The International Seismological Summary.

1947 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 1947 contains 158 epicentres, 119 of which are repetitions from previous determinations.

Cases of abnormal focal depth are noted below :—

Oct.	1d. 12h.	11·9S.	166·8E.	0·005
	3d. 6h.	31·0N.	139·5E.	0·050
	3d. 23h.	18·8N.	100·7W.	Suggested Deep.
	5d. 6h.	48·5N.	155·2E.	Suggested Deep.
	6d. 19h.	36·9N.	22·0E.	Suggested Deep.
	12d. 12h.	37·3N.	141·3E.	0·005
	17d. 4h.	8·5S.	74·0W.	0·020
	17d. 13h.	28·0S.	70·0W.	Base of Superficial Layers.
	20d. 2h.	37·6N.	141·7E.	0·005
	20d. 12h.	49·5N.	156·2E.	0·005
	29d. 11h.	43·6N.	144·3E.	0·015
	29d. 13h.	36·7N.	70·5E.	0·020
Nov.	1d. 14h.	10·5S.	74·9W.	Suggested Deep.
	8d. 5h.	2·1S.	76·8W.	Suggested Deep.
	8d. 6h.	7·7S.	127·8E.	0·020
	10d. 1h.	36·8N.	69·4E.	0·030
	14d. 10h.	43·9N.	148·2E.	0·020
	20d. 9h.	17·8S.	178·8W.	0·070
	30d. 21h.	34·7N.	137·9E.	0·050

Dec.	2d.	21h.	20·5S.	179·0W.	0·080
	4d.	14h.	7·5N.	124·5E.	0·070
	5d.	23h.	36·0S.	178·0W.	0·010
	7d.	1h.	36·7N.	70·5E.	0·030
	14d.	2h.	26·3S.	63·2W.	Base of Superficial Layers.
	15d.	19h.	59·4S.	159·7W.	Suggested Deep.
	20d.	20h.	36·5N.	71·0E.	0·030

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

KEW OBSERVATORY,
Richmond,
SURREY.

January, 1956.

1947 OCTOBER, NOVEMBER, DECEMBER.

Oct. 1d. 12h. 31m. 41s. Epicentre 11°·9S. 166°·8E. Depth of Focus 0·005.
(as on 1942, February 16d.).

$A = -·9529$, $B = +·2235$, $C = -·2049$; $\delta = -5$; $h = +6$;
$D = +·228$, $E = +·974$; $G = +·199$, $H = -·047$, $K = -·979$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		21·0	98	e 4 38	− 2	—	—	—	—	—
Auckland		25·9	165	5 9	−19	10 22	+31	16 35	ScS	—
Riverview		26·1	210	i 5 21a	− 9	i 9 40	−14	i 5 47	pP	e 12·4
Arapuni		27·2	165	—	—	9 49?	−23	—	—	—
Wellington		30·1	168	5 55	−11	10 39	−19	7 23	PP	12·1
Christchurch		31·9	172	6 14	− 7	—	—	—	—	—
Vladivostok		63·4	333	i 10 28	+ 3	i 18 57	+ 6	—	—	—
Berkeley		82·7	49	i 12 18	0	i 23 27	+58	i 13 0	pP	e 37·8
Irkutsk		83·3	328	12 21	0	22 32	− 3	e 15 19	PP	—
Santa Barbara	Z.	83·4	54	e 12 22	0	—	—	—	—	—
Shasta Dam		83·6	47	e 12 23	0	e 16 9	sP	e 12 56	pP	—
Sitka		83·8	28	—	—	e 22 25	−15	e 22 45	sS	—
Calcutta	E.	84·1	294	e 12 25	0	i 22 33	−10	—	—	—
Pasadena	Z.	84·5	54	i 12 26	− 1	—	—	i 12 58	pP	—
Mount Wilson		84·7	54	i 12 28	0	—	—	e 12 58	pP	—
La Jolla	Z.	84·9	56	e 12 31	+ 2	—	—	—	—	—
Haiwee	Z.	85·3	53	e 12 32	+ 1	—	—	e 13 1	pP	—
Tinemaha	Z.	85·4	52	i 12 36	+ 4	—	—	—	—	—
Boulder City		87·7	53	e 12 43	0	—	—	e 13 13	pP	—
Overton		88·1	52	i 12 45	0	—	—	i 13 18	pP	—
Colombo	E.	88·4	277	21 28	?	23 24	0	—	—	—
Pierce Ferry		88·4	53	i 12 46	0	—	—	i 13 16	pP	—
Grand Coulee		88·4	40	e 12 47	+ 1	—	—	e 13 16	pP	—
Tucson		89·9	57	i 12 53	0	i 13 32	sP	i 13 26	pP	—
Salt Lake City		91·2	49	—	—	e 24 14	pS	e 25 47	PPS	—
Kodaikanal	E.	91·4	280	—	—	e 23 17	[− 8]	—	—	—
Antarctica		91·5	162	i 12 54	− 7	e 23 45	− 7	i 30 6	SS	—
Hyderabad	N.	92·0	287	—	—	23 19	[− 9]	—	—	—
Tashkent		103·4	310	e 13 55	+ 1	e 24 21	[− 6]	—	—	—
St. Louis		107·4	53	e 29 48	PKKP	e 25 38	SKKS	i 28 8	PS	—
Sverdlovsk		108·7	326	e 18 53	PP	25 16	[+25]	—	—	—
Chicago		109·4	49	e 18 58	PP	e 35 3	SS	e 28 27	PS	e 51·9
Ashkabad		111·7	306	e 13 48	P	—	—	e 20 9	PP	—
Baku		118·1	310	e 19 45	PP	—	—	—	—	—
Scoresby Sund		121·2	3	—	—	—	—	29 57	PS	—
Leninakan		122·5	311	19 4	[+16]	—	—	e 20 44	PP	—
Helsinki		124·2	339	—	—	e 26 13	[+26]	e 40 5	SS	e 63·3
Ksara		130·3	304	i 19 2	[− 1]	26 2	[− 2]	19 31	pPKP	—
Warsaw		131·2	332	e 21 43	PP	e 23 1	PKS	—	—	e 69·3
Copenhagen		132·0	341	e 18 41	[−25]	—	—	e 22 23	PP	—
Istanbul		133·0	316	e 19 8	[0]	—	—	e 21 53?	PP	—
Helwan	Z.	135·0	300	e 19 10	[− 2]	—	—	e 19 40	pPKP	—
Cheb		136·5	337	e 21 2	?	—	—	—	—	—
De Bilt		137·2	343	e 19 15	[− 1]	—	—	e 22 7	PP	e 64·3
Zagreb		138·1	329	e 19 17	[− 1]	—	—	e 21 57	PP	—
Uccle		138·6	344	e 19 19	[0]	e 22 57	SKP	e 22 7	PP	—
Stuttgart		138·8	337	e 19 12	[− 7]	e 22 37	SKP	e 22 9	PP	e 70·3
Kew		139·2	347	e 19 13?	[− 7]	—	—	e 22 18?	PP	—
Triest		139·3	331	i 22 56	PP	—	—	—	—	—
Strasbourg		139·5	338	e 19 15	[− 5]	e 26 55	[+33]	i 19 47	pPKP	e 64·3
Zürich		140·2	337	e 18 49	[−32]	—	—	e 19 22	PKP	—
Basle		140·4	337	e 19 17	[− 5]	—	—	e 22 22	PP	—
Paris		141·0	343	e 19 21	[− 2]	e 23 7	SKP	e 22 28	PP	e 73·3
Neuchatel		141·1	337	e 19 21	[− 2]	—	—	—	—	—
Florence		141·9	331	e 19 30	[+ 5]	(i 22 53)	PP	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Rome		142·6	328	e 19 20a	[− 6]	e 29 40	SKKS	e 22 32	PP	—
Clermont-Ferrand		143·5	340	i 19 25	[− 2]	e 41 28	SS	i 22 43	PP	68·3
Tortosa		148·8	339	19 42	[+ 6]	29 43	SKKS	20 25	pPKP	—
Alicante		151·3	339	19 5	PKP	26 6	[−33]	23 8	PP	e 71·0
Granada		153·4	343	19 43k	[0]	i 26 4	[−38]	20 11	pPKP	70·4
Almeria		153·4	341	i 19 43	[0]	i 26 45	[+ 3]	23 38	PP	67·3
Malaga	z.	154·0	344	i 19 44a	[0]	30 18	SKKS	i 23 48	PP	78·1

Additional readings :—
Auckland PP = 5m.49s., i = 7m.9s.
Riverview iE = 9m.45s. and 9m.58s., isSN = 10m.31s., iE = 10m.35s., eQE = 10m.49s., iS_cS?E = 15m.34s.
Berkeley iN = 12m.25s., iE = 12m.29s., iSKKSZ = 23m.31s., iPKKPN = 28m.46s., ePKKPZ = 28m.55s., iE = 29m.3s., iZ = 29m.45s., eN = 29m.57s.
Mount Wilson iZ = 13m.2s., eZ = 15m.22s.
Grand Coulee epPP = 16m.39s.
Tucson epPP = 16m.58s.
Antarctica i = 15m.2s.
St. Louis iPPS = 28m.51s.
Ksara PP = 21m.27s., PPS = 33m.26s.
Warsaw iPPEZ = 22m.25s.
Copenhagen 23m.7s., 30m.32s.
Helwan eZ = 21m.49s., PPZ = 22m.19s.
De Bilt ePKS = 23m.17s.
Zagreb eNW = 22m.13s.
Stuttgart ePKP?Z = 19m.20s., $ePKP_2$?Z = 19m.49s., eSS = 40m.25s.
Kew eEZ = 19m.25s.?
Strasbourg iPP = 22m.19s., iSKP = 22m.39s., i = 23m.29s., ePS? = 32m.7s., ePPS = 34m.27s. and 34m.34s., $eSKKS_2$ = 34m.57s., eSS = 40m.39s., eSSS = 44m.39s.
Zürich ePP = 22m.21s.
Rome eZ = 20m.48s., eE = 28m.16s., ePSKSN = 32m.41s., eE = 34m.4s., eSSEN = 41m.6s.?, eSSSN = 46m.30s.
Clermont-Ferrand iSKP = 23m.10s.
Tortosa PKP_2EN = 20m.1s., sPKPEN = 21m.6s., PP = 23m.20s., SKS?N = 27m.8s., SKKSE = 34m.49s.
Alicante PKP = 19m.17s. and 19m.25s., PKS = 22m.38s.
Granada $pPKP_2$ = 20m.34s., iPP = 23m.41s., pPP = 24m.31s., sPP = 24m.52s., PPP = 27m.10s., sSKS = 28m.11s., SKKS = 29m.30s., sSKKS = 30m.47s., SKSP = 33m.39s., SS = 43m.58s., SSS = 51m.15s.
Almeria PKP_2 = 20m.8s., PKS = 23m.13s., PPP = 27m.10s., SKKS = 30m.22s., PPS = 36m.50s., SS = 43m.0s.
Malaga $iPKP_2$Z = 20m.8s., PPPZ = 27m.16s., SKSPZ = 34m.6s., SSZ = 44m.8s.

Oct. 1d. 21h. 28m. 3s. Epicentre 19°·4N. 70°·4W. (as on 1946, November 22d.).

A = +·3166, B = −·8892, C = +·3302; δ = −6; h = +5;
D = −·942, E = −·335; G = +·111, H = −·311, K = −·944.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Port au Prince		2·0	245	(i 0 46)	+11	(i 1 14)	S_g	(i 1 23)	?	(i 1·8)
San Juan		4·2	103	e 1 4	− 3	i 1 49	− 8	i 1 17	P*	—
Fort de France		10·0	116	e 3 25	+58	—	—	—	—	—
Tucson		38·4	298	e 7 24k	− 1	—	—	e 7 46	?	—
Pierce Ferry		41·6	303	i 8 22	+31	—	—	—	—	—
Overton		42·1	304	i 7 59	+ 4	—	—	—	—	—
Boulder City		42·3	303	i 7 57	0	—	—	—	—	—
Palomar	z.	43·5	299	i 8 7	0	—	—	—	—	—
Riverside	z.	44·0	300	e 8 11	0	—	—	—	—	—
Mount Wilson	z.	44·6	300	i 8 12	− 4	—	—	—	—	—
Pasadena	z.	44·7	300	e 8 15	− 1	—	—	—	—	—
Tinemaha	z.	45·2	303	i 8 20	0	—	—	—	—	—
Grand Coulee		48·4	318	e 8 43	− 3	—	—	—	—	—
Shasta Dam		49·0	308	e 8 46	− 4	—	—	—	—	—
Malaga	z.	59·7	58	i 10 9a	0	e 18 18	− 1	e 12 23	PP	29·0
Stuttgart		68·9	44	e 11 8	− 1	—	—	—	—	e 34·9

Additional readings :—
The readings for Port au Prince were increased by 8 minutes.
San Juan i = 1m.41s.
Mount Wilson iZ = 8m.31s. and 8m.43s.
Malaga eP_cPZ = 10m.53s., ePPP?Z = 13m.51s., eS_cP?Z = 14m.31s., iS_cSZ = 19m.26s.
Long waves were recorded at Bermuda, Strasbourg, and De Bilt.

Oct. 1d. Readings also at 4h. (Strasbourg), 11h. (near Lick and near Triest), 12h. (Erevan, near Grozny, Leninakan, and Piatigorsk, Bogota, La Paz, Boulder City, Mount Wilson, Pasadena, Shasta Dam, Tinemaha, Tucson, near Huancayo, and near Mineral), 14h. (Philadelphia), 17h. (La Paz, Mount Wilson, Overton, Pasadena, Pierce Ferry, Shasta Dam, Tinemaha, Tucson, and near Huancayo), 18h. (Lick), 19h. (Overton, Pierce Ferry, and near San Juan), 20h. (Ashkabad, Helwan, and Ksara), 21h. (Istanbul and Strasbourg), 23h. (Sitka).

Oct. 2d. 20h. 34m. 48s. Epicentre 38°·5N. 9°·9W.

Intensity V at Lisbon ; III at Badajoz and in central Portugal. Epicentre as adopted.

Resumen de las Observaciones solares meteorologicas y sismologicas efectuados durante el año, 1947, Vol. 35, Series A, Tortosa, 1950, p. 224.

$A = +\cdot7729$, $B = -\cdot1349$, $C = +\cdot6199$; $\delta = -15$; $h = -1$;
$D = -\cdot172$, $E = -\cdot985$; $G = +\cdot611$, $H = -\cdot107$, $K = -\cdot785$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Lisbon		0·6	70	0 14	− 1	—	—	—	—	—
Malaga		4·7	110	i 1 15k	+ 1	i 2 4	− 6	1 40	P_g	—
Granada		5·1	102	1 54	P_g	2 19	− 1	—	—	—
Almeria		6·1	103	1 40	+ 6	2 56	+11	2 9	P_g	—
Alicante		7·4	88	i 1 45	− 7	3 25	+ 7	2 25	P_g	—
Tortosa		8·4	71	e 2 3	− 3	4 29	S_g	2 29	P*	6·2
Clermont-Ferrand		12·1	49	3 1	+ 4	—	—	—	—	—
Zürich		16·2	51	e 4 29	+39	—	—	—	—	e 8·8
Stuttgart		17·2	47	e 4 2	− 1	—	—	—	—	9·0
Rome	N.	17·4	72	e 2 23	?	—	—	—	—	—

Additional readings :—
Malaga iS_gNW =2m.40s.
Granada P_g =2m.13s. and 2m.38s., PS =2m.45s., 2m.55s., 3m.1s., iS_g =3m.22s., S = 3m.25s.
Almeria P_g =1m.45s. and 1m.49s., P_gS_g =2m.20s., 2m.31s., and 2m.50s., iS_g =3m.2s., S_g =3m.7s.
Alicante PP =1m.55s., PPP =2m.7s., P_gS_g =3m.8s.
Tortosa P_gS_gN =3m.23s., 3m.52s., 4m.0s., and 4m.20s., S_gN =4m.22s., S_gEN =4m.25s.
Long waves were also recorded at Basle, Strasbourg, and De Bilt.

Oct. 2d. Readings also at 2h. (Shasta Dam, Mineral, and near Ferndale), 3h. (Antarctica and Warsaw), 4h. (Apia, Wellington, Auckland, Arapuni, Riverview, Stuttgart, Ksara, and near College), 5h. (Rome, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Tucson, and near Huancayo), 8h. (La Paz), 9h. (Mount Wilson, Pasadena, Riverside, Santa Barbara, Tinemaha, Shasta Dam, Erevan, and near Leninakan), 10h. (Boulder City, Overton, Pierce Ferry, Shasta Dam, Tucson, Palomar, and Auckland), 12h. (Copenhagen), 13h. (New Delhi), 14h. (Antarctica), 15h. (Tucson), 18h. (Philadelphia), 21h. (near Lick), 22h. (Mount Wilson, Pasadena, Riverside, Tinemaha, Tucson, Boulder City, and Pierce Ferry).

Oct. 3d. 6h. 13m. 46s. Epicentre 26°·0N. 57°·2E.

$A = +\cdot4875$, $B = +\cdot7565$, $C = +\cdot4360$; $\delta = +4$; $h = +4$;
$D = +\cdot841$, $E = -\cdot542$; $G = +\cdot236$, $H = +\cdot367$, $K = -\cdot900$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ashkabad		12·0	5	i 2 55	0	5 8	− 3	—	—	—
Baku		15·6	339	3 47	+ 4	—	—	—	—	—
Samarkand		15·9	29	3 46	− 1	—	—	—	—	—
Stalinabad		15·9	35	i 3 44	− 3	e 6 54	+10	—	—	—
Bombay		16·1	113	i 3 40	− 9	i 6 51	+ 2	7 2	SS	7·8
Obi-garm		16·5	37	i 3 54	0	i 7 5	+ 7	i 6 50	S	—
Erevan		17·7	327	e 4 12	+ 2	7 34	+ 8	—	—	—
New Delhi	N.	18·0	76	e 4 22	+ 9	i 7 38	+ 6	4 37	PP	9·5
Tashkent		18·3	29	e 4 12	− 5	—	—	—	—	—
Leninakan		18·5	327	4 22	+ 3	i 7 47	+ 3	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Dehra Dun	N.	18·9	71	e 5 54	?	—	—	—	—	e 12·8
Tchimkent		19·2	28	e 4 24	− 4	—	—	—	—	—
Grozny		19·7	335	i 4 32	− 2	e 8 12	+ 2	—	—	—
Ksara		20·0	297	i 4 37	0	i 8 24	+ 7	—	—	—
Piatigorsk		21·4	332	e 4 51	0	—	—	—	—	—
Hyderabad	N.	21·5	109	4 51	− 1	8 53	+ 6	5 33	PP	—
Sotchi		22·6	326	e 5 6	+ 3	e 9 18	+11	e 5 24	PP	—
Helwan		23·1	286	i 5 10k	+ 2	i 9 23	+ 7	i 5 56	PP	—
Almata		23·6	37	5 13	0	—	—	—	—	—
Kodaikanal	E.	24·8	124	i 5 28	+ 3	i 9 53	+ 7	—	—	12·6
Theodosia		25·8	324	e 5 37	+ 3	e 10 13	+11	i 7 41	PPP	—
Yalta		26·2	321	e 5 39	+ 1	10 19	+10	—	—	—
Istanbul		27·7	311	e 4 30	−82	9 20	−73	—	—	—
Calcutta	E.	28·6	89	e 5 52	− 8	i 11 11	+23	i 12 58	SS	15·0
Colombo	E.	28·8	127	6 3	+ 1	—	—	—	—	20·1
Sverdlovsk		30·9	4	i 6 17	− 3	i 11 22	− 2	—	—	—
Moscow		32·9	340	6 38	0	12 4	+ 8	—	—	—
Belgrade		35·0	312	e 6 56	0	e 15 5	SSS	e 8 58	PPP	22·2
Kalossa		36·5	315	e 7 11	+ 2	—	—	e 9 4	PPP	—
Budapest		36·8	317	7 21	+10	12 58	+ 2	8 28	PP	21·7
Warsaw		37·8	324	i 7 21k	+ 1	13 9	− 2	8 53	PP	e 21·2
Zagreb		38·3	312	e 7 23	− 1	e 13 6	−13	e 8 57	PP	—
Triest		39·7	312	i 7 36	0	i 13 40	0	i 9 13	PP	—
Rome		39·9	306	i 7 37a	0	i 13 43	0	e 16 11	SS	e 18·9
Prague		40·6	319	7 41	− 2	e 13 51	− 3	e 16 32	SS	e 20·2
Helsinki		40·7	337	e 7 44	0	e 13 54	− 1	e 17 14	SS	e 23·2
Florence		41·1	308	i 7 44	− 3	i 14 1	0	—	—	—
Cheb		41·9	317	e 7 55	+ 1	i 14 17	+ 4	e 16 57	SS	e 22·2
Collmberg	Z.	41·9	319	e 8 0	+ 6	—	—	e 9 41	PP	—
Potsdam		42·2	321	i 7 58	+ 2	i 14 19	+ 2	i 14 27	PS	e 23·2
Jena	N.	42·6	318	e 8 7	+ 8	e 14 22	− 1	—	—	—
Chur		42·9	312	e 8 2	0	e 14 20	− 7	—	—	e 23·1
Upsala		43·4	332	e 7 46	−20	e 14 17	−18	e 9 29	PP	e 23·2
Stuttgart		43·5	315	i 8 6a	− 1	e 14 30	− 6	e 9 47	PP	e 23·2
Zürich		43·6	313	e 8 7a	− 1	e 14 33	− 5	e 9 53	PP	—
Copenhagen		43·8	326	i 8 10	+ 1	e 14 42	+ 2	18 13	SS	—
Irkutsk		43·9	40	i 8 9	− 1	—	—	—	—	—
Basle		44·3	313	e 8 13a	0	e 14 43	− 5	e 10 0	PP	—
Strasbourg		44·4	314	i 8 13	− 1	e 14 34	−15	e 10 0	PP	24·9
Neuchatel		44·6	312	e 8 14	− 2	—	—	—	—	—
Besançon		45·3	312	e 8 22	+ 1	e 15 6	+ 4	—	—	e 25·2
De Bilt		46·8	319	i 8 41a	+ 8	i 15 30	+ 6	e 10 28	PP	e 21·2
Uccle		47·0	317	i 8 35a	0	i 15 27	+ 1	e 10 27	PP	e 23·2
Clermont-Ferrand		47·1	310	i 8 35	0	e 15 34	+ 6	i 10 29	PP	24·2
Paris		47·9	314	i 8 40	− 2	e 15 32	− 7	e 10 32	PP	e 26·2
Tortosa		48·8	303	i 8 50	+ 1	i 15 53	+ 1	10 36	PP	e 23·8
Bergen		49·1	330	8 50	− 1	16 6	+10	10 51	PP	22·7
Alicante		49·6	300	e 8 16	−39	i 15 27	−36	8 45	pP	e 24·1
Kew		50·0	317	i 8 58a	0	e 16 8?	− 1	e 10 48?	PP	—
Jersey		50·9	314	e 8 58	− 7	e 16 17	− 4	—	—	—
Almeria		51·3	298	i 9 9	+ 1	16 29	+ 3	9 19	pP	29·2
Durham		51·3	321	i 9 6	− 2	i 15 22	−64	i 9 24	pP	i 29·4
Aberdeen	E.	52·0	324	i 9 16	+ 3	i 16 48	+12	i 19 50	SS	i 29·1
Granada		52·2	298	i 9 20	+ 5	i 16 39	0	9 36	pP	28·3
Edinburgh		52·4	322	e 9 9	− 7	—	—	—	—	l 29·2
Malaga	Z.	52·9	298	i 9 21k	+ 1	i 16 45	− 3	9 27	pP	25·0
Lisbon		56·4	301	9 45	0	17 36	0	—	—	33·8
Kirkland Lake		96·8	332	13 38	+ 4	—	—	—	—	—
Fordham		99·5	324	e 17 47	PP	—	—	—	—	—
Cleveland	E.	102·7	329	—	—	i 25 4	{−10}	e 33 22	SSP	—
Riverview		107·1	120	i 18 40	PP	i 26 44	+24	e 28 0	PS	e 54·2
Fort de France		107·7	296	—	—	e 28 20	PS	—	—	—
St. Louis		108·8	334	18 50	PP	e 26 44	S	e 21 18	PPP	—
La Paz		128·5	269	i 19 18	[+ 9]	—	—	i 21 35	PP	61·5

For Notes see next page.

NOTES TO OCTOBER 3d. 6h. 13m. 46s.

Additional readings :—
Bombay iSN =6m.44s., SSSN =7m.25s.
New Delhi iN =7m.48s., SSN =8m.9s.
Hyderabad SSN =9m.15s.
Helwan iN =6m.32s. and 7m.14s.
Calcutta ePPPE =7m.6s.
Belgrade eSS? =17m.28s.
Budapest PPPE =8m.43s., PPPN =8m.49s., SE =13m.6s.
Warsaw ePN =7m.24s., iZ =7m.44s., SE =13m.21s., SZ =13m.29s., eE =14m.3s., SSE =15m.39s., SSN =15m.50s., SSZ =15m.56s., SSSEN =16m.35s., eE =17m.13s., S_cSZ =17m.50s.
Rome eN =13m.59s., iSSSE =16m.41s.
Prague ePPP =9m.26s., eSSS =17m.38s.
Helsinki e =9m.12s. and 20m.12s.
Cheb ePP =10m.0s., ePS =14m.39s.
Collmberg eSSS =17m.57s., e =21m.1s., iZ =8m.22s.
Potsdam iPSN =14m.30s., iEN =14m.42s., iE =16m.7s., eSSSN =17m.56s., eE =19m.14s.
Jena eP?E =8m.1s.
Upsala ePPN =9m.21s., eSSE =17m.34s., eSSN =17m.43s.
Stuttgart i =8m.18s.k, eSSS =18m.14s., e =20m.20s.
Copenhagen 9m.55s. ,14m.50s., S_cS =17m.18s., SSS =19m.26s.
Strasbourg e =9m.14s., 9m.26s., and 9m.54s., ePPP =10m.49s., e =11m.31s. and 16m.34s., eSS =18m.8s.
De Bilt eSS =18m.40s.
Uccle eSSEN =18m.14s.?, eN =21m.15s.
Clermont-Ferrand eSS? =17m.56s.
Paris e =8m.52s., i =9m.32s., iPS =15m.44s., e =17m.52s.
Tortosa PPP?E =11m.44s., PSEN =16m.7s., PPSEN =16m.17s., SSSE =20m.42s.
Bergen eZ =9m.24s., S_cSN =18m.43s., eN =19m.55s.
Alicante P_cP =9m.21s., PP =10m.19s., SS =16m.31s. and 17m.53s.
Kew iP$_c$P?EZ =9m.53s., eSP? =11m.52s.?, eS$_c$P? =12m.53s., eS$_c$S?N =17m.38s.,?, isS?NZ =19m.31s., eSS? =20m.18s.,?, eSSS?EN =24m.14s.?.
Almeria P_cP =10m.19s., PP =11m.19s., PPP =12m.19s., P_cS =14m.19s., S_cS =18m.49s., SS =21m.51s.
Durham iPPE =10m.46s., iPPPE =11m.16s., isSN =15m.40s., iSSN =17m.55s.
Granada PP =11m.21s., PPP =12m.21s., P_cS =14m.12s., sS =17m.12s., PS =17m.27s., S_cS =18m.57s., sS_cS =19m.45s., SS =20m.33s., sSS =21m.24s., SSS =22m.12s.
Malaga P_cPZ =10m.23s., PPZ =11m.27s., PPPZ =12m.21s., S_cPZ =14m.15s., S_cSZ =19m.7s., SSZ =20m.45s.
Kirkland Lake e =21m.14s.
Cleveland iN =32m.36s.
Riverview iE =28m.7s.
St. Louis i =20m.5s., iS =26m.54s.
Long waves were also recorded at Butte, Harvard, and Santa Clara.

October 3d. 6h. 20m. 56s. Epicentre 31°·0N. 139°·5E. Depth of Focus 0·050.
(as on 1945, April 24d.).

Intensity V at Tukubasan, Mito, Utunomiya; IV at Mera, Hunatu, Tokyo, Yokohama, Titibu, Kakioka, Hukusima; II-III at Sendai, Morioka, Hatinohe, Kumagaya, Oshima. Macroseismic radius 300km. Depth 350km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1947, Tokyo, 1950, pp. 32-33, 1 carte macroséismique, p. 32. Epicentre 31°·5N. 139°·0E.

$A = -\cdot6530$, $B = +\cdot5577$, $C = +\cdot5125$; $\delta = +9$; $h = +2$;
$D = +\cdot649$, $E = +\cdot760$; $G = -390$, $H = +\cdot333$, $K = -\cdot859$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Omaesaki	3·7	343	1 6k	0	1 58	0	—	—	—
Osima	3·8	358	1 8k	+ 1	1 59	− 1	—	—	—
Mera	3·9	4	1 10k	+ 2	2 2	0	—	—	—
Siomisaki	4·0	308	1 6a	− 3	1 53	−11	—	—	—
Shizuoka	4·1	347	1 10k	0	2 0	− 6	—	—	—
Misima	4·1	353	1 12	+ 2	2 5	− 1	—	—	—
Owase	4·1	318	1 7a	− 3	1 58	− 8	—	—	—
Yokohama	4·4	1	1 18k	+ 4	2 12	+ 1	—	—	—
Hunatu	4·5	352	1 16k	+ 1	2 10	− 3	—	—	—
Kameyama	4·6	327	1 13	− 3	2 10	− 5	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nagoya		4·7	333	1 16k	− 1	2 11	− 6	—	—	—
Tokyo		4·7	2	1 17	0	2 15	− 2	—	—	—
Osaka		4·9	319	1 16	− 3	2 15	− 6	—	—	—
Gihu		5·0	333	1 17k	− 3	2 14	− 9	—	—	—
Muroto		5·0	298	1 14	− 6	2 11	−12	—	—	—
Hikone		5·1	328	1 17a	− 4	2 16	− 9	—	—	—
Sumoto		5·1	312	1 6a	−15	2 12	−13	—	—	—
Kumagaya		5·1	359	1 20k	− 1	2 21	− 4	—	—	—
Kyoto		5·1	323	1 21a	0	—	—	—	—	—
Tukubasan		5·2	5	1 24	+ 2	2 20	− 7	—	—	—
Kobe		5·2	316	1 16a	− 6	2 14	−13	—	—	—
Kakioka		5·3	6	1 22k	− 2	2 22	− 7	—	—	—
Mito		5·4	8	1 25	0	2 27	− 4	—	—	—
Maebasi		5·4	356	1 26	+ 1	2 25	− 6	—	—	—
Utunomiya		5·5	3	1 25	− 1	—	—	—	—	—
Kôti		5·6	298	1 22	− 5	2 20	−15	—	—	—
Nagano		5·8	349	1 26k	− 3	—	—	—	—	—
Toyama		6·0	342	1 30	− 1	2 39	− 4	—	—	—
Onahama		6·0	11	1 32k	+ 1	2 41	− 2	—	—	—
Toyooka		6·0	320	1 30	− 1	2 30	−13	—	—	—
Matuyama		6·4	298	1 31a	− 5	2 40	−12	—	—	—
Wazima		6·7	342	1 36	− 4	2 52	− 6	—	—	—
Hirosima		6·8	301	1 32	− 9	2 46	−14	—	—	—
Hukusima		6·8	6	1 38k	− 3	2 53	− 7	—	—	—
Miyazaki		7·0	280	1 37a	− 6	2 55	− 9	—	—	—
Aikawa		7·1	352	1 42k	− 2	2 54	−12	—	—	—
Sendai		7·3	8	1 47k	0	3 6	− 4	—	—	—
Hamada		7·4	304	1 38a	−10	2 55	−18	—	—	—
Kagosima		7·7	277	1 44a	− 7	3 8	−11	—	—	—
Kumamoto		7·7	286	1 45a	− 6	2 45	−34	—	—	—
Izuka		7·9	292	1 43a	−11	3 5	−18	—	—	—
Unzendake		8·1	285	2 37	+41	4 22	+54	—	—	—
Hukuoka		8·1	291	1 46a	−10	3 15	−13	—	—	—
Mizusawa	E.	8·2	9	2 0	+ 3	3 27	− 3	—	—	—
Morioka		8·8	8	2 4k	0	3 37	− 6	—	—	—
Miyako		8·9	12	2 4k	− 2	3 39	− 6	—	—	—
Hatinohe		9·7	9	2 16k	+ 1	3 55	− 7	—	—	—
Aomori		9·8	5	2 17k	+ 1	4 12	+ 8	—	—	—
Mori		11·1	4	2 31	− 1	4 29	− 3	—	—	—
Sapporo		12·1	6	2 43a	− 1	4 49	− 5	—	—	—
Nemuro		13·2	19	2 59k	+ 2	5 20	+ 2	—	—	—
Vladivostok		13·5	336	i 2 52	− 8	i 5 11	−13	—	—	—
Nanking		17·7	279	3 38	− 7	6 32	−15	e 6 46	S	—
Irkutsk		33·3	320	i 5 58	−10	i 10 46	−16	—	—	—
College		55·1	29	e 8 59	0	i 16 12	− 1	e 20 9	SS	e 22·6
Samarkand		58·3	300	9 14	− 7	—	—	—	—	—
Riverview		65·4	169	i 10 13	+ 5	i 18 29	+ 6	i 22 16	SS	—
Moscow		71·2	324	10 36	− 7	19 0	−31	—	—	—
Victoria		71·8	44	e 12 11	PcP	19 39	+ 1	—	—	50·1
Grozny		72·0	310	i 10 42	− 6	—	—	—	—	—
Leninakan		74·4	308	e 11 0	− 2	—	—	—	—	—
Grand Coulee		74·7	43	i 11 4	0	i 20 11	+ 1	e 12 28	pP	—
Auckland		75·2	151	17 1	PPP	21 22	PS	i 21 44	PPS	—
Shasta Dam		76·2	51	i 11 13	+ 1	e 20 26	0	i 12 38	pP	—
Ukiah		76·3	52	—	—	e 20 24	− 3	—	—	—
Arapuni		76·6	151	—	—	i 22 4?	PS	—	—	—
Berkeley		77·5	53	i 11 22	+ 3	i 20 43	+ 3	i 26 3	SS	e 32·7
Theodosia		77·7	315	e 11 11	− 9	e 20 27	−15	—	—	—
Santa Clara		78·0	53	i 11 22	0	e 20 46	+ 1	e 12 46	?	—
Lick		78·2	53	e 10 26	−57	e 19 50	−57	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Yalta		78·7	315	11 18	− 7	—	—	—	—	—
Wellington		79·0	153	—	—	20 56	0	—	—	—
Saskatoon		79·1	35	—	—	i 20 56	− 1	—	—	44·1
Butte		79·4	42	—	—	e 20 54	− 6	e 21 0	S_cS	—
Fresno	N.	79·8	53	e 11 36	+ 5	e 21 9	+ 5	—	—	—
Bozeman		80·5	42	—	—	i 21 13	+ 2	—	—	—
Tinemaha		80·7	52	i 11 39a	+ 3	i 21 18	+ 5	i 13 6	pP	—
Santa Barbara		81·0	55	i 11 41a	+ 3	i 21 51	+35	i 13 9	pP	—
Haiwee		81·4	53	i 11 42	+ 2	i 21 23	+ 3	—	—	—
Pasadena		82·3	55	i 11 45	+ 1	i 21 30	+ 1	i 13 11	pP	e 41·2
Mount Wilson		82·3	55	i 11 46a	+ 2	i 21 32	+ 3	i 13 11	pP	—
Copenhagen		82·6	333	i 11 39	− 7	i 21 16	−16	—	—	—
Salt Lake City		82·8	46	e 12 6	+19	e 21 50	+16	e 13 32	pP	—
Riverside		82·9	55	i 11 48a	+ 1	e 21 32	− 3	i 13 17	pP	—
Boulder City		83·6	52	i 11 53	+ 2	e 21 42	0	i 13 21	pP	—
La Jolla		83·6	55	i 11 52	+ 1	e 21 41	− 1	i 13 22	pP	—
Palomar		83·6	54	i 11 53a	+ 2	i 21 42	0	i 13 21	pP	—
Pierce Ferry		84·1	51	e 11 40	−13	e 21 40	− 7	i 13 24	pP	—
Potsdam		84·7	330	—	—	i 21 40	−13	—	—	e 47·1
Collmberg		85·5	330	i 11 57	− 3	—	—	—	—	—
Rapid City		85·9	40	e 12 4	+ 2	i 22 2	− 2	e 13 41	sP	—
Tucson		88·4	52	i 11 46	−28	e 22 12	−15	i 13 42	pP	e 37·7
Stuttgart		89·0	329	e 12 10	− 7	—	—	e 15 44	PP	—
Strasbourg		89·8	330	e 12 11	− 9	—	—	—	—	—
Paris		91·8	333	i 12 22	− 8	—	—	e 16 2	PP	—
Clermont-Ferrand		94·0	331	e 12 8	−32	—	—	—	—	—
St. Louis		96·7	37	12 55	+ 3	—	—	—	—	—
Ottawa		97·5	23	12 55	− 1	22 54	[− 4]	14 20	?	43·1
Seven Falls		97·6	20	18 46	?	23 42	− 5	30 34	SS	51·2
Cleveland	E.	98·5	29	—	—	e 23 58	+ 4	i 23 2	SKS	—
Fordham		102·1	24	—	—	i 24 25	+ 1	i 23 15	SKS	—
Philadelphia		102·4	26	e 18 33	pPP	e 24 7	−20	e 31 40	SS	e 41·9
Tacubaya		104·6	56	e 14 56	P	e 23 34	[+ 2]	—	—	—
Bermuda		112·9	22	e 17 34	PP	e 25 11	SKKS	e 18 30	pPP	e 45·1
Bogota	Z.	132·2	47	i 18 35	[+ 2]	—	—	i 22 9	PP	—
Huancayo		142·7	67	e 18 53	[+ 1]	—	—	e 21 57	PP	—
La Paz		151·0	65	i 18 48	[−17]	i 26 40	[+63]	i 23 4	PP	70·5

Additional readings :—
College eS_cS? =19m.6s.
Grand Coulee eS_cS =20m.42s.
Berkeley iE =11m.28s., 12m.48s., and 22m.26s., iN =22m.30s.
Butte eSP? =22m.36s., eSS =26m.34s., e =29m.25s.
Pasadena ePPZ =15m.8s., iSPZ =22m.27s., iSSN =27m.10s., eSKP,PKPZ =41m.0s.
Mount Wilson iPPZ =15m.6s.
Salt Lake City e =24m.26s., ePS =25m.57s., e =27m.18s.
Riverside iZ =13m.30s., iPPZ =15m.7s.
Boulder City iPP =15m.11s.
Palomar iZ =12m.8s., iPPEZ =15m.12s., eZ =20m.31s., iZ =22m.46s., ePKP,PKP?Z = 35m.39s., iSKP,PKPZ =40m.55s.
Pierce Ferry iP =11m.55s., iPP =15m.14s.
Collmberg iZ =12m.12s.
Rapid City i =12m.14s., eS_cS =21m.50s., eSP =23m.10s.
Tucson i =12m.15s., ePP? =14m.27s., iPP =15m.51s., e =18m.21s., iPS =23m.41s., esS =23m.54s., eSS? =28m.46s., eSSS? =32m.34s.
Stuttgart eZ =13m.44s.
St. Louis iPS =21m.23s., iSS =27m.26s.
Seven Falls PPS =24m.58s.
Cleveland eE =26m.36s., iE =31m.0s.
Fordham i =31m.45s.
Bermuda ePPP? =19m.50s., iSP? =25m.50s., eSPP =27m.44s., eSSS? =38m.11s., eSKP,PKP =40m.35s.
Bogota PKP and PP given as SKP and SKS respectively.
Huancayo e =20m.15s.
La Paz iNZ =20m.41s., SS =42m.54s.

Oct. 3d. 8h. 10m. 54s. Epicentre 16°·3N. 98°·6W. (as on 1943, November 21d.).

