
Lwow		145·4	341	19 40	[0]	—	—	—	—	—
Potsdam		145·4	354	i 19 40a	[0]	e 32 19	PS	i 23 18	PKS	70·1
De Bilt		145·9	2	i 19 44	[+ 3]	e 34 7	PS	e 41 58	SS	e 68·8
Kew		146·1	8	i 19 44a	[+ 3]	e 30 50	{+53}	i 19 56	pPKP	e 63·8
Collmberg		146·4	353	i 19 44k	[+ 2]	e 26 52	[+ 3]	i 19 54	PKP_2	—
Raciborzu		146·8	347	e 19 46	[+ 4]	—	—	e 20 4	PKP_2	—
Jena	N.	146·9	354	e 19 46	[+ 4]	—	—	e 23 10	PP	—
Skalnate Pleso		147·1	344	e 19 46?	[+ 3]	—	—	e 19 59	PKP_2	—
Prague		147·5	351	i 19 46	[+ 3]	e 26 46	[− 4]	i 20 19	pPKP	e 60·8
Cheb		147·7	354	e 19 47	[+ 3]	—	—	e 23 27	PP	—
Jersey	E.	148·0	11	e 20 1	[+17]	e 42 26	SS	e 23 25	PKS	—
Ogyalla		148·8	345	e 19 49	[+ 3]	—	—	e 23 11	PP	—
Budapest	E.	149·0	344	19 52	[+ 6]	—	—	e 20 56	PKP_2	e 70·8
Karlsruhe		149·0	358	i 19 48	[+ 2]	—	—	—	—	e 72·8
Paris		149·0	6	i 19 49	[+ 3]	e 33 48	PS	e 23 15	PP	e 72·8
Bucharest		149·2	333	i 19 49a	[+ 3]	—	—	i 20 24	PKP_2	47·8
Stuttgart		149·3	357	i 19 48a	[+ 2]	33 58	PSKS	i 20 5	PKP_2	73·8
Strasbourg		149·5	359	i 19 48	[+ 1]	i 33 48	PSKS	19 54	PKP_2	e 70·5
Ksara		149·8	307	i 19 56	[+ 9]	—	—	e 23 13?	PP	—
Kalossa	N.	149·9	344	19 56	[+ 9]	—	—	e 23 50	PP	—
Istanbul		150·2	326	i 19 47	[− 1]	—	—	i 23 24	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Basle		150·5	359	e 19 50	[+ 2]	—	—	e 23 0	PP		—
Zürich		150·7	358	e 19 54a	[+ 6]	e 29 39	{−43}	e 21 4	pPKP		—
Besançon		150·8	0	i 19 51	[+ 2]	—	—	e 23 25	PP		—
Belgrade		151·0	340	e 19 50a	[+ 1]	e 26 51	[− 4]	e 37 33	PPS		e 85·7
Chur		151·2	356	e 19 52a	[+ 3]	e 29 36	{−49}	e 23 29	PP		—
Zagreb		151·3	347	e 20 2	[+13]	—	—	—	—		—
Sofia		151·7	334	e 20 2?	[+12]	e 33 52	PS	e 22 14	PP		e 81·3
Triest		151·9	350	e 19 59	[+ 9]	i 38 59	$PSKS_2$	i 20 15	PKP_2		—
Clermont-Ferrand		152·1	6	i 19 55	[+ 4]	e 35 12	PS	i 23 48	PP		73·8
Pavia		152·8	354	e 19 46?	[− 6]	—	—	—	—		—
Padova		153·3	352	19 54	[+ 2]	—	—	23 45	PP		—
Prato		154·0	353	e 20 4	[+11]	—	—	—	—		—
Florence Arc.		154·1	353	19 55	[+ 2]	e 31 57	{+76}	23 55	PP		—
Florence Xim.		154·1	353	e 20 0	[+ 7]	—	—	i 24 8	PP		—
Helwan		154·9	303	i 19 56a	[+ 2]	30 46	{+ 1}	20 21	PKP_2		—
Lisbon		155·0	30	19 58a	[+ 3]	—	—	20 30	PKP_2		75·8
Rome		155·7	350	i 19 57	[+ 2]	44 10	SS	i 24 1	PP		e 72·8
Taranto		155·9	341	e 18 46	[−70]	37 26	PPS	43 56	SS		—
Toledo		156·2	22	i 19 59	[+ 3]	e 26 52	[− 9]	e 20 33	PKP_2		73·9
Tortosa		156·6	12	20 4	[+ 7]	44 34	SS	23 29	PKS		e 76·8
Alicante		158·7	17	20 33	PKP_2	27 13	[+10]	24 50	PP		e 75·4
Granada		158·7	24	i 19 55a	[− 4]	26 21	[−42]	20 42	PKP_2		75·4
Malaga	z.	158·8	26	i 20 0k	[+ 1]	31 20	{+14}	i 20 32	PKP_2		76·6
Almeria		159·5	22	19 53	[− 7]	26 57	[− 7]	20 45	PKP_2		75·4
Algiers Univ.	z.	161·0	10	i 20 6	[+ 4]	e 28 1	PPP	i 20 48	PKP_2		—
Tamanrasset	z.	175·0	—	i 20 15k	[+ 3]	e 27 24	[+11]	e 25 42	PP		82·8

Additional readings :—
Apia e =1m.6s.
Christchurch eN =8m.32s.
Brisbane iZ =9m.24s.
Riverview iPPPN =8m.37s., iN =8m.52s., iP_cPZ =9m.32s., eZ =12m.50s., iE =13m.11s., iZ =13m.17s., iE =13m.21s., iZ =15m.15s., iS_cSE =17m.21s.
Honolulu ePPP =10m.13s., i =13m.1s.
Perth i =20m.46s.
Nagoya eN =11m.44s. and 12m.45s.
Mizusawa PE =11m.24s.
Osaka iPEN =11m.27s., e =13m.20s., S =16m.49s.
Berkeley eZ =14m.49s., eN =16m.24s., eSZ =21m.9s., eSE =21m.12s.
Lick iZ =11m.54s. and 12m.24s., eN =22m.5s.
Pasadena iZ =11m.55s. and 12m.8s., eZ =14m.2s., iPPZ =14m.17s., iSN =21m.9s., eSSN =25m.46s.
Sapporo P_cPN =12m.10s., eS_cSN =21m.49s.
Fresno iN =14m.22s., iE =15m.38s., eE =16m.16s.
Palomar eN =20m.11s., iPKP,PKPZ =39m.20s.
Riverside ePKP,PKPZ =39m.3s.
Shasta Dam e =16m.6s.
Tinemaha eZ =19m.2s.
Reno iZ =12m.1s., eSE =21m.24s., eSN =21m.30s.
Boulder City e =16m.40s.
Overton eZ =12m.24s., ePPP?Z =16m.39s., eZ =32m.15s., ePKP,PKPZ =38m.58s.
Pierce Ferry i =12m.20s., ePKP,PKP =39m.15s.
Tucson i =13m.7s., iS_cS =22m.21s., eSS =26m.50s., eSSS? =29m.46s., e =31m.7s., ePKP,PKP =39m.9s., eSKP,PKP? =42m.44s.
Hungry Horse ePPP =17m.47s.
College i =13m.48s., ePPS? =24m.21s., eSS =28m.30s., ePKP,PKP =38m.52s.
Santa Lucia N =11m.46s.?, E =16m.17s.
Saskatoon e =23m.46s. and 36m.43s.
Huancayo i =14m.44s. and 26m.0s., eSS =31m.4s.
St. Louis i =13m.38s. and 24m.1s., iSS? =30m.53s.
Chicago eSS =31m.6s.
La Paz iSKS =24m.24s., iSE =25m.22s., iPS =26m.46s., iPPS =27m.22s., iSS =32m.11s.
Irkutsk SKKS =24m.44s., S =25m.18s., PS =26m.51s.
Bogota eSEN =25m.49s.?, ePSE =26m.55s., eSSE =32m.4s.
Cleveland ePSE =27m.21s., eE =29m.21s., eSSE =33m.11s.
Pennsylvania iE =25m.39s. and 28m.12s.
Philadelphia eS =26m.25s., iPS =28m.3s., e =29m.0s., eSS =34m.3s., eSSS =38m.15s.
Ottawa e =28m.16s.
Weston iPS =28m.42s., iPKKP? =29m.4s.
Kodaikanal PSE =26m.23s., SSE =33m.17s. ; phases wrongly identified.
Bermuda e =30m.22s.

Continued on next page.

Poona PPN =18m.2s., PPPN =19m.32s., PKSN =19m.48s., PPSN =29m.33s., SSN = 33m.9s., SSPN =33m.39s., SKKSN =36m.6s., SSSN =37m.33s., QN =48·8m. : phases wrongly identified.
Bombay ePPEN =19m.49s., iSKSN =25m.52s., iPSE =29m.58s.
Tashkent iSKKS =27m.30s.
Sverdlovsk iPP =20m.45s., PPP =23m.21s., PS =30m.47s., SS =37m.38s., SSS = 42m.28s.
Tananarive PPS =32m.6s., eSS? =38m.16s.
Moscow PKS =22m.55s., PPP =24m.52s., PS =32m.14s., SS =39m.58s.
Helsinki eSKKS =28m.51s., eSKSP =31m.58s., eSS =39m.58s., e =41m.59s.
Upsala iPPN =22m.9s., eSKSP?N =32m.4s., eN =33m.4s., eSSSE =44m.35s., eE = 54m.46s.?, eQN =56·8m.
Tiflis iPKS =23m.11s.
Aberdeen iEN =23m.5s. and 28m.10s., eE =53m.6s., eN =58m.26s.
Copenhagen 37m.59s., SS =41m.10s., SSS =46m.34s.
Potsdam iN =19m.43s., iZ =20m.0s., iE =20m.11s., iN =23m.29s.
De Bilt iZ =20m.8s. and 20m.42s., eSSS =46·8m.
Kew esPKPEZ =20m.14s., ePKP$_2$Z =20m.34s., ePPNZ =23m.52s., ePPPEN =27m.10s., eSKSPZ =34m.10s., ePSEZ =35m.45s., eSSEN =42m.0s., eE =52m.47s., eEZ = 61m.48s.
Collmberg iZ =19m.50s., eZ =20m.2s. and 20m.8s., ePPZ =23m.2s., eZ =23m.12s., ePPPN =26m.40s., eSKSN =33m.40s., eSSE =41m.52s., eSSSE =47m.46s., eN = 47m.52s.
Prague iPKP$_2$ =20m.0s., ipPKP$_2$ =20m.29s., ePP? =23m.15s., eSKKS =33m.22s., ePPS =35m.46s., eSS =42m.16s., eSSS =47m.46s.
Jersey eE =50m.46s.
Budapest eN =21m.3s.
Paris i =19m.52s., 20m.3s., and 20m.22s., ePPP? =26m.27s., e =33m.34s., iSS? = 42m.15s., eQ =67·8m.
Bucharest iN =21m.49s.
Stuttgart iPKPZ =19m.54s., iPKP$_2$ =20m.9s., iPKP$_2$Z =20m.13s., eZ =20m.45s., e =22m.8s., ePP =24m.0s., e =28m.52s. and 33m.10s., ePPS =36m.52s., e = 40m.34s., eSS =42m.46s., eSSS =48m.22s., eQ =71·8m.
Strasbourg i =20m.14s., 20m.47s., 20m.55s., and 23m.0s., iPP? =23m.54s., i =26m.39s., e =29m.44s. and 35m.53s., ePPS =36m.32s., i =37m.27s. and 39m.25s., eSS = 42m.23s., i =42m.44s., iSSP =42m.53s., e =46m.26s., eSSS? =47m.22s., iQ = 60m.22s.
Kalossa ePE =20m.6s., eE =23m.46s.?
Basle e =20m.56s.
Zürich ePP =23m.30s.
Besançon e =19m.57s., 20m.43s., 20m.57s., 21m.38s., 22m.46s., and 24m.50s.
Belgrade i =19m.58s., e =42m.57s.
Sofia ePKP =19m.2s., e =39m.34s.
Triest ipPKP? =21m.5s., ipPKP$_2$? =21m.25s., iPP =24m.0s., ePPP =27m.8s., iSS = 42m.53s.?, eSSS =48m.40s.?
Clermont-Ferrand ePPP =27m.23s., iSS =43m.12s., eSSS =48m.56s.
Helwan SKPZ =23m.28s., iPPEZ =23m.56s., PSKSE =34m.13s.
Lisbon PKPEZ =20m.15s.
Rome iZ =20m.53s. and 22m.33s., SSS =50m.46s.
Toledo iPPN =24m.14s., SKKSN =31m.1s., SSN =44m.7s.
Tortosa PPPN =28m.28s., SSP?N =45m.40s.
Alicante PKP$_2$ =21m.17s., PPP =28m.27s., SKKS =30m.29s., SS =44m.29s., SSS = 51m.29s.?, Q =65m.13s.
Granada iPP =24m.21s., eSKKS =30m.30s., e =31m.5s., iSS =44m.24s., SSS =49m.51s.
Malaga iPPZ =24m.20s., PPPZ =28m.8s., PPSZ =37m.44s. and QZ =67·3m.
Almeria PKS =23m.21s., PP =25m.26s., SKKS =31m.10s., PPS =38m.1s., SS = 44m.41s., SSS =51m.3s.
Algiers Univ. iZ =20m.19s., eZ =21m.18s. and 22m.10s., ePPZ =24m.25s.
Tamanrasset eZ =20m.28s., ePKP$_2$Z =21m.49s., iZ =25m.57s., eZ =26m.34s., iPPPZ = 29m.19s., eSKKSZ =32m.40s.
Long waves were also recorded at Dehra Dun, Sitka, and Barcelona.

Nov. 27d. Readings also at 0h. (Boulder City), 1h. and 2h. (La Paz), 5h. (Tacubaya), 8h. (College), 9h. (Boulder City, Ottawa, Mineral (2), Hungry Horse, near College, and near Alicante), 10h. (Cleveland), 11h. (Wellington), 12h. (Hungry Horse, and near Alicante), 14h. (near Berkeley, Branner, Lick, and San Francisco), 15h. (Frunse, Obi-garm, Samarkand, near Andijan, Garm (2), Stalinabad (2), Tchimkent, Istanbul, Sofia, Messina, and near Taranto), 16h. (Overton, Hungry Horse, and near La Paz), 17h. (Hungry Horse), 21h. (near Berkeley, Branner, and Lick).

Nov. 28d. 16h. 27m. 50s. Epicentre 48°·5N. 135°·2E. (as on 1947, October 5d.).

$A = -·6038$, $B = +·2790$, $C = +·7467$; $\delta = -2$; $h = -5$;
$D = +·419$, $E = +·908$; $G = -·678$, $H = +·313$, $K = -·665$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		33·9	40	e 6 47	0	—	—	—	—	—
Hungry Horse		56·6	53	e 9 46	− 1	—	—	—	—	—
China Lake	z.	62·5	66	i 10 37	+ 9	—	—	—	—	—
Mount Wilson	z.	63·3	68	i 10 33	0	—	—	—	—	—
Overton	z.	63·9	64	e 10 29	− 8	—	—	—	—	—
Pierce Ferry		64·5	64	e 10 43	+ 2	—	—	—	—	—
Tucson		69·1	65	e 11 13	+ 3	—	—	—	—	—
Collmberg	z.	75·5	337	e 11 45	− 3	—	—	—	—	—
Jena		76·2	337	e 11 50	− 2	—	—	e 12 11	P_cP	—
Stuttgart		78·7	339	e 12 5	− 1	—	—	—	—	—
Strasbourg		79·3	340	e 12 9	0	—	—	—	—	—
Paris		80·2	343	i 12 14	0	—	—	—	—	—
Zürich		80·2	340	e 12 14a	0	—	—	—	—	—
Basle		80·3	340	e 12 13	− 1	—	—	—	—	—
Triest		80·4	335	—	—	e 24 50	?	—	—	e 49·2
Besançon		80·9	341	e 12 17	0	—	—	—	—	—

Long waves were also recorded at Clermont-Ferrand.

Nov. 28d. 16h. 53m. 23s. Epicentre 8°·1N. 83°·2W. (as on 1946, October 21d.).

$A = +·1172$, $B = -·9832$, $C = +·1400$; $\delta = +2$; $h = +6$;
$D = -·993$, $E = -·118$; $G = +·017$, $H = -·139$, $K = -·990$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights	3·7	78	e 0 59	− 1	e 1 33	−12	—	—	—
Bogota	9·7	110	e 2 15	− 7	e 3 16	−59	—	—	e 4·7
Huancayo	21·5	159	e 4 57	+ 5	(e 8 37)	−10	—	—	e 8·6
La Paz	28·6	148	e 6 13	+13	10 53	+ 5	e 7 5	PPP	15·1
Tucson	35·1	317	e 6 58	+ 1	—	—	—	—	—
Ottawa	37·7	9	7 16	− 3	—	—	—	—	—
Pierce Ferry	39·6	320	i 8 36	+61	—	—	e 8 47	PP	—
Boulder City	40·0	319	e 7 40	+ 2	—	—	—	—	—
Palomar	z. 40·0	314	i 7 39	+ 1	—	—	—	—	—
Overton	z. 40·1	320	i 7 42	+ 3	—	—	—	—	—
Pasadena	z. 41·3	315	i 7 51	+ 2	—	—	—	—	—
Tinemaha	z. 42·9	318	i 8 4	+ 2	—	—	e 9 50	P_cP	—
Lick	z. 45·4	316	i 8 22k	0	—	—	—	—	—
Hungry Horse	47·8	333	i 8 40	− 1	—	—	i 10 6	P_cP	—
College	72·1	337	e 11 26	− 2	—	—	—	—	—

La Paz also gives iSS? =12m.31s.

Nov. 28d. 18h. 47m. 12s. Epicentre 40°·6N., 30°·9E. (as on 1944, April 5d.).

$A = +·6534$, $B = +·3911$, $C = +·6482$; $\delta = +5$; $h = -2$;
$D = +·514$, $E = -·858$; $G = +·556$, $H = +·333$, $K = -·761$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul	1·5	287	i 0 28	0	i 0 45	S*	—	—	—
Yalta	4·6	31	e 1 11	− 1	1 58	− 9	—	—	—
Simferopol	5·0	27	1 17	− 1	2 9	− 9	—	—	—
Bucharest	5·2	318	e 1 36	P*	e 2 19	− 3	i 2 40	S*	4·8
Sofia	6·0	292	e 1 55?	P_g	i 3 22	S_g	—	—	e 3·7
Sotchi	7·2	63	e 2 3	P*	—	—	—	—	—
Tiflis	10·5	80	e 2 53	PPP	—	—	—	—	—
Stuttgart	17·4	305	e 4 7	+ 1	—	—	—	—	e 9·8
Paris	21·7	301	e 4 55	0	—	—	—	—	—
College	74·9	0	e 11 51	+ 7	—	—	—	—	—
Hungry Horse	86·2	337	i 12 39	− 5	—	—	—	—	—

Additional readings :—
Bucharest eN =2m.8s., iE =2m.57s.
Sofia e =2m.26s.?

Nov. 28d. Readings also at 0h. (College, Hungry Horse, and Pierce Ferry), 1h. (College), 5h. (Obi-garm, Frunse, near Stalinabad, Garm, Tashkent, Andijan, Samarkand Tchimkent, and near Copiapo), 9h. (Frunse, Tchimkent, Tashkent, near Obi-garm (2), Andijan (3), Stalinabad (2), and Samarkand (2)), 11h. (near Mizusawa, near Andijan, and near Obi-garm), 16h. (near Mizusawa), 17h. (Rolphton, near La Cave, and Ottawa), 18h. (near Garm), 20h. (Boulder City, Pierce Ferry, Tucson, Palomar, Tinemaha, Hungry Horse, College, and Ottawa (2)), 21h. (Triest and near Andijan), 22h. (near La Paz).

Nov. 29d. Readings at 0h. (Paris, Frunse, near Andijan, Tashkent, Tchimkent, and near Messina), 1h. (Hungry Horse, Boulder City, Pierce Ferry, and Tucson), 3h. (College and near Apia), 6h. (College, near Berkeley, Branner, and near Lick), 7h. (near Berkeley, Branner, Lick, near Fresno, and Obi-garm), 9h. (China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, College, and near Apia (2)), 10h. (Christchurch, Wellington, Palomar, Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Lick, Mineral, Hungry Horse, College, and Stuttgart (2)), 13h. (Hungry Horse, Victoria, and near Seattle), 14h. (Tucson), 16h. (Samarkand, near Garm, Obi-garm, and near Mizusawa), 17h. (La Paz, Ottawa, China Lake, and College), 18h. (near Copiapo, near Victoria, and near Klyuchi), 19h. (near Istanbul), 20h. (Boulder City, Overton, Pierce Ferry, and near Tucson), 22h. (near Tacubaya).

Nov. 30d. 8h. 31m. 53s. Epicentre 38°·6N. 122°·1W.

A = −·4164, B = −·6637, C = +·6213 ; δ = −10 ; h = −1 ;
D = −·847, E = +·531 ; G = −·330, H = −·526, K = −·784.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Berkeley		0·7	190	i 0 17	0	i 0 27	− 1	—	—	—
San Francisco		0·9	198	i 0 19	− 1	i 0 31	− 3	—	—	—
Branner		1·2	183	i 0 23$_a$	− 1	e 0 41	0	—	—	—
Santa Clara		1·3	175	e 0 46	S	e 1 30	?	—	—	—
Lick		1·3	164	i 0 25k	0	i 0 42	− 2	i 0 46	S_g	—
Mineral		1·8	13	i 0 31k	− 1	i 0 56	0	i 0 37	P_g	—
Reno		2·0	62	i 0 38k	+ 3	i 1 1	− 1	i 0 45	P_g	—
Shasta Dam		2·1	354	e 0 35	− 2	e 1 20	S_g	—	—	—
Fresno		2·6	136	e 0 43	− 1	i 1 17	0	e 0 51	P_g	—
Tinemaha		3·4	115	e 1 0	+ 5	i 1 50	S_g	i 1 3	P*	—
China Lake	z.	4·5	126	e 1 12	+ 1	i 2 20	S*	—	—	—
Pasadena		5·4	143	i 1 24	0	i 2 25	− 3	—	—	—
Riverside	z.	6·0	139	i 1 31	− 1	—	—	—	—	—
Boulder City		6·3	112	e 1 54	P*	—	—	e 2 6	P_g	—
Overton	z.	6·4	106	e 1 50	P*	e 3 25	S_g	i 2 10	P_g	—
Pierce Ferry		6·9	108	e 1 54	P*	e 3 51	S_g	—	—	—

Additional readings :—
Berkeley iN = 26s.
San Francisco iEN = 22s.
Branner iE = 26m. and 31s.
Lick iZ = 28s., iN = 38s.
Mineral iE = 34s., i = 41s., iE = 45s. and 51s., iN = 54s., iE = 58s.
Reno iZ = 1m.4s., iEN = 1m.9s., iN = 1m.19s.
Fresno ePN = 47s., iS_gEZ = 2m.26s.
Long waves only were recorded at Tucson.

Nov. 30d. Readings also at 0h. (Tucson, Overton, Pierce Ferry, Garm, near Obi-garm, and Stalinabad), 4h. (near Garm), 6h. (near Obi-garm), 7h. (near Berkeley), 12h. (near Garm), 13h. (College), 15h. (Hungry Horse), 16h. (Victoria, near Seattle, and near Istanbul), 19h. (Erevan, Tiflis, Frunse, Garm, near Andijan, Obi-garm, Tashkent, near Leninakan, and near Istanbul), 21h. (La Paz), 23h. (Leninakan and near Istanbul).

Dec. 1d. 21h. 37m. 28s. Epicentre 43°·5N. 16°·0E. (as on 1941, July 7d.).

Felt near Kresevo (43°35′N. 16°3′E.). Intensity V at Makarska and Rogoznice; IV at Split and Zavelin.
Epicentre near that given by Belgrade, with macroseismic radius 56km.

M. D. Uzelac.
Annuaire microséismique et macroséismique de l'Institut séismologique de Beograd, 1949, Nouvelle Série No. 9, pp. 67, 68, Belgrade 1950.

$A = +·6995$, $B = +·2006$, $C = +·6859$; $\delta = 0$; $h = -3$;
$D = +·276$, $E = -·961$; $G = +·659$, $H = +·189$, $K = -·728$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Triest		2·7	323	e 0 57	P_g	e 1 17	− 2
Taranto		3·2	163	0 52	0	1 22	−10
Zürich		6·5	309	e 1 12	−27	—	—
Prague		6·6	351	i 1 59	P*	e 2 41	?
Stuttgart	Z.	7·1	321	e 2 24	P_g	e 3 0	−10
Jena	E.	8·0	339	e 2 56	P_g	—	—
Collmberg	Z.	8·1	346	e 2 18?	P*	e 2 54	P_g

Jena also gives eN = 3m.1s.

Dec. 1d. Readings also at 0h. (near Garm and near Batavia), 4h. (Andijan, Frunse, Obi-garm, and Tashkent), 5h. (Ksara, La Paz, Erevan, near Leninakan, and Tiflis), 10h. (College, Ivigtut, Jena, Collmberg, Stuttgart, and near Helwan), 11h. (Collmberg, Triest, and Pierce Ferry), 12h. (near Ottawa), 13h. (near Istanbul), 14h. (College), 15h. (near Obi-garm), 19h. (Ottawa and near Andijan), 20h. (Istanbul, Samarkand, Tchimkent, near Andijan, Obi-garm (2), Stalinabad (2), near Branner, and Lick), 21h. (Alicante), 22h. (near Messina), 23h. (Mount Wilson, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, College, Rome, near Istanbul (2), and near Mizusawa).

Dec. 2d. 2h. South-west Pacific.

Wellington e?Z = 47m.15s., iP?Z = 47m.59s., iSZ = 51m.25s., i = 51m.37s.
Auckland iN = 47m.20s.
Cobb River eP? = 47m.26s.
Arapuni eE = 47m.27s.
Tuai eN = 47m.37s.
Brisbane iPZ = 47m.47s.
Kaimata ePNE = 48m.13s.
Riverview iP = 48m.27s.k, ipPZ = 48m.48s., iSN = 52m.21s., iP_cP = 52m.25s., isSN = 53m.0s.
Lick ePZ = 56m.14s.k.
Pasadena ePZ = 56m.17s.
Riverside iPZ = 56m.21s.
Shasta Dam eP = 56m.21s.
China Lake iPZ = 56m.25s.
Tinemaha iPZ = 56m.25s., i = 56m.31s.
Boulder City iP = 56m.36s., e = 57m.7s.
Overton iPZ = 56m.37s.
Pierce Ferry iP = 56m.38s.
College iP = 56m.41s., e = 57m.11s.
Tucson iP = 56m.41s.
Collmberg eZ = 63m.13s.
Stuttgart ePKPZ = 63m.22s.
Prague i = 64m.26s.
Alicante records long waves.

Dec. 2d. 20h. Local shock. Epicentre near Bologna.

Prato iP_g = 48m.14s., iS_g = 48m.26s.
Zagreb P_g = 48m.25s., iS_g = 48m.44s.
Florence Xim. eP = 48m.56s., iS = 49m.21s.
Triest eP_g = 49m.6s., iS_g = 49m.14s.
Stuttgart ePZ = 49m.8s., eZ = 49m.14s., eP_g? = 49m.27s., eS? = 50m.6s., eZ = 50m.24s., e = 50m.37s., eS_g? = 50m.40s., eZ = 50m.50s.
Basle e = 49m.9s.
Zürich eP? = 49m.11s., eS? = 50m.17s.
Collmberg eZ = 49m.35s.?, 50m.39s., 51m.12s., and 51m.15s.
Prague e = 49m.58s., i = 50m.44s.
Jena eE = 50m.34s. and 51m.12s., eN = 51m.17s.
Strasbourg eS_g = 50m.42s.
Besançon e = 50m.48s. and 51m.18s.

Dec. 2d. Readings also at 1h. (Christchurch, Wellington, Boulder City, Overton, Tucson, and Pierce Ferry), 2h. (Kew, Shasta Dam, Hungry Horse, and near Apia (2)), 4h. (Collmberg and near Messina (3)), 5h. (near Messina), 6h. (Rome and near Messina (7)), 7h. (Bogota, Mount Wilson, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, and Messina), 8h. (Rome, near Messina (4), Samarkand, Tchimkent, near Andijan (2), Obi-garm, and Stalinabad), 10h. (Mount Wilson, China Lake, Tinemaha, Overton, Pierce Ferry, and Messina), 11h. (near Apia and near Andijan), 13h. (Overton and Pierce Ferry), 14h. (Mount Wilson, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, near Puebla, Tacubaya, and Vera Cruz), 16h. (Stuttgart), 17h. (Kodaikanal and near Tacubaya), 18h. (near Andijan), 19h. (La Paz, Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, College (2), Auckland, Christchurch, Wellington, Riverview, and near Apia), 20h. (Ottawa, Seven Falls, Weston, Harvard, Istanbul, Ksara, Rome, Besançon, Clermont-Ferrand, Paris, Granada, Strasbourg, and Stuttgart), 21h. (Almeria), 22h. (Rome, Ottawa, Harvard, Salt Lake City, Logan, Pasadena, Palomar, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, Mineral, Lick, Hungry Horse, College, and near Victoria).

Dec. 3d. 12h. 1m. 55s. Epicentre 17°·7S. 69°·2W. Depth of focus 0·020.
(as on 1947, April 1d.).

Intensity IV between latitudes 18° and 19° S.

F. Greve.
Boletin del año 1949, segundo semestre : Instituto Seismologique Santiago, p. 23.

$A = +·3385$, $B = -·8911$, $C = -·3022$; $\delta = -3$; $h = +5$;
$D = -·935$, $E = -·355$; $G = -·107$, $H = +·282$, $K = -·953$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz		1·6	40	i 0 32k	0	i 0 58	+ 2	—	—	—
Antofagasta	E.	6·0	191	—	—	e 2 22	−14	—	—	—
Huancayo		8·2	313	e 2 5	+ 8	—	—	—	—	e 3·9
Tucson		63·7	321	e 10 16	− 1	—	—	e 10 51	pP	—
Palomar		68·2	318	i 10 45k	0	—	—	i 11 20	pP	—
Pierce Ferry		68·3	322	i 10 46	0	—	—	i 11 10	pP	—
Boulder City		68·7	322	i 10 48	0	—	—	—	—	—
Overton	z.	68·8	323	i 10 50	+ 1	—	—	i 11 28	pP	—
Riverside	z.	68·9	318	i 10 50k	+ 1	—	—	e 11 23	pP	—
Pasadena		69·5	318	i 10 51k	− 2	—	—	e 11 29	pP	—
China Lake	z.	70·2	320	i 10 57k	0	—	—	i 11 30	pP	—
Tinemaha	z.	71·5	320	i 11 4k	− 1	—	—	i 11 23	pP	—
Lick	z.	73·7	319	i 11 19k	+ 1	—	—	—	—	—
Mineral	z.	75·5	321	i 11 28a	0	—	—	—	—	—
Shasta Dam		76·2	321	i 11 31	− 1	—	—	—	—	—
Hungry Horse		76·9	331	i 11 36	0	—	—	i 12 25	pP	—
Victoria		81·7	327	i 11 53	− 9	—	—	e 12 29	pP	—
Tamanrasset	z.	83·4	64	e 12 12	+ 2	—	—	e 12 47	pP	—
College		101·1	335	e 13 33	0	—	—	—	—	—

Additional readings :—
La Paz iS_g = 1m.4s.
Tucson e = 11m.11s.
Pierce Ferry i = 11m.0s.
Pasadena iZ = 11m.39s.
China Lake iZ = 11m.45s.

Dec. 3d. Readings also at 0h. (Samarkand, near Andijan, Garm, and Stalinabad), 2h. (Tamanrasset, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Lick, Shasta Dam, and Hungry Horse), 3h. (College), 5h. (Andijan, Garm, Tashkent, near Obi-garm, Samarkand, Stalinabad, and Tchimkent), 6h. (Apia and near Alicante), 7h. (near Alicante (2)), 10h. (Bombay), 12h. (Seattle and near Andijan), 15h. (near Copiapo), 16h. (near Mizusawa), 17h. (near Seattle), 18h. (near Andijan), 19h. (Seattle, Garm, Tashkent, near Andijan, Frunse, and Tchimkent), 20h. (Palomar, China Lake, Tinemaha, Pierce Ferry, Shasta Dam, College, and near Fort de France), 21h. (near Stuttgart), 22h. (Seattle).

Dec. 4d. Readings at 0h. (Palomar, Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse (2), College, Samarkand, near Andijan, Obi-garm, Stalinabad, and near Istanbul), 1h. (College and Istanbul), 3h. (near Obi-garm), 4h. (near Tacubaya (2)), 12h. (Huancayo, La Paz, Andijan, Obi-garm, Stalinabad, and Tashkent), 13h. (Andijan and Tashkent), 14h. (near Andijan), 16h. (Andijan, Samarkand, Tashkent, Tchimkent, near Garm (2), Obi-garm, and Stalinabad), 17h. (Algiers Univ., Andijan, and Frunse), 18h. (Palomar, China Lake, Tinemaha, Overton, Pierce Ferry, College, near Andijan, Frunse, Garm, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 20h. (Mizusawa, Baku, and near College), 21h. (Santa Lucia), 22h. (Arcata, near Ferndale, Mineral, and Shasta Dam).

Dec. 5d. 11h. 21m. 47s. Epicentre 8°·1N. 84°·2W.
(as on 1937, June 24d., and fore-shock of 12h.).

A = +·1001, B = −·9851, C = +·1400 ; δ = +4 ; h = +7 ;
D = −·995, E = −·101 ; G = +·014, H = −·139, K = −·990.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		18·4	310	i 4 14	− 4	—	—	—	—	—
San Juan		20·3	58	—	—	e 9 54	Q	—	—	e 12·4
Huancayo		21·9	156	e 6 52	?	—	—	—	—	e 10·2
La Paz		29·2	146	(e 5 37)	−28	(i 10 27)	−31	(11 59)	SS	(13·8)
St. Louis		30·9	350	e 6 24	+ 4	e 13 54	SSS	—	—	—
Cleveland	N.	33·3	4	e 6 31	−10	—	—	—	—	—
Antofagasta	E.	34·3	157	—	—	13 54	SS	—	—	—
Tucson		34·5	318	e 6 49	− 3	—	—	e 6 56	P	—
Ottawa		37·9	9	e 7 26a	+ 6	—	—	8 38	PP	20·7
Pierce Ferry		38·9	321	i 7 30	+ 1	—	—	—	—	—
Palomar		39·3	315	i 7 33a	+ 1	—	—	—	—	—
Boulder City		39·4	320	e 7 33	0	—	—	—	—	—
Overton	Z.	39·5	322	i 7 34	0	—	—	—	—	—
Pasadena		40·6	315	i 7 41	− 2	—	—	—	—	—
China Lake	Z.	41·1	319	i 7 46	− 1	—	—	e 10 2	PcP	—
Logan		41·5	330	e 7 45	− 5	—	—	—	—	—
Tinemaha		42·3	318	i 7 58	+ 1	—	—	e 10 6	PcP	—
Fresno	Z.	43·1	316	e 8 5	+ 1	—	—	—	—	—
Lick	Z.	44·7	316	i 8 17k	+ 1	—	—	i 9 35	PP	—
Mineral	Z.	46·2	321	e 8 29k	+ 1	—	—	—	—	—
Hungry Horse		47·4	334	e 8 36	− 2	—	—	e 10 18	PP	—
College		71·7	337	e 11 29	+ 3	—	—	—	—	—

Additional readings and note :—
La Paz readings reduced by 8m. and still appear to be 30s. in error.
Palomar iZ = 7m.40s.
China Lake iZ = 7m.55s.
Tinemaha iZ = 8m.5s.
Hungry Horse i = 8m.53s.
Long waves were also recorded at Sofia.

Dec. 5d. 12h. 42m. 30s. Epicentre 8°·1N. 84°·2W. (as at 11h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		4·7	79	e 2 14	S	(e 2 14)	+ 4	—	—	e 4·0
Vera Cruz		16·0	315	3 50	+ 2	—	—	—	—	e 8·1
Tacubaya		18·4	310	i 4 7	−11	e 7 42	+ 1	e 13 23	?	—
San Juan		20·3	58	e 4 58	PP	e 8 12	−11	e 5 23	PPP	e 9·0
Fort de France		23·5	72	e 5 46	PP	e 10 22	SSS	—	—	—
Columbia		25·9	5	e 5 37	+ 2	e 10 10	+ 6	—	—	e 13·0
La Paz		29·2	146	7 3	PP	13 36	L	17 0	ScS	(13·6)
St. Louis		30·9	350	e 6 20	0	e 11 27	+ 3	e 7 7	PP	—
Philadelphia		32·7	13	e 6 48	+12	e 11 45	− 7	—	—	e 13·5
Cleveland		33·3	4	i 6 43	+ 2	—	—	e 9 27	PcP	—
Tucson		34·5	318	i 6 46	− 6	e 12 14	− 6	e 7 52	PP	e 17·7
Ottawa		37·9	9	e 7 23	+ 3	13 17	+ 4	8 56	PP	19·5
Pierce Ferry		38·9	321	i 7 27	− 2	—	—	—	—	—
Palomar	Z.	39·3	315	i 7 28	− 4	—	—	—	—	—
Boulder City		39·4	320	e 7 30	− 3	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Overton	Z.	39·5	322	i 7 30	− 4	e 13 29	− 8	i 8 42	PP	—
Shawinigan Falls	N.	39·5	13	7 38	+ 4	—	—	—	—	—
Riverside		40·0	315	e 7 36	− 2	—	—	—	—	—
Seven Falls	E.	40·5	14	7 47	+ 5	—	—	—	—	20·5
Pasadena		40·6	315	i 7 38	− 5	—	—	—	—	e 21·1
China Lake	Z.	41·1	319	i 7 43	− 4	—	—	i 10 5	P_cP	—
Logan		41·5	330	e 7 43	− 7	—	—	—	—	—
Tinemaha	Z.	42·3	318	i 7 54	− 3	—	—	i 10 4	P_cP	—
Fresno	Z.	43·1	316	e 8 0a	− 4	e 18 19	SSS	—	—	—
Lick	Z.	44·7	316	i 8 13a	− 3	—	—	—	—	—
Berkeley	Z.	45·4	316	i 8 21a	− 1	—	—	i 10 27	P_cP	e 25·5
Mineral	Z.	46·2	321	i 8 27k	− 1	—	—	—	—	—
Shasta Dam		47·0	321	i 8 30	− 5	—	—	e 10 18	PP	—
Hungry Horse		47·4	334	i 8 34	− 4	—	—	i 10 19	PP	—
College		71·7	337	e 11 26	0	—	—	—	—	—
Granada		77·7	54	i 12 7k	+ 7	e 22 31	PS	—	—	39·6
Almeria		78·6	54	e 12 0	− 5	e 21 0	−62	15 4	PP	38·9
Alicante		80·1	52	—	—	e 22 36	+18	—	—	e 38·5
Stuttgart	Z.	86·2	42	e 13 6	+22	—	—	—	—	—

Additional readings :.
St. Louis i = 6m.28s., e = 11m.19s. and 11m.35s.
Cleveland ePN = 6m.47s., eE = 11m.30s.
Tucson e = 9m.42s.
Pierce Ferry i = 7m.51s. and 8m.38s.
Palomar iZ = 7m.37s.
Overton iZ = 8m.31s.
Pasadena iZ = 7m.45s. and 8m.3s.
Tinemaha iZ = 8m.1s.
Lick iZ = 8m.23s. and 8m.32s.
Berkeley iZ = 8m.24s.
Mineral iZ = 8m.34s.
Almeria SS = 27m.8s.
Long waves were also recorded at Bermuda, Harvard, Weston, Chicago, Saskatoon, Bucharest, Copenhagen, Clermont-Ferrand, Strasbourg, Rome, and Ksara.

Dec. 5d. 14h. 51m. 53s. Epicentre 40°·2N. 142°·2E. Depth of focus 0·010.
(as on 1937, March 21d.).

Intensity V at Hatinohe, Miyako, and Morioka ; IV at Aomori ; II-III at Mizusawa and Tomakomai. Macroseismic radius >300km.
Epicentre 40°·4N. 142°·0E. Depth 85km.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1949, Tokyo 1950, p. 39, with macroseismic chart.

$A = -·6052$, $B = +·4694$, $C = +·6429$; $\delta = -8$; $h = -2$;
$D = +·613$, $E = +·790$; $G = -·508$, $H = +·394$, $K = -·766$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Hatinohe	0·6	303	0 17a	0	—	—	—	—
Miyako	0·6	196	0 19a	+ 2	0 32	+ 3	—	—
Morioka	0·9	238	0 19	0	0 33	− 1	—	—
Aomori	1·2	300	0 23k	0	0 37	− 3	—	—
Mizusawa	1·3	218	i 0 25	+ 1	0 42	0	—	—
Akita	1·7	253	0 27k	− 2	0 46	− 5	—	—
Sendai	2·2	208	0 35	− 1	0 59	− 3	—	—
Mori	2·3	327	0 35	− 2	0 59	− 6	—	—
Hukusima	2·8	209	0 43	− 1	1 14	− 3	—	—
Sapporo	2·9	348	0 44	− 1	1 13	− 6	—	—
Onahama	3·4	198	0 25	−27	—	—	—	—
Aikawa	3·8	236	0 55	− 3	1 35	− 7	—	—
Mito	4·0	201	1 1	+ 1	1 48	+ 2	—	—
Nemuro	4·0	38	1 1	+ 1	1 46	0	—	—
Utunomiya	4·1	207	0 59	− 3	1 43	− 6	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Kakioka		4·3	203	1 1	− 4	1 31	−23	—	—
Tukubasan		4·3	204	1 11	+ 6	—	—	—	—
Maebasi		4·5	214	1 33	+26	2 14	+15	—	—
Kumagaya		4·6	210	1 20	+11	1 59	− 2	—	—
Nagano		4·7	223	1 24	+14	2 3	− 1	—	—
Matusiro		4·8	222	1 24	+13	—	—	—	—
Tokyo		4·9	205	1 22	+ 9	1 59	−10	—	—
Wazima		5·0	238	1 15	+ 1	2 8	− 3	—	—
Yokohama		5·2	204	1 55	+38	—	—	—	—
Mera		5·6	201	2 3	+41	—	—	—	—
Nagoya		6·5	221	1 34	− 1	—	—	—	—
College		46·1	35	e 8 15	− 1	—	—	e 8 42	pP
Shasta Dam		68·7	55	e 10 56	+ 1	—	—	—	—
Hungry Horse		69·1	44	i 10 56	− 2	—	—	—	—
China Lake	z.	74·7	56	i 11 30	− 1	—	—	—	—
Pasadena	z.	75·3	59	i 11 34	0	—	—	—	—
Overton	z.	76·2	54	e 11 39	0	—	—	i 12 9	pP
Pierce Ferry		76·7	54	i 11 43	+ 1	—	—	—	—

Overton also gives eZ = 13m.27s.

Dec. 5d. Readings also at 0h. (Bucharest, Ksara, Pretoria, Puebla, and near Tacubaya), 1h. (near Andijan, Frunse, Obi-garm, Stalinabad, Tchimkent, and Samarkand), 3h. (Samarkand, near Garm (2), Obi-garm (2), Stalinabad, and Andijan), 6h. (La Paz, near Andijan, and near Bogota), 10h. (near Andijan), 12h. (Huancayo, near Messina, and near Antofagasta), 13h. (Copenhagen), 14h. (Tananarive), 15h. (near Tortosa), 17h. (College, Hungry Horse, Mineral, Mount Wilson, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, and near Mizusawa, near Bogota, Rolphton, and near Ottawa), 18h. (Copiapo and Ksara), 21h. (Samarkand, near Garm, Stalinabad, and Andijan), 22h. (Hungry Horse, Samarkand, Tchimkent, near Garm, Stalinabad, and Andijan), 23h. (Leninakan, Ksara, Copiapo, Antofagasta, Palomar, Tucson, Stalinabad, near Obi-garm, and near Mizusawa).

Dec. 6d. 3h. 46m. 22s. Epicentre 43°·8N. 12°·8E.

Intensity VI at Cardelara (Pesaro); II at Fano and Orciano di Pesaro. Epicentre given by Strasbourg.
Monthly Seismological Bulletin, Rome, 1949, p. 2.

$A = +·7061$, $B = +·1604$, $C = +·6897$; $\delta = -1$; $h = -3$;
$D = +·222$, $E = -·975$; $G = +·673$, $H = +·153$, $K = -·724$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Padova		1·0	316	e 1 10	?	—	—	—	—
Florence Arc.		1·1	269	0 22	0	i 0 43	+ 4	—	—
Florence Xim		1·1	269	i 0 22	0	i 0 48	+ 9	—	—
Prato		1·2	274	i 0 24	0	i 0 48	+ 7	—	—
Rome		1·9	187	e 0 11?	?	i 1 25	?	—	—
Triest		2·0	20	e 0 24	−11	e 0 47	−15	—	—
Pavia		2·9	298	—	—	e 1 22	− 2	—	—
Chur		3·8	324	e 0 54	− 7	e 1 39	− 8	—	—
Zürich		4·6	321	e 1 16	+ 4	e 2 24	S*	—	—
Ravensburg		4·6	332	e 1 28	P_g	e 2 29	S_g	—	—
Basle		5·2	317	e 1 48	P_g	e 2 45	S_g	—	—
Stuttgart		5·5	334	e 1 27?	+ 2	e 2 21	− 9	e 3 4	S_g
Strasbourg		5·9	325	e 2 28	?	e 2 33	− 7	e 3 11	S_g
Prague		6·4	9	e 2 20	P_g	e 3 34	S_g	—	—
Jena		7·2	354	e 2 8	P*	e 3 2	−11	e 3 49	S_g
Collmberg	z.	7·5	1	e 1 39?	−14	e 3 48	S*	e 2 52?	P_g

Additional readings :—
Padova e = 1m.18s., 1m.26s., and 1m.38s.
Triest iP_gP_g = 33s., iS_g = 52s.
Stuttgart e = 2m.14s. and 2m.56s.
Strasbourg e? = 2m.50s.
Jena eE = 2m.59s. and 4m.11s.
Collmberg eZ = 4m.2s.

Dec. 6d. 14h. 27m. 35s. Epicentre 17°·28. 174°·4W. (as on 1949, June 9d.).

A = −·9513, B = −·0933, C = −·2939 ; δ = +5 ; h = +5 ;
D = −·098, E = +·995 ; G = +·292, H = +·029, K = −·956.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		4·2	37	e 1 4	− 3	1 43	−14	—	—	e 5·1
Auckland	N.	21·8	205	e 4 59	+ 3	i 8 54	+ 2	—	—	—
Arapuni	E.	22·6	202	e 5 13	+10	—	—	—	—	—
Riverview		35·0	235	e 8 37	PPP	e 13 17	+49	—	—	e 15·3
Lick	Z.	73·5	42	e 11 35k	− 1	—	—	i 11 41	P_cP	—
Berkeley		73·5	42	i 11 40k	+ 4	—	—	—	—	e 33·8
Pasadena	Z.	73·9	47	i 11 38	− 1	—	—	i 11 42	P_cP	—
Fresno	Z.	74·4	43	i 11 44a	+ 2	—	—	—	—	—
Palomar	Z.	74·4	48	i 11 40	− 2	—	—	i 11 45	P_cP	—
Shasta Dam		75·1	39	e 11 45	− 1	—	—	—	—	—
China Lake	Z.	75·3	45	e 11 44	− 3	—	—	i 11 49	P_cP	—
Mineral	Z.	75·4	40	e 11 41k	− 6	—	—	i 11 51	P_cP	—
Tinemaha	Z.	75·6	44	e 11 47	− 1	—	—	—	—	—
Boulder City		77·2	47	e 11 58	+ 1	—	—	—	—	—
Overton	Z.	77·8	46	i 12 1	0	—	—	i 12 5	P_cP	—
Pierce Ferry		77·9	47	i 11 59	− 2	—	—	i 12 4	P_cP	—
Tucson		78·2	52	i 12 2	− 1	—	—	i 12 6	P_cP	—
Logan		82·3	42	e 12 25	0	—	—	—	—	—
College		84·3	10	i 12 37	+ 2	—	—	—	—	—
Hungry Horse		84·5	36	i 12 35	− 1	—	—	e 12 47	P_cP	—
Harvard		110·8	50	i 23 44	PKS	—	—	—	—	—
Collmberg	Z.	145·5	353	e 19 45	[+ 5]	—	—	e 20 12	PKP_2	—
Jena	E.	146·0	351	e 19 49	[+ 8]	—	—	e 20 1	PKP_2	—
Ksara		148·2	307	e 19 55	PKP_2	—	—	23 35	PP	—
Stuttgart	Z.	148·4	355	e 19 50?	PKP_2	—	—	—	—	—
Paris		148·4	5	i 19 58	PKP_2	—	—	i 20 5	PKP_2	—
Strasbourg		148·6	357	e 20 6	PKP_2	—	—	e 20 10	PKP_2	—
Besançon		150·0	0	e 20 3	PKP_2	—	—	—	—	—
Clermont-Ferrand		151·5	3	e 20 15	PKP_2	—	—	—	—	—
Alicante		158·3	13	20 25	PKP_2	25 36	?	37 35	PPS	e 72·6
Granada		158·5	20	20 42k	PKP_2	27 19	[+16]	24 57	PP	—
Almeria		159·2	18	19 57	[− 3]	26 45	[−19]	20 9	pPKP	—

Additional readings :—
Lick iZ = 11m.45s.
Berkeley eZ = 12m.37s.
Overton iZ = 12m.35s.
Tucson e = 14m.7s.
Collmberg eZ = 19m.55s.
Jena eN = 19m.57s.
Stuttgart ePKPZ = 19m.53s., eZ = 20m.7s.
Alicante PP = 24m.57s.
Granada PKP_2 = 21m.39s., SKSP = 35m.36s., SS = 45m.12s.
Almeria PKP_2 = 20m.31s., PKS = 23m.17s., PP = 23m.54s., SKSP = 34m.13s., PPS = 27m.19s., SS = 43m.47s., SSS = 49m.52s.
Long waves were also recorded at Triest, Christchurch, and Wellington.

Dec. 6d. 22h. 6m. 59s. Epicentre 38°·3N. 117°·7W. (given by California).

A = −·3657, B = −·6966, C = +·6172 ; δ = −8 ; h = −1 ;
D = −·885, E = +·465 ; G = −·287, H = −·546, K = −·787.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Fresno		2·3	227	i 0 46	+ 6	i 1 16	+ 7	—	—
Overton	Z.	3·1	124	i 1 20	P_g	i 2 12	S_g	—	—
Boulder City		3·3	135	e 1 17	P_g	e 2 13	S_g	—	—
Lick		3·3	253	i 0 52k	− 1	i 1 35	0	i 1 11	P_g
Berkeley		3·6	265	i 1 1	+ 3	e 1 41	− 1	i 1 8	P_g
Mineral		3·6	306	i 0 49a	− 9	e 1 41	− 1	—	—
Pierce Ferry		3·7	125	e 1 15	P_g	i 2 10	S_g	—	—
Shasta Dam		4·3	305	e 1 2	− 6	e 2 18	S_g	—	—

For Notes see next page.

NOTES TO DECEMBER 6d. 22h. 6m. 59s.

Additional readings :—
Lick iZ = 58s., eEN = 1m.1s.
Berkeley eE = 1m.45s.
Mineral iZ = 55s. and 1m.1s., iE = 1m.29s., iSZ = 1m.37s.
Pierce Ferry i = 1m.32s. and 1m.46s.
Shasta Dam i = 1m.11s.

Dec. 6d. Readings also at 0h. (Pasadena, China Lake, Tinemaha, Overton, Pierce Ferry, Lick, Shasta Dam, and Hungry Horse), 1h. (near Antofagasta, La Paz, Andijan, Obi-garm, Stalinabad, and near Garm), 2h. (near Tananarive), 7h. (College, Frunse, Samarkand, near Andijan, Garm, Obi-garm (2), and Stalinabad), 8h. (Overton, Pierce Ferry, Mineral, Hungry Horse, near Andijan, Frunse, Garm, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 11h. (near Obi-garm), 12h. (Tucson, Pierce Ferry, College, Puebla, near Tacubaya, Stuttgart, near Basle, Frunse, Samarkand (2), near Andijan (2), Obi-garm (2), Stalinabad (2), and Tchimkent), 13h. (Palomar, Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Overton, Mineral, Lick, Shasta Dam, College, and Stuttgart), 14h. (near Tananarive), 15h. (Samarkand, near Andijan, Stalinabad, Tchimkent, and near Tananarive), 16h. (Antofagasta, Copiapo, La Paz, Mount Wilson, Palomar, China Lake (2), Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry (2), Hungry Horse, Triest, near Garm, Obi-garm, Stalinabad, and near Tananarive) 17h. (Andijan, Samarkand, near Tchimkent, Copenhagen, Granada, and near Alicante), 18h. (Tashkent), 19h. (Pierce Ferry, Tucson, and near Garm), 20h. (Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, and Lick), 22h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Mineral, Lick, Shasta Dam, Hungry Horse, College, and Mizusawa), 23h. (Basle and Obi-garm).

Dec. 7d. 2h. 43m. 59s. Epicentre 45°·9N. 13°·8E.

Intensity V at Solkan (45°58′N., 13°40′E.) and Gorizia ; IV-V at Udine ; III-IV at Triest; III at Idrija.
Epicentre given by Strasbourg. Macroseismic radius 34km.

M. D. Uzelac.
Annuaire Microséismique et Macroséismique de l'Institut Séismologique de Beograd, 1949, Nouvelle Séries No. 9, Belgrade, 1950, p. 68.

