

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained thanks to funding provided by the US National Science Foundation through grant EAR-9725140 (Villaseñor et al., 1997) and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of the EUROSEISMOS project.

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## **The International Seismological Summary.**

**1950 January, February, March.**

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

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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.

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This number constitutes the beginning of the fourteenth volume of the International Seismological Summary in which travel times and Epicentral distances are calculated with reference to "Geocentric" latitudes of epicentres and observing stations. The travel-times used in making determinations are those contained in "Seismological Tables" by H. Jeffreys and K. E. Bullen, British Association for Advancement of Science—London, 1950, and residuals derived accordingly.

Distances are calculated from modified direction-cosines defined by :

$$\begin{aligned}A &= \cos \phi' \cos \lambda \\B &= \cos \phi' \sin \lambda \\C &= \sin \phi'\end{aligned}$$

$\lambda$  being the east longitude from Greenwich and  $\phi'$  the *geocentric* latitude whose relationship to the ordinary *geographic* latitude  $\phi$  is :—

$$\tan \phi' = .99328 \tan \phi.$$

These formulae are used to determine direction-cosines of both epicentre and station, though the position is in every case referred to normal  $\phi$  and  $\lambda$ .

The notation is that generally accepted. P and S stand for the times of onset of the direct longitudinal and transverse waves. Pg, Sg, P\*, S\* for short distances are used for times of these waves transmitted through the superficial "Granitic" and "Intermediate" layers respectively. Reflections of the direct waves at the earth's surface are denoted by PP, PS, PPP, SS . . . and at the outer surface of the central core by PcP, PcS . . .

The refracted longitudinal wave through the central core is known as K. Such waves as PKP, SKS, PKS, SKKS, are frequently recorded at great distances from the epicentre. All times are given as Greenwich Civil Time and are referred to the adopted  $T_0$  as zero,

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The arrangement of the " Summary " consists of :—

- (1) Date and Time at Origin ( $T_0$ ), calculated from the above-mentioned tables, together with the depth of focus where this is assumed not to be in the surface. The time calculated is that at which the P wave leaves the focus, not that when P arrives at the epicentre.

- (2) Epicentre constants :—

$$\begin{array}{lll} A = \cos \phi' \cos \lambda & D = \sin \lambda & G = \sin \phi' \cos \lambda \\ B = \cos \phi' \sin \lambda & E = -\cos \lambda & H = \sin \phi' \sin \lambda \\ C = \sin \phi' & & K = -\cos \phi' \end{array}$$

from which distances,  $\Delta$ , and where necessary Azimuths, of stations with respect to the epicentre may be calculated by means of the formulae :—

$$\begin{aligned} \cos \Delta &= aA + bB + cC \\ 2 - 2 \cos \Delta &= (a - A)^2 + (b - B)^2 + (c - C)^2 \\ \sin \text{Az.} &= -(aD + bE) \operatorname{cosec} \Delta \\ \cos \text{Az.} &= -(aG + bH + cK) \operatorname{cosec} \Delta \end{aligned}$$

$a, b, c$  being related to the observing station in the same way as  $A, B, C$  are to the epicentre.

$\delta$  is defined as the nearest integer to  $10^5(A^2 + B^2 + C^2 - 1)$  and may be used to compare distances calculated by the first two formulae above, whose equivalence depends on the assumption

$$A^2 + B^2 + C^2 = 1$$

$h$  is the height, in kilometres, of the epicentre above the sphere of equal volume concentric with the earth and is given by

$$h = -3.549 + 10.738 \cos 2 \phi$$

- (3) The tabular matter consisting of the station names arranged in order of epicentral distances, followed by this distance and the Azimuth measured round the epicentre from North through East. Other columns give the P phase and its residual, or PKP, in which the residual is shown in brackets [ ]. The S phase or an associated phase follows with its residual. If SKS is entered here the residual is shown in [ ], and if SKKS in { }. Under " Supp " is placed the time of some other, preferably well recorded phase such as PS, SS, or, in the case of deep focus shocks, pP. The final column, L, records the onset, if known, of Rayleigh waves R, or of the horizontally polarised surface waves Q.
- (4) Readings for which space is not available in the tabular part, added at the foot.

The letters E, N, Z after a phase indicate that the reading was taken on an instrument recording East-West, North-South, or Vertical component of motion, though some stations have instruments oriented to record North-East or North-West components. Reflections near

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the epicentre take place, and in the case of deep focus earthquakes can be distinguished from the direct phases. These are distinguished as pP, sS, sP, pPP—the small p and s referring to the initial portion of the path towards the surface.

The letters a, k after a P or PKP phase stand for the terms “Anaseismic” and “Kataseismic,” and indicate whether the first longitudinal motion was one away from the focus or towards it.

The epicentres for earthquakes with abnormal focal depth are calculated from travel times appropriate to them in the tables cited above. The depth to be assumed can be obtained from these tables when the observational data are plentiful, and the epicentre then determined in the usual way. When the data are scanty an indication of depth can be obtained from the evidence of the readings of certain individual stations.

The first quarter for 1950 contains 180 epicentres, 119 of which are repetitions from previous epicentres.

Cases of abnormal focal depth are noted below :—

Jan.	2d.	0h.	19·1 <sup>o</sup> N.	67·1 <sup>o</sup> W.	0·005
	2d.	15h.	11·5S.	165·4E.	Suggested Deep.
	4d.	9h.	43·9N.	146·2E.	Suggested Deep.
	5d.	21h.	37·1N.	141·8E.	Suggested Deep.
	7d.	22h.	31·5S.	66·0W.	0·010
	8d.	20h.	20·0S.	175·0W.	0·005
	9d.	8h.	37·9S.	177·8E.	0·015
	11d.	18h.	44·2N.	135·5E.	0·050
	12d.	12h.	18·5S.	178·0W.	0·080
	12d.	17h.	42·3N.	142·4E.	0·015
	13d.	0h.	37·6N.	141·7E.	0·005
	13d.	10h.	18·3S.	69·2W.	0·025
	13d.	23h.	4·6S.	153·6E.	Base of Superficial Layers.
	14d.	13h.	20·5S.	70·5W.	Base of Superficial Layers.
	16d.	4h.	45·7N.	26·8E.	0·015
	20d.	18h.	62·6N.	150·9W.	0·010
	20d.	23h.	Undetermined shock		Suggested Deep.
	21d.	14h.	36·0S.	71·5W.	0·005
	22d.	1h.	31·0N.	139·5E.	0·050
	24d.	16h.	14·9S.	167·1E.	0·020
	26d.	3h.	18·5S.	178·0W.	0·080
	26d.	11h.	18·5S.	178·0W.	0·080
	28d.	19h.	Undetermined shock		Deep.
	31d.	22h.	51·1N.	156·5E.	0·010

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Feb.	1d. 11h.	22·6S.	68·8W.	Suggested Deep.
	3d. 5h.	23·1S.	178·6E.	0·090
	3d. 18h.	41·9N.	143·6E.	0·010
	7d. 21h.	7·2S.	74·0W.	0·020
	8d. 10h.	38·6N.	75·3E.	0·010
	9d. 20h.	28·5S.	67·2W.	0·020
	11d. 11h.	15·4S.	174·6W.	0·040
	13d. 5h.	22·1S.	68·7W.	0·010
	15d. 14h.	11·2N.	93·3E.	0·010
	17d. 3h.	13·9N.	90·8W.	Suggested Deep.
	21d. 20h.	46·3N.	146·5E.	0·060
	21d. 22h.	55·0N.	161·6E.	0·005
	22d. 3h.	22·6S.	68·8W.	0·020
	23d. 4h.	44·7N.	150·3E.	0·020
	23d. 8h.	49·2N.	147·8E.	0·070
	23d. 21h.	20·5S.	177·5W.	0·030
	26d. 21h.	30·8S.	71·5W.	Suggested Deep.
	28d. 10h.	46·0N.	143·8E.	0·040
Mar.	3d. 10h.	27·9S.	175·9W.	0·005
	5d. 9h.	19·0S.	174·2W.	0·005
	5d. 18h.	22·1S.	68·7W.	0·020
	9d. 18h.	42·1N.	141·0E.	0·015
	10d. 20h.	20·2S.	178·2W.	0·060
	14d. 3h.	8·5S.	74·0W.	0·020
	16d. 19h.	18·5S.	178·0W.	0·080
	18d. 18h.	17·7S.	69·2W.	0·020
	22d. 21h.	22·5N.	122·5E.	0·010
	28d. 12h.	36·4N.	140·6E.	0·005
	28d. 20h.	Undetermined shock		Deep.
	29d. 12h.	27·9S.	175·9W.	0·005
	30d. 22h.	36·7N.	70·5E.	0·030
	31d. 13h.	36·7N.	70·5E.	0·030
	31d. 22h.	36·7N.	70·5E.	0·030

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.

November, 1957.

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## 1950 JANUARY, FEBRUARY, MARCH.

Jan. 1d. 2h. 52m. 16s. Epicentre 25°·1N. 109°·7W. (as on 1949, March 26d.).

A = -·3056, B = -·8536, C = +·4219;  $\delta = +2$ ;  $h = +3$ ;  
D = -·941, E = +·337; G = -·142, H = -·397, K = -·907.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Tucson	7·1	354	i 1 45	- 3	e 2 20	P <sub>r</sub>	i 3·5
Palomar	10·3	325	i 2 34	+ 2	—	—	i 5·7
Riverside	z. 11·1	325	e 2 42	- 1	—	—	e 6·2
Tacubaya	11·3	118	—	—	e 5 31	SS	e 6·0
Pasadena	11·6	325	i 2 50	0	—	—	e 5·1
Pierce Ferry	11·6	342	i 2 49	- 1	—	—	i 5·9
Boulder City	11·7	339	e 2 50	- 1	—	—	e 6·0
Overton	z. 12·1	342	i 2 55	- 2	i 4 48	-26	i 6·0
China Lake	12·6	330	i 3 5	+ 2	—	—	e 7·0
Haiwee	z. 13·1	329	i 3 11	+ 1	—	—	—
Lick	z. 15·9	325	e 3 47k	0	—	—	e 9·5
Santa Clara	16·1	322	e 3 19	-30	e 7 14	+25	e 9·6
Berkeley	16·6	323	i 3 57a	+ 1	i 7 49	+49	e 9·7
Logan	16·7	355	e 3 53	- 4	—	—	e 8·5
Reno	z. 16·7	332	e 3 59k	+ 2	—	—	e 8·9
Mineral	z. 18·2	330	e 4 17k	+ 1	—	—	e 9·8
Shasta Dam	18·8	330	e 4 24	+ 1	—	—	—
Hungry Horse	23·5	354	e 5 12	0	—	—	e 14·3
Seattle	24·6	340	e 6 2	+39	—	—	e 13·2
Ottawa	34·0	45	e 6 53	+ 5	—	—	e 18·0
College	46·7	339	e 8 34	+ 2	—	—	e 25·5
La Paz	57·9	131	e 7 9	?	e 8 26	?	—
Stuttgart	z. 88·5	35	e 13 54	+58	—	—	—

Additional readings :—

Tucson e = 2m.10s., i = 3m.6s.

Berkeley iZ = 9m.5s.

Mineral iZ = 4m.24s., eZ = 6m.13s.

Shasta Dam e = 5m.13s. and 6m.11s.

Seattle e = 6m.14s.

Long waves were also recorded at Kew and at other American stations.

Jan. 1d. 16h. 4m. 29s. Epicentre 17°·0N. 121°·5E. (as on 1949, December 29d.).

A = -·5000, B = +·8159, C = +·2906;  $\delta = +14$ ;  $h = +5$ ;  
D = +·853, E = +·522; G = -·152, H = +·248, K = -·957.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Djakarta	27·2	213	—	—	11 41	SS	—
Bandong	27·4	211	—	—	10 39	+11	—
Vladivostok	27·5	16	—	—	i 13 58	Q	—
Hyderabad	41·1	287	e 7 45	- 2	e 13 58	- 3	—
New Delhi	N. 42·2	295	—	—	e 18 58	SSS	—
Bombay	46·2	280	e 9 39	+71	e 15 16	+ 1	—
Andijan	48·3	310	e 8 45	0	e 15 52	+ 7	—
Obi-garm	49·9	307	i 8 56	- 1	e 16 7	0	—
Stalinabad	50·6	307	e 9 5	+ 3	—	—	—
Tashkent	50·7	310	e 9 4	+ 1	—	—	—
Sverdlovsk	60·1	327	e 13 6	PP	—	—	—
Tiflis	69·1	309	e 11 7	- 3	e 20 13	- 2	—
Moscow	72·7	324	e 11 36	+ 4	—	—	—
College	75·1	26	e 11 41	- 5	—	—	—
Ksara	77·2	301	e 11 57	0	e 22 4	+17	—
Stuttgart	91·3	322	e 13 4	- 5	—	—	e 50·5
Rathfarnham Ctle.	z. 96·9	331	—	—	i 30 11	SS	e 51·4

Additional readings :—

Hyderabad SE = 14m.4s.

Bombay eE = 10m.19s.

Ksara e = 5m.0s.

Rathfarnham Castle eZ = 30m.47s.

Long waves were also recorded at other European stations.

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Jan. 1d. Readings also at 0h. (Palomar, China Lake, Tucson, Overton, Pierce Ferry, Collmberg, near Ebingen, Stuttgart, and near Zürich), 1h. (near Garm), 2h. (Apia, Auckland, Christchurch, Wellington, Tacubaya, and near Ashkabad (2)), 3h. (Palomar, China Lake, Tucson, Overton (4), Pierce Ferry, and near Tacubaya), 5h. Apia, Auckland, Christchurch, China Lake, Tucson, Overton, Pierce Ferry, Mineral, Shasta Dam, and College), 6h. (near Tacubaya), 7h. (Palomar, Riverside, Tucson, Boulder City, Overton, Pierce Ferry, and near Alicante), 9h. (Apia, Pasadena, Palomar, Riverside, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Mineral, Shasta Dam, College, Prague, and near Alicante), 10h. (Apia, Auckland, Christchurch, Wellington, China Lake (2), Palomar, Tucson, Boulder City, Overton (2), Pierce Ferry (2), Shasta Dam (2), Mineral (2), Hungry Horse, College, Collmberg (2), Prague, Stuttgart, Strasbourg, Zürich, Basle, Messina, Taranto, Rome, Ksara, Poona, and near Obi-garm; several shocks), 11h. (Palomar, China Lake, Tucson, Overton, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, College, and near Apia), 12h. (Alicante, Granada, Messina, Ashkabad, Overton, Pierce Ferry, Hungry Horse, and College), 13h. (Pierce Ferry, Hungry Horse (2), and College (2)), 14h. (Durham, Strasbourg, Shasta Dam, Hungry Horse, and near Andijan), 15h. (Tucson and Hungry Horse), 16h. (Mount Wilson, Palomar, China Lake, Hungry Horse, and Overton), 17h. (Overton (2)), 18h. (Palomar, China Lake, Overton, and Pierce Ferry), 19h. (Granada, Palomar, Pasadena, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, Hungry Horse (2), and College), 20h. (La Paz, Overton, and Ashkabad), 22h. (Overton), 23h. (Overton and Rathfarnham Castle).

Jan. 2d. 0h. 42m. 34s. Epicentre 19°·1N. 67°·1W. Depth of focus 0·005.  
(as on 1949, June 4d.).

A = +·3680, B = -·8711, C = +·3252;  $\delta = -1$ ;  $h = +5$ ;  
D = -·921, E = -·389; G = +·127, H = -·300, K = -·946.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
San Juan	1·2	128	i 0 24	+ 2	e 0 45	+ 7	—	e 1·1
Port au Prince	5·0	265	i 1 10	- 4	i 2 5	- 7	—	2·3
Bogota	15·9	206	e 3 39	- 2	i 6 25	-10	i 3 56	PP 9·4
Washington, N.R.L.	21·6	340	4 44	- 2	8 26	-10	—	—
Philadelphia	21·9	344	e 4 44	- 5	e 8 31	-11	—	e 12·3
City College, N.Y.	22·4	348	e 4 59	+ 5	i 8 57	+ 6	i 5 34	PP —
Fordham	22·4	348	e 4 52	- 2	i 8 44	- 7	—	—
Pennsylvania	23·5	340	i 5 11	+ 6	e 9 13	+ 3	—	e 10·6
Weston	23·5	353	i 5 19	+14	i 9 10	0	—	—
Harvard	23·6	353	i 5 4	- 2	i 9 12	0	i 5 22	pP e 12·9
Cleveland	25·5	334	e 5 31	+ 7	e 9 53	+ 9	—	e 12·2
Ottawa	27·2	347	e 5 40	0	e 9 26	-46	e 11 13	SS 12·4
St. Louis	28·0	319	i 5 41	- 6	e 10 22	- 3	—	—
Seven Falls	E. 28·1	355	6 1	+13	10 59	+33	—	12·8
Huancayo	32·0	196	e 6 18	- 4	e 11 33	+ 5	—	—
La Paz	35·4	181	e 6 50	- 2	i 12 35	+14	e 8 20	PP 18·0
Tucson	41·3	298	i 7 35	- 6	—	—	e 8 58	PP —
Logan	44·1	312	e 7 58	- 6	—	—	e 9 43	PPP e 24·6
Pierce Ferry	44·4	303	i 8 2	- 4	—	—	i 8 13	pP —
Overton	z. 44·9	304	i 8 5	- 5	—	—	i 9 9	PP e 19·7
Boulder City	45·1	303	i 8 7	- 5	—	—	i 8 22	pP —
Palomar	46·4	299	i 8 17 <sub>a</sub>	- 5	—	—	i 8 29	pP —
Riverside	46·9	300	i 8 20 <sub>a</sub>	- 6	—	—	i 8 30	pP —
Haiwee	z. 47·6	303	i 8 26	- 5	—	—	—	—
Pasadena	47·6	300	i 8 25 <sub>a</sub>	- 6	—	—	i 8 34	pP e 35·3
Hungry Horse	47·7	320	i 8 26	- 6	—	—	i 8 39	pP —
Tinemaha	48·0	303	i 8 29 <sub>a</sub>	- 5	—	—	—	—
Lick	z. 50·7	304	i 8 49 <sub>a</sub>	- 6	—	—	i 8 55	pP —
Shasta Dam	51·6	307	i 8 54	- 8	—	—	i 9 36	P <sub>c</sub> P —
Toledo	z. 57·5	55	i 9 49	+ 4	—	—	e 14 1	P <sub>c</sub> S —
Granada	57·8	57	9 45 <sub>a</sub>	- 2	e 18 3	PS	—	28·3
Almeria	58·7	58	10 4	+11	17 48	- 3	12 22	PP 32·4
Jersey	E. 59·5	43	e 11 6	+67	—	—	—	—
Alicante	60·3	56	e 10 5	+ 1	e 18 6	- 6	10 53	P <sub>c</sub> P e 28·8
Paris	62·5	44	i 10 18	- 1	—	—	—	—

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Clermont-Ferrand	62.8	47	e 10 24	+ 3	—	—	—	—
Algiers Univ. z.	63.1	57	12 12	PP	—	—	—	—
Besançon	64.8	45	e 10 35	+ 1	—	—	e 11 3	P <sub>c</sub> P
Basle	65.9	45	e 10 44	+ 3	e 19 10	-12	—	—
Strasbourg	66.0	44	i 10 44 <sub>a</sub>	+ 2	—	—	e 11 33	P <sub>c</sub> P
Zürich	66.6	46	e 10 46	0	—	—	—	—
Stuttgart	66.9	44	e 10 48	+ 1	—	—	—	e 37.4
Tamanrasset z.	67.3	72	i 10 55 <sub>a</sub>	+ 5	—	—	e 11 20	P <sub>c</sub> P
College	69.0	334	i 10 56	- 5	—	—	—	—
Collmberg z.	69.2	42	e 11 3	+ 1	—	—	—	—
Prague	70.2	42	i 11 11	+ 3	e 20 20	+ 7	—	—
Ksara	89.8	55	e 12 6	-47	e 23 52	+15	—	—

Additional readings :—

Port au Prince i = 1m.52s.

Bogota i P<sub>c</sub>P?EN = 7m.46s.

Fordham i = 8m.55s. and 9m.4s.

Pennsylvania eN = 9m.5s.

Cleveland iE = 5m.37s., eN = 5m.40s.

La Paz iSS = 14m.58s.

Logan i = 8m.10s.

Toledo eZ = 10m.30s.

Almeria S<sub>c</sub>S = 19m.50s., SSS = 24m.34s.

Alicante PP = 12m.13s., PPP = 13m.39s., P<sub>c</sub>S = 15m.9s., PS = 18m.21s., S<sub>c</sub>S = 20m.19s.,

SS = 22m.35s.

Tamanrasset eZ = 11m.1s. and 12m.11s., ePPZ = 13m.26s.

Long waves were also recorded at Berkeley, Malaga, Kew, De Bilt, and Potsdam.

Jan. 2d. 1h. 15m. 28s. Epicentre 7°·1N. 34°·6W.

A = +·8169, B = -·5635, C = +·1228;  $\delta$  = -6;  $h$  = +7;  
D = -·568, E = -·823; G = +·101, H = -·070, K = -·992.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Bogota	39.3	269	e 7 36	+ 4	e 13 39	+ 5	e 16 41	SS
La Paz	40.6	234	i 7 47	+ 4	i 14 0	+ 6	i 9 24	PP
Granada	41.1	38	i 7 48 <sub>k</sub>	+ 1	—	—	17 6	SS
Almeria	41.6	40	9 2	PP	—	—	—	—
Tamanrasset z.	41.6	63	i 7 53 <sub>a</sub>	+ 2	—	—	e 9 30	PP
Huancayo	44.8	245	e 8 13	- 4	e 14 57	+ 2	e 10 2	PP
Algiers Univ. z.	45.2	44	e 8 22	+ 2	—	—	—	—
Weston	47.8	324	e 8 40	- 1	—	—	—	e 18.9
Harvard	48.0	324	i 8 42	- 1	—	—	—	—
Clermont-Ferrand	50.4	34	e 9 3	+ 2	—	—	—	23.5
Rathfarnham Ctle. z.	51.5	21	e 8 3	-66	—	—	e 10 47	PP
Paris	52.0	30	i 9 12	- 1	—	—	—	—
Ottawa	52.1	325	e 9 12	- 2	—	—	—	—
Besançon	52.9	34	9 32?	+12	—	—	—	—
Rome	54.1	42	—	—	e 17 9	+ 4	—	e 30.8
Strasbourg	54.6	33	e 9 32	0	—	—	—	—
Stuttgart	55.5	34	e 9 36	- 3	e 17 24	0	e 12 8	PP
Triest	56.6	39	—	—	e 17 11	-27	—	—
Collmberg z.	59.0	33	e 10 2?	- 2	—	—	—	—
Prague	59.1	34	e 10 0	- 4	e 18 7	- 4	e 11 44	PP
Helwan z.	65.6	61	e 10 36	-12	—	—	e 12 57	PP
Ksara	69.9	57	e 11 16	+ 1	—	—	e 15 33	PPP
Tucson	74.6	302	i 11 43	0	—	—	—	—
Logan	75.8	311	e 11 50	0	e 21 18	-13	e 14 47	PP
Pierce Ferry	77.3	306	e 11 59	+ 1	—	—	—	—
Hungry Horse z.	77.7	319	i 11 59	- 1	—	—	—	—
Overton	77.7	307	i 12 1	+ 1	—	—	—	—
Boulder City	78.0	306	i 12 13	+11	—	—	—	—
Palomar z.	79.7	303	i 12 25	+14	—	—	—	—
Riverside z.	80.1	304	i 12 13	0	—	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Tinemaha	z.	80.7	307	i 11 55	-21	—	—	—	—
Pasadena	z.	80.8	304	e 12 17	0	—	—	—	—
Reno	z.	81.8	309	e 12 23	+1	—	—	—	—
Mineral	z.	83.2	310	i 12 30	+1	—	—	—	—
Lick	z.	83.4	307	e 12 31 <sub>a</sub>	+1	—	—	—	—
Shasta Dam		83.8	311	e 12 31	-1	—	—	—	—
College		93.2	338	e 13 17	0	—	—	—	—

Additional readings :—

La Paz i = 14m.22s.

Tamanrasset iZ = 8m.1s., eZ = 8m.47s., ePPPZ = 10m.5s.

Algiers Univ. eZ = 8m.34s.

Strasbourg e = 9m.59s.

Prague i = 10m.43s., e = 11m.4s.

Helwan eZ = 14m.44s.

Pierce Ferry i = 12m.12s.

Hungry Horse i = 12m.13s.

Overton iZ = 12m.15s.

Boulder City i = 12m.26s.

Lick iZ = 12m.50s.

Long waves were also recorded at Alicante, Potsdam, and Copenhagen.

Jan. 2d. 13h. Undetermined shock.

Istanbul iP = 45m.12s., iS<sub>s</sub> = 45m.58s.

Helwan ePZ = 45m.13s., S?N = 46m.40s., eZ = 47m.25s.

Bucharest eE = 45m.18s., eN = 45m.35s., eE = 46m.27s., EN = 46m.36s., eE = 46m.58s., eN = 47m.11s.

Ksara e = 46m.18s. and 47m.51s.

Stuttgart eP = 47m.29s., eQ = 53.5m.

Strasbourg eP = 47m.39s., ePP = 48m.4s., eS? = 51m.26s.

Triest eS? = 48m.20s., eL? = 50m.44s.

Tamanrasset iPZ = 48m.44s., iZ = 48m.50s., ePPZ = 49m.22s., ePPPZ = 49m.37s.

Athens eS? = 49m.22s.

Rathfarnham Castle eZ = 50m.37s. and 55m.2s.

Weston iP = 54m.41s.

Ottawa eP = 54m.44s.

College eP = 55m.9s.

Hungry Horse eP = 56m.4s.

Long waves were also recorded at Warsaw.

Jan. 2d. 15h. 14m. 35s. Epicentre 11°.5S. 165°.4E. (as on 1944, Dec. 22d.).

Suggested deep (Strasbourg and U.S.C.G.S.).

$$A = -.9485, B = +.2471, C = -.1981; \quad \delta = -5; \quad h = +6;$$

$$D = +.252, E = +.968; \quad G = +.192, H = -.050, K = -.980.$$

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane		19.7	214	i 4 33k	-1	i 8 12	+2	—	—
Apia		22.4	98	e 5 5	+3	e 9 55	+51	e 5 41	pP e 11.4
Riverview		25.8	208	i 5 34k	0	i 9 59	-3	i 6 0	PP e 12.7
Auckland	N.	26.6	163	5 43	+1	i 10 33	+17	—	—
Arapuni		28.0	163	e 5 57	+2	e 10 51	+13	—	—
New Plymouth	E.	28.5	165	e 6 5	+6	e 10 15	-31	—	—
Tuai	N.	29.1	161	e 6 8	+4	e 11 8	+12	—	—
Cobb River	E.	30.2	169	e 6 15	+1	e 11 29	+16	—	—
Wellington		30.8	166	i 6 19	-1	i 11 35	+12	i 7 21	PP 14.9
Kaimata	N.E.	31.4	172	e 6 25	0	—	—	—	—
Christchurch		32.5	170	i 6 36	+2	e 11 47	-2	7 49	PP e 16.8
Perth		49.9	237	8 40	-17	i 16 5	-2	19 45	SS 23.7
Bandong		57.1	270	e 9 50	0	e 17 39	-6	—	—
Djakarta		58.0	270	e 9 51 <sub>a</sub>	-6	e 17 42	-15	—	—
Vladivostok		62.4	333	i 10 22	-5	i 18 48	-5	—	—
Irkutsk		82.2	327	i 12 2	-22	i 22 35	-4	—	—
Berkeley		83.4	49	i 12 33k	+3	e 22 47	-4	e 28 31	SS e 42.0
Santa Clara		83.5	49	i 12 29	-2	i 22 53	+1	i 12 36	PcP e 43.4
Lick	z.	83.7	49	i 12 34k	+2	—	—	i 15 47	PP —
College		83.8	18	i 12 29	-3	i 22 51	-4	e 13 31	pP e 36.8

Continued on next page.



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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Sitka	84.1	28	i 12	32	- 2	—	—	—	—	—	e 37.2
Shasta Dam	84.3	46	e 12	33	- 2	—	—	—	e 15	55	PP
Mineral	z. 84.8	47	i 12	38k	+ 1	—	—	—	e 15	53	PP
Pasadena	85.4	54	i 12	41k	+ 1	e 23	5	[+ 2]	i 24	8	PS
Reno	z. 85.8	48	e 12	45k	+ 3	e 22	48	[-18]	e 16	4	PP
Riverside	86.0	54	i 12	45k	+ 2	e 23	12	{ 0}	i 13	25	?
Palomar	86.2	56	i 12	46k	+ 2	e 23	16	- 3	—	—	—
Tinemaha	86.2	51	i 12	47k	+ 3	—	—	—	i 13	26	?
Colombo	E. 87.0	277	12	47	- 1	23	27	0	—	—	—
Boulder City	88.5	53	i 12	57	+ 1	—	—	—	—	—	—
Overton	z. 89.0	53	i 13	1	+ 3	—	—	—	—	—	—
Pierce Ferry	89.2	53	e 13	1	+ 2	—	—	—	i 13	38	pP
Hyderabad	E. 90.5	288	13	4	- 1	23	33	[- 3]	—	—	—
Tucson	90.9	57	i 13	9	+ 2	e 24	12	+ 3	e 13	55	pP
Hungry Horse	92.3	41	i 13	13	0	—	—	—	e 13	53	pP
Logan	92.3	48	e 13	14	+ 1	(e 24	18)	+ 3	e 17	1	PP
Poona	E. 95.0	288	e 13	21	- 5	24	40	+ 2	—	—	—
Bombay	96.1	288	e 13	25	- 6	e 24	3	[- 4]	—	—	—
Frunse	98.3	312	e 13	41	0	e 24	17	[- 2]	—	—	—
Andijan	99.7	310	e 13	44	- 3	24	24	[- 2]	—	—	—
Obi-garm	101.5	307	i 13	57	+ 2	—	—	—	—	—	—
Tashkent	102.1	310	e 13	57	- 1	i 24	36	[- 1]	e 18	3	PP
Stalinabad	102.2	307	e 14	5	+ 7	i 24	35	[- 3]	—	—	—
St. Louis	108.3	53	—	—	—	e 24	51	[-14]	i 28	20	PS
Cleveland	N. 114.8	49	—	—	—	e 31	41	?	e 35	41	SS
Huancayo	115.3	109	e 18	50	[+ 6]	e 25	50	[+17]	i 29	39	PS
Ottawa	118.3	44	i 18	50k	[+ 1]	—	—	—	—	—	—
La Paz	120.2	117	e 18	48	[- 5]	25	59	[+ 8]	20	29	PP
Moscow	120.2	329	e 18	54	[+ 1]	—	—	—	e 20	17	PP
Tiflis	120.3	311	e 18	53	[ 0]	—	—	—	e 20	11	PP
City College, N.Y.	120.5	48	i 18	56	[+ 2]	e 37	4	SSP	e 30	7	?
Harvard	121.9	46	i 18	58	[+ 2]	—	—	—	—	—	e 50.3
Weston	122.1	46	i 19	0?	[+ 3]	—	—	—	—	—	e 61.8
Ksara	129.0	304	i 19	11	[+ 1]	33	8	PPS	21	21	PP
Warsaw	z. 130.3	332	e 19	14a	[+ 1]	e 22	31	PKS	e 22	19	PP
Potsdam	133.5	337	i 19	20a	[+ 1]	i 22	51	PKS	i 21	45	PP
Helwan	z. 133.6	300	19	17	[- 2]	e 31	53	PS	21	42	PP
Collmberg	z. 134.4	335	e 19	15	[- 5]	—	—	—	—	—	—
Jena	135.2	336	e 19	22	[ 0]	e 22	52	PKS	—	—	—
Prague	135.7	334	e 19	16	[- 7]	—	—	—	e 25	3	PPP
De Bilt	136.5	342	e 19	25	[+ 1]	—	—	—	i 22	5	PP
Rathfarnham Castle	137.8	352	i 19	26	[- 1]	e 26	15	[-20]	e 32	35	PS
Stuttgart	137.9	336	e 19	18	[- 9]	e 22	57	SKP	e 22	10	PP
Triest	138.3	330	e 19	31	[+ 4]	i 22	30	SKP	—	—	e 80.4
Strasbourg	138.6	337	i 19	29	[+ 1]	e 22	47	SKP	e 19	52	pPKP
Zürich	139.3	336	e 19	20	[- 9]	—	—	—	e 22	13	PP
Basle	139.5	337	e 19	28	[- 2]	—	—	—	e 22	16	PP
Paris	140.2	342	i 19	31	[ 0]	i 23	8	PKS	i 22	27	PP
Bologna	140.3	331	e 19	35	[+ 4]	e 22	55	PKS	—	—	e 82.4
Besançon	140.4	337	e 19	31	[ 0]	—	—	—	—	—	—
Florence Arc.	140.9	330	e 22	10?	PP	e 28	33?	{-53}	—	—	—
Rome	141.6	327	i 19	34	[+ 1]	e 23	12	SKP	e 25	49	PPP
Clermont-Ferrand	142.7	339	e 19	34	[- 1]	e 23	18	PKS	e 22	50	PP
Tortosa	147.9	337	i 19	48	[+ 4]	—	—	—	i 20	43	?
Algiers Univ.	z. 150.2	330	i 19	53a	[+ 5]	—	—	—	e 20	37	pPKP
Toledo	150.2	343	i 19	50	[+ 2]	—	—	—	e 23	22	PP
Alicante	150.4	338	20	0	[+12]	27	20	[+26]	20	8	PKP <sub>1</sub>
Almeria	152.5	339	i 19	52	[+ 1]	26	52	[- 5]	23	48	PP
Granada	152.6	341	i 19	58a	[+ 7]	e 43	55	SSP	20	28	pPKP
Malaga	z. 153.3	342	i 19	53a	[+ 1]	—	—	—	i 23	45	PP
Tamanrasset	z. 157.8	303	i 20	0a	[+ 2]	e 30	27	{-34}	e 20	52	PKP <sub>1</sub>

For Notes see next page.

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NOTES TO JANUARY 2d. 15h. 14m. 35s.

Additional readings :—

Apia P? = 5m.11s., eS = 10m.0s.  
 Riverview iZ = 5m.47s., iEZ = 8m.59s., iZ = 9m.5s., iE = 10m.5s., iN = 10m.18s., iE = 10m.26s., iN = 10m.38s., iE = 10m.47s., iN = 11m.8s. and 11m.20s.  
 Wellington P<sub>c</sub>P = 8m.57s., iZ = 10m.8s., eSS = 13m.25s.  
 Christchurch iP<sub>c</sub>PZ = 9m.16s., eN = 11m.3s., iSZ = 12m.3s., iSEN = 12m.6s., iSSNZ = 13m.46s., eQE = 14m.0s.  
 Perth PP = 10m.30s.  
 Berkeley eN = 34m.27s., eZ = 36m.57s.  
 Lick iZ = 13m.9s.  
 College ePPP? = 17m.29s., e = 23m.55s.  
 Shasta Dam iP = 12m.36s.  
 Mineral iP<sub>c</sub>PZ = 12m.47s.  
 Pasadena iZ = 13m.18s., eE = 26m.47s.  
 Palomar iZ = 13m.6s. and 15m.18s.  
 Pierce Ferry i = 13m.22s., iPP = 16m.44s.  
 Tucson ePP = 16m.50s., ePKKP = 30m.32s., ePKP, PKP = 38m.44s.  
 Logan true S is given as pP.  
 Obi-garm iS<sub>g</sub> = 14m.28s.  
 St. Louis i = 25m.58s., eSS? = 34m.31s.  
 La Paz PS = 30m.31s., SS = 36m.9s.  
 Potsdam eE = 20m.25s., ePPEN = 21m.40s., ePKSE = 22m.43s.  
 Helwan PP? = 22m.48s., eN = 23m.58s.  
 Collmberg eEZ = 19m.21s., eE = 19m.25s.  
 Prague iPKP = 19m.24s., e = 19m.38s. and 23m.35s.  
 Rathfarnham Castle iZ = 19m.55s., ePP = 21m.20s., ePPEN = 24m.7s., e = 24m.21s., eEN = 28m.40s., ePS?EN = 31m.15s., eSS = 39m.25s.  
 Stuttgart iPKPZ = 19m.28s.  
 Trieste iPP = 23m.7s., ePKS = 23m.15s., ePPP = 26m.2s., ePPS = 35m.30s., iSS = 41m.27s., iPSS? = 42m.24s.  
 Strasbourg e = 22m.0s.?, ePP? = 22m.19s., ePKS = 23m.13s., e = 63m.25s.?  
 Zürich i = 19m.28s.  
 Paris i = 19m.34s., iPPP? = 25m.33s.  
 Algiers Univ. eZ = 20m.17s.  
 Toledo iZ = 19m.55s., 19m.58s., and 20m.17s., eZ = 21m.10s., iN = 32m.47s.  
 Alicante PP = 24m.0s., PPP = 27m.10s., SS = 33m.3s.  
 Almeria PKP<sub>g</sub> = 20m.36s., PPP = 27m.16s., SKKS = 30m.32s., SS = 41m.18s.  
 Granada iPP = 23m.28s., SKSP = 32m.25s.  
 Malaga iPPPZ = 27m.35s.  
 Tamanrasset iZ = 20m.12s. and 20m.31s., iPPZ = 24m.15s., eZ = 28m.58s. and 31m.30s.  
 Long waves were also recorded at Victoria, Saskatoon, Chicago, Fordham, Upsala, Copenhagen, and Kew.

Jan. 2d. 19h. 53m. 3s. Epicentre 41°·5N. 112°·3W. (as on 1943, February 22d.).

A = -·2850, B = -·6950, C = +·6601; δ = -2; h = -2;  
 D = -·925, E = +·379; G = -·250, H = -·611, K = -·751.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Logan		0·4	55	i 0 4	- 9	—	—	—	i 1·7
Salt Lake City		0·8	155	e 0 16	- 2	—	—	—	i 0·4
Overton	z.	5·2	199	i 1 46	P <sub>g</sub>	—	—	—	—
Pierce Ferry		5·5	195	i 1 42	P*	i 2 19	-11	—	i 3·1
Boulder City		5·9	201	i 1 43	P*	—	—	—	—
Reno	z.	6·0	253	e 2 6	P <sub>g</sub>	e 3 18	S <sub>g</sub>	—	—
Tinemaha		6·4	229	e 1 55	P*	i 3 34	S <sub>g</sub>	i 2 14	—
Hungry Horse		6·9	250	e 1 41	- 4	i 2 53	-10	i 2 8	i 3·6
Mineral		7·1	264	e 1 55	+ 7	i 3 56	S <sub>g</sub>	i 2 11	—
Shasta Dam		7·7	267	e 2 21	P*	—	—	—	—
Lick	z.	8·3	243	i 2 20 <sub>a</sub>	P*	i 4 27	S <sub>g</sub>	—	—
Riverside	z.	8·5	211	i 2 13	+ 6	i 4 39	S <sub>g</sub>	—	—
Palomar	z.	8·9	205	i 2 59	P <sub>g</sub>	—	—	—	—
Tucson		9·3	173	e 2 21	+ 4	(i 4 16)	+ 9	—	i 4·3
College		30·9	332	e 6 20	0	—	—	—	—

Additional readings :—

Tucson e = 2m.31s., i = 2m.50s. and 3m.24s., iS = 3m.37s.

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Jan. 2d. Readings also at 1h. (Ottawa), 2h. (near Andijan, Fergana, Frunse, Obi-garm, Samarkand, Stalinabad, and Tashkent), 3h. (Tucson), 4h. (near Alicante), 5h. (near Obi-garm), 6h. (College), 8h. (Sochi and near Mizusawa), 9h. (near Almeria and Alicante), 10h. (College, Hungry Horse, Victoria, near Andijan, Fergana, Obi-garm, Stalinabad, and near Almeria), 12h. (near Andijan), 13h. (La Paz and near Huancayo), 15h. (Overton), 16h. (near Ashkabad), 17h. (Andijan, Samarkand, near Obi-garm, Stalinabad, and near Mizusawa), 18h. (Huancayo, Fergana, Samarkand, near Andijan and Obi-garm), 19h. (Palomar, Pasadena, Riverside, Tinemaha, Tucson, Lick, College, and Stuttgart), 20h. (La Paz, Overton, and Stuttgart), 21h. (Harvard, Hungry Horse, College, Ksara, and near Mizusawa), 22h. (Lick, near Grahamstown, and near Obi-garm), 23h. (near Overton (3)).

Jan. 3d. 2h. 51m. 49s. Epicentre 17°·6N. 121°·1E.

A = -·4926, B = +·8167, C = +·3005;  $\delta = -5$ ;  $h = +5$ ;  
D = +·856, E = +·517; G = -·155, H = +·257, K = -·954.

		$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
		°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Zi-ka-wei	N.	13·5	1	e 3	11	- 4	e 6	9	L	—	—	(e 6·1)
Nanking		14·5	352	e 3	35	+ 7	6	36	+25	—	—	—
Yakusima		15·4	32	3	44	+ 4	7	26	+54	4	18	pP
Kagosima		16·4	30	e 3	52	- 1	i 7	5	+ 9	4	16	pP
Miyazaki		17·1	33	e 3	50	-12	i 7	12	0	—	—	i 9·8
Kumamoto		17·5	28	e 4	9	+ 2	7	50	+29	—	—	12·4
Hukuoka		18·0	17	i 4	13 <sub>a</sub>	0	i 7	39	+ 7	—	—	e 8·9
Ooita		18·2	29	e 4	35 <sub>a</sub>	+19	e 8	8	+31	—	—	—
Simidu		18·7	34	4	5	-17	e 7	46	- 2	—	—	13·4
Kōti		19·4	33	i 4	29 <sub>k</sub>	- 1	e 8	8	+ 4	i 5	2	pP
Muroto		19·5	34	i 4	31	0	8	14	+ 8	5	26	PP
Hamada	E.	19·8	28	e 4	44	+ 9	8	19	+ 6	9	41	SS
Sumoto		20·7	34	i 4	47 <sub>k</sub>	+ 3	8	33	+ 2	5	59	PP
Kobe		21·2	34	i 4	48 <sub>k</sub>	- 1	e 8	58	+17	i 6	34	PP
Osaka		21·3	34	e 4	52	+ 2	e 8	35	- 8	—	—	10·1
Kameyama		22·0	36	4	59	+ 1	8	59	+ 3	—	—	18·0
Hikone		22·2	34	5	3	+ 3	9	6	+ 6	—	—	—
Nagoya		22·5	36	5	6	+ 4	9	9	+ 4	—	—	e 10·8
Gihu		22·6	36	5	2	- 1	9	4	- 3	5	26	pP
Shizuoka		23·2	38	5	7	- 2	e 9	20	+ 2	5	30	PP
Toyama		23·7	33	e 5	23	+ 9	9	45	+18	—	—	e 11·6
Hunatu		23·8	38	i 5	15 <sub>a</sub>	0	i 9	28	0	—	—	18·6
Wazima		24·1	31	e 5	25	+ 7	e 9	37	+ 3	—	—	—
Matusiro		24·2	34	e 5	21	+ 2	e 9	34	- 1	—	—	e 12·1
Nagano		24·3	34	e 5	21	+ 1	e 9	57	+20	e 6	17	PP
Tokyo		24·5	39	e 5	21	- 1	9	49	+ 9	e 5	47	pP
Maebasi		24·6	37	e 5	22	- 1	i 10	21	+39	i 6	25	PP
Onahama		26·0	39	e 5	21	-15	e 10	14	+ 8	—	—	—
Hukusima		26·3	36	5	37	- 2	e 10	7	- 4	—	—	i 11·4
Sendai		26·9	36	e 5	47	+ 2	e 10	21	+ 1	6	21	PP
Vladivostok		27·0	18	i 5	43	- 2	i 10	21	- 1	—	—	—
Djakarta		27·5	213	e 5	47	- 3	i 10	33	+ 3	—	—	—
Bandong		27·7	211	e 5	41	-11	e 10	22	-11	—	—	—
Mizusawa	E.	27·7	35	5	51	- 1	10	13	-20	—	—	—
Sapporo		30·7	29	e 6	41	+22	e 11	25	+ 4	e 6	44	pP
Calcutta	E.	31·1	285	e 6	32	+10	i 11	35	+ 7	i 8	10	PP
Irkutsk		37·0	343	7	24	+11	16	1	SS	8	45	PP
Hyderabad		40·6	277	7	45	+ 2	13	56	+ 2	9	32	PP
Colombo	E.	41·6	261	7	51	0	14	31	+23	—	—	23·8
New Delhi	N.	41·6	294	e 7	54	+ 3	e 14	13	+ 5	9	35	PP
Kodaikanal	E.	42·9	266	i 8	5	+ 3	i 14	44	+17	8	23	PP
Poona	E.	44·8	279	i 8	20	+ 3	i 14	59	+ 4	9	44	P <sub>c</sub> P
Almata		45·2	315	i 8	22	+ 2	e 15	4	+ 3	—	—	—
Bombay		45·8	280	e 8	26	+ 1	i 15	9	0	i 10	20	PP
Semipalatinsk		46·2	325	i 8	28	0	—	—	—	—	—	—

Continued on next page.

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	$\Delta$ e	Az. e	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.
			m.	s.		m.	s.		m.	s.	
Frunse	46.7	313	i 8	36	+ 4	—	—	—	e 10 29	PP	—
Andijan	47.7	310	e 8	44	+ 4	15	46	+10	e 10 39	PP	—
Fergana	48.0	313	i 8	45	+ 2	e 15	42	+ 1	—	—	—
Obi-garm	49.3	307	i 8	52?	- 1	i 16	7?	+ 8	i 19 31	SS	—
Perth	49.5	186	e 8	57	+ 3	16	34	+32	10 56	PP	25.4
Stalinabad	49.9	307	i 8	59	+ 2	i 16	15	+ 8	i 10 56	PP	—
Tashkent	50.1	310	i 9	0	+ 1	e 16	27	PS	e 11 43?	PPP	—
Samarkand	51.5	307	i 9	10	+ 1	e 16	54	PS	—	—	—
Brisbane	54.5	144	i 9	32 <sup>a</sup>	0	i 17	2	- 8	—	—	—
Mary	55.2	304	i 9	40	+ 3	—	—	—	—	—	—
Ashkabad	58.0	304	9	59	+ 2	18	5	+ 8	—	—	—
Riverview	58.6	151	e 10	5	+ 4	e 18	9	+ 5	e 13 40	PPP	e 27.5
Sverdlovsk	59.4	327	i 10	6	0	i 18	16	+ 1	i 10 46	P <sub>c</sub> P	—
Baku	64.6	308	—	—	—	e 20	19?	+58	—	—	—
Grozny	67.6	311	e 11	2	+ 1	e 20	2?	+ 5	—	—	—
Tiflis	68.4	309	i 11	3	- 3	20	9?	+ 2	i 11 19	P <sub>c</sub> P	—
Leninakan	69.2	308	11	12	+ 2	—	—	—	—	—	—
Piatigorsk	69.5	312	11	15	+ 3	20	26?	+ 6	—	—	—
Sotchi	71.9	311	e 11	28	+ 1	—	—	—	—	—	—
Moscow	72.0	324	11	25	- 3	20	45	- 4	—	—	—
Apia	73.2	110	e 11	37	+ 2	—	—	—	—	—	—
Auckland	74.1	138	e 11	53	+13	21	11	- 1	—	—	—
College	74.7	26	i 11	38	- 5	e 21	11	- 8	i 14 14	PP	e 34.7
Honolulu	75.7	72	e 11	50	+ 1	e 21	24	- 6	—	—	e 32.3
Simferopol	75.7	314	11	50	+ 1	21	32	+ 2	—	—	—
Yalta	75.7	313	e 11	44	- 5	21	37	+ 7	—	—	—
Ksara	76.5	301	i 11	52	- 2	i 21	54?	+15	—	—	—
Wellington	76.8	141	11	58	+ 3	21	31	-11	i 12 41	P <sub>c</sub> P	—
Christchurch	77.0	143	i 12	2	+ 6	21	33	-12	12 33	P <sub>c</sub> P	—
Helsinki	77.9	330	(e 12 1 <sup>a</sup> )	—	0	(e 21 53)	—	- 1	(e 26 45)	SS	e 37.2
Kishinev	78.8	316	i 12	3	- 3	i 22	0	- 4	i 15 0	PP	—
Lwow	81.2	320	e 12	22	+ 3	—	—	—	e 15 27	PP	—
Helwan	81.2	298	i 12	20 <sup>k</sup>	+ 1	i 22	32	+ 3	15 31	PP	—
Bucharest	81.4	314	i 12	17	- 3	i 22	32	+ 1	i 15 8	PP	38.2
Upsala	81.5	331	e 15	37	PP	i 22	31	- 1	e 23 11?	PS	e 38.8
Warsaw	82.3	322	12	24 <sup>k</sup>	- 1	22	46	+ 6	22 36	SKS	e 41.2
Sitka	82.4	32	e 12	30	+ 5	e 22	41	0	—	—	e 35.3
Skalnate Pleso	83.7	320	e 12	33	+ 1	e 23	0	+ 6	e 12 56	pP	e 42.2
Raciborzu	84.7	321	e 12	41	+ 4	e 23	6	+ 2	—	—	—
Budapest	85.1	318	12	40	+ 1	23	5	- 3	e 16 18	PP	46.7
	85.1	318	12	44	+ 5	23	8	0	e 12 47	P <sub>c</sub> P	46.2
Kalossa	85.5	317	e 12	43	+ 2	23	9	- 3	24 24	PS	e 48.2
Ogyalla	85.5	319	e 12	46	+ 5	e 23	24	+12	e 16 34	PP	—
Copenhagen	85.7	328	i 12	41	- 1	i 23	16	+ 2	e 23 8	SKS	42.2
Potsdam	86.8	324	i 12	47 <sup>a</sup>	0	i 23	27	+ 2	i 16 21	PP	e 43.2
Bergen	86.9	334	e 21	0	?	23	8? [- 5]	—	—	—	e 37.2
Prague	86.9	322	e 12	48	0	e 23	27	+ 1	e 16 35	PP	e 43.2
Collmberg	87.3	323	e 12	49	- 1	e 23	38	+ 9	e 16 21	PP	e 46.5
Zagreb	87.7	318	e 12	51	- 1	e 23	15 [- 4]	—	e 16 20	PP	e 47.2
Cheb	88.1	323	e 12	53	- 1	e 23	42	+ 5	e 16 30	PP	e 45.2
Jena	88.2	323	e 12	55	+ 1	e 23	39	+ 1	e 16 21	PP	e 47.2
Triest	89.2	318	i 12	58	- 1	i 23	57	+10	i 13 43	pP	—
Stuttgart	90.6	322	e 13	4	- 1	e 24	14	+14	e 16 36	PP	e 46.2
Karlsruhe	90.7	323	e 14	55	?	e 23	37 [ 0]	—	e 17 49	PPP	e 50.2
Padova	90.8	318	13	5	- 1	23	42 [+ 4]	—	e 16 27	PP	—
Messina	90.9	311	e 13	6	- 1	e 24	21 +18	—	—	—	—
Bologna	91.2	318	e 13	12 <sup>k</sup>	+ 4	e 24	29	+24	e 16 51	PP	—
De Bilt	91.2	326	i 13	11	+ 3	e 23	11	-54	e 30 11?	SS	e 44.2
Salo	91.2	319	e 13	11	+ 3	e 23	54 {+ 4}	—	e 24 12	S	—
Strasbourg	91.5	323	e 13	9	- 1	i 24	20 +12	—	e 16 49	PP	e 47.2
Florence Arc.	91.6	317	e 12	11?	-59	23	42? [ 0]	—	16 17?	PP	—

Continued on next page.

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Florence Xim	91.6	317	e 13	18	+ 8	i 23	41	[- 1]	i 24	40	S	—
Prato	91.6	317	e 13	14	+ 4	i 24	22	+13	—	—	—	—
Rome	91.6	315	i 13	7	- 3	24	19	+10	i 16	49	PP	45.3
Zürich	91.6	321	e 13	9k	- 1	e 24	8	- 1	e 16	45	PP	—
Aberdeen	91.9	333	e 17	2	PP	24	17	+ 6	23	44	SKS	e 45.0
Basle	92.1	321	e 13	11	- 1	e 24	27	+14	—	—	—	—
Pavia	92.3	319	e 12	58	-15	—	—	—	—	—	—	—
Neuchatel	92.8	321	e 13	22	+ 6	—	—	—	—	—	—	—
Victoria	92.8	37	13	14k	- 2	—	—	—	—	—	—	e 51.2
Durham	93.1	331	—	—	—	i 23	51	[ 0]	i 24	23	S	—
Edinburgh	E. 93.1	332	13	19	+ 2	24	26	+ 4	13	35	PcP	—
Besançon	93.2	322	e 12	56	-21	—	—	—	e 17	35	PP	—
Seattle	93.9	37	i 13	25k	+ 4	e 24	43	+14	e 13	44	pP	e 38.2
Kew	94.4	328	i 13	25	+ 2	e 23	55	[- 3]	i 17	13	PP	e 40.2
Paris	94.4	325	i 13	23	0	e 24	42	+ 9	i 17	10	PP	e 46.2
Clermont-Ferrand	95.7	322	e 13	30	+ 1	e 24	41	- 3	e 17	25	PP	46.2
Rathfarnham Castle	96.2	331	e 13	43	+12	e 23	50	[-18]	e 26	2	PS	e 48.2
Jersey	E. 96.6	327	—	—	—	e 29	41	?	e 33	43	SSP	52.7
Shasta Dam	97.4	43	e 13	35	- 2	—	—	—	e 17	3	PP	—
Ukiah	97.6	45	—	—	—	e 24	21	[+ 6]	—	—	—	e 41.3
Hungry Horse	98.0	33	i 13	38	- 1	e 24	57	- 7	e 17	40	PP	—
Mineral	Z. 98.1	43	e 13	40k	0	—	—	—	e 17	2	PP	—
Berkeley	98.9	46	i 13	44k	+ 1	i 24	13	[- 9]	i 17	42	PP	e 45.5
Saskatoon	99.1	28	—	—	—	i 25	11?	- 2	—	—	—	50.7
Santa Clara	99.4	46	e 17	57	PP	e 24	55	-20	—	—	—	e 50.6
Lick	Z. 99.6	46	i 13	41	- 5	—	—	—	e 17	44	PP	—
Reno	Z. 99.7	43	e 13	47	0	e 24	36	[+10]	e 17	54	PP	—
Tortosa	100.0	318	—	—	—	—	—	—	i 17	32	PP	e 53.2
Butte	N. 100.3	35	e 23	42	?	e 25	24	+ 1	—	—	—	e 57.6
Algiers Univ.	Z. 100.4	314	e 18	1	PP	—	—	—	—	—	—	—
Bozeman	101.3	35	—	—	—	e 24	46	[+13]	—	—	—	e 49.6
Alicante	102.0	317	14	1	+ 4	—	—	—	16	39	PP	e 47.7
Tinemaha	Z. 102.1	44	i 14	3	+ 5	—	—	—	—	—	—	—
Grahamstown	103.1	239	e 18	23	PP	—	—	—	—	—	—	—
China Lake	Z. 103.2	44	e 14	0	- 3	—	—	—	i 18	12	PP	—
Toledo	103.3	320	e 13	57	- 6	e 24	37	[- 6]	e 18	15	PP	53.4
Logan	103.4	38	e 14	4	0	e 24	45	[+ 2]	e 18	22	PP	e 45.4
Pasadena	103.7	47	i 14	7	+ 2	i 24	45	[ 0]	i 18	17	PP	e 47.4
Salt Lake City	103.9	39	—	—	—	e 24	48	[+ 2]	e 31	38	SS	e 51.6
Almeria	104.1	317	14	11	+ 4	24	40	[- 6]	18	28	PP	56.3
Riverside	Z. 104.3	47	e 14	10	+ 2	—	—	—	i 18	23	PP	—
Granada	104.6	318	i 14	20k	+11	i 24	50	[+ 1]	i 18	26	PP	57.6
Boulder City	104.9	44	i 17	21	PP	—	—	—	—	—	—	—
Overton	Z. 104.9	43	i 18	24	PP	—	—	—	—	—	—	—
Palomar	105.0	47	i 18	30	PP	—	—	—	—	—	—	—
Tamanrasset	Z. 105.3	301	e 14	33	+21	e 29	54	PS	e 18	22	PP	—
Malaga	Z. 105.4	318	e 12	53	?	23	5	?	i 18	39	PP	56.2
Pierce Ferry	105.4	43	e 18	28	PP	—	—	—	—	—	—	—
Tucson	109.8	45	e 14	39	P	e 24	49	[-22]	e 18	7	PKP	e 47.2
Seven Falls	E. 114.7	8	—	—	—	e 26	15	[-23]	e 34	33	SS	48.6
Chicago	115.2	23	e 19	39	PP	e 27	15	{+34}	e 29	47	PS	e 46.6
Ottawa	115.5	13	e 18	43	[- 1]	e 26	55	{+11}	19	50	PP	54.2
St. Louis	116.8	27	e 18	49	[+ 2]	i 27	26	{+33}	i 19	57	PP	—
Cleveland	117.6	19	i 18	59	[+11]	e 27	34	{+36}	i 20	11	PP	56.5
Halifax	117.9	3	—	—	—	e 29	47	PS	—	—	—	58.0
Harvard	119.1	10	i 18	50	[- 1]	e 26	51	{-17}	i 20	14	PP	e 65.0
Weston	119.2	10	18	55	[+ 4]	e 36	41	SS	e 20	12	PP	48.5
Pennsylvania	N. 119.3	17	e 20	17	PP	e 30	6	PS	—	—	—	—
Fordham	120.3	13	e 18	54	[+ 1]	e 30	11	PS	i 20	17	PP	62.2
Philadelphia	120.8	14	e 20	21	PP	e 25	57	[+ 4]	e 30	18	PS	e 48.0
Columbia	124.5	22	—	—	—	e 30	45	PS	—	—	—	e 52.4
Bermuda	130.0	6	e 22	30	PKS	e 32	25	PS	e 23	47	PPP	e 55.2
Fort de France	147.8	3	e 19	46	[+ 2]	—	—	—	—	—	—	—
Bogota	153.3	35	i 20	2	[+10]	e 23	31	PP	—	—	—	—
Huancayo	163.2	73	i 20	11	[+ 7]	e 35	23	PSKS	e 24	44	PP	e 75.7
La Paz	171.1	84	i 20	11a	[+ 1]	i 27	23	[+11]	i 21	31	PKP,	81.2

For Notes see next page.

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NOTES TO JANUARY 3d. 2h. 51m. 49s.

Additional readings and notes :—

Nanking P = 3m.41s., iN = 3m.52s.  
 Kagosima i = 3m.59s.  
 Miyazaki iN = 4m.8s.  
 Kōti i = 5m.35s., esS = 9m.29s.  
 Sumoto iZ = 5m.29s., iN = 5m.39s., iScS?Z = 17m.39s.  
 Kobe eE = 4m.51s.  
 Osaka i = 4m.57s.  
 Shizuoka PPP = 5m.44s., e = 8m.53s.  
 Hunatu i = 5m.37s. and 16m.27s.  
 Wazima eE = 5m.40s.  
 Nagano eP<sub>c</sub>PE = 8m.24s.  
 Tokyo ePP = 6m.29s., i = 10m.15s.  
 Maebasi iPPP = 6m.30s.  
 Sendai SS? = 11m.22s.  
 Sapporo e = 7m.9s., ePP = 7m.33s., eP<sub>c</sub>P = 10m.13s., eSS = 13m.7s., eSSS = 13m.31s., Q = 14m.37s.  
 Calcutta iSSSE = 14m.27s.  
 Irkutsk iScS = 17m.46s.  
 Hyderabad SSN = 17m.41s.  
 New Delhi PPPN = 10m.3s., SSN = 16m.56s., SSSN = 17m.26s., S<sub>c</sub>SN = 17m.41s.  
 Kodaikanal SSE = 18m.1s.  
 Poona iPPE = 10m.8s., iPPPE = 10m.54s., iP<sub>c</sub>SE = 13m.18s., iScSE = 17m.54s., iSSE = 18m.28s., QE = 19m.34s.  
 Bombay SSN = 18m.48s.  
 Andijan ePS = 15m.54s.  
 Perth PS = 17m.12s., SS = 19m.53s.  
 Riverview iE = 18m.21s., ePSE = 18m.27s., eSSN = 22m.0s., eSSSZ = 24m.13s.  
 Sverdlovsk PP = 12m.20s., PPP = 13m.50s., SS = 22m.18s., SSS = 24m.53s.  
 Tiflis ePS = 20m.37s., eSSS = 27m.56s.  
 Apia eP = 11m.41s., e = 12m.23s.  
 College eSS = 26m.35s.  
 Yalta eP = 11m.51s.  
 Wellington PPZ = 14m.44s.  
 Christchurch iZ = 12m.20s., iPPNZ = 15m.5s., PPPZ = 16m.39s., eZ = 18m.21s., eE = 20m.43s., eEN = 22m.56s., SSEN = 26m.21s., SSS = 29m.55s.  
 Helsinki e = (12m.15s.), (18m.17s.), (22m.1s.), and (22m.13s.), eSSS = (28m.24s.), readings have been increased by 5m.  
 Kishinev iPPP = 16m.59s.  
 Helwan iZ = 12m.38s., 12m.53s., and 13m.59s., eZ = 14m.40s., SKSN = 22m.37s., iN = 23m.11s., PPSEN = 23m.38s.  
 Bucharest iPN = 12m.24s., iN = 14m.56s., iPPP?N = 17m.20s., iPSN = 22m.57s.  
 Upsala iSN = 22m.45s., eE = 27m.47s., eSS?N = 28m.11s.?, eSSSE = 31m.36s., eN = 34m.11s.?, eE = 35m.41s.  
 Warsaw PN = 12m.35s., PS = 23m.11s., PPSN = 23m.47s., PPSE = 23m.50s., SSN = 28m.15s., SSE = 28m.24s., SSSN = 31m.58s.  
 Skalnaté Pleso e = 13m.30s., ePP = 15m.49s., e = 19m.36s. and 23m.31s., ePS = 23m.57s., eSS = 28m.11s., eSSS = 31m.11s.  
 Raciborzu eS?N = 23m.20s.  
 Budapest PPN = 16m.34s., PPPE = 17m.58s., eN = 19m.41s., SN = 23m.19s., S<sub>c</sub>SN = 23m.28s., S<sub>c</sub>SE = 23m.40s., PSE = 24m.18s., PPSE = 24m.51s., SSE = 29m.8s., eN = 29m.44s., SSSN = 32m.28s., SSSE = 32m.51s.  
 Kalossa SE = 23m.21s., eSSE = 29m.18s.  
 Ogyalla e = 13m.39s., 14m.24s., 15m.38s., and 17m.38s., ePPP? = 18m.17s., esS? = 23m.55s., ePS = 24m.29s., e = 27m.17s., eSSS = 31m.35s.  
 Copenhagen 23m.29s., SS = 28m.37s., SSS = 31m.41s.  
 Potsdam ePE = 12m.53s., eSKSN = 23m.17s., iSZ = 23m.31s., iPSN = 24m.31s., iPSEZ = 24m.36s., iPPSZ = 24m.53s., iPPSE = 24m.59s., and other unidentified readings.  
 Prague iEN = 12m.55s., eZ = 13m.46s., e = 14m.21s., 15m.39s., and 17m.39s., ePPP = 19m.2s., e = 19m.51s., eSKS = 22m.35s., eSKKS = 23m.12s., e = 24m.8s., ePS = 24m.33s., eSS = 29m.11s., eSSS = 32m.41s.  
 Collnberg eZ = 12m.54s., eE = 13m.7s. and 13m.11s., eZ = 13m.16s., eSKSE = 23m.8s.  
 Zagreb eP<sub>c</sub>P = 13m.5s., eE = 13m.15s., e = 23m.51s.  
 Cheb e = 13m.49s., eE = 16m.11s., e = 16m.57s., eN = 19m.26s., eSKS? = 23m.24s., e = 23m.53s. and 24m.19s., ePS = 24m.30s., e = 24m.45s., 25m.11s., and 27m.32s., eSS = 30m.41s., e = 35m.41s.  
 Jena ePE = 13m.1s., eN = 13m.15s., ePPN = 16m.25s., eSKS?N = 23m.13s. and 23m.21s., eSKS?E = 23m.26s., eSN = 23m.33s., eSE = 23m.45s.  
 Trieste IPP = 16m.37s., epPP = 17m.19s., ePPP = 18m.33s.?, iSKS = 23m.27s., iSKKS = 23m.42s., ipSKS = 24m.25s., isSKS = 24m.33s.?, iPS = 24m.54s., iSS = 29m.52s., iSSS = 33m.48s.  
 Stuttgart eZ = 13m.44s., eSKS = 23m.34s., eSS = 30m.11s., eSSS = 34m.5s., e = 37m.11s.  
 Karlsruhe eSEN = 24m.23s.  
 Bologna eZ = 13m.37s., eSKS = 23m.44s.  
 Strasbourg eSKS = 23m.43s., ePS = 25m.27s., iPPS = 25m.53s. and 25m.58s., eSS = 30m.2s., and 30m.17s., eSSS = 33m.27s., and other unidentified phases.

Continued on next page.

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Florence Arc. SKS = 22m.46s.?, ePS = 24m.25s.?, e = 28m.29s.?  
 Rome eSKS = 23m.31s., SS? = 30m.29s., SSS = 34m.5s.  
 Zürich eSKS = 23m.38s., ePS = 24m.33s.  
 Aberdeen iE = 22m.49s., eSSEN = 30m.41s.  
 Durham iEN = 24m.41s.  
 Edinburgh PPE = 17m.15s., PPPE = 19m.19s., SKS?E = 23m.34s., S<sub>c</sub>SE = 24m.36s., PSE = 25m.56s., PPSE = 26m.32s., PKKPE = 30m.18s., SSE = 31m.1s.  
 Besançon e = 14m.43s. and 16m.37s.  
 Seattle esP = 13m.50s., eSKS = 24m.8s., eSKKS = 24m.29s., e = 25m.15s. and 25m.29s., ePS = 25m.45s., ePPS = 26m.26s., e = 26m.51s., 27m.19s., and 28m.17s., eSS = 30m.37s., SKKS( $\Delta > 180^\circ$ ) = 37m.47s.  
 Kew e = 21m.1s., eSEN = 24m.53s., ePPS = 26m.55s., eSS = 31m.25s., eSSS = 36m.9s., eEN = 38m.13s.  
 Paris eSKS? = 23m.42s., iSKKS? = 24m.11s., iPS = 25m.57s., iSS = 31m.9s., ePKP,PKP = 38m.36s., and other unidentified i readings.  
 Clermont-Ferrand ePPP = 19m.34s., eSKS = 24m.7s., ePS = 26m.3s., eSS = 31m.35s.  
 Rathfarnham Castle eZ = 14m.4s., iZ = 16m.37s., iPP = 17m.22s., e = 20m.42s., ePPS?EN = 27m.22s.  
 Hungry Horse i = 13m.44s. and 18m.7s., eSKS = 24m.1s., iPKKP = 30m.15s.  
 Berkeley eZ = 16m.37s., iPSZ = 26m.34s., iPPSN = 27m.40s., iPKKP?E = 29m.45s., eSSE = 32m.14s., eN = 39m.59s.  
 Lick eZ = 16m.54s., ePPPZ = 19m.37s.  
 Reno eZ = 17m.6s.  
 Alicante PP = 14m.38s.  
 Toledo e = 22m.26s., SSN = 32m.42s.  
 Logan e = 16m.45s. and 37m.59s.  
 Pasadena eN = 18m.35s., iN = 24m.55s.  
 Almeria PPP = 20m.40s., SKKS = 25m.18s., PPS = 28m.24s., SS = 33m.14s., SSS = 37m.12s.  
 Granada pPP = 19m.7s., PPP = 20m.46s., SKKS = 25m.47s., PS = 27m.33s., PPS = 28m.44s., iSS = 33m.18s., SSS = 38m.14s.  
 Tamanrasset ePP?Z = 18m.36s., ePPPZ = 20m.58s.  
 Malaga iZ = 20m.43s.  
 Tucson ePP = 18m.51s., e = 19m.0s., and 19m.35s., eS? = 26m.22s., ePS = 28m.32s.  
 Ottawa PPP = 21m.53s., e = 31m.35s., SS = 35m.41s.  
 St. Louis i = 30m.2s., iPPS? = 31m.8s., iSS = 35m.56s.  
 Cleveland iE = 20m.28s., eN = 27m.48s. and 28m.2s., eE = 28m.28s. and 28m.39s., ePPSN = 30m.21s., eE = 32m.32s., and 35m.31s., eSSN = 35m.54s., eN = 42m.56s.  
 Harvard ePKS = 21m.55s., eS = 27m.43s., ePKKP = 28m.57s., ePS = 29m.31s., ePPS? = 31m.32s., eSS = 36m.42s.  
 Philadelphia eSS = 37m.6s.  
 Bermuda e = 29m.27s., 34m.49s., and 40m.18s.  
 Huancayo e = 30m.47s., eSS = 45m.29s.  
 La Paz i = 20m.28s., iPKSZ = 23m.11s., iPPZ = 25m.32s., SKKS = 33m.11s.  
 Long waves were also recorded at San Juan, Ivigtut, and Lisbon.

Jan. 3d. 5h.-6h. New Hebrides.

Riverview eZ = 52m.25s., eEN = 56m.18s.  
 Wellington eZ = 53m.17s., iZ = 56m.31s.  
 Christchurch eNZ = 56m.40s., eLE = 60m.30s.  
 College iP = 58m.36s.  
 Berkeley iPZ = 58m.39s. a, ipPZ = 58m.43s.  
 Lick iPZ = 58m.40s. k, ipPZ = 58m.45s., iZ = 58m.53s., and 59m.7s.  
 Shasta Dam iP = 58m.43s.  
 Mineral eZ = 58m.44s.  
 Pasadena iPZ = 58m.48s.  
 Riverside iPZ = 58m.50s.  
 Reno iPZ = 58m.51s. k, iZ = 59m.14s.  
 China Lake iPZ = 58m.52s. k, eZ = 68m.22s., ePKP,PKP?Z = 83m.20s.  
 Tinemaha iPZ = 58m.53s.  
 Pierce Ferry iP = 59m.3s.  
 Boulder City iP = 59m.5s.  
 Overton iPZ = 59m.7s.  
 Tucson eP = 59m.15s., e = 59m.27s., ePKP,PKP? = 84m.19s.  
 Hungry Horse iP = 59m.20s., i = 59m.31s. and 60m.2s.  
 Logan eP = 59m.21s.  
 La Paz PZ = 61m.24s.  
 Ottawa eP = 64m.55s.  
 Tamanrasset e?Z = 65m.4s.  
 Harvard e = 65m.10s.  
 Ksara e = 65m.17s., i = 77m.5s.  
 Prague ePKP = 65m.24s., e = 78m.20s. and 79m.17s.  
 Stuttgart ePKPZ = 65m.30s., eQ = 114m.  
 Strasbourg ePKP = 65m.31s., eL = 112m.  
 Toledo iPZ = 66m.2s., iZ = 66m.8s., eZ = 69m.21s.  
 Long waves were also recorded at Auckland (also note long waves to earthquake at 6h. 5m. 8s.).

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Jan. 3d. 6h. 5m. 8s. Epicentre 17°·6N. 121°·1E. (as at 2h).

	$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.
			m.	s.		m.	s.	
Vladivostok	27·0	18	e 5	45	0	—	—	—
Irkutsk	37·0	343	7	17	+ 4	13	4	+ 5
Andijan	47·7	310	e 8	44	+ 4	—	—	—
Fergana	48·0	313	e 8	39	- 4	—	—	—
Obi-garm	49·3	307	8	52	- 1	—	—	—
Stalinabad	49·9	307	i 9	0	+ 3	16	19	+12
Tashkent	50·1	310	e 9	0	+ 1	—	—	—
Samarkand	51·5	307	e 9	10	+ 1	—	—	—
Sverdlovsk	59·4	327	i 10	8	+ 2	e 18	17	+ 2
Tifis	68·4	309	e 11	1	- 6	—	—	—
Leninakan	69·2	308	e 11	35?	+25	—	—	—
Moscow	72·0	324	e 11	28	0	—	—	—
College	74·7	26	i 11	42	- 1	—	—	—
Stuttgart	z. 90·6	322	e 13	6	+ 1	—	—	—
Shasta Dam	97·4	43	e 13	37	0	—	—	—
Hungry Horse	98·0	33	i 13	40	+ 1	—	—	—

Hungry Horse gives also i = 13m.48s. and 14m.0s.

Long waves only were recorded at Auckland, Wellington, Rome, De Bilt, and Kew.

Jan. 3d. 11h. 6m. 28s. Epicentre 45°·2S. 77°·0W.

A = +·1590, B = -·6889, C = -·7072;  $\delta = 0$ ;  $h = -4$ ;  
D = -·974, E = -·225; G = -·159, H = +·689, K = -·707.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.	
				m.	s.		m.	s.		m.	s.		
La Plata		17·8	61	4	10	- 1	7	37	+ 9	—	—	9·0	
La Paz		29·6	18	i 6	8 <sub>a</sub>	- 1	i 11	8	+ 4	7	16	PP	15·0
Huancayo		33·1	3	i 6	41	+ 1	i 12	6	+ 7	i 7	50	PP	e 13·9
San Juan		64·1	12	—	—	—	e 26	38	Q	—	—	—	e 35·6
Christchurch		72·2	226	e 11	22	- 7	20	40	-11	24	32	SS	32·3
Bermuda		78·0	11	—	—	—	e 23	1	PPS	—	—	—	e 39·0
Tucson		83·0	332	e 12	25	- 3	—	—	—	e 14	36	PP	e 36·4
Philadelphia		84·8	2	e 12	47	+10	e 22	34	-31	e 28	45	SS	e 36·9
Pennsylvania	N.	85·6	359	—	—	—	e 23	14	+ 1	e 28	59	SS	—
Cleveland	E.	86·4	356	—	—	—	i 23	20	- 1	—	—	—	—
Pasadena		87·3	327	e 12	53	+ 3	—	—	—	—	—	—	e 41·7
Weston		87·3	5	e 12	59	+ 9	i 23	32	+ 3	e 36	14	Q	44·0
Harvard		87·5	5	e 12	54	+ 3	—	—	—	—	—	—	e 37·1
Pierce Ferry		87·6	331	e 12	50	- 1	—	—	—	—	—	—	—
Boulder City		87·7	331	e 12	55	+ 3	—	—	—	—	—	—	—
Overton	z.	88·1	331	i 12	50	- 4	—	—	—	—	—	—	—
China Lake	z.	88·6	329	e 12	51	- 5	—	—	—	—	—	—	—
Riverview		90·0	219	—	—	—	e 23	25	[- 8]	e 23	52	S	e 40·6
Ottawa		90·2	1	e 13	6	+ 2	e 24	2	+ 6	—	—	—	47·4
Granada		105·3	52	e 15	26 <sub>a</sub>	?	24	41	[-11]	18	41	PP	—
Jersey	E.	114·4	44	—	—	—	e 24	12	?	—	—	—	—
Kew		116·7	43	—	—	—	e 25	2	[-36]	—	—	—	e 55·5
Strasbourg		119·1	49	e 21	20	PP	e 29	50	PS	e 36	32	SS	e 51·5
Stuttgart		120·0	50	e 18	50?	[- 3]	e 30	14	PS	e 20	12	PP	e 56·5
College		122·7	331	e 18	52	[- 6]	—	—	—	—	—	—	e 57·5
Prague		123·5	51	—	—	—	e 37	21	SS	—	—	—	e 66·5
Ksara		128·4	79	e 11	4	?	e 21	32	PP	—	—	—	—
Bombay		143·7	127	—	—	—	e 31	32?	?	—	—	—	e 69·5

Additional readings :—

La Plata N = 4m.56s., E = 5m.2s., N = 5m.42s., 6m.38s. and 7m.2s., S?N = 7m.18s., E = 7m.26s., SE = 7m.45s., EN = 8m.37s.

La Paz iZ = 6m.42s., iSS = 12m.55s., iSSS = 13m.18s.

San Juan e = 26m.45s.

Christchurch eQN = 27m.52s.

Philadelphia eSSS = 33m.7s.

Riverview ePS?N = 24m.47s., ePPS?E = 25m.22s., eSS?E = 30m.9s.

Granada PP = 19m.29s., S = 27m.32s.

Strasbourg e = 32m.2s., ePKKS = 33m.2s., eSSS = 40m.50s., e = 41m.32s., and 45m.2s.

Stuttgart eSS = 36m.44s., eSSS = 41m.8s.

Long waves were also recorded at Kodaikanal, Berkeley, Chicago, and other European stations.



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Jan. 3d. Readings also at 1h. (Overton, Shasta Dam, near Obi-garm, and near Tananarive), 2h. (Overton, Stalinabad, near Andijan, and Fergana), 3h. (Tucson, Overton, and College), 4h. (College), 5h. (near Stalinabad), 6h. (Huancayo, La Paz, Fergana, Tashkent, near Andijan (2), Almata, and Frunse), 7h. (Hungry Horse and College), 8h. (Overton (3)), 9h. (Christchurch), 10h. (Auckland, Wellington, Bucharest, and near Istanbul), 11h. (Tucson, near Boulder City, Overton, and Pierce Ferry), 12h. (Tashkent, and near Ashkabad), 13h. (Grahamstown, Ottawa, Overton, Prague, Stuttgart, Bologna, Florence, and near Rome), 14h. (near Ashkabad, near Andijan, Fergana, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchinkent), 16h. (Klyuchi), 17h. (College, Klyuchi, and near Obi-garm), 18h. (Hungry Horse, Algiers Univ., near Andijan, Garm, Obi-garm, and near Istanbul), 20h. (Klyuchi and Ottawa).

Jan. 4d. 9h. 45m. 30s. Epicentre  $43^{\circ}9'N$ .  $146^{\circ}2'E$ . (as on 1947, Oct. 21d.).

Intensity V at Attoko (Hokkaido); IV at Otiisi and Keinebetu (Hokkaido); II-III at Kusiro. Macroseismic radius 200-300 km.  
Epicentre  $41^{\circ}5'N$ .  $147^{\circ}0'E$ . Depth 30-100km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1950, Tokyo, 1952, p. 5.

$$A = -0.6007, B = +0.4021, C = +0.6909; \quad \delta = -13; \quad h = -3;$$

$$D = +0.556, E = +0.831; \quad G = -0.572, H = +0.384, K = -0.723.$$

	$\Delta$	Az.	P.		O-C.	S.		O-C.
	°	°	m.	s.	s.	m.	s.	s.
Nemuro	0.7	218	0	11	-6	0	17	-11
Sapporo	3.6	260	1	1	+3	1	50	S*
Miyako	5.3	219	1	8	-14	1	56	-29
Morioka	5.6	224	1	14	-13	2	6	-27
Mizusawa	6.1	221	1	42	+8	e 2	14	-31
Sendai	6.9	218	1	32	-13	2	36	-29
Hukushima	7.5	218	1	58	+5	2	53	-27
Onahama	8.0	212	3	1	+61	—	—	—
Mito	8.7	213	3	18	+68	—	—	—
Kakioka	8.9	213	2	7	-5	—	—	—
Kumagaya	9.3	217	3	34	+77	—	—	—
Tokyo	9.6	214	3	38	+77	—	—	—
College	41.4	36	i 7	52	+2	—	—	—
Shasta Dam	64.2	57	i 10	38	-1	—	—	—
Hungry Horse	64.4	47	i 11	10	+30	—	—	—
Mineral	z. 64.9	57	i 10	43	0	—	—	—
Tinemaha	z. 69.0	58	i 11	10	+1	—	—	—
China Lake	z. 70.2	59	i 11	15	-2	—	—	—
Pasadena	z. 70.9	60	i 11	21	0	—	—	—
Riverside	z. 71.5	60	i 11	23	-1	—	—	—
Boulder City	71.8	57	e 12	26	+60	—	—	—
Pierce Ferry	72.2	57	i 11	29	0	—	—	—
Tucson	76.7	58	i 11	54	-1	—	—	—
La Paz	140.1	57	e 19	46	[+15]	—	—	—

Additional readings :—

Hungry Horse i = 11m.22s. and 11m.29s.

China Lake eZ = 11m.27s.

Pasadena eZ = 11m.30s.

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Jan. 4d. 14h. 7m. 12s. Epicentre 42°·5N. 12°·6E.

As given by Strasbourg.

A = +·7217, B = +·1613, C = +·6731;  $\delta = -7$ ;  $h = -3$ ;  
D = +·218, E = -·976; G = +·657, H = +·147, K = -·740.

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Rome	0·6	188	0	8 <sub>a</sub>	P <sub>g</sub>	i 0	24	S <sub>g</sub>	i 1	3	—
Florence Arc.	1·6	322	0	36	P <sub>g</sub>	e 0	54	+ 3	i 1	3	—
Florence Xim.	1·6	322	e 0	29	- 1	i 1	2	S <sub>g</sub>	—	—	—
Prato	1·7	323	i 0	38	P <sub>g</sub>	i 0	56	S <sub>g</sub>	—	—	—
Padova	2·1	345	—	—	—	e 1	29	S <sub>g</sub>	e 2	18	—
Bologna	2·2	335	e 0	44	P <sub>g</sub>	e 1	5	- 1	e 1	14	—
Triest	3·2	15	e 0	52	0	e 1	23	- 9	e 1	36	e 1·5
Salo	3·4	336	e 1	20	P <sub>g</sub>	e 1	42	S*	e 1	56	—
Zürich	5·6	331	e 1	6	-21	e 2	34	+ 1	—	—	e 2·1
Basle	6·2	327	—	—	—	e 2	44	- 4	—	—	—
Stuttgart	6·7	340	e 1	51	P*	e 3	21	S*	—	—	—
Strasbourg	7·0	332	e 5	57	?	e 6	28	?	—	—	—
Prague	7·7	9	—	—	—	e 3	31	+ 6	e 4	19	—
Jena N.	8·5	355	—	—	—	e 3	44	- 1	—	—	e 4·5
Collmburg z.	8·8	2	—	—	—	e 4	30	S*	—	—	—
Rathfarnam Ctle. z.	16·6	317	e 4	16	PP	—	—	—	e 4	22	PPP e 8·7

Bologna also gives e = 1m.18s.

Jan. 4d. Readings also at 0h. (near Obi-garm), 4h. (near Prague), 10h. (Overton and Tucson), 11h. (near Ashkabad), 12h. (near Irkutsk, near Andijan, and near Istanbul), 13h. (Istanbul), 14h. (Ashkabad, Christchurch, near Obi-garm, Garm, Stalinabad, Fergana, Andijan, Tashkent, Samarkand, and Tchikent), 15h. (College, Hungry Horse, and Mineral, and near Istanbul), 20h. (Hungry Horse (2), and Ashkabad), 21h. (Cleveland), 23h. (Kew).

Jan. 5d. 4h. 31m. 4s. Epicentre 7°·0N. 103°·0W.

Uncertain.

A = -·2233, B = -·9672, C = +·1211;  $\delta = 0$ ;  $h = +7$ ;  
D = -·974, E = +·225; G = -·027, H = -·118, K = -·993.

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Tacubaya	12·9	16	e 3	1	- 6	—	—	—	—	—	6·1
Tucson	26·2	345	e 5	35	- 3	e 10	0	- 9	e 6	16	PP e 12·2
Bogota	28·9	93	—	—	—	e 11	14	+21	e 13	40	S <sub>c</sub> P
Palomar z.	29·2	337	i 6	6	+ 1	—	—	—	—	—	—
Riverside z.	30·0	335	i 6	12	0	—	—	—	—	—	—
Pasadena	30·4	335	i 6	17	+ 1	—	—	—	—	—	—
Pierce Ferry	30·7	343	e 6	14	- 5	—	—	—	—	—	e 12·7
Boulder City	30·8	341	e 6	3	-17	—	—	—	—	—	—
China Lake z.	31·6	338	i 6	27	+ 1	—	—	—	—	—	—
Tinemaha z.	33·0	337	i 6	39	0	—	—	—	—	—	—
Huancayo	33·4	124	—	—	—	e 12	26	+23	—	—	—
Lick z.	34·6	333	e 6	43 <sub>a</sub>	-10	—	—	—	—	—	—
Mineral z.	37·1	337	e 7	15	+ 1	—	—	—	—	—	—
Philadelphia	41·2	33	—	—	—	e 14	57	+55	—	—	—
La Paz	41·7	124	—	—	—	i 14	34	+24	—	—	e 21·7
Hungry Horse	42·3	349	e 7	56	- 1	e 13	0	?	—	—	—
Bermuda	43·7	49	—	—	—	e 15	54	PPS	—	—	21·9
Ottawa	45·0	27	e 8	17	- 2	14	56	- 2	—	—	23·9
Saskatoon	45·1	357	—	—	—	e 18	19	SS	—	—	e 21·4
College	65·8	341	e 10	55	+ 6	—	—	—	—	—	—
Kew	92·4	38	—	—	—	e 22	56? [-51]	—	—	—	—

Additional readings:—

Tucson e = 11m.14s.

Pierce Ferry i = 6m.19s.

Lick Z = 6m.54s.

College e = 11m.29s.

Long waves were also recorded at Harvard, Lincoln, Chicago, Berkeley, and Logan.

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained thanks to funding provided by the US National Science Foundation through grant EAR-9725140 (Villaseñor et al., 1997) and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of the EUROSEISMOS project.

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Jan. 5d. 10h. 55m. 21s. Epicentre 48°·2S. 164°·2E.

A = -·6438, B = +·1822, C = -·7432;  $\delta = +2$ ;  $h = -5$ ;  
D = +·272, E = +·962; G = +·715, H = -·202, K = -·669.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Christchurch	7·5	55	e 2 29	P <sub>r</sub>	e 3 39	S*	—	5·1
Kaimata	N.E. 7·6	44	e 1 56	+ 1	3 27	+ 4	—	—
Cobb River	E. 9·3	44	e 2 18	+ 1	e 4 9	+ 4	—	—
Wellington	10·2	51	e 2 30	- 1	e 4 24	- 3	—	5·6
Auckland	N. 13·8	38	—	—	e 6 24?	?	—	e 7·6
Riverview	17·4	331	i 4 6 <sub>a</sub>	0	e 7 18	- 1	i 4 20 PP	e 8·8

Riverview gives also eQE = 7m.28s., iSSE = 7m.39s., iSSSN = 7m.51s., iN = 8m.4s.  
Long waves were also recorded at Brisbane.

Jan. 5d. 21h. 56m. 1s. Epicentre 37°·1N. 141°·8E. (as on 1939, July 28d.).

Intensity V at Shioyazaki lighthouse (Hukusima prefecture); IV at Onahama, Mito, Kakioka; II-III at Shirakawa, Hukusima, Sendai, Inawashiro, Tokyo, Titibu, and Utunomiya.

Epicentre 37°·1N. 141°·6E. Suggested depth 60km. Macroseismic radius 200-300km.

Seismo. Bull., Cent. Met. Obs., Japan, 1950, Tokyo, 1952, p. 6., with macroseismic chart.

A = -·6283, B = +·4944, C = +·6006;  $\delta = -9$ ;  $h = -1$ ;  
D = +·618, E = +·786; G = -·471, H = +·371, K = -·800.

	$\Delta$	Az.	P.	O-C.	S.	O-C.
	°	°	m. s.	s.	m. s.	s.
Onahama	0·8	257	0 15k	- 3	0 23	- 8
Hukusima	1·2	302	0 23k	- 1	0 37	- 4
Mito	1·3	236	0 23	- 2	0 37	- 7
Sendai	1·3	329	0 25	0	0 40	- 4
Kakioka	1·5	236	0 28k	0	0 41	- 8
Tukubasan	1·6	237	0 27	- 3	0 44	- 7
Utunomiya	1·7	250	0 27	- 4	—	—
Kumagaya	2·1	244	0 36	- 1	1 0	- 4
Mizusawa	2·1	346	0 35	- 2	0 57	- 7
Tokyo	2·1	229	0 36	- 1	0 59	- 5
Maebasi	2·3	252	0 38	- 2	1 3	- 6
Yokohama	2·4	226	0 43	+ 2	1 8	- 4
Miyako	2·6	3	0 44	0	1 11	- 6
Mera	2·7	216	0 46	+ 1	1 12	- 7
Morioka	2·7	349	0 43	- 2	1 12	- 7
Hunatu	2·9	237	0 39	- 9	1 12	-12
Matusiro	2·9	259	0 48	0	1 31	+ 7
Nagano	2·9	261	0 48	0	1 18	- 6
Akita	3·0	334	0 53	+ 3	—	—
Misima	3·0	229	0 50	0	—	—
Osima	3·1	220	0 49	- 2	1 26	- 3
Toyama	3·4	266	1 4	+ 9	1 40	+ 3
Shizuoka	3·5	234	1 1	+ 4	1 39	- 1
Aomori	3·8	348	1 9	+ 8	2 17	+30
Gihu	4·4	250	1 21	+11	2 14	+12
Nagoya	4·4	245	1 15	+ 5	2 5	+ 3
Hikone	4·8	250	2 6	S	(2 6)	- 6
Kameyama	4·9	245	2 9	S	(2 9)	- 6
Kyoto	5·3	249	1 30	+ 8	—	—
Owase	5·5	239	1 34	+ 9	—	—
Hungry Horse	71·5	42	i 11 21	- 3	—	—
Collmberg	z. 81·2	331	e 12 16	- 3	—	—
Stuttgart	z. 84·7	330	e 12 33	- 4	—	—

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Jan. 5d. Readings also at 0h. (near Seattle and Victoria), 1h. (College and Mizusawa), 3h. (Apia, Auckland, Christchurch, Wellington, Palomar, Pasadena, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Mineral, and College), 4h. (near La Paz), 5h. (near Istanbul), 6h. (Pretoria, Tucson, and La Paz), 8h. (College), 10h. (College (2), Pierce Ferry, and near Prague), 12h. (Andijan, and near Garm), 13h. (Pasadena, China Lake, Tucson, Boulder City, Pierce Ferry, College, La Paz, La Plata, Huancayo, Pretoria, Samarkand, Tashkent, Tchimkent, near Andijan, Garm, Stalinabad, Obigarm, Fergana, and near Ashkabad), 16h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Boulder City, Pierce Ferry, Overton, Mineral, Shasta Dam, Hungry Horse, College, Collmberg, Stuttgart, and Pretoria), 17h. (near Garm and Obi-garm), 18h. (near Ottawa), 19h. (near Andijan, Fergana, Garm, Obi-garm, and Stalinabad), 20h. (Ashkabad, Samarkand, and Tchimkent), 23h. (Ashkabad).

Jan. 6d. 18h. May be two separate shocks.

La Plata E. P = 40m.31s., 43m.29s., 44m.0s.  
 N. P = 40m.54s., S? = 43m.6s., L? = 43.8m.  
 Z. P = 40m.30s., 41m.5s., S = 43m.24s., L = 44.3m.  
 La Paz iP = 42m.55s., i = 43m.12s., iS = 47m.12s., i = 47m.32s., SS = 48m.10s., L = 50.2m.  
 Bogota eP = 45m.38s., eS? = 45m.55s.  
 Huancayo e = 48m.30s.  
 Ottawa eP = 49m.17s.  
 Tucson eP = 49m.39s., iP = 49m.54s.  
 Pretoria iZ = 49m.47s.  
 Boulder City eP? = 49m.50s.  
 Overton ePZ = 49m.50s.  
 Harvard iP = 50m.3s.  
 Weston iP = 50m.4s.  
 China Lake ePZ = 50m.7s., epP?Z = 50m.23s.  
 Pasadena ePZ = 50m.19s.  
 Riverside eP?Z = 50m.24s.  
 Tinemaha eZ = 50m.25s.  
 Logan e = 50m.38s.  
 Lick ePZ = 50m.39s., Z = 51m.7s.  
 Hungry Horse eP = 50m.49s.  
 Shasta Dam eP = 50m.51s.

Jan. 6d. Readings also at 0h. (Andijan, Tchimkent, Samarkand, Frunse, near Obi-garm, Garm, Stalinabad, and Fergana), 2h. (Mineral, and near Prague), 4h. (Ashkabad, La Paz, and near Istanbul), 6h. (La Paz), 7h. (near Alicante, near Garm, Fergana, Obi-garm, Andijan, Stalinabad, Samarkand, Tchimkent, and Frunse), 8h. (near Huancayo), 9h. (Istanbul), 10h. (near Granada and near Ashkabad), 11h. (Samarkand, Fergana, Tchimkent, near Garm, Obi-garm, Stalinabad (2), and Andijan), 13h. (near Prague), 14h. (Prague), 15h. (Tucson, Alicante, Granada, near Lisbon, Malaga, Toledo, and Almeria), 16h. (near Istanbul), 17h. (Mizusawa, and near Klyuchi), 18h. (near Garm), 20h. (La Paz and Bogota), 21h. (near Stalinabad), 22h. (Samarkand, Fergana, near Obi-garm, Garm, Stalinabad, and Andijan), 23h. (Rolphton, near La Cave, and Ottawa).

Jan. 7d. 14h. 20m. 58s. Epicentre 41°18. 174°4E.

Intensity V in the epicentral region.

Epicentre 41°05'S. 174°4E.

R. C. Hayes.

The Cook Strait Earthquakes, 1950, Jan.-Feb. New Zealand Journal of Science and Technology, Sec. B. (1952), Vol. 33, No. 4, pp. 309-318.

A = -0.7522, B = +0.0738, C = -0.6548;  $\delta = +1$ ;  $h = -2$ ;  
 D = +0.098, E = +0.995; G = +0.652, H = -0.064, K = -0.756.

	$\Delta$	Az.	P.	O - C.	S.	O - C.
	°	°	m. s.	s.	m. s.	s.
Wellington	0.3	123	10 11	0	10 17	- 1
Cobb River	E. 1.3	269	10 23	- 2	10 41	- 3
New Plymouth	E. 2.0	353	0 35	0	1 0	- 2
Kaimata	N.E. 2.6	239	10 46	+ 2	1 17	0
Christchurch	2.8	208	10 46	- 1	1 21	- 1
Tuai	N. 3.1	44	e 0 46?	- 5	1 1 23?	- 6
Arapuni	3.2	18	1 1 4	P <sub>g</sub>	1 30	- 2

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Jan. 7d. 22h. 36m. 19s. Epicentre 31°·5S. 66°·0W. Depth of focus 0·010.

A = +·3474, B = -·7804, C = -·5199;  $\delta = +1$ ;  $h = +1$ ;  
D = -·914, E = -·407; G = -·211, H = +·475, K = -·854.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
	°	°	m. s.	s.	m. s.	s.	m. s.	m.	
La Paz	15·1	352	i 3 31	+ 2	i 6 21	+ 7	6 41	SS	7·0
Huancayo	21·2	336	i 4 43	+ 4	i 8 35	+11	i 5 30	pPP	—
Bogota	36·7	347	e 6 58	- 1	—	—	—	—	—
Grahamstown	75·4	120	(i 11 35)	0	i 11 35	P	e 12 14	P <sub>c</sub> P	—
Tucson	76·3	323	i 11 39	- 1	—	—	e 14 31	PP	—
Ottawa	77·0	354	i 11 42k	- 2	—	—	—	—	—
Palomar	80·4	319	i 12 3k	+ 1	i 12 58	sP	i 12 42	pP	—
Pierce Ferry	80·9	323	i 12 5	0	—	—	i 12 43	pP	—
Boulder City	81·2	322	i 12 7	+ 1	—	—	i 12 42	pP	—
Riverside	81·2	319	i 12 5k	- 1	i 13 0	sP	i 12 44	pP	—
Pasadena	81·7	319	i 12 9k	0	i 13 4	sP	—	—	—
China Lake	z. 82·6	321	i 12 13k	- 1	—	—	i 12 52	pP	—
Tinemaha	83·9	320	i 12 20k	0	—	—	—	—	—
Logan	84·2	328	e 12 22	0	—	—	—	—	—
Fresno	z. 84·5	320	e 12 22k	- 1	—	—	—	—	—
Lick	z. 86·0	319	i 12 29k	- 2	—	—	e 13 9	pP	—
Reno	z. 86·5	322	e 12 34k	+ 1	—	—	—	—	—
Tamanrasset	z. 87·3	61	e 12 36	- 1	—	—	i 13 14	pP	—
Shasta Dam	88·7	321	i 12 42	- 2	—	—	—	—	—
Hungry Horse	90·4	330	i 12 51	- 1	—	—	i 13 30	pP	—
Algiers Univ.	z. 93·7	49	i 13 5 <sub>a</sub>	- 2	—	—	i 13 43	pP	—
College	114·7	332	e 18 33	[+ 4]	—	—	—	—	—

Jan. 7d. 23h. 15m. 27s. Epicentre 3°·0N. 97°·0E. (as on 1949, Jan. 2d.).

A = -·1217, B = +·9912, C = +·0520;  $\delta = -1$ ;  $h = +7$ ;  
D = +·993, E = +·122; G = -·006, H = +·052, K = -·999.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Djakarta	13·4	134	—	—	6 9	SSS	—	—
Colombo	E. 17·5	283	3 54	-13	6 48	-33	—	8·4
Kodaikanal	E. 20·7	293	i 4 44	0	e 8 12	-19	—	—
Calcutta	E. 21·2	338	e 4 49	0	e 8 45	+ 4	—	—
Poona	E. 27·4	305	e 5 52	+ 3	10 22	- 6	i 12 9	SSS 12·4
Bombay	28·4	305	—	—	e 10 2	-43	e 10 10	? e 12·6
Fergana	43·6	335	8 33	+25	—	—	—	—
Andijan	43·7	332	e 8 9	+ 1	14 36	- 3	—	—
Stalinabad	43·8	328	i 8 6	- 3	i 14 27	-13	—	—
Almata	43·9	340	—	—	e 14 37	- 5	—	—
Frunse	44·4	337	e 8 11	- 3	e 14 47	- 2	—	—
Samarkand	45·5	327	e 8 20	- 3	—	—	—	—
Tchimkent	46·2	333	i 8 28	0	—	—	—	—
Irkutsk	49·5	7	i 8 58	+ 4	—	—	—	—
Sverdlovsk	61·0	339	10 17	- 1	18 31	- 4	—	—
Ksara	64·5	306	—	—	e 23 27	SS	—	—
Helwan	N. 67·5	302	—	—	e 19 47	- 9	—	—
Istanbul	71·5	311	e 11 3	-21	—	—	—	—
Stuttgart	z. 86·3	318	e 12 42	- 3	—	—	—	—
Hungry Horse	122·1	24	e 18 59	[+ 2]	—	—	—	—
Overton	z. 131·0	33	—	—	e 43 30	SSS	—	—
Pierce Ferry	131·5	33	—	—	e 43 39	SSS	—	—

Helwan also gives eN = 20m.0s. and 21m.3s.  
Long waves were also recorded at Bandung and Rome.

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Jan. 7d. Readings also at 1h. (Samarkand, Fergana, Andijan, near Obi-garm, Stalinabad, and Garm), 2h. (Bogota), 3h. (Hungry Horse and Shasta Dam), 7h. (Hungry Horse), 9h. (Fresno, Boulder City, near Overton, and Tucson), 10h. (Hungry Horse, Boulder City, Overton (2), Tucson (2), and Logan), 11h. (Hungry Horse, Boulder City, Overton, and Tucson), 12h. (near Ashkabad), 13h. (near Istanbul), 16h. (Fergana, Samarkand (2), Tchimkent (2), near Garm (2), Obi-garm (2), Stalinabad (2), and Andijan (2)), 17h. (near Ashkabad), 18h. (Hungry Horse, Pierce Ferry, and near Mizusawa), 19h. (Pierce Ferry, Stuttgart, and near Fort de France), 21h. (La Plata, and near Ashkabad (2)), 23h. (Hungry Horse, Fergana, Samarkand, Tchimkent, near Garm, Obi-garm, Stalinabad, and Andijan).

Jan. 8d. 20h. 42m. 56s. Epicentre 20°·0S. 175°·0W. Depth of focus 0·005.

Intensity IV at Nukualofa. Epicentre as adopted (Strasbourg).  
Seismological Report for Jan.-Mar. 1950. Seismological Observatory, Wellington, New Zealand, p.3.

A = -·9368, B = -·0820, C = -·3400 ;  $\delta = -8$  ;  $h = +5$  ;  
D = -·087, E = +·996 ; G = +·339, H = +·030, K = -·940.

		$\Delta$		Az.		P.		O-C.		S.		O-C.		Supp.	
		°	°	m.	s.	s.	m.	s.	m.	s.	m.	s.			
Apia		6·9	27	e 1	37	-	4	e 2	44	-	15	—	—	—	—
Tuai	N.	19·9	199	e 4	27	-	2	e 6	55	-	69	—	—	—	—
Wellington		22·9	202	5	1	+	2	e 9	3	+	3	—	—	—	—
Cobb River	E.	23·5	205	e 5	8	+	3	e 9	15	+	5	—	—	—	—
Kaimata	N.E.	25·2	205	e 5	23	+	2	—	—	—	—	—	—	—	—
Christchurch		25·7	202	e 5	31	+	5	—	—	—	—	e 4	54	?	—
Brisbane	Z.	30·1	250	i 6	6 <sub>a</sub>	-	0	—	—	—	—	—	—	—	—
Lick	Z.	76·0	42	i 11	41 <sub>a</sub>	-	1	—	—	—	—	i 12	5	pP	—
Pasadena	Z.	76·3	46	i 11	44	-	0	—	—	—	—	i 12	3	pP	—
Palomar		76·7	47	i 11	46 <sub>a</sub>	-	0	—	—	—	—	i 12	9	pP	—
Fresno	Z.	76·8	43	e 11	46 <sub>a</sub>	-	0	—	—	—	—	e 12	1	pP	—
Riverside	Z.	76·8	46	i 11	46 <sub>a</sub>	-	0	—	—	—	—	i 12	10	pP	—
China Lake	Z.	77·7	48	i 11	51	-	0	—	—	—	—	i 12	14	pP	—
Shasta Dam		77·7	38	i 11	51	-	0	—	—	—	—	—	—	—	—
Mineral	Z.	77·9	40	e 11	52 <sub>a</sub>	-	0	—	—	—	—	—	—	—	—
Tinemaha	Z.	78·0	44	i 11	53	-	0	—	—	—	—	i 12	18	pP	—
Reno	Z.	78·5	41	i 11	57 <sub>a</sub>	+	1	—	—	—	—	—	—	—	—
Boulder City		79·6	46	i 12	2	-	0	—	—	—	—	—	—	—	—
Overton	Z.	80·2	46	i 12	5	-	0	—	—	—	—	i 12	30	pP	—
Pierce Ferry		80·2	47	i 12	6	+	1	—	—	—	—	i 12	30	pP	—
Tucson		80·4	51	i 12	7	+	1	—	—	—	—	i 12	30	pP	—
Victoria		82·3	33	e 12	16	-	0	—	—	—	—	—	—	—	—
Logan		84·7	42	i 12	30	+	2	—	—	—	—	i 12	54	pP	—
College		87·1	11	i 12	41	+	1	i 23	10	-	2	e 13	5	pP	—
Hungry Horse		87·1	36	i 12	38	-	2	—	—	—	—	i 13	3	pP	—
Collmberg		148·1	350	e 19	39	[+ 4]		—	—	—	—	e 18	52?	?	—
Raciborzu	Z.	148·2	344	e 19	40	[+ 5]		—	—	—	—	—	—	—	—
Jena	Z.	148·7	352	e 19	40	[+ 4]		—	—	—	—	—	—	—	—
Prague		149·1	348	e 19	44	[+ 7]		—	—	—	—	—	—	—	—
Ksara		149·3	302	—	—	—		e 32	59	SKSP		e 34	38	PS	—
Istanbul		150·7	321	i 19	47	[+ 8]		—	—	—	—	—	—	—	—
Stuttgart	Z.	151·1	354	e 19	39?	[- 1]		—	—	—	—	—	—	—	—
Paris		151·2	4	e 19	44	[+ 4]		—	—	—	—	—	—	—	—
Strasbourg		151·4	356	e 19	48	[+ 8]		—	—	—	—	e 20	11	pPKP	—

Additional readings :—

Apia e = 2m.16s. and 2m.41s.

Kaimata iNE = 5m.26s.

Lick iZ = 11m.53s.

Overton iZ = 13m.23s.

Pierce Ferry e = 15m.4s.

Tucson e = 14m.10s. and 15m.31s.

Hungry Horse ePP? = 15m.57s.

Collmberg eZ = 19m.42s., 19m.52s., 20m.7s., and 20m.14s.

Prague e = 20m.18s. and 21m.40s.

Stuttgart ePKP = 19m.46s., e = 20m.15s.

Paris i = 19m.51s. and 20m.14s.

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1950

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Jan. 8d. Readings also at 0h. (College, Pierce Ferry, and Salt Lake City), 1h. (College, and near Bogota), 2h. (Fergana, Samarkand, Tchinkent, near Garm, Obi-garm, Stalinabad, and Andijan), 4h. (College, Hungry Horse, Overton, Pierce Ferry, Tucson, Stuttgart, and near Pavia), 7h. (near Alicante, near Obi-garm, and Stalinabad), 8h. (Hungry Horse, near College, and near Ashkabad), 9h. (near Andijan), 10h. (College, Overton, Wellington, Christchurch, Auckland, Collmberg, and Stuttgart), 12h. (Hungry Horse, Overton, Pierce Ferry, Fergana, Tchinkent, near Naryn, Andijan, and Frunse), 13h. (Istanbul, Fergana, Tchinkent, Naryn, near Obi-garm, Stalinabad, and Andijan), 14h. (Obi-garm, Fergana, Tashkent, near Naryn, Andijan, Frunse, and Almata), 15h. (Samarkand, Stalinabad, and Huancayo), 16h. (Istanbul, near Athens, Obi-garm, near Stalinabad, and Andijan), 20h. (Hungry Horse), 21h. (Leninakan, Erevan, Tifis, near Sochi, and near Taranto), 22h. (Boulder City).

Jan. 9d. 8h. 40m. 4s. Epicentre  $37^{\circ}9S$ .  $177^{\circ}8E$ . Depth of focus 0.015.  
(as on 1937, Oct. 25d.).

$A = -.7905$ ,  $B = +.0304$ ,  $C = -.6117$ ;  $\delta = -1$ ;  $h = -1$ ;  
 $D = +.038$ ,  $E = +.999$ ;  $G = +.611$ ,  $H = -.023$ ,  $K = -.791$ .

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Tuai	N.	1.0	210	i 0 22	- 1	i 0 35	- 6
Arapuni		1.7	264	i 0 33?	+ 2	i 0 52?	- 2
New Plymouth	E.	3.1	248	i 0 52	+ 3	i 1 28	+ 2
Wellington		4.1	214	i 1 0	- 2	i 1 44	- 6
Cobb River	E.	5.1	229	e 1 16	0	i 2 6	- 8
Kaimata	N.E.	6.7	225	e 1 36	- 1	i 2 46	- 7
Christchurch		6.9	214	e 1 40	0	i 2 46	- 11

Jan. 9d. 19h. 40m. 35s. Epicentre  $51^{\circ}1N$ .  $1^{\circ}9E$ .

Felt on both sides of the Straits of Dover at Dover, Deal, and Calais. Epicentre as adopted.

Annales de l'Institut de Physique du Globe de Strasbourg, 2ème partie, Séismologie, 1950, Nouvelle Série, Tome XV, Strasbourg, 1954, p. 6.

$A = +.6302$ ,  $B = +.0209$ ,  $C = +.7762$ ;  $\delta = +8$ ;  $h = -6$ ;  
 $D = +.033$ ,  $E = -.999$ ;  $G = +.776$ ,  $H = +.026$ ,  $K = -.630$ .

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.
Kew		1.4	285	i 0 27	0	i 0 46	$S_g$	—
Paris		2.3	170	i 0 44	$P^*$	i 1 11	$S^*$	i 0 47 $P_g$
Strasbourg		4.6	121	—	—	e 2 12	+ 5	e 2 32 $S_g$
Besançon		4.7	144	e 1 30	$P_g$	e 2 19	$S^*$	e 2 35 $S_g$
Basle		5.2	132	e 1 36	$P^*$	e 2 48	$S_g$	—
Stuttgart	z.	5.3	114	e 1 37?	$P^*$	e 2 30	+ 5	e 1 43 $P_g$
Clermont-Ferrand		5.4	171	e 1 50	$P_g$	i 2 57	$S_g$	—
Rathfarnham Cle.	z.	5.5	297	i 1 34	$P^*$	i 2 55	$S_g$	i 1 45 $P_g$
Zürich		5.8	128	e 1 32	+ 3	e 3 9	$S_g$	—
Jena	E.	6.1	92	—	—	e 2 41	- 4	e 3 28 $S_g$
Prague		8.0	93	—	—	e 3 57	$S^*$	e 4 15 $S_g$

Additional readings:—

Strasbourg  $iS_g? = 2m.35s.$ ,  $e = 2m.38s.$

Besançon  $eP? = 1m.43s.$ ,  $e = 2m.49s.$

Stuttgart  $eS^*?Z = 2m.40s.$ ,  $eS_gZ = 2m.51s.$

Rathfarnham Castle  $iZ = 1m.42s.$  and  $3m.20s.$ ,  $eZ = 7m.11s.$

Jena  $eN = 2m.45s.$ ,  $eS?E = 3m.8s.$ ,  $eS?N = 3m.14s.$ ,  $eS_g?E = 3m.49s.$

Jan. 9d. Readings also at 1h. (College (2), Hungry Horse, Shasta Dam, Mineral, China Lake, Pierce Ferry, Tucson, Pretoria, Istanbul, Bombay, and near Calcutta; more than one shock), 2h. (College (2), Hungry Horse, Shasta Dam, Tucson (2), Athens, and near Ashkabad), 3h. (Athens, Salt Lake City, near Obi-garm, and Stalinabad), 4h. (College (2), Hungry Horse, Andijan, and Pretoria), 5h. (Ashkabad), 6h. (Boulder City), 7h. (near Basle), 8h. (near Ashkabad), 10h. (College, Hungry Horse, Tucson, Riverside, China Lake, and Tinemaha), 11h. (near Tananarive), 12h. (near Almata), 13h. (College, Hungry Horse, Lick, Fresno, Reno, Overton, Boulder City, Pierce Ferry, near Tucson, Helwan, Ksara, Christchurch, Cobb River, Kaimata, New Plymouth, Tuai, and near Wellington), 14h. (Klyuchi, Hungry Horse, Andijan, Stalinabad, Sverdlovsk, near Irkutsk, and near Ashkabad), 15h. (near Klyuchi), 16h. (Shawinigan Falls), 17h. (Huancayo), 18h. (near Obi-garm), 20h. (Hungry Horse), 22h. (Boulder City), 23h. (Hungry Horse, Mount Wilson, China Lake, Overton, Pierce Ferry, Tucson, and Tacubaya).

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained thanks to funding provided by the US National Science Foundation through grant EAR-9725140 (Villaseñor et al., 1997) and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of the EUROSEISMOS project.

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1950

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Jan. 10d. 3h. 5m. 37s. Epicentre 10°·0N. 104°·0W. (as on 1948, July 15d.).

A = -·2383, B = -·9557, C = +·1725;  $\delta$  = -9;  $h$  = +7;  
D = -·970, E = +·242; G = -·042, H = -·167, K = -·985.

		$\Delta$ °	Az. °	P.		O-C.		S.		O-C.		Supp.		L. m.
				m.	s.	s.	m.	s.	s.	m.	s.			
Tacubaya		10·5	26	e 2	30	- 5	e 4	34	- 1	—	—	—	e 5·3	
Tucson		23·0	345	e 5	6	- 1	i 9	11	- 3	—	—	—	e 10·2	
Palomar	z.	26·1	336	i 5	37	0	—	—	—	—	—	—	—	
Riverside	z.	26·9	334	i 5	42	- 3	—	—	—	—	—	—	—	
Pasadena		27·3	334	e 5	47	- 1	i 10	32	+ 5	e 9	8	P <sub>c</sub> P	—	
										e 9	7	P <sub>c</sub> P	e 11·9	
Pierce Ferry		27·5	343	e 5	49	- 1	e 10	1	-29	i 6	40	PP	—	
Boulder City		27·7	341	e 5	51	- 1	—	—	—	e 8	41	P <sub>c</sub> P	—	
Overton	z.	28·1	342	i 5	58	+ 3	e 10	26	-14	—	—	—	e 12·4	
China Lake	z.	28·5	338	i 5	59	0	—	—	—	—	—	—	—	
Chinchina		28·6	96	i 5	39?	-21	i 10	27?	-21	i 6	30?	PP	—	
Tinemaha	z.	29·9	337	e 6	11	- 1	—	—	—	—	—	—	—	
Bogota		30·2	97	i 6	16	+ 2	e 11	23	+10	—	—	—	14·0	
St. Louis		31·1	20	e 6	17	- 5	i 11	18	-10	i 7	16	PP	—	
Lick	z.	31·5	333	e 6	23k	- 3	—	—	—	—	—	—	—	
Columbia		31·9	37	—	—	—	e 11	37	- 3	—	—	—	e 14·5	
Berkeley		32·3	333	—	—	—	e 11	40	- 6	e 14	17	SSS	e 15·3	
Logan		32·4	349	e 6	39	+ 5	i 11	56	+ 8	—	—	—	e 13·3	
Reno	z.	32·6	337	e 6	42	+ 7	—	—	—	—	—	—	e 17·2	
Rapid City	E.	34·0	2	e 6	50	+ 2	e 12	22	+ 9	—	—	—	e 14·5	
Shasta Dam		34·6	335	e 6	52	- 1	—	—	—	—	—	—	—	
Chicago		34·9	20	e 6	54	- 1	i 12	30	+ 3	—	—	—	e 17·7	
Huancayo		35·9	126	i 7	6	+ 2	i 12	47	+ 5	—	—	—	—	
Bozeman		36·1	352	—	—	—	e 12	48	+ 3	—	—	—	e 15·7	
Cleveland		37·1	28	e 7	13	- 1	e 13	4	+ 3	e 7	47	PP	18·6	
Hungry Horse		39·1	350	e 7	29	- 2	—	—	—	e 9	19	PP	—	
Philadelphia		39·3	36	e 9	14	PP	—	—	—	—	—	—	e 18·9	
Seattle		40·6	341	—	—	—	e 13	32	-22	e 16	3	SS	e 19·4	
Victoria		41·7	341	e 7	53?	+ 1	—	—	—	—	—	—	17·4	
Fort de France		42·1	79	—	—	—	e 14	9	- 7	e 17	43	SSS	—	
Saskatoon		42·1	357	—	—	—	e 17	33	SS	e 20	8	Q	24·6	
Bermuda		42·5	52	e 10	42	PPP	e 15	30	+68	i 17	30	S <sub>c</sub> S	e 18·9	
Ottawa		42·8	29	e 7	58	- 3	e 14	27	+ 1	e 9	51	PP	e 21·7	
La Paz		44·2	125	e 8	13	+ 1	i 14	43	- 3	i 10	3	PP	22·4	
College		62·6	340	e 10	25	- 3	—	—	—	—	—	—	—	
Kew		90·6	37	e 21	17	?	—	—	—	—	—	—	e 40·4	
Granada		92·2	51	e 12	53k	-20	i 24	9	- 5	30	27	SS	47·4	
Almeria		93·2	51	e 13	13	- 4	24	3	{- 2}	16	47	PP	45·7	
De Bilt		93·7	35	—	—	—	e 30	23?	SS	—	—	—	e 39·4	
Alicante		94·3	49	13	23	0	24	29	- 3	17	22	PP	e 43·6	
Tamanrasset	z.	103·7	63	e 18	18	PKP	—	—	—	—	—	—	—	
Riverview		107·8	237	e 27	29	?	e 34	30	SS	e 45	11	Q	e 50·0	

Additional readings :—

Tucson i = 5m.14s., e = 7m.53s.

Palomar iZ = 6m.1s.

Pierce Ferry i = 8m.4s.

Overton iZ = 7m.24s., eZ = 11m.16s.

China Lake iZ = 6m.8s. and 6m.26s.

Chinchina eS<sub>c</sub>P?EN = 13m.20s.?

Tinemaha iZ = 6m.20s.

Bogota eN = 11m.48s.

St. Louis eS = 11m.24s.

Lick iZ = 6m.28s.

Reno eZ = 6m.59s.

Shasta Dam e = 6m.56s.

Cleveland iPE = 7m.16s., eN = 12m.1s.

Seattle e = 14m.16s. and 17m.58s.

La Paz iPZ = 8m.16s.

Almeria SKS = 23m.35s., PPS = 25m.47s., SS = 30m.7s.

Alicante SKS = 23m.57s., SS = 30m.43s., SSS = 34m.16s.

Riverview eE = 34m.49s.

Long waves were also recorded at San Juan, Galerazamba, Honolulu, Apia, Christ-

church, Bombay, and other American and European stations.



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Jan. 10d. 16h. 23m. 36s. Epicentre  $54^{\circ}3S$ .  $57^{\circ}3W$ . (as on 1949, Dec. 19d.).

$$A = +.3167, B = -.4933, C = -.8102; \quad \delta = +7; \quad h = -7;$$

$$D = -.842, E = -.540; \quad G = -.438, H = +.682, K = -.586.$$

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	E.	19.4	359	4 31	+ 1	8 9	+ 5	—	10.5
	N.	19.4	359	4 25	- 5	8 5	+ 1	—	10.5
La Paz		38.6	344	e 7 39	+13	i 13 21	- 2	8 58	PP 18.8
Huancayo		44.5	335	e 8 15	0	e 14 50	- 1	—	e 18.1
Grahamstown		60.3	106	e 10 16	+ 3	—	—	—	—
Pretoria	Z.	66.9	102	e 10 58	+ 2	—	—	—	—
Tamanrasset	Z.	93.7	55	e 13 23	+ 3	—	—	—	—
Tucson		97.8	316	e 18 35	?	—	—	—	—
Pierce Ferry		102.4	316	e 18 29	PP	—	—	—	—
China Lake	Z.	103.6	313	e 18 12	PP	—	—	—	—
Hungry Horse		112.9	322	19 26	PP	—	—	e 29 33	PKKP —
Ksara		118.4	70	e 14 55	P	—	—	—	59.4
College		137.3	320	e 19 15	[-11]	—	—	e 22 54	PP —

Additional readings :—

La Plata E = 5m.30s. and 7m.54s., N = 8m.24s.

La Paz iSS = 16m.12s., iS<sub>c</sub>S = 17m.40s.

Long waves were also recorded at Christchurch, Bogota, Bermuda, Harvard, and a few European stations.

Jan. 10d. Readings also at 0h. (Hungry Horse), 1h. (Wellington and Tucson), 2h. (College, and near Ashkabad), 4h. (Malaga, and near Ashkabad), 5h. (Samarkand (2), near Andijan (2), Fergana, Obi-garm (2), and Stalinabad (2)), 7h. (Ashkabad, Fergana, Samarkand, near Andijan, Garm, Obi-garm, Stalinabad, and Tchimkent), 8h. (Tacubaya, Riverside, China Lake (2), Tinemaha, Tucson (2), Overton, College (2), and near Obi-garm), 9h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College (3), Christchurch, and near Mizusawa (2)), 11h. (near Obi-garm), 12h. (Mount Wilson, Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, College, Basle, and near Zürich), 14h. (College), 15h. (Prague, and near Obi-garm), 17h. (Pretoria, Fergana, Tashkent, near Andijan, Garm, Obi-garm, and Tchimkent (2)), 18h. (College, Grahamstown, and Pretoria), 19h. (La Paz, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, College, Bermuda, Tamanrasset, Collmberg, and Stuttgart).

Jan. 11d. 18h. 59m. 14s. Epicentre  $44^{\circ}2N$ .  $135^{\circ}5E$ . Depth of focus 0.050.

$$A = -.5130, B = +.5041, C = +.6947; \quad \delta = -11; \quad h = -3;$$

$$D = +.701, E = +.713; \quad G = -.496, H = +.487, K = -.719.$$

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Vladivostok		2.8	247	i 0 58	0	i 1 43	0
Mizusawa	E.	6.6	138	1 32	- 6	2 44	-12
College		45.7	35	i 7 52	+ 3	e 12 38	?
Hungry Horse		69.5	41	i 10 35	+ 2	—	—
Shasta Dam		70.3	52	i 10 39	+ 1	—	—
Mineral	Z.	71.0	52	i 10 43 <sub>a</sub>	+ 1	—	—
Collmberg		72.7	326	e 10 52	0	—	—
Prague		73.0	324	e 10 48	- 6	e 20 24	PS
Jena		73.5	326	e 10 58	+ 1	—	—
Tinemaha		75.2	53	i 11 7 <sub>a</sub>	+ 1	—	—
Logan		75.3	45	i 11 11	+ 4	—	—
Stuttgart	Z.	76.2	327	e 11 12	0	—	—
China Lake	Z.	76.4	53	i 11 14 <sub>a</sub>	+ 1	—	—
Pasadena	Z.	77.3	54	i 11 18 <sub>a</sub>	0	—	—
Overton	Z.	77.7	51	i 11 23	+ 3	—	—
Riverside	Z.	77.8	54	i 11 21 <sub>a</sub>	0	—	—
Boulder City		77.9	51	i 11 22	+ 1	—	—
Pierce Ferry		78.2	51	i 11 25	+ 2	i 14 32	PP
Tucson		82.9	51	i 11 49	+ 2	—	—
Ottawa		86.6	21	i 12 6	+ 1	—	—
Tamanrasset	Z.	99.1	314	e 16 56	PP	—	—

Additional readings :—

Hungry Horse i = 10m.38s., e = 10m.54s.

Tamanrasset ePPZ = 17m.9s., iPPZ = 17m.12s.

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Jan. 11d. 21h. 41m. 31s. Epicentre 33°·8N. 118°·1W. (as on 1944, June 19d.).

$$A = -.3922, B = -.7345, C = +.5537; \quad \delta = -11; \quad h = +1; \\ D = -.882, E = +.471; \quad G = -.261, H = -.488, K = -.833.$$

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.
				m.	s.		m.	s.		m.	s.	
Pasadena		0·3	350	i 0	8k	- 3	i 0	10	- 8	—	—	—
Mount Wilson		0·4	5	i 0	9k	- 4	i 0	14	- 7	—	—	—
Pomona	z.	0·4	47	i 0	12	- 1	—	—	—	—	—	—
La Jolla	z.	1·2	143	i 0	27	+ 3	—	—	—	—	—	—
Santa Barbara	z.	1·4	296	i 0	28	+ 1	—	—	—	—	—	—
Fresno	z.	3·2	335	i 0	51a	- 1	i 1	26	- 6	—	—	—
Overton	z.	4·1	46	i 1	6	+ 1	—	—	—	—	—	i 2·2
Pierce Ferry		4·1	54	i 1	6	+ 1	i 1	19	P <sub>z</sub>	—	—	i 2·2
Lick	z.	4·6	322	i 1	11a	- 1	i 1	58	- 9	i 2	17	S*
Tucson		6·3	102	e 2	15	P <sub>z</sub>	—	—	—	—	—	—

Jan. 11d. Readings also at 0h. (Pierce Ferry and Hungry Horse), 2h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry (2), near Garm and Obi-garm), 3h. (near Messina), 5h. (near Algiers Univ.), 6h. (Erevan), 7h. (Hungry Horse (2), near Obi-garm, and near Istanbul), 8h. (College, near Andijan and Garm), 10h. (College, Hungry Horse, and near Ashkabad), 12h. (College and La Paz), 13h. (China Lake, Tucson, Overton (3), Pierce Ferry (2), Hungry Horse, College (2), and near Balboa Heights), 19h. (near Obi-garm), 21h. (College, Hungry Horse (2), and La Paz), 22h. (near Prague).

Jan. 12d. 12h. 6m. 9s. Epicentre 18°·5S. 178°·0W. Depth of focus 0·080. (as on 1949, Nov. 26d.).

$$A = -.9484, B = -.0331, C = -.3154; \quad \delta = +4; \quad h = +5; \\ D = -.035, E = +.999; \quad G = +.315, H = +.011, K = -.949.$$

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.	
				m.	s.		m.	s.		m.	s.		
Apia		7·6	53	1	49	- 5	3	24	- 1	e 13	51	S <sub>c</sub> S	—
Auckland	N.	19·4	198	i 3	51f	- 1	i 6	6f	- 52	—	—	—	—
Arapuni		20·3	195	4	15	+ 15	e 6	41	- 32	—	—	—	—
New Plymouth	E.	21·6	196	e 4	11	- 1	e 7	51	+ 16	—	—	—	—
Wellington		23·5	194	i 4	35	+ 6	i 8	12	+ 7	7	11	sP	—
Cobb River	E.	23·9	198	e 4	9	- 24	e 8	22	+ 10	—	—	—	—
Kaimata	N.E.	25·6	199	4	54	+ 6	8	48	+ 10	14	40	S <sub>c</sub> S	—
Christchurch		26·2	196	i 4	59	+ 6	i 8	57	+ 9	7	29	sP	—
Brisbane		28·1	246	i 5	12k	+ 2	i 9	20	+ 2	i 6	40	pP	—
Riverview		31·5	235	i 5	44k	+ 5	i 10	8	- 2	i 7	16	pP	—
Honolulu		44·2	28	i 7	19	- 3	i 13	6	- 11	e 8	50	pP	—
Tokyo		67·1	324	e 10	3	+ 2	18	12	- 1	—	—	—	—
Hunatu		67·6	324	i 9	57	- 7	i 18	6	- 13	i 19	12	SP	—
Kumagaya		67·7	325	e 10	3	- 2	18	15	- 5	—	—	—	—
Maebasi		68·0	325	e 10	6	- 1	i 18	20	- 3	—	—	—	—
Hokusima		68·2	327	10	7	- 1	18	22	- 4	i 19	20	SP	—
Kameyama		68·4	322	10	13	+ 4	18	28	0	—	—	—	—
Nagoya		68·4	323	10	10	+ 1	e 18	25	- 3	e 19	25	SP	—
Sendai		68·4	327	e 10	8	- 1	e 18	27	- 1	19	18	SP	—
Gihu		68·7	323	e 10	11	0	18	29	- 2	i 11	50	pP	—
Nagano		68·7	324	e 10	13	+ 2	i 18	31	0	e 12	28	PP	—
Kobe		69·1	320	e 10	12	- 1	e 18	34	- 2	e 19	29	SP	—
Sumoto		69·1	320	i 10	14	+ 1	18	28	- 8	—	—	—	—
Koti		69·4	318	i 10	14	- 1	i 18	38	- 1	i 19	21	SP	—
Miyazaki		69·7	316	10	19a	+ 2	i 17	45	- 58	—	—	—	—
Kagosima		70·1	315	10	19	0	18	48	+ 1	—	—	—	—
Kumamoto		70·8	317	e 10	26	+ 3	18	57	+ 2	—	—	—	—
Hukuoka		71·4	317	e 10	26	- 1	—	—	—	—	—	—	—
Bandong		73·0	270	e 10	40	+ 4	i 19	29	+ 9	—	—	—	—
Djakarta		74·0	270	i 10	44k	+ 2	i 19	34	+ 4	—	—	—	—

Continued on next page.