A = −·1436, B = −·9496, C = +·2789 ; δ = +15 ; h = +5 ;
D = −·989, E = +·150 ; G = −·042, H = −·276, K = −·960.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		3·1	350	i 0 51	0	—	—	i 0 58	P•	1·5
Tucson		19·4	328	i 4 27	− 3	e 7 58	− 6	e 8 9	SS	e 9·4
St. Louis		23·4	16	e 5 17	+ 6	e 9 26	+ 5	i 5 28	pP	—
La Jolla		23·6	318	e 5 14	+ 1	—	—	—	—	—
Denver		23·9	348	—	—	10 28	+58	12 57	?	14·4
Pierce Ferry		24·0	328	e 5 17	0	e 12 35	L	i 5 38	PP	(e 12·6)
Boulder City		24·3	327	i 5 21	+ 1	e 12 47	L	i 5 33	pP	(e 12·8)
Riverside		24·4	321	i 5 20	− 1	—	—	i 5 34	pP	—
Pasadena		25·0	321	i 5 27	0	i 9 45	− 4	i 5 39	pP	e 11·1
Mount Wilson		25·0	321	i 5 27	0	—	—	i 5 38	pP	—
Santa Barbara	z.	26·2	319	e 5 54	+16	—	—	—	—	—
Haiwee		26·2	324	e 5 38	0	—	—	—	—	—
Bogota	z.	26·7	113	e 6 19	PP	—	—	—	—	—
Tinemaha		27·1	324	i 5 46	0	—	—	i 6 0	pP	—
Rapid City		28·0	353	e 5 56	+ 1	—	—	e 6 22	pP	e 14·7
Cleveland		29·1	26	i 6 13	+ 9	e 10 56	0	i 6 24	pP	—
Temiskaming		34·3	23	i 6 53	+ 3	—	—	—	—	—
Harvard		34·9	36	i 7 1	+ 6	—	—	—	—	—
Kirkland Lake		35·2	21	i 7 1	+ 3	—	—	—	—	—
Grand Coulee		35·7	337	e 7 2	0	—	—	e 7 21	pP	—
Malaga	z.	83·7	54	12 38	+ 6	23 2	+ 8	15 58	PP	40·1
Granada		84·2	53	i 12 58k	+24	i 23 56	+57	—	—	—
Almeria		85·2	53	12 16	−23	22 38	−31	15 32	PP	44·1

Additional readings :—
Tucson i = 4m.38s. and 5m.39s.
St. Louis i = 5m.32s., esS = 9m.46s.
Pierce Ferry ipP? = 5m.27s., i = 6m.26s.
Boulder City i = 6m.49s.
Pasadena i = 5m.43s., iS_cSN = 14m.54s.
Mount Wilson iZ = 5m.54s.
Cleveland eN = 11m.58s., eE = 12m.2s.
Grand Coulee e = 8m.27s.
Malaga PPPZ = 17m.52s.
Almeria PPP = 17m.33s., S_cS = 22m.22s., sS = 23m.24s., PS = 23m.46s., PPS = 24m.9s., SS = 28m.13s.
Long waves were also recorded at Salt Lake City.

Oct. 3d. 23h. 32m. 10s. Epicentre 18°·8N. 100°·7W. (as on 1945, April 21d.).

Felt in the States of Guerrero, Michoacan, and Mexico. Epicentre 18°33′N., 100°33°W. U.S.C.G.S. suggest depth = 100km.

Catalogo de temblores, Temblores registrados en la red sismologica mexicana durante el periodo que comprende del 3 de enero al. 31 de Diciembre, 1947. Instituto de Geofisica, Mexico, 1950, p. 64.

A = −·1767, B = −·9307, C = +·3203 ; δ = +2 ; h = +5 ;
D = −·982, E = +·187 ; G = −·060, H = −·315, K = −·947.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya	1·6	71	0 47	+17	—	—	—	—	1·1
Tucson	16·2	328	i 3 46a	− 4	i 6 32	−19	i 4 0	pP	i 7·0
La Jolla	20·4	317	i 4 34a	− 7	—	—	—	—	—
Palomar	20·4	320	i 4 35a	− 6	—	—	—	—	—
Pierce Ferry	20·8	329	i 4 46	+ 1	i 8 31	− 2	i 5 25	PP	i 11·6
Boulder City	21·1	328	i 4 44	− 3	e 11 41	L	i 5 1	pP	(e 11·7)
Riverside	21·2	320	i 4 42a	− 7	i 8 50	+ 9	i 5 0	pP	—
Mount Wilson	21·8	320	i 4 48a	− 8	—	—	—	—	—
Pasadena	21·8	320	i 4 48a	− 8	i 8 47	− 5	i 5 3	pP	e 8·7
St. Louis	21·8	23	i 4 56	0	i 8 56	+ 4	i 5 11	pP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		22·8	113	i 5 12	+ 7	e 9 29	+18	—	—	—
Haiwee		23·0	323	i 5 1a	− 6	—	—	—	—	—
Santa Barbara		23·0	317	i 5 0	− 7	—	—	—	—	—
Columbia		23·2	45	e 5 10	+ 1	e 9 21	+ 3	e 5 30	pP	e 9·8
Tinemaha		23·8	324	i 5 11a	− 4	—	—	i 5 27	pP	—
Salt Lake City		23·9	340	i 5 26	+10	e 9 14	−16	i 5 46	PP	i 9·8
Fresno	N.	24·5	322	e 7 50	f	—	—	—	—	—
Rapid City		25·3	357	i 5 28	− 2	e 9 18	−36	i 6 10	PP	e 9·8
Chicago		25·5	22	i 5 29	− 3	i 9 54	− 3	i 5 46	pP	i 10·7
Lick		26·0	321	e 5 30	− 6	—	—	—	—	e 14·5
Santa Clara		26·2	321	i 5 32	− 6	—	—	—	—	e 10·1
Berkeley		26·7	321	i 5 36	− 7	i 10 10	− 7	—	—	—
San Francisco	N.	26·8	321	e 5 35	− 9	e 10 56	+37	—	—	e 14·9
Cleveland		27·9	32	e 5 52a	− 2	i 10 36	− 1	i 6 12	pP	—
Mineral	E.	28·0	325	i 5 56	+ 1	—	—	—	—	e 15·6
Bozeman		28·1	346	e 5 50	− 5	i 10 36	− 4	e 6 50	PP	i 11·5
New Kensington		28·2	35	e 6 35	+39	e 10 44	+ 3	i 7 4	pP	e 12·4
Shasta Dam		28·7	325	i 5 52	− 9	e 10 33	−17	e 7 9	PPP	e 15·3
Georgetown		28·7	41	e 6 10	+ 9	11 22	+32	e 13 21	SSS	17·8
Butte		28·8	345	i 5 54	− 8	e 10 50	− 1	e 6 12	pP	i 11·8
Pennsylvania		29·4	36	i 6 8	+ 1	e 10 58	− 3	i 6 50	pP	—
Bogota	Z.	29·6	115	i 6 16	+ 7	e 11 26	+22	i 7 9	PP	14·8
Ferndale		29·6	323	e 5 28	−41	e 11 32	+28	e 7 10	PP	—
Philadelphia		30·5	42	e 6 15	− 2	i 11 57	+39	i 6 35	pP	i 12·8
Fordham		31·8	41	i 6 27	− 1	i 11 38	0	i 7 28	PP	—
Grand Coulee		32·6	338	e 6 29	− 6	—	—	e 6 46	pP	—
San Juan		32·8	85	e 6 39	+ 2	e 11 57	+ 3	e 9 44	PcP	e 13·5
Temiskaming		33·0	26	6 37	− 2	11 55	− 2	7 33	PP	14·2
Saskatoon		33·6	354	6 40	− 4	11 55	−11	7 40	PP	15·8
Seattle		33·7	334	e 7 20	+35	—	—	—	—	e 14·4
Ottawa		33·7	32	6 43	− 2	11 57	−11	14 32	SS	15·8
Kirkland Lake		33·8	25	6 42	− 4	12 6	− 4	7 50	PP	—
Harvard		34·2	40	i 6 49	0	e 12 13	− 3	i 7 10	pP	—
Weston		34·3	40	6 49	− 1	12 15	− 2	7 59	PP	—
Victoria		34·9	334	6 44	−11	12 10	−17	7 44	PP	14·8
Bermuda		35·0	60	e 7 2	+ 6	e 12 30	+ 2	e 8 22	PP	e 14·7
Shawinigan Falls		36·0	34	7 6	+ 1	12 42	− 2	8 29	PP	15·8
Seven Falls		37·3	34	7 15	− 1	12 59	− 5	8 45	PP	17·8
Fort de France		38·1	90	e 7 26	+ 4	13 23	+ 7	—	—	—
Huancayo		39·6	138	i 7 39	+ 4	i 13 58	+20	i 8 3	pP	e 17·3
Halifax		40·2	42	—	—	—	—	e 17 20	SSS	21·8
Sitka		46·4	335	i 8 22	− 8	e 15 4	−14	e 10 15	PP	e 19·0
La Paz		47·5	135	i 8 46	+ 8	15 50	+16	10 24	PP	23·1
College		55·6	338	e 9 43	+ 3	e 17 12	−13	e 13 3	PPP	e 22·0
Ivigtut		56·0	28	9 38	− 5	17 26	− 4	12 56	PPP	32·8
La Plata	E.	67·1	143	10 54	− 3	19 43	− 8	23 44	SS	34·2
	N.	67·1	143	10 53	− 4	20 7	+16	23 56	SS	41·0
	Z.	67·1	143	10 52	− 5	—	—	—	—	—
Scoresby Sund		68·7	21	—	—	20 10	0	—	—	33·8
Aberdeen	E.	79·0	34	i 12 7	0	i 22 0	− 6	—	—	e 33·7
Lisbon		79·7	53	12 11	0	22 12	− 1	12 28	pP	—
Durham		80·0	36	i 12 8	− 5	i 22 13	− 4	15 2	PP	—
Jersey		81·5	41	e 12 49	+28	e 22 30	− 2	—	—	—
Bergen		81·5	29	e 12 20	− 1	e 22 18	−14	—	—	—
Kew		81·8	38	i 12 20a	− 2	e 22 31?	− 4	e 12 43?	pP	e 42·2
Malaga	Z.	83·9	54	i 12 34a	+ 1	i 22 54	− 2	i 12 52k	pP	39·4
Granada		84·3	53	i 12 35	0	i 22 52	− 8	13 23	pP	i 44·5
Paris		84·4	40	i 12 34a	− 2	e 22 53	− 8	i 24 6	PPS	e 40·8
De Bilt		84·7	37	i 12 37a	0	i 22 56	− 8	i 13 7	pP	e 37·8
Uccle		84·8	39	e 12 37a	0	e 22 56	− 9	e 15 44	PP	e 36·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Almeria		85·3	53	i 12 43	+ 3	i 22 58	[− 5]	13 38		pP	49·8
Clermont-Ferrand		86·0	43	i 12 43	0	i 23 19	+ 2	e 23 5		SKS	41·8
Tortosa	N.	86·1	48	i 12 45	+ 1	i 23 17	− 1	e 23 4		SKS	e 36·8
Alicante		86·3	51	i 12 6	−39	23 10	−10	12 26		pP	39·7
Copenhagen		87·0	31	—	—	i 23 26	− 1	23 5		SKS	39·8
Barcelona		87·0	47	e 12 48	0	i 23 24	− 3	—		—	—
Upsala		87·2	27	—	—	i 23 9	[− 6]	e 35 50?		Q	e 40·8
Besançon		87·2	41	e 12 46	− 3	e 23 25	− 3	—		—	e 45·8
Strasbourg		87·7	39	i 12 50	− 2	i 23 33	0	i 13 9		pP	41·8
Neuchatel		87·9	41	e 12 45	− 8	e 23 15	[− 5]	—		—	—
Basle		88·1	40	e 12 52	− 2	e 24 11	+34	—		—	—
Stuttgart		88·5	39	i 12 54a	− 2	i 23 40	− 1	i 23 20		SKS	e 41·8
Jena	E.	88·8	37	12 55	− 2	—	—	—		—	—
Zürich		88·8	40	e 12 54a	− 3	e 23 43	− 1	e 14 2		pP	—
Potsdam		88·9	34	—	—	i 23 47	+ 3	—		—	e 42·8
Chur		89·6	40	i 13 0	− 1	—	—	—		—	—
Helsinki		90·0	24	—	—	i 23 50	− 4	i 23 27		SKS	—
Antarctica		90·2	169	i 13 2	− 2	i 23 28	[− 6]	e 16 50		PP	—
Prague		90·8	35	—	—	i 23 33	[− 5]	e 25 5		PS	e 40·8
Florence		92·1	42	i 13 11	− 1	i 23 36	[− 9]	—		—	—
Triest		92·7	39	i 13 14a	− 1	i 24 21	+ 3	i 23 46		SKS	—
Rome		93·8	43	e 13 17a	− 3	e 24 25	− 3	i 23 49		SKS	e 39·8
Zagreb		94·0	38	e 13 20	− 1	e 23 52	[− 4]	—		—	—
Arapuni		96·5	232	—	—	25 50?	+59	—		—	45·8
Belgrade		97·1	37	e 13 34a	− 1	e 24 9	[− 3]	e 25 8		S	e 37·8
Moscow		97·8	22	—	—	24 8	[− 8]	—		—	—
Wellington		98·2	229	—	—	i 24 40	{− 1}	25 0		S	44·8
Vladivostok		101·7	322	e 13 48	− 8	24 24	[−11]	i 32 32		SS	—
Sverdlovsk		103·1	10	e 13 54	− 8	i 24 34	[− 8]	27 18		PS	—
Istanbul		104·4	36	e 15 2	+54	—	—	i 28 35		SKSP	—
Irkutsk		105·9	344	e 14 10	− 5	24 47	[− 8]	e 18 32		PP	—
Leninakan		112·2	28	e 19 16	PP	25 20	[− 1]	—		—	—
Helwan		113·1	44	e 18 56	[+17]	e 25 20	[− 5]	e 29 8		PS	—
Ksara		113·3	38	e 14 48	P	29 12	PS	19 30		PP	—
Riverview		115·0	241	—	—	—	—	e 34 56		SS	e 52·9
Baku		115·1	24	—	—	25 34	[+ 2]	—		—	—
New Delhi	N.	132·9	2	e 21 33	PP	i 26 20	[− 7]	i 41 18		SS	e 68·1
Calcutta	E.	138·0	347	e 23 9	PP	—	—	—		—	—
Hyderabad	N.	144·0	1	e 19 31	[− 6]	29 32	{−12}	34 46		?	44·9
Colombo	E.	155·4	0	20 9	[+14]	—	—	—		—	76·2

Additional readings :—
Tucson i =4m.28s. and 4m.48s., iP$_c$P =8m.10s.
Boulder City iPP =5m.14s., i =5m.44s.
Riverside iZ =5m.22s., 9m.8s., and 9m.21s.
Pasadena isPNZ =5m.16s., iN =7m.21s., iSNZ =8m.36s., ipP$_c$P? =8m.52s., iZ = 9m.10s.
Tinemaha iZ =5m.32s., ipP$_c$P?Z =8m.56s., iZ =12m.29s.
Chicago i =5m.59s., 6m.30s., and 7m.0s., eS =9m.40s., isS? =10m.5s.
Berkeley iSE =10m.4s.
Cleveland iZ =5m.55s., and 6m.23s., iPPNZ =6m.30s., iPPZ =6m.35s., iZ =6m.40s., and 6m.52s., ipPPEN =6m.57s., iE =11m.0s., iN =11m.8s., isSE =11m.16s., iSSE =11m.46s., isSSN =12m.26s.
Bozeman esP =6m.18s., esS =11m.0s.
New Kensington ePP =7m.26s.
Shasta Dam esP =6m.33s., iP$_c$P =9m.6s., eS$_c$S =12m.41s.
Georgetown e =9m.55s. and 16m.44s.
Butte iPP =6m.56s., esS =11m.10s.
Pennsylvania iPPN =7m.16s., esSE =11m.57s.
Bogota iPPPZ =7m.28s.
Ferndale eE =11m.44s.
Philadelphia iPP =7m.7s.
Grand Coulee esPP =7m.51s., i =9m.18s., isS =12m.56s.
San Juan e =9m.42s.
Ottawa PPP =8m.2s.
Kirkland Lake SS =14m.36s.
Harvard i =7m.54s., iPP =8m.9s., e =14m.54s. and 23m.14s.
Weston e =8m.19s.
Bermuda esS? =13m.14s., iS$_c$P? =17m.20s.

Continued on next page.

Seven Falls SS =15m.10s.
Huancayo iPP =9m.34s., isPP =9m.50s., eSS =16m.58s.
La Paz P_cPN =10m.10s., S_cSN =18m.34s.
Ivigtut 17m.54s. and 19m.26s.
La Plata E. =11m.13s., P_cP =11m.29s., 12m.10s., 12m.38s., and 13m.26s., PP = 14m.8s., PPP =15m.6s., P_cS? =16m.31s., SSS =27m.11s., Q =30·7m.
La Plata N. =11m.16s., P_cP =11m.36s., 12m.2s., PP =14m.20s., Q =31·8m.
La Plata Z. =11m.17s.
Durham iEN =22m.21s., SSEN =27m.5s., iE =28m.12s.
Kew iPcPE =12m.28s.?, epPcPZ =12m.50s., isPZ =12m.55s., ePPE =15m.44s.?, epPPZ =15m.59s., ePPP?Z =17m.27s., eSPEZ =23m.26s., iPSE =23m.37s., eSSPE =24m.0s., eQ =36·8m.
Malaga PPZ =16m.0s., PPPZ =17m.44s.
Granada iPP =16m.8s., pPP =16m.45s., PPP =17m.46s., sS =23m.34s., PPS =24m.33s., iSS =28m.37s., sSS =30m.8s., SSS =32m.27s.
Paris iS =22m.50s.
De Bilt iS_cS =23m.12s., isS =23m.41s., eSS =28m.26s.
Uccle eSSEN =27m.38s.
Almeria PP =16m.6s., PPP =18m.6s., SKS =22m.52s., PS =24m.10s., SS =28m.54s.
Clermont-Ferrand iPP =16m.2s., eSS =29m.2s.
Tortosa P_cP?N =12m.56s., iE =13m.23s., iN =13m.46s., PSN =24m.4s.
Alicante P_cP =12m.12s., PP =15m.26s., PPP =17m.14s., iS =22m.30s., PS =23m.26s., PPS =23m.48s., SS =28m.0s.
Strasbourg eP =12m.54s., ePP =16m.6s. and 16m.15s., ePPP =18m.12s. and 18m.26s. iSKS =23m.15s., e =25m.40s., eSS =29m.30s., eSSS =33m.24s.
Stuttgart e =13m.12s., ePP =16m.20s., ePS =24m.48s., ePPS =25m.15s., eSSS = 33m.50s., eQ =37m.50s.
Helsinki ePS =25m.6s., e =48m.50s. and 53m.7s.
Prague eSKKS =24m.5s.
Rome ePP?Z =17m.3s., ePPP?Z =18m.31s., eN =23m.39s., ePSE =25m.25s., eSSN = 30m.57s.
Belgrade e =15m.41s., ePP? =17m.7s.
Wellington S =25m.32s., SS =31m.45s.
Vladivostok iSKKS =25m.2s., iPPS =27m.50s.
Irkutsk PS =27m.50s., eSS =32m.56s.
Helwan iZ =19m.25s., eZ =19m.56s., eEN =26m.26s.
Ksara pPP =19m.50s., PPS =30m.14s.
New Delhi iN =22m.38s. and 28m.30s., eN =46m.0s.
Hyderabad iPN =19m.47s., PSN =30m.4s.
Long waves were also recorded at Cheb.

Oct. 3d. Readings also at 2h. (near San Juan), 4h. (Ksara), 5h. (Boulder City, Mount Wilson, Palomar, Pierce Ferry, Riverside, Shasta Dam, Tinemaha, Tucson, and Riverview), 9h. (Mount Wilson, Pierce Ferry, Shasta Dam, Tinemaha, Tucson, Antarctica), 10h. (Stuttgart), 13h. (near Lick), 14h. (near Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 15h. (Ashkabad, Basle, Zürich, and near Ottawa), 18h. (Edinburgh (2) and near Lick), 22h. (Temiskaming and near Ottawa).

Oct. 4d. 15h. Widely but not accurately recorded shock in South Pacific.

Auckland P =32m.45s.?, S? =34m.25s., L =35m.0s.
Wellington P =34m.17s., S =36m.30s., L =37m.
Tuai e =35m.28s.
Riverview eZ =36m.39s., iE =37m.24s., 41m.27s., and 42m.6s., eLN =44·2m.
Mount Wilson ePZ =43m.13s.
Pasadena ePZ =43m.15s., eLZ =71·3m.
Palomar ePNZ =43m.15s.
Riverside ePZ =43m.15s.
Haiwee ePZ =43m.21s.
Tinemaha eP =43m.24s.
Boulder City eP =43m.31s.
Tucson eP =43m.32s., i =43m.43s., ePP? =44m.23s., e =47m.5s., eS? =51m.38s., eL =71m.20s.
Pierce Ferry iP =43m.35s.
Rome ePKPZ =47m.45s., ePP =52m.37s., eSKS?N =53m.57s., ePPP?Z =56m.9s., eSKKS?E =59m.27s., eZ =61m.11s., eSSN =73m.22s.
Ksara ePKP =50m.42s., PP =54m.26s., PSKS =64m.48s.
Helwan eZ =50m.49s., iZ =51m.6s., eZ =52m.10s and 53m.18s.
Stuttgart eZ =50m.53s., e =75m.12s., eR? =119m.
Paris ePKP =51m., ePP? =56m., eL =117m.
De Bilt eZ =51m.12s., and 55m.12s., eL =116m.
Berkeley iE =53m.44s., iN =53m.47s., eEN =71m.36s.
Bombay eEN =56m.6s.
Ottawa eE =60m.30s. and 67m.6s., e =82m., L =97m.
Long waves were also recorded at Arapuni, Apia, La Paz, Bermuda, Philadelphia, Harvard, and other European stations.

Oct. 4d. Readings also at 0h. (Antarctica, Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 4h. (near Lick), 8h. (Auckland, Arapuni, Wellington, Apia, Riverview, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 9h. (near Zürich and Chur), 10h. (Malaga, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Grand Coulee), 11h. (near Lick), 15h. (Kew), 18h. (Pierce Ferry), 21h. (La Paz).

Oct. 5d. 6h. 24m. 10s. Epicentre 48°·5N. 155°·2E. (as on 1938, May 30d.).

Suggested deep.

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	13·8	232	—	—	e 6 12	+18	—	—	—
Vladivostok		17·1	260	e 4 12	+10	e 7 30	+18	—	—	—
Grand Coulee		54·2	56	e 9 25	− 4	—	—	—	—	—
Shasta Dam		56·5	64	e 9 47	+ 1	—	—	e 10 47	pP	—
Tinemaha	z.	61·3	66	e 10 33	+13	—	—	—	—	—
Haiwee	z.	62·1	66	e 10 26	+ 1	—	—	—	—	—
Mount Wilson	z.	63·3	68	i 10 33	0	—	—	e 10 45	pP	—
Pasadena	z.	63·3	68	e 10 33	0	—	—	i 10 48	pP	—
Riverside	z.	63·9	68	i 10 37	0	—	—	i 10 51	pP	—
Boulder City		64·1	64	i 10 39	+ 1	—	—	i 10 54	pP	—
Pierce Ferry		64·5	64	e 10 42	+ 1	—	—	i 10 56	pP	—
Palomar	z.	64·6	68	i 10 42	+ 1	—	—	e 10 53	pP	—
Tucson		69·1	65	i 11 10	0	—	—	e 11 22	pP	—
Stuttgart		78·7	339	e 12 6	0	—	—	—	—	e 40·8
Paris		80·2	343	i 12 15a	+ 1	—	—	—	—	—
Ksara		81·8	314	e 12 34	+12	e 19 18	?	—	—	—

Additional readings :—
Mount Wilson iZ = 10m.48s.
Pasadena eZ = 11m.4s.
Palomar eZ = 10m.48s.
Tucson i = 11m.25s.
Long waves were also recorded at Bombay and Rome.

Oct. 5d. 18h. 40m. 48s. Epicentre 4°·3S. 134°·3E. (as on 1942, Jan. 27d.).

$A = -·6965$, $B = +·7137$, $C = -·0745$; $\delta = +3$; $h = +7$;
$D = +·716$, $E = +·698$; $G = +·052$, $H = -·053$, $K = -·997$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Perth		32·5	209	i 6 37	+ 3	i 11 52	+ 3	i 14 4	SS	i 16·0
Riverview		33·3	154	i 6 40k	− 1	e 11 50	−12	—	—	e 15·7
Hukuoka		37·9	355	e 7 16	− 4	13 18	+ 5	—	—	i 16·1
Nagoya		39·3	6	e 7 52	+20	—	—	—	—	e 16·4
Tokyo		40·1	8	e 7 55	+16	13 43	− 3	—	—	e 19·8
Mizusawa	E.	43·7	8	8 11	+ 3	13 41	−58	—	—	—
	N.	43·7	8	8 17	+ 9	13 33	−66	—	—	—
Vladivostok		47·3	358	e 8 32	− 5	—	—	—	—	—
Auckland		49·3	137	8 52	− 1	15 52	− 7	14 12	PeS	22·2
Kaimata		50·4	144	—	—	e 16 0	−14	—	—	25·4
Arapuni		50·5	138	—	—	17 42?	?	21 54	SS	25·2
Wellington		51·6	141	9 3	− 7	16 12	−19	14 23	PeS	24·5
Calcutta	E.	52·2	303	e 9 13	− 2	i 16 41	+ 2	i 21 1	SS	28·5
Apia		54·0	104	—	—	e 19 32	?	—	—	—
Colombo	E.	55·5	281	9 38	− 1	17 21?	− 3	(20 16)	SS	20·3
Kodaikanal	E.	58·4	285	i 10 0	0	i 18 2	0	12 4	PP	28·4
Hyderabad	N.	59·2	294	e 9 59	− 6	18 3	− 9	12 7	PP	29·4
Irkutsk		60·9	340	e 10 30	+13	e 18 47	+13	—	—	—
New Delhi	N.	63·8	305	e 10 36	0	i 19 19	+ 8	—	—	—
Bombay		64·7	293	e 10 42	0	e 19 24	+ 2	23 58	SS	29·9

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Honolulu		71·1	67	—	—	e 20 36	− 2	e 21 35	ScS - e	27·6
Obi-garm		73·2	313	e 11 36	+ 1	e 21 7	+ 5	—	—	—
Stalinabad		73·9	313	i 11 36	− 3	i 21 9	− 1	—	—	—
Tashkent		74·4	315	e 11 38	− 4	e 21 15	− 1	—	—	—
Samarkand		75·6	313	e 11 49	+ 1	—	—	—	—	—
Ashkabad		81·6	308	e 12 19	− 2	—	—	—	—	—
Sverdlovsk		84·7	328	i 12 34	− 3	23 0	− 4	—	—	—
Baku		88·5	311	e 13 3	+ 7	e 23 50	+ 9	—	—	—
College		88·7	25	—	—	e 23 30	[+ 5]	e 24 46	PS	e 37·8
Erevan		92·6	310	—	—	e 24 19	+ 1	—	—	—
Leninakan		93·2	311	e 13 37	+20	24 25	+ 2	e 17 25	PP	—
Sitka		93·8	33	—	—	e 23 52	[− 2]	e 25 28	PS	e 35·9
Moscow		97·3	325	—	—	e 24 27	[+14]	—	—	—
Ksara		99·4	303	e 13 52	+ 6	—	—	27 28	PPS	—
Victoria		101·3	42	—	—	e 25 25	− 6	e 26 51	PS	44·2
Ukiah		102·4	51	—	—	e 24 29	[−10]	e 27 11	PS	e 43·4
Shasta Dam		102·9	49	e 13 58	− 3	—	—	e 27 53	PPS	e 50·6
Berkeley		103·2	53	e 18 9	PP	i 24 32	[−10]	i 32 56	SS	e 43·4
Helsinki		103·3	331	—	—	e 24 47	[+ 4]	e 27 56	PS	e 46·2
Helwan		103·4	299	e 14 9	+ 5	e 25 44	− 5	e 18 4	PP	—
Istanbul		104·3	311	e 18 10	PP	e 28 48	PPS	—	—	—
Antarctica		106·1	172	e 18 32	PP	e 27 42	PS	e 33 54	SS	e 49·2
Upsala		106·9	331	—	—	e 28 28	PS	e 33 59	SS	e 44·2
Pasadena		106·9	56	e 14 14	P	e 33 36	SS	i 37 13	SSS	e 42·7
Mount Wilson	Z.	107·0	56	e 14 16	P	—	—	—	—	—
Warsaw		107·5	323	e 22 28	PKS	e 25 20	[+18]	e 34 29	SS	e 39·2
Riverside	Z.	107·6	56	e 14 15	P	—	—	—	—	—
Boulder City		109·4	53	e 14 22	P	e 29 22	PPS	e 18 32	PKP	—
Belgrade		109·8	316	e 18 57	[+25]	e 25 25	[+14]	e 40 25	Q	60·1
Pierce Ferry		110·0	53	e 14 33	P	e 29 15	PPS	e 18 34	PKP	—
Bozeman		110·2	43	—	—	e 25 13	[0]	e 29 41	PPS	e 46·6
Saskatoon		110·9	35	—	—	25 22	[+ 6]	28 33	PS	49·2
Copenhagen		111·1	328	—	—	25 34	[+17]	28 56	PS	51·2
Bergen	N.	112·1	336	—	—	e 31 28	PPS	e 38 24	SSS	e 46·7
Scoresby Sund		112·1	352	—	—	29 33	PS	—	—	—
Prague		112·2	322	e 19 24	PP	e 25 36	[+15]	e 35 12	SS	e 53·2
Zagreb		112·6	318	e 19 25	PP	—	—	—	—	e 57·2
Tucson		113·3	57	e 18 38	[− 2]	e 28 40	PS	e 19 19	PP	—
Cheb		113·4	322	—	—	e 25 29	[+ 3]	—	—	e 57·2
Triest		114·1	318	e 19 21	PP	e 26 40	{+ 6}	i 29 28	PS	—
Stuttgart		115·8	323	e 18 44?	[− 1]	e 25 47	[+12]	e 19 57	PP	e 55·2
Rome		116·2	315	e 19 50	PP	e 26 41	{− 7}	i 36 8	SS	e 55·1
Florence		116·4	317	i 20 21	PP	—	—	—	—	—
De Bilt		116·5	327	e 20 5	PP	e 25 52	[+14]	e 29 39	PS	e 52·2
Strasbourg		116·7	323	e 20 1	PP	e 27 46	?	e 22 40	PPP	e 57·2
Zürich		116·8	321	e 19 23	[+36]	—	—	e 20 41	PP	—
Aberdeen	E.	117·1	335	i 20 10	PP	i 25 44	[+ 4]	e 35 58	SS	53·3
Basle		117·3	322	e 28 20	?	e 30 47	PPS	e 44 52	?	—
Uccle		117·6	326	e 19 54	PP	e 29 48	PS	e 36 30	SS	e 53·2
Durham		118·4	332	e 20 39	PP	e 26 5	[+21]	—	—	—
Kew		119·7	328	e 20 16?	PP	—	—	—	—	e 59·2
Paris		119·7	324	18 52	[0]	e 30 25	PS	i 20 17	PP	e 60·2
Clermont-Ferrand		120·9	321	e 18 50	[− 4]	e 30 27	PS	e 20 22	PP	62·2
Jersey		122·0	328	e 20 57	PP	e 31 12	PS	—	—	55·2
Barcelona		123·5	319	—	—	e 30 15	PS	—	—	e 61·5
Tortosa	N.	124·9	318	19 48	[+46]	26 27	[+21]	i 20 58	PP	e 51·2
Alicante		126·8	316	19 20	[+14]	26 11	[0]	21 36	PP	e 60·9
St. Louis		127·1	45	e 19 7	[+ 1]	e 26 15	[+ 3]	e 20 56	PP	—
Chicago		127·2	39	—	—	e 27 48	{−13}	e 30 46	PS	e 46·8
Almeria		128·9	315	i 21 19	PP	28 23	{+11}	23 51	PPP	61·2
Granada		129·5	316	21 36k	PP	28 36	{+19}	23 12	PPP	66·7
Malaga	Z.	130·3	316	e 21 28	PP	i 28 27	{+ 5}	—	—	66·2
Cleveland		131·0	35	e 19 20	[+ 6]	e 22 55	PKS	e 21 30	PP	—
Ottawa		131·4	28	19 14	[− 1]	28 22	{− 6}	22 42	PKS	57·2
Seven Falls		132·1	22	20 18	PP	28 36	{+ 3}	22 46	PKS	58·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
New Kensington		132·7	35	e 22 46	PKS	e 26 32	[+ 5]	e 38 47	SS		e 68·3
Georgetown		135·3	34	e 19 29	[+ 7]	e 26 2	[−29]	e 22 52	PKS		60·0
Harvard		135·5	26	i 19 21	[−1]	e 35 37	PPPS	e 22 53	PKS		e 65·2
Philadelphia		135·6	32	e 22 28	PS	e 39 49	SS	e 40 49	P'P'		e 55·4
Fordham		135·7	30	e 19 29	[+ 6]	i 23 10	PKS	e 22 8	PP		68·2
Weston		135·7	26	e 19 27	[+ 4]	e 22 54	PKS	e 41 14	SSP		—
La Plata	E.	139·3	165	28 18	?	29 18	{+ 1}	40 42	SS		71·8
	N.	139·3	165	23 0	PP	27 0	[+22]	44 42	SSS		71·0
Balboa Heights		146·1	80	e 19 41	[0]	—	—	—	—		—
Huancayo		146·4	119	e 19 43	[+ 1]	—	—	—	—		e 69·3
Bermuda		146·9	30	e 19 54	[+12]	e 26 45	[− 5]	e 42 45	SSP		e 63·4
La Paz		149·7	135	19 54	[+ 7]	27 4	[+11]	i 23 32	PP		71·5
Bogota	Z.	151·7	87	i 19 53	[+ 3]	—	—	—	—		—
San Juan		155·6	53	e 20 6	[+11]	e 30 44	{− 5}	e 44 12	SSP		e 62·2
Fort de France		161·6	55	e 20 17	[+15]	—	—	—	—		—

Additional readings :—
Auckland i =17m.27s., SS? =18m.12s., i =19m.27s. and 19m.58s.
Wellington i =18m.30s., SS =21m.36s., Q =23m.20s.
Calcutta iSSSE =23m.1s.
Kodaikanal SSE =21m.46s.
Hyderabad PSN =18m.9s., SSN =22m.25s.
Bombay SSE =24m.2s.
College eSKS? =22m.47s., eSSS =33m.1s.
Sitka e =23m.55s., i =25m.48s., iSS? =30m.28s.
Victoria eN =30m.31s.
Ukiah ePSPS =32m.33s.
Berkeley ePE =18m.18s., iSE =26m.50s., iSN =26m.54s., eZ =27m.11s.
Helsinki ePKKP =30m.36s., ePKKS =34m.32s., eSKKS =37m.32s., e =43m.31s.
Helwan iZ =18m.27s., eN =26m.32s. and 27m.28s.
Upsala eE =32m.59s., eSSE =35m.42s., eSSSN =39m.50s.
Warsaw eE =22m.48s. and 29m.47s.
Bozeman e =34m.33s., eSSS =37m.43s.
Saskatoon SS =34m.52s.
Copenhagen 26m.38s., SS =36m.0s., SSS =38m.12s.
Prague eSKKS =26m.36s., ePPS =30m.48s., eSSS =40m.12s.
Tucson e =20m.22s., ePPP =21m.19s., eSKS? =22m.54s., ePPS =29m.42s.
Triest eSS =35m.59s.
Stuttgart ePPP =22m.32s., e =29m.29s., and 30m.46s., ePPS =31m.22s., eSS =36m.6s., eSSS =41m.24s., e =44m.0s. and 48m.32s.
Rome eZ =20m.16s., eSKKSN =27m.49s., eS =28m.50s., eSSN =36m.54s., eSSSN =41m.41s., iE =44m.56s.
De Bilt eSS =36m.13s.
Strasbourg ePS =29m.42s., eSSS =40m.47s.
Aberdeen iE =29m.50s.
Paris ePP =20m.38s., eSS =36m.52s., eQ =54·2m.
Clermont-Ferrand eSS =36m.57s.
Tortosa PPPN =23m.44s., SKKSN =27m.55s., PSN =31m.6s., SSN =37m.13s., SSSN =42m.46s.
Alicante PKS =22m.48s., PS =31m.46s., SSP =38m.44s.
St. Louis eSKKS =28m.0s., eS? =29m.19s., e =30m.11s., ePS =31m.11s., iPPS? =33m.4s., iSS =38m.15s.
Chicago ePPS =32m.34s.
Almeria PKS =24m.50s., PPP =26m.39s., SKKS =30m.37s., PPS =35m.47s., SS =41m.37s.
Granada PPP =26m.12s., SKKS =30m.19s., S =32m.6s., PS =33m.50s., PPS =36m.12s.
Malaga iPKP$_2$Z =21m.51s., ePP?Z =25m.19s., ePPPZ =28m.47s.
Cleveland eZ =21m.55s., eEN =23m.10s. and 23m.16s., ePSEN =31m.32s.
Ottawa PPP =24m.18s., PPS =33m.30s., SS =38m.18s., SSS =44m.48s.
Seven Falls SS =38m.6s.
New Kensington e =33m.47s.
Georgetown e =22m.32s.
Philadelphia e =23m.0s., 29m.25s., and 34m.38s., eSSS? =45m.26s.
Fordham ePPPP =28m.26s.
Weston e =49m.42s.
La Plata E. SKSP? =33m.0s., 44m.54s., SSS =46m.53s., 50m.18s., 53m.36s., and 58m.18s., Q =62m.27s.
La Plata N. 31m.24s., SKSP =32m.54s., PPS =34m.48s., 38m.7s., 52m.36s., 54m.42s., Q =63m.6s.
Bermuda eS =28m.47s., e =35m.39s., eSSS? =55m.29s.
La Paz SKKS =30m.34s., PSKS =33m.46s., PPS =36m.52s.
San Juan ePKS =24m.18s., e =24m.51s.
Long waves were also recorded at Tuai, New Plymouth, Christchurch, and other American and European stations.

Oct. 5d. Readings also at 4h. (near Berkeley), 5h. (Antarctica, Helwan, Ksara, Branner, Shasta Dam, near Berkeley, Fresno, Lick, and San Francisco), 6h. (La Paz, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Almata, Samarkand, and near Obi-garm), 7h. (near Obi-garm), 9h. (La Paz and La Plata), 12h. (Riverview, Almata, Samarkand, Tashkent, near Obi-garm and Stalinabad), 13h. (Tashkent, near Samarkand, Stalinabad, and Obi-garm), 15h. (Grand Coulee), 17h. (Mizusawa), 19h. (Stuttgart, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, and near Ottawa), 20h. (Potsdam), 22h. (near Balboa Heights), 23h. (La Paz, near Balboa Heights, near Lick, Ashkabad, near Obi-garm, Samarkand, and Stalinabad).

Oct. 6d. 15h. 18m. 14s. Epicentre 33°·3N. 58°·7E. (as on 1947, Sept. 27d.).

A = +·4351, B = +·7156, C = +·5464 ; δ = −5 ; h = +1 ;
D = +·854, E = −·520 ; G = +·284, H = +·467, K = −·838.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ashkabad		4·7	357	e 1 13	− 1	2 6	− 4	—	—	—
Samarkand		9·2	44	2 15	− 1	—	—	—	—	—
Stalinabad		9·7	54	i 2 22	0	—	—	—	—	—
Baku		10·0	318	e 2 43	PPP	—	—	—	—	—
Obi-garm		10·4	56	i 2 32	− 2	—	—	—	—	—
Tashkent		11·6	43	e 2 43	− 7	e 4 54	− 7	—	—	—
Tchimkent		12·4	41	e 2 57	− 4	e 5 20	− 1	—	—	—
Erevan		13·3	305	3 42?	+29	—	—	—	—	—
Leninakan		14·0	307	e 3 25	+ 3	—	—	—	—	—
New Delhi	N.	16·5	101	—	—	e 7 17	SS	—	—	9·1
Almata		17·4	50	4 8	+ 2	—	—	—	—	—
Ksara		19·0	276	i 4 29	+ 3	e 8 12	+17	—	—	—
Bombay		19·1	134	e 4 32	+ 5	e 8 27	SS	—	—	e 9·9
Helwan	Z.	23·5	268	5 17	+ 5	9 46	+23	6 13	PPP	—
Sverdlovsk		23·6	3	5 15	+ 2	9 26	+ 1	—	—	—
Hyderabad	N.	23·8	126	e 5 16	+ 1	9 39	+11	—	—	—
Istanbul		24·8	297	5 37	+12	10 10	+24	—	—	—
Moscow		26·8	335	e 6 8	+24	—	—	—	—	—
Calcutta	E.	28·2	103	—	—	e 11 32	+51	i 16 37	S_cS	—
Kodaikanal	E.	28·7	138	e 6 44	PP	—	—	—	—	—
Colombo	E.	32·8	138	e 11 6	?	—	—	—	—	18·6
Warsaw		33·0	316	12 30	S	(12 30)	+33	—	—	e 22·8
Triest		36·4	304	e 8 22	PP	e 15 28	SSS	—	—	—
Prague		36·5	311	—	—	e 16 1	SSS	—	—	e 21·8
Rome		37·2	297	e 7 24	+ 9	e 13 0	− 2	e 8 26	PP	e 17·7
Stuttgart		39·7	307	e 7 35	− 1	e 16 46	SSS	e 9 9	PP	e 22·8
Strasbourg		40·6	308	e 7 44	+ 1	e 16 52	SS	—	—	e 23·2
De Bilt		42·5	313	—	—	e 17 56	SSS	—	—	e 22·8
Clermont-Ferrand		43·8	303	e 8 10	+ 1	e 18 4	SS	—	—	27·3
Paris		44·1	308	i 8 12	0	e 17 46?	SS	—	—	e 27·8
Tortosa	N.	46·3	297	—	—	e 15 19	+ 3	16 54	?	e 25·8
Malaga	Z.	51·0	294	e 9 7	+ 1	e 16 52	+30	—	—	e 28·8

Additional readings and note :—
Warsaw P_cPE = 13m.16s., eE = 15m.19s., 15m.42s., and 15m.48s., eN = 16m.4s., SE = 16m.40s., P_cSE = 17m.15s., eE = 18m.22s., SSE = 19m.24s., SSSN = 20m.7s., S_cS = 21m.29s. Readings wrongly identified.
Rome eSSE = 15m.10s.
Strasbourg eSS = 16m.59s., e = 19m.8s., 21m.18s., and 21m.28s.
Long waves were also recorded at Dehra Dun and at other European stations,

Oct. 6d. 18h. California.