$A = +\cdot6782$, $B = +\cdot1666$, $C = +\cdot7158$; $\delta = +8$; $h = -4$;
$D = +\cdot239$, $E = -\cdot971$; $G = +\cdot695$, $H = +\cdot171$, $H = -\cdot698$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Triest		0·3	188	0 7?	− 4	i 0 13	− 5	—	—
Zagreb		1·5	93	i 0 32$_g$	+ 4	e 0 57	+ 8	i 0 34	P_g
Padova		1·9	224	1 7	S_g	i 1 27	?	—	—
Florence Arc.		2·8	220	—	—	e 1 19	− 3	e 1 47	S_g
Florence Xim		2·8	220	—	—	i 1 20	− 2	i 1 44	S_g
Prato		2·8	223	—	—	i 1 19	− 3	i 1 45	S_g
Pavia		3·3	258	—	—	e 1 33	− 2	—	—
Ravensburg		3·4	304	e 1 3	P*	e 1 45	+ 8	—	—
Prague		4·2	5	e 1 14	P*	i 2 13	S*	—	—
Cheb		4·3	347	e 1 6	− 2	e 2 43	S_g	—	—
Stuttgart		4·3	314	e 1 3	− 5	e 2 9	S*	e 1 19	P_g
Basle		4·6	293	e 1 6	− 6	e 2 24	S*	—	—
Karlsruhe		4·8	312	e 1 27	P_g	e 2 31	S*	—	—
Strasbourg		4·9	305	e 1 17	0	e 2 15	0	i 1 36	P_g
Jena		5·2	344	e 1 20	− 1	e 2 17	− 5	e 1 49	P_g
Collmberg	z.	5·4	354	e 1 21	− 3	e 2 33	+ 5	e 1 41	P*
Besançon		5·5	287	e 1 44	P_g	e 2 30	0	e 3 1	S_g
Clermont-Ferrand		7·5	273	e 1 59	+ 6	e 3 8	−12	e 3 55	S*

Additional readings :—
Zagreb iP_gZ = 37s. and iP_gE = 40s.
Ravensburg eZ = 1m.25s. and 1m.49s.
Stuttgart e = 1m.8s., eP_gZ = 1m.17s., eZ = 1m.26s., e = 1m.29s., eZ = 1m.35s., eS? = 1m.49s., iS_g? = 2m.15s., eZ = 2m.21s.
Strasbourg e = 1m.32s. and 1m.58s., iS_g = 2m.35s., i = 2m.47s.
Jena eN = 1m.57s., eE = 2m.45s.
Collmberg eZ = 1m.29s., 2m.16s. and 2m.27s., eS*?Z = 2m.39s., eS_gZ = 2m.47s., eZ = 2m.50s.
Besançon e = 2m.33s.

Dec. 7d. 16h. 13m. 34s. Epicentre 34°·7N. 24°·1E.

A = +·7521, B = +·3364, C = +·5667 ; δ = −3 ; h = 0 ;
D = +·408, E = −·913 ; G = +·517, H = +·231, K = −·824.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Athens		3·3	355	e 0 43	−10	e 1 33	− 2	—	—	—
Istanbul		7·4	30	e 1 52	0	i 4 45	SS_s	—	—	—
Messina		7·7	300	e 2 16	P*	i 3 14	−11	—	—	—
Helwan		7·8	126	e 1 56	− 2	i 3 20	− 8	3 41	S	—
Taranto		7·9	319	1 57	− 2	3 17	−13	—	—	—
Bucharest		9·8	9	2 32	+ 8	—	—	i 2 57	P*	—
Ksara		9·8	92	e 2 23?	− 1	e 4 13?	− 4	—	—	—
Belgrade		10·5	346	e 2 57k	+22	e 4 50	+15	—	—	e 6·1
Rome		11·6	312	e 3 36	+46	e 4 33	−28	—	—	e 5·4
Kalossa		12·5	343	e 4 23	?	e 5 22	0	—	—	e 6·5
Yalta		12·5	35	e 3 1	− 1	—	—	—	—	—
Zagreb		12·7	333	e 3 6	+ 1	e 5 22	− 6	—	—	e 6·0
Budapest		13·4	345	e 3 24	+10	—	—	—	—	8·6
Triest		13·5	327	e 2 51	−24	e 5 55	+ 8	i 7 40	SS	i 7·8
Padova		13·6	320	e 4 24	+67	e 7 2	+72	—	—	e 9·8
Skalnate Pleso		14·8	350	e 3 43	+11	e 6 13	− 5	—	—	—
Pavia		15·5	317	e 4 3	+21	—	—	—	—	—
Chur		16·4	322	e 3 54k	+ 1	e 7 6	+10	—	—	—
Leninakan		16·8	63	3 56	− 2	—	—	—	—	—
Prague		16·9	338	i 4 1	+ 2	i 7 12	+ 5	i 4 15	PP	e 9·6
Ravensburg	z.	17·0	323	e 4 2	+ 1	—	—	—	—	—
Erevan		17·1	65	e 4 6	+ 4	—	—	—	—	—
Zürich		17·2	321	e 4 2	− 1	e 7 10	− 4	—	—	—
Algiers Univ.	z.	17·2	282	i 4 12	+ 9	—	—	—	—	—
Piatigorsk		17·4	51	4 6	0	7 23	+ 4	—	—	—
Cheb		17·6	335	e 4 30	PP	e 7 28	+ 5	—	—	—
Tiflis		17·7	60	i 4 9	− 1	e 7 34	+ 8	i 4 20	PP	—
Neuchatel		17·8	320	e 4 10	− 1	—	—	—	—	—
Basle		17·8	321	e 4 10	− 1	e 7 32	+ 4	—	—	—
Stuttgart		17·9	327	e 4 10	− 2	e 7 26	− 4	—	—	e 10·3
Strasbourg		18·4	324	i 4 20k	+ 2	i 7 53	+12	—	—	e 10·4
Besançon		18·5	318	e 4 20	+ 1	—	—	—	—	—
Collmberg		18·5	337	e 4 16	− 3	e 7 52	+ 8	—	—	—
Jena		18·6	335	e 4 18	− 3	e 7 30	−16	—	—	—
Grozny		18·9	56	e 4 28	+ 4	8 2	+ 9	—	—	—
Clermont-Ferrand		19·4	311	i 4 30	0	e 8 19	+15	—	—	12·4
Potsdam		19·4	339	i 4 28k	− 2	—	—	i 4 38	PP	e 11·0
Tamanrasset	z.	20·1	240	e 4 35	− 3	e 8 35	+16	e 5 8	PP	—
Alicante		20·1	288	e 4 59	+21	e 8 32	+13	—	—	e 9·9
Baku		21·2	66	e 5 2	+13	8 50	+ 9	—	—	—
Paris		21·3	318	e 4 51	+ 1	—	—	—	—	—
Almeria		21·6	284	4 57	+ 3	8 54	+ 5	5 27	PP	11·2
Copenhagen		22·5	343	i 5 0	− 2	e 9 11	+ 6	—	—	12·6
Toledo	z.	22·9	291	i 5 9	+ 3	9 23	+10	—	—	—
Moscow		23·0	19	e 5 4	− 3	e 9 4	−10	—	—	—
Kew		24·3	322	e 6 26?	?	—	—	—	—	e 12·4
Rathfarnham Castle		28·4	321	i 6 1	+ 3	e 10 53	+ 8	—	—	—
Sverdlovsk		33·1	36	i 6 38	− 2	11 53	− 6	—	—	—
Stalinabad		35·8	69	i 7 2	− 1	—	—	—	—	—
Tchimkent		36·1	63	i 7 23	+18	—	—	—	—	—
Obi-garm		36·5	69	i 7 8	− 1	—	—	—	—	—
Garm		36·9	69	e 7 11	− 1	—	—	—	—	—
Frunse		39·7	62	e 7 35	− 1	—	—	—	—	—
Grahamstown	z.	67·7	177	e 11 8	+ 7	—	—	—	—	—
College		80·6	357	i 12 15	− 1	—	—	—	—	—
St. Louis		85·0	314	e 12 38	0	—	—	—	—	—
Hungry Horse		89·3	334	i 12 59	0	—	—	—	—	—
Pierce Ferry		99·4	327	e 13 39	− 7	—	—	i 13 4	pP	—
La Paz		101·0	257	e 13 37	−16	—	—	—	—	—

For Notes see next page.

NOTES TO DECEMBER 7d. 16h. 13m. 34s.

Additional readings :—
Messina i = 3m.19s.
Helwan eZ = 2m.4s., P*Z = 2m.14s., SEN = 3m.16s.
Belgrade e = 3m.22s.
Rome e = 4m.13s.
Budapest eN = 3m.56s. and 7m.56s., eE = 8m.1s.
Triest $iS_gS_gS_g$ = 7m.43s.
Chur i = 3m.58s. a.
Prague i = 4m.51s., e = 5m.20s., 6m.9s., and 7m.45s.
Ravensburg eZ = 4m.10s.
Zürich e = 4m.10s.
Algiers Univ. eZ = 4m.27s., 4m.36s., 4m.48s., 5m.0s., and 5m.35s.
Stuttgart e = 4m.20s., 4m.23s., and 4m.48s.
Strasbourg e = 4m.30s. and 8m.6s.
Besançon e = 4m.31s.
Collmberg eZ = 4m.25s. and 7m.56s., eE = 7m.59s.
Clermont-Ferrand i = 4m.46s.
Tamanrasset iPZ = 4m.39s.k, eZ = 4m.45s. and 4m.52s.
Paris i = 5m.1s. and 5m.12s., e = 6m.0s.
Toledo eZ = 5m.14s. and 5m.43s.
Hungry Horse i = 13m.14s.
Long waves were also recorded at De Bilt and Ogyalla.

Dec. 7d. 16h. 44m. 21s. Epicentre 3°·5N. 83°·0W. (as on 1948, June 8d.).

A = +·1216, B = −·9907, C = +·0606; δ = −5; h = +7.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bogota		9·0	83	e 2 12	− 1	e 3 38	−20	—	—	e 4·5
Huancayo		17·2	154	e 4 11	+ 8	e 7 11	− 3	—	—	e 9·1
La Paz		24·7	143	5 21	− 3	i 9 51	+ 7	11 15	SS	12·8
Tucson		38·7	321	e 7 28	+ 1	—	—	—	—	—
Pierce Ferry		43·2	323	e 8 0	− 4	—	—	—	—	—
Palomar	z.	43·4	317	e 8 2	− 4	—	—	—	—	—
Boulder City		43·7	322	e 8 2	− 6	—	—	—	—	—
Overton	z.	43·8	323	e 8 31	+22	—	—	—	—	—
Pasadena	z.	44·7	317	e 8 17	+ 1	—	—	—	—	—
China Lake	z.	45·3	320	e 8 16	− 5	—	—	—	—	—
Tinemaha	z.	46·5	321	e 8 30	− 1	—	—	—	—	—
Hungry Horse		52·0	335	i 9 7	− 6	—	—	—	—	—

Palomar gives also i = 8m.28s.

Dec. 7d. 17h. 17m. 45s. Epicentre 47°·2N. 10°·8E.

Intensity IV west of Ots (Tyrol). Epicentre given by Strasbourg. Macroseismic area 2000 sq. km.

Jahrbücher der Zentralanstalt für Meteorologie und Geodynamik. Jahrgang, 1949, Vienna, 1950, New Series, Vol. 86, p. E.1, with macroseismic chart p. E.2.

A = +·6698, B = +·1278, C = +·7314; δ = −9; h = −4;
D = +·187, E = −·982; G = +·718, H = +·137, K = −·682.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Chur		0·9	248	e 0 17	− 3	e 0 29	− 5	—	—	—
Ravensburg		1·0	306	e 0 21?	0	e 0 36	0	—	—	—
Zürich		1·5	276	e 0 28	0	e 0 48	− 1	—	—	—
Stuttgart		1·9	326	e 0 35	+ 1	e 1 0	+ 1	e 0 37	P_g	—
Basle		2·2	279	e 0 45	P_g	e 1 11	+ 5	—	—	—
Strasbourg		2·5	304	e 0 47	+ 4	e 1 20?	+ 6	e 0 52	P_g	—
Neuchatel		2·6	266	e 0 53	P_g	e 1 22	+ 5	—	—	—
Triest		2·6	127	—	—	e 1 27	S_g	—	—	—
Jena	E.	3·8	8	—	—	e 2 0	S*	—	—	—
Collmberg	z.	4·4	19	—	—	e 2 19	S*	e 2 24	S_g	—
Clermont-Ferrand		5·5	258	—	—	e 3 1	S_g	—	—	e 3·1

Additional readings :—
Stuttgart eZ = 0m.48s., e = 0m.55s., eS_g = 1m.3s., e = 1m.7s. and 1m.11s.

Dec. 7d. 18h. 37m. 10s. Epicentre 38°·4S. 176°·5E. Depth of focus 0·020. (as on 1948, February 17d.).

A = −·7842, B = +·0480, C = −·6186; δ = −6; h = −1;
D = +·061, E = +·998; G = +·617, H = −·038, K = −·786.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Tuai	N.	0·6	128	0 29	+ 6	0 48	+ 7	—	—
Arapuni	E.	0·7	295	i 0 23?	− 1	i 0 41?	− 1	—	—
New Plymouth	E.	2·0	251	i 0 35	− 1	i 1 1	− 3	—	—
Wellington		3·2	205	i 0 50	− 1	i 1 27	− 3	—	—
Cobb River		3·9	226	e 1 16	+16	i 1 41	− 5	e 1 26	pP
Kaimata	N.E.	5·6	221	e 1 23	+ 1	i 2 20	− 6	—	—
Christchurch		5·9	208	—	—	2 29	− 4	—	—

Dec. 7d. 18h. 44m. 38s. Epicentre 39°·4N. 119°·7W. (as on November 14d.).

A = −·3839, B = −·6730, C = +·6322; δ = −1; h = −1;
D = −·869, E = +·495; G = −·313, H = −·549, K = −·775.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Mineral		1·7	303	e 0 34s	+ 3	i 0 53	− 1
Berkeley		2·5	233	0 41	− 2	e 1 14	0
Shasta Dam		2·5	302	e 0 45	+ 2	e 1 17	+ 3
Fresno		2·6	181	e 0 45	+ 1	i 1 15	− 2
Lick		2·6	216	i 0 42k	− 2	e 1 13	− 4
Overton	Z.	5·0	123	—	—	e 2 44	S_g
Boulder City		5·1	130	e 1 42	P_g	—	—
Pierce Ferry		5·6	124	e 1 48	P_g	2 54	S*

Additional readings:—
Mineral iE = 37s., iZ = 42s., iSEZ = 58s.
Berkeley eZ = 46s. and 1m.7s.
Fresno e = 54s.
Lick iZ = 47s. and 1m.7s., iE = 1m.19s.
Pierce Ferry i = 2m.57s.

Dec. 7d. Readings also at 0h. (Antofagasta and near La Paz), 2h. (near Obi-garm), 7h. (Tucson, Pierce Ferry, College, near Andijan, Obi-garm, Stalinabad, Tashkent, Tchimkent, and near Grozny), 8h. (near Andijan, Garm (2), Obi-garm, Stalinabad, Baku, near Grozny, Leninakan, Tiflis, and near Tananarive), 9h. (Bucharest and Cleveland), 10h. (near Lick and Mineral), 13h. (Overton, Pierce Ferry, Hungry Horse, and College), 14h. (Mizusawa, Hungry Horse, Vera Cruz, Collmberg, and Jena), 16h. (near Garm and near Tananarive), 17h. (Frunse, Stalinabad, near Andijan, Garm, Obi-garm, Samarkand, Tashkent, Tchimkent, College, and near Alicante (3)), 21h. (Apia, Wellington, and Pierce Ferry), 22h. (near Ottawa), 21h. (Apia, Wellington, and Pierce Ferry), 22h. (near Ottawa), 23h. (Antofagasta, La Paz, and Basle).

Dec. 8d. Readings at 0h. (Mount Wilson, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, and Hungry Horse), 2h. (Stalinabad), 3h. (Pierce Ferry, Tucson, near Oaxaca, Ksara, Samarkand, near Obi-garm, and Stalinabad), 5h. (near Obi-garm), 6h. (near Erevan), 8h. (near Bogota), 9h. (near Alicante), 15h. (Stuttgart and near Stalinabad), 17h. (Ottawa and near Granada), 18h. (Wellington, near Ottawa, and near Triest), 19h. (China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Shasta Dam), 20h. (near Boulder City, Overton, Pierce Ferry, near Fresno, and near Garm), 21h. (Pierce Ferry, China Lake, Tinemaha, and near Obi-garm), 23h. (Rolphton (2), near Ottawa (2), Samarkand, near Garm, Obi-garm, and Stalinabad).

Dec. 9d. 8h. 41m. 19s. (I) } Epicentre 37°·5N. 118°·5W.
12h. 39m. 3s. (II) } (as on November 14d.).

$A = -·3795$, $B = -·6989$, $C = +·6062$; $\delta = -4$; $h = -1$;
$D = -·879$, $E = +·477$; $G = -·289$, $H = -·533$, $K = -·795$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Tinemaha	0·5	155	i 0 9	− 5	i 0 15	− 8	—	—	—
II		0·5	155	i 0 9k	− 5	i 0 16	− 7	—	—	—
I	Fresno	1·3	233	i 0 22a	− 3	i 0 37	− 7	—	—	—
II		1·3	233	i 0 22a	− 3	i 0 37	− 7	—	—	—
I	Haiwee	1·4	163	i 0 25	− 2	i 0 48	+ 2	—	—	—
II		1·4	163	i 0 25k	− 2	i 0 43	− 3	—	—	—
I	China Lake z.	1·8	157	e 0 31	− 1	i 0 57	+ 1	—	—	—
II	z.	1·8	157	i 0 31k	− 1	—	—	—	—	—
I	Reno	2·3	334	e 0 45	+ 5	i 1 22	+13	—	—	—
II		2·3	334	i 0 46a	+ 6	i 1 25	+16	—	—	—
I	Branner	2·9	268	i 0 47a	− 1	i 1 25	+ 1	i 0 56	P_g	—
II		2·9	268	i 0 47k	− 1	i 1 24	0	i 0 56	P_g	—
I	Berkeley	3·0	277	i 0 49k	− 1	i 1 29	+ 2	—	—	—
II		3·0	277	i 0 49k	− 1	i 1 27	0	e 1 31	S*	—
I	San Francisco	3·2	275	e 0 51	− 1	e 1 31	− 1	—	—	—
II		3·2	275	i 0 51	− 1	e 1 32	0	—	—	—
I	Boulder City	3·3	117	e 0 57	+ 4	i 1 53	S_g	i 1 10	P_g	—
II		3·3	117	e 0 56	+ 3	—	—	i 1 14	P_g	i 1·7
I	Overton z.	3·4	106	e 0 58	+ 3	i 1 53	S_g	i 1 4	P*	—
II	z.	3·4	106	e 0 57	+ 2	—	—	i 1 3	P*	—
I	Pasadena	3·4	175	i 0 57	+ 2	i 1 42	+ 5	i 1 0	P*	—
II		3·4	175	i 0 53	− 2	i 1 40	+ 3	—	—	—
I	Riverside z.	3·6	165	i 0 59	+ 1	i 1 49	+ 7	—	—	—
II		3·6	165	e 0 57	− 1	i 1 47	+ 5	—	—	—
I	Mineral	3·7	320	i 1 4k	+ 4	i 1 54	S*	i 1 13	P_g	—
II		3·7	320	e 1 3	+ 3	i 1 57	S*	i 1 14	P_g	—
I	Pierce Ferry	3·9	110	i 1 2	0	i 2 3	S*	—	—	—
II		3·9	110	e 0 59	− 3	i 2 5	S_g	—	—	1 2·2
I	Palomar	4·4	162	i 1 8	− 2	i 2 9	+ 7	—	—	—
II		4·4	162	i 1 7	− 3	i 2 14	S*	i 1 18	P*	—
I	Shasta Dam	4·4	318	e 1 26	P_g	e 2 18	S*	—	—	—
II		4·4	318	e 1 13	+ 3	—	—	—	—	e 2·4
I	Logan	6·7	48	—	—	e 3 36	S_g	—	—	e 4·0
II		6·7	48	e 1 48	+ 6	e 2 10	P_g	—	—	e 3·6
I	Tucson	8·2	128	e 2 3	0	e 3 51	S*	—	—	i 4·4
II		8·2	128	e 2 4	+ 1	e 3 44	+ 6	—	—	e 4·4
I	Alicante	85·3	44	11 23	−77	—	—	—	—	e 35·4
II		85·3	44	e 13 27	+47	e 24 32	PS	17 19	PP	e 44·2

Additional readings :—
Reno I iSZ = 1m.25s., iZ = 1m.36s.
Branner I iN = 1m.13s., iSZ = 1m.28s.
San Francisco I eSN = 1m.35s., II i = 1m.16s.
Boulder City I iP = 1m.1s., i = 2m.15s., II iP = 1m.1s.
Pasadena II i = 57s.
Mineral I i = 1m.7s., iNZ = 1m.16s., iZ = 1m.39s., iE = 1m.59s. and 2m.6s., II eEN = 1m.7s., iZ = 1m.10s., iE = 1m.17s., iZ = 1m.33s., iN = 2m.0s., iE = 2m.6s.
Pierce Ferry II iP = 1m.4s.
Palomar II iZ = 1m.22s.
Alicante II Q = 37m.43s.

Dec. 9d. Readings also at 0h. (Hungry Horse and Shasta Dam), 1h. (La Paz (2)), 3h. (Collmberg), 4h. (near Boulder City, Overton, Pierce Ferry, and Fresno), 5h. (Overton, Pierce Ferry, Hungry Horse, La Paz, Santa Lucia, Stuttgart, and near Garm), 7h. (Auckland, Overton, and Pierce Ferry), 8h. (Wellington), 11h. (Apia, College, Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Collmberg, Stuttgart, Strasbourg, Triest, Granada, and Malaga), 12h. (Alicante and La Paz), 13h. (Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, and Shasta Dam), 15h. (Grozny, near Leninakan and Tiflis), 16h. (College), 17h. (La Paz, near Andijan, Garm, and Tchimkent), 18h. (Auckland, Tuai, Cobb River, Kaimata, Christchurch, and Wellington), 19h. (Palomar, Pasadena, Riverside, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, and Shasta Dam), 21h. (near Tananarive and near Andijan), 23h. (Helwan, Ksara, Ottawa, Lick (2), and near Branner (2)).

Dec. 10d. 17h. Undetermined shock.

Apia iP = 20m.16s., S = 20m.37s.
Pasadena iP = 31m.5s.
Fresno ePZ = 31m.7s.k
Riverside iP = 31m.7s.
Shasta Dam iP = 31m.11s.
China Lake iP = 31m.12s.k, i = 31m.23s.
Mineral iPZ = 31m.12s.k, iZ = 31m.23s.
Tinemaha iP = 31m.14s.k
Reno ePZ = 31m.17s.k
Boulder City iP? = 31m.24s.
Pierce Ferry iP = 31m.28s.
Overton iPZ = 31m.28s., ipPZ = 32m.6s.
Tucson iP = 31m.30s., e = 31m.54s. and 32m.6s.
Logan eP = 31m.48s.
College iP = 32m.1s., ipP = 32m.25s.
Hungry Horse iP = 32m.2s., i = 32m.9s. and 32m.21s.
Collmberg eZ = 39m.12s.? and 39m.27s.
Stuttgart ePKPZ = 39m.22s., eZ = 39m.40s. and 39m.49s.
Paris ePKP = 39m.44s., i = 39m.49s.
Strasbourg ePKP = 39m.50s.
Besançon ePKP = 39m.51s.
Long waves were also recorded at Christchurch, Wellington. Tacubaya, and Vera Cruz.

Dec. 10d. 19h. 15m. 45s. Epicentre 4°·4N. 129·2W.

A = −·6302, B = −·7727, C = +·0762; δ = +2; h = +7;
D = −·775, E = +·632; G = −·048, H = −·059, K = −·997.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pasadena		31·3	18	i 6 25	+ 1	—	—	i 9 16	PcP	e 14·2
Riverside	z.	31·4	18	i 6 28	+ 3	—	—	i 7 21	PP	—
Tucson		32·6	30	e 6 36	+ 1	—	—	e 7 47	PP	e 14·6
China Lake	z.	33·0	28	i 6 41	+ 2	—	—	i 9 23	P_cP	—
Fresno	z.	33·3	14	e 6 43	+ 2	—	—	e 9 23	P_cP	—
Lick	z.	33·5	11	e 6 45k	+ 2	—	—	i 9 24	PcP	—
Santa Clara		33·5	11	e 10 32	?	i 12 30	+25	e 15 3	SSS	e 21·0
Berkeley		33·9	11	i 6 49k	+ 2	e 12 21	+10	e 9 26	P_cP	e 16·2
Tinemaha		34·0	26	i 6 49	+ 1	—	—	i 9 25	P_cP	—
Boulder City		34·1	22	i 6 51	+ 3	—	—	i 7 27	pP	—
Pierce Ferry		34·5	23	i 6 53	+ 1	—	—	—	—	—
Overton	z.	34·7	22	i 6 55	+ 1	—	—	i 9 28	P_cP	—
Reno		36·0	13	e 7 9	+ 4	—	—	e 9 33	P_cP	—
Mineral	z.	36·4	10	i 7 11a	+ 3	—	—	e 9 18	P_cP	—
Shasta Dam		36·7	8	i 7 12	+ 2	—	—	i 9 33	P_cP	—
Logan		40·3	20	e 7 39	− 1	—	—	e 9 20	PP	e 22·2
Victoria		44·2	6	i 8 14a	+ 2	—	—	e 9 57	P_cP	—
Hungry Horse		45·7	14	i 8 24	0	—	—	i 10 0	P_cP	—
Lincoln	E.	46·6	34	e 8 33	+ 1	e 15 12	− 9	—	—	e 19·0
Chicago		52·5	38	—	—	e 16 39	− 4	—	—	e 25·4
Bogota		55·0	87	i 9 35	0	e 18 17	+60	—	—	—
Huancayo		56·0	107	e 9 47	+ 4	e 17 10	−20	—	—	e 26·1
Cleveland		56·3	42	e 9 43a	− 2	e 17 33	− 1	—	—	—
Pennsylvania		58·5	44	e 9 37	−23	e 18 23	+20	e 13 57	PPP	e 33·5
Philadelphia		60·1	46	i 10 11	0	e 18 17	− 7	e 12 4	PP	e 27·3
College		61·8	351	i 10 22	− 1	—	—	e 11 2	pP	—
Ottawa		61·8	40	i 10 22a	− 1	18 51	+ 5	11 4	pP	e 30·0
San Juan		63·1	71	e 10 48	+16	e 18 37	−25	—	—	e 28·1
Harvard		63·5	44	i 10 33	− 1	—	—	—	—	e 35·8
Weston		63·6	44	i 10 33	− 2	—	—	i 10 47	pP	43·2
La Paz		63·8	111	i 10 33a	− 3	i 19 3	− 8	12 47	PP	i 33·2
Seven Falls	E.	65·6	39	10 47	− 1	—	—	—	—	29·2
Tamanrasset	z.	128·2	57	e 19 10	[+ 1]	—	—	e 21 8	PP	—
Ksara		139·5	20	e 19 35	[+ 5]	29 42	{+24}	—	—	—
Helwan	z.	141·2	28	e 19 39	[+ 6]	—	—	e 22 40	PP	—
Grahamstown	z.	143·4	155	i 19 35	[− 1]	—	—	—	—	—

For Notes see next page.

NOTES TO DECEMBER 10d. 19h. 15m. 45s.

Additional readings :—
Tucson i =6m.53s.
China Lake iZ =7m.57s.
Fresno eZ =10m.57s.
Lick iZ =6m.49s., 9m.34s., and 9m.37s.
Berkeley eEN =14m.57s.
Overton i =8m.33s.
Reno eE =7m.15s. and 7m.19s., eN =9m.9s.
Mineral iZ =7m.16s., 7m.21s., 7m.35s., and 7m.39s.
Cleveland iPE =9m.46s., iSE =17m.37s.
Pennsylvania ePSE =19m.55s., eSSEN =24m.57s., eSSSE =27m.47s.
Philadelphia eSS? =22m.13s.
La Paz PS =19m.35s., i =20m.41s., SS =23m.19s.
Long waves were also recorded at Sitka and Tacubaya.

Dec. 10d. 19h. 37m.14s. Epicentre 26°·0N. 89°·0E.
Rough.

Intensity strong at Dhubri. Also felt at Darjeeling, Gauhati, Tezpur, and Cooch Behar.

$A = +\cdot0157$, $B = +\cdot8998$, $C = +\cdot4360$; $\delta = -2$; $h = +3$;
$D = +1\cdot000$, $E = -\cdot017$; $G = +\cdot008$, $H = +\cdot436$, $K = -\cdot900$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	E.	3·5	191	e 1 3	P*	i 2 1	S_g	1 13	P_g	—
Dehra Dun	E.	10·6	296	(e 2 48)	+12	(e 4 34)	− 3	—	—	—
New Delhi	N.	10·8	286	i 3 0	+21	i 5 17	+35	e 3 26	PP	5·9
Hyderabad		13·0	231	3 11	+ 2	5 27	− 8	3 18	PP	—
Poona	E.	15·8	245	i 3 39	− 6	6 37	− 5	3 51	PP	—
Bombay		16·5	248	e 4 2	+ 8	e 6 59	+ 1	—	—	8·6
Kodaikanal	E.	19·1	219	i 4 31	+ 4	i 8 5	+ 8	—	—	—
Andijan		20·2	320	e 4 42	+ 3	i 8 32	+11	—	—	—
Garm		20·4	313	i 4 43	+ 2	—	—	—	—	—
Frunse		20·6	328	e 4 44	+ 1	—	—	—	—	—
Obi-garm		20·6	313	i 4 45	+ 2	—	—	—	—	—
Stalinabad		21·1	312	i 4 51	+ 3	8 40	+ 1	—	—	—
Tashkent		22·3	318	e 5 7?	+ 6	9 10?	+ 8	—	—	—
Tchimkent		22·8	321	i 5 6	+ 1	—	—	—	—	—
Samarkand		22·9	312	i 5 12?	+ 6	—	—	—	—	—
Irkutsk		28·7	19	e 6 11	+10	—	—	—	—	—
Grozny		39·1	308	e 7 11	−20	—	—	—	—	—
Tiflis		39·5	305	e 7 36	+ 2	—	—	—	—	—
Moscow		47·4	323	e 8 38	0	—	—	—	—	—
Collmberg	Z.	61·6	316	e 10 20	− 2	—	—	—	—	—
Jena	E.	62·5	316	e 10 26	− 2	—	—	—	—	—
Stuttgart	Z.	64·4	314	e 10 39a	− 1	—	—	—	—	—
Paris		68·7	315	i 11 7	0	—	—	—	—	—
Tamanrasset	Z.	74·8	288	i 11 44k	0	—	—	e 11 59	PcP	—
College		79·4	21	i 12 2	− 7	—	—	e 18 10	PPP	—
Bogota		145·4	329	i 19 41	[+ 1]	—	—	(e 39 51)	P′P′	e 39·8

Additional readings and note :—
Calcutta PSE =1m.25s.
Dehra Dun readings have been reduced by 5m.
New Delhi iN =4m.53s.
Poona PPPE =3m.58s., SSE =6m.57s., SSSE =7m.3s.
Collmberg eZ =10m.27s.
Jena eN =10m.30s.
Tamanrasset iZ =11m.46s. and 12m.12s., ePPPZ =14m.34s.
Long waves were also recorded at Clermont-Ferrand, De Bilt, Kew, and Potsdam.

Dec. 10d. Readings also at 1h. (near Istanbul), 4h. (Areata, Branner, Ferndale, Lick, Mineral, and Wellington), 5h. (Lick), 7h. (Stalinabad (2), near Andijan (2), and Garm (2)), 8h. (near Mineral), 9h. (Pretoria, Boulder City, Overton, Tucson, and Santa Lucia), 10h. (near Frunse and near Copiapo), 11h. (near Frunse), 14h. (Pierce Ferry, and near Overton), 15h. (Ottawa, Overton, and near Messina), 16h. (Tacubaya), 17h. (near Apia), 18h. (Hungry Horse), 19h. (Boulder City, Overton, and Hungry Horse), 21h. (near Andijan, Garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 23h. (Basle and Hungry Horse).

Dec. 11d. 11h. 33m. 49s. Epicentre 21°·0S. 169°·5E. (as on 1948, Nov. 3d.).

$A = -·9188$, $B = +·1703$, $C = -·3563$; $\delta = +15$; $h = +4$;
$D = +·182$, $E = +·983$; $G = +·350$, $H = -·065$, $K = -·934$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		16·3	244	i 3 48	− 4	i 7 5	+12	i 4 0	PP	—
Auckland	N.	16·4	165	e 4 4	+11	—	—	—	—	e 7·7
Apia		19·2	72	e 4 26	− 2	e 7 53	− 6	—	—	—
Riverview		20·6	228	i 4 45k	+ 2	i 8 40	+11	i 4 54	pP	e 10·0
Wellington	Z.	20·7	169	e 4 41	− 3	e 8 33	+ 2	—	—	10·7
Kaimata	N.E.	21·5	177	e 4 56	+ 4	—	—	—	—	—
Christchurch		22·6	174	i 5 2	− 1	9 7	0	—	—	11·2
Lick	Z.	86·9	48	i 12 49k	+ 1	—	—	—	—	—
Pasadena	Z.	87·9	53	i 12 52	− 1	—	—	—	—	—
Fresno	Z.	88·0	50	e 12 53	0	—	—	—	—	—
Shasta Dam		88·1	45	i 12 53	− 1	—	—	—	—	—
Mineral	Z.	88·4	46	i 12 55a	0	—	—	—	—	—
Riverside	Z.	88·4	53	i 12 55	0	—	—	—	—	—
China Lake	Z.	89·1	49	i 12 58	0	—	—	—	—	—
Tinemaha	Z.	89·2	50	i 12 59	0	—	—	—	—	—
Boulder City		91·2	52	i 13 9	+ 1	—	—	—	—	—
Victoria		91·4	39	e 13 8	− 1	—	—	—	—	—
College		91·7	17	e 13 13	+ 3	—	—	—	—	—
Overton	Z.	91·7	51	i 13 11	+ 1	—	—	—	—	—
Pierce Ferry		91·9	52	i 13 11	0	—	—	—	—	—
Tucson		92·7	57	i 13 16	+ 1	—	—	—	—	—
Hungry Horse		96·9	41	e 13 32	− 2	—	—	—	—	—
Ottawa		121·9	49	i 18 55k	[− 1]	—	—	—	—	e 52·2
Ksara		137·2	297	e 19 27	[+ 2]	—	—	22 49?	PKS	—
Collmberg	Z.	144·6	335	e 19 37	[− 1]	—	—	—	—	—
Stuttgart	Z.	148·1	336	e 19 44	[0]	—	—	—	—	—
Triest		148·1	328	i 19 52	[+ 8]	e 42 11?	SS	—	—	e 62·2
Chur	Z.	149·5	335	e 19 44	[− 3]	—	—	—	—	—
Paris		150·4	342	i 19 44	[− 4]	—	—	—	—	—

Additional readings :—
Brisbane iPN = 3m.51s., iSN = 7m.11s., iSSN = 7m.23s., iSSZ = 7m.28s.
Apia e = 4m.38s.
Riverview i = 4m.49s., iNZ = 5m.15s., iPPPE = 5m.19s., iPPPZ = 5m.22s., i = 5m.29s., iP_cPEZ = 8m.44s., iZ = 8m.49s., iE = 9m.0s., iN = 9m.12s., iE = 9m.15s.
Lick iZ = 12m.53s.
Mineral iZ = 13m.11s.
Overton iZ = 13m.33s.
Pierce Ferry i = 14m.28s.
Collmberg eZ = 19m.40s. and 19m.46s.
Stuttgart iPKPZ = 19m.48s.a, eZ = 19m.51s.
Triest ePKP? = 19m.26s., e = 20m.20s. The reading entered as PKP is given as PKP_2.
Long waves were also recorded at Philadelphia.

Dec. 11d. Readings also at 1h. (La Paz and near Bogota), 2h. (Obi-garm, Samarkand, Stalinabad, Tashkent, near Andijan, Frunse, Garm, and Tchimkent), 3h. (Hungry Horse), 4h. (near Tacubaya), 7h. (Andijan, Garm, Samarkand, Tchimkent, near Obi-garm, Stalinabad, and Tashkent), 8h. (near Andijan and Stalinabad), 10h. (near Garm and near Bogota), 11h. (Messina and Overton), 12h. (Pennsylvania), 13h. and 14h. (near Concepción), 17h. (Tucson, Boulder City, Pierce Ferry, China Lake, Hungry Horse, Grahamstown, Pretoria, Andijan, Samarkand, near Obi-garm, Stalinabad, near Bandoug, and near Batavia), 18h. (Alicante, Malaga, China Lake, Boulder City, Overton, Pierce Ferry, Shasta Sam, Hungry Horse, College, Andijan, Samarkand, near Garm, Obi-garm, and Stalinabad), 19h. (Stuttgart], 21h. (near Andijan, Frunse, Garm, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 23h. (Nanking, Shasta Dam, and Hungry Horse).

Dec. 12d. Readings at 1h. (Overton and near La Paz), 3h. (Wellington, Boulder City (2), Overton, Pierce Ferry (2), and Tucson), 4h. (Collmberg, Jena, Stuttgart, Ksara, Hungry Horse, Erevan, near Sotchi, Leninakan, Piatigorsk, Tiflis, and Grozny), 5h. (Boulder City, Overton, and Pierce Ferry), 6h. (Florence Arc., Bologna, and near Tacubaya), 7h. (Tacubaya, near Istanbul and near Rome), 8h. (Hungry Horse, Shasta Dam, Mount Wilson, Riverside, China Lake, Boulder City, Tucson, and near Obi-garm), 11h. (Reno, and near La Paz), 12h. (near Klyuchi), 15h. (Durham, and near Messina), 18h. (Mizusawa), 20h. (Pasadena, China Lake, Tinemaha, Overton, Pierce Ferry, and Tucson.

Dec. 13d. Readings at 0h. (near Bogota), 1h. (Bogota), 3h. (Samarkand, Andijan, near Stalinabad, and Obi-garm), 4h. (Tashkent, College, Hungry Horse, Shasta Dam, Mineral, Mount Wilson, Tinemaha, Boulder City, Overton, Pierce Ferry, and Tucson), 5h. (Overton, near Reno, Fresno, Lick, Berkeley, Mineral, and Shasta Dam), 9h. (near Lick and Berkeley), 11h. (Almeria, and La Paz), 12h. (Santa Lucia), 14h. (near Boulder City, Overton, and Pierce Ferry), 15h. (Istanbul), 17h. (Hungry Horse), 18h. (Seattle), 19h. (Boulder City, Overton, Pierce Ferry, and Tucson), 20h. (Seattle, Victoria, Rolphton, and near Ottawa), 21h. (near Tacubaya), 22h. (Hungry Horse and Seattle). 23h. (Lick).

Dec. 14d. 3h. 43m. 50s. Epicentre 36°·0N. 59°·0E.

Epicentre given by U.S.S.R.

$A = +\cdot4176$, $B = +\cdot6951$, $C = +\cdot5852$; $\delta = +1$; $h = 0$;
$D = +\cdot857$, $E = -\cdot515$; $G = +\cdot301$, $H = +\cdot502$, $K = -\cdot811$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Ashkabad		2·0	345	i 0 40	+ 5	1 14	S_g
Samarkand		7·3	58	e 1 50	0	—	—
Stalinabad		8·2	69	e 2 2	− 1	—	—
Obi-garm		8·9	69	e 2 13	+ 1	—	—
Garm		9·5	68	e 2 20	0	—	—
Tashkent		9·6	53	e 2 31?	+10	—	—
Tchimkent		10·4	49	i 2 31	− 2	—	—
Andijan		11·5	62	e 2 49	+ 1	e 4 59	0
Tiflis		12·4	302	e 3 33	PPP	—	—
Grozny		12·5	310	e 3 10	+ 8	e 5 33	+10
Ksara		19·1	270	i 4 20	− 7	e 8 10	+13
Stuttgart	z.	38·3	306	e 7 18	− 6	—	—
College		77·3	11	e 11 55	− 3	—	—

Dec. 14d. 14h. Mexico.

Guadalajara P = 40m.52s., L = 41m.28s.
Tacubaya P = 41m.6s., L = 41m.56s.
Manzanillo P = 41m.41s., L = 42m.5s.
Vera Cruz e = 43m.28s.
Tucson eP = 43m.48s., ePP = 44m.19s., eL = 48m.39s.
Palomar iPZ = 44m.38s.
Boulder City eP = 44m.46s.
Pasadena iPZ = 44m.48s.
Pierce Ferry eP? = 44m.56s.
China Lake iPZ = 44m.58s., iZ = 45m.6s., eZ = 51m.52s.
Tinemaha iPZ = 45m.11s.
Lick ePZ = 45m.29s.
Hungry Horse iP = 46m.22s.
College eP = 49m.37s.
Long waves were also recorded at Puebla.

Dec. 14d. Readings also at 0h. (Lick), 2h. (College, Mineral, and near Victoria), 4h. (Istanbul), 5h. (Overton and Pierce Ferry), 6h. (near Andijan and near Garm), 8h. (Stalinabad, near Garm, Obi-garm, and Andijan), 9h. (Bogota), 10h. (College, Hungry Horse, Shasta Dam, Overton, Pierce Ferry, and Collmberg), 12h. (near Tacubaya), 14h. (La Paz), 17h. (Granada, Strasbourg, Stuttgart, Istanbul, Tucson (2), Hungry Horse, near Boulder City, Overton, Pierce Ferry, Fresno, near Reno, and Lick; several shocks), 18h. (Upsala), 19h. (near Victoria), 21h. (Ksara and near Andijan), 22h. (Tacubaya), 23h. (Rolphton (2) and near Ottawa (2)).

Dec. 15d. 3h. 32m. 29s. Epicentre 18°·0N. 102°·8W. (given by Tacubaya).

A = −·2108, B = −·9280, C = +·3071 ; δ = −7 ; h = +5 ;
D = −·975, E = +·222 ; G = −·068, H = −·299, K = −·952.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manzanillo		1·8	306	0 30	− 2	—	—	—	—	0·9
Guadalajara		2·7	349	0 42	− 3	—	—	—	—	1·3
Tacubaya		3·7	67	1 1	+ 1	—	—	—	—	1·9
Puebla		4·5	76	1 8	− 3	—	—	—	—	2·2
Tucson		15·9	335	e 3 49	+ 2	e 7 15	+31	e 4 8	PP	e 8·2
Palomar	z.	19·8	324	i 4 37	+ 2	—	—	—	—	—
Pierce Ferry		20·6	335	i 4 44	+ 1	—	—	—	—	—
Boulder City		20·8	333	e 4 50	+ 5	—	—	—	—	—
Overton	z.	21·1	334	i 4 50	+ 2	e 9 3	+24	—	—	e 11·2
Pasadena	z.	21·1	324	i 4 49	+ 1	—	—	—	—	—
China Lake	z.	22·1	329	i 4 59	0	—	—	—	—	—
Tinemaha	z.	23·3	328	i 5 12	+ 2	—	—	—	—	—
St. Louis		23·3	25	e 5 7	− 3	—	—	—	—	—
Lick	z.	25·4	324	i 5 32	+ 1	—	—	—	—	—
Hungry Horse		31·6	346	i 6 24	− 2	—	—	—	—	—
College		55·6	339	e 9 37	− 3	—	—	e 10 37	P_cP	—

Additional readings :—
Tucson e = 5m.28s.
China Lake iZ = 5m.9s.
Tinemaha iZ = 5m.21s.
Long waves were also recorded at Bozeman, Butte, Logan, Rapid City, and Harvard.

Dec. 15d. Readings also at 0h. (Autofagasta, Copiapo, Samarkand, near Andijan (2), Garm (2), Obi-garm (2), Stalinabad, and Tashkent), 3h. (near Bandong), 4h. (near Andijan, Garm, Obi-garm, Stalinabad, and near Taranto), 5h. (Shasta Dam, and near Bogota), 6h. (Bogota, La Paz, Samarkand, near Obi-garm and Stalinabad), 7h. (Reykjavik), 9h. (Overton, near Boulder City, Pierce Ferry, near Andijan, Garm, Obi-garm, and Stalinabad), 10h. (Apia (2), Auckland (2), Wellington (2), Ksara, Palomar, Pasadena, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, College (2), and Seattle), 11h. (Palomar, Pasadena, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, College, and near Tacubaya), 13h. (Hungry Horse, near Garm, Obi-garm, and Stalinabad), 14h. (Mount Wilson, Palomar, Tinemaha, China Lake, Tucson, Overton, Hungry Horse, near Antofagasta, and near La Paz), 17h. (Antofagasta, Rolphton, near Ottawa and near Tamanrasset), 18h. (College, near Branner, Samarkand, near Andijan (2), Garm, Obi-garm, and Stalinabad), 21h. (Mineral, Shasta Dam, Hungry Horse, College, and near La Paz), 22h. (Rome, near Taranto and near Hungry Horse), 23h. (Pierce Ferry, Overton, near Hungry Horse, La Paz, La Plata, and near Huancayo).

Dec. 16d. 14h. 6m. 35s. Epicentre 27°·0S. 177°·0W.

Approximate.

A = −·8910, B = −·0467, C = −·4516 ; δ = 0 ; h = +3 ;
D = −·052, E = +·999 ; G = +·451, H = +·024, K = −·892.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	12·1	213	—	—	(e 5 37)	SSS	—	—	e 5·6
Tuai	N.	12·8	201	—	—	e 5 19	−11	—	—	—
Apia		14·0	21	e 3 16	− 6	e 5 39	−20	—	—	e 7·9
Wellington		15·8	203	—	—	e 6 26	−16	—	—	—
Cobb River		16·4	208	—	—	e 6 43	−13	—	—	—
Kaimata	N.E.	18·2	208	—	—	e 7 27	−10	—	—	—
Christchurch		18·5	204	—	—	e 7 36	− 8	—	—	—
Brisbane		26·6	261	i 6 39	PPP	—	—	—	—	e 13·4
Riverview		28·2	247	e 5 58	+ 2	—	—	e 7 1	PPP	e 12·4
Berkeley		82·4	41	e 12 27k	+ 2	—	—	—	—	e 40·6
Mount Wilson	z.	82·6	46	e 12 26	0	—	—	—	—	—
Riverside	z.	82·9	46	e 12 30	+ 2	—	—	—	—	—
China Lake	z.	83·9	44	e 12 34	+ 1	—	—	—	—	—
Vladivostok		84·1	325	e 12 38	+ 4	e 23 9	+11	—	—	—
Shasta Dam		84·3	38	i 12 35	0	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tinemaha	Z.	84·3	43	e 12 35	0	—	—	—	—	—
Mineral	Z.	84·5	39	i 12 37k	+ 1	—	—	i 12 50	PcP	—
Boulder City		85·8	45	e 12 43	+ 1	—	—	—	—	—
Overton	Z.	86·4	45	i 12 46	+ 1	—	—	—	—	—
Pierce Ferry		86·4	46	i 12 46	+ 1	—	—	—	—	—
Victoria		89·1	32	e 12 59	+ 1	—	—	—	—	—
Logan		91·1	42	e 13 7	− 1	—	—	—	—	—
Hungry Horse		93·8	36	e 13 19	− 1	—	—	—	—	—
College		94·3	11	e 13 22	− 1	—	—	—	—	—
Huancayo		94·8	105	—	—	e 23 53	[− 7]	e 31 25	SS	e 47·4
La Paz		98·6	113	e 14 3	+21	24 17	[− 3]	26 35	PS	47·4
Sverdlovsk		129·8	323	—	—	22 38	PKS	—	—	—
Ksara		150·9	291	e 19 52	[+ 3]	—	—	37 4?	PPS	—
Collmberg	Z.	154·6	345	e 20 5	[+11]	—	—	—	—	—
Stuttgart		157·7	349	e 20 5	[+ 7]	—	—	—	—	e 94·4
Rome	N.	163·2	335	—	—	e 45 47	SS	—	—	—

Additional readings :—
China Lake iZ = 12m.38s.
Tinemaha iZ = 12m.39s.
Mineral iZ = 12m.40s.
Pierce Ferry i = 13m.13s.
Long waves were also recorded at other American and European stations.

Dec. 16d. 23h. 24m. 0s. Epicentre 27°·0N. 54°·5E. (as on 1942, June 7d.).

A = +·5181, B = +·7264, C = +·4516 ; δ = +3 ; h = +3 ;
D = +·814, E = −·581 ; G = +·262, H = +·368, K = −·892.

		Δ	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Ashkabad		11·4	16	2 48	+ 1	4 54	− 2	—
Samarkand		16·4	36	e 4 0?	+ 7	e 7 4?	+ 8	—
Stalinabad		16·6	43	i 3 53	− 3	6 59	− 1	—
Tiflis		16·7	334	e 3 52	− 5	—	—	—
Ksara		17·4	297	e 4 35	+29	e 7 16	− 3	—
Grozny		17·8	339	e 4 11	0	e 7 18	−10	—
Tashkent		18·8	36	e 4 21	− 2	e 7 51?	+ 1	—
Tchimkent		19·6	35	e 4 30	− 2	—	—	—
Andijan		20·1	42	e 4 37	− 1	e 8 21	+ 2	—
Helwan	N.	20·6	283	—	—	e 8 30	+ 1	e 11 2
Frunse		22·8	42	e 5 10	+ 5	e 9 15	+ 4	—
Grahamstown	Z.	65·6	206	i 10 52	+ 4	—	—	—

Long waves were also recorded at Istanbul.

Dec. 16d. Readings also at 2h. (Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton (2), Pierce Ferry (2), Mineral, Shasta Dam, Hungry Horse, and College), 3h. (Pierce Ferry and near Garm), 4h. (College, Overton, Pierce Ferry (2), and near Apia), 5h. (Kodaikanal), 6h. (Tucson, Overton, Pierce Ferry, College, and near Victoria), 7h. (Apia, Boulder City, Overton, Pierce Ferry, Shasta Dam, Mineral, and College (2)), 8h. (Autofagasta and La Paz), 9h. (Ashkabad, and near Tchimkent), 11h. (Reno), 16h. (near Mizusawa), 17h. (Messina), 18h. (Messina and Pierce Ferry), 21h. (near Apia).

Dec. 17d. 1h. 13m. 15s. Epicentre 38°·0N. 57°·0E. (as given by U.S.S.R.).

A = +·4303, B = +·6625, C = +·6131 ; δ = −4 ; h = −1 ;
D = +·839, E = −·545 ; G = +·334, H = +·514, K = −·790.

		Δ	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Ashkabad		1·1	93	i 0 18	− 4	i 0 29	−10	—
Baku		6·0	296	e 1 36	+ 4	—	—	—
Samarkand		8·0	75	e 2 5	+ 5	—	—	—
Stalinabad		9·3	83	e 2 19	+ 2	—	—	—
Obi-garm		10·0	82	e 2 23	− 4	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Tashkent		10·0	67	e 2 29?	+ 2	—	—	—
Grozny		10·1	305	e 2 31	+ 3	—	—	—
Tiflis		10·1	295	2 27	− 1	—	—	—
Garm		10·5	80	e 2 33	− 2	—	—	—
Tchimkent		10·6	62	i 2 30	− 6	—	—	—
Piatigorsk		12·1	304	—	—	e 5 8?	− 6	—
Andijan		12·2	72	e 2 54	− 4	—	—	—
Sotchi		14·2	298	e 3 23	− 1	—	—	—
Ksara		17·6	262	e 4 6	− 2	e 7 46	SS	—
Sverdlovsk		19·0	6	—	—	8 3	+ 8	—
Moscow		22·0	330	e 5 2	+ 4	e 9 6	+10	—
Helwan	N.	22·7	257	—	—	e 9 17	+ 8	e 12·7
Collmberg	Z.	33·5	308	e 6 44	+ 1	—	—	—
Stuttgart	Z.	35·8	304	e 7 2	− 1	—	—	—
College		75·6	12	e 11 47	− 1	—	—	—
Hungry Horse		93·7	354	e 13 17	− 3	—	—	—

Long waves were also recorded at Potsdam, Rome, Istanbul, and Copenhagen.

Dec. 17d. 6h. 53m. 24s. Epicentre 54°·1S. 67°·5W.

Foreshock of large earthquake at 15h. Strasbourg suggests that there may be two successive shocks with an interval of 54 seconds, but all readings have been referred to the same time at origin.

Destructive at Punta Arenas, with one death. Intensity V-VI between 53°S. and 54°S. latitudes ; felt as far as 45°S. latitude. Epicentre 54°S. 71°W. (Pasadena).

