The International Seismological Summary.

1948 October, November, December.

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

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

The last quarter of 1948 contains 126 epicentres, 90 of which are repetitions from previous determinations.

Cases of abnormal focal depth are noted below :—

		°	°	
Oct.	1d. 11h.	16·9N.	98·7W.	0·010
	14d. 21h.	22·7S.	179·4E.	0·080
	28d. 20h.	36·1N.	141·2E.	0·005
	29d. 3h.	19·5S.	69·4W.	Suggested Deep.
Nov.	6d. 23h.	7·5S.	71·0W.	0·090
	9d. 10h.	40·0N.	142·8E.	0·010
	10d. 12h.	30·0N.	140·8E.	0·015
	11d. 7h.	36·0S.	71·5W.	0·005
	15d. 4h.	29·8N.	139·0E.	0·060
	19d. 1h.	9·7N.	83·7W.	0·010
	20d. 4h.	7·5S.	71·0W.	0·090
	20d. 10h.	45·8N.	151·4E.	0·040

	20d.	13h.	36·9N.	70·8E.	0·030
	21d.	19h.	13·3S.	167·0E.	0·020
	22d.	16h.	Undetermined shock		Suggested Deep.
	25d.	14h.	Undetermined shock		Suggested Deep.
	26d.	5h.	5·0S.	144·5E.	Base of Superficial Layers.
	26d.	19h.	41·0N.	143·3E.	0·005
	28d.	12h.	33·5N.	138·2E.	0·040
	28d.	23h.	Undetermined shock		Suggested Deep.
	30d.	8h.	28·0S.	63·5W.	0·080
Dec.	2d.	23h.	36·8N.	71·4E.	0·015
	8d.	22h.	17·4S.	71·0W.	0·015
	15d.	19h.	21·9N.	142·7E.	0·030
	15d.	21h.	46·5N.	149·5E.	0·005

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

KEW OBSERVATORY,
Richmond,
SURREY.

August, 1956.

1948 OCTOBER, NOVEMBER, DECEMBER.

Oct. 1d. 3h. 10m. 8s. Epicentre 20°·4N. 122°·0E. (as on 1940, Feb. 22d.).

A = −·4971, B = +·7955, C = +·3465; δ = −1; h = +5;
D = +·848, E = +·530; G = −·184, H = +·294, K = −·938.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		11·9	347	—	—	e 4 38	−31	—	—	—
Vladivostok		24·1	18	i 5 13	− 5	i 9 27	− 7	—	—	—
Mizusawa	E.	24·9	37	5 29	+ 3	6 3	PP	—	—	—
Irkutsk		34·7	341	6 52?	− 2	—	—	—	—	—
Frunse		45·5	311	e 8 23	0	—	—	—	—	—
Bombay	E.	46·2	277	e 9 14	+46	—	—	—	—	—
Kulyab		48·2	303	8 44	0	—	—	—	—	—
Tashkent		49·0	308	—	—	e 15 46	− 9	—	—	—
Samarkand		50·5	305	e 9 10?	+ 8	—	—	—	—	—
Sverdlovsk		57·6	326	9 51	− 3	17 41	−10	—	—	—
Moscow		70·3	324	11 17	0	—	—	—	—	—
Stuttgart		88·9	323	e 12 59	+ 1	—	—	—	—	e 45·9
Victoria	z.	90·0	38	i 13 9	+ 6	—	—	—	—	—
Paris		92·6	325	e 13 18	+ 3	—	—	—	—	e 49·9
Tamanrasset		104·6	302	18 24	PP	—	—	—	—	—
Tucson		107·2	45	e 18 44	PP	—	—	—	—	—

Long waves were also recorded at other European stations.

Oct. 1d. 11h. 33m. 8s. Epicentre 16°·9N. 98°·7W. Depth of focus 0·010.
(as on 1947, Dec. 24d.).

A = −·1448, B = −·9464, C = +·2889; δ = +10; h = +5;
D = −·988, E = +·151; G = −·044, H = −·286, K = −·957.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Puebla	E.	2·2	12	0 35	− 1	—	—	—	—	1·0
Tacubaya		2·5	349	0 32	− 8	—	—	—	—	0·8
Guadalajara		5·8	311	1 15	−10	—	—	1 20	P	2·5
Manzanillo		5·8	292	0 49	−36	1 57	−34	—	—	—
Merida		9·5	64	5 12	?	6 28	?	6 49	?	—
Mobile		16·7	33	i 3 43	− 6	i 6 58	+ 8	i 3 54	pP	—
Tucson		18·8	327	i 4 11k	− 3	i 7 32	− 5	e 4 29	pP	e 8·7
St. Louis		22·9	17	i 4 56	0	i 8 57	+ 3	i 5 13	pP	e 11·8
La Jolla		23·1	318	i 4 57k	− 1	—	—	i 5 17	pP	—
Palomar	z.	23·1	319	i 4 56	− 2	—	—	i 5 16	pP	—
Columbia		23·3	39	e 5 21	pP	e 9 12	+10	—	—	e 10·0
Pierce Ferry		23·5	328	i 5 0	− 2	—	—	i 5 29	pP	e 11·4
Boulder City		23·8	327	e 5 4	− 1	e 9 3	− 7	i 5 26	pP	—
Riverside		23·9	319	i 5 5k	− 1	i 9 12	0	i 5 21	pP	—
Mount Wilson		24·5	319	i 5 11	0	—	—	i 5 28	pP	—
Pasadena		24·5	319	i 5 11k	0	i 9 28	+ 6	i 5 31	pP	11·0
Haiwee		25·7	323	i 5 21k	− 2	—	—	i 5 36	pP	—
Santa Barbara	z.	25·7	318	e 5 22	− 1	—	—	i 5 50	pP	—
Tinemaha		26·5	323	i 5 29	− 1	—	—	i 5 45	pP	—
Chicago		26·6	18	e 5 33	+ 2	i 10 1	+ 4	e 10 37	sS	e 11·4
Bogota		27·0	114	e 6 9	PP	e 10 39	sS	e 11 27	SS	—
Fresno		27·2	322	e 5 36	0	—	—	e 6 29	PP	—
Cleveland		28·6	27	i 5 51	+ 2	e 10 26	− 3	i 6 9	pP	—
Branner	z.	29·1	321	i 5 54k	0	—	—	i 6 14	pP	—
Berkeley	z.	29·4	321	i 5 55k	− 1	—	—	i 6 15	pP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Francisco		29·5	321	e 5 55	− 2	—	—	—	—	—
Bozeman		30·5	344	e 6 7	+ 1	e 10 59	0	e 6 23	pP	e 13·5
Mineral	Z.	30·6	325	i 6 6	− 1	—	—	i 6 27	pP	—
Philadelphia		30·7	38	e 6 28	pP	e 11 9	+ 7	e 7 5	PP	e 12·5
Butte	N.	31·2	342	e 6 11	− 1	—	—	e 6 26	pP	e 16·3
Fordham		32·1	38	6 24	+ 4	11 31	+ 7	—	—	—
Arcata	Z.	32·4	324	e 6 21	− 1	—	—	i 6 42	pP	—
Temiskaming		33·8	25	i 6 38	+ 3	—	—	i 7 58	PP	—
Rolphton		34·0	27	i 6 38	+ 2	e 11 50	− 4	e 7 56	PP	—
Ville Marie		34·2	23	e 6 40	+ 2	—	—	—	—	—
Ottawa		34·3	29	6 41	+ 2	12 2	+ 4	8 14	PP	14·9
Harvard		34·5	37	i 6 45	+ 4	—	—	i 7 6	pP	—
Grand Coulee		35·1	336	i 6 51	+ 5	—	—	—	—	—
Saskatoon		35·7	352	6 11	−40	12 42	+22	6 55	P	14·9
Shawinigan Falls	N.	36·6	31	e 7 3	+ 5	—	—	—	—	—
Huancayo		36·9	138	e 7 40	pP	—	—	—	—	e 17·1
Victoria		37·4	333	7 3	− 2	12 43	− 3	e 9 29	?	16·2
Seven Falls	E.	37·9	32	—	—	e 12 58	+ 5	—	—	19·9
La Paz		44·8	135	i 8 39	pP	—	—	—	—	22·2
Sitka		48·9	335	—	—	e 15 12	−21	—	—	e 20·5
Toledo	Z.	82·8	51	i 12 29	pP	e 22 37	+14	e 23 49	SSP	—
Granada		83·9	53	12 36a	+16	—	—	13 21a	sP	—
Paris		84·6	41	i 12 34	+10	e 22 45	+ 4	i 12 55	pP	e 62·9
De Bilt		85·1	37	i 12 37k	+11	e 23 13	sS	i 12 58	pP	—
Alicante		85·9	52	12 30	0	23 11	sS	24 7	PS	e 41·3
Tortosa		85·9	49	13 2	+32	23 25	sS	13 40	sP	—
Clermont-Ferrand		86·0	44	i 12 41	+10	—	—	i 13 4	pP	—
Strasbourg		87·9	40	e 12 50	+10	e 23 30	+17	i 13 13	pP	e 50·9
Basle		88·2	41	e 11 50	−51	e 24 8	PPS	e 18 8	PPP	—
Stuttgart		88·7	39	e 11 53	−51	e 24 0	PS	e 12 16	pP	—
Zürich		88·9	41	e 11 56	−49	—	—	e 12 54	P	—
Jena	E.	89·2	37	e 12 56	+10	—	—	—	—	—
Tamanrasset		96·1	65	i 13 32k	+14	—	—	i 13 56k	pP	—

Additional readings :—
Mobile 4m.29s.
Tucson iPP = 4m.53s., esS = 7m.58s.
St. Louis isS = 9m.27s.
Palomar iZ = 5m.9s., iP_cPZ = 8m.55s.
Pierce Ferry e = 7m.35s., eP_cP = 8m.48s.
Boulder City iPP = 5m.54s.
Riverside iZ = 5m.26s., iP_cPZ = 8m.56s., iZ = 9m.7s.
Mount Wilson iZ = 5m.33s. and 6m.0s., iP_cPZ = 8m.57s.
Pasadena esP?Z = 5m.48s., eZ = 5m.57s., iP_cPZ = 8m.57s., ipP_cPZ = 9m.14s.
Haiwee iZ = 5m.42s., 5m.56s., and 6m.46s., iP_cPZ = 8m.58s.
Tinemaha iP_cPZ = 9m.1s., iZ = 9m.17s.
Chicago iPP = 6m.9s.
Bogota ePPEZ = 6m.42s., eS_cPEZ = 13m.22s.
Fresno iN = 5m.43s., 6m.1s., and 6m.12s., iE = 6m.15s., eSE = 6m.20s.
Cleveland ipPZ = 6m.12s., ePPEN = 6m.36s., eE = 10m.21s., iZ = 10m.34s.
Branner iPPZ = 9m.9s.
Berkeley iPPZ = 9m.8s.
Bozeman ePP = 7m.11s., esS = 11m.55s.
Mineral iZ = 6m.11s. and 6m.39s., iPPZ = 9m.12s.
Butte ePPN = 7m.17s.
Saskatoon PPP = 7m.11s., S = 11m.5s.
Toledo ipPZ = 12m.48s., i = 13m.9s.
Granada P_cP = 12m.55s.k.
Paris i = 12m.50s.
De Bilt esS = 13m.31s.
Alicante S_cS = 23m.27s., PPS = 24m.37s., Q = 35m.37s.
Tortosa S_cSN = 23m.38s., SS?N = 28m.54s.
Clermont-Ferrand i = 12m.57s.
Strasbourg e = 13m.6s., esP = 13m.28s., ePP = 16m.32s., eS? = 23m.52s.
Stuttgart ePS? = 23m.38s.
Jena eN = 12m.59s., eE = 13m.18s.
Tamanrasset i = 13m.47s.k, ePP = 17m.10s.
Long waves were also recorded at Potsdam.

Oct. 1d. 22h. 45m. 31s. Epicentre 14°·3S. 167°·3E. (as on 1948, April 21d.).

$A = -\cdot 9457$, $B = +\cdot 2131$, $C = -\cdot 2454$; $\delta = -2$; $h = +6$;
$D = +\cdot 220$, $E = +\cdot 976$; $G = +\cdot 239$, $H = -\cdot 054$, $K = -\cdot 969$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Brisbane	E.	18·7	224	i 4 21	− 1	i 7 50	+ 2	e 8 5	sS
Riverview		24·3	215	i 5 46a	PP	i 10 32	SS	i 5 57	PPP
Tuai	N.	25·9	163	e 5 49	+14	—	—	—	—
Vladivostok		65·7	333	i 10 50	+ 2	i 19 29	− 5	—	—
Lick	Z.	84·1	49	i 12 35	+ 1	—	—	i 12 41	pP
Pasadena	Z.	85·6	54	e 12 42	+ 1	—	—	—	—
Mount Wilson	Z.	85·7	54	e 12 42	0	—	—	e 13 20	?
Riverside	Z.	86·1	54	i 12 44	0	—	—	—	—
Palomar	Z.	86·3	55	i 12 45	0	—	—	i 13 22	?
Boulder City		88·7	53	e 12 58	+ 1	—	—	e 13 33	pP
Pierce Ferry		89·4	53	i 13 1	+ 1	—	—	e 13 32	pP
Grand Coulee		90·1	40	e 13 2	− 1	—	—	e 13 33	pP
Tucson		90·8	57	i 13 4	− 2	—	—	i 13 45	pP
Istanbul		135·0	315	e 21 19	PP	—	—	—	—
Helwan		136·6	298	e 22 45	PP	e 23 50	?	—	—
Stuttgart		141·2	337	e 19 32	[− 1]	—	—	e 20 6	?
Strasbourg		141·9	337	e 19 31	[− 3]	—	—	e 22 29?	PP
Zürich		142·6	336	e 19 30	[− 5]	—	—	—	—
Basle		142·8	337	e 19 32	[− 3]	—	—	—	—
Paris		143·4	343	i 19 33	[− 3]	—	—	i 22 50	PP
Florence	Z.	144·2	331	i 19 38	[0]	—	—	—	—
Rome	Z.	144·9	327	i 19 39	[0]	—	—	e 20 40	?
Clermont-Ferrand		145·9	340	i 19 43	[+ 2]	—	—	i 20 30	?
Tamanrasset		160·8	302	e 20 44	PKP_2	—	—	e 24 31	PP

Additional readings :—
Brisbane isPZ = 4m.54s.
Riverside iZ = 12m.57s. and 13m.22s.
Basle e = 20m.31s. and 21m.4s.
Paris e = 20m.19s., i = 21m.0s.

Oct. 1d. Readings also at 1h. (Pierce Ferry and Tucson), 3h. (near Grozny (2) and near Mizusawa), 9h. (Samarkand, near Andijan, Tashkent, Tchimkent, Frunse, Stalinabad, Murgab, near Grozny, near Victoria, and Grand Coulee), 11h. (Bogota, Merida, Boulder City, Pierce Ferry, Tucson, Mount Wilson, Palomar, Riverside, and Tinemaha), 12h. (Columbia), 13h. (La Paz and Padova), 16h. (Strasbourg), 19h. (near Grozny), 21h. (near Mizusawa), 22h. (Stuttgart, Strasbourg, Uccle, Kew, Paris, De Bilt, Tamanrasset, near Grozny, and Leninakan).

Oct. 2d. 4h. Undetermined shock. Malacca

Vladivostok iP = 46m.39s., eS = 53m.53s.
Murgab P = 48m.35s., S = 57m.35s.
Andijan eP = 48m.51s.
Stalinabad iP = 49m.1s.
Samarkand eP = 49m.14s.
Leninakan eP = 51m.9s.?.
Stuttgart eZ = 56m.54s.?.
Grand Coulee eP = 57m.1s.
Lick iPZ = 57m.4s., iZ = 57m.46s.
Haiwee ePZ = 57m.12s., eZ = 58m.1s.
Mount Wilson iPZ = 57m.12s.
Pasadena iPZ = 57m.12s.
Riverside iPZ = 57m.13s.
Boulder City eP = 57m.16s., e = 58m.1s.
Pierce Ferry eP = 57m.17s.
Tucson iP = 57m.24s., e = 58m.18s., 58m.36s., and 60m.18s.
La Paz PNZ = 58m.30s.
Bogota ePZ = 58m.32s., epP?Z = 59m.31s.

Oct. 2d. 14h. 22m. 4s. Epicentre 28°·2S. 177°·7W. (as on 1944, Dec. 21d.).

Approximate.

$A = -·8819$, $B = -·0354$, $C = -·4701$; $\delta = -1$; $h = +2$;
$D = -·040$, $E = +·999$; $G = +·470$, $H = +·019$, $K = -·883$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Arapuni	E.	11·3	208	—	—	5 8	+14	—	—	—
Tuai	N.	11·4	201	—	—	i 4 50	− 6	i 5 31	SSS	—
Wellington		14·3	203	—	—	5 58	− 8	—	—	e 6·9
Apia		15·3	22	e 3 35	− 4	e 6 13	−17	—	—	e 6·8
Brisbane		25·9	265	i 5 41	+ 6	e 10 21	+17	i 6 18	PP	e 13·2
Riverview		27·1	250	e 5 38	− 8	e 10 16	− 8	e 11 17	SS	e 12·7
Santa Barbara	Z.	83·0	45	e 12 30	+ 2	—	—	—	—	—
Berkeley	Z.	83·8	42	i 12 29k	− 3	—	—	i 12 49	pP	—
Lick	Z.	83·8	42	i 12 40	+ 8	—	—	i 12 49	pP	—
Pasadena		83·8	46	i 12 33	+ 1	—	—	—	—	—
Mount Wilson	Z.	83·9	46	i 12 34	+ 1	—	—	—	—	—
Riverside	Z.	84·2	46	i 12 36	+ 2	—	—	i 12 49	pP	—
Fresno		84·5	43	e 12 38	+ 2	—	—	e 12 56	pP	—
Haiwee		85·2	45	i 12 42	+ 3	—	—	e 12 54	pP	—
Boulder City		87·0	46	i 12 51	+ 3	—	—	—	—	—
Tucson		87·5	51	i 12 52a	+ 1	—	—	i 13 7	pP	—
Pierce Ferry		87·7	47	i 12 54	+ 2	—	—	—	—	—
Grand Coulee		92·3	35	e 13 14	+ 1	—	—	—	—	—
Ksara		150·8	289	16 56?	?	—	—	e 20 26	PKP_2	—
Istanbul		154·6	308	e 19 56	[+ 2]	—	—	—	—	—
Helwan		154·7	281	19 59	[+ 5]	—	—	20 24	PKP_2	—
De Bilt		156·0	355	e 20 8	[+12]	—	—	—	—	e 89·9
Stuttgart		158·8	348	e 20 2	[+ 3]	—	—	e 20 40	PKP_2	93·9
Paris		159·4	0	e 19 56?	[− 4]	—	—	—	—	e 86·9
Alicante		169·6	348	—	—	e 72 2	Q	—	—	e 90·1
Tamanrasset		173·9	209	e 20 17	[+ 6]	—	—	e 21 47	PKP_2	—

Additional readings :—
Tuai S_eSN = 16m.19s.
Brisbane ePE = 5m.44s., iE = 6m.32s.
Riverview eZ = 7m.13s.
Haiwee iZ = 12m.48s.
Tucson i = 13m.11s.
Helwan sPKP = 20m.38s., PP = 24m.0s.
Stuttgart ePP? = 24m.38s.
Tamanrasset ePP = 25m.42s.
Long waves were also recorded at Christchurch, Auckland, Bombay, Salt Lake City, Seven Falls, Victoria, Strasbourg, Clermont-Ferrand, Uccle, and Kew.

Oct. 2d. 15h. 59s. 59s. Epicentre 19°·4N. 105°·1W.

$A = -·2459$, $B = -·9113$, $C = +·3302$; $\delta = -3$; $h = +5$;
$D = -·965$, $E = +·261$; $G = -·086$, $H = -·319$, $K = -·944$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manzanillo		0·8	116	0 13	− 5	0 19	−12	—	—	—
Guadalajara		2·1	52	0 39	+ 2	1 9	+ 5	—	—	—
Tacubaya		5·6	90	1 27	0	i 2 31	− 2	e 1 39	P*	—
Vera Cruz	Z.	8·4	90	(i 2 9)	+ 3	—	—	—	—	—
Tucson		13·8	339	e 3 25	+ 6	e 7 41	?	i 3 39	PP	e 9·0
Riverside	Z.	18·2	326	e 4 18	+ 2	—	—	—	—	—
Pierce Ferry		18·4	337	i 4 21	+ 3	—	—	—	—	e 10·1
Boulder City		18·6	335	e 4 24	+ 3	—	—	—	—	—
Mount Wilson	Z.	18·7	326	i 4 27	+ 5	—	—	—	—	—
Pasadena	Z.	18·7	326	i 4 26	+ 4	—	—	i 4 41	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Haiwee		20·2	330	i 4 40	+ 1	—	—	—	—	—
Fresno		21·5	328	e 5 8	PP	—	—	—	—	—
Lick	z.	23·0	324	i 5 14	+ 7	—	—	—	—	—
St. Louis		23·1	30	i 5 3	− 5	e 9 38	+22	—	—	e 12·6
Mineral	z.	25·2	330	e 5 30	+ 1	—	—	i 6 10	PP	—
Grand Coulee		30·6	342	e 5 18	−60	—	—	—	—	—

Additional readings and note :—
Tacubaya eEN = 1m.43s., SNZ = 2m.38s., SEN = 2m.41s.
Vera Cruz reading increased by 4 minutes.
Tucson iS = 7m.47s.
Riverside iZ = 4m.21s.
Pasadena iZ = 4m.35s.
Long waves were also recorded at Lincoln and Seven Falls.

Oct. 2d. Readings also at 0h. (Apia, Boulder City, Pierce Ferry, Salt Lake City, Tucson, Pasadena, Mount Wilson, Palomar, Riverside, Lick, and Branner), 6h. (Boulder City, Pierce Ferry, Tucson, Pasadena, Mount Wilson, Riverside, Haiwee, and Lick), 7h. (near Mizusawa), 8h. (Pierce Ferry), 14h. (Tucson, Pasadena, Mount Wilson, and Haiwee), 15h. (Istanbul, Stuttgart, and Granada), 16h. (Rome), 18h. (Apia and La Paz), 23h. (near La Paz).

Oct. 3d. 6h. 47m. 44s. Epicentre 6°·7S. 153°·0E. (as on 1948, May 17d.).

A = −·8850, B = +·4509, C = −·1159 ; δ = −3 ; h = +7 ;
D = +·454, E = +·891 ; G = +·103, H = −·053, K = −·993.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		20·7	179	i 4 45	+ 1	i 8 40	+ 9	i 5 10	PP	—
Riverview		27·1	183	e 5 53	+ 7	i 10 28	+ 4	e 6 28	PP	e 13·6
Vladivostok		53·2	341	e 9 20	− 2	i 16 47	− 5	—	—	—
Irkutsk		71·9	330	e 11 24	− 3	20 44	− 4	—	—	—
Frunse		86·1	314	e 12 45	+ 1	—	—	—	—	—
Andijan		87·3	311	e 12 51	+ 1	—	—	—	—	—
Stalinabad		89·6	308	i 13 1	0	i 23 47	− 4	—	—	—
Tchimkent		89·6	313	13 3	+ 2	i 23 52	+ 1	—	—	—
Tashkent		89·7	311	i 13 1	0	i 23 47	− 5	—	—	—
Santa Barbara	z.	91·5	56	e 13 26	+16	—	—	—	—	—
Pasadena	z.	92·7	56	i 13 17	+ 2	—	—	—	—	—
Mount Wilson	z.	92·9	56	i 13 16	0	—	—	—	—	—
Haiwee	z.	93·1	54	e 13 18	+ 1	—	—	—	—	—
La Jolla	z.	93·4	57	e 13 22	+ 4	—	—	—	—	—
Riverside	z.	93·4	56	i 13 21	+ 3	—	—	—	—	—
Palomar	z.	93·7	57	i 13 23	+ 3	—	—	—	—	—
Pierce Ferry		96·3	54	e 13 31	− 1	—	—	e 17 15	PP	—
Stuttgart	z.	128·1	331	e 19 6?	[− 2]	—	—	—	—	—
Tamanrasset		144·9	301	i 19 41k	[+ 2]	—	—	—	—	—

Additional readings :—
Brisbane eE = 4m.52s., iSSEN = 9m.5s.
Riverview iN = 5m.56s. and 6m.18s., eN = 10m.38s., iN = 10m.50s. and 11m.13s.
Long waves were also recorded at Christchurch and Wellington.

Oct. 3d. Readings also at 0h. (La Paz), 2h. (near Boulder City, Pierce Ferry (2), and near Stalinabad), 4h. (Stuttgart, Boulder City, Pierce Ferry, and near Logan), 7h. (Samarkand, Tchimkent, near Andijan, Kulyab, and Stalinabad), 9h. (Alicante, near Berkeley, Branner, Lick, and San Francisco), 10h. (Andijan and near Stalinabad), 14h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Boulder City, Pierce Ferry, Vera Cruz, near Tacubaya, and near Stalinabad), 17h. (Mount Wilson, Riverside, Tucson, Boulder City, Pierce Ferry, Grand Coulee, Victoria, Frunse, near Andijan, Kulyab, Murgab, Samarkand, Stalinabad, Tashkent, and Tchimkent), 21h. (Murgab, near Kulyab, Samarkand, and Stalinabad), 23h. (Basle, Potsdam, and near Mizusawa).

Oct. 4d. 5h. 56m. 51s. Epicentre 23°·9N. 121·7E. (as on 1945, Aug. 1d.).

Strong at Hwalen (Formosa). Nanking suggests 24°·25N. 121°·5E.

A = −·4809, B = +·7787, C = +·4029; δ = −3; h = +4;
D = +·851, E = +·525; G = −·212, H = +·343, K = −·915.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		8·5	343	2 10	+ 3	4 5	+20	—	—	—
Vladivostok		21·0	22	i 4 41	− 6	e 8 35?	− 2	—	—	—
Calcutta	E.	30·7	275	e 6 19	0	e 11 30	+ 9	e 13 15	SS	—
Irkutsk		31·3	340	6 21	− 3	11 30	− 1	—	—	—
Hyderabad	N.	40·9	270	—	—	14 0	+ 2	—	—	—
Almata		41·4	310	e 7 41	− 9	—	—	—	—	—
Frunse		43·0	309	e 8 5	+ 2	—	—	—	—	—
Colombo	E.	43·5	255	12 9?	?	—	—	—	—	25·3
Kodaikanal		44·2	261	e 8 14	+ 2	14 54	+ 8	10 4	PP	21·6
Andijan		44·4	305	e 8 17	+ 3	—	—	—	—	—
Bombay		45·6	274	e 8 26	+ 2	e 15 18	+12	e 10 19	PP	—
Kulyab		46·1	301	i 8 29	+ 1	i 15 16	+ 2	—	—	—
Tchimkent		46·6	307	i 8 33	+ 1	e 15 23	+ 2	—	—	—
Tashkent		46·7	306	i 8 34	+ 2	i 15 26	+ 4	—	—	—
Stalinabad		46·9	302	i 8 39?	+ 5	e 15 33?	+ 8	—	—	—
Samarkand		48·4	303	e 8 41	− 5	—	—	—	—	—
Sverdlovsk		54·6	324	i 9 31	− 1	e 17 8	− 3	—	—	—
Riverview	N.	63·9	153	—	—	i 19 16	+ 4	e 23 0	SS	e 30·0
Leninakan		65·9	307	e 10 50	0	—	—	—	—	—
Moscow		67·3	323	e 10 59	0	e 19 49	− 5	—	—	—
Sotchi		68·3	310	e 10 59	− 6	—	—	—	—	—
Yalta		72·0	312	11 28	0	20 49	0	—	—	—
Upsala		76·4	331	e 13 44	?	—	—	—	—	e 42·2
Istanbul		76·6	310	11 55	+ 1	—	—	14 52	PP	—
Warsaw		77·7	323	e 12 0	0	—	—	—	—	e 39·2
Helwan		78·8	298	i 12 7a	+ 1	e 22 3	− 1	15 9	PP	—
Copenhagen		80·7	328	e 12 48	+32	—	—	—	—	40·2
Belgrade		81·0	315	e 12 19k	+ 1	e 24 25	?	e 15 25	PP	e 54·0
Potsdam		82·0	325	i 12 22a	− 1	—	—	—	—	e 41·2
Prague		82·1	322	e 12 22	− 2	e 22 39	+ 1	e 15 45	PP	e 43·2
Cheb		83·5	323	e 12 29	− 2	e 22 50	− 2	e 28 45	SS	e 39·2
Jena	E.	83·5	323	e 12 30	− 1	—	—	—	—	—
Triest		84·9	318	e 12 39	+ 1	e 22 58	− 8	—	—	—
Stuttgart		86·0	323	e 12 41	− 2	e 23 19	+ 2	e 15 59	PP	e 45·2
De Bilt		86·3	327	i 12 45a	0	e 23 15	− 5	e 16 7	PP	e 40·2
Strasbourg		86·9	323	e 12 47a	− 1	e 23 10	[− 3]	e 15 57	PP	e 40·2
Zürich		87·1	322	e 12 48a	− 1	e 23 24	[+ 9]	e 16 16	PP	—
Uccle		87·4	327	e 13 46	+56	e 24 13?	[+56]	—	—	e 44·2
Basle		87·5	322	e 13 7	+16	e 23 3	[−14]	—	—	e 49·2
Rome		87·5	314	i 12 49	− 2	23 47	+16	e 16 17	PP	e 41·6
Victoria		87·5	37	e 12 47	− 4	—	—	—	—	51·2
Kew		89·4	328	i 12 59	− 1	e 23 59	+10	e 23 25	SKS	e 44·2
Paris		89·6	325	e 13 0	− 1	e 23 30	[0]	e 16 32	PP	e 47·2
Grand Coulee		90·2	37	i 13 0	− 4	—	—	—	—	—
Clermont-Ferrand		91·2	322	e 13 17	+ 9	—	—	e 17 16	PP	48·2
Mineral	Z.	93·1	44	e 13 14a	− 3	—	—	—	—	—
Lick	Z.	94·8	46	i 13 21	− 4	—	—	—	—	—
Alicante		97·7	319	—	—	e 25 41	+40	—	—	—
Toledo		98·9	320	e 13 15	−28	—	—	—	—	54·0
Tamanrasset		102·6	302	14 0	0	—	—	e 18 17	PP	—
Bogota		147·7	29	i 19 46	[+ 2]	e 23 21	PKS	e 20 12	PKP_2	e 93·2
La Paz		168·2	53	i 20 12	[+ 4]	—	—	—	—	100·6

Additional readings :—
Calcutta eE = 8m.46s.
Bombay eE = 15m.44s.
Riverview eZ = 19m.22s.
Helwan i = 12m.24s., SKS = 22m.19s., PPS = 23m.7s.
Prague ePPP? = 17m.57s., ePPS? = 24m.21s., eSS? = 28m.45s , eSSS? = 32m.33s.

Continued on next page.

Cheb e =13m.33s. and 22m.28s.
Strasbourg eS =23m.37s., eSS =29m.9s.
Rome eSKSE =23m.8s., ePPSN =25m.21s., eSSE =29m.19s., eSSS?E =33m.3s.?
Paris ePS =25m.0s., e =37m.9s.?
Mineral iZ =13m.26s.
Lick iZ =13m.33s.
Long waves were also recorded at Aberdeen, Edinburgh, Granada, Ivigtut, College, Saskatoon, Seven Falls, and Philadelphia.

Oct. 4d. Readings also at 2h. (Mizusawa), 4h. (Irkutsk, Sverdlovsk, and near Kulyab), 5h. (De Bilt, Uccle, Paris, Samarkand, near Andijan, Kulyab, Murgab, and Stalinabad), 6h. (Stuttgart), 8h. (near Mizusawa), 10h. (Tamanrasset, La Paz, Mount Wilson, Pasadena, Riverside, Boulder City, Pierce Ferry, and Apia), 11h. (De Bilt, Paris, and Uccle), 13h. (Stuttgart, Jena, Florence, Bologna, Salo, Rome, near Triest, near Andijan, Frunse, Kulyab, Murgab, Stalinabad, and Tashkent), 14h. (Lick, near Boulder City, Pierce Ferry, and near Ksara), 16h. (Christchurch, New Plymouth, Tuai, and Wellington), 17h. (Tucson (2), near Balboa Heights and near Bogota), 19h. (Ottawa), 23h. (La Paz and Ottawa).

Oct. 5d. 20h. 12m. 4s. Epicentre 37°·9N. 58°·6E.

Destructive at Askhabad and in the province of Chorassan, Iran. Many casualties, Epicentre as adopted.

G. Krumbach.
Das Turkmenische Erdbeben vom 5 Oktober, 1948. Urania. Monatszeitschrift über Natur und Gesellschaft. Jahrgang 12, Heft 2. Feb. 1949, pp. 70-72. Macroseismic chart p. 71.

A = +·4122, B = +·6752, C = +·6117 ; δ = −2 ; h = −1 ;
D = +·854, E = −·521 ; G = +·319, H = +·522, K = −·791.

		Δ	Az.	P.	O−C.	S.	O−C.		Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.		m.
Samarkand		6·8	72	i 1 43	− 1	—	—	—		—	—
Baku		7·2	293	i 1 47	− 2	—	—	—		—	—
Stalinabad		8·0	82	i 2 3	+ 3	e 3 34	+ 1	—		—	—
Kulyab		8·8	87	i 2 13	+ 2	—	—	—		—	—
Tashkent		8·9	64	i 2 12	0	e 3 52	− 3	—		—	—
Tchimkent		9·5	59	i 2 19	− 1	i 4 8	− 2	—		—	—
Andijan		11·0	71	e 2 40	− 2	i 4 43	− 4	—		—	—
Erevan		11·2	286	2 45	+ 1	4 50	− 2	—		—	—
Grozny		11·2	303	e 2 40	− 4	4 48	− 4	—		—	—
Leninakan		11·8	289	e 2 44	− 9	—	—	—		—	—
Murgab		12·1	83	i 2 58	+ 1	—	—	—		—	—
Frunse		13·2	63	i 3 10	− 1	e 5 33	− 7	—		—	—
Piatigorsk		13·2	302	e 3 5	− 6	5 27	−13	—		—	—
Almata		14·9	63	e 3 36	+ 2	e 6 23	+ 3	—		—	—
Sotchi		15·4	298	3 35	− 5	e 6 16	−16	—		—	—
Dehra Dun	N.	17·8	110	e 4 56	+45	e 8 14	+46	—		—	e 10·0
Theodosia		18·7	300	e 4 20	− 2	e 7 52	+ 4	—		—	—
Ksara		18·8	263	e 4 22	− 1	8 3	+13	—		—	—
Sverdlovsk		19·0	4	i 4 21	− 5	e 7 50	− 5	—		—	—
Yalta		19·5	297	4 23	− 8	—	—	—		—	—
Simferopol		19·6	299	4 31	− 1	i 8 6	− 2	—		—	—
Bombay	N.	22·6	143	i 5 5	+ 2	i 9 16	+ 9	—		—	—
Moscow		22·7	329	5 3	− 1	e 9 3	− 6	—		—	—
Istanbul		23·0	287	i 5 5a	− 2	9 15	+ 1	—		—	—
Helwan		24·0	258	i 5 14a	− 3	i 9 34	+ 2	5 50	PP		—
Bucharest	E.	25·2	296	i 5 32	+ 3	i 9 55	+ 3	e 5 57	PP		—
Cernauti		25·8	304	5 21	−13	9 45	−17	—		—	—
Campulung		26·0	298	e 5 40	+ 4	—	—	—		—	—
Hyderabad	N.	26·8	134	5 46	+ 2	10 22	+ 3	—		—	—
Belgrade		29·2	295	e 6 4a	− 1	i 10 50	0	e 7 3	PP		—
Calcutta	E.	29·8	112	i 6 6k	− 5	i 10 41	−26	i 7 1	PP		—
Warsaw		29·8	311	e 6 9k	− 2	11 0	− 7	e 7 5	PP	e 14·9	
Budapest		30·3	301	6 4	−11	11 13	− 2	12 39	SS		—
Helsinki		30·8	328	e 6 18k	− 2	i 11 17	− 6	e 7 4	PP	e 14·9	
Raciborzu		31·1	307	e 6 25	+ 3	i 11 8	−20	i 7 17	PP	e 13·2	

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		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Taranto		31·9	288	e 6 21	− 8	e 11 12	−20	—	—	—
Kodaikanal	E.	32·4	143	6 36	+ 2	11 36	−12	7 41	PP	—
Prague		33·5	307	e 6 42	− 1	11 58	− 7	i 7 1	pP	e 15·4
Messina		33·7	285	e 7 8	+23	e 12 23	+15	—	—	—
Upsala		33·9	324	e 6 46k	− 1	i 12 8	− 3	i 7 58?	PP	e 15·6
Triest		34·0	298	e 6 47	− 1	i 12 10	− 3	e 7 47	PP	—
Catania		34·2	283	e 6 43	− 6	e 12 11	− 5	—	—	—
Collmberg		34·6	307	e 6 53	0	i 12 22	0	i 7 57	PP	15·3
Potsdam		34·6	310	i 6 51k	− 2	i 12 14	− 8	i 6 56	pP	e 14·9
Irkutsk		34·7	50	6 49	− 5	—	—	—	—	—
Cheb		34·9	307	i 6 59	+ 4	i 12 24	− 3	e 7 14	pP	e 14·9
Rome		35·3	292	e 6 55a	− 4	i 12 32	− 1	i 7 55	PP	—
Jena		35·4	307	e 6 59	− 1	e 12 34	0	e 8 14	PP	i 19·3
Copenhagen		35·5	316	i 6 59k	− 1	12 31	− 5	i 7 3	pP	—
Bologna		35·8	296	7 3k	0	12 41	0	e 7 20	pP	—
Florence		35·9	295	e 7 3	− 1	e 12 37	− 5	e 8 29	PPP	—
Salo		36·2	298	i 7 9	+ 3	i 12 45	− 2	—	—	—
Colombo	E.	36·4	143	7 4	− 4	12 49	− 1	—	—	—
Chur		36·8	300	e 7 8k	− 3	e 12 43	−13	—	—	—
Stuttgart		36·9	304	i 7 11k	− 1	i 12 56	− 2	i 7 29	pP	e 19·9
Pavia		37·2	298	i 7 27	+12	e 13 15?	+13	e 8 50	PP	—
Zürich		37·4	301	e 7 14k	− 2	e 12 58	− 7	—	—	—
Strasbourg		37·9	304	i 7 19	− 1	i 13 9	− 4	i 8 46	PP	16·9
Basle		38·1	301	i 7 20	− 2	e 13 10	− 6	—	—	—
Neuchatel		38·6	301	e 7 24	− 2	e 15 52	SS	—	—	—
De Bilt		39·4	310	i 7 33k	0	i 13 38	+ 3	i 9 5	PP	e 18·9
Uccle		40·0	308	e 7 40k	+ 2	i 13 48	+ 4	i 9 18	PP	e 20·4
Clermont-Ferrand		41·4	299	i 7 49	− 1	i 14 5	0	i 9 31	PP	—
Paris		41·4	304	i 7 48	− 2	i 13 59	− 6	i 9 23	PP	e 22·9
Kew		42·9	308	i 8 2	0	e 14 31	+ 4	e 9 40	PP	e 20·9
Barcelona		43·0	294	i 8 4	+ 1	i 14 23	− 6	9 46	PP	e 20·1
Durham		43·4	313	i 8 7	+ 1	i 14 31	− 4	i 9 55	PP	—
Aberdeen		43·6	317	i 8 6	− 2	i 14 32	− 6	i 9 40	PP	25·3
Algiers		43·6	286	8 11	+ 3	i 14 40	+ 2	9 47	PP	22·9
Edinburgh		44·3	315	8 12	− 1	14 38	−10	9 56	PcP	—
Jersey		44·3	305	e 8 13	0	e 14 45	− 3	—	—	—
Tortosa		44·3	293	i 8 11	− 2	i 14 38	−10	9 55	PP	21·6
Alicante		45·8	290	8 25	0	15 5	− 4	9 54	PP	22·6
Tamanrasset		47·6	268	i 8 37a	− 2	e 15 26	− 9	e 10 15	PcP	—
Toledo		47·9	292	i 8 38	− 4	i 15 38	− 1	i 9 57	PcP	20·4
Granada		48·5	289	i 8 47a	+ 1	i 15 40	− 8	9 18k	pP	i 28·6
Nanking		48·9	78	8 52	+ 2	16 0	+ 7	10 11	PcP	24·3
Scoresby Sund		51·7	335	i 9 12	+ 1	16 21	−11	11 8	PP	—
Lisbon		52·0	293	9 11a	− 2	i 16 36	0	11 23	PP	—
Reykjavik		52·6	328	9 23	+ 5	i 16 51	+ 7	e 11 19	PP	e 25·1
Vladivostok		54·3	60	i 9 33	+ 3	e 17 4	− 3	—	—	—
Hukuoka		57·1	71	i 9 55	+ 5	17 50	+ 5	e 12 52	PPP	—
Izuka		57·3	71	e 9 22	−30	15 43	?	—	—	—
Tananarive		57·5	193	e 9 49	− 4	e 17 41	− 9	13 25	PPP	e 27·3
Kumamoto		57·7	72	10 2	+ 7	18 8	+15	—	—	—
Hamada		57·8	69	9 2	?	16 43	?	—	—	—
Matuyama		58·7	69	—	—	e 18 20	+14	—	—	—
Koti		59·4	70	10 7	+ 1	18 44	+29	13 42	PPP	—
Kobe		60·1	67	e 10 29	+18	18 52	+28	—	—	—
Muroto		60·1	70	10 38	+27	18 40	+16	—	—	—
Sumoto		60·1	68	e 10 13	+ 2	18 45	+21	—	—	—
Wazima		60·2	64	e 9 45	−27	—	—	—	—	—
Osaka		60·4	67	e 10 18	+ 5	18 52	+24	12 56	PP	—
Sapporo		60·7	56	10 30	+15	18 34	+ 2	—	—	32·3
Aikawa		60·8	63	10 5	−11	—	—	—	—	—
Kameyama		61·0	67	10 20	+ 2	18 40	+ 5	—	—	—
Nagoya		61·2	66	10 20	+ 1	18 42	+ 4	e 27 39	Q	e 34·2
Owase		61·2	68	10 15	− 4	18 42	+ 4	—	—	—
Aomori		61·3	59	10 26	+ 6	18 57	+18	—	—	—
Morioka		62·1	60	e 10 29	+ 4	18 50	+ 1	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Maebasi		62·2	64	10 34	+ 8	19 32	+41	—	—	—
Yamagata		62·2	62	10 30	+ 4	18 53	+ 2	—	—	—
Mizusawa		62·3	61	10 32	+ 6	18 54	+ 2	—	—	e 26·6
Shizuoka		62·4	66	10 28	+ 1	—	—	—	—	—
Kumagaya		62·5	65	e 10 26	− 2	e 19 10	+16	—	—	—
Sendai		62·6	61	10 28	0	—	—	—	—	—
Miyako		62·7	59	10 23	− 6	18 54	− 3	e 23 5	SS	—
Utunomiya		62·7	64	e 10 33	+ 4	—	—	—	—	—
Kakioka		63·0	64	e 10 30	− 1	19 3	+ 2	—	—	—
Tokyo		63·0	65	e 10 54	+23	18 46	−15	—	—	—
Tukubasan		63·0	64	10 26?	− 5	—	—	—	—	—
Mito		63·2	64	e 10 17	−15	18 50	−13	—	—	—
Ivigtut		64·9	329	i 10 44	+ 1	i 19 22	− 2	23 14	SS	29·9
Johannesburg		69·9	209	e 11 14	− 1	e 20 20	− 4	25 8	SS	e 36·9
College		75·5	12	e 11 46	− 2	i 21 28	0	i 14 35	PP	i 29·9
Guam		78·9	82	e 12 13	+ 6	—	—	—	—	—
Halifax		82·7	323	12 19	− 8	22 31	−13	15 33	PP	38·0
Seven Falls	E.	84·0	328	12 37	+ 4	22 58	+ 1	15 45	PP	41·0
Sitka		84·7	8	i 12 40	+ 3	i 22 52	−12	i 15 52	PP	i 33·7
Shawinigan Falls	N.	85·3	329	12 40	0	23 9	− 1	15 8	PP	40·9
Vermont		87·2	328	e 12 56	+ 7	e 23 13	[− 2]	e 16 34	PP	e 39·9
Ville Marie		87·2	333	i 12 50	+ 1	—	—	—	—	—
Ottawa		87·4	330	12 53k	+ 3	23 26	− 4	15 48	PP	41·5
Rolphton		87·6	331	i 12 52	+ 1	—	—	e 16 7	PP	—
Temiskaming		87·7	332	e 12 52	0	—	—	—	—	—
Harvard		88·0	325	i 12 57	+ 4	e 23 23	[+ 2]	e 16 21	PP	e 48·0
Saskatoon		89·4	351	13 6	+ 6	23 55	+ 6	16 36	PP	43·2
Fordham		90·4	326	i 13 12	+ 8	i 23 33	[− 2]	i 16 48	PP	41·4
Philadelphia		91·7	326	e 13 14	+ 4	e 23 36	[− 6]	e 16 49	PP	e 41·1
Pennsylvania		92·1	329	i 13 18	+ 6	i 23 42	[− 3]	i 16 44	PP	—
Bermuda		92·4	315	e 13 16	+ 2	e 24 14	− 2	e 16 57	PP	e 36·9
Cleveland		93·0	331	i 13 20k	+ 3	i 23 50	[0]	i 17 9	PP	—
New Kensington	E.	93·1	330	—	—	e 23 45	[− 6]	e 24 32	S	e 39·9
Victoria		93·9	2	13 37	+16	i 23 59	[+ 4]	17 11	PP	45·9
Grand Coulee		94·5	359	i 13 24	+ 1	e 23 57	[− 1]	—	—	—
Chicago		94·9	336	e 13 28	+ 3	i 23 57	[− 4]	e 17 16	PP	e 29·5
Butte	N.	96·1	353	e 13 35	+ 4	e 23 43	[−24]	e 17 24	PP	e 38·3
Lincoln	E.	98·4	341	—	—	e 24 14	[− 5]	e 31 38	SS	e 42·3
St. Louis		98·6	336	e 13 42	0	i 24 13	[− 7]	i 17 34	PP	—
Columbia		99·2	327	e 24 11	SKS	(e 24 11)	[−12]	e 32 13	SS	e 45·9
Logan		100·2	352	e 13 47	− 2	e 24 25	[− 3]	e 17 47	PP	—
Salt Lake City		101·2	352	e 14 0	+ 6	e 24 28	[− 5]	e 17 59	PP	e 41·6
Arcata	Z.	101·6	2	e 18 5	PP	—	—	—	—	e 55·8
Ferndale	E.	101·9	2	e 18 6	PP	—	—	—	—	e 52·9
Mineral		102·1	0	e 14 3	+ 5	e 27 6	PS	e 18 11	PP	e 51·9
Fort de France		103·1	300	e 14 16	+14	e 25 46	0	—	—	—
Ukiah		103·3	1	e 19 15	PP	e 25 42	− 6	e 28 19	PPS	e 41·7
San Juan		103·7	307	e 14 7	+ 2	e 24 38	[− 7]	e 18 18	PP	e 40·9
Berkeley		104·6	0	i 14 16k	+ 7	i 24 53	[+ 4]	i 18 12	PP	e 52·5
Mobile		104·7	331	18 36	PP	24 54	[+ 5]	27 54	PS	—
Lick		105·1	0	i 17 12k	?	e 27 44	PP	e 29 3	PPS	e 59·9
Santa Clara		105·1	0	e 18 41	PP	e 24 56	[+ 5]	e 27 38	PS	e 50·3
Fresno		105·7	359	e 14 17	+ 4	—	—	i 18 37	PP	e 55·4
Pierce Ferry		106·0	353	e 14 19	+ 4	—	—	e 18 26	PP	e 50·3
Boulder City		106·3	354	e 14 18	+ 2	—	—	e 18 30	PP	e 47·9
Santa Barbara	Z.	108·0	358	e 17 28	?	—	—	—	—	—
Mount Wilson	Z.	108·2	357	e 18 0	PKP	—	—	i 18 40	PP	—
Pasadena		108·3	357	e 14 29	P	i 25 8	[+ 3]	i 18 50	PP	e 50·5
Riverside	Z.	108·4	357	e 14 27	P	e 17 27	?	e 29 49	PKKP	—
Palomar	Z.	109·0	355	e 17 37	?	i 25 6	[− 2]	i 29 45	PKKP	—
Tucson		109·5	350	e 14 40	P	i 25 16	[+ 6]	i 18 40	PKP	42·2
Brisbane		109·6	110	i 18 53	PP	e 25 12	[+ 1]	i 28 27	PS	—
Riverview		111·6	117	i 19 21	PP	i 25 18	[− 1]	i 28 56	PS	e 53·4
Honolulu		111·9	36	e 19 25	PP	e 25 12	[− 8]	e 28 37	PS	e 44·0
Bogota	E.	119·0	303	i 19 58	PP	e 22 38	PKS	—	—	—

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.
Tacubaya		119·3	335	e 20 14	PP	e 30 2	PS	e 36 56	SSP		e 57·6
Manzanillo		121·1	342	e 16 8	?	e 26 56	{−25}	e 38 9	SSP		e 52·9
La Paz		128·8	280	i 19 14	[+ 4]	i 26 14	[− 3]	19 32	pPKP		60·9
Apia		129·4	75	e 21 33	PP	e 38 51	SS	—	—		e 53·9
La Plata	E.	129·7	253	20 34	?	26 50	[+31]	21 20	PP		66·4
	N.	129·7	253	21 50	PP	34 14	?	38 43	SS		66·0
Auckland	N.	130·2	109	21 40	PP	27 5	[+45]	23 11	PKS		57·9
Christchurch		130·8	119	19 19	[+ 5]	22 37	PKS	i 21 20	PP		64·1
Arapuni	E.	131·3	111	21 26	PP	31 26	PS	39 20	SS		64·1
Huancayo		131·6	289	e 19 22	[+ 7]	e 28 18	{−12}	e 21 32	PP	i	53·4
Wellington		131·7	115	19 21	[+ 6]	29 2	{+32}	21 28	PP		61·9

Additional readings :—
Piatigorsk i = 5m.25s.
Sverdlovsk i = 7m.53s.
Bucharest ePPN = 6m.2s., iP$_c$PN = 9m14s., iP$_c$PE = 9m.24s., iSN = 9m.46s.
Belgrade iSS = 12m.23s.
Warsaw PE = 6m.14s., iZ = 6m.17s. and 6m.22s., ePPPZ = 7m.21s., ePPPN = 7m.28s., eP$_c$PZ = 8m.43s., eP$_c$PN = 9m.5s., SN = 11m.9s., iN = 11m.49s., P$_c$SZ = 12m.33s.?, P$_c$SN = 12m.40s.
Budapest PN = 6m.18s., eE = 11m.56s.?, SSSN = 13m.6s.
Helsinki i = 6m.22s., e = 6m.36s. and 7m.8s.
Raciborzu iP = 6m.28s., eP$_c$P?NZ = 9m.12s.
Taranto e = 7m.0s. and 8m.10s.
Prague iP = 6m.46s., eEN = 7m.16s., ePP? = 7m.31s., e = 9m.7s., eNZ = 10m.4s., eSS? = 12m.56s., e = 13m.56s.,
Upsala iP = 6m.50s., i = 7m.39s. and 7m.52s., P$_c$SN = 13m.13s.
Triest ePPP = 8m.11s.
Collmberg iPPP? = 8m.28s., iSSS = 14m.21s.
Potsdam iPPEN = 8m.2s., isSN = 12m.23s., iN = 13m.48s., iSSN = 14m.34s.
Cheb ePP? = 8m.9s., ePPP = 8m.26s., e = 9m.20s., eSS = 13m.14s.
Jena eP = 7m.2s., eSSN = 14m.51s.
Bologna ePP = 8m.9s., ePPP = 8m.42s., i = 9m.2s.
Florence iZ = 7m.9s. and 7m.22s.
Colombo iE = 11m.46s.
Stuttgart iP = 7m.16s., i = 8m.44s., isSS? = 15m.35s., i = 17m.19s.
Pavia e = 15m.36s.?
Strasbourg iP = 7m.23s., iPPP = 9m.2s., i = 14m.56s., iSS = 15m.48s.
De Bilt iP = 7m.38s.
Uccle eN = 7m.43s., iN = 7m.53s., eN = 8m.28s., iE = 9m.2s., eZ = 9m.7s., iE = 9m.21s., eE = 9m.24s., iPPPN = 9m.38s., eE = 10m.26s., iE = 10m.46s., eN = 11m.50s., eP$_c$S?N = 13m.43s., iPSE = 13m.56s., eE = 14m.30s., eSSN = 16m.39s., eSSSN = 17m.30s., eN = 18m.30s. and 19m.42s.
Clermont-Ferrand iP = 7m.52s., i = 7m.57s., iPPP = 9m.57s., i = 14m.22s., 15m.27s. and 16m.26s., iSS = 17m.4s.
Paris iPP = 10m.8s.?, i = 10m.29s., iP$_c$S = 13m.33s., iSS = 16m.59s.
Kew ePPP = 10m.46s., iE = 14m.37s., iSSZ = 17m.26s., iZ = 19m.44s.
Barcelona SS = 17m.30s., SSS = 17m.48s.
Durham iE = 9m.46s., iP$_c$PE = 10m.3s., iSSN = 17m.44s., iS$_c$SN = 18m.11s.
Aberdeen iN = 9m.55s., iEN = 10m.41s., iSSEN = 17m.39s., iE = 23m.30s.
Algiers PPP = 10m.24s., iS = 14m.43s., SS? = 17m.5s., S$_c$S = 18m.9s., SSS = 18m.26s.
Edinburgh PPP = 10m.21s., P$_c$S = 13m.47s., SS = 17m.36s., S$_c$S = 18m.5s.
Tortosa P$_c$PN = 10m.3s., PPPE = 10m.34s., P$_c$SE = 14m.1s., SSEN = 17m.49s., S$_c$SN = 18m.15s., SSSE = 18m.41s.
Alicante i = 8m.28s. and 8m.45s., pP = 9m.22s., PP = 10m.21s., PS = 15m.17s., PPS = 18m.23s.
Tamanrasset ePP = 10m.25s.
Toledo iZ = 8m.53s. and 9m.30s., iPPE = 10m.35s., iPPPE = 11m.34s., iE = 16m.44s., iSSE = 19m.17s.
Granada P$_c$P = 10m.8s.a, iPP = 10m.40s.k, PPP = 11m.49s., P$_c$S = 14m.17s., PS = 16m.37s., S$_c$S = 18m.25s., iSS = 19m.29s., SSS = 20m.16s.
Nanking PP = 10m.49s., PPP? = 11m.47s., SS? = 19m.31s.
Scoresby Sund 10m.33s. and 12m.20s.
Lisbon P = 9m.14s., E = 10m.48s.?, N = 11m.40s., Z = 12m.36s., iPSE = 16m.47s., Z = 16m.52s., S$_c$SEN = 18m.59s., SSEN = 20m.20s.
Reykjavik eE = 12m.11s. and 15m.2s., eSSEN = 20m.22s., eE = 24m.20s.
Hukuoka eSS = 21m.47s.
Tananarive iP = 9m.56s. and 10m.5s., ePS? = 17m.52s., i = 18m.3s., SS = 21m.37s., SSS = 23m.50s.
Koti PPP = 14m.20s., SS = 23m.20s.
Osaka PPP = 14m.39s., PS = 19m.19s., SS = 23m.55s.
Ivigtut 20m.34s., SSS = 26m.38s.
College ePPP = 16m.26s., iPPP = 16m.42s., i = 18m.21s., iS$_c$S = 22m.22s., iSS = 26m.6s., eSSS = 29m.24s.
Halifax PS = 23m.17s., SS = 28m.2s.

Continued on next page.

Seven Falls PSE =23m.37s., SSE =26m.54s., SSSE =32m.2s., eE =37m.32s.
Sitka eSS =28m.20s., eSSS =31m.56s.
Shawinigan Falls SSN =28m.38s.
Vermont eSS? =29m.51s., eSSS =32m.52s.
Ottawa PPP =18m.2s., SKS =22m.52s., PS =24m.30s., SS =28m.26s., SSS =32m.50s., SSSS =37m.26s.
Saskatoon PPP =18m.52s., SKS =23m.28s., PS =24m.51s., SS =29m.51s., SSS =33m.38s.
Philadelphia ePS =25m.20s., eSS =30m.21s., eSSS =34m.6s., e =36m.44s.
Harvard e =24m.36s., eSS =29m.20s.
Pennsylvania eE =17m.59s., iPSZ =25m.28s.
Bermuda e =23m.16s., eSKS =23m.40s., ePS? =25m.22s., eSS =30m.18s.
Cleveland iPZ =13m.24s., ePPEN =17m.14s., iSKKS?E =24m.48s., iSKKS?N =24m.52s., iPSN =25m.36s., iPSE =25m.42s.
New Kensington eE =29m.13s.
Victoria e =15m.39s. and 16m.45s., PPP =19m.2s., SKKS =24m.38s., S =24m.53s., ePS =25m.50s., e =27m.50s., SS =30m.56s., SSS =35m.2s.
Chicago ePPP =19m.8s., iPPS =25m.51s., eSS =30m.51s., iSS =31m.10s., eSSS =34m.29s.
Butte iSKSN =24m.8s., iPSN =26m.7s., eSSN =31m.25s., eSSSN =35m.10s.
Lincoln eSSS?E =36m.24s.
St. Louis eSP? =24m.23s.
Columbia e =25m.23s., ePP =27m.48s.
Logan iP =13m.53s., iPP =17m.52s., iSKS =24m.28s., ePS =26m.36s., eSS? =32m.17s., eSSS =35m.59s.
Salt Lake City e =21m.56s., iSKS =24m.33s., iPS =27m.10s., eSS =32m.20s., iPSPS =32m.50s., eSSS =36m.40s.
Ferndale eN =19m.36s.
Mineral eN =14m.15s., iZ =19m.26s.
Ukiah eSS =34m.26s., eSSS =37m.56s.
San Juan eS =25m.43s., iS =25m.51s., ePS =27m.25s., eSS =33m.2s., iSS =33m.5s., iSSS =37m.32s.
Berkeley iN =14m.22s., iZ =18m.24s., eN =18m.33s., iN =18m.40s., eE =18m.50s., iPPE =19m.0s., iZ =20m.35s., iN =24m.10s., iScSE =26m.13s., iSE =27m.50s., iPSZ =28m.30s., ePSN =28m.47s.
Mobile 48m.1s.
Lick iZ =17m.29s., eN =17m.40s., iZ =17m.49s. and 18m.30s., eE =18m.46s., iZ =19m.21s., eQE =52m.8s.
Santa Clara ePPPSN =28m.53s., ePPSSN =34m.6s., ePKP,PKPN =37m.10s.
Fresno eZ =17m.36s., eN =18m.14s., eE =18m.40s., iZ =18m.50s., eE =19m.46s., iZ =20m.27s., eE =21m.13s., eN =21m.41s.
Pierce Ferry e =16m.59s. and 20m.22s., ePPP? =20m.53s.
Boulder City e =17m.22s.
Pasadena iZ =20m.50s., iPPPZ =21m.12s., eSZ =26m.30s., iPSN =28m.13s., iPPS =29m.22s., iPKKP$_2$ =29m.46s., eSSN =34m.14s., iN =38m.32s.
Palomar iZ =18m.38s. and 18m.51s., eZ =20m.24s., eZ =31m.38s.
Tucson ePP =19m.2s., iPP =19m.8s., ePPP =21m.23s., e =24m.50s., iPS =28m.32s., iPPS =29m.30s., iPKKP =29m.38s., eSS =34m.26s.
Brisbane ePPE =18m.57s., iSSE =34m.49s.
Riverview iZ =20m.32s. and 25m.5s., iSKSN =25m.10s., iSN =27m.0s., isSN =27m.20s., ePPSE =29m.59s., iN =30m.9s., iSSN =35m.0s., iN =35m.15s., iPSPSE =35m.24s., iN =38m.40s., SSSN =39m.1s.
Honolulu eSS =34m.41s., eSSS =39m.0s.
Tacubaya eE =20m.30s., ePSPSE =37m.44s., eE =38m.57s., eZ =40m.20s., eSSSE? =42m.6s.
Manzanillo eN =16m.27s., eN =33m.11s., eE =33m.14s. and 43m.9s., eN =45m.56s., eE =46m.1s.
La Paz iPPZ =21m.15s., iN =23m.35s., iPPPE =24m.4s., iSKKSE =28m.6s., iPSE =31m.3s., iSSE =38m.24s., iSSSE =43m.12s.
Apia eEN =46m.41s.
La Plata E. PP =22m.38s., PPP =23m.50s., PS =30m.42s., PPS =33m.8s., SS =38m.9s., SSS =46m.53s., Q =58m.57s.
La Plata N. 22m.37s., PSS =41m.20s., SSS =46m.44s. and 54m.14s., Q =56m.50s.
Auckland eN =22m.15s., PPPN =25m.12s., SKKSN =28m.52s., ScS,PKPN =34m.46s., PKP,PKPN =37m.31s., SKKKSN =38m.35s., SSN =38m.56s., SSPN =39m.27s., iN =42m.7s., SSSN =44m.14s.
Christchurch PPZ =24m.4s., PPPZ =27m.19s., SKKS =31m.28s., PSE =34m.53s., eEN =37m.46s., SSEN =43m.18s., SSSN =47m.16s., QEN =57m.24s.
Arapuni SSSE =44m.50s.
Huancayo iPKS =22m.46s., e =24m.4s. and 29m.48s., eSKSP =31m.58s., ePPS =34m.1s., eSSS =43m.52s.
Wellington PKSZ =22m.47s., i =23m.41s., PSZ? =31m.47s., SKKS? =36m.15s., SSZ =39m.17s., SSSZ =44m.22s., Q =55·9m.
Long waves were also recorded at San Francisco.

Oct. 5d. 22h. Turkestan. U.S.S.R. suggests 39°·7N. 70°·7E., but this position does not account for the phases recorded at European stations.

Andijan eP = 39m.24s., iS_g = 39m.49s.
Stalinabad iP = 39m.25s., iS_g = 39m.53s.
Tashkent iP = 39m.37s., eS_g = 40m.9s.
Murgab eP = 39m.43s.?, S_g = 40m.17s.?
Tchimkent iP = 39m.52s., iS = 40m.38s.
Samarkand P = 39m.53s., S = 40m.39s.
Frunse iS* = 41m.12s.?
Hyderabad PPN = 44m.53s., SN = 51m.46s., SSN = 56m.34s., LN = 66m.40s.
Copenhagen P = 47m.45s.
Potsdam eZ = 47m.46s.
Jena eEN = 47m.55s.
Zürich e = 47m.58s.
Stuttgart ePZ = 48m.7s.
Strasbourg eP = 48m.16s., e = 48m.41s., ePPP = 50m.7s.
Basle e = 48m.28s. and 53m.47s.
Paris eP = 48m.41s., iP = 48m.45s.
Clermont-Ferrand eP = 48m.48s.
Tamanrasset eP = 49m.45s.

Oct. 5d. Readings also at 0h. (Brisbane, Mount Wilson, Pasadena, Riverside, Tucson, Grand Coulee, La Paz, Potsdam, De Bilt, Paris, Strasbourg, and Uccle), 1h. (Ottawa, Tamanrasset, Jena, and Stuttgart (2)), 2h. (La Paz, near Kulyab, Samarkand, and Stalinabad), 3h. (Tortosa and near Bogota), 6h. (La Paz, Almata, Kulyab, Tchimkent, near Andijan, Frunse, and Murgab), 8h. (near Kulyab), 12h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tucson (2), Boulder City, Pierce Ferry, Berkeley, Lick, Mineral (2), Grand Coulee, and Victoria), 14h. (Istanbul), 16h. (Apia and Paris), 20h. (Boulder City, Pierce Ferry, Stuttgart (2), and Stalinabad), 21h. (Andijan, Frunse, Samarkand, Stalinabad, Tchimkent, Tamanrasset, and Stuttgart), 22h. (Stuttgart (3) and Tamanrasset), 23h. (Moscow and Tashkent).

Oct. 6d. 1h. 24m. 43s. Epicentre 37°·9N. 58°·6E. (as on 5d.).

$A = +\cdot4122$, $B = +\cdot6752$, $C = +\cdot6117$; $\delta = -2$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Samarkand		6·8	72	1 42	− 2	—	—	—	—	—
Baku		7·2	293	e 1 50	+ 1	e 3 10	− 3	—	—	—
Stalinabad		8·0	82	e 1 58	− 2	i 3 25	− 8	—	—	—
Kulyab		8·8	87	2 12	+ 1	—	—	—	—	—
Tashkent		8·9	64	e 2 13	+ 1	i 3 51	− 4	—	—	—
Tchimkent		9·5	59	i 2 19	− 1	i 4 1	− 9	—	—	—
Andijan		11·0	71	e 2 39	− 3	4 41	− 6	—	—	—
Erevan		11·2	286	e 2 51	+ 7	4 54	+ 2	—	—	—
Grozny		11·2	303	e 2 48	+ 4	4 56	+ 4	—	—	—
Leninakan		11·8	289	e 2 52	− 1	—	—	—	—	—
Murgab		12·1	83	i 3 10	PP	5 25	+11	—	—	—
Frunse		13·2	63	e 3 27?	PP	e 5 58?	SS	—	—	—
Piatigorsk		13·2	302	e 3 7	− 4	*—	—	—	—	—
Almata		14·9	63	3 42	+ 8	*6 38	+18	—	—	—
Sotchi		15·4	298	i 3 41	+ 1	—	—	—	—	—
Theodosia		18·7	300	e 4 24	+ 2	—	—	—	—	—
Ksara		18·8	263	e 4 24	+ 1	8 5?	+15	—	—	—
Sverdlovsk		19·0	4	e 4 22	− 4	i 7 57	+ 2	—	—	—
Yalta		19·5	297	i 4 27	− 4	8 4	− 2	—	—	—
Simferopol		19·6	299	e 4 33	+ 1	8 10	+ 2	—	—	—
Bombay		22·6	143	i 5 3	0	e 9 17	+10	—	—	—
Moscow		22·7	329	e 5 6	+ 2	i 9 12	+ 3	1 5 10	P	—
Istanbul		23·0	287	i 5 6	− 1	e 9 17	+ 3	—	—	—
Helwan		24·0	258	i 5 13a	− 4	e 9 41	+ 9	10 27	SS	—
Bucharest		25·2	296	e 5 34	+ 5	e 10 3	+11	—	—	—
Hyderabad	N.	26·8	134	e 5 40	− 4	e 10 20	+ 1	—	—	—
Belgrade		29·2	295	e 7 7k	PPP	e 12 9	SS	e 7 43	?	—
Calcutta	E.	29·8	112	—	—	e 11 2	− 5	—	—	—
Warsaw		29·8	311	e 6 9	− 2	e 11 8	+ 1	e 7 12	PP	e 16·3
Raciborzu		31·1	307	e 6 21	− 1	e 8 52	?	i 9 59?	?	e 12·8

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Taranto		31·9	288	6 48	+19	11 58	+18	—	—	—
Kodaikanal	E.	32·4	143	6 32	− 2	—	—	—	—	—
Prague		33·5	307	e 6 34	− 9	e 11 47	−18	—	—	e 13·8
Upsala		33·9	324	i 8 36	PPP	—	—	—	—	e 18·3
Triest		34·0	298	e 6 49	+ 1	e 12 22	+ 9	e 8 5	PP	—
Collmberg	E.	34·6	307	e 6 53	0	—	—	7 58	PP	—
Potsdam		34·6	310	e 6 52	− 1	—	—	i 6 56	pP	e 14·3
Irkutsk		34·7	50	6 58	+ 4	—	—	—	—	—
Cheb		34·9	307	i 6 57	+ 2	i 12 24	− 3	e 16 17	Q	e 17·3
Rome		35·3	292	i 6 54	− 5	e 12 25	− 8	e 14 51	SS	—
Jena	E.	35·4	307	e 6 59	− 1	e 12 37	+ 3	—	—	—
Copenhagen		35·5	316	e 7 0	0	12 36	0	—	—	—
Florence	Z.	35·9	295	e 7 2	− 2	—	—	—	—	—
Salo	N.	36·2	298	e 7 13	+ 7	—	—	—	—	—
Stuttgart		36·9	304	i 7 11a	− 1	e 12 56	− 2	e 9 3	PPP	e 24·9
Zürich		37·4	301	e 7 13a	− 3	—	—	—	—	—
Strasbourg		37·9	304	i 7 19	− 1	e 13 8	− 5	e 15 47	SS	—
Basle		38·1	301	e 7 20	− 2	e 13 6	−10	—	—	—
De Bilt		39·4	310	i 7 36k	+ 3	e 13 35	0	i 9 8	PP	e 21·3
Uccle		40·0	308	e 7 41	+ 3	e 13 45	+ 1	e 9 9	PP	e 23·3
Clermont-Ferrand		41·4	299	i 7 49	− 1	i 14 4	− 1	i 9 27	PP	27·3
Paris		41·4	304	i 7 49	− 1	e 14 4	− 1	e 9 28	PP	e 21·3
Kew		42·9	308	i 8 1	− 1	e 14 28	+ 1	e 9 49	PP	e 22·3
Tortosa	E.	44·3	293	8 11	− 2	—	—	10 2	PP	e 23·3
Alicante		45·8	290	8 26	+ 1	e 15 54	+45	—	—	e 23·9
Tamanrasset		47·6	268	i 8 37a	− 2	e 15 36	+ 1	e 10 25	PP	—
Toledo	Z.	47·9	292	i 8 39	− 3	e 14 9	?	i 9 11	?	—
Granada		48·5	289	i 7 22	?	—	—	9 58	PcP	—

Additional readibgs :—
Warsaw ePE =6m.22s., eSZ =11m.12s., eSN =11m.17s., eSSN =12m.14s., eSSE = 12m.25s., SSSEZ =13m.16s., SSSN =13m.25s.
Upsala eE =13m.40s., eS?N =13m.50s., eE =13m.56s., SS?N =15m.34s.
Potsdam ePPZ =7m.58s. and 8m.1s.
Cheb e =13m.9s.
Stuttgart i =7m.14s.k, e =15m.38s.
Strasbourg iP =7m.23s., e =10m.47s.
De Bilt ePS =13m.47s., eSS =16m.17s.
Uccle eN =7m.46s., eE =13m.57s., eN =16m.39s.
Clermont-Ferrand iSS =17m.13s.
Kew eSS =17m.33s.
Long waves were also recorded at Edinburgh and Aberdeen.

Oct. 6d. Readings also at 0h. (Apia, Stalinabad, Kulyab, Tashkent, Tchimkent, and Almata), 1h. (Samarkand, near Kulyab and Stalinabad), 2h. (Stuttgart (2), Tamanrasset, Tashkent, and near Stalinabad), 3h. (Alicante), 4h. (Stuttgart and Stalinabad (3)), 5h. (Basle and Stuttgart), 9h. (near Stuttgart, Basle, and Neuchatel), 12h. (Tchimkent, near Kulyab, Andijan, Stalinabad, and Samarkand), 14h. (Stalinabad and Tashkent), 16h. (near Mizusawa), 18h. (Basle), 21h. (Apia, Samarkand, Stalinabad, Tashkent, and Kulyab), 22h. (Stuttgart, Pierce Ferry (2), and near Mizusawa), 23h. (Mount Wilson, Pasadena, Haiwee, Palomar, Tinemaha, La Jolla, Boulder City, Pierce Ferry, Tucson, Lick, and Uccle).

Oct. 7d. 1h. 18m. 32s. Epicentre 27°·9N. 91°·9E. (as on 1947, Nov. 29d.).

$A = -·0294$, $B = +·8847$, $C = +·4654$; $\delta = +16$; $h = +3$;
$D = +·999$, $E = +·033$; $G = -·015$, $H = +·465$, $K = -·885$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Calcutta	E.	6·2	212	e 1 25	−10	i 3 1	+13	—	—	—
Murgab		18·3	310	4 11	− 6	e 7 37	− 2	—	—	—
Almata		19·5	327	e 4 35	+ 4	—	—	—	—	—
Bombay		19·6	247	e 4 32	0	i 8 10	+ 2	—	—	—
Andijan		20·5	314	e 4 43	+ 1	e 8 34	+ 7	—	—	—
Kulyab		21·0	305	i 4 44	− 3	—	—	—	—	—
Stalinabad		22·0	306	i 4 56	− 2	i 8 52	− 4	—	—	—
Tashkent		22·8	312	e 5 6	+ 1	e 9 12	+ 1	—	—	—
Samarkand		23·7	306	e 5 12	− 2	—	—	—	—	—
Sverdlovsk		36·4	332	i 7 10	+ 2	e 12 50	0	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Moscow		47·5	322	e 8 38	0	—	—	—	—	—
Copenhagen		61·6	322	11 22	+60	—	—	—	—	38·5
Jena	E.	63·0	316	e 10 30	− 1	—	—	—	—	—
Stuttgart	Z.	65·0	314	e 10 42	− 2	—	—	e 10 48	P	—
Strasbourg		65·9	314	i 10 55	+ 5	—	—	—	—	—
Paris		69·2	316	i 11 9	− 1	—	—	—	—	—
Tamanrasset		76·7	290	e 11 53	− 2	—	—	e 14 47	PP	—

Long waves were also recorded at Potsdam, Uccle, De Bilt, Kodaikanal, and Hyderabad.

Oct. 7d. 18h. Undetermined shock.
Apia ePN =44m.39s., SEN =46m.35s.
Auckland S?N =45m.41s., eN =45m.58s., LN =48m.45s.
Wellington eZ =46m.6s., L =50m.11s.
Brisbane iPZ =47m.37s., iZ =48m.1s., LN =52m.50s.
Arapuni eE =48m.
Riverview eS?N =53m.17s., eLN =55·2m., iS_cSN =58m.33s.
Lick iPZ =54m.5s.a, iZ =54m.9s., 54m.12s., and 54m.30s.
Pasadena iP =54m.5s.a, eNZ =54m.23s., eZ =54m.28s.
Berkeley iPZ =54m.5s.k, iZ =54m.29s.
Mount Wilson iPZ =54m.6s.a, iZ =54m.25s. and 54m.33s.
Palomar iPZ =54m.8s.a, eZ =54m.32s. and 54m.44s.
Riverside iPZ =54m.9s.a, iZ =54m.32s.
Haiwee iPZ =54m.14s.a, iZ =54m.38s. and 54m.51s.
Mineral iPZ =54m.15s.k.
Tinemaha iPEZ =54m.15s.a, iZ =54m.40s., 55m.1s., and 55m.7s.
Boulder City iP =54m.23s., ipP? =54m.47s., e =55m.56s.
Pierce Ferry iP =54m.27s., ipP =54m.52s.
Tucson iP =54m.27s., i =54m.50s.
Grand Coulee eP =54m.46s.
Copenhagen P =61m.37s.
Stuttgart eZ =61m.43s., 61m.53s., and 62m.10s.
Jena eEN =61m.50s.
Tamanrasset ePKP =62m.2s., $iPKP_2$ =63m.47s.k, ePP =67m.38s., e =70m.50s., eSKKS =74m.23s.
Istanbul e =62m.9s.
Strasbourg e =62m.15s.
Alicante e =72m.10s.?
Long waves were also recorded at Christchurch and Ottawa.

Oct. 7d. Readings also at 1h. (Calcutta), 5h. (near Stalinabad), 7h. (near Apia), 8h. (near Murgab), 9h. (Granada), 13h. (near Mizusawa), 16h. (Wellington, Stuttgart, and near Balboa Heights), 19h. (near Murgab), 21h. (near Lick, Branner, Berkeley, and San Francisco), 22h. (Frunse and Tashkent).

Oct. 8d. 9h. 8m. 52s. Epicentre 52°·1N. 171°·2W. (as on 1946, June 3d.).

A = −·6096, B = −·0944, C = +·7871 ; δ = +5 ; h = −6 ;
D = −·153, E = +·988 ; G = −·778, H = −·120, K = −·617.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sitka		21·2	93	—	—	e 8 44	+ 3	—	—	—
Victoria	Z.	30·3	77	e 6 13	− 2	—	—	—	—	—
Grand Coulee		33·2	75	e 6 39	− 1	—	—	—	—	—
Mineral	Z.	35·4	89	i 6 58k	− 2	—	—	—	—	—
Berkeley		36·7	92	i 7 7k	− 3	e 15 57	SSS	e 16 8	Q	e 18·0
Branner	Z.	37·0	92	i 7 9k	− 4	—	—	—	—	—
Lick	Z.	37·4	92	i 7 13k	− 3	—	—	—	—	—
Vladivostok		38·5	279	e 7 27	+ 1	i 13 27	+ 5	—	—	—
Tinemaha	Z.	39·7	91	i 7 34k	− 2	—	—	—	—	—
Haiwee	Z.	40·4	91	i 7 41k	0	—	—	i 9 43	P_cP	—
Santa Barbara	Z.	40·5	95	e 7 39	− 3	—	—	—	—	—
Mount Wilson	Z.	41·6	93	i 7 49k	− 2	—	—	—	—	—
Pasadena		41·6	93	i 7 48k	− 3	—	—	i 9 42	P_cP	—
Riverside	Z.	42·2	93	i 7 53k	− 3	—	—	—	—	—
Boulder City		42·5	89	i 7 57	− 2	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pierce Ferry		42·9	88	i 8 1	− 1	—	—	—	—	—
Palomar		43·0	93	i 8 0k	− 3	—	—	—	—	—
La Jolla	z.	43·1	95	i 8 0k	− 4	—	—	—	—	—
Tucson		47·4	90	i 8 36k	− 2	—	—	1 8 49	pP	—
Temiskaming		56·3	56	e 9 44	− 1	—	—	—	—	—
Rolphton		57·3	55	e 9 51	− 1	—	—	e 10 4	P_cP	—
Ottawa	z.	58·9	55	e 10 2	− 1	—	—	—	—	—
Copenhagen		72·5	358	(11 36)	+ 6	—	—	(11 49)	P_cP	—
Collmberg		76·9	357	e 12 3	+ 7	—	—	—	—	—
Paris		79·3	4	i 12 13	+ 4	—	—	i 12 27	P_cP	—
Stuttgart		79·5	0	e 12 14	+ 4	e 29 13	SSP	e 12 28	P_cP	—
Strasbourg		79·7	1	e 12 16	+ 5	e 21 8	−65	i 12 30	P_cP	—
Basle		80·7	0	e 12 11	− 5	—	—	—	—	—
Zürich		80·9	0	i 12 19k	+ 2	—	—	—	—	—
Chur		81·4	359	e 12 25k	+ 5	—	—	—	—	—

Additional readings and note :—
Lick iZ = 7m.19s. and 7m.34s.
Tinemaha iZ = 7m.58s., eZ = 8m.12s.
Haiwee eZ = 7m.53s. and 8m.5s., iZ = 9m.57s.
Mount Wilson iZ = 7m.59s. and 8m.12s.
Pasadena eZ = 8m.2s. and 8m.12s.
Riverside iZ = 8m.16s.
Pierce Ferry i = 8m.23s.
Palomar iZ = 8m.14s. and 8m.25s.
La Jolla iZ = 8m.14s.
Tucson i = 9m.0s.
Temiskaming e = 9m.56s.
Copenhagen readings increased by 2 minutes.
Long waves were also recorded at Seven Falls.

Oct. 8d. 19h. 1m. 57s. Epicentre 27°·7N. 103°·6E.

Destructive at Chaotung and Yunnan ; 3 dead, 43 injured, and 310 houses damaged. Epicentre 27·5°N. 103·5°E. (Strasbourg). Seismic Bulletin of Nanking.

$A = -·2085$, $B = +·8618$, $C = +·4624$; $\delta = -1$; $h = +3$;
$D = +·972$, $E = +·235$; $G = -·109$, $H = +·449$, $K = -·887$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		13·9	68	e 3 18	− 3	e 6 7	+10	—	—	6·7
Calcutta	E.	14·8	253	e 3 27	− 5	i 6 30	+12	—	—	e 7·5
Dehra Dun	N.	22·5	283	—	—	e 8 58	− 7	—	—	e 12·1
Kagosima		23·7	75	e 5 16	+ 2	—	—	—	—	—
Hukuoka		23·8	70	5 11	− 4	9 30	+ 2	—	—	13·1
Irkutsk		24·6	0	5 23	0	9 48	+ 6	—	—	—
Hamada		25·3	67	e 5 13	−17	9 50	− 4	—	—	—
Hyderabad	N.	25·3	252	5 26	− 4	9 48	− 6	—	—	—
Koti		26·4	70	5 57	+17	10 30	+18	6 34	PP	12·2
Almata		26·5	314	e 5 46	+ 5	e 10 26	+12	—	—	—
Murgab		27·0	301	5 47	+ 2	—	—	—	—	—
Vladivostok		27·4	49	e 5 45	− 4	i 10 25	− 3	—	—	—
Sumoto		27·5	68	e 5 54	+ 4	—	—	—	—	—
Frunse		27·9	310	e 6 10?	+16	—	—	—	—	—
Osaka		28·1	68	5 59	+ 4	—	—	—	—	—
Andijan		28·8	305	e 6 5	+ 3	e 10 58	+ 7	—	—	—
Kameyama		28·9	68	e 5 3	−60	—	—	—	—	—
Gihu		29·2	67	5 58	− 7	10 41	−17	—	—	16·0
Nagoya		29·3	67	5 27	−39	—	—	—	—	—
Bombay		29·5	260	e 6 7	− 1	i 11 4	+ 2	—	—	—
Kodaikanal	E.	30·1	241	e 5 58	−15	—	—	—	—	—
Kulyab		30·1	299	6 15	+ 2	—	—	—	—	—
Omaesaki		30·3	67	—	—	e 10 44	−31	—	—	—
Colombo	E.	30·6	232	e 6 20	+ 2	11 22	+ 2	—	—	—
Stalinabad		31·0	300	i 6 23	+ 2	i 11 29	+ 3	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Maebasi		31·2	64	6 45	+22	—	—	—	—	—
Tashkent		31·2	305	i 6 25	+ 2	i 11 33	+ 4	—	—	—
Tchimkent		31·2	307	i 6 26	+ 3	i 11 35	+ 6	—	—	—
Kakioka		32·0	65	e 6 27	− 3	—	—	—	—	—
Samarkand		32·5	301	e 6 37	+ 3	e 11 51	+ 2	—	—	—
Sverdlovsk		42·0	326	7 54	0	14 17	+ 3	—	—	—
Baku		45·6	301	e 8 29	+ 5	—	—	—	—	—
Grozny		48·7	305	e 8 49	+ 1	15 47	− 3	—	—	—
Piatigorsk		50·6	306	e 9 3	+ 1	e 16 21	+ 4	—	—	—
Sotchi		53·0	306	e 9 15	− 6	—	—	—	—	—
Moscow		54·2	321	9 27	− 2	17 6	0	—	—	—
Theodosia		56·0	308	e 9 42	− 1	—	—	—	—	—
Yalta		56·9	307	e 9 48	− 1	17 42	0	—	—	—
Ksara		57·6	294	e 9 54	0	e 17 56	+ 5	—	—	—
Istanbul		61·2	304	10 19	0	18 41	+ 3	—	—	—
Helwan		62·4	291	i 10 26a	− 1	e 18 49	− 4	12 49	PP	—
Upsala		64·5	327	e 9 32	−69	—	—	—	—	e 33·0
Belgrade		66·4	310	e 10 48	− 5	e 19 49	+ 6	e 8 49	?	e 43·3
Copenhagen		68·2	323	11 5	+ 1	20 11	+ 7	—	—	35·0
Prague		68·8	317	e 11 3?	− 5	e 20 11	0	e 13 22	PP	e 34·1
Potsdam		68·9	320	i 11 9k	0	i 20 16	+ 3	i 20 8?	S	e 35·0
Collmberg		69·3	318	e 11 13	+ 2	—	—	—	—	—
Cheb		70·0	317	—	—	e 20 26	0	—	—	e 35·0
Jena	N.	70·2	317	e 11 17	0	e 20 29	+ 1	—	—	—
Triest		70·7	312	e 11 19	− 1	i 20 32	− 2	—	—	—
Stuttgart		72·4	316	e 11 28	− 2	e 20 55	+ 2	e 14 23	PP	e 38·0
Bologna		72·7	312	e 11 33	+ 1	e 21 27	PS	—	—	—
Rome		72·7	308	e 11 30a	− 2	e 20 58	+ 1	e 11 52	P_cP	—
Salo	z.	72·8	313	e 11 31	− 1	—	—	—	—	—
Chur		73·0	314	e 11 32a	− 1	—	—	—	—	e 40·0
Florence		73·0	311	e 11 33	0	e 21 3	+ 3	—	—	—
Strasbourg		73·4	317	e 11 35	− 1	e 21 5	0	e 29 3	SSS	e 36·1
Zürich		73·4	315	e 11 34k	− 2	e 21 9	+ 4	—	—	—
De Bilt		73·5	321	e 11 35a	− 1	e 21 13	+ 7	e 29 33	SSS	e 37·0
Basle		73·9	315	e 11 37	− 2	e 21 1	− 9	—	—	e 45·0
Uccle		74·5	320	e 11 43	+ 1	e 21 21	+ 4	e 26 9	SS	e 37·1
Paris		76·5	319	i 11 52	− 2	e 21 41	+ 2	—	—	e 40·0
Clermont-Ferrand		77·5	315	i 12 0	+ 1	e 22 0	+10	i 15 1	PP	40·0
Tortosa		81·5	312	12 21	0	22 37	+ 5	12 28	P_cP	e 44·0
Alicante		83·3	310	e 12 30	0	22 50	0	28 44	SS	e 40·3
Toledo	z.	84·9	313	i 12 38	0	—	—	e 16 56	?	—
Granada		86·0	310	i 12 45a	+ 2	i 23 12	− 5	i 16 19a	PP	i 40·9
Tamanrasset		86·4	296	i 12 45a	0	—	—	e 16 4	PP	—
Victoria	z.	93·2	29	e 13 15	− 2	—	—	—	—	—
Grand Coulee		95·6	27	e 13 28	0	—	—	—	—	—
Tinemaha	z.	104·5	33	e 14 6	− 2	—	—	e 18 29	PP	—
Mount Wilson	z.	106·9	35	e 18 39	PP	—	—	—	—	—
Boulder City		107·0	31	e 18 27	[0]	—	—	e 18 46	PP	—
Pierce Ferry		107·3	31	e 18 30	[+ 2]	—	—	e 18 51	PP	—
Riverside	z.	107·4	35	e 18 27	[− 1]	—	—	—	—	—
Palomar	z.	108·2	34	e 14 23	P	—	—	e 17 59	?	—
Tucson		112·0	30	i 18 38	[+ 1]	—	—	—	—	—
Bogota	z.	147·8	356	i 18 44	[−60]	—	—	—	—	—
La Paz		166·4	324	e 20 15	[+ 8]	27 19	[+10]	e 25 13	PP	78·1

Additional readings :—
Prague eSS = 25m.3s.
Stuttgart ePZ = 11m.33s.a, eSS = 25m.33s.
Rome ePPZ = 14m.16s., eN = 22m.11s. and 22m.52s., eSS = 25m.36s.
Strasbourg eSS = 25m.3s.
Uccle eSSSEN = 29m.27s.
Tortosa PPE = 15m.41s.
Granada ePcP = 13m.20s.k, PPS = 25m.7s., iSS = 28m.58s., SSS = 33m.0s.
La Paz SSE = 47m.3s.
Long waves were also recorded at Tokyo, Warsaw, Kew, Philadelphia, Ottawa, and Seven Falls.

Oct. 8d. Readings also at 1h. (near Berkeley, Branner, Lick, San Francisco, Mineral, and Santa Clara), 4h. (Stuttgart (2)), 6h. (Stuttgart, Apia, Wellington, Auckland, Grand Coulee, Pierce Ferry, Tucson, Pasadena, Mount Wilson, Riverside, Palomar, Haiwee, Tinemaha, Berkeley, Lick, and Mineral), 7h. (near Alicante, near Zürich, Stuttgart, and Strasbourg), 9h. (near Stalinabad, Samarkand, and Tchimkent), 10h. (Victoria and Stuttgart), 14h. (Pierce Ferry, Stuttgart (2), Samarkand, Stalinabad, Tchimkent, Tashkent, and Andijan), 16h. (near Rolphton), 18h. (Logan), 20h. (near Ottawa).

Oct. 9d. 17h. Undetermined shock.

Mizusawa PEN = 28m.27s., SEN = 29m.12s.
Yuzno-Sakhlinsk P = 28m.28s., S = 29m.17s.
Vladivostok iP = 28m.35s., iS = 29m.56s.
Mineral iPZ = 38m.5s. a.
Tinemaha iPZ = 38m.31s. a.
Mount Wilson iPZ = 38m.42s. a.
Pasadena iPZ = 38m.42s.
Riverside iPZ = 38m.45s. a.
Boulder City iP = 38m.46s.
Palomar iPZ = 38m.49s. a.
Pierce Ferry eP = 38m.49s.
Stuttgart eZ = 39m.0s.
Paris i = 39m.13s.
Tucson iP = 39m.14s. a.

Oct. 9d. 18h. 22m. 41s. Epicentre 37°·0S. 101°·4W.