Lick iP$_g$EN =49m.16s., iS$_g$EN =49m.29s.
Fresno iPN =49m.20s., iSN =49m.36s.
Berkeley iPNZ =49m.26s., iPZ =49m.29s., eE =49m.37s., iZ =49m.52s.
San Francisco iN =49m.30s., iSN =49m.50s.
Fort de France e =51m.39s.
Philadelphia eP? =52m.8s., eS =56m.25s., eL =59m.8s.
Tucson eP =52m.52s., i =52m.57s., e =53m.7s., and 55m.46s., eS? =56m.31s., eL = 59m.46s.
Ottawa eZ =53m.10s., L =61m.
Temiskaming e =53m.17s.
Kirkland Lake e =53m.24s.
Pierce Ferry eP? =53m.32s.
Boulder City eP =53m.36s.
Palomar iPZ =53m.40s.
Riverside ePZ =53m.45s., eZ =53m.49s., iZ =53m.58s.
Pasadena ePZ =53m.54s.
Shasta Dam eP? =54m.36s.
Paris e =58m.46s.
Long waves were also recorded at Harvard.

Oct. 6d. 19h. 55m. 34s. Epicentre 36°·9N. 22°·0E.

Intensity VIII-IX at Corone, Militsa, Pyla, Panyperi, etc.; VII-VIII at Loga and Dara; VI-VII at Methoni, Kalamata, and Pylos. Destructive in the south of the Peloponees with 4888 houses destroyed, 3 dead, and 20 injured. Macroseismic area (elliptical) greater than 160,000 sq. km. Epicentre as adopted. Depth 28km.

A. G. Galanopoulos:
The Karone (Messinia) earthquake of October 6th, 1947. Bulletin of the Seismological Society of America, Vol. 39, 1949, pp. 33-39, macroseismic charts, pp. 35 and 38.

$A = +\cdot7432$, $B = +\cdot3003$, $C = +\cdot5978$; $\delta = -11$; $h = -1$;
$D = +\cdot375$, $E. -\cdot927$; $G = +\cdot554$, $H = +\cdot224$, $K = -\cdot802$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		6·9	50	1 59	P*	3 50	sSS	—	—	—
Belgrade		8·0	353	i 1 57	− 3	i 2 30	P_g	i 4 27	sS	—
Rome		8·9	306	e 2 10	− 2	e 3 30	−25	i 2 16	PP	i 4·3
Kalossa	N.	9·9	348	2 33	+ 8	4 31	+11	—	—	5·5
Zagreb		10·0	335	e 2 25	− 2	i 4 27	+ 5	i 4 34	SS	i 5·0
Helwan		10·5	129	2 29	− 6	4 16	−19	2 38	PP	—
Florence	N.	10·7	313	i 2 39	+ 1	i 4 28	−11	—	—	—
Triest		10·7	328	i 2 34a	− 4	i 4 42	+ 3	—	—	i 6·3
Budapest		10·8	350	i 2 38	− 1	4 41	− 1	i 2 47	PP	5·7
Ksara		11·7	101	e 2 49	− 2	4 57	− 7	—	—	—
Yalta		11·9	47	i 3 0	+ 6	—	—	—	—	—
Theodosia		12·9	47	i 3 10	+ 3	i 6 1?	SSS	i 3 24	PPP	—
Chur		13·6	321	e 3 16	− 1	—	—	—	—	e 9·2
Prague		14·3	340	3 24	− 2	e 6 4	− 2	—	—	e 6·9
Zürich		14·4	321	e 3 25a	− 2	e 6 10	+ 1	i 3 44	PPP	—
Cheb		14·9	335	e 3 33	− 1	e 6 32	SS	e 3 47	PP	—
Basle		15·1	319	i 3 36k	0	e 6 33	+ 8	e 4 16	PPP	—
Neuchatel		15·1	317	e 3 33	− 3	—	—	—	—	—
Sotchi		15·1	58	e 3 36	0	e 6 43	SS	—	—	—
Stuttgart		15·1	326	e 3 33	− 3	i 6 17	− 8	i 3 46	PP	i 6·4
Warsaw	z.	15·4	358	e 3 41k	+ 1	6 46	+14	—	—	—
Besançon		15·7	316	e 3 46	+ 2	i 6 52	+13	i 3 53	PP	e 7·9
Strasbourg		15·7	323	e 3 42	− 2	i 6 34	− 5	i 3 53	PP	i 8·5
Collmberg		15·8	339	i 3 53	+ 8	i 6 45	+ 3	—	—	i 8·7
Jena		15·9	335	e 3 46	− 1	e 6 37	− 7	i 3 50	PP	i 7·2
Barcelona		16·1	293	e 3 45	− 4	i 6 49	0	—	—	e 8·0
Clermont-Ferrand		16·7	308	e 3 55	− 2	—	—	i 4 5	PP	8·5
Potsdam		16·7	341	i 4 2	+ 5	i 7 16	+13	i 4 9	PP	e 8·4
Tortosa		17·2	290	i 3 59	− 4	i 7 12	− 2	4 12	PP	8·5
Leninakan		17·3	70	i 4 10	+ 6	—	—	i 4 31	PPP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Piatigorsk		17·5	58	e 4 11	+ 4	7 34	+13	—	—	—
Alicante		17·9	283	i 4 9	− 3	i 7 25	− 5	4 14	pP	e 8·8
Erevan		17·9	72	e 4 18	+ 6	—	—	e 4 33	PPP	—
Paris		18·6	316	i 4 16	− 5	i 7 39	− 7	i 4 24	PP	8·9
Uccle		18·8	323	i 4 22a	− 1	i 7 52	+ 2	i 8 1	SS	e 9·9
Grozny		19·2	63	i 4 33	+ 5	i 8 10	+11	i 4 59	PPP	—
De Bilt		19·3	329	i 4 30a	+ 1	i 8 7	+ 5	i 4 37k	PP	e 9·4
Almeria		19·6	278	i 4 26	− 6	i 8 2	− 6	4 32	pP	12·6
Copenhagen		19·9	344	i 4 32	− 4	i 8 0	−15	i 8 54	SSS	—
Granada		20·4	279	i 4 37a	− 4	i 8 32	+ 7	4 53	pP	11·7
Malaga		21·1	279	i 4 43	− 5	i 8 33	− 6	—	—	—
Kew		21·5	321	i 4 50?	− 2	e 8 46?	− 1	—	—	e 9·4
Moscow		21·6	24	i 4 53	− 1	—	—	—	—	—
Baku		22·0	72	e 5 2	+ 4	—	—	—	—	—
Upsala		23·2	354	i 5 8	− 1	i 9 14	− 4	—	—	e 11·4
Helsinki		23·4	4	i 5 10a	− 1	i 9 20	− 1	i 5 43	PP	e 11·9
Durham		24·1	326	i 5 13	− 5	i 9 42	+ 8	i 5 42	PP	—
Lisbon		24·6	285	5 19	− 4	9 44	+ 2	6 1	PP	14·0
Edinburgh		25·5	327	5 32	0	10 1	+ 4	9 12	PcP	—
Aberdeen	E.	25·6	330	i 5 34	+ 2	i 10 6	+ 7	—	—	14·4
Ashkabad		28·8	78	i 6 2	0	i 10 51	0	—	—	—
Sverdlovsk		32·5	39	i 6 34	0	i 12 12	+23	—	—	—
Samarkand		35·1	72	6 58	+ 1	—	—	—	—	—
Tashkent		36·6	68	e 7 9	− 1	—	—	—	—	—
Stalinabad		36·7	72	i 7 12	+ 2	i 12 58	+ 4	—	—	—
Tchimkent		36·7	66	e 7 12	+ 2	e 12 57	+ 3	—	—	—
Obi-garm		37·4	72	i 7 17	+ 1	—	—	—	—	—
Reykjavik		37·8	331	e 7 30	+10	e 13 20	+ 9	e 8 58	PP	19·0
Scoresby Sund		40·8	339	7 45	0	13 55	− 1	9 29	PP	—
Almata		41·9	63	7 55	+ 1	—	—	—	—	—
Dehra Dun	N.	46·6	80	e 10 32?	PP	e 17 21	+120	—	—	e 23·9
New Delhi	N.	46·6	84	i 8 30k	− 2	i 15 21	0	18 44	SS	22·5
Bombay		47·8	97	i 8 40	− 1	i 15 38	0	i 11 36	PPP	23·1
Ivigtut		49·1	323	8 50	− 1	15 51	− 5	19 56	SS	—
Hyderabad	N.	53·1	95	9 16	− 5	16 44	− 7	11 30	PP	26·0
Kodaikanal	E.	56·4	103	i 9 47	+ 2	i 17 34	− 2	11 47	PP	27·3
Irkutsk		57·5	46	9 51	− 2	17 51	+ 1	—	—	—
Calcutta	E.	58·3	84	e 9 55	− 4	i 18 13	+12	i 12 13	PP	28·7
Colombo	E.	60·4	105	10 15	+ 2	18 28	0	—	—	31·3
Tananarive		60·5	152	e 10 25	+11	e 18 27	− 2	22 43	SS	29·2
Halifax		62·4	307	10 24	− 3	18 46	− 7	25 32	SSS	30·4
Johannesburg		63·0	174	e 10 26	− 5	e 18 56	− 5	e 23 26?	SS	e 30·4
Seven Falls		65·8	312	10 50	+ 1	19 27	− 8	23 44	SS	32·4
Shawinigan Falls		67·3	312	11 1	+ 2	19 51	− 3	27 2	SSS	34·4
Harvard		68·6	307	i 11 5	− 2	i 20 5	− 4	e 27 8	SSS	e 37·4
Vermont		68·6	310	e 11 12	+ 5	e 20 18	+ 9	e 13 40	PP	e 28·8
Bermuda		69·0	296	e 11 20	+11	e 20 10	− 4	e 13 52	PP	e 27·4
Ottawa		69·6	312	11 10	− 3	20 18	− 3	13 46	PP	32·4
Kirkland Lake		70·6	317	11 17	− 2	20 43	+10	21 18	PPS	—
Fordham		70·9	307	i 11 20	− 1	i 20 36	0	i 28 28	SSS	—
Temiskaming		70·9	315	i 11 21	0	—	—	i 11 26	PcP	—
Philadelphia		72·2	306	i 11 24	− 5	i 21 5	+14	e 25 17	SS	e 28·8
Georgetown		74·0	307	i 11 38	− 1	i 21 9	− 2	i 14 38	PP	31·9
New Kensington		74·7	309	e 11 49	+ 6	i 21 21	+ 2	e 15 3	PP	e 35·3
Cleveland		75·3	311	i 11 46k	− 1	i 21 22	− 4	i 11 56	PcP	—
Fort de France		75·9	278	e 11 51	+ 1	e 21 30	− 2	—	—	—
San Juan		77·7	284	e 12 4	+ 4	i 21 52	0	e 14 47	PP	e 32·9
Vladivostok		78·0	45	i 12 1	− 1	i 21 54	− 1	—	—	—
College		78·3	356	e 12 6	+ 3	e 21 59	0	e 15 11	PP	—
Chicago		78·7	315	e 13 7	+61	i 22 57	+54	e 15 52	PP	e 32·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Columbia		79·5	305	e 12 13	+ 3	e 22 8	− 3	e 30 18	SSS	e 30·7
Saskatoon		80·7	331	12 18	+ 2	22 26	+ 2	30 14	SS	38·4
St. Louis		82·3	313	i 11 46	−39	i 21 57	−43	22 43	PS	—
Kagosima		84·6	55	12 40	+ 4	22 58	− 5	—	—	44·6
Sitka		84·6	348	e 12 34	− 2	i 23 2	− 1	e 28 26	SS	e 34·5
Rapid City		85·3	324	e 12 40	0	i 22 48	[−15]	i 12 43	P_cP	e 42·3
Kobe		85·5	49	e 12 46	+ 5	—	—	—	—	e 48·1
Osaka		85·7	49	e 12 44	+ 2	23 19	+ 5	—	—	e 51·7
Mizusawa		85·9	43	12 53	+10	23 5	[− 2]	e 12 57	P_cP	—
Sendai		86·3	44	12 44	− 1	23 9	[0]	—	—	42·5
Shizuoka		87·2	47	12 54	+ 5	23 28	0	—	—	e 46·6
Bozeman		87·5	329	e 12 57	+ 6	e 23 23	[+ 6]	e 13 11	P_cP	e 36·4
Butte		87·9	331	e 12 52	− 1	e 23 36	+ 1	e 28 58	SS	e 38·8
Grand Coulee		88·6	335	e 12 55	− 1	e 23 24	[0]	e 16 54	PP	—
Victoria		89·6	338	12 54	− 7	23 22	[− 8]	29 56	SS	37·4
Seattle		90·0	337	—	—	e 23 21	[−12]	e 34 8	SSS	e 36·8
Logan		91·1	327	i 13 5	− 3	i 24 0	− 4	i 16 48	PP	e 36·4
Salt Lake City		91·9	327	e 13 26	+15	e 24 1	−10	e 17 9	PP	e 37·2
Bogota		92·1	277	e 23 47	SKS	(e 23 47)	[+ 2]	e 24 12	S	—
Shasta Dam		95·2	333	e 13 29	+ 2	e 24 20	{+ 1}	e 17 31	PP	—
Mineral	E.	96·2	333	e 13 55	+24	e 24 26	{− 1}	—	—	e 52·0
Pierce Ferry		96·7	325	i 13 38	+ 5	—	—	i 17 35	PP	—
Boulder City		97·2	326	i 13 40	+ 4	—	—	i 17 36	PP	—
Tinemaha	Z.	97·7	329	i 13 46	+ 8	—	—	—	—	—
Ukiah		97·8	333	—	—	e 24 14	[− 2]	e 26 43	PS	e 39·5
Tucson		98·3	321	e 13 40	− 1	e 24 20	[+ 1]	e 17 23	PP	—
Berkeley		98·6	332	i 13 52	+10	i 24 36	[+16]	i 17 45	PP	e 46·4
Fresno	N.	98·6	330	e 14 0	+18	e 24 11	[− 9]	e 17 41	PP	e 52·8
Lick		98·8	332	e 13 52	+ 9	—	—	e 17 53	PP	e 47·6
Santa Clara		98·9	332	e 17 49	PP	e 25 44	+33	—	—	e 49·1
La Paz		99·8	257	e 13 55	+ 8	i 24 23	[− 3]	i 18 6	PP	48·9
Riverside	Z.	100·0	327	e 13 56	+ 8	—	—	e 30 9	PKKP	—
Mount Wilson	Z.	100·1	327	i 13 52	+ 3	—	—	—	—	—
Pasadena		100·2	327	e 13 51	+ 2	i 24 51	{− 4}	i 17 54	PP	e 41·4
Palomar	Z.	100·3	326	e 13 54	+ 4	—	—	e 30 17	PKKP	—
Santa Barbara	Z.	100·6	328	e 14 2	+11	—	—	—	—	—
La Jolla	Z.	100·8	326	e 13 54	+ 2	—	—	—	—	—
Huancayo		102·9	265	e 18 18	PP	e 24 42	[+ 1]	e 27 32	PS	—
La Plata	E.	103·0	236	18 20	PP	24 31	[−10]	27 26	PS	55·0
	N.	103·0	236	18 20	PP	24 34	[− 7]	27 32	PS	53·4
Perth		111·1	114	—	—	i 26 46	S	i 34 50	SS	—
Santa Lucia		111·1	244	19 26	PP	28 26	PS	—	—	56·4
Antarctica		123·3	207	e 16 13	P	e 25 49	[−12]	19 1	PKP	e 59·4
Riverview		138·8	102	e 19 20	[− 8]	i 29 38	{+24}	e 22 20	PP	e 52·1
Auckland		158·3	98	19 51?	[− 8]	44 13	SS	49 16	SSS	78·4
Wellington		158·4	110	20 1	[+ 2]	30 13	{−51}	24 20	PP	80·9
Arapuni		159·1	102	—	—	44 26?	SS	e 68 26?	Q	80·4

Additional readings :—
Belgrade iP_g =2m.20s., i =2m.44s., iS =3m.10s., i =4m.51s., and 5m.16s.
Rome iN =2m.36s., iE =2m.49s., iN =3m.16s.
Kalossa eN =2m.55s., eE =3m.6s., eN =3m.25s., eE =3m.36s. and 4m.49s., eN = 5m.22s.
Zagreb iP =2m.32s., i =3m.25s., 4m.5s., and 4m.13s., iSP_gP_g =4m.41s., iS_g =4m.51s.
Triest iP_gP_g =3m.27s., iS_gS_g =5m.52s.
Cheb ePPP =3m.58s., eSSS =6m.55s., i =8m.44s., 9m.4s., and 10m.12s.
Warsaw iPZ =3m.44s.a, SN =6m.52s.
Strasbourg iP =3m.48s., iPPP =4m.1s. and 4m.4s., i =4m.46s., 5m.1s., and 5m.45s., iS =6m.31s., iSS =6m.44s. and 6m.48s., iSSS =6m.57s., i =7m.4s. and 7m.43s.
Collmberg i =5m.34s.
Potsdam iPPPE =4m.27s., iSE =7m.19s.
Tortosa iEN =4m.7s., PPPEN =4m.25s., SSN =7m.48s., P_cPEN =9m.7s., P_cSE = 12m.33s., S_cSN =16m.17s., S_cS?E =16m.27s.
Alicante PP =4m.24s., sS =7m.37s., SS =7m.50s., P_cP =9m.8s., P_cS =12m.46s., S_cS = 15m.56s.
Paris e =5m.25s.
Almeria PP =4m.49s., PPP =5m.3s., i =7m.40s., sS =8m.18s., SS =8m.29s., SSS = 8m.57s.

Continued on next page.

Granada iPP =5m.8s., PPP =5m.52s., P_cP =8m.8s., sS =9m.11s., iSS =9m.38s., SSS = 10m.25s.
Malaga iP_cPN =14m.7s., S_cPN =17m.37s., S_cSN =22m.19s.
Helsinki i =5m.30s., iPPP =5m.57s., i =6m.28s., 6m.46s., 7m.22s., and 9m.33s., iSS = 10m.4s., iSSS =10m.35s.
Durham iEN =5m.23s., iP_cPN =9m.27s., iN =10m.18s., iSSN =10m.27s.
Edinburgh PP =6m.1s.
Aberdeen iE =7m.26s., 10m.35s., and 12m.34s.
Reyhjavik eSEN =16m.4s.
Scoresby Sund 8m.31s.
New Delhi iN =9m.7s., iSE =15m.17s., iN =15m.41s., S_cSN =18m.24s., iN =19m.9s.
Bombay PPN =11m.41s., iSE =15m.34s., iSSE =20m.7s.
Ivigtut 8m.54s., 9m.14s., 9m.45s., 16m.20s., and 18m.43s.
Hyderabad S_cSN =18m.55s., SSN =20m.47s.
Kodaikanal P_cPE =10m.45s., S_cSE =19m.30s., SSE =21m.20s.
Calcutta iSSSE =24m.13s.
Tananarive S_cS =20m.10s.
Seven Falls SSS =26m.38s.
Harvard i =11m.9s.
Vermont i =11m.22s., e =11m.51s., ePPP =15m.17s., i =20m.33s., eS_cS? =21m.41s., e =24m.47s., eSS =27m.55s.
Bermuda e =11m.58s., ePPP =15m.18s., iS =20m.26s., eSS? =24m.11s.
Ottawa SS =25m.16s., SSS =27m.42s.
Kirkland Lake PP =14m.19s.
Fordham eS =20m.26s.
Temiskaming i =15m.56s.
Philadelphia i =11m.38s., e =14m.47s., ePPP =15m.46s., i =20m.39s., e =23m.39s.
Georgetown e =11m.43s., iSS =26m.5s., i =28m.0s.
New Kensington ePPP? =15m.53s., eS =21m.16s., eSS? =26m.58s.
Cleveland eE =11m.50s., iE =12m.6s. and 21m.50s., iN =22m.23s.
San Juan e =15m.32s., ePPP =17m.14s., eS =21m.45s., i =21m.59s., eSS =26m.59s., eSSS =29m.51s.
College ePPP =16m.57s., e =25m.0s., eSS =27m.30s., eSSS? =30m.30s.
Chicago e =13m.50s. and 17m.12s., i =23m.23s., eSS =28m.8s., eSSS =31m.28s.
Columbia eSS =26m.42s.
Sitka i =13m.4s. and 23m.30s., eSSS? =31m.13s.
Rapid City e =13m.56s., iS =22m.30s.
Bozeman ePP =16m.52s., eS =23m.43s., iS =24m.1s., eSS =29m.42s.
Butte eS =23m.44s., iS =24m.0s.
Grand Coulee ePPP =18m.53s.
Victoria PS =24m.5s.
Logan eSKS =23m.32s.
Salt Lake City eS =24m.23s., eSS =30m.53s.
Bogota eS =25m.2s., eSS? =27m.2s., readings wrongly identified.
Shasta Dam i =13m.38s., ePKKP? =30m.28s., eSS =31m.23s.
Pierce Ferry ePKP,PKP =38m.55s.
Boulder City ePKP,PKP =38m.56s.
Ukiah eS =24m.52s., e =25m.28s., eSS =31m.34s.
Tucson i =13m.44s. and 14m.0s., eS =24m.43s., ePS? =25m.30s., ePKKP =30m.13s., eSS =31m.56s., ePKP,PKP =38m.39s.
Berkeley iPPN =17m.56s., iZ =21m.52s., iE =21m.58s., iN =24m.48s., iS_cSE =25m.22s. iPSZ =26m.43s., iN =26m.56s., iPPSZ =27m.36s., eN =40m.2s., eE =41m.26s.
La Paz iPPPN =20m.22s., SKKS =25m.5s., iPS =25m.56s., iSSN =32m.26s.
Pasadena eZ =15m.20s., iEZ =18m.24s., iN =26m.2s., iPSN =27m.0s., ePKKPZ = 30m.9s., iZ =30m.39s., eSSN =32m.0s., ePKKP,PKPZ =38m.34s.
Huancayo e =18m.50s. and 18m.56s.
La Plata E. SS =33m.15s., SSS =36m.32s., SSS =40m.8s., Q =48m.38s.
La Plata N. PP =18m.56s., SSS =32m.56s., SSS =36m.50s., 40m.56s., 42m.38s., Q = 46m.44s.
Santa Lucia PN =29m.11s., SKSN =39m.11s., SSSN =51m.26s.?, E =53m.26s.? and 57m.26s., readings wrongly identified.
Antarctica ePPS =32m.31s.
Riverview eEZ =22m.31s., iN =30m.49s., iSKSPN =32m.31s., eEN =32m.35s., iPSE = 32m.54s., iPPSE =35m.11s., eZ =36m.0s., iSSN =40m.35s., iSSE =40m.44s., ePSPSE =42m.1s., iN =42m.11s. and 42m.40s., eE =43m.13s. and 43m.53s., eSSSN =46m.0s.
Auckland SKSP? =33m.41s., e =40m.56s., and 50m.26s.?, Q? =54·4m.
Wellington PKP,Z =20m.40s., PPPZ =27m.58s., SKKKS =31m.50s., SKSP =34m.11s., i =36m.46s., iZ =37m.50s., PPPS =39m.32s., SS =44m.0s., SSS =48m.52s., Q = 58m.56s.
Long waves were also recorded at Montezuma, Honolulu, and Ferndale.

Oct. 6d. Readings also at 3h. (Riverview), 4h. (Mizusawa, Branner, and near Lick), 5h. (Riverview and near Huancayo), 7h. (Riverview, Arapuni, Auckland, Wellington, Palomar, Tucson, and Shasta Dam), 8h. (near Bogota), 12h. and 13h. (Riverview), 15h. (Mizusawa), 16h. (Antarctica), 18h. (Riverview), 19h. (Shasta Dam), 20h. (Paris and Stuttgart), 21h. (Ashkabad, Upsala, and near Ottawa), 22h. (Aberdeen, Upsala, Paris, and Tucson).

Oct. 7d. 1h. 53m. 21s. Epicentre 64°·2N. 148°·3W. (as on 1946, July 1d.).

$A = -·3723$, $B = -·2299$, $C = +·8992$; $\delta = +2$; $h = -10$;
$D = -·525$, $E = +·851$; $G = -·765$, $H = -·472$, $K = -·438$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		0·7	17	i 0 15	− 2	i 0 25	− 3	—	—	i 0·5
Sitka		9·2	129	e 2 28	+12	i 4 39	S*	—	—	i 5·0
Victoria		20·7	128	4 37	− 7	8 26	− 5	—	—	9·6
Grand Coulee		22·8	121	e 5 6	+ 1	—	—	—	—	e 12·0
Saskatoon		24·6	100	5 25	+ 2	9 39	− 3	—	—	12·6
Butte		26·8	115	e 5 47	+ 3	e 10 27	+ 8	e 7 31	PPP	e 11·8
Bozeman		27·7	114	e 5 47	− 5	e 10 39	+ 6	e 8 11	P_cP	e 11·6
Shasta Dam		28·0	134	i 5 44	−11	—	—	i 9 8	P_cP	i 12·8
Mineral	E.	28·5	133	e 6 5	+ 6	e 10 55	+ 9	—	—	e 16·9
Ukiah		29·1	137	—	—	e 11 22	+26	—	—	e 14·7
Berkeley		30·6	136	i 6 19	+ 1	i 11 30	+10	—	—	i 17·0
Logan		30·7	118	i 6 18	− 1	e 12 13	+52	—	—	e 13·0
Santa Clara	Z.	31·2	136	i 6 28	+ 5	—	—	—	—	—
Lick	N.	31·3	136	e 6 25	+ 1	—	—	—	—	e 19·3
Salt Lake City		31·5	120	e 6 40	+14	e 11 51	+17	—	—	e 15·8
Fresno	N.	32·4	133	e 6 37	+ 3	—	—	—	—	e 18·6
Tinemaha	Z.	32·6	131	i 6 39	+ 4	—	—	i 9 23	P_cP	—
Haiwee		33·5	131	i 6 46a	+ 3	—	—	—	—	—
Santa Barbara	Z.	34·5	135	i 6 54	+ 2	—	—	—	—	—
Boulder City		34·7	127	i 6 55	+ 1	e 13 14	P_cS	e 9 22	P_cP	—
Pierce Ferry		34·9	126	i 6 58	+ 3	—	—	i 9 45	P_cP	i 14·2
Mount Wilson		35·2	133	i 6 59a	+ 1	i 13 15	P_cS	i 9 28	P_cP	—
Pasadena		35·3	133	i 7 0	+ 1	e 12 27	− 6	i 9 28	P_cP	e 15·6
Riverside		35·7	133	i 7 3a	+ 1	i 13 16	P_cS	i 9 31	P_cP	—
Palomar		36·4	132	i 7 10a	+ 2	i 13 20	P_cS	i 9 25	P_cP	—
La Jolla		36·8	133	i 7 12a	+ 1	—	—	—	—	—
Tucson		39·5	125	i 7 35a	+ 1	e 13 52	+15	e 9 11	PP	e 17·9
Temiskaming		40·6	80	7 45	+ 2	14 3	+ 9	8 59	PP	20·6
Chicago		40·8	93	e 7 42	− 3	e 14 54	+58	e 9 22	PP	e 18·2
St. Louis		42·2	99	i 7 56	0	i 14 14	− 3	9 36	PP	—
Ottawa		43·1	80	8 2	− 2	14 31	+ 1	9 39	PP	21·0
Shawinigan Falls		43·4	75	8 6	0	—	—	—	—	19·6
Cleveland		43·7	88	i 8 8k	0	i 14 40	+ 1	—	—	i 23·0
Seven Falls		43·8	74	8 9	0	14 41	+ 1	17 23	SS	21·6
Vermont		44·9	78	e 8 25	+ 7	e 15 26	+30	—	—	e 18·3
New Kensington		45·3	87	e 8 23	+ 2	e 15 7	+ 5	e 10 17	PP	e 21·4
Harvard		47·2	78	i 8 35	− 1	e 15 36	+ 7	e 10 6	PP	i 24·7
Fordham		47·5	82	e 8 38	0	e 15 38	+ 4	—	—	—
Philadelphia		47·7	83	e 8 30	−10	e 15 30	− 6	e 10 22	PP	e 19·4
Georgetown		47·8	86	i 8 44	+ 3	e 15 41	+ 3	19 24	SS	22·6
Vladivostok		48·0	284	i 8 42	− 1	e 15 45	+ 4	—	—	—
Irkutsk		51·0	311	e 9 5	− 1	e 19 57?	SS	e 11 6	PP	—
Sverdlovsk		57·8	342	i 9 51	− 4	e 17 41	−13	—	—	—
Moscow		60·3	357	i 10 11	− 2	—	—	—	—	—
De Bilt		62·2	18	i 10 26	0	e 19 0	+ 9	e 12 42	PP	e 29·6
Uccle		63·4	20	e 10 32a	− 2	e 19 7	+ 1	e 12 54	PP	e 30·6
Warsaw	Z.	63·6	7	10 34k	− 1	—	—	e 12 31	PP	—
Jena	N.	64·1	14	e 10 43	+ 5	—	—	—	—	—
Paris		65·0	21	i 10 42	− 2	—	—	i 10 47	P_cP	e 33·6
Strasbourg		66·0	17	i 10 50a	0	e 19 39	+ 1	e 11 25	P_cP	31·6
Stuttgart		66·0	16	i 10 50a	0	e 24 9	SS	e 13 15	PP	e 35·6
Basle		67·0	17	e 10 56	− 1	—	—	—	—	—
Zürich		67·3	17	e 10 56	− 3	e 19 21	−33	—	—	—
Clermont-Ferrand		68·1	22	i 11 3	− 1	—	—	—	—	31·6
Tashkent		70·7	331	e 11 16	− 4	—	—	—	—	—
Yalta		71·6	357	e 11 25	0	—	—	—	—	—
Samarkand		72·8	333	e 11 29	− 3	—	—	—	—	—
Rome		73·2	15	i 11 33	− 2	e 21 0	− 2	e 15 44	PPP	e 34·6
Alicante		74·7	26	e 11 54	+11	e 25 12	SS	—	—	e 39·9
Leninakan		74·9	351	e 11 33	−11	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Granada		75·2	29	i 11 45k	− 1	21 54	+29	12 3		PcP	—
Malaga		75·4	29	i 11 49k	+ 2	—	—	i 14 39a		PP	39·8
Almeria		75·7	28	i 11 46	− 3	21 11	−19	12 2		PcP	40·6
Bogota		79·0	103	e 12 7	0	e 22 11	+ 5	—		—	—
Ksara		82·3	356	i 12 24	− 1	24 1	PS	16 0		PP	—
Helwan	z.	86·3	1	i 12 45k	0	—	—	i 16 7		PP	—
La Paz		100·5	106	e 17 59	PP	—	—	—		—	—
Antarctica		144·0	141	i 19 36	[− 1]	—	—	e 23 17		PKS	—

Additional readings :—
Butte eP_cP = 8m.29s.
Bozeman e = 5m.55s
Ukiah e = 11m.40s.
Berkeley iSE = 11m.41s., iZ = 12m.16s., iE = 14m.16s.
Lick eE = 6m.28s.
Mount Wilson iZ = 7m.3sa., and 9m.32s.
Pasadena i = 7m.5s., iS_cP = 13m.16s.
Palomar iZ = 7m.14s., 7m.51s., 8m.44s., and 9m.13s., eZ = 15m.21s., iS_cS?NZ = 23m.18s.
Tucson e = 8m.9s. and 8m.30s., iP_cP = 9m.47s.
Temiskaming SS = 16m.53s.
St. Louis i = 8m.0s.
Ottawa SS = 17m.39s.
Cleveland iZ = 8m.13s. and 9m.59s., eE = 14m.28s.
Harvard i = 10m.25s.
Philadelphia eS_cS? = 18m.12s.
De Bilt eSS = 23m.12s.
Uccle ePS = 19m.40s., eSSEN = 23m.15s., eSSSE = 26m.9s.
Warsaw eZ = 10m.51s., and 11m.37s.
Jena e = 11m.2s.
Paris ePP = 12m.58s.
Strasbourg eSS = 24m.15s., eSSS = 27m.29s., e? = 29m.54s.
Rome eZ = 12m.31s., eSSN = 25m.59s., eSSSN = 28m.35s.
Granada PP = 15m.9s., PPP = 16m.1s.
Almeria PP = 14m.31s., PPP = 16m.13s., SS = 25m.55s.
Long waves were also recorded at Bombay, Cheb, Kew, Bermuda, and San Juan.

Oct. 7d. 2h. 57m. 29s. Epicentre 64°·2N. 148°·3W. (as at 1h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
College		0·7	17	i 0 13	− 4	i 0 23	− 5	—		—	—
Sitka		9·2	129	—	—	e 4 51	S_g	—		—	i 5·1
Victoria		20·7	128	4 51	+ 7	8 39	+ 8	—		—	9·5
Grand Coulee		22·8	121	e 5 7	+ 2	—	—	i 5 44		PP	e 12·0
Saskatoon		24·6	100	—	—	e 9 49	+ 7	e 13 1		Q	14·5
Butte		26·8	115	—	—	e 9 43	−36	—		—	e 12·0
Bozeman		27·7	114	e 5 49	− 3	—	—	—		—	e 14·7
Shasta Dam		28·0	134	e 5 41	−14	—	—	—		—	—
Tinemaha	z.	32·6	131	e 6 37	+ 2	—	—	—		—	—
Boulder City		34·7	127	e 6 56	+ 2	—	—	—		—	—
Pierce Ferry		34·9	126	e 6 56	+ 1	—	—	—		—	—
Mount Wilson	z.	35·2	133	e 6 56	− 2	e 13 13	P_cS	i 10 19		P_cP	—
Pasadena	z.	35·3	133	e 6 58	− 1	—	—	e 13 13		P_cS	—
Riverside	z.	35·7	133	i 7 1	− 1	e 14 43	SS	—		—	—
Palomar	z.	36·4	132	e 7 7	− 1	—	—	i 13 17		P_cS	—
Tucson		39·5	125	e 7 34	0	—	—	—		—	—
St. Louis		42·2	99	e 7 57	+ 1	—	—	—		—	—
Ottawa		43·1	80	8 0	− 4	—	—	17 36		SS	21·5
Shawinigan Falls		43·4	75	e 8 5	− 1	—	—	—		—	21·5
Seven Falls		43·8	74	—	—	—	—	e 17 55		SS	21·5
Georgetown		47·8	86	13 31?	?	—	—	19 56		SSS	i 23·5
Columbia		50·1	93	—	—	e 17 16	+66	—		—	e 21·9
Paris		65·0	21	e 10 42	− 2	—	—	—		—	—
Stuttgart	z.	66·0	16	—	—	e 20 31	+53	—		—	—
Fort de France		75·6	86	—	—	e 20 35	−54	—		—	—
Ksara		82·3	356	—	—	e 21 23	−77	—		—	—
Bombay	e.	91·3	322	—	—	e 24 1	− 5	—		—	—
La Paz		100·5	106	e 11 31	?	—	—	—		—	—
Antarctica		144·0	141	19 35	[− 2]	—	—	—		—	—

Additional readings :—
Mount Wilson eZ = 14m.31s.
Long waves were also recorded at Strasbourg, Uccle, and other American stations.

Oct. 7d. 12h. 20m. 55s. Epicentre 46°·7N. 9°·6E. (as on 1946, Dec. 21d.).

Intensity V at Alvaschein (Grisons).

E. Wanner.
Jahresbericht des Erdbebendienstes der Schweiz im Jähre, 1947. Zürich, 1948, p. 2, map of epicentre region, figure 4. Epicentre as adopted.

$A = +·6787$, $B = +·1148$, $C = +·7255$; $\delta = +16$; $h = -4$;

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Chur	0·2	—	i 0 5	− 5	i 0 8	− 8	—	—
Zürich	1·0	314	e 0 21	0	e 0 33	− 3	e 0 36	S
Basle	1·6	301	—	—	e 0 53	+ 2	—	—
Stuttgart	2·1	352	e 0 42?	+ 5	e 1 9	+ 5	—	—
Strasbourg	2·3	327	—	—	e 1 35?	?	—	—

Oct. 7d. 18h. 36m. 46s. Epicentre 31°·5N. 132°·2E.

Intensity V at Miyakonojo (Miyazaki pref.); IV at Miyazaki; II-III at Kagosima and Kumamoto. Macroseismic radius 200-300km., shallow. Epicentre as adopted.
Seismo. Bull. Cent. Met. Obs., Japan, 1947, Tokyo, 1950, p. 34, with macroseismic chart.

$A = -·5738$, $B = +·6328$, $C = +·5199$; $\delta = -2$; $h = +1$;
$D = +·741$, $E = +·672$; $G = -·349$, $H = +·385$, $K = -·854$.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Miyazaki	0·8	303	0 15k	− 3	0 28	− 3
Kagosima	1·4	273	0 29	+ 2	0 45	− 1
Kumamoto	1·8	316	0 34a	+ 2	0 56	0
Izuka	2·5	330	0 45	+ 2	1 20	+ 6
Hukuoka	2·6	324	0 46k	+ 2	1 22	+ 5
Hamada	3·4	358	0 48	− 7	1 29	− 8
Sumoto	3·6	38	1 35	S	(1 35)	− 7
Kobe	4·0	38	1 37	+33	—	—
Toyooka	4·6	28	2 11	S	(2 11)	+ 4
Kyoto	4·6	40	1 48	Pe	—	—
Kameyama	4·9	46	2 20	S	(2 20)	+ 5
Hikone	5·1	44	2 20	S	(2 20)	0
Nagoya	5·4	46	1 38	P*	—	—
Gihu	5·4	43	2 31	S	(2 31)	+ 3
Nagano	7·2	43	3 9	S	(3 9)	− 4

Oct. 7d. Readings also at 0h. (Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Pierce Ferry, Shasta Dam, Jena, Stuttgart, Strasbourg, Paris, Clermont-Ferrand, Riverview, near Apia, Almata, Samarkand, near Obi-garm, Tashkent, and Tchimkent), 2h. (Paris, Strasbourg, and Stuttgart), 3h. (Antarctica, Auckland, Wellington, Arapuni, and Riverview), 4h. (Mount Wilson, Pasadena, Palomar, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Grand Coulee, Sitka, and near College), 5h. (Harvard and Riverview (2)), 7h. (Riverview), 8h. (near Mizusawa), 10h. (Shasta Dam), 11h. (Paris, 12h. (Istanbul and Rome), 13h. (Antarctica), 14h. (Paris), 16h. (Collmberg), 18h. (Riverview, Ksara, Istanbul, Belgrade, Zagreb, Rome, Strasbourg, Stuttgart, Chur, Zürich, and Clermont-Ferrand; some of the readings for these stations and those quoted under 19h. may originate from the Japanese earthquake; it is, however, not easy to identify phases of that shock and it seems more probable that all, except perhaps surface waves, are attributable to the three shocks from an unidentified origin in the Near East), 19h. (Helwan (2), Ksara, Istanbul, Bucharest, Belgrade, Zagreb, Triest (2), Florence (2), Rome, Strasbourg, Stuttgart, Paris (2), Cheb, Prague, Jena, Basle, De Bilt, Uccle, Kew, and Malaga), 23h. (Istanbul).