F. Greve, S. J.
Boletin del año 1949, segundo semestre, Instituto Sismologico, Santiago, p. 24.

$A = +\cdot2254,\ B = -\cdot5441,\ C = -\cdot8081\ ;\quad \delta = -12\ ;\quad h = -7\ ;$
$D = -\cdot924,\ E = -\cdot383\ ;\quad G = -\cdot309,\ H = +\cdot747,\ K = -\cdot589.$

		△	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Concepcion		17·7	350	(i 3 52)	−18	(i 7 26)	0	— —	—
La Plata	E.	20·3	23	4 43	+ 3	8 29	+ 6	8 47 SS	10·4
	N.	20·3	23	4 45	+ 5	7 53	−30	9 2 SSS	11·3
	Z.	20·3	23	4 46	+ 6	8 14	− 9	8 44 SS	10·9
Buenos Aires		20·5	24	e 4 46	+ 4	8 38	+11	— —	10·0
Santa Lucia		20·8	353	e 4 49	+ 4	e 8 43	+10	5 39 pP	—
Copiapo	N.	26·8	354	e 5 41	− 3	i 10 5	−14	i 6 41 PPP	—
Antofagasta	E.	30·5	355	e 6 18	+ 1	e 11 20	+ 2	e 7 9 PP	15·4
La Paz		37·5	0	i 7 16a	− 1	i 13 9	+ 2	i 8 53 PP	18·6
Huancayo		42·4	349	e 7 56	− 2	i 14 26	+ 6	i 9 13 PP	i 17·6
Bogota		58·8	353	e 10 6	+ 4	i 18 14	+ 7	i 12 36 PP	32·6
Balboa Heights		63·6	348	e 10 46	+11	e 19 36	+28	— —	—
Grahamstown	Z.	66·0	113	e 10 51	+ 1	—	—	i 11 54 ?	—
Fort de France		68·8	7	i 11 3	− 5	i 20 22	+11	— —	e 35·3
Christchurch		70·1	222	11 10	− 6	20 21	− 6	24 51 SS	32·1
Wellington		71·1	225	i 11 33	+11	i 20 56	PS	i 16 5 PPP	31·6
Kaimata	N.E.	71·4	222	e 11 42	+18	e 21 12	PS	— —	—
Cobb River	E.	72·1	224	e 11 21	− 7	—	—	— —	—
Tuai	N.	72·1	228	e 11 11	−17	—	—	— —	—
San Juan		72·2	2	e 11 38	+ 9	e 20 23	−28	e 13 59 PP	29·4
Port-au-Prince		72·5	356	e 12 34	+64	e 21 4	+10	— —	40·0
Auckland	N.	74·7	228	e 12 11	+28	i 21 17	− 2	i 26 16 SS	—
Vera Cruz		77·0	333	e 11 56	0	—	—	— —	—
Puebla		77·5	331	e 11 54	− 5	e 22 21	PS	— —	—
Tacubaya		78·1	330	e 12 1	− 1	e 21 58	+ 2	i 22 45 PS	—
Manzanillo		79·4	325	—	—	e 21 36	−34	— —	—
Guadalajara		80·6	326	e 12 11	− 5	22 17	− 6	— —	—
Melbourne	E.	84·3	205	e 12 36	+ 1	i 22 56	− 4	i 16 37 PP	—
Bermuda		86·2	2	e 13 46	+62	i 24 25	PS	— —	e 35·7
Mobile		86·3	342	i 12 47	+ 2	i 23 19	− 1	16 14 PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverview		86·3	211	i 12 43k	− 2	i 23 13	[+ 4]	i 12 55	pP	e 40·1
Apia		87·2	251	12 58	+ 9	23 41	+13	16 24	PP	38·6
Columbia		88·5	349	e 12 57	+ 1	e 23 47	+ 6	e 16 15	PP	e 34·8
Tananarive		88·6	121	13 18	+22	24 0	+18	16 47	PP	43·8
Brisbane		91·5	215	e 13 2	− 8	i 23 35	[− 7]	i 24 42	PS	e 44·1
Washington		93·0	353	i 13 19	+ 2	e 24 4	{ 0}	i 16 55	PP	i 42·0
Tucson		93·8	324	e 13 15	− 5	e 24 10	{ 0}	e 23 42	SKS	e 38·1
Philadelphia		93·9	355	e 13 33	+12	i 24 9	{− 1}	e 17 25	PP	e 38·2
Perth		94·3	183	e 15 53	?	25 16	+44	26 48	PPS	38·0
St. Louis		94·4	342	e 13 21	− 2	i 24 26	− 7	i 24 1	SKS	—
Fordham		94·7	356	e 13 31	+ 7	i 24 4	[+ 5]	—	—	46·1
City College, N.Y.		94·7	356	i 13 28	+ 4	e 24 25	{+ 9}	e 30 48	SS	e 39·9
New Kensington E.		94·9	350	e 13 45	+20	e 23 45	[−16]	e 17 22	PP	e 38·7
Pennsylvania		94·9	351	i 13 29	+ 4	e 24 41	+ 4	—	—	—
Cleveland		96·0	348	e 13 34k	+ 4	e 24 5	[− 2]	e 17 13	PP	—
Weston		96·2	357	i 12 34	−57	i 24 16	[+ 8]	—	—	i 39·5
Harvard		96·3	357	e 13 32	0	e 24 55	+ 6	e 31 20	SS	e 49·1
Palomar	Z.	97·0	320	i 13 34	− 1	—	—	i 14 59	?	—
Chicago		97·1	344	e 13 30	− 5	e 24 2	[−10]	e 17 12	PP	e 41·6
Riverside	Z.	97·7	319	e 13 32	− 6	—	—	i 17 40	PP	—
Lincoln	E.	97·8	338	e 17 47	PP	e 24 7	[− 9]	e 31 31	SS	e 39·4
Pasadena		98·2	319	e 13 39	− 1	i 24 19	[+ 1]	e 26 36	PS	e 52·1
Halifax		98·4	3	17 38	PP	25 8	+ 1	24 24	SKS	41·1
Pierce Ferry		98·4	323	e 13 41	0	e 24 34	{− 9}	i 17 40	PP	—
Boulder City		98·6	323	e 13 35	− 7	—	—	e 18 8	PP	—
Tamanrasset	Z.	98·8	63	e 13 50	+ 7	—	—	—	—	—
Overton	Z.	98·9	323	e 13 39	− 4	e 24 34	{−12}	i 17 46	PP	—
Ottawa		99·4	354	e 13 47	+ 1	24 16	[− 8]	17 46	PP	42·8
China Lake	Z.	99·4	321	e 13 40	− 6	—	—	e 17 25	PP	—
Shawinigan Falls	N.	100·4	357	e 14 10	+20	—	—	e 18 14	PP	48·6
Tinemaha	Z.	100·8	321	e 13 51	− 1	—	—	—	—	—
Seven Falls	E.	100·9	358	18 17	PP	i 25 34	+ 6	32 22	PS	47·8
Fresno		101·1	320	e 14 58	+65	e 24 52	[+20]	e 18 4	PP	e 51·8
Salt Lake City		101·9	327	e 17 59	PP	e 24 22	[−14]	e 27 17	PS	e 43·8
Santa Clara		102·3	318	(e 13 44)	−15	(e 24 4)	[−34]	(i 14 11)	pP	(e 45·4)
Logan		102·8	328	e 13 40	−21	—	—	e 18 8	PP	e 47·7
Berkeley		103·0	318	i 13 54a	− 8	e 24 44	[+ 3]	e 18 24	PP	e 52·1
Reno		103·5	321	e 14 32	+28	e 24 57	[+13]	i 18 16	PP	e 49·2
Ukiah		104·5	318	e 18 20	PP	e 24 42	[− 6]	—	—	e 44·9
Mineral		104·9	320	e 18 8	PP	e 24 33	[−17]	—	—	e 51·6
Lisbon		105·2	44	18 8	PKP	25 53	−11	29 4	PPS	48·6
Malaga	Z.	105·5	48	i 14 52k	+39	i 26 14	+ 8	19 0	PP	36·7
Shasta Dam		105·5	320	e 14 39	+26	e 25 59	− 7	e 19 13	PP	e 48·7
Bozeman		106·1	330	e 18 38	PP	e 25 5	[+10]	e 28 17	PS	e 47·7
Ferndale	E.	106·1	318	—	—	e 25 8	[+13]	e 28 16	PS	e 52·0
Granada		106·2	48	i 19 9	PP	i 26 58	+46	28 48	PPS	50·2
Almeria		106·5	49	i 19 19	PP	26 53	+38	29 21	PPS	50·5
Butte	N.	106·8	329	e 19 2	PP	e 24 57	[− 2]	e 21 4	PPP	e 44·1
Honolulu		107·2	283	e 24 8	?	e 29 6	PPS	—	—	e 44·0
Toledo		108·3	47	e 18 56	PP	i 25 25	[+20]	29 3	PPS	51·0
Alicante		108·6	50	19 12	PP	26 46	S	29 5	PPS	e 52·0
Algiers Univ.	Z.	108·9	53	e 18 55	PP	e 28 31	PS	e 21 38	PPP	—
Hungry Horse		109·4	329	e 14 35	P	e 25 28	[+18]	e 18 45	PP	—
Saskatoon		110·8	335	19 20	PP	25 21	[+ 6]	21 48	PPP	56·6
Tortosa		111·0	49	19 52	PP	26 35	S	29 50	PPS	50·9
Seattle		111·6	324	i 19 22	PP	i 25 28	[+ 9]	i 28 26	PS	—
Barcelona		112·2	49	e 20 6	PP	i 29 37	PPS	—	—	53·2
Victoria		112·6	324	e 18 13	[−25]	30 35	PPS	e 19 15	PP	56·1
Ivigtut		116·0	10	22 20	PPP	31 0	PPS	36 12	SSP	47·6
Clermont-Ferrand		116·1	47	e 20 4	PP	i 26 42	[+66]	i 30 14	PS	53·1

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Messina		116·2	61	e 19 11	[+26]	e 27 20	{+32}	e 20 24	PP	55·6
Jersey	E.	116·7	42	e 23 39	?	e 31 6	PPS	e 36 46	SSP	54·6
Rome		117·5	56	e 15 36	P	i 25 58	[+17]	e 20 4	PP	e 51·1
Paris		118·2	44	e 19 35	[+46]	i 25 46	[+ 2]	i 20 12	PP	e 54·6
Florence Arc.		118·3	54	e 20 17	PP	e 31 15	PPS	e 37 11	SSP	e 49·2
Florence Xim.		118·3	54	e 20 1	PP	i 27 15	{+13}	—	—	—
Prato		118·3	54	e 20 25	PP	i 30 36	PPS	—	—	—
Pavia		118·4	51	e 20 23?	PP	—	—	—	—	e 59·4
Helwan		118·6	78	e 20 36	PP	e 25 36	[− 9]	31 32	PPS	—
Taranto		118·8	60	e 20 25	PP	e 29 21	PS	37 21	SSP	51·0
Neuchatel		118·8	49	e 18 53	[+ 3]	e 30 35	PS	—	—	—
Bologna		118·9	53	e 19 30	[+39]	e 39 2	?	e 20 47	PP	e 51·6
Bandong		119·1	174	e 20 13	PP	—	—	—	—	e 48·6
Padova		119·1	53	e 20 55	PP	26 43	[+56]	—	—	60·9
Kew		119·2	41	e 20 7	[+76]	e 26 9	[+22]	i 20 53	PP	e 51·6
Salo		119·3	52	e 19 18	[+27]	e 25 56	[+ 8]	e 30 5	PS	—
Basle		119·4	49	e 19 8	[+16]	e 27 49	{+39}	—	—	—
Batavia		119·7	173	20 30	PP	—	—	—	—	e 49·6
Chur		119·8	51	e 19 15	[+23]	e 32 43	PKKS	—	—	e 55·1
Zürich		119·8	49	e 18 49	[− 3]	—	—	e 15 18	P	—
Athens		120·3	66	e 21 46	?	e 31 28	PPS	—	—	—
Strasbourg		120·3	48	e 19 47	[+54]	i 26 12	[+21]	e 20 26	PP	56·6
Karlsruhe		120·9	48	e 19 5	[+11]	—	—	—	—	—
Triest		120·9	53	i 20 59	PP	i 26 18	[+25]	i 37 43	SSP	—
Stuttgart		121·1	49	e 19 0	[+ 5]	e 25 52	[− 2]	e 20 44	PP	62·6
Durham		121·3	38	(i 19 14)	[+19]	(i 30 20)	PS	(i 23 13)	PPP	—
Edinburgh	E.	121·6	36	—	—	26 9	[+14]	37 46	SSP	—
De Bilt		121·9	44	i 20 46k	PP	e 36 48	SS	e 29 0	PKKP	e 49·6
Zagreb		122·1	55	e 20 38	PP	e 31 22	PPS	e 23 46	PKS	e 53·4
Aberdeen		123·0	36	i 19 40	[+42]	i 27 47	{+13}	21 1	PP	58·9
Reykjavik		123·1	22	—	—	e 38 36	SSP	e 43 54	?	e 60·9
Sofia		123·5	62	e 19 30	[+30]	e 27 59	{+21}	e 31 19	PS	52·9
Cheb		123·5	49	e 19 2	[+ 2]	—	—	e 21 21	PP	—
Belgrade		123·6	59	i 20 50k	PP	i 27 58	{+20}	i 21 28	PP	e 47·0
Jena		123·7	48	e 19 11	[+11]	e 31 8	PS	e 20 55	PP	—
Kalossa		124·0	56	e 20 16	PP	—	—	—	—	e 59·6
Ksara		124·1	78	e 16 3	P	30 54	PS	20 57	PP	—
Sitka		124·1	323	e 18 56	[− 5]	e 28 6	{+24}	e 20 18	PP	e 52·6
Prague		124·4	50	e 17 4	?	e 27 36	{− 7}	e 20 17	PP	—
Collmberg		124·6	49	e 19 6	[+ 4]	e 28 54	{+69}	e 20 57	PP	—
Ogyalla		124·6	54	e 21 51	PP	—	—	e 23 16	PPP	—
Budapest		124·7	56	20 6	PP	26 50	[+45]	22 26	PKS	41·6
Istanbul		125·4	67	e 16 21	P	e 30 52	PS	—	—	—
Potsdam		125·4	47	e 19 21	[+18]	i 30 41	PS	i 21 45	PP	59·6
Colombo	E.	126·1	138	e 20 57	PP	e 38 36?	SSP	—	—	61·1
Raciborzu		126·1	52	e 18 22	[−42]	—	—	e 20 34	PP	e 58·6
Bucharest		126·2	62	e 20 57	PP	e 31 35	PS	e 42 29	SSS	58·6
Skalnate Pleso		126·5	54	e 19 14	[+ 9]	—	—	e 21 47	PP	—
Copenhagen		127·4	44	19 26	[+19]	28 21	{+18}	31 51	PS	—
Bergen	N.	127·9	36	23 40?	PPP	e 26 3	[−11]	e 39 24	SSP	52·6
Kodaikanal	E.	128·2	133	21 10	PP	28 20	{+12}	32 31	PPS	63·3
Yalta		130·5	67	19 16	[+ 3]	—	—	—	—	—
Simferopol		130·8	66	e 19 28	[+14]	—	—	—	—	—
Theodosia		131·5	67	e 19 0	[−15]	—	—	e 24 17	PPP	—
Upsala		132·2	42	e 22 41	PKS	e 39 31	SS	i 24 50	PPP	e 59·0
Sotchi		133·0	71	19 25	[+ 7]	e 46 36	SSS	e 21 56	PP	—
College		132·5	325	e 19 1	[−18]	e 26 37	[+ 9]	e 21 54	PP	e 49·0
Erevan		133·5	79	e 18 38?	[−41]	e 22 10?	PKS	e 24 22?	PPP	—
Leninakan		133·5	77	19 27	[+ 8]	—	—	—	—	—
Bombay		133·6	123	e 22 37	PP	26 54	[+26]	23 10	PKS	64·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Poona		133·8	125	20 3	[+44]	26 48	[+19]	23 5	PKS	65·6
Tiflis		134·7	77	e 19 31	[+10]	—	—	e 20 48?	PP	—
Hyderabad		134·9	131	22 22	PP	29 5	{+15}	e 23 4	PKS	56·9
Piatigorsk		135·1	73	e 19 50	[+28]	—	—	—	—	—
Helsinki		135·4	44	i 22 55	?	e 26 48	[+17]	i 23 32	PKS	e 51·6
Grozny		136·2	76	i 23 13	PKS	—	—	—	—	—
Baku		136·8	82	e 19 35	[+10]	—	—	—	—	—
Moscow		138·9	56	e 19 27	[− 2]	41 32	SSP	46 30	SSS	—
Ashkabad		140·1	91	19 39	[+ 8]	—	—	—	—	—
Calcutta	E.	143·6	140	e 19 51	[+14]	e 39 58	?	e 27 55	?	—
New Delhi	N.	143·8	120	e 19 43	[+ 6]	i 33 15	PS	i 42 1	SS	59·0
Dehra Dun	E.	145·7	119	e 22 36	PP	e 26 51	[+ 3]	—	—	56·1
Samarkand		146·3	96	e 19 59?	[+18]	--	—	i 22 52?	PP	—
Stalinabad		146·6	99	e 19 42	[0]	e 26 47	[− 2]	e 19 47	PKP_2	—
Obi-garm		147·3	100	i 19 47	[+ 4]	—	—	—	—	—
Garm		147·8	100	e 20 13	[+29]	—	—	i 20 34	?	—
Tashkent		148·7	96	e 19 48	[+ 3]	—	—	e 26 16	PPP	—
Andijan		150·2	99	e 19 50	[+ 2]	29 57?	{−22}	19 57	PKP_2	—
Sverdlovsk		151·0	63	i 19 52	[+ 3]	i 43 31	SSP	i 23 47	PP	—
Frunse		152·8	98	e 20 16	[+24]	30 35	{+ 1}	—	—	—
Tokyo		153·6	237	20 22	[+29]	30 51	{+13}	24 41	PP	87·6
Nagoya		154·5	233	e 20 11	[+17]	—	—	—	—	72·8
Kôti		154·6	224	20 8	[+14]	30 6	{−38}	28 6	PPP	—
Osaka		154·7	229	(i 19 49)	[− 5]	(30 6)	{−38}	—	—	(71·6)
Kobe		154·9	229	e 20 26	[+32]	—	—	e 25 21	PP	e 73·8
Sendai		155·0	243	e 20 21	[+27]	30 47	{+ 1}	49 45	SSS	72·1
Mizusawa		155·5	244	e 20 47	[+52]	e 34 10	SKSP	—		e 48·4
Hukuoka		155·9	219	e 20 4	[+ 8]	43 54	SS	25 6	PP	65·4
Sapporo		158·1	254	20 12	[+13]	31 31	{+29}	71 37	Q	80·9
Semipalatinsk		160·0	87	e 20 6	[+ 5]	—	—	i 20 58	PKP_2	—
Vladivostok		163·2	237	e 20 2	[− 2]	i 45 42	SS	i 20 45	PKP_2	—
Irkutsk		174·7	107	i 20 38	[+27]	28 16?	[+63]	i 22 15	PKP_2	—

Additional readings and notes :—
Concepcion (5m.17s.), i =(7m.36s.), readings have been reduced by 3m.
La Plata E. 5m.36s., 6m.6s.
La Plata N. 5m.45s., 6m.12s., 7m.37s., 9m.47s.
La Plata Z. 5m.47s., S =9m.14s., 9m.39s., 10m.11s.
Antofagasta eE =6m.39s., 6m.50s., 7m.27s., 8m.10s., 9m.22s., and 10m.27s., eSE = 11m.27s., iE =12m.9s., 13m.30s., and 14m.2s.
La Paz iZ =7m.23s.
Huancayo iP =8m.4s.
Bogota iPEN =10m.10s., iP_cPEN =11m.23s., iPPPEN =13m.49s.
Fort de France SS =25m.22s., SSS =28m.2s.
Christchurch iZ =11m.33s. and 12m.41s., e =19m.34s., QEN =28m.41s.
Wellington iPPZ =13m.26s.
San Juan i =12m.22s., ePPP =15m.45s., eSS =25m.6s.
Port au Prince i =12m.57s. and 22m.19s.
Auckland SSSN =30m.1s.
Bermuda e =17m.12s., i =30m.21s.
Mobile i =18m.12s. and 24m.25s., SS =29m.57s., i =32m.23s.
Riverview iP_cPZ =12m.47s., iZ =13m.3s., iPPPZ =17m.55s., iS_cSE =23m.19s., iE = 23m.51s.,iN =24m.0s.,iZ =24m.3s.iPSZ =24m.15s.,iPSE =24m.19s.,eN =24m.26s., iN =30m.22s., eQE =35·6m.
Apia eEN =25m.3s.
Tananarive P =14m.12s., PPP =18m.39s., S =24m.53s., PS =25m.3s. and 25m.54s., SS = 29m.48s., SSS =33m.24s., Q =37m.57s.
Brisbane ePNZ =13m.6s., iZ =13m.58s. and 14m.29s.
Washington ePPP =19m.1s., i =24m.48s., iSS =30m.8s., eSSS =34m.0s.
Tucson i =13m.21s. and 13m.36s., ePP =16m.42s., ePPP =18m.38s., ePS =25m.33s., eSS =29m.56s., eSSS =33m.46s.
Philadelphia i =25m.6s. and 26m.26s., eSS =30m.31s., eSSS? =35m.4s.
Perth PP =18m.11s., PPP =20m.24s., i =24m.6s., SS =31m.16s., SSS =35m.36s.
St. Louis i =14m.37s. and 24m.59s.
City College, N.Y. iPP =16m.54s., iPPP? =18m.46s., e =26m.47s. and 34m.14s.
New Kensington ePPPE =19m.30s., ePS?E =25m.10s.
Pennsylvania eN =13m.49s. and 16m.17s., eE =18m.35s., iE =20m.19s., eN =22m.28s.
Cleveland ePZ =13m.39s., eSE =25m.2s., eN =25m.9s., iSSE =31m.53s., iE =32m.24s.
Weston iPPP =18m.36s., iSKS =23m.0s., iSS =30m.34s.
Harvard i =13m.55s., e =16m.53s., i =18m.57s., e =24m.10s., 27m.7s., 29m.6s. and 32m.42s., eQ =45·0m.

Continued on next page.

Chicago eSS? =30m.18s.
Riverside iZ =14m.58s. and 17m.7s.
Lincoln ePSE =25m.43s., eSSSE =35m.27s.
Pasadena ePPZ =17m.36s., iPPZ =18m.3s., eS?N =25m.18s., iPPSZ =27m.42s., eSS?N =33m.6s., eQN =41m.36s.
Halifax PS =26m.52s.
Pierce Ferry eS? =25m.19s.
Boulder City i =16m.0s., e =21m.36s.
Tamanrasset iZ =14m.7s., eZ =14m.47s., iZ =17m.14s.
Ottawa S =25m.0s., PS =26m.54s., PPS =27m.48s.
China Lake iZ =14m.54s. and 18m.38s.
Shawinigan Falls PPPN =20m.3s., eN =24m.22s., PPSN =29m.1s.
Seven Falls PSE =28m.38s., SSSE =37m.10s., QE =42·9m.
Fresno ePN =15m.26s., ePE =15m.29s., ePPZ =17m.55s., eNZ =18m.51s., eZ =26m.14s., and 26m.54s., eE =27m.39s.
Salt Lake City eSS? =33m.5s., eSSS? =36m.23s.
Santa Clara iPPE =(19m.35s.), readings reduced by 5m.
Logan e =23m.32s. and 26m.27s., ePKKP =29m.54s.
Berkeley iPZ =14m.12s., iPPZ =18m.12s., eE =18m.36s., iE =24m.54s., eE =24m.58s., eN =25m.2s., eE =33m.13s.
Reno eE =16m.12s., eN =16m.49s. and 23m.7s., eZ =33m.8s., eE =43m.9s.
Ukiah eSP =26m.54s., eSS =32m.38s.
Mineral eZ =18m.20s., eN =51m.6s.
Lisbon EN =23m.31s., SKSEN =26m.30s., PPSEN =29m.42s., QEN =43m.54s.
Malaga PPPZ =21m.18s., PSZ =27m.38s.
Shasta Dam eSKS =25m.1s.
Bozeman eS? =26m.41s., eSS =33m.45s., eSSS? =38m.43s.
Ferndale eN =28m.21s.
Granada PP =19m.43s., ePPP =22m.38s., iSS =34m.18s., SSS =38m.39s., Q =44·2m.
Almeria iPP =19m.59s., PPP =22m.21s., PKS =22m.57s., S =27m.33s., SS =35m.17s., SSS =39m.21s.
Toledo iZ =19m.16s., iPPZ =19m.39s., PPPZ =21m.51s., S?N =26m.59s., iN =29m.45s., eN =33m.51s., QN =45m.59s.
Alicante PP =19m.46s., PPP =22m.0s., PPS =30m.4s., SS =34m.38s., SSS =38m.58s., Q =45m.8s.
Algiers Univ. ePPZ =19m.16s., eZ =19m.38s. and 22m.35s., iZ =29m.4s.
Hungry Horse ePKKP =29m.48s.
Saskatoon PS =28m.51s., i =33m.11s., SS =35m.6s., SSS =39m.18s., Q =46·6m.
Tortosa PPN =20m.29s., PPPN =22m.37s., SKKSN =27m.40s., PPS?N =31m.0s., SS?N =36m.38s., SSSE =39m.49s.
Seattle iPP =19m.52s., iPPP =21m.56s., iPKS =22m.22s., i =22m.51s. and 23m.46s., iSKS =25m.50s., iPPS =29m.36s., iPKKS =33m.12s., iSS =34m.26s., iSSP =35m.11s., iSKKS =37m.46s., iSSS =39m.4s., iSKKKS =40m.46s.
Victoria SKS =24m.53s., S? =27m.5s., PS =29m.6s., SS =35m.54s., Q =49·8m.
Ivigtut S =28m.11s., SSS =39m.42s., 41m.18s.
Clermont-Ferrand i =20m.33s., iPPP =22m.50s., i =27m.28s., iS =28m.9s., iPPS =30m.51s., iSS =35m.39s., iSSS =40m.14s., Q =46·6m.
Messina PS =30m.0s., SS =36m.29s.
Jersey eE =28m.17s.
Rome ePPN =20m.30s., iZ =20m.50s., iPS =30m.8s., eSSE =38m.8s.
Paris iPPP? =23m.0s., eSKKS =27m.46s., iS =28m.13s., iPS =30m.14s., ePPS? =31m.54s., iPKKS? =34m.13s., eSSS? =40m.19s., and other unidentified readings.
Florence Arc. ePP?Z =20m.48s., e =26m.14s.
Helwan eN =24m.28s. and 24m.48s., SKSN =26m.20s., SKKSN =27m.36s., PSE =30m.26s., eN =33m.6s., eEN =36m.21s.
Kew e =21m.23s., iZ =24m.47s., iPS =30m.17s., ePPS =31m.11s., eSKKP =32m.21s., e =34m.33s., iSS =37m.22s., e =44m.53s.
Salo e =20m.46s. and 20m.55s., 21m.9s., i =21m.28s., and 27m.44s., e =28m.13s.
Zürich ePP =20m.14s.
Strasbourg iPP? =21m.0s., iSKP =22m.45s., iPPP =23m.13s., iSKS =27m.2s., and 27m.11s., iSKKS =27m.56s., iS =28m.56s., iPS =30m.30s. and 30m.33s., iPPS =32m.13s., iSS =37m.14s., iSSS =41m.42s., and many other unidentified readings.
Triest iPP =21m.19s., iSKKS =27m.53s., iS =29m.20s., iPS =32m.39s., i =39m.13s.
Stuttgart e =21m.10s., ePPP =23m.16s., e =24m.57s., eSKKS =27m.36s., eS =28m.36s., ePS =30m.39s., eQ =55·6m.
Durham iEN =(24m.53s.) and (29m.18s.), readings increased by 10min.
De Bilt iZ =21m.13s., iPP =21m.57s.
Zagreb e =21m.20s., eEZ =31m.2s., e =39m.28s., 44m.48s., and 46m.24s.
Aberdeen iN =26m.3s., iPSEN =30m.50s., iPPSEN =32m.28s., iN =33m.56s., iE =34m.17s., iSSEN =37m.59s., iSSSEN =42m.20s., iE =45m.36s., iN =46m.40s., QE =50m.54s.
Reykjavik eN =58m.6s.
Sofia ePP =21m.25s.?, e =36m.9s.
Belgrade e =24m.4s., i =33m.32s.
Jena ePKP?E =19m.15s., ePP?E =21m.8s., ePP?Z =21m.21s., eE =31m.46s., eN =31m.49s., eZ =31m.54s.
Kalossa eE =21m.22s., eN =21m.38s., eL =41·6m.
Sitka eSS? =37m.46s.

Continued on next page.

Prague e =17m.7s. and 19m.43s., ePP =21m.31s., ePPP? =24m.6s., eSKKS =28m.18s., ePS? =31m.48s.
Collmberg ePKPZ =19m.22s., eE =21m.7s., ePPN =21m.41s., eZ =21m.44s., eE = 21m.48s., ePKS?Z =23m.16s., cPPPE =24m.9s., eN =28m.23s., eN =29m.42s. and 33m.58s., eSSE =38m.24s., eN =39m.6s., eSSSE =43m.0s.
Budapest PKS =21m.47s., S_cSPKP =33m.26s., SSP =37m.6s., e =38m.50s., SSS = 41m.9s.
Potsdam eE =20m.54s., eN =20m.57s., ePPN =21m.29s., iZ =22m.58s., ePPPE = 24m.39s., iPPPN =24m.45s., iN =29m.0s., iSE =29m.9s., iSN =29m.17s., iN = 29m.47s., iZ =30m.4s., eLE =38·1m.
Raciborzu eZ =18m.31s., ePKP?N =19m.29s.
Bucharest e =21m.20s., eEN =24m.5s., iE =24m.27s., iSKSE =31m.39s., iSKKSN = 33m.19s., iSEN =34m.3s., eSKSPN =35m.33s.
Copenhagen 21m.50s., 24m.30s., 29m.23s.
Bergen eN =26m.52s., SKKSN =29m.12s., PPSN =34m.24s., SKKSN =36m.54s., SSN =40m.10s., readings wrongly identified.
Kodaikanal PPE =22m.48s., PKSE =24m.41s., PPSE =33m.57s., SSE =39m.12s., SSPE =39m.30s., SSSE =43m.52s., QE =53m.15s.
Upsala ePKSN =22m.55s., eSSN =39m.37s.?, eSSSE =44m.36s., eQN =54·6m., and other unidentified readings.
College ePKP =19m.30s., e =20m.30s., iPKS =22m.51s., ePPP =23m.48s., i =30m.6s., ePS =32m.9s., iPKP,PKP =40m.36s.
Bombay PKSEN =23m.20s., PPPEN =25m.37s., PKKPEN =28m.59s., PSEN = 32m.47s., PPSEN =34m.37s., SSEN =40m.37s., SSPEN =41m.7s., SSSEN = 45m.54s., QEN =57·6m.
Poona PPEN =22m.48s., PKSEN =23m.25s., PPPEN =25m.41s., PKKPEN =28m.41s., PKKSEN =32m.11s., PPSEN =34m.33s., SSEN =40m.32s., SSPEN =41m.17s., SSSEN =45m.55s., QEN =57m.36s.
Hyderabad PSN =34m.41s., SSN =40m.43s.
Helsinki ePPP =25m.34s., e =40m.32s. and 42m.27s., eSKKKS =45m.18s., e =48m.31s.
New Delhi ePPN =21m.35s., ePPPN =24m.25s., iN =25m.55s., and 30m.0s., iPSN = 31m.37s., iN =35m.50s., iSSN =38m.3s., iSSSN =43m.3s., iN =47m.14s., QN = 52m.41s.
Dehra Dun eE =32m.55s., QE =44m.51s.
Stalinabad eSKKS =29m.57s., PS =33m.24s., eSS =41m.52s.
Sverdlovsk iPPP =26m.57s., ePS =34m.4s.?
Tokyo SKKKS =31m.49s., P_eS,PKP =32m.47s., PPS =39m.24s., SS =44m.41s., SSS = 49m.51s., Q =71m.21s.
Kôti PPS =38m.26s., SS =55m.5s.
Osaka readings have been reduced by 2m.
Kobe e =20m.58s.
Mizusawa PN =20m.51s., L?N =48m.25s.
Hukuoka PPP =27m.31s., PPS =37m.31s.
Sapporo eSKP =24m.12s.
Irkutsk iPP =26m.12s., SKKS =32m.20s., SKSP =36m.38s., SS =47m.36s.
Long waves were also recorded at Branner.

Dec. 17d. 12h. 55m. 43s. Epicentre 54°·1S. 67°·5W. (as at 6h.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz		37·5	0	i 7 18	+ 1	i 13 9	+ 2	i 8 49	PP	18·4
Huancayo		42·4	349	e 7 58	0	e 14 14	− 6	—	—	e 17·8
Grahamstown	z.	66·0	113	e 10 54	+ 4	—	—	—	—	—
Tucson		93·8	324	i 13 17	− 3	—	—	i 13 47	?	e 45·3
Pierce Ferry		98·4	323	e 13 40	− 1	—	—	—	—	—
Overton	z.	98·9	323	e 13 40	− 3	—	—	—	—	—
Hungry Horse		109·4	329	e 18 33	[+ 1]	e 29 32	PPS	i 29 50	PKKP	—
Ksara		124·1	78	—	—	e 34 0	?	—	—	—
College		133·5	325	e 19 15	[− 4]	i 22 41	PKS	—	—	—
Bombay		133·6	123	—	—	—	—	e 57 17?	Q	e 65·3
Tashkent		148·7	96	i 19 49?	[+ 4]	i 23 28?	PKS	—	—	—

La Paz also gives iPPPZ =9m.17s., iSS =15m.57s., S_cS =17m.41s.
Long waves were also recorded at Santa Lucia, Philadelphia, Berkeley, Strasbourg, Rome, Kew, and Potsdam.

Dec. 17d. 15h. 7m. 50s. Epicentre 54°·1S. 67°·5W. (as at 12h.).

Some damage at Punta Arenas. Santa Cruz Is. in Tuckers Archipelago partly submerged. Landslides and crevasses in Ainsworth Is. (press report). Intensity VII between 53° and 54°S. latitude in Chile, felt as far as 43°S. latitude. Epicentre 54°S. 71°W. (Pasadena).

F. Greve, S.J.
Descripcion de los principales efectos producidos por los sismos destructores de Chile y ubicacion de sus epicentros. Santiago de Chile, 1953, p. 27, with isoseismic chart in supplement.

Seismological Notes. Bulletin of the Seismological Society of America. Jan., 1950, Vol. 40, No. 1, p. 73.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Concepcion	E.	17·7	350	(i 4 13)	+ 3	(i 7 29)	+ 3	—	—	—
La Plata	E.	20·3	23	4 40	0	i 8 38	+15	—	—	i 9·4
	N.	20·3	23	4 44	+ 4	i 8 45	+22	—	—	i 10·4
	Z.	20·3	23	4 40	0	8 40	+17	—	—	i 11·2
Buenos Aires		20·5	24	e 4 48	+ 6	8 39	+12	5 20	PPP	10·2
Santa Lucia		20·8	353	e 4 50	+ 5	8 38	+ 5	5 27	PPP	—
Copiapo		26·8	354	e 5 38	− 6	i 10 24	+ 5	i 6 33	PP	—
Antofagasta	E.	30·5	355	e 6 21	+ 4	e 11 7	−11	e 7 36	PPP	12·1
La Paz		37·5	0	i 7 17 a	0	i 13 12	+ 5	i 8 52	PP	18·7
Huancayo		42·4	349	e 7 57	− 1	i 14 22	+ 2	—	—	i 18·2
Bogota		58·8	353	i 9 53	− 9	i 18 12	+ 5	—	—	—
Balboa Heights		63·6	348	e 10 38	+ 3	e 19 10	+ 2	—	—	—
Galerazamba		65·0	352	i 10 57	+13	i 19 46	+20	i 11 17	pP	e 30·2
Grahamstown	Z.	66·0	113	e 10 54	+ 4	—	—	—	—	—
Fort de France		68·8	7	e 11 5	− 3	i 20 17	+ 6	—	—	e 33·6
Christchurch		70·1	222	i 11 15	− 1	20 21	− 6	25 0	SS	31·7
Wellington		71·1	225	i 11 20	− 2	i 20 27	−11	e 14 3	PP	29·2
Kaimata	N.E.	71·4	222	e 11 28	+ 4	—	—	—	—	—
Cobb River	E.	72·1	224	e 11 28	0	—	—	—	—	—
Tuai	N.	72·1	228	e 11 22	− 6	—	—	—	—	—
San Juan		72·2	2	e 11 30	+ 1	e 20 21	−30	e 13 59	PP	e 28·8
Port au Prince		72·5	356	e 11 34	+ 4	e 21 8	+14	—	—	36·1
Auckland	N.	74·7	228	e 11 34	− 9	i 21 12	− 7	11 58	PcP	31·0
Oaxaca		75·1	332	—	—	e 30 18	SSS	—	—	—
Vera Cruz		77·0	333	e 11 58	+ 2	e 21 46	+ 1	—	—	—
Puebla		77·5	331	e 12 0	+ 1	e 21 46	− 4	—	—	—
Tacubaya		78·1	330	e 12 4	+ 2	e 22 0	+ 4	e 17 0	PPP	—
Manzanillo		79·4	325	e 12 6	− 3	e 22 6	− 4	—	—	—
Guadalajara		80·6	326	e 12 12	− 4	e 22 20	− 3	—	—	—
Melbourne	E.	84·3	205	e 12 32	− 3	i 22 53	− 7	i 16 24	PP	—
Bermuda		86·2	2	e 12 55	PcP	i 23 30	ScS	i 28 20	SS	i 35·6
Riverview		86·3	211	i 12 46 k	+ 1	i 23 16	− 4	i 12 59	pP	39·5
Apia		87·2	251	12 53	+ 4	23 16	[+ 1]	16 41	PP	37·2
Columbia		88·5	349	e 12 55	− 1	e 23 19	[− 5]	e 29 25	SS	e 35·3
Tananarive		88·6	121	13 7	+11	23 39	− 3	16 37	PP	37·3
Brisbane		91·5	215	i 13 5	− 5	i 23 47	[+ 5]	i 23 55	SKKS	e 42·0
Washington, N.R.L.		92·9	353	—	—	23 20	[−30]	30 58	SSP	—
Washington		93·0	353	i 13 18	+ 1	e 23 31	[−19]	e 17 15	PP	i 35·3
Woodstock		93·4	348	—	—	26 10?	PPS	—	—	e 38·2
Tucson		93·8	324	e 13 14	− 6	e 23 45	[− 9]	e 25 40	PS	e 38·2
Philadelphia		93·9	355	e 17 26	PP	e 23 46	[− 9]	e 30 59	SSP	e 38·0
Perth		94·3	183	i 17 12	PP	i 24 3	[+ 6]	i 25 50	PS	i 47·6
St. Louis		94·4	342	i 13 20	− 3	i 24 29	− 4	i 24 4	SKS	—
Florissant		94·6	342	i 13 23	− 1	i 23 54	[− 5]	i 17 20	PP	—
City College, N.Y.		94·7	356	e 13 26	+11	e 23 50	[− 9]	e 17 16	PP	e 36·8
Fordham		94·7	356	e 13 26	+ 2	i 23 57	[− 2]	i 24 56	S	45·7
New Kensington	E.	94·9	350	e 13 48	+23	e 23 59	[− 2]	e 17 12	PP	e 40·6
Pennsylvania		94·9	351	e 13 28	+ 3	i 23 52	[− 9]	—	—	—
Cleveland		96·0	348	e 13 31 k	+ 1	e 24 42	− 5	i 17 26	PP	—
Weston		96·2	357	i 12 35	−56	i 24 26	{− 1}	i 26 7	PS	—
Harvard		96·3	357	i 13 32	0	e 24 46	− 3	i 17 10	PP	e 42·6
Palomar	Z.	97·0	320	i 13 31	− 4	—	—	—	—	—
Chicago		97·1	344	e 13 34	− 1	i 24 10	[− 2]	e 17 30	PP	e 39·0
Riverside	Z.	97·7	319	i 13 41	+ 3	—	—	i 17 43	PP	—
Lincoln	E.	97·8	338	e 13 40	+ 2	e 24 15	[− 1]	e 17 35	PP	e 39·5

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Pasadena		98·2	319	i 13 37	− 3	i 24 10	[− 8]	e 17 36	PP		c 40·2
Halifax		98·4	3	17 34	PP	24 16	[− 3]	26 47	PS		39·0
Pierce Ferry		98·4	323	e 13 35	− 6	—	—	i 17 48	PP		—
Boulder City		98·6	323	e 13 41	− 1	—	—	e 17 16	PP		—
Tamanrasset	Z.	98·8	63	e 13 49	+ 6	—	—	e 18 4	PP		—
Overton	Z.	98·9	323	e 13 38	− 5	—	—	e 17 43	PP		—
China Lake	Z.	99·4	321	e 13 39	− 7	—	—	i 17 55	PP		—
Shawinigan Falls	N.	100·4	357	13 56	+ 6	24 28	[− 1]	18 0	PP		—
Tinemaha	Z.	100·8	321	e 13 47	− 5	—	—	e 18 7	PP		—
Seven Falls	E.	100·9	358	e 14 10	+18	25 27	− 1	27 11	PS		48·4
Fresno		101·1	320	e 14 16	+23	e 24 22	[−10]	e 17 55	PP		e 50·2
Salt Lake City		101·9	327	e 17 59	PP	e 24 33	[− 3]	e 27 7	PS		e 42·6
Santa Clara		102·3	318	(i 13 50k)	− 9	(i 36 22)	SSS	—	—		(e 43·2)
Branner		102·6	318	—	—	e 36 34	SSS	—	—		e 43·4
Logan		102·8	328	e 13 52	− 9	e 27 16	PS	e 18 8	PP		e 40·0
Berkeley		103·0	318	e 14 5	+ 3	i 24 41	[0]	e 18 24	PP		e 49·7
Reno		103·5	321	e 14 5	+ 1	e 24 48	[+ 4]	e 18 15	PP		e 43·3
Ukiah		104·5	318	e 18 28	PP	e 24 47	[− 1]	e 33 12	SS		e 43·3
Mineral		104·9	320	e 18 31	PP	e 24 42	[− 8]	e 41 58	Q		e 50·9
Lisbon		105·2	44	19 23	PP	26 15	+11	33 52	SSP		50·2
Malaga	N.W.	105·5	48	i 14 39	P	i 26 4	− 2	18 36	PP		44·3
Shasta Dam		105·5	320	e 14 15?	P	—	—	—	—		e 42·2
Bozeman		106·1	330	e 18 33	PP	i 24 55	[0]	e 37 37	SSS		e 44·7
Ferndale	E.	106·1	318	—	—	e 25 38	{ 0}	e 27 52	PS		e 44·8
Granada		106·2	48	i 18 43	PP	i 26 34	+22	21 21	PPP		49·7
Butte	N.	106·8	329	e 18 44	PP	e 24 58	[− 1]	e 27 42	PS		e 41·6
Honolulu		107·2	283	—	—	e 25 2	[+ 2]	e 26 9	S		e 44·0
Toledo		108·3	47	e 18 42	[+12]	25 11	[+ 6]	i 19 23	PP		51·5
Alicante		108·6	50	18 56	[+26]	25 38	[+32]	19 32	PP		e 52·7
Algiers Univ.	Z.	108·9	53	e 18 35	[+ 4]	e 28 31	PS	i 19 24	PP		—
Hungry Horse		109·4	329	e 19 0	PP	e 28 30	PS	i 29 42	PKKP		—
Saskatoon		110·8	335	19 20	PP	25 12	[− 3]	21 48	PPP		50·5
Tortosa		111·0	49	19 41	PP	26 21	{+ 9}	22 16	PPP		51·4
Seattle		111·6	324	e 19 40	PP	—	—	—	—		—
Barcelona		112·2	49	e 17 17	?	—	—	—	—		53·4
Victoria		112·6	324	19 41	PP	25 28	[+ 5]	28 58	PS		46·2
Ivigtut		116·0	10	e 19 51	PP	i 29 54	PS	35 52	SS		46·2
Clermont-Ferrand		116·1	47	e 20 2	PP	i 27 26	{+38}	i 29 48	PS		51·7
Messina		116·2	61	e 19 46	PP	e 35 52	SS	e 23 30	?		e 43·6
Jersey	E.	116·7	42	e 20 22	PP	e 25 15	[−23]	e 36 10?	SS		e 47·2
Rome		117·5	56	e 19 54k	PP	e 27 21	{+24}	i 29 59	PS		—
Paris		118·2	44	e 18 59	[+10]	i 25 43	[− 1]	i 20 17	PP		e 55·2
Florence Arc.		118·3	54	e 20 34	PP	e 30 0	PS	e 20 51	?		—
Florence Xim.		118·3	54	i 20 39	PP	i 31 7	PPS	—	—		—
Prato		118·3	54	e 19 16	[+27]	—	—	i 20 40	PP		—
Pavia		118·4	51	e 20 18	PP	—	—	—	—		—
Rathfarnham Castle		118·4	36	e 20 6	PP	—	—	e 20 58	?		—
Besançon		118·5	48	e 19 9	[+19]	—	—	—	—		—
Helwan	N.	118·6	78	e 20 16	PP	27 22	{+18}	30 10	PS		—
Neuchatel		118·8	49	e 18 58	[+ 7]	—	—	—	—		—
Taranto		118·8	60	i 20 21	PP	e 25 26	[−20]	36 36	SS		61·0
Bologna	Z.	118·9	53	e 20 38	PP	e 28 29	?	e 22 49	PPP		—
Bandong		119·1	174	e 18 38	[−13]	—	—	e 19 21	PP		e 48·2
Padova		119·1	53	20 29	PP	27 18	{+10}	—	—		61·8
Kew		119·2	41	e 20 35	PP	e 26 41	{−27}	e 30 21	PS		e 49·2
Salo		119·3	52	e 18 52	[+ 1]	e 25 58	[+10]	e 20 44	PP		—
Basle		119·4	49	e 18 51	[− 1]	e 30 17	PS	—	—		—
Batavia		119·7	173	e 20 11	PP	—	—	—	—		e 50·2
Chur		119·8	51	e 18 56	[+ 4]	—	—	—	—		e 50·2
Zürich		119·8	49	e 18 50	[− 2]	—	—	e 20 12	PP		—
Athens		120·3	66	e 21 19	?	e 38 26	?	—	—		—
Strasbourg		120·3	48	e 19 15	[+22]	i 26 21	[+30]	e 20 11	PP		55·9
Triest		120·9	53	i 20 33	PP	i 27 30	{+11}	i 37 32	SSP		—
Stuttgart	Z.	121·1	49	e 18 59	[+ 4]	—	—	—	—		—
Durham		121·3	38	i 30 45	PS	—	—	—	—		—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Edinburgh	E.	121·6	36	—	—	26 7	[+12]	37 44	SSP		—
De Bilt		121·9	44	i 20 47	PP	e 28 40	{+74}	e 37 32	SSP		—
Zagreb		122·1	55	e 19 15	[+18]	—	—	e 20 57	PP		e 61·2
Aberdeen		123·0	36	i 20 35	PP	i 22 17	PKS	i 37 10	SS		57·9
Sofia		123·5	62	e 19 10?	[+10]	e 23 4	PKS	i 21 17	PP		58·5
Belgrade		123·6	59	e 19 20k	[+20]	e 27 40	{+ 2}	e 23 41	PPP		e 59·4
Jena		123·7	48	e 19 4	[+ 4]	e 38 20	SSP	—	—		e 52·5
Kalossa		124·0	56	e 20 5	[+65]	—	—	e 20 34	PP		53·2
Ksara		124·1	78	19 25?	[+24]	—	—	21 21	PP		—
Sitka		124·1	323	e 20 50	PP	e 27 10	{−32}	e 30 26	PS		e 50·5
Prague		124·4	50	e 19 19	[+18]	e 27 54	{+11}	e 20 57	PP		60·2
Collmberg		124·6	49	e 19 2	[0]	e 25 57	[− 8]	e 21 19	PP		e 51·2
Budapest		124·7	56	19 21	[+19]	27 49	{+ 4}	21 21	PP		—
Istanbul		125·4	67	e 19 13	[+10]	e 25 49	[−18]	—	—		—
Potsdam		125·4	47	e 19 24	[+21]	i 28 3	{+13}	i 21 0	PP		59·7
Colombo	E.	126·1	138	19 27	[+23]	e 38 52	SSP	—	—		62·2
Raciborzu		126·1	52	e 19 8	[+ 4]	—	—	e 21 16	PP		e 69·2
Bucharest		126·2	62	e 21 12	PP	i 27 31	{−24}	—	—		62·2
Skalnate Pleso		126·5	54	e 19 38	[+33]	—	—	e 21 32	PP		—
Copenhagen		127·4	44	e 19 24	[+17]	38 34	SSP	24 7	PPP		60·4
Bergen	N.	127·9	36	23 14	PKS	28 39	{+33}	38 44	SSP		50·6
Kodaikanal	E.	128·2	133	e 19 50	[+41]	—	—	—	—		—
Yalta		130·5	67	e 19 2	[−11]	e 22 46	PKS	—	—		—
Simferopol		130·8	66	19 25	[+11]	e 22 57	PKS	—	—		—
Theodosia		131·5	67	e 19 8	[− 7]	e 22 36	PKS	—	—		—
Upsala		132·2	42	e 22 10?	PP	e 28 41	{+ 8}	22 59	PKS		54·8
Sotchi		133·0	71	e 19 42?	[+24]	—	—	e 22 0	PP		—
College		133·5	325	e 19 51	[+32]	e 31 42	SKSP	e 21 30	PP		—
Erevan		133·5	79	e 23 25	PKS	—	—	—	—		—
Leninakan		133·5	77	19 44?	[+25]	—	—	—	—		—
Bombay		133·6	123	e 19 45	[+26]	e 40 4	SSP	e 22 3	PP		i 55·4
Poona		133·8	125	19 45	[+26]	23 8	PKS	32 22	PKKS		57·2
Tiflis		134·7	77	e 19 22	[+ 1]	39 40	SS	—	—		—
Hyderabad	N.	134·9	131	22 8	PP	28 58	{+ 8}	34 19	PPS		57·0
Piatigorsk		135·1	73	e 19 31	[+ 9]	e 40 25	SSP	e 22 10	PP		—
Helsinki		135·4	44	e 22 27	PP	e 26 17	[−15]	e 23 4	PKS		e 52·2
Grozny		136·2	76	e 19 43	[+19]	i 23 5	PKS	—	—		—
Baku		136·8	82	e 19 35	[+10]	—	—	—	—		—
Moscow		138·9	56	e 19 33	[+ 4]	26 38	[+ 1]	23 20?	PKS		—
Calcutta	E.	143·6	140	e 19 58	[+21]	e 26 55	[+10]	e 23 29	PP		—
Dehra Dun	E.	145·7	119	e 23 7	PP	e 36 49	PPS	e 50 59	Q		71·5
Stalinabad		146·6	99	e 19 45	[+ 3]	e 27 2	[+13]	e 19 51	PKP_2		—
Obi-garm		147·3	100	i 19 47	[+ 4]	i 30 9	{+ 5}	—	—		—
Garm		147·8	100	e 20 14	[+30]	—	—	—	—		—
Tashkent		148·7	96	e 19 53	[+ 8]	e 29 58	{−13}	—	—		—
Tchimkent		149·5	94	i 19 50	[+ 3]	—	—	—	—		—
Andijan		150·2	99	e 19 55	[+ 7]	i 29 45	{−34}	—	—		—
Sverdlovsk		151·0	63	i 19 55	[+ 6]	i 30 30	{+ 6}	i 20 11	PKP_2		—
Frunse		152·8	98	e 20 4	[+12]	—	—	—	—		—
Tokyo		153·6	237	20 19	[+26]	31 25	{+47}	43 10?	SS		87·8
Nagoya		154·5	233	e 20 10	[+16]	(e 43 25)	SS	—	—		e 43·4
Kôti		154·6	224	20 11	[+17]	30 58	{+14}	27 58	PPP		—
Osaka		154·7	229	e 20 20	[+26]	23 47	PKS	27 30	PPP		e 70·4
Sendai		155·0	243	20 16	[+22]	30 40	{− 6}	26 20	PPP		49·9
Mizusawa		155·5	244	20 13	[+18]	33 42	SKSP	(43 42)	SS		43·7
Hukuoka		155·9	219	e 19 49	[− 7]	30 38	{−12}	24 7	PP		60·5
Sapporo		158·1	254	e 21 4	PKP_2	e 44 49	SS	e 27 50	PPP		61·2
Semipalatinsk		160·0	87	e 20 24	[+23]	e 24 2	PKS	i 24 42	PP		—
Vladivostok		163·2	237	i 20 23	[+19]	i 31 20	{− 9}	i 20 55	PKP_2		—
Irkutsk		174·7	107	i 20 30	[+19]	i 32 29	{+ 3}	i 21 56	PKP_2		—

Additional readings and notes :—
Concepcion readings have been reduced by 3m.
La Plata E. 6m.19s., 6m.50s., i = 7m.15s.
La Plata N. i = 4m.57s., 5m.16s. and 5m.47s., 8m.24s., S? = 9m.35s., 9m.48s.
La Plata Z. 6m.6s., 10m.4s.
Santa Lucia 6m.25s.

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Copiapo i =9m.43s.
Antofagasta eE =6m.37s., iE =7m.56s., eE =9m.2s., iE =9m.31s., and 11m.18s.
La Paz iZ =7m.22s.
Huancayo iP =8m.3s., i =8m.53s.
Galerazamba iPSEN =20m.35s., eEN =26m.3s.
Fort de France SS =24m.57s., SSS =27m.40s.
Christchurch iZ =11m.32s. and 12m.22s., eZ =15m.14s., eEN =19m.55s., QE =28m.40s.
Wellington iPePZ =12m.10s., ePPP =16m.6s., i =20m.58s.
San Juan eSS? =25m.29s.
Auckland iPS?N =21m.44s., SSN =26m.27s., SSSN =29m.49s.
Bermuda i =24m.45s.
Riverview iSKS?N =23m.2s., iScSN =23m.26s., iE =24m.1s., iPSN =24m.21s., iZ = 24m.31s., QEN =35·5m.
Apia eN =23m.36s., eEN =29m.10s.
Tananarive S =24m.8s., SS =29m.34s., SSS =33m.37s.
Brisbane iPN =13m.8s., ePE =13m.23s., iZ =13m.50s.
Washington i =24m.42s., iSS =30m.22s., i =33m.16s.
Tucson i =14m.3s., ePP =16m.41s., i =17m.30s., ePPP =18m.40s., eSS =30m.10s., eSSS? =34m.10s.
Philadelphia e =26m.4s., eSSS? =34m.49s.
Perth i =15m.2s., 31m.10s., and 42m.11s.
St. Louis i =15m.13s. and 22m.23s., iPS =25m.44s.
Florissant iPPP =19m.5s., iPS =25m.28s.
City College, N.Y. ePPP =19m.27s., eS =24m.37s., ePS =25m.50s., eSS =31m.15s., eSSS? =34m.33s.
Fordham i =33m.26s.
Pennsylvania eE =13m.52s. and 14m.46s., iE =26m.28s.
Cleveland eN =15m.6s., iN =18m.9s. and 24m.4s., ePSN =26m.10s., eE =26m.15s., iE =28m.16s., iSSE =31m.32s.
Weston iPP =16m.30s., iSS =30m.26s.
Harvard ePPP =21m.3s., e =26m.9s., eSS =31m.14s., eQ =38m.40s.
Riverside ePPZ =17m.20s.
Lincoln eE =24m.56s. and 26m.41s., eSSE =31m.31s.
Pasadena iPPZ =17m.47s., ePPPZ =19m.25s., iZ =23m.54s., iPPSNZ =26m.38s., iSSN =30m.58s.
Halifax SS =31m.58s., SSS =35m.40s.
Boulder City i =14m.52s., e =22m.30s.
Tamanrasset iZ =14m.6s. and 17m.14s., ePPPZ =20m.11s.
China Lake ePPZ =17m.35s., eZ =30m.15s.
Shawinigan Falls PS?N =26m.46s.
Tinemaha iZ =14m.23s.
Seven Falls eE =17m.30s., SSE =32m.13s., SSSE =37m.19s., QE =46·9m.
Fresno eZ =17m.4s., eE =18m.12s., eE =19m.28s., eN =21m.10s., eSKSZ =25m.52s., eZ =42m.58s., eN =45m.52s.
Salt Lake City ePPS =27m.29s., eSSS? =36m.25s.
Santa Clara iE =(19m.48s.), (22m.31s.), and (38m.18s.), readings have been reduced by 5m.
Logan eSS =31m.47s.
Berkeley eNZ =15m.25s., iPPZ =17m.44s., ePPZ =18m.2s., ePPEN =18m.6s., iPPPE = 20m.42s., iSE =25m.52s., eSE =26m.2s., iPSNZ =27m.24s., iSS =33m.4s., eSSSE = 36m.22s., iZ =40m.42s., eQE =43·1m.
Reno eN =15m.2s., ePPN =18m.6s., eE =18m.41s., eZ =20m.40s., eSKSN =24m.45s., eZ =27m.8s. and 37m.34s.
Ukiah ePS? =27m.27s.
Mineral eZ =24m.36s.
Lisbon iQEN =44m.10s.
Malaga PPPNW =20m.38s., PSNW =27m.36s.
Bozeman eS =27m.19s., eSS =33m.4s.
Granada PP =19m.10s., PPS =29m.30s., i =33m.22s., Q =43·9m.
Honolulu eSS =33m.16s., eSSS =37m.14s.
Toledo iZ =18m.59s., PPP?N =21m.37s., iS?N =26m.45s., PSN =28m.47s., iN = 33m.37s., 34m.9s., and 38m.10s., SSSN =39m.13s., Q =45m.13s.
Alicante PPP =22m.8s., SKKS =26m.42s., 28m.48s., PS =29m.24s., PPS =30m.28s., SS =34m.46s., SSS =39m.2s., Q =45m.42s.
Algiers Univ. eZ =19m.49s., ePPPZ =21m.44s., eZ =22m.50s., 24m.28s., and 33m.43s.
Hungry Horse eSP =27m.42s.
Saskatoon SKKS =26m.10s., PS =28m.40s., PPS =29m.50s., SS =34m.34s., SSS = 38m.55s., Q =45·7m.
Tortosa SKKSEN =27m.18s., PPS =30m.40s., SS?N =35m.54s., SSS?N =40m.22s., iE =45m.36s., iN =46m.31s.
Victoria PPS =30m.10s., SS =35m.34s., SSS =39m.28s.
Clermont-Ferrand iPP =20m.16s., iS =28m.1s., iPPS =31m.3s., i =34m.53s., eSSS = 40m.58s., Q =47·7m.
Jersey eSE =28m.25s.
Rome iZ =20m.12s., iPPZ =20m.31s., iSKPZ =21m.51s., eSSE =38m.0s.
Paris iPPP? =22m.40s., eSKKS =27m.20s., eS =28m.9s., iPS =30m.2s., iPPS =31m.2s., iSS =36m.49s., and other readings without phase.
Helwan SKPN =21m.50s., eN =22m.40s., eEN =26m.16s., eN =28m.15s., and 29m.15s., PPSN =31m.22s., eE =34m.25s., eN =35m.25s.