$A = -\cdot1583$, $B = -\cdot7848$, $C = -\cdot5992$; $\delta = +1$; $h = -1$;
$D = -\cdot980$, $E = +\cdot198$; $G = +\cdot118$, $H = +\cdot587$, $K = -\cdot801$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		34·1	50	e 6 51	+ 3	e 12 19	+ 5	e 8 4	PP	e 16·5
La Plata		35·0	99	6 25	−31	—	—	14 47	Q	16·2
La Paz		35·8	64	i 7 3	0	i 12 43	+ 2	8 26	PP	17·3
Tucson		69·4	351	i 11 12	0	—	—	—	—	—
Palomar	z.	71·5	347	i 11 28	+ 4	—	—	—	—	—
Riverside	z.	72·2	346	e 11 28	− 1	—	—	—	—	—
Mount Wilson	z.	72·5	346	e 11 31	+ 1	—	—	—	—	—
Pasadena	z.	72·5	346	e 11 30	0	—	—	—	—	—
Santa Barbara	z.	73·1	345	e 11 47	+13	—	—	—	—	—
Boulder City		73·7	349	e 11 36	− 2	—	—	—	—	—
Pierce Ferry		73·7	350	e 11 40	+ 2	—	—	—	—	—
Haiwee	z.	74·4	347	e 11 42	0	—	—	—	—	—
Lick	z.	76·3	344	e 11 53k	+ 1	—	—	—	—	—
Mineral	z.	79·2	345	e 12 8	0	—	—	—	—	—
Grand Coulee		86·0	348	e 11 59	−44	—	—	—	—	—

Additional readings :—
Huancayo eSS = 14m.32s.
La Plata N = 1m.43s. and 4m.31s.
La Paz P_cP = 9m.21s., SSE = 15m.13s.
Long waves were also recorded at Wellington and Christchurch.

Oct. 9d. Readings also at 2h. (Berkeley, Istanbul, near Stalinabad and near Andijan), 3h. (Bucharest), 4h. (Stalinabad, near Murgab and Andijan), 5h. (Mineral, Lick, Victoria, Boulder City, Pierce Ferry, Tucson, Tinemaha, Apia, and Stuttgart), 6h. (Pierce Ferry), 7h. (Victoria, Mineral, Mount Wilson, Tinemaha, Haiwee, La Jolla, Riverside, Palomar, Boulder City, Grand Coulee, Pierce Ferry, and Tucson), 8h. (Samarkand, Kulyab, Stalinabad, Tashkent, Andijan, Sverdlovsk, and Stuttgart), 9h. (Pierce Ferry and La Paz), 12h. (near Mizusawa), 14h. (near Mizusawa), 15h. (Belgrade), 16h. (Stuttgart), 18h. (Collmberg), 21h. (Mount Wilson, Pasadena, Riverside, Palomar, Tinemaha, Tamanrasset, and near La Paz), 22h. (Pierce Ferry (2), Wellington, near Zürich, Chur, Basle, Jena, Stuttgart, Strasbourg, and Triest), 23h. (Collmberg and near Tacubaya).

Oct. 10d. 2h. 6m. 43s. Epicentre 27°·7N. 103°·6E. (as on 8d.).

A = −·2085, B = +·8618, C = +·4624 ; $\delta = -1$; $h = +3$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		13·9	68	e 3 22	+ 1	e 6 10	+13	—	—	7·1
Calcutta	E.	14·8	253	e 3 32	0	e 7 0	SSS	—	—	e 7·6
Irkutsk		24·6	0	i 5 24	+ 1	e 9 39	− 3	—	—	—
Hyderabad	N.	25·3	252	5 30	0	9 59	+ 5	—	—	13·0
Almata		26·5	314	e 5 44	+ 3	—	—	—	—	—
Murgab		27·0	301	5 48	+ 3	—	—	—	—	—
Vladivostok		27·4	49	i 5 47	− 2	11 14	SS	e 6 41	PP	—
Frunse		27·9	310	e 6 13?	+19	—	—	—	—	—
Andijan		28·8	305	e 6 4	+ 2	—	—	—	—	—
Bombay		29·5	260	e 6 11	+ 3	e 10 56	− 6	—	—	—
Kokaikanal	E.	30·1	241	e 6 17	+ 4	—	—	—	—	—
Kulyab		30·1	299	6 14	+ 1	e 11 18	+ 6	—	—	—
Stalinabad		31·0	300	i 6 23	+ 2	i 11 31	+ 5	—	—	—
Tashkent		31·2	305	i 6 24	+ 1	i 11 29	0	—	—	—
Tchimkent		31·2	307	i 6 37	+14	i 11 53	+24	—	—	—
Samarkand		32·5	301	e 6 35	+ 1	e 11 53	+ 4	—	—	—
Sverdlovsk		42·0	326	i 7 56	+ 2	i 14 17	+ 3	—	—	—
Baku		45·6	301	—	—	e 15 11	+ 5	—	—	—
Leninakan		50·2	302	e 9 0	0	—	—	—	—	—
Moscow		54·2	321	9 28	− 1	17 7	+ 1	—	—	—
Istanbul	E.	61·2	304	12 29	PP	—	—	13 59	PPP	—
Helwan		62·4	291	i 10 26k	− 1	—	—	—	—	—
Copenhagen		68·2	323	11 3	− 1	—	—	—	—	35·3
Stuttgart		72·4	316	e 11 29	− 1	—	—	e 11 34	P	38·3
Rome		72·7	308	e 3 10	?	e 20 59	+ 2	e 25 56	SS	e 39·2
Strasbourg		73·4	317	e 11 35	− 1	e 20 53	−12	—	—	—
Zürich		73·4	315	e 11 33	− 3	—	—	—	—	—
Basle		73·9	315	e 11 38	− 1	i 19 41	?	e 17 41	?	—
Paris		76·5	319	i 11 52	− 2	—	—	—	—	e 42·3
Clermont-Ferrand		77·5	315	e 11 58	− 1	—	—	40 17	Q	45·3
Tamanrasset		86·4	296	e 12 43	− 2	—	—	—	—	—
Pierce Ferry		107·3	31	e 18 29	[+ 1]	—	—	—	—	—
Tucson		112·0	30	e 18 37	[0]	—	—	—	—	—
Bogota		147·8	356	i 19 45	[+ 1]	—	—	—	—	—

Rome also gives eE = 29m.30s.
Long waves were also recorded at other European stations.

Oct. 10d. 17h. 43m. 1s. Epicentre 35°·1N. 23°·4E. (as on 1948, March 29d.).

A = +·7525, B = +·3257, C = +·5724 ; $\delta = -2$; $h = 0$;
D = +·397, E = −·918 ; G = +·525, H = +·227, K = −·820.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Messina	7·0	299	e 2 12	P_g	e 3 21	+13	—	—	—
Taranto	7·2	320	1 42	− 7	3 7	− 6	—	—	—
Istanbul	7·4	35	i 1 54	+ 2	3 55	S*	—	—	—
Helwan	8·5	125	i 2 8_a	+ 1	i 3 38	− 7	4 8	S*	—
Bucharest	9·5	12	e 2 17	− 3	e 4 3	− 7	e 2 20	P	—
Belgrade	10·0	348	e 2 26_a	− 1	i 4 22	0	i 3 12	?	i 5·9
Ksara	10·4	93	1 59?	−35	e 4 28	− 4	—	—	—
Rome	10·9	312	e 2 44	+ 4	i 4 58	+14	e 2 55	PPP	5·3
Kalossa	11·9	346	e 3 3	PP	—	—	e 3 34	?	e 6·0
Yalta	12·5	38	i 2 59	− 3	e 5 19	− 4	—	—	—
Budapest	12·8	347	e 3 25	PPP	—	—	—	—	8·0
Florence	12·8	316	e 3 2	− 4	—	—	—	—	e 7·9
Triest	12·8	328	e 3 6	0	i 5 34	+ 4	i 4 20	?	i 7·9
Padova	12·9	320	e 3 24	PPP	e 5 55	SS	6 1	SSS	—
Bologna	13·2	319	e 3 17	+ 6	e 5 55	SS	—	—	e 8·9

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Theodosia		13·5	39	e 3 21	+ 6	—	—	—	—	—
Salo		14·4	321	e 3 27	0	e 5 53	−16	—	—	—
Pavia		14·8	317	e 3 51	PPP	—	—	—	—	—
Sotchi		15·2	51	e 3 31	− 7	—	—	—	—	—
Raciborzu		15·4	348	e 3 42?	+ 2	e 6 5	−27	—	—	e 8·0
Prague		16·3	339	e 3 56	+ 4	e 6 58	+ 5	e 4 6	PP	e 8·0
Zürich		16·5	322	e 3 50	− 4	e 7 1	+ 3	—	—	—
Algiers		16·6	283	3 59	+ 3	i 7 17	+17	i 7 44	SSS	9·0
Leninakan		16·9	65	e 4 3	+ 4	—	—	—	—	—
Cheb		17·0	335	e 4 3	+ 2	e 7 10	0	—	—	e 9·0
Neuchatel		17·1	319	e 4 0	− 2	—	—	—	—	e 10·6
Basle		17·2	323	e 4 1	− 2	e 7 10	− 4	e 4 9	P	—
Stuttgart		17·2	327	e 4 0	− 3	e 7 19	+ 5	—	—	e 9·8
Warsaw		17·2	355	4 11a	+ 8	e 7 17	+ 3	4 24	PP	e 9·0
Erevan		17·5	67	e 4 9	+ 2	—	—	—	—	—
Piatigorsk		17·6	52	e 4 8	0	—	—	—	—	—
Barcelona		17·8	297	4 12	+ 1	e 7 40	+12	—	—	e 9·2
Strasbourg		17·8	326	e 4 4	− 7	e 7 28	0	e 4 11	P	9·0
Collmberg		17·9	338	e 4 12	0	e 7 40	+10	e 4 21	PP	10·2
Jena		18·0	337	e 4 10	− 3	e 7 35	+ 3	—	—	e 9·4
Clermont-Ferrand		18·7	311	i 4 21	− 1	e 7 59	+11	i 4 35	PP	10·0
Potsdam		18·8	340	i 4 23k	0	i 7 53	+ 3	i 4 50	PPP	e 10·0
Tortosa	E.	18·9	295	i 4 30	+ 6	7 52	− 1	4 48	PP	e 10·0
Alicante		19·4	288	4 29	− 1	8 7	+ 3	4 34	pP	e 10·0
Tamanrasset		19·8	238	i 4 41k	+ 6	e 8 48	SS	—	—	—
Paris		20·6	318	i 4 42	− 1	i 8 31	+ 2	i 5 1?	PP	e 10·0
Uccle		20·9	325	e 4 45	− 1	e 8 40	+ 5	8 53	SS	e 12·0
De Bilt		21·4	330	e 4 53	+ 2	e 8 53	+ 8	—	—	e 11·0
Baku		21·6	68	5 3?	+ 9	8 51	+ 2	—	—	—
Copenhagen		21·9	344	i 4 56k	− 1	8 52	− 2	—	—	11·0
Granada		21·9	284	i 4 57a	0	i 8 51	− 3	5 6k	pP	12·7
Toledo		22·3	291	i 5 1	0	i 9 3	+ 1	i 5 17	pP	12·9
Moscow		22·9	21	5 3	− 3	9 9	− 4	—	—	—
Jersey		23·4	317	e 5 9	− 2	e 8 27	−54	—	—	—
Kew		23·6	322	i 5 13	0	e 9 33	+ 8	i 9 41	?	e 12·0
Upsala		25·1	353	5 26k	− 2	9 42	− 9	i 10 32	SS	e 11·6
Lisbon		26·2	289	5 44k	+ 6	10 12	+ 3	—	—	—
Aberdeen		28·0	331	—	—	i 10 43	+ 5	i 10 53	?	—
Sverdlovsk		33·2	37	6 37	− 3	11 51	− 9	—	—	—
Samarkand		34·7	69	e 6 49	− 5	—	—	—	—	—
Stalinabad		36·2	70	i 7 6	0	e 12 47	0	—	—	—
Tashkent		36·3	66	i 7 6	− 1	e 12 44	− 4	—	—	—
Andijan		38·6	66	e 7 46?	+20	—	—	—	—	—
Frunse		40·0	63	e 7 38	0	—	—	—	—	—
Murgab		40·2	70	7 42	+ 2	13 49	+ 1	—	—	—
Almata		41·7	61	e 8 6	+14	—	—	—	—	—
Bombay		46·4	97	e 8 33	+ 3	e 15 19	+ 1	e 18 55	SS	—
Kodaikanal	E.	54·9	103	e 8 59?	−36	—	—	—	—	—
Irkutsk		57·9	46	e 9 53	− 3	17 49	− 6	—	—	—
Seven Falls	E.	67·9	313	e 11 3	+ 1	—	—	—	—	38·0
Ottawa	Z.	71·7	313	e 11 25	− 1	—	—	—	—	—
St. Louis		84·3	313	e 12 36	+ 1	e 23 5	+ 5	—	—	—
Grand Coulee		90·7	336	e 13 9	+ 3	—	—	—	—	—
Pierce Ferry		98·8	326	e 13 45	+ 2	—	—	e 17 28	PP	—
La Paz		100·5	257	e 14 1	+10	25 25	0	e 32 28	SS	49·4

Additional readings : —
Helwan P_g = 2m.47s.
Bucharest eE = 2m.33s.
Rome iN = 4m.37s.
Budapest ePN = 3m.45s., SN = 6m.22s., eE = 6m.39s.
Prague e = 3m.59s.?, 6m.23s., and 6m.44s., eSS = 7m.11s.
Algiers i = 4m.28s. and 4m.46s.
Stuttgart iP = 4m.7s., eZ = 4m.38s.
Warsaw PPN = 4m.27s., PPPZ = 4m.37s., PPPN = 4m.44s., eE = 4m.54s., eSE = 7m.23s.
SSE = 7m.36s., SSSN = 7m.55s., SSSE = 8m.0s.

Continued on next page.

Strasbourg e = 4m.45s. and 5m.3s., is = 7m.32s., iSS = 7m.37s.
Collmberg iPPPEN = 4m.31s., eEN = 5m.12s., eSSEN = 8m.35s.
Jena eS?N = 7m.13s. and 7m.39s.
Potsdam iPE = 4m.26s., iSSZ = 8m.15s.
Tortosa PPP?N = 5m.4s., SSE = 8m.13s.
Alicante PP = 4m.45s., PPP = 4m.53s., P_cP = 8m.31s., SS = 8m.41s., SSS = 8m.47s., P_cS = 12m.27s., S_cS = 16m.13s.
Tamanrasset e = 5m.21s. and 5m.37s.
Copenhagen 4m.59s. and 9m.9s.
Granada iPP = 5m.30s.k, SS = 9m.39s.
Toledo iZ = 5m.30s., iPP?Z = 5m.46s.
Upsala eN = 6m.23s., iE = 10m.24s.
Lisbon PP = 6m.45s.?, i = 10m.24s., N = 10m.40s.
La Paz iPP? = 18m.34s.

Oct. 10d. Readings also at 2h. (Tamanrasset), 3h. (Granada and Tucson), 4h. (Christchurch, Wellington, and Pierce Ferry), 6h. (near Andijan, Stalinabad, and Murgab), 8h. (Huancayo), 9h. (near Murgab), 10h. (Tucson), 11h. (Fresno, near Lick, Branner, San Francisco, Mineral, and Berkeley), 13h. (Mount Wilson, Pasadena, Riverside, Palomar, Tinemaha, Boulder City, Tucson, Merida, Tacubaya (2), and Wellington), 15h. (near Messina), 17h. (Stuttgart), 18h. (Tamanrasset, Istanbul, Helwan, Strasbourg, Paris, and near La Paz), 19h. (Paris, Strasbourg, Basle, Zürich, Alicante, Triest, Belgrade, Stuttgart, Stalinabad, Auckland, and Wellington), 20h. (Stuttgart, Pierce Ferry, near Kulyab, and Stalinabad), 23h. (Rome, Paris, and Istanbul.)

Oct. 11d. Readings at 2h. (Auckland, Christchurch, Wellington, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Collmberg, Jena, Strasbourg, Stuttgart, Potsdam, Basle, Zurich, and near Triest; more than one shock), 3h. (Pierce Ferry and near Klyuchi), 4h. (Boulder City, Tucson, Lick, Mount Wilson, Palomar, Riverside, Paris, Strasbourg, Stuttgart, Paris, and Tamanrasset), 7h. (Tananarive), 8h. (Arcata, Berkeley, Branner, Lick, Mineral, Pierce Ferry, near Fresno, Paris, and Stuttgart), 10h. (Strasbourg, Auckland, and Wellington), 11h. (Auckland, Christchurch (2), Wellington, and Potsdam), 13h. (Paris, Rome, and Tucson), 14h. (La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Boulder City, and Pierce Ferry), 16h. (Rome), 17h. (Tamanrasset (2), Seven Falls, Alicante, Toledo, Clermont-Ferrand, De Bilt, Paris, Strasbourg, Potsdam, Stuttgart, Uccle, Helwan, and near Johannesburg), 19h. (Clermont-Ferrand), 20h. (La Paz), 22h. (Istanbul, Rome, Stuttgart, Paris, and Tamanrasset), 23h. (Auckland, Wellington, and Theodosia).

Oct. 12d. 2h. 34m. 49s. I } Epicentre 21°·8S. 170°·8E.
2h. 40m. 3s. II } (as on 1946, April 11d.).

A = −·9173, B = +·1486, C = −·3693; δ = −10; h = +4;
D = +·160, E = +·987; G = +·365, H = −·059, K = −·929.

			△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Auckland	N.	15·4	168	e 3 59	+19	—	—	—	—	e 7·3
II		N.	15·4	168	i 3 53	+13	—	—	—	—	7·0
I	Arapuni	E.	16·8	166	—	—	e 6 11?	−54	—	—	—
I	Brisbane		17·1	247	i 4 2	0	i 7 23	+11	—	—	e 8·8
II			17·1	247	i 3 59	− 3	—	—	—	—	—
I	Tuai	N.	17·8	165	e 4 32	+21	—	—	—	—	—
II		N.	17·8	165	e 4 27	+16	—	—	—	—	—
I	Apia	E.	18·4	68	—	—	e 6 11?	?	—	—	—
I	Wellington		19·7	172	2 21	?	8 58	+48	—	—	i 9·9
I	Kaimata		20·7	180	5 1	+17	—	—	—	—	—
II			20·7	180	4 57	+13	—	—	—	—	—
I	Riverview		21·0	230	i 4 55k	+ 8	i 8 47	+10	—	—	e 10·3
II		z.	21·0	230	i 4 50a	+ 3	—	—	—	—	e 10·2
I	Christchurch		21·7	176	—	—	9 36	+45	—	—	12·7
I	Santa Barbara	z.	86·5	51	e 12 57	+11	—	—	—	—	—
II		z.	86·5	51	e 12 48	+ 2	—	—	—	—	—
II	Lick	z.	86·6	47	i 12 47a	+ 1	—	—	—	—	—
II	La Jolla	z.	87·5	54	e 12 52	+ 1	—	—	—	—	—
I	Pasadena	z.	87·5	52	e 12 49	− 2	—	—	—	—	—
II		z.	87·5	52	e 12 50	− 1	—	—	—	—	—
I	Mount Wilson	z.	87·6	52	e 12 49	− 2	—	—	—	—	—
II		z.	87·6	52	e 12 51	0	—	—	—	—	—

Continued on next page.

			△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Riverside	z.	88·0	52	e 12 51	− 2	—	—	—	—	—
II		z.	88·0	52	i 12 53	0	—	—	—	—	—
I	Palomar	z.	88·1	53	i 12 52	− 2	—	—	—	—	—
II		z.	88·1	53	i 12 54	0	—	—	—	—	—
I	Mineral	z.	88·2	45	i 12 52a	− 2	—	—	—	—	—
II		z.	88·2	45	e 12 54	0	—	—	—	—	—
I	Tinemaha	z.	88·8	50	e 12 54	− 3	—	—	—	—	—
II		z.	88·8	50	i 12 57	0	—	—	—	—	—
I	Boulder City		90·7	51	e 13 5	− 1	—	—	—	—	—
II			90·7	51	e 13 7	+ 1	—	—	—	—	—
I	Victoria	z.	91·3	38	e 14 8	+59	—	—	—	—	—
II		z.	91·3	38	e 13 8	− 1	—	—	—	—	—
I	Pierce Ferry		91·4	52	e 13 7	− 2	—	—	—	—	—
II			91·4	52	e 13 10	+ 1	—	—	—	—	—
I	Tucson		92·1	56	i 13 13	+ 1	—	—	—	—	—
II			92·1	56	i 13 14	+ 2	—	—	—	—	—
I	Stuttgart	z.	149·4	337	e 19 44	[− 2]	—	—	—	—	—
II		z.	149·4	337	e 19 47	[+ 1]	—	—	—	—	—
I	Strasbourg		150·0	338	e 19 50	[+ 3]	e 26 6	[−48]	—	—	—
II			150·0	338	e 19 47	[0]	—	—	—	—	—
I	Paris		151·5	345	e 20 10	PKP_2	—	—	—	—	—
II			151·5	345	e 19 48	[− 2]	—	—	—	—	—
I	Rome		152·9	332	e 19 38	[−14]	—	—	—	—	e 75·2
I	Tamanrasset		166·3	277	e 20 7	[0]	—	—	e 24 58	PP	—

Additional readings :—
Brisbane I iZ = 4m.18s., II iZ = 4m.26s.
Wellington I PPZ = 4m.13s., SS? = 11m.31s.
Lick II iZ = 12m.53s.
Tamanrasset I ePKP$_2$ = 21m.3s.
Long waves were also recorded at Philadelphia and Seven Falls.

Oct. 12d. 11h. 51m. 37s. Epicentre 46°·3N. 13°·1E.

Intensity V-VI at Venzone. Julian Alps.

Bulletin séismique trimestriel de Triest. Epicentre as adopted.

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

	△	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Triest	0·8	145	e 0 17	− 1	i 0 28	− 3	—	—
Chur	2·5	283	e 0 45	+ 2	e 1 21	S_g	i 0 47	P_g
Zürich	3·3	289	e 0 51	− 2	e 1 44	S*	—	—
Stuttgart	3·6	314	e 0 58	0	e 1 41	− 1	e 1 8	P_g
Basle	4·0	290	e 1 4	0	e 2 12	S_g	e 1 22	P_g
Strasbourg	4·3	304	e 1 10	+ 2	e 2 9	S*	e 2 38	S_g
Jena	4·7	348	e 1 30	P_g	e 2 26	S*	e 2 36	S_g
Collmberg	5·0	359	—	—	e 2 16	− 2	i 2 38	S_g

Additional readings :—
Stuttgart eZ = 1m.30s., e = 1m.55s., eS_g = 1m.58s., i = 2m.3s.
Jena eE = 1m.56s., eN = 2m.2s.

Oct. 12d. 12h. 57m. 26s. Epicentre 38°·5N. 41°·5E.
(as on 1943, Nov. 29d.).

A = +·5876, B = +·5199, C = +·6199 ; δ = −15 ; h = −1 ;
D = +·663, E = −·749 ; G = +·464, H = +·411, K = −·785.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Leninakan		2·9	38	e 0 44	− 4	i 1 20	− 4
Grozny		5·8	32	e 1 45	P*	2 43	+ 5
Moscow		17·5	352	e 4 42	+17	—	—
Stalinabad		21·3	81	i 4 49	− 1	i 8 34	− 9
Tashkent		21·5	74	e 4 49	− 3	e 8 36	−11
Tchimkent		21·7	71	e 4 55	0	—	—
Sverdlovsk		22·3	29	5 5	+ 4	9 15	+13
Andijan		23·8	75	e 5 15	0	—	—
Stuttgart	z.	25·4	305	e 5 57	+26	—	—

Additional readings :—
Leninakan i = 47s. and 1m.4s.
Long waves were also recorded at Istanbul, Ksara, and Rome.

Oct. 12d. 13h. Deep focus shock. South-West Pacific.

Apia iPEZ = 40m.12s.a, eSEZ = 41m.23s.
Brisbane iPZ = 45m.29s.
Santa Barbara ePZ = 49m.43s.k.
La Jolla iPZ = 49m.46s.k.
Lick iPZ = 49m.46s.
Mount Wilson iPZ = 49m.49s.k, iZ = 50m.0s., epPZ = 51m.16s.
Pasadena iP = 49m.49s.k, iZ = 50m.3s., ipPZ = 51m.16s., iZ = 51m.44s., eZ = 52m.43s.
Riverside iPZ = 49m.52s.k, iZ = 50m.2s., epPZ = 51m.18s., eZ = 52m.46s.
Palomar iPNZ = 49m.53s.k, iZ = 50m.12s., ipPZ = 51m.20s., eZ = 51m.54s.
Haiwee iPZ = 49m.55s., epPZ = 51m.26s.
Mineral iPZ = 49m.55s.k.
Tinemaha iPEZ = 49m.58s.k, eZ = 50m.49s., and 51m.10s., epP?Z = 51m.28s.
Boulder City iP = 50m.7s., epP = 51m.29s.
Pierce Ferry iP = 50m.11s., epP? = 51m.43s.
Tucson iP = 50m.14s.k, e = 51m.30s.
Victoria eZ = 50m.15s.
Grand Coulee iP = 50m.26s.
Potsdam eZ = 57m.30s.
De Bilt iZ = 57m.35s.k.
Jena eN = 57m.35s.
Stuttgart ePKPZ = 57m.38s., iPKPZ = 57m.42s., eZ = 59m.15s.
Uccle ePNZ = 57m.39s.a.
Paris ePKP = 57m.40s., iPKP = 57m.43s., epPKP = 59m.20s.
Strasbourg iPKP = 57m.44s., e = 57m.58s., epPKP = 59m.21s.
Clermont-Ferrand iPKP = 57m.45s., i = 57m.52s.
Basle ePKP = 57m.46s., e = 61m.31s. and 64m.34s.
Zürich ePKP = 57m.46s.k, e = 57m.51s., ePKP$_2$ = 58m.48s.
Tamaurasset iPKP = 58m.7s., e = 59m.13s.
Prague e = 71m.

Oct. 12d. Readings also at 0h. (near Oaxaca, Tacubaya, and Vera Cruz), 1h. (Tamanrasset, Almata, Andijan, Murgab, Stalinabad, Calcutta, Hyderabad, Stuttgart, Mount Wilson, and Riverside), 2h. (Mount Wilson, Riverside, Tucson, and La Paz), 3h. (Mount Wilson, Palomar, Riverside, Tinemaha, Boulder City, and Pierce Ferry), 4h. (near Murgab), 5h. (Samarkand, Stalinabad, Tchimkent, Strasbourg, and Stuttgart), 9h. (La Paz), 10h. (Andijan, Kulyab, Stalinabad, Tashkent, Bombay, Hyderabad, and Kodaikanal), 11h. (Pierce Ferry), 12h. (Stalinabad), 15h. (near Stalinabad), 16h. (near Andijan, Kulyab, and Stalinabad), 20h. (Stuttgart), 21h. (Bombay, Hyderabad, Kodaikanal, Helwan, and Upsala).

Oct. 13d. Readings at 0h. (La Paz), 1h. (near Jena), 2h. (Apia and Collmberg), 6h. (near Stalinabad), 8h. (Kodaikanal, near Kulyab, Stalinabad, and near Grand Coulee), 11h. (near Stalinabad), 12h. (Mount Wilson, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry (2), and Tucson), 13h. (Uccle, Ottawa, Tucson, Vladivostok, Brisbane, Christchurch, Wellington, Auckland, and Arapuni), 14h. (Uccle De Bilt, Warsaw, Clermont-Ferrand, Paris, Strasbourg, Copenhagen, Potsdam, and Stuttgart), 15h. (near Andijan, Frunse, Almata, Murgab, Tchimkent, Stalinabad, Kulyab, and Tashkent), 16h. (near Andijan), 18h. (Edinburgh and near Ottawa), 23h. (Tucson and near Tacubaya).

Oct. 14d. 15h. 59m. 10s. Epicentre 33°·0N. 131°·9E.

Intensity V at Matuyama ; IV at Uwazima, Miyazaki, Koti, Simidu ; II-III at Hirosima, and Takamatsu.
Epicentre as adopted. Macroseismic Radius 200-300km. Shallow.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1948, Tokyo, 1950, p. 42-43, with macroseismic chart p. 42.

A = −·5612, B = +·6254, C = +·5421 ; δ = −6 ; h = +1 ;
D = +·744, E = +·668 ; G = −·362, H = +·403, K = −·840.

		△	Az.	P.	O−C.	S.	O−C.		
		°	°	m. s.	s.	m. s.	s.		
Matuyama		0·8	41	0 23k	+ 5	0 41	+10		
Simidu		0·9	97	0 23	+ 3	0 42	+ 8		
Kumamoto		1·0	260	0 20a	− 1	0 34	− 2		
Izuka		1·2	305	0 18k	− 6	0 33	− 8		
Miyazaki		1·2	201	0 22	− 2	0 41	0		
Hirosima		1·4	17	0 27	0	0 46	0		
Hukuoka		1·4	296	0 20k	− 7	0 37	− 9		
Unzendake		1·4	260	0 36	+ 9	—	—		
Koti		1·5	67	0 29k	+ 1	0 51	+ 2		
Kagosima		1·8	220	0 28k	− 4	0 50	− 6		
Muroto		1·9	82	0 34k	0	1 0	+ 1		
Sumoto		2·8	61	0 47k	0	1 20	− 2		
Tottori		3·1	37	0 39	−12	1 17	−12		
Kobe		3·2	57	0 51	− 1	1 30	− 2		
Siomisaki		3·3	81	0 53	0	1 34	− 1		
Osaka		3·4	60	0 59k	+ 4	1 40	+ 3		
Toyooka		3·5	42	0 50	− 7	1 35	− 5		
Owase		3·7	72	0 43	−17	1 43	− 2		
Kameyama		4·2	63	1 6	− 1	1 56	− 1		
Hikone		4·3	57	0 41k	−27	1 32	−28		
Gihu		4·7	58	1 12	− 2	2 7	− 3		
Nagoya		4·7	61	1 13	− 1	2 10	0		
Toyama		5·7	48	1 20	− 8	2 52	S*		
Hunatu		6·2	64	1 18	−17	—	—		
Misima		6·2	68	1 39	+ 4	2 45	− 3		
Nagano		6·3	53	1 49	+13	2 44	− 6		
Maebasi		6·8	58	2 0	P*	3 20	S*		

Oct. 14d. 21h. 42m. 26s. Epicentre 22°·7S. 179°·4E. Depth of focus 0·080.
(as on 1945, Sept. 11d.).

A = −·9234, B = +·0097, C = −·3837 ; δ = −1 ; h = +4 ;
D = +·010, E = +1·000 ; G = +·384, H = −·004, K = −·923.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		12·2	45	2 46a	+ 5	4 46	− 4	—	—	—
Auckland	N.	14·6	195	5 4	S	(5 4)	−31	—	—	13·1
Tuai	N.	16·2	187	5 4	S	(5 4)	−59	—	—	12·9
Wellington		18·9	192	6 46	S	(6 46)	− 4	—	—	14·0
Kaimata		20·9	197	4 14	+ 8	e 7 17	− 6	—	—	—
Brisbane		24·3	254	i 4 39	+ 3	i 8 14	− 4	i 7 21	?	—
Riverview		27·1	239	i 5 0a	− 1	i 8 59	− 3	i 7 36	sP	e 12·6
Vladivostok		78·7	326	e 11 7	0	i 20 16	− 4	—	—	—
Santa Barbara	Z.	81·1	48	e 11 20a	0	—	—	e 13 33	pP	—
Branner	Z.	81·2	44	i 11 21a	+ 1	—	—	i 13 39	pP	—
Berkeley	Z.	81·4	44	i 11 22a	+ 1	—	—	e 12 41	pP	—
Lick	Z.	81·5	44	i 11 22a	0	—	—	i 13 36	pP	—
La Jolla	Z.	81·9	51	i 11 23a	− 1	—	—	e 13 39	pP	—
Pasadena		81·9	49	i 11 24a	0	e 14 34	sP	i 13 38	pP	—
Mount Wilson		82·1	49	i 11 25a	0	i 14 36	sP	e 13 38	pP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Arcata	z.	82·2	39	i 11 31k	+ 6	—	—	—	—	—
Palomar		82·4	50	i 11 27a	+ 1	i 14 45	sP	e 13 41	pP	—
Riverside		82·4	49	i 11 26a	0	i 14 45	sP	i 13 41	pP	—
Haiwee		83·2	47	e 11 17a	−13	e 14 41	sP	i 13 45	pP	—
Mineral	z.	83·3	41	i 11 30a	− 1	e 20 42	−24	i 13 50	pP	—
Tinemaha		83·5	47	i 11 32a	0	e 20 57	−11	i 13 53	pP	—
Boulder City		85·2	49	i 11 40	0	—	—	e 13 55	pP	—
Pierce Ferry		85·9	49	i 11 44	0	—	—	i 13 58	pP	—
Tucson		86·2	53	i 11 45a	0	—	—	i 13 59	pP	—
Victoria		87·3	34	i 11 49	− 1	—	—	e 14 11	pP	—
Grand Coulee		89·4	37	i 11 58	− 2	e 21 59	− 4	i 14 18	pP	—
La Paz	z.	103·3	115	e 13 35	P	—	—	i 16 5	pP	—
Ottawa	z.	116·1	49	e 17 39	[− 2]	—	—	—	—	—
Tashkent		119·4	306	i 19 5	PP	25 6	?	—	—	—
Stalinabad		119·6	303	e 19 0?	PP	—	—	—	—	—
Sverdlovsk		124·4	324	19 46	PP	e 25 39	?	e 26 53?	?	—
Moscow		136·6	330	e 20 52	PP	—	—	—	—	—
Copenhagen		145·7	347	18 37	[0]	—	—	—	—	—
Ksara		146·2	297	i 18 40	[+ 2]	—	—	21 0	pPKP	—
Istanbul		149·1	314	e 18 43	[+ 1]	—	—	—	—	—
Collmberg		149·6	344	e 18 49	[+ 6]	—	—	—	—	—
Jena	N.	150·3	344	e 18 49	[+ 5]	—	—	—	—	—
Helwan		150·5	291	i 19 1a	[+17]	22 4	sPKP	21 10	pPKP	—
Stuttgart	z.	152·9	346	e 18 46	[− 2]	—	—	e 21 23	pPKP	—
Paris		153·8	356	e 18 48	[− 1]	—	—	i 19 14	PKP_2	—
Rome		157·9	334	e 36 25	PPS	e 48 34	SSS	e 41 42	?	—
Granada		165·3	10	19 58	[+56]	—	—	23 54s	PP	—
Tamanrasset		174·4	—	e 19 8	[+ 1]	e 30 32	SKKS	i 21 36k	pPKP	—

Additional readings :—
Riverview iP_cPZ =7m.54s., iZ =8m.40s., iS_cPZ =10m.44s., iS_cSE =14m.40s., iS_cSN = 14m.43s.
Branner iZ =11m.25s.
Berkeley iZ =11m.25s.
Lick iZ =11m.36s., 13m.39s., 13m.54s., 14m.39s., and 14m.46s.
La Jolla iZ =11m.38s.
Pasadena iZ =12m.24s. and 13m.42s., eZ =14m.50s.
Mount Wilson iZ =11m.41s., 12m.11s., and 13m.43s.
Palomar iZ =11m.42s., 13m.44s. and 14m.54s., eZ =15m.55s.
Mineral iE =11m.43s.
Tinemaha iZ =11m.41s., esPZ =14m.53s.
Boulder City ePP =14m.37s.
Pierce Ferry iPP =15m.14s.
Tucson i =11m.56s., e =15m.19s., i =15m.29s.
Ksara PP =22m.0s.
Helwan ePP =23m.10s.
Stuttgart eZ =18m.54s.
Paris i =18m.58s.
Granada pPP =24m.14s.k.
Tamanrasset $ePKP_2$? =20m.45s., e =28m.19s.

Oct. 14d. Readings also at 0h. (Tucson, near Tacubaya and near Stalinabad (2)), 2h. (near Samarkand, Stalinabad, Tashkent, and Andijan), 5h. (Wellington, Auckland, Arapuni, Christchurch, Ottawa, and Ksara), 6h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, and Tucson), 7h. (Bogota), 8h. (near Kulyab, Stalinabad, and near Balboa Heights), 9h. (Balboa Heights, near Kulyab, Stalinabad, and near Branner, Lick, and Berkeley), 10h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, and Tucson), 11h. (Brisbane, Berkeley, Mount Wilson, Pasadena, Haiwee, La Jolla, Palomar, Riverside, Tinemaha, Boulder City, Grand Coulee, and Tucson), 17h. (near Andijan), 19h. (Kulyab and near Stalinabad), 22h. (Ottawa (2)).

Oct. 15d. 22h. 43m. 47s. Epicentre 61°·0S. 21°·0W.

$A = +·4549$, $B = -·1746$, $C = -·8732$; $\delta = -10$; $h = -9$;
$D = -·358$, $E = -·934$; $G = -·815$, $H = +·313$, $K = -·487$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Plata		35·2	302	6 54	− 4	12 15	−16	7 57	PP	20·9
La Paz		55·6	303	i 9 40a	0	17 22	− 3	i 9 47	pP	26·2
Huancayo		62·7	297	e 10 31	+ 2	e 19 4	+ 7	e 14 57	PPP	i 26·8
Tananarive		63·3	81	e 10 34	+ 1	e 19 8	+ 4	12 55	PP	27·4
Christchurch		75·2	191	11 43	− 3	21 29	+ 4	14 40	PP	37·1
Bogota		77·2	305	i 11 55	− 2	i 21 54	+ 7	e 26 27	SS	—
Wellington		77·3	193	12 3	+ 5	22 13	+25	15 23	PP	42·2
Arapuni	E.	80·3	194	10 13	−121	22 49	+29	28 13	SS	—
Auckland	N.	81·6	194	—	—	i 25 25	?	32 47	SSS	44·0
Fort de France		82·0	322	e 12 20	− 3	e 22 42	+ 5	—	—	—
Riverview		85·3	174	e 12 41	+ 1	23 9	− 1	e 15 56	PP	35·1
Tamanrasset		86·2	25	e 12 44	0	—	—	—	—	—
San Juan		87·0	318	e 13 17	+29	i 23 15	[+ 1]	e 16 8	PP	e 34·8
Brisbane		91·7	175	—	—	i 23 44	[+ 1]	e 30 15	SS	i 37·2
Granada		98·9	13	i 14 12k	+29	i 25 28	+17	e 16 58	PP	i 39·7
Algiers		99·4	19	—	—	e 26 35	PS	32 17	SS	46·2
Bermuda		99·6	323	e 17 51	PP	e 24 27	[+ 2]	e 26 35	PS	e 45·7
Lisbon	N.	99·8	9	—	—	—	—	32 1	SS	41·2
Helwan		100·0	44	e 13 48	0	26 57	PS	17 54	PP	—
Alicante		100·4	16	—	—	e 25 37	+13	—	—	e 42·8
Toledo	Z.	101·5	13	e 14 14	+19	e 25 44	+11	e 18 23	PP	40·1
Kodaikanal	E.	103·0	92	—	—	e 24 13	[−28]	—	—	—
Ksara		105·2	46	18 32	PP	28 40	PPS	—	—	—
Rome		106·1	25	e 14 14	− 1	26 4	− 7	e 27 58	PS	43·8
Clermont-Ferrand		108·2	17	e 19 19	PP	e 29 21	PPS	e 34 16	SS	44·2
Istanbul		109·6	38	18 53	PP	28 51	PPS	—	—	—
Hyderabad	N.	109·7	89	e 19 2	PP	28 28	PS	—	—	—
Philadelphia		109·8	318	e 18 28	[− 5]	e 24 28	[−43]	—	—	e 40·9
Triest		110·0	25	e 19 34	PP	e 28 32	PS	e 21 51	PPP	e 45·4
Fordham		110·2	320	e 19 13	PP	i 28 34	PS	e 34 12	SS	51·5
Basle		110·6	20	e 10 41	?	—	—	e 19 14	PP	e 56·2
Zürich		110·6	20	e 19 9	PP	—	—	e 19 55	?	—
Belgrade		110·7	30	e 19 9a	PP	e 28 40	PS	—	—	e 67·2
Halifax		110·8	329	—	—	e 28 35	PS	(34 55)	SS	34·9
Paris		111·1	16	e 19 16	PP	e 28 45	PS	e 38 53?	SSS	52·2
Strasbourg		111·7	20	e 19 20	PP	e 28 51	PS	e 34 51	SS	45·2
Stuttgart		112·1	21	e 19 28	PP	e 28 33	PS	e 34 54	SS	e 45·2
Kew		113·3	13	e 29 13	PS	e 35 7	SS	—	—	e 38·2
Uccle		113·3	16	e 23 13	?	e 26 13?	(−15)	e 29 1	PS	e 56·2
Cleveland		113·3	314	i 19 30	PP	e 28 56	PS	e 35 16	SS	—
Cheb		113·9	22	e 19 13?	PP	e 29 1	PS	e 22 25	PPP	e 46·2
St. Louis		114·1	306	e 19 38	PP	e 25 51	[+22]	e 26 41	SKKS	—
Yalta		114·2	40	e 20 2	PP	29 18?	SKSP	—	—	—
Prague		114·3	24	e 19 13	PP	e 25 25	[− 4]	e 22 25	PPP	e 51·2
De Bilt		114·7	17	e 20 13?	PP	e 29 13?	PS	e 35 13?	SS	e 54·2
Ottawa		114·9	320	e 19 49	PP	e 29 15	PS	(35 13?)	SS	35·2
Seven Falls	E.	115·0	324	e 19 55	PP	e 29 25	PS	—	—	43·2
Chicago		115·8	310	e 29 9	PP	e 35 20	SS	—	—	e 50·9
Potsdam		116·3	22	e 19 17?	[+31]	e 25 1	[−36]	e 20 10?	PP	e 46·2
Tucson		117·6	287	e 18 47	[− 1]	e 29 54	PS	e 19 58	PP	e 43·9
Warsaw		117·8	27	—	—	e 29 47	PS	e 30 48	PPS	e 55·2
Aberdeen	N.	118·8	11	—	—	i 30 21	PS	—	—	e 56·2
Calcutta	E.	118·8	95	e 20 6	PP	e 27 16	{+10}	e 29 50	PS	—
Copenhagen		119·3	20	20 19	PP	29 55	PS	36 43	SS	50·2
Palomar	Z.	121·3	283	i 18 56	[+ 1]	—	—	i 20 26	PP	—
Riverside	Z.	122·1	283	i 18 56	[− 1]	—	—	—	—	—
Pierce Ferry		122·2	287	i 18 56	[− 1]	—	—	e 20 32	PP	—
Mount Wilson	Z.	122·6	283	e 18 53	[− 5]	—	—	—	—	—
Pasadena		122·6	283	e 18 57	[− 1]	i 37 28	SS	i 20 49	PP	e 51·7
Samarkand		122·8	66	e 19 23	[+25]	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ivigtut		123·6	344	—	—	37 13	SS	—	—	57·2
Upsala		124·2	22	22 30?	PKS	e 33 37	?	e 37 13?	SS	e 53·2
Tinemaha	z.	125·0	284	e 19 4	[+ 2]	—	—	e 20 49	PP	—
Moscow		125·2	36	—	—	e 25 53	[−13]	e 37 1	SS	—
Tashkent		125·2	67	19 8	[+ 5]	e 26 15	[+ 9]	e 22 28	PKS	—
Tchimkent		126·1	67	e 19 25	[+21]	—	—	—	—	—
Lick	z.	126·8	282	e 19 7k	[+ 1]	—	—	e 21 14	PP	—
Branner	z.	127·1	282	i 19 8k	[+ 2]	—	—	—	—	—
Berkeley		127·5	282	—	—	e 32 31	PPS	e 38 25	SS	—
Frunse		128·8	69	e 19 52	[+42]	—	—	—	—	—
Almata		130·2	71	e 22 35	PKS	—	—	—	—	—
Scoresby Sund		131·2	359	e 22 55	PKS	—	—	—	—	—
Sverdlovsk		133·7	48	e 19 17	[− 2]	22 52	PKS	i 21 51	PP	—
Grand Coulee		133·8	293	e 19 17	[− 2]	—	—	e 21 45	PP	—
Victoria		136·2	290	e 19 37	[+13]	e 39 55	SS	e 23 25	PKS	60·2
Sitka		147·5	293	e 20 1	[+18]	e 26 7	[−43]	e 42 19	SS	e 59·5
Irkutsk		149·5	80	e 19 45	[− 2]	e 27 13	[+20]	e 35 13	PS	—
Vladivostok		155·8	126	e 19 53?	[− 3]	27 29	[+28]	23 46	PKS	—

Additional readings :—
La Plata PPPE =8m.15s., SSN =14m.34s., QE =15m.34s., QN =15m.44s.
La Paz isP?EN =10m.6s., P_cP =10m.53s., iPPZ =11m.49s., iPS?E =18m.7s., isS?E = 18m.41s., SS =21m.9s., SSS =23m.23s.
Huancayo eSS? =22m.45s.
Tananarive S_cS? =20m.1s., SS =23m.1s., SSS =26m.5s.
Christchurch eZ =13m.10s., PPPZ =16m.43s., SS =26m.15s., SSS =30m.18s., QE = 32m.3s.
Wellington eZ =16m.51s. and 22m.41s., iZ =23m.30s., PSZ =23m.51s., eZ =25m.15s. and 25m.59s., SSZ =27m.3s., QZ =35m.13s.?.
Arapuni eE =32m.37s.?.
Auckland SSSN =35m.17s.
Riverview iP_cPZ =12m.46s., iPPZ =16m.2s., iSKSN =23m.0s., iS_cSE =23m.14s., ePSN =24m.4s., iSSN =28m.39s., eQE =34m.43s.
Tamanrasset i =12m.57s.k.
San Juan e =16m.45s., iSS =29m.12s., eSSS =32m.20s.
Granada P_cP =14m.29s., SKKS =25m.5s., PPS =27m.17s., iSS =31m.56s., SSS =35m.53s.
Bermuda iSS =32m.8s.
Helwan PPS =27m.49s., SS =32m.19s.
Toledo eSKSZ =24m.53s., eSSZ =32m.41s.
Rome ePPZ =19m.28s., ePPS =29m.0s., iSS =33m.47s.
Clermont-Ferrand eSSS =37m.34s.
Triest ePPS =29m.34s., eSS =34m.32s.
Belgrade e =19m.32s.
Paris ePPS =29m.43s., e =36m.13s.?, eQ =46m.13s.?.
Strasbourg e =19m.27s., 19m.39s., 19m.59s., and 20m.33s., ePPS =29m.50s., e =36m.23s. and 38m.13s., eSSS =38m.49s.
Stuttgart eZ =19m.36s., e =20m.35s., ePPP =21m.48s., ePPS =29m.53s., ePKKPZ = 30m.41s.
Uccle eSSE =35m.13s., eSSN =35m.43s., eSSSN =39m.7s., eEN =48m.13s.?.
Cleveland ePPE =19m.33s., eEN =29m.37s., eN =30m.33s. and 33m.36s., eSSE =35m.20s.
Cheb e =21m.13s.?, e =24m.37s., ePPS =30m.1s., e =36m.52s., and 38m.25s., eSSS = 40m.29s.
St. Louis eS =27m.32s., iPS =29m.4s., iPPS =30m.22s.
Prague e =17m.37s., e =21m.13s., ePS =29m.40s., ePPS =30m.32s., e =34m.43s., eSS = 35m.31s., eSSS =39m.43s.
Potsdam eN =20m.55s., eZ =21m.1s.
Tucson e =20m.58s., ePKKP =29m.9s.
Warsaw eSKKSN =30m.52s., eE =31m.51s., eN =32m.11s., eE =32m.37s., eN =35m.10s PKKSE =37m.47s., eN =40m.20s.
Calcutta eE =36m.26s.
Palomar iZ =19m.8s., and 19m.24s.
Pasadena iZ =19m.14s.
Upsala eN =40m.13s.?.
Berkeley eZ =32m.43s.
Irkutsk eSS =42m.49s.
Vladivostok ePP =23m.52s., SKKS =30m.49s., ePS =34m.56s., iSS =43m.56s., SSS = 50m.7s.
Long waves were also recorded at Tortosa.

Oct. 15d. Readings also at 3h. (La Paz, Ksara, and Tamanrasset), 6h. (Apia (2)), 8h. (Arapuni and Wellington), 9h. (Apia), 10h. (Mizusawa, Vladivostok, and Sverdlovsk), 11h. (Istanbul, Ksara, Rome, Triest, Basle, Zürich, Paris, Strasbourg, Stuttgart (2), Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Mineral and Grand Coulee), 14h. (Pierce Ferry), 15h. (near Apia), 17h. (near Andijan, Kulyab, Stalinabad, Tashkent, and near Zürich (2)), 18h. (Berkeley), 19h. (Grand Coulee and near Ottawa), 20h. (Kodaikanal and Ksara), 21h. (Moscow, Sverdlovsk, and Stalinabad).

Oct. 16d. 1h. 55m. 50s. Epicentre 21°·8S. 170°·8E. (as on 12d.).

$A = -\cdot 9173$, $B = +\cdot 1486$, $C = -\cdot 3693$,; $\delta = -10$; $h = +4$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	15·4	168	4 5	PPP	7 30	+58	—	—	8·7
Arapuni	E.	16·8	166	—	—	7 34	SSS	—	—	—
Brisbane		17·1	247	i 3 58	− 4	i 7 15	+ 3	i 4 13	PP	—
Tuai	N.	17·8	165	4 30	PP	8 10	SSS	—	—	—
Apia		18·4	68	e 4 25	PP	e 7 10?	−31	—	—	—
Kaimata		20·7	180	5 13	PPP	—	—	—	—	—
Riverview		21·0	230	e 4 52k	+ 5	i 8 54	+17	i 5 12	PP	10·4
Christchurch		21·7	176	5 8	+13	9 18	+27	10 0	Q	12·0
Vladivostok		73·9	332	e 11 34	− 5	i 21 4	− 6	—	—	—
Lick	Z.	86·6	47	e 11 47k	−59	—	—	—	—	—
Pasadena		87·5	52	e 12 51	0	—	—	—	—	e 39·2
Mount Wilson	Z.	87·6	52	e 12 53	+ 2	—	—	—	—	—
Riverside	Z.	88·0	52	e 12 54	+ 1	—	—	—	—	—
Palomar		88·1	53	i 12 55	+ 1	—	—	—	—	—
Mineral	Z.	88·2	45	e 12 54	0	—	—	—	—	—
Tinemaha	Z.	88·8	50	e 12 50	− 7	—	—	i 13 6	P_cP	—
Boulder City		90·7	51	e 13 8	+ 2	—	—	—	—	—
Victoria		91·3	38	e 13 8	− 1	—	—	—	—	—
Pierce Ferry		91·4	52	e 13 11	+ 2	—	—	—	—	—
Tucson		92·1	56	e 13 15	+ 3	—	—	e 15 50	?	e 42·3
La Paz	E.	110·9	119	e 14 10	P	i 29 10	PS	i 19 26	PP	—
Ksara		138·7	297	e 19 43?	[+15]	—	—	23 15	PKS	—
Istanbul		142·5	310	e 18 47	[−48]	—	—	e 22 47	PP	—
Jena	N.	146·7	335	e 19 45	[+ 3]	—	—	—	—	—
Stuttgart	Z.	149·4	337	e 19 47	[+ 1]	—	—	e 23 30	PP	—
Strasbourg		150·0	338	e 20 21	PKP_2	—	—	—	—	—
Zürich		150·7	336	e 20 2	PKP_2	—	—	—	—	—
Basle		151·0	337	e 19 58	[+ 9]	e 30 41	{+17}	—	—	—
Paris		151·5	345	e 19 55	[+ 5]	—	—	e 20 35	?	79·2
Tamanrasset		166·3	277	e 20 15	[+ 8]	—	—	e 21 12	PKP_2	—

Additional readings :—
Brisbane eSE =7m.18s., iSSN =7m.32s.
Riverview iP =5m.0s., iPPPN =5m.34s., iPcPZ =8m.58s., isSN =9m.16s., iE =9m.21s., iZ =9m.24s., iSSN =9m.30s., iN =9m.53s.
Christchurch iNZ =7m.2s., and 10m.41s.
Jena eE =19m.49s.
Stuttgart eZ =20m.22s. and 20m.43s.
Tamanrasset ePKP_2 =25m.11s.
Long waves .were also recorded at Berkeley, Ottawa, Seven Falls, Uccle, Clermont-Ferrand, Rome, and Granada.

Oct. 16d. 4h. 30m. 39s. Epicentre 21°·8S. 170°·8E. (as at 1h.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Brisbane		17·1	247	i 4 2	0	i 7 10	− 2	—	—	—
Riverview		21·0	230	e 4 53	+ 6	i 8 51	+14	—	—	e 10·2
Branner	Z.	86·2	47	(i 12 33a)	−11	—	—	—	—	—
Lick	Z.	86·6	47	i 12 44a	− 2	—	—	—	—	—
La Jolla	Z.	87·5	54	e 12 49	− 2	—	—	—	—	—
Pasadena	Z.	87·5	52	i 12 48k	− 3	—	—	i 12 54	P_cP	—
Mount Wilson	Z.	87·6	52	i 12 48k	− 3	—	—	i 12 55	P_cP	—
Riverside	Z.	88·0	52	i 12 50k	− 3	—	—	i 12 57	P_cP	—
Palomar	Z.	88·1	53	i 12 51k	− 3	—	—	i 12 55	P_cP	—
Mineral	Z.	88·2	45	i 12 50a	− 4	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Haiwee	z.	88·6	50	e 12 53k	− 3	—	—	—	—	—
Tinemaha	z.	88·8	50	i 12 55k	− 2	—	—	i 13 2	P_cP	—
Boulder City		90·7	51	i 13 5	− 1	—	—	—	—	—
Victoria	z.	91·3	38	e 13 5	− 4	—	—	—	—	—
Pierce Ferry		91·4	52	i 13 7	− 2	—	—	—	—	—
Tucson		92·1	56	i 13 11k	− 1	—	—	—	—	—
Ksara		138·7	297	—	—	e 32 21	PS	—	—	—
Stuttgart	z.	149·4	337	—	—	e 27 55	[+62]	—	—	—
Strasbourg		150·0	338	—	—	e 27 57	[+63]	—	—	—
Paris		151·5	345	—	—	i 27 52	[+56]	—	—	—
Tamanrasset		166·3	277	e 21 7	[+60]	—	—	—	—	—

The reading for Branner is reduced by ten minutes.
Long waves were also recorded at Wellington, Auckland, Istanbul, Clermont-Ferrand and De Bilt.

Oct. 16d. Readings also at 0h. (College, Bombay, and Clermont-Ferrand), 1h. (near Branner, Lick, Mineral, and Arcata), 4h. (Christchurch, Boulder City, College, Grand Coulee, Pierce Ferry, Tucson, Pasadena, Mount Wilson, Riverside, Palomar, La Jolla, Haiwee, Santa Barbara, Tinemaha, Lick, Mineral (2), and Victoria (2)), 6h. and 8h. (Theodosia), 9h. (near Alicante), 14h. (Brisbane, Riverview, Wellington, Arapuni, Pierce Ferry, Pasadena, Mount Wilson, Riverside, and Palomar), 19h. (Brisbane and Stuttgart), 21h. (La Paz and near Stalinabad), 23h. (Samarkand, near Andijan, Frunse, Tchimkent, Tashkent, and Almata).

Oct. 17d. 6h. 16m. 31s. Epicentre 37°·9N. 58°·6E. (as on 6d.).

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Samarkand		6·8	72	e 1 45	+ 1	—	—
Stalinabad		8·0	82	e 1 53	− 7	i 3 29	− 4
Tashkent		8·9	64	e 2 4	− 8	e 3 47	− 8
Tchimkent		9·5	59	i 2 10	−10	i 3 57	−13
Grozny		11·2	303	e 2 53	+ 9	e 5 1	+ 9
Leninakan		11·8	289	e 3 7	+14	—	—
Murgab		12·1	83	2 51	− 6	5 4	−10
Frunse		13·2	63	e 3 6	− 5	e 5 33	− 7
Ksara		18·8	263	e 4 22	− 1	e 7 50	0
Sverdlovsk		19·0	4	4 19	− 7	7 53	− 2
Moscow		22·7	329	e 5 5	+ 1	e 9 12	+ 3
Stuttgart	z.	36·9	304	e 7 5	− 7	—	—

Stuttgart gives also e =7m.9s.

Oct. 17d. Readings also at 1h. (Istanbul), 2h. (Auckland, Christchurch, Wellington, Huancayo, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, and Stuttgart), 3h. (Ksara), 5h. (near Berkeley, Branner, Lick, and San Francisco), 7h. (Sotchi, Baku, Piatigorsk, near Erevan and Leninakan, Samarkand, near Andijan, Murgab, Stalinabad, and Kulyab), 9h. (near Alicante), 12h. (Ksara and near Istanbul), 13h. (Auckland, Christchurch, Wellington, Frunse, near Andijan and Tchimkent), 16h. (Klyuchi), 18h. (near Mizusawa), 20h. (Mineral and Stuttgart).

Oct. 18d. 8h. 59m. 53s. Epicentre 35°·5N. 27°·2E. (as on 1948, July 26d.).

$A = +·7258$, $B = +·3730$, $C = +·5781$; $\delta = +11$; $h = 0$;
$D = +·457$, $E = -·889$; $G = +·514$, $H = +·264$, $K = -·816$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul	5·8	14	i 1 23	− 6	i 2 49	+11	—	—	—
Helwan	6·6	147	i 1 41k	0	3 5	+ 7	2 19	P_g	—
Ksara	7·4	101	e 1 51	− 1	3 13	− 5	—	—	—
Bucharest	8·9	355	e 2 15	+ 3	e 3 51	− 4	e 4 42	S_g	—
Taranto	9·3	305	2 13	− 4	e 4 48	S*	e 3 15	P_g	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Messina		9·7	289	e 2 25	+ 3	e 4 12	− 3	—	—	—
Catania		10·0	285	e 2 45	PPP	e 4 57	?	—	—	—
Belgrade		10·6	333	e 2 36a	0	—	—	—	—	i 5·4
Theodosia		11·4	31	e 2 44	− 3	—	—	—	—	—
Sotchi		12·6	46	3 5	+ 2	—	—	—	—	—
Rome		13·1	304	e 3 11	+ 1	i 5 39	+ 1	—	—	e 7·3
Budapest		13·4	335	e 3 14	0	—	—	—	—	e 7·4
Erevan		14·4	66	e 3 32	+ 5	—	—	—	—	—
Triest		14·4	319	i 3 32a	+ 5	i 6 17	+ 8	i 4 44	P_gP_g	i 8·7
Florence		14·8	309	e 3 33	+ 1	e 6 30	+12	—	—	—
Padova		14·8	312	e 3 43	+11	e 6 44	+26	—	—	e 7·3
Piatigorsk		14·9	50	—	—	6 35?	+15	—	—	—
Bologna		15·1	311	e 3 36	0	e 6 28	+ 3	—	—	—
Raciborzu		16·0	338	e 3 44?	− 4	—	—	—	—	e 7·1
Salo		16·2	314	e 3 52	+ 2	—	—	—	—	—
Grozny		16·3	56	e 3 54	+ 2	6 57	+ 4	—	—	—
Pavia		16·8	311	e 4 1?	+ 3	—	—	—	—	—
Prague		17·3	333	e 4 1a	− 3	e 7 14?	− 2	—	—	e 8·4
Warsaw		17·3	348	e 4 4a	0	e 7 19	+ 3	i 4 14	PP	e 9·1
Cheb		18·1	329	i 4 17	+ 3	e 7 43	+ 8	—	—	e 9·1
Zürich		18·3	317	e 4 13a	− 4	e 7 49	+10	—	—	—
Baku		18·5	68	e 4 29	+10	7 53	+ 9	—	—	—
Stuttgart		18·7	322	e 4 20a	− 2	e 8 2	+14	e 4 40	PP	e 10·5
Basle		18·9	317	e 4 17	− 7	—	—	—	—	—
Collmberg		19·1	331	e 4 23	− 4	e 7 53	− 4	e 4 34	PP	10·5
Jena	N.	19·1	330	e 4 24	− 3	e 8 19	+22	—	—	e 10·4
Strasbourg		19·4	320	i 4 28a	− 2	e 8 7	+ 3	i 4 51	PP	10·1
Algiers		19·6	281	e 4 45?	+13	8 25	SS	4 55	PP	e 10·1
Potsdam		19·6	334	i 4 29a	− 3	i 8 15	+ 7	i 4 46	PP	e 11·1
Barcelona		20·5	296	e 4 48	+ 6	—	—	—	—	e 12·3
Clermont-Ferrand		20·9	307	i 4 43	− 3	i 8 42	+ 7	i 9 38	SSS	11·1
Moscow		21·5	16	4 48	− 4	8 41	− 6	—	—	—
Tortosa		21·6	292	4 49	− 5	8 53	+ 4	5 17	PP	13·1
Alicante		22·3	287	5 17	+16	9 3	+ 1	5 33	pP	11·1
Paris		22·5	314	i 5 2	0	e 9 10	+ 5	i 5 31	PP	e 13·1
Uccle		22·5	321	e 5 7	+ 5	e 9 6	+ 1	—	—	e 11·1
Copenhagen		22·6	338	e 5 2a	− 1	9 7	0	—	—	13·1
Tamanrasset		22·7	242	i 5 8a	+ 4	e 9 18	+ 9	i 5 31	PP	—
Helsinki		24·7	358	i 5 21a	− 3	e 9 38	− 6	—	—	e 12·6
Granada		24·8	284	i 5 24a	− 1	i 9 48	+ 2	5 54k	PP	—
Toledo		25·0	290	i 5 27	0	i 9 51	+ 2	i 5 47	pP	12·2
Upsala		25·2	349	e 5 7?	−22	e 9 43	− 9	e 10 54	SS	e 13·1
Sverdlovsk		31·0	36	i 6 19	− 2	11 19	− 7	—	—	—
Stalinabad		33·1	71	i 6 39	− 1	i 11 56	− 3	—	—	—
Tashkent		33·2	67	e 6 39	− 1	e 11 54	− 6	—	—	—
Kulyab		34·0	73	6 52	+ 4	12 14	+ 1	—	—	—
Andijan		35·6	68	e 7 3	+ 2	e 12 37	− 1	—	—	—
Hyderabad	N.	48·7	97	e 8 51	+ 3	15 48	− 2	—	—	—
Irkutsk		55·4	47	—	—	e 17 19	− 3	—	—	—
Ottawa	Z.	73·6	315	e 11 35	− 2	—	—	—	—	—
St. Louis		86·3	316	i 12 41	− 4	i 23 19	− 1	e 23 7	SKS	—
Victoria	Z.	92·4	341	e 13 15	+ 1	—	—	—	—	—
Mineral	Z.	99·2	336	i 13 44a	− 1	—	—	—	—	—

Additional readings :—
Helwan P* = 1m.59s.
Bucharest eN = 3m.29s., eE = 3m.43s.
Belgrade e = 2m.56s.
Rome eZ = 4m.22s.
Padova eN = 5m.12s.
Bologna eZ = 3m.41s., e = 5m.7s.
Warsaw eP = 4m.7s., ePPPZ = 4m.27s., SSZ = 7m.35s., SSE = 7m.39s., eSSSN = 7m.49s., SSSE = 7m.54s., eP_cPZ = 8m.43s., eP_cPN = 8m.46s.
Stuttgart iZ = 4m.24s., iPP = 4m.43s., eZ = 5m.21s.
Basle e = 4m.46s. and 6m.53s.
Collmberg ePPP?EZ = 5m.7s., eEZ = 6m.12s.
Strasbourg e = 6m.1s., eSSS = 9m.4s., iSSS = 9m.7s.

Continued on next page.

Algiers SSS =8m.43s.
Potsdam iPN =4m.35s., iSZ =8m.20s., iSSEN =8m.29s., iN =10m.20s.
Tortosa PPP?E =5m.29s., SS?N =9m.31s.
Alicante PP =5m.47s., PPP =6m.11s., P_cP =9m.11s., SS =9m.35s., SSS =9m.53s., P_cS =12m.59s., S_cS =16m.57s.
Paris iPPP =5m.40s., i =5m.53s., e =9m.25s. iSSS =10m.5s.
Uccle ePZ =5m.13s.?
Copenhagen 9m.37s.
Tamanrasset iPPP =5m.41s.
Helsinki e =5m.32s., 5m.37s., 5m.47s., and 6m.42s.
Granada SS =11m.19s.
Toledo isPZ =5m.58s., iPPZ =6m.14s., eS_cS?Z =16m.49s.
Upsala eSE =9m.40s.
Long waves were also recorded at De Bilt.

Oct. 18d. Readings also at 0h. (near Andijan), 2h. (Upsala), 3h. (Basle, Zürich, Stuttgart, Bogota, Tinemaha, and near Andijan), 4h. (near Andijan), 6h. (Bucharest), 7h. (near Berkeley, Lick, and San Francisco), 9h. (Stuttgart), 10h. (near Klyuchi and near Apia), 11h. (Nanking), 12h. (Klyuchi).

Oct. 19d. 3h. 4m. 28s. Epicentre 35°·5N. 27°·2E. (as on 18d.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		5·8	14	1 27	− 2	i 3 2	S*	—	—	—
Helwan		6·6	147	1 40	− 1	2 56	− 2	—	—	—
Ksara		7·4	101	e 1 53	+ 1	e 3 14	− 4	—	—	—
Bucharest	N.	8·9	355	—	—	e 4 2	+ 7	e 4 43	S_g	—
Taranto		9·3	305	2 42	P*	—	—	—	—	e 5·4
Yalta		10·4	28	e 2 31	− 3	e 4 29	− 3	—	—	—
Belgrade		10·6	333	e 2 42k	+ 6	—	—	—	—	i 6·1
Rome		13·1	304	e 2 42?	−28	5 39	+ 1	—	—	7·2
Triest		14·4	319	e 3 33	+ 6	e 6 18	+ 9	—	—	i 8·9
Baku		18·5	68	e 4 15	− 4	7 54	+10	—	—	—
Stuttgart		18·7	322	e 4 21	− 1	—	—	—	—	e 10·5
Basle		18·9	317	e 4 13	−11	e 7 55	+ 2	—	—	—
Strasbourg		19·4	320	e 4 28	− 2	—	—	—	—	9·5
Moscow		21·5	16	e 4 49	− 3	e 8 52	+ 5	—	—	—
Paris		22·5	314	e 5 5	+ 3	—	—	e 5 37	PP	—
Tamanrasset		22·7	242	e 5 9	+ 5	—	—	—	—	—
Tinemaha	z.	101·0	332	e 14 17	+24	—	—	—	—	—
Mount Wilson	z.	103·4	330	e 14 43	+39	—	—	—	—	—

Additional readings :—
Bucharest eE =4m.39s.
Belgrade e =2m.46s.
Stuttgart eZ =4m.25s.
Strasbourg e =5m.30s. and 7m.2s.
Long waves were also recorded at Prague, Warsaw, Potsdam, and De Bilt.

Oct. 19d. Readings also at 1h. (College (2) and Kew), 3h. (Istanbul, Ksara, Belgrade, Tamanrasset, Pierce Ferry, and Tinemaha), 4h. (Andijan, near Kulyab, and Stalinabad), 5h. (Arapuni, Wellington, and Stalinabad), 6h. and 8h. (La Paz), 9h. (Belgrade and near Apia), 13h. (Wellington and near Murgab), 15h. (near Victoria and near Mizusawa), 16h. (near Messina), 19h. (Istanbul, Stalinabad, Tchimkent, near Andijan and Kulyab), 20h. (Apia and Klyuchi), 22h. (Tinemaha (2), Tucson (2), Boulder City, Pierce Ferry (2), Ottawa, Victoria, and near Klyuchi (3)), 23h. (near Klyuchi (2)).

Oct. 20d. Readings at 0h. (Ksara), 1h. (Ksara and near Murgab), 2h. (Riverside, Tucson, Stuttgart, near Basle, Neuchatel, Zürich, and Clermont-Ferrand), 3h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Mineral, Grand Coulee, near Klyuchi (2), and near Bogota), 4h. (near Klyuchi), 5h. (Alicante and near Apia), 6h. (Theodosia), 7h. (near Berkeley, Branner, and Lick), 8h. (Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, and Pierce Ferry), 9h. (Klyuchi), 10h. (Ksara and Sverdlovsk), 11h. (Mount Wilson (2), Pasadena (2), Palomar (2), Riverside (2), Tinemaha (2), Tucson (2), Boulder City (2), Pierce Ferry (2), Mineral, Fresno, Lick (2), Grand Coulee, Victoria (2), Theodosia, near Klyuchi (7), and near Ottawa), 14h. (near Branner, Lick, and near Granada), 15h. (Ashkabad), 16h. (Ashkabad, Klyuchi, College, and Pierce Ferry), 19h. (near Ottawa), 20h. (Klyuchi, Lick, and Victoria), 21h. (Pierce Ferry), 23h. (Ashkabad, Piatigorsk, near Grozny, Leninakan, near Kulyab, Victoria, and near Grand Coulee),

Oct. 21d. 1h. 48m. 5s. Epicentre 7°·2S. 155°·3E. (as on 1945, Sept. 24d.).

Foreshock of 5h. 1m. 37s.

$A = -·9014$, $B = +·4146$, $C = -·1245$; $\delta = -8$; $h = +7$;
$D = +·418$, $E = +·909$; $G = +·113$, $H = -·052$, $K = -·992$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		20·3	185	i 4 38	− 2	e 8 30	+ 7	e 11 5	Q	e 11·2
Riverview		26·8	187	e 5 47	+ 3	e 10 19	0	—	—	—
Arapuni	E.	35·9	151	—	—	e 12 55?	+13	—	—	—
Fresno	Z.	90·2	53	e 13 4k	0	—	—	—	—	—
Pasadena		91·1	56	i 13 8	0	—	—	—	—	e 46·0
Mount Wilson	Z.	91·2	56	e 13 8	0	—	—	—	—	—
Tinemaha	Z.	91·4	53	i 13 9	0	—	—	—	—	—
Haiwee	Z.	91·6	54	e 13 10	0	—	—	—	—	—
Riverside	Z.	91·8	56	i 13 11	0	—	—	—	—	—
Palomar	Z.	92·1	57	i 13 13	+ 1	—	—	e 16 57	PP	—
Grand Coulee		92·4	42	e 13 13	− 1	—	—	—	—	—
Boulder City		94·1	54	e 13 22	0	—	—	—	—	—
Pierce Ferry		94·8	54	i 13 25	0	—	—	—	—	—
Tucson		97·1	58	e 17 28	PP	—	—	—	—	e 39·7
Ksara		118·3	304	e 19 54	[+65]	e 28 15	?	—	—	—
Stuttgart	Z.	129·7	332	e 19 14	[+ 3]	e 25 38	?	e 21 28	PP	—
Tamanrasset		147·1	302	i 19 47k	[+ 4]	—	—	e 26 12	PPP	—

Additional readings :—
Palomar eZ = 13m.58s. and 17m.20s.
Stuttgart eSKPZ = 22m.35s.
Tamanrasset ePKP = 19m.50s.
Long waves were also recorded at other New Zealand, European, and North American stations.

Oct. 21d. 4h. 50m. 13s. Epicentre 13°·0N. 87°·8W. (as on 1947, Jan 25d.).

$A = +·0374$, $B = -·9740$, $C = +·2235$; $\delta = +3$; $h = +6$;
$D = -·999$, $E = -·038$; $G = +·009$, $H = -·223$, $K = -·975$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Merida		8·1	348	2 23	P*	3 53	+18	4 27	S_g	—
Balboa Heights		9·0	115	e 2 23	+10	e 4 10	+12	—	—	—
Puebla	N.	11·6	302	e 2 58	+ 8	i 5 21	+20	—	—	—
Tacubaya		12·6	302	3 18	PPP	e 6 5	SSS	—	—	e 6·3
Guatanamo Bay		14·0	59	i 3 30	+ 8	—	—	—	—	—
Bogota		15·9	120	i 4 12	PPP	e 7 12	SS	—	—	—
Mobile		17·6	359	i 4 14	+ 6	7 35	+12	i 4 39	PPP	9·8
San Juan		21·5	74	e 4 55	+ 3	e 9 9	SS	e 5 32	PPP	e 10·2
Columbia		21·8	15	e 4 58	+ 2	e 9 3	+11	e 11 16	Q	e 12·2
St. Louis		25·6	4	i 5 33	+ 1	e 10 0	+ 1	i 10 53	SS	e 13·3
Fort de France		25·9	84	e 5 37	+ 2	—	—	—	—	—
Huancayo		27·8	155	e 5 56	+ 3	e 10 36	+ 1	e 7 2	PPP	e 12·7
Tucson		28·5	317	i 5 57a	− 2	e 10 59	+13	i 9 8	P_cP	e 11·2
Chicago		28·7	359	e 6 43	PP	e 10 44	− 6	—	—	e 11·7
Lincoln	E.	28·8	345	—	—	e 10 44	− 7	—	—	e 12·0
Cleveland		28·9	9	i 6 4	+ 1	e 10 49	− 4	e 12 9	SS	—
Philadelphia		29·1	21	e 6 5	+ 1	e 11 0	+ 4	e 6 15	?	e 11·7
Fordham		30·3	22	e 6 16	+ 1	e 11 18	+ 3	i 6 35	?	—
Harvard		32·6	23	i 6 37	+ 2	—	—	—	—	e 16·1
Pierce Ferry		32·9	318	i 6 38	0	e 12 32	+36	i 6 57	?	—
Palomar	Z.	33·3	313	i 6 41a	0	i 12 59	S_cP	i 9 20	P_cP	—
Boulder City		33·4	317	i 6 42	0	—	—	—	—	—
Rapid City	E.	33·7	340	e 6 51	+ 6	—	—	e 8 14	PP	e 15·2
Vermont		33·8	19	e 8 5	PP	e 13 4	+54	—	—	e 13·6
Ottawa		33·9	15	6 47	0	12 9	− 2	14 47	SSS	17·8

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverside	Z.	34·0	314	i 6 47 a	− 1	e 13 1	S_cP	i 9 24	P_cP	—
Rolphton		34·2	13	i 6 49	0	—	—	e 7 8	?	—
Temiskaming		34·4	11	i 6 50	− 1	—	—	7 9	?	—
Mount Wilson	Z.	34·6	314	i 6 52 a	− 1	e 13 14	S_cP	e 9 25	P_cP	—
Pasadena		34·7	314	i 6 52 a	− 2	i 13 2	S_cP	i 9 25	P_cP	e 14·8
Salt Lake City		34·8	328	e 8 1	PP	—	—	—	—	e 14·7
La Paz		35·2	146	i 7 2	+ 4	i 12 27	− 4	i 8 23	PP	17·2
Haiwee	Z.	35·6	317	e 7 1	0	—	—	e 9 29	P_cP	—
Shawinigan Falls	N.	35·8	18	e 7 3	0	—	—	—	—	—
Tinemaha	Z.	36·3	318	i 7 6 a	− 1	i 13 9	S_cP	i 9 30	P_cP	—
Seven Falls	E.	36·9	19	e 7 10	− 2	e 12 54	− 4	—	—	41·8
Fresno	Z.	37·1	316	e 7 11 k	− 3	—	—	i 8 53	PPP	—
Lick	Z.	38·7	316	i 7 26 a	− 1	—	—	i 7 51	?	—
Branner	Z.	39·1	316	e 7 30 k	− 1	—	—	i 9 39	PPP	—
Berkeley		39·4	316	i 7 31	− 2	e 16 41	SSS	i 9 40	PPP	e 21·2
Mineral	Z.	40·2	319	(i 7 39 k)	− 1	i 11 6	?	(i 7 34)	P	—
Saskatoon		41·9	343	—	—	e 17 28	SSS	—	—	—
Grand Coulee		43·4	330	e 8 5	− 1	—	—	—	—	—
Victoria	Z.	45·9	328	i 8 25	− 1	—	—	—	—	—
Strasbourg		84·0	41	—	—	e 22 50	− 7	e 28 24	SS	—
Stuttgart	Z.	84·9	41	e 12 34	− 4	—	—	e 12 57	?	—
Copenhagen		85·1	34	e 12 27	−12	—	—	—	—	51·8
Prague		87·8	39	e 18 41	PPP	e 24 17	PS	—	—	—
Rome		88·9	47	e 13 35	+37	e 23 41	− 3	e 16 57	PP	—
Istanbul		100·8	44	e 16 35	?	—	—	—	—	—
Ksara		109·0	48	e 19 1	PP	e 28 41	PS	—	—	—

Additional readings :—
Bogota iEZ = 4m.45s.,
San Juan e = 6m.51s.
St. Louis iPP = 5m.53s.
Huancayo e = 6m.14s. and 7m.25s.
Tucson i = 6m.11s. and 7m.1s., iS_cP = 12m.42s.
Cleveland ePPPN = 6m.55s.
Palomar iZ = 7m.5s. and 7m.8s.
Ottawa i = 7m.5s.
Riverside iZ = 7m.6s.
Mount Wilson iZ = 7m.14s.
Pasadena eZ = 7m.24s.
La Paz iPPP? = 7m.59s., iSSN = 15m.6s.
Tinemaha iZ = 7m.31s., eZ = 13m.57s.
The readings for Mineral were increased by 3 minutes.
Prague ePPP?Z = 19m.59s., e = 27m.35s.
Rome eSSE = 30m.17s.?.
Long waves were also recorded at Scoresby Sund, Ivigtut, and Ukiah.

Oct. 21d. 5h. 1m. 37s. Epicentre 7°·2S. 155°·3E. (as at 1h.).

A = −·9014, B = +·4146, C = −·1245 ; δ = −8 ; h = +7 ;
D = +·418, E = +·909 ; G = +·113, H = −·052, K = −·992.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		20·3	185	i 4 39	− 1	i 8 32	+ 9	e 8 35	SS	i 12·0
Guam		23·1	333	e 5 15	+ 7	i 9 27	+11	—	—	—
Riverview		26·8	187	e 5 47	+ 3	i 10 19	0	i 5 59	pP	e 13·5
Auckland	N.	34·5	154	6 54	+ 2	12 23	+ 3	9 27	P_cP	17·9
Arapuni	E.	35·9	151	—	—	12 59	+17	—	—	16·4
Wellington		38·1	155	7 24	+ 2	13 14	− 2	8 53	PP	18·4
Christchurch		39·2	159	7 36	+ 5	13 31	− 1	9 15	PP	19·1
Perth		44·2	230	—	—	i 14 43	− 3	i 18 13	SS	i 23·9
Honolulu		54·0	57	—	—	e 17 25	+22	(e 22 31)	SSS	e 22·5
Vladivostok		54·4	339	e 9 31	0	i 17 25	+16	—	—	—
Irkutsk		73·4	331	11 38	+ 2	21 54	S_cS	—	—	—
Colombo	E.	76·5	278	11 57	+ 3	21 42	+ 3	—	—	40·2
Kodaikanal	E.	79·4	282	e 10 43	?	22 23	+13	29 38	?	45·9
Hyderabad	N.	79·7	289	e 12 28	+17	22 26	+13	27 41	SS	e 37·8
College		83·2	20	e 12 30	+ 1	e 22 37	−12	e 31 29	SSS	e 37·4

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sitka		85·0	30	e 12 37	− 1	e 23 13	+ 6	e 16 13	PP	e 34·6
Berkeley		88·4	52	e 12 55	0	i 23 51	+11	i 24 43	PS	e 39·3
Santa Clara	E.	88·6	52	—	—	e 24 0	+18	—	—	e 45·7
Lick	Z.	88·8	52	e 12 56	− 1	—	—	—	—	—
Andijan		89·3	311	13 2	+ 3	—	—	—	—	—
Mineral	Z.	89·4	49	e 12 57	− 3	—	—	—	—	—
Victoria		89·6	41	e 16 53	PP	e 24 10	+19	—	—	41·4
Fresno	Z.	90·2	53	e 13 3k	− 1	—	—	i 13 32	?	e 51·2
Kulyab		90·9	308	e 12 49	−18	—	—	—	—	—
Pasadena		91·1	56	e 13 4	− 4	e 24 17	+13	e 16 34	PP	e 37·4
Mount Wilson	Z.	91·2	56	e 13 6	− 2	—	—	i 15 40	?	—
Tinemaha	Z.	91·4	53	e 13 9	0	—	—	—	—	—
Stalinabad		91·6	309	i 13 12	+ 2	i 24 19	+10	—	—	—
Tchimkent		91·6	312	e 13 6	− 4	—	—	—	—	—
Tashkent		91·7	311	13 10	0	e 24 16	+ 6	e 26 10?	PPS	—
Riverside	Z.	91·8	56	i 13 9	− 2	—	—	e 15 41	?	—
Palomar	Z.	92·1	57	i 13 9	− 3	—	—	e 15 38	?	—
Grand Coulee		92·4	42	e 14 12	+58	—	—	—	—	—
Samarkand		93·2	309	e 12 58?	−19	e 23 36?	[−15]	—	—	—
Boulder City		94·1	54	e 13 21	− 1	—	—	—	—	—
Pierce Ferry		94·8	54	e 13 24	− 1	—	—	—	—	—
Salt Lake City		96·8	49	—	—	e 26 4	PS	—	—	e 40·0
Tucson		97·1	58	e 13 34	− 1	e 24 13	[+ 1]	—	—	e 39·0
Bozeman		97·7	45	e 13 38	0	e 24 3	[−12]	e 26 29	PS	e 40·5
Sverdlovsk		98·5	326	e 13 40	− 2	e 25 13	+ 5	e 17 46	PP	—
Saskatoon		100·6	38	e 27 1	PS	—	—	—	—	46·4
Rapid City	E.	103·2	46	—	—	e 27 37	PS	—	—	e 47·2
Baku		106·4	310	e 18 51	PP	—	—	—	—	—
Lincoln	E.	108·3	49	—	—	e 28 0	PS	—	—	e 49·1
Moscow		111·3	227	e 19 21	PP	28 57	PS	e 35 9	SS	—
St. Louis		113·5	50	—	—	i 29 9	PS	e 35 1	SS	—
Scoresby Sund		116·8	359	20 9	PP	29 49	PS	—	—	—
Yalta		117·0	316	e 20 7	PP	—	—	—	—	—
Ksara		118·3	304	i 20 15	PP	29 57	PS	—	—	—
Cleveland		119·3	46	—	—	e 25 55	[+ 7]	e 30 4	PS	—
Warsaw		121·6	329	e 20 50	PP	e 30 42	PS	e 36 54	SS	e 59·4
Helwan		122·9	300	19 4	[+ 6]	—	—	20 41	PP	—
Copenhagen		123·4	336	20 48	PP	—	—	—	—	57·4
Vermont		123·9	40	—	—	e 27 10	{−30}	e 30 56	PS	e 57·3
Philadelphia		124·4	45	—	—	e 30 39	PS	e 38 20	SSP	e 50·0
Potsdam		125·4	333	e 19 10?	[+ 7]	—	—	e 20 56	PP	e 59·4
Prague		125·7	331	e 19 23	[+19]	e 26 23	[+15]	e 32 41	PPS	—
Belgrade		125·8	321	e 22 25	?	e 29 39	?	—	—	e 74·9
Harvard		125·8	41	e 20 53	PP	e 30 29	PS	—	—	e 59·6
Cheb		127·3	332	e 21 11	PP	e 27 17	{−45}	e 31 35	PS	e 62·4
De Bilt		129·0	337	e 21 28	PP	e 22 40	PKS	e 31 41	PS	e 63·4
Triest		129·3	327	e 19 13	[+ 2]	e 26 2	[−16]	e 21 34	PP	—
Halifax		129·7	35	e 22 31	PKS	e 34 27	?	—	—	64·4
Stuttgart		129·7	332	e 19 12	[+ 1]	e 25 53	[−26]	e 21 28	PP	e 64·4
Strasbourg		130·1	333	e 19 17	[+ 5]	e 26 40	[+20]	e 21 32	PP	61·4
Uccle	Z.	130·3	337	e 21 31	PP	e 22 43?	SKP	e 32 31	?	e 74·4
Bogota		130·8	90	e 19 31	[+17]	22 52	SKP	e 22 1	PP	—
Zürich		130·9	331	e 19 13	[− 1]	e 28 36	{+11}	e 22 37	?	—
La Paz		131·0	119	i 19 15	[+ 1]	39 7	SS	i 21 37	PP	62·1
Kew		131·5	340	e 21 43	PP	e 22 47	SKP	—	—	e 66·4
Basle		131·7	331	e 19 17	[+ 2]	e 28 39	{+ 9}	e 22 35	SKP	—
Florence		131·9	325	e 19 19	[+ 3]	e 22 45	SKP	—	—	—
Rome		132·3	322	e 19 19	[+ 3]	e 26 9	[−17]	e 21 37	PP	e 60·4
Paris		132·6	336	e 19 22	[+ 5]	e 32 20	PS	i 21 50	PP	e 64·4
Clermont-Ferrand		134·8	333	i 19 25	[+ 4]	e 39 53	SS	i 22 2	PP	63·4
San Juan		138·1	70	e 19 30	[+ 3]	e 26 28	[− 8]	e 23 6	PP	e 54·4
Alicante		142·0	328	19 49	[+15]	27 4	[+22]	22 40	PP	e 67·6
Toledo	Z.	142·6	333	e 19 34	[− 1]	e 26 40	[− 3]	i 22 7	PP	—
Lisbon		145·6	337	e 19 40k	[0]	—	—	23 2	PP	60·4
Tamanrasset		147·1	302	e 19 45	[+ 2]	—	—	e 22 21	PP	—

For Notes see next page,

NOTES TO OCTOBER 21d. 5h. 1m. 37s.

Additional readings :—
Brisbane iZ = 5m.5s.
Riverview iN = 6m.21s., iE = 6m.56s., iN = 7m.1s. and 7m.25s., iZ = 10m.39s., iE = iE = 10m.44s., iN = 10m.56s., iE = 11m.23s. and 12m.24s.
Auckland eN = 7m.34s., SSN = 14m.39s., SSSN = 15m.14s.
Wellington SS = 16m.12s.
Christchurch QEN = 16m.18s. SSZ = 16m.39s.
Perth i = 21m.25s.
Sitka e = 15m.34s., iS = 23m.23s., e = 26m.42s., eSS = 29m.11s., eSSS = 32m.35s.
Berkeley iPZ = 12m.59s.a, iZ = 15m.29s., iPPPE = 19m.17s., iE = 21m.57s., iE = 23m.57s. and 24m.25s., iSE = 24m.55s., iPSN = 25m.39s., iE = 33m.51s., eN = 36m.47s.
Pasadena iZ = 14m.6s., iPPZ = 15m.39s., iPPPSE = 25m.22s.
Bozeman eSKS = 24m.45s., eSSS = 35m.24s.
Sverdlovsk iPS = 26m.49s., eSS = 32m.2s.
Warsaw ePS?N = 30m.30s., eE = 31m.0s. and 37m.56s.
Vermont e = 39m.12s.
Philadelphia e = 33m.12s.
Potsdam eEN = 22m.29s., ePPSZ = 32m.30s.
Prague ePP? = 21m.47s., eSKP? = 22m.53s., eSS? = 38m.5s., e = 39m.47s., eSSS? = 43m.23s.
Cheb e = 22m.6s., eSKP = 22m.37s., e = 23mr.23s., ePPP = 24m.23s., e = 30m.53s., ePPS? = 32m.35s.
Triest iPKS = 22m.34s.
Stutggart eZ = 21m.45s., eSKP = 22m.39s., eSS = 38m.59s.
Strasbourg eSKP = 22m.42s., and 22m.45s., eSKKS = 28m.23s., ePKKS = 32m.28s., ePPS = 33m.23s., e = 33m.40s. and 38m.11s., eSS = 38m.25s., eSSS? = 42m.28s.
La Paz i = 22m.46s.
Rome iSKPE = 22m.51s., ePPSE = 33m.38s., eSSE = 39m.31s.?.
Paris iPKS = 22m.50s., i = 23m.5s., e = 31m.32s., ePPS? = 33m.20s., e = 38m.12s., eQ = 60m.23s.?.
Clermont-Ferrand iPKS = 23m.2s.
Alicante PKS = 23m.18s., SKKS = 29m.14s.
Lisbon iPKP$_2$Z = 19m.45s.a, Z = 19m.55s. and 20m.33s., N = 21m.46s.?, NZ = 22m.15s.
Long waves were also recorded at Upsala, Ivigtut, Apia and La Plata.

Oct. 21d. 8h. 31m. 50s. Epicentre 7°·2S. 155°·3E. (as at 5h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		20·3	185	i 4 38	− 2	i 8 26	+ 3	e 4 43	P	i 10·3
Riverview		26·8	187	i 5 51	+ 7	i 10 8	−11	i 10 37	S	e 13·9
Arapuni	E.	35·9	151	—	—	e 15 10?	SS	—	—	—
Wellington		38·1	155	—	—	e 16 16?	SSS	—	—	19·2
Christchurch		39·2	159	—	—	16 22	SS	17 18	Q	19·8
Vladivostok		54·4	339	e 9 29	− 2	e 17 20	+11	—	—	—
Fresno	z.	90·2	53	e 13 6k	+ 2	—	—	—	—	—
Pasadena	z.	91·1	56	e 13 6	− 2	—	—	—	—	e 46·2
Mount Wilson	z.	91·2	56	e 13 7	− 1	—	—	—	—	—
Tinemaha	z.	91·4	53	e 13 10	+ 1	—	—	—	—	—
Tashkent		91·7	311	i 13 13	+ 3	e 24 21	+11	—	—	—
Riverside	z.	91·8	56	i 13 11	0	—	—	—	—	—
Palomar	z.	92·1	57	i 13 12	0	—	—	—	—	—
Sverdlovsk		98·5	326	—	—	25 18	+10	—	—	—
Ksara		118·3	304	e 20 12	PP	e 36 9	SS	—	—	—
Tamanrasset		147·1	302	e 19 46	[+ 3]	—	—	—	—	—

Brisbane also gives iZ = 5m.13s.
Long waves were also recorded at Auckland, and at other European and North American (Canadian) stations.