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	$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Klyuchi	76.6	349	e 10 54	- 2	i 19 52	- 6	—	—
Santa Clara	76.6	42	i 12 51	pP	i 16 31	?	—	—
Berkeley	76.7	42	e 10 56k	- 1	e 20 0	+ 1	i 12 52	pP
Vladivostok	76.7	325	i 10 56	- 1	i 19 58	- 1	i 12 53	pP
Lick	76.8	42	i 10 57a	0	e 20 1	+ 1	i 12 55	pP
Ukiah	76.9	41	e 10 59	+ 1	i 19 58	- 4	e 12 54	pP
Pasadena	77.3	47	i 11 0a	0	i 20 7	+ 1	e 12 56	pP
Arcata	77.4	39	i 11 1a	+ 1	e 20 7	0	i 12 57	pP
Fresno	77.7	44	i 11 2	0	e 20 10	0	i 12 58	pP
Palomar	z. 77.8	48	i 10 42a	-21	i 41 1	SKPPKP	i 12 41	pP
Riverside	77.8	47	i 11 2a	- 1	i 20 11	0	i 13 1	pP
Shasta Dam	78.3	40	i 11 5	0	i 20 15	- 1	e 13 0	pP
China Lake	z. 78.6	45	i 11 6a	- 1	i 20 18	- 1	i 13 5	pP
Mineral	78.6	41	e 11 6a	- 1	e 20 18	- 1	(i 12 7)	pP
Tinemaha	78.9	45	i 11 8a	0	i 20 25	+ 3	i 13 6	pP
Reno	79.2	42	i 11 10	0	i 20 27	+ 2	i 13 9	pP
Boulder City	80.6	47	i 11 18	+ 1	i 20 50	+10	e 13 10	pP
Overton	z. 81.2	47	e 11 21	+ 1	i 20 50	+ 4	i 13 15	pP
Pierce Ferry	81.3	47	i 11 21	0	i 20 51	+ 4	i 14 36	PP
Tucson	81.7	52	i 11 24	+ 1	e 20 53	+ 2	i 13 21	pP
Victoria	82.5	33	11 26a	- 1	i 20 54	- 5	13 27	pP
Seattle	82.6	34	e 11 26a	- 1	i 20 59	- 1	e 13 27	pP
Sitka	83.7	22	e 11 29	- 4	i 20 56	-14	e 14 48	PP
Salt Lake City	85.1	44	e 13 38	pP	i 21 17	[+ 6]	e 15 11	PP
Logan	85.6	43	i 11 43	+ 1	i 21 20	[+ 6]	i 13 41	pP
Tacubaya	86.0	68	i 11 52k	+ 8	i 21 41	+ 9	i 15 26	PP
College	86.3	12	i 11 43	- 2	i 21 16	[- 3]	i 13 41	pP
Butte	N. 87.2	39	e 12 1	+11	i 21 26	[+ 1]	e 15 22	PP
Hungry Horse	87.5	37	i 11 50	- 1	e 21 25	[- 1]	e 13 46	pP
Bozeman	88.0	40	e 14 1	pP	i 21 34	[+ 4]	—	—
Rapid City	E. 92.3	44	e 12 22	+ 9	e 22 30	+ 2	i 21 57	SKS
Saskatoon	93.5	35	—	—	i 21 59	[- 2]	i 22 38	S
Lincoln	E. 95.6	48	—	—	i 22 13	[+ 1]	i 22 59	S
Irkutsk	97.2	322	e 12 34	- 2	24 35?	SP	—	—
Huancayo	97.9	105	e 14 50	PP	i 22 35	[+11]	e 30 33	SS
Florissant	99.6	52	—	—	i 22 31	[- 1]	i 23 35	S
St. Louis	99.6	52	e 12 49	+ 3	i 22 31	[- 1]	i 14 49	pP
La Plata	E. 102.2	133	17 39	PP	22 46	[+ 1]	25 21	SP
Chicago	102.4	49	—	—	i 22 45	[- 1]	i 23 58	S
La Paz	102.7	111	e 14 7	+67	i 22 57	[+10]	17 29	PP
Chinchina	103.3	88	(e 25 35)	SP	(i 22 42?)[+ 8]	(e 23 25)	SKKS	—
Colombo	E. 103.6	273	15 8	pP	e 22 53	[+ 2]	—	—
Bogota	104.7	89	e 17 36	PP	i 23 1	[+ 5]	i 23 58	S
Hyderabad	E. 107.8	283	17 58	PP	e 23 11	[+ 1]	e 31 19	SS
Philadelphia	111.3	53	—	—	e 24 34	SKKS	—	—
Ottawa	111.5	47	e 17 33	[ 0]	i 23 25	[ 0]	i 18 34	PP
Poona	E. 112.3	283	(i 18 31)	PP	(i 23 31)	[+ 3]	—	—
City College, N.Y.	112.4	52	e 27 33	PS	i 23 30	[+ 2]	i 24 31	SKKS
Bombay	113.4	283	e 18 26	PP	i 23 39	[+ 7]	—	—
Shawinigan Falls	N. 113.6	46	—	—	e 23 37	[+ 4]	—	—
Naryn	113.9	308	e 17 34	[- 3]	—	—	—	—
Harvard	114.3	50	i 17 42	[+ 4]	—	—	i 18 42	PP
Weston	114.4	50	i 18 44	PP	—	—	—	—
Frunse	115.0	309	e 17 47	[+ 8]	e 23 39	[+ 1]	e 18 47	PP
San Juan	115.8	77	e 27 45	SP	i 23 44	[+ ?]	i 24 57	SKKS
Andijan	116.6	307	e 17 45	[+ 3]	29 32	PPS	i 19 3	PP
Fergana	117.0	310	e 17 45	[+ 2]	—	—	e 19 3	PP
Garm	118.1	305	e 17 49	[+ 4]	—	—	—	—
Obi-garm	118.6	305	i 17 52	[+ 6]	—	—	—	—
Tchimkent	118.7	309	i 17 48	[+ 2]	—	—	—	—
Tashkent	118.9	308	e 17 49	[+ 2]	34 43	SS	19 8	PP
Bermuda	119.1	62	e 20 19	pP	i 25 3	SKKS	i 29 25	PS
Stalinabad	119.3	305	i 17 50	[+ 2]	29 19	PS	19 15	PP
Samarkand	120.7	306	e 17 55	[+ 5]	—	—	—	—
Sverdlovsk	122.3	326	e 19 36	PP	28 40	SP	35 30	SS

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	$\Delta$	Az.	P.		O-C.	S.	O-C.	Supp.	L.	
	°	°	m.	s.	s.	m. s.	s.	m. s.	m.	
Grahamstown	123.4	205	i 18	11	[+15]	e 27 50	?	e 19 55	pPKP	—
Ivigtut	124.8	26	i 18	0	[+ 2]	—	—	—	—	—
Mary	124.8	304	e 18	9	[+11]	—	—	e 19 58	PP	—
Ashkabad	127.5	304	18	9	[+ 6]	—	—	—	—	—
Pretoria	z. 129.2	211	i 18	11	[+ 4]	e 30 28	SP	e 20 28	pPKP	—
Moscow	134.1	333	i 18	20	[+ 4]	—	—	i 20 54	PP	—
Grozny	135.7	314	e 18	17	[- 2]	—	—	—	—	—
Tiflis	136.9	312	18	25	[+ 4]	—	—	i 21 8	PP	—
Upsala	137.2	349	i 21	12	PP	i 21 56	PKS	e 38 29	SS	—
Erevan	137.6	310	e 18	29	[+ 7]	—	—	—	—	—
Leninakan	137.9	311	e 18	29	[+ 6]	—	—	—	—	—
Theodosia	141.7	321	e 18	25	[- 6]	—	—	e 22 11?	PP	—
Copenhagen	142.0	350	i 18	28	[- 4]	—	—	i 21 21	PP	—
Simferopol	142.4	322	e 18	32	[ 0]	—	—	e 22 13	PP	—
Yalta	142.7	321	18	30	[- 3]	—	—	i 21 58	PP	—
Warsaw	143.2	341	e 18	25k	[- 8]	e 22 1	PKS	e 21 25	PP	—
Lwow	144.1	336	18	34	[- 1]	—	—	—	—	—
Rathfarnham Cle. z.	144.7	8	i 18	36	[ 0]	—	—	i 21 29	PP	—
Potsdam	145.1	348	e 18	34	[- 2]	i 21 27	sPKP	i 22 3	PP	—
Raciborz	145.9	342	e 18	42	[+ 5]	—	—	—	—	—
Skalnate Pleso	146.0	338	i 18	42	[+ 4]	e 33 57	SPP	e 20 6	pPKP	—
Collmberg	z. 146.1	347	e 18	39	[+ 1]	—	—	e 20 52	pPKP	—
Ksara	146.2	303	i 18	40k	[+ 2]	—	—	20 49	pPKP	—
De Bilt	146.4	355	i 18	42k	[+ 3]	—	—	—	—	e 43.8
Jena	146.8	347	e 18	40	[+ 1]	e 28 8	SKKS	e 20 15	pPKP	—
Prague	147.0	345	e 18	40k	[+ 1]	e 25 9	[+15]	i 20 12	pPKP	—
Kew	147.1	2	e 20	48	pPKP	e 28 11	sSKS	—	—	e 43.8
Bucharest	z. 147.2	327	i 18	27	[-12]	—	—	—	—	—
Cheb	147.4	348	e 18	46	[+ 6]	e 28 9	SKKS	e 20 15	pPKP	—
Istanbul	147.7	320	e 18	43	[+ 3]	—	—	—	—	—
Ogyalla	147.9	339	i 18	49	[+ 9]	—	—	e 22 23	PP	—
Karlsruhe	149.1	352	i 18	39	[- 3]	—	—	—	—	—
Jersey	E. 149.2	5	e 18	51	[+ 9]	e 24 56	[- 1]	e 20 54	pPKP	—
Stuttgart	149.2	350	i 18	45k	[+ 3]	i 20 56	sPKP	e 20 28	pPKP	—
Strasbourg	149.6	352	i 18	46k	[+ 3]	e 21 38	sPKP	i 20 58	pPKP	—
Paris	149.8	359	e 18	45	[+ 2]	i 21 39	sPKP	i 20 57	pPKP	—
Zagreb	150.4	340	e 18	50?	[+ 6]	—	—	e 20 59	pPKP	—
Basle	150.7	352	e 18	47k	[+ 3]	—	—	e 21 0	pPKP	—
Zürich	150.7	351	e 18	46k	[+ 2]	—	—	e 20 59	pPKP	—
Helwan	z. 151.0	298	i 18	48a	[+ 3]	33 0	PSKS	i 20 58	pPKP	—
Besançon	151.1	354	i 18	48	[+ 3]	i 22 8	sPKP	i 21 5	pPKP	—
Chur	151.1	349	e 18	47k	[+ 2]	—	—	e 20 59	pPKP	—
Triest	151.2	342	i 18	55	[+10]	i 28 32	SKKS	i 21 4	pPKP	—
Neuchatel	151.3	352	e 18	49	[+ 4]	—	—	e 21 1	pPKP	—
Salo	152.1	347	e 18	53	[+ 7]	e 28 36	SKKS	e 41 41	SSP	—
Pavia	z. 152.7	349	e 18	53	[+ 6]	—	—	—	—	—
Clermont-Ferrand	152.8	358	e 18	50	[+ 3]	e 22 16	SKP	i 21 3	pPKP	—
Padova	152.8	345	18	57	[+10]	—	—	21 45	pPKP	—
Bologna	152.9	346	e 18	51k	[+ 3]	e 29 5	SKKS	e 21 10	pPKP	—
Florence Arc.	153.6	345	e 18	50k	[+ 1]	29 27	SKKS	21 10	pPKP	—
Florence Xim	153.6	345	i 18	53	[+ 4]	e 28 44	SKKS	(i 19 17)	pPKP	—
Prato	153.6	345	i 18	53	[+ 4]	i 29 2	SKKS	—	—	—
Rome	155.0	341	i 18	52	[+ 2]	e 28 53	SKKS	20 58	pPKP	—
Tortosa	157.7	2	e 19	8	PKP <sub>2</sub>	i 22 17	SKP	—	—	—
Toledo	158.1	13	i 19	0	[+ 6]	29 13	SKKS	21 11	pPKP	—
Alicante	160.1	6	19	31	[+34]	26 29	[+80]	23 51	PP	e 77.5
Granada	160.7	13	19	57a	[+60]	43 21	SS	20 37	PKP <sub>2</sub>	—
Malaga	z. 161.0	14	i 19	2	[+ 4]	25 32	[+22]	i 22 58	PP	—
Almeria	161.3	11	19	17	[+19]	26 18	[+67]	19 57	PKP <sub>2</sub>	72.8
Algiers Univ.	z. 161.8	357	e 19	1	[+ 3]	e 25 28	[+17]	e 21 14	pPKP	—
Tamanrasset	z. 174.6	323	i 19	12a	[+ 5]	e 30 32	SKKS	e 21 7	pPKP	—

For Notes see next page.

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NOTES TO JANUARY 12d. 12h. 6m. 9s.

Additional readings and notes :—

Apia e = 3m.13s., eS? = 3m.21s.  
 Wellington iZ = 5m.16s. and 6m.12s., iP<sub>c</sub>PZ = 7m.48s., S<sub>c</sub>PZ = 10m.22s., P<sub>c</sub>SZ = 11m.24s., pP<sub>c</sub>SZ = 13m.22s., iS<sub>c</sub>S = 14m.35s., pS<sub>c</sub>SZ = 17m.20s., sS<sub>c</sub>SZ = 19m.8s.  
 Christchurch eP<sub>c</sub>PNZ = 8m.20s., eNZ = 10m.36s., eEZ = 11m.12s., eNZ = 12m.27s., iEN = 12m.55s., iZ = 13m.19s., iE = 13m.51s., iS<sub>c</sub>SEZ = 14m.48s.  
 Riverview iN = 5m.47s., iPPNZ = 7m.20s., iSEN = 10m.17s., i = 10m.20s., iN = 10m.39s., iE = 10m.50s. and 11m.6s., iS<sub>c</sub>PZ = 11m.14s., iEN = 12m.9s., iSSEZ = 13m.15s., iS<sub>c</sub>SEN = 15m.17s.  
 Sendai PP? = 12m.17s.  
 Gihu ePP = 13m.1s.  
 Kobe eE = 10m.37s.  
 Berkeley iS = 20m.3s., iS<sub>c</sub>SEN = 20m.22s.  
 Vladivostok esS = 23m.31s.  
 Lick iPPZ = 13m.57s., iZ = 14m.48s. and 15m.49s., eZ = 19m.8s., iZ = 22m.8s., iPKP, PKPZ = 37m.58s., eSKP,PKPZ = 40m.55s.  
 Ukiah iS<sub>c</sub>S = 20m.18s.  
 Pasadena iSPZ = 13m.56s., ePPZ = 14m.0s., eSPZ = 20m.48s., isSZ = 23m.17s., eL?Z = 31m.51s.  
 Fresno eE = 14m.6s., ePKP,PKPZ = 38m.0s.  
 Riverside iZ = 11m.20s., iSP = 14m.4s., iPPZ = 14m.12s., eSKP,PKPZ = 40m.52s.  
 Shasta Dam eS = 20m.11s., ePKP,PKP = 38m.4s., eSKP,PKP = 40m.39s.  
 China Lake iZ = 11m.54s., iPPZ = 13m.52s., iSPZ = 14m.13s., iPKP,PKPZ = 38m.10s., iSKP,PKPZ = 40m.50s.  
 Mineral iP<sub>c</sub>PZ = 11m.14s., iZ = 11m.46s., iSPZ = 13m.2s., iZ = 16m.21s., iSP?Z = 21m.15s., iZ = 22m.8s., eZ = 25m.49s., iZ = 30m.2s.; time of pP as given.  
 Tinemaha iSPZ = 14m.13s., iPKP,PKPZ = 38m.12s., eSKP,PKPZ = 40m.52s.  
 Reno ePKP,PKPZ = 37m.56s.  
 Boulder City ePKKP? = 29m.55s.  
 Overton iPPZ = 13m.46s.  
 Pierce Ferry i = 13m.56s., 17m.46s., and 19m.23s., iPKKP? = 29m.56s., iPKP,PKP = 37m.51s.  
 Tucson ePP = 14m.34s., ePPP = 16m.55s., iS = 20m.56s., iPKKP? = 29m.56s., iPKP, PKP? = 37m.54s., iSKP,PKP = 40m.39s.  
 Victoria PP = 14m.41s.  
 Seattle i = 11m.30s. and 13m.30s., esP = 14m.25s., ePP = 14m.31s., e = 15m.0s., eSKS = 21m.7s., e = 21m.31s., ePS = 22m.14s., ePPS = 23m.14s., e = 23m.36s.  
 Sitka eSS = 26m.31s.  
 Salt Lake City i = 22m.47s., eSS = 26m.27s.  
 Logan iPP = 15m.7s., ePKP,PKP = 37m.47s., eSKP,PKP = 40m.23s.  
 Tacubaya iS<sub>c</sub>S = 21m.26s., iSP = 22m.41s., isSP = 25m.48s.  
 College epP = 13m.45s., i = 23m.16s., iPKKP = 29m.43s., ePKP,PKP = 37m.35s., ePKP, PKP,PKP = 58m.19s.  
 Butte iN = 21m.42s.  
 Hungry Horse i = 12m.8s., 12m.31s., and 12m.52s., iPP = 15m.15s., i = 15m.57s., iSKS = 21m.28s., eSP = 22m.21s., ePKKP = 29m.39s., ePKP,PKP = 37m.38s.  
 Rapid City eSPE = 23m.42s.  
 Saskatoon i = 23m.59s.  
 Lincoln iE = 22m.41s., eE = 24m.26s.  
 Florissant iSKKS = 23m.9s., e = 25m.11s.  
 St. Louis iPP = 16m.53s., iSKKS = 23m.7s., iS = 23m.35s., i = 25m.9s.  
 La Plata N. = 18m.38s., E = 19m.21s., N = 19m.24s. E. = 30m.50s.  
 Chicago iSKKS = 23m.28s., eSSS? = 38m.14s.  
 La Paz iSKKS = 23m.39s., iS = 24m.18s., iPS = 26m.51s., i = 31m.33s., iSSS = 36m.28s.  
 Chinchina readings have been increased by 1m.  
 Bogota eSEN = 24m.36s., iPSSEN = 26m.5s.  
 Ottawa iPPP = 20m.20s., i = 24m.29s., SKKS = 25m.19s., PS = 27m.21s., i = 28m.33s., PPS = 28m.45s., SS = 33m.21s., SSS = 37m.21s.  
 Poona PKSE = (19m.18s.), PPPE = (19m.57s.), readings reduced by 10m.  
 City College, N.Y. e = 30m.44s.  
 Andijan eSS = 34m.29s.  
 Bermuda epPP = 21m.18s., iS = 26m.30s., i = 30m.17s., eSS? = 36m.31s.  
 Stalinabad SKKS = 26m.24s.  
 Upsala iN = 23m.0s. and 27m.8s., e = 34m.51s.?  
 Copenhagen i = 18m.35s.  
 Warsaw ePKP?EN = 18m.29s., ePKP,?Z = 19m.9s., eZ = 20m.47s., ePPN = 21m.19s., ePPE = 21m.25s., ePPPE = 24m.3s., ePPPNZ = 24m.18s., eSKSEN = 26m.5s., eSKKSZ = 27m.38s., eSKKSEN = 27m.48s., eE = 29m.46s. and 32m.48s., eSKKS (Δ > 180°)? = 34m.1s., ePP(Δ > 180°)?EN = 36m.1s., ePP(Δ > 180°)?Z = 36m.6s., eSS = 39m.24s.  
 Rathfarnham Castle iZ = 18m.55s., iPKP,?Z = 19m.15s., iZ = 19m.55s., iNZ = 24m.12s., ePPP = 26m.51s., eNZ = 27m.10s., iZ = 53m.24s., i = 55m.42s.  
 Potsdam iPKPNZ = 18m.39s., iN = 19m.14s., iE = 19m.17s., iN = 20m.52s.  
 Skalnate Pleso e = 19m.26s. and 33m.24s.  
 Collmberg iPKP,?Z = 18m.59s., esPKP?E = 21m.25s., and other unidentified readings.  
 Ksara PP = 22m.12s.

Continued on next page.

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Jena iPKPN = 18m.43s., eE = 19m.1s., eN = 20m.3s.  
 Prague eE = 18m.43s., iPKP<sub>1</sub> = 19m.9s., epPKP<sub>1</sub> = 20m.39s., isPKP = 20m.55s.,  
 esPKP<sub>1</sub>? = 21m.14s., i = 21m.39s. and 21m.55s., iPP = 22m.10s., e = 25m.31s. and  
 26m.15s., eSKKS? = 28m.9s., e = 33m.27s., eSSN = 40m.21s.  
 Bucharest iE = 18m.46s. and 19m.16s.  
 Cheb e = 18m.56s., esPKP = 20m.55s., ePP = 22m.9s., e = 22m.59s.  
 Ogyalla iE = 18m.52s., eE = 24m.4s.  
 Karlsruhe i = 18m.50s., iEZ = 21m.1s.  
 Stuttgart iPKP = 18m.51s., iZ = 18m.59s., eZ = 19m.9s., 19m.19s., 19m.34s., and 19m.42s.  
 isPKP = 21m.0s.  
 Strasbourg i = 18m.51s., iPKP<sub>1</sub> = 19m.20s., i = 20m.28s., ePP = 22m.49s., epPP = 24m.36s.  
 Paris i = 18m.52s., 18m.57s., 19m.19s., and 19m.38s., iPP? = 22m.33s., iPP = 22m.49s.,  
 e = 34m.3s.  
 Zagreb i = 18m.54s.  
 Basle iPKP = 18m.54s.  
 Zürich iPKP = 18m.52s., ePP = 21m.59s.  
 Helwan PKP<sub>2</sub>Z = 19m.6s., iZ = 20m.5s., eZ = 22m.0s., PPZ = 22m.30s., iZ = 29m.5s.  
 Besançon e = 19m.13s., ePKP<sub>2</sub> = 19m.18s., ePP = 22m.44s., e = 23m.46s., esPP? =  
 26m.11s., esKS? = 29m.27s.  
 Chur iPKP = 18m.53s.  
 Salo e = 19m.0s., 19m.30s., 20m.13s., 24m.42s., and 49m.41s.  
 Clermont-Ferrand i = 18m.58s., iPKP<sub>2</sub> = 19m.15s., ePP = 22m.49s., epPP = 24m.40s.  
 Padova PP = 22m.0s.  
 Bologna iZ = 18m.54s., iPKP<sub>2</sub>Z = 19m.13s.  
 Florence Arc. iZ = 19m.0s., iPKP<sub>2</sub>Z = 19m.13s., i = 28m.44s.  
 Florence Xim iPKP<sub>2</sub>? = 19m.1s., pPKP as given.  
 Rome PP = 22m.57s., eZ = 30m.2s., eSSN = 41m.44s.?  
 Toledo iPKP<sub>2</sub>Z = 19m.34s., iZ = 21m.39s., ePPZ = 23m.23s., iN = 29m.54s., eN = 30m.36s.  
 Alicante PKP<sub>2</sub> = 20m.7s., PKS = 23m.9s., PPP = 27m.33s., i = 29m.24s., SS = 43m.27s.,  
 Q = 66m.3s.  
 Granada iPP = 23m.57s., PPP = 26m.51s.  
 Malaga PPPZ = 26m.4s., SKKSZ = 29m.20s.  
 Almeria PP = 23m.39s., SKKS = 30m.21s., SS = 44m.37s.  
 Algiers Univ. iZ = 19m.7s., iPKP<sub>2</sub>Z = 19m.58s., iZ = 20m.4s., esPKPZ = 21m.50s., eZ =  
 23m.18s., iPPZ = 23m.35s., eZ = 24m.33s. and 27m.58s., eSKKS?Z = 28m.48s.  
 Tamanrasset eZ = 19m.46s., iZ = 20m.29s., iPKP<sub>2</sub>Z = 20m.47s., eZ = 20m.59s., iPPZ =  
 24m.39s., epPPZ = 26m.49s., iZ = 27m.54s. and 28m.10s., eZ = 30m.48s.,  
 eSKSP?Z = 34m.32s.

Jan. 12d. 17h. 10m. 0s. Epicentre 42°·3N. 142°·4E. Depth of focus 0·015.  
 (as on 1949, Feb. 26d.).

Intensity V at Urakawa ; IV at Hatinohe and Mori ; II-III at Muroran, Sapporo, Kusiro,  
 Aomori, and Miyako. Macroseismic radius 200-300km. Epicentre 42°·1N. 142°·6E.  
 Depth 20km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year  
 1950, Tokyo, 1952, p. 7, with macroseismic chart.

A = -·5878, B = +·4527, C = +·6706 ;  $\delta = +15$  ;  $h = -3$  ;  
 D = +·619, E = +·792 ; G = -·531, H = +·409, K = -·742.

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m.	s.
Sapporo	1·1	315	i 0 21k	- 3	i 0 35	- 8	—	—
Mori	1·4	262	0 27	- 1	0 46	- 2	—	—
Aomori	1·9	219	0 36 <sub>a</sub>	+ 3	1 2	+ 4	—	—
Hatinohe	1·9	200	0 37 <sub>a</sub>	+ 4	1 2	+ 4	—	—
Nemuro	2·6	66	- 0 20	- 62	0 8	- 66	—	—
Miyako	2·7	187	0 45 <sub>a</sub>	+ 1	1 17	0	—	—
Morioka	2·8	200	0 46	+ 1	1 21	+ 2	—	—
Akita	3·1	215	0 52	+ 3	1 31	+ 5	—	—
Mizusawa	3·3	197	0 55	+ 3	1 31	0	—	—
Sendai	4·2	198	e 1 6	+ 3	1 50	- 2	e 1 26	?
Aikawa	5·3	218	1 22	+ 4	2 21	+ 2	—	—
Onahama	5·5	193	1 29	+ 8	2 24	0	—	—
Mito	6·1	196	1 32	+ 3	2 41	+ 3	—	—
Utunomiya	6·1	200	1 31	+ 2	2 39	+ 1	—	—
Kakioka	6·3	198	1 34	+ 2	2 44	+ 1	—	—

Continued on next page.

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	$\Delta$	Az.	P.		O - C.	S.		O - C.	Supp.	
	°	°	m.	s.	s.	m.	s.	s.	m.	s.
Tukubasan	6.4	198	1	34	+ 1	2	46	+ 1	—	—
Maebasi	6.4	205	1	38	+ 5	2	49	+ 4	—	—
Nagano	6.5	212	1	40	+ 5	—	—	—	—	—
Wazima	6.5	223	1	37	+ 2	—	—	—	—	—
Kumagaya	6.6	202	1	40	+ 4	2	51	+ 1	—	—
Matusiro	6.6	211	1	39	+ 3	2	53	+ 3	—	—
Tokyo	6.9	198	e 1	44	+ 4	2	58	+ 1	—	—
Toyama	6.9	217	1	48	+ 8	3	2	+ 5	—	—
Kohu	7.3	204	1	53	+ 8	2	58	- 9	—	—
Mizima	7.7	202	1	55	+ 4	—	—	—	—	—
Vladivostok	7.8	280	e 1	49	- 3	i 3	15	- 4	—	—
Osima	7.9	198	1	55	+ 2	3	20	- 2	—	—
Shizuoka	8.0	205	1	56	+ 1	3	43	+ 19	—	—
Gihu	8.2	215	1	59	+ 2	3	35	+ 6	—	—
Nagoya	8.3	210	2	2	+ 3	4	6	+ 35	—	—
Omaesaki	8.4	205	1	36	- 24	—	—	—	—	—
Hikone	8.5	217	2	6	+ 4	—	—	—	—	—
Kameyama	8.7	213	2	8	+ 4	4	9	+ 28	—	—
Osaka	9.3	217	2	17	+ 5	—	—	—	—	—
Owase	9.6	213	2	15	- 1	—	—	—	—	—
Sumoto	9.9	219	2	21	+ 1	—	—	—	—	—
Siomisaki	10.3	213	2	14	- 11	4	23	+ 4	—	—
Irkutsk	27.4	305	5	33	- 2	10	4	0	5	49
College	44.3	35	i 7	58	- 1	—	—	—	—	pP
Frunse	48.6	295	e 8	33	+ 1	e 15	24	+ 1	—	—
Andijan	51.1	293	e 8	50	- 1	15	58	0	—	—
Sverdlovsk	51.8	317	i 8	55	- 2	—	—	—	—	—
Tchinkent	52.2	297	i 8	59	- 1	e 16	13	0	—	—
Garm	53.3	293	e 9	5	- 3	—	—	—	—	—
Obi-garm	53.8	293	9	0	- 12	—	—	—	—	—
Samarkand	55.2	294	e 9	23	+ 1	—	—	—	—	—
Victoria	62.3	48	i 10	11k	0	—	—	—	—	—
Moscow	63.5	322	e 10	17	- 2	—	—	—	—	—
Shasta Dam	67.4	55	i 10	44	0	—	—	—	—	—
Hungry Horse	67.5	45	i 10	43	- 1	—	—	—	i 11	12
Mineral	z. 68.1	55	i 10	48a	0	—	—	—	—	—
Berkeley	z. 69.2	57	i 10	55a	0	—	—	—	—	—
Reno	z. 69.7	55	i 10	59k	+ 1	—	—	—	i 11	37
Lick	z. 69.9	57	i 10	59a	0	—	—	—	i 11	22
Tinemaha	z. 72.2	56	i 11	14a	+ 1	—	—	—	i 11	43
Logan	72.9	49	e 11	18	+ 1	—	—	—	—	—
China Lake	z. 73.4	56	i 11	20a	0	—	—	—	e 11	52
Pasadena	z. 74.1	58	i 11	24a	0	—	—	—	i 11	57
Riverside	z. 74.7	58	i 11	27a	0	—	—	—	e 12	0
Overton	z. 74.8	54	i 11	29	+ 1	—	—	—	—	—
Boulder City	75.0	55	i 11	31	+ 2	—	—	—	—	—
Pierce Ferry	75.4	55	i 11	33	+ 2	—	—	—	i 12	27
Palomar	z. 75.6	58	i 11	32a	0	—	—	—	—	—
Collmberg	76.9	330	e 11	38	- 2	—	—	—	e 12	7
Prague	77.4	328	i 11	41	- 1	e 21	42	SP	e 12	16
Jena	77.7	330	e 11	43	- 1	—	—	—	e 12	13
Tucson	79.9	55	i 11	57	+ 1	—	—	—	e 12	30
Stuttgart	z. 80.4	331	e 11	58	- 1	—	—	—	e 12	27
Strasbourg	81.1	332	e 12	2	0	—	—	—	e 12	22?
Paris	82.6	334	e 12	9	- 1	—	—	—	e 12	37
Besançon	82.8	331	i 12	9	- 2	e 12	55	sP	e 12	38
Clermont-Ferrand	85.1	332	e 12	21	- 2	—	—	—	—	—
Ottawa	86.3	26	i 12	27a	- 2	—	—	—	—	—
Harvard	90.2	24	i 12	48	+ 1	—	—	—	—	—
Weston	90.4	24	i 12	48	0	—	—	—	i 13	17
Pretoria	z. 124.3	265	e 18	47	[+ 3]	—	—	—	—	—

Additional readings :—

Osaka e = 3m.2s., 3m.28s., and 4m.23s.

Lick iZ = 11m.11s.

Prague i = 12m.2s., e = 12m.26s., 12m.37s., and 13m.15s.

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Jan. 12d. Readings also at 2h. (College), 4h. (Bombay, Colombo, Hyderabad, College, Hungry Horse, Shasta Dam, Tucson, Logan, China Lake, Grahamstown, Pretoria, Ksara, Collmberg, and Stuttgart), 5h. (College, Tamanrasset, Grahamstown, and Pretoria), 6h. (near Ashkabad), 8h. (Apia, College, Hungry Horse, Shasta Dam, Pasadena, China Lake, Tinemaha, Boulder City, Pierce Ferry, and Tucson), 9h. (near Garm), 10h. (near Obi-garm), 11h. (Bandong), 12h. (Frunse, near Andijan, Fergana, Tchimkent, Obi-garm, and near Jena), 14h. (near Obi-garm), 16h. (Pierce Ferry), 17h. (near Istanbul), 19h. (Andijan, Naryn, and Obi-garm), 20h. (Pretoria, Christchurch, Riverview (2), near Wellington, Cobb River, Bunnythorpe, New Plymouth, and Kaimata), 21h. (Stuttgart, College, Ottawa, Grozny, Mary, Obi-garm, Samarkand, Frunse, Almata, near Garm, Fergana, Stalnabad, Andijan, Tashkent, Tchimkent, and Naryn), 22h. (near Obi-garm), 23h. (Stuttgart, Pretoria, Helwan, Ksara, Algiers Univ., and Tamanrasset).

Jan. 13d. 0h. Undetermined shock.

Pretoria eZ = 11m.22s.  
 Brisbane iPZ = 16m.1s.  
 Riverview eS?EN = 21m.51s., eSS?E = 23m.3s., eLE = 24.2m.  
 College iP = 23m.22s., e = 23m.38s.  
 Shasta Dam eP = 24m.0s.  
 Pasadena iPZ = 24m.13s., iZ = 24m.38s.  
 Tinemaha iPZ = 24m.14s.  
 Riverside iPZ = 24m.16s.  
 China Lake iPZ = 24m.17s.  
 Boulder City e = 24m.27s.  
 Overton iPZ = 24m.27s., eZ = 25m.0s.  
 Pierce Ferry iP = 24m.30s., i = 25m.0s.  
 Hungry Horse iP = 24m.30s., i = 24m.46s. and 25m.7s.  
 Christchurch eEN = 29m.15s., eRZ = 32m.30s.  
 Ottawa eP = 29m.56s.  
 Collmberg eZ = 29m.57s.  
 Stuttgart ePKPZ = 30m.4s., eZ = 30m.23s.  
 Harvard iPKP = 30m.5s.  
 Weston iPKP = 30m.5s.

Jan. 13d. 0h. 35m. 38s. Epicentre 37°·6N. 141°·7E. Depth of focus 0·005.  
 (as on 1947, Oct. 20d.).

Intensity V at Namie (Hokusima pref.); IV at Onahama, Sendai, Isinomaki, Hokusima, Inawashiro, Kakioka, Tukubasan, Miyako, and Titibu; II-III at Morioka, Shirakawa, Utunomiya, Mizusawa, and Tokyo. Epicentre 37°·6N. 141°·5E. Depth 70km. Macroseismic radius 200-300km.

Seismo. Bull. Cent. Met. Obs., Japan, for 1950, Tokyo, 1952, p.8, with macroseismic chart.

A = -·6233, B = +·4923, C = +·6076;  $\delta = +4$ ;  $h = -1$ ;  
 D = +·620, E = +·785; G = -·477, H = +·377, K = -·794.

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m.	s.
Onahama	0·9	224	0 15k	- 3	0 23	- 8	—	—
Sendai	0·9	317	0 17k	- 1	0 34	+ 3	—	—
Hokusima	1·0	279	0 18k	- 1	0 30	- 3	—	—
Mito	1·5	219	0 24	- 2	0 40	- 5	—	—
Mizusawa	1·6	344	0 29	+ 2	0 46	- 1	—	—
Kakioka	1·8	222	0 27	- 3	0 40	-12	—	—
Utunomiya	1·8	234	0 26	- 4	0 41	-11	—	—
Tukubasan	1·9	223	0 28	- 3	0 48	- 6	—	—
Miyako	2·1	6	0 34	0	0 56	- 3	—	—
Morioka	2·1	349	0 19	-15	0 43	-16	—	—
Kumagaya	2·4	232	0 35	- 3	0 57	-10	—	—
Maebasi	2·4	240	0 36k	- 2	—	—	—	—
Akita	2·5	329	0 40 <sub>a</sub>	+ 1	1 14	+ 5	—	—
Tokyo	2·5	219	0 35	- 4	1 2	- 7	—	—
Yokohama	2·7	217	0 44	+ 2	1 18	+ 4	—	—
Aikawa	2·8	279	0 42	- 2	1 23	+ 6	—	—
Hatinohe	3·0	357	0 48	+ 1	1 20	- 2	—	—
Matusiro	3·0	248	0 45	- 2	1 17	- 5	—	—
Nagano	3·0	252	0 45k	- 2	1 27	+ 5	—	—
Misima	3·2	222	0 51	+ 2	1 33	+ 6	—	—

Continued on next page.



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		$\Delta$	Az.	P.		O - C.	S.		O - C.	Supp.	
		°	°	m.	s.	s.	m.	s.	s.	m.	s.
Aomori		3.3	348	1	2	+11	1	51	+22	—	—
Osima		3.4	214	0	50	-2	1	30	-2	—	—
Shizuoka		3.7	226	0	57	+1	1	37	-2	—	—
Toyama		3.7	256	1	2	+6	2	6	+27	—	—
Wazima		3.8	269	1	5	+7	2	1	+19	—	—
Gihu		4.5	243	1	8	+1	1	57	-2	—	—
Nagoya		4.5	239	1	7	0	2	2	+3	—	—
Mori		4.5	349	1	14	+7	2	7	+8	—	—
Hikone		4.9	244	1	15	+2	2	8	-1	—	—
Kameyama		5.0	239	2	18	+64	3	21	+69	—	—
Sapporo		5.5	357	1	36	+15	—	—	—	—	—
Owase		5.7	233	1	24	0	—	—	—	—	—
Osaka		5.8	242	1	31	+6	—	—	—	—	—
Kobe		6.0	244	2	26	S	(2 26)	-11	—	—	—
Sumoto		6.4	241	2	22	S	(2 22)	-24	—	—	—
Vladivostok		9.3	309	e 2	10	-4	e 3	56	-2	—	—
College		48.5	33	e 8	41	+3	—	—	—	—	—
Shasta Dam		70.6	53	i 11	27	pP	—	—	—	—	—
Hungry Horse		71.2	43	i 11	9	-5	—	—	i 11	32	pP
Mineral	z.	71.3	54	e 11	17	+2	—	—	i 11	31	pP
Tinemaha	z.	75.3	55	e 11	41	+3	—	—	i 11	55	pP
China Lake	z.	76.5	55	e 11	48	+3	—	—	i 12	2	pP
Pasadena	z.	77.1	57	e 12	5	pP	—	—	—	—	—
Overton	z.	78.1	53	i 11	57	+3	—	—	i 12	11	pP
Boulder City		78.2	54	i 11	58	+4	—	—	e 12	11	pP
Pierce Ferry		78.6	53	i 12	0	+4	—	—	i 12	15	pP
Collmberg	z.	80.7	330	e 12	8	0	—	—	—	—	—
Prague		81.1	329	e 11	41	-29	—	—	—	—	—
Tucson		83.1	55	e 12	24	+4	—	—	e 12	38	pP
Stuttgart	z.	84.2	331	e 12	27	+1	—	—	e 12	41	pP
Strasbourg		84.9	331	e 12	20	-9	—	—	—	—	—
Basle		85.9	331	e 12	36	+2	—	—	—	—	—
Paris		86.7	335	e 12	38	0	—	—	—	—	—

Overton gives also  $iZ = 12m.34s.$

Jan. 13d. 5h. 7m. 16s. Epicentre  $33^{\circ}9N. 116^{\circ}3W.$  (as on 1948, Dec. 4d.).

A = -0.3685, B = -0.7457, C = +0.5552;  $\delta = +11$ ;  $h = +1$ ;  
D = -0.896, E = +0.443; G = -0.246, H = -0.498, K = -0.832.

		$\Delta$	Az.	P.		O - C.	S.		O - C.	Supp.		L.
		°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Palomar		0.7	221	i 0	17 <sub>k</sub>	0	—	—	—	—	—	—
Riverside		0.9	277	i 0	18 <sub>a</sub>	-2	i 0	28	-6	—	—	—
Pasadena		1.6	279	i 0	29	-1	i 0	49	-2	—	—	—
Boulder City		2.4	30	i 0	42	+1	i 1	15	S*	—	—	—
Pierce Ferry		2.9	40	i 0	50	+2	—	—	—	—	—	i 1.4
Overton	z.	3.0	30	i 0	51	+1	—	—	—	—	—	i 1.5
Fresno		4.0	316	i 1	15 <sub>k</sub>	P <sub>g</sub>	i 2	2	S*	—	—	—
Tucson		4.9	108	i 1	16	-1	i 2	8	-7	i 1	38	P <sub>r</sub>
Lick	z.	5.5	310	i 1	27	+2	—	—	—	—	—	e 2.8
Mineral	z.	7.7	328	e 1	56	0	i 3	34	+9	—	—	—

Additional readings:—

Pierce Ferry  $i = 1m.1s.$

Overton  $iZ = 1m.0s.$

Tucson  $i = 1m.24s., 1m.50s.,$  and  $2m.31s.$

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Jan. 13d. 10h. 10m. 54s. Epicentre 18° 3S. 69° 2W. Depth of focus 0.025.  
(as on 1949, Sept. 18d.).

A = +.3374, B = -.8882, C = -.3121;  $\delta = +14$ ;  $h = +5$ ;  
D = -.935, E = -.355; G = -.111, H = +.292, K = -.950.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Paz	2.1	29	e 0 40	+ 1	i 1 22	+12	—	2.2
Huancayo	8.6	316	e 2 19	+17	—	—	—	—
Bogota	23.4	348	e 5 3	+10	—	—	—	—
Harvard	60.5	358	i 9 55	+ 3	—	—	i 10 23	pP
Ottawa	63.7	355	10 14	+ 1	—	—	e 10 42	pP
Tucson	64.1	321	i 10 17	+ 1	—	—	—	—
Palomar	z. 68.6	318	i 10 44	0	—	—	—	—
Pierce Ferry	68.7	322	i 10 46	+ 1	—	—	—	—
Boulder City	69.1	321	i 10 48	+ 1	—	—	—	—
Overton	z. 69.3	322	i 10 48	0	—	—	—	—
Riverside	69.3	318	i 10 47k	- 1	—	—	—	—
Pasadena	69.9	318	i 10 51k	- 1	—	—	—	—
China Lake	z. 70.7	320	i 10 55k	- 2	—	—	—	—
Logan	71.6	328	e 11 2	0	—	—	—	—
Tinemaha	71.9	320	i 11 3	- 1	—	—	—	—
Lick	z. 74.2	319	e 11 17k	0	—	—	—	—
Reno	z. 74.4	321	e 11 19k	0	—	—	—	—
Shasta Dam	76.7	321	i 11 28	- 3	—	—	—	—
Hungry Horse	77.5	331	i 11 35	- 1	—	—	—	—
Pretoria	z. 88.6	116	e 12 5	-27	—	—	—	—

La Paz i = 54m. and 1m.34s.  
Harvard isP? = 10m.36s.

Jan 13d. 23h. 52m. 35s. Epicentre 4° 6S. 153° 6E. Focus at base of superficial layers.  
(as on 1948, Aug. 3d.).

A = -.8928, B = +.4432, C = -.0796;  $\delta = -15$ ;  $h = +7$ ;  
D = +.445, E = +.896; G = +.071, H = -.035, K = -.997.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane	22.8	182	i 5 1	0	i 9 5	+ 2	i 10 10	SS
Riverview	29.2	185	i 5 59a	- 2	e 10 51	+ 1	e 6 55	PP
Auckland	N. 37.5	152	—	—	e 12 25?	-34	—	e 14.2
Wellington	41.2	156	i 7 44	+ 1	i 13 52	- 2	9 10	PP
Christchurch	42.3	159	i 7 54	+ 2	i 14 4	- 7	i 9 35	PP
Perth	44.6	228	i 10 55	-16	i 14 37	- 7	—	—
Vladivostok	51.4	340	—	—	i 16 44	+24	—	—
Calcutta	E. 69.2	296	—	—	e 20 2	- 6	—	—
Irkutsk	70.3	330	11 9	- 3	e 24 55	SS	e 11 28	P <sub>c</sub> P
College	81.4	22	i 12 14	- 1	e 22 37	+15	e 16 3	PP
Bombay	N. 82.8	289	e 12 4	-18	e 21 27	-70	—	—
Frunse	85.1	313	12 34	0	e 22 51	[- 1]	—	—
Andijan	86.4	311	i 12 39	- 1	22 58	[- 3]	—	—
Fergana	86.7	313	i 12 38?	- 4	—	—	—	—
Garm	87.7	309	i 12 47	0	—	—	—	—
Obi-garm	88.1	309	i 12 45	- 3	—	—	—	—
Shasta Dam	88.4	49	e 13 15	+25	—	—	—	—
Lick	z. 88.6	52	i 13 49k	+58	—	—	—	—
Tashkent	88.7	311	i 12 52	+ 1	i 23 29	- 5	e 23 7?	SKS
Stalinabad	88.8	309	i 12 49	- 3	i 23 11	[- 6]	i 23 33	S <sub>c</sub> S
Fresno	z. 90.0	53	e 13 15	pP	—	—	—	—
Samarkand	90.3	309	e 12 59	0	e 23 21	[- 4]	—	—
Pasadena	91.1	56	i 13 5	+ 2	—	—	i 13 23	pP
Tinemaha	z. 91.3	53	e 13 7	+ 3	—	—	e 13 32	pP
China Lake	z. 91.7	54	i 13 7	+ 2	—	—	i 13 35	pP

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Riverside	z.	91.7	56	i 13 8	+ 3	—	—	i 13 32	pP	—
Palomar	z.	92.1	56	i 13 8	+ 1	—	—	i 13 27	pP	—
Boulder City		93.9	54	e 13 32	pP	—	—	—	—	—
Mary		94.2	307	—	—	i 23 47	[- 1]	—	—	—
Overton	z.	94.3	54	i 13 45	pP	—	—	—	—	—
Pierce Ferry		94.6	54	e 13 21	+ 2	—	—	e 17 10	PP	—
Hungry Horse		95.0	42	e 13 21	+ 1	—	—	e 17 6	PP	—
Sverdlovsk		95.4	326	i 13 17	- 5	23 50	[- 4]	17 10	PP	—
Logan		96.5	48	e 17 12	PP	—	—	—	—	—
Tucson		97.1	58	e 13 52	pP	—	—	e 17 40	PP	e 44.8
Tiflis		107.1	312	—	—	e 24 49	[- 1]	—	—	—
Ksara		115.5	305	e 19 42	PP	e 29 50	PS	—	—	—
Ottawa		121.0	38	e 18 50	[+ 1]	—	—	—	—	—
Collmberg	z.	123.1	331	e 18 55	[+ 2]	—	—	—	—	—
Prague		123.1	329	e 19 4	[+ 11]	—	—	e 23 25	PPP	—
Jena		124.0	331	e 19 1	[+ 6]	—	—	—	—	—
Harvard		125.0	39	i 19 0	[+ 3]	—	—	—	—	—
Weston		125.2	39	i 19 1	[+ 4]	—	—	—	—	e 60.4
Stuttgart		126.6	331	e 19 1	[+ 1]	e 25 7	[- 54]	—	—	e 74.8
Strasbourg		127.4	332	i 19 4	[+ 2]	—	—	—	—	—
Chur		127.7	330	i 18 33	[- 29]	—	—	—	—	—
Zürich	z.	127.8	331	e 19 3k	[+ 1]	—	—	—	—	—
Basle		128.2	331	e 19 5	[+ 2]	—	—	—	—	—
Kew		128.5	339	—	—	e 42 24	SSS	—	—	e 65.4
Besançon		129.2	332	i 19 7	[+ 2]	—	—	—	—	—
Rome		129.2	322	e 19 7	[+ 2]	e 22 27	PKS	—	—	e 53.1
Paris		129.5	335	e 19 5	[- 1]	i 22 25	PKS	i 21 17	PP	e 57.4
Chinchina		131.0	86	e 18 47	[- 21]	—	—	e 15 14	P	—
Clermont-Ferrand		131.6	332	e 19 10	[ 0]	—	—	e 22 31	SKP	65.4
Bogota		132.5	87	e 19 16	[+ 5]	—	—	—	—	—
La Paz		133.7	118	i 19 19	[+ 6]	26 57	SKKS	21 53	PP	64.4
Bermuda		134.8	47	e 23 57	PPP	—	—	e 29 38	PKKP	e 64.9
Tortosa		136.6	329	—	—	i 22 50	PKS	—	—	—
Algiers Univ.	z.	138.1	323	e 19 14	[- 8]	e 22 52	PKS	e 22 10	PP	—
Alicante		138.9	329	19 40	[+ 17]	23 30	PKS	22 52	PP	e 63.7
Toledo		139.5	333	e 19 28	[+ 4]	e 23 0	PKS	e 22 17	PP	—
Almeria		141.1	328	19 30	[+ 3]	26 38	[+ 6]	23 34	PKS	71.4
Granada		141.4	330	19 32 <sub>a</sub>	[+ 4]	34 27	PPS	20 3	pPKP	71.4
Malaga	z.	142.2	330	19 27 <sub>k</sub>	[- 2]	—	—	i 22 35	PP	67.2

Additional readings :—

Riverview iN = 7m.1s. and 11m.20s.  
 Wellington iZ = 8m.25s., PPP? = 9m.43s., eZ = 11m.11s., PS? = 14m.17s., SS?Z = 17m.33s.  
 Christchurch iZ = 8m.8s., eZ = 12m.5s., iSEN = 14m.9s., iEN = 14m.28s., eZ = 15m.13s.,  
 iSS = 17m.39s.  
 Calcutta eE = 20m.58s.  
 Irkutsk ePPP = 15m.27s.?  
 Bombay eE = 12m.34s. and 21m.51s.  
 Hungry Horse i = 13m.56s.  
 Sverdlovsk eS = 24m.21s., ePS = 26m.12s., SS = 30m.56s.  
 Tucson ePKKP = 30m.16s.  
 Collmberg eZ = 19m.3s., eEZ = 19m.11s.  
 Prague e = 21m.26s.  
 Stuttgart eZ = 19m.15s. and 19m.33s.  
 Strasbourg e = 19m.12s.  
 Rome eZ = 22m.51s.  
 Paris i = 19m.9s., e = 31m.19s.  
 La Paz iZ = 22m.47s., PS = 32m.17s., SS = 40m.9s.  
 Algiers Univ. ePKPZ = 19m.23s., eZ = 23m.22s.  
 Alicante PPS = 34m.56s.  
 Toledo eZ = 23m.25s.  
 Almeria PPP = 25m.38s., PPS = 34m.42s.  
 Granada PP = 23m.12s., pPP = 23m.30s., eSS = 42m.51s.  
 Malaga PPPZ = 25m.51s.  
 Long waves were also recorded at Berkeley, Sitka, De Bilt, and Triest,

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Jan. 13d. Readings also at 0h. (Fergana, Naryn, Samarkand, Tchimkent, near Andijan, Garm, Obi-garm (2), and Stalinabad), 2h. (Frunse, Samarkand, Tchimkent, near Andijan, Fergana, Garm, Obi-garm, Stalinabad, and Tashkent), 4h. (College, Mary, Almata, Garm, Obi-garm, near Andijan, Frunse, Naryn, Samarkand, Stalinabad, Tashkent, and Tchimkent), 7h. (College, Christchurch, and Wellington), 8h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry (2), Lick, Shasta Dam, College, Besançon, Stuttgart, Strasbourg, and Ksara), 9h. (Christchurch and Wellington), 10h. (near Arapuni, Auckland, Christchurch, Cobb River, Kaimata, New Plymouth, and Wellington), 11h. (La Cave and Rolph-ton), 12h. (La Paz, Pretoria, College, Hungry Horse (2), Mineral, and Shasta Dam), 12h. (Collmberg, Padova, Salo, Basle, Zürich, near Chur, Ravensburg, Stuttgart, and Triest), 16h. (Andijan, Fergana, Samarkand, near Garm, Obi-garm, and Stalinabad), 17h. (Ashkabad, Overton, Pierce Ferry, Hungry Horse, Shasta Dam, and College), 18h. (near Algiers Univ. and near Ottawa (2)), 20h. (near Bogota), 21h. (Tortosa, Chur, and near Garm).

Jan. 14d. 12h. 18m. 29s. Epicentre  $40^{\circ}4N$ .  $124^{\circ}2W$ . (as on 1949, October 28d.).

A = -0.4293, B = -0.6316, C = +0.6456;  $\delta = +2$ ;  $h = -2$ ;  
D = -0.827, E = +0.562; G = -0.363, H = -0.534, K = -0.764.

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		°	°	m. s.	s.	m. s.	s.
Ferndale	E.	0.2	343	i 0 9	- 1	—	—
Arcata		0.5	12	i 0 14k	0	i 0 22	- 1
Mineral		2.0	91	i 0 36k	+ 1	i 1 2	0
Berkeley		2.9	149	i 0 48k	0	e 1 21	- 3
Branner	Z.	3.4	152	e 0 54	- 1	i 1 34	- 3
Reno	Z.	3.5	103	e 1 0	+ 3	—	—
Lick	Z.	3.6	146	i 0 58a	0	i 1 39	- 3

Lick gives also  $iZ = 1m.27s.$

Jan. 14d. 13h. 24m. 37s. Epicentre  $20^{\circ}5S$ .  $70^{\circ}5W$ . Focus at base of superficial layers. (as on 1946, July 26d.).

A = +0.3129, B = -0.8837, C = -0.3481;  $\delta = +1$ ;  $h = +5$ ;  
D = -0.943, E = -0.334; G = -0.116, H = +0.328, K = -0.937.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Paz		4.6	30	i 1 14a	+ 5	i 2 13	S*	i 1 34	P <sub>g</sub> ?
Huancayo		9.6	330	e 2 25	+ 6	e 4 31	+24	i 2 37	pP
La Plata	E.	18.1	144	i 4 3	- 7	7 28	0	—	—
Bogota		25.2	353	e 5 37	+13	e 10 24	SS	—	—
Tacubaya		48.6	324	i 8 58	+16	—	—	—	—
Tucson		65.1	324	i 10 39	- 1	—	—	i 10 53	pP
Palomar		69.5	321	i 11 6k	- 1	—	—	i 11 20	pP
Pierce Ferry		69.7	325	i 11 9	+ 1	—	—	i 11 23	pP
Boulder City		70.1	323	i 11 11	0	—	—	—	—
Riverside		70.2	321	i 11 11k	0	—	—	i 11 25	pP
Overton	Z.	70.3	325	i 11 11	- 1	—	—	i 11 28	pP
Pasadena		70.8	321	i 11 14k	- 1	—	—	i 11 28	pP
China Lake	Z.	71.6	323	i 11 20k	0	—	—	i 11 34	pP
Logan		72.8	330	e 11 26	- 1	—	—	—	—
Tinemaha		72.9	322	i 11 27	- 1	—	—	i 11 42	pP
Lick	Z.	75.0	320	i 11 41a	+ 1	—	—	i 11 55	pP
Reno	Z.	75.4	324	e 11 43	+ 1	—	—	—	—
Shasta Dam		77.7	323	e 11 53	- 2	—	—	i 12 8	pP
Hungry Horse		78.8	333	i 12 4	+ 3	—	—	i 12 16	pP
Grahamstown		84.6	124	e 12 28	- 3	—	—	e 12 42	pP
Tamanrasset	Z.	85.7	65	e 12 36	- 1	—	—	i 12 51	pP
Pretoria	Z.	88.7	117	i 12 48	- 3	—	—	e 13 0	pP
Algiers Univ.	Z.	89.7	51	e 12 54	- 2	—	—	e 13 8	pP
College		103.1	334	e 18 17	PP	—	—	—	—

Additional readings:—

La Paz  $iS_g = 2m.50s.$

La Plata  $SN = 7m.17s.$ ,  $E = 8m.29s.$

Tucson  $ePP = 12m.53s.$

Boulder City  $i = 12m.24s.$

Continued on next page.

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Overton iPPZ = 12m.59s.  
 China Lake iZ = 18m.2s.  
 Tamanrasset ipPZ = 12m.57s.  
 Algiers Univ. ePPZ = 16m.25s., epPPZ = 17m.47s.  
 College e = 18m.50s.

Jan. 14d. 19h. 52m. 29s. Epicentre 40°·4N. 124°·2W. (as at 12h.).

Intensity VI in Humboldt County; V at Cape Mendocino, Eureka, Ferndale, etc.  
 Epicentre 40°13'N., 124°25'W.

L. M. Murphy and F. P. Ulrich.

United States Earthquakes, 1950, Serial No. 755, Washington, 1952, p.8.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Ferndale		0·2	343	i 0 8	- 2	i 0 14	- 2	—	—
Shasta Dam		1·4	78	i 0 28	+ 1	e 0 47	+ 1	—	e 2·0
Ukiah		1·5	149	e 0 28	0	e 0 40	- 9	—	e 0·8
Mineral		2·0	91	i 0 36 <sub>a</sub>	+ 1	i 1 0	- 2	—	—
Berkeley		2·9	149	i 0 47 <sub>a</sub>	- 1	i 1 18	- 6	i 1 4	P <sub>e</sub>
Reno	z.	3·5	103	e 0 57	0	—	—	—	—
Santa Clara		3·5	150	—	—	i 1 45	+ 5	—	—
Lick	z.	3·6	146	i 0 56 <sub>k</sub>	- 2	e 1 39	- 3	—	—
Fresno	z.	5·0	135	e 1 19	+ 1	—	—	—	—
Tinemaha	z.	5·7	124	i 1 30	+ 2	i 2 46	+11	—	—
China Lake	z.	6·9	129	e 1 46	+ 1	i 3 9	+ 4	—	—
Pasadena		7·9	140	i 1 58	- 1	i 3 26	- 4	—	—
Riverside	z.	8·4	137	i 2 4	- 2	—	—	—	—
Overton	z.	8·6	114	i 2 15	+ 6	—	—	i 3 2	P <sub>e</sub>
Logan		9·4	78	e 2 33	+15	—	—	—	e 4·8
Hungry Horse		10·8	39	i 2 39	0	—	—	—	—
Tucson		13·5	123	i 3 17	+ 2	—	—	—	e 7·5
College		28·0	339	e 9 6	P <sub>e</sub> P	—	—	—	—
Ottawa		35·4	66	e 6 58	- 2	—	—	—	—

Hungry Horse gives also e = 2m.46s.

Jan. 14d. Readings also at 0h. (Kiyuchi), 1h. (College), 3h. (College and Messina), 4h. (near Prague and near Obi-garm), 6h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, Besançon, Strasbourg, Stuttgart, Pretoria, near Obi-garm, Erevan, and near Tiflis), 8h. (Tacubaya, Palomar, Pasadena, Riverside, China Lake, Tucson, and Pierce Ferry), 11h. (near Messina (2)), 12h. (Samarkand, near Andijan, Fergana, Obi-garm, Tchinkent (2), and near Messina), 13h. (Apia, Auckland, Christchurch, Wellington, Tucson, Pierce Ferry, and Shasta Dam), 14h. (Samarkand, Leninakan, near Ashkabad, Andijan, Garm, and near Tiflis), 16h. (near Prague), 17h. (Christchurch), 18h. (Bombay, Kodaikanal, and Wellington), 19h. (Tucson), 20h. (Collmberg, Jena, Prague (2), Ravensburg, Stuttgart, Obi-garm, near Andijan, and Garm), 21h. (Alicante, Granada, Tucson, and Shasta Dam), 22h. (Ottawa, Rolphton, Leninakan, Tiflis, Prague, Stuttgart, Trieste, Algiers Univ., Rome, Istanbul, Helwan, and near Ksara).

Jan. 15d. 23h. 52m. 21s. Epicentre 7°·2S. 154°·6E. (as on 1939, February 20d.).

A = -·8963, B = +·4256, C = -·1245;  $\delta$  = -1; h = +7;  
 D = +·429, E = +·903; G = +·112, H = -·053, K = -·992.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane	N.	20·2	184	14 38	- 1	i 8 28	+ 7	4 57	PP
Riverview		26·7	186	i 5 42	- 1	e 10 15	- 2	e 6 44	PP
Auckland	N.	34·8	151	—	—	e 11 39 <sub>?</sub>	-46	—	—
Wellington		38·4	156	7 25	0	13 21	+ 1	9 6	PP
Vladivostok		54·2	340	9 27	- 2	i 17 2	- 4	—	—
Irkutsk		73·1	331	11 32	- 2	e 21 0	- 1	—	—
College		83·4	22	i 12 28	- 2	—	—	—	—
Andijan		88·8	312	12 57	0	23 43	- 1	—	—
Lick	z.	89·4	52	i 13 2 <sub>k</sub>	+ 2	—	—	—	—
Shasta Dam		89·4	49	e 13 1	+ 1	—	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Mineral	z.	89.9	50	e 13 4 <sub>a</sub>	+ 2	—	—	—	—
Fresno	z.	90.8	53	i 13 9 <sub>k</sub>	+ 3	—	—	—	—
Reno		91.2	50	e 13 11	+ 3	—	—	—	—
Pasadena		91.7	56	i 13 13	+ 3	—	—	—	—
Tinemaha	z.	92.0	53	i 13 14	+ 2	—	—	—	—
China Lake	z.	92.4	54	i 13 15	+ 1	i 31 51	SSP	—	—
Riverside	z.	92.4	56	i 13 15	+ 1	—	—	—	—
Palomar	z.	92.7	57	i 13 16	+ 1	—	—	—	—
Boulder City		94.6	54	i 13 27	+ 3	—	—	—	—
Overton	z.	95.0	53	i 13 27	+ 1	—	—	—	—
Pierce Ferry		95.3	54	i 13 30	+ 3	—	—	—	—
Hungry Horse		96.2	42	e 13 32	+ 1	—	—	—	—
Tucson		97.6	58	e 17 31	PP	—	—	—	—
Sverdlovsk		98.2	326	—	—	e 24 21	[+ 3]	e 26 33	PS
Ksara		117.8	303	e 19 50	PP	e 36 33	SS	—	—
Stuttgart	z.	129.3	331	e 19 12	[+ 1]	—	—	e 21 20	PP
Bogota		131.5	90	—	—	e 25 54	[-30]	e 28 5	SKKS
La Paz		131.6	119	e 22 23	PKS	i 29 31	?	—	—
Granada		144.2	329	19 37 <sub>k</sub>	[- 1]	43 40	SSP	23 34	PKS
Tamanrasset	z.	146.5	301	e 19 42	[ 0]	—	—	—	79.8

Additional readings:—

Brisbane iN = 5m.29s.

Riverview isSN = 10m.33s., iZ = 10m.41s., iN = 11m.26s., iSSN = 11m.34s.

Wellington PP?Z = 9m.16s., S<sub>c</sub>S?Z = 17m.32s.

Reno eN = 13m.27s.

Pasadena iZ = 13m.27s.

Sverdlovsk eSS = 32m.3s.

Bogota eZ = 27m.46s.

La Paz i = 22m.46s.

Granada SKSP = 33m.4s.

Tamanrasset iPKPZ = 19m.46s., iZ = 20m.16s.

Long waves were also recorded at Alicante.

Jan. 15d. Readings also at 0h. (Hungry Horse, College (2), near Mizusawa, and near Garm), 1h. (near Obi-garm), 3h. (near Garm, Obi-garm, and near Victoria), 5h. (Jena, Kew, and Shasta Dam), 8h. (near Obi-garm), 9h. (Alicante, Huancayo, Tucson, Pierce Ferry, Shasta Dam, College (2), and near Mizusawa), 11h. (Jena, Overton, and near Garm), 12h. (Alicante (2) and La Paz), 13h. (near Almeria), 14h. (near Ashkabad), 15h. (Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Mineral, Reno, Lick, Hungry Horse, College, Logan, and Tacubaya), 17h. (Bandong, Rome, Messina, near San Juan, and near Ashkabad), 18h. (Perth, Brisbane, Riverview, Djakarta, Huancayo, La Paz, Ksara, Paris, Kew, Rathfarnham Castle, Pierce Ferry, Hungry Horse, and College), 20h. (near Ashkabad), 21h. (Apia, Christchurch, Wellington, Auckland, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, and College), 22h. (Rathfarnham Castle and near Bogota), 23h. (Samarkand, Stalinabad, near Andijan, Fergana, Garm, and Obi-garm).

Jan. 16d. 4h. 25m. 1s. Epicentre 45°·7N. 26°·8E. Depth of focus 0·015.

(as on 1949, December 26d.).

Intensity IV at Bucharest.

Epicentre near that adopted. Depth 150km. (Strasbourg).

Bulletin du Service Séismologique de Roumanie, Jan., 1950.

A = +·6255, B = +·3160, C = +·7133;  $\delta$  = -10;  $h$  = -4;

D = +·451, E = -·893; G = +·637, H = +·322, K = -·701.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Bucharest	E.	1.4	198	(i 0 27)	- 1	(i 0 27)	P	—	—
Kishinev		1.9	47	i 0 37	+ 4	i 1 3	+ 5	—	—
Lwow		4.5	337	i 1 10	+ 2	i 2 1	+ 2	i 1 23	pP
Istanbul		4.9	160	e 1 6	- 7	i 1 44?	-25	—	—
Simferopol		5.2	96	e 1 21	+ 4	e 2 21	+ 5	—	—
Yalta		5.3	101	1 25	+ 7	2 25	+ 6	—	—
Kalossa	E.	5.5	281	e 1 21	0	i 2 19	- 5	—	3.2
Budapest		5.6	291	1 19	- 3	2 23	- 3	—	3.0
Skalnate Pleso		5.6	310	e 1 16	- 6	e 2 21	- 5	e 1 57	pP
Theodosia		6.1	93	e 1 33	+ 4	2 42	+ 4	—	e 3.2

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Ogyalla	E.	6.3	293	e 1 38	+ 6	e 2 46	+ 3	e 2 2 pP	—
Raciborzu		7.3	310	e 1 43	- 2	e 3 9	+ 2	—	—
Warsaw		7.5	332	2 10	+22	3 28	+16	—	e 4.0
Zagreb	Z.	7.6	275	e 0 46	-63	—	—	—	—
Triest		9.1	275	i 2 9	0	i 3 9	-42	—	i 4.2
Collmberg		10.8	306	e 2 28	- 4	e 3 36	-55	—	—
Jena	E.	11.4	303	e 2 38	- 2	e 4 6	-39	—	e 6.1
Moscow		12.1	30	e 3 0	+11	—	—	—	—
Stuttgart		12.4	291	e 2 49k	- 4	—	—	e 3 19 pP	—
Zürich		12.7	284	e 2 51	- 6	e 5 9	- 7	—	—
Strasbourg		13.3	290	e 3 2	- 3	e 5 34	+ 4	i 3 40 pP	—
Basle		13.4	285	e 3 3	- 3	—	—	e 3 34 pP	e 7.9
Copenhagen		13.5	323	e 3 4	- 3	—	—	—	—
Tiflis		13.6	100	e 3 13	+ 4	—	—	—	—
Ksara		13.8	146	e 0 54	?	e 12 4	P <sub>c</sub> S	—	—
Besançon		14.4	284	e 3 15	- 4	—	—	—	—
Clermont-Ferrand		16.6	279	i 3 45	- 1	—	—	—	—
Paris		16.8	289	e 3 43	- 6	—	—	i 4 11 pP	—
Algiers Univ.	Z.	19.9	251	i 4 19k	- 4	e 4 59	sP	e 4 46 pP	—
Obi-garm		32.2	86	i 6 23	+ 5	—	—	—	—
College		69.7	358	e 10 59	+ 1	—	—	—	—
Hungry Horse		80.3	335	i 11 59	+ 1	—	—	i 12 30 pP	—
Pierce Ferry		91.2	328	i 12 54	+ 2	—	—	i 13 30 pP	—
Tucson		93.4	325	i 13 3	+ 1	—	—	e 13 39 pP	—

Additional readings :—

Bucharest iPZ = 9s.

Kalossa iE = 2m.47s.

Budapest PN = 1m.23s., iE = 2m.7s. and 2m.37s., iN = 2m.50s.

Ogyalla eN = 2m.34s., iN = 3m.5s., e = 3m.13s., eE = 3m.26s., i = 3m.39s., e = 3m.45s.

Raciborzu e = 1m.55s.

Warsaw SE = 3m.36s.

Collmberg eZ = 2m.36s.

Strasbourg e = 4m.8s., 7m.27s., and 9m.25s.

Basle e = 4m.11s.

Paris i = 3m.48s.

Jan. 16d. Readings also at 0h. (College), 2h. (Palomar, China Lake, Arapuni, Kaimata, Wellington, and near Tuai), 3h. (Ashkabad), 5h. (Auckland, Christchurch, Wellington, Brisbane, Riverview, Fergana, Samarkand, near Andijan, Garm, Obi-garm, and Stalinabad), 6h. (Ksara), 7h. (Tinemaha), 8h. (College, Frunse, Naryn, Samarkand, near Andijan, Obi-garm (2), Stalinabad, Stuttgart, Clermont-Ferrand (2), near Basle, and Zürich), 10h. (Auckland, and near Leninakan), 12h. (Auckland, and near Obi-garm), 15h. (La Paz), 17h. (near Huancayo), 20h. (Boulder City), 21h. (Overton, Pierce Ferry, Reno, Mineral, Hungry Horse, near Shasta Dam, and near Obi-garm).

Jan. 17d. 4h. 15m. 48s. Epicentre 38° 9S. 175° 7E.

Given by New Zealand stations. Felt at Dannevirke.

A = -0.7781, B = +0.585, C = -0.6254;  $\delta = -1$ ;  $h = -1$ ;

D = +0.075, E = +0.997; G = +0.624, H = -0.047, K = -0.780.

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		°	°	m. s.	s.	m. s.	s.
Arapuni		0.8	357	i 0 20	+ 2	i 0 38	+ 7
Tuai	N.	1.1	85	i 0 23	+ 1	i 0 42	+ 3
New Plymouth	E.	1.3	263	i 0 27	+ 2	—	—
Wellington		2.5	197	0 40	- 3	1 12	- 2
Kaimata	N.E.	4.9	221	e 1 12	- 5	2 4	-11
Christchurch		5.2	206	e 1 18	- 3	2 12	-10

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Jan. 17d. 6h. 57m. 31s. Epicentre 14°·2N. 122°·1E. (as on 1941, May 9d.).

A = -·5154, B = +·8216, C = +·2438;  $\delta = +10$ ;  $h = +6$ ;  
D = +·847, E = +·531; G = -·130, H = +·206, K = -970.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.	
				m.	s.		m.	s.		m.	s.
Vladivostok		30·0	14	e 6	10	- 2	e 11	3	- 7	—	—
Irkutsk		40·6	342	e 7	36	- 7	e 17	17	SS	e 9	15
Bombay	E.	47·4	282	—	—	—	e 15	38	+ 6	—	PP
Obi-garm		52·1	308	e 9	14	0	—	—	—	—	—
Stalinabad		52·7	308	e 9	22	+ 4	—	—	—	—	—
Sverdlovsk		62·7	327	e 10	29	0	e 18	54	- 3	—	—
College		77·3	25	i 12	2	+ 4	—	—	—	—	—
Shasta Dam		99·2	44	e 13	57	+12	—	—	—	—	—
Hungry Horse		100·3	34	i 14	0	+10	—	—	—	—	—
Overton	z.	106·6	45	e 17	42	PP	—	—	—	—	—
Tucson		111·5	46	e 12	53	?	—	—	—	e 19	31

Additional readings :—

Irkutsk e = 7m.55s.

Bombay eN = 15m.51s.

Long waves were also recorded at Copenhagen.

Jan. 17d. 10h. 58m. 15s. Epicentre 0°·5N. 24°·5W.

A = +·9099, B = -·4147, C = +·0087;  $\delta = -3$ ;  $h = +7$ ;  
D = -·415, E = -·910; G = +·008, H = -·004, K = -1·000.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.	
				m.	s.		m.	s.		m.	s.		
Tamanrasset	z.	36·6	50	17	12 <sub>a</sub>	+ 2	e 13	9	+16	e 8	39	PP	15·8
Almeria		41·5	27	e 8	4	+14	e 14	35	+28	9	54	PP	—
Toledo	z.	43·4	23	i 8	7	+ 1	—	—	—	—	—	—	—
Alicante		43·7	27	8	11	+ 3	14	47	+ 8	10	7	PP	e 28·8
La Paz		46·2	247	i 8	32	+ 4	i 15	17	+ 2	10	27	PP	23·0
Bogota		49·7	276	i 8	58	+ 2	e 16	3	- 1	—	—	—	e 25·2
Clermont-Ferrand		51·2	25	e 9	10	+ 3	e 16	37	+12	e 10	17	P <sub>c</sub> P	25·4
Huancayo		52·0	254	i 9	10	- 3	i 16	33	- 3	—	—	—	—
Rome		53·0	34	i 9	21 <sub>a</sub>	0	i 17	1	+11	11	21	PP	25·8
Paris		53·5	22	e 9	25	+ 1	—	—	—	e 10	38	P <sub>c</sub> P	e 31·8
Besançon		53·6	26	e 9	24	- 1	—	—	—	—	—	—	—
Florence Arc.		53·6	32	e 9	25	0	e 17	25	+27	—	—	—	—
Florence Xim.		53·6	32	i 9	36	+11	e 17	9	+11	—	—	—	—
Bologna		54·1	31	e 9	31	+ 2	—	—	—	—	—	—	—
Padova		54·4	31	e 9	6	-25	—	—	—	—	—	—	—
Salo		54·5	30	e 9	42	+10	—	—	—	—	—	—	—
Basle		54·5	26	e 9	31	- 1	e 16	53	-17	—	—	—	—
Rathfarnham Ctle	z.	54·8	14	e 14	26	P <sub>c</sub> S	e 18	42	S <sub>c</sub> S	—	—	—	—
Zürich		54·9	27	e 9	32	- 3	—	—	—	—	—	—	—
Strasbourg		55·4	26	e 9	38	0	e 17	32	+10	e 10	56	P <sub>c</sub> P	—
Triest		56·1	31	i 9	42	- 1	i 17	38	+ 6	i 9	55	pP	—
Stuttgart		56·2	27	e 9	43	- 1	e 17	35	+ 2	e 10	0	pP	e 29·8
Pretoria	z.	57·1	121	i 9	49	- 1	—	—	—	—	—	—	—
Grahamstown		58·6	130	i 9	59	- 2	—	—	—	—	—	—	—
Jena		58·8	27	e 10	1	- 1	—	—	—	10	48	P <sub>c</sub> P	—
Prague		59·5	28	e 10	5?	- 2	e 18	20?	+ 4	e 11	48	PP	—
Helwan	z.	60·5	56	e 10	5	- 9	e 19	9	+40	e 12	43	PP	—
Potsdam	z.	60·5	25	e 10	9	- 5	—	—	—	—	—	—	—
Warsaw	z.	64·0	29	e 10	39	+ 1	—	—	—	e 12	57	PP	—
Ksara		65·4	54	e 10	46	- 1	19	51	+21	—	—	—	—
Moscow		74·2	31	i 11	39	- 1	—	—	—	—	—	—	—
Tiflis		74·3	47	e 11	41	0	—	—	—	—	—	—	—
Tucson		86·6	303	e 12	44	- 2	—	—	—	e 16	31	PP	—
Sverdlovsk		86·9	33	12	50	+ 2	23	33	+ 7	16	16	PP	—
Logan		87·7	312	e 12	48	- 4	—	—	—	e 15	58	PP	—

Continued on next page.



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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Hungry Horse	89.3	318	i 12 56	- 3	—	—	e 16 26	PP
Pierce Ferry	89.3	306	e 12 57	- 2	—	—	—	—
Overton	z. 89.7	307	e 12 59	- 2	—	—	—	—
Boulder City	90.0	306	e 13 0	- 3	—	—	—	—
Samarkand	90.8	50	e 13 8	+ 2	—	—	—	—
Riverside	z. 92.1	304	e 13 9	- 3	—	—	—	—
China Lake	z. 92.2	307	e 13 11	- 2	—	—	—	—
Stalinabad	92.3	51	i 13 13	0	e 24 26	+11	—	—
Tashkent	92.5	49	—	—	e 24 0?	-17	e 25 33?	PS
Pasadena	z. 92.8	304	i 13 13	- 3	—	—	—	—
Bombay	e. 96.8	71	e 17 32	PP	—	—	—	—
College	103.1	338	e 14 1	- 1	—	—	—	—

Additional readings :—

Tamanrasset iZ = 7m.18s., eZ = 7m.28s.

Alicante PPP = 10m.41s., PS = 14m.55s.

La Paz iPS = 15m.37s.

Rome SS = 20m.38s.?

Paris i = 9m.32s.

Florence Arc. iN = 9m.35s.

Triest iPP = 11m.58s., isP = 17m.45s., isS = 18m.15s., eSS = 22m.0s.

Grahamstown i = 10m.6s.

Jena eN = 13m.0s., eE = 14m.8s.

Prague e = 10m.10s., and 12m.56s.

Warsaw eZ = 10m.43s., 11m.3s., 11m.49s., 14m.38s., and 15m.12s.

Sverdlovsk SKKS = 23m.22s., SS = 29m.15s.

Long waves were also recorded at Malaga, Kew, De Bilt, and Copenhagen.

Jan. 17d. Readings also at 0h. (Overton, near Pierce Ferry and Tucson), 2h. (Overton, Pierce Ferry, and Tucson), 3h. (near La Paz), 8h. (near Collmberg), 9h. (Andijan, Fergana, Samarkand, near Obi-garm (2), and Stalinabad), 10h. (Mount Wilson, Riverside, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, and Collmberg), 11h. (near Ashkabad), 12h. (Wellington, near Bandung and Djakarta), 13h. (Hungry Horse), 16h. (Tucson, Shasta Dam (2), Hungry Horse (2), and College (2)), 18h. (China Lake, Tinemaha, Tucson, Pierce Ferry, Baku, Grozny, Ksara, Stalinabad, and near Ashkabad), 20h. (Mount Wilson, China Lake, Tinemaha, Tucson, Pierce Ferry, Hungry Horse, and College).

Jan. 18d. 1h. 55m. 5s. Epicentre  $40^{\circ}5N$ .  $106^{\circ}0W$ .

Approximate.

A = -0.2102, B = -0.7331, C = +0.6469;  $\delta = +10$ ;  $h = -2$ ;

D = -0.961, E = +0.276; G = -0.178, H = -0.622, K = -0.763.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Salt Lake City	4.5	276	i 1 3	- 8	—	—	i 1 17	P*
Logan	4.6	288	i 1 18	+ 6	i 1 39	P <sub>g</sub>	—	i 2.5
Pierce Ferry	7.6	238	e 2 5	+10	i 3 25	+ 2	i 2 19	P*
Overton	z. 7.7	242	i 2 3	+ 7	(i 3 12)	-13	i 2 15	P*
Boulder City	8.2	240	i 2 11	+ 8	—	—	—	e 3.4
Tucson	9.1	207	2 47	P <sub>g</sub>	i 4 18	+18	—	e 4.8
Hungry Horse	9.7	327	i 2 48	P*	—	—	—	—
Tinemaha	10.2	254	i 2 30	- 1	i 4 21	- 6	i 2 54	PP
China Lake	z. 10.3	246	i 2 34	+ 2	—	—	i 3 1	PP
Reno	10.6	269	e 2 32	- 4	i 4 27	-10	—	—
Riverside	z. 11.2	238	i 2 51	+ 7	—	—	—	—
Fresno	z. 11.4	255	e 2 48	+ 1	e 4 57	+ 1	—	—
Pasadena	11.6	240	i 2 55	+ 5	i 5 17	+16	—	—
Shasta Dam	12.5	276	e 2 58	- 4	—	—	—	—
Lick	z. 12.6	260	i 3 1a	- 2	i 5 30	+ 4	—	—
College	34.1	330	e 7 22	?	—	—	—	—

Additional readings :—

Tucson e = 3m.8s., i = 3m.15s., 3m.31s., and 4m.36s.

Reno eE = 4m.22s.

Long waves only were also recorded at Ottawa.

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Jan. 18d. Readings also at 6h. (Riverside, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 9h. (College, Frunse, near Andijan, Fergana, Naryn, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 11h. (China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, and near Ashkabad), 12h. (College and Ottawa), 15h. (Ashkabad), 16h. (Pasadena, China Lake, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, College, Andijan (2), Obi-garm, Samarkand, Tashkent, Tchimkent (2), Sverdlovsk (2), Semipalatinsk (2), Grozny, Istanbul, Ksara, Kodaikanal, Bandung, Djakarta, and near Ottawa; several shocks), 17h. (near College), 18h. (Berkeley, and near Obi-garm), 19h. (near Balboa Heights), 21h. (Pasadena, Riverside, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Lick, Shasta Dam, Hungry Horse, College, Andijan, and near Obi-garm), 22h. (near Apia), 23h. (College, Pierce Ferry, Tchimkent, near Andijan, Obi-garm, and Stalinabad).

Jan. 19d. 17h. 27m. 15s. Epicentre 27°·3N. 53°·2E. (as on 1941, June 15d.).

Destructive earthquake in the region to the S.E. of Bouchir, near the S. coast of Iran; several villages destroyed and about 20 deaths.

Epicentre 27°¼N., 53°E. (Strasbourg).

Annales de l'Institut de Physique du Globe de Strasbourg, 2 ème Partie, Séismologie, 1950, Nouvelle Serie, Tome XV, Strasbourg, 1954, p. 7.

$$A = +.5330, B = +.7125, C = +.4562; \quad \delta = -14; \quad h = +3; \\ D = +.801, E = -.599; \quad G = +.273, H = +.365, K = -.890.$$

	$\Delta$	Az.	P.		O-C.	S.		O-C.		Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.		m.
Mary	12·6	33	3	3	0	—	—	—	—	—	—	—
Baku	13·4	349	e 3	50	+36	—	—	—	—	—	—	—
Erevan	14·7	333	3	39	+ 8	e 6	27	+11	—	—	—	—
Leninakan	15·5	333	3	43	+ 1	—	—	—	—	—	—	—
Tiflis	16·0	338	i 3	48	0	6	50?	+ 4	i 7	26	SSS	—
Ksara	16·3	298	i 3	52	0	i 7	10	SS	—	—	—	i 9·4
Samarkand	16·8	39	i 3	58?	0	i 7	15?	+10	—	—	—	—
Grozny	17·1	341	e 4	5	+ 3	7	21	+ 9	—	—	—	—
Stalinabad	17·2	45	i 4	4	+ 1	i 7	24	+10	—	—	—	—
Obi-garm	17·9	46	i 4	11	- 1	i 7	33	+ 3	—	—	—	—
Piatigorsk	18·6	338	e 4	23	+ 2	—	—	—	—	—	—	—
Tashkent	19·3	39	i 4	32	+ 3	i 8	11	+ 9	—	—	—	—
Helwan	19·4	284	i 4	30k	0	i 8	3	- 1	4	55	PPP	—
Bombay	19·9	111	e 4	39	+ 3	e 8	31	+16	—	—	—	—
Tchimkent	20·1	37	i 4	38?	0	i 8	29?	+10	—	—	—	—
Fergana	20·2	40	i 4	42	+ 3	i 8	30	+ 9	—	—	—	—
Andijan	20·7	45	4	46	+ 2	8	39	+ 8	—	—	—	—
Poona	20·9	109	i 4	49	+ 3	i 8	49	+14	5	14	PP	9·1
New Delhi	N. 21·2	81	e 4	58	+ 9	8	45	+ 4	i 8	55	P <sub>c</sub> P	10·9
Theodosia	22·7	327	5	5	+ 1	e 9	11	+ 2	—	—	—	—
Yalta	23·0	325	5	6	- 1	9	12	- 2	—	—	—	—
Frunse	23·3	43	e 5	16	+ 6	e 9	33	+13	—	—	—	—
Simferopol	23·3	325	e 5	15	+ 5	9	25	+ 5	e 5	26	PP	—
Istanbul	24·2	312	e 5	17	- 2	e 9	44	+ 9	—	—	—	—
Almata	25·0	44	i 5	30	+ 3	i 10	9	+20	—	—	—	—
Kishinev	27·5	324	e 5	47	- 3	10	33	+ 3	—	—	—	—
Bucharest	27·6	317	e 6	27	+36	i 10	57	+25	e 6	55	PP	—
Sverdlovsk	30·0	9	i 6	14	+ 2	i 11	20?	+10	i 7	13	PP	—
Moscow	30·6	343	6	18	0	e 11	26	+ 6	—	—	—	—
Semipalatinsk	30·9	35	e 6	22	+ 2	—	—	—	—	—	—	—
Lwow	31·7	324	e 6	41	+14	—	—	—	—	—	—	—
Colombo	E. 32·4	124	6	35	+ 1	—	—	—	—	—	—	17·8
Messina	33·3	300	e 6	46	+ 5	—	—	—	—	—	—	e 17·2
Skalnate Pleso	33·5	321	—	—	—	e 12	1?	- 4	e 16	45	Q	e 20·4
Ogyalla	34·1	318	—	—	—	e 11	59	-15	e 14	51	SSS	e 17·0
Warsaw	34·6	326	e 6	44	- 9	e 12	17	- 5	e 8	2	PP	e 20·8
Raciborzu	z. 35·1	322	e 6	57	0	—	—	—	—	—	—	—
Rome	36·2	306	e 7	6	0	e 13	20	+33	—	—	—	—
Triest	36·2	312	i 8	41	+95	—	—	—	—	—	—	—
Prague	37·3	319	e 7	16	0	e 12	56	- 8	e 8	45	PP	e 22·0

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Florence Xin	37.5	309	e 7 20	+ 3	e 14 2	+55	—	—
Cheb	38.5	318	e 8 56	PP	e 13 24	+ 2	e 16 45	SSS e 18.2
Collmburg	38.6	320	e 7 26	0	—	—	e 9 3	PP e 21.8
Potsdam	39.0	322	i 7 30 <sub>a</sub>	0	—	—	i 9 14	PP e 21.8
Chur	39.3	313	e 7 32 <sub>a</sub>	0	—	—	—	—
Jena	39.3	320	e 7 31	- 1	e 13 27	- 7	e 9 6	PP —
Stuttgart	40.0	315	e 7 37 <sub>k</sub>	- 1	e 13 55	+11	e 9 7	PP e 20.8
Zürich	40.1	313	e 7 35 <sub>k</sub>	- 4	e 13 43	- 3	—	—
Upsala	40.6	333	—	—	e 13 45?	- 9	e 16 45?	SS e 21.8
Copenhagen	40.7	326	i 7 45	+ 1	e 14 5	+10	—	— 19.8
Basle	40.8	313	e 7 44 <sub>a</sub>	- 1	e 13 56	0	e 9 11	PP e 18.2
Strasbourg	40.9	315	i 7 46	0	e 14 8	+10	e 9 21	PP e 22.8
Algiers Univ.	z. 43.1	296	e 7 41	-23	—	—	—	—
Tamanrasset	z. 43.2	276	i 8 4 <sub>k</sub>	0	e 14 36	+ 4	e 9 49	PP —
De Bilt	43.4	319	—	—	e 14 45?	+10	e 17 45?	SS e 23.8
Clermont-Ferrand	43.5	309	e 8 7	0	e 14 47	+11	e 9 54	PP e 20.8
Paris	44.4	313	i 8 13	- 1	e 14 52	+ 3	i 10 1	PP e 27.8
Irkutsk	45.3	42	8 24	+ 3	15 26	PPS	e 10 20	PP —
Alicante	45.9	299	9 0	+34	15 58	+47	10 50	PP e 23.3
Kew	46.6	317	i 8 29	- 3	e 15 22	+ 1	e 18 59	SS e 23.8
Almeria	47.5	297	10 48	PP	—	—	—	— 27.8
Durham	E. 48.0	321	i 10 41	PP	i 19 54	SSS	i 12 43	? —
Granada	48.4	298	8 39 <sub>a</sub>	- 7	12 59	?	10 29	PP 28.8
Toledo	z. 48.6	301	i 8 48	+ 1	—	—	e 10 41	PP —
Malaga	z. 49.1	297	i 8 45 <sub>k</sub>	- 6	e 15 45	-11	—	— 31.8
Rathfarnham Castle	50.5	318	i 9 3	+ 1	e 16 21	+ 5	i 10 28	P <sub>c</sub> P e 22.8
Pretoria	z. 58.0	207	i 9 57	0	—	—	—	—
Vladivostok	64.0	53	i 10 41	+ 3	i 19 10?	- 3	—	—
Grahamstown	65.4	204	e 10 47	0	—	—	—	—
College	86.7	9	i 12 48	+ 1	—	—	e 16 18	PP —
Ottawa	94.0	327	e 13 22	+ 1	—	—	—	—
Hungry Horse	103.8	351	e 14 6	+ 1	—	—	i 17 24	? i 41.4
Boulder City	116.1	349	e 18 50	[+ 5]	—	—	—	—
China Lake	z. 116.6	351	e 19 58	PP	—	—	—	—
Mount Wilson	z. 118.2	352	e 19 58	PP	—	—	—	—
Tucson	118.9	346	e 18 54	[+ 3]	—	—	—	—
La Paz	124.9	268	e 19 1	[- 1]	—	—	—	58.8
Huancayo	129.6	277	e 19 16	[+ 5]	—	—	—	—

Additional readings and notes :—

Poona PPPEN = 5m.27s., SSEN = 9m.43s., SSEN = 9m.49s.  
 Sverdlovsk iSS = 13m.11s.  
 Skalnate Pleso e = 15m.15s.  
 Ogyalla eS = 12m.45s.  
 Warsaw eE = 7m.46s., ePPZ = 7m.53s., PPPZ = 8m.4s., eP<sub>c</sub>PE = 8m.56s., eP<sub>c</sub>PZ = 9m.4s., eP<sub>c</sub>PN = 9m.7s., P<sub>c</sub>SN = 13m.1s., P<sub>c</sub>SE = 13m.12s., eE = 14m.6s., SSEN = 15m.8s., eN = 17m.36s., eE = 18m.2s.  
 Trieste i = 8m.49s., iPP = 10m.9s., iPPP = 10m.48s., i = 15m.26s. and 15m.33s., iSP = 15m.50s., iSS = 18m.35s.; record appears to have been wrongly interpreted.  
 Prague e = 7m.29s. and 7m.57s., i = 8m.8s., e = 8m.21s., ePPP = 9m.14s., e = 9m.23s., 9m.38s., and 10m.54s.  
 Cheb eS = 13m.8s., eE = 14m.45s.  
 Collmburg eE = 9m.14s.  
 Potsdam ePN = 7m.33s., iZ = 14m.2s.  
 Jena ePP?E = 9m.0s., eP<sub>c</sub>P?E = 9m.13s., eS?N = 13m.18s.  
 Stuttgart eS<sub>c</sub>P = 13m.24s., eSS = 16m.45s.  
 Copenhagen i = 8m.6s. and 8m.15s.  
 Strasbourg i = 8m.36s., iPP = 9m.26s., iP<sub>c</sub>P = 9m.43s., eP<sub>c</sub>S = 13m.25s., e = 13m.32s. and 13m.41s., eS = 14m.13s., e = 16m.7s., eSS = 16m.53s., eS<sub>c</sub>S = 17m.47s.  
 Algiers Univ. iP?Z = 7m.45s., eZ = 8m.59s.  
 Tamanrasset ePPPZ = 10m.42s.  
 Clermont-Ferrand eP<sub>c</sub>P = 9m.36s., ePPP = 10m.36s., eS<sub>c</sub>S = 18m.10s., eSSS = 18m.24s.  
 Paris i = 8m.16s., 8m.29s., 8m.40s., and 9m.23s., e = 19m.43s.  
 Alicante P<sub>c</sub>P = 10m.16s., PPP = 11m.48s., P<sub>c</sub>S = 14m.14s., PS = 16m.8s., SS = 19m.16s., Q = 20m.12s., SSS = 20m.50s.  
 Kew iPPZ = 8m.54s.  
 Toledo iZ = 8m.51s.  
 Rathfarnham Castle iZ = 9m.24s. and 9m.32s., ePPZ = 10m.8s., i = 11m.43s., eEN = 15m.27s.  
 College i = 13m.35s., ePKKP = 30m.43s.  
 Long waves were also recorded at Dehra Dun, Budapest, Helsinki, and Bergen.

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Jan. 19d. 23h. 10m. 53s. Epicentre 27°·3N. 53°·2E. (as at 17h.).

	$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.
			m.	s.		m.	s.		m.	s.	
Leninakan	15·5	333	e 3	45	+ 3	—	—	—	—	—	—
Tiflis	16·0	338	e 3	46	- 2	6	52	+ 6	—	—	—
Ksara	16·3	298	e 3	54	+ 2	e 7	13	SS	—	—	—
Samarkand	16·8	39	e 4	0	+ 2	—	—	—	—	—	—
Grozny	17·1	341	e 4	7	+ 5	e 7	22	+10	—	—	—
Stalinabad	17·2	45	i 4	57	+ 2	i 7	287	+14	—	—	—
Obi-garm	17·9	46	e 4	16	+ 4	—	—	—	—	—	—
Tashkent	19·3	39	e 4	30	+ 1	i 8	7	+ 5	—	—	—
Helwan	19·4	284	i 4	30 <sub>a</sub>	0	e 8	7	+ 3	—	—	i 10·8
Tchimkent	20·1	37	i 4	42	+ 4	e 8	29	+10	—	—	—
Fergana	20·2	40	e 4	43	+ 4	e 8	37	+16	—	—	—
Andijan	20·7	45	e 4	46	+ 2	e 8	44	+13	—	—	—
Frunse	23·3	43	e 5	23	+13	—	—	—	—	—	—
Sverdlovsk	30·0	9	—	—	—	e 11	31	+21	—	—	—
Collmberg	z. 38·6	320	e 7	25	- 1	—	—	—	e 7	28	P
Stuttgart	z. 40·0	315	e 7	36	- 2	—	—	—	—	—	—
Copenhagen	40·7	326	i 7	44	0	—	—	—	i 7	52	?
Strasbourg	40·9	315	e 7	42	- 4	—	—	—	e 8	37	?
Tamanrasset	z. 43·2	276	e 8	4	0	—	—	—	e 9	37	PP
Pretoria	z. 58·0	207	e 9	56	- 1	—	—	—	—	—	—
College	86·7	9	e 12	47	0	—	—	—	—	—	—

Tamanrasset also gives  $iZ = 9m.7s.$

Jan. 19d. Readings also at 1h. (near Obi-garm), 2h. (Boulder City, Pierce Ferry (2), Overton, near Balboa Heights, and near Basle), 3h. (Mount Wilson, China Lake, Tinemaha, near Djakarta, and Bandung), 5h. (Prague), 9h. (Ksara, Lick, Hungry Horse, near Boulder City, Overton, Pierce Ferry, near Djakarta, and Bandung), 10h. (Huancayo, Riverside, China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, and Logan), 11h. (College, Hungry Horse, Shasta Dam, Mineral, and Pierce Ferry), 12h. (Hungry Horse and Victoria), 13h. (College, Hungry Horse, Lick, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, near Huancayo, and near Klyuchi), 15h. (Stuttgart), 17h. (College, Hungry Horse (2), and Kodaikanal), 18h. (Helwan, Ksara, Copenhagen, and near Garm), 19h. (near Tacubaya), 21h. (College, Hungry Horse, Shasta Dam, Boulder City, Pierce Ferry, Mount Wilson, Riverside, China Lake, and Tinemaha), 22h. (Pretoria, Fergana, near Garm, Obi-garm (2), Stalinabad (2), Tchimkent (2), and Andijan), 23h. (College, and near Andijan).

Jan. 20d. 18h. 37m. 38s. Epicentre 62°·6N. 150°·9W. Depth of focus 0·010. (as on 1949, September 3d.).

A = -·4042, B = -·2250, C = +·8865;  $\delta = -12$ ;  $h = -10$ ;  
D = -·486, E = +·874; G = -·775, H = -·431, K = -·463.

	$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.
			m.	s.		m.	s.		m.	s.	
College	2·7	30	i 0	45	+ 2	i 1	32	+18	—	—	e 3·0
Sitka	9·3	116	—	—	—	e 4	12	+16	—	—	e 5·0
Victoria	20·7	119	e 4	36	+ 2	—	—	—	—	—	—
Seattle	21·9	119	i 4	49 <sub>a</sub>	+ 3	e 9	40	+63	i 5	14	pP
Hungry Horse	24·9	107	e 5	13	- 2	e 9	56	+27	—	—	e 13·4
Shasta Dam	27·8	128	e 5	38	- 4	—	—	—	—	—	—
Mineral	z. 28·4	127	i 5	44 <sub>k</sub>	- 3	—	—	—	i 6	28	pP
Reno	z. 29·7	126	i 5	56 <sub>k</sub>	- 3	—	—	—	—	—	—
Lick	z. 31·0	130	i 6	6 <sub>a</sub>	- 4	—	—	—	—	—	—
Fresno	z. 32·2	128	e 6	22 <sub>a</sub>	+ 1	—	—	—	—	—	—
Tinemaha	z. 32·5	126	e 6	20	- 3	i 12	49	P <sub>c</sub> S	e 9	4	P <sub>c</sub> P
Rapid City	E. 33·0	102	e 6	50	PP	e 11	55	+17	—	—	e 17·0
China Lake	z. 33·8	126	e 6	31	- 4	i 12	54	P <sub>c</sub> S	i 9	9	P <sub>c</sub> P
Overton	z. 34·4	122	i 6	40	0	—	—	—	—	—	—
Boulder City	34·7	122	e 6	41	- 1	—	—	—	—	—	—

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	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Pierce Ferry	34.9	121	e 6 57	+13	—	—	—	—
Pasadena	35.1	127	i 6 44	- 2	—	—	—	—
Riverside	z. 35.5	127	e 6 44	- 5	—	—	i 9 13	P <sub>c</sub> P
Palomar	36.3	126	i 6 56	0	—	—	—	—
Tucson	39.6	120	e 7 23	0	—	—	—	—
Ottawa	44.6	76	8 4	0	—	—	9 52	PP
Cleveland	45.0	84	e 8 9	+ 2	—	—	e 8 55	pP
Shawinigan Falls	N. 45.0	72	8 12	+ 5	—	—	—	—
Seven Falls	E. 45.4	70	8 14	+ 4	—	—	—	24.4
Vladivostok	47.3	284	—	—	e 15 2	- 9	—	—
Harvard	48.7	75	e 8 36	0	—	—	e 26 2	Q
Columbia	51.3	90	e 9 59	P <sub>c</sub> P	e 12 55	?	—	e 28.8
Sverdlovsk	58.4	340	i 9 48	0	e 17 59	+18	—	e 26.4
Kew	63.9	20	(e 10 25)	0	e 23 0	SS	—	e 32.4
Collmberg	z. 65.7	12	e 10 38	+ 2	—	—	—	—
Prague	67.1	10	e 10 52	+ 7	—	—	—	—
Stuttgart	z. 67.8	15	e 10 52	+ 2	—	—	—	—
Strasbourg	67.9	16	e 10 53	+ 3	—	—	e 11 20	pP
Grozny	73.6	348	e 11 29	+ 5	—	—	—	—
Tiflis	75.3	349	e 11 34	0	—	—	—	—

Additional readings and note :—

Seattle i = 4m.52s., 4m.58s., 5m.11s., 5m.28s., 5m.36s., and 6m.16s., e = 6m.41s.

China Lake iZ = 10m.21s.

Riverside iZ = 6m.52s., eZ = 8m.17s.

Kew P reading has been increased by 9m.

Collmberg eE = 10m.44s.

Strasbourg e = 12m.22s.?

Long waves were also recorded at Bozeman, Logan, Lincoln, and Chicago.

Jan. 20d. 23h. Probably Argentine ; suggested depth of focus 600km.

La Plata ePE = 17m.34s., N = 18m.0s., E = 18m.18s. and 18m.48s., S?N = 19m.1s.,

iSN = 19m.8s., LE = 19.3m.

La Paz eP = 18m.0s., iS = 20m.44s.

Collmberg eE = 25m.48s.

Stuttgart eZ = 26m.8s.

Ottawa eP = 26m.17s.

Grahamstown iZ = 26m.21s.

Tucson eP = 26m.25s.

Pretoria iZ = 26m.44s.

Palomar iPZ = 26m.50s., ipPZ = 28m.50s.

Pierce Ferry eP = 26m.50s., epP = 28m.52s.

Boulder City eP = 26m.52s., epP = 28m.53s.

Riverside iPZ = 26m.52s., ipPZ = 28m.55s.

Overton iPZ = 26m.53s., epPZ = 28m.55s.

Pasadena iPZ = 26m.55s., epPZ = 28m.56s.

China Lake iPZ = 26m.59s., epPZ = 29m.2s.

Tinemaha iPZ = 27m.5s., ipPZ = 29m.8s.

Shasta Dam iP = 27m.27s., epP = 29m.31s.

Hungry Horse iP = 27m.31s.

Bozeman eL = 43m.21s.

Jan. 20d. Readings also at 1h. (Hungry Horse and Ksara), 2h. (Riverside (2), China Lake (2), Tinemaha (2), Tucson, Boulder City, Pierce Ferry, Hungry Horse, College, Copenhagen, and near Tacubaya), 5h. (Hungry Horse and College (2)), 6h. (near Obi-garm), 7h. (China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Hungry Horse, College, and near Obi-garm), 8h. (La Paz), 10h. (near Prague), 11h. (Bandong and Djarkarta), 13h. (Huancayo, and near Garm), 19h. (Pierce Ferry, Hungry Horse, and near College), 23h. (College, Hungry Horse, Ebingen, near Stuttgart, Zürich, Basle, and near Mizusawa).

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Jan. 21d. 14h. 9m. 49s. Epicentre 36°·0S. 71°·5W. Depth of focus 0·005.  
(as on 1948, Nov., 11d.).

Intensity V-VI between latitudes 36° and 37°S. Suggested epicentre 35°·5S. 72°·5W.  
Depth 100km.

F. Greve.  
Boletín del año, 1950. Instituto Sismológico, Santiago, 1951, p. 1.

A = +·2573, B = -·7690, C = -·5852;  $\delta = +2$ ;  $h = 0$ ;  
D = -·948, E = -·317; G = -·186, H = +·555, K = -·811.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Buenos Aires	10·7	86	i 2 36	+ 3	4 44	+12	2 48	PP 5·4
La Plata	11·1	90	i 2 38	0	i 4 42	0	i 2 50	pP 5·4
La Paz	19·7	11	i 4 24k	- 3	i 8 3	+ 3	i 4 47	pP 9·7
Huancayo	24·1	351	e 5 12	+ 2	i 9 28	+ 7	i 5 28	pP —
Bogota	z. 40·5	357	e 7 33	- 1	—	—	i 7 50	pP —
San Juan	54·3	8	e 10 14	+52	e 17 16	+23	e 20 55	SS e 22·3
Tacubaya	61·0	332	i 10 12k	+ 3	e 18 22	+ 1	i 10 29	pP —
Washington	74·7	357	e 11 31	- 3	—	—	i 11 53	pP —
Lubbock	74·8	336	11 37	+ 2	—	—	—	—
St. Louis	76·3	346	i 11 40	- 4	i 21 17	- 5	i 11 59	pP —
Fordham	76·5	0	e 11 42	- 3	i 21 59	sS	i 12 1	pP —
Grahamstown	77·0	122	i 12 27	sP	—	—	—	i 40·8
Tucson	77·2	327	i 11 47	- 2	e 21 52	pS	i 12 6	pP —
Cleveland	77·7	354	e 11 49a	- 2	e 21 55	pS	e 12 6	pP —
Weston	78·0	2	i 11 52	- 1	—	—	i 12 9	pP —
Harvard	78·1	2	i 11 53	- 1	—	—	i 12 12	pP —
Palomar	81·0	323	i 12 10k	+ 1	e 22 14	+ 2	i 12 28	pP —
Ottawa	81·1	358	i 12 7a	- 3	—	—	—	—
Christchurch	81·7	222	—	—	(e 22 11?)	- 8	—	e 22·2
Riverside	81·8	323	i 12 12k	- 1	e 22 41	+21	i 12 31	pP —
Pierce Ferry	81·9	328	i 12 13	- 1	—	—	i 12 33	pP —
Wellington	82·0	225	e 12 19	+ 5	—	—	—	—
Boulder City	82·2	326	i 12 15	0	—	—	i 12 34	pP —
Pasadena	82·3	323	i 12 15k	- 1	e 22 23	- 2	i 12 34	pP —
Overton	z. 82·5	328	i 12 16	- 1	e 23 0	+33	i 12 35	pP —
Pretoria	z. 82·5	117	i 11 18	-59	—	—	—	e 39·8
China Lake	z. 83·3	326	i 12 19k	- 2	—	—	i 12 39	pP —
Tinemaha	84·7	325	i 12 27k	- 1	—	—	i 12 47	pP —
Fresno	85·1	324	i 12 29k	- 1	—	—	i 12 49	pP —
Logan	85·7	332	i 12 32	- 1	e 22 59	0	e 12 52	pP —
Lick	z. 86·5	323	i 12 36k	- 1	—	—	i 12 55	pP —
Berkeley	z. 87·2	323	i 12 41a	+ 1	i 23 50	PS	i 13 0	pP e 40·4
Reno	z. 87·4	326	i 12 41k	0	—	—	i 13 0	pP —
Mineral	z. 88·8	325	i 12 48a	0	—	—	i 13 5	pP —
Shasta Dam	89·5	325	i 12 49	- 2	—	—	e 13 8	pP —
Hungry Horse	92·1	334	i 13 2	- 1	i 13 28	sP	e 13 20	pP —
Tamanrasset	z. 93·3	64	e 13 10	+ 1	—	—	i 13 30	pP —
Granada	96·2	49	i 13 10k	-12	—	—	17 37	PP —
Almeria	96·7	49	13 14	-10	24 34	- 3	17 14	PP 54·2
Alicante	98·9	49	—	—	24 8	[+ 3]	26 41	PS e 46·6
Rome	109·0	52	e 21 38	PPP	e 28 44	PS	—	e 45·7
Strasbourg	109·7	44	e 18 33	[+10]	e 29 40	PKKP	e 19 14	PP —
Stuttgart	z. 110·6	45	e 18 25	[ 0]	e 29 35	PKKP	e 19 20	PP —
Triest	111·7	49	e 19 44	PP	e 25 28	[+25]	i 19 59	pPP —
Collmberg	z. 114·0	43	e 18 31	[- 1]	—	—	—	—
Prague	114·2	45	e 19 44	PP	e 25 25	[+12]	e 29 21?	PS —
College	116·6	333	i 18 35	[- 2]	—	—	e 16 25	? —
Moscow	129·3	44	e 21 29	PP	—	—	—	—
Tiflis	131·1	63	e 21 20	PP	—	—	—	—
Sverdlovsk	142·0	41	e 19 43	[+18]	e 29 17	SKKS	i 22 49	PP —

Continued on next page.

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	$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Samarkand	147.2	71	e 19 36	[+ 2]	—	—	—	—
Stalinabad	148.5	73	e 19 36	[ 0]	—	—	e 20 4	pPKP
Tashkent	149.1	68	i 19 39	[+ 2]	—	—	e 20 8	pPKP
Obi-garm	149.2	73	i 20 7	pPKP	—	—	—	—
Fergana	151.0	65	i 19 54	[+14]	—	—	e 23 37	PP
Andijan	151.4	70	e 19 45	[+ 5]	—	—	e 23 29	PP
Frunse	153.1	65	e 19 45	[+ 2]	—	—	—	—
Naryn	154.2	68	e 20 11	pPKP	—	—	—	—
Irkutsk	163.5	10	19 55	[ 0]	30 49	? SKKS	20 59	PKP <sub>2</sub>

Additional readings:—

La Plata SIZ = 4m.29s.

La Paz iPZ = 4m.27s., iPPZ = 4m.41s., iZ = 5m.31s., iSS = 8m.40s.

Huancayo iP = 5m.15s., eSS = 9m.53s.

Tacubaya esS = 28m.58s.

St. Louis i = 12m.6s., isS = 21m.49s.

Tucson ePPP = 16m.45s.

Cleveland esPN = 12m.14s., eN = 12m.18s.

Pasadena iZ = 12m.24s.

Overton iPPZ = 15m.46s., iPKKPZ = 30m.44s.

Logan ePP = 15m.53s.

Lick iPcPZ = 12m.42s.

Reno eZ = 13m.9s.

Mineral iZ = 13m.15s.

Hungry Horse i = 13m.37s., ePP = 16m.31s., iPKKP? = 30m.18s., i = 30m.58s.

Tamanrasset eZ = 16m.37s., iPPZ = 16m.52s.

Almeria PPP = 19m.19s., SS = 31m.14s.

Alicante SS = 32m.6s., SSS = 35m.54s.

Triest iSKKS = 26m.2s., esSKKS = 26m.54s., epPS? = 29m.48s., ePPS = 30m.31s., eSS = 35m.7s.

Prague e = 19m.53s., e = 27m.41s., ePPS = 30m.17s.?, eSS? = 35m.23s.

College e = 20m.0s.

Sverdlovsk ePS = 33m.1s.

Tashkent ePP = 23m.18s.?

Irkutsk PP = 24m.50s., SKSP = 35m.5s.

Long waves were also recorded at Clermont-Ferrand, De Bilt, and Ksara.

Jan. 21d. Readings also at 2h. (Palomar, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Samarkand, near Garm, Obi-garm, and Stalinabad), 4h. (Ottawa, Washington, Mount Wilson, Riverside, China Lake, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, and near College), 5h. (Rome, and near Messina), 6h. (Frunse (2), Obi-garm (2), Samarkand (2), near Andijan (2), Fergana (2), Garm (2), Stalinabad (2), Tashkent (2), Tchimbkent (2), and near Prague), 8h. (Riverside, China Lake, Boulder City, Overton, Pierce Ferry, and Hungry Horse), 9h. (Hungry Horse (2)), 11h. (Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, and near Tacubaya), 14h. (La Jolla (2), Palomar (2), Pasadena (2), Riverside (2), Tucson (3), Boulder City (2), Overton (2), Pierce Ferry, College, near Andijan and near Istanbul), 15h. (Tucson, Overton, Pierce Ferry (2), Shasta Dam, Hungry Horse, College, Logan, and Ottawa), 16h. (Boulder City, Overton, Pierce Ferry (2), and near Tucson (2)), 17h. (Boulder City, Overton, Pierce Ferry, College, near Shasta Dam, Leninakan, and near Grozny), 19h. (near Ashkabad and near Ottawa), 20h. (Riverside, China Lake, Tinemaha, Overton, Pierce Ferry, Shasta Dam, College, and near Istanbul (2)), 22h. (Christchurch, near Arapuni Kaimata, Tuai, and Wellington), 23h. (Pierce Ferry).

Jan. 22d. 1h. 4m. 43s. Epicentre 31°·0N. 139°·5E. Depth of focus 0·050.  
(as on 1947, Oct. 3d.).

A = -·6530, B = +·5577, C = +·5125;  $\delta = +9$ ;  $h = +2$ ;  
D = +·649, E = +·760; G = -·390, H = +·333, K = -·859.

	$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.
Mizusawa	R. 8.2	9	1 59	+ 2	3 34	+ 4	—
College	55.1	29	e 9 0	+ 1	—	—	—
Shasta Dam	76.2	51	e 11 11	- 1	—	—	e 12 25
Hungry Horse	77.3	41	i 11 19	+ 1	—	—	i 12 30
Tinemaha	z. 80.7	52	i 11 36	0	—	—	i 12 50

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
China Lake	z.	81.8	52	e 11 43	+ 1	—	—	i 12 56	pP
Pasadena	z.	82.3	55	i 11 44	0	—	—	i 12 56	pP
Riverside	z.	82.9	55	e 11 46	- 1	—	—	e 13 1	pP
Overton	z.	83.5	51	i 11 51	+ 1	—	—	i 13 7	pP
Boulder City		83.6	52	i 11 51	0	—	—	—	—
Palomar	z.	83.6	54	i 11 31	-20	—	—	i 12 45	pP
Pierce Ferry		84.1	51	i 11 53	0	—	—	i 13 9	pP
Collmberg	z.	85.5	330	e 11 57	- 3	—	—	—	—
Tucson		88.4	52	e 12 16	+ 2	—	—	—	—
Stuttgart	z.	89.0	329	e 12 14	- 3	—	—	e 15 49	PP
Strasbourg		89.8	330	e 15 57	PP	—	—	—	—

Mizusawa gives also SN = 3m.37s.

Jan. 22d. 3h. 18m. 18s. Epicentre 4°·2N. 78°·6W.

A = +·1971, B = -·9777, C = +·0728;  $\delta$  = +5;  $h$  = +7;  
D = -·980, E = -·198; G = +·014, H = -·071, K = -·997.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Bogota		4.5	84	i 1 11	0	e 2 6	+ 1	i 1 35	P <sub>z</sub>	i 2.5
Huancayo		16.5	169	e 3 52	- 2	—	—	—	—	—
La Paz		23.0	153	5 9	+ 2	i 9 17	+ 3	5 46	PP	10.8
Tucson		41.1	317	e 7 49	+ 2	—	—	e 9 46	PP	—
Pierce Ferry		45.5	320	i 8 24	+ 1	—	—	—	—	—
Boulder City		46.0	319	e 8 28	+ 1	—	—	—	—	—
Overton	z.	46.0	320	e 8 28	+ 1	—	—	—	—	—
Riverside	z.	46.6	315	e 8 35	+ 3	—	—	e 10 4	P <sub>c</sub> P	—
Pasadena	z.	47.3	315	e 8 35	- 2	—	—	—	—	—
China Lake	z.	47.7	317	i 8 42	+ 2	—	—	i 10 9	P <sub>c</sub> P	—
Logan		47.7	327	e 8 42	+ 2	—	—	—	—	—
Tinemaha	z.	48.9	317	i 8 49	- 1	—	—	i 10 13	P <sub>c</sub> P	—
Lick	z.	51.3	316	i 9 8 <sub>a</sub>	0	—	—	—	—	—
Mineral	z.	52.8	320	e 9 20	+ 1	—	—	—	—	—
Hungry Horse		53.4	332	e 9 22	- 2	—	—	i 10 30	P <sub>c</sub> P	—
College		77.5	336	i 11 58	- 1	—	—	—	—	—
Stuttgart	z.	85.4	42	e 12 40	0	—	—	—	—	—

Additional readings:—

Huancayo i = 3m.57s.

Lick iZ = 9m.17s.

Long waves were also recorded at Kew and Galerazamba.

Jan. 22d. 4h. 7m. 13s. Epicentre 27°·3N. 53°·2E. (as on 19d.).

A = +·5330, B = +·7125, C = +·4562;  $\delta$  = -14;  $h$  = +3;  
D = +·801, E = -·599; G = +·272, H = +·365, K = -·890.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Ashkabad		11.5	21	e 2 54?	+ 6	—	—	—	—
Mary		12.6	33	3 5?	+ 2	5 34?	SS	—	—
Erevan		14.7	333	e 3 39	+ 8	—	—	—	—
Leninakan		15.5	333	e 3 41	- 1	—	—	—	—
Tiflis		16.0	338	i 3 44	- 4	6 44	- 2	i 3 50	P
Ksara		16.3	298	i 3 51k	- 1	7 11	SS	—	—
Samarkand		16.8	39	i 3 59	+ 1	—	—	—	—
Grozny		17.1	341	4 5	+ 3	7 19	+ 7	—	—
Stalinabad		17.2	45	i 4 0	- 3	—	—	—	—
Obi-garm		17.9	46	i 4 10	- 2	—	—	—	—
Piatigorsk		18.6	338	4 16	- 5	7 48	+ 2	—	—
Tashkent		19.3	39	i 4 28	- 1	i 8 3?	+ 1	—	—
Helwan		19.4	284	i 4 27k	- 3	i 8 2	- 2	4 55	PPP
Bombay		19.9	111	e 4 40	+ 4	e 8 23	+ 8	—	—
Tchimkent		20.1	37	i 4 39	+ 1	—	—	—	—

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		$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Andijan		20.7	45	e 4 44	0	8 38	+ 7	—	—
Poona	E.	20.9	109	e 4 45	- 1	8 42	+ 7	5 15	PPP
New Delhi		21.2	81	e 4 51	+ 2	i 8 47	+ 6	5 25	PPP
Dehra Dun	N.	22.0	76	e 6 17	+79	—	—	e 12 35	PcS
Theodosia		22.7	327	e 5 7?	+ 3	e 9 11?	+ 2	—	e 15.9
Yalta		23.0	325	i 5 2	- 5	9 10	- 4	—	—
Frunse		23.3	43	e 5 13	+ 3	—	—	—	—
Naryn		23.4	46	i 5 16	+ 5	i 9 31	+10	—	—
Istanbul		24.2	312	e 5 17	- 2	e 9 38	+ 3	—	—
Almata		25.0	44	i 5 29	+ 2	i 9 59	+10	—	—
Hyderabad	N.	25.3	107	e 4 55	-35	9 57	+ 3	—	15.1
Athens		26.9	300	—	—	e 10 11	- 9	—	—
Kishinev		27.5	324	5 48	- 2	10 26	- 4	—	—
Bucharest		27.6	317	i 5 55	+ 4	i 10 33	+ 1	i 11 21	SS
Kodaikanal	E.	28.5	121	e 5 46	-13	—	—	—	—
Sverdlovsk		30.0	9	5 10?	-62	i 11 12?	+ 2	—	—
Moscow		30.6	343	e 6 15	- 3	e 11 17	- 3	—	—
Taranto		32.4	304	6 30	- 4	11 32	-16	—	e 18.7
Messina	Z.	33.3	300	e 6 39	- 2	e 12 0	- 2	—	—
Budapest		33.4	318	e 6 47?	+ 5	e 12 3	0	e 14 27	SSS
Skalnate Pleso		33.5	321	e 8 23	PPP	e 12 3	- 2	e 14 25	SSS
Ogyalla		34.1	318	—	—	e 12 1	-13	e 17 38	Q
Warsaw		34.6	326	e 7 5	+12	12 19	- 3	15 2	SSS
Zagreb		34.7	313	6 47	- 7	e 12 23	- 1	—	e 21.3
Rome		36.2	306	e 7 6	0	i 12 38	- 9	i 16 39	SSS
Triest		36.2	312	i 6 56	-10	i 12 41	- 6	i 15 13	SS
Padova		37.2	311	e 7 16	+ 1	e 13 6	+ 4	—	—
Prague		37.3	319	e 7 17	+ 1	e 13 1	- 3	e 8 29	PP
Florence Xim.		37.5	309	e 7 8	- 9	e 13 5	- 2	—	—
Bologna		37.6	310	e 7 22	+ 4	e 13 8	0	—	e 14.5
Prato		37.6	309	e 7 8	-10	e 13 3	- 5	—	—
Helsinki		38.1	339	e 13 12	PcS	e 16 11	SSS	—	e 19.8
Salo		38.4	312	e 7 28	+ 3	e 13 20	0	—	—
Cheb		38.5	318	e 8 47	PP	e 13 18	- 4	e 17 23	ScS
Collmberg		38.6	320	e 7 22	- 4	—	—	e 8 58	PP
Potsdam		39.0	322	e 7 18	-12	i 13 26	- 3	e 7 29	P
Pavia		39.2	311	e 7 47?	+16	—	—	—	—
Jena		39.3	320	e 7 34	+ 2	—	—	e 7 59	PP
Stuttgart		40.0	315	e 7 38	0	e 13 37	- 7	e 16 41	SS
Zürich		40.1	313	e 7 32 <sub>a</sub>	- 7	e 13 35	-11	e 9 14	PP
Upsala		40.6	333	e 11 27	?	e 16 35	SS	—	e 21.8
Copenhagen		40.7	326	i 7 41	- 3	i 13 54	- 1	—	20.4
Basle		40.8	313	e 7 43	- 2	e 13 47	- 9	e 8 23	?
Strasbourg		40.9	315	e 7 44	- 2	e 13 51	- 7	e 16 58	SS
Algiers Univ.	Z.	43.1	296	e 8 0	- 4	—	—	e 9 42	PP
Tamanrasset	Z.	43.2	276	e 8 2	- 2	e 14 28	- 4	e 10 22	PPP
Clermont-Ferrand		43.5	309	e 7 57	-10	e 14 42	+ 6	e 17 58	SS
Paris		44.4	313	e 8 13	- 1	—	—	—	e 29.8
Irkutsk		45.3	42	8 21	0	e 15 6?	+ 4	—	—
Almeria		47.5	297	(8 19)	-19	(15 27)	- 7	(18 51)	SS
Granada		48.4	298	9 41 <sub>k</sub>	+55	17 1	+75	14 22	PcS
Toledo		48.6	301	e 8 48	+ 1	i 15 48	- 1	—	—
Vladivostok		64.0	53	e 10 41	+ 8	e 19 23	+10	—	—
College		86.7	9	e 12 43	- 4	—	—	e 18 52	PPP
Hungry Horse		103.8	351	e 14 4	- 1	—	—	—	—
Overton	Z.	115.5	349	e 12 46	?	—	—	i 13 5	?
Pierce Ferry		115.8	348	e 12 47	?	—	—	—	—
Tucson		118.9	346	e 18 50	[- 1]	—	—	e 20 27	PP
La Paz		124.9	268	e 19 3	[+ 1]	26 13	[+ 7]	20 54	PP

Additional readings :—

Poona PPE = 5m.4s., eE = 8m.13s., SSE = 8m.57s., SSSE = 9m.17s.,

New Delhi iN = 5m.4s.

Bucharest iN = 8m.41s., iS? = 10m.28s., iN = 11m.8s.

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Budapest eN = 11m.1s., eE = 12m.11s.  
Skalnate Pleso eSSS = 14m.53s.  
Warsaw PPPZ = 8m.34s., PPPE = 8m.41s., SN = 12m.4s., eP<sub>c</sub>SE = 13m.3s., eP<sub>c</sub>SN = 13m.6s., SSE = 15m.5s., and other unidentified e readings.  
Triest ePP = 8m.16s., iP<sub>c</sub>P = 9m.22s., iP<sub>c</sub>S = 13m.7s.?, iS<sub>c</sub>S = 17m.1s.  
Prague e = 7m.54s., 8m.10s., 8m.25s., 8m.47s., 9m.24s., 10m.45s., 13m.7s., and 17m.12s.  
Collmberg eE = 8m.7s.  
Potsdam ePZ = 7m.23s., iZ = 7m.33s., iPPZ = 8m.59s., eE = 12m.59s., iSSE = 16m.48s.  
Jena eN = 7m.56s.  
Stuttgart ePP = 9m.11s.  
Upsala eN = 14m.47s., eE = 15m.23s., and 18m.11s., eN = 19m.47s.?  
Strasbourg e = 8m.20s., ePP = 9m.5s., eP<sub>c</sub>P = 9m.42s., e = 9m.55s., 11m.18s., and 13m.6s., iSSS = 17m.28s.  
Algiers Univ. iZ = 8m.5s. and 8m.21s., eZ = 9m.10s.  
Tamanrasset eZ = 8m.6s. and 8m.45s., ePPZ = 9m.48s.  
Clermont-Ferrand ePP = 9m.35s., ePPP = 10m.19s.  
Almeria PP = (10m.17s.), readings reduced by 4 minutes.  
Toledo eN = 30m.21s. and 31m.43s.  
College e = 13m.26s.  
La Paz iSS = 38m.11s.  
Long waves were also recorded at Bergen, De Bilt, Alicante, and Harvard.

Jan. 22d. 22h. Undetermined shock. South Pacific.

Arapuni eP? = 8m.58s.  
Wellington P? = 9m.17s., S? = 11m.54s.  
Apia eP = 9m.22s., e = 11m.52s., eS = 11m.58s.  
Cobb River eP?E = 9m.22s., eS?E = 13m.55s.  
Kaimata ePNE = 9m.36s., eNE = 12m.32s.  
Christchurch eP = 9m.43s., eS? = 12m.47s.  
Riverview iS?N = 14m.28s.  
Boulder City e = 15m.40s.  
Pierce Ferry eP? = 15m.49s., i = 16m.40s.  
Overton eZ = 15m.53s., iZ = 16m.48s. and 18m.1s.  
Tucson eP? = 16m.6s., e = 17m.4s., eL? = 18m.9s.  
Shasta Dam e = 17m.48s.  
Copenhagen iP = 24m.48s., i = 24m.55s.  
Collmberg eZ = 24m.55s., eE = 25m.9s.  
Stuttgart ePKPZ = 25m.4s.?, eZ = 25m.24s.  
Strasbourg ePKP = 25m.28s.

Jan. 22d. Readings also at 0h. (near Andijan, Garm, and near Istanbul), 1h. and 2h. (near Istanbul), 3h. (Ksara), 4h. (Frunse, near Almata and Naryn), 5h. (China Lake, Tucson, Overton, Pierce Ferry, Hungry Horse, and near College (2)), 7h. (Christchurch, Auckland, Wellington, and Riverview), 8h. (Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Shasta Dam, Logan, College, Bucharest, Istanbul, and near Athens), 9h. (College, and near Alicante), 10h. (Helwan, Potsdam, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, (2), Pierce Ferry, Lick, Shasta Dam, Hungry Horse (2), Sitka, and near College), 11h. (near Ashkabad (2), and near Granada), 12h. (Alicante), 16h. (China Lake, Tashkent, Tchimbkent, Helwan, and near Obi-garm), 17h. (near Kizyl-Arvat), 18h. (Bucharest and Istanbul), 19h. (Samarkand, Tchimbkent, near Andijan, Frunse, Garm, Obi-garm, and Stalinabad), 20h. (Haiwee, Riverside, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College).

Jan. 23d. 9h. Probably in the region of Crete.

Athens P<sub>r</sub> = 30m.48s., iS = 31m.15s.  
Taranto P = 31m.48s., e = 32m.20s., S = 33m.8s., e = 35m.8s.  
Rome e = 32m.15s. and 35m.23s.  
Messina eZ = 32m.18s.  
Prague e = 33m.21s.  
Triest eP<sub>r</sub>P<sub>r</sub>P<sub>r</sub> = 33m.34s., eS = 34m.47s., iQ = 36m.15s.  
Zürich eP = 33m.42s., e = 36m.32s.  
Stuttgart eP?Z = 33m.43s.?  
Strasbourg eP = 33m.45s.?, e = 37m.6s.  
Collmberg eZ = 33m.56s.  
Istanbul eP = 34m.4s., eS = 35m.56s.  
Tamanrasset iPZ = 34m.52sk, eZ = 34m.59s. and 36m.2s.  
Zagreb e = 35m.0s.  
Rathfarnham Castle eZ = 35m.9s., iZ = 35m.43s.  
College eP = 42m.15s.  
Hungry Horse iP = 42m.57s., i = 43m.8s.

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Jan. 23d. 9h. 59m. 51s. Epicentre 10°·5N. 125°·1E.

A = -·5655, B = +·8046, C = +·1811;  $\delta$  = -3;  $h$  = +6;  
D = +·818, E = +·575; G = -·104, H = +·148, K = -·984.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Nanking		22·2	345	e 5 1	+ 1	7 4	?	—	—	
Bandong		24·5	228	e 5 22	0	e 9 42	+ 2	—	—	
Djakarta		24·6	230	i 5 21 <sub>a</sub>	- 2	e 9 41	- 1	—	—	
Vladivostok		33·0	10	e 6 37	- 2	e 11 59	+ 2	—	—	
Irkutsk		44·9	342	8 17	- 1	14 57	+ 1	—	—	
Hyderabad	N.	45·7	285	e 9 59	P <sub>c</sub> P	15 5	- 3	18 16	SS	21·7
Colombo	E.	45·8	270	e 8 9	-16	15 9	0	—	—	27·2
Brisbane	Z.	46·5	145	i 8 29	- 2	—	—	—	—	—
Poona	E.	50·1	286	i 8 59	0	e 16 0	-10	11 41	PPP	20·5
Riverview		50·6	152	i 9 5 <sub>k</sub>	+ 3	i 16 20	+ 3	i 11 1	PP	—
Bombay		51·1	286	e 8 54	-12	i 16 24	0	e 9 9	P	—
Almata		52·9	318	i 9 23	+ 3	e 16 52	+ 4	—	—	—
Naryn		52·9	315	i 9 17	- 3	—	—	—	—	—
Semipalatinsk		54·2	327	i 9 34	+ 5	—	—	—	—	—
Frunse		54·4	316	e 9 31	0	—	—	—	—	—
Andijan		55·2	313	9 36	- 1	17 21	+ 1	—	—	—
Fergana		55·6	316	9 37?	- 3	—	—	—	—	—
Garm		56·3	311	9 43?	- 2	17 34?	0	—	—	—
Obi-garm		56·7	310	9 43	- 5	—	—	—	—	—
Stalinabad		57·3	310	9 48	- 4	i 17 42	- 5	—	—	—
Tashkent		57·6	313	e 9 55?	+ 1	i 17 52?	+ 1	—	—	—
Tchimkent		57·7	314	i 9 54	- 1	i 17 53	0	—	—	—
Samarkand		58·9	310	e 10 2	- 1	—	—	—	—	—
Mary		62·5	307	i 10 27	- 1	—	—	—	—	—
Sverdlovsk		67·4	328	i 10 57	- 2	i 19 51	- 4	—	—	—
Tiflis		75·9	311	i 11 48	- 2	—	—	—	—	—
Leninakan		76·6	310	e 12 14?	+20	—	—	—	—	—
College		79·3	26	i 12 9	0	—	—	e 15 6	PP	—
Moscow		80·0	325	e 12 9	- 4	e 22 10	- 7	—	—	—
Ksara		83·6	303	i 12 29 <sub>a</sub>	- 2	e 22 59?	+ 6	—	—	—
Helwan		88·1	300	i 12 53 <sub>k</sub>	- 1	23 35	- 2	16 24	PP	—
Prague		94·9	323	e 14 16	?	e 15 15	?	e 17 21	PP	—
Taranto		96·5	313	—	—	e 26 9	PS	e 32 9	SSP	—
Triest		97·0	319	e 17 35	PP	e 24 53	- 2	i 24 16	SKS	—
Stuttgart		98·5	323	e 13 40	- 2	—	—	e 17 34	PP	e 52·2
Rome		99·3	316	e 21 33	?	e 27 5	PS	e 32 23	SSP	—
Shasta Dam		99·7	46	e 13 48	+ 1	—	—	e 17 50	PP	—
Lick		101·5	48	e 14 1 <sub>k</sub>	+ 6	—	—	e 18 5	PP	—
Hungry Horse		101·6	35	i 13 56	0	—	—	i 18 2	PP	—
Rathfarnham Castle		104·2	332	—	—	—	—	e 40 49	Q	44·6
Tinemaha	Z.	104·2	47	i 18 32	PP	—	—	—	—	—
China Lake	Z.	105·1	47	e 14 12	+ 1	—	—	i 18 31	PP	—
Pasadena	Z.	105·4	50	i 18 35	PP	—	—	—	—	—
Riverside	Z.	106·1	50	e 18 34	PP	—	—	—	—	—
Logan		106·4	41	e 14 19	P	—	—	e 18 47	PP	—
Boulder City		107·1	47	e 18 45	PP	—	—	—	—	—
Overton	Z.	107·1	46	e 14 24	P	—	—	i 18 38	PP	—
Pierce Ferry		107·6	46	e 14 11	P	—	—	i 18 35	PP	—
Tucson		111·8	48	e 17 56	?	e 29 39	PPS	e 19 19	PP	—
Tamanrasset	Z.	112·1	300	e 18 40	[+ 3]	—	—	e 19 23	PP	—
Harvard		125·1	114	i 19 3	[ 0]	—	—	—	—	e 81·0
Weston		125·3	114	e 19 2	[- 1]	—	—	—	—	—
La Paz	Z.	165·8	116	i 20 9	[+ 3]	32 1	{+19}	i 21 10	PKP <sub>s</sub>	—

Additional readings :—

Riverview iN = 9m.8s., iP<sub>c</sub>PZ = 10m.22s., eN = 16m.27s., ePPSE = 16m.41s., iS<sub>c</sub>SN = 18m.51s., iEN = 19m.7s., eN = 19m.46s., eSSE = 19m.54s., iN = 21m.6s.

College i = 13m.4s.

Helwan eZ = 13m.17s.† and 14m.39s., PPPZ = 18m.24s.

Triest ePPP? = 19m.36s., iPPS = 27m.9s., eSS = 30m.56s., eSSS = 35m.14s.

Lick eZ = 18m.33s.

Continued on next page.

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Hungry Horse  $e = 17m.37s.$ ,  $ePKKP? = 30m.1s.$

China Lake  $ePKKPZ = 29m.52s.$

Logan  $ePKP = 17m.44s.$

Overton  $eZ = 29m.43s.$ ,  $iZ = 29m.59s.$

Pierce Ferry  $i = 18m.17s.$

La Paz  $PPZ = 24m.53s.$ ,  $PPS = 38m.49s.$

Long waves were also recorded at Christchurch, Wellington, and at other European stations.

Jan. 23d. Readings also at 2h. (near Garm, Andijan, Obi-garm (2), Tchimkent, Stalinabad (2), and Fergana), 3h. (Naryn, Tchimkent, Stalinabad, Samarkand, near Fergana, Andijan, Garm, and Obi-garm), 4h. (near Hungry Horse, near Seattle, Victoria, near Obi-garm and Garm), 7h. (Hungry Horse, Victoria, and near Seattle), 9h. (Rathfarnham Castle, and near Irkutsk), 10h. (Durham, and near Obi-garm (2)), 13h. (Prague and Klyuchi), 16h. (Stuttgart, Ebingen, Garm (2), Tchimkent, Samarkand, near Andijan, Obi-garm, and Stalinabad), 17h. (Granada, and La Paz). 19h. (Obi-garm, and near Garm).

Jan. 24d. 1h. 54m. 5s. Epicentre  $35^{\circ}6N. 136^{\circ}2E.$

Intensity V at Tsuruga, Hikone, and Gihu; IV at Nagoya, Kameyama, Tu, Kashiwara, Osaka, and Kobe; II-III at Hukui, Himeji, Toyooka, Kanazawa, Wakayama, Sumoto, Shizuoka, Tokushima, and Kohu.

Epicentre as adopted. Macroseismic radius 200-300km. Depth 10km.