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Kew ePPZ =21m.19s., eZ =22m.7s., eSKKP =34m.51s., eSS =36m.51s., eSSS = 41m.13s., e =44m.29s. and 46m.21s.
Salo i =21m.22s.
Basle eS? =28m.46s., e =29m.41s.
Zürich ePPP =23m.32s.
Strasbourg iPP =20m.46s., iSKP =22m.40s. and 22m.55s., iSKS =26m.28s., eSKKS = 27m.28s., iSKKS =27m.33s., iS =28m.34s., iPS =30m.22s., iPPS =31m.38s., iSS = 37m.29s., iSSS =41m.29s., and 41m.40s., Q =51·2m., and other readings without phase.
Triest iPP =20m.53s.
Zagreb eE =19m.24s. and 23m.49s., e =28m.59s., eLE =38m.10s.?
Aberdeen iSKSN =26m.42s., iPPSEN =31m.33s., iSSSEN =41m.50s., iEN =51m.2s.
Sofia ePS? =31m.22s., eSS? =38m.21s.
Belgrade e =33m.47s. and 38m.17s.
Jena eZ =19m.19s. and 21m.8s., eN =21m.13s. and 38m.26s.
Kalossa eN =21m.13s., eE =21m.23s.
Sitka eSS? =37m.40s., eSSS? =41m40s.
Prague ePPP =23m.48s., eSKS? =26m.40s., ePS =31m.10s., eSKSP =31m.40s., ePPS = 32m.33s., eSS =38m.10s., eSSS =42m.40s., and other readings without phase.
Collmberg ePKPZ =19m.18s., eZ =20m.1s., ePPZ =21m.37s., eS?N =28m.49s., eSSEN = 38m.10s.?, eSSSN =42m.10s.?
Budapest PPP =23m.55s., e =29m.0s., PS =31m.31s., PPS =32m.37s., SS =38m.38s., SSS =43m.10s.?
Potsdam iZ =19m.27s., iPPZ =21m.34s., eE =22m.34s., iPPPE =24m.11s., iPPPN = 24m.16s., iPSN =31m.22s., iPPS?Z =33m.9s?, iPPSE =33m.39s., iE =34m.9s.?, eLE =37·8m.
Raciborzu ePKP?E =19m.11s., ePKP?Z =19m.14s., ePP?E =21m.24s., ePPP?E = 23m.10s.
Bucharest iEN =21m.37s., iE =25m.11s.
Copenhagen 22m.24s.
Bergen eN =29m.14s.?, 32m.54s., and 35m.38s.
Upsala eN =23m.49s., iE =24m.25s., eN =33m.43s., ePPSE =33m.55s., eS_cS,PKP?E = 34m.49s., eS_cS,PKP?N =34m.54s., eN =36m.29s. and 39m.10s.?, eSSE =39m.47s., eE =43m.10s.
Bombay iSS?E =40m.47s., eN =44m.48s.
Poona PPEN =22m.51s., PKS_2EN =23m.32s., PKKPEN =28m.52s., SKKSEN = 35m.15s., SSEN =40m.45s., SSPEN =41m.30s.
Hyderabad PPN =23m.58s., SSN =40m.40s.
Helsinki e =40m.34s. and 45m.6s.
Moscow SKKS =29m.24s., SKSP =32m.37s.
Calcutta eSSE =42m.29s., iSSSE =47m.48s.
Stalinabad PP =23m.18s., ePKS =23m.32s.?, PPP =26m.46s., eSKKS =30m.2s.
Sverdlovsk iPP =23m.42s., SKSP =34m.6s.?, iSS =43m.5s.
Tokyo PKP_2 =21m.16s., PP =23m.32s., P_cS,PKP =33m.16s., SS =49m.16s., Q =70·2m.
Kôti SS =44m.21s.
Sendai SKKS =31m.36s., Q =44m.10s.
Mizusawa PN =20m.19s.
Hukuoka PKP_2 =20m.19s., SKP =23m.30s., SS =43m.51s., SSS =49m.31s.
Sapporo eSKP =24m.14s., PPS =45m.46s., SSS =50m.32s.
Vladivostok iPP =24m.42s., iPPP =28m.33s.
Irkutsk iPKS =25m.47s., iPPP =30m.10s., SSS =47m.10s.
Long waves were also recorded at Reykjavik and Almeria.

Dec. 17d. 22h. 30m. 41s. Epicentre 54°·1S. 67°·5W. (as at 15h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Plata	E.	20·3	23	4 43	+ 3	8 37	+14	5 21	PPP	10·2
	N.	20·3	23	5 45	+65	8 32	+ 9	—	—	10·5
Santa Lucia	N.	20·8	353	4 38	− 7	8 38	+ 5	9 32	Q	e 13·7
La Paz		37·5	0	i 7 13	− 4	i 13 5	− 2	i 8 41	PP	21·3
Huancayo		42·4	349	e 8 4	+ 6	—	—	—	—	e 21·0
Grahamstown	Z.	66·0	113	i 11 0	+10	—	—	—	—	—
Tucson		93·8	324	i 13 11	− 9	—	—	—	—	—

La Plata also gives iN =4m.50s., N =5m.54s. and 6m.23s., SN =8m.38s., N =9m.25s.
Long waves were also recorded at Copiapo, Bogota, Harvard, Granada, and Rome.

Dec. 17d. Readings also at 1h. (Andijan, Stalinabad, Tashkent, and near Ashkabad (2)), 3h. (College, Hungry Horse, Overton, Shasta Dam, Boulder City, Mineral, China Lake, Riverside, Mount Wilson, and Tinemaha), 5h. (La Paz, College, Hungry Horse, Overton, and Shasta Dam). 8h. (College, Hungry Horse, Grozny, Tiflis, Leninakan, near Sotchi, and Piatigorsk), 11h. (Rolphton, Samarkand, Andijan, Tashkent, near Garm, Obi-garm, and Stalinabad), 12h. (near Garm and near Obi-garm), 13h. (near Victoria), 14h. (La Paz, near Strasbourg and Stuttgart), 15h. (Overton and Pierce Ferry), 16h. (near Arcata), 17h. (College, Tucson, and Grahamstown), 19h. (College, Tucson, and near Istanbul), 20h. (near Istanbul), 21h. (Hungry Horse, and near Tacubaya).

Dec. 18d. 5h. 39m. 9s. Epicentre 34°·7S. 179°·7E. Depth of focus 0·025.

Intensity IV at Opotiki and Wellington. Epicentre 34°S. 179°·5E.. Depth 150-200km.

R. C. Hayes.
Earthquake origins in New Zealand during the year 1949. New Zealand Journal of Science and Technology, Sect. B., Vol. 31, No. 4, January, 1950, p. 445.

$A = -\cdot8239$, $B = +\cdot0043$, $C = -\cdot5667$; $\delta = -2$; $h = 0$;
$D = +\cdot005$, $E = +1\cdot000$; $G = +\cdot567$, $H = -\cdot003$, $K = -\cdot824$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	4·5	240	i 1 15	+ 6	i 2 11	+ 9	—	—	—
Tuai	N.	4·6	206	i 1 10	0	i 2 8	+ 4	—	—	—
New Plymouth	E.	6·3	225	i 1 33	+ 1	i 2 38	− 5	—	—	—
Wellington		7·6	209	i 1 47	− 2	i 3 11	− 3	—	—	—
Cobb River		8·4	219	e 1 59	0	—	—	—	—	—
Kaimata	N.E.	10·1	217	e 2 21	0	i 4 8	− 4	—	—	—
Christchurch		10·4	210	e 2 27	+ 2	e 4 14	− 5	—	—	—
Apia		22·2	22	4 41	0	8 17	−11	i 5 27	pP	—
Riverview		23·6	264	i 4 53a	− 2	i 9 8	+16	i 5 29	pP	—
Brisbane		23·9	281	i 4 53	− 4	i 8 57	0	i 5 31	pP	—
Melbourne	E.	28·1	254	i 5 41	+ 5	i 10 25	+20	—	—	—
Bandong		71·4	276	e 11 2	+ 1	e 21 28	PPS	—	—	—
Batavia		72·4	275	i 11 9a	+ 2	e 21 41	PPS	—	—	—
Santa Lucia	N.	85·4	128	—	—	e 22 26	− 4	—	—	—
Vladivostok		88·9	327	i 13 27	pP	e 22 57	− 6	—	—	—
Copiapo	N.	89·5	123	—	—	—	—	e 35 41	Q	—
Pasadena		89·8	48	i 12 36a	− 2	i 23 17	+ 6	i 13 24	pP	—
Lick	Z.	90·0	43	i 12 36a	− 3	—	—	i 13 44	pP	—
Berkeley		90·1	43	i 12 37	− 2	—	—	i 17 55	PP	—
Palomar		90·1	49	i 12 38a	− 1	e 22 50	[0]	i 13 24	pP	—
Riverside		90·2	48	i 12 38a	− 2	—	—	i 13 25	pP	—
Fresno		90·7	44	e 12 40a	− 2	e 23 23	+ 4	i 13 29	pP	—
China Lake	Z.	91·3	46	i 12 42a	− 3	—	—	i 13 30	pP	—
Tinemaha	Z.	91·8	45	i 12 45a	− 2	—	—	—	—	—
Shasta Dam		92·0	40	i 12 45	− 3	—	—	—	—	—
Mineral	Z.	92·2	41	e 12 47k	− 2	—	—	—	—	—
Reno	Z.	92·6	43	e 12 49	− 2	—	—	e 13 15	pP	—
Boulder City		93·1	48	i 12 51	− 2	—	—	i 13 46	pP	—
Tucson		93·2	53	i 12 54	0	e 23 46	+ 5	i 13 40	pP	—
Overton	Z.	93·7	48	e 12 54	− 2	—	—	—	—	—
Pierce Ferry		93·7	48	i 12 55	− 1	e 23 55	+10	—	—	—
Tacubaya		93·8	69	e 15 16	?	e 23 56	+10	—	—	—
Huancayo		95·2	108	e 12 57	− 6	i 23 24	[+ 5]	e 31 51	SS	—
La Paz		97·9	116	e 13 31	+16	i 23 37	[+ 4]	i 17 20	PP	—
Logan		98·6	45	e 13 15	− 3	—	—	e 17 18	PP	—
Hungry Horse		101·6	39	e 13 27	− 5	e 23 51	[0]	e 29 35	PKKP	—
College		102·4	13	e 13 29	− 6	—	—	e 17 31	PP	—
Kodaikanal	E.	105·8	272	e 18 26	PP	—	—	—	—	—
Grahamstown	Z.	107·8	204	e 18 24	PP	—	—	—	—	—
Irkutsk		108·6	321	e 18 18	[+13]	e 25 38?	SKKS	—	—	—
St. Louis		110·7	57	e 19 8?	PP	e 28 13	PS	—	—	—
Bombay		114·1	277	e 19 3	PP	—	—	—	—	—
Fordham		123·1	60	i 18 31	[− 3]	—	—	i 19 20	PP	—
Ottawa		123·3	54	i 18 31a	[− 3]	—	—	e 21 3	PP	—
Andijan		123·7	299	e 18 31	[− 4]	e 28 19	SKKS	e 21 12	PP	—
Harvard		125·3	59	i 18 36	[− 2]	—	—	—	—	e 44·1
Weston		125·4	59	i 17 36	[−62]	—	—	i 18 11	pPKP	—
Stalinabad		125·6	296	—	—	25 50	[+27]	—	—	—
Tashkent		126·1	299	i 18 37	[− 2]	—	—	24 27	PPP	—
Tchimkent		126·2	300	i 18 36	[− 4]	—	—	—	—	—
Seven Falls	E.	127·0	53	e 18 41	[0]	—	—	—	—	—
Sverdlovsk		133·9	318	i 18 52	[− 2]	i 22 21	PKS	e 40 12	SS	—
Grozny		143·6	298	e 19 4	[− 8]	—	—	—	—	—
Tiflis		144·2	295	e 19 7	[− 6]	—	—	—	—	—
Erevan		144·3	292	e 19 11?	[− 2]	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O – C.	S.	O – C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Leninakan		144·8	294	e 19 9	[– 5]	—	—	e 19 27 PKP_3	—
Piatigorsk		145·5	299	19 11	[– 4]	—	—	— —	—
Moscow		146·6	321	e 19 14	[– 3]	—	—	e 20 1 pPKP	—
Ksara		150·2	279	i 19 20	[– 3]	—	—	e 23 34 PP	—
Istanbul		156·0	295	e 19 26	[– 5]	—	—	e 23 31 PP	—
Copenhagen		157·2	342	i 19 28	[– 4]	—	—	i 19 59 pPKP	—
Jena		161·6	335	e 19 34	[– 3]	—	—	e 20 19 pPKP	—
Stuttgart	Z.	164·3	336	e 19 36	[– 4]	—	—	e 20 30 pPKP	—
Strasbourg		164·9	339	i 19 39	[– 2]	—	—	i 20 33 pPKP	—
Paris		165·7	353	i 19 40	[– 1]	—	—	i 20 37 pPKP	—
Zürich		165·7	336	e 19 28	[–13]	—	—	e 20 26 pPKP	—
Besançon		166·6	340	i 20 41	pPKP	—	—	— —	—
Tamanrasset	Z.	167·1	204	e 19 41?	[– 1]	—	—	e 20 11 pPKP	—
Rome	N.	167·7	310	—	—	e 30 24	SKKS	— —	—
Toledo	Z.	174·0	—	i 19 58	[+12]	—	—	— —	—
Alicante		176·3	—	19 15	[–32]	25 47	[–42]	20 23 PKP_2	e 68·4
Granada		176·3	—	18 52	[–55]	33 51	SKSP	24 51 PP	—
Algiers Univ.	Z.	176·6	—	e 19 40	[– 7]	e 26 43	[+14]	i 20 6 pPKP	—
Almeria		177·2	—	19 9	[–38]	26 6	[–23]	20 47 PKP_2	—

Additional readings :—
Tuai iN =1m.38s.
New Plymouth iE =1m.40s.
Cobb River e? =1m.55s.
Riverview iE =5m.15s., iZ =5m.36s., iPPEZ =5m.43s., iPPP?EZ =5m.57s., iE = 6m.53s., iP_cPZ =8m.11s., iZ =9m.6s., iSN =9m.11s.. iN =9m.23s. and 9m.55s., isSN =10m.10s., isSE =10m.14s., iE =10m.31s.. iSSN =10m.34s.
Brisbane iZ =5m.53s., iN =5m.56s., iZ =8m.31s., iEN =10m.7s.
Copiapo eN =36m.14s.
Pasadena eZ =15m.50s., iS?EN =22m.49s.
Lick iZ =12m.39s.
Palomar eEN =23m.21s.
Fresno ipPE =13m.3s., eN =24m.36s., and 25m.55s.
China Lake iZ =16m.28s.
Tucson ePP? =16m.21s., i =23m.51s., ePKKP =27m.0s.
Huancayo ePPS? =27m.58s., e =35m.23s.
La Paz iN =18m.19s., SKKS? =23m.59s., iZ =25m.57s., iN =28m.21s. and 29m.39s., iSS =31m.33s., SSS =35m.7s., iN =38m.11s.
Ottawa e =19m.21s.
Andijan eSKSP =31m.19s.
Weston iPP =19m.59s.
Strasbourg i =21m.0s. and 21m.7s.
Paris i =19m.51s. and 20m.50s., e =21m.8s.
Tamanrasset eZ =19m.49s., and 20m.6s.. $iPKP_2Z$ =20m.47s., iZ =20m.50s., eZ = 21m.5s., $epPKP_2Z$ =21m.18s., iPP?Z =24m.35s., eZ =24m.55s.
Alicante Q =67m.23s.
Algiers Univ. iZ =19m.46s.. ePPZ =24m.13s., eZ =25m.19s., iPPPZ =28m.25s.
Almeria PP =24m.37s., PPP =28m.47s., SS =45m.53s.

Dec. 18d. 9h. 35m. 29s. Epicentre 39°·5S. 175°·3E. (as on 1947, May 5d.).

A = –·7711, B = +·0634, C = –·6335 ; δ = –6 ; h = –1 ;
D = +·082, E = +·997 ; G = +·631, H = –·052, K = –·774.

		Δ	Az.	P.	O – C.	S.	O – C.
		°	°	m. s.	s.	m. s.	s
New Plymouth	E.	1·0	294	i 0 25	+ 4	i 0 32	– 4
Arapuni	E.	1·5	11	i 0 27?	– 1	i 0 44?	– 5
Tuai	N.	1·6	64	i 0 18	–12	i 0 33	P
Wellington		1·8	193	i 0 31	– 1	i 0 57	+ 1
Cobb River		2·5	231	0 43	0	1 19	+ 5
Auckland	N.	2·7	352	i 0 46	+ 1	i 1 14	– 5
Kaimata	N.E.	4·2	223	e 1 6	– 1	i 1 57	0
Christchurch		4·5	206	e 1 8	– 3	e 1 56	– 9
Ottawa		128·8	59	e 18 55	[–15]	—	—

Christchurch gives also iS =1m.59s.

Dec. 18d. 19h. 13m. 20s. Epicentre 36°·8N. 69°·4E. (as on 1947, Nov. 27d.).

A = +·2824, B = +·7513, C = +·5964 ; δ = −11 ; h = 0 ;
D = +·936, E = −·352 ; G = +·210, H = +·558, K = −·803.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stalinabad		1·8	344	i 0 33	+ 1	i 1 5	+ 9			—
Obi-garm		1·9	7	i 0 37?	+ 3	i 1 10?	+11			—
Garm		2·3	18	i 0 41	+ 1	i 1 21	+12			—
Samarkand		3·5	327	e 0 54	− 3	i 1 54	+14			—
Tashkent		4·5	359	e 1 10	− 1	e 2 6?	+ 1			—
Andijan		4·6	30	1 12	0	e 2 40?	S_E			—
Tchimkent		5·5	1	i 1 24	− 1	i 2 30	0			—
Frunse		7·3	32	e 1 50	0	i 3 20	+ 5			—
New Delhi	N.	10·5	139	—	—	i 4 10	−25			i 5·2
Poona	E.	18·6	166	e 7 19	?	7 33	−13			8·6
Grozny		19·2	297	—	—	7 47	−12			—
Tiflis		19·7	292	4 21	−13	—	—			—
Leninakan		20·3	290	e 4 40?	0	—	—			—
College		74·6	16	e 11 32	−11	—	—			—

Poona PPE = 7m.22s., iE = 8m.22s., eSE = 8m.56s., SSE = 9m.12s.,, wrong identification.

Dec. 18d. Readings also at 1h. (Huancayo, La Paz, La Plata, Santa Lucia, Tucson, and Grahamstown), 2h. (Bogota, Mount Wilson, Palomar,, Tinemaha, Tucson, College (2), Obi-garm, and near Stalinabad), 3h. (College and Pierce Ferry), 4h. (Bombay), 6h. (Toledo, Ottawa, and Tucson), 7h. (Harvard), 8h. (La Paz, La Plata, Santa Lucia, Pierce Ferry, Tucson, and near Alicante (2)), 9h. (College and Harvard), 11h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Shasta Dam, Hungry Horse, and College), 14h. (La Paz and Santa Lucia), 15h. (Punta Arenas (2)), 16h. (near Bandong, Batavia, and near Punta Arenas (2)), 17h. (Hungry Horse, Ottawa, near Andijan, Obi-garm, Stalinabad, and Tchimkent), 18h. (Klyuchi), 19h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Logan, Ottawa, Fresno (2), Shasta Dam, Pierce Ferry (2), and near Boulder City), 20h. (near Punta Arenas (2)), 21h. (near Andijan, near Messina (2), and near Punta Arenas), 22h. (Hungry Horse, near College, and near Punta Arenas), 23h. (Frunse, Samarkand, Stalinabad, near Andijan (2), and Obi-garm).

Dec. 19d. 7h. 40m. 36s. Epicentre 54°·38. 57°·3W. (as on 1941, Dec. 1d.).

A = +·3167, B = −·4933, C = −·8102 ; δ = +7 ; h = −7 ;
D = −·842, E = −·540 ; G = −·438, H = +·682, K = −·586.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Punta Arenas	N.	8·2	273	e 1 0	−63	i 3 12	−26	—	—	—
La Plata	E.	19·4	359	4 36	+ 6	8 10	+ 6	—	—	10·1
Santa Lucia	N.	22·9	331	e 4 59	− 7	e 8 52	−21	—	—	12·1
La Paz		38·6	344	e 7 28	+ 2	e 13 19	− 4	i 16 10	8S	18·4
Huancayo		44·5	335	e 8 1	−14	e 20 24	Q	—	—	(e 20·4)
Bogota	Z.	60·3	341	e 10 15	+ 2	—	—	—	—	—
Fort de France		68·8	357	e 10 51	−17	—	—	—	—	—
Hungry Horse		112·9	322	e 29 41	PPS	—	—	—	—	—
Ksara		118·4	70	e 41 24?	SSS	—	—	—	—	—
College		137·3	320	e 19 25	[− 1]	—	—	e 22 56	PP	—

Additional readings :—
Punta Arenas iN = 1m.16s., 1m.22s., and 1m.49s., these are probably one minute in error.
La Plata PZ = 4m.42s., N = 8m.43s., SN = 9m.18s., E = 9m.37s.
La Paz iN = 17m.52s.
Long waves were also recorded at Auckland, Christchurch, San Juan, and other stations in North and South America.

Dec. 19d. Readings also at 1h. (Tchimkent, near Andijan (2), and Obi-garm), 2h. (near Bogota), 4h. (near Punta Arenas (3)), 5h. (Copiapo and Punta Arenas), 6h. (near Punta Arenas), 7h. (Apia, China Lake, Tinemaha, Tucson, Pierce Ferry, Hungry Horse, College, Pennsylvania, Frunse, near Andijan, Obi-garm, Samarkand, Stalinabad, and Tashkent), 9h. (Brisbane, Batavia, Palomar, Pasadena, Riverside, Shasta Dam, Hungry Horse, College, Ottawa, Fort de France, and Tamanrasset), 10h. (Hungry Horse (2), Tucson, Bogota, Huancayo, La Paz, Punta Arenas, near Concepcion, and near Istanbul), 11h. (near Punta Arenas and near Alicante), 12h. (Brisbane, Pasadena, Riverside, China Lake, Tinemaha, Shasta Dam, Hungry Horse, College, Tamanrasset, and near Mizusawa), 14h. (Helwan, near Andijan, Obi-garm, Stalinabad, and Tchimkent), 16h. (Punta Arenas, and near Obi-garm), 17h. (Raciborzu), 19h. (near Piatigorsk), 20h. (near Obi-garm), 21h. (Hungry Horse, and Shasta Dam), 22h. (Samarkand, near Obi-garm, Stalinabad, and near Tucson).

Dec. 20d. 0h. 34m. 37s. Epicentre 13°·0N. 53°·5E.

$A = +\cdot5798$, $B = +\cdot7835$, $C = +\cdot2235$; $\delta = -1$; $h = +6$;
$D = +\cdot804$, $E = -\cdot595$; $G = +\cdot133$, $H = +\cdot180$, $K = -\cdot975$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bombay		19·5	70	e 4 25	− 6	e 8 1	− 5	—	—	—
Poona	E.	20·3	72	e 4 41	+ 1	8 26	+ 3	5 8	PP	9·9
Kodaikanal	E.	23·6	93	i 5 27	+14	i 9 47	+22	—	—	11·7
Hyderabad	E.	24·5	77	5 25	+ 3	9 46	+ 6	—	—	11·9
Ashkabad		25·2	10	e 5 25	− 4	—	—	—	—	—
Ksara		26·2	325	5 43?	+ 5	e 14 10?	L	—	—	(e 14·2)
Helwan	N.	26·5	313	e 7 39	+118	10 13	− 1	—	—	—
New Delhi	N.	27·0	52	e 6 10	PP	e 10 14	− 8	i 11 42	SS	i 13·7
Baku		27·5	355	e 5 56?	+ 6	e 10 16?	−14	—	—	—
Leninakan		28·9	346	e 6 4?	+ 1	—	—	e 6 40	PP	—
Stalinabad		28·9	26	i 5 57	− 6	e 10 27	−26	—	—	—
Tiflis		29·6	347	e 6 11	+ 2	—	—	—	—	—
Tashkent		31·4	24	—	—	11 19	−13	—	—	—
Tananarive		32·3	190	—	—	e 12 20	+34	e 13 53	SS	—
Tchimkent		32·4	24	e 6 26	− 8	—	—	—	—	—
Calcutta	E.	34·4	69	e 7 52	PP	e 12 19	0	—	—	—
Frunse		34·9	28	e 7 4	+ 9	—	—	—	—	—
Istanbul		35·2	328	e 6 8	−50	e 14 31	Q	—	—	—
Sverdlovsk		44·1	6	—	—	14 31	−14	—	—	—
Moscow		44·4	347	8 27	+13	e 14 43	− 6	—	—	—
Rome		45·8	317	—	—	e 15 37	+28	—	—	—
Tamanrasset	Z.	46·5	290	e 8 36	+ 5	—	—	e 10 28	PP	—
Triest		46·8	322	i 8 30	− 3	i 15 16	− 8	e 9 49	PP	e 25·4
Prague		48·8	328	e 9 15	+26	—	—	—	—	—
Collmberg	Z.	50·3	328	e 8 59	− 1	—	—	—	—	—
Algiers Univ.	Z.	50·8	307	e 9 5	+ 1	—	—	—	—	—
Stuttgart	Z.	51·0	324	e 9 2	− 4	—	—	e 11 4	PP	—
Strasbourg		51·8	323	e 9 12	0	—	—	e 12 5	PPP	—
Besançon		52·3	320	e 9 11	− 4	—	—	—	—	—
Alicante		53·9	309	e 9 31	+ 4	e 16 55	PS	—	—	—
Paris		55·0	321	i 9 37	+ 2	—	—	—	—	—
Almeria		55·2	306	8 51	−46	16 12	−68	10 24	P_cP	—
Granada		56·1	306	9 45a	+ 2	i 17 35	+ 3	10 51	P_cP	26·7
Batavia		56·3	106	—	—	17 46	+12	—	—	—
Malaga	Z.	56·7	306	i 9 49a	+ 1	i 17 35	− 5	10 37	P_cP	27·7
Bandong		57·3	106	—	—	17 58	+11	—	—	—
Kew		57·7	323	e 10 23?	+28	—	—	—	—	—
College		100·7	9	e 18 2	PP	—	—	—	—	—

Additional readings :—
Poona PPPE = 5m.20s., QE = 8m.43s.
Helwan PPN = 7m.50s., SSE = 10m.29s.
Tananarive e = 14m.53s., 15m.14s., and 15m.17s.
Tamanrasset iZ = 8m.39s., eZ = 8m.51s., 8m.58s., and 9m.7s.
Triest iS? = 15m.32s., eSP = 16m.37s.
Algiers Univ. iZ = 9m.12s., eZ = 9m.16s. and 9m.40s.
Strasbourg e = 9m.27s. and 15m.53s.

Continued on next page.

Besançon e =9m.32s. and 10m.2s.
Paris i =10m.2s.
Almeria PP =11m.0s., PPP =11m.52s., SS =19m.40s.
Granada ePP =12m.29s., SS =21m.18s., SSS =23m.45s.
Malaga PPZ =12m.1s., PPPZ =13m.5s., S_cPZ =14m.31s., S_cSZ =19m.13s., SSZ = 21m.33s.
Long waves were also recorded at Bucharest, Belgrade, Potsdam, Upsala, De Bilt, Harvard, Seven Falls, Ottawa, and Huancayo.

Dec. 20d. 4h. 16m. 40s. Epiecntre 22°·3S. 179°·2W. Depth of focus 0·090.
(as on 1946, Dec. 10d.).

A = −·9260, B = −·0129, C = −·3773 ; δ = 0 ; h = + 4;
D = −·014, E = +1·000 ; G = +·377, H = +·005, K = −·926.

	△	Az.	P.	O−C.	S.	O−C.		Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Apia		11·0	41 e 2 23	− 6	4 12	−16	e 7	53 P$_c$P	—
Auckland	N.	15·4	198 —	—	5 40	− 6	—	—	—
Arapuni	E.	16·3	194 —	—	e 6 22	+20	—	—	—
Tuai	N.	16·7	189 —	—	e 6 14	+ 6	e 13	55 S$_c$S	—
Wellington		19·6	194 3 42	− 9	e 7 0	+ 3	i 14	6 S$_c$S	—
Cobb River		19·9	199 —	—	e 7 7	+ 5	—	—	—
Kaimata	N.E.	21·6	199 e 4 14	+ 5	i 7 34	+ 5	—	—	—
Christchurch		22·2	175 —	—	e 7 46	+ 7	—	—	—
Brisbane	Z.	25·7	253 i 4 49	+ 3	—	—	—	—	—
Riverview		28·5	239 i 5 15k	+ 5	i 9 25	+ 7	e 6	55 pP	e 12·5
Vladivostok		79·1	326 e 11 3	− 1	i 20 17	+ 2	—	—	—
Pasadena		80·7	48 i 11 7	− 5	i 20 35	+ 4	i 13	19 pP	—
Fresno	Z.	81·2	45 e 11 15	0	e 20 36	0	e 13	20 pP	—
Palomar		81·2	49 i 11 15a	0	—	—	i 13	21 pP	—
Riverside		81·2	48 i 11 15	0	—	—	i 13	21 pP	—
Shasta Dam		81·9	40 i 11 18	0	e 20 40	− 3	i 13	24 pP	—
China Lake	Z.	82·1	46 i 11 19a	0	—	—	i 13	24 pP	—
Mineral	Z.	82·2	41 i 11 20a	0	e 20 49	+ 3	—	—	—
Tinemaha	Z.	82·4	45 i 11 18	− 3	—	—	—	—	—
Reno		82·8	43 e 11 22	− 1	e 21 49	+57	e 13	24 pP	—
Boulder City		84·0	48 e 11 29	0	e 21 10	+ 7	e 13	36 pP	—
Overton	Z.	84·6	47 i 11 32	0	—	—	i 13	39 pP	—
Pierce Ferry		84·7	48 i 11 32	0	—	—	i 13	41 pP	—
Tucson		84·9	52 i 11 34	+ 1	e 21 3	− 9	e 13	41 pP	—
Seattle		86·3	35 i 11 41k	+ 1	e 21 29	+ 4	e 13	49 pP	—
Victoria		86·3	34 i 11 38k	− 2	—	—	13	46 pP	—
Logan		89·1	44 e 11 50	− 3	e 21 30	[+ 5]	i 13	58 pP	—
College		89·8	13 e 11 54	− 2	e 21 42	[+12]	e 14	5 pP	—
Hungry Horse		91·2	37 i 12 1	− 2	e 21 37	[− 1]	i 14	0 pP	—
Huancayo		98·0	106 —	—	e 22 20	[+ 6]	e 25	53 PS	—
Ottawa		114·8	48 28 25	PS	—	—	—	—	—
Copenhagen		145·5	349 i 18 32	[+ 1]	—	—	—	—	—
Ksara		147·1	297 i 18 37	[+ 4]	—	—	e 20	52 pPKP	—
Raciborzu		149·1	339 i 18 42	[+ 6]	—	—	—	—	—
Collmberg	Z.	149·5	345 e 18 38	[+ 1]	—	—	e 21	3 pPKP	—
Jena		150·2	345 e 18 39	[+ 2]	—	—	e 21	2 pPKP	—
Prague		150·3	343 i 18 45	[+ 7]	—	—	e 21	14 pPKP	—
Stuttgart	Z.	152·8	348 e 18 42	[+ 1]	—	—	e 21	6 pPKP	—
Strasbourg		153·2	349 e 18 43	[+ 1]	—	—	i 21	15 pP	—
Paris		153·5	357 e 18 44	[+ 2]	—	—	i 21	14 pP	—
Zürich		154·2	348 e 18 41	[− 2]	—	—	—	—	—
Triest		154·4	339 e 18 47	[+ 4]	—	—	e 21	10 pP	—
Besançon		154·8	351 e 18 55	[+11]	—	—	—	—	—
Algiers Univ.	Z.	165·4	352 i 18 59	[+ 4]	—	—	e 21	15 pP	—
Tamanrasset	Z.	175·6	— i 19 5a	[+ 4]	—	—	e 21	26 pP	—

Additional readings :—
Apia e =2m.48s.
Riverview eZ =7m.59s., iE =9m.55s., iN =12m.28s., iEN =12m.33s., iS_cSN =14m.46s., iS_cSE =14m.49s.
Pasadena i =11m.12s.
Palomar i?Z =13m.12s.

Continued on next page.

Riverside iZ = 13m.34s.
Mineral iZ = 12m.3s., eZ = 12m.24s.
Reno eSN = 21m.56s., eSE = 22m.0s.
Tucson i = 21m.20s., ePKP,PKP = 37m.44s.
Seattle esP = 14m.34s., e = 21m.57s.
Hungry Horse i = 14m.11s., e = 37m.20s. and 37m.32s.
Collmberg iZ = 18m.43s. and 18m.49s., eZ = 18m.53s.
Jena eEN = 18m.45s., eN = 21m.9s.
Stuttgart iPKPZ = 18m.51s.k, eZ = 19m.2s.
Strasbourg i = 18m.52s. and 19m.3s.
Paris i = 18m.52s. and 19m.6s., ePP = 22m.59s.
Triest $ePKP_2$ = 19m.29s., $epPKP_2$ = 21m.59s.
Besançon e = 19m.12s.
Algiers Univ. $iPKP_2Z$ = 19m.58s., ePPZ = 23m.45s., epPPZ = 25m.43s.
Tamanrasset $iPKP_2Z$ = 20m.48s., $epPKP_2Z$ = 23m.13s., ePPZ = 24m.41s., epPPZ = 26m.56s., isPP?Z = 27m.49s., eZ = 30m.35s.

Dec. 20d. Readings also at 4h. (College, Tucson, Irkutsk, and Triest), 5h. (Andijan, and near Tchimkent), 7h. (Hungry Horse), 9h. (Santa Lucia), 13h. (Erevan, Leninakan, and near Tiflis), 14h. (near Andijan and Obi-garm), 15h. (Salo), 17h. (Obi-garm, near Andijan, Stalinabad, Tchimkent, and near Klyuchi), 18h. (Copiapo, near Andijan, Obi-garm, Stalinabad, and Tchimkent), 20h. (Copiapo, Hungry Horse, and near Istanbul), 21h. (Copiapo and Puebla), 23h. (near Andijan, Stalinabad, and Tchimkent).

Dec. 21d. 12h. 31m. 23s. Epicentre 18°·5N. 67°·0W. Depth of focus 0·010.

Epicentre given by U.S. Coast and Geodetic Survey.

A = +·3708, B = −·8736, C = +·3154; δ = +15; h = +5;
D = −·921, E = −·391; G = +·123, H = −·290, K = −·949.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Juan		0·8	108	i 0 16	− 2	i 0 29	− 3	—	—	i 1·0
Port au Prince		5·1	272	e 1 37	+21	i 2 17	+ 3	—	—	i 2·4
Fort de France		6·7	123	e 1 34	− 3	e 3 4	+11	—	—	—
Galerazamba		11·1	227	e 5 2	S	(e 5 2)	+22	—	—	—
Bermuda		14·0	8	e 4 12	+57	—	—	—	—	e 6·4
Bogota	Z.	15·4	207	i 3 44	+11	e 6 44	+23	—	—	—
Washington		22·1	340	e 4 45	− 3	—	—	—	—	i 9·8
Washington, N.R.L.		22·1	340	e 4 48	0	8 7	−33	—	—	—
Philadelphia		22·5	344	i 4 55	+ 3	e 9 1	+13	i 8 27	P_cP	e 9·6
Fordham		23·0	349	i 4 58	+ 1	i 8 48	− 8	—	—	—
Weston		24·1	353	i 4 18	?	i 8 8	?	—	—	—
Pennsylvania		24·1	340	—	—	i 9 20	+ 5	—	—	—
Harvard		24·3	353	i 5 6	− 3	i 9 7	−11	—	—	e 11·6
Cleveland		26·1	335	i 6 48	PP	e 9 58	+ 9	e 10 14	SS	—
Ottawa		27·8	347	—	—	(10 37)	sS	—	—	10·6
St. Louis		28·5	321	e 5 51	+ 3	e 10 1	−26	i 6 15	pP	—
Seven Falls	E.	28·7	355	6 43	PP	11 15	+44	—	—	—
Chicago		29·1	328	e 6 42	PP	e 10 36	− 1	—	—	e 13·2
Huancayo		31·4	196	e 6 21	+ 7	e 11 37	+24	e 7 35	PP	e 13·6
La Paz		34·8	181	e 6 47	+ 4	12 17	+11	—	—	17·9
Tucson		41·6	299	i 7 40	0	—	—	—	—	—
Logan		44·5	312	e 7 59	− 4	—	—	—	—	e 22·9
Pierce Ferry		44·8	304	i 8 6	0	—	—	—	—	—
Overton	Z.	45·3	304	i 8 10	0	—	—	—	—	—
Boulder City		45·5	303	e 8 11	0	—	—	—	—	—
Palomar		46·8	299	i 8 22	0	—	—	i 8 49	pP	—
Riverside		47·3	300	i 8 26	0	—	—	i 8 50	pP	—
China Lake	Z.	47·7	303	i 8 28	− 1	—	—	—	—	—
Pasadena		48·0	300	i 8 31	0	—	—	i 8 56	pP	e 24·6
Hungry Horse		48·2	320	i 8 29	− 3	—	—	—	—	—
Tinemaha		48·4	304	i 8 28	− 6	—	—	—	—	—
Lick	Z.	51·1	304	e 8 53	− 2	—	—	—	—	—
Mineral	Z.	51·4	307	i 8 57k	0	—	—	—	—	—
Shasta Dam		52·1	308	e 8 58	+ 4	—	—	—	—	—
Victoria		54·2	317	9 14	− 4	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malaga	z.	57·4	57	i 9 41a	0	e 17 32	+ 4	—	—	—
Clermont-Ferrand		63·2	48	e 10 18	− 2	—	—	—	—	37·6
Algiers Univ.	z.	63·4	58	e 10 23	+ 1	—	—	—	—	—
De Bilt		64·7	40	—	—	e 19 37?	+36	—	—	e 28·6
Stuttgart	z.	67·3	44	e 10 45	− 1	—	—	—	—	—
Tamanrasset	z.	67·4	73	e 10 50	+ 3	—	—	e 11 4	pP	—
College		69·5	334	i 10 59	− 1	—	—	—	—	—
Collmberg	z.	69·6	42	e 11 0	− 1	—	—	12 37?	?	—

Additional readings :—
San Juan i = 20s.
Washington e = 5m.4s.
Washington, N.R.L. iP = 4m.53s.
Fordham i = 8m.57s.
Cleveland eN = 11m.32s.
St. Louis e = 5m.38s., i = 6m.21s., e = 6m.25s., i = 7m.9s.
Tamanrasset isP?Z = 11m.12s.a, eZ = 11m.29s.
Long waves were also recorded at Berkeley, Saskatoon, Kew, Potsdam, and Rome.

Dec. 21d. 13h. South-West Pacific.

Tuai eN = 23m.10s.
Cobb River eE = 23m.23s.
Wellington e = 23m.27s. and = 27m.?
Kaimata eNE = 23m.36s.
Riverview iZ = 24m.12s., eE = 27m.10s., eLN = 29·3m.
Christchurch PZ = 24m.32s., eE = 26m.30s., SNZ = 27m.49s., REZ = 29m.10s.
Auckland eN = 26m.
Berkeley iPZ = 30m.50s., eZ = 31m.45s.
Lick iPZ = 30m.52s.a, ipPZ = 30m.56s.k.
Fresno ePZ = 30m.56s.
Pasadena iP = 30m.56s.a.
Shasta Dam iP = 30m.57s.
Mineral iPZ = 30m.58s.a, iZ = 31m.13s.a.
Palomar iP = 31m.0s.a.
Riverside iPEZ = 31m.0s.a.
Reno ePZ = 31m.3s.a.
Tinemaha iP = 31m.3s.a.
China Lake iPZ = 31m.3s.a, eZ = 32m.12s.
College iP = 31m.7s.
Victoria P = 31m.10s.a.
Boulder City iP = 31m.12s.
Overton iPZ = 31m.16s.
Pierce Ferry eP = 31m.16s.
Tucson iP = 31m.21s.
Hungry Horse iP = 31m.35s., ePP = 35m.28s.
Collmberg eZ = 37m.40s.
Stuttgart ePKPZ = 37m.51s.

Dec. 21d. 19h. 33m. 8s. Epicentre 19°·3S. 63°·8W. Depth of focus 0·090.

Intensity II-III between latitudes 18° and 19°S. in Chili.
Epicentre 19°·5S. 64°W. Depth 620km.

F. Greve.
Boletin del año, 1949, Segundo semestre, Instituto Sismologico, Santiago, p. 27.

A = +·4170, B = −·8475, C = −·3285 ; δ = +6 ; h = +5 ;
D = −·897, E = −·442 ; G = −·145, H = +·295, K = −·944.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz		5·0	303	i 1 32k	− 2	i 2 40	− 8	i 1 41	PP	2·9
Antofagasta	E.	7·5	234	i 1 54	− 1	—	—	—	—	i 3·4
Copiapo	N.	10·0	216	i 2 17	− 2	—	—	—	—	—
Huancayo		13·2	301	i 2 53	+ 3	i 4 58	− 9	—	—	i 6·0
Santa Lucia	N.	15·4	202	e 3 9	− 3	i 5 41	− 5	—	—	—
Buenos Aires		16·0	164	i 3 17	− 1	5 1	−55	—	—	5·6
La Plata	E.	16·4	163	3 23	+ 2	i 6 0	− 3	13 58	S_cS	7·9
	N.	16·4	163	i 3 21	0	i 6 6	+ 3	13 54	S_cS	7·9
	Z.	16·4	163	3 21	0	6 15	+12	—	—	—
Bogota		25·8	336	i 4 39	− 8	i 9 15	+39	i 8 36	P_cP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Galerazamba		32·0	339	i 5 57	+17	i 10 23	+11	i 12 47	S_cP	—
Fort de France		33·9	5	i 5 58	+ 2	i 10 38	− 2	—	—	—
Punta Arenas	N.	34·2	188	5 59	+ 1	i 10 42	− 3	—	—	e 13·6
San Juan		37·4	357	e 6 22	− 2	i 11 26	− 6	e 7 58	pP	e 18·1
Vera Cruz		49·7	319	—	—	e 14 16	− 9	—	—	—
Bermuda		51·4	359	e 9 21	PP	i 15 55	+67	e 19 14	SS	—
Tacubaya		51·8	316	e 8 17	+ 2	e 14 58	+ 5	—	—	—
Columbia		55·5	343	e 8 41	0	i 15 37	− 5	e 19 11	sS	—
Washington		59·2	349	i 9 6	0	e 16 28	− 1	i 9 48	P_cP	—
Washington, N.R.L.		59·2	349	9 5	− 1	16 27	− 2	e 9 47	P_cP	—
Philadelphia		59·9	351	i 9 19	+ 8	i 16 51	+13	i 11 16	PP	e 24·5
Fordham		60·6	352	i 9 16	+ 1	i 16 45	− 1	i 11 16	pP	—
Pennsylvania		61·2	348	i 9 20	+ 1	e 16 49	− 5	i 18 11	S_cS	—
Cincinnati		61·3	342	i 9 17	− 3	i 16 50	− 5	i 11 10	pP	—
Weston		61·8	354	e 8 21	−62	i 15 59	−62	i 10 12	pP	24·4
Harvard		61·9	354	i 9 23	− 1	e 17 0	− 2	i 11 22	pP	—
Cleveland		62·7	346	i 9 29	0	i 17 10	− 2	e 12 2	PP	—
St. Louis		62·7	337	e 9 26	− 3	i 17 8	− 4	i 11 34	pP	—
Florissant		62·9	337	i 9 29	− 1	e 17 10	− 4	e 12 28	sP	—
Halifax		63·6	1	9 40	+ 5	17 26	+ 3	e 11 38	pP	—
Chicago		64·7	340	i 9 19	−23	e 17 15	−21	e 11 3	pP	—
Ottawa		65·3	351	i 9 43k	− 2	17 42	− 1	e 21 18	sS	30·9
Shawinigan Falls	N.	66·0	354	9 48	− 2	17 51	0	i 11 26	pP	—
Rolphton		66·4	351	e 9 50	− 2	e 17 55	− 1	—	—	—
Seven Falls	E.	66·4	355	9 52	0	17 54	− 2	i 21 28	sS	—
Tucson		68·2	319	e 10 1	− 2	e 18 17	0	i 12 5	pP	—
Pierce Ferry		72·7	320	i 10 20	− 9	e 19 13	+ 6	i 12 23	pP	—
Palomar		72·8	316	i 10 31k	+ 1	i 19 12	+ 4	i 12 38	pP	—
Boulder City		73·2	319	e 10 32	0	i 19 19	+ 6	—	—	—
Overton	Z.	73·3	320	i 10 34	+ 1	e 38 19	P′P′	i 12 40	pP	—
Riverside		73·5	316	e 10 34	0	i 19 19	+ 3	i 12 42	pP	—
Pasadena		74·2	316	e 10 38	0	e 19 23	− 1	e 12 42	pP	—
Salt Lake City		74·6	325	e 10 40	0	i 19 30	+ 2	—	—	e 32·9
China Lake	Z.	74·8	318	i 10 41	0	i 19 33	+ 3	i 12 44	pP	—
Logan		75·2	326	e 10 39	− 4	e 19 34	0	i 12 47	pP	—
Tinemaha		76·0	318	i 10 47	− 1	i 19 48	+ 5	i 12 47	pP	—
Bozeman		77·6	329	e 10 59	+ 3	i 19 57	− 3	i 23 46	sS	—
Lick	Z.	78·3	317	i 11 0k	0	—	—	i 12 58	pP	—
Reno	E.	78·5	320	e 11 0	− 1	e 20 14	+ 5	—	—	—
Santa Clara		78·5	317	i 10 53	− 8	(e 19 57)	−12	i 16 12	PP	e 20·0
Butte	N.	78·6	329	i 11 2	0	i 20 13	+ 3	e 13 21	pP	—
Branner	Z.	78·7	317	i 11 2k	0	—	—	i 13 12	pP	—
Berkeley		79·0	317	i 11 4a	0	e 20 14	0	i 13 14a	pP	—
Malaga	Z.	79·0	45	i 11 4	0	i 20 16	+ 2	i 13 14	pP	38·5
Tamanrasset	Z.	79·6	61	i 11 8a	+ 1	e 20 19	− 1	i 13 18	pP	—
Granada		79·8	45	i 11 12k	+ 4	i 20 23	+ 1	i 13 44	pP	42·4
Grahamstown	Z.	80·0	121	i 11 9	0	e 20 21	− 3	i 13 16	pP	—
Mineral		80·0	319	i 11 8a	− 1	i 20 14	−10	i 13 18k	pP	—
Saskatoon		80·3	335	—	—	e 20 26	− 1	—	—	—
Almeria		80·4	46	i 11 8	− 3	21 16	SP	14 12	PP	36·4
Shasta Dam		80·7	319	i 11 10	− 2	i 20 30	− 1	13 22	pP	—
Hungry Horse		80·9	329	i 11 12	− 1	e 20 32	− 1	—	—	—
Toledo		81·0	42	i 11 16	+ 2	20 36	+ 2	13 25	pP	—
Ivigtut		81·2	7	i 11 16	+ 1	e 20 36	0	24 22	sS	—
Alicante		82·5	45	i 11 25	+ 4	e 20 53	+ 4	14 13	PP	e 35·6
Pretoria	Z.	83·5	115	i 11 26	0	e 20 58	− 1	i 13 33	pP	—
Algiers Univ.	Z.	84·1	48	i 11 30	+ 1	—	—	i 13 40	pP	—
Tortosa		84·4	43	i 11 34	+ 3	21 3	− 4	13 40	pP	—
Seattle		84·7	325	i 11 34k	+ 2	i 21 16	+ 6	e 13 45	pP	—
Victoria		85·9	325	11 37	− 1	21 18	− 3	13 45	pP	—
Rathfarnham Castle		87·6	30	i 11 50	+ 4	i 22 18	SP	—	—	—
Clermont-Ferrand		88·6	41	e 11 51	0	i 21 29	[+ 7]	i 15 31	PP	41·4
Kew		89·6	34	i 11 56	0	e 21 32	[+ 4]	i 15 38	PP	e 27·9
Paris		89·7	37	i 11 55	− 1	i 21 28	[− 1]	i 14 8	pP	e 46·9
Neuchatel		91·5	40	e 12 4	0	—	—	e 15 53	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Basle		92·1	40	e 12 7	0	e 21 46	[+ 3]	—	—	—
Pavia	z.	92·1	42	e 12 11	+ 4	—	—	—	—	—
Strasbourg		92·7	39	i 12 12	+ 2	e 21 42	[− 4]	i 16 2	PP	—
De Bilt		92·8	35	i 12 12	+ 2	e 21 51	[+ 5]	e 14 22	pP	—
Florence Arc.		92·8	44	e 12 12	+ 2	e 21 36	[−10]	e 16 2	PP	—
Florence Xim.		92·8	44	e 12 14	+ 4	—	—	i 16 4	PP	—
Prato		92·8	44	12 13	+ 3	—	—	i 15 34	PP	—
Rome		92·9	47	e 12 12k	+ 2	i 21 51	[+ 4]	e 14 21	pP	—
Chur		93·0	41	e 12 12k	+ 1	—	—	—	—	—
Padova		93·6	44	12 19	+ 5	e 21 59	[+ 8]	e 16 16	PP	—
Stuttgart		93·6	39	e 12 12	− 2	e 21 55	[+ 4]	e 15 45	PP	e 35·9
Bologna		93·7	43	12 13	− 1	e 21 51	[0]	e 16 6	PP	—
Triest		95·2	43	e 12 15	− 6	e 22 40	− 3	e 14 21	pP	—
Jena		95·9	38	e 12 25	+ 1	e 22 4	[+ 1]	e 14 38	pP	—
Cheb		96·1	39	e 12 13?	−12	—	—	e 16 28	PP	—
Zagreb		96·8	44	e 12 31	+ 3	e 22 10	[+ 3]	e 16 28	PP	—
Collmberg		96·9	38	e 12 28	− 1	e 22 12	[+ 4]	e 14 55	pP	e 37·9
Prague		97·3	39	i 12 31	+ 1	i 22 14	[+ 4]	e 14 32	pP	—
Potsdam		97·4	36	e 12 31	0	i 22 20	[+ 9]	i 16 40	PP	e 37·2
Copenhagen		98·3	33	i 12 38	+ 3	i 22 21	[+ 6]	16 44	PP	—
Christchurch		98·9	218	—	—	21 52?	[−26]	—	—	—
Wellington		98·9	221	—	—	e 22 15	[− 3]	—	—	—
Ogyalla		98·9	42	e 17 24	PP	e 22 21	[+ 3]	—	—	—
Budapest		99·3	43	e 16 56	PP	e 26 12	PS	—	—	—
Belgrade		99·4	46	e 16 41k	PP	i 22 23	[+ 3]	e 25 56	PS	e 58·1
Raciborzu	z.	99·6	40	e 12 41	0	—	—	—	—	—
Skalnate Pleso		100·6	41	e 16 22	PP	e 22 33	[+ 7]	—	—	—
Auckland	N.	101·4	225	e 21 52?	?	—	—	—	—	—
Upsala	E.	102·3	30	—	—	i 22 33	[− 1]	i 25 52	PS	—
Bucharest		103·2	47	—	—	i 22 43	[+ 5]	i 26 48	PS	—
Helwan		103·7	63	e 17 25	PP	e 22 42	[+ 1]	20 17	PPP	—
Istanbul		104·5	51	e 13 7	P	e 25 42	PS	—	—	—
College		104·8	335	e 13 3	P	e 22 39	[− 6]	e 15 17	pP	—
Helsinki		105·9	30	—	—	e 26 57	PS	—	—	—
Ksara		108·3	60	i 18 1	PP	—	—	19 59	pPP	—
Yalta		108·8	48	18 3	PP	i 27 17	PS	—	—	—
Moscow		112·1	36	e 17 32	[+ 5]	23 18	[+ 2]	i 18 25	PP	—
Sotchi		112·7	49	e 17 35?	[+ 7]	—	—	—	—	—
Leninakan		115·5	53	e 17 36	[+ 2]	e 23 40	[+11]	e 18 54?	PP	—
Tiflis		116·3	52	e 17 38	[+ 2]	e 23 34	[+ 2]	—	—	—
Grozny		117·1	50	e 17 42	[+ 5]	—	—	—	—	—
Riverview		117·5	212	—	—	i 23 39	[+ 3]	e 27 38	PS	—
Baku		120·1	53	e 19 16	PP	e 23 52	[+ 7]	—	—	—
Sverdlovsk		124·6	33	e 17 56	[+ 4]	e 24 4	[+ 5]	e 20 12	pPKP	—
Kizyl-Arvat		125·1	55	i 17 57	[+ 4]	—	—	e 19 58	PP	—
Samarkand		133·3	53	e 18 13?	[+ 5]	—	—	e 20 44?	PP	—
Tchimkent		134·6	49	i 18 6	[− 5]	—	—	i 20 48	PP	—
Stalinabad		134·8	54	e 18 1	[−10]	—	—	i 20 34	PP	—
Obi-garm		135·5	54	i 18 10	[− 2]	i 24 30	[+ 5]	i 20 32	pPKP	—
Andijan		137·0	51	e 18 8	[− 7]	e 31 7	SP	e 20 55?	PP	—
Frunse		137·9	47	e 18 19	[+ 2]	e 21 54	PKS	—	—	—
Semipalatinsk		137·9	33	e 18 12	[− 5]	—	—	e 21 2	PP	—
Bombay		139·1	83	e 18 28	[+ 9]	—	—	e 21 6	PP	—
Naryn		139·3	47	e 17 55?	[−24]	—	—	i 20 42?	PP	—
Poona	E.	140·0	84	e 18 17	[− 4]	i 20 42	PP	—	—	—
Kodaikanal	E.	141·6	97	e 18 16	[− 8]	—	—	—	—	—
New Delhi	N.	143·3	67	i 18 24	[− 3]	—	—	—	—	—
Irkutsk		145·8	13	e 18 35	[+ 4]	—	—	—	—	—
Mizusawa	E.	150·8	318	18 50	[+12]	21 25	PKS	—	—	—
Bandong		152·7	159	—	—	e 21 26	PKS	—	—	—
Vladivostok		152·8	335	e 18 44	[+ 3]	i 41 15	SS	i 21 4	pPKP	—
Batavia		153·1	158	e 19 3	[+21]	e 21 36	pPKP	—	—	—

Additional readings :—
Copiapo iN = 2m.21s.
Huancayo i = 3m.8s. and 3m.16s.
La Plata Z = 3m.29s., N = 3m.31s., E = 3m.33s., and 4m.42s., N = 4m.45s. and 5m.45s., S?N = 5m.59s., N = 6m.37s., 6m.56s., and 7m.24s.
Bogota iE = 7m.35s., iS_cPEN = 11m.35s., iS_cSEN = 14m.22s.
San Juan i = 6m.59s., eP_cP = 8m.31s.