Oct. 8d. Readings at 0h. (Antarctica (2)), 2h. (Ksara, Riverview, near Shasta Dam, and near Ashkabad), 3h. (Almata, Sverdlovsk, Bombay, Calcutta, New Delhi, Kodaikanal, Istanbul, Ksara, Rome, Paris, and Stuttgart), 4h. (Istanbul, Stuttgart, De Bilt, and Copenhagen), 6h. (Temiskaming and near Irkutsk), 9h. (Riverview, Wellington, Temiskaming, La Paz, and Antarctica), 14h. (near Berkeley, Lick, and San Francisco), 15h. (Mount Wilson, Pasadena, Riverside, Tinemaha, Tucson, Pierce Ferry, La Paz, La Plata, Santa Lucia, Paris, Tashkent, and near Ashkabad), 16h. (Istanbul, Ksara, Rome, and near Obi-garm), 17h. (La Paz, near Huancayo, and near Mizusawa), 18h. (Riverside, Tinemaha, Tucson, Boulder City, and Pierce Ferry), 19h. (Riverview and Uccle), 21h. (Uccle and near Stalinabad), 23h. (Riverview, and near Berkeley).

Oct. 9d. 0h. 30m. 19s. Epicentre 7°·5N. 80°·1W. (as on 1942, Dec. 23d.).

$A = +\cdot1705$, $B = -\cdot9768$, $C = +\cdot1297$; $\delta = +3$; $h = +7$;
$D = -\cdot985$, $E = -\cdot172$; $G = +\cdot022$, $H = -\cdot128$, $K = -\cdot992$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		1·6	20	e 0 30	0	e 0 55	+ 4	—	—	i 2·0
Bogota		6·7	115	i 1 31	−11	i 3 11	+11	—	—	—
Huancayo		20·0	168	e 4 33	− 4	—	—	—	—	—
Tucson		37·7	316	e 7 21	+ 2	—	—	—	—	—
Temiskaming		39·0	2	e 7 35	+ 5	—	—	e 8 44	PP	—
Palomar	z.	42·6	313	i 8 3	+ 4	—	—	—	—	—
Riverside	z.	43·3	313	e 8 6	+ 1	—	—	—	—	—
Mount Wilson	z.	43·9	313	e 8 9	− 1	—	—	—	—	—
Tinemaha	z.	45·5	316	e 8 22	− 1	—	—	—	—	—

Oct. 9d. Readings also at 1h. (Stuttgart), 3h. (Mount Wilson, Palomar, Riverside, Tinemaha, Pierce Ferry, Shasta Dam, Tucson, Stuttgart, and near Apia), 4h. (near San Francisco), 5h. (Helwan, Istanbul, Ksara, Bombay, Stuttgart, and near Zürich), 8h. (Fresno), 11h. (Istanbul), 14h. (near Zürich), 16h. (Istanbul, Cheb, Copenhagen, Helsinki, Strasbourg, Stuttgart, Prague, Warsaw, Zagreb, Triest, near Rome, and Belgrade), 17h. (near Ottawa), 20h. (Strasbourg, and near Andijan).

Oct. 10d. 2h. 38m. 50s. Epicentre 30°·1S. 177°·8W. (as on 1946, October 14d., and foreshock to large earthquake at 13h.).

$A = -\cdot8660$, $B = -\cdot0333$, $C = -\cdot4990$; $\delta = +7$; $h = +2$;
$D = -\cdot038$, $E = +\cdot999$; $G = +\cdot499$, $H = +\cdot019$, $K = -\cdot867$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland		9·2	221	2 29	+13	(3 40)	−23	—	—	3·7
Riverview		26·5	254	—	—	e 10 47	+33	—	—	e 12·3
Antarctica		69·6	158	i 11 8	− 5	—	—	—	—	—
Pasadena	z.	85·1	46	i 12 40a	+ 1	—	—	—	—	—
Mount Wilson	z.	85·3	46	i 12 40a	0	—	—	—	—	—
Palomar		85·4	47	i 12 42a	+ 2	—	—	—	—	—
Riverside	z.	85·5	46	i 12 41a	0	—	—	—	—	—
Haiwee	z.	86·6	44	e 12 47	+ 1	—	—	—	—	—
Shasta Dam		87·1	39	e 12 48	− 1	—	—	—	—	—
Boulder City		88·4	47	i 12 56	+ 1	—	—	—	—	—
Tucson		88·7	51	i 12 57a	0	—	—	e 16 25	PP	—
Pierce Ferry		89·0	47	i 13 0	+ 2	—	—	—	—	—
Ksara		151·3	285	e 19 40	[− 9]	—	—	—	—	—
Copenhagen		153·4	347	19 50	[− 2]	—	—	—	—	—
Helwan	z.	154·8	276	e 20 15	[+21]	—	—	—	—	—
Collmberg	z.	157·3	343	e 18 59	[−59]	—	—	—	—	—
Stuttgart	z.	160·6	345	e 19 59	[− 2]	—	—	e 20 42	PKP_3	—
Strasbourg		161·0	348	e 19 57	[− 5]	—	—	i 20 44	PKP_3	—
Paris		161·3	359	i 19 33k	[−29]	—	—	i 20 44	PKP_3	—
Basle		162·1	347	e 20 50	PKP_3	—	—	e 25 21	PP	—
Zürich		162·1	346	e 20 6	[+ 3]	—	—	—	—	—
Clermont-Ferrand		164·4	357	e 20 4	[− 1]	—	—	—	—	—

Additional readings :—
Mount Wilson iZ = 12m.51s. and 12m.56s.
Palomar iZ = 12m.56s.
Riverside iZ = 12m.54s.
Tucson i = 13m.16s., e = 13m.57s.
Copenhagen 19m.58s.
Collmberg iZ = 19m.16s. and 19m.34s.

Oct. 10d. 7h. 32m. 9s. Epicentre 45°·0N. 147°·0E.

Intensity II-III at Kusiro, macroseismic radius 200-300km.
Epicentre 44°·0N. 148°·0E. Very shallow.
Seismo. Bull. Cent. Met. Obs., Japan, 1947, Tokyo, 1950, pp. 34, 35, with macroseismic chart.

The adopted position is determined as an accurate epicentre and not approximate, as the exact figures for latitude and longitude might suggest.

$A = -\cdot5950$, $B = +\cdot3864$, $C = +\cdot7047$; $\delta = -7$; $h = -4$;
$D = +\cdot545$, $E = +\cdot839$; $G = -\cdot591$, $H = +\cdot384$, $K = -\cdot710$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nemuro		2·0	211	0 32a	− 3	0 59	− 3	—	—	—
Sapporo		4·5	246	1 14	+ 3	2 14	+ 9	—	—	—
Mori		5·5	240	1 25a	0	2 38	+ 8	—	—	—
Hatinohe		6·0	224	1 31	− 1	2 36	− 7	—	—	—
Aomori		6·2	229	1 37	+ 2	2 48	0	—	—	—
Miyako		6·5	216	1 35	− 4	2 55	0	—	—	—
Morioka		6·8	221	1 39	− 5	—	—	—	—	—
Mizusawa	N.	7·3	219	1 49	− 1	3 25	+10	—	—	—
Akita		7·4	226	1 37	−15	—	—	—	—	—
Sendai		8·1	216	1 59	− 3	3 29	− 6	—	—	—
Hukusima		8·7	216	1 55	−15	3 33	−17	—	—	—
Aikawa		9·6	226	2 20	− 1	—	—	—	—	—
Utunomiya		10·0	215	2 23	− 4	—	—	—	—	—
Kakioka		10·2	213	2 24	− 7	—	—	—	—	—
Tukubasan		10·2	213	2 25	− 6	—	—	—	—	—
Maebasi		10·5	217	2 33	− 2	—	—	—	—	—
Kumagaya		10·6	216	2 28	− 8	4 23	−14	—	—	—
Nagano		10·7	222	2 32	− 6	—	—	—	—	—
Tokyo		10·8	213	2 42	+ 3	4 32	−10	—	—	—
Vladivostok		11·0	265	i 2 46	+ 4	i 4 45	− 2	—	—	—
Toyama		11·1	225	2 43	0	—	—	—	—	—
Yokohama		11·1	213	2 29	−14	4 17	−32	—	—	—
Hunatu		11·4	216	2 57	+10	4 40	−16	—	—	—
Gihu		12·4	222	2 58	− 3	—	—	—	—	—
Nagoya		12·4	221	2 55	− 6	5 29	+ 8	—	—	—
Hikone		12·7	224	3 3	− 2	5 40	+12	—	—	—
Kameyama		13·0	222	3 3	− 6	5 9	−26	—	—	—
Kyoto		13·2	225	2 47	−24	—	—	—	—	—
Toyooka		13·2	229	3 9k	− 2	5 41	+ 1	—	—	—
Osaka		13·6	224	3 26	+ 9	—	—	—	—	—
Kobe		13·7	205	3 16	− 2	—	—	—	—	—
Owase		13·7	221	3 25	+ 7	—	—	—	—	—
Sumoto		14·1	225	3 20	− 3	6 0	− 2	—	—	—
Hamada		15·2	234	3 37	− 1	6 42	+14	—	—	—
Hukuoka		17·1	234	4 0a	− 2	7 31	+19	—	—	—
Nanking		25·4	250	e 3 25	?	—	—	—	—	e 12·3
Irkutsk		28·8	300	5 59	− 3	10 48?	− 3	—	—	—
College		40·1	36	e 7 43	+ 4	e 13 48	+ 2	e 15 56	eS	—
Sitka		47·5	46	e 8 41	+ 3	e 15 43	+ 9	e 20 9	SSS	e 23·6
Almata		48·8	295	e 8 49	0	—	—	—	—	—
Sverdlovsk		52·2	316	9 13	− 2	16 37	− 2	—	—	—
Calcutta	E.	52·4	265	e 9 17	+ 1	e 16 55	+13	e 22 35	SSS	—
Tashkent		54·7	296	e 9 32	− 1	e 17 9	− 4	—	—	—
Obi-garm		55·9	294	e 9 37	− 5	—	—	—	—	—
Stalinabad		56·6	293	i 9 44	− 3	i 17 29	− 9	—	—	—
Samarkand		57·1	295	e 9 55	+ 5	—	—	—	—	—
Grand Coulee		60·8	50	e 10 14	− 2	—	—	—	—	—
Hyderabad	N.	62·8	268	10 28	− 2	18 53	− 5	—	—	—
Shasta Dam		63·1	58	e 10 26	− 6	—	—	e 13 1	PP	—
Ashkabad		63·6	297	e 10 36	+ 1	19 6	− 2	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Saskatoon		64·4	41	10 45	+ 5	19 24	+ 6	—	—	32·8
Scoresby Sund		64·6	356	—	—	26 57	SSS	—	—	—
Berkeley		64·9	61	i 10 43	0	i 20 10	+46	—	—	e 28·0
Helsinki		65·0	333	—	—	e 19 19	− 7	e 23 36	SS	e 30·8
Butte		65·4	48	e 10 51	+ 4	e 19 33	+ 3	e 12 59	PP	e 30·3
Lick		65·7	61	e 10 55	+ 7	—	—	—	—	—
Bombay		65·8	273	e 10 50	+ 1	e 19 31	− 4	i 12 1	PP	30·2
Bozeman		66·5	48	e 10 55	+ 1	e 19 51	+ 7	e 13 47	PP	e 32·8
Fresno	N.	67·2	60	i 11 4	+ 6	—	—	—	—	—
Baku		67·2	305	e 11 1	+ 3	—	—	—	—	—
Upsala		67·6	335	—	—	e 19 51	− 6	e 27 30	SSS	e 34·2
Tinemaha		67·9	59	i 11 2	0	e 20 16	+15	e 39 19	P′P′	—
Kodaikanal	E.	68·4	263	e 11 5	− 1	e 20 5	− 2	—	—	e 33·2
Logan		68·6	52	i 11 9	+ 2	e 19 37	−32	i 11 53	pP	e 38·0
Haiwee		68·7	59	e 11 7	0	e 20 20	+10	—	—	—
Santa Barbara	Z.	68·7	62	i 11 7	0	—	—	—	—	—
Colombo	E.	69·0	259	—	—	20 12	− 2	—	—	44·7
Salt Lake City		69·3	53	e 11 22	+11	e 20 26	+ 9	e 21 26	S_cS	e 31·7
Mount Wilson		69·9	61	i 11 13a	− 2	e 20 34	+10	—	—	—
Pasadena		69·9	61	i 11 14	− 1	i 20 35	+11	—	—	e 30·0
Bergen		70·4	341	e 16 55?	PPP	e 24 16	SS	—	—	e 35·8
Riverside		70·5	61	i 11 16	− 2	—	—	e 42 34	SKPP	—
Boulder City		70·7	58	e 11 19	− 1	—	—	e 13 42	PP	—
Sotchi		70·7	313	e 11 9	−11	—	—	—	—	—
Pierce Ferry		71·1	57	e 11 25	+ 3	i 11 31	P_cP	i 14 7	PP	—
Palomar		71·2	61	i 11 21	− 2	i 20 52	+12	i 11 44	P_cP	—
La Jolla		71·3	62	e 11 23	0	—	—	—	—	—
Rapid City		71·6	45	e 11 37	+12	e 20 45	+ 1	e 15 3	PP	—
Copenhagen		72·6	335	11 35	+ 4	21 33	PS	28 51	SSS	36·8
Warsaw		72·6	328	e 12 9	+38	20 56	0	15 53	PPP	—
Yalta		72·8	316	e 11 37	+ 5	—	—	—	—	—
Denver		73·7	50	11 44	+ 6	21 14	+ 6	12 42	pP	31·5
Aberdeen	E.	75·0	343	—	—	e 25 22	?	—	—	e 38·9
Tucson		75·7	58	e 11 48	− 1	e 21 16	−14	e 12 45	pP	e 32·4
Collmberg	Z.	76·2	333	i 11 50	− 2	—	—	—	—	—
Prague		76·7	331	e 12 53	+58	e 21 40	− 1	e 26 39	SS	e 36·8
Jena	N.	76·9	332	e 11 56	0	—	—	—	—	—
Budapest	E.	77·2	326	e 12 11	+14	21 43	− 4	—	—	e 43·8
	N.	77·2	326	e 12 16	+19	e 21 51	+ 4	—	—	43·8
Cheb		77·4	332	e 18 1	?	e 21 32	−17	e 34 33	Q	e 40·8
Istanbul		77·9	317	e 11 59	− 2	e 21 52	− 2	—	—	—
Kirkland Lake		78·5	30	e 12 2	− 2	—	—	—	—	—
Riverview		78·6	176	i 12 4a	− 1	e 22 9	+ 7	i 15 0	PP	e 37·8
Belgrade		78·8	324	e 12 8	+ 2	e 19 11	?	e 14 58	PP	37·8
Stuttgart		79·6	333	e 12 7	− 3	e 22 7	− 5	e 14 59	PP	e 45·4
Zagreb		79·7	327	e 12 8?	− 3	—	—	—	—	e 43·8
Kew		79·8	340	i 12 15?	+ 3	e 22 13	− 1	i 13 25?	pP	e 36·4
Ksara		79·8	308	i 12 11	− 1	23 13	PS	—	—	—
Temiskaming		80·1	30	e 12 17	+ 4	—	—	—	—	—
Strasbourg		80·2	334	e 12 14	0	e 22 21	+ 2	e 13 18	pP	40·2
Triest		80·7	329	e 12 41	+25	e 22 26	+ 2	—	—	—
Chicago		80·8	38	—	—	e 22 19	− 6	—	—	e 38·3
Zürich		81·0	333	e 12 15	− 3	e 22 15	−12	—	—	—
Paris		81·6	338	—	—	e 22 30	− 3	—	—	e 37·8
Ottawa		82·4	29	12 23	− 2	22 41	0	31 51?	SSS	38·8
Seven Falls		82·4	25	—	—	e 22 40	− 1	e 32 51?	SSS	40·9
Florence		83·2	330	e 12 6	−23	e 22 31	−18	—	—	—
Cleveland		83·6	34	e 12 29	− 2	i 22 55	+ 2	—	—	—
Clermont-Ferrand		84·2	335	e 12 40	+ 6	e 23 9	+10	e 27 27	SS	—
Rome	Z.	84·4	328	e 12 35	− 1	e 22 59	− 2	e 17 17	PPP	—
Auckland		85·3	158	—	—	23 13	+ 3	—	—	40·9
Helwan		85·3	308	i 12 37k	− 3	23 3	[0]	13 48	pP	—
Harvard		86·3	27	i 12 44	− 1	e 23 9	[0]	—	—	e 44·8
Fordham		87·0	30	i 12 51	+ 3	e 23 9	[− 5]	e 24 23	PS	47·8
Philadelphia		87·3	31	e 13 13	+23	e 23 10	[− 6]	e 17 28	pPP	e 40·4

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Georgetown		87·5	33	e 12 53	+ 2	i 23 12	[− 5]	—	—	40·8
Tortosa		89·4	335	—	—	22 26	[−63]	24 56	PS	e 44·8
Wellington		89·4	159	12 59	− 1	23 51	+ 2	29 16	SS	52·8
Alicante		92·0	335	e 13 36	+24	e 24 14	+ 2	14 42	pP	e 45·5
Almeria		94·0	336	i 13 30	+ 9	24 42	+12	17 24	PP	51·8
Granada		94·0	337	13 23	+ 2	e 24 3	[+ 7]	14 33	pP	—
Malaga	z.	94·6	337	i 13 26	+ 2	i 24 50	+15	14 36	pP	45·4
Bermuda		97·8	26	e 18 21	PP	e 24 21	[+ 5]	e 25 15	S	e 40·0
San Juan		110·1	33	e 19 17	PP	e 22 25	SKP	e 35 46	sSS	e 50·2
Bogota		118·5	47	e 19 11	[+21]	—	—	—	—	63·8
La Paz		139·1	57	e 19 32	[+ 3]	35 0	PPS	i 23 17	SKP	—
Antarctica		150·9	154	19 54	[+ 5]	—	—	—	—	—

Additional readings :—
Mizusawa SE =3m.36s.
College eS$_c$S =16m.57s.
Grand Coulee i =10m.21s. and 10m.37s., e =12m.11s.
Shasta Dam i =10m.38s.
Berkeley iZ =10m.47s. and 10m.53s., iN =20m.59s.
Helsinki e =20m.26s. and 26m.41s.
Butte e =16m.51s. and 19m.57s., eSS =23m.43s., eSSS =25m.27s.
Bozeman eP$_c$P =11m.21s., eSS =24m.25s.
Fresno iN =11m.36s.
Upsala sS?N =22m.10s., eE =30m.51s.
Tinemaha i =11m.9s., iZ =11m.37s. and 12m.23s.
Logan isP =12m.47s., epPP =14m.18s.
Haiwee i =11m.13s.
Santa Barbara i =11m.13s.
Mount Wilson i =11m.18s. a.
Pasadena iEZ =11m.20s. a, iZ =12m.33s., eZ =13m.21s. and 20m.26s.
Bergen eN =25m.15s.
Riverside i =11m.24s.
Boulder City iP$_c$P =11m.27s., i =11m.37s. and 14m.8s.
Palomar i =11m.27s., iZ =11m.39s., eZ =12m.9s.
La Jolla iEZ =11m.29s.
Warsaw eN =13m.2s., PPPN =15m.56s., eE =18m.58s., PSN =21m.3s., PSE =21m.13s., PPSE =21m.31s., PPSN =21m.34s., S$_c$SE =22m.11s., eN =23m.54s., SSN =24m.44s., SSE =24m.47s., SSSN =27m.58s., SSSE =28m.2s., eE =28m.58s., eN =29m.6s.
Denver 22m.40s.
Tucson iP$_c$P =11m.56s., i =12m.29s., e =12m.35s., ePP =14m.48s., epPP =15m.55s., esPP =16m.23s., ePPP =16m.28s.
Collmberg iZ =11m.59s. and 12m.17s.
Prague eSSS =29m.51s.
Kirkland Lake i =12m.9s.
Riverview iZ =14m.15s., ePPPZ =17m.4s., ePSE =23m.0s., eSSN =27m.30s., eQE =33m.3s.
Belgrade e =13m.11s., eSS? =26m.41s., eSSS? =29m.31s.
Stuttgart eP$_c$PZ =12m.17s., eS$_c$S =22m.26s., ePPS? =22m.58s., eSS =27m.27s., eSSS =30m.45s., e =31m.39s., and 38m.33s., eQ =43m.21s.
Kew iP$_c$PZ =12m.21s., ipP$_c$PZ =13m.39s.?, isPZ =13m.57s.?, isP$_c$PZ =14m.7s., eSS?EN =27m.40s.?, eSSS?EN =31m.15s.?, eQE =33m.21s.?
Temiskaming i =12m.24s.
Strasbourg ePP =15m.55s., epS =23m.18s., eSS =27m.49s., eSSS =30m.55s., e =31m.51s., 36m.50s., and 37m.17s.
Cleveland iPZ =12m.36s., iN =23m.50s.
Clermont-Ferrand esSS =30m.12s.
Helwan PPZ =16m.19s., PSN =24m.46s.
Philadelphia eSP? =24m.22s., ePS =25m.9s., eSS =30m.26s.
Georgetown iS =23m.16s.
Tortosa S$_c$SN =22m.50s., PSN =24m.2s.
Wellington SSS =42m.51s.?
Alicante PP =17m.2s., PPP =19m.18s., SKS =23m.38s., PS =25m.12s., PPS =26m.20s., SS =30m.42s., SSS =34m.34s.
Almeria PPP =19m.24s., SKS =23m.56s., PS =26m.4s., SS =31m.32s.
Malaga PPZ =17m.18s., PPPZ =19m.26s., PSZ =26m.10s., SSZ =31m.46s.
Bermuda epPPP? =22m.23s., eSP? =26m.21s.
San Juan eSKS =23m.37s., ePSP =29m.14s., eSSS =38m.53s.
La Paz iPEZ =19m.44s., iSKP =23m.42s., iE =24m.42s.
Long waves were also recorded at Arapuni, Honolulu, Columbia, and other European stations.

Oct. 10d. 8h. 29m. 41s. Epicentre 35°·1N. 23°·4E. (as on 1947, Aug. 30d.).

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		7·4	35	—	—	e 3 42	S*	—	—	—
Helwan		8·5	125	e 2 9	+ 2	i 3 43	− 2	—	—	—
Belgrade		10·0	348	—	—	e 4 16	− 6	—	—	—
Ksara		10·4	93	e 2 59	+25	e 4 29	− 3	—	—	—
Kalossa		11·9	346	—	—	e 5 24	+15	—	—	e 6·8
Zagreb		12·1	335	e 2 59	+ 2	—	—	—	—	e 7·4
Budapest		12·8	347	e 5 49	S	(e 5 49)	+19	—	—	—
Triest		12·8	328	e 3 25	+19	e 5 13	−17	—	—	—
Zürich		16·5	322	e 3 51k	− 3	e 7 17	+19	—	—	—
Neuchatel		17·1	319	e 4 15	+13	—	—	—	—	—
Basle		17·2	323	e 3 59k	− 4	—	—	—	—	e 8·3
Stuttgart		17·2	327	e 4 0	− 3	—	—	—	—	—
Strasbourg		17·8	326	e 4 8	− 3	i 7 51	+23	—	—	—
Collmberg	Z.	17·9	338	e 4 12	0	—	—	—	—	—
Jena	N.	18·0	337	e 4 10	− 3	—	—	—	—	—
Uccle		20·9	325	e 4 46	0	—	—	—	—	—
Copenhagen		21·9	344	4 53	− 4	—	—	—	—	—
Granada		21·9	284	i 4 57 a	0	e 7 56	−58	5 21	PP	—

Additional readings :—
Belgrade eS? = 5m.41s., e = 6m.22s. and 7m.7s.
Strasbourg i = 4m.13s.
Collmberg eZ = 4m.29s.

Oct. 10d. 13h. 42m. 42s. Epicentre 30°·1S. 177°·8W. (as at 2h.).

$A = -·8660$, $B = -·0333$, $C = -·4990$; $\delta = +7$; $h = +2$;
$D = -·038$, $E = +·999$; $G = +·499$, $H = +·019$, $K = -·867$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland		9·2	221	3 3	P_g	4 50	S_g	—	—	5·1
Arapuni		9·6	213	3 18	P_g	4 30	+18	—	—	5·1
Tuai		9·6	204	3 5	P_g	3 56	−16	—	—	i 5·8
New Plymouth		11·2	215	—	—	4 21	−31	—	—	—
Bunnythorpe		11·5	207	e 3 18?	PPP	e 4 18?	−41	—	—	—
Wellington		12·7	207	3 1	− 4	(5 38)	+10	—	—	5·6
Kaimata		15·1	212	3 58?	+22	5 55	−30	—	—	i 7·6
Christchurch		15·4	207	—	—	5 56	−36	—	—	e 7·9
Riverview		26·5	254	e 5 44	+ 3	e 10 34	+20	11 24	Q	e 12·6
Antarctica		69·6	158	i 11 7	− 6	e 20 13	− 8	e 25 7	SS	32·3
Pasadena		85·1	46	e 12 38	− 1	e 23 11	+ 3	—	—	e 52·0
Berkeley		85·2	41	e 12 51	+12	e 23 32	+23	—	—	e 35·5
Mount Wilson	z.	85·3	46	e 12 40	0	—	—	i 12 54	pP	—
Palomar	z.	85·4	47	e 12 33	− 7	—	—	i 12 46	pP	—
Riverside	z.	85·5	46	e 12 40	− 1	—	—	i 12 55	pP	—
Ukiah		85·6	39	—	—	—	—	e 39 49	?	e 47·3
Vladivostok		86·3	325	e 12 51	+ 6	i 23 12	[+ 3]	—	—	—
Haiwee	z.	86·6	44	e 12 54	+ 8	—	—	—	—	—
Tinemaha	z.	87·0	44	e 12 47	− 1	—	—	—	—	—
Shasta Dam		87·1	39	e 12 33	−16	—	—	e 12 48	P	—
Boulder City		88·4	47	e 12 53	− 2	—	—	—	—	—
Tucson		88·7	51	e 12 55	− 2	—	—	i 13 7	pP	—
Pierce Ferry		89·0	47	i 13 1	+ 3	—	—	i 13 17	pP	—
Victoria		92·1	33	—	—	e 24 42	+29	—	—	48·3
Grand Coulee		93·9	34	e 13 5	−16	—	—	—	—	—
Sitka		94·3	21	e 22 56	?	e 25 4	PS	e 31 23	SS	e 38·1
Huancayo		94·6	107	—	—	e 24 6	[+ 7]	e 31 24	SS	e 43·3
College		97·5	12	—	—	e 25 12	+13	e 31 8	SS	e 44·6
La Paz		98·0	114	e 13 39	0	i 24 28	[+11]	i 26 38	PS	46·7
Saskatoon		102·7	36	—	—	e 31 42	SS	—	—	52·3

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	E.	104·1	287	—	—	e 24 14	[−32]	e 33 38	SS	—
Colombo	E.	104·1	270	24 57	SKS	(24 57)	[+11]	—	—	57·4
Irkutsk		106·4	321	e 18 18	PP	24 58	[+ 1]	33 18	SS	—
Kodaikanal	E.	107·8	272	e 19 6	PP	—	—	—	—	—
Cleveland	E.	113·6	54	—	—	e 25 39	[+12]	e 29 30	PS	—
Bombay		115·7	277	e 18 31	[−13]	—	—	e 22 18	PPP	—
San Juan		117·4	83	—	—	e 25 34	[− 7]	e 36 35	SSP	—
Philadelphia		117·7	58	—	—	e 29 51	PS	e 36 42	SSP	e 60·8
Ottawa		118·8	51	—	—	e 37 18?	SSP	—	—	71·3
Fordham		118·9	57	e 20 21	PP	e 37 13	SSP	e 55 48	Q	e 61·8
Harvard		121·0	55	—	—	e 37 18	SSP	—	—	e 62·8
Seven Falls		122·5	50	—	—	e 26 18?	[+20]	—	—	69·3
Bermuda		123·6	69	e 21 18	PP	e 30 58	PS	e 36 18	SS	e 58·3
Stalinabad		125·4	298	19 7	[+ 4]	—	—	—	—	—
Tashkent		125·6	301	18 45	[−19]	25 30	[−38]	—	—	—
Sverdlovsk		131·8	321	e 19 19	[+ 4]	26 41	[+17]	i 22 45	PKS	—
Ashkabad		133·4	294	e 19 40	[+22]	—	—	23 5	PKS	—
Erevan		144·3	298	19 41	[+ 3]	—	—	—	—	—
Moscow		144·3	326	19 35	[− 3]	—	—	—	—	—
Leninakan		144·8	299	e 19 43	[+ 4]	—	—	—	—	—
Helsinki		146·3	340	—	—	e 42 3	SS	75 18	Q	e 82·3
Sotchi		147·4	305	19 52	[+ 9]	—	—	—	—	—
Ksara		151·3	285	e 19 54	[+ 5]	26 50	[− 5]	42 54	SS	—
Copenhagen		153·4	347	e 20 22	PKP_2	25 54	[−64]	—	—	75·3
Warsaw		153·9	333	e 20 48	PKP_2	e 30 37	{− 2}	e 43 43	SS	—
Helwan		154·8	276	e 19 56	[+ 2]	e 34 36	SKSP	20 18	PKP_2	—
Istanbul		155·7	303	e 19 50	[− 5]	e 30 37	{−12}	—	—	—
Prague		158·0	339	—	—	e 37 42	PPS	e 44 18	SS	e 86·3
Cheb		158·6	343	e 24 46	PP	e 31 17	{+12}	e 28 24	PPP	e 89·3
Uccle		159·3	357	—	—	e 32 48	?	—	—	e 93·3
Stuttgart		160·6	345	e 19 59?	[− 2]	e 45 18	SS	e 20 42	PKP_2	e 87·3
Strasbourg		161·0	348	e 20 13	[+11]	e 32 6	{+48}	e 23 45	PKS	84·8
Zagreb		161·0	330	e 20 44	PKP_2	—	—	—	—	e 96·3
Paris		161·3	359	i 20 13	[+11]	e 45 10	SS	e 20 51	PKP_2	e 84·3
Triest		162·0	333	e 24 4	PP	e 31 9	{−14}	e 34 47	PSKS	—
Clermont-Ferrand		164·4	357	e 21 42	?	e 45 48	SS	—	—	90·8
Rome		165·6	328	i 19 14	[−52]	e 31 30	{−11}	20 24	PKP_2	—
Lisbon		167·3	44	25 34	PP	—	—	—	—	90·0
Tortosa	N.	169·2	7	—	—	31 53	{− 6}	45 29	SS	e 91·3
Malaga	Z.	171·4	38	i 20 14k	[+ 4]	27 12	[0]	25 56	PP	63·4
Alicante		171·5	14	20 3	[− 7]	27 13	[+ 1]	21 33	PKP_2	e 82·6
Granada		171·5	32	i 20 18s	[+ 8]	27 18	[+ 6]	21 3	pPKP	87·4
Almeria		172·2	28	i 20 18	[+ 7]	i 27 14	[+ 2]	21 42	PKP_2	90·3

Additional readings :—
Arapuni i =3m.23s. and 3m.38s.
Tuai i =3m.30s., SS? =4m.42s.
Wellington i =3m.39s., S =4m.42s.
Riverview iE =10m.49s., iN =11m.18s.
Berkeley iZ =13m.10s. and 13m.17s., iSE =23m.41s.
Ukiah eSSS =43m.26s.
Tinemaha eZ =13m.28s.
Huancayo e =24m.10s., eS? =25m.46s.
College e =25m.24s., ePSPS =32m.2s.
La Paz iSSE =32m.12s.
Irkutsk ePPS =28m.18s., SSS =37m.18s.
Cleveland eE =29m.48s.
San Juan ePKP,PKP? =37m.30s.
Philadelphia ePKP,PKP? =40m.5s.
Ottawa eN =48m.18s.?
Bermuda eSSS =41m.30s.
Sverdlovsk PS =31m.57s.
Helsinki e =43m.28s., 45m.13s., 52m.18s., and 56m.23s.
Warsaw eSKP?E =23m.27s., PP_2?N =26m.23s., eSKKS?N =31m.9s., ePPP?E = 31m.49s., $eSKKS_2$?N =33m.33s., eE =34m.29s., eN =34m.44s. and 36m.38s., ePPS?E =38m.28s., eN =39m.23s. and 45m.1s., eSS?E =45m.46s., eE =48m.16s., eN =50m.3s., eE =51m.34s., eSSS?E =53m.21s.
Helwan iZ =20m.48s., 21m.10s., and 21m.39s.

Continued on next page.

Prague e =51m.48s.
Cheb e =34m.41s. and 52m.32s.
Stuttgart eZ =21m.32s., ePP?Z =24m.52s., eZ =30m.3s., e =35m.42s. and 38m.18s., eZ =41m.42s., eSS?Z =51m.48s.
Strasbourg ePKP =20m.18s., e =22m.32s., ePP =24m.40s., e =30m.32s., 34m.22s., 35m.43s., and 42m.36s., eSS =44m.42s.
Paris e =20m.29s., 21m.41s., and 32m.18s.
Clermont-Ferrand e =36m.43s. and 58m.18s.?
Rome ePPN =24m.25s., eSKS?EN =25m.29s., eN =29m.14s., ePSKSN =35m.14s., eSSN =45m.32s.
Tortosa SKSPN =35m.57s., SSPN =46m.42s., SSN =49m.25s., SSS?N =57m.20s.
Malaga eSS?Z =41m.2s.
Alicante PP =24m.48s., PPS =29m.57s., SKKS =34m.57s., PPS =40m.5s., SS =46m.39s., SSP =48m.1s., SSS =53m.37s.
Granada sPKP =21m.31s., iPKP$_2$ =21m.50s., pPKP$_2$ =22m.18s., iPP =25m.42s., pPP =26m.8s., sPP =26m.45s., PPP =30m.0s., pPPP =30m.18s., SKKS =32m.18s., sSKKS =33m.27s., sSKSP =38m.6s., iSS =42m.6s., SSS =46m.45s.
Almeria PP =25m.34s., iPPP =29m.38s., SKKS =32m.14s., PPS =39m.26s., SS =46m.34s., SSS =53m.21s.
Long waves were also recorded at Perth, Tananarive, La Plata, and other American and European stations.

Oct. 10d. 17h. 30m. 59s. (I) } Epicentre 31°·0N. 131°·4E.
17h. 51m. 28s. (II) }

Intensity respectively V and IV at Kagosima; II-III at Kumamoto and Miyazaki. Macroseismic radius 200-300km. for both. Epicentre as adopted. Shallow.

Seismo. Bull. Cent. Met. Obs., Japan, 1947, Tokyo, 1950, pp. 35, 36. Macroseismic charts, pp. 35, 36.

$A = -\cdot5679$, $B = +\cdot6441$, $C = +\cdot5125$; $\delta = +3$; $h = +2$;
$D = +\cdot750$, $E = +\cdot661$; $G = -\cdot339$, $H = +\cdot384$, $K = -\cdot859$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
I Kagosima	0·9	308	0 20a	0	0 33	− 1	—	—	—
II	0·9	308	0 19k	− 1	0 33	− 1	—	—	—
I Miyazaki	0·9	2	0 17a	− 3	0 29	− 5	—	—	—
II	0·9	2	0 15a	− 5	0 27	− 7	—	—	—
I Kumamoto	1·9	342	0 30a	− 4	0 58	− 1	—	—	—
II	1·9	342	0 32a	− 2	0 55	− 4	—	—	—
I Hukuoka	2·7	342	0 43a	− 2	1 24	+ 5	—	—	—
II	2·7	342	0 46k	+ 1	1 24	+ 5	—	—	—
I Izuka	2·7	347	0 45k	0	1 21	+ 2	—	—	—
II	2·7	347	0 43a	− 2	1 25	+ 6	—	—	—
II Muroto	3·2	55	1 25	S	2 11	?	—	—	—
I Hirosima	3·5	14	0 45	−12	1 35	− 5	—	—	—
II	3·5	14	1 3	+ 6	1 56	S_e	—	—	—
I Hamada	3·9	8	1 6	+ 4	2 0	S*	—	—	—
II	3·9	8	1 9	+ 7	1 54	+ 4	—	—	—
I Kobe	4·9	40	1 22	+ 5	—	—	—	—	—
II	4·9	40	1 15	− 2	—	—	—	—	—
I Osaka	5·0	43	1 33	P*	2 52	S_e	—	—	—
II	5·0	43	1 49	P_e	2 55	S_e	—	—	—
I Owase	5·1	51	2 4	?	3 7	S_e	—	—	—
II	5·1	51	2 3	?	3 5	S_e	—	—	—
I Toyooka	5·3	31	1 17	− 5	—	—	—	—	—
II	5·3	31	1 23	+ 1	—	—	—	—	—
I Kyoto	5·4	41	2 24	S	(2 24)	− 4	—	—	—
II	5·4	41	1 19	− 5	2 37	+ 9	—	—	—
I Kameyama	5·7	46	1 26	− 2	—	—	—	—	—
II	5·7	46	2 14	?	3 16	S_e	—	—	—
I Hikone	5·9	42	1 26	− 5	2 32	− 8	—	—	—
I Nagoya	6·2	47	1 34	− 1	—	—	—	—	—
I Shizuoka	7·1	54	3 18	S	(3 18)	+ 8	—	—	—
I Toyama	7·4	38	3 39	S	(3 39)	+21	—	—	—
II	7·4	38	3 29	S	(3 29)	+11	—	—	—
I Hunatu	7·6	52	3 8	S	(3 8)	−15	—	—	—
II	7·6	52	3 15	S	(3 15)	− 8	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
I	Wazima	7·8	34	1 47	− 11	—	—	—	—	—
I	Copenhagen	79·2	330	12 3	− 5	—	—	—	—	45·0
I	Shasta Dam	81·3	48	e 12 14	− 6	—	—	—	—	—
II		81·3	48	e 12 14	− 6	—	—	—	—	—
I	Stuttgart	85·3	326	e 12 34	− 6	—	—	—	—	e 53·0
II		85·3	326	e 12 34	− 6	—	—	—	—	e 53·0
I	Tinemaha z.	86·0	49	e 12 39	− 4	—	—	—	—	—
I	Mount Wilson z.	87·9	51	e 12 58	+ 5	—	—	—	—	—
I	Tucson	93·8	49	e 13 14	− 6	—	—	—	—	—

Kyoto I gives also S = 3m.45s.
Long waves for one or other of the two shocks were also recorded at other European stations.

Oct. 10d. Readings also at 1h. (near Balboa Heights), 6h. (near Almata), 8h. (Bucharest), 9h. (La Paz), 13h. (Apia and near Balboa Heights), 18h. (Strasbourg, Stuttgart, Kalocsa, and near Budapest), 19h. (near Boulder City and Pierce Ferry), 21h. (Mount Wilson, Riverside, Tinemaha, Tucson, Butte, and Salt Lake City), 22h. (Granada).

Oct. 11d. 9h. 3m. 6s. Epicentre 36°·8N. 69°·4E. (as on 1947, June 23d.).

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

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Stalinabad	1·8	344	i 0 33	+ 1	i 1 5	S_g
Obi-garm	1·9	7	e 0 36	+ 2	e 1 4	S*
Samarkand	3·5	327	i 0 50	− 7	i 1 50	S_g
Tashkent	4·5	359	1 19	P*	e 2 3	− 2
Tchimkent	5·5	1	e 1 23	− 2	i 3 13	S_g
Almata	8·7	39	e 2 20	+10	—	—
Ashkabad	8·9	281	e 1 54	−18	—	—
Sverdlovsk	20·9	346	e 4 43	− 3	e 8 51	+16

Oct. 11d. Readings also at 4h. (Mount Wilson, Palomar, Pasadena, Riverside, Pierce Ferry, and Tucson), 6h. (near San Juan), 11h. (near Mineral and near Zürich), 12h. (Mizusawa), 13h. (near San Juan), 14h. (Boulder City, Antarctica, and near Almata), 18h. (near Santa Lucia), 19h. (Ksara and near Grozny (2)), 21h. (Huancayo, La Paz, Kirkland Lake, and Temiskaming), 22h. (Boulder City, Pierce Ferry, and Shasta Dam).

Oct. 12d. 12h. 36m. 18s. Epicentre 37°·3N. 141°·3E. Depth of Focus 0·005.
(as on 1946, Dec. 10d.).

Intensity IV at Onahama, Hukusima, Mito, Kakioka, Tukubasan; II-III at Titibu, Utunomiya, and Misima.
Epicentre 37°·2N. 141°·5E. Macroseismic radius 300km. Depth 50km.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year, 1947, Tokyo, 1950, p. 37, macroseismic chart, p. 37.