Oct. 21d. Readings also at 1h. (Auckland, Rome, and near Andijan), 2h. (Mount Wilson (2), Pasadena (2), Palomar (2), Riverside (2), Tinemaha (2), Boulder City (2), Philadelphia, Pierce Ferry (2), Tucson (2), La Paz, La Plata, and Ashkabad), 4h. (Mount Wilson (2), Pasadena, Palomar, Riverside (2), Tinemaha (2), Boulder City, Pierce Ferry (2), Tucson, Lick, Oaxaca, Vera Cruz, Wellington, Auckland, and near Ashkabad), 5h. (Klyuchi), 6h. (Apia), 7h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Pierce Ferry, Tucson, Fresno, Vera Cruz, Bombay, Stuttgart, and Ksara), 8h. (Theodosia), 9h. (near Grozny, Leninakan, Piatigorsk, Erevan, and Sotchi), 10h. (Klyuchi), 11h. (Pierce Ferry, Tucson, Tacubaya, near Apia, near Kulyab, Stalinabad, Andijan, and near Klyuchi (2)), 12h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Pierce Ferry, Tucson, Tacubaya, Helwan, Istanbul, Ksara, Rome, Triest, Paris, Strasbourg, Stuttgart, Tamanrasset, and Klyuchi), 13h. (Pierce Ferry, Frunse, near Kulyab, Andijan, Stalinabad, Tashkent, Samarkand, Tchimkent, and near Klyuchi), 14h. (Mount Wilson (2), Pasadena, Palomar, Tinemaha, Grand Coulee, Pierce Ferry, Tucson (2), La Paz, Huancayo, Apia, Auckland, Christchurch, Wellington, Arapuni, Paris, Stuttgart, Ksara, Tamanrasset, near Stalinabad, and near Klyuchi (2)), 15h. (Mount Wilson, Tinemaha, Grand Coulee, Pierce Ferry, Tucson, Rome, Strasbourg, Clermont-Ferrand, and near Klyuchi (2)), 16h. (near Klyuchi and near Tacubaya (2)), 17h. (Vera Cruz, Apia, Tinemaha, near Ottawa and near Klyuchi (2)), 18h. (Mount Wilson, Palomar, Riverside, Tinemaha, Boulder City, Grand Coulee, Pierce Ferry, Tucson, Salt Lake City, Tacubaya, and near Ashkabad (2)), 20h. (near Klyuchi), 21h. (Pierce Ferry, Grand Coulee, Tinemaha (3), near Tacubaya and near Klyuchi (2)), 22h. (Mount Wilson, Riverside, Boulder City, Pierce Ferry, and Tucson), 23h. (near Berkeley, Branner, Lick, and San Francisco).

Oct. 22d. 14h. North Pacific.

Vladivostok eP =11m.56s.?, eS =16m.36s.
Victoria e =15m.48s.
Grand Coulee iP =16m.8s.
Sverdlovsk iP =16m.31s.
Mineral iPZ =16m.37s.k, iZ =16m.50s.
Berkeley iPZ =16m.49s.a.
Branner ePZ =16m.51s.k.
Lick iPZ =16m.54s.k.
Tinemaha iPZ =17m.10s., iZ =17m.18s.
Haiwee iPZ =17m.16s., eZ =17m.25s.
Pasadena iPZ =17m.24s.
Mount Wilson iPZ =17m.25s., iZ =17m.31s.
Riverside iPZ =17m.27s., iZ =17m.35s.
Boulder City iP =17m.29s.
Pierce Ferry iP =17m.30s.
Palomar iPZ =17m.33s., iZ =17m.50s.
La Jolla iPZ =17m.35s.
Tucson iP =18m.1s.
Stuttgart eZ =19m.9s.
Strasbourg eP =19m.12s., e =19m.44s.
Ksara e =24m.12s.
Long waves recorded at Istanbul.

Oct. 22d. Readings also at 0h. (near Basle, Zürich, and near Kulyab), 1h. (near Klyuchi), 2h. (Mount Wilson, Pasadena, Riverside, Tinemaha (2), Boulder City, Tucson, Pierce Ferry (2), Lick and near Klyuchi (4)), 3h. (near Klyuchi), 4h. (Tinemaha, Tucson, Pierce Ferry, and near Tacubaya (2)), 5h. (Klyuchi and Seven Falls), 6h. (Klyuchi), 9h. (Paris), 10h. (2) and 13h. (near Klyuchi), 14h. (Pierce Ferry (2), Mineral, Victoria, and near Klyuchi (2)), 15h. (Ashkabad, Mount Wilson, Palomar, Pasadena, and Riverside), 16h. (Mount Wilson, Pasadena, Palomar, and Riverside), 18h. (Klyuchi and near Mizusawa), 19h. (Pasadena, Riverside, and Tinemaha), 20h. (Samarkand (2), Tashkent, near Andijan, Frunse, Kulyab (2), Murgab, Stalinabad (2), Tchimkent, and near Klyuchi), 21h. (Stuttgart, Tamanrasset, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Pierce Ferry, and near Ottawa), 22h. (Lick, Pierce Ferry, Stuttgart, Klyuchi, and near Kulyab), 23h. (near Ashkabad (2)).

Oct. 23d. 4h. Undetermined shock.

Victoria e = 32m.48s. and 35m.6s.
Grand Coulee iP = 33m.11s.
Mineral iPZ = 33m.32s.k, iZ = 33m.51s.
Berkeley iPZ = 33m.41s.a, iZ = 33m.52s.
Branner iPZ = 33m.44s a, iZ = 33m.50s.
Lick iPZ = 33m.47s.a, iZ = 34m.3s.
Tinemaha iPZ = 34m.6sk, iZ = 34m.19s., 34m.22s., and 34m.35s.
Haiwee iPZ = 34m.8s., iZ = 34m.23s.
Santa Barbara ePZ = 34m.17s.
Pasadena iPZ = 34m.20s., iZ = 34m.36s.
Mount Wilson iPZ = 34m.21s.k, iZ = 34m.37s.
Riverside iPZ = 34m.24s., iZ = 34m.40s., eZ = 34m.52s.
Boulder City iP = 34m.28s.
Palomar iPNZ = 34m.30s.k, iZ = 34m.46s. and 34m.58s.
Pierce Ferry iP = 34m.30s.
La Jolla ePZ = 34m.33s.
Tucson iP = 35m.3s.k.
Stuttgart eZ = 37m.44s.
Paris iP = 37m.46s.

Oct. 23d. 4h. 47m. 0s. Epicentre 24°·3N. 122°·3E. (as on 1947, Nov. 14d.).

A = −·4876, B = +·7713, C = +·4092; δ = +10; h = +4;
D = +·845, E = +·534; G = −·219, H = +·346, K = −·912.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zi-ka-wei		6·9	354	e 1 32	−13	3 24	S*	—	—	i 3·7
Nanking		8·3	339	e 2 5	+ 1	3 56	+16	—	—	4·4
Vladivostok		20·4	22	e 4 41	0	e 8 45	+20	—	—	—
Irkutsk		31·1	338	6 23	+ 1	—	—	—	—	—
Hyderabad	N.	41·4	269	e 9 45	PP	14 0	− 5	17 22	SS	—
Frunse		43·2	308	e 8 7	+ 3	—	—	—	—	—
Murgab		43·2	301	8 5	+ 1	14 37	+ 5	—	—	—
Andijan		44·6	304	e 8 17	+ 1	—	—	—	—	—
Kodaikanal	E.	44·8	261	e 1 30	?	—	—	—	—	—
Bombay	E.	46·1	274	e 8 29	+ 1	—	—	—	—	—
Kulyab		46·4	299	i 8 29	− 1	i 15 18	0	—	—	—
Tashkent		46·9	305	i 8 34?	0	15 29?	+ 4	—	—	—
Stalinabad		47·2	301	8 39	+ 3	e 15 33	+ 4	—	—	—
Samarkand		48·6	302	e 8 50	+ 3	—	—	—	—	—
Sverdlovsk		54·6	324	i 9 31	− 1	e 17 17	+ 6	—	—	—
Baku		61·6	305	e 9 52	−30	—	—	—	—	—
Riverview	N.	64·0	153	—	—	i 19 15	+ 2	—	—	e 37·2
Grozny		64·2	308	e 10 43	+ 4	—	—	—	—	—
Leninakan		66·1	306	e 10 52	+ 1	—	—	—	—	—
Moscow		67·4	323	e 10 58	− 1	—	—	—	—	—
Sotchi		68·5	309	e 11 6	0	—	—	—	—	—
Ksara		74·1	300	i 11 40a	0	22 57	?	—	—	—
Istanbul		76·8	309	11 56	+ 1	21 42	0	—	—	—
Prague		82·4	322	e 12 26	+ 1	—	—	—	—	e 46·0
Cheb		83·5	323	e 19 19	?	—	—	—	—	e 43·5
Jena	N.	83·5	323	e 12 30	− 1	—	—	—	—	—
Stuttgart		86·0	322	e 12 43a	0	e 24 0	PS	e 16 3	PP	e 48·0
Victoria	Z.	86·8	37	e 12 48	+ 1	—	—	—	—	—
Strasbourg		86·9	323	i 12 48	0	e 23 30	+ 4	e 28 30	SS	43·0
Zürich		87·1	322	e 12 48a	− 1	—	—	—	—	—
Uccle		87·4	326	—	—	e 23 0?	[−17]	—	—	—
Basle		87·6	322	e 12 50	− 1	e 23 20	[+ 2]	—	—	e 55·0
Rome		87·6	316	e 12 50	− 1	e 23 16?	[− 2]	e 29 16	SS	e 46·6
Grand Coulee		89·5	37	i 13 0	0	—	—	—	—	—
Paris		89·6	325	i 13 0	− 1	—	—	e 16 48	PP	e 49·0
Mineral	Z.	92·5	44	i 13 14a	0	—	—	—	—	—
Lick	Z.	94·1	46	i 13 22a	0	—	—	—	—	—
Tinemaha	Z.	96·5	45	i 13 34	+ 2	—	—	—	—	—
Haiwee	Z.	97·2	45	i 13 42	+ 6	—	—	—	—	—
Mount Wilson	Z.	98·3	47	e 14 5	+24	—	—	—	—	—

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.
Pasadena	Z.	98·3	47	e 14 6	+25	—	—	—	—	—
Riverside	Z.	98·9	47	e 14 10	+27	—	—	—	—	—
Pierce Ferry		99·8	43	e 13 46	− 1	—	—	e 18 38	PP	—
Tamanrasset		102·8	303	e 17 41	PKP	—	—	e 18 17a	PP	—
Tucson		104·3	45	e 18 18	PP	—	—	—	—	—
Bogota	Z.	147·1	31	i 19 50	[+ 7]	—	—	—	—	—
La Paz	N.	167·5	53	20 8	[0]	—	—	—	—	103·0

Long waves were also recorded at Ottawa and other European stations.

Oct. 23d. 15h. 45m. 46s. Epicentre 56°·4N. 160°·7E.

A = −·5248, B = +·1838, C = +·8312; δ = +9; λ = −8;
D = +·331, E = +·944; G = −·784, H = +·275, K = −·556.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	21·6	226	4 55	+ 1	8 54	+ 5	—	—	—
Vladivostok		22·6	247	e 5 2	− 1	e 9 18	+11	—	—	—
Irkutsk		32·3	288	e 6 32	− 1	—	—	—	—	—
Victoria		44·7	67	e 8 15	− 1	—	—	—	—	23·2
Grand Coulee		47·3	64	e 8 36	− 1	—	—	—	—	—
Sverdlovsk		50·1	316	i 9 0	+ 1	e 16 11	+ 1	—	—	—
Saskatoon		50·3	54	e 10 43	PP	—	—	—	—	28·2
Berkeley	Z.	52·6	76	i 9 17k	− 1	—	—	—	—	—
Lick	Z.	53·4	76	i 9 22k	− 2	—	—	—	—	—
Frunse		53·8	296	e 9 23	− 3	—	—	—	—	—
Tinemaha		55·4	74	i 9 38k	0	—	—	—	—	—
Haiwee	Z.	56·2	74	i 9 45k	+ 1	—	—	—	—	—
Andijan		56·4	295	9 44	− 1	17 40	+ 4	—	—	—
Santa Barbara	Z.	56·6	77	e 9 47	0	—	—	—	—	—
Mount Wilson		57·6	76	i 9 54k	0	—	—	—	—	—
Pasadena		57·6	76	i 9 53k	− 1	—	—	—	—	—
Tashkent		57·6	298	i 9 53	− 1	i 17 53	+ 2	—	—	—
Boulder City		58·0	72	i 9 56	− 1	—	—	e 11 54	PP	—
Riverside	Z.	58·2	76	i 9 57k	− 1	—	—	—	—	—
Pierce Ferry		58·4	71	i 9 59	− 1	—	—	e 12 14	PP	—
Palomar		58·9	75	i 10 2k	− 1	—	—	—	—	—
La Jolla	Z.	59·1	76	i 10 3k	− 1	—	—	—	—	—
Samarkand		59·9	298	e 10 12	+ 2	—	—	—	—	—
Stalinabad		59·9	296	i 10 8	− 2	—	—	—	—	—
Tucson		63·0	72	i 10 30k	− 1	—	—	—	—	—
Grozny		66·6	315	e 10 52	− 2	—	—	e 13 24	PP	—
Ottawa	Z.	68·1	39	e 11 1	− 3	—	—	—	—	—
Sotchi		68·7	319	e 11 7	0	—	—	e 13 42	PP	—
Leninakan		69·5	315	e 11 22?	+10	—	—	—	—	—
Cheb		70·7	340	e 15 45	PPP	e 20 29	− 5	—	—	e 34·2
Stuttgart		72·5	341	e 11 31	+ 1	—	—	—	—	e 45·2
Strasbourg		73·0	342	e 11 35	+ 2	—	—	—	—	38·2
Paris		73·6	347	i 11 42	+ 5	—	—	—	—	—
Rome		78·5	337	e 12 56	+ 52	e 22 18	+17	—	—	—
Ksara		78·7	316	e 12 14?	+ 8	e 22 14?	PPS	—	—	—
Helwan		83·9	318	e 12 47	+14	i 22 56	0	i 15 50	PP	—
Tamanrasset		98·4	338	e 12 47	−54	—	—	e 17 28	PP	—

Additional readings :—
Klyuchi (Δ = 0°·1) records eP_g = 15h.45m.17s., S_g = 15h.45m.21s.
Lick iZ = 9m.31s.
Tinemaha iZ = 9m.47s. and 10m.0s.
Haiwee iZ = 9m.53s.
Santa Barbara eZ = 9m.55s.
Mount Wilson, iZ = 10m.2s. and 10m.13s.
Pasadena, iZ = 10m.1s. and 10m.6s.
Riverside, iZ = 10m.4s. and 10m.18s.
Palomar, iZ = 10m.11s.
La Jolla, iZ = 10m.11s.
Tuscon, i = 10m.39s.

Continued on next page.

Ottawa, iZ = 11m.7s.
Cheb, e = 23m.45s.
Stuttgart, eZ = 11m.38s.
Strasbourg, iP = 11m.42s.
Helwan, i = 12m.56s.
Long waves were also recorded at Bombay, Kodaikanal, Istanbul, De Bilt, and Seven Falls.

Oct. 23d. Readings also at 1h. (Klyuchi, Kulyab, near Murgab and Stalinabad (2)), 3h. (Pierce Ferry), 6h. (near Klyuchi (2)), 7h. (Nanking), 8h. (Klyuchi), 10h. (Stuttgart), 11h. (Arapuni, Christchurch, Wellington, Riverview, Mount Wilson (2), Pasadena, Riverside (2), Tinemaha (2), Tucson, Pierce Ferry, La Paz, Stuttgart, and Ashkabad), 12h. (Theodosia), 13h. (Pierce Ferry and near Ottawa), 18h. (Mount Wilson, Pasadena, Palomar, Riverside, Pierce Ferry, Stuttgart, Rome, and Tamanrasset), 19h. (Klyuchi (2)), 21h. (Palomar, Riverside, Tinemaha, Lick, Grand Coulee, Kew, Clermont-Ferrand, Paris, Strasbourg, Ksara and Tamanrasset), 23h. (Pierce Ferry, near Berkeley, Branner, Lick, Fresno, Santa Clara, and San Francisco).

Oct. 24d. Readings at 2h. (Ksara), 3h. (La Paz (2) and Pierce Ferry), 5h. (Rome), 6h. and 7h. (Klyuchi), 8h. (near Alicante), 9h. (Klyuchi (2)), 10h. (Klyuchi (6), near Andijan and Tchimkent), 11h. (Klyuchi (3) and Ashkabad (2)), 12h. (Klyuchi, Stalinabad, and near Ashkabad (2)), 13h. (near Ottawa and near Ashkabad (2)), 14h. (near Taranto), 15h. (Klyuchi), 16h. (Arapuni), 17h. (Wellington, Christchurch, Auckland, Apia, Brisbane (2), Riverview (2), Boulder City (2), Pierce Ferry (2), Tucson (2), Pasadena, Mount Wilson (2), Riverside (2), Palomar (2), Haiwee, Tinemaha (2), Lick, Mineral, Stuttgart, and Ksara), 18h. (Seven Falls, La Paz, and Istanbul), 19h. (Klyuchi and near Leninakan), 21h. (Rome and near Stalinabad), 22h. (near Kulyab), 23h. (Stuttgart, Ksara, Murgab, Kulyab, Tashkent, Stalinabad, Sverdlovsk, near Ashkabad and near Mizusawa; several shocks).

Oct. 25d. Readings also at 0h. (Ashkabad), 1h. (Stuttgart), 2h. (La Paz), 3h. (near Klyuchi and near Kulyab), 4h. (Andijan, Murgab, Stalinabad, Sverdlovsk, Leninakan, Irkutsk, Ksara, Grand Coulee, Tinemaha, Pierce Ferry, and Tucson), 5h. (Ashkabad (2) and near Kulyab), 6h. (Ashkabad and Pierce Ferry), 7h. (near Klyuchi and near Stalinabad) 8h. (Mount Wilson, Pasadena, Palomar, Riverside, Haiwee, Boulder City, Pierce Ferry, and Tucson) 9h. (Pierce Ferry), 10h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Riverside, Boulder City, Pierce Ferry, Tucson, La Paz, and near Klyuchi), 11h. (near Ashkabad and near Klyuchi (2)), 12h. (Mount Wilson (3), Pasadena, La Jolla, Palomar, Haiwee, Tinemaha (3), Riverside, Boulder City, Grand Coulee, Pierce Ferry (3), Tucson (3), Victoria, Branner, Lick, Mineral, Vladivostok, near Kulyab, Stalinabad, near Klyuchi (7), and near Alicante), 13h. (Ksara, near Ashkabad and near Klyuchi), 14h. (La Paz), 18h. (near Ashkabad and near Stalinabad), 20h. (Ksara, Belgrade, Bucharest, Rome, Tamanrasset, and near Istanbul), 21h. (Frunse, near Kulyab, Stalinabad, Andijan, Tashkent, Samarkand, Murgab, and Tchimkent), 22h. (Pierce Ferry).

Oct. 26d. 8h. Region of Samoa.

Apia ePʔN = 13m.47s., eSE = 15m.2sʔ, eLEN = 15m.44s.
Christchurch SEN = 22m.2s., LEN = 24m.44s.
Lick iPZ = 22m.54s.. a
Pasadena ePZ = 23m.54s.
Mount Wilson ePZ = 23m.56s.
Palomar iPZ = 23m.57s.
Riverside ePZ = 23m.57s.
Haiwee ePZ = 24m.3s.
La Jolla ePZ = 24m.3s.
Mineral ePZ = 24m.5s.k
Boulder City eP = 24m.8s.
Pierce Ferry iP = 24m.17s.
Tucson iP = 24m.17s.
Grand Coulee eP = 24m.32s.
Stuttgart ePZ = 31m.0s., eZ = 32m.3s., eL = 43·1m.
Rome eZ = 32m.11sʔ
Helwan e = 31m.14s., 32m.9s., and 36m.11s.
Istanbul e = 31m.38s.
Ksara iPKP = 32m.5s., PP = 35m.46s.
Tamanrasset ePKP = 32m.16s., ePKP$_2$ = 34m.7s., ePP = 38m.7s.
Berkeley eE = 45m.48s., eN = 46m.0s.
Long waves were also recorded at Brisbane, Wellington, Auckland, and Arapuni.

Oct. 26d. 19h. 52m. 14s. Epicentre 30°·6N. 131°·8E.

Intensity V at Kagosima; IV at Miyazaki; II-III at Hukuoka.
Macroseismic radius 200-300 km.
Epicentre 31°·6N. 131°·8E. Very shallow.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1948, Tokyo, 1950, pp. 43-44, with macroseismic chart.

$A = -\cdot5747$, $B = +\cdot6428$, $C = +\cdot5065$; $\delta = +1$; $h = +2$;
$D = +\cdot745$, $E = +\cdot667$; $G = -\cdot338$, $H = +\cdot378$, $K = -\cdot862$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Kagosima		1·4	312	0 26	− 1	0 38	− 8	—	—	—
Miyazaki		1·4	346	0 26k	− 1	0 34	−12	—	—	—
Kumamoto		2·4	338	0 42a	+ 1	1 12	0	—	—	—
Simidu		2·4	24	0 12	−29	1 12	0	—	—	—
Hukuoka		3·2	338	0 52k	0	1 40	S*	—	—	—
Izuka		3·2	343	0 47	− 5	1 41	S*	—	—	—
Koti		3·3	25	1 10?	P_g	—	—	—	—	—
Matuyama		3·3	13	0 44	− 9	1 50	S_g	—	—	—
Muroto		3·3	37	1 26	+33	—	—	—	—	—
Tomie		3·3	308	0 38	−15	1 17	−18	—	—	—
Hirosima		3·8	8	1 3	+ 2	1 45	− 2	—	—	—
Hamada		4·3	3	1 8	0	2 16	S*	—	—	—
Siomisaki		4·4	49	1 2	− 8	1 41	−21	—	—	—
Sumoto		4·6	34	1 14a	+ 2	2 52	+45	—	—	—
Kobe		5·0	34	1 13?	− 5	—	—	—	—	—
Osaka		5·1	37	1 22	+ 2	3 23	+63	—	—	—
Owase		5·1	46	1 17	− 3	3 28	+68	—	—	—
Kyoto		5·5	36	1 26	+ 1	2 17	−13	—	—	—
Toyooka		5·5	26	1 25	0	2 13	−17	—	—	—
Tu		5·7	43	1 28	0	3 39	+64	—	—	—
Kameyama		5·8	42	1 33	+ 4	3 44	+66	—	—	—
Gihu		6·3	40	1 40	+ 4	2 50	0	—	—	—
Nagoya		6·3	42	1 27	− 9	—	—	—	—	—
Misima		7·5	51	1 55	+ 2	—	—	—	—	—
Hunatu		7·6	48	1 57	+ 2	4 39	+76	—	—	—
Toyama		7·6	35	1 36	−19	4 18	+55	—	—	—
Nagano		8·1	40	2 9	+ 7	—	—	—	—	—
Maebasi		8·4	44	2 14a	+ 8	4 2	+19	—	—	—
Tokyo		8·4	51	2 45	P_g	—	—	—	—	—
Kakioka		9·0	49	2 15	+ 2	—	—	—	—	—
Sendai		10·7	42	2 40	+ 2	—	—	—	—	—
Irkutsk		29·6	325	e 7 39	PPP	—	—	—	—	—
Stalinabad		51·6	297	i 9 4	− 6	—	—	—	—	—
Sverdlovsk		54·8	320	9 29	− 5	e 17 6	− 8	—	—	—
Moscow		67·5	323	e 10 55	− 5	e 19 46	−10	—	—	—
Leninakan		69·3	306	e 11 11	0	—	—	—	—	—
Victoria	z.	76·6	42	e 11 52	− 2	i 21 37	− 3	—	—	—
Ksara		78·1	303	e 11 15	−47	—	—	—	—	—
Grand Coulee		79·4	41	e 11 59	−10	—	—	—	—	—
Mineral	z.	82·1	48	i 12 23a	− 1	—	—	—	—	—
Prague		82·4	325	e 11 46	−39	—	—	—	—	e 43·8
Helwan		83·4	301	e 12 28	− 2	—	—	e 15 55	PP	—
Stuttgart		85·8	326	e 12 40	− 2	—	—	e 12 52	P_cP	e 47·8
Tinemaha	z.	86·1	49	i 12 44k	0	—	—	i 12 53	P_cP	—
Santa Barbara	z.	86·6	51	e 12 47	+ 1	—	—	—	—	—
Haiwee	z.	86·8	49	i 12 47	0	—	—	e 12 58	P_cP	—
Mount Wilson	z.	87·8	51	e 12 53	+ 1	—	—	e 13 2	P_cP	—
Pasadena	z.	87·8	51	i 12 52	0	—	—	e 13 4	P_cP	—
Riverside	z.	88·4	51	e 12 54	− 1	—	—	—	—	—
Boulder City		88·9	48	e 13 0	+ 2	—	—	—	—	—
Palomar	z.	89·2	51	e 12 57	− 2	—	—	—	—	—
Pierce Ferry		89·4	48	e 13 0	0	—	—	—	—	—
Tucson		93·8	49	i 13 21k	+ 1	—	—	e 17 3	PP	—
Tamanrasset		106·0	310	18 47	PP	—	—	—	—	—

For Notes see next page.

NOTES TO OCTOBER 26d. 19h. 52m. 14s.

Additional readings:—
Victoria iZ = 21m.40s. and 21m.43s.
Tucson i = 13m.35s.
Long waves were also recorded at Bombay and at other European stations.

Oct. 26d. Readings also at 2h. (Rome and near Ashkabad), 4h. (near Murgab and Stalinabad), 5h. (near Ashkabad (2)), 8h. (near Murgab and Kulyab), 9h. (Boulder City, Pierce Ferry, Tucson, Mount Wilson, and Tinemaha), 10h. (Ashkabad), 13h. (Apia), 14h. (Pierce Ferry, Tucson (2), Mount Wilson, Palomar, Tinemaha, Andijan, Stalinabad, Kulyab, and Samarkand), 15h. (Tucson and near Stalinabad), 18h. (Istanbul).

Oct. 27d. 18h. 37m. 16s. Epicentre 17°·0N. 61°·0W.

Intensity II-III at Fort-de-France. Epicentre : as adopted.

Bulletin séismique mensuel de Morne des Cadets.

$A = +\cdot4639$, $B = -\cdot8369$, $C = +\cdot2906$; $\delta = +5$; $h = +5$;
$D = -\cdot875$, $E = -\cdot485$; $G = +\cdot141$, $H = -\cdot254$, $K = -\cdot957$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fort de France		2·3	184	i 0 41k	+ 1	i 1 4	− 5	0 47	P_g	—
San Juan		5·0	287	i 1 20	+ 2	i 2 10	− 8	—	—	i 2·4
Bogota	z.	17·8	228	i 4 10	− 1	e 7 18	−10	—	—	—
Philadelphia		26·0	336	e 5 40	+ 4	e 10 3	− 3	e 10 39	?	e 11·2
Cleveland		30·1	329	e 6 21	+ 8	e 12 53	SS	—	—	e 15·5
Ottawa		30·9	341	e 6 21	+ 1	—	—	—	—	11·7
Shawinigan Falls	N.	31·0	345	e 6 25	+ 4	—	—	—	—	—
Huancayo		32·1	207	e 6 30	− 1	e 13 43	SS	—	—	e 16·7
Rolphton		32·2	340	e 6 34	+ 2	—	—	—	—	—
Temiskaming		33·1	338	e 6 42	+ 2	—	—	—	—	—
St. Louis		33·4	317	i 6 41	− 1	e 12 9	+ 6	e 14 14	SS	e 17·0
Ville Marie		33·8	337	e 6 45	− 1	—	—	—	—	—
La Paz		34·0	192	e 6 52	+ 4	i 13 35	?	—	—	16·7
Tucson		47·4	299	i 8 37a	− 1	—	—	—	—	—
Pierce Ferry		50·4	304	i 9 1	0	—	—	—	—	—
Boulder City		51·1	304	e 9 6	0	—	—	—	—	—
Palomar	z.	52·5	300	i 9 17a	0	—	—	i 9 29	?	—
La Jolla	z.	52·8	299	e 9 18	− 1	—	—	e 10 25	P_cP	—
Riverside	z.	53·0	301	i 9 20a	− 1	—	—	i 10 29	P_cP	—
Haiwee		53·6	303	i 9 24	− 1	—	—	e 9 39	?	—
Mount Wilson		53·6	301	i 9 24	− 1	—	—	e 9 35	?	—
Pasadena		53·7	301	i 9 24	− 2	—	—	i 9 39	?	—
Tinemaha	z.	53·9	304	i 9 28a	+ 1	—	—	—	—	—
Santa Barbara	z.	55·0	301	e 9 33	− 2	—	—	—	—	—
Grand Coulee		56·2	318	i 9 43	− 1	—	—	—	—	—
Lick	z.	56·7	304	i 9 47	− 1	—	—	—	—	—
Mineral	z.	56·9	308	i 9 37a	−12	—	—	i 9 40	P	—
Branner	z.	57·1	304	i 9 50k	0	—	—	i 9 58	P	—
Berkeley	z.	57·2	304	i 9 51k	0	—	—	—	—	—
Victoria	z.	59·2	317	e 10 3	− 2	—	—	—	—	—
Tamanrasset		62·4	73	e 10 31	+ 4	—	—	—	—	—
Stuttgart	z.	64·4	44	e 10 41	+ 1	—	—	e 10 51	P	—
Ksara		86·2	56	e 12 58	+14	e 23 13 [+ 4]		—	—	—

Additional readings:—
Tucson i = 8m.54s., 9m.5s., and 9m.25s.
Riverside iZ = 9m.31s. and 9m.36s.
Tinemaha iZ = 9m.33s. and 9m.42s.
Long waves were also recorded at Harvard, Bermuda, and at other European stations.

Oct. 27d. Readings also at 0h. (Victoria), 6h. (Stalinabad, Kulyab, Tashkent, Ksara, and near Taranto), 7h. (Victoria), 8h. (near Andijan), 9h. (Theodosia), 10h. (near Basle), 11h. (Stuttgart), 13h. (Ashkabad), 14h. (Theodosia, Ashkabad, and near Reykjavik), 17h. (Ashkabad and near Ottawa), 18h. (Triest, Jena, Stuttgart, and Istanbul), 19h. (Boulder City, Tucson, and Ashkabad), 20h. (Ashkabad), 21h. (Ottawa and La Paz), 23h. (Balboa Heights, Pasadena, Palomar, Riverside, Boulder City, Pierce Ferry, Tucson, and Bombay).

Oct. 28d. 14h. 18m. 17s. I
14h. 30m. 15s. II } Epicentre 43°·7N. 126°·7W.

A = −·4335, B = −·5815, C = +·6884 ; δ = −4 ; h = −3 ;
D = −·802, E = +·598 ; G = −·411, H = −·552, K = −·725.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
II Mineral	z.	5·1	130	i 1 21k	+ 1	2 24	+ 4	—	—
I Victoria		5·3	24	1 22	0	2 26	+ 1	1 45	P_g
II		5·3	24	1 23	+ 1	2 27	+ 2	1 46	P_g
I Grand Coulee		6·8	49	i 1 43	− 1	—	—	—	—
II Branner	z.	7·2	150	i 1 43k	− 6	—	—	i 1 50	pP
I Lick	z.	7·4	147	e 1 49k	− 3	—	—	—	—
II	z.	7·4	147	i 1 49a	− 3	—	—	i 1 55	pP
I Tinemaha	z.	9·2	133	e 2 19	+ 3	—	—	—	—
II	z.	9·2	133	i 2 21	+ 5	—	—	—	—
I Haiwee	z.	10·1	135	e 2 35	+ 7	—	—	—	—
II	z.	10·1	135	e 2 30	+ 2	—	—	—	—
I Mount Wilson	z.	11·6	142	e 2 46	− 4	—	—	—	—
II	z.	11·6	142	i 2 47	− 3	—	—	i 2 57	pP
I Pasadena	z.	11·6	142	e 2 48	− 2	—	—	—	—
II		11·6	142	e 2 47	− 3	—	—	i 2 55	pP
I Boulder City		11·9	126	e 3 1	+ 7	—	—	—	—
II		11·9	126	e 2 57	+ 3	—	—	—	—
I Riverside	z.	12·1	140	e 2 55	− 2	—	—	—	—
II	z.	12·1	140	i 2 54	− 3	—	—	i 3 4	pP
I Pierce Ferry		12·3	124	e 3 1	+ 2	—	—	—	—
II		12·3	124	e 3 1	+ 2	—	—	—	—
I Palomar	z.	12·8	140	e 2 55	−11	—	—	—	—
II	z.	12·8	140	e 3 7	+ 1	—	—	i 3 18	pP
I Tucson		16·9	127	i 4 9	+10	—	—	—	—
II		16·9	127	i 4 2	+ 3	—	—	i 4 10	pP

Additional readings :—
Victoria I e = 1m.27s., P* = 1m.35s., e = 2m.19s., i = 2m.31s., S = 2m.47s. ; II e = 1m.29s., P* = 1m.36s., S = 2m.30s.
Tucson I e = 4m.53s. and 4m.56s.
Long waves were recorded at Honolulu, Scoresby Sund, and other American stations.

Oct. 28d. 20h. 45m. 29s. Epicentre 36°·1N. 141°·2E. Depth of focus 0·005.
(as on 1945, Nov. 1d.).

Intensity VI at Jinpozan (Ibaraki pref.) ; V at Mito, Kakioka, Tukubasan, Hukusima, Onahama ; IV at Yokohama, Tokyo, Titibu, Maebasi, Sendai, Morioka, Mizusawa ; II-III at Osima, Hatinohe, and Miyako. Epicentre 36°·2N. 141°·3E., rather shallow.

Seismo. Bull. Cent. Met. Obs., Japan, for 1948. Tokyo, 1950, p.p. 44, 45, with macroseismic chart.

A = −·6312, B = +·5075, C = +·5866 ; δ = +7 ; h = 0 ;
D = +·627, E = +·779 ; G = −·457, H = +·368, K = −·810.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Mito	0·7	296	0 12k	− 3	0 19	− 8	—	—	—
Kakioka	0·8	279	0 14k	− 3	0 23	− 6	—	—	—
Onahama	0·9	344	0 12k	− 6	0 20	−11	—	—	—
Tukubasan	0·9	277	0 15	− 3	0 25	− 6	—	—	—
Tokyo	1·2	251	0 23k	+ 1	0 38	0	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Utunomiya		1·2	293	0 16k	− 6	0 30	− 8	—	—	—
Yokohama		1·4	242	0 21k	− 3	—	—	—	—	—
Kumagaya		1·5	272	0 24k	− 2	0 45	0	—	—	—
Mera		1·6	223	0 29	+ 2	—	—	—	—	—
Hukusima		1·8	340	0 25k	− 5	0 45	− 7	—	—	—
Maebasi		1·8	280	0 30k	0	0 50	− 2	—	—	—
Osima		2·0	228	0 35	+ 3	—	—	—	—	—
Misima		2·1	242	0 36	+ 2	1 13	+14	—	—	—
Sendai		2·2	354	0 32k	− 3	0 54	− 8	—	—	—
Yamagata		2·3	342	0 33	− 4	0 57	− 7	—	—	—
Nagano		2·5	283	0 58k	+19	—	—	—	—	—
Shizuoka		2·6	244	0 44k	+ 3	1 28	+16	—	—	—
Omaesaki		2·9	239	0 51k	+ 6	1 34	+15	—	—	—
Mizusawa	E.	3·0	359	0 46	− 1	1 4	−18	—	—	—
Aikawa		3·1	309	0 43	− 5	1 24	0	—	—	—
Toyama		3·3	280	0 53	+ 2	1 46	+17	—	—	—
Miyako		3·6	11	0 52	− 3	1 25	−12	—	—	—
Morioka		3·6	0	0 52	− 3	1 29	− 8	—	—	—
Nagoya		3·6	256	0 56k	+ 1	1 49	+12	—	—	—
Akita		3·7	347	0 40	−16	1 21	−18	—	—	—
Gihu		3·7	260	0 56	0	1 57	+18	—	—	—
Wazima		3·7	292	0 56	0	1 54	+15	—	—	—
Hikone		4·1	260	1 4	+ 2	2 8	+19	—	—	—
Kameyama		4·1	253	1 3	+ 1	2 12	+23	—	—	—
Hatinohe		4·4	4	1 4	− 2	—	—	—	—	—
Kyoto		4·6	258	1 17	+ 8	—	—	—	—	—
Owase		4·6	245	1 6	− 3	2 28	+26	—	—	—
Aomori		4·7	356	1 3	− 7	2 5	+ 1	—	—	—
Osaka		4·9	254	1 15	+ 2	—	—	—	—	—
Kobe		5·1	256	1 17	+ 1	2 31	+17	—	—	—
Siomisaki		5·2	241	1 20	+ 3	2 39	+22	—	—	—
Toyooka		5·2	266	1 17	0	2 30	+13	—	—	—
Sumoto		5·5	253	1 21	0	3 3	?	—	—	—
Tottori		5·7	266	1 13	−11	2 16	−13	—	—	—
Mori		6·0	356	1 29	+ 1	2 52	+15	—	—	—
Koti		6·8	250	1 44a	+ 5	3 14	+18	—	—	—
Sapporo		7·0	1	1 53	+11	—	—	—	—	—
Matuyama		7·3	254	1 53	+ 7	3 33	+24	—	—	—
Hirosima		7·4	259	1 52	+ 4	3 19	+ 8	—	—	—
Izuka		9·0	257	1 58	−12	4 17	+26	—	—	—
Miyazaki		9·1	245	2 13	+ 2	3 59	+ 6	—	—	—
Hukuoka		9·2	257	2 16	+ 4	4 12	+17	—	—	—
Kumamoto		9·3	252	2 16	+ 2	5 6	+68	—	—	—
Kagosima		9·9	246	2 37	+15	5 19	+67	—	—	—
Vladivostok		10·0	317	i 2 21	− 2	i 4 16	+ 1	—	—	—
Irkutsk		30·6	314	i 6 9	− 1	11 3	− 3	—	—	—
Calcutta	E.	47·5	269	e 8 30	0	i 15 20	+ 1	i 18 45	SS	—
Almata		48·9	300	e 8 55?	+14	e 15 55?	+16	—	—	—
Frunse		50·6	300	i 8 56	+ 2	e 16 9	+ 6	—	—	—
Andijan		52·9	297	9 13	+ 1	—	—	—	—	—
Tashkent		54·9	299	i 9 26	0	i 17 2	+ 1	—	—	—
Kulyab		55·7	295	i 9 33	+ 1	i 17 15	+ 3	—	—	—
Sverdlovsk		55·7	319	i 9 31	− 1	i 17 13	+ 1	—	—	—
Stalinabad		56·2	297	—	—	i 17 21	+ 3	—	—	—
Samarkand		57·1	298	e 9 42	0	—	—	—	—	—
Hyderabad	N.	58·1	269	9 50	+ 1	17 48	+ 5	—	—	29·0
Bombay		61·9	274	e 10 20	+ 5	e 18 41	+ 9	—	—	—
Kodaikanal	E.	62·8	264	10 16	− 5	19 1	sS	12 31	PP	—
Colombo	E.	62·9	289	10 24	+ 2	18 51	+ 6	—	—	—
Brisbane		64·2	168	i 10 35	+ 5	i 19 11	+10	—	—	—
Victoria		67·2	46	10 51	+ 2	19 45	+ 7	i 11 5	pP	33·5
Moscow		67·9	324	i 10 53	− 1	i 19 46	0	—	—	—
Grozny		69·8	310	e 11 2	− 3	e 20 22	+14	—	—	—
Grand Coulee		70·0	45	e 11 8	+ 1	—	—	—	—	—
Riverview		70·2	171	i 11 13k	+ 5	i 20 22	+ 9	i 11 27	PcP	e 32·8

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Piatigorsk		71·1	312	11 14	+ 1	e 20 45	PS	—	—	—
Erevan		72·3	307	e 11 20	0	—	—	—	—	—
Leninakan		72·4	308	e 11 36?	+15	e 21 14?	PS	—	—	—
Mineral	Z.	72·5	53	e 11 27a	+ 5	—	—	—	—	—
Scoresby Sund		73·0	354	i 11 27	+ 2	20 51	+ 6	14 9	PP	35·5
Berkeley		73·4	355	i 11 28k	+ 1	i 20 59	+ 9	i 12 0	P_cP	e 33·9
Sotchi		73·4	313	e 11 29	+ 2	e 21 18	PS	—	—	—
Branner		73·7	56	i 11 33a	+ 4	—	—	—	—	—
Upsala		73·7	334	e 11 24	− 5	i 20 52	− 1	i 21 20	S_cS	e 33·5
Santa Clara	E.	73·9	56	e 11 50	+20	e 21 4	+ 9	—	—	—
Lick	Z.	74·1	56	e 11 34a	+ 3	—	—	—	—	—
Saskatoon		74·1	37	11 38	+ 7	21 3	+ 6	14 15	PP	34·5
Theodosia		75·1	316	e 11 39	+ 2	e 21 37	PS	—	—	—
Yalta		76·1	316	i 11 43	+ 1	21 21	+ 1	—	—	—
Tinemaha	Z.	76·5	54	i 11 48a	+ 3	—	—	i 11 58	pP	—
Haiwee	Z.	77·2	55	i 11 52a	+ 3	—	—	i 12 2	pP	—
Warsaw		77·7	328	11 52a	+ 1	e 21 40	+ 3	14 46	PP	e 37·5
Logan		77·8	47	i 12 6	+14	i 21 42	+ 4	i 12 26	pP	e 41·5
Pasadena		78·2	56	i 11 56	+ 2	i 21 44	+ 2	i 12 5	pP	e 32·2
Mount Wilson	Z.	78·3	56	i 11 58a	+ 3	—	—	i 12 8	pP	—
Salt Lake City		78·3	48	e 13 20	?	e 21 50	+ 7	e 16 26	PPP	e 34·6
Copenhagen		78·7	334	i 11 57	0	i 21 50	+ 2	i 12 13	pP	38·5
Riverside	Z.	78·9	56	i 11 59a	+ 1	—	—	e 12 9	pP	—
Auckland	N.	79·0	153	i 18 31?	?	e 23 31?	PPS	—	—	39·5
Boulder City		79·4	53	e 12 10	+ 9	—	—	e 15 4	PP	—
La Jolla	Z.	79·6	57	i 12 7a	+ 5	—	—	i 12 21	sP	—
Palomar	Z.	79·6	56	i 12 4a	+ 2	—	—	i 12 12	pP	—
Pierce Ferry		79·8	52	e 12 6	+ 3	e 21 28	−31	i 12 18	P_cP	—
Arapuni	E.	80·4	153	—	—	e 27 31?	SS	—	—	40·5
Raciborzu		80·5	327	e 12 9?	+ 2	e 22 39	+32	—	—	—
Bucharest		80·6	319	e 12 19	+12	e 22 12	+ 5	—	—	—
Potsdam		81·0	331	i 12 10a	+ 1	i 22 15	+ 3	i 12 23	pP	e 38·5
Istanbul		81·2	315	i 12 11	+ 1	22 33	+19	—	—	—
Ksara		81·6	306	i 12 14a	+ 2	22 48	PS	—	—	—
Collmberg		81·8	330	e 12 12	− 1	—	—	14 51	PP	—
Prague		82·2	329	e 12 15a	0	e 22 19	− 5	e 12 47	pP	e 39·5
Jena	N.	82·7	331	e 12 19	+ 1	e 22 53	PS	—	—	—
Wellington		82·9	155	12 30	+11	—	—	15 44	PP	38·5
Belgrade		83·3	322	e 12 22a	+ 1	i 23 6	PS	i 15 35	PP	e 44·7
De Bilt		84·1	335	i 12 26a	+ 1	e 22 47	+ 4	i 15 41	PP	e 39·5
Tucson		84·3	54	i 12 29a	+ 3	e 22 47	+ 2	i 12 41	pP	e 39·1
Stuttgart		85·3	331	i 12 32	+ 1	e 22 41	[− 6]	i 12 45	pP	e 42·5
Uccle		85·5	335	i 12 33a	+ 1	e 23 7	+10	i 12 48	pP	e 42·5
Triest		85·8	326	—	—	i 23 19	+19	—	—	—
Strasbourg		86·1	331	i 12 36	+ 1	e 23 4	+ 1	i 12 51	pP	42·5
Kew		86·5	337	i 12 37	0	e 23 6	0	i 12 55	pP	e 41·5
Chur		86·7	329	e 12 39	+ 1	e 23 25	+17	—	—	e 46·5
Zürich		86·7	331	e 12 38a	0	e 22 51	[− 5]	e 23 11	S	—
Helwan		87·0	305	i 12 41a	+ 2	e 23 1	[+ 3]	i 12 57	pP	—
Basle		87·0	331	e 12 41	+ 2	—	—	e 12 58	pP	—
Salo		87·3	327	12 38	− 3	e 23 16	+ 2	i 23 41	PS	—
Padova		87·6	326	e 12 46	+ 4	e 23 32	+15	e 24 33	PPS	—
Bologna		87·8	328	e 12 46	+ 3	e 23 52	PS	—	—	—
Paris		87·8	334	i 12 45	+ 2	e 23 29	+10	i 13 3	pP	e 44·5
Taranto		88·0	320	e 16 55	PP	e 23 51	PS	—	—	—
Florence		88·4	326	e 12 42	− 4	e 23 28	+ 4	—	—	—
Rome		89·3	324	i 12 50	0	i 23 44	+11	i 16 24	PP	e 41·6
Ville Marie		89·3	27	e 12 50	0	—	—	—	—	—
Temiskaming		90·0	27	e 12 55	+ 1	—	—	e 13 9	pP	—
Clermont-Ferrand		90·2	332	i 12 56	+ 1	i 23 36	− 5	e 16 51	PP	45·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Rolphton		90·9	26	i 12 59	+ 1	—	—	e 13 13	Pp	—
St. Louis		91·8	38	i 13 3	+ 1	e 23 31	[+ 4]	i 13 18	Pp	—
Ottawa		92·3	25	13 13	+ 9	23 58	− 1	16 50	PP	46·5
Seven Falls	E.	92·3	21	—	—	e 24 2	+ 3	—	—	45·5
Fordham		96·9	26	e 17 25	PP	e 24 3	[+ 8]	—	—	—
Algiers		97·7	327	i 13 48	+19	—	—	e 17 45	PP	e 53·5
Alicante		97·9	331	13 21	− 9	23 43	[−17]	17 11	PP	e 45·7
Toledo		97·9	334	e 13 30	0	—	—	e 17 42	PP	51·3
Lisbon		100·7	337	17 49	PP	—	—	—	—	53·5
Tamanrasset		108·0	317	e 14 16	P	e 34 5	SS	e 18 46	PP	—
La Paz		147·4	61	i 19 40s	[+ 6]	36 19	PPS	23 3	PP	69·7

Additional readings:—
Calcutta i?E =15m.46s.
Kodaikanal SSE =23m.1s.
Brisbane iZ =11m.23s., iN =20m.29s.
Riverview iSN =20m.25s., iS_cSE =20m.56s., iPSE =21m.20s., iN =21m.26s., eQE =30m.13s.
Mineral iZ =11m.33s. and 11m.37s.
Scoresby Sund 22m.2s., SS =25m.21s.
Berkeley iE =11m.21s., iZ =11m.40s., eN =11m.44s., iPPZ =13m.27s., eE =25m.33s., and 30m.7s.
Branner iZ =11m.41s. and 11m.44s.
Upsala eSSE =25m.31s.?
Lick eEN =11m.42s., iZ =11m.46s.
Saskatoon PPP =15m.58s., PS =21m.33s.
Tinemaha isPZ =12m.2s.
Haiwee isPZ =12m.9s.
Warsaw ePE =11m.55s., ePPE =14m.50s., S_cSE =22m.6s., PSN =22m.15s., PSE =22m.25s., PPSE =22m.35s., eSSN =26m.47s.
Logan ePP =14m.58s., isS =22m.3s., esS =22m.8s., eSS =26m.43s.
Pasadena isPEZ =12m.11s., eZ =12m.36s., isSE =22m.13s.
Mount Wilson isPZ =12m.12s.
Salt Lake City esS =22m.16s.
Copenhagen 14m.54s. and 16m.45s., i =22m.15s.
Riverside isPZ =12m.11s.
Boulder City i =12m.16s.
Palomar isPNZ =12m.20s., iZ =12m.32s. and 12m.46s.
Pierce Ferry ePP =15m.11s.
Potsdam iPPZ =15m.11s., isSEN =22m.40s.
Prague eZ =12m.30s., eN =13m.11s., eZ =13m.19s., ePP =15m.32s., ePPP =17m.48s., e =22m.47s., ePS? =22m.56s., e =23m.22s., eSS =27m.51s., eSSS =32m.1s.
Tucson i =13m.50s., e =15m.57s.
Stuttgart ipPZ =12m.50s., ePPZ =15m.55s., eS =23m.19s., ePS =23m.52s.
Uccle eE =14m.13s., e =19m.28s. and 23m.1s., eSN =23m.14s.?, e =27m.31s.? eN =32m.31s.?.
Strasbourg i =13m.14s. and 14m.40s., ePP =16m.18s., eS =22m.59s., isS =23m.27s., ePS =23m.51s., ePPS =24m.15s., e =24m.21s., eSS =28m.56s., e =36m.1s.
Kew ePSN =24m.34s., eSSS?EN =30m.46s., eN =33m.12s.
Zürich e =13m.37s.
Helwan PP =16m.5s., sS =23m.37s.
Basle e =13m.52s. and 16m.31s.
Bologna iE =24m.16s.
Paris i =12m.58s. and 13m.16s., ePP =16m.15s., ePS? =24m.21s.
Rome ePSN =24m.49s., eSSE =29m.38s., eSSSE? =33m.11s.
Clermont-Ferrand iS? =24m.13s., iPS =25m.40s.
St. Louis isS =23m.57s., i =24m.23s.
Ottawa SKS =23m.35s., SS =30m.19s.
Alicante PPP =19m.13s., SKKS =24m.5s., PS =25m.57s., Q =40m.17s.
Tamanrasset i =30m.9s., eSSS =37m.53s.
La Paz SSE =41m.56s.
Long waves were also recorded at Christchurch, Huancayo, Harvard, Philadelphia, San Juan, and Aberdeen.

Oct. 28d. Readings also at 0h. (Haiwee, Mount Wilson, Pasadena, Riverside, Tucson, Mineral, Grand Coulee, Victoria, Saskatoon, Kodaikanal, Clermont-Ferrand, Ksara, and near Granada), 3h. (Ashkabad and near Balboa Heights), 9h. (Samarkand, Stalinabad, Tchimkent, near Almata, Andijan, Frunse, Kulyab, and Tashkent), 10h. (near Stalinabad), 13h. (near Alicante), 15h. (near Apia and near Ashkabad), 16h. (Berkeley), 17h. (near Ashkabad), 19h. (near Branner, Lick, and near Stalinabad), 22h. (Ashkabad), 23h. (near Granada).

Oct. 29d. 3h. 7m. 10s. Epicentre 19°·5S. 69°·4W. (as on 1946, May 8d.).

Intensity II-III between 18° and 19° S. Lat.
Epicentre 19°S. 71°W. Depth 100 km.
Boletín del año 1948, Instituto sismológico, Santiago, p. 38.

$A = +·3319$, $B = -·8830$, $C = -·3318$; $\delta = -6$; $h = +4$;
$D = -·936$, $E = -·352$; $G = -·117$, $H = +·311$, $K = -·943$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz		3·2	22	i 1 6a	P_g	i 1 34	+ 2	i 1 52	S_g	—
Huancayo		9·4	321	e 2 32	P*	—	—	—	—	e 4·5
Bogota		24·4	349	i 5 21	0	e 9 45	+ 6	e 16 25	S_cS	—
Fort de France		35·0	15	e 6 54	− 2	—	—	—	—	—
St. Louis		61·0	342	e 10 15	− 3	i 18 26	− 9	—	—	—
Tucson		64·9	322	e 10 45	+ 2	—	—	i 11 11	pP	—
Rolphton		65·8	354	i 10 47	− 2	—	—	e 11 13	pP	—
Temiskaming		66·4	353	e 10 52	− 1	—	—	e 11 20	pP	—
La Jolla	z.	69·3	318	e 11 36	pP	—	—	—	—	—
Palomar	z.	69·4	319	e 11 13	+ 1	—	—	i 11 39	pP	—
Pierce Ferry		69·6	323	e 11 13	0	—	—	i 11 40	pP	—
Boulder City		69·9	322	e 11 15	0	—	—	e 11 43	pP	—
Mount Wilson	z.	70·7	319	e 11 21	+ 1	—	—	i 11 47	pP	—
Pasadena	z.	70·7	319	e 11 20	0	—	—	i 11 47	pP	—
Tinemaha	z.	72·7	321	e 11 32	0	—	—	i 12 1	pP	—
Lick	z.	74·9	319	i 12 13a	pP	—	—	i 12 23	?	—
Mineral	z.	76·8	322	e 11 57	+ 2	—	—	—	—	—
Grand Coulee		80·5	329	e 12 15	0	—	—	—	—	—
Victoria	z.	83·1	327	e 12 27	− 2	—	—	—	—	—
Tamanrasset		84·3	63	e 12 30	− 5	—	—	i 12 51k	pP	—
Toledo		84·8	45	e 12 0	−37	—	—	—	—	—
Alicante		86·5	47	12 58	+12	23 44	+22	16 38	PP	e 40·3
Ksara		113·0	61	—	—	e 25 23	[− 1]	e 28 13	PS	—

Additional readings:—
Bogota eScPNZ = 12m.56s.
St. Louis eP? = 11m.2s., iS? = 19m.13s., e = 19m.56s.
Tucson i = 11m.33s.
Palomar eZ = 11m.32s.
Alicante PPP = 18m.34s., PS = 24m.36s., Q = 36m.0s.

Oct. 29d. 11h. 7m. 22s. Epicentre 5°·7N. 100°·2W. (as on 1947 June 19d.).

$A = -·1762$, $B = -·9794$, $C = +·0987$; $\delta = +1$; $h = +7$;
$D = -·984$, $E = +·177$; $G = -·018$, $H = -·098$, $K = -·995$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		13·7	4	3 23	+ 5	e 6 7	+15	e 6 33	SSS	7·0
Bogota		26·0	90	e 5 39	+ 3	e 10 9	+ 3	—	—	—
Tucson		28·2	341	i 5 57a	+ 1	e 11 0	+19	i 6 52	PP	e 13·2
Huancayo		30·4	125	—	—	e 10 58	−18	—	—	e 15·0
La Jolla	z.	31·4	332	e 6 24	− 1	—	—	—	—	—
Palomar		31·6	333	i 6 26	0	—	—	e 7 40	PP	—
Pierce Ferry		32·8	340	i 6 7	−30	—	—	—	—	—
Pasadena		32·8	333	i 6 36k	− 1	—	—	i 9 21	P_cP	e 15·0
Mount Wilson	z.	32·9	333	i 6 38k	0	—	—	i 9 20	P_cP	—
Boulder City		33·0	339	i 6 9	−30	—	—	—	—	—
St. Louis		34·0	14	e 6 49	+ 1	i 12 8	− 5	i 8 15	PP	i 15·1
Haiwee	z.	34·4	335	e 6 46	− 5	—	—	—	—	—
Tinemaha	z.	35·3	335	i 7 0	+ 1	—	—	i 9 28	P_cP	—
Lick	z.	37·1	332	i 7 15a	+ 1	—	—	—	—	—
Logan		37·4	346	e 7 15	− 1	e 12 59	− 6	—	—	e 18·2

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Chicago		37·7	14	e 8 57	PP	e 13 6	− 4	—	—	e 16·2
Berkeley		37·8	332	—	—	e 13 14	+ 3	—	—	e 16·3
La Paz		38·6	124	7 29	+ 3	i 13 29	+ 6	i 16 18	SSS	19·1
Fort de France		39·4	74	e 7 31	− 2	—	—	—	—	—
Mineral	z.	39·5	334	i 7 35a	+ 1	—	—	—	—	—
Ottawa		44·9	24	e 8 17	− 1	e 15 2	+ 6	—	—	25·6
Grand Coulee		45·0	343	e 8 18	− 1	—	—	—	—	—
Saskatoon		46·6	355	—	—	—	—	e 21 42	Q	23·6
Victoria	z.	47·0	340	e 8 33	− 2	—	—	—	—	—

Additional readings:—
Tucson iP_ePP = 9m.10s.
St. Louis eSS = 14m.4s.
Long waves were also recorded at Harvard, Seven Falls, and San Juan.

Oct. 29d. Readings also at 0h. (near Chur, Zürich, and Basle), 2h. (Ksara, Sotchi, Grozny, Sverdlovsk, Pierce Ferry, Stuttgart, Klyuchi, and near Ashkabad (4)), 3h. (near Ashkabad), 6h. (Mineral), 7h. (near Ashkabad (2)), 8h. (Theodosia, Grand Coulee, Victoria, and near Kulyab), 10h. (Riverview, Strasbourg, Mount Wilson, Pasadena, Palomar, La Jolla, Tinemaha, Boulder City, Pierce Ferry, Tucson, Lick, Mineral, and Vera Cruz), 12h. (Frunse (2), Kulyab (2), Sverdlovsk (2), Tashkent (2), Samarkand (2), Tchimkent (2), Andijan (2), Stalinabad (2), and near Almata (2)), 13h. (Upsala, near Lick, Berkeley and San Francisco), 14h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Boulder City, Grand Coulee, Tucson, Huancayo, and La Paz), 15h. (Christchurch), 20h. (2) and 23h. (near Ashkabad).

Oct. 30d. Readings also at 0h. (Ashkabad), 1h. (near Mizusawa), 2h. (Calcutta and Stuttgart), 3h. (Ashkabad), 4h. (Mizusawa, near Apia, and near Stalinabad), 5h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Berkeley, Lick, Mineral, Grand Coulee, and Victoria), 6h. (near Basle and Zürich), 7h. and 8h. (near Stalinabad), 9h. (near Leninakan), 13h. (Andijan, Frunse, and near Almata), 14h. (near Sotchi), 16h. (Christchurch, near Almata and Frunse), 17h. (Andijan and near Ottawa), 19h. (Istanbul, near Ashkabad and near Ottawa), 20h. (near Ashkabad (2), and near Stalinabad), 21h. (near Ottawa), 22h. (Istanbul and Riverview).

Oct. 31d. Readings at 0h. (near Ashkabad and near Andijan), 1h. (near Ashkabad (2)), 3h. (near Ksara), 4h. (Ashkabad), 5h. (near Ashkabad), 6h. (Stuttgart and Strasbourg), 7h. (Stuttgart, Andijan, Sverdlovsk, and near Ashkabad), 9h. (Ashkabad), 11h. (Grozny), 15h. (Samarkand, Tashkent, near Stalinabad and Andijan), 16h. (Ottawa, Ksara, Stuttgart, Andijan, Stalinabad, Tashkent, Sverdlovsk, Grozny, Leninakan, Piatigorsk, and Moscow), 22h. (near Ashkabad).

Nov. 1d. 11h. Undetermined Shock.

Tucson iP = 46m.12s., i = 46m.38s., eS = 47m.40s., iS = 47m.57s., iL = 48m.10s.
La Jolla ePZ = 46m.53s.
Palomar iPNZ = 47m.3s., eZ = 49m.41s.
Riverside ePZ = 47m.13s.
Pierce Ferry eP = 47m.15s., eS? = 48m.47s.
Boulder City eP = 47m.20s., eL = 49m.48s.
Pasadena ePZ = 47m.20s., eLE = 50m.
Mount Wilson iPZ = 47m.21s.
Haiwee eZ = 47m.44s.
Tinemaha ePZ = 47m.51s.
Lick iPZ = 48m.17s., iZ = 48m.23s.
Berkeley ePZ = 48m.27s., ipPZ = 48m.31s., eE = 52m.42s., eZ = 54m.12s.
St. Louis iP = 49m.27s., eS = 53m.13s., eL = 55m.37s.
Victoria eZ = 50m.2s.
Tacubaya eN = 50m.59s., iE = 51m.24s., eN = 54m.7s., eE = 54m.12s.
Ottawa e = 51m.25s., L = 62m.
La Paz eP = 55m.12s.
Long waves were also recorded at other North American stations,

Nov. 1d. 12h. 5m. 52s. Epicentre 56°·2N. 162°·8E.

A = −·5339, B = +·1653, C = +·8292; δ = −5; h = −7;
D = +·296, E = +·955; G = −·792, H = +·245, K = −·559.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Klyuchi		1·1	275	0 54	?	1 14	?	—	—	—
Aomori		21·1	233	e 4 55	+ 7	—	—	—	—	—
Mizusawa		22·3	229	5 3	+ 2	9 7	+ 5	—	—	—
Sendai		23·1	228	5 9	+ 1	9 17	+ 1	—	—	—
Vladivostok		23·7	249	e 5 10	− 4	e 9 44	+17	i 5 44	PP	—
College		25·2	49	e 5 28	− 1	e 10 1	+ 9	e 11 18	SSS	e 12·9
Nagano		25·6	233	e 5 37	+ 5	—	—	—	—	—
Tokyo		25·8	228	5 29	− 5	10 27	+25	—	—	—
Shizuoka		27·0	229	5 46	+ 1	—	—	—	—	—
Nagoya		27·5	231	5 48	− 2	—	—	—	—	—
Osaka		28·5	233	e 5 58	− 1	11 49	+63	—	—	—
Hukuoka		31·7	238	7 3	+36	—	—	—	—	—
Irkutsk		33·5	289	6 43	0	—	—	—	—	—
Victoria		43·7	67	8 5	− 3	14 32	− 7	9 51	PP	22·1
Saskatoon		49·5	54	8 30	−24	16 0	− 2	19 50	SS	23·5
Mineral		50·1	75	e 8 56	− 3	—	—	e 9 2	P	—
Sverdlovsk		51·1	317	i 9 6	0	16 25	+ 1	—	—	—
Berkeley		51·6	77	e 9 7	− 3	e 16 32	+ 1	i 9 19	pP	e 23·4
Bozeman		51·9	63	e 9 18	+ 6	e 16 28	− 7	e 19 56	SS	e 23·3
Branner	Z.	51·9	77	i 9 10a	− 2	—	—	i 9 20k	P	—
Lick	Z.	52·3	77	i 9 13k	− 2	—	—	—	—	—
Scoresby Sund		53·6	3	9 26a	+ 1	17 0	+ 2	12 41	PPP	—
Tinemaha		54·3	75	i 9 29k	− 1	—	—	—	—	—
Frunse		54·9	297	i 9 33	− 2	—	—	—	—	—
Salt Lake City		55·0	67	e 9 39	+ 4	e 19 21	S_cS	—	—	e 24·8
Haiwee	Z.	55·2	75	e 9 35k	− 2	—	—	i 9 47	?	—
Santa Barbara	Z.	55·5	78	e 9 37	− 2	—	—	—	—	—
Mount Wilson	Z.	56·5	77	i 9 44k	− 2	—	—	i 9 57	?	—
Pasadena		56·5	77	e 9 44	− 2	—	—	i 9 53	P	e 25·1
Rapid City	E.	56·9	59	e 9 55	+ 6	e 17 37	− 5	i 19 33	S_cS	e 29·6
Boulder City		57·0	74	e 9 48	− 2	—	—	e 39 28	P′P′	—
Riverside	Z.	57·1	77	i 9 47k	− 3	—	—	i 9 59	P	—
Pierce Ferry		57·3	73	i 9 50	− 2	e 17 0	−47	e 39 8	P′P′	—
Andijan		57·6	296	i 9 55	+ 1	e 17 55	+ 4	—	—	—
Palomar		57·8	77	i 9 53	− 2	—	—	i 10 2	P_cP	—
Tchimkent		57·8	299	i 9 55	0	—	—	—	—	—
La Jolla	Z.	58·0	78	e 9 55	− 2	—	—	i 10 6	P	—
Tashkent		58·7	299	i 10 2	0	e 18 7	+ 1	—	—	—
Helsinki		59·3	338	e 10 5a	− 1	e 18 9	− 5	—	—	e 27·1
Moscow		59·9	328	i 10 10	0	i 18 22	+ 1	—	—	—
Ivigtut		60·4	17	i 10 11	− 2	e 18 28	0	—	—	31·6
Kulyab		61·1	296	e 10 15	− 3	e 18 34	− 3	—	—	—
Samarkand		61·1	299	e 10 18	0	—	—	—	—	—
Stalinabad		61·1	297	i 10 16	− 2	e 18 36	− 1	—	—	—
Tucson		61·9	73	i 10 22k	− 2	—	—	e 39 21	P′P′	e 31·7
Lincoln	E.	62·4	57	e 10 30	+ 3	e 18 50	− 3	e 20 12	S_cS	e 30·5
Calcutta	E.	63·0	271	e 10 32	+ 1	e 19 20	+19	—	—	—
Chicago		65·7	51	e 10 45	− 3	e 19 26	− 8	—	—	e 33·8
Copenhagen		65·9	343	i 10 50a	0	19 46	+ 9	20 8	PPS	31·1
Rolphton		66·1	41	i 11 6	+15	—	—	e 11 16	pP	—
St. Louis		67·2	55	i 10 55	− 3	i 19 47	− 5	i 11 6	pP	—
Warsaw		67·4	336	i 11 2k	+ 3	e 19 59	+ 4	e 13 47	PP	e 34·1
Ottawa		67·5	41	10 56	− 4	19 50	− 6	27 20	SSS	35·1
Shawinigan Falls	N.	67·5	38	e 10 57	− 3	—	—	—	—	—
Grozny		67·6	316	e 11 1	0	—	—	—	—	—
Seven Falls	E.	67·7	37	10 59	− 2	19 59	+ 1	e 27 38	SSS	34·1
Piatigorsk		68·0	318	i 11 4	+ 1	—	—	—	—	—
Baku		68·3	311	11 10	+ 5	20 13	+ 7	—	—	—
Cleveland		68·6	47	e 10 54	−13	i 19 53	−16	e 20 49	PS	—
Durham		68·7	350	—	—	i 25 7	SS	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Potsdam		68·9	342	i 11 10a	+ 1	e 20 22	+ 9	i 13 43	PP	e 38·1
Vermont		69·2	40	—	—	e 21 12	PPS	—	—	e 32·4
Sotchi		69·6	320	e 11 30?	+17	e 20 55	PS	—	—	—
Theodosia		69·9	323	i 11 16	+ 1	—	—	—	—	—
Collmberg		70·0	342	i 11 16	+ 1	—	—	e 13 52	PP	—
Raciborzu		70·1	337	e 11 18	+ 2	e 20 56	PS	e 10 46?	?	e 41·6
De Bilt		70·5	346	i 11 19a	+ 1	e 20 38	+ 6	e 13 54	PP	e 36·1
Leninakan		70·5	316	e 11 8?	−10	20 26?	− 6	11 41	PcP	—
Jena	N.	70·6	341	e 11 19	0	e 20 35	+ 2	—	—	—
Pennsylvania	N.	70·6	45	i 12 25	+66	i 21 26	PPS	—	—	—
Erevan		70·7	315	e 11 24	+ 4	e 20 52	PS	—	—	—
Yalta		70·8	324	e 11 22	+ 2	e 20 38	+ 3	e 13 58	PP	—
Prague		70·9	340	i 11 20	− 1	e 20 51	+15	e 14 8	PP	e 32·1
Cheb		71·3	341	e 11 24	+ 1	e 20 50?	+ 9	e 20 15?	?	e 41·7
Harvard		71·5	39	i 11 23	− 1	e 20 37	− 6	—	—	e 37·1
Kew		71·8	350	—	—	e 20 8	−38	—	—	e 38·1
Uccle		71·9	347	i 11 26a	− 1	e 21 8	+20	11 47	pP	e 33·1
Fordham		72·1	42	i 11 24	− 4	—	—	—	—	—
Budapest		72·3	336	i 11 33	+ 4	—	—	i 11 45	PcP	e 41·1
Philadelphia		72·4	43	e 11 27	− 3	e 20 44	− 9	e 28 20	SSS	e 34·3
Hyderabad	N.	72·6	276	11 27	− 4	20 57	+ 1	—	—	36·5
Stuttgart		73·1	342	i 11 34a	0	e 21 15	+14	e 14 19	PP	43·1
Kalossa		73·2	335	e 11 37	+ 2	—	—	—	—	—
Bucharest		73·3	330	e 11 37	+ 2	e 21 19	+15	e 15 14	?	—
Strasbourg		73·5	343	i 11 37a	+ 1	e 21 12	+ 6	e 14 24	PP	36·1
Paris		74·1	348	i 11 40	0	e 21 10?	− 2	e 14 19	PP	e 39·1
Belgrade		74·5	333	i 11 42k	0	e 21 16	− 1	—	—	e 47·2
Bombay		74·5	281	e 11 41	− 1	e 21 27	+10	—	—	—
Basle		74·6	343	e 11 43a	0	—	—	—	—	—
Zürich		74·6	343	i 11 42a	− 1	e 21 25	+ 7	—	—	—
Mobile		74·7	58	—	—	i 21 18	− 1	29 54	SSS	41·1
Triest		75·2	339	i 11 46	0	i 21 42	+17	—	—	—
Istanbul		75·5	325	i 11 49	+ 1	21 42	+14	—	—	—
Salo		75·9	340	i 11 50a	0	e 21 44	+12	—	—	—
Bologna	Z.	76·8	339	i 11 58a	+ 3	—	—	—	—	—
Clermont-Ferrand		77·0	346	i 11 57	+ 1	i 21 56	+11	i 14 55	PP	36·6
Florence		77·5	339	i 11 59a	0	e 21 48	− 2	e 14 57	PP	—
Tacubaya		78·4	73	i 12 8	+ 4	—	—	—	—	—
Rome		79·1	338	i 12 8a	0	e 22 13	+ 6	e 22 57	PS	e 38·1
Ksara		79·6	318	i 12 11a	+ 1	22 21	+ 9	—	—	—
Tortosa		82·2	347	12 27	+ 3	—	—	12 35	PcP	e 43·1
Bermuda		83·0	39	—	—	—	—	e 34 33	Q	e 42·8
Toledo		83·6	350	i 12 32	+ 1	e 22 51	− 2	i 15 58	PP	48·9
Alicante		84·7	348	12 38	+ 1	23 12	+ 8	12 52	pP	e 41·8
Helwan		84·9	319	e 12 42	+ 4	23 14	+ 8	23 0	SKS	—
Algiers		85·8	344	i 12 45	+ 3	e 23 19	+ 4	e 24 21	PS	—
Granada		86·3	350	i 12 47k	+ 2	23 25	+ 5	15 43k	PP	44·4
Malaga	Z.	86·8	350	i 12 56k	+ 9	i 23 40	+15	i 16 18k	PP	49·9
Riverview		90·2	191	i 13 4a	0	e 23 30	[− 4]	i 13 11	PcP	43·5
Wellington		97·6	171	—	—	25 8	+ 8	46 56	Q	48·1
Tamanrasset		99·0	338	e 13 43	− 1	—	—	e 17 45	PP	—
Bogota		103·8	59	—	—	e 24 50	[+ 5]	—	—	—
Huancayo		117·4	68	e 29 31	PS	e 36 0	SS	—	—	e 52·5
La Paz		124·9	64	e 19 4	[+ 2]	27 44	{− 2}	20 52	PP	64·1

Additional readings :—
Vladivostok iSS = 10m.17s.
Victoria SSS = 18m.8s.
Saskatoon S = 15m.24s., SS = 18m.42s.
Berkeley eN = 9m.24s. and 20m.44s., eE = 21m.50s.
Lick iZ = 9m.22s. and 9m.45s., eZ = 13m.21s.
Scoresby Sund 19m.25s.
Tinemaha iZ = 9m.40s. and 9m.45s.
Pasadena ePKP,PKPZ = 39m.30s.,
Boulder City e = 11m.3s.

Continued on next page.

Pierce Ferry e =14m.43s.
Tucson i =10m.33s., 10m.57s.
St. Louis iSS =27m.35s.
Warsaw ePPPZ =15m.2s., eE =20m.38s., eZ =20m.47s., eS_cSN =20m.58s., eS_cSEZ = 21m.4s., eE =23m.37s.
Ottawa e =22m.20s.
Potsdam ePPPZ =15m.26s., eSSN =24m.56s., eN =28m.26s.
Collmberg eE =12m.34s.
Yalta ePPP =15m.42s.
Prague e =11m.28s., 12m.23s. and 13m.8s., ePPP =15m.55s., ePS =21m.20s., eSS = 25m.38s., eSSS =29m.20s.
Uccle pPE =11m.50s., eSSEN =25m.8s.
Philadelphia eS_cS =21m.29s.
Stuttgart eSP =21m.38s., eSS =26m.0s., eSSS =29m.32s., eQ =37m.8s.?.
Kalossa eE =12m.51s. and 14m.59s.
Strasbourg i =11m.44s., iP_cP? =11m.59s., i =12m.6s., ePP =14m.30s., eSS =25m.50s., eSSS? =30m.8s.
Paris iP_cP? =12m.4s., e =15m.16s. and 17m.19s., ePPS? =22m.13s., ePKKP? =30m.46s.
Zürich e =12m.43s. and 15m.28s.
Clermont-Ferrand i =12m.4s., iPS? =22m.25s., iSS =26m.59s.
Florence eN =24m.23s.
Rome eZ =12m.26s., eSSSE =31m.26s.
Toledo i =12m.39s. and 12m.59s., iS =23m.7s.
Alicante PP =16m.0s., PPP =17m.58s., S_cS =23m.0s., PS =24m.10s., PPS =24m.50s., SS =28m.58s., Q =36m.24s.
Helwan PS =24m.18s.
Riverview iP_cPZ =13m.11s., iS_cSEN =23m.59s., Q =38m.20s.
Tamanrasset e =16m.55s.
La Paz SSN =37m.48s.
Long waves were also recorded at Sitka, Halifax, San Juan, Upsala, Taranto, and Auckland.

Nov. 1d. 23h. 51m. 36s. Epicentre 52°·0N. 174°·5W. (as on 1946, Nov. 1d.).

$A = -·6153$, $B = -·0593$, $C = +·7860$; $\delta = -9$; $h = -6$;
$D = -·096$, $E = +·995$; $G = -·782$, $H = -·075$, $K = -·618$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Victoria	z.	32·3	75	e 6 33	0	—	—	—	—	—
Shasta Dam		36·9	85	i 7 13	+ 1	i 12 14	−44	i 7 29	pP	—
Berkeley	z.	38·7	89	i 7 28a	+ 1	—	—	—	—	—
Branner	z.	39·1	89	i 7 31k	0	—	—	—	—	—
Lick	z.	39·4	89	i 7 34a	+ 1	—	—	i 7 49k	pP	—
Tinemaha	z.	41·7	87	i 7 53a	+ 1	—	—	i 10 5a	P_cP	—
Haiwee	z.	42·5	88	i 7 58a	− 1	—	—	—	—	—
Santa Barbara	z.	42·5	91	e 7 59	0	—	—	e 8 13	pP	—
Mount Wilson	z.	43·7	90	i 8 8a	0	—	—	—	—	—
Pasadena		43·7	90	i 8 8a	0	—	—	e 8 21	pP	—
Riverside	z.	44·3	90	i 8 12a	− 1	—	—	i 10 12	P_cP	—
Boulder City		44·5	86	i 8 15	0	e 14 13	−38	—	—	—
Pierce Ferry		44·9	85	i 8 19	+ 1	—	—	—	—	—
Palomar		45·0	90	i 8 19a	0	—	—	i 10 3	P_cP	—
La Jolla	z.	45·1	91	i 8 19	− 1	—	—	—	—	—
Tucson		49·5	87	i 8 53a	− 1	—	—	i 9 7	pP	—
Ottawa	z.	60·6	53	e 10 11	− 4	—	—	—	—	—
Potsdam		75·8	356	(e 11 24?)	−26	—	—	—	—	e 11·4
Stuttgart	z.	79·6	357	e 12 9	− 1	—	—	—	—	—
Strasbourg		79·8	358	e 12 11	− 1	—	—	—	—	—

Additional readings :—
Shasta Dam i =7m.35s.
Berkeley iZ =7m.32s.a, 7m.43s.k, and 8m.8s.
Branner iZ =7m.37s.k and 7m.43s.k.
Haiwee iZ =8m.14s. and 8m.21s.
Mount Wilson iZ =8m.18s. and 8m.23s.
Riverside iZ =8m.24s.
Palomar iZ =8m.33s. and 10m.27s.
Tucson iP_cP =10m.15s., iPP =10m.30s.

Nov. 1d. Readings also at 0h. (near Bogota), 6h. (near Alicante), 7h. (Klyuchi), 8h. (Stuttgart, near Grozny, and Leninakan), 9h. (Tucson), 10h. (Mount Wilson, Pasadena, Riverside, Palomar, Tinemaha, La Jolla, Boulder City, Pierce Ferry, Ottawa, Seven Falls, Halifax, Saskatoon, Rapid City, Lincoln, Chicago, Salt Lake City, Victoria, Berkeley, Branner, Lick, Tacubaya, Brisbane, Auckland, Christchurch, Wellington, Riverview, Ksara, and Sverdlovsk; several shocks), 12h. (Christchurch), 13h. (Bogota, Huancayo, and near Ashkabad), 14h. (La Paz), 16h. (Ksara, near Reykjavik, and Leninakan), 18h. (Stuttgart and near Ashkabad (2)), 21h. (Stuttgart and near Leninakan), 22h. (Istanbul, Ksara, Triest, Stuttgart, Strasbourg, Rome, Granada, La Paz, Huancayo, Wellington, and Christchurch), 23h. (Istanbul, Clermont-Ferrand, Paris, Uccle, Kew, De Bilt, Alicante, Malaga, La Plata, Seven Falls, Tucson, and near Klyuchi).

Nov. 2d. 8h. 29m. 35s. Epicentre 36°·1N. 141°·2E. (as on October 28d.).

Intensity IV at Ose (Ibaraki Pref.); II-III at Mito, Kakioka, and Hukusima. Epicentre 36°·2N. 141°·2E. Shallow. Macroseismic radius 200-300km.

Seismo. Bull. Cent. Met. Obs., Japan, for 1948, Tokyo, 1950, pp. 45-46, with macroseismic chart.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Mito		0·7	296	0 16k	− 1	0 24	− 4
Kakioka		0·8	279	0 17	− 1	0 27	− 4
Onahama		0·9	344	0 19	− 1	0 27	− 7
Tukubasan		0·9	277	0 19	− 1	0 28	− 6
Tokyo		1·2	251	0 26	+ 2	0 44	+ 3
Utunomiya		1·2	293	0 20	− 4	0 32	− 9
Yokohama		1·4	242	0 39	+12	1 2	+16
Kumagaya		1·5	272	0 28	0	—	—
Mera		1·6	223	0 36	+ 6	—	—
Hukusima		1·8	340	0 30	− 2	0 49	− 7
Maebasi		1·8	280	0 32	0	0 52	− 4
Hunatu		2·0	253	0 37	+ 2	1 8	+ 6
Misima		2·1	242	0 48	P_g	1 23	S_g
Sendai		2·2	354	0 35	− 3	0 58?	− 8
Nagano		2·5	283	0 46	+ 3	—	—
Mizusawa	E.	3·0	359	0 52	+ 2	1 24	− 3
Toyama		3·3	280	0 55	+ 2	1 58	S_g
Morioka		3·6	0	0 59	+ 1	1 42	0
Nagoya		3·6	256	1 2	+ 4	1 49	+ 7
Kameyama		4·1	253	1 20	P_g	—	—
Osaka		4·9	254	2 11	S	(2 11)	− 4

Nov. 2d. 9h. 53m. 18s. Epicentre 4°·8N. 61°·6E.

A = +·4740, B = +·8766, C = +·0831; δ = +1; h = +7;
D = +·880, E = −·476; G = +·040, H = +·073, K = −·997.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kodaikanal	E.	16·6	68	i 3 59	+ 3	i 6 31	−29	—	—	7·6
Bombay	E.	17·8	37	i 4 7	− 4	—	—	—	—	—
Hyderabad	N.	20·7	51	e 4 43	− 1	—	—	—	—	—
Calcutta	E.	31·3	53	e 7 12	+48	e 11 42	+11	—	—	—
Kulyab		33·8	12	e 5 19	−87	—	—	—	—	—
Stalinabad		34·2	10	i 6 51	+ 2	—	—	—	—	—
Samarkand		35·1	7	e 6 55	− 2	—	—	—	—	—
Baku		37·0	344	e 7 12	− 1	—	—	—	—	—
Tashkent		37·0	10	i 7 12	− 1	e 13 0	+ 1	—	—	—
Andijan		37·1	14	e 7 9	− 5	—	—	—	—	—
Ksara		37·5	323	e 7 18	+ 1	e 15 23	SS	e 8 44	PP	—
Helwan		37·9	314	e 7 27	+ 7	e 13 27	+14	—	—	—
Erevan		38·5	339	e 8 53	PP	—	—	—	—	—
Frunse		39·6	15	e 7 36	+ 1	—	—	—	—	—
Grozny		40·8	342	e 8 20?	+35	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Yalta		46·3	333	e 8 28	− 1	15 15	− 1	—	—	—
Istanbul		46·4	25	e 8 37	+ 7	e 15 5	−13	—	—	—
Sverdlovsk		51·9	359	e 9 10	− 2	16 23	−12	—	—	—
Moscow		54·3	344	e 9 30	0	e 17 9	+ 2	—	—	—
Tamanrasset		57·0	294	e 9 51	+ 1	—	—	i 10 40k	PcP	—
Rome		57·2	318	e 9 47	− 4	e 17 17	−29	e 13 15	PPP	—
Warsaw		57·9	332	—	—	17 55	0	—	—	e 24·7
Triest		58·1	323	e 10 0	+ 2	e 18 30	PPS	e 10 37	pP	—
Irkutsk		59·0	29	e 10 2	− 2	18 2	− 8	—	—	—
Potsdam	N.	62·0	329	(e 12 42?)	PP	—	—	—	—	e 12·7
Zürich		62·1	322	e 10 29	+ 4	e 18 21	−28	—	—	—
Stuttgart		62·3	324	e 10 27	+ 1	—	—	—	—	e 34·7
Basle		62·8	322	e 10 28	− 2	e 18 36	−22	e 12 53	PP	—
Strasbourg		63·1	323	e 10 20	−12	e 19 0	− 2	e 13 15	PP	e 30·7
Clermont-Ferrand		64·9	318	e 10 43	0	e 19 30	+ 6	e 13 3	PP	32·7
Alicante		65·3	310	13 19	PP	19 38	+ 9	—	—	e 31·8
De Bilt		66·1	326	i 10 50	− 1	e 19 37	− 2	—	—	e 33·7
Paris		66·4	322	e 10 52	− 1	e 20 4?	+21	e 14 6	PP	—
Granada		67·4	308	10 59a	0	e 21 6	+71	13 24k	PP	—
Malaga	z.	68·0	307	i 10 58k	− 5	20 0	− 2	i 13 34a	PP	33·4
Toledo		68·3	311	e 11 5	0	—	—	—	—	—
Vladivostok		72·4	47	e 11 30	0	—	—	—	—	—
La Paz		129·4	253	e 19 48	[+37]	i 29 12	{+56}	21 42	PP	65·1

Additional readings :—
Tamanrasset iPP =12m.19s.k.
Rome ePS?N =17m.59s.
Warsaw SS?N =18m.12s.
Triest esP? =11m.11s., ePP? =13m.5s., esS? =19m.47s., eSS? =23m.5s.
Strasbourg ePP =13m.18s.
Clermont-Ferrand iP =10m.50s.
Granada pPP =14m.3s.k, PPP =15m.35s.a.
Malaga PPP =15m.15s.
La Paz iE =22m.42s.
Long waves were also recorded at Copenhagen.

Nov. 2d. 15h. 24m. 24s. Epicentre 38°·3N. 59°·2E.

A = +·4029, B = +·6758, C = +·6172 ; δ = −3 ; h = −1 ;
D = +·859, E = −·512 ; G = +·316, H = +·530, K = −·787.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Ashkabad		1·2	249	−i 0 1	?	0 6	?
Samarkand		6·2	75	e 1 39	+ 4	i 2 50	+ 2
Baku		7·5	289	e 2 6	+13	—	—
Stalinabad		7·5	85	e 1 55	+ 2	e 3 19	− 1
Tashkent		8·3	65	e 2 4	0	e 3 35	− 5
Tchimkent		8·9	60	e 2 14	+ 2	e 3 55	0
Andijan		10·4	72	e 2 33	− 1	e 4 27	− 5
Grozny		11·4	300	e 2 48	+ 1	5 3	+ 7
Leninakan		12·2	287	e 2 59	+ 1	e 5 24?	+ 8
Frunse		12·6	64	e 3 19	+16	—	—
Piatigorsk		13·4	300	e 3 16	+ 2	5 45	0
Sverdlovsk		18·6	3	—	—	e 7 45	− 1
Ksara		19·4	265	e 4 21	− 9	e 8 7	+ 3
Moscow		22·7	328	e 5 2	− 2	—	—
Stuttgart	z.	37·1	303	e 7 8	− 6	—	—
Tamanrasset		48·1	268	8 35	− 8	—	—

Long waves were recorded at Bombay and Rome.

Nov. 2d. Readings also at 1h. (Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Lick, Shasta Dam, and Ottawa), 3h. (near Andijan, Kulyab (2), and Stalinabad (4)), 5h. (near Kulyab and near Tananarive), 6h. (near Kulyab), 8h. (near Leninakan), 9h. (Bombay, Hyderabad, Kodaikanal, and Ksara), 10h. (Huancayo, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Tashkent, near Ashkabad, Stalinabad (2), and near Klyuchi), 11h. (Frunse), 12h. (Pierce Ferry, Auckland, Wellington, Stuttgart, Kulyab, near Andijan, Frunse, near Istanbul, and near Mizusawa), 13h. (Brisbane and Vladivostok), 14h. (Auckland, Wellington, Riverview, Stuttgart (2), San Juan, La Paz, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, and Shasta Dam), 16h. (near Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, and Pierce Ferry), 17h. (Apia), 21h. (Mount Wilson, Palomar, Riverside, and Boulder City), 22h. (Ashkabad, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, Bogota, La Paz, and near Huancayo. Deep focus).

Nov. 3d. 5h. 18m. 54s. Epicentre 21°·0S. 169°·5E. (as on 1946, Sept. 13d.).