Seismo. Bull. Cent. Met. Obs., Japan, for 1950. Tokyo, 1952, p. 9, with macroseismic chart.

$$A = -.5882, B = +.5641, C = +.5795; \quad \delta = +1; \quad h = 0;$$

$$D = +.692, E = +.722; \quad G = -.418, H = +.401, K = -.815.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C
	°	°	m. s.	s.	m. s.	s.
Hikone	0.3	173	0 4 <sub>a</sub>	- 7	0 9	- 9
Gihu	0.5	113	0 7	- 7	0 14	- 9
Kyoto	0.7	213	0 13	- 4	0 22	- 6
Nagoya	0.7	125	i 0 12 <sub>k</sub>	- 5	i 0 22	- 6
Kameyama	0.8	164	0 13 <sub>a</sub>	- 5	0 24	- 7
Osaka	1.1	210	i 0 21 <sub>a</sub>	- 1	i 0 36	- 3
Toyooka	1.1	267	0 23	+ 1	0 38	- 1
Kobe	1.2	222	0 23	- 1	0 39	- 2
Toyama	1.4	37	0 26	- 1	0 48	+ 2
Owase	1.5	180	0 24	- 4	0 45	- 4
Sumoto	1.6	221	0 28	- 2	0 49	- 2
Matusiro	1.9	60	0 32	- 2	0 59	0
Nagano	1.9	57	0 36	+ 2	1 3	+ 4
Omaesaki	1.9	121	0 45	+11	1 57	+58
Shizuoka	1.9	109	0 33	- 1	0 57	- 2
Hunatu	2.1	93	0 35 <sub>k</sub>	- 2	1 5	+ 1
Siomisaki	2.2	189	0 33 <sub>k</sub>	- 5	1 1	- 5
Misima	2.3	102	0 37	- 3		
Maebasi	2.5	71	0 41	- 2	1 17	+ 3
Kumagaya	2.6	78	0 44	0	1 25	+ 8
Osima	2.7	108	0 45	0	1 25	+ 6
Yokohama	2.8	93	0 49	+ 2	1 32	+10
Aikawa	2.9	34	0 57	+ 9	1 33	+ 9
Muroto	2.9	215	0 27 <sub>a</sub>	-21	1 10	-14
Tokyo	2.9	88	e 0 49	+ 1	i 1 27	+ 3
Kōti	3.0	227	0 48	- 2	1 30	+ 3
Mera	3.1	103	0 55	+ 4		
Utunomiya	3.1	72	0 50	- 1	1 39	$S_4$
Tukubasan	3.2	79	0 54	+ 2	1 42	$S_4$
Hirosima	3.3	248	0 57	+ 4	1 39	+ 4
Kakioka	3.3	79	0 52	- 1	1 36	+ 1
Matuyama	3.3	238	0 54	+ 1	1 41	$S_4$
Hamada	3.4	260	1 2	P*	1 46	$S_4$
Mito	3.5	76	0 53	- 4	1 44	+ 4
Hokusima	4.0	57	1 7	+ 3	2 23	$S_4$

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.
		°	°	m. s.	s.	m. s.	s.
Onahama		4.0	69	1 14	P*	1 56	+ 4
Ooita		4.5	240	1 24	P*	—	—
Sendai		4.6	53	e 1 13	+ 1	e 2 28	S <sub>e</sub> *
Hukuoka		5.2	249	e 1 33	P*	e 2 39	S <sub>e</sub> *
Kumamoto		5.3	241	1 26	+ 4	2 49	S <sub>e</sub>
Mizusawa	E.	5.3	46	(1 19)	- 3	1 19	P
Miyazaki		5.4	229	1 17	- 7	2 51	S*
College		52.5	31	e 9 13	- 4	—	—
Shasta Dam		75.3	50	e 11 43	- 4	—	—
Hungry Horse		75.7	40	i 11 44	- 5	—	—

Additional readings :—

Osaka i = 31s.  
Tokyo i = 54s. and 1m.22s.  
Mizusawa PE = -3m.11s.

Jan. 24d. 16h. 47m. 19s. Epicentre 14°·9S. 167°·1E. Depth of focus 0·020.

A = -·9424, B = +·2158, C = -·2555;  $\delta$  = -3;  $h$  = +6;  
D = +·223, E = +·975; G = +·249, H = -·057, K = -·967.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane		18.1	224	i 4 3k	+ 1	i 7 32	+16	i 4 48	sP
Apia		20.5	90	i 4 27	0	5 12	sP	4 53	pP
Auckland	N.	22.9	164	i 4 51	+ 1	i 9 6	+21	i 5 45	sP
Riverview		23.7	214	i 5 2a	+ 4	i 9 5	+ 7	i 5 31	pP
Arapuni		24.3	164	e 6 9	+65	—	—	—	i 13.6
Cobb River	E.	26.6	170	e 5 26	+ 1	—	—	—	—
Wellington		27.1	167	i 5 28	- 2	e 9 51	- 3	i 5 51	pP
Kaimata	N.E.	27.8	173	5 37	+ 1	—	—	—	—
Christchurch		28.9	171	5 48	+ 2	—	—	—	—
Perth		49.5	241	i 8 56	+20	i 15 36	+ 6	11 29	PPP
Honolulu		49.8	45	—	—	e 15 26	- 8	—	e 20.5
Tokyo		56.6	334	e 9 30	+ 2	e 17 0	- 6	—	—
Hunatu		56.9	333	i 9 29a	- 1	i 17 6	- 4	—	—
Kakioka		56.9	335	e 9 28	- 2	e 17 6	- 4	e 10 31	sP
Kumagaya		57.1	334	9 30	- 2	e 17 11	- 1	—	—
Nagoya		57.4	332	e 9 33	- 1	17 15	- 1	e 10 25	pP
Osaka		57.7	330	i 9 43	+ 7	17 27	+ 7	—	—
Miyazaki		57.8	325	e 9 35	- 2	i 17 24	+ 3	i 10 22	pP
Sumoto		57.8	330	i 9 34	- 3	17 18	- 3	12 47	PPP
Kōti		57.9	328	e 9 38	+ 1	i 17 25	+ 2	e 10 16	P <sub>c</sub> P
Hokusima	E.	58.0	337	9 37	- 1	17 25	+ 1	—	—
Kagosima		58.0	323	i 9 38a	0	i 17 25	+ 1	—	—
Nagano		58.1	333	e 9 42	+ 3	e 17 18	- 7	10 48	P <sub>c</sub> P
Sendai		58.3	337	e 9 39	- 1	e 17 18	-10	19 17	S <sub>e</sub> S
Bandong		58.8	272	e 9 41	- 3	i 17 35	+ 1	e 10 16	pP
Mizusawa		59.0	337	9 41	- 4	17 36	- 1	—	—
Miyako		59.1	338	e 9 45	- 1	17 39	+ 1	—	—
Hukuoka		59.6	325	e 9 50k	+ 1	e 17 43	- 2	—	—
Djarkata		59.7	272	i 9 50a	0	i 17 50	+ 4	—	—
Sapporo		62.3	340	i 10 5	- 2	e 18 15	- 4	e 10 19	pP
Vladivostok		66.1	333	i 10 31	- 1	i 19 7	+ 1	i 11 8	pP
Klyuchi		71.1	357	11 0	- 3	20 1	- 3	e 13 43	PP
Ukiah		84.2	48	—	—	e 22 17	- 7	e 27 11	SS
Branner	Z.	84.3	49	i 12 14a	- 1	—	—	—	e 35.0
Berkeley		84.4	49	i 12 14k	- 1	i 22 19	- 7	i 12 54	pP
Santa Clara		84.4	49	i 12 14	- 1	i 23 23	- 3	—	e 36.0
Lick	Z.	84.6	49	e 12 15a	- 1	i 30 29	?	12 57	pP
Shasta Dam		85.5	46	i 12 19	- 2	e 22 25	[- 2]	13 1	pP
Fresno	Z.	85.8	50	e 12 19	- 3	—	—	e 13 0	pP
Mineral	Z.	85.9	47	i 12 21a	- 2	—	—	i 13 13	pP

Continued on next page.



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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
	°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Copenhagen	134.9	340	i 19 2	[+ 2]	—	—	i 22 19	SKP	—
Istanbul	135.3	314	e 19 1	[— 0]	e 31 46	PS	—	—	—
Bucharest	N. 135.8	320	i 22 29	PKS	i 28 26	SKKS	—	—	—
Skalnate Pleso	136.4	328	e 19 4	[+ 1]	e 25 50	[— 6]	e 22 8	PP	—
Helwan	136.7	297	i 19 5k	[+ 2]	22 26	SKP	e 19 45	pPKP	—
Aberdeen	N. 137.0	351	i 22 30	SKP	i 25 4	[— 53]	i 40 25	SS	—
Potsdam	137.5	337	i 19 5a	[+ 1]	i 22 25	SKP	i 19 46	pPKP	e 65.7
Prague	138.5	333	e 19 7	[— 0]	e 26 5	[+ 6]	e 19 43	pPKP	e 64.7
Vienna	138.9	330	e 18 59	[— 8]	e 22 30	PKS	e 22 3	PP	—
Jena	139.0	335	e 19 3	[— 4]	—	—	e 19 45	pPKP	—
Cheb	139.3	335	e 19 0	[— 8]	e 25 59	[— 1]	i 22 22	PP	e 67.7
De Bilt	140.2	342	i 19 11	[+ 1]	e 40 11	SS	i 22 10	PP	e 63.7
Zagreb	140.8	327	e 19 6	[— 5]	e 28 41	SKKS	e 22 32	PP	—
Rathfarnham Castle	141.3	353	i 19 9	[— 3]	i 22 55	PKS	i 19 39	pPKP	e 59.2
Stuttgart	141.7	336	e 19 8k	[— 5]	e 22 51	PKS	e 19 54	pPKP	e 67.7
Karlsruhe	141.8	337	e 19 11	[— 2]	e 28 57	SKKS	—	—	—
Triest	142.0	329	e 19 11	[— 2]	i 28 57	SKKS	e 19 56	pPKP	—
Kew	142.1	347	e 19 12	[— 1]	—	—	—	—	e 52.7
Strasbourg	142.3	337	i 19 11k	[— 3]	e 28 5	SKKS	e 19 50	pPKP	—
Zürich	143.0	336	e 19 7a	[— 8]	—	—	e 22 13	PP	—
Chur	143.1	334	e 19 13	[— 2]	—	—	—	—	—
Salo	143.6	332	i 19 17	[+ 1]	e 29 6	SKKS	e 22 56	PKS	—
Padova	143.8	329	i 19 12	[— 4]	i 29 5	SKKS	i 22 54	PKS	—
Paris	143.9	342	i 19 14	[— 2]	i 29 8	SKKS	i 19 56	pPKP	—
Bologna	144.0	330	e 19 16a	[— 0]	e 29 12	SKKS	e 22 53	PKS	—
Neuchatel	144.0	336	e 19 15	[— 1]	—	—	e 20 9	pPKP	—
Besançon	144.1	337	i 19 15	[— 2]	—	—	—	—	—
Florence Arc.	144.6	329	i 19 16a	[— 2]	i 29 12	SKKS	i 19 59	pPKP	—
Florence Xim.	144.6	329	i 19 16	[— 2]	e 27 0	[+ 51]	—	—	—
Prato	144.6	329	i 19 17	[— 1]	—	—	i 23 41	PP	—
Rome	145.3	326	i 19 19a	[— 0]	29 14	SKKS	20 45	pPKP	—
Messina	z. 145.8	318	i 19 19	[— 1]	—	—	i 20 40	sPKP	—
Clermont-Ferrand	146.4	339	e 19 21	[— 0]	e 42 11	SSP	i 20 3	pPKP	67.7
Tortosa	151.7	338	i 19 31	[+ 2]	—	—	i 22 21	SKP	—
Toledo	153.9	344	i 19 34	[+ 2]	30 7	SKKS	20 22	pPKP	e 43.6
Algiers Univ.	z. 154.0	329	e 19 33	[+ 1]	—	—	e 20 14	pPKP	—
Alicante	154.2	337	19 41	[+ 9]	26 17	[— 4]	20 7	PKP <sub>1</sub>	e 73.8
Almeria	156.2	339	i 19 32	[— 3]	26 25	[+ 1]	i 20 3	PKP <sub>1</sub>	76.2
Granada	156.3	342	i 19 37a	[+ 2]	30 15	SKKS	20 6	PKP <sub>1</sub>	i 72.9
Malaga	z. 157.0	342	i 19 38k	[+ 2]	33 44	SKSP	i 23 46	PP	89.6
Tamanrasset	z. 160.9	298	i 19 43a	[+ 3]	—	—	i 20 27	pPKP	74.7

Additional readings and notes :—

Apia eS = 5m.5s., eSE = 5m.9s.  
 Riverview iPPEZ = 5m.37s., iPPP = 5m.51s., isSE = 9m.50s., isSE = 10m.16s., iP<sub>c</sub>SZ = 12m.15s., iS<sub>c</sub>SE = 15m.55s., and many other unidentified i readings.  
 Wellington e = 6m.0s., i = 6m.21s. and 7m.6s., eZ = 10m.55s.  
 Perth PP = 13m.16s., PPP = 13m.53s., S = 18m.16s., SS = 21m.16s. The reading entered as PPP is given as P and the remainder are also wrongly identified.  
 Kakioka e = 19m.6s.  
 Osaka eP = 9m.47s., iN = 19m.26s.  
 Miyazaki i = 19m.17s.  
 Mizusawa SE = 17m.24s.  
 Sapporo eP<sub>c</sub>P = 11m.0s., e = 11m.10s., esS = 18m.29s., iS<sub>c</sub>S = 19m.44s.  
 Vladivostok isS = 20m.13s.  
 Berkeley eZ = 14m.30s. and 23m.18s., eSSN = 27m.58s.  
 Lick iPPZ = 15m.33s.  
 Shasta Dam e = 12m.41s., ePP = 15m.36s., ePKKP = 30m.25s.  
 Fresno eE = 12m.44s., ePPZ = 15m.40s., iPKP,PKPZ = 38m.31s.  
 Mineral iZ = 12m.33s., isPZ = 13m.22s.  
 Irkutsk ePP = 15m.41s.?, esS = 23m.46s.  
 Pasadena iPPZ = 15m.42s.  
 College eSKS = 22m.28s., iPKKP = 30m.20s., ePKP,PKP = 38m.12s., ePKP,PKP,PKP = 58m.47s.  
 Riverside iZ = 13m.25s., iPPZ = 15m.47s.  
 Reno iZ = 12m.50s., eE = 22m.49s.  
 China Lake eZ = 15m.39s., iPPZ = 15m.52s., iPKP,PKPZ = 38m.38s.  
 Tinemaha ePKP,PKPZ = 38m.28s.  
 Victoria PS = 23m.59s.

Continued on next page.

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Seattle eS = 23m.13s., i = 23m.31s., ePS = 24m.13s., ePPS = 25m.21s., eSS = 29m.3s.  
Boulder City iPP = 16m.9s., ePPP = 17m.9s., iPKKP = 30m.18s., ePKP,PKP = 38m.19s.  
Tucson epP = 13m.40s., ePP = 15m.53s., ePPP = 18m.34s., eS = 23m.37s., ePS? = 24m.41s., eSS = 29m.43s., ePKKP? = 30m.12s., ePKP,PKP? = 38m.25s.  
Salt Lake City e = 26m.1s.  
Logan ePP = 16m.42s., ePKP,PKP? = 38m.19s.  
Hungry Horse iSKS = 23m.19s., iPS = 24m.44s., iPKKP = 29m.53s.  
New Delhi iSKSN = 23m.55s., iN = 24m.48s.  
Poona iSKSEN = 23m.36s., PSE = 25m.56s.  
Andijan ePP = 17m.52s., SKKS = 24m.46s.  
Tashkent PP = 18m.45s.?  
St. Louis iPS = 27m.47s., iPPS = 28m.52s.  
Sverdlovsk PP = 18m.53s., iSP = 28m.9s., iPPS = 29m.18s., SS = 34m.9s., SSS = 38m.23s.  
Cleveland esSKSE = 26m.6s., eSN = 27m.2s., iN = 27m.7s., ePSE = 28m.55s., eE = 29m.7s., ePPSE = 29m.53s., esPSE = 30m.5s., isPPSE = 31m.1s., esSE = 35m.9s.  
La Paz i = 19m.15s., iSKKS = 26m.21s., iPS = 29m.24s., iPPS = 30m.29s., iZ = 32m.43s.  
Pennsylvania eE = 26m.13s., iSN = 27m.25s., eE = 30m.1s., eSSN = 35m.35s.  
Ottawa SKKS = 26m.29s., S = 29m.11s., SS = 36m.5s.  
City College, New York e = 21m.46s. and 30m.43s., eSS = 36m.26s.  
Fordham e = 27m.53s. and 36m.35s.  
Seven Falls eE = 47m.5s.  
Harvard ePPS = 31m.19s., e = 32m.15s., eSS = 36m.15s., e = 37m.3s. and 46m.41s., eQ = 55m.39s.  
Weston ePKKP = 28m.27s.  
Tifis esS = 29m.2s.  
Moscow ePP = 20m.15s., epPP = 20m.59s., esS = 29m.13s., eSS = 36m.59s.  
Upsala iPKS = 22m.12s., eN = 32m.41s.?, and 40m.37s.  
Warsaw eZ = 19m.45s., eN = 19m.59s., SKPE = 22m.27s., SKPN = 22m.30s., eE = 23m.9s., eZ = 23m.14s. and 23m.28s., eE = 23m.31s., eN = 23m.39s. and 24m.10s., PPN = 24m.28s., eE = 28m.2s., SKKSN = 28m.33s., SKKSE = 28m.36s.  
Copenhagen i = 19m.45s., e = 21m.35s.  
Skalnate Pleso iPKPE = 19m.8s., e = 19m.49s., 21m.22s., 22m.33s., 25m.29s., and 28m.28s.  
Helwan eZ = 21m.19s., PPZ = 21m.51s., eZ = 23m.39s., iE = 28m.23s., PSKSZ = 31m.41s., PPSZ = 34m.6s.  
Aberdeen iN = 27m.53s. and 41m.28s.  
Potsdam epPKPE = 19m.52s., isPKPZ = 20m.7s., eN = 20m.41s., eE = 20m.46s., iPPZ = 21m.53s., ePPE = 22m.5s., iE = 22m.35s., ipPP = 22m.42s., iN = 28m.31s., iZ = 33m.42s.  
Prague e = 19m.27s., esPKP = 20m.4s., e = 21m.9s., and 22m.16s., iPPZ = 22m.30s., e = 22m.44s., epPP = 22m.57s., e = 23m.46s., 24m.38s., 27m.44s., 28m.4s., and 33m.44s.  
Jena eEN = 19m.10s., eN = 20m.15s. and 21m.27s., ePP?N = 22m.1s., epPP?EN = 22m.44s., eE = 23m.45s.  
Cheb e = 20m.12s., iSKPE = 22m.45s., iSKPN = 22m.49s., epSKP? = 23m.25s., epSKS = 26m.53s., e = 27m.47s. and 28m.41s.  
De Bilt eZ = 18m.59s., iZ = 22m.45s.  
Zagreb eZ = 19m.13s., eE = 21m.22s.  
Rathfarnham Castle iZ = 19m.14s., eZ = 20m.9s., i = 21m.41s., eEN = 29m.16s. and 31m.2s., ePPSEN = 32m.28s., eEN = 39m.44s., e = 43m.34s., eEN = 48m.37s. and 57m.13s.  
Stuttgart iPKPZ = 19m.19s., eZ = 20m.50s., ePP = 22m.20s., e = 23m.41s., eZ = 24m.4s., eSKKS = 28m.53s., ePS = 34m.16s., e = 40m.29s.  
Karlsruhe e = 19m.17s., eE = 29m.5s.  
Triest iPP = 22m.51s., ipPP = 23m.23s., iPSKS = 33m.54s., eSS = 40m.41s.?  
Strasbourg iPKP = 19m.14s., ipPKP = 19m.53s., iPP = 22m.21s., ipPP? = 22m.45s., ipPP? = 22m.58s., ePPP? = 25m.14s., e = 28m.23s., eSS = 40m.45s., and other unidentified i readings.  
Zürich e = 20m.47s.  
Salo 20m.59s.  
Padova i = 23m.35s., e = 30m.4s.  
Paris i = 19m.25s., 19m.33s., and 20m.41s., iPP = 22m.31s., iPKS = 22m.57s., ipPP = 23m.2s., esPP = 23m.29s., eSS = 41m.4s., eSSS = 46m.12s.  
Bologna e = 19m.38s. and 29m.35s.  
Florence Arc. iPPZ = 22m.37s., eN = 23m.27s.  
Rome PP = 23m.2s., PSKS = 32m.44s., e = 35m.0s., and 41m.6s.  
Clermont-Ferrand iPP = 22m.48s., ipPP = 23m.21s., ePPS = 35m.4s.  
Toledo iZ = 19m.40s., PKP,Z = 19m.57s., sPKPN = 20m.34s., ePPZ = 23m.34s., eN = 23m.42s.  
Algiers Univ. iPKP,Z = 19m.57s., eZ = 20m.23s., epPKP,Z = 20m.36s., esPKP,Z = 20m.51s., eZ = 21m.31s., ePPZ = 23m.19s., epPPZ = 23m.45s., esPPZ = 25m.12s.  
Alicante PKS = 23m.5s., PP = 23m.39s., PPP = 26m.54s., SKKS = 29m.59s., PPS = 36m.21s., SSS = 43m.13s.  
Almeria PP = 23m.39s., PPP = 27m.21s., SKKS = 30m.23s., PPS = 36m.43s., SS = 43m.29s., SSS = 49m.29s.  
Granada sPKP = 20m.33s., iPP = 23m.45s., pPP = 24m.6s., PPP = 27m.36s., SKSP = 32m.48s., PPS = 36m.54s., iSS = 43m.6s., SSS = 49m.51s.  
Malaga PPPZ = 27m.24s.  
Tamanrasset ePKP,Z = 20m.39s., epPKP,Z = 21m.18s.?, iPPZ = 24m.13s., epPPZ = 24m.47s., ePPPZ = 27m.57s.  
Long waves were also recorded at Helsinki and Ivigtut.



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Jan. 24d. 21h. 57m. 1s. Epicentre  $34^{\circ}8'N$ .  $119^{\circ}0'W$ . (as on 1946, July 24d.).

A = -0.3990, B = -0.7198, C = +0.5681;  $\delta = +5$ ;  $h = 0$ ;  
D = -0.875, E = +0.485; G = -0.275, H = -0.497, K = -0.823.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Fresno	z.	2.0	342	i 0 37k	+ 2	i 1 4	+ 2	—	—
Lick	z.	3.3	322	i 0 58k	+ 5	e 1 41	+ 6	—	—
Boulder City		3.6	70	i 0 59	+ 1	i 1 54	S*	—	—
Berkeley	E.	4.0	321	e 1 18	P <sub>g</sub>	e 1 55	+ 3	—	—
Overton	z.	4.1	64	e 1 2	- 3	i 2 5	S*	i 2 18	S <sub>g</sub>
Pierce Ferry		4.3	72	e 1 0	- 8	i 2 16	S*	i 1 35	P <sub>g</sub>
Reno		4.8	353	i 1 26	P*	—	—	—	—
Shasta Dam		6.5	337	e 2 19	P <sub>g</sub>	—	—	—	e 3.2
Tucson		7.3	108	e 2 24	P <sub>g</sub>	i 3 52	S <sub>g</sub>	—	i 4.5

Tucson gives also  $i = 2m.51s.$

Jan. 24d. Readings also at 1h. (Pasadena, Riverside, China Lake, Tinemaha, Tucson, Overton, Shasta Dam, College, and near Huancayo), 2h. (Apia), 3h. (Riverside, China Lake, Tucson, Overton, Shasta Dam, and College), 4h. (Hungry Horse and Logan), 5h. (China Lake, Tucson, Shasta Dam, Hungry Horse, College, Harvard, near San Juan, and near Apia), 6h. (Tucson, Shasta Dam, Hungry Horse, and College), 9h. (College), 10h. (College, and near Garm), 12h. (Fergana, Naryn, near Andijan, Garm, Stalinabad, Tchimkent, and near Granada), 15h. (Garm, and near Andijan), 16h. (Granada), 17h. (Ottawa, and near Mizusawa), 19h. (near Klyuchi), 20h. (College), 21h. (Hungry Horse and Wellington), 23h. (Nanking and Hungry Horse).

Jan. 25d. 2h. South-West Pacific.

Apia eP = 13m.10s., e = 13m.42s. and 16m.6s., eS = 16m.10s.  
Brisbane iPZ = 15m.15s.  
Riverview ePZ = 15m.32s., iPPZ = 16m.22s., eE = 20m.31s., eLZ = 22.9m.  
Tinemaha iPZ = 22m.9s.  
China Lake ePZ = 22m.12s.  
Shasta Dam eP = 22m.14s.  
Pasadena ePZ = 22m.23s., eLZ = 53m.  
Tucson eP = 22m.23s., eL = 58m.0s.  
Overton iPZ = 22m.25s., iZ = 22m.37s.  
Pierce Ferry eP = 22m.26s., i = 22m.37s.  
Logan eP = 22m.47s.  
College eP = 23m.1s.  
Ksara iPKP? = 29m.32s.

Long waves were also recorded at Auckland, Christchurch, Wellington, Berkeley, Alicante, and Granada.

Jan. 25d. Readings also at 0h. (Brisbane, Riverview, College, Hungry Horse, Overton, China Lake, near Ebingen and Stuttgart), 3h. (near Huancayo), 5h. (near Hungry Horse and near Obi-garm (3)), 6h. (Bogota, Huancayo, La Paz, Boulder City, Pierce Ferry, Tucson, China Lake, and Hungry Horse), 7h. (near Ashkabad), 8h. (Apia, Auckland, Wellington, Christchurch, Brisbane, College, Hungry Horse (2), Berkeley, Overton, Tucson, and near Ashkabad), 9h. (Ksara), 10h. (Huancayo and near Fresno), 11h. (Nanking (3), Vladivostok (2), College (2), Hungry Horse (3), and Clermont-Ferrand), 12h. (Nanking, Zi-ka-wei, Vladivostok, College, Hungry Horse, De Bilt, Kew, Paris, Rathfarnham Castle, Stuttgart, Rome, near Alicante, and near Granada), 13h. (Fort de France, Pierce Ferry, Hungry Horse, College, near San Juan, and near Obi-garm), 15h. (near Chur (2)), 16h. (Nanking, Vladivostok, and near Hungry Horse), 17h. (Kodaikanal, College, Hungry Horse, Boulder City, and Pierce Ferry), 18h. (Hungry Horse), 20h. (Apia, Nanking, and Hungry Horse), 21h. (College, Overton, Pierce Ferry, Hungry Horse, Stuttgart, and Strasbourg), 23h. (College).

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Jan. 26d. 3h. 52m. 19s. Epicentre 18°·5S. 178°·0W. Depth of focus 0·080. (as on 12d.).

		$\Delta$ °	Az. °	P.		O - C. s.	S.		O - C. s.	Supp.		
				m.	s.		m.	s.		m.	s.	
Apia		7·6	53	i 1	53	- 1	i 3	20	- 5	e 3	44	sP
Wellington		23·5	194	i 4	27	- 2	8	3	- 2	—	—	—
Cobb River	E.	23·9	198	i 4	34	+ 1	8	5	- 7	—	—	—
Kaimata	N.E.	25·6	199	e 4	52	+ 4	8	38	0	—	—	—
Christchurch		26·2	196	—	—	—	8	56	+ 8	—	—	—
Brisbane	Z.	28·1	246	i 5	11	+ 1	—	—	—	—	—	—
Riverview		31·5	235	i 5	41k	+ 2	i 10	11	+ 1	i 15	11	ScS
Djakarta		74·0	270	10	39	- 3	—	—	—	—	—	—
Vladivostok		76·7	325	i 10	57	0	i 20	2	+ 3	—	—	—
Berkeley	Z.	76·7	42	i 10	57k	0	—	—	—	i 12	55	pP
Lick	Z.	76·8	42	i 10	57a	0	—	—	—	i 12	54	pP
Pasadena	Z.	77·3	47	i 10	59a	- 1	—	—	—	i 12	56	pP
Fresno	Z.	77·7	44	i 11	2k	0	—	—	—	i 12	59	pP
Palomar		77·8	48	i 11	3a	0	—	—	—	i 13	0	pP
Riverside	Z.	77·8	47	i 11	1a	- 2	—	—	—	i 12	59	pP
Shasta Dam		78·3	40	e 11	5	0	—	—	—	i 13	3	pP
China Lake	Z.	78·6	45	i 11	7a	0	—	—	—	i 13	4	pP
Mineral	Z.	78·6	41	i 11	6k	- 1	—	—	—	e 13	4	pP
Tinemaha	Z.	78·9	45	i 11	9	+ 1	—	—	—	i 13	4	pP
Reno	Z.	79·2	42	i 11	11k	+ 1	—	—	—	i 13	8	pP
Boulder City		80·6	47	e 11	18	+ 1	—	—	—	i 13	18	pP
Overton	Z.	81·2	47	i 11	21	+ 1	—	—	—	i 13	19	pP
Pierce Ferry		81·3	47	i 11	22	+ 1	—	—	—	i 13	20	pP
Tucson		81·7	52	i 11	24	+ 1	—	—	—	e 13	23	pP
Logan		85·6	43	e 11	43	+ 1	—	—	—	e 13	43	pP
College		86·3	12	i 11	43	- 2	e 21	27	- 8	i 13	45	pP
Hungry Horse		87·5	37	i 11	50	- 1	—	—	—	e 13	52	pP
Tchimkent		118·7	309	i 17	47	[+ 1]	e 19	7	PP	—	—	—
Lwow		144·1	336	e 14	2	?	—	—	—	—	—	—
Rathfarnham C.	Z.	144·7	8	i 18	37	[+ 1]	e 39	52	SS	i 20	32	pPKP
Raciborzu	Z.	145·9	342	e 18	40	[+ 3]	—	—	—	—	—	—
Collmberg	Z.	146·1	347	e 18	38	[ 0]	—	—	—	e 20	53	pPKP <sub>2</sub>
Ksara		146·2	303	i 18	42k	[+ 4]	e 21	50	PP	e 21	29	pPKP
Jena	N.	146·8	347	e 18	43	[+ 4]	—	—	—	—	—	—
Prague		147·0	345	i 18	47	[+ 8]	e 35	41	PPS	e 20	50	pPKP
Stuttgart	Z.	149·2	350	e 18	43	[+ 1]	—	—	—	e 20	59	pPKP
Strasbourg		149·6	352	i 18	49k	[+ 6]	e 21	59	PKS	i 21	2	pPKP
Paris		149·8	359	e 18	50	[+ 7]	—	—	—	e 21	1	pPKP
Basle		150·7	352	e 18	59	[+ 15]	e 24	41	[- 18]	—	—	—
Zürich		150·7	351	e 18	50k	[+ 6]	—	—	—	—	—	—
Helwan	Z.	151·0	298	i 18	53	[+ 8]	—	—	—	—	—	—
Tamanrasset	Z.	174·6	323	e 19	10	[+ 3]	e 30	45	SKKS	e 21	29	pPKP

Additional readings :—

Riverview iN = 10m.30s.  
 Lick iP<sub>c</sub>PZ = 11m.18s.  
 Mineral eZ = 11m.45s.  
 Tucson e = 19m.15s.  
 Rathfarnham Castle eZ = 34m.29s. and 43m.25s.  
 Collmberg eE = 18m.44s., eZ = 21m.3s., eE = 21m.7s.  
 Prague ePKP<sub>2</sub> = 19m.4s., e = 19m.31s., i = 19m.57s., epPKP<sub>2</sub> = 21m.0s., esPKP = 21m.34s.  
 Stuttgart iPKPZ = 18m.49s., eZ = 19m.13s.  
 Strasbourg i = 18m.55s.  
 Paris e = 18m.57s.  
 Helwan iZ = 19m.4s.  
 Tamanrasset iPKP<sub>2</sub>?Z = 20m.47s., iZ = 21m.36s., ePPZ = 24m.42s., epPPZ = 26m.46s., eZ = 31m.13s.

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Jan. 26d. 11h. 7m. 49s. Epicentre 18°·5S. 178°·0W. Depth of focus 0·080. (as at 3h.).

It is doubtful whether this shock is really a repetition of that at 3h. P and PKP readings from American and European stations are in agreement, but those from the only near station give appreciable residuals.

		$\Delta$ °	Az. °	P.		O - C. s.	S.		O - C. s.	Supp.	
				m.	s.		m.	s.		m.	s.
Apia		7·6	53	2	8	+14	3	35	+10	—	—
Berkeley	z.	76·7	42	i 10	58k	+ 1	e 21	29	pS	e 12	42 pP
Lick	z.	76·8	42	i 10	59	+ 2	—	—	—	—	—
Pasadena		77·3	47	i 11	0k	0	—	—	—	—	—
Fresno		77·7	44	i 11	3k	+ 1	—	—	—	—	—
Palomar		77·8	48	i 11	3k	0	—	—	—	—	—
Riverside		77·8	47	i 11	2k	- 1	—	—	—	—	—
Shasta Dam		78·3	40	i 11	5	0	—	—	—	—	—
China Lake	z.	78·6	45	i 11	7k	0	—	—	—	e 13	6 pP
Mineral		78·6	41	i 11	7k	0	—	—	—	—	—
Tinemaha		78·9	45	i 13	0k	pP	—	—	—	—	—
Reno	z.	79·2	42	i 11	12k	+ 2	—	—	—	e 13	25 pP
Boulder City		80·6	47	i 11	19	+ 2	—	—	—	—	—
Overton	z.	81·2	47	i 11	20	0	—	—	—	—	—
Pierce Ferry		81·3	47	i 11	22	+ 1	—	—	—	i 11	27 pP
Tucson		81·7	52	i 11	24	+ 1	—	—	—	—	—
Logan		85·6	43	e 11	41	- 1	—	—	—	—	—
College		86·3	12	i 11	45	0	e 21	42	+ 7	—	—
Hungry Horse		87·5	37	i 11	51	0	—	—	—	i 12	1 pP
Copenhagen		142·0	350	i 18	25	[- 7]	—	—	—	—	—
Collmberg	z.	146·1	347	e 18	37	[- 1]	—	—	—	—	—
Jena		146·8	347	e 18	36	[- 3]	—	—	—	—	—
Prague		147·0	345	i 18	41	[+ 2]	—	—	—	e 20	18 pPKP
Karlsruhe	z.	149·1	352	e 18	43	[+ 1]	—	—	—	—	—
Stuttgart	z.	149·2	350	e 18	38	[- 4]	—	—	—	—	—
Strasbourg		149·6	352	e 18	39	[- 4]	—	—	—	i 18	57 PKP <sub>2</sub>
Zürich		150·7	351	e 18	47	[+ 3]	—	—	—	—	—
Besançon		151·1	354	e 19	4	PKP <sub>2</sub>	—	—	—	—	—

Additional readings :—

Lick iZ = 11m.7s.  
 Mineral Z = 11m.21s. and 11m.34s.  
 Overton iZ = 11m.36s.  
 Tucson i = 11m.41s.  
 Hungry Horse ePP = 15m.28s.  
 Collmberg eE = 18m.41s.  
 Jena eN = 18m.40s.  
 Prague e = 19m.3s. and 19m.54s.  
 Karlsruhe eEN = 18m.46s.  
 Stuttgart ePKPZ = 18m.45s. and 18m.55s.  
 Strasbourg i = 18m.46s.

Jan. 26d. Readings also at 0h. (near Obi-garm), 1h. (near Klyuchi), 2h. and 3h. (near Obi-garm), 4h. (Hungry Horse), 5h. (near Obi-garm), 6h. (Harvard), 7h. (Mount Wilson, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 8h. (Rolphton and near La Cave), 9h. (College, Hungry Horse, and near Ashkabad), 10h. (near Chur (2)), 11h. (Tucson, Boulder City, Overton, Pierce Ferry, and near La Paz (2)), 12h. (near Obi-garm), 13h. (College), 14h. and 15h. (near Obi-garm), 17h. (Ottawa, Rolphton, and near Obi-garm), 18h. (Rome, Fergana, Samarkand, near Andijan, Obi-garm, and Stalinabad), 20h. (near Huancayo), 21h. (China Lake), 22h. (La Paz, Andijan, Fergana, Samarkand, Tchimkent, near Obi-garm, and Stalinabad), 23h. (La Cave, Rolphton, and Ottawa).

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Jan. 27d. 10h. 47m. 20s. Epicentre 42°·0N. 125°·1W.

Given by Berkeley.

A = -·4286, B = -·6098, C = +·6666;  $\delta$  = -9;  $h$  = -2  
D = -·818, E = +·575; G = -·383, H = -·545, K = -·745.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Arcata		1·4	146	i 0 23	- 4	—	—	—	—
Shasta Dam		2·4	123	i 0 40	- 1	e 1 11	- 1	i 1 14	S*
Mineral	z.	3·1	120	e 0 51 <sub>a</sub>	0	i 1 27	- 2	—	e 1·4
Berkeley	z.	4·7	151	i 1 10 <sub>a</sub>	- 4	—	—	—	—
Reno	z.	4·7	119	i 1 17 <sub>a</sub>	+ 3	—	—	—	—
Lick	z.	5·3	149	e 1 20 <sub>k</sub>	- 2	i 2 24	- 1	i 1 24	P*
Seattle		6·0	18	e 1 28	- 4	i 2 44	+ 1	i 1 48	P*
Fresno	z.	6·6	140	e 1 40	- 1	—	—	—	—
Tinemaha	z.	7·3	131	i 1 53	+ 3	e 3 31	S*	—	—
Haiwee	z.	8·1	134	e 2 6	+ 4	—	—	—	—
China Lake	z.	8·5	134	e 2 9	+ 2	e 4 5	S*	—	—
Pasadena		9·6	143	i 2 20 <sub>a</sub>	- 1	—	—	—	—
Logan		9·9	87	e 2 27	+ 2	—	—	—	—
Overton	z.	9·9	120	e 2 29	+ 4	—	—	—	—
Riverside	z.	10·0	140	i 2 30	+ 3	—	—	—	—
Hungry Horse		10·1	47	i 2 24	- 4	e 4 40	SS	—	—
Pierce Ferry		10·4	120	e 2 37	+ 3	—	—	—	—
Tucson		15·0	126	i 3 42	+ 7	e 6 31	+ 8	—	—

Additional readings:—

Shasta Dam e = 1m.4s.

Seattle i = 1m.34s., iS = 2m.35s.

Long waves were also recorded at Ukiah and Santa Clara.

Jan. 27d. 19h. 18m. 9s. Epicentre 16°·3S., 172°·8W. (as on 1949, September 9d.).

Intensity III at Apia. Suggested epicentre 17°S. 173°W.

Preliminary seismological bulletin, Apia Observatory, Western Samoa, January-March, 1950, p.4.

A = -·9528, B = -·1204, C = -·2789;  $\delta$  = +11;  $h$  = +5;  
D = -·125, E = +·992; G = +·277, H = +·035, K = -·960.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Apia		2·7	21	i 0 53	P <sub>g</sub>	e 1 27	S <sub>g</sub>	—	—
Auckland	N.	23·2	208	i 5 5	- 4	i 9 9	- 9	—	i 10·7
Tuai	N.	24·1	201	e 5 16	- 2	e 9 21	- 13	—	—
New Plymouth	E.	25·4	205	5 37	+ 6	10 1	+ 5	—	—
Wellington		27·1	202	i 5 46	0	i 10 30	+ 6	—	—
Cobb River	E.	27·7	205	e 5 50	- 2	e 10 27	- 6	—	—
Kaimata	N.E.	29·4	206	6 9	+ 2	e 11 8	+ 7	—	—
Christchurch		29·8	202	—	—	i 10 55	- 12	i 11 8	S
Brisbane	E.	33·5	245	e 6 38	- 5	i 11 55	- 10	i 7 51	PP
Riverview		36·8	236	e 7 9	- 2	e 12 51	- 5	e 8 34	PP
Honolulu		40·1	22	e 7 32	- 7	(e 16 57)	SSS	—	e 17·0
Berkeley		71·8	41	e 11 30 <sub>k</sub>	+ 4	e 20 51	+ 5	i 11 45	P <sub>c</sub> P
Lick	z.	71·8	41	e 11 29 <sub>k</sub>	+ 3	—	—	i 11 48	P <sub>c</sub> P
Pasadena		72·2	46	i 11 30	+ 1	e 20 51	0	i 11 50	P <sub>c</sub> P
Fresno	z.	72·7	43	e 11 33 <sub>k</sub>	+ 1	—	—	—	e 29·4
Palomar	z.	72·7	47	i 11 33	+ 1	—	—	—	—
Riverside	z.	72·7	46	i 11 33	+ 1	—	—	—	—
Shasta Dam		73·5	37	e 11 36	0	—	—	—	—
China Lake	z.	73·6	44	i 11 38	+ 1	—	—	—	—
Mineral	z.	73·7	38	i 11 40 <sub>a</sub>	+ 2	—	—	i 12 36	?

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Tinemaha	73.9	43	i 11 40	+ 1	—	—	—	—
Reno	74.3	41	e 11 43k	+ 2	—	—	—	—
Boulder City	75.5	45	i 11 51	+ 3	—	—	—	—
Overton	76.1	45	i 11 52	+ 1	—	—	—	—
Pierce Ferry	76.2	45	i 11 53	+ 1	—	—	—	—
Tucson	76.4	50	e 11 54	+ 1	e 22 17	PS	—	—
Vladivostok	77.9	322	e 12 4	+ 3	i 22 4	+10	—	e 34.8
Victoria	78.0	32	e 12 4	+ 2	—	—	—	—
Bandong	78.1	267	20 14	?	—	—	—	—
Djakarta	79.1	267	e 20 19	?	—	—	—	—
Logan	80.6	42	e 12 17	+ 1	—	—	—	—
Hungry Horse	82.9	35	i 12 27	- 1	—	—	e 15 44	PP
College	83.1	10	e 12 30	+ 1	e 22 49	+ 1	e 29 57	PKKP
Huancayo	93.7	104	e 13 19	- 1	e 24 33	+ 6	e 23 41	SKS
St. Louis	94.4	51	e 13 22	- 1	e 24 1	[+ 3]	e 26 0	PS
La Paz	98.9	110	e 13 37	- 6	i 24 21	[- 1]	i 32 15	SSP
Almata	115.7	311	e 19 41	PP	—	—	—	47.4
Andijan	119.2	307	e 19 13	[+22]	e 26 8	[+21]	e 27 38	SKKS
Stalinabad	122.1	306	e 19 12	[+15]	26 4	[+ 7]	37 15	SS
Grozny	137.6	318	e 19 43	[+17]	—	—	—	—
Tiflis	139.0	316	e 19 56	[+27]	e 23 28	PKS	—	—
Yalta	143.8	327	i 19 39	[+ 2]	—	—	e 22 56	PP
Lwow	143.9	342	e 19 42	[+ 5]	—	—	—	—
Collmberg	144.8	353	e 19 47	[+ 8]	—	—	—	—
Jena	145.3	353	e 19 43	[+ 3]	—	—	—	—
Prague	145.8	351	e 19 41	[ 0]	—	—	—	—
Ogyalla	147.2	346	e 20 9	[+26]	—	—	—	—
Karlsruhe	147.4	0	i 19 51	[+ 8]	—	—	i 19 55	PKP <sub>2</sub>
Paris	147.4	6	i 19 48	[+ 5]	—	—	i 20 5	PKP <sub>2</sub>
Stuttgart	z. 147.6	358	e 19 49	[+ 6]	—	—	—	—
Strasbourg	147.8	359	i 19 49	[+ 5]	—	—	e 20 1	PKP <sub>2</sub>
Basle	148.8	358	e 19 46	[+ 1]	e 27 43	?	e 19 57	PKP <sub>2</sub>
Ksara	148.9	309	e 19 52	[+ 6]	—	—	23 31	PP
Istanbul	148.9	327	—	—	e 26 57	[+ 5]	—	—
Zürich	149.0	358	e 19 50	[+ 4]	—	—	e 20 4	PKP <sub>2</sub>
Chur	149.7	357	e 19 34	[-13]	—	—	e 20 11	PKP <sub>2</sub>
Clermont-Ferrand	150.4	5	i 19 59	[+11]	—	—	i 20 13	PKP <sub>2</sub>
Helwan	z. 154.1	305	e 19 59	[+ 6]	—	—	e 20 18	PKP <sub>2</sub>
Rome	154.1	352	e 19 55	[+ 2]	e 43 49	SS	e 23 40?	PP
Granada	157.1	22	(e 19 52a)	[- 5]	(43 41)	SS	(24 40)	PP
Almeria	157.8	20	20 0	[+ 2]	37 33	PPS	21 37	PKP <sub>2</sub>
Algiers Univ.	z. 159.3	11	e 20 14	[+14]	—	—	e 20 54	PKP <sub>2</sub>
Tamanrasset	z. 173.4	14	e 20 13	[+ 2]	—	—	e 21 41	PKP <sub>2</sub>

Additional readings and notes :—

Wellington eS = 10m.6s., eSS = 11m.5s.  
 Christchurch iE = 11m.3s., eEZ = 11m.15s.  
 Brisbane iE = 7m.18s.  
 Riverview eSN = 12m.46s., iN = 12m.52s., eQN = 15m.21s., iSSSN = 15m.35s., iSSSZ = 15m.41s.  
 Berkeley eZ = 12m.26s., eQEN = 29m.57s.  
 Lick iP<sub>c</sub>PZ = 11m.55s.  
 Pasadena iZ = 11m.42s.  
 Palomar iZ = 11m.58s. and 12m.19s.  
 Riverside iZ = 11m.45s.  
 China Lake iZ = 11m.59s.  
 Tinemaha iZ = 12m.3s.  
 Reno eE = 12m.16s.  
 Overton iZ = 12m.12s.  
 Tucson e = 12m.21s.  
 Logan e = 12m.50s.  
 Hungry Horse e = 12m.44s., ePKP,PKP? = 39m.0s.  
 College i = 12m.51s., e = 23m.13s.  
 St. Louis e = 13m.43s., eS = 24m.21s., e = 24m.38s.  
 Andijan eSKSP = 30m.12s., SS = 36m.27s.  
 Stalinabad eSKSP = 30m.16s.  
 Collmberg eZ = 19m.52s.? and 19m.58s., eE = 20m.6s. and 20m.14s., eZ = 20m.18s.  
 Jena eN = 19m.55s., eE = 20m.6s.

Continued on next page.

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Prague e = 19m.57s., 20m.50s., 21m.12s., 21m.33s., 22m.2s., and 22m.17s., ePP? = 24m.13s.  
Ogyalla e = 20m.58s. and 21m.45s.  
Paris e = 20m.53s.  
Strasbourg i = 20m.10s. and 20m.34s., e = 21m.50s.  
Stuttgart eZ = 20m.7s. and 21m.22s.  
Basle e = 20m.4s.  
Clermont-Ferrand i = 20m.28s. and 20m.48s.  
Helwan eZ = 20m.38s. and 22m.34s.  
Granada SKSP = (34m.52s.); readings reduced by 10m.  
Almeria PP = 24m.17s., PPP = 27m.59s., SS = 44m.21s.  
Algiers Univ. eZ = 20m.40s. and 21m.21s., ePPZ = 24m.21s.  
Tamanrasset eZ = 20m.27s., ePPZ = 25m.38s., ePPPZ = 29m.37s., eZ = 31m.12s.  
Long waves were also recorded at City College, N.Y., Philadelphia, Harvard, Weston, Pretoria, and Alicante.

Jan. 27d. Readings also at 0h. (near Andijan), 2h. (College, Overton, and Pierce Ferry), 5h. (near Ebingen, Stuttgart, Zürich, and Basle), 6h. (Pretoria, Pietermaritzburg, and Grahamstown), 7h. (Hungry Horse), 8h. (College, Hungry Horse, Shasta Dam, Lick, Pasadena, Riverside, China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, near Apia, and near Almata), 11h. (near Mizusawa), 12h. (Pasadena, Haiwee, China Lake, and Grahamstown), 13h. (Hungry Horse and near Ashkabad), 14h. (near Klyuchi), 15h. (Mizusawa and near Klyuchi), 16h. (College, Hungry Horse, Shasta Dam, Pasadena, Palomar, China Lake, Tinemaha, Overton, Pierce Ferry, and Tucson), 17h. (near Victoria (2), and near Ashkabad), 18h. (Frunse, near Obi-garm, Fergana, Stalinabad, Andijan, Tchimkent, Tashkent, Samarkand, and near Istanbul), 19h. (near Istanbul), 20h. (Tucson, Boulder City, near Overton, and Pierce Ferry), 21h. (Reno, College, near Hungry Horse, near Victoria, near Mizusawa, and near Prague), 22h. (Pretoria).

Jan. 28d. 19h. Probably west of Fiji. Not a repetition of 26d., though also very deep.

Apia eEN = 31m.11s., eSEN = 33m.20s.  
Wellington eP = 31m.41s., S = 34m.52s.  
Cobb River ePE = 31m.45s., eSE = 34m.39s.  
Kaimata eNE = 32m.2s.  
Christchurch eP = 32m.8s., eS = 35m.22s.  
Tuai SN = 33m.40s.  
Berkeley iPZ = 39m.41s.k.  
Lick iPZ = 39m.41s.a.  
Pasadena iPZ = 39m.42s.  
Riverside iPZ = 39m.44s.a.  
Palomar iP = 39m.45s.a., ipPZ = 41m.31s.  
China Lake iPZ = 39m.48s.a., ipPZ = 41m.35s.  
Tinemaha iPZ = 39m.51s.  
Boulder City iP = 40m.0s.  
Overton iPZ = 40m.1s., eZ = 41m.58s.  
Pierce Ferry iP = 40m.2s., i = 41m.49s.  
Tucson iP = 40m.3s., e = 41m.59s.  
College eP = 40m.28s., e = 42m.21s.  
Hungry Horse iP? = 40m.31s.  
Mineral Z = 41m.36s.  
Collmberg eZ = 47m.6s.  
Stuttgart ePKPZ = 47m.32s.

Jan. 28d. Readings also at 0h. (near Ashkabad), 6h. (near Apia and near Klyuchi), 8h. (China Lake, Tucson, Overton, Pierce Ferry, and near Tchimkent), 10h. (Andijan, Frunse, Obi-garm, Stalinabad, Tashkent, and Tchimkent), 11h. (Poona), 13h. (Poona, Andijan, Frunse, Obi-garm, Stalinabad, Tashkent, Tchimkent, College, Bogota, Huancayo, and La Paz), 14h. (Frunse, Samarkand, Tashkent, Tchimkent, near Andijan, Fergana, Obi-garm, Stalinabad, and near Istanbul), 15h. (Leninakan, Piatigorsk, Tiflis, near Baku, and Grozny), 17h. (near Tucson), 18h. (Ottawa, Hungry Horse, College, and near Tacubaya), 21h. (Prague and near Alicante), 22h. (near Obi-garm).

Jan. 29d. Readings at 0h. (Frunse, Stalinabad, near Andijan, and Fergana), 1h. (Ksara, Rome, Bogota, Tucson, Hungry Horse, and College), 2h. (near Obi-garm), 3h. (Palomar, Riverside, China Lake, Tucson, Hungry Horse, College, and near Tacubaya), 6h. (Shasta Dam, and near Obi-garm), 7h. (Pierce Ferry, Tchimkent, near Andijan, near Basle, Neuchatel, and Zürich), 8h. (Tucson and near Alicante), 9h. (Tucson (2), Pierce Ferry, Shasta Dam, and College), 15h. (Tucson, Pierce Ferry, College, Prague, Fergana, near Garm, Obi-garm, Samarkand, Stalinabad, near Apia, and near Ashkabad), 18h. (near Huancayo and near Obi-garm), 20h. (near Obi-garm), 21h. (near Klyuchi).

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Jan. 30d. 0h. 56m. 31s. Epicentre 53°·0S. 70°·9W.

Intensity V-VI at latitudes 51°-52°S.

F. Greve.

Boletín del año, 1950, Instituto Sismológico, Santiago, 1951, p. 2. Suggested epicentre 53°5S. 71°·5W.

A = +·1978, B = -·5711, C = -·7967;  $\delta = +1$ ;  $h = -6$ ;  
D = -·945, E = -·327; G = -·261, H = +·753, K = -·604.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	20·3	32	9 12	S	(9 12)	+49	—	14·5
Buenos Aires	20·4	30	4 44	+ 3	8 40	+15	—	10·6
La Paz	36·5	5	i 7 9 <sub>a</sub>	0	i 13 5	+14	i 8 40	PP 18·9
Huancayo	41·0	353	i 7 48	+ 2	e 14 11	+12	e 9 29	PP i 17·2
Bogota	57·5	356	i 9 52	- 1	i 17 58	+ 8	i 10 32	P <sub>c</sub> P 31·5
Fort de France	68·0	11	e 11 3	0	—	—	—	—
Christchurch	69·5	224	i 11 12	0	e 20 11	- 9	e 13 47	PP 30·9
Wellington	70·4	227	i 11 19	+ 1	e 20 23	- 7	21 7	PS 32·0
San Juan	71·2	5	e 11 18	- 5	e 20 45	+ 5	e 14 9	PP e 34·9
Auckland	N. 74·0	230	—	—	e 20 57	-14	—	30·0
Pretoria	Z. 75·0	113	i 11 44	- 1	i 23 52	?	—	e 36·5
Tacubaya	76·2	333	e 11 53	+ 1	e 21 50	+14	e 26 44	SS i 37·6
Mobile	84·7	345	i 12 38	+ 1	i 23 4	0	—	—
Bermuda	85·2	6	i 13 48	+69	e 23 29	+20	e 17 17	PPP e 42·0
Apia	E. 85·5	253	—	—	e 23 21	+ 9	—	e 35·5
Riverview	86·1	214	i 12 45 <sub>k</sub>	+ 1	i 23 23	+ 5	i 23 9	SKS e 35·9
Columbia	87·1	352	e 12 51	+ 2	e 23 33	+ 5	e 23 15	SKS e 37·7
Tananarive	90·9	123	—	—	e 24 21	+18	e 25 33	PS 39·6
Washington	91·7	355	i 13 11	+ 1	e 25 20	PS	e 16 57	PP e 48·4
Tucson	91·7	327	i 13 10	0	e 24 17	+ 7	i 16 54	PP e 37·9
Cincinnati	92·5	349	i 13 12	- 2	—	—	i 16 54	PP —
Philadelphia	92·7	357	e 13 16	+ 1	e 23 48	[ 0]	e 16 57	PP e 40·5
St. Louis	92·8	344	e 13 14	- 2	i 24 24	+ 5	i 16 46	PP —
Florissant	93·0	344	i 13 16	- 1	i 23 46	[- 4]	e 16 44	PP +
Pittsburgh	93·4	353	i 18 3	PKP	—	—	—	—
City College, N.Y.	93·5	358	e 13 23	+ 4	e 24 29	+ 4	e 17 4	PP —
Fordham	93·5	358	e 13 21	+ 2	e 23 42	[-11]	e 16 19	PP 50·5
New Kensington	E. 93·5	353	e 17 17	PP	e 23 55	[+ 2]	e 30 39	SS e 40·9
Pennsylvania	93·6	354	i 13 20	+ 1	i 23 45	[- 8]	i 16 59	PP e 46·0
Cleveland	94·6	351	e 13 24 <sub>k</sub>	0	e 23 56	[- 3]	e 17 11	PP 44·2
Weston	95·0	0	i 13 29	+ 3	i 24 1	[ 0]	i 17 20	PP —
Harvard	95·1	0	i 13 26	0	e 23 51	[-11]	i 16 59	PP e 50·4
Perth	95·2	187	—	—	i 24 4	[+ 2]	i 24 39	S —
Chicago	95·5	346	e 13 29	+ 1	e 23 59	[- 5]	e 26 5	PS e 40·2
Riverside	Z. 95·6	322	e 13 28	0	—	—	e 17 18	PP —
Pasadena	96·0	322	i 13 30	0	i 24 7	[ 0]	e 17 15	PP e 40·5
Lincoln	E. 96·1	341	—	—	e 23 47	[-20]	—	e 46·1
Pierce Ferry	96·3	326	e 13 33	+ 1	—	—	e 17 28	PP —
Boulder City	96·5	326	e 17 29	PP	—	—	—	—
Overton	Z. 96·9	326	e 13 35	+ 1	—	—	e 17 31	PP —
China Lake	Z. 97·3	324	i 13 36	0	—	—	i 17 31	PP —
Halifax	97·4	6	—	—	e 24 11	[- 3]	—	44·7
Ottawa	98·1	356	13 46	+ 6	24 12	[- 6]	17 21	PP 48·5
Tinemaha	Z. 98·6	324	i 13 42	0	—	—	e 17 41	PP —
Fresno	Z. 98·9	323	e 17 47 <sub>k</sub>	PP	—	—	—	—
Seven Falls	E. 99·7	0	—	—	e 27 0	PS	—	44·5
Salt Lake City	99·9	330	e 17 55	PP	e 24 29	[+ 2]	e 26 47	PS e 42·7
Tamanrasset	Z. 100·1	66	e 13 59	+10	e 25 29	+ 8	e 17 44	PP 46·5
Lick	100·2	321	e 13 50	+ 1	—	—	e 17 55	PP —
Santa Clara	100·3	321	i 25 38	S	(i 25 38)	+15	e 42 44	Q e 50·8
Rapid City	E. 100·6	337	e 14 1	+10	e 23 10	?	e 18 54	PP e 45·8
Logan	100·8	331	e 13 52	0	e 24 31	[ 0]	e 17 57	PP e 42·2
Berkeley	100·9	321	e 13 42 <sub>k</sub>	-10	e 24 35	[+ 4]	e 18 3	PP e 43·1
Reno	101·4	324	e 13 56	+ 1	e 24 40	[+ 6]	e 18 10	PP e 52·6
Mineral	Z. 102·8	323	e 15 5	+64	—	—	e 18 57	PP —
Shasta Dam	103·4	323	e 14 3	- 1	—	—	e 18 9	PP —

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Bozeman	104.1	332	e 18 18	PKP	e 24 50	[+ 4]	—	e 40.1
Butte	N. 104.9	332	e 17 50	PP	e 24 51	[+ 1]	e 27 54	PS e 45.2
Lisbon	105.8	46	28 11	PS	34 11	SS	44 5	Q 49.5
Malaga	106.3	50	i 14 17	P	21 19	PPP	29 11	PcPP' 49.4
Granada	107.1	50	17 57k	[-30]	26 15	S	i 18 51	PP 54.2
Almeria	107.3	51	17 56	[-32]	25 4	[+ 3]	18 40	PP 52.6
Hungry Horse	107.4	332	e 13 33	?	e 28 14	PS	e 18 32	PP —
Saskatoon	109.0	337	—	—	25 6	[- 2]	28 28	PS 49.5
Toledo	109.0	48	e 19 9	PP	e 24 18	[-50]	45 30	Q 52.5
Seattle	109.4	326	—	—	e 25 14	[+ 4]	e 25 42	SKKS e 47.5
Alicante	109.5	51	18 55	PP	25 33	[+23]	28 57	PS e 49.7
Algiers Univ.	z. 109.9	55	e 19 3	PP	e 28 34	PS	e 21 32	PPP —
Clermont-Ferrand	116.9	49	e 18 14	[-33]	e 28 4	S	—	47.5
Rome	118.6	57	e 19 52	PP	i 28 12	S	i 29 58	PS 60.8
Rathfarnham Castle	118.8	38	—	—	e 29 30	PS	e 31 59	PPS e 44.7
Paris	118.9	47	e 18 51?	[ 0]	e 30 3	PS	i 36 29?	SS e 57.5
Florence Arc.	119.3	56	—	—	e 27 52	S	—	61.6
Kew	119.7	43	—	—	e 30 32	PS	e 36 51	SS e 51.5
Taranto	120.0	62	e 18 53	[ 0]	e 28 18	S	e 48 31	Q —
Helwan	z. 120.4	80	e 18 59	[+ 6]	e 26 41	[+50]	22 59	PPP —
Zürich	120.6	51	e 18 54	[ 0]	e 29 46	PS	—	—
Djakarta	121.0	177	20 23	PP	—	—	—	62.6
Strasbourg	121.1	49	e 19 3	[+ 8]	e 30 52	PS	e 31 53	PPS e 56.5
Stuttgart	121.9	50	e 18 58	[+ 2]	e 25 53	[- 3]	e 31 5	PPS e 57.5
Triest	121.9	55	e 18 53	[- 3]	e 27 0	{-26}	i 19 11	pPKP i 51.8
Sitka	122.0	324	—	—	e 27 19	{- 8}	e 37 39	SS e 52.5
De Bilt	122.5	45	—	—	e 37 29?	SS	e 51 29?	Q e 56.5
Aberdeen	N. 123.3	37	—	—	i 35 43	?	i 42 23	SSS 59.6
Cheb	124.3	50	—	—	—	—	e 43 35	SSS e 58.0
Prague	125.3	52	e 19 8	[+ 5]	e 26 11	[+ 4]	e 20 57	PP e 58.5
Collmberg	125.4	51	e 19 4?	[+ 1]	—	—	e 38 41	SS e 51.9
Ksara	125.9	80	e 19 5	[+ 1]	31 57	PS	—	—
Potsdam	z. 126.2	49	—	—	e 32 23	PPS	i 38 35	SS e 56.5
Istanbul	126.9	68	e 19 0	[- 6]	—	—	e 24 13	PPP —
Bucharest	127.5	63	i 21 20	PP	i 22 36	PKS	i 24 38	PPP 43.5
Skalnate Pleso	127.5	56	e 22 30?	PKS	e 40 10	?	—	—
Copenhagen	128.1	45	i 19 14	[+ 6]	22 7	PKS	38 32	SS e 62.0
Colombo	E. 128.2	142	19 5	[- 4]	38 40	SS	—	53.8
Bergen	128.3	37	e 29 33?	PKKP	—	—	—	e 57.5
Warsaw	129.8	53	19 16	[+ 4]	26 14	[- 5]	22 35	PKS 62.5
Kodaikanal	E. 130.3	137	22 43	PKS	38 52	SS	50 44	Q 56.2
Kishinev	130.6	63	e 19 10	[- 3]	—	—	—	—
College	131.5	326	e 19 13	[- 2]	i 22 41	PKS	e 21 34	PP i 50.1
Yalta	132.0	68	i 19 20	[+ 4]	—	—	i 22 47	PKS —
Upsala	132.8	43	i 22 47	PKS	e 26 29	[+ 2]	e 39 8	SS e 53.5
Erevan	135.3	79	e 23 3	PKS	—	—	—	—
Leninakan	135.3	78	e 23 0	PKS	—	—	—	—
Bombay	E. 135.9	127	e 22 10	PP	e 25 53	[-39]	—	—
Poona	N. 136.1	128	i 19 4	[-19]	e 25 59	[-34]	22 4	PP 63.5
Helsinki	136.1	45	e 22 59	PKS	—	—	—	e 61.5
Tiflis	136.4	78	e 19 28	[+ 4]	e 23 4	PKS	e 22 4	PP —
Hyderabad	N. 137.2	135	22 7	PP	26 16	[-19]	—	58.4
Grozny	137.9	77	e 19 55?	[+28]	—	—	i 22 30?	PP —
Moscow	140.0	56	i 19 30	[ 0]	28 56	{-25}	22 29	PP —
New Delhi	N. 146.1	123	19 47	[+ 6]	37 18	?	—	—
Samarkand	148.5	98	e 19 47	[+ 2]	—	—	—	—
Stalinabad	148.8	101	i 19 43	[- 2]	—	—	—	—
Tashkent	150.9	97	i 19 48	[- 1]	e 26 42	[-13]	e 32 17	SKSP —
Tchinkent	151.7	96	i 19 49	[- 1]	—	—	—	—
Sverdlovsk	152.3	62	i 19 54	[+ 3]	i 26 37	[-20]	i 23 50	PP —
Andijan	152.4	102	e 20 5	[+14]	—	—	e 49 31	SSS —
Naryn	154.9	103	i 19 58	[+ 4]	—	—	—	—
Vladivostok	161.9	246	i 20 4	[+ 1]	i 31 25	{+ 2}	e 20 48	PKP <sub>2</sub> —
Semipalatinsk	162.0	86	e 19 55	[- 8]	—	—	—	—
Irkutsk	177.0	—	20 15	[+ 3]	46 29	SS	22 2?	PKP <sub>1</sub> —

For Notes see next page.



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NOTES TO JANUARY 30d. 0h. 56m. 31s.

Additional readings :—

La Plata PE = 9m.16s., PZ = 9m.20s., E = 9m.33s. and 9m.53s., N = 10m.5s., E = 10m.35s., SN = 13m.7s., SE = 13m.10s., SZ = 13m.29s., E = 13m.38s., N = 13m.53s. The phases for this shock appear to be completely wrong.  
 La Paz ipPZ = 7m.12s., PPP = 9m.1s., iP<sub>c</sub>P = 9m.41s., SS = 15m.58s.  
 Bogota iPPEN = 12m.14s., ePS = 18m.26s.  
 Christchurch PPPZ = 14m.39s., PSNZ = 20m.54s., eNZ = 23m.4s., SS?N = 24m.3s., eE = 25m.54s.  
 Wellington iZ = 11m.59s. and 19m.15s., SS = 25m.12s., eSSS = 27m.59s.  
 San Juan ePPP? = 15m.56s., e = 26m.43s.  
 Pretoria iZ = 11m.47s.  
 Tacubaya e = 12m.15s. and 22m.15s.  
 Bermuda i = 24m.29s. and 25m.16s., e = 29m.59s.  
 Riverview eZ = 15m.54s., iPS?E = 24m.19s.  
 Tananarive SS = 30m.32s., SSS = 34m.18s.  
 Tucson i = 13m.13s., e = 14m.48s., ePPP = 18m.53s., eSKS? = 23m.42s., iSKS? = 23m.48s., iPS = 25m.19s., ePS? = 25m.36s., ePKKP = 30m.22s., eSS = 30m.35s.  
 Philadelphia e = 24m.36s., 25m.41s., 31m.9s., and 35m.29s.  
 St. Louis i = 13m.55s., 14m.44s., 14m.53s., and 17m.14s., iSKS = 23m.46s., iPS = 25m.40s., iSS = 30m.59s.  
 Florissant iSKKS = 24m.23s., i = 25m.4s., iPS = 25m.41s., iPPS = 26m.27s.  
 City College, N.Y. ePPP = 19m.9s., eSKS = 23m.52s., e = 30m.19s. and 38m.44s.  
 Fordham iPS = 25m.55s.  
 New Kensington eE = 35m.47s.  
 Pennsylvania iN = 32m.39s. and 33m.17s.  
 Cleveland eSKKSN = 24m.37s.  
 Weston eSS = 31m.6s.  
 Harvard iPPP = 18m.49s., e = 22m.37s., ePS = 26m.9s., e = 27m.29s., eQ = 46m.44s.  
 Perth i = 26m.47s., 31m.19s., and 43m.6s.  
 Chicago e = 16m.51s., 18m.13s., and 31m.51s.  
 Pasadena iSEN = 24m.54s., eSPN = 25m.51s., eSSEN = 30m.59s.  
 China Lake iZ = 14m.1s.  
 Ottawa PS = 26m.45s., SS = 32m.3s.  
 Salt Lake City eSS? = 32m.23s.  
 Tamanrasset eZ = 14m.59s. and 21m.59s., ePSZ = 26m.59s., eSSZ = 32m.29s.?, eSSSZ = 36m.29s.?  
 Rapid City eE = 17m.1s. and 23m.56s., eSS?E = 30m.31s.  
 Logan e = 18m.58s., ePS = 26m.29s.  
 Berkeley eSSZ = 33m.5s., iS<sub>c</sub>S<sub>c</sub>S?N = 36m.51s.  
 Reno eZ = 19m.6s. and 24m.11s., eN = 28m.18s.  
 Shasta Dam ePKKP = 30m.12s.  
 Malaga iPPZ = 15m.1s., PPPZ = 17m.17s., readings wrongly identified.  
 Granada PPS = 29m.9s., SS = 33m.39s., iSSS = 38m.30s.  
 Almeria PPP = 20m.56s., PPS = 28m.52s., SS = 33m.42s., SSS = 37m.52s.  
 Saskatoon PPS = 29m.43s., e = 35m.8s., SSS = 38m.40s., Q = 45m.38s.  
 Seattle e = 26m.46s. and 26m.58s., ePS = 28m.26s., e = 30m.45s., 31m.5s., and 35m.44s.  
 Alicante SS = 34m.53s., SSS = 39m.13s.  
 Algiers Univ. eZ = 19m.10s., 19m.45s., 20m.26s., 22m.49s., and 23m.44s., ePPSZ = 29m.35s., eZ = 37m.16s.  
 Rome SS = 36m.44s., SSS = 40m.19s.?, iE = 48m.28s., i = 49m.59s.  
 Rathfarnham Castle eZ = 30m.22s., and 39m.8s.  
 Paris i = 30m.21s., iPKKS = 32m.33s., i = 43m.29s.?, eQ = 49.5m.?  
 Kew eQEN = 44.5m.  
 Helwan eZ = 20m.20s., PPSZ = 32m.39s.  
 Strasbourg e = 19m.16s. and 23m.37s., eSS? = 38m.11s., e = 39m.25s., 45m.4s., and 51m.29s.?  
 Stuttgart eSS = 38m.17s., eSSS? = 42m.17s., eQ? = 51.5m.  
 Trieste iPP = 20m.35s., iSKP = 21m.12s., iPKS = 21m.23s., iPS = 30m.33s., eSS = 37m.11s., eQ = 50.5m.  
 Sitka e = 29m.13s., e? = 37m.59s.  
 Aberdeen iN = 49m.29s.  
 Prague ePS = 30m.48s., ePPS = 31m.47s., eSS = 38m.11s., eSSS = 42m.59s., e = 46m.47s. and 52m.29s.?  
 Potsdam eZ = 46m.23s.  
 Bucharest eN = 21m.25s., iE = 36m.20s.  
 Skalnate Pleso e = 45m.19s. and 46m.29s.  
 Copenhagen 33m.59s., SSS = 44m.11s.  
 Warsaw eE = 23m.14s. and 24m.47s., SKSE = 26m.17s., SKKSN = 28m.15s., SKKSZ = 28m.29s., PKKS = 31m.41s., PPSZ = 33m.15s.  
 College e = 19m.10s., 20m.54s., and 31m.24s.  
 Upsala eN = 26m.56s. and 28m.8s., eSKS,SKS?N = 41m.29s.?  
 Poona iPKS,N = 22m.57s., PPN = 25m.6s., PKKP = 28m.17s., SKKSN = 28m.54s., PKKSN = 31m.29s., PSN = 32m.24s., PPSN = 34m.3s., SSN = 39m.56s., SSPN = 40m.35s., SSSN = 45m.3s., QN = 57.5m.  
 Tiflis ePPP = 25m.5s.  
 Moscow iPKS = 23m.11s.  
 New Delhi PPN = 21m.13s.

Continued on next page,

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Tashkent eSSS = 49m.29s.  
 Sverdlovsk iPKP<sub>2</sub> = 20m.3s., iSS = 43m.17s.  
 Vladivostok ePKS = 23m.33s., iPP = 24m.30s., ePPP = 28m.36s.?, iSKSP = 34m.43s.,  
 iSS = 43m.43s., eSSS = 50m.53s.  
 Irkutsk PP = 25m.57s.?, ePPP = 29m.35s.  
 Long waves were also recorded at Honolulu, Victoria, Ivigtut, Dehra Dun, and other European stations.

Jan. 30d. 2h. 49m. 49s. Epicentre 61°·1N. 150°·1W.

A = -·4211, B = -·2422, C = +·8740;  $\delta$  = -14;  $h$  = -9;  
 D = -·499, E = +·867; G = -·758, H = -·436, K = -·486.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
College		3·9	14	i 1 2	0	e 1 47	- 3	—	e 2·1
Victoria		19·7	117	e 4 39	+ 5	—	—	—	—
Seattle		20·8	117	i 4 50 <sup>k</sup>	+ 5	—	—	—	—
Hungry Horse		24·1	105	i 5 17	- 1	—	—	—	—
Shasta Dam		26·5	127	i 5 41	0	—	—	—	—
Mineral	z.	27·1	126	i 5 47	+ 1	—	—	—	—
Lick	z.	29·7	129	i 6 10 <sup>a</sup>	0	—	—	—	—
Tinemaha	z.	31·3	125	i 6 25	+ 1	—	—	—	—
China Lake	z.	32·6	124	i 6 35	0	—	—	—	—
Overton	z.	33·3	120	i 6 41	0	—	—	—	—
Boulder City		33·6	121	i 6 45	+ 1	—	—	—	—
Pierce Ferry		33·8	120	i 6 47	+ 1	—	—	—	—
Pasadena	z.	33·9	127	i 6 45	- 2	—	—	—	—
Riverside	z.	34·3	127	i 6 49	- 1	—	—	—	—
Tucson		38·5	119	i 7 26	0	—	-	—	—
Ottawa		44·6	75	e 8 14	- 2	—	—	—	—
Shawinigan Falls N.		45·1	71	e 8 19	- 1	—	—	—	—
Harvard		48·7	74	i 8 46	- 2	—	—	—	—
Weston		48·9	74	i 8 47	- 3	e 29 24	?	—	—
Stuttgart	z.	69·2	14	e 11 6	- 4	—	—	—	—
Pretoria	z.	144·7	3	i 20 3	[+24]	—	—	—	—

Additional readings:—

Seattle i = 5m.30s. and 5m.47s.

Mineral iZ = 5m.51s. and 6m.0s.

Lick iZ = 6m.20s.

Pierce Ferry i = 7m.11s.

Long waves were also recorded at Logan and Wellington.

Jan. 30d. 10h. 3m. 23s. Epicentre 34°·0N. 45°·5E. (as on 1949, June 22d.).

A = +·5823, B = +·5926, C = +·5566;  $\delta$  = +5;  $h$  = 0;  
 D = +·713, E = -·701; G = +·390, H = +·397, K = -·831.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Erevan		6·2	353	1 39	+ 4	2 51	+ 3	—	—
Leninakan		6·9	350	e 1 52?	+ 7	3 11?	+ 6	—	—
Baku		7·3	28	—	—	e 3 12	- 3	—	—
Tiflis		7·7	356	e 1 46	-10	—	—	—	—
Ksara		8·0	271	e 2 18?	+18	e 4 50	L	—	(e 4·8)
Grozny		9·3	1	e 2 34?	+17	—	—	—	—
Ashkabad		11·1	66	2 45	+ 2	—	—	—	—
Helwan	z.	12·7	255	6 16	S*	—	—	—	i 7·7
Samarkand		18·1	65	e 4 14	0	—	—	—	—
Stalinabad		19·3	68	i 4 29	0	—	—	—	—
Tashkent		20·2	62	i 4 40?	+ 1	e 8 12	- 9	—	—
Garm		20·5	67	4 25	-17	—	—	—	—
Tchimkent		20·6	58	i 4 41?	- 2	—	—	—	—
Fergana		21·8	58	e 4 59	+ 3	e 8 55	+ 3	—	—
Sverdlovsk		25·1	19	e 5 4	-24	—	—	—	—
Stuttgart	z.	30·6	310	e 6 17	- 1	—	—	—	—
College		80·9	6	i 12 18	+ 1	—	—	—	—
Hungry Horse		96·0	346	e 13 33	+ 3	—	—	—	—

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Jan. 30d. Readings also at 1h. (Bogota), 2h. (Huancayo, Grozny, Tiflis, and near Leninakan), 3h. (near Obi-garm), 5h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, College (2), and Apia), 6h. (Tucson, College, and La Paz), 7h. (Bogota, Overton, and Hungry Horse), 8h. (near Istanbul), 9h. (Hungry Horse and near Granada), 10h. (near Istanbul), 11h. (College), 13h. (Auckland, Christchurch, Cobb River, Kaimata, Wellington, China Lake, Tucson, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 14h. (Kew and La Paz), 16h. (Frunse, Garm, Samarkand, near Andijan, Obi-garm, Stalinabad, Tchimkent, and near Granada), 17h. (College (2), Hungry Horse, Ksara, and near Obi-garm), 18h. (Frunse, Samarkand, near Andijan (2), Obi-garm, Stalinabad, Tashkent, and Tchimkent), 19h. (Pretoria, and Wellington), 21h. (Hungry Horse, Andijan, near Obi-garm, and Stalinabad), 23h. (College, Frunse, Naryn, Tashkent, near Andijan, Fergana, Garm, Obi-garm (2), Samarkand, Stalinabad, and Tchimkent).

Jan. 31d. 10h. 48m. 58s. Epicentre 43°·0N. 0°·2E. (as on 1948, March 16d.).

Intensity VII-VIII at Baudéan and Campan; VII at Hèches; VI-VII at Bagnères-de-Bigorre, Cleutat, etc.; in Spain, V at Bielsa and Benasque; IV in the valley of Aran and as far as Lérida; II at Barcelona and Gerona.  
Epicentre 43°00'N., 0°13'E.

E. Fontiseré.

Los temblores de tierra catalanes del año 1950, R. Acad. de Ciencias y Artes de Barcelona, Observatorio Fabra, Bol. No. 39, Barcelona, 1952, p. 343, with macroseismic chart.

J. P. Rothé, N. Dechevoy.

La Séismicité de la France de 1940 à 1950; Annales de l'Institut de Physique du Globe de Strasbourg, 3ème partie, Géophysique, Nouvelle Série, Tome VIII, Le Puy, 1954, p. 57 with isoseismal chart.

$$A = +.7336, B = +.0026, C = +.6795; \quad \delta = -10; \quad h = -3;$$

$$D = +.003, E = -1.000; \quad G = +.679, H = +.002, K = -.734.$$

	$\Delta$	Az.		P.		O-C.		S.		O-C.		Supp.		L. m.		
		°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.	s.			
Barcelona	2.1	129	0	41	P <sub>g</sub>	1	9	S <sub>g</sub>	—	—	—	—	—	1.3		
Tortosa	2.2	172	i	0	38	0	i	1	8	S*	—	—	—	—		
Clermont-Ferrand	3.5	36	i	0	53	-4	i	1	39	-1	i	1	4	P*	—	
Toledo	4.4	227	i	1	9	-1	2	28	S <sub>g</sub>	—	i	1	28	P <sub>g</sub>	—	
Alicante	4.7	187	1	2	-12	2	9	-1	1	34	1	34	P <sub>g</sub>	—		
Besançon	5.9	42	i	1	51	P <sub>g</sub>	e	2	37	-3	e	3	2	S*	—	
Paris	6.1	16	e	1	31	-3	i	2	39	-6	i	2	2	P <sub>g</sub>	—	
Almeria	6.4	199	e	1	31	-7	e	2	36	-17	—	—	—	—	3.6	
Algiers Univ.	z.	6.5	159	1	48	+9	e	2	52	-3	e	3	35	S <sub>g</sub>	—	
Granada	6.5	208	1	30 <sub>k</sub>	-9	3	17	S*	3	45	3	45	S <sub>g</sub>	—		
Basle	6.9	46	e	1	58	P*	e	3	33	S*	e	2	10	P <sub>g</sub>	—	
Malaga	n.	7.2	211	i	1	34	-15	i	2	56	-17	—	—	—	4.0	
Zürich	7.3	51	e	1	53	+3	e	3	56	S <sub>g</sub>	e	2	17	P*	—	
Chur	7.7	57	e	2	0	+4	e	3	12	-13	e	2	25	P <sub>g</sub>	—	
Strasbourg	7.7	41	e	2	27	P <sub>g</sub>	i	3	26	+1	i	4	19	S <sub>g</sub>	—	
Ravensburg	8.2	51	e	2	34	P*	e	4	28	S <sub>g</sub>	e	2	38	?	—	
Karlsruhe	8.3	41	e	2	42	P <sub>g</sub>	e	4	32	S <sub>g</sub>	—	—	—	—	—	
Kew	z.	8.5	358	—	—	—	e	3	44	-1	e	4	30	S <sub>g</sub>	—	
Stuttgart	z.	8.5	44	e	2	23	P*	e	4	43	S <sub>g</sub>	e	2	41	P <sub>g</sub>	—
Jena	n.	11.1	40	—	—	—	e	5	8	SS	e	5	47	Q	e 6.1	
Collmberg	12.0	42	e	2	56	+1	e	5	7	-4	e	5	20	SS	e 6.6	
Prague	12.1	49	i	3	49	?	e	5	18	+4	e	4	52	?	e 6.2	
Bombay	n.	64.8	87	e	11	50	?	—	—	—	—	—	—	—	—	
Hungry Horse	72.2	321	i	11	26	-3	—	—	—	—	—	—	—	—	—	
Pierce Ferry	81.1	311	e	12	18	0	—	—	—	—	—	—	—	—	—	
Tucson	82.1	307	e	12	23	-1	—	—	—	—	—	—	—	—	—	

Additional readings:—

Clermont-Ferrand iP = 0m.57s., iS = 1m.32s., iS<sub>g</sub> = 1m.47s.

Toledo iZ = 1m.14s., iSN = 1m.44s., iZ = 1m.51s., S\*N = 2m.12s.

Alicante P\* = 1m.24s., S<sub>g</sub> = 2m.22s., e = 2m.41s.

Besançon e = 2m.2s.

Paris iP = 1m.40s., iP<sub>g</sub> = 1m.56s., e = 2m.29s., iS = 3m.11s., iS<sub>g</sub> = 3m.19s.

Algiers Univ. eSZ = 3m.8s.

Granada PS = 2m.25s.

Strasbourg i = 2m.34s. and 2m.41s., iS = 4m.5s., iS<sub>g</sub> = 4m.22s.

Kew eZ = 4m.4s.

Stuttgart eZ = 2m.37s., eP<sub>g</sub>Z = 3m.6s., eSZ = 4m.3s., eZ = 4m.32s., eS<sub>g</sub>Z = 5m.3s.

Collmberg eE = 6m.6s.

Long waves were also recorded at Cheb.

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Jan. 31d. 11h. 24m. 41s. Epicentre 10°·4S. 33°·5E.

A = +·8204, B = +·5430, C = -·1790;  $\delta = -5$ ;  $h = +6$ ;  
D = +·552, E = -·834; G = -·149, H = -·099, K = -·984.

		$\Delta$	Az.	P.		O-C.	S.	O-C.	Supp.	L.	
		°	°	m.	s.	s.	m.	s.	m.	m.	
Tananarive		16·0	124	3	49	+ 1	6	59	SS	i 7 47	e 8·5
Pretoria	z.	16·1	197	i 3	47	- 2	6	43	- 6	7 25	e 8·3
Johannesburg		16·5	197	e 3	54	0	e 6	50	- 8	—	8·6
Grahamstown		23·7	195	i 5	16	+ 2	e 9	52	+25	e 5 52	e 12·2
Helwan	z.	40·1	357	i 7	37	- 2	—	—	—	e 9 21	i 21·1
Ksara		44·0	3	e 8	12	+ 1	—	—	—	e 10 2	PP
Kodaikanal	E.	48·3	65	e 8	45	0	e 15	52	+ 7	—	23·0
Bombay		48·5	53	e 8	43	- 3	—	—	—	—	—
Poona		49·1	54	e 8	39	-12	e 15	32	-24	10 45	PP
Taranto		52·8	344	e 10	49	PP	—	—	—	—	e 39·3
Tiflis		52·9	10	i 9	18	- 2	—	—	—	—	—
Algiers Univ.	z.	55·0	330	e 9	36	+ 1	19	3	S <sub>c</sub> S	e 11 47	PP
Rome		55·5	341	e 9	46	+ 7	e 17	31	+ 7	—	e 28·8
Alicante		57·9	329	—	—	—	27	4	Q	—	e 28·8
Samarkand		58·7	30	e 10	3	+ 1	—	—	—	—	—
Stalinabad		58·8	32	i 10	2	0	i 18	12	+ 5	—	—
Obi-garm		59·4	32	i 10	5	- 1	—	—	—	—	—
Toledo	N.	60·9	327	—	—	—	e 25	35	SSS	—	—
Tashkent		61·1	30	i 10	18	0	e 18	38?	+ 1	—	—
Basle		62·0	340	e 10	31	+ 7	—	—	—	—	—
Andijan		62·3	32	e 10	24	- 2	—	—	—	—	—
Stuttgart	z.	62·7	342	e 10	29	0	—	—	—	e 11 1	P <sub>c</sub> P
Karlsruhe	z.	63·1	346	e 10	38	+ 6	—	—	—	—	—
Frunse		64·9	32	e 10	55	+12	—	—	—	—	—
Moscow		66·0	3	e 10	40	-10	—	—	—	—	—
Sverdlovsk		70·6	15	i 11	17	- 2	20	33	0	—	—
College		125·6	1	e 19	9	[+ 5]	—	—	—	e 20 54	PP
Hungry Horse		133·4	330	i 19	21	[+ 3]	—	—	—	—	—
Tucson		140·6	309	e 19	31	[- 1]	—	—	—	e 22 48	PP
Pierce Ferry		141·0	316	e 19	40	[+ 8]	—	—	—	—	—
Overton	z.	141·1	317	e 19	46	[+14]	—	—	—	—	—
Boulder City		141·6	316	e 19	26	[- 7]	—	—	—	e 19 6	i
Reno	z.	142·5	324	e 19	35	[ 0]	—	—	—	e 19 44	PKP <sub>s</sub>
Mineral	z.	142·9	327	e 19	35 <sub>a</sub>	[- 1]	—	—	—	e 22 15	PP
Tinemaha	z.	143·1	320	e 19	41	[+ 5]	—	—	—	—	—
China Lake	z.	143·5	318	e 19	38	[+ 1]	—	—	—	—	—
Fresno	z.	144·3	322	e 19	46	[+ 8]	—	—	—	e 22 23	PP
Palomar	z.	144·5	314	i 19	45	[+ 7]	—	—	—	i 20 2	PKP <sub>s</sub>
Riverside	z.	144·5	316	e 19	42	[+ 4]	—	—	—	i 19 46	PKP <sub>s</sub>
Pasadena	z.	144·9	316	e 19	43	[+ 4]	—	—	—	e 22 53	PP
Berkeley	z.	145·0	324	e 19	48 <sub>a</sub>	[+ 9]	—	—	—	e 20 0	PKP <sub>s</sub>
Lick	z.	145·0	324	i 19	48 <sub>k</sub>	[+ 9]	—	—	—	—	—

Additional readings :—

Grahamstown i = 5m.21s.

Helwan iZ = 18m.31s.

Poona PPPEN = 11m.22s.

Algiers Univ. iZ = 9m.42s., ePPPZ = 12m.55s., eZ = 15m.56s.

Stuttgart eZ = 10m.35s.

Tucson e = 19m.36s.

Mineral iZ = 19m.39s., 19m.47s., and 19m.55s.

Fresno eZ = 19m.57s. and 21m.26s.

Pasadena iZ = 19m.48s.

Berkeley eZ = 21m.20s.

Long waves were also recorded at Tamanrasset, Pavia, Kew, Almeria, and Malaga.

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Jan. 31d. 20h. Undetermined shock.

Stalinabad iP = 27m.43s., iS = 28m.20s.  
 Obi-garm iP = 27m.44s.?, iS = 28m.17s.?  
 Garm iP = 27m.51s.?, iS = 28m.25s.?  
 Fergana P = 27m.55s., iS = 28m.41s.  
 New Delhi ePN = 27m.59s., iSN = 29m.39s.  
 Andijan iP = 28m.3s., iS = 28m.53s.  
 Samarkand eP = 28m.6s.  
 Tashkent eP = 28m.11s.  
 Naryn iP = 28m.14s.  
 Tchimkent iP = 28m.21s., iS = 29m.25s.  
 Frunse eP = 28m.35s.  
 Almata eP = 28m.51s.  
 College iP = 38m.8s., e = 39m.10s.  
 Pierce Ferry e = 39m.37s.

Jan. 31d. 22h. 43m. 30s. Epicentre 51°·1N. 156°·5E. Depth of focus 0·010.  
 (as on 1939, Aug. 1d.).

A = -·5782, B = +·2514, C = +·7762;  $\delta = 0$ ;  $h = -6$ ;  
 D = +·399, E = +·917; G = -·712, H = +·310, K = -·631.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
College	31·4	43	i 6 16	+ 2	i 11 21	+ 8	—	—
Hungry Horse	54·4	55	i 9 20	+ 1	—	—	i 10 0	PcP
Shasta Dam	54·7	67	i 9 21	0	—	—	i 9 47	pP
Mineral	z. 55·4	67	i 9 26 <sub>a</sub>	0	i 9 56	sP	i 9 52	pP
Berkeley	z. 56·6	70	e 9 35 <sub>a</sub>	0	—	—	e 10 1	pP
Reno	56·9	67	i 9 38	+ 1	e 17 30	+ 8	i 10 5	pP
Lick	z. 57·3	70	i 9 39 <sub>k</sub>	- 1	—	—	i 10 6	pP
Tinemaha	59·5	68	i 9 58	+ 3	—	—	i 10 22	pP
Logan	59·9	60	e 10 25	pP	—	—	—	—
China Lake	z. 60·7	68	i 10 2	- 1	—	—	i 10 29	pP
Pasadena	61·6	70	i 10 17 <sub>k</sub>	+ 7	—	—	i 10 34	pP
Overton	z. 62·1	66	i 10 13	0	—	—	i 10 38	pP
Riverside	z. 62·1	70	i 10 11	- 2	—	—	i 10 38	pP
Boulder City	62·2	67	i 10 15	+ 1	—	—	i 10 41	pP
Pierce Ferry	62·6	66	i 10 17	+ 1	—	—	i 10 44	pP
Palomar	z. 62·9	70	i 10 22	+ 4	—	—	—	—
Tucson	67·2	66	i 10 46	0	—	—	i 11 12	pP
Ottawa	73·8	36	e 11 25 <sub>a</sub>	- 1	—	—	—	—
Shawinigan Falls	N. 73·9	33	e 11 26	0	—	—	—	—
Jena	N. 74·1	338	e 11 26	- 1	—	—	—	—
Prague	74·2	336	e 11 27	- 1	—	—	i 11 59	pP
Rathfarnham Castle	z. 75·0	349	i 11 29	- 3	—	—	i 11 51	pP
Strasbourg	77·1	340	i 11 43 <sub>a</sub>	- 1	—	—	e 12 3	pP
Harvard	77·8	34	i 11 46	- 2	—	—	—	—
Paris	78·0	343	i 11 48	- 1	—	—	—	—
Zürich	78·1	339	e 11 48	- 2	—	—	—	—
Basle	78·2	340	e 11 49	- 1	—	—	—	—
Triest	78·4	340	e 11 40	-12	e 21 22	-16	e 14 39	PP
Besançon	78·8	340	i 11 53	- 1	—	—	e 12 18	pP
Clermont-Ferrand	80·8	342	i 12 6	+ 2	—	—	—	—
Toledo	z. 87·8	345	i 12 40	+ 1	—	—	e 13 28	?
Algiers Univ.	z. 89·4	339	e 12 43	- 4	—	—	e 14 33	?

Additional readings :—

Prague e = 13m.3s. and 14m.49s.  
 Rathfarnham Castle iZ = 11m.39s.  
 Strasbourg i = 11m.48s., e = 12m.39s.  
 Triest iPPS = 22m.41s., eSS = 26m.14s.  
 Besançon e = 12m.6s.

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Jan. 31d. Readings also at 0h. (Pierce Ferry and Tucson), 1h. (Samarkand, Tohimkent, Naryn, Fergana, Frunse, near Obi-garm, Stalinabad, and Andijan), 2h. (near Obi-garm), 3h. (Hungry Horse, Logan, Overton, Pierce Ferry, and Tucson), 4h. (Helwan, Ksara, Bombay, and near Mizusawa), 5h. (Samarkand, Tchimkent, near Obi-garm, Stalinabad, and Andijan), 6h. (Ksara, Mount Wilson, and Palomar), 7h. (Tacubaya (2), Pasadena, Mount Wilson, Riverside (2), China Lake (2), Logan, Boulder City, Overton, Pierce Ferry (2), Tucson (2), Hungry Horse (2), Santa Clara, Berkeley, Lick, and Mineral), 8h. (Christchurch), 9h. (China Lake and Tucson), 10h. (near Tacubaya), 11h. (Algiers Univ.), 16h. (Prague and Grahamstown), 18h. (Brisbane, Colombo, Bandung, Djakarta, Hungry Horse, and Shasta Dam), 19h. (Kodaikanal, Bombay, and Ksara), 21h. (Wellington), 22h. (Bandong, Djakarta, and Wellington), 23h. (Pierce Ferry, Shasta Dam, and near Klyuchi).

Feb. 1d. 11h. 41m. 18s. Epicentre 22°·6S. 68°·8W. (as on 1948, Dec. 26d.).

Pasadena suggests a depth of 100km.

A = +·3342, B = -·8616, C = -·3821;  $\delta = +4$ ;  $h = +4$ ;  
D = -·932, E = -·361; G = -·138, H = +·356, K = -·924.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Paz	6·1	5	i 1 33 <sub>a</sub>	- 1	i 2 37	- 8	i 1 46	P*
Huancayo	12·2	328	e 2 50	- 8	e 5 10	- 6	i 3 8	pP
Chinchina	28·2	348	(i 6 10)	+14	(i 10 32)	- 9	—	(13·7)
Harvard	64·8	358	i 10 40	- 3	i 11 20	sP	i 11 10	pP
Tucson	67·7	322	i 11 1	0	—	—	e 11 31	pP
Ottawa	68·0	355	e 10 59	- 4	—	—	—	—
Palomar	72·1	319	i 11 28 <sub>k</sub>	0	—	—	—	—
Pierce Ferry	72·4	323	i 11 30	0	—	—	i 12 0	pP
Boulder City	72·7	322	i 11 32	0	—	—	i 12 2	pP
Riverside	72·8	319	i 11 33	+ 1	—	—	—	—
Overton	z. 72·9	323	i 11 33	0	—	—	i 12 4	pP
Pasadena	73·4	319	i 11 36 <sub>k</sub>	0	—	—	—	—
China Lake	z. 74·2	321	i 11 41 <sub>k</sub>	+ 1	—	—	—	—
Logan	75·4	328	e 11 44	- 3	—	—	—	—
Tinemaha	z. 75·5	321	i 11 49	+ 1	—	—	—	—
Fresno	z. 76·1	320	e 11 51	0	—	—	i 12 10	pP
Lick	z. 77·6	319	i 12 1 <sub>k</sub>	+ 1	—	—	i 12 22	pP
Reno	z. 78·0	322	i 12 3 <sub>k</sub>	+ 1	—	—	—	—
Berkeley	z. 78·4	319	i 12 6 <sub>a</sub>	+ 2	—	—	—	—
Mineral	z. 79·6	322	e 12 11 <sub>k</sub>	+ 1	—	—	—	—
Shasta Dam	80·3	322	i 12 13	- 1	—	—	e 12 45	pP
Hungry Horse	81·4	332	i 12 20	0	—	—	—	—
Victoria	86·0	327	e 12 47	+ 4	—	—	—	—
College	105·7	334	e 13 51	-23	—	—	—	—

Additional readings and note :—

La Paz iS = 2m.16s., L = 2m.26s.  
Huancayo i = 4m.19s.  
Chinchina readings have been reduced by 2m.  
Palomar iZ = 11m.57s. and 13m.24s.  
Riverside iZ = 12m.3s.  
Pasadena eZ = 11m.55s., iZ = 12m.5s.  
China Lake iZ = 12m.11s.  
Logan e = 12m.18s.  
Tinemaha iZ = 12m.20s.  
Fresno eZ = 14m.3s.  
Lick iPcPZ = 12m.4s., iZ = 12m.31s., eZ = 13m.14s.  
Reno eE = 12m.30s.  
Berkeley iZ = 12m.36s.  
Mineral eZ = 12m.41s. and 13m.6s.  
Hungry Horse i = 12m.42s. and 12m.51s.

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Feb. 1d. 14h. 38m. 4s. Epicentre 3°·7N. 128°·5E. (as on 1947, October 24d.).

A = -·6212, B = +·7810, C = +·0641;  $\delta$  = -4; h = +7;  
D = +·783, E = +·623; G = -·040, H = +·050, K = -·998.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Bandong	23·3	244	e 5 14	+ 4	i 9 29	+ 9	—	—
Djakarta	23·8	245	e 5 18	+ 3	i 9 38	+10	—	—
Brisbane	39·0	143	e 7 27	- 3	i 13 21	- 8	e 8 58	PP
Vladivostok	39·4	3	e 7 31	- 2	e 13 31	- 4	e 16 17	SS
Riverview	43·0	153	e 8 7	+ 4	e 14 27	- 2	i 17 35	SS e 22·7
Colombo	E. 48·5	276	8 49	+ 3	15 49	+ 1	—	— 23·8
Hyderabad	N. 50·9	290	—	—	16 22	+ 1	—	—
Kodaikanal	E. 51·0	280	i 9 16	+10	i 16 46	+24	i 11 26	PP
Irkutsk	52·4	342	e 9 16	0	16 41	- 1	—	—
New Delhi	N. 54·6	303	—	—	i 17 8	- 3	—	e 29·6
Poona	N. 55·4	290	—	—	i 17 22	0	e 21 2	SS
Bombay	56·4	291	e 9 24	-21	i 17 44	+ 8	—	—
Auckland	N. 59·0	137	—	—	i 18 14	+ 4	—	—
Naryn	60·1	317	e 10 5	- 6	—	—	—	—
Christchurch	61·5	145	—	—	e 18 36	- 6	(e 25 41)	SSS e 25·7
Wellington	61·5	143	—	—	e 21 56?	SS	—	—
Frunse	61·6	318	e 10 35	+13	—	—	—	—
Andijan	62·3	315	e 10 53	+27	i 19 21	+29	—	—
Fergana	62·6	315	e 10 53	+25	—	—	—	—
Garm	63·3	313	e 10 26?	- 7	18 56?	- 8	—	—
Stalinabad	64·3	312	i 10 40	+ 1	i 19 16	- 1	—	—
Tashkent	64·7	315	i 10 42	0	i 19 23	+ 1	—	—
Tchimkent	64·8	316	i 10 42	- 1	i 19 23	0	—	—
Samarkand	65·9	312	e 10 55	+ 5	—	—	—	—
Ashkabad	72·1	309	e 11 16	-12	—	—	—	—
Sverdlovsk	74·9	329	i 11 42	- 2	21 16	- 6	—	—
Leninakan	83·6	311	e 12 46?	+15	—	—	—	—
College	84·0	25	e 12 32	- 1	—	—	—	—
Moscow	87·5	325	—	—	e 23 15	{ - 2 }	—	—

Additional readings :—  
Vladivostok iS<sub>e</sub>S = 17m.44s.  
Riverview iE = 19m.28s.  
Kodaikanal SSE = 20m.36s.  
New Delhi iN = 25m.30s.  
Christchurch eN = 21m.6s.

Feb. 1d. 22h. 19m. 3s. Epicentre 3°·1N. 127°·8E. (as on 1949, March 27d.).

A = -·6120, B = +·7890, C = +·0538;  $\delta$  = -4; h = +7;  
D = +·790, E = +·613; G = -·033, H = +·043, K = -·998.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Vladivostok	40·0	5	e 6 41	+ 3	—	—	—	—
Riverview	42·8	152	—	—	e 14 20	- 6	i 17 29	SS e 22·6
Colombo	E. 47·9	276	8 41	- 1	15 41	+ 2	—	24·0
Kodaikanal	E. 50·4	281	—	—	e 16 27	+13	—	—
Irkutsk	52·8	342	—	—	e 15 57	-50	—	—
Poona	N. 54·9	290	—	—	i 17 15	- 1	e 21 5	SS
Bombay	56·0	291	e 9 43	0	—	—	—	—
Andijan	62·3	315	10 24	- 2	i 18 52	0	—	—
Obi-garm	63·5	312	i 10 18?	-16	i 18 53?	-14	—	—
Stalinabad	64·1	312	i 10 35	- 3	i 19 15	+ 1	—	—
Tashkent	64·6	315	e 10 34	- 7	—	—	—	—
Samarkand	65·8	312	e 10 52	+ 3	—	—	—	—
Sverdlovsk	75·1	328	10 57	-49	—	—	—	—
College	84·8	25	e 12 28	- 9	—	—	e 15 37	PP

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Feb. 1d. Readings also at 1h. (Samarkand, Frunse, near Obi-garm, Stalinabad, Andijan, Tashkent, and Tchimkent), 2h. (Kodaikanal, Hungry Horse, and Shasta Dam), 3h. (Arapuni, New Plymouth, Cobb River, Kaimata, Christchurch, and near Wellington), 5h. (Auckland), 7h. (near Bandung), 8h. (Hungry Horse, Boulder City, Overton, Pierce Ferry, near Tucson, near Bandung, and Djakarta), 10h. (Fergana, Frunse, near Naryn, Andijan, and near Ashkabad), 12h. (near Tananarive), 13h. (College), 14h. (Hungry Horse (2)), 15h. (near Ashkabad, near Djakarta (2), and Bandung (2)), 17h. (Kew), 18h. (College (2), Hungry Horse, Almata, Naryn, Tchimkent, Obi-garm, Samarkand, Semipalatinsk, near Przhevalsk, and near New Delhi), 21h. (College, Hungry Horse, Shasta Dam, Lick, Boulder City, Pierce Ferry, and Pretoria), 22h. (near Obi-garm).

Feb. 2d. 16h. Undetermined shock.

Stalinabad iP = 32m.25s., iS = 37m.30s.  
 Obi-garm eP = 32m.40s., S = 37m.50s.  
 Tashkent eP = 32m.50s., eS = 38m.10s.  
 Baku ePPP = 33m.0s., eS = 35m.38s.?  
 Tchimkent iP = 33m.0s., eS = 38m.26s.  
 Andijan eP = 33m.7s., eS = 38m.35s.  
 Frunse eP = 33m.54s.  
 Ksara eP? = 34m.20s., eS? = 39m.12s.  
 Helwan iPZ = 34m.28s.<sub>a</sub>, eZ = 34m.51s. and 36m.39s., eN = 39m.28s.  
 Grozny eS = 37m.22s.?  
 Yalta iSSS = 39m.12s.  
 Simferopol eSS = 39m.22s.

Feb. 2d. 22h. 45m. 13s. Epicentre 25°·5N. 54°·0E.

Epicentre given by the U.S.S.R. network bulletin.

A = +·5312, B = +·7311, C = +·4281;  $\delta = -5$ ;  $h = +3$ ;  
 D = +·809, E = -·588; G = +·252, H = +·346, K = -·904.

	$\Delta$	Az.	P.	O - C.	S.	O - C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Baku	15·3	348	e 4 5?	+26	—	—	—
Ksara	17·8	300	e 4 15	+ 4	e 9 17	L	(e 9·3)
Samarkand	17·9	33	e 4 15	+ 3	e 7 34	+ 4	—
Tiflis	17·9	335	i 3 59	-13	—	—	—
Stalinabad	18·2	39	i 4 14	- 2	7 31	- 6	—
Obi-garm	18·7	39	e 4 48?	+26	e 8 14?	+26	—
Grozny	19·0	340	e 4 24	- 2	—	—	—
Tashkent	20·3	34	e 4 41	+ 1	e 8 21	- 2	—
Helwan	20·5	287	4 39	- 3	e 8 17	-10	e 10·3
Tchimkent	21·1	33	i 4 51	+ 3	—	—	—
Frunse	24·2	38	e 5 39?	+20	—	—	—
Nanking	56·4	67	—	—	e 16 56	-40	—

Helwan also gives eZ = 5m.27s. and 9m.26s.

Feb. 2d. 23h. 33m. 37s. Epicentre 21°·7N. 100°·2E.

A = -·1647, B = +·9153, C = +·3676;  $\delta = +3$ ;  $h = +4$ ;  
 D = +·984, E = +·177; G = -·065, H = +·362, K = -·930.

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Calcutta	E.	11·0	276	i 2 40	- 2	i 4 37	-10	—
Nanking		19·5	54	4 33	+ 2	8 15	+ 9	5 3 PPP 10·0
Hyderabad	N.	20·9	262	4 43	- 3	8 32	- 3	4 49 P 10·1
Zi-ka-wei	N.	21·2	59	4 55	+ 6	8 46	+ 5	5 29 PPP 9·6
Dehra Dun	N.	21·4	298	e 5 36	PPP	e 9 27	SS	— e 12·5
New Delhi	N.	21·9	293	i 4 54 <sub>a</sub>	- 3	i 8 46	- 8	5 18 PP 10·4
Colombo	E.	24·5	236	5 23	+ 1	9 53	+13	— 14·0
Poona		24·9	267	5 28	+ 2	i 9 49	+ 2	e 6 0 PP 11·9
Bombay		25·8	269	e 5 36	+ 2	i 10 6	+ 4	— 12·0
Djakarta		28·5	166	e 5 58	- 1	e 10 50	+ 4	—

Continued on next page.



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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Almata	28.9	324	i 6 4	+ 1	i 10 56	+ 3	—	—
Hukuoka	29.2	60	e 6 1k	- 4	e 10 17	-41	e 11 38	? e 13.4
Frunse	30.1	321	i 6 15	+ 2	—	—	—	—
Andijan	30.3	314	e 6 21	+ 6	11 22	+ 7	—	—
Fergana	30.4	314	e 6 15?	- 1	e 11 21?	+ 5	—	—
Irkutsk	30.7	5	6 19	0	11 24	+ 3	—	—
Garm	30.8	311	—	—	i 11 38	+15	—	—
Hirosima	31.0	60	(e 6 17)	- 4	(e 11 48)	+22	—	(e 15.0)
Obi-garm	31.2	310	i 6 47?	+24	i 11 52?	+23	—	—
Stalinabad	31.8	310	i 6 28	0	i 11 41	+ 3	—	—
Tashkent	32.4	314	i 6 33	- 1	—	—	—	—
Semipalatinsk	32.7	337	i 6 25?	-11	e 11 41?	-11	—	—
Tchimkent	32.8	316	i 6 37	0	i 11 57	+ 3	—	—
Kobe	33.3	60	e 6 47	+ 6	—	—	e 17 12	Q 17.8
Samarkand	33.5	309	i 6 48?	+ 5	12 9?	+ 4	—	—
Vladivostok	33.9	44	e 6 47	0	i 12 12	+ 1	—	—
Nagoya	34.8	59	e 6 53	- 1	e 15 59	Q	—	e 18.6
Tokyo	37.1	59	e 7 28	+14	e 12 59	- 2	17 33	Q 19.7
Sendai	38.7	56	e 7 27	0	e 13 16	- 9	16 7	SS 19.9
Mizusawa	E. 39.0	54	7 30	0	13 11	-18	—	e 19.7
Ashkabad	39.4	304	7 32	- 1	e 13 39	+ 4	—	—
Sapporo	40.2	47	e 7 40	0	—	—	—	e 22.1
Sverdlovsk	45.5	331	i 8 21	- 2	i 15 3	- 2	—	—
Baku	46.3	306	i 8 34	+ 5	e 15 20	+ 4	—	—
Grozny	49.8	309	e 8 58	+ 2	e 16 7	+ 1	i 9 59	PcP —
Tiflis	50.3	307	i 9 0	0	i 16 13	0	e 10 57	PP —
Erevan	50.4	304	e 9 2	+ 1	i 16 18	+ 4	—	—
Leninakan	50.9	305	e 9 4	- 1	16 21	0	—	—
Piatigorsk	51.8	310	9 11	- 1	16 33	0	—	—
Sotchi	54.2	309	e 9 30	+ 1	17 8	+ 2	e 11 22	PP —
Perth	55.4	164	i 15 8	?	i 17 35	+13	—	—
Moscow	56.9	323	e 9 46	- 3	e 17 38	- 4	—	—
Theodosia	57.3	311	e 9 52	0	—	—	—	—
Ksara	57.4	297	e 9 52 <sub>a</sub>	- 1	17 54	+ 5	—	—
Simferopol	58.2	311	e 10 0	+ 2	18 0	+ 1	—	—
Yalta	58.2	310	9 57	- 1	17 57	- 2	12 3	PP —
Pulkovo	61.4	328	10 21	+ 1	18 41	+ 1	—	—
Helwan	61.7	293	10 22	0	18 41	- 3	e 12 47	PP —
Kishinev	61.9	314	10 22	- 2	18 41	- 6	—	—
Istanbul	62.1	306	e 10 18	- 7	e 18 54	+ 5	—	—
Bucharest	64.0	310	e 10 34	- 4	i 19 15	+ 2	e 20 26	ScS 32.4
Helsinki	64.1	328	(i 11 9 <sub>a</sub> )	+31	(e 18 3)	-71	(e 13 12)	PP —
Lwow	64.9	317	i 10 44	+ 1	—	—	—	—
Tananarive	65.4	236	—	—	e 19 36	+ 6	20 51	ScS 29.9
Warsaw	66.6	319	e 9 54	-60	18 42	-63	e 12 31	PP e 30.4
Skalnate Pleso	67.4	316	e 11 1	+ 2	e 19 55	0	—	e 31.9
Upsala	67.8	328	11 2	0	19 58	- 2	i 13 35	PP e 32.4
Budapest	E. 68.4	314	11 7	+ 1	20 6	- 1	11 37	PcP —
	N. 68.4	314	11 8	+ 2	20 2	- 5	11 29	PcP 34.4
Raciborzu	Z. 68.6	317	e 11 5	- 2	—	—	—	—
Ogyalla	69.0	315	e 11 2	- 7	e 20 28	PS	e 24 35	SS —
Brisbane	70.7	132	i 11 33	+13	i 20 38	+ 4	e 20 48	PS —
Zagreb	70.8	313	e 11 21	+ 1	e 28 5	SSS	e 13 55	PP —
Prague	71.0	318	e 11 22	0	e 20 35	- 2	e 14 0	PP e 32.4
Taranto	71.0	307	11 32	+10	20 34	- 3	—	36.0
Copenhagen	71.1	324	i 11 23	+ 1	e 20 32	- 6	i 14 10	PP 32.4
Potsdam	71.4	321	i 11 25 <sub>k</sub>	+ 1	e 20 40	- 2	e 14 38	PP e 35.4
Collmberg	71.7	319	e 11 25	- 1	e 20 28	-17	e 25 17	SS e 28.8
Cheb	72.3	318	e 11 28?	- 1	e 20 53	+ 1	e 16 1	PPP e 33.4
Triest	72.4	313	e 11 19	-11	i 20 40	-13	i 14 8	PP —
Jena	72.6	318	e 11 31	0	—	—	e 14 15	PP 38.9
Messina	72.9	305	e 11 33	0	e 20 58	- 1	e 14 9	PP —
Riverview	73.5	138	i 11 43 <sub>k</sub>	+ 7	i 21 18	+12	i 21 52	ScS e 34.0
Bergen	N. 73.8	330	e 23 27?	?	25 55	SS	e 29 27?	SSS 31.9
Padova	74.0	312	e 11 42	+ 3	e 21 4	- 7	i 11 58	PcP —

Continued on next page.



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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
St. Louis	119.2	9	e 20 8	PP	e 30 5	PS	e 31 11	PPS i 45.0
Bermuda	124.3	344	—	—	e 27 32	{-11}	e 38 48	SSP e 54.0
Columbia	124.6	1	—	—	e 42 28	SSS	—	e 50.6
San Juan	138.0	339	—	—	(e 45 25)	SSS	—	(e 62.6)
Galerazamba	147.4	350	e 19 49	[+ 6]	—	—	—	— 71.4
Bogota	153.2	346	e 20 5	[+13]	e 46 8	?	51 22	? 78.4
La Paz	167.8	293	e 20 47	[+39]	i 26 26	[-44]	32 9	SKKS 79.9
Huancayo	169.5	335	e 20 29	[+20]	e 39 43	PPS	—	e 79.6

Additional readings and notes :—

New Delhi QN = 9m.4s., SSN = 9m.16s., SSSN = 9m.31s.  
 Poona PPPEN = 6m.24s., P<sub>c</sub>PEN = 8m.46s., SSEN = 12m.2s., SSSEN = 12m.39s.  
 Hiroshima readings have been reduced by 2m.  
 Tokyo S? = 13m.48s.  
 Tiflis eSS = 19m.36s., ePS = 20m.3s.  
 Perth i = 19m.38s. and 24m.20s.  
 Yalta PPP = 13m.27s.  
 Helwan eZ = 10m.42s., 11m.11s., 14m.34s., 19m.13s., and 19m.44s.  
 Bucharest iPZ = 10m.39s., eN = 10m.45s., 10m.58s., and 11m.44s.  
 Helsinki eL = (22m.23s.?), readings have been reduced by 6m.  
 Tananarive SSS = 27m.21s.  
 Warsaw eP<sub>c</sub>PE = 10m.30s., eP<sub>c</sub>PZ = 10m.36s., ePPZ = 12m.26s., ePPN = 12m.36s., ePPPNZ = 14m.8s., SE = 18m.46s., eS<sub>c</sub>SE = 19m.51s., eS<sub>c</sub>SN = 19m.56s., SSSN = 26m.3s., SSSZ = 26m.15s. Times appear to be 1m. too early.  
 Upsala eSE = 19m.51s., ePPSN = 20m.23s., eS<sub>c</sub>SE = 20m.47s., iS<sub>c</sub>SN = 20m.52s., iN = 22m.45s., eSSE = 23m.53s., eSSN = 24m.7s., eSSS? = 27m.23s.  
 Budapest eE = 16m.15s. and 17m.23s.?, eN = 17m.32s., PPSE = 20m.40s., eN = 21m.43s., SSE = 24m.8s., SSN = 24m.23s., SSSN = 28m.3s., eSSSE = 28m.33s.  
 Ogyalla e = 11m.50s. and 13m.16s., ePS = 20m.31s.  
 Zagreb e = 19m.23s.?  
 Prague eEZ = 12m.6s., ePP = 14m.9s., ePPP = 15m.45s., e = 16m.48s., 20m.28s., and 23m.41s., eSS = 25m.11s., eSSS = 28m.23s.  
 Copenhagen i = 20m.42s. and 28m.30s.  
 Potsdam ePEN = 11m.29s.  
 Collmberg eE = 11m.32s., eZ = 15m.0s.  
 Cheb e = 11m.53s., ePP? = 14m.53s., eSS = 25m.47s., eSSS = 28m.59s.  
 Trieste iP<sub>c</sub>P = 11m.31s., iPPP = 15m.55s., iPS = 21m.12s.  
 Jena ePP?E = 14m.9s.  
 Riverview iN = 21m.30s., iPSE = 21m.58s., eSSE = 26m.12s., eSSSN = 29m.9s.  
 Stuttgart ePZ = 11m.43s., eZ = 11m.49s., 11m.57s., and 12m.35s.  
 Strasbourg i = 11m.55s., 12m.3s. and 12m.42s., e = 13m.53s., ePP = 14m.27s., iSSS = 30m.7s. and 30m.18s.  
 De Bilt eSSS = 30m.23s.?  
 Paris e = 12m.13s., ePS = 23m.1s., eSS = 27m.9s., eSSS = 31m.21s., eQ = 36.4m.  
 College e = 15m.44s., eSSS = 31m.13s.  
 Kew ePPZ = 14m.36s., eSSSEN = 31m.38s.  
 Rathfarnham Castle Z = 13m.7s., eZ = 16m.53s., eEN = 24m.29s., 32m.46s., and 34m.3s.  
 Algiers Univ. iP<sub>c</sub>PZ = 12m.29s., eZ = 13m.33s., and 13m.45s., ePPPZ = 17m.38s., ePSZ = 23m.35s.  
 Pietermaritzburg reading has been increased by 4m.  
 Alicante PS = 24m.6s., PPS = 24m.36s., SS = 28m.42s., SSS = 34m.10s., Q = 35m.54s.  
 Tamanrasset ePSZ = 24m.13s., ePPSZ = 24m.43s., eSS?Z = 29m.23s., eSSSZ = 32m.33s., eQZ = 36m.3s.  
 Toledo iZ = 14m.19s.  
 Almeria PPP = 17m.55s., SKS = 22m.57s., PPS = 25m.33s., SS = 28m.57s., SSS = 32m.21s.  
 Christchurch eZ = 22m.28s.  
 Victoria Q = 40m.5s.  
 Seattle e = 14m.2s., eSKKS = 24m.53s., eSS = 32m.3s., e = 37m.39s.  
 Hungry Horse i = 14m.12s. and 14m.41s.  
 Berkeley iSSN = 34m.21s., iSSSE = 38m.21s., eN = 39m.35s.  
 Santa Clara readings have been reduced by 10m.  
 Rapid City eE = 27m.57s., eSSE = 34m.33s.  
 China Lake eZ = 18m.57s.  
 Ottawa PS = 33m.3s. Phases wrongly identified.  
 Pasadena eSSN = 35m.25s., eSSSE = 40m.17s.  
 Pennsylvania eN = 40m.13s.  
 Tucson ePKKP = 29m.15s., ePS? = 30m.7s., eSS? = 36m.42s., e = 38m.50s.  
 Bermuda e = 43m.41s.  
 San Juan readings have been reduced by 20m.  
 La Paz iPPS = 37m.23s., iSS = 46m.3s., iSSS = 52m.31s., Q = 75m.47s.  
 Long waves were also recorded at Honolulu, Barcelona, Ivigtut, Tacubaya, and at other North American stations.

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February 2d. Readings also at 0h. (Hungry Horse (2), Pierce Ferry, Erevan, and Ashkabad), 2h. (near Obi-garm and near Malaga), 3h. (College, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Lick, Boulder City, Overton, Pierce Ferry, Tucson, Andijan, Tashkent, Almata, Stuttgart, Jena, Collmburg, Strasbourg, Chur, Zürich, Basle, near Raciborzu, and Prague : several shocks), 5h. (Hungry Horse, Bucharest, and near Kishinev), 6h. (College, Hungry Horse, and Huancayo), 7h. (Kew), 9h. (College, Hungry Horse, and near Ashkabad), 10h. (Auckland, La Paz, Ashkabad, Hungry Horse, Pasadena, Riverside, Palomar, Boulder City, Overton, Pierce Ferry, and near Tucson), 11h. (near Ashkabad), 13h. (Overton, Pierce Ferry, and Tucson), 14h. (Brisbane, near Garm, and Obi-garm), 15h. (Stalinabad, Obi-garm, Garm, Tashkent, Tchimkent, Andijan, Frunse, Helwan, and Ksara), 18h. (College, and near Almata), 20h. (Helwan, Ksara, Garm, Stalinabad, Samarkand, Tashkent, Obigarm, Tchimkent, Andijan, and near Almata), 21h. (Hungry Horse), 22h. (College, Hungry Horse, Shasta Dam, Lick, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, and Aberdeen), 23h. (College, Hungry Horse, and Shasta Dam).

Feb. 3d. 2h. 51m. 46s. Epicentre  $21^{\circ}7'N$ .  $100^{\circ}2'E$ . (as on 2d.).

$A = -0.1647$ ,  $B = +0.9153$ ,  $C = +0.3676$ ;  $\delta = +3$ ;  $h = +4$ ;  
 $D = +0.984$ ,  $E = +0.177$ ;  $G = -0.065$ ,  $H = +0.362$ ,  $K = -0.930$ .

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.	
Calcutta	E.	11.0	276	i 2 34	- 8	i 4 48	+ 1	i 5 8	SSS	—
Nanking		19.5	54	4 33	+ 2	8 16	+10	—	—	—
Hyderabad	N.	20.9	262	4 44	- 2	8 32	- 3	—	—	10.5
Zi-ka-wei	N.	21.2	59	e 5 4	+15	8 54	+13	—	—	10.4
Dehra Dun	N.	21.4	298	e 5 56	+65	e 9 44	+59	—	—	e 12.8
New Delhi		21.9	293	i 4 53 <sub>a</sub>	- 4	i 8 49	- 5	5 15	PP	10.1
Colombo	E.	24.5	236	5 24	+ 2	9 49	+ 9	—	—	14.2
Kodaikanal	E.	24.6	247	i 5 29	+ 6	i 10 0	+18	—	—	12.2
Poona	N.	24.9	267	i 5 23	- 3	i 9 45	- 2	5 55	PP	12.6
Bombay		25.8	269	e 5 36	+ 2	i 10 5	+ 3	—	—	14.3
Djakarta		28.5	166	i 6 5	+ 6	e 11 3	+17	—	—	—
Almata		28.9	324	i 6 4	+ 1	i 11 2	+ 9	—	—	—
Hukuoka		29.2	60	e 6 6 <sub>a</sub>	+ 1	e 11 13	+15	(e 12 44)	SSS	e 12.7
Bandong		29.4	164	—	—	e 11 4	+ 3	—	—	—
Frunse		30.1	321	e 6 15	+ 2	—	—	—	—	—
Andijan		30.3	314	e 6 15	0	11 19	+ 4	—	—	—
Fergana		30.4	314	e 6 18 <sub>?</sub>	+ 2	e 11 16 <sub>?</sub>	0	—	—	—
Irkutsk		30.7	5	6 18	- 1	11 23	+ 2	—	—	—
Garm		30.8	311	i 6 12	- 8	—	—	—	—	—
Hirosima		31.0	60	e 10 34	?	e 14 42	?	—	—	e 17.1
Obi-garm		31.2	310	i 6 55 <sub>?</sub>	+32	i 12 0 <sub>?</sub>	+31	—	—	—
Stalinabad		31.8	310	i 6 25	- 3	i 11 36	- 2	—	—	—
Tashkent		32.4	314	i 6 32	- 2	i 11 49	+ 1	—	—	—
Tchimkent		32.8	316	i 6 38	+ 1	—	—	—	—	—
Osaka		33.5	60	6 51	+ 8	e 12 30	+25	e 14 27	SSS	e 18.2
Samarkand		33.5	309	i 6 50	+ 7	—	—	—	—	—
Vladivostok		33.9	44	e 6 45	- 2	i 12 7	- 4	—	—	—
Nagoya		34.8	59	e 7 2	+ 8	—	—	—	—	e 18.6
Tokyo		37.1	59	e 7 47	+33	14 20	+79	17 38	Q	20.3
Sendai		38.7	56	7 28	+ 1	e 13 18	- 7	—	—	e 16.1
Mizusawa	E.	39.0	54	7 30	0	12 43	-46	—	—	18.1
Ashkabad		39.4	304	7 36	+ 3	13 38	+ 3	—	—	—
Sverdlovsk		45.5	331	i 8 20	- 3	i 15 1	- 4	—	—	—
Baku		46.3	306	e 8 46	+17	—	—	—	—	—
Grozny		49.8	309	e 9 0	+ 4	16 7	+ 1	—	—	—
Tiflis		50.3	307	i 9 0	0	16 12	- 1	—	—	—
Erevan		50.4	304	e 9 4 <sub>?</sub>	+ 3	16 15 <sub>?</sub>	+ 1	—	—	—
Leninakan		50.9	305	e 9 7	+ 2	—	—	—	—	—
Piatigorsk		51.8	310	e 9 12	0	e 16 29	- 4	—	—	—
Sotchi		54.2	309	e 9 29	0	e 17 7 <sub>?</sub>	+ 1	—	—	—
Perth		55.4	164	—	—	i 17 21	- 1	19 36	ScS	—
Moscow		56.9	323	e 9 49	0	17 40	- 2	—	—	—
Theodosia		57.3	311	e 9 50	- 2	e 17 46 <sub>?</sub>	- 1	—	—	—
Ksara		57.4	297	e 9 52 <sub>k</sub>	- 1	e 17 54	+ 5	—	—	—
Simferopol		58.2	311	e 9 58	0	17 58	- 1	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Yalta		58.2	310	i 9 56	- 2	17 55	- 4	—	—
Pulkovo		61.4	328	e 10 20	0	i 18 38	- 2	—	—
Helwan		61.7	293	10 20	- 2	18 44	0	—	—
Bucharest	E.	64.0	310	e 10 42?	+ 4	19 15	+ 2	—	—
	N.	64.0	310	e 10 58	+20	e 19 8	- 5	—	—
Helsinki		64.1	328	e 17 8	?	24 3	?	—	28.2
Lwow		64.9	317	e 10 43	0	—	—	e 13 10	PP
Tananarive		65.4	236	—	—	e 20 44	ScS	e 27 44	Q
Warsaw		66.6	319	e 10 22	-32	19 38	- 7	—	e 31.0
Skalnate Pleso		67.4	316	e 10 58	- 1	e 19 48	- 7	e 28 14	Q
Upsala	E.	67.8	328	11 0	- 2	19 58	- 2	e 20 30	PPS
	N.	67.8	328	10 57	- 5	19 54	- 6	21 0	ScS
Budapest		68.4	314	11 8	+ 2	e 20 4	- 3	15 14?	PPP
Raciborz	Z.	68.6	317	e 11 6	- 1	—	—	—	e 36.7
Kalossa		68.7	313	e 11 12	+ 5	—	—	e 13 40	PP
Ogyalla		69.0	315	—	—	e 19 32	-42	—	e 36.7
Brisbane		70.7	132	i 11 21 <sub>a</sub>	+ 1	e 20 38	+ 4	—	—
Zagreb		70.8	313	11 19?	- 1	—	—	—	41.8
Prague		71.0	318	e 11 23	+ 1	i 20 40	+ 3	e 25 14	SS
Taranto		71.0	307	11 7	-15	20 34	- 3	—	e 35.2
Copenhagen		71.1	324	e 11 19	- 3	e 20 27	-11	i 28 29	SSS
Potsdam		71.4	321	i 11 26 <sub>k</sub>	+ 2	—	—	e 14 20	PP
Collmberg		71.7	319	e 11 25	- 1	—	—	—	38.2
Cheb		72.3	318	e 11 35?	+ 6	e 20 56?	+ 4	—	e 35.2
Triest		72.4	313	e 11 25	- 5	i 20 50	- 3	i 14 9	PP
Jena		72.6	318	e 11 31	0	—	—	e 14 7	PP
Messina		72.9	305	e 11 33	0	e 20 54	- 5	—	e 39.1
Riverview		73.5	138	—	—	i 21 14	+ 8	e 26 10	SS
Bergen	N.	73.8	330	—	—	e 29 14	SSS	—	e 34.2
Padova		74.0	312	e 11 19	-20	20 54	-17	—	—
Rome		74.2	309	i 11 40 <sub>a</sub>	0	e 21 16	+ 2	e 14 26	PP
Bologna		74.3	313	e 11 53 <sub>a</sub>	+11	e 22 59	?	e 14 24	PP
Florence (Arc.)		74.6	311	e 11 45 <sub>a</sub>	+ 2	—	—	14 41	PP
Florence (Xim.)		74.6	311	e 11 45	+ 2	i 21 30	+12	—	—
Stuttgart		74.6	317	e 11 42	- 1	—	—	—	—
Prato		74.7	311	e 11 46	+ 3	i 21 14	- 5	—	—
Chur		74.9	314	e 11 14?	-30	—	—	—	40.2
Karlsruhe		75.1	318	e 11 56	+10	—	—	—	e 42.2
Zürich		75.4	316	e 11 47	0	—	—	—	—
Pavia	Z.	75.6	313	e 11 47	- 1	—	—	—	—
Strasbourg		75.6	317	i 11 49	+ 1	e 30 24	SSS	i 14 31	PP
Basle		76.0	316	e 11 51	0	—	—	—	—
De Bilt		76.2	321	—	—	e 27 14?	?	e 30 14?	SSS
Paris		78.8	318	i 12 7	+ 1	i 22 2	- 2	e 30 24	SSS
College		79.4	24	e 12 8	- 1	e 22 8	- 2	e 14 57	PP
Kew		79.6	321	e 12 18	+ 8	e 22 18	+ 6	e 15 33	PP
Rathfarnham Castle		82.2	325	i 12 33	+ 9	e 23 3	ScS	e 16 5	PP
Algiers Univ	Z.	82.8	306	12 26	- 1	—	—	e 15 34	PP
Pietermaritzburg	Z.	84.3	235	e 12 37	+ 2	—	—	—	—
Pretoria	Z.	84.3	240	i 12 36	+ 1	—	—	—	—
Alicante		84.7	310	12 24	-13	i 22 38	-26	15 38	PP
Tamanrasset	Z.	85.9	293	e 12 54	+11	e 23 34	ScS	e 16 14	PP
Toledo		86.6	312	e 12 49	+ 3	—	—	e 16 8	PP
Almeria		86.8	308	12 51	+ 4	23 27	+ 2	16 15	PP
Granada		87.5	309	13 50 <sub>a</sub>	+59	24 53	PS	30 32	?
Wellington		93.1	133	—	—	e 28 14?	?	—	e 43.2
Victoria		100.0	28	e 13 56	+ 8	—	—	—	39.4
Hungry Horse		103.8	22	e 14 4	- 1	—	—	e 18 2	PP
Butte	N.	106.3	22	—	—	—	—	e 41 22	Q
Shasta Dam		106.4	31	e 14 18	0	—	—	e 18 42	PP

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.	
Mineral	z.	107.0	31	e 17 39	?	—	—	e 18 50	PP	—
Bozeman		107.2	21	—	—	—	—	e 39 29	?	e 52.6
Reno		108.5	30	e 18 53	PP	—	—	e 19 7	?	—
Berkeley	z.	108.6	34	e 18 37	[+ 7]	e 25 57	{+ 2}	—	—	—
Santa Clara	E.	109.1	34	—	—	e 34 26	SS	—	—	e 58.7
Lick	z.	109.3	34	e 18 35k	[+ 3]	e 21 34	PKS	e 19 26	PP	—
Logan		110.3	24	e 19 0	PP	e 21 29	PKS	—	—	e 51.3
Rapid City	E.	111.1	17	e 18 18	[-17]	e 26 30	{+17}	e 34 8	SS	e 51.3
Tinemaha	z.	111.3	32	e 19 2	[+26]	—	—	e 19 27	PP	—
China Lake	z.	112.5	31	e 18 42	[+ 4]	—	—	e 19 29	PP	—
Ottawa		113.1	357	—	—	—	—	e 50 20	Q	64.2
Overton	z.	113.5	29	e 18 42	[+ 2]	—	—	i 19 39	PP	—
Pasadena		113.5	33	e 18 44	[+ 4]	e 36 2	SSP	e 19 35	PP	e 51.2
Boulder City		113.8	29	e 18 44	[+ 3]	—	—	e 19 45	PP	—
Pierce Ferry		114.0	29	e 18 47	[+ 6]	—	—	i 19 39	PP	—
Riverside	z.	114.1	33	e 19 30	PP	—	—	—	—	—
Palomar	z.	114.8	33	e 18 51	[+ 8]	—	—	—	—	—
Cleveland	N.	117.1	1	e 24 41	SKS	e 30 56	PPS	e 35 58	SS	54.6
Fordham		117.5	353	—	—	e 30 2	PS	—	—	63.7
Pennsylvania		117.8	357	e 29 18	PS	i 31 0	PPS	—	—	—
Philadelphia		118.5	354	e 31 18	PPS	e 36 27	SS	e 40 42	SSS	e 47.2
Tucson		118.7	29	e 18 32	[-18]	e 29 50	PS	e 18 54	PKP	e 54.1
St. Louis		119.2	9	e 19 48	PP	e 30 14	PS	e 31 16	PPS	—
Bermuda		124.3	344	—	—	e 38 34	SSP	—	—	e 47.0
Bogota		153.2	346	e 20 2	[+10]	—	—	—	—	80.0
La Paz		167.8	293	i 20 25	[+17]	i 31 50	{- 2}	25 6	PP	73.9
Huancayo		169.5	335	e 20 16	[+ 7]	—	—	—	—	—

Additional readings :—

New Delhi PPPN = 5m.28s., QN = 9m.4s., SSN = 9m.14s.