A = −·6223, B = +·4986, C = +·6034; δ = −5; h = −1;
D = +·625, E = +·780; G = −·471, H = +·377, K = −·797.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Onahama	0·5	221	0 11	− 2	0 20	− 3
Hukusima	0·8	304	0 16k	− 1	0 29	0
Sendai	1·0	342	0 18k	− 1	0 32	− 1
Mito	1·1	216	0 20	0	0 34	− 2
Kakioka	1·4	220	0 23	− 1	0 39	− 4
Tukubasan	1·4	222	0 24	0	0 42	− 1
Utunomiya	1·4	237	0 27	+ 3	0 48	+ 5
Kumagaya	1·9	233	0 34	+ 3	1 3	+ 9
Tokyo	2·0	218	0 33	+ 1	1 0	+ 3
Yokohama	2·3	215	0 40	+ 3	1 10	+ 6

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Miyako	2·4	13	0 34	− 4	1 2	− 5
Morioka	2·4	358	0 36k	− 2	1 3	− 4
Akita	2·6	339	0 41	0	1 21	+ 9
Hunatu	2·7	229	0 47	+ 5	1 20	+ 6
Misima	2·9	221	0 46	+ 1	1 27	+ 8
Nagano	3·0	256	0 42	− 5	1 16	− 6
Osima	3·0	211	1 1	+14	—	—
Shizuoka	3·3	225	0 55	+ 4	1 39	+10
Toyama	3·3	259	1 5	+14	1 40	+11
Aomori	3·6	353	0 59	+ 4	1 46	+ 9
Nagoya	4·1	240	1 10	+ 8	1 58	+ 9
Gihu	4·1	244	1 10	+ 8	1 59	+10
Hikone	4·5	245	1 41	PPP	—	—
Kameyama	4·6	239	1 8	− 1	—	—
Mori	4·8	353	1 17	+ 5	2 13	+ 6
Kyoto	5·0	245	1 32	+18	—	—
Sapporo	5·8	0	1 34	+ 9	—	—

Oct. 12d. Readings also at 0h. (Stuttgart), 1h. (Philadelphia), 5h. (near Andijan, Samarkand, Stalinabad, and Tashkent), 6h. (Stuttgart), 7h. (Rome, Stuttgart, and Ksara), 10h. (near Mizusawa), 13h. (Bozeman), 19h. (near Mineral), 20h. (Antarctica), 22h. (La Paz).

Oct. 13d. 1h. Undetermined shock.

Grand Coulee eP? =11m.20s., eS =18m.14s.
Shasta Dam eP? =11m.50s., e =12m.8s., i =19m.2s.
Haiwee eP?Z =13m.0s.
Boulder City iP? =13m.11s.
Pierce Ferry iP? =13m.13s.
Pasadena iPZ =13m.15s.
Mount Wilson iPZ =13m.16s.
Palomar eP?Z =13m.17s., iP?Z =13m.22s.
Kirkland Lake e =13m.40s., eL =27m.0s.
Tucson iP =13m.52s.
Temiskaming e =13m.54s., eL =27·3m.
Ottawa eZ =14m.12s., L =27m.
Shawinigan Falls e =14m.15s., L =28m.
Butte eS? =20m.30s., L =20m.53s.
Rapid City eS? =23m,34s., e =24m.36s., eL =26m.40s.
Berkeley eZ =24m.6s., eE =24m.18s., eN =26m.0s.
Harvard e =30m.30s., eL =34m.0s.

Long waves were also recorded at Salt Lake City.

Oct. 13d. 7h. 31m. 19s. Epicentre 44°·2S. 169°·0E.

Maximum intensity VII. Felt throughout the larger part of the Southern Island of New Zealand (Southern Alps and Mts. Castor and Pollux). Epicentre as adopted.

Earthquakes in New Zealand during the Year, 1947; New Zealand Journal of Science and Technolagy, 1948, Vol. 30, No. 2 (Sec. B.), p. 104, Isoseismic chart, p. 105.

A = −·7061, B = +·1372, C = −·6947; δ = +1; h = −4;
D = +·191, E = +·982; G = +·682, H = −·133, K = −·719.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Monowai	1·9	212	0 31	− 3	0 50	− 9	—	—	—
Kaimata	2·6	50	0 43	− 1	—	—	—	—	—
Christchurch	2·7	76	0 47	+ 2	—	—	—	—	—
Wellington	5·2	58	1 19	− 2	2 14	− 8	—	—	—
Bunnythorpe	6·3	54	1 51	+15	3 6	+16	—	—	—
New Plymouth	6·4	38	1 39	+ 1	2 51	− 2	—	—	—
Tuai	8·1	52	2 6	+ 4	3 37	+ 2	—	—	—
Auckland	8·5	33	2 3	− 4	3 41	− 4	—	—	—
Riverview	17·3	301	14 1k	− 3	17 13	− 3	14 16	PP	e 8·0
Perth	42·9	268	18 46	+44	1 17 51	SS	—	—	—

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Antarctica		60·4	159	i 10 14	+ 1	e 18 59	+31	—	—	e 30·5
Kodaikanal	E.	98·1	276	—	—	e 24 4	[−14]	—	—	—
Calcutta	E.	99·0	293	e 20 47	?	e 31 27	SS	—	—	—
La Paz		100·3	125	e 19 21	PP	—	—	—	—	50·9
Berkeley		102·6	49	—	—	e 28 36	PPS	e 47 35	Q	e 48·2
Tucson		105·3	60	—	—	e 30 16	?	—	—	—
Bombay		107·3	280	—	—	e 24 37	[−24]	—	—	—
Ottawa		135·2	65	e 19 23	[+ 1]	—	—	—	—	69·7
Bermuda		136·9	87	—	—	e 29 56	?	—	—	e 65·3
Seven Falls		139·0	64	e 23 5	PP	—	—	—	—	64·7
Ksara		142·6	271	e 19 37	[+ 2]	42 13	SSP	33 21	PSKS	—
Helwan	Z.	143·7	262	e 19 41	[+ 4]	26 5	PPP	22 56	PP	—
Rome		162·7	271	e 20 9	[+ 6]	e 23 49	SKP	e 25 7	PP	—
Cheb		163·1	300	e 29 41?	?	—	—	—	—	—
Stuttgart	Z.	165·4	296	e 21 6	[+60]	—	—	—	—	—
Almeria		170·2	224	i 20 19	[+10]	27 51	[+39]	46 31	SS	91·7
Granada		171·0	221	i 25 20a	PP	32 4	{− 4}	i 30 31	PPP	81·9
Malaga	Z.	171·0	216	i 20 16k	[+ 6]	27 2	[−10]	25 19	PP	78·2

Additional readings :—
Riverview iQEN =7m.23s., iSS =7m.33s., iSSSEN =7m.48s.
Rome ePKP$_2$ =21m.43s., ePPP?N =30m.13s.
Almeria iPKP$_2$ =21m.32s., PKS =23m.43s., iPP =25m.22s., PPP =29m.31s., SKKS = 32m.15s., PPS =39m.27s., SS =46m.31s.
Granada SKKS =36m.47s., PPS =45m.4s.
Malaga iPKP$_2$Z =21m.35s., PPPZ =29m.31s., SSZ =46m.7s.
Long waves were also recorded at Clermont-Ferrand, De Bilt, Kew, Strasbourg, Paris, Uccle, Istanbul, Hyderabad, Pasadena, Huancayo, Philadelphia, San Juan, and Ukiah.

Oct. 13d. Readings also at 1h. (near College), 4h. (Santa Lucia and near Stalinabad), 5h. (Andijan), 6h. (Alicante and Riverview), 7h. (near Pierce Ferry), 9h. (Stuttgart), 11h. (Balboa Heights), 12h. (near Stalinabad), 18h. (Mizusawa, Huancayo, La Plata, La Paz, Santa Lucia, Riverside, Tinemaha, Shasta Dam, and Tucson), 22h. (near Mineral (2)), 23h. (De Bilt).

Oct. 14d. 1h. 41m. 12s. Epicentre 33°·0S. 178°·0W. (as on 1943, July 11d.).

A = −·8398, B = −·0293, C = −·5421 ; δ = −1 ; h = +1 ;
D = −·035, E = +·999 ; G = +·542, H = +·019, K = −·840.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tuai		7·0	213	1 46	0	3 3	− 5	—	—	3·8
Auckland		7·0	236	1 50	+ 4	3 7	− 1	i 3 21	SS	3·6
Arapuni		7·2	224	—	—	3 36	S*	4 0	S_g	—
New Plymouth		8·8	225	3 2	?	3 48	− 5	—	—	—
Bunnythorpe		8·9	214	—	—	3 48?	− 7	4 42	S_g	—
Wellington		10·1	213	2 33	+ 5	i 4 23	− 2	—	—	4·8
Kaimata		12·7	217	4 0	?	5 25	− 3	—	—	i 6·6
Christchurch		12·8	212	—	—	5 18	−12	—	—	i 7·1
Apia		19·9	20	e 4 32	− 4	e 8 16	+ 1	—	—	—
Riverview		25·7	259	i 5 32a	− 1	i 10 3	+ 2	i 11 15	SS	e 12·8
Antarctica		67·0	158	i 10 58	+ 1	—	—	—	—	e 33·5
Pasadena		87·3	46	e 12 48	− 2	e 23 37	+ 8	—	—	e 36·3
Palomar		87·5	47	e 12 49	− 2	—	—	i 13 3	P_cP	—
Berkeley		87·5	41	—	—	i 23 34	+ 3	i 23 10	SKS	e 36·2
Riverside	Z.	87·7	46	i 12 49	− 3	—	—	—	—	—
Vladivostok		88·5	325	i 12 53	− 3	i 23 22	[− 2]	—	—	—
Haiwee	E.	88·8	44	e 12 57	0	—	—	—	—	—
Tinemaha		89·3	44	e 12 59	0	—	—	i 13 12	P_cP	—
Shasta Dam		89·5	38	e 12 57	− 3	—	—	—	—	—
Boulder City		90·5	46	e 13 3	− 2	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		90·7	51	e 13 5	− 1	e 24 8	+ 7	e 23 44	SKS	e 38·4
Pierce Ferry		91·1	46	e 13 2	− 6	—	—	—	—	—
Huancayo		93·9	106	e 13 44	+23	e 24 0	[+ 5]	e 17 26	PP	e 44·0
Victoria		94·7	33	—	—	e 24 40	+ 4	—	—	45·8
La Paz	E.	97·0	114	e 13 30	− 5	e 25 11	+16	i 24 14	SKS	47·5
Butte		98·4	39	—	—	e 25 17	+10	e 31 52	SS	—
Bogota	E.	104·2	93	—	—	e 24 47	[0]	e 27 41	PS	51·8
Calcutta	E.	104·8	287	—	—	e 24 50	[0]	i 30 42	?	—
Kodaikanal		107·6	271	e 17 13	?	e 29 23	PPS	—	—	53·1
St. Louis		108·1	54	e 18 53	PP	e 25 7	[+ 3]	e 28 17	PS	—
Irkutsk		108·5	320	18 48	PP	24 48	[−18]	39 48	?	—
Chicago		111·4	52	—	—	—	—	e 28 50	PS	e 44·8
Cleveland		115·4	55	—	—	e 25 33	[0]	i 35 48	SS	—
Bombay		115·8	276	e 18 42	[− 3]	e 25 40	[+ 5]	—	—	33·1
San Juan		117·9	84	—	—	e 25 40	[− 3]	e 29 48	PS	—
Fordham		120·6	58	20 23	PP	e 25 58	[+ 6]	e 36 58	SS	62·6
Ottawa		120·7	53	e 18 52	[− 2]	e 27 24	{+ 6}	e 36 48?	SS	54·8
Harvard		122·7	57	e 20 35	PP	e 37 18	SS	e 31 54	PPS	62·8
Bermuda		124·8	70	e 21 18	PP	e 26 10	[+ 4]	e 38 10	SS	e 48·1
Stalinabad		126·6	297	19 17	[+11]	31 49	SKSP	30 44	PS	—
Tashkent		126·9	299	22 22	PKS	26 14	[+ 2]	—	—	—
Sverdlovsk		133·9	319	22 48	PP	—	—	23 52	PKS	—
Baku		141·3	295	e 23 16?	PP	—	—	—	—	—
Leninakan		145·9	296	e 19 42	[+ 1]	—	—	—	—	—
Sotchi		148·8	301	e 19 48	[+ 3]	—	—	—	—	—
Ksara		151·8	280	e 19 52	[+ 2]	37 0	PPS	23 36	PP	—
Helwan	z.	154·8	270	i 19 55	[+ 1]	—	—	27 27	PPP	—
Copenhagen		156·2	346	20 14	[+18]	—	—	—	—	90·8
Istanbul		157·0	299	23 9	PKS	26 44	[−18]	—	—	—
Collmberg		160·0	339	e 20 42	PKP_2	—	—	—	—	—
De Bilt		160·8	353	e 20 31	[+29]	e 31 16	{− 1}	e 44 42	SS	e 83·8
Cheb		161·3	340	e 27 47	PPP	e 31 24	{+ 4}	e 45 20	SS	e 87·8
Kew		161·5	4	e 20 11?	[+ 9]	e 44 18	SS	e 24 43	PP	—
Uccle		162·1	357	e 20 48	PKP_2	e 31 28	{+ 4}	e 25 2	PP	e 83·8
Stuttgart		163·4	343	e 20 8	[+ 4]	e 31 28	{− 2}	e 24 38	PP	89·8
Strasbourg		163·8	346	e 20 30	[+26]	e 31 36	{+ 4}	e 25 0	PP	84·8
Paris		164·2	358	e 20 14	[+ 9]	e 31 35	{+ 1}	e 45 1	SS	e 86·8
Triest		164·5	328	—	—	e 31 34	{− 1}	e 36 10	?	—
Zürich		164·8	342	e 20 19a	[+14]	—	—	e 21 58	PKP_2	—
Clermont-Ferrand		167·3	357	e 20 19	[+11]	i 45 52	SS	—	—	83·8
Rome		167·8	322	e 29 35	PPP	i 31 48	{− 4}	e 35 35	?	—
Malaga	z.	173·5	53	i 20 24k	[+13]	27 30	[+17]	i 20 48	kpPKP	80·4
Granada		173·8	46	i 19 53a	[−18]	27 5	[− 8]	20 47	pPKP	89·4
Alicante		174·3	20	20 15	[+ 4]	32 33	{+ 9}	25 43	PP	e 82·3
Almeria		174·7	42	i 20 23	[+12]	27 21	[+ 8]	32 39	SKKS	88·8

Additional readings :—
Auckland i =2m.9s. and 2m. 26s.
Wellington i =3m.18s., S =4m.8s.
Riverview iEZ =5m.37s., iNZ =6m.0s., iPPE =6m.15s., iPPPN =6m.28s., iEZ =6m.31s., iZ =7m.11s., iE =7m.14s., iN =7m.29s., iE =7m.55s., iZ =7m.59s., isSN =10m.20s., iE =10m.23s., iN =10m.55s. and 11m.40s.
Berkeley iN =23m.23s.
Tucson i =13m.18s. and 13m.40s., iPP =17m.4s., ePS =25m.19s., eSS =29m.21s., eSSS =33m.47s.
Huancayo e =13m.48s., eSS =31m.12s.
La Paz iPSE =26m.20s., iSSE =32m.0s.
Butte ePPS =27m.18s., ePKKP? =30m.46s., eS_cS,S_cS =36m.59s., eSKKP =42m.30s.
Kodaikanal SKSE =27m.58s., PSE =30m.48s., SS =36m.18s.
St. Louis e =19m.6s., eSKKS =25m.56s., eS =26m.40s.
Cleveland eE =26m.31s., ePSE =29m.18s., eN =29m.38s.
Fordham eSKKS =27m.22s., iPS? =30m.6s.
Harvard eSSS =40m.12s.
Bermuda ePS =31m.4s., eSSS =42m.13s.
Helwan iZ =20m.8s., ePKKPZ =20m.18s., iZ =26m.6s.
De Bilt ePP =24m.53s.
Cheb eSKS? =28m.59s., e =35m.16s.
Kew iZ =21m.17s., eNZ =28m.29s.?, eEZ =32m.16s.?, eNZ =35m.16s.?, eN =39m.25s.?

Continued on next page.

Uccle eSKP =24m.30s., ePSKSE =35m.40s., eSSE =44m.52s., eEN =58m.49s.
Stuttgart ePKP$_2$Z =21m.1s., eSKKSZ =32m.7s., ePSKS =35m.5s., ePPS? =38m.11s., e =56m.18s., eQ? =84m.48s.
Strasbourg eSKP =23m.48s., ePPP$_2$ =32m.24s., eSKKS$_2$ =34m.24s., ePPS =38m.6s., e =39m.48s. and 43m.36s., eSS =45m.12s., e =57m.18s.
Paris ePKP =20m.24s., ePP =24m.39s., ePP =24m.43s., e =30m.36s., eSKKS =34m.32s., e =35m.38s.?, ePPS =38m.18s.
Triest ePSKS =39m.49s.
Malaga PKP$_2$Z =21m.49s., iPPZ =25m.42s., PPPZ =29m.48s.
Granada PKP$_2$ =21m.8s., pPKP$_2$ =21m.58s., iPP =24m.32s., pPP =25m.57s., PPP =29m.26s., pPPP =30m.11s., iSKKS =32m.45s., sSKKS =33m.14s., SKSP =36m.50s., iSS =46m.56s.
Alicante PKP$_2$ =21m.46s., PKS =23m.59s., PPP =30m.7s., SKSP =36m.45s., PPS =40m.15s., SS =47m.35s., PSS =49m.21s.
Almeria PKP$_2$ =21m.46s., PKS =23m.49s., iPP =25m.57s., PPS =40m.9s., SS =47m.21s.
Long waves were also recorded at Denver, Santa Clara, Rapid City, Ukiah, Aberdeen, Helsinki, Prague, Upsala, and Warsaw.

Oct. 14d. 22h. 29m. 23s. Epicentre 38°·1N. 73°·2E. (as on 1947, April 6d.).

$A = +·2280$, $B = +·7552$, $C = +·6145$; $\delta = -8$; $h = -1$;
$D = +·957$, $E = -·289$; $G = +·178$, $H = +·588$, $K = -·789$.

		Δ	Az.	P	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Andijan		2·7	346	e 0 48	+ 3	i 1 24	+ 5	—	—	—
Stalinabad		3·5	279	i 1 0	+ 3	1 43	+ 3	—	—	—
Tashkent		4·4	318	i 1 9	− 1	i 2 4	+ 2	—	—	—
Samarkand		5·1	290	i 1 19	− 1	i 2 22	+ 2	—	—	—
Tchimkent		5·1	328	i 1 22	+ 2	i 2 25	+ 5	—	—	—
Almata		5·9	27	1 31	0	3 6	S*	—	—	—
Ashkabad		11·7	274	e 2 53	+ 2	i 4 59	− 5	—	—	—
Baku		18·2	285	e 4 20	+ 4	e 7 42	+ 5	—	—	—
Bombay		19·1	181	e 4 29	+ 2	e 8 11	+14	—	—	—
Calcutta		20·2	135	e 4 40	+ 1	i 8 28	+ 7	i 9 13	SS	—
Sverdlovsk		20·5	341	4 38	− 4	8 27	0	—	—	—
Hyderabad	N.	21·1	166	4 47	− 1	8 50	+11	—	—	11·3
Grozny		21·4	293	e 4 54	+ 3	i 8 48	+ 3	—	—	—
Erevan		22·3	285	e 5 13	+12	—	—	—	—	—
Leninakan		22·8	287	e 5 15	+10	e 9 27	+16	—	—	—
Piatigorsk		23·4	295	e 5 17	+ 6	9 31	+10	—	—	—
Irkutsk		25·9	46	5 41	+ 6	e 10 7	+ 3	—	—	—
Ksara		30·4	273	e 6 18	+ 2	12 0	+44	—	—	—
Istanbul		33·9	290	e 6 43	− 4	—	—	—	—	—
Helwan	Z.	35·4	270	7 4	+ 4	—	—	8 22	pP	—
Warsaw		38·1	309	—	—	e 12 41	−35	e 15 49	SS	e 20·1
Upsala		40·9	321	e 9 19	PP	e 16 9	?	—	—	e 21·6
Copenhagen		43·5	315	8 5	− 2	—	—	—	—	23·6
Jena	N.	44·5	308	e 11 7	?	—	—	—	—	—
Stuttgart		46·4	305	e 8 29k	− 1	e 15 37	PPS	e 18 49	SS	e 24·6
Zürich		47·1	304	e 8 55	+20	—	—	—	—	—
Strasbourg		47·4	305	i 8 36	− 2	—	—	i 8 44	P	e 22·6
Basle		47·7	304	e 8 33	− 7	—	—	—	—	—
De Bilt		48·3	311	e 10 37	PP	e 19 37	SS	—	—	e 23·6
Paris		50·7	306	i 9 1	− 2	—	—	—	—	e 29·6
Clermont-Ferrand		51·2	303	e 9 5	− 2	—	—	—	—	e 29·1

Additional readings :—
Helwan SNZ =16m.42s., SKSZ =16m.47s., SPZ =17m.37s., sSZ =19m.2s.
Warsaw eE =16m.50s. and 18m.0s.
Strasbourg e =9m.3s.
Long waves were also recorded at Helsinki, Kew, Prague, Cheb, Uccle, Granada, and Malaga.

Oct. 14d. Readings also at 0h. (Balboa Heights and Bogota), 1h. (College), 3h. (Mineral), 4h. (near Andijan), 5h. (near La Paz), 8h. (Riverview and near Andijan), 10h. (near Grand Coulee), 11h. (Stuttgart, Strasbourg, Paris, near Zürich, and Basle), 14h. (Bozeman), 15h. (Auckland, Wellington, Riverview, and Pierce Ferry), 17h. (Strasbourg), 18h. (Strasbourg), 19h. (Riverview), 23h. (Irkutsk and La Paz).

Oct. 15d. 4h. 9m. 28s. Epicentre 64°·2N. 148°·3W. (as on Oct. 7d.).

A = −·3723, B = −·2299, C = +·8992; δ = +2; h = −10.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		0·7	17	i 0 12	− 5	i 0 19	− 9	—	—	—
Grand Coulee		22·8	121	e 5 6	+ 1	—	—	i 5 24	PP	e 12·0
Shasta Dam		28·0	134	e 5 53	− 2	—	—	—	—	—
Tinemaha	z.	32·6	131	e 6 35	0	—	—	—	—	—
Haiwee	z.	33·5	131	e 6 44	+ 1	—	—	—	—	—
Santa Barbara	z.	34·5	135	e 7 2	+10	—	—	—	—	—
Boulder City		34·7	127	e 6 54	0	—	—	—	—	—
Pierce Ferry		34·9	126	e 6 56	+ 1	—	—	—	—	—
Mount Wilson	z.	35·2	133	i 6 56	− 2	—	—	i 7 20	?	—
Pasadena	z.	35·3	133	e 6 58	− 1	—	—	—	—	—
Riverside	z.	35·7	133	i 6 59	− 3	—	—	—	—	—
Palomar		36·4	132	i 7 9	+ 1	—	—	—	—	—
Kirkland Lake		39·1	80	e 7 34	+ 3	—	—	—	—	e 19·4
Tucson		39·5	125	i 7 35	+ 1	—	—	e 9 49	P_cP	—
Ottawa		43·1	80	e 7 59	− 5	—	—	—	—	21·5
Shawinigan Falls		43·4	75	e 8 0	− 6	—	—	—	—	21·5

Tucson also gives i = 8m.3s.
Long waves were also recorded at Butte, Harvard, Philadelphia, Rapid City, and Ville Marie.

Oct. 15d. 8h. 55m. 47s. Epicentre 43°·6N. 128°·0W. (as on 1941, Oct. 31d.).

A = −·4473, B = −·5725, C = +·6872; δ = +8; h = −3;
D = −·788, E = +·616; G = −·423, H = −·542, K = −·727.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ferndale		4·1	136	e 1 37	?	i 1 57	+ 2	e 1 43	?	i 2·1
Shasta Dam		5·1	122	e 1 16	− 4	e 2 47	SSS	—	—	e 3·2
Seattle		5·7	42	—	—	e 2 51	SS	—	—	e 4·2
Ukiah		5·7	139	e 1 20	− 8	e 2 59	SS	—	—	i 3·6
Mineral		5·8	122	e 1 30	+ 1	e 2 48	+10	e 2 56	S•	—
Berkeley		7·2	141	i 1 45	− 4	i 3 16	+ 3	e 3 43	S•	—
Grand Coulee		7·6	52	e 1 52	− 3	e 3 23	0	e 2 39	P_g	e 5·2
Santa Clara		7·7	141	e 2 16	+20	e 4 7	S_g	—	—	—
Lick		7·9	140	e 1 58	− 1	e 4 31	S_g	—	—	e 5·1
Tinemaha	z.	9·9	127	i 2 28	+ 3	—	—	i 2 43	PPP	—
Haiwee	z.	10·7	130	e 2 39	+ 1	—	—	—	—	—
Santa Barbara	z.	11·2	142	i 2 44	0	—	—	i 2 54	PP	—
Pasadena		12·1	138	e 2 54	− 3	—	—	i 3 3	PP	e 6·2
Bozeman		12·2	75	e 3 24	PPP	—	—	e 3·52	?	—
Riverside	z.	12·6	135	e 3 2	− 1	—	—	i 3 10	PP	—
Boulder City		12·7	122	i 3 5	0	—	—	i 3 19	PP	e 7·2
Pierce Ferry		13·1	120	i 3 10	0	—	—	—	—	e 7·2
Palomar		13·6	136	i 3 15	− 2	—	—	i 3 24	PP	—
Tucson		17·6	124	e 4 8	0	e 7 6	−17	i 4 11	PP	e 9·4
Rapid City		17·9	79	i 4 11	− 1	—	—	e 4 37	PP	e 5·8
St. Louis		28·7	87	e 7 0	+59	e 12 13	+83	—	—	e 16·1
Ottawa		36·8	68	e 7 9	− 2	—	—	—	—	19·2
Paris		78·2	31	e 11 45	−18	—	—	i 12 11	P_cP	e 48·2

Additional readings :—
Shasta Dam iP = 1m.21s., i = 1m.55s.
Berkeley eZ = 3m.48s. and 6m.45s., eE = 7m.8s.
Tinemaha iZ = 2m.56s.
Palomar i = 3m.52s.
Tucson e = 6m.3s., eS = 9m.1s.
Rapid City e = 5m.17s.
Paris e = 12m.5s.
Long waves were also recorded at Bogota, Butte, Harvard, Philadelphia, Salt Lake City, and Istanbul.

Oct. 15d. 19h. 34m. 37s. Epicentre 64°·2N. 148°·3W. (as at 4h.).

$A = -·3723$, $B = -·2299$, $C = +·8992$; $\delta = +2$; $h = -10$;
$D = -·525$, $E = +·851$; $G = -·765$, $H = -·472$, $K = -·438$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		0·7	17	i 0 13	− 4	—	—	—	—	—
Grand Coulee		22·8	121	e 5 7	+ 2	—	—	—	—	e 11·9
Saskatoon		24·6	100	5 33	+10	9 56	+14	—	—	13·0
Shasta Dam		28·0	134	e 5 55	0	—	—	e 6 48	PP	i 12·8
Tinemaha	z.	32·6	131	i 6 37	+ 2	—	—	i 13 5	S_cP	—
Haiwee		33·5	131	e 6 48	+ 5	—	—	—	—	—
Boulder City		34·7	127	i 6 54	0	—	—	i 13 15	S_cP	—
Pierce Ferry		34·9	127	e 6 56	+ 1	i 13 12	S_cP	i 7 13	?	—
Pasadena		35·3	133	i 7 1	+ 2	—	—	i 13 13	S_cP	e 22·5
Riverside	z.	35·7	133	i 7 2	0	—	—	—	—	—
Palomar	z.	36·4	132	i 7 11	+ 3	—	—	i 13 18	S_cP	—
La Jolla	z.	36·8	133	e 7 14	+ 3	—	—	—	—	—
Kirkland Lake		39·1	80	i 7 33	+ 2	—	—	e 8 59	PP	e 20·3
Tucson		39·5	125	e 7 36	+ 2	e 13 38	+ 1	e 8 56	PP	e 17·0
Ville Marie		40·0	80	i 7 39	+ 1	—	—	—	—	23·4
St. Louis		42·2	99	e 7 55	− 1	e 14 24	+ 7	e 17 25	SS	i 22·3
Ottawa		43·1	80	i 8 1	− 3	e 17 53	SS	—	—	21·4
Shawinigan Falls		43·4	75	e 8 5	− 1	—	—	—	—	19·4
Cleveland		43·7	88	i 8 11k	+ 3	e 14 52	+13	e 18 2	SS	i 22·8
Seven Falls		43·8	74	—	—	e 17 56	SS	—	—	22·4
Harvard		47·2	78	i 8 36	0	—	—	—	—	i 24·3
Philadelphia		47·7	83	—	—	e 17 5	?	—	—	e 20·2
Vladivostok		48·0	284	e 8 35	− 8	e 15 37	− 4	—	—	—
Irkutsk		51·0	311	e 9 3	− 3	16 20	− 2	—	—	—
Sverdlovsk		57·8	342	9 48	− 7	e 17 44	−10	—	—	—
Paris		65·0	21	e 10 41	− 3	e 20 11	+45	e 14 55	PPP	e 34·4
Stuttgart		66·0	16	e 10 47	− 3	—	—	—	—	e 32·4
Strasbourg		66·0	17	i 10 49	− 1	e 19 23	−15	—	—	e 32·4
Andijan		70·6	329	e 11 46	+27	—	—	—	—	—
Grozny		72·2	350	e 11 30	+ 1	—	—	—	—	—
Samarkand		72·8	333	e 11 33	+ 1	—	—	—	—	—
Stalinabad		73·5	331	e 11 35	− 1	—	—	—	—	—
Alicante		74·7	26	e 11 12	−31	e 21 3	−16	21 44	PS	e 37·6
Leninakan		74·9	351	e 11 52?	+ 8	—	—	—	—	—
Granada		75·2	29	i 11 56k	+10	i 21 32	+ 7	12 17	P_cP	36·1
Malaga	z.	75·4	29	i 11 49k	+ 2	e 22 7	+40	12 4	pP	40·0
Almeria		75·7	28	11 50	+ 1	21 38	+ 8	12 2	P_cP	41·4
Ksara		82·3	356	e 11 56	−29	e 23 6	+26	—	—	—
Bombay		91·3	322	—	—	e 25 23?	PS	—	—	—
La Paz	z.	100·5	106	i 13 48	− 3	—	—	—	—	—

Additional readings :—
Tucson eS = 13m.30s., e = 15m.12s.
St. Louis iP = 7m.59s.
Alicante SS = 26m.4s.
Granada PPP = 15m.54s., SS = 26m.3s., SSS = 29m.29s.
Almeria PP = 14m.37s., PPP = 16m.26s., SS = 26m.28s.
Malaga PPZ = 15m.5s., ePPPZ = 17m.5s., SSZ = 27m.59s.
Long waves were also recorded at other American and European stations.

Oct. 15d. Readings also at 0h. (near Lick), 3h. (near Mineral), 6h. (near Lick (2)), 7h. (Stuttgart and near Zagreb), 10h. (Granada, Berkeley, and near Lick), 11h. (Paris), 13h. (near Lick), 15h. (near Andijan), 17h. (Stuttgart, Riverview, Berkeley, near Lick and near Apia), 18h. (San Juan), 22h. (Stuttgart and Zagreb).

Oct. 16d. 2h. 9m. 44s. Epicentre 64°·2N. 148°·3W. (as on 15d.).

Intensity VIII at Fairbanks and Nenana; VII at Beaver, Berg, Clear; VI at Central, Ferry, etc. Formation of many large fissures, landslides, and rock falls. The principal shocks of a series of more than 200.

Epicentres: 64° 5N. 148°·8W (L. M. Murphy). About 70km. S.W. of Fairbanks.
64°·2N. 149°·0W. (P. St. Amand). Macroseismic Radius 500km.

L. M. Murphy.
United States Earthquakes, Serial No. 730, Washington, 1950, p. 28.

P. St. Amand.
The Central Alaska earthquake swarm of Oct., 1947, Trans. Amer. Geophys. Union, Vol. 29, No. 5, Oct., 1948, p. 613-623, macroseismic chart, p. 619, plan of aftershocks p. 621.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		0·7	17	i 0 23	+ 6	—	—	—	—	—
Sitka		9·2	129	i 2 22	+ 6	i 4 48	S_g	—	—	—
Victoria		20·7	128	4 47	+ 3	8 41	+10	9 16	SS	10·3
Seattle		21·8	126	e 5 3	+ 7	i 9 28	+36	—	—	i 10·9
Grand Coulee		22·8	121	e 5 6	+ 1	e 9 25	+14	i 5 20	PP	—
Saskatoon		24·6	100	5 24	+ 1	9 50	+ 8	5 56	PP	—
Butte		26·8	115	i 5 42	− 2	i 10 42	+23	i 11 30	SS	i 12·1
Bozeman		27·7	114	e 5 53	+ 1	i 10 37	+ 4	e 8 15	P_cP	i 12·3
Shasta Dam		28·0	134	e 5 54	− 1	e 10 47	+ 9	i 6 28	PP	e 11·5
Mineral	E.	28·5	133	i 6 2	+ 3	e 10 53	+ 7	—	—	e 13·0
Ukiah		29·1	137	e 6 3	− 1	e 10 43	−13	e 7 7	pP	i 13·1
Berkeley		30·6	136	e 6 19	+ 1	e 11 33	+13	i 6 31	pP	e 17·2
San Francisco	N.	30·6	136	e 6 9	− 9	e 14 27	Q	i 6 21	pP	e 17·6
Logan		30·7	118	i 6 17	− 2	i 11 17	− 4	i 7 16	PP	i 12·5
Santa Clara		31·2	136	i 6 24	+ 1	e 11 39	+10	—	—	—
Lick		31·3	136	e 6 25	+ 1	e 11 40	+ 9	—	—	e 16·3
Salt Lake City		31·5	120	i 6 41	+15	e 11 21	−13	e 8 23	P_cP	e 11·9
Tinemaha		32·6	131	i 6 37a	+ 2	e 12 0	+ 9	i 8 9	PPP	—
Haiwee		33·5	131	i 6 45a	+ 2	—	—	i 6 57	pP	—
Santa Barbara		34·5	135	i 6 54	+ 2	i 12 33	+13	i 13 15	S_cP	—
Boulder City		34·7	127	i 6 55	+ 1	i 12 27	+ 3	i 7 7	pP	i 17·9
Pierce Ferry		34·9	126	i 6 57	+ 2	i 12 34	+ 7	i 7 9	pP	i 16·3
Denver		35·0	113	6 45	−11	11 24	−64	8 10	PP	—
Mount Wilson		35·2	133	i 6 59a	+ 1	e 12 41	+10	i 13 18	S_cP	—
Pasadena		35·3	133	i 6 59a	0	i 12 39	+ 6	e 13 15	S_cP	15·4
Riverside	N.	35·7	133	e 7 3	+ 1	—	—	—	—	—
Palomar		36·4	132	i 7 8a	0	—	—	i 13 21	S_cP	—
La Jolla		36·8	133	i 7 13a	+ 2	e 13 3	+ 7	e 13 22	S_cP	—
Tucson		39·5	125	i 7 36a	+ 2	i 13 38	+ 1	e 9 7	PP	i 16·9
Ville Marie		40·0	80	7 41	+ 3	13 54	+10	16 43	SS	20·3
Scoresby Sund		40·6	25	7 42a	− 1	13 54	0	9 17	PP	—
Chicago		40·8	93	i 7 43	− 2	i 13 53	− 3	i 9 18	PP	i 16·8
Ivigtut		41·5	46	i 7 49a	− 1	14 6	− 1	9 27	PP	—
Nemuro		41·9	274	e 8 24	+30	15 10	?	17 39	SS	21·0
Ann Arbor		42·1	89	e 7 38	−17	—	—	e 9 42	PP	—
St. Louis		42·2	99	i 7 56	0	i 14 14	− 3	i 8 6	pP	—
Hamilton		43·0	84	8 13	+10	14 45	+16	17 21	SS	21·3
Ottawa		43·1	80	i 8 2	− 2	14 28	− 2	9 49	PP	21·3
Honolulu		43·3	193	e 8 8	+ 3	e 14 27	− 6	e 10 11	PPP	e 17·7
Shawinigan Falls		43·4	75	8 5	− 1	14 34	− 1	17 34	SS	21·3
Cleveland		43·7	88	i 8 8a	0	e 14 41	+ 2	i 8 18	pP	—
Seven Falls		43·8	74	8 9	0	14 43	+ 3	9 47	PP	20·2
Cincinnati		44·3	92	8 14	+ 1	14 51	+ 3	10 12	PPP	—
New Kensington		45·3	87	i 8 21	0	i 15 4	+ 2	i 9 42	P_cP	i 18·5
Pennsylvania		45·9	86	i 8 21	− 5	i 15 13	+ 2	e 10 17	PP	—
Reykjavik		46·0	30	i 9 52	P_cP	15 22	+10	i 10 17	PP	e 22·2
Morioka		46·8	274	e 8 34	+ 1	15 26	+ 2	—	—	e 24·6
Harvard		47·2	78	i 8 34	− 2	i 15 30	+ 1	i 19 2	SS	i 30·0
Mizusawa		47·3	274	8 39	+ 2	e 15 39	+ 8	8 46	P	22·5
Sendai		47·3	273	e 8 49	+12	15 40	+ 9	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Weston		47·4	78	i 8 36	− 2	i 15 38	+ 6	i 10 36	PP	—
Fordham		47·5	82	e 8 38	0	i 15 39	+ 5	i 8 45	P	—
Philadelphia		47·7	83	i 8 37	− 3	i 15 26	−10	i 10 23	PP	i 20·6
Vladivostok		48·0	284	i 8 42	− 1	i 15 39	− 2	—	—	—
Hukusima		48·7	273	e 8 48	0	15 36	−14	—	—	e 23·3
Halifax		48·8	70	8 46	− 3	15 56	+ 4	19 16	SS	24·3
Mito		49·9	272	e 8 58	+ 1	16 13	+ 6	—	—	27·8
Columbia		50·1	93	e 8 58	− 1	i 16 16	+ 6	e 11 5	PP	e 19·7
Kumagaya		50·5	273	e 8 56	− 6	16 18	+ 2	—	—	e 24·5
Tokyo		50·8	272	e 9 2	− 2	16 7	−13	10 22	P_cP	28·0
Irkutsk		51·0	311	i 9 5	− 1	16 16	− 6	—	—	—
Shizuoka		52·0	273	9 13	0	16 44	+ 8	—	—	23·3
Nagoya		52·4	274	9 14	− 2	—	—	24 43	Q	29·1
Osaka		53·5	276	e 9 26	+ 2	16 55	− 2	10 26	PP	e 25·4
Bergen		54·1	16	9 36	+ 7	17 4	− 1	20 39	SS	23·8
Tacubaya		55·4	119	e 9 39	+ 1	i 17 33	+11	i 10 7	pP	—
Upsala		55·8	9	9 39a	− 2	17 30	+ 2	11 37	PP	e 23·3
Helsinki		55·8	5	i 9 40a	− 1	i 17 26	− 2	e 10 46	P_cP	e 24·8
Aberdeen	E.	56·2	22	i 9 48	+ 4	i 17 39	+ 6	i 11 40	PP	24·4
Hukuoka		56·6	279	i 9 48	+ 1	e 22 28	SSS	e 10 3	pP	25·9
Edinburgh		57·2	23	—	—	17 41	− 5	21 34	SS	—
Sverdlovsk		57·8	342	i 9 52	− 3	i 17 47	− 7	—	—	—
Kagosima		58·3	278	e 9 54	− 5	—	—	—	—	23·0
Durham		58·6	22	i 10 1	0	i 18 9	+ 5	i 10 10	pP	—
Bermuda		58·6	80	e 9 58	− 3	e 18 3	− 1	i 22 6	SS	e 23·3
Copenhagen		59·5	13	i 10 8	+ 1	i 18 19	+ 3	24 52	SSS	28·3
Moscow		60·3	357	i 10 13	0	i 18 28	+ 2	—	—	—
Kew		62·0	22	i 10 23a	− 1	e 18 51	+ 3	e 10 53	P_cP	e 28·8
De Bilt		62·2	18	i 10 25a	− 1	i 18 56	+ 5	i 12 42	PP	e 29·3
Potsdam		62·8	13	e 10 33	+ 3	e 19 10	+12	—	—	e 24·3
Nanking		62·9	288	e 10 32	+ 2	e 18 56	− 4	e 18 50	S	26·2
Uccle		63·4	20	e 10 33a	− 1	i 19 9	+ 3	e 23 16	SS	e 30·3
Warsaw		63·6	7	10 35a	0	e 19 10	+ 2	23 16	SS	e 26·3
Jersey		63·9	25	9 37	−60	19 17	+ 5	—	—	—
Collmberg	Z.	63·9	14	e 10 39	+ 2	—	—	i 13 25	PP	e 39·6
Jena		64·1	14	e 10 37	− 1	e 19 18	+ 4	e 13 2	PP	e 31·8
Paris		65·0	21	i 10 42a	− 2	i 19 28	+ 2	e 13 8	PP	e 30·3
Cheb		65·1	14	e 10 56	+11	i 19 32	+ 5	i 23 40	SS	—
Prague		65·3	12	i 10 44	− 2	e 19 22	− 7	e 23 28	SS	e 29·3
Stuttgart		66·0	16	i 10 49a	− 1	i 19 39	+ 1	e 24 1	SS	e 33·3
Strasbourg		66·0	17	i 10 50a	0	i 19 37	− 1	i 24 0	SS	e 28·9
Basle		67·0	17	e 10 56	− 1	e 19 42	− 8	e 22 48	?	—
Besançon		67·1	19	e 10 57	0	e 19 45	− 6	—	—	e 27·7
Almata		67·1	326	10 57	0	e 19 44	− 7	—	—	—
Zürich		67·3	17	e 10 57a	− 2	e 19 54	0	e 13 28	PP	—
Neuchatel		67·5	18	e 10 59	− 1	e 20 4	+ 8	—	—	—
Chur		67·9	17	e 11 2	0	e 20 8	+ 7	e 24 31	SS	—
Clermont-Ferrand		68·1	22	e 11 7	+ 3	i 20 10	+ 7	i 25 47	?	i 29·0
Budapest		68·2	9	11 4	0	20 8	+ 4	13 41	PP	30·8
Kalocsa		69·2	9	11 13	+ 3	e 20 22	+ 6	e 13 39	PP	e 28·8
Triest		69·6	14	e 11 16a	+ 3	i 20 24	+ 3	i 13 53	PP	—
Zagreb		69·6	12	e 11 12	− 1	e 20 22	+ 1	i 11 24	P_cP	e 32·6
Tchimkent		69·7	331	e 11 16	+ 2	—	—	—	—	—
San Juan		70·2	88	e 11 16	− 1	e 20 20	− 8	e 25 6	SS	e 28·2
Andijan		70·6	329	e 11 18	− 1	e 20 26	− 7	—	—	—
Tashkent		70·7	331	e 11 18	− 2	e 20 32	− 2	—	—	—
Belgrade		71·0	8	i 11 20a	− 2	i 20 40	+ 3	e 13 59	PP	e 38·5
Theodosia		71·1	358	e 11 25	+ 3	e 20 40	+ 2	—	—	—
Florence		71·2	16	i 11 21	− 2	i 20 39	− 1	—	—	—
Yalta		71·6	357	i 11 25	0	i 20 43	− 1	i 14 45	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bucharest		71·6	4	e 11 25	0	e 20 39	− 5	e 13 53	PP	34·3
Piatigorsk		71·7	352	e 11 27	+ 1	—	—	—	—	—
Grozny		72·2	350	11 31	+ 2	—	—	—	—	—
Barcelona		72·2	23	11 28	− 1	i 20 53	+ 2	28 41	SSS	—
Sotchi		72·4	355	e 11 29	− 1	—	—	—	—	—
Lisbon		72·5	33	11 29	− 1	20 54	0	11 39	pP	34·6
Tortosa		72·5	24	i 11 27	− 3	20 48	− 6	11 48	P_cP	34·3
Balboa Heights		72·8	105	e 11 30	− 2	e 20 53	− 5	—	—	e 33·1
Samarkand		72·8	333	e 11 32	0	e 20 54	− 4	—	—	—
Rome		73·2	15	i 11 33a	− 2	e 20 58	− 4	e 25 51	SS	e 34·3
Stalinabad		73·5	331	i 11 35	− 1	i 20 59	− 7	—	—	—
Alicante		74·7	26	i 11 45	+ 2	i 21 19	0	12 21	pP	i 36·2
Baku		74·8	347	11 45	+ 1	—	—	—	—	—
Leninakan		74·9	351	e 11 50	+ 6	—	—	—	—	—
Istanbul		75·1	2	i 11 45	− 1	i 21 29	+ 5	—	—	—
Granada		75·2	29	i 11 49k	+ 3	i 21 25	0	12 13	P_cP	i 34·3
Malaga	Z.	75·4	29	i 11 48k	+ 1	i 21 32	+ 5	i 12 12	pP	i 37·2
Erevan		75·5	350	e 11 49	+ 1	—	—	—	—	—
Fort de France		75·6	86	e 11 46	− 2	e 21 26	− 3	—	—	—
Almeria		75·7	28	i 11 48	− 1	i 21 35	+ 5	i 11 59	pP	32·6
Ashkabad		76·0	339	e 11 52	+ 1	i 21 34	0	—	—	—
Dehra Dun	N.	79·0	320	e 13 12	+65	e 23 0	PPS	e 32 4	Q	e 42·2
Bogota		79·0	103	e 12 8	+ 1	i 22 7	+ 1	i 12 21	pP	45·3
Apia		79·8	203	e 12 19	P_cP	e 19 31	?	—	—	e 35·8
Ksara		82·3	356	i 12 24	− 1	22 45	+ 5	—	—	—
Calcutta	E.	83·1	309	e 12 30	+ 1	i 22 51	+ 3	i 28 27	SS	—
Helwan		86·3	1	i 12 48k	+ 3	i 23 20	0	16 10	PP	—
Hyderabad	N.	91·1	316	13 0	− 8	24 2	− 2	16 39	PP	44·9
Bombay		91·3	322	e 13 8	− 1	i 24 9	+ 3	16 57	PP	41·6
Huancayo		93·5	111	e 13 22	+ 3	i 25 4	+39	i 17 24	PP	e 38·3
Kodaikanal		98·2	315	e 13 40	0	e 25 1	− 4	31 8	SS	45·8
Colombo	E.	100·5	312	15 16	?	—	—	—	—	50·7
La Paz		100·5	106	i 13 51	0	25 24	− 1	i 14 1	pP	49·3
Auckland		104·9	211	17 33	?	e 24 37	[−13]	—	—	48·7
Arapuni		105·8	210	e 15 46	?	e 26 40	?	—	—	47·4
Riverview		108·6	231	e 14 29	P	i 25 10	[+ 4]	i 18 59	PP	e 51·1
Wellington		109·1	210	18 19	?	i 25 1	[− 7]	38 28	SSS	49·1
Perth		120·8	290	—	—	i 40 48	SSS	i 30 6	PS	51·5
La Plata	E.	121·0	107	20 16	PP	25 56	[+ 3]	36 50	SS	62·8
	N.	121·0	107	20 22	PP	25 58	[+ 5]	36 51	SS	65·6
Tananarive		133·5	340	—	—	28 43	{+ 1}	40 21	SS	63·3
Antarctica		144·0	141	i 19 35	[− 2]	e 29 44	{− 1}	e 41 49	SS	e 59·3