$A = -\cdot9188$, $B = +\cdot1703$, $C = -\cdot3563$; $\delta = +15$; $h = +4$;
$D = +\cdot182$, $E = +\cdot983$; $G = +\cdot350$, $H = -\cdot065$, $K = -\cdot934$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		16·3	244	i 3 56	+ 4	i 7 16	+23	i 4 12	PP	i 9·0
Auckland	N.	16·4	165	3 6?	−47	6 24	−32	—	—	7·2
Arapuni	E.	17·8	165	—	—	7 18	−10	—	—	9·6
New Plymouth	E.	18·4	169	4 21	+ 3	8 21	+40	—	—	11·1
Tuai	N.	18·9	163	4 24	0	8 18	+25	—	—	—
Apia		19·2	72	e 4 18a	−10	7 42	−17	—	—	e 9·4
Riverview		20·6	228	i 4 47a	+ 4	i 8 47	+18	i 5 14	PP	i 10·8
Wellington		20·7	169	4 46	+ 2	8 15	−16	5 4	PP	10·1
Kaimata		21·5	177	4 56	+ 4	—	—	—	—	—
Christchurch		22·6	174	5 5	+ 2	9 7	0	i 5 24	PP	—
Honolulu		52·8	39	e 9 34	+15	e 16 42	− 5	—	—	e 21·4
Tokyo		63·0	334	e 11 14	+43	19 58	+57	—	—	—
Nagoya		63·8	332	10 27	− 9	—	—	—	—	—
Osaka		64·1	329	10 13	−25	19 16	+ 2	—	—	—
Sendai		64·8	337	e 10 44	+ 1	19 23	0	—	—	—
Hukuoka		65·8	325	11 21	+32	20 16	+41	—	—	—
Vladivostok		72·6	333	e 11 29	− 2	i 21 5	+ 9	—	—	—
Branner	Z.	86·6	48	i 12 41a	− 5	—	—	—	—	—
Santa Clara	E.	86·7	48	e 13 17	+30	—	—	—	—	e 40·3
Berkeley	Z.	86·8	48	i 12 40k	− 7	e 24 30	PS	e 18 26	PPP	e 51·0
Lick	Z.	86·9	48	i 12 51a	+ 3	—	—	—	—	—
Santa Barbara	Z.	86·9	53	e 12 52	+ 4	—	—	—	—	—
Arcata	Z.	87·1	45	i 12 53k	+ 4	—	—	i 13 2a	pP	—
Pasadena		87·9	53	e 12 46	− 7	e 23 33	− 2	i 16 18	PP	e 39·8
La Jolla	Z.	88·0	54	e 12 48	− 5	—	—	—	—	—
Mount Wilson	Z.	88·1	53	e 12 48	− 6	—	—	—	—	—
Shasta Dam		88·1	45	e 12 47	− 7	—	—	—	—	—
Riverside	Z.	88·4	53	i 12 49k	− 6	—	—	—	—	—
Mineral	E.	88·4	46	e 12 59	+ 4	—	—	—	—	—
Palomar		88·5	54	i 12 50k	− 6	i 23 52	+11	i 16 24	PP	—
Haiwee	Z.	89·0	51	e 12 53	− 5	—	—	—	—	—
Tinemaha	Z.	89·2	50	e 12 53k	− 6	—	—	—	—	—
Calcutta	E.	90·2	294	e 13 56	+52	e 24 2	+ 6	—	—	—
Boulder City		91·2	52	i 13 8	0	—	—	e 16 30	PP	—
Victoria	Z.	91·4	39	e 13 8	− 1	—	—	—	—	—
Pierce Ferry		91·9	52	i 13 6	− 5	e 24 20	+ 9	e 38 49	P′P′	—
Irkutsk		92·3	326	e 13 14	+ 1	23 58	[+12]	—	—	—
Tucson		92·7	57	i 13 10k	− 5	e 24 27	+ 9	e 16 57	PP	e 38·3
Salt Lake City		95·3	48	—	—	e 26 3	PS	—	—	e 39·8
Kodaikanal	E.	95·5	280	e 14 14	+46	e 24 46	+ 4	30 7	SS	43·6

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		97·9	73	e 18 34	?	e 25 12	+ 9	e 19 48	PPP	e 44·9
Bombay		102·6	285	e 17 23	PP	e 25 11	{− 2}	—	—	—
Lincoln	E.	106·2	52	—	—	e 27 24	PS	e 33 45	SS	e 49·6
Huancayo		108·4	112	e 18 53	PP	e 25 20	[+15]	e 28 26	PS	e 45·2
St. Louis		110·6	56	e 19 9	PP	e 34 45	SS	—	—	—
Stalinabad		110·9	305	e 18 35	[0]	28 54	PS	19 16	PP	—
Tashkent		111·0	308	e 18 50	[+15]	e 26 26	{+14}	e 19 41	PP	—
La Paz		112·3	119	i 19 34	PP	i 29 8	PS	35 22	SS	53·1
Chicago		113·1	52	e 29 9	PS	e 35 31	SS	—	—	e 47·2
Bogota		116·3	95	e 19 58	PP	e 29 49	PS	e 31 12	PPS	47·1
Cleveland	E.	117·6	53	—	—	e 28 46	PS	e 36 18	SS	—
Sverdlovsk		117·6	324	e 20 19	PP	—	—	—	—	—
Ottawa		121·9	49	e 18 49	[− 7]	—	—	—	—	56·1
Vermont		123·8	50	—	—	e 37 38	SS	—	—	e 51·1
Baku		125·6	306	e 21 24	PP	—	—	—	—	—
San Juan		127·8	83	e 21 22	PP	e 26 36	[+22]	e 22 30	PKS	e 53·8
Scoresby Sund		130·0	5	21 39	PP	38 51	SS	—	—	53·1
Leninakan		130·3	306	19 29?	[+16]	22 57?	PKS	—	—	—
Piatigorsk		130·3	310	—	—	23 11	PKS	—	—	—
Bermuda		130·7	65	e 22 37	PKS	e 27 20	[+58]	e 33 28	PPS	e 54·3
Fort de France		131·6	89	e 18 55	[−20]	—	—	—	—	—
Theodosia		135·4	313	19 38	[+16]	—	—	—	—	—
Upsala		136·3	340	—	—	i 33 52	PPS	e 45 6?	SSS	e 56·1
Yalta		136·4	313	19 41	[+17]	—	—	e 23 26	PKS	—
Ksara		137·2	297	e 19 31	[+ 6]	—	—	e 22 32	PP	—
Warsaw		140·4	330	e 19 37	[+ 6]	e 23 21	PKS	e 22 40	PP	e 63·1
Istanbul		141·1	311	e 19 21	[−11]	—	—	e 26 14	PPP	—
Copenhagen		141·4	341	e 19 18	[−15]	—	—	—	—	60·1
Helwan		141·4	293	—	—	—	—	e 42 48	SSP	—
Potsdam		143·8	335	e 23 0	PP	e 26 54	[+ 9]	e 31 36	SKKS	e 59·1
Collmberg		144·6	335	e 19 31	[− 7]	—	—	e 20 28	?	—
Prague		144·9	333	e 19 40	[+ 1]	e 27 6	[+19]	e 23 30	PKS	e 59·1
Belgrade		145·2	319	e 23 6	PP	—	—	e 25 58	PPP	e 74·1
Jena	N.	145·5	334	e 19 39	[− 1]	—	—	—	—	—
Cheb		145·8	334	e 19 45	[+ 4]	e 30 54	{+59}	e 42 29	SSP	—
De Bilt		146·7	343	i 19 40	[− 2]	e 48 6?	SSS	e 23 12	PP	e 68·1
Uccle	N.	148·1	343	e 19 46	[+ 2]	—	—	—	—	—
Stuttgart		148·1	336	e 19 42	[− 2]	e 30 24	{+16}	23 37	PKS	e 71·1
Triest		148·1	328	e 19 46	[− 2]	i 23 24	PKS	i 20 34	PKP_2	e 62·1
Kew		148·6	348	e 19 57	[+12]	—	—	e 42 47	SS	e 66·1
Strasbourg		148·8	337	e 19 48	[+ 3]	e 43 14	SS	e 49 25	SSS	63·1
Taranto		149·4	316	19 53	[+ 7]	—	—	—	—	69·8
Chur		149·5	335	e 19 50	[+ 3]	—	—	—	—	e 69·1
Zürich		149·5	336	e 19 49	[+ 2]	—	—	e 20 42	PKP_2	—
Basle		149·8	336	e 19 49	[+ 2]	e 29 58	{−19}	20 38	PKP_2	—
Bologna	Z.	150·4	327	e 19 59	[+11]	e 26 12	[−42]	—	—	—
Paris		150·4	342	e 19 51	[+ 3]	e 30 19	{− 1}	e 22 52	?	e 66·1
Florence	Z.	151·0	326	e 19 47	[− 2]	—	—	e 20 40	PKP_2	—
Pavia	Z.	151·0	331	e 20 1?	[+12]	—	—	—	—	—
Rome		151·6	322	e 19 59s	[+ 9]	e 42 52	SS	i 23 6	PP	e 68·1
Clermont-Ferrand		152·9	338	i 20 3	[+11]	e 28 47	?	i 23 53	PP	63·1
Tortosa		158·2	337	20 46	PKP_2	31 43	{+40}	e 24 20	PP	e 66·1
Algiers		160·4	324	24 10	PP	31 40	{+26}	e 29 6?	PPP	e 60·1
Toledo	Z.	160·4	345	e 20 8	[+ 7]	e 28 3	[+58]	i 20 49	PKP_2	72·9
Alicante		160·7	336	20 20	[+18]	27 31	[+26]	23 57	PKS	e 74·2
Lisbon		162·3	356	20 22	[+19]	—	—	20 52k	PKP_2	77·1
Granada		162·8	342	i 21 45k	?	32 45	{+78}	22 15k	pPKP	77·2
Tamanrasset		165·1	280	i 20 1	[− 5]	—	—	i 20 57s	PKP_2	—

Additional readings and notes :—
Brisbane iSZ =7m.20s., iSSN =8m.1s., iPcPN =8m.20s.
Auckland iN =3m.12s. and 3m.28s., eN =5m.1s.
Apia i =4m.24s.

Continued on next page.

Riverview iEN =4m.53s., i =4m.59s., iE =5m.9s., iN =5m.32s., iZ =5m.35s., iE =6m.7s. iN =6m.54s., iNZ =9m.0s., iEN =9m.21s., iSSZ =9m.28s., eQ =9m.36s.
Wellington iZ =5m.26s., i =7m.18s., e =8m.33s., i =8m.37s.
Christchurch eEN =7m.39s.
Honolulu e =9m.51s.
Branner eEN =12m.49s.a, iZ =13m.10s.k.
Berkeley eEN =12m.43s., iZ =12m.49s., and 13m.0s., eZ =13m.8s., 17m.34s., 21m.46s., 27m.18s. and 32m,29s.
Lick iZ =13m.2s.
Santa Barbara eZ =13m.10s.
Pasadena iEZ =12m.55s., i =13m.5s. and 14m.28s., iN =23m.50s., ePSEZ =24m.34s., eSSE =28m.24s., eQE =35m.36s.
La Jolla iZ =12m.57s.
MountWilson i =12m.56s., iZ =13m.6s.
Shasta Dam i =12m.58s., e =14m.5s.
Riverside iZ =12m.57s.
Mineral eN =13m.2s.
Palomar iNZ =12m.59s., iZ =13m.9s. and 14m.1s.
Haiwee i =13m.3s., iZ =13m.13s.
Tinemaha iZ =12m.59s. and 13m.10s.
Boulder City e =13m.22s.
Pierce Ferry e =13m.23s.
Tucson i =13m.16s. and 16m.36s., ePS? =25m.26s., ePPS =26m.10s., eSS =30m.30s., eSSS =34m.6s., ePKKP =31m.10s.
Kodaikanal PSE =25m.31s.
Tacubaya eE =10m.35s., eN =18m.40s., eE =18m.46s., 19m.56s., and 30m.57s., eN = 33m.11s.
Lincoln eSSSE =37m.23s.
Huancayo eS? =27m.8s., ePPS? =30m.14s., eSS =34m.26s., eSSS =39m.3s.
Tashkent ePPP =22m.10s.
La Paz PPSE =29m.18s., QN =48m.18s.
San Juan e =24m.26s., eS? =29m.47s., ePS =31m.48s., eSS =38m.24s., eSSS =43m.10s.
Bermuda eSS =39m.21s.
Upsala 51m.6s.?.
Warsaw eN =24m.19s., ePPPZ =25m.23s.
Prague eN =20m.30s., e =24m.6s., ePPP =26m.24s., e =20m.30s. and 32m.36s., ePPS? = 36m.36s., eSS =41m.30s.
Jena eE =19m.44s.
Cheb e =20m.38s. and 24m.42s., eSSS? =47m.7s.
De Bilt iZ =20m.26s.
Stuttgart ePKP =19m.46s., e =20m.28s., 20m.47s., 21m.34s., 22m.20s., and 24m.26s., eSS =42m.6s., eQ =66·1m.
Kew eN =55m.19s. and 61m.3s.
Strasbourg i =20m.19s. and 20m.24s., e =20m.34s., 21m.42s., 22m.46s., and 34m.51s.
Basle e =21m.17s.
Paris e =20m.10s., i =20m.34s. and 20m.57s., e =22m.8s.
Rome iN =21m.0s., e =24m.34s.
Clermont Ferrand i =21m.5s., 21m.36s., and 22m.15s.
Tortosa PPPN =34m.9s.
Algiers e =34m.6s.?
Toledo ePPZ =24m.32s.
Alicante PP =24m.38s., PPP =28m.39s., PPS =37m.59s., SS =44m.43s., SSS =50m.53s., Q =65m.23s.
Lisbon NZ =21m.27s., QE =68·6m.
Granada PKP_2 =22m.33s.k, SKP =25m.33s., iPP =26m.6s.a, pPP =26m.24s.k, sPP = 27m.8s., SKSP =36m.36s., PPS =39m.12s., iSS =45m.5s., times appear to be subject to some error.
Tamanrasset e =22m.48s., ePP =25m.24s.
Long waves were also recorded at Aberdeen, Malaga, Ivigtut, and other American stations.

Nov. 3d. Readings also at 2h. (La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 5h. (Tucson (2), Mount Wilson, Palomar, Riverside (2), Tinemaha (2), Helwan, Ksara, Istanbul, Belgrade, Stuttgart, Strasbourg, Basle, Zürich, Paris, Taranto, Rome, Triest, and Granada), 6h. (Alicante), 7h. (Mount Wilson, Palomar (2), Riverside (2), Tinemeha, Tucson (2), Boulder City, and Pierce Ferry (2)), 8h. (Tinemaha, Tucson, and Wellington), 10h. (Klyuchi, Leninakan, and near Erevan), 11h. (Stuttgart, near Bologna, Florence, Rome, and Triest), 12h. (Tamanrasset, Messina, Pierce Ferry, and near Ashkabad (2)), 13h. (La Paz, Messina, near Grozny, and near Klyuchi (2)), 14h. Messina and near Klyuchi), 15h. (Messina, Leninakan, Piatigorsk, near Andijan, Frunse, Samarkand, Stalinabad, Tashkent, and Tchimkent), 16h. (Mount Wilson, Riverside, Tinemaha, Tucson, Pierce Ferry, Stuttgart, near Kodaikanal, and near Stalinabad), 18h. (near Berkeley, Branner, San Francisco, Lick, and near Irkutsk), 20h. (Askkabad and near Klyuchi), 21h. (near Klyuchi), 22h. (near Andijan), 23h. (Klyuchi (2)).

Nov. 4d. 13h. 18m. 5s. Epicentre 56°·4N. 160°·7E. (as on Oct. 23d.).

$A = -\cdot5248$, $B = +\cdot1838$, $C = +\cdot8312$; $\delta = +9$; $h = -8$;
$D = +\cdot331$, $E = +\cdot944$; $G = -\cdot784$, $H = +\cdot275$, $K = -\cdot556$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Klyuchi		0·1	—	0 1	P_g	—	—	—	—	—
Mizusawa	E.	21·6	226	2 27	?	4 54	?	—	—	—
Vladivostok		22·6	247	e 5 9	+ 6	i 9 14	+ 7	—	—	—
College		25·9	50	e 5 36	+ 1	—	—	—	—	e 16·0
Irkutsk		32·3	288	e 6 33	0	11 55	+ 9	—	—	—
Victoria	Z.	44·7	67	e 8 16	0	—	—	—	—	—
Sverdlovsk		50·1	316	i 9 0	+ 1	i 16 14	+ 4	—	—	—
Shasta Dam		50·5	74	i 9 1	− 1	—	—	—	—	—
Almata		52·3	294	e 9 14	− 1	—	—	—	—	—
Lick	Z.	53·4	76	i 9 22k	− 2	—	—	—	—	—
Frunse		53·8	296	e 9 27	+ 1	e 17 6	+ 5	—	—	—
Tinemaha		55·4	74	i 9 38	0	—	—	—	—	—
Andijan		56·4	295	e 9 45	0	i 17 40	+ 4	—	—	—
Santa Barbara	Z.	56·6	77	e 9 49	+ 2	—	—	—	—	—
Tchimkent		56·7	298	i 9 46	− 2	i 17 42	+ 2	—	—	—
Mount Wilson	Z.	57·6	76	i 9 53k	− 1	—	—	—	—	—
Pasadena	Z.	57·6	76	i 9 52k	− 2	—	—	—	—	—
Tashkent		57·6	298	e 9 54	0	e 17 52	+ 1	—	—	—
Boulder City		58·0	72	i 9 56	− 1	—	—	—	—	—
Pierce Ferry		58·4	71	i 9 59	− 1	—	—	—	—	—
Palomar	Z.	58·9	75	i 10 3k	0	—	—	—	—	—
La Jolla	Z.	59·1	76	i 10 3	− 1	—	—	—	—	—
Moscow		59·1	327	10 4	0	e 18 14	+ 3	—	—	—
Kulyab		59·8	295	10 8	− 1	i 18 23	+ 3	—	—	—
Samarkand		59·9	298	e 10 9	− 1	—	—	—	—	—
Stalinabad		59·9	296	i 10 9	− 1	i 18 23	+ 2	—	—	—
Tucson		63·0	72	i 10 30k	− 1	—	—	i 11 8	PcP	—
Ville Marie		65·1	42	e 10 43	− 2	—	—	—	—	—
Copenhagen		65·3	342	10 47	+ 1	—	—	—	—	41·9
Temiskaming		65·8	41	e 10 47	− 2	—	—	—	—	—
Grozny		66·6	315	e 10 47	− 7	—	—	—	—	—
Rolphton		66·7	40	e 10 52	− 3	—	—	—	—	—
Ottawa	Z.	68·1	39	e 11 1	− 3	—	—	—	—	—
Shawinigan Falls	N.	68·1	37	e 11 1	− 3	—	—	—	—	—
Leninakan		69·5	315	e 11 2	−10	—	—	—	—	—
Jena		70·0	340	e 11 16	+ 1	—	—	—	—	—
Hyderabad	N.	71·4	274	—	—	20 36	− 6	—	—	—
Harvard		72·1	38	i 11 27	− 1	—	—	—	—	—
Stuttgart		72·5	341	e 11 31	+ 1	—	—	—	—	e 44·9
Strasbourg		73·0	342	e 11 34	+ 1	—	—	e 12 11	PcP	—
Paris		73·6	347	i 11 39	+ 2	—	—	—	—	—
Basle		74·0	342	e 11 21	−18	—	—	e 11 40	P	—
Zürich		74·0	342	e 11 39	0	—	—	—	—	—
Triest		74·6	338	e 11 35	− 8	—	—	—	—	—
Istanbul		74·7	325	11 48	+ 5	e 21 24	+ 5	—	—	—
Rome		78·5	337	e 12 5	+ 1	e 22 7	PS	—	—	e 31·4
Ksara		78·7	316	e 12 4	− 2	e 22 58	PS	—	—	—
Helwan		83·9	318	—	—	e 22 55	− 1	—	—	—
Alicante		84·3	346	e 12 17	−18	—	—	—	—	42·3
Granada		85·8	348	i 12 52	+10	23 17	+ 2	16 6	PP	42·6
Tamanrasset		98·4	338	e 15 50	?	—	—	e 17 33	PP	—

Additional readings :—
Shasta Dam i =9m.9s., e =9m.34s.
Lick iZ =9m.41s.a.
Tinemaha iZ =9m.45s.
Santa Barbara iZ =10m.2s.
Mount Wilson iZ =10m.3s., and 10m.26s.
Pasadena iZ =9m.57s. and 10m.11s.
Palomar iZ =10m.20s.
La Jolla iZ =10m.27s.

Continued on next page.

Tucson i =10m.34s. and 11m.1s.
Harvard i =11m.34s.
Stuttgart eZ =11m.37s.
Strasbourg eP =11m.40s., e =12m.11s.
Zürich e =12m.32s.
Granada P_cP =13m.18s.
Long waves were also recorded at Bombay, Calcutta, Wellington, Christchurch, Warsaw, Cheb, Tortosa, and Clermont Ferrand.

Nov. 4d. 17h. Peru.

Huancayo iP =11m.7s., eS? =11m.17s., iL =11m.32s.
La Paz eP =12m.55s., i =13m.26s., iS =15m.0s., iS_g =15m.24s., L =16m.0s.
Bogota eP =14m.35s., iPP =14m.49s., iSEN =17m.37s., iLEN =19m.21s.
Tucson iP =20m.18s., i =20m.26s.
Ottawa eZ =20m.24s.
Shawinigan Falls eN =20m.32s.
Pierce Ferry eP? =20m.49s.
Palomar ePZ =20m.51s., iZ =20m.54s.
Boulder City iP =20m.58s.
Mount Wilson iPZ =20m.59s., eZ =21m.11s.
Pasadena iPZ =20m.59s., eZ =21m.1s. and 21m.21s., iZ =21m.47s.
Shasta Dam eP =21m.40s., e =21m.56s.
Toledo iPZ =23m.8s., i =23m.21s. and 23m.26s.

Nov. 4d. Readings also at 0h. (Klyuchi (3)), 1h. (Klyuchi (3) and Ottawa), 2h. (Klyuchi (4)), 3h. (near Kulyab, Stalinabad, and Andijan), 4h. (Boulder City, Pierce Ferry, Shasta Dam, Tucson (2), Pasadena, Mount Wilson, Riverside, Palomar (2), near Victoria, Samarkand, Klyuchi, near Granada, and Malaga), 5h. (Klyuchi and near Stalinabad), 6h. (Klyuchi and near Alicante), 8h., 9h. and 11h. (Klyuchi), 13h. (Alicante, near Malaga, Toledo, and Lisbon), 14h. (Ashkabad (2), Klyuchi, Samarkand, Stalinabad, and near Apia), 15h. (near Granada), 16h. (Istanbul, Stalinabad Tashkent, near Ashkabad (2), and near Zürich), 17h. (Klyuchi), 20h. (Klyuchi and near Ottawa), 21h. (near Ashkabad), 23h. (near Ashkabad (2), and near Ottawa).

Nov. 5d. 8h. 32m. 30s. Epicentre 19°·0S. 169°·5E. (as on 1947, July 24d.).

$A = -\cdot9304$, $B = +\cdot1724$, $C = -\cdot3236$; $\delta = +8$; $h = +5$;
$D = +\cdot182$, $E = +\cdot983$; $G = +\cdot318$, $H = -\cdot059$, $K = -\cdot946$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		17·3	238	i 3 59	− 5	i 7 27	+11	i 4 40	PPP	—
Auckland	N.	18·4	168	3 8?	−70	6 21	−80	—	—	7·7
Tuai	N.	20·8	164	4 28	−17	—	—	—	—	—
Riverview		22·0	225	i 4 57k	− 1	i 8 55	− 1	e 5 24	PP	10·5
Wellington		22·7	171	4 49	−15	8 24	−45	e 5 5	P	11·5
Kaimata		23·5	176	5 5	− 7	—	—	—	—	—
Christchurch		24·6	175	6 21	+58	9 37	− 5	9 58	Q	12·3
Lick	Z.	85·6	48	i 12 43k	+ 2	—	—	—	—	—
Shasta Dam		86·7	46	e 12 46	− 1	—	—	—	—	—
Pasadena	Z.	86·7	53	e 12 47	0	—	—	e 12 53	P_cP	—
Mount Wilson	Z.	86·8	53	e 12 48	+ 1	—	—	—	—	—
Riverside	Z.	87·2	53	i 12 48	− 1	—	—	i 12 57	P_cP	—
Palomar	Z.	87·4	55	i 12 50	0	—	—	i 12 55	P_cP	—
Haiwee	Z.	87·7	51	e 12 51	− 1	—	—	e 12 56	P_cP	—
Tinemaha	Z.	87·9	51	i 12 55	+ 2	—	—	i 13 1	P_cP	—
Boulder City		89·9	53	e 13 5	+ 3	—	—	—	—	—
Pierce Ferry		90·6	52	e 13 6	+ 1	—	—	—	—	—
Tucson		91·6	57	i 13 10	0	—	—	i 13 17	P_cP	—
Ottawa	Z.	120·6	47	e 18 50	[− 4]	—	—	—	—	—
Stuttgart	Z.	146·3	336	e 19 44	[+ 3]	—	—	e 19 51	?	—
Strasbourg		147·0	337	e 19 54	[+11]	—	—	e 20 22	?	—
Tamanrasset		164·6	287	20 5	[0]	e 21 5	PKP_2	e 24 56	PP	—

Riverview gives also iZ =9m.5s., isSN =9m.13s., iZ =9m.21s., eQN =9m.24s., iSSZ =9m.37s.
Long waves were also recorded at Apia and Ksara.

Nov. 5d. Readings also at 0h. (near Ashkabad), 4h. (near Samarkand, Kulyab, and Andijan), 5h. (Christchurch, Wellington, Auckland, Arapuni, and Apia), 7h. (Pierce Ferry), 8h. (Stalinabad, Tashkent, Samarkand, Kulyab, near Andijan, Frunse, Murgab, Tchimkent, and Almata), 9h. (near Catania, Messina, and near Mizusawa), 12h. (Raciborzu and near Alicante), 13h. (near Malaga, Lisbon, Toledo, Alicante, and Granada), 14h. (near Branner, Lick, and San Francisco), 17h. (Stuttgart, Messina, Mount Wilson, Pasadena, Riverside, Haiwee, Tinemaha, Boulder City, Pierce Ferry, Tucson, near Klyuchi (2), and near Tacubaya), 18h. (Ksara and near Mizusawa), 19h. (Mount Wilson, Pasadena, Riverside, Haiwee, Tinemaha, Palomar, Boulder City, Pierce Ferry, and Tucson), 20h. (Merida, Tacubaya, Berkeley, Pierce Ferry, and Boulder City), 21h. (Samarkand, near Kulyab, Stalinabad, Murgab, and Andijan), 22h. (Frunse and near Stalinabad), 23h. (Wellington, Riverview, Brisbane, and near Ashkabad (2)).

Nov. 6d. 14h. 8m. 53s. Epicentre 20°·2S. 169°·5E. (as on 1938, June 30d.).

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

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		16·7	241	e 3 57	0	i 7 22	+19	i 4 17	PP	—
Auckland	N.	17·2	165	i 4 7?	+ 4	e 7 11	− 3	—	—	8·4
Arapuni	E.	18·6	165	—	—	7 25	−21	—	—	—
Apia		19·0	73	e 4 26	0	e 8 7	+12	—	—	e 9·1
Tuai	N.	19·7	163	4 28	− 6	—	—	—	—	—
Riverview		21·2	227	i 4 49k	0	i 8 52	+11	i 4 58	pP	e 10·3
Wellington		21·5	170	4 47	− 5	9 0	+13	9 37	SS	11·3
Christchurch		23·4	174	5 9	− 2	9 19	− 2	10 5	Q	12·0
Lick	Z.	86·4	48	i 12 47a	+ 2	—	—	—	—	—
La Jolla	Z.	87·6	54	e 12 53	+ 2	—	—	—	—	—
Mount Wilson	Z.	87·6	53	i 12 52k	+ 1	—	—	—	—	—
Pasadena		87·6	53	i 12 51k	0	—	—	—	—	—
Riverside	Z.	88·0	53	i 12 53k	0	—	—	—	—	—
Palomar		88·1	54	i 12 55k	+ 1	—	—	—	—	—
Haiwee	Z.	88·5	51	e 12 57k	+ 1	—	—	—	—	—
Tinemaha	Z.	88·7	50	i 12 58	+ 1	—	—	—	—	—
Boulder City		90·7	52	e 17 37	PP	—	—	—	—	—
Victoria	Z.	90·8	39	e 13 10	+ 4	—	—	—	—	—
Pierce Ferry		91·4	53	i 13 40	+31	—	—	—	—	—
Tucson		92·2	57	e 13 14	+ 1	—	—	—	—	e 43·7
Huancayo		108·6	111	—	—	e 29 27	PPS	—	—	e 54·3
La Paz		112·7	118	i 19 19	PP	i 29 0	PS	i 35 17	SS	—
Ksara		136·8	298	e 20 38	[+73]	—	—	—	—	—
Istanbul		140·6	311	e 18 42	[−50]	—	—	—	—	—
Stuttgart	Z.	147·4	336	e 19 47	[+ 4]	—	—	—	—	—
Strasbourg		148·1	337	—	—	e 33 7?	PS	—	—	—
Clermont-Ferrand		152·2	339	—	—	e 33 54	PS	—	—	88·1
Alicante		159·9	337	—	—	e 40 41	?	—	—	—
Malaga	Z.	162·7	343	i 25 3a	PP	31 51	(+25)	i 28 35a	PPP	93·1
Tamanrasset		164·9	283	e 20 8	[+ 2]	24 22	PP	e 21 6	PKP_2	—

Additional readings :—
Brisbane iZ =4m.43s.
Riverview iN =4m.52s. and 5m.1s., iPPE =5m.7s., iPPZ =5m.10s., iE =5m.45s. and 6m.7s., iZ =8m.56s., isSN =9m.7s., iE =9m.15s., iSSSN =9m.41s.
Christchurch eEZ =8m.32s.
Lick iZ =12m.53s.a
Pasadena iZ =12m.58s.
Riverside iZ =12m.58s.
Haiwee eZ =13m.8s.
Tinemaha iZ =13m.5s.
Tucson i =13m.23s.
Stuttgart eZ =20m.22s.
Long waves were also recorded at Seven Falls, Bombay, and other European stations.

Nov. 6d. 23h. 49m. 14s. Epicentre 7°·5S. 71°·0W. Depth of focus 0·090.

A = +·3228, B = −·9376, C = −·1297 ; δ = +12 ; h = +7 ;
D = −·946, E = −·326 ; G = −·042, H = +·123, K = −·992.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		6·2	223	i 1 44	0	e 2 45	−21	—	—	e 3·1
La Paz		9·4	163	i 2 12	− 1	i 3 58	− 2	—	—	4·4
Bogota		12·4	346	i 2 49	+ 6	e 5 10	+17	e 8 37	P_cP	i 7·4
Fort de France		24·1	25	e 4 38	+ 6	—	—	—	—	—
San Juan		26·2	11	—	—	e 8 46	+ 4	e 11 51	SS	—
La Plata		29·8	158	4 38	?	—	—	—	—	—
Tucson		54·8	319	i 8 37a	+ 1	—	—	i 10 35	pP	—
Pierce Ferry		59·3	321	i 9 37	+30	—	—	e 11 36	pP	—
Palomar	z.	59·5	316	i 9 9	+ 1	—	—	i 11 9	pP	—
Boulder City		59·7	320	e 9 38	?	—	—	e 11 38	PP	—
Riverside	z.	60·2	316	i 9 14a	+ 1	—	—	i 11 18	pP	—
Mount Wilson	z.	60·8	316	i 9 18a	+ 1	—	—	i 11 21	pP	—
Pasadena	z.	60·9	316	i 9 17	0	—	—	i 11 19	pP	—
Tinemaha	z.	62·6	319	i 9 29a	+ 1	—	—	i 11 35	pP	—
Tamanrasset		80·6	65	e 13 28	pP	—	—	e 14 31	PP	—

Additional readings :—
Tucson ePP = 12m.6s.
Pierce Ferry ePP = 12m.35s.
Palomar esP = 12m.6s.
Riverside esPZ = 12m.10s.
Mount Wilson esPZ = 12m.12s.
Pasadena isPZ = 12m.12s.
Tinemaha isPZ = 12m.20s.

Nov. 6d. Readings also at 3h. (near Ashkabad (2)), 6h. (Almata, Frunse (2), Tchimkent, near Andijan (2), Kulyab, Murgab (2), Samarkand (2), Stalinabad (2), and Tashkent (2)), 7h. (near Ashkabad and near Piatigorsk), 12h. (near Ashkabad), 13h. (La Paz), 15h. (Istanbul and Bologna (2)), 16h. (near Klyuchi), 17h. (Wellington and near Pierce Ferry), 18h. (Clermont-Ferrand, Paris, Strasbourg, Triest, near Ravensburg, Stuttgart, near Ashkabad, and near Pierce Ferry), 20h. (Boulder City and near Pierce Ferry), 21h. (Stuttgart and near Ashkabad), 22h. (Istanbul and Stuttgart), 23h. (near Ashkabad).

Nov. 7d. Readings at 1h. (Tucson, Pierce Ferry, Tamanrasset, and near Murgab), 2h. (Pierce Ferry), 3h. (Pierce Ferry and near Ashkabad), 4h. (La Plata and Pierce Ferry), 7h. (Grozny and near Leninakan), 9h. (Klyuchi), 10h. (Ksara and near Alicante), 11h. (La Paz), 14h. (Frunse, near Andijan, Kulyab, Murgab, and Stalinabad), 15h. (Klyuchi and near Mizusawa), 21h. (near Branner and Lick), 22h. (near Ashkabad (4)).

Nov. 8d. 2h. 41m. 30s. Epicentre 22°·0S. 171°·7E. (as on 1948, March 29d.).

A = −·9184, B = +·1340, C = −·3724 ; δ = +10; h = +4 ;
D = +·144, E = +·990 ; G = +·368, H = −·054, K = −·928.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	15·1	170	3 21?	−15	5 54	−31	—	—	7·2
Arapuni	E.	16·4	169	—	—	e 7 30?	+34	—	—	—
Tuai	N.	17·4	166	4 2	− 4	7 12	− 7	—	—	—
Brisbane		17·8	248	i 4 16	+ 5	i 7 48	+20	—	—	—
Wellington		19·4	174	4 30	0	8 6	+ 2	9 25	Q	9·8
Christchurch	Z.	21·5	179	—	—	8 58	+11	—	—	11·6
Riverview	N.	21·6	232	—	—	i 9 1	+12	i 9 16	sS	e 10·4
Riverside	Z.	87·4	51	e 12 48	− 2	—	—	—	—	—
Palomar	Z.	87·5	53	e 12 49	− 2	—	—	—	—	—
Boulder City		90·2	51	e 13 31	+27	—	—	—	—	—
Pierce Ferry		90·9	51	e 13 35	+28	—	—	—	—	—
Tucson		91·6	56	e 13 10	0	—	—	—	—	—

Additional readings :—
Brisbane iZ = 5m.6s.
Riverview iE = 9m.5s.
Long waves were also recorded at Apia.

Nov. 8d. 17h.-18h. South-West Pacific. Perhaps Tonga.

Apia P =53m.53s.k, eS =55m.41s.
Brisbane iPZ =56m.32s., iZ =57m.28s. and 58m.35s., iSEN =60m.23s.
Riverview eSE =61m.15s., eLE =64·5m.
Branner iPZ =62m.37s.a.
Santa Barbara ePZ =62m.37s.
Berkeley iPNZ =62m.39s.a.
La Jolla iPZ =62m.41s.a.
Pasadena iP =62m.41s.a.
Mount Wilson iPZ =62m.42s.a.
Palomar iPNZ =62m.44s.a, i =63m.4s. and 63m.15s.
Shasta Dam eP =62m.46s.
Haiwee iP =62m.48s.a.
Mineral iPZ =62m.48s.a, iZ =62m.54s.a and 63m.1s.k.
Tinemaha iP =62m.50s.a.
Tucson iP =63m.5s.a, i =63m.23s., 63m.52s., and 64m.18s., eS =72m.39s.
Victoria eZ =63m.7s.
Boulder City iP =63m.29s., ePP =65m.28s.
Pierce Ferry iP =63m.32s., iPP =65m.52s., iPPP =66m.54s.
Lick iPZ =63m.39s.k.
Copenhagen P =70m.1s., 72m.43s.
Jena eN =70m.14s.
Stuttgart eZ =70m.14s., 70m.21s., 70m.30s., and 72m.56s.
Strasbourg ePKP =70m.22s.
Paris ePKP =70m.24s.
Tamanrasset ePKP =70m.39s., 76m.51s., and 79m.50s., e = +81m.51s.

Nov. 8d. Readings also at 0h. (La Paz), 1h. (near Balboa Heights), 2h. (near Mizusawa), 4h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Santa Barbara, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Lick, Victoria, Stuttgart, Collmberg, Klyuchi (3) and near Stalinabad), 5h. (Istanbul, Ksara, and Triest), 6h. (Ashkabad), 7h. (near Apia), 8h. (Ashkabad and Wellington), 11h. (Malaga and near La Paz), 14h. (Bogota and Balboa Heights), 15h. (Paris), 16h. (Pierce Ferry and Victoria), 18h. (Victoria, near Branner, Lick, near Tacubaya, and near Grozny), 19h. (near Leninakan), 23h. (near Berkeley, Branner, and Lick).

Nov. 9d. 10h. 11m. 18s. Epicentre 40°·0N. 142°·8E. Depth of focus 0·010.

Intensity V at Arasawa (Iwate Pref.); IV at Miyako, Hatinohe, and Morioka; II-III at Sendai and Mizusawa.
Epicentre as adopted Depth 60km. Macroseismic radius 200-300km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year, 1948, Tokyo, 1950, p. 46, with macroseismic chart.

A = −·6119, B = +·4645, C = +·6402 ; δ = +4 ; h = −2 ;
D = +·605, E = +·797 ; G = −·510, H = +·387, K = −·768.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Miyako	0·8	249	0 14	− 4	0 24	− 8
Hatinohe	1·1	299	0 20	− 2	0 33	− 5
Morioka	1·3	257	0 21k	− 3	0 37	− 5
Mizusawa	1·5	237	0 24	− 3	0 41	− 6
Aomori	1·7	298	0 35	+ 6	0 51	0
Akita	2·1	263	0 39	+ 5	0 55	− 5
Sendai	2·3	221	0 32	− 5	0 57	− 8
Hukusima	2·9	220	0 47	+ 2	1 13	− 6
Onahama	3·4	206	1 16	S	(1 16)	−16
Mito	4·0	209	1 7	+ 7	—	—
Utunomiya	4·1	215	2 24	S	(2 24)	+35
Kakioka	4·3	209	1 2	− 3	1 46	− 8
Kumagaya	4·7	216	1 55	S	(1 55)	− 9
Maebasi	4·7	220	1 55	S	(1 55)	− 9
Tokyo	4·9	210	1 42	+29	—	—
Yokohama	5·2	210	2 10	S	(2 10)	− 6
Hunatu	5·5	217	1 22	+ 1	—	—
Misima	5·8	213	1 59	+33	—	—
Shizuoka	6·1	216	2 32	S	(2 32)	− 6

Nov. 9d. 20h. Undetermined shock.

Tucson iP =39m.22s.a, i =39m.34s. and 39m.44s., iS? =39m.55s., iS =40m.12s., iL = 40m.20s.
Palomar ePZ =39m.28s., iN =39m.36s., i =39m.39s.
La Jolla iNZ =39m.36s., iSEZ =40m.21s.
Riverside iPZ =39m.46s., iEZ =39m.52s., iSE =40m.48s.
Tinemaha iPZ =39m.48s., iSEN =42m.37s.
Pasadena ePZ =39m.50s., iZ =40m.0s., iSE =41m.1s.
Mount Wilson iPZ =39m.54s., iNZ =40m.0s., iSE =41m.2s.
Boulder City iP =40m.23s., i =40m.56s. and 41m.20s., iS =41m.58s.
Pierce Ferry iP =40m.26s.
Lick ePZ =40m.45s., eEN =40m.51s., iZ =41m.23s., 41m.30s., 41m.38s., and 43m.36s., eE =43m.44s., iZ =43m.47s., eN =43m.50s., iZ =44m.20s. and 53m.27s.
Mineral iPZ =40m.48s.k, eZ =41m.30s.k, iZ =44m.20s.k, and 44m.41s.a, eEN =44m.48s., iZ =54m.33s.
Branner iZ =41m.1s.a, eZ =41m.28s. and 43m.35s., eN =43m.48s., eE =43m.53s.
Berkeley eZ =41m.1s., eE =43m.31s., eSNZ =43m.47s., iE =43m.50s., iZ =43m.56s.
Logan eP =41m.17s., eS =43m.26s., eL =44m.32s.
Shasta Dam eP =41m.24s., e =41m.39s., eL =44m.57s.
Rapid City ePE =42m.17s., eS?E =46m.26s., eLE =47m.9s.
Salt Lake City e =42m.39s., eL =43m.57s.
Tacubaya ePN =42m.41s., eSN =47m.59s., SN =48m.2s., eE =48m.14s., iN =48m.48s., iE =49m.11s., eN =50m.8s., eE =50m.14s.
St. Louis iP =43m.18s., eS =47m.29s.
Santa Clara eE =43m.31s. and 44m.14s.
Victoria e =43m.58s., L =51m.
Ottawa e =45m.11s., L =56·2m.
Halifax e =54m.12s., L =61m.
Long waves were also recorded at Bermuda and at other North American stations.

Nov. 9d. Readings also at 2h. (Wellington, Copenhagen, Zürich, Tamanrasset, Ksara, Stuttgart, Istanbul, Helwan, Erevan, Grozny, near Taranto, and Triest), 4h. (Mineral and Tucson), 5h. (Victoria), 6h. (Mount Wilson, Pasadena, Palomar, Riverside, and Pierce Ferry), 9h. (Alicante), 10h. (near Tacubaya), 12h. (Tucson and near Pierce Ferry), 16h. (near Ashkabad), 18h. (near Basle and near La Paz), 19h. (Huancayo, Ksara, and Stuttgart), 20h. (Huancayo, Victoria, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, Mobile, Puebla (3), Tacubaya (4), near La Jolla and Tucson, Stuttgart, Tchimkent, Tashkent, Almata, Frunse, Grozny, near Kulyab, Stalinabad, Murgab, Andijan, and Samarkand), 21h. (Puebla and Tacubaya (2)), 22h. (Tacubaya, Stuttgart, and near Florence), 23h. (Stuttgart, Ksara, Bucharest, and near Istanbul).

Nov. 10d. 3h. 22m. 51s. Epicentre 1°·5S. 121°·0E.

A = −·5149, B = +·8569, C = −·0260 ; δ = +8 ; h = +7 ;
D = +·857, E = +·515 ; G = +·013, H = −·022, K = −1·000.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	E.	39·8	309	e 7 28	− 8	e 13 53	+11	e 9 23	PP	—
Brisbane		40·1	133	i 9 22	?	i 16 56	?	—	—	i 23·4
Riverview		42·8	142	i 8 8a	+ 7	i 14 38	+12	i 18 1	ScS	e 22·5
Vladivostok		45·5	11	i 8 22	− 1	i 15 5	0	—	—	—
Hyderabad	N.	45·9	297	8 24	− 2	15 13	+ 2	18 45	SS	—
Bombay		51·5	296	e 8 57	−12	i 16 32	+ 3	—	—	—
Irkutsk		55·4	347	9 40	+ 2	i 17 26	+ 4	—	—	—
Almata		59·5	324	e 10 14	+ 7	—	—	—	—	—
Auckland	N.	60·7	132	—	—	18 9?	−23	—	—	32·1
Frunse		60·7	322	e 10 16	+ 1	—	—	—	—	—
Andijan		61·0	319	e 10 15	− 3	—	—	—	—	—
Kulyab		61·4	316	i 10 20	0	—	—	—	—	—
Christchurch		62·0	140	—	—	26 13	SSS	29 9	Q	32·1
Stalinabad		62·4	316	i 10 26	− 1	e 18 49	− 4	—	—	—
Wellington		62·5	137	10 26	− 2	20 19	ScS	i 11 10	PcP	35·1
Tashkent		63·3	318	i 10 30	− 3	i 19 0	− 4	—	—	—
Sverdlovsk		75·5	331	e 11 49	+ 1	21 24	− 4	—	—	—
Leninakan		81·3	311	e 12 29	+ 9	—	—	—	—	—
Ksara		86·8	303	e 12 46	− 1	23 27	+ 2	—	—	—
Helwan		90·4	299	e 13 5	+ 1	23 57	− 1	16 40	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stuttgart	z.	105·4	320	e 18 27	[+ 3]	—	—	—	—	—
Mount Wilson	z.	116·1	51	e 19 4	[+19]	—	—	—	—	—
Pasadena	z.	116·1	51	e 19 4	[+19]	—	—	—	—	—
Tucson		122·5	51	e 19 23	[+25]	—	—	—	—	—
Huancayo		158·9	130	e 20 11	[+11]	e 26 54	[−10]	e 24 27	PP	e 81·3
La Paz	z.	160·0	154	i 20 9k	[+ 8]	—	—	i 24 31	PP	—
San Juan		161·8	21	e 21 31	PKP_2	e 38 27	PPS	e 23 51	PP	—

Additional readings :—
Riverview iEN =8m.11s., iSE =14m.41s., iE =15m.6s. and 16m.2s., eN =17m.21s.
Helwan PS =25m.7s.
Huancayo e =20m.52s., eSS =44m.31s., eSSS =51m.22s.
San Juan ePKS =25m.5s., eSKS? =28m.21s., eSSS =48m.34s.
La Paz iZ =20m.49s.

Nov. 10d. 12h. 58m. 29s. Epicentre 30°·0N. 140°·8E. Depth of focus 0·015.

Intensity V at Torisima; II-IV at Hatijojima. Macroseismic radius more than 300km. Epicentre 31°·5N. 144°·2E. Depth of focus 100km.

The Seismological Bulletin of the C.M.O., Japan, for the year 1948, Tokyo, 1950, p. 47.

$A = -·6723$, $B = +·5483$, $C = +·4975$; $\delta = +13$; $h = +2$;
$D = +·632$, $E = +·775$; $G = -·386$, $H = +·314$, $K = -·868$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Osima	4·9	346	1 9	− 4	—	—	—	—
Mera	5·0	351	1 8	− 6	2 2	−10	—	—
Omaesaki	5·1	335	1 27	+11	2 33	+19	—	—
Yokohama	5·5	350	1 18	− 3	2 15	− 9	—	—
Tokyo	5·7	352	1 20	− 4	2 14	−14	—	—
Hunatu	5·8	343	1 23	− 2	2 17	−14	—	—
Kameyama	6·1	324	1 30	+ 1	2 39	+ 1	—	—
Nagoya	6·1	329	1 27	− 2	2 38	0	—	—
Kakioka	6·2	356	1 25	− 5	2 36	− 5	—	—
Kumagaya	6·2	350	1 26	− 4	2 34	− 7	—	—
Mito	6·4	357	1 28	− 5	2 27	−18	—	—
Osaka	6·4	318	1 37	+ 4	2 50	+ 5	—	—
Maebasi	6·5	348	1 30	− 5	2 41	− 7	—	—
Kyoto	6·6	321	1 31	− 5	—	—	—	—
Utunomiya	6·6	353	1 28	− 8	—	—	—	—
Kobe	6·7	316	1 40	+ 3	—	—	—	—
Onahama	6·9	1	2 17a	+37	3 25	+28	—	—
Nagano	7·0	343	1 39	− 2	—	—	—	—
Toyama	7·3	337	1 46	+ 1	3 14	+ 7	—	—
Toyooka	7·5	319	1 55	+ 7	3 11	− 1	—	—
Hukusima	7·7	358	1 45	− 6	3 12	− 5	—	—
Wazima	8·0	337	2 4	+ 9	3 23	− 1	—	—
Aikawa	8·3	346	1 50	− 9	—	—	—	—
Sendai	8·3	1	1 48	−11	3 13	−18	—	—
Kumamoto	9·1	291	2 13	+ 4	—	—	—	—
Mizusawa E.	9·1	2	2 3	− 6	e 3 34	−17	—	—
Miyako	9·7	5	2 7	−10	3 45	−20	—	—
Morioka	9·7	2	2 7	−10	3 35	−30	—	—
Vladivostok	14·9	335	i 3 22	− 3	i 6 22	+15	—	—
Brisbane z.	58·3	168	i 9 44	0	—	—	i 10 7	pP
Victoria z.	71·7	45	i 11 8	− 2	—	—	—	—
Mineral z.	76·5	52	i 11 36k	− 1	—	—	—	—
Lick z.	77·9	54	i 11 44k	− 1	—	—	—	—
Tinemaha z.	80·4	53	i 11 59	0	—	—	i 12 29	pP
Santa Barbara z.	80·7	56	e 12 0	0	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Pasadena	z.	81·9	56	i 12 6k	− 1	—	—	i 12 37	pP
Mount Wilson	z.	82·0	56	i 12 6k	− 1	—	—	i 12 37	pP
Riverside	z.	82·6	56	i 12 9k	− 1	—	—	i 12 35	pP
La Jolla	z.	83·2	56	e 12 8	− 5	—	—	—	—
Boulder City		83·3	53	i 12 44	+30	—	—	—	—
Palomar	z.	83·3	55	i 12 14	0	—	—	—	—
Pierce Ferry		83·8	52	i 12 47	+31	—	—	—	—
Tucson		88·1	54	i 12 39	+ 2	—	—	i 13 7	pP
Stuttgart	z.	90·5	331	e 13 13	pP	—	—	—	—
Paris		93·1	335	i 13 27	pP	—	—	—	—

Additional readings :—
Mizusawa eSN =3m.37s.
Victoria iZ =11m.16s.
Mineral iZ =11m.45s.
Lick iZ =11m.53s.k.
Tinemaha iZ =12m.8s.
Santa Barbara eZ =12m.8s.
Pasadena iZ =12m.14s. and 12m.53s., eZ =13m.5s.
Mount Wilson iZ =12m.15s. and 12m.46s.
Riverside iZ =12m.17s., 12m.48s., and 13m.12s.
Palomar iZ =12m.23s.
Tucson iZ =12m.47s.

Nov. 10d. Readings also at 0h. (Tacubaya), 2h. (Victoria and Tacubaya), 4h. (Stuttgart), 5h. (Ashkabad), 6h. (Pierce Ferry and near Ashkabad (2)), 14h. (Klyuchi, Erevan, and near Leninakan), 20h. (Tacubaya and near Balboa Heights), 23h. (Tacubaya, Berkeley, Lick, Branner, Mineral, and near Boulder City).

Nov. 11d. 7h. 4m. 28s. Epicentre 36°·0S. 71°·5W. Depth of focus 0·005.

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	n. s.	s.	m. s.		m.
La Plata		11·1	90	2 35	− 3	4 33	− 9	—	—	5·6
La Paz		19·7	11	i 4 32	+ 5	i 8 8	+ 8	i 5 0	PP	9·8
Huancayo		24·1	351	e 5 15	+ 5	e 8 24	−57	e 5 37	pP	e 10·3
Tucson		77·2	327	i 11 49k	0	—	—	i 12 14	pP	—
Palomar	z.	81·0	323	i 12 9k	0	—	—	i 12 35	pP	—
Ottawa	z.	81·1	358	e 12 7	− 3	—	—	—	—	—
Riverside	z.	81·8	323	i 12 12k	− 1	—	—	i 12 38	pP	—
Boulder City		82·2	326	i 11 44	−31	—	—	—	—	—
Mount Wilson	z.	82·3	323	i 12 16k	0	—	—	i 12 42	pP	—
Pasadena	z.	82·3	323	i 12 15k	− 1	—	—	i 12 41	pP	—
Temiskaming		82·6	355	i 12 16	− 1	—	—	—	—	—
Ville Marie		83·2	355	i 12 18	− 3	—	—	—	—	—
Haiwee	z.	83·8	325	i 12 23k	− 1	—	—	i 12 50	pP	—
Tinemaha		84·7	325	i 12 28	0	—	—	—	—	—
Lick	z.	86·5	323	i 12 36k	− 1	—	—	—	—	—
Branner	z.	86·8	323	i 12 38k	0	—	—	—	—	—
Mineral	z.	88·8	325	i 12 47a	− 1	—	—	—	—	—
Victoria		96·0	329	e 13 18	− 3	—	—	—	—	—

Additional readings :—
La Plata SE =4m.43s., E =5m.9s., N =5m.16s.
La Paz iSS =8m.50s.
Huancayo e =9m.35s.
Tucson isP =12m.26s., ePP =13m.50s.
Riverside isPZ =12m.55s.
Pasadena isPZ =12m.52s.

Nov. 11d. 7h. 31m. 58s. Epicentre 51°·8S. 27°·0E.

A = +·5533, B = +·2819, C = −·7838 ; δ = −5 ; h = −6 ;
D = +·454, E = −·891 ; G = −·698, H = −·356, K = −·621.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tananarive		36·6	34	e 8 23	PP	e 12 50	− 3	—	—	16·3
Tamanrasset		76·6	340	e 11 55	+ 1	—	—	—	—	—
La Paz		80·3	257	i 12 15	+ 1	i 22 25	+ 5	—	—	39·0
Christchurch		80·5	155	—	—	27 18	SS	31 18	SSS	38·3
Helwan		81·4	4	e 12 20	0	e 22 35	+ 4	—	—	—
Riverview		81·7	137	e 12 22	0	e 22 35	+ 1	e 23 30	PS	e 37·8
Ksara		85·6	8	e 12 41	0	e 23 27	+14	—	—	—
Huancayo		88·1	253	e 11 5	?	—	—	—	—	—
Stuttgart	z.	101·3	348	e 18 15	PKP	—	—	—	—	—
Ottawa	z.	130·7	295	e 19 17	[+ 4]	—	—	—	—	—
Temiskaming		133·4	295	e 19 32	[+14]	—	—	—	—	—
Ville Marie		133·9	295	e 19 32	[+13]	—	—	—	—	—
Tucson		143·7	255	i 19 36	[− 1]	i 26 25	[−20]	i 23 41	PKS	—
Rapid City	E.	146·3	277	e 19 45	[+ 4]	—	—	—	—	—
Palomar	z.	148·1	250	e 19 49	[+ 5]	—	—	—	—	—
Boulder City		148·7	255	e 19 15	[−30]	—	—	—	—	—
Riverside	z.	148·8	249	i 19 48	[+ 3]	—	—	—	—	—
Mount Wilson	z.	149·4	249	i 19 51	[+ 5]	e 23 29	PKS	—	—	—
Pasadena	z.	149·4	249	i 19 50	[+ 4]	e 23 28	PKS	—	—	—
Haiwee	z.	150·7	252	i 19 25	[−23]	—	—	—	—	—
Tinemaha	z.	151·5	253	e 20 1	[+11]	—	—	—	—	—
Lick	z.	153·6	250	i 20 2	[+ 9]	—	—	—	—	—
Branner	z.	154·0	249	i 20 2a	[+ 9]	—	—	—	—	—
Mineral	z.	155·6	255	i 20 9a	[+14]	—	—	—	—	—
Shasta Dam		156·3	255	e 20 15	[+19]	—	—	—	—	—
Victoria		160·8	272	e 20 15	[+13]	—	—	—	—	—

Additional readings :—
Christchurch QEN =34m.14s.
Helwan e =13m.8s.
Riverview eSE =22m.38s., eSSN =27m.26s., eSSSN =30m.57s., eQE =33m.56s.
Tucson i =19m.48s. and 20m.19s.
Palomar eZ =19m.58s., iZ =20m.3s.
Boulder City iPKP =19m.32s.
Riverside iZ =19m.59s., and 20m.3s.
Mount Wilson iZ =20m.3s., 20m.7s., and 20m.35s.
Pasadena iZ =20m.5s. and 20m.23s.
Haiwee iZ =19m.38s.
Tinemaha iZ =20m.16s. and 20m.36s.
Lick iZ =20m.16s.k.
Branner iZ =20m.16s.
Mineral iZ =20m.45s.k.
Shasta Dam e =20m.45s.
Long waves were also recorded at Auckland, Wellington, Alicante, and Rome.

Nov. 11d. Readings also at 1h. and 3h. (near Grozny), 5h. (near Ashkabad (2)), 8h. (Uccle and near Belgrade), 10h. (Klyuchi), 12h. (Klyuchi, Mount Wilson, Pasadena, Palomar. Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Victoria, near Merida, and Tacubaya), 14h. (near Ashkabad), 16h. (near Grozny and near Andijan), 18h. (near Andijan, Kulyab, Murgab, Samarkand, Stalinabad, Tashkent, and Tchimkent), 19h. (Frunse), 20h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Pierce Ferry, Mineral, Saskatoon, Victoria, and Ottawa), 21h. (near Ottawa), 22h. (Victoria).

Nov. 12d. 1h. 53m. 38s. Epicentre 41°·4N. 44°·1E. given by U.S.S.R.

A = +·5403, B = +·5236, C = +·6588 ; δ = +10 ; h = −2 ;
D = +·696, E = −·718 ; G = +·473, H = +·458, K = −·752.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Leninakan		0·6	199	i 0 8	− 7	—	—
Erevan		1·2	166	0 21	− 3	i 0 39	− 2
Grozny		2·3	32	0 46	+ 6	i 1 21	S_g
Piatigorsk		2·7	344	e 0 50	+ 5	—	—
Yalta		7·9	296	e 3 28?	S	(e 3 28?)	− 2
Ksara		10·0	223	e 3 32	+65	e 5 20	+58
Moscow		15·0	346	e 3 42	+ 7	e 6 38	+15
Sverdlovsk		18·8	29	4 24	+ 1	8 2	+12
Tchimkent		19·0	78	i 4 27	+ 1	—	—
Stalinabad		19·1	89	e 4 28	+ 1	8 11	+14
Andijan		21·3	82	e 4 49	− 1	—	—
Stuttgart	z.	25·5	298	e 5 32	0	—	—

Additional readings :—
Grozny iP_g = 50s., i = 56s.
Yalta eS = 5m.1s.?.
Long waves were also recorded at Istanbul.

Nov. 12d. 17h. 33m. 45s. Epicentre 20°·0S. 174°·0W. (as on 1948, Aug. 28d.).

A = −·9352, B = −·0983, C = −·3400 ; δ = −14 ; h = +5 ;
D = −·105, E = +·995 ; G = +·338, H = +·036, K = −·940.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		6·5	19	e 1 41	+ 2	e 2 44	−11	—	—	e 3·2
Auckland	N.	19·4	208	3 15?	?	6 56	?	—	—	9·2
Tuai	N.	20·3	200	—	—	8 4	−19	—	—	—
Wellington		23·3	202	5 14	+ 4	9 4	−16	e 6 5	PPP	i 13·7
Christchurch		26·0	202	—	—	10 8	+ 2	12 25	Q	15·6
Brisbane		31·0	249	i 6 18	− 3	e 11 25	− 1	i 7 20	PP	e 15·7
Riverview		33·8	238	e 6 46	0	i 12 9	− 1	i 17 15	S_eS	e 15·2
Branner	z.	75·1	40	e 11 51k	+ 5	—	—	—	—	—
Lick	z.	75·4	40	i 11 47k	0	—	—	—	—	—
Pasadena		75·6	45	i 11 47	− 1	e 33 10	Q	—	—	e 35·2
Mount Wilson	z.	75·8	45	i 11 48	− 2	—	—	—	—	—
Palomar	z.	76·0	48	i 11 52	+ 1	—	—	—	—	—
Riverside	z.	76·1	45	i 11 49	− 2	—	—	—	—	—
Haiwee	z.	77·0	43	e 11 56	0	—	—	—	—	—
Tinemaha	z.	77·3	42	i 11 59	+ 1	—	—	—	—	—
Boulder City		78·9	46	e 12 23	+16	—	—	—	—	—
Pierce Ferry		79·6	46	e 12 10	0	—	—	—	—	—
Tucson		79·7	49	i 12 12	+ 1	e 22 19	+ 6	e 15 23	PP	e 37·8
Vladivostok		80·1	323	e 12 12	− 1	i 22 28	+10	—	—	—
Logan		84·1	42	e 12 31	− 3	—	—	—	—	—
Huancayo		93·9	104	—	—	e 23 53	[− 2]	e 30 57	SS	e 45·0
La Paz		98·7	111	17 19	PP	—	—	—	—	—
Irkutsk		100·6	321	e 18 15	PP	—	—	—	—	—
Tashkent		122·8	326	e 18 58	[0]	e 26 3	[+ 4]	e 20 48	PP	—
Sverdlovsk		125·7	327	e 20 43	PP	e 27 57?	(+ 5)	22 11?	PKS	—
Theodosia		145·2	322	19 45	[+ 5]	—	—	—	—	—
Warsaw		145·8	345	19 43k	[+ 2]	—	—	—	—	e 86·2
Yalta		146·2	322	19 43	[+ 2]	—	—	—	—	—
De Bilt		148·0	1	e 20 15	[+31]	—	—	—	—	e 84·2
Ksara		150·1	303	e 19 51k	[+ 3]	—	—	23 37	PP	—
Paris		151·1	4	e 19 53	[+ 4]	—	—	—	—	e 88·2
Stuttgart	z.	151·2	356	e 19 49	[0]	—	—	—	—	—
Istanbul		151·3	322	e 19 50	[+ 1]	—	—	—	—	—
Strasbourg		151·4	356	e 19 58	[+ 8]	—	—	—	—	—
Triest		153·6	343	e 20 20	[+27]	—	—	—	—	—

Continued on next page.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Helwan	155·0	298	e 19 56	[+ 1]	—	—	i 20 22	PKP_2	—
Rome	157·5	347	e 20 35	PKP_2	e 27 40	[+38]	—	—	—
Tamanrasset	177·3	—	20 15	[+ 3]	e 29 4	PPP	e 25 50	PP	—

Additional readings ;—
Wellington eZ =6m.26s., e =10m.15s.
Brisbane iE =7m.31s. and 8m.32s., eN =13m.35s.
Mount Wilson eZ =12m.7s. and 13m.1s.
Palomar eZ =11m.56s.
Riverside iZ =12m.1s., eZ =12m.9s.
Tinemaha iZ =12m.10s.
Pierce Ferry i =12m.31s.
Tucson i =12m.32s., eSS =27m.52s.
Huancayo e =26m.55s.
Tashkent eSS =37m.21s.
Sverdlovsk ePS =31m.3s.?, eSS =37m.45s.
Stuttgart ePKPZ =19m.57s.
Strasbourg e =20m.6s.
Tamanrasset ePKP$_2$ =22m.0s.
Long waves were also recorded at Arapuni, Ukiah, Seven Falls, and Bermuda.

Nov. 12d. Readings also at 0h. (near La Paz), 2h. (Balboa Heights and near Leninakan), 3h. (Piatigorsk, near Erevan, and Leninakan), 4h. (Balboa Heights, Mount Wilson, Palomar, Riverside, Tucson, Pierce Ferry, and near Leninakan), 7h. (Erevan and near Leninakan), 10h. (Calcutta), 12h. (Malaga and Alicante), 14h. (Klyuchi and near Ashkabad), 16h. (near Erevan and Leninakan), 21h. (Temiskaming and Ville Marie), 22h. (Mount Wilson, Palomar, Tucson, Boulder City, Victoria, and Stuttgart), 23h. (Mineral, Ferndale, near Arcata, Berkeley, and Lick).

Nov. 13d. 4h. 44m. 36s. Epicentre 39°·8N. 29°·6E. (as on 1943, April 14d.).

$A = +·6698$, $B = +·3805$, $C = +·6376$; $\delta = -5$; $h = -2$;
$D = +·494$, $E = -·869$; $G = +·554$, $H = +·315$, $K = -·770$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		1·3	342	i 0 31	+ 6	i 0 41	− 3	—	—	—
Bucharest		5·3	330	e 1 30	+ 8	i 2 23	− 2	i 1 44	P_g	—
Yalta		5·8	35	i 0 41	−48	—	—	—	—	—
Theodosia		6·8	37	i 1 56	P*	3 26	S*	—	—	—
Ksara		7·8	138	e 2 38	P_g	5 22	?	—	—	—
Belgrade		8·4	309	i 1 59$_a$	− 7	i 4 6	S*	i 2 33	P*	—
Sotchi		8·5	60	2 28	P*	—	—	—	—	—
Taranto		9·5	278	2 46	P*	e 5 17	S_g	—	—	e 6·2
Helwan		10·0	172	i 3 3k	+36	e 5 42	+80	—	—	5·9
Kalossa		10·3	314	e 2 38	+ 6	5 15	+45	i 5 57	Q	6·0
Budapest	E.	10·8	319	2 39	0	5 15	SS	i 6 2	Q	6·5
	N.	10·8	319	e 3 24	+45	e 4 27	−15	5 17	SS	6·6
Piatigorsk		10·9	63	e 3 23	+43	—	—	—	—	—
Leninakan		11·0	80	3 19	+37	—	—	—	—	—
Messina		11·1	266	e 2 43	0	e 4 59	+10	—	—	—
Erevan		11·4	83	e 3 22	+35	—	—	—	—	—
Triest		13·0	302	e 2 53	−16	i 5 54	SS	—	—	i 8·0
Raciborzu		13·1	326	e 4 42	?	4 51	?	e 6 36	Q	e 7·4
Rome		13·1	284	e 3 4	− 6	5 46	+ 8	e 5 55	SS	i 7·3
Warsaw		13·8	337	e 3 24	+ 5	e 6 4	+10	e 3 38	PPP	e 6·9
Padova		14·0	295	—	—	e 6 42	SSS	—	—	e 7·5
Florence		14·3	292	e 3 32	+ 6	e 6 32	SS	—	—	i 7·8
Bologna		14·4	295	e 3 21k	− 6	e 6 15	+ 6	e 6 57	SSS	e 7·6
Prague		14·8	319	e 3 39	+ 7	e 6 12?	− 6	e 6 48	SS	e 7·0
Salo		15·2	299	e 3 30	− 8	e 6 26	− 2	e 3 40	P	—
Baku		15·5	81	—	—	e 6 10	−25	—	—	—
Cheb		15·9	316	e 3 42	− 5	e 6 42	− 2	e 8 55	Q	e 9·4
Pavia		16·0	298	e 3 47	− 1	—	—	—	—	—
Chur		16·2	302	e 3 45	− 5	e 8 4	SSS	—	—	—
Collmberg		16·3	320	e 3 46	− 6	e 6 31	−22	i 4 2	PP	8·5
Ravensberg		16·5	305	e 3 54	0	e 6 58	0	—	—	e 8·9

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Jena	N.	16·8	317	e 3 52	− 6	e 8 4	SSS	—	—	e 9·0
Moscow		16·8	18	3 57	− 1	7 6	+ 1	—	—	—
Potsdam		17·0	324	3 54	− 7	—	—	—	—	e 8·4
Zürich		17·0	303	e 3 55	− 6	e 6 56	−14	—	—	—
Stuttgart		17·1	308	e 3 55	− 7	e 7 6	− 6	e 4 2k	P	e 9·1
Basle		17·7	304	e 4 7	− 3	e 8 37	SSS	—	—	—
Neuchatel		17·9	301	e 4 4	− 8	—	—	—	—	e 9·5
Strasbourg		17·9	309	i 4 12	0	e 7 24	− 6	i 4 44	PPP	e 8·9
Copenhagen		19·5	331	4 34	+ 3	—	—	4 52	PP	9·4
Clermont-Ferrand		20·3	296	e 4 40	0	e 8 18	− 5	i 4 46	PP	10·4
De Bilt		20·8	316	i 4 47a	+ 2	e 8 27	− 6	—	—	e 10·4
Uccle	z.	20·8	310	e 4 55?	+10	e 8 24	− 9	—	—	e 11·4
Algiers		21·0	271	e 6 25	?	—	—	—	—	10·4
Paris		21·3	304	i 4 47	− 3	i 8 33	−10	5 2	PP	e 11·4
Upsala		21·4	344	—	—	e 8 53	+ 8	i 11 19	Q	e 11·9
Tortosa		22·2	283	i 5 7	+ 7	8 32	−28	5 28	PP	e 9·4
Alicante		23·4	278	5 22	+11	9 17	− 4	5 48	PP	e 11·0
Kew		23·8	310	e 4 14	−61	e 9 20	− 8	—	—	e 13·3
Toledo		25·7	281	i 5 38	+ 5	i 10 7	+ 6	i 5 53	pP	12·9
Granada		26·0	276	i 5 39a	+ 3	i 10 32	+26	6 41k	PPP	i 13·2
Sverdlovsk		26·4	39	e 5 54	+14	e 10 20	+ 8	—	—	—
Tamanrasset		26·5	238	e 5 54	+13	—	—	e 6 54	PPP	—
Malaga	z.	26·8	276	i 5 52k	+ 8	i 10 11	− 8	6 41	PPP	11·6
Stalinabad		30·2	79	e 6 21	+ 7	11 12	− 1	—	—	—
Andijan		32·4	74	e 6 46?	+12	—	—	—	—	—
Murgab		34·2	78	i 7 19	+30	—	—	—	—	—
Victoria	z.	88·9	342	e 13 9	+11	—	—	—	—	—
Mineral	z.	96·0	338	e 13 45a	+15	—	—	i 13 58k	?	—
Pierce Ferry		97·3	331	e 13 46	+10	—	—	i 13 52	P_cP	—

Additional readings :—
Bucharest iEN =1m.38s., EN =2m.34s.
Budapest iN =5m.46s.
Triest iP_gP_g =4m.15s., iS_gS_g =7m.33s.
Warsaw eN =3m.52s., eE =4m.43s., eSE =6m.9s., eSSEZ =6m.20s., eSSN =6m.24s.
Bologna e =7m.19s.
Collmberg eEZ =4m.35s.
Stuttgart ePP =4m.7s.k, e =5m.57s.
Copenhagen 4m.57s. and 5m.6s.
Paris iPP? =4m.57s., i =5m.29s., SS =9m.0s.
Upsala iN =10m.59s., iE =11m.9s.
Tortosa PPP?N =5m.34s., SS?EN =9m.12s.
Alicante P_cP =9m.44s.
Kew eZ =9m.43s., iE =11m.21s.
Toledo iPPZ =6m.26s.
Granada P_cP =8m.8s.k, SS =11m.56s.
Long waves were also recorded at Helsinki, Aberdeen, and Barcelona.

Nov. 13d. 7h. 0m. 27s. (I). 22h. 48m. 35s. (II). } Epicentre 20°·0S. 174°·0W. (as on 12d.).

A = −·9352, B = −·0983, C = −·3400 ; δ = −14 ; h = +5.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Apia	6·5	19	e 1 40	+ 1	e 2 53	− 2	—	—	—
II		6·5	19	e 1 39	0	i 2 47	− 8	—	—	e 2·9
I	Auckland N.	19·4	208	4 33?	+ 3	8 8	+ 4	8 44	SS	10·2
II	N.	19·4	208	—	—	e 7 25	−39	—	—	9·4
I	Tuai N.	20·3	200	5 23	+43	7 43	−40	—	—	—
I	Wellington	23·3	202	5 12	+ 2	9 12	− 8	5 53	PPP	i 10·3
II		23·3	202	5 5	− 5	8 53	−27	—	—	11·4
I	Kaimata	25·6	206	5 37	+ 5	9 55	− 4	—	—	—
I	Christchurch	26·0	202	5 32	− 4	9 59	− 7	10 48	Q	13·2
II		26·0	202	5 47	+11	10 7	+ 1	—	—	12·8

Continued on next page.

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.

			△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Brisbane		31·0	249	i 6 19	− 2	i 11 23	− 3	i 7 33	PP	—
II		E.	31·0	249	e 7 46	PPP	—	—	—	—	—
I	Riverview		33·8	238	i 6 44a	− 2	i 12 10	0	i 8 1	PP	e 16·3
II			33·8	238	e 6 56	+10	e 12 9	− 1	i 8 1	PP	e 16·3
I	Santa Barbara	Z.	74·8	44	e 11 44	0	—	—	—	—	—
II	Branner	Z.	75·1	40	e 11 47	+ 1	—	—	—	—	—
I	Santa Clara	E.	75·2	40	—	—	e 20 54	−31	—	—	e 32·7
I	Berkeley		75·3	40	i 11 42a	− 5	i 21 31	+ 5	i 22 6	PS	e 32·5
I	Lick	Z.	75·4	40	i 11 47a	0	—	—	—	—	—
II		Z.	75·4	40	i 11 49k	+ 2	—	—	—	—	—
I	Pasadena		75·6	45	e 11 50	+ 2	e 21 28	− 1	—	—	e 35·5
II			75·6	45	e 11 46	− 2	i 21 35	+ 6	i 11 50	P	—
I	Mount Wilson	Z.	75·8	45	i 11 49	− 1	—	—	—	—	—
II		Z.	75·8	45	i 11 47	− 3	—	—	i 11 51	P	—
I	Palomar	Z.	76·0	48	e 11 45	− 6	—	—	—	—	—
II		Z.	76·0	48	e 11 49	− 2	i 11 55	?	i 12 7	P_cP	—
I	Riverside	Z.	76·1	45	i 11 49k	− 2	—	—	—	—	—
II		Z.	76·1	45	e 11 48	− 3	—	—	—	—	—
II	Fresno		76·2	41	e 11 49k	− 3	—	—	i 11 56	P_cP	—
I	Haiwee	Z.	77·0	43	e 11 55	− 1	—	—	—	—	—
II		Z.	77·0	43	i 11 55	− 1	—	—	—	—	—
II	Shasta Dam		77·1	38	e 11 58	+ 1	—	—	—	—	—
I	Mineral	Z.	77·3	39	e 11 57k	− 1	—	—	—	—	—
II		Z.	77·3	39	e 11 56a	− 2	—	—	i 12 0	P	—
I	Tinemaha	Z.	77·3	42	i 12 0	+ 2	—	—	—	—	—
II			77·3	42	i 11 55	− 3	—	—	i 12 0	P	—
I	Boulder City		78·9	46	e 12 27?	+20	—	—	—	—	—
II			78·9	46	e 12 27	+20	—	—	—	—	—
I	Pierce Ferry		79·6	46	e 12 15?	+ 5	—	—	e 39 7	P'P'	—
II			79·6	46	i 12 8	− 2	—	—	i 12 24	?	—
I	Tucson		79·7	49	i 12 12	+ 1	e 22 19	+ 6	e 15 31	PP	e 35·7
II			79·7	49	i 12 10k	− 1	e 22 16	+ 3	e 15 0	PP	e 34·9
I	Vladivostok		80·1	323	i 12 15	+ 2	i 22 27	+ 9	—	—	—
II			80·1	323	e 12 14	+ 1	e 22 27	+ 9	—	—	—
I	Victoria		81·8	31	e 12 21	− 1	—	—	—	—	42·5
II			81·8	31	e 14 23	?	—	—	—	—	41·4
I	Salt Lake City		83·5	42	e 12 32	+ 1	e 22 54	+ 2	e 28 33	SS	e 37·8
II			83·5	42	e 13 3	+32	e 22 51	− 1	e 26 35	?	e 36·1
I	Logan		84·1	42	e 12 34	0	e 22 48	−10	e 15 13	PP	e 38·4
I	Bozeman		86·7	38	—	—	e 23 19	− 5	—	—	e 39·7
II			86·7	38	—	—	e 23 19	− 5	—	—	e 39·7
I	College		87·0	10	—	—	e 23 27	0	—	—	e 37·3
II			87·0	10	—	—	e 23 26	− 1	—	—	e 39·5
I	Rapid City	E.	90·7	43	e 13 8	+ 2	e 24 8	+ 7	—	—	e 44·1
I	Saskatoon		92·6	34	—	—	e 24 21	+ 3	—	—	44·1
II			92·6	34	—	—	e 24 19	+ 1	—	—	46·4
I	Huancayo		93·9	104	—	—	e 23 58	[+ 3]	e 25 53	PS	e 43·3
II			93·9	104	—	—	e 23 59	[+ 4]	e 25 50	PS	e 43·7
I	La Paz		98·7	111	i 13 53	+11	i 24 13	[− 8]	i 17 43	PP	48·3
II			98·7	111	i 13 46	+ 4	i 24 20	[− 1]	—	—	46·4
1	Chicago		100·5	49	—	—	e 25 30	+ 5	—	—	e 46·2
I	Irkutsk		100·6	121	e 17 40?	PP	e 24 36	[+ 6]	e 32 33	SS	—
II			100·6	121	—	—	e 24 32	[+ 2]	e 27 11?	PS	—
I	Bogota		100·9	89	—	—	e 24 28	[− 3]	e 24 58	SKKS	49·5
II			100·9	89	—	—	e 24 47	[+16]	—	—	49·4
I	Cleveland		104·8	50	—	—	e 24 50	[0]	e 26 11	S	—
I	Ottawa		109·7	47	—	—	e 24 57	[−14]	—	—	51·6
II			109·7	47	—	—	e 26 31	S	e 34 25?	SS	52·4
I	Kodaikanal	E.	110·4	274	e 19 15	PP	—	—	—	—	—
II		E.	110·4	274	—	—	e 24 17	[−57]	—	—	—
I	San Juan		112·4	77	e 20 54	PP	e 28 52	PS	e 34 46	SS	e 55·5
II			112·4	77	—	—	e 29 10	PS	e 39 27	SSS	e 55·9
I	Bermuda		116·4	63	—	—	e 36 4	SS	—	—	e 59·7

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Andijan	120·5	306	e 20 22	PP	e 30 4	PS	—	—	—
II		120·5	306	18 55	[+ 1]	30 11	PS	20 21	PP	—
II	Kulyab	122·5	303	e 19 28	[+30]	—	—	21 20	PP	—
I	Tashkent	122·8	326	i 20 41	PP	26 4	[+ 5]	e 37 20	SS	—
II		122·8	326	e 20 3	PP	e 26 49	{−44}	e 22 0	PKS	—
I	Stalinabad	123·2	304	e 19 1	[+ 2]	26 7	[+ 7]	e 20 43	PP	—
II		123·2	304	e 19 3	[+ 4]	e 26 5	[+ 5]	e 20 40	PP	—
I	Sverdlovsk	125·7	327	e 19 7	[+ 3]	27 57	{+ 5}	i 32 33	PS	—
II		125·7	327	e 20 57	PP	e 28 3?	{+11}	e 38 7	SS	—
II	Copenhagen	144·0	353	19 55	[+18]	—	—	—	—	77·4
I	Warsaw	145·8	345	19 44k	[+ 3]	—	—	e 23 2	PP	94·5
II		145·8	345	19 42a	[+ 1]	e 42 4	SS	—	—	e 86·4
I	De Bilt	148·0	1	i 19 51	[+ 7]	—	—	—	—	e 79·5
II		148·0	1	e 19 50	[+ 6]	e 42 37	SS	—	—	e 79·4
I	Kew	148·2	6	e 19 50	[+ 5]	—	—	—	—	e 78·5
II		148·2	6	—	—	e 59 25	?	—	—	e 81·4
I	Collmberg	148·3	352	e 35 50	PPS	—	—	—	—	—
I	Jena N.	148·8	352	e 19 52	[+ 7]	—	—	—	—	—
I	Prague	149·2	349	e 18 47	[−59]	e 29 33	{−41}	e 19 55	PKP	—
II		149·2	349	e 21 36	?	e 41 49	SS	e 66 25?	Q	e 75·4
I	Uccle	149·2	2	e 18 50	[−56]	—	—	—	—	e 81·5
II		149·2	2	e 19 55	[+ 9]	—	—	—	—	e 79·4
II	Cheb	149·6	352	e 21 8	?	e 25 25	?	e 21 25	?	—
I	Ksara	150·1	303	e 19 51	[+ 3]	36 55	PPS	20 20	pPKP	—
II		150·1	303	—	—	e 29 58	{−21}	46 49	SSS	—
I	Paris	151·1	4	e 19 50	[+ 1]	e 41 33?	?	e 19 58	PKP_2	e 80·5
II		151·1	4	e 19 59	[+10]	—	—	—	—	e 79·4
I	Stuttgart	151·2	356	e 19 50	[+ 1]	e 23 3	SKP	e 43 57	SSP	e 81·5
II		151·2	356	e 19 52	[+ 3]	—	—	—	—	e 81·4
I	Istanbul	151·3	322	e 19 36	[−13]	—	—	e 20 17	PKP_2	—
I	Strasbourg	151·4	356	e 19 57	[+ 7]	—	—	e 21 17	?	e 83·0
II		151·4	356	e 19 58	[+ 8]	e 43 7	SS	e 23 43	PP	e 81·4
I	Zürich	152·6	357	e 19 59	[+ 8]	—	—	e 23 39	PP	—
I	Triest	153·6	343	e 24 20	?	e 44 16	SSP	—	—	—
II		153·6	343	e 20 31	[+38]	—	—	—	—	—
I	Clermont-Ferrand	154·2	356	e 19 52	[− 1]	e 43 47	SS	e 49 37	SSS	85·0
II		154·2	356	e 20 11	[+18]	e 43 44	SS	e 49 25	SSS	81·4
I	Helwan	155·0	298	e 19 55	[0]	—	—	e 23 42	PP	e 64·6
II		155·0	298	e 20 7	[+12]	—	—	e 23 45	PP	—
I	Rome	157·5	347	e 20 55	[+57]	e 33 21	?	e 25 6	PP	—
II		157·5	347	e 20 23	[+25]	—	—	24 39	PP	—
I	Alicante	160·9	16	e 24 55	PP	e 30 10	?	—	—	e 81·5
II		160·9	16	20 35	[+33]	24 49	PKS	21 31	PKP_2	e 78·7
II	Granada	160·9	23	i 20 47k	[+45]	45 28	SSP	25 10a	PP	83·0
I	Malaga z.	161·0	26	i 20 6a	[+ 4]	i 27 8	[+ 2]	i 25 4k	PP	80·9
II	z.	161·0	26	e 20 47	[+45]	27 31	[+25]	i 25 49k	PP	67·6
I	Tamanrasset	177·3	—	20 5	[− 7]	—	—	e 20 14	PKP	—
II		177·3	—	e 20 16	[+ 4]	—	—	e 25 49	PP	—

Additional readings :—
Wellington I i =16m.22s.?.
Christchurch I iEN =10m.9s.
Brisbane I iZ =7m.41s., iE =7m.48s., iEZ =8m.16s., iN =8m.41s. and 12m.53s.
Riverview I iPPPZ =8m.20s., eQE =14m.15s., iSSZ =14m.25s., iS_cSE =17m.16s., II eQN =14m.37s.
Berkeley I eN =11m.47s., iPZ =11m.51s., iZ =12m.5s., iSKSN =22m.13s., iN =24m.18s.
Tucson I i =13m.8s., II i =12m.27s., and 23m.28s.
Salt Lake City I e =26m.29s.
Logan I e =12m.54s. and 27m.16s.
Huancayo I ePPS =26m.26s., eSS =30m.40s., II e =26m.36s. and 30m.52s.
Irkutsk II eSS =32m.25s.
Cleveland I eN =38m.14s.
San Juan I eSKKS =27m.8s., II e =33m.40s.
Kulyab II PPP =24m.0s.
Tashkent I SP =30m.29s., II eSKSP =29m.32s.?.
Stalinabad I PS =30m.48s., PPS =32m.19s., SS =37m.33s., II eSKSP =30m.35s.
Sverdlovsk I eSKSP =30m.59s., eSS =38m.3s., II ePS =31m.3s.

Continued on next page.

Warsaw I ePKPE =19m.47s., eZ =21m.7s., and 21m.51s., ePPE =22m.52s., ePPN = 23m.9s., eE =42m.1s., II ePKPN =20m.1s., eZ =20m.12s. and 20m.37s., eE = 52m.37s.
Prague I e =19m.5s., ePP =22m.15s., eSKSP =33m.33s., ePS =34m.57s., ePPS = 36m.33s., eSS =42m.3s., eSSS =48m.9s., II e =25m.7s., 29m.1s. and 32m.49s., eZ =34m.49s., e =39m.25s.?, eZ =54m.43s., e =59m.25s.
Stuttgart I ePKPZ =19m.57s. and 20m.6s., e =20m.28s., ePP? =21m.59s., ePPS? = 33m.57s., II ePKP$_2$Z =20m.13s., eZ =23m.25s., ePPP =27m.49s.
Strasbourg II e =20m.19s., 20m.34s., 20m.37s., 21m.26s., and 22m.53s., ePPP =26m.55s., e =29m.1s., 29m.49s., 31m.25s., and 33m.55s., eSSS? =49m.25s.?,
Triest I ePP? =24m.59s., ePSKS =34m.54s., ePPS? =37m.52s.
Clermont-Ferrand II ePKP$_2$ =20m.49s.
Helwan I PKP$_2$ =20m.45s., e =22m.18s., II e =24m.55s.
Rome II PKP$_2$ =20m.59s.
Alicante II SKS =24m.27s., Q =61m.59s.
Granada II PKP$_2$ =21m.25s.k.
Malaga I QZ =69m.50s.
Tamanrasset I ePKP$_2$ =22m.1s., ePP =25m.52s., II ePKP =22m.10s., iPP =26m.4s., ePPP =29m.16s.
Long waves to the first shock were also recorded at Sitka, Honolulu, Seven Falls, Ukiah, Philadelphia and Arapuni.
Long waves to the second shock were also recorded at Ukiah, Chicago, Rapid City, Santa Clara, Seven Falls, Philadelphia, Bermuda, Arapuni, and Upsala.

Nov. 13d. 9h. 52m. 10s. Epicentre 40°·9N. 8°·9E.

Felt in the province of Sassari : Intensity VI at Aggius, Viddalba, Vignola ; V at Sassari, Cheremule, Bartigiadas, Isola, Asinara ; IV at Castelsardo, etc.

Felt uniformly throughout S.W. Corsica : V at Sartene ; III at Ajaccio. Epicentre 40°56′N. 8°53′E. Macroseismic radius 100km.

F. Peronaci.
Il terremoto sardo del 13 novembre 1948, Annali di. Geofisica, vol. VI, No. 4, Rome, 1953. p.p. 569-577 with macroseismic chart, fig. 1.

J. P. Rothé and 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, t. VII, p. 52.

$A = +\cdot7489$, $B = +\cdot1173$, $C = +\cdot6522$; $\delta = -2$; $h = -2$;
$D = +\cdot155$, $E = -\cdot988$; $G = +\cdot644$, $H = +\cdot101$, $K = -\cdot758$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Rome		2·9	68	0 46	− 2	1 22	− 2	1 16	?	—
Florence		3·4	30	e 1 24	P_g	e 1 35	− 2	e 2 6	S_g	—
Bologna		4·1	25	e 1 10	+ 5	e 1 46	− 9	e 1 56	S	—
Padova		4·3	30	e 2 13	S*	(e 2 13)	S*	e 2 50	S_g	—
Pavia		4·3	2	e 1 19	P*	e 1 58	− 2	e 2 13	S*	—
Salo		4·8	13	e 1 29	P*	e 2 14	+ 2	—	—	—
Barcelona		5·1	278	—	—	e 2 15	− 5	—	—	e 2·6
Chur		5·9	4	e 1 35	+ 4	e 2 27	−13	—	—	—
Triest		5·9	35	e 2 19	P_gP_g	i 2 54	+14	i 3 35	S_gS_g	—
Neuchatel		6·3	348	e 1 34	− 2	e 3 25	S_g	—	—	—
Clermont-Ferrand		6·4	321	i 1 37	− 1	i 2 54	+ 1	i 2 10	P_g	3·8
Tortosa		6·4	272	e 1 29	− 9	2 50	− 3	3 43	S_g	—
Zürich		6·5	358	e 1 39	0	e 2 58	+ 3	—	—	—
Basle		6·7	352	e 1 44	+ 2	e 2 59	− 1	e 3 11	?	—
Alicante		7·7	254	e 2 8	+12	3 35	+10	—	—	—
Strasbourg		7·7	354	e 2 35	P_g	e 3 20	− 5	e 3 56	S*	—
Stuttgart		7·9	1	e 1 58	− 1	e 3 28	− 2	e 3 16	?	e 4·5
Paris		9·1	332	i 2 13	− 1	e 3 50	−10	—	—	—
Cheb		9·5	14	e 3 1	P_g	—	—	—	—	e 6·0
Prague		9·9	21	e 2 31	+ 6	e 5 30	S_g	e 2 39	?	—
Toledo		9·9	268	i 2 29	+ 4	—	—	—	—	e 6·1
Jena	N.	10·2	10	e 3 55	?	e 4 33	+ 6	—	—	—
Tamanrasset		18·3	190	e 4 14	− 3	—	—	—	—	—

For Notes see next page.

NOTES TO NOVEMBER 13d. 9h. 52m. 10s.

Additional readings :—
Bologna eZ =1m.40s.
Clermont-Ferrand iP =1m.54s., iS =3m.19s., iS_g =3m.42s.
Tortosa P_gS_gN =3m.16s., 3m.38s., and 4m.0s., $S_g?N$ =4m.20s., S_gN =4m.27s., LN = 5m.10s.
Alicante PP =2m.24s., L =7m.28s.
Strasbourg e =3m.34s., eS? =3m.50s., e =4m.2s. and 4m.30s.
Paris i =2m.22s., e =2m.28s.
Jena eN =4m.8s., eE =4m.13s.
Long waves were also recorded at Warsaw, Potsdam, and De Bilt.

Nov. 13d. Readings also at 0h. (Victoria), 2h. (Mineral and Pierce Ferry), 3h. (Bombay, Bogota, and near Mizusawa), 4h. (near Balboa Heights), 5h. (near Ashkabad), 6h. (Bombay and near Ashkabad), 8h. (near Ashkabad), 9h. (near Leninakan, near Ashkabad, Tortosa, and near Alicante), 10h. (near Alicante), 11h. (Andijan and Collmberg), 12h. (Stuttgart, Pierce Ferry, near Mineral, Shasta Dam, Lick, Berkeley and Branner), 13h. (Boulder City), 16h. (Tucson, near Ottawa, Ville Marie, Temiskaming, Seven Falls, and Shawinigan Falls), 18h. (Riverside, Palomar, Mount Wilson, Pierce Ferry, and Tucson), 19h. (La Paz), 21h. (near Ashkabad), 22h. (near Ottawa and near Ashkabad).

Nov. 14d. 6h. 15m. 25s. Epicentre 36°·9N. 141°·3E. (as on 1948, March 15d.).

Intensity V at Kakioka, Onahama, Mito, and Maebasi ; IV at Tyosi, Shirakawa, Hukusima, Tokyo, Titibu, Yokohama, and Osima ; II-III at Sendai, Mizusawa, Miyako, Morioka, Hatinohe, and Ajiro. Epicentre 36°·9N. 141°·6E.. Shallow. Macroseismic radius >300km.

Seismo. Bull. Cent. Met. Obs., Japan for 1948. Tokyo, 1950, pp. 47, 48, with macroseismic chart.