Continued on next page.

Vera Cruz e =14m.26s.
Columbia eSS? =20m.5s.
Washington e =11m.3s., ePP =11m.22s., eS$_c$S =17m.34s., e =20m.13s.
Washington, N.R.L. sS =20m.31s.
Philadelphia isP? =11m.51s., e =20m.31s.
Fordham iP$_c$P =10m.8s.
Pennsylvania iE =9m.34s., eN =11m.42s., 12m.19s., 13m.16s., 14m.0s. and 24m.37s.
Cincinnati i =9m.37s., iP$_c$P =9m.56s., isP =12m.20s.
Weston iP =8m.25s., iPP =10m.49s., isP =11m.22s., isS =19m.28s., SS =20m.18s.
Harvard iP$_c$P =9m.56s., iPP =11m.42s., isP =12m.50s., eS$_c$S =18m.15s., esS =20m.26s., eSS? =22m.1s., i =23m.17s., e =24m.19s.
Cleveland eN =12m.31s., iS =17m.13s., iE =17m.27s., and 18m.23s.
St. Louis iP$_c$P =10m.0s., isP =12m.28s., iS$_c$S =18m.19s., isS =20m.30s.
Florissant eS$_c$S =18m.22s., esS =20m.35s., i =22m.27s., e =23m.21s. and 24m.11s.
Halifax e =12m.32s., 18m.32s., and 20m.58s.
Chicago eS$_c$S =18m.23s., esS =20m.51s.
Shawinigan Falls eN =10m.56s.
Rolphton i =9m.53s.
Tucson iPP =12m.47s., ePPP =14m.29s., e =19m.9s., ePKP,PKP =38m.9s.
Pierce Ferry e =12m.38s., ePPP =15m.8s., ePKP,PKP =38m.4s., iSKP,PKP =40m.32s.
Palomar iZ =38m.2s., iSKP,PKPZ =40m.17s.
Overton eZ =15m.36s.
Riverside i =13m.41s. and 14m.30s., eSKP,PKPZ =40m.19s.
Pasadena eP$_c$PZ =10m.50s., isP?Z =13m.45s., isSE =22m.56s., iSSN =24m.40s., eSSSEN =28m.16s., eSKP,PKPZ =40m.26s.
China Lake iZ =14m.48s., eZ =37m.53s., iSKP,PKPZ =40m.20s.
Logan ePP? =13m.54s.
Tinemaha eSKP,PKP =40m.21s.
Lick iZ =11m.6s.
Reno eN =19m.52s.
Branner iZ =12m.8s.
Berkeley iP$_c$PZ =11m.14s., ipPPZ =16m.21s., eSEN =20m.19s., iSKSZ =20m.37s., eSPE =21m.19s., esSE =23m.48s., eZ =23m.52s., eE =32m.46s.
Malaga PPZ =14m.8s., PPPZ =15m.58s., iZ =18m.12s., SSZ =28m.30s.
Tamanrasset eSPZ =21m.2s.
Granada P$_c$P =12m.2s., PS =21m.11s., sS =24m.5s., SS =26m.1s., sSS =29m.41s., SSS =31m.5s., sSSS =32m.52s.
Grahamstown eZ =12m.32s. and 40m.22s.
Mineral iNZ =11m.13s., iZ =11m.18s., iN =11m.27s., iZ =11m.31s., 11m.54s., 13m.29s., and 13m.58s., iPPZ =14m.18s., iZ =14m.24s.
Saskatoon e =24m.16s.
Almeria PPP =16m.0s., S$_c$S =21m.36s., SS =26m.36s.
Shasta Dam esP =14m.17s.
Toledo iP$_c$PZ =11m.19s., iN =13m.57s., sPN =14m.21s., iE =24m.48s.
Alicante PPP =16m.3s., Q =33m.5s.
Pretoria iZ =11m.49s., eZ =29m.41s. and 40m.7s.
Algiers Univ. iP$_c$PZ =11m.34s., iZ =11m.42s., ipP$_c$PZ =13m.43s., iZ =13m.50s., 13m.52s., and 13m.56s., eZ =14m.40s., iPPZ =14m.56s., ipPPZ =16m.42s.
Tortosa PPN =14m.57s., sS?EN =25m.4s.
Seattle i =11m.43s., 11m.58s., 13m.6s., 21m.35s., and 22m.22s.
Victoria PP =15m.4s., sS =25m.15s.
Clermont-Ferrand iP =11m.54s., ePPP =17m.20s., ePS =22m.58s., i =25m.36s., eSS =28m.12s., Q =37m.22s.
Kew eSPZ =23m.15s., ePS =25m.34s., eEN =25m.58s.
Paris i =14m.1s., isP =15m.2s., iPP =15m.39s., ipPP =17m.26s., isPP =18m.31s., isS =25m.34s., esSP =26m.58s., eSS =27m.52s., esSS =31m.6s.
Basle e =23m.19s.
Strasbourg e =15m.31s., ePP =16m.10s., epPP =17m.53s., iPPP =18m.11s., eSP =23m.42s., ePS =25m.2s., e =25m.52s., esS =26m.4s., isSP =27m.30s., eSS =28m.59s. esSS =32m.19s.
De Bilt esS =25m.11s.
Rome iPPZ =16m.4s., eZ =22m.29s., esSN =25m.7s.
Stuttgart iP=12m.16s., eZ=13m.2s., e =16m.8s., ePPP=17m.52s., e=25m.18s. and 26m.0s.
Triest esP =15m.12s., iPP =16m.22s., iPPP =18m.19s., isSKS =22m.4s., isSKS =25m.37s., isS =26m.13s., isPS =27m.53s., iSS =29m.21s., iSSS =32m.59s.
Jena eN =13m.16s., ePP?N =16m.26s., eN =19m.34s.
Zagreb e =12m.38s., eE =18m.35s., e =25m.49s.
Collmberg eEZ =12m.31s., eZ =12m.40s., ePPEZ =16m.32s., epPPZ =18m.22s., ePSE =25m.51s., eEN =26m.22s., ePSE =28m.16s., eSS?E =29m.58s., eSSSE =34m.16s.
Prague e =13m.4s. and 13m.24s., i =13m.52s., e =15m.5s., esP =15m.30s., ePP =16m.29s., i =17m.37s., epPP =18m.24s., eS =23m.2s., ePS? =25m.52s., e =26m.24s., 29m.17s., and 30m.28s.
Potsdam iZ =12m.34s., iE =25m.55s., eN =26m.27s.
Copenhagen 26m.6s., i =26m.27s., 28m.29s.
Budapest e =26m.32s.
Belgrade e =16m.56s., iPS =26m.33s.
Helwan eN =20m.40s., SEN =26m.52s., eN =27m.58s., SSN =31m.32s.
College ePKP =16m.58s., ePP =17m.15s.
Moscow i =27m,31s.

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Riverview SN? =24m.59s., iPKKP?NZ =29m.17s., eSSS?E =38m.30s.
Sverdlovsk eSP =28m.17s.
Obi-garm iPP =20m.45s.
Bombay eE =21m.20s.
Poona ePPE =18m.26s., ePPPE =18m.35s., iSSSE =21m.5s.
New Delhi iN =18m.27s.
Vladivostok iPP =22m.41s., isSS =45m.8s.
Long waves were also recorded at Concepcion.

Dec. 21d. Readings also at 1h. (near Bogota), 2h. (near Tacubaya), 3h. (Punta Arenas), 4h. (Apia, Riverview, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Berkeley, Shasta Dam, Mineral, Hungry Horse, College, Ksara, Besançon, Strasbourg, and Stuttgart), 5h. (Tucson, near Oaxaca and Tacubaya), 6h. (near Tacubaya, near Santa Lucia, and near Istanbul), 10h. (Stuttgart, and near Andijan), 11h. (La Paz, College, and Stuttgart), 13h. (Victoria, and near Seattle), 14h. (College, Andijan, and Naryn), 15h. (Granada), 16h. (Santa Lucia), 17h. (Apia, Wellington, China Lake, Tinemaha, Overton, Pierce Ferry (2), Lick, College, Ottawa, Rolphton, (2), and Bogota), 18h. (Collmberg), 19h. (near Frunse and near Tchimkent), 20h. (Tamanrasset (2), Stuttgart, Boulder City, Hungry Horse, and Shasta Dam), 21h. (Mizusawa, and near Istanbul), 22h. (Pierce Ferry), 23h. (Berkeley, Branner, Arcata, Reno, near Ferndale, Mineral, Shasta Dam, and near Punta Arenas.)

Dec. 22d. 9h. 30m. 47s. Epicentre 15°·9N. 93°·0W. Depth of focus 0·005.
(as on 1948, Aug. 13d.).

Felt very strongly in the State of Chiapas. Epicentre given by J.S.A. and U.S.C.G.S. Depth 100km.

Monthly Seismological Bulletin, Tacubaya, Dec., 1949.

$A = -\cdot0504$, $B = -\cdot9609$, $C = +\cdot2722$; $\delta = -4$; $h = +6$;
$D = -\cdot999$, $E = +\cdot052$; $G = -\cdot014$, $H = -\cdot272$, $K = -\cdot962$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Oaxaca		3·8	287	0 52	− 6	1 40	− 2	—	—	—
Vera Cruz		4·5	318	1 1	− 5	1 55	− 4	—	—	—
Puebla		5·8	302	1 21	− 4	2 36	+ 4	—	—	—
Tacubaya		6·9	302	1 42	+ 1	i 3 9	+10	—	—	i 3·3
Guadalajara		11·0	298	2 30	− 7	i 5 14	sS	—	—	—
Balboa Heights		14·8	116	e 3 31	+ 4	—	—	—	—	—
Columbia		21·0	28	i 4 41	+ 1	i 8 35	+10	e 5 13	pP	e 11·5
Bogota	z.	21·7	119	i 4 51	+ 4	i 8 52	+14	i 5 15	pP	—
St. Louis		22·8	5	i 5 1	+ 3	i 9 14	+16	i 5 22	pP	—
Florissant		22·9	5	i 5 2	+ 3	i 9 7	+ 7	i 5 23	pP	—
Tucson		23·0	319	e 5 2	+ 2	i 8 52	−10	i 5 23	pP	e 11·5
Cincinnati		24·3	17	i 5 14	+ 2	i 10 17	+53	i 5 29	pP	—
San Juan		25·8	80	e 5 33	+ 6	e 10 23	+34	e 6 19	sS	i 11·3
Chicago		26·3	9	i 5 30	− 1	e 9 41	−16	i 5 51	pP	e 13·8
Washington		26·8	30	i 5 39	+ 3	—	—	i 5 54	pP	—
Washington, N.R.L.		26·8	30	e 5 42	+ 6	—	—	i 5 56	pP	—
Cleveland		27·4	20	e 5 41a	0	i 10 23	+ 8	i 5 59	pP	i 13·7
Pierce Ferry		27·5	323	i 5 25	−17	—	—	i 6 5	pP	e 15·1
Palomar		27·7	313	i 5 45k	+ 1	i 10 28	+ 8	i 6 3	pP	—
Boulder City		27·9	322	i 5 48	+ 2	—	—	i 6 9	pP	e 12·2
Overton	z.	28·0	323	i 5 49	+ 2	—	—	i 6 53	PP	e 15·1
Pennsylvania		28·1	24	i 5 47	− 1	e 10 0	−26	i 6 20	pP	—
Riverside		28·4	314	i 5 50k	0	—	—	i 6 11	pP	—
Philadelphia		28·6	31	i 6 3	+11	i 11 1	pS	i 6 25	pP	—
Pasadena		29·0	314	i 5 57k	+ 1	e 10 43	+ 2	i 6 14	pP	i 12·2
China Lake	z.	29·6	319	i 6 1k	0	i 16 55	S_cS	i 6 17	pP	—
Salt Lake City		29·7	332	i 6 4	+ 2	i 10 58	+ 6	i 11 32	sS	e 13·3
Fordham		29·9	30	i 6 6	+ 2	i 10 58	+ 3	—	—	—
Logan		30·4	334	i 6 6	− 2	i 10 58	− 5	i 7 51	PP	i 12·6
Bermuda		30·5	52	e 7 18	PP	—	—	i 7 53	PPP	i 12·3
Fort de France		30·7	88	i 6 10	− 1	i 11 46	sS	e 16 6	ScS	—
Tinemaha		30·8	318	i 6 12	0	e 16 43	S_cS	i 6 33	pP	—
Weston		32·3	31	i 5 31	−54	i 10 37	−56	i 5 48	pP	12·6
Harvard		32·3	31	i 6 26	+ 1	i 11 28	− 5	i 6 47	pP	e 14·3
Huancayo		32·8	147	i 6 30	+ 1	i 11 43	+ 2	i 7 0	pP	e 13·8

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Rolphton		32·8	22	e 6 28	− 1	—	—	—		—	—
Ottawa		32·8	23	e 6 30	+ 1	e 11 43	+ 2	e 7 33		PP	18·7
Lick	Z.	33·1	317	i 6 33k	+ 1	—	—	i 6 54a		pP	—
Reno		33·2	322	i 6 35k	+ 2	—	—	i 6 56		pP	e 16·9
Santa Clara		33·3	317	e 7 5	pP	e 12 26	sS	i 7 28		pP	e 17·1
Bozeman		33·3	337	i 6 36	+ 2	i 11 54	+ 6	e 6 56		pP	e 14·5
Branner		33·5	315	i 6 37k	+ 2	e 11 57	+ 6	i 6 58		pP	—
Berkeley		33·8	317	e 6 38	0	i 12 3	+ 7	i 7 0		pP	e 16·5
Butte	N.	34·2	336	i 6 43	+ 2	i 12 4	+ 2	e 7 3		pP	e 14·0
Mineral		34·8	321	e 6 47k	+ 1	—	—	i 7 8		pP	e 17·0
Shawinigan Falls	N.	34·9	25	e 6 46	− 1	e 13 57	SS	e 7 7		pP	19·7
Ukiah		35·1	317	e 7 16	sP	e 12 26	+10	—		—	e 17·1
Shasta Dam		35·5	321	e 6 52	0	e 17 3	S_cS	e 7 9		pP	—
Seven Falls	E.	36·2	26	6 57	− 1	12 41	+ 8	e 7 18		pP	16·2
Hungry Horse		36·7	337	i 7 4	+ 2	e 12 34	− 7	i 9 47		P_cP	—
Saskatoon		37·7	346	7 13	+ 2	12 58	+ 2	8 43		PP	18·2
Halifax		37·9	35	7 10	− 3	13 14	+15	e 7 40		pP	19·3
Seattle		39·9	330	i 9 47	P_cP	i 13 51	+22	e 13 37		P_cS	—
La Paz		40·5	142	i 7 32k	− 2	i 13 39	+ 1	i 9 20		PP	20·1
Victoria		40·9	330	7 39	+ 2	13 46	+ 2	8 9		pP	27·2
Sitka		51·9	333	e 9 3	− 1	e 16 29	+ 8	i 10 5		P_cP	e 25·6
Santa Lucia	N.	53·5	157	i 9 12	− 4	16 42	0	—		—	—
Ivigtut		55·3	25	—	—	i 17 7	+ 1	i 18 51		S_cS	26·2
Buenos Aires		60·0	147	9 58	− 4	18 47	SS	—		—	—
La Plata		60·5	147	9 57	− 7	(18 6)	− 8	11 49		P_cP	18·1
College		61·1	338	i 10 9	− 1	e 18 22	0	i 10 31		pP	e 31·2
Honolulu		61·3	287	i 10 9	− 2	—	—	e 10 31		pP	—
Rathfarnham Castle		75·5	38	i 11 39	0	e 20 48	−25	—		—	—
Aberdeen		77·3	34	—	—	22 2	+29	26 55		SS	e 36·7
Toledo		79·2	52	e 11 58	− 2	e 21 52	− 1	i 12 34		sP	38·8
Kew		79·4	40	i 11 59	− 2	e 21 55	0	i 12 26		pP	e 33·2
Malaga	Z.	79·6	55	i 12 3k	+ 1	e 22 25	sS	15 29		PP	37·3
Granada		80·1	54	i 12 42k	sP	i 22 2	0	13 17		sP	—
Almeria		81·1	54	12 29	pP	i 22 1	−12	15 1		PP	39·7
Paris		81·8	42	i 12 12	− 1	i 22 16	− 4	i 12 35		pP	e 39·2
Alicante		82·2	52	e 12 36	pP	22 14	−10	22 50		PS	e 35·6
Tortosa		82·4	50	e 12 57	sP	22 0	−26	17 29		PPP	38·2
De Bilt		82·5	38	i 12 20k	+ 3	e 22 29	+ 2	i 12 43		pP	e 39·2
Clermont-Ferrand		83·0	45	e 12 19	− 1	i 22 31	− 1	e 12 42		pP	38·2
Apia		83·3	253	e 12 20	− 1	—	—	e 12 41		pP	—
Strasbourg		85·2	41	e 12 30	− 1	i 22 48	[+ 2]	i 12 54		pP	e 40·2
Algiers Univ.	Z.	85·4	53	e 12 29	− 3	—	—	e 13 2		pP	—
Basle		85·4	42	e 12 30	− 2	e 22 29	[−19]	e 23 33		PS	—
Copenhagen		85·5	33	i 12 34	+ 2	i 22 52	− 5	i 12 59		pP	—
Klyuchi		85·6	328	—	—	e 24 0	PS	—		—	—
Stuttgart		86·0	40	e 12 33	− 2	e 22 49	[− 3]	i 12 59		pP	42·2
Upsala		86·3	29	13 33	+57	i 22 53	[− 1]	e 24 2		PS	e 41·2
Jena		86·7	38	e 12 38	0	e 22 58	[+ 2]	e 13 0		pP	—
Potsdam		87·0	36	i 12 38a	− 1	i 23 14	+ 3	i 13 4		pP	e 33·7
Collmberg		87·4	38	e 12 41	0	e 23 2	[+ 1]	e 13 8		pP	—
Cheb		87·5	38	e 16 58	PP	e 23 10	− 6	—		—	—
Prague		88·7	38	e 13 18?	pP	e 23 11	[+ 2]	e 13 40		pP	e 42·2
Bologna		88·9	44	e 13 26	pP	—	—	e 16 38		PP	—
Prato		88·9	44	e 13 48	sP	i 23 28	− 1	—		—	—
Florence Arc.		89·1	44	i 13 14	pP	e 23 27	− 4	e 16 48		PP	—
Florence Xim.		89·1	44	i 13 31	pP	i 23 42	+11	—		—	—
Padova		89·2	43	e 13 30	pP	e 23 13	[+ 1]	—		—	—
Helsinki		89·4	26	—	—	i 23 14	[+ 1]	i 23 36		S	e 42·2
Triest		90·0	42	e 12 56	+ 2	i 23 41	+ 2	e 13 37		pP	—
Rome		90·6	46	i 12 55a	− 1	i 23 22	[+ 2]	i 13 30		pP	—
Zagreb		91·4	42	e 13 1	+ 1	e 23 19	[− 6]	e 13 7		pP	e 47·5
Tamanrasset	Z.	91·5	65	i 13 0k	− 1	—	—	e 13 25		pP	—
Skalnate Pleso		92·5	36	e 13 49	sP	e 23 35	[+ 4]	—		—	—
Budapest		92·6	38	e 14 13?	?	i 23 13?	[−19]	—		—	—
Taranto		94·5	45	—	—	e 22 43	[−59]	—		—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Belgrade		94·7	40	e 13 16k	+ 1	i 23 43	[0]	e 13 41	P_cP	e 50·4
Moscow		97·4	25	e 13 23	− 5	i 23 57	[− 1]	—	—	—
Bucharest		98·4	38	e 19 1	PPP	i 24 3	[0]	i 39 13?	Q	—
Istanbul		102·0	40	e 14 1	+13	e 24 32	[+11]	—	—	—
Wellington		102·0	230	i 17 56	PP	e 27 26	PS	i 18 18	pPP	46·2
Yalta		103·1	35	—	—	24 27	[+ 1]	—	—	—
Theodosia		103·4	34	—	—	e 24 36	[+ 9]	—	—	—
Christchurch		103·9	228	18 27	PP	24 31	[+ 2]	e 21 5	PPP	47·5
Sverdlovsk		104·3	14	e 14 1	+ 3	e 25 31?	−10	e 18 18	PP	—
Vladivostok		108·3	327	e 18 49	PP	e 24 49	[0]	e 25 42	SKKS	—
Helwan		109·7	50	e 19 19	PP	i 24 55	[0]	e 21 43	PPP	—
Irkutsk		110·5	348	19 3	PP	e 25 1	[+ 3]	e 34 21	SS	—
Ksara		110·6	44	14 13?	P	e 25 8	[+10]	—	—	—
Tiflis		110·7	32	e 18 52?	PP	i 25 2	[+ 3]	e 28 16	PS	—
Leninakan		110·9	33	e 19 2	PP	25 5	[+ 5]	—	—	—
Baku		114·2	30	—	—	e 25 18	[+ 5]	—	—	—
Tchimkent		119·9	14	i 18 43	[+ 1]	i 25 36	[+ 3]	—	—	—
Riverview		120·0	239	e 19 59	PP	e 25 24	[−10]	i 27 47	S	e 55·4
Ashkabad		120·1	25	—	—	25 37	[+ 3]	—	—	—
Frunse		120·4	10	e 18 32?	[−12]	e 25 40?	[+ 5]	—	—	—
Tashkent		120·7	14	e 18 47	[+ 2]	i 25 39	[+ 3]	i 20 16	PP	—
Andijan		122·0	12	20 35	PP	e 25 45?	[+ 5]	—	—	—
Naryn		122·1	8	e 18 15	[−32]	i 26 12	SKKS	i 19 53	PP	—
Grahamstown	Z.	123·1	118	i 18 50	[+ 1]	—	—	i 19 14	pPKP	—
Stalinabad		123·2	16	e 18 51	[+ 2]	e 25 48	[+ 4]	i 20 31	PP	—
Obi-garm		123·3	15	e 18 47	[− 3]	—	—	i 20 32	PP	—
Pretoria	Z.	124·6	109	i 18 53	[+ 1]	—	—	e 19 16	pPKP	—
New Delhi	N.	134·8	11	e 21 19	PP	e 33 23	PPS	i 41 1	SS	e 71·2
Bombay	N.	142·7	21	e 19 23	[− 3]	e 22 40	PKS	e 29 17	SKKS	—
Poona	E.	143·4	20	e 19 38	[+11]	(26 43)	[+15]	20 13	PP	—
Bandong		157·9	293	20 18	PKP_2	—	—	—	—	—
Batavia		158·3	294	20 32	PKP_3	—	—	—	—	—

Additional readings and notes :
St. Louis isS = 9m.48s.
Florissant isP = 5m.34s., isS = 9m.47s.
Tucson i = 6m.28s., isS = 9m.35s.
Chicago i = 10m.35s.
Washington isP = 6m.7s.
Washington, N.R.L. i = 6m.8s.
Cleveland ePE = 5m.45s., epPE = 6m.2s., iN = 9m.49s., esSN = 11m.4s., iSSEN = 11m.16s., iN = 11m.51s.
Pierce Ferry iPP = 6m.29s.
Palomar iE = 6m.36s., iN = 7m.35s., iS_cSN = 16m.27s.
Boulder City iPP = 6m.30s.
Overton iZ = 6m.29s.
Pennsylvania eE = 9m.53s.
Riverside iP_cPZ = 9m.0s., ipP_cP = 9m.23s.
Philadelphia i = 10m.10s.
Pasadena iPPZ = 7m.16s., eP_cPZ = 9m.1s., ipP_cPZ = 9m.23s., iS_cSN = 16m.31s.
China Lake iP_cPZ = 9m.2s., ipP_cPZ = 9m.28s.
Tinemaha iP_cPZ = 9m.6s., ipP_cPZ = 9m.30s., iZ = 12m.48s.
Weston iPP = 6m.37s., iP_cP = 8m.12s., isS = 11m.15s.
Harvard isP = 6m.58s., iPP = 7m.44s., isPP = 8m.10s., iP_cP = 8m.51s., iS_cP = 12m.38s., iP_cS = 12m.55s.
Huancayo iPP = 7m.34s., e = 8m.18s., isS = 12m.18s.
Ottawa PPP = 7m.47s., SS = 13m.31s., S_cS = 17m.31s.
Lick eZ = 8m.55s.
Reno iN = 6m.51s., eN = 16m.53s.
Santa Clara isSE = 13m.1s.
Bozeman ePP = 7m.30s., esS? = 12m.22s.
Branner iPPZ = 7m.47s., iP_cPZ = 9m.14s., eSZ = 12m.0s.
Berkeley ePN = 6m.42s., ePPZ = 7m.58s., iZ = 9m.16s., eZ = 9m.41s., iZ = 12m.34s., eSSE = 15m.22s.
Butte eP_cPN = 9m.6s., isSN = 12m.55s.
Mineral eE = 6m.51s., isPZ = 7m.19s., iPPZ = 7m.32s.
Shawinigan Falls eN = 7m.56s. and 16m.55s.
Shasta Dam e = 8m.23s., iP_cP = 9m.18s.
Seven Falls iE = 8m.12s., eE = 15m.13s.
Saskatoon PPP = 9m.13s., P_cP = 9m.32s., SS = 16m.3s., SSS = 16m.25s.
Halifax PP = 8m.48s., e = 13m.30s., SS = 16m.2s., SSS = 16m.50s., S_cS = 17m.32s.

Continued on next page.

Seattle i =8m.19s., 8m.54s., 10m.35s., iS =12m.40s., i =14m.24s., iS_cS =17m.31s., i = 18m.21s.
La Paz iPPPZ =9m.42s., iE =14m.16s., iSS =16m.43s., iS_cS =17m.30s.
Victoria e =17m.7s.
Sitka isS =17m.5s.
Ivigtut i =19m.12s.
La Plata N =10m.43s. and 12m.13s., SE =14m.47s.
College i =11m.13s., iSS =19m.49s., esSS =20m.30s., ePKP,PKP =39m.17s.
Aberdeen iE =23m.9s., eN =32m.32s.
Toledo iE =15m.21s., eE =21m.34s.
Kew ePPP =18m.49s., eSS =22m.53s., ePPS =23m.21s., eSSEZ =26m.29s., eSSS = 31m.5s.
Malaga PPPZ =17m.27s., PSZ =23m.29s.
Granada PP =15m.30s., PPP =17m.29s., PS =22m.47s., iSS =25m.41s.
Almeria PPP =16m.53s., S_cS =22m.21s., SS =26m.21s., SSS =30m.55s.
Paris i =12m.39s., isP =12m.48s., i =12m.56s. and 13m.8s., iPP? =15m.41s., i =16m.41s., iPPP? =17m.30s., iPS =23m.24s., iPPS =23m.35s., eSS =27m.21s., e =28m.21s.
Tortosa S_cS?E =22m.31s.
De Bilt ePPS =23m.47s., eSS =27m.13s.
Clermont-Ferrand esP =12m.51s., ePP =15m.27s., iPPS =23m.49s., iSS =27m.15s.
Strasbourg i =12m.33s., esP =13m.4s., isP =13m.7s., i =13m.27s., e =14m.37s., 14m.55s., and 15m.39s., ePP =16m.11s., ePPP? =18m.9s., isS =23m.32s., iPS =24m.9s., iPPS =24m.41s., eSS =28m.42s., eSSS =32m.21s., e =33m.13s. and 37m.13s.
Algiers Univ. esPZ =13m.9s., epPPZ =16m.21s.
Copenhagen 13m.9s., iPP =15m.57s., 23m.10s., i =23m.40s.
Stuttgart iP =12m.37s., esP?Z =13m.20s., ePP =16m.17s., ePS =24m.16s., eQ =41·2m.
Upsala iSE =23m.7s., ePSE =24m.5s., eN =26m.43s., eSSSE =32m.13s.?, eQN =37·2m.
Jena ePP?N =16m.32s., eS?N =23m.1s., esS?N =24m.25s.
Potsdam eN =13m.13s.?, iPPZ =16m.2s., iZ =16m.25s.
Collmberg ePPE =16m.10s., epPPEZ =16m.30s., eN =25m.39s., esSSE =29m.19s.
Prague ePP =16m.43s., ePS =23m.29s., eSS =28m.49s.
Florence Arc. e =15m.15s., eS =23m.51s., e =29m.10s., eS? =31m.13s.?
Helsinki e =24m.12s.
Triest esP =13m.47s., ePP =16m.27s., epPP =16m.56s., ePPP =18m.17s., iSKS = 23m.20s., isS =24m.37s., iPPS =25m.3s.
Rome iPPZ =16m.58s., iSN =24m.20s., iPSN =25m.14s., eSSE =30m.29s.
Zagreb e =23m.53s. and 24m.42s.
Tamanrasset eZ =13m.14s. and 13m.55s., iZ =16m.7s., ePPZ =16m.32s.
Belgrade e =17m.30s.
Wellington eZ =33m.8s.
Christchurch eE =23m.43s., iSKKSEZ =25m.20s., PPS =27m.42s., SSEN =34m.9s., SSS =36m.22s., SSSS =40m.28s.
Sverdlovsk iSKS =24m.35s., PS =27m.25s.
Vladivostok ePS =28m.13s.
Helwan eE =28m.27s.
Riverview eSKKSE =26m.26s., ePSZ =29m.56s., iSPPE =30m.46s., iSPPZ =30m.49s., eE =32m.1s., eSS?Z =36m.34s., eE =36m.48s., ePKP,PKP =39m.31s., eSSSE = 40m.50s., eQN =50m.25s.
Stalinabad eSKKS =27m.16s.
New Delhi eN =21m.42s., iN =22m.23s., eN =34m.18s. and 38m.16s.
Bombay eE =19m.45s.
Poona iE =20m.4s., PPPE =20m.32s., P_cP?E =23m.12s., iSE =24m.13s., eSSE = 25m.32s., SSSE =25m.43s. True SKS is given as P_cS and other phases have been wrongly interpreted.

Dec. 22d. 13h. 12m. 50s. Epicentre 41°·4S. 172°·3E.

Intensity V near the Epicentre.

R. C. Hayes.
Earthquake origin in New Zealand during the year, 1949. New Zealand Journal of Science and Technology, Section B, Vol. 31, No. 4, Jan., 1950, p. 445. Epicentre 41°·3S. 172°·3E.

A = −·7456, B = +·1008, C = −·6588 ; δ = +10 ; h = −2 ;
D = +·134, E = +·991 ; G = +·653, H = −·088, K = −·752.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Cobb River	E.	0·4	46	i 0 9	− 4	0 15?	− 6
Kaimata	N.E.	1·3	210	i 0 25	0	0 33	−11
Wellington		1·9	86	i 0 34	0	i 0 58	− 1
Christchurch		2·2	174	e 0 37	− 1	1 2	− 4
New Plymouth	E.	2·7	30	i 0 46	+ 1	1 20	+ 1
Arapuni		4·2	39	e 1 10	+ 3	i 2 19	S_g
Tuai	N.	4·5	56	e 1 17	P*	i 2 5	0
Auckland	N.	4·9	23	e 1 49	P_g	i 3 4	?

Dec. 22d. 21h. 29m. 19s. Epicentre 32°·5S. 69°·5W. Depth of focus 0·010.

A = +·2959, B = −·7915, C = −·5347 ; δ = −7 ; h = +1 ;
D = −·937, E = −·350 ; G = −·187, H = +·501, K = −·845.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Santa Lucia	E.	1·4	228	i 0 24	− 1	—	—	—	—	i 0·7
Copiapo	N.	5·2	352	1 20	+ 3	2 16	0	—	—	—
La Paz		16·0	5	i 3 42k	+ 2	i 6 41	+ 6	i 7 23	SSS	7·8
Tucson		75·3	324	i 12 5	pP	—	—	—	—	—
Grahamstown	Z.	77·4	121	e 11 45	− 1	—	—	—	—	—
Palomar		79·3	321	i 11 58	+ 2	—	—	i 12 29	pP	—
Pierce Ferry		80·0	324	e 12 0	0	—	—	i 12 32	pP	—
Riverside		80·0	321	e 12 1	+ 1	—	—	i 12 32	pP	—
Boulder City		80·3	324	i 12 34	pP	—	—	—	—	—
Overton	Z.	80·5	325	i 12 4	+ 1	—	—	i 12 35	pP	—
Pasadena		80·6	321	e 12 4	+ 1	—	—	i 12 35	pP	—
China Lake	Z.	81·5	322	e 12 8	0	—	—	i 12 39	pP	—
Pretoria		82·6	115	e 12 13	− 1	—	—	e 12 49	pP	—
Tinemaha	Z.	82·8	322	e 12 16	+ 1	—	—	i 12 47	pP	—
Reno	Z.	85·5	323	e 13 1k	pP	—	—	e 15 7	PP	—
Shasta Dam		87·7	323	e 12 38	− 1	—	—	i 13 10	pP	—
Hungry Horse		89·8	332	i 13 20	pP	—	—	—	—	—

Dec. 22d. Readings also at 0h. (Raciborzu and near Andijan), 2h. (La Paz), 3h. (near Tacubaya (9), and near Punta Arenas), 4h. (La Paz), 5h. (Bombay Pretoria, and Tananarive), 6h. (Rome), 7h. (Basle, Stuttgart, near Alicante, and near Huancayo), 8h. (La Paz, near Punta Arenas, and near Tacubaya (5)), 9h. (Brisbane, Palomar, Pasadena, Riverside, China Lake, Tinemaha, College, Boulder City, Overton, and Pierce Ferry), 10h. (College, Hungry Horse, near Boulder City, Overton (2), and Pierce Ferry), 11h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Mineral, Reno, Shasta Dam, Hungry Horse, College, and Logan), 12h. (Tacubaya, Vera Cruz, Mount Wilson, Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton (2), Pierce Ferry (2), Mineral (2), and Hungry Horse), 13h. (near Stuttgart and near Punta Arenas), 14h. (Andijan and near Obi-garm), 15h. (near Messina), 16h. (near Ottawa), 17h. (Grahamstown, Pretoria, Pierce Ferry, Hungry Horse, College, and near Apia), 18h. (Bogota, Huancayo, La Paz, Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Hungry Horse, and College), 19h. (near Punta Arenas), 20h. (Andijan, near Obi-garm, Samarkand, Stalinabad, and near Punta Arenas), 21h. (Overton, Pierce Ferry, Shasta Dam, College, near Algiers Univ. (2), and near Tchimkent), 23h. (Grahamstown, Pretoria, Ksara, Tananarive, Pierce Ferry, Shasta Dam, Hungry Horse, and College).

Dec. 23d. 4h. 57m. 5s. Epicentre 44°·2N. 10°·2E. (as on 1939, Oct. 31d.).

Felt at La Spezia, many houses destroyed at Massa.
Monthly Seismological Bulletin. Rome, Dec., 1949, p.9, Epicentre 44°·1N. 10°·2E.

A = +·7079, B = +·1274, C = +·6947 ; δ = −4 ; h = −3 ;
D = +·177, E = −·984 ; G = +·684, H = +·123, K = −·719.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Prato		0·7	116	i 0 13	− 4	i 0 25	− 3	—	—
Bologna		0·8	70	e 0 19	+ 1	i 0 30	− 1	—	—
Florence, Arc.		0·9	120	e 0 19	− 1	e 0 35	+ 1	—	—
Florence, Xim.		0·9	120	e 0 17	− 3	i 0 31	− 3	—	—
Pavia		1·2	323	e 0 26	+ 2	e 0 46	+ 5	—	—
Salo		1·4	9	e 0 26	− 1	i 0 44	− 2	—	—
Zürich		3·4	340	e 0 53	− 2	e 1 33	− 4	—	—
Basle		3·8	332	e 1 4	+ 3	e 2 10	S_g	—	—
Besançon		4·2	317	—	—	1 55?	− 2	—	—
Stuttgart	Z.	4·6	352	e 1 9?	− 3	e 2 0	− 7	e 1 27	P_g
Strasbourg		4·7	340	—	—	e 2 14	+ 4	e 2 33	S_g
Clermont-Ferrand		5·2	290	e 1 23	+ 2	e 3 10	S_g	—	—
Collmberg	Z.	7·3	14	—	—	e 3 42	S*	—	—

Additional readings :—
Florence, Arc. e = 29s.
Salo iE = 57s.
Stuttgart eZ = 2m.33s.
Strasbourg e = 2m.5s.

Dec. 23d. 21h. 33m. 29s. Epicentre 20°·4N. 122°·0E. (as on 1948, Oct. 1d.).

$A = -·4971$, $B = +·7955$, $C = +·3465$; $\delta = -1$; $h = +5$;
$D = +·848$, $E = +·530$; $G = -·184$, $H = +·294$, $K = -·938$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Vladivostok		24·1	18	i 5 16	− 2	i 9 32	− 2	—
Irkutsk		34·7	341	e 7 10?	+16	—	—	—
Bombay		46·2	277	—	—	e 13 31?	?	—
Tashkent		49·0	308	e 8 48	− 2	e 15 44?	−11	—
Sverdlovsk		57·6	326	e 9 49	− 5	i 17 41	−10	—
Tiflis		67·3	308	e 11 8	+ 9	—	—	—
Moscow		70·3	324	e 11 16	− 1	—	—	—
College		71·8	27	e 11 27	+ 1	—	—	—
Ksara		75·8	300	i 11 56	+ 6	e 21 42	+11	—
Copenhagen		83·8	328	12 33	+ 1	—	—	—
Collmberg	z.	85·5	324	e 12 40	− 1	—	—	—
Jena		85·8	323	e 12 45	+ 3	—	—	—
Stuttgart		88·9	323	e 12 57	− 1	—	—	e 48·5
Shasta Dam		94·8	44	e 13 28	+ 3	—	—	—
Hungry Horse		95·2	34	e 13 30	+ 3	—	—	—

College gives also e = 11m.31s.
Long waves were also recorded at Rome, De Bilt, Kew, and Granada.

Dec. 23d. Readings also at 0h. (Harvard, Alicante, Granada, and near Sotchi), 2h. (near Punta Arenas (3)), 3h. (Hungry Horse, and near Tacubaya (2)), 4h. (Hungry Horse and College), 5h. (Tacubaya and Tortosa), 7h. (Brisbane, Andijan, Samarkand, Tchimkent, near Garm, Obi-garm, and Stalinabad), 10h. (Ottawa and Punta Arenas), 11h. (Shasta Dam, Hungry Horse, College, and near Istanbul), 12h. (Hungry Horse), 14h. (Collmberg, Jena, Stuttgart, Moscow, Sverdlovsk, Overton, Pierce Ferry (2), Hungry Horse, and College), 17h. (near Pretoria), 18h. (Santa Lucia and near Tacubaya), 19h. (Istanbul, near Bucharest, and near Santa Lucia), 20h. (Nanking, near Leninakan, and near Rome), 21h. (near Algiers Univ., near Ottawa, and near Obi-garm), 22h. (La Paz, Punta Arenas, and near Stalinabad), 23h. (Samarkand, near Garm, Obi-garm, Stalinabad, and Tchimkent).

Dec. 24d. Readings at 0h. (Guadalajara, Puebla, Tacubaya, Vera Cruz, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Berkeley, Santa Clara, Hungry Horse, and College), 1h. (Punta Arenas and Tchimkent), 2h. (Jena and near Obi-garm), 5h. (Stuttgart), 7h. (near Andijan), 11h. (Santa Lucia), 12h. (Overton), 15h. (Irkutsk and near Tacubaya), 16h. (Clermont-Ferrand and near Obi-garm (2)), 18h. (near Obi-garm), 22h. (Brisbane, Riverside, China Lake (2), Tinemaha, Tucson (2), Boulder City, Overton, Pierce Ferry (2), Shasta Dam, Hungry Horse, College (2), Collmberg, Strasbourg, Stuttgart, Samarkand, Andijan, near Obi-garm, Stalinabad, and near Apia; several shocks), 23h. (Grahamstown, Ksara, and Mineral).

Dec. 25d. 18h. 59m. 4s. Epicentre 48°·2N. 9°·0E. (as on Nov. 6d.).
Intensity IV-V. Depth 10km. Epicentre 48°15′·9N. 9°1′·3E.
Seismischer Bericht des Wurttembergischen Erdbebendienstes, Stuttgart. 4 Vierteljahr, 1949, p.46.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Ebingen		0·0	—	e 0 5	− 2	i 0 7	− 4
Stuttgart	z.	0·6	13	e 0 12	− 3	i 0 19	− 7
Strasbourg		0·9	295	—	—	i 0 33	− 1
Zürich		0·9	198	e 0 21	+ 1	e 0 35	+ 1
Basle		1·2	235	e 0 26	+ 2	e 0 43	+ 2

Stuttgart gives also iZ = 21s. and 25s.

Dec. 25d. 21h. 43m. 27s. Epicentre 36°·2N. 139°·9E. Depth of focus 0·005.
(as on 1945, Oct. 24d.).

Intensity VI at Hiraishi and Mikuriya (Tochigi prefecture), V at Onahama, Utunomiya, Yokohama, Kakioka, Tukubasan, Kohu, Hukusima, Inawashiro, and Maebasi. Depth 50km., Macroseismic radius 200-300km. Epicentre as adopted.

Seismo. Bull. Cent. Met. Obs., Japan, 1949, Tokyo, 1950, p.40 with macroseismic chart.

$A = -·6187$, $B = +·5210$, $C = +·5880$; $\delta = -3$; $h = 0$;
$D = +·644$, $E = +·765$; $G = -·450$, $H = +·379$, $K = -·809$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Kakioka		0·2	82	0 6	− 5	0 13	− 6
Tukubasan		0·2	84	0 8a	− 3	0 13	− 6
Utunomiya		0·3	356	0 9k	− 3	0 17	− 3
Kumagaya		0·4	263	0 9k	− 3	0 17	− 5
Mito		0·5	68	0 17	+ 4	0 25	+ 2
Tokyo		0·5	192	0 9	− 4	0 18	− 5
Maebasi		0·7	287	0 12k	− 3	0 22	− 5
Yokohama		0·8	195	0 14	− 3	0 27	− 2
Onahama		1·1	48	0 20	0	0 34	− 2
Hunatu		1·2	233	0 18	− 4	0 38	0
Mera		1·3	182	0 19	− 4	0 30	−10
Matusiro		1·4	284	0 24k	0	0 42	− 1
Nagano		1·4	289	0 23	− 1	0 42	− 1
Osima		1·5	196	0 20	− 6	0 39	− 6
Hukusima		1·6	16	0 24k	− 3	0 47	0
Shizuoka		1·7	225	0 33	+ 5	0 46	− 4
Aikawa		2·2	324	0 22	−13	0 44	−18
Sendai		2·2	21	0 35	0	1 4	+ 2
Toyama		2·2	283	0 40	+ 5	1 22	+20
Nagoya		2·6	247	0 41	0	1 13	+ 1
Gihu		2·7	253	0 33?	− 9	—	—
Hikone		3·1	253	0 50	+ 2	1 29	+ 5
Kameyama		3·1	244	0 57	+ 9	1 30	+ 6
Mizusawa	E.	3·1	18	0 50	+ 2	1 28	+ 4
Kyoto		3·6	251	1 3	+ 8	1 47	+10
Morioka		3·6	16	0 57	+ 2	1 35	− 2
Owase		3·7	237	1 3	+ 7	1 41	+ 2
Miyako		3·8	24	0 55	− 3	1 38	− 4
Osaka		3·9	248	1 16	+17	1 58	+14
Sumoto		4·5	247	1 12	+ 5	2 10	+11
Hungry Horse		73·2	42	i 11 26	0	—	—
Santa Lucia	N.	154·8	93	20 1	[+16]	—	—

Dec. 25d. 22h. 40m. 38s. Epicentre 18°·7N. 104°·7W.

$A = -·2405$, $B = -·9168$, $C = +·3187$; $\delta = -7$; $h = +5$;
$D = -·967$, $E = +·254$; $G = -·081$, $H = -·308$, $K = -·948$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Manzanillo	0·5	45	0 11	− 3	—	—	— —	—
Guadalajara	2·4	33	0 38	− 3	—	—	— —	1·1
Tacubaya	5·2	81	1 21	0	—	—	— —	2·6
Puebla	6·2	86	1 39	+ 4	—	—	— —	3·3
Tucson	14·6	339	e 3 30	0	i 6 9	− 4	i 3 34 PP	e 6·9
Palomar	18·3	327	i 4 18	+ 1	—	—	i 5 10 PPP	—
Riverside	19·0	326	i 4 26a	0	—	—	i 5 30 PPP	—
Pierce Ferry	19·2	337	e 4 27	− 1	e 7 44	−15	— —	—
Boulder City	19·4	335	e 4 30	0	—	—	— —	e 10·7
Pasadena	19·5	326	i 4 31a	0	—	—	i 5 36 PPP	e 8·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Overton	z.	19·7	336	i 4 33	− 1	—	—	—	—	—
China Lake	z.	20·5	331	i 4 41a	− 1	—	—	i 5 44	PPP	—
Tinemaha		21·9	330	i 4 58	+ 1	—	—	i 5 56	PPP	—
Fresno		22·3	328	i 4 53k	− 8	—	—	e 4 59	P	e 12·9
St. Louis		23·5	29	i 5 9	− 3	e 9 25	+ 2	i 5 15	PP	i 9·7
Lick	z.	23·8	325	i 5 16a	+ 1	—	—	i 5 46a	PP	—
Logan		23·8	348	e 5 11	− 4	—	—	—	—	e 12·4
Santa Clara		24·0	325	e 5 17k	0	e 9 56	+24	—	—	e 13·8
Branner	z.	24·1	325	i 5 20k	+ 2	—	—	i 5 25a	PP	—
Reno		24·5	331	i 5 24a	+ 2	—	—	—	—	e 14·1
Berkeley		24·5	325	i 5 22	0	i 9 58	+18	e 11 44	SSS	i 14·0
Mineral	z.	26·0	329	i 5 37k	+ 1	—	—	i 6 8	PP	e 15·3
Shasta Dam		26·7	329	i 5 40	− 3	—	—	e 6 6	PP	e 14·3
Chicago		27·3	28	—	—	e 10 49	+22	—	—	e 14·5
Hungry Horse		30·5	348	e 6 12	− 5	—	—	—	—	e 16·7
Seattle		32·3	338	i 6 37	+ 4	—	—	i 7 33	PP	e 18·4
Ottawa		35·9	36	e 6 30	−34	—	—	—	—	22·2
Huancayo		42·1	134	—	—	e 14 14	− 2	(e 17 5)	SS	e 17·1
La Paz		50·2	131	e 8 58	− 2	16 8	− 3	—	—	24·3
College		54·3	339	i 9 28	− 2	—	—	—	—	—
Toledo	Z.	86·1	50	e 12 40	− 4	—	—	—	—	—
Malaga	N.	86·9	52	i 12 54	+ 6	i 23 46	+20	16 44	PP	45·1
Granada		87·4	52	12 49a	− 1	i 23 45	+15	—	—	48·8

Additional readings :
Tucson i = 4m.27s. and 5m.55s.
Palomar iZ = 5m.22s.
Fresno eZ = 7m.45s.
St. Louis i = 6m.12s.
Lick iZ = 5m.22s. and 6m.17s.
Santa Clara ePE = 5m.21s.
Mineral iZ = 5m.43s., 5m.46s., 5m.58s., 6m.39s., 6m.45s., and 7m.18s.
Seattle i = 6m.42s.
Ottawa e = 6m.57s.
Malaga PPPN = 18m.42s.
Long waves were also recorded at Alicante, Almeria, and at other North American Stations.

Dec. 25d. 23h. 17m. 34s. Epicentre 36°·7N. 139·7E. Focus at base of Superficial Layers. (as on 1937, March 26d.).

Intensity VII-VIII at Mikuriya, Kanuma, Hiraishi (Tochigi Prefecture) ; VI at Kakioka, Kumagaya, Mito ; V at Onahama, Oiwake, Utunomiya, Shirakawa, Tokyo, and Yokohama ; IV at Maebasi, Tukubasan, Titibu, Hukusima, Hunatu, Kohu, Shizuoka ; II-III at Nagano, Matushiro, Takada, Aikawa, Sendai, and Osima. Epicentre as adopted. Macroseismic radius >300km. Seismo. Bull. Cent. Met. Obs., Japan, 1949. Tokyo, 1950, pp. 41-42, with Macroseismic Chart.