Additional readings :—
Victoria PPP =5m.26s.
Saskatoon PPP =6m.7s.
Butte i =5m.50s. and 7m.56s.
Bozeman i =6m.3s., ePP =7m.1s.
Shasta Dam i =6m.6s., e =11m.13s.
Ukiah i =11m.48s.
Berkeley eE =6m.25s.
Logan i =6m.56s., iPPP? =8m.0s.
Lick iE =6m.36s., eSN =11m.44s.
Salt Lake City ePP =7m.47s.
Tinemaha iZ =6m.48s., 8m.42s., and 9m.28s., iS_cPZ =12m.10s.
Haiwee iZ =9m.27s.
Boulder City iPP =8m.12s., iPPP =8m.26s., iS? =11m.52s., iSS? =13m.20s.
Pierce Ferry iPP =8m.16s., iPPP =8m.32s., iSS? =13m.24s.
Denver 9m.45s.
Mount Wilson iN =9m.33s.
Pasadena i =7m.11s.$_c$, iN =9m.6s., iZ =9m.31s.
La Jolla i =7m.23s.
Tucson i =7m.48s., iPPP =9m.52s.
Ville Marie PP =9m.8s., PPP =9m.46s., SSS =18m.16s.?
Scoresby Sund 7m.55s., 9m.33s., 14m.9s., 16m.52s., and 17m.5s.
Chicago i =7m.50s. and 14m.32s.
Ivigtut 6m.21s., 6m.44s., and 17m.14s.
Nemuro SSS =18m.41s.
Ann Arbor i =8m.7s., e =21m.58s.

Continued on next page.

St. Louis iPP =9m.21s., e =13m.20s.
Hamilton PP =9m.49s.
Ottawa SSS =17m.58s.
Shawinigan Falls PP =9m.52s.
Cleveland iZ =10m.2s., eE =14m.34s., eZ =16m.4s., eSS?Z =17m.51s.
Seven Falls SS =16m.47s.
Cincinnati i =8m.23s.
Pennsylvania iN =8m.35s., iEN =15m.50s.
Reykjavik eEN =18m.53s. and 21m.14s.
Weston iSS =19m.12s.
Philadelphia i =9m.31s., ePPP =11m.6s., eS =15m.8s., iS_cS =18m.16s., iSS =19m.0s.
Halifax PP =10m.46s., SSS =20m.26s.
Columbia ePPP =12m.44s., eSS =18m.50s.
Tokyo PP? =11m.6s., PPP? =12m.13s.
Osaka PPP =12m.3s.
Bergen PSN =17m.24s.
Tacubaya e =9m.45s., iPP =10m.41s., iPPP =12m.34s., iP_cS =14m.45s., i =17m.13s., isS =18m.15s., eS_cS =19m.24s., iSS =21m.16s.
Upsala P_cPN =10m.49s., PPPN =12m.55s., SN =17m.17s.?, iN =17m.58s., iS_cSE = 19m.35s., eSS? =21m.35s., eE =21m.46s.
Helsinki ePP =11m.49s., e =12m.9s., ePPP =13m.39s., e =13m.57s., 15m.16s., 18m.3s., and 18m.53s., eS_cS =19m.27s., eSS =21m.26s., eSSS =23m.41s.
Aberdeen iPSE =18m.3s., iSSE =21m.35s., iSSSE =23m.13s.
Edinburgh S_cS =19m.38s.
Durham iPPN =12m.20s., iPPPN =13m.48s., isSN =18m.35s., iSSEN =22m.3s.
Bermuda i =10m.12s., ePP =12m.22s., ePPP =13m.46s., iS =18m.6s., eS_cS =19m.56s.
Copenhagen 11m.40s., 12m.21s., 17m.57s., S_cS =20m.3s., SS =22m.49s.
Kew ePP =12m.39s., eSSEN =22m.53s., eSSS =24m.46s.
De Bilt eSS =23m.4s., eSSS =26m.4s.
Uccle ePPN =12m.54s., ePPPN =14m.4s., iSE =19m.12s.
Warsaw ePE =10m.46s., PPN =13m.1s., ePPPZ =14m.41s., PPPN =14m.44s., P_cSZ = 18m.39s., P_cSN =18m.47s., eSZ =19m.24s., PSE =19m.37s., PPSN =19m.51s., iPPSZ =19m.58s., S_cSE =20m.24s., S_cSN =20m.30s., S_cSZ =20m.44s., eE = 21m.59s., SSEN =23m.26s., eE =25m.21s., SSSN =26m.2s., SSSE =26m.12s.
Collmberg iZ =10m.46s., 11m.20s., and 11m.37s., eZ =15m.2s.
Jena ePPN =13m.6s., eSN =19m.22s., eSSE =23m.32s., eSSN =23m.44s.
Paris i =10m.50s., eP_cP =11m.10s., ePP =13m.18s., ePPP =14m.58s., e =15m.46s., i =17m.0s., iS_cS =20m.32s., i =23m.10s., iSS =23m.16s., e =24m.16s. and 25m.16s., iSSS =26m.38s., i =27m.40s., e =29m.10s. and 29m.20s., iPKP,PKP =39m.30s.
Cheb ePP =14m.0s., i =21m.3s. and 22m.51s., iSSS =27m.1s., i =28m.17s.
Prague ePP =13m.16s., ePPP =14m.58s., e =26m.58s.
Stuttgart i =11m.1s. a, e =12m.46s., iPP =13m.30s., e =17m.3s., 18m.56s., and 20m.41s., eSSS =26m.41s., eQ? =29m.16s.
Strasbourg iP_ePP =11m.15s. and 11m.22s., iPP =13m.31s., iPPP =14m.33s. and 15m.1s., i =18m.43s., iS =19m.33s., iSP =19m.51s., iS_cS =20m.21s., iSS =23m.39s. and 23m.46s., iSSS =27m.23s., ePKP,PKP =39m.29s.
Zürich eSS =24m.7s.
Budapest PE =11m.8s., PPPN =15m.34s., ePPPE =15m.38s., PSE =20m.38s., PSN = 20m.44s., SSE =24m.38s., SSSEN =28m.6s.
Kalossa ePE =11m.16s., eE =11m.55s. and 12m.38s., eN =14m.10s., 15m.27s., and 20m.19s., eE =20m.44s.
Triest iSS =24m.36s., iSSS =27m.22s.
Zagreb iPPNE =14m.17s., eSS =25m.10s., eSSS =28m.24s.
San Juan ePPP =15m.34s., i =20m.31s., iS_cS =21m.23s.
Belgrade iP_cP =11m.46s., i =12m.39s., ePPP =14m.27s., eSS? =25m.26s., iSSS = 28m.37s., i =32m.23s.
Bucharest iN =21m.5s.
Barcelona PPP? =16m.12s.
Lisbon PP =14m.8s., PSNZ =21m.44s., E =23m.20s., SSN =25m.18s.
Tortosa iEN =11m.37s., PPE =14m.18s., PPPN =16m.4s., PSEN =21m.21s., $S_cS?N$ = 21m.30s., PPSEN =21m.39s., SSN =25m.19s., SSSE =28m.45s., QN =29m.42s.
Rome eSSS =29m.5s.
Alicante P_cP =12m.3s., sP =12m.41s., PP =14m.43s., P_cS =16m.5s., PPP =16m.37s., S_cS =21m.47s., SKS =21m.51s., sS =22m.21s., SS =26m.31s., SSS =29m.41s., Q =31m.42s.
Granada iPP =14m.37s., PPP =16m.10s., PS =22m.22s., iSS =26m.16s., SSS =30m.16s.
Malaga iPPZ =14m.40s., iPPPZ =16m.34s., iPSZ =22m.38s., iSSZ =26m.32s.
Almeria PP =14m.43s., PPP =16m.32s., S_cS =21m.55s., PS =22m.15s., SS =25m.29s., SSS =29m.47s.
Bogota iEZ =12m.14s. and 13m.33s., iPPEZ =15m.16s.
Calcutta iSSSE =31m.47s.
Helwan PSN =24m.22s., SSN =29m.0s.
Hyderabad PSN =25m.14s., SSN =29m.57s.
Bombay iSS =30m.9s.
Huancayo i =13m.34s.
La Paz iPPEZ =17m.51s., ipPPZ =17m.59s., iSKS =24m.32s., SKKS =25m.2s., PSE = 26m.58s., iSSE =32m.16s.
The readings for Auckland were decreased by one minute.

Continued on next page.

Auckland PPP =22m.16s., SKS =27m.42s., S =28m.34s., SS =34m.43s., SSS =38m.28s., Q =44m.58s.
Arapuni e =32m.16s. and 44m.16s.
Riverview iSKSE =25m.0s., eE =25m.45s., iSKKSN =26m.8s., iS?E =26m.47s., ePSN =28m.0s., eN =28m.42s., eE =28m.48s., iSSE =34m.11s., eQE =44m.46s.
Wellington iZ =19m.21s., i =19m.51s., PPZ =22m.6s., SKS =28m.26s., S? =29m.51s., S_cSP? =31m.26s., SS =35m.16s., PSPS? =35m.51s., iZ =39m.31s., i =43m.6s., Q =45m.52s.
La Plata E. PPP =22m.16s., 24m.58s., SKKS? =28m.17s., PPS =31m.16s., 34m.4s., PSS? =38m.47s., SSS =41m.16s., 44m.22s., 48m.46s., Q =52m.36s.
La Plata N. PPP =22m.34s., SKKS =27m.22s., PKKP? =28m.28s., PS =30m.14s., PPP? =35m.28s., SSS =40m.22s., 41m.22s., 46m.31s., 49m.16s., and 52m.4s., Q =55m.28s.
Antarctica iPKP =19m.39s., i =23m.19s., e =34m.46s.

Oct. 16d. 9h. 22m. 15s. Epicentre 64°·2N. 148°·3W. (as at 2h.).

		Δ	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
College		0·7	17	i 0 13	− 4	i 0 16	−12	—
Shasta Dam		28·0	134	e 5 55	0	—	—	—
Tinemaha	z.	32·6	131	e 6 32	− 3	—	—	—
Boulder City		34·7	127	e 6 50	− 4	—	—	—
Pierce Ferry		34·9	126	i 6 56	+ 1	—	—	—
Mount Wilson	z.	35·2	133	e 6 59	+ 1	—	—	—
Pasadena	z.	35·3	133	e 6 59	0	—	—	—
Palomar	z.	36·4	132	i 7 8	0	—	—	—
Kirkland Lake		39·1	80	e 7 31	0	—	—	e 20·2
Tucson		39·5	125	e 7 32	− 2	—	—	—
Ville Marie		40·0	80	e 7 33	− 5	—	—	e 19·7

Oct. 16d. 11h. 22m. 41s. Epicentre 64°·2N. 148°·3W. (as at 9h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		0·7	17	i 0 18	+ 1	i 0 20	− 8	—	—	—
Shasta Dam		28·0	134	e 5 54	− 1	—	—	—	—	—
Tinemaha	z.	32·6	131	e 6 37	+ 2	—	—	—	—	—
Boulder City		34·7	127	e 6 55	+ 1	—	—	—	—	—
Pierce Ferry		34·9	126	e 6 56	+ 1	—	—	—	—	—
Mount Wilson	z.	35·2	133	e 6 59	+ 1	—	—	—	—	—
Pasadena	z.	35·3	133	e 6 59	0	—	—	—	—	—
Palomar	z.	36·4	132	e 7 6	− 2	—	—	—	—	—
Kirkland Lake		39·1	80	e 7 31	0	—	—	—	—	—
Tucson		39·5	125	e 7 33	− 1	—	—	i 9 42	PPP	—
Ville Marie		40·0	80	e 7 37	− 1	—	—	—	—	e 20·7

Oct. 16d. Readings also at 0h. (Huancayo, Bogota, and near La Paz), 1h. (Port au Prince, near Malaga, Andijan, near Samarkand, and Stalinabad), 2h. (Granada, Stuttgart, Zürich, and near Mizusawa), 3h. (near Ashkabad), 4h. (Ashkabad, Grozny, Leninakan, and near Piatigorsk (2)), 8h. (Istanbul, Collmberg, Stuttgart, near Florence, Zagreb, Basle, and Zürich), 10h. (near Apia), 12h. (Kirkland Lake and Ville Marie), 13h. (near Andijan, Samarkand, and Stalinabad), 14h. (Harvard, Boulder City, Pierce Ferry, Ville Marie, Ottawa, Kirkland Lake, Apia, and near College), 15h. (Ksara, Istanbul, Stuttgart, and near Leninakan), 17h. (La Paz, Kirkland Lake, and Ville Marie), 18h. (near Triest), 19h. (near Tananarive), 21h. (La Paz and Uccle), 22h. (near Zagreb), 23h. (Calcutta).

Oct. 17d. 4h. 5m. 41s. Epicentre 8°·5S. 74°·0W. Depth of focus 0·020.

A = +·2727, B = −·9509, C = −·1468 ; δ = +13 ; h = +7 ;
D = −·961, E = −·276 ; G = −·040, H = +·141, K = −·989.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		3·8	201	i 0 57	− 2	i 1 31	−13	—	—	—
La Paz		9·8	145	i 2 19	+ 1	i 4 14	+ 8	—	—	5 2
Bogota		13·0	0	e 3 9	+ 9	i 5 42	+21	—	—	—
Tucson		53·6	321	i 9 5k	− 2	—	—	e 10 9	pP	—
Temiskaming		55·1	356	e 9 16	− 2	—	—	—	—	—
Kirkland Lake		56·6	356	e 9 29	+ 1	—	—	—	—	—
Palomar		58·2	318	i 9 39k	− 1	—	—	e 10 28	pP	—
Pierce Ferry		58·2	322	i 9 39	− 1	—	—	—	—	—
Boulder City		58·6	322	i 9 42	0	—	—	—	—	—
Riverside	z.	59·0	318	i 9 44	− 1	—	—	e 10 36	pP	—
Mount Wilson	z.	59·5	318	i 9 48	0	—	—	e 10 39	pP	—
Pasadena	z.	59·6	318	e 9 49	0	—	—	e 10 41	pP	—
Tinemaha		61·4	321	i 10 2	+ 1	—	—	e 10 54	pP	—
Shasta Dam		66·2	322	i 10 31	− 2	—	—	e 11 30	pP	—
Grand Coulee		68·8	329	e 10 48	− 1	—	—	—	—	—
Stuttgart	z.	91·9	41	e 12 53	+ 2	—	—	—	—	—

Additional readings :—
Riverside iZ = 10m.21s.
Shasta Dam e = 10m.46s. and 10m.59s.

Oct. 17d. 9h. 3m. 46s. Epicentre 20°·0N. 125°·0E.

Very doubtful determination. In any case the position is very uncertain and approximate.

A = −·5394, B = +·7703, C = +·3400 ; δ = −9 ; h = +5 ;
D = +·819, E = +·574 ; G = −·195, H = +·279, K = −·940.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Irkutsk		36·0	339	e 7 6	+ 1	12 49	+ 5	—	—	—
Hyderabad	N.	44·1	275	—	—	e 14 20	−25	—	—	—
Kodaikanal	E.	46·8	266	e 7 44	−49	—	—	—	—	—
Bombay	N.	49·1	278	e 8 40	−11	—	—	—	—	—
Andijan		49·1	307	e 8 50	− 1	—	—	—	—	—
Tashkent		51·5	308	e 8 45?	−24	e 16 14?	−15	—	—	—
Stalinabad		51·6	304	e 9 7	− 3	—	—	—	—	—
Samarkand		53·1	305	e 9 44	+23	—	—	—	—	—
Riverview	E.	59·1	154	—	—	e 19 26	?	e 22 56	SS	e 30·9
Sverdlovsk		59·5	325	e 10 5	− 2	18 10	− 6	—	—	—
Baku		66·2	307	e 11 5	+13	—	—	—	—	—
Grozny		68·9	310	e 11 6	− 3	—	—	—	—	—
Leninakan		70·7	308	e 11 31	+11	—	—	—	—	—
Ksara		78·4	302	e 12 5	+ 1	e 22 33	+33	—	—	—
Istanbul		81·4	310	e 11 43	−37	—	—	—	—	—
Warsaw		82·6	323	—	—	e 22 41	− 2	e 26 22	SS	e 43·2
Helwan	Z.	83·3	299	12 30	0	—	—	—	—	—
Stuttgart		90·9	323	e 13 9?	+ 2	—	—	e 16 27	PP	e 49·2
Shasta Dam		93·1	45	e 13 37	+20	—	—	—	—	—

Additional readings :—
Bombay eE = 8m.46s.
Helwan eZ = 12m.50s.
Shasta Dam e = 13m.44s.
Long waves were also recorded at other European stations.

Oct. 17d. 10h. 23m. 4s. Epicentre 64°·2N. 148°·3W. (as on 16d.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		0·7	17	i 0 14	− 3	i 0 18	−10	—	—	i 0·4
Grand Coulee		22·8	121	e 5 10	+ 5	e 12 5	L	—	—	(e 12·1)
Shasta Dam		28·0	134	e 5 52	− 3	—	—	e 7 11	PPP	—
Tinemaha	Z.	32·6	131	e 6 37	+ 2	—	—	—	—	—
Haiwee	Z.	33·5	131	e 6 46	+ 3	—	—	—	—	—
Boulder City		34·7	127	e 6 52	− 2	—	—	—	—	—
Pierce Ferry		34·9	126	i 6 57	+ 2	—	—	—	—	—
Mount Wilson	Z.	35·2	133	e 6 59	+ 1	—	—	—	—	—
Pasadena	Z.	35·3	133	e 6 59	0	—	—	—	—	—
Riverside	Z.	35·7	133	e 6 59	− 3	—	—	—	—	—
Palomar	Z.	36·4	132	i 7 10	+ 2	—	—	—	—	—
Kirkland Lake		39·1	80	e 7 32	+ 1	—	—	e 8 56	PP	e 25·7
Tucson		39·5	125	e 7 35	+ 1	—	—	—	—	—
Ville Marie		40·0	80	e 7 32	− 6	—	—	—	—	e 19·9
Ottawa		43·1	80	i 7 59	− 5	—	—	—	—	21·9
La Plata	E.	121·0	107	19 32	[+37]	29 19	{+119}	—	—	66·2
	N.	121·0	107	19 17	[+22]	28 50	{+ 90}	—	—	66·5

Additional readings :—
Shasta Dam e =5m.55s.
La Plata E. PP? =21m.37s., PPS? =37m.56s., PSS =42m.44s., 43m.56s., SSS =47m.26s., 54m.14s., 61m.9s., Q =63m.50s.
La Plata N. PP? =21m.37s., SKSP =32m.14s., PS =34m.8s., PPS =35m.2s., SS? = 39m.50s., SSS? =49m.32s., Q =63m.2s., readings wrongly identified.
Long waves were also recorded at Temiskaming, Cleveland, Butte, and Philadelphia.

Oct. 17d. 13h. 25m. 20s. Epicentre 45°·7N. 26°·8E. (as on 1946, Nov. 3d.).

A = +·6255, B = +·3160, C = +·7133 ; δ = −10 ; h = −4 ;
D = +·451, E = −·893 ; G = +·637, H = +·322, K = −·701.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bucharest		1·4	198	i 0 36	+ 9	i 0 57	+11	—	—	—
Belgrade		4·5	262	i 1 12	+ 1	i 2 3	− 2	i 1 19	P*	—
Istanbul		4·9	160	e 1 44	P_g	e 2 20	+ 5	—	—	—
Yalta		5·3	101	i 1 29	+ 7	i 3 2?	S_g	—	—	—
Budapest		5·6	291	1 29	+ 2	e 2 14	−19	1 45	P_g	3·0
Warsaw		7·5	332	e 2 56	+63	e 3 0	?	e 3 55	S_g	e 4·7
Zagreb		7·6	275	e 1 56	+ 1	e 4 11	S_g	—	—	—
Florence	N.	11·2	266	e 2 47	+ 3	e 3 59	−53	—	—	—
Moscow		12·1	30	e 2 57	0	e 6 2	S*	—	—	—
Stuttgart		12·4	291	e 2 57k	− 4	—	—	—	—	e 6·5
Zürich		12·7	284	e 3 5	0	e 5 31	+ 3	—	—	e 10·7
Strasbourg		13·3	290	i 3 9	− 4	i 6 5	+23	—	—	—
Leninakan		13·3	105	e 3 16	+ 3	—	—	—	—	—
Basle		13·4	285	e 3 10	− 4	e 5 50	+ 5	—	—	—
Grozny		13·7	93	e 3 10	− 8	—	—	—	—	—
Ksara		13·8	146	e 2 48	−31	e 4 59	?	—	—	—
Erevan		14·1	107	e 3 29	+ 6	—	—	—	—	—
Helwan		16·2	166	e 3 51	+ 1	e 6 58	+ 7	e 4 30	PP	e 7·8
Clermont-Ferrand		16·6	279	e 3 50	− 6	—	—	—	—	—
Paris		16·8	289	e 3 54	− 4	—	—	—	—	e 7·0
Baku		17·7	100	—	—	e 7 28	+ 2	—	—	—
Kew		18·8	298	—	—	e 7 43?	− 7	—	—	—
Antarctica		132·8	212	e 19 44	[+27]	—	—	—	—	—

Additional readings :—
Belgrade i =1m.44s. and 2m.11s.
Long waves also recorded at Jena and Copenhagen.

Oct. 17d. 13h. 51m. 58s. Epicentre 28°·0S. 70°·0W. Focus at base of superficial layers.
(as on 1942, Sept. 6d.).

Intensity VI between south latitudes 27° and 28°. Macroseismic radius 150km.

F. Greve.
Lista de sismos sensibles al hombre obtenidos por el servicio de postales informativas año, 1947. Instituto sismologico de la Universidad de Chile, p. 16.

$A = +·3024$, $B = -·8310$, $C = -·4670$; $\delta = +10$; $h = +2$;
$D = -·940$, $E = -·342$; $G = -·160$, $H = +·439$, $K = -·884$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m.	s.		m.
Montezuma		5·5	12	e 1 37	+15	e 2 24	− 1	—		—	e 2·7
La Paz		11·6	9	i 2 51	+ 5	i 5 45	+49	—		—	i 6·7
La Plata	E.	12·4	127	2 58a	+ 1	5 34	+19	3	6	PP	i 6·4
	N.	12·4	127	2 58	+ 1	5 24	+ 9	3	6	PP	6·3
	Z.	12·4	127	2 56	− 1	5 33	+18	3	6	PP	6·4
Huancayo		16·6	341	e 3 53	+ 1	i 7 9	+15	i 4	3	pP	e 7·6
Punta Arenas		25·1	181	5 46	+23	9 42	− 1	11	1	Q	14·0
Bogota		32·7	353	e 6 32	+ 1	e 11 52	+ 8	e 7	43	PP	16·0
Antarctica		40·3	178	(i 7 38)	+ 2	—	—	(e 16	58)	SS	(e 22·5)
Fort de France		43·3	13	e 7 57	− 3	—	—	—		—	—
Tucson		71·4	324	i 11 16	− 3	—	—	—		—	—
Temiskaming		74·8	354	e 11 36	− 3	—	—	—		—	—
Ville Marie		75·4	354	e 11 39	− 3	—	—	e 11	48	pP	—
Palomar		75·5	321	i 11 41a	− 2	—	—	—		—	—
Pierce Ferry		76·1	325	i 11 44	− 2	—	—	i 11	54	pP	—
Riverside	z.	76·2	321	i 11 45	− 2	—	—	i 11	54	pP	—
Kirkland Lake		76·3	354	e 11 47	0	—	—	—		—	—
Boulder City		76·4	324	e 11 47	− 1	—	—	e 11	55	pP	—
Mount Wilson	z.	76·8	321	e 11 49	− 1	—	—	e 11	58	pP	—
Pasadena	z.	76·8	321	e 11 48	− 2	—	—	e 11	57	pP	—
Santa Barbara	z.	77·9	320	e 11 55	− 1	—	—	—		—	—
Haiwee	z.	78·2	322	i 11 57	− 1	—	—	—		—	—
Tinemaha		79·0	322	i 12 1	− 1	—	—	i 12	9	pP	—
Shasta Dam		83·9	323	e 12 25	− 3	—	—	—		—	—
Grand Coulee		87·4	330	e 12 52	+ 7	—	—	—		—	—
Malaga	z.	89·1	47	i 12 55	+ 2	23 29	− 8	16	29	PP	51·2
Istanbul		114·3	55	e 20 7?	PP	e 29 2?	PS	—		—	—
Ksara		117·4	65	e 20 1	PP	e 30 37	PPS	—		—	—
Stalinabad		144·2	61	e 19 35	[+ 3]	i 23 4	PKS	—		—	—
Tashkent		144·3	57	e 19 35	[+ 2]	—	—	i 21	59	?	—

Additional readings and notes :—
Santa Lucia (△ =5°·5), PN =13h.51m.1s., SN =13h.51m.58s., L =13m.52m.13s.
La Plata E =4m.8s., N =4m.29s., Z =4m.49s., SN =5m.31s.
Bogota eSSEN =12m.58s.
Santa Barbara eZ =12m.46s.
Tinemaha eZ =12m.34s.
Grand Coulee e =13m.29s.
Malaga PPZ =13m.59s., eSKZ =19m.45s., SSZ =29m.59s., PKP,SKSZ =38m.55s.,
P and S are given as PKP and PS respectively and true PP as PPP.
Long waves are also given at Bombay and other European stations.

Oct. 17d. Readings also at 0h. (Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Boulder City, Shasta Dam, Kirkland Lake, and Ville Marie), 1h. (La Paz), 5h. (near Samarkand, Stalinabad, and Tashkent), 8h. (Pierce Ferry), 11h. (Boulder City, Pierce Ferry, and Istanbul), 12h. (Vladivostok), 13h. (Paris), 14h. (near Andijan, Tchimkent, and near Mizusawa), 15h. (Paris), 16h. (Riverview, Wellington, Auckland, and Paris), 17h. (near Alicante and near Ottawa), 20h. (near Erevan), 21h. (near Apia), 22h. (near Balboa Heights), 23h. (Bombay, Vladivostok, and Stuttgart).

Oct. 18d. 1h. S.W. Pacific, probably deep.

Auckland S? =5m.46s., L? =7m.45s.?
Arapuni S? =6m.0s.
Riverview iPZ =6m.24s.s, ePPZ =7m.24s., iE =7m.28s., eSE =11m.28s., eE =11m.31s., eN =12m.34s., eQE =13·2m., eLZ =13·6m.
Wellington S? =6m.23s., iZ =7m.10s., L =8m.
Antarctica iP =11m.53s., e =21m.2s.
Pasadena iPZ =13m.5s., ipPZ =13m.21s.
Mount Wilson iPZ =13m.6s., ipPZ =13m.23s.
Palomar iPNZ =13m.8s., ipPZ =13m.24s., iZ =13m.43s.
Riverside iPZ =13m.8s., ipPZ =13m.23s.
Haiwee iPZ =13m.14s., ipPZ =13m.29s.
Tinemaha iPEZ =13m.14s., ipPZ =13m.31s.
Shasta Dam iP =13m.15s., ipP =13m.31s.
Boulder City iP =13m.23s., ipP =13m.40s.
Tucson iP =13m.24s., ipP =13m.40s.
Pierce Ferry iP =13m.26s., ipP =13m.43s.
Istanbul e =20m., eL =93m.?
Ksara ePKP 20m.26s.?, PP 24m.9s.?
Helwan eZ =20m.55s.
Stuttgart eZ =20m.30s., and 21m.11s., eL? =90m.
Long waves were also recorded at Strasbourg.

Oct. 18d. Readings also at 1h. (Strasbourg), 4h. (Tucson, Boulder City, Pierce Ferry, La Paz, Bogota, and near Balboa Heights), 7h. (Samarkand, near Andijan and Stalinabad), 8h. (La Paz), 11h. (Antarctica and Stuttgart), 12h. (Riverside and Theodosia), 13h. (Stuttgart, Pasadena, Mount Wilson, Palomar, Tucson, Pierce Ferry, Boulder City, and Shasta Dam), 16h. (Boulder City, and near Pierce Ferry), 18h. (Temiskaming and near Ottawa), 19h. (near Stalinabad), 20h. (Stuttgart, Boulder City, Pierce Ferry, Shasta Dam, and Mizusawa), 21h. (Tucson and Pierce Ferry), 23h. (Stuttgart, Tucson, Boulder City, Pierce Ferry, and Balboa Heights).

Oct. 19d. 12h. 42m. 49s. Epicentre 64°·2N. 148°·3W. (as on 17d.).

		Δ	Az.	P.	O−C.	S.	O−C.		Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
College		0·7	17	i 0 13	− 4	i 0 20	− 8	—	—	—
Sitka		9·2	129	e 2 33	+17	e 4 49	S*	—	—	e 5·0
Seattle		21·8	126	e 6 6	+70	e 10 3	+71	—	—	e 11·2
Grand Coulee		22·8	121	e 5 4	− 1	e 7 42	−89	—	—	e 12·1
Shasta Dam		28·0	134	i 5 55	0	—	—	i 9 7	PcP	e 12·3
Tinemaha		32·6	131	i 6 36	+ 1	—	—	i 9 20	PcP	—
Haiwee	z.	33·5	131	i 6 44	+ 1	—	—	i 9 22	PcP	—
Boulder City		34·7	127	i 6 56	+ 2	i 13 13	ScP	i 9 27	PcP	—
Pierce Ferry		34·9	126	i 6 56	+ 1	—	—	—	—	—
Mount Wilson	z.	35·2	133	i 6 58	0	e 13 14	ScP	i 9 27	PcP	—
Pasadena	z.	35·3	133	i 6 58	− 1	—	—	i 9 27	PcP	—
Riverside	z.	35·7	133	i 7 1	− 1	—	—	i 9 28	PcP	—
Palomar		36·4	132	i 7 9a	+ 1	e 13 18	ScP	i 9 31	PcP	—
La Jolla	z.	36·8	133	e 7 12	+ 1	—	—	—	—	—
Kirkland Lake		39·1	80	e 7 30	− 1	—	—	e 8 59	PP	e 19·8
Tucson		39·5	125	e 7 35k	+ 1	e 13 30	− 7	e 9 41	PcP	e 15·4
Ville Marie		40·0	80	e 7 35	− 3	—	—	—	—	e 20·1
Ottawa		43·1	80	i 8 1	− 3	—	—	—	—	22·2
Paris		65·0	21	e 10 43	− 1	—	—	—	—	—
Stuttgart	z.	66·0	16	e 10 46	− 4	—	—	—	—	—
Strasbourg		66·0	17	i 10 48	− 2	—	—	—	—	—

Additional readings :—
Shasta Dam i =5m.58s.
Tinemaha iZ =6m.39s.
Mount Wilson iZ =7m.1s.
Pasadena iZ =7m.1s.
Riverside iZ =7m.5s.
Palomar iZ =7m.12s.
Long waves were also recorded at Bozeman, Butte, Salt Lake City, and Cleveland.

Oct. 19d. Readings also at 2h. (Apia and Istanbul), 4h. (near Florence), 9h. (La Paz), 18h. (Antarctica), 20h. (near Ottawa), 21h. (near Huancayo).