$A = -·6256$, $B = +·5012$, $C = +·5978$, ; $\delta = -6$; $h = -1$;
$D = +·625$, $E = +·780$; $G = -·467$, $H = +·374$, $K = -·802$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·3	276	−0 6	−17	0 0	−18	—	—	—
Mito	0·8	232	0 18	0	0 28	− 3	—	—	—
Hukusima	1·1	322	0 25k	+ 3	0 39	0	—	—	—
Utunomiya	1·2	253	0 23	− 1	0 39	− 2	—	—	—
Sendai	1·4	347	0 28k	+ 1	0 47	+ 1	—	—	—
Kumagaya	1·7	244	0 31	0	0 51	− 3	—	—	—
Tokyo	1·7	225	0 30	− 1	0 41	−13	—	—	—
Maebasi	1·8	254	0 34k	+ 2	0 57	+ 1	—	—	—
Yokohama	2·0	222	0 36	+ 1	1 2	0	—	—	—
Mizusawa	2·2	357	0 41	+ 3	1 12	+ 6	—	—	—
Mera	2·4	216	0 39	− 2	1 8	− 4	—	—	—
Nagano	2·5	265	0 45a	+ 2	1 19	+ 5	—	—	—
Misima	2·6	227	0 44	0	1 24	+ 7	—	—	—
Miyako	2·8	11	0 47	0	1 22	0	—	—	—
Morioka	2·8	358	0 49k	+ 2	1 25	+ 3	—	—	—
Shizuoka	3·0	232	0 51	+ 1	1 26	− 1	—	—	—
Toyama	3·3	268	0 55	+ 2	1 51	S_g	—	—	—
Omaesaki	3·4	228	1 4	P*	1 42	S*	—	—	—
Wazima	3·5	281	0 53	− 4	1 46	S*	—	—	—
Hatinohe	3·7	2	1 3	+ 3	1 56	S*	—	—	—
Aomori	3·9	354	1 20	P_g	2 9	S_g	—	—	—
Nagoya	3·9	244	1 6	+ 4	—	—	—	—	—
Gihu	4·0	250	1 7	+ 3	1 54	+ 2	—	—	—
Kameyama	4·4	246	1 13	+ 3	3 4	+62	—	—	—
Kyoto	4·9	249	1 25	P*	2 29	S*	—	—	—
Owase	5·0	238	1 26	P*	2 42	S_g	—	—	—
Osaka	5·2	247	1 26	+ 5	2 25	+ 3	—	—	—
Mori	5·2	354	1 20	− 1	2 28	+ 6	—	—	—
Toyooka	5·4	258	1 24	0	2 34	S*	—	—	—
Vladivostok	9·5	314	i 2 22	+ 2	i 4 16	+ 6	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Irkutsk		30·1	313	e 6 12	− 1	e 11 8?	− 4	—	—	—
Frunse		50·3	299	e 9 13	+13	—	—	—	—	—
Andijan		52·6	297	e 9 15	− 3	16 45	+ 1	—	—	—
Tashkent		54·6	299	e 9 29	− 3	e 17 7	− 4	—	—	—
Sverdlovsk		55·2	319	9 35	− 2	17 13	− 7	—	—	—
Kulyab		55·5	295	e 9 11?	−28	e 16 53?	−31	—	—	—
Stalinabad		56·0	296	i 9 38?	− 5	17 27?	− 3	—	—	—
Samarkand		56·8	298	e 9 53	+ 5	—	—	—	—	—
Moscow		67·3	324	e 10 59	0	e 19 47	− 7	—	—	—
Shasta Dam		71·3	52	e 10 59	−24	—	—	—	—	—
Scoresby Sund		71·5	354	—	—	20 54	+11	—	—	—
Mineral	z.	72·0	53	i 11 24k	− 4	—	—	—	—	—
Branner	z.	73·2	56	i 11 31k	− 4	—	—	—	—	—
Lick	z.	73·6	56	i 11 34k	− 3	—	—	—	—	—
Fresno	z.	75·2	55	i 11 43k	− 3	—	—	e 11 57a	pP	—
Tinemaha	z.	75·9	54	i 11 48	− 2	—	—	—	—	—
Santa Barbara	z.	76·5	58	e 11 51	− 3	—	—	e 12 4	pP	—
Haiwee	z.	76·7	55	i 11 53	− 2	—	—	i 12 6	pP	—
Pasadena	z.	77·7	56	i 11 57k	− 3	—	—	—	—	—
Mount Wilson	z.	77·8	56	i 11 57k	− 4	—	—	i 12 11	pP	—
Copenhagen		78·0	334	12 1	− 1	21 52	− 3	—	—	40·6
Riverside	z.	78·4	56	i 12 0k	− 4	—	—	i 12 14	pP	—
Boulder City		78·8	53	i 12 26	+20	—	—	—	—	—
Palomar	z.	79·1	56	i 12 5	− 3	—	—	i 12 17	pP	—
Pierce Ferry		79·3	52	i 12 36	+27	—	—	e 17 1	PPP	—
Prague		81·5	329	e 11 54	−27	e 21 56	−36	—	—	e 41·6
Tucson		83·7	54	i 12 31k	− 1	—	—	i 12 44	pP	—
Stuttgart		84·7	330	e 12 33	− 4	—	—	e 12 43	pP	e 45·6
Triest		85·2	327	e 16 28	PP	e 22 53	[− 9]	e 23 57	PS	—
Strasbourg		85·4	331	e 12 38	− 2	e 22 59	[− 4]	—	—	e 43·6
Paris		87·1	335	i 12 47	− 2	—	—	i 12 58	pP	e 39·6
Rome		88·7	325	e 16 25	PP	23 15	[−10]	—	—	—
St. Louis		91·1	39	e 13 3	− 5	e 23 57	− 7	e 13 15	pP	—
La Paz		147·0	60	i 19 56	[+13]	—	—	23 7	PP	—

Additional readings :—
Haiwee eZ =12m.29s.
Pasadena iZ =12m.14s. and 12m.29s.
Mount Wilson eZ =12m.44.s
Copenhagen 12m.11s. and 22m.16s.
Riverside eZ =12m.26s.
Tucson i =13m.2s., ePP =15m.59s.
Triest ePS? =25m.13s., eSS? =30m.23s.
St. Louis esS =24m.22s.
Long waves were also recorded at Huancayo and other European Stations.

Nov. 14d. Readings also at 1h. (near Tchimkent), 2h. (Apia, Auckland, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Mineral, Stuttgart, and near Ashkabad), 3h. (near Ashkabad), 4h. (Haiwee, Mount Wilson, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, near Berkeley, Branner, and Lick), 5h. (Bombay), 6h. (near Ashkabad), 8h. (Mizusawa), 10h. (Mount Wilson, Palomar, Riverside, Tucson, Pierce Ferry, Stuttgart, and near Mizusawa), 13h. (Arapuni, Auckland, Wellington, Brisbane, Apia, and near Pierce Ferry), 14h. (Christchurch, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Branner, Lick, Fresno, Huancayo, Strasbourg, Stuttgart, and Tamanrasset), 15h. (De Bilt, Uccle, and Clermont-Ferrand), 16h. (near Ashkabad), 17h. (Huancayo, La Plata, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, and near Ottawa), 20h. (Palomar, Pasadena, Riverside, Tucson, and Pierce Ferry), 22h. (Pierce Ferry), 23h. (near Stalinabad),.

Nov. 15d. 4h. 49m. 33s. Epicentre 29°·8N. 139°·0E. Depth of focus 0·060.
(as on 1945, January 24d.).

Intensity IV at Mikuriya (Totigi Pref.); II-III at Utunomiya. Epicentre as adopted. Depth 370km. Macroseismic radius >300km.

Seismo. Bull. Cent. Met. Obs., Japan, for 1948, Tokyo 1950, pp. 48, 49, with macroseismic chart.

$A = -\cdot6560$, $B = +\cdot5702$, $C = +\cdot4945$; $\delta = -1$; $h = +2$;
$D = +\cdot656$, $E = +\cdot755$; $G = -\cdot373$, $H = +\cdot324$, $K = -\cdot869$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Mera		5·2	7	1 29	+ 4	2 22	−10	—	—
Misima		5·3	359	1 29	+ 3	2 31	− 3	—	—
Kameyama		5·5	338	1 31	+ 3	—	—	—	—
Nagoya		5·6	343	1 29	− 1	2 43	+ 3	—	—
Osaka		5·6	332	1 38	+ 8	2 42	+ 2	—	—
Hunatu		5·7	358	1 32	+ 1	2 41	− 1	—	—
Tokyo		5·9	6	1 40	+ 7	—	—	—	—
Kumagaya		6·3	3	1 37	0	2 48	− 5	—	—
Kakioka		6·5	8	1 40	+ 1	2 53	− 4	—	—
Maebasi		6·5	0	1 43	+ 4	2 55	− 2	—	—
Mito		6·7	10	1 39	− 2	—	—	—	—
Nagano		6·9	355	1 44	0	3 3	− 3	—	—
Toyama		7·0	348	1 34	−11	3 9	+ 1	—	—
Onahama		7·2	12	1 38	− 9	3 10	− 2	—	—
Kagosima		7·5	286	3 9	S	(3 9)	− 9	—	—
Kumamoto		7·7	295	1 52	− 1	3 21	− 1	—	—
Hukusima		8·0	8	1 56	0	3 22	− 6	—	—
Hukuoka		8·3	299	1 58	− 2	3 31	− 3	—	—
Sendai		8·6	10	2 2	− 1	3 35	− 5	—	—
Mizusawa		9·5	10	2 13	0	3 55	− 4	—	—
Morioka		10·0	10	2 18	− 1	4 7	− 2	—	—
Sapporo		13·3	8	2 57	+ 1	—	—	—	—
Vladivostok		14·5	339	—	—	i 5 30	−10	—	—
Frunse		52·3	303	e 8 30	− 3	—	—	—	—
Murgab		53·6	298	i 8 42	− 1	—	—	—	—
Andijan		54·3	301	e 8 44	− 4	—	—	—	—
Tchimkent		56·1	304	i 8 56	− 4	—	—	—	—
Stalinabad		57·5	300	i 9 0	−10	16 19	−15	—	—
Sverdlovsk		59·4	322	i 9 17	− 6	i 16 48	−10	—	—
Moscow		71·9	325	10 37	− 4	—	—	—	—
Shasta Dam		77·2	50	e 11 12	+ 1	—	—	—	—
Mineral	z.	77·9	51	i 11 15a	0	—	—	—	—
Berkeley	z.	78·6	53	i 11 19a	+ 1	—	—	—	—
Branner	z.	78·9	53	i 11 21a	+ 1	—	—	—	—
Lick	z.	79·3	53	i 11 23a	+ 1	—	—	—	—
Tinemaha	z.	81·7	53	i 11 42	+ 7	—	—	e 13 19	pP
Santa Barbara	z.	82·1	55	e 11 38	+ 1	—	—	—	—
Haiwee	z.	82·4	53	e 11 40	+ 2	—	—	—	—
Pasadena	z.	83·3	55	i 11 44a	+ 1	—	—	e 13 21	pP
Mount Wilson		83·4	55	i 11 45	+ 2	—	—	e 13 25	pP
Copenhagen		83·4	333	11 40	− 3	—	—	—	—
Riverside	z.	84·0	55	i 11 41a	− 5	—	—	—	—
Palomar	z.	84·7	55	i 11 50	0	—	—	e 13 30	pP
Boulder City		84·7	52	i 11 52	+ 2	—	—	e 15 15	PP
Pierce Ferry		85·2	51	i 11 53	+ 1	—	—	e 15 17	PP
Tucson		89·5	53	i 12 15	+ 3	—	—	i 15 54	PP
Stuttgart	z.	89·8	330	e 12 10	− 4	—	—	e 13 56	pP

Additional readings :—
Lick iZ = 11m.32s.k.
Tinemaha iZ = 12m.0s.
Pasadena eZ = 11m.52s.

Nov. 15d. Readings also at 4h. (near Tacubaya), 5h. (near Mizusawa), 6h. (near Andijan), 7h. (near Berkeley, Lick, and Branner), 9h. (Granada and Stuttgart), 10h. (Haiwee, Mount Wilson (2), Pasadena, Palomar, Riverside, Tinemaha, Tucson (2), Boulder City, Pierce Ferry, Shasta Dam, Branner, Lick, and Ottawa), 12h. (near Bologna, Florence, Rome, and Triest), 13h. (Christchurch, Wellington, Mount Wilson, Palomar, Riverside, Tucson, Boulder City, and Pierce Ferry), 15h. (near Ashkabad), 21h. (near La Paz, near Apia, near Alicante, Granada, Malaga, and Toledo), 22h. (Catania, near Messina, and Taranto), 23h. (near Ottawa, near Branner, and Lick).

Nov. 16d. Readings at 0h. (near La Paz), 4h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Ottawa, Mineral, Berkeley, Lick, near Ferndale, and near Klyuchi), 5h. (Tucson, Ksara, near Kulyab, and Stalinabad), 6h. (Frunse, Tashkent, and near Tchimkent), 8h. (near Klyuchi (2)), 9h. (near Alicante), 11h. (near Ravensburg, Basle, Zürich, and Stuttgart), 19h. (near Ottawa), 21h. (Rome), 22h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Collmberg, Basle, Zürich, Stuttgart, Clermont-Ferrand, Paris, Strasbourg, Copenhagen, Jena, Tamanrasset, near Andijan, and Stalinabad).

Nov. 17d. Readings at 1h. (Tananarive, Ksara, Fort de France (2), Lick, Pierce Ferry (2), Shasta Dam, Tucson (2), Pasadena, Mount Wilson (2), Riverside (2), Palomar, and near Victoria), 2h. (near Ashkabad), 5h. (Tananarive, Pierce Ferry, Bogota, and La Paz), 7h. (Ashkabad), 9h. (Tucson and near Klyuchi), 10h. (Rome, Catania, Messina, and Tamanrasset), 11h. (near Stalinabad), 15h. (Boulder City, Pierce Ferry, Tucson, Mineral, and near Apia), 16h. (Paris and Stuttgart), 17h. (Riverside, Palomar, and Haiwee), 18h. (near Tacubaya and near Ashkabad), 19h. (Basle, Zürich, Stuttgart, Strasbourg, Paris, De Bilt, Uccle, and Scoresby Sund), 21h. (near Mizusawa), 22h. (near Bogota), 23h. (near Tacubaya).

Nov. 18d. 3h. 34m. 46s. Epicentre 41°·5N. 8°·5W.

Intensity IV-V at Viana do Castelo, Braga, Barcelos, Guimaraes, Cabaceiras de Basto, Murça, Felgueiras, Paços de Ferreira, Tua, etc. Epicentre as adopted.

Observaçoes macrsismicas 1948. Anuario Sismologico de Portugal No. 2, 1948, p.3. Macroseismic chart p. 7.

$A = +\cdot7430$, $B = -\cdot1110$, $C = +\cdot6601$; $\delta = +10$; $h = -2$;
$D = -\cdot148$, $E = -\cdot989$; $G = +\cdot653$, $H = -\cdot098$, $K = -\cdot751$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Lisbon		2·8	190	0 45	− 2	1 22	0	0 48	P*	—
Toledo		3·7	114	i 0 50	−10	i 1 49	+ 4	i 1 4	P*	—
Granada		5·7	137	2 56	?	e 4 55	?	—	—	—
Malaga	z.	5·7	145	e 1 27	− 1	i 2 51	S*	—	—	3·8
Almeria		6·6	133	1 5	−36	—	—	—	—	—
Tortosa		6·8	93	1 46	+ 2	2 58	− 5	e 1 51	P*	—
Alicante		6·9	114	e 1 54	+ 9	3 26	S*	2 14	P_g	e 4·3

Additional readings :—
Lisbon P_g =0m.52s., S =1m.17s., S*EZ =1m.20s., eZ =1m.34s.?
Toledo i =0m.55s.
Tortosa P_gS_gE =2m.32s., P_gS_gEN =2m.44s., P_gS_gN =2m.55s., P_gS_gEN =3m.22s., S_gN = 3m.36s. and 3m.40s., S_gE =3m.47s.
Alicante P_g =2m.34s., SS =3m.35s., SSS =3m.46s.

Nov. 18d. Readings also at 0h. (Scoresby Sund, De Bilt, Jena, Stuttgart, Strasbourg, Paris, Basle, Zürich, Alicante, Tamanrasset, Shasta Dam, and Tucson), 2h. (near Ashkabad and near Tacubaya), 3h. (La Paz, Tchimkent, Murgab, Andijan, near Stalinabad, Kulyab, near Grozny, and Piatigorsk), 4h. (near Chur, Zürich, Basle, and Stuttgart ; intensity V at Lenzerhorn), 5h. (near Neuchatel, Basle, Zürich, Chur, and Stuttgart ; intensity V in the Haut Valois), 6h. (near Chur), 7h. (La Paz), 8h. (Tananarive and near Victoria), 9h. and 10h. (near Stalinabad), 13h. (Klyuchi, Ottawa, Lick, Branner, Mineral, Pasadena (2), Mount Wilson (2), Riverside (2), Palomar (2), La Jolla, Haiwee (2), Tinemaha (2), Boulder City (2), Pierce Ferry (2), Shasta Dam (2), Tucson (2), La Paz, and near Huancayo), 14h. (Tacubaya), 15h. (Uccle and near Ashkabad), 16h. (Alicante), 17h. (Ottawa), 18h. (near Chur), 21h. (near Bogota and near Ottawa), 22h. and 23h. (near Andijan, Samarkand, and Stalinabad).

Nov. 19d. 1h. 4m. 27s. Epicentre 9°·7N. 83°·7W. Depth of focus 0·010.
(as on 1939, December 23d.).

A = +·1082, B = −·9799, C = +·1674; δ = −7; h = −7;
D = −·994, E = −·110; G = +·018, H = −·166, K = −·986.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		4·2	100	i 0 57	− 6	e 1 40	−11	—	—	—
Bogota		10·8	117	e 2 26	− 7	i 4 39	+ 7	i 2 36	pP	—
Merida		12·6	334	6 33	?	e 6 39	?	i 9 15	P_cP	—
Puebla		16·8	306	e 3 54	+ 4	—	—	—	—	—
Tacubaya	N.	17·8	304	i 3 58	− 5	i 7 31	+16	i 7 48	sS	e 9·2
San Juan		19·1	61	i 4 18	0	e 7 53	+10	i 4 39	pP	i 8·2
Mobile		21·3	349	4 41	+ 1	9 1	SS	5 10	PP	—
Manzanillo		22·0	299	e 4 33	−14	—	—	—	—	—
Fort de France		22·6	76	i 4 55	+ 2	i 9 7	+18	5 19	pP	—
Huancayo		23·1	158	e 4 55	− 3	e 9 10	+12	i 5 25	pP	e 10·9
Columbia		24·3	6	e 5 9	0	e 9 23	+ 5	—	—	e 9·9
Bermuda		28·5	36	e 5 58	+10	e 10 39	+12	i 11 50	sS	e 13·6
St. Louis		29·4	350	i 5 54	− 2	i 10 51	+ 9	i 6 16	pP	—
La Paz		30·3	148	5 59	− 5	e 11 1	+ 5	6 9	pP	i 14·4
Philadelphia		31·1	14	i 6 12	+ 1	i 11 20	+12	i 7 16	PP	e 12·8
Pennsylvania	N.	31·4	18	i 6 19	+ 5	i 11 15	+ 2	i 7 21	PP	—
Cleveland		31·7	3	i 6 13	− 3	e 11 21	+ 3	e 11 45	sS	14·8
Fordham		32·2	16	e 6 22	+ 1	i 11 38	+12	i 7 28	PP	16·9
Chicago		32·3	355	e 6 15	− 7	e 11 24	− 3	e 7 23	PP	e 13·1
Lincoln	E.	33·1	344	e 7 38	PP	—	—	—	—	e 19·6
Tucson		33·7	317	i 6 31a	− 3	e 12 0	+11	i 6 48	pP	e 14·0
Weston		34·3	17	i 6 40	+ 1	e 12 10	+12	14 36	SS	e 15·3
Harvard		34·4	17	i 6 41	+ 1	e 12 3	+ 3	—	—	e 16·1
Ottawa		36·2	10	6 55	0	12 40	+13	8 11	PP	18·2
Temiskaming		37·0	6	e 7 3	+ 1	—	—	e 8 25	PP	21·6
Ville Marie		37·7	5	e 7 7	− 1	e 13 13	+23	e 8 55	PP	—
Shawinigan Falls	N.	37·9	12	7 9	0	13 2	+ 9	8 58	PP	19·5
Pierce Ferry		38·1	318	e 7 9	− 2	e 12 45	−11	e 8 45	PP	—
Rapid City		38·2	337	i 7 13	+ 1	e 12 43	−15	i 8 35	PP	e 15·6
Boulder City		38·5	318	e 7 13	− 1	e 12 31	−31	e 8 43	PP	—
Palomar		38·5	314	i 7 14a	0	i 13 14	+12	i 7 32	pP	—
La Jolla		38·6	313	e 7 13a	− 2	—	—	i 8 51	PP	—
Halifax		38·9	23	7 21	+ 3	13 19	+11	i 8 59	PP	22·5
Seven Falls	E.	38·9	14	7 19	+ 1	13 17	+ 9	8 57	PP	19·5
Riverside		39·2	314	i 7 19a	− 1	—	—	i 9 6	PP	—
Salt Lake City		39·7	327	e 7 21	− 3	e 13 25	+ 5	e 9 12	PP	e 17·1
Mount Wilson		39·8	314	i 7 25a	0	—	—	i 9 0	PP	—
Pasadena		39·9	314	i 7 25a	− 1	i 13 35	+12	e 7 44	pP	e 18·1
Logan		40·4	327	e 7 27	− 3	e 13 27	− 4	i 9 11	PP	e 16·3
Haiwee		40·7	317	e 7 32a	0	—	—	e 9 12	PP	—
Santa Barbara		41·1	314	i 7 36a	0	—	—	i 8 13	pP	—
Tinemaha		41·4	318	i 7 38a	0	—	—	e 9 12	PP	—
Fresno		42·3	316	e 7 44	− 2	—	—	e 7 48	P	—
Bozeman		42·8	332	e 7 55	+ 5	e 14 6	0	e 9 38	PP	e 17·9
Butte	N.	43·8	333	e 7 55	− 3	—	—	e 9 53	PP	e 18·3
Lick	Z.	43·9	316	i 7 58a	− 1	—	—	i 8 16	pP	—
Santa Clara	E.	44·1	316	e 8 1	+ 1	e 14 44	+19	—	—	—
Branner		44·3	316	e 8 1a	− 1	e 14 17	−11	i 9 45a	PP	—
Berkeley		44·6	316	i 8 3a	− 1	e 14 43	+11	i 8 5	pP	i 20·6
Mineral	Z.	45·4	319	e 8 8a	− 2	—	—	i 9 47k	PP	—
Shasta Dam		46·1	319	e 8 11	− 5	—	—	i 9 53	PP	—
Saskatoon		46·2	341	e 9 33	?	19 48	SSS	11 3	PPP	24·0
Arcata	Z.	47·3	319	i 8 27k	+ 1	—	—	—	—	—
La Plata	E.	50·6	153	8 47	− 4	16 10	+13	12 5	PPP	29·0
	N.	50·6	153	8 48	− 3	16 15	+18	11 3	PP	31·6
Victoria		50·9	328	8 53	0	16 24	+23	e 9 57	?	26·5
Ivigtut		57·7	20	—	—	e 17 41	+ 9	e 24 33	SSS	—
Sitka		61·7	332	—	—	e 19 11	PPS	—	—	e 26·7
College		70·4	337	—	—	e 20 43	PS	—	—	e 33·7
Scoresby Sund		71·7	18	11 16	+ 3	20 32	+ 8	—	—	30·5

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Honolulu		71·8	290	e 11 48	+34	—	—	—	—	e 36·0
Lisbon		72·0	52	11 17a	+ 2	20 45	+18	11 54a	pP	33·4
Malaga	z.	75·7	54	i 11 39a	+ 3	21 26	+17	i 11 55k	pP	36·1
Toledo		75·9	51	i 11 40	+ 2	i 21 27	+16	i 14 35	PP	—
Granada		76·3	54	i 11 51k	+11	i 21 32	+17	i 14 31	PP	i 34·3
Kew		78·4	39	i 11 51	− 1	e 21 47	+ 9	e 22 7	sS	e 32·5
Alicante		78·7	53	11 55	+ 2	21 53	+12	12 11	pP	36·5
Tortosa		79·4	50	12 17	+20	22 3	+15	15 21	PP	—
Pairs		80·3	42	i 11 57	− 5	e 22 7	+ 9	e 22 29	sS	e 36·5
Clermont-Ferrand		80·9	45	e 12 5	0	i 21 44	−20	i 22 20	sS	36·5
Uccle		81·3	40	e 12 10	+ 3	e 22 16	+ 8	e 27 21	SS	e 34·5
Algiers		81·7	54	e 12 10	+ 1	e 25 33	?	—	—	e 39·5
De Bilt		81·7	38	i 12 12	+ 3	e 22 21	+ 9	e 15 3	PP	e 33·5
Neuchatel		83·4	44	e 12 19	+ 1	e 22 36	+ 7	e 23 47	PS	—
Basle		83·8	43	e 12 20	0	—	—	e 19 51	?	e 38·5
Strasbourg		83·8	42	e 12 20	0	e 22 41	+ 8	i 12 51	pP	37·1
Stuttgart		84·7	42	e 12 23a	− 1	e 22 51	+ 9	i 12 39k	pP	e 39·5
Chur		85·2	43	e 12 27	0	e 22 59	+12	—	—	e 42·5
Pavia		85·2	45	e 12 55	pP	—	—	—	—	—
Copenhagen		85·5	34	e 12 32	+ 4	23 0	+10	24 21	PS	37·5
Tamanrasset		85·6	67	e 12 29	0	—	—	e 12 58	pP	—
Jena		85·9	40	e 12 31	+ 1	—	—	e 12 34	P	—
Salo		86·1	45	12 33a	+ 2	e 23 2	+ 6	—	—	—
Cheb		86·5	40	e 12 43?	+10	e 23 36?	+36	e 15 55?	PP	e 34·5
Potsdam		86·5	37	e 12 43	+10	e 23 10	+10	e 23 34	sS	e 43·5
Collmberg		86·7	39	e 12 38	+ 4	—	—	—	—	—
Bologna		86·8	45	e 12 36	+ 1	e 23 19	+17	—	—	—
Florence		86·9	46	e 12 35	0	e 23 37	+34	—	—	—
Upsala		87·3	30	—	—	e 23 14	+ 7	e 29 6	SS	e 38·5
Prague		87·8	39	e 12 41	+ 2	e 23 23	+11	e 16 21	PP	e 37·5
Rome		88·2	48	e 12 44a	+ 3	i 23 31	+15	e 29 26?	SS	e 45·0
Triest		88·3	44	i 12 55	+13	i 23 30	+13	i 24 21	sS	—
Warsaw		91·3	36	e 13 11	+15	e 23 53	+ 9	25 23	PS	e 42·5
Belgrade		93·1	44	e 13 5a	+ 1	e 25 50	PS	e 16 59	PP	e 47·8
Moscow		98·7	29	e 13 47	+17	e 24 27	−20	e 18 4	PP	—
Helwan		106·2	56	—	—	e 26 9	+19	e 28 3	PS	—
Sverdlovsk		107·5	19	e 18 31?	PP	e 24 54	[+16]	28 11	PS	—
Ksara		108·2	50	i 18 49	PP	e 28 17	PS	i 19 10	pPP	—
Leninakan		110·3	40	18 45	[+25]	—	—	—	—	—
Vladivostok		118·2	331	i 19 52	PP	25 23	[+ 3]	e 26 51	SKKS	—
Tchimkent		122·8	22	i 20 20	PP	—	—	—	—	—
Tashkent		123·5	24	i 20 21	PP	—	—	—	—	—
Samarkand		123·9	27	e 18 59	[+12]	—	—	—	—	—
Frunse		124·0	19	e 20 31	PP	—	—	—	—	—
Riverview		124·4	236	e 20 46	PP	e 37 25	SS	e 30 44	PS	e 58·3
Andijan		125·1	22	e 18 52	[+ 3]	—	—	e 23 55	PPP	—
Stalinabad		125·6	25	e 18 52	[+ 2]	e 27 42	SKKS	i 20 48	PP	—
Bombay		143·3	39	e 24 16	?	—	—	—	—	—
Hyderabad	N.	147·8	33	e 19 41	[+10]	—	—	—	—	—

Additional readings :—
Bogota isS =4m.55s., iP$_c$P =8m.24s.
Puebla eN =4m.54s., eE =4m.59s., eN =6m.12s., eE =6m.33s.
Tacubaya iPEN =4m.1s., iPPE =4m.15s., iPPN =4m.21s., iSN =7m.35s., eSN =7m.53s.
Mobile SS =10m.7s.
Manzanillo eE =17m.39s., eN =17m.49s., eSN =19m.2s., eSE =19m.6s.
Huancayo i =5m.6s., e =6m.23s.
Bermuda ePP =6m.45s., iP$_c$P =9m.6s.
St. Louis isS =11m.28s.
La Paz iPPZ =7m.5s., PPP =7m.21s., iSSE =12m.21s., iSSSE =12m.43s., iS$_c$S =15m.33s.
Philadelphia i =7m.34s., iP$_c$P =9m.22s.
Pennsylvania iS$_c$SN =15m.17s., eN =18m.57s.
Cleveland iPPZ =7m.17s., eSSN =12m.44s.
Chicago eS =11m.41s.
Tucson isP =7m.16s., i =7m.37s., iPP =7m.45s., i =8m.6s. and 8m.35s., iP$_c$P =8m.59s., eS$_c$P =12m.54s.

Continued on next page,

Weston PP =7m.56s., SKP =10m.12s.
Ottawa i =6m.58s. and 7m.15s., PP =7m.23s., e =13m.3s., SS =15m.1s., SSS =15m.33s.
Temiskaming e =7m.14s.
Ville Marie e =8m.41s.
Pierce Ferry eP_cP? =9m.4s.
Rapid City iE =8m.32s.
Palomar iN =7m.29s., iZ =7m.48s., iNZ =8m.5s., iZ =8m.22s., 8m.29s., and 9m.9s.
La Jolla iZ =7m.26s., 7m.38s., 7m.53s., 8m.27s., and 9m.8s.
Halifax PPP =9m.14s., SS =15m.21s.
Seven Falls SSE =15m.57s.
Riverside iP_cPZ =9m.30s., iZ =9m.46s.
Mount Wilson iZ =8m.36s.
Pasadena isPZ =7m.59s., iPPZ =9m.0s., iZ =9m.12s., iP_cPZ =9m.33s.
Logan e =8m.25s.
Haiwee eZ =8m.48s.
Santa Barbara eZ =10m.11s.
Tinemaha iZ =8m.1s., 8m.9s., and 8m.29s., iP_cPZ =9m.35s., iZ =9m.56s.
Lick iZ =8m.48s. a.
Branner eE =8m.5s.
Berkeley iZ =8m.28s. and 8m.58s., iPPN =9m.28s., iZ =9m.46s. and 10m.6s., iE = 16m.1s.
Mineral eEN =8m.11s., iZ =8m.50s. a.
Saskatoon S =16m.18s.
La Plata E. SSS =22m.13s., Q =26m.28s.
La Plata N. P_cP =10m.2s., P_cS =14m.3s., S =16m.21s., ? =20m 9s., SS =20m.57s., SSS =22m.53s., Q =26m.27s.
Malaga PPZ =14m.52s., $PPPZ$ =16m.20s.
Toledo i =11m.55s. and 12m.14s., SKS =22m.0s.
Granada P_cP =12m.14s. a, PS =21m.50s., iSS =26m.20s.
Alicante PP =14m.27s., PPP =15m.59s., sS =22m.16s., PS =22m.37s., PPS =22m.59s., SS =26m.55s., SSS =30m.42s.
Tortosa P_cPN =12m.37s., PSE =22m.50s.
Paris i =12m.1s., ePS =22m.53s.
Clermont-Ferrand iP =12m.9s., ePP =14m.58s., iPS =22m.41s.
Uccle iSSE =27m.56s.
Strasbourg eP =12m.23s., i =12m.34s. and 12m.59s., ePP =15m.38s. and 15m.53s., ePS =23m.41s., eSS =28m.17s., eSSS =31m.38s.
Stuttgart iP =12m.27s., e =13m.45s., ePP =15m.39s., ePS =23m.53s., e =27m.9s., eSS =28m.57s.
Tamanrasset iP_cP =12m.33s.k, ePP =15m.57s.
Cheb e =24m.55s.?, eSS =29m.33s.
Potsdam ePE =12m.49s.?.
Collmberg iEZ =12m.41s. and 13m.7s., eZ =14m.14s.
Upsala eSKS? =23m.19s.
Prague eZ =12m.57s. and 14m.0s., ePPP =18m.15s., e =23m.49s. and 24m.33s., eSS = 29m.27s., eSSS? =32m.33s.
Rome eZ =16m.59s., iN =23m.59s., PPS? =24m.49s., SSSE =33m.18s.?.
Triest iS =23m.48s., iPS =24m.45s.
Warsaw eE =14m.42s., eN =16m.8s., eZ =17m.35s., eE =17m.42s., eSN =24m.0s.
Moscow eS =25m.17s.
Sverdlovsk SS =33m.57s.
Vladivostok ePS =27m.46s., SS =36m.39s.
Riverview eSKSPE =30m.41s., ePSKSZ =30m.51s., ePSKSEN =30m.54s., epPSEZ = 31m.5s., eE =33m.35s. and 37m.45s., esSSE =38m.14s., ePKP_2,PKP_2?N =40m.42s., eSSSN =42m.4s., eE =42m.27s.
Long waves were laso recorded at Arapuni, Wellington, Christchurch, Aberdeen, and Kodaikanal.

Nov. 19d. 11h. 6m. 50s. Epicentre 46°·3N. 12°·8E.

Intensity II at Gemona del Friuli and Rive d'Arcano (Udine). Epicentre as adopted.

Bulletin séismique mensuel de l'Institute Nazionale de Geofisica, Rome.

$A = +·6761$, $B = +·1536$, $C = +·7206$; $\delta = -3$; $h = -4$;
$D = +·222$, $E = -·975$; $G = +·703$, $H = +·160$, $K = -·693$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Triest	0·9	124	i 0 18	− 2	i 0 33	− 1	i 0 29	S_g	—
Salo	1·7	247	0 32	+ 1	i 0 56	+ 2	—	—	—
Padova	1·9	200	e 0 38	+ 4	—	—	—	—	—
Bologna	2·1	210	e 0 44	P_g	i 1 8	+ 4	—	—	—
Ravensburg	2·6	305	e 0 45	+ 1	e 1 23	S*	e 1 29	S_g	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zürich		3·1	291	e 0 50	− 1	e 1 31	+ 2	e 1 37	S_g	—
Stuttgart		3·5	316	e 0 54	− 3	e 1 39	− 1	e 1 10	P_g	—
Prague		3·9	15	e 0 41	−21	e 1 55	+ 5	e 2 1	S*	—
Neuchatel		4·1	281	e 1 4	− 1	e 2 11	S_g	—	—	—
Strasbourg		4·1	305	e 1 5	0	e 1 53	− 2	e 1 19	P_g	—
Jena		4·7	350	e 1 21	P*	2 27	S*	e 1 32	P_g	—
Collmberg		5·0	1	e 1 18	0	e 2 14	− 4	e 1 27	P*	—
Potsdam		6·1	1	—	—	e 3 10	S*	—	—	—

Additional readings :—
Ravensburg eZ =50s. and 1m.4s.
Stuttgart e =1m.3s., iP_g =1m.7s., e =1m.22s. and 1m.30s., eS =1m.36s., e =1m.49s., i =1m.53s. and 1m.59s.
Prague eP? =55s., e =1m.18s., eS? =1m.31s., e =2m.4s.
Strasbourg eS_g? =2m.20s.
Jena eN =1m.28s., eEN =1m.58s.
Collmberg eP_gEZ =1m.47s., EZ =2m.40s., 3m.58s., and 4m.33s.

November 19d. 21h. Undetermined Shock.

Apia ePEN =28m.6s., eSEN =28m.55s., eLEN =29·5m.
La Jolla ePZ =37m.54s.
Pasadena iPZ =37m.54s.
Mount Wilson iPZ =37m.55s.
Palomar iPNZ =37m.57s.
Riverside iPZ =37m.57s.
Tinemaha ePZ =38m.2s.
Shasta Dam eP =38m.2s.
Haiwee ePZ =38m.2s.
Boulder City eP =38m.13s.
Pierce Ferry eP =38m.17s.
Tucson iP =38m.18s.k.
Logan eP =38m.37s.
Wellington e =39m.
Stuttgart eZ =45m.56s.
Long waves were also recorded at Huancayo.

Nov. 19d. Readings also at 0h. (Stuttgart, Belgrade, Bucharest, and near Taranto), 1h. (Puebla, Oaxaca, Balboa Heights, near Tacubaya, and near Alicante), 2h. (near Andijan), 6h. (La Paz), 12h. (Bombay, Kodaikanal, Colombo, Ksara, Stuttgart, Stalinabad, Tashkent, Leninakan, Grozny, Andijan, Vladivostok, near Ashkabad, and near Alicante), 13h. (Balboa Heights, Zürich, and near Ashkabad), 14h. (near Stuttgart), 15h. (Andijan), 17h. (near Apia), 18h. (near Tacubaya), 19h. (Tacubaya (2)), 21h. (Mizusawa), 22h. and 23h. (near Ashkabad).

Nov. 20d. 4h. 4m. 54s. Epicentre 7°·5S. 71°·0W. Depth of focus 0·090. (as on Nov. 6d.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		6·2	223	i 1 43	− 1	e 2 39	−27	—	—	e 3·1
La Paz		9·4	163	i 2 9k	− 4	i 3 56	− 4	—	—	4·8
Bogota		12·4	346	e 2 10	−33	i 5 10	+17	i 2 51	pP	—
Ottawa	z.	52·8	354	e 10 21	PP	—	—	—	—	—
Tucson		54·8	319	i 8 38	+ 2	—	—	i 10 46	pP	—
Pierce Ferry		59·3	321	i 9 8	+ 1	—	—	i 11 9	pP	—
Palomar	z.	59·5	316	i 9 8	0	—	—	i 11 10	pP	—
Boulder City		59·7	320	e 9 12	+ 3	—	—	e 11 13	pP	—
Riverside	z.	60·2	316	i 9 15	+ 2	—	—	e 11 17	pP	—
Mount Wilson	z.	60·8	316	i 9 18	+ 1	—	—	—	—	—
Pasadena	z.	60·9	316	i 9 19	+ 2	—	—	—	—	—
Haiwee	z.	61·9	318	i 9 27	+ 3	—	—	i 11 17	pP	—
Tinemaha	z.	62·6	319	i 9 31	+ 3	—	—	i 11 36	pP	—
Victoria	z.	72·2	327	e 12 35	pP	—	—	—	—	—
Tamanrasset		80·6	65	i 13 30	pP	—	—	—	—	—
Stuttgart	z.	89·2	41	e 14 11	pP	—	—	—	—	—

Additional readings :—
Tucson e =12m.27s.
Pierce Ferry iPP =12m.7s.
Palomar iZ =12m.6s.
Tinemaha iZ =12m.21s.
Long waves were also recorded at Cleveland,

Nov. 20d. 8h. 21m. 17s. Epicentre 16°·5N. 106°·0W. (as on 1948, Aug. 29d.).

Approximate.

$A = -·2644$, $B = -·9221$, $C = +·2823$; $\delta = -13$; $h = +5$;
$D = -·961$, $E = +·276$; $G = -·078$, $H = -·271$, $K = -·959$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manzanillo		3·0	32	e 0 44	− 6	e 1 24	− 3	e 1 50	S_g	—
Guadalajara	N.	4·9	31	e 1 16	− 1	—	—	—	—	—
Tacubaya	N.	7·1	65	e 1 58	P*	i 3 38	S*	e 3 51	S_g	1 4·4
Tucson		16·3	345	i 3 47k	− 5	e 7 5	+12	—	—	e 8·1
Palomar		19·4	333	i 4 30	0	—	—	—	—	—
Riverside	Z.	20·2	332	i 4 39	0	—	—	—	—	—
Mount Wilson	Z.	20·7	332	e 4 43	− 1	—	—	—	—	—
Pasadena		20·7	332	i 4 44	0	—	—	—	—	e 9·8
Pierce Ferry		20·8	342	e 4 43	− 2	—	—	—	—	—
Boulder City		20·9	340	e 4 46	0	—	—	—	—	—
Haiwee	Z.	22·3	335	i 5 0	− 1	—	—	—	—	—
Tinemaha		23·2	335	i 5 9	0	—	—	—	—	—
Salt Lake City		24·7	350	e 5 25	+ 1	—	—	—	—	e 13·2
Lick	Z.	24·9	330	e 5 28k	+ 2	—	—	—	—	—
Lincoln	E.	25·6	17	—	—	e 9 56	− 3	—	—	e 12·8
Logan		25·7	350	e 5 45	+12	e 9 47	−14	e 6 17	PP	e 13·6
St. Louis		26·0	29	i 5 41	+ 5	e 10 8	+ 2	i 6 12	PP	—
Mineral	Z.	27·4	334	e 5 49a	0	—	—	—	—	—
Rapid City	E.	27·5	5	e 6 6	+16	e 10 47	+17	—	—	e 14·2
Chicago		29·8	27	—	—	e 10 51	−16	—	—	e 13·5
Philsdelphia		35·5	43	—	—	e 12 36	0	—	—	e 18·9
Ottawa		38·4	35	e 7 26	+ 1	—	—	—	—	e 20·3
La Paz		49·7	129	e 8 53	− 3	16 41	+37	—	—	24·1

Additional readings :—
Manzanillo eN =2m.10s., eE =2m.44s., eN =2m.49s.
Guadalajara eE =58s., iE =1m.7s., eE =1m.22s.
Tacubaya iSN =3m.54s.
Tucson i =4m.23s.
Palomar iZ =4m.37s.
Riverside iZ =4m.50s.
Mount Wilson iZ =4m.46s. and 4m.58s., eZ =5m.33s.
Pasadena iZ =4m.59s.
St. Louis i =5m.46s. and 5m.56s., iS =10m.18s., i =11m.8s.
Mineral iZ =5m.53s.a.
Long waves were also recorded at Bogota, Huancayo, Bermuda, and other American Stations.

Nov. 20d. 10h. 10m. 17s. Epicentre 45°·8N. 151°·4E. Depth of focus 0·040.

$A = -·6142$, $B = +·3349$, $C = +·7146$; $\delta = +5$; $h = -4$;
$D = +·479$, $E = +·878$; $G = -·627$, $H = +·342$, $K = -·700$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Mizusawa	E.	10·1	232	2 21	+ 1	4 11	0	—	—
Victoria	Z.	55·1	54	e 9 1	− 3	—	—	—	—
Shasta Dam		60·0	61	i 9 41	+ 2	—	—	e 10 13	pP
Mineral	Z.	60·7	61	i 9 45k	+ 2	—	—	—	—
Tinemaha	Z.	64·8	63	i 10 13	+ 3	—	—	i 10 45	pP
Haiwee	Z.	65·6	63	e 10 18	+ 3	—	—	e 10 51	pP
Logan		65·7	55	e 10 13	− 3	—	—	—	—
Pasadena	Z.	66·7	65	e 10 25	+ 3	—	—	e 10 58	pP
Mount Wilson	Z.	66·8	65	i 10 25k	+ 2	—	—	i 10 58	pP
Riverside	Z.	67·3	65	i 10 27k	+ 1	—	—	e 10 59	pP
Boulder City		67·6	62	i 10 30	+ 2	—	—	e 11 3	pP
Pierce Ferry		68·0	61	i 10 33	+ 3	—	—	i 11 6	pP
Palomar	Z.	68·1	65	i 10 34	+ 3	—	—	i 11 13	pP
Tucson		72·6	62	i 11 1k	+ 3	—	—	i 11 34	pP
Copenhagen		73·1	338	10 59	− 2	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Ville Marie		77·1	34	i 11 22k	− 1	—	—	—	—
Temiskaming		77·8	33	i 11 29k	+ 2	—	—	—	—
Ottawa	z.	80·1	33	e 11 39	0	—	—	—	—
Stuttgart	z.	80·2	336	e 11 39k	− 1	—	—	—	—
Strasbourg		80·8	336	e 11 43	0	—	—	—	—
Basle		81·8	336	e 11 48k	0	—	—	—	—
Paris		81·9	340	i 11 49	0	—	—	—	—
Harvard		84·1	31	i 12 1	+ 1	—	—	—	—
Clermont-Ferrand		84·6	339	i 12 4	+ 2	—	—	—	—
Tamanrasset		105·0	328	e 13 37	0	—	—	e 17 55	PP

Additional readings :—
Tinemaha iZ =10m.20s.
Mount Wilson eZ =11m.17s., iZ =11m.53s.
Tucson i =11m.10s. and 11m.20s.
Strasbourg e =12m.10s.
Paris e =11m.59s.
Clermont-Ferrand i =12m.23s.

Nov. 20d. 13h. 32m. 43s. Epicentre 36°·9N. 70°·8E. Depth of focus 0·030.
(as on 1948, July 19d.).

A = +·2636, B = +·7570, C = +·5978 ; δ = −10 ; h = −1 ;
D = +·944, E = −·329 ; G = +·197, H = +·565, K = −·802.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Kulyab	1·3	321	i 0 36	+ 1	i 1 3	+ 2
Stalinabad	2·3	316	i 0 45	+ 1	i 1 19	+ 2
Murgab	2·9	59	i 0 49	− 1	i 1 27	− 2
Andijan	4·0	17	e 1 3	0	i 1 51	− 1
Samarkand	4·1	314	i 1 6	+ 2	i 1 55	+ 1
Tashkent	4·6	346	i 1 11	0	i 2 5	0
Tchimkent	5·5	351	i 1 22	0	i 2 23	− 3
Frunse	6·6	25	e 1 35?	− 1	e 2 49	− 2
Almata	7·9	35	e 1 50?	− 3	i 3 17	− 4
Ashkabad	9·9	280	i 2 15	− 3	i 2 21	?

Nov. 20d. Readings also at 0h. (near Andijan and near Tacubaya), 1h. (near Andijan), 2h. (Shasta Dam), 3h. (Helwan, Ksara, Stuttgart, and Tamanrasset), 4h. (near Ashkabad), 5h. (Tananarive), 7h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Lick, Mineral, Shasta Dam (2), Logan, Strasbourg, Stuttgart, Tamanrasset, Tananarive, and near Tacubaya, more than one shock). 10h. (near Tacubaya and near Stalinabad), 11h. (Andijan, Sverdlovsk, Tashkent, Vladivostok, and Yuzno-Sakhlinsk), 13h. (Rome), 15h. (Logan), 20h. (Pierce Ferry), 22h. (Mount Wilson, Riverside, Tucson, and near La Paz).

Nov. 21d. 19h. 10m. 30s. Epicentre 13°·3S. 167°·0E. Depth of focus 0·020.
(as on 1945, Oct. 28d.).

A = −·9485, B = +·2190, C = −·2285 ; δ = −17 ; h = +6 ;
D = +·225, E = +·974 ; G = +·223, H = −·051, K = −·974.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		19·2	221	i 4 13	− 1	i 7 45	+ 7	i 4 48	PP	i 9·4
Apia		20·7	93	4 27a	− 2	8 8	+ 2	5 0	pP	—
Auckland	N.	24·5	166	4 30?	−36	9 47	+35	—	—	—
Riverview		25·0	213	i 5 12a	+ 2	i 9 22	+ 2	i 5 45	pP	i 13·2
Tuai	N.	27·0	164	5 27	− 2	9 53	0	16 1	S_cS	—
Wellington		28·7	168	5 40	− 4	10 8	−12	—	—	—
Kaimata		29·4	174	5 54	+ 4	—	—	—	—	—
Christchurch		30·5	171	5 58	− 2	10 46	− 2	6 57	PP	14·3
Honolulu		48·7	46	—	—	e 16 34	sS	—	—	e 20·2
Tokyo		55·1	334	e 9 15	− 3	—	—	—	—	—

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kameyama		56·0	331	9 25	+ 1	16 0	−58	—	—	—
Nagoya		56·0	331	9 26	+ 2	17 0	+ 2	—	—	—
Osaka		56·3	330	e 9 30	+ 4	17 4	+ 2	—	—	—
Sumoto		56·4	330	e 9 30	+ 3	—	—	—	—	—
Kagosima		56·7	323	e 9 32	+ 3	e 17 9	+ 2	—	—	—
Sendai		56·8	338	e 9 32	+ 2	—	—	—	—	—
Toyama		57·1	333	9 26	− 6	—	—	—	—	—
Mizusawa		57·5	338	e 9 36	+ 1	e 17 18	+ 1	—	—	—
Wazima		57·8	333	9 37	0	17 24	+ 3	—	—	—
Hukuoka		58·2	325	e 9 41	+ 1	—	—	—	—	—
Vladivostok		64·7	333	i 10 23	0	i 18 52	+ 3	i 10 43	pP	—
Arcata	z.	83·3	46	e 12 22k	+12	—	—	e 12 56a	pP	—
Branner	z.	83·3	49	i 12 11a	+ 1	—	—	i 12 55a	pP	—
Berkeley		83·4	49	i 12 11a	+ 1	i 22 18	+ 2	i 12 54	pP	e 38·8
Santa Clara	z.	83·5	51	e 12 10	− 1	e 24 27	PPS	e 12 57	pP	e 40·6
Lick	z.	83·7	49	i 12 13k	+ 1	e 15 30	PP	i 12 56k	pP	—
Santa Barbara	z.	84·1	53	e 12 18a	+ 4	—	—	i 13 1	pP	—
Shasta Dam		84·4	47	e 12 17	+ 2	—	—	e 13 1	pP	—
Irkutsk		84·6	327	i 12 16	0	i 22 23	− 5	12 56	pP	—
Sitka		84·7	28	e 12 12	− 5	e 22 32	+ 3	e 24 35	PPS	e 35·5
Calcutta	E.	84·8	295	e 12 42	pP	e 22 22	− 8	—	—	—
Mineral	z.	84·8	47	i 12 19k	+ 2	e 16 17	PP	—	—	—
Fresno	z.	84·9	50	e 12 17	− 1	—	—	e 13 3	pP	—
College		85·0	18	e 12 17	− 1	e 22 31	− 1	e 13 1	pP	e 34·1
Pasadena		85·2	54	i 12 19a	0	i 22 4	[−21]	i 13 2	pP	e 34·9
Mount Wilson	z.	85·3	54	i 12 20	0	—	—	i 13 4	pP	—
La Jolla	z.	85·5	55	e 12 21a	0	—	—	i 13 6	pP	—
Riverside	z.	85·8	54	i 12 20	− 2	—	—	i 13 5	pP	—
Palomar		86·0	56	12 23a	0	—	—	i 13 8	pP	—
Tinemaha		86·1	51	i 12 26	+ 2	—	—	i 13 12	pP	—
Victoria		86·8	40	12 27	0	22 48	− 1	13 10	pP	44·5
Boulder City		88·4	53	e 12 34	− 1	—	—	i 13 20	pP	—
Colombo	E.	88·8	277	13 19	pP	22 49	[+ 1]	—	—	—
Pierce Ferry		89·1	53	e 12 37	− 1	—	—	i 13 23	pP	—
Tucson		90·5	57	i 12 45	0	e 23 3	[+ 4]	i 13 31	pP	e 39·8
Kodaikanal	E.	91·9	280	e 13 30	pP	—	—	—	—	—
Salt Lake City		92·0	50	—	—	e 23 40	+ 3	e 26 10	PPS	e 37·8
Butte	N.	92·9	43	—	—	e 23 41	− 4	—	—	e 49·9
Bozeman		93·9	44	e 13 47	pP	e 23 55	+ 2	e 25 34	PS	e 44·4
Saskatoon		98·2	38	—	—	e 24 30	0	e 26 12	PS	44·8
Rapid City	E.	99·0	47	—	—	e 24 53	+17	e 25 32	pS	e 54·3
Frunse		100·7	311	17 20	PP	e 23 54	[0]	—	—	—
Lincoln	E.	103·3	50	e 17 59	PP	e 23 52	[−13]	e 27 4	PS	e 50·8
Kulyab		103·7	306	e 17 10†	PP	e 24 10	[+ 3]	i 24 52	SKKS	—
Tchimkent		104·3	311	i 18 8	PP	i 24 10	[0]	—	—	—
Tashkent		104·4	310	—	—	i 24 11	[+ 1]	e 24 52	SKKS	—
Stalinabad		104·5	307	e 17 44	PP	i 24 14	[+ 3]	24 54	SKKS	—
St. Louis		108·1	54	e 18 3	PKP	e 24 23	[− 4]	e 19 14	PP	—
Sverdlovsk		110·0	326	—	—	i 24 37	[+ 2]	e 26 9	SKKS	—
Chicago		110·2	49	e 18 47	PP	e 27 56	SP	e 28 7	PS	e 48·5
Huancayo		113·3	110	e 19 12	PP	e 24 54	[+ 6]	e 19 51	pPP	e 47·1
Cleveland		114·7	50	e 19 18	PP	e 26 54	S	e 20 5	pPP	—
Columbia		115·5	58	e 19 24	PP	e 29 6	PS	—	—	e 48·0
La Paz		118·0	117	i 19 44	PP	i 25 10	[+ 4]	i 22 24	PPP	56·5
Ottawa		118·5	45	e 18 28	[− 1]	e 29 24	PS	e 36 50	SSP	53·5
Baku		119·1	310	—	—	e 26 45	S	—	—	—
Bogota		119·2	92	e 19 54	PP	e 28 7	?	e 29 30	SP	—
Philadelphia		119·7	51	—	—	e 27 13	S	e 29 38	PS	e 52·2
Fordham		120·6	49	e 19 34	PP	e 29 40	PS	e 37 38	SS	54·0
Seven Falls	E.	121·4	42	—	—	e 30 30	PS	—	—	49·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Grozny		121·7	313	e 18 40	[+ 5]	—	—	—	—	—
Scoresby Sund		122·6	3	20 16	PP	29 48	PS	36 41	SS	50·5
San Juan		128·8	77	e 21 0	PP	e 21 52	PKS	e 32 42	PPS	e 47·0
Bermuda		129·2	58	e 21 5	PP	e 21 58	PKS	e 22 14	sPP	e 61·7
Yalta		129·3	317	e 18 48	[− 1]	—	—	e 21 36	PP	—
Ksara		131·3	303	i 14 42?	?	—	—	—	—	—
Copenhagen		133·3	341	e 18 59	[+ 2]	—	—	22 13	PKS	—
Istanbul		134·1	315	i 18 58	[0]	—	—	22 12	PKS	—
Potsdam	N.	135·8	338	—	—	—	—	e 22 38	PKS	—
Helwan		135·9	299	e 22 22	PKS	e 39 30	SS	—	—	—
Prague		137·0	334	e 19 6	[+ 2]	e 32 36	SKSP	e 40 0	SS	e 64·5
Jena	N.	137·5	336	e 18 52	[−13]	—	—	—	—	—
Belgrade		137·6	325	e 19 7	[+ 2]	e 23 46	pPKS	e 19 50	pPKP	—
Cheb		137·8	336	e 18 48	[−17]	e 40 54	SS	e 22 12	PP	e 66·5
De Bilt		138·6	343	i 19 8a	[+ 1]	e 40 4	SS	i 19 54a	pPKP	e 66·5
Uccle		140·0	344	19 13a	[+ 3]	e 28 32	SKKS	e 22 9	PP	e 65·5
Stuttgart		140·1	338	e 19 4	[− 6]	e 28 48	SKKS	e 19 47	pPKP	64·5
Triest		140·6	330	i 22 49	PP	e 40 25	SS	i 23 33	pPP	—
Kew		140·6	348	i 19 10	[− 1]	(e 40 30?)	SS	i 19 56	pPKP	e 40·5
Zürich		141·5	337	e 19 8	[− 4]	—	—	e 19 56	pPKP	—
Chur		141·6	335	e 19 8	[− 4]	—	—	e 22 37	PP	—
Basle		141·8	337	e 19 11	[− 2]	—	—	e 22 21	PP	—
Strasbourg		141·8	338	e 19 6	[− 7]	e 28 50	SKKS	e 19 52	pPKP	63·5
Salo		142·1	331	e 19 10	[− 3]	—	—	—	—	—
Padova		142·3	330	19 28	[+14]	e 26 20	[+15]	e 22 52	PKS	—
Paris		142·3	344	i 19 9	[− 5]	26 13	[+ 8]	i 19 55	pPKP	e 66·5
Neuchatel		142·5	337	e 19 11	[− 3]	—	—	e 22 24	PP	—
Bologna		142·6	331	e 19 8a	[− 6]	e 29 3	SKKS	e 22 24	PP	—
Pavia	Z.	143·0	333	i 19 19	[+ 4]	—	—	—	—	—
Florence		143·2	330	e 19 11	[− 4]	—	—	i 19 56	pPKP	—
Clermont-Ferrand		144·9	340	i 19 20	[+ 2]	i 41 20	SS	i 20 2	pPKP	67·5
Rome		144·9	326	i 19 15a	[− 3]	e 26 13	[+ 4]	i 19 58	pPKP	—
Tortosa	E.	150·1	338	i 19 31	[+ 5]	—	—	i 20 27	pPKP	—
Toledo		152·4	345	i 19 30?	[0]	—	—	19 52	pPKP	—
Alicante		152·7	338	19 32	[+ 2]	42 48	SS	23 8	PP	e 71·7
Granada		154·8	343	i 19 40	[+ 7]	i 42 55	SS	i 23 35	PP	70·8
Malaga	Z.	155·4	343	i 19 32	[− 2]	26 17	[− 2]	i 23 34	PP	63·5
Tamanrasset		160·0	302	i 19 41a	[+ 1]	i 29 55	SKKS	i 20 48k	pPKP	—

Additional readings :—
Brisbane iN =5m.4s., iZ =5m.49s., iSSZ =8m.2s., iN =8m.18s., iE =8m.23s., iP_cPE = 8m.39s., iS_cSE =15m.43s.
Auckland iN =7m.1s.
Riverview iPPEN =5m.54s., iPPPZ =6m.8s., iN =7m.47s., iZ =9m.36s., iE =9m.41s., isSN =10m.15s., iE =10m.31s., iSSZ =10m.42s., iN =10m.49s., iSSSEZ =10m.59s., iS_cSE =15m.57s.
Tuai S_cP?N =12m.29s.
Wellington e =5m.45s., i =7m.30s.
Christchurch iNZ =7m.52s., P_cP =9m.14s., QEN =11m.50s., SSZ =11m.56s.
Berkeley eEN =12m.14s., iZ =12m.57s., eN =22m.36s., eZ =24m.12s.
Lick iZ =12m.17s. and 12m.20s.
Shasta Dam epPP =16m.20s., ePKP,PKP =38m.31s.
Irkutsk sS =23m.13s.?, 23m.29s.
Sitka e =27m.26s.
Calcutta iE =14m.4s.
Mineral iZ =13m.2s., 13m.15s., and 13m.20s.
Fresno ePEN =12m.23s.
College ePP =16m.16s., ePS =23m.42s., ePPS =24m.39s.
Pasadena iZ =12m.45s. and 13m.24s., eZ =14m.45s., eSPZ =23m.16s., esSN =23m.42s., iSPPE =23m.59s., eZ =24m.39s., iE =24m.42s.
Mount Wilson iZ =12m.41s. and 14m.8s., eZ =16m.31s.
La Jolla iZ =13m.23s.
Palomar iZ =12m.28s., 12m.33s., 13m.33s., and 14m.35s., eZ =15m.47s.
Tinemaha iZ =12m.38s.
Victoria e =14m.9s. and 16m.18s., PS =24m.3s., e =30m.0s.
Boulder City ePKKP =30m.19s.
Pierce Ferry i =14m.27s., ePP? =15m.55s., ePKKP =30m.46s., ePKP,PKP =38m.30s.
Tucson ePP =16m.22s., epPP =17m.9s., ePS =24m.44s., ePPS =25m.49s., eSS =30m.3s., ePKKP =30m.14s., esSS =30m.46s., eSSS =34m.47s., ePKP,PKP =38m.20s.

Continued on next page.

Bozeman ePPS =26m.30s., eSSS? =35m.4s.
Rapid City ePSE =26m.21s., ePPSE =27m.12s.
Lincoln eE =19m.49s., eSSE =32m.42s.
Kulyab ePPP =19m.10s.
Stalinabad sSKS =25m.28s.
St. Louis e =25m.47s. and 27m.20s.
Sverdlovsk ePS =28m.1s., PPS =29m.21s., eSS =33m.54s.
Chicago ePPS =29m.11s., eSS =33m.49s., esSS =35m.12s.
Huancayo ePPP =21m.42s., eS? =26m.18s., iPS =29m.12s., ePPS =29m.52s., e = 30m.38s., esSS =36m.3s., eSSS =39m.15s.
Cleveland ePSEN? =28m.57s., eE =29m.52s., 30m.43s., and 36m.15s.
La Paz iPSN =29m.42s., iE =30m.30s., iSSN =36m.24s., iE =36m.30s.
Bogota ePSEN =31m.30s.
Philadelphia esS =28m.51s., ePPS? =30m.36s., eSS =36m.32s.
Fordham i =20m.2s.
Scoresby Sund 20m.56s.
San Juan i =22m.8s., e =24m.58s., eSS? =39m.2s.
Bermuda ePPS =32m.47s., e =34m.45s., eSS? =39m.34s., eSSS =43m.52s.
Helwan i =22m.36s. and 23m.18s.
Prague e =35m.30s.?
Jena eN =19m.8s.
Cheb e =22m.42s., ePPP? =25m.6s.
De Bilt ePP =22m.0s., epPP =22m.30s., eSSS =44m.30s.?
Uccle PKPE =19m.16s., eSKPN =22m.45s., eSKPEZ =22m.49s., epPPZ =23m.31s., ipPPN =23m.34s., ePPSN =35m.15s., eSSN =40m.12s., eSSE =40m.16s., eSSSN =44m.59s.
Stuttgart ePKPZ =19m.7s., iPKP =19m.14s., e =22m.5s., iPPZ =22m.37s., ePP =22m.44s., eSKP =23m.34s., eSZ =31m.5s., eSPZ =33m.54s., ePPS =35m.6s., eSS =40m.2s., eSSS =42m.8s.
Kew eZ =30m.3s., eNZ =30m.21s.
Zürich ePP =22m.0s.
Basle e =22m.50s.
Strasbourg i =19m.14s. and 19m.20s., ePP =22m.11s. and 22m.17s., e =22m.35s., i =22m.38s., epPP =22m.49s., ePPP =26m.3s., ePPS =34m.11s., eSS =40m.27s., iSS =40m.31s., esSS =42m.2s., eSSS =45m.42s.
Paris iPP =22m.21s., e =22m.55s., ipPP =23m.3s., e =24m.22s., epPPP? =25m.55s., iSS =40m.46s., e =41m.15s.
Florence ePPE? =22m.54s., eE =23m.37s.
Clermont-Ferrand iPP =22m.40s., ipPP =23m.25s., iPPP =25m.51s.
Rome iZ =21m.22s., ePP?Z =22m.30s., iSKKS?EN =29m.10s., eSSN =40m.47s.
Tortosa sPKPN =21m.1s., PPN =23m.1s.
Toledo iPKP$_2$Z =20m.23s., iPPE =23m.58s.
Alicante PKP$_2$ =19m.50s., PPP =26m.55s., SSP =43m.48s.
Malaga iPKP$_2$Z =20m.19s., PPS =36m.34s.
Tamanrasset isPKP =21m.7s.k, ePP =24m.1s., esPP =25m.10s.
Long waves were also recorded at Arapuni and Ivigtut.

Nov. 21d. Readings also at 2h. (Mizusawa and La Paz), 3h. (Stuttgart), 4h. (La Paz, Mount Wilson, Pasadena, Riverside, Tucson, Pierce Ferry, Shasta Dam, Kulyab, Stalinabad, near Andijan, and Murgab), 9h. (near Alicante), 12h. (Klyuchi), 14h. (Strasbourg, Stuttgart, and Ottawa), 15h. (Victoria), 16h. (near Ottawa), 17h. (Pierce Ferry, Huancayo, and near La Paz), 19h. (Ottawa), 21h. (near Ottawa).

Nov. 22d. 9h. 6m. 54s. Epicentre 51°·5N. 180° (as on 1948, June 18d.).

$A = -\cdot6251$, $B = \cdot0000$, $C = +\cdot7806$; $\delta = +9$; $h = -6$;
$D = \cdot000$, $E = +1\cdot000$; $G = -\cdot781$, $H = \cdot000$, $K = -\cdot625$.

		△	Az.	P.	O−C.	S.	O−C.		Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
College		21·3	37	e 4 57	+ 7	e 9 7	SS	—	—	e 10·2
Vladivostok		33·1	275	i 6 41	+ 1	i 12 1	+ 2	—	—	—
Honolulu		34·7	141	e 7 9	+15	—	—	—	—	e 15·4
Victoria		35·7	72	7 3	+ 1	12 41	+ 2	15 27	SSS	17·1
Shasta Dam		40·4	81	e 7 41	0	i 13 30	−20	—	—	—
Mineral	z.	41·1	81	i 7 47	0	—	—	—	—	—
Berkeley		42·2	85	i 7 55a	− 1	i 14 10	− 7	e 17 48	SSS	e 19·3
Branner	z.	42·5	86	i 7 58a	− 1	—	—	—	—	—
Lick	z.	42·9	86	e 8 0k	− 2	e 13 40	P_cS	—	—	—
Saskatoon		43·5	60	—	—	e 14 37	+ 1	e 14 50	PS	19·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bozeman		44·4	69	—	—	e 14 45	− 4	e 18 7	S_cS	e 22·6
Fresno		44·4	85	i 8 14	0	—	—	—	—	—
Irkutsk		44·7	302	8 17	+ 1	14 53	− 1	—	—	—
Tinemaha	z.	45·1	83	i 8 20	0	—	—	—	—	—
Haiwee	z.	45·9	84	i 8 28	+ 2	—	—	—	—	—
Santa Barbara	z.	45·9	87	e 8 25	− 1	—	—	—	—	—
Salt Lake City		46·8	75	e 8 32	− 1	e 15 22	− 2	e 18 24	S_cS	e 21·5
Mount Wilson	z.	47·1	86	i 8 34	− 1	—	—	—	—	—
Pasadena		47·1	86	i 8 33	− 2	—	—	—	—	e 19·4
Boulder City		48·0	82	i 8 42	− 1	—	—	—	—	—
Palomar		48·4	87	i 8 42	− 4	—	—	—	—	—
Pierce Ferry		48·4	82	i 8 45	− 1	—	—	—	—	—
La Jolla	z.	48·5	87	i 8 45	− 1	—	—	—	—	—
Tucson		52·9	83	i 9 19	− 1	e 19 56	SS	—	—	e 23·0
Lincoln	E.	55·7	66	—	—	e 17 20	− 6	—	—	e 28·2
Scoresby Sund		57·3	9	9 54	+ 2	17 48	+ 1	18 17	PPS	—
Chicago		60·1	60	—	—	e 18 19	− 5	e 20 11	S_cS	e 28·1
Ville Marie		60·4	51	e 10 12	− 1	—	—	—	—	—
St. Louis		60·8	64	i 10 15	− 1	i 18 30	− 3	i 11 3	P_cP	—
Temiskaming		61·0	51	i 10 17	− 1	—	—	—	—	—
Sverdlovsk		61·1	327	i 10 19	+ 1	18 43	+ 6	—	—	—
Cleveland		63·5	57	e 10 33	− 1	e 19 2	− 5	e 20 18	S_cS	e 28·9
Ottawa		63·6	50	e 10 32	− 3	e 19 12	+ 4	—	—	29·6
Harvard		67·7	49	i 11 11	+10	—	—	—	—	e 40·6
Fordham		67·9	52	i 11 2	0	e 20 8	+ 7	—	—	34·6
Philadelphia		67·9	54	—	—	e 19 59	− 2	—	—	e 30·6
Upsala		68·1	351	—	—	e 29 6?	?	e 31 6?	Q	e 36·1
Andijan		68·7	309	11 9	+ 2	—	—	—	—	—
Moscow		68·7	339	11 7	0	e 20 9	− 1	—	—	—
Tchimkent		68·8	312	e 10 52?	−16	—	—	—	—	—
Columbia		69·3	62	—	—	e 20 11	− 6	—	—	e 32·6
Murgab		69·7	307	i 11 19	+ 5	i 20 26	+ 4	—	—	—
Tashkent		69·7	311	i 11 15	+ 1	e 20 22	0	—	—	—
Kulyab		72·1	309	i 11 27	− 1	i 20 51	+ 1	—	—	—
Samarkand		72·1	312	e 11 30	+ 2	—	—	—	—	—
Stalinabad		72·1	310	i 11 29	+ 1	i 20 52	+ 2	—	—	—
Copenhagen		72·7	354	11 32	0	—	—	—	—	37·1
Warsaw		75·1	347	—	—	e 26 35	SS	—	—	e 42·1
De Bilt		76·7	357	e 11 56	+ 1	e 21 54	+13	e 27 6	SS	e 37·1
Kew		77·4	0	e 12 2	+ 4	—	—	—	—	—
Jena	N.	77·5	353	e 11 59	0	—	—	e 12 50	?	—
Grozny		77·6	328	e 11 59	− 1	—	—	—	—	—
Uccle		78·0	358	—	—	e 21 57	+ 2	e 22 26	SeS	e 37·1
Prague		78·1	351	e 11 43	−19	e 21 41	−15	e 17 26	PPP	e 42·1
Bermuda		79·1	52	e 12 9	+ 1	e 22 12	+ 5	e 27 36	SS	e 32·3
Stuttgart		79·8	354	e 12 12a	0	e 22 30	+16	e 23 10	PS	e 41·1
Yalta		79·9	336	—	—	e 22 26	+10	—	—	—
Paris		80·0	358	i 12 14	+ 1	e 22 31	+14	—	—	e 43·1
Strasbourg		80·1	355	e 12 12	− 1	e 22 18	0	e 28 4	SS	38·1
Basle		81·1	355	e 12 15	− 3	—	—	—	—	—
Belgrade		82·4	345	e 12 26k	+ 1	e 22 43	+ 2	—	—	e 43·0
Triest		82·5	351	e 11 24	−62	e 22 40	− 2	—	—	—
Salo	z.	82·9	352	e 12 59	+31	—	—	—	—	—
Clermont-Ferrand		83·1	358	i 12 29	0	—	—	—	—	43·1
Istanbul		84·4	339	e 10 14	?	—	—	—	—	—
Rome		86·3	352	i 12 45a	0	e 23 12	[+ 3]	e 22 39	?	—
Riverview		88·7	203	—	—	e 23 19	[− 6]	i 23 43	S_cS	e 41·2
Ksara		89·4	331	e 13 0	0	25 18	PS	—	—	—
San Juan		89·7	60	—	—	e 23 31	[0]	e 25 22	PPS	e 45·2
Alicante		90·5	1	e 12 15	−50	e 21 44	?	16 59	PP	e 37·4
Wellington		92·5	184	—	—	e 23 36	[−11]	—	—	45·2
Helwan		94·4	333	e 12 46	−37	i 23 56	[− 2]	e 17 17	PP	—
Bogota		96·2	75	—	—	e 24 39	{+12}	e 26 48	PPS	58·1
Huancayo		108·5	87	—	—	e 26 32	{+37}	e 28 13	PS	e 51·3
La Paz		116·3	83	e 18 56	[+10]	—	—	—	—	56·3

For Notes see next page.

NOTES TO NOVEMBER 22d. 9h. 6m. 54s.

Additional readings :—
Shasta Dam i = 7m.49s.
Mineral iZ = 7m.50s.
Berkeley iZ = 8m.6s., iE = 8m.12s., iN = 14m.32s., eZ = 14m.50s.
Branner iZ = 8m.9s. a.
Saskatoon e = 18m.6s.
Salt Lake City eSS = 18m.52s.
Pasadena iZ = 8m.44s.
Palomar iZ = 9m.2s.
Tucson i = 9m.28s. and 9m.35s.
Scoresby Sund 13m.36s., SS = 22m.6s.
St. Louis i = 19m.46s.
Cleveland ePN = 10m.42s.
Uccle eSSN = 27m.28s.
Stuttgart eSS = 28m.6s.
Strasbourg e = 12m.39s., eSSS? = 31m.36s.
Riverview iN = 23m.25s.
Alicante PP = 15m.23s., SS = 26m.58s., SSS = 30m.26s.
Huancayo eSS = 34m.31s., eSSS = 37m.48s.
Long waves were also recorded at Malaga, Christchurch, Auckland, Arapuni, Ivigtut, Santa Clara, Butte, Rapid City, Ukiah, Halifax, and Seven Falls.

Nov. 22d. 16h. Turkestan. U.S.S.R. suggest a depth of 180km.

Stalinabad iP = 6m.18s.
Samarkand iP = 6m.34s., iS = 6m.57s.
Tashkent iP = 6m.48s., iS = 7m.22s.?
Tchimkent iP = 7m.2s., iS = 7m.45s.
Andijan P = 7m.6s., eS = 7m.52s.
Frunse eP = 7m.43s., iS = 8m.54s.
Grozny eP = 10m.19s., eS = 13m.23s.
Sverdlovsk P = 10m.25s.
Leninakan P = 10m.34s.

Nov. 22d. 23h. 32m. 48s. Epicentre 82°·5N. 41°·5E. (as on 1948, September 26d.).

$A = +\cdot0984$, $B = +\cdot0871$, $C = +\cdot9913$; $\delta = -6$; $h = -14$;
$D = +\cdot663$, $E = -\cdot749$; $G = +\cdot742$, $H = +\cdot657$, $K = -\cdot131$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Scoresby Sund		17·6	267	4 11	+ 3	—	—	—	—	—
Helsinki		22·9	204	e 5 3a	− 3	e 9 14	+ 1	—	—	e 11·2
Upsala		23·6	213	5 23a	+10	e 9 25	0	e 9 40	SS	i 11·7
Sverdlovsk		26·3	156	i 5 40	+ 1	10 10	− 1	—	—	—
Moscow		26·9	185	e 5 43	− 2	10 21	+ 1	—	—	—
Copenhagen		28·1	217	e 5 54	− 1	—	—	—	—	15·2
Warsaw		31·0	206	e 6 19	− 2	e 11 33	+ 7	e 7 21	PP	e 15·7
Jena		32·9	216	e 6 36	− 2	—	—	e 6 40	P	e 16·4
Raciborzu		33·3	209	e 6 44	+ 3	—	—	—	—	e 17·5
Prague		33·5	214	e 6 44	+ 1	e 12 12?	+ 7	—	—	e 21·7
Cheb		33·7	216	—	—	e 14 12?	SSS	e 16 55	Q	e 18·1
Irkutsk		35·0	108	e 6 55	− 1	—	—	—	—	—
Stuttgart		35·2	219	e 6 58a	0	—	—	—	—	e 20·7
Strasbourg		35·5	220	i 7 0a	0	—	—	—	—	—
Paris		35·8	227	i 7 2	− 1	—	—	—	—	—
Basle		36·6	220	e 7 9a	− 1	—	—	—	—	—
Zürich		36·7	220	e 7 9a	− 1	—	—	—	—	—
Triest		38·0	213	e 7 23	+ 2	—	—	—	—	—
Yalta		38·2	189	e 7 22	− 1	13 16	− 1	8 44	PP	—
Belgrade		38·4	205	e 7 24k	− 1	—	—	e 10 17	?	e 20·5
Clermont-Ferrand		38·7	225	i 7 28	+ 1	—	—	—	—	—
Grozny		39·3	175	i 7 37	+ 5	—	—	—	—	—
Frunse		41·1	143	e 7 51	+ 4	—	—	—	—	—
Tchimkent		41·4	148	i 7 50	0	—	—	—	—	—
Istanbul		41·8	196	—	—	e 17 20	SS	—	—	23·3
Rome	z.	41·8	214	i 7 49?a	− 4	—	—	—	—	—
Leninakan		41·9	178	e 8 0?	+ 6	—	—	9 50?	P_cP	—
Tashkent		42·3	149	e 7 56	− 1	e 14 19	0	—	—	—
Samarkand		43·8	152	e 8 10	+ 1	—	—	—	—	—
Stalinabad		45·0	150	i 8 19	0	e 14 59	+ 1	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kulyab		45·7	149	e 8 8?	−16	i 14 54?	−14	—	—	—
Vladivostok		47·6	83	—	—	e 15 30	− 5	—	—	—
Malaga	z.	48·4	232	i 8 47k	+ 1	e 15 35	−11	—	—	28·5
Ottawa		48·6	305	e 8 48	+ 1	—	—	—	—	—
Ksara		48·8	187	e 8 34	−15	e 17 12	?	—	—	—
Helwan		52·9	192	e 9 18	− 2	—	—	e 11 24	PP	—
Cleveland		53·1	309	e 9 22	+ 1	e 17 8	+17	e 19 10	S_cS	—
Shasta Dam		56·8	347	e 9 46	− 2	—	—	—	—	—
Mineral	z.	57·1	346	e 9 50a	0	—	—	—	—	—
Lick	z.	60·1	346	i 10 8k	− 3	—	—	—	—	—
Tinemaha	z.	60·2	342	i 10 14a	+ 2	—	—	—	—	—
Pierce Ferry		61·0	338	e 10 17	− 1	—	—	—	—	—
Boulder City		61·2	339	e 10 19	0	—	—	—	—	—
Haiwee	z.	61·2	342	e 10 20	+ 1	—	—	—	—	—
Tamanrasset		61·3	219	i 10 19a	− 1	—	—	—	—	—
Mount Wilson	z.	63·1	342	i 10 32a	0	—	—	—	—	—
Pasadena	z.	63·2	342	i 10 31a	− 1	—	—	—	—	—
Riverside	z.	63·3	342	i 10 32a	− 1	—	—	—	—	—
Palomar	z.	63·9	341	i 10 37a	0	—	—	—	—	—
Tucson		64·7	336	i 10 42a	0	—	—	—	—	—

Additional readings :—
Warsaw eE =12m.20s., eSSSEZ =13m.20s., eZ =13m.53s., eN =14m.19s., eE =14m.31s.
Stuttgart eZ =7m.6s.
Strasbourg e =7m.8s.
Paris i =7m.12s.
Yalta SS =15m.47s.
Rome eS_g? =8m.3s.?
Cleveland eSN =17m.13s., ePSN =17m.37s., ePSE =17m.40s.
Mineral iZ =10m.0s.a.
Tinemaha iZ =10m.23s.
Boulder City e =10m.29s.
Haiwee eZ =10m.30s.
Tamanrasset i =10m.29s.a.
Mount Wilson iZ =10m.41s.
Riverside iZ =10m.41s.
Palomar iZ =10m.45s. and 10m.57s.
Tucson i =10m.52s. and 11m.0s.
Long waves were also recorded at Saskatoon, Victoria, and at other European stations.

Nov. 22d. Readings also at 1h. (Apia), 2h. (Shasta Dam, Tucson, Mount Wilson, and Klyuchi), 4h. (Strasbourg), 6h. (Tananarive, near Andijan, Kulyab, and Stalinabad), 7h. (Rome (2)), 9h. (near Stalinabad (2)), 10h. (near Stalinabad), 12h. (Pierce Ferry, Shasta Dam, Tucson, Mount Wilson, Palomar, Tinemaha, Mineral, and Victoria), 13h. (near Istanbul), 15h. (Ashkabad and near Tacubaya), 16h. (near Apia), 18h. (near Lick and Branner), 20h. (Tacubaya, Boulder City, Pierce Ferry, Tucson, and Palomar), 22h. (Strasbourg), 23h. (Shasta Dam, Pierce Ferry, and near Ottawa).

Nov. 23d. 0h. 52m. 2s. Epicentre 47°·5N. 8°·9E. (as on 1947, January 16d.).

Intensity V-VI. South of Winterthur.
Epicentre 47° 27′N., 8° 42′E. (Zürich). Macroseismic radius 10km.
The strongest shock ever felt in this district.

Dr. E. Wanner.
Jährесbericht des Erdbebendienstes der Schweiz im Jähre, 1948, Zürich, 1949, p. 4, with macroseismic chart, fig. 6.

$A = +·6699$, $B = +·1049$, $C = +·7350$; $\delta = 0$; $h = -4$;
$D = +·115$, $E = -·988$; $G = +·726$, $H = +·114$, $K = -·678$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Zürich	0·2	238	i 0 8a	− 2	—	—	i 0 10	P
Ravensburg	0·6	60	e 0 18	+ 3	e 0 28	+ 2	e 0 21	S*
Ebingen	0·7	4	—	—	e 0 31	+ 3	—	—
Basle	0·9	273	e 0 21k	+ 1	e 0 33	− 1	—	—
Strasbourg	1·3	325	e 0 31	P_g	i 0 48	+ 4	e 1 12	?
Stuttgart	1·3	9	e 0 32?	P_g	e 0 46	+ 2	—	—
Neuchatel	1·4	249	e 0 28	+ 1	e 0 47	+ 1	e 0 30	P_g

Ravensburg also gives eS_g? =32s.
Stuttgart e =36s., iS_g =49s.

Nov. 23d. 14h. Undetermined shock. U.S.S.R. suggests 6°S. 91°E.

Colombo PE =44m.34s., SE =48m.49s., LE =50m.59s.
Tananarive iP =45m.55s., e =48m.56s. and 49m.1s., eS? =49m.26s., eL =50m.23s., e = 54m.20s.
Stalinabad eP =48m.51s.
Kodaikanal eE =49m.12s., eS?E =50m.46s., LE =51m.21s.
Tashkent eP =49m.12s., eS =56m.22s.
Sverdlovsk eP =51m.2s., eS =59m.50s.
Tamanrasset P =51m.17s.
Stuttgart eZ =52m.14s.
Strasbourg eP? =52m.36s.
Calcutta eE =53m.27s., 56m.23s., and 61m.3s.
Ksara e =60m.46s. and 66m.6s.

Nov. 23d. Readings also at 0h. (Palomar, Riverside, Tucson, near Tacubaya, and near Zürich), 1h. (Tashkent, Samarkand, Tchimkent, near Kulyab, Stalinabad, and Andijan), 4h. (near Ottawa), 5h. (Nanking, Paris, and Strasbourg), 10h. (Pierce Ferry, near Apia, and near Stalinabad), 14h. (near Andijan), 15h. (Mineral), 19h. (La Paz), 20h. (Stalinabad, Tchimkent, Samarkand, Andijan, Kulyab, Tashkent, and near Ashkabad), 21h. (La Paz, Huancayo, near Ville Marie, Temiskaming, Rolphton, Shawinigan Falls, Ottawa, and near Ashkabad).

Nov. 24d. 6h. 33m. 55s. Epicentre 21°·0S. 69°·0W. (as on 1943, December 1d.).

Intensity IV between 20°—21°S. Lat.
Epicentre 21°·25S. 69°W.

Boletin del año 1948, Instituto sismologico, Santiago, p. 45.

$A = +\cdot3349$, $B = -\cdot8723$, $C = -\cdot3563$; $\delta = +1$; $h = +4$;
$D = -\cdot934$, $E = -\cdot358$; $G = -\cdot128$, $H = +\cdot333$, $K = -\cdot934$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Montezuma		1·6	175	e 0 59	?	e 1 5	+14	i 1 15	?	e 1·4
La Paz		4·6	11	i 1 20a	P*	i 2 8	+ 1	i 1 41	P_g	—
Huancayo		10·8	325	e 2 50	+11	e 4 56	+14	—	—	e 5·2
Ottawa	z.	66·4	355	e 10 50	− 3	—	—	—	—	—
Tucson		66·4	332	i 10 52k	− 1	—	—	e 11 45	P_cP	—
La Jolla	z.	70·7	318	e 11 26	+ 6	—	—	—	—	—
Palomar		70·8	319	i 11 20k	0	—	—	i 11 57	P_cP	—
Pierce Ferry		71·0	323	i 11 21	− 1	—	—	—	—	—
Boulder City		71·4	322	i 11 24	0	—	—	—	—	—
Riverside	z.	71·5	319	i 11 25k	+ 1	—	—	i 11 44	P_cP	—
Mount Wilson	z.	72·1	319	i 11 29k	+ 1	—	—	e 12 7	?	—
Pasadena	z.	72·1	319	i 11 28k	0	—	—	e 11 52	P_cP	—
Haiwee	z.	73·3	320	i 11 35k	0	—	—	—	—	—
Tinemaha		74·1	321	i 11 41k	+ 1	—	—	—	—	—
Lick	z.	76·3	319	i 12 53k	+61	—	—	i 12 57k	pP	—
Shasta Dam		78·9	322	i 12 5	− 2	—	—	i 12 31	?	—
Tamanrasset		84·7	63	12 39	+ 2	—	—	i 13 7k	?	—

Additional readings :—
La Paz iS_gE =2m.31s.
Riverside iZ =11m.51s. and 12m.6s.
Pasadena iZ =12m.5s. and 12m.24s.

Nov. 24d. Readings also at 1h. (near Stalinabad), 6h. (Tacubaya), 7h. (Riverview), 8h. (near Leninakan and Erevan), 10h. (Ashkabad, near Salo, and near Stuttgart), 11h. (Tacubaya and Ksara), 12h. (Ashkabad), 16h. (La Paz), 17h. (La Paz, Huancayo, La Plata, and near Ottawa), 18h. (Wellington, Christchurch, Rome, and Mizusawa), 22h. (Almata, near Murgab, Andijan, Frunse, and Stalinabad).

Nov. 25d. 14h. Undetermined shock. Tonga region. Depth suggested 300km.

Apia iP =47m.50s.k, iS =48m.40s.
Christchurch eE =56m.55s., iEN =62m.34s., eEN =64m.54s.
Wellington e =57m.
Auckland eN =57m.
Lick iPZ =57m.43s.a, ipPZ =57m.47s.k, iZ =57m.52s. and 58m.8s.
Pasadena iPEZ =57m.45s., ipPEZ =58m.54s., eZ =61m.40s.
Mount Wilson iPZ =57m.46s., ipPZ =58m.55s., eZ =61m.10s.
La Jolla iPZ =57m.47s., ipPZ =58m.55s.
Palomar iPNZ =57m.48s., ipPZ =58m.58s.
Riverside iPZ =57m.49s., ipPZ =58m.59s.
Haiwee iPZ =57m.52s., ipPZ =59m.3s.
Mineral iPZ =57m.52s.k, iZ =57m.56s.k and 59m.2s.k.
Tinemaha iP =57m.54s., ipPZ =59m.3s.
Boulder City iP =58m.3s., ipP =59m.14s., ePP =61m.0s.
Pierce Ferry iP =58m.8s., ipP =59m.18s.
Tucson iP =58m.11s., ipP =59m.22s., ePP =61m.9s., iS =67m.41s.
Riverview eS?E =58m.18s., iEZ =59m.45s., iS_cS?N =63m.6s.
Stalinabad eP =62m.3s., ePP =65m.9s., epPP =66m.14s.
Stuttgart ePKPZ =65m.50s., iPKPZ =65m.54s.k, epPKPZ =67m.12s.
Paris iPKP =65m.51s., ipPKP =67m.8s.
Strasbourg iPKP =65m.52s., epPKP =67m.16s., e =67m.23s.
Zürich e =65m.52s. and 74m.11s.
Ksara iPKP? =65m.53s., epPKP? =67m.42s., PP? =69m.18s.
Basle e =65m.54s., 69m.7s., and 75m.49s.
Clermont-Ferrand iPKP =66m.1s.
Helwan i =66m.5s. and 69m.45s.
Tamanrasset ePKP =66m.18s., ipPKP =67m.41s.k, i =67m.47s.a, ePP? =71m.34s.
Sverdlovsk ePP =66m.33s., eSS =82m.44s.
Huancayo eSKS =69m.56s., ePS =72m.18s.

Nov. 25d. Readings also at 2h. (Copenhagen), 3h. (near Bogota), 4h. (Stuttgart, Tacubaya, and near Shasta Dam), 6h. (near Taranto, Messina, and near Stalinabad), 8h. (near Andijan), 9h. (Pierce Ferry and near Stalinabad), 11h. (Tacubaya (4)), 12h. (Tamanrasset and near Mizusawa), 13h. (Calcutta (2)), 16h. (near Stalinabad), 17h. (near Ashkabad), 18h. (Shasta Dam, Bombay, and Calcutta), 20h. (near Mizusawa), 21h. (Ksara, Baku, Grozny, near Erevan, and Leninakan, near Branner, Berkeley, and Lick).

Nov. 26d. 5h. 36m. 36s. Epicentre 5°·0S. 144°·5E. Focus at base of superficial layers. (as on 1948, June 14d.).