Poona PPPN = 6m.19s., P<sub>c</sub>PN = 8m.41s., QN = 11m.48s.

Hukuoka eS? = 10m.19s.

Osaka i = 9m.21s.

Helwan eZ = 10m.43s., 11m.32s., and 12m.20s., PPPZ = 13m.11s., eZ = 19m.35s., eN = 20m.38s.

Warsaw eEZ = 13m.28s., eP<sub>c</sub>SE = 18m.11s., S = 19m.1s., S<sub>c</sub>SZ = 20m.4s., eSSZ = 23m.5s., eSSE = 23m.10s., eSSN = 23m.13s., sSSS = 25m.59s.

Upsala ePP?N = 13m.52s., S<sub>c</sub>SE = 20m.56s., eN = 22m.0s., eE = 23m.6s., eSSSN = 26m.44s., eSSSE = 27m.14s.?

Budapest eE = 16m.25s. and 18m.34s., eS<sub>c</sub>SE = 20m.44s., eN = 22m.22s., eSSSN = 28m.1s.

Kalossa eN = 12m.18s., eE = 12m.51s., ePPN = 13m.44s., ePPPE = 15m.24s., eE = 18m.44s. and 23m.14s.?

Prague e = 11m.56s., eZ = 12m.26s., ePP = 14m.16s., ePPP = 15m.14s., e = 20m.31s. and 24m.44s., eSSS = 28m.38s.

Copenhagen i = 20m.43s.

Potsdam eN = 12m.38s., iN = 22m.24s.

Triest iSS = 25m.28s.

Riverview eSSSN = 29m.24s.

Florence (Arc.) e = 12m.52s.

Strasbourg eSSS? = 30m.29s., e = 31m.59s.

Paris i = 13m.0s., e = 31m.15s. and 35m.0s., eQ = 36.2m.

College e = 12m.55s.

Kew eSSN = 26m.51s., eSSSEN = 31m.43s.

Rathfarnham Castle iZ = 13m.11s., eZ = 14m.53s., iZ = 22m.43s., iEN = 23m.37s., eEN = 26m.4s. and 27m.25s., eSSSEN = 31m.42s.

Algiers Univ. eZ = 15m.56s. and 17m.56s.

Alicante PPP = 17m.26s., S<sub>c</sub>S = 22m.52s., PPS = 24m.10s., SS = 28m.14s., Q = 35m.4s.

Tamanrasset ePSZ = 24m.24s., eSSZ = 29m.4s., eSSSZ = 29m.44s., QZ = 35m.54s.

Toledo eZ = 18m.45s.

Almeria SS = 29m.3s.

Hungry Horse i = 14m.41s.

Santa Clara ePPPE = 37m.26s., eSE = 42m.10s.

Pierce Ferry i = 19m.3s.

Cleveland eSSSN = 40m.25s.

Pennsylvania eN = 41m.20s., iE = 44m.44s., iN = 45m.0s.

Tucson ePP = 20m.10s., eSS? = 36m.41s.

La Paz iPPS = 38m.50s., iSS = 45m.52s.

Long waves were also recorded at Christchurch, Auckland, San Juan, Galerazamba, and other North American and European stations.

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Feb. 3d. 5h. 56m. 5s. Epicentre 23°·1S. 178°·6E. Depth of focus 0·090.  
(as on 1945, April 13d.).

A = -·9205, B = +·0225, C = -·3901;  $\delta = 0$ ;  $h = +4$ ;  
D = +·024, E = +1·000; G = +·390, H = -·010, K = -·921.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.	
				m.	s.		m.	s.		m.	s.
Apia		13·0	44	e 2	39	- 9	e 4	50	-14	—	—
Auckland	N.	14·1	193	—	—	—	i 5	33?	+10	—	—
Arapuni		15·1	189	e 3	48	+39	—	—	—	—	—
New Plymouth	E.	16·4	193	i 3	22	+ 1	—	—	—	—	—
Wellington		18·4	191	e 3	38	- 2	e 6	31	- 6	—	—
Cobb River	E.	18·6	194	e 3	41	- 1	e 6	39	- 1	—	—
Kaimata	N.E.	20·3	195	e 3	57	- 1	i 7	7	- 1	—	—
Brisbane		23·5	253	i 4	28	+ 2	i 7	0	-60	—	—
Lick	Z.	82·3	43	i 11	21 <sub>k</sub>	+ 1	—	—	—	e 13	24
Pasadena	Z.	82·8	48	i 11	22	- 1	—	—	—	i 13	26
Palomar	Z.	83·2	49	i 11	25	0	—	—	—	i 13	26
Riverside	Z.	83·2	48	i 11	24	- 1	—	—	—	i 13	27
Shasta Dam		83·9	41	i 11	29	+ 1	—	—	—	e 11	38
China Lake	Z.	84·1	46	i 11	28	- 1	—	—	—	i 13	34
Mineral	Z.	84·1	42	e 11	30 <sub>a</sub>	+ 1	—	—	—	—	—
Tinemaha	Z.	84·3	46	i 11	32	+ 2	—	—	—	—	—
Boulder City		86·0	48	e 11	40	+ 1	—	—	—	—	—
Overton	Z.	86·6	48	i 11	43	+ 2	—	—	—	e 13	49
Pierce Ferry		86·7	49	i 11	43	+ 1	—	—	—	i 13	52
Tucson		87·0	53	i 11	44	+ 1	—	—	—	e 13	47
Logan		91·1	44	e 12	1	- 1	—	—	—	e 13	55
College		91·4	13	e 12	4	0	—	—	—	e 14	9

Feb. 3d. 13h. 3m. 52s. Epicentre 21°·7N. 100°·2E. (as at 2h.).

A = -·1647, B = +·9153, C = +·3676;  $\delta = +3$ ;  $h = +4$ ;  
D = +·984, E = +·177; G = -·065, H = +·362, K = -·930.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.
				m.	s.		m.	s.		m.	s.	
Nanking		19·5	54	—	—	—	—	—	—	e 9	16	Q
Hyderabad		20·9	262	4	46	0	8	40	+ 5	—	—	e 10·4
Dehra Dun	N.	21·4	298	(5	0)	+ 9	(e 8	14)	-31	—	—	10·6
New Delhi	E.	21·9	293	i 4	55 <sub>a</sub>	- 2	8	52	- 2	—	—	—
Colombo	E.	24·5	236	5	28	+ 6	9	50	+10	—	—	14·5
Poona	E.	24·9	267	e 5	25	- 1	e 9	50	+ 3	11	10	SSS
Bombay		25·8	269	5	38	+ 4	e 10	5	+ 3	—	—	13·8
Djakarta		28·5	166	e 6	5	+ 6	—	—	—	—	—	16·1
Frunse		30·1	321	e 6	23	+10	—	—	—	—	—	—
Andijan		30·3	314	e 6	12	- 3	e 11	12	- 3	—	—	—
Fergana		30·4	314	e 6	13	- 3	—	—	—	—	—	—
Irkutsk		30·7	5	6	18	- 1	—	—	—	—	—	—
Obi-garm		31·2	310	i 6	14?	- 9	e 11	17?	-12	—	—	—
Stalinabad		31·8	310	e 6	25	- 3	i 11	32	- 6	—	—	—
Tashkent		32·4	314	e 6	30	- 4	—	—	—	—	—	—
Tobimkent		32·8	316	i 6	32	- 5	11	47?	- 7	—	—	—
Samarkand		33·5	309	e 6	46	+ 3	—	—	—	—	—	—
Vladivostok		33·9	44	—	—	—	e 12	1?	-10	—	—	—
Mary		36·6	305	—	—	—	i 12	56	+ 3	—	—	—
Sverdlovsk		45·5	331	i 8	20	- 2	i 15	2	- 3	—	—	—

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Tiflis	50.3	307	i 9 3†	+ 3	e 16 12	- 1	—	—
Moscow	56.9	323	9 46	- 3	e 17 43?	+ 1	—	—
Ksara	57.4	297	e 8 20	-93	e 16 12	-97	—	—
Collmberg	71.7	319	e 11 23	- 3	—	—	e 11 50	P <sub>c</sub> P
Stuttgart	74.6	317	e 11 42	- 1	—	—	e 12 0	P <sub>c</sub> P
Strasbourg	75.6	317	e 11 43	- 5	—	—	—	—
College	79.4	24	i 12 8	- 1	—	—	e 13 32	?
Algiers Univ.	z. 82.8	306	12 26	- 1	—	—	e 12 33	P <sub>c</sub> P
Pretoria	z. 84.3	240	i 12 37	+ 2	—	—	—	—
Hungry Horse	103.8	22	e 14 6	+ 1	—	—	e 18 20	PP
Overton	z. 113.5	29	e 19 16	PP	—	—	—	—

Additional reading and note :—

Dehra Dunn readings have been reduced by 5m.

Algiers Univ. eZ = 12m.51s.

Long waves were also recorded at Bandung, Helsinki, Upsala, and Kew.

Feb. 3d. 15h. 0m. 28s. Epicentre 42°·6N. 20°·7E. (as on 1947, Feb. 5d.).

Intensity VI at Péc ; IV at Djacovica ; III at Vel Crusa, etc. Macroseismic radius 40km.  
Macroseismic epicentre 42°·6N. 20°·3E.

M. Uzelac.

Annuaire macroséismique de l'Institut Séismologique de Béograd, Année 1950, Nouvelle Série No. 10, Béograd, 1951, p. 53.

A = +·6907, B = +·2612, C = +·6744 ;  $\delta$  = +11 ;  $h$  = -3 ;  
D = +·353, E = -·935 ; G = +·631, H = +·239, K = -·738.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Taranto	3.4	231	0 51	- 4	1 37	0	—	—
Bucharest	4.3	64	e 1 16	P*	e 2 9	S*	e 1 33	P <sub>c</sub>
Zagreb	4.7	314	1 29	P <sub>c</sub>	e 2 27	S*	—	i 2.7
Messina	5.9	223	e 1 54	P <sub>c</sub>	e 2 36	- 4	—	e 3.4
Triest	5.9	304	e 1 28	- 3	e 2 29	-11	i 1 50	P*
Rome	6.2	266	e 1 36	+ 1	—	—	—	e 3.8
Padova	6.7	289	e 1 52	P*	e 3 17	S*	—	e 4.3
Florence Arc.	7.0	283	e 1 48	+ 2	e 3 0	- 8	e 1 58	P*
Florence Xim	7.0	283	e 2 44	?	i 3 37	S*	—	—
Bologna	7.1	289	e 1 49	+ 1	e 2 48	-22	e 3 31	S*
Prato	7.1	284	—	—	i 2 49	-21	i 3 33	S*
Prague	8.6	332	e 2 48	P <sub>c</sub>	e 3 39	- 9	e 4 23	S*
Pavia	8.7	291	—	—	e 3 32?	-18	—	—
Chur	9.0	302	e 2 14	+ 1	e 3 56	- 2	—	—
Ravensburg	9.4	307	e 2 20?	+ 2	—	—	—	e 5.3
Zürich	9.8	303	e 2 21	- 3	e 4 14	- 3	—	—
Stuttgart	10.1	311	e 2 25	- 3	e 4 1	-24	—	e 5.6
Collmberg	e. 10.2	332	e 3 35	?	e 4 16	-11	—	—
Jena	N. 10.4	326	—	—	e 4 30	- 2	—	e 6.2
Basle	10.5	302	e 2 46	+11	e 4 49	+14	—	—
Strasbourg	10.9	308	e 2 53	PP	e 4 59	+15	—	e 6.0
Algiers Univ.	z. 14.8	252	e 3 33	+ 1	—	—	—	—

Additional readings :—

Triest iS<sub>c</sub> = 3m.4s.

Prague e = 3m.0s., eS\*? = 3m.57s.

Stuttgart e = 2m.30s., 2m.40s., 4m.58s., and 5m.17s.

Jena eE = 4m.33s. and 5m.6s., eN = 5m.9s., eEN = 5m.53s.

Strasbourg e = 4m.12s., 5m.12s., and 5m.18s.

Long waves were also recorded at Karlsruhe and Besançon.



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1950

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Feb. 3d. 16h. 45m. 27s. Epicentre 54°·0N. 162°·4W. (as on 1946, June 9d.).

A = -·5628, B = -·1785, C = +·8071;  $\delta = +2$ ;  $h = -7$ ;  
D = -·302, E = +·953; G = -·769, H = -·244, K = -·590.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
College		13·1	28	e 3 11	+ 1	e 5 51	SS	e 3 20	PP	e 6·8
Victoria		24·9	86	i 5 28 <sub>a</sub>	+ 2	e 9 56	+ 9	—	—	—
Seattle		25·8	87	e 5 54	+20	—	—	i 6 16	PP	e 11·6
Shasta Dam		29·8	100	e 6 12	+ 1	—	—	e 9 11	P <sub>c</sub> P	—
Hungry Horse		30·4	81	e 6 17	+ 1	i 12 55	SS	e 9 7	P <sub>c</sub> P	—
Mineral	z.	30·5	99	i 5 26 <sub>k</sub>	-51	—	—	i 9 8	P <sub>c</sub> P	—
Berkeley		31·7	104	i 6 29	+ 2	e 11 41	+ 5	e 9 39	?	e 15·0
Reno	z.	32·0	99	e 6 35	+ 5	—	—	e 7 33	PP	—
Santa Clara	E.	32·3	104	e 8 27	?	—	—	—	—	e 14·3
Lick	z.	32·4	104	i 6 42 <sub>a</sub>	+ 8	—	—	i 7 44	PP	—
Fresno	z.	33·9	102	e 6 55	+ 8	—	—	i 7 5	?	—
Tinemaha	z.	34·6	100	i 6 56	+ 3	—	—	i 7 9	?	—
China Lake	z.	35·8	101	i 7 5	+ 2	—	—	i 7 12	?	—
Pasadena		36·7	103	e 7 10	0	—	—	e 7 22	?	e 15·8
Overton	z.	37·2	98	i 7 18	+ 3	—	—	i 7 30	?	—
Riverside	z.	37·3	103	e 7 16	0	—	—	i 7 31	?	—
Boulder City		37·4	99	e 7 2	-14	—	—	—	—	—
Pierce Ferry		37·7	98	i 7 21	+ 2	—	—	e 8 24	PP	—
Palomar	z.	38·0	104	i 7 23	+ 2	—	—	—	—	—
Tucson		42·3	98	i 7 59	+ 2	—	—	e 9 52	P <sub>c</sub> P	e 20·8
Vladivostok		43·3	284	e 7 56	- 9	e 14 36	+ 3	—	—	—
Chicago		49·3	72	—	—	e 15 54	- 5	—	—	e 20·9
St. Louis		50·0	77	e 8 55	- 3	i 16 8	- 1	—	—	—
Cleveland	N.	52·9	68	—	—	e 26 22	Q	—	—	33·4
Ottawa		53·4	61	9 22	- 2	—	—	11 6	PP	29·0
Shawinigan Falls	N.	54·1	58	e 9 40	+11	—	—	—	—	—
Seven Falls	E.	54·7	56	9 37	+ 4	—	—	e 9 44	?	29·6
Weston		57·7	61	i 9 55	0	—	—	—	—	30·6
Sverdlovsk		64·1	336	i 10 34	- 4	e 19 25	+11	—	—	—
Moscow		69·4	348	e 11 9	- 3	—	—	—	—	—
Frunse		71·9	320	11 25	- 2	—	—	—	—	—
Tchimkent		74·2	323	i 11 37	- 3	—	—	—	—	—
Andijan		74·6	320	11 40	- 3	e 21 28	+10	—	—	—
Fergana		75·1	320	11 39	- 7	—	—	—	—	—
Tashkent		75·2	323	i 11 43	- 3	—	—	—	—	—
Prague		76·3	3	e 11 50	- 2	e 22 5?	PS	e 12 16	P <sub>c</sub> P	—
Obi-garm		77·4	321	i 11 57?	- 1	—	—	—	—	—
Stuttgart	z.	77·4	6	e 11 57	- 1	—	—	e 12 8	P <sub>c</sub> P	—
Samarkand		77·5	324	e 12 1	+ 2	—	—	—	—	—
Strasbourg		77·5	7	i 11 59 <sub>k</sub>	0	—	—	—	—	—
Stalinabad		77·8	322	i 11 56	- 5	—	—	—	—	—
Tiflis		81·8	340	12 21	- 1	—	—	—	—	—
Leninakan		82·9	341	e 12 33?	+ 5	—	—	—	—	—
Algiers Univ.	z.	88·7	12	e 12 55	- 2	—	—	e 12 30	?	—
Ksara		91·1	347	e 13 30	+22	e 24 33	+29	—	—	—
Bombay		93·4	309	—	—	e 23 33?	[-19]	—	—	—
Pretoria	z.	150·7	340	e 19 47	[- 1]	—	—	i 19 53	PKP <sub>1</sub>	—

Additional readings:—

College iP = 3m.23s.

Seattle e = 6m.1s. and 6m.8s., i = 6m.21s., 6m.47s., and 7m.6s.

Lick iZ = 6m.57s. and 7m.0s.

Boulder City i = 7m.26s. and 7m.40s.

Pierce Ferry i = 7m.30s. and 7m.49s.

Tucson i = 8m.10s.

St. Louis i = 9m.10s. and 9m.18s.

Ottawa e = 9m.35s.

Algiers Univ. eZ = 13m.7s.

Long waves were also recorded at Bermuda, Honolulu, La Paz, Tamanrasset, Kodai-kanal, Rome, and at other North American stations.

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1950

82

Feb. 3d. 18h. 27m. 47s. Epicentre 41°·9N., 143°·6E. Depth of focus 0·010.  
(as on 1949, August 3d.).

Intensity V at Urakawa; IV at Hatinohe; II-III at Sapporo and Morioka. Macro-seismic radius 200-300km.  
Epicentre 41°·7N. 143°·2E. Depth 40km.  
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1950, Tokyo, 1952, p. 10, with macroseismic chart.

A = -·6009, B = +·4430, C = +·6653;  $\delta = -5$ ;  $h = -2$ ;  
D = +·593, E = +·805; G = -·536, H = +·395, K = -·747.

		$\Delta$ °	Az. °	P.		O-C.		S.		O-C.		Supp.	
				m.	s.	s.	m.	s.	s.	m.	s.		
Nemuro		2·0	46	0	40	+ 7	1	10	+13	—	—	—	—
Sapporo		2·0	305	0	27k	- 6	1	6	+ 9	—	—	—	—
Hatinohe		2·1	229	0	25	- 9	0	46	-14	—	—	—	—
Aomori		2·4	243	0	19k	-19	0	54	-13	—	—	—	—
Morioka		2·9	220	0	43	- 2	1	13	- 6	—	—	—	—
Akita		3·4	232	0	51	- 1	1	23	- 9	—	—	—	—
Mizusawa	E.	3·4	316	0	49	- 3	1	25	- 7	—	—	—	—
Sendai		4·2	211	0	57	- 6	1	41	-10	—	—	—	—
Hukusima		4·8	212	1	7	- 4	1	57	- 9	—	—	—	—
Onahama		5·4	204	1	22	+ 2	2	31	+10	—	—	—	—
Aikawa		5·6	229	1	15	- 7	—	—	—	—	—	—	—
Mito		6·0	205	1	29	+ 1	2	29	- 7	—	—	—	—
Kakioka		6·3	207	1	25	- 7	2	32	-11	—	—	—	—
Tukubasan		6·3	207	1	33	+ 1	2	34	- 9	—	—	—	—
Maebasi		6·5	214	2	0	+25	3	11	+23	—	—	—	—
Kumagaya		6·6	211	1	36	0	2	38	-12	—	—	—	—
Nagano		6·7	221	1	41	+ 4	3	21	+28	—	—	—	—
Matusiro		6·8	220	1	27	-12	—	—	—	—	—	—	—
Tokyo		6·8	207	1	37	- 2	2	47	- 8	—	—	—	—
Wazima		6·8	231	1	45	+ 6	—	—	—	—	—	—	—
Yokohama		7·1	207	1	49	+ 6	—	—	—	—	—	—	—
Hunatu		7·4	213	2	4	+17	3	16	+ 6	—	—	—	—
Mera		7·6	205	1	42	- 8	—	—	—	—	—	—	—
Misima		7·7	210	1	52	+ 1	—	—	—	—	—	—	—
Osima		7·8	207	1	51	- 1	—	—	—	—	—	—	—
Shizuoka		8·0	212	2	9	+14	—	—	—	—	—	—	—
Omaesaki		8·4	212	3	1	+61	—	—	—	—	—	—	—
Nagoya		8·5	220	2	3	+ 1	4	17	+40	—	—	—	—
Vladivostok		8·7	282	e 1	55	-10	i 3	34	- 8	—	—	—	—
Kameyama		9·0	221	2	22	+13	4	1	+12	—	—	—	—
Owase		9·8	219	2	31	+11	—	—	—	—	—	—	—
Irkutsk		28·4	306	5	44	- 3	10	24?	- 2	—	—	—	—
College		44·1	35	e 8	7	+ 7	—	—	—	i 8	27	pP	—
Andijan		52·0	295	9	1	0	e 16	20	+ 4	—	—	—	—
Fergana		52·6	296	e 9	5	- 1	—	—	—	—	—	—	—
Sverdlovsk		52·7	317	i 9	5	- 2	—	—	—	—	—	—	—
Tchimkent		53·2	297	i 9	8	- 2	—	—	—	—	—	—	—
Tashkent		53·9	297	e 9	13	- 3	—	—	—	—	—	—	—
Obi-garm		54·8	293	i 9	20?	- 2	—	—	—	—	—	—	—
Stalinabad		55·5	293	i 9	24	- 3	—	—	—	—	—	—	—
Samarkand		56·2	295	e 9	26	- 6	—	—	—	—	—	—	—
Moscow		64·4	323	e 10	42	+14	—	—	—	—	—	—	—
Shasta Dam		66·9	56	e 10	52	+ 8	—	—	—	—	—	—	—
Hungry Horse		67·1	45	i 10	53	+ 8	—	—	—	i 11	13	pP	—
Reno	z.	69·2	55	i 11	8k	+10	—	—	—	i 11	22	pP	—
Fresno	z.	70·9	58	e 11	17	+ 9	—	—	—	e 11	32	pP	—
Tinemaha	z.	71·6	57	i 11	22	+ 9	—	—	—	i 11	43	pP	—
China Lake	z.	72·9	57	i 11	29	+ 9	i 11	53	sP	i 11	44	pP	—
Pasadena	z.	73·6	59	e 11	33	+ 9	i 11	56	sP	i 11	48	pP	—
Riverside	z.	74·2	59	e 11	37	+ 9	i 12	0	sP	i 11	51	pP	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
		°	°	m. s.	s.	m. s.	s.	m. s.
Overton	z.	74.3	55	i 11 38	+10	—	—	i 11 53 pP
Boulder City		74.5	56	e 11 39	+ 9	e 12 6	sP	—
Palomar	z.	74.9	59	i 11 41	+ 9	—	—	i 11 55 pP
Pierce Ferry		74.9	55	e 11 42	+10	—	—	i 11 57 pP
Collmberg	z.	77.7	331	e 11 53	+ 5	—	—	—
Tucson		79.4	56	e 12 6	+ 9	—	—	e 12 21 pP
Stuttgart	z.	81.2	322	e 12 8	+ 2	—	—	e 12 30 pP
Ottawa		86.3	27	e 12 38	+ 6	—	—	e 12 51 pP
Weston		90.4	26	i 13 8	+16	—	—	—

Hungry Horse also gives  $i = 11m.8s.$  and  $12m.32s.$   
Long waves were recorded at Kew.

Feb. 3d. 18h. 53m. 42s. Epicentre  $54^{\circ}0N. 162^{\circ}4W.$  (as at 16h.).

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
		°	°	m. s.	s.	m. s.	s.	m. s.
College		13.1	28	e 3 12	+ 2	—	—	—
Hungry Horse		30.4	81	i 6 18	+ 2	—	—	i 9 13 PcP
Tinemaha	z.	34.6	100	i 7 4	+11	—	—	i 7 18 ?
China Lake	z.	35.8	101	e 7 4	+ 1	—	—	—
Overton	z.	37.2	98	i 8 21	PP	—	—	—
Boulder City		37.4	99	e 7 18	+ 2	—	—	—
Pierce Ferry		37.7	98	e 7 22	+ 3	—	—	—
Palomar	z.	38.0	104	i 7 37	+16	—	—	—
Tucson		42.3	98	e 7 58	+ 1	—	—	—
Tacubaya		58.8	99	e 9 59	- 3	e 18 18	+11	—
Stuttgart	z.	77.4	6	e 11 58	0	—	—	—
Rome		84.4	4	—	—	e 22 18	-43	e 28 18 SS

Feb. 3d. Readings also at 0h. (Brisbane, Hungry Horse, Shasta Dam, Pierce Ferry, and Huancayo), 1h. (Aberdeen), 2h. (Helsinki, La Paz, Hungry Horse, Overton, Pierce Ferry, and Tucson), 4h. (Tacubaya and near Alicante), 5h. (Tucson), 6h. and 7h. (near Ashkabad), 9h. (near Andijan), 10h. (Stuttgart (3)), 11h. (near Andijan), 15h. (College, Tacubaya, Andijan, Boulder City, Overton, Pierce Ferry, and Tucson), 16h. (Shasta Dam, New Plymouth, Arapuni, Auckland, near Wellington, Cobb River, Kaimata, Christchurch, and near Prague), 18h. (Tacubaya, Pierce Ferry, Tucson, Hungry Horse, Riverside, and China Lake), 19h. (Hungry Horse and near Ottawa), 20h. (near Ottawa), 21h. (Boulder City, Overton, Pierce Ferry, and Tucson), 22h. (College).

Feb. 4d. 0h. Atlantic median crest.

Paris iP = 35m.46s.  
Clermont-Ferrand eP = 35m.56s.  
Besançon eP = 36m.17s.  
Strasbourg iP = 36m.26s.  
Stuttgart eZ = 36m.27s.  
Hungry Horse eP? = 40m.34s.  
Overton eZ = 41m.25s.  
Pierce Ferry e = 41m.26s.  
Tucson eP? = 41m.27s., e = 41m.37s.  
Tinemaha iPZ = 41m.38s.  
China Lake ePZ = 41m.41s.

Feb. 4d. 2h. 7m. 51s. Epicentre  $54^{\circ}0N. 162^{\circ}4W.$  (as on 3d.).

$A = -.5628, B = -.1785, C = +.8071; \delta = +2; h = -7.$

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
College		13.1	28	e 3 12	+ 2	e 5 50	+12	—	e 7.6
Klyuchi		21.0	291	e 4 13?	-34	—	—	—	—
Victoria		24.9	86	5 29	+ 3	—	—	—	—
Seattle		25.8	87	e 5 51	+17	—	—	e 6 24 PP	e 14.2
Shasta Dam		29.8	100	e 6 12	+ 1	—	—	e 9 11 PcP	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Hungry Horse		30.4	81	i 6 17	+ 1	—	—	i 9 13	PcP
Mineral	z.	30.5	99	e 6 13	- 4	—	—	i 6 29	?
Berkeley		31.7	104	e 8 49	?	e 11 10	-27	—	—
Reno	z.	32.0	99	e 6 33	+ 3	—	—	—	e 13.6
Fresno	z.	33.9	102	e 6 55	+ 8	—	—	e 9 16	PcP
Tinemaha	z.	34.6	100	i 6 57	+ 4	—	—	e 7 3	?
China Lake	z.	35.8	101	i 7 4k	+ 1	—	—	e 9 28	PcP
Mount Wilson	z.	36.7	103	e 7 12	+ 2	—	—	e 7 18	?
Pasadena		36.7	103	e 7 18	+ 8	—	—	—	—
Overton	z.	37.2	98	i 7 16	+ 1	e 13 19	PcS	i 7 27	?
Boulder City		37.4	99	e 7 18	+ 2	e 13 33	PcS	—	—
Pierce Ferry		37.7	98	i 7 22	+ 3	e 13 18	+ 8	—	—
Palomar	z.	38.0	104	i 7 23k	+ 2	—	—	i 7 37	?
Rapid City	E.	39.0	80	e 6 39	-51	—	—	—	—
Tucson		42.3	98	e 7 59	+ 2	—	—	e 9 30	PP
Vladivostok		43.3	284	e 7 57	- 8	—	—	—	—
St. Louis		50.0	77	e 8 58	0	i 16 11	+ 2	—	—
Irkutsk		52.0	308	e 9 8	- 5	—	—	—	—
Ottawa		53.4	61	e 9 23	- 1	—	—	e 9 36	?
Shawinigan Falls n.		54.1	58	e 9 42	+13	—	—	—	—
Weston		57.7	61	i 9 56	+ 1	—	—	—	—
Sverdlovsk		64.1	336	i 10 36	- 2	e 19 21	PS	—	—
Rathfarnham Cas.	z.	71.2	14	e 18 33	?	—	—	—	—
Frunse		71.9	320	e 11 26	- 1	—	—	—	e 30.3
Tchimkent		74.2	323	i 11 29	-11	—	—	—	—
Andijan		74.6	320	i 11 41	- 2	e 21 30	+12	—	—
Collmberg		75.0	3	e 11 44	- 1	—	—	—	—
Fergana		75.1	320	i 11 42	- 4	—	—	—	—
Tashkent		75.2	323	e 11 41	- 5	—	—	—	—
Prague		76.3	3	e 11 53	+ 1	e 21 41	+ 4	—	—
Paris		76.8	11	i 11 56	+ 1	—	—	e 12 2	PcP
Obi-garm		77.4	321	i 11 56	- 2	—	—	—	—
Stuttgart	z.	77.4	6	e 11 57	- 1	—	—	—	—
Samarkand		77.5	324	e 12 0	+ 1	—	—	—	—
Strasbourg		77.5	7	i 11 59k	0	—	—	e 12 23	?
Stalinabad		77.8	322	i 11 58	- 3	e 22 2	+ 9	—	—
Basle		78.5	8	e 12 5	+ 1	e 22 9	+ 8	—	—
Besançon		78.6	8	e 12 5	0	—	—	—	—
Clermont-Ferrand		79.9	10	e 12 12	0	—	—	—	—
Algiers Univ.	z.	88.7	12	e 12 57	0	—	—	e 13 16	?
Pretoria	z.	150.7	340	e 19 47	[- 1]	—	—	i 19 54	PKP <sub>2</sub>

Additional readings :—

Seattle e = 6m.1s., 6m.38s., and 7m.12s.

China Lake iZ = 7m.18s.

Long waves were also recorded at Honolulu, Kew, Rome, Bombay, and at other North American stations.

Feb. 4d. 9h. 30m. 52s. Epicentre 39°·5N. 40°·6E. (as on 1949, Aug. 29d.).

Approximate.

A = +·5875, B = +·5035, C = +·6335;  $\delta = -1$ ;  $h = -1$ ;  
D = +·651, E = -·759; G = +·481, H = +·412, K = -·774.

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Erevan		3.1	76	e 0 44	- 7	1 17	-12
Tiflis		3.9	53	e 0 52	-10	i 1 32?	-18
Platigorsk		4.9	21	e 1 13	- 4	—	—
Grozny		5.4	45	e 1 31	+ 7	—	—
Ksara		6.8	215	e 1 34?	-10	e 4 6	S <sub>r</sub>
Collmberg		22.6	310	e 5 10	+ 7	—	—
Stuttgart	z.	24.2	304	e 5 26	+ 7	—	—
College		75.6	5	e 11 47	- 1	—	—
Hungry Horse		89.7	344	e 13 1	0	—	—

Long waves were recorded at Bucharest.

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Feb. 4d. 11h. Undetermined shock.

New Delhi eE = 3m.25s., eN = 4m.51s. and 5m.56s.  
 Stalinabad iP = 3m.35s.  
 Obi-garm iP = 3m.38s.?, iS = 5m.19s.?  
 Samarkand eP = 4m.2s.  
 Fergana eP = 4m.5s., S = 6m.8s.  
 Andijan P = 4m.12s., eS = 6m.19s.  
 Tashkent eP = 4m.13s.  
 Tchimkent iP = 4m.23s., iS = 6m.37s.  
 Naryn eP = 4m.34s.  
 Frunse eP = 4m.37s., eS = 7m.17s.  
 Almata iP = 5m.1s.  
 Bombay eN = 5m.7s., eE = 7m.50s., eN = 13m.33s.  
 Semipalatinsk eP = 6m.32s.  
 Poona ePE = 6m.42s., PPE = 6m.49s., PPPE = 6m.58s., QE = 8m.27s., SE = 8m.36s.,  
 RE = 8m.55s.  
 Kodaikanal eE = 12m.0s.  
 College eP? = 13m.45s.

Feb. 4d. Readings also at 0h. (Algiers Univ., Tiflis, and near Apia), 1h. (Apia and near Ashkabad), 3h. (near Huancayo), 4h. (Ashkabad), 6h. (College and near La Paz), 11h. (near Zürich and near Andijan), 12h. (College (2), Hungry Horse and Overton), 14h. (Reykjavik), 16h. (near Huancayo and near Reykjavik), 17h. (Reykjavik, Prague, and near Alicante), 18h. (La Paz, Hungry Horse, and near Reykjavik (6)), 19h. (College and Hungry Horse), 20h. (New Delhi, Tashkent, Tchimkent, Frunse, near Fergana, Andijan, Obi-garm, Stalinabad, Naryn, and Samarkand), 21h. (College, near Obi-garm, and near Klyuchi), 23h. (College, Hungry Horse, Boulder City, Overton, Pierce Ferry, and Pretoria).

Feb. 5d. 1h. 23m. 42s. Epicentre 48°·2S. 164°·2E. (as on January 5d.).

Intensity IV in the South Island; slight damage in Stewart Island.

Epicentre 48°·5S., 164°E.

Seismological Report for January, February, March, 1950. Seismological Observatory, Wellington, New Zealand, p. 9.

R. C. Hayes.

Earthquake origins in New Zealand during the year 1950, New Zealand Journal of Science and Technology, Sect. B, Vol. 33, No. 4, January, 1952, p. 306, with map on p. 305.

$$A = -.6438, B = +.1822, C = -.7432; \quad \delta = +2; \quad h = -5;$$

$$D = +.272, E = +.962; \quad G = +.715, H = -.202, K = -.669.$$

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Christchurch		55	i 1 52	- 1	i 3 21	+ 1	—	—
Kaimata	N.E.	7.6	e 2 6	P*	i 3 23	0	—	—
Cobb River	E.	9.3	e 2 18	+ 1	4 5	0	—	—
Wellington		10.2	e 2 29	- 2	i 4 25	- 2	—	—
New Plymouth	E.	11.6	2 53	+ 3	e 5 5	+ 4	—	—
Arapuni		13.1	e 2 56	- 14	e 5 37	- 1	—	—
Auckland	N.	13.8	i 3 23	+ 4	i 5 51	- 3	—	—
Riverview		17.4	i 4 10 <sub>a</sub>	+ 4	i 7 26	+ 7	i 7 46	SS e 8.3
Brisbane		22.4	i 5 0	- 2	i 9 20	+ 16	i 5 38	PP i 11.5
Apia		39.7	e 7 31	- 5	e 13 47	+ 7	e 9 16	PP e 16.8
Perth		39.7	i 9 16	PP	i 13 40	0	i 16 11	SS —
Bandong	E.	62.9	—	—	18 33	- 27	—	—
Djakarta		64.0	e 10 19 <sub>a</sub>	- 19	e 18 56	- 17	—	—
Honolulu		77.1	i 11 52	- 5	e 30 15	SSS	—	e 36.8
La Plata	E.	89.1	23 6	SKS	(23 6) [- 21]	—	24 42	PS 37.1
Grahamstown		90.4	i 12 49	- 15	—	—	—	—
Vladivostok		95.3	e 13 19	- 8	i 26 15	PS	e 17 10	PP —
Kodaikanal	E.	95.4	e 14 36	+ 68	—	—	—	—
Hyderabad	N.	100.0	—	—	e 24 16	[- 11]	—	—
Huancayo		100.2	i 13 43	- 6	i 24 23	[- 5]	e 31 48	SS e 41.3
La Paz		100.5	13 42	- 9	i 26 51	PS	17 51	PP 47.1
Poona	N.	103.8	e 17 40	PKP	24 37	[- 8]	e 18 28	PP —
Bombay		104.8	e 18 42	PP	e 25 54	- 6	—	—
Pasadena		107.2	e 18 15	[- 12]	e 28 6	PS	e 18 41	PP e 44.5
Palomar	Z.	107.4	i 18 40	PP	—	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Santa Clara	E.	107.5	52	—	—	(e 38 14)	SSS	(e 40 6)	Q (e 48.6)
Riverside	Z.	107.6	58	e 18 43	PP	—	—	—	—
Berkeley		107.7	52	i 18 54	PP	e 28 3	PS	e 34 0	SS e 48.9
New Delhi	N.	108.8	291	—	—	e 26 19	S	i 34 8	SS —
Tucson		110.2	64	e 18 26	[- 8]	e 28 23	PS	e 19 2	PP e 45.7
Boulder City		110.4	58	e 18 27	[- 7]	—	—	—	—
Pierce Ferry		111.0	59	e 18 27	[- 8]	—	—	e 19 7	PP —
Overton	Z.	111.1	58	e 18 29	[- 6]	—	—	—	—
Irkutsk		112.3	324	e 19 22	PP	e 28 57	PS	e 34 24	SS —
Chinchina		113.5	110	—	—	e 29 34	PS	—	47.3
Bogota		114.2	111	e 21 46	PPP	e 22 28	PKS	—	62.3
Logan		116.1	55	e 19 44	PP	e 29 35	PS	e 49 51	Q e 57.4
Sitka		116.6	32	—	—	e 29 39	PS	—	e 54.7
College		118.7	20	i 18 40	[- 10]	—	—	—	e 49.4
Hungry Horse		119.3	48	e 18 43	[- 8]	—	—	i 18 53	PKP —
Stalinabad		120.7	295	—	—	e 27 15	{- 3}	e 36 43	SS —
Tashkent		122.1	297	i 23 12	PPP	i 27 43	{+ 15}	i 30 23	PS —
Rapid City	E.	122.5	58	e 18 34	[- 24]	—	—	e 21 58	? e 57.2
Tchimbkent		122.6	298	e 18 48	[- 10]	—	—	—	—
St. Louis		127.1	70	e 18 54	[- 12]	i 31 5	PS	—	—
San Juan		129.7	107	e 22 12	PP	e 38 45	SS	e 43 8	SSS e 49.7
Chicago		130.5	68	—	—	e 38 48	SS	—	e 54.3
Cleveland		134.2	72	e 19 10	[- 10]	i 22 41	SKP	e 39 17	SS 57.1
Sverdlovsk		135.0	310	19 13	[- 8]	22 45	PKS	e 24 48	PPP —
Washington		135.7	78	i 19 17	[- 6]	e 23 11	PKS	i 20 6	? e 64.9
Pennsylvania		136.2	74	i 22 8	PP	e 44 48	SSS	—	—
Philadelphia		137.5	78	e 31 57	PS	e 39 37	SS	e 36 27	? e 62.8
Tiflis		137.6	284	e 19 30	[+ 4]	e 32 31	PS	e 22 18	PP —
City College	N.Y.	138.8	77	e 22 16	PP	—	—	—	e 48.5
Fordham		138.8	77	e 18 42	?	e 40 44	SS	—	66.7
Ksara		139.2	268	e 20 15	?	e 29 56	?	—	—
Helwan		139.8	260	i 22 58	PKS	—	—	e 25 26	PPP —
Ottawa		139.8	69	19 19	[- 11]	e 40 42	SS	—	67.8
Bermuda		140.2	94	e 33 46	PS	e 42 8	SSP	e 46 40	SSS e 60.3
Harvard		141.2	76	i 22 29	PP	i 23 28	PKS	e 41 44	SSP e 67.1
Weston		141.2	76	e 19 10	[- 23]	41 32	SSP	e 22 26	PP —
Seven Falls	E.	143.6	69	19 25	[- 12]	e 32 56	PS	e 42 12	SSP 67.3
Yalta		145.8	283	e 20 16	PP	—	—	—	—
Moscow		147.0	303	19 37	[- 6]	—	—	—	—
Tamanrasset	Z.	149.5	221	i 19 48k	[+ 1]	e 36 18	PPS	e 23 18	PP e 60.3
Helsinki		153.8	313	—	—	—	—	e 63 26	Q e 70.9
Skalnate Pleso		156.3	286	e 25 36	?	e 36 42	PPS	e 34 45	PS e 77.3
Upsala		157.4	313	—	—	e 43 42	SS	e 68 18?	Q e 85.3
Rome		159.1	264	e 19 37	[- 23]	e 44 18	SS	e 50 18	SSS —
Triest		159.7	274	e 20 48	PKP <sub>2</sub>	e 23 32	PKS	e 24 9	PP e 87.3
Prague		160.2	287	e 20 30	PKP <sub>2</sub>	e 27 3	[- 2]	e 24 9	PP e 70.3
Padova		160.6	270	e 19 36	[- 25]	—	—	—	—
Florence Xim		160.7	267	e 24 4	PP	i 35 4	?	—	—
Copenhagen		161.1	304	e 20 38	PKP <sub>2</sub>	44 50	SS	36 23	? 74.3
Collmberg		161.2	291	e 20 38?	PKP <sub>2</sub>	e 44 30	SS	e 51 30	SSS e 86.3
Potsdam	Z.	161.2	294	i 20 40k	PKP <sub>2</sub>	e 32 6	P <sub>0</sub> SPKP	—	— e 83.3
Cheb		161.5	286	e 23 6	PKS	e 26 46	[- 20]	e 45 36	SSP e 80.3
Stuttgart		163.4	282	e 20 46	[+ 42]	e 38 48	PPS	e 21 29	PKP <sub>2</sub> e 91.3
Zürich		163.6	276	e 20 49	[+ 45]	—	—	e 21 23	PKP <sub>2</sub> e 106.3
Strasbourg		164.3	281	e 20 46	[+ 41]	e 35 22	PSKS	e 21 28	PKP <sub>2</sub> e 79.1
Almeria		165.0	226	19 36	[- 30]	23 4	PKS	20 35	PKP <sub>2</sub> 93.3
Alicante		165.2	234	19 50	[- 16]	31 12	{- 27}	20 58	PKP <sub>2</sub> e 77.8
Granada		165.8	224	21 32 <sub>a</sub>	PKP <sub>2</sub>	32 19	{+ 37}	36 11	SKSP 99.4
Malaga	Z.	165.8	220	—	—	i 52 41	SSS	i 55 9	? 92.1
De Bilt		166.0	294	—	—	e 46 18?	SSP	—	e 78.3

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Clermont-Ferrand	166.9	266	e 22 22	?	e 26 38	[-32]	e 25 3	PP 88.3
Aberdeen	167.8	322	—	—	i 37 13	?	i 46 5	SS 91.4
Paris	167.8	280	e 30 36	?	e 45 44	SS	e 46 36	SSP e 86.3
Toledo	168.2	229	e 21 42	PKP <sub>2</sub>	e 53 11	SSS	e 28 47	PPP 99.0
Kew	169.5	294	e 21 31	PKP <sub>2</sub>	e 46 10	SS	—	e 84.3
Rathfarnham Castle	172.1	314	e 22 56	?	—	—	—	e 88.3

Additional readings and notes :—

Riverview i = 4m.14s., iE = 7m.36s.

Brisbane iPN = 5m.4s., iZ = 5m.11s., iSE = 9m.28s.

Perth i = 14m.48s.

La Paz iSKS = 24m.11s.

Poona ePPN = 20m.40s., PSN = 27m.40s., PPSN = 28m.43s., SSN = 33m.28s., SSPN = 33m.51s., SSSN = 37m.31s.

Pasadena ePPS?EN = 29m.6s., eSS?EN = 33m.51s.

Santa Clara readings have been reduced by 10m.

Berkeley iPPSZ = 29m.36s., ePKP,PKPZ = 38m.28s., eQZ = 45.0m.

New Delhi eN = 31m.36s. and 38m.24s.

Tucson eSS? = 34m.38s., eSSS? = 38m.42s.

Tashkent eSS = 36m.47s.

St. Louis e = 19m.45s. and 20m.52s., eSS? = 37m.24s.

Cleveland eN = 23m.43s., 23m.47s., and 48m.36s.

Sverdlovsk SS = 39m.42s., SSS = 44m.48s.

Tiflis PKS = 22m.2s.

City College N.Y. eSS? = 30m.35s., eSSS = 35m.51s.

Fordham e = 19m.18s. and 19m.38s.

Tamanrasset ePPPZ = 26m.3s., eSKSPZ = 33m.18s., eSSZ = 43m.18s.?

Rome ePSKS = 34m.39s.

Triest eSKKS = 30m.5s., eSS = 44m.28s., ePPS = 45m.24s.

Prague ePPP = 28m.6s., ePPS = 38m.30s., eSS = 44m.30s., eSSS = 51m.0s., and other unidentified e readings.

Cheb e = 29m.18s. and 38m.57s.

Stuttgart eS? = 33m.38s., eSS = 45m.0s., e = 49m.18s., eSSS = 51m.18s.

Strasbourg e = 21m.48s. and 30m.48s., ePPP? ( $\Delta > 180^\circ$ ) = 31m.46s., e = 32m.50s., ePPS = 38m.4s., e = 41m.43s., eSS = 45m.0s., e = 50m.17s., eSSS = 51m.40s.

Almeria PP = 24m.0s., SKS = 25m.45s., SKKS = 30m.51s., SS = 46m.15s., SSS = 51m.48s.; readings appear to be 30s. in error.

Alicante PP = 24m.50s., PPP = 28m.42s., PPS = 38m.22s., SS = 45m.6s., SSP = 46m.14s., SSS = 51m.34s.

Granada eSKP = 24m.59s., PP = 26m.11s., PPP = 29m.34s., PPS = 40m.44s., iSS = 51m.41s., SSS = 58m.11s.

Clermont-Ferrand iPKS? = 22m.52s., ePPS? = 40m.25s., eSS? = 47m.24s., eSSSP = 48m.17s., eSSS = 52m.49s.

Aberdeen iSSSN = 52m.23s., eEN = 79m.18s.?, eN = 88m.3s.

Paris ePPS? = 37m.41s., eSSS = 52m.24s., eSSS? ( $\Delta > 180^\circ$ ) = 57m.18s.?, eQ = 69.3m.

Toledo eZ = 26m.2s. and 58m.2s.

Kew ePPZ = 26m.32s., ePPP? = 32m.3s., ePPSEN = 41m.11s., e = 49m.27s., eEN = 62m.23s.

Rathfarnham Castle eZ = 26m.49s. and 35m.1s., eEN = 54m.31s., 58m.8s., 69m.28s., and 73m.48s.

Long waves were also recorded at Fort de France, Galerazamba, Tacubaya, Ivigtut, and at other North American and European stations.

Feb. 5d. 12h. 18m. 3s. Epicentre  $16^\circ 0'N$ .  $94^\circ 0'W$ . (as on 1943, December 7d.).

Epicentre suggested by Pasadena.

$$A = -0.671, B = -0.9594, C = +0.2739; \quad \delta = -3; \quad h = +6;$$

$$D = -0.998, E = +0.070; \quad G = -0.019, H = -0.273, K = -0.962.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Tacubaya	6.0	305	1 38	+ 6	—	—	—	3.2
Tucson	22.2	320	i 5 1	+ 1	e 9 14	+14	i 5 36	PPP e 11.7
Bogota	22.6	118	e 5 3	0	e 9 9	+ 2	e 5 32	PP —
Pierce Ferry	26.8	323	i 5 44	0	—	—	—	—
Palomar	26.9	315	i 5 44k	- 1	—	—	—	—
Boulder City	27.2	322	i 5 47	0	—	—	—	—
Overton	z. 27.3	323	i 5 48	0	—	—	e 7 22	? —
Riverside	z. 27.6	315	i 5 50	- 1	—	—	—	—
Pasadena	28.3	315	i 5 55	- 2	—	—	—	e 14.0
China Lake	z. 28.9	319	i 6 1k	- 2	—	—	—	—

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		$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Logan		29.9	333	e 6 9	- 3	—	—	e 7 9	PP
Tinemaha	z.	30.0	319	i 6 12	0	—	—	—	—
Lick	z.	32.4	317	i 6 32 <sub>a</sub>	- 2	—	—	—	—
Reno	z.	32.5	322	e 6 35	+ 1	—	—	—	—
Berkeley		33.1	317	—	—	e 12 18	+ 19	—	e 17.4
Shasta Dam		34.8	322	e 6 51	- 3	—	—	—	—
Hungry Horse		36.2	338	i 7 6	0	—	—	i 7 17	pP
College		60.6	337	i 10 11	- 4	—	—	—	—
Paris		82.3	41	i 12 24	- 1	—	—	—	—
Besançon		85.0	42	e 12 37	- 1	—	—	—	—
Strasbourg		85.7	40	i 12 40 <sub>a</sub>	- 2	—	—	—	—
Stuttgart	z.	86.6	39	e 12 43	- 3	—	—	—	—

Additional readings :—

Tucson e = 9m.29s.

Lick iZ = 6m.43s. and 6m.57s.

Hungry Horse eP<sub>c</sub>P = 9m.5s., e = 10m.2s.

Long waves were also recorded at Harvard.

Feb. 5d. Readings also at 1h. (Hungry Horse), 2h. (near Ashkabad), 3h. (near Andijan), 6h. (near Mizusawa), 7h. (Overton College, near Tchinkent, and near Pietermartizburg), 8h. (La Paz and near Grahamstown), 9h. (Arapuni, Auckland, New Plymouth, Wellington, Hungry Horse, College, La Paz, Ksara, Ashkabad, Mary, Obi-garm, Stalinabad, and Tashkent, several shocks), 10h. (Tacubaya, Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson (2), Boulder City, Overton (2), Pierce Ferry, Hungry Horse (2), College (2), and near Mizusawa), 11h. (near Obi-garm and near Bogota), 12h. (Pasadena, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Shasta Dam, College (2), Samarkand, near Fergana, Obi-garm, and Stalinabad), 13h. (Fergana), 16h. (Bogota), 17h. (Chinchina, Hungry Horse (2), Tucson, and near Ashkabad), 22h. (Hungry Horse, College, Samarkand, near Andijan, and Obi-garm).

Feb. 6d. 3h. Undetermined shock—Molucca Islands.

Bandong ePEN = 16m.10s., eSEN = 19m.34s.

Djakarta eP = 16m.10s., ePPZ = 16m.19s., eS = 19m.33s.

Obi-garm iP = 22m.27s.

Stalinabad iP = 22m.31s.

Tchinkent eP = 22m.37s.

Tashkent eP = 22m.37s., eS = 31m.25s.

Sverdlovsk P = 23m.50s., eS = 33m.42s.

College eP? = 24m.39s.

Bombay eEN = 25m.2s. and 29m.17s.

Riverview iZ = 28n..20s.

Vladivostok ePP = 30m.0s.

Hungry Horse eP? = 30m.8s., e = 30m.12s., i = 30m.20s.

Pierce Ferry e = 30m.13s.

Overton eZ = 30m.21s.

Tucson e = 30m.26s. and 30m.29s.

Feb. 6d. 4h. 28m. 53s. Epicentre 50°·0N, 98°·0E. (as 1938, February 21d.).

Approximate.

A = -·0898, B = +·6390, C = +·7639;  $\delta$  = -7; h = -5;

D = +·990, E = +·139; G = -·106, H = +·756, K = -·645.

	$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.
Irkutsk	4.6	58	1 9	- 3	i 2 0	- 7
Semipalatinsk	11.4	279	e 2 44	- 3	—	—
Almata	15.9	253	i 3 55	+ 8	—	—
Frunse	17.6	255	e 4 14	+ 6	—	—
Andijan	20.2	252	e 4 41	+ 2	8 27	+ 6
Fergana	20.7	253	i 4 47	+ 3	—	—
Tchinkent	21.0	260	i 4 48	+ 1	—	—
Tashkent	21.8	258	i 4 57	+ 1	—	—
Sverdlovsk	23.1	302	5 3	- 5	9 11	- 5
Samarkand	24.1	257	e 5 23	+ 5	—	—
College	54.7	29	e 9 24	- 9	—	—
Hungry Horse	78.2	21	i 11 50	- 13	—	—



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Feb. 6d. 10h. 40m. 44s. Epicentre  $42^{\circ}5S$ .  $172^{\circ}9E$ . (as on 1949, September 27d.).

A = -0.7338, B = +0.0914, C = -0.6731;  $\delta = -12$ ;  $h = -3$ ;  
D = +0.124, E = +0.992; G = +0.668, H = -0.083, K = -0.740.

	$\Delta$	Az.	P.	O-C.	S.	O-C.
	°	°	m. s.	s.	m. s.	s.
Christchurch		191	0 15	P*	0 25	-11
Cobb River	E.	355	0 32	P <sub>g</sub>	0 53	+ 7
Wellington		49	0 34	P*	0 57	S*
New Plymouth	E.	15	1 11	P <sub>g</sub>	1 43	+ 3
Arapuni		27	1 26	P*	—	—
Tuai	N.	43	e 1 38	P <sub>g</sub>	i 2 14	- 1

Feb. 6d. 11h. 52m. 41s. Epicentre  $14^{\circ}0S$ .  $112^{\circ}0W$ .

A = -0.3636, B = -0.9000, C = -0.2404;  $\delta = 0$ ;  $h = +6$ ;  
D = -0.927, E = +0.375; G = +0.090, H = +0.223, K = -0.971.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Huancayo	35.8	91	e 7 3	0	e 12 36	- 5	—	i 15.2
La Paz	42.3	99	e 7 56	- 1	i 14 23	+ 4	i 18 7	ScS 21.3
Tucson	46.0	2	e 8 26	- 1	—	—	e 8 41	? e 19.5
Palomar	z. 47.3	355	e 8 36	- 1	—	—	—	—
Riverside	z. 48.0	354	e 8 49	+ 6	—	—	—	—
China Lake	z. 49.8	355	e 8 58	+ 2	—	—	e 9 8	? —
Pierce Ferry	49.9	359	e 9 0	+ 3	—	—	—	—
Overton	z. 50.3	358	e 9 1	+ 1	—	—	—	—
Tinemaha	z. 51.1	354	e 9 7	+ 1	—	—	—	—
Berkeley	52.5	350	—	—	e 17 1	+18	—	e 22.9
Hungry Horse	62.1	359	e 10 24	- 1	—	—	e 10 30	? —
College	83.2	345	e 12 28	- 1	—	—	—	e 39.3

La Paz also gives SSS = 18m.39s.

Long waves were also recorded at Tacubaya, Honolulu, Philadelphia, and Pasadena.

Feb. 6d. 22h. 53m. 28s. Epicentre  $48^{\circ}2S$ .  $164^{\circ}2E$ . (as on February 5d.).

A = -0.6438, B = +0.1822, C = -0.7432;  $\delta = +2$ ;  $h = -5$ ;

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Christchurch	7.5	55	—	—	e 3 2	-18	3 38	SS —
Kaimata	N.E. 7.6	44	e 1 55	0	e 3 23	0	—	—
Cobb River	E. 9.3	44	e 3 38	?	e 4 6	+ 1	—	—
Wellington	10.2	51	—	—	e 4 25	- 2	e 5 53	SSS —
New Plymouth	E. 11.6	42	—	—	e 4 58	- 3	—	—
Tuai	N. 13.3	50	—	—	e 5 37	- 5	—	—
Riverview	17.4	331	i 4 7k	+ 1	e 7 23	+ 4	i 4 20	PP e 8.7
Tamanrasset	z. 149.5	221	e 19 34	[-13]	—	—	e 19 42	PKP —
Algiers Univ.	z. 162.1	237	26 11	?	e 26 38	[-29]	—	—

Additional readings:—

Riverview eQ = 7m.32s., iZ = 7m.43s., iSSE = 7m.49s.

Tamanrasset eZ = 20m.39s.

Long waves were also recorded at Brisbane.

Feb. 6d. Readings also at 0h. (Jena, Fergana, Frunse, near Almata, Andijan, and Naryn), 1h. (near Obi-garm), 3h. (College, La Paz, Mizusawa, Tamanrasset, and near Garm), 4h. (Sverdlovsk, Huancayo, Boulder City, Overton, Pierce Ferry, near Tucson, near Vladivostok, and near Irkutsk), 5h. (Andijan, Samarkand, near Fergana, Obi-garm, and Tchimkent), 6h. (near Obi-garm), 7h. (Huancayo), 8h. (College), 9h. (Pierce Ferry), 11h. (La Plata, Logan, and Pierce Ferry), 12h. (College), 14h. (near Kizyl-Arvat), 15h. (Fergana, near Andijan, Obi-garm, Stalinabad, Tashkent, and Tchimkent), 16h. (Samarkand, near Frunse, and near Klyuchi), 18h. (Hungry Horse and near College), 19h. (near Ottawa and near Grozny), 23h. (Christchurch, Wellington, New Plymouth, Cobb River, Tuai, near Kaimata, La Plata, and near Tacubaya)

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Feb. 7d. 0h. 8m. 23s. Epicentre 42°·0S. 86°·0W.

Approximate.

$$A = +.0520, B = -.7436, C = -.6666; \quad \delta = 0; \quad h = -2;$$

$$D = -.998, E = -.070; \quad G = -.047, H = +.665, K = -.745.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Paz	29.7	38	i 6 9	- 1	i 11 5	- 1	i 7 1	PP 14.4
Huancayo	31.3	22	e 6 22	- 2	e 11 26	- 5	e 7 26	PP e 13.0
Bogota	E. 47.7	17	—	—	e 15 43	+ 7	e 19 17	SS e 22.1
Tucson	77.3	339	e 11 57	- 1	—	—	e 12 17	P <sub>c</sub> P
Palomar	Z. 80.2	335	i 12 13	- 1	—	—	i 12 26	P <sub>c</sub> P
Riverside	Z. 80.9	334	e 12 15	- 2	—	—	—	—
Mount Wilson	Z. 81.4	334	e 12 26	+ 6	—	—	—	—
Overton	Z. 82.4	338	i 12 27	+ 2	—	—	—	—
China Lake	82.7	336	e 12 23	- 4	—	—	—	—
Tinemaha	84.0	335	i 12 38	+ 5	—	—	—	—
Berkeley	86.1	332	—	—	e 23 25	+ 7	—	—
Logan	86.6	342	e 12 47	+ 1	—	—	—	—
Hungry Horse	93.3	342	e 13 14	- 4	—	—	—	—

La Paz also gives i = 11m.29s. and 13m.47s.

Feb. 7d. 0h. 25m. 57s. Epicentre 14°·9S. 167°·1E. (as on January 24d.).

$$A = -.9424, B = +.2158, C = -.2555; \quad \delta = -3; \quad h = +6;$$

$$D = +.223, E = +.975; \quad G = +.249, H = -.057, K = -.967.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane	18.1	224	i 4 13 <sub>a</sub>	- 1	i 7 37	+ 2	i 4 29	PP
Apia	20.5	90	e 4 38	- 4	—	—	e 4 48	?
Riverview	23.7	214	i 5 22 <sub>k</sub>	+ 8	i 9 36	+ 9	i 10 33	SSS e 11.6
Vladivostok	66.1	333	e 10 48	- 3	e 19 38	- 1	—	—
Berkeley	84.4	49	e 12 46	+10	e 24 15	PPS	e 29 21	SSP e 35.8
Lick	Z. 84.6	49	e 12 36 <sub>k</sub>	0	—	—	e 15 52	PP
Shasta Dam	85.5	46	e 12 41	0	—	—	—	—
Mineral	Z. 85.9	47	e 12 41	- 2	—	—	—	—
Pasadena	86.1	54	i 12 42	- 2	—	—	i 12 53	P <sub>c</sub> P e 40.0
College	86.5	18	e 12 43	- 3	—	—	i 12 46	P <sub>c</sub> P
Riverside	Z. 86.6	54	i 12 47	+ 1	—	—	i 12 56	P <sub>c</sub> P
Palomar	Z. 86.8	55	i 12 48	+ 1	—	—	i 12 56	P <sub>c</sub> P
China Lake	Z. 87.1	51	i 12 47	- 2	—	—	i 12 58	P <sub>c</sub> P
Tinemaha	87.1	51	i 12 50	+ 1	—	—	—	—
Boulder City	89.3	53	i 13 1	+ 2	—	—	—	—
Overton	Z. 89.7	52	i 13 3	+ 2	—	—	—	—
Pierce Ferry	90.0	53	i 13 3	0	—	—	—	—
Tucson	91.3	57	e 13 10	+ 1	e 23 41	[+ 1]	e 32 14	? e 42.5
Kodaikanal	E. 92.2	281	—	—	e 24 3	{+ 5}	—	—
Hungry Horse	93.8	41	e 13 15	- 5	—	—	i 13 31	P <sub>c</sub> P
Ottawa	119.5	45	e 18 50	[- 2]	—	—	—	—
Harvard	122.9	48	—	—	e 29 53	PS	—	e 62.6
Weston	123.1	48	—	—	—	—	46 33	Q 64.0
Ksara	132.2	302	e 18 24	[- 52]	—	—	e 21 44	PP
Stuttgart	141.7	336	e 19 35	[+ 2]	—	—	e 19 42	PKP <sub>2</sub>
Strasbourg	142.3	337	e 19 39	[+ 4]	—	—	—	—
Zürich	143.0	336	e 19 28 <sub>k</sub>	[- 8]	—	—	—	—
Chur	143.1	334	e 19 33 <sub>k</sub>	[- 3]	—	—	e 19 42	PKP <sub>2</sub>
Paris	143.9	342	e 19 41	[+ 4]	—	—	(e 39 3?)	P'P' e 39.0
Clermont-Ferrand	146.4	339	e 19 49	[+ 8]	—	—	i 19 54	PKP <sub>2</sub>
Alicante	154.2	337	20 35	PKP <sub>2</sub>	44 35	SSP	—	e 84.5
Granada	156.3	342	—	—	43 21	SS	—	82.2
Tamanrasset	Z. 160.9	298	e 20 5	[+ 3]	—	—	e 20 52	PKP <sub>2</sub>

Additional readings:—

Brisbane iPPN = 4m.32s., eSE = 7m.40s.

Riverview iSE = 9m.39s., iN = 9m.52s., iE = 10m.3s. and 10m.23s.

Lick iP<sub>c</sub>PZ = 12m.55s., eZ = 14m.7s. and 16m.3s.

Palomar iZ = 13m.14s.

Tamanrasset iPPZ = 24m.34s.

Long waves were also recorded at Philadelphia, Potsdam, and Almeria.

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Feb. 7d. 10h. 35m. 0s. Epicentre 16°·4S. 71°·0W. (as on 1947, May 23d).

A = +·3125, B = -·9075, C = -·2806;  $\delta$  = -5; h = +5;  
D = -·946, E = -·326; G = -·091, H = +·265, K = -·960.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Paz	2·8	92	i 0 48k	+ 1	i 1 32	S <sub>g</sub>	—	—
Huancayo	6·0	315	e 2 2	P <sub>g</sub>	e 3 36	L	—	(e 3·6)
Harvard	58·6	0	i 10 20	+19	—	—	—	—
Tucson	61·6	322	e 10 22	0	—	—	—	—
Pierce Ferry	66·2	324	i 10 52	0	—	—	—	—
Overton	z. 66·7	324	i 10 55	0	—	—	i 11 8	?
Riverside	z. 66·8	319	i 10 55	- 1	—	—	e 11 9	?
Pasadena	z. 67·4	319	i 10 58	- 1	—	—	—	—
China Lake	z. 68·1	322	i 11 3	- 1	—	—	—	—
Logan	69·1	329	e 11 8	- 2	—	—	—	—
Tinemaha	z. 69·4	321	i 11 11	- 1	—	—	—	—
Lick	z. 71·6	220	i 11 24 <sub>a</sub>	- 1	—	—	—	—
Berkeley	z. 72·3	320	e 11 22	- 7	—	—	—	—
Mineral	z. 73·5	323	i 11 37k	+ 1	—	—	—	—
Shasta Dam	74·2	323	e 11 37	- 3	—	—	—	—
Hungry Horse	75·0	333	i 11 44	- 1	e 20 28	-55	e 12 27	P <sub>c</sub> P
Tamanrasset	z. 84·3	65	e 12 20	-15	—	—	e 12 43	P <sub>c</sub> P
Stuttgart	95·9	41	—	—	e 34 36	SSS	—	—

Additional readings :—

La Paz i = 1m.6s., iS<sub>g</sub> = 1m.48s.

Tamanrasset iZ = 12m.25s.

Feb. 7d. 10h. 37m. 24s. Epicentre 46°·2N. 151°·2E. (as on 1947, May 26d.).

A = -·6087, B = +·3346, C = +·7194;  $\delta$  = +1; h = -4;  
D = +·482, E = +·876; G = -·630, H = +·347, K = -·695.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Sapporo	7·7	249	e 2 2	+ 6	e 4 5	S*	e 4 21	S <sub>g</sub> 5·0
Mizusawa	F. 10·2	230	2 42	+11	4 14	-13	—	—
Sendai	11·0	227	e 2 42	0	4 44	- 3	e 4 27	?
Klyuchi	11·7	27	—	—	4 47	-17	—	—
Tokyo	13·6	223	e 5 27	S	(5 27)	-23	7 24	L
Vladivostok	14·1	264	i 3 22	- 1	i 6 24	SSS	—	—
Nagoya	15·4	229	—	—	e 6 41	+ 9	—	—
Hukuoka	20·2	239	—	—	e 8 22	+ 1	—	e 10·5
Irkutsk	30·8	299	—	—	11 44?	+21	—	—
College	37·4	38	e 7 13	- 3	(e 13 5)	0	i 8 34	PP e 13·1
Sitka	44·6	48	—	—	e 14 56	+ 4	e 17 55	SS e 19·9
Almata	51·0	296	e 9 10	+ 4	—	—	—	—
Naryn	52·6	294	i 9 16	- 2	—	—	—	—
Sverdlovsk	53·3	317	i 9 21	- 2	e 16 52	- 2	—	—
Andijan	55·3	295	e 9 36	- 2	e 17 24	+ 3	—	—
Fergana	55·8	295	9 42	+ 1	—	—	—	—
Tashkent	56·9	307	e 9 49	0	e 17 46	+ 4	—	—
Stalinabad	58·8	294	i 10 2	0	18 8	+ 1	—	—
Samarkand	59·2	297	e 10 8	+ 3	—	—	—	—
New Delhi	N. 59·3	280	e 9 44	-22	i 18 9	- 5	10 9	P
Shasta Dam	60·0	61	i 10 8	- 3	—	—	—	—
Hungry Horse	60·2	50	e 10 3	- 9	—	—	—	—
Mineral	z. 60·7	61	e 10 14	- 1	—	—	i 10 25	?
Berkeley	z. 61·8	64	e 10 21	- 2	e 18 30	-16	e 20 4	S <sub>c</sub> S e 25·8
Lick	z. 62·5	64	i 10 25	- 3	—	—	—	—
Bozeman	63·4	51	—	—	e 19 4	- 2	—	e 31·8
Moscow	64·1	325	e 10 40	+ 2	—	—	—	—
Tinemaha	z. 64·7	62	i 10 40	- 2	—	—	—	—
Logan	65·5	53	e 10 45	- 2	—	—	—	—
China Lake	z. 66·0	63	i 10 44	- 6	—	—	i 10 57	S

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.	
Pasadena	z.	66.7	65	i 10 52	- 3	—	—	i 11 39	PcP	—
Riverside	z.	67.3	65	i 10 55	- 4	—	—	e 11 5	P	—
Overton	z.	67.4	61	i 10 57	- 2	—	—	i 12 2	PcP	—
Boulder City		67.6	61	e 10 56	- 5	—	—	—	—	—
Pierce Ferry		68.0	60	i 10 59	- 4	—	—	—	—	—
Bombay		68.7	275	e 11 8	+ 1	e 20 8	- 2	—	—	—
Grozny		69.1	311	11 18	+ 8	—	—	—	—	—
Tiflis		70.7	311	i 11 20	0	e 21 23	PPS	—	—	—
Kodaikanal	E.	71.4	265	—	—	e 25 16	SS	—	—	—
Leninakan		71.9	311	e 11 28	+ 1	—	—	—	—	—
Tucson		72.5	61	e 11 26	- 4	—	—	—	—	e 34.7
Copenhagen		72.7	337	i 11 31	- 1	—	—	—	—	35.1
Warsaw		73.0	331	—	—	e 21 55	PPS	—	—	e 39.6
Potsdam	z.	75.4	335	i 11 49k	+ 2	—	—	—	—	e 44.6
Collmberg		76.4	334	e 9 52	-121	—	—	e 9 59	?	—
Prague		77.1	333	e 11 59k	+ 2	e 22 4	ScS	e 27 16	SS	e 33.9
St. Louis		79.2	45	e 12 7	- 1	e 22 5	- 3	—	—	—
Kew		79.7	343	—	—	e 22 52?	PS	—	—	e 38.6
Stuttgart		79.8	335	e 12 11	- 1	—	—	—	—	—
Strasbourg		80.4	336	e 12 10	- 5	—	—	—	—	e 42.6
Cleveland		80.9	38	—	—	e 22 21	- 5	e 22 39	ScS	—
Ksara		81.3	310	e 12 18	- 2	e 22 59	ScS	—	—	—
Paris		81.5	340	i 12 22	+ 1	—	—	i 13 10	?	e 44.6
Pennsylvania		82.9	36	—	—	i 22 36	-10	i 22 57	ScS	—
Harvard		83.8	30	i 12 34	+ 2	—	—	—	—	e 50.2
Weston		84.0	30	e 12 39	+ 6	—	—	—	—	46.8
City College, N.Y.		84.5	32	—	—	e 22 46	-15	—	—	e 42.6
Helwan		86.8	311	12 49	+ 2	e 23 12	-13	i 13 0	PcP	—
Alicante		92.1	339	13 34	+22	24 15	+ 2	17 10	PP	e 46.5
Granada		93.9	341	13 18k	- 3	23 53	[- 2]	e 19 6	PPP	45.2
Almeria		94.0	339	e 13 22	+ 1	24 20	-10	17 6	PP	52.6
Tamanrasset	z.	104.6	327	e 13 58	-11	—	—	—	—	—

Additional readings:—

Berkeley eZ = 10m.30s. and 12m.2s.

Prague eSSS?Z = 31m.38s.

Stuttgart e = 46m.18s. and 52m.0s., eZ = 66m.36s.

Pennsylvania iN = 29m.13s.

Helwan iZ = 13m.9s., eZ = 14m.18s.

Alicante PPP = 19m.7s., PS = 25m.28s., PPS = 25m.56s., SS = 30m.9s., SSP = 30m.20s.

Granada PS = 25m.54s., SS = 31m.12s., SSS = 35m.0s.

Almeria SKS = 23m.14s., SS = 30m.50s.

Long waves were also recorded at Philadelphia, Bermuda, and at other European stations.

Feb. 7d. 21h. 16m. 16s. Epicentre 7°·2S. 74°·0W. Depth of focus 0·020.  
(as on 1945, July 12d.).

A = +·2735, B = -·9538, C = -·1245;  $\delta = +4$ ;  $h = +7$ ;  
D = -·961, E = -·276; G = -·034, H = +·120, K = -·992.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Huancayo		5.0	196	i 1 4	-10	i 1 35	-37	—	—
La Paz		10.9	149	3 9	+37	i 5 17	+45	—	—
Bogota		11.7	0	e 2 50	+ 7	e 5 18	SS	i 3 2	PP
Tacubaya		36.3	317	i 7 57	+67	—	—	—	—
Weston		49.4	4	i 9 12	+37	—	—	—	—
Harvard		49.5	4	i 9 14	+38	—	—	—	—
Tucson		52.6	320	i 9 0	+ 1	—	—	i 9 35	pP
Pierce Ferry		57.2	322	i 9 33	+ 1	—	—	i 10 10	pP
Palomar	z.	57.3	317	i 9 35	+ 2	i 10 25	sP	i 10 14	pP
Boulder City		57.6	321	i 9 36	+ 1	—	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Overton	z.	57.7	322	i 9 37	+ 1	—	—	i 10 14	pP
Riverside	z.	58.0	317	i 9 37	- 1	—	—	i 10 14	pP
Pasadena	z.	58.6	317	i 9 42	0	—	—	i 10 19	pP
China Lake	z.	59.2	321	i 9 46	- 1	i 10 41	sP	—	—
Logan		59.7	329	e 9 49	- 1	—	—	—	—
Tinemaha	z.	60.4	320	i 9 54	- 1	—	—	—	—
Lick	z.	62.8	319	i 10 11k	0	i 10 56	sP	—	—
Reno	z.	62.9	322	i 10 3 <sub>a</sub>	- 8	—	—	—	—
Mineral		64.5	321	e 10 20k	- 2	—	—	—	—
Shasta Dam		65.2	321	e 10 24	- 2	e 11 21	sP	e 11 0	pP
Hungry Horse		65.5	332	i 10 30	+ 2	—	—	—	—
Tamanrasset	z.	83.6	66	e 12 12	+ 1	e 13 14	sP	i 12 48	pP
College		89.7	336	i 12 41	0	—	—	i 13 19	pP

Additional readings :—

Bogota eEN = 2m.55s.

Pasadena eZ = 10m.8s.

Lick eZ = 10m.24s.

Tamanrasset eZ = 12m.16s.

College i = 13m.9s.

Feb. 7d. Readings also at 1h. (Hungry Horse and near Obi-garm), 2h. (Grozny and Tiflis), 4h. (near Kizyl-Arvat and Ashkabad), 7h. (near Tacubaya), 8h. (near Tchimkent), 9h. (near Istanbul (2)), 10h. (Hungry Horse (2) and near Granada), 11h. (College, Hungry Horse, Shasta Dam, Mount Wilson, China Lake, Riverside, Tucson, Fergana, Andijan, near Obi-garm, and Stalinabad), 13h. (College, New Delhi, Bombay, Poona, and Kodaikanal), 15h. (near Istanbul), 17h. (Hungry Horse (2)), 19h. (near Stalinabad), 21h. (College, Pierce Ferry, New Delhi, Andijan, Tchimkent, Samarkand, Frunse, near Obi-garm, Stalinabad, and Fergana), 22h. (near Istanbul), 23h. (College, Hungry Horse, Shasta Dam, Mineral, Pasadena, China Lake, Tinemaha, Boulder City, Pierce Ferry, Tucson, and near Tacubaya).

Feb. 8d. 10h. 4m. 24s. Epicentre  $38^{\circ}6'N$ .  $75^{\circ}3'E$ . Depth of focus 0.010.

Epicentre as given by the U.S.S.R. network bulletin.

A = +.1988, B = +.7579, C = +.6213;  $\delta = -5$ ;  $h = -1$ ;  
D = +.967, H = -.254; G = +.158, H = +.601, K = -.784.

	$\Delta$	Az.	P.	O-C.	S.	O-C.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Naryn	2.9	12	i 0 41	- 4	i 1 14	- 5
Andijan	3.1	315	e 0 47	- 1	i 1 24	0
Fergana	3.3	303	e 0 48	- 3	e 1 28	- 1
Frunse	4.3	353	e 1 3	- 2	i 1 54	0
Obi-garm	4.4	273	i 1 6	0	—	—
Almata	4.8	15	—	—	i 1 59	- 7
Stalinabad	5.1	271	e 1 17	+ 1	—	—
Tchimkent	5.7	312	i 1 21	- 3	—	—
Samarkand	6.5	283	e 1 37	+ 2	—	—
New Delhi	10.1	170	e 2 26	+ 2	e 4 23	+ 7
Mary	10.6	269	—	—	i 4 30	+ 2
Semipalatinsk	12.3	15	—	—	e 5 0	- 8
Leninakan	24.9	285	e 5 22	+ 7	—	—
College	71.5	18	i 11 11	- 1	—	—
Hungry Horse	93.0	6	i 13 6	+ 2	—	—

New Delhi gives also eSE = 4m.27s.

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Feb. 8d. 15h. Region of the Solomon Islands.

Brisbane iPN = 7m.2s., iSN = 10m.39s.  
 College iP = 15m.11s., ipP = 15m.23s.  
 Branner iPZ = 15m.22s., ipPZ = 15m.33s.  
 Berkeley iPZ = 15m.23s.a, ipPZ = 15m.34s.  
 Lick iPZ = 15m.24s.a, ipPZ = 15m.36s., eZ = 15m.45s.  
 Shasta Dam eP = 15m.26s., ipP = 15m.38s.  
 Mineral ePZ = 15m.28s.a.  
 Pasadena iPZ = 15m.33s., ipPZ = 15m.44s.  
 Reno ePZ = 15m.35s.k, epPZ = 15m.46s., eZ = 15m.50s.  
 Riverside iPZ = 15m.36s., ipPZ = 15m.47s.  
 China Lake iPZ = 15m.37s., ipPZ = 15m.48s.  
 Tinemaha iPZ = 15m.38s., ipPZ = 15m.49s.  
 Palomar iP = 15m.40s., ipPZ = 15m.51s.  
 Boulder City eP = 15m.48s., ipP = 16m.0s.  
 Overton iPZ = 15m.50s., ipPZ = 16m.2s.  
 Pierce Ferry iP = 15m.52s., ipP = 16m.4s.  
 Hungry Horse eP? = 16m.3s., ipP? = 16m.13s.  
 Tucson eP = 16m.12s.  
 Tamanrasset ePKP?Z = 22m.18s., ePKP,Z = 22m.36s., iZ = 22m.54s., eZ = 23m.34s.

February 8d. 18h. 19m. 47s. Epicentre 46°·5N. 27°·5W. (as on 1947, November 10d.).

A = +·6127, B = -·3189, C = +·7231;  $\delta = -3$ ;  $h = -4$ ;  
 D = -·462, E = -·887; G = +·641, H = -·334, K = -·691.

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Rathfarnham Castle	15·3	56	i 3 46	+ 7	e 6 55	+25	i 3 56 PP	10·9
Toledo	18·3	104	i 4 21	+ 4	e 8 4	+25	8 40 SS	8·9
Kew	18·5	64	e 4 17	- 2	e 8 3	+19	e 9 3 P <sub>c</sub> P	e 10·2
Malaga z.	19·8	111	i 4 34k	- 1	i 8 16	+ 3	—	9·4
Granada	20·2	110	i 4 40a	+ 1	i 8 37	+16	i 5 7 PPP	i 10·5
Paris	20·3	73	i 4 39	- 1	i 8 25	+ 2	i 5 7 PPP	e 9·5
Almeria	21·0	108	i 4 42	- 5	i 8 35	- 2	5 6 PP	11·2
Tortosa	21·0	95	i 4 48	+ 1	—	—	—	10·7
Clermont-Ferrand	21·2	81	i 4 50	+ 1	—	—	i 5 4 PP	9·9
Alicante	21·5	102	i 4 59	+ 7	8 50	+ 3	5 9 PP	e 10·6
Besançon	22·8	76	e 5 4	- 1	—	—	e 5 55 PPP	—
Neuchatel	23·5	76	e 5 11	- 1	—	—	—	—
Basle	23·8	75	e 5 14	- 1	e 9 30	+ 2	—	—
Strasbourg	23·8	71	e 5 15k	0	e 9 32	+ 4	5 38 PP	e 11·2
Karlsruhe	24·1	70	i 5 25	+ 7	e 9 45	+11	e 12 53 P <sub>c</sub> S	e 13·4
Zürich	24·5	75	e 5 24a	+ 2	e 9 40	0	—	—
Algiers Univ. z.	24·7	103	e 5 24	0	e 9 45	+ 1	e 6 5 PP	e 10·2
Stuttgart	24·7	71	e 5 24	0	e 9 43	- 1	e 5 49 PP	e 12·5
Chur	25·3	76	e 5 28	- 2	—	—	—	—
Pavia	25·4	79	e 5 23	- 8	—	—	—	—
Jena	25·9	67	e 5 32	- 3	—	—	e 6 16 PP	—
Copenhagen	26·4	55	e 5 41	+ 1	—	—	—	11·2
Collmborg	26·8	66	e 5 49	+ 5	e 10 14	- 5	e 9 15 P <sub>c</sub> P	e 12·7
Potsdam z.	26·8	62	i 5 43k	- 1	—	—	—	13·2
Prato	27·2	81	e 5 53	+ 6	—	—	—	—
Florence Xim	27·3	81	—	—	i 10 24	- 3	—	—
Florence Arc.	27·3	81	e 5 57	+ 9	—	—	—	e 11·5
Prague	27·9	67	e 5 54	0	e 10 29	- 8	e 6 40 PP	—
Triest	28·4	76	i 5 58	0	i 10 43	- 2	i 7 15 PPP	e 13·2
Upsala N.	29·5	48	e 8 57	P <sub>c</sub> P	—	—	—	e 15·2
Raciborzu z.	30·3	66	e 6 14	- 1	—	—	e 7 21 PP	—
Weston	31·3	280	e 6 25	+ 1	e 11 36	+ 5	—	—
Harvard	31·4	280	i 6 24	- 1	—	—	—	e 15·0
Skalnate Pleso	31·7	68	e 9 43	P <sub>c</sub> P	—	—	—	—
Taranto	32·7	85	e 10 35	?	—	—	—	e 17·5
City College, N.Y.	33·7	279	—	—	e 12 16	+ 8	—	e 14·8
Philadelphia	34·9	278	—	—	e 11 50	-37	—	e 15·1
Tamanrasset z.	35·6	120	e 7 4	+ 3	e 12 54	+16	i 8 33 PPP	—
Pennsylvania E.	36·4	281	—	—	i 12 39	-11	—	—
Istanbul	40·5	77	e 7 50	+ 8	e 14 3	PS	—	—

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Moscow	40.5	53	e 7 36	- 6	—	—	—	—
San Juan	42.3	243	—	—	e 14 30	+11	(e 17 24)	SS e 17.4
Florissant	45.8	285	—	—	e 15 12	+ 3	—	—
St. Louis	45.8	285	e 8 26	+ 1	e 18 3	SS	i 15 20	PS e 22.2
Helwan	48.0	89	8 46	+ 3	15 43	+ 2	10 37	PP —
Ksara	48.8	82	e 8 52	+ 3	e 15 59	+ 7	—	—
Leninakan	50.4	70	e 9 1	0	—	—	—	—
Tiflis	50.5	68	e 9 1	- 1	e 16 21	+ 5	—	—
Rapid City	E. 51.4	298	e 9 10	+ 1	e 16 41	+13	—	— e 27.0
Sverdlovsk	51.9	45	i 9 7	- 5	i 16 31	- 4	—	—
Hungry Horse	55.5	307	i 9 34	- 5	—	—	i 9 49	PcP —
Bogota	57.9	240	e 10 16	+20	—	—	(16 13)	? 16.2
Logan	57.9	300	e 9 54	- 2	—	—	e 12 6	PP e 30.3
College	59.7	337	e 10 1	- 8	—	—	—	—
Overton	Z. 62.7	297	i 10 26	- 3	—	—	—	—
Pierce Ferry	62.7	296	i 10 27	- 2	—	—	—	—
Tucson	63.1	290	i 10 31	- 1	e 15 55	ScP	e 19 48	PPS e 34.5
Boulder City	63.3	296	e 10 31	- 2	—	—	—	—
Mary	63.6	63	e 10 34	- 1	—	—	—	—
Reno	64.1	302	e 10 37k	- 1	—	—	—	—
Mineral	64.6	304	e 10 37k	- 4	—	—	—	—
Tinemaha	Z. 64.7	299	i 10 40	- 2	—	—	i 10 54	PcP —
Shasta Dam	64.9	304	e 10 41	- 2	—	—	—	—
China Lake	Z. 65.1	297	i 10 41	- 4	—	—	—	—
Tchimkent	65.1	55	i 10 42	- 3	—	—	—	—
Samarkand	65.3	59	e 10 43	- 3	—	—	—	—
Riverside	Z. 66.2	296	e 10 49	- 3	—	—	—	—
Palomar	Z. 66.3	295	i 10 52	0	—	—	—	—
Berkeley	66.6	301	e 10 47	- 7	e 19 52	+ 7	—	e 32.5
Lick	Z. 66.6	301	i 10 53a	- 1	—	—	e 13 7	PP —
Pasadena	66.6	296	e 10 50	- 4	—	—	i 11 37	PcP e 31.2
Santa Clara	66.8	301	—	—	e 24 5	SS	—	e 33.7
Branner	Z. 66.9	301	e 10 54k	- 2	—	—	—	—
Stalinabad	67.1	58	i 10 53	- 4	—	—	—	—
Huancayo	72.3	230	e 11 35	+ 6	—	—	—	—
La Paz	72.6	221	11 33	+ 2	i 20 57	+ 1	—	— 36.0
Vladivostok	88.9	16	e 12 59	+ 1	e 23 45	+ 1	—	—

Additional readings :—

Rathfarnham Castle eZ = 4m.3s. and 5m.5s., eEN = 7m.54s., ePcP? = 8m.59s.  
 Toledo PPZ = 4m.42s.  
 Malaga iPcP?Z = 7m.44s.  
 Granada SS = 9m.43s.  
 Paris i = 4m.50s.  
 Almeria PcP = 8m.50s., SS = 9m.14s.  
 Clermont-Ferrand i = 4m.56s.  
 Alicante PP = 5m.30s., PPP = 5m.34s., iS = 9m.5s., SS = 10m.0s.  
 Besançon e = 6m.44s.  
 Strasbourg i = 6m.54s., ePcP? = 8m.47s.  
 Algiers Univ. iZ = 5m.27s. and 5m.33s., eZ = 5m.48s. and 5m.58s., ePPPZ = 6m.17s., eZ = 9m.22s. and 10m.0s.  
 Stuttgart eZ = 5m.31s.  
 Jena eE = 5m.37s., eN = 5m.43s., ePP?N = 6m.6s., eN = 6m.33s.  
 Collmberg eE = 5m.56s.  
 Potsdam ePEN = 5m.49s.  
 Prague eZ = 5m.59s., ePP = 6m.25s., e = 6m.58s., 8m.4s., and 9m.21s.  
 Raciborz ePN = 6m.17s.  
 Tamanrasset ePPPZ = 8m.53s., eZ = 14m.0s.  
 St. Louis ePP = 10m.4s., e = 10m.25s., i = 18m.36s.  
 Helwan eZ = 9m.31s., PcPZ = 10m.19s.  
 Mineral iZ = 10m.41s.  
 Lick iZ = 10m.55s. and 11m.0s.  
 Long waves were also recorded at Bergen, De Bilt, Warsaw, Zagreb, and Chicago.

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Feb. 8d. 23h. 39m. 8s. Epicentre 36°3N, 1°3E.

Intensity V-VI at Flatters, Chassériaux, and Pontéba; V at Fromentin, Cavaignac, etc.; IV-V at Orléansville.  
Epicentre as adopted. Same epicentre as the destructive Orléansville earthquake of 1954, Sept. 9d.

A. Grandjean.

Séismes d'Algérie de 1940 à 1950 inclus, Annales de l'Institut de Physique du Globe de Strasbourg, 3<sup>ème</sup> partie, Géophysique, Nouvelle Série, Tome VII, La Puy, 1954, pp. 75, 82, with macroseismic chart.

$$A = +.8076, B = +.0183, C = +.5894; \quad \delta = -5; \quad h = 0;$$

$$D = +.023, E = -1.000; \quad G = +.589, H = +.013, K = -.808.$$

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Algiers Univ.	z.	1.5	72	i 0 26k	- 2	e 0 48	- 1	i 0 30	P <sub>g</sub>	—
Alicante		2.5	326	i 0 44	+ 1	i 1 9	- 5	—	—	—
Almeria		3.1	282	i 1 19	+28	2 6	+37	—	—	—
Malaga	z.	4.6	277	e 1 9	- 3	i 2 5	- 2	i 1 28	P <sub>g</sub>	—
Tortosa		4.6	352	—	—	i 2 8	+ 1	—	—	—
Tamanrasset	z.	13.9	164	e 3 34	PP	e 5 57	0	e 6 22	SSS	7.4

Additional readings and note:—

Algiers Univ. iP\*Z = 27s., eZ = 40s., eSZ = 45s.  
Malaga SPZ = 1m.14s.; P<sub>g</sub> given as S.

Feb. 8d. Readings also at 1h. (near Ashkabad, and near Fort de France), 2h. (Tucson), 5h. (Tacubaya, Tamanrasset, Pietermaritzburg, Pretoria, Pasadena, Riverside (2), Palomar, China Lake (2), Tinemaha (2), Overton, Pierce Ferry, Tucson (2), Hungry Horse, near Seattle, and Victoria), 7h. (China Lake and Tucson), 9h. (Huancayo, Andijan, near Naryn, and near Tashkent), 11h. (College, Hungry Horse, Shasta Dam, and Pierce Ferry), 14h. (Hungry Horse and Taranto), 16h. (near Istanbul), 23h. (College (2), Hungry Horse (2), Tamanrasset, Strasbourg, Stuttgart, and near Athens).

Feb. 9d. 13h. 6m. 42s. Epicentre 31°8N, 140°5E. (as on 1941, July 6d.).

Approximate.

$$A = -.6570, B = +.5416, C = +.5244; \quad \delta = -3; \quad h = +1;$$

$$D = +.636, E = +.772; \quad G = -.405, H = +.334, K = -.852.$$

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Mizusawa	E.	7.3	4	e 1 56	+ 6	2 35	-40	—	—
Vladivostok		13.2	331	e 3 7	- 4	e 5 31	- 9	—	—
Irkutsk		33.3	319	e 7 6	+25	—	—	—	—
College		54.0	30	e 9 22	- 6	e 16 47	-16	e 19 18	S <sub>c</sub> S
Sverdlovsk		58.6	321	e 9 47	-14	—	—	—	e 23.5
Riverview		66.0	170	—	—	i 20 9	PPS	—	—
Shasta Dam		74.9	51	i 11 42	- 2	—	—	—	e 38.2
Mineral	z.	75.6	51	e 11 46	- 2	—	—	—	—
Hungry Horse		76.2	42	i 11 48	- 4	—	—	e 12 8	P <sub>c</sub> P
Berkeley		76.4	54	i 11 53 <sub>a</sub>	0	—	—	i 12 40	?
Tinemaha	z.	79.5	53	i 12 8	- 2	—	—	—	—
China Lake	z.	80.6	53	i 12 14	- 2	—	—	i 12 19	P <sub>c</sub> P
Logan		81.1	45	e 12 20	+ 2	—	—	—	—
Pasadena		81.1	55	i 12 22	+ 4	—	—	—	e 37.3
Riverside	z.	81.8	55	i 12 22	0	—	—	—	—
Boulder City		82.4	52	e 12 26	+ 1	—	—	—	—
Overton	z.	82.4	52	e 12 24	- 1	—	—	—	—
Palomar	z.	82.5	55	i 12 31	+ 5	—	—	i 12 57	P <sub>c</sub> P
Pierce Ferry		82.9	52	e 12 27	- 1	—	—	—	—
Ksara		83.6	306	e 12 40	P <sub>c</sub> P	—	—	—	—
Tucson		87.3	53	e 12 46	- 4	—	—	e 12 54	P <sub>c</sub> P
La Paz		149.9	67	20 4	[+17]	—	—	i 20 14	PKP <sub>1</sub>

Long waves were also recorded at New Delhi.



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Feb. 9d. 18h. Region of Jan Mayen Island.

Prague eP = 57m.51s.  
 Stuttgart ePZ = 58m.1s.  
 Paris iP = 58m.4s.  
 College e = 60m.27s.  
 Tamanrasset iPZ = 61m.40s.k, ePPZ = 63m.32s.  
 Hungry Horse iP = 61m.50s., e = 61m.53s.  
 Overton eZ = 63m.12s.  
 Pierce Ferry e = 63m.14s.  
 Boulder City e = 63m.16s.  
 China Lake eZ = 63m.21s.  
 Pasadena ePZ = 63m.32s.  
 Tucson e = 63m.32s. and 63m.38s.

Feb. 9d. 20h. 18m. 30s. Epicentre 28°·5S. 67°·2W. Depth of focus 0·020.

Intensity IV between 27° and 28° South latitudes.  
 Epicentre 28°·5S. 67°·25W.; depth 150km. (Strasbourg).

F. Greve.

Boletín del año 1950, Instituto Sismológico, Santiago, 1951, p. 3.

A = +·3411, B = -·8114, C = -·4747;  $\delta = +6$ ;  $h = +2$ ;  
 D = -·922, E = -·388; G = -184, H = +·438, K = -·880.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
La Plata	E.	10·2	131	2 18	- 5	4 12	- 4	3 36	?	4·9
	N.	10·2	131	2 30	+ 7	4 7	- 9	2 54	PPP	4·8
La Paz		12·0	356	i 2 55	+ 8	i 5 16	-42	—	—	6·2
Huancayo		18·6	334	e 4 1	- 6	7 26	0	—	—	—
Tucson		73·3	323	e 11 15	- 1	—	—	e 11 49	pP	—
Palomar	z.	77·5	320	i 11 41	+ 2	—	—	i 12 17	pP	—
Pierce Ferry		77·9	323	i 11 41	- 1	—	—	i 13 16	sP	—
Riverside	z.	78·2	320	e 11 42	- 1	—	—	i 12 17	pP	—
Boulder City		78·3	323	e 11 43	- 1	—	—	i 12 18	pP	—
Overton	z.	78·5	323	i 11 44	- 1	—	—	i 12 18	pP	—
Pasadena	z.	78·8	320	i 11 46	0	—	—	i 12 19	pP	—
China Lake	z.	79·7	322	e 11 50	- 1	—	—	i 12 25	pP	—
Tinemaha	z.	80·9	321	i 11 57	- 1	—	—	i 12 33	pP	—
Logan		81·1	328	e 11 56	- 3	—	—	e 12 31	pP	—
Lick	z.	83·0	320	e 12 9 <sub>a</sub>	+ 1	—	—	i 12 44	pP	—
Reno	z.	83·5	323	e 12 11	0	—	—	e 12 46	pP	—
Mineral	z.	85·1	322	e 12 21	+ 2	—	—	e 12 53	pP	—
Shasta Dam		85·8	322	e 12 20	- 2	—	—	i 12 55	pP	—
Tamanrasset	z.	86·6	62	e 12 29	+ 3	i 13 17	sP	i 13 3	pP	—
Hungry Horse		87·2	331	i 12 28	- 1	—	—	i 13 3	pP	—

Additional readings :—

Pasadena iZ = 12m.37s.  
 China Lake eZ = 12m.41s.  
 Tamanrasset eZ = 12m.59s.

Feb. 9d. Readings also at 1h. (Santa Clara), 2h. (Hungry Horse, Tucson, and near Irkutsk), 4h. (College), 5h. (near Kizyl-Arvat), 6h. (Tucson, Boulder City, Overton, Pierce Ferry, Mount Wilson, Riverside, Palomar, China Lake, Tinemaha, Hungry Horse, Shasta Dam, College, and near La Paz), 7h. (College, Hungry Horse, Overton, Pierce Ferry, and Tucson), 10h. (near Stalinabad and near Rome), 11h. (near Tacubaya), 12h. (near Huancayo), 13h. (Overton, Pierce Ferry, and Tucson), 15h. (Stuttgart and Strasbourg), 16h. (Mineral), 17h. (near Stalinabad), 18h. (College), 21h. (Weston), 23h. (College, Mount Wilson, Riverside, China Lake, Pierce Ferry, Tucson, and near Obi-garm).

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Feb. 10d. 17h. Pacific Ocean, region of Easter Island.

Huancayo eP = 37m.25s., eS? = 42m.49s.  
 La Paz P = 37m.25s., iS = 43m.14s., SS = 45m.40s., iSSS = 46m.30s., L = 48.5m.  
 Tucson eP = 41m.53s.  
 Palomar iPZ = 42m.11s.  
 Riverside ePZ = 42m.11s.  
 Pasadena iPZ = 42m.18s.  
 Pierce Ferry eP = 42m.19s.  
 Boulder City e = 42m.20s.  
 China Lake ePZ = 42m.22s.  
 Overton iPZ = 42m.24s.  
 Tinemaha ePZ = 42m.30s.  
 Lick iPZ = 42m.37s. a, iZ = 42m.46s.  
 Reno ePZ = 42m.48s. k.  
 Shasta Dam iP = 42m.54s.  
 Hungry Horse iP = 43m.24s.  
 College eP? = 50m.11s.  
 Tamanrasset Z = 50m.30s.  
 Long waves were also recorded at La Plata.

Feb. 10d. 20h. Central America.

Tacubaya iP = 26m.15s., iS? = 27m.50s., iS = 28m.17s.  
 Bogota ePEN = 28m.22s., ePPEN = 28m.51s., eSEN = 32m.0s.  
 Tucson eP = 29m.14s., e = 29m.27s., ePP = 29m.53s., eS? = 34m.7s., eL = 38m.13s.  
 Pierce Ferry eP? = 29m.54s.  
 Boulder City e = 29m.58s.  
 Overton eZ = 30m.1s.  
 La Paz eP = 30m.14s., L = 41.6m.  
 Logan e = 30m.18s., eL = 50m.23s.  
 Weston eP = 30m.37s.  
 Hungry Horse eP? = 31m.0s.  
 College e = 34m.14s.  
 Cleveland eSN = 34m.37s.  
 Long waves were also recorded at Philadelphia, San Juan, Bermuda, and Fort de France.

Feb. 10d. Readings also at 1h. (Rathfarnham Castle), 2h. (College, Christchurch, Huancayo, Bogota, La Paz, China Lake, Tucson, Tchimkent, Andijan, Samarkand, near Obi-garm, Fergana, Stalinabad, Naryn, and near Ashkabad; several shocks), 3h. (Bandong, Djakarta, Hungry Horse, Fresno, Tucson, near Boulder City, Overton, and Pierce Ferry), 4h. (La Paz, Tortosa, Pretoria, Pietermaritzburg, and Grahams-town), 7h. (near Seattle), 8h. (near Tchimkent), 9h. (Christchurch), 12h. (Hungry Horse, and New Delhi), 13h. (College, New Delhi, Kizyl-Arvat, near Ashkabad, and near Obi-garm), 14h. (College, near Ashkabad, and near Obi-garm), 15h. (Frunse, Samarkand, near Obi-garm, Stalinabad, Fergana, Tashkent, Andijan, and Tchimkent), 16h. (Shasta Dam, Mount Wilson, Riverside, China Lake, Tinemaha, Pierce Ferry, Overton, and Tucson), 17h. (Pierce Ferry, Shasta Dam, and near Ashkabad), 18h. (Huancayo, Harvard, College, Hungry Horse, Shasta Dam, Lick, Pasadena, Riverside, China Lake, Boulder City, Pierce Ferry, Tucson, and near Obi-garm; several shocks), 19h. (College, Pierce Ferry, Andijan, near Obi-garm, Stalinabad, near Djakarta and Bandong), 20h. (Seattle) 22h. (Samarkand, near Obi-garm (2), Andijan, and Stalinabad), 23h. (Logan, Tucson, Mount Wilson, Tinemaha, Hungry Horse, near Shasta Dam, and near Obi-garm).

Feb. 11d. 1h. 22m. 6s. Epicentre 43° 3S. 41° 6E.

A = +.5460, B = +.4847, C = -.6834;  $\delta = +9$ ;  $h = -3$ ;  
 D = +.664, E = -.748; G = -.511, H = -.454, K = -.730.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Grahamstown	15.4	305	e 3 33	- 7	i 6 12	-20	—	e 8.4
Pietermaritzburg z.	16.3	323	i 3 46	- 6	e 6 32	-21	—	—
Johannesburg	20.0	323	i 4 36	- 1	—	—	—	—
Pretoria z.	20.6	325	i 4 39	- 4	—	—	e 8 55	P <sub>c</sub> P
Tananarive	24.9	13	i 5 22	- 4	e 9 50	+ 3	6 7	PP e 12.1
Perth	58.1	105	—	—	i 17 59	+ 1	—	—
Colombo E.	60.8	45	10 22	+ 6	18 32	- 1	—	28.9
Kodaikanal E.	62.5	39	—	—	e 25 4	SSS	—	—
Djakarta	67.8	76	—	—	e 19 58	- 2	—	—
Bandong	67.9	78	e 11 4	+ 2	e 20 2	+ 1	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Bombay	N.	68.2	32	—	—	i 20 3	- 1	—	—
Helwan		73.4	350	i 11 36	0	e 21 2	- 3	14 21	PP
Tamanrasset	Z.	73.7	326	i 11 36 <sub>a</sub>	- 2	e 21 4	- 4	i 11 53	P <sub>c</sub> P
Ksara		76.9	355	e 12 4?	+ 8	—	—	—	—
New Delhi	N.	78.7	31	e 12 3	- 3	i 21 55	- 8	14 58	PP
Riverview		79.9	127	i 12 13 <sub>a</sub>	+ 1	e 22 16	0	i 23 5	PS
Ashkabad		82.3	13	e 12 26	+ 1	—	—	—	—
Mary		82.6	16	i 12 25	- 1	—	—	—	—
Kizyl-Arvat		83.0	11	e 12 28	0	—	—	—	—
Leninakan		83.7	2	e 12 33	+ 1	—	—	—	—
Tiflis		84.7	2	12 34	- 3	23 4	0	—	—
Stalinabad		85.1	21	i 12 37	- 2	i 23 8	0	—	—
Obi-garm		85.5	22	e 12 36	- 5	e 23 8	- 4	—	—
Brisbane		85.6	124	i 12 41 <sub>a</sub>	0	e 23 7	- 6	—	e 41.5
Samarkand		85.7	19	e 12 40	- 2	—	—	—	—
Wellington		85.8	146	i 12 42	0	i 23 9	- 6	i 23 21	S <sub>c</sub> S
Grozny		86.3	3	e 12 54	+ 9	—	—	i 13 6	P <sub>c</sub> P
Algiers Univ.	Z.	87.1	330	e 12 42	- 7	—	—	i 12 54	P <sub>c</sub> P
Fergana		87.6	22	e 12 49	- 2	—	—	—	—
Yalta		87.7	354	e 16 14	PP	e 23 32	- 1	e 18 18	PPP
Tashkent		87.9	20	e 12 49	- 4	23 21	[+ 1]	i 12 56	P <sub>c</sub> P
Simferopol		88.1	354	12 55	+ 1	—	—	—	—
Andijan		88.2	23	e 12 52	- 2	23 39	+ 1	—	—
Rome		88.8	338	—	—	e 23 25	[- 1]	e 29 25	SS
Tchimkent		88.9	20	i 12 54	- 4	e 23 42	- 2	—	—
Almeria		89.3	326	13 4	+ 5	23 34	[- 2]	16 40	PP
Auckland	N.	89.6	143	e 23 29	SKS	(e 23 29)	[- 1]	e 26 24	?
Alicante		89.8	328	15 50	PP	e 22 54	- 59	—	e 40.4
Malaga	Z.	90.0	325	i 13 6 <sub>k</sub>	+ 3	i 25 1	PS	—	45.8
Frunse		90.8	24	e 13 13	+ 7	—	—	—	—
Granada		91.4	325	i 13 6 <sub>k</sub>	- 3	i 23 43	[+ 2]	i 16 47	PP
Triest		92.0	341	e 12 53	- 19	e 23 39	[- 5]	e 30 22	SS
Toledo		92.5	325	e 13 17	+ 3	23 29	[- 18]	e 16 53	PP
La Paz		92.5	245	13 19	+ 5	i 25 26	PS	i 30 34	SS
Besançon		95.5	336	i 13 34	+ 6	—	—	i 17 15	PP
Prague		96.0	342	e 13 38	+ 8	e 23 59	[- 8]	e 17 28	PP
Stuttgart		96.0	339	e 13 35	+ 5	e 26 6	PS	e 17 18	PP
Strasbourg		96.2	338	e 17 29	PP	—	—	—	—
Moscow		98.7	357	e 13 50	+ 8	—	—	—	—
Huancayo		100.5	242	—	—	e 27 9	PS	—	—
Sverdlovsk		101.0	10	e 13 58	+ 5	25 33	+ 4	—	—
Kew		101.2	334	e 13 18?	- 36	e 23 26	?	—	e 45.9
Copenhagen		101.7	343	e 18 4	PP	—	—	—	48.9
Bermuda		122.5	285	—	—	e 38 34	SSP	—	e 52.6
Philadelphia		133.6	288	—	—	e 39 34	SS	—	e 62.1
Ottawa		136.1	295	e 19 25	[+ 2]	—	—	—	—
Tacubaya		139.4	246	i 19 13	[- 16]	—	—	e 24 15	?
Rapid City		154.7	284	e 20 6	[+ 12]	—	—	—	—
Tucson	E.	155.7	252	i 19 59	[+ 4]	e 37 22	PPS	—	e 76.4
College		157.8	10	e 20 5	[+ 7]	—	—	e 24 3	PP
Pierce Ferry		160.0	257	i 20 3	[+ 2]	—	—	e 24 48	PP
Logan		160.3	275	e 20 5	[+ 4]	—	—	e 24 34	PP
Boulder City		160.5	256	e 20 5	[+ 4]	—	—	i 20 12	PKP
Overton	Z.	160.5	257	i 20 12	[+ 11]	—	—	e 24 25	PP
Palomar	Z.	160.5	247	i 20 12	[+ 11]	—	—	i 24 7	PP
Riverside	Z.	161.2	247	e 20 5	[+ 3]	—	—	i 20 13	PKP
Pasadena		161.8	247	e 20 0	[- 3]	—	—	i 25 51	?
China Lake	Z.	162.3	254	e 20 6	[+ 3]	—	—	e 24 49	PP
Hungry Horse		162.3	296	e 20 0	[- 3]	—	—	i 24 50	PP
Tinemaha	Z.	163.4	255	e 20 15	[+ 11]	—	—	—	—
Reno	Z.	165.6	261	e 20 16 <sub>k</sub>	[+ 10]	—	—	e 25 8	PP
Shasta Dam		167.8	263	e 20 14	[+ 6]	—	—	e 21 23	PKP <sub>1</sub>
Victoria		168.3	302	e 21 32	PKP <sub>2</sub>	—	—	—	—

For Notes see next page.

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NOTES TO FEBRUARY 11d. 1h. 22m. 6s.

Additional readings:—

Tananarive S = 9m.53s., SS = 10m.59s., SSS = 11m.17s.  
 Helwan eZ = 17m.45s., PSZ = 21m.36s.  
 Tamanrasset iZ = 11m.44s., ePP?Z = 14m.11s., ePPPZ = 16m.6s.  
 New Delhi eN = 14m.41s., PSN = 22m.43s., iN = 25m.9s.  
 Riverview eSKSEN = 22m.24s., eSSN = 27m.36s.  
 Wellington iZ = 13m.21s. and 13m.35s., Q = 39.9m.  
 Algiers Univ. eP<sub>c</sub>PZ = 12m.47s., eZ = 13m.1s., 13m.43s., 14m.5s., 15m.9s., and 15m.36s.,  
 ePPPZ = 18m.7s.  
 Yalta ePS = 24m.49s.  
 Tashkent ePP = 16m.18s., eSS = 29m.24s.  
 Almeria PPS = 25m.36s., SS = 30m.2s.  
 Granada PPS = 25m.38s., iSS = 29m.52s.  
 Trieste ePP = 16m.37s., ePPP = 18m.22s., iSP = 24m.53s.  
 Prague e = 14m.38s. and 15m.27s., eSKKS = 24m.24s., e = 25m.6s., ePS = 26m.5s., eSS =  
 31m.18s., eSSS = 35m.30s.  
 Stuttgart e = 22m.54s.  
 Kew ePP = 17m.18s., eSSEN = 33m.26s.  
 Tucson i = 20m.7s., ePP? = 21m.26s., ePPP? = 22m.11s., e = 26m.5s.  
 College e = 20m.36s. and 27m.46s.  
 Pierce Ferry e = 21m.12s.  
 Overton iZ = 20m.55s.  
 Pasadena iZ = 20m.13s.  
 China Lake iZ = 20m.14s., iPKP<sub>2</sub>Z = 21m.42s., eZ = 29m.50s.  
 Hungry Horse i = 20m.10s.  
 Long waves were also recorded at Seven Falls, Harvard, Berkeley, and at other European  
 stations.

Feb. 11d. 11h. 30m. 1s. Epicentre 15°.4S. 174°.6W. Depth of focus 0.040.  
 (as on 1944, July 10d.).

A = -0.9603, B = -0.0908, C = -0.2639;  $\delta = +6$ ;  $h = +6$ ;  
 D = -0.094, E = +0.996; G = +0.263, H = +0.025, K = -0.965.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Apia		3.2	60	i 0 55	- 2	1 38	- 4	—	—
Auckland	N.	23.4	201	i 4 45	0	i 8 37	+ 3	5 35	pP
Arapuni		24.2	198	—	—	8 20	P <sub>c</sub> P	—	—
Tual	N.	24.4	195	e 4 52	- 2	e 9 15	+24	—	—
New Plymouth	E.	25.6	200	e 5 4	- 1	—	—	—	—
Wellington		27.4	197	i 5 18	- 3	—	—	i 6 39	PP
Cobb River	E.	27.9	201	e 5 23	- 3	—	—	—	15.0
Kaimata	N.E.	29.6	201	5 36	- 5	—	—	—	—
Christchurch		30.1	198	i 5 45	0	10 16	- 6	7 4	pP
Brisbane		32.3	243	e 5 59	- 5	e 10 55	- 1	e 6 51	pP
Riverview		35.9	233	i 6 33k	- 2	i 11 49	- 2	i 7 56	PP
Honolulu		40.0	25	i 7 11	+ 2	e 13 2	+ 9	—	—
Berkeley		72.2	41	i 11 0 <sub>a</sub>	+ 5	e 20 5	+12	i 12 12	pP
Lick	Z.	72.3	41	i 11 0 <sub>a</sub>	+ 4	i 12 35	sP	e 12 0	pP
Pasadena		72.8	46	i 11 1 <sub>a</sub>	+ 2	i 20 13	+13	i 11 59	pP
Fresno	N.	73.2	43	e 11 5	+ 4	—	—	e 12 5	pP
Palomar		73.3	48	i 11 6 <sub>a</sub>	+ 4	—	—	i 12 10	pP
Riverside		73.3	46	i 11 5 <sub>a</sub>	+ 3	—	—	e 12 8	pP
Shasta Dam		73.9	39	i 11 7	+ 2	—	—	e 12 5	pP
Mineral	Z.	74.1	40	e 11 9 <sub>a</sub>	+ 3	—	—	i 12 17	pP
China Lake	Z.	74.1	45	i 11 10 <sub>a</sub>	+ 4	—	—	i 12 13	pP
Tinemaha		74.4	43	i 11 11 <sub>a</sub>	+ 3	—	—	i 12 18	pP
Reno	Z.	74.8	41	i 11 13k	+ 3	—	—	e 12 11	pP
Boulder City		76.1	47	i 11 22	+ 4	—	—	i 12 26	pP
Vladivostok		76.1	323	e 11 13	- 5	i 20 43	+ 7	—	—
Bandong		76.4	267	e 11 19	- 1	e 20 46	+ 6	—	—
Overton	Z.	76.7	46	i 11 25	+ 4	—	—	i 12 29	pP
Pierce Ferry		76.8	47	i 11 26	+ 4	—	—	i 12 24	pP
Tucson		77.2	50	i 11 28	+ 4	e 21 2	+14	e 12 26	pP
Djakarta		77.4	267	e 11 24	- 1	e 20 56	+ 6	—	e 33.8

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Victoria	78.2	32	e 11 34k	+ 5	—	—	—	—
Logan	81.1	42	i 11 46	+ 1	e 21 36	+ 7	e 12 45	pP
Tacubaya	81.8	67	i 11 55	+ 7	e 21 47	+11	i 13 3	pP
College	82.6	11	i 11 54	+ 2	e 21 48	+ 4	i 12 55	pP
Hungry Horse	83.1	36	i 11 55	0	—	—	e 15 9	PP
St. Louis	95.2	51	e 12 51	- 1	i 23 5	[+ 6]	i 23 51	S
Huancayo	95.6	104	—	—	i 23 19	[+18]	—	—
La Paz	100.8	110	e 13 11	- 7	i 23 39	[+12]	i 27 49	PPS
Philadelphia	106.9	52	—	—	e 23 53	[- 2]	e 27 10	PS
Kodaikanal	E. 109.8	276	—	—	e 26 19	sSKS	—	e 47.2
Bermuda	114.7	61	—	—	e 25 47	S <sub>c</sub> S	e 26 59	sSKS
Stalinabad	120.2	306	e 18 21	[+ 4]	—	—	—	—
Tiflis	137.1	316	e 18 53	[+ 4]	—	—	e 21 32	PP
Rathfarnham Cas. z.	141.1	11	e 19 0	[+ 4]	e 26 30	[+54]	e 21 59	PP
Jena	E. 144.2	351	e 19 4	[+ 2]	—	—	e 20 15	pPKP
Prague	144.7	350	i 19 7	[+ 4]	e 20 29	sPKP	e 20 12	pPKP
Karlsruhe	146.4	357	e 19 12	[+ 6]	—	—	e 20 17	pPKP
Paris	146.6	3	i 19 11	[+ 5]	—	—	i 20 16	pPKP
Stuttgart	z. 146.6	355	e 19 9	[+ 3]	—	—	e 20 16	pPKP
Strasbourg	146.8	357	i 19 12	[+ 6]	i 20 40	sPKP	i 20 17	pPKP
Ksara	147.0	308	i 19 12k	[+ 5]	—	—	20 19	pPKP
Basle	147.9	357	e 19 15	[+ 7]	—	—	e 23 56	pPKS
Zürich	148.0	356	e 19 12	[+ 4]	—	—	e 20 20	pPKP
Chur	148.5	354	e 19 12k	[+ 3]	—	—	—	—
Clermont-Ferrand	149.7	3	e 19 20	[+ 9]	—	—	e 20 26	pPKP
Helwan	152.2	305	19 18	[+ 4]	21 9	sPKP	20 23	pPKP
Alicante	156.5	12	19 18	[- 2]	—	—	23 0	PKS
Granada	156.9	19	20 6k	[+45]	—	—	21 6	pPKP
Algiers Univ.	z. 158.6	5	e 19 26	[+ 3]	—	—	e 20 38	pPKP
Tamanrasset	z. 172.6	—	i 19 39k	[+ 5]	—	—	e 20 47	pPKP

Additional readings :—

Auckland iN = 5m.49s.  
Wellington iZ = 7m.20s.  
Christchurch P<sub>c</sub>PZ = 8m.23s., e = 11m.59s., 13m.44s., and 17m.49s.  
Brisbane iPP = 7m.25s., ePPN = 7m.28s., iE = 8m.32s., isSN = 12m.32s., esSE = 12m.35s., iSSN = 13m.32s.  
Riverview isSE = 12m.47s., iE = 13m.11s. and 13m.45s., isSE = 14m.13s., iSSN = 14m.47s., iE = 18m.32s.  
Berkeley iZ = 11m.5s., ipPZ = 11m.10s., i = 20m.9s., iS<sub>c</sub>S?E = 20m.49s.  
Lick iZ = 11m.5s., ePPZ = 13m.41s.  
Pasadena iZ = 11m.39s.  
Palomar iZ = 11m.31s.  
Shasta Dam e = 13m.53s.  
China Lake iZ = 11m.43s.  
Tinemaha iZ = 11m.30s.  
Boulder City i = 11m.30s. and 11m.38s.  
Overton iZ = 13m.33s.  
Pierce Ferry i = 14m.21s.  
Tucson e = 13m.41s. and 21m.22s.  
Logan ePP? = 14m.35s.  
Tacubaya isS = 23m.55s.  
Hungry Horse ePKKP? = 30m.6s., iPKKP = 30m.15s., ePKP,PKP? = 38m.6s.  
La Paz PP = 17m.11s., iS = 24m.51s., SS = 30m.59s.  
Bermuda e = 30m.1s.  
Rathfarnham Castle iZ = 28m.5s.  
Jena eE = 21m.8s.  
Prague iPKP<sub>z</sub> = 19m.11s., e = 20m.18s., 20m.56s., and 21m.18s., ePP = 22m.34s., e = 24m.11s., eZ = 26m.17s.  
Strasbourg e = 20m.29s. and 21m.2s.  
Ksara PP = 22m.39s.  
Zürich ePP = 22m.26s.  
Helwan PKP<sub>z</sub> = 19m.35s., PPZ = 23m.8s., eZ = 24m.41s.  
Algiers Univ. ePKP<sub>z</sub> = 20m.1s., epPKPZ = 21m.9s., ePPZ = 23m.44s., epPPZ = 24m.50s.  
Tamanrasset eZ = 19m.43s., ePKP<sub>z</sub> = 21m.6s., iPPZ = 24m.56s., epPPZ = 25m.59s., ePPPZ = 28m.53s.  
Long waves were also recorded at Almeria.

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Feb. 11d. Readings also at 0h. (Prague, Zagreb, near Trieste, near Leninakan, Samarkand, near Stalinabad, and Obi-garm), 1h. (Grahamstown, Pietermaritzburg, Pretoria, Huancayo, and near Hungry Horse), 2h. (near Fergana), 3h. (Apia and Huancayo), 6h. (near Obi-garm), 7h. (near Obi-garm and near Tacubaya), 8h. (near Tacubaya), 9h. (Tucson, Boulder City, Pierce Ferry, Overton, China Lake, Hungry Horse (2), College (2), Bogota, La Paz, Tamanrasset, and Ksara), 10h. (Andijan, Frunse, Irkutsk, Obi-garm, Samarkand, Stalinabad, Tchimkent, College, Hungry Horse, Shasta Dam, and Tamanrasset), 11h. (Samarkand, Tchimkent, near Obi-garm, Stalinabad, and Andijan), 12h. (Tucson and Huancayo), 13h. (College, and near Obi-garm), 14h. (College, Hungry Horse, and near Obi-garm), 16h. (Tchimkent, Samarkand, near Obi-garm, Stalinabad, and Andijan), 17h. (Huancayo, near Tchimkent, and near Tananarive), 18h. (College, Hungry Horse, China Lake, Overton, Pierce Ferry, Tucson, near Huancayo, and near Tacubaya), 19h. (Huancayo and near Obi-garm), 20h. (Andijan (2), Tchimkent, Samarkand, near Obi-garm, and Stalinabad), 22h. and 23h. (near Tacubaya).

Feb. 12d. 9h. 43m. 47s. Epicentre  $34^{\circ}7'N$ .  $24^{\circ}1'E$ . (as on 1949, Dec. 7d.).

$$A = +.7521, B = +.3364, C = +.5667; \quad \delta = -3; \quad h = 0; \\ D = +.408, E = -.913; \quad G = +.517, H = +.231, K = -.824.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Athens	3.3	355	e 0 53	0	i 1 37	+ 2	—	—
Messina	7.7	300	e 1 47	- 9	i 3 22	- 3	—	—
Prague	16.9	338	e 4 6	+ 7	e 7 13	+ 6	—	—
Algiers Univ.	z. 17.2	282	e 4 4	+ 1	—	—	e 4 13	PP e 8.2
Zürich	17.2	321	e 4 7	+ 4	—	—	—	—
Tiflis	17.7	60	(e 4 8)	- 2	(e 7 31?)	+ 5	—	—
Basle	17.8	321	e 4 13	+ 2	—	—	e 6 40	? —
Stuttgart	z. 17.9	327	e 4 13	+ 1	—	—	e 4 25	PP —
Strasbourg	18.4	324	e 4 20	+ 2	—	—	—	—
Besançon	18.5	318	e 4 33	+14	—	—	e 5 2	? —
Clermont-Ferrand	19.4	311	e 4 32	+ 2	—	—	—	—
Tamanrasset	z. 20.1	240	e 4 36	- 2	e 8 16	- 3	i 4 54	PP —
Paris	21.3	318	e 4 49	- 1	—	—	i 5 6	PP —
Weston	71.2	309	i 11 22	- 1	—	—	—	—
Ottawa	72.3	314	e 11 29	0	—	—	—	—
College	80.6	357	e 12 16	0	—	—	—	—
Hungry Horse	89.3	334	i 12 59	0	—	—	—	—

Additional readings and notes:—

Messina i = 3m.14s. and 3m.34s.

Prague e = 4m.32s., 5m.11s., and 5m.35s.

Algiers Univ. ePPPZ = 4m.25s., eZ = 4m.41s., 4m.58s., and 6m.7s.

Tiflis readings have been reduced by 6m.

Stuttgart ePPZ = 4m.41s.

Tamanrasset ePPPZ = 5m.6s., eZ = 6m.46s., eSSZ = 8m.49s.

Feb. 12d. 22h. 14m. 55s. Epicentre  $19^{\circ}0'S$ .  $178^{\circ}0'E$ .

Felt in the Fiji Islands. Epicentre  $19^{\circ}S$ .  $178^{\circ}E$ . (U.S.C.G.S.).

Seismological Report for January-March, 1950, Seismological Observatory, Wellington, New Zealand, p. 11.

$$A = -.9456, B = +.0330, C = -.3236; \quad \delta = -3; \quad h = +5; \\ D = +.035, E = +.999; \quad G = +.323, H = -.011, K = -.946.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Apia	11.1	64	e 2 44	+ 1	e 4 20	-29	—	e 5.6
Auckland	N. 18.0	188	i 4 17	+ 4	i 7 52	SS	8 55	PcP 9.9
New Plymouth	E. 20.3	188	—	—	e 8 50	SS	—	—
Wellington	22.4	187	i 5 1	- 1	i 9 5	+ 1	i 5 20	PP 11.6
Cobb River	E. 22.5	190	e 5 5	+ 3	e 9 16	+11	—	—
Kaimata	N.E. 24.1	192	e 5 21	+ 3	—	—	—	—
Brisbane	24.4	245	i 5 19	- 2	i 9 41	+ 2	e 6 1	PP i 11.9
Christchurch	24.9	189	e 5 21	- 5	9 41	- 6	e 5 59	PP 12.0
Riverview	28.1	232	i 5 54 <sub>a</sub>	- 1	10 38	- 2	i 6 6	pP 13.5
Honolulu	46.5	32	e 8 51	+20	e 16 19	+60	—	e 19.1

Continued on next page.

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	$\Delta$ °	Az. °	P. m. s.	O - C. s.	S. m. s.	O - C. s.	Supp. m. s.	L. m.
Perth	56.9	243	—	—	—	—	i 26 23 Q	i 29.8
Vladivostok	74.9	327	e 11 44	0	i 21 25	+ 3	—	—
Santa Clara	79.6	44	e 12 24k	+14	e 23 22	PS	—	e 37.3
Berkeley	79.7	44	i 12 12k	+ 1	i 22 15	+ 2	i 23 11	PPS
Lick	z. 79.8	44	e 12 11k	- 1	—	—	i 12 20	PcP
Pasadena	80.5	49	e 12 15	0	e 22 23	+ 1	i 15 22	PP
Fresno	80.7	46	e 12 16k	0	—	—	e 14 15	?
Palomar	81.0	50	i 12 20	+ 2	—	—	—	—
Riverside	81.0	49	i 12 18	0	—	—	—	—
Shasta Dam	81.2	41	i 12 19	0	—	—	—	—
Mineral	z. 81.5	42	e 12 19k	- 2	—	—	i 12 41	PcP
China Lake	z. 81.7	48	i 12 21k	- 1	—	—	i 12 34	PcP
Tinemaha	z. 81.9	47	i 12 25	+ 2	—	—	—	—
Reno	82.2	43	i 12 24k	0	e 22 39	0	e 22 52	ScS
Boulder City	83.8	49	e 12 32	0	—	—	—	—
Overton	z. 84.3	48	i 12 35	0	—	—	e 16 3	PP
Pierce Ferry	84.4	49	e 12 37	+ 1	—	—	e 14 25	?
Tucson	85.0	53	i 12 37	- 1	e 23 13	+ 6	i 16 11	PP
Seattle	85.2	36	i 12 43k	+ 4	—	—	i 12 49	PcP
Sitka	85.6	23	—	—	e 23 5	{ 0 }	—	—
College	87.6	13	e 12 48	- 3	e 23 24	{ 0 }	e 13 16	?
Salt Lake City	88.1	46	e 12 55	+ 1	e 23 35	- 2	e 24 49	PS
Logan	88.5	44	e 12 53	- 3	e 24 24	PS	—	e 41.2
Tacubaya	89.7	69	i 13 10	+ 9	e 23 57	+ 5	e 25 35	PPS
Butte	N. 90.0	40	—	—	e 24 32	PS	—	e 43.1
Hungry Horse	90.3	38	e 13 2	- 2	—	—	e 16 44	PP
Bozeman	90.8	41	—	—	e 24 9	+ 7	e 29 14	SS
Irkutsk	95.3	323	e 13 26?	- 1	e 24 5	{ + 2 }	—	—
Rapid City	E. 95.3	44	e 12 54	-33	e 23 24	{ -39 }	—	e 46.4
Colombo	E. 99.9	273	23 13	?	26 58	PS	—	53.4
Huancayo	101.4	107	—	—	e 25 47	+15	—	—
St. Louis	102.9	53	e 17 19	?	e 26 58	PS	—	—
La Paz	106.0	114	e 14 35	+19	—	—	e 18 37	PP
Bogota	E. 108.4	91	e 20 46	PPP	e 28 4	PS	—	53.1
Poona	N. 108.8	283	—	—	i 25 33	{ +26 }	—	—
Bombay	109.8	283	19 8	PP	e 29 14	PPS	—	—
Cleveland	110.0	51	—	—	e 25 49	{ +37 }	i 29 0	PS
Naryn	111.2	307	e 21 21	PPP	e 24 59	{ -18 }	—	—
Frunse	112.4	309	e 19 31	PP	e 25 49	{ +27 }	—	—
Pennsylvania	112.7	52	—	—	i 27 24	{ +60 }	i 28 59	PS
Andijan	113.8	306	e 19 36?	PP	e 27 26	{ +54 }	e 35 27	SS
Philadelphia	114.7	53	—	—	e 27 42	{ +64 }	e 35 3	SS
Fordham	115.7	52	—	—	e 27 51	{ +66 }	e 29 51	PS
Tchinkent	116.0	308	i 18 43	{ - 2 }	—	—	i 19 45	PP
Tashkent	116.2	307	18 42	{ - 3 }	e 25 20	{ -16 }	e 19 50	PP
Stalinabad	116.4	304	e 19 55	PP	e 35 53	SS	—	—
Harvard	117.5	50	—	—	e 30 5	PS	—	e 51.7
Weston	117.7	50	—	—	36 41	SSP	—	e 55.9
Samarkand	117.9	305	e 19 53	PP	—	—	—	—
San Juan	119.6	78	—	—	e 25 46	{ - 3 }	e 32 14	PPS
Sverdlovsk	120.6	325	e 18 54	{ 0 }	e 36 59	SS	e 20 14	PP
Bermuda	122.7	62	—	—	e 31 57	PPS	—	e 60.4
Ashkabad	124.6	303	e 18 59	{ - 3 }	—	—	—	—
Moscow	132.8	330	e 24 17	PPP	—	—	—	—
Tiflis	134.4	310	e 19 21	{ + 1 }	i 22 50	PKS	e 42 5	?
Yalta	140.6	318	e 19 33	{ + 1 }	e 25 18	PPP	e 19 22	?
Ksara	143.2	301	e 19 38	{ + 2 }	—	—	22 51?	PP
Potsdam	z. 144.7	344	i 19 38k	{ - 1 }	—	—	e 20 53	PKP <sub>2</sub>
Skalnate Pleso	145.0	334	e 19 46	{ + 7 }	—	—	—	—
Raciborzu	z. 145.0	337	e 19 41	{ + 2 }	—	—	—	—
Rathfarnham Castle	145.6	4	i 19 44	{ + 4 }	e 23 2	PKS	e 20 21	?
Prague	146.3	341	i 19 45	{ + 4 }	e 30 5	{ + 7 }	e 19 55	PKP <sub>2</sub>
Jena	146.4	343	e 19 38	{ - 4 }	—	—	e 19 44	PKP <sub>2</sub>
Kew	147.6	357	—	—	e 61 10	?	e 69 56	Q
Helwan	147.9	296	19 45	{ + 1 }	i 42 31	SS	e 23 5	PP

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Karlsruhe	148.9	347	i 19 48	[+ 2]	—	—	—	e 79.1
Stuttgart	149.0	345	e 19 45	[- 1]	—	—	e 20 8	PKP <sub>2</sub> e 76.1
Strasbourg	149.4	347	i 19 51	[+ 5]	—	—	e 20 3	PKP <sub>2</sub> 76.1
Zagreb	149.4	334	e 19 40	[- 6]	—	—	—	—
Paris	150.0	354	i 19 55	[+ 8]	—	—	i 20 10	PKP <sub>2</sub> e 71.1
Zürich	150.4	346	e 19 51	[+ 3]	—	—	—	—
Basle	150.5	347	e 19 52	[+ 4]	—	—	—	—
Chur	150.7	343	e 19 53 <sub>a</sub>	[+ 5]	—	—	—	—
Besançon	151.1	349	e 19 56	[+ 7]	—	—	e 20 23	PKP <sub>2</sub> —
Clermont-Ferrand	153.0	352	e 20 0	[+ 8]	—	—	—	75.1
Rome	154.1	334	—	—	e 30 5	{-36}	—	—
Toledo	z. 159.1	4	e 19 59	[- 1]	—	—	e 21 56	? 98.4
Alicante	160.7	357	20 4	[+ 2]	27 12	[+ 7]	20 39	PKP <sub>2</sub> e 76.8
Algiers Univ.	z. 161.7	346	e 20 1	[- 1]	—	—	e 20 47	PKP <sub>2</sub> —
Granada	161.8	4	20 36 <sub>a</sub>	[+ 33]	45 30	SS	24 33	PP 77.2
Almeria	162.2	1	20 5	[+ 2]	44 45	SS	20 53	PKP <sub>2</sub> 79.0
Malaga	z. 162.2	6	i 20 3 <sub>a</sub>	[ 0]	29 5	?	25 25	PP 84.2
Tamanrasset	z. 172.0	300	20 10	[ 0]	—	—	e 21 35	PKP <sub>2</sub> —

Additional readings :—

Auckland iPP?N = 5m.15s., iN = 5m.30s. and 8m.17s.  
 Wellington i = 6m.17s., iP<sub>c</sub>P = 8m.39s., SS = 9m.54s., P<sub>c</sub>S = 11m.10s.  
 Brisbane iSSE = 10m.43s.  
 Christchurch QE = 10m.30s.  
 Riverview iPPZ = 6m.36s., iE = 6m.57s., iZ = 7m.0s., iN = 10m.45s., iE = 10m.55s., iSSZ = 12m.3s., iSSN = 12m.20s., iZ = 12m.37s., iN = 13m.10s.  
 Berkeley iZ = 12m.38s., eZ = 13m.20s., eE = 13m.34s., eNZ = 14m.32s., eZ = 21m.50s., iN = 22m.20s., iZ = 24m.31s., eE = 24m.51s., ePKKPZ = 33m.17s., eSSSEN = 33m.29s.  
 Lick eEN = 12m.23s., iP<sub>c</sub>PZ = 12m.31s., iZ = 12m.36s. and 12m.41s., ePP?Z = 14m.55s.  
 Pasadena eZ = 12m.26s.  
 Tucson i = 12m.40s., ePPP? = 19m.30s., ePS? = 23m.55s., eSS? = 29m.27s.  
 Seattle i = 12m.58s.  
 Logan e = 14m.34s. and 14m.38s.  
 Tacubaya i = 17m.15s., e = 20m.30s.  
 St. Louis e = 29m.1s. and 38m.46s.  
 Cleveland eN = 32m.6s. and 47m.46s.  
 Pennsylvania iN = 33m.30s., iE = 34m.6s., iEN = 37m.23s., iE = 38m.29s.  
 Philadelphia eSSS = 38m.52s.  
 Sverdlovsk ePKS = 22m.36s.  
 Potsdam iZ = 21m.1s.  
 Rathfarnham Castle eZ = 37m.5s.  
 Prague e = 20m.17s. and 20m.58s., eZ = 21m.19s., ePP? = 22m.30s.  
 Jena eE = 20m.5s., eN = 20m.24s. and 21m.38s.  
 Helwan eZ = 20m.11s. and 21m.59s.  
 Stuttgart ePKPZ = 19m.49s. and 20m.40s.  
 Strasbourg i = 20m.34s., 20m.38s., and 20m.44s.  
 Paris i = 20m.26s.  
 Rome e = 32m.43s. and 35m.23s.  
 Alicante PKS = 23m.39s.  
 Algiers Univ. eZ = 20m.18s., ePPZ = 24m.31s., eZ = 26m.25s., PPPZ = 28m.16s., eZ = 35m.6s.  
 Granada PPP = 28m.30s., SSS = 51m.23s.  
 Almeria PP = 24m.35s., PPP = 28m.17s., SSS = 50m.55s.  
 Malaga iPPP?Z = 22m.27s.  
 Tamanrasset eZ = 20m.26s., eZ = 24m.19s., ePPZ = 25m.24s., ePPPZ = 29m.18s.  
 Long waves were also recorded at other North American and European stations.