Oct. 20d. 1h. 43m.16s. Epicentre 64°·2N. 148·3W. (as on 19d.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		0·7	17	i 0 14	− 3	—	—	—	—	—
Sitka		9·2	129	e 2 20	+ 4	i 4 6	+ 3	—	—	i 4·7
Victoria		20·7	128	4 49	+ 5	i 8 46	+15	5 14	PP	10·7
Grand Coulee		22·8	121	e 5 4	− 1	e 9 24	+13	—	—	i 12·2
Saskatoon		24·6	100	5 23	0	9 53	+11	6 14	PPP	12·7
Butte		26·8	115	e 5 44	0	e 10 21	+ 2	e 6 52	PPP	i 11·8
Ferndale		27·5	137	e 6 16	+26	e 11 4	+34	—	—	e 15·9
Bozeman		27·7	114	e 5 54	+ 2	e 10 32	− 1	e 6 54	PPP	i 11·2
Shasta Dam		28·0	134	e 5 53	− 2	e 10 41	+ 3	e 8 57	P_cP	i 12·8
Ukiah		29·1	137	e 5 53	−11	e 11 3	+ 7	—	—	—
Berkeley		30·6	136	i 6 17	− 1	i 11 22	+ 2	i 9 18	P_cP	e 15·2
San Francisco		30·6	136	e 6 21	+ 3	e 15 27	L	—	—	(e 15·4)
Logan		30·7	118	i 6 16	− 3	i 11 19	− 2	i 7 27	PP	e 11·8
Santa Clara		31·2	136	e 6 21	− 2	e 11 51	+22	—	—	e 15·6
Lick		31·3	136	e 6 24	0	e 11 33	+ 2	—	—	e 17·9
Salt Lake City		31·5	120	e 6 39	+13	e 11 51	+17	e 7 59	PP	e 11·9
Rapid City		32·2	106	e 6 38	+ 6	e 12 20	+35	e 8 56	P_cP	i 14·2
Tinemaha		32·6	131	i 6 36a	+ 1	e 11 20	−31	i 8 53	P_cP	—
Haiwee		33·5	131	i 6 43a	0	i 11 37	−28	i 9 28	P_cP	—
Santa Barbara		34·5	135	e 6 52	0	e 12 7	−13	i 9 7	P_cP	—
Boulder City		34·7	127	i 6 54	0	i 11 57	−27	i 7 6	pP	e 16·6
Pierce Ferry		34·9	126	i 6 54	− 1	i 11 52	−35	i 7 6	pP	e 16·2
Mount Wilson		35·2	133	i 6 58	0	—	—	—	—	—
Pasadena		35·3	133	i 6 58a	− 1	e 12 38	+ 5	i 9 31	P_cP	e 15·5
Riverside	z.	35·7	133	i 7 1a	− 1	—	—	i 9 16	P_cP	—
Palomar		36·4	132	i 7 8a	0	i 13 25	+35	—	—	—
La Jolla		36·8	133	e 7 11	0	e 13 3	+ 7	—	—	—
Kirkland Lake		39·1	80	7 29	− 2	13 45	+14	9 0	PP	18·7
Tucson		39·5	125	i 7 34a	0	e 13 36	− 1	e 9 9	PP	e 16·6
Ville Marie		40·0	80	7 37	− 1	13 51	+ 7	9 7	PP	19·7
Scoresby Sund		40·6	25	7 43a	0	13 46	− 8	9 27	PP	—
Ivigtut		41·5	46	7 53	+ 3	14 8	+ 1	—	—	17·7
St. Louis		42·2	99	e 7 55	− 1	i 14 21	+ 4	i 9 34	PP	i 20·8
Ottawa		43·1	80	8 1	− 3	14 28	− 2	9 46	PP	21·7
Honolulu		43·3	193	e 8 10	+ 5	e 14 30	− 3	—	—	e 17·7
Shawinigan Falls		43·4	75	8 3	− 3	18 8	SSS	9 49	PP	20·7
Cleveland		43·7	88	e 8 7	− 1	i 14 40	+ 1	e 17 32	SS	—
Seven Falls		43·8	74	8 7	− 2	14 37	− 3	9 46	PP	20·7
Cincinnati		44·3	92	e 8 13	0	e 14 55	+ 7	10 0	PP	—
New Kensington		45·3	87	e 8 20	− 1	e 15 7	+ 5	e 10 3	PP	e 18·5
Reykjavik		46·0	30	i 7 10	?	—	—	—	—	e 24·2
Harvard		47·2	78	e 8 37	+ 1	e 15 44	+15	e 10 34	PP	i 24·5
Weston		47·4	78	e 8 35	− 3	e 15 40	+ 8	10 32	PP	—
Fordham		47·5	82	e 8 42	+ 4	e 15 57	+23	i 10 42	PP	i 24·5
Philadelphia		47·7	83	e 8 42	+ 2	e 15 34	− 2	e 10 36	PP	e 21·0
Georgetown		47·8	86	i 8 40	− 1	i 15 17	−21	e 10 28	PP	22·7
Vladivostok		48·0	284	e 8 42	− 1	i 15 37	− 4	—	—	—
Halifax		48·8	10	8 50	+ 1	15 46	− 6	10 38	PP	24·7
Columbia		50·1	93	e 9 3	+ 4	e 16 10	0	e 11 4	PP	—
Irkutsk		51·0	311	9 4	− 2	i 16 23	+ 1	—	—	—
Bergen		54·1	16	e 9 29	0	—	—	e 11 29	PP	25·4
Tacubaya		55·4	119	e 9 42	+ 4	e 17 36?	+14	i 11 50	PP	e 27·6
Helsinki		55·8	5	e 9 33a	− 8	e 17 19	− 9	e 21 7	SS	e 24·2
Upsala		55·8	9	e 9 44	+ 3	e 17 14	−14	e 21 31	SS	e 23·7
Aberdeen	E.	56·2	22	e 16 31	?	i 17 38	+ 5	i 21 21	SS	23·6
Edinburgh		57·2	23	—	—	e 17 44	− 2	—	—	—
Sverdlovsk		57·8	342	9 50	− 5	17 43	−11	—	—	—
Bermuda		58·6	80	e 10 10	+ 9	e 18 9	+ 5	e 12 24	PP	e 24·4
Copenhagen		59·5	13	i 10 6	− 1	18 18	+ 2	13 51	PPP	27·7
Moscow		60·3	357	i 10 11	− 2	i 18 26	0	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kew		62·0	22	i 10 21k	− 3	e 18 46†	− 2	i 11 0	PcP	e 28·7
De Bilt		62·2	18	i 10 26k	0	e 18 50	− 1	i 12 36	PP	e 26·7
Potsdam	N.	62·8	13	e 10 38	+ 8	—	—	—	—	e 30·7
Uccle		63·4	20	e 10 32a	− 2	e 19 4	− 2	e 12 50	PP	e 30·7
Warsaw		63·6	7	10 31a	− 4	e 19 8	0	10 47	PcP	e 27·7
Collmberg	Z.	63·9	14	e 10 38	+ 1	—	—	—	—	—
Jena		64·1	14	e 10 37	− 1	e 19 14	0	—	—	—
Paris		65·0	21	i 10 44k	0	i 19 36	+10	i 13 18	PP	e 30·7
Cheb		65·1	14	e 10 48	+ 3	e 19 30	+ 3	e 19 55	PS	e 32·7
Prague		65·3	12	10 47†	+ 1	e 19 24	− 5	e 24 2	SS	e 30·7
Strasbourg		66·0	17	i 10 49k	− 1	e 19 44	+ 6	i 13 4	PP	e 31·7
Stuttgart		66·0	16	e 10 47	− 3	e 19 39	+ 1	e 13 22	PP	e 31·7
Basle		67·0	17	e 10 53	− 4	e 20 49	PPS	—	—	—
Almata		67·1	326	e 10 58	+ 1	—	—	—	—	—
Zürich		67·3	17	e 11 1	+ 2	—	—	e 13 24	PP	e 39·2
Neuchatel		67·5	18	e 10 57	− 3	—	—	—	—	—
Chur		67·9	17	e 10 59	− 3	—	—	—	—	—
Clermont-Ferrand		68·1	22	e 11 1	− 3	i 20 3	0	e 24 33	SS	30·2
Budapest		68·2	9	11 4	0	e 20 5	+ 1	15 34	PPP	e 33·7
Kalossa	N.	69·2	9	e 11 14	+ 4	—	—	—	—	—
Triest		69·6	14	e 11 15	+ 2	e 20 26	+ 5	—	—	—
Zagreb		69·6	12	e 11 11	− 2	—	—	e 11 22	PcP	e 32·7
Tchimkent		69·7	331	e 11 16	+ 2	—	—	—	—	—
San Juan		70·2	88	e 11 4	−13	e 20 24	− 4	e 13 58	PP	e 28·3
Andijan		70·6	329	e 11 23	+ 4	—	—	—	—	—
Tashkent		70·7	331	e 11 26	+ 6	e 20 38	+ 4	—	—	—
Belgrade		71·0	8	i 11·19	− 3	e 20 39	+ 2	e 11 38	PcP	e 34·7
Theodosia		71·1	358	e 11 20	− 2	—	—	—	—	—
Florence		71·2	16	i 11 37	+14	i 20 40	0	—	—	—
Bucharest		71·6	4	e 16 38	PPP	—	—	—	—	27·7
Barcelona		72·2	23	e 11 30	+ 1	e 20 55	+ 4	—	—	—
Sotchi		72·4	355	e 11 22	− 8	—	—	—	—	—
Tortosa	N.	72·5	24	i 11 29	− 1	21 1	+ 7	11 47	PcP	36·9
Lisbon		72·5	33	11 25	− 5	—	—	14 9	PP	28·9
Balboa Heights		72·8	105	e 11 34	+ 2	—	—	—	—	—
Samarkand		72·8	333	e 11 32	0	—	—	—	—	—
Stalinabad		73·5	331	i 11 34	− 2	i 20 58	− 8	—	—	—
Alicante		74·7	26	i 11 48	+ 5	i 21 23	+ 4	12 27	pP	e 36·2
Baku		74·8	347	11 47	+ 3	—	—	—	—	—
Leninakan		74·9	351	e 11 50	+ 6	—	—	—	—	—
Istanbul		75·1	2	i 11 45	− 1	e 21 25	+ 1	—	—	—
Granada		75·2	29	i 11 47a	+ 1	i 21 27	+ 2	12 14	PcP	31·6
Malaga	Z.	75·4	29	i 11 48k	+ 1	i 21 21	− 6	12 10	pP	37·3
Fort de France		75·6	86	e 11 43	− 5	e 21 33	+ 4	—	—	—
Almeria		75·7	28	i 11 40	− 9	21 32	+ 2	11 54	PcP	34·2
Ksara		82·3	356	e 12 24	− 1	23 37	PS	—	—	—
Helwan		86·3	1	12 44	− 1	23 14	− 6	16 5	PP	—
Hyderabad	N.	91·1	316	e 13 4	− 4	23 52	{+ 2}	16 40	PP	—
Bombay		91·3	322	e 13 8	− 1	e 24 8	+ 2	16 51	PP	41·6
Huancayo		93·5	111	e 13 19	0	e 24 4	[+11]	—	—	e 38·3
Colombo	E.	100·5	312	23 35	?	—	—	—	—	46·7
La Paz		100·5	106	i 13 54	+ 3	i 24 36	[+ 7]	18 0	PP	48·5
Riverview		108·6	231	e 31 9	?	e 35 14	SS	e 45 50	Q	e 52·3
Wellington		109·1	210	13 44	?	35 2	SS	45 44†	Q	52·2
Antarctica		144·0	141	i 19 35	[− 2]	—	—	—	—	68·7

Additional readings :—
Victoria SS =9m.44s.
Butte eP_cP =8m.29s.
Ferndale eE =6m.20s., eSE =11m.8s.
Bozeman e =10m.52s.
Shasta Dam i =6m.4s.
Berkeley iPE =6m.22s., iSZ =11m.27s., eSN =11m.31s.
San Francisco ePE =6m.24s.
Logan iPPP? =8m.4s., iP_cP =9m.1s.

Continued on next page.

Tinemaha iZ =6m.43s. and 9m.23s., iS_cPZ =13m.11s.
Santa Barbara iZ =9m.33s.
Boulder City iPP =8m.26s., iPPP? =8m.38s., iSS =12m.49s.
Pierce Ferry iPP =8m.24s., iPPP? =8m.34s., iSS =12m.43s.
Pasadena i =7m.4s., iSN =12m.45s.
Riverside iEZ =7m.5s., iZ =9m.31s. and 11m.44s.
Palomar iZ =7m.12s.a.
Kirkland Lake SS =16m.26s.
Tucson i =7m.39s. and 8m.6s., eP_cP =9m.37s., ePPP =9m.51s.
Ville Marie SSS =17m.1s.
Scoresby Sund 9m.54s., 14m.3s., and 16m.20s.
St. Louis i =7m.58s., iSS =17m.20s.
Ottawa SS =17m.34s.
Seven Falls SS =17m.33s.
Cleveland iPNZ =8m.13s., i =10m.0s., iSE =14m.46s., iN =17m.59s.
Cincinnati SS =18m.10s.
Harvard eSS =19m.17s.
Weston SS =19m.14s.
Fordham iSS =19m.13s.
Philadelphia e =15m.42s., eS_cS =18m.42s., iSS =19m.5s.
Georgetown i =10m.37s., SS =18m.44s.?
Halifax SS =19m.24s.
Columbia eSS =19m.44s.
Tacubaya e =13m.48s., eS_cS =19m.30s.
Upsala eS?N =17m.44s.
Bermuda ePPP? =13m.44s., e =18m.16s., eS_cS =20m.2s., eSS =22m.0s.
Copenhagen 19m.57s. and 24m.56s.
Kew ePP =12m.49s.?, ePPP =14m.11s.?, eP_cSZ =14m.54s., ePPSN =19m.17s., eS_cSE =19m.58s.?, eSS =22m.51s.?, eSSSEZ =25m.24s.?
De Bilt eSS =23m.1s.
Uccle ePS =19m.30s., eSSN =22m.54s., eSSSE =26m.8s.
Warsaw iPZ =10m.36s.a, eE =10m.41s., eN =11m.1s., eE =11m.51s., PPZ =13m.20s., PPPE =14m.40s., PPPN =15m.6s., eSN =19m.16s., PSE =19m.30s., PSZ = 19m.35s., SSE =23m.17s., eN =23m.38s. and 25m.1s., SSSE =26m.32s., eN = 27m.30s.
Jena eN =19m.18s.
Paris iP =10m.50s., ePPP =15m.0s., e =16m.40s., eSS =23m.40s., e =24m.56s., SSS = 26m.56s., iPKP,PKP =39m.32s.
Cheb e =26m.48s.
Prague eSSS =26m.44s.
Strasbourg iPPP? =14m.27s., e =15m.58s., i =16m.14s., ePS =20m.7s., iPPS =20m.34s., iS_cS =21m.1s., eSS =23m.53s., and 24m.4s., iSSS =27m.23s., eSSS =27m.30s., ePKP,PKP =39m.33s.
Stuttgart iP =10m.51s.k, iZ =10m.57s., e =15m.56s., eS_cS? =20m.28s., e =23m.44s., and 25m.12s., eSSS? =27m.15s., ePKP,PKPZ =39m.24s.
Clermont-Ferrand eSSS =27m.53s.
Budapest SE =20m.29s., eSSE =24m.53s., eSSN =24m.59s., eSSSE =28m.4s.
Kalocsa eE =11m.23s.
Zagreb ePKP,PKP =39m.20s.
San Juan e =12m.0s., iS =20m.34s., eS_cS =21m.28s., eSS? =24m.31s.
Belgrade e =12m.28s., and 13m.44s., eSS =25m.46s., eSSS? =28m.5s.
Tortosa PPN =14m.33s., PPPN =16m.5s., PSN =21m.27s., SSN =25m.47s., SSSN = 29m.0s., QN =29m.54s.
Alicante P_cP =12m.18s., PPP =16m.23s., SS =26m.16s., SSS =30m.45s.
Granada PP =15m.32s., SS =25m.53s.
Malaga PPZ =14m.43s., PPPZ =16m.24s., PSZ =22m.28s., SSZ =26m.18s.
Almeria PP =14m.38s., PPP =16m.24s., S_cS =22m.0s., PPS =22m.32s., SS =26m.28s., SSS =29m.48s.
Helwan PPPZ =18m.5s., PPSN =24m.38s.
Hyderabad SKSN =23m.33s., SSN =29m.59s.
Bombay eSSE =30m.1s.
La Paz iSKKS =25m.10s., S =25m.44s., iPS =27m.0s., SS =32m.0s.
Antarctica iPKP =19m.41s., i =19m.46s. and 27m.50s.
Long waves were also recorded at Auckland, Mizusawa, Calcutta, and Besançon.

Oct. 20d. 2h. 2m. 22s. Epicentre 37°·6N. 141°·7E. Depth of focus 0·005.
(as on 1940, Feb. 9d.).

Intensity IV at Hukusima, Mito, Kakioka, and Tukubasan; II-III at Sendai, Onahama, Utunomiya, and Morioka.

Seismo. Bull. Cent. Met. Obs., Japan, 1947. Tokyo, 1950, p. 38, with macroseismic chart. Epicentre 37°·5N. 141°·7E., depth of focus 60km. Macroseismic radius 200-300km.

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

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Onahama		0·9	224	0 21	+ 3	0 31	0
Sendai		0·9	317	0 18k	0	0 29	− 2
Hukusima		1·0	279	0 17k	− 2	0 28	− 5
Mito		1·5	219	0 26	0	0 43	− 2
Mizusawa	E.	1·6	344	0 29	+ 2	0 47	0
Kakioka		1·8	222	0 28	− 2	0 46	− 6
Utunomiya		1·8	234	0 28	− 2	0 46	− 6
Tukubasan		1·9	223	0 29	− 2	0 49	− 5
Miyako		2·1	6	0 34	0	0 58	− 1
Morioka		2·1	349	0 34a	0	0 58	− 1
Kumagaya		2·4	232	0 31	− 7	0 56	−11
Maebasi		2·4	240	0 38	0	1 5	− 2
Akita		2·5	329	1 15	?	—	—
Tokyo		2·5	219	0 37	− 2	1 4	− 5
Aikawa		2·8	279	0 42	− 2	—	—
Hatinohe		3·0	357	0 43	− 4	1 18	− 4
Mera		3·0	209	1 20	S	(1 20)	− 2
Nagano		3·0	252	0 46	− 1	—	—
Misima		3·2	222	0 58	+ 9	—	—
Wazima		3·8	269	0 48	−10	1 36	− 6
Gihu		4·5	243	1 51	S	(1 51)	− 8
Nagoya		4·5	239	1 33	S	(1 33)	−26
Hikone		4·9	244	2 2	S	(2 2)	− 7

Oct. 20d. 12h. 17m. 24s. Epicentre 49°·5N. 156°·2E. Depth of focus 0·005.
(as on 1943, Nov. 29d.).

$A = -·5966$, $B = +·2631$, $C = +·7582$; $\delta = +2$; $h = -5$;
$D = +·404$, $E = +·915$; $G = -·694$, $H = +·306$, $K = -·652$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vladivostok		17·9	258	e 4 8	+ 2	i 7 27	+ 7	—	—	—
Grand Coulee		53·1	57	e 9 11	− 2	—	—	—	—	—
Shasta Dam		55·5	66	e 9 33	+ 2	—	—	e 11 34	PP	—
Tinemaha	z.	60·3	68	i 10 7	+ 3	—	—	i 10 20	pP	—
Haiwee	z.	61·1	68	e 10 11	+ 1	—	—	e 10 25	pP	—
Mount Wilson	z.	62·3	70	e 10 19	+ 1	—	—	i 10 34	pP	—
Pasadena	z.	62·3	70	e 10 19	+ 1	—	—	—	—	—
Riverside	z.	62·9	70	i 10 23	+ 1	—	—	e 10 37	pP	—
Boulder City		63·1	66	i 10 25	+ 2	—	—	i 10 39	pP	—
Pierce Ferry		63·5	65	i 10 28	+ 2	—	—	i 10 44	pP	—
Palomar	z.	63·6	70	i 10 28	+ 2	—	—	i 10 41	pP	—
Tucson		68·0	67	i 10 56a	+ 2	—	—	e 11 10	pP	—
Stuttgart		78·1	339	e 11 51	− 3	—	—	—	—	e 42·6
Strasbourg		78·6	340	i 11 55	− 1	—	—	—	—	e 46·6
Paris		79·5	343	i 12 1	0	—	—	—	—	i 43·6
Zürich		79·5	339	e 11 59	− 2	—	—	—	—	—
Basle		79·6	340	i 11 59	− 3	—	—	—	—	—
Ksara		81·6	313	e 12 9	− 3	e 22 46	+28	—	—	—

Mount Wilson gives also iZ −10m.57s.
Long waves were also recorded at Riverview, Bombay, De Bilt, and Malaga.

Oct. 20d. Readings also at 2h. (Istanbul, Granada, Haiwee (3), Palomar, (2), Riverside (3), Tinemaha, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 3h. (Ottawa, Ville Marie, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Grand Coulee), 4h. (Haiwee (2), Riverside (3), Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 5h. (Helwan and Stalinabad), 7h. (Basle, Boulder City, and Pierce Ferry), 8h. (Stuttgart), 13h. (Mizusawa), 14h. (Ksara, Clermont-Ferrand, Paris, De Bilt, Stuttgart, Malaga, and La Paz), 16h. (Antarctica, La Paz, Huancayo, and Kirkland Lake), 17h. (Ksara), 23h. (Santa Lucia).

Oct. 21d. 9h. 45m. 35s. Epicentre 43°·9N. 146°·2E.

$A = -\cdot6007$, $B = +\cdot4021$, $C = +\cdot6909$; $\delta = -13$; $\lambda = -3$;
$D = +\cdot556$, $E = +\cdot831$; $G = -\cdot572$, $H = +\cdot384$, $K = -\cdot723$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	N.	6·1	221	e 1 48	P*	3 3	S*	—	—	—
Vladivostok		10·5	271	i 2 36	+ 1	i 4 36	+ 1	—	—	—
Irkutsk		28·9	303	e 6 10?	+ 7	e 10 48	− 5	—	—	—
Calcutta	E.	51·8	266	—	—	e 17 1	+28	—	—	—
Sverdlovsk		52·6	317	e 9 22	+ 4	—	—	—	—	—
Andijan		53·0	294	e 9 17	− 4	e 16 49	− 1	—	—	—
Tashkent		54·7	297	e 9 28	− 5	e 17 3	−10	—	—	—
Stalinabad		56·5	294	i 9 42	− 4	i 17 29	− 8	—	—	—
Samarkand		57·1	296	e 9 53	+ 3	—	—	—	—	—
Hyderabad	N.	62·2	268	—	—	e 18 39	−12	—	—	—
Shasta Dam		64·2	57	e 10 39	0	—	—	e 10 48	pP	—
Bombay		65·3	274	e 10 46	0	—	—	—	—	—
Scoresby Sund		65·6	357	—	—	27 16	SSS	—	—	32·4
Baku		67·3	305	e 11 5	+ 6	e 19 53	− 1	—	—	—
Grozny		67·9	310	e 10 55	− 7	—	—	—	—	—
Tinemaha	Z.	69·0	58	i 11 10	+ 1	—	—	i 11 19	pP	—
Haiwee	Z.	69·7	59	e 11 15	+ 1	—	—	i 11 23	pP	—
Santa Barbara	Z.	69·7	61	e 11 6	− 8	—	—	—	—	—
Leninakan		70·7	309	e 11 27	+ 7	—	—	—	—	—
Mount Wilson	Z.	70·9	60	e 11 22	+ 1	—	—	i 11 31	pP	—
Pasadena	Z.	70·9	60	i 11 22	+ 1	—	—	i 11 31	pP	—
Sotchi		71·0	313	e 11 21	− 1	—	—	—	—	—
Riverside	Z.	71·5	60	i 11 25	+ 1	—	—	i 11 34	pP	—
Boulder City		71·8	57	e 11 27	+ 1	—	—	i 11 36	pP	—
Palomar	Z.	72·2	60	i 11 30	+ 1	—	—	i 11 37	pP	—
Pierce Ferry		72·2	57	i 11 30	+ 1	—	—	i 11 39	pP	—
Tucson		76·7	58	i 11 56	+ 1	—	—	i 12 5	pP	—
Collmberg		76·9	332	11 54	− 2	—	—	e 12 5	pP	—
Cheb		78·1	333	e 19 39	?	—	—	—	—	e 41·4
Ksara		80·0	308	i 12 13	0	23 10	PS	—	—	—
Stuttgart		80·3	333	e 12 10	− 4	e 22 25	+ 5	e 12 20	PcP	e 40·4
Strasbourg		80·9	334	e 12 15	− 2	e 22 25	− 1	e 31 25	SSS	e 40·9
Paris		82·3	337	e 12 23	− 2	—	—	e 12 33	PcP	e 42·4
Cleveland	Z.	84·8	35	i 12 46	+ 9	—	—	—	—	—
Helwan		85·5	308	12 40	− 1	e 23 7	− 5	e 13 1	PcP	—
Malaga	Z.	95·4	337	e 15 14	P	—	—	—	—	e 52·7

Stuttgart gives also eSSS =31m.25s.
Long waves were also recorded at College and at other European stations.

Oct. 21d. Readings also at 1h. (Riverview), 2h. (Santa Clara, Berkeley, Branner, and near Lick (2)), 5h. (Samarkand, near Andijan and Stalinabad), 8h. (near Theodosia), 10h. (near Istanbul (2)), 16h. (Stuttgart), 21h. (Temiskaming, Kirkland Lake, and near Mineral).

Oct. 22d. 17h. 22m. 41s. Epicentre 9°·0S. 153°·0E. (as on 1941, Sept. 24d.).

$A = -·8802$, $B = +·4485$, $C = -·1554$; $\delta = +5$; $h = +7$;
$D = +·454$, $E = +·891$; $G = +·138$, $H = -·071$, $K = -·988$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverview		24·8	184	i 5 22$_a$	− 3	i 9 43	− 3	i 10 6	sS	e 11·8
Auckland		34·1	148	7 54	PP	12 16	+ 2	—	—	14·5
Arapuni		35·4	148	—	—	12 49	+15	—	—	e 16·3
Wellington		37·5	153	7 15	− 2	13 8	+ 1	7 41	pP	19·1
Perth		41·3	231	—	—	i 14 2	− 2	i 16 59	SS	—
Vladivostok		55·3	341	e 9 34	− 4	i 17 18	− 3	—	—	—
Irkutsk		73·9	332	—	—	21 8	− 2	—	—	—
Kodaikanal		77·6	282	—	—	21 46	− 5	—	—	—
Bombay		83·7	290	e 18 8	?	e 22 53	− 1	—	—	—
Almata		86·1	315	e 13 0	+16	—	—	—	—	—
Andijan		88·8	311	e 13 6	+ 9	—	—	—	—	—
Stalinabad		91·1	309	e 13 7	− 1	24 5	+ 1	—	—	—
Tashkent		91·2	312	e 13 3	− 5	e 23 20?	[−20]	—	—	—
Shasta Dam		91·7	49	e 13 7	− 3	—	—	e 16 54	PP	—
Samarkand		92·6	310	e 13 19	+ 4	—	—	—	—	—
Pasadena	z.	94·0	56	e 13 23	+ 2	—	—	—	—	—
Mount Wilson	z.	94·1	56	e 13 22	0	—	—	—	—	—
Riverside	z.	94·7	56	e 13 24	0	—	—	—	—	—
Grand Coulee		95·3	42	e 13 30	+ 3	—	—	—	—	—
Boulder City		97·0	55	e 13 36	+ 1	—	—	—	—	—
Pierce Ferry		97·6	55	e 13 37	− 1	—	—	—	—	—
Antarctica		98·0	166	e 13 32	− 7	—	—	—	—	e 49·3
Sverdlovsk		98·8	326	e 13 50	+ 7	e 25 12	+ 2	17 38	PP	—
Tucson		99·9	59	e 16 15	?	—	—	e 17 48	PP	e 47·1
Ksara		117·4	303	e 20 3	PP	e 35 17	SS	—	—	—
Scoresby Sund		118·5	358	—	—	—	—	29 55	PS	55·3
Helwan	z.	121·8	300	e 20 22	PP	—	—	e 23 10	PPP	—
De Bilt		129·6	335	e 22 19?	PKS	—	—	—	—	e 64·3
Stuttgart		130·1	329	e 19 8	[− 4]	e 26 34	[+14]	e 38 42	SS	e 62·3
Strasbourg		130·9	330	e 19 13	[− 1]	e 26 57	[+35]	e 38 50	SS	56·8
La Paz		132·1	122	21 36	PP	—	—	—	—	72·3
Paris		133·2	333	e 19 17	[− 1]	e 26 13	[−15]	e 21 45	PP	e 65·3
Clermont-Ferrand		135·2	331	—	—	e 39 43	SS	—	—	—
Alicante		142·3	326	19 46	[+11]	e 23 52	PKS	—	—	e 67·9
Almeria		144·5	324	i 19 35	[− 3]	26 36	[−10]	23 36	PP	75·3
Granada		144·8	326	19 49	[+10]	30 7	{+18}	41 58	SS	68·2
Malaga	z.	145·6	327	i 19 40	[0]	26 28	[−20]	23 42	PP	76·6
Fort de France		146·1	78	e 19 50	[+ 9]	—	—	—	—	—

Additional readings :—
Riverview iN =5m.48s., iPPN =6m.0s., iPPPN =6m.15s., iZ =9m.47s., iE =9m.53s., and 10m.16s., iSSE =10m.45s., iE =10m.51s., iN =11m.44s.
Wellington P_cP =8m.44s., sS =14m.35s., SS =15m.40s., i =17m.21s.
Sverdlovsk PPP =19m.37s., SS =32m.13s.
Tucson e =43m.45s.
Helwan eZ =23m.34s.
Paris eSKKS$_2$ =35m.33s., eSS =39m.35s.
Stuttgart ePP? =21m.33s., ePS? =31m.25s.
Strasbourg ePP =21m.28s., eSP =31m.36s., and 31m.41s., eSPP =33m.50s.
Almeria PKP_2 =20m.2s., PKS =23m.4s., SKKS =30m.8s., PPS =36m.21s., SS =43m.4s.
Granada PP =22m.49s., SKSP =33m.49s., SSS =45m.1s.
Malaga iPKP$_2$Z =20m.6s., PPSZ =36m.56s., SSZ =43m.26s.
Long waves were also recorded at Berkeley and at other European stations.

Oct. 22d. Readings also at 1h. (Palomar, Riverside, Boulder City, Pierce Ferry, Shasta Dam, and Tucson), 3h. (near Grozny), 5h. (Auckland), 9h. (Kirkland Lake and near Ottawa, Seven Falls, and Shawinigan Falls), 10h. (Almata, Andijan, Stalinabad, Tashkent, Irkutsk, Sverdlovsk, Paris, and Stuttgart), 13h. (Jena and near Lick and Berkeley), 15h. (Christchurch, Kaimata, New Plymouth, Tuai, and Wellington), 20h. (near Ottawa), 21h. (Pierce Ferry, Shasta Dam, and Tucson), 22h. (near Andijan), 23h. (Pierce Ferry, Shasta Dam, La Paz, and near Stalinabad).

Oct. 23d. 11h. 46m. 19s. Epicentre 18°·5N. 63°·0W. (as on 1941, Jan. 17d.).

Doubtful identification. Probably slightly further south-east.

$A = +·4308$, $B = -·8456$, $C = +·3154$; $\delta = +11$; $h = +5$;
$D = -·891$, $E = -·454$; $G = +·143$, $H = -·281$, $K = -·949$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Juan		2·9	268	e 0 53	+ 5	e 0 56	P_g	—	—	e 1·0
Fort de France		4·1	154	i 0 55	− 9	1 47	− 8	1 6	P	—
Bermuda		13·8	355	—	—	e 6 23	+29	—	—	—
Harvard		25·0	347	i 5 27	0	i 10 15	+26	—	—	—
Kirkland Lake		32·7	339	e 5 41	−55	—	—	—	—	—
La Paz		35·1	189	6 52	− 5	i 16 50	Q	—	—	21·3
Tucson		45·0	299	i 8 22	+ 3	—	—	—	—	—
Pierce Ferry		48·0	303	i 8 46	+ 3	i 20 16	?	—	—	—
Boulder City		48·7	303	i 8 51	+ 3	—	—	—	—	—
Palomar		50·1	298	i 9 2k	+ 3	—	—	—	—	—
Riverside	z.	50·6	300	i 9 4	+ 2	—	—	—	—	—
Haiwee	z.	51·2	303	e 9 11	+ 4	—	—	—	—	—
Mount Wilson	z.	51·2	300	i 9 9	+ 2	—	—	—	—	—
Pasadena	z.	51·3	300	i 9 9	+ 1	—	—	—	—	—
Tinemaha		51·5	304	i 9 11	+ 2	—	—	—	—	—
Shasta Dam		55·1	307	e 9 35	− 1	—	—	—	—	—
Stuttgart	z.	64·6	45	e 10 37	− 4	—	—	—	—	—

Additional readings :—
Fort de France e =1m.1s. and 1m.26s., S =1m.39s.
Tucson i =8m.26s. and 8m.38s.
Pierce Ferry i =9m.16s.
Boulder City i =9m.24s.
Riverside iZ =9m.18s.
Mount Wilson iZ =9m.17s.

Oct. 23d. Readings also at 2h. and 3h. (near Andijan), 4h. (Erevan and near Leninakan, 5h. (Boulder City, Pierce Ferry, and near Tucson), 10h. (Warsaw), 11h. (near Reykjavik), 12h. (near Mineral), 13h. (Kew), 21h. (near Ottawa), 23h. (Ukiah and near Balboa Heights).

Oct. 24d. 17h.

Perhaps a repetition of 22d. 17h.

Riverview iPNZ =6m.45s.a, ipPZ =6m.54s., iP_cPZ =10m.6s., eS?E =11m.6s., iSN = 11m.15s., iE =11m.19s., isSN =11m.31s., eQ?E =12m.0s., iSSE =12m.22s., eLN = 12·5m., iS_cSE =17m.33s.
Wellington P?Z =8m.14s., P_cP =10m.10s., S? =14m.32s., SS =17m.14s., Q =19m.
Irkutsk eP =13m.21s., eS =22m.35s.
Auckland P_cP? =13m.28s., S =16m.18s., L =18·5m.
Perth i =18m.5s. and 20m.2s.
Ksara e =19m.23s. and 21m.33s.
Stuttgart eZ =20m.38s.?, eQ? =65m.
Malaga iPKPZ =21m.3s., PPZ =22m.49s., PKSZ =24m.21s., PPPZ =25m.33s., iSKSZ =27m.5s., PPSZ =34m.43s., RZ =60m.23s.
Bombay eE =24m.22s.
Long waves were also recorded at Bermuda, Arapuni, Copenhagen, Helsinki, Kew, De Bilt, Paris, Clermont-Ferrand, and Strasbourg.

Oct. 24d. 22h. 25m. 18s. Epicentre 3°·7N. 128°·5E. (as on 1946, July 31d.).

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

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Almata	60·2	319	e 9 56	−16	—	—	—	—	—
Andijan	62·3	315	e 10 28	+ 2	—	—	—	—	—
Stalinabad	64·3	312	i 10 38	− 1	i 19 22	+ 5	—	—	—
Tashkent	64·7	315	e 10 42	0	—	—	—	—	—
Samarkand	65·9	312	e 11 4	+14	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sverdlovsk		74·9	329	11 45	+ 1	21 24	+ 2	—	—	—
Ksara		90·1	303	e 13 5	+ 2	—	—	e 25 13	PS	—
Shasta Dam		101·9	47	e 13 55	− 2	—	—	e 18 10	PP	—
Stuttgart		106·0	323	e 18 48	PP	—	—	—	—	c 64·7
Pasadena	z.	107·0	53	e 14 17	− 3	—	—	—	—	—
Riverside	z,	107·7	53	e 14 23	P	—	—	e 18 46	PP	—
Pierce Ferry		109·6	50	e 18 34	PP	—	—	—	—	—
Paris		109·9	325	e 19 20	PP	—	—	—	—	—
Tucson		113·4	52	e 18 57	[+17]	—	—	e 19 30	PP	—

Shasta Dam also gives e =17m.30s.
Long waves were also recorded at Arapuni, Wellington, Riverview, and Strasbourg.

Oct. 24d. Readings also at 5h. (Boulder City, Pierce Ferry, and Shasta Dam), 6h. (Palomar, Pasadena, Tinemaha, Boulder City, Pierce Ferry, and Tucson), 7h. (Palomar, Pasadena, Tinemaha, Haiwee, Pierce Ferry, Shasta Dam (2), Tucson, Basle, Zürich, Warsaw, Stuttgart (2), Ksara, and near Strasbourg), 10h. (Huancayo and near La Paz (2)), 13h. (Paris, Stuttgart, Riverview, and near Stalinabad), 14h. (Santa Lucia, and near Mineral), 15h. (La Paz), 16h. (Paris), 19h. (Pierce Ferry), 20h. (La Paz).

Oct. 25d. 14h. 43m. 40s. Epicentre 41°·5N. 109°·0W.

A = −·2446, B = −·7103, C = +·6601; δ = +9; h = −2;
D = −·946, E = +·326; G = −·215, H = −·624, K = −·751.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Logan		2·1	277	i 0 13	−24	i 0 23	−41	—	—	—
Salt Lake City		2·3	251	e 0 43	+ 3	e 0 59	−10	—	—	i 1·1
Pierce Ferry		6·6	217	e 1 41	0	i 3 14	SS	i 2 1	PPP	—
Boulder City		7·1	221	e 2 11	PPP	i 3 32	SS	i 2 34	PPP	—
Tinemaha		8·4	241	i 2 10	+ 4	i 3 39	− 4	—	—	—
Haiwee	z.	8·8	235	—	—	i 4 0	+ 7	—	—	—
Tucson		9·3	189	e 3 1	P_g	e 5 24	S_g	—	—	e 5·8
Riverside	z.	10·0	224	e 2 20	− 7	—	—	—	—	—
Shasta Dam		10·1	270	e 2 32	+ 4	i 4 13	−12	—	—	—
Mount Wilson	z.	10·2	226	e 2 21	−10	e 4 49	SS	—	—	—
Palomar	z.	10·2	219	e 2 24	− 7	e 5 13	SS	—	—	—
Pasadena	z.	10·3	227	—	—	e 4 46	SS	—	—	—

Oct. 25d. 20h. 53m. 4s. Epicentre 37°·7N. 141°·8E. (as on 1945, June 25d.).

Intensity II-III at Sendai, Miyako, Hukushima.
Epicentre 37°·6N. 141°·9E. Macroseismic radius 200-300km. Shallow.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1947, Tokyo, 1950, pp. 38-39, macroseismic chart p. 38.

A = −·6234, B = +·4905, C = +·6090; δ = +10; h = −1;
D = +·618, E = +·786; G = −·479, H = +·377, K = −·793.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Sendai		0·9	309	0 19	− 1	0 31	− 3
Onahama		1·1	223	0 19	− 3	0 31	− 8
Mizusawa	E.	1·5	343	0 29	+ 1	0 48	− 1
Mito		1·7	219	0 26	− 5	0 45	− 9
Kakioka		1·9	221	0 30	− 4	0 48	−11
Miyako		1·9	4	0 34	0	0 58	− 1
Morioka		2·0	347	0 36	+ 1	0 58	− 4
Tukubasan		2·0	322	0 32	− 3	—	—
Kumagaya		2·5	231	0 44	+ 1	1 4	−10
Tokyo		2·6	219	0 49	+ 5	—	—
Maebasi		2·6	239	0 44	0	1 7	−10
Yokohama		2·8	217	1 14	S	(1 14)	− 8
Misima		3·5	223	1 19	+22	—	—

Oct. 25d. Readings also at 0h. (near Berkeley, Lick, and San Francisco), 2h. (near Balboa Heights), 3h. (Lick), 6h. (near Ashkabad), 10h. (near Boulder City, Pierce Ferry, and Tucson), 12h. (Ksara, Helwan, and near Lick), 14h. (Basle, Chur, Zürich, Budapest, Zagreb, Strasbourg, Stuttgart, Triest, Kalossa, near Istanbul, Almata, near Andijan and Samarkand), 17h. (near Andijan, Samarkand, Stalinabad, and near Pierce Ferry), 18h. (College, Shasta Dam, Harvard, and near San Juan), 19h. (near Boulder City and Pierce Ferry), 20h. (Shasta Dam), 21h. (near Ashkabad), 22h. (Istanbul, Stuttgart, Temiskaming, and near Ottawa).

Oct. 26d. Readings at 3h. (Boulder City and Pierce Ferry), 4h. (near Mizusawa), 9h. (Pierce Ferry, Auckland, and Wellington), 11h. (Auckland, Balboa Heights, and La Paz), 12h. (Arapuni, Wellington, and Auckland), 13h. (Mount Wilson, Palomar, Pasadena, Riverside, Haiwee, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Riverview, Ksara, Piatigorsk, and near Grozny), 17h. (Kew), 19h. (Pierce Ferry and Tucson), 20h. (Pierce Ferry).

Oct. 27d. 10h. 29m. 42s. Epicentre 37°·6N. 8°·5E.

Felt strongly on the coastal portion of the department of Constantine. Intensity V-VI at La Calle and Cap de Garde; III-IV at Tabarca in Tunisia.

J. P. Rothé.
"Les séismes de Kerrata, et la Séismicité de l'Algérie," Annales de l'Institut de Physique du Globe de Strasbourg, 3ème partie, Géophysique, Nouvelle Série, tome VI, 1950, p. 35. Epicentre as adopted.

$A = +\cdot7856$, $B = +\cdot1174$, $C = +\cdot6076$; $\delta = +13$; $h = -1$;
$D = +\cdot148$, $E = -\cdot989$; $G = +\cdot601$, $H = +\cdot090$, $K = -\cdot794$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Barcelona		6·2	310	1 47	+12	3 2	S*	2 3	PP	—
Florence	N.	6·5	18	(e 1 25)	−14	e 1 25	P	—	—	—
Tortosa	N.	7·0	298	1 45	− 1	3 11	+ 3	2 14	P_g	—
Alicante		7·1	279	i 1 48	0	3 6	− 4	1 52	PP	i 3·4
Almeria		8·8	268	2 3	− 8	3 47	− 6	2 13	PP	—
Clermont-Ferrand		9·1	335	e 2 13	− 1	e 4 7	+ 7	—	—	4·6
Granada		9·6	271	i 2 19k	− 2	4 23	+11	5 24	S_g	—
Zürich		9·8	0	e 2 23	− 1	—	—	—	—	e 6·6
Basle		10·0	356	2 43	+16	—	—	—	—	e 6·7
Malaga	Z.	10·3	269	e 2 16	−16	e 5 28	S_g	i 7 4	P_cP	7·3
Strasbourg		11·0	357	e 2 45	+ 3	(e 4 18?)	−29	—	—	e 4·3
Stuttgart		11·2	2	e 2 42	− 2	—	—	—	—	e 5·5
Paris		12·0	341	i 2 52	− 3	—	—	—	—	e 6·3
Cheb		12·8	11	e 4 44	?	—	—	—	—	e 8·0
Prague		13·2	17	—	—	e 6 2	SS	—	—	e 6·9
Kew		15·2	338	i 3 42	+ 4	—	—	—	—	e 7·3
Istanbul		16·3	71	(e 2 18?)	?	—	—	—	—	e 2·3
Warsaw		17·1	28	e 5 22	?	—	—	—	—	e 7·3
Helwan		20·5	105	e 4 37k	− 5	e 8 33	+ 6	—	—	—
Aberdeen	E.	20·8	344	e 4 54	+ 9	—	—	—	—	—
Ksara		22·5	92	e 5 0	− 2	e 9 21	+16	—	—	—

Additional readings:—
Florence eP =10h.28m.44s.
Tortosa P_gN =2m.5s., P_gS_gN =2m.41s., 2m.49s., and 2m.54s., S_gN =3m.26s.
Alicante PPP =2m.2s., iS =2m.58s., SSS =3m.18s.
Almeria PPP =2m.17s., S =3m.27s., SS =3m.38s., P_cP =8m.44s., P_cS =11m.12s.
Granada P =3m.6s., PS =4m.54s., S =5m.45s.
Malaga S_cPZ =10m.2s., S_cS =13m.46s.
Strasbourg e =3m.18s.
Stuttgart eZ =3m.4s.
Paris iP? =2m.59s.
Warsaw eN =5m.47s.
Helwan iZ =4m.46s., eZ =5m.28s.
Long waves were also recorded at Budapest, Zagreb, Uccle, Copenhagen, and Helsinki.