$A = -\cdot6129$, $B = +\cdot5198$, $C = +\cdot5951$; $\delta = -2$; $h = 0$;
$D = +\cdot647$, $E = +\cdot763$; $G = -\cdot454$, $H = +\cdot385$, $K = -\cdot804$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Utunomiya	0·2	138	0 1k	− 6	—	—	—	—	—
Kakioka	0·6	140	0 9k	− 3	0 17	− 4	—	—	—
Kumagaya	0·6	205	0 10a	− 2	0 18	− 3	—	—	—
Maebasi	0·6	239	0 7k	− 5	0 19	− 2	—	—	—
Tukubasan	0·6	146	0 8k	− 4	0 16	− 5	—	—	—
Mito	0·7	117	0 18k	+ 5	0 30	+ 7	—	—	—
Onahama	1·0	76	0 16a	− 2	0 29	− 2	—	—	—
Tokyo	1·0	177	0 16k	− 2	0 31	0	—	—	—
Hukusima	1·2	30	0 20a	0	0 40	+ 4	—	—	—
Matusiro	1·2	263	0 20k	0	0 35	− 1	—	—	—
Nagano	1·2	268	0 20k	0	0 37	+ 1	—	—	—
Yokohama	1·3	182	0 22	0	—	—	—	—	—
Hunatu	1·4	212	0 24	+ 1	0 42	+ 1	—	—	—
Aikawa	1·7	319	0 26a	− 2	0 50	+ 1	—	—	—
Sendai	1·8	31	0 29a	0	0 55	+ 4	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Osima		1·9	188	0 31k	0	0 58	+ 4	—	—	—
Shizuoka		2·0	211	0 34k	+ 2	0 58	+ 2	—	—	—
Toyama		2·0	270	0 33k	+ 1	—	—	—	—	—
Omaesaki		2·4	210	0 41	+ 3	1 19	+13	—	—	—
Wazima		2·4	287	0 37	− 1	1 6	0	—	—	—
Mizusawa	E.	2·7	25	i 0 43	+ 1	i 1 22	+ 8	—	—	—
Nagoya		2·7	235	0 44k	+ 2	1 19	+ 5	—	—	—
Akita		3·0	6	0 45	− 1	1 31	+ 9	—	—	—
Hikone		3·1	243	0 49k	+ 1	1 32	+ 8	—	—	—
Kameyama		3·2	235	0 52k	+ 3	1 32	+ 5	—	—	—
Morioka		3·2	21	0 51a	+ 2	1 41	+14	—	—	—
Miyako		3·4	31	0 52a	0	1 38	+ 6	—	—	—
Kyoto		3·6	244	0 56	+ 1	1 40	+ 3	—	—	—
Osaka		3·9	240	1 3	+ 4	2 3	+19	—	—	—
Owase		3·9	228	1 3	+ 4	1 56	+12	—	—	—
Hatinohe		4·1	20	1 4a	+ 2	1 54	+ 5	—	—	—
Toyooka		4·1	255	1 4k	+ 2	2 8	+19	—	—	—
Kobe		4·2	243	1 5	+ 2	2 0	+ 8	—	—	—
Siomisaki		4·6	226	1 10	+ 1	2 10	+ 8	—	—	—
Sumoto		4·6	240	1 9k	0	2 9	+ 7	—	—	—
Mori		5·4	7	1 24	+ 4	2 34	+12	—	—	—
Kôti		5·9	240	1 27	0	2 52	+17	—	—	—
Hamada		6·4	256	1 33	− 1	2 52	+ 5	—	—	—
Matuyama		6·4	245	1 34k	0	2 46	− 1	—	—	—
Sapporo		6·5	11	1 39k	+ 3	3 2	+12	—	—	—
Nemuro		8·0	32	1 54	− 3	3 20	− 7	—	—	—
Hukuoka		8·2	251	1 59k	− 1	3 53	+21	—	—	—
Miyazaki		8·3	238	2 0	− 1	3 38	+ 3	—	—	—
Kumamoto		8·4	245	2 25a	+23	4 14	+37	—	—	—
Vladivostok		8·8	319	e 2 7	− 1	i 4 2	+15	—	—	—
Kagosima		9·2	239	2 27	+14	4 53	+56	—	—	—
Zi-ka-wei	N.	16·1	255	e 3 48	+ 3	7 6	+24	—	—	—
Nanking		17·9	261	4 15	+ 7	—	—	—	—	—
Irkutsk		29·3	313	e 5 58	− 4	e 10 58	+ 7	—	—	—
Semipalatinsk		44·1	308	i 8 6	− 1	—	—	—	—	—
Calcutta	E.	46·3	267	i 8 27	+ 3	e 15 19	+11	i 18 45	SSS	—
Naryn		48·7	297	i 8 36	− 7	i 15 38	− 4	—	—	—
Frunse		49·3	298	i 8 48	0	—	—	—	—	—
College		50·1	32	i 8 52	− 2	—	—	—	—	e 20·9
Andijan		51·5	296	9 2	− 2	—	—	—	—	—
Tashkent		53·5	298	i 9 18	− 1	i 16 50?	+ 2	—	—	—
Garm		53·6	295	i 8 20	−60	—	—	—	—	—
Obi-garm		54·2	295	9 21	− 3	17 12	+14	—	—	—
Sverdlovsk		54·5	319	i 9 23	− 4	i 17 8	+ 6	—	—	—
Stalinabad		54·9	295	i 9 28	− 2	17 10	+ 3	17 27	PS	—
Samarkand		55·8	297	i 9 35	− 1	—	—	—	—	—
Hyderabad		56·9	268	9 42	− 2	17 38	+ 4	—	—	—
Poona	E.	60·0	271	i 10 0	− 6	i 18 13	− 1	10 24	pP	—
Bombay		60·6	272	e 10 11	+ 1	—	—	—	—	—
Kodaikanal	E.	61·7	262	e 10 16	− 1	—	—	—	—	—
Kizyl-Arvat		63·6	301	i 10 25	− 5	—	—	—	—	—
Moscow		66·7	323	e 10 48	− 2	e 19 39	+ 1	e 20 6	PS	—
Baku		67·3	304	e 10 49?	− 4	—	—	—	—	—
Victoria		67·6	45	e 10 53	− 2	—	—	—	—	—
Grozny		68·5	308	e 10 57	− 4	—	—	—	—	—
Seattle		68·7	46	i 11 4	+ 2	—	—	e 11 15	pP	—
Tiflis		69·9	307	i 11 7	− 3	—	—	—	—	—
Erevan		70·9	306	e 11 16	0	—	—	—	—	—
Leninakan		71·0	307	e 11 54	+38	—	—	—	—	—
Sotchi		72·1	311	e 11 24	+ 1	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Shasta Dam		72·4	52	i 11 23	− 2	—	—	—	—	—
Hungry Horse		73·0	42	i 11 28	0	—	—	—	—	—
Mineral	Z.	73·1	52	e 11 28a	− 1	—	—	—	—	—
Berkeley	Z.	74·0	55	i 11 35k	+ 1	—	—	—	—	—
Branner	Z.	74·3	55	i 11 36k	0	—	—	—	—	—
Reno	Z.	74·7	52	e 11 38a	0	—	—	—	—	—
Lick		74·8	55	i 11 38a	− 1	—	—	—	—	—
Yalta		74·8	314	11 36	− 3	—	—	—	—	—
Butte	N.	75·2	43	e 11 49	+ 8	—	—	—	—	—
Bozeman		76·2	43	e 11 46	− 1	—	—	—	—	—
Fresno	Z.	76·3	54	i 11 48a	+ 1	—	—	—	—	—
Tinemaha		77·1	53	i 11 52	0	—	—	—	—	—
Copenhagen		77·6	333	i 11 54	0	—	—	—	—	—
Logan		78·2	46	i 11 57	− 1	—	—	—	—	—
China Lake	Z.	78·3	53	i 11 57a	− 1	—	—	—	—	—
Pasadena		78·9	56	i 12 1	− 1	—	—	—	—	—
Skalnate Pleso		79·1	324	e 11 59	− 4	e 22 21	+23	—	—	—
Raciborzu	Z.	79·4	326	e 12 4?	0	—	—	—	—	—
Riverside		79·5	56	i 12 5a	0	—	—	—	—	—
Overton	Z.	79·9	52	i 12 8	+ 1	e 22 36	+29	—	—	—
Potsdam		79·9	330	i 12 6a	− 1	e 22 30	+23	e 17 4	PPP	e 34·4
Istanbul		79·9	314	e 12 32	+25	e 23 18	PS	—	—	—
Boulder City		80·0	52	e 12 7	− 1	—	—	—	—	—
Ksara		80·2	305	i 12 8	− 1	e 23 2	PS	—	—	—
Palomar		80·3	55	i 12 10a	+ 1	—	—	i 12 40	pP	—
Pierce Ferry		80·4	52	i 12 6	− 4	e 22 36	+24	e 15 1	PP	—
Collmberg		80·7	328	e 12 9	− 2	—	—	—	—	—
Prague		81·0	328	e 12 10	− 3	e 22 36	+18	i 15 14	PP	e 38·4
Jena		81·6	329	e 12 15	− 1	e 23 32	PS	—	—	—
Cheb		81·9	329	e 12 46	+28	—	—	e 16 48	PPP	—
Belgrade		82·0	320	e 12 18	0	e 22 26?	− 3	e 15 27	PP	e 44·0
Zagreb		83·5	324	e 12 23	− 3	e 23 0	+16	e 15 40	PP	e 44·4
Stuttgart		84·2	329	e 12 28	− 1	e 22 50	− 1	—	—	e 44·4
Strasbourg		84·9	330	i 12 31	− 2	—	—	e 16 15	PP	—
Tucson		84·9	53	e 12 33	0	—	—	—	—	—
Kew	Z.	85·5	336	i 12 35	− 1	—	—	—	—	—
Zürich		85·6	329	e 12 33	− 3	—	—	—	—	—
Helwan		85·7	304	12 37	0	23 8	+ 3	15 55	PP	—
Basle		85·8	329	e 12 36	− 1	e 21 14	?	—	—	—
Bologna		86·6	326	e 12 42k	+ 1	—	—	—	—	—
Besançon		86·7	330	i 12 41	− 1	—	—	—	—	—
Paris		86·8	333	i 12 41	− 1	—	—	—	—	—
Rome		88·1	323	i 12 46	− 2	e 23 15	[+ 3]	i 16 17	PP	—
Clermont-Ferrand		89·1	331	e 12 55	+ 2	e 23 50	+13	—	—	42·9
Rolphton		90·9	26	e 13 2	0	—	—	—	—	—
St. Louis		92·0	37	i 13 8	+ 1	—	—	—	—	—
Ottawa		92·3	24	e 13 8	0	—	—	—	—	—
Weston		96·4	22	i 13 25	− 2	—	—	—	—	—
Algiers Univ.	Z.	96·6	326	—	—	24 0	[−1]	—	—	—
Granada		99·0	332	e 9 46a	?	—	—	—	—	—
Tamanrasset	Z.	106·7	316	e 18 31	PP	—	—	—	—	—
La Paz		148·2	57	i 19 45	[+ 6]	—	—	e 23 14	PP	72·4

Additional readings :—
Poona sPE = 10m.39s., P_cPE = 10m.42s., PSE = 18m.24s., PPSE = 18m.32s., sSE = 18m.56s.
Mineral iZ = 11m.36s. and 12m.21s.
Lick eN = 11m.44s., iZ = 12m.5s.
Potsdam eE = 20m.44s.
Pierce Ferry i = 12m.32s.
Prague iP = 12m.13s., e = 12m.31s. and 13m.32s., eSS = 28m.14s.
Zagreb eE = 19m.10s.
Strasbourg e = 16m.41s.
Helwan eZ = 13m.6s.
Bologna e = 20m.5s. and 20m.49s.
Tamanrasset eZ = 18m.40s.
Long waves due to this or the following shock were recorded at Auckland, Christchurch, Wellington, Chicago, Seven Falls, and other European stations.

Dec. 25d. 23h. 24m. 57s. Epicentre 36°·7N. 139°·7E. Focus at base of Superficial Layers. (as at 23h. 17m.).

Intensity IX at Imaichi, Ochiai, Okurugawa (Tochigi prefecture); VII-VIII at Kanuma, Awano; VI at Utunomiya, Kakioka, Kumagaya, Mito; V at Maebasi, Onahama, Tukubasan, Shirakawa, Titibu, Yokohama, Tokyo, Hunatu, Kohu, and Tyosi; IV at Oiwake, Hukusima, Matusiro, Takada, Sendai, Inawashiro, Iida; II-III at Aikawa, Nagano, Matumoto, Osima, Mizusawa, Tsuruga, and Tomisaki. Epicentre as adopted. Macroseismic radius >300km..
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Time distribution of felt aftershocks of the Imaichi Earthquake of Dec. 26th, 1949.
Bull. Earthquake Reseach Inst., Tokyo Univ., Vol. 29, 1951, pp. 301-304.

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Change of the ground water level due to the Imaichi Earthquake.
Bull. Earthquake Research Inst., Tokyo Univ., 1950, Vol. 28, Nos. 1-2, pp. 129-132.

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The Imaichi Earthquake of Dec. 26th, 1949. General description.
Bull. Earthquake Research Inst., Tokyo Univ., 1950, Vol. 28, Nos. 3-4, pp. 355-367. Seven plates.

R. Takahasi, K. Hirono, and J. Aita.
Results of precise levellings executed in the Epicentral Region of the Imaichi Earthquake.
Bull. Earthquake Reasearch Inst., Tokyo Univ., 1950, Vol. 28, Nos. 3, 4, pp. 443-447, with figure and tables.

Y. Kato, S. Utashiro, and J. Ossaka.
On the changes of the terrestrial magnetic field accompanying the Tochigi Earthquake of Dec. 26th., 1949.
Scientific Report: Tôhoku University, Series V, Geophysics, 1950, Vol. 2, No. 2, pp. 149-152.

E. Inoue.
On the vertical displacements accompaning Imaichi Earthquake in 1949.
Bull. Earthquake Research Inst., Tokyo Univ., 1951, Vol. 29, No. 1, pp. 143-146, with figure.

R. Morimote.
Geology of Imaichi district, with special reference to the Earthquake of Dec. 26th, 1949.
I Bull. Earthquake Research Inst., Tokyo Univ., 1950, Vol. 28, No. 3, 4, pp. 379-386, two plates.
II Loc. Cit., 1951, Vol. 29, pp. 349-359, with plates and photographs.

Y. Koshikawa.
Seismometrical study of the Imaichi Earthquake on Dec. 26th, 1949.
I Bull. Earthquake Reasearch Inst., Tokyo Univ., 1950, Vol. 28, Nos. 3, 4, pp. 369-377. Figure and tables.
II Loc. Cit., 1951, Vol. 29, pp. 295-300.

Very great damage in the epicentral region. Many casualties and destruction of many houses. Mud streams, landslides, and considerable faulting were caused. Nearly 1700 aftershocks were observed during the following month at the Meteorological Station at Utunomiya.

$A = -\cdot6129,\ B = +\cdot5198,\ C = +\cdot5951;\quad \delta = -2;\quad h = 0;$
$D = +\cdot647,\ E = +\cdot763;\quad G = -\cdot454,\ H = +\cdot385,\ K = -\cdot804.$

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Utunomiya	0·2	138	0 3?	− 4	—	—	—	—	—
Kakioka	0·6	140	0 9k	− 3	0 17	− 4	—	—	—
Kumagaya	0·6	205	0 11	− 1	0 19	− 2	—	—	—
Maebasi	0·6	239	0 11k	− 1	0 23	+ 2	—	—	—
Tukubasan	0·6	146	0 8k	− 4	0 15	− 6	—	—	—
Mito	0·7	117	0 5k	− 8	0 15	− 8	—	—	—
Tokyo	1·0	177	0 18	0	0 53	+22	—	—	—
Hukusima	1·2	30	0 17a	− 3	0 35	− 1	—	—	—
Matusiro	1·2	263	0 21k	+ 1	0 37	+ 1	—	—	—
Nagano	1·2	268	0 23	+ 3	0 42	+ 6	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Yokohama		1·3	182	0 17k	− 5	—	—	—	—	—
Hunatu		1·4	212	0 21k	− 2	—	—	—	—	—
Aikawa		1·7	319	0 19	− 9	0 44	− 5	—	—	—
Sendai		1·8	31	0 30a	+ 1	0 56	+ 5	—	—	—
Osima		1·9	188	0 30	− 1	—	—	—	—	—
Shizuoka		2·0	211	0 33	+ 1	0 57	+ 1	—	—	—
Toyama		2·0	270	0 31k	− 1	1 3	+ 7	—	—	—
Omaesaki		2·4	210	0 44	+ 6	1 16	+10	—	—	—
Wazima		2·4	287	0 37	− 1	1 7	+ 1	—	—	—
Mizusawa	N.	2·7	25	0 46	+ 4	1 24	+10	—	—	—
Nagoya		2·7	235	0 43	+ 1	1 18	+ 4	—	—	—
Akita		3·0	6	0 50	+ 4	1 37	+15	—	—	—
Hikone		3·1	243	0 53	+ 5	1 36	+12	—	—	—
Kameyama		3·2	235	0 56k	+ 7	1 37	+10	—	—	—
Morioka		3·2	21	0 53	+ 4	1 43	+16	—	—	—
Miyako		3·4	31	0 53	+ 1	1 37	+ 5	—	—	—
Kyoto		3·6	244	1 0	+ 5	1 45	+ 8	—	—	—
Osaka		3·9	240	1 6	+ 7	2 4	+20	—	—	—
Owase		3·9	228	1 3	+ 4	2 3	+19	—	—	—
Hatinohe		4·1	20	1 8a	+ 6	2 0	+11	—	—	—
Toyooka		4·1	255	1 3	+ 1	2 7	+18	—	—	—
Kobe		4·2	243	1 7	+ 4	1 58	+ 6	—	—	—
Siomisaki		4·6	226	1 24	+15	2 18	+16	—	—	—
Sumoto		4·6	240	1 9	0	2 6	+ 4	—	—	—
Mori		5·4	7	1 24	+ 4	2 34	+12	—	—	—
Kôti		5·9	240	1 36	+ 9	2 56	+21	—	—	—
Hamada		6·4	256	1 41k	+ 7	2 59	+12	—	—	—
Hirosima		6·4	251	1 36	+ 2	2 52	+ 5	—	—	—
Matuyama		6·4	245	1 36	+ 2	2 48	+ 1	—	—	—
Sapporo		6·5	11	1 39	+ 3	3 0	+10	—	—	—
Nemuro		8·0	32	1 54	− 3	—	—	—	—	—
Hukuoka		8·2	251	2 5	+ 5	3 38	+ 6	—	—	—
Miyazaki		8·3	238	2 1	0	—	—	—	—	—
Kumamoto		8·4	245	2 9	+ 7	4 24	L	—	—	(4·4)
Saga		8·4	249	2 11	+ 9	4 28	L	—	—	(4·5)
Nagasaki		9·0	247	2 32	+21	—	—	—	—	—
Kagosima		9·2	239	2 17	+ 4	4 43	L	—	—	(4·7)
Nanking		17·9	261	e 4 16	+ 8	—	—	—	—	—
Semipalatinsk		44·1	308	i 8 7	0	—	—	—	—	—
Naryn		48·7	297	i 8 39	− 4	—	—	—	—	—
College		50·1	32	i 8 54	0	—	—	e 12 5	PPP	—
Andijan		51·5	296	9 2	− 2	16 25	+ 4	—	—	—
Tashkent		53·5	298	i 9 14	− 5	i 16 49	+ 1	—	—	—
Obi-garm		54·2	295	9 22	− 2	16 59	+ 1	—	—	—
Sverdlovsk		54·5	319	i 9 26	− 1	17 6?	+ 4	—	—	—
Stalinabad		54·9	295	9 28	− 2	17 10	+ 3	—	—	—
Samarkaud		55·8	297	e 9 35	− 1	—	—	—	—	—
Honolulu		55·9	87	i 9 39	+ 2	e 17 46	+25	—	—	e 24·3
Poona		60·0	271	i 10 0	− 6	i 18 15	+ 1	i 18 27	PS	25·6
Bombay		60·6	272	e 10 11	+ 1	—	—	—	—	—
Colombo	E.	61·8	257	10 54	+36	18 34	− 3	—	—	29·9
Kizyl-Arvat		63·6	301	i 10 27	− 3	—	—	—	—	—
Moscow		66·7	323	e 10 42	− 8	19 38	0	—	—	—
Baku		67·3	304	e 10 53?	0	—	—	—	—	—
Victoria		67·6	45	e 10 55	0	—	—	—	—	—
Apia		67·9	128	e 11 29	+32	—	—	—	—	—
Grozny		68·5	308	e 11 2	+ 1	—	—	—	—	—
Seattle		68·7	46	i 11 6	+ 4	—	—	—	—	—
Helsinki		69·7	332	e 9 3?	?	—	—	—	—	e 29·0
Tiflis		69·9	307	e 11 7	− 3	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverview		71·0	169	e 11 17	+ 1	e 20 28	− 1	e 28 57	Q	e 32·4
Sotchi		72·1	311	e 11 23	0	—	—	—	—	—
Shasta Dam		72·4	52	i 11 25	0	—	—	e 14 10	PP	—
Hungry Horse		73·0	42	i 11 28	0	—	—	e 14 41	PP	—
Mineral	z.	73·1	52	i 11 29a	0	—	—	—	—	—
Berkeley		74·0	55	i 11 36a	+ 2	e 21 8	+ 5	i 14 25	PP	e 36·0
Branner	z.	74·3	55	i 11 37a	+ 1	—	—	—	—	—
Santa Clara		74·6	55	e 11 35k	− 3	e 21 21	+11	—	—	e 29·5
Reno	z.	74·7	52	e 11 39a	+ 1	—	—	—	—	—
Lick	z.	74·8	55	i 11 39a	0	—	—	i 11 48	pP	—
Yalta		74·8	314	11 36	− 3	—	—	—	—	—
Butte	N.	75·2	43	e 11 42	+ 1	—	—	—	—	e 42·8
Bozeman		76·2	43	e 11 49	+ 2	e 21 39	+12	—	—	e 36·1
Fresno		76·3	54	i 11 48a	+ 1	e 21 13	−15	e 13 50	PP	—
Tinemaha		77·1	53	i 11 53a	+ 1	—	—	—	—	—
Copenhagen		77·6	333	11 54	0	e 22 3?	+21	—	—	33·0
Logan		78·2	46	i 11 55	− 3	e 22 8	+19	e 16 8	PPP	e 33·9
China Lake	z.	78·3	53	i 11 59a	+ 1	—	—	—	—	—
Pasadena	z.	78·9	56	i 12 1a	− 1	e 21 57	+ 1	e 14 38	PP	e 32·6
Bucharest		79·4	318	e 11 45	−19	—	—	—	—	37·0
Riverside		79·5	56	i 12 4a	− 1	—	—	—	—	—
Overton	z.	79·9	52	i 12 9	+ 2	—	—	—	—	—
Boulder City		80·0	52	i 12 9	+ 1	—	—	—	—	—
Ksara		80·2	305	i 12 7?	− 2	23 5	PS	—	—	—
Palomar		80·3	55	i 12 10a	+ 1	—	—	i 16 12	PPP	—
Pierce Ferry		80·4	52	i 12 11	+ 1	—	—	e 15 15	PP	—
Collmberg		80·7	328	e 12 10	− 1	—	—	e 15 12	PP	e 35·0
Budapest		80·8	323	e 12 27	+15	—	—	e 15 20	PP	e 37·6
Prague		81·0	328	i 12 7	− 6	e 22 31	+13	e 15 13	PP	—
Jena		81·6	329	e 12 15	− 1	e 23 12	PS	—	—	—
Belgrade		82·0	320	e 12 18	0	—	—	—	—	e 50·6
Zagreb	z.	83·5	324	e 12 23?	− 3	—	—	—	—	—
Stuttgart		84·2	329	e 12 28	− 1	—	—	—	—	—
Triest		84·7	325	e 12 38	+ 6	i 22 58	+ 2	i 15 31	PP	e 39·0
Strasbourg		84·9	330	i 12 32	− 1	e 23 9	+11	e 32 27	SSS	e 41·0
Tucson		84·9	53	i 12 34	+ 1	e 23 6	+ 8	e 15 36	PP	e 36·2
Kew		85·5	336	i 12 35	− 1	e 23 4	+ 1	i 14 30	PP	e 34·0
Zürich		85·6	329	e 12 35	− 1	—	—	e 15 55	PP	—
Helwan		85·7	304	12 36	− 1	e 23 12	+ 7	15 55	PP	—
Basle		85·8	329	e 12 36	− 1	e 20 58	?	—	—	—
Salo		86·1	327	e 13 47	?	—	—	—	—	—
Bologna		86·6	326	e 13 16	+35	—	—	e 16 7	PP	—
Besançon		86·7	330	i 12 40	− 2	—	—	—	—	—
Paris		86·8	333	i 12 41	− 1	e 23 31	+15	e 39 3	Q	e 43·0
Prato		87·2	325	e 12 43	− 1	e 22 28	−52	—	—	—
Florence Xim.		87·2	325	i 13 12	+28	—	—	—	—	—
Rome		88·1	323	i 13 13	+25	e 30 32?	SS	i 16 17	PP	—
Clermont-Ferrand		89·1	331	e 12 55	+ 2	—	—	—	—	—
Rolphton		90·9	26	e 13 1	− 1	—	—	—	—	—
St. Louis		92·0	37	i 13 8	+ 1	i 24 14	+11	i 16 50	PP	—
Ottawa		92·3	24	e 13 7	− 1	—	—	—	—	45·0
Cleveland	N.	93·5	30	—	—	e 24 28	+11	—	—	—
Tortosa		94·3	330	16 19	PP	25 28	PS	—	—	e 51·0
Harvard		96·2	22	i 13 27	+ 1	—	—	—	—	e 43·6
Weston		96·4	22	i 13 28	+ 1	35 17	SSS	i 19 23	PPP	—
Algiers Univ.	z.	96·6	326	e 17 22	PP	—	—	—	—	—
Toledo		96·8	330	e 13 27	− 2	—	—	18 1	PP	44·3
Alicante		96·8	330	17 32	PP	25 21	+36	19 24	PPP	e 45·2
City College, N.Y.		96·9	25	e 13 30	+ 1	—	—	e 17 25	PP	—
Almeria		98·8	330	13 39	+ 1	24 55	− 6	17 35	PP	49·3
Granada		99·0	332	18 31	PKP	26 53	PS	—	—	47·0
Malaga	z.	99·7	332	i 17 40k	PKP	i 29 26	?	21 46	?	50·4
Tamanrasset	z.	106·7	316	e 14 8	− 4	—	—	e 18 35	PP	—
Bogota		128·2	44	e 19 6	[+ 3]	—	—	e 22 45	PP	—
Huancayo		140·1	61	—	—	e 46 3	SSS	—	—	e 54·4
La Paz		148·2	57	i 19 46	[+ 7]	—	—	23 6	PP	71·6

For Notes see next page.

NOTES TO DECEMBER 25d. 23h. 24m. 57s.

Additional readings :—
Seattle i =11m.44s., 11m.49s., 12m.7s., 18m.41s., and 19m.24s.
Mineral iZ =11m.33s., 12m.4s., and 12m.14s.
Berkeley eN =24m.17s., eZ =27m.35s.
Reno eE =12m.12s., eZ =12m.16s.
Lick iZ =11m.43s., eZ =12m.53s.
Fresno eZ =12m.16s., eN =12m.29s., iN =13m.21s.
Copenhagen 11m.58s. and 12m.2s.
Pasadena eZ =15m.2s.
Palomar iZ =12m.39s.
Collmberg e =12m.14s., eE =12m.19s., eZ =12m.23s., eE =14m.30s.
Triest ePPP =17m.15s.
Strasbourg e =12m.46s., 23m.25s., 27m.16s., and 34m.3s., eQ? =37·0m.
Tucson ePPP =17m.49s.
Kew ePPSEN =25m.52s., eSSEN =28m.32s.
Besançon e =12m.56s. and 13m.4s.
Paris i =13m.1s., e =38m.6s.
St. Louis e =16m.10s.
Toledo PPPZ =19m.24s.
Almeria PPP =19m.43s., PS =26m.23s., SS =31m.35s.
Granada iPP =19m.50s., PS =28m.14s., iSS =33m.38s.
Malaga PPPZ =24m.0s., PSZ =31m.2s.

Dec. 25d. Readings also at 0h. (Tucson, Pierce Ferry, Hungry Horse, College, and Rapid City), 1h. (China Lake, Clermont-Ferrand, Stuttgart, near Batavia, and Bandong), 2h. (Tucson, Pierce Ferry, Hungry Horse, College, near Mineral (2), and Reno (2)), 4h. (near Obi-garm), 5h. (Andijan, Samarkand, near Garm, Obi-garm, and Stalinabad), 6h. (Apia, Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, and College), 7h. (near Copiapo, and near Obi-garm), 9h. (near Tchimkent, near Berkeley, Branner, and Lick), 10h. (near Mizusawa), 11h. (Stuttgart, Hungry Horse, and College), 13h. (Brisbane, Copiapo, Shasta Dam, and near Tucson), 14h. (Mount Wilson, Palomar, China Lake, Overton, Pierce Ferry, and Hungry Horse), 15h. (Brisbane, Copiapo, Huancayo, La Paz, Tucson, Hungry Horse, Obi-garm, and near Stalianbad), 17h. (Bogota, Christchurch, Samarkand, near Andijan, Garm, Obi-garm, Stalinabad, and Tashkent), 19h. (Collmberg and Reno), 20h. (near Santa Lucia), 21h. (near Mineral), 22h. (Weston, near Manzanillo and Tacubaya), 23h. (Mineral, and Punta Arenas).

Dec. 26d. 3h. 36m. 10s. Epicentre 45°·7N. 26°·8E. Depth of focus 0·015.
(as on 1948, May 29d.).

$A = +·6255$, $B = +·3160$, $C = +·7133$; $\delta = -10$; $h = -4$;
$D = +·451$, $E = -·893$; $G = +·637$, $H = +·322$, $K = -·701$.

		△	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Bucharest		1·4	198	i 0 28	0	i 0 47	− 1	—
Sofia		3·9	221	i 0 59	0	i 1 40?	− 5	3·5
Belgrade		4·5	262	e 1 1a	− 7	e 2 1	+ 2	—
Istanbul		4·9	160	i 1 43	+30	i 3 12	?	—
Yalta		5·3	101	1 21	+ 3	i 2 10	− 9	—
Kalossa		5·5	281	e 1 31	+10	—	—	e 2·9
Budapest		5·6	291	1 22	0	i 2 17	− 9	—
Skalnate Pleso		5·6	310	i 1 24	+ 2	—	—	e 4·4
Ogyalla		6·3	293	e 1 33	+ 1	—	—	e 4·9
Raciborzu	E.	7·3	310	e 1 42	− 3	—	—	—
Prague		9·4	303	e 2 9	− 4	—	—	e 5·1
Collmberg	Z.	10·8	306	e 2 29	− 3	—	—	—
Jena		11·4	303	e 2 26	−14	—	—	e 4·8
Stuttgart	Z.	12·4	291	e 2 52	− 1	e 5 0	− 9	—
Leninakan		13·3	105	e 3 12	+ 7	—	—	—
Basle		13·4	285	e 3 9	+ 3	e 5 1	−31	—
Tiflis		13·6	101	3 14	+ 5	—	—	—
Helsinki		14·5	356	i 5 17	?	i 5 52	− 6	e 6·8
College		69·7	358	i 10 58	0	—	—	—
Hungry Horse		80·3	335	i 11 56	− 2	—	—	—
Pierce Ferry		91·2	328	i 12 52	0	—	—	—
Tucson		93·4	325	e 13 2	0	—	—	—

For Notes see next page.

NOTES TO DECEMBER 26d. 3h. 36m. 10s.

Additional readings :—
Sofia iP = 1m.8s., i = 1m.20s., 2m.8s., 2m.23s., 3m.6s., and 3m.23s.
Belgrade e = 1m.28s., i = 2m.24s.
Yalta iP_g = 1m.33s., i = 2m.22s.
Raciborzu ePN = 1m.45s.
Collmberg eZ = 2m.43s.
Jena eP?E = 2m.37s.
Hungry Horse e = 12m.6s. and 12m.32s.

Dec. 26d. 5h. 18m. 51s. Epicentre 44°·0N. 34°·3E. (as on 1949, August 30d.).

A = +·5922, B = +·4039, C = +·6972 ; δ = −8 ; h = −3 ;
D = +·564, E = −·826 ; G = +·576, H = +·393, K = −·717.

		△	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Yalta		0·1	—	i 0 9	+ 1	—	—	—
Simferpol		0·6	347	i 0 16	+ 1	i 0 26	0	—
Theodosia		1·0	51	i 0 22	+ 1	i 0 37	+ 1	—
Sotchi		4·0	100	1 1	− 3	1 45	− 7	—
Istanbul		5·1	231	i 1 48	P_g	i 2 39	S*	—
Tiflis		8·1	106	1 59	− 3	3 27	− 8	—
Lwow		8·9	311	(e 2 11?)	− 1	e 2 11?	P	—
Prague		14·6	300	—	—	e 6 44	+31	e 8·3
Collmberg		15·9	303	e 3 43?	− 4	—	—	—
Jena	N.	16·6	301	—	—	e 6 32	−28	e 8·1
Helsinki		16·8	344	—	—	i 6 49	−16	e 8·2
Stuttgart	Z.	17·8	294	e 4 15	+ 4	—	—	e 8·8
Upsala		18·5	333	—	—	i 7 29	−15	i 9·8
Clermont-Ferrand		22·0	285	e 4 58	0	—	—	—
College		71·1	2	e 11 21	− 1	—	—	—
Hungry Horse		83·5	339	e 12 29	− 2	—	—	—

Additional readings :—
Collmberg eZ = 3m.47s.?, and 3m.51s.?.
Helsinki i = 7m.24s.

Dec. 26d. 6h. 23m. 53s. Epicentre 16°·0S. 179°·0W.

A = −·9616, B = −·0168, C = −·2739 ; δ = −2 ; h = +6 ;
D = −·017, E = +1·000 ; G = +·274, H = +·005, K = −·962.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		7·3	74	1 57	+ 7	e 3 18	+ 3	e 2 26	P_g	3·4
Auckland	N.	21·5	194	4 53	+ 1	i 9 1	+14	i 5 10	PP	i 11·1
Arapuni		22·5	191	5 5	+ 3	—	—	—	—	—
Tuai	N.	23·0	188	e 5 7	0	—	—	—	—	—
Wellington		25·8	192	i 5 35	+ 1	i 10 17	+15	i 6 5	PP	i 12·3
Cobb River	E.	26·0	195	e 5 36	0	—	—	—	—	—
Kaimata	N.E.	27·7	196	e 5 47	− 5	—	—	—	—	—
Brisbane		28·3	241	i 5 52	− 5	i 10 40	− 3	—	—	e 12·9
Christchurch		28·4	193	5 54	− 4	10 38	− 7	11 31	SS	12·4
Riverview		32·1	231	e 6 29	− 2	i 11 43	0	i 7 44	PP	e 12·9
Melbourne	E.	38·5	229	i 6 28	−58	i 12 24	−58	—	—	—
Honolulu		42·5	30	e 7 55	− 4	i 14 29	+ 7	e 9 56	PP	e 17·8
Perth		60·8	242	11 41	PP	18 27	− 6	13 55	PPP	—
Tokyo		64·6	324	10 40	− 1	19 17	− 4	—	—	22·7
Nagoya		65·8	322	e 10 51	+ 2	—	—	—	—	e 18·7
Sendai		65·8	327	10 51	+ 2	19 32	− 3	12 31	PP	35·7
Matusiro		66·0	323	e 10 49	− 1	19 31	− 7	—	—	26·9
Osaka		66·3	320	e 10 50	− 2	18 47	−55	13 2	PP	26·1
Mizusawa	E.	66·3	327	18 58	S	(18 58)	−44	(26 17)	SSS	—
Kôti		66·9	318	10 55	− 1	19 32	−17	13 53	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kagosima		67·7	314	11 0	− 1	—	—	—	—	28·0
Hukuoka		69·0	317	e 10 31	−38	20 11	− 3	—	—	e 32·0
Sapporo		69·1	331	(e 11 0)	−10	—	—	(15 42)	P_cS	(36·4)
Bandong		72·0	268	e 11 21	− 7	e 20 35	−14	—	—	—
Batavia		73·1	268	e 11 24	−10	e 20 44	−17	—	—	—
Branner		75·3	44	e 11 44a	− 3	e 20 13	−73	e 31 19	Q	e 34·8
Santa Clara		75·4	44	e 11 52k	+ 5	i 22 7	+40	—	—	e 34·5
Berkeley		75·5	44	i 11 49a	+ 1	i 21 29	+ 1	i 22 32	PS	e 34·1
Ukiah		75·6	42	e 11 55	+ 7	e 21 21	− 8	—	—	e 31·3
Lick		75·6	44	i 11 47k	− 1	e 21 58	+29	e 14 45	PP	e 33·8
Ferndale		75·8	40	e 11 44	− 6	e 21 14	−17	e 22 36	PPS	e 33·9
Nanking		76·3	309	e 12 29	+37	—	—	e 7 59	?	—
Pasadena		76·4	48	i 11 50	− 3	i 21 42	+ 4	e 14 41	PP	i 31·7
Fresno		76·6	45	i 11 53k	− 1	e 21 7	−33	e 31 42	Q	e 34·9
Palomar		76·9	50	i 11 56	0	—	—	—	—	—
Riverside		76·9	48	i 11 54	− 2	—	—	—	—	—
Shasta Dam		77·0	41	e 11 54	− 2	—	—	e 15 11	PP	e 35·6
Mineral		77·3	42	e 11 57k	− 1	—	—	i 12 8	P_eP	e 36·4
China Lake	Z.	77·6	47	i 11 58	− 2	—	—	i 14 56	PP	e 39·1
Tinemaha	Z.	77·8	46	i 12 0	− 1	—	—	—	—	—
Reno		78·0	43	i 12 2	0	e 22 27	PS	—	—	e 35·8
Boulder City		79·6	48	i 12 11	+ 1	—	—	—	—	—
Overton	Z.	80·2	48	i 12 13	− 1	—	—	e 15 14	PP	—
Pierce Ferry		80·3	48	i 12 13	− 1	—	—	i 15 19	PP	—
Tucson		80·9	53	i 12 19	+ 2	e 22 38	+12	e 15 29	PP	e 33·5
Victoria		81·0	34	e 11 28	−50	22 31	+ 4	e 26 25	SS	36·1
Seattle		81·1	35	e 12 22	+ 4	e 22 45	+17	i 23 43	PS	e 34·1
Salt Lake City		83·9	45	i 12 39	+ 6	e 22 49	− 7	—	—	e 35·0
College		84·0	13	i 12 29	− 4	e 22 34	−23	i 15 51	PP	e 34·8
Logan		84·4	44	e 12 31	− 5	e 23 36	PS	e 28 6	SS	e 34·9
Butte	N.	85·9	39	e 13 1	+18	e 22 6	[−61]	e 23 27	PS	e 35·8
Tacubaya		86·0	69	12 41	− 2	—	—	e 17 54	PPP	—
Hungry Horse		86·1	37	e 12 39	− 5	—	—	i 30 46	PKKP	—
Bozeman		86·7	41	i 12 29	−18	e 22 19	−65	e 29 9	SS	e 36·2
Punta Arenas	N.	87·8	145	15 42	?	—	—	—	—	e 37·0
Saskatoon		92·1	36	—	—	24 15	+ 2	25 31	PS	42·7
Irkutsk		94·6	323	e 13 25	+ 1	24 34	− 1	17 7	PP	—
Florissant		98·8	52	e 14 27	+44	i 24 30	[+ 9]	e 25 21	S	e 41·2
St. Louis		98·9	52	e 13 47	+ 4	i 25 15	+ 4	e 17 49	PP	i 47·5
Huancayo		99·5	105	e 14 37	+51	e 24 15	[−10]	e 18 33	PP	e 39·1
Chicago		101·5	49	e 18 18	PP	e 25 18	−15	e 24 30	SKS	e 41·1
Colombo	E.	102·5	273	18 48	PP	e 27 43	PS	—	—	52·1
La Plata		104·6	133	—	—	25 11	[+22]	33 25	SS	50·0
La Paz		104·6	112	e 14 23	+14	25 59	0	i 18 39	PP	49·3
Bogota		105·6	89	e 18 54	PP	e 26 9	+ 2	e 20 34	PPP	e 51·1
Kodaikanal	E.	105·7	277	i 18 30	PP	e 27 32	PS	20 33	PPP	48·5
Cleveland		105·9	51	—	—	e 26 24	+14	e 28 10	PS	52·3
Hyderabad		106·3	284	e 18 38	PP	25 2	[+ 6]	28 49	PS	44·9
Pennsylvania		108·6	52	i 19 51	PP	e 25 12	[+ 6]	e 34 23	SS	45·6
Dehra Dun	E.	108·9	295	e 27 14	S	e 34 39	SS	e 45 45	Q	52·4
Washington		109·1	54	e 19 37	PP	e 29 3	PS	i 29 53	PKKP	e 47·2
Ottawa		110·5	47	e 18 11	[−23]	e 28 43	PS	e 29 35	PPS	51·1
Poona		110·8	284	18 40	[+ 5]	25 18	[+ 3]	19 29	PP	51·1
City College, N.Y.		111·6	52	e 18 52	[+16]	e 25 14	[− 5]	—	—	e 46·8
Fordham		111·6	52	e 20 27	PP	e 27 7	S	e 29 47	PPS	—
Naryn		111·6	309	e 18 53?	[+17]	—	—	—	—	—
Bombay		111·9	284	e 18 39	[+ 2]	e 28 39	PS	—	—	—
Frunse		112·7	310	e 18 27	[−11]	e 28 33	PS	—	—	—
Harvard		113·4	50	i 19 30	PP	e 29 13	PS	e 34 29	SS	e 53·8
Weston		113·6	50	e 18 45	[+ 5]	e 25 33	[+ 6]	i 19 50	PP	54·1

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Seven Falls	E.	113·9	45	e 19 39	PP	e 25 23	[− 5]	e 35 51	SS	50·1
Andijan		114·3	308	e 19 34	PP	—	—	—	—	—
San Juan		116·2	77	e 19 16	[+31]	e 25 36	[0]	e 35 14	SS	e 49·2
Obi-garm		116·4	306	18 44	[− 2]	—	—	—	—	—
Tashkent		116·6	308	e 20 6	PP	i 29 35	PS	e 22 8	PKS	—
Stalinabad		117·1	306	18 50	[+ 3]	29 38	PS	e 19 50	PP	—
Samarkand		118·4	306	e 19 14	[+24]	—	—	—	—	—
Bermuda		118·8	61	—	—	e 27 9	{+ 3}	e 37 42	SS	e 48·6
Halifax		119·1	47	—	—	e 37 13	SS	—	—	49·1
Sverdlovsk		119·7	327	i 20 14	PP	30 6	PS	i 22 58	PPP	—
Fort de France		120·3	82	—	—	e 24 48	?	e 37 8	SS	e 49·4
Tananarive		122·5	234	—	—	e 26 22	[+24]	37 12	SS	e 51·6
Ivigtut		123·0	26	—	—	32 20	PPS	37 43	SS	60·1
Baku		131·3	310	e 19 25	[+10]	—	—	e 22 57	PKS	—
Moscow		131·5	333	e 19 20	[+ 5]	e 31 33	PS	e 38 59	SS	—
Helsinki		132·6	345	i 22 46	PKS	e 39 10	SS	—	—	e 53·1
Grozny		133·3	315	19 22	[+ 4]	—	—	22 52	PKS	—
Tiflis		134·5	313	19 28	[+ 8]	—	—	i 23 6	PKS	—
Upsala		134·6	349	22 53	PKS	e 29 51	{+62}	25 55	PPP	e 73·1
Leninakan		135·5	312	e 19 46?	[+24]	—	—	—	—	—
Bergen	N.	135·6	357	—	—	e 40 27	SS	e 45 19	SSS	—
Aberdeen	N.	138·8	3	i 25 31	PPP	i 29 35	{+21}	e 40 28	SS	e 61·1
Copenhagen		139·4	351	—	—	i 26 33	[− 5]	40 43	SS	—
Yalta		140·1	322	e 19 32	[+ 1]	—	—	—	—	—
Durham		141·3	2	e 23 32	PKS	—	—	—	—	—
Potsdam		142·5	348	e 19 39	[+ 4]	i 26 51	[+ 8]	—	—	e 57·6
Skalnate Pleso		143·4	339	e 22 21	PP	e 29 7	{−34}	—	—	—
Collmberg		143·5	348	—	—	e 38 43	P′P′	e 41 19	SS	e 59·1
De Bilt		143·8	355	i 20 20	[+43]	e 41 7?	SS	—	—	e 66·1
Ksara		144·0	306	19 35	[− 2]	36 49	PPS	—	—	—
Jena	N.	144·1	348	e 19 44	[+ 6]	—	—	e 22 51	PKS	—
Prague		144·3	346	19 37	[− 1]	e 23 7	PKS	e 22 47	PP	62·6
Bucharest		144·6	328	e 18 37	[−61]	—	—	—	—	—
Kew		144·6	2	i 19 41	[+ 3]	e 26 41	[− 5]	e 23 10	PP	e 59·1
Cheb		144·8	348	e 19 43	[+ 4]	—	—	e 22 43	PP	—
Istanbul		145·2	322	i 20 10	[+30]	e 34 16	PS	—	—	—
Budapest		145·2	338	19 43	[+ 3]	—	—	i 22 58	PP	e 68·6
Ogyalla		145·2	340	e 19 47	[+ 7]	—	—	e 24 13	PP	—
Karlsruhe		146·5	352	i 19 54	[+12]	—	—	—	—	—
Stuttgart		146·6	350	e 19 41	[− 1]	e 31 55	?	e 42 1	SS	e 67·1
Belgrade		146·9	334	e 19 43$_a$	[+ 1]	e 42 7	SS	—	—	e 68·5
Strasbourg		147·0	352	e 19 44	[+ 1]	i 26 48	[− 2]	i 23 27	PP	60·1
Sofia		147·2	329	e 19 37	[− 6]	—	—	—	—	66·0
Paris		147·2	358	i 19 45	[+ 2]	i 27 0	[+10]	i 23 45	PP	e 68·1
Zagreb		147·7	341	e 19 50	[+ 6]	—	—	—	—	e 72·1
Basle		148·0	351	e 19 48	[+ 4]	e 31 1	{+54}	—	—	—
Zürich		148·1	351	e 19 49	[+ 5]	—	—	e 23 39	PP	—
Chur		148·4	349	e 19 48	[+ 3]	—	—	—	—	e 60·6
Besançon		148·6	353	i 19 53	[+ 8]	—	—	—	—	—
Triest		148·6	343	i 19 56	[+11]	i 27 2	[+10]	i 23 19	PKS	e 62·7
Neuchatel		148·7	352	e 19 49	[+ 4]	—	—	—	—	—
Salo		149·4	347	e 20 7	[+21]	—	—	—	—	—
Pavia	z.	150·1	349	e 19 56	[+ 8]	—	—	—	—	—
Bologna		150·3	346	i 19 59$_a$	[+11]	e 23 30	SKP	e 20 17	PKP$_2$	—
Clermont-Ferrand		150·3	357	e 19 53	[+ 5]	i 27 12	[+18]	i 20 0	PKP$_2$	69·6
Prato		150·9	345	e 20 1	[+12]	—	—	—	—	—
Florence Xim.		151·0	345	e 19 57	[+ 8]	—	—	i 23 14	PP	—
Taranto		151·8	334	e 20 17	PKP$_2$	42 34	SS	23 22	PP	—
Rome		152·4	342	e 19 57	[+ 6]	i 43 12	SS	i 23 42	PP	i 77·1
Messina		154·4	334	e 20 4	[+10]	30 21	{−21}	23 42	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Barcelona		154·7	358	e 21 0	?	i 27 11	[+12]	—	—	73·4
Tortosa		155·3	1	20 23	[+28]	30 58	{+10}	24 12	PP e	72·1
Lisbon		155·7	19	20 0	[+ 5]	23 58	PKS	20 52	PKP_2	73·5
Toledo		155·8	10	e 19 51	[− 5]	i 26 49	[−11]	23 21	PKS	73·4
Alicante		157·7	4	20 18	[+20]	27 24	[+22]	23 22	PKS e	73·1
Granada		158·5	11	i 20 8k	[+ 9]	31 15	{+10}	20 42	PKP_2	66·5
Malaga	z.	158·8	12	i 20 7	[+ 8]	27 59	[+56]	i 20 37	PKP_2	74·0
Almeria		159·0	8	i 20 8	[+ 8]	31 6	{− 1}	20 44	PKP_2	77·5
Algiers Univ.	z.	159·2	355	i 20 6	[+ 6]	—	—	e 20 35	PKP_2	—
Tamanrasset	z.	172·0	328	e 20 12	[+ 2]	—	—	e 21 33	PKP_2	—

Additional readings :—
Auckland iSSN =9m.47s.
Wellington i =6m.33s., iPP?Z =6m.54s., iZ =7m.59s., P_cP? =9m.12s., iZ =10m.47s., iSS =11m.38s., S_cS? =16m.22s.
Brisbane iPN =5m.59s.
Christchurch iNZ =6m.4s., eNZ =6m.27s., e?NZ =6m.47s.
Riverview iP =6m.35s., iN =7m.7s., iZ =7m.24s. and 10m.40s. iE =10m.48s., iN =11m.34s. and 11m.52s.
Perth PS =18m.55s., i =20m.15s. and 25m.7s.
Sendai PPP =14m.32s., Q =29m.6s.
Osaka SSS? =24m.0s.
Mizusawa gives S and SSS as P and S.
Kôti PPP =15m.19s., SS =24m.17s.
Hukuoka e =10m.42s. and 10m.53s.
Sapporo eP_cP =(11m.7s.), e =(11m.53s.), eS =(21m.55s.), esSS =(27m.9s.), eSSS =(29m.7s.), Q =(34m.23s.), all readings increased by 7m.
Branner ePN =11m.47s.
Santa Clara iP =11m.57s.
Berkeley eQN =31·0m.
Lick eEN =11m.53s., iZ =12m.3s., eQN =31·0m.
Ferndale eN =31m.39s., eE =31m.48s.
Pasadena iSPZ =22m.25s.
Fresno eN =22m.3s.
Riverside iZ =12m.10s.
Shasta Dam e =13m.19s.
Mineral iZ =12m.2s., 12m.12s., and 13m.30s., ePPZ =15m.13s., eZ =17m.15s., eN =32m.31s., eE =35m.31s.
China Lake iZ =12m.15s. and 13m.30s.
Reno iN =12m.22s., eN =22m.55s., eZ =23m.2s.
Boulder City i =13m.27s.
Overton ePPP?Z =17m.39s.
Tucson i =13m.0s., ePPP? =17m.45s., ePS =23m.16s., ePKP,PKP =39m.9s.
Victoria e =11m.37s.
Seattle i =12m.29s., 12m.36s., and 12m.58s., e =13m.15s. and 13m.32s., ePPS =23m.58s., e =24m.42s., 25m.37s., and 26m.41s., eSS =28m.29s.
College e =13m.32s. and 16m.27s., ePPP =17m.24s., esS =22m.56s.
Logan i =13m.29s. and 17m.28s., esSS =29m.10s., eSSS =32m.17s.
Saskatoon SS =30m.33s., SSS =34m.17s., Q =38m.47s.
Irkutsk SS =30m.51s.
Florissant iS =25m.24s., ePPS =27m.4s., i =27m.49s., and 31m.0s., iSS =32m.7s.
St. Louis ePPP =19m.59s., iSKS =24m.29s., iS =25m.20s., iPS =26m.32s., iPPS =27m.3s., i =27m.31s. and 27m.49s., e =30m.29s., iSS =32m.6s. and 32m.11s., i =33m.47s., and 35m.49s., iSSS =36m.33s., iQ =41m.21s.
Huancayo e =24m.33s. and 25m.22s., isS =25m.49s., iPS =27m.7s., iSS =32m.39s.
Chicago eSS? =31m.58s.
La Plata PSN =26m.37s., N =31m.1s., SSN =33m.31s., SSSE =40m.49s., Q?E =52·2m.
La Paz iPPPZ =20m.44s., iE =24m.53s., iPS =27m.57s., iPPS =28m.47s., iSS =33m.43s., iSSS =36m.57s., Q =44m.27s.
Bogota ePSEN =28m.39s., eSSEN =33m.58s., eEN =45m.57s.
Kodaikanal SSE =33m.2s., SSSE =36m.49s., QE =43m.31s.
Cleveland eSSN =33m.45s.
Hyderabad SSE =33m.3s.
Pennsylvania eE =20m.43s., eN =26m.40s., eE =28m.23s., eN =31m.35s. and 32m.44s.
Washington i =20m.48s., eSS? =33m.17s.
Poona PPPE =21m.42s., SKSE =25m.31s., SKKSE =26m.15s., iPSN =28m.48s., iPPSE =29m.38s., PKKSN =33m.25s., eSSN =34m.54s., SSPN =35m.17s., SSSN =38m.50s., iSKKKSN =40m.28s., Q =46·1m.
Fordham eSS =34m.47s.
Harvard i =27m.38s., eQ =46m.29s.
Weston iPPP =22m.13s., ePS =29m.32s., iSS =35m.49s., eSSS =43m.23s.
San Juan e =23m.9s., eS =27m.27s.
Stalinabad SS =35m.52s.
Sverdlovsk SS =36m.30s.

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Tananarive e =35m.20s., SSS =41m.32s.
Ivigtut 41m.43s.
Upsala e =23m.34s., eE =30m.37s., eN =30m.41s., ePPSE =33m.46s., eN =34m.19s., eSSE =39m.36s., iSSN =39m.44s., eSSS =44m.7s.?, eQ =54·1m.
Aberdeen iN =34m.19s., eE =43m.16s., eN =53m.35s.
Potsdam iZ =19m.43s. and 24m.12s., eE =24m.25s.
Jena eN =20m.55s.
Prague e =19m.48s., 20m.17s., 20m.37s., 21m.17s., 21m.28s., and 21m.58s., ePPP? = 25m.41s., e =26m.55s., eSKKS? =29m.49s., e =30m.36s., 31m.31s., 32m.31s., and 36m.49s., eSS =41m.37s., e =46m.19s., and 58m.7s.
Kew iZ =20m.43s. and 21m.38s., e =24m.12s., iSKKSZ =30m.38s., eSSNZ =42m.6s., eSSS =47m.10s.
Budapest eN =19m.56s. and 24m.11s.
Stuttgart iPKPZ =19m.47s., i =20m.12s. and 20m.35s., e =21m.47s., eSSS =47m.55s.
Belgrade i =19m.48s., e =20m.19s., and 21m.9s.
Strasbourg eSKS =26m.39s., ePP (Δ >180°) =27m.59s., iSKKS =30m.5s. and 30m.16s., iPPS =35m.51s., iSS =42m.10s., eSSS =47m.47s., and other unidentified readings.
Sofia e =20m.7s. and 20m.15s.
Paris iSKKS =29m.47s., eSS =42m.19s., iSSS =47m.48s., and other i and e readings without phase.
Zürich ePKP =19m.52s., e =20m.32s.
Besançon i =20m.12s.
Triest iPKP$_2$ =20m.16s., iPP =23m.49s., iPPP =26m.42s., iSKKS =29m.38s., iSKKKS =30m.45s., iPSKS =33m.2s., iPS =34m.22s., iSS =42m.27s., iPSS =43m.4s., eSSS =47m.29s.
Salo e =20m.36s. and 21m.15s.
Clermont-Ferrand iPKS =23m.25s., ePPS =36m.37s., eSS =42m.43s., eSSP =43m.40s., eSSS =48m.23s., Q =61·6m.
Taranto PSKS =33m.9s.
Rome iNZ =21m.2s., iN =42m.33s., eSSSN =48m.42s.
Messina e =22m.23s. and 30m.51s.
Tortosa PPP?E =27m.24s., PPSE =36m.43s., SSSE =49m.44s.
Lisbon PKSN =24m.4s., SSSEN =49m.19s.
Toledo ePKP$_2$Z =20m.26s., PPZ =23m.53s., iZ =25m.6s., iN =29m.54s., SKKS?N = 30m.59s., iN =36m.36s., SSN =43m.21s., SSSN =49m.30s., QN =66m.11s.
Alicante Q =66m.8s.
Granada iPP =24m.24s., PPP =27m.27s., SKSP =34m.36s., PPS =38m.6s., iSS = 44m.6s.
Malaga iPPZ =24m.27s., PPSZ =37m.21s., QZ =65m.57s.
Almeria PKS =23m.38s., PP =24m.22s., PPP =28m.2s., PPS =37m.38s., SS =44m.18s., SSS =50m.30s.
Algiers Univ. eZ =21m.3s. and 22m.49s., ePPZ =25m.5s.
Tamanrasset eZ =20m.16s. and 20m.33s., ePPZ =25m.26s., ePPPZ =29m.38s.
Long waves were also recorded at Sitka and Columbia.

Dec. 26d. Readings also at 0h. (Hungry Horse, Overton, and near Mizusawa), 1h. (near Punta Arenas and near Mizusawa), 2h. (Mount Wilson, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse (2), College, near Mizusawa and near Concepcion), 3h. (Santa Lucia and Hungry Horse), 4h. (near Bandong, Batavia, and near Mizusawa), 5h. (Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Mizusawa), 6h. (Andijan, near Stalinabad, and near Punta Arenas), 7h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, College, Stuttgart, near Ottawa, and Rolphton), 8h. (Mizusawa), 10h. (China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, Garm, Samarkand, near Andijan, Obi-garm, Stalinabad, and near Mizusawa), 11h. (La Plata), 12h. (near Punta Arenas), 13h. (La Paz, Overton, Hungry Horse, Rome, Andijan, Samarkand, near Garm, Obi-garm, and Stalinabad), 14h. (Overton, and near Ottawa), 15h. (near Klyuchi), 16h. (China Lake and Palomar), 18h. (near Garm and Obi-garm), 19h. (Overton and Pierce Ferry), 20h. (near Obi-garm), 21h. (College, Grozny, near Leninakan, and Tiflis), 23h. (Grahamstown, Pierce Ferry, Hungry Horse, and near Mizusawa).

Dec. 27d. 8h. 56m. 10s. Epicentre 36°·7N. 139°·7E. Focus at base of Superficial Layers (as on 25d.).

Intensity VII-VIII at Kanuma (Tochigi Prefecture) ; VI at Sasanuma (Tochigi Prefecture); V at Utunomiya, Kumagaya, Kakioka, Tokyo, Mito ; IV at Onahama, Tukubasan, Shirakawa, Hunatu, Tyosi, Oiwake, Kohu, Inauashiro ; II-III at Titibu, Yokohama, Hukusima, Takada, Isinomaki, Shizuoka. Epicentre as adopted. Macroseismic radius 200-300km.