Feb. 12d. Readings also at 0h. (Auckland and near Obi-garm), 1h. (Tchimkent, Samarkand, Andijan, Naryn, near Obi-garm, and Stalinabad), 2h. (Naryn, Frunse, near Garm, Obi-garm, Stalinabad, Andijan, Tashkent, Tchimkent, and Samarkand), 3h. (Overton, Hungry Horse, Tucson, Grahamstown (2), Pietermaritzburg (2), Pretoria, Tananarive, Tamanrasset, and Ksara), 4h. (Rome, College, Wellington, and near Obi-garm (2)), 5h. (Pierce Ferry and Tucson), 7h. (Bogota), 8h. (Fergana, near Andijan, and near Tacubaya), 9h. (near Ashkabad, near Bandung, and Djakarta), 10h. (College, Shasta Dam, and Tucson), 11h. (Huancayo, Bogota, La Paz, Tucson, Hungry Horse, Tchimkent, near Obi-garm, and near Alicante), 12h. (near Prague), 15h. (Mizusawa, Ottawa, La Cave, and near Rolphton), 16h. (near Andijan), 17h. (College and Hungry Horse), 18h. (Hungry Horse), 19h. (College, Hungry Horse, Shasta Dam, Overton, Pierce Ferry, Tucson, Harvard, Stuttgart, Warsaw, New Delhi, Mary, Ashkabad, Stalinabad, Samarkand, Tchimkent, Naryn, Frunse, near Obi-garm (2), Garm (2), Fergana, and Andijan; several shocks), 20h. (near Ashkabad and near Andijan), 21h. (College and near Huancayo).



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Feb. 13d. 5h. 55m. 2s. Epicentre 22°·1S., 68°·7W. Depth of focus 0·010.

Intensity III between 22° and 23° south latitudes.  
Epicentre as adopted; depth 100km. (Strasbourg).

F. Greve.

Boletín del año 1950, Instituto Sismológico, Santiago, 1951, p. 3.

A = +·3369, B = -·8641, C = -·3740;  $\delta = +5$ ;  $h = +4$ ;  
D = -·932, E = -·363; G = -·136, H = +·348, K = -·927.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.	
				m.	s.		m.	s.		m.	s.
La Paz		5·6	6	i 1	19 <sub>a</sub>	- 3	i 2	15	-11	—	—
Huancayo		11·8	327	e 2	24	-22	e 5	23	SS	—	—
Harvard		64·3	358	i 10	26	- 1	—	—	—	e 10	57
Tucson		67·4	323	i 10	48	+ 1	—	—	—	—	—
Palomar	z.	71·8	320	i 11	16	+ 2	—	—	—	—	—
Pierce Ferry		72·0	323	i 11	18	+ 3	—	—	—	i 11	32
Boulder City		72·4	322	i 11	20	+ 3	—	—	—	—	—
Riverside	z.	72·5	319	i 11	21 <sub>k</sub>	+ 3	—	—	—	i 11	50
Overton	z.	72·6	323	i 11	22	+ 3	—	—	—	e 11	52
Pasadena	z.	73·1	319	i 11	24 <sub>k</sub>	+21	—	—	—	i 11	54
China Lake	z.	73·9	321	i 11	27	+ 1	—	—	—	i 11	58
Logan		75·0	328	e 11	31	- 1	—	—	—	e 12	2
Tinemaha	z.	75·1	321	i 11	36	+ 3	—	—	—	i 12	7
Mineral	z.	79·3	322	e 11	58 <sub>k</sub>	+ 2	—	—	—	—	—
Shasta Dam		79·9	322	i 12	0	0	—	—	—	e 12	31
Hungry Horse		81·0	332	i 12	7	+ 1	—	—	—	i 12	36
Tamanrasset	z.	85·0	63	i 12	28 <sub>a</sub>	+ 2	i 13	15	sP	e 13	0

Additional readings :—

La Paz iZ = 2m.1s., iS<sub>g</sub> = 2m.46s.

Pierce Ferry i = 11m.47s.

Tamanrasset eZ = 14m.38s., ePPZ = 15m.41s.

Feb. 13d. 7h. 3m. 28s. Epicentre 22°·0N. 65°·0E.

Epicentre as given by the U.S.S.R. network bulletin.

A = +·3922, B = +·8411, C = +·3724;  $\delta = -5$ ;  $h = +4$ ;  
D = +·906, E = -·423; G = +·157, H = +·338, K = -·928.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.
				m.	s.		m.	s.	
Bombay	K.	7·9	112	e 2	32 <sub>?</sub>	P <sub>g</sub>	—	—	—
Stalinabad		16·8	9	e 3	49	- 9	e 6	55	-10
Ashkabad		16·9	342	e 3	53	- 6	e 6	59	- 8
Obigarm		17·2	12	e 4	0	- 3	—	—	—
Garm		17·6	12	e 4	10	+ 2	—	—	—
Samarkand		17·7	4	e 3	46	-24	—	—	—
Tashkent		19·6	10	e 4	22	-10	—	—	—
Andijan		19·7	16	e 4	40	+ 6	—	—	—
Frunse		22·3	18	e 5	2	+ 1	—	—	—
Tiflis		26·0	323	i 5	36	0	—	—	—
Grozny		26·6	327	e 5	44	+ 2	—	—	—
Ksara		28·2	301	e 3	36	?	e 10	29	-12
College		89·8	14	e 13	15	+13	—	—	—

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Feb. 13d. 7h. 22m.19s. Epicentre 29°·8N. 95°·3E. (as on 1942, Sept. 3d.).

U.S.S.R. gives epicentre 29°·5N. 95°·0E.

$$A = -.0878, B = +.8648, C = +.4945; \quad \delta = +12; \quad h = +2;$$

$$D = +.995, E = +.101; \quad G = -.050, H = +.492, K = -.869.$$

		$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
				m.	s.		m.	s.		m.	s.	
Calcutta	E.	9.8	225	(i 2 18)		- 6	(i 3 8)	-69				
New Delhi		16.3	271	(e 4 0)		+ 8	(e 6 15)	-38				
Naryn		19.9	314	e 4 39		+ 3	e 8 1?	-14				
Hyderabad	N.	20.1	236	(e 7 4)		?	(i 8 20)	+ 1				
Almata		20.2	319	e 4 51?		+12						
Frunse		21.4	314	e 5 4		+13						
Andijan		22.0	307	e 4 57		- 1	e 8 44	-12				
Fergana		22.2	307	i 4 57		- 3						
Garm		22.9	303	e 4 58		- 8						
Poona		22.9	345	(e 5 6)		0	(e 8 15)	-58				(8.9)
Obi-garm		23.3	302	i 4 59		-11						
Stalinabad		23.9	302	e 5 4		-12	9 7	-23				
Tashkent		24.3	307	e 5 19		- 1	e 9 28?	- 9				
Samarkand		25.5	300	e 5 26		- 6						
Stuttgart	Z.	66.1	315	e 10 53		+ 2						
College		73.6	24	i 12 16		+39						

Additional readings and note:—

New Delhi eSE = (6m.12s.).

Poona QEN = (8m.2s.), SSSSEN = (8m.34s.); L as given.

All readings from the Indian stations have been increased by 1 minute.

Feb. 13d. 11h. Region of the Solomon Islands.

Brisbane iPZ = 32m.1s., ePN = 32m.6s., iZ = 32m.11s., eE = 32m.18s., iSN = 36m.4s., eREN = 38m.30s.

Riverview eZ = 33m.11s., eS?N = 37m.51s., eLE = 40.3m.

College iP = 39m.24s., e = 40m.5s.

Shasta Dam e = 40m.1s.

Pasadena iPZ = 40m.14s.

China Lake iPz = 40m.16s.

Riverside iPZ = 40m.17s.

Tinemaha iPZ = 40m.17s.

Palomar iPZ = 40m.21s.

Boulder City e = 40m.29s.

Hungry Horse iP = 40m.31s.

Pierce Ferry e = 40m.31s.

Christchurch eEN = 41m.15s., eE = 44m.30s., eLEN = 48m.10s.

Strasbourg e = 46m.7s. and 46m.37s.

Stuttgart ePKPZ = 46m.8s.

Tamanrasset ePKPZ = 46m.38s., ePKP<sub>2</sub>Z = 46m.45s., eZ = 46m.55s., 47m.2s., and 47m.21s., ePPZ = 50m.47s.

Long waves were also recorded at Auckland, Wellington, Berkeley, Philadelphia, and Bermuda.

Feb. 13d. Readings also at 1h. (Zagreb and near Trieste), 3h. (Hungry Horse, Tucson, and Tacubaya), 4h. (Huancayo and near Obi-garm), 5h. (near Ashkabad), 8h. and 9h. (near Obi-garm), 10h. (Lick), 11h. (Tacubaya, College, Hungry Horse, Shasta Dam, Mineral, Lick, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, and Tucson), 13h. (Mizusawa, College, and Pierce Ferry), 14h. (Alicante, Granada, College, Hungry Horse, and Tucson), 15h. (Stuttgart, near Basle), 16h. (near Tacubaya), 17h. (near Obi-garm), 18h. (near Ottawa), 19h. (Stuttgart), 22h. (Prague).

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Feb. 14d. 0h. 5m. 59s. Epicentre 36°·7N. 55°·3E.

Epicentre given by the U.S.S.R. network bulletin.

$$A = +\cdot4575, B = +\cdot6607, C = +\cdot5951; \quad \delta = -3; \quad h = 0;$$

$$D = +\cdot822, E = -\cdot569; \quad G = +\cdot339, H = +\cdot489, K = -\cdot804.$$

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.	
			m.	s.		m.	s.		m.	s.
Kizyl-Arvat	2·4	18	0	41	0	1	21	S <sub>g</sub>	—	—
Ashkabad	2·7	62	e 0	49	+ 4	2	36	?	—	—
Tiflis	9·6	305	e 2	23	+ 2	i 4	17	+ 5	—	—
Samarkand	9·7	68	e 2	25	+ 3	—	—	—	—	—
Grozny	9·9	315	e 2	29	+ 4	—	—	—	—	—
Stalinabad	10·9	76	e 2	44	+ 4	—	—	—	—	—
Obi-garm	11·6	76	e 2	52	+ 2	e 5	8	+ 7	—	—
Tashkent	11·8	63	—	—	—	i 6	32	?	—	—
Garm	12·1	74	e 3	12?	+15	—	—	—	—	—
Andijan	13·9	68	e 3	19	- 2	—	—	—	—	—
Ksara	16·1	265	e 3	39?	-10	—	—	—	e 8	59 P <sub>c</sub> P
Sverdlovsk	20·5	8	4	37	- 5	—	—	—	—	—
Helwan	N. 21·1	257	—	—	—	e 8	49	+10	—	—
Tamanrasset	z. 44·9	266	i 8	13k	- 5	—	—	—	—	—
College	77·2	10	e 11	54	- 3	—	—	—	—	—

Feb. 14d. Readings also at 1h. (China Lake, College, and Pierce Ferry), 2h. (Tamanrasset), 4h. (near Garm, Stalinabad, Fergana, Andijan, Samarkand, and Tchimkent), 5h. (Samarkand, Tchimkent, near Garm, Andijan, and near Ashkabad), 6h. (near Tacubaya), 7h. (New Delhi, La Paz, Riverside, China Lake, Boulder City, Overton, Pierce Ferry, Shasta Dam, and Hungry Horse), 8h. (College, Hungry Horse (2), Shasta Dam, Overton, Pierce Ferry, Athens, Stuttgart, Copenhagen, and Tamanrasset), 9h. (Durham, and near Tchimkent), 10h. (Samarkand, near Garm, Andijan, Stalinabad, and Tchimkent), 11h. (College, Hungry Horse, Shasta Dam, Mineral, Mount Wilson, Riverside, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, and near Garm), 12h. (Messina and near Granada), 14h. (Christchurch, Brisbane, College, Hungry Horse, Mount Wilson, China Lake, Overton, Pierce Ferry, Tamanrasset, Huancayo, and near Tacuabaya), 16h. (Mary, Tashkent, Andijan, Tchimkent, near Stalinabad, and Samarkand), 17h. (Mary, Fergana, Samarkand, Tchimkent, Frunse, Andijan, Stalinabad, Tashkent, near Garm, Obi-garm, and near Malaga), 18h. (Seattle, Victoria (2), Pretoria, and Grahamstown), 20h. (Seattle (2), Victoria (2), Tchimkent, Frunse, Andijan, Fergana, and near Obi-garm), 21h. (Victoria (2) and Seattle), 22h. (Riverview, Auckland, Christchurch, Wellington, Hungry Horse, Tamanrasset, near Granada, and Malaga), 23h. (College, Hungry Horse, Shasta Dam, Pasadena, Palomar, China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, Paris, Kew, Raciborzu, Ksara, Bombay, and Poona; more than one shock).

Feb. 15d. 0h. 12m. 42s. Epicentre 7°·4N. 35°·6W. (as on 1942, November 28d.).

$$A = +\cdot8064, B = -\cdot5773, C = +\cdot1280; \quad \delta = -6; \quad h = +7;$$

$$D = -\cdot582, E = -\cdot813; \quad G = +\cdot104, H = -\cdot075, K = -\cdot992.$$

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L. m.
			m.	s.		m.	s.		m.	s.	
La Paz	40·0	233	7	38	0	13	43	- 1	—	—	20·3
Tamanrasset	z. 42·4	64	i 8	6k	+ 8	—	—	—	e 9	41 PP	—
Tucson	73·6	302	e 11	34	- 3	—	—	—	—	—	—
Logan	74·8	313	e 11	43	- 1	—	—	—	e 13	26 PP	—
Pierce Ferry	76·3	305	e 11	50	- 2	—	—	—	—	—	—
Overton	z. 76·7	306	i 11	54	- 1	—	—	—	—	—	—
Hungry Horse	76·8	318	e 11	53	- 2	—	—	—	—	—	—
Boulder City	77·0	305	e 11	56	0	—	—	—	—	—	—
Palomar	z. 78·7	303	e 12	7	+ 1	—	—	—	—	—	—
Riverside	z. 79·1	304	e 12	7	- 1	—	—	—	—	—	—
China Lake	z. 79·2	306	e 12	9	+ 1	—	—	—	—	—	—
Tinemaha	z. 79·7	307	e 11	57	-14	—	—	—	—	—	—
Mineral	z. 82·2	310	e 12	26 <sub>a</sub>	+ 2	—	—	—	—	—	—
Shasta Dam	82·8	311	e 12	25	- 2	—	—	—	—	—	—

Long waves were also recorded at Bermuda.

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Feb. 15d. 3h. Kurile Islands.

College iP = 43m.54s., e = 44m.10s.  
 Shasta Dam eP = 46m.51s.  
 Hungry Horse iP = 46m.52s.  
 Tinemaha iPZ = 47m.24s.  
 China Lake iPZ = 47m.31s.  
 Mount Wilson ePZ = 47m.36s.  
 Riverside ePZ = 47m.39s.  
 Boulder City eP = 47m.42s.  
 Overton ePZ = 47m.42s.  
 Pierce Ferry eP = 47m.44s.  
 Tucson eP? = 48m.12s.  
 Collmberg eE = 48m.46s., 48m.49s., and 48m.52s.  
 Jena eEN = 48m.51s., eN = 49m.4s.  
 Prague eP = 48m.51s.  
 Stuttgart ePZ = 49m.6s.  
 Paris iP = 49m.15s.  
 Weston iP = 49m.19s.  
 Long waves were recorded at Ksara.

Feb. 15d. 7h. South Atlantic.

Pretoria eZ = 59m.37s., iZ = 59m.41s.  
 La Paz P = 60m.4s., iS = 67m.28s., L = 77m.0s.  
 Ksara eP? = 61m.21s., eS? = 72m.32s.  
 Tamanrasset iPZ = 63m.23s. a.  
 Shasta Dam eP = 70m.1s.  
 Mineral ePZ = 70m.2s.  
 Hungry Horse iP = 70m.3s.  
 College eP = 70m.50s.  
 Overton eZ = 81m.6s.  
 Long waves were also recorded at Kew.

Feb. 15d. 14h. 36m. 59s. Epicentre 11°·2N. 93°·3E. Depth of focus 0·010.

A = -·0565, B = +·9796, C = +·1930;  $\delta$  = +6; h = +6;  
 D = +·998, E = +·058; G = -·011, H = +·193, K = -·981;

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Calcutta	E.	12·2	338	i 3 55	+63	i 5 49	SSS	—	—
Colombo	E.	13·9	253	3 31	PP	5 44	- 2	—	9·2
Kodaikanal	E.	15·6	268	i 3 33	- 3	i 6 33	+ 7	—	—
Hyderabad	N.	15·7	295	i 3 38	+ 1	i 6 36	+ 8	—	—
Poona		20·2	294	i 4 32	+ 3	i 8 6	+ 1	e 4 50	pP 10·7
Bombay		21·2	294	e 4 44	+ 5	e 8 32	+ 8	e 4 52	pP 9·4
Djakarta		21·9	142	e 4 52	+ 6	e 9 48	SSS	—	—
New Delhi		22·9	322	i 4 57 <sup>a</sup>	+ 1	i 8 58	+ 4	5 24	PP
Bandong		23·0	138	e 5 8	+11	e 9 8	+12	—	—
Dehra Dun	N.	23·7	327	(e 5 19)	+15	(e 9 8)	0	—	— (e 13·9)
Naryn		33·7	337	i 6 34	0	i 11 47	- 2	—	—
Przhevalsk		33·8	341	i 6 36	+ 1	i 16 42	S <sub>c</sub> S	—	—
Garm		34·4	329	6 39	- 1	11 58	- 2	—	—
Obi-garm		34·6	328	i 6 40	- 2	i 12 0	- 3	e 14 23	SS
Andijan		34·7	332	e 6 43	+ 1	i 12 5	+ 1	e 7 9	pP
Fergana		34·7	332	6 42?	0	e 12 8?	+ 4	—	—
Almata		35·0	340	i 6 45	0	—	—	—	—
Stalinabad		35·0	326	i 6 44?	- 1	i 12 4?	- 5	e 7 11	pP
Frunse		35·5	336	e 8 49	PPP	e 12 17	0	—	—
Samarkand		36·7	325	e 7 0	+ 1	e 12 33	- 2	—	—
Tashkent		36·7	330	e 6 56	- 3	—	—	e 7 21	pP
Tchimkent		37·2	331	i 7 3	0	i 12 45	+ 2	—	—
Mary		38·5	319	i 7 16	+ 2	i 13 4	+ 2	e 8 52	PPP
Semipalatinsk		40·5	348	e 7 40	+ 9	—	—	—	—
Ashkabad		41·1	317	7 39	+ 3	—	—	—	—
Irkutsk		41·9	11	7 41	- 1	13 50	- 3	e 9 17	PP
Kizyl-Arvat		43·0	318	7 57	+ 6	—	—	—	—
Vladivostok		46·1	39	8 13	- 3	i 14 49	- 5	—	—
Baku		48·0	316	e 8 34	+ 3	—	—	—	—
Grozny		52·0	317	e 9 3?	+ 2	16 18?	+ 2	—	—

Continued on next page.

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		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.
				m.	s.		m.	s.		m.	s.	
Sverdlovsk		52.0	338	8	57	- 4	i 16 13	- 3				
Tiflis		52.1	315	i 9	2	0	e 16 18	+ 1	i 9 10	?		
Leninakan		52.9	314	e 9	15	+ 7	e 16 34	+ 6	e 9 45	pP		
Piatigorsk		54.1	317	e 9	18	+ 1	e 16 45	+ 1				
Sotchi		56.2	316	e 9	33	+ 1	e 17 15	+ 3				
Ksara		56.8	303	e 9	13	-23	17 44	+24				
Theodosia		59.6	317	e 9	59?	+ 3						
Helwan		60.2	298	10	28	pP	e 18 1	- 3	e 25 1	SSS		
Yalta		60.3	315				i 18 2	- 4				
Moscow		61.8	328	10	8	- 3	i 18 24	- 1	10 36	pP		
Istanbul		63.3	311	e 10	18	- 3	e 18 38	- 6				
Brisbane	z.	69.5	125	i 10	56	- 4						
Riverview		70.9	132	i 11	6k	- 2	e 20 48	sS	e 29 19	Q	e 33.4	
Pietermaritzburg	z.	72.9	235	i 11	18	- 2			e 11 46	pP		
Pretoria	z.	73.2	239	i 11	20	- 2			e 11 46	pP		
Prague		74.4	320	i 11	29	0	e 20 54	0	e 12 6	pP		
Collmburg		75.3	321	e 11	32	- 2						
Cheb		75.7	320	i 20	10	?	e 21 1	- 8				
Jena		76.2	321	e 11	41	+ 2			e 12 7	pP		
Grahamstown	z.	77.3	232	i 11	45	- 1						
Stuttgart	z.	77.8	318	e 11	46	- 2			e 12 17	P <sub>c</sub> P		
Zürich		78.3	317	e 11	49	- 2	e 21 32	- 5				
Basle		79.0	317	e 11	54	- 1						
Tamanrasset	z.	83.7	292	e 12	19	0			i 12 44	pP		
College		91.6	22	e 12	56	- 1	e 23 12	[- 7]	i 13 27	pP	e 44.7	
Hungry Horse		116.0	20	i 18	29	[- 3]						
Shasta Dam		118.7	30	e 18	35	[- 2]						
Mineral	z.	119.4	30	e 18	37k	[- 2]						
Weston		124.8	346	i 25	33	SKS	(i 25 33)	[- 9]				
China Lake	z.	124.9	30	i 18	48	[- 1]			i 19 25	pPKP		
Overton	z.	125.8	27	i 18	49	[- 2]			i 19 23	pPKP		
Pasadena	z.	125.9	32	i 18	50	[- 1]			i 19 31	pPKP		
Boulder City		126.1	28	e 18	51	[ 0]			e 21 58	pPP		
Riverside	z.	126.4	32	i 18	50	[- 2]			i 19 30	pPKP		
Palomar	z.	127.2	31	i 18	53	[ 0]						
Tucson		131.0	27	i 19	0	[- 1]			i 22 13	pPP		
Tacubaya		147.2	21	e 19	52	pPKP	e 30 31	SKKS	e 23 58	pPP		
La Paz		161.2	253	19	49	[ 0]	30 57	SKKS				
Huancayo		168.8	264	e 19	26	[- 29]						

Additional readings and note:—

Poona PPPEN = 5m.12s., P<sub>c</sub>PEN = 8m.15s., QEN = 8m.44s., SSEN = 9m.19s., SSSSEN = 9m.55s.

Bombay iSN = 8m.37s.

New Delhi iN = 9m.20s., SSN = 9m.42s., iN = 9m.55s. and 10m.46s.

Dehra Dun readings have been decreased by 2m.30s.

Obi-garm eSSS = 14m.43s.

Andijan eSSS = 14m.37s.

Stalinabad ePP = 7m.52s., eSS = 14m.18s., eSSS = 15m.1s.

Mary eP<sub>c</sub>P = 9m.25s.?, eSS = 15m.19s.

Irkutsk ePPP = 9m.39s.?, S<sub>c</sub>S = 15m.33s., eSS = 17m.0s.?

Helwan eN = 19m.37s.

Moscow sS = 19m.15s.

Prague e = 13m.9s., ePP = 14m.12s., ePS = 21m.21s.

Jena eN = 14m.22s., eE = 14m.35s.

Stuttgart ePPZ = 14m.49s.

Tamanrasset iZ = 12m.22s., epP<sub>1</sub>Z = 13m.9s., iPPZ = 15m.35s.

College e = 16m.29s.

Overton iPPZ = 21m.58s.

Tucson i = 22m.16s.

Tacubaya eSS = 38m.15s., ePSPS = 38m.46s.

Feb. 15d. Readings also at 0h. (De Bilt and College), 1h. (Frunse, Garm, and near Obi-garm), 2h. (Boulder City, Overton, Pierce Ferry, Tucson, Samarkand, near Andijan, Obi-garm, Tchinkent, and near Chur), 3h. (near Obi-garm), 5h. (Hungry Horse, Shasta Dam, Mount Wilson, Riverside, China Lake, Boulder City, Overton, and Pierce Ferry), 6h. (College, Logan, Overton, and Pierce Ferry (2)), 7h. (Huancayo and near Obi-garm), 8h. (Irkutsk and near Obi-garm), 9h. (near Tchinkent), 10h. (near Obi-garm), 11h. (New Delhi), 13h. (Copenhagen, Basle, and Stuttgart), 15h. (near Ottawa), 17h. (Tamanrasset), 21h. (Hungry Horse, Chinchina, and near Bogota).

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Feb. 16d. 12h. 50m. 56s. Epicentre 33°·0S. 111°·5W.

A = -·3080, B = -·7818, C = -·5421;  $\delta$  = -5;  $h$  = +1;  
D = -·930, E = +·367; G = +·199, H = +·504, K = -·840.

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.	
				m.	s.		m.	s.		m.	s.		
Huancayo		39·1	67	i 7	31	0	i 13	22	- 9	—	—	i 16·4	
La Paz		42·3	78	i 8	4	+ 7	i 14	24	+ 5	9	52	PP	21·1
La Plata		44·0	108	14	4	?	14	44	+ 1	19	58	Q	21·7
Chinchina		50·8	50	e 9	5	+ 1	e 16	21	+ 1	17	15	?	25·1
Tucson		64·9	1	e 10	39	- 4	e 18	49	- 35	e 11	42	P <sub>c</sub> P	e 30·7
Palomar	z.	66·2	356	i 10	50	- 2	—	—	—	—	—	—	—
Riverside	z.	66·9	355	i 10	52	- 4	—	—	—	—	—	—	—
Pasadena		67·1	355	i 10	54	- 3	—	—	—	i 10	59	P	i 28·8
Boulder City		68·7	358	e 11	6	- 1	—	—	—	—	—	—	—
China Lake	z.	68·7	356	e 11	4	- 3	—	—	—	i 11	8	P	—
Pierce Ferry		68·8	359	e 11	3	- 5	—	—	—	—	—	—	—
Haiwee	z.	69·0	356	e 11	10	+ 1	—	—	—	—	—	—	—
Overton	z.	69·2	358	e 11	9	- 1	—	—	—	i 11	14	P	—
Fresno	z.	69·8	354	e 11	8	- 6	—	—	—	e 13	58	PP	—
Berkeley		71·2	352	e 11	24 <sub>a</sub>	+ 1	—	—	—	e 34	4	Q	e 36·9
Reno	z.	72·6	354	e 11	32 <sub>k</sub>	+ 1	—	—	—	—	—	—	—
Mineral	z.	73·6	353	e 11	34	- 3	—	—	—	—	—	—	—
Shasta Dam		74·0	352	e 11	35	- 4	—	—	—	i 11	40	P	—
Logan		74·4	0	e 11	35	- 7	—	—	—	—	—	—	—
Riverview		77·8	238	—	—	—	e 22	7	+14	—	—	—	e 37·0
Hungry Horse		81·0	359	e 12	13	- 5	—	—	—	i 12	16	P	—
Victoria		81·9	352	e 12	24	+ 1	—	—	—	—	—	—	—
Tamanrasset	z.	124·1	83	e 19	1	[ 0]	—	—	—	—	—	—	—
Istanbul		147·7	64	e 19	52	[ + 8]	—	—	—	—	—	—	—
Helwan	z.	148·2	86	e 19	49	[ + 4]	—	—	—	—	—	—	—
Ksara		152·8	80	e 20	7?	PKP <sub>2</sub>	e 30	35	{ + 1}	—	—	—	—

Additional readings :—

La Paz iSS = 17m.40s., i = 20m.4s.

La Plata N = 18m.4s.

Logan e = 13m.53s. and 18m.6s.

Hungry Horse i = 13m.4s.

Long waves were also recorded at Bermuda, Bozeman, College, Auckland, Christchurch, Wellington, and Bombay.

Feb. 16d. 14h. 21m. 24s. Epicentre 33°·0S. 111°·5W. (as at 12h.).

		$\Delta$ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.	
				m.	s.		m.	s.		m.	s.		
Huancayo		39·1	67	i 7	34	+ 3	—	—	—	—	—	—	
La Paz		42·3	78	e 7	56	- 1	14	32	+13	—	—	—	
Tucson		64·9	1	i 10	42	- 1	—	—	—	e 11	11	P <sub>c</sub> P	—
Palomar	z.	66·2	356	i 10	51 <sub>a</sub>	- 1	—	—	—	—	—	—	—
Riverside	z.	66·9	355	i 10	55	- 1	—	—	—	—	—	—	—
Pasadena		67·1	355	i 10	56	- 1	—	—	—	—	—	—	—
Boulder City		68·7	358	i 11	8	+ 1	—	—	—	—	—	—	—
China Lake	z.	68·7	356	i 11	6 <sub>a</sub>	- 1	—	—	—	—	—	—	—
Pierce Ferry		68·8	359	i 11	6	- 2	—	—	—	—	—	—	—
Overton	z.	69·2	358	i 11	11	+ 1	—	—	—	—	—	—	—
Fresno	z.	69·8	354	e 11	14	0	—	—	—	—	—	—	—
Tinemaha		70·0	355	i 11	15	0	—	—	—	—	—	—	—
Berkeley		71·2	352	e 11	27 <sub>a</sub>	+ 4	—	—	—	e 33	42	Q	e 37·3
Reno		72·6	354	e 11	31	0	—	—	—	e 12	48	?	—
Mineral	z.	73·6	353	e 11	36	- 1	—	—	—	—	—	—	—
Shasta Dam		74·0	352	i 11	38	- 1	—	—	—	—	—	—	—
Logan		74·4	0	e 11	39	- 3	—	—	—	—	—	—	—
Helwan	z.	148·2	86	e 19	51	[ + 6]	—	—	—	—	—	—	—

Long waves were also recorded at College.

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Feb. 16d. Readings also at 2h. (China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, Huancayo, near Obi-garm, and near Frunse), 3h. (near Przhevalsk), 4h. (near Taranto), 5h. (near Huancayo), 6h. (Tacubaya, Riverside, China Lake, and Tinemaha), 9h. (near Ashkabad, near Tchimbkent, and near Fergana), 11h. (near Andijan), 12h. (Prague), 13h. (Tacubaya (2), China Lake, Tinemaha, Overton, Tucson, and near Paris), 14h. (Hungry Horse and near Istanbul), 15h. (Stuttgart), 16h. (Paris and Ashkabad), 17h. (College, Hungry Horse, Pierce Ferry, Stuttgart, Tamanrasset, and near Obi-garm), 18h. (near Obi-garm), 19h. (College, Hungry Horse, and Collmberg), 21h. (Huancayo, near Granada, and near Obi-garm), 22h. (near Granada).

Feb. 17d. 3h. 47m. 16s. Epicentre  $13^{\circ}9'N$ .  $90^{\circ}8'W$ . (as on 1942, September 27d.).

Depth suggested 100km. (J.S.A.).

$A = -0.136$ ,  $B = -0.9710$ ,  $C = +0.2387$ ;  $\delta = 0$ ;  $h = +6$ ;  
 $D = -1.000$ ,  $E = +0.014$ ;  $G = -0.033$ ,  $H = -0.239$ ,  $K = -0.971$ .

	$\Delta$	Az.	P.		O-C.		S.		O-C.		Supp.		L.
	$^{\circ}$	$^{\circ}$	m.	s.	s.		m.	s.	s.		m.	s.	m.
Oaxaca	6.5	299	e 1	44	+ 5		i 2	58	+ 3				
Merida	7.1	9	i 1	56k	+ 8		i 3	25	+15				
Vera Cruz	7.3	316	e 1	58	+ 8		i 3	23	+ 8				
Puebla	8.7	306	e 2	14	+ 4		i 3	56	+ 6				
Tacubaya	9.7	305	e 2	28	+ 6		e 4	18	+ 3				i 4.6
Guadalajara	13.8	301	i 3	16	- 3		e 5	50	- 4	e 6	13	SS	
Bogota	18.3	116	i 4	26	+ 9		e 8	3	+24	i 4	48	PPP	
Columbia	21.9	22	e 4	54	- 3		e 8	56	+ 2				e 11.2
Lubbock	22.0	336	5	0	+ 2		11	11	L				(11.2)
San Juan	24.1	76	e 4	54	-24		e 9	37	+ 3	e 5	31	PP	e 10.8
St. Louis	24.6	0	i 5	23	0		e 10	13	+31				
Tucson	25.9	319	i 5	36	+ 1		e 9	56	- 8	i 5	53	pP	e 11.3
Washington	27.7	24	i 6	9	+17		e 11	22	+49	i 7	9	PPP	i 13.3
Chicago	27.9	4	e 5	55	+ 1		e 10	50	+13	e 6	14	pP	e 14.3
Pittsburgh	28.1	17	i 5	56	+ 1								
Cleveland	28.7	15	e 6	1	0		e 11	19	+29	e 6	25	pP	e 17.0
Fort de France	28.9	85	e 11	0	S		(e 11	0)	+ 7				e 16.1
Pennsylvania	29.1	20	i 6	13	+ 9		i 10	57	+ 1	i 6	57	PP	e 12.6
Philadelphia	29.4	25					e 10	46	-15				e 13.0
Huancayo	30.0	149	i 6	12	0		i 11	9	- 1				
Pierce Ferry	30.4	322	i 6	18	+ 2					i 9	15	P <sub>c</sub> P	
Fordham	30.6	26	e 6	20	+ 2		e 11	42	+22				17.4
Palomar	30.6	315	i 6	19 <sub>a</sub>	+ 1								
Boulder City	30.8	321	e 6	21	+ 1					i 7	30	PP	
Overton	z. 30.9	322	i 6	20	0					i 7	23	PP	e 16.9
Riverside	z. 31.3	315	e 6	24	0					i 9	16	P <sub>c</sub> P	
Pasadena	31.9	315	e 6	29 <sub>a</sub>	0					i 9	18	P <sub>c</sub> P	e 14.9
Rapid City	E. 32.0	344	e 6	16	-14		e 11	19	-23				e 12.7
China Lake	z. 32.5	319	i 6	35 <sub>a</sub>	+ 1					i 9	20	P <sub>c</sub> P	
Salt Lake City	32.5	329	e 7	21	+47		e 11	47	- 2				e 13.2
Harvard	33.0	26	i 6	40	+ 1					i 6	53	pP	e 18.1
Logan	33.2	331	i 6	39	- 1		e 12	2	+ 2	i 6	49	pP	e 18.8
Tinemaha	33.7	318	i 6	46	+ 1					i 9	24	P <sub>c</sub> P	
Ottawa	33.9	18	e 6	46	- 1		12	14	+ 3				20.2
Fresno	34.5	317	e 6	52 <sub>a</sub>	0		e 12	28	+ 8	e 7	15	pP	
Shawinigan Falls N.	35.9	21	e 6	53	-11								
Lick	z. 36.0	316	i 7	6 <sub>a</sub>	+ 1					i 7	19	pP	
Reno	z. 36.1	321	e 7	8 <sub>a</sub>	+ 3					e 7	28	pP	
Santa Clara	36.2	316	e 7	8 <sub>k</sub>	+ 2								e 21.0
Branner	z. 36.4	316	i 7	10 <sub>k</sub>	+ 2					i 7	31	pP	
Berkeley	36.7	316	i 7	13 <sub>k</sub>	+ 3		e 13	17	+23	i 9	32	P <sub>c</sub> P	e 17.7
Butte	N. 36.9	337	e 7	24	+12		e 12	10	-48	e 8	23	PP	e 15.2
Seven Falls	E. 37.1	22	7	21	+ 7		13	4	+ 3				16.1
La Paz	37.6	142	e 7	14	- 4		i 13	4	- 4	i 7	20	P	18.6
Mineral	z. 38.0	321	e 7	19 <sub>a</sub>	- 2					i 9	37	P <sub>c</sub> P	

Continued on next page.

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	$\Delta$	Az.	P.		O - C.	S.		O - C.	Supp.		L.	
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Shasta Dam	38.4	321	e 7	24	- 1	—	—	—	i 9	36	P <sub>c</sub> P	—
Hungry Horse	39.4	337	i 7	3	- 30	—	—	—	i 9	9	P <sub>c</sub> P	—
Saskatoon	40.2	345	e 9	29	P <sub>c</sub> P	—	—	—	—	—	—	—
Seattle	42.6	329	e 7	56	- 3	—	—	—	e 8	17	pP	e 24.7
Victoria	43.8	329	8	9 <sub>a</sub>	0	—	—	—	e 9	55	PP	26.7
College	63.8	337	e 10	35	- 1	—	—	—	i 11	10	pP	e 33.3
Stuttgart	z. 86.1	40	e 12	40	- 4	—	—	—	—	—	—	—
Prague	89.0	38	e 14	27	?	—	—	—	—	—	—	—
Tamanrasset	z. 90.4	66	e 13	2	- 2	—	—	—	e 13	36	pP	—
Ksara	110.5	46	e 14	30	P	—	—	—	e 10	48	?	—

Additional readings:—

Bogota i = 8m.18s.

St. Louis i = 5m.36s. and 5m.51s., e = 10m.29s., i = 10m.50s.

Tucson ePP = 6m.42s.

Washington i = 6m.21s. and 7m.21s.

Chicago ePP = 6m.49s., eS<sub>c</sub>S? = 12m.16s.

Cleveland eN = 6m.7s. and 6m.33s., esSN = 11m.56s., eSS?N = 13m.7s., eN = 14m.18s.

Logan ePP = 8m.0s., eP<sub>c</sub>P = 9m.14s., e = 11m.35s.

Ottawa PP = 8m.22s., e = 12m.41s., SSS = 14m.56s., S<sub>c</sub>S = 16m.46s., e = 18m.47s.

Fresno eEN = 8m.45s., eZ = 11m.2s.

Reno eN = 10m.49s., eE = 14m.46s., eZ = 27m.20s.

Branner iP<sub>c</sub>PZ = 9m.31s.

Berkeley eE = 15m.50s.

Butte ePPP?N = 8m.58s.

Mineral eZ = 9m.20s.

Seattle e = 8m.25s. and 8m.37s., i = 8m.50s. and 9m.7s.

College e = 11m.16s.

Long waves were also recorded at Galerazamba, Bermuda, New Kensington, Sitka, Wellington, Christchurch, and at other European stations.

Feb. 17d. 17h. 40m. 28s. Epicentre 39°·0N. 74°·0E. (as on 1941, April 9d.).

A = +·2148, B = +·7490, C = +·6268;  $\delta = +2$ ;  $h = +1$ ;  
D = +·961, E = -·276; G = +·173, H = +·603, K = -·779.

	$\Delta$	Az.	P.		O - C.	S.		O - C.
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.
Andijan	2.1	324	i 0	37	0	i 1	1	- 3
Fergana	2.2	309	i 0	38	0	i 1	4	- 2
Garm	2.9	270	i 1	0	P <sub>r</sub>	i 1	40	S <sub>r</sub>
Naryn	2.9	32	i 0	48	0	i 1	18	- 6
Obi-garm	3.4	265	i 1	5?	P <sub>r</sub>	1	45	S*
Frunse	3.9	8	e 1	4	+ 2	—	—	—
Stalinabad	4.1	265	e 1	14	P*	2	6	S*
Tashkent	4.2	305	e 1	12	+ 5	e 2	2	+ 5
Tchimkent	4.7	316	i 1	14	0	2	6	- 4
Almata	4.8	27	e 1	15	0	i 2	8	- 4
Przhevalsk	4.8	43	1	18	+ 3	—	—	—
Samarkand	5.5	279	e 1	34	P*	—	—	—
Semipalatinsk	12.2	19	—	—	—	e 5	10	- 6
Ashkabad	12.3	270	e 4	6	+ 67	—	—	—
Kizyl-Arvat	13.8	276	—	—	—	e 6	8	+ 14
College	71.4	17	e 11	23	- 1	—	—	—

Long waves were recorded at Stuttgart.

Feb. 17d. Readings also at 2h. (College), 5h. (Garm, Fergana, Tchimkent, Stalinabad, near Obi-garm, and Andijan), 6h. (near Obi-garm), 7h. (near Tchimkent), 8h. (near Andijan), 9h. (near Fergana), 11h. (Ksara and near Klyuchi), 13h. (near Ashkabad, and near Obi-garm), 14h. (Durham), 15h. (College), 16h. (Pierce Ferry and near Alicante), 17h. (Cobb River, near Tuai, Wellington, Garm, near Obi-garm and Fergana), 18h. (Klyuchi, near Ashkabad (2), and near Bucharest), 21h. (Huancayo and near Andijan), 22h. (Ksara),



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Feb. 18d. 5h. 4m. 26s. Epicentre 33°·0S. 111°·5W. (as on 16d.).

A = -·3080, B = -·7818, C = -·5421;  $\delta = -5$ ;  $h = +1$ .

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Huancayo	39·1	67	i 7 33	+ 2	e 13 23	- 8	i 13 43	PcS i 16·4
La Paz	42·3	78	e 7 54	- 3	i 14 27	+ 8	9 46	PP 20·3
La Plata	44·0	108	e 11 34	?	—	—	—	22·6
Chinchina	50·8	50	e 9 2	- 2	e 16 47	PPS	—	22·6
Bogota	51·6	51	i 9 10	0	e 16 38	+ 7	—	21·6
Tucson	64·9	1	10 42	- 1	—	—	e 12 50	PP e 31·4
Palomar	z. 66·2	356	e 10 48	- 4	—	—	i 10 54	P —
Riverside	z. 66·9	355	i 10 55	- 1	—	—	—	—
Pasadena	67·1	355	i 10 57	0	—	—	—	e 28·9
Boulder City	68·7	358	e 11 8	+ 1	—	—	—	—
China Lake	z. 68·7	356	i 11 9	+ 2	—	—	—	—
Pierce Ferry	68·8	359	e 11 7	- 1	—	—	—	—
Overton	z. 69·2	358	i 10 33	-37	—	—	—	—
Fresno	z. 69·8	354	i 11 14 <sub>a</sub>	0	—	—	—	—
Tinemaha	z. 70·0	355	i 11 15	0	—	—	—	—
Lick	z. 70·6	352	e 11 18 <sub>k</sub>	- 1	—	—	e 11 34	PcP —
Berkeley	71·2	352	i 11 23	0	—	—	i 11 58	PcP e 34·4
Reno	z. 72·6	354	e 11 32 <sub>k</sub>	+ 1	—	—	—	—
Mineral	z. 73·6	353	e 11 36 <sub>k</sub>	- 1	—	—	—	—
Shasta Dam	74·0	352	i 11 38	- 1	—	—	—	—
Logan	74·4	0	e 11 40	- 2	—	—	—	—
Hungry Horse	81·0	359	i 12 18	0	—	—	e 13 1	? —
Harvard	83·6	29	i 12 31	0	—	—	—	e 41·7
Weston	83·6	29	e 12 29	- 2	—	—	—	—
Ottawa	84·5	25	e 12 36	0	e 23 10	+ 8	—	—
College	102·2	345	e 14 19	+21	—	—	—	—
Tamanrasset	z. 124·1	83	e 19 3	[+ 2]	—	—	i 19 8	? —
Istanbul	147·7	64	e 19 52	[+ 8]	—	—	—	—
Ksara	152·8	80	e 20 6	PKP <sub>2</sub>	e 36 26	PPS	—	—

Additional readings :—

La Paz SS = 17m.34s.

Tucson i = 10m.55s.

Lick iZ = 11m.24s.

Berkeley eZ = 12m.29s.

Logan e = 12m.59s. and 13m.55s.

Long waves were also recorded at Wellington, Honolulu, Santa Clara, and Rome.

Feb. 18d. 6h. 17m. 44s. (I) }  
7h. 32m. 17s. (II) }

Epicentre 30°·6N. 42°·4W.  
(as on 1943, Aug. 31d.).

A = +·6367, B = -·5814, C = +·5065;  $\delta = -4$ ;  $h = +2$ ;  
D = -·674, E = -·738; G = +·374, H = -·342, K = -·862.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
I Weston	25·9	305	i 5 36	+ 1	—	—	—	—
I Harvard	26·1	305	i 5 39	+ 2	—	—	—	e 13·4
II	26·1	305	i 5 39	+ 2	—	—	—	—
I Paris	38·4	49	e 5 16?	?	—	—	—	e 19·3
I Stuttgart	z. 42·8	49	e 8 2	+ 1	—	—	e 8 19	? —
II	z. 42·8	49	e 8 1	0	—	—	—	—
I Tamanrasset	z. 43·2	88	e 8 6	+ 2	—	—	e 9 55	PP —
I La Paz	53·0	210	i 9 18	- 3	—	—	—	—
I Logan	55·7	302	e 9 38	- 2	—	—	e 11 38	PP —
II	55·7	302	e 9 46	+ 6	—	—	—	—
I Hungry Horse	56·0	310	e 9 41	- 2	—	—	—	—
II	56·0	310	e 9 40	- 3	—	—	—	—

Continued on next page.

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		$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
I Tucson		57.5	291	e 9 52	- 1	—	—	—	—
II		57.5	291	e 9 50	- 3	—	—	—	—
I Pierce Ferry		58.8	296	e 10 0	- 2	—	—	—	—
II		58.8	296	e 9 59	- 3	—	—	—	—
I Overton	z.	59.0	297	e 10 0	- 4	—	—	—	—
II	z.	59.0	297	e 10 4	0	—	—	—	—
I Boulder City		59.5	296	e 10 8	+ 1	—	—	—	—
II		59.5	296	e 10 7	0	—	—	—	—
I Tinemaha	z.	61.8	298	i 10 24	+ 1	—	—	—	—
II	z.	61.8	298	e 10 24	+ 1	—	—	—	—
I Haiwee	z.	61.9	298	e 10 23	- 1	—	—	—	—
I Riverside	z.	62.1	295	e 10 33	+ 8	—	—	—	—
I Mount Wilson	z.	62.6	295	i 10 28	0	—	—	—	—
I Mineral	z.	63.2	303	e 10 32 <sub>a</sub>	0	—	—	? 10 41	?
II	z.	63.2	303	e 10 31	- 1	—	—	—	—
I Shasta Dam		63.7	303	e 10 33	- 3	—	—	—	—
II		63.7	303	e 10 34	- 2	—	—	e 10 45	?
II Lick	z.	64.3	300	e 10 40 <sub>a</sub>	+ 1	—	—	—	—
I College		68.9	334	e 11 10	+ 1	—	—	—	—
II		68.9	334	e 11 8	- 1	—	—	—	—

Long waves were also recorded at San Juan and Philadelphia to shock I, and at San Juan, Paris, and Alicante to shock II.

Feb. 18d. 14h. 39m. 27s. Epicentre 54°·2N. 164°·5W. (as on 1947, September 23d.).

A = -·5662, B = -·1570, C = +·8092;  $\delta$  = +4;  $h$  = -6;  
D = -·267, E = +·964; G = -·780, H = -·216, K = -·588.

		$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
College		13.6	31	e 3 19	+ 2	e 5 57	+ 7	—	e 7.5
Shasta Dam		31.0	98	e 6 18	- 3	—	—	e 6 34	?
Hungry Horse		31.5	80	i 6 23	- 3	—	—	—	—
Mineral	z.	31.7	98	e 6 31 <sub>k</sub>	+ 4	—	—	e 6 40	?
Tinemaha	z.	35.8	99	e 7 0	- 3	—	—	e 7 11	?
China Lake	z.	37.1	99	e 7 11	- 3	—	—	i 7 28	?
Mount Wilson	z.	38.0	101	e 7 21	0	—	—	e 7 26	?
Overton	z.	38.4	96	e 7 22	- 3	—	—	e 7 34	?
Boulder City		38.6	97	e 7 32	+ 6	—	—	—	—
Palomar	z.	39.3	102	e 7 28	- 4	—	—	i 7 46	?
Tucson		43.6	96	e 8 4	- 4	—	—	—	—
Weston		58.7	59	i 10 3	+ 1	—	—	—	—
Stuttgart	z.	77.3	5	e 12 2	+ 4	—	—	e 12 17	P <sub>c</sub> P
Pretoria	z.	150.1	336	i 19 58	[+10]	—	—	—	—

Tinemaha gives also  $iZ = 7m.22s.$

Feb. 18d. Readings also at 0h. (Seattle), 3h. (near Obi-garm), 4h. (Victoria, Saskatoon, China Lake, Tinemaha, Overton, and Tucson), 7h. (near Chinchina and Bogota), 8h. (Mount Wilson, Pierce Ferry, Tchinkent, Frunse, Almata, Przhevalsk, near Andijan, Naryn, and Fergana), 9h. (College), 11h. (Zürich, Stuttgart, Triest, Alicante, Tamanrasset, near Taranto, Hungry Horse, near College, and near Andijan), 12h. (New Delhi), 17h. (College, Hungry Horse, Shasta Dam, Palomar, China Lake, Tinemaha, Overton, Pierce Ferry, Tucson, and near Mizusawa), 19h. (College (2), Shasta Dam (2), Riverside, Palomar, China Lake, Tinemaha, Overton, Pierce Ferry (2), Tucson, Stuttgart, near Apia, Mary, near Ashkabad, and near Klyuchi (2)), 20h. (Klyuchi and near Tacubaya), 21h. (near Almata and near Przhevalsk), 22h. (Huancayo), 23h. (Hungry Horse, Shasta Dam, Mount Wilson, Riverside, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, Samarkand, near Garm, Fergana, Obi-garm, Andijan, Stalinabad, Tashkent, and Tchinkent).

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Feb. 19d. 3h. 52m. 0s. Epicentre 30°·1N. 68°·8E. (as on 1949, February 24d.).

$A = +\cdot3134$ ,  $B = +\cdot8080$ ,  $C = +\cdot4990$ ;  $\delta = +8$ ;  $h = +2$ ;  
 $D = +\cdot932$ ,  $E = -\cdot362$ ;  $G = +\cdot180$ ,  $H = +\cdot465$ ,  $K = -\cdot867$ .

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
New Delhi	N.	7·5	99	e 1 30	-23	i 3 16	- 4	e 2 34	—
Stalinabad		8·2	0	e 2 6	+ 3	—	—	—	—
Obi-garm		8·3	5	i 2 7	+ 3	i 3 48	+ 8	—	—
Garm		9·0	8	e 2 15	+ 2	—	—	—	—
Samarkand		9·7	352	e 2 26	+ 4	—	—	—	—
Fergana		10·6	13	e 2 30	- 6	4 30	- 7	—	—
Andijan		11·0	14	e 2 37	- 5	—	—	—	—
Tchimkent		12·2	3	i 2 55	- 3	e 5 13	- 3	—	—
Poona	E.	12·4	157	—	—	i 5 52	SSS	—	i 7·0
Naryn		12·7	25	e 2 58	- 7	5 16	-12	—	—
Frunse		13·6	18	—	—	e 5 45	- 5	—	—

Feb. 19d. Readings also at 0h. (Samarkand, Tchimkent, near Stalinabad, Obi-garm, Garm, Fergana, and Andijan), 6h. (Ksara, Klyuchi, College, Przhevalsk, Andijan, Fergana, Tchimkent, Garm, Obi-garm, Samarkand, Tashkent, near Naryn, Almata, and Frunse), 7h. (Bombay, New Delhi, Tananarive, Riverview, Pasadena, Riverside, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Fresno, Shasta Dam, Reno, Mineral, Hungry Horse, Logan, and Harvard), 8h. (Boulder City), 9h. (Stuttgart), 11h. (near Klyuchi), 12h. (Tucson, near Alicante, and near Mizusawa), 13h. (College (2), Overton, and near Alicante), 16h. (Boulder City and near Ashkabad), 18h. (College and Hungry Horse), 19h. (Andijan, near Obi-garm, and Stalinabad), 20h. (near Obi-garm), 21h. (Upsala), 22h. (Pretoria), 23h. (Tamanrasset).

Feb. 20d. 1h. 55m. 42s. Epicentre 46°·3N. 13°·1E. (as on 1949, November 2d.).

Intensity III-IV at several places in Austria; V-VI at Tolmezzo and Carniole (press reports from Trieste). Epicentre 46°·4N. 13°·1E. (Strasbourg).

Makroseismische Beobachtungen, 1950, Jahrbücher des Zentralanstalt für Meteorologie und Geodynamik, Jahrgang, 1950, Neue Folge, Band 87, Vienna, 1951, p. E.1.

$A = +\cdot6753$ ,  $B = +\cdot1571$ ,  $C = +\cdot7206$ ;  $\delta = -3$ ;  $h = -4$ ;  
 $D = +\cdot227$ ,  $E = -\cdot974$ ;  $G = +\cdot702$ ,  $H = +\cdot163$ ,  $K = -\cdot693$ .

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
		°	°	m. s.	s.	m. s.	s.	m. s.
Chur		2·5	283	0 45	+ 2	1 20	S*	—
Ravensburg		2·8	302	e 0 46	- 1	e 1 27	S*	e 1 37
Zürich		3·3	289	e 0 52	- 1	e 1 42	S*	i 0 59
Stuttgart	z.	3·6	314	e 0 56	- 2	e 1 41	- 1	e 1 53
Prague		3·9	13	e 1 17	P <sub>r</sub>	e 1 46	- 4	i 1 58
Basle		4·0	290	e 1 3	- 1	e 2 7	S*	—
Karlsruhe		4·2	312	—	—	e 2 8	S*	—
Strasbourg		4·3	304	e 1 4?	- 4	e 2 13	S*	e 2 22
Jena		4·7	348	—	—	e 1 59	-11	e 2 24
Besançon		5·0	283	—	—	e 2 44	S <sub>r</sub>	—
Collmberg	z.	5·0	359	e 1 14	- 4	—	—	e 1 38

Additional readings:—

Stuttgart eP<sub>r</sub>Z = 1m.8s., eS\*Z = 1m.48s.

Prague e = 1m.36s., i = 2m.1s., iS<sub>r</sub> = 2m.7s.

Strasbourg eP<sub>r</sub> = 1m.22s., e = 2m.30s., 2m.36s., and 2m.53s.

Jena eS<sub>r</sub>N = 2m.7s., eE = 2m.27s., eS<sub>r</sub>eEN = 2m.30s.

Collmberg eZ = 1m.20s. and 1m.50s.

Feb. 20d. Readings also at 2h. (Samarkand, Tchimkent, Andijan, near Stalinabad, Obi-garm, and Garm), 3h. (College, Hungry Horse, Shasta Dam, Mineral, Mount Wilson, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, Samarkand, near Garm, Obi-garm, and Stalinabad), 5h. (Huancayo and New Delhi), 6h. (Hungry Horse, Boulder City, Overton (2), Pierce Ferry, and Tucson (2)), 8h. (Huancayo, Hungry Horse, Overton, and Pierce Ferry), 10h. (Auckland, Kaimata, Christchurch, near Tuai, New Plymouth, Wellington, Cobb River, and near Obi-garm), 11h. and 12h. (near Alicante), 13h. (near Alicante and near Klyuchi), 14h. (Huancayo, Reno, near Logan, and Overton), 15h. (Tucson, Fergana, Samarkand, near Garm, Stalinabad, and Andijan), 18h. (Brisbane, Riverview, Algiers Univ., Tamanrasset, Garm, and near Obi-garm), 19h. (Huancayo), 20h. (Tortosa, La Paz, Auckland, and Wellington), 21h. (Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, and Tamanrasset), 22h. (near Mary).

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Feb. 21d. 20h. 26m. 37s. Epicentre 46°·3N. 146°·5E. Depth of focus 0·060.

Intensity II-III at Nemuro, Urakawa, Kusiro, and Hatinohe.

Epicentre as adopted, depth 250km. Macro seismic radius >300km.

Seismological Bulletin of the C.M.O., Japan, for the year 1950, Tokyo, 1952, p. 11.

A = -·5781, B = +·3827, C = +·7206;  $\delta = -8$ ;  $h = -4$ ;  
D = +·552, E = +·834; G = -·601, H = +·398, K = -·693.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
	°	°	m. s.	s.	m. s.	s.	m. s.
Nemuro	3·0	192	1 1	- 4	1 48	- 8	—
Sapporo	4·9	230	i 1 19k	- 3	i 2 17	-10	e 1 25 P
Hatinohe	6·8	214	2 29	+46	3 52	+48	—
Aomori	6·9	219	1 47	+ 3	3 2	- 4	—
Miyako	7·4	208	1 48	- 1	3 8	- 8	—
Morioka	7·7	212	1 49	- 4	3 15	- 7	—
Akita	8·1	218	2 22	+25	—	—	—
Mizusawa	8·2	211	e 2 2	+ 4	3 24	- 8	—
Sendai	9·0	209	2 5	- 3	e 3 45	- 3	—
Hukushima	9·6	210	2 17	+ 3	4 9	+ 8	—
Aikawa	10·3	219	2 25	+ 3	4 9	- 6	—
Onahama	10·4	206	2 14	-10	—	—	—
Mito	10·9	207	2 32	+ 3	—	—	—
Utunomiya	10·9	209	2 29	0	4 33	+ 5	—
Vladivostok	10·9	258	i 2 20	- 9	i 4 13	-15	—
Kakioka	11·1	207	2 33	+ 1	4 37	+ 5	—
Maebasi	11·3	212	2 35	+ 1	—	—	—
Nagano	11·4	216	2 35	0	4 44	+ 6	—
Wazima	11·4	222	2 36	+ 1	4 42	+ 4	—
Kumagaya	11·5	210	2 38	+ 2	4 44	+ 4	—
Tokyo	11·8	208	e 2 10	-30	4 21	-26	—
Toyama	11·9	219	3 6	+25	—	—	—
Yokohama	12·1	208	2 48	+ 5	4 59	+ 6	—
Hunatu	12·3	211	3 7	+22	4 59	+ 2	—
Osima	12·7	207	2 51	+ 1	—	—	—
Nagoya	13·3	216	e 2 55	- 1	e 5 21	+ 4	—
Kameyama	13·7	217	2 59	- 1	—	—	—
Hukuoka	17·7	228	—	—	e 6 41	+ 1	—
Irkutsk	27·9	299	—	—	e 11 35	SS	—
College	39·3	38	i 6 53	+ 1	—	—	e 8 10 pP
Naryn	49·5	294	e 8 22	+10	—	—	—
Frunse	49·7	295	e 8 11?	- 3	—	—	—
Andijan	52·2	293	e 8 29	- 3	—	—	—
Garm	54·5	293	e 8 47	- 2	—	—	—
Obi-garm	55·1	293	i 8 48	- 5	—	—	—
Stalinabad	55·7	293	e 8 55	- 3	—	—	—
Samarkand	56·2	295	e 8 59	- 2	—	—	—
Hungry Horse	62·6	48	i 9 46	+ 2	—	—	—
Shasta Dam	62·8	59	e 9 50	+ 5	—	—	—
Kizyl-Arvat	63·3	300	e 9 49	+ 1	—	—	—
Tiflis	68·1	309	10 19	+ 1	—	—	—
China Lake	z. 68·8	60	i 10 28	+ 5	—	—	e 11 48 pP
Leninakan	69·3	308	10 27	+ 1	—	—	—
Pasadena	z. 69·6	62	e 10 31	+ 3	—	—	i 11 55 pP
Riverside	z. 70·2	62	e 10 34	+ 3	—	—	i 11 59 pP
Boulder City	70·3	59	e 10 36	+ 4	—	—	e 12 1 pP
Pierce Ferry	70·7	58	i 10 39	+ 5	—	—	i 12 4 pP
Collmberg	z. 74·9	332	e 10 55	- 3	—	—	—
Tucson	75·3	59	e 11 7	+ 7	—	—	e 12 33 pP
Prague	75·4	331	e 10 59	- 2	—	—	—
Stuttgart	z. 78·3	334	e 11 15	- 2	—	—	—
Strasbourg	78·9	335	i 11 19k	- 1	—	—	e 11 40 PcP
Paris	80·2	337	i 11 25	- 2	—	—	—
Besançon	80·6	335	i 11 28	- 1	—	—	—
Tamanrasset	z. 102·7	324	e 13 11	- 1	—	—	e 17 22 PP

China Lake gives also  $iZ = 11m.53s.$

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Feb. 21d. 20h. Undetermined shock.

College eP = 41m.42s., e = 42m.26s., 46m.15s., and 46m.26s.  
 Shasta Dam eP = 44m.37s.  
 Hungry Horse eP = 44m.42s., i = 47m.24s.  
 Mineral iPZ = 44m.43s. a, iZ = 44m.58s.  
 Lick ePZ = 45m.8s.k.  
 China Lake ePZ = 45m.29s., iZ = 45m.41s., iP<sub>c</sub>PZ = 47m.42s.  
 Riverside ePZ = 45m.34s., iZ = 45m.50s.  
 Boulder City e = 45m.43s.  
 Pasadena iZ = 45m.46s.  
 Pierce Ferry i = 45m.46s.  
 Tucson eP = 46m.22s.  
 Ottawa P = 47m.44s.  
 Harvard iP = 48m.14s.  
 Pretoria iPKP<sub>2</sub>Z = 57m.58s.  
 Long waves were recorded at Granada

Feb. 21d. 22h. 36m. 33s. Epicentre 55°·0N. 161°·6E. Depth of focus 0·005.  
 (as on 1943, Aug. 10d.).

A = -·5468, B = +·1818, C = +·8173;  $\delta = +2$ ;  $h = -7$ ;  
 D = +316, E = +·949; G = -·776, H = +·258, K = -·576.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
	°	°	m. s.	s.	m. s.	s.	m. s.
Klyuchi	1·4	340	i 0 35	pP	i 1 5	sS	—
Vladivostok	22·6	252	e 4 37	-19	—	—	—
College	26·4	48	i 5 37	+ 5	—	—	—
Victoria	44·8	66	e 8 12	+ 3	—	—	e 8 39 sP
Hungry Horse	49·7	61	i 8 49	+ 2	—	—	i 10 6 P <sub>c</sub> P
Shasta Dam	50·4	74	i 8 55	+ 2	—	—	e 9 42 ?
Mineral	z. 51·1	74	i 8 59 <sub>a</sub>	+ 1	—	—	e 9 19 pP
Lick	z. 53·2	77	i 9 15 <sub>a</sub>	+ 1	—	—	i 9 37 pP
Logan	55·4	66	i 9 30	0	—	—	e 12 44 PPP
China Lake	z. 56·6	74	i 9 40 <sub>a</sub>	+ 1	—	—	i 9 55 pP
Pasadena	z. 57·5	76	i 9 44	- 1	i 10 6	sP	i 9 59 pP
Boulder City	58·0	72	i 9 49	+ 1	—	—	i 10 14 sP
Riverside	z. 58·0	76	i 9 48	0	—	—	i 10 3 pP
Pierce Ferry	58·3	72	i 9 52	+ 2	—	—	e 10 50 P <sub>c</sub> P
Palomar	58·8	76	i 9 54 <sub>a</sub>	0	—	—	—
Tucson	62·9	73	e 10 22	0	—	—	e 10 38 pP
St. Louis	68·4	54	i 10 56	- 1	e 20 2	+10	i 11 11 pP
Ottawa	68·9	40	i 10 59 <sub>a</sub>	- 1	—	—	e 13 36 PP
Tiflis	69·7	315	e 11 1	- 4	—	—	—
Collmberg	z. 70·9	341	e 12 10	+58	—	—	—
Jena	N. 71·5	341	e 11 15	- 1	—	—	e 12 38 ?
Rathfarnham Castle	71·6	353	i 11 18	+ 2	—	—	i 11 46 pP
Prague	71·8	340	e 11 17	- 1	—	—	e 11 44 pP
Harvard	72·9	39	i 11 25	+ 1	—	—	—
Weston	73·1	39	i 11 25	0	—	—	—
Karlsruhe	z. 74·0	343	e 11 29	- 1	—	—	—
Stuttgart	74·0	342	e 11 29 <sub>a</sub>	- 1	—	—	—
Strasbourg	74·5	343	i 11 33 <sub>a</sub>	0	—	—	e 12 2 pP
Paris	75·1	347	i 11 35	- 2	—	—	i 11 51 pP
Zürich	75·5	343	i 11 37 <sub>a</sub>	- 2	—	—	—
Chur	75·8	341	i 11 40 <sub>a</sub>	- 1	—	—	—
Besançon	76·1	344	i 11 40	- 2	—	—	—
Clermont-Ferrand	78·0	345	e 11 53	0	—	—	e 12 32 ?
Tortosa	83·2	346	i 12 26	+ 5	—	—	—
Toledo	z. 84·7	350	i 12 30	+ 2	e 12 51	sP	e 12 45 pP
Algiers Univ.	z. 86·8	344	i 12 34 <sub>k</sub>	- 4	—	—	—
Tamanrasset	z. 99·9	338	i 13 37 <sub>k</sub>	- 2	—	—	e 14 0 pP
Pretoria	z. 135·3	292	i 19 8	[- 5]	e 22 42	PKS	—
Grahamstown	. 142·0	287	e 19 13	[-12]	—	—	—

For Notes see next page.

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NOTES TO FEBRUARY 21d. 22h. 36m. 33s.

Additional readings :—

Hungry Horse iPP? = 10m.36s.  
 Lick eZ = 9m.23s., iZ = 9m.34s. and 10m.4s.  
 China Lake ePKP,PKPZ = 39m.31s.  
 Pasadena ePKP,PKPZ = 39m.30s.  
 Boulder City e = 39m.30s.  
 Riverside ePKP,PKPZ = 39m.32s.  
 Pierce Ferry e = 39m.19s.  
 Tucson e = 39m.18s.  
 St. Louis i = 12m.5s.  
 Prague e = 12m.18s.  
 Strasbourg i = 11m.39s., e = 12m.44s.  
 Paris i = 12m.25s.  
 Toledo eZ = 13m.16s.  
 Algiers Univ. eZ = 12m.38s. and 12m.47s.  
 Tamanrasset eZ = 13m.48s., ePPZ = 17m.35s.  
 Long waves were recorded at Ksara, Rome, and Granada.

Feb. 21d. Readings also at 0h. (Hungry Horse, Huancayo, and near Ashkabad), 2h. (Mount Wilson, Riverside, Haiwee, China Lake, Boulder City, Overton, Pierce Ferry, and Tucson), 3h. (Granada), 5h. (near Istanbul), 8h. (Hungry Horse, Riverside, China Lake, Overton, Pierce Ferry, and Tucson), 9h. (Bombay), 10h. (Brisbane, College, and Hungry Horse), 12h. (Boulder City), 13h. (College, and near Ashkabad), 15h. (Kew, Ashkabad, and Hungry Horse), 16h. (Hungry Horse and Shasta Dam), 17h. (Ashkabad, and near Taranto), 18h. (Hungry Horse), 19h. (near Prague), 22h. (near Andijan).

Feb. 22d. 3h. 30m. 36s. Epicentre 22°·6S. 68°·8W. Depth of focus 0·020.  
 (as on Feb. 1d.).

A = +·3342, B = -·8616, C = -·3821;  $\delta$  = +4; h = +4;  
 D = -·932, E = -·361; G = -·138, H = +·356, K = -·924.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
	°	°	m. s.	s.	m. s.	s.	m. s.
La Paz	6·1	5	i 1 17 <sub>a</sub>	- 12	i 2 8	- 30	—
Huancayo	12·2	328	i 2 51	+ 2	e 5 7	+ 5	—
Bogota	27·5	348	e 5 30	- 3	e 9 57	- 4	—
Tucson	67·7	322	i 10 44	+ 2	—	—	e 12 40
Pierce Ferry	72·4	323	i 11 12	+ 2	—	—	—
Boulder City	72·7	322	e 11 14	+ 2	—	—	e 11 32
Riverside	z. 72·8	319	i 11 14 <sub>k</sub>	+ 1	—	—	i 12 5
Pasadena	z. 73·4	319	i 11 18 <sub>k</sub>	+ 2	—	—	i 12 8
China Lake	z. 74·2	321	i 11 21 <sub>k</sub>	0	—	—	i 12 11
Haiwee	z. 74·6	321	i 11 26	+ 3	—	—	—
Logan	75·4	328	e 11 26	- 2	—	—	—
Lick	z. 77·6	319	i 11 43 <sub>a</sub>	+ 3	—	—	i 12 34
Mineral	z. 79·6	322	i 11 52 <sub>a</sub>	+ 1	—	—	—
Shasta Dam	80·3	322	i 11 55	+ 1	—	—	—
Hungry Horse	81·4	332	i 12 0	0	—	—	i 12 27
Tamanrasset	z. 85·2	63	e 12 15	- 4	—	—	i 13 4
Victoria	86·0	327	e 12 25	+ 2	—	—	—
Algiers Univ.	z. 89·8	50	e 12 34	- 8	—	—	e 13 24
Ksara	114·0	62	—	—	e 33 8	SS	e 39 18

Additional readings :—

La Paz i = 1m.23s.  
 Tamanrasset ePPZ = 15m.49s.  
 Algiers Univ. eZ = 12m.47s.

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Feb. 22d. 4h. 13m. 2s. Epicentre 46°·3N. 7°·5E. (as on 1949, Oct. 5d.).

Felt throughout Central Valais. Intensity IV at Montana and Sion; III at Zermatt and the Bernese Oberland.  
Epicentre as adopted. Macroseismic radius, 30km.

E. Wanner.

Jahresbericht des Erdbebendienstes der Schweiz im Jahre, 1950, Zürich, 1951, p. 2.  
Macroseismic chart, p. 6, separate from the text.

A = +·6874, B = +·0905, C = +·7206;  $\delta = -3$ ;  $h = -4$ ;  
D = +·131, E = -·991; G = +·714, H = +·094, K = -·693.

		$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Besançon		1·4	312	i 0 27	0	i 0 46	0	—	—
Ravensburg	z.	2·1	44	e 0 40	+ 3	e 1 14	+10	—	—
Strasbourg		2·3	5	—	—	e 1 13	+ 4	e 1 18	S <sub>g</sub>
Stuttgart		2·7	24	e 0 42	- 3	e 1 28	S*	e 0 53	P <sub>g</sub>
Clermont-Ferrand		3·1	260	—	—	e 1 41	S <sub>g</sub>	—	—

Additional readings:—

Besançon e = 1m.20s.

Strasbourg e = 1m.38s.

Stuttgart eS<sub>g</sub> = 1m.35s. and 1m.38s.

Feb. 22d. 11h. 16m. 8s. Epicentre 60°·3S. 27°·9W. (as on 1943, May 1d.).

A = +·4401, B = -·2330, C = -·8672;  $\delta = +1$ ;  $h = -9$ ;  
D = -·468, E = -·884; G = -·766, H = +·406, K = -·498.

		$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pretoria	z.	51·3	74	e 9 1	- 7	—	—	—	—	—
La Paz		52·5	309	e 9 24	+ 7	i 16 52	+ 9	11 14	PP	26·6
Huancayo		59·4	303	e 14 10	PPP	—	—	—	—	—
Riverview		86·2	179	—	—	e 23 58	+39	e 36 55	Q	e 50·3
Tamanrasset	z.	87·2	32	e 12 49	0	e 14 27	?	—	—	—
Bermuda		97·2	329	—	—	e 26 12	PS	—	—	e 38·6
Helwan	N.	102·0	50	—	—	e 24 34	[- 3]	e 25 46	S	—
Ksara		107·3	51	e 14 5?	P	e 25 13	[+12]	—	—	—
Kew		113·6	18	—	—	—	—	e 42 10	Q	e 53·9
Hungry Horse		128·6	302	i 19 23	[+14]	—	—	—	—	—
College		152·9	306	e 20 10	[+18]	—	—	—	—	—

Additional readings:—

La Paz iP = 9m.29s.k, iSS = 20m.38s.

Riverview iE = 24m.4s.

Tamanrasset iZ = 12m.52s., eZ = 13m.32s.

Helwan eZ = 27m.4s.

College e = 20m.23s.

Long wayes were also recorded at Christchurch, Wellington, Philadelphia, De Bilt, Clermont-Ferrand, Bombay, and Kodaikanl.

Feb. 22d. Readings also at 2h. (Andijan, Frunse, Tchimkent, near Garm, Obigarm, Stalinabad, and Taranto), 4h. (near Basle, Chur, Neuchatel, and Zürich), 6h. (Hungry Horse, College, Almata, Samarkand, Stalinabad, Tashkent, near Andijan, Fergana, Frunse, Garm, Naryn, Obi-garm, and Tchimkent), 7h. (Haiwee, Palomar, Pasadena, Riverside, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Hungry Horse, Victoria, and Pretoria), 8h. (near College and near Andijan), 9h. (near Fergana and near Reykjavik), 10h. (Andijan, Fergana, Frunse, Garm, near Naryn, Obi-garm, Stalinabad, near Nanking, and Zi-ka-wei), 11h. (China Lake, Shasta Dam, Hungry Horse, and College), 12h. (near Obi-garm and near Andijan), 13h. (near Garm), 14h. (Haiwee, Palomar, Pasadena, Riverside, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, College, Logan, Collimberg, Jena, Paris, Besançon, Strasbourg, Stuttgart, Ksara, near Mizusawa, and near Malaga), 15h. (Kew), 16h. (Ksara, Tamanrasset, Pretoria, La Paz, Christchurch, Hungry Horse, College, near Nanking, near Prague, and near Ottawa), 17h. (near Tiflis), 18h. (Tamanrasset), 20h. (Huancayo and near Obi-garm), 21h. (Tamanrasset, near Butte, Hungry Horse, and near Ashkabad), 23h. (Grahamstown and Pretoria).

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Feb. 23d. 4h. 48m. 36s. Epicentre 44°·7N. 150°·3E. Depth of focus 0·020.  
(as on 1948, May 8d.).

A = -·6195, B = +·3534, C = +·7010;  $\delta = +7$ ;  $h = -3$ ;  
D = +·495, E = +·869; G = -·609, H = +·347, K = -·713.

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Mizusawa	8·8	234	2	3	- 2	3	39	- 4	—	—	—
Vladivostok	13·4	269	i 2	59	- 6	—	—	—	—	—	—
College	39·0	37	i 7	6	- 6	—	—	—	—	—	—
Naryn	52·6	297	e 9	1	+ 2	—	—	—	—	—	—
Andijan	55·3	296	e 9	21	+ 2	—	—	—	—	—	—
Tchimkent	56·2	299	i 9	26	0	—	—	—	—	—	—
Tashkent	57·0	298	e 9	43?	+12	—	—	—	—	—	—
Stalinabad	58·8	295	i 9	44	0	—	—	—	—	—	—
Samarkand	59·3	297	e 9	51	+ 4	—	—	—	—	—	—
Shasta Dam	61·3	60	e 9	57	- 4	—	—	—	i 10	10	pP
Hungry Horse	61·6	59	i 10	0	- 3	—	—	—	—	—	—
Mineral	z. 62·0	60	e 10	1 <sub>a</sub>	- 4	—	—	—	—	—	—
Reno	z. 63·6	59	i 10	26 <sub>k</sub>	+10	—	—	—	e 12	49	PP
Lick	z. 63·7	63	e 10	26 <sub>k</sub>	+ 9	—	—	—	—	—	—
Mary	63·8	299	e 10	8	- 9	—	—	—	—	—	—
Fresno	z. 65·3	62	e 10	37 <sub>k</sub>	+10	—	—	—	—	—	—
Tinemaha	z. 66·0	61	i 10	42	pP	—	—	—	i 11	14	sP
Logan	66·9	54	e 10	33	- 4	—	—	—	e 10	46	pP
China Lake	z. 67·2	61	i 10	36	- 3	—	—	—	i 10	49	pP
Mount Wilson	z. 67·9	63	e 10	40	- 3	—	—	—	i 10	54	pP
Riverside	z. 68·5	63	e 10	44	- 3	—	—	—	i 10	57	pP
Overton	z. 68·7	59	i 10	46	- 2	—	—	—	i 11	0	pP
Boulder City	68·9	60	i 10	48	- 1	—	—	—	i 11	0	pP
Palomar	z. 69·3	63	—	—	—	—	—	—	i 11	1	pP
Pierce Ferry	69·3	59	i 10	49	- 3	—	—	—	i 11	2	pP
Tiflis	71·2	311	e 11	4	+ 1	—	—	—	—	—	—
Tucson	73·8	61	e 11	17	- 1	—	—	—	i 11	30	pP
Raciborzu	z. 76·8	331	i 11	36	0	—	—	—	—	—	—
Collmberg	z. 77·5	334	e 11	38	- 1	—	—	—	e 11	53	pP
Prague	78·1	333	e 11	44	+ 1	—	—	—	e 12	1	pP
Jena	78·2	334	e 11	43	0	—	—	—	e 11	58	pP
Rathfarnham Castle	80·3	347	i 11	51	- 3	—	—	—	—	—	e 55·4
Stuttgart	z. 80·9	336	i 11	57 <sub>a</sub>	- 1	—	—	—	e 12	14	pP
Strasbourg	81·5	336	i 12	1 <sub>k</sub>	0	—	—	—	e 12	37	pP
Ksara	81·8	310	e 12	7	+ 5	—	—	—	—	—	—
Paris	82·7	340	e 12	6	- 1	—	—	—	—	—	—
Besançon	83·2	337	i 12	10	+ 1	—	—	—	e 12	24	pP
Clermont-Ferrand	85·4	338	e 12	22	+ 2	—	—	—	—	—	—
Helwan	87·3	310	e 12	31	+ 1	23	12	+18	—	—	—
Tamanrasset	z. 105·5	326	e 13	54	+ 1	—	—	—	e 17	25	PP

Additional readings:—

Shasta Dam i = 10m.53s.

Hungry Horse i = 10m.58s.

Mineral iZ = 10m.14s. and 10m.56s.

Prague e = 13m.12s. and 13m.40s.

Jena eN = 12m.3s.

Long waves were also recorded at Granada and Kew.



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Feb. 23d. 8h. 31m. 23s. Epicentre 49°·2N. 147°·8E. Depth of focus 0·070.

A = -·5551, B = +·3495, C = +·7548 ;  $\delta = +1$  ;  $h = -5$  ;  
D = +·533, E = +·846 ; G = -·639, H = +·402, K = -·656.

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Yuzno-Sakhlinsk	4·1	238	i 1	26	+ 8	i 2	31	+11	—	—	—
Sapporo	7·6	218	i 1	57	+ 4	i 3	22	0	—	—	—
Klyuchi	10·6	43	i 2	28	+ 3	i 4	25	+ 4	—	—	—
Mizusawa	11·1	208	i 2	33	+ 3	4	31	0	—	—	—
Sendai	12·0	207	i 3	41	+61	i 4	50	+ 2	—	—	—
Vladivostok	12·6	247	i 2	45	- 1	i 4	56	- 4	—	—	—
Tokyo	14·7	207	3	10	+ 2	5	38	- 2	—	—	—
Nagoya	16·1	214	3	23	+ 1	6	9	+ 3	—	—	—
Osaka	17·1	216	e 3	28	- 4	i 6	32	+ 8	e 4	28	pP
Hukuoka	20·3	225	e 4	6	+ 3	7	19	0	—	—	—
Irkutsk	27·4	294	i 5	8	+ 1	9	12	- 2	—	—	—
College	36·5	40	i 6	26	+ 1	e 11	3	-30	e 7	57	pP
Semipalatinsk	42·2	299	e 7	12	+ 1	—	—	—	—	—	e 14·7
Frunse	49·4	292	e 8	8	+ 1	—	—	—	—	—	—
Sverdlovsk	49·6	315	i 8	8	0	14	37	- 3	9	48	pP
Andijan	52·0	292	e 8	26	0	i 15	12	0	e 10	10	pP
Fergana	52·5	292	e 8	29	0	—	—	—	—	—	—
Tchimkent	52·7	294	i 8	32	+ 1	e 15	20	- 2	i 10	13	pP
Tashkent	53·5	293	i 8	36	- 1	i 15	31	- 1	—	—	—
Garm	54·3	291	i 8	40	- 2	i 15	38	- 5	—	—	—
Obi-garm	54·8	291	i 8	44	- 2	i 15	45	- 4	e 10	28	pP
Victoria	55·0	54	i 8	47 <sub>a</sub>	0	e 15	54	+ 2	e 10	31	pP
Stalinabad	55·5	291	i 8	50	- 1	i 15	56	- 2	i 10	35	pP
Samarkand	55·9	293	e 8	56	+ 2	i 16	3	- 1	—	—	—
Seattle	56·1	55	i 8	56 <sub>a</sub>	+ 1	—	—	—	i 10	29	pP
Hungry Horse	60·0	50	i 9	22	+ 1	—	—	—	i 11	9	pP
Mary	60·3	295	e 9	24	+ 1	—	—	—	—	—	—
Shasta Dam	60·5	61	i 9	24	0	e 17	4	+ 2	i 11	11	pP
Mineral	z. 61·2	61	i 9	29 <sub>a</sub>	0	e 17	16	+ 5	i 11	16	pP
Berkeley	62·5	63	i 9	37 <sub>a</sub>	- 1	i 17	28	+ 1	i 11	25	pP
Kizyl-Arvat	62·6	299	e 9	39	+ 1	—	—	—	—	—	—
Reno	62·8	60	i 9	40 <sub>a</sub>	0	e 17	27	- 4	i 11	29	pP
Lick	z. 63·2	63	i 9	42 <sub>a</sub>	0	—	—	—	i 11	30	pP
Hyderabad	63·5	267	—	—	—	17	32	- 7	—	—	e 25·3
Fresno	z. 64·7	62	i 9	51 <sub>a</sub>	- 1	—	—	—	i 11	40	pP
Grozny	65·4	309	e 9	58	+ 2	17	58	- 4	e 12	20	PP
Tinemaha	65·4	62	i 9	57 <sub>a</sub>	+ 1	—	—	—	i 11	46	pP
Logan	65·6	54	i 9	56	- 1	e 18	4	0	i 11	46	pP
Poona	E. 65·8	271	i 9	56	- 3	i 18	4	- 3	e 11	45	pP
Bombay	N. 66·2	272	e 10	2	+ 1	e 18	6	- 6	e 21	21	SS
China Lake	z. 66·6	62	i 10	3 <sub>a</sub>	- 1	—	—	—	i 11	54	pP
Tiflis	67·1	308	10	7	0	i 18	21	- 1	—	—	—
Pasadena	67·4	64	i 10	8 <sub>a</sub>	0	i 18	24	- 2	i 11	57	pP
Overton	z. 67·9	60	i 10	13	+ 1	e 18	54	+22	e 12	4	pP
Riverside	z. 68·0	64	i 10	11 <sub>a</sub>	- 1	—	—	—	i 12	2	pP
Boulder City	68·1	60	i 10	13	0	e 18	35	+ 1	i 12	5	pP
Leninakan	68·2	308	e 10	22	+ 9	—	—	—	e 13	24	PP
Pierce Ferry	68·4	60	i 9	15	-59	e 18	38	+ 1	i 12	7	pP
Palomar	z. 68·8	63	i 10	15 <sub>a</sub>	- 2	—	—	—	i 12	5	pP
Kodaikanal	K. 69·5	263	—	—	—	e 18	37?	-13	—	—	—
Tucson	73·1	60	i 10	42	0	e 19	26	- 4	i 12	32	pP
Prague	73·3	331	e 12	45	pP	—	—	—	e 14	43	PPP
Jena	73·5	333	e 10	44	0	—	—	—	e 12	40	pP
Rathfarnham Castle	75·6	345	i 10	56	0	—	—	—	—	—	e 35·0
Stuttgart	z. 76·1	334	e 10	59	0	—	—	—	e 12	53	pP
Strasbourg	76·7	335	i 11	4 <sub>k</sub>	+ 2	—	—	—	i 14	6	PP
Lubbock	77·0	53	11	9	+ 5	—	—	—	12	57	pP
Triest	77·4	329	e 10	51	-15	i 20	11	- 6	e 12	34	pP
Ksara	77·6	308	e 18	48	?	e 24	28	?	—	—	—
Basle	77·7	334	e 11	7	- 1	—	—	—	e 13	36	?

Continued on next page.

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Paris	77.9	338	i 11	8	- 1	—	—	—	i 13	6	pP	—
Ottawa	78.4	29	i 11	9 <sub>a</sub>	- 2	e 20	25	- 2	e 13	6	pP	—
St. Louis	78.6	43	i 11	10	- 2	i 20	24	- 5	i 13	6	pP	—
Cleveland	79.8	36	e 11	12	- 7	i 20	30	- 12	e 17	46	?	—
Weston	82.5	28	i 11	32	- 1	e 21	3	- 6	—	—	—	—
Riverview	82.7	177	—	—	—	i 24	31	sS	—	—	—	e 34.8
Fordham	z. 83.1	31	i 11	35	- 1	—	—	—	—	—	—	—
Helwan	83.1	309	13	31	pP	e 21	10	- 5	—	—	—	—
Alicante	88.4	336	e 12	59	+58	e 23	53	?	16	21	PPP	e 41.7
Almeria	90.3	337	e 13	0	+50	23	36	SKKS	16	32	PP	—
Granada	90.3	338	e 13	4 <sub>a</sub>	+54	24	10	SKKS	29	16	SS	—
Pretoria	z. 128.2	274	i 20	42	PP	—	—	—	—	—	—	—
La Paz	136.3	54	e 18	17	[-10]	24	57	[+ 7]	i 21	9	PP	—

Additional readings :—

Sapporo e = 2m.19s.  
Tokyo eZ = 5m.46s., iN = 6m.52s.  
College e = 7m.43s., iPP? = 8m.12s., i = 10m.15s.  
Sverdlovsk esS = 17m.41s.  
Victoria i = 9m.43s.  
Seattle i = 9m.3s., e = 9m.27s., 9m.57s., and 11m.7s., esP = 11m.20s.  
Hungry Horse iP<sub>c</sub>P = 10m.2s.  
Shasta Dam iP<sub>c</sub>P = 9m.53s., i = 11m.38s., ePP? = 12m.1s., eS<sub>c</sub>S = 18m.23s.  
Mineral iZ = 9m.37s., 9m.49s., and 9m.54s.  
Berkeley iP<sub>c</sub>PZ = 10m.12s., iPPZ = 12m.3s., ipPPZ = 13m.20s., iN = 15m.4s., isSN = 20m.34s., iSSN = 21m.43s., iN = 23m.44s.  
Reno iP<sub>c</sub>PZ = 10m.19s., iN = 11m.42s., eZ = 16m.59s.  
Logan ePP = 12m.38s., epPP? = 14m.8s.  
Poona isPE = 12m.33s., P<sub>c</sub>PE = 14m.39s., iPSE = 18m.19s., PPSE = 18m.29s., S<sub>c</sub>SE = 19m.41s., SS?E = 21m.11s.  
Pasadena iP<sub>c</sub>P?Z = 10m.27s., ipP<sub>c</sub>P?Z = 12m.27s., ePPZ = 12m.47s., eS<sub>c</sub>S?E = 19m.14s., eSSN = 22m.55s.  
Riverside eZ = 11m.55s.  
Pierce Ferry e = 13m.55s.  
Palomar isPZ = 12m.48s.  
Tucson ePP = 13m.33s., e = 14m.25s.  
Prague e = 12m.57s.  
Strasbourg e = 13m.15s., i = 13m.53s.  
Triest ePP? = 13m.50s., isS = 22m.57s.  
Paris e = 13m.34s.  
Ottawa e = 13m.52s.  
St. Louis eN = 25m.5s.  
Helwan eZ = 14m.55s., 16m.53s., and 17m.46s.  
Almeria PPP = 18m.30s., SS = 29m.42s.  
Granada sSS = 31m.19s.

Feb. 23d. 11h. 1m. 10s. Epicentre 29°·8N. 95°·3E. (as on 13d.).

$$A = -0.878, B = +0.8648, B = +0.4945; \quad \delta = +12; \quad h = +2;$$

$$D = +0.995, E = +0.101; \quad G = -0.050, H = +0.492, K = -0.869.$$

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.
Dehra Dun	N. 15.4	276	e 2	52	-48	—	—	—	—	—	—
New Delhi	N. 16.3	271	e 3	19	-33	—	—	—	—	—	—
Przhevalsk	18.9	320	e 4	24	0	—	—	—	—	—	—
Naryn	19.9	314	e 4	51?	+14	—	—	—	—	—	—
Hyderabad	N. 20.1	236	e 6	6	?	10	29	L	—	—	(10.5)
Almata	20.2	319	i 4	39	0	i 8	24	+ 3	—	—	—
Frunse	21.4	314	e 4	53	+ 2	e 8	53	+ 8	—	—	—
Andijan	22.0	307	4	56	- 2	8	58	+ 2	—	—	—
Garm	22.9	303	5	1	- 5	i 9	14?	+ 1	—	—	—
Poona	E. 22.9	245	e 5	5	- 1	i 7	20	?	—	—	—
Irkutsk	23.3	14	e 5	14	+ 4	—	—	—	—	—	—
Bombay	23.5	248	e 5	9	- 3	e 7	17	?	—	—	—
Stalinabad	23.9	302	i 5	16	0	—	—	—	—	—	—
Tchimkent	24.5	309	5	22	0	—	—	—	—	—	—
Samarkand	25.5	300	e 5	33	+ 1	—	—	—	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Kodaikanal	E.	25.7	226	e 7 50?	?	—	—	—	—
Kizyl-Arvat		33.7	298	e 6 46	+ 1	—	—	—	—
Tiflis		42.5	301	e 8 10?	+11	—	—	—	—
Ksara		50.4	291	—	—	e 18 53	SS	—	e 25.1
Stuttgart	z.	66.1	315	e 10 52	+ 1	—	—	—	—
Strasbourg		67.1	315	i 10 58	+ 1	—	—	—	—
Besançon		68.7	313	e 11 8	+ 1	—	—	—	—
Paris		70.2	316	i 11 17	0	—	—	—	—
Kew		70.9	320	—	—	e 28 6?	SSS	—	e 34.8
College		73.6	24	i 11 40	+ 3	—	—	—	—
Hungry Horse		97.7	20	e 13 44	+ 6	—	—	e 17 40	PP
Mineral	z.	102.1	29	e 18 14	PP	—	—	—	—

Additional readings :—  
New Delhi eN = 3m.56s.

Feb. 23d. 21h. 46m. 1s. Epicentre 20°·5S. 177°·5W. Depth of focus 0·030.  
(as on 1946, Dec. 17d.).

A = -·9365, B = -·0409, C = -·3481;  $\delta$  = -12;  $h$  = +5;  
D = -·044, E = +·999; G = +·348, H = +·015, K = -·937.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Apia		8.6	40	1 57	- 5	3 19	-18	—	—
Auckland	N.	17.6	201	i 4 14	+22	i 6 14	-45	—	—
Tuai	N.	18.8	194	e 4 6	+ 1	e 7 23	+ 1	—	—
New Plymouth	E.	19.9	199	e 4 23	+ 7	e 6 52	-50	e 15 21	S <sub>e</sub> S
Wellington		21.7	197	e 4 36	+ 2	8 17	+ 2	i 15 24	S <sub>e</sub> S
Cobb River	E.	22.2	201	e 4 40	+ 2	e 8 26	+ 3	—	—
Kaimata	N.E.	23.9	201	e 4 54	- 1	e 11 31	L	—	(e 11.5)
Riverview		30.8	237	i 6 3 <sub>a</sub>	+ 6	i 10 50	+ 7	i 12 28	P <sub>e</sub> S
Berkeley	z.	77.9	42	i 11 32 <sub>k</sub>	- 2	e 21 33	+26	i 11 50	pP
Lick	z.	77.9	42	i 11 33 <sub>k</sub>	- 1	—	—	—	—
Pasadena		78.3	47	i 11 34 <sub>a</sub>	- 3	i 21 7	- 5	i 11 46	pP
Vladivostok		78.6	325	i 11 40	+ 2	i 21 20	+ 5	—	—
Fresno	z.	78.8	44	e 11 38 <sub>k</sub>	- 1	e 21 13	- 4	—	—
Palomar		78.8	49	i 11 38 <sub>a</sub>	- 1	—	—	i 11 49	pP
Riverside		78.8	47	i 11 36 <sub>a</sub>	- 3	—	—	i 11 51	pP
Shasta Dam		79.5	39	i 11 41	- 2	—	—	—	—
China Lake	z.	79.7	46	i 11 41 <sub>a</sub>	- 3	—	—	i 11 54	pP
Mineral	z.	79.8	41	i 11 43 <sub>k</sub>	- 2	—	—	—	—
Tinemaha		80.0	44	i 11 44 <sub>a</sub>	- 2	—	—	i 12 3	pP
Reno		80.4	42	i 11 47 <sub>a</sub>	- 1	e 21 31	- 3	—	—
Boulder City		81.6	47	i 11 53	- 1	—	—	—	—
Overton	z.	82.2	46	i 11 55	- 2	—	—	i 12 18	pP
Pierce Ferry		82.3	47	i 11 56	- 2	—	—	i 12 45	pP
Tucson		82.5	52	i 11 58	- 1	e 21 54	- 1	i 12 11	pP
Victoria		83.9	33	e 12 6 <sub>k</sub>	0	—	—	—	—
Logan		86.7	44	e 12 15	- 5	—	—	—	—
College		88.1	12	i 12 24	- 2	i 22 42	- 7	e 15 52	PP
Hungry Horse		88.9	37	i 12 27	- 3	—	—	—	—
Grahamstown		121.8	204	i 18 29	[+ 2]	—	—	—	—
Pretoria	z.	127.7	210	i 21 41	PP	—	—	—	—
Rathfarnham C.	z.	146.6	9	i 19 15	[+ 2]	—	—	i 19 48	pPKP
Ksara		147.6	300	e 19 18	[+ 3]	e 29 37	PKKP	—	—
Jena		148.8	348	e 19 19	[+ 2]	—	—	e 20 9	pPKP
Prague		149.0	345	i 19 22 <sub>k</sub>	[+ 5]	e 34 6	P <sub>e</sub> P	e 22 38	PP
Karlsruhe		151.3	352	e 19 27	[+ 7]	—	—	—	—
Stuttgart		151.3	350	e 19 21 <sub>k</sub>	[+ 1]	—	—	e 22 41	PP
Paris		151.7	0	i 19 29	[+ 8]	e 23 6	PKS	i 19 39	pPKP
Strasbourg		151.7	352	i 19 29 <sub>k</sub>	[+ 8]	i 24 8	?	—	—
Basle		152.7	353	e 19 29	[+ 7]	e 25 29	[-37]	e 28 14	?
Zürich		152.7	352	e 19 24 <sub>k</sub>	[+ 2]	—	—	—	—

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Clermont-Ferrand	154.8	358	e 19 29	[+ 4]	—	—	e 19 52 pPKP	—
Toledo	z. 159.9	15	i 20 14	pPKP	—	—	—	—
Algiers Univ.	z. 163.7	357	e 20 29	pPKP	—	—	—	—
Tamanrasset	176.4	—	e 19 45	[+ 2]	e 31 48	SKKS	i 21 30 PKP <sub>2</sub>	—

Additional readings :—

Wellington i = 4m.39s.

Riverview iSSN = 13m.14s., iS<sub>c</sub>SN = 16m.11s.

Berkeley iZ = 11m.42s. and 12m.17s., iPPZ = 14m.27s.

Lick iZ = 11m.45s.

Mineral iZ = 11m.49s.

Reno eZ = 20m.26s.

College i = 12m.43s., e = 13m.26s. and 15m.18s.

Rathfarnham Castle eZ = 20m.25s.

Jena eE = 19m.23s.

Prague e = 19m.33s., 19m.47s., and 20m.14s., ePPS? = 35m.21s.

Karlsruhe eEZ = 19m.39s.

Stuttgart iPKPZ = 19m.28s., eZ = 19m.35s.

Strasbourg i = 19m.39s., e = 19m.59s., i = 20m.14s., and 20m.35s., e = 20m.54s.

Clermont-Ferrand e = 19m.37s.

Tamanrasset iZ = 20m.51s. and 21m.58s., eZ = 22m.33s., ePPZ = 24m.27s., iZ = 25m.24s.,

ePPPZ = 28m.19s., iZ = 32m.6s.

Long waves were also recorded at Trieste.

Feb. 23d. Readings also at 0h. (Pasadena, Riverside, China Lake, Tucson (2), Boulder City (2), Overton, and Pierce Ferry (2)), 1h. (Huancayo and Malaga), 2h. (Auckland, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Hungry Horse, College, and Tamanrasset), 3h. (Apia, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, Shasta Dam, College, Stuttgart, and near Mizusawa), 5h. (Pierce Ferry, Mineral, Shasta Dam, Hungry Horse, and College), 6h. (Rathfarnham Castle), 7h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Shasta Dam, College, and near Obi-garm), 8h. (Pierce Ferry, near Irkutsk and near Andijan), 9h. (Calcutta and Kew), 10h. (Calcutta and Huancayo), 11h. (Stuttgart, near Obi-garm and Garm), 12h. (Overton, Pierce Ferry, Hungry Horse, Shasta Dam, College, Pretoria, New Delhi, Andijan, near Klyuchi, and near Obi-garm), 13h. (Overton, Mineral (2), Hungry Horse, Shasta Dam, College, near Andijan, Fergana, Garm, Obi-garm, Samarkand, Naryn, Stalinabad, and Tchimbkent), 15h. (Palomar, China Lake, Tucson, Pierce Ferry, Tacubaya, Zürich, Tamanrasset, and near Obi-garm), 16h. (Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, Tamanrasset, Mizusawa, Vladivostok, Prague, Strasbourg, Stuttgart, Trieste, Zagreb, and near Taranto), 17h. (Mizusawa, Pasadena, Riverside, Palomar, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Berkeley, Lick, Reno, Hungry Horse, Shasta Dam, College, Collmberg, Jena, Besançon, Paris, Prague, Stuttgart, and Strasbourg), 18h. (Tamanrasset, Ksara, Frunse, near Andijan, Fergana, Garm, Naryn, Samarkand, Stalinabad, Tashkent, and Tchimbkent), 19h. (near Andijan and near Tacubaya), 20h. (Basle), 21h. (Auckland, Palomar, China Lake, Shasta Dam, Hungry Horse, and College), 22h. (Pierce Ferry and Hungry Horse), 23h. (Collmberg, and near Ashkabad).

Feb. 24d. 6h. 1m. 42s. Epicentre 6°·0N. 77°·5W.

Felt at Quibdo.

Epicentre as adopted (U.S.C.G.S. and Strasbourg).

Monthly Seismic Bulletin, Bogota, Feb., 1950, p. 2.

$$A = +.2153, B = -.9710, C = +.1038; \quad \delta = -3; \quad h = +7;$$

$$D = -.976, E = -.216; \quad G = +.022, H = -.101, K = -.995.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Chinchina	2.1	118	i 0 22	-15	i 0 46	-18	i 0 54	S <sub>g</sub>
Balboa Heights	3.6	326	i 0 57	-1	i 1 39	-3	—	—
Bogota	3.7	111	i 1 6	P*	i 1 49	+ 4	i 1 14	P <sub>g</sub>
Huancayo	18.1	173	i 4 13	-1	i 7 42	+ 7	i 4 17	P
La Paz	24.2	156	e 5 18	-1	9 43	+ 8	—	12.2
Tacubaya	25.0	305	i 5 33 <sub>k</sub>	+ 6	—	—	—	e 14.5
Ottawa	39.3	3	i 7 33 <sub>a</sub>	+ 1	—	—	e 9 40	P <sub>c</sub> P
Tucson	40.6	315	i 7 44	+ 1	—	—	e 9 31	PP
Pierce Ferry	44.9	318	i 8 19	+ 1	—	—	—	—
Boulder City	45.4	317	e 8 24	+ 2	—	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Overton	z.	45.4	318	i 8 24	+ 2	—	—	—	—
Palomar		45.5	313	i 8 24	+ 1	—	—	—	—
Riverside	z.	46.2	313	i 8 29	+ 1	—	—	—	—
Logan		46.9	325	e 8 31	- 3	—	—	—	—
Pasadena		46.9	313	i 8 34	0	—	—	—	—
China Lake	z.	47.3	316	i 8 26	- 11	—	—	i 8 34	P
Reno		50.6	319	e 9 4	+ 2	—	—	—	—
Lick	z.	50.8	315	e 9 3	- 1	—	—	—	—
Mineral	z.	52.2	319	e 9 14 <sub>a</sub>	- 1	—	—	—	—
Hungry Horse		52.4	331	i 9 15	- 1	—	—	i 9 23	pP
Shasta Dam		52.9	319	e 9 18	- 2	—	—	—	—
Victoria		57.5	326	e 9 53	0	—	—	—	—
College		76.3	336	e 11 51	- 1	—	—	—	—
Clermont-Ferrand		79.2	45	e 12 9	+ 1	—	—	—	—
Tamanrasset	z.	81.3	68	12 20	0	—	—	e 15 26	PP
Stuttgart	z.	83.4	42	e 12 30	0	—	—	—	—

Additional readings :—

Bogota  $iP_g = 1m.20s.$ ,  $iS^* = 1m.55s.$ ,  $iS_g = 2m.18s.$

Tucson  $i = 7m.51s.$

Pierce Ferry  $i = 8m.28s.$ ,  $e = 8m.45s.$

Overton  $iZ = 9m.0s.$

Palomar  $iZ = 8m.31s.$

Pasadena  $iZ = 8m.42s.$

Reno  $e = 9m.12s.$

Mineral  $eZ = 9m.21s.$

Tamanrasset  $eP_cPZ = 12m.26s.$

Feb. 24d. 12h. Indian Ocean.

Pietermaritzburg  $eZ = 44m.6s.$

Grahamstown  $i = 44m.26s.$

Pretoria  $iZ = 44m.33s.$

Ksara  $e = 50m.5s.$

Tamanrasset  $iPZ = 50m.34s. a$ ,  $iZ = 50m.43s.$ ,  $ePPZ = 53m.26s.$

Stuttgart  $ePZ = 52m.4s.$

Strasbourg  $iP = 52m.6s.$

Paris  $eP = 52m.19s.$

Kodaikanal  $eE = 53m.$

College  $iPKP = 58m.25s.$ ,  $e = 58m.37s.$  and  $58m.54s.$ ,  $ePP? = 61m.43s.$

Hungry Horse  $ePKP = 58m.53s.$ ,  $i = 59m.48s.$

Tucson  $ePKP = 58m.59s.$ ,  $e = 59m.10s.$

Boulder City  $ePKP = 59m.2s.$

China Lake  $eZ = 59m.14s.$

Overton  $ePKP = 59m.39s.$ ,  $eZ = 60m.29s.$  and  $65m.21s.$

Shasta Dam  $e = 60m.27s.$ ,  $i = 64m.17s.$

Mineral  $ePZ = 60m.28s.$ ,  $eP_cPZ = 60m.44s.$ ,  $eZ = 64m.19s.$

Feb. 24d. Readings also at 0h. (College, Hungry Horse, Shasta Dam, Mineral, Algiers Univ., Tamanrasset, Pretoria, near Bandung, and Djakarta), 5h. (Athens, Taranto (2), Stuttgart, and Tamanrasset), 6h. (Naryn, near Garm, Obi-garm, Fergana, Stalinabad, Andijan, Tchimkent, and Samarkand), 8h. (Hungry Horse, Pierce Ferry, and near Tacubaya), 10h. (Durham and near Stalinabad), 12h. (near Djakarta), 13h. (Stuttgart and Strasbourg), 15h. (Chinchina, Bogota, Huancayo, and La Paz), 16h. (Apia, Hungry Horse (2), Shasta Dam, Lick, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry (2), and Tucson (2)), 17h. (Huancayo), 18h. (Stalinabad, near Garm, Obi-garm, and Andijan), 20h. (near Ashkabad), 21h. (College, Hungry Horse, Shasta Dam, Mineral, Riverside, China Lake, Pierce Ferry, Tucson, Pretoria, Samarkand, near Garm, Obi-garm, Stalinabad, and Andijan), 22h. (Mineral), 23h. (Tchimkent, Samarkand (2), Frunse, Naryn, Przhevalsk, near Garm (2), Obi-garm (2), Fergana, Andijan (2), and Stalinabad (2)).

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Feb. 25d. 5h. 47m. 8s. Epicentre 45°·5N. 98°·9E.

A = -·1088, B = +·6948, C = +·7109;  $\delta = -4$ ;  $h = -4$ ;  
D = +·988, E = +·155; G = -·110, H = +·702, K = -·703.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Irkutsk		7·7	26	e 2 41	P <sub>g</sub>	3 34	+ 9	—	—
Semipalatinsk		13·4	298	e 3 11	- 3	—	—	—	—
Przhevalsk		15·1	266	e 3 35	- 1	—	—	—	—
Almata		15·9	270	i 3 48	+ 1	—	—	—	—
Naryn		17·1	267	i 4 5	+ 3	7 25	+13	4 54	PP
Frunse		17·6	270	e 4 10	+ 2	—	—	—	—
Andijan		19·9	265	e 4 35	- 1	i 8 27	+12	—	—
Fergana		20·5	265	i 4 41	- 1	e 8 38	+11	—	—
Tchimkent		21·3	272	i 4 50	0	—	—	—	—
Tashkent		21·9	269	e 4 53	- 4	i 9 2	+ 8	e 5 17?	PP
Obi-garm		22·6	263	i 5 8	+ 5	i 9 18	+11	—	—
Stalinabad		23·3	264	i 5 7	- 3	i 9 25	+ 5	—	—
Vladivostok		23·6	84	i 5 13	0	e 9 30	+ 5	—	—
Samarkand		24·1	267	i 5 16	- 2	—	—	—	—
New Delhi		24·1	232	e 5 22	+ 4	i 9 43	+ 9	5 42	PP
Calcutta	E.	24·5	203	i 5 27	+ 5	i 9 46	+ 6	i 6 6	PP
Sverdlovsk		26·2	310	i 5 38	0	i 10 17	+ 8	—	—
Mary		28·6	268	e 5 59	- 1	—	—	—	—
Ashkabad		30·9	270	6 24	+ 4	—	—	—	—
Kizyl-Arvat		31·9	275	6 30	+ 1	—	—	—	—
Poona	N.	34·0	225	i 6 45	- 3	i 12 8	- 5	i 14 26	SS
Bombay	N.	34·2	227	e 6 37	-12	e 12 28	+12	—	—
Grozny		37·5	287	e 7 20	+ 3	—	—	e 16 0	SS
Tiflis		38·7	285	e 7 27	0	—	—	e 16 27	SS
Moscow		39·0	309	e 7 30	0	—	—	e 17 10	SSS
Kodalkanal	E.	39·7	214	e 8 52?	PP	—	—	—	—
Leninakan		39·8	284	e 7 44	+ 8	—	—	—	—
Helsinki	Z.	44·5	318	i 8 16	+ 1	—	—	—	—
Upsala		48·1	318	i 8 44	+ 1	e 15 28	-14	e 10 36	PP
Ksara		48·7	279	e 8 48	0	e 16 56	+66	—	—
Istanbul		49·6	291	e 8 52?	- 3	—	—	—	e 37·3
Copenhagen		52·4	315	i 9 16	0	—	—	—	27·9
Potsdam		53·6	311	i 9 24 <sub>a</sub>	- 1	—	—	e 26 4	Q
Prague		54·0	308	e 9 26	- 2	e 17 7?	+ 4	e 9 51	pP
Collmberg	Z.	54·2	310	e 9 27	- 2	—	—	—	e 28·9
Helwan	Z.	54·2	278	9 24	- 5	—	—	—	—
Jena		55·2	309	e 9 35	- 2	—	—	e 11 55	PP
Stuttgart		57·6	309	e 9 53	- 1	—	—	e 10 21	P <sub>c</sub> P
Karlsruhe		57·9	310	e 9 56	0	—	—	e 13 32	PPP
College		58·4	28	i 9 58	- 2	—	—	—	e 30·9
Strasbourg		58·5	309	i 10 0 <sub>k</sub>	0	—	—	e 13 38	PPP
Zürich		58·8	308	e 10 0 <sub>a</sub>	- 2	—	—	e 12 19	PP
Basle		59·2	308	e 10 4 <sub>a</sub>	- 1	—	—	—	—
Besançon		60·3	309	i 10 11	- 2	—	—	—	—
Kew		61·0	316	e 16 2	?	e 24 58	SSS	—	e 32·9
Paris		61·2	312	i 10 19	0	—	—	e 10 52	P <sub>c</sub> P
Clermont-Ferrand		62·7	309	i 10 29	0	—	—	—	e 37·9
Rathfarnham Castle		62·7	320	i 10 31	+ 2	—	—	e 13 30	PP
Algiers Univ.	Z.	68·5	301	e 11 5	- 1	—	—	e 11 24	P <sub>c</sub> P
Toledo	Z.	70·6	307	e 11 20	+ 1	—	—	e 13 2	PP
Tamanrasset	Z.	76·4	289	i 11 53 <sub>a</sub>	0	—	—	e 12 3	P <sub>c</sub> P
Victoria		79·3	27	e 12 11 <sub>a</sub>	+ 2	—	—	—	—
Seattle		80·4	27	i 12 18 <sub>k</sub>	+ 3	—	—	e 13 5	pP
Hungry Horse		82·2	22	i 12 24	0	—	—	—	—
Shasta Dam		86·6	30	i 12 46	0	—	—	—	—
Mineral	Z.	87·2	30	i 12 49 <sub>a</sub>	0	—	—	i 12 55	P <sub>c</sub> P
Reno	Z.	88·5	29	e 12 57	+ 1	—	—	—	—
Logan		88·9	22	i 12 57	- 1	—	—	—	—
Lick	Z.	89·8	31	e 13 2 <sub>a</sub>	0	—	—	i 13 9	P <sub>c</sub> P
Fresno		91·0	30	e 13 9 <sub>k</sub>	+ 2	—	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Tinemaha	z.	91.3	29	i 13 11	+ 2	—	—	—	—
China Lake	z.	92.6	28	i 13 15 <sub>a</sub>	0	—	—	—	—
Overton	z.	93.0	26	i 13 18	+ 1	—	—	—	—
Boulder City		93.4	26	e 13 20	+ 2	—	—	—	—
Pierce Ferry		93.5	25	e 13 20	+ 1	—	—	e 15 55	PP
Pasadena	z.	93.9	29	i 13 22 <sub>a</sub>	+ 1	—	—	—	—
Riverside	z.	94.3	29	i 13 24	+ 1	—	—	—	—
Palomar		95.1	28	i 13 27	+ 1	—	—	—	—
Tucson		98.0	24	e 13 39	0	—	—	—	—
Huancayo		146.3	349	i 19 44	[+ 3]	—	—	—	—
La Paz	z.	149.1	334	i 19 54	[+ 8]	—	—	—	—

Additional readings :—

Tashkent eSSS = 17m.10s.

New Delhi iEN = 9m.57s., SSEN = 11m.6s.

Calcutta QE = 9m.55s., iSSE = 10m.58s.

Poona iSSN = 14m.53s.

Bombay eE = 12m.33s.

Helsinki iZ = 8m.20s.

Potsdam eN = 27m.52s.

Upsala eN = 25m.52s.?

Prague e = 9m.32s. and 10m.3s., ePP = 11m.27s., ePPP? = 12m.6s.

Collmberg eZ = 9m.31s.

Helwan eZ = 10m.22s.

Jena eN = 10m.33s.

Stuttgart ePZ = 9m.58s., ePPPZ = 13m.27s., eZ = 15m.24s.

Strasbourg e? = 10m.43s. and 14m.47s.

Besançon e = 10m.29s. and 11m.17s.

Paris e = 10m.36s. and 11m.54s.

Tamanrasset eZ = 12m.32s.

Seattle i = 12m.23s., e = 12m.37s.

Hungry Horse i = 12m.39s.

Shasta Dam i = 12m.52s.

Mineral iZ = 13m.54s., ePPZ = 15m.55s.

Tinemaha iZ = 13m.17s.

Boulder City e = 13m.36s.

Pasadena iZ = 13m.27s.

Long waves were also recorded at Warsaw, Bergen, De Bilt, Rome, Taranto, Trieste, Scoresby Sund, and Philadelphia.

Feb. 25d. 9h. 51m. 44s. Epicentre 29°·0N. 131°·5E. (as on 1948, Aug. 29d.).

A = -·5805, B = +·6561, C = +·4823;  $\delta$  = +6; h = +2;

D = +·749, E = +·663; G = -·320, H = +·361, K = -·876.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Hukuoka		4.7	348	e 1 21	+ 7	e 2 24	+14	3 9	S <sub>g</sub>
Hirosima		5.4	8	e 1 40	+16	e 4 9	?	—	—
Osaka		6.6	30	e 1 57	+16	e 2 55	- 3	—	e 5.4
Nagoya		7.7	36	2 12	P*	—	—	—	e 11.2
Tokyo		9.7	44	e 2 51	P*	e 6 2	?	—	—
Nanking		11.4	289	i 2 32	-15	—	—	—	—
Sendai		12.1	38	e 2 58	+ 1	e 7 12	L	—	e 9.5
Vladivostok		14.1	1	e 3 31	+ 8	—	—	—	—
Irkutsk		30.8	327	e 6 31	+11	e 11 25	+ 2	—	—
Calcutta	E.	39.2	271	e 6 48	-43	e 12 28	-64	7 53	PP
Djakarta		42.3	218	e 7 34	-23	e 13 47	-32	—	—
Bandong		42.5	217	7 36	-23	e 13 46	-36	—	—
New Delhi		47.2	284	e 8 22	-14	i 15 7	-22	18 16	SS
Andijan		49.1	300	e 8 45	- 6	—	—	—	—
Tashkent		51.3	302	e 9 41	+33	e 17 9	+43	—	—
Colombo	E.	53.3	256	9 5	-18	16 35	-19	—	—
Poona	N.	53.3	273	e 9 15	- 8	i 16 27	-27	i 15 15	S <sub>c</sub> P
Kodaikanal	E.	53.7	262	e 8 56	-30	e 16 36	-23	19 16	SS
Bombay		54.1	273	e 9 31	+ 2	e 16 44	-21	—	—
Sverdlovsk		55.9	322	e 9 43	+ 1	i 17 21	- 8	—	—

Continued on next page.

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		$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Brisbane	z.	59.8	158	i 9 53	-16	—	—	—	—
College		60.2	29	i 10 11	-1	e 18 41	PS	—	e 30.6
Riverview		65.2	162	e 10 44	-1	e 19 21	-6	e 26 58	e 29.4
Grozny		67.8	308	e 10 53?	-9	e 19 51?	-9	e 15 26	PPP
Moscow		68.6	323	e 10 33?	-34	—	—	—	—
Tiflis		69.1	307	e 11 1	-9	20 9	-6	—	—
Leninakan		70.1	306	e 11 14	-2	—	—	e 11 26	P <sub>c</sub> P
Helsinki		73.0	331	i 11 37	+4	—	—	—	e 37.3
Yalta		75.1	313	—	—	e 21 12	-12	—	—
Victoria		78.0	41	e 12 2	0	—	—	e 16 38	PPP
Ksara		78.7	302	e 11 56	-10	e 21 56?	-7	—	—
Seattle		79.0	41	e 12 10	+3	—	—	—	—
Istanbul		80.0	311	e 12 7	-6	e 22 11	-6	—	—
Copenhagen		81.0	330	e 12 9	-9	—	—	i 16 47	PPP
Shasta Dam		82.6	48	i 12 24	-2	—	—	e 15 38	PP
Potsdam		82.8	328	i 12 12 <sub>a</sub>	-15	i 23 23	PS	—	—
Hungry Horse		83.3	37	i 12 28	-2	—	—	—	e 45.3
Mineral	z.	83.3	47	e 12 27	-3	—	—	—	—
Collmberg	z.	83.5	326	e 12 21	-10	e 22 45	-7	—	e 45.3
Prague		83.6	324	e 12 22	-9	e 22 50	-3	e 15 28	PP
Helwan		84.0	300	e 12 24	-9	e 23 1	+4	e 15 55	PP
Jena		84.4	326	e 12 31	-5	—	—	e 17 5	PPP
Lick	z.	84.9	50	e 12 36 <sub>k</sub>	-2	—	—	—	—
Reno	z.	84.9	47	i 12 38 <sub>k</sub>	0	—	—	i 12 52	P <sub>c</sub> P
Fresno	z.	86.5	49	e 12 46	0	—	—	—	—
Triest		86.7	322	—	—	i 23 16	-8	—	—
Stuttgart		87.0	326	i 12 42	-6	e 23 10	[-4]	i 12 51	P <sub>c</sub> P
Karlsruhe		87.2	327	e 12 48	-1	—	—	—	e 46.3
Tinemaha	z.	87.3	49	e 12 50	0	—	—	—	e 47.3
Strasbourg		87.8	326	i 12 58	+6	—	—	—	e 46.8
China Lake	z.	88.5	49	e 12 53	-3	—	—	—	—
Logan		88.5	42	e 12 54	-2	—	—	—	—
Padova		88.5	322	—	—	e 23 54	+13	—	—
Salo		88.5	323	—	—	e 24 22	PS	—	—
Basle		88.7	325	e 20 35	?	—	—	—	e 56.3
Bologna		88.8	322	—	—	e 23 58	+14	—	—
Pasadena	z.	89.0	51	i 12 56	-2	—	—	—	—
Florence Arc.		89.3	321	—	—	e 22 44	?	—	—
Florence Xim.		89.3	321	e 13 32	+33	i 23 47	-1	—	—
Kew		89.4	332	—	—	e 23 19	[-10]	e 24 11	S
Riverside	z.	89.7	51	e 12 58	-3	—	—	—	—
Rome		89.8	319	—	—	i 23 50	-3	e 34 9	SSS
Overton	z.	90.1	48	e 13 2	-1	—	—	i 16 38	PP
Paris		90.1	329	e 12 57	-6	i 24 8	+13	e 16 56	PP
Boulder City		90.2	48	e 13 2	-2	—	—	e 16 41	PP
Palomar	z.	90.4	51	e 13 1	-3	—	—	—	—
Pierce Ferry		90.6	47	e 13 4	-1	—	—	i 17 42	PP
Clermont-Ferrand		92.1	327	i 13 11	-1	—	—	47 16?	Q
Tucson		95.1	49	i 13 26	0	—	—	e 17 17	PP
Alicante		99.4	324	17 54	PP	24 48	{-2}	19 56	PPP
Tamanrasset	z.	106.8	308	e 17 59	PP	—	—	—	—
Huancayo		149.8	61	e 19 44	[-3]	—	—	—	—
La Paz	z.	158.1	59	e 19 56	[-3]	—	—	i 24 24	PP

Additional readings :—

Osaka e = 2m.35s., eS = 4m.38s.

Tokyo eN = 6m.54s.

Calcutta PPPE = 8m.29s., P<sub>c</sub>SE = 13m.2s., SSE = 12m.54s., QE = 15m.12s., SSSE = 15m.46s.

Bandong E = 7m.42s.

New Delhi SSSN = 19m.22s.

Poona iPSN = 16m.39s., iPPSN = 16m.45s., iS<sub>c</sub>SN = 17m.54s., iSSN = 19m.4s.

Leninakan ePPP = 15m.56s.

Shasta Dam e = 12m.57s.

Potsdam iPPZ = 16m.58s.

Mineral iZ = 12m.31s. and 13m.1s.

Continued on next page.



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Collnberg eZ = 12m.24s. and 12m.30s.  
 Prague eZ = 12m.32s., eE = 12m.36s., ePPP = 17m.1s., e = 32m.20s.  
 Helwan eZ = 13m.10s. and 16m.58s., eN = 23m.16s.  
 Jena eN = 12m.37s. and 17m.17s.  
 Stuttgart ePZ = 12m.45s., eZ = 17m.17s., eSS? = 28m.28s.  
 Kew eQEN = 42.3m.  
 Rome e? = 27m.50s.  
 Overton iPPZ = 17m.38s.  
 Boulder City e = 17m.39s.  
 Paris i = 13m.8s., 17m.32s., and 23m.45s., e = 24m.28s., and 34m.14s.  
 Long waves were also recorded at Sapporo, Philadelphia, Scoresby Sund, and other European stations.

Feb. 25d. Readings also 1h. (College, Hungry Horse, Obi-garm, Samarkand, Tchimkent, near Fergana, Garm, and Stalinabad), 2h. (Tucson, Boulder City, Overton, Pierce Ferry, and Zi-ka-Wei), 3h. (Apia), 7h. (near La Paz), 9h. (Hungry Horse, Garm, Fergana, Andijan, near Obi-garm, Stalinabad, Arapuni, Christchurch, Cobb River, Kaimata, near New Plymouth, Tuai, and Wellington), 10h. (Mount Wilson, Palomar, Pasadena, Riverside (2), China Lake (2), Tinemaha, Tucson (2), Boulder City, Overton, Pierce Ferry, Fresno, Lick, Logan (2), Reno, Mineral (2), Shasta Dam (2), Victoria, Hungry Horse (2), College (3), Tamanrasset, Tiflis, and near Obi-garm) 12h. (Reykjavik), 13h. (Mount Wilson, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Reno, Mineral, Hungry Horse, College, Salt Lake City, and near Logan), 14. (Apia, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Pierce Ferry, Mineral, Shasta Dam, Lick, Hungry Horse, College, Alicante, and Granada), 15h. (Boulder City, Tamanrasset, Fergana, Frunse, near Andijan (2), Garm, Naryn, Samarkand (2), Stalinabad, Besançon, Strasbourg, Stuttgart, Zürich, near Taranto, Triest, and near Athens), 18h. (near Istanbul), 19h. (Tacubaya, Tucson, Boulder City, Pierce Ferry, College, near Garm, and Obi-garm), 21h. (Brisbane, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Shasta Dam, Lick, College, Besançon, Paris, Stuttgart, Strasbourg, and Tamanrasset), 22h. (Bogota, Tacubaya, Tucson, Boulder City, Pierce Ferry, and College), 23h. (near Tiflis).

Feb. 26d. 0h. 6m. 22s. Epicentre 34°·6N. 119°·1W.

Intensity VI at Montalvo, Oxnard, Santa Paula, Ventura, etc.; V at Santa Barbara, Somis, Summerland, etc. Macroseismic area, 2500 sq. miles.  
 Epicentre 34°37'N. 119°05'W.

L. M. Murphy and F. P. Ulrich.

United States earthquakes, 1950, Serial No. 755, Washington, 1952, p. 8.

A = -·4012, B = -·7208, C = +·5652;  $\delta = -3$ ;  $h = 0$ ;  
 D = -·874, E = +·486; G = -·275, H = -·494, K = -·825.

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Santa Barbara	0·5	252	i 0 12 <sub>a</sub>	- 2	i 0 20	- 3	—	—	—
Mount Wilson	0·9	114	i 0 19 <sub>k</sub>	- 1	—	—	—	—	—
Pasadena	0·9	119	i 0 18 <sub>k</sub>	- 2	i 0 30	- 4	—	—	—
China Lake	z.	1·7	45 i 0 35	P <sub>r</sub>	—	—	—	—	—
Haiwee	1·8	31	i 0 37	P <sub>r</sub>	—	—	—	—	—
Fresno	2·2	346	i 0 41 <sub>a</sub>	P*	i 1 12	S <sub>r</sub>	—	—	—
Lick	3·4	324	i 0 57 <sub>a</sub>	+ 2	i 1 47	S*	—	—	—
Santa Clara	3·6	320	e 1 20	P <sub>r</sub>	e 1 56	S*	e 2 0	S <sub>r</sub>	—
Boulder City	3·7	67	c 1 3	+ 3	—	—	i 1 18	P <sub>r</sub>	i 2·2
Berkeley	4·1	323	i 1 7 <sub>k</sub>	+ 2	i 2 0	+ 5	e 1 18	P <sub>r</sub>	—
Overton	z.	4·3	61 i 1 11	+ 3	—	—	i 1 16	P <sub>r</sub>	—
Pierce Ferry	4·4	69	i 1 11	+ 1	i 1 59	- 3	i 1 27	P <sub>r</sub>	—
Reno	z.	5·0	353 e 1 22	+ 4	—	—	—	—	—
Ukiah	5·6	325	e 2 0	P <sub>r</sub>	—	—	—	—	e 3·3
Mineral	z.	6·1	342 i 1 37	+ 3	—	—	—	—	—
Shasta Dam	6·6	338	e 1 45	+ 4	e 3 0	+ 2	—	—	e 3·9
Tucson	7·3	107	e 1 49	- 1	e 3 20	+ 5	e 2 21	P <sub>r</sub>	e 3·7
Salt Lake City	8·4	41	e 3 14?	?	—	—	—	—	e 4·4
Logan	9·2	36	e 2 23	?	—	—	—	—	e 5·1
Hungry Horse	14·3	14	e 3 32	+ 6	—	—	—	—	e 7·7
Rapid City	E.	15·5	48 i 3 58	PP	—	—	—	—	e 9·0

Additional readings:—

Santa Clara eSEN = 2m.12s.  
 Berkeley iZ = 1m.14s., eP<sub>r</sub>?Z = 1m.29s., iEN = 2m.31s.  
 Tucson e = 1m.59s. and 2m.16s., iS? = 3m.3s.  
 Long waves were also recorded at Bozeman, Butte, and Saskatoon.

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Feb. 26d. 3h. 35m. 48s. Epicentre 28°·0N. 90°·5E. (as on 1940, Aug. 2d.).

$$A = -.0077, B = +.8843, C = +.4670; \quad \delta = +13; \quad h = +2;$$

$$D = +1.000, E = +.009; \quad G = -.004, H = +.467, K = -.884.$$

		$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L. m.	
				m.	s.	s.	m.	s.	m.	s.			
Calcutta	E.	6.0	201	i 1	31	- 1	2	45	+ 2				
New Delhi		11.7	276	e 2	56	+ 5	i 5	4	0	5	32	SSS	i 6.0
Hyderabad	N.	15.3	229	e 4	31	+52	9	3	?				
Przhevalsk		17.5	330	e 4	12	+ 5							
Naryn		17.9	322	e 4	17	+ 5	i 7	49	SS				
Poona	N.	17.9	243	e 4	8	- 4	i 7	17	-13	i 7	47	SS	8.2
Bombay		18.6	245	e 4	21	0	e 7	36	-10				8.5
Almata		18.8	329	i 4	28	+ 5							
Andijan		19.6	315	4	37	+ 5	8	24	+16				
Fergana		19.8	315	i 4	38	+ 3	e 8	32	+19				
Garm		20.0	310	4	41?	+ 4	8	28?	+11				
Obi-garm		20.3	308	i 4	43	+ 3							
Stalinabad		20.9	307	i 4	50	+ 4	i 8	48	+13				
Kodaikanal	E.	21.5	219	e 4	42	-10							
Tashkent		21.9	313	i 4	58	+ 1	i 9	5	+11				
Tchimkent		22.2	316	e 5	3	+ 3	9	13	+13				
Samarkand		22.7	307	e 5	8	+ 4							
Semipalatinsk		23.7	345	i 5	14	0							
Mary		25.8	300	5	42	+ 8							
Irkutsk		26.7	19	e 5	39	- 4							
Sverdlovsk		35.7	322	e 7	2	0							
Vladivostok		36.5	55	e 6	7?	-62							
Tiflis		39.5	303	e 7	42	+ 8	e 13	46	+ 9				
Moscow		46.6	322	e 8	33	+ 1	e 15	23	+ 2				
Ksara		46.7	291				e 16	31	?				
Jena	N.	62.0	316	e 10	23	- 1				e 10	53	P <sub>c</sub> P	
Stuttgart	Z.	64.0	314	e 10	36	- 2							
Tamanrasset	Z.	75.4	289	e 11	45	- 2				i 14	33	PP	
College		77.1	22	i 11	50	- 7				e 14	40	PP	
Pretoria	Z.	80.3	235	i 12	8	- 6							
Hungry Horse		100.9	17	e 13	47	- 5							

Additional readings:—

Calcutta iSE = 2m.30s.

New Delhi iN = 5m.16s.

Poona iSSSN = 7m.54s.

Tamanrasset iZ = 11m.50s

Feb. 26d. 11h. 40m. 55s. Epicentre 46°·6N. 7°·4E.

Felt in the upper valley of the Simme, intensity IV at Boltingen.

Dr. E. Wanner.