$A = -·8110$, $B = +·5785$, $C = -·0866$; $\delta = -12$; $h = +7$;
$D = +·581$, $E = +·814$; $G = +·071$, $H = -·050$, $K = -·996$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	N.	23·8	161	i 5 9	− 2	i 9 13	− 8	i 5 31	PP	e 13·4
Riverview		29·4	168	i 6 0a	− 2	e 10 45	− 8	i 6 14	pP	e 13·6
Miyazaki		38·8	342	e 7 15	− 8	12 59	−19	—	—	—
Owase		39·6	349	7 32	+ 2	13 31	+ 1	—	—	19·0
Kôti		39·7	345	6 56	−35	12 54	−38	—	—	—
Osaka		40·3	349	7 43	+ 7	13 44	+ 3	—	—	—
Nagoya		40·6	352	7 38	0	13 45	0	—	—	20·3
Tokyo		40·7	354	e 7 39	0	14 4	sS	—	—	—
Hamada		41·1	343	7 46	+ 4	13 57	+ 4	—	—	—
Maebasi		41·5	354	e 7 48	+ 2	13 58	− 1	—	—	—
Auckland	N.	42·1	142	7 24?	−26	13 43	−25	7 45	pP	—
Hukusima		42·7	357	7 57	+ 2	14 13	− 3	—	—	—
New Plymouth	E.	43·2	145	8 12	pP	14 20	− 4	—	—	17·9
Sendai		43·2	357	8 0	0	14 21	− 3	—	—	—
Arapuni	E.	43·4	143	e 10 24?	PPP	14 24	− 3	i 17 54	SS	—
Apia		44·0	105	e 7 52	−14	e 14 24	−11	e 8 1	pP	e 17·9
Mizusawa		44·0	357	8 10	+ 4	14 36	+ 1	—	—	—
Kaimata		44·4	152	8 14	+ 5	14 37	− 4	17 57	S_cS	—
Tuai	N.	44·8	143	8 13	+ 1	14 41	− 6	—	—	—
Wellington		45·1	147	8 14	− 1	14 45	− 6	8 48	pP	18·3

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Christchurch		45·7	151	8 19	− 1	14 56	− 4	9 52	PP	21·7
Sapporo		47·9	357	8 57	+20	—	—	—	—	—
Vladivostok		49·2	347	8 48	+ 1	i 15 51	+ 2	—	—	—
Calcutta	E.	61·3	299	e 10 18	+ 4	e 18 40	+ 9	i 20 5	S_eS	—
Honolulu		62·3	63	e 10 6	−15	i 18 43	− 1	i 10 32	pP	e 25·8
Colombo	E.	65·6	280	10 45	+ 2	19 30	+ 6	—	—	34·0
Irkutsk		66·5	334	10 49	+ 1	i 19 40	+ 5	—	—	—
Kodaikanal	E.	68·4	284	i 10 59	− 1	i 20 2	+ 4	11 23	P_eP	32·9
Bombay		74·4	291	e 11 40	+ 4	i 21 11	+ 4	—	—	—
Almata		77·4	317	11 56	+ 3	21 43	+ 3	—	—	—
Murgab		78·1	311	e 11 57	0	i 21 49	+ 1	—	—	—
Frunse		78·9	315	e 12 4	+ 2	e 21 59	+ 3	—	—	—
Andijan		79·9	312	e 12 7	0	i 22 11	+ 4	—	—	—
Kulyab		81·1	310	i 12 15	+ 2	i 22 17	− 2	—	—	—
Stalinabad		82·0	310	i 12 17	− 1	i 22 30	+ 1	—	—	—
Tashkent		82·3	313	i 12 20	0	i 22 33	+ 1	—	—	—
Tchimkent		82·3	314	i 12 22	+ 2	i 22 33	+ 1	—	—	—
College		85·2	24	c 12 52	pP	e 22 46	[− 7]	e 16 15	PP	e 39·4
Sitka		88·9	32	—	—	e 24 6	+30	—	—	e 40·5
Sverdlovsk		90·8	327	i 13 0	− 1	i 23 51	− 2	—	—	—
Tananarive		94·9	251	e 19 6	PPP	23 56	[+ 5]	26 6	PS	48·1
Victoria		95·1	42	13 20	− 1	23 47	[− 5]	24 19	S	43·4
Berkeley		95·6	53	i 13 22k	− 1	e 23 58	[+ 3]	e 17 14	PP	e 44·2
Shasta Dam		95·6	49	e 13 21	− 2	e 23 51	[− 4]	i 13 44	pP	—
Santa Clara		95·8	53	i 17 15	PP	—	—	—	—	e 43·7
Seattle		95·8	42	—	—	e 25 57	PS	—	—	e 44·5
Lick		96·1	53	c 13 24a	− 1	—	—	e 17 15	PP	e 44·2
Mineral	Z.	96·2	49	i 13 31k	+ 5	e 26 2	PS	i 13 42a	pP	—
Fresno		97·5	53	e 13 47	+15	—	—	e 13 54	pP	e 45·0
Tinemaha	Z.	98·8	53	i 13 35	− 3	—	—	i 13 56	pP	—
Pasadena		98·8	56	i 13 36	− 2	i 24 6	[− 6]	i 13 54	pP	e 42·6
Mount Wilson	Z.	98·9	56	i 13 37	− 1	—	—	i 13 56	pP	—
Riverside	Z.	99·5	56	i 13 39a	− 2	—	—	i 13 57	pP	—
La Jolla	Z.	99·6	57	e 13 48	+ 7	—	—	—	—	—
Grozny		99·8	312	e 14 1	+19	24 19	[+ 2]	—	—	—
Palomar	Z.	99·9	57	i 13 42	− 1	—	—	i 13 59	pP	—
Leninakan		101·3	310	e 17 53	PP	24 55	SKKS	—	—	—
Boulder City		101·5	54	e 13 48	− 2	—	—	e 18 11	PP	—
Pierce Ferry		102·2	54	e 13 52	− 1	—	—	e 18 8	PP	—
Butte	N.	102·6	43	e 18 18	PP	e 24 27	[− 3]	—	—	e 44·3
Logan		103·5	48	e 14 14	pP	e 24 38	[+ 4]	e 18 22	PP	e 43·7
Moscow		103·6	327	14 15	PP	24 34	[− 1]	e 18 23	PP	—
Salt Lake City		103·6	49	e 18 33	pPP	e 24 31	[− 4]	e 27 18	PS	e 43·1
Bozeman		103·7	43	e 18 24	PP	e 24 34	[− 1]	e 27 30	PS	e 45·5
Tucson		105·1	58	e 14 6	0	e 26 27	sS	e 14 14	pP	e 43·7
Saskatoon		105·5	37	18 29	PP	24 30	[−13]	26 14	S	48·9
Ksara		108·2	303	e 18 56	PP	e 28 34	PPS	—	—	—
Rapid City	E.	109·4	44	e 18 52	PP	e 25 38	SKKS	e 28 12	PS	e 50·8
Upsala		112·1	334	e 19 24?	PP	e 25 54	SKKS	e 34 49	SS	e 41·4
Helwan		112·5	301	e 15 15	?	e 27 0	S	e 19 15	PP	—
Scoresby Sund		114·0	355	19 46	PP	29 3	PS	35 14	SS	54·4
Warsaw		114·0	326	e 18 37	[+ 1]	e 29 5	PS	e 19 33	PP	e 46·4
Raciborzu		116·5	324	e 19 57	PP	—	—	—	—	—
Copenhagen		116·7	332	18 43	[+ 2]	29 28	PS	19 53	PP	—
Budapest		117·1	322	e 19 54	PP	—	—	—	—	e 61·4
Belgrade		117·2	319	e 18 43k	[+ 1]	—	—	e 20 41	?	e 66·9
Potsdam		118·2	328	e 20 12?	pPP	e 36 24	SS	—	—	e 57·4
Prague		118·7	326	e 20 3	PP	e 26 42	SKKS	e 23 0	PPP	e 56·4
Collmberg		118·8	327	e 18 50	[+ 5]	—	—	e 19 14	pPKP	—
Cheb		119·8	327	e 21 11	?	e 31 54	PPS	—	—	e 65·4

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Jena		119·8	328	e 19 9	pPKP	—	—	e 20 35	PP		—
St. Louis		120·3	48	e 19 6	pPKP	i 25 36	[− 6]	i 20 10	PP		—
Chicago		121·0	43	e 20 15	PP	e 25 37	[− 7]	e 30 4	PS		e 53·4
Triest		121·2	322	i 20 23	PP	i 28 14	S	i 30 21	PS		—
Stuttgart		122·2	327	e 18 52k	[+ 1]	e 30 18	PS	e 20 32	PP		62·4
De Bilt		122·3	332	e 20 36	PP	e 30 22	PS	e 36 24?	SS		e 56·4
Padova		122·9	321	19 11	pPKP	e 28 26	S	—	—		—
Strasbourg		123·1	328	e 18 55	[+ 2]	e 27 34	SKKS	e 19 16	pPKP		60·2
Bologna		123·2	321	e 18 57a	[+ 4]	e 28 31	S	—	—		—
Salo		123·2	322	e 18 54	[+ 1]	e 28 33	S	—	—		—
Zürich		123·4	326	e 18 55	[+ 1]	e 28 34	S	e 19 16	pPKP		—
Uccle	z.	123·5	332	(e 20 44)	PP	—	—	—	—		—
Ville Marie		123·5	34	e 18 57	[+ 3]	—	—	e 20 51	PP		—
Florence		123·6	320	e 18 56	[+ 2]	e 25 56	[+ 3]	e 19 20	pPKP		—
Rome	z.	123·7	318	e 18 56	[+ 2]	e 22 5	SKP	e 20 43	PP		—
Basle		123·8	325	e 18 56a	[+ 1]	—	—	e 21 43	?		e 63·4
Temiskaming		124·0	34	e 18 57	[+ 2]	—	—	e 20 54	PP		—
Pavia	z.	124·2	323	i 18 58	[+ 3]	—	—	—	—		—
Rolphton		125·0	34	e 18 58	[+ 1]	—	—	e 19 18	pPKP		—
Cleveland		125·2	41	i 19 12	pPKP	e 30 42	PS	i 21 3	PP		59·2
Kew		125·2	334	e 18 59	[+ 2]	i 27 35	SKKS	e 19 13	pPKP		e 60·4
Paris		125·7	330	i 19 1	[+ 3]	i 30 56	PS	i 19 22	pPKP		61·4
Ottawa		126·7	34	19 2	[+ 2]	32 36	PPS	i 19 19	pPKP		57·4
Clermont-Ferrand		127·4	326	i 19 5	[+ 3]	i 22 24	PKS	i 21 8	PP		59·4
Seven Falls	E.	128·2	29	e 19 25	pPKP	e 22 24	PKS	e 32 48	PPS		58·4
Vermont		128·7	33	e 21 55	PP	e 32 9	PS	e 39 23	SS		e 61·4
Columbia		128·9	49	e 21 26	PP	e 22 30	PKS	e 31 34	PS		e 56·1
Philadelphia		130·1	40	—	—	e 23 14	PKS	e 39 32	SS		e 56·7
Fordham		130·5	38	e 21 39	PP	i 31 44	PS	—	—		60·4
Harvard		130·8	34	e 21 42	PP	—	—	e 22 27	?		e 60·4
Tortosa		131·9	323	19 14	[+ 4]	—	—	24 30	PPP		e 70·4
Algiers		132·6	317	e 19 25	pPKP	26 1	[−16]	e 22 5	PP		—
Alicante		134·0	322	20 17	?	23 18	PKS	—	—		e 69·5
La Plata	E.	135·0	153	23 1	PKS	—	—	—	—		68·2
	N.	135·0	153	23 6	PKS	—	—	—	—		71·5
Toledo		135·2	325	i 19 20	[+ 4]	i 26 22	[0]	i 19 39	pPKP		—
Tamanrasset		136·6	298	19 9	[−10]	e 23 7	PKS	i 19 24a	pPKP		—
Granada		136·7	323	i 19 28a	pPKP	32 34	PS	i 22 22a	PP		67·5
Huancayo		136·9	114	e 19 23	[+ 4]	e 22 58	PKS	e 22 28	PP		e 55·9
Malaga	z.	137·5	323	i 19 22a	[+ 1]	—	—	i 22 34	PP		60·6
Lisbon		138·8	329	19 25a	[+ 2]	40 18	SS	22 20	PP		56·2
La Paz		141·3	125	i 19 26k	[− 1]	23 8	PKS	i 19 44	pPKP		66·9
Bermuda		141·5	42	e 22 36	PP	e 35 1	PPS	e 41 4	SS		e 55·5
Bogota		141·6	89	e 18 23	[−65]	e 41 4	SS	e 19 46	PKP		e 60·2
San Juan		147·3	63	e 19 37	[− 1]	e 41 59	SS	—	—		e 60·7
Fort de France		153·0	68	e 19 48	[+ 1]	e 29 53	SKKS	—	—		—

Additional readings :—
Brisbane iSSN =9m.49s.
Riverview iN =6m.50s., iPPN =6m.53s., ePPPN =7m.5s., iN =7m.30s., iE =9m.18s. and 12m.11s., QE =12m.24s., iS_cS?E =16m.50s.
Auckland PPN =9m.6s., P_cPN =9m.24s., sSN =14m.4s., SSN =16m.15s., S_cS?N = 17m.17s.
Wellington P_cPZ =9m.44s., PPZ =10m.3s., pPPZ =10m.21s., P_cS =13m.22s., S_cS = 17m.59s., sS_cS =18m.24s.
Christchurch iZ =8m.43s., eN =16m.6s., QEN =18m.4s., S_cSNZ =18m.7s., SSZ = 18m.38s.
Honolulu eS =18m.40s., e =20m.6s.,
Kodaikanal PPE =13m.29s., PSE =20m.20s., S_cSE =20m.44s., SSE =24m.16s.
College esS =13m.26s., eSS =28m.31s.
Tananarive SKKS =24m.18s., SS? =31m.42s., Q =45m.24s.
Victoria i =13m.41s., PP =17m.35s., PS =25m.41s., PPS =26m.30s.
Berkeley iZ =13m.43s., eZ =17m.8s., ipPZ =17m.30s.k, iZ =25m.54s., iE =26m.10s. and 26m.28s., iN =27m.16s. and 30m.22s., eN =40m.42s., eE =41m.54s., eZ =43m.42s.
Shasta Dam e =16m.33s., esS =25m.19s.
Lick iZ =13m.41s.k, and 13m.46s.k, ePPN =17m.18s.
Fresno ePPE =17m.27s., ePPZ =17m.46s., ePPN =17m.49s.

Continued on next page.

Tinemaha ePPZ =17m.23s.
Pasadena iZ =13m.58s., eZ =16m.25s., iPPZ =17m.34s., iZ =17m.50s., eSEN =25m.7s., ePSEN =26m.10s., eSSEN =31m.30s.
Mount Wilson iZ =14m.0s. and 14m.28s., ePPZ =17m.38s.
Riverside ePPZ =17m.19s., iZ =17m.31s, and 17m.56s., iPKKPZ =30m.33s., i =38m.26s.
Palomar iZ =13m.52s., ePPZ =17m.57s., iPKKPZ =30m.32s., eZ =30m.46s.
Boulder City ePKKP =30m.23s.
Pierce Ferry iPKKP =30m.20s.
Logan ePPP =20m.29s., eS? =25m.17s., ePS =27m.3s., e =31m.35s.
Bozeman e =26m.35s., eSS =33m.42s., eSSS =36m.57s.
Tucson ePKP =17m.43s., ePP =18m.16s., ipPP =18m.41s., iPS =27m.30s., ePPS =28m.27s., iPKKP =30m.8s., eSS =33m.30s., eSSS =38m.0s., ePKP,PKP =38m.28s.
Saskatoon i =18m.46s., PS =27m.37s., PPS =29m.0s., SS =34m.0s., SSS =38m.6s.
Rapid City eSSE =34m.28s., eSSSE =38m.32s.
Upsala eE =28m.24s., ePSN =28m.57s., eE =35m.24s., eSSSE =39m.2s.
Helwan i =19m.48s. and 20m.45s.
Warsaw eZ =19m.41s., eE =20m.34s., eZ =22m.14s., ePPZ =23m.0s., eSKPE =26m.29s., eSKKSZ =29m.39s., eSKKSE =29m.45s., eZ =31m.35s., ePPSZ =33m.40s., ePPSE =33m.47s., eE =35m.43s. and 36m.28s., PKKS?E =37m.26s., SSE =38m.29s.
Copenhagen 35m.42s.
Prague e =27m.42s., ePS =30m.0s., eSKSP =30m.36s., e =32m.24s.? and 33m.48s., eSS =36m.42s.
Collmberg eEZ =20m.56s.
St. Louis i =20m.26s., iPS =29m.59s.
Chicago ePPS =31m.29s., eSS =36m.44s., esSS =37m.16s., eSSS =41m.14s.
Stuttgart eZ =19m.15s.k, e =20m.47s., ePPP =23m.25s., eS? =28m.31s., ePS =31m.42s., e =33m.4s., 36m.54s., 39m.42s., and 46m.36s., eQ =59·4m.
Uccle reading is increased by 30m.
Strasbourg e =19m.6s., ePP =20m.39s. and 20m.42s., e =21m.26s., ePS =30m.27s. and 30m.30s., e =33m.8s. and 33m.12s., eSS =37m.24s., ePKP,PKP =37m.39s., eSSS =42m.2s., eSSSS? =45m.40s.
Florence eSKKS?N =27m.22s., S =28m.39s.
Rome iSN =28m.35s., ePSE =30m.31s., eSSN =37m.11s.
Rolphton i =21m.2s.
Cleveland ePPE =21m.6s., iSSE =37m.45s.
Kew ePP =20m.56s., eEZ =30m.44s., eSSEZ =31m.49s., iEZ =32m.24s. and 33m.10s., iE =38m.16s., 43m.46s., and 51m.46s., eE =59m.18s.
Paris i =19m.6s., iPP =20m.48s., ipPP? =21m.11s., ePPP =23m.46s., PPS =32m.20s., eSS =38m.54s., eSSS =42m.23s., eSSS? =42m.54s., e =52m.24s.,? eQ =58·4m.
Ottawa PP =20m.52s., SS =38m.4s., SSS =42m.42s.
Clermont-Ferrand iPPP =23m.59s., eSKKS =28m.4s., iPS =31m.9s., iPPS =32m.43s. i =35m.48s., eSKKS$_2$ =36m.21s., eSS =38m.29s., e =38m.57s., Q =55·4m.
Vermont eSSS? =45m.3s.
Columbia eSS =38m.58s., eSSS =44m.2s.
Tortosa PPN =21m.25s., PKSEN =22m.39s.
Algiers SKP =22m.40s., i =23m.7s., eSS =39m.25s.
Alicante PP =22m.46s., PPP =26m.37s., SKS =27m.25s., SS =42m.29s., Q =62m.5s.
La Plata PPE =25m.8s., PPPN =28m.39s., SKKSN =32m.6s., SKSP?E =35m.48s., SKSPE(Δ >180°) =39m.37s., SKKSN(Δ >180°) =39m.48s., SSN =43m.18s., SSSN =48m.24s., QN =63·8m.
Toledo iPP =22m.13s., iPPP =25m.14s.
Tamanarasset i =19m.45s., ePP =22m.17s., e =23m.30s., ePPP =25m.7s.
Granada PPP =25m.55s.a, SKSP =30m.46s., SS =39m.49s.
Huancayo e =21m.21s., eSKS? =27m.29s., ePS =32m.31s., eSS =40m.14s.
Malaga PPPZ =25m.38s., PPSZ =35m.42s.
La Paz PPE =22m.33s., iEN =23m.20s., iPSEZ =32m.56s., PPSEZ =34m.53s., iSS =40m.55s.
Bermuda eSKSP =32m.42s., e =34m.12s., ePSPS =42m.28s.
Bogota eSKPZ =22m.46s.
San Juan e =20m.41s., and 21m.16s., ePKS =24m.36s., eSKS? =28m.11s., eSKSP =33m.36s., e =34m.57s., i =37m.9s.
Long waves were also recorded at Halifax, Ivigtut, Barcelona, Taranto, Aberdeen, and Edinburgh.

Nov. 26d. 19h. 40m. 29s. Epicentre 41°·0N. 143°·3E. Depth of focus 0·005.
(as on 1947, Dec. 13d.).

Intensity IV at Hatinohe ; II-III at Kusiro, Miyako, and Morioka. Macroseismic radius 200-300km. Epicentre 41°·1N. 143°·0E. Depth 40km.

The Seismological Bulletin of the Cent. Met. Obs., Japan, for the year 1948, Tokyo, 1950, p.49.

$A = -\cdot6069$, $B = +\cdot4523$, $C = +\cdot6535$; $\delta = -3$; $h = -2$;
$D = +\cdot598$, $E = +\cdot802$; $G = -\cdot524$, $H = +\cdot391$, $K = -\cdot757$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Hatinohe		1·4	251	−0 29?	−55	—	—
Miyako		1·7	216	0 31	+ 3	0 51	+ 1
Aomori		1·9	264	0 32	+ 1	0 56	+ 2
Morioka		2·1	232	0 36a	+ 2	1 5	+ 6
Mori		2·3	298	0 32	− 5	0 58	− 6
Mizusawa	E.	2·5	222	0 42	+ 3	1 10	+ 1
Sapporo		2·5	325	0 35	− 4	0 58	−11
Nemuro		2·9	44	0 37	− 8	1 4	−15
Sendai		3·3	214	0 51	0	1 35	+ 6
Hukusima		3·9	214	1 2	+ 3	1 49	+ 5
Onahama		4·5	205	0 47	−20	—	—
Mito		5·1	206	1 18	+ 2	2 24	+10
Kakioka		5·3	208	1 19	0	2 22	+ 3
Tukubasan		5·4	208	1 21	+ 1	2 24	+ 2
Tokyo		6·0	206	1 19	− 9	2 40	+ 3

Nov. 26d. Readings also at 0h. (Klyuchi), 1h. (near Stalinabad), 3h. (Pierce Ferry, Shasta Dam, Tucson, Pasadena, Mount Wilson, Riverside, Palomar, Tinemaha, and near Apia), 4h. (Pierce Ferry, Tucson, and Palomar), 5h. (near Stalinabad), 6h. (Andijan, Tchimkent, near Kulyab, Stalinabad, and Murgab), 7h. (Logan, Saskatoon, and Victoria), 8h. (Wellington, Arapuni, Uccle, and near Bogota), 12h. (Ashkabad), 13h. (Tamanrasset), 14h. (Huancayo), 15h. (near Paris and near Tacubaya), 17h. (Pierce Ferry, Ottawa, and near Ashkabad), 18h. (near Ashkabad), 19h. (near Ottawa), 20h. (Ottawa), 21h. (near Ashkabad (2)), 22h. (Ottawa).

Nov. 27d. 6h. Undetermined Shock.

La Plata E. P =36m.22s., PPP =37m.23s., E =38m.22s., S =41m.1s., PcS =43m.7s., L =45m.47s.,
N. P =36m.20s., PPP? =37m.50s., S? =41m.12s., PcS =43m.11s., L =44m.20s.
Huancayo eP? =37m.15s., eS =42m.33s., e =43m.42s., eL =44m.17s.
La Paz PN =37m.15s., iSN =42m.17s., L =45m.18s.
Tucson iP =42m.18s., i =42m.25s., 42m.30s., and 43m.8s.
Palomar iPZ =42m.32s., iZ =42m.46s. and 43m.3s.
Pierce Ferry eP =42m.38s.
Pasadena iPZ =42m.40s.a, iZ =42m.52s.
Boulder City eP =42m.45s.
Lick iPZ =43m.2s.a.
Mineral ePZ =43m.14s.a.
Shasta Dam eP =43m.15s., i =43m.29s.
Ottawa eZ =43m.21s.
Stuttgart eZ =49m.36s.
Long waves were also recorded at Rome.

Nov. 27d. Readings also at 0h. (La Paz, Tacubaya, and near Klyuchi), 4h. (La Paz, Tucson, and Shasta Dam), 6h. (Boulder City, Pierce Ferry, Shasta Dam, Tucson, Mount Wilson, Pasadena, Palomar, Haiwee, Riverside, Tinemaha, Lick, Mineral, Victoria, Ville Marie, Temiskaming, Ottawa, Huancayo (2), Bogota (2), La Paz (2), near Montezuma, and near Ashkabad), 7h. (La Paz, Montezuma, Ville Marie, Temiskaming, Shasta Dam, and near Stalinabad), 12h. (Tucson, Balboa Heights, Samarkand, Andijan, Tchimkent, Frunse, near Kulyab, Stalinabad, Murgab, and near Tacubaya), 14h. (Samarkand, Andijan, near Kulyab, and Stalinabad), 15h. (Ksara), 16h. (near Klyuchi and near Zürich), 17h. (Stalinabad, Tashkent, Copenhagen, De Bilt, and Calcutta), 18h. (Bombay and near Balboa Heights), 19h. (near Ashkabad), 20h. (Palomar and Tacubaya), 22h. (Shawinigan Falls and near Ottawa), 23h. (near Tacubaya and near Ashkabad).

Nov. 28d. 12h. 49m. 53s. Epicentre 33°·5N. 138°·2E. Depth of focus 0·040.
(as on 1941, March, 22d.).

Intensity IV at Ryugasaki (Ibaraki Pref.); II-III at Ito, Yokohama, Tokyo, Utunomiya. Epicentre 33°·6N. 138°·4E. Macroseismic Radius more than 300km. Depth 250km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1948, Tokyo, 1950, pp. 49-50, with macroseismic chart p. 49.

$A = -\cdot6229$, $B = +\cdot5570$, $C = +\cdot5493$; $\delta = -2$; $h = +1$;
$D = +\cdot667$, $E = +\cdot745$; $G = -\cdot409$, $H = +\cdot366$, $K = -\cdot836$.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Shizuoka	1·5	8	0 43	+ 1	1 15	0
Misima	1·7	21	0 45	+ 1	1 17	− 1
Owase	1·8	289	0 30	−14	1 17	− 2
Nagoya	1·9	329	0 44	− 1	1 17	− 3
Kameyama	2·0	313	0 45	− 1	1 19	− 3
Mera	2·0	44	0 46	0	1 23	+ 1
Siomisaki	2·0	269	1 24	S	(1 24)	+ 2
Hunatu	2·1	13	0 24	−23	1 22	− 1
Gihu	2·2	328	0 41	− 7	1 19	− 6
Yokohama	2·3	32	0 50	+ 2	1 23	− 3
Osaka	2·4	298	0 50	+ 1	1 26	− 2
Tokyo	2·5	30	0 50	0	1 28	− 2
Kumagaya	2·8	20	1 29	S	(1 29)	− 6
Sumoto	2·9	287	0 52	− 2	1 33	− 3
Maebasi	3·0	14	0 55	0	1 33	− 5
Kakioka	3·2	30	0 55	− 2	1 34	− 8
Nagano	3·2	0	0 56	− 1	1 39	− 3
Tukubasan	3·2	30	0 55	− 2	1 33	− 9
Utunomiya	3·3	24	1 8	+10	1 50	+ 6
Mito	3·4	31	1 0	+ 1	1 42	− 4
Onahama	4·1	32	1 23	+16	1 55	− 5
Hukusima	4·6	21	1 11	− 2	2 3	− 7
Sendai	5·2	24	1 16	− 4	2 15	− 7
Mizusawa	6·1	22	1 28	− 3	2 32	−10
Morioka	6·6	20	1 34	− 3	2 41	−12
Miyako	6·8	26	1 33	− 6	2 45	−12

Nov. 28d. 21h. 43m. 7s. Epicentre 26°·8N. 94°·0E. (as on 1948, March 1d.).

$A = -\cdot0623$, $B = +\cdot8916$, $C = +\cdot4485$; $\delta = -2$; $h = +3$;
$D = +\cdot998$, $E = +\cdot070$; $G = -\cdot031$, $H = +\cdot447$, $K = -\cdot894$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	E.	6·7	232	e 1 42	0	i 3 4	+ 4	—	—	—
Hyderabad	N.	17·1	241	3 55	− 7	7 14	+ 2	7 28	SS	—
Murgab		20·4	310	i 4 45	+ 4	i 8 35	+10	—	—	—
Bombay		21·0	253	i 5 4	+17	i 8 45	+ 8	—	—	10·8
Almata		21·5	326	e 4 57	+ 5	i 9 1	+14	—	—	—
Nanking		22·2	70	4 50	−10	e 8 43	−17	—	—	—
Frunse		22·5	321	i 5 8	+ 6	e 9 20	+15	—	—	—
Andijan		22·7	313	i 5 9	+ 5	i 9 20	+11	—	—	—
Kodaikanal	E.	22·7	228	i 5 0	− 4	i 9 12	+ 3	5 30	PP	11·6
Kulyab		23·2	305	i 5 12	+ 3	i 9 26	+ 8	i 5 24	pP	—
Colombo	E.	23·9	217	5 13	− 3	9 45	+15	—	—	14·1
Stalinabad		24·2	307	e 5 22	+ 3	i 9 43	+ 8	i 5 34	pP	—
Tashkent		24·9	313	e 5 29	+ 3	e 11 11	SS	—	—	—
Tchimkent		25·2	315	e 5 29	0	e 9 58	+ 6	—	—	—
Samarkand		25·9	306	e 5 43?	+ 8	—	—	—	—	—
Irkutsk		26·6	15	5 40	− 2	i 10 17	+ 1	—	—	—
Vladivostok		34·7	52	e 6 42	−12	i 12 8	−16	—	—	—
Sverdlovsk		38·3	331	7 25	+ 1	15 58	SS	i 7 40	pP	—
Baku		38·8	303	e 7 50?	+22	—	—	—	—	—
Grozny		42·2	306	e 7 59	+ 3	14 21	+ 4	—	—	—

Continued on next page,

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Erevan		42·9	302	e 8 19	+17	—	—	—	—	—
Leninakan		43·4	303	e 8 28?	+22	—	—	—	—	—
Piatigorsk		44·2	307	8 24	+12	—	—	—	—	—
Sotchi		46·6	306	8 58?	+26	—	—	—	—	—
Moscow		49·5	322	e 8 54	0	16 2	0	e 9 8	pP	—
Theodosia		49·7	308	—	—	16 10	+ 6	—	—	—
Ksara		50·1	292	e 8 55?	− 4	—	—	11 15	PP	—
Yalta		50·6	307	e 9 11	+ 9	16 32	+15	—	—	—
Helwan		54·6	290	e 9 44	+12	e 17 29	+18	e 11 38	PP	—
Belgrade		60·3	308	e 10 25k	+12	—	—	e 12 24	PP	e 43·2
Prague		63·4	316	—	—	e 26 42	SSS	—	—	e 32·9
Copenhagen		63·6	322	e 10 47?	+12	18 53	−15	e 10 53	P	26·7
Collmberg		64·1	317	e 10 38	0	—	—	—	—	—
Cheb		64·7	316	—	—	e 27 2	SSS	—	—	e 33·9
Triest		64·8	311	e 10 56	+13	e 19 47	+24	—	—	e 30·9
Rome		66·6	307	e 10 51	− 3	e 19 43	− 2	e 13 27	PP	e 31·9
Bologna		66·7	310	e 10 55	0	—	—	e 11 55	?	—
Salo		67·0	311	e 10 54	− 3	e 19 46	− 4	e 11 21	PcP	—
Stuttgart		67·1	315	e 10 55	− 2	e 19 48	− 3	e 20 16	PS	e 37·9
Chur		67·3	312	e 10 56	− 3	e 19 51	− 3	—	—	—
Zürich		67·8	314	e 10 59	− 3	e 20 0	0	—	—	—
Strasbourg		68·0	315	e 11 0	− 3	e 20 33	PS	e 15 33	PPP	34·9
Basle		68·4	314	e 11 4	− 2	—	—	e 13 43	PP	—
De Bilt		68·6	319	e 11 18	+11	e 20 10	+ 1	e 28 11	SSS	e 34·9
Uccle		69·5	318	—	—	e 20 23	+ 3	e 24 53?	SS	e 36·9
Paris		71·3	316	i 11 21?	− 2	e 20 53?	+12	i 11 35	PcP	e 41·9
Clermont-Ferrand		71·9	312	e 11 26	− 1	e 21 2	+14	i 21 47	PS	36·9
Kew		72·1	319	i 11 27	− 1	—	—	e 11 40	PcP	e 35·9
Scoresby Sund		73·1	342	—	—	21 35	PS	—	—	—
Tortosa		75·5	308	13 33	?	—	—	—	—	—
Alicante		77·2	307	12 21	+24	21 41	− 6	14 29	PP	42·9
Tamanrasset		78·8	291	e 12 3	− 3	i 12 17	PcP	e 15 16	PP	—
Toledo		79·0	309	i 12 5	− 2	—	—	e 15 10	PP	—
Granada		79·9	306	i 11 33k	−39	27 37	SS	14 13k	?	44·6
Haiwee	z.	110·5	27	e 19 33	PP	—	—	—	—	—
Boulder City		111·9	25	e 19 19	PP	—	—	—	—	—
Mount Wilson	z.	112·1	28	e 19 19	PP	—	—	—	—	—
Pasadena	z.	112·1	28	e 19 14	PP	—	—	—	—	—
Pierce Ferry		112·1	24	e 18 32	[− 5]	—	—	—	—	—
Tucson		116·7	23	e 18 41	[− 5]	—	—	e 20 12	PP	—
La Paz	N.	160·5	297	i 20 1	[0]	—	—	—	—	—
Huancayo		162·2	323	e 20 0	[− 3]	e 20 22	?	e 21 5	?	—

Additional readings :—
Kodaikanal SSE =9m.54s.
Sverdlovsk iPP =9m.2s., iPPP =9m.22s., PcP =9m.44s.
Helwan e =11m.53s.
Belgrade e =14m.14s.
Collmberg eEZ =11m.33s., 12m.10s., 15m.29s., and 16m.30s.
Triest ePS =20m.13s., eSS =24m.22s.
Rome ePPPE =14m.36s., PS =20m.9s., eSSN =24m.7s.
Salo eZ =11m.7s.
Stuttgart eZ =11m.9s.k, ePcPZ =11m.16s., eZ =11m.30s., eSS =23m.53s.
Strasbourg e =11m.14s. and 11m.35s.
Basle e =11m.46s.
Uccle eN =28m.35s.
Paris Q =39m.53s.?
Clermont-Ferrand i =12m.4s., iSS =25m.57s.
Kew eEN =18m.33s., eE =29m.33s.
Long waves were also recorded at other European stations.

Nov. 28d. 23h. Undetermined shock. Suggested depth 40km.

Apia ePEN =45m.50s., eZ =45m.55s., SEN =46m.20s., eLEN =46m.30s.
Santa Barbara ePZ =56m.34s.k.
Lick iPZ =56m.37s.k.
Pasadena iP =56m.39s.k, ipPZ =56m.51s., iZ =57m.8s.
Mount Wilson iPZ =56m.39s.k, ipPZ =56m.52s.
Riverside iPZ =56m.41s.k, ipP =56m.55s.
Palomar iPZ =56m.42s.k, iZ =56m.51s., ipPZ =56m.55s.
Haiwee iPZ =56m.46s.k.
Shasta Dam iP =56m.46s., epP =56m.59s.
Mineral iPZ =56m.48s.a.
Tinemaha iPZ =56m.49s.k.
Boulder City eP =56m.54s., epP? =57m.16s.?
Pierce Ferry iP =57m.2s.
Tucson iP =57m.3s.k, ipP =57m.16s., i =57m.27s.
Paris iPKP =64m.58s.
Strasbourg ePKP =65m.0s., e =65m.21s.
Basle e =65m.4s.
Tamanrasset e =65m.23s.

Nov. 28d. Readings also at 0h. (near Ashkabad (2)), 1h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Pierce Ferry, Shasta Dam, Mineral, Lick, and near Grozny), 2h. (near Tacubaya and near Stalinabad), 3h. (near Tacubaya and near Ashkabad), 4h. (Ottawa), 5h. (near Andijan and Tchimkent), 6h. (Stuttgart and Istanbul), 7h. (Shasta Dam and near Andijan), 8h. (Mizusawa), 10h. (Ksara, near Erevan, and Leninakan), 11h. (near Tacubaya), 12h. (Mount Wilson, Pasadena, Riverside, Tinemaha, Shasta Dam, Kaimata, Christchurch, near Tuai, Wellington, New Plymouth, near Kulyab, and Stalinabad), 15h. (Sotchi, Piatigorsk, near Leninakan, Erevan, and Grozny), 16h. (Mount Wilson and Shasta Dam), 21h. (Istanbul).

Nov. 29d. Readings at 0h. (Stuttgart, near Murgab, and near Klyuchi), 1h. (Stuttgart and Pierce Ferry), 2h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Riverside, Haiwee, Boulder City, Shasta Dam, Tucson, Mineral, Lick, and near Ashkabad), 6h. (Berkeley (2)), 8h. (Huancayo), 12h. (La Paz), 13h. (Stalinabad), 14h. (Calcutta), 15h. (near Salo, Stuttgart, Collmberg, Ravensburg, Strasbourg, Clermont-Ferrand, Paris, and Jena), 16h. (near Alicante and near Messina), 18h. (near Rome, Bologna, Florence, and near Malaga (2)), 20h. (Ottawa).

Nov. 30d. 8h. 29m. 8s. Epicentre 28°·0S. 63°·5W. Depth of focus 0·080.
(as on 1948, February 14d.).

$A = +\cdot3946$, $B = -\cdot7914$, $C = -\cdot4670$; $\delta = +11$; $h = +2$;
$D = -\cdot895$, $E = -\cdot446$; $G = -\cdot208$, $H = +\cdot418$, $K = -\cdot884$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Plata	E.	8·4	147	i 2 13	+11	3 49	+ 9	—	—	4·2
	N.	8·4	147	i 2 13	+11	3 48	+ 8	—	—	4·2
	Z.	8·4	147	i 2 13	+11	i 3 56	+16	—	—	4·2
La Paz		12·2	338	i 2 44a	+ 3	i 4 49	− 1	i 5 1	SS	—
Huancayo		19·4	324	e 3 54	+ 2	i 6 56	− 2	e 4 29	PP	e 7·7
Bogota		34·0	342	(i 5 57)	− 3	(i 10 37)	−11	(i 13 58)	S_cP	(e 15·3)
Fort de France		42·5	5	e 7 6	− 3	e 12 41	−12	—	—	—
San Juan		46·2	358	e 7 34	− 4	e 13 24	−21	e 17 2	sS	—
Ottawa	Z.	73·9	352	e 10 39	− 2	—	—	—	—	—
Shawinigan Falls	N.	74·7	354	e 10 45	− 1	—	—	—	—	—
Tucson		74·9	320	i 10 47k	0	e 19 38	− 2	i 12 47	pP	—
Seven Falls	E.	75·1	356	e 10 47	− 1	—	—	—	—	—
Temiskaming		75·6	350	i 10 50	− 1	—	—	—	—	—
Ville Marie		76·3	349	i 10 59	+ 5	—	—	—	—	—
La Jolla		79·2	316	e 11 12	+ 2	e 20 26	+ 1	e 13 13	pP	—
Palomar		79·2	318	i 11 12	+ 2	i 20 29	+ 4	e 13 13	pP	—
Pierce Ferry		79·6	321	i 11 12	0	e 20 23	− 7	i 13 14	pP	—
Boulder City		79·9	320	e 11 15	+ 1	e 20 37	+ 4	i 13 12	pP	—
Riverside		80·0	317	i 11 15k	+ 1	e 20 33	− 1	i 13 17	pP	—
Mount Wilson		80·6	317	i 11 19k	+ 2	i 20 38	− 2	i 13 21	pP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pasadena		80·6	317	i 11 19k	+ 2	i 20 40	0	i 13 20	pP	—
Haiwee	z.	81·8	319	i 11 26	+ 3	—	—	—	—	—
Santa Barbara	z.	81·8	316	e 11 25	+ 2	—	—	—	—	—
Tinemaha	z.	82·7	319	i 11 29	+ 1	—	—	i 13 32	pP	—
Tamanrasset		83·5	60	i 11 32k	0	—	—	i 13 37a	pP	—
Lick	z.	84·8	317	i 11 40k	+ 2	—	—	i 13 43k	pP	—
Malaga	z.	85·0	44	i 11 35	− 4	—	—	—	—	—
Mineral	z.	86·8	320	e 11 48k	0	e 21 38	− 1	e 13 54	pP	—
Shasta Dam		87·5	320	e 11 51	0	e 21 42	− 4	i 13 54	pP	—
Basle		98·6	41	e 12 42	0	—	—	—	—	—
Stuttgart	z.	100·1	41	e 12 48	− 1	e 16 57	?	e 14 59	pP	—
Helwan		107·2	66	e 17 58	PP	e 27 20	PS	e 19 42	PPP	—
Ksara		112·3	63	i 18 30	PP	—	—	20 24	PPP	—

Additional readings :—
La Plata N =2m.41s., 3m.3s., and 3m.12s., E =3m.27s. and 3m.35s., iSEN =3m.54s.
La Paz iSSS =6m.14s.
Huancayo e =6m.37s., eScS? =14m.17s.
The readings for Bogota were reduced by 15 minutes.
San Juan eScS =16m.26s.
Tucson i =10m.57s.
Pierce Ferry ePP =14m.14s.
Riverside eZ =12m.38s.
Mount Wilson eZ =12m.44s.
Pasadena eZ =12m.36s.
Tinemaha eZ =12m.44s.
Shasta Dam i =12m.2s.

Nov. 30d. Readings also at 0h. (near Ashkabad), 1h. (Tananarive), 2h. (near Kulyab, Stalinabad, and near Bogota), 4h. (near Huancayo), 7h. (Pierce Ferry, Mizusawa, and near Ashkabad), 8h. (Stalinabad, Frunse, and near Ashkabad (3)), 9h. (Samarkand, near Andijan, Stalinabad, and near Ashkabad), 13h. (Tucson and near Ashkabad (2)), 14h. (near Ashkabad), 16h. (La Paz and near Montezuma), 21h. (near Ottawa, near Mizusawa, and near Ashkabad), 22h. (Stalinabad and near Ottawa), 23h. (near Basle, Zürich, and Stuttgart).

Dec. 1d. 18h. 14m. 40s. Epicentre 58°·0S. 147°·0E. (as on 1948, Feb. 16d.).

A = −·4466, B = +·2900, C = −·8464 ; δ = −6 ; h = −8 ;
D = +·545, E = +·839 ; G = +·710, H = −·460, K = −·533.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Christchurch		21·5	59	4 56	+ 4	8 55	+ 8	—	—	10·8
Riverview		24·3	10	i 5 17a	− 3	i 9 29	− 8	i 5 52	PP	e 10·8
Wellington		24·3	58	5 21	+ 1	9 41	+ 4	6 15	PP	11·6
Arapuni	E.	27·3	56	e 5 20?	−28	—	—	—	—	e 14·2
Auckland	N.	27·9	54	—	—	(10 20?)	−17	—	—	10·3
Brisbane	N.	30·8	10	i 6 14	− 6	i 11 13	−10	i 7 6	PP	e 13·9
Huancayo		102·1	138	—	—	e 24 58	{−12}	e 27 40	PS	e 43·7
Ksara		128·9	272	e 23 46	PPP	e 35 30	?	—	—	—
Tamanrasset		135·3	235	e 19 36	[+14]	—	—	e 22 36	PP	—
Stuttgart		153·6	270	e 10 28	?	—	—	—	—	e 89·3

Additional readings :—
Riverview iZ =5m.45s., iPPPN =6m.1s., iZ =6m.11s., iE =9m.38s., isSN =9m.42s., eSSZ =10m.19s., iScSE =16m.17s.
Wellington SS =10m.45s., SSS =11m.10s.
Brisbane iSSE =12m.36s., eE =13m.43s.
Huancayo eSS? =33m.34s.
Long waves were also recorded at De Bilt.

Dec. 1d. Readings also at 0h. (near Mizusawa), 1h. (near Shasta Dam), 4h. (Pierce Ferry and near Apia), 5h. (near Ashkabad), 8h. (Huancayo, Klyuchi, and Ksara), 9h. (Tucson and near Ashkabad), 11h. (near Stalinabad), 12h. (Tucson), 13h. (Victoria and near Andijan), 14h. (Shawinigan Falls), 20h. (Seven Falls), 22h. (near Branner and Lick),

Dec. 2d. 23h. 42m. 16s. Epicentre 36°·8N. 71°·4E. Depth of focus 0·015.
(as on 1946, March 27d.).

A = +·2560, B = +·7607, C = +·5964 ; δ = −11 ; h = 0 ;
D = +·948, E = −·319 ; G = +·190, H = +·565, K = −·803.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Murgab	2·5	52	0 44	+ 3	1 14	+ 2
Stalinabad	2·7	310	i 0 42	− 2	i 1 14	− 3
Andijan	4·0	11	e 1 0	− 1	i 1 47	0
Samarkand	4·5	312	i 1 8	0	i 2 1	+ 2
Tashkent	4·8	341	—	—	i 2 4	− 3
Tchimkent	5·7	347	—	—	i 2 25	− 3
Frunse	6·5	21	e 1 36	+ 1	i 2 52	+ 4
Almata	7·8	32	—	—	i 3 17	− 2
Grozny	20·6	298	4 34	+ 3	—	—
Leninakan	21·8	289	4 59?	+16	—	—

Dec. 2d. Readings also at 4h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Mineral, and College), 5h. (near Andijan), 8h. (Tucson), 11h. (Apia), 13h. (Tucson and near Apia), 16h. (Stuttgart and near Shasta Dam), 17h. (La Paz), 18h. (Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, Tamanrasset, Huancayo, and near La Paz), 22h. (near Ashkabad), 23h. (Victoria (2) and Ashkabad (2)).

Dec. 3d. Readings at 6h. (Palomar, Tucson, Pierce Ferry (2), and Bogota), 8h. (Tamanrasset, Ksara, Stalinabad, and near Ashkabad), 9h. (near Andijan), 14h. (near Piatigorsk), 16h. (near Ashkabad), 17h. and 18h. (Tucson), 20h. (Sitka), 21h. (near La Paz), 23h. (Shasta Dam).

Dec. 4d. 0h. 22m. 47s. Epicentre 21°·6N. 106°·7W.

Damage with casualties in the Isles Las Tres Marias.
Epicentre as adopted.

See Catalogo di Tremblores, 1948. University of Mexico, 1953.

A = −·2674, B = −·8914, C = +·3660 ; δ = +5 ; h = +4 ;
D = −·958, E = +·287 ; G = −·105, H = −·351, K = −·931.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mazatlan	z.	1·6	10	i 0 23	− 7	i 0 41	−10	—	—	—
Guadalajara		3·3	106	0 48	− 5	i 1 29	− 6	i 1 6	P_g	i 1·6
Manzanillo		3·4	139	i 0 52k	− 3	i 1 34	− 3	—	—	i 1·6
Tacubaya		7·4	106	i 1 53	+ 1	i 3 28	+10	i 2 28	P_g	i 4·0
Puebla		8·4	106	i 2 6a	0	i 3 52	+ 9	i 4 10	S^*	i 4·4
Vera Cruz		10·2	102	i 2 34	+ 3	i 4 40	+13	i 4 55	SSS	i 5·2
Oaxaca	z.	10·4	114	i 2 35	+ 1	i 4 41	+ 9	i 4 53	SSS	—
Tucson		11·2	342	i 2 45	+ 1	i 5 7	+15	—	—	i 5·7
Lubbock		12·7	19	3 7	+ 2	—	—	—	—	6·3
La Jolla		14·6	322	i 3 33a	+ 3	—	—	—	—	—
Palomar		14·8	324	i 3 35a	+ 3	—	—	—	—	—
Riverside		15·5	325	i 3 44a	+ 2	i 6 43	+ 8	—	—	—
Merida		15·9	89	e 3 47	0	i 6 49	+ 5	—	—	i 7·6
Mount Wilson		16·1	324	i 3 51a	+ 2	—	—	—	—	—
Pasadena		16·1	323	i 3 51a	+ 2	—	—	—	—	6·1
Santa Barbara		17·2	321	i 4 5a	+ 2	—	—	—	—	—
Haiwee		17·5	328	i 4 10a	+ 3	—	—	—	—	—
Tinemaha		18·4	329	i 4 21a	+ 3	—	—	—	—	i 10·1
Fresno		18·9	326	i 4 26	+ 2	—	—	i 4 33	PP	i 10·5
Mobile		18·9	54	i 4 25	+ 1	7 57	+ 4	—	—	—
Lick		20·3	323	i 4 41a	+ 1	e 8 47	+24	e 9 25	SSS	—
Logan		20·5	348	i 4 42	0	i 8 38	+11	—	—	i 10·2
Santa Clara		20·5	323	i 4 43	+ 1	e 8 43	+16	i 5 12	pP	e 10·3
Branner		20·7	323	i 4 48	+ 4	e 8 51	+20	—	—	e 10·8
Lincoln	E.	21·0	20	e 4 46	− 1	e 8 42	+ 5	—	—	e 9·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Berkeley		21·1	323	i 4 51	+ 3	—	—	—	—	—
San Francisco		21·1	323	i 4 51	+ 3	e 9 1	+22	—	—	e 10·3
St. Louis		22·1	34	i 4 55	− 4	i 8 54	− 4	—	—	i 13·8
Ukiah		22·5	324	i 5 10	+ 8	e 9 30	+25	—	—	e 11·0
Mineral		22·6	328	i 5 5a	+ 2	e 9 25	+18	i 5 27	PP	e 13·7
Shasta Dam		23·2	327	e 5 8	− 1	e 9 32	+14	—	—	—
Ferndale	N.	24·1	325	e 5 17	− 1	e 9 55	+21	—	—	—
Arcata		24·2	326	i 5 22k	+ 3	e 9 32	− 3	—	—	e 12·6
Bozeman		24·3	352	e 4 19	−61	i 8 45	−52	—	—	e 11·7
Columbia		25·8	54	e 4 30	−64	e 9 5	−57	—	—	e 11·8
Cleveland		29·0	40	i 5 59	− 5	i 10 56	+ 2	—	—	—
New Kensington	E.	29·7	43	—	—	i 12 49	SS	—	—	i 17·0
Victoria		30·0	337	i 6 12	0	11 18	+ 8	7 19	PP	17·3
Saskatoon		30·5	359	6 16	− 1	11 27	+ 9	7 14	PP	15·9
Pennsylvania		31·0	44	i 6 20	− 1	12 27	+61	8 27	P_cP	e 18·9
Philadelphia		32·5	48	i 6 34	0	i 11 53	+ 4	—	—	e 12·6
City College, N.Y.		33·7	47	i 6 43	− 2	i 12 11	+ 3	i 7 41	PP	e 14·2
Fordham		33·7	47	i 6 43	− 2	i 12 17	+ 9	—	—	—
Ville Marie		33·8	34	e 6 41	− 5	—	—	e 9 21	P_cP	17·5
Rolphton		34·1	37	i 6 43	− 5	e 12 17	+ 3	i 9 24	P_cP	17·5
Ottawa		34·7	38	6 50a	− 4	12 27	+ 3	7 42	PP	16·8
Vermont		35·8	42	e 7 4	+ 1	e 12 50	+ 9	i 15 23	SSS	e 17·0
Bogota		35·9	113	i 7 3	− 1	i 12 47	+ 5	i 8 4	PP	—
Harvard		36·0	46	i 7 0	− 5	e 12 37	− 7	i 9 29	P_cP	e 21·2
Shawinigan Falls	N.	37·1	39	7 12	− 2	13 3	+ 2	8 44	PP	17·6
San Juan		38·2	86	i 7 21	− 2	i 13 15	− 2	e 8 38	PP	i 16·2
Seven Falls	E.	38·5	39	7 22	− 4	13 23	+ 1	8 47	PP	18·4
Bermuda		38·7	64	i 7 35	+ 8	i 13 36	+11	i 9 10	PP	i 16·1
Halifax		42·1	46	7 55	0	14 20	+ 4	10 3	PPP	21·7
Fort de France		43·7	91	i 6 43	−85	i 13 13	−86	e 8 27	PP	e 19·6
Huancayo		45·5	134	i 8 24	+ 1	i 15 7	+ 2	i 10 0	PP	i 18·7
La Paz		53·5	131	i 9 19	− 5	i 16 49	− 8	i 11 25	PP	26·2
Ivigtut		56·2	29	—	—	i 17 45	+12	21 31	SS	27·2
La Plata		72·8	139	11 30	− 2	20 53	− 5	17 54	PPP	44·2
Rathfarnham Castle		78·9	37	e 12 11	+ 4	e 22 10	+ 5	e 22 29	S_cS	e 37·3
Aberdeen	E.	79·7	32	i 12 11	0	i 22 13	0	i 15 11	PP	43·5
Durham		80·9	35	i 12 18	+ 1	i 22 21	− 5	i 12 32	PcP	—
Lisbon		82·4	51	i 12 23a	− 2	22 43	+ 2	23 28	PS	38·6
Kew	E.	83·0	37	i 12 28	0	e 22 45	− 2	e 15 37	PP	e 39·2
Toledo		85·6	49	i 12 41	0	i 23 19	+ 6	e 16 4	PP	37·8
De Bilt		85·7	35	i 12 41a	− 1	e 23 19	+ 5	e 15 59	PP	e 39·2
Paris		85·9	39	i 12 41	− 2	i 23 23	+ 7	i 16 3	PP	41·2
Uccle		85·9	36	e 12 43k	0	i 23 23	+ 7	16 3	PP	e 39·2
Malaga	Z.	86·6	51	i 12 46k	0	i 23 34	+11	16 46	PP	42·6
Granada		87·0	50	i 12 52a	+ 4	i 23 23	− 4	16 10	PP	i 43·1
Upsala		87·1	25	—	—	23 33	+ 5	e 29 13?	SS	e 40·2
Copenhagen		87·4	29	e 12 50	0	23 34	+ 4	16 14	PP	—
Clermont-Ferrand		87·7	41	e 12 49	− 3	i 23 43	+10	i 16 13	PP	39·7
Tortosa		88·3	46	13 3	+ 8	e 23 25	[+ 3]	16 30	PP	e 36·2
Alicante		88·7	49	e 13 3	+ 6	i 23 39	− 4	13 20	pP	e 42·5
Strasbourg		89·0	37	i 12 57	− 1	i 23 51	+ 6	e 16 21	PP	38·2
Barcelona		89·1	45	—	—	e 24 2	+16	—	—	e 42·1
Basle		89·4	38	e 12 57	− 3	e 24 57	PS	—	—	e 42·2
Potsdam		89·7	32	—	—	e 24 53	PS	—	—	e 44·2
Stuttgart		89·7	36	e 12 59a	− 2	i 24 1	+ 9	e 16 32	PP	e 43·2
Jena	Z.	89·8	34	e 12 59	− 3	—	—	—	—	—
Zürich		90·1	38	e 13 0a	− 3	e 24 3	+ 8	e 16 27	PP	—
Cheb		90·7	34	e 13 13	+ 7	e 24 17	+16	e 17 1	PP	e 38·2
Chur		90·9	38	e 13 5	− 2	—	—	—	—	e 45·2
Prague		91·7	33	e 13 20	+10	e 24 19	+ 9	e 16 46	PP	e 39·7

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Algiers		91·9	49	e 13 15	+ 4	e 24 16	+ 5	23 44	SKS	—
Salo		92·2	39	e 13 10	− 3	e 23 49	[+ 3]	—	—	—
Bologna		93·3	40	e 13 17	− 1	e 24 17	− 7	e 17 32	PP	—
Florence	E.	93·7	40	e 13 18	− 2	—	—	—	—	—
Arapuni	E.	93·9	230	—	—	e 23 25	[−30]	e 31 13	SSP	43·3
Auckland	N.	94·0	232	18 1	PP	24 25	{+14}	23 43	SKS	37·2
Triest		94·0	37	e 13 19?	− 2	i 24 9	[+13]	i 17 7	PP	e 40·2
Rome		95·5	41	i 14 16k	+48	e 24 58	+16	i 18 3	PP	—
Wellington		95·8	227	13 29	0	24 55	+10	17 24	PP	43·2
Vladivostok		96·1	320	i 13 29	− 2	i 24 10	[+ 3]	i 17 21	PP	—
Moscow		97·2	19	e 13 40	+ 4	e 24 16	[+ 3]	e 17 34	PP	—
Christchurch		98·1	226	13 41	+ 1	25 18	+14	24 15	SKS	44·4
Belgrade		98·2	35	e 13 38	− 2	—	—	e 17 40	PP	e 54·2
Tamanrasset		100·6	60	e 13 49	− 2	—	—	i 17 57	—	—
Sverdlovsk		101·2	6	e 18 4	PP	e 25 31	+ 1	e 24 38	SKS	—
Yalta		105·1	28	—	—	e 28 2	PS	—	—	—
Istanbul		105·3	33	i 18 19	PP	—	—	e 20 37	PPP	—
Brisbane		108·4	247	i 26 49	?	i 28 28	PS	i 34 12	SS	—
Riverview		111·4	241	i 18 36	[0]	e 28 3	PS	e 34 13	SS	e 50·8
Leninakan		112·1	23	e 18 44	[+ 7]	—	—	—	—	—
Ksara		114·4	34	i 19 39	PP	i 29 23	PS	—	—	—
Helwan		114·8	40	19 25	PP	29 19	PS	21 55	PPP	—
Tashkent		117·3	3	i 19 50	PP	e 29 21	PS	i 22 8	PPP	—
Stalinabad		120·0	4	e 18 51	[− 2]	e 30 13	PS	—	—	—
Subic Bay		121·4	303	e 15 25	?	—	—	—	—	—
Calcutta	E.	133·8	340	e 21 48	P	i 32 8	PS	—	—	—
Bombay		139·7	0	e 19 24	[− 6]	—	—	—	—	—
Hyderabad	N.	140·9	352	e 19 23	[− 9]	—	—	—	—	—
Kodaikanal	E.	148·1	353	e 19 45	[+ 1]	—	—	—	—	—

Additional readings :—
Tacubaya iN = 2m.3s., iZ = 3m.3s., iN = 3m.48s.
Vera Cruz iN = 2m.49s., iSN = 4m.43s.
Tucson i = 3m.21s., 3m.46s., and 4m.3s.
Merida iSE = 6m.57s.
Pasadena i = 5m.11s., and 5m.53s.
Lick iZ = 5m.51s.
Logan i = 5m.41s.
Santa Clara esSE = 9m.25s.
Branner eSN = 8m.57s.
St. Louis iZ = 5m.4s., iSZ = 9m.4s.
Ukiah e = 6m.10s.
Mineral iN = 5m.14s., eSE = 9m.28s., eQE? = 11m.38s.
Arcata iN = 5m.27s., eSN = 9m.49s., eZ = 11m.37s.
Cleveland iN = 11m.10s., iE = 11m.13s.
Victoria i = 6m.19s. and 6m.27s., PPP = 7m.37s., SS = 13m.7s.
Saskatoon PPP = 7m.34s., e = 11m.14s., 11m.52s., and 13m.31s.
Philadelphia eS = 11m.35s.
City College iP_cP = 9m.10s.
Fordham iPZ = 6m.46s., iE = 12m.27s., i = 14m.29s.
Rolphton i = 6m.54s.
Ottawa PPP = 8m.10s., SS = 14m.51s.
Bogota e = 12m.14s., eSS = 15m.5s.
Harvard eQ = 18·2m.
Shawinigan Falls SSSN = 16m.34s.
San Juan i = 9m.3s.
Seven Falls SSE = 16m.25s.
Bermuda i = 14m.57s.
Halifax e = 8m.51s., SS = 17m.25s.
Huancayo e = 8m.57s., iSS = 17m.55s.
La Paz S_cSN = 18m.51s., SSN = 20m.25s., SSSN = 22m.28s., QN = 24m.25s.
La Plata PZ = 11m.34s., P_cPN = 12m.20s., P_cP? = 12m.54s., SKKSN = 22m.51s., SSN = 24m.36s., QN = 31m.13s., QE = 36m.7s.
Rathfarnham Castle ePSE = 22m.44s., eSSE = 27m.32s., eSSS = 32m.33s., eE = 33m.53s.
Aberdeen iSSE = 27m.35s., iSSSE = 30m.51s., eE = 35m.59s.
Durham iPPSEN = 23m.33s.
Lisbon E = 12m.43s., Z = 12m.47s., E = 18m.53s., SSE = 28m.13s.?, QN = 34·2m.
Kew ePSE = 23m.34s., eSSE = 28m.18s., eE = 31m.52s., eSSSE = 34m.14s.
Toledo SKSE = 23m.4s., SSN = 29m.3s.
De Bilt eSS = 28m.43s., eSSS = 32m.13s.?

Continued on next page.

Paris i =14m.31s., SKS =23m.1s.?, ePS =24m.24s., cPPS? =25m.11s., eSS =29m.13s.?, eSSS =33m.13s.?, eQ =37·2m.
Uccle ePN =13m.4s.?, SE =22m.20s., eSSE =28m.43s., SSN =28m.55s., eSSSE = 32m.13s.?
Malaga PPPZ =18m.52s., PSZ =24m.30s.
Granada P_cP =12m.57s., PPP =17m.9s., PS =24m.19s., iSS =29m.0s., SSS =31m.33s.
Upsala SN =23m.39s., eE =28m.13s.?, eSSSN =32m.37s.
Clermont-Ferrand iP =12m.52s., iSKS =23m.22s., iPS =24m.37s., iSS? =29m.41s., iSSS? =33m.25s.
Alicante PP =16m.33s., PPP =18m.22s., S_cS =23m.32s., sS =24m.27s., PS =24m.51s., PPS =25m.26s., SS =29m.51s., SSS =33m.31s., Q =36m.59s.
Strasbourg i =13m.15s., e =14m.35s., ePP =16m.24s. and 16m.27s., eSKS =23m.35s., iS =23m.54s., i =24m.3s., iPS =24m.41s., iSS =29m.51s., eSSS? =33m.22s.
Potsdam eE =25m.12s.
Stuttgart eSKS =23m.33s., ePS =24m.54s., eSS =29m.55s., eSSS =33m.26s.
Jena eN =13m.3s.
Cheb ePPP =19m.34s., SKS =23m.49s., ePS =25m.9s., ePPS =26m.7s., eSS =30m.19s., eSSS? =34m.1s.,
Prague eZ =15m.55s., eSKS =23m.49s., eS? =24m.40s., ePS =25m.21s., eSS =30m.37s., eSSS =35m.13s.
Triest iSKKS =24m.33s., iS =24m.48s., iPS =25m.49s.
Rome e =19m.37s., eSKKS =25m.37s., ePS =26m.53s., eSS =32m.13s.
Wellington SKS =24m.8s., PS =26m.16s., SS =31m.25s., SSS =34m.23s., Q =40m.1s.
Vladivostok iPS =26m.16s.
Christchurch PZ =9m.34s., i?Z =10m.55s., PPPZ =16m.15s., SKSNZ =19m.37s., SKSE =20m.17s., PSZ =22m.53s., i?EZ =26m.35s., SSE =29m.53s., SSSEN = 33m.13s., QE =38m.33s.
Belgrade e =47m.20s.
Tamanrasset i =13m.57s.a.
Sverdlovsk iPS =27m.11s., eSS =32m.39s.
Riverview ePSE =28m.12s., iE =28m.33s., ePPSEZ =29m.13s., eSSE =34m.43s., eSSSN =38m.13s., eN =38m.39s., eQN =45m.49s.
Helwan PS =30m.1s.
Long waves were also recorded at Apia, Colombo, Budapest, Kalossa, Warsaw, Edinburgh, and Tananarive.

Dec. 4d. 2h. 43m. 31s. I
2h. 49m. 21s. II
3h. 52m. 46s. III
Epicentre 21°·6N. 106°·7W. (as at 0h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Mazatlan z.	1·6	10	e 0 35	+ 5	e 0 51	0	—	—	—
I	Guadalajara	3·3	106	e 0 48	− 5	(i 1 32)	− 3	i 1 12	P_g	i 1·5
II		3·3	106	e 1 18	P_g	e 1 34	− 1	—	—	—
III		3·3	106	—	—	e 1 37	+ 2	e 1 41	S*	—
I	Manzanillo	3·4	139	i 0 52	− 3	i 1 32	− 5	—	—	—
II		3·4	139	i 1 34	?	i 1 38	+ 1	i 1 47	S*	—
III		3·4	139	i 0 55	0	i 1 37	0	—	—	—
I	Tacubaya	7·4	106	1 49	− 3	3 17	− 1	—	—	3·8
III		7·4	106	1 54	+ 2	3 28	+10	—	—	4·0
I	Puebla	8·4	106	e 2 0	− 6	—	—	—	—	4·3
III		8·4	106	e 2 6	0	—	—	—	—	i 4·4
I	Vera Cruz	10·2	102	i 3 21	?	i 3 37	?	i 4 54	SS	i 5·4
III		10·2	102	—	—	i 5 2	SS	—	—	i 5·6
I	Tucson	11·2	342	i 2 46	+ 2	i 5 6	+14	—	—	i 5·8
III		11·2	342	e 2 44	0	e 4 56	+ 4	i 3 1	PP	i 5·5
I	La Jolla z.	14·6	322	e 3 38	+ 8	—	—	—	—	—
I	Palomar z.	14·8	324	i 3 34	+ 2	—	—	—	—	—
II	z.	14·8	324	i 3 32	0	—	—	—	—	—
III	z.	14·8	324	i 3 34	+ 2	—	—	—	—	—
I	Riverside z.	15·5	325	e 3 43	+ 1	—	—	—	—	—
II	z.	15·5	325	i 3 46	+ 4	—	—	—	—	—
III	z.	15·5	325	e 3 42	0	—	—	—	—	—
I	Mount Wilson z.	16·1	324	i 3 50	+ 1	—	—	—	—	—
II	z.	16·1	324	i 3 50	+ 1	—	—	—	—	—
III	z.	16·1	324	i 3 53	+ 4	—	—	—	—	—

Continued on next page.

			△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Pasadena	z.	16·1	323	i 3 50	+ 1	—	—	—	—	—
II		z.	16·1	323	i 3 52	+ 3	—	—	—	—	—
III		z.	16·1	323	i 3 50	+ 1	—	—	—	—	—
I	Santa Barbara	z.	17·2	321	e 4 5	+ 2	—	—	—	—	—
I	Haiwee	z.	17·5	328	e 4 8	+ 1	—	—	—	—	—
II		z.	17·5	328	e 4 7	0	—	—	—	—	—
III		z.	17·5	328	e 4 5	− 2	—	—	—	—	—
I	Tinemaha	z.	18·4	329	i 4 20	+ 2	—	—	—	—	—
II		z.	18·4	329	i 4 17	− 1	—	—	—	—	—
III		z.	18·4	329	e 4 19	+ 1	—	—	—	—	—
III	Lick	z.	20·3	323	i 4 39	− 1	—	—	—	—	—
I	Logan		20·5	348	e 4 42	0	e 8 50	+23	—	—	e 10·4
III			20·5	348	e 4 41	− 1	e 8 39	+12	—	—	e 11·0
I	Shasta Dam		23·2	327	e 5 8	− 1	—	—	—	—	—
III			23·2	327	e 5 7	− 2	—	—	—	—	—
I	Cleveland		29·0	40	i 6 1	− 3	e 11 23	+29	e 10 6	?	—
I	Ottawa		34·7	38	e 6 49	− 5	—	—	—	—	18·5
II			34·7	38	e 6 48	− 6	—	—	—	—	—
III			34·7	38	e 6 50	− 4	—	—	—	—	20·2
I	La Paz		53·5	131	e 9 25	+ 1	—	—	—	—	—

Additional readings :—
Tacubaya I SN = 3m.22s. and 3m.25s.
Logan I i = 5m.27s. and 6m.3s., III e = 5m.23s.
Long waves were also recorded at other American stations.

Dec. 4d. 15h. 57m. 21s. Epicentre 21°·6N. 106·7W. (as at 3h.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manzanillo		3·4	139	− e 1 39	?	—	—	—	—	—
Tacubaya		7·4	106	e 1 54	+ 2	—	—	—	—	e 3·8
Vera Cruz	E.	10·2	102	—	—	—	—	e 5 1	SS	e 6·4
Tucson		11·2	342	i 2 43	− 1	e 4 48	− 4	i 2 54	PP	e 6·0
Palomar	z.	14·8	324	i 3 31	− 1	—	—	—	—	—
Riverside	z.	15·5	325	e 3 42	0	—	—	—	—	—
Pierce Ferry		15·8	338	i 3 46	+ 1	—	—	—	—	—
Boulder City		16·0	335	e 3 48	0	—	—	—	—	—
Mount Wilson	z.	16·1	324	i 3 48	− 1	—	—	—	—	—
Pasadena	z.	16·1	323	i 3 51	+ 2	—	—	—	—	—
Haiwee	z.	17·5	328	i 4 7	0	—	—	—	—	—
Tinemaha	z.	18·4	329	i 4 17	− 1	—	—	—	—	—
Lick	z.	20·3	323	i 4 37k	− 3	—	—	—	—	—
Berkeley	z.	21·1	323	i 4 41a	− 7	—	—	i 4 45	pP	—
Mineral	z.	22·6	328	i 5 2k	− 1	—	—	—	—	—
Shasta Dam		23·2	327	e 4 41	−28	—	—	—	—	—
Ottawa		34·7	38	e 6 48	− 6	—	—	—	—	—

Dec. 4d. 16h. 30m. 22s. Epicentre 53°·8N. 168°·9W. (as on 1946, July 12d.).

A = −·5821, B = −·1142, C = +·8051 ; δ = +7 ; h = −6 ;
D = −·193, E = +·981 ; G = −·790, H = −·155, K = −·593.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sitka		19·2	67	—	—	i 8 18	+19	—	—	e 14·4
Shasta Dam		33·6	94	e 6 44	0	—	—	i 7 0	pP	—
Mineral	z.	34·3	94	i 6 51a	+ 1	—	—	—	—	—
Berkeley	z.	35·5	98	i 7 10a	+10	—	—	i 7 16k	pP	—
Lick	z.	36·2	98	i 6 56k	−10	—	—	i 7 15	pP	—
Tinemaha	z.	38·3	95	e 7 26	+ 2	—	—	—	—	—
Haiwee	z.	39·2	95	e 7 49	+18	—	—	—	—	—
Vladivostok		39·6	279	e 7 33	− 2	i 13 35	− 3	—	—	—
Mount Wilson	z.	40·4	98	e 7 40	− 1	—	—	e 7 55	pP	—
Pasadena	z.	40·4	98	e 7 53	+12	—	—	—	—	e 19·0

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverside	Z.	41·0	98	e 7 49	+ 3	—	—	e 8 1	pP	—
Pierce Ferry		41·5	92	e 7 51	+ 1	—	—	i 8 12	pP	—
Palomar	Z.	41·8	98	i 7 52	− 1	—	—	i 7 58	pP	—
Tucson		46·1	93	e 8 24	− 4	—	—	i 8 34	pP	—
Ottawa		56·8	57	9 48	0	—	—	e 10 30	sP	30·6
Shawinigan Falls	N.	57·4	54	e 9 56	+ 3	—	—	—	—	—
Stuttgart	Z.	77·8	2	e 12 4	+ 3	—	—	—	—	—
Ksara		90·2	340	—	—	e 36 7	Q	—	—	—

Additional readings :—
Mineral iE = 6m.56s., iZ = 7m.5s.
Lick iZ = 7m.26s.
Tinemaha iZ = 7m.30s. and 7m.44s.
Palomar iZ = 8m.6s.
Long waves were also recorded at Auckland, Christchurch, Wellington, Bombay, Saskatoon, and Seven Falls.

Dec. 4d. 19h. 52m. 6s. Epicentre 41°·1N. 47°·7E. (as on 1938, Dec. 21d.).

A = +·5086, B = +·5590, C = +·6548 ; δ = −8 ; h = −2 ;
D = +·740, E = −·673 ; G = +·441, H = +·484, K = −·756.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Baku	1·8	113	e 0 40	P_g	e 1 0	S_g	—	—	—
Grozny	2·6	327	e 0 53	P_g	i 1 35	S_g	—	—	
Erevan	2·6	249	e 0 40	− 4	1 12	− 5	i 0 53	P_g	—
Leninakan	3·0	264	e 0 41?	− 9	1 26?	− 1	e 1 2?	P_g	—
Piatigorsk	4·5	313	e 1 22?	P_g	2 38	S_g	—	—	—
Sotchi	6·4	296	e 1 39	+ 1	2 56	+ 3	—	—	—
Ashkabad	9·0	111	e 2 7	− 6	4 24	S*	—	—	—
Ksara	11·9	236	e 3 10	+16	e 6 11	L	—	—	(e 6·2)
Samarkand	14·8	89	e 3 34	+ 2	—	—	—	—	—
Moscow	16·1	339	e 3 42?	− 7	e 6 42?	− 7	—	—	—
Tashkent	16·2	82	e 3 46?	− 4	—	—	—	—	—
Tchimkent	16·4	78	i 3 50	− 3	e 6 51	− 5	—	—	—
Stalinabad	16·4	91	i 3 51	− 2	i 6 47	− 9	—	—	—
Sverdlovsk	17·8	23	e 4 14	+ 3	e 7 30	+ 2	—	—	—
Andijan	18·6	84	e 4 18	− 3	—	—	—	—	—
Frunse	20·0	77	e 4 35	− 2	—	—	—	—	—
Murgab	20·4	89	e 4 42	+ 1	—	—	—	—	—
Stuttgart Z.	28·1	299	e 5 50s	− 5	—	—	e 6 45	PP	—
Tamanrasset	39·7	257	e 7 27	− 9	—	—	—	—	—

Additional readings :—
Grozny e = 1m.6s.
Leninakan eP_g = 47s.?

Dec. 4d. 20h. 18m. 46s. Epicentre 2°·0N. 99°·0E. (as on 1944, Jan. 4d.).

A = −·1563, B = +·9871, C = +·0347 ; δ = 0 ; h = +7 ;
D = +·988, E = +·156 ; G = −·005, H = +·034, K = −·999.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Colombo	E.	19·7	285	4 36	+ 2	8 24	+14
Calcutta	E.	22·9	334	e 5 11	+ 5	i 9 21	+ 8
Kodaikanal	E.	22·9	293	i 5 15	+ 9	i 9 20	+ 7
Hyderabad	N.	25·4	309	e 5 32	+ 1	10 12	+16
Bombay		30·7	305	e 6 19	0	e 10 22	−59
Murgab		43·1	332	7 53	−11	—	—
Andijan		45·5	332	e 8 27	+ 4	—	—
Stalinabad		45·7	327	i 8 23	− 1	—	—
Frunse		46·2	335	e 8 28?	0	e 15 16?	+ 1
Tashkent		47·4	330	i 8 38	0	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Samarkand		47·5	327	e 8 38	0	e 15 20	−14
Tchimkent		48·0	331	i 8 43	0	i 15 37	− 4
Vladivostok		50·4	32	—	—	e 18 37	S_cS
Sverdlovsk		62·6	338	i 10 28	0	—	—
Leninakan		62·9	316	10 24?	− 6	—	—
Piatigorsk		64·7	319	e 10 42?	0	—	—
Sotchi		66·7	318	e 10 34?	−21	—	—
Theodosia		70·2	318	11 25	P_cP	—	—
Moscow		72·6	329	e 11 25	− 6	e 20 34	−22
Copenhagen		86·4	326	12 44	− 1	—	—
Stuttgart	z.	88·4	319	e 12 52k	− 3	—	—
Tamanrasset		92·4	293	i 13 12k	− 2	—	—
Tinemaha	z.	128·0	38	i 22 15	PKS	i 23 3	?
Logan		128·3	29	e 22 14	PKS	e 23 2	?
Haiwee	z.	128·5	38	e 22 21	PKS	i 23 6	?
Mount Wilson	z.	129·9	40	i 22 23	PKS	i 23 32	?
Pasadena	z.	129·9	40	i 22 21	PKS	i 23 9	?
Riverside	z.	130·5	40	i 19 41	[+28]	i 22 24	PKS
Boulder City		130·8	36	i 22 31	PKS	i 23 18	?
Pierce Ferry		131·2	40	i 23 15	?	—	—
Palomar	z.	131·2	40	i 22 27	PKS	i 23 14	?
Ottawa		132·6	355	e 22 31	PKS	e 23 19	?
Tucson		135·7	36	i 22 42	PKS	i 23 30	?

Additional readings :—
Copenhagen 13m.9s.
Stuttgart eZ = 13m.19s.
Tamanrasset ePP = 13m.39s., iPPP = 13m.49s.k.
Riverside iZ = 20m.41s. and 23m.12s.
Palomar iZ = 22m.45s., eZ = 22m.54s.
It is doubtful if the American readings belong to this list.

Dec. 4d. 23h. 43m. 15s. Epicentre 33°·9N. 116°·3W.

Intensity VII at Cabazon, Desert Hot Springs, Indio, Mecca, Morongo Valley, Palm Springs, Twentynine Palms, San Bernardino, Willis Palms ; VI at Alberhill, Alta Loma, Beaumont, Huntington Park, and Los Angeles. Epicentre as adopted, macroseismic area 65,000 sq.m.

L. M. Murphy and F. P. Ulrich.
United States Earthquakes, 1948, Serial 746, Washington, 1951, pp. 19-23, macroseismic chart, p. 18.

C. F. Richter.
Desert Hot Springs earthquake of Dec. 4, 1948. Bulletin of the Geolog. Soc. of America, 1949, vol. 60, No. 12, part 2, p. 1956.

S. E. Warner.
Report of Field investigation of Coachella valley earthquake on Dec. 4, 1948. Bulletin of the Geolog. Soc. of America, vol. 60, part 2, p. 1958.

$A = -·3685$, $B = -·7457$, $C = +·5552$; $\delta = +11$; $h = +1$;
$D = -·896$, $E = +·443$; $G = -·246$, $H = -·498$, $K = -·832$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Palomar		0·7	221	i 0 16k	− 1	—	—	—	—	—
Riverside		0·9	277	i 0 17a	− 3	—	—	—	—	—
La Jolla		1·3	217	i 0 25k	0	—	—	—	—	—
Mount Wilson		1·5	282	i 0 27a	− 1	—	—	—	—	—
Pasadena		1·6	279	i 0 28a	− 2	i 0 50	− 1	—	—	—
Boulder City		2·4	30	(i 0 45)	+ 4	(i 1 13)	+ 1	—	—	—
Haiwee		2·6	329	e 0 43	− 1	—	—	—	—	—
Santa Barbara	z.	2·9	281	i 0 47	− 1	—	—	—	—	—
Tinemaha		3·6	334	i 0 56k	− 2	—	—	—	—	—
Fresno		4·0	316	i 1 3	− 1	—	—	i 1 14	P*	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		4·9	108	i 1 14k	− 3	i 2 18	+ 3	e 1 26	P*	i 2·7
Lick		5·5	310	i 1 23a	− 2	i 2 21	− 9	i 2 0	P_g	i 2·7
Santa Clara		5·7	308	e 1 41	+13	i 3 7	S_g	—	—	—
Branner		5·9	308	i 1 28a	− 3	i 2 51	+11	i 2 0	P_g	i 3·0
Berkeley		6·2	311	i 1 33a	− 2	i 2 54	+ 6	i 2 3	P_g	i 3·2
San Francisco		6·3	309	i 1 35	− 1	i 2 43	− 7	i 2 1	P_g	i 3·2
Mineral		7·7	328	i 1 56	0	i 4 0	S*	i 2 31	P_g	—
Shasta Dam		8·3	326	e 2 5	+ 1	e 4 13	S*	—	—	i 4·4
Logan		8·6	23	e 2 8	− 1	i 4 26	S*	i 2 42	P_g	i 4·7
Ferndale	E.	9·2	319	e 4 15	S	(e 4 15)	+12	e 5 3	S_g	—
Arcata	Z.	9·3	321	e 2 20	+ 3	i 4 19	+14	—	—	—
Bozeman		12·4	17	e 3 8	+ 7	e 5 36	+15	—	—	e 6·4
Butte	N.	12·4	12	i 3 13	+12	i 5 42	+21	—	—	i 6·2
Rapid City	E.	14·4	41	e 3 26	− 1	e 6 28	+19	—	—	i 7·2
Victoria		15·5	342	3 49	+ 7	6 44	+ 9	4 1	PP	7·8
Lincoln	E.	17·1	59	e 4 6	+ 4	e 7 28	+16	e 4 34	PP	e 8·9
Manzanillo		18·2	141	e 1 57	?	—	—	e 4 58	PPP	—
Saskatoon		19·5	17	4 38	+ 7	8 16	+10	5 10	PPP	9·8
Tacubaya		21·0	128	4 56	+ 9	8 45	+ 8	—	—	e 11·3
St. Louis		21·5	69	i 4 53	+ 1	i 9 4	+17	i 9 59	SS	e 10·8
Puebla		21·9	127	e 4 45	−12	—	—	—	—	e 12·0
Vera Cruz		23·2	123	e 3 51	?	—	—	—	—	e 11·4
Chicago		23·9	61	e 5 17	+ 1	e 9 39	+ 9	e 6 23	PPP	e 12·0
Mobile		24·0	89	e 5 31	+14	e 9 50	+18	—	—	i 12·4
Sitka		26·9	337	—	—	i 10 33	+13	—	—	i 13·1
Cleveland		28·4	64	e 5 55	− 3	e 10 50	+ 5	—	—	e 13·9
Columbia		29·2	78	—	—	e 10 58	0	—	—	e 12·3
New Kensington	E.	29·7	66	—	—	i 11 17	+11	—	—	i 18·1
Ville Marie		30·7	53	e 6 18	− 1	—	—	—	—	16·0
Pennsylvania	E.	31·1	65	i 6 15	− 7	i 11 39	+11	—	—	—
Rolphton		31·7	55	e 6 27	0	—	—	—	—	16·8
Ottawa		33·0	57	6 38	− 1	12 0	+ 3	13 45	SS	17·0
Philadelphia		33·2	67	—	—	e 12 16	+16	—	—	e 15·1
Fordham		34·2	65	i 6 50	+ 1	e 12 24	+ 8	—	—	17·6
Vermont		34·7	59	—	—	e 14 34	SS	—	—	e 16·8
Shawinigan Falls	N.	35·1	55	e 7 12	+15	—	—	—	—	15·8
Harvard		35·8	62	i 7 5	+ 2	e 12 57	+16	e 15 3	SS	e 21·2
Seven Falls	E.	36·5	55	e 6 9	−60	e 12 59	+ 8	—	—	19·2
Halifax		41·5	59	7 55	+ 5	14 15	+ 8	16 59	SS	20·4
Bermuda		42·9	77	e 9 13	PP	e 16 2	?	—	—	e 18·8
San Juan		47·2	95	e 8 34	− 2	e 15 37	+ 8	e 10 33	PP	e 19·6
Bogota		48·8	117	e 8 49	0	e 16 4	+12	e 11 9	PP	23·8
Huancayo		60·0	132	(e 10 12)	+ 1	e 10 12	P	—	—	—
La Paz		67·9	129	i 11 5	+ 3	20 5	+ 4	i 13 29	PP	31·4
Lisbon		81·2	49	12 20	+ 1	—	—	—	—	38·8
Paris		81·3	36	i 12 20	0	—	—	—	—	e 43·8
Vladivostok		81·3	316	i 12 21	+ 1	e 22 28	− 2	—	—	—
Clermont-Ferrand		83·7	38	e 12 34	+ 2	—	—	—	—	40·8
Strasbourg		83·9	33	e 12 35	+ 2	—	—	—	—	38·8
Stuttgart		84·4	33	e 12 37	+ 1	—	—	e 15 53	PP	e 44·8
Basle		84·6	34	e 12 36	0	—	—	—	—	—
Cheb		84·9	30	e 12 33	− 5	e 22 52	−14	e 16 20	PP	e 39·8
Zürich		85·2	34	e 12 40a	+ 1	e 23 20	+11	—	—	—
Malaga	Z.	85·3	48	i 12 42a	+ 2	—	—	i 16 6	PP	50·5
Granada		85·5	47	i 12 43a	+ 2	i 23 30	+18	13 7	P_cP	37·8
Prague		85·7	29	e 12 45	+ 3	e 23 33	+19	—	—	e 43·8
Alicante		86·7	45	12 16	−31	22 52	[−20]	16 8	PP	e 42·1
Triest		88·8	33	—	—	e 23 32	[+ 7]	—	—	e 45·8
Sverdlovsk		89·6	2	13 0	− 1	23 55	+ 4	16 41	PP	—
Christchurch		100·7	223	—	—	43 7	?	44 2	Q	46·2
Tamanrasset		101·0	53	13 54	+ 1	—	—	18 6	PP	—
Stalinabad		107·8	355	e 14 32	+ 9	28 18	PS	18 34	PKP	—
Ksara		107·8	25	i 18 58	PP	e 28 14?	PS	—	—	—
Helwan		109·6	30	e 19 6	PP	e 25 18	[+ 7]	e 28 35	PS	—
Riverview		109·8	241	—	—	e 29 4	PS	e 45 27	Q	e 50·8

For Notes see next page.

NOTES TO DECEMBER 4d. 23h. 43m. 15s.

Additional readings and note :—
Boulder City readings have been reduced by 3m.
Pierce Ferry ($\Delta = 2°{\cdot}9$) gives iP = 16m.12s., i = 17m.5s.
Fresno iEN = 1m.7s.
Lick iN = 1m.28s., iE = 1m.33s., iN = 1m.36s., 1m.43s., and 2m.6s., iSE = 2m.28s.
Branner iE = 1m.31s., iN = 1m.41s.
Berkeley iEN = 1m.38s., iN = 1m.41s., iE = 1m.47s. and 1m.59s., iEN = 2m.21s., iE = 2m.32s., iN = 2m.45s. and 2m.59s.
Mineral iZ = 1m.59s., iEN = 2m.7s., iN = 3m.7s. and 4m.5s.
Logan i = 3m.2s.
Ferndale eE = 4m.47s.
Arcata iZ = 2m.27s., iN = 2m.58s., iN = 4m.41s., iZ = 4m.45s.
Bozeman i = 3m.13s., iS = 5m.55s.
Butte iN = 3m.30s.
Rapid City iE = 3m.57s.
Victoria SS = 7m.3s.
Manzanillo eE = 6m.24s., eN = 6m.28s.
Tacubaya eE = 7m.22s., eSE = 8m.57s., eN = 10m.31s.
Pueblo eEN = 7m.6s.
Vera Cruz eN = 4m.1s., eZ = 4m.10s., eE = 8m.6s., eN = 8m.15s., eE = 10m.51s., eN = 11m.6s.
Chicago iS = 9m.50s., i = 10m.16s.
Cleveland iZ = 6m.5s., eE = 12m.47s.
New Kensington eE = 13m.32s., iE = 15m.37s.
Harvard eQ = 17m.51s.
Halifax SSS = 17m.37s.
Bogota e = 9m.9s.
La Paz SSE = 24m.33s.
Strasbourg iP = 12m.38s., e = 12m.59s.
Cheb eSS = 26m.45s.
Alicante PPP = 18m.4s., SS = 28m.48s., SSS = 32m.0s., Q = 35m.52s.
Sverdlovsk PS = 25m.7s., SS = 29m.57s.
Tamanrasset e = 17m.53s.
Stalinabad eSS = 34m.9s.
Long waves were also recorded at Auckland, Arapuni, Wellington, Honolulu, Bombay, College, Seattle, Ivigtut, and other European stations.

Dec. 4d. Readings also at 0h. (Riverside, Tinemaha, and near Apia), 1h. (Granada), 2h. (Riverside and Tucson), 4h. (Ottawa, and Tacubaya), 6h. (near La Paz), 7h. (Riverside, Tinemaha, Tucson, Ottawa, and Tacubaya), 10h. (near Stalinabad), 17h. (Askhabad), 20h. (Tucson), 23h. (Belgrade).

Dec. 5d. 6h. 26m. 1s. Epicentre 55°·1S. 158°·5E. (as on 1943, Sept. 16d.).

$A = -{\cdot}5348$, $B = +{\cdot}2107$, $C = -{\cdot}8183$; $\delta = +2$; $h = -7$;
$D = +{\cdot}367$, $E = +{\cdot}930$; $G = +{\cdot}761$, $H = -{\cdot}300$, $K = -{\cdot}575$.