The Seismo. Bulletin of the Cent. Met. Obs., Japan, for the year, 1949, Tokyo, 1950, pp. 43-44, with macroseismic chart.

$A = -\cdot 6129$, $B = +\cdot 5198$, $C = +\cdot 5951$; $\delta = -2$; $h = 0$;
$D = +\cdot 647$, $E = +\cdot 763$; $G = -\cdot 454$, $H = +\cdot 385$, $K = -\cdot 804$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Utunomiya		0·2	138	−0 4k	−11	−0 2	−11	—	—	—
Kakioka		0·6	140	0 9k	− 3	0 20	− 1	—	—	—
Kumagaya		0·6	205	0 7a	− 5	0 16	− 5	—	—	—
Tukubasan		0·6	146	0 0k	−12	0 12	− 9	—	—	—
Mito		0·7	117	0 9k	− 4	0 19	− 4	—	—	—
Onahama		1·0	76	0 17	− 1	0 32	+ 1	—	—	—
Tokyo		1·0	177	0 16k	− 2	0 29	− 2	—	—	—
Hukusima		1·2	30	0 20a	0	0 38	+ 2	—	—	—
Matusiro		1·2	263	0 19	− 1	0 34	− 2	—	—	—
Nagano		1·2	268	0 19	− 1	0 42	+ 6	—	—	—
Tokahama		1·3	182	0 19k	− 3	0 34	− 4	—	—	—
Aikawa		1·7	319	0 28a	0	0 52	+ 3	—	—	—
Mera		1·8	177	0 26	− 3	0 49	− 2	—	—	—
Sendai		1·8	31	0 30a	+ 1	0 56	+ 5	—	—	—
Osima		1·9	188	0 32a	+ 1	0 49	− 5	—	—	—
Shizuoka		2·0	211	0 45	+13	1 13	+17	—	—	—
Toyama		2·0	270	0 37k	+ 5	1 2	+ 6	—	—	—
Omaesaki		2·4	210	0 40	+ 2	1 12	+ 6	—	—	—
Wazima		2·4	287	0 40	+ 2	1 9	+ 3	—	—	—
Gihu		2·7	241	0 47	+ 5	1 20	+ 6	—	—	—
Mizusawa	E.	2·7	25	0 45	+ 3	1 23	+ 9	—	—	—
Nagoya		2·7	235	0 44	+ 2	1 18	+ 4	—	—	—
Akita		3·0	6	0 47	+ 1	1 36	+14	—	—	—
Hikone		3·1	243	0 51	+ 3	1 32	+ 8	—	—	—
Kameyama		3·2	235	0 58	+ 9	—	—	—	—	—
Morioka		3·2	21	0 48	− 1	1 36	+ 9	—	—	—
Miyako		3·4	31	0 52	0	1 34	+ 2	—	—	—
Kyoto		3·6	244	0 57	+ 2	1 41	+ 4	—	—	—
Osaka		3·9	240	1 10	+11	2 2	+18	—	—	—
Owase		3·9	228	0 58	− 1	1 52	+ 8	—	—	—
Hatinohe		4·1	20	1 6	+ 4	1 55	+ 6	—	—	—
Toyooka		4·1	255	1 4	+ 2	2 7	+18	—	—	—
Aomori		4·2	11	1 10	+ 7	2 7	+15	—	—	—
Kobe		4·2	243	1 12	+ 9	2 6	+14	—	—	—
Siomisaki		4·6	226	1 21	+12	2 23	+21	—	—	—
Sumoto		4·6	240	1 16	+ 7	2 13	+11	—	—	—
Mori		5·4	7	1 18	− 2	2 40	+18	—	—	—
Muroto		5·7	234	1 23	− 1	2 40	+10	—	—	—
Kôti		5·9	240	1 40	+13	2 53	+18	—	—	—
Hirosima		6·3	251	1 31	− 2	3 16	+31	—	—	—
Matuyama		6·4	245	1 33	− 1	2 45	− 2	—	—	—
Sapporo		6·5	11	1 43	+ 7	3 19	+29	—	—	—
Hukuoka		8·2	251	2 10k	+10	4 14	SSS	—	—	—
Miyazaki		8·3	238	1 46	−15	—	—	—	—	—
Kumamoto		8·4	245	2 29	PPP	4 25	L	—	—	(4·4)
College		50·1	32	e 8 53	− 1	—	—	—	—	—
Shasta Dam		72·4	52	i 11 24	− 1	—	—	—	—	—
Hungry Horse		73·0	42	i 11 27	− 1	—	—	—	—	—
Mineral	z.	73·1	52	e 11 47a	P_cP	—	—	—	—	—
Berkeley	z.	74·0	55	i 11 34a	0	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Reno	Z.	74·7	52	e 11 38a	0	—	—	e 12 22	PcP	—
Lick	Z.	74·8	55	i 11 39a	0	—	—	—	—	—
Tinemaha	Z.	77·1	53	i 11 51	− 1	—	—	—	—	—
China Lake	Z.	78·3	53	i 11 58	0	—	—	—	—	—
Pasadena	Z.	78·9	56	i 12 0	− 2	—	—	—	—	—
Riverside	Z.	79·5	56	e 12 3	− 2	—	—	—	—	—
Overton	Z.	79·9	52	i 12 8	+ 1	—	—	—	—	—
Boulder City		80·0	52	e 12 7	− 1	—	—	—	—	—
Ksara		80·2	305	e 12 10	+ 1	—	—	—	—	—
Palomar	Z.	80·3	55	i 12 9	0	—	—	—	—	—
Pierce Ferry		80·4	52	i 12 10	0	—	—	—	—	—
Collmberg		80·7	328	e 12 9	− 2	—	—	e 12 13	P	—
Stuttgart		84·2	329	e 12 28	− 1	—	—	—	—	e 40·8
Tucson		84·9	53	i 12 33	0	—	—	—	—	—
Paris		86·8	333	i 12 40	− 2	—	—	e 13 25	?	e 51·8
Tamanrasset	Z.	106·7	316	18 31	[+ 9]	—	—	—	—	—
La Paz		148·2	57	19 42	[+ 3]	—	—	—	—	—

Long waves were also recorded at Potsdam, Strasbourg, and Triest.

Dec. 27d. 21h. 3m. 49s. Epicentre 13°·0S. 174°·5W.

A = −·9702, B = −·0934, C = −·2235 ; δ = −4 ; h = +6 ;
D = −·096, E = +·995 ; G = +·222, H = +·021, K = −·975.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Apia		2·8	107	0 45	− 2	1 19	− 3	—	—
Branner	Z.	70·2	42	i 11 18a	+ 1	—	—	—	—
Berkeley	Z.	70·4	42	i 11 19k	+ 1	—	—	i 11 52	PcP
Lick	Z.	70·5	42	i 11 20k	+ 2	—	—	i 11 43	PcP
Pasadena		71·1	47	i 11 21k	− 1	—	—	i 11 41	PcP
Fresno		71·4	43	i 11 24	0	—	—	e 11 27	P
Riverside	Z.	71·6	47	i 11 23k	− 2	—	—	—	—
Palomar		71·7	48	i 11 24k	− 2	—	—	—	—
Shasta Dam		71·9	39	i 11 29	+ 2	—	—	—	—
Mineral	Z.	72·2	39	e 11 30k	+ 1	—	—	i 11 56	PcP
China Lake	Z.	72·4	45	i 11 29k	− 1	—	—	i 11 51	PcP
Tinemaha		72·6	44	i 11 31k	0	—	—	—	—
Reno		72·9	42	e 11 31	− 2	—	—	i 11 35	P
Boulder City		74·4	47	i 11 41	− 1	—	—	i 12 6	pP
Overton	Z.	75·0	46	i 11 35	−10	—	—	—	—
Pierce Ferry		75·1	47	i 11 45	− 1	—	—	—	—
Tucson		75·7	51	i 11 47	− 2	—	—	—	—
College		80·2	11	i 12 19	+ 5	—	—	e 12 45	pP
Hungry Horse		81·1	36	i 12 19	+ 1	—	—	i 12 45	pP
La Paz		101·6	110	i 19 33	PPP	—	—	—	—
Collmberg	Z.	141·3	352	e 19 27	[− 6]	—	—	e 19 54	pPKP
Paris		144·2	3	i 19 36	[− 2]	—	—	i 20 1	pPKP
Stuttgart	Z.	144·2	355	e 19 33	[− 5]	—	—	e 20 3	pPKP
Strasbourg		144·5	357	i 19 38	[0]	i 20 3	sPKP	e 19 52	pPKP
Basle		145·5	357	e 19 41a	[+ 1]	—	—	—	—
Besançon		145·8	358	i 19 41	[0]	—	—	e 20 7	pPKP
Clermont-Ferrand		147·3	3	i 19 44	[+ 1]	—	—	e 20 12	pPKP

Additional readings :—
Pasadena eZ = 11m.54s.
Hungry Horse i = 13m.26s., e = 16m.22s.
Stuttgart ePKPZ = 19m.37s.

Dec. 27d. 23h. 57m. 10s. Epicentre 59°·8S. 20°·9W.

$A = +\cdot4723$, $B = -\cdot1804$, $C = -\cdot8628$; $\delta = +4$; $h = -9$;
$D = -\cdot357$, $E = -\cdot934$; $G = -\cdot806$, $H = +\cdot308$, $K = -\cdot506$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Punta Arenas	N.	27·8	261	e 5 52	− 1	10 43	+ 8	—	—	—
La Plata		34·6	299	6 50	− 3	12 26	+ 4	7 53	PP	18·7
Buenos Aires		35·1	299	e 6 46	−11	12 21	− 9	—	—	16·0
Grahamstown	Z.	40·7	71	i 7 44	0	e 13 50?	− 5	—	—	e 19·3
Santa Lucia		41·8	286	i 7 51	− 2	14 13	+ 2	8 22	PP	e 17·2
Copiapo	N.	46·6	292	i 8 37	+ 5	14 49	−32	17 48	SS	—
Pretoria	Z.	47·8	67	i 8 40	− 1	e 15 28	−10	—	—	e 24·3
Antofagasta		49·8	294	e 8 56	0	e 16 8	+ 2	e 20 44	SSS	28·6
La Paz		55·1	302	i 9 34k	− 2	i 17 20	+ 2	i 9 45	pP	25·6
Huancayo		62·2	296	i 10 25	− 1	i 18 54	+ 3	—	—	i 25·6
Tananarive		63·0	81	e 10 36	+ 5	e 19 6	+ 5	i 10 49	pP	26·8
Christchurch		76·4	190	i 11 54	+ 1	e 21 42	+ 4	12 19	PcP	—
Bogota		76·5	305	i 11 53	− 1	i 21 42	+ 3	i 26 38	SS	—
Kaimata	N.E.	77·5	189	e 12 15	+16	—	—	—	—	—
Wellington		78·5	192	i 12 2	− 2	21 48	−13	12 41	PcP	41·6
Cobb River	E.	78·8	190	e 12 15	+ 9	—	—	—	—	—
Fort de France		81·1	321	i 11 55	−23	i 22 7	−21	—	—	e 38·1
Perth		81·9	144	i 12 30	+ 7	i 22 46	+10	i 15 34	PP	i 38·7
Galerazamba		82·6	307	e 12 45	+19	i 22 52	+ 9	—	—	35·8
Auckland	N.	82·8	192	e 12 55	+28	e 22 50	+ 5	—	—	e 42·8
Tamanrasset	Z.	85·1	24	e 12 38	− 1	e 23 8	0	e 16 3	PP	e 39·8
San Juan		86·1	318	e 12 45	+ 1	e 23 8	[0]	e 15 48	PP	e 34·8
Riverview		86·5	174	i 12 47k	+ 1	e 23 13	[+ 2]	i 23 42	ScS	i 35·7
Brisbane		92·9	175	e 13 14	− 2	i 24 1	−19	i 17 1	PP	43·1
Malaga	Z.	97·1	13	i 13 42a	+ 7	i 24 23	[−11]	17 38	PP	40·6
Almeria		97·5	14	i 13 57	+20	i 25 11	+12	17 57	PP	43·0
Granada		97·7	13	i 14 4k	+26	i 25 13	+12	i 17 52	PP	i 43·3
Algiers Univ.	Z.	98·2	19	e 13 47	+ 7	e 26 29	PS	e 17 51	PP	—
Lisbon		98·6	9	13 51	+ 9	25 6	− 3	38 32	Q	40·8
Helwan		99·1	44	e 13 55	+11	24 56	{+ 8}	e 17 50	PP	—
Alicante		99·2	16	14 6	+21	24 30	[+ 7]	—	—	e 43·5
Toledo		100·3	13	e 13 57	+ 7	i 25 29	+ 6	e 18 4	PP	44·3
Tacubaya		100·8	290	i 17 48	?	e 24 35	[+ 4]	i 18 8	PP	e 52·8
Tortosa		101·8	17	18 47	PP	25 24	−11	24 55	SKKS	e 48·8
Messina		102·2	28	—	—	e 25 55	+16	e 32 56	SS	42·0
Barcelona		102·6	17	e 20 31	PPP	—	—	—	—	e 54·9
Kodaikanal	E.	103·0	91	i 17 56	PP	e 24 36	[− 5]	19 46	PPP	37·9
Athens		104·1	35	e 19 22	PP	—	—	—	—	—
Ksara		104·3	46	e 14 14	+ 6	28 14	PPS	18 36	PP	—
Taranto		104·8	29	18 33	PP	e 24 53	[+ 3]	e 30 33	PKKP	—
Rome		105·0	25	e 14 16	+ 5	e 24 48	[− 3]	i 18 36	PP	—
Florence Arc.		106·5	23	e 19 21	PP	e 34 39	SS	e 38 39	SSS	—
Florence Xim.		106·5	23	e 19 2	PP	—	—	—	—	—
Prato		106·6	23	e 18 50	PP	e 28 18	PS	—	—	—
Clermont-Ferrand		107·0	17	e 14 33	P	e 25 9	[+10]	e 18 58	PP	49·8
Bologna		107·3	23	e 19 19	PP	e 34 0	SS	—	—	—
Padova		107·4	23	e 19 19	PP	e 31 17	?	—	—	—
Bombay		108·0	83	e 18 12	[−17]	i 28 33	PS	—	—	45·4
Poona		108·2	84	e 18 59	[+29]	i 28 28	PS	21 32	PPP	38·3
Istanbul		108·6	37	e 18 40	[+10]	e 29 2	PS	—	—	—
Washington		108·7	317	e 17 54	[−36]	e 28 29	PS	e 18 57	PP	e 48·9
Neuchatel		108·8	19	e 18 54	PP	—	—	—	—	—
Triest		108·8	24	i 18 57	PP	i 25 27	[+20]	i 21 24	PPP	e 42·1
Besançon		108·9	18	e 19 4	PP	—	—	—	—	—
Philadelphia		109·0	319	e 19 1	PP	e 25 3	[− 5]	e 28 18	PS	e 47·1
City College, N.Y.		109·3	321	e 18 42	[+10]	e 25 12	[+ 3]	e 28 28	PS	e 44·8
Fordham		109·3	321	e 18 56	PP	e 28 24	PS	i 34 19	SS	—
Basle		109·5	20	e 19 14	PP	e 28 40	PS	e 29 50	PPS	—
Zagreb		109·5	26	e 18 51	[+19]	e 28 41?	PS	e 29 45	PPS	e 44·8
Belgrade		109·6	30	e 18 59a	[+27]	e 28 59	PS	e 34 25	SS	e 61·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hyderabad	E.	109·6	89	19 16	PP	28 33	PS	34 40	SS	44·0
Jersey	E.	109·7	13	e 20 10	?	—	—	—	—	47·8
Halifax		109·8	329	—	—	e 26 12	{+ 8}	e 34 50?	SS	44·3
Paris		109·9	15	e 18 28	[− 5]	e 26 2	{− 2}	e 19 4	PP	e 49·8
Weston		109·9	323	e 18 22	[−11]	i 34 44	SS	i 19 2	PP	61·0
Harvard		110·1	323	e 18 55	[+22]	e 26 42	{+36}	i 19 39	PP	e 51·4
Strasbourg		110·5	20	e 19 10	PP	e 25 20	[+ 6]	e 21 29	PPP	e 53·8
Pennsylvania		110·6	317	i 19 5	PP	25 56	{−13}	i 21 25	PPP	—
Budapest		110·8	33	19 32	PP	i 29 10	PS	—	—	—
Stuttgart		111·0	21	e 18 25	[−10]	e 27 6	{+54}	e 19 16	PP	e 43·8
Cincinnati		111·6	311	i 19 18	PP	—	—	i 21 42	PPP	—
Budapest		111·8	27	—	—	e 27 20	{+62}	e 30 20	PPS	e 34·8
Ogyalla		111·9	26	e 20 38	?	e 27 17	{+59}	—	—	—
Kew		112·2	13	e 19 25	PP	e 24 56	[−25]	e 21 46	PPP	e 42·8
Cleveland		112·5	315	e 19 23k	PP	e 25 26	[+ 4]	e 21 53	PPP	53·3
Prague		113·2	24	e 15 24	P	e 25 37	[+12]	e 19 24	PP	e 42·8
Yalta		113·3	39	e 29 22	PS	—	—	—	—	—
Leninakan		113·4	48	e 19 41	PP	—	—	—	—	—
St. Louis		113·4	307	e 18 40	[0]	e 25 28	[+ 2]	e 19 21	PP	—
De Bilt		113·5	17	e 18 50	[+10]	e 29 10	PS	e 19 38	PP	e 48·8
Jena	N.	113·5	22	e 20 0	PP	—	—	e 22 12	PKS	—
Ottawa		114·0	321	e 18 35	[− 6]	25 28	[0]	19 35	PP	46·8
Collmberg		114·1	22	e 17 56?	[−45]	e 27 20	{+46}	e 19 11	PP	e 42·8
Seven Falls	E.	114·1	325	e 19 43	PP	i 27 15	{+41}	i 34 31	SS	55·8
Tiflis		114·6	48	e 18 35	[− 7]	i 29 35	PS	e 19 53	PP	—
Chicago		115·0	310	i 19 37	PP	e 26 29	{−11}	e 35 33	SS	e 46·3
Potsdam		115·1	21	e 19 8	[+25]	i 29 28	PS	i 19 51	PP	e 35·8
Durham		115·3	12	—	—	i 27 47	?	i 29 37	PS	i 48·7
Baku		115·5	53	e 20 5	PP	e 29 51	PS	40 32	SSS	—
Grozny		116·3	48	e 19 17	[+31]	—	—	—	—	—
Tucson		117·2	287	e 18 46	[− 1]	e 27 5	{+10}	e 19 53	PP	e 47·3
Lincoln	E.	117·9	304	—	—	e 26 18	[+35]	e 36 11	SS	e 50·0
Copenhagen		118·2	20	20 13	PP	26 7	[+23]	30 4	PS	—
New Delhi	N.	118·3	81	e 20 16	PP	e 28 1	{+59}	e 29 47	PS	i 49·4
Calcutta	E.	118·9	94	e 20 27	PP	e 30 4	PS	38 22	SSP	—
Palomar	Z.	121·1	283	i 18 50	[− 5]	—	—	i 20 25	PP	—
Bergen		121·6	14	—	—	e 25 48?	[− 7]	31 56	PPS	49·8
Riverside	Z.	121·8	283	e 18 55	[− 1]	—	—	i 20 36	PP	—
Pierce Ferry		121·9	287	e 18 56	[0]	e 29 20	PKKP	e 20 10	PP	—
Boulder City		122·2	287	i 18 57	[0]	e 26 25	[+28]	e 20 36	PP	—
Stalinabad		122·2	67	e 18 56	[− 1]	e 30 35	PS	—	—	—
Samarkand		122·3	65	e 19 1?	[+ 4]	—	—	—	—	—
Pasadena		122·4	283	e 18 56	[− 1]	i 26 3	[+ 5]	e 20 29	PP	e 49·0
Ivigtut		122·5	344	—	—	e 37 0	SS	e 50 26	Q	57·8
Overton		122·5	287	e 18 58	[0]	—	—	e 29 20	PKKP	—
Obi-garm		122·8	68	18 57	[− 1]	e 30 43	PS	—	—	—
Upsala		123·0	22	e 22 44	PKS	e 30 20	PS	e 36 8	SS	e 50·8
Rapid City	E.	123·3	301	i 20 38	PP	e 26 2	[+ 1]	e 37 31	SS	e 50·7
Garm		123·3	68	e 19 9	[+10]	—	—	—	—	—
China Lake	Z.	123·4	285	i 19 0	[+ 1]	i 32 58	PPS	i 20 34	PP	—
Moscow		124·2	35	19 8	[+ 7]	30 50	PS	e 20 59	PP	—
Salt Lake City		124·6	293	e 21 28	PP	e 37 29	SS	—	—	e 50·6
Tashkent		124·7	66	e 19 1	[− 1]	e 26 1	[− 4]	i 20 53	PP	—
Tinemaha	Z.	124·7	285	i 19 2	[0]	e 32 41	PPS	e 21 0	PP	—
Helsinki		124·8	25	—	—	e 27 8	{−38}	e 31 8	PS	e 52·8
Fresno		125·2	284	e 19 1a	[− 2]	e 32 27	PPS	i 20 56	PP	e 61·8
Logan		125·3	294	e 18 59	[− 4]	i 26 5	[− 2]	i 20 57	PP	e 53·0
Andijan		125·7	68	e 19 4	[0]	e 28 5	{+13}	e 21 7	PP	—
Lick	Z.	126·5	283	i 19 6a	[+ 1]	—	—	e 21 2	PP	—
Santa Clara		126·8	283	e 21 2	PP	e 38 27	SS	—	—	e 64·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Branner	z.	126·9	283	i 19 8	[+ 2]	—	—	i 21 12	PP	—
Berkeley	z.	127·3	283	i 19 7a	[0]	—	—	e 21 7k	PP	—
Naryn		127·9	71	—	—	i 38 42	SS	—	—	—
Bozeman		128·0	297	e 21 8	PP	—	—	—	—	e 54·2
Frunse		128·4	68	e 19 21	[+12]	e 28 26	{+17}	—	—	—
Ukiah		128·8	283	—	—	e 38 22	SS	—	—	e 54·1
Mineral	z.	128·9	285	e 19 9	[− 1]	—	—	i 21 18	PP	—
Butte	N.	129·0	297	e 21 9	PP	—	—	—	—	e 53·8
Shasta Dam		129·6	285	e 19 10	[− 1]	e 31 42	PS	e 21 27	PP	—
Honolulu		131·0	238	—	—	e 39 40	SS	—	—	e 62·1
Saskatoon		131·0	305	21 28	PP	26 20	[− 2]	22 42	PKS	53·8
Hungry Horse		131·4	297	e 19 12	[− 3]	—	—	i 21 34	PP	—
Sverdlovsk		132·8	47	19 17	[0]	26 20	[− 7]	i 21 48	PP	—
Seattle		134·7	291	e 23 0	PKS	e 25 55	[−35]	e 23 48	PPP	e 68·8
Victoria		135·8	291	19 23	[0]	40 14	SS	23 7	PKS	58·8
Semipalatisk		136·5	65	e 19 19?	[− 5]	—	—	—	—	—
Sitka		147·1	295	i 19 42	[− 1]	e 27 28	[+38]	e 24 14	PP	e 61·0
Irkutsk		149·3	78	19 47	[+ 1]	—	—	23 21	PP	—
College		155·5	305	i 19 51	[− 4]	—	—	e 23 57	PP	e 56·6
Vladivostok		156·4	123	e 19 54	[− 2]	e 23 28	PKS	e 43 59	SS	—

Additional readings :—
Punta Arenas N =7m.56s., and 9m.54s.
La Plata PPN =7m.57s., P_cPN =9m.14s., P_cP?E =9m.57s., N =11m.38s., SE =12m.8s., QE =14m.8s., QN =14m.14s.
Santa Lucia N =14m.4s.
La Paz iPP?Z =11m.16s., PPP =13m.4s., iPS =17m.40s., iSS =21m.2s., iSSS =23m.20s.
Tananarive PP =12m.58s., PPP =14m.25s., esS =19m.21s., PS =19m.37s., S_cS =20m.40s. SS =23m.6s., SSS =26m.4s.
Christchurch eZ =13m.19s., PPZ =14m.51s., iSEZ =21m.50s., SSEZ =26m.50s., SSSEN =30m.30s.
Wellington iPPZ =15m.15s., e =22m.24s., i =23m.8s., eSS =27m.10s., Q =34·8m.
Perth i =28m.14s.
Tamanrasset eZ =12m.26s., iZ =12m.41s., and 12m.49s., ePPPZ =18m.14s., eSZ = 23m.34s., eZ =24m.24s., eSSZ =28m.54s., eZ =31m.24s., eSSSZ =32m.14s., eZ = 34m.44s. and 34m.50s.
San Juan eSS =29m.2s., eSSS =32m.50s.
Riverview iN =23m.24s., iE =23m.33s., iPPSE =24m.37s., iSSE =29m.13s., eQE = 35m.2s.
Brisbane iQE =37m.44s.
Malaga PPPZ =19m.6s., PSZ =25m.40s., SSZ =30m.10s.
Almeria PPP =20m.3s., SKS =24m.31s., PPS =27m.17s., SS =31m.42s., SSS =35m.29s., Q =39m.2s.
Granada PPP =19m.58s., SKS =24m.31s., PS =26m.1s., iSS =31m.51s., SSS =35m.19s., Q =39·0m.
Helwan PPPZ =20m.5s., eN =24m.18s., PSNZ =26m.53s.
Toledo PPPZ =20m.14s., iSKSN =24m.30s., SSE =32m.31s., SSSN =36m.19s., QN = 41m.37s.
Tacubaya ePPS =27m.43s.
Tortosa SE =26m.3s., PS?N =27m.39s., SS?E =33m.1s., SSS?N =38m.7s., eQ?E = 42·8m.
Messina e =36m.49s.
Kodaikanal PSE =25m.4s., SSE =29m.6s., Q =34m.20s.
Rome iPS =27m.50s., iSS =33m.37s., i =43m.42s.
Clermont-Ferrand e =14m.52s., ePPP =21m.7s., eSKKS =25m.57s., ePS =28m.9s., ePPS =29m.10s., eSS =33m.57s., eSSP =34m.21s., eSSS =38m.2s.
Poona P_cPE =19m.9s., PPSN =29m.17s. There is also a separate set of readings purporting to be a repetition. These are probably in reality addition phases to the present earthquake. As given thay are iPN =25m.2s., PPN =27m.40s., iSN = 34m.31s., PPSN =35m.10s., SSN =39m.11s., Q =44·8m.
Washington ePPP =20m.55s., eSS =34m.13s.
Triest iS =26m.55s., iPS =28m.35s., iPPS =29m.37s.
Besançon e =19m.15s.
Philadelphia eS =26m.29s., eSS =34m.9s., eSSS? =39m.2s.
City College, N.Y. eSS =34m.7s., eSSS =39m.36s., e =42m.53s.
Zagreb eSSE =34m.43s.
Belgrade e =27m.0s.
Paris e =18m.36s., and 19m.17s., i =19m.25s. and 23m.22s., iPS? =29m.1s., iPKKP = 29m.40s., iPPS? =30m.14s., iSS =34m.30s., iSSS =38m.14s., eQ =43·8m.
Weston eSSS =38m.58s.
Harvard e =22m.23s., ePS =28m.32s., eSS =34m.41s., i =42m.19s., eQ =44m.41s.

Continued on next page.

Strasbourg ePPP =21m.35s., eS? =27m.5s., ePS =28m.39s. and 28m.48s., iPPS = 29m.58s., eSS =34m.39s., iSS =35m.4s., e =37m.7s., eSSS =38m.20s., iSSS =38m.35s., i =42m.2s. and 43m.9s., eQ? =45·8m.
Pennsylvania eEN =19m.35s., iPPE =20m.7s., iN =25m.17s., eN = =28m.29s., ePSE = 28m.49s., eE =30m.37s., eN =34m.6s.
Stuttgart e =20m.14s., ePPP =21m.20s., ePS =28m.39s., eZ =29m.42s., ePFS = 30m.0s., eSS =34m.50s.
Cincinnati i =19m.31s.
Budapest eN =28m.50s.?
Kew eSEN =27m.16s., ePPSNZ =29m.1s., eNZ =30m.15s., eSS =35m.17s., eSSSEN = 38m.36s., e =42m.0s.
Cleveland eEN =19m.55s., iN =24m.48s. and 27m.2s., eSE =27m.8s., iN =35m.6s., iSSE =35m.18s.
Prague e =19m.34s., 22m.56s., and 23m.10s., eSS? =35m.38s., eSSS? =40m.20s.
St. Louis eSKP =21m.6s., e =23m.43s., and 25m.9s., i =26m.10s., iSS =35m.14s.
De Bilt ePPS =29m.58s., eSS =34m.50s.
Ottawa PPP =22m.3s., e =24m.10s., SKKS =26m.14s., PS =29m.11s., SS =35m.23s.
Collmberg eE =22m.59s., eN =29m.32s., eSSE =35m.14s., eSSN =35m.44s., eSSSN = 39m.2s.
Seven Falls QE =43·5m.
Tiflis SKSP =29m.28s.
Potsdam eZ =19m.18s., iN =20m.9s., eE =27m.8s., iPPS?N =29m.40s.
Durham iEN =29m.46s., iN =35m.45s., iEN =35m.55s., iN =36m.5s., iEN =36m.19s., iE =40m.5s., iN =40m.12s.
Tucson ePKKP =29m.12s., ePS =29m.52s., eSS =36m.10s., eSKP,PKP =43m.59s.
Copenhagen SS =36m.22s.
New Delhi iN =41m.10s.
Bergen SSN =37m.18s., eN =41m.28s.
Pasadena iPPZ =20m.44s., ePSN =30m.28s., ePPSEN =31m.49s., iSSEN =37m.23s., eSSSEN =41m.32s.
Upsala eS_cS,PKPE =34m.18s., eN =35m.14s.?, eSKKSE =36m.19s., eN =38m.9s., 40m.42s., and 45m.50s.
China Lake eZ =25m.28s. and 28m.49s.
Moscow PKS =22m.34s.
Tashkent ePKS =22m.28s., eSKSP =30m.34s.
Tinemaha iZ =19m.14s.
Helsinki e =37m.45s. and 42m.32s.
Fresno ePKPN =19m.6s., ePKPE =19m.11s., eN =20m.38s., eZ =20m.50s., eE = 21m.27s., eN =21m.54s. and 34m.55s., eZ =35m.51s.
Logan ePS =31m.0s., eSS =37m.50s.
Lick eEN =19m.11s., iZ =19m.20s.a, 21m.30s., and 22m.3s.
Mineral iZ =19m.23s. and 21m.42s.
Saskatoon SKKS =28m.28s., SS =44m.20s.
Hungry Horse e =19m.0s.
Sverdlovsk iPKS =22m.53s., iPPP =24m.48s., SKKS =28m.30s., iSS =39m.27s., SSS = 44m.44s.
Seattle ePKKP =29m.47s., ePPS =32m.10s.
Sitka eSS =42m.0s.
College iPKP =20m.20s.
Vladivostok $iPKP_2$ =20m.53s., iPP =24m.2s., SSS =47m.26s.
Long waves were also recorded at Colombo.

Dec. 27d. Readings also at 1h. (Ksara and near Istanbul), 2h. (Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral (2), Shasta Dam, Hungry Horse, College, Stuttgart, near Lick, near Punta Arenas, and near Mizusawa), 3h. (near Mizusawa), 4h. (near Punta Arenas (2), near Mineral and Reno), 5h. (Simferopol, near Theodosia and Yalta), 6h. (Mineral, and near Obi-garm), 8h. (Palomar (2), Pasadena (2), Riverside (2), China Lake (2), Tinemaha (2), Tucson, Boulder City, Overton (2), Pierce Ferry (2), Mineral (2), Shasta Dam (2), Hungry Horse (2), College (2), Berkeley, Lick (2), and La Paz), 9h. (Hungry Horse, and near Mizusawa), 10h. (Mount Wilson, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Berkeley, Lick, Shasta Dam, (2), Reno, Mineral (2), Hungry Horse (2), College (2), and near Mizusawa), 11h. (Palomar, Pasadena Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Hungry Horse, and College (2)), 12h. (Hungry Horse, and near Tchimkent), 14h. (Pierce Ferry), 16h. (China Lake, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Mizusawa), 17h. (College and Hungry Horse), 18h. (La Paz and Hungry Horse), 19h. (Hungry Horse, Overton, near Tucson and near Andijan), 20h. (Mount Wilson, Riverside, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, College, Logan, La Paz, Samarkand, near Obi-garm, and Stalinabad), 22h. (Hungry Horse, Somarkand, near Andijan, Obi-garm, and Stalinabad), 23h. (Mizusawa).

Dec. 28d. 3h. 50m. 56s. Epicentre 40°·7N. 29°·4W.

Foreshock of earthquake at 6h.

$A = +·6624$, $B = -·3732$, $C = +·6495$; $\delta = -10$; $h = -2$;
$D = -·491$, $E = -·871$; $G = +·566$, $H = -·319$, $K = -·760$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Paris		23·9	59	i 5 16	0	—	—	i 5 54	PP	e 12·1
Clermont-Ferrand		24·1	67	e 5 17	− 1	—	—	—	—	—
Algiers Univ.	z.	25·5	89	e 5 26	− 6	—	—	—	—	—
Besançon		26·1	64	e 5 37	0	—	—	—	—	—
Basle		27·2	63	e 5 47	0	e 10 30	+ 5	—	—	—
Strasbourg		27·4	60	e 5 49	0	—	—	e 6 13	PP	—
Stuttgart	z.	28·3	60	e 5 54	− 3	—	—	—	—	—
Tamanrasset	z.	34·4	111	e 6 50	− 1	—	—	—	—	—
Hungry Horse		57·9	309	e 9 54	− 2	—	—	—	—	—
Logan		59·6	302	e 10 4	− 4	—	—	—	—	—
Tucson		63·8	292	e 10 38	+ 2	—	—	—	—	—
Overton	z.	64·0	298	e 10 37	− 1	—	—	—	—	—
Pierce Ferry		64·0	297	e 10 38	0	—	—	—	—	—
Boulder City		64·6	297	e 10 42	+ 1	—	—	—	—	—
Tinemaha	z.	66·3	300	e 10 51	− 1	—	—	—	—	—
China Lake	z.	66·6	299	e 10 55	+ 1	—	—	—	—	—
Palomar	z.	67·5	295	e 10 59	− 1	—	—	—	—	—
Mount Wilson	z.	67·8	296	e 10 58	− 4	—	—	—	—	—
Lick	z.	68·4	302	e 11 10	+ 4	—	—	—	—	—

Additional readings :—
Paris i = 5m.25s.
Besançon e = 5m.45s.
Hungry Horse e = 10m.12s.
Long waves were also recorded at De Bilt.

Dec. 28d. 6h. 25m. 23s. Epicentre 40°·7N. 29°·4W. (as at 3h.).

Given by J.S.A.

$A = +·6624$, $B = -·3732$, $C = +·6495$; $\delta = -10$; $h = -2$;
$D = -·491$, $E = -·871$; $G = +·566$, $H = -·319$, $K = -·760$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Toledo	E.	19·3	85	(i 4 23)	− 6	i 4 23	P	—	—	—
Malaga	z.	19·9	93	i 4 35k	− 1	i 8 9	− 6	—	—	9·8
Granada		20·4	92	4 41a	0	8 18	− 7	5 3	PP	10·1
Almeria		21·3	92	4 32	−18	8 14	−29	4 59	PP	10·2
Alicante		22·4	86	e 5 3	+ 1	—	—	—	—	e 10·3
Tortosa		22·6	80	5 18	+15	9 20	+13	5 45	PP	11·2
Kew		22·7	52	e 5 28	+24	e 9 16	+ 7	—	—	e 10·6
Paris		23·9	59	i 5 18	+ 2	e 9 50	+20	i 5 54	PP	e 11·1
Clermont-Ferrand		24·1	67	e 5 18	0	i 9 49	+15	e 5 56	PP	11·6
Algiers Univ.	z.	25·5	89	e 5 34	+ 2	—	—	e 6 0	PP	—
Besançon		26·1	64	i 5 40	+ 3	—	—	e 6 25	PP	—
De Bilt		26·2	52	—	—	e 10 17	+ 8	—	—	e 12·6
Strasbourg		27·4	60	e 5 51	+ 2	e 10 35	+ 7	e 6 21	PP	—
Zürich	z.	27·9	63	e 5 37	−17	—	—	—	—	—
Stuttgart		28·3	60	e 5 56	− 1	e 10 37	− 6	—	—	e 13·6
Potsdam		31·0	53	e 8 37?	?	e 11 7	−19	—	—	e 15·1
Weston		31·2	288	e 7 0	+37	—	—	—	—	14·6
Rome	N.	31·3	74	—	—	e 10 35	−56	—	—	—
Triest		31·6	66	—	—	i 10 44	−51	—	—	—
Prague		31·8	58	e 6 17	−11	—	—	e 7 49	PPP	—
City College, N.Y.		33·5	286	—	—	e 14 46	SS	—	—	—
Tamanrasset	z.	34·4	111	e 6 51	0	—	—	e 8 16	PP	—
St. Louis		46·1	289	e 8 34	+ 6	e 15 17	+ 3	e 18 19	SS	e 22·9
Sverdlovsk		57·2	41	i 9 48	− 3	i 17 47	+ 1	—	—	—
Hungry Horse		57·9	309	e 9 53	− 3	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Logan		59·6	302	e 10 2	− 6	—	—	—	—	—
Tucson		63·8	292	e 10 37	+ 1	—	—	—	—	e 33·5
Overton	z.	64·0	298	e 10 38	0	—	—	—	—	—
Pierce Ferry		64·0	297	i 10 37	− 1	—	—	—	—	—
College		64·4	337	e 10 32	− 8	—	—	—	—	—
Boulder City		64·6	297	e 10 43	+ 2	—	—	—	—	—
Tinemaha	z.	66·3	300	e 10 52	0	—	—	—	—	e 39·4
China Lake	z.	66·6	299	i 10 54	0	—	—	—	—	e 39·5
Mineral	z.	66·6	304	e 10 53	− 1	—	—	e 13 21	PP	—
Shasta Dam		66·9	305	e 10 57	+ 1	—	—	—	—	—
La Paz		67·3	221	11 3	+ 4	18 49	−65	—	—	31·6
Riverside	z.	67·4	296	e 11 0	+ 1	—	—	—	—	e 39·4
Palomar	z.	67·5	295	i 11 0	0	—	—	—	—	—
Pasadena		67·9	296	e 11 4	+ 2	—	—	—	—	e 35·6
Lick	z.	68·4	302	e 11 9	+ 3	—	—	—	—	—

Additional readings :—
Almeria P_cP = 8m.54s.
Tortosa PPPE = 5m.57s.
Paris i = 5m.23s.
Clermont-Ferrand i = 5m.29s. and 5m.36s.
Besançon i = 5m.52s.
Strasbourg e = 6m.6s.
Stuttgart ePZ = 6m.0s.
Long waves were also recorded at Copenhagen, Harvard, Philadelphia, Ottawa, Seven Falls, Bozeman, and Mount Wilson.

Dec. 28d. 10h. 25m. 13s. Epicentre 59°·8S. 20°·9W. (as on 27d.).

		△	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Pretoria	z.	47·8	67	i 8 36	− 5	—	—	—
La Paz		55·1	302	i 9 35	− 1	i 17 14	− 4	27·8
Huancayo		62·2	296	e 10 32	+ 6	e 18 49	− 2	e 32·1
Ksara		104·3	46	e 16 21	?	e 26 29	?	—
Strasbourg		110·5	20	i 9 7	?	—	—	—
Tucson		117·2	287	e 18 57	[+10]	—	—	—
Pierce Ferry		121·9	287	e 18 57	[+ 1]	—	—	—
Mount Wilson	z.	122·4	283	e 19 7	[+10]	—	—	—
Overton	z.	122·5	287	e 19 13	[+15]	—	—	—
China Lake	z.	123·4	285	e 19 1	[+ 2]	—	—	—
Lick	z.	126·5	283	e 18 45	[−20]	—	—	—
Mineral	z.	128·9	285	e 19 19	[+ 9]	—	—	—
Hungry Horse		131·4	297	e 19 10	[− 5]	—	—	—
College		155·5	305	e 19 54	[− 1]	—	—	—

Long waves were also recorded at Rome.

Dec. 28d. 11h. 58m. 36s. Epicentre 39°·4N. 118°·0W. (given by the stations in California)

A = −·3638, B = −·6841, C = +·6322 ; δ = +2 ; h = −1 ;
D = −·883, E = +·469 ; G = −·297, H = −·558, K = −·775.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Reno		1·4	275	e 0 28	+ 1	e 0 46	0	—	—	—
Mineral	z.	2·9	289	i 0 50k	+ 2	i 1 37	S_g	0 54	P*	—
Lick	z.	3·5	236	e 0 59k	+ 2	e 1 39	− 1	i 1 5	P*	—
Shasta Dam		3·6	292	e 0 59	+ 1	e 1 46	+ 4	—	—	e 1·8
Overton	z.	4·0	135	e 1 2	− 2	i 2 3	S*	i 1 15	P*	—
Boulder City		4·2	143	i 1 18	P*	e 1 54	− 3	—	—	—
Pierce Ferry		4·6	135	i 1 10	− 2	i 1 50	−17	—	—	—

Additional readings :—
Reno iE = 31s., iEN = 49m.
Mineral iZ = 57s., 1m.0s., and 1m.53s.
Lick iZ = 1m.48s., eN = 1m.52s., eE = 1m.56s.

Dec. 28d. 13h. 41m. 27s. Epicentre 51°·4N. 176°·0W.

$A = -·6249$, $B = -·0437$, $C = +·7795$; $\delta = +3$; $h = -6$;
$D = -·070$, $E = +·998$; $G = -·778$, $H = -·054$, $K = -·626$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		19·8	36	i 4 35	0	e 8 13	0	i 4 49	pP	e 10·8
Victoria		33·4	74	e 5 50	−52	—	—	—	—	—
Shasta Dam		37·9	84	i 7 21	+ 1	—	—	—	—	—
Mineral	z.	38·6	84	e 7 34	+ 8	—	—	e 9 47	PPP	—
Hungry Horse		39·0	69	i 7 30	0	e 13 28	− 1	i 7 47	pP	—
Reno	z.	40·2	84	e 7 54	pP	—	—	—	—	—
Lick	z.	40·4	89	e 7 43	+ 2	—	—	i 7 56	pP	—
Fresno	z.	41·9	87	e 8 3	+ 9	—	—	—	—	—
China Lake	z.	43·9	86	e 8 10	0	—	—	i 8 24	pP	—
Pasadena	z.	44·6	89	e 8 15	− 1	—	—	i 8 28	pP	—
Riverside	z.	45·2	89	i 8 34	pP	—	—	—	—	—
Overton	z.	45·4	84	i 8 23	+ 1	—	—	—	—	—
Boulder City		45·5	85	e 8 24	+ 1	—	—	—	—	—
Palomar	z.	45·9	89	i 8 27	+ 1	—	—	i 8 41	pP	—
Pierce Ferry		45·9	84	i 8 15	−11	—	—	—	—	—
Tucson		50·4	86	i 9 2	+ 1	—	—	i 9 15	pP	—
St. Louis		58·6	66	e 9 59	− 2	e 18 2	− 2	i 10 16	pP	—
Pretoria	z.	148·5	315	i 19 50	[+ 5]	—	—	—	—	—
Grahamstown	z.	155·6	309	i 19 53	[− 2]	—	—	—	—	—

Additional readings :—
Mineral iZ = =7m.42s.
Hungry Horse iP_cP =9m.40s.
China Lake iZ =8m.17s. and 9m.56s.
Pasadena iZ =10m.13s.
Palomar iZ =8m.52s. and 10m.22s.

Dec. 28d. Readings also at 1h. (Hungry Horse and near Tiflis), 2h. (Vera Cruz, Hungry Horse, Tucson, Basle, Stuttgart, Strasbourg, Paris, and near Messina), 3h. (Hungry Horse), 4h. (Clermont-Ferrand), 5h. (La Paz, Messina (2), and near Obi-garm), 7h. (Zürich, and near Obi-garm), 8h. (Reno), 9h. (Berkeley, Branner, Lick, near Fresno and Mineral), 10h. (near Tananarive), 11h. (near Obi-garm), 12h. (Mineral), 13h. (Rome), 16h. (near Lick, Mineral, and Reno), 18h. (near Tacubaya), 19h. (near Granada), 21h. (Messina and Weston), 22h. (Messina, Mineral, Hungry Horse, Sitka, College (2), and near Manzanillo), 23h. (near Branner).

Dec. 29d. 3h. 3m. 50s. Epicentre 17°·0N. 121°·5E. (as on 1949, Sept. 5d.).

Destructive along the N.W. coast of the province of Isabella. Intensity VI at Manila. The earthquake was accompanied by the opening of crevasses and the emission of steam with streams of mud throughout the central provinces of Luzon. See letter from the French Legation in Manila.

Epicentre 18°N. 121°·E. (Pasadena).
17·5N. 121·5E. (U.S.C.G.S.).

$A = -·5000$, $B = +·8159$, $C = +·2906$; $\delta = +14$; $h = +5$;
$D = +·853$, $E = +·522$; $G = -·152$, $H = +·248$, $K = -·957$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zi-ka-wei		14·1	0	e 3 20	− 3	6 45	+43	—	—	8·3
Nanking		15·2	351	3 35	− 3	6 32	+ 4	—	—	e 6·9
Kagosima		16·7	28	e 3 56	− 1	—	—	—	—	8·4
Hukuoka		18·3	25	i 4 18	+ 1	7 40	+ 1	—	—	e 9·4
Kôti		19·7	31	i 4 31	− 3	8 14	+ 4	i 4 48	PP	9·0
Hirosima		19·9	27	4 42	+ 6	7 19	−56	—	—	10·6
Kobe		21·5	32	4 54	+ 2	9 3	+16	—	—	—
Osaka		21·6	33	4 56	+ 2	9 28	+39	i 6 1	PP	e 14·5
Nagoya		22·7	35	e 5 5	+ 1	9 52	+43	—	—	e 19·1
Tokyo		24·7	37	5 38	+14	9 56	+12	—	—	—
Sendai		27·2	35	5 42	− 5	10 22	− 3	11 50	Q	13·4
Batavia		27·2	213	i 5 51a	+ 4	i 10 38	+13	—	—	—
Bandoeng		27·4	211	e 6 3	+14	e 10 57	+29	—	—	—
Vladivostok		27·5	16	i 5 47	− 3	i 11 24	SS	i 6 31	PP	—
Mizusawa	E.	27·9	33	5 53	− 1	11 52	SS	—	—	17·1

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sapporo		31·0	28	e 6 33	+12	11 11	−15	13 9	SS	13·5
Calcutta	E.	31·6	286	i 6 27	+ 1	i 13 8	SS	i 7 50	PP	—
Irkutsk		37·7	343	i 7 17	− 2	i 13 4	SS	—	—	—
Hyderabad		41·1	287	i 7 47	0	i 15 15	SS	9 0	PcP	—
Colombo	E.	41·9	262	7 57	+ 3	14 22	+ 9	—	—	24·7
New Delhi	N.	42·2	295	e 8 5	+ 9	i 15 5	+48	e 10 47	PPP	—
Kodaikanal	E.	43·2	268	i 8 10	+ 6	16 0	?	10 21	PPP	24·8
Poona		45·3	279	e 8 20	− 1	i 15 53	+51	9 27	PcP	24·7
Naryn		45·9	311	i 8 26	0	i 15 10	− 1	—	—	—
Bombay		46·2	280	i 8 31	+ 3	i 15 35	+20	i 18 59	SS	23·2
Semipalatinsk		46·9	326	8 33	− 1	—	—	—	—	—
Frunse		47·4	313	e 8 40	+ 2	—	—	—	—	—
Andijan		48·3	310	8 45	0	—	—	—	—	—
Perth		49·0	186	9 6	+16	15 26	−29	9 34	PcP	—
Klyuchi		49·1	27	e 9 0?	+ 9	e 16 26?	PPS	—	—	—
Garm		49·5	307	i 8 56?	+ 2	—	—	—	—	—
Obi-garm		49·9	307	i 8 56	− 1	—	—	e 19 47	SS	—
Stalinabad		50·6	307	i 9 0	− 2	i 16 38	PPS	—	—	—
Tashkent		50·7	310	i 9 4	+ 1	—	—	i 11 13	PP	—
Samarkand		52·2	307	i 9 14	− 1	—	—	—	—	—
Brisbane		53·8	145	i 9 28	+ 2	i 17 3	+ 2	i 20 24	SS	e 24·8
Riverview		57·9	151	e 9 59	+ 3	i 17 59	+ 4	i 10 48	PcP	27·8
Melbourne	E.	58·8	158	i 9 12	−50	i 17 34	−33	i 12 10	PP	—
Sverdlovsk		60·1	327	i 10 9	− 2	—	—	—	—	—
Baku		65·3	308	i 10 48	+ 2	—	—	—	—	—
Grozny		68·2	311	i 11 6	+ 2	—	—	—	—	—
Tiflis		69·1	309	i 11 10	0	i 20 14	− 1	i 11 28	PcP	—
Erevan		69·4	308	11 15	+ 3	—	—	—	—	—
Leninakan		69·8	308	i 11 17	+ 3	—	—	—	—	—
Piatigorsk		70·1	312	11 17	+ 1	—	—	—	—	—
Apia		72·6	110	11 35	+ 4	e 21 4	+ 8	e 21 26	PS	e 34·2
Sotchi		72·6	312	11 29	− 2	—	—	—	—	—
Moscow		72·7	324	11 28	− 4	20 50	− 7	—	—	—
Auckland	N.	73·4	137	11 56	+20	i 21 15	+10	e 14 55	PP	—
New Plymouth	E.	74·3	139	e 11 53	+12	—	—	—	—	—
Arapuni		74·7	138	e 12 1	+18	—	—	—	—	—
Cobb River	E.	74·8	142	e 12 9	+25	—	—	—	—	—
Kaimata	N.E.	74·9	144	e 12 10?	+26	—	—	—	—	—
College		75·1	26	e 11 43	− 3	i 21 18	− 6	e 14 10	PP	e 43·7
Theodosia		75·5	313	11 29?	−19	21 34	+ 6	—	—	—
Honolulu		75·6	71	e 11 48	0	e 21 30	+ 1	e 14 39	PP	e 31·5
Tuai	N.	76·1	138	e 12 10?	+19	e 21 52	+17	—	—	—
Wellington		76·1	141	i 12 0	+ 9	21 57	+22	i 12 34	PcP	35·4
Christchurch		76·3	144	i 12 4	+12	21 38	+ 1	14 47	PP	36·5
Simferopol		76·4	314	e 11 52	− 1	e 21 36?	− 2	—	—	—
Yalta		76·4	312	11 52	− 1	—	—	—	—	—
Ksara		77·2	301	e 12 0	+ 3	22 4?	+17	—	—	—
Helsinki		78·6	330	e 12 4a	− 1	e 21 56	− 6	e 16 42	PPP	e 41·2
Kishinev		79·5	316	i 12 7	− 3	i 22 25	ScS	15 10	PP	—
Istanbul		80·8	311	i 12 8	− 9	i 23 1	PS	—	—	—
Tananarive		81·0	247	e 12 21	+ 3	e 22 27	0	15 27	PP	39·3
Helwan		81·9	299	i 12 17a	− 6	22 43	+ 7	23 34	PS	—
Lwow		81·9	319	e 12 21	− 2	e 22 38	+ 2	e 12 26	PcP	—
Bucharest	Z.	82·1	314	(i 12 25)	+ 1	(i 23 5)	+27	—	—	(44·2)
Upsala		82·2	331	12 22a	− 2	22 42	+ 3	i 15 44	PP	e 44·2
Sitka		82·7	33	i 12 28	+ 1	e 22 31	−13	—	—	e 34·2
Skalnate Pleso		84·4	320	i 12 35	− 1	e 22 59	− 2	—	—	—
Sofia		84·5	313	e 12 36?	0	e 22 54	− 8	e 17 29	PPP	48·0
Raciborzu		85·4	321	e 12 40	0	e 23 37	+26	—	—	e 45·7
Athens		85·7	307	e 13 39	+57	i 24 23	PS	—	—	—
Belgrade		85·8	316	e 12 41a	− 1	i 23 30	+15	—	—	e 49·4
Budapest	E.	85·8	318	12 41	− 1	23 32	+17	16 23	PP	e 33·2
	N.	85·8	318	12 43	+ 1	23 40	+25	16 23	PP	34·2
Lund		86·0	328	12 44?	+ 1	23 7	[0]	—	—	—
Kalocsa		86·2	318	e 12 47	+ 3	e 23 25	+ 6	e 16 16	PP	e 31·2