Jahresbericht des Erdbebendienstes der Schweiz im Jahre, 1950, Zürich, 1951, p. 2, with macroseismic chart.

$$A = +.6838, B = +.0888, C = +.7243; \quad \delta = +8; \quad h = -4;$$

$$D = +.129, E = -.992; \quad G = +.718, H = +.093, K = -.690.$$

		$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		
				m.	s.	s.	m.	s.	m.	s.		
Neuchatel		0.5	323	e 0	10	P <sub>r</sub>	e 0	17	S <sub>r</sub>			
Basle		0.9	8	e 0	19	- 1	e 0	32	- 2			
Zürich		1.1	46	e 0	20	- 2	e 0	36	- 3			
Besançon		1.2	304	e 0	22	- 2	e 0	44	+ 3	e 0	28	P <sub>r</sub>
Chur		1.5	73	e 0	28	0	e 0	50	+ 1			
Ravensburg		1.9	51	e 0	36	+ 2	e 0	58	- 1	e 0	39	P <sub>r</sub>
Strasbourg		2.0	7	e 0	39 <sup>k</sup>	P <sub>r</sub>						
Stuttgart		2.5	30	e 0	38	- 5	e 1	17	+ 3	e 0	47	P <sub>r</sub>
Clermont-Ferrand		3.1	256	e 1	7	P <sub>r</sub>	e 1	59	?			
Paris		4.0	306	e 1	18	P <sub>r</sub>	e 2	12	S <sub>r</sub>			
Prague		5.8	51	e 1	35	P <sub>r</sub>	e 2	38	0	e 2	56	S*

Additional readings:—

Ravensburg eS\* = 1m.1s.

Strasbourg i = 46s., 48s., 1m.13s., 1m.15s., 1m.25s., and 1m.33s.

Stuttgart eS\*? = 1m.21s., eS<sub>r</sub>Z = 1m.25s.

Prague eP<sub>r</sub> = 1m.49s., eS<sub>r</sub> = 2m.58s.

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Feb. 26d. 21h. 1m. 13s. Epicentre 30°·8S. 71°·5W. (as on 1943, Dec. 14d.).

Intensity IV between 28° and 29°S.  
Epicentre 30°·5S. 71°·5W. (Strasbourg). Depth 100km. ?

F. Greve.  
Boletin del año, 1950, Instituto sismologico, Santiago, 1951, p. 3.

A = +·2730, B = -·8160, C = -·5095;  $\delta = -2$ ;  $h = +2$ ;  
D = -·948, E = -·317; G = -·162, H = +·483, K = -·861.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	E.	12·1	114	2 58	+ 1	4 33	-41	—	5·3
	N.	12·1	114	—	—	4 9	-65	—	5·2
	Z.	12·1	114	3 11	PPP	5 11	- 3	—	5·9
La Paz		14·6	13	e 3 30	0	i 6 29	SS	—	i 7·4
	Tucson	72·9	326	e 11 30	- 3	—	—	—	—
Ottawa		75·9	358	e 11 48	- 2	—	—	e 12 7	P <sub>c</sub> P
Palomar	z.	76·9	323	e 11 56	0	—	—	—	—
Pierce Ferry		77·6	327	e 12 0	0	—	—	i 12 15	P <sub>c</sub> P
Riverside	z.	77·6	323	e 11 59	- 1	—	—	e 12 14	P <sub>c</sub> P
Overton	z.	78·1	326	e 12 49	+47	—	—	—	—
China Lake	z.	79·2	325	i 12 8	0	—	—	—	—
Grahamstown		79·8	123	e 12 12	0	—	—	—	—
Tinemaha	z.	80·5	324	e 12 14	- 1	—	—	e 12 29	P <sub>c</sub> P
Pietermaritzburg	z.	84·5	121	i 12 38	+ 2	—	—	—	—
Pretoria	z.	84·9	117	i 12 38	0	—	—	—	—
Shasta Dam		85·3	324	e 12 39	- 1	—	—	—	—
Hungry Horse		87·5	334	i 12 50	- 1	—	—	—	—
Tamanrasset	z.	91·0	64	e 13 7	0	—	—	—	—

Tamanrasset gives also eZ = 13m.28s. and 14m.22s.

Feb. 26d. 22h. 1m. 59s. Epicentre 41°·5N. 52°·0E.

A = +·4625, B = +·5920, C = +·6601;  $\delta = +10$ ;  $h = -2$ ;  
D = +·788, E = -·616; G = +·406, H = +·520, K = -·751.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Baku		1·9	235	—	—	e 1 1	+ 2	—	—
Kizyl-Arvat		4·1	125	e 1 17	- 4	i 1 44?	-11	—	—
Grozny		5·0	294	e 1 29	P*	i 2 29	S*	—	—
Tiflis		5·4	275	e 1 26	+ 2	i 2 24	- 4	—	—
Ashkabad		6·0	124	1 30	- 2	2 33	-10	—	—
Leninakan		6·2	266	3 7	S*	—	—	—	—
Piatigorsk		7·1	294	e 1 51	+ 3	3 8	- 2	—	—
Mary		8·6	114	3 44	S	(3 44)	- 4	—	—
Samarkand		11·5	94	e 2 47	- 1	—	—	—	—
Tashkent		13·0	85	e 3 12?	+ 3	—	—	—	—
Tchimkent		13·1	81	e 3 11	+ 1	—	—	—	—
Stalinabad		13·2	97	e 3 13	+ 2	i 5 37	- 3	—	—
Obi-garm		13·8	96	—	—	i 5 50	- 4	—	—
Ksara		14·9	244	e 1 10	?	—	—	—	—
Fergana		15·0	88	e 3 34	- 1	—	—	—	—
Andijan		15·4	85	3 34	- 6	e 6 22	-10	—	—
Sverdlovsk		16·3	17	—	—	6 57	+ 4	—	—
Frunse		16·8	78	e 4 1	+ 3	—	—	—	—
Moscow		17·1	332	4 6	+ 4	7 16	+ 4	—	—
Stuttgart		30·7	299	e 6 19	0	—	—	—	—
Karlsruhe	z.	31·2	300	e 6 17	- 6	—	—	—	—
Tamanrasset	z.	43·0	260	e 8 0	- 3	—	—	i 8 13	?
College		72·8	10	i 11 34	+ 2	—	—	e 14 21	PP
Hungry Horse		89·7	351	i 13 2	+ 1	—	—	—	—

College gives also i = 11m.47s., e = 12m.4s.

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Feb. 26d. Readings also at 1h. (College (2), Hungry Horse (2), Shasta Dam, China Lake, Boulder City, Pierce Ferry (2), and near Apia (2)), 2h. (Tacubaya, Tucson, Boulder City, Pierce Ferry, Palomar, China Lake, College (2), Samarkand, near Obi-garm, Stalinabad, and Andijan), 5h. (near Istanbul), 6h. (Leninakan, Erevan, Tiflis, Piatigorsk, Ksara, and near Istanbul (2)), 7h. (Collmberg), 8h. (near Andijan), 9h. (Tacubaya, Tucson, Boulder City, Overton, Pierce Ferry, Mount Wilson, Palomar, China Lake, Tinemaha, Hungry Horse, Shasta Dam, Mineral, College, and near Andijan), 11h. (Stuttgart), 12h. (Overton, Tucson, and near Obi-garm), 14h. (near Mizusawa), 15h. (near Przhevalsk), 16h. (near Andijan), 18h. (Samarkand, near Obi-garm, Stalinabad, Andijan, Garm, and near Ashkabad), 20h. (near Mizusawa).

Feb. 27d. Readings at 1h. (Bogota), 3h. (Mineral, Ashkabad, Grozny, Tiflis, Helwan, Ksara, Samarkand, Tashkent, Stalinabad (2), near Andijan, Fergana, Garm, and Obi-garm), 4h. (Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Pierce Ferry, Mineral, College, Logan, Ottawa, Harvard, San Juan, Tamanrasset, Andijan, Fergana, Tchinkent, Ashkabad, and near Stalinabad), 6h. (near Andijan and Obi-garm), 7h. (Reykjavik), 11h. (Hungry Horse, College, Tamanrasset, Jena, Prague, Strasbourg, Stuttgart, Basle, Chur, Zürich, and Taranto), 12h. (Overton and near Athens), 13h. (La Paz, Tucson, Pierce Ferry, Shasta Dam, and Hungry Horse), 14h. (near Przhevalsk, near Garm, Obi-garm, and Stalinabad), 17h. (Alicante), 21h. (Istanbul, Ashkabad, near Garm, and Obi-garm), 22h. (Pretoria and near Obi-garm), 23h. (College).

Feb. 28d. 7h. Two confused shocks.

New Delhi (I) ePE = 31m.41s., eSN = 33m.10s., eN = 33m.21s.; (II) eP?N = 36m.33s., iN = 37m.10s. and 37m.34s., iSEN = 38m.0s., iN = 38m.13s.

Obi-garm eP = 31m.52s.

Stalinabad iP = 31m.54s., iS = 34m.57s.

Garm eP = 31m.59s.

Samarkand eP = 32m.10s.

Fergana eP = 32m.26s.?

Andijan eP = 32m.32s.?

Tiflis eP = 34m.30s., iS = 39m.35s.

Bombay (I) eE = 36m.4s., ePN = 36m.23s., eSE = 41m.0s., LN = 43m.34s.

Poona ePEN = 36m.9s., iPPN = 36m.30s., PPPEN = 36m.46s., iSEN = 40m.6s., SSE = 40m.30s., iSSN = 40m.49s., REN = 41m.19s.

Kizyl-Arvat eS = 37m.8s.

Hyderabad (II) PEN = 37m.58s., SN = 43m.1s., SSN = 44m.37s.

Sverdlovsk eS = 40m.18s.?

Ksara eP? = 40m.53s., eS = 46m.36s.?

Kodaikanal (II) eE = 41m.0s.

Jena eE = 43m.5s., eN = 42m.51s.

Stuttgart eZ = 43m.16s. and 43m.28s.

Collmberg eZ = 43m.34s.

Tamanrasset iZ = 44m.13s. a.

Colombo (II) PE = 44m.20s., SE = 48m.25s., LE = 55m.

College iP = 46m.51s., e = 49m.59s.

Istanbul e = 49m.30s.

Hungry Horse eP = 51m.43s.

Kew e = 60m.

Long waves also recorded at Copenhagen and Upsala.

Feb. 28d. 10h. 20m. 55s. Epicentre 46°·0N. 143°·8E. Depth of focus 0·040.

Intensity VI at Kusiro, Urakawa, and Aomori; V at Akita, Mizusawa, Sapporo, Nemuro, Muroran, Mori, Hatinohé, Miyako, Morioka, and Sendai; IV at Wakkanai, Sakata, Isinomaki, Hukusima, Onahama, Tyosi, Osima, and Aijiro, II-III at Abashiri, Yamagata, Aikawa, Shirakawa, Utunomiya, Kakioka, Oiwake, Tokyo, Yokohama, Kohu, Toyooka, and Hikone.

Epicentre as adopted. Depth 320km. Macroseismic radius >300km.

Seismo. Bull. Cent. Met. Obs., Japan, 1950, Tokyo, 1952, pp. 11, 12, with macroseismic chart.

A = -·5625, B = +·4117, C = +·7170;  $\delta = -1$ ;  $h = -4$ ;  
D = +·591, E = +·807; G = -·579, H = +·423, K = -·697.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Yuzno-Sakhlinsk	1·2	322	1 0 45	+ 5	—	—	—	—
Nemuro	3·0	155	0 59	+ 4	1 36	- 2	—	—
Sapporo	3·4	211	1 1 4 <sub>a</sub>	+ 5	e 1 58	+12	14 37	S <sub>c</sub> S
Mori	4·5	212	1 17 <sub>k</sub>	+ 5	—	—	—	—
Aomori	5·6	206	1 26 <sub>a</sub>	+ 1	—	—	—	—

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	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Hatinohe	5.7	197	1 28 <sub>a</sub>	+ 2	2 32	- 1	—	—
Miyako	6.5	192	1 35 <sub>a</sub>	- 1	3 8	+17	—	—
Morioka	6.6	198	1 37 <sub>a</sub>	0	2 51	- 2	—	—
Akita	6.8	205	1 41	+ 2	2 57	0	—	—
Mizusawa	7.1	197	i 1 44	+ 1	3 2	- 2	—	—
Sendai	8.0	196	i 1 54	0	i 3 27	+ 3	14 34	ScS
Hokusima	8.6	198	2 2 <sub>a</sub>	0	3 39	+ 2	—	—
Aikawa	9.0	209	2 6 <sub>a</sub>	- 1	3 46	0	—	—
Vladivostok	9.0	255	i 2 6	- 1	—	—	—	—
Onahama	9.3	194	2 19 <sub>a</sub>	+ 9	4 6	+13	—	—
Mito	9.9	196	2 18 <sub>a</sub>	0	4 7	+ 1	—	—
Utunomiya	9.9	199	2 17 <sub>a</sub>	- 1	4 7	+ 1	—	—
Wazima	10.0	213	2 19 <sub>a</sub>	0	4 10	+ 1	—	—
Kakioka	10.1	197	2 19 <sub>a</sub>	- 1	4 14	+ 3	—	—
Maebasi	10.2	202	2 21	- 1	4 21	+ 8	—	—
Nagano	10.2	206	2 22 <sub>a</sub>	0	4 23	+10	—	—
Tukubasan	10.2	197	2 21 <sub>a</sub>	- 1	4 17	+ 4	—	—
Matusiro	10.3	206	2 23 <sub>a</sub>	0	4 12	- 3	—	—
Kumagaya	10.4	200	2 23 <sub>a</sub>	- 1	4 21	+ 3	—	—
Toyama	10.5	210	2 26	+ 1	3 38	-42	—	—
Tokyo	10.8	198	i 2 28 <sub>a</sub>	- 1	4 32	+ 6	—	—
Yokohama	11.0	198	2 32 <sub>a</sub>	+ 1	4 33	+ 2	—	—
Hunatu	11.2	202	2 32 <sub>a</sub>	- 2	4 38	+ 2	—	—
Mera	11.5	197	2 36 <sub>a</sub>	- 2	4 9	-33	—	—
Misima	11.5	200	2 36 <sub>a</sub>	- 2	4 46	+ 4	—	—
Osima	11.7	198	2 38 <sub>a</sub>	- 2	4 55	+ 8	—	—
Shizuoka	11.8	202	2 40 <sub>a</sub>	- 1	4 56	+ 7	—	—
Gihu	11.9	209	2 41 <sub>a</sub>	- 2	4 50	- 1	—	—
Nagoya	12.0	208	i 2 51 <sub>a</sub>	+ 7	5 4	+11	14 51	ScS
Hikone	12.1	211	2 48 <sub>a</sub>	+ 3	5 0	+ 4	—	—
Omaesaki	12.2	202	2 39 <sub>a</sub>	- 7	4 48	-10	—	—
Kameyama	12.5	209	2 49 <sub>a</sub>	- 1	5 5	+ 1	—	—
Kyoto	12.6	211	2 50 <sub>a</sub>	- 1	5 3	- 4	—	—
Kobe	13.0	213	2 56	0	5 19	+ 4	—	—
Osaka	13.0	212	i 2 55 <sub>a</sub>	- 1	5 22	+ 7	e 15 15	ScS
Owase	13.3	209	2 57 <sub>a</sub>	- 3	5 22	0	—	—
Sumoto	13.5	213	3 1 <sub>a</sub>	- 1	5 34	+ 8	—	—
Siomisaki	14.0	209	3 7 <sub>a</sub>	- 1	5 37	0	—	—
Hamada	14.2	223	3 10 <sub>a</sub>	0	5 45	+ 3	—	—
Hirosima	14.5	221	3 15	+ 1	i 5 52	+ 4	—	—
Kōti	14.7	216	3 15 <sub>a</sub>	- 1	5 53	0	—	—
Muroto	14.7	213	3 15	- 1	5 43	-10	—	—
Klyuchi	14.8	40	i 3 18	0	i 6 4	+ 9	—	—
Matuyama	14.8	219	3 17 <sub>a</sub>	- 1	5 57	+ 2	—	—
Simidu	15.6	216	3 18 <sub>a</sub>	- 9	6 7	- 5	—	—
Ooita	15.8	220	3 34 <sub>a</sub>	+ 5	6 31	+15	—	—
Hukuoka	16.1	224	i 3 31 <sub>a</sub>	- 1	6 18	- 5	—	—
Kumamoto	16.6	222	3 36 <sub>a</sub>	- 2	6 45	+13	—	—
Unzendake	16.9	223	3 14	-27	—	—	—	—
Miyazaki	17.0	218	3 42 <sub>a</sub>	0	6 47	+ 7	—	—
Nagasaki	17.0	224	3 15	-27	6 22	-18	—	—
Kagosima	17.7	220	3 48	- 1	7 1	+ 7	—	—
Zi-ka-wei	22.8	237	i 4 53	+14	i 8 54	+30	—	—
Nanking	23.8	244	i 4 48	- 1	i 8 49	+ 8	i 5 52	pP
Irkutsk	26.3	299	i 5 8	- 3	i 9 15	- 7	—	—
College	40.7	37	i 7 10	- 4	i 12 52	-11	e 9 17	PcP e 17.3
Semipalatinsk	41.4	301	i 7 12	- 8	i 13 0	-13	—	—
Przhevalsk	45.8	290	i 7 54	- 1	i 14 12	- 4	—	—
Almata	46.4	293	i 7 58	- 2	i 14 23	- 2	—	—
Naryn	47.9	292	i 8 10	- 1	—	—	—	—
Frunse	48.1	293	i 8 11	- 2	i 14 47	- 2	—	—
Sitka	48.4	64	i 8 17	+ 2	i 14 55	+ 2	e 10 17	pP e 21.6
Sverdlovsk	49.9	315	i 8 25	- 1	i 15 11	- 2	i 9 35	pP
Andijan	50.6	292	i 8 31	- 1	i 15 20	- 3	—	—
Fergana	51.2	292	i 8 34	- 2	i 15 25	- 6	—	—

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
	$\circ$	$\circ$	m. s.	s.	m. s.	s.	m. s.	m.	
Tashkent	52.3	294	i 8 43	- 1	i 15 39	- 7	e 10 39	PP	—
Dehra Dun	52.6	277	e 9 38	pP	e 16 14	+24	18 47	S <sub>c</sub> S	—
Garm	52.9	292	8 46	- 3	—	—	—	—	—
Honolulu	53.2	97	i 8 49	- 2	e 15 58	0	e 9 50	pP	i 21.8
Obi-garm	53.4	291	i 8 51	- 1	i 15 55	- 6	—	—	—
Stalinabad	54.1	292	i 8 54	- 3	i 16 2	- 8	—	—	—
New Delhi	54.2	276	i 8 55 <sub>a</sub>	- 3	i 16 2	-10	10 12	P <sub>c</sub> P	22.9
Samarkand	54.6	294	i 8 58	- 3	i 16 9	- 8	—	—	—
Mary	59.1	294	i 9 31	- 1	i 17 12	- 4	—	—	—
Victoria	59.1	51	i 9 33 <sub>a</sub>	+ 1	i 17 22	+ 6	e 10 21	P <sub>c</sub> P	25.5
Seattle	60.2	51	i 9 42 <sub>a</sub>	+ 2	i 17 36	+ 6	i 10 45	pP	—
Hyderabad	60.6	265	i 9 37	- 6	i 17 24	-11	10 49	P <sub>c</sub> P	—
Ashkabad	61.1	297	i 9 46	0	—	—	—	—	—
Moscow	61.2	322	9 43	- 4	17 34	- 8	—	—	—
Pulkovo	61.4	329	9 47	- 1	i 17 41	- 4	i 10 58	pP	—
Djakarta	61.5	223	i 9 47	- 2	i 17 38	- 8	i 11 4	pP	—
Bandong	61.8	222	i 9 51	+ 1	i 17 48	- 2	i 11 11	pP	—
Kizyl-Arvat	61.8	298	i 9 49	- 1	i 17 45	- 5	—	—	—
Poona	63.0	269	i 9 59	+ 1	i 18 0	- 5	i 11 11	pP	—
Helsinki	63.1	332	i 9 58 <sub>a</sub>	- 1	i 17 58	- 8	i 11 2	pP	—
Scoresby Sund	63.4	356	i 9 59	- 2	i 18 5	- 5	10 54	pP	—
Bombay	63.5	271	i 10 1	- 1	i 18 12	+ 1	i 11 13	pP	27.3
Ferndale	63.5	58	i 10 8	+ 6	i 18 18	+ 7	—	—	e 27.2
Hungry Horse	64.1	46	i 10 7	+ 1	i 18 20	+ 2	e 37 44	P'P'	—
Shasta Dam	64.5	57	i 10 9	+ 1	i 18 25	+ 2	i 11 31	pP	e 25.7
Baku	64.8	303	10 13	+ 3	—	—	—	—	—
Ukiah	65.0	59	i 10 11	0	i 18 31	+ 2	e 12 35	PP	e 27.4
Saskatoon	65.1	40	10 14	+ 2	18 32	+ 2	—	—	—
Grozny	65.2	308	i 10 11	- 1	i 18 27	- 5	—	—	—
Mineral	65.2	57	i 10 12	0	e 18 32	0	i 12 41	PP	e 27.7
Upsala	65.7	334	i 10 13 <sub>a</sub>	- 3	i 18 28	-10	i 11 29	pP	e 33.1
Piatigorsk	66.2	310	i 10 21	+ 2	i 18 43	- 1	—	—	—
Kodaikanal	66.3	261	i 10 22	+ 3	i 18 47	+ 2	12 25	PP	27.7
Berkeley	66.4	59	i 10 20 <sub>a</sub>	0	i 18 48	+ 2	e 12 37	PP	e 28.2
Butte	66.4	47	i 10 20	0	i 18 46	0	e 11 46	pP	e 28.0
Reno	66.8	57	i 10 24 <sub>a</sub>	+ 1	i 18 53	+ 2	i 12 49	PP	e 27.6
Tiflis	66.8	307	i 10 22	- 1	i 18 46	- 5	—	—	—
Santa Clara	66.9	59	i 10 25 <sub>k</sub>	+ 2	i 18 54	+ 2	—	—	e 31.6
Lick	67.1	59	i 10 25 <sub>a</sub>	+ 1	e 18 53	- 1	i 11 43	pP	—
Colombo	67.1	256	10 15	- 9	(18 50)	- 4	21 5	SS	43.1
Bozeman	67.5	47	i 10 25	- 2	e 18 51	- 8	e 11 32	pP	e 28.6
Erevan	68.0	305	e 10 30	0	—	—	—	—	—
Leninakan	68.0	307	i 10 39	+ 9	19 13	+ 8	—	—	—
Sotchi	68.3	311	—	—	19 2	- 6	—	—	—
Fresno	68.6	59	i 10 34 <sub>a</sub>	0	e 19 15	+ 3	e 38 33	P'P'	—
Bergen	68.7	340	i 10 34	0	i 19 7	- 6	i 11 50	pP	33.5
Tinemaha	69.3	58	i 10 38 <sub>a</sub>	0	i 19 23	+ 3	e 38 19	P'P'	—
Reykjavik	69.6	354	(i 10 44)	+ 4	i 19 26	+ 2	i 12 3	pP	28.6
Haiwee	70.1	58	i 10 43 <sub>a</sub>	0	—	—	—	—	—
Santa Barbara	70.2	61	i 10 44 <sub>a</sub>	0	—	—	—	—	—
Salt Lake City	70.4	52	i 10 48	+ 3	i 19 38	+ 5	i 12 4	pP	e 29.2
Lund	70.5	334	10 45	0	i 19 27	- 7	—	—	—
Warsaw	70.5	327	10 52 <sub>a</sub>	+ 7	19 28	- 6	12 45	pP	e 33.1
China Lake	70.6	58	i 10 46 <sub>a</sub>	0	i 19 37	+ 2	i 13 47	PP	—
Yalta	70.6	315	i 10 43	- 3	—	—	i 11 59	pP	—
Copenhagen	70.7	334	10 45 <sub>a</sub>	- 1	i 19 30	- 6	i 12 5	pP	—
Pasadena	71.3	60	i 10 51 <sub>a</sub>	+ 1	i 19 42	- 1	i 12 8	pP	i 29.3
Apia	71.7	135	e 10 53	+ 1	e 19 48	0	e 13 35	PP	—
Overton	71.9	56	i 10 55	+ 1	i 19 50	0	i 21 53	sS	—
Riverside	71.9	60	i 10 53 <sub>a</sub>	- 1	i 19 49	- 1	i 12 12	pP	—
Boulder City	72.1	57	i 10 56	+ 1	i 19 51	- 1	i 12 10	pP	—
Pierce Ferry	72.4	56	i 12 41	sP	i 19 57	+ 1	i 13 58	PP	—
Rapid City	72.5	44	i 10 59	+ 2	i 19 58	+ 1	—	—	i 30.2
Palomar	72.7	60	i 10 58	0	i 19 55	- 4	i 37 37	P'P'	—
Ivigut	72.7	7	i 10 55	- 3	i 19 55	- 4	i 12 53	sP	27.1

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Skalnate Pleso	73.2	326	e 10	56	- 5	i 19	58	- 7	e 12	15	pP	—
Aberdeen	73.3	342	i 11	3	+ 1	i 20	0	- 6	i 12	25	pP	33.0
Potsdam	73.3	332	i 11	0 <sub>a</sub>	- 2	i 19	59	- 7	i 13	37	PP	29.1
Raciborz	73.3	327	i 11	2	0	e 19	59	- 7	11	10	P <sub>c</sub> P	—
Brisbane	73.6	172	i 11	1 <sub>k</sub>	- 3	i 20	8	- 1	i 12	24	pP	—
Collenberg	74.2	330	i 11	4 <sub>k</sub>	- 3	i 20	8	- 8	i 12	21	pP	e 29.1
Bucharest	74.5	319	i 11	14	+ 5	i 20	15	- 4	i 20	39	PS	31.1
Edinburgh	E. 74.7	342	e 11	7	- 3	20	21	0	12	36	pP	—
Prague	74.7	330	i 11	8 <sub>a</sub>	- 2	e 20	14	- 7	i 12	28	pP	—
Jena	75.0	331	i 11	10	- 2	i 20	17	- 7	i 12	33	pP	e 30.4
Budapest	N. 75.1	325	11	13	+ 1	20	20	- 6	12	15	pP	31.1
Ogyalla	75.1	326	e 11	13	+ 1	e 20	19	- 7	e 12	34	pP	—
Durham	N. 75.4	340	i 11	16	+ 2	i 20	26	- 3	i 14	11	PP	—
Cheb	75.5	331	i 11	13	- 1	e 20	21	- 9	i 12	38	pP	—
Vienna	75.5	327	i 11	14	0	i 20	30	0	e 14	12	PP	—
Istanbul	75.6	315	e 11	14	- 1	e 20	28	- 3	—	—	—	—
Kalossa	75.9	325	11	18	+ 1	20	34	0	12	18	pP	e 30.6
De Bilt	76.0	336	i 11	16 <sub>a</sub>	- 1	i 20	30	- 5	i 12	30	pP	e 36.1
Tucson	77.0	57	i 11	23	0	i 20	49	+ 3	i 12	39	pP	e 31.2
Ksara	77.4	306	i 11	24 <sub>k</sub>	- 1	20	47	- 3	12	42	pP	—
Karlsruhe	77.7	333	i 11	28	+ 1	i 20	49	- 4	i 12	43	pP	e 21.1
Stuttgart	77.7	331	i 11	25 <sub>a</sub>	- 2	i 20	46	- 7	i 12	36	pP	e 30.1
Zagreb	77.7	326	i 11	25	- 2	i 20	47	- 6	e 12	50	pP	—
Rathfarnham Castle	77.8	342	i 11	26	- 1	e 20	53	- 1	i 14	29	PP	31.8
Kew	78.1	338	i 11	24	- 5	i 20	53	- 5	e 14	21	PP	e 31.1
Lincoln	E. 78.1	43	i 11	30	+ 1	i 20	52	- 6	i 14	34	PP	e 33.3
Strasbourg	78.3	333	i 11	29	- 1	i 20	50	-10	i 12	46	pP	1 31.7
Triest	78.7	327	i 11	28	- 4	i 20	55	- 9	i 12	45	pP	—
Zürich	79.1	332	e 11	31 <sub>a</sub>	- 3	e 21	2	- 6	—	—	—	—
Chur	79.2	330	e 11	33 <sub>a</sub>	- 2	e 21	2	- 7	—	—	—	—
Basle	79.3	332	e 11	33	- 2	e 21	4	- 6	—	—	—	—
Paris	79.7	336	e 11	36	- 1	i 21	9	- 5	i 13	0	pP	e 38.1
Riverview	79.7	174	i 11	38 <sub>k</sub>	+ 1	i 21	18	+ 4	i 12	59	pP	e 33.0
Salo	79.9	329	i 11	39 <sub>a</sub>	+ 1	i 21	10	- 6	i 14	15	PP	—
Neuchatel	79.9	332	i 11	38	0	e 21	12	- 4	—	—	—	—
Besançon	80.0	333	i 11	35	- 4	—	—	—	—	—	—	—
Padova	80.4	327	11	42	+ 1	i 21	9	-13	13	1	pP	—
Athens	80.6	316	e 11	42	0	i 21	18	- 6	i 12	59	pP	—
Bologna	80.6	327	i 11	43 <sub>a</sub>	+ 1	i 21	32	+ 8	e 13	2	pP	—
La Cave	80.7	28	11	42 <sub>a</sub>	- 1	i 21	20	- 5	—	—	—	—
Pavia	z. 80.8	330	i 11	42	- 1	i 21	24	- 2	e 13	6	pP	—
Lubbock	81.1	50	11	46	+ 1	21	33	+ 4	—	—	—	—
Florence Arc.	81.2	327	i 11	42 <sub>a</sub>	- 3	i 21	23	- 7	i 13	0	pP	—
Florence Xim.	81.2	327	e 11	43	- 2	i 21	25	- 5	—	—	—	—
Prato	81.2	327	i 11	44	- 1	i 21	25	- 5	—	—	—	—
Rolphton	81.2	29	e 11	40 <sub>a</sub>	- 5	i 21	24	- 6	—	—	—	—
Chicago	81.3	37	i 11	46	0	i 21	18	-13	i 13	13	pP	e 31.3
Taranto	81.6	321	11	49	+ 2	21	29	- 5	e 13	29	pP	—
Clermont-Ferrand	82.3	334	i 11	50	- 1	i 21	36	- 5	i 13	9	pP	33.1
Rome	82.3	326	e 11	49 <sub>a</sub>	- 2	i 21	34	- 7	e 13	8	pP	—
Seven Falls	E. 82.4	23	11	50	- 1	21	39	- 3	12	58	pP	i 32.6
Shawinigan Falls	N. 82.4	24	i 11	54 <sub>a</sub>	+ 3	e 21	30	-12	e 13	11	pP	—
Ann Arbor	82.5	34	i 11	51	- 1	i 21	39	- 4	i 15	11	PP	—
Ottawa	82.5	27	i 11	50 <sub>a</sub>	- 2	i 21	37	- 6	12	43	pP	—
Florissant	82.6	40	i 11	52	0	i 21	40	- 4	i 14	56	PP	—
St. Louis	82.8	40	i 11	52	- 1	i 21	42	- 4	i 13	13	pP	—
Helwan	82.9	306	i 11	52 <sub>a</sub>	- 2	21	40	- 7	i 13	7	pP	—
Cleveland	84.0	33	e 11	59 <sub>a</sub>	0	i 21	48	-10	i 13	28	pP	—
Messina	84.2	322	e 11	58 <sub>k</sub>	- 2	i 21	51	- 9	e 13	24	pP	—
Cincinnati	84.9	36	i 12	3	- 1	i 21	54	-12	i 13	24	pP	—
Little Rock	85.0	44	i 12	4	0	i 21	56	[- 2]	i 15	35	PP	—
New Kensington	E. 85.5	32	i 12	6	- 1	i 21	59	[- 2]	i 23	9	PS	e 33.6
Pittsburgh	85.5	32	i 12	8	+ 1	i 22	1	[ 0]	i 13	26	pP	—
Bagnères	85.6	335	e 12	7	0	e 22	9	- 4	—	—	—	—
Pennsylvania	85.9	31	i 12	8	- 1	i 22	4	[ 0]	e 13	22	pP	—

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		$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.						
		$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.						
Harvard		86.4	26	i	12	11	0	i	22	7	[ 0]	i	13	34	pP	e	41.1	
Halifax		86.5	19		12	11	- 1		22	5	[- 3]		23	13	PS			
Barcelona		86.5	333	i	12	16	+ 4	i	22	19	- 3	i	17	31	PPP	e	28.0	
Weston		86.6	26	i	12	13	+ 1	i	22	5	[- 4]	i	13	41	pP			
Hartford		86.8	27	i	12	2	-11											
Auckland	N.	87.1	155	i	12	15	0	i	22	26	+ 9	i	13	39	pP			
City College, N.Y.		87.2	28	i	12	13	- 2	i	22	25	- 3	i	13	33	pP	e	35.9	
Fordham		87.2	28	i	12	13	- 2	i	22	11	[- 2]	i	13	41	pP		35.4	
Philadelphia		87.6	29	i	12	16	- 1	i	22	11	[- 4]	i	15	38	PP	e	36.1	
Tortosa		87.6	333	i	12	17	0	i	22	30	- 2							
Tunis		87.6	324	e	12	11	- 6	i	22	16	[+ 1]							
Georgetown		87.9	31	i	12	19	+ 1					i	13	47	pP			
Washington		87.9	31	i	12	22	+ 4											
Arapuni		88.5	155		12	23	+ 2		22	18	[- 3]		24	31	SS			
New Plymouth	E.	88.9	156		12	28	+ 5		23	1	+17		22	24	SKS			
Tuai	N.	89.6	155		12	27	+ 1		22	22	[- 5]							
Toledo		89.8	336	i	12	27	0	i	22	46	- 6		13	49	pP		35.4	
Alicante		90.1	333		12	35	+ 6		22	49	- 6		13	37	pP	e	41.7	
Algiers Univ.	Z.	90.4	330	e	12	29	- 1	i	22	52	- 5	i	13	50	pP			
Cobb River	E.	90.5	158	e	12	29	- 1	i	22	27	[- 6]	e	16	9	PP			
Columbia		90.7	36	e	12	31	0	i	22	30	[- 4]	e	16	7	PP	e	36.3	
Wellington		91.2	157	i	12	33	- 1	i	23	9	+ 5	i	13	55	pP			
Kaimata	N.E.	91.5	160	e	12	35	0	i	22	31	[- 7]							
Almeria		92.1	333	i	12	28	-10		23	20	+ 8		12	36	pP		42.1	
Granada		92.1	334	i	12	41k	+ 3	i	23	6	- 6	i	13	0	pP		39.8	
Lisbon		92.2	339		12	36a	- 2	i	23	13	0		13	59	pP			
Malaga	N.W.	92.8	335	i	12	43	+ 2	i	22	47	[+ 1]	i	16	7	PP		37.3	
Christchurch		92.8	159	i	12	42	+ 1	i	23	31	+13	i	14	7	pP		28.2	
Tacubaya		93.6	57	i	12	48a	+ 3	e	23	18	- 7	i	14	3	pP	e	39.2	
Bermuda		97.8	24	e	14	14	pP	e	24	15	+14	e	18	11	PPP	e	41.1	
Tamanrasset	Z.	101.8	321	e	13	21	- 1	e	24	36	+ 2	i	14	45	pP		39.1	
Tananarive		107.6	261		18	17	PP		23	55	[- 3]		24	45	SKKS	e	44.6	
San Juan		110.4	30	e	14	8	P	i	24	5	[+ 5]	i	18	38	PP	e	45.0	
Fort de France		115.5	26	e	17	45	[-23]	i	25	10	SKKS	i	18	51	PP			
Chinchina		118.4	44	e	14	36	P	e	24	43	[+ 3]	i	18	35	PKP	e	50.1	
Bogota		119.4	44	e	18	24	[+ 9]	i	24	43	[ 0]	i	19	46	PP			
Pretoria	Z.	125.6	268	e	15	27	P						18	27	PKP			
Pietermaritzburg	Z.	126.4	263	i	18	29	[ 0]						e	19	56	pPKP		
Grahamstown		131.2	262	e	18	30	[- 8]						e	20	8	pPKP		
Huancayo		132.6	57	e	18	31	[-10]	e	33	23	PPS	i	21	11	PP			
La Paz		140.3	52	i	18	51k	[- 4]	i	25	11	[-24]	i	20	25	pPKP		67.1	
Buenos Aires		159.6	63		20	6	PKP <sub>2</sub>										43.4	
La Plata	E.	160.2	63		19	13	[-11]		30	59	SKKS		20	29	PKP <sub>2</sub>		66.3	
	N.	160.2	63		19	41	[+17]		30	55	SKKS	i	20	12	PKP <sub>2</sub>		66.0	
	Z.	160.2	63		19	23	[- 1]		23	53	PKS		20	7	PKP <sub>2</sub>			

Additional readings :—

Mizusawa SN = 3m.11s.  
 Nanking pP = 5m.55s., iN = 9m.6s., iE = 9m.16s.  
 College ePPP = 9m.37s., eSS? = 16m.6s., eScS = 16m.53s., iPKP, PKP? = 36m.44s.  
 Sitka ePP = 11m.24s., isS = 16m.31s., eSS = 18m.15s., i = 20m.29s.  
 Sverdlovsk iPP = 11m.10s., iPPP = 11m.37s.  
 Tashkent esS = 17m.42s.  
 Honolulu i = 9m.27s., iPP = 10m.48s., iPPP = 11m.48s., is = 16m.1s., esS = 17m.25s., eSS = 20m.5s.  
 New Delhi PPN = 10m.25s., PPPN = 11m.51s., iSE = 16m.5s., ScSN = 18m.8s., sSN = 18m.23s., SSN = 19m.15s., SSSN = 20m.27s.  
 Victoria e = 10m.46s., 10m.53s., and 11m.44s., i = 18m.1s., e = 18m.50s., and 21m.18s.  
 Seattle iPcP = 10m.31s., isP = 11m.16s., ipPcP = 11m.38s., isPcP = 12m.8s., iPP = 12m.30s., ipPP = 14m.45s., iPPP = 15m.6s., iSSS = 24m.41s., and many other unidentified i readings.  
 Hyderabad PPE = 11m.28s., PSN = 17m.29s., ScSE = 19m.43s., SSN = 21m.29s.  
 Poona isPEN = 11m.44s., iEN = 19m.22s., isSN = 20m.14s.  
 Helsinki i = 10m.2s., 11m.17s., 18m.2s., 19m.15s., 19m.19s., and 20m.17s.  
 Scoresby Sund 11m.19s., sP = 11m.39s., i = 18m.11s., 18m.41s., and 19m.25s., 20m.20s., 24m.29s.  
 Bombay iE = 15m.20s., SSE = 21m.50s., iSSN = 22m.22s.

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Hungry Horse iPKP,PKP = 38m.43s., i = 40m.20s.  
 Shasta Dam i = 10m.53s., iScS = 19m.29s., isS? = 20m.3s., iPKP,PKP = 38m.40s., eSKP,PKP = 41m.49s.  
 Ukiah ePPP = 14m.11s., esS? = 20m.42s., eSS? = 23m.37s., eSSS = 25m.55s.  
 Mineral ePKP,PKPZ = 38m.33s., iZ = 38m.52s., eZ = 40m.18s., eSKP,PKPZ = 41m.55s.  
 Upsala i = 10m.18s. and 10m.26s., isP = 12m.8s., iPP = 13m.3s., ipPPN = 13m.49s., iPPPN = 14m.24s., isPP = 14m.37s., iN = 14m.46s., iE = 15m.11s., ipPPP = 15m.19s., i = 16m.2s., iScS = 19m.34s., isSN = 20m.47s., isSE = 20m.51s., iN = 22m.46s., SSN = 23m.7s.?, sSSN = 25m.7s.?, iSSS?N = 26m.1s., iSSSE = 26m.13s.  
 Kodaikanal SSE = 22m.5s., QE = 24m.50s.  
 Berkeley esS?EN = 26m.29s.  
 Butte ePPN = 12m.56s., isS?N = 19m.42s., eSSN = 24m.54s.  
 Reno iZ = 10m.37s., ePKP,PKPZ = 38m.47s., iSKP,PKPZ = 40m.17s.  
 Lick iPPZ = 13m.0s., iZ = 13m.21s., iPPPZ = 14m.43s., iZ = 15m.57s., ePSNZ = 19m.52s., ePKP,PKPZ = 38m.27s., iZ = 38m.43s., iSKP,PKPZ = 41m.58s., ePKP,PKP,PKP?Z = 47m.14s.  
 Colombo SSSE = 28m.25s., true S is given as PP.  
 Bozeman iPP = 13m.0s., ePPP = 14m.12s., iS = 18m.58s., e = 20m.6s. and 21m.14s., eSS = 23m.30s.  
 Bergen iNZ = 10m.49s., iPPZ = 12m.27s., iZ = 14m.54s. and 16m.42s., ScSEN = 20m.0s.?, sSN = 21m.30s., SSN = 23m.30s., SSSSEN = 27m.6s.  
 Tinemaha iZ = 11m.1s., iN = 20m.10s., iZ = 38m.38s., eZ = 41m.39s., and 47m.22s.  
 Reykjavik iN = 11m.23s., eN = 12m.24s., and 21m.43s., P is given as iS, pP as sS and iS as iN.  
 Salt Lake City iPPP = 15m.12s., i = 20m.20s., eSS = 24m.22s.  
 Warsaw PcPEN = 11m.4s., PP = 13m.51s., sPE = 15m.19s., SPPE = 18m.0s., PSEN = 20m.24s., sSEN = 23m.49s., SSE = 24m.15s., and other unidentified e and i readings.  
 China Lake ePKP,PKPZ = 38m.9s., iZ = 38m.33s., 41m.32s., and 47m.34s., ePKP,PKP,PKPZ = 58m.3s.  
 Copenhagen i = 12m.41s. and 20m.19s., 21m.52s., 22m.42s., 24m.18s.  
 Pasadena iPcPZ = 11m.13s., isPZ = 12m.37s., iPPZ = 13m.37s., ipPPZ = 14m.40s., iPPPZ = 15m.29s., iScSE = 20m.22s., isS?N = 22m.7s., iSSN = 24m.27s., ePKP,PKP?Z = 38m.14s., iPKP,PKPZ = 38m.28s., iSKP,PKP?Z = 41m.28s., iZ = 41m.49s., ePKP,PKP,PKPZ = 58m.17s., eZ = 60m.56s.  
 Apia e = 11m.32s., eN = 16m.41s. and 20m.35s., eN = 22m.2s., eE = 24m.35s.  
 Overton iZ = 21m.12s., 23m.20s., and 40m.8s., iPKP,PKPZ = 42m.50s.  
 Riverside iPcPZ = 11m.17s., ePKP,PKPZ = 38m.15s., eZ = 38m.24s., iZ = 41m.47s.  
 Boulder City isP = 12m.41s., iPP = 13m.44s., epPP = 14m.49s., esPP = 15m.17s., ePPP? = 15m.29s., epPPP? = 16m.27s., eScS? = 20m.34s., i = 21m.27s., eSS = 24m.45s., iPKP,PKP = 38m.18s., i = 41m.44s.  
 Pierce Ferry iPPP = 14m.35s., i = 15m.42s. and 17m.35s., iScS = 20m.17s., esS = 21m.52s., esPS = 22m.27s., eSS = 24m.52s., eSSS = 28m.30s., iPKP,PKP = 38m.5s.  
 Palomar iZ = 20m.49s., eZ = 30m.50s. and 37m.3s., iZ = 40m.28s., 40m.42s., 47m.12s., and 61m.27s.  
 Ivigtut i = 11m.1s. and 12m.15s., 21m.23s., and 23m.35s.  
 Skalnate Pleso iP = 11m.0s., i = 11m.31s., isP = 12m.58s., e = 13m.26s., iPPP = 15m.28s., e = 16m.18s., i = 17m.20s., eScS = 20m.40s., epS = 21m.39s., esS = 22m.21s.  
 Aberdeen iPPEN = 13m.37s., iPPPEN = 15m.3s., IPSE = 20m.33s., iN = 21m.34s., iE = 22m.27s., iSSSEN = 24m.39s., iSSSEN = 26m.51s., iE = 28m.44s. and 30m.20s.  
 Potsdam ipPPZ = 14m.5s., ipPPPZ = 15m.42s., isZ = 19m.53s., iPSN = 20m.35s., iPPSZ = 21m.1s., iSSN = 24m.27s., and many other i readings.  
 Raciborzu iZ = 11m.7s., iPcPEN = 12m.35s.  
 Brisbane iPN = 11m.5s., iZ = 12m.55s., iN = 13m.0s., isSE = 22m.20s., iE = 26m.25s.  
 Collmberg iPcPZ = 11m.20s., ePN = 13m.2s.?, iPPZ = 13m.57s., epPPE = 15m.1s., esPP?N = 15m.48s.?, ePPPZ = 15m.52s., epPPP?N = 17m.23s., eScS?Z = 20m.35s., iSPN = 20m.48s., esSE = 22m.24s., eSPSE = 22m.50s., eSSN = 25m.9s., esS?E = 26m.55s., eSSSE = 28m.23s., eSKP,PKP = 41m.39s., also many other readings without phase.  
 Bucharest iPcPE = 13m.39s., IPSE = 20m.43s., iScSN = 20m.59s., iSSN = 24m.33s.  
 Edinburgh PcP = 11m.11s., PP = 13m.52s., PPP = 15m.40s., S = 20m.11s., ScS = 20m.26s., PPS = 22m.32s., sS = 22m.49s., SS = 24m.55s., SSS = 28m.14s.  
 Prague i = 11m.14s., ePcP = 11m.22s., iE = 11m.29s., e = 11m.39s., eN = 11m.51s., e = 12m.16s., epPcP = 12m.39s., eE = 12m.56s., isPZ = 13m.6s., iPP = 13m.59s., epPPE = 15m.12s., epPPZ = 15m.15s., ePPP = 15m.51s., epPPP = 16m.59s., 17m.34s., ScS = 20m.45s., epS = 21m.45s., esS = 22m.31s., eSS = 24m.35s., eSSS = 30m.5s.?  
 Jena iEZ = 11m.15s., isPN = 13m.7s., iZ = 15m.55s., eN = 17m.38s., eE = 17m.41s., iPS?N = 20m.49s., iPS?E = 20m.53s., ipS?N = 21m.49s., ipS?E = 21m.52s., isS?EN = 22m.43s., eSS?E = 25m.21s.  
 Budapest iN = 11m.17s., 15m.55s., 16m.11s., 16m.42s., 17m.1s., 17m.40s., and 21m.39s., SSN = 22m.20s., iN = 22m.47s., 26m.31s., and 27m.26s.  
 Ogyalla iP = 11m.18s., ePcP = 11m.29s., esP = 13m.7s., ePPN = 13m.55s., ePPE = 14m.0s., epPP = 15m.14s., e = 17m.32s., eE = 20m.12s., epS = 21m.59s., esS = 22m.47s., eSS = 24m.59s.  
 Durham iN = 13m.14s., 15m.26s., 22m.11s., and 22m.48s.  
 Cheb iP = 11m.19s., ePcP = 11m.27s., esP = 13m.6s.?, ePP = 14m.5s., epPP = 15m.16s., ePPP = 16m.0s., ipPPP = 17m.1s., eScS = 20m.50s., epSZ = 22m.6s.?, esS = 22m.39s., eSS = 25m.5s., with other unidentified phases.

Continued on next page.

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Kalossa  $iE = 11m.23s.$ ,  $iN = 11m.42s.$ ,  $iE = 11m.50s.$ ,  $pPN = 12m.23s.$ ,  $iN = 13m.13s.$ ,  
 $iE = 13m.18s.$ ,  $iN = 13m.56s.$ ,  $eE = 16m.0s.$ ,  $iN = 21m.10s.$ ,  $sSN = 22m.24s.$ ,  $sSE = 22m.29s.$   
De Bilt  $iZ = 13m.10s.$ ,  $iPP = 14m.17s.$ ,  $iPPP = 16m.6s.$ ,  $epPPP = 17m.11s.$ ,  $eZ = 18m.51s.$ ,  
 $isS = 22m.56s.$ ,  $i = 25m.29s.$ ,  $e = 31m.0s.$   
Tucson  $e = 13m.25s.$ ,  $iPP = 14m.22s.$ ,  $e = 15m.19s.$ ,  $i = 16m.36s.$  and  $17m.44s.$ ,  $eSS = 24m.50s.$ ,  $ePKP, PKP, PKP = 58m.9s.$   
Karlsruhe  $i = 11m.39s.$ ,  $11m.45s.$ ,  $12m.7s.$ ,  $12m.23s.$ , and  $13m.19s.$ ,  $iE = 23m.8s.$   
Stuttgart  $iP = 11m.31s.$ ,  $i = 11m.39s.$ ,  $iP_cP?Z = 11m.59s.$ ,  $isP = 13m.24s.$ ,  $iPP = 14m.33s.$ ,  
 $ipPP = 15m.39s.$ ,  $iPPP = 16m.20s.$ ,  $ipPPP = 17m.25s.$ ,  $i = 18m.1s.$ ,  $iS_cS = iPS = 21m.12s.$ ,  
 $i = 22m.29s.$ ,  $isS = 23m.12s.$ ,  $iSS = 25m.59s.$ ,  $ePKP, PKPZ = 38m.24s.$ ,  
 $eSKP, PKPZ = 41m.12s.$  and  $41m.30s.$   
Zagreb  $iP = 11m.28s.$ ,  $iP_cP = 11m.31s.$ ,  $esPZ = 13m.18s.$ ,  $iS_cS = 21m.0s.$ ,  $iSPE = 21m.54s.$ ,  
 $isS = 23m.16s.$ , and other unidentified  $i$  readings.  
Rathfarnham Castle  $iPSEN = 22m.30s.$ ,  $eSSEN = 26m.11s.$ ,  $eSSSEN = 29m.18s.$ , and other  $e$  and  $i$  readings.  
Lincoln  $ePPE = 16m.25s.$ ,  $iPSE = 22m.32s.$ ,  $eSSE = 26m.17s.$ ,  $iE = 32m.34s.$   
Strasbourg  $iP = 11m.33s.$ ,  $i = 12m.9s.$ ,  $isP = 13m.23s.$ ,  $ipPP = 15m.49s.$ ,  $isPP = 16m.17s.$ ,  
 $i = 19m.18s.$ ,  $ipS = 22m.16s.$ ,  $isS = 23m.6s.$ ,  $i = 23m.35s.$ , and  $25m.3s.$ ,  $iSS = 26m.14s.$ ,  
 $isSS = 27m.33s.$ ,  $iSSS = 29m.12s.$ ,  $iPKP, PKP = 38m.25s.$ ,  $iSKP, PKP = 41m.22s.$ ,  
 $iPKP, PKP, PKP = 58m.29s.$   
Triest  $iP_cP = 11m.42s.$ ,  $ipP_cP = 13m.1s.$ ,  $isP = 13m.18s.$ ,  $iPP = 14m.38s.$ ,  $ipPP = 15m.41s.$ ,  
 $iPPP = 16m.28s.$ ,  $ipPPP = 17m.25s.$ ,  $isS = 22m.39s.$ ,  $isSP? = 23m.25s.$ ,  $iSS = 26m.12s.?$ ,  
 $i = 31m.3s.$   
Zürich  $i = 11m.37s.$  and  $11m.43s.$   
Kew  $iP_cP = 11m.30s.$ ,  $i = 13m.19s.$ ,  $iPPPEN = 16m.17s.$ ,  $iPSEN = 22m.28s.$ ,  $eSSEN = 24m.39s.$ ,  
 $eSSSEN = 26m.33s.$ ,  $eEN = 29m.29s.$   
Paris  $isP = 13m.33s.$ ,  $iPP = 14m.54s.$ ,  $ipPP = 15m.51s.$ ,  $iPPP = 16m.36s.$ ,  $ipPPP? = 17m.48s.$ ,  
 $iPS = 22m.51s.$ ,  $iSS = 26m.30s.$ ,  $eSSS = 30m.16s.$ ,  $ePKP, PKP = 38m.31s.$ ,  
 $eSKP, PKP = 41m.19s.$ , and other unidentified  $i$  readings.  
Riverview  $iP_cPZ = 11m.41s.$ ,  $iS_cSN = 21m.30s.$ ,  $isSE = 23m.35s.$ , and many other unidentified readings.  
Salo  $eN = 11m.43s.$ ,  $iZ = 12m.0s.$ ,  $iN = 22m.3s.$ ,  $eN = 32m.29s.$   
Padova  $PP? = 14m.51s.$   
Athens  $i = 11m.47s.$ ,  $e = 21m.30s.$ , and  $22m.12s.$   
Bologna  $iZ = 11m.48s.$ ,  $e = 12m.10s.$ ,  $i = 21m.50s.$   
Pavia  $iZ = 11m.47s.$   
Florence Arc.  $iZ = 11m.47s.$ ,  $iE = 22m.4s.$ ,  $eE = 23m.32s.$ ,  $e = 32m.21s.$   
Chicago  $ePP = 15m.2s.$ ,  $esS? = 23m.6s.$ ,  $eSS? = 26m.12s.$   
Taranto  $e = 46m.44s.$   
Clermont-Ferrand  $isP = 13m.50s.$ ,  $ipPP = 16m.21s.$ ,  $iPPP = 17m.0s.$ ,  $ipS = 23m.25s.$ ,  
 $isS = 24m.19s.$   
Rome  $iZ = 11m.54s.$ , and  $13m.49s.$ ,  $ePP = 14m.58s.$ ,  $e = 16m.31s.$ ,  $iZ = 16m.47s.$ ,  $isS = 24m.36s.$ ,  
 $e = 32m.14s.$   
Seven Falls  $PPE = 14m.52s.$ ,  $PPPE = 16m.53s.$ ,  $PSE = 22m.58s.$ ,  $sSE = 23m.59s.$ ,  $SSE = 26m.51s.$   
Shawinigan Falls  $ePPN = 14m.46s.$ ,  $eN = 16m.48s.$ ,  $iSN = 21m.47s.$   
Ottawa  $e = 18m.35s.$  and  $20m.51s.$ ,  $PPS = 23m.15s.$ ,  $Q = 33m.23s.$ ,  $e = 38m.14s.$  and  $41m.13s.$   
Florissant  $i = 15m.19s.$   
St. Louis  $iPP = 15m.13s.$ ,  $iPPP = 16m.57s.$ ,  $iSKS? = 21m.9s.$   
Helwan  $P_cPEN = 11m.59s.$ ,  $PPN = 15m.7s.$ ,  $eZ = 16m.16s.$ ,  $PPP = 16m.55s.$ ,  $iN = 22m.41s.$ ,  
 $sSN = 23m.13s.$ ,  $iEN = 24m.3s.$ ,  $iN = 29m.15s.$   
Cleveland  $eN = 13m.45s.$ ,  $ePPN = 15m.24s.$ ,  $iSPN = 22m.50s.$ ,  $isSN = 23m.48s.$   
Messina  $iZ = 12m.3s.$ ,  $13m.56s.$ , and  $17m.12s.$ ,  $iE = 21m.57s.$ ,  $isS? = 24m.49s.$ ,  $eE = 33m.51s.$   
New Kensington  $eE = 14m.57s.$ ,  $isSE = 23m.50s.$ ,  $eSSE = 29m.33s.$   
Pittsburgh  $iZ = 14m.41s.$   
Harvard  $iP_cP = 12m.31s.$ ,  $isP = 13m.59s.$ ,  $iPP = 15m.35s.$ ,  $ipPP = 16m.50s.$ ,  $iPPP = 17m.29s.$ ,  
 $ipPPP = 18m.44s.$ ,  $iSP = 23m.16s.$ ,  $ePS = 23m.59s.$ ,  $isS = 24m.40s.$ ,  $epPS = 25m.7s.$ ,  
 $isPS = 25m.42s.$ ,  $eSS = 28m.5s.$ ,  $eSSS = 30m.17s.$ ,  $eQ = 37.6m.$ , and other unidentified readings.  
Halifax  $e = 22m.21s.$  and  $22m.53s.$ ,  $SSS = 30m.53s.$ ,  $e = 34m.47s.$ , and  $40m.23s.$   
Barcelona  $PS? = 22m.53s.$ ,  $i = 24m.50s.$   
Weston  $iPP = 15m.47s.$   
Auckland  $PPN = 16m.1s.$ ,  $PPPN = 17m.55s.$ ,  $iSKSN = 22m.11s.$ ,  $iPSN = 24m.15s.$ ,  
 $esSN = 24m.43s.$ ,  $SSN = 28m.43s.$   
City College, N.Y.,  $iSKS = 22m.8s.$ ,  $iSP? = 23m.26s.$ ,  $iPS? = 24m.9s.$ ,  $iPKP, PKP = 38m.39s.$ ,  
 $iSKP, PKP = 41m.7s.$   
Fordham  $i = 23m.23s.$  and  $24m.1s.$   
Philadelphia  $iPS? = 23m.25s.$ ,  $isS? = 24m.3s.$ ,  $eSS? = 28m.58s.$   
New Plymouth  $ePSE = 25m.15s.$   
Toledo  $PPE = 16m.5s.$ ,  $PPPE = 18m.9s.$ ,  $iSKSE = 22m.22s.$ ,  $sSE = 24m.11s.$ ,  $PSE = 24m.45s.$ ,  
 $SSE = 28m.58s.$ ,  $SSSE = 32m.32s.$   
Alicante  $PP = 16m.17s.$ ,  $PPP = 17m.57s.$ ,  $i = 23m.0s.$ ,  $PS = 24m.35s.$ ,  $PPS = 25m.1s.$ ,  
 $SS = 28m.47s.$ ,  $SSS = 32m.11s.$ ,  $Q = 35m.41s.$   
Algiers Univ.  $iZ = 12m.33s.$ ,  $eZ = 12m.39s.$ ,  $esP?Z = 14m.12s.$ ,  $eZ = 14m.44s.$ ,  $ePPZ = 15m.48s.$ ,  
 $epPP?Z = 17m.15s.$ ,  $iPPPZ = 17m.57s.$

*Continued on next page.*

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Cobb River e?E = 12m.16s., eE = 23m.5s.  
 Columbia iSP = 24m.5s., eSSS = 33m.57s.  
 Wellington iPP = 16m.17s., pPPZ = 17m.19s., PPP = 18m.22s., pPPPZ = 19m.25s.,  
 iSKS = 22m.26s., iPS = 24m.29s., iSS = 29m.5s.  
 Almeria PP = 16m.14s., PPP = 18m.4s., SKS = 22m.58s., SKKS = 23m.15s., ScS =  
 23m.28s., sS = 23m.39s., PS = 24m.35s., PPS = 25m.7s., SS = 30m.26s., Q = 36m.35s.  
 Granada PcP = 12m.45s., iPP = 16m.0s., pPP = 16m.30s., sPP = 16m.56s., PPP =  
 17m.42s., pPPP = 18m.24s., S = 23m.51s., sS = 25m.12s., iSS = 29m.24s., SSS =  
 33m.6s.  
 Lisbon iPNZ = 12m.41s., Z = 14m.35s., PP? = 16m.17s., NZ = 17m.41s., PPP = 18m.19s.,  
 iSKSEN = 22m.39s., iSE = 23m.21s., PS?EN = 24m.59s., N? = 26m.0s., E = 27m.16s.  
 and 35m.41s.  
 Malaga iPPNW = 17m.45s., isSNW = 23m.19s., iPSNW = 23m.49s., iSSNW = 28m.19s.,  
 QNW = 33m.15s.  
 Christchurch isP = 14m.42s., iPP = 16m.33s., pPP = 17m.33s., iNZ = 18m.16s., ePPPEN =  
 18m.55s., iNZ = 20m.38s., iZ = 22m.14s., SKS = 22m.39s., SP = 24m.35s., PSEN =  
 25m.20s., SSEN = 29m.25s., sSSEN = 31m.25s., eSSSEN = 33m.5s.  
 Tacubaya i = 12m.54s. and 13m.6s., iPP = 16m.42s., iSKS = 22m.48s., e = 24m.17s.,  
 i = 24m.47s.  
 Bermuda e = 16m.10s., i = 28m.5s. and 37m.25s.  
 Tamanrasset esPZ = 15m.20s., eZ = 16m.26s., iPPZ = 17m.37s., ipPPZ = 18m.55s.,  
 eSPZ = 26m.5s., ePS = 26m.47s., ePPSZ = 27m.48s., iPKKPZ = 29m.28s., iSSZ =  
 31m.39s., ePKP,PKPZ = 37m.53s.  
 Tananarive PS = 27m.46s., SS = 33m.7s., SSS = 37m.35s.  
 San Juan isS = 25m.6s., i = 25m.48s., ePS? = 26m.45s., i = 28m.13s., eSS = 32m.3s.,  
 eSSS? = 37m.38s.  
 Fort de France iPS = 28m.15s.  
 Chinchina iPPZ = 19m.16s., eSKKSEN = 26m.0s., ePSEN = 29m.7s.?  
 Beqota iSKP = 20m.8s., iSKKS = 26m.9s., iPSN = 29m.41s., iPPSEN = 30m.58s.  
 Pretoria epPKPZ = 19m.56s.  
 Pietermaritzburg iPPZ = 20m.28s.  
 Grahamstown iPP = 21m.32s.  
 Huancayo i = 18m.43s.  
 La Paz iPKP<sub>2</sub> = 19m.0s., iPPZ = 22m.3s., iZ = 22m.13s., i = 25m.25s., iSKKS = 28m.25s.,  
 iSKSP = 31m.41s., iPPS = 34m.9s., i = 36m.40s., iSS = 39m.49s., SSS = 45m.50s.  
 La Plata E = 18m.53s., PKSE = 22m.53s., PPN = 23m.47s., PPPE = 29m.8s., PPPN =  
 29m.59s., SKKSN = 32m.29s., SKKSE = 32m.41s. and 34m.22s., SKSPE =  
 36m.11s., SKSPN = 36m.53s., PPS?E = 39m.5s., PPSN = 39m.59s., N = 43m.33s.,  
 E = 43m.41s., SSE = 46m.41s., PSSE = 48m.59s., N = 49m.53s., SSS?E = 51m.11s.,  
 N = 59m.53s.  
 Long waves were also recorded at Galerazamba.

Feb. 28d. 18h. 58m. 39s. Epicentre 38°·7S. 176°·8E.

Intensity VII in Epicentral Region north-west of Hawkes Bay. Felt generally throughout the North Island.

R. C. Hayes.

Earthquake origins in New Zealand during the year, 1950. New Zealand Journal of Science and Technology. Sect. B., Vol. 33, No. 4. January, 1952, p. 306, Isoleismic Chart, p. 305. Epicentre as adopted.

$$A = -0.7812, B = +0.0437, C = -0.6227; \quad \delta = -6; \quad h = -1;$$

$$D = +0.056, E = +0.998; \quad G = +0.622, H = -0.035, K = -0.782.$$

		$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Tuai	N.	0.3	110	i 0 13	+ 2	—	—	—	—
Arapuni		1.1	304	i 0 23	+ 1	i 0 39	0	—	—
New Plymouth	E.	2.2	260	i 0 41	+ 3	i 1 8	+ 2	—	—
Auckland	N.	2.4	319	i 0 39	- 2	i 1 5	- 7	—	—
Wellington		3.0	211	i 0 47	- 3	i 1 19	- 8	—	—
Cobb River	E.	3.9	232	i 1 2	0	i 1 46	- 4	—	—
Christchurch		5.8	212	e 1 25	- 4	2 23	- 15	—	—
Pasadena	Z.	94.2	49	e 13 33	+ 11	—	—	—	—
Palomar	Z.	94.5	50	i 13 32	+ 9	—	—	—	—
Lick	Z.	94.5	44	i 13 19k	- 4	—	—	—	—
Riverside	Z.	94.6	49	i 13 19	- 5	—	—	—	—
China Lake	Z.	95.7	48	e 13 24	- 5	—	—	—	—
Shasta Dam		96.6	42	e 13 27	- 6	—	—	—	—
Mineral	Z.	96.7	43	e 13 33	0	—	—	—	—
Ottawa		127.4	58	19 0	[- 7]	—	—	—	—
Tamanrasset	Z.	162.5	207	e 20 0	[- 3]	—	—	e 20 55	PKP <sub>2</sub>
Collmberg	Z.	163.0	323	e 20 46	PKP <sub>2</sub>	—	—	—	—

For Notes see next page.

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NOTES TO FEBRUARY 28d. 18h. 58m. 39s.

Additional readings :—

Lick iZ = 13m.34s.  
 Riverside eZ = 13m.34s.  
 China Lake eZ = 13m.40s.  
 Ottawa eP = 19m.15s.  
 Collmberg eZ = 20m.51s. and 21m.2s.

Feb. 28d. Readings also at 0h. (Riverview), 1h. (Pasadena, Riverside, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 4h. (near Mizusawa), 5h. (Hungry Horse, Fergana, Frunse, Naryn, near Andijan, Garm, Obi-garm, and Stalinabad), 8h. (near Fergana and near Hungry Horse), 9h. (near Andijan), 10h. (Helwan, Ksara, Karlsruhe, and Strasbourg), 11h. (Aberdeen, Padova, Rome, Tamanrasset (2), and near Apia), 12h. (Aberdeen, Durham, and Mizusawa), 13h. (near Andijan, Obi-garm, Stalinabad, and Samarkand), 14h. (near Prague), 15h. (China Lake and Prague), 16h. (Stuttgart, China Lake, and Wellington), 17h. (Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Mineral, Shasta Dam, Hungry Horse, Victoria, College, Collmberg, Stuttgart, and near Klyuchi), 19h. (Andijan, Frunse, Naryn, Samarkand, Tashkent, Tchimkent, near Fergana, Garm, and Stalinabad), 23h. (Hungry Horse).

March 1d. 8h. 23m. 48s. Epicentre 46°·0S. 95°·6E.

A = -·0680, B = +·6938, C = -·7170;  $\delta = +7$ ;  $h = -4$ ;  
 D = +·995, E = +·098; G = +·070, H = -·714, K = -·697.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Perth	21·0	56	i 4 44	- 3	8 37	0	9 37	SS
Bandong	E. 40·3	19	7 48	+ 8	—	—	—	—
Djakarta	40·8	18	7 47	+ 2	—	—	—	—
Riverview	43·5	94	i 8 7 <sub>a</sub>	0	i 14 38	+ 2	i 14 54	sS
Tananarive	47·8	289	8 22	-19	e 15 46	+18	e 20 47	Q
Brisbane	48·5	88	i 8 48	+ 2	i 15 50	+ 2	i 10 37	PP
Pietermaritzburg	Z. 52·6	266	e 9 21	+ 3	—	—	—	e 22·0
Christchurch	52·7	117	e 9 7	-11	16 51	+ 5	18 58	ScS
Wellington	55·3	115	—	—	e 19 15	?	25 12	Q
Pretoria	Z. 56·5	268	e 12 34	PPP	—	—	—	—
Kodaikanal	E. 58·3	339	—	—	e 18 5	+ 4	—	—
Hyderabad	E. 65·0	342	—	—	19 25	- 1	—	—
Poona	67·2	338	e 10 55	- 3	e 20 1	+ 9	13 39	PP
Bombay	67·8	337	e 11 30	+28	e 19 58	- 2	e 15 14	PPP
New Delhi	N. 76·1	344	—	—	e 21 31	- 4	e 26 38	SS
Garm	87·6	340	12 54?	+ 3	i 23 24?	- 8	—	—
Stalinabad	87·6	340	i 12 51	0	i 23 24	- 8	—	—
Andijan	88·8	343	e 12 57	0	23 30	[+ 5]	—	—
Naryn	88·8	346	e 12 57	0	i 23 32	[+ 7]	—	—
Ashkabad	90·0	331	—	—	e 23 47	{+ 5}	—	—
Tashkent	90·1	341	e 13 4	+ 1	i 23 40	[+ 7]	—	—
Almata	90·4	346	—	—	e 23 42	[+ 7]	—	—
Frunse	90·4	344	—	—	e 23 40	[+ 5]	—	—
Tchimkent	90·9	341	i 13 5	- 2	—	—	—	—
Vladivostok	94·4	26	e 17 15	PP	i 23 58	{ 0}	—	—
Baku	95·2	327	—	—	e 24 16	{- 3}	—	—
Helwan	95·3	308	e 13 48	+21	24 12	[+ 9]	—	—
Ksara	96·0	313	e 18 9	PP	—	—	—	—
Irkutsk	98·2	5	e 13 40	0	24 21	[+ 3]	e 25 1	S
Istanbul	105·0	314	e 14 54	P	—	—	—	—
Yalta	105·2	319	e 18 26	PP	—	—	—	—
Tamanrasset	Z. 106·1	287	13 27	?	e 17 5	?	e 19 16	PP
La Paz	116·1	198	i 19 52	PP	29 36	PS	i 29 13	PKKP
Prague	118·6	314	—	—	e 32 55	PPS	—	—
Alicante	120·1	296	—	—	e 37 45	SSP	—	e 61·8

Continued on next page.

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	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Stuttgart	120.6	310	—	—	e 37 0	SSP	—	e 69.2
College	141.4	37	e 19 41	[+ 8]	—	—	—	—
Tacubaya	150.8	151	e 20 18	PKP <sub>2</sub>	—	—	—	—
Berkeley	150.9	93	i 19 59 <sup>k</sup>	[+10]	—	—	e 20 28	e 70.8
Lick	z. 151.1	93	i 19 59 <sup>a</sup>	[+10]	—	—	—	—
Pasadena	151.8	103	e 19 55	[+ 5]	—	—	—	e 70.2
Fresno	z. 152.1	96	e 19 48	[- 3]	—	—	—	—
Shasta Dam	152.1	87	e 19 58	[+ 7]	—	—	—	—
Palomar	z. 152.2	106	e 19 59	[+ 8]	—	—	—	—
Riverside	z. 152.2	103	e 19 56	[+ 5]	—	—	—	—
Mineral	z. 152.5	88	e 20 2	[+11]	—	—	—	—
China Lake	z. 153.1	99	e 20 4	[+12]	—	—	—	—
Tinemaha	z. 153.3	97	e 20 5	[+13]	—	—	—	—
Reno	z. 153.4	90	e 19 59	[+ 7]	—	—	—	—
Boulder City	155.1	103	e 20 1	[+ 6]	—	—	—	—
Tucson	155.5	114	e 19 59	[+ 4]	—	—	—	e 84.5
Overton	z. 155.7	101	e 20 2	[+ 7]	—	—	—	—
Pierce Ferry	155.7	103	e 20 0	[+ 5]	—	—	—	—
Hungry Horse	159.8	72	e 20 9	[+ 8]	—	—	—	—
Logan	159.8	92	e 20 26	[+25]	—	—	—	—
Weston	170.0	—	e 42 54	?	—	—	—	e 78.8
Philadelphia	170.9	—	—	—	e 46 32	SS	—	e 75.0

Additional readings :—

Riverview iSN = 14m.41s., eSSZ = 17m.48s., iS<sub>c</sub>SE = 17m.57s., eSSS?NZ = 18m.24s.

Christchurch eSS = 20m.22s., QEN = 22m.2s.

Poona PPPEN = 15m.7s., PSN = 20m.27s., PPSN = 20m.42s., SSN = 24m.33s., SSSN = 27m.34s.

New Delhi IN = 22m.0s. and 29m.14s.

La Paz PPS = 30m.58s., SS = 35m.40s.

Lick iZ = 20m.4s.

Mineral iZ = 20m.10s., eZ = 20m.13s.

Reno eZ = 20m.5s., eN = 20m.31s.

Tucson e = 20m.14s.

Overton iZ = 20m.10s.

Long waves were also recorded at Auckland, Bogota, Bermuda, Scoresby Sund, and other American and European stations.

March 1d. Readings also at 0h. (Ksara and near Mizusawa), 1h. (Hungry Horse, College, Tamanrasset, Collmberg, Stuttgart, near Istanbul, and near Malaga), 3h. (Mount Wilson (2), Riverside, China Lake (2), Tinemaha, Tucson (3), Boulder City, Overton (2), Pierce Ferry (3), Shasta Dam (2), Hungry Horse (2), College, and near Apia), 7h. (Ashkabad and College), 8h. (Tucson and near Logan (2)), 10h. (Bandong, Djakarta, and near Messina), 11h. (near Tananarive), 12h. (Mineral and near Garm), 13h. (near Andijan), 16h. and 17h. (Hungry Horse), 20h. (Bucharest, Sofia, and near Istanbul), 21h. (Tucson (2) and Shasta Dam), 23h. (near Istanbul).

March 2d. 6h. South-west Pacific.

Apia eP = 20m.7s., eS = 21m.1s, e = 23m.11s.

Lick ePZ = 31m.2s.a, iZ = 31m.16s.

Pasadena iPZ = 31m.4s., eZ = 31m.18s. and 31m.28s.

Riverside ePZ = 31m.7s.

Fresno ePZ = 31m.8s.a.

Palomar iPZ = 31m.8s., eZ = 31m.19s., iZ = 31m.47s. and 32m.1s.

Shasta Dam eP = 31m.12s.

China Lake iPZ = 31m.13s., iZ = 31m.25s.

Tinemaha iPZ = 31m.14s.

Mineral ePZ = 31m.14s.k, iZ = 31m.29s. and 31m.56s.

Reno ePEZ = 31m.18s.k, eN = 31m.51s.

Boulder City eP = 31m.25s.

Overton ePZ = 31m.27s.

Pierce Ferry iP = 31m.29s.

Tucson iP = 31m.30s.

Logan eP = 31m.50s., e = 32m.5s.

Hungry Horse iP = 32m.1s.

College iP = 32m.2s., i = 32m.17s.

Collmberg eZ = 39m.10s.

Jena ePKP?N = 39m.16s., eN = 39m.25s.

Stuttgart ePKPZ = 39m.20s.

Tamanrasset ePKPZ = 39m.40s., ePKP,Z = 41m.15s.

Long waves were recorded at Auckland and Wellington.

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March 2d. 18h. 39m. 44s. Epicentre 60°·3S. 35°·0W. (as on 1946 October 26d.).

A = +·4079, B = -·2856, C = -·8672;  $\delta = -1$ ;  $h = -9$ ;  
D = -·574, E = -·819; G = -·710, H = +·497, K = -·498.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	E.	29·4	321	(6 16?)	+ 9	—	—	—	—
Buenos Aires		29·9	320	i 6 14	+ 2	11 12	+ 3	—	14·2
Grahamstown		47·7	84	i 8 39	- 1	—	—	—	—
La Paz		49·9	317	i 8 58k	+ 1	i 15 58	- 9	i 10 52	PP 23·3
Pietermaritzburg	z.	52·6	85	e 9 16	- 2	—	—	—	—
Pretoria	z.	54·7	80	i 9 1	-32	—	—	—	—
Huancayo		56·6	310	i 9 55	+ 8	i 17 40	+ 2	e 13 24	PPP e 27·3
Tananarive		70·1	92	e 11 16	0	e 20 33	+ 6	13 55	PP —
Bogota		71·6	318	i 11 26	+ 1	e 20 46	+ 2	e 14 57	PP e 46·3
Chinchina		72·4	318	i 11 30	0	e 21 4	+11	e 14 22	PP 40·3
Christchurch		74·1	200	11 36	- 4	21 22	+10	e 14 46	PP 38·1
Wellington		75·9	203	i 11 48	- 2	21 34	+ 2	e 26 30	SS 36·3
Fort de France		77·7	334	e 11 56	- 4	e 21 56	+ 4	—	—
Galerazamba		77·8	320	i 12 20	+19	e 21 45	- 8	e 14 21	PP 38·3
Auckland	N.	80·1	204	e 16 16?	PP	—	—	—	—
San Juan		82·4	330	e 12 24	- 1	e 23 13	PS	e 15 56	PP e 30·8
Perth		85·0	155	i 15 28	PP	i 23 3	[+ 2]	i 28 49	SS i 42·2
Riverview		86·1	185	i 12 44k	0	i 23 20	+ 2	i 16 8	PP e 41·3
Tamanrasset	z.	89·1	37	i 12 58	0	e 23 38	- 8	e 16 29	PP e 43·3
Brisbane		92·3	187	i 13 14a	+ 1	e 24 16	+ 1	—	—
Tacubaya		94·7	301	e 13 26	+ 2	—	—	e 18 46	PPP —
Malaga	z.	99·9	23	i 13 42a	- 6	26 50	PS	18 18	PP 51·8
Granada		100·5	24	11 29a	?	24 5	[-24]	28 41	PPS 44·9
Alicante		102·3	26	14 31	+32	28 0	PPS	18 49	PP e 49·0
Helwan	N.	104·8	55	e 18 28	PP	e 25 31	(+ 2)	e 26 28	S —
Philadelphia		105·2	328	—	—	e 33 48	SS	—	— e 43·8
City College, N.Y.		105·7	330	e 17 53	PKP	e 26 23	+15	—	— e 31·5
Fordham		105·7	330	e 18 38	PP	e 27 42	PS	i 33 38	SS 52·3
Weston		106·6	332	e 14 8	-10	—	—	—	— e 47·3
Harvard		106·7	332	i 18 42	PP	e 34 6	SS	e 37 36	SSS e 50·4
Pennsylvania		106·7	326	i 18 44	PP	i 25 48	{+ 6}	—	— —
Colombo	E.	108·1	107	17 36	?	28 6	PS	—	— —
St. Louis		108·5	317	i 18 56	PP	i 26 36	S	e 28 28	PS —
Rome		109·0	35	19 0	PP	e 21 57	PPP	28 50	PS —
Taranto		109·2	28	—	—	e 34 16	SS	—	— —
Kodaikanal	E.	109·9	103	e 19 1	PP	—	—	—	— —
Clermont-Ferrand		110·2	27	e 19 7	PP	e 28 36	PS	e 35 11	SS 53·3
Ksara		110·2	56	e 14 36?	P	28 48	PS	18 58	PP —
Florence Arc.		110·4	32	e 21 18	PPP	e 27 5	S	e 29 42	PPS e 44·3
Florence Xim		110·4	32	e 19 0	PP	i 21 58	PPP	—	— —
Ottawa		110·5	330	e 19 9	PP	—	—	—	— e 52·3
Tucson		110·9	298	e 18 33	[- 2]	e 25 42	{+26}	e 19 14	PP e 53·2
Basle		112·9	29	e 17 13	?	e 26 18	{- 7}	e 19 21	PP e 62·3
Paris		112·9	25	e 19 16	PP	e 30 16	PPS	—	— e 59·3
Zürich		113·0	29	e 18 49	[+10]	—	—	—	— —
Istanbul		113·8	47	e 19 36	PP	e 25 27	[- 1]	—	— —
Strasbourg		113·9	29	e 19 32	PP	e 29 16	PS	e 30 14	PPS e 52·3
Stuttgart		114·5	30	e 18 32?	[-10]	e 29 22	PS	e 19 36	PP e 59·3
Palomar	z.	114·6	294	i 18 44	[+ 2]	—	—	i 19 40	PP —
Kew		114·9	23	—	—	e 29 33	PS	e 35 59	SS e 51·3
Bombay		115·0	95	e 19 51	PP	e 29 23	PS	—	— —
Poona		115·2	96	e 19 36	PP	i 25 26	[- 7]	22 28	PPP —
Riverside	z.	115·3	294	e 18 42	[- 2]	—	—	e 29 31	PKKP —
Pierce Ferry		115·6	298	e 18 45	[+ 1]	—	—	i 19 49	PP —
Rathfarnham Castle		115·6	17	e 19 34	PP	29 44	PS	e 39 38	SSS 51·3
Boulder City		115·8	297	18 44	[- 1]	e 29 17	PS	e 19 50	PP —
Pasadena		115·8	294	i 18 44	[- 1]	e 29 35	PS	i 19 49	PP e 56·0
Overton	z.	116·1	298	e 18 45	[ 0]	e 28 18	PKKP	i 19 47	PP —
De Bilt		116·6	26	—	—	e 30 16	PPS	e 36 16	SS e 51·8
Hyderabad	N.	116·6	101	e 18 45	[- 1]	29 35	PS	—	— —

Continued on next page.

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Prague	117.0	32	e 20	0	PP	e 29	52	PS	e 31	16	PPS e 47.3
Jena	z. 117.1	30	e 19	51	PP	—	—	—	—	—	—
Rapid City	E. 117.9	311	e 20	4	PP	e 37	23	?	—	—	e 59.7
Tinemaha	z. 118.3	295	i 18	50	[+ 1]	—	—	—	—	—	—
Yalta	118.6	48	e 20	6	PP	—	—	—	—	—	—
Potsdam	z. 118.8	29	e 20	4	PP	i 30	4	PS	i 36	37	SS 62.3
Leninakan	119.4	57	—	—	—	e 22	39	PKS	—	—	—
Logan	119.4	303	e 18	49	[- 3]	—	—	—	e 20	17	PP —
Lick	z. 120.0	293	i 18	53 <sub>a</sub>	[ 0]	—	—	—	e 20	22	PP —
Tiflis	120.6	57	e 18	56	[+ 2]	26	59	{-19}	e 20	19	PP —
Berkeley	120.8	293	i 18	54 <sub>a</sub>	[ 0]	e 30	28	PS	e 20	24	PP e 57.4
Reno	z. 121.0	296	e 18	56 <sub>a</sub>	[+ 1]	—	—	—	e 20	26	PP —
Copenhagen	121.6	28	20	39	PP	30	49	PS	—	—	62.3
Baku	121.7	62	e 18	56	[ 0]	—	—	—	—	—	—
Mineral	z. 122.5	74	e 18	57 <sub>a</sub>	[- 1]	—	—	—	—	—	—
Shasta Dam	123.1	295	e 18	58	[- 1]	—	—	—	e 20	52	—
Ashkabad	123.6	70	e 19	1	[+ 1]	—	—	—	—	—	—
New Delhi	N. 125.3	92	e 20	55	PP	e 25	51	[-16]	e 30	54	PS 42.4
Hungry Horse	125.7	305	i 19	2	[- 2]	e 31	48	PPS	20	42	PP —
Seattle	128.5	300	e 19	10	[+ 1]	—	—	—	e 19	42	? —
Helsinki	z. 128.8	32	i 20	9	[+59]	—	—	—	i 20	42	PP —
Moscow	129.1	43	e 19	11	[+ 1]	—	—	—	21	8	PP —
Samarkand	129.1	75	e 19	12	[+ 2]	—	—	—	—	—	—
Stalinabad	129.1	78	i 19	11	[+ 1]	e 29	2	{+48}	e 21	6	PP —
Obi-garm	129.7	78	i 19	10	[- 1]	—	—	—	e 22	33?	PKS —
Victoria	129.7	300	i 19	11 <sub>a</sub>	[ 0]	—	—	—	—	—	—
Pulkovo	130.1	35	e 19	12	[ 0]	—	—	—	e 21	19	PP —
Scoresby Sund	130.8	5	—	—	—	e 23	4	PKS	—	—	63.3
Tashkent	131.5	76	i 19	14	[- 1]	e 31	50	PS	i 21	34	PP —
Fergana	132.0	78	e 19	14	[- 2]	—	—	—	e 22	41	PKS —
Tchimkent	132.4	75	e 19	24	[+ 7]	—	—	—	—	—	—
Andijan	132.6	78	e 19	16	[- 1]	—	—	—	i 22	42	PKS —
Naryn	134.9	81	e 19	20	[- 1]	e 28	30	{-20}	i 21	58	PP —
Frunse	135.3	78	e 19	41	[+19]	—	—	—	e 22	19	PP —
Almata	136.7	79	e 19	19	[- 5]	—	—	—	—	—	—
Sverdlovsk	138.7	55	i 19	26	[- 2]	e 23	1	PKS	e 22	17	PP —
Semipalatinsk	143.4	74	i 19	32	[- 4]	—	—	—	—	—	—
College	150.1	308	e 19	41	[- 7]	e 29	42	{-36}	—	—	—
Irkutsk	156.0	89	i 19	55	[- 1]	e 31	21?	{+30}	20	24	PP —
Vladivostok	161.0	149	i 20	0	[- 2]	e 23	40	PKS	i 20	47	PKP, —

Additional readings and note :—

La Plata readings have been increased by 45m.  
 La Paz iPPP = 11m.46s., iPS = 16m.12s., iS<sub>c</sub>S = 18m.47s., SS = 19m.40s., iSSS = 20m.56s.  
 Huancayo eSS = 21m.32s.  
 Tananarive PS = 21m.0s., SS = 25m.9s.  
 Bogota eSSN = 25m.6s.  
 Chinchina eSSN = 26m.0s.  
 Christchurch eSSN = 26m.11s., QEN = 31.3m.  
 Galerazamba eEN = 19m.25s., eSKKS?EN = 29m.35s.  
 San Juan eSS = 27m.52s.  
 Riverview iE = 23m.51s. and 24m.9s., iZ = 24m.20s., iN = 24m.38s., eSSN = 28m.57s., eSSZ = 29m.4s., eQE = 35.2m.  
 Tamanrasset eZ = 13m.11s., iZ = 14m.49s., eZ = 15m.35s., ePPPZ = 18m.34s., eSKSZ = 23m.27s., iPSZ = 24m.52s., eSSZ = 29m.44s., ePKKPZ = 30m.38s.  
 Malaga iZ = 15m.50s., PPPZ = 20m.47s., QZ = 47m.50s.  
 Granada PP = 15m.17s.  
 Alicante PPP = 20m.59s.  
 Helwan eN = 18m.58s.  
 Harvard e = 33m.14s.  
 Pennsylvania iE = 18m.52s., iN = 26m.59s.  
 St. Louis ePPS = 29m.4s., i = 29m.53s.  
 Clermont-Ferrand e = 29m.13s.  
 Tucson i = 19m.38s., ePS? = 28m.46s., i = 30m.8s., eSS = 34m.56s.  
 Paris ePS? = 20m.30s., e = 45m.16s. and 50m.16s., eQ = 58.3m.  
 Zürich ePKP = 16m.39s.  
 Strasbourg e = 20m.22s., eSKP? = 21m.43s., e = 22m.43s., 28m.42s.?, and 31m.34s., eSS = 35m.8s., e = 37m.1s.  
 Stuttgart e = 21m.10s., ePPS = 30m.19s., e = 33m.16s. and 36m.58s., eSSS = 39m.58s., eQ? = 53.1m.

Continued on next page.

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Palomar iZ = 19m.8s.  
 Kew eSSSEN = 39m.53s.  
 Poona P<sub>c</sub>PEN = 19m.44s., PPPN = 24m.12s., eSEN = 29m.9s., SKSEN = 29m.32s.,  
 S<sub>0</sub>SN = 29m.40s., PSN = 30m.21s., SSN = 34m.11s.  
 Rathfarnham Castle EN = 20m.6s., 22m.7s., 24m.6s., 28m.37s., and 31m.36s., iZ =  
 32m.28s.  
 Pasadena iSSSEN = 36m.4s., eSSSEN = 39m.16s.  
 Hyderabad SN = 29m.44s.  
 Prague e = 23m.25s.  
 Potsdam iZ = 28m.51s.  
 Lick iZ = 19m.3s.  
 Tiflis eSKSP = 29m.49s., eSS = 36m.50s.  
 Berkeley iZ = 19m.4s., eSSSEN = 37m.40s., eN = 46m.34s.  
 Mineral eZ = 19m.7s.  
 New Delhi PPS = 31m.53s.  
 Hungry Horse i = 19m.34s., ePKKP? = 28m.40s., eSKKP? = 32m.22s.  
 Stalinabad ePPP = 23m.44s., SKSP = 31m.8s., eSS = 38m.25s., SSS = 43m.40s.  
 Tashkent eSS = 39m.21s.  
 Naryn iPKS = 22m.51s., PS = 32m.12s.  
 Sverdlovsk eSS = 40m.22s.  
 College i = 20m.20s., e = 31m.24s.  
 Irkutsk ePP = 24m.5s., ePPP = 27m.29s., SKSP = 34m.24s.?  
 Vladivostok iPP = 24m.27s., ePPP = 27m.50s.?, iSS = 44m.46s.  
 Long waves were also recorded at Bermuda, Bozeman, Lincoln, Upsala, Warsaw, and Toledo.

March 2d. Readings also at 1h. (Mizusawa), 3h. (Mineral), 4h. (near Mizusawa), 5h. (near Garm, Obi-garm, and Stalinabad), 6h. (Stuttgart, and near Huancayo), 7h. (College, Obi-garm, near Andijan, and Naryn), 8h. (Cleveland, Stuttgart, and near Andijan), 9h. (near Andijan), 10h. (Tamanrasset (2), near Helwan, near Huancayo, near Andijan, Garm, Obi-garm, and Stalinabad), 11h. (La Paz, Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, and Hungry Horse), 12h. (Pasadena, Riverside, China Lake, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Andijan), 13h. (Auckland, La Paz, Mount Wilson, Palomar, China Lake, Tucson, Overton, Pierce Ferry, and Shasta Dam), 14h. (near Victoria), 18h. (near Garm), 19h. (Tamanrasset), 20h. (College, Victoria, and Tamanrasset), 21h. (Hungry Horse and College), 22h. (Ashkabad, Prague, Tamanrasset, Hungry Horse (2), and College), 23h. (Christchurch, Tuai, and Wellington).

March 3d. 6h. 12m. 24s. Epicentre 60°·3S. 35°·0W. (as on 2d.).

A = +·4079, B = -·2856, C = -·8672;  $\delta = -1$ ;  $h = -9$ .

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Paz	49·9	317	i 8 56	- 1	i 15 56	-11	i 10 37 PP	26·1
Huancayo	56·6	310	e 9 47	0	e 17 54	PS	—	e 30·9
Tamanrasset	z. 89·1	37	i 12 58 <sub>a</sub>	0	—	—	e 13 28 ?	—
Ksara	110·2	56	e 18 16	[-18]	e 29 50	PPS	—	—
Tucson	110·9	298	e 13 45	?	—	—	—	—
Pierce Ferry	115·6	298	e 14 25	P	—	—	—	—
Boulder City	115·8	297	e 14 29	P	—	—	—	—
Overton	z. 116·1	298	e 14 31	P	—	—	—	—
China Lake	z. 116·9	295	e 14 44	P	—	—	—	—
Hungry Horse	125·7	305	i 19 1	[- 3]	—	—	—	—
College	150·1	308	i 19 50	[+ 2]	—	—	i 19 55 PKP <sub>1</sub>	—

College gives also i = 20m.16s.

Long waves were also recorded at Malaga and San Juan.

March 3d. 10h. 43m. 39s. Epicentre 27°·9S. 175°·9W. Depth of focus 0·005.

A = -·8828, B = -·0632, C = -·4654;  $\delta = -7$ ;  $h = +2$ ;  
 D = -·071, E = +·997; G = +·464, H = +·033, K = -·885.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	N. 11·9	219	e 3 8	PPP	5 36	SSS	—	—
Tuai	N. 12·3	206	—	—	4 59	-11	—	e 7·0
Apia	14·6	16	e 3 24	0	e 5 52	-13	—	—
Wellington	15·4	207	e 3 37	+ 2	e 6 8	-16	—	e 6·8
Kalmata	N.E. 17·9	214	e 4 4	- 2	e 8 10	SSS	—	—

Continued on next page.



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	△	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Christchurch	18.2	209	e 4 31	PP	e 7 22	- 5	—	—
Brisbane	27.5	264	i 5 41	- 1	i 10 31	+14	i 6 31	PP i 13.3
Riverview	28.8	251	e 5 55	+ 1	e 10 33	- 5	i 6 48	PP
Santa Clara	z. 82.3	41	i 12 25 <sup>a</sup>	+ 9	—	—	—	—
Pasadena	82.4	46	e 12 18	+ 2	—	—	i 12 30	pP e 39.4
Berkeley	82.5	41	e 12 19	+ 2	—	—	—	— e 36.4
Lick	z. 82.5	41	i 12 18 <sup>a</sup>	+ 1	—	—	i 12 23	P <sub>e</sub> P
Palomar	z. 82.7	47	e 12 19	+ 1	—	—	i 12 34	pP
Riverside	z. 82.8	46	e 12 19	+ 1	—	—	i 12 34	pP
Fresno	z. 83.2	43	e 12 23 <sup>a</sup>	+ 2	—	—	e 15 32	PP
China Lake	z. 83.9	44	i 12 24	0	—	—	i 12 39	pP
Tinemaha	z. 84.3	43	i 12 27	+ 1	—	—	i 12 41	pP
Shasta Dam	84.4	38	i 12 27	0	—	—	e 12 42	pP
Mineral	z. 84.6	39	i 12 29 <sup>k</sup>	+ 1	—	—	i 12 43	pP
Reno	85.0	41	e 12 31	+ 1	—	—	e 12 50	pP
Vladivostok	85.4	325	i 12 35	+ 3	22 55	- 1	e 23 9	PS
Boulder City	85.7	46	e 12 34	+ 1	—	—	—	—
Tucson	86.0	50	i 12 36	+ 1	e 22 57	- 5	e 12 51	pP e 29.9
Overton	z. 86.3	46	i 12 38	+ 2	—	—	e 15 8	?
Pierce Ferry	86.3	46	i 12 37	+ 1	—	—	—	—
Victoria	89.4	33	e 12 49	- 2	—	—	—	—
Logan	91.1	43	e 13 1	+ 2	—	—	e 16 38	PP e 45.4
Huancayo	93.6	106	e 13 22	pP	i 24 4	- 7	e 25 45	PS i 47.8
Hungry Horse	93.9	37	i 13 11	- 1	—	—	i 13 25	pP
College	95.0	12	e 13 14	- 3	—	—	i 13 30	pP
La Paz	97.4	113	i 13 37	+ 9	i 24 15	SKKS	17 33	PP 49.4
Irkutsk	105.7	322	—	—	24 50? [+13]	—	—	—
Kodaikanal	E. 109.4	273	—	—	e 25 1 [+ 8]	—	—	—
Pennsylvania	113.4	55	i 24 23	?	e 31 33	?	e 37 37	?
Ottawa	116.1	50	i 30 51	PPS	—	—	e 57 51	Q e 63.4
Bombay	117.0	278	e 22 37	PKS	e 25 39 [+16]	—	e 26 54	SKKS
Obi-garm	125.2	300	e 19 2	[+ 9]	—	—	—	—
Stalinabad	125.8	300	e 19 10	pPKP	e 26 7 [+15]	—	e 21 6	PP
Tchimkent	125.8	304	e 18 58	[+ 3]	—	—	—	—
Tashkent	125.9	303	e 19 10	pPKP	e 26 9 [+17]	—	i 20 51	PP
Sverdlovsk	131.1	323	e 19 17	[+12]	e 26 20 [+14]	—	e 38 53	SS
Moscow	143.2	329	e 22 47	PP	—	—	—	—
Tiflis	144.2	304	e 19 40	[+12]	e 23 16	PKS	—	—
Erevan	144.6	302	e 19 56?	[+27]	—	—	—	—
Helsinki	z. 144.7	343	i 19 43	pPKP	—	—	—	—
Leninakan	145.0	303	e 19 38?	pPKP	—	—	—	—
Sotchi	147.4	309	e 19 56?	pPKP	—	—	—	—
Simferopol	150.7	315	e 20 3	pPKP <sub>2</sub>	—	—	—	—
Yalta	150.8	314	e 19 38	[- 1]	—	—	—	—
Copenhagen	151.6	351	i 19 51	[+11]	—	—	—	—
Ksara	152.2	291	e 19 53	[+12]	34 7	PSKS	—	—
Rathfarnham Cste.	152.6	14	e 20 55	[+73]	—	—	—	80.4
Collmberg	z. 155.7	346	e 19 55?	[+ 9]	—	—	20 0	PKP <sub>2</sub>
De Bilt	155.8	358	e 20 15	PKP <sub>2</sub>	—	—	—	e 83.4
Helwan	156.1	282	e 20 9	pPKP	30 51	SKKS	e 23 54	PP
Kew	156.2	7	e 20 27	PKP <sub>2</sub>	e 43 32	SS	—	e 82.4
Jena	z. 156.3	347	e 19 53	[+ 6]	e 22 53	SKP	e 23 57	PP
Prague	156.5	344	e 20 9	pPKP	—	—	e 20 51	pPKP <sub>2</sub>
Stuttgart	158.8	351	e 19 57	[+ 7]	e 23 51	SKP	e 20 34	PKP <sub>2</sub>
Paris	159.1	4	e 19 56	[+ 6]	—	—	e 20 11	pPKP e 85.4
Strasbourg	159.1	353	e 20 13?	pPKP	—	—	e 23 56?	PP e 90.3
Clermont-Ferrand	162.2	3	e 20 10	pPKP	—	—	—	88.4
Florence Arc.	163.1	342	e 21 23	pPKP <sub>2</sub>	e 31 49	SKKS	e 24 30	PP
Florence Xim	163.1	342	e 20 37	PKP <sub>2</sub>	i 30 54	SKKS	—	—
Taranto	163.4	323	(25 21)	pPP	—	?	—	25.4
Rome	164.4	336	e 20 33	PKP <sub>2</sub>	e 31 26	SKKS	i 24 54	PP
Toledo	z. 166.3	27	e 19 59	[+ 1]	—	—	e 24 54	PP
Malaga	z. 168.6	37	e 20 15	PKP <sub>2</sub>	27 1	[+ 7]	i 25 9	PP e 88.0
Alicante	168.9	19	e 20 33	[+34]	27 6	[+11]	25 4	PP e 79.0
Tamanrasset	z. 174.8	195	e 20 5	[+ 3]	e 23 35	PKS	i 20 20	pPKP 91.4

For Notes see next page.

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NOTES TO MARCH 3d. 10h. 43m. 39s.

Additional readings and note :—

Brisbane iSSE = 11m.48s.  
 Riverview ePE = 5m.58s., eN = 10m.28s., iE = 10m.48s., iN = 11m.5s., iZ = 12m.10s.  
 Pasadena iZ = 12m.38s. and 12m.52s.  
 Palomar i = 12m.23s., iZ = 13m.16s.  
 Riverside iZ = 12m.23s.  
 China Lake iZ = 13m.0s.  
 Mineral iZ = 12m.34s.  
 Tucson e = 23m.23s.  
 Logan e = 14m.45s.  
 College ePP = 16m.43s., e = 17m.4s.  
 La Paz PSZ = 25m.29s.  
 Stalinabad eSKKS = 27m.50s.  
 Tashkent iSKKS = 27m.49s., ePS = 30m.55s.  
 Sverdlovsk SKKS = 28m.22s.  
 Helsinki iZ = 19m.50s., 20m.12s., and 20m.19s.  
 Rathfarnham Castle iEN = 21m.1s.  
 Helwan eZ = 20m.21s., PPZ = 24m.12s., PPPZ = 27m.41s., eZ = 32m.37s. and 41m.4s.  
 Stuttgart eZ = 20m.4s., eSS = 44m.15s.  
 Strasbourg e = 22m.11s., 28m.37s., 35m.1s., and 36m.21s.?  
 Toledo eZ = 21m.4s.  
 Malaga PPPZ = 28m.55s.  
 Alicante PKP<sub>2</sub> = 21m.28s., SS = 45m.22s., SSP? = 46m.14s.  
 Tamanrasset ePKP<sub>2</sub>Z = 21m.39s., iZ = 21m.55s., eZ = 22m.42s., ePPZ = 25m.26s., iZ = 25m.42s.  
 Long waves were also recorded at Saskatoon, Ukiah, Chicago, Philadelphia, Harvard, Weston, and Scoresby Sund.

March 3d. 15h. 41m. 8s. Epicentre 60°·3S. 35°·0W. (as at 6h.).

$$A = +.4079, B = -.2856, C = -.8672; \quad \delta = -1; \quad h = -9.$$

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	29.4	321	6 5	- 2	10 58	- 3	13 52? Q	14.2
Grahamstown	47.7	84	e 8 40	0	—	—	—	—
La Paz	49.9	317	e 8 57	0	i 16 18	+11	i 10 58 PP	26.4
Pietermaritzburg z.	52.6	85	e 9 17	- 1	—	—	—	—
Pretoria z.	54.7	80	e 9 31	- 2	—	—	—	—
Huancayo	56.6	310	i 9 50	+ 3	e 17 49	+11	—	—
Tananarive	70.1	92	—	—	e 20 33	+ 6	25 42 SS	34.6
Bogota	71.6	318	i 11 26	+ 1	i 20 57	+13	i 14 6 PP	44.9
Chinchina	72.4	318	e 11 31	+ 1	e 21 0	+ 7	e 14 23 PP	—
Riverview	86.1	185	e 12 54	+10	e 23 15	- 3	e 29 7 SS	—
Tamanrasset z.	89.1	37	i 12 59 <sub>a</sub>	+ 1	e 23 45	- 1	e 16 30 PP	43.9
Helwan z.	104.8	55	e 18 25	[+ 2]	e 25 4	[+14]	—	—
Rome	109.0	35	e 18 41	PP	—	—	—	—
Ksara	110.2	56	e 19 15	PP	28 55	PS	—	—
Tucson	110.9	298	e 18 36	[+ 1]	—	—	e 18 43 ?	e 54.2
Palomar z.	114.6	294	e 18 50	[+ 8]	—	—	i 19 48 PP	—
Riverview z.	115.3	294	e 18 51	[+ 7]	—	—	—	—
Pierce Ferry	115.6	298	e 18 45	[+ 1]	—	—	e 19 49 PP	—
Pasadena z.	115.8	294	i 18 53	[+ 8]	—	—	—	—
Overton z.	116.1	298	e 19 27	PP	e 28 57	PS	—	—
China Lake z.	116.9	295	i 18 48	[+ 1]	—	—	e 20 4 PP	—
Tinemaha z.	118.3	295	e 18 51	[+ 2]	—	—	e 19 57 PP	—
Logan	119.4	303	e 20 16	PP	e 33 3	?	—	—
Lick z.	120.0	293	i 18 54 <sub>a</sub>	[+ 1]	—	—	e 19 1 ?	—
Tiflis	120.6	57	e 20 15	PP	e 30 5	PS	—	—
Mineral z.	122.5	74	e 18 59 <sub>k</sub>	[+ 1]	—	—	e 19 4 ?	—
Shasta Dam	123.1	295	e 18 58	[- 1]	—	—	—	—
Hungry Horse	125.7	305	i 19 3	[- 1]	e 32 23	PPS	e 23 41 PPP	—
Garm	130.2	78	e 19 12	[ 0]	—	—	—	—
Tashkent	131.5	76	e 19 13	[- 2]	i 22 36	PKS	i 21 44 PP	—

Continued on next page.

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	$\Delta$ °	Az. °	P. m. s.	O - C. s.	S. m. s.	O - C. s.	Supp. m. s.	L. m.
Tchimkent	132.4	75	i 22 15	PP	i 22 40	PKS	—	—
Andijan	132.6	78	e 19 8	[- 9]	e 26 2	[- 24]	e 22 44	PKS
Sverdlovsk	138.7	55	e 22 15	PP	e 23 9	PKS	—	—
Semipalatinsk	143.4	74	e 19 46	[+ 10]	—	—	—	—
College	150.1	308	i 20 52	[+ 64]	—	—	—	—
Vladivostok	161.0	149	e 20 1	[- 1]	e 44 47	SS	i 20 52	PKP <sub>s</sub>

Additional readings :—

La Plata PE = 6m.16s., N = 9m.40s., SN = 11m.4s., E = 11m.58s.

La Paz iS<sub>c</sub>S = 18m.51s., iSS = 19m.52s.

Riverview iSE = 23m.24s., iS<sub>c</sub>SE = 23m.32s., esSE = 23m.44s.

Tamanrasset eZ = 13m.58s. and 15m.5s., ePPPZ = 18m.8s., ePSZ = 24m.54s.

Helwan eZ = 20m.22s. and 23m.6s.

China Lake iZ = 18m.54s.

Hungry Horse i = 19m.9s. and 19m.26s., e = 28m.34s.

Tashkent eSKSP = 31m.26s.

College i = 20m.57s., e = 22m.21s.

Vladivostok ePP = 24m.32s.

Long waves were also recorded at Harvard and Ottawa.

March 3d. Readings also at 0h. (Ksara, Tamanrasset, Pasadena, Mount Wilson (2), Riverside (2), Palomar, China Lake, Tinemaha (2), Lick, Mineral, Shasta Dam, Hungry Horse, College (2), Overton (2), Pierce Ferry (2), Tucson, near Balboa Heights (2), and near Huancayo), 1h. (Granada, and near Apia), 2h. (Balboa Heights), 4h. (College, Hungry Horse, Mineral, Lick, Mount Wilson, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, Apia, Frunse, near Garm, Obi-garm, Andijan, and Tchimkent), 5h. (Tucson, La Paz, and near Ottawa), 7h. (College (2), Hungry Horse, Shasta Dam, Mineral, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, and near Klyuchi), 9h. (College, Ksara, Mary, Fergana, Andijan (3), Tchimkent, Frunse, Tashkent, Przhevalsk, near Garm, Obi-garm, Stalinabad, Samarkand, Naryn, Leninakan, and near Tiflis), 10h. (College, Hungry Horse, Shasta Dam, Mineral, Mount Wilson, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, La Paz, and near Mizusawa), 11h. (near Klyuchi), 13h. (Pretoria, College, Hungry Horse (2), Mineral, Mount Wilson, Palomar, Tinemaha, Tucson (2), near Boulder City, Overton (2), Pierce Ferry (2), and near Andijan), 14h. (College, Hungry Horse, Shasta Dam, and near Victoria), 15h. (Klyuchi), 17h. (Apia, near Overton, and Pierce Ferry), 18h. (College, Pierce Ferry, and near Ashkabad (2)), 19h. (Bandong, Djakarta, Bombay, and Ksara), 22h. (Tashkent, Stalinabad, Samarkand, Andijan, Frunse, Grozny, Tiflis, near Ashkabad, Kizyl-Arvat, and Mary), 23h. (Stuttgart, Mary, near Ashkabad (2), and Kizyl-Arvat).

March 4d. 15h. Undetermined shock.

Huancayo eP = 28m.46s.

La Paz PZ = 29m.5s., S = 34m.41s., L = 38m.0s.

La Plata PN = 32m.8s., PPE = 33m.48s., N = 33m.54s., LN = 37.6m.

Tucson eP = 33m.5s., e = 33m.39s., ePP = 35m.25s.

Palomar iPZ = 33m.17s.

Ksara e = 33m.20s. and 41m.58s.

Pasadena ePZ = 33m.20s.

China Lake ePZ = 33m.28s.

Pierce Ferry eP = 33m.28s.

Boulder City eP = 33m.29s.

Tinemaha ePZ = 33m.37s.

Overton ePZ = 33m.38s.

Lick ePZ = 33m.46s. a, iZ = 33m.56s., eZ = 34m.31s.

Berkeley ePZ = 33m.53s. a

Reno ePN = 33m.56s.

Shasta Dam eP? = 33m.59s.

Hungry Horse eP = 34m.31s., i = 34m.40s., e = 34m.49s.

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March 4d. 15h. 48m. 33s. Epicentre 60°·3S. 27°·9W. (as on Feb. 22d.).

A = +·4401, B = -·2330, C = -·8672;  $\delta = +1$ ;  $h = -9$ ;  
D = -·468, E = -·884; G = -·766, H = +·406, K = -·498.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	32·0	310	6 39	+ 9	12 15	+33	13 45	14·4
Buenos Aires	32·5	310	i 6 35	+ 1	—	—	—	—
Grahamstown	44·2	78	i 8 15	+ 3	—	—	i 8 50	—
Pietermaritzburg z.	49·1	79	i 8 48	- 3	e 15 57	+ 1	e 9 29	—
Pretoria z.	51·3	74	i 9 9	+ 1	e 16 12	-14	i 9 44	—
La Paz	52·5	309	e 9 7	-10	i 16 29	-14	i 9 59	24·0
Huancayo	59·4	303	i 10 5	- 1	e 18 9	- 6	e 14 14	—
Bogota	74·1	311	i 11 38	- 2	i 21 0	-12	i 14 29	31·4
Chinchina	75·0	312	i 11 41	- 4	e 22 1	PS	i 14 29	—
Christchurch	75·2	194	i 11 56	+10	i 21 21	- 4	e 21 55	e 31·1
Wellington	77·1	196	e 12 0	+ 3	i 21 38	- 8	e 12 33	—
Cobb River E.	77·6	196	e 11 47	-13	—	—	—	—
Tuai N.	79·1	199	e 13 25	?	—	—	—	—
Arapuni	80·0	198	e 12 18	+ 5	—	—	—	—
Riverview	86·2	179	i 12 48k	+ 4	i 23 12	- 7	i 13 22	—
Tamanrasset z.	87·2	32	i 12 48k	- 1	—	—	i 16 12	—
Brisbane	92·5	181	i 13 18	+ 4	i 23 39	{- 8}	26 36	—
Alicante	101·0	21	—	—	25 0	{- 1}	26 36	e 46·4
Helwan	102·0	50	e 18 9	PP	e 25 42	+ 5	e 32 27	—
Washington	106·8	322	i 18 46	PP	—	—	i 19 1	—
Rome z.	107·1	31	—	—	e 29 29	PPS	—	—
Ksara	107·3	51	e 18 45	PP	e 28 6	PS	—	—
Florence Xim.	108·5	28	e 19 6	PP	—	—	—	—
St. Louis	111·0	311	i 19 12	PP	e 26 5	{- 7}	e 29 38	—
Istanbul	111·2	42	e 18 21	[-15]	—	—	—	—
Bombay N.	111·5	89	e 21 2	PPP	e 25 1	[-17]	i 28 42	—
Paris	111·5	21	i 19 17	PP	—	—	—	—
Ottawa	112·3	325	e 18 36	[- 2]	—	—	i 19 21	—
Strasbourg	112·3	24	i 19 23k	PP	—	—	—	—
Stuttgart z.	112·8	25	e 18 36?	[- 3]	—	—	e 19 25	—
Kew E.	113·6	18	e 19 27?	PP	—	—	—	—
Tucson	114·1	292	e 18 39	[- 2]	e 30 1	PPS	e 19 36	—
Prague	115·2	28	e 18 4	[-39]	—	—	e 19 30	—
Collmberg z.	116·0	27	e 18 41	[- 4]	—	—	—	—
Tiflis	117·6	53	e 19 58	PP	29 51	PS	—	—
Palomar z.	117·9	288	i 18 46	[- 3]	—	—	—	—
Baku	118·6	58	e 20 6	PP	—	—	—	—
Riverside z.	118·6	288	i 18 47	[- 3]	—	—	e 19 44	—
Pierce Ferry	118·8	293	i 18 48	[- 2]	—	—	i 20 21	—
Boulder City	119·0	292	i 18 48	[- 3]	—	—	i 20 24	—
Pasadena	119·1	288	i 18 49	[- 2]	e 29 43	PS	i 20 12	—
Overton z.	119·3	293	i 18 54	[+ 3]	e 29 13	PS	i 20 19	—
China Lake z.	120·2	290	i 18 50	[- 3]	i 29 39	PS	i 20 15	—
Tinemaha z.	121·6	290	i 20 27	PP	e 29 27	PS	i 28 59	—
Fresno z.	122·0	289	e 18 55k	[- 2]	—	—	e 20 31	—
Logan	122·4	298	e 18 54	[- 3]	—	—	e 20 27	—
Lick z.	123·3	287	i 18 58a	[- 1]	—	—	—	—
Berkeley z.	124·1	287	i 18 58k	[- 3]	—	—	i 19 10	—
Reno z.	124·2	291	e 18 59	[- 2]	—	—	e 20 33	—
Samarkand	125·7	71	e 19 6	[+ 2]	—	—	—	—
Stalinabad	125·7	73	i 19 2	[- 2]	27 46	{- 6}	i 22 36	—
Shasta Dam	126·4	290	e 19 2	[- 3]	—	—	—	—
Tashkent	128·1	72	i 19 6	[- 2]	—	—	i 21 18	—
Hungry Horse	128·6	302	i 19 6	[- 3]	e 32 9	PS	e 21 15	—
Tchimkent	129·0	70	i 19 12	[+ 2]	—	—	—	—
Andijan	129·1	74	e 19 9	[- 1]	e 22 34	PKS	e 21 22	—
Seattle	131·7	295	e 22 22	PP	e 22 49	PKS	e 22 59	—
Frunse	131·8	73	—	—	e 22 43	PKS	—	—
Victoria	132·8	295	i 19 17k	[ 0]	—	—	—	—
Sverdlovsk	135·8	52	i 19 22	[- 1]	e 23 1	PKS	e 22 1	—

Continued on next page.

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	$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Irkutsk	152.8	85	19 51	[- 1]	—	—	—	—
College	152.9	306	e 19 46	[- 6]	—	—	e 23 40	PP
Vladivostok	158.9	136	i 19 59	[- 1]	i 30 53	{-13}	e 20 32	PKP <sub>2</sub>

Additional readings :—

La Plata E = 11m.27s., N = 12m.21s.  
 La Paz iPZ = 9m.15s., iPPZ = 10m.56s., iSS = 17m.31s.  
 Bogota ePPPSEN = 21m.36s., eS<sub>c</sub>SEN = 21m.56s.  
 Christchurch iPZ = 12m.21s., S<sub>c</sub>S = 22m.21s., eSSEN = 26m.17s.  
 Riverview iKSN = 23m.2s., iSN = 24m.6s., eSSE = 28m.59s.  
 Tamanrasset iZ = 13m.26s., eZ = 14m.49s.  
 Helwan eZ = 18m.41s., 27m.8s., 27m.48s., and 29m.54s.  
 St. Louis e = 19m.43s., 28m.34s., and 29m.19s.  
 Ottawa eP = 20m.1s.  
 Boulder City ePP = 20m.1s.  
 Pasadena iPPZ = 19m.47s., iEZ = 20m.30s.  
 China Lake iZ = 20m.35s., iPKK<sub>2</sub> = 29m.2s., eZ = 32m.20s.  
 Tinemaha iZ = 20m.45s.  
 Logan e = 21m.53s. and 32m.42s.  
 Lick iZ = 19m.0s. and 19m.11s., iPPZ = 19m.55s.  
 Stalinabad PPP = 23m.48s., SS = 37m.45s.  
 Andijan ePPP = 23m.55s., SS = 38m.27s.  
 Sverdlovsk eSS = 39m.53s.  
 College e = 19m.49s., i = 19m.55s., e = 20m.7s., i = 20m.47s., e = 24m.31s., eSKKS? = 29m.46s.

Long waves were also recorded at Clermont-Ferrand and Harvard.

March 4d. Readings also at 2h. (College, Hungry Horse, Shasta Dam, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, Stuttgart, and near Mizusawa), 3h. (Mizusawa), 5h. (near Andijan), 6h. (Brisbane, College, Hungry Horse, Shasta Dam, Lick, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Boulder City, Pierce Ferry, Andijan, and near Naryn), 7h. (Tamanrasset, College, Hungry Horse, Shasta Dam, Overton, Pierce Ferry, Tucson, and Pretoria), 8h. (Hungry Horse, Istanbul, near Athens, and near Andijan), 9h. (Prague, Bogota, near Balboa Heights, near Andijan, and near Obi-garm), 10h. (Tamanrasset), 12h. (near Andijan), 13h. (La Paz, Tucson, Overton, Pierce Ferry, Mount Wilson, Riverside, China Lake, Tinemaha, Hungry Horse, and Shasta Dam), 14h. (Kew), 15h. (near Garm), 20h. (Stuttgart, Tamanrasset, Kodaikanal, Andijan, near Garm, Obi-garm (2), and Stalinabad), 22h. (Tamanrasset, near Ashkabad, and near Obi-garm).

March 5d. 0h. 32m. 44s. Epicentre 39°·2N. 70°·7E. (as on 1949, November 17d.).

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

	$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Garm	0.4	237	i 0 13	0	i 0 23	+ 2	—	—
Obi-garm	0.9	237	i 0 23	+ 3	i 0 40	+ 6	—	—
Fergana	1.4	31	i 0 23	- 4	0 40	- 6	—	—
Stalinabad	1.6	247	i 0 37	+ 7	i 1 5	+14	—	—
Andijan	2.0	39	i 0 34	- 1	i 0 59	- 3	—	—
Tashkent	2.4	333	i 0 45	+ 4	i 1 27	+15	—	—
Samarkand	2.9	279	i 0 55	+ 7	i 1 48	+24	—	—
Tchimkent	3.1	345	i 0 54	+ 3	1 48	+19	—	—
Naryn	4.6	60	i 1 10	- 2	2 2	- 5	—	—
Frunse	4.7	38	i 1 14	0	i 2 8	- 2	—	—
Almata	6.2	47	i 1 34	- 1	i 2 42	- 6	—	—
Przhevalsk	6.7	58	i 1 40	- 2	—	—	—	—
Mary	7.1	260	i 1 48	0	—	—	—	—
Ashkabad	9.8	267	2 27	+ 3	4 22	+ 5	—	—
Kizyl-Arvat	11.2	274	e 2 43	- 1	4 54	+ 2	—	—
New Delhi	n. 11.9	151	e 2 45	- 9	i 4 55	-14	2 55	PP
Semipalatinsk	13.1	28	e 3 2	- 8	e 5 36?	- 2	—	—
Sverdlovsk	18.9	343	e 4 23	- 1	7 56	+ 3	—	—
Grozny	19.2	290	e 4 31	+ 3	e 8 9?	+10	—	—
Tifis	19.8	285	e 4 36?	+ 1	8 26?	+13	—	—

Continued on next page.

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		$\Delta$ °	Az. °	P. m. s.	O - C. s.	S. m. s.	O - C. s.	Supp. m. s.	L. m.
Bombay	N.	20.3	175	e 4 42	+ 2	e 8 29	+ 6	—	—
Gori		20.4	286	4 49	+ 8	—	—	—	—
Leninakan		20.6	284	e 4 53	+10	—	—	—	—
Poona		20.8	172	e 4 41	- 4	e 8 29	- 4	5 6	PP
Piatigorsk		21.2	293	e 4 54	+ 5	e 8 49	+ 8	—	—
Abastumanj		21.3	285	4 54	+ 4	—	—	—	—
Zugdidi		22.0	288	5 3	+ 5	—	—	—	—
Hyderabad	E.	22.7	161	—	—	9 5	- 4	—	—
Simferopol		27.6	295	5 51	0	—	—	—	—
Ksara		28.4	269	e 7 49	?	—	—	—	e 13.6
Prague		40.6	305	e 8 6	+23	e 17 10	SS	e 9 43	PP
Collmberg	Z.	41.4	308	e 7 43	- 7	—	—	—	—
Copenhagen		41.4	314	i 7 49	- 1	—	—	—	22.3
Jena	N.	42.7	306	e 7 57	- 3	—	—	e 9 41	P <sub>c</sub> P
Stuttgart	Z.	44.2	304	e 8 12	0	—	—	e 9 54	P <sub>c</sub> P
Strasbourg		45.1	304	i 8 20k	0	—	—	—	—
Vladivostok		45.3	65	e 9 49	PP	—	—	—	—
Paris		48.5	305	i 8 45	- 1	—	—	—	—
Tamanrasset	Z.	57.1	275	i 9 49 <sub>a</sub>	- 1	e 17 48	+ 3	e 11 59	PP
College		72.0	17	i 11 23	- 5	—	—	—	—
Hungry Horse		92.7	3	i 13 12	- 3	—	—	—	—

Additional readings :—

New Delhi PPPN = 3m.0s., QEN = 4m.45s., SSN = 5m.3s., SSSN = 5m.13s.

Bombay eE = 8m.25s.

Poona PPPN = 5m.17s., QN = 8m.53s., SSN = 9m.12s., SSSN = 9m.26s.

Prague e = 11m.20s., 16m.30s., and 18m.52s.

Collmberg Z = 7m.49s.

Jena eEN = 8m.5s.

Stuttgart eZ = 8m.55s.

Strasbourg e = 8m.27s.

Paris i = 8m.54s.

Tamanrasset eZ = 10m.37s. and 11m.44s.

College i = 11m.30s. and 12m.5s.

Long waves were also recorded at Upsala, Rome, De Bilt, and Kew.

March 5d. 9h. 21m. 50s. Epicentre 19° 0S. 174° 2W. Depth of focus 0.005.

(as on 1949, Aug. 6d.).

A = -0.9414, B = -0.0956, C = -0.3236;  $\delta = +9$ ;  $h = +5$ ;

D = -0.101, E = +0.995; G = +0.322, H = +0.033, K = -0.946.

		$\Delta$ °	Az. °	P. m. s.	O - C. s.	S. m. s.	O - C. s.	Supp. m. s.	L. m.
Apia		5.7	25	1 20	- 4	2 13	-16	—	—
Auckland	N.	20.2	207	—	—	e 9 0	+50	—	—
Tuai	N.	21.1	200	i 4 42	+ 1	8 30	+ 3	e 5 12	PP
Wellington		24.1	202	e 5 11	+ 1	e 9 27	+ 6	—	—
Kaimata	N.E.	26.4	205	e 5 38	+ 6	e 10 8	+ 9	—	16.6
Brisbane	Z.	31.2	248	i 6 17k	+ 2	—	—	—	—
Lick	Z.	74.8	41	e 11 44	+ 9	—	—	i 11 57	pP
Pasadena	Z.	75.1	46	i 11 37	0	—	—	—	—
Palomar	Z.	75.5	47	i 11 38	- 1	—	—	i 11 53	pP
Riverside	Z.	75.5	46	i 11 38	- 1	—	—	—	—
Fresno	Z.	75.6	43	e 11 40k	0	—	—	—	—
China Lake	Z.	76.4	44	i 11 44	0	—	—	—	—
Shasta Dam		76.4	38	e 11 43	- 1	—	—	e 12 2	pP
Mineral	Z.	76.7	39	e 11 44 <sub>a</sub>	- 2	—	—	i 12 6	pP
Tinemaha	Z.	76.7	43	i 11 46	0	—	—	i 12 7	pP
Reno	Z.	77.2	41	e 11 50 <sub>a</sub>	+ 1	—	—	—	—
Boulder City		78.4	46	e 11 56	+ 1	—	—	—	—
Overton	Z.	78.9	46	i 12 4	+ 6	—	—	—	—
Pierce Ferry		79.0	46	i 11 58	- 1	—	—	—	—
Tucson		79.2	50	i 12 0	0	—	—	e 12 17	pP

Continued on next page.

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	$\Delta$ °	Az. °	P. m. s.		O-C. s.	S. m. s.	O-C. s.	Supp. m. s.		L. m.
Logan	83.5	42	e 12	21	- 1	—	—	e 12 40	pP	—
Hungry Horse College	85.8	36	i 12	32	- 2	—	—	e 12 53	pP	—
Collmberg	86.0	11	i 12	32	- 3	—	—	e 12 53	pP	—
Prague	z. 147.3	351	e 19	37?	[+ 3]	—	—	—	—	—
	148.3	349	e 19	39	[+ 4]	—	—	—	—	—
Ksara	149.4	305	e 19	17	[- 20]	—	—	e 23 9	PKS	—
Paris	150.1	5	e 19	48	[+ 10]	—	—	—	—	—
Stuttgart	150.2	356	e 19	44	[+ 6]	—	—	e 20 17	PKP <sub>2</sub>	—
Strasbourg	150.4	358	i 19	47	[+ 8]	—	—	—	—	—
Tamanrasset	z. 176.2	—	e 20	7	[+ 5]	e 23 33	PKS	e 21 44	PKP <sub>2</sub>	—

Additional readings :—

Tucson e = 13m.30s.

Prague e = 14m.56s.

Strasbourg e = 19m.54s.

Tamanrasset ePPZ = 25m.28s.

March 5d. 18h. 1m. 23s. Epicentre 22°-18. 68°-7W. Depth of focus 0.020.  
(as on Feb. 13d.).

Intensity V-VI between 20° and 21°S.

Epicentre 22°S. 68°-25W. (Strasbourg). Depth 150km.

F. Greve.

Boletin del año, 1950, Instituto Sismologico, Santiago, 1951, p.4.

A = +.3369, B = -.8641, C = -.3740 ;  $\delta = +5$  ;  $h = +4$  ;  
D = -.932, E = -363 ; G = -.136, H = +.348, K = -.927.

	$\Delta$ °	Az. °	P. m. s.		O-C. s.	S. m. s.	O-C. s.	Supp. m. s.		L. m.
La Paz	5.6	6	i 1	13 <sub>a</sub>	- 9	i 2 11	- 15	—	—	—
Huancayo	11.8	327	e 2	40	- 4	e 5 2	+ 9	—	—	—
Bogota	27.1	349	e 5	27	- 3	e 9 48	- 6	e 5 58	pP	e 12.6
Chinchina	27.7	348	e 5	29	- 6	e 9 49	- 15	—	—	13.6
Tacubaya	50.9	322	e 9	1	+ 14	e 15 51	+ 2	e 18 53	?	—
Washington	61.2	354	i 9	59	- 1	—	—	e 10 27	pP	—
Weston	64.2	358	e 10	18	- 2	—	—	—	—	—
Harvard	64.3	358	i 10	18	- 2	—	—	i 10 51	sP	—
Tucson	67.4	323	i 10	40	0	—	—	e 11 14	pP	—
Ottawa	67.5	355	10	38	- 3	—	—	—	—	—
Rolphon	68.4	354	e 10	44	- 2	—	—	—	—	—
Palomar	71.8	320	i 11	8 <sub>k</sub>	+ 1	i 11 57	sP	i 11 41	pP	—
Pierce Ferry	72.0	323	i 11	10	+ 2	i 11 59	sP	i 11 45	pP	—
Boulder City	72.4	322	i 11	11	+ 1	—	—	i 11 45	pP	—
Riverside	72.5	319	i 11	11 <sub>k</sub>	0	i 12 1	sP	i 11 46	pP	—
Overton	z. 72.6	323	i 11	18	+ 6	—	—	—	—	—
Pasadena	z. 73.1	319	i 11	15 <sub>k</sub>	+ 1	i 12 4	sP	i 11 50	pP	—
China Lake	z. 73.9	321	i 11	19 <sub>k</sub>	0	—	—	i 11 54	pP	—
Logan	75.0	328	e 11	23	- 2	—	—	e 12 12	pP	—
Tinemaha	75.1	321	i 11	27 <sub>k</sub>	+ 1	i 12 16	sP	i 12 2	pP	—
Lick	z. 77.3	320	i 11	39 <sub>k</sub>	+ 1	—	—	e 12 14	pP	—
Reno	z. 77.7	323	i 11	43 <sub>k</sub>	+ 3	—	—	—	—	—
Shasta Dam	79.9	322	i 11	52	0	—	—	e 12 28	pP	—
Hungry Horse	81.0	332	i 11	59	+ 1	—	—	i 12 33	pP	—
Grahamstown	82.4	122	i 12	9	+ 4	—	—	—	—	—
Tamanrasset	z. 85.0	63	i 12	18 <sub>k</sub>	0	—	—	e 12 53	pP	—
Victoria	85.6	327	e 12	22	+ 1	—	—	—	—	—
Pretoria	z. 86.5	116	e 12	29	+ 3	—	—	—	—	—

Additional readings :—

La Paz i = 2m.3s. and 2m.40s.

Bogota eSSN = 10m.38s.

Tucson e = 11m.46s.

Overton eZ = 13m.29s.

China Lake iZ = 11m.34s., 12m.9s., and 12m.26s.

Lick iZ = 11m.44s. and 12m.29s.

Reno iZ = 12m.32s.

Tamanrasset eZ = 12m.37s. and 13m.19s.

Long waves were also recorded at College.

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March 5d. Readings also at 2h. (Mineral, La Paz, near Huancayo, and near Algiers Univ.), 3h. (Tamanrasset, near Alicante (2), and near Irkutsk), 6h. (Mineral, near Mizusawa, and near Andijan), 7h. (Hungry Horse, Pierce Ferry, La Paz, and near Bogota), 8h. (Kew, Wellington, Abastumanj, Gori, Grozny, Piatigorsk, near Erevan, Leninkan, Tiflis, and Zugdidi), 9h. (Andijan, Fergana, Frunse, Mary, near Obi-garm, Garm, Samarkand, Stalinabad, and Tchimkent), 10h. (Auckland, Christchurch, Kaimata, Wellington, Brisbane, Mount Wilson, Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, College, and Tamanrasset), 13h. (Balboa Heights), 14h. (Apia, Brisbane, Bombay, New Dehli, Pasadena, Riverside, Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Fresno, Lick, Reno, Mineral, Shasta Dam, Logan (2), Hungry Horse, College, Victoria, and Tamanrasset), 15h. (Lick and Victoria (2)), 16h. (Hungry Horse), 17h. (College, Pierce Ferry, Fergana, Mary, Naryn, Samarkand, Tchimkent, near Andijan, Obi-garm, and Stalinabad), 18h. (Poona, Tacubaya, and Toledo), 19h. (Prague), 20h. (near Andijan, Garm, Obi-garm, and Stalinabad), 21h. (Sverdlovsk), 23h. (Hungry Horse).

March 6d. 19h. 49m. 24s. Epicentre  $46^{\circ}3N$ .  $7^{\circ}5E$ . (as on Feb. 22d.).

$$A = +.6874, B = +.0905, C = +.7206; \quad \delta = -3; \quad h = -4.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Neuchatel	0.8	332	e 0 14	- 4	e 0 26	- 5	—	
Basle	1.3	3	e 0 22	- 3	e 0 32	-12	—	
Besançon	1.4	312	i 0 27	0	—	—	—	
Chur	1.5	68	e 0 32	+ 4	e 0 53	+ 4	—	
Pavia	1.6	134	e 0 35	+ 5	—	—	—	
Ravensburg	2.1	44	e 0 38	+ 1	e 1 3	- 1	e 0 43	$P_g$
Strasbourg	2.3	5	e 0 41	+ 1	i 1 9	0	i 1 18	$S_g$
Stuttgart	2.7	24	e 0 41	- 4	e 1 12	- 7	e 1 26	$S^*$
Karlsruhe	2.8	13	—	—	e 1 30	$S_g$	—	—
Clermont-Ferrand	3.1	260	e 1 14	$P_g$	e 2 0	$S_g$	—	—
Paris	4.2	308	i 1 6	- 1	i 2 24	$S_g$	i 1 22	$P_g$
Jena	5.3	29	—	—	e 2 31?	+ 6	e 2 54	$S_g$
Prague	6.0	48	e 1 51	$P^*$	e 2 47	+ 4	e 3 8	$S^*$

Additional readings:—

Ravensburg  $eS_g = 1m.5s.$  and  $1m.10s.$   
 Strasbourg  $i = 50s.$ ,  $iS? = 1m.12s.$ ,  $i = 1m.25s.$  and  $1m.30s.$   
 Stuttgart  $eP_gZ = 50s.$ ,  $eZ = 1m.2s.$ ,  $eS^*Z = 1m.21s.$   
 Paris  $i = 1m.36s.$ ,  $2m.33s.$ , and  $2m.54s.$   
 Jena  $eEN = 2m.47s.$   
 Prague  $e = 3m.15s.$

March 6d. Readings also at 2h. (near Prague), 5h. (near Obi-garm), 6h. (near Andijan), 7h. (Hungry Horse, and near College), 8h. (Prague, and near Istanbul), 9h. (Tamanrasset, and near Andijan), 10h. (near Andijan and near Logan), 11h. (near Andijan), 15h. (College), 16h. (Fergana, Stalinabad, Tashkent, Tchimkent, Obi-garm, near Almata, Andijan, Frunse, Naryn (2), Przhevsk, near Shawinigan Falls, and Seven Falls), 17h. (College, Hungry Horse, and Tamanrasset), 20h. (Tamanrasset, Bombay, Poona, New Delhi, Andijan, Samarkand, near Garm, Naryn, Obi-garm, Stalinabad, and Tashkent), 21h. (Algiers Univ., Ksara, Collmberg, Stuttgart, Tamanrasset, College, Hungry Horse, Apia, and near Ashkabad), 22h. (Apia, Palomar, Pasadena, Riverside, China Lake, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, College, Tamanrasset (2), Paris, Stuttgart, and Zagreb).