There appears to have been a second shock about 20 seconds after this one, mostly recorded at the more distant stations.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Christchurch		14·8	44	3 27	− 5	6 34	+16	i 3 57	PPP	i 7·7
Kaimata		15·2	39	3 59	+21	—	—	—	—	—
Wellington		17·5	45	4 12	+ 5	7 26	+ 5	8 35	P_cP	—
New Plymouth	E.	19·1	42	4 49	+22	—	—	—	—	—
Arapuni	E.	20·6	42	e 5 17	PPP	e 8 59	+30	—	—	—
Tuai	N.	20·6	45	4 51	+ 8	—	—	i 5 29	PPP	9·3
Auckland	N.	21·4	38	3 59?	−52	i 8 18	−27	—	—	—
Riverview		21·9	346	i 4 55a	− 2	i 9 19	+25	i 5 32	PP	e 11·1
Brisbane	N.	27·9	350	e 5 50	− 4	e 9 52	−45	i 6 23	PP	i 13·0
Apia		47·2	43	e 8 53	+17	e 15 53	+24	—	—	(e 15·9)
La Plata	E.	85·1	151	12 35	− 4	23 0	[− 1]	15 43	PP	48·2
	N.	85·1	151	12 41	+ 2	22 56	[− 5]	15 25	PP	48·3
Tananarive		86·0	243	e 12 45	+ 2	e 23 22	+ 5	17 53	PPP	e 39·7
Colombo	E.	89·1	283	e 13 19	+21	e 23 34	[+ 7]	—	—	37·3
Kodaikanal	E.	93·2	283	e 12 54	−23	i 24 19	− 4	e 30 37	SSP	e 37·3

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz		98·5	136	e 13 55	+13	i 24 33	[+13]	i 26 31	PS	44·0
Hyderabad	N.	98·6	288	e 9 32	?	—	—	—	—	39·7
Huancayo		99·3	127	e 14 6	+21	e 24 35	[+11]	e 17 49	PP	e 40·5
Vladivostok		100·4	341	e 13 58	+ 8	27 27	PS	i 18 16	PP	—
Bombay		102·9	285	e 15 15	+74	e 25 45	0	e 27 29	PS	42·6
Pasadena		113·7	64	i 19 0	[+20]	e 29 39	PS	—	—	47·4
Mount Wilson	z.	113·8	64	i 18 59	[+18]	—	—	—	—	—
Riverside	z.	114·0	64	e 18 49	[+ 8]	—	—	—	—	—
Santa Clara	z.	114·3	59	e 25 19	SKS	(e 25 19)	[−10]	—	—	—
Bogota		114·4	119	e 18 54	[+12]	e 27 31	{+55}	e 19 47	PP	e 64·0
Lick	z.	114·4	59	e 19 9k	[+27]	—	—	—	—	—
Berkeley		114·5	59	i 21 41	PPP	i 29 55	PS	—	—	—
Haiwee	z.	115·3	63	e 19 18	[+34]	—	—	—	—	—
Tinemaha	z.	115·9	62	e 19 14	[+29]	—	—	—	—	—
Irkutsk		116·0	326	e 19 37	[+52]	e 25 59	[+23]	29 48	PS	—
Tucson		116·1	70	e 19 0	[+15]	e 29 43	PS	e 20 6	PP	e 46·5
Shasta Dam		116·7	57	e 19 15	[+29]	—	—	—	—	—
Boulder City		116·8	65	e 18 44	[− 3]	—	—	—	—	—
Pierce Ferry		117·4	66	e 18 46	[− 2]	—	—	—	—	—
Andijan		120·2	299	e 19 0	[+ 7]	—	—	—	—	—
Stalinabad		120·4	295	e 18 51	[− 2]	e 27 30	{+14}	e 22 20	PKS	—
Frunse		120·7	301	e 19 8	[+14]	—	—	—	—	—
Samarkand		122·1	294	e 19 13	[+16]	—	—	—	—	—
Tashkent		122·2	297	19 29?	[+32]	—	—	e 21 1?	PP	—
Victoria		122·2	50	e 22 5	PKS	i 32 35	PPS	—	—	56·1
Logan		122·7	62	e 19 4	[+ 6]	e 25 22	[−37]	e 30 43	PS	e 52·0
Tchimkent		122·7	298	e 19 14	[+16]	—	—	—	—	—
Sitka		124·3	36	—	—	e 29 43	?	e 38 45	SSP	e 52·6
Butte	N.	125·4	58	e 21 43	PP	e 38 31	SSP	e 34 40	?	e 51·1
Bozeman		125·9	59	e 19 36	[+32]	e 26 25	[+16]	e 22 40	PKS	e 53·5
Rapid City	E.	128·8	65	e 19 27	[+17]	e 22 46	PKS	e 27 57	SKKS	e 55·5
Fort de France		129·4	127	e 19 31	[+20]	—	—	—	—	—
Lincoln	E.	130·2	73	e 22 49	PKS	e 28 41	{+20}	e 39 52	SSP	e 55·7
San Juan		130·2	119	e 19 47	[+35]	i 22 59	PKS	i 24 38	PPP	e 50·4
Baku		131·8	283	e 22 47	PKS	—	—	—	—	—
St. Louis		132·2	80	e 19 22	[+ 6]	e 25 48	[−37]	e 21 53	PP	—
Saskatoon		132·4	56	i 23 1	PKS	e 39 52	SS	e 24 27	PPP	63·0
Columbia		134·2	91	e 22 51	PP	e 39 45	SS	e 45 3	SSS	e 55·2
Helwan		135·0	258	e 19 30	[+ 9]	22 51	SKP	21 51	PP	—
Ksara		135·3	265	e 19 26	[+ 4]	33 20	?	—	—	—
Chicago		135·8	78	e 19 41	[+18]	e 27 47	[+75]	e 22 59	PKS	e 54·6
Sverdlovsk		136·6	308	e 23 8	PKS	—	—	—	—	—
Cleveland		139·1	83	e 19 38	[+ 9]	e 23 22	SKP	e 40 57	SS	—
Pennsylvania	E.	140·7	87	e 21 16	?	i 23 14	PKS	—	—	—
Philadelphia		141·5	90	e 23 23	PKS	e 25 56	[−46]	e 29 53	SKKS	e 59·8
Tamanrasset		142·0	223	e 19 52	[+18]	—	—	—	—	—
Bermuda		142·3	108	e 21 42	PP	e 33 48	PS	e 42 22	SSP	e 58·0
Fordham		143·1	89	e 19 46	[+10]	i 23 49	SKP	i 21 29	PP	60·4
Theodosia		143·1	278	20 57	[+81]	—	—	—	—	—
Yalta		143·5	276	e 20 53	[+76]	—	—	—	—	—
Temiskaming		143·7	78	e 19 32	[− 5]	—	—	—	—	—
Ville Marie		143·8	77	e 19 31	[− 6]	—	—	—	—	—
Rolphton		144·2	81	i 19 24	[−14]	—	—	i 19 46	PKP	—
Istanbul		144·2	268	i 22 34	PP	—	—	i 25 54	PPP	—
Ottawa		144·8	82	19 26	[−13]	26 35	[−12]	—	—	61·0
Harvard		145·5	90	e 19 34	[− 6]	—	—	—	—	e 72·0
Vermont		145·7	86	e 21 56	?	e 45 8	?	—	—	e 64·1
Shawinigan Falls	N.	147·2	82	e 19 56	[+13]	—	—	—	—	—
Moscow		147·4	296	19 40	[− 3]	—	—	22 43	PP	—
Seven Falls	E.	148·6	83	19 51	[+ 6]	30 29	{+18}	26 11	PPP	64·0

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Catania		149·7	250	e 20 31	[+44]	—	—	— —	—
Halifax		151·3	93	e 25 35	?	e 39 9	?	— —	65·0
Belgrade		151·5	266	e 19 45k	[− 5]	—	—	i 20 2 PKP	e 74·2
Kalossa		153·4	270	e 20 15	[+23]	—	—	e 20 26 PKP_2	—
Budapest	E.	153·8	270	e 20 14	[+21]	—	—	— —	—
Rome		154·2	254	e 20 7	PKP_2	e 23 50	PKS	e 23 13 PP	—
Warsaw		154·9	281	e 20 28	[+34]	—	—	— —	e 72·0
Raciborzu		155·6	275	e 20 2	[+ 7]	—	—	— —	—
Triest		155·8	262	e 20 18	[+23]	e 27 13	[+13]	i 20 53 PKP_2	e 63·9
Padova		156·2	260	e 20 42?	[+46]	—	—	e 24 24 PP	—
Bologna	z.	156·5	257	e 19 59	[+ 3]	—	—	— —	—
Salo	z.	157·7	258	e 20 19	[+21]	—	—	e 24 32 PP	—
Prague		157·8	273	e 20 23	[+25]	e 27 29	[+27]	e 24 17 PP	e 65·0
Alicante		158·1	229	20 11	[+12]	30 59	{− 3}	20 39 PKP_2	73·4
Malaga	z.	158·2	220	i 20 1k	[+ 2]	—	—	i 20 31 PKP_2	76·0
Granada		158·3	221	i 20 24k	[+25]	30 39	{−25}	20 36 PKP_2	79·6
Upsala		158·7	299	—	—	e 37 59?	PPS	e 50 23 SSS	e 59·0
Cheb		158·9	271	e 20 47	PKP_2	e 27 11	[+ 7]	e 23 59 SKP	e 66·0
Barcelona		159·3	239	—	—	e 50 46	SSS	— —	e 65·7
Potsdam	N.	159·5	278	—	—	i 50 29	SSS	— —	e 65·0
Tortosa		159·6	235	22 17	?	36 22	SKSP	50 32 SSS	e 69·0
Zürich		159·8	260	e 20 25	[+24]	—	—	— —	—
Stuttgart		160·2	265	e 20 12	[+11]	—	—	e 20 47 PKP_2	e 84·0
Basle		160·4	260	e 18 39	?	—	—	e 23 9 ?	—
Copenhagen		160·8	287	—	—	44 47	SS	51 5 SSS	64·0
Toledo		160·8	224	e 20 19	[+17]	e 43 58	SS	i 20 52 PKP_2	64·8
Strasbourg		160·9	263	e 20 20	[+18]	—	—	i 20 52 PKP_2	—
Lisbon		161·6	212	20 49	PKP_2	44 29	SS	24 26 PP	65·0
Clermont-Ferrand		161·8	249	e 20 38	PKP_2	(41 59)	?	— —	42·0
Paris		164·0	258	e 20 22	[+17]	e 46 59?	SSP	24 45 PP	e 79·0
Ivigtut		164·7	56	—	—	32 47	?	56 41 Q	76·0
Kew		166·8	265	—	—	e 35 55	?	e 47 3 SSP	e 67·0

Additional readings :—
Wellington PP =4m.40s., i =5m.53s., 9m.13s., 10m.39s., 11m.54s., and 13m.3s.
Auckland iN =4m.20s., 5m.23s., and 6m.50s.
Riverview i =5m.0s., iN =5m.28s. and 9m.25s., iE =9m.41s., iZ =9m.51s., iE =10m.11s., iN =10m.14s., iSSSN =10m.47s.
Brisbane iSS =10m.55s.
La Plata P_cP?N =13m.19s., E =14m.25s., PPPE =17m.50s., PPSN =24m.33s., SSE =28m.15s., N =28m.19s., SSN =28m.48s., QE =36m.52s., QN =38m.36s.
Tananarive e =22m.58s., PS =24m.14s., e =35m.35s.
La Paz iPEN =14m.5s., iPPEN =17m.17s., iPPP?N =20m.15s., iE =25m.27s., iSSN =29m.29s., SSS =31m.59s.
Huancayo e =19m.59s., ePS =26m.25s., i =26m.54s., iSS =30m.59s.
Vladivostok iSS =32m.23s.
Bogota eSEN =29m.27s.
Berkeley iSE =31m.13s., iE =36m.22s., iN =36m.45s., eE =48m.35s.
Irkutsk eSSS =40m.17s.
Tucson e =33m.29s., eSS =35m.4s., eSSS =40m.31s.
Victoria i =23m.39s., e =27m.53s., 38m.29s., and 42m.29s.
Logan e =32m.26s., eSS =36m.37s., eSSS =41m.15s.
Bozeman ePPS =32m.28s., eSS =38m.35s., e =39m.0s., and 43m.24s.
Rapid City eE =19m.47s. and 25m.43s., ePPSE =32m.23s., eSSE =39m.31s.
San Juan iPPP =23m.24s., ePPS =33m.4s., eSS? =39m.14s., e =44m.59s.
St. Louis i =22m.27s., iPPP =23m.45s., e =31m.43s.
Saskatoon i =23m.16s., e =32m.17s., 45m.0s., 48m.30s., and 58m.29s.
Chicago e = 31m.45s. and 40m.13s., eSS =40m.45s.
Cleveland eEN =23m.30s. and 24m.0s., eE =24m.53s., eN =40m.10s., eE =41m.39s. 45m.16s., eSSSN =46m.23s., eEN =56m.35s.
Pennsylvania eE =23m.59s., 43m.5s.
Philadelphia eS =30m.57s., e =35m.44s., eSS =41m.38s.
Bermuda eSKS? =28m.2s., e =47m.35s.
Fordham iP =20m.2s.
Ottawa i =19m.37s., e =20m.8s., PP =21m.59s., PPP =25m.17s., SKKS =28m.57s., PS =32m.29s., PPS =34m.11s., SS =39m.59s.?
Harvard i =19m.47s., e =21m.17s., 22m.23s., 25m.11s., and 39m.11s.
Seven Falls PPSE =35m.17s., SSE =42m.11s., SSSE =46m.41s.
Catania e =20m.59s. and 21m.33s.
Belgrade e =24m.37s.
Kalossa eE =22m.30s.

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Budapest iE =22m.30s., eE =48m.47s., and 63m.59s.?
Rome e =21m.11s., eSS =42m.59s.?
Triest iSKP =23m.50s., ePP =24m.4s., ePPP =27m.39s., eSKSP =34m.21s., eSSS = 49m.59s.?
Padova eN =21m.31s.
Bologna eZ =21m.2s., e =24m.55s. and 30m.27s.
Prague eZ =30m.23s., ePPP($\triangle > 180°$) =33m.29s., eSKSP? =35m.41s., eN =40m.17s., eSS? =43m.59s., eSSS? =50m.17s., eE =58m.53s.
Alicante PKS =24m.13s., PP =24m.39s., PPP =27m.35s., SKS =28m.7s., SS =44m.19s., SSP =44m.59s., SSS =49m.47s., Q =64m.27s.
Malaga iPPZ =24m.11s., PPPZ =27m.55s., PPSZ =37m.31s.
Granada sPKP =21m.24s., iPP =24m.9s., pPP =24m.39s., sPP =25m.8s., SKSP = 34m.51s., PPS =37m.24s., iSS =44m.12s., SSS =50m.10s., Q =71m.11s.
Upsala eN =38m.59s., eSS =43m.59s., eN =48m.59s.
Cheb e =30m.23s., eSKKS =31m.29s., e =32m.11s., eSKSP =35m.11s., e =35m.29s., eSS? =43m.47s., eSSS =50m.5s.
Toledo ePPZ =24m.22s., eSSSN =50m.1s.
Strasbourg e =21m.23s. and 24m.20s., L? =39m.59s.?
Lisbon E? =28m.22s. and 38m.42s.
Paris i =20m.35s., iPKP =21m.3s., e =57m.59s.?
Kew e =36m.13s. and 41m.21s., eE =45m.56s., and 52m.43s., eEN =56m.22s.
Long waves were also recorded at Honolulu, De Bilt, and Aberdeen.

Dec. 5d. Readings also at 0h. (Shasta Dam (2), near Boulder City (2), Pierce Ferry (4), Tucson (3), Pasadena (3), Palomar (3), and Riverside (3)), 2h. (near Shasta Dam and near Stuttgart), 3h. (near Grozny, near Shasta Dam, Ferndale, and Mineral), 5h. (Dehra Dun, Andijan, Tashkent, Tchimkent, Frunse, near Kulyab, Stalinabad, Samarkand, and Murgab), 7h. (Tacubaya, Riverview, Wellington, Arapuni, Auckland, Kaimata, near Mineral, near Boulder City, Pierce Ferry, and near Shasta Dam), 8h. (Granada and Stuttgart), 9h. (Uccle, near Stalinabad, near Mineral, Boulder City, Pierce Ferry, and Shasta Dam), 10h. (near Stalinabad), 12h. (Salt Lake City, near Boulder City and Pierce Ferry), 13h. (near Boulder City), 14h. (near Shasta Dam), 16h. (College, near Mineral and Shasta Dam), 17h. (near Shasta Dam, Ferndale, Mineral, and Arcata), 18h. (Wellington, Christchurch, and Auckland), 19h. (near Stalinabad), 22h. (Andijan and near Frunse).

Dec. 6d. 12h. 10m. 40s. Epicentre 17°·4S. 167°·9E. (as on 1948, Jan. 18d.).

$A = -·9336$, $B = +·2002$, $C = -·2972$; $\delta = +2$; $h = +5$;
$D = +·210$, $E = +·978$; $G = +·291$, $H = -·062$, $K = -·955$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		17·0	230	i 3 54k	− 7	i 7 11	+ 1	i 4 4	PP	i 8·7
Auckland	N.	20·3	164	(4 56?)	+16	(8 30)	+ 7	—	—	(10·3)
Arapuni	E.	21·7	163	—	—	9 20	SS	—	—	—
Riverview		22·2	218	i 4 59a	− 1	i 8 56	− 4	i 5 13	PP	e 10·3
Tuai	N.	22·8	161	5 2	− 3	9 15	+ 4	—	—	e 15·4
Wellington		24·5	167	5 18	− 4	9 56	+16	8 49	P_cP	12·6
Kaimata		25·2	174	5 43	+14	—	—	—	—	—
Christchurch		26·4	172	5 41	+ 1	10 7	− 5	10 42	Q	12·3
Vladivostok		68·7	333	e 11 0	− 7	i 20 5	− 5	—	—	—
Lick	Z.	85·7	49	e 12 36	− 6	—	—	—	—	—
Shasta Dam		86·6	46	e 12 44	− 2	—	—	—	—	—
Pasadena		87·0	53	e 12 50	+ 2	—	—	e 13 14	P_cP	e 39·4
Mount Wilson	Z.	87·1	53	e 12 48	− 1	—	—	e 12 56	P_cP	—
Riverside	Z.	87·5	53	e 12 53	+ 2	—	—	e 13 14	P_cP	—
Palomar	Z.	87·6	54	e 12 53	+ 2	—	—	e 13 16	P_cP	—
Tinemaha	Z.	88·1	50	e 12 49	− 5	—	—	e 12 57	P_cP	—
Boulder City		90·2	52	e 13 5	+ 1	—	—	—	—	—
Colombo	E.	90·2	276	—	—	23 2	[−32]	—	—	—
Pierce Ferry		90·9	52	e 13 4	− 3	—	—	—	—	—
Tucson		92·0	57	e 13 11	− 1	—	—	i 13 33	P_cP	e 42·5
Bombay	E.	100·1	286	e 21 20?	?	—	—	—	—	—
Stalinabad		107·6	306	e 18 19	PP	e 29 2	PPS	—	—	—
St. Louis		109·8	54	e 28 3	PS	e 34 15	SS	i 28 28	PS	e 52·3
Huancayo		111·0	111	e 28 52	PS	e 35 5	SSP	e 31 22	?	e 51·8
Sverdlovsk		113·8	325	—	—	e 39 13	SSS	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz	115·3	118	e 18 32	[−12]	i 29 20	PS	35 32	SS	55·3
Bogota	118·1	94	e 29 54	PS	e 36 55	SSP	—	—	e 56·3
Ksara	134·2	300	e 21 47	PP	e 27 53	?	—	—	—
Helwan	138·5	295	e 19 36	[+ 8]	—	—	i 22 38	PP	e 49·4
Prague	141·1	333	e 20 38	?	e 30 50	?	e 34 20?	?	—
Stuttgart	144·2	336	e 19 30	[− 8]	e 37 38	?	e 24 15	?	—
Triest	144·5	328	e 18 47	[−51]	e 28 8	?	e 31 47	?	e 67·3
Strasbourg	144·9	337	e 19 33	[− 6]	—	—	e 19 39	PKP	86·3
Zürich	145·6	335	e 19 33	[− 7]	—	—	—	—	—
Basle	145·9	336	e 19 34	[− 7]	—	—	—	—	—
Paris	146·5	342	e 19 38	[− 4]	—	—	e 19 52	PKP	e 81·3
Bologna	146·6	328	e 19 39	[− 3]	—	—	e 19 49	PKP	—
Rome	147·8	325	e 19 42	[− 2]	e 23 9	SKP	—	—	—
Clermont-Ferrand	149·0	339	e 19 50	[+ 4]	—	—	—	—	—
Granada	158·9	341	22 56	?	45 31	SSP	—	—	84·2

Additional readings :—
Auckland readings increased by 2m.
Riverview iE = 9m.3s., iZ = 9m.7s., iN = 9m.23s., iE = 9m.29s., iSSSE = 9m.50s.
Mount Wilson eZ = 13m.13s.
Tinemaha eZ = 13m.17s.
Strasbourg e = 20m.28s. and 21m.5s.
Long waves were also recorded at Apia, Tananarive, Alicante, and at other North American stations.

Dec. 6d. 14h. 9m. 12s. Epicentre 22°·9N. 121°·5E. (as on 1943, Dec. 2d.).

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zi-ka-wei	E.	8·3	356	—	—	e 3 58	S*	—	—	—
Nanking		9·4	346	2 15	− 3	3 55	−12	—	—	—
Calcutta	E.	30·6	276	—	—	e 11 30	+10	—	—	e 15·3
Frunse		43·5	308	e 8 18	+11	—	—	—	—	—
Andijan		44·8	305	e 8 19	+ 2	e 15 1	+ 6	—	—	—
Bombay	E.	45·5	274	—	—	e 16 6	+61	—	—	—
Tchimkent		47·0	307	e 8 34	− 1	—	—	—	—	—
Tashkent		47·2	306	e 8 35?	− 1	e 15 31?	+ 2	—	—	—
Stalinabad		47·3	302	e 8 38	+ 1	e 15 41	+10	—	—	—
Samarkand		48·8	303	e 8 52	+ 3	—	—	—	—	—
Sverdlovsk		55·2	324	i 9 39	+ 2	17 21	+ 1	—	—	—
Leninakan		66·3	306	10 48	− 4	—	—	—	—	—
Moscow		68·0	323	e 11 3	0	—	—	—	—	—
Helwan		79·1	297	e 12 8	0	e 22 18	+11	—	—	—
Prague		83·0	322	—	—	e 32 0	SSS	e 36 36	Q	e 41·9
Kew		90·1	328	—	—	e 35 48?	?	—	—	—

Long waves were also recorded at other European stations.

Dec. 6d. Readings also at 2h. (Nanking, near Pasadena, Riverside, Palomar, Boulder City, Pierce Ferry, and Tucson), 6h. (near Tacubaya), 8h. (near Mizusawa), 9h. (La Paz), 11h. (near Stalinabad), 13h. (Tamanrasset, Ksara, and near Shasta Dam), 14h. (Strasbourg, Stuttgart, Tamanrasset, Kaimata, Wellington, Tuai, Arapuni, Auckland, Christchurch, and Riverview), 16h. (Basle, Zürich, Stuttgart, and Strasbourg), 17h. (Stuttgart), 18h. (Stuttgart, Christchurch, and Wellington), 19h. (near Ashkabad), 20h. (Tucson), 23h. (Samarkand, near Stalinabad and Murgab).

Dec. 7d. 9h. 15m. 18s. Epicentre 18°·0N. 69°·5W.

Felt at San Juan, Romey Airfield, slightly at Caguas, Ponce, and Humacao. Epicentre as adopted.

L. M. Murphy, F. P. Ulrich.
United States Earthquakes, 1948, serial no. 746, Washington, 1951, p. 28.

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

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Port-au-Prince		2·7	282	e 1 0	P_g	i 1 37	S_g	—	—	i 2·5
San Juan		3·1	83	e 0 56	+ 5	i 1 27	− 2	—	—	i 1·6
Fort-de-France		8·6	111	e 2 14	+ 5	e 3 41	− 7	—	—	—
Bogota		14·0	199	i 3 39	PPP	i 6 20	SS	i 6 25	SSS	—
Philadelphia		22·4	349	i 5 37	PP	i 9 0	− 4	—	—	e 10·0
Fordham		23·1	353	i 5 6	− 2	i 9 9	− 7	—	—	—
Harvard		24·5	358	i 5 14	− 8	i 9 43	+ 3	i 5 55	PP	—
St. Louis		27·4	323	e 5 46	− 3	e 11 10	+42	e 6 22	PP	—
Ottawa		27·8	351	e 5 48	− 5	e 10 57	+22	—	—	—
Shawinigan Falls	N.	28·6	356	—	—	e 11 53	SS	—	—	—
Seven Falls	E.	29·1	358	—	—	e 11 53	SS	—	—	—
Temiskaming		29·7	347	i 6 5	− 5	—	—	—	—	—
Huancayo		30·4	192	e 7 23	PP	—	—	—	—	—
La Paz		34·3	177	6 51	+ 1	e 12 22	+ 5	—	—	—
Tucson		39·8	300	i 7 37a	+ 1	—	—	e 9 20	PP	—
Pierce Ferry		43·1	304	i 8 5	+ 1	—	—	e 8 32	?	—
Boulder City		43·8	304	i 8 4	− 5	—	—	—	—	—
Palomar		45·0	299	i 8 19a	0	—	—	i 8 33	?	—
Riverside	Z.	45·5	301	i 8 23a	0	—	—	i 8 55	?	—
Mount Wilson	Z.	46·1	301	i 8 27a	− 1	—	—	i 8 55	?	—
Pasadena	Z.	46·1	301	i 8 28a	0	i 8 47	?	i 9 28	?	—
Haiwee	Z.	46·3	303	i 8 30	+ 1	—	—	—	—	—
Tinemaha	Z.	46·7	305	i 8 32a	0	—	—	i 8 59	?	—
Lick	Z.	49·4	305	i 8 53a	0	—	—	—	—	—
Branner	Z.	49·8	305	i 8 56a	0	—	—	i 9 23	?	—
Mineral	Z.	49·8	308	i 8 54a	− 2	—	—	—	—	—
Shasta Dam		50·5	308	i 8 57	− 5	—	—	—	—	—
Victoria		53·0	318	i 9 17	− 4	—	—	e 9 42	?	—
Paris		64·9	44	i 10 38	− 5	—	—	e 11 23	P_cP	—
Stuttgart	Z.	69·3	44	e 11 4	− 7	—	—	—	—	—

Additional readings :—
Bogota iPP = 3m.50s., eS_cSEN = 15m.44s.
Harvard i = 5m.41s. and 5m.45s.
Tucson i = 7m.57s.
Shasta Dam e = 9m.23s., and 9m.41s.

Dec. 7d. 16h. Undetermined shock.

Riverview eP?Z = 23m.47s., eSN = 27m.34s., iSE = 27m.38s., iZ = 27m.47s., iN = 28m.0s. and 28m.28s., eL = 29·2m.
Auckland eN = 27m., LN = 29m.
Christchurch = 28m.
Wellington e = 28m.39s., L = 31·5m.
Arapuni eE = 29m.
Palomar eP?Z = 31m.22s.
Tinemaha ePZ = 31m.24s.
Tucson eP? = 31m.43s.
Vladivostok eP = 33m.1s., SS = 51m.44s.
Stuttgart eZ = 38m.7s.
Strasbourg ePKP = 38m.10s.
Clermont-Ferrand ePKP = 38m.21s.
Paris ePKP = 38m.23s., e = 38m.50s.
Tamanrasset PKP = 38m.36s.
Long waves were recorded at Uccle,

Dec. 7d. 21h. Undetermined shock, probably a repetition of that at 16h.

Riverview ePʔZ =8m.22s., eSN =12m.9s., iSE =12m.13s., iZ =12m.23s., iN =12m.36s., iZ =13m.0s., eLE =13·6m.
Arapuni eE =12m.30s.
Auckland eN =12m.
Shasta Dam eP =15m.51s.
Riverside ePZ =15m.57s.
Palomar ePZ =15m.57s.
Tinemaha ePZ =16m.9s.
Mount Wilson ePZ =16m.9s.
Boulder City ePʔ =16m.11s.
Pierce Ferry ePʔ =16m.13s.
Tucson eP =16m.37s.
Stuttgart eZ =22m.43s.
Strasbourg iPKP =22m.44s.
Long waves were also recorded at Wellington and Christchurch.

Dec. 7d. 23h. 19m. 53s. Epicentre 25°·1N. 90°·9E. (as on 1945, May 19d.).

A = −·0142, B = +·9066, C = +·4219; δ = +12; h = +3;
D = +1·000, E = +·016; G = −·006, H = +·422, K = −·907.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	N.	3·5	244	e 0 52	− 5	i 1 36	− 4	—	—	—
Hyderabad	N.	13·9	239	e 3 13	− 8	5 54	− 3	e 5 37	ʔ	—
Bombay		17·8	253	4 11	0	e 7 26	− 2	—	—	i 8·9
Murgab		19·5	316	4 32	+ 1	8 5	− 1	—	—	—
Colombo	E.	20·9	212	4 49	+ 3	8 37	+ 2	—	—	—
Andijan		22·0	319	4 58ʔ	0	9 8ʔ	+12	—	—	—
Frunse		22·2	326	e 5 3ʔ	+ 3	—	—	—	—	—
Stalinabad		23·0	312	e 5 6	− 1	i 9 12	− 2	—	—	—
Tashkent		24·2	317	e 5 18ʔ	− 1	e 9 41ʔ	+ 6	—	—	—
Tchimkent		24·5	320	e 5 24	+ 2	e 9 57	+17	—	—	—
Vladivostok		38·0	52	e 8 36ʔ	PP	e 15 52ʔ	SS	—	—	—
Leninakan		42·0	305	8 31	+37	—	—	—	—	—
Ksara		48·2	294	e 16 7	PPS	—	—	—	—	e 23·4
Moscow		49·1	324	e 8 47	− 4	—	—	—	—	—
Stuttgart	Z.	66·2	315	e 10 49	− 3	—	—	e 10 58	P	—

Long waves were also recorded at Kew.

Dec. 7d. Readings also at 1h. (Manzanillo and Tucson), 3h. (near Ashkabad), 5h. (Shasta Dam), 7h. (near Mizusawa and near Ashkabad), 8h. (Nanking, Kaimata, Christchurch, near Tuai, Wellington, and New Plymouth), 9h. (La Paz), 10h. (near Stalinabad), 12h. (Mizusawa), 13h. (near Stalinabad), 14h. (Mount Wilson, Pasadena, Palomar, Tinemaha, La Jolla, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Lick, Paris, Strasbourg, Stuttgart, and Tamanrasset), 18h. (near Branner and Lick), 20h. (near Rome, Bologna, and near Stalinabad), 22h. (Pierce Ferry), 23h. (Ottawa and Pierce Ferry).

Dec. 8d. 7h. 59m. 12s. Epicentre 40°·4N. 38°·2E. (as on 1940, Jan. 26d.). Rough.

A = +·6001, B = +·4723, C = +·6456; δ = −1; h = −2;
D = +·618, E = −·786; G = +·508, H = +·399, K = −·764.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Sotchi	3·4	19	0 58	+ 3	i 0 42	+ 5
Leninakan	4·3	83	e 1 20	P_g	2 16	S*
Erevan	4·8	90	e 1 14	− 1	2 8	− 4
Theodosia	5·1	337	e 1 31	P*	—	—
Piatigorsk	5·1	43	e 1 19	− 1	2 31	S*
Ksara	6·8	196	e 1 57	P*	e 3 38	S_g
Istanbul	7·0	279	2 6	P*	4 36	ʔ
Helwan	11·9	210	e 2 56	+ 2	—	—
Moscow	15·4	359	e 3 41	+ 1	—	—
Triest	18·6	296	e 3 52	−29	e 7 23	−23

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Rome		19·4	283	e 4 50	PP	e 8 27	SS
Bologna		20·2	291	e 5 4	PP	—	—
Sverdlovsk		22·0	34	e 4 58	0	e 9 2	+ 6
Stuttgart	z.	22·1	303	e 5 11	+12	—	—
Stalinabad		23·6	84	e 5 10	− 3	—	—

Helwan also gives e = 7m.6s.

Dec. 8d. 16h. Undetermined shock.

La Paz iP = 21m.10s., iS = 28m.31s., iPS = 29m.0s., iE = 31m.0s. and 34m.34s., L = 37m.30s.
Huancayo eP = 22m.4s., e = 25m.54s., 30m.12s., 32m.2s., and 36m.42s., eL = 41m.12s.
Christchurch eZ = 24m.10s., SKS = 34m.7s., PSNZ = 35m.10s., e = 37m.24s., SSEN = 39m.5s., SSSE = 43m.6s., QE = 46m.32s., RNZ = 53m.2s.
Riverview eP?Z = 25m.22s., eZ = 25m.51s., eSKS?E = 35m.49s., eSKS?N = 35m.58s., eSS?N = 42m.45s., eQ? = 48·7m.
San Juan e = 28m.47s., eSKS = 34m.41s., e = 40m.5s., 44m.52s., and 50m.59s., eL = 58m.53s.
Lick iPZ = 31m.3s.a
Wellington SKS = 34m.28s., S = 35m.59s., Q = 55m., RZ = 58m.
Ksara eP = 35m.12s., eS? = 45m.27s.?
Alicante e = 36m.24s., eL = 50m.14s.
Rome e = 36m.36s., 39m.6s., and 45m.6s.
Helwan e = 37m.30s.
Long waves were also recorded at Arapuni, Auckland, Ottawa, Seven Falls, and at other European stations.

Dec. 8d. 22h. 22m. 57s. Epicentre 17°·4S. 71°·0W. Depth of focus 0·015.
(as on 1948, May 11d.).

A = +·3109, B = −·9028, C = −·2972; δ = +3; h = +5;
D = −·946, E = −·326; G = −·097, H = +·281, K = −·955.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz		2·9	72	i 0 40a	− 6	i 1 28	+ 7	i 1 49	sS	—
Huancayo		6·8	321	e 2 6	pP	e 3 38	sS	—	—	e 4·3
Bogota		22·1	352	e 4 55	+10	e 8 54	+18	e 12 32	ScP	—
Tucson		62·4	322	i 10 12k	+ 1	—	—	i 10 43	pP	—
Ottawa		62·6	356	i 10 14	+ 1	—	—	i 10 49	pP	—
Temiskaming		64·2	354	i 10 19	− 4	—	—	—	—	—
La Jolla	z.	66·7	318	i 10 39k	0	—	—	—	—	—
Palomar		66·8	319	i 10 40k	0	—	—	—	—	—
Pierce Ferry		67·0	323	i 10 41	0	i 11 22	sP	i 11 11	pP	—
Boulder City		67·4	322	i 10 43	− 1	—	—	i 11 14	pP	—
Riverside	z.	67·5	319	i 10 44k	0	—	—	i 11 12	pP	—
Mount Wilson		68·1	319	i 10 48k	0	—	—	i 11 17	pP	—
Pasadena		68·1	319	i 10 48k	0	i 11 29	sP	i 11 20	pP	—
Haiwee	z.	69·3	321	i 10 54k	− 1	—	—	e 11 25	pP	—
Santa Barbara	z.	69·3	318	e 10 33	−22	—	—	—	—	—
Tinemaha		70·1	321	i 11 0k	0	—	—	e 11 29	pP	—
Berkeley	z.	73·1	319	i 11 16k	− 2	—	—	—	—	—
Mineral	z.	74·2	322	i 11 22a	− 2	—	—	—	—	—
Shasta Dam		74·9	322	i 11 23	− 5	—	—	e 11 53	pP	—

Additional readings :—
Riverside iZ = 11m.25s. and 11m.42s., eZ = 12m.13s.
Mount Wilson iZ = 11m.38s. and 11m.42s.
Pasadena iZ = 11m.47s.
Mineral iZ = 11m.31s.

Dec. 8d. Readings also at 1h. (Boulder City, Shasta Dam, Tucson, Pasadena, Tinemaha, Ottawa, near Tacubaya and Puebla), 3h. (Riverview, Mount Wilson, Riverside, Tinemaha, Tucson, Kaimata, Wellington, and near Tuai), 5h. (Uccle and Ksara), 6h. (San Juan, Huancayo, La Paz, Bogota, Clermont-Ferrand, Strasbourg, and near Stuttgart), 8h. (Ksara, Theodosia, near Ashkabad and near La Paz), 9h. (near Theodosia), 10h. (near Stalinabad), 11h. (Lick and Victoria), 12h. (near Stalinabad), 13h. (Rome), 15h. (Granada and near Chihuahua), 17h. (La Plata, Shasta Dam, Tucson, Palomar, Tinemaha, Ashkabad, and near Murgab), 21h. (Tchimkent, Andijan, Frunse, near Kulyab, Stalinabad, Murgab, Samarkand, and Tashkent).

Dec. 9d. Readings at 0h. (Auckland), 1h. (near Murgab), 2h. (near Kulyab, Tashkent, Samarkand, Stalinabad, and Murgab), 3h. (near Ashkabad), 4h. (Mineral, near Tacubaya and near Triest), 6h. (2) and 7h. (Mineral), 8h. (Stuttgart, near Florence, Bologna (2), and near Stalinabad), 9h. (near Stalinabad), 11h. (Ksara, Bombay and Stuttgart), 12h. (near Ashkabad), 13h. (Tucson, Mineral, Kew, and near Mizusawa), 21h. (Boulder City), 23h. (Stuttgart).

Dec. 10d. 9h. 41m. 57s. Epicentre 53°·5N. 160°·5E. (as on 1944, Sept. 25d.).

$A = -\cdot5631$, $B = +\cdot1994$, $C = +\cdot8019$; $\delta = -11$; $h = -7$;
$D = +\cdot334$, $E = +\cdot943$; $G = -\cdot756$, $H = +\cdot268$, $K = -\cdot597$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Klyuchi		2·9	3	−0 30	?	—	—	—	—	—
Yuzno-Sakhlinsk		13·1	247	e 3 24	PP	—	—	—	—	—
Vladivostok		21·5	253	e 5 14	PP	e 9 16	SS	—	—	—
Irkutsk		33·2	292	e 6 40	0	e 12 2	+ 2	—	—	—
Victoria	z.	46·0	64	e 8 26	− 1	—	—	—	—	—
Shasta Dam		51·5	72	e 9 9	0	—	—	e 12 10	PPP	—
Sverdlovsk		52·1	317	9 12	− 2	16 31	− 7	—	—	—
Mineral	z.	52·2	72	e 9 14k	− 1	—	—	i 9 25	?	—
Berkeley		53·5	74	i 9 26k	+ 2	i 16 55	− 2	i 9 49	?	e 26·9
Branner	z.	53·9	74	i 9 28k	+ 1	—	—	i 9 53	?	—
Lick	z.	54·2	74	i 9 31k	+ 2	—	—	i 9 59	?	—
Frunse		54·9	297	e 9 39	+ 4	—	—	—	—	—
Tinemaha	z.	56·3	72	i 9 47	+ 2	—	—	—	—	—
Haiwee	z.	57·2	73	e 9 52	+ 1	—	—	—	—	—
Santa Barbara	z.	57·4	75	e 9 55	+ 2	—	—	—	—	—
Mount Wilson	z.	58·5	74	i 10 0	0	—	—	i 10 17	?	—
Pasadena	z.	58·5	74	i 10 1	+ 1	—	—	i 10 16	?	—
Tashkent		58·8	299	e 10 2	0	—	—	—	—	—
Boulder City		59·1	70	e 10 5	+ 1	—	—	e 39 20	P′P′	—
Riverside	z.	59·1	74	e 9 48	−16	—	—	—	—	—
Palomar		59·8	74	i 10 9	0	—	—	—	—	—
La Jolla	z.	59·9	75	e 9 50	−20	—	—	—	—	—
Stalinabad		61·1	297	e 10 15	− 3	e 18 29	− 8	—	—	—
Samarkand		61·2	299	e 10 21	+ 2	—	—	—	—	—
Moscow		61·4	328	e 10 19	− 1	—	—	—	—	—
Tucson		64·0	70	i 10 38	0	—	—	e 39 27	P′P′	e 33·8
Copenhagen		68·0	342	11 3	0	—	—	—	—	36·0
Temiskaming		68·1	41	i 10 50	−14	—	—	i 11 8	P	—
St. Louis		69·9	52	i 11 14	− 1	i 20 20	− 4	i 11 33	pP	—
Ottawa	z.	70·4	39	e 11 15	− 3	—	—	—	—	—
Sotchi		70·8	319	11 9	−11	—	—	—	—	—
Leninakan		71·4	315	e 10 49?	−35	—	—	—	—	—
Collmberg		72·1	340	e 11 30	+ 2	—	—	e 12 32	?	—
Yalta		72·2	323	e 11 26	− 3	—	—	—	—	—
Jena	n.	72·7	340	e 11 30	− 2	—	—	e 11 44	P_cP	—
De Bilt		72·8	344	i 11 34a	+ 2	—	—	—	—	e 39·0
Bombay	e.	73·7	280	—	—	e 21 3	− 5	—	—	—
Harvard		74·4	37	i 11 40	− 2	—	—	—	—	—
Stuttgart		75·2	342	i 11 46a	0	—	—	e 42 3?	Q	47·0
Strasbourg		75·7	343	e 11 49a	0	—	—	e 32 33	Q	38·0
Paris		76·4	346	i 11 53	0	—	—	i 12 1	P	e 49·0
Basle		76·7	342	e 11 55	0	—	—	—	—	—
Zürich		76·7	342	i 11 55a	0	—	—	—	—	—
Istanbul		77·0	325	e 11 40	−16	—	—	—	—	—
Triest	n.	77·2	337	e 11 56	− 1	—	—	—	—	—
Salo		78·0	339	e 12 1a	− 1	—	—	—	—	—
Padova		78·7	338	e 12 7	+ 1	e 22 14	+11	—	—	—
Pavia		78·7	340	e 12 6	0	—	—	—	—	—
Bologna	z.	78·9	338	e 12 8a	+ 1	—	—	—	—	—
Clermont-Ferrand		79·3	345	i 12 9	0	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Florence	z.	79·6	338	e 12 11a	+ 1	—	—	—	—	—
Ksara		80·7	316	i 12 17	+ 1	—	—	—	—	—
Rome		81·1	337	i 12 16	− 2	e 22 23	− 5	—	—	—
Tortosa		84·5	345	i 12 37	+ 1	13 45	sP	13 22	pP	—
Helwan		86·0	318	i 12 43a	0	—	—	e 13 12	?	—
Toledo	z.	86·0	349	i 12 44	+ 1	—	—	i 12 55	?	—
Alicante		87·0	346	4 1	?	23 21	− 6	16 7	PP	e 39·9
La Paz	N.	127·2	64	e 19 13	[+ 6]	—	—	—	—	—

Additional readings :—
Shasta Dam ePKP,PKP =39m.7s.
Berkeley eN =22m.15s.
Lick iZ =9m.48s.
Boulder City e =13m.7s.
Tucson i =10m.54s. and 11m.5s.
Strasbourg eP =12m.13s., eP_cP? =12m.37s., e =13m.58s.
Tortosa PPP?N =17m.13s.
Alicante PPP =18m.1s., PS =24m.24s., SS =28m.57s., SSS =32m.3s., Q =35m.5s.
Long waves were also recorded at Kodaikanal, Arapuni, Wellington, and at other European stations.

Dec. 10d. Readings also at 2h. (De Bilt), 3h. (near Tashkent, Stalinabad, and Samarkand), 6h. (Mount Wilson, Pasadena, Tinemaha, Riverside, Palomar, Shasta Dam, and Tucson), 7h. (near Stalinabad), 8h. (Almata and near Alicante), 9h. (Bozeman), 10h. (Stuttgart, Tucson, Riverside, Tinemaha, near Boulder City, and near La Paz), 11h. (near Ashkabad), 13h. (Wellington, Araupuni, Christchurch, Auckland, Apia, Mineral, Huancayo, Ksara, and Alicante), 14h. (Mizusawa, Alicante, Andijan, near Almata, and Frunse), 16h. (near Klyuchi), 18h. (Temiskaming), 19h. (La Paz, Samarkand, near Andijan, Kulyab, and Stalinabad), 20h. (near Tucson, Pasadena, Palomar, Riverside, Pierce Ferry, and Boulder City), 22h. (La Paz), 23h. (near Victoria).

Dec. 11d. 5h. Undetermined shock.
Tacubaya PEN =10m.57s., iSE =12m.24s., iSN =12m.27s., iLE =12m.48s.
Tucson iP =11m.31s., eS =13m.37s., eL =14m.19s.
Palomar ePZ =12m.19s.
Pasadena iPZ =12m.34s.
Pierce Ferry iP =12m.34s.
Boulder City eP =12m.36s.
Riverside ePZ =12m.36s.
Mount Wilson ePZ =12m.36s.
Haiwee ePZ =12m.55s.
Tinemaha iPZ =13m.6s.
Shasta Dam eP =13m.54s., i =14m.6s.
Ottawa e =15m.33s.

Dec. 11d. Readings also at 1h. (Klyuchi and Stuttgart), 2h. (near Salo, Jena, Stuttgart, Neuchatel, Basle, Zürich, Clermont-Ferrand, Strasbourg, and Paris), 3h. (Stuttgart, Lick, Pasadena, Mount Wilson, Palomar, Riverside, Haiwee, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, and Tucson), 7h. (Klyuchi and La Paz), 10h. Boulder City), 16h. (near Palomar, Riverside, Pasadena, Boulder City, Pierce Ferry and Tucson), 19h. (Ksara, Istanbul, and Stuttgart).

Dec. 12d. 6h. 35m. 35s. Epicentre 17°·4S. 167°·9E. (as on Dec. 6d.).

$A = -·9336$, $B = +·2002$, $C = -·2972$; $\delta = +2$; $h = +5$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		17·0	230	i 3 52	− 9	i 7 4	− 6	i 7 14	SS	e 8·4
Apia		19·9	83	e 4 59	PP	—	—	—	—	—
Auckland	N.	20·3	164	4 40	0	8 31	+ 8	16 49	S_cS	—
Arapuni	E.	21·7	163	4 55	0	9 25	SS	—	—	—
Riverview		22·2	218	i 4 59a	− 1	i 8 58	− 2	i 5 24	PP	e 10·7

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Wellington		24·5	167	5 25	+ 3	9 46	+ 6	i 5 51	PP	15·8
Kaimata		25·2	174	5 25	− 4	—	—	—	—	—
Christchurch		26·4	172	—	—	10 35	+23	12 15	SS	15·3
Vladivostok		68·7	333	i 11 7	0	—	—	e 20 40	PS	—
Berkeley		85·5	49	i 12 46k	+ 5	—	—	i 12 58	pP	—
Lick	z.	85·7	49	i 12 48a	+ 6	—	—	—	—	—
Mineral	z.	87·0	47	i 12 56a	+ 8	—	—	—	—	—
Pasadena	z.	87·0	53	e 12 53	+ 5	—	—	e 13 4	pP	—
Mount Wilson	z.	87·1	53	e 12 52	+ 3	—	—	i 13 4	pP	—
Riverside	z.	87·5	53	e 12 55	+ 4	—	—	e 13 7	pP	—
Palomar		87·6	54	i 12 55	+ 4	—	—	i 13 8	pP	—
Haiwee	z.	87·7	51	e 12 58	+ 6	—	—	i 13 12	pP	—
Tinemaha	z.	88·1	50	i 12 58	+ 4	—	—	—	—	—
Boulder City		90·2	52	e 13 8	+ 4	—	—	i 13 21	pP	—
Pierce Ferry		90·9	52	e 13 11	+ 4	—	—	—	—	—
Tucson		92·0	57	i 13 16	+ 4	—	—	i 13 28	pP	—
Ottawa	z.	120·7	47	e 18 55	[+ 1]	—	—	—	—	—
San Juan		128·8	80	e 12 49	?	—	—	e 13 1	?	—
Stuttgart	z.	144·2	336	e 19 38	[0]	—	—	e 19 51	pPKP	—
Strasbourg		144·9	337	e 19 42	[+ 3]	—	—	—	—	—
Basle		145·9	336	e 19 44	[+ 3]	—	—	e 19 57	pPKP	—
Salo		146·1	330	e 19 44	[+ 3]	—	—	—	—	—
Paris		146·5	342	i 19 47	[+ 5]	—	—	i 20 5	pPKP	—
Clermont-Ferrand		149·0	339	19 53	[+ 7]	—	—	—	—	—

Additional readings :—
Auckland eN = 12m.40s.
Riverview iE = 9m.3s., isSN = 9m.15s.
Wellington e = 13m.26s., Q = 14m.55s.
Christchurch QEN = 12m.19s.
Stuttgart eZ = 19m.57s.

Dec. 12d. 13h. 17m. 18s. Epicentre 51°·6N. 177°·2E.

A = − ·6230, B = + ·0305, C = + ·7817 ; δ = +11 ; h = −6 ;
D = + ·049, E = + ·999 ; G = − ·781, H = + ·038, K = − ·624.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		22·3	40	e 5 7	+ 6	e 9 13	+11	e 6 1	PPP	e 11·2
Vladivostok		31·4	273	i 6 23	− 2	i 11 29	− 3	—	—	—
Victoria		37·3	70	7 18	+ 2	13 10	+ 6	e 8 19	PP	22·0
Shasta Dam		42·1	80	e 7 54	− 1	—	—	e 9 36	PP	—
Ukiah		42·5	82	—	—	e 15 29	+67	—	—	e 21·4
Mineral	z.	42·8	80	i 8 1k	0	—	—	—	—	—
Irkutsk		43·2	302	i 8 2	− 2	18 2	S_cS	9 45	PP	—
Berkeley		43·9	84	e 8 10	0	e 14 41	− 1	—	—	e 20·6
Branner	z.	44·2	84	i 8 12k	0	—	—	—	—	—
Santa Clara		44·4	84	i 8 25	pP	e 14 54	+ 5	—	—	—
Lick		44·6	84	i 8 16k	0	i 14 58	+ 6	i 10 11	PP	—
Saskatoon		45·0	58	—	—	e 14 55	− 3	i 18 11	SS	21·2
Bozeman		46·0	68	—	—	e 16 26	?	—	—	e 24·2
Tinemaha		46·9	82	i 8 35k	+ 1	e 15 26	+ 1	i 8 42	pP	—
Haiwee		47·7	82	i 8 40k	0	—	—	i 8 50	pP	—
Santa Barbara	z.	47·7	86	e 8 41	+ 1	—	—	—	—	—
Salt Lake City		48·5	73	e 10 55	PP	e 15 48	0	(e 19 21)	SS	e 19·4
Mount Wilson		48·8	85	i 8 49k	0	—	—	i 9 0	pP	—
Pasadena		48·8	85	i 8 48k	− 1	i 15 52	0	i 8 59	pP	e 21·2
Riverside	z.	49·4	85	i 8 53k	0	—	—	i 9 3	pP	—
Boulder City		49·7	80	i 8 56	0	e 14 8	?	—	—	—
Pierce Ferry		50·1	79	i 8 59	0	e 16 12	+ 2	—	—	—
La Jolla	z.	50·2	85	e 9 0	0	—	—	—	—	—
Palomar		50·2	84	i 8 59k	− 1	i 16 13	+ 2	i 9 10	pP	—
Tucson		54·6	81	i 9 32k	0	e 17 12	+ 1	i 11 25	PP	e 23·8

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Lincoln	E.	57·2	64	—	—	e 27 26	Q	—	—	e 31·5
Sverdlovsk		60·0	325	10 9	− 2	i 18 24	+ 1	—	—	—
St. Louis		62·3	62	e 10 23	− 3	e 18 41	−11	—	—	—
Temiskaming		62·3	49	e 10 23	− 3	—	—	—	—	—
Ottawa		64·8	48	e 10 44	+ 1	—	—	e 14 15	PPP	26·7
Cleveland	E.	64·9	54	—	—	e 26 36	SSS	—	—	—
Shawinigan Falls	N.	65·3	45	e 10 53	+ 7	—	—	—	—	—
Andijan		67·2	307	10 52?	− 6	—		—	—	—
Tchimkent		67·4	309	i 10 58	− 1	i 19 50	− 5	—	—	—
Moscow		67·9	337	11 1	− 1	20 0	− 1	—	—	—
Murgab		68·2	304	11 5	+ 1	20 4	0	—	—	—
Tashkent		68·3	309	i 11 4?	− 1	e 20 2?	− 4	—	—	—
Fordham		69·2	50	e 11 15	+ 5	e 20 24	+ 8	e 21 18	PPS	34·7
Samarkand		70·7	310	e 11 18	− 2	—	—	—	—	—
Stalinabad		70·7	308	i 11 19	− 1	20 32	− 2	—	—	—
Columbia		70·8	59	—	—	e 20 32	− 3	—	—	e 34·3
Calcutta	E.	72·0	283	e 11 27	− 1	—	—	—	—	—
De Bilt		76·4	355	e 11 52	− 1	—	—	e 22 24	PPS	e 37·7
Grozny		76·5	326	e 11 53	− 1	21 41	+ 2	—	—	—
Piatigorsk		76·8	328	e 11 55	0	21 45	+ 3	—	—	—
Jena	N.	77·1	351	e 11 57	0	—	—	—	—	—
Kew		77·3	358	e 11 56?	− 2	e 21 52?	+4	—	—	e 38·7
Baku		77·5	322	e 12 0	+ 1	—	—	—	—	—
Prague		77·7	348	e 12 3	+ 3	e 22 6	+14	e 32 51	Q	e 37·2
Uccle		77·8	356	e 12 17a	+16	e 21 43	−10	—	—	—
Sotchi		78·3	330	e 12 7?	+ 4	—	—	—	—	—
Yalta		79·1	334	e 12 5	− 3	22 9	+ 2	—	—	—
Leninankan		79·4	326	e 11 40?	−29	e 21 47?	−23	—	—	—
Stuttgart		79·5	352	e 12 8	− 2	e 23 3	PS	e 27 42	SS	e 41·7
Strasbourg		79·8	353	i 12 11	− 1	e 22 42	PS	e 12 35	pP	37·7
Paris		79·9	357	i 12 12	0	e 22 10	− 6	e 22 59	PS	e 45·7
Bermuda		80·3	49	—	—	e 23 23	PS	—	—	e 34·3
Basle		80·8	353	e 12 17	0	—	—	—	—	—
Zürich		80·9	352	e 12 19	+ 2	—	—	—	—	—
Hyderabad	N.	81·8	287	12 22	0	22 35	0	28 0	SS	—
Belgrade		81·9	343	i 12 22a	− 1	i 22 40	+ 4	e 15 37	PP	e 49·0
Triest		82·1	348	e 15 3	PP	i 22 55?	+17	—	—	e 45·9
Salo		82·5	350	e 12 27	+ 1	e 22 38	− 4	—	—	—
Clermont-Ferrand		82·9	356	i 12 29	+ 1	e 23 12	PS	—	—	39·7
Padova		83·4	349	e 12 34	+ 4	e 22 50	− 1	—	—	—
Bologna		83·5	350	e 12 32a	+ 1	e 22 45	− 7	e 15 39	PP	—
Istanbul		83·6	336	e 12 24	− 7	22 30	−23	—	—	—
Bombay		84·0	292	e 12 34	+ 1	e 22 52	− 5	—	—	—
Florence		84·2	350	e 12 28	− 6	e 22 50	− 9	e 23 48	PS	—
Rome		85·9	348	i 12 43a	0	i 23 6	[− 1]	i 16 2	PP	—
Kodaikanal	E.	88·0	284	e 12 44	− 9	—	—	—	—	—
Riverview		88·1	201	i 12 58a	+ 4	i 23 42	+ 5	i 16 27	PP	e 40·6
Ksara		88·4	328	i 12 54a	− 1	e 23 32	− 8	—	—	—
Alicante		90·4	358	13 3	− 1	24 3	+ 5	16 53	PP	e 43·6
San Juan		91·2	58	—	—	e 23 30	[−10]	e 28 57	SS	e 36·5
Algiers		91·8	355	—	—	e 23 42?	[− 1]	—	—	—
Helwan		93·5	330	e 13 18	− 1	23 48	[− 5]	17 6	PP	—
Bogota		97·9	72	—	—	e 24 23	[+ 7]	—	—	49·7
Huancayo		110·2	82	e 26 44	?	e 28 42	PS	e 34 43	SS	e 46·0
La Paz		118·1	80	e 19 11	[+22]	i 29 54	PS	36 26	SS	58·4

Additional readings :—
Victoria e = 9m.54s., SSS = 16m.54s.
Shasta Dam e = 13m.18s. and 13m.48s.
Mineral iZ = 8m.6s.k.
Berkeley iZ = 8m.22s., iN = 8m.28s., iSN = 14m.46s., iZ = 15m.8s., eN = 18m.1s., iE = 18m.14s.
Branner eE = 8m.16s., eN = 8m.20s., iNZ = 8m.29s.
Lick iZ = 8m.25s. and 9m.14s., eN = 9m.17s. and 15m.54s.
Tinemaha iZ = 8m.44s.

Continued on next page.

Mount Wilson iZ = 9m.13s.
Pasadena iZ = 9m.10s., ePPZ = 10m.22s., eZ = 14m.17s., eS$_c$SE = 18m.42s., eSSN = 19m.42s.
Riverside iZ = 9m.17s. and 10m.14s.
Palomar iZ = 9m.23s.
Tucson i = 9m.46s. and 10m.45s.
Prague eZ = 12m.26s.
Strasbourg e = 12m.27s. and 12m.59s., eSS? = 27m.48s.
Paris i = 12m.23s., ePPS = 23m.12s.
Hyderabad SN = 22m.49s.
Belgrade e = 19m.32s.
Clermont-Ferrand i = 13m.49s.
Bologna eZ = 13m.44s., e = 19m.19s.
Florence eE = 22m.59s.
Rome eSS = 27m.59s., eSSS = 32m.3s.
Riverview eSKSN = 23m.17s., eE = 29m.23s., eSSN = 29m.44s., eQN = 37m.48s.
Alicante PPP = 18m.53s., PS = 24m.53s., SS = 29m.43s., SSS = 33m.39s.
Huancayo e = 38m.55s.
Long waves were also recorded at Honolulu, Fort-de-France, Ivigtut, Tacubaya, and other American, European, and New Zealand stations.

Dec. 12d. Readings also at 0h. (Tchimkent, near Andijan, Murgab, and Stalinabad), 1h. (Haiwee, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, La Paz, and near Tacubaya), 3h. (near Tacubaya), 6h. (Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Lick, Mineral, Jena, Strasbourg, Paris and Stuttgart), 7h. (Berkeley and near Ashkabad), 9h. (Huancayo, La Paz, Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Lick), 12h. (near Branner and Lick), 15h. (Kodaikanal, Ksara, Stuttgart, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 20h. (near Stalinabad), 23h. (Stuttgart).

Dec. 13d. Readings at 1h. (Mizusawa, Erevan, Sotchi, near Grozny, Leninakan, and Piatigorsk), 2h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Strasbourg, Stuttgart, Paris, Triest, Belgrade, near Taranto, and near Stalinabad; several shocks), 3h. (near Balboa Heights), 4h. (near Mizusawa), 11h. (near Tacubaya), 12h. (near Taranto), 13h. (Ashkabad (2)), 14h. (Arapuni, Auckland, Christchurch, Wellington, Brisbane, Triest, Strasbourg, Stuttgart, Cheb, Belgrade, Copenhagen, Prague, Padova, Rome, Taranto, Bucharest, Ksara, and near, Istanbul), 15h. (Ksara), 16h. (Ottawa and near Tacubaya), 17h. (near Grozny), 18h. (Tamanrasset), 19h. (near Victoria (3)), 23h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, and Stuttgart.)

Dec. 14d. Readings at 0h. (near Tacubaya), 2h. (near Andijan), 4h. (Huancayo and La Paz), 7h. (near Mizusawa), 9h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Mineral, Lick, Shasta Dam, Ottawa, Stuttgart, and near Stalinabad), 10h. (Nanking, Bombay, Calcutta, Stuttgart, Andijan, Almata, Frunse, Stalinabad, Tashkent, Sverdlovsk, and Irkutsk), 11h. (Brisbane, Christchurch, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, and Tamanrasset), 14h. (Murgab, Samarkand, near Andijan, and Stalinabad), 15h. (Puebla, and near Tacubaya), 16h, (Nanking, Zi-ka-wei, De Bilt, Uccle, Kew, Strasbourg, Rathfarnham Castle, Prague, Cheb, Copenhagen, Potsdam, Upsala, Rome, Stuttgart, Ksara, Mount Wilson, Palomar, Riverside, Tinemaha, Victoria, Shasta Dam, Mineral, Calcutta, near Almata, Andijan, Frunse, Murgab, Samarkand, Stalinabad, Tashkent, and Tchimkent), 17h. (Clermont-Ferrand, Paris, and near Frunse), 18h. (2) and 19h. (near Victoria), 20h. (La Paz), 21h. (Nanking, Shasta Dam, and near Victoria (4)), 22h. (Tacubaya (2), near Victoria (2), near Andijan, Murgab, Samarkand, Stalinabad, and Tchimkent), 23h. (near Victoria).

Dec. 15d. 19h. 11m. 29s. Epicentre 21°·9N. 142°·7E. Depth of focus 0·030.

$A = -·7388$, $B = +·5628$, $C = -·3708$; $\delta = +6$; $h = +4$;
$D = +·606$, $E = +·795$; $G = -·295$, $H = +·225$, $K = -·929$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	17·2	356	3 50	+ 2	6 53	+ 3	—	—	—
Vladivostok		23·0	339	i 4 46	0	i 8 36	− 1	i 5 33	pP	—
Irkutsk		42·3	325	7 33	0	13 34	− 3	—	—	—
Brisbane		50·1	168	e 8 33	− 1	i 15 25	− 2	i 9 17	pP	—
Calcutta	E.	50·1	282	e 8 36	+ 2	e 15 16	−11	e 9 56	P_cP	—
Riverview		56·0	172	i 9 19a	+ 2	i 16 48	+ 2	i 10 11	pP	—
Almata		57·9	308	9 30	− 1	—	—	—	—	—
Hyderabad	N.	60·3	278	e 9 39	− 8	e 17 39	− 3	—	—	—
Murgab		60·4	302	9 49	+ 1	17 44	+ 1	—	—	—
Andijan		61·4	305	e 9 56	+ 2	17 58	+ 2	—	—	—
College		61·7	27	—	—	e 17 54	− 6	e 18 49	sS	e 24·8
Tchimkent		63·3	307	10 10	+ 3	i 18 20	0	—	—	—
Kodaikanal	E.	63·4	271	e 9 8	−60	—	—	—	—	—
Tashkent		63·7	306	i 10 10?	0	i 18 25?	0	i 11 0?	pP	—
Stalinabad		64·4	304	i 10 14	0	i 18 32	− 1	11 8	pP	—
Bombay		65·1	281	e 10 19	0	i 18 39	− 3	—	—	—
Arapuni	E.	67·2	153	—	—	19 31?	+24	—	—	—
Sitka		67·5	36	—	—	i 19 9	− 2	e 24 1	SS	e 27·3
Sverdlovsk		67·7	324	i 10 33	− 2	i 19 8	− 5	—	—	—
Tuai	N.	68·5	152	10 39	− 1	19 20	− 2	20 14	S_cS	—
Wellington		69·5	155	10 45	− 1	19 31	− 3	20 26	ScS	—
Christchurch		70·7	158	e 14 49	PPP	19 44	− 4	i 21 9	PPS	—
Victoria		76·4	43	11 25k	− 1	20 51	− 1	21 29	PS	31·9
Baku		78·2	309	e 11 43	+ 7	e 21 14	+ 3	—	—	—
Arcata	Z.	78·3	51	i 11 40k	+ 3	—	—	i 12 36a	—	—
Shasta Dam		79·6	50	i 11 43	− 1	e 21 21	− 4	i 12 41	pP	—
Grozny		80·1	312	e 11 48	+ 2	21 30	− 1	—	—	—
Mineral		80·3	50	i 11 46a	− 1	e 21 30	− 3	—	—	—
Moscow		80·3	327	i 11 45	− 2	i 21 27	− 6	e 12 42	pP	—
Berkeley		80·7	53	i 11 48a	− 1	i 21 35	− 2	i 12 45	pP	—
Santa Clara	E.	81·1	53	—	—	i 21 49	+ 8	—	—	—
Lick		81·3	53	i 11 53a	0	e 21 39	− 4	—	—	—
Piatigorsk		81·7	314	e 11 56	+ 1	21 42	− 5	—	—	—
Reno		81·9	51	i 11 57	+ 1	i 22 47	PS	i 12 58	pP	—
Erevan		82·1	310	e 11 58	+ 1	—	—	—	—	—
Leninakan		82·4	311	e 12 2	+ 4	21 57	+ 3	—	—	—
Fresno	Z.	82·9	53	i 12 0	− 1	i 21 57	− 2	—	—	—
Santa Barbara	Z.	83·8	55	e 12 6a	+ 1	—	—	i 13 3	pP	—
Tinemaha	Z.	83·9	53	i 12 6a	0	e 22 7	− 2	i 13 4	pP	—
Helsinki		84·0	334	—	—	e 21 46	−24	—	—	e 43·5
Sotchi		84·1	314	e 12 3	− 4	e 22 9	− 2	—	—	—
Haiwee		84·5	53	i 12 9a	0	e 22 9	− 6	i 13 5	pP	—
Saskatoon		84·8	36	e 20 28	?	e 22 4	−14	e 23 47	PS	31·5
Pasadena	Z.	85·1	55	i 12 10a	− 2	i 22 17	− 3	i 13 7	pP	e 34·5
Mount Wilson		85·2	55	i 12 11a	− 1	e 22 17	− 4	e 13 9	pP	—
Riverside	Z.	85·8	55	i 12 14a	− 1	e 22 23	− 4	i 13 12	pP	—
La Jolla	Z.	86·3	56	i 12 18a	0	—	—	i 13 20	pP	—
Palomar		86·4	56	i 12 18a	0	i 22 34	+ 1	i 13 14	pP	—
Boulder City		86·9	53	i 12 20	− 1	e 22 36	− 2	i 13 18	pP	—
Salt Lake City		86·9	47	e 12 33	+12	i 22 36	− 2	i 22 21	SKS	e 36·1
Upsala		87·1	336	—	—	e 28 7	SS	e 35 31?	?	e 39·5
Scoresby Sund		87·2	355	—	—	22 23	[− 3]	23 37	S	—
Yalta		87·3	317	e 12 12	−11	22 20	[− 6]	—	—	—
Pierce Ferry		87·4	52	i 12 23	0	e 22 43	+ 1	i 13 19	pP	—
Warsaw		90·4	328	—	—	e 22 50	[+ 5]	e 23 5	S	e 43·5
Rapid City	E.	90·9	42	e 12 40	+ 1	i 23 13	− 1	i 22 45	SKS	e 41·8
Ksara		91·0	307	i 12 38	− 2	—	—	i 13 38	pP	—
Tucson		91·5	54	i 12 42a	0	i 23 20	0	i 13 40	pP	e 38·8
Bucharest		91·7	320	—	—	e 24 24	SP	i 24 52	PPS	—
Copenhagen		92·0	334	e 12 42	− 2	22 52	[− 2]	23 16	S	44·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Prague		95·0	329	e 16 58	PP	e 23 41	− 9	e 30 7	SS	e 45·5
Belgrade		95·3	322	e 12 57	− 3	e 24 1	+ 9	e 22 51	SKS	e 55·9
Cheb		95·9	330	—	—	e 23 16	[+ 1]	e 30 31	SS	e 44·5
Helwan		96·3	305	i 13 3a	− 1	e 25 1	pS	i 14 1	pP	—
Stuttgart		98·3	331	e 13 11a	− 2	e 24 14	− 4	e 17 15	PP	e 48·5
Triest		98·4	326	e 27 18	PPS	e 23 44	[+15]	e 25 13	pSKS	—
Strasbourg		99·1	331	e 13 16	− 1	e 23 31	[0]	e 17 25	PP	45·5
Basle		100·0	331	e 13 19	− 2	—	—	e 17 41	PP	—
Kew		100·1	337	e 18 4?	PP	e 28 52	?	—	—	e 44·5
Paris		101·2	334	e 13 23	− 3	i 26 4	PS	e 17 29	PP	e 56·5
Rome		101·6	324	e 17 40	PP	e 24 43	− 2	e 26 13	SP	—
St. Louis		102·3	40	e 17 42	PP	i 23 41	[− 6]	e 24 45	SKS	—
Clermont-Ferrand		103·3	332	e 16 40	?	—	—	e 18 14	PP	48·5
Ottawa		104·6	27	—	—	e 23 56	[− 2]	(32 31?)	SS	32·5
Cleveland	E.	104·8	33	—	—	i 23 49	[−10]	e 25 3	S	49·9
Philadelphia		109·0	30	—	—	e 29 31	PPS	e 35 10	?	e 49·3
Alicante		110·8	330	14 28	P	27 46	PS	18 30	PP	e 49·9
Toledo		111·2	333	e 18 49	PP	—	—	—	—	58·9
Tamanrasset		119·1	315	e 18 24	[+ 2]	—	—	e 19 14	pPKP	—
San Juan		131·0	37	e 21 41	PP	e 27 30	SKKS	e 38 14	SS	e 59·2
Bogota		135·4	57	—	—	e 27 44	SKKS	—	—	—
Huancayo		142·4	80	e 22 43	PP	e 27 39	SKKS	—	—	e 60·3
La Paz		150·4	83	i 19 22a	[+ 3]	25 55	[− 8]	i 20 23	pPKP	—

Additional readings :—
Mizusawa SN =6m.57s.
Brisbane iPPNZ =9m.51s., iN =11m.46s. and 13m.21s., isSEN =17m.9s., eN =17m.56s., eE =18m.3s.
Riverview isPNZ =10m.40s., isSN =18m.27s., iZ =18m.32s., iScSN =18m.35s.
College eSS =22m.3s.
Stalinabad sS =20m.4s.
Christchurch L?EZ =24m.26s.
Victoria e =12m.35s., 12m.59s., and 22m.31s., SS =25m.37s.
Shasta Dam isP =13m.20s., esS =23m.4s.
Mineral iZ =11m.50s. and 12m.43s.
Moscow esS =23m.7s.
Berkeley ipPZ =11m.53s., iPZ =12m.11s., iZ =12m.57s., eN =21m.32s., iZ =22m.13s., iE =22m.25s. and 25m.51s.
Lick iZ =11m.56s. and 12m.10s.
Reno iN =13m.10s.
Fresno iSEN =21m.54s.
Saskatoon i =22m.19s.
Pasadena iZ =13m.21s., isPZ =13m.37s., iSKSEN =22m.9s., iSPEN =23m.10s., eSSEN =28m.1s.
Palomar eSN =22m.23s.
Boulder City esP =13m.46s.
Salt Lake City e =23m.37s., eSS =27m.52s., eSSS =32m.8s.
Scoresby Sund 28m.24s.
Warsaw eE =24m.21s.
Rapid City eSSE =29m.8s.?
Tucson i =13m.54s. and 14m.24s., eSKS =22m.49s., ePS =24m.18s.
Bucharest iE =24m.31s., iN =24m.38s. and 24m.47s.
Copenhagen 12m.56s., 24m.32s., 29m.7s.
Prague e =33m.31s. and 37m.1s.
Cheb eSSS =34m.31s.
Helwan sP =14m.28s., PP =17m.1s., sPP =18m.24s.
Stuttgart eSS =31m.10s.
Strasbourg eS =24m.28s., ePS =25m.49s., eSS =31m.14s., eSSS =35m.3s. and 35m.13s., eSSSS? =38m.31s. and 38m.45s.
Basle ePP =17m.0s.
Paris iPKKP? =29m.35s., eSS =31m.40s.
Rome eSS =31m.31s.?
St. Louis esSKS =25m.33s., ePS? =26m.18s., i =27m.14s., ipPS? =27m.37s., i =28m.1s. and 28m.18s., eSS =31m.16s.
Clermont-Ferrand Q =42m.31s.?
Cleveland esSE =26m.52s., eE =46m.31s.
Alicante PP =19m.4s., PPP =21m.30s., SS =33m.40s., SSS =37m.42s.
Toledo eZ =23m.9s. and 23m.53s., eS?Z =31m.21s.
Tamanrasset iPP =19m.45s.k, e =28m.39s. and 32m.0s.
San Juan e =30m.52s. and 33m.39s., i =40m.33s., e =44m.44s.
Huancayo e =30m.57s., eSKSP =32m.28s., eSSS? =46m.55s.
La Paz PPZ =23m.9s., iSKKS =29m.29s.
Long waves were also recorded at De Bilt, Granada, and Malaga.

Dec. 15d. 21h. 52m. 20s. Epicentre 46°·5N. 149°·5E. Depth of focus 0·005.
(as on 1937, June 8d.).

Intensity II-III at Nemuro and Kusiro. Macroseismic radius more than 300 km. Epicentre 42°·7N. 149°·3E. Very shallow.

The Seismo. Bull. of the Cent. Met. Obs., Japan, for the year 1948. Tokyo, 1950, pp. 50-51, with macroseismic chart.

$A = -\cdot5952$, $B = +\cdot3506$, $C = +\cdot7231$; $\delta = +6$; $h = -4$;
$D = +\cdot508$, $E = +\cdot862$; $G = -\cdot623$, $H = +\cdot367$, $K = -\cdot691$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Nemuro		4·1	223	0 55a	− 7	1 34	−15	—	—
Yuzno-Sakhlinsk		4·7	278	e 1 16	+ 6	i 2 12	+ 8	—	—
Mori		7·8	239	0 57	−56	2 24	−57	—	—
Aomori		8·5	231	3 18	+75	—	—	—	—
Miyako		8·8	221	2 1	− 6	3 20	−26	—	—
Morioka		9·1	225	2 3	− 8	3 29	−24	—	—
Mizusawa		9·6	223	e 2 27	+ 9	3 39	−26	—	—
Akita		9·7	228	3 30	+71	—	—	—	—
Sendai		10·4	221	3 0	+31	4 26	+ 1	—	—
Hukusima		11·0	221	2 17	−20	4 19	−20	—	—
Onahama		11·5	217	4 13	+89	—	—	—	—
Mito		12·1	217	4 12	+80	—	—	—	—
Utunomiya		12·3	219	4 34	+100	—	—	—	—
Kakioka		12·4	217	2 49	− 7	4 46	−27	—	—
Tukubasan		12·5	217	4 48	+111	—	—	—	—
Maebasi		12·7	221	5 2	+122	—	—	—	—
Nagano		12·9	225	3 12	+10	—	—	—	—
Vladivostok		13·0	260	e 3 5	+ 1	e 5 32	+ 5	—	—
Tokyo		13·1	218	5 1	+116	—	—	—	—
Hunatu		13·6	220	4 38	+87	—	—	—	—
Misima		13·9	219	5 30	+135	—	—	—	—
Sverdlovsk		52·3	317	—	—	e 18 43	S_cS	—	—
Andijan		54·0	294	e 9 28	+ 8	—	—	—	—
Tchimkent		54·9	297	e 9 29	+ 3	—	—	—	—
Tashkent		55·7	297	e 9 31	− 1	—	—	—	—
Victoria		55·7	54	e 9 32	0	—	—	—	—
Stalinabad		57·6	293	i 9 44	− 2	17 34	− 3	—	—
Shasta Dam		60·9	61	i 10 6	− 2	—	—	i 10 30	pP
Mineral	z.	61·6	61	i 10 11a	− 2	—	—	i 10 35a	pP
Berkeley	z.	62·7	63	i 10 19k	− 1	—	—	i 10 43	pP
Reno	z.	63·1	61	i 10 23	0	—	—	i 10 47	pP
Lick	z.	63·4	63	i 10 24k	− 1	—	—	i 10 47	pP
Tinemaha	z.	65·6	61	i 10 39	0	—	—	i 11 3	pP
Haiwee	z.	66·4	62	i 10 43	− 1	—	—	i 11 7	pP
Mount Wilson	z.	67·6	63	i 11 14	pP	—	—	—	—
Pasadena	z.	67·6	63	i 11 14	pP	—	—	—	—
Riverside	z.	68·2	63	i 10 54	− 2	—	—	i 11 17	pP
Boulder City		68·4	60	i 10 56	− 1	—	—	i 11 19	pP
Pierce Ferry		68·8	60	i 11 0	+ 1	—	—	i 11 23	pP
Palomar	z.	69·0	64	i 10 59	− 2	—	—	i 11 22	pP
Leninakan		70·8	309	e 11 18	+ 6	—	—	—	—
Tucson		73·4	61	i 11 25	− 2	—	—	i 11 50	pP
Stuttgart	z.	79·0	335	e 11 58	− 1	—	—	—	—
Strasbourg		79·6	336	e 12 6	+ 4	—	—	—	—
Paris		80·8	339	i 12 8	0	—	—	i 12 53	sP
Tamanrasset		103·7	326	e 12 49?	−67	—	—	—	—

Additional readings :—
Shasta Dam e = 13m.18s.
Mineral iZ = 11m.17s.
Reno iN = 10m.26s.
Long waves were recorded at Ottawa.

Dec. 15d. 22h. Undetermined shock.

Yuzno-Sakhlinsk P = 29m.36s., S = 30m.34s.
Mizusawa PE = 31m.38s., SE = 32m.2s.
Berkeley iPZ = 37m.41s.k
Shasta Dam eP = 38m.28s., epP = 38m.58s.
Mineral iPZ = 38m.33s.a, iZ = 39m.3s.
Reno iPZ = 38m.45s.
Pierce Ferry iP = 38m.51s., ipP = 39m.22s.
Tinemaha iPZ = 39m.2s.a, ipPZ = 39m.32s.
Pasadena iPZ = 39m.12s.a, ipPZ = 39m.42s.
Mount Wilson iPZ = 39m.13s.a, ipPZ = 39m.43s.
Riverside iPZ = 39m.16s.a.
Boulder City iP = 39m.18s., ipP = 39m.48s.
Palomar iPZ = 39m.21s., ipPZ = 39m.51s.
Tucson iP = 39m.48s., ipP = 40m.19s.
Stuttgart eZ = 40m.18s.
Paris iP = 40m.29s.

Dec. 15d. Readings also at 2h. (Mineral, Shasta Dam, Tucson, Riverside, Palomar, Tinemaha, near Tacubaya), 4h. (2) and 5h. (near Apia), 6h. (near Stalinabad), 8h. (near Victoria), 10h. (near Ashkabad (3), near Stalinabad, Andijan, Murgab, Tashkent, Samarkand, and Tchimkent), 11h. (Tucson and Tacubaya), 12h. (Sotchi (2), near Stalinabad, Andijan, Murgab, Tchimkent, and Samarkand), 13h. (Victoria), 14h. (Paris), 16h. (Tamanrasset), 18h. (Santa Clara), 22h. (near Tacubaya (2)).

Dec. 16d. 7h. 18m. 20s. Epicentre 19°·7S. 175°·9W. (as on 1943, May 12d.).

$A = -\cdot9397$, $B = -\cdot0674$, $C = -\cdot3351$; $\delta = -13$; $h = +5$;
$D = -\cdot071$, $E = +\cdot997$; $G = +\cdot334$, $H = +\cdot024$, $K = -\cdot942$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		7·1	35	e 1 43	− 5	—	—	—	—	i 2·8
Arapuni	E.	19·6	201	—	—	8 40	SS	—	—	10·9
Tuai	N.	19·9	196	4 39	+ 3	—	—	—	—	—
Wellington		22·8	197	5 2	− 3	9 11	0	5 44	PP	12·1
Kaimata		25·2	203	5 58	PP	—	—	—	—	—
Christchurch		25·5	200	5 32	0	9 37	−20	i 6 31	PPP	11·7
Brisbane		29·5	249	i 6 2	− 6	e 11 0	− 2	i 7 51	?	i 14·3
Riverview		32·4	238	e 6 32	− 2	i 11 49	+ 1	i 7 57	PPP	e 13·8
Honolulu		44·4	25	—	—	e 14 49	0	—	—	e 18·2
Santa Clara		76·1	42	e 11 57	+ 6	—	—	—	—	e 22·1
Berkeley		76·3	42	i 10 57a	−55	i 21 42	+ 5	e 30 40	Q	e 31·4
Lick	z.	76·3	42	i 11 54a	+ 2	—	—	—	—	—
Pasadena		76·8	47	e 11 55	0	e 21 42	0	—	—	e 31·4
Mount Wilson	z.	76·9	47	e 11 55	− 1	—	—	—	—	—
Fresno	z.	77·2	44	i 12 1	+ 4	—	—	—	—	—
Palomar		77·2	48	i 11 59	+ 2	—	—	—	—	—
Riverside	z.	77·2	47	e 11 58	+ 1	—	—	—	—	—
Haiwee	z.	78·0	45	e 12 5	+ 3	—	—	—	—	—
Shasta Dam		78·0	39	e 12 0	− 2	—	—	e 14 54	PP	—
Mineral	z.	78·2	40	i 12 4k	+ 1	—	—	—	—	—
Tinemaha	z.	78·4	44	e 12 5	+ 1	—	—	—	—	—
Vladivostok		78·9	324	e 12 5	− 2	i 22 3	− 2	—	—	—
Boulder City		80·0	47	e 12 13	0	—	—	—	—	—
Pierce Ferry		80·6	47	i 12 15	− 1	—	—	—	—	—
Tucson		80·9	51	e 12 16	− 1	e 22 47	+21	i 12 21	P_cP	e 31·5
Victoria		82·5	33	e 12 25	− 1	e 22 46	+ 4	e 28 8	SS	33·7
Sitka		84·2	22	—	—	e 23 15	+16	—	—	e 32·4
Salt Lake City		84·5	44	—	—	e 22 57	− 5	e 28 36	SS	e 34·9
College		87·2	12	—	—	e 23 20	[+ 5]	—	—	e 36·0
Bozeman		87·6	40	—	—	e 23 33	+ 1	e 31 20	?	e 38·5
Saskatoon		93·3	36	—	—	e 24 30	+ 6	—	—	45·0
Huancayo		95·7	106	e 17 43	PP	e 25 1	+17	e 26 35	PS	e 38·7
Irkutsk		99·3	322	e 18 19	PP	—	—	—	—	—
La Paz		100·4	112	18 4	PP	24 42	[+13]	i 25 34	S	47·9
Bogota		102·7	90	e 18 16	PP	e 27 25	PS	e 21 27	?	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kodaikanal	E.	108·9	275	—	—	e 24 56	[−12]	—	—	—
San Juan		114·1	78	e 14 26	P	e 30 30	PPS	e 19 55	PP	e 49·3
Bombay	E.	115·6	282	e 20 26	PP	—	—	—	—	—
Bermuda		117·8	63	—	—	e 29 21	PS	e 32 40	?	e 50·9
Tashkent		121·2	307	e 18 32	[−23]	—	—	i 20 19	PP	—
Stalinabad		121·6	304	e 20 51	PP	e 30 19	SKSP	—	—	—
Tananarive		122·6	231	e 33 29	?	37 25	SS	e 49 34	Q	e 65·2
Sverdlovsk		124·4	327	—	—	e 37 21	SS	—	—	—
Warsaw		144·9	343	e 20 1	[+22]	—	—	—	—	e 69·7
Yalta		145·0	322	19 37	[− 2]	—	—	—	—	—
Kew		148·1	6	e 19 52	[+ 8]	—	—	—	—	e 59·7
Jena	E.	148·3	351	e 19 47	[+ 2]	—	—	e 19 54	?	—
Ksara		148·5	304	i 19 52a	[+ 7]	—	—	23 19	PP	—
Prague		148·6	348	—	—	e 51 5	?	e 58 58	Q	e 67·7
Istanbul		149·9	321	e 20 33	[+46]	—	—	—	—	—
Paris		150·5	4	e 22 34	PP	—	—	—	—	e 77·7
Stuttgart		150·7	353	e 19 49	[+ 1]	—	—	—	—	e 71·7
Strasbourg		151·0	356	e 19 53	[+ 4]	e 42 54	SS	e 23 6	PP	66·7
Belgrade		151·5	336	e 19 58a	[+ 8]	—	—	—	—	—
Basle		152·1	356	e 20 1	[+10]	—	—	e 27 37	PPP	—
Triest		152·9	347	e 20 6	[+14]	—	—	—	—	e 77·7
Helwan		153·3	298	e 19 58	[+ 6]	—	—	e 24 24	PP	—
Salo	z.	153·6	352	e 19 55	[+ 2]	—	—	—	—	—
Clermont-Ferrand		154·0	3	i 20 5	[+12]	—	—	i 24 5	PP	70·7
Bologna		154·5	349	e 19 59	[+ 5]	e 29 3	?	e 24 10	PP	—
Rome		156·7	345	e 20 20	[+23]	e 44 17	SSP	—	—	—
Toledo		158·7	20	e 20 2	[+ 3]	—	—	—	—	84·0
Alicante		161·0	13	19 58	[− 4]	44 51	SS	24 19	PP	e 72·7
Tamanrasset		176·6	—	e 20 9	[− 3]	—	—	e 25 48	PP	—

Additional readings :—
Wellington iZ = 5m.8s., PPP = 5m.50s., iZ = 5m.56s., SS = 9m.45s., iZ = 10m.9s., Q? = 10m.20s., i = 10m.51s.
Riverview eSN = 11m.30s., iE = 12m.1s. and 12m.16s.
Berkeley iPZ = 12m.0s., iE = 20m.21s., 20m.36s., and 23m.24s.
Shasta Dam e = 14m.33s.
Huancayo eSS? = 31m.41s.
La Paz iSSEN = 32m.40s.
San Juan e = 22m.24s., eS = 27m.37s., ePS = 28m.40s., eSS? = 36m.1s.
Tashkent ePPP = 22m.55s.
Stuttgart ePKPZ = 19m.52s., iPKP = 19m.57s.k, eZ = 20m.26s., 21m.55s., and 22m.56s., e = 24m.51s.
Strasbourg i = 19m.59s., e = 21m.2s., eSS? = 43m.18s., eSSS = 48m.40s., e = 52m.40s.
Belgrade i = 20m.5s., e = 20m.51s. and 21m.54s.
Basle e = 26m.38s.
Helwan e = 21m.40s., 22m.52s., and 25m.5s.
Clermont-Ferrand iPKP$_2$? = 20m.35s.
Alicante PKP$_2$? = 20m.39s., SKS = 26m.45s., SS = 37m.3s., SSS = 43m.43s.
Tamanrasset i = 21m.0s.a, iPKP$_2$ = 21m.56s.a, ePPP? = 29m.23s.
Long waves were also recorded at Ottawa, Seven Falls, Cleveland, Philadelphia, Ivigtut, and at other European stations.

Dec. 16d. Readings also at 0h. (Andijan, Tchimkent, near Stalinabad, Murgab, and Samarkand), 4h. (near Victoria), 5h. (near Mizusawa), 7h. (near Yuzno-Sakhlinsk), 8h. (near Pierce Ferry), 9h. (near Stalinabad), 16h. (near Leninakan), 17h. (near Ottawa), 20h. (Tchimkent, near Stalinabad, Samarkand, Tashkent, Andijan, and near Ottawa), 22h. (La Paz and near Huancayo).

Dec. 17d. 11h. 31m. 28s. Epicentre 6°·9N. 80°·4W. (as on 1943, May 2d.).

$A = +\cdot1656$, $B = -\cdot9789$, $C = +\cdot1194$; $\delta = -8$; $h = +7$;
$D = -\cdot986$, $E = -\cdot167$; $G = +\cdot020$, $H = -\cdot118$, $K = -\cdot993$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		2·2	22	i 0 39	+ 1	e 1 9	+ 3	—	—	—
Bogota		6·7	110	e 1 43	+ 1	i 2 56	− 4	i 3 43	S_g	—
San Juan		18·0	50	e 4 13	0	i 7 42	+10	—	—	e 8·5
Huancayo		19·5	166	e 4 30	− 1	e 8 16	+10	e 5 24	?	e 10·2
La Paz		26·1	152	e 5 34	− 3	i 10 32	+25	—	—	15·1
St. Louis		32·8	347	i 6 35	− 2	e 14 17	SSS	—	—	—
Tucson		37·9	317	i 7 22	+ 2	—	—	—	—	e 22·8
Ottawa	z.	38·9	7	e 7 26	− 3	—	—	—	—	—
Pierce Ferry		42·3	319	e 8 8	+11	—	—	—	—	—
Boulder City		42·8	318	e 8 1	0	—	—	—	—	—
Mount Wilson	z.	44·1	315	i 8 12	0	—	—	—	—	—
Tinemaha	z.	45·7	318	e 8 35	+11	—	—	i 8 44	?	—
Mineral	z.	49·6	319	e 8 55k	0	—	—	i 9 3a	?	—
Shasta Dam		50·3	320	e 8 58	− 2	—	—	—	—	—
Victoria	z.	55·1	328	e 9 36	0	—	—	—	—	—
Tamanrasset		83·6	67	e 12 38	+ 7	—	—	—	—	—
Stuttgart	z.	84·6	42	e 12 35?	− 1	—	—	—	—	—

Bogota also gives iP*E = 1m.57s., eEN = 7m.42s.

Dec. 17d. 21h. 18m. 3s. Epicentre 42°·6N. 12°·9E.

$A = +\cdot7198$, $B = +\cdot1649$, $C = +\cdot6744$; $\delta = +12$; $h = -3$;
$D = +\cdot223$, $E = -\cdot975$; $G = +\cdot657$, $H = +\cdot151$, $K = -\cdot738$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Rome		0·8	203	0 14k	− 4	i 0 24	− 7	—	—	—
Florence		1·7	315	e 0 23?	− 8	i 0 52?	− 2	—	—	—
Padova		2·0	339	e 1 1?	S	(e 1 1?)	− 1	e 1 5?	S_g	—
Bologna		2·3	331	e 0 43	+ 3	i 1 15	S_g	i 0 53	P_g	—
Triest		3·1	11	i 0 53	+ 2	i 1 31	+ 2	i 1 7	P_g	—
Salo		3·4	331	e 0 58	+ 3	1 40	+ 3	—	—	—
Pavia		3·7	315	e 1 4	P*	e 2 1	S_g	—	—	—
Taranto		3·9	121	1 1	− 1	—	—	e 1 29	P_g	—
Chur		4·8	331	e 1 18	+ 3	e 2 12	0	—	—	—
Zürich		5·7	329	e 1 27	− 1	e 2 34	− 1	—	—	—
Belgrade		5·9	66	e 2 4	P_g	e 2 58	S*	e 3 25	S_g	e 3·9
Basle		6·2	325	e 1 35	0	e 3 22	S_g	—	—	—
Stuttgart		6·7	339	e 1 41	− 1	e 2 56	− 4	e 2 9	P_g	e 4·4
Strasbourg		7·0	331	e 1 44	− 2	e 3 18	+10	e 2 19	P_g	—
Jena		8·4	354	e 2 4	− 2	e 3 48	+ 5	e 4 12	S*	e 4·5
Collmberg	E.	8·7	1	—	—	e 3 42	− 8	e 4 47	S_g	—
Paris		9·6	314	e 2 45	P*	—	—	—	—	—
Alicante		11·0	252	e 2 36	− 6	e 4 44	− 3	—	—	—
Tamanrasset		20·7	200	e 4 44	0	—	—	—	—	—

Additional readings :—
Padova eS*? = 1m.39s.?, eS_g? = 1m.54s.?
Triest iS_g = 1m.58s.
Stuttgart e = 1m.52s. and 2m.33s.
Strasbourg eP = 2m.9s., e = 2m.52s.
Collmberg eE = 4m.12s. and 4m.27s.

Dec. 17d. Readings also at 3h. (Basle, Stuttgart, and near Shasta Dam), 9h. (Shasta Dam, Tucson, Tinemaha, and near Tchimkent), 10h. (Shasta Dam, Tucson, Tinemaha, Huancayo, near La Paz and near Granada), 11h. (near Balboa Heights), 12h. (Balboa Heights), 14h. (Stuttgart), 15h. (Brisbane), 16h. (La Paz), 19h. (near Ashkabad), 20h. (near Shasta Dam and near La Paz).

Dec. 18d. 14h. 13m. 15s. Epicentre 19°·0S. 169°·5E. (as on 1948, Nov. 5d.).