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ogyalla		86·2	318	e 12 40	− 4	e 23 23	+ 4	—	—	—
Copenhagen		86·4	328	i 12 44	− 1	e 23 4	[− 6]	i 23 34	S	46·2
Potsdam		87·5	324	i 12 50a	− 1	i 23 31	0	i 16 36	PP	46·2
Bergen		87·6	334	12 51k	0	23 28	− 4	15 50	PP	37·3
Prague		87·6	323	i 12 50	− 1	e 23 32	0	e 16 10	PP	e 39·2
Collmberg		88·0	324	e 12 51	− 2	i 23 37	+ 1	e 16 21	PP	e 46·2
Zagreb		88·4	318	e 12 54a	− 1	e 23 43	+ 3	—	—	e 48·2
Cheb		88·8	323	i 13 1	+ 4	e 23 37	− 7	—	—	—
Jena		88·9	323	e 12 54	− 4	e 23 20	[− 6]	e 24 0	S	e 47·5
Taranto		89·5	313	12 40	−20	23 28	[− 2]	15 53	PP	—
Triest		89·9	318	i 13 1	− 1	i 23 56	+ 2	i 16 44	PP	—
Stuttgart		91·3	322	e 13 5	− 4	e 23 30	[−10]	e 16 35	PP	e 46·2
Padova		91·5	318	i 13 8	− 2	24 26	+18	23 36	SKS	—
Karlsruhe		91·6	323	e 13 18	+ 8	e 23 40	[− 2]	—	—	—
Messina		91·6	311	e 13 11k	+ 1	24 30	+21	e 17 8	PP	—
Bologna		91·9	318	e 13 13a	+ 2	i 24 30	+19	e 23 47	SKS	—
Salo		91·9	319	e 13 15	+ 4	i 24 27	+16	i 17 53	PP	—
De Bilt		91·9	327	i 13 10	− 1	e 23 44	[0]	—	—	e 45·2
Chur		92·0	320	e 13 12a	0	e 23 40	[− 4]	—	—	—
Strasbourg		92·2	323	i 13 12a	− 1	i 24 18	+ 4	i 16 51	PP	e 46·5
Florence Arc.		92·3	317	i 13 56a?	+43	i 24 25?	+10	17 38?	PP	—
Florence Xim.		92·3	317	e 13 14	+ 1	i 24 22	+ 7	—	—	—
Prato		92·3	317	i 13 14	+ 1	i 23 45	[− 1]	—	—	—
Rome		92·3	316	i 13 11a	− 2	i 24 8	− 7	i 16 52	PP	—
Zürich		92·3	321	e 13 11a	− 2	e 24 21	+ 6	e 17 14	PP	—
Basle		92·8	322	e 13 25	+ 9	e 23 36	[−13]	—	—	—
Pavia	Z.	93·0	319	e 13 16	− 1	—	—	—	—	—
Victoria		93·0	37	13 19k	+ 2	24 16	− 5	23 47	SKS	—
Durham		93·8	330	i 13 32	+12	i 23 53	[− 1]	i 13 50	P_cP	—
Edinburgh	E.	93·8	332	e 13 25	+ 5	23 57	[+ 3]	17 17	PP	—
Besançon		93·9	322	i 13 21	0	—	—	e 19 24	PPP	—
Seattle		94·1	37	e 13 26	+ 4	—	—	e 17 24	PP	—
Kew		95·1	328	e 13 24	− 2	e 24 22	{+ 3}	e 17 22	PP	e 45·2
Paris		95·1	325	i 13 24	− 2	e 23 57	[− 5]	i 17 27	PP	e 47·2
Clermont-Ferrand		96·4	322	e 13 32	0	i 24 9	[0]	i 24 38	S	47·2
Jersey	E.	96·4	326	e 17 48	PP	e 24 38	−12	e 26 47	PPS	46·2
Rathfarnham Castle		96·9	331	e 13 39	+ 5	e 24 10	[− 1]	—	—	—
Shasta Dam		97·6	44	i 13 38	0	i 24 15	[0]	e 17 45	PP	—
Ukiah		97·8	45	e 14 2	+24	e 24 48	−14	e 17 34	PP	e 41·1
Hungry Horse		98·3	34	i 13 40	− 1	e 24 25	[+ 6]	e 17 48	PP	—
Mineral	Z.	98·3	43	e 13 40k	− 1	e 25 58	PS	i 17 36	PP	—
Berkeley		99·0	46	i 13 43k	− 1	i 24 24	[+ 2]	i 18 4	PP	—
Branner		99·3	46	i 13 45	0	e 24 24	[0]	e 17 55	PP	—
Barcelona		99·3	319	e 14 33	+48	i 28 51	PPS	e 17 27	PP	e 51·7
Santa Clara		99·5	46	i 13 56k	+10	i 24 35	[+10]	i 18 17	PP	e 50·2
Saskatoon		99·5	28	13 50	+ 4	24 17	[− 8]	17 50	PP	50·5
Lick	Z.	99·7	46	i 13 48	+ 1	—	—	i 17 59	PP	—
Reno		99·9	43	e 13 50	+ 2	e 24 40	[+13]	e 18 7	PP	e 47·2
Pretoria	Z.	100·1	246	e 13 50	+ 1	e 30 50	PKKP	e 17 21	?	—
Butte	N.	100·5	35	e 14 1	+10	i 25 27	+ 2	e 18 3	PP	e 50·6
Tortosa		100·7	318	e 14 18	+26	25 47	+21	18 19	PP	52·0
Algiers Univ.	Z.	101·1	314	e 13 52	− 1	e 24 22	[−10]	i 17 45	PP	—
Fresno	Z.	101·3	46	e 13 42	−12	i 26 58	PS	i 18 11	PP	—
Bozeman		101·6	35	e 13 55	− 1	e 24 33	[− 2]	e 17 51	PP	e 53·0
Ivigtut		101·6	355	—	—	24 41	[+ 6]	e 25 32	S	48·2
Tinemaha		102·2	45	e 14 0	+ 2	—	—	i 30 27	PKKP	—
Alicante		102·7	317	e 14 30	+30	e 25 50	+ 7	18 22	PP	e 48·7
Grahamstown	Z.	103·2	239	e 14 10	+ 7	—	—	e 18 40	PP	—
China Lake	Z.	103·3	45	i 14 3	0	—	—	i 18 27	PP	—
Logan		103·6	38	e 14 2	− 2	i 24 46	[+ 2]	i 18 36	PP	e 44·2
Pasadena		103·8	47	e 14 6k	+ 1	i 25 55	+ 3	i 18 29	PP	e 42·2
Toledo		104·0	319	e 14 24	+18	i 24 42	[− 4]	i 18 25	PP	41·7
Salt Lake City		104·2	39	e 14 18	+11	i 24 49	[+ 2]	e 17 59	PKP	—
Riverside		104·4	47	e 14 12	+ 4	—	—	i 18 27	PP	—
Almeria		104·8	316	i 14 12	+ 2	25 55	− 5	18 25	PP	56·6

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Overton	Z.	105·0	44	e 14 14	+ 3	—	—	e 17 58	PKP	—
Boulder City		105·1	45	e 14 14	+ 3	e 25 19	{−12}	i 19 6	PP	—
Palomar		105·1	48	i 14 14	+ 3	—	—	i 18 39	PP	—
Granada		105·3	318	e 15 1a	P	e 24 46	[− 6]	e 17 27	PKP	54·8
Pierce Ferry		105·6	44	e 14 4	− 9	e 25 9	[+16]	i 18 3	PKP	—
Tamanrasset	Z.	106·0	301	e 14 16	+ 1	e 27 16	PS	e 18 34	PP	e 55·2
Malaga	Z.	106·1	317	i 17 55a	PKP	i 24 45	[−10]	i 20 38	PPP	61·0
Lisbon		107·9	321	18 48k	PP	24 20	[−43]	25 28	SKKS	51·9
Tucson		109·9	46	e 14 37	P	e 25 30	[+18]	e 17 59	PKP	e 43·9
Lincoln	E.	112·4	30	e 18 50	[+12]	e 25 12	[−10]	e 19 19	PP	e 47·2
Seven Falls	E.	115·2	9	e 19 48	PP	i 27 4	{+23}	e 36 48	SS	51·8
Shawinigan Falls	N.	115·4	10	e 19 45	PP	—	—	—	—	—
Chicago		115·6	23	e 19 25	PP	e 25 29	[− 5]	e 27 10	SKKS	e 47·1
Ottawa		116·0	13	e 18 45	[0]	e 26 16	{−31}	19 44	PP	46·2
Florissant		117·0	27	e 18 47	[0]	i 25 43	[+ 4]	i 19 56	PP	—
St. Louis		117·2	27	i 18 50	[+ 3]	i 27 43	{+48}	e 19 57	PP	i 56·2
Cleveland		118·0	19	e 19 21	?	e 28 17	S	e 20 5	PP	—
Halifax		118·5	3	20 28	PP	30 12	PPS	e 22 40	PKS	61·6
Harvard		119·6	10	e 18 52	[0]	e 28 29	S	i 20 15	PP	e 56·2
Pennsylvania		119·7	17	e 20 10	PP	e 27 43	{+31}	e 30 11	PS	—
Weston		119·7	10	i 19 1	[+ 9]	i 30 20	PS	i 20 29	PP	50·3
City College, N.Y.		120·7	13	e 20 19	PP	e 30 24	PS	e 37 14	SS	—
Fordham		120·7	13	e 18 59	[+ 5]	i 30 7	PS	e 20 15	PP	—
Philadelphia		121·2	14	e 20 30	PP	e 25 55	[+ 1]	e 30 13	PS	e 48·9
Washington		121·7	16	e 19 8	[+12]	e 30 17	PS	e 36 41	SS	e 53·8
Columbia		124·9	22	e 20 53	PP	e 30 47	PS	—	—	e 57·6
Tacubaya		126·1	49	e 19 22	[+18]	e 31 31	PS	e 21 32	PP	—
Bermuda		130·6	7	e 20 35	?	i 24 1	PPP	e 22 41	PKS	e 49·4
Punta Arenas	N.	142·6	168	i 24 49	?	25 40	PPP	—	—	—
San Juan		144·1	12	e 19 41	[+ 3]	e 41 13	SS	e 23 1	PP	e 59·0
Galerazamba		147·8	32	i 20 4	[+20]	e 32 56	?	—	—	—
Fort de France		148·4	4	i 19 44	[− 1]	—	—	—	—	—
Bogota		153·6	37	i 19 59	[+ 6]	e 31 49	{+71}	—	—	—
Santa Lucia	N.	160·3	148	e 20 42	PKP_2	—	—	—	—	—
La Plata		162·2	182	20 16	[+13]	30 58	{−26}	29 40	PPP	83·3
Buenos Aires		162·5	182	20 45	PKP_2	45 7	SS	—	—	—
Huancayo		163·0	75	e 20 10	[+ 6]	e 27 20	[+13]	i 24 57	PP	e 64·1
Antofagasta		167·0	122	20 44	PKP_2	32 20	{+32}	—	—	—
La Paz		170·8	88	i 20 14a	[+ 4]	i 27 6	[− 6]	i 21 38	PKP_2	81·2

Additional readings and notes :
Nanking i = 3m.43s.
Kôti SS = 8m.54s.
Osaka i = 7m.27s., 8m.28s., 9m.10s., 9m.54s., and 10m.41s.
Sendai e = 5m.46s., 5m.54s., and 7m.18s.
Vladivostok iSSS = 11m.58s.
Mizusawa ePN = 5m.56s.
Sapporo eSS = 12m.10s.
Calcutta PPPE = 8m.11s.
Hyderabad PPEN = 9m.33s.
New Delhi iN = 11m.8s., 12m.59s., and 17m.32s., iSSN = 18m.18s.
Kodaikanal iPPPE = 11m.39s., P_cSE = 13m.13s., PSE = 16m.12s., PPSE = 16m.35s., SSE = 19m.48s., SSSE = 21m.45s.
Poona PPEN = 10m.31s., iPPPEN = 11m.47s., iPcSEN = 13m.24s., iPSEN = 16m.17s., PPSEN = 16m.34s., S_cSEN = 18m.2s., iSSEN = 19m.39s., SSSEN = 21m.47s., QEN = 21m.54s.
Bombay iSSE = 19m.13s.
Perth i = 16m.34s., SSS = 20m.10s.
Brisbane eSZ = 17m.7s.
Riverview iP = 10m.9s., iN = 10m.37s., iPP?Z = 12m.17s., iPPPZ = 13m.33s., iNZ = 13m.49s., iPSEN = 18m.19s., iPPSZ = 18m.26s., iE = 18m.39s., iS_cSN = 18m.43s., and many later i readings.
Melbourne iPPPE = 13m.0s.
Tiflis iPPP = 15m.50s., iPS = 20m.38s.
Apia P?EZ = 11m.39s., eZ = 12m.29s., iE = 21m.30s., eEN = 31m.10s.
Auckland P_eS?N = 15m.38s., iN = 21m.40s.
College ePPP? = 16m.17s., eSS? = 26m.48s., ePS = 28m.24s., eSSS = 30m.2s., ePKP,PKP = 38m.31s.
Wellington iZ = 13m.30s., iPP = 14m.55s., iPPPZ = 16m.20s., iPPPPZ = 19m.30s., i = 23m.10s., SS = 25m.58s., Q = 32·7m.

Continued on next page.

Christchurch iZ =15m.37s., PPP =16m.33s., SS =26m.35s., eSSS =29m.50s., QEN = 31m.25s.
Tananarive i =12m.36s., e =13m.1s. and 15m.36s., iS_eS =22m.37s., iPS =23m.34s., sS =23m.43s., SS =28m.6s., eQ =34m.16s.
Helwan eEN =22m.28s., PPSE =23m.58s.
Bucharest readings have been increased by 30m.
Upsala i =12m.58s., iE =16m.22s., eE =22m.21s., SKSN =22m.37s., iE =22m.51s., eN =23m.10s., iPPSN =24m.2s., eSSE =28m.10s.?, eSSS? =32m.10s.?, ePKKS?N = 33m.54s.
Sofia e =27m.0s.?.
Raciborzu ePN =12m.46s.
Belgrade i =14m.56s., 19m.17s., and 24m.36s.
Budapest PPPN =18m.27s., SKKSE =23m.17s., SKKSN =23m.22s., PSN =24m.51s., PPSE =25m.25s., PPSN =25m.54s., SSN =29m.29s., eSSPN =30m.10s., eE = 31m.10s., SSSN =33m.20s.
Kalossa iEN =13m.11s., iE =13m.32s., eN =16m.22s., eE =16m.26s.
Copenhagen 13m.47s., 14m.37s.
Potsdam iE =13m.8s.?, iZ =19m.12s., iS?E =23m.34s., iS?Z =23m.37s., iE =23m.47s., iEN =23m.57s., iN =24m.4s., iPSZ =24m.38s., iN =25m.40s., iZ =26m.31s., 31m.2s., and 36m.38s.
Bergen eN =20m.36s., 25m.8s.?, and 26m.6s., SSN =30m.8s.?.
Prague i =13m.26s., e =13m.52s., ePPP =18m.10s.?, e =22m.34s., ePS =24m.10s., ePPS =24m.34s., eSS =29m.40s., eSSS? =33m.34s.
Collmberg eN =13m.0s. and 13m.4s., eE =15m.33s., ePPZ =16m.26s., eZ =16m.38s., ePPPZ =18m.14s., eSKSE =23m.19s., eSE =23m.53s., iN =24m.3s., iPSE =24m.33s eE =24m.36s.
Zagreb e =13m.3s., 13m.14s., 23m.21s., i =23m.56s. and 24m.12s., e =24m.24s., i = 25m.8s.
Jena iPZ =13m.6s., eN =13m.34s. and 15m.44s., eSKS?E =23m.23s., eSN =24m.4s.
Triest i =13m.13s. and 16m.56s., iPPP =18m.42s., iSKS =23m.28s., iSKKS =23m.42s., iPS =24m.44s., iPPS =25m.38s., iSS =30m.14s., iSSS =33m.43s.
Stuttgart eZ =13m.30s., ePS =25m.42s., eSS =31m.10s.
Messina e =13m.51s., SKS =23m.47s.
Bologna iZ =13m.36s., e =17m.50s.
Salo i =13m.21s., iE =13m.46s. and 14m.1s., e =23m.52s.
Strasbourg iPP =17m.0s., iPPP =18m.53s. and 19m.7s., iSKS =23m.43s. and 24m.7s., iPS =25m.38s., iPPS =26m.28s., iSS =30m.37s., iPSS =31m.0s., iSSS =34m.35s. and 34m.54s., and many other i readings without phase.
Florence Arc. iZ =14m.16s.?, iPS =26m.17s.?, eSS =31m.2s.?, eSSS =36m.0s.?.
Rome iE =23m.6s., iSKSE =23m.42s., eSS =30m.23s.,
Basle e =24m.56s.
Victoria SS =29m.57s.
Durham iPPPN =18m.40s., iS_cSEN =24m.15s., iPSE =24m.54s., iEN =25m.0s. and 26m.9s., iSSSE =32m.45s.
Edinburgh SS =31m.4s.
Besançon e =13m.30s., 14m.12s., 16m.14s., 16m.45s., and 18m.34s.
Seattle i =13m.33s., 13m.58s., 15m.23s., and 18m.41s.
Kew e =13m.37s., eEZ =14m.0s., ePPPNZ =19m.18s., eSKS? =22m.26s., ePPSE = 27m.2s., eSS =30m.42s., e =32m.18s. and 37m.42s.
Paris iPPP =19m.23s., ePKS? =21m.37s., eSKKS =24m.23s., eS =24m.44s., iPS = 26m.5s., iPPS =26m.51s., iSS =31m.23s., eQ =45·2m., and many other i readings.
Clermont-Ferrand i =13m.42s. and 18m.34s., iPS =26m.45s., iSS =32m.18s., iSSS = 36m.12s.
Jersey e =22m.57s.
Shasta Dam ePPP =19m.36s., ePKKP =30m.6s.
Ukiah eSS =31m.2s.
Hungry Horse ePPP =19m.51s., eS =25m.32s., ePKP,PKP,PKP? =66m.1s.
Mineral eEN =13m.58s., iZ =14m.2s. and 14m.7s., eN =17m.54s., eZ =19m.58s.
Berkeley iZ =13m.46s. and 13m.54s., iN =14m.1s., iZ =14m.5s., eN =14m.11s., iZ = 17m.3s. and 17m.22s., iPKPN =17m.55s., iZ =18m.29s., 19m.1s., 20m.13s., and 23m.3s., eSKSN =24m.27s., iN =24m.35s., iE =24m.59s., iSKKSN =25m.27s., iN =32m.15s.
Branner iZ =14m.38s., eZ =16m.58s.
Saskatoon PPP =19m.47s., S =24m.54s., SKKS =25m.13s., SS =32m.13s., SSS = 35m.33s.
Lick iZ =14m.43s.
Reno eE =14m.4s. and 17m.12s., eN =17m.15s., eZ =17m.44s., eN =17m.53s., eZ = 24m.48s., eE =24m.56s., eZ =39m.5s.
Butte eSKS =24m.29s., eSS =32m.6s.
Tortosa SKSE =24m.53s., SKKSE =25m.16s., PSEN =27m.9s., PPSE =28m.10s., SSE =32m.49s., SSSE =36m.9s.
Algiers Univ. iZ =13m.59s., eZ =14m.15s., iZ =14m.26s., eZ =16m.52s., and 18m.8s., ePPPZ =20m.13s., eZ =29m.20s., eSS?Z =30m.45s.
Fresno ePN =14m.0s., ePE =14m.10s., iZ =14m.54s., and 17m.5s., eE =17m.21s., eN =18m.20s., eZ =38m.58s.
Bozeman e =30m.56s.
Ivigtut 26m.4s.
Tinemaha iZ =14m.23s.

Continued on next page.

Alicante PPP =20m.30s., SS =32m.50s., SSS =36m.54s., Q =43m.10s.
China Lake iPKKPZ =30m.22s.
Logan i =17m.56s., eSS =32m.57s., eSSS =36m.53s., ePKP,PKP =38m.50s.
Pasadena iZ =14m.13s., iPKP$_2$ =17m.35s., ePPPZ =20m.30s., iSKSEN =24m.46s., iPSN =27m.38s., ePKKP =30m.5s., eSSEN =32m.40s., eSSSZ =37m.58s.
Toledo PPPN =20m.28s., eN =20m.45s. and 21m.23s., SKKSN =25m.21s., eN =26m.25s., SSN =32m.55s.
Salt Lake City eSS =33m.39s., eSSS? =37m.29s.
Riverside ePKPZ =17m.37s., ePKKPZ =30m.0s.
Almeria PPP =20m.39s., SKS =24m.19s., SKKS =25m.25s., PPS =28m.35s., SS =33m.19s., SSS =37m.7s.
Overton iPPPZ =20m.44s.
Boulder City ePKP,PKP =38m.39s.
Palomar iZ =17m.40s., iPKKPZ =30m.13s.
Granada iPP =18m.22s., PPP =20m.18s., iSKKS =25m.28s., PPS =28m.39s., iSS =34m.10s., SSS =38m.16s., Q =44·5m.
Pierce Ferry i =14m.14s.
Tamanrasset eZ =14m.37s. and 17m.29s., iZ =17m.54s., iPPZ =18m.44s., ePPPZ =20m.49s., eZ =24m.24s. and 30m.8s., eSS =33m.44s., eSSS =39m.10s.?.
Malaga iPPS =27m.31s., Q =54m.59s.
Lisbon E =31m.52s., SSS?E =36m.58s.
Tucson i =15m.6s., ePP =19m.2s., ePPP? =21m.36s., eS =26m.37s., ePS =28m.27s., ePKKP =29m.54s., eSS =34m.19s.
Lincoln eSS?E =34m.30s.
Seven Falls eE =39m.28s. and 49m.4s.
Chicago ePPS =30m.26s., eSS =35m.38s., eSSS =39m.30s.
Ottawa PPP =21m.52s., PS =29m.38s., PPS =30m.52s., SS =36m.0s.
Florissant iPPP =22m.17s., i =23m.21s., iS =27m.41s., iPS =29m.37s., iSS =35m.56s.
St. Louis iPP =20m.4s., iPPP =22m.23s., i =24m.4s., iPPS? =31m.4s., i =31m.36s., iSS =35m.58s.
Cleveland eZ =20m.19s. and 20m.37s., ePSE =29m.54s., ePPSN =30m.59s.
Halifax e =28m.28s., SS =36m.46s., Q =49·4m.
Harvard ePPP =22m.23s., ePS =30m.11s., ePPS =31m.12s., e =33m.6s., eSS =36m.55s.
Pennsylvania iE =20m.14s., eE =20m.27s.
Weston SS =37m.10s.
City College, N.Y. e =26m.27s., 27m.40s., 40m.27s., and 48m.59s.
Fordham i =20m.45s.
Philadelphia ePKP,PKP =37m.39s., eSKP,PKP =43m.6s.
Washington i =19m.41s.
Bogota iPKP$_2$EN =20m.24s.
Santa Lucia N =22m.40s.
La Plata N =21m.14s., PPPE(△ >180°) =31m.52s., PPPN(△ >180°) =32m.16s., SKSPE =34m.52s., SKSP?N =36m.16s., E =36m.34s., N =36m.58s., SKSPN (△ >180°) =38m.15s., PPSE =40m.16s., SS?E =42m.27s., SSN =44m.40s., PSSE =35m.34s., SSS?E =49m.34s., SSSN =52m.10s., E =59m.22s., N =60m.28s., QE =70m.34s., QN =70m.58s.
Buenos Aires 54m.39s.
Huancayo i =23m.7s. and 24m.3s., e =27m.52s., eSKKS =30m.40s., e =32m.35s., i =46m.15s., e =55m.12s.
Antofagasta e =13m.24s., 22m.28s.
La Paz iZ =20m.33s., iPPZ =25m.27s., iPPP =29m.41s., iPPS =39m.20s., iSS =46m.27s.
Long waves were also recorded at Reykjavik.

Dec. 29d. 6h. 22m. 55s. Epicentre 17°·0N. 121°·5E. (as at 3h.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Irkutsk		37·7	343	e 7 12?	− 7	e 12 57?	−13	—	—
Andijan		48·3	310	e 8 46	+ 1	—	—	—	—
Stalinabad		50·6	307	e 9 3	+ 1	e 16 18	+ 1	—	—
Samarkand		52·2	307	e 9 12	− 3	—	—	—	—
Brisbane	z.	53·8	145	e 9 25	− 1	—	—	—	—
Tiflis		69·1	309	e 11 17	+ 7	—	—	—	—
College		75·1	26	e 11 42	− 4	—	—	—	—
Ksara		77·2	301	e 11 55	− 2	e 22 43	PPS	—	—
Stuttgart	z.	91·3	322	e 13 9	0	—	—	—	—
Shasta Dam		97·6	44	e 13 46	+ 8	—	—	—	—
Hungry Horse		98·3	34	e 14 42	+61	—	—	e 29 9	PKKP
Tinemaha	z.	102·2	45	e 14 1	+ 3	—	—	e 18 4	PP
China Lake	z.	103·3	45	e 14 7	+ 4	—	—	e 18 49	PP
Mount Wilson	z.	103·8	47	e 14 4	− 1	—	—	e 18 16	PP
Palomar	z.	105·1	48	i 18 32	PP	—	—	—	—
Pierce Ferry		105·6	44	e 17 39	?	—	—	—	—
Tucson		109·9	46	e 19 9	PP	—	—	—	—

Long waves were also recorded at Upsala, Potsdam, Kew, and De Bilt.

Dec. 29d. 10h. 17m. 54s. Epicentre 17°·0N. 121°·5E. (as at 6h.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vladivostok		27·5	16	e 5 55	+ 5	—	—	e 6 46	PPP	—
Irkutsk		37·7	343	e 7 17?	− 2	13 6?	− 4	—	—	—
Poona	E.	45·3	279	e 8 24	+ 3	14 59	− 3	10 14	PP	—
Bombay		46·2	280	e 10 29	PP	e 15 21	+ 6	—	—	—
Andijan		48·3	310	e 8 42	− 3	e 20 49	SSS	—	—	—
Obi-garm		49·9	307	i 9 2	+ 5	—	—	—	—	—
Stalinabad		50·6	307	i 9 0	− 2	i 16 16	− 1	—	—	—
Tashkent		50·7	310	e 9 2	− 1	i 16 21	+ 3	e 10 57	PP	—
Samarkand		52·2	307	e 9 16	+ 1	—	—	—	—	—
Brisbane	Z.	53·8	145	e 9 20	− 6	—	—	i 10 17	P_cP	—
Riverview		57·9	151	e 9 52	− 4	e 17 54	− 1	e 18 22	PPS	e 24·5
Sverdlovsk		60·1	327	10 9	− 2	18 22	− 2	—	—	—
Baku		65·3	308	—	—	e 19 34	+ 5	—	—	—
Tiflis		69·1	309	e 11 18	+ 8	—	—	—	—	—
College		75·1	26	i 11 42	− 4	e 21 37	+ 3	—	—	e 34·4
Copenhagen		86·4	328	12 48	+ 3	—	—	—	—	43·1
Collmberg	Z.	88·0	324	e 12 50	− 3	—	—	—	—	—
Strasbourg		92·2	323	e 39 6?	P'P'	—	—	e 41 46	Q	e 48·1
Shasta Dam		97·6	44	e 13 50	+12	—	—	—	—	—
Hungry Horse		98·3	34	i 13 39	− 2	—	—	—	—	—
Overton	Z.	105·0	44	e 18 12	[−11]	—	—	—	—	—
Pierce Ferry		105·6	44	e 18 53	PP	—	—	—	—	—

Additional readings :—
Poona SSE = 18m.21s.
Tashkent iSS = 20m.17s.
Brisbane iZ = 9m.27s., 9m.41s., and 10m.5s.
Long waves were also recorded at other European stations.

Dec. 29d. 16h. 42m. 54s. Epicentre 27°·0S. 177°·0W. Depth of focus 0·020.
(as on 16d.).

$A = -·8910$, $B = -·0467$, $C = -·4516$; $\delta = 0$; $h = +3$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	12·1	213	e 3 4	pP	i 5 44	+44	e 3 16	PPP	—
Tuai	N.	12·8	201	—	—	e 5 1	−15	—	—	—
Apia		14·0	21	e 2 56	−16	—	—	e 3 31	PP	6·1
Wellington		15·8	203	3 31	− 4	e 6 7	−18	—	—	7·1
Cobb River	E.	16·4	208	—	—	e 6 26?	−12	—	—	—
Kaimata	N.E.	18·2	208	e 4 6?	+ 3	e 7 6?	−12	—	—	—
Christchurch		18·5	204	e 4 2	− 4	7 53	+29	—	—	9·7
Brisbane		26·6	261	e 5 31	+ 6	e 10 37	sS	i 6 16	pP	i 13·8
Riverview		28·2	247	e 5 40	0	i 10 8	− 4	e 6 16	pP	e 13·9
Honolulu		51·5	23	—	—	e 16 10	+13	—	—	e 21·4
Perth		57·9	247	(9 26)	−11	(16 6)	−77	—	—	(24·8)
Branner	Z.	82·2	41	e 12 3	− 1	—	—	e 12 46	pP	—
Santa Clara		82·3	41	i 12 47	pP	e 22 17	+12	—	—	e 36·9
Lick	Z.	82·4	41	e 12 5	0	—	—	i 12 48	pP	—
Pasadena		82·5	46	e 12 6	0	e 22 24	+17	i 12 47	pP	e 37·0
Ukiah		82·7	39	e 13 16	?	e 22 26	+17	—	—	e 34·9
Palomar	Z.	82·8	47	i 12 8	+ 1	—	—	i 12 50	pP	—
Riverside	Z.	82·9	46	e 12 8	0	—	—	i 12 49	pP	—
China Lake	Z.	83·9	44	i 12 14	+ 1	—	—	i 12 55	pP	—
Vladivostok		84·1	325	e 12 18	+ 4	e 22 46	+23	—	—	—
Tinemaha	Z.	84·3	43	i 12 16	+ 1	—	—	i 13 9	pP	—
Mineral	Z.	84·5	39	i 12 18a	+ 2	—	—	i 13 13	pP	—
Reno		85·0	40	e 12 19	+ 1	e 22 56	+24	e 13 8	pP	e 41·6
Boulder City		85·8	45	e 12 18	− 4	—	—	i 13 8	pP	—
Tucson		86·2	50	e 12 25	+ 1	e 22 26	[− 6]	e 13 9	pP	e 35·7

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Overton	Z.	86·4	45	i 12 23	− 2	i 24 31	PPS	i 13 7	pP		—
Pierce Ferry		86·4	46	i 12 25	0	—	—	i 13 11	pP		—
Seattle		89·1	33	—	—	e 23 25	+14	e 24 49	SPP		—
Salt Lake City		90·5	43	—	—	e 23 18	− 6	—	—		e 41·2
Logan		91·1	42	e 12 45	− 3	e 23 6	[+ 3]	e 13 26	pP		e 46·2
Bozeman		93·9	39	—	—	e 23 43	−10	e 24 19	sSKS		e 43·1
College		94·3	11	e 13 11	+ 9	i 23 42	SKKS	e 16 36	PP		—
Huancayo		94·8	105	e 13 10	+ 6	e 23 23	[0]	e 25 4	sS		e 43·5
La Paz		98·6	113	i 13 28	+ 6	i 24 42	+ 9	17 41	PP		46·6
Bogota		103·6	91	—	—	e 26 31	sS	—	—		62·1
St. Louis		104·0	53	—	—	e 24 26	[+17]	e 32 20	SS		e 46·1
Irkutsk		104·4	321	e 17 51?	PP	e 25 15?	− 6	e 19 54	PPP		—
Cleveland	N.	111·2	53	—	—	e 26 38	S	e 34 53	PSS		—
Pennsylvania	E.	113·7	54	—	—	e 28 33	PS	—	—		—
New Delhi	N.	115·4	291	—	—	e 25 25	[+29]	e 26 35	S		e 69·3
Bombay		115·9	279	e 19 36	PP	e 25 29	[+31]	e 20 29	?		—
City College, N.Y.		116·5	55	—	—	e 25 11	[+11]	e 29 22	PS		e 46·1
Bermuda		121·8	67	—	—	e 27 31	S	e 38 11	PSS		e 51·0
Pretoria	Z.	122·2	207	e 18 36	[0]	—	—	—	—		—
Tashkent		124·6	303	e 18 41	[+ 1]	e 29 25	SKSP	e 19 54	PP		—
Sverdlovsk		129·8	323	e 19 8	[+18]	i 23 1	PKS	e 21 8	PP		—
Tiflis		142·9	304	e 19 18	[+ 3]	—	—	—	—		—
Copenhagen		150·5	349	e 19 38	[+11]	42 42	SS	—	—		—
Ksara		150·9	291	19 40	[+12]	—	—	23 28	PP		—
Potsdam	Z.	153·6	347	e 20 30	pPKP	—	—	—	—		e 82·1
Istanbul		154·4	310	e 20 21?	pPKP	e 27 1	[+40]	—	—		—
Collmberg	Z.	154·6	345	e 19 47	[+14]	—	—	e 20 38	pPKP		—
De Bilt		154·9	356	i 20 33	pPKP	e 43 26	SS	e 21 23	$pPKP_2$		e 85·1
Jena	E.	155·2	346	e 19 36	[+ 3]	—	—	e 20 27	pPKP		—
Kew		155·4	4	i 20 30	pPKP	—	—	—	—		e 73·1
Prague		155·4	342	e 20 41	pPKP	e 22 46	SKP	e 21 26	?		—
Belgrade		157·4	326	e 20 21k	pPKP	e 30 5	SKKS	e 38 5	?		e 103·4
Stuttgart		157·7	349	e 19 28	[− 9]	—	—	e 20 30	pPKP		—
Paris		158·2	1	i 20 22	pPKP	i 21 5	sPKP	e 20 34	$pPKP_2$		e 86·1
Strasbourg		158·2	351	e 19 40	[+ 3]	—	—	e 20 9	PKP_2		e 76·1
Besançon		159·6	353	e 20 34	pPKP	e 26 22	[− 5]	e 21 5	sPKP		84·1
Clermont-Ferrand		161·3	0	e 20 14	[+33]	e 26 22	[− 6]	e 21 5	sPKP		84·1
Florence Arc.		162·0	340	e 23 20	PKS	e 26 59	[+30]	e 45 59	PSS		—
Florence Xim.		162·0	340	e 24 36	PP	—	—	—	—		—
Rome		163·2	335	e 20 24	pPKP	e 45 4	SS	e 24 30	PP		—
Granada		168·4	27	20 2a	[+15]	30 7	SKKS	21 26	PKP_2		85·6
Malaga	Z.	168·4	31	(i 19 48)	[+ 1]	(23 22)	PKS	(i 25 0)	PP		(86·6)
Almeria		169·1	24	20 2	[+15]	45 38	SS	21 36	PKP_2		100·2
Algiers Univ.	Z.	170·3	0	i 20 3	[+15]	—	—	e 20 46	pPKP		—
Tamanrasset	Z.	175·2	209	e 19 55	[+ 5]	—	—	e 20 49	pPKP		e 87·1

Additional readings and notes :—
Auckland eN = 3m.46s.
Apia eN = 3m.39s.
Wellington iP? = 4m.16s., iS? = 6m.46s.
Christchurch iZ = 4m.44s., e = 5m.49s., iEN = 8m.42s.
Brisbane iPPE = 6m.56s., eN = 11m.37s.
Riverview iPPZ = 6m.21s., iE = 6m.45s. and 6m.59s., iEZ = 7m.17s., iE = 7m.54s., iSSE = 11m.16s., iSSSN = 11m.35s., iE = 11m.51s., iN = 13m.4s.
Perth SS = (20m.4s.), SSS = (22m.6s.), readings reduced by 9m.
Lick eZ = 13m.42s.
Pasadena ePPZ = 15m.53s., iPPZ = 16m.22s., eSEN = 23m.8s.
Mineral iZ = 12m.59s.
Reno ePN = 12m.25s., eZ = 12m.55s., eE = 13m.33s., eSZ = 23m.37s.
Tucson esP = 13m.28s., epPP = 16m.32s., epPPP = 18m.21s., epS? = 23m.44s., eSS = 28m.21s., ePKP,PKP = 38m.12s.
Seattle e = 23m.41s. and 24m.12s.
Logan isS = 24m.30s., eSS = 29m.33s.
College i = 24m.20s.
La Paz SKKS = 25m.30s., PS = 26m.32s., iSS = 31m.24s.
St. Louis eSKKS = 25m.9s., i = 35m.48s.
Irkutsk SKKS = 24m.29s.?, eSS = 31m.54s.
Cleveland eN = 27m.26s. and 33m.46s.

Continued on next page.

City College, N.Y. eSS =36m.13s., e =38m.56s.
Tashkent ePPP =22m.44s.
Sverdlovsk eSS =38m.34s.
Kew iPKSEZ =21m.16s., eSKSZ =24m.58s., ePS =31m.14s., ePPSEN =32m.20s., eZ =34m.52s., readings wrongly identified.
Stuttgart e =24m.42s., ePS? =35m.24s.
Strasbourg ePKP$_2$ =20m.51s., e =28m.15s., 28m.28s., and 33m.26s., iPPS =38m.2s., e =44m.6s.? and 51m.6s.?
Granada sSKSP =31m.50s., iPPS =35m.52s.
Malaga iPKP$_2$Z =(21m.6s.), PPPZ =(29m.12s.), readings reduced by 2m.
Almeria PPP =29m.5s.
Algiers Univ. eZ =20m.30s. and 21m.29s., ePKP$_2$?Z =21m.58s., ePPZ =25m.5s., epPPZ =25m.58s.
Tamanrasset eZ =20m.35s., esPKP$_2$Z =21m.12s., iZ =22m.27s., ePPZ =25m.28s., ipPPZ =26m.12s., ePPP?Z =29m.20s., eZ =36m.20s., 44m.6s.?, and 50m.6s.?
Long waves were also recorded at New Plymouth, La Plata, San Juan, and at other North American and European stations.

Dec. 29d. 22h. 6m. 37s. Epicentre 5°·7S. 112°·0E. Depth of focus 0·090.
A = −·3728, B = +·9227, C = −·0987; δ = +10; h = + 7;
D = +·927, E = +·375; G = +·037, H = −·091, K = −·995.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bandong		4·5	254	e 1 41	+11	i 2 54	+13	13 43	ScS	—
Batavia		5·2	264	i 1 35	0	i 2 50	− 1	13 23	ScS	—
Brisbane	Z.	44·6	124	i 7 22	0	—	—	i 9 10	pP	—
Poona	E.	44·7	304	i 7 20	− 2	i 13 12	− 4	7 41	pP	—
Bombay		45·7	304	—	—	e 13 32	+ 2	e 16 24	sS	—
Riverview		45·8	133	i 7 31k	0	e 13 29	− 3	e 16 23	sS	—
Vladivostok		51·8	19	i 8 17	+ 2	i 14 57?	+ 4	—	—	—
Irkutsk		58·1	354	9 2	+ 3	16 21	+ 6	17 49	sS	—
Andijan		58·8	325	9 6	+ 2	i 16 24	0	i 17 54	sS	—
Obi-garm		59·0	322	i 9 10?	+ 5	i 16 26?	0	—	—	—
Frunse		59·1	329	e 8 45	−21	—	—	—	—	—
Stalinabad		59·5	322	i 9 8	0	i 16 28	− 4	i 17 58	sS	—
Tashkent		60·9	324	i 9 20	+ 3	i 16 47	− 3	i 18 11	sS	—
Samarkand		61·3	321	e 9 20	0	e 16 50	− 5	—	—	—
Sverdlovsk		75·0	334	—	—	i 19 34	+ 2	—	—	—
Leninakan		77·1	314	e 10 53	− 1	19 57	+ 3	—	—	—
Tiflis		77·1	315	i 10 57	+ 3	—	—	—	—	—
Pretoria	Z.	82·0	245	i 11 20	+ 1	—	—	—	—	—
Grahamstown	Z.	83·1	237	i 11 27	+ 3	—	—	—	—	—
Helwan		84·8	301	i 11 35k	+ 2	i 20 11	−60	e 13 41	pP	—
Moscow		86·0	327	e 11 41?	+ 2	i 21 25	+ 3	—	—	—
College		99·5	25	e 16 43	PP	—	—	e 28 59	PKKP	—
Collmberg	Z.	100·1	321	e 16 56	PP	—	—	—	—	—
Stuttgart	Z.	102·7	319	e 17 17	PP	—	—	—	—	—
Tamanrasset	Z.	107·4	292	e 17 23	[+ 5]	—	—	e 17 57	PP	—
Shasta Dam		120·3	46	e 17 46	[+ 2]	e 27 52	SP	—	—	—
Lick	Z.	122·0	49	i 17 50k	[+ 3]	e 31 14	PPS	i 19 34	PP	—
Tinemaha	Z.	124·6	49	i 17 56	[+ 4]	—	—	i 20 13	PP	—
China Lake	Z.	125·6	49	i 17 58	[+ 4]	e 31 30	SKKP	i 19 50	PP	—
Pasadena		125·7	52	i 17 58k	[+ 4]	i 20 37	SKP	i 20 13	PP	—
Riverside	Z.	126·4	52	i 17 58	[+ 3]	e 19 57	SKP	e 19 44	PP	—
Palomar		127·0	52	i 18 1k	[+ 5]	i 20 23	SKP	i 20 1	PP	—
Boulder City		127·6	49	e 18 2	[+ 4]	—	—	—	—	—
Overton	Z.	127·7	48	i 18 4	[+ 6]	e 30 46	PS	i 20 26	PP	—
Pierce Ferry		128·1	48	i 15 52	?	—	—	—	—	—
Tucson		132·1	51	i 18 10	[+ 4]	i 20 43	SKP	—	—	—
Ottawa		139·9	8	e 18 16	[− 5]	e 21 3	SKP	—	—	—
La Paz		157·9	180	i 18 50	[+ 2]	—	—	22 23	PP	72·9

Additional readings and note :—
Poona SPE =7m.54s., PPE =8m.52s., PPPE =9m.18s., P$_c$PE =9m.36s., PSE =13m.18s., sSE =13m.50s., pP entered as given.
Riverview iN =20m.25s. and 23m.36s.
Andijan iPP =11m.1s.

Continued on next page.

Tamanrasset ePPP?Z =20m.3s.
Lick iZ =27m.49s., eZ =31m.47s.
Tinemaha iPKKPZ =27m.39s.
China Lake ePKKPZ =27m.33s.
Pasadena iPKKPZ =27m.34s., eSKKPZ =31m.25s.
Riverside ePKKPZ =27m.30s.
Palomar iPKKPZ =27m.30s., iSKKPZ =31m.22s.
Overton iZ =27m.28s.

Dec. 29d. Readings also at 0h. (Hungry Horse). 1h. (near Leninakan), 2h. (College, Hungry Horse, and Overton), 3h. (College, and Hungry Horse), 4h. (Brisbane and College (2)), 6h. (College, Shasta Dam, Pasadena, Palomar, China Lake, Tinemaha, Overton, Pierce Ferry, and Tucson), 7h. (Brisbane, College, Hungry Horse, and Tucson), 8h. (College, Leninakan, and near Tiflis), 10h. (Klyuchi, Erevan, near Tiflis (2), and Leninakan (2)), 11h. (Brisbane (2), College (3), Hungry Horse (3), Overton, Kew, Strasbourg, Erevan, near Leninakan, and Tiflis), 12h. (near Stalinabad and near Andijan), 13h. (near College), 15h. (College, Pierce Ferry, Pasadena, Palomar, China Lake, Tinemaha, and near Obi-garm), 16h. (near Stalinabad, Andijan, and Samarkand), 17h. (China Lake, Tinemaha, Upsala, Samarkand, near Stalinabad, and Obi-garm), 19h. (Tuai, College, Riverside, China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, Stalinabad, near Obi-garm, and Andijan), 21h. (Leninakan and near Tiflis).

Dec. 30d. 1h. Pacific Ocean.

Apia eP?EN =42m.34s., eLN =46·9m.
Tuai eN =45m.45s.
Wellington iP? =46m.10s., S =50m.28s.
Brisbane iPE =46m.12s., iZ =48m.16s., iSNZ =50m.27s., iSE =50m.30s.
Christchurch P?EZ =46m.32s., eSEN =50m.56s.
Kaimata ePNE =46m.42s.
Riverview ePZ =46m.44s., iPPZ =47m.30s., iSE =51m.24s., isSE =51m.40s., eLN =53·1m.
Lick ePZ =53m.22s. a.
Pasadena iPZ =53m.26s., epP?Z =55m.29s.
Riverside iPZ =53m.28s.
Shasta Dam eP? =53m.28s.
Palomar iPZ =53m.30s.
China Lake iPZ =53m.31s., ipP?Z =55m.36s., eZ =57m.10s., iZ =63m.25s.
Tinemaha iPZ =53m.31s., epP?Z =55m.38s.
Boulder City iP? =53m.42s.
Overton iP?Z =53m.46s.
Pierce Ferry iP? =53m.46s., e =63m.38s.
Tucson eP =53m.50s.
College eP? =53m.53s.
La Paz eP =55m.37s.
Rome eN =60m.13s.
Collmberg eZ =60m.42s., 61m.12s., and 62m.46s.
Jena eN =60m.43s., eEN =60m.46s.
Prague ePKP =60m.49s., e =62m.43s.
Triest ePKP? =60m.49s., 61m.58s.
Stuttgart ePKPZ =60m.50s.
Strasbourg ePKP =60m.54s., e =61m.35s.
Besançon ePKP =60m.58s.
Paris ePKP =60m.58s., i =61m.4s. and 61m.20s.
Tamanrasset ePKPZ =61m.15s., ePKP$_2$Z =62m.32s.

Dec. 30d. 6h. Undetermined Shock.

Vladivostok eP =30m.29s., iS =36m.21s.
College eP =34m.57s.
Shasta Dam eP =36m.22s.
Lick iPZ =36m.26s., iZ =36m.32s., eZ =37m.6s.
Tinemaha eP?Z =36m.38s., iZ =36m.45s., epPZ =37m.20s.
Pasadena ePZ =36m.43s., ipPZ =37m.22s.
China Lake ePZ =36m.45s., ipPZ =37m.22s.
Riverside ePZ =36m.49s., epPZ =37m.25s.
Overton ePZ =36m.51s., iZ =36m.59s.
Palomar ePZ =36m.52s., epPZ =37m.28s.
Boulder City eP =36m.55s.
Pierce Ferry eP? =37m.3s.
Tucson eP =37m.19s.
Long waves were recorded at Potsdam and Rome.

Dec. 30d. 8h. 56m. 48s. Epicentre 35°·8N. 140°·8E. Depth of focus 0·005.
(as on 1946, Sept. 14d.).

Intensity V at Tyosi ; IV at Kakioka and Mito ; II-III at Tokyo, Yokohama, Utunomiya, Hukusima, and Onahama. Macroseismic radius 200-300km.
Epicentre 35°·8N. 141°·0E. Depth 40km.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1949, Tokyo, 1950, p. 45, with macroseismic chart.

$A = -\cdot6300$, $B = +\cdot5138$, $C = +\cdot5823$; $\delta = -4$; $h = 0$;
$D = +\cdot632$, $E = +\cdot775$; $G = -\cdot451$, $H = +\cdot368$, $K = -\cdot813$.

		△	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Kakioka		0·7	311	0 12	− 3	0 20	− 7	—
Mito		0·7	335	0 14	− 1	0 22	− 5	—
Tukubasan		0·7	306	0 12	− 3	0 22	− 5	—
Tokyo		0·8	263	0 14k	− 3	0 26	− 3	—
Yokohama		1·0	249	0 17k	− 2	0 31	− 2	—
Onahama		1·1	4	0 28	+ 8	0 41	+ 5	—
Utumomiya		1·1	315	0 18	− 2	0 37	+ 1	—
Kumagaya		1·2	287	0 20a	− 2	0 31	− 7	—
Mera		1·2	222	0 18	− 4	—	—	—
Maebasi		1·5	293	0 23k	− 3	0 47	+ 2	—
Osima		1·5	228	0 22	− 4	0 42	− 3	—
Hunatu		1·7	260	0 25	− 3	0 44	− 6	—
Hukusima		2·0	352	0 33	+ 1	1 6	+ 9	—
Shizuoka		2·1	247	0 32	− 2	0 57	− 2	—
Matusiro		2·2	291	0 36	+ 1	0 55	− 7	—
Nagano		2·3	292	0 38	+ 1	0 58	− 6	—
Omaesaki		2·4	240	0 39	+ 1	—	—	—
Sendai		2·5	2	0 38	− 1	1 9	0	—
Aikawa		3·0	317	0 47	0	1 21	− 1	—
Toyama		3·0	287	0 55	+ 8	1 49	+27	—
Nagoya		3·2	259	0 51	+ 2	—	—	—
Gihu		3·3	263	0 54	+ 3	1 38	+ 9	—
Mizusawa	E.	3·3	5	0 55	+ 4	1 51	+22	—
Wazima		3·5	298	0 59	+ 5	—	—	—
Kameyama		3·7	257	1 5	+ 9	1 56	+17	—
Hikone		3·8	264	0 57	− 1	1 52	+10	—
Akita		3·9	252	1 6	+ 7	1 57	+13	—
Miyako		3·9	13	1 5	+ 6	—	—	—
Morioka		3·9	4	1 1	+ 2	1 46	+ 2	—
Kyoto		4·2	262	1 10	+ 7	2 5	+13	—
Owase		4·2	247	0 50	−13	—	—	—
Osaka		4·5	257	1 18	+11	2 19	+20	—
Kobe		4·7	258	1 26	+16	2 30	+26	—
Hatinohe		4·8	8	0 24	−48	—	—	—
Toyooka		4·9	268	1 25	+12	2 27	+18	—
Sumoto		5·1	255	1 23	+ 7	—	—	—
Kôti		6·4	252	1 44	+10	—	—	—
Vladivostok		10·1	319	e 2 23	− 2	e 4 19	+ 2	—
College		50·4	31	e 8 56	+ 3	—	—	e 31·7
Shasta Dam		72·2	53	e 11 26	+ 6	—	—	—
China Lake	z.	78·1	54	e 16 56	PPP	—	—	e 33·1
Overton	z.	79·7	52	e 10 57	−65	—	—	—
Pierce Ferry		80·3	52	e 12 2	− 3	—	—	e 33·4
Tucson		84·7	54	e 17 9	PPP	—	—	—

Overton also gives iZ = 11m.11s.
Long waves were also recorded at Mount Wilson, Palomar, and Stuttgart.

Dec. 30d. 10h. 41m. 1s. Epicentre 27°·0S. 177°·0W. (as on 29d.).

$A = -\cdot8910$, $B = -\cdot0467$, $C = -\cdot4516$; $\delta = 0$; $h = +3$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		14·0	21	e 3 19	− 3	e 5 40	−19	—	—	—
Wellington		15·8	203	e 3 49	+ 4	7 23	SSS	—	—	—
Christchurch		18·5	204	—	—	e 8 13	SS	—	—	—
Riverview		28·2	247	(e 5 57)	+ 1	(e 10 41)	0	(e 12 8)	SS	(13·2)
Lick	z.	82·4	41	i 12 25a	0	—	—	i 12 29	P	—
Pasadena	z.	82·5	46	i 12 25	− 1	—	—	—	—	—
Palomar	z.	82·8	47	i 12 26	− 1	—	—	—	—	—
Riverside	z.	82·9	46	e 12 28	0	—	—	—	—	—
China Lake	z.	83·9	44	i 12 31	− 2	—	—	—	—	—
Tinemaha	z.	84·3	43	i 12 35	0	—	—	—	—	—
Shasta Dam		84·3	38	i 12 35	0	—	—	—	—	—
Mineral	z.	84·5	39	e 12 35	− 1	—	—	i 12 41	P_cP	—
Reno	z.	85·0	40	e 12 44	P_cP	—	—	—	—	—
Boulder City		85·8	45	e 12 42	0	—	—	—	—	—
Tucson		86·2	50	i 12 45	+ 1	—	—	—	—	—
Overton	z.	86·4	45	i 12 46	+ 1	—	—	—	—	—
Pierce Ferry		86·4	46	i 12 46	+ 1	—	—	—	—	—
College		94·3	11	e 13 23	0	—	—	—	—	—
Tamanrasset	z.	175·2	209	e 20 15	[+ 31]	—	—	e 21 50	PKP_2	—

Riverview readings have been reduced by 1 m.
Tamanrasset gives also PPZ = 25m.47s.
Long waves were also recorded at Auckland, Ksara, Alicante, Almeria, and Granada.

Dec. 30d. Readings also at 0h. (Pierce Ferry, Tucson, and near Copiapo), 1h. (Granada, Collmberg, Stuttgart, Ksara, near Istanbul, Samarkand, near Garm, Obi-garm, Stalinabad, and Andijan), 2h. (College, Riverside, Palomar, China Lake (2), Tinemaha (2), Boulder City, Pierce Ferry, Overton, Tucson, Brisbane, and near Mizusawa), 3h. (Andijan, Samarkand, Tashkent, near Garm, Obi-garm, Stalinabad, and near Copiapo), 4h. (Auckland, Christchurch, Mount Wilson, Palomar, China Lake, Tinemaha, Overton, and Pierce Ferry), 5h. (College), 6h. (Brisbane), 7h. (Brisbane, China Lake, Overton, Pierce Ferry, and Tucson), 9h. (Leninakan, near Tiflis, Grozny, near Obi-garm, near Reno, and Mineral), 10h. (Brisbane), 11h. (College and near Andijan), 13h. (Pierce Ferry, Tucson, near Lick, Reno, and Mineral), 14h. (Overton and near Andijan), 15h. (Brisbane and near Copiapo), 16h. (Pierce Ferry, near Reno, and Mineral), 19h. (Clermont-Ferrand), 22h. (College, Pierce Ferry, Ksara and Pretoria), 23h. (Auckland, Wellington, China Lake, Pierce Ferry, and Tucson).

Dec. 31d. 8h. Pacific Ocean, perhaps a repetition of the undetermined shock on 30d. 1h.

Auckland iPN = 46m.4s., eSN = 49m.30s.
Tuai eN = 46m.28s.
Wellington iP = 46m.46s., iS = 51m.6s.
Christchurch ePZ = 47m.12s., SNZ = 51m.35s., P_cSE = 54m.47s.
Pasadena ePZ = 54m.5s.
Riverside ePZ = 54m.6s.
Shasta Dam eP = 54m.8s.
Palomar iPZ = 54m.9s.
China Lake iPZ = 54m.9s.
Tinemaha iPZ = 54m.12s.
Boulder City eP = 54m.21s.
Overton iPZ = 54m.25s.
Pierce Ferry eP = 54m.25s.
Tucson eP = 54m.29s.
College eP = 54m.32s.
Hungry Horse eP = 54m.46s.
Jena eE = 61m.26s. and 61m.35s.
Helwan PZ = 61m.26s., eZ = 61m.46s.
Stuttgart ePKPZ = 61m.31s.
Strasbourg ePKP = 61m.37s.
Long waves were recorded at Pretoria, Ksara, Jena, and Prague.

Dec. 31d. Readings also at 1h. (Auckland, Wellington, China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, and Shasta Dam), 2h. (Pierce Ferry), 4h. (Apia (2), Tuai, Auckland, Wellington, College (3), Pasadena, Riverside (2), Palomar, China Lake (3), Tinemaha (3), Boulder City, Overton (2), Pierce Ferry (2), Tucson (2), Hungry Horse, Shasta Dam (2), and Mineral), 5h. (Pierce Ferry, Overton, and Ksara), 7h. (Hungry Horse, Overton, Tucson, Ksara, and near Mizusawa), 8h. (College and near Copiapo), 9h. (College (2), Pasadena, Riverside, Palomar (2), China Lake (4), Tinemaha (3), Boulder City, Overton (3), Pierce Ferry (3), Tucson (2), Hungry Horse (2), Shasta Dam (2), Mineral, and Mizusawa), 10h. (College, Overton, Pierce Ferry, Tucson, Stuttgart, Bogota, and near Balboa Heights), 11h. (Reykjavik), 13h. (College), 22h. (near Apia), 23h. (Strasbourg and near Messina).

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained as part of a global earthquake relocation project (Villaseñor et al., 1997) initiated with funding from the US National Science Foundation through grant EAR-9725140 and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of Euroseismos project.

A digital hypocenter file of the ISS (Villaseñor and Engdahl, 2005) can be obtained from the USGS web site: http://earthquake.usgs.gov/scitech/iss/

Villaseñor, A., and E.R. Engdahl, *A digital hypocenter catalog for the International Seismological Summary,* Seism. Res. Lett., vol. 76, no. 5, pp. 554-559, 2005.

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