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March 7d. 2h. 7m. 47s. Epicentre 10°·5N. 122°·3E.

Intensity V at Ilo-Ilo (Panay); IV at Dumaguete, and Bacolod (Negros); III at Capiz (Panay).

Epicentres 10°·5N. 122°·25E. Strasbourg.

11°·0N. 122°·5E. U.S.C.G.S.

Communication from the French Legation in Manila.

A = -·5255, B = +·8313, C = +·1811;  $\delta = +1$ ;  $h = +6$ ;  
D = +·845, E = +·534; G = -·097, H = +·153, K = -·984.

	$\Delta$	Az.	P.		O-C.		S.		O-C.		Supp.		L. m.
			m.	s.	s.	m. s.	s.	m. s.	m. s.				
Nanking	21·7	351	i 4	58	+ 3	8	58	+ 7	i 5	12	PP	—	
Bandong	22·6	222	i 5	4	+ 1	—	—	—	—	—	—	—	
Djakarta	22·6	224	i 5	7 <sub>a</sub>	+ 4	i 9	19	+12	—	—	—	—	
Kumamoto	23·5	18	e 5	16	+ 4	9	30	+ 7	—	—	—	13·0	
Hukuoka	24·1	17	e 5	19 <sub>a</sub>	+ 1	e 9	35	+ 1	e 5	59	PPP	e 12·0	
Kōti	25·2	22	i 5	15	-14	e 10	11	+19	e 11	25	SSS	13·3	
Hamada	25·9	19	e 5	36	+ 1	e 10	25	+21	—	—	—	e 14·4	
Owase	26·7	27	e 5	42	- 1	e 10	34	+17	e 13	27	Q	e 14·2	
Kyoto	27·3	24	e 5	29	-19	e 10	16	-11	—	—	—	e 12·9	
Kameyama	27·5	26	5	56	+ 6	10	59	+29	—	—	—	13·0	
Nagoya	28·0	27	e 5	54	- 1	e 10	39	+ 1	—	—	—	e 13·6	
Gihu	28·1	27	e 5	56	+ 1	e 11	12	+32	—	—	—	13·6	
Shizuoka	28·4	29	5	59	+ 1	11	23	+38	—	—	—	14·4	
Toyama	29·3	25	e 6	17	+11	e 11	13	+14	e 7	17	PP	15·4	
Matusiro	29·7	26	e 5	59	-11	e 12	1	+55	—	—	—	16·9	
Tokyo	29·7	30	e 6	8	- 2	16	53	S <sub>c</sub> S	7	10	PP	12·4	
Nagano	N. 29·8	26	e 6	18	+ 7	e 11	8	+ 1	e 7	20	PP	e 15·2	
Sendai	32·3	29	6	32	- 1	e 11	46	0	e 7	46	PPP	16·4	
Mizusawa	E. 33·1	28	6	41	+ 1	13	41	SS	—	—	—	—	
Vladivostok	33·6	13	i 6	43	- 1	i 11	59	- 7	—	—	—	—	
Calcutta	E. 34·6	295	i 6	54	+ 1	i 12	23	+ 1	i 7	58	PP	16·5	
Sapporo	36·4	23	e 7	17	+ 9	e 12	50	0	e 7	33	pP	e 19·9	
Colombo	E. 42·1	269	7	57	+ 2	14	20	+ 4	—	—	—	24·3	
Perth	42·7	188	i 8	0	0	i 14	33	+ 9	10	1	PP	i 24·1	
Irkutsk	44·1	344	8	12	0	14	39	- 6	—	—	—	—	
Kodaikanal	E. 44·1	275	9	44	PP	i 14	52	+ 7	10	40	PPP	22·2	
New Delhi	N. 45·8	300	e 8	25	0	i 15	8	- 1	18	16	SS	21·0	
Poona	E. 47·2	286	i 8	39	+ 3	i 15	33	+ 4	10	35	PP	21·8	
Brisbane	48·1	143	i 8	41	- 2	i 15	37	- 5	i 10	30	PP	—	
Bombay	48·5	286	8	48	+ 2	i 15	50	+ 2	i 19	22	SS	22·2	
Przhevalsk	49·8	319	i 8	56	0	e 16	9	+ 3	—	—	—	—	
Naryn	50·9	316	i 9	4	- 1	16	13	- 8	—	—	—	—	
Almata	51·1	319	i 9	7	+ 1	16	25	+ 1	—	—	—	—	
Riverview	51·9	150	i 9	14 <sub>a</sub>	+ 2	e 16	34	- 1	i 9	24	pP	e 23·2	
Frunse	52·5	317	e 9	20	+ 3	e 16	47	+ 4	—	—	—	—	
Semipalatinsk	52·7	328	e 9	18	0	—	—	—	—	—	—	—	
Andijan	53·2	313	e 9	22	0	16	55	+ 3	—	—	—	—	
Fergana	53·5	313	9	24	0	16	58	+ 1	—	—	—	—	
Garm	54·2	311	i 9	31?	+ 2	16	57?	- 9	—	—	—	—	
Obi-garm	54·5	311	i 9	32	0	i 17	13	+ 3	—	—	—	—	
Stalinabad	55·2	311	i 9	38	+ 1	i 17	22	+ 2	—	—	—	—	
Tashkent	55·6	314	e 9	36	- 4	i 17	25	0	—	—	—	—	
Tchimkent	55·7	315	i 9	41	+ 1	i 17	27	+ 1	—	—	—	—	
Samarkand	56·8	311	i 9	47	- 1	17	40	- 1	—	—	—	—	
Mary	60·3	307	e 10	17	+ 4	—	—	—	—	—	—	—	
Ashkabad	63·1	307	i 10	35	+ 3	19	9	+ 7	—	—	—	—	
Sverdlovsk	65·9	329	i 10	49	- 1	i 19	33	- 4	—	—	—	—	
Auckland	N. 68·2	137	e 11	4	0	19	51	-13	e 13	24	PP	—	
Apia	69·7	109	—	—	—	e 23	8	SS	—	—	—	e 33·5	
Christchurch	70·6	143	i 11	19	0	20	41	+ 8	14	3	PP	e 34·2	
Wellington	70·6	140	i 11	16	- 3	e 20	27	- 6	i 11	39	pP	34·9	
Grozny	73·1	313	e 11	37	+ 3	21	3	+ 2	i 15	31	PPP	—	
Tiflis	73·8	311	i 11	38	0	21	8	- 1	i 11	58	P <sub>c</sub> P	—	
Erevan	74·0	309	e 11	44	+ 5	—	—	—	—	—	—	—	
Leninakan	74·5	310	e 11	42?	0	—	—	—	—	—	—	—	

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.
Piatigorsk	75.0	313	e 11	54	+ 9	—	—	—	—	—	—
Zugdidi	75.9	312	e 11	38	-12	—	—	—	—	—	—
Honolulu	76.9	70	—	—	—	e 22	2	+19	—	—	e 31.7
Moscow	78.4	325	i 12	5	+ 1	i 21	55	- 5	—	—	—
Tananarive	79.2	248	e 12	11	+ 3	e 22	12	+ 4	15	19	PP 33.6
College	80.5	26	i 12	15	0	e 22	18	- 4	i 12	31	pP —
Theodosia	80.5	314	e 12	14	- 1	—	—	—	—	—	—
Ksara	81.3	302	i 12	21 <sub>a</sub>	+ 1	22	36	+ 6	23	24	PS —
Simferopol	81.4	314	e 12	23	+ 3	—	—	—	e 15	41	PP —
Yalta	81.4	313	e 12	18	- 2	—	—	—	e 23	20	PS —
Pulkovo	82.0	329	11	49	-34	—	—	—	—	—	—
Helsinki	84.6	331	i 12	37	+ 1	e 22	55	- 8	—	—	e 47.2
Kishinev	84.8	318	12	37	0	—	—	—	—	—	—
Istanbul	85.6	311	i 12	57	+16	i 23	21	+ 8	—	—	—
Helwan	85.7	299	e 12	45	+ 3	i 23	6	[+ 1]	15	59	PP —
Lwow	87.3	320	e 12	50	0	—	—	—	—	—	—
Sitka	87.8	32	e 12	56	+ 4	e 23	27	[+ 8]	e 16	23	PP e 37.6
Upsala	88.2	331	24	36	PS	i 23	33	- 5	e 23	13	SKS e 41.2
Warsaw	88.6	323	e 12	47	- 9	23	41	- 1	23	22	SKS e 43.2
Skalnate Pleso	89.9	320	e 12	57	- 5	e 23	55	+ 1	—	—	e 42.2
Raciborz	z. 90.9	322	i 13	7	0	—	—	—	—	—	—
Budapest	91.1	318	e 14	13 <sub>?</sub>	P <sub>c</sub> P	e 24	7	+ 3	e 16	50	PP e 49.2
Kalossa	N. 91.4	318	e 13	36	+27	e 24	9	+ 2	e 23	34	SKS —
Ogyalla	91.6	319	e 14	56	?	e 23	42	[ 0]	e 16	32	PP —
Copenhagen	92.3	328	i 13	21	+ 8	i 23	46	[ 0]	—	—	44.2
Potsdam	93.2	324	i 13	18 <sub>k</sub>	+ 1	e 23	55	[+ 4]	i 13	27	P <sub>c</sub> P 47.2
Prague	93.2	322	e 13	17	0	e 24	19	- 4	e 17	0	PP e 44.2
Collmberg	93.6	323	e 13	19	0	e 24	29	+ 3	e 17	27	PP e 46.8
Zagreb	93.7	317	e 13	31	+11	e 23	53	[- 1]	e 17	11 <sub>?</sub>	PP e 50.2
Cheb	94.4	322	e 13	39 <sub>?</sub>	+16	e 24	37	+ 4	e 23	53	SKS e 45.2
Taranto	94.4	312	13	8	-15	23	53	[- 5]	30	38	SS —
Jena	94.6	322	e 13	24	0	—	—	—	e 17	22	PP —
Triest	95.2	318	e 13	17	-10	i 23	58	[- 4]	i 17	27	PP e 46.2
Scoresby Sund	95.6	349	e 13	31	+ 3	i 24	47	+ 4	i 23	57	SKS 45.2
Messina	96.4	311	e 17	39	PP	e 26	24	PS	e 31	22	SS —
Pietermaritzburg	z. 96.7	242	e 13	35	+ 2	—	—	—	e 16	55	PP —
Padova	96.8	317	17	34	PP	24	12	[+ 1]	—	—	—
Stuttgart	96.9	322	e 13	33	- 1	e 23	43	[-28]	e 17	38	PP e 49.2
Bologna	97.2	318	e 14	2	+26	e 24	13	[ 0]	e 17	51	PP —
Karlsruhe	97.2	323	e 13	41	+ 5	e 26	14	PS	—	—	e 52.2
Salo	97.3	319	e 15	18	?	e 24	11	[- 2]	e 17	43	PP —
Chur	97.4	320	e 13	37	0	—	—	—	e 17	33	PP e 54.5
Rome	97.4	315	i 13	35 <sub>a</sub>	- 2	i 24	12	[- 2]	17	39	PP —
Florence Arc.	97.5	316	e 14	32	+55	24	12	[- 2]	e 17	49	PP —
Florence Xim.	97.5	316	e 13	40	+ 3	i 24	57	- 2	—	—	—
Prato	97.6	316	e 17	28	PP	e 26	37	PS	—	—	—
De Bilt	97.7	326	e 13	35 <sub>?</sub>	- 3	i 24	13	[- 2]	e 17	45	PP e 46.2
Victoria	97.7	37	e 13	39	+ 1	e 24	22	[+ 7]	—	—	48.9
Strasbourg	97.8	322	e 13	38	0	e 25	5	+ 3	e 17	46	PP 54.0
Zürich	97.8	321	e 13	32 <sub>a</sub>	- 6	e 24	3	[-13]	e 17	28	PP —
Pretoria	z. 98.2	246	e 13	41	+ 1	—	—	—	e 17	41	PP —
Pavia	98.3	319	e 16	13 <sub>?</sub>	?	—	—	—	—	—	—
Basle	98.4	321	e 13	41	0	e 24	46	{+ 3}	17	40	PP —
Aberdeen	98.7	333	—	—	—	24	22	[+ 1]	26	32	PS 51.4
Seattle	98.7	38	—	—	—	e 25	7	- 3	e 27	43	PPS e 42.2
Besançon	99.5	321	e 13	46	0	—	—	—	e 17	42	PP —
Durham	99.8	330	—	—	—	i 24	33	[+ 7]	i 32	7	SS —
Grahamstown	100.4	238	e 13	55	+ 5	—	—	—	—	—	—
Paris	100.8	324	e 13	52	0	i 24	29	[- 2]	i 18	5	PP e 45.2
Kew	101.0	327	e 13	43	-10	e 24	21	[-11]	e 17	58	PP e 44.2
Shasta Dam	101.7	44	e 13	56	0	—	—	—	e 18	27	PP —
Ukiah	101.7	46	—	—	—	e 26	53	PS	—	—	e 42.2
Clermont-Ferrand	101.9	321	e 14	8	+11	i 24	41	[+ 5]	e 18	17	PP 47.2
Mineral	z. 102.4	44	e 13	59 <sub>k</sub>	0	—	—	—	e 17	58	PKP —
Berkeley	102.9	47	—	—	—	e 24	19	[-22]	e 27	16	PS e 42.1

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Rathfarnham Castle	102.9	331	e 14 3?	+ 2	e 24 44	[+ 3]	e 21 34	PPP e 54.2
Hungry Horse	103.2	34	i 14 4	+ 1	e 29 58	PKKP	e 17 18	PKP
Santa Clara	103.4	47	—	—	e 28 31	PPS	—	e 49.8
Lick	z. 103.6	47	e 14 5	+ 1	—	—	e 17 33	PKP
Reno	z. 104.0	44	e 14 11	+ 5	e 27 13	PS	e 17 29	PKP e 50.6
Saskatoon	104.8	28	—	—	e 24 54	[+ 4]	e 28 8	PPS 52.2
Tortosa	106.0	317	e 18 36	PP	—	—	—	e 59.2
Algiers Univ.	z. 106.1	313	e 14 31	P	—	—	e 17 56	PKP
Tinemaha	z. 106.2	46	e 14 29	P	—	—	e 17 45	PKP
China Lake	z. 107.2	46	e 14 21	P	—	—	e 17 45	PKP
Pasadena	107.5	49	e 18 46	PP	e 28 3	PS	e 33 55	SS e 44.5
Alicante	107.9	316	18 5	[-23]	25 6	[+ 3]	28 19	PS e 52.1
Ivigtut	108.1	350	19 0	PP	25 9	[+ 5]	33 56	SS 52.2
Logan	108.1	39	e 14 25	P	e 25 38	[-14]	e 18 32	PKP e 45.8
Riverside	z. 108.2	49	e 18 2	[-27]	—	—	e 19 20	PP
Salt Lake City	108.6	40	—	—	e 25 11	[+ 5]	e 28 17	PS e 48.7
Palomar	z. 108.8	49	i 19 1	PP	—	—	—	—
Boulder City	109.1	45	e 18 33	[+ 2]	—	—	e 19 20	PP
Overton	z. 109.1	45	e 18 2	[-29]	—	—	i 19 9	PP
Toledo	109.4	318	e 19 12	PP	28 33	PS	34 48	SS 53.8
Pierce Ferry	109.6	45	e 18 43	[+11]	e 29 7	PS	—	—
Tamanrasset	z. 109.8	299	e 14 42	P	e 28 38	PS	e 18 19	PKP 49.2
Granada	110.6	316	19 6 <sub>a</sub>	PP	25 20	[+ 5]	19 14	pPKP 60.0
Malaga	z. 111.4	316	i 19 19 <sub>a</sub>	PP	23 55	PKS	i 21 21	PPP 58.0
Rapid City	E. 111.8	33	e 19 23	PP	e 25 23	[+ 3]	e 28 33	PS e 53.7
Lisbon	113.4	320	19 33 <sub>a</sub>	PP	25 7	[-19]	35 19	SS
Tucson	113.8	47	e 18 40	[- 1]	e 25 30	[+ 3]	e 19 35	PP e 49.5
Seven Falls	E. 121.5	10	e 21 1	PP	—	—	—	i 37.0
Ottawa	122.0	14	e 18 57	[ 0]	e 26 0	[+ 3]	e 20 30	PP e 54.5
St. Louis	122.5	29	e 18 58	[ 0]	e 26 1	[+ 3]	e 20 36	PP
Cleveland	123.8	21	e 20 43	PP	e 26 1	[- 1]	e 27 40	SKKS
Pittsburgh	N.W. 125.3	20	e 20 53	PP	i 30 57	PS	—	—
Harvard	125.7	12	i 20 54	PP	e 32 11	PPS	e 23 30	PPP e 63.1
Pennsylvania	125.7	18	i 20 55	PP	i 25 51	[-17]	i 27 47	SKKS
Weston	125.9	12	i 20 44	PP	e 26 6	[- 3]	e 37 59	SS e 57.7
Fordham	126.8	14	i 19 8	[+ 2]	e 38 10	SS	e 21 4	PP 69.7
Philadelphia	127.2	16	e 21 3	PP	e 26 50	[+38]	e 31 28	PS e 51.5
Washington	127.6	18	i 19 10	[+ 3]	e 28 4	{ 0}	e 21 6	PP e 57.3
Tacubaya	129.5	53	e 17 34	?	e 26 15	[- 4]	e 21 4	PP e 65.4
Columbia	130.5	25	e 21 29	PP	e 26 23	[+ 2]	e 38 58	SS e 55.9
Bermuda	136.8	8	e 24 18	?	e 32 32	PS	e 46 41	SSS e 57.0
San Juan	150.1	15	e 19 49	[+ 1]	e 27 13	[+19]	e 24 4	PP e 60.6
Galerazamba	152.6	39	e 18 57	[-54]	—	—	—	e 75.2
Fort de France	154.7	6	e 19 48	[- 6]	—	—	e 23 16	PKS
La Plata	N. 155.7	180	20 12	[+17]	30 43	{- 6}	23 49	PKS 79.8
Bogota	157.8	47	e 20 6	[+ 8]	e 22 56	PKS	e 20 34	PKP <sub>2</sub> 81.2
Huancayo	162.6	97	i 20 9	[+ 6]	—	—	e 45 31	SS
La Paz	168.2	122	i 20 13	[+ 5]	27 39	[+28]	i 21 19	PKP <sub>2</sub> 81.2

Additional readings :—

Nanking iN = 9m.16s.

Hukuoka iSS = 10m.38s.

Toyama ePPP = 7m.35s., eSS = 12m.46s., eSSS = 13m.26s.

Tokyo PPPE = 7m.29s., iN = 8m.38s., P<sub>c</sub>PN = 9m.33s., e = 10m.37s., Q = 11m.58s. ?

Sendai eN = 13m.48s.

Mizusawa PN = 6m.47s.

Calcutta iPPPE = 8m.28s., P<sub>c</sub>SE = 13m.16s., SSE = 14m.12s., SSSE = 14m.43s., S<sub>c</sub>SE = 17m.18s.

Perth i = 14m.3s. and 14m.48s., SS = 18m.33s.

Kodaikanal PPSE = 15m.21s., S<sub>c</sub>SE = 17m.39s., SSE = 18m.24s.

New Delhi P<sub>c</sub>PN = 10m.22s., PSN = 15m.5s., QN = 18m.41s., SSSN = 19m.6s.

Poona iE = 10m.10s., PPPE = 11m.22s., S<sub>c</sub>PE = 14m.0s., PSE = 15m.46s., PPSE = 15m.52s., S<sub>c</sub>SE = 18m.21s., SSE = 18m.53s., QE = 19m.52s., SSSE = 20m.12s.

Brisbane iPE = 8m.44s., iSSE = 18m.57s.

Riverview ePPEZ = 11m.14s., ePPPZ = 12m.17s., iN = 14m.26s., cPSE = 16m.49s.,

iE = 17m.1s., iS<sub>c</sub>SN = 18m.56s., iE = 19m.22s., eSSE = 20m.7s., iN = 20m.56s.,

iSSSN = 21m.49s.

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Christchurch iZ = 11m.31s., 12m.5s. and 12m.23s., iPPP = 15m.41s., iZ = 17m.38s., eSN = 20m.21s., iEN = 21m.39s., iZ = 22m.23s., eSS = 25m.33s., eSSS = 28m.43s.  
 Wellington ePPZ = 14m.19s., ePPP = 15m.44s., iSZ = 20m.33s., SS = 25m.33s., SSS = 28m.38s., Q = 30m.53s.  
 Tiflis eSSS = 29m.25s.  
 Tananarive S<sub>c</sub>S = 22m.31s., SS = 27m.0s.  
 College e = 13m.40s., 14m.24s., and 15m.3s., ePP = 15m.25s., ePKP,PKP = 39m.6s.  
 Helsinki iZ = 12m.44s.  
 Upsala eSSE = 29m.13s., eSSSE = 33m.13s.?, eN = 35m.13s.?, eQE = 39.2m.  
 Warsaw eE = 16m.56s. and 21m.7s., SKSN = 23m.26s., SN = 23m.47s., SSE = 29m.36s., SSSE = 33m.19s.  
 Skalnaté Pleso e = 13m.30s. and 24m.19s.  
 Budapest iE = 14m.42s., eE = 23m.42s., eN = 24m.13s.?, eSKSE = 24m.53s., eE = 29m.48s.  
 Kalossa eE = 23m.43s.  
 Ogyalla e = 25m.19s.  
 Potsdam iZ = 16m.49s., iPPZ = 17m.11s., iZ = 25m.31s., iPSZ = 25m.53s., eZ = 34m.7s., iZ = 37m.55s.  
 Prague e = 13m.31s., 15m.2s., 15m.35s., and 17m.29s., ePPP = 18m.49s., e = 21m.32s., eSKS = 23m.47s., ePS = 25m.22s., e = 26m.17s., 28m.36s., and 29m.25s., eSS = 30m.55s., eSSS = 34m.13s.  
 Collmberg eZ = 13m.27s., 14m.2s., and 14m.43s., eSKS?E = 23m.51s., eE = 25m.31s., ePPS = 26m.39s., eSSE = 30m.53s.?  
 Zagreb e = 25m.52s., 31m.13s.?, and 34m.43s.?  
 Cheb iPS = 25m.42s., e = 28m.31s. and 30m.31s., eSS = 31m.3s., eSSS = 34m.37s.  
 Taranto e = 15m.23s.  
 Jena eE = 13m.43s.  
 Trieste iPPP = 18m.28s., iSKKS = 24m.14s., iPS = 26m.0s., iSS = 31m.12s.  
 Scoresby Sund 17m.28s. and 21m.13s., iPS = 26m.5s., 27m.17s., SS = 31m.31s.  
 Stuttgart ePZ = 13m.41s., eZ = 14m.9s., e = 15m.48s., ePPP = 19m.35s., ePS = 26m.13s., ePKP = 30m.19s., eSS? = 32m.13s., eSSS? = 34m.43s., e = 39m.31s.  
 Bologna e = 26m.59s.  
 Salo e = 26m.29s.  
 Rome SS = 31m.54s.  
 Florence Arc. e = 21m.49s., SKKS = 24m.59s.  
 De Bilt iP = 13m.46s., eSS = 32m.13s.  
 Strasbourg i = 13m.48s., e = 14m.20s., ePPP = 19m.50s., eSKS = 24m.13s., e = 24m.41s., ePS = 26m.13s., ePPS = 27m.10s., eSS = 31m.13s.?, ePKP,PKP = 36m.13s.?, e = 40m.13s.?  
 Basle e = 17m.51s. and 27m.18s.  
 Aberdeen iEN = 35m.50s., eEN = 42m.53s.  
 Seattle eSKKS = 25m.38s., e = 29m.32s., eSS = 32m.54s., e = 33m.52s.  
 Paris i = 14m.3s. and 17m.43s., e = 17m.53s., ePS = 26m.49s., e = 31m.24s., eSS = 32m.24s., ePKP,PKP = 36m.24s.  
 Kew ePPPNZ = 21m.17s., eSP = 26m.44s., eSS = 32m.40s., e = 35m.0s. and 38m.20s.  
 Shasta Dam i = 14m.32s., e = 17m.30s.  
 Clermont-Ferrand ePS = 27m.12s., eSS = 32m.41s., eSSS = 36m.26s.  
 Berkeley eN = 25m.56s., iPPSE = 28m.15s., iSSSEN = 32m.55s., eZ = 34m.11s.  
 Rathfarnham Castle eEN = 26m.59s., eSSSEN = 32m.50s., eEN = 35m.40s. and 41m.51s.  
 Algiers Univ. ePPZ = 18m.42s., eZ = 19m.47s., ePPPZ = 21m.16s.  
 Tinemaha eZ = 18m.46s.  
 China Lake iPPZ = 18m.26s., iZ = 18m.53s.  
 Pasadena e?Z = 19m.9s., eZ = 29m.59s.  
 Alicante PPS = 29m.16s., SS = 34m.4s., Q = 44m.46s.  
 Ivigtut 31m.47s. and 47m.37s.  
 Logan e = 29m.55s.  
 Salt Lake City e = 25m.15s., eSS = 33m.39s., e = 38m.36s.  
 Toledo eZ = 21m.10s., iE = 25m.16s., eE = 28m.48s., SSS?E = 38m.35s., eE = 42m.28s.  
 Tamanrasset eZ = 17m.38s., iPP?Z = 18m.58s., iPPZ = 19m.9s., eZ = 19m.42s., ePPP?Z = 21m.17s., ePPPZ = 21m.31s., eZ = 22m.28s., ePPSZ = 29m.39s., eSSZ = 34m.47s.  
 Granada PP = 19m.50s., pPP = 19m.59s., pPPP = 22m.48s., SKKS = 27m.5s., PPS = 28m.23s., SS = 34m.53s., SSS = 38m.43s.  
 Rapid City eSSE = 34m.20s., eSSSE = 39m.24s.  
 Lisbon PPZ = 19m.43s.  
 Tucson e = 22m.35s. and 26m.39s., ePS = 29m.6s., eSS? = 35m.23s.  
 Ottawa ePS = 30m.23s.  
 St. Louis e = 24m.54s., eSKKS = 27m.35s.  
 Cleveland ePPEN = 20m.46s., iPSN = 30m.46s.  
 Harvard ePPS? = 33m.17s., e = 35m.58s., eSS = 38m.5s.  
 Philadelphia eSS = 38m.13s., eSSS = 42m.25s.  
 Washington ePKP = 19m.39s., e = 21m.29s., ePS = 31m.16s., eSS = 37m.21s.  
 Tacubaya eSKP = 22m.6s., ePPP = 23m.30s.  
 Columbia e = 22m.39s. and 33m.21s.  
 Bermuda e = 36m.53s.  
 San Juan e = 25m.22s. and 34m.28s., eSS? = 41m.36s., e = 48m.27s.  
 La Plata PKPE = 20m.43s., N = 21m.19s., PPSN = 38m.31s., N = 41m.55s., PSSN = 44m.49s., E = 48m.49s.  
 Bogota ePPP?EN = 24m.21s., ePSKSEN = 34m.36s.  
 Huancayo e = 29m.16s.  
 La Paz iPPZ = 25m.9s., PPP = 29m.1s., i = 32m.3s., iSKSP = 36m.7s., iPPS = 39m.43s., iSS = 46m.25s.  
 Long waves were also recorded at Bergen, Edinburgh, Neuchatel, Barcelona, and Halifax.

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March 7d. 4h. 5m. 37s. Epicentre 42°·6N. 13°·5E. (as on 1943, March 25d.).

Intensity V at Toricella Sicura (Teramo) and Alanno (Pescara); IV at Sarnano (Macerata), Civitella del Tronto (Teramo), Civitella Casanova (Pescara), and Ofena (l'Aquila). Epicentre 42°·4N. 13°·7E.

Monthly Bulletin of Rome, March, 1950, p. 5.

$$A = +.7180, B = +.1724, C = +.6744; \quad \delta = +6; \quad h = -3;$$

$$D = +.233, E = -.972; \quad G = +.656, H = +.157, K = -.738.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Rocca di Papa	1.0	214	0 12	- 9	i 0 36	0	—	—
Rome	1.0	230	i 0 13k	- 8	i 0 35	- 1	—	—
Florence Arc.	2.0	306	0 34	- 1	1 3	+ 1	—	—
Florence Xim	2.0	306	e 0 38	+ 3	i 1 2	0	—	—
Padova	2.2	328	e 1 15	S <sub>g</sub>	e 1 53	?	—	—
Prato	2.2	306	e 0 41	+ 3	i 1 7	+ 1	—	—
Bologna	2.5	323	e 0 45	+ 2	e 1 22	S <sub>g</sub>	—	—
Triest	3.1	3	—	—	e 1 7	P <sub>g</sub>	—	e 1.4
Taranto	3.5	126	0 41	-16	e 1 38	- 2	e 1 6	P*
Salo	3.7	325	e 1 6	P*	e 2 17	S <sub>g</sub>	—	—
Zagreb	3.7	29	e 1 14	P <sub>g</sub>	e 2 1	S <sub>g</sub>	—	—
Pavia	4.1	311	e 1 23	P <sub>g</sub>	e 2 14	S <sub>g</sub>	—	—
Chur	5.1	328	e 1 21	+ 1	e 2 21	+ 1	—	—
Kalossa N.	5.5	43	—	—	e 3 5	S <sub>g</sub>	—	—
Zürich	5.9	325	e 1 21	-10	e 2 35	- 5	—	—
Budapest	6.3	37	e 3 53	S <sub>g</sub>	—	—	—	e 4.5
Basle	6.5	321	e 2 2	P <sub>g</sub>	e 3 48	S <sub>g</sub>	—	—
Stuttgart z.	6.9	335	e 1 50?	+ 5	e 2 57	- 8	e 2 15	P <sub>g</sub>
Besançon	7.1	314	e 1 49	+ 1	—	—	e 2 30	P <sub>g</sub>
Strasbourg	7.2	328	i 1 56	+ 7	e 3 30	S <sub>g</sub>	i 2 19	P <sub>g</sub>
Karlsruhe	7.3	333	e 1 52	+ 2	e 3 50	S <sub>g</sub>	—	e 4.7
Prague	7.5	5	e 1 55	+ 2	e 3 16	- 4	e 2 33	P <sub>g</sub>
Jena	8.4	352	—	—	e 3 54?	+11	e 4 32	S <sub>g</sub>
Paris	9.9	313	i 2 33	+ 8	—	—	—	—
De Bilt	11.0	332	—	—	e 4 47	0	—	—
Tamanrasset z.	20.8	201	e 4 40	- 5	e 8 36	+ 3	i 5 5	PP

Additional readings :—

Rome iZ = 22s., iE = 26s.

Florence Arc. e = 49s.

Bologna eEZ = 1m.3s., e = 1m.40s.

Taranto e = 2m.9s.

Salo e = 1m.32s.

Kalossa eEN = 3m.24s., eN = 3m.58s., eE = 4m.2s.

Budapest ePN = 4m.0s.

Stuttgart eZ = 1m.53s., eS<sub>g</sub>?Z = 3m.30s.

Strasbourg i = 2m.57s.

Prague i = 2m.57s., iS\*? = 3m.44s., e = 3m.59s., eS<sub>g</sub>? = 4m.6s.

Jena eN = 4m.50s., eE = 5m.8s., eN = 5m.12s.

Tamanrasset ePPPZ = 5m.11s., eZ = 5m.48s.

March 7d. 22h. 48m. 34s. (I) } Epicentre 45°·2N. 14°·5E.  
22h. 52m. 58s. (II) } (as on 1939, February 6d.).

Intensity V at Rijeka and Grobnik; IV at Delnice and Gstav; III-IV at Triest; III at Mrkopalj, Bakar, Crikvenica. Epicentre 45°·4N. 14°·4E. Macro seismic radius 37km.

M. Uzelac.

Annuaire macroséismique de l'Institut Séismologique de Béograd, 1950, Nouvelle Série No. 10, Belgrade, 1951, p. 54.

$$A = +.6845, B = +.1770, C = +.7072; \quad \delta = 0; \quad h = -4;$$

$$D = +.250, E = -.968; \quad G = +.685, H = +.177, K = -.707.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
	°	°	m. s.	s.	m. s.	s.	m. s.
I Triest	0.7	311	0 18	+ 1	i 0 29	+ 1	—
II	0.7	311	i 0 18	+ 1	i 0 28	0	—
I Zagreb	1.2	59	0 27?	+ 3	i 0 41	0	—
II	1.2	59	i 0 26	+ 2	i 0 40	- 1	—
I Padova	2.0	249	0 44	P <sub>g</sub>	1 10	+ 8	—
II	2.0	249	0 43	P <sub>g</sub>	1 9	+ 7	—

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.		
	°	°	m. s.	s.	m. s.	s.	m.	s.	
I Bologna	2.4	253	e 1 22	S <sub>g</sub>	e 1 36	?	—	—	
II	2.4	253	e 1 25	S <sub>g</sub>	e 1 35	?	—	—	
I Florence Arc.	2.7	239	e 1 27	P <sub>g</sub>	e 1 49	?	—	—	
II	2.7	239	e 1 29	S <sub>g</sub>	e 1 50	?	—	—	
I Florence Xim	2.7	239	—	—	i 1 13	- 6	i 1 50	?	
II	2.7	239	—	—	i 1 25	+ 6	i 2 52	?	
II Prato	2.8	241	—	—	e 1 29	+ 7	—	—	
I Ogyalla	3.7	43	e 1 38	S	e 1 48	+ 3	—	—	
II	3.7	43	—	—	e 1 45	0	—	—	
I Pavia	3.8	271	e 1 17	P <sub>g</sub>	e 2 14	S <sub>g</sub>	—	—	
I Ravensburg	4.2	309	e 1 26	P <sub>g</sub>	e 2 21	S <sub>g</sub>	—	—	
II	4.2	309	e 1 26	P <sub>g</sub>	e 2 19	S <sub>g</sub>	—	—	
I Zürich	4.7	300	e 1 27	P*	e 2 25	S*	—	—	
II	4.7	300	e 1 16	+ 2	e 2 13	+ 3	e 1 29	P <sub>g</sub>	
I Prague	4.9	0	e 1 9	- 8	e 2 18	+ 3	e 1 32	P <sub>g</sub>	
II	4.9	0	e 1 32	P*	i 2 8	- 7	e 1 38	P <sub>g</sub>	
I Stuttgart	z.	5.1	317	e 1 22	+ 2	e 2 17	- 3	e 1 36	P*
II	z.	5.1	317	e 1 20	0	e 2 16	- 4	e 1 41	P*
I Basle	5.3	299	e 1 30	P*	e 2 59	S <sub>g</sub>	e 1 49	P <sub>g</sub>	
II	5.3	299	e 1 29	P*	e 2 25	0	e 1 47	P <sub>g</sub>	
I Karlsruhe	5.6	315	e 1 44	P*	e 2 52	S*	e 3 8	S <sub>g</sub>	
II	5.6	315	—	—	e 2 40	+ 7	e 3 4	S <sub>g</sub>	
I Strasbourg	5.7	309	e 1 57	P <sub>g</sub>	e 2 56	S*	e 3 5	S <sub>g</sub>	
II	5.7	309	e 1 43	P*	i 2 56	S*	i 3 13	S <sub>g</sub>	
I Jena	6.1	341	i 1 31	- 3	e 3 5	S*	e 1 59	P <sub>g</sub>	
II	6.1	341	e 1 32?	- 2	e 2 51	+ 6	e 1 59	P <sub>g</sub>	
I Besançon	6.2	292	e 1 42	+ 7	i 3 41	S <sub>g</sub>	e 2 8	P <sub>g</sub>	
II	6.2	292	e 1 33	- 2	e 3 31	S <sub>g</sub>	e 2 12	P <sub>g</sub>	
I Collmberg	z.	6.2	348	e 1 35	0	3 12	2 9	P <sub>g</sub>	
II	z.	6.2	348	e 1 35	0	2 49	+ 1	3 10?	S*

Additional readings :—

Zagreb I i=29s. and 34s., II i=28s. and 33s., iE=38s.

Florence Arc. II e=1m.43s.

Ogyalla I eS<sub>g</sub>?=1m.57s., e=2m.3s., II e=1m.55s.

Zürich II eS<sub>g</sub>=2m.31s.

Prague I e=1m.38s., 1m.44s., and 1m.54s., eS=2m.7s., eS\*=2m.22s., eS<sub>g</sub>=2m.32s., II e=1m.53s. and 2m.2s.?, iS\*=2m.22s., eS<sub>g</sub>=2m.32s.

Stuttgart I eP<sub>g</sub>Z=1m.43s., eZ=1m.55s. and 2m.10s., eS\*?Z=2m.44s., eS<sub>g</sub>Z=2m.48s. and 2m.52s., II eZ=1m.26s., eP\*Z=1m.34s., eZ=1m.54s., 2m.8s., and 2m.21s., eS\*?Z=2m.44s., eS<sub>g</sub>Z=2m.47s. and 2m.50s.

Strasbourg I i=2m.20s., 2m.46s., 3m.14s., and 3m.28s., II e=2m.14s. and 2m.44s., i=3m.27s.

Jena I eN=1m.44s. and 2m.11s., eE=2m.15s., eN=2m.29s., eE=2m.33s., eN=2m.38s., eE=2m.42s., eN=2m.52s. and 3m.15s., eE=3m.19s. II eE=1m.35s.?, eN=1m.43s. and 2m.38s., eE=3m.4s., eN=3m.14s.

Besançon I e=2m.13s. and 3m.28s., II i=3m.38s.

Collmberg I Z=3m.18s., 3m.27s., 3m.42s., 4m.12s., and 4m.24s., II S<sub>g</sub>Z=3m.19s., Z=3m.39s. and 4m.38s.

March 7d. Readings also at 0h. (Mizusawa), 1h. (Hungry Horse, Tucson, and near Obi-garm), 3h. (Florence Arc., Bologna, Prague, and near Rome), 4h. (Bologna, Florence, Stuttgart, near Rome, and near Tacubaya), 5h. (Hungry Horse, College, La Paz, Bologna, near Rome, and near Mizusawa), 6h. (China Lake, Tucson, Hungry Horse, Rome, near Bogota, Grozny, Zugdidi, near Abastumanj, Shemakla, Erevan, Gori, Leninakan, Piatigorsk, and Tiflis), 7h. (Hungry Horse, College (2), Tamanrasset, Moscow, Ksara, Tiflis, near Gori, Abastumanj, and Grozny), 8h. (Prague, La Paz, near Huancayo, near Messina, Fergana, near Andijan, Garm, Obi-garm, Samarkand, Stalinabad, and Tchimkent), 9h. (Prague, Tamanrasset, and Bogota), 11h. (College, Hungry Horse, and Mizusawa), 12h. (La Paz, Tucson, Hungry Horse, near Obi-garm, and Stalinabad), 13h. (Garm and near Bandung), 14h. (Paris and near Obi-garm), 15h. (Stuttgart and near Tamanrasset), 16h. (College, Tamanrasset, Stuttgart, Ksara, Stalinabad, near Obi-garm, Grozny, near Abastumanj, Borzhomi, Erevan, Gori, Leninakan, Piatigorsk, Tiflis, and Zugdidi), 17h. (Stuttgart, Tortosa, Tamanrasset, and Pretoria), 19h. (La Paz), 22h. (Triest), 23h. (Leninakan, Tiflis, near Borzhomi, Grozny, and Piatigorsk).

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March 8d. 4h. 27m. 2s. Epicentre 50°·8N. 6°·9E. (as on 1949, July 11d.).

Intensity VII-VIII at Billig; VII at Euskirchen; IV at Bonn, Cologne, Coblenz, Dusseldorf, Dortmund, and Aachen. Epicentre 50°47'N. 6°50'E. Depth 8km.

H. Berg.

Das Rheinische Erdbeben bei Euskirchen am 8 März, 1950, Geofisica pura e applicata, Vol. 17, 1950, pp. 1-12, macroseismic and acoustic charts pp. 2, 4, 5. Also Vol. 18, pp.198-208.

M. Schwarzbach.

Die Erdbeben des Rheinlandes. Kölner Geologische Hefte, Cologne, 1951, p. 21.

$$A = +.6300, B = +.0762, C = +.7728; \quad \delta = -7; \quad h = -6;$$

$$D = +.120, E = -.993; \quad G = +.767, H = +.093, K = -.635.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Heerlem	0.6	278	i 0 15	0	—	—	—	—
De Bilt	1.7	322	i 0 32	+ 1	i 0 57	+ 3	i 0 37	P <sub>g</sub>
Karlsruhe	2.0	151	e 0 34	- 1	i 1 2	0	e 0 41	P <sub>g</sub>
Strasbourg	2.3	166	e 0 39 <sup>a</sup>	- 1	i 1 9	0	i 0 45	P <sub>g</sub>
Stuttgart	z. 2.5	143	e 0 42	- 1	i 1 11	- 3	i 0 50	P <sub>g</sub>
Ebingen	2.9	152	—	—	e 1 28?	+ 4	e 1 37	S <sub>g</sub>
Jena	3.0	85	e 0 54	+ 4	i 1 27	0	i 1 3	P <sub>g</sub>
Basle	3.3	172	e 0 52	- 1	e 1 29	- 6	e 1 44	S <sub>g</sub> *
Paris	3.4	237	e 0 55	0	i 1 46	S*	i 1 8	P <sub>g</sub>
Ravensburg	3.5	148	e 0 57	0	e 1 36	- 4	e 1 12	P <sub>g</sub>
Besançon	3.6	190	e 0 54	- 4	i 1 34	- 8	i 1 10	P <sub>g</sub>
Cheb	3.6	99	e 1 7	P*	e 1 46	+ 4	i 1 17	P <sub>g</sub>
Zürich	3.6	161	e 0 56	- 2	e 1 35	- 7	e 1 55	S <sub>g</sub> *
Neuchatel	3.8	179	e 0 59	- 2	e 1 41	- 6	e 1 6	P <sub>g</sub> *
Collmberg	3.9	82	e 1 5	+ 3	i 1 49	- 1	e 1 18	P <sub>g</sub>
Potsdam	4.1	65	e 1 23	P*	i 2 7	S*	i 2 23	S <sub>g</sub>
Chur	4.3	155	e 1 9?	+ 1	—	—	—	—
Kew	4.6	282	i 1 15	+ 3	e 2 15	S*	—	—
Prague	4.9	95	i 1 22	+ 5	e 2 14	- 1	i 1 40	P <sub>g</sub>
Clermont-Ferrand	5.6	208	e 1 22	- 5	e 2 24	- 9	i 1 45	P <sub>g</sub>
Pavia	5.8	164	—	—	e 2 30	- 8	—	—
Copenhagen	5.9	32	e 1 40	P*	i 2 39	- 1	i 2 3	P <sub>g</sub>
Triest	6.9	136	—	—	e 3 44	S <sub>g</sub>	—	—
Raciborzu	7.3	91	e 2 29	P <sub>g</sub>	—	—	—	—
Prato	7.5	156	—	—	e 3 18	- 2	—	—
Ogyalla	7.9	107	—	—	e 4 28	S <sub>g</sub>	—	—
Rathfarnham Ctle. z.	8.5	292	i 2 6	- 1	i 3 53	+ 8	i 2 41	P <sub>g</sub>

Additional readings :—

De Bilt iS<sub>g</sub> = 1m.2s.

Karlsruhe i = 49s., iS = 1m.12s., i = 1m.16s., e = 1m.21s. and 1m.26s.

Strasbourg iP\* = 43s., i = 54m. and 1m.3s., iS\* = 1m.13s., iS<sub>g</sub> = 1m.16s.

Stuttgart iP\*Z = 48s., iZ = 52s., 56s., 1m.5s., 1m.14s., and 1m.18s., iS\*Z = 1m.22s.,

iS<sub>g</sub>Z = 1m.25s., 1m.28s., and 1m.31s., iZ = 1m.36s.

Ebingen e = 1m.44s.

Jena eN = 59s., iP<sub>g</sub>N = 1m.6s., iP<sub>g</sub>E = 1m.10s., iSE = 1m.30s., iS\*E = 1m.35s., iS<sub>g</sub>N =

1m.41s.

Paris iP\* = 1m.2s., i = 1m.30s. and 1m.40s., iS<sub>g</sub> = 1m.57s. and other later i readings.

Ravensburg eS\*? = 1m.52s., eS<sub>g</sub> = 1m.56s., e = 2m.10s.

Besançon eP\* = 1m.3s., i = 1m.28s.

Cheb iP = 1m.10s., e = 1m.23s., 1m.31s. and 1m.40s., iS<sub>g</sub> = 2m.3s.

Collmberg iZ = 1m.15s., iN = 1m.21s., eE = 1m.28s., eZ = 2m.3s., eSZ = 2m.9s., eZ =

2m.12s., eS<sub>g</sub>Z = 2m.42s.

Potsdam eP\*N = 1m.26s., iS<sub>g</sub> = 2m.32s.

Kew iP = 59s., eE = 2m.51s.

Prague e = 1m.30s., iP\* = 1m.36s., e = 1m.54s., i = 2m.0s., e = 2m.24s. and 2m.34s., iS\* =

2m.41s., eS<sub>g</sub> = 2m.47s.

Clermont-Ferrand iS<sub>g</sub>? = 2m.58s.

Rathfarnham Castle iZ = 2m.13s., 3m.41s., and 4m.1s.

Ogyalla e = 4m.36s., 4m.42s., and 4m.50s.

Long waves were also recorded at Tortosa.

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March 8d. Readings also at 2h. (China Lake and Tinemaha), 3h. (Auckland (2), Christchurch (2), Wellington (2), Riverview (2), Ksara, Paris (2), Strasbourg, Stuttgart (2), Besançon (2), Zürich, Tamanrasset (2), Mount Wilson, Pasadena, Riverside (2), China Lake (2), Tinemaha (2), Tucson (2), Boulder City (2), Overton (3), Pierce Ferry (2), Fresno, Lick (2), Mineral, Shasta Dam (3), Hungry Horse, College, near Santa Clara, and near Obi-garm), 4h. (Riverview), 5h. (Wellington, Mount Wilson, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Mineral, Shasta Dam, Besançon, and Tamanrasset), 6h. (Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Mineral, Shasta Dam, Hungry Horse, College, Tamanrasset, and near Messina), 7h. (Fergana, Naryn, Tchimkent, near Andijan (2), Garm (2), Obi-garm, and Stalinabad), 8h. (Andijan, near Garm (2), Obi-garm, and Stalinabad), 9h. (Tamanrasset, near Obi-garm, and near Athens), 10h. (near Andijan), 12h. (near Andijan, and near Naryn (2)), 17h. (Mizusawa, near Ashkabad, and Kizyl-Arvat), 18h. (Stalinabad, near Andijan, Garm, Obi-garm, and near Bogota), 20h. (Tamanrasset), 21h. (Stuttgart and Prague), 22h. (near Prague), 23h. (College).

March 9d. 10h. 3m. 38s. Epicentre 15°·8N. 60°·5W.

Intensity IV in La Martinique. Epicentre 15°45'N. 60°30'W. (Strasbourg).  
Monthly Seismic Bulletin from Morne des Cadets, 1950, March.

A = +·4740, B = -·8379, C = +·2706;  $\delta = -2$ ;  $h = +6$ ;  
D = -·870, E = -·492; G = +·133, H = -·235, K = -·963.

	$\Delta$ °	Az. °	P.		O-C.		S.		O-C.		Supp.		L. m.
			m.	s.	s.	m.	s.	s.	m.	s.			
Fort de France	1·2	210	i 0	15	- 9	—	—	—	—	—	—	—	—
San Juan	5·9	297	i 1	34	+ 3	i 2	37	- 3	—	—	—	—	i 3·3
Port au Prince	11·6	285	e 2	40	-10	e 4	45	-16	—	—	—	—	—
Bermuda	16·9	348	e 5	0	+61	—	—	—	—	—	—	—	e 8·4
Bogota	17·4	233	i 4	9	+ 3	i 7	32	+13	i 4	21	PP	—	—
Chinchina	18·3	236	e 4	13	- 4	e 7	42	+ 3	e 4	32	PP	—	9·4
Balboa Heights	19·8	253	i 4	36	+ 1	—	—	—	—	—	—	—	—
Fordham	27·5	339	e 5	52	+ 2	e 11	12	+42	—	—	—	—	—
Weston	28·1	344	i 5	56	+ 1	—	—	—	—	—	—	—	—
Harvard	28·3	344	i 6	6	+ 9	e 11	22	+39	—	—	—	—	—
Huancayo	31·3	210	i 6	23	- 1	e 11	26	- 5	e 7	11	PP	—	e 16·0
Ottawa	32·2	341	e 6	32	0	e 11	46	+ 1	e 7	40	PP	—	—
Shawinigan Falls N.	32·3	346	e 6	35	+ 2	—	—	—	—	—	—	—	—
La Paz	33·0	194	i 6	40 <sub>a</sub>	+ 1	11	53	- 4	7	54	PP	—	15·9
St. Louis	34·6	318	i 6	53	0	e 12	17	- 5	e 14	57	SS	—	—
Tacubaya	37·0	282	e 7	16	+ 3	e 13	11	+12	—	—	—	—	—
Rapid City	E. 45·8	318	i 8	27	+ 2	i 15	10	+ 1	—	—	—	—	e 24·1
Tucson	48·4	301	i 8	47	+ 1	e 15	42	- 4	e 10	37	PP	—	e 20·4
Lisbon	50·3	53	8	59 <sub>a</sub>	- 1	—	—	—	—	—	—	—	23·4
Salt Lake City	50·7	311	e 9	8	+ 5	e 16	18	0	—	—	—	—	e 27·8
Logan	51·0	313	i 9	4	- 2	e 16	19	- 3	e 12	15	PPP	—	—
Bozeman	51·5	318	—	—	—	e 17	43	PPS	—	—	—	—	e 24·2
Pierce Ferry	51·5	305	i 9	10	+ 1	e 16	31	+ 2	—	—	—	—	—
Overton	Z. 51·9	306	i 9	13	+ 1	e 16	39	+ 4	—	—	—	—	—
Boulder City	52·2	305	i 9	15	0	e 16	45	+ 6	e 10	17	P <sub>c</sub> P	—	—
Palomar	53·5	301	i 9	24 <sub>a</sub>	0	i 16	52	- 5	—	—	—	—	—
Malaga	N.W. 53·7	56	i 9	32	+ 6	17	6	+ 7	11	40	PP	—	26·5
Riverside	54·0	302	i 9	28 <sub>a</sub>	0	—	—	—	—	—	—	—	—
Hungry Horse	54·3	320	i 9	30	0	—	—	—	—	—	—	—	—
China Lake	Z. 54·4	305	i 9	31 <sub>a</sub>	0	—	—	—	—	—	—	—	—
Granada	54·4	56	9	4 <sub>a</sub>	-27	e 16	13	-56	10	52	PP	—	—
Toledo	Z. 54·4	53	i 9	31	0	e 18	46	S <sub>c</sub> S	—	—	—	—	—
Pasadena	54·7	302	i 9	32 <sub>a</sub>	- 1	—	—	—	—	—	—	—	e 30·9
Tinemaha	55·0	305	i 9	35 <sub>a</sub>	0	—	—	—	—	—	—	—	—
Fresno	Z. 56·2	305	e 9	43 <sub>a</sub>	- 1	—	—	—	—	—	—	—	—
Rathfarnham Castle	56·3	36	i 9	43	- 2	e 17	55	+21	e 11	45	PP	—	28·4
Reno	Z. 56·5	308	e 9	46 <sub>a</sub>	0	—	—	—	—	—	—	—	—
Alicante	56·9	54	i 9	51	+ 2	e 17	46	+ 4	10	24	P <sub>c</sub> P	—	e 29·8
Lick	Z. 57·7	306	i 9	56 <sub>a</sub>	+ 1	—	—	—	—	—	—	—	—
Mineral	Z. 58·0	309	i 9	56 <sub>a</sub>	- 1	—	—	—	i 10	50	P <sub>c</sub> P	—	—

Continued on next page.



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		$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
		°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Tortosa		58.0	52	i 10	8	+11	—	—	—	—	—	—
Berkeley	z.	58.3	306	i 9	58 <sub>a</sub>	-1	—	—	—	e 10	45	P <sub>c</sub> P e 33.4
Shasta Dam		58.6	310	i 10	0	-1	—	—	—	—	—	—
Kew		59.3	39	i 9	54	-12	e 18	21	+7	—	—	e 24.4
Seattle		59.5	317	e 10	6	-1	—	—	—	e 11	11	P <sub>c</sub> P —
Algiers Univ.	z.	59.6	57	i 10	6 <sub>k</sub>	-2	—	—	—	e 10	53	P <sub>c</sub> P —
Victoria		60.4	318	i 10	11 <sub>a</sub>	-2	—	—	—	—	—	—
Clermont-Ferrand		60.5	47	i 10	13	-1	—	—	—	—	—	27.9
Paris		60.5	43	i 10	13	-1	—	—	—	i 10	59	P <sub>c</sub> P e 31.4
Tamanrasset	z.	62.3	72	i 10	25 <sub>k</sub>	-1	e 18	53	+1	e 12	50	PP —
Besançon		62.6	45	i 10	27	-1	—	—	—	11	14	P <sub>c</sub> P —
De Bilt		62.8	39	e 10	27	-3	e 18	52	-6	—	—	e 29.4
Basle		63.7	45	e 10	34 <sub>k</sub>	-2	—	—	—	e 14	28	PPP —
Strasbourg		64.0	43	e 10	35	-3	e 19	2	-11	i 10	59	P <sub>c</sub> P —
Karlsruhe		64.4	42	i 10	39	-1	e 19	43	+25	—	—	—
Zürich		64.4	45	e 10	37 <sub>k</sub>	-3	e 19	37	+19	—	—	—
Stuttgart		64.9	43	e 10	41 <sub>a</sub>	-2	e 19	42	+18	e 11	2	P <sub>c</sub> P e 30.4
Florence Arc.		66.1	49	e 10	32?	-19	e 16	22	?	—	—	—
Padova		66.6	48	e 11	7	+13	e 20	40	PPS	—	—	—
Jena		66.6	42	e 10	52	-2	e 20	0	+15	e 11	10	P <sub>c</sub> P —
Rome		67.0	51	i 10	56 <sub>k</sub>	-1	e 19	44	-6	—	—	—
Collmberg	z.	67.5	42	i 10	58	-2	—	—	—	11	40	P <sub>c</sub> P —
Copenhagen		67.5	36	i 10	59	-1	e 20	4	+8	—	—	31.4
Potsdam		67.6	39	i 11	0?	-1	—	—	—	—	—	e 32.4
Triest		67.9	47	11	3	+1	e 20	11	+10	e 20	42	PS —
Prague		68.4	42	i 11	4	-2	e 20	13	+6	e 14	13	PP e 32.4
Zagreb		69.5	47	e 11	11	-1	—	—	—	—	—	—
Taranto		70.7	52	—	—	—	e 21	22	PPS	—	—	—
Warsaw		72.5	40	—	—	—	e 21	11	+17	—	—	e 39.4
College		74.7	334	i 11	42	-1	e 21	13	-6	e 14	27	PP —
Ksara		86.5	57	e 12	48	+2	e 21	57	[-74]	—	—	—
Brisbane	z.	146.8	244	i 19	44 <sub>k</sub>	[+2]	—	—	—	—	—	—

Additional readings :—

San Juan i = 2m.14s.  
 Port au Prince i = 2m.51s., 4m.54s., and 5m.14s.  
 Bogota iSS = 8m.1s.  
 Ottawa e = 7m.56s., SSS = 14m.0s.  
 La Paz SS = 13m.54s.  
 St. Louis i = 7m.1s.  
 Tucson i = 9m.36s. and 11m.11s., iPPP = 11m.32s., e = 15m.52s.  
 Logan e = 9m.44s.  
 Boulder City ePP = 11m.10s.  
 Palomar iZ = 9m.39s.  
 Riverside iZ = 9m.37s. and 9m.43s.  
 China Lake i = 9m.44s. and 9m.54s.  
 Granada iSS = 20m.55s.  
 Toledo iZ = 9m.40s., eZ = 9m.59s.  
 Pasadena iZ = 9m.42s.  
 Tinemaha iZ = 10m.1s.  
 Rathfarnham Castle iZ = 9m.59s., 10m.20s., and 10m.46s., eEN = 12m.44s.  
 Lick iZ = 10m.0s. and 10m.18s.  
 Mineral iZ = 10m.2s., 10m.9s., and 11m.31s., eZ = 14m.14s.  
 Kew i = 10m.5s.  
 Seattle e = 10m.32s.  
 Algiers Univ. eZ = 10m.19s., ePP?Z = 12m.34s., eZ = 12m.50s., PKP, PKPZ = 39m.45s.  
 Paris i = 10m.22s., 10m.29s., 11m.38s., and 13m.24s.  
 Tamanrasset iZ = 10m.35s. and 12m.56s., ePPPZ = 14m.11s., eSSZ = 22m.46s., ePKP, PKPZ = 39m.32s., ePKP<sub>1</sub>, PKP<sub>2</sub>Z = 40m.5s.  
 Besançon e = 10m.47s. and 11m.29s., ePP = 12m.40s.  
 Basle e = 11m.54s.  
 Strasbourg i = 10m.46s., e = 12m.2s., ePP = 12m.56s., e = 19m.33s.  
 Stuttgart eZ = 10m.54s., ePP? = 13m.34s., eQ = 27.4m.  
 Jena e = 12m.47s., eE = 12m.50s.  
 Collmberg eZ = 11m.8s.  
 Prague e = 11m.14s., 11m.41s., 12m.7s., 13m.11s., and 15m.37s., ePS = 20m.30s.  
 College i = 12m.6s. and 12m.52s., ePP = 14m.40s., eS<sub>c</sub>S? = 21m.44s.  
 Long waves were also recorded at Scoresby Sund and Sitka,

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March 9d. 18h. 27m. 55s. Epicentre  $42^{\circ}1'N$ .  $141^{\circ}0'E$ . Depth of focus 0.015.

Intensity IV at Esanmisaki (Hokkaido); II-III at Urakawa and Miyako.

Epicentre as adopted. Macroseismic radius 200-300km. Depth 110km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1950, Tokyo, 1952, p. 13. Macroseismic chart p. 13.

$$A = -0.5784, B = +0.4683, C = +0.6679; \quad \delta = -6; \quad h = -2;$$

$$D = +0.629, E = +0.777; \quad G = -0.519, H = +0.420, K = -0.744.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Mori	0.3	270	0 26	+ 8	0 38	+ 6
Sapporo	1.0	14	0 28	+ 5	0 45	+ 4
Aomori	1.3	187	0 30	+ 4	0 52	+ 6
Hatinohe	1.6	166	0 31	+ 1	0 51	- 1
Morioka	2.4	177	0 39	- 1	1 8	- 2
Akita	2.5	196	0 39	- 2	1 19	+ 7
Miyako	2.6	163	0 39	- 3	1 8	- 6
Mizusawa	3.0	178	0 49	+ 1	1 21	- 3
Nemuro	3.6	68	1 30	S	(1 30)	- 8
Sendai	3.8	181	1 15	+17	1 42	- 1
Onahama	5.2	181	2 12	+55	2 37	+21
Mito	5.7	184	2 29	S	(2 29)	+ 1
Kakioka	5.9	186	1 35	+ 9	—	—
Kumagaya	6.1	192	2 43	S	(2 43)	+ 5
Tokyo	6.5	189	2 44	S	(2 44)	- 4
Osima	7.4	190	3 5	S	(3 5)	- 5
College	45.1	35	i 8 8	+ 3	—	—

March 9d. Readings also at 0h. (Stalinbad, near Andijan, and Garm), 1h. (Tiflis and near Abastumanj), 2h. (Frunse, near Almata, Naryn, and near Przhivalsk (2)), 4h. (near Bogota and near Andijan), 5h. (La Paz, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Lick, Mineral, Hungry Horse, College, Tamanrasset, Algiers, Univ., Fergana, near Andijan, Garm, Samarkand, Stalinabad, and near Apia—several shocks), 6h. (Apia, Besancon, Strasbourg, and Stuttgart), 7h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Lick, Mineral, Hungry Horse, College, and near Andijan), 8h. (Mizusawa, Palomar, Riverside, China Lake, Tinemaha, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 9h. (near Andijan), 10h. (Copenhagen and near Andijan), 12h. (near Przhivalsk), 13h. (Karlsruhe, Strasbourg, near Stuttgart, and near Obi-garm), 14h. (Samarkand, Tchimkent, near Andijan, Garm, Obi-garm, and Stalinabad), 15h. (College, Tamanrasset, Stalinabad, near Obi-garm (2), and near Apia), 17h. (Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Mineral, Lick, Shasta Dam, Reno, Hungry Horse (2), Victoria, College, Ottawa, Weston, and Stuttgart), 18h. (near Andijan), 19h. (Ksara, Tamanrasset, and Hungry Horse), 20h. (Kew), 21h. (Jena, Prague, Stuttgart, and near Obi-garm), 22h. (Mizusawa, College, Hungry Horse, and Stuttgart).

March 10d. 20h. 15m. 54s. Epicentre  $20^{\circ}2'S$ .  $178^{\circ}2'W$ . Depth of focus 0.060. (as on 1948, January 27d.).

$$A = -0.9387, B = -0.0295, C = -0.3433; \quad \delta = -12; \quad h = +5;$$

$$D = -0.031, E = +1.000; \quad G = +0.343, H = +0.011, K = -0.939.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Apia	8.8	45	e 2 1	- 4	e 3 36	- 8	—	—
Arapuni	18.6	196	—	—	e 7 9	+13	—	—
Tuai	N. 19.0	192	e 3 51	- 3	7 1	- 3	—	—
New Plymouth	E. 20.0	198	4 6	+ 2	7 28	+ 7	—	—
Wellington	21.9	195	e 4 23	+ 1	7 52	- 1	—	—
Cobb River	E. 22.2	200	e 4 25	0	e 7 57	- 1	—	—
Kaimata	N.E. 23.9	200	e 4 40	0	e 8 22	- 4	—	—
Christchurch	24.5	197	e 4 26	-20	8 47	+12	e 4 58	?
Riverview	30.4	237	—	—	i 10 13	+ 5	i 12 57	SSS
Berkeley	Z. 78.1	43	i 11 17k	+ 1	—	—	i 12 38	pP e 13.0

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		$\Delta$	Az.	P.		O-C.	S.	O-C.	Supp.		L.	
		$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	m.	s.	m.	
Lick	z.	78.2	43	i 11	17k	+ 1	—	—	e 12	56	pP	—
Pasadena		78.6	48	i 11	20k	+ 2	—	—	e 12	46	pP	—
Fresno	z.	79.0	45	e 11	22k	+ 1	—	—	—	—	—	—
Palomar		79.1	49	i 11	22k	+ 1	—	—	i 12	53	pP	—
Riverside	z.	79.3	48	i 11	21k	- 1	—	—	e 12	53	pP	—
Shasta Dam		79.7	40	i 11	26	+ 2	—	—	—	—	—	—
China Lake	z.	79.9	46	i 11	26k	+ 1	—	—	i 12	56	pP	—
Mineral	z.	80.0	40	i 11	27k	+ 1	—	—	e 13	11	pP	—
Tinemaha		80.2	45	i 11	29k	+ 2	—	—	—	—	—	—
Reno	z.	80.6	42	e 11	31k	+ 2	—	—	—	—	—	—
Boulder City		81.9	47	i 11	38	+ 2	—	—	e 12	18	?	—
Overton	z.	82.5	47	i 11	39	0	—	—	i 13	13	pP	—
Pierce Ferry		82.6	48	i 11	41	+ 2	e 14	8	sP	e 13	11	pP
Tucson		82.9	52	e 12	14	?	—	—	e 13	11	pP	—
College		88.0	12	i 12	6	0	—	—	e 13	35	pP	—
Hungry Horse		89.0	37	i 12	11	+ 1	—	—	e 13	38	pP	—
Copenhagen		143.7	350	i 18	48	[+ 1]	—	—	—	—	—	—
Rathfarnham Ctle.	z.	146.4	8	i 18	55	[+ 4]	—	—	—	—	—	—
Potsdam	z.	146.7	349	i 18	55	[+ 3]	—	—	i 20	32	pPKP	—
Ksara		146.9	301	e 18	57	[+ 5]	—	—	20	37	pPKP	—
Collmberg	z.	147.7	347	e 19	0k	[+ 7]	—	—	e 20	40	pPKP	—
Jena	N.	148.4	347	e 19	1	[+ 7]	—	—	e 20	36	pPKP	—
Prague		148.6	345	e 18	58	[+ 3]	e 29	1	SKKS	i 19	4	PKP,
Stuttgart	z.	150.9	350	e 19	0	[+ 2]	—	—	e 20	41	pPKP	—
Strasbourg		151.3	352	e 19	3	[+ 4]	—	—	i 19	9	PKP,	—
Paris		151.4	0	e 19	2	[+ 3]	—	—	e 20	40	pPKP	—
Besançon		152.8	354	e 19	5	[+ 4]	—	—	e 20	46	pPKP	—
Tamanrasset	z.	175.7	307	i 19	24k	[+ 4]	e 22	43	PKS	e 21	6	pPKP

Additional readings :—

Apia e = 3m.33s.

Berkeley iZ = 11m.50s.

Lick iZ = 11m.26s., eZ = 11m.59s.

Palomar iZ = 11m.42s.

Mineral iZ = 11m.33s. and 11m.39s.

Overton iPPZ = 14m.9s.

College e = 14m.43s.

Hungry Horse e = 15m.43s., ePKKP = 29m.47s.

Rathfarnham Castle iZ = 19m.7s., e = 19m.24s. and 19m.52s.?

Prague e = 19m.25s., 19m.37s., 19m.53s., and 21m.18s., ePP = 22m.7s., e = 29m.25s.,

eSKSP = 32m.42s., eSS = 41m.36s.

Stuttgart eZ = 19m.8s. and 19m.16s.

Strasbourg i = 19m.19s., 19m.27s., and 19m.43s.

Paris i = 19m.9s., 20m.44s., and 20m.50s.

Besançon e = 19m.12s., i = 19m.25s.

Tamanrasset eZ = 23m.42s., iZ = 24m.40s., ePPZ = 25m.2s., epPPZ = 26m.33s., eZ =

28m.7s. and 29m.50s., eSKKSZ = 31m.12s.

Long waves were also recorded at La Plata.

March 10d. Readings also at 2h. (Tucson), 3h. (College, Lick, Mount Wilson, Riverside, Palomar, China Lake, Tinemaha, Tucson, and near Messina), 4h. (Hungry Horse, near Messina, and near Klyuchi), 5h. (near Tacubaya), 6h. (Tucson, Mineral, Wellington, and near Malaga), 7h. (near Basle, Zürich, Neuchatel, Ravensburg, and Stuttgart), 11h. (Strasbourg, Stuttgart, and Frunse), 12h. (near Naryn and near Przhivalsk), 13h. (College, Hungry Horse, Mineral, Mount Wilson, Palomar, China Lake, Tinemaha, Boulder City, Overton, Pierce Ferry, Tucson, near Tacubaya, Prague, Basle, Neuchatel, Zürich, Collmberg, Jena (2), Stuttgart (2), Strasbourg (2), Besançon (2), Clermont-Ferrand, and near Paris (2)), 16h. (near Fort de France and near Mizusawa), 17h. (near Hungry Horse), 19h. (near Andijan and near Prague (2)), 20h. (Mount Wilson, Palomar, China Lake, Tinemaha, Overton, and Pierce Ferry (2)), 21h. (Hungry Horse and Tamanrasset), 22h. (Andijan, near Obi-garm, Kulyab, and Stalinabad), 23h. (near Tacubaya).

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained thanks to funding provided by the US National Science Foundation through grant EAR-9725140 (Villaseñor et al., 1997) and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of the EUROSEISMOS project.

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March 11d. 0h. 42m. 50s. Epicentre 20°·0N. 99°·2W.

Intensity IV in the Federal District of Mexico.

Epicentres: 20°·5N. 99°W. (U.S.C.G.S.).

20°21'N. 98°58'W. (Tacubaya).

Monthly Seismic Bulletin, Tacubaya, March, 1950, p. 1.

$$A = -.1504, B = -.9283, C = +.3400; \quad \delta = -4; \quad h = +5;$$

$$D = -.987, E = +.160; \quad G = -.054, H = -.336, K = -.940.$$

		$\Delta$	Az.	P.		O-C.		S.		O-C.		Supp.		L. m.
				m.	s.	s.	m. s.	s.	m. s.	s.	m. s.	s.		
Tacubaya		0·6	180	i 0	18k	+ 3	—	—	—	—	—	—	—	0·5
Puebla		1·3	136	0	26	+ 1	—	—	—	—	—	—	—	0·7
Vera Cruz		3·0	105	0	48	- 2	—	—	—	—	—	—	—	1·5
Oaxaca		3·8	142	1	3	+ 2	—	—	—	—	—	—	—	2·0
Guadalajara		3·9	280	1	4	+ 2	1 55	+ 5	—	—	i 1 7	P*	—	—
Manzanillo		4·9	260	—	—	—	e 2 19	+ 4	—	—	—	—	—	e 3·4
Merida		9·0	84	2	12	- 1	i 3 57	- 1	i 3 37	—	—	?	—	—
Chihuahua		10·6	325	e 2	32	- 4	e 4 34	- 3	e 4 58	SS	—	—	—	—
Lubbock		13·7	351	3	18	0	—	—	—	—	—	—	—	e 7·4
Tucson		16·0	322	i 3	49	+ 1	i 6 38	- 8	i 3 58	PP	—	—	—	i 7·2
St. Louis		20·2	21	i 4	38	- 1	—	—	—	—	—	—	—	—
Palomar		20·6	315	i 4	44a	+ 1	—	—	—	—	i 4 49	?	—	—
Pierce Ferry		20·6	325	e 4	45	+ 2	—	—	—	—	—	—	—	—
Boulder City		21·0	324	i 4	49	+ 2	—	—	—	—	—	—	—	—
Overton	z.	21·2	325	i 4	50	+ 1	—	—	—	—	—	—	—	—
Riverside		21·3	316	i 4	50a	0	—	—	—	—	—	—	—	—
Pasadena		21·9	316	i 4	54	- 3	—	—	—	—	—	—	—	—
China Lake	z.	22·6	319	e 5	4	+ 1	—	—	—	—	—	—	—	e 11·7
Tinemaha		23·8	320	i 5	16	+ 1	—	—	—	—	—	—	—	i 11·8
Logan		24·2	338	e 5	22	+ 3	—	—	—	—	—	—	—	e 11·5
Rapid City	E.	24·2	354	—	—	—	e 9 31	- 4	—	—	—	—	—	e 11·6
Fresno	z.	24·5	319	e 5	23k	+ 1	—	—	—	—	—	—	—	e 12·8
Lick	z.	26·1	318	i 5	37k	0	—	—	—	—	i 6 5	PP	—	e 14·0
Cleveland		26·2	31	e 5	41	+ 3	—	—	e 5 58	—	—	—	—	—
Reno		26·3	324	e 5	28	-11	—	—	—	—	—	—	—	e 14·3
Berkeley	z.	26·8	318	—	—	—	e 11 47	SSS	—	—	—	—	—	e 15·0
Hungry Horse		30·7	342	e 6	16	- 3	—	—	—	—	—	—	—	—
College		55·0	338	e 9	33	- 2	—	—	—	—	—	—	—	—
Tamanrasset	z.	95·1	64	13	25	- 1	—	—	—	—	—	—	—	—

Tinemaha gives also  $IZ = 5m.26s.$ ,  $eZ = 7m.19s.$

Long waves were also recorded at other North American stations.

March 11d. Readings also at 0h. (near Tacubaya), 1h. (Tucson), 2h. (Tacubaya and Fergana), 3h. (Tacubaya), 4h. (Mineral and near Tacubaya), 5h. (Lick and Bandung), 6h. (Ksara, College, Hungry Horse, Mount Wilson, Riverside, China Lake, Tinemaha, and Tucson), 7h. (Stuttgart and Tacubaya), 10h. (College), 11h. and 14h. (near Andijan), 16h. (College, Apia, Samarkand, near Obi-garm, Andijan, Kulyab, and Stalinabad), 17h. (near Ashkabad), 19h. (near Bandung), 20h. (Bandong, and near College), 21h. (Bucharest), 22h. (Hungry Horse, Balboa Heights, and Tam-anrasset, 23h. (Victoria).

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March 12d. 2h. 5m. 58s. Epicentre 29°·5N. 70°·7E.

See Bulletin of U.S.S.R.

A = +·2881, B = +·8228, C = +·4899;  $\delta=0$ ;  $h=+2$ ;  
D = +·944, E = -·331; G = +·162, H = +·462, K = -·872.

		$\Delta$		Az.		P.		O - C.	S.		O - C.	Supp.		L.
		°	'	m.	s.	s.	m.	s.	s.	m.	s.	m.	s.	m.
New Delhi		5·8	97	e 1	47	P*	i 2	59	S*	2	2	P <sub>g</sub>	—	—
Dehra Dun	N.	6·4	81	e 4	50	?	—	—	—	—	—	—	—	—
Kulyab		8·4	355	e 2	3	- 3	3	36	- 7	—	—	—	—	—
Obi-garm		9·2	355	i 2	15	- 1	i 3	57	- 6	—	—	—	—	—
Stalinabad		9·2	351	i 2	11	- 5	i 3	52	-11	—	—	—	—	—
Mary		10·9	320	e 2	40	0	—	—	—	—	—	—	—	—
Andijan		11·3	6	e 2	49	+ 3	e 4	55	+ 1	—	—	—	—	—
Poona		11·3	164	e 3	28	?	5	25	S*	—	—	—	—	5·3
Tashkent		11·9	355	e 2	45?	- 9	e 4	57?	-12	—	—	—	—	—
Naryn		12·7	19	e 3	5	0	e 5	21	- 7	—	—	—	—	—
Tchimkent		12·8	356	i 3	2	- 4	e 5	20	-10	—	—	—	—	—
Frunse		13·7	12	e 3	17	- 1	5	46	- 6	—	—	—	—	—
Almata		14·6	342	i 3	30	0	—	—	—	—	—	—	—	—
Calcutta	E.	17·3	110	e 7	59	S	(e 7	59)	+43	—	—	—	—	(i 9·7)
Baku		20·2	309	e 4	43	+ 4	e 8	29	+ 8	—	—	—	—	—
Colombo	E.	24·1	158	e 7	2?	?	—	—	—	—	—	—	—	—
Grozny		24·2	312	e 5	33	+14	—	—	—	—	—	—	—	—
Tiflis		24·2	308	e 5	17	- 2	e 9	26	- 9	—	—	—	—	—
Leninakan		24·6	306	e 5	18	- 5	—	—	—	—	—	—	—	—
Borzhomi		25·3	308	e 5	35	+ 5	—	—	—	—	—	—	—	—
Zugdidi		26·5	309	e 6	38	PP	—	—	—	—	—	—	—	—
Ksara		29·9	288	e 6	31	+19	e 12	5	+56	—	—	—	—	—
Stuttgart	Z.	50·0	312	e 9	3	+ 5	—	—	—	—	—	—	—	—
Tamanrasset	Z.	58·2	280	e 9	59	+ 1	—	—	—	—	—	—	—	—
College		81·3	16	i 12	23	+ 3	—	—	—	—	—	—	—	—

Additional readings and note :—

New Delhi P<sub>g</sub>E = 2m.15s., P<sub>g</sub>?N = 2m.21s., S\*E = 3m.16s., S<sub>g</sub>E = 3m.32s., S<sub>g</sub>N = 3m.36s.

Dehra Dun eN = 5m.24s.

Poona SSEN = 5m.38s., SSEN = 5m.56s.

Calcutta gives S as P and L as S.

Tamanrasset eZ = 10m.52s.

Long waves were also recorded at Kodaikanal and other European stations.

March 12d. Readings also at 2h. (Besançon, Strasbourg, Stuttgart, Tamanrasset, College, Logan, Tucson, Overton, Shasta Dam, Mineral, Hungry Horse, Messina, near Taranto, near Istanbul and near Apia), 3h. (Apia, Christchurch, Wellington, Riverview, Tucson, and near Istanbul), 4h. (Apia, Auckland, Ksara, Stuttgart, Tamanrasset, Algiers Univ., Rome, Pasadena, Sitka, College, and near Andijan), 5h. (Scoresby Sund, Kew, near Andijan, and near Istanbul), 6h. (Sverdlovsk), 7h. (Pasadena, Boulder City, Overton, Berkeley, Mineral, Shasta Dam, Hungry Horse, College, Logan, Harvard, Weston, Seven Falls, Philadelphia, Bermuda, San Juan, Kew, Rome, Tamanrasset, and near Huancayo), 8h. (near Granada and near Obi-garm), 9h. (Rome, and near Andijan), 10h. (Stuttgart), 12h. (Bombay, and near Alicante (3)), 13h. (Messina), 14h. (near Mizusawa), 15h. (Tamanrasset, Almata, Tchimkent, near Andijan, Fergana, Frunse, Kulyab, Naryn, Obi-garm, Stalinabad, and Tashkent), 16h. (Christchurch, near Arapuni, Cobb River, Kaimata, New Plymouth, Tuai, and Wellington), 17h. (College), 18h. (Huancayo, La Paz, Shasta Dam, Hungry Horse, Bologna, Florence Arc., Zürich, Padova, Salo, Stuttgart, near Prato, Rocca di Papa, Rome, near Tananarive, near Obi-garm, near Bogota and Chinchina), 19h. (Tinemaha, Tucson, Overton, Mineral, Shasta Dam, Hungry Horse, College, Stuttgart, and Tamanrasset), 20h. (Hungry Horse), 23h. (near Stalinabad).

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March 13d. 18h. 10m. 41s. Epicentre 37°·9S. 177°·8E. (as on 1950, Jan. 9d.).

Intensity VI in the epicentral region. Suggested epicentre 37°·8S. 177°·2E.

R. C. Hayes.

Earthquake origins in New Zealand during the year, 1950. New Zealand Journal of Science and Technology, Sect. B., Vol. 33, No. 4, Jan., 1952, p. 306.

$$A = -0.7905, B = +0.0304, C = -0.6117; \quad \delta = -1; \quad h = -1; \\ D = +0.038, E = +0.999; \quad G = +0.611, H = -0.023, K = -0.791.$$

		$\Delta$	Az.	P.		O-C.	S.		O-C.		Supp.		L.
		°	°	m.	s.	s.	m.	s.	s.	m.	s.		m.
Tuai	N.	1.0	210	i 0	23	+ 2	0	36	0	—	—	—	—
New Plymouth	E.	3.1	248	0	50	- 1	—	—	—	—	—	—	—
Wellington		4.1	214	e 1	5	0	—	—	—	—	—	—	—
Cobb River	E.	5.1	229	e 1	18	- 2	—	—	—	—	—	—	—
Kaimata	N.E.	6.7	225	e 1	41	- 1	2	51	- 9	—	—	—	—
Christchurch		6.9	214	e 1	58	P*	—	—	—	—	—	—	—
Riverview		21.9	273	i 5	2k	+ 5	e 8	58	+ 4	i 9	4	P <sub>c</sub> P	e 10.5
Overton	z.	97.0	49	e 13	58	+23	—	—	—	—	—	—	—
Stuttgart	z.	166.4	327	e 21	11	PKP <sub>s</sub>	—	—	—	—	—	—	—

Additional readings :—

Riverview isSN = 9m.13s., iSSSE = 9m.52s.

Overton eZ = 14m.42s.

Long waves were also recorded at Warsaw.

March 13d. Readings also at 1h. (College, Hungry Horse, and Stuttgart), 2h. (Sverdlovsk), 3h. (near La Paz), 7h. (near Bandung and Djakarta), 9h. (Balboa Heights, Ottawa, Rathfarnham Castle, Arapuni, near Christchurch, Cobb River, Kaimata, New Plymouth, Tuai, and Wellington), 11h. (near Granada (2), and near Naryn), 12h. (Frunse, and near Andijan (2)), 13h. (Karlsruhe, Andijan, and near Obi-garm), 14h. (near Klyuchi), 15h. (near Granada), 16h. (Granada, Stuttgart, Ksara, and Taman-rasset), 17h. (near Prague), 19h. (Brisbane, Prague, Hungry Horse, near Ottawa, and near Tacubaya), 21h. (Hungry Horse).

March 14d. 3h. 10m. 4s. Epicentre 8°·5S. 74°·0W. Depth of focus 0.020. (as on 1948, June 14d.).

Intensity V-VI at Cerro de Pasco; V at Pucallpa; IV-V at Tengo Maria; IV at Oventeni and Tarma; II-III at Lima.

Epicentre 8°S. 74°W. Macroseismic area 600,000 sq.km. Depth 150km.

E. Silgado.

Datos sismologicos del Peru, 1949, 1950. Bol. No. 4, Lima, 1952, p. 18.

$$A = +0.2727, B = -0.9509, C = -0.1468; \quad \delta = +13; \quad h = +7; \\ D = -0.961, E = -0.276; \quad G = -0.040, H = +0.141, K = -0.989.$$

		$\Delta$	Az.	P.		O-C.	S.		O-C.		Supp.		L.
		°	°	m.	s.	s.	m.	s.	s.	m.	s.		m.
Huancayo		3.8	201	i 1	2	+ 3	e 1	48	+ 4	—	—	—	—
La Paz		9.8	145	i 2	22	+ 4	i 4	22	+16	i 2	40	PP	5.3
Bogota		13.0	0	i 3	0	0	i 5	15	- 6	i 3	18	pP	—
Chinchina		13.5	353	i 3	4	- 2	i 5	31	- 1	i 5	8	PP	—
Balboa Heights		18.2	344	i 4	2	- 1	i 7	23	+ 5	—	—	—	—
Galerazamba		19.2	357	i 4	17	+ 3	i 7	51	+13	i 4	32	pP	—
Fort de France		26.4	30	i 5	27	+ 4	e 9	39	- 4	—	—	—	—
San Juan		27.8	16	i 5	37	+ 1	e 10	5	- 1	e 6	34	PP	—
La Plata	E.	30.1	152	6	1	+ 4	10	45	+ 3	11	44	SS	14.3
	N.	30.1	152	5	58	+ 1	10	49	+ 7	6	29	pP	14.3
	z.	30.1	152	5	57	0	—	—	—	—	—	—	—
Tacubaya		37.2	319	i 6	57 <sub>a</sub>	0	i 12	51	+19	i 7	24	pP	—
Bermuda		41.6	13	e 8	44	+70	i 14	46	+69	—	—	—	e 18.0
Washington		47.2	358	i 8	17	- 1	—	—	—	i 10	16	PP	—
Philadelphia		48.2	0	i 8	25	- 1	i 15	12	0	i 9	15	pP	e 18.7
Pittsburgh		49.0	355	i 8	31	- 1	i 15	24	+ 1	—	—	—	—

Continued on next page.

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		Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
		°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Fordham		49.1	2	i 8	33	0	i 15	25	+ 1	i 9	9	pP	—
Pennsylvania		49.2	357	i 8	34	0	i 15	24	- 2	i 16	23	sS	—
St. Louis		49.3	344	i 8	32	- 2	e 15	22	- 5	i 10	33	PP	—
Cleveland		50.2	353	i 8	40	- 1	e 15	38	- 2	e 9	16	pP	—
Weston		50.7	4	i 8	45	0	e 15	37	- 9	i 9	18	pP	—
Harvard		50.8	4	i 8	46	0	i 18	18	sS	i 9	8	pP	e 26.4
Tucson		53.6	321	i 9	6	- 1	e 16	18	- 8	e 9	57	pP	e 21.7
Ottawa		53.7	359	i 9	6k	- 1	e 16	32	+ 5	i 9	42	pP	e 23.6
Rolphon		54.6	358	e 9	12k	- 2	—	—	—	—	—	—	—
Shawinigan Falls N.		54.8	3	e 9	16k	+ 1	e 16	45	+ 3	—	—	—	—
Seven Falls	E.	55.4	4	i 9	20	0	i 16	50	0	i 17	45	sS	27.9
Palomar		58.2	318	i 9	38k	- 2	i 16	36	-51	i 10	30	PcP	—
Pierce Ferry		58.2	322	i 9	38	- 2	e 18	16	sS	i 10	4	pP	—
Boulder City		58.6	322	i 9	42	0	e 39	30	P'P'	i 10	1	pP	—
Rapid City	E.	58.6	337	i 9	43	+ 1	e 17	33	+ 1	c 11	27	PP	e 24.4
Overton	Z.	58.7	323	i 9	43	0	e 17	35	+ 2	i 10	7	pP	—
Riverside		59.0	318	i 9	42k	- 3	—	—	—	i 10	15	pP	—
Pasadena		59.6	318	i 9	48k	- 1	i 17	48	+ 3	i 10	21	pP	—
Haiwee		60.6	321	i 9	55k	- 1	—	—	—	—	—	—	—
Logan		60.8	329	i 9	53	- 4	e 17	57	- 3	e 10	25	pP	—
Tinemaha		61.4	321	i 10	0k	- 1	—	—	—	i 10	19	pP	—
Fresno		62.2	320	i 10	4k	- 3	e 18	20	+ 2	—	—	—	—
Lick	Z.	63.7	319	i 10	16k	- 1	—	—	—	i 10	49	pP	—
Reno		63.9	323	i 10	18k	- 0	e 18	31	- 8	i 10	56	pP	—
Berkeley		64.4	319	i 10	20k	- 1	e 19	52	sS	i 10	53	pP	—
Mineral	Z.	65.5	321	i 10	26k	- 2	—	—	—	i 10	48	pP	—
Shasta Dam		66.2	322	i 10	29	- 4	—	—	—	e 11	7	pP	—
Saskatoon		66.6	339	i 10	34	- 1	i 19	11	- 1	—	—	—	—
Hungry Horse		66.7	333	i 10	34	- 2	e 18	53	-20	e 11	21	pP	—
Arcata		67.3	322	i 10	39k	- 1	—	—	—	e 11	26	pP	—
Seattle		70.3	328	i 10	57k	- 1	—	—	—	i 12	0	pP	—
Victoria		71.4	329	i 11	4k	0	e 20	14	+ 6	—	—	—	—
Malaga	Z.	79.1	50	i 11	52a	+ 4	i 21	39	+ 7	i 14	47	PP	37.6
Granada		79.8	50	i 11	55k	+ 3	21	39	- 1	12	19	pP	31.5
Toledo		80.4	47	i 11	58	+ 3	i 21	49	+ 3	12	2	PcP	—
Sitka		82.4	332	—	—	—	e 23	11	sS	—	—	—	e 39.4
Alicante		82.5	49	12	12	+ 6	22	14	+ 7	15	14	PP	e 39.1
Tamanrasset	Z.	83.7	66	i 12	16a	+ 4	e 22	17	- 2	i 12	52	pP	—
Rathfarnham Castle		83.8	34	i 12	15	+ 3	i 22	25	+ 5	i 12	38	pP	38.9
Tortosa		84.0	48	12	19	+ 6	i 22	29	+ 7	—	—	—	—
Algiers Univ.	Z.	84.8	52	i 12	19k	+ 2	e 22	34	+ 4	i 12	58	pP	—
Kew		86.6	37	i 12	17k	- 9	i 22	39	[+ 5]	i 23	33	SP	e 39.9
Clermont-Ferrand		87.1	43	i 12	32	+ 3	i 22	48	- 4	e 24	18	PS	—
Aberdeen		87.5	31	—	—	—	e 22	56?	0	—	—	—	—
Paris		87.6	40	i 12	31	0	i 22	57	0	i 13	8	pP	e 41.9
Besançon		89.4	42	i 12	41	+ 1	—	—	—	i 13	11	pP	—
Basle		90.6	42	e 12	47	+ 2	e 23	26	+ 2	e 15	35	PP	—
College		90.9	336	i 12	46	- 1	i 22	59	[- 2]	i 13	25	pP	—
Strasbourg		90.9	41	e 12	47	0	e 23	31	+ 4	e 13	20	pP	—
Zürich		91.2	42	e 12	51k	+ 3	e 23	12	[+ 9]	e 13	24	pP	—
Stuttgart		91.9	41	i 12	53k	+ 2	e 23	34	- 2	e 13	6	pP	—
Florence Arc.		92.4	46	e 12	53	- 1	i 23	41	+ 1	—	—	—	—
Padova		93.0	45	13	2	+ 6	23	51	+ 6	23	21	SKS	—
Rome		93.0	48	e 12	54	- 2	i 23	52	+ 7	e 23	24	SKS	—
Jena		93.8	40	e 13	2	+ 2	e 23	55	+ 3	e 23	26	SKS	—
Cheb		94.1	40	e 13	10	+ 9	i 23	34	[+ 15]	e 29	11	SS	—
Triest		94.4	44	e 13	5	+ 2	i 23	27	[+ 6]	—	—	—	—
Potsdam	Z.	94.9	38	e 13	6	+ 1	e 24	14	+ 12	—	—	—	—
Copenhagen		95.0	35	e 13	6	+ 1	i 24	7	+ 4	30	39	SS	—
Prague		95.4	40	e 13	10	+ 3	e 23	19	[- 7]	e 13	47	pP	—

Continued on next page.

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Zagreb	96.0	45	—	—	e 23 32	[+ 2]	—	—
Upsala	98.1	31	—	—	i 24 33	+ 4	i 30 24	SS
Warsaw	E. 99.7	39	—	—	e 23 53	[+ 4]	e 24 51	S
Pulkovo	104.5	30	—	—	e 24 12	[+ 1]	e 25 27	S
Kishinev	104.9	43	—	—	i 24 17	[+ 5]	i 25 0	SKKS
Istanbul	105.4	49	—	—	e 24 21	[+ 6]	—	—
Helwan	107.5	61	—	—	e 24 32	[+ 8]	e 27 46	PS
Yalta	108.9	46	e 18 27	[+ 17]	—	—	e 19 21	PP
Moscow	109.1	33	e 18 54	PP	e 24 44?	[+ 13]	e 27 52?	PS
Ksara	111.2	57	e 18 56?	PP	e 28 26?	PS	—	—
Zugdidi	114.7	46	e 19 12	PP	e 26 9	S	—	—
Borzhomi	115.9	47	e 19 40?	PP	e 26 17?	S	—	—
Leninakan	116.5	48	—	—	e 26 26	S	—	—
Sverdlovsk	120.3	27	e 18 35	[+ 3]	e 36 10	SS	i 20 6	PP
Tchimkent	133.6	37	i 19 0	[+ 2]	—	—	—	—
Stalinabad	135.1	42	i 19 5	[+ 5]	e 22 36	PKS	—	—
Obi-garm	135.7	41	e 19 4	[+ 3]	—	—	—	—
Garm	135.9	40	18 54	[- 8]	i 22 23	PKS	—	—
Fergana	136.0	38	e 22 27	PKS	—	—	—	—
Andijan	136.1	38	e 19 6	[+ 4]	28 34	SKKS	i 19 48	pPKP
Irkutsk	136.3	2	19 7	[+ 4]	22 41	PKS	21 43	PP
Almata	136.9	30	e 19 10	[+ 6]	—	—	—	—
Naryn	137.8	33	e 19 12	[+ 7]	—	—	—	—
Kodaikanal	E. 151.8	83	e 19 53	[+ 24]	i 29 12	SKKS	—	—
Nanking	Z. 153.7	336	19 30	[- 1]	i 23 18	PKS	i 19 52	pPKP

Additional readings :—

La Paz iZ = 3m.26s., iSS = 4m.48s.  
 Bogota iPPZ = 3m.3s., iSSSEN = 5m.36s.  
 Galerazamba iSS = 8m.12s.  
 San Juan esS = 11m.18s.  
 La Plata PPN = 7m.8s., E = 8m.14s., sS = 11m.44s., N = 12m.50s.  
 Tacubaya eSS = 15m.30s.  
 Philadelphia iPP = 10m.26s., esS = 16m.10s., i = 18m.0s.  
 Pittsburgh i = 16m.26s.  
 Fordham isS = 16m.21s., i = 17m.46s.  
 Pennsylvania iScSE = 18m.6s.  
 St. Louis i = 9m.55s., iS = 15m.26s., esS = 16m.18s., i = 18m.7s., eSS = 19m.20s.  
 Cleveland eN = 8m.44s., iN = 15m.48s., eZ = 15m.52s., esSN = 16m.34s., eSSE = 18m.39s., eE = 18m.45s.  
 Harvard isP = 9m.31s., i = 9m.37s., iPcP = 9m.59s., iSS = 19m.21s.  
 Tucson i = 9m.26s. and 9m.37s., esP = 10m.11s., iPP = 11m.15s., esS = 17m.32s., eSS = 21m.14s.  
 Ottawa e = 18m.44s.  
 Palomar iZ = 9m.53s. and 10m.41s., eE = 15m.18s.  
 Pierce Ferry iPP = 12m.8s.  
 Rapid City esPPE = 12m.52s., esSE = 18m.26s.  
 Overton ePKP, PKPZ = 39m.16s.  
 Riverside iPcPZ = 10m.31s.  
 Pasadena iPcPZ = 10m.34s., esP iZ = 10m.42s., iPPE = 12m.8s., ePPPZ = 13m.35s., esSEN = 18m.46s.  
 Logan ePP = 12m.12s.  
 Tinemaha iZ = 10m.28s. and 10m.34s.  
 Lick iZ = 10m.27s., iPcPZ = 10m.42s., isPZ = 11m.5s., iPPZ = 13m.1s.  
 Reno iZ = 10m.36s., eEN = 18m.44s.  
 Berkeley iZ = 10m.40s.  
 Mineral iZ = 10m.31s. and 12m.6s., eZ = 12m.53s., iPPZ = 13m.8s., ePKP, PKPZ = 39m.5s., eZ = 39m.49s.  
 Shasta Dam, epPP = 13m.42s., ePKP, PKP = 39m.8s.  
 Saskatoon i = 20m.8s.  
 Hungry Horse ePP = 12m.49s., ePKP, PKP = 38m.57s.  
 Arcata eZ = 10m.50s., iE = 11m.32s.  
 Seattle i = 11m.4s., 11m.12s., 11m.19s., 11m.30s., 11m.43s., 12m.6s., and 12m.24s., ePP = 13m.26s., e = 20m.56s. and 21m.56s.  
 Granada PPP = 17m.10s., PS = 21m.58s., SS = 26m.58s.  
 Toledo iPPZ = 14m.57s., SKS?E = 21m.58s., SSE = 27m.2s.  
 Alicante PPP = 17m.6s., PS = 22m.56s., PPS = 23m.12s.  
 Tamanrasset iZ = 12m.29s., esPZ = 13m.7s., iZ = 15m.5s., ePPZ = 15m.46s., iSZ = 22m.29s., iSPZ = 23m.20s., eZ = 25m.39s., iSSZ = 27m.59s.  
 Rathfarnham Castle Z = 12m.57s., 13m.29s., 13m.47s., and 14m.3s., i = 22m.29s., iSS?EN = 22m.53s., eEN = 27m.43s. and 30m.32s.

Continued on next page.



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Algiers Univ. eZ = 12m.29s., 12m.41s., 13m.30s., 13m.46s., and 14m.15s., ePPZ = 15m.45s., eZ = 21m.49s., ePSZ = 23m.44s.  
 Kew eSSS = 35m.28s.  
 Clermont-Ferrand i = 23m.30s., iS = 24m.7s.  
 Paris e = 22m.42s., iPS = 23m.52s., i = 25m.51s., e = 31m.18s.  
 Besançon eSP? = 13m.46s.  
 College i = 12m.59s., e = 14m.53s., i = 15m.4s., ePP = 16m.12s., i = 16m.23s.  
 Strasbourg i = 13m.11s., e = 15m.6s., 17m.30s., 19m.56s., and 24m.20s., eSP = 24m.33s., eSPP = 25m.20s., e = 26m.16s. and 26m.28s.  
 Zürich ePP = 15m.14s., eS = 23m.34s.  
 Stuttgart eZ = 14m.28s., eSKS = 23m.14s., e = 27m.26s.  
 Florence e = 20m.33s.  
 Padova ePS? = 24m.44s.  
 Jena eP?N = 13m.5s.  
 Cheb e = 24m.5s.  
 Potsdam iPZ = 13m.9s.  
 Copenhagen 36m.32s.  
 Prague eSP = 14m.5s., e = 14m.27s., 15m.7s., and 15m.22s., ePP = 16m.47s., e = 21m.22s., eSKKS = 23m.35s., epSKS = 24m.13s., esSKS = 24m.33s., ePS = 25m.37s., esPS = 26m.31s., e = 27m.14s.  
 Warsaw eN = 23m.56s.  
 Helwan eE = 25m.21s., eN = 25m.56s.  
 Yalta ePPP = 21m.10s.  
 Moscow eSKKS = 25m.31s.?  
 Andijan ePP = 21m.49s., PKS = 22m.29s.  
 Nanking iZ = 19m.39s., eZ = 20m.18s., iZ = 23m.27s.

March 14d. 16h. 25m. 4s. Epicentre  $1^{\circ}5'S$ .  $23^{\circ}4'W$ . (as on 1944, June 25d.).

A = +.9175, B = -.3970, C = -.0260;  $\delta = +9$ ;  $h = +7$ ;  
 D = -.397, E = -.918; G = -.024, H = +.010, K = -1.000.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.	
Tamanrasset	z.	37.1	47	e 7 13	- 1	e 13 10	+ 9	e 8 42	PP	—
Granada		42.7	23	8 53k	+53	14 29	+ 5	10 34	PP	—
Alicante		44.9	25	10 26	PP	15 13	+17	—	—	e 22.9
Algiers Univ.	z.	45.3	30	e 8 22	+ 1	—	—	e 10 6	PP	—
La Paz		46.5	249	e 8 30	- 1	i 15 11	- 8	18 22	SS	21.9
Bermuda		51.6	315	—	—	e 17 36	PPS	—	—	e 22.6
Pretoria	z.	55.1	120	e 9 43	+ 7	—	—	—	—	—
Kew		56.3	18	—	—	e 16 56?	-38	—	—	—
Grahamstown		56.5	129	e 9 51	+ 5	—	—	—	—	—
Stuttgart		57.5	25	e 9 58?	+ 5	e 17 56	+ 6	e 10 33	P <sub>c</sub> P	e 30.4
De Bilt		58.6	20	—	—	e 18 26	PPS	—	—	e 24.9
Collnberg	z.	61.0	25	e 10 18	0	—	—	—	—	—
Istanbul		63.7	41	—	—	e 17 14	?	—	—	35.9
Ksara		65.7	52	e 6 33?	?	—	—	e 15 35	PPP	—
Tucson		88.6	302	e 12 52	- 4	—	—	—	—	—
Pierce Ferry		91.4	306	e 13 7	- 2	—	—	—	—	—
Hungry Horse		91.5	318	e 13 4	- 6	—	—	—	—	—
Overton	z.	91.7	306	e 13 17	+ 7	—	—	—	—	—

Additional readings:—

Tamanrasset iZ = 7m.28s. and 7m.35s., ePPPZ = 9m.1s.

Granada SS = 17m.23s.

Stuttgart ePPP?Z = 13m.2s.

Collnberg eZ = 10m.27s. and 10m.34s.

Long waves were also recorded at Bogota, Sitka, Copenhagen, and Potsdam.

March 14d. Readings also at 2h. (La Paz and Hungry Horse), 3h. (Balboa Heights), 5h. (Tchimkent, near Andijan, Garm, Kulyab, and Obi-garm), 6h. (Overton, Pierce Ferry, College, and near Apia), 7h. (Hungry Horse), 9h. (near Fort de France and near Andijan), 12h. (near Tacubaya), 15h. (Kulyab, Stalinabad, and near Obi-garm), 16h. (Tchimkent, near Andijan, Kulyab, Obi-garm, College, and near Ottawa), 20h. (near Ottawa), 21h. (Andijan, near Stalinabad, and near Obi-garm), 23h. (near Klyuchi).

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March 15d. 6h. Greece.

Epicentre given as  $38^{\circ}7'N$ ,  $24^{\circ}3'E$ ., but this does not fit the readings and there is insufficient data for a more accurate determination.  
Intensity IV-V at Skynos; IV at Kymi; III at Athens.

A. Galanopoulos.

Seismological Institute Bulletin, 1950, Athens, 1951, p. 15.

Ksara e = 32m.9s. and 36m.9s.  
Athens eP? = 34m.10s.?, iS<sub>g</sub> = 34m.24s.  
Bucharest eEN = 35m.36s., eN = 36m.27s. and 36m.37s., iN = 36m.48s. and 36m.55s.  
Istanbul eP = 35m.37s., eS = 36m.37s.  
Tamanrasset ePZ = 38m.55s., iZ = 38m.58s., ePPZ = 39m.26s., ePPPZ = 39m.36s., eZ = 39m.43s. and 42m.27s., eSZ = 43m.1s., LZ = 44m.50s.  
Budapest ePN = 39m.5s., ePE = 39m.8s., eN = 40m.18s., eE = 41m.  
Kalossa ePN = 39m.5s., eE = 39m.12s., eN = 40m.11s.  
Triest iS<sub>g</sub>S<sub>g</sub> = 39m.45s.  
Kew eZ = 40m.17s., eL = 45m.  
Warsaw eZ = 41m.15s., eN = 42m.29s., eE = 42m.37s., eL = 43m.  
Hungry Horse eP = 46m.27s., iP = 46m.31s.  
Long waves were also recorded at Rathfarnham Castle.

March 15d. 17h. 40m. 59s. Epicentre  $33^{\circ}8'N$ ,  $134^{\circ}5'E$ . (as on 1949, March 19d.).

Intensity V at Murotomisaki; IV at Tokushima, Kōti, Sumoto, Takamatu, Kobe; II-III at Matuyama, Owase, Osaka, Wakayama, Kasiwara, Tu, Hiroshima.  
Epicentre  $33^{\circ}6'N$ ,  $134^{\circ}6'E$ . Depth 10km. Macroseismic radius 200-300km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1950, Tokyo, 1952, p. 13-14, with macroseismic chart, p. 13.

$$A = -0.5836, B = +0.5939, C = +0.5537; \quad \delta = -11; \quad h = +1; \\ D = +0.713, E = +0.701; \quad G = -0.388, H = +0.395, K = -0.833.$$

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.
	°	°	m. s.	s.	m. s.	s.	m. s.
Muroto	0.6	206	0 11k	- 4	0 17	- 9	—
Sumoto	0.6	30	0 16 <sub>a</sub>	+ 1	0 27	+ 1	—
Kōti	0.8	253	-0 2k	-18	0 10	-21	—
Kobe	1.0	32	0 23	+ 2	0 38	+ 2	—
Siomisaki	1.1	108	0 37	S	(0 37)	- 2	—
Osaka	1.2	45	0 26	+ 2	0 43	+ 2	—
Owase	1.4	79	0 26	- 1	0 43	- 3	—
Matuyama	1.5	271	0 17 <sub>k</sub>	-27	—	—	0 22 P
Kyoto	1.6	40	0 31	+ 1	0 55	+ 4	—
Simidu	1.6	232	0 54	S	(0 54)	+ 3	—
Toyooka	1.7	9	0 34	+ 3	1 1	S <sub>g</sub>	—
Hiroshima	1.8	288	0 38	P <sub>g</sub>	1 3	S <sub>g</sub>	—
Kameyama	1.9	57	0 35	+ 1	1 4	S <sub>g</sub> *	—
Hikone	2.1	45	0 38	+ 1	1 3	- 1	—
Hamada	2.3	299	0 47	P <sub>g</sub>	1 20	S <sub>g</sub>	—
Gifu	2.4	49	0 43	+ 2	1 12	S <sub>g</sub> 0	—
Nagoya	2.4	56	0 43	+ 2	1 17	S <sub>g</sub> *	—
Ooita	2.5	257	0 49 <sub>a</sub>	P <sub>g</sub>	1 27	S <sub>g</sub> 2	—
Miyazaki	3.1	234	0 50	- 1	1 27	- 2	—
Omaesaki	3.1	75	0 58	P*	1 38	S*	—
Hukuoka	3.4	269	0 56	+ 1	1 51	S <sub>g</sub>	—
Shizuoka	3.4	68	1 6	P <sub>g</sub>	1 45	S <sub>g</sub> *	—
Toyama	3.6	36	0 54	- 4	1 44	+ 2	—
Hunatu	3.9	63	1 5	+ 3	2 0	S <sub>g</sub> *	—
Misima	3.9	68	1 9	P*	2 5	S <sub>g</sub>	—
Kagosima	4.0	238	1 15	P*	2 9	S <sub>g</sub>	—
Wazima	4.0	26	1 14	P*	2 16	S <sub>g</sub>	—
Matusiro	4.1	47	1 35	P <sub>g</sub>	2 23	S <sub>g</sub>	—
Nagano	4.1	45	1 30	P <sub>g</sub>	2 18	S <sub>g</sub>	—
Osima	4.1	76	1 12	P*	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	s.
Mera		4.5	76	1 39	P <sub>g</sub>	—	—	—	—
Kumagaya		4.6	61	1 25	P*	—	—	—	—
Maebasi		4.6	55	1 27	P*	—	—	—	—
Yokohama		4.6	66	1 28	P*	2 26	S*	—	—
Tokyo		4.7	64	1 27	P*	2 29	S*	—	—
Kakioka		5.2	61	1 26	+ 5	—	—	—	—
Utunomiya		5.2	56	1 30	P*	2 29	+ 7	—	—
Mito		5.5	60	2 29	S	(2 29)	- 1	—	—
Onahama		6.1	57	1 58	P*	3 19	S <sub>g</sub>	—	—
Sendai		6.8	47	3 11	S*	—	—	—	—
Mizusawa	N.	7.5	43	e 2 24	P <sub>g</sub>	e 4 10	S <sub>g</sub>	—	—
Nanking	Z.	13.3	267	—	—	e 6 19	SSS	—	—
College		54.8	30	e 9 33	- 1	—	—	—	—
Shasta Dam		77.5	49	e 11 57	- 2	—	—	—	—
Hungry Horse		77.9	39	i 12 0	- 1	—	—	—	—
Stuttgart	Z.	84.4	327	e 12 39	+ 3	—	—	—	—
Overton	Z.	85.0	49	i 12 38	0	—	—	—	—
Boulder City		85.1	50	e 12 38	- 1	—	—	—	—
Pierce Ferry		85.5	49	e 12 40	- 1	—	—	—	—

Additional readings :—  
 Mizusawa eSE = 4m.1s.  
 Stuttgart eZ = 11m.42s.

March 15d. Readings also at 0h. (Apia, College, Hungry Horse, Shasta Dam, Boulder City, Overton, Pierce Ferry, and Tucson), 1h. (Tamanrasset), 3h. (Overton), 5h. (Tacubaya), 6h. (Aberdeen, Yalta, and near Athens), 7h. (College, Shasta Dam, Boulder City, Pierce Ferry, and near Athens), 8h. (near Tacubaya), 9h. (Tamanrasset, near Algiers Univ., near Fergana, and near Andijan), 11h. (near Andijan and near New Delhi), 13h. (Stuttgart), 14h. (Hungry Horse, Shasta Dam, and Alicante), 15h. (near New Delhi (2)), 16h. (near Tacubaya), 17h. (College, Hungry Horse, and near Alicante), 19h. (Stalinabad, near Garm and Kulyab), 20h. (near Ottawa), 21h. (College, Hungry Horse, Mount Wilson, Riverside, Tinemaha, Tamanrasset, and near Klyuchi), 23h. (Pretoria, near Chinchina and Bogota).

March 16d. 19h. 24m. 54s. Epicentre 18°·5S. 178°·0W. Depth of focus 0·080.  
 (as on 1950, Jan. 26d.).

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

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Apia		7.6	53	e 1 55	+ 1	e 3 21	- 4	—	—
Tuai	N.	20.7	192	e 4 4	0	7 21	+ 1	—	—
Wellington		23.5	194	—	—	e 7 38	-27	—	e 13.1
Cobb River	E.	23.9	198	e 4 36	+ 3	8 13	+ 1	—	—
Kaimata	N.E.	25.6	199	e 4 46	- 2	e 8 35	- 3	—	—
Christchurch		26.2	196	4 6?	-47	—	—	—	—
Brisbane		28.1	246	i 5 11	+ 1	i 9 15	- 3	i 6 33	sP
Riverview		31.5	235	i 7 12	PP	i 10 9	- 1	i 15 8	S <sub>c</sub> S
Bandong		73.0	270	e 10 36	0	e 19 14	- 6	—	—
Branner	Z.	76.5	42	i 10 55k	- 1	—	—	i 12 56	pP
Berkeley		76.7	42	i 10 55k	- 2	e 19 58	- 1	i 12 55	pP
Lick	Z.	76.8	42	i 10 56k	- 1	e 20 2	+ 2	i 11 6	P <sub>c</sub> P
Pasadena		77.3	47	i 10 59	- 1	i 20 6	0	i 13 0	pP
Fresno		77.7	44	i 11 1k	- 1	e 20 10	0	i 13 2	pP
Palomar		77.8	48	i 11 2k	- 1	i 20 13	+ 2	i 12 58	pP
Riverside		77.8	47	i 11 0k	- 3	—	—	e 13 1	pP
Shasta Dam		78.3	40	i 11 3	- 2	e 20 14	- 2	e 13 5	pP
China Lake	Z.	78.6	45	i 11 6k	- 1	—	—	i 13 9	pP
Mineral	Z.	78.6	41	i 11 5	- 2	—	—	i 13 6	pP
Nanking	Z.	78.6	309	i 11 3	- 4	—	—	—	—

Continued on next page.

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Tinemaha	78.9	45	i 11	7k	- 1	e 20	24	+ 2	i 13	10	pP	---
Reno	79.2	42	e 11	10k	0	e 20	22	- 3	e 13	10	pP	---
Boulder City	80.6	47	i 11	17	0	e 20	41	+ 1	e 13	17	pP	---
Overton	z. 81.2	47	i 11	20	0	e 20	52	+ 6	i 13	15	pP	---
Pierce Ferry	81.3	47	i 11	20	- 1	e 20	47	0	i 13	6	pP	---
Tucson	81.7	52	i 13	25	pP	e 20	36	-15	e 14	21	PP	---
Victoria	82.5	33	i 11	24k	- 3	---	---	---	e 13	28	pP	---
Seattle	82.6	34	i 11	26a	- 1	---	---	---	e 13	27	pP	---
Logan	85.6	43	e 11	39	- 3	e 21	7	[- 7]	e 13	42	pP	---
College	86.3	12	i 11	40	- 5	e 21	11	[- 8]	i 13	45	pP	---
Hungry Horse	87.5	37	i 11	49	- 2	e 21	24	[- 2]	i 13	52	pP	---
St. Louis	99.6	52	---	---	---	e 22	29	[- 3]	e 25	59	PPS	---
Bogota	104.7	89	---	---	---	e 22	54	[- 2]	e 23	54	SKKS	---
Almata	113.3	310	i 17	33	[- 2]	---	---	---	---	---	---	---
Tchimkent	118.7	309	i 17	44	[- 2]	---	---	---	i 19	5	PP	---
Tashkent	118.9	308	e 19	10	PP	i 23	45	[- 7]	---	---	---	---
Bermuda	119.1	62	---	---	---	e 25	6	SKKS	---	---	---	---
Stalinabad	119.3	305	e 17	45	[- 2]	---	---	---	e 19	14	PP	---
Samarkand	120.7	306	e 17	43	[- 7]	---	---	---	---	---	---	---
Sverdlovsk	122.3	326	e 17	51	[- 2]	28	0	SKSP	e 34	24	SS	---
Grahamstown	123.4	205	i 17	57	[+ 1]	---	---	---	---	---	---	---
Pietermaritzburg z.	124.9	212	e 18	0	[+ 1]	---	---	---	---	---	---	---
Pretoria z.	129.2	211	e 18	8	[+ 1]	---	---	---	i 20	38	PP	---
Baku	133.6	309	e 20	43	PP	---	---	---	---	---	---	---
Grozny	135.7	314	e 20	55	PP	---	---	---	---	---	---	---
Tiflis	136.9	312	i 18	21	[ 0]	e 21	53	PKS	e 20	55	PP	---
Leninakan	137.9	311	e 18	34	[+11]	---	---	---	e 21	16	PP	---
Abastumanj	138.3	314	e 18	23	[- 1]	---	---	---	---	---	---	---
Zugdidi	138.6	313	e 18	27	[+ 3]	---	---	---	---	---	---	---
Warsaw z.	143.2	341	e 18	28	[- 5]	---	---	---	---	---	---	---
Rathfarnham Castle	144.7	8	i 18	34	[- 2]	e 47	36	?	---	---	---	---
Potsdam z.	145.1	348	i 18	33k	[- 3]	---	---	---	---	---	---	---
Raciborzu z.	145.9	342	i 18	37	[ 0]	---	---	---	---	---	---	---
Collnberg z.	146.1	347	i 18	37a	[- 1]	---	---	---	---	---	---	---
Ksara	146.2	303	e 18	37	[- 1]	---	---	---	e 20	53	pPKP	---
Jena	146.8	347	e 18	39	[ 0]	---	---	---	e 20	48	pPKP	---
Prague	147.0	345	i 18	39	[ 0]	---	---	---	e 21	0	pPKP	---
Kew	147.1	2	i 18	37	[- 2]	e 29	38	SKKS	e 40	20	SS	---
Istanbul	147.7	320	e 18	43	[+ 3]	e 22	12	PKS	---	---	---	---
Karlsruhe	149.1	352	e 18	42	[ 0]	---	---	---	---	---	---	---
Stuttgart z.	149.2	350	i 18	40k	[- 2]	---	---	---	i 20	58	pPKP	---
Strasbourg	149.6	352	i 18	42	[- 1]	e 22	3	PKS	---	---	---	---
Basle	150.7	352	e 18	42	[- 2]	---	---	---	---	---	---	---
Zürich	150.7	351	e 18	42k	[- 2]	---	---	---	e 20	59	pPKP	---
Helwan z.	151.0	298	e 18	42	[- 3]	e 25	38	[+38]	22	21	PP	---
Besançon	151.1	354	i 18	50	[+ 5]	---	---	---	e 21	5	pPKP	---
Chur	151.1	349	e 18	43k	[- 2]	---	---	---	---	---	---	---
Clermont-Ferrand	152.8	358	e 18	47	[ 0]	---	---	---	e 21	5	pPKP	---
Athens	152.9	320	e 18	53	[+ 5]	---	---	---	---	---	---	---
Rome z.	155.0	341	i 18	48	[- 2]	---	---	---	---	---	---	---
Alicante	160.1	6	20	11	PKP <sub>a</sub>	27	21	SKKS	24	33	PP	e 70.7
Algiers Univ. z.	161.8	357	e 18	50	[- 8]	---	---	---	e 21	10	pPKP	---
Tamanrasset z.	174.6	323	i 19	8a	[+ 1]	i 30	31	SKKS	e 21	27	pPKP	---

Additional readings :—

- Apia eS = 3m.25s.
- Brisbane iE = 6m.41s.
- Berkeley iP<sub>c</sub>PZ = 11m.4s., iZ = 12m.36s., isPZ = 13m.49s.
- Lick eZ = 11m.57s.
- Pasadena esPZ = 13m.57s., isPZ = 20m.49s.
- Palomar isPZ = 14m.1s., iE = 20m.37s.
- China Lake eZ = 11m.29s., ePKP, PKPZ = 40m.45s.
- Mineral iP<sub>c</sub>PZ = 11m.18s., eZ = 13m.11s.
- Nanking iZ = 11m.11s., eZ = 11m.25s., iZ = 14m.48s., eZ = 15m.8s.
- Tinemaha i = 11m.33s.
- Tucson iS<sub>c</sub>S = 20m.54s., eSS = 24m.48s.

Continued on next page.

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Seattle e = 13m.47s., esP = 14m.22s.  
 Logan ePP = 15m.8s.  
 College i = 11m.59s.  
 St. Louis e = 23m.7s., eS = 23m.31s.  
 Bogota ePPSE = 27m.11s.  
 Rathfarnham Castle iZ = 18m.58s., eEN = 53m.6s.  
 Potsdam eEN = 18m.42s.  
 Collmberg eZ = 18m.41s., 18m.55s., and 19m.12s.  
 Ksara sPKP = 21m.51s.  
 Jena eE = 18m.42s., epPKP?N = 20m.54s.  
 Prague ePKP<sub>2</sub> = 18m.52s., i = 19m.13s., e = 19m.18s., 20m.3s., and 20m.39s., esPKP = 21m.52s., ePP = 22m.11s.  
 Karlsruhe e = 18m.45s. and 18m.56s.  
 Stuttgart iPKPZ = 18m.46s., eZ = 19m.16s., ePPZ = 22m.39s.  
 Strasbourg i = 18m.45s., e = 19m.6s., and 19m.56s.  
 Basle e = 18m.49s. and 19m.2s.  
 Zürich e = 18m.48s., ePP = 22m.27s.  
 Helwan PKP<sub>2</sub>Z = 18m.51s., iZ = 19m.0s., eZ = 20m.0s. and 20m.27s.  
 Besançon e = 19m.11s., ePKP<sub>2</sub> = 19m.54s.  
 Clermont-Ferrand i = 18m.53s.  
 Alicante PPP = 28m.18s.  
 Algiers Univ. ePKP<sub>2</sub>Z = 19m.46s., epPKP<sub>2</sub>Z = 22m.0s., esPKPZ = 22m.21s.  
 Tamanrasset iPKP<sub>2</sub>Z = 20m.44s., esPKPZ = 22m.18s., epPKP<sub>2</sub>Z = 23m.5s., eZ = 23m.40s., esPKP<sub>2</sub>Z = 24m.10s., iPPZ = 24m.37s., epPPZ = 26m.48s., esPPZ = 27m.51s., iZ = 28m.20s., eZ = 31m.15s.  
 Long waves were also recorded at Auckland.

March 16d. Readings also at 0h. (Tucson (2), Boulder City (2), Pierce Ferry (2), Shasta Dam, Mineral, Hungry Horse, College (2), Tamanrasset, Grozny, near Abastumanj, Borghomi, Erevan, Gori, Leninakan, Tiflis, and Zugdidi), 1h. (Boulder City and Hungry Horse), 2h. (La Paz), 3h. (China Lake, Tucson, Pierce Ferry, Hungry Horse, and College), 5h. (China Lake and near Klyuchi), 6h. (near Andijan, near Garm and Kulyab), 8h. (Hungry Horse, Samarkand, near Andijan (2), Kulyab, and Stalinabad), 9h. (Ksara and near Andijan), 10h. (La Cave, Ottawa, near Andijan, and near Zagreb), 11h. and 13h. (near Andijan), 14h. (Tamanrasset, near Andijan, and near Garm), 15h. (Balboa Heights and Hungry Horse), 16h. (near Ashkabad (3)), 17h. (near Alicante), 19h. (Hungry Horse), 22h. (near Seattle), 23h. (near Garm and near Klyuchi).

March 17d. Readings at 3h. (Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Shasta Dam, Mineral, Hungry Horse, near Bandung, and Djakarta), 5h. (Mount Wilson, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Lick, College, San Juan, Stuttgart, and near Apia), 7h. (near Mizusawa and near Andijan), 8h. (Tucson, Boulder City, Overton, Pierce Ferry, and Hungry Horse), 9h. (Stuttgart (2) and near Andijan), 10h. (near Andijan), 12h. (Stuttgart and near Andijan (2)), 13h. (Hungry Horse, Strasbourg, Stuttgart, and near Klyuchi), 14h. (Stuttgart), 16h. (Stuttgart, near La Paz, and near Ashkabad), 17h. (Pierce Ferry and Hungry Horse), 18h. (Huancayo), 20h. (Andijan and near Tehimkent), 21h. (Prague, Kizyl-Arvat, Mary, and near Ashkabad).

March 18d. 4h. 39m. 34s. Epicentre 57°·5S. 23°·5W.

Not intended as an approximate determination.

A = +·4951, B = -·2153, C = -·8417;  $\delta$  = -6; h = -8;  
 D = -·399, E = -·917; G = -·772, H = +·336, K = -·540.

	$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.	
	°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Grahamstown	41·4	76	i 7 50	0	—	—	e 9 47	PP	—
Pietermaritzburg z.	46·3	77	i 8 29	0	—	—	—	—	—
Pretoria z.	48·3	72	i 8 43	- 2	—	—	—	—	—
La Paz	52·7	303	i 9 19	+ 1	i 18 43?	ScS	i 9 40	pP	—
Huancayo	59·9	298	i 10 6	- 4	e 18 14	- 7	—	—	—
Bogota	74·1	307	i 11 40	0	i 21 10	- 2	e 25 59	SS	36·4
Chinchina	75·1	306	i 11 48	+ 2	i 21 30	+ 6	—	—	35·4
Christchurch	78·4	192	—	—	e 22 6	+ 6	e 36 51	Q	41·6
Fort de France	78·4	323	e 12 2	- 2	e 21 46	- 14	—	—	—
Galerazamba	80·1	309	i 11 43	- 30	e 22 26	+ 8	e 23 38	PPS	—

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
San Juan		83.5	320	e 12 30	- 1	e 22 46	- 6	e 15 42	PP e 43.9
Tamanrasset	z.	83.6	27	e 12 32	+ 1	—	—	—	—
Riverview		88.9	176	i 12 58 <sub>a</sub>	0	i 23 43	- 1	i 13 10	pP e 36.6
Algiers Univ.	z.	96.5	21	e 13 32	0	—	—	—	—
Helwan		98.4	46	—	—	e 24 14	[- 5]	e 26 39	PS —
Rome		103.5	26	e 22 33?	?	i 31 21	?	—	—
Ksara		103.7	47	e 13 9	-56	27 44	PS	—	—
Kodaikanal	E.	104.5	93	—	—	e 25 44	-14	—	—
Triest		107.4	26	e 23 0	?	—	—	—	—
Kew		110.3	15	—	—	e 26 53	?	e 39 33	Q e 51.4
Prague		111.7	25	—	—	e 39 56	SSS	e 45 32	Q e 56.4
Baku		115.2	54	e 22 11	PPP	—	—	—	—
Tucson		115.2	291	e 18 43	[ 0]	—	—	—	e 58.0
Palomar	z.	118.9	287	i 18 51	[ 0]	—	—	—	—
Pierce Ferry		119.9	291	i 18 53	[ 0]	—	—	e 20 27	PP —
Riverside	z.	119.9	287	i 18 51	[- 2]	—	—	i 19 11	? —
Boulder City		120.2	290	e 18 52	[- 1]	—	—	—	—
Overton	z.	120.4	291	i 18 56	[+ 2]	—	—	i 20 21	PP —
Pasadena	z.	120.4	287	i 18 55	[+ 1]	—	—	e 20 33	PP —
China Lake	z.	121.4	288	i 18 55	[ 0]	—	—	e 20 30	PP —
Kulyab		122.6	69	e 19 0	[+ 2]	—	—	—	—
Stalinabad		122.6	68	e 19 13	[+15]	—	—	—	—
Tinemaha		122.7	288	i 18 59	[+ 1]	—	—	e 28 52	PKKP —
Logan		123.1	297	e 18 57	[- 2]	—	—	e 20 38	PP —
Tashkent		125.0	66	e 19 6	[+ 4]	e 27 48	{+ 1}	e 20 58	PP —
Berkeley		125.4	286	i 19 4 <sub>a</sub>	[+ 1]	—	—	—	e 63.4
Tchimkent		125.9	65	e 19 3	[- 1]	—	—	—	—
Andijan		126.1	69	e 19 5	[+ 1]	e 27 46	{- 9}	e 20 52	PP —
Mineral	z.	126.9	289	i 19 7 <sub>k</sub>	[+ 1]	—	—	—	—
Shasta Dam		127.6	289	i 19 8	[+ 1]	—	—	i 19 31	? —
Hungry Horse		129.1	301	e 19 8	[- 2]	e 22 29	PKS	e 22 12	PP —
Sverdlovsk		132.3	47	e 19 18	[+ 2]	e 28 29	{- 5}	e 22 47	PKS —
Nanking	z.	143.8	118	i 19 39	[+ 2]	i 23 31	PKS	e 22 45	PP —
College		153.0	310	e 19 48	[- 4]	—	—	e 23 40	PP —

Additional readings :—

La Paz iPPZ = 11m.27s.  
 Christchurch eKN = 32m.36s., eE = 33m.46s.  
 San Juan e = 28m.22s.  
 Tamanrasset iZ = 12m.42s., eZ = 12m.52s.  
 Riverview eSKSN = 23m.27s., iSE = 23m.47s., iS<sub>c</sub>SN = 23m.58s., iE = 24m.2s., eSSE = 29m.51s., eSSN = 29m.55s.  
 Algiers Univ. eZ = 14m.35s. and 18m.21s.  
 Helwan eN = 25m.26s.  
 China Lake iZ = 19m.12s., iPKKPZ = 28m.57s.  
 Tinemaha iZ = 19m.13s.  
 Tashkent ePKS = 22m.38s., ePS = 30m.59s.  
 Berkeley iZ = 19m.13s. and 19m.22s.  
 Andijan eSS = 37m.20s.  
 Mineral iZ = 19m.18s. and 19m.29s.  
 Sverdlovsk SS = 39m.2s., SSS = 41m.50s.  
 Nanking iZ = 19m.46s., 20m.6s., and 20m.11s.  
 College i = 19m.57s., 20m.11s., and 20m.30s., e = 29m.15s.  
 Long waves were also recorded at La Plata, Auckland, Wellington, Brisbane, Bermuda, Philadelphia, Harvard, Alicante, Clermont-Ferrand, De Bilt, Copenhagen, Upsala, Stuttgart, and Potsdam.

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March 18d. 18h. 19m. 12s. Epicentre  $17^{\circ}7'S$ .  $69^{\circ}2'W$ . Depth of focus 0.020.  
(as on 1949, December 3d).

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

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
La Paz	z.	1.6	40	i 0 32k	0	i 0 56	0	—	—
Huancayo		8.2	313	i 2 1	+ 4	e 4 7	+ 39	—	—
La Plata		19.9	151	4 17	- 4	7 44	- 7	—	—
Bogota		22.7	349	e 4 52	+ 4	i 8 46	+ 5	i 9 19	SS
Chinchina		23.4	347	e 4 55	0	e 10 14	SSS	—	—
San Juan		36.0	4	e 6 40	- 7	e 12 0	- 13	e 13 12	sS
Weston		59.8	340	i 9 46	- 4	—	—	—	—
Harvard		59.9	340	i 8 48	- 63	—	—	—	—
Ottawa		63.1	355	e 10 9	- 4	—	—	—	—
Tucson		63.7	321	e 10 17	0	—	—	e 11 1	pP
Boulder City		68.7	322	i 10 49	+ 1	—	—	i 11 35	pP
Overton	z.	68.8	323	e 10 51	+ 2	—	—	i 11 34	pP
Riverside	z.	68.9	318	i 10 50	+ 1	—	—	e 11 34	pP
Pasadena	z.	69.5	318	i 10 55	+ 2	—	—	i 11 39	pP
China Lake	z.	70.2	320	i 10 58	+ 1	—	—	i 11 42	pP
Tinemaha	z.	71.5	320	i 11 6	+ 1	—	—	i 11 51	pP
Reno	z.	74.0	322	e 11 24	+ 4	—	—	—	—
Shasta Dam		76.2	321	i 11 32	0	—	—	e 12 17	pP
Hungry Horse		76.9	331	i 11 36	0	—	—	e 12 20	pP
Tamanrasset	z.	83.4	64	i 12 8 <sub>a</sub>	- 2	—	—	i 12 55	pP
Grahamstown		85.1	123	(i 12 17)	- 2	—	—	—	—
Pretoria	z.	88.8	116	(i 12 35)	- 2	—	—	e 16 0	PP
Stuttgart	z.	95.7	41	e 13 6	- 3	—	—	—	—

Additional readings and note:—

La Paz iZ = 51s.  
La Plata iPN = 4m.20s., N = 5m.30s. and 7m.48s.?  
Tinemaha iZ = 11m.32s.  
Hungry Horse i = 11m.41s., e = 15m.26s.  
Tamanrasset eZ = 12m.23s., epPPZ = 16m.9s.  
Grahamstown and Pretoria P given as pP.  
Long waves were also recorded at Galerazamba.

March 18d. Readings also at 0h. (near Athens), 3h. (Samarkand, Naryn, Frunse, near Garm, Obi-garm, Kulyab, Stalinabad, and Andijan), 4h. (College and near Apia), 5h. (Arapuni, Tuai, near Wellington, Kaimata, Christchurch, and New Plymouth), 8h. (near Andijan), 10h. (Samarkand, Andijan, near Kulyab, Stalinabad, and Obi-garm), 11h. (Kew), 12h. (near Andijan), 13h. (Collmberg, Stuttgart, and Algiers Univ.), 15h. (near New Delhi), 16h. (Bandong, Nanking, Christchurch, Wellington, College, Hungry Horse (2), and Alicante).

March 19d. Readings at 0h. (Stuttgart and Prague), 1h. (near Garm), 5h. (Ashkabad), 6h. (Ksara and near Alicante), 7h. (Helwan and near Huancayo), 8h. (near Messina and near Andijan), 9h. (near Ashkabad), 10h. (Frunse, Naryn, Samarkand, near Andijan (2), Fergana, Garm (2), Kulyab, Obi-garm, Stalinabad, and Tchimkent), 11h. (Pierce Ferry, Shasta Dam, Hungry Horse (2), College, Tamanrasset, and near Kulyab), 12h. (Overton, Pierce Ferry, and College), 15h. (College), 16h. (Ksara, Borzhomi, Leninakan, Tashkent, Tiflis, near Abastumanj, and near Ottawa), 17h. (Ksara, Gori, Zugdidi, near Abastumanj, Borzhomi, Leninakan, and Tiflis), 18h. (Pierce Ferry), 19h. (near La Paz), 20h. (Pierce Ferry, Hungry Horse, and College), 22h. (near Bogota and near Chinchina).

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March 20d. 15h. 22m. 15s. Epicentre 40°·5N. 121°·6W. (as on 1949, Nov. 16d.).

Intensity V at Chester, Chico, Gridley, and Magalia.  
Epicentre suggested 40°27'N. 121°28'W. Macroseismic area 40,000 sq. m.