$A = -·9304$, $B = +·1724$, $C = -·3236$; $\delta = +8$; $h = +5$;
$D = +·182$, $E = +·983$; $G = +·318$, $H = -·059$, $K = -·946$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		17·3	238	i 4 3	− 1	i 7 32	+16	i 8 0	SSS	i 10·9
Arapuni	E.	19·7	167	—	—	9 9	SS	—	—	—
New Plymouth	E.	20·4	169	5 2	PP	8 54	SS	i 5 43	?	e 9·6
Tuai	N.	20·8	164	5 7	PP	—	—	—	—	—
Riverview		22·0	225	e 5 0	+ 2	e 9 8	+12	i 5 29	PP	e 11·0
Wellington		22·7	171	5 5	+ 1	11 26	L	i 5 26	PP	(11·4)
Kaimata		23·5	176	5 31	PP	—	—	—	—	—
Christchurch		24·6	175	6 3	PP	—	—	10 47	Q	12·7
Vladivostok		70·8	333	e 10 50	−30	i 20 24	−11	—	—	—
Mount Wilson	Z.	86·8	53	e 12 49	+ 2	—	—	—	—	—
Mineral	Z.	87·0	46	e 12 45a	− 3	—	—	—	—	—
Riverside	Z.	87·2	53	e 12 45	− 4	—	—	—	—	—
Boulder City		89·9	53	e 13 5	+ 3	—	—	—	—	—
Pierce Ferry		90·6	52	e 13 1	− 4	—	—	—	—	—
Bombay	E.	102·0	286	e 18 45	PP	—	—	—	—	—
Huancayo		109·1	111	—	—	e 33 45	SS	—	—	e 51·5
Tashkent		109·8	308	—	—	e 24 24	[−47]	i 34 6	SS	—
La Paz		113·2	119	e 19 10	PP	—	—	—	—	—
Ksara		136·3	298	e 21 16	?	—	—	e 25 4	PPP	—
Helwan		140·6	294	e 17 12	?	—	—	e 22 53	PP	—
Stuttgart	Z.	146·3	336	e 19 36a	[− 5]	—	—	e 19 47	PKP	—
Strasbourg		147·0	337	e 19 39	[− 4]	—	—	e 24 1	PP	—
Paris		148·5	343	e 19 42	[− 3]	—	—	e 19 53	PKP	—
Rome	Z.	150·0	324	e 19 54	[+ 7]	—	—	e 22 45	?	—
Tamanrasset		164·6	287	20 12	[+ 7]	—	—	—	—	—

Additional readings :—
Riverview iZ = 5m.16s., iPPZ = 5m.32s., iE = 9m.14s., iN = 9m.20s., iSSN = 9m.51s., iSSE = 9m.56s.
Wellington SS = 13m.27s., SSS = 13m.55s., Q = 14m.24s.
Christchurch eZ = 7m.23s., eEN = 8m.20s., iN = 10m.7s.
Helwan e = 20m.9s., 20m.49s., and 25m.19s.
Strasbourg e = 19m.50s., 20m.19s., 21m.12s., and 21m.57s.
Long waves were also recorded at Ottawa, Berkeley, Seven Falls, Apia, Uccle, and De Bilt.

Dec. 18d. 23h. 45m. 13s. Epicentre 35°·0N. 116°·5W. (as on 1947, April 11d.).

$A = -·3663$, $B = -·7347$, $C = +·5710$; $\delta = 0$; $h = 0$;
$D = -·895$, $E = +·446$; $G = -·255$, $H = -·511$, $K = -·821$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mount Wilson	1·5	238	i 0 26k	− 2	i 0 42	− 7	—	—	—
Pasadena	1·6	238	i 0 28k	− 2	—	—	—	—	—
Haiwee	1·6	314	i 0 29a	− 1	i 0 48	− 3	—	—	—
Boulder City	1·7	54	0 37	+ 6	i 1 7	+13	—	—	—
Palomar	1·7	190	i 0 33k	+ 2	—	—	—	—	—
Pierce Ferry	2·3	61	i 0 45	+ 5	i 1 25	S_s	—	—	—
Tinemaha	2·5	326	i 0 43a	0	—	—	—	—	—
Fresno	3·2	303	i 0 51	− 1	i 1 33	+ 1	i 0 56	P*	—
Lick	4·8	301	i 1 12a	− 3	i 2 21	+ 9	i 2 28	S*	—
Branner	5·2	299	i 1 17k	− 4	e 2 23	+ 1	i 1 20	P	—
Reno	5·2	331	i 1 44	P_s	i 2 36	S*	i 2 51	S_s	—
Berkeley	5·5	303	i 1 21k	− 4	i 2 27	− 3	i 1 29	P	—
Tucson	5·5	118	i 1 28	+ 3	i 2 29	− 1	i 1 39	P*	1 3·2
Mineral	6·7	324	e 1 44k	+ 2	i 3 27	S*	i 1 56	P*	—
Shasta Dam	7·3	322	e 2 27	P_s	e 3 40	S*	—	—	—

Additional readings :—
Fresno iSN = 1m.37s.
Lick iZ = 1m.20s. and 1m.27s.
Branner eN = 2m.17s.
Reno iZ = 2m.29s., iN = 3m.2s.
Tucson i = 1m.55s. and 3m.2s.
Mineral iZ = 2m.2s., eE = 2m.5s., iSZ = 3m.17s.

Dec. 18d. Readings also at 2h, (near Reno, Lick, Mineral, and near Ashkabad), 4h. (Tchimkent and near Mizusawa), 7h. (near Shasta Dam), 9h. (Piatigorsk, near Stuttgart, Chur, Basle, and Zurich), 13h. (near Tananarive), 20h. (near Mizusawa), 22h. (Pierce Ferry, Shasta Dam, Tucson, Palomar, Tinemaha, Mount Wilson, and near Apia).

Dec. 19d. 4h. Undetermined Shock.

La Paz PZ = 0m.5s., iN = 1m.31s. and 1m.56s., iS = 2m.44s., L = 3m.42s.
La Plata PEN = 0m.30s., Z = 0m.43s., E = 2m.48s., N = 2m.55s., 3m.19s., and 3m.43s., SE = 3m.48s., SN = 3m.53s., E = 4m.12s., LN = 4m.26s.
Huancayo eP = 1m.4s., eS = 4m.1s., iS = 4m.8s., eL = 5m.6s.
Tucson iP = 8m.29s., ipP = 8m.40s.
Ottawa eZ = 8m.40s.
Pierce Ferry iP = 8m.58s.
Boulder City eP = 8m.59s.
Riverside ePZ = 8m.59s., ipPZ = 9m.10s.
Mount Wilson ePZ = 9m.1s., ipPZ = 9m.13s.
Pasadena ePZ = 9m.2s., ipPZ = 9m.13s.
Haiwee ePZ = 9m.11s., epPZ = 9m.21s.
Tinemaha iPZ = 9m.14s., ipPZ = 9m.26s.
Shasta Dam eP? = 9m.35s., i = 9m.38s.
Mineral iPZ = 9m.42s.k.
Long waves were recorded at Cheb.

Dec. 19d. Readings also at 2h. (Leninakan), 4h. (Stuttgart, Ksara, Tamanarasset, Samarkand, and near Ashkabad,) 5h. (Nanking, Murgab, Stalinabad, Andijan, Grozny, Tashkent, Piatigorsk, near Ashkabad, and near Granada), 6h. (De Bilt), 7h. (near Ashkabad), 9h. (Strasbourg), 11h. (Ksara, Helwan and Tamanrasset (2)), 12h. Samarkand, near Stalinabad, Andijan, near Malaga, and near Messina), 16h. (near Shasta Dam), 18h. (Samarkand, Tchimkent, near Stalinabad, and Murgab), 19h. and 21h. (near Ashkabad), 23h. (La Paz).

Dec. 20d. 4h. 42m. 47s. Epicentre 35°·7N. 121°·2W. (as on 1945, July 11d.).

A = −·4217, B = −·6962, C = +·5810 ; δ = +9 ; h = 0;
D = −·855, E = +·518 ; G = −·301, H = −·497, K = −·814.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fresno	Z.	1·5	48	i 0 27	− 1	—	—	—	—	—
Lick		1·7	348	i 0 29k	− 2	i 0 55	+ 1	—	—	—
Santa Clara		1·7	340	e 0 31	0	e 0 53	− 1	e 0 57	S_g	—
Santa Barbara		1·7	136	i 0 32	+ 1	i 0 59	+ 5	—	—	—
Berkeley		2·3	338	i 0 37	− 3	1 13	+ 4	i 0 47	P_g	—
Haiwee		2·6	81	i 0 45	+ 1	—	—	—	—	—
Tinemaha		2·7	61	i 0 47	+ 2	—	—	—	—	—
Pasadena		2·9	119	i 0 48a	0	—	—	—	—	—
Reno		4·0	16	(e 1 7)	+ 3	(i 1 54)	+ 2	(i 1 20)	P_g	—
Mineral		4·7	356	i 1 13a	− 1	i 2 14	+ 4	i 1 29	P_g	—
Shasta Dam		5·1	350	e 1 18	− 2	—	—	i 1 45	P_g	i 2·8
Boulder City		5·2	85	e 1 21	0	e 2 16	− 6	—	—	i 3·0
Pierce Ferry		5·9	84	i 1 29	− 2	i 2 34	− 6	—	—	—
Tucson		9·3	109	e 2 18	+ 1	—	—	—	—	e 5·2

Additional readings :—
Fresno iEN = 30s., i = 36s.
Lick eE = 32s., iN = 39s., and 47s.
Berkeley iE = 42s., iN = 1m.9s., iZ = 1m.18s.
Reno iN = (1m.10s.) and (1m.58s.), all readings increased by 1m.
Mineral iZ = 1m.17s., iNZ = 1m.51s., iZ = 2m.8s., iE = 2m.23s.

Dec. 20d. 23h. 7m. 19s. Epicentre 23°·4N. 121°·6E. (as on 1946, Sept. 9d.).

Felt throughout most of the Island of Taiwan.
Seismological Bulletin of Nanking. Epicentre near 23°·5N. 122°E.

A = −·4814, B = +·7825, C = +·3949 ; δ = 0 ; h = +4 ;
D = +·852, E = +·524 ; G = −·207, H = +·336, K = −·919.

		Δ	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Nanking		9·0	345	2 7	− 6	3 46	−12	4·8
Calcutta	E.	30·6	276	—	—	e 11 31	+11	e 15·4
Irkutsk		31·7	340	e 6 27	0	11 30?	− 7	—
Andijan		44·6	305	e 8 20	+ 4	—	—	—
Bombay		45·6	274	e 10 19	PP	—	—	—
Stalinabad		47·1	303	e 8 39	+ 4	e 15 49	+21	—
Samarkand		48·6	304	e 8 51	+ 4	—	—	—
Ksara		74·0	300	e 30 45	?	e 37 46	?	—
Stuttgart		86·3	323	e 12 45	0	—	—	e 46·7
Strasbourg		87·2	323	e 12 50	+ 1	—	—	43·7
Victoria		87·9	38	e 12 49	− 4	—	—	—
Kew		89·8	328	e 17 41?	PP	—	—	e 42·7
Shasta Dam		92·9	44	e 13 13	− 3	—	—	—
Mineral	z.	93·6	44	i 13 16k	− 3	—	—	—
Tinemaha	z.	97·6	44	i 13 35	− 3	—	—	—
Mount Wilson	z.	99·4	47	e 13 44	− 2	—	—	—
Pasadena	z.	99·4	47	i 13 44	− 2	—	—	—
Tamanrasset		102·8	303	18 12	PP	—	—	—

Additional readings :—
Nanking P = 2m.21s., S = 3m.32s., L = 3m.35s.
Mineral iZ = 13m.31s.k.
Tinemaha iZ = 13m.48s.
Long waves were also recorded at other European stations.

Dec. 20d. Readings also at 0h. (Leninakan and near Grozny), 1h. (near Ashkabad), 2h. (near Mizusawa and near Shasta Dam), 5h. (near Murgab and near Ashkabad), 7h. (Strasbourg and near Stuttgart), 8h. (Dehra Dun), 11h. (Logan), 12h. (La Paz), 14h. (near Stalinabad), 15h. (near Shasta Dam and near Yuzno-Sakhlinsk), 16h. (near Shasta Dam), 17h. (Mineral and Shasta Dam), 18h. (Tucson, Mount Wilson, Pasadena, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, near Mizusawa, and near Yuzno-Sakhlinsk), 20h. (Brisbane, Riverview, Mount Wilson, Pasadena, Riverside, Tinemaha, Shasta Dam, Ottawa, Huancayo. La Paz, and Stuttgart), 23h. (near Bogota).

Dec. 21d. 20h. 13m. 31s. Epicentre 19°·3N. 69°·3W. (as on 1948, April 30d.).

A = +·3339, B = −·8835, C = +·3285 ; δ = −3 ; h = +5 ;
D = −·935, E = −·353 ; G = +·116, H = −·307, K = −·944.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Port au Prince		3·0	255	e 1 3	P_g	i 1 33	S*	—	—	i 2·0
San Juan		3·1	107	i 0 35	−16	i 1 3	−26	—	—	i 1·2
Bogota	z.	15·3	198	(i 3 38)	− 1	(i 6 30)	0	(i 7 2)	SS	—
Philadelphia		21·2	348	e 4 49	0	e 8 48	+ 7	—	—	e 9·7
Fordham		21·8	352	i 4 55	− 1	e 8 53	+ 1	—	—	—
Harvard		23·2	357	i 5 6	− 3	i 9 23	+ 5	—	—	—
St. Louis		26·5	322	e 5 40	− 1	i 10 34	+20	—	—	—
Ottawa		26·6	350	e 5 41	− 1	e 10 47	+31	—	—	—
Shawinigan Falls	N.	27·3	356	e 5 58	+10	—	—	—	—	—
Seven Falls	E.	27·8	358	e 6 41	PP	e 11 20	SS	—	—	—
Huancayo		31·7	191	e 6 36	+ 9	e 11 29	− 8	—	—	e 16·6
La Paz		35·6	178	6 59	− 2	12 37	− 1	i 8 25	PP	18·5
Tucson		39·3	299	e 7 33	+ 1	—	—	—	—	—
Pierce Ferry		42·6	303	e 8 0	+ 1	—	—	—	—	—
Boulder City		43·2	302	e 8 7	+ 3	—	—	—	—	—

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Palomar	z.	44·5	299	i 8 17 a	+ 2	—	—	e 10 9	PP	—
La Jolla	z.	44·8	298	e 8 17	0	—	—	—	—	—
Mount Wilson	z.	45·6	300	i 8 25	+ 1	—	—	i 9 49	PP	—
Pasadena	z.	45·7	300	e 8 25	+ 1	—	—	—	—	—
Tinemaha	z.	46·1	304	i 8 28	0	—	—	—	—	—
Fresno	z.	47·3	303	e 8 37	0	—	—	—	—	—
Lick	z.	48·8	304	i 8 50 k	+ 1	—	—	—	—	—
Shasta Dam		49·9	308	e 8 54	− 3	—	—	—	—	—
Victoria		52·2	317	e 9 15	0	—	—	—	—	27·5
Alicante		61·9	56	10 6	−18	e 18 20	−27	22 19	SSS	e 28·9
Kew		62·1	41	e 10 29?	− 4	—	—	—	—	e 37·5
Paris		63·8	44	i 10 27	− 9	—	—	—	—	e 29·5
Uccle		65·0	42	—	—	e 26 29?	SSS	—	—	e 31·5
Basle		67·2	45	e 11 19	+21	—	—	—	—	—
Strasbourg		67·3	45	e 11 2	+ 3	—	—	—	—	e 26·5
Stuttgart		68·2	45	e 10 59	− 5	—	—	—	—	e33·5
Tamanrasset		69·2	72	i 11 4 k	− 6	—	—	e 11 27	P_cP	—
Ksara		91·4	54	e 12 48	−21	e 23 44 [+ 3]		—	—	—

Additional readings and note :—
Port au Prince i = 1m.13s.
San Juan i = 39s,
Bogota readings were given 15m. early.
St. Louis eP?Z = 5m.52s.
La Paz iSS = 14m.53s.
Tucson i = 7m.52s.
Palomar iZ = 8m.36s.
Mount Wilson eZ = 8m.37s., iZ = 8m.44s., and 9m.13s.
Pasadena eZ = 8m.39s., iZ = 9m.1s.
Tinemaha iZ = 8m.36s., eZ = 8m.44s., iZ = 8m.54s.
Shasta Dam iP = 8m.57s.
Alicante P_cP = 10m.50s., PP = 12m.26s., PPP = 14m.0s., P_cS = 14m.40s., PS = 18m.38s., PPS = 18m.48s., S_cS = 19m.40s., SSS = 24m.52s.
Tamanrasset i = 11m.15s.k.
Long waves were also recorded at Bozeman, Salt Lake City, De Bilt, and Potsdam.

Dec. 21d. Readings also at 0h. (near Shasta Dam), 3h. (Brisbane), 5h. (Andijan and near Stalinabad), 7h. (Tucson), 14h. (Strasbourg and near Stuttgart), 16h. (Arapuni, Christchurch, Wellington, Brisbane, Riverview, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, and Stuttgart), 17h. (Merida, Tacubaya, Mount Wilson, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, and Lick), 19h. (near Ashkabad), 20h. (Ottawa), 21h. (Brisbane, Mount Wilson, Tinemaha, Pierce Ferry, Shasta Dam, and near Ashkabad), 23h. (Andijan, near Tchimkent, and near Shasta Dam).

Dec. 22d. Readings at 0h. (Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, near Andijan, and near Mizusawa), 4h. (near Bucharest), 5h. (Palomar, Tinemaha, Tucson (2), Pierce Ferry, near Stuttgart, near Tacubaya, and near Ashkabad), 11h. (Zi-ka-wei and De Bilt), 13h. (near Ashkabad), 15h. (Huancayo, La Paz (2), Mount Wilson, Pasadena, Palomar, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 16h. (La Plata, near Ottawa and near Ashkabad), 20h. (Bermuda), 23h. (near Ashkabad and near Messina).

Dec. 23d. 7h. 12m. 9s. Epicentre 26°·2S. 178°·5W.

A = −·8981, B = −·0235, C = −·4391 ; δ = −6 ; h = +3 ;
D = −·026, E = +1·000 ; G = +·439, H = +·011, K = −·898.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	N.	12·1	207	3 42	+45	5 58	L	—	—	6·4
Arapuni	E.	12·8	201	—	—	e 5 39	+ 9	—	—	—
Wellington		16·1	199	3 45	− 4	6 53	+ 4	—	—	—
Kaimata		18·3	204	4 20	+ 3	—	—	—	—	—
Christchurch		18·7	201	4 33	+11	7 46	− 2	—	—	9·2
Brisbane		25·4	261	e 5 32	+ 1	i 10 5	+ 9	i 5 59	PP	12·8
Riverview		27·3	247	e 5 47	− 1	i 10 33	+ 6	i 10 57	SS	13·0
Vladivostok		82·7	325	e 12 35	+ 8	i 22 57	+13	—	—	—
Berkeley		82·7	42	i 12 29 k	+ 2	—	—	—	—	e 40·8
Lick	z.	82·7	42	i 12 30 a	+ 3	—	—	—	—	—

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pasadena	z.	82·9	47	i 12 29	+ 1	—	—	—	—	—
Mount Wilson	z.	83·0	47	i 12 28	0	—	—	i 15 39	PP	—
Palomar		83·3	48	i 12 31	+ 1	—	—	—	—	—
Haiwee	z.	84·3	45	i 12 37	+ 2	—	—	—	—	—
Shasta Dam		84·5	39	e 12 37	+ 1	—	—	—	—	—
Mineral	z.	84·7	40	i 12 38 a	+ 1	—	—	—	—	—
Reno	z.	85·3	42	i 12 44 k	+ 4	—	—	—	—	—
Boulder City		86·2	47	e 12 42	− 2	—	—	—	—	—
Pierce Ferry		86·8	47	e 12 45	− 2	—	—	e 16 12	PP	—
Tucson		86·8	52	e 12 45	− 2	—	—	—	—	e 41·4
Victoria	z.	89·2	33	e 13 0	+ 1	—	—	—	—	—
Huancayo		96·3	106	—	—	—	—	e 31 32	SS	e 44·7
La Paz		100·1	114	i 12 51	−58	i 24 27	[0]	i 24 55	SKKS	46·4
Bombay		114·4	279	—	—	e 29 28	PS	—	—	—
Ksara		149·4	292	e 19 43	[− 3]	—	—	e 23 21	PP	—
Helwan		153·4	284	e 20 15	[+23]	—	—	e 23 27	PKS	—
Stuttgart	z.	156·7	347	e 20 1	[+ 4]	—	—	e 20 31	PKP_2	—
Basle		158·2	349	e 20 7	[+ 8]	e 37 34	PPS	e 25 2	PP	—
Tamanrasset		175·0	—	e 20 10	[− 2]	28 51	?	e 21 41	PKP_2	—

Additional readings :—
Riverview eQN = 11m.57s.
Berkeley eN = 34m.15s., eE = 35m.3s.
Mount Wilson eZ = 12m.44s., iZ = 12m.49s.
Tucson iP = 12m.48s., i = 13m.5s.
Helwan e = 21m.1s., 22m.12s., and 25m.42s.
Tamanrasset ePP = 25m.39s.
Long waves were also recorded at Apia, New Plymouth, Tacubaya, and Seven Falls.

Dec. 23d. 8h. 41m. 10s. Epicentre 55°·6N. 166°·4E.

$A = -·5516$, $B = +·1335$, $C = +·8233$; $\delta = -9$; $h = -7$;
$D = +·235$, $E = +·972$; $G = -·800$, $H = +·194$, $K = -·568$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Klyuchi		3·2	283	1 41	S_g	—	—	—	—	—
Nemuro		18·2	237	4 13	− 3	7 39	+ 2	—	—	—
Aomori		22·4	239	5 0	− 2	9 12	+ 8	—	—	—
Morioka		23·1	237	5 8	0	9 20	+ 4	—	—	—
Mizusawa	E.	23·6	236	5 14	+ 1	9 34	+ 9	—	—	—
College		24·0	49	i 5 22	+ 5	i 9 36	+ 4	e 6 24	PP	i 11·5
Sendai		24·4	235	5 20	− 1	9 48	+ 9	—	—	12·4
Vladivostok		25·4	255	i 5 28	− 3	i 9 54	− 2	—	—	—
Aikawa		25·8	241	e 5 27	− 7	10 18	+16	—	—	—
Nagano		26·9	239	e 5 47	+ 2	—	—	—	—	—
Tokyo		27·0	234	e 5 50	+ 5	—	—	—	—	—
Shizuoka		28·2	235	e 5 57	+ 1	11 9	+28	—	—	—
Nagoya		28·7	237	6 4	+ 3	10 50	0	—	—	—
Osaka		29·8	239	e 6 28	+17	12 34	SS	—	—	16·8
Sitka		31·3	63	e 6 34	+10	i 11 35	+ 4	—	—	i 13·2
Hukuoka		33·2	244	6 45	+ 5	12 12	+12	—	—	16·0
Irkutsk		35·6	292	7 1	0	12 37	− 1	—	—	—
Nanking		40·6	256	e 12 42	?	e 15 26	?	—	—	—
Victoria		42·0	70	7 54 k	0	14 20	+ 6	9 38	PP	21·0
Seattle		43·1	70	e 8 4	0	e 14 7	−23	—	—	e 19·2
Honolulu		43·4	127	e 8 7	+ 1	e 14 42	+ 7	—	—	e 18·0
Shasta Dam		47·6	77	i 8 39	0	e 15 37	+ 2	e 10 33	PP	—
Mineral		48·3	77	i 8 44 a	− 1	e 15 46	+ 1	—	—	—
Ukiah		48·3	79	—	—	e 16 34	+49	—	—	e 21·4
Butte	N.	49·3	65	e 8 55	+ 2	e 15 59	0	e 19 11	SS	e 21·9
Berkeley		49·7	80	i 8 54 a	− 2	1 16 8	+ 4	—	—	e 26·4
Reno		49·9	77	i 8 57 a	0	i 16 9	+ 2	—	—	—
Santa Clara		50·2	80	i 8 49	−11	e 13 0	?	e 20 54	SS	e 23·0
Bozeman		50·3	65	e 9 0	0	i 16 13	0	i 10 54	PP	i 21·4
Lick	Z.	50·4	80	i 9 0 a	− 1	—	—	—	—	—

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fresno		51·9	79	i 9 11	− 1	—	—	—	—	e 29·7
Tinemaha		52·5	78	i 9 17	0	e 16 47	+ 4	—	—	—
Sverdlovsk		52·9	319	i 9 20	0	i 16 50	+ 2	—	—	—
Haiwee	z.	53·3	78	i 9 23	0	—	—	—	—	—
Santa Barbara	z.	53·6	81	e 9 25	0	—	—	—	—	—
Scoresby Sund		54·1	4	9 23	− 6	17 7	+ 2	20 49	SS	23·8
Mount Wilson		54·7	80	i 9 32	− 1	e 17 14	+ 1	—	—	—
Pasadena		54·7	80	i 9 31a	− 2	i 17 14	+ 1	i 10 32	P_cP	e 22·7
Boulder City		55·2	76	e 9 34	− 3	e 17 22	+ 2	—	—	—
Rapid City	E.	55·4	62	i 9 39?	+ 1	i 17 29?	+ 7	e 12 53?	PPP	e 22·7
Almata		55·5	298	e 9 37	− 2	—	—	—	—	—
Pierce Ferry		55·5	75	i 9 38	− 1	e 17 24	0	e 11 44	PP	—
Palomar		56·0	79	i 9 42	− 1	i 17 34	+ 4	—	—	—
La Jolla		56·1	80	i 9 41	− 2	e 17 34	+ 2	—	—	—
Frunse		57·0	299	e 9 50	0	e 17 42	− 1	—	—	—
Andijan		59·7	299	e 10 6	− 3	e 18 19	0	—	—	—
Tchimkent		59·9	302	i 10 5?	− 5	e 18 18?	− 3	—	—	—
Tucson		60·2	76	i 10 10a	− 2	e 18 27	+ 2	e 10 59	pP	e 26·6
Helsinki		60·6	340	—	—	e 18 27	− 3	e 22 51	SS	e 30·8
Tashkent		60·7	302	i 10 12	− 3	i 18 29	− 3	—	—	—
Murgab		60·7	296	10 18	+ 3	18 35	+ 3	—	—	—
Lincoln	E.	61·0	60	i 10 18	0	e 18 44	+ 9	e 12 35	PP	i 29·2
Moscow		61·5	331	10 20	− 1	18 40	− 2	—	—	—
Upsala		62·2	343	e 12 50?	PP	e 18 51?	0	e 22 31	SS	e 28·8
Samarkand		63·1	302	e 10 39?	+ 7	e 19 8?	+ 6	—	—	—
Stalinabad		63·1	300	i 10 28	− 4	i 18 58	− 4	—	—	—
Ville Marie		63·6	44	e 10 32	− 3	—	—	—	—	—
Chicago		64·6	53	e 10 40	− 1	e 19 14	− 7	e 14 30	PPP	e 26·5
Rolphton		65·2	43	i 10 42	− 3	—	—	—	—	i 39·8
St. Louis		65·8	57	i 10 46	− 3	i 19 33	− 2	e 11 6	pP	—
Ottawa		66·6	43	10 51k	− 3	19 42	− 3	13 11	PP	30·3
Shawinigan Falls	N.	66·7	40	e 5 54	?	—	—	e 14 44	PPP	—
Seven Falls	E.	66·9	39	e 10 58	+ 2	e 19 48	− 1	e 27 14	SSS	35·2
Copenhagen		67·1	345	i 10 57	0	19 52	+ 1	24 10	SS	33·8
Aberdeen	E.	67·2	354	e 19 30	?	i 19 50	− 2	e 28 33	Q	e 44·8
Cleveland		67·5	50	i 11 6k	+ 6	i 20 1	+ 5	i 21 3	sS	33·6
Warsaw		68·8	338	i 11 8k	0	20 13	+ 2	13 36	PP	e 32·8
New Kensington	E.	69·0	49	e 11 9	0	e 20 11	− 3	(e 28 11)	SSS	e 28·2
Grozny		69·4	318	e 11 6	− 6	—	—	—	—	—
Durham		69·6	353	—	—	i 20 20	− 1	i 20 56	S_cS	—
Pennsylvania	N.	69·6	47	i 11 14	+ 1	i 20 20	− 1	e 28 7	SSS	e 35·4
Piatigorsk		69·8	321	e 11 14	0	20 20	− 3	—	—	—
Potsdam		70·1	344	i 11 17k	+ 1	i 20 30	+ 3	i 15 36	PPP	e 36·8
Baku		70·2	314	11 25	+ 8	20 39?	+11	—	—	—
Harvard		70·6	42	i 11 16	− 3	e 20 22	−11	e 25 3	SS	e 37·3
Weston		70·9	42	i 11 20	− 1	e 20 24	−12	e 15 44	PPP	30·5
Fordham		71·2	44	i 11 20	− 3	e 20 26	−14	i 25 12	SS	—
Rathfarnam Castle		71·3	356	i 11 24	+ 1	i 20 48	+ 7	e 21 26	PPS	34·9
Philadelphia		71·4	45	e 11 23	− 1	i 20 36	− 6	e 14 4	PP	e 28·5
Raciborzu		71·4	340	e 11 24	0	e 20 38	− 4	e 16 26	PPP	—
De Bilt		71·5	348	i 11 26k	+ 2	i 20 46	+ 3	e 12 0	pP	e 37·8
Theodosia		71·6	326	e 11 25	0	—	—	—	—	—
Halifax		71·6	36	—	—	e 20 40	− 4	e 21 12	PS	34·8
Jena		71·8	343	e 11 26	0	e 20 42	− 4	e 14 6	PP	—
Prague		72·1	342	e 11 25	− 3	e 20 49	− 1	e 11 46	pP	—
Leninakan		72·3	318	e 11 36?	+ 7	—	—	—	—	—
Cheb		72·5	343	e 11 29	− 1	e 20 55	+ 1	e 14 28	PP	e 32·8
Erevan		72·6	317	e 11 32	+ 1	—	—	e 21 31	PS	—
Kew		72·7	352	i 11 33	+ 1	e 20 54	− 3	e 14 20	PP	e 32·8
Uccle	z.	72·9	349	e 11 32k	− 1	e 21 25	PS	e 12 32	P_cP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Budapest		73·7	338	11 43	+ 5	21 12	+ 4	21 40	PS	38·0
Columbia		73·9	53	i 11 37	− 2	e 21 1	− 9	e 25 42	SS	e 29·7
Stuttgart		74·3	345	e 11 40	− 1	e 21 14	− 1	e 14 5	PP	37·8
Kalossa	N.	74·6	338	e 11 55	+12	e 21 22	+ 4	—	—	e 43·3
Hyderabad	N.	74·7	279	11 40	− 3	21 10	− 9	14 31	PP	—
Strasbourg		74·7	346	e 11 43	0	e 21 17	− 2	e 14 32	PP	37·8
Paris		75·1	350	i 11 44	− 2	i 21 23	− 1	i 12 2	pP	e 36·8
Basle		75·7	346	e 11 48	− 1	e 22 10	+40	e 14 20	PP	—
Zürich		75·7	345	e 11 48a	− 1	e 21 23	− 7	e 14 41	PP	—
Belgrade		75·9	336	e 11 48	− 2	e 22 25	+53	—	—	e 42·5
Neuchatel		76·3	346	e 11 51	− 1	—	—	—	—	—
Triest		76·5	341	i 11 56	+ 2	i 21 38	− 1	i 14 46	PP	e 39·8
Bombay		76·6	284	e 11 54	0	e 21 35	− 5	—	—	—
Tacubaya	N.	76·7	76	e 11 57	+ 2	e 21 43	+ 2	—	—	—
Istanbul		77·1	329	i 11 52	− 5	—	—	i 16 38	PPP	—
Clermont-Ferrand		78·0	349	i 12 4	+ 2	i 21 57	+ 2	i 15 6	PP	36·8
Bologna		78·1	343	e 12 5	+ 3	e 22 2	+ 6	—	—	—
Florence		78·8	343	e 12 6	0	e 22 2	− 2	—	—	—
Rome		80·4	341	i 12 14	− 1	i 22 22	+ 1	—	—	—
Taranto		80·8	337	12 7	−10	22 26	+ 1	—	—	e 36·6
Kodaikanal	E.	81·0	276	i 12 15	− 3	22 23	− 4	i 15 25	PP	41·3
Ksara		81·4	320	i 12 20	0	i 23 28	PS	—	—	—
Bermuda		82·1	42	e 12 30	+ 6	e 22 38	0	e 28 0	SS	e 34·3
Barcelona		82·4	349	e 12 26	+ 1	e 22 46	+ 5	—	—	e 34·6
Colombo	E.	82·4	271	11 50?	−35	—	—	—	—	45·7
Tortosa		83·2	349	—	—	22 44	− 5	22 53	S_cS	e 45·8
Brisbane		83·5	192	i 12 29	− 2	e 23 6	+14	—	—	—
Toledo	N.	84·5	353	i 12 37	+ 1	i 23 3	+ 1	—	—	46·6
Alicante		85·7	350	12 57	+15	i 23 21	+ 7	16 8	PP	e 40·2
Helwan		86·6	322	i 12 45a	− 1	23 10	[− 1]	i 13 18	pP	—
Algiers		86·9	347	e 16 49	PP	i 23 23	− 3	—	—	—
Granada		87·2	353	i 12 50k	+ 1	i 23 42	+14	—	—	51·0
Malaga	Z.	87·7	353	i 12 52k	0	i 22 28	−65	16 0	PP	41·8
Riverview		90·0	193	i 13 3k	0	i 23 39	[+ 6]	i 16 36	PP	e 41·2
Auckland	N.	92·4	174	—	—	e 26 10	PPS	e 31 2	SSP	42·8
San Juan		94·0	50	e 13 31	+10	e 23 53	[− 3]	e 17 6	PP	e 38·1
Wellington		96·8	175	—	—	23 50?	[−21]	31 50?	SS	44·8
Tamanrasset		100·2	343	e 14 19	+30	—	—	i 17 58k	PP	—
Bogota		102·3	63	e 18 7	PP	e 24 41	[+ 3]	e 19 58	PPP	48·8
Huancayo		115·7	73	e 19 54	PP	e 29 16	PS	e 35 1	SS	e 49·6
La Paz		123·2	69	e 19 2	[+ 3]	i 30 42	PS	i 20 45	PP	62·2

Additional readings :—
Victoria e =9m.2s., 14m.50s., and 15m.30s., SS =17m.40s.
Shasta Dam e =10m.15s., eS_cS =18m.31s.
Mineral iZ =9m.15s.
Berkeley iE =8m.58s., iZ =9m.10s. and 10m.1s., iN =10m.12s., iZ =10m.16s., iSE = 16m.23s. and 16m.44s.
Reno iZ =9m.6s., iN =9m.13s.
Bozeman iPPP =12m.8s., iSS =19m.45s.
Lick iZ =9m.9s. and 10m.20s.
Fresno iPEN =9m.14s.
Scoresby Sund 9m.30s.
Pasadena eSE =17m.4s., eSSEN =21m.2s.
Rapid City iP_cPE =19m.24s.?, eE =21m.22s.?.
Pierce Ferry i =20m.35s.
Tucson ePP =12m.27s., ePPP =13m.42s., eSS =22m.30s.
Lincoln iS_cSE =20m.6s., eSSE =22m.34s., eSSSE =24m.58s.,
Upsala eSSS?E =25m.50s.?, eSSS?N =26m.8s.
Chicago iS =19m.17s., e =19m.52s. and 21m.9s., eSS =23m.26s., e =23m.51s.
St. Louis i =11m.22s., isS =19m.50s., i =22m.35s. ,
Ottawa e =11m.11s., e =20m.0s., SS =23m.43s., SSS =27m.11s.
Seven Falls eE =23m.26s.
Cleveland eSSN =24m.18s.
Warsaw SE =20m.16s., PSN =20m.31s., SS?E =24m.23s., eSSSN =27m.58s., iSSSE = 28m.4s.
Potsdam isSZ =21m.6s., eZ =23m.50s.
Harvard eSSS =28m.27s.

Continued on next page.

Weston SS =25m.10s., e =28m.28s.
Rathfarnham Castle eSS? =25m.14s.
Philadelphia e =12m.33s., ePPP =15m.49s., eSS =25m.3s.
De Bilt ePPP =15m.50s., esS =21m.32s., eSS =25m.20s.
Halifax e =26m.36s., 28m.28s., and 29m.16s.
Prague ePP =14m.8s., ePPP =15m.39s., ePS =21m.29s., eSS =25m.25s., eSSS = 28m.50s.
Cheb ePS =21m.37s., ePPS =22m.5s., eSS =25m.40s., eSSS =28m.44s.
Kew eZ =12m.44s., eSSEN =25m.46s., eSSS?EN =29m.54s.
Budapest SE =21m.15s., SSSE =29m.24s.
Stuttgart eZ =12m.38s., eSP =21m.41s., eSS =25m.56s., eSSS =29m.34s., eQ =35·8m.
Hyderabad SSN =26m.10s.
Strasbourg e =12m.18s., ePP =14m.35s., ePPP =16m.19s. and 16m.22s., ePS =21m.49s., iPS =21m.53s., eSS =26m.8s. and 26m.12s., eSSS =29m.25s. and 29m.29s.
Paris isP =12m.10s., i =13m.0s., iPPP =16m.34s., iS =21m.26s., iSKS? =21m.54s., iPS =22m.4s., iSS =26m.28s., iSSS =30m.2s., e =34m.33s.
Triest iPS =22m.13s., iPPS =22m.54s., iSS =26m.37s., eSSS =29m.44s.
Clermont-Ferrand iSS =27m.24s.
Rome iZ =12m.31s. and 13m.3s.
Kodaikanal PSE =23m.21s., SSE =29m.55s.
Alicante PPP =17m.55s., S_oS =23m.12s., PS =23m.53s., PPS =24m.17s., SS =28m.21s., SSS =31m.51s., Q =36m.1s.
Helwan PP =16m.8s., PS =24m.17s., PPS =24m.44s.
Malaga PPPZ =19m.29s., SSZ =27m.31s.
Riverview iPPPZ =18m.40s., iN =23m.4s., isSN =24m.23s., iPSN =25m.2s., isPSN = 25m.25s., eSSN =29m.39s., eSSE =29m.53s., esSSN =30m.18s., eSSSN =33m.18s.
San Juan e =21m.26s. and 27m.4s., eSS =30m.32s.
Tamanrasset e =17m.10s., iPPP =20m.7s., iPKKP =30m.6s.k.
Bogota ePPSEN =28m.52s.
Huancayo e =20m.51s., 23m.59s., and 29m.35s., eSSS =40m.27s.
La Paz iPKP =19m.54s., iEZ =21m.30s., iPPPEZ =23m.34s., iSS =37m.30s.
Long waves were also recorded at Arapuni, Chur, and Tananarive.

Dec. 23d. 15h. North Pacific.

Klyuchi iP =28m.20s., iSg =29m.0s.
Mizusawa ePN =31m.16s., PE =31m.19s., SE =36m.39s., eSN =36m.47s.
Vladivostok P =32m.33s.
Victoria eZ =33m.56s.
Reno eNZ =34m.13s., eZ =41m.4s., iZ =41m.10s., iN =41m.16s.
Shasta Dam eP =34m.40s., i =40m.28s., e =41m.29s. and 42m.39s.
Tinemaha iPZ =35m.21s., iZ =35m.28s. and 35m.36s., eP_cPZ =40m.30s., iS_cPZ = 43m.16s.
Haiwee ePZ =35m.26s.
Irkutsk P =35m.28s., S =38m.53s.
Pasadena iPZ =35m.34s., iZ =35m.50s., eLE =43m.
Mount Wilson iPZ =35m.36s., iP_cPZ =40m.0s., iS_cPZ =43m.28s.
Boulder City eP =35m.39s., e =39m.59s.
Pierce Ferry eP =35m.43s., e =39m.58s.
Palomar iPZ =35m.45s., iZ =35m.57s.
Ottawa e =36m.54s. and 48m.34s., L =55m.
Manzanillo eEN =37m.30s., eN =39m.57s.
Tacubaya iN =38m.48s., eN =41m.16s.
Tucson iP =38m.58s., i =39m.6s., eS =41m.17s., eL =42m.10s.
Tashkent iP =39m.16s.,
Sverdlovsk P =39m.16s., eSS =48m.53s.
Stalinabad P =39m.30s., eS =46m.8s.
Moscow eP =40m.48s.
Mineral iPZ =41m.19s.
Stuttgart ePZ =42m.44s., eQ =70m.
Berkeley iE =44m.51s., iZ =44m.56s., eE =46m.48s., eNZ =48m.24s.
Tamanrasset e =48m.19s.
Prague eZ =60m.37s., eE =65m.42s., eL =68m.
Long waves were also recorded at Bombay, Seven Falls, and other European stations.

Dec. 23d. 17h. 33m. 25s. Epicentre 46°·4N. 1°·5E.

Intensity IV-V at Azérables. Less strongly at La Souterraine, Nouhet, Les Grands-Chézeaux Eguzon, and Crozant.

J. P. Rothé and Dechevoy.
La Seisimicity de la France de 1940-1950. Annales de la Institut de Physique du Globe de Strasbourg, 3e partie, Geophysique, Nouvelle, série, tome VII, p. 52.

$A = +\cdot6918$, $B = +\cdot0181$, $C = +\cdot7218$; $\delta = -9$; $h = -4$.

	Δ	P.	O−C.	S.	O−C.	Supp.	
	°	m. s.	s.	m. s.	s.	m. s.	
Clermont-Ferrand	1·3	i 0 25	0	i 0 44	0	i 0 27	P_g
Paris	2·5	i 0 50	P_g	i 1 25	S_g	—	—
Basle	4·3	—	—	e 2 8	S*	—	—
Strasbourg	4·8	—	—	e 2 49	S_g	—	—
Stuttgart	5·7	—	—	e 2 59	S*	—	—

Additional readings :—
Clermont-Ferrand $iS_g = 50s.$
Paris e = 1m.4s., i = 1m.22s.
Stuttgart e = 3m.2s.

Dec. 23d. Readings also at 1h. (Reykjavik), 5h. (Huancayo and near La Paz), 9h. (near Victoria), 11h. (Nanking (2), Florence, and near Bologna), 12h. (near Malaga, near Stalinabad, and near La Paz), 14h. (Nanking and Toledo), 15h. (Pierce Ferry and Nanking), 17h. near Ottawa, and near Ashkabad), 18h. (Tamanrasset, Haiwee, Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson, Boulder City, Shasta Dam, Mineral, Reno, Victoria, near Stalinabad, near Yuzno-Sakhlinsk, and near Klyuchi), 19h. (Ottawa and Stuttgart), 20h. (Stuttgart), 21h. (near Messina and near Ashkabad), 23h. (near Bucharest).

Dec. 24d. Readings at 0h. (near Istanbul), 3h. (Riverview and Wellington), 4h. (Christchurch, Wellington, Riverview, Arapuni, Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Mineral, and Reno; not all one shock), 5h. (Stuttgart), 7h. (Huancayo, La Paz, Mount Wilson, Pasadena, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Berkeley, Lick, Mineral, Reno, and Tamanrasset), 8h. (Christchurch, Wellington, De Bilt, Uccle, Clermont-Ferrand, Stuttgart, and Ksara), 9h. (Copenhagen, De Bilt, Uccle, Stuttgart, Strasbourg, and Clermont-Ferrand), 10h. (near Alicante), 12h. (near Stalinabad, near Leninakan, and near Alicante), 14h. (near Ashkabad), 15h. (near Murgab), 16h. (Stuttgart, Strasbourg, and near Clermont-Ferrand), 21h. (near Basle, Zürich, and Stuttgart), 22h. (near Tacubaya).

Dec. 25d. 12h. 6m. 16s. Epicentre 50°·5N. 4°·0E.

P. Fourmarier and Ch. Charlier.
Les Séismes dans la province du Hainaut, 1900-1949. Bull. Academie Roy. de Belgique, t. XXXVI, 1950. Publications du service Séismologique et Gravimétrique Serie S, No. 6. pp. 207-219.

$A = +\cdot6370$, $B = +\cdot0445$, $C = +\cdot7695$; $\delta = -12$; $h = -6$;
$D = +\cdot070$, $E = -\cdot998$; $G = +\cdot768$, $H = +\cdot054$, $K = -\cdot639$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Uccle	0·4	36	e 0 12	− 1	e 0 16	− 5	—	—
Paris	1·9	210	i 0 37	+ 3	1 6	S_g	e 0 40	P_g
Strasbourg	3·1	128	e 1 19	?	e 1 37	S*	e 1 45	S_g
Basle	3·8	140	—	—	e 1 48	+ 1	—	—
Stuttgart	3·8	115	e 1 16	P_g	e 2 0	S*	—	—
Neuchatel	4·0	150	—	—	e 1 46	− 6	—	—
Zürich	4·4	134	—	—	e 1 50	−12	—	—

Additional readings :—
Paris e = 48s.
Strasbourg e = 1m.59s.

Dec. 25d. Readings also at 1h. (near Ashkabad), 2h. (Victoria, Stalinabad, and near Ashkabad), 4h. (near Apia), 7h. (La Paz), 15h. (Kew), 16h. (near Andijan, Kulyab, Murgab, Samarkand, Stalinabad, and Tashkent), 17h. (Frunse, Tchimkent, and La Paz), 20h. (Strasbourg).

Dec. 26d. 7h. 12m. 21s. Epicentre 22°·6S. 68°·8W. (as on 1940, Sept. 18d.).

Intensity VII between latitudes 22° and 23°S.; V-VI at Antofogasta; IV at Tocopilla and Copiapo. Tsunami at Tocopilla. Macroseismic radius 450 km., suggested epicentre 22°·9S. 68·°5W. (J.S.A.).

F. Greve.
Description de los principales efectos producidos por los sismos destructores de Chile, y ubicacion de sus epicentros p.24. With macroseismic chart

$A = +\cdot3342$, $B = -\cdot8616$, $C = -\cdot3821$; $\delta = +4$; $h = +4$;
$D = -\cdot932$, $E = -\cdot361$; $G = -\cdot138$, $H = +\cdot356$, $K = -\cdot924$.

		Δ	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 43k	P*	i 2 58	S*	i 2 0	P_g	—
Santiago		10·9	188	e 2 41	+ 1	i 4 49	+ 5	—	—	—
Huancayo		12·2	328	e 2 58	0	i 5 20	+ 4	—	—	i 5·6
La Plata		15·5	145	i 3 42	0	6 33	− 2	—	—	7·8
Bogota		27·5	348	i 5 53	+ 3	i 10 37	+ 7	i 6 10	pP	—
Fort de France		37·8	13	e 7 22	+ 2	e 13 31	+20	e 16 36	SSS	—
San Juan		40·8	4	e 7 56	+11	i 13 45	−11	i 8 18	pP	e 18·4
Tacubaya		51·2	322	i 9 8	+ 1	e 16 22	− 3	—	—	—
Bermuda		54·8	4	e 14 9	?	e 18 1	?	—	—	e 24·0
Fordham		63·3	356	e 10 34	+ 1	e 18 47	−17	i 19 20	PS	—
Florissant		64·3	341	e 10 54	+15	i 19 22	+ 5	—	—	—
Cleveland		64·8	349	i 10 41	− 2	i 19 17	− 6	i 19 34	PS	—
Harvard		64·8	358	i 10 43	0	—	—	i 10 57	pP	—
Tucson		67·7	322	i 11 0	− 1	e 19 54	− 4	i 11 15	pP	e 28·2
Ottawa		68·0	355	e 11 2	− 1	e 19 51	−11	—	—	32·6
Rolphton		68·9	353	e 11 14	+ 5	—	—	—	—	—
Shawinigan Falls	N.	68·9	357	e 11 7	− 2	—	—	—	—	—
Seven Falls	E.	69·4	359	e 11 13	+ 1	e 20 15	− 3	—	—	35·6
Ville Marie		70·2	352	e 11 16	− 1	—	—	—	—	—
La Jolla	Z.	72·0	319	e 11 25	− 3	—	—	—	—	—
Palomar	Z.	72·1	319	i 11 27	− 1	—	—	i 11 48	pP	—
Pierce Ferry		72·4	323	i 11 28	− 2	—	—	i 11 48	pP	—
Boulder City		72·7	322	i 11 31	− 1	—	—	i 11 48	pP	—
Riverside		72·8	319	e 11 30	− 2	—	—	—	—	—
Mount Wilson	Z.	73·4	319	i 11 35a	− 1	—	—	i 11 50	pP	—
Pasadena		73·4	319	i 11 35a	− 1	e 20 54	−11	i 11 50	pP	—
Rapid City	E.	73·5	335	i 11 37?	+ 1	e 20 55?	−11	—	—	—
Haiwee		74·6	321	e 11 43	0	—	—	—	—	—
Tinemaha		75·5	321	i 11 46	− 2	—	—	i 12 4	pP	—
Lick	Z.	77·6	319	i 11 59a	− 1	—	—	—	—	—
Reno	Z.	78·0	322	i 12 2a	0	—	—	i 12 22k	pP	—
Berkeley	Z.	78·4	319	i 12 3a	− 1	—	—	—	—	—
Malaga	Z.	84·6	47	i 12 41a	+ 5	23 1	− 2	12 55	pP	—
Tamanrasset	Z.	85·2	63	i 12 44a	+ 5	e 23 19	+10	i 12 47a	P_cP	—
Victoria		86·0	327	e 12 39	− 4	(23 39?)	+22	—	—	23·6
Toledo		86·6	44	i 12 51	+ 5	e 23 30	+ 7	e 16 32	PP	36·1
Alicante		88·1	47	e 13 14	+20	i 24 8	+31	16 38	PP	41·7
Tortosa	N.	90·0	45	—	—	i 24 23	+29	—	—	e 43·6
Wellington		93·4	222	—	—	24 19	− 5	e 39 39?	Q	48·6
Clermont-Ferrand		94·1	42	i 13 46	+24	i 25 6	+35	e 30 35	SS	46·6
Kew		94·9	36	—	—	e 28 39?	?	—	—	e 39·6
Strasbourg		98·2	41	—	—	—	—	e 31 21	SS	—
Rome		98·6	49	e 17 51	PP	e 25 41	+32	e 32 17	SS	—
Stuttgart		99·2	41	e 13 47	+ 2	e 25 10	− 4	e 14 9	pP	e 42·6
Copenhagen		103·6	35	—	—	26 22	+31	33 30	SS	44·6
Helwan		109·3	65	—	—	e 29 54	PPS	—	—	—
Riverview	N.	112·2	215	—	—	e 26 24	{+ 4}	—	—	e 46·4
Ksara		114·0	62	e 19 40	PP	e 29 32	PS	—	—	—
Moscow		117·6	37	e 20 31	PP	e 30 31	PPS	e 36 33	SS	—
Leninakan		121·2	54	e 32 21	PPS	—	—	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sverdlovsk	130·7	33	e 19 13	[0]	e 31 53	PS	e 39 15	SS	—
Tashkent	140·3	51	e 19 34	[+ 3]	i 22 47	PP	e 25 57	PPP	—
Stalinabad	140·5	55	e 19 42	[+11]	—	—	—	—	—
Andijan	142·7	52	19 43	[+ 8]	—	—	—	—	—
Frunse	143·5	47	—	—	e 20 50	?	—	—	—
Bombay	144·0	88	e 23 11	PP	—	—	—	—	—
Irkutsk	149·9	8	e 19 50	[+ 3]	e 26 39	[−15]	e 23 45	PP	—
Vladivostok	153·3	324	i 19 52	[0]	e 34 27	PS	e 23 46	PP	—

Additional readings :—
La Paz i = 3m.19s., iS_s = 3m.35s.
Huancayo i = 3m.20s.
La Plata EN = 4m.15s., E = 4m.34s., N = 6m.3s., E = 6m.15s., S?N = 6m.39s., SE = 6m.51s., E = 7m.15s., N = 7m.21s. and 7m.27s.
Bogota ePEN = 5m.56s., iS_cP = 13m.45s., iS_cS? = 18m.29s.
San Juan esP = 8m.31s., iPP = 9m.25s., ipPP = 9m.40s., i = 11m.19s., iS_cS = 17m.8s.
Fordham e = 10m.47s.
Florissant i = 10m.58s.
Tucson isP = 11m.28s., e = 12m.31s., ePP = 13m.55s.
Boulder City ePP = 13m.59s.
Rapid City iE = 12m.43s.?
Reno iZ = 13m.38s.
Malaga PP?Z = 15m.33s., PSZ = 24m.23s.
Tananarasset e = 13m.0s., ipP = 13m.9s.a
Toledo iZ = 13m.5s. and 13m.21s., eSKS?Z = 23m.36s., iS?Z = 23m.53s.
Alicante PPP = 18m.42s., PS = 25m.0s., PPS = 25m.28s., SS = 30m.20s., SSS = 33m.46s.
Clermont-Ferrand Q = 43·6m.
Stuttgart eS? = 25m.42s.
Helwan e = 30m.18s.
Moscow i = 28m.20s.
Sverdlovsk i = 22m.35s.
Irkutsk eSSS = 42m.39s.
Vladivostok eSS = 43m.21s.
Long waves were also recorded at Arapuni, Christchurch, and other European stations.

Dec. 26d. Readings also at 0h. (Lick, Tchimkent, near Andijan and Murgab), 3h. (near Tananarive), 5h. (Auckland), 6h. (Alicante), 8h. (Apia, Mount Wilson, Tinemaha, Pasadena, Palomar, Tucson, Boulder City, and Pierce Ferry), 9h. (Auckland, Christchurch, Riverview, Wellington, Arapuni, Tucson, Huancayo, La Paz, San Juan, Stuttgart, Helwan, and Ksara), 10h. (Bombay, De Bilt, and Clermont-Ferrand), 11h. (Victoria), 13h. (Raciborzu), 14h. (Auckland, Christchurch, Brisbane, Wellington, Strasbourg, and Stuttgart), 15h. (near Granada), 17h. (Almata, Frunse, Samarkand, near Tchimkent, Tashkent, Stalinabad, Kulyab, Murgab, and near Mizusawa), 19h. (Pierce Ferry and near Leninakan), 21h. (near Ashkabad).

Dec. 27d. Readings at 0h. and 2h. (Pierce Ferry), 4h. (Auckland, Christchurch, Wellington, Brisbane, Riverview, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Stuttgart), 5h. (Arapuni, Wellington, Balboa Heights, Collmberg, and near Murgab), 7h. (Copenhagen and Tacubaya), 8h. (Mizusawa and near Tacubaya), 9h. (Nanking), 11h. (near Mizusawa, near Boulder City and Pierce Ferry), 13h. (Helwan), 15h. (near Ashkabad), 17h. (La Paz, Tashkent, near Kulyab, Murgab, Samarkand, and Stalinabad).

Dec. 28d. 2h. 25m. 33s. I
5h. 25m. 59s. II
Epicentre 39°·7N. 119°·3W. (as on 1945, March 4d.).

$A = -·3776$, $B = -·6728$, $C = +·6362$; $\delta = -1$; $h = -2$;
$D = -·872$, $E = +·489$; $G = -·311$, $H = -·555$, $K = -·772$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Reno	0·4	247	i 0 9	− 4	—	—	—	—	—
II		0·4	247	i 0 9	− 4	—	—	—	—	—
I	Shasta Dam	2·6	293	i 0 41	− 3	i 1 12	− 5	—	—	—
II		2·6	293	i 0 41	− 3	e 1 11	− 6	—	—	—
I	Tinemaha z.	2·7	162	i 0 55	P_g	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I Berkeley	z.	3·0	232	i 0 46k	− 4	i 1 19	− 8	—	—	—
II		3·0	232	i 0 45k	− 5	i 1 17	−10	—	—	—
I Fresno		3·0	187	i 0 55	+ 5	i 1 32	+ 5	—	—	—
II		3·0	187	i 0 54	+ 4	i 1 32	+ 5	i 1 37	S_g	—
I Lick		3·0	218	i 0 49a	− 1	i 1 24	− 3	i 0 53	P*	—
II		3·0	218	i 0 48k	− 2	i 1 21	− 6	i 0 59	P_g	—
I San Francisco		3·1	232	i 0 49	− 2	i 1 23	− 6	—	—	—
II		3·1	232	i 0 50	− 1	i 1 22	− 7	—	—	—
I Santa Clara		3·1	221	e 1 25	S	e 1 57	S_g	—	—	—
II		3·1	221	e 1 13	+22	e 1 47	S_g	—	—	—
I Haiwee		3·7	164	i 1 16	P_g	e 2 5	S_g	—	—	—
I Boulder City		5·1	135	i 1 51	P_g	—	—	—	—	e 2·9
II		5·1	135	e 1 49	P_g	—	—	—	—	—
II Pierce Ferry		5·5	129	i 1 34	P*	—	—	—	—	e 3·2
I Pasadena		5·6	171	e 1 33	+ 6	i 3 3	S_g	—	—	—
I Tucson		10·1	135	e 2 50	+22	—	—	—	—	e 5·7
II		10·1	135	(e 2 56)	+28	—	—	—	—	(e 5·7)

Additional readings and note :—
Tinemaha I iZ = 59s.
Berkeley I iZ = 54s. and 1m.9s., II iE = 50s., 1m.0s., iZ = 1m.3s.
Fresno I iZ = 1m.23s., iN = 3m.52s., II iZ = 1m.23s.
Tucson II readings reduced by 15m.

Dec. 28d. 5h. 23m. 39s. Epicentre 38°·0N. 21°·0E. (as on 1943, July 21d.).

Approximate.

$A = +·7375$, $B = +·2831$, $C = +·6131$; $\delta = -6$; $h = -1$;
$D = +·358$, $E = -·934$; $G = +·572$, $H = +·220$, $K = -·790$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Belgrade	6·8	357	i 1 41k	− 3	e 3 25	S*	e 2 10	P_g	—
Istanbul	7·0	61	—	—	e 3 49	S_g	—	—	5·1
Bucharest	7·4	30	—	—	e 3 3	−15	e 4 2	S_g	—
Kalossa	8·7	351	e 3 17	?	e 4 38	S_g	—	—	—
Triest	9·4	327	e 2 20	+ 2	i 3 46	−21	e 2 54	P_gP_g	—
Budapest	9·6	352	e 2 46	P*	e 4 5	− 7	—	—	e 5·5
Zürich	13·1	320	e 3 3	− 7	e 5 16	−22	—	—	—
Basle	13·7	319	e 3 31	+13	e 5 33	−19	—	—	—
Stuttgart	13·7	326	e 3 13	− 5	e 5 58	+ 6	—	—	e 7·8
Strasbourg	14·3	322	e 3 25	− 1	e 6 25	+19	—	—	e 8·0
Paris	17·2	315	i 4 1	− 2	e 8 3	SS	i 4 12	PP	—
Grozny	19·5	66	e 4 42	+11	8 26	+20	—	—	—
Tamanrasset	20·2	226	e 4 35	− 4	e 8 33	+12	e 5 4	PP	—

Additional readings :—
Belgrade iS = 4m.2s., iPPS = 4m.7s.
Bucharest eN = 3m.36s., eE = 3m.40s., eN = 3m.52s.
Kalossa eE = 3m.21s., eN = 4m.46s., eE = 5m.16s., eN = 5m.43s., eE = 5m.51s.
Stuttgart e = 3m.20s., 3m.24s., and 3m.43s.
Strasbourg e = 3m.51s. and 7m.32s.
Paris iPPP? = 4m.19s.
Tamanrasset i = 4m.39s. and 9m.49s.
Long waves were also recorded at Ksara, Warsaw, De Bilt, and Potsdam.

Dec. 28d. Readings also at 0h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson, Boulder City, Berkeley, Reno, Shasta Dam, Victoria, near Tacubaya, Brisbane, Riverview, near Bunnythorp, Christchurch, Kaimata, New Plymouth, Tuai, and Wellington, several shocks), 1h. (near Berkeley, Fresno, San Francisco, Shasta Dam, and Reno (3)), 2h. (Lick, near Shasta Dam, Reno, and near Ashkabad), 3h. (near Reno), 4h. (near Shasta Dam and Reno (2)), 6h. (Brisbane, Riverview, Christchurch, Wellington, Auckland, Arapuni, Reno, near Shasta Dam and near Bogota), 12h. (Boulder City and near Pierce Ferry), 13h. (Stuttgart), 14h. (near Ashkabad), 15h. (Auckland, Christchurch, Wellington, Brisbane, Riverview, Tucson, and near Tacubaya), 17h. (near Tacubaya), 18h. (Tacubaya), 19h. (Pasadena, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Ottawa, Christchurch, Wellington, and Riverview), 23h. (Andijan, near Kulyab and Stalinabad).

Dec. 29d. 5h. South-West Pacific.

Christchurch P = 46m.27s., iZ = 46m.30s., eEN = 48m.34s., S?EN = 49m.18s., RNZ = 50m.40s.
Wellington P = 46m.41s., PPZ = 47m.26s., S = 51m.10s., L = 53m.
Kaimata P = 46m.43s., S = 50m.51s.
Auckland PN = 47m.20s., PPN = 47m.54s., eN = 49m.38s., SN = 51m.19s., sSN = 52m.7s., SSN = 52m.19s., S_cPN = 58m.48s., LN = 59m.45s.
Riverview ePZ = 48m.48s., iZ = 49m.0s., ePPN = 50m.25s., iNZ = 50m.32s., iP_cPZ = 50m.48s., iPPPN = 50m.57s., iSEN = 54m.57s., eQ?E = 57m.30s., eRZ = 59·9m.
Brisbane ePZ = 49m.24s., iZ = 49m.40s., iS?N = 56m.13s., iQ?N = 60m.13s.
Huancayo eP = 53m.39s., e = 55m.2s., ePP = 57m.22s., eSKS = 63m.52s., ePS = 67m.2s., eSS = 69m.6s., eL = 75m.0s.
La Paz iPZ = 53m.41s.k, PPZ = 56m.31s., iSKS? = 63m.35s., SSE = 68m.51s., Q = 75m.0s.
Pasadena eZ = 59m.27s., eQE = 85·1m.
Helwan ePKP? = 61m.9s., e = 62m.15s. and 63m.18s.
Granada PKP = 61m.53s.k, PKP_2 = 63m.5s., PP = 66m.55s., L = 121·6m.
Bogota ePKP? = 66m.57s., e = 72m.51s.
Bombay eEN = 71m.30s.
Berkeley eN = 75m.32s., eE = 86m.12s., eZ = 86m.24s., cN = 88m.12s.
Long waves were also recorded at Arapuni, Apia, La Plata, Rome, Kew, Butte, Philadelphia, Salt Lake City, Saskatoon, and Seven Falls.

Dec. 29d. 12h. 53m. 27s. Epicentre 39°·6N. 120°·1W.

Intensity VII at Chilcoot, Verdi and Reno; VI at Baxter, Floriston, King's Beach, Meeks Bay, Sloughouse, Garden Valley, Long Valley, Sparks, etc. Macroseismic area 40,000 sq.miles. Epicentre 39°33′N. 120°05′W. (on the Verdi Fault to the west of Verdi).

L. M. Murphy and F. P. Ulrich.
United States Earthquakes, 1948, serial No. 746, Washington, 1951, pp. 24-25, with macroseismic chart p. 18.

$A = -·3882$, $B = -·6680$, $C = +·6349$; $\delta = +2$; $h = -2$;
$D = -·865$, $E = +·503$; $G = -·319$, $H = -·549$, $K = +·773$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Reno		0·2	106	i 0 3	P_g	—	—	—	—	—
Mineral		1·4	327	i 0 27	0	—	—	—	—	—
Shasta Dam		2·1	328	i 0 36	− 1	e 1 6	+ 2	—	—	—
Berkeley		2·4	225	i 0 41	0	—	—	i 0 44	P*	—
Ukiah		2·5	259	e 1 46	+63	i 2 18	+64	—	—	i 2·7
Lick		2·6	241	i 0 43a	− 1	—	—	i 0 48	P*	—
San Francisco	N.	2·6	225	i 0 43	− 1	i 1 17	0	—	—	—
Santa Clara		2·7	231	e 0 46	+ 1	i 1 23	+ 4	e 0 51	P_g	—
Fresno		2·9	175	i 0 47k	− 1	—	—	i 0 50	P*	—
Tinemaha		3·0	148	e 0 48	− 2	i 1 27	0	—	—	—
Arcata		3·3	296	e 0 56	+ 3	i 1 33	− 2	i 1 5	P_g	—
Halwee		3·9	152	e 1 7	+ 5	i 2 0	S*	i 1 10	P*	—
Santa Barbara		5·2	175	e 1 23	+ 2	i 2 34	S*	—	—	—
Boulder City		5·6	129	e 1 49	P_g	—	—	—	—	—
Mount Wilson	Z.	5·6	162	i 1 25	− 2	—	—	—	—	—
Pasadena		5·7	162	i 1 26	− 2	i 2 45	+10	—	—	—
Pierce Ferry		6·0	123	i 1 29	− 3	—	—	—	—	—
Riverside		6·0	157	i 1 31	− 1	i 3 1	S*	—	—	—
Salt Lake City		6·5	77	e 1 36	− 3	i 3 7	S*	i 2 18	P_g	i 3·3
Palomar		6·8	156	i 1 41	− 3	—	—	—	—	—
Butte	N.	8·5	39	e 2 39	+32	e 4 0	+15	—	—	i 4·4
Bozeman		9·1	45	e 2 35	+21	e 4 24	S*	—	—	i 4·7
Victoria		9·2	347	2 14	− 2	—	—	—	—	5·5
Tucson		10·5	131	e 2 34	− 1	i 4 44	+ 9	i 2 38	PP	i 5·3
Rapid City	E.	13·4	65	e 3 11?	− 3	e 5 49?	+ 4	—	—	e 7·0
Saskatoon		15·7	32	3 44	0	6 55	+16	7 28	SSS	8·1
Lincoln	E.	18·0	78	e 4 13	0	e 7 38	+ 6	—	—	e 9·8
St. Louis		23·2	83	e 5 5	− 4	i 9 19	+ 1	—	—	—
Chicago		24·7	74	—	—	i 9 53	+ 9	—	—	e 12·3
Tacubaya		27·0	132	i 5 57	+12	—	—	e 6 21	PP	e 14·4

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ville Marie		30·3	62	e 6 15	0	—	—	—	—	—
Temiskaming		30·5	63	e 6 3	−14	—	—	—	—	—
Rolphton		31·5	64	i 6 25	− 1	—	—	—	—	—
Ottawa		33·0	65	6 37	− 2	e 11 57	0	e 11 3	?	16·5
Philadelphia		34·3	75	e 6 57	+ 7	e 12 43	SS	—	—	e 14·6
Fordham		35·0	73	e 6 55	− 1	e 12 27	− 1	—	—	—
Seven Falls	E.	36·1	62	—	—	e 12 45	0	—	—	18·9
La Paz		73·9	128	e 11 36	− 3	—	—	—	—	46·7
Granada		83·9	46	i 12 34a	− 1	i 23 5	+ 9	e 15 35	PP	40·7
Alicante		84·7	43	12 20	−17	—	—	—	—	e 40·6

Additional readings :—
Berkeley iE = 0m.56s.
Arcata iZ = 0m.59s., i = 1m.2s., iE = 1m.9s., iN = 1m.36s., iE = 1m.41s.
Boulder City iP = 1m.52s.
Tucson i = 2m.56s. and 3m.29s.
Granada P_cP = 12m.50s., eSS = 27m.38s.
Long waves were also recorded at New Kensington, Pennsylvania, Shawinigan Falls, Halifax, Ivigtut, and Uccle.

Dec. 29d. Readings also at 0h. (Boulder City, Pierce Ferry, and near Andijan), 1h. (Pierce Ferry, Bombay, Colombo, Kodaikanal, and near Ashkabad), 2h. (Boulder City), 4h. (near Granada), 5h. (Tacubaya), 6h. (Pierce Ferry, Shasta Dam, Tucson, Pasadena, Mount Wilson, Palomar, Tinemaha, Apia, La Paz, and near Tacubaya), 7h. (Pierce Ferry), 8h. (Nanking), 9h. (Stuttgart, near Ashkabad, and near Bogota), 10h. (near Apia), 11h. (Stuttgart, Nanking, Pierce Ferry, Shast Dam, Tucson, Pasadena, Mount Wilson, Riverside, Palomar, Tinemaha, and Lick), 12h. (Chihuahua and near Pierce Ferry), 13h. (near Ashkabad), 14h. (Basle, near Balboa Heights, and near Bogota), 15h. and 16h. (near Mizusawa), 17h. (Nanking); 18h. (Pierce Ferry), 19h. (near Tacubaya), 20h. (Shasta Dam, Tucson, Pasadena, Mount Wilson, Palomar, and Tinemaha), 21h. (Pierce Ferry and near Shasta Dam), 23h. (Pierce Ferry, Boulder City, Shasta Dam, and Lick).

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Dec. 30d. 23h. 49m. 54s. Epicentre 50°·9N. 130°·7W. (as on 1948, March 18d.).

A = −·4122, B = −·4792, C = +·7749 ; δ = +1 ; h = −6 ;
D = −·758, E = +·652 ; G = −·505, H = −·587, K = −·632.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Victoria		5·3	115	1 20k	− 2	2 25	0	e 1 35	P*	—
Seattle		6·4	118	e 1 22?	−16	e 2 16?	−37	—	—	e 3·1
Sitka		7·1	340	i 1 34	−14	i 2 52	−18	—	—	i 3·5
Ferndale		11·3	154	e 2 50	+ 4	e 5 10	SS	e 2 54	PP	—
Mineral		12·4	146	e 3 2	+ 1	e 5 53	SSS	—	—	—
Butte	N.	13·0	106	e 3 36	+27	e 5 40	+ 5	—	—	e 6·0
Ukiah		13·0	153	e 4 11?	+62	e 5 46?	+11	e 4 40?	?	e 6·8
Reno	N.	13·8	142	i 3 20	+ 1	—	—	i 3 29	PP	e 8·1
Bozeman		14·1	104	i 3 18	− 5	e 6 2	0	e 3 37	PP	i 7·3
Berkeley		14·4	152	i 3 28	+ 1	i 6 16	+ 7	i 3 35	PP	e 8·2
San Francisco		14·4	153	e 3 29	+ 2	e 6 38	SSS	—	—	—
Santa Clara		15·0	152	i 3 34	− 1	e 6 37	SS	e 3 53	pP	e 8·1
Saskatoon		15·0	76	3 35	0	6 17	− 6	—	—	6·9
Lick	Z.	15·1	151	e 3 36a	0	—	—	—	—	—
Logan		15·9	118	i 3 45	− 2	i 6 51	+ 7	—	—	e 7·6
Fresno		16·2	147	i 3 51	+ 1	i 6 40	−11	e 7 20	SSS	—
College		16·5	334	e 3 48?	− 6	e 6 53?	− 5	e 4 15?	PP	e 8·0
Tinemaha		16·5	143	i 4 56a	+62	—	—	—	—	—
Salt Lake City		16·6	121	i 3 54	− 2	i 7 20	SS	i 4 28	PPP	i 8·4
Haiwee		17·4	143	i 4 39	+33	—	—	—	—	—
Santa Barbara		18·4	149	e 4 21	+ 3	—	—	—	—	—
Boulder City		18·9	137	i 4 23	− 1	—	—	—	—	—
Mount Wilson	Z.	19·1	146	i 4 27a	0	—	—	—	—	—
Pasadena		19·1	146	i 4 26a	− 1	e 7 54	− 3	i 5 16	?	i 8·2
Pierce Ferry		19·1	135	i 4 25	− 2	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverside	Z.	19·6	146	i 4 30	− 2	—	—	—	—	—
Rapid City	E.	19·7	99	i 4 31?	− 3	i 8 17?	+ 7	i 8 48?	SS	i 9·9
Palomar		20·3	144	i 4 40	0	—	—	—	—	—
La Jolla		20·6	146	i 4 44	+ 1	—	—	—	—	—
Tucson		23·8	133	e 5 15a	0	e 9 43	+15	—	—	i 11·4
Lincoln	E.	25·6	100	e 5 31	− 1	e 10 9	+10	e 6 14	PP	e 12·0
Chicago		30·7	90	e 6 21	+ 2	i 11 18	− 3	e 6 55	PP	e 13·3
St. Louis		30·9	97	i 6 17	− 3	i 11 22	− 2	e 7 10	PP	—
Ville Marie		33·2	76	e 6 37	− 3	—	—	—	—	—
Temiskaming		33·7	77	e 6 40	− 5	—	—	—	—	—
Cincinnati		34·2	92	e 6 54	+ 5	e 12 11	− 5	e 8 3	PP	—
Cleveland		34·7	87	e 6 49	− 5	i 12 21	− 3	e 8 17	PP	i 16·8
Rolphton		34·7	77	i 6 56	+ 2	—	—	i 7 9	?	—
Honolulu		36·4	225	—	—	e 13 1	+11	—	—	e 15·5
Ottawa		36·4	76	7 3k	− 5	e 12 47	− 3	8 33	PP	19·0
Pennsylvania		37·4	85	i 7 24	+ 8	i 13 4	− 1	i 8 47	PP	—
Shawinigan Falls	N.	37·6	72	7 19	+ 1	—	—	—	—	19·1
Seven Falls	E.	38·5	71	7 23	− 3	13 22	0	15 30	SS	17·7
Georgetown		39·0	85	e 7 33	+ 3	e 16 8	SS	—	—	—
Philadelphia		39·6	83	e 9 9	PP	e 13 31	− 7	e 10 2	P_cP	e 15·8
City College, N.Y.		39·9	82	e 9 27	PPP	e 13 37	− 6	—	—	e 16·3
Fordham		39·9	82	e 7 37	0	i 13 41	− 2	i 16 29	SS	19·1
Tacubaya		40·1	129	e 7 49	+10	—	—	e 9 52	P_cP	e 20·0
Halifax		44·1	71	—	—	e 18 6	SS	e 20 38	Q	22·9
Bermuda		50·9	84	—	—	e 17 24	+63	e 20 0	S_cS	e 21·0
San Juan		60·0	98	e 13 34	PPP	e 18 21	− 2	—	—	e 25·0
Vladivostok		62·1	305	e 10 20	− 5	—	—	—	—	—
Fort de France		65·8	97	—	—	e 18 18	−77	—	—	—
Bogota		65·9	113	i 10 53	+ 3	e 19 43	+ 6	e 13 50	PP	—
Upsala		66·6	17	—	—	e 19 48	+ 3	e 26 6?	SSS	e 33·1
Irkutsk		67·1	327	e 11 2	+ 5	e 19 48	− 3	—	—	—
Kew		69·6	31	e 12 6?	+53	—	—	—	—	e 33·1
Sverdlovsk		72·1	354	e 11 26	− 2	20 48	− 2	—	—	—
Paris		72·8	31	i 11 26	− 6	—	—	—	—	e 37·1
Moscow		73·2	7	e 11 31	− 4	e 20 57	− 5	—	—	—
Cheb		74·5	24	—	—	e 31 0	?	e 35 36	Q	e 38·1
Strasbourg		74·6	27	e 11 47	+ 4	e 26 13	SS	e 14 28	PP	35·9
Stuttgart		74·9	27	e 11 44?	0	—	—	—	—	e 38·1
Basle		75·5	28	e 11 52	+ 4	e 21 22	− 6	—	—	e 42·4
Lisbon		77·1	43	12 4k	+ 7	—	—	38 30	Q	41·9
Salo	Z.	78·1	28	e 12 6	+ 4	—	—	—	—	—
Toledo		78·2	40	e 12 6	+ 3	—	—	—	—	e 43·3
Granada		80·7	41	i 12 22k	+ 6	e 22 48	+24	31 0	SSS	40·6
Malaga	Z.	80·7	41	i 12 22k	+ 6	22 28	+ 4	15 32	PP	45·7
Belgrade		81·4	21	e 12 24a	+ 4	—	—	e 15 32	PP	e 49·5
Rome		82·1	27	e 12 22	− 2	e 22 36	− 2	i 12 34	P_cP	37·1
Algiers		83·6	36	e 12 39	+ 8	e 23 9	+16	—	—	40·1
Grozny		86·0	3	e 13 3	+20	—	—	—	—	—
Tashkent		86·4	345	—	—	i 23 25	+ 4	—	—	—
La Paz		86·5	121	i 12 46	0	i 23 13	[+ 2]	16 14	PP	40·1
Istanbul		86·6	16	12 32	−14	e 23 8	−15	—	—	—
Samarkand		88·4	347	e 13 6	+11	—	—	—	—	—
Stalinabad		89·2	345	e 12 57	− 2	e 23 40	− 7	—	—	—
Tamanrasset		97·0	40	e 13 40	+ 5	—	—	e 17 19	PP	—
Helwan		98·0	16	e 13 36	− 3	26 41	PS	17 45	PP	—
Calcutta	E.	99·1	324	—	—	e 24 43	{− 5}	e 32 13	SS	—
Christchurch		106·2	219	—	—	e 34 10	SS	44 42	Q	49·4
Bombay		107·4	336	e 21 45	PPP	e 25 53	{+ 6}	—	—	—
Riverview		108·7	239	—	—	e 25 30	{−29}	—	—	e 50·0
Kodaikanal	E.	114·3	329	—	—	e 35 5	SS	—	—	—

For Notes see next page.

NOTES TO DECEMBER 30d. 23h. 49m. 54s.

Additional readings :—
Victoria e = 1m.24s., 1m.27s., 1m.44s., and 2m.6s., i = 2m.30s., e = 2m.44s.
Ferndale iE = 3m.2s. and 6m.10s., iN = 6m.34s.
Mineral eE = 4m.8s., eEN = 6m.48s.
Berkeley iZ = 3m.43s. and 6m.26s., iSZ = 6m.38s., iN = 6m.55s.
San Francisco eSE = 6m.44s., eN = 7m.35s., eE = 8m.3s.
Santa Clara esSE = 7m.1s.
Lick iE = 3m.42s., eN = 5m.9s., eZ = 7m.12s., eN = 7m.18s., eE = 7m.30s.
Logan i = 4m.32s. and 5m.0s.
Fresno eE = 7m.33s.
Rapid City iE = 5m.8s., and 6m.6s.?.
Tucson iPP = 6m.28s., i = 7m.6s. and 10m.30s.
Chicago e = 7m.53s.
St. Louis iSE = 11m.12s., iSS?E = 13m.9s.
Cleveland ePZ = 6m.52s., iSS?EN = 14m.48s.
Ottawa S = 12m.42s., SS = 14m.24s.
Tacubaya eN = 9m.22s., eE = 17m.31s. and 18m.57s.
Bogota eS_cS = 22m.13s.
Upsala eE = 29m.6s.?.
Strasbourg eP = 11m.53s.
Granada PS = 23m.54s.
Malaga PPSZ = 23m.50s.
La Paz iSKKS = 23m.23s.
Long waves were also recorded at Ivigtut, Huancayo, New Kensington, Harvard, Auckland, Wellington, and at other European stations.

Dec. 30d. Readings also at 2h. (near Apia), 3h. (near Ashkabad and near Istanbul), 4h. (Boulder City, Pierce Ferry, Shasta Dam, Tucson, Mount Wilson, Tinemaha, and Klyuchi), 5h. (near Alicante), 17h. and 18h. (near Tacubaya), 20h. (Pierce Ferry), 21h. (Pierce Ferry, near Grozny, Leninakan, and Piatigorsk), 23h. (near Rome).

Dec. 31d. 3h. 32m. 39s. Epicentre 42°·6N. 12°·9E. (as on Dec. 17d.).

Intensity VII at Rivodutri and Greccio; VI at Borbona and Collevecchio (Rieti). Felt as far as Rome and Macerata.

Monthly Seismological Bulletin. L'Instituto Nazionale di Geofisica, Roma.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Rome		0·8	203	i 0 13	− 5	i 0 25	− 6	—	—	—
Florence		1·7	315	e 0 31	0	i 0 53	− 1	i 1 2	S_g	—
Bologna		2·3	331	e 0 42k	+ 2	i 1 9	0	i 0 53	P_g	—
Triest		3·1	11	e 0 54	+ 3	i 1 35	+ 6	i 1 8	P_g	—
Salo		3·4	331	0 57k	+ 2	i 1 38	+ 1	i 2 3	S_g	—
Pavia		3·7	315	i 1 3	+ 3	e 1 47	+ 2	—	—	—
Taranto		3·9	121	e 1 0	− 2	—	—	—	—	—
Chur		4·8	331	e 1 17	+ 2	e 2 9	− 3	—	—	—
Messina	N.	4·8	154	e 1 21	+ 6	e 2 19	+ 7	—	—	—
Ravensburg		5·7	337	e 1 26	− 2	e 2 37	+ 2	e 1 43	P*	—
Zürich		5·7	329	e 1 26	− 2	e 2 32	− 3	—	—	—
Belgrade		5·9	66	e 1 33a	+ 2	e 2 53	S*	i 2 0	P_g	—
Kalossa		5·9	46	2 47	S	(2 47)	+ 7	3 39	S_g	3·9
Neuchatel		6·1	318	e 1 33	− 1	e 3 0	S*	e 3 40	S_g	—
Basle		6·2	325	e 1 34	− 1	e 2 40	− 8	—	—	—
Ebingen		6·2	335	e 2 11?	P_g	e 3 5	S*	—	—	—
Budapest	E.	6·5	40	2 55	S	(2 55)	0	3 46	S_g	4·0
	N.	6·5	40	2 59	S	(2 59)	+ 4	3 53	S_g	4·0
Stuttgart		6·7	339	e 1 41	− 1	e 2 58	− 2	e 2 16	P_g	—
Strasbourg		7·0	331	i 1 45a	− 1	e 3 10	+ 2	i 2 25	P_g	—
Cheb		7·5	357	—	—	e 3 16?	− 4	e 3 54	S*	i 4·4
Prague		7·5	8	e 2 53	P_g	e 3 37	+17	—	—	—
Clermont-Ferrnad		7·7	298	i 1 57	+ 1	—	—	i 2 50	P_g	—
Jena		8·4	354	e 2 5	− 1	e 3 39	− 4	e 2 39	P_g	—
Collmberg		8·7	1	e 2 12	+ 2	i 3 50	0	i 4 24	S*	—
Paris		9·6	314	e 2 20	− 1	—	—	—	—	—
Potsdam		9·8	1	—	—	e 4 51	S*	—	—	e 5·6
Tamanrasset		20·7	200	i 4 43k	− 1	—	—	—	—	—
Tucson		89·4	315	e 12 59	− 1	—	—	—	—	—

For Notes see next page.

Notes to December 31d. 3h. 32m. 39s.

Additional readings :—
Florence e = 49s.
Bologna iP*E = 45s., iP_gP_g = 1m.3s., iS = 1m.13s., iS_g = 1m.27s.
Triest iS_g = 1m.58s.
Taranto e = 1m.4s., and 1m.33s.
Ravensburg eZ = 1m.33s.
Belgrade e = 1m.46s., iS_g = 3m.24s.
Ebingen e = 3m.1s.
Stuttgart e = 1m.52s., 2m.2s., 2m.28s., 3m.2s., and 3m.12s., iS_g?Z = 3m.36s., iS_g? = 3m.42s.
Strasbourg iP = 2m.10s., e = 2m.41s. and 2m.59s.
Prague e = 3m.6s., eNZ = 3m.44s., e = 4m.5s., and 4m.18s.
Clermont-Ferrand i = 2m.9s.
Jena eN = 3m.4s.
Collmberg iEZ = 5m.6s., iS_g?EZ = 5m.20s.
Tamanrasset iP = 4m.48s.k.

Dec. 31d. 7h. 7m. 58s. I
7h. 31m. 19s. II
Epicentre 8°·4N. 72°·0W.
(as on 1947, Sept. 27d.).

A = +·3058, B = −·9410, C = +·1451 ; δ = + 5 ; h = +7 ;
D = −·951, E = −·309 ; G = +·045, H = −·138, K = −·989.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Bogota	4·3	209	i 1 13	+ 5	i 2 8	+ 8	i 1 28	P_g	—
II		4·3	209	(i 1 13)	+ 5	(i 2 9)	+ 9	—	—	—
I	Balboa Heights	7·5	274	e 1 55	+ 2	e 3 25	+ 5	—	—	—
II		7·5	274	e 1 55	+ 2	e 3 23	+ 3	—	—	—
I	Fort de France	12·3	59	e 2 49	−10	—	—	—	—	—
II		12·3	59	e 2 48	−11	—	—	—	—	—
I	Huancayo	20·6	189	e 4 46	+ 3	e 8 31	+ 2	—	—	e 11·4
II		20·6	189	e 4 47	+ 4	e 8 51	+22	—	—	e 10·2
I	La Paz	25·0	171	i 5 27a	0	i 10 6	+17	6 21	PP	13·4
II		25·0	171	5 25k	− 2	i 9 59	+10	—	—	13·0
I	Ottawa z.	37·0	356	e 7 11	− 2	—	—	—	—	—
II	z.	37·0	356	e 7 9	− 4	—	—	—	—	—
I	Tucson	43·1	309	e 8 4	0	—	—	—	—	—
II		43·1	309	i 8 4	0	—	—	—	—	—
I	Pierce Ferry	47·1	312	i 8 36	+ 1	—	—	—	—	—
II		47·1	312	i 8 44	+ 9	—	—	—	—	—
I	Boulder City	47·7	312	e 8 40	0	—	—	—	—	—
II		47·7	312	e 8 41	+ 1	—	—	—	—	—
I	Palomar z.	48·2	308	i 8 45	+ 1	—	—	—	—	—
II	z.	48·2	308	i 8 45	+ 1	—	—	—	—	—
I	Riverside z.	48·8	309	e 8 46	− 3	—	—	—	—	—
II	z.	48·8	309	i 8 48	− 1	—	—	—	—	—
I	Mount Wilson z.	49·4	309	e 8 56	+ 3	—	—	—	—	—
II	Pasadena z.	49·5	309	i 8 57	+ 3	—	—	—	—	—
I	Tinemaha z.	50·6	312	i 9 3	+ 1	—	—	—	—	—
II	z.	50·6	312	i 9 3	+ 1	—	—	—	—	—
I	Shasta Dam	55·0	315	e 9 27	− 8	—	—	—	—	—
II		55·0	315	e 9 32	− 3	—	—	—	—	—
II	Stuttgart z.	77·9	42	e 11 55	− 6	—	—	—	—	—

Additional readings and note :—
Bogota I iS* = 2m.23s., readings for Shock II have been dimished by 15m.
Huancayo I e = 5m.35s. and 10m.33s.
La Paz I PPP = 6m.35s., iSSE = 11m.49s.
Long waves to Shock I were recorded at San Juan,

Dec. 31d. 14h. 35m. 47s. Epicentre 35°·7N. 121°·2W. (as on 20d.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fresno		1·5	48	i 0 28	0	i 0 48	− 1	—	—	—
Lick		1·7	348	i 0 28 a	− 3	i 0 55	+ 1	i 0 34	P_g	—
Santa Clara		1·7	340	e 0 35	+ 4	i 0 55	+ 1	—	—	—
Santa Barbara		1·7	136	e 0 31	0	i 1 3	S_g	—	—	—
Berkeley		2·3	338	i 0 37	− 3	i 1 15	S_g	i 0 46	P_g	—
San Francisco		2·3	334	i 0 39	− 1	i 1 9	0	i 0 45	P_g	—
Haiwee	E.	2·6	81	e 0 44	0	—	—	—	—	—
Tinemaha		2·7	61	i 0 47 a	+ 2	i 1 23	+ 4	—	—	—
Pasadena		2·9	119	i 0 47	− 1	i 1 21	− 3	—	—	—
Reno	N.	4·0	16	e 1 4	0	i 2 15	S_g	i 1 19	P_g	—
Mineral		4·7	356	e 1 15	+ 1	i 2 3	− 7	i 1 42	P_g	—
Shasta Dam		5·1	350	e 1 14	− 6	i 2 18	− 2	e 1 35	P*	—
Boulder City		5·2	85	e 1 21	0	—	—	—	—	e 2·7
Pierce Ferry		5·9	84	e 0 59	−32	—	—	—	—	—
Tucson		9·3	109	e 2 18	+ 1	e 3 49	−16	—	—	e 4·6

Additional readings :—
Fresno iSEZ = 58s., iZ = 1m.13s., iN = 1m.28s. and 1m.41s.
Lick eE = 31s., iE = 39s.
Berkeley eE = 40s., iZ = 43s., e = 1m.45s., iN = 1m.59s., iZ = 2m.9s., iE = 2m.16s.
Reno iN = 1m.41s.
Mineral iN = 1m.21s., iE = 1m.46s., 2m.8s., and 2m.14s., iN = 2m.21s.

Dec. 31d. Readings also at 1h. (near Ashkabad), 2h. (Pierce Ferry and near Shasta Dam), 3h. (Rome and near Stalinabad), 4h. (Ksara), 5h. (Tamanrasset), 6h. (Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam (2)), Ksara, and near Victoria), 7h. (Pierce Ferry, near Shasta Dam, and near Tacubaya), 8h. (Pierce Ferry and near Shasta Dam), 9h. (near Bogota and near Shasta Dam), 10h. (Pierce Ferry and near Ashkabad), 11h. (near Alicante and near Mizusawa), 12h. (near Reykjavik (2)), 14h. (Mineral, Reno, near Berkeley, Lick, Santa Clara, near Mizusawa, and near Tacubaya), 15h. (Tacubaya (3)), 23h. (Andijan, Samarkand, near Kulyab and near Stalinabad).

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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A digital hypocenter file of the ISS (Villaseñor and Engdahl, 2005) can be obtained from the USGS web site: http://earthquake.usgs.gov/scitech/iss/

Villaseñor, A., and E.R. Engdahl, *A digital hypocenter catalog for the International Seismological Summary,* Seism. Res. Lett., vol. 76, no. 5, pp. 554-559, 2005.

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