L. M. Murphy and F. P. Ulrich.  
United States Earthquakes, 1950, Serial No. 755, Washington, 1952, p. 9.

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

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Mineral	0·1	—	i 0 5 <sub>a</sub>	- 3	—	—	—	—
Shasta Dam	0·6	289	i 0 15	0	—	—	—	e 1·8
Reno	1·7	125	i 0 30 <sub>a</sub>	- 1	—	—	—	—
Arcata	1·9	282	i 0 37 <sub>a</sub>	+ 3	—	—	—	—
Ferndale	N. 2·0	272	i 0 39	+ 4	i 1 13	S <sub>g</sub>	—	—
Berkeley	2·7	191	i 0 45	0	i 1 15	- 4	—	—
San Francisco	2·8	194	i 0 46	- 1	i 1 19	- 3	—	—
Branner	3·1	188	i 0 52 <sub>k</sub>	+ 1	i 1 29	0	—	—
Lick	3·2	181	e 0 51 <sub>k</sub>	- 1	i 1 26	- 6	—	—
Santa Clara	3·2	185	i 0 53 <sub>a</sub>	+ 1	i 1 33	+ 1	i 1 1	P <sub>g</sub>
Fresno	4·0	159	i 1 3 <sub>a</sub>	- 1	i 2 4	S*	i 1 9	P*
Tinemaha	4·3	142	i 1 8	0	i 2 26	S <sub>g</sub>	—	—
Halwee	5·2	146	e 1 20	- 1	i 2 40	S*	—	—
Santa Barbara	6·2	166	i 1 37	+ 2	i 3 4	S*	—	—
Pasadena	6·9	156	i 1 41	- 4	i 3 6	+ 1	—	—
Overton	z. 6·9	123	i 1 43	- 2	i 3 34	S*	i 2 11	P <sub>g</sub>
Boulder City	7·0	128	i 1 14	-32	i 3 16	+ 8	—	—
Seattle	7·2	356	i 1 51 <sub>k</sub>	+ 2	e 3 15	+ 2	i 2 21	P <sub>g</sub>
Riverside	7·3	151	i 1 50	0	i 3 46	S*	—	i 4·2
Pierce Ferry	7·4	124	i 1 50	- 2	i 3 37	S*	—	—
Salt Lake City	7·4	85	e 2 21	P <sub>g</sub>	—	—	—	e 3·9
Logan	7·5	77	e 1 53	0	i 3 8	-12	i 2 21	P <sub>g</sub>
Palomar	8·0	151	i 2 3	+ 3	—	—	—	i 3·4
Victoria	8·1	351	i 2 5 <sub>a</sub>	+ 3	3 38	+ 3	—	5·0
Hungry Horse	9·5	32	i 2 22	+ 2	—	—	—	e 5·0
Tucson	12·0	131	i 2 55	0	i 4 58	-13	—	e 5·6
Rapid City	E. 14·1	69	e 3 32	+ 9	e 5 53	- 9	—	e 8·8
St. Louis	24·2	84	e 5 17	- 2	e 9 4	-31	e 9 49	SS 12·2
College	28·7	337	i 6 2	+ 1	—	—	e 9 10	P <sub>c</sub> P
Alicante	84·8	43	—	—	e 22 52	-13	—	e 40·2

Additional readings :—

Berkeley iN = 59s.

Lick i = 54s., iE = 1m.31s.

Santa Clara i = 1m.13s.

Tinemaha iZ = 1m.14s.

Pasadena iEZ = 1m.54s.

Boulder City i = 1m.57s. and 2m.14s.

Seattle iZ = 1m.58s., 2m.4s., and 2m.14s., eN = 3m.43s., iE = 4m.2s.

Riverside iZ = 2m.12s., eEN = 3m.32s.

Victoria i = 2m.18s.

Tucson e = 2m.58s., i = 3m.13s.

Long waves were also recorded at Lincoln, Chicago, Weston, Philadelphia, Tacubaya, and Kew.

March 20d. Readings also at 1h. (near Andijan), 3h. (near Bogota and Chinchina), 5h. (Ksara and Tamanrasset), 6h. (near Ashkabad), 8h. (near Kulyab and Stalinabad), 11h. (near Kulyab), 12h. (near Rocca di Papa and Rome), 16h. (Harvard and near La Paz), 17h. (Sofia, near Bucharest, and near Alicante), 18h. (Jena and near Trieste), 19h. (College), 20h. (Tamanrasset (2)), 21h. (College), 22h. (Boulder City, Overton, Hungry Horse, near Shasta Dam, near Ottawa, and near Naryn).



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March 21d. 9h. Western Pacific.

Nanking ePZ = 34m.19s., ePP?Z = 34m.46s., eS?Z = 38m.41s.  
 Bandung ePEN = 35m.7s., eSEN = 39m.24s.  
 Djakarta ePNZ = 35m.11s., eSN = 39m.31s.  
 Irkutsk eP = 37m.33s., ePPP = 39m.35s.  
 Stalinabad eP = 39m.6s., eS = 47m.34s.  
 Tashkent eP = 39m.8s., eS = 47m.43s.  
 Sverdlovsk eP = 40m.11s., eS = 49m.41s.  
 College eP = 41m.16s., e = 41m.50s. and 42m.43s.  
 Ksara eP? = 41m.49s., e = 54m.7s.  
 Shasta Dam eP = 42m.54s.  
 Hungry Horse eP = 43m.5s.  
 Riverview eS?N = 45m.41s., eE = 45m.51s., eSS?N = 49m.13s., eLE = 54.8m.  
 Tucson e = 48m.15s. and 48m.24s.  
 Christchurch eE = 59m.40s., eR = 65m.  
 Kodaikanal eE = 61m.6s.

March 21d. Readings also at 0h. (Mizusawa), 1h. (College, near Andijan, and near Garm), 2h. (Logan), 3h. (near Messina), 4h. (College, Hungry Horse, Nanking, Ksara, Erevan, Grozny, Leninakan, and near Tiflis), 6h. (Boulder City, Pierce Ferry, Lick, Shasta Dam, and Hungry Horse), 7h. (near Huancayo), 11h. (Frunse, Samarkand, near Andijan, Garm, Stalinabad, Tashkent, and Tchimkent), 12h. (Overton and near Andijan), 13h. (Triest, La Paz, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Mizusawa), 17h. (Huancayo, Hungry Horse, and College (2)), 18h. (Hungry Horse, Fergana, Frunse, Naryn, near Andijan (2), Garm (4), Samarkand (2), Stalinabad, Tashkent, and Tchimkent), 19h. (Bombay), 21h. (Collmberg, Stuttgart, Palomar, Pasadena, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Hungry Horse, College, and near Victoria (2)), 22h. (Pierce Ferry, Hungry Horse, and near Malaga), 23h. (Tucson, Overton, Pierce Ferry, Hungry Horse (2), College (2), Collmberg, and Stuttgart (2)).

March 22d. 11h. Off north coast of Venezuela.

San Juan eP = 2m.37s.  
 Galerazamba iP = 2m.38s., iS = 3m.40s.  
 Fort de France eP = 2m.58s.  
 Bogota iP = 3m.4s. and 4m.40s., iS = 4m.50s.  
 Chinchina iP = 3m.7s., iS = 4m.44s.  
 Tucson eP = 8m.49s.  
 Pierce Ferry eP = 9m.20s.  
 Overton ePZ = 9m.24s.  
 Hungry Horse eP = 9m.58s., e = 10m.20s.  
 Tamanrasset iPZ = 12m.22s.k, eZ = 12m.38s.  
 College eP = 12m.27s.  
 La Paz eP = 15m.9s.

March 22d. 12h. 50m. 45s. Epicentre 49°·9N. 28°·3W.

A = +·5694, B = -·3066, C = +·7628;  $\delta = +8$ ;  $h = -5$ ;  
 D = -·474, E = -·880; G = +·672, H = -·362, K = -·647.

	$\Delta$	Az.	P.		O - C.	S.		O - C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Rathfarnham Castle	14·1	68	e 3	36	+13	e 7	25	SSS	—	—	e 11·3
Kew	17·8	74	i 4	14	+ 3	—	—	—	—	—	e 7·3
Paris	20·0	82	i 4	37	0	e 9	21	SSS	—	—	10·2
Malaga	21·7	118	i 4	55	0	—	—	—	e 5	27	PPP
Granada	21·8	117	4	57k	+ 1	8	54	+ 2	—	—	—
Besançon	22·7	83	e 5	4	0	—	—	—	e 5	11	PP
Strasbourg	23·5	79	e 5	18	+ 6	—	—	—	—	—	—
Karlsruhe	23·7	27	e 5	6	- 8	—	—	—	—	—	—
Stuttgart	24·3	78	e 5	20	0	—	—	—	—	—	—
Jena	N. 25·2	72	e 5	30	+ 1	—	—	—	—	—	—
Algiers Univ.	Z. 26·1	109	e 5	30	- 7	—	—	—	—	—	—
Prague	27·2	72	e 5	47	0	e 10	38	+13	—	—	—
Tamanrasset	Z. 37·9	123	e 7	8	-12	e 12	36	-37	e 8	23	PP
Ksara	48·9	84	e 8	49	- 1	e 16	3	+10	—	—	—
Hungry Horse	53·1	304	i 9	20	- 1	—	—	—	—	—	—

Continued on next page.

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		$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.	
College		56.4	334	e 9 47	+ 2	—	—	e 10 47	P <sub>c</sub> P	—
Overton	z.	60.8	293	e 10 17	+ 1	—	—	—	—	—
Pierce Ferry		60.9	292	e 10 16	- 1	—	—	—	—	—
Boulder City		61.5	293	e 10 20	- 1	—	—	—	—	—
Tucson		61.6	287	e 10 21	- 1	—	—	—	—	—
Shasta Dam		62.6	301	e 10 32	+ 4	—	—	—	—	—
Tinemaha	z.	62.7	296	e 10 28	- 1	—	—	—	—	—
China Lake	z.	63.2	295	i 10 31	- 1	—	—	—	—	—
Riverside	z.	64.3	293	e 10 44	+ 5	—	—	—	—	—
Mount Wilson	z.	64.6	293	e 10 46	+ 5	—	—	—	—	—

Additional readings :—

Paris e = 9m.42s.

Malaga iN = 5m.13s., iZ = 7m.53s.

Tamanrasset iZ = 7m.17s.

Hungry Horse i = 9m.26s.

Pierce Ferry i = 10m.23s.

Tinemaha eZ = 10m.35s.

China Lake iZ = 10m.37s.

Long waves were also recorded at Potsdam and Clermont-Ferrand.

March 22d. 21h. 7m. 22s. Epicentre 22°·5N. 122°·5E. Depth of focus 0·010.  
(as on 1947, May 25d.).

As given by U.S.S.R.

A = -·4969, B = +·7800, C = +·3805;  $\delta$  = +9;  $h$  = +4;  
D = +·843, E = +·537; G = -·204, H = +·321, K = -·925.

		$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Nanking	z.	10.1	341	e 2 28	+ 4	4 21	+ 5	—	i 4.6
Andijan		45.8	305	e 8 13	- 1	e 14 53	+ 4	—	—
Fergana		46.1	305	—	—	e 18 15	SS	—	—
Kulyab		47.5	302	e 8 26	- 1	—	—	—	—
Obi-garm		47.6	303	i 8 28	0	15 16	+ 1	—	—
Tchimkent		48.0	308	e 8 30	- 1	—	—	—	—
Tashkent		48.1	306	i 8 32	0	e 15 19?	- 3	—	—
Stalinabad		48.3	302	8 30	- 3	e 15 25?	0	—	—
Samarkand		49.7	304	e 8 44	0	—	—	—	—
Sverdlovsk		56.1	325	i 9 32	0	i 17 14	+ 3	—	—
Moscow		68.9	323	e 10 55	- 1	—	—	—	—
College		69.7	27	e 11 6	+ 5	—	—	i 11 27	pP
Ksara		75.1	301	e 11 34	+ 1	e 21 54	- 8	—	—
Copenhagen		82.3	328	i 12 15	+ 3	—	—	—	41.6
Collmberg	z.	84.1	323	e 12 24	+ 3	—	—	—	—
Kew		90.9	329	—	—	e 26 24	SS	e 46 38?	Q
Hungry Horse		93.3	34	i 13 14	+ 9	—	—	—	e 55.6
Tamanrasset	z.	103.9	301	e 18 13	PP	—	—	—	—
Tucson		105.4	45	e 18 30	PP	—	—	—	—

Long waves were also recorded at other European stations.

March 22d. Readings also at 0h. (Hungry Horse and New Delhi), 1h. (Boulder City (2), Overton, Pierce Ferry, Shasta Dam, Hungry Horse, and College), 2h. (College), 4h. (Overton, Pierce Ferry, Hungry Horse, Obi-Garm, Samarkand, near Andijan, Garm, near Alicante, Granada, Malaga, and Toledo), 5h. (Tucson, Overton, Pierce Ferry, and College), 9h. (near Athens), 10h. (near Andijan and near Athens (2)), 12h. (De Bilt, Fergana, Samarkand, Tchimkent, near Andijan, Garm, Obi-garm, and Stalinabad), 15h. (La Paz, Palomar (2), Pasadena (2), Riverside, China Lake (2), Tinemaha (2), Tucson (2), Overton (2), Pierce Ferry (2), Lick, Shasta Dam, Hungry Horse, and Tamanrasset), 16h. (College), 17h. (Pierce Ferry, Fergana, Samarkand, Tchimkent, near Andijan, Garm, Kulyab, Obi-garm, and Stalinabad), 18h. (Pierce Ferry), 19h. (Jena, near Collmberg, and near Istanbul), 20h. (Bucharest, Istanbul, Sofia, Messina, Taranto, and near Athens), 21h. (Jena, Prague, Collmberg, Copenhagen, Zürich, Stuttgart, Rome, Trieste, Hungry Horse, College, Tamanrasset, Obi-garm, Tchimkent, near Andijan, Kulyab, Stalinabad, near Naryn, and near Tananarive), 22h. (College and Pretoria), 23h. (College and Grahamstown).

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March 23d. 0h. 24m. 41s. Epicentre 30°·1N. 68°·8E. (as on February 19d.).

	$\Delta$	Az.	P.		O-C.	S.		O-C.
	°	°	m.	s.	s.	m.	s.	s.
Kulyab	7·8	6	e 1	59	+ 1	e 3	30	+ 2
Stalinabad	8·2	0	i 2	5	+ 2	3	39	+ 1
Obl-garm	8·3	5	2	9	+ 5	4	2	+ 22
Garm	9·0	8	e 2	11	- 2	—	—	—
Mary	9·4	324	e 2	26	+ 8	—	—	—
Samarkand	9·7	352	2	25	+ 3	—	—	—
Fergana	10·6	13	e 2	37	+ 1	4	36	- 1
Andijan	11·0	14	e 2	44	+ 2	4	49	+ 2
Tashkent	11·2	2	e 2	49	+ 5	—	—	—
Ashkabad	11·7	315	2	44	- 7	4	47	- 17
Tchimkent	12·2	3	i 2	55	- 3	—	—	—
Naryn	12·7	25	e 3	7	+ 2	5	27	- 1
Frunse	13·6	18	e 3	17	0	e 5	47	- 3
Almata	14·7	24	3	31	0	—	—	—
Tiflis	22·5	307	4	58	- 4	8	58	- 7
Grozny	22·6	311	e 4	56?	- 7	—	—	—
Sverdlovsk	27·3	350	e 5	45	- 3	—	—	—
Ksara	28·1	285	e 4	51	- 64	e 11	35	+ 55
Collmberg z.	46·0	314	e 8	27?	0	—	—	—
Stuttgart z.	48·4	310	e 8	39?	- 7	—	—	—
Strasbourg	49·3	310	e 8	44	- 9	—	—	—
Tamanrasset z.	56·5	279	e 9	46	0	—	—	—
College	81·1	15	e 12	14	- 4	—	—	—

Additional readings:—

Collmberg eZ = 8m.32s.

Stuttgart eZ = 8m.55s.

Long waves were recorded at Bombay and Hyderabad.

March 23d. 4h. 16m. 50s. (I) } Epicentre 40°·5N. 121°·6W.  
8h. 1m. 4s. (II) } (as on 20d.).

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.	L.
	°	°	m.	s.	s.	m.	s.	s.	m.	m.
I Shasta Dam	0·6	289	i 0	13	- 2	e 0	21	- 5	—	e 1·2
II	0·6	289	i 0	14	- 1	e 0	25	- 1	—	e 0·9
I Reno	1·7	125	e 0	27k	- 4	i 0	48	- 6	—	—
II	1·7	125	i 0	30k	- 1	—	—	—	—	—
I Arcata	1·9	282	i 0	39a	+ 5	i 0	59	0	—	i 1·1
I Berkeley	2·7	191	i 0	42k	- 3	i 1	16	- 3	—	—
II	2·7	191	i 0	44a	- 1	e 1	17	- 2	—	—
I Lick z.	3·2	181	i 0	50k	- 2	i 1	28	- 4	—	—
II z.	3·2	181	i 0	52k	0	i 1	31	- 1	—	—
I Fresno	4·0	159	i 1	8	+ 4	i 1	56	+ 4	—	—
II	4·0	159	e 1	6	+ 2	e 2	0	S*	—	—
I Tinemaha	4·3	142	e 1	8	0	i 2	8	+ 8	i 1 18	P*
II z.	4·3	142	e 1	22	P*	e 2	13	S*	—	—
I Haiwee	5·2	146	i 1	35	P*	i 2	38	S*	—	—
I China Lake z.	5·6	145	e 1	25	- 2	i 2	49	S*	—	—
I Pasadena	6·9	156	i 2	2	P*	i 3	28	S*	—	—
II z.	6·9	156	—	—	—	i 3	33	S*	—	—
I Overton z.	6·9	123	i 1	53	+ 8	—	—	—	i 2 13	P*
II z.	6·9	123	e 2	21	P*	—	—	—	—	—
I Boulder City	7·0	128	e 2	11	P*	e 3	33	S*	—	—
II	7·0	128	e 2	19	P*	—	—	—	—	—
I Riverside z.	7·3	151	—	—	—	e 3	43	S*	—	—
I Pierce Ferry	7·4	124	e 1	48	- 4	—	—	—	—	—
II	7·4	124	e 1	49	- 3	—	—	—	—	—
I Logan	7·5	77	e 2	19	P*	—	—	—	—	e 4·0
I Hungry Horse	9·5	32	e 2	21	+ 1	—	—	—	—	—
II	9·5	32	e 2	22	+ 2	—	—	—	—	—

Overton I gives also iZ = 2m.25s.

Long waves to shock I were also recorded at Tucson.

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March 23d. 8h. Samoa. Widely recorded at distant stations only.

Apia eP = 10m.18s., eS = 11m.28s., e = 11m.35s. and 17m.11s.  
 Lick ePZ = 20m.22s.k, eZ = 20m.33s.  
 Pasadena ePZ = 20m.23s.  
 Riverside iPZ = 20m.25s.  
 Shasta Dam eP = 20m.31s.  
 China Lake iPZ = 20m.32s.  
 Tinemaha iPZ = 20m.33s.  
 Reno e = 20m.36s.  
 Boulder City eP = 20m.43s.  
 Overton iPZ = 20m.46s.  
 Pierce Ferry iP = 20m.46s.  
 Tucson eP = 20m.47s.  
 Logan eP = 21m.9s.  
 Hungry Horse eP = 21m.20s.  
 College iP = 21m.21s., i = 21m.28s.  
 Rathfarnham Castle iZ = 26m.16s. and 26m.27s.  
 Stuttgart ePKPZ = 28m.23s., eZ = 28m.29s.  
 Collmberg eZ = 28m.23s., 28m.31s., 28m.37s., and 28m.43s.  
 Strasbourg ePKP = 28m.25s., e = 28m.31s. and 29m.14s.  
 Jena ePKPN = 28m.26s.?, eN = 28m.31s.  
 Ksara eP = 28m.26s., e = 30m.58s.  
 Prague ePKP? = 28m.37s., e = 30m.9s.  
 Paris iPKP<sub>2</sub> = 28m.41s., eL = 90m.  
 Tamanrasset iPKPZ = 28m.47s.a, eZ = 28m.58s., ePKP<sub>2</sub>Z = 30m.33s., ePPZ = 34m.38s.  
 eZ = 37m.40s.  
 Besançon ePKP<sub>2</sub> = 28m.56s.

Long waves were also recorded at Auckland, Christchurch, and Wellington.

March 23d. Readings also at 1h. (Athens), 3h. (Ksara and near Granada (2)), 5h. (Tucson, Boulder City, Overton, Pierce Ferry (2), Hungry Horse, College (2), near Shasta Dam, near Tacubaya, and near Obi-garm), 7h. (Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, and near Mizusawa), 8h. (Paris, Tamanrasset, and near Shasta Dam), 9h. (Ksara, Abastumanj, Borzhomi, Gori, Leninakan, Piatigorsk, Zugdidi, near Grozny, and Tiflis), 10h. (Nanking, Collmberg, Jena, Riverside, China Lake, Tinemaha, Tucson (2), Boulder City (3), Overton, Pierce Ferry (2), Shasta Dam (2), Hungry Horse (2), Sitka, and College (2)), 11h. (Shasta Dam, Hungry Horse, and College), 12h. (Tucson and Huancayo), 14h. (Collmberg and near Athens), 17h. (near Garm), 18h. (Riverside, China Lake, Tinemaha, and near Tacubaya), 19h. (Overton, Pierce Ferry, Mineral, Hungry Horse, College, and near Sitka), 20h. (near Ottawa), 23h. (Samarkand, Tchimkent, near Andijan, Garm, Obi-garm, and Stalinabad).

March 24d. Readings at 0h. (Besançon, Paris, Strasbourg, Stuttgart, Algiers Univ., Tamanrasset, and near Alicante), 1h. (Overton, Pierce Ferry, Hungry Horse, De Bilt, Kew, Potsdam, Garm, Samarkand, near Obi-garm, and Stalinabad), 3h. (near Obi-garm (4) and Stalinabad), 5h. (Strasbourg, Tucson, College (2), and near Fort de France), 7h. (College and Ksara), 8h. (near Andijan), 9h. (Bandong, Djakarta, La Paz, Tacubaya, Hungry Horse, College, Tamanrasset, and near Bogota), 10h. (Kodaikanal and near Andijan), 12h. (Tucson, Pierce Ferry, Hungry Horse, College, Huancayo, Galerazamba, Tacubaya, Tamanrasset, near Balboa Heights, and near Andijan), 13h. (College and near Andijan), 14h. (College, Hungry Horse, and near La Paz), 15h. (near Huancayo), 18h. (Reykjavik), 19h. (Stuttgart, near Basle, Neuchatel, Zürich, Besançon, Strasbourg, and near Obi-garm), 20h. (near Istanbul and near Mizusawa), 22h. (Hungry Horse), 23h. (La Paz).

March 25d. 6h. 53m. 50s. Epicentre 15°·0N. 115°·0E.

A = -·4084, B = +·8759, C = +·2572;  $\delta$  = +14; h = +6;  
 D = +·906, E = +·423; G = -·109, H = +·233, K = -·966.

	$\Delta$	Az.	P.		O-C.		S.		O-C.		Supp.		L. m.
			m.	s.	s.	m.	s.	m.	s.	m.	s.		
Djakarta	22·5	202	e 4	56	- 6	e 9	16	+11	—	—	—	—	
Bandong	22·9	200	e 5	5	- 1	e 9	33	+20	—	—	—	—	
Kodaikanal	E. 36·9	268	e 6	25	-47	—	—	—	—	—	—	—	
Irkutsk	38·1	349	7	29	+ 7	13	22	+ 6	9	2	PP	—	
Bombay	40·5	282	e 8	20	?	e 13	50	- 2	—	—	—	—	
Naryn	42·7	316	i 8	1	+ 1	—	—	—	—	—	—	—	
Almata	43·0	319	i 8	4	+ 1	—	—	—	—	—	—	—	
Frunse	44·3	317	e 8	20	+ 7	—	—	—	—	—	—	—	
Andijan	45·0	313	8	19	0	15	0	+ 2	18	40?	SS	—	
Fergana	45·2	313	e 8	20	0	—	—	—	—	—	—	—	

Continued on next page.

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	△	Az.	P.		O-C.	S.		O-C.	Supp.		L.
			m.	s.		m.	s.		m.	s.	
Garm	45.9	311	8	18	- 8	15	10?	- 1	—	—	—
Obi-garm	46.2	310	8	29	+ 1	e 15	19	+ 4	—	—	—
Stalinabad	46.9	310	i 8	34	0	e 15	26	+ 1	—	—	—
Tchimkent	47.5	314	i 8	38	0	—	—	—	—	—	—
Tashkent	47.6	313	i 8	39	0	i 15	36	+ 1	e 19	6	SS
Samarkand	48.5	310	e 8	17	-29	—	—	—	—	—	—
Brisbane	z. 56.1	139	i 9	42 <sub>a</sub>	- 1	—	—	—	—	—	—
Sverdlovsk	58.4	329	—	—	—	18	4	+ 2	—	—	—
Tiflis	65.4	310	e 10	47	0	—	—	—	—	—	—
Moscow	70.6	325	e 11	21	+ 2	—	—	—	—	—	—
Ksara	72.9	301	e 13	22	?	e 23	30	?	—	—	—
College	79.6	26	e 12	10	0	—	—	—	e 12	40	P <sub>c</sub> P
Potsdam	z. 85.4	324	i 12	43?	+ 3	—	—	—	—	—	—
Collmberg	z. 85.8	322	e 12	46	+ 4	—	—	—	—	—	—
Stuttgart	z. 88.9	320	e 12	57	- 1	—	—	—	e 16	27	PP
Kew	93.3	326	—	—	—	e 42	16	?	e 49	10?	Q
Tamanrasset	z. 101.4	297	e 17	30	PP	—	—	—	—	—	e 53.2

Irkutsk gives also eSS = 16m.14s.

Long waves were also recorded at other European stations and at Scoresby Sund.

March 25d. 22h. Undetermined shock.

Tuai ePN = 32m.40s., LN = 43m.43s.

Auckland eP?N = 33m.?, eLN = 42.5m.

Christchurch eNZ = 33m.55s. and 35m.25s., eEN = 36m.30s., S = 38m.14s., L = 39m.35s.

Wellington eP?Z = 34m.4s., iS = 38m.18s., eL = 39.5m.

La Paz P = 37m.26s.

Riverview ePN = 37m.33s., ePPP = 39m.6s., iSN = 42m.55s., iE = 42m.59s., eLE = 46.7m.

College e = 45m.28s. and 45m.36s.

Tamanrasset eZ = 46m.0s. and 46m.9s.

Rome eN = 46m.22s.

Algiers Univ. eZ = 46m.32s., 46m.43s., 47m.9s., 47m.40s., and 50m.4s.

Stuttgart ePKP?Z = 46m.46s.?

Helwan PKPZ = 47m.0s., SKPZ = 50m.33s., eZ = 52m.23s., PSKSZ = 61m.54s.

Ksara ePKP = 47m.12s., pPKP? = 47m.36s., PP? = 50m.46s.

Collmberg eZ = 47m.41s.

Triest iPKP = 48m.19s., iPKP<sub>2</sub> = 50m.51s., eSS? = 67m.9s.?, eL = 118m.30s.

Granada e = 68m.54s., 77m.39s., and 100m.50s., L = 116.1m.

Long waves were also recorded at Brisbane, De Bilt, Kew, and Potsdam.

March 25d. Readings also at 0h. (College, Tucson, Auckland, Wellington, Christchurch, and New Delhi), 1h. (Tacubaya), 2h. (Istanbul), 3h. (College and Tinemaha), 4h. (La Paz), 7h. (Pierce Ferry, near Victoria, and near Klyuchi), 8h. (College, Alicante, and Granada), 9h. (Hungry Horse, Saskatoon, Ottawa, Seven Falls, Shawinigan Falls, and near Andijan), 10h. (near Tacubaya), 11h. (College), 12h. (near Alicante), 13h. (near Andijan), 14h. (near Mizusawa), 15h. (College, Hungry Horse, and near La Paz), 16h. (Hungry Horse), 17h. (Tamanrasset), 20h. (Hungry Horse and Victoria), 21h. (Hungry Horse, Andijan, near Garm, near Chiuchina, and Bogota), 22h. (near La Paz, College, Hungry Horse, Shasta Dam, Overton, Tamanrasset, Paris, and Rome), 23h. (La Paz, College, Sitka, Hungry Horse (2), Mary, Samarkand, Fergana, Andijan, Tchimkent, near Stalinabad, and Obi-garm).

March 26d. 4h. 25m. 33s. Epicentre 40°·5N. 121°·6W. (as on 23d.).

	△	Az.	P.		O-C.	S.		O-C.	Supp.		L.
			m.	s.		m.	s.		m.	s.	
Shasta Dam	0.6	289	i 0	14	- 1	e 0	20	- 6	—	—	e 0.6
Reno	1.7	125	i 0	27 <sub>k</sub>	- 4	i 0	45	- 9	—	—	—
Arcata	1.9	282	i 0	39 <sub>a</sub>	+ 5	i 1	3	+ 4	—	—	—
Berkeley	2.7	191	i 0	43 <sub>a</sub>	- 2	i 1	15	- 4	—	—	—
Lick	3.2	181	i 0	49 <sub>a</sub>	- 3	i 1	29	- 3	—	—	—
Fresno	4.0	159	i 1	7 <sub>a</sub>	+ 3	—	—	—	—	—	—
Tinemaha	4.3	142	i 1	9	+ 1	e 2	14	S*	i 1	17	P*
Haiwee	5.2	146	e 1	0	-21	i 2	44	S*	i 1	31	P*
China Lake	z. 5.6	145	e 1	19	- 8	i 2	50	S*	i 1	41	P*
Mount Wilson	z. 6.8	155	i 2	0	P*	i 3	27	S*	—	—	—

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Overton	z.	6.9	123	e 1 42	- 3	i 2 42	-23	—	i 3.6
Boulder City		7.0	128	e 2 11	P*	—	—	e 2 21	—
Seattle	z.	7.2	356	e 2 6	P*	—	—	—	—
Riverside		7.3	151	e 1 57	+ 7	i 3 52	S*	—	—
Pierce Ferry		7.4	124	i 2 21	P <sub>g</sub>	—	—	—	—
Logan		7.5	77	e 2 17	P*	—	—	—	e 3.8
Hungry Horse		9.5	32	e 2 21	+ 1	—	—	—	—
Tucson		12.0	131	e 2 53	- 2	—	—	—	e 6.5

Additional readings :—

Haiwee iZ = 2m.36s.

China Lake iZ = 2m.33s.

March 26d. 16h. 53m. 25s. Epicentre 14°·5N. 39°·5E. (as on 1945, March 31d.).

A = +·7474, B = +·6161, C = +·2488;  $\delta$  = +9; h = + 6;

D = +·636, E = -·772; G = +·192, H = +·158, K = -·969.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Helwan		17.0	334	i 3 58k	- 3	i 7 15	+ 5	8 37	—
Ksara		19.5	351	e 4 0?	-31	e 8 5?	- 1	—	—
Leninakan		26.5	7	e 5 37	- 4	—	—	—	—
Abastumanj		27.3	5	e 5 49	+ 1	—	—	—	—
Baku		27.3	17	e 5 55	+ 7	—	—	—	—
Borzhomi		27.4	7	e 5 49	0	—	—	—	—
Gori		27.7	9	e 5 55	+ 3	—	—	—	—
Tiflis		27.7	8	5 48	- 4	—	—	—	—
Istanbul		28.0	343	e 11 2	S	(e 11 2)	+24	—	—
Zugdidi		28.0	6	5 59	+ 4	—	—	—	—
Kizyl-Arvat		28.6	27	e 6 4	+ 4	—	—	—	—
Ashkabad		28.7	32	6 17	+16	—	—	—	—
Sotchi		29.0	1	e 6 45	PP	—	—	—	—
Yalta		30.2	353	e 6 12	- 2	e 11 14	+ 1	—	—
Mary		30.4	36	e 6 16	0	e 13 5	SS	—	—
Bombay		32.2	78	e 7 57	PP	e 11 50	+ 5	—	—
Taranto		32.4	327	6 26	- 8	12 25	+37	—	e 19.4
Tamanrasset	z.	33.2	289	6 49k	+ 9	12 19	+19	i 8 3	PP
Samarkand		34.8	38	6 55	+ 1	—	—	—	—
Stalinabad		35.2	41	6 59	+ 1	e 12 27?	- 4	—	—
Kulyab		35.5	43	e 6 59	- 1	—	—	—	—
Obi-garm		35.9	41	e 7 5	+ 1	e 12 43	+ 1	—	—
Rome		35.9	324	e 7 1	- 3	e 12 39	- 3	i 8 28	PP
Garm		36.5	41	e 7 33?	+24	—	—	—	—
Tashkent		37.2	39	e 7 13	- 2	e 12 56	- 6	e 15 27	SS
New Delhi		37.6	62	e 7 20	+ 2	i 13 6	- 2	e 8 37	PP
Florence Xim.		37.9	326	e 6 56	-24	e 13 13	0	—	—
Triest		37.9	331	7 24	+ 4	i 13 10	- 3	—	e 22.2
Tchimkent		38.0	37	i 7 18	- 3	i 13 8	- 6	—	—
Fergana		38.2	41	e 7 21	- 2	—	—	—	—
Andijan		38.7	42	e 7 30	+ 3	13 27	+ 2	8 55	PP
Algiers Univ.	z.	39.3	310	e 7 37	+ 5	—	—	e 8 58	PP
Moscow		40.9	359	e 7 46	0	—	—	—	—
Prague		40.9	336	e 7 47	+ 1	e 14 4?	+ 6	e 9 49	PPP
Naryn		41.5	41	e 6 5	?	—	—	e 7 18	?
Pretoria	z.	41.5	194	i 7 55	+ 5	—	—	e 21 56	Q
Stuttgart		42.3	330	e 7 57	0	e 14 5	-14	e 17 29	SS
Alicante		42.5	312	7 58	- 1	e 14 34	+12	9 38	PP
Collmberg	z.	42.5	337	e 7 57	- 2	—	—	—	—
Besançon		42.9	327	i 8 4	+ 2	—	—	—	—
Strasbourg		42.9	330	e 7 54?	- 8	—	—	e 10 38	PPP
Granada		44.4	310	i 8 25 <sub>a</sub>	+11	14 52	+ 3	e 10 16	PP
Pietermaritzburg	z.	44.7	190	e 8 41	+25	—	—	—	e 24.6
Sverdlovsk		45.2	17	e 8 18	- 2	e 14 53	- 9	e 18 12	SS
Copenhagen		46.1	340	e 8 28	0	—	—	—	29.6

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	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Grahamstown	49.1	193	e 8 46	- 5	—	—	—	e 26.7
Irkutsk	63.3	38	—	—	e 25 35	SSS	—	—
College	100.7	3	e 17 46	PP	—	—	—	—

Additional readings:—

Helwan eZ = 5m.41s.

Bombay eE = 12m.7s.

Tamanrasset ePPPZ = 8m.20s., eZ = 13m.14s., eSSZ = 14m.33s.

Rome eSS = 14m.37s.

Tashkent eSSS = 15m.57s., eScS = 17m.17s.

Algiers Univ. eZ = 7m.42s., 7m.57s., 8m.34s., 9m.20s., and 10m.15s.

Prague e = 8m.40s., 8m.50s., and 10m.53s.

Alicante Q = 19m.36s.

Besançon e = 8m.8s. and 8m.27s.

Strasbourg e = 8m.28s. and 8m.45s.

Granada SS = 16m.54s., SSS = 18m.23s.

Long waves were also recorded at other European stations.

March 26d. Readings also at 0h. (Ashkabad, near Andijan, Fergana, Garm, Obi-garm, Samarkand, Stalinabad, and near Apia), 3h. (near Obi-garm and near Klyuchi), 4h. (near Reno), 5h. (Obi-garm, and near Kulyab), 6h. (China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Logan, Seattle (2), Shasta Dam, Hungry Horse, College, near Victoria, near Obi-garm, and Stalinabad), 7h. (Tucson, Lick, Hungry Horse, College, near Bogota, and Chinchina), 8h. (Overton, Pierce Ferry, College, and Logan), 10h. (near Andijan, and near Alicante (2)), 11h. (near Abastumanj, Borzhomi, and Tiflis), 12h. (Huancayo, and near Andijan), 13h. (Hungry Horse), 14h. (Hungry Horse, and near Athens), 16h. (Istanbul, Tamanrasset, Hungry Horse, and College), 17h. (Hungry Horse, Fergana, Obi-garm, Stalinabad, near Andijan, Garm, Kulyab, Tchimkent, and near Borzhomi), 19h. (near New Delhi), 20h. (College, and near Istanbul), 22h. (near Klyuchi).

March 27d. 6h. 16m. 11s. Epicentre  $28^{\circ}5S$ .  $67^{\circ}2W$ . (as on Feb. 9d.).

Intensity III in Chile between Lats.  $27^{\circ}$ ,  $28^{\circ}S$ .

F. Greve.

Boletin del año, 1950, Instituto sismologico, Santiago, 1951, p.4.

A = +.3411, B = -.8114, C = -.4747;  $\delta = +6$ ;  $h = +2$ .

D = -.922, E = -.388; G = -.184, H = +.438, K = -.880.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	E. 10.2	131	2 25	- 6	4 13	-14	—	i 5.0
	N. 10.2	131	2 19	-12	4 5	-22	—	i 5.0
	Z. 10.2	131	2 19	-12	4 18	- 9	—	5.0
La Paz	12.0	356	3 4	+ 9	i 5 38	+27	6 1 SS	7.0
Huancayo	18.6	334	i 4 19	- 2	i 7 55	+ 9	—	—
Harvard	70.8	357	i 11 19	- 1	—	—	—	—
Tucson	73.3	323	i 11 36	+ 1	—	—	e 11 53	pP
Grahamstown	77.8	121	i 11 55	- 6	—	—	i 12 4	PcP
Pierce Ferry	77.9	323	i 12 2	+ 1	—	—	i 12 12	PcP
Riverside	Z. 78.2	320	i 12 3	0	—	—	i 12 13	pP
Boulder City	78.3	323	e 12 4	+ 1	—	—	—	—
Overton	Z. 78.5	323	i 12 6	+ 2	—	—	i 12 15	PcP
Pasadena	Z. 78.8	320	i 12 6	0	—	—	i 12 15	pP
China Lake	Z. 79.7	322	i 12 10	- 1	—	—	i 12 20	pP
Tinemaha	Z. 80.9	321	i 12 18	+ 1	—	—	i 12 28	pP
Logan	81.1	328	e 12 17	- 1	—	—	—	—
Pretoria	Z. 82.5	115	i 12 19	- 7	—	—	i 12 29	PcP
Lick	Z. 83.0	320	e 12 38	+10	—	—	i 13 1	PcP
Reno	Z. 83.5	323	e 12 29	- 2	—	—	—	—
Shasta Dam	85.8	322	e 12 41	- 1	—	—	—	—
Tamanrasset	Z. 86.6	62	e 12 41	- 5	—	—	e 16 1	PP
Hungry Horse	87.2	331	e 12 48	- 1	—	—	i 12 58	PcP
College	111.6	333	e 19 10	PP	—	—	—	—

Additional readings:—

Harvard e = 11m.28s., i = 11m.53s.

Pasadena eZ = 12m.34s.

Lick iZ = 12m.40s.

Tamanrasset eZ = 12m.51s.

Long waves were also recorded at Bogota.

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March 27d. 13h. 4m. 2s. Epicentre 53°·3N. 172°·2E.

A = -·5946, B = +·0815, C = +·7998;  $\delta$  = -13;  $h$  = -7;  
 D = +·136, E = +·991; G = -·792, H = +·109, K = -·600.

		$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
		°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Klyuchi		7·3	299	i 1	48	- 2	i 3	10	- 5	—	—	—	
Nemuro		20·2	253	4	36	- 3	8	20	- 1	—	—	10·3	
Sapporo		22·8	259	i 5	6	+ 1	i 9	18 <sub>a</sub>	+ 7	i 6	0	PP	13·5
College		23·1	44	i 5	9	+ 1	e 9	20	+ 4	—	—	—	e 13·2
Hatinohe		24·3	252	5	21	+ 1	9	41	+ 4	—	—	—	—
Morioka		25·1	250	i 5	28	0	e 10	1	+10	5	50	PP	—
Mizusawa		25·5	250	5	37	+ 5	10	7	+10	—	—	—	—
Akita		25·7	251	e 5	34	+ 1	e 10	1	0	e 6	6	PP	—
Sendai		26·2	248	5	38	0	e 10	15	+ 6	—	—	—	—
Hukusima		26·8	248	5	44	0	10	33	+14	—	—	—	e 13·8
Onahama	E.	27·2	246	e 5	48	+ 1	e 10	48	+23	—	—	—	—
Kakioka		28·1	246	e 5	54	- 1	e 10	40	0	e 6	19	PP	—
Maebasi		28·6	248	e 6	0	0	e 10	42	- 6	—	—	—	—
Tokyo		28·7	246	e 6	5	+ 4	e 12	2	SS	e 6	32	PP	—
Nagano		28·9	250	e 6	5	+ 2	e 11	3	+10	e 7	12	PPP	—
Matusiro		29·0	250	i 6	3	- 1	11	9	+15	6	32	pP	—
Toyama		29·4	251	e 6	3	- 4	e 11	9	+ 8	7	2	PP	e 15·4
Sitka		29·5	61	i 6	9	+ 1	e 11	4	+ 2	e 7	9	PP	e 12·2
Shizuoka		30·0	247	6	14	+ 2	11	11	+ 1	7	3	PP	13·5
Kobe		32·0	250	e 6	30	0	e 11	49	+ 7	e 7	36	PP	e 14·2
Kōti		33·8	251	e 6	46	0	e 12	9	- 1	e 7	12	pP	—
Hukuoka		35·5	254	7	0 <sub>k</sub>	0	12	38	+ 2	—	—	—	16·4
Honolulu		39·3	132	e 7	16	-16	e 14	15	PPS	—	—	—	e 16·0
Irkutsk		39·7	298	i 7	34	- 2	i 13	37	- 3	—	—	—	—
Victoria		39·7	70	i 7	35 <sub>a</sub>	- 1	13	43	+ 3	—	—	—	17·2
Seattle		40·7	70	e 8	15	+31	e 13	53	- 2	e 9	37	PP	e 18·0
Nanking	Z.	43·4	264	i 8	5	- 1	14	36	+ 1	i 9	50	PP	20·1
Shasta Dam		44·8	79	i 8	17	0	e 14	56	+ 1	e 10	10	PP	—
Hungry Horse		45·0	65	i 8	18	- 1	e 14	55	- 3	i 8	33	pP	e 18·2
Mineral	Z.	45·5	79	i 8	22 <sub>a</sub>	- 1	—	—	—	—	—	—	—
Saskatoon		46·6	58	8	24	- 8	15	20	- 1	18	26	S <sub>c</sub> S	22·0
Berkeley		46·7	82	i 8	32 <sub>a</sub>	0	i 15	21	- 1	e 10	10	P <sub>c</sub> P	19·0
Butte	N.	47·1	67	e 8	45	+10	e 15	19	- 9	—	—	—	—
Reno		47·1	78	i 8	35 <sub>a</sub>	0	e 15	36	+ 8	—	—	—	e 24·8
Santa Clara		47·2	82	i 9	1 <sub>k</sub>	+25	e 15	21	- 8	—	—	—	e 21·0
Lick	Z.	47·4	82	i 8	37 <sub>a</sub>	- 1	—	—	—	i 11	51	PPP	—
Bozeman		48·2	67	e 8	52	+ 8	e 15	36	- 7	e 10	32	PP	e 19·2
Fresno		48·9	81	i 8	49 <sub>a</sub>	- 1	e 15	52	- 1	—	—	—	—
Tinemaha		49·7	80	i 8	55 <sub>a</sub>	- 1	—	—	—	—	—	—	—
Logan		50·3	71	i 8	58	- 2	e 16	21	+ 8	9	14	pP	e 22·3
China Lake	Z.	50·9	80	i 9	3 <sub>a</sub>	- 2	—	—	—	—	—	—	—
Salt Lake City		50·9	72	e 9	4	- 1	—	—	—	e 20	8	SS	e 23·5
Pasadena		51·7	82	i 9	9 <sub>a</sub>	- 2	i 16	34	+ 2	i 9	22	pP	i 21·7
Overton	Z.	52·2	78	i 9	15	0	e 16	34	- 5	i 12	15	PPP	—
Riverside		52·3	82	i 9	12 <sub>a</sub>	- 3	—	—	—	i 9	26	pP	—
Boulder City		52·4	79	i 9	16	0	e 16	48	+ 6	i 9	29	pP	—
Pierce Ferry		52·8	78	i 9	19	0	—	—	—	i 10	49	PP	—
Palomar		53·0	82	i 9	20 <sub>a</sub>	- 1	—	—	—	—	—	—	—
Semipalatinsk		53·0	308	e 9	18	- 3	—	—	—	—	—	—	—
Rapid City	E.	53·5	63	i 9	22	- 2	e 20	33	SS	e 12	42	PPP	e 22·3
Scoresby Sund		56·1	7	i 9	50	+ 7	e 17	33	+ 1	19	30	S <sub>c</sub> S	23·9
Sverdlovsk		56·9	323	i 9	48	- 1	i 17	42	0	—	—	—	—
Tucson		57·4	79	i 9	52	- 1	e 17	53	+ 4	e 11	51	PP	e 22·0
Lincoln	E.	59·2	62	e 9	48	-17	e 18	2	-10	—	—	—	e 24·3
Frunse		61·1	305	e 10	16	- 2	i 18	36	- 1	—	—	—	—
Naryn		61·4	303	i 10	19	- 1	18	39	- 1	—	—	—	—
Ivigtut		61·4	22	—	—	—	e 18	57	+17	25	16	SSS	30·2
Pulkovo		63·2	341	—	—	—	19	0	- 3	—	—	—	—
Chicago		63·2	56	e 10	45	+13	e 18	58	- 5	e 23	18	SS	e 25·5
Andijan		63·8	304	e 10	36	0	19	10	- 1	—	—	—	—

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	$\Delta$ o	Az. o	P. m. s.		O-C. s.	S. m. s.		O-C. s.	Supp. m. s.		I. m.
Helsinki	63.9	344	—		—	e 19 8	- 4	e 29 55	Q	e 34.0	
Tchimkent	63.9	307	i 10 35		- 2	i 19 10	- 2	—	—	—	
St. Louis	64.2	60	e 10 28		-11	i 19 11	- 5	—	—	e 30.0	
Fergana	64.3	304	—		—	19 14	- 3	—	—	—	
Tashkent	64.8	307	e 10 42		- 1	i 19 22	- 1	—	—	—	
Moscow	65.1	335	10 43		- 2	19 27	0	—	—	—	
Upsala	65.4	347	i 10 45		- 2	e 19 24	- 6	13 22	PP	e 32.0	
Ottawa	65.9	46	i 10 46 <sup>a</sup>		- 4	19 31	- 6	e 23 46	SS	32.0	
Garm	66.1	304	i 10 48		- 3	i 19 38	- 1	—	—	—	
Shawinigan Falls	66.2	43	10 53		+ 1	—	—	—	—	—	
Cleveland	66.3	52	i 10 51 <sup>a</sup>		- 1	e 19 40	- 2	e 20 8	PPS	—	
Seven Falls	66.5	42	10 57		+ 3	19 42	- 2	e 14 58	PPP	33.3	
Obi-garm	66.6	304	i 10 52		- 2	i 19 42	- 3	—	—	—	
Kulyab	67.2	303	e 10 54		- 4	e 19 48	- 4	—	—	—	
Samarkand	67.2	307	e 11 0?		+ 2	e 19 52?	0	—	—	—	
Stalinabad	67.2	305	i 10 57		- 1	19 50	- 2	—	—	—	
New Kensington	67.9	52	e 11 7		+ 5	i 19 58	- 3	e 24 58	SS	e 27.6	
Pennsylvania	68.6	50	i 11 16		+ 9	i 19 58	-11	i 21 8	SeS	e 27.5	
Calcutta	68.7	280	e 11 10		+ 3	e 20 6	- 4	—	—	—	
Aberdeen	69.8	357	—		—	i 20 22	- 1	i 25 6	SS	e 39.0	
Harvard	70.0	45	i 11 14		- 1	e 20 19	- 7	i 13 35	PP	e 35.6	
Copenhagen	70.1	349	i 11 15 <sup>a</sup>		- 1	i 20 28	+ 1	i 21 8	PPS	31.0	
Weston	70.2	45	i 11 15		- 2	e 20 23	- 5	e 13 54	PP	28.6	
City College, N.Y.	70.3	47	e 11 16		- 1	e 20 25	- 4	e 14 18	PP	—	
Fordham	70.3	47	e 11 17		0	e 20 26	- 3	e 25 10	SS	e 38.0	
New Delhi	70.4	292	e 11 18		0	i 20 25	- 5	13 57	PP	28.4	
Philadelphia	70.5	49	e 11 20		+ 2	e 20 9	-23	c 24 39	SS	e 28.4	
Mary	71.3	310	e 11 25		+ 2	i 20 42	+ 1	—	—	—	
Halifax	71.4	39	—		—	20 38	- 4	—	—	28.8	
Durham	72.2	357	—		—	i 20 52	+ 1	—	—	—	
Columbia	72.5	57	—		—	e 20 48	- 6	—	—	e 29.2	
Ashkabad	72.7	311	11 33		+ 1	20 58	+ 1	—	—	—	
Potsdam	73.3	348	i 11 35 <sup>a</sup>		0	—	—	i 11 55	PcP	e 34.0	
Grozny	73.4	323	e 11 35		- 1	e 21 4	- 1	—	—	—	
Piatigorsk	73.7	325	e 11 41?		+ 3	e 21 11?	+ 3	e 14 22	PP	—	
Lwow	73.8	340	e 11 38		0	i 21 10	+ 1	—	—	—	
Rathfarnham Castle	73.8	359	i 11 37		- 1	e 21 8	- 1	e 14 19	PP	42.0	
Tacubaya	73.9	79	e 11 45		+ 6	e 21 31	+21	e 26 49	SS	—	
Baku	74.3	319	i 11 49?		+ 8	i 21 20?	+ 5	—	—	—	
Collmburg	74.3	347	e 11 40		- 1	e 21 4	-11	e 14 10	PP	e 39.0	
De Bilt	74.4	352	i 11 44		+ 2	i 21 18	+ 2	e 25 58	SS	e 32.0	
Raciborzu	74.7	344	e 11 45?		+ 2	—	—	—	—	—	
Jena	74.9	348	e 11 44?		0	e 21 18	- 4	e 12 16	PcP	—	
Gori	75.1	324	11 53?		+ 7	21 32?	+ 8	—	—	—	
Tiflis	75.1	323	i 11 46		0	i 21 25	+ 1	—	—	—	
Skalnate Pleso	75.2	342	e 11 52		+ 6	e 21 30	+ 5	e 14 37	PP	e 34.0	
Sotchi	75.2	327	e 11 47?		+ 1	e 21 29?	+ 4	—	—	—	
Prague	75.3	346	e 11 48		+ 1	e 21 23	- 3	e 14 26	PP	e 32.0	
Kishinev	75.3	338	11 48		+ 1	—	—	—	—	—	
Theodosia	75.3	331	e 11 47		0	e 21 24	- 2	—	—	—	
Kew	75.4	356	i 11 48 <sup>k</sup>		+ 1	i 21 22	- 5	e 21 56	PS	e 32.0	
Zugdidi	75.4	325	11 49		+ 2	21 31	+ 4	—	—	—	
Borzhom	75.5	324	e 11 49		+ 1	21 31	+ 3	—	—	—	
Cheb	75.6	348	e 11 49		+ 1	e 21 22	- 7	e 14 39	PP	e 38.0	
Abastumanj	75.8	325	11 50		0	—	—	—	—	—	
Yalta	76.2	331	e 11 52		0	i 21 36	0	i 14 46	PP	—	
Leninakan	76.3	323	e 11 51?		- 1	21 37?	0	—	—	—	
Ogyalla	76.8	343	e 12 10		+15	e 21 48	+ 6	e 22 12	PS	—	
Budapest	77.0	342	12 0		+ 4	21 51	+ 6	12 6	PcP	45.5	
	77.0	342	12 3		+ 7	21 47	+ 2	14 51	PP	46.0	

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Karlsruhe	77.1	350	i 11	57	0	e 21	45	- 1	—	—	e 47.0
Stuttgart	77.3	351	i 11	57	- 1	e 21	28	-20	e 12	23	P <sub>c</sub> P 38.0
Paris	77.4	354	i 12	0	+ 2	i 21	54	+ 5	i 12	8	P <sub>c</sub> P e 34.5
Strasbourg	77.6	350	e 12	0 <sub>a</sub>	0	e 21	51	0	i 12	6	P <sub>c</sub> P e 35.0
Kalossa	77.9	342	e 12	12	+11	e 21	40	-14	e 14	55	PP —
Bucharest	78.4	337	e 12	14	+10	i 21	43	-17	i 22	5	PS 32.0
Hyderabad	78.4	284	e 12	3	- 1	21	55	- 5	27	5	SS 36.4
Basle	78.7	350	e 12	6	0	c 22	18	+15	—	—	—
Zürich	78.7	350	e 12	6 <sub>a</sub>	0	c 22	3	0	—	—	—
Besançon	79.1	351	e 12	7	- 1	—	—	—	e 12	14	P <sub>c</sub> P —
Chur	79.1	349	e 12	8	0	—	—	—	—	—	e 48.0
Zagreb	79.2	344	e 12	7	- 1	e 22	7	- 1	e 12	15	P <sub>c</sub> P e 44.0
Neuchatel	79.3	351	e 12	8	- 1	e 22	8	- 1	—	—	—
Triest	79.7	346	e 12	17	+ 6	i 22	18	+ 5	12	31	P <sub>c</sub> P e 36.7
Salo	80.2	348	12	21	+ 7	22	44	+25	—	—	e 51.3
Poona	80.2	288	e 12	14	0	i 22	15	- 4	15	24	PP 37.0
Bombay	80.5	289	e 12	16	+ 1	e 22	22	0	15	8	PP 34.1
Djakarta	80.6	247	e 12	18	+ 2	e 22	34	+11	—	—	—
Bandong	80.8	246	12	12	- 5	e 22	28	+ 3	—	—	—
Istanbul	80.8	333	e 12	16	- 1	c 22	25	0	—	—	—
Pavia z.	80.8	349	e 13	18	+61	—	—	—	—	—	—
Clermont-Ferrand	80.9	353	i 12	21	+ 4	i 22	27	+ 1	e 15	27	PP 39.0
Padova	81.1	347	12	21	+ 3	22	20	- 8	e 13	3	P <sub>c</sub> P —
Bologna	81.2	347	e 12	22	+ 3	e 22	41	+12	e 26	54	SS —
Bermuda	81.4	46	e 13	46	?	e 23	38	PS	e 17	2	PPP e 32.5
Florence Arc.	81.9	347	e 12	16	- 7	22	26	-10	e 15	55	PP —
Florence Xim.	81.9	347	e 12	34	+11	—	—	—	i 28	15	SS —
Brisbane	82.2	197	i 12	30	+ 6	i 22	43	+ 4	—	—	—
Rome	83.6	346	i 12	31 <sub>k</sub>	0	i 22	49	- 4	i 13	26	pP —
Kodaikanal E.	84.7	281	e 12	38	+ 1	i 23	1	- 3	23	48	PS 38.9
Athens	85.1	336	e 12	39	0	e 22	58	[- 3]	—	—	—
Barcelona	85.3	354	—	—	—	e 23	9	- 1	—	—	e 42.6
Ksara	85.3	326	i 12	41 <sub>k</sub>	+ 1	23	15	+ 5	—	—	—
Colombo E.	85.9	277	12	47	+ 4	23	12	- 4	—	—	43.8
Tortosa	86.0	354	i 12	46	+ 3	i 23	0	[- 7]	—	—	—
Messina	86.7	342	e 12	39	- 8	e 23	30	+ 6	—	—	—
Toledo	87.2	358	i 12	53	+ 4	i 23	30	+ 2	e 16	16	PP 41.8
Alicante	88.5	355	13	0	+ 4	23	45	+ 4	16	25	PP e 42.3
Riverview	88.7	197	e 13	0	+ 3	i 23	49	+ 6	e 25	4	PS e 40.3
Algiers Univ. z.	89.8	352	e 13	0	- 2	e 23	51	- 2	e 16	42	PP —
Granada	89.8	358	e 13	47	+45	23	32	[ 0]	17	9	PP 53.5
Auckland N.	89.8	178	—	—	—	e 23	38	[+ 6]	e 29	48	SS e 41.0
Malaga N.W.	90.3	358	e 13	15	+11	e 23	33	[- 2]	e 16	37	PP 58.5
Helwan z.	90.5	326	i 13	5 <sub>k</sub>	0	23	58	- 1	16	34	PP —
San Juan	92.8	54	—	—	—	e 23	45	[- 4]	e 25	39	PS e 37.4
Wellington	94.2	179	—	—	—	e 24	33	+ 2	e 30	53	SS 42.0
Christchurch	96.5	180	e 14	23	+51	e 24	38	{+ 9}	e 25	18	S 42.0
Tamanrasset z.	103.4	347	e 14	3	- 1	e 24	46	[+ 3]	e 18	22	PP —
Huancayo	113.0	79	e 18	34	[- 5]	i 28	52	PS	e 19	52	PP —
La Paz	120.7	75	e 19	18	[+24]	i 25	58	[+ 6]	20	27	PP 69.0
Pretoria z.	141.6	302	e 19	29	[- 4]	—	—	—	e 22	40	PP —
Pietermaritzburg z.	143.5	295	e 19	36	[- 1]	—	—	—	—	—	—
Grahamstown	148.4	296	i 19	48	[+ 3]	—	—	—	—	—	—

Additional readings:—

College i = 6m.52s. and 8m.2s.  
 Mizusawa eSN = 10m.11s.  
 Akita eSS = 11m.4s.  
 Nagano ePPP? = 7m.31s.  
 Matusiro PP = 7m.16s., sPP = 8m.6s., sS = 11m.54s.  
 Toyama SS = 12m.49s.  
 Shizuoka PPP = 7m.36s., SS = 12m.31s.  
 Kobe iZ = 6m.36s.  
 Kōti ePP = 8m.0s., eSS = 14m.7s., eSSS = 14m.36s.  
 Honolulu e = 7m.45s.  
 Victoria i = 7m.47s.

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Seattle e = 8m.24s., 8m.42s., 9m.5s., and 9m.14s., eP<sub>c</sub>P = 9m.54s., ePPP = 10m.15s.,  
 e = 10m.35s. and 10m.47s.  
 Nanking iZ = 8m.11s., 8m.41s., 10m.9s., and 14m.45s., iSSZ = 17m.19s.  
 Shasta Dam i = 8m.24s., eS<sub>c</sub>S = 18m.11s.  
 Hungry Horse ePP = 10m.9s.  
 Mineral iZ = 8m.26s. and 9m.38s.  
 Saskatoon e = 19m.6s.  
 Berkeley eZ = 8m.46s., iZ = 8m.57s. and 9m.45s., iN = 16m.46s., eS<sub>c</sub>SEN = 18m.8s.  
 Reno eN = 15m.28s.  
 Lick iZ = 8m.48s. and 8m.56s.  
 Bozeman ePPP = 11m.36s.  
 Tinemaha iZ = 9m.9s.  
 Logan ePP = 10m.53s., eSS = 19m.47s.  
 Overton iZ = 10m.53s.  
 Boulder City i = 10m.56s.  
 Scoresby Sund 10m.58s. and 13m.2s., SS = 21m.34s.  
 Tucson ePPP = 13m.7s., eSS = 21m.17s.  
 Upsala iN = 11m.29s., iE = 13m.41s., ePPPN = 14m.46s., iSE = 19m.28s., eSSN =  
 24m.10s., eQ?E = 30.0m.  
 Cleveland iNZ = 11m.6s., eE = 20m.49s., eSSN = 24m.35s.  
 Seven Falls eE = 24m.6s. and 27m.4s.  
 New Kensington eE = 12m.45s.  
 Pennsylvania iN = 22m.0s., iE = 22m.45s., eEN = 24m.31s.  
 Aberdeen iN = 28m.29s., eEN = 32m.46s.  
 Harvard ePPP = 15m.42s., eSS = 25m.23s., eSSS = 28m.30s.  
 Copenhagen 24m.43s.  
 City College, N.Y. i = 11m.29s., ePPP? = 16m.9s., eSS = 25m.2s., eSSS = 28m.43s.  
 New Delhi PPN = 15m.29s., iN = 16m.33s.  
 Philadelphia e = 16m.37s.  
 Potsdam iPPZ = 14m.19s., iPPSZ = 21m.56s.  
 Rathfarnham Castle iZ = 11m.53s., 12m.21s., and 12m.45s., eEN = 15m.51s., iPSEN =  
 21m.36s., iEN = 22m.0s. and 22m.56s., eSSEN = 25m.59s., eEN = 28m.23s., 31m.21s.,  
 34m.13s., and 37m.3s.  
 Collnberg eZ = 11m.46s. and 12m.14s., eS<sub>c</sub>S?N = 21m.45s., eSSN = 25m.16s.?, eN =  
 26m.4s.?, eSSSN = 29m.52s.?, eQE = 34.0m.  
 Jena ePN = 11m.50s., eN = 13m.43s. and 16m.19s., eE = 17m.5s.  
 Skalnaté Pleso ePS? = 21m.50s., eSS = 26m.4s.  
 Prague e = 12m.6s., 12m.41s., 13m.13s., 13m.30s., 13m.48s., 15m.4s., 15m.23s., and  
 15m.46s., ePPP = 16m.29s., e = 17m.1s. and 21m.35s., ePSZ = 22m.8s., ePPS? =  
 22m.24s., eSS = 26m.40s., eSSS = 30m.10s.  
 Kew i = 11m.52s., e = 23m.7s., eSS = 26m.24s.  
 Cheb ePPP = 16m.29s., e = 20m.47s., ePS? = 21m.58s., eSSS = 30m.16s.  
 Yalta iPPP = 16m.38s., iPS = 22m.30s.  
 Ogyalla e = 12m.35s. and 18m.4s.  
 Budapest PPE = 14m.48s., PPN = 16m.53s., PSE = 21m.35s., SSE = 26m.48s., SSN =  
 26m.58s.?, SSSE = 29m.33s., eSSSN = 31m.28s.  
 Stuttgart e = 12m.4s., eZ = 12m.9s., ePPZ = 14m.53s., ePPP? = 16m.6s., ePS = 22m.9s.,  
 e = 22m.35s., and 23m.46s., eSS = 26m.16s., eSSS = 30m.10s., eQ = 35.0m.  
 Paris i = 12m.52s., iS<sub>c</sub>S = 22m.21s., iPS = 22m.32s., e = 23m.37s., iSS = 26m.42s., eSSS =  
 30m.46s., e = 31m.58s.?  
 Strasbourg i = 12m.24s., e = 14m.43s., iPP = 15m.2s., e = 15m.46s., 16m.2s., 20m.40s.,  
 and 21m.24s., eS<sub>c</sub>S = 22m.22s., ePS = 22m.45s., e = 24m.12s. and 26m.34s., eSS =  
 27m.16s., e = 33m.28s.  
 Kalossa eE = 12m.18s. and 12m.24s., eN = 13m.37s., eE = 15m.3s.  
 Bucharest iN = 21m.19s.  
 Besançon e = 12m.36s. and 12m.58s.  
 Trieste ePP? = 15m.56s.?, ePS = 23m.17s., iSS = 27m.25s.  
 Salo e = 12m.29s.  
 Poona PPN = 17m.14s., SKSEN = 22m.24s., iPSEN = 23m.2s., PPSEN = 23m.24s.,  
 SSEN = 27m.28s., SSSN = 30m.56s.  
 Clermont-Ferrand iP<sub>c</sub>P = 12m.24s., i = 12m.30s., ePS = 23m.33s., eSS = 27m.57s., Q =  
 33.0m.  
 Bologna eE = 13m.41s.  
 Florence Arc. i = 12m.28s. and 13m.2s.  
 Rome ePP = 15m.50s., SS = 28m.17s., SSS = 34m.1s.  
 Kodaikanal SSE = 28m.25s., QE = 34m.55s.  
 Toledo PPP?Z = 18m.18s., SKSZ = 23m.14s., eZ = 24m.8s., iPSN = 24m.37s., SSN =  
 29m.26s., SSSN = 32m.48s.  
 Alicante PS = 24m.49s., PPS = 25m.19s., SS = 29m.35s., SSS = 32m.57s., Q = 37m.3s.  
 Riverview eSSE = 29m.50s., eQE = 37.3m.  
 Algiers Univ. Z = 13m.7s., 14m.10s., and 14m.37s., ePPPZ = 18m.38s., ePSZ = 24m.59s.  
 Helwan eZ = 16m.6s., PPNZ = 18m.34s., iSKSN = 23m.34s., PPSN = 25m.19s.  
 San Juan eSS = 30m.38s.  
 Wellington S = 25m.3s., eSSS = 33m.58s.?, Q = 40.0m.  
 Christchurch ePS?Z = 26m.13s., eSS = 30m.58s., eSSE = 34m.18s.  
 Tamarrasset eZ = 16m.51s., iPPPZ = 20m.26s., eSZ = 25m.47s., ePKKPZ = 29m.57s.  
 Huancayo eSS = 35m.28s.  
 La Paz Q = 60.2m.  
 Long waves were also recorded at Apia and Rolphton.

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March 27d. 21h. 18m. 29s. Epicentre 5°·9S. 102°·9E.

A = -·2221, B = +·9697, C = -·1021;  $\delta$  = +7;  $h$  = +7;  
D = +·975, E = +·223; G = +·023, H = -·100, K = -·995.

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Djakarta	3·9	94	i 1 3 <sup>a</sup>	+ 1	i 1 49 <sup>a</sup>	- 1	—	—
Bandong	4·8	102	e 1 17	+ 2	i 2 13	+ 1	—	—
Colombo	E. 26·3	298	5 48	+ 9	10 20	+ 9	—	18·9
Perth	28·6	156	—	—	i 11 16	+28	i 12 33	i 13·1
Calcutta	E. 31·6	334	e 6 31	+ 5	e 11 39	+ 4	e 7 36	SSS PP
Hyderabad	33·5	315	6 45	+ 2	12 6	+ 1	7 49	PP
Poona	37·5	312	e 7 16	- 1	i 13 0	- 7	8 47	PPP
Bombay	38·5	311	e 7 31	+ 5	e 13 27	+ 5	9 2	PP
Nanking	Z. 40·7	21	i 7 41	- 3	14 14	+19	i 9 23	PP
New Delhi	42·3	326	7 55	- 2	i 14 12	- 7	17 53	SSS
Dehra Dun	N. 43·2	329	e 9 52	PP	e 16 7	?	—	—
Guam	45·8	65	8 27	+ 2	14 55	-14	—	—
Brisbane	52·2	120	e 9 16 <sup>a</sup>	+ 1	e 16 43	+ 4	i 11 29	PP
Riverview	52·6	129	e 9 31	+13	i 16 45	+ 1	e 11 36	PP
Naryn	53·1	336	i 9 11	-10	i 16 48	- 3	—	e 24·9
Obi-garm	54·0	329	i 9 26	- 2	i 16 59	- 4	e 9 40	pP
Andijan	54·2	332	e 9 30	+ 1	i 17 7	+ 1	e 9 45	pP
Almata	54·3	338	i 9 30	0	i 17 9	+ 2	—	—
Stalinabad	54·4	328	i 9 27	- 4	i 17 4	- 5	17 28	sS
Fergana	54·5	332	e 9 27	- 5	e 17 3	- 7	—	—
Frunse	54·9	336	e 9 33	- 2	e 17 13	- 3	—	—
Tananarive	55·4	252	—	—	e 17 28	+ 6	—	—
Samarkand	56·2	327	e 9 43	- 1	—	—	—	24·0
Tashkent	56·2	331	e 9 41	- 3	e 17 26	- 7	—	—
Tchimkent	56·7	332	i 9 33	-15	i 17 35	- 5	—	—
Mary	57·7	323	e 9 58	+ 3	—	—	—	—
Irkutsk	58·0	1	9 54	- 3	17 55	- 2	—	—
Ashkabad	60·1	321	10 12	+ 1	18 20	- 4	—	—
Kizyl-Arvat	62·1	322	i 10 23	- 2	—	—	—	—
Baku	67·0	319	e 11 5?	+ 8	e 19 57?	+ 7	—	—
Kaimata	N.E. 70·2	133	e 10 20	-57	—	—	—	—
Erevan	70·5	317	e 11 32	+14	—	—	—	—
Tiflis	71·0	318	i 11 23	+ 1	i 20 34	- 3	—	—
Grozny	71·1	320	e 11 22	0	e 20 35	- 3	—	—
Leninakan	71·2	317	e 11 21	- 2	e 20 37	- 3	—	—
Christchurch	71·3	134	11 35	+12	e 20 36	- 5	i 12 2	pP
Sverdlovsk	71·4	338	i 11 22	- 2	i 20 38	- 4	i 11 26	PcP
Gori	71·6	318	e 11 29	+ 4	e 20 51	+ 7	—	—
Pietermaritzburg	Z. 71·9	242	e 11 26	- 1	—	—	e 11 39	PcP
Auckland	N. 72·0	127	—	—	e 19 31?	?	—	e 36·5
Abastumanj	72·3	317	e 11 31	+ 2	—	—	—	—
Wellington	72·5	132	11 33	+ 3	20 41	-13	i 14 46	PP
Piatigorsk	73·2	320	e 11 33	- 2	e 20 58	- 4	—	—
Zugdidi	73·3	318	e 11 31	- 4	—	—	—	—
Pretoria	Z. 73·7	246	e 11 36	- 2	—	—	e 11 49	PaP
Ksara	74·5	307	i 11 46 <sup>k</sup>	+ 4	21 34	+17	—	—
Sotchi	75·2	319	e 11 48	+ 2	—	—	e 12 7	PcP
Grahamstown	75·4	238	e 11 44	- 3	—	—	i 11 59	PcP
Helwan	77·1	303	e 11 55	- 2	21 41	- 5	22 15	PS
Theodosia	78·6	319	e 12 8	+ 3	—	—	—	—
Yalta	79·8	318	e 12 9	- 3	i 22 2	-12	12 35	pP
Moscow	81·3	330	i 12 19	- 1	i 22 25	- 5	—	—
Istanbul	81·8	313	e 12 21	- 1	e 22 32	- 3	—	—
Apia	84·1	103	e 12 35	+ 1	—	—	—	—
Pulkovo	86·4	332	12 47	+ 2	23 10	[ 0]	—	—
Taranto	90·5	311	—	—	23 31	[- 5]	—	—
Raciborzu	Z. 91·1	321	e 13 9	+ 1	—	—	—	—
Upsala	N. 92·7	330	—	—	e 24 14	- 4	—	e 52·5
Prague	93·5	321	e 13 20	+ 1	e 23 52	[- 1]	e 17 6	PP
Triest	93·6	316	—	—	e 24 2	[- 6]	—	e 56·5 e 56·5

Continued on next page.

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		$\Delta$	Az.	P.	O - C.	S.	O - C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Rome		94.2	312	e 13 25	+ 3	24 11	{ - 1 }	17 24	44.2
Collmberg	z.	94.5	322	e 13 25	+ 2	—	—	e 17 10	—
Bologna		95.2	315	e 18 28	?	e 24 12	{ - 7 }	—	—
Florence Xim.		95.2	314	e 13 21	- 6	e 24 15	{ - 4 }	—	—
Jena	N.	95.4	321	e 13 30?	+ 2	—	—	e 17 49	—
Stuttgart		96.8	319	e 13 34	0	e 24 53	- 1	e 13 44	51.5
Strasbourg		97.8	319	e 17 10?	PP	e 26 31	PS	e 17 54	e 57.8
Tamanrasset	z.	99.1	293	e 13 45	+ 1	—	—	e 17 42	—
De Bilt		99.4	323	e 13 49?	+ 3	e 25 19	+ 4	e 24 29	e 51.5
Clermont-Ferrand		101.0	316	e 18 15	PP	—	—	—	57.5
Paris		101.3	319	e 13 55	+ 1	i 27 3	PS	—	e 50.5
Kew		102.8	322	—	—	e 27 37	PS	e 33 6	e 54.5
College		103.5	25	e 14 4	0	—	—	e 18 11	—
Alicante		104.1	309	14 0	- 7	e 25 6	[ + 20 ]	27 46	e 48.0
Granada		106.7	307	18 1k	PKP	26 18	+ 2	20 38	58.5
Ivigtut		120.7	345	—	—	26 19	[ + 27 ]	—	65.5
Victoria		122.2	34	e 18 24?	[ - 33 ]	—	—	—	—
Shasta Dam		126.8	42	e 19 8	[ + 2 ]	—	—	e 20 58	—
Hungry Horse		127.3	30	e 19 6	[ - 1 ]	—	—	e 21 21	—
Mineral		127.5	42	i 19 8a	[ + 1 ]	—	—	—	—
Berkeley		128.1	46	i 19 11k	[ + 3 ]	—	—	i 21 0	e 61.5
Lick	z.	128.8	46	i 19 11a	[ + 1 ]	—	—	e 21 15	—
Reno		129.1	42	e 19 13k	[ + 3 ]	—	—	—	—
Fresno	z.	130.4	46	e 19 13k	[ 0 ]	i 22 34	PKS	e 20 59	—
Tinemaha	z.	131.4	45	e 19 10	[ - 5 ]	i 22 39	PKS	—	—
China Lake	z.	132.4	46	e 19 7	[ - 10 ]	i 22 41	PKS	—	—
Logan		132.8	35	e 19 15	[ - 2 ]	i 22 42	PKS	e 22 13	—
Pasadena		132.8	48	e 19 18	[ + 1 ]	i 22 42	PKS	i 21 39	e 82.3
Riverside	z.	133.4	48	e 19 20	[ + 2 ]	i 22 49	PKS	e 21 37	—
Salt Lake City		133.4	36	—	—	e 22 48	PKS	—	—
Palomar	z.	134.1	48	i 19 20	[ 0 ]	i 23 0	PKS	—	—
Overton	z.	134.2	43	e 19 17	[ - 3 ]	i 22 51	PKS	i 21 52	—
Boulder City		134.3	44	i 19 24	[ + 4 ]	i 23 37	PKS	e 22 51	—
Pierce Ferry		134.8	43	i 19 22	[ + 1 ]	—	—	e 21 55	—
Rapid City	e.	135.6	27	e 19 20	[ - 2 ]	e 23 40	?	e 23 1	e 79.2
Tucson		139.1	46	e 19 21	[ - 8 ]	e 26 38	[ 0 ]	e 22 3	e 69.6
Shawinigan Falls	N.	139.3	355	e 19 48	[ + 19 ]	—	—	—	—
Ottawa		140.6	358	e 19 26	[ - 6 ]	—	—	e 22 32	69.5
Harvard		143.2	352	i 19 34	[ - 2 ]	e 33 27	SKSP	i 22 49	e 81.2
Weston		143.3	352	e 19 35	[ - 1 ]	—	—	e 22 47	60.7
Cleveland	z.	144.3	6	i 19 38k	[ 0 ]	—	—	—	—
Fordham		145.1	353	i 17 56	?	—	—	i 21 17	e 84.5
Pennsylvania		145.3	1	i 19 31	[ - 9 ]	i 30 10	{ + 18 }	—	—
St. Louis		145.3	18	i 19 38	[ - 2 ]	—	—	i 19 47	—
Philadelphia		146.0	356	e 19 41	[ 0 ]	e 29 35	{ - 21 }	e 41 55	e 62.2
Bermuda		151.2	338	—	—	e 27 33	[ + 38 ]	e 44 11	e 77.0
Tacubaya		154.7	56	e 20 8	PKP <sub>2</sub>	—	—	—	—
La Paz		156.0	203	e 20 11	PKP <sub>2</sub>	—	—	—	75.5
Huancayo		162.1	186	e 20 8	[ + 5 ]	—	—	—	—
Bogota		176.7	—	e 20 51	PKP <sub>2</sub>	e 27 31	[ + 18 ]	e 24 34	e 85.6

Additional readings :—

Poona PPPEN = 9m.3s., P<sub>c</sub>PEN = 9m.41s., P<sub>c</sub>SEN = 13m.23s., SSEN = 15m.37s., SSSEN = 16m.3s.

Bombay SSE = 17m.28s.

Nanking iZ = 8m.26s., 9m.45s., and 15m.35s.

Riverview iPSE = 16m.59s., iN = 17m.47s., iS<sub>c</sub>SN = 19m.10s.

Andijan isS = 17m.30s., S<sub>c</sub>S = 19m.18s.

Stalinabad iS<sub>c</sub>S = 19m.19s.

Christchurch ePPZ = 14m.31s., eZ = 18m.46s., iSN = 20m.40s., SS = 25m.9s., eSSS = 28m.41s.

Sverdlovsk iPS = 20m.54s., iS<sub>c</sub>S = 21m.27s., SS = 25m.10s.

Wellington eP<sub>1</sub>Z = 10m.52s., iZ = 11m.43s., eEN = 29m.9s.

Helwan eZ = 12m.2s. and 18m.7s.

Yalta sS = 22m.53s.

Prague e = 14m.26s., 15m.28s., and 16m.49s., ePP = 17m.15s., e = 20m.51s., ePS = ePS = 25m.39s., ePPS = 26m.54s., eSS = 30m.49s.

Continued on next page.

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Rome S = 24m.25s., SS = 31m.5s.  
 Jena eE = 17m.54s.  
 Stuttgart ePPZ = 16m.58s., eSS = 31m.19s., eQ = 42.7m.  
 Strasbourg eSSS = 35m.18s., e = 37m.20s., 41m.43s., 52m.6s., and 56m.9s.  
 Tamanrasset eZ = 17m.3s.  
 De Bilt eSS = 32m.1s.  
 Paris e? = 24m.8s., i = 27m.13s., 27m.51s., 29m.45s., and 40m.11s.  
 Kew eQ = 45.5m.  
 Alicante SKS = 23m.52s., PS = 26m.50s., Q = 43m.6s.  
 Granada SKS = 24m.45s.  
 Shasta Dam e = 19m.57s. and 21m.20s.  
 Mineral iZ = 19m.15s.  
 Berkeley eZ = 19m.29s.  
 Lick eZ = 22m.3s. and 22m.19s.  
 Reno eE = 19m.56s.  
 Tinemaha iZ = 19m.18s.  
 China Lake iZ = 19m.18s.  
 Pasadena eZ = 20m.6s., i = 23m.28s.  
 Riverside iZ = 22m.20s. and 23m.23s.  
 Palomar iZ = 19m.30s. and 22m.19s.  
 Overton iPKPZ = 19m.23s.  
 Pierce Ferry iPKP = 19m.25s.  
 Tucson iPKS = 23m.7s., eSKKS = 29m.4s.  
 Ottawa e = 19m.36s. and 23m.9s.  
 Harvard eS<sub>c</sub>SPKP = 34m.44s., ePPS = 36m.45s., eSS = 43m.31s., e = 45m.21s. and 57m.53s.  
 Weston i = 20m.9s.  
 St. Louis ipPKP? = 20m.21s., iPP = 22m.54s., i = 24m.56s.  
 Bogota ePKP,EN = 22m.37s., ePPN = 26m.27s., iSKKSN = 33m.6s.  
 Long waves were also recorded at Seven Falls, San Juan, Galerazamba, Sitka, La Plata, Scoresby Sund, and other European stations.

March 27d. 22h. 6m. 6s. Epicentre 5°.9S. 102°.9E. (as at 21h.).

		$\Delta$	Az.	P.	O - C.	S.	O - C.
		°	°	m. s.	s.	m. s.	s.
Djakarta		3.9	94	i 1 3 <sub>a</sub>	+ 1	i 1 49	- 1
Bandong	E.	4.8	102	e 1 15	0	e 2 11	- 1
New Delhi	E.	42.3	326	e 7 57	0	—	—
Brisbane	Z.	52.2	120	i 9 19	+ 4	—	—
Pretoria	Z.	73.7	246	e 11 12	- 26	—	—
Grahamstown		75.4	238	e 11 39	- 8	—	—
Tamanrasset	Z.	99.1	293	7 52	?	—	—
College		103.5	25	e 18 23	[+ 3]	—	—
Shasta Dam		126.8	42	e 19 9	[+ 3]	—	—
Hungry Horse		127.3	30	e 19 8	[+ 1]	—	—
Tinemaha	Z.	131.4	45	i 19 18	[+ 3]	e 22 40	PKS
China Lake	Z.	132.4	46	i 19 20	[+ 3]	i 22 44	PKS
Logan		132.8	35	—	—	e 22 41	PKS
Pasadena	Z.	132.8	48	—	—	e 22 55	PKS
Riverside	Z.	133.4	48	i 19 22	[+ 4]	i 22 59	PKS
Overton	Z.	134.2	43	e 22 58	PKS	—	—
Pierce Ferry		134.8	43	e 19 26	[+ 5]	e 23 5	PKS
Tucson		139.1	46	e 23 25	PKS	—	—

Additional readings :—

New Delhi iE = 8m.28s.

College e = 18m.39s.

Tinemaha iZ = 23m.0s. and 23m.19s.

March 27d. Readings also at 2h. (Boulder City, Pierce Ferry, Hungry Horse (2), College, Tamanrasset, Pietermaritzburg, and Pretoria), 3h. (Auckland, Christchurch, Tuai, Wellington, Riverview, and College), 4h. (Brisbane, Pretoria, Tucson, Boulder City, Overton, Pierce Ferry, Collmberg, Strasbourg, Stuttgart, and Tamanrasset), 5h. (Auckland, Christchurch, Kaimata, Tuai, Wellington, near Kulyab, Stalinabad, and Obi-garm), 6h. (Collmberg, Strasbourg, Stuttgart, Tamanrasset, and Brisbane), 7h. (near Obi-garm), 8h. (near Andijan), 9h. (Mount Wilson, Tucson, Boulder City, Overton, Pierce Ferry, Hungry Horse, and College), 11h. (De Bilt, Kew, Paris, Tamanrasset, Kulyab, Hungry Horse, and College), 12h. (near Alicante (2), near Stalinabad, and Obi-garm), 13h. (near Andijan), 15h. (Wellington), 16h. (Strasbourg, Stuttgart, La Paz, and near Garm), 17h. (Tucson, Overton, Pierce Ferry, near Stalinabad, and near Mizusawa), 19h. (Tucson, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, near Mizusawa, and near Alicante), 20h. (near Tacubaya), 21h. (near Mizusawa), 22h. (near Istanbul).

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March 28d. 8h. 41m. 1s. Epicentre 39°·4S. 177°·8E.

Intensity VI in the epicentral region. Epicentre as adopted.

R. C. Hayes.

Earthquake Origins in New Zealand during the year 1950, *New Zealand Journal of Science and Technology*, Section B, Vol. 33, No. 4, January, 1952, p. 307.

$$A = -.7742, B = +.0297, C = -.6322; \quad \delta = -6; \quad h = -1; \\ D = +.038, E = +.999; \quad G = +.632, H = -.024, K = -.775.$$

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		°	°	m. s.	s.	m. s.	s.
Tuai	N.	0·8	312	i 0 17	- 1	0 25	S <sub>g</sub>
Arapuni		2·1	308	i 0 38	+ 1	i 1 0	- 4
New Plymouth	E.	2·9	277	i 0 48	0	i 1 21	- 3
Wellington		3·0	230	i 0 48	- 2	i 1 22	- 5
Auckland	N.	3·4	314	i 0 59	+ 4	i 1 34	- 3
Christchurch		5·7	222	e 1 30	+ 2	e 2 34	- 1
Kaimata	N.E.	5·8	235	e 1 29	0	e 2 33	- 5

March 28d. 12h. 32m. 52s. Epicentre 36°·4N. 140°·6E. Depth of focus 0·005.

(as on 1949, October 25d.).

Intensity VI at Otu (Ibaraki Pref.); V at Mito, Kakioka, Onahama, Utunomiya, and Tukubasan; IV at Sirakawa, Tyosi, Tokyo, Inawasiro, and Hukusima; II-III at Maebasi, Yokohama, Sendai, Hunatu, Kohu, Mizusawa, Morioka, and Miyako. Macro-seismic radius >300km.

Epicentre 36°·5N. 140°·8E. Depth 50km.

The Seismological Bulletin of the C.M.O., Japan, for the year 1950, Tokyo, 1952, pp. 14-15, with macroseismic chart.

$$A = -.6235, B = +.5121, C = +.5908; \quad \delta = +4; \quad h = 0; \\ D = +.635, E = +.773; \quad G = -.457, H = +.375, K = -.807.$$

	$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.
	°	°	m. s.	s.	m. s.	s.	m. s.
Mito	0·1	261	0 8	- 2	0 15	- 3	—
Kakioka	0·4	244	0 11	- 1	0 18	- 4	—
Tukubasan	0·5	246	0 12	- 1	0 20	- 3	—
Onahama	0·6	24	0 14 <sub>a</sub>	0	0 22	- 3	—
Utunomiya	0·6	284	0 15 <sub>k</sub>	+ 1	0 23	- 2	—
Kumagaya	1·0	256	0 19	0	0 32	- 1	—
Tokyo	1·0	224	i 0 19 <sub>k</sub>	0	i 0 30	- 3	—
Maebasi	1·3	270	0 22 <sub>k</sub>	- 1	0 35	- 5	—
Yokohama	1·3	219	0 24 <sub>a</sub>	+ 1	0 41	+ 1	—
Hukusima	1·4	356	0 22	- 2	0 38	- 5	—
Mera	1·6	203	0 29	+ 2	0 50	+ 3	—
Hunatu	1·8	239	0 30	0	0 57	+ 5	—
Misima	1·8	226	0 31	+ 1	0 58	+ 6	—
Matusiro	1·9	274	0 33 <sub>k</sub>	+ 2	—	—	—
Osima	1·9	211	0 32	+ 1	0 55	+ 1	—
Sendai	1·9	7	0 29 <sub>k</sub>	- 2	0 50	- 4	—
Nagano	2·0	278	0 30 <sub>k</sub>	- 2	0 54	- 3	—
Shizuoka	2·3	231	0 40	+ 3	1 10	+ 6	—
Omaesaki	2·7	227	0 45	+ 3	—	—	—
Mizusawa	2·8	9	0 46	+ 2	1 21	+ 4	—
Toyama	2·8	276	0 43	- 1	1 19	+ 2	—
Wazima	3·1	288	0 49	+ 1	—	—	—
Nagoya	3·2	247	0 52	+ 3	1 35	+ 8	—
Gihu	3·3	252	0 53	+ 2	1 37	+ 8	—
Morioka	3·3	8	0 49	- 2	1 24	- 5	—
Akita	3·4	355	0 52	0	—	—	—
Miyako	3·4	18	0 51	- 1	1 28	- 4	—
Hikone	3·7	253	1 1	+ 5	—	—	—
Kameyama	3·7	247	1 0	+ 4	1 54	+15	—
Hatinohe	4·2	10	1 1	- 2	1 51	- 1	—

Continued on next page.

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	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.	
	°	°	m.	s.	s.	m.	s.	s.	m.	s.
Kyoto	4.2	252	1	4	+ 1	—	—	—	—	—
Owase	4.3	238	1	3	- 2	2	2	+ 8	—	—
Aomori	4.4	1	1	5	- 1	2	6	+ 9	—	—
Osaka	4.5	249	1	10	+ 3	2	16	+17	—	—
Kobe	4.7	250	1	22	+12	2	31	+27	—	—
Toyooka	4.8	261	1	10	- 2	2	10	+ 3	—	—
Sumoto	5.1	247	1	17	+ 1	2	10	- 4	—	—
Mori	5.7	0	1	23	- 1	2	35	+ 6	—	—
Koti	6.4	246	1	38	+ 4	3	26	+40	—	—
Sapporo	6.7	8	1	36	- 2	2	53	- 1	—	—
Hamada	7.1	259	1	46	+ 2	3	16	+12	—	—
Nemuro	7.9	27	1	50	- 5	3	12	-11	—	—
Ooita	8.0	250	2	0	+ 4	4	1	+35	—	—
Hukuoka	8.8	254	e 2	11	+ 4	e 4	10	+24	—	—
Nanking	z. 18.5	264	e 4	11	- 2	—	—	—	—	—
College	50.0	32	i 8	49	- 1	—	—	—	i 9	10 pP
Shasta Dam	71.9	53	e 11	28	pP	—	—	—	—	—
Hungry Horse	72.7	42	i 11	23	0	—	—	—	—	—
Mineral	z. 72.7	52	e 11	23 <sub>a</sub>	0	—	—	—	e 11	35 pP
Lick	z. 74.3	55	e 11	32 <sub>a</sub>	0	—	—	—	e 11	49 pP
Tinemaha	76.7	55	i 11	47	+ 1	—	—	—	i 12	3 pP
China Lake	z. 77.9	55	i 11	52	0	—	—	—	—	—
Logan	77.9	47	e 12	15	pP	—	—	—	—	—
Copenhagen	78.2	334	i 11	53	- 1	—	—	—	—	—
Pasadena	z. 78.5	57	e 12	15	pP	—	—	—	—	—
Riverside	z. 79.1	57	e 12	16	pP	—	—	—	—	—
Overton	z. 79.5	53	i 12	2	+ 1	—	—	—	i 12	23 pP
Boulder City	79.6	53	i 11	58	- 4	—	—	—	e 12	24 pP
Pierce Ferry	80.0	52	i 12	4	0	—	—	—	—	—
Collmberg	z. 81.3	330	e 12	10	- 1	—	—	—	—	—
Jena	82.2	330	e 12	15?	0	—	—	—	e 12	22? PcP
Tucson	84.5	54	i 12	28	+ 1	—	—	—	e 12	46 pP
Stuttgart	z. 84.8	331	i 12	28 <sub>a</sub>	- 1	—	—	—	—	—
Strasbourg	85.6	331	i 12	32 <sub>a</sub>	- 1	—	—	—	—	—
Besançon	87.3	331	e 12	41	0	—	—	—	—	—

Tucson gives also e = 13m.37s.

March 28d. 20h. Region of the New Hebrides. Deep.

Brisbane iPZ = 9m.11s., iSEN = 13m.11s.  
 Lick ePZ = 17m.35s.k, ipPZ = 18m.26s., eZ = 20m.2s.  
 Shasta Dam eP = 17m.38s., ipP = 18m.29s.  
 College iP = 17m.40s., ipP = 18m.28s.  
 Mineral ePZ = 17m.41s.k, epPZ = 18m.32s.  
 Pasadena iPZ = 17m.43s., ipPZ = 18m.34s.  
 Riverside iPZ = 17m.44s., ipPZ = 18m.33s.  
 Reno ePZ = 17m.45s.a, epPZ = 18m.37s.  
 China Lake iPZ = 17m.47s., ipPZ = 18m.38s.  
 Palomar iPZ = 17m.47s., ipPZ = 18m.36s.  
 Tinemaha iPZ = 17m.47s., ipPZ = 18m.38s.  
 Boulder City eP = 17m.59s., ipP = 18m.48s.  
 Overton iPZ = 18m.1s., ipPZ = 19m.50s.  
 Pierce Ferry eP = 18m.2s., ipP = 18m.51s.  
 Tucson iP = 18m.9s., epP = 18m.57s.  
 Hungry Horse eP = 18m.17s., ipP = 19m.6s.  
 Copenhagen iPKP = 24m.22s.  
 Collmberg eZ = 24m.27s. and 27m.44s.  
 Stuttgart ePKPZ = 24m.31s. and 24m.36s., ePPZ = 27m.52s.  
 Strasbourg ePKP = 24m.34s.?  
 Besançon ePKP = 24m.36s.  
 Tamanrasset iPKPZ = 25m.6s.



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March 28d. Readings also at 0h. (Riverview, Tuai, Kaimata, Christchurch, near New Plymouth, Arapuni, Wellington, and near Istanbul), 1h. (Boulder City), 4h. (Kew, College (2), Overton, Pierce Ferry, and near Apia), 5h. (Istanbul), 7h. (Overton, Pierce Ferry, Tucson, and near Andijan), 8h. (Tacubaya), 9h. (Tacubaya, and near Andijan), 10h. (Tamanrasset and Ksara), 11h. (near Bogota), 13h. (Hungry Horse (2) and near College), 14h. (Raciborzu, Tamanrasset, College, Bogota, La Paz, near Huancayo, and near Garm), 15h. (Hungry Horse and Shasta Dam), 16h. (near Andijan), 18h. (Shasta Dam), 19h. (near Obi-garm), 20h. (near Garm), 21h. (La Paz, near Obi-garm, and Stalinabad), 22h. (Algiers Univ., near Huancayo and near Andijan), 23h. (Collmberg, College, Shasta Dam, Samarkand, Fergana, Andijan, Tchinkent, Naryn, Frunse, near Garm, Obi-garm, Stalinabad, and near Prague).

March 29d. 2h. 4m. 6s. Epicentre  $41^{\circ}1N$ .  $15^{\circ}0E$ . (foreshock of 2h. 19m.).

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Taranto		1.8	111	0 31	- 1	0 54	- 2	e 1 4	S <sub>g</sub>	—
Rocca di Papa		1.8	291	e 0 27	- 5	i 0 58	+ 2	—	—	—
Rome		2.1	293	e 0 30	- 7	i 1 3	- 1	—	—	—
Florence Arc.		3.8	316	—	—	e 2 24	S <sub>g</sub>	—	—	—
Florence Xim		3.9	316	e 1 19?	P <sub>r</sub>	i 2 2	S <sub>g</sub> *	—	—	—
Prato		4.0	316	e 1 10	P*	i 1 54	+ 2	—	—	—
Triest		4.6	349	i 1 57	?	i 2 32	S <sub>g</sub>	—	—	i 3.2
Zagreb		4.8	8	e 1 18	+ 3	—	—	—	—	—
Chur		7.0	327	e 2 45	?	—	—	—	—	—
Zürich		7.8	326	e 2 0	+ 2	—	—	—	—	—
Stuttgart	z.	8.7	334	e 2 12	+ 2	—	—	—	—	—
Prague		9.0	358	—	—	e 4 7	+ 9	e 4 57	S <sub>g</sub>	—
Collmberg	z.	10.3	353	e 2 21?	-11	—	—	—	—	—

Additional readings :—  
 Florence Arc. e = 2m.39s.  
 Stuttgart eZ = 3m.27s.  
 Prague eS<sub>g</sub> = 5m.7s.

March 29d. 2h. 19m. 37s. Epicentre  $41^{\circ}1N$ .  $15^{\circ}0E$ . (as at 2h. 4m.).

Intensity V at Ariano, Iripino, and Benevento. Epicentre as adopted (Strasbourg).  
 Seismic Bulletin, Triest, March-April, 1950, p. 2.

A = +.7300, B = +.1956, C = +.6548 ;  $\delta = -8$  ;  $h = -2$  ;  
 D = +.259, E = -.966 ; G = +.632, H = +.169, K = -.756.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Taranto		1.8	111	0 32	0	0 54	- 2	—	—
Rome		2.1	293	i 0 35k	- 2	2 1	+57	—	—
Florence Arc.		3.8	316	—	—	e 1 51	+ 4	e 2 2	S <sub>g</sub>
Florence Xim		3.9	316	1 32	P <sub>g</sub>	2 16	S <sub>g</sub>	—	—
Prato		4.0	316	i 1 31	P <sub>g</sub>	i 2 17	S <sub>g</sub>	—	—
Triest		4.6	349	e 1 40	P <sub>g</sub>	i 2 31	S <sub>g</sub>	—	—
Zagreb		4.8	8	e 1 26	P*	—	—	—	i 3.2
Chur		7.0	327	e 2 48	?	e 2 54	?	—	—
Zürich		7.8	326	—	—	e 3 21	- 7	—	—
Neuchatel		8.3	318	e 3 5	?	—	—	—	—
Stuttgart	z.	8.7	334	e 2 41?	P*	—	—	—	—
Prague		9.0	358	—	—	e 3 49	- 9	e 4 55	S <sub>g</sub>
Strasbourg		9.1	328	e 3 35	?	e 4 2	+ 2	e 4 31	S*
Collmberg	z.	10.3	353	e 2 25	- 7	—	—	—	—
Tamanrasset	z.	19.9	207	e 4 37	+ 1	—	—	e 4 57	PP

Additional readings :—  
 Rome eN = 48s., S = 56s.  
 Florence Arc. e = 2m.52s.  
 Triest iP<sub>g</sub>P<sub>g</sub> = 2m.0s.  
 Stuttgart eZ = 3m.30s. and 4m.4s.  
 Prague eS = 4m.10s., e = 4m.30s., eS\* = 4m.46s., eS<sub>g</sub> = 5m.11s., e = 5m.23s.?  
 Tamanrasset ePPPZ = 5m.8s.

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March 29d. 12h. 52m. 59s. Epicentre 27°·9S. 175°·9W. Depth of focus 0·005.  
(as on 3d.).

A = -·8828, B = -·0632, C = -·4654;  $\delta = -7$ ;  $h = +3$ .

		$\Delta$ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Auckland	N.	11·9	219	e 2 6	-43	—	—	—	e 5·6
Tuai	N.	12·3	206	—	—	i 5 10	0	—	—
New Plymouth	E.	13·9	214	e 4 2	+47	e 6 1	+13	—	—
Apia		14·6	16	e 3 6	-18	e 5 33	-32	—	e 7·0
Wellington		15·4	207	e 3 42	+ 7	e 6 18	- 6	—	9·0
Cobb River	E.	16·1	212	—	—	e 6 32	- 8	—	—
Kaimata	N.E.	17·9	214	e 4 25?	+19	e 7 31?	+11	—	—
Brisbane		27·5	264	i 5 39k	- 3	—	—	i 6 28	PP e 13·8
Riverview		28·8	251	e 5 58	+ 4	e 10 50	+12	i 6 56	PP e 13·7
Pasadena		82·4	46	i 12 16	0	—	—	i 12 33	pP e 40·3
Berkeley		82·5	41	e 11 50k	-27	—	—	e 12 14	P e 36·9
Lick	Z.	82·5	41	e 12 17k	0	—	—	—	—
Palomar	Z.	82·7	47	i 12 17	- 1	—	—	i 12 33	pP
Riverside	Z.	82·8	46	e 12 14	- 4	—	—	i 12 33	pP
Fresno	Z.	83·2	43	e 12 21	0	—	—	e 12 36	pP
China Lake	Z.	83·9	44	i 12 23	- 1	—	—	i 12 38	pP
Tinemaha		84·3	43	i 12 26	0	—	—	i 12 42	pP
Shasta Dam		84·4	38	e 12 25	- 2	—	—	—	—
Mineral	Z.	84·6	39	e 12 27k	- 1	—	—	i 12 43	pP
Reno		85·0	41	i 12 32 <sub>a</sub>	+ 2	—	—	i 12 45	pP
Boulder City		85·7	46	e 12 34	+ 1	—	—	—	—
Tucson		86·0	50	i 12 35	0	e 23 14	+12	—	e 36·2
Nanking	Z.	86·1	310	e 12 33	- 2	—	—	—	—
Overton	Z.	86·3	46	i 12 36	0	—	—	—	—
Pierce Ferry		86·3	46	i 12 32	- 4	—	—	—	—
Seattle		89·3	34	e 12 50	0	—	—	e 13 21	pP
Victoria		89·4	33	e 12 48	- 3	—	—	—	—
Logan		91·1	43	e 12 58	- 1	—	—	—	—
Hungry Horse		93·9	37	e 13 10	- 2	—	—	—	—
College		95·0	12	i 13 12	- 5	—	—	—	—
Ksara		152·2	291	e 19 32	[- 9]	—	—	23 12	PP
Collmberg	Z.	155·7	346	e 19 55?	[+ 9]	—	—	—	—
Istanbul		155·7	311	e 19 47	[+ 1]	—	—	—	—
Stuttgart	Z.	158·8	351	e 19 50	[ 0]	—	—	—	—
Strasbourg		159·1	353	20 1?	[+11]	—	—	—	—
Besançon		160·6	356	i 20 32	pPKP	—	—	—	—
Tamanrasset	Z.	174·8	195	i 20 5 <sub>a</sub>	[+ 3]	—	—	e 25 30	PP

Additional readings :—

Apia e = 3m.30s. and 5m.27s.

Brisbane ePE = 5m.45s., iE = 6m.39s. and 11m.3s.

Riverview iPPPE = 7m.11s., eSSSN = 12m.45s.

Palomar iZ = 12m.22s.

Riverside eZ = 12m.23s.

Fresno eZ = 12m.52s.

Lick iZ = 12m.22s., iPS?Z = 12m.39s.

Mineral iZ = 13m.27s.

Seattle e = 14m.9s.

Besançon e = 21m.5s.

Tamanrasset iPKP, Z = 21m.42s., eZ = 24m.8s. and 28m.45s.

Long waves were also recorded at Christchurch, Bombay, Philadelphia, Harvard, De Bilt, Kew, Paris, Clermont-Ferrand, and Potsdam.

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March 29d. 17h. 41m. 10s. Epicentre 3°·18. 138°·6E.

A = -·7490, B = +·6603, C = -·0537;  $\delta$  = -12;  $h$  = +7;  
D = +·661, E = +·750; G = +·040, H = -·036, K = -·999.

	$\Delta$	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Guam	17·6	20	4	6	- 2	—	—	—	—	—	9·2
Brisbane	27·9	152	i 5	54	0	e 10	34	- 3	i 6	13	pP
Bandong	31·1	263	e 6	24	+ 2	e 11	42	+14	—	—	—
Djakarta	31·8	264	e 6	27 <sup>a</sup>	- 1	i 11	46	+ 8	—	—	—
Riverview	32·7	161	i 6	38 <sup>a</sup>	+ 2	i 11	51	- 1	i 6	58	pP
Miyazaki	35·5	352	e 6	57	- 3	i 12	29	- 7	i 7	41	?
Perth	35·8	215	8	18	PP	i 12	51	+10	8	43	PPP
Hukuoka	37·3	350	e 7	14	- 2	e 12	21	-43	—	—	e 17·1
Sumoto	37·4	357	e 7	16	0	13	5	0	e 14	50	SS
Osaka	37·7	357	e 7	17	- 2	—	—	—	e 8	34	PP
Hamada	38·3	352	7	23	- 1	13	10	- 9	—	—	—
Hunatu	38·4	2	7	24	- 1	e 13	12	- 8	—	—	—
Tokyo	38·6	3	e 7	28	+ 2	13	13	-10	16	50?	SSS
Maebasi	39·3	2	e 7	34	+ 2	e 13	38	+ 4	—	—	—
Matusiro	39·4	0	7	12	-21	13	4	-31	9	1	PP
Nagano	N. 39·6	0	e 7	35	0	e 13	26	-12	—	—	—
Nanking	Z. 39·7	334	i 7	35	- 1	13	46	+ 6	i 9	5	PP
Hokusima	40·7	4	7	42	- 2	e 13	44	-11	—	—	—
Sendai	41·2	5	e 7	46	- 2	13	59	- 3	—	—	—
Mizusawa	42·1	4	7	56	+ 1	e 14	2	-14	e 14	5	S
Akita	42·6	3	e 7	59	0	e 14	19	- 4	e 10	38	PPP
Sapporo	46·0	4	e 8	26	- 1	e 14	55	-17	—	—	—
Auckland	N. 47·3	140	8	50	+13	16	6	+35	10	50	PP
New Plymouth	E. 48·2	143	e 8	31	-13	—	—	—	i 9	8	?
Cobb River	E. 48·7	146	i 8	47	- 1	—	—	—	—	—	—
Kaimata	N.E. 49·0	148	e 9	2?	+12	—	—	—	—	—	—
Wellington	50·0	145	i 8	58	0	i 16	36	+27	i 9	17	pP
Apia	50·1	106	e 8	59	0	—	—	—	e 9	19	?
Christchurch	50·3	148	i 9	0	0	e 16	5	- 8	i 9	21	pP
Colombo	E. 59·5	281	10	6	- 1	18	39	PS	—	—	31·2
Klyuchi	61·9	15	e 10	20	- 4	—	—	—	—	—	—
Irkutsk	62·3	338	10	24	- 2	i 18	47	- 5	—	—	—
Kodaikanal	E. 62·3	285	i 10	29	+ 3	e 18	53	+ 1	11	9	P <sub>c</sub> P
Hyderabad	N. 62·7	292	e 10	28	- 1	e 18	49	- 8	—	—	29·5
New Delhi	66·7	304	e 10	49	- 6	i 19	37	- 9	20	11	PS
Poona	N. 67·2	292	i 10	55	- 3	i 19	45	- 7	13	33	PP
Naryn	71·9	317	i 11	26	- 1	e 20	42	- 6	11	48	pP
Almata	72·0	319	i 11	27	- 1	—	—	—	—	—	—
Semipalatinsk	72·9	327	i 11	30	- 3	—	—	—	—	—	—
Frunse	73·4	317	e 11	36	0	—	—	—	—	—	—
Andijan	74·3	314	e 11	40	- 1	21	10	- 5	e 12	5	pP
Fergana	74·6	313	i 11	41	- 2	—	—	—	—	—	—
Garm	75·3	313	—	—	—	e 21	12	-14	—	—	—
Kulyab	75·4	311	i 11	48	+ 1	i 21	23	- 4	—	—	—
Stalinabad	76·3	312	i 11	53	+ 1	i 21	33	- 4	12	17	pP
Tashkent	76·7	314	i 11	54	- 1	i 21	33	- 8	e 12	18	pP
Tchimkent	76·7	315	i 11	55	0	i 21	35	- 6	—	—	—
Samarkand	77·9	312	e 12	2	+ 1	e 21	50	- 4	—	—	—
Ashkabad	84·2	309	12	36	+ 2	—	—	—	—	—	—
College	85·9	24	i 12	39	- 4	e 22	54	[-13]	e 16	28	PP
Kizyl-Arvat	86·0	310	i 12	46?	+ 3	—	—	—	—	—	—
Sverdlovsk	86·0	337	i 12	42	- 1	i 23	9	[+ 2]	i 13	12	pP
Sitka	90·4	33	—	—	—	e 23	34	[- 1]	—	—	e 39·0
Baku	91·0	311	e 13	14?	+ 7	e 24	7?	+ 4	—	—	—
Grozny	94·2	313	e 13	42?	+20	e 24	17	{+ 5}	e 16	57	PP
Tiflis	94·9	312	e 13	22	- 3	e 24	30	- 7	e 17	14	PP
Gori	95·4	312	e 13	27	- 1	—	—	—	—	—	—
Leninakan	95·6	311	e 13	36	+ 8	—	—	—	—	—	—
Borzhomi	95·9	312	e 13	19?	-11	—	—	—	e 17	16	PP
Abastumanj	96·4	312	e 13	28	- 4	—	—	—	—	—	—

Continued on next page.

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	$\Delta$	Az.	P.		O-C.	S.	O-C.	Supp.		L.	
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	m.	s.	m.	
Zugdidi	97.0	313	e 13	38	+ 3	—	—	—	—	—	
Victoria	97.6	42	e 13	32	- 6	—	—	—	—	—	
Moscow	98.7	326	e 13	39	- 3	—	—	—	—	—	
Shasta Dam	98.8	49	i 13	42	- 1	e 24 11	[-10]	e 17 30	PP	—	
Berkeley	99.1	52	i 13	42 <sub>a</sub>	- 2	e 24 16	[- 7]	i 17 30	PP	e 44.6	
Santa Clara	E. 99.4	52	e 24	22	SKS	(e 24 22)	[- 2]	e 32 27	SSP	e 52.0	
Mineral	Z. 99.5	49	i 13	44 <sub>k</sub>	- 2	—	—	e 17 34	PP	—	
Lick	Z. 99.5	52	i 13	45 <sub>k</sub>	- 1	—	—	e 17 40	PP	—	
Reno	100.9	50	e 13	50	- 2	e 24 28	[- 3]	e 18 24	PP	—	
Fresno	Z. 101.2	53	i 13	53	- 1	—	—	e 18 20	PP	—	
Ksara	102.3	304	e 14	1	+ 2	28 13	PPS	—	—	—	
Tinemaha	Z. 102.4	53	e 13	58	- 1	—	—	—	—	—	
Yalta	102.5	315	i 18	15	PP	—	—	—	—	—	
Pasadena	102.7	56	e 13	58	- 2	—	—	e 18 13	PP	e 46.3	
China Lake	Z. 103.0	54	i 14	0	- 2	—	—	i 18 13	PP	—	
Riverside	Z. 103.4	56	i 14	1	- 3	—	—	i 18 18	PP	—	
Hungry Horse	103.8	41	e 14	3	- 2	—	—	e 29 57	PKKP	—	
Helsinki	104.3	332	—	—	—	e 33 5	SS	—	—	e 48.8	
Boulder City	105.2	54	e 14	11	0	—	—	e 18 36	PP	—	
Overton	Z. 105.4	53	e 19	32	?	—	—	—	—	—	
Pierce Ferry	105.9	53	e 14	13	- 2	—	—	i 18 9	PKP	—	
Helwan	106.5	300	e 17	47	?	e 25 32	{- 8}	e 18 40	PP	—	
Logan	106.6	47	e 18	37	PP	e 27 57	PS	—	—	e 49.3	
Istanbul	106.7	312	e 14	16	P	e 18 47	PP	—	—	—	
Salt Lake City	106.8	48	—	—	—	e 28 9	PS	e 34 4	SS	e 49.7	
Pretoria	Z. 106.9	243	e 18	2	[-25]	—	—	—	—	—	
Upsala	107.8	333	e 27	50?	?	i 34 2	SS	e 50 50?	Q	e 53.8	
Warsaw	107.8	325	e 19	2	PP	28 54	PPS	—	—	e 58.8	
Tucson	109.0	56	e 18	32	[+ 1]	e 28 15	PP	e 14 27	P	e 48.7	
Scoresby Sund	111.5	353	—	—	—	e 29 3	PS	34 44	SS	54.8	
Copenhagen	112.2	331	e 19	17	PP	28 52	PS	35 1	SS	53.8	
Potsdam	Z. 113.5	328	i 19	31 <sub>k</sub>	PP	e 29 8	PS	i 21 59	PPP	57.8	
Prague	113.7	325	e 18	23	[-17]	e 25 20	[- 7]	e 19 26	PP	e 53.8	
Collmberg	114.0	326	e 14	49?	P	e 29 2	PS	e 18 41	PKP	e 53.8	
Jena	N. 114.5	326	e 18	45?	[+ 3]	e 21 57	PKS	e 19 44	PP	—	
Triest	116.0	321	e 18	48	[+ 3]	e 26 17	{-30}	e 20 2	PP	—	
Stuttgart	117.4	325	e 18	47	[- 1]	e 27 32	{+36}	e 15 1	P	61.8	
De Bilt	117.7	330	e 19	50	PP	e 36 20	SS	—	—	e 52.8	
Aberdeen	N. 117.8	337	—	—	—	e 30 0	PS	e 39 28	?	e 59.8	
Strasbourg	118.3	326	e 20	7	PP	e 30 6	PS	e 22 38	PPP	e 43.5	
Rome	118.4	317	e 19	42	PP	26 13	[+29]	e 30 37	PPS	e 59.0	
Durham	119.2	335	—	—	—	e 30 5	PS	—	—	—	
Besançon	120.0	325	e 18	53	[ 0]	—	—	e 20 13	PP	—	
Kew	120.8	332	e 20	23	PP	e 30 15	PS	e 31 47	PPS	e 55.8	
Paris	121.1	328	i 20	27	PP	i 31 52	PPS	e 42 22	SSS	e 58.8	
Tacubaya	121.3	69	—	—	—	e 28 13	?	e 28 58	?	—	
Rathfarnham Castle	122.2	336	e 19	50	PP	e 29 17	?	e 43 2	Q	e 58.8	
Clermont-Ferrand	122.5	325	i 20	35	PP	—	—	—	—	62.8	
St. Louis	123.2	44	i 18	57	[- 2]	e 30 32	PS	e 20 34	PP	e 51.6	
Cleveland	127.5	38	—	—	—	e 38 27	SS	e 38 45	P'P'	—	
Ottawa	128.7	30	19	9 <sub>k</sub>	[- 1]	—	—	—	—	e 60.8	
Alicante	128.8	319	21	21	PP	26 19	[+ 2]	22 33	PKS	e 62.0	
Seven Falls	E. 129.3	25	e 19	11	[ 0]	e 38 32	SS	e 22 31	PKS	57.8	
Pennsylvania	130.1	36	e 21	27	PP	i 22 30	PKS	—	—	—	
Toledo	130.2	322	i 19	15	[+ 3]	—	—	21 3	PP	73.7	
Tamanrasset	Z. 130.6	298	e 19	14	[+ 1]	i 32 9	PS	e 18 59	?	—	
Philadelphia	132.2	34	i 22	43	PKS	e 39 7	SS	e 44 11	SSS	e 53.9	
Fordham	132.4	32	e 19	16	[- 1]	e 22 45	PKS	e 31 50	PS	65.8	
Harvard	132.4	30	i 19	18	[+ 1]	e 30 50	SKSP	e 22 32	PP	e 62.2	
Weston	132.6	30	i 19	16	[- 1]	—	—	—	—	—	

Continued on next page.

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	$\Delta$ °	Az. °	P. m. s.	O - C. s.	S. m. s.	O - C. s.	Supp. m. s.	L. m.
Huancayo	143.1	115	i 19 36	[ 0]	—	—	—	—
Bermuda	143.6	34	e 21 12	[ ?]	e 42 58	SSP	—	e 60.1
Chinchina	145.8	85	i 19 41	[ 0]	e 35 10	PPS	—	—
La Paz	147.2	128	e 19 50	[ + 7]	i 20 30	?	—	—
Bogota	147.4	86	e 19 47	[ + 3]	e 23 19	PKS	i 20 17	e 83.8
San Juan	151.4	56	e 19 55	[ + 5]	e 30 19	{ - 7}	e 26 21	PPP

Additional readings :—

Brisbane ipPZ = 6m.18s., iPPE = 6m.47s., ePPN = 6m.50s., iSE = 10m.39s., isSE = 11m.5s., isSN = 11m.8s., iE = 12m.9s.

Riverview iN = 6m.41s., iPPEZ = 7m.48s., i = 8m.10s., iSE = 11m.57s., iEN = 12m.4s., isSN = 12m.29s.

Perth SS = 14m.52s.

Osaka eP = 7m.26s., e = 11m.27s.

Matusiro i = 16m.26s.

Nanking iZ = 9m.55s. and 13m.24s., SSZ = 16m.33s.

Akita e = 8m.57s.

Auckland eN = 15m.30s., eSS?N = 19m.55s., eSSS?N = 21m.6s.

Wellington eSS = 20m.15s., eSSS = 22m.5s.

Christchurch PP = 11m.18s., isSNZ = 16m.45s., eEZ = 19m.10s., SSEN = 20m.10s., QN = 21m.20s.

Kodaikanal PPE = 13m.9s., PcSE = 15m.14s., PSE = 19m.11s., PPSE = 19m.21s.

Poona iPcPN = 11m.17s., PPPN = 15m.9s., ScSN = 20m.5s., iPSN = 20m.29s., iPPSN = 20m.47s., iSSN = 24m.49s., SSSN = 28m.1s., QN = 29m.50s.?

Naryn sS = 21m.17s.

College i = 12m.55s. and 13m.7s.

Sverdlovsk sS = 23m.44s.

Berkeley iZ = 14m.6s., eZ = 15m.10s., eEN = 19m.8s., isSE = 22m.14s.

Mineral iZ = 13m.48s., eZ = 30m.36s.

Lick iZ = 13m.50s. and 14m.10s.

Reno eN = 14m.6s.

Tinemaha iP?Z = 14m.20s., iZ = 14m.34s.

China Lake iP?Z = 14m.22s., iZ = 14m.40s.

Hungry Horse ePKP, PKP = 38m.15s.

Helwan eZ = 18m.8s.

Upsala iN = 34m.34s., eN = 44m.50s.

Warsaw ePE = 19m.6s., eZ = 20m.16s., ePSE = 32m.38s.

Tucson ePPP = 21m.7s., ePPS = 29m.8s.

Copenhagen SSS = 38m.50s.

Potsdam iZ = 37m.28s.

Prague e = 19m.55s., 20m.14s., and 20m.50s., eSKP? = 21m.22s., e = 21m.57s., ePPP = 22m.14s. and 22m.30s., eSKKS? = 26m.8s., ePS? = 29m.5s., ePPS? = 30m.2s., eSS? = 36m.11s., e = 38m.50s.?

Collmberg eZ = 19m.22s., ePPZ = 19m.41s., ePPPZ = 22m.1s., ePKKPZ = 29m.23s.

Triest iPPP = 22m.23s., iPS = 29m.14s., iPPS = 30m.27s., eSS = 35m.38s.

Stuttgart ePP = 19m.57s., ePPP = 22m.31s., e = 28m.20s., ePS = 29m.50s., eSSS = 40m.50s., eQ = 55m.50s.?

Strasbourg eS? = 27m.36s., e = 30m.50s., ePPS = 31m.17s., e = 39m.32s.

Rome e = 20m.10s., 22m.38s., and 29m.45s., eSS = 35m.52s.

Besançon i = 20m.20s., e = 20m.49s.

Kew eSS?EN = 37m.7s., eEN = 50m.41s.

St. Louis e = 20m.53s. and 21m.9s., ePPS = 32m.2s.

Alicante PPP = 24m.7s.

Tamanrasset eZ = 21m.26s., ePP?Z = 21m.53s., eSKPZ = 23m.12s., ePPPZ = 24m.18s.

Philadelphia eSKSP = 31m.43s.

Fordham eSS = 39m.32s.

Harvard ePPPS = 34m.46s., e = 46m.28s.

Long waves were also recorded at Tortosa.

March 29d. Readings also at 1h. (Cleveland), 2h. (Rome, College (2), Hungry Horse, Shasta Dam, Boulder City, Pierce Ferry, and near Mizusawa), 8h. (Piatigorsk, Gori, Borzhomi, near Grozny, and Tiflis), 10h. (Prague, Tchinkent, Samarkand, near Garm, Stalinabad, Fergana, Andijan, Tashkent, and near Mizusawa), 11h. (near Messina), 12h. (Tamanrasset), 14h. (College, Shasta Dam, near Weston, New Delhi, Ashkabad, Naryn, Frunse, Tchinkent, near Obi-garm, Garm, Stalinabad, Andijan, Fergana, Samarkand, Tashkent, and near Messina), 15h. (Helwan), 18h. (College, near Ashkabad, and Kizyl-Arvat), 19h. (New Delhi, near College, near Prague, and near Andijan), 20h. (near Andijan), 21h. (near Kulyab), 22h. (Pierce Ferry, Tucson, near Istanbul (3), near Kulyab, Obi-garm, and Stalinabad), 23h. (Messina, Rome, Stuttgart, and College),

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March 30d. 22h. 1m. 16s. Epicentre 23°·3S. 170°·9E. (as on 1947, November 12d.).

A = -·9078, B = +·1454, C = -·3933;  $\delta = -7$ ;  $h = +4$ ;  
D = +·158, E = +·987; G = +·388, H = -·062, K = -·919.

		$\Delta$	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	N.	13·9	167	i 3 11	-10	e 6 8	+11	—	—
Brisbane	Z.	16·7	252	i 3 55	-2	—	—	—	—
Wellington		18·2	172	i 4 7	-9	i 7 36	-1	—	e 8·7
Apia		18·9	64	e 4 28	+4	—	—	—	—
Riverview		20·2	234	i 4 44k	+5	i 8 26	+5	i 5 0	PP e 8·7
Lick	Z.	87·5	48	e 12 52k	+1	—	—	—	—
Berkeley	Z.	87·6	48	e 12 53k	+2	—	—	e 13 1	pP
Pasadena	Z.	88·3	52	i 12 55	0	—	—	i 13 4	pP
Riverside	Z.	88·8	52	i 12 59	+2	—	—	i 13 8	pP
Shasta Dam		88·8	44	i 12 58	+1	—	—	—	—
Mineral	Z.	89·1	45	i 12 55k	-3	—	—	i 13 16	pP
China Lake	Z.	89·5	50	i 13 2	+2	—	—	i 13 12	pP
Tinemaha	Z.	89·7	49	i 13 2	+1	—	—	i 13 11	pP
Reno	Z.	89·9	47	e 13 3	+1	—	—	—	—
Boulder City		91·6	51	e 13 12	+2	—	—	—	—
Pierce Ferry		92·3	52	i 13 15	+2	—	—	—	—
Tucson		92·9	56	i 13 17	+1	—	—	i 13 26	pP
College		93·5	16	e 13 16	-3	—	—	—	—
Ksara		139·4	294	e 19 39	[+10]	—	—	23 19	PKS
Potsdam	Z.	146·4	336	e 19 56	[+14]	—	—	—	—
Collmberg	Z.	147·2	333	e 19 46	[+3]	—	—	—	—
Jena	N.	148·1	334	e 19 51?	[+7]	—	—	—	—
Stuttgart	Z.	150·7	335	e 19 54	[+6]	—	—	—	—
Strasbourg		151·4	337	e 19 57	[+7]	—	—	—	—
Tamanrasset	Z.	166·5	271	e 20 7	[0]	e 21 9	PKP <sub>s</sub>	e 24 55	PP

Additional readings :—

Apia e = 4m.34s.

Riverview iEZ = 4m.51s.

Lick i = 13m.3s. and 13m.8s.

Jena eEN = 20m.7s., eN = 20m.17s., eE = 20m.53s.

Stuttgart eZ = 20m.37s.

Strasbourg e = 20m.21s. and 20m.54s.

Long waves were also recorded at Paris.

March 30d. 22h. 37m. 33s. Epicentre 36°·7N. 70°·5E. Depth of focus 0·030  
(as on 1949, July 21d.).

A = +·2683, B = +·7576, C = +·5951;  $\delta = +9$ ;  $h = 0$ ;  
D = +·943, E = -·334; G = +·199, H = +·561, K = -·804.

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		°	°	m. s.	s.	m. s.	s.
Kulyab		1·3	335	i 0 35	0	i 1 1	0
Obi-garm		2·1	342	0 40	-2	1 11	-3
Garm		2·3	356	e 0 44	0	1 17	0
Stalinabad		2·3	323	i 0 44	0	i 1 17	0
Fergana		3·8	15	i 1 0	-1	i 1 46	-2
Samarkand		4·1	319	e 1 6	+2	i 1 54	0
Andijan		4·3	20	1 7	0	1 59	0
Tashkent		4·7	349	i 1 14	+2	i 2 9?	+1
Tchimkent		5·6	354	i 1 25	+2	i 2 30	+2
Naryn		6·4	41	i 1 36	+3	e 2 48	+2
Frunse		6·9	26	i 1 40	0	e 2 57	-1
Almata		8·2	35	1 56	-1	3 29	+1
Przhevalsk		8·4	44	i 1 58	-1	—	—
Ashkabad		9·8	281	e 2 18	+1	e 4 8	+3
New Delhi		9·8	143	e 2 10	-7	i 4 7	+2

Continued on next page.

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		$\Delta$	Az.	P.	O-C.	S.	O-C.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Poona	E.	18.3	170	—	—	e 7 13	+ 1
Tiflis		20.5	293	e 4 32	+10	e 8 8	+15
Sverdlovsk		21.2	345	i 4 33	+ 4	—	—
Tamanrasset	Z.	57.1	277	e 9 23	- 2	—	—
College		74.4	17	i 11 15	0	—	—
Hungry Horse		95.2	4	e 13 0	+ 1	—	—

Additional readings :—

New Delhi iSEN = 3m.47s.

Poona iE = 7m.23s., eE = 7m.49s., iE = 8m.22s.

March 30d. Readings also at 1h. (China Lake, Tucson, Overton, Pierce Ferry, College, Apia, and near Garm), 2h. (Mount Wilson, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Mineral, Shasta Dam, Kulyab, near Obi-garm, and Stalinabad), 3h. (Grozny), 4h. (Hungry Horse), 5h. (Bogota, La Paz, and near Ashkabad), 8h. (Boulder City, Overton, Pierce Ferry, Shasta Dam, Hungry Horse, College, Tamanrasset, and near Andijan), 9h. (near Santa Clara), 10h. (near Andijan), 11h. (Istanbul and near Ashkabad (2) ), 12h. (Shasta Dam, Hungry Horse, College, Istanbul, Besançon, near Florence Arc., Prato, Triest, near Andijan, and near Mizusawa), 13h. (near Obi-garm), 14h. (Hungry Horse), 15h. (Brisbane, Cobb River, New Plymouth, Wellington, and Tamanrasset), 16h. (Palomar, Riverside, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Lick, Mineral, Shasta Dam, Hungry Horse, College, Logan, Klyuchi, Kew, Paris, Clermont-Ferrand, Potsdam, Strasbourg, Stuttgart, Tamanrasset, and near Stalinabad), 17h. (De Bilt, and near Alicante (2) ), 19h. (near Huancayo), 21h. (Mineral, Shasta Dam, Boulder City, Overton (2), Pierce Ferry (2), Reno, near Tucson (2), and near Obi-garm), 22h. (near Kizyl-Arvat and near Mary).

March 31d. 13h. 37m. 51s. I } Epicentre 36°·7N. 70·5E. Depth of focus 0·030.  
22h. 39m. 9s. II } (as on March 30d.).

		$\Delta$	Az.	P.	O-C.	S.	O-C.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
I Kulyab		1.3	335	e 0 44	+ 9	i 1 10	+ 9
II		1.3	335	0 35	0	i 1 1	0
I Obi-garm		2.1	342	0 40?	- 2	1 11?	- 3
I Garm		2.3	356	i 0 40?	- 4	i 1 11?	- 6
II		2.3	356	0 44?	0	1 17?	0
I Stalinabad		2.3	323	i 0 47	+ 3	e 1 21	+ 4
II		2.3	323	i 0 44	0	i 1 17	0
I Fergana		3.8	15	i 0 57	- 4	i 1 40	- 8
I Samarkand		4.1	319	e 1 9	+ 5	e 2 0	+ 6
II		4.1	319	e 1 4	0	1 52	- 2
I Andijan		4.3	20	e 1 3	- 4	e 1 49	-10
II		4.3	20	e 1 7	0	e 1 59	0
II Tashkent		4.7	349	e 1 12	0	i 2 8?	0
I Tchinkent		5.6	354	e 1 24	+ 1	i 2 27	- 1
II		5.6	354	i 1 24	+ 1	i 2 28	0
I Naryn		6.4	41	e 1 28	- 5	—	—
I Frunse		6.9	26	—	—	e 2 54	- 4
II		6.9	26	—	—	e 3 0	+ 2
I Mary		6.9	280	—	—	e 3 17	+19
II Collmberg	Z.	42.8	309	—	—	e 17 53	SS

Collmberg II gives also eZ = 18m.2s.

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March 31d. 18h. 32m. 4s. Epicentre 43°·3N. 46°·2E. Given by U.S.S.R.

A = +·5053, B = +·5270, C = +·6834;  $\delta = +9$ ;  $h = -3$ ;  
D = +722, E = -·692; G = +·473, H = +·493, K = -·730.

	$\Delta$ °	Az. °	P.		O-C.	S.		O-C.	Supp.		L.
			m.	s.	s.	m.	s.	m.	s.	m.	
Grozny	0·3	273	0	8	- 3	0	11	- 7	—	—	—
Tiflis	1·9	213	0	35	+ 1	1	1	+ 2	—	—	—
Gori	2·0	229	e 0	36	+ 1	—	—	—	—	—	—
Piatigorsk	2·4	288	e 0	56	P <sub>g</sub>	1	31	S <sub>g</sub>	—	—	—
Borzhom	2·6	235	0	43	- 1	—	—	—	—	—	—
Abastumanj	2·9	238	e 0	46	- 2	—	—	—	—	—	—
Leninakan	3·1	215	—	—	—	1	42	S <sub>g</sub>	—	—	—
Erevan	3·3	202	1	5?	P <sub>g</sub>	—	—	—	—	—	—
Baku	4·0	135	e 1	17	P <sub>g</sub>	—	—	—	—	—	—
Sotchi	4·7	276	e 1	17	+ 3	—	—	—	—	—	—
Ashkabad	10·7	116	e 2	33	- 5	e 4	34	- 5	—	—	—
Ksara	12·4	224	e 3	2	+ 1	e 5	40?	+19	—	—	—
Mary	13·2	110	e 2	59	-12	—	—	—	—	—	—
Moscow	13·6	339	e 3	21?	+ 4	e 5	58?	+ 8	—	—	—
Sverdlovsk	16·3	29	e 3	48?	- 4	—	—	—	—	—	—
Lwow	16·6	301	—	—	—	e 7	7	+ 7	—	—	—
Tashkent	17·2	88	e 4	7	+ 4	e 7	20	+ 6	—	—	—
Stalinabad	17·7	97	i 4	10	0	e 7	26	0	—	—	—
Fergana	19·2	89	e 4	33	+ 5	—	—	—	—	—	—
Andijan	19·6	89	4	31	- 1	e 8	10	+ 2	—	—	—
Naryn	22·0	82	e 5	1	+ 3	—	—	—	—	—	—
Prague	22·7	299	e 5	0	- 4	—	—	—	e 6	10	PP
Collmberg	z. 23·7	301	e 5	12	- 2	—	—	—	—	—	e 12·2
Potsdam	z. 23·8	305	e 5	14?	- 1	—	—	—	—	—	15·9
Jena	E. 24·6	300	e 5	22	- 1	—	—	—	—	—	—
Stuttgart	z. 26·1	296	e 5	33	- 4	—	—	—	—	—	—
Tamanrasset	z. 39·3	252	i 7	30 <sub>a</sub>	- 2	—	—	—	—	—	—

Long waves were also recorded at Warsaw.

March 31d. Readings also at 0h. (Collmberg, Huancayo, and La Paz), 1h. (Tamanrasset, Tucson, China Lake, Tinemaha, Shasta Dam, College, Hungry Horse, and near Ashkabad), 5h. and 6h. (near Ashkabad), 7h. (near Gori), 8h. (La Paz), 12h. (Mount Wilson, China Lake, Tinemaha, Tucson, Overton, Pierce Ferry, Lick, Shasta Dam, Hungry Horse, La Paz, and near Huancayo), 13h. (College and Rome), 15h. (Mount Wilson, China Lake, Tinemaha, Tucson, Boulder City, Pierce Ferry, Lick Mineral, Hungry Horse, Victoria, College, near Mizusawa, and near Fort de France), 16h. (Nanking and Rome), 18h. (Baku, near Andijan, near Garm, near Grozny (5), and Tiflis), 19h. (Grozny (9)), 20h. (Tucson, Pierce Ferry, Shasta Dam, Hungry Horse, Rome, Tamanrasset, Grozny, near La Paz, near Mizusawa, near Algiers Univ., and near Ottawa), 21h. (Grozny (7), and near Andijan), 22h. (Apia, Auckland, Wellington, Lick, Mount Wilson, Palomar, China Lake, Tinemaha, Tucson, Boulder City, Overton, Pierce Ferry, Shasta Dam (2), College, Grozny, and Tamanrasset), 23h. (College, Ksara, and Tamanrasset).



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/>

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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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