Oct. 27d. 11h. 11m. 56s. Epicentre 36°·0S. 94°·5W.

Rough and uncertain.

A = −·0636, B = −·8084, C = −·5852; δ = +1; h = 0;
D = −·997, E = +·078; G = +·046, H = +·583, K = −·811.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		29·5	41	e 6 32	+24	—	—	—	—	e 11·7
La Paz		30·4	57	e 6 19	+ 3	i 11 28	+12	i 7 18	PP	15·2
Antarctica		35·8	163	e 7 3	0	—	—	—	—	e 15·6
Tucson		69·6	345	i 11 14	+ 1	—	—	e 14 10	PP	—
Palomar		72·1	341	e 11 27	− 1	—	—	—	—	—
Riverside	z.	72·8	340	e 11 30	− 2	—	—	—	—	—
Mount Wilson	z.	73·2	340	e 11 33	− 2	—	—	—	—	—
Pasadena	z.	73·2	340	e 11 35	0	—	—	—	—	—
Pierce Ferry		74·0	344	e 11 58	+19	—	—	—	—	—
Boulder City		74·1	343	e 11 59	+19	—	—	—	—	—
Haiwee	z.	75·0	341	e 11 45	0	—	—	—	—	—
Tinemaha	z.	76·0	341	e 11 50	− 1	—	—	—	—	—
Shasta Dam		80·5	339	e 12 12	− 3	—	—	—	—	—
Temiskaming		83·5	10	e 12 40	+ 9	—	—	—	—	—
Kirkland Lake		84·8	10	e 12 40	+ 3	—	—	—	—	—
Grand Coulee		86·4	344	e 12 49	+ 4	—	—	—	—	—
Riverview		87·4	229	e 15 37	PP	e 23 5	[−12]	e 24 13	PS	e 39·0
Stuttgart		124·5	51	e 19 11	[+10]	—	—	—	—	e 65·1
Helwan	z.	134·6	82	e 19 51	[+30]	e 23 17	PKS	e 24 52	PPP	—
Istanbul		136·2	66	e 20 4?	[+40]	—	—	—	—	—
Ksara		139·6	79	e 21 10?	PP	37 42	?	—	—	—
Bombay		159·6	144	—	—	e 31 4?	{− 6}	e 44 4?	SS	—
Tashkent		166·3	62	e 21 8?	PKP_2	e 25 59?	PP	—	—	—

Additional readings :—
La Paz iE =7m.54s. and 10m.4s., iSS =12m.29s.
Tucson i =11m.38s. and 12m.8s.
Palomar iZ =11m.43s.
Riverside iZ =11m.45s. and 11m.53s.
Mount Wilson eZ =11m.52s.
Pasadena iZ =11m.49s., eZ =13m.42s.
Haiwee iZ =12m.1s.
Tinemaha iZ =12m.5s.
Grand Coulee e =13m.38s.
Riverview eN =23m.13s., eSS?E =28m.22s., eZ =28m.48s., eN =29m.9s., eQE = 35m.46s.
Long waves were also recorded at Copiapo, Santa Lucia, Arapuni, Wellington, Philadelphia, and De Bilt.

Oct. 27d. Readings also at 0h. (Pierce Ferry, Shasta Dam, and Tucson), 2h. (Palomar, Riverside, Tinemaha, Tucson (2), Pierce Ferry (2), Shasta Dam (2), and Ksara), 4h. (Auckland, Wellington, Tuai, Arapuni, Riverview, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, near Tucson, Boulder City, and Pierce Ferry), 5h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Ksara), 8h. (Pierce Ferry, Shasta Dam, and Riverview), 9h. (Ksara), 10h. (Almata, Stalinabad, near Tashkent, and Tchimkent; Stuttgart and near Tortosa), 12h. (Antarctica, Wellington, and Auckland), 13h. (De Bilt, Kew, and Stuttgart (2)), 14h. (Samarkand, near Andijan, and Stalinabad), 17h. (Temiskaming), 21h. (Santa Lucia).

Oct. 28d. 9h. 39m. 21s. Epicentre 14°·8S. 106°·5W.

A = −·2748, B = −·9278, C = −·2522; δ = −7; h = +6;
D = −·959, E = +·284; G = +·072, H = +·242, K = −·968.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		34·6	12	i 7 29?	+36	(e 12 33)	+11	i 10 32	?	e 12·6
La Paz		37·0	97	e 9 47	?	i 17 45	?	—	—	—
Tucson		46·9	355	e 8 30	− 4	—	—	e 11 13	PPP	e 17·2
Palomar		48·8	349	i 8 49	0	—	—	—	—	—
Riverside	z.	49·5	348	e 8 54	0	—	—	—	—	—
Pasadena		49·8	348	e 8 55	− 1	—	—	—	—	e 19·2
Mount Wilson	z.	49·9	348	e 8 57	0	—	—	—	—	—
Pierce Ferry		51·0	353	i 8 35	−31	—	—	—	—	i 22·5
Boulder City		51·0	352	e 9 5	− 1	—	—	—	—	—
Haiwee	z.	51·7	349	e 9 13	+ 2	—	—	—	—	—
Tinemaha	z.	52·7	349	i 9 29	+11	—	—	—	—	—
Berkeley		54·3	345	—	—	—	—	e 23 51	SSS	—
St. Louis		55·2	15	e 9 40	+ 3	e 17 25	+ 5	e 19 56	SS	—
Shasta Dam		57·1	346	e 9 56	+ 6	—	—	—	—	—

Additional readings :—
Tucson e =8m.37s., 8m.50s., and 9m.53s., eS? =13m.56s.
Riverside iZ =9m.0s.
Mount Wilson eZ =9m.3s.
Long waves were also recorded at Huancayo and Riverview.

Oct. 28d. Readings also at 0h. (Boulder City, Pierce Ferry, Tucson, and Riverside), 1h. (Leninakan and near Bogota), 3h. (Boulder City, Pierce Ferry, Tucson, Bermuda, Palomar, Riverside, Port-au-Prince, Bogota, and near San Juan), 4h. (Stuttgart and Riverview), 9h. (Helwan and Ksara), 10h. (Istanbul, Kew, Stuttgart, Haiwee, Mount Wilson, Palomar, Riverside, Boulder City, Pierce Ferry, Shasta Dam, Tucson, and near Huancayo), 11h. (Ksara), 12h. (Palomar, Boulder City, Pierce Ferry, Tucson, and near Balboa Heights), 13h. (Strasbourg and Stuttgart), 14h. (Almata and near Andijan), 15h. (Mount Wilson, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, Tucson, and Stuttgart), 16h. (Jena and Stuttgart), 17h. (near Tucson), 18h. (Kew), 22h. (Andijan and near Obi-garm, Samarkand, and Stalinabad).

Oct. 29d. 11h. 59m. 4s. Epicentre 43°·6N. 144°·3E. Depth of focus 0·015.
(as on 1938, May 28d.).

Intensity V at Nemuro, Kusiro, Hatinohe; IV at Urakawa; II-III at Aomori and Morioka.
Epicentre 42°·7N. 145°·4E. Shallow. Macroseismic radius 300kms.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1947. Tokyo, 1950, pp. 39-40, macroseismic chart p. 39.

A = −·5900, B = +·4239, C = +·6872; δ = +4; h = −3;
D = +·584, E = +·812; G = −·558, H = +·401, K = −·726.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Nemuro		1·0	106	0 13	−10	0 22	−19	—	—
Sapporo		2·2	256	0 46k	+ 9	1 21	+16	—	—
Mori		3·1	241	0 57	+ 8	1 38	+12	—	—
Hatinohe		3·7	214	0 58a	+ 1	1 40	0	—	—
Aomori		3·8	224	1 1	+ 3	1 47	+ 4	—	—
Miyako		4·3	205	1 2	− 3	1 48	− 7	—	—
Morioka		4·6	212	1 8a	− 1	1 58	− 4	—	—
Akita		5·0	220	1 16	+ 2	2 14	+ 2	—	—
Mizusawa	N.	5·1	208	e 1 15	− 1	2 10	− 4	—	—
Sendai		5·9	206	1 45	P•	—	—	—	—
Hukusima		6·6	208	1 31	− 5	2 45	− 5	—	—
Aikawa		7·2	221	1 45	+ 1	—	—	—	—
Onahama		7·2	202	1 45	+ 1	2 44	−21	—	—
Mito		7·8	203	1 46	− 6	3 11	− 8	—	—
Utunomiya		7·8	207	1 56	+ 4	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Kakioka		8·0	204	1 51	− 4	3 18	− 6	—	—
Tukubasan		8·0	204	1 49	− 6	3 16	− 8	—	—
Maebasi		8·2	211	2 4	+ 7	—	—	—	—
Kumagaya		8·4	208	2 8	+ 8	3 28	− 6	—	—
Wazima		8·4	224	2 19	+19	3 38	+ 4	—	—
Nagano		8·4	216	2 25	+25	—	—	—	—
Tokyo		8·7	205	2 2	− 2	3 34	− 7	—	—
Yokohama		8·9	205	1 59	− 8	3 46	0	—	—
Vladivostok		9·1	271	e 2 14	+ 5	i 4 9	+18	—	—
Mera		9·3	203	3 50	S	(3 50)	− 5	—	—
Osima		9·6	205	3 48	S	(3 48)	−14	—	—
Shizuoka		9·8	210	3 38	?	—	—	—	—
Gihu		10·0	218	2 20	− 1	—	—	—	—
Nagoya		10·2	216	2 36	+12	—	—	—	—
Hikone		10·4	219	2 33	+ 6	—	—	—	—
Sverdlovsk		51·8	317	i 8 4	−53	—	—	—	—
Grand Coulee		63·2	48	e 10 41	+24	—	—	—	—
Shasta Dam		65·5	56	i 10 29	− 3	—	—	i 10 56	pP
Tinemaha	z.	70·3	58	i 10 59	− 2	—	—	i 11 26	pP
Pasadena	z.	72·2	59	i 11 11	− 2	—	—	i 11 38	pP
Mount Wilson	z.	72·3	59	i 11 11	− 2	—	—	e 11 19	?
Riverside	z.	72·8	59	i 11 14	− 2	—	—	i 11 41	pP
Copenhagen		73·0	334	11 18	+ 1	—	—	11 43	pP
Boulder City		73·1	57	i 11 16	− 2	—	—	e 11 43	pP
Pierce Ferry		73·5	56	i 11 20	0	—	—	i 11 46	pP
Palomar	z.	73·6	60	—	—	—	—	i 11 49	pP
Tucson		78·1	56	i 11 45	− 1	—	—	e 12 12	pP
Stuttgart	z.	79·9	331	e 12 0	+ 4	—	—	e 12 26	pP
Kirkland Lake		80·7	29	e 12 0	0	—	—	—	—
Basle		81·5	332	e 12 9	+ 5	—	—	—	—
Paris		82·1	335	e 12 14	+ 6	—	—	i 12 40	pP
Temiskaming		82·3	29	e 12 7	− 2	—	—	—	—

Additional readings :—
Pasadena eZ =11m.19s., iZ =11m.49s. and 12m.4s.
Riverside iZ =11m.23s. and 11m.55s., eZ =12m.9s.
Pierce Ferry i =16m.45s.
Tucson i =11m.54s.

Oct. 29d. 13h. 6m. 52s. Epicentre 36°·7N. 70°·5E. Depth of focus 0·020. (as on 1947, August 23d.).

A = +·2683, B = +·7576, C = +·5951 ; δ = +9 ; h = 0 ;
D = +·943, E = −·334 ; G = +·199, H = +·561, K = −·804.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Stalinabad	2·3	323	i 0 42	+ 2	i 1 15	+ 5
Samarkand	4·1	319	i 1 4	+ 1	1 52	+ 1
Andijan	4·3	20	e 1 2	− 3	i 1 51	− 4
Tashkent	4·7	349	i 1 9	− 1	e 2 2	− 3
Almata	8·2	35	e 1 50	− 7	—	—
Ashkabad	9·7	277	2 18	+ 1	4 9	+ 5

Oct. 29d. 22h. 5m. 38s. Epicentre 28°·0N. 61°·0E. (as on 1943, December 31d.).

A = +·4287, B = +·7734, C = +·4670 ; δ = +2 ; h = +2 ;
D = +·875, E = −·485 ; G = +·226, H = +·408, K = −·884.

		Δ	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Ashkabad		10·2	348	2 23	− 8	4 12	−15	—
Stalinabad		12·4	30	i 3 3	+ 2	i 5 38	+17	—
Samarkand		12·6	22	e 3 6	+ 3	—	—	—
Tashkent		14·9	25	e 3 37	+ 3	—	—	—
Ksara		22·3	291	e 8 55	S	(e 8 55)	− 7	(e 11·7)
Sverdlovsk		28·8	359	6 2	0	10 49	− 2	—
Stuttgart	z.	44·6	313	e 8 15	− 1	—	—	—

Ksara S given as P ; L given as S.
Long waves were also recorded at Helwan.

Oct. 29d. Readings also at 1h. (La Paz and La Plata (2)), 8h. (Leninakan, near Erevan, and near Granada), 11h. (Stuttgart and Zagreb), 12h. (Stuttgart and near Alicante), 14h. (Kew, Scoresby Sund, near Andijan, and near Mizusawa), 15h. (near Alicante and near Ottawa), 16h. (near Andijan), 19h. (Riverview and Kirkland Lake).

Oct. 30d. 3h. Undetermined shock.

La Paz iPZ =46m.41s., iSEN =49m.47s., L =50m.49s.
Santa Lucia E =47m.31s., 49m.22s., and 50m.27s.
La Plata P?EN =49m.12s.. N =49m.46s., EN =50m.30s., NZ =51m.6s., SEZ =51m.20s., iSN =51m.25s., iL =51m.52s.
Bogota eE =50m.53s. and 60m.31s.
Huancayo eP? =53m.0s.
Uccle eL =55m.
Tucson eP =55m.59s.
Boulder City eP =56m.27s.
Riverside ePZ =56m.29s.
Mount Wilson ePZ =56m.33s.
Pasadena ePZ =56m.33s.
Shasta Dam eP =57m.6s.
Pierce Ferry eP =57m.26s.
Long waves were also recorded at Wellington and Arapuni.

Oct. 30d. Readings also at 2h. (Pierce Ferry and Vladivostok), 3h. (Arapuni, Auckland, Wellington, Riverview, Tashkent, Ksara, and Paris), 6h. (Arapuni, Auckland, and Wellington), 7h. (Arapuni, Auckland, and Wellington), 12h. (near Frunse), 13h. (Bozeman), 15h. (Bermuda, near Port-au-Prince, and San Juan), 16h. and 20h. (Wellington), 21h. and 22h. (Istanbul).

Oct. 31d. 1h. New Zealand.

Auckland P =30m.39s., S =31m.17s.
Tuai P? =30m.46s., S? =31m.56s., P_cS? =40m.19s.
Arapuni S? =32m.48s.
Wellington S =33m.3s., e =33m.10s.?, SSZ =34m.2s., LZ =35m.30s., S_cS =41m.27s.
New Plymouth S? =33m.29s.
Riverview eZ =34m.22s., eLZ =41·4m.
Riverside ePZ =41m.42s., eZ =42m.6s.
Palomar ePZ =41m.52s.
Shasta Dam eP? =41m.57s.
Boulder City eP =42m.3s.
Tucson eP =42m.4s., e =42m.21s. and 44m.6s.
Pierce Ferry eP =42m.6s.
Ksara ePKP =48m.48s., ePP =52m.30s.
Long waves were also recorded at De Bilt and Berkeley.

Oct. 31d. Readings also at 0h. (Auckland, Wellington, Tuai, Arapuni, Riverview, Riverside, Tucson, Pierce Ferry, and near Shasta Dam), 2h. (Tucson, Shasta Dam, and Pierce Ferry), 12h. (Lick, Branner, Berkeley, Pasadena, Mount Wilson, Palomar, Riverside, Santa Barbara, Tinemaha, Tucson, Shasta Dam (2), Grand Coulee, Pierce Ferry (2), Boulder City, and near Honolulu), 13h. (Ferndale, San Francisco, Lick, Branner, Berkeley, Pasadena, Mount Wilson, Palomar, Riverside, Haiwee, Tinemaha, Tucson (2), Shasta Dam, Grand Coulee, Pierce Ferry, Boulder City, Ukiah, Butte, and Salt Lake City), 15h. (near Malaga), 16h. (Stuttgart, Bombay, Calcutta, Bogota, and near Balboa Heights), 17h. (Pierce Ferry, Andijan, and near Tashkent), 20h. (Ksara), 23h. (Mount Wilson, Riverside, Tucson, Shasta Dam, Grand Coulee, and Pierce Ferry).

Nov. 1d. 5h. 59m. 43s. Epicentre 3°·5S. 102°·3E. (as on 1946, March 26d.).

$A = -·2126$, $B = +·9753$, $C = -·0606$; $\delta = +8$; $h = +7$;
$D = +·977$, $E = +·213$; $G = +·013$, $H = -·059$, $K = -·998$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Colombo	E.	24·6	294	5 23	0	9 47	+ 5	—		—	12·4
Kodaikanal	E.	28·2	300	i 6 22	+26	i 11 7	+26	7 7		PPP	14·4
Calcutta	E.	29·2	333	i 6 4	− 1	i 10 54	− 4	i 7 0		PP	—
Perth		31·0	157	—	—	i 11 22	− 4	—		—	—
Bombay		36·6	308	e 7 9	− 1	i 12 48	− 5	8 26		PP	18·2

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Dehra Dun	N.	40·8	328	e 11 47	?	e 16 52	SS	—	—	e 26·3
Kagosima		44·0	35	8 19	+ 8	—	—	—	—	—
Hukuoka		45·5	34	i 8 28	+ 5	15 28	+23	18 45	SS	e 22·9
Osaka		49·9	37	e 8 58	+ 1	—	—	—	—	—
Hikone		50·0	37	e 9 2	+ 4	—	—	—	—	—
Nagoya		50·4	38	e 9 8	+ 7	—	—	e 9 20	?	e 38·3
Omaesaki		50·8	39	e 9 11	+ 7	—	—	—	—	—
Almata		51·9	348	i 9 15	+ 3	—	—	—	—	—
Andijan		51·9	331	e 9 10	− 2	16 36	+ 1	—	—	—
Nagano		52·1	36	e 9 16	+ 2	—	—	—	—	—
Stalinabad		52·1	327	i 9 10	− 4	i 16 28	−10	—	—	—
Tokyo		52·4	39	e 9 22	+ 6	—	—	—	—	—
Kumagaya		52·5	38	e 9 2	−15	—	—	—	—	—
Vladivostok		53·5	27	i 9 27	+ 3	i 17 2	+ 5	—	—	—
Tashkent		53·8	330	i 9 25	− 1	e 16 59	− 2	—	—	—
Brisbane		53·9	122	i 9 26	− 1	i 16 59	− 3	i 20 37	SS	—
Tchimkent		54·4	331	i 9 27	− 4	i 17 5	− 4	—	—	—
Riverview		54·5	130	i 9 34k	+ 2	i 17 11	+ 1	i 19 18	SeS	e 25·8
Sendai		54·8	38	e 9 38	+ 4	17 20	+ 6	—	—	26·6
Mizusawa	N.	55·5	37	9 46	+ 7	17 33	+ 9	—	—	—
Irkutsk		55·6	2	i 9 45	+ 5	17 30	+ 5	—	—	—
Tananarive		55·6	250	—	—	17 17	− 8	—	—	—
Baku		64·8	318	e 10 43	0	—	—	—	—	—
Erevan		68·4	316	—	—	e 20 4	− 3	—	—	—
Grozny		68·9	320	e 10 50	−19	19 52	−21	—	—	—
Sverdlovsk		68·9	338	i 11 8	− 1	i 20 11	− 2	—	—	—
Leninakan		69·1	317	e 11 10	0	e 20 10	− 5	—	—	—
Ksara		72·6	307	i 11 29	− 2	20 57	+ 1	i 16 25	PPP	—
Sotchi		73·0	318	e 11 16	−17	20 54	− 6	—	—	—
Auckland		73·9	128	—	—	21 11	+ 1	25 47?	SS	38·3
Wellington		74·6	132	—	—	21 11	− 7	25 57	SS	36·8
Arapuni		74·8	129	—	—	21 47	PS	e 27 5	?	40·1
Helwan		75·4	302	i 11 31k	−16	i 21 15	−12	11 44	P	—
Theodosia		76·4	318	e 11 50	− 3	21 34	− 4	—	—	—
Moscow		79·0	329	i 12 5	− 2	22 0	− 6	—	—	—
Istanbul		79·7	312	i 12 19	+ 8	22 3	−10	—	—	—
Helsinki		86·7	331	i 12 48	+ 1	e 23 9	[− 3]	e 29 1	SS	e 42·3
Warsaw		87·4	323	e 12 25	−25	i 23 30	0	16 18	PP	e 42·3
Kalossa		87·9	317	12 53	0	23 37	+ 2	e 23 41	S	—
Budapest		88·0	318	12 53	0	i 23 33	− 3	24 22	PS	e 54·3
Upsala		90·3	330	e 13 0k	− 4	23 33	[− 2]	16 50	PP	e 38·3
Prague		91·3	320	e 13 53	+44	e 23 35	[− 5]	e 30 17?	SS	e 43·3
Triest		91·5	315	e 13 18	+ 8	e 23 39	[− 3]	e 16 57	PP	—
Cheb		92·6	320	e 16 58	PP	i 23 47	[− 1]	e 24 17	S	e 55·3
Copenhagen		92·8	325	13 17	+ 1	i 24 13	− 6	e 16 59	PP	44·3
Florence		93·1	314	e 13 53	+36	e 24 19	− 3	—	—	—
Jena	N.	93·1	320	e 13 20	+ 3	—	—	e 15 47	?	—
Chur		94·4	316	e 13 21	− 2	—	—	—	—	—
Stuttgart		94·7	319	i 13 22a	− 2	e 24 17	{+ 1}	e 17 9	PP	e 49·3
Zürich		95·1	317	e 13 27	+ 1	e 24 37	− 2	e 23 55	SKS	—
Strasbourg		95·6	319	e 13 23	− 5	e 24 37	− 6	e 17 9	PP	e 40·3
Bergen		96·5	331	e 17 24?k	PP	e 24 52	+ 1	e 27 53	?	45·3
De Bilt		97·1	322	e 13 34	− 1	e 24 53	− 3	e 17 38	PP	e 47·3
Uccle		97·7	320	e 13 35?	− 3	e 24 13	[− 2]	e 17 39	PP	e 51·3
Clermont-Ferrand		98·9	316	e 13 46	+ 3	e 24 44	{− 2}	e 18 5	PP	—
Paris		99·1	318	e 13 49	+ 5	i 24 27	[+ 4]	e 17 45	PP	e 57·3
Kew		100·6	321	e 13 55?	+ 4	e 24 29	[− 1]	e 17 58	PP	e 45·3
Aberdeen	E.	100·7	328	i 20 13	PPP	i 24 22	[− 8]	—	—	59·5
Almeria		103·9	307	(14 20)	+14	(25 54)	+ 1	(24 42)	SKS	(53·5)
Malaga	Z.	105·5	307	i 18 35k	PP	i 28 48	PPS	—	—	41·9
Antarctica		108·1	185	e 18 53	PP	—	—	—	—	e 54·8
Grand Coulee		123·3	32	e 19 1	[+ 2]	—	—	e 20 43	PP	—
Shasta Dam		125·4	40	e 19 3	[0]	—	—	e 20 54	PP	—
Saskatoon		125·9	22	e 22 23	PKS	e 31 5	PS	e 38 47	SSP	65·3
Berkeley		126·9	44	i 22 51	PKS	i 31 41	PS	i 32 25	PPS	e 62·3

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tinemaha	z.	130·0	42	e 19 13	[+ 1]	i 22 34	SKP	e 21 35	PP	—
Santa Barbara		130·3	46	e 19 15	[+ 3]	i 22 38	SKP	e 21 28	PP	—
Haiwee	z.	130·7	43	e 19 14	[+ 1]	i 22 38	SKP	—	—	—
Logan		131·2	33	—	—	i 22 35	SKP	—	—	e 66·7
Mount Wilson	z.	131·6	46	e 19 18	[+ 3]	i 22 41	SKP	e 21 37	PP	—
Pasadena		131·6	45	i 19 17	[+ 2]	i 22 48	SKP	e 21 34	PP	e 58·0
Salt Lake City		131·8	34	—	—	e 22 51	SKP	—	—	e 64·9
Riverside	z.	132·2	45	e 19 16	[0]	i 22 43	SKP	—	—	—
La Jolla		132·9	46	e 19 21	[+ 3]	e 22 46	SKP	—	—	—
Palomar		133·0	46	i 19 21	[+ 3]	i 22 46	SKP	i 21 45	PP	—
Pierce Ferry		133·4	41	e 19 20	[+ 2]	i 22 47	SKP	i 21 48	PP	—
Kirkland Lake		135·4	2	e 19 26	[+ 4]	—	—	e 22 3	PP	—
Seven Falls		136·2	352	—	—	e 30 53	?	—	—	61·3
Temiskaming		137·0	0	e 22 10	PP	—	—	—	—	—
Tucson		137·8	43	e 19 20	[− 6]	e 26 49	[+13]	i 22 30	PP	e 68·1
Ottawa		138·3	357	19 28	[+ 1]	32 17?	PS	22 17	PP	66·8
Cleveland		142·0	4	i 19 36k	[+ 2]	i 29 47	{+14}	i 22 41	PP	e 62·7
St. Louis		143·2	16	i 19 42	[+ 6]	e 29 47	{+ 7}	i 22 43	PP	—
Philadelphia		143·6	355	e 22 57	PKS	e 34 59	PPS	e 42 13	SSP	e 63·1
Bermuda		148·8	338	e 19 39	[− 6]	e 26 30	[−22]	e 22 52	PP	e 60·1
La Paz		158·0	206	i 20 2	[+ 3]	26 25	[−38]	i 23 35	PP	76·0
Fort de France		160·2	303	e 19 38	[−23]	—	—	—	—	—
San Juan		161·4	323	e 20 5	[+ 3]	e 31 29	{+ 9}	e 24 30	PP	e 79·1
Huancayo		164·4	189	e 20 10	[+ 5]	e 34 45	SKSP	e 45 10	SS	—
Bogota		176·2	287	i 20 32	[+20]	i 32 32	{− 1}	e 25 17	PP	—

Additional readings and notes :—
Kodaikanal SSE =12m.22s.
Calcutta iSSE =12m.24s.
Brisbane i =17m.24s., iS_cSEN =19m.12s.
Riverview iZ =9m.57s., iEN =17m.39s.
Auckland SSS =30m.47s. ?
Wellington S_cS? =21m.39s., SSS =30m.17s.
Helwan iS_cSN =21m.43s., iN =22m.15s.
Istanbul readings reduced by 4m.
Helsinki e =13m.4s. and 13m.29s., ePP =15m.49s., e =16m.3s. and 23m.45s.
Warsaw ePE =12m.35s., ePZ =12m.48s., PPN =16m.10s., PPPE =18m.16s., SKSN = 22m.58s., SKKSN =23m.16s., iN =23m.58s., PSE =24m.32s., PSN =24m.39s., SSN =29m.13s., SSE =29m.26s.
Budapest SE =23m.44s., eE =23m.57s., PSE =24m.18s.
Upsala eP?N =13m.28s., ePPE =16m.57s., PPPPE =19m.54s., SKSE =23m.19s.?, S_cSN =23m.54s., iS_cSE =23m.57s., PS =24m.19s.?, eSSN =29m.48s.
Prague ePP =17m.17s., eSKKS =24m.5s.
Triest iS =24m.36s.
Cheb ePPP =19m.20s., e =24m.47s., ePS =25m.41s., eSS =31m.17s., eSSS =35m.1s.
Copenhagen S =24m.50s., 30m.35s.
Stuttgart eS =24m.53s., ePS =25m.57s., eSS? =30m.47s.
Strasbourg ePPP =19m.30s., eSKS =24m.17s., ePS =26m.1s. and 26m.9s., ePPS = 27m.22s., eSS =31m.32s., eSSS =35m.17s.
De Bilt ePPP =19m.47s., eSKS =24m.7s., ePS =26m.31s., eSS =31m.30s.
Uccle ePPPE =19m.35s., eSKKSN =24m.57s., ePSE =26m.24s., eSSN =31m.54s., eSSSE =35m.37s.
Clermont-Ferrand ePS =26m.57s., eSS? =31m.6s.
Paris epP? =14m.18s., e =16m.45s., i =17m.27s., eSKKS =24m.45s., iPPS =27m.33s., i =27m.55s., eSS =32m.29s., eSSS =36m.19s.
Kew ePPP?Z =19m.34s.?, eSKKS?EZ =24m.49s., eS?NZ =25m.19s.?, ePS?E =27m.4s.?, eSS?N =31m.54s.?, eSKKS?Z(Δ >180°) =37m.14s.?, eSKKKS?EN =41m.6s.?
Almeria PP =(18m.32s.), PPP =(20m.36s.), PS =(27m.30s.), PPS =(28m.28s.), SS = (33m.10s.); readings reduced by 4 minutes.
Malaga P_cPZ =18m.51s., PPZ =21m.33s., PPPZ =23m.11s., SSZ =32m.25s.; phases wrongly identified.
Saskatoon e =43m.59s.
Pasadena iSKPZ =22m.40s., e =23m.2s.
Palomar iZ =19m.31s.
Tucson iPKP =19m.32s., e =20m.39s., iPKS =23m.1s., eSKKS =29m.24s.
Cleveland eN =22m.35s., iNZ =22m.55s., iN =23m.13s., iSN =32m.51s., ePSN = 35m.11s., eSSN =42m.25s.
St. Louis i =19m.56s., iSKP =22m.57s., i =23m.22s., iPPP =26m.9s., e =33m.30s.
Bermuda eSKSP =33m.9s., ePSPS =42m.41s., eSSS? =49m.47s.
La Paz iZ =20m.20s., SKKS =30m.25s., PPSE =36m.41s., SSN =43m.57s.
San Juan eSKSP? =35m.55s., eSS? =44m.42s., eSSS =50m.33s.
Bogota iPKPEZ =21m.7s.
Japanese readings are given at 4h.
Long waves were also recorded at Potsdam, Besançon, College, Bozeman, Butte, and Chicago.

Nov. 1d. 14h. 58m. 52s. Epicentre 10°·5S. 74°·9W. (as on 1945, August 21d.).

Intensity VIII-IX at Satipo ; VI-VII at La Merced ; VI at Oventino, Tarma, etc. ; many casualities. Macroseismic area 1,300,000 sq. km.
Epicentre in the region 11°-11°25′S, 74°50′-75°15′W. Depth of focus 70km.

E. Silgado.
Datos sismológicas del Perú, 1947, Instituto Geológico del Perú, Bol. 11, Lima, 1948, pp. 17-18.

E. Silgado.
El Terremoto del 1° de novembre de 1947, with 3 photos and an isoseismic chart. Datos sismológicos del Perú, Bol. 11, Lima, 1948, pp. 25-31.

$A = +\cdot2562$, $B = -\cdot9495$, $C = -\cdot1811$; $\delta = -1$; $h = +6$;
$D = -\cdot965$, $E = -\cdot261$; $G = -\cdot047$, $H = +\cdot175$, $K = -\cdot983$.

		Δ	Az.	P.	O−C.	S.	O−C.		Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Huancayo		1·6	195	i 0 23	− 7	—	—	—	—	—
La Paz		8·9	133	i 2 9	− 3	i 4 0	+ 5	i 4 44	S_g	—
Montezuma		13·4	155	e 3 6	− 8	e 5 12	−33	i 3 42	PPP	i 5·6
Bogota		15·0	3	i 2 45	−50	i 5 51	−32	—	—	—
Copiapo	E.	17·3	166	i 4 28	+24	7 43	SS	—	—	9·4
Balboa Heights		19·9	348	e 4 40	+ 4	i 8 33	+18	—	—	—
Santa Lucia	E.	22·8	172	e 4 18	−47	9 30	+19	5 48	PPP	—
	N.	22·8	172	i 4 17	−48	9 23	+12	6 27	?	—
Fort de France		28·5	30	i 5 57	− 2	—	—	—	—	—
La Plata	E.	28·8	150	i 5 57	− 5	10 38	−13	i 12 14	SSS	16·2
	N.	28·8	150	i 5 57	− 5	10 39	−12	12 24	SSS	15·9
	Z.	28·8	150	i 5 55	− 7	11 10	+19	13 38	Q	14·4
Port au Prince		29·0	6	e 6 17	+13	i 11 14	+20	6 56	PP	—
San Juan		30·0	17	e 6 14	+ 2	—	—	i 6 20	P	—
Tacubaya		38·2	322	i 7 28	+ 5	i 13 28	+11	i 7 41	pP	19·1
Bermuda		43·7	13	e 8 8	0	i 14 14	−25	i 10 2	PP	i 17·7
Columbia		44·6	353	e 8 20	+ 4	i 14 54	+ 2	e 10 23	PP	i 18·7
Georgetown		49·2	359	i 8 52	0	i 16 1	+ 3	i 16 9	PPS	—
Philadelphia		50·2	0	i 9 5	+ 5	i 16 15	+ 4	i 11 4	PP	i 25·4
St. Louis		50·9	345	i 9 4	− 1	i 16 21	0	i 11 3	PP	—
Fordham		51·1	2	i 9 8	+ 2	i 16 28	+ 4	—	—	—
Pennsylvania		51·1	358	i 9 9	+ 3	i 16 21	− 3	—	—	—
Cleveland		52·1	354	i 9 13a	− 1	i 16 44	+ 6	i 11 19	PP	—
Weston		52·7	4	i 9 19	+ 1	i 16 41	− 5	i 11 26	PP	—
Harvard		52·8	4	i 9 21	+ 2	i 16 40	− 7	i 11 28	PP	e 30·0
Ann Arbor		53·1	352	e 9 28	+ 7	e 16 54	+ 3	e 16 42	S	e 23·5
Chicago		53·3	348	e 9 20	− 3	i 16 54	0	e 11 36	PP	e 21·9
Tucson		54·6	322	i 9 33a	+ 1	e 17 14	+ 3	e 19 41	ScS	—
Ottawa		55·6	359	9 39a	− 1	i 17 28	+ 3	11 44	PP	30·1
Halifax		55·8	10	9 34	− 7	17 16	−12	11 38	PP	27·1
Shawinigan Falls		56·8	3	9 49	+ 1	17 48	+ 7	12 5	PP	27·1
Temiskaming		57·0	357	9 54	+ 4	18 3	+20	21 32	SS	27·1
Seven Falls		57·5	4	9 55	+ 2	17 55	+ 5	18 17	PPS	30·1
Antarctica		57·9	176	9 49	− 7	i 17 49	− 6	9 56	P	e 27·8
Kirkland Lake		58·6	356	10 0	− 1	18 6	+ 2	18 38	PPS	30·1
La Jolla		59·1	319	e 10 4	0	e 18 18	+ 7	i 10 20	PcP	—
Palomar		59·1	320	i 10 5a	+ 1	e 18 50	+39	i 13 48	PPP	—
Pierce Ferry		59·2	324	e 10 4	− 1	i 18 36	+24	i 12 36	PP	—
Riverside		59·9	320	i 10 9a	− 1	e 18 20	− 1	—	—	—
Rapid City		60·1	337	i 11 12	+61	i 19 24	+60	e 15 20	PPP	—
Mount Wilson		60·5	320	i 10 14a	0	e 18 32	+ 3	i 10 28	PcP	—
Pasadena		60·5	320	i 10 14a	0	i 18 35	+ 6	e 12 55	PP	i 26·3
Salt Lake City		61·4	329	e 10 32	+12	i 18 56	+16	i 12 58	PP	e 29·5
Haiwee	Z.	61·6	321	e 10 21	− 1	—	—	i 39 37	P′P′	—
Santa Barbara		61·7	319	e 10 21	− 1	e 18 46	+ 2	i 11 10	PcP	—
Logan		62·1	330	e 10 21	− 4	i 18 53	+ 4	i 19 56	ScS	e 31·3
Tinemaha		62·4	322	i 10 26	− 1	e 18 49	− 4	i 11 34	PcP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Bozeman		64·7	333	e 10 46	+ 4	e 19 26	+ 4	e 13 12		PP	e 27·4
Lick		64·7	320	e 10 45	+ 3	e 19 29	+ 7	e 19 34		PS	e 35·3
Santa Clara		64·9	320	i 10 48	+ 5	e 19 31	+ 7	—		—	—
Berkeley		65·4	320	i 10 47	0	i 19 44	+14	i 20 4		PS	e 35·5
San Francisco		65·4	320	e 10 51	+ 4	e 19 38	+ 8	i 11 13		PcP	e 36·4
Butte		65·6	333	e 10 51	+ 3	e 19 35	+ 2	e 11 21		PcP	e 28·2
Ukiah		66·7	321	e 11 2	+ 7	i 19 54	+ 8	i 20 22		PPS	e 28·5
Shasta Dam		67·2	323	i 10 56	− 2	e 19 55	+ 3	—		—	—
Saskatoon		68·1	340	12 38	?	i 20 11	+ 8	29 38		Q	32·1
Ferndale	E.	68·2	322	e 11 27	+23	i 20 26	+22	—		—	—
Grand Coulee		70·1	331	e 11 12	− 4	e 20 26	− 1	—		—	—
Seattle		71·5	328	e 12 18	+54	e 21 37	+54	—		—	e 33·0
Victoria		72·7	328	11 34	+ 2	21 6	+ 9	14 26		PP	38·1
Ivigtut		74·5	13	i 11 42	0	i 21 19	+ 2	14 36		PP	31·1
Lisbon		78·3	47	i 12 4a	+ 1	i 22 1	+ 2	15 4		PP	—
Malaga	Z.	81·0	50	i 12 17a	− 1	i 22 22	− 5	i 22 56		sS	39·6
Granada		81·8	50	i 12 21k	− 1	i 22 39	+ 4	i 15 30		PP	i 41·3
Almeria		82·5	51	i 12 23	− 3	i 22 48	+ 6	i 12 35		pP	38·8
Sitka		83·7	332	—	—	e 22 50	− 4	—		—	e 35·5
Reykjavik		84·4	20	12 44	+ 8	i 23 8	+ 7	i 24 8		PS	e 40·2
Alicante		84·5	49	i 12 38	+ 2	i 23 4	+ 2	12 44		pP	39·6
Tortosa		86·0	48	i 12 49	+ 6	i 23 14	− 3	12 56		PcP	42·4
Bagneres		86·4	45	e 12 41?	− 4	i 23 8?	[− 2]	e 15 38?		PP	—
Jersey		86·9	39	e 13 9	+21	e 23 49	+23	—		—	—
Barcelona		87·3	47	12 54	+ 4	23 34	+ 5	29 19		SS	29·5
Honolulu		87·3	292	e 12 57	+ 7	e 23 19	[+ 3]	e 28 59		SS	e 36·3
Edinburgh		88·6	33	12 8	−48	23 24	[0]	29 38		SS	—
Kew		88·7	37	i 12 56a	− 1	e 23 25?	[0]	e 16 25?		PP	e 36·1
Scoresby Sund		88·7	15	12 56a	− 1	i 23 44	+ 1	16 35		PP	—
Durham		89·1	34	i 13 3	+ 5	i 23 29	[+ 2]	i 29 47		SS	—
Clermont-Ferrand		89·2	43	e 12 59	0	i 23 33	[+ 5]	i 16 41		PP	41·1
Aberdeen	E.	89·6	31	i 13 6	+ 5	i 23 32	[+ 2]	i 16 22		PP	43·0
Paris		89·7	40	i 13 6	+ 5	i 23 37	[+ 6]	i 13 25		pP	45·1
Marseilles		90·2	46	e 13 24	+20	e 23 42	{− 1}	—		—	—
Uccle		91·4	38	e 13 8a	− 1	i 23 44	[+ 3]	e 16 45		PP	e 44·1
Besançon		91·5	42	e 13 9	− 1	e 23 49	[+ 7]	—		—	e 39·8
Neuchatel		92·1	42	e 13 12	0	e 23 47	[+ 2]	—		—	—
De Bilt		92·2	37	e 13 12a	− 1	i 24 18	+ 4	e 16 58		PP	e 37·1
College		92·3	336	e 13 15	+ 2	e 24 12	− 3	e 17 4		PP	—
Basle		92·6	42	e 13 13	− 2	e 23 54	[+ 6]	—		—	—
Strasbourg		93·0	41	e 13 13	− 4	i 23 52	[+ 2]	i 16 47		PP	40·1
Zürich		93·3	42	e 13 17a	− 1	e 24 20	− 4	e 17 0		PP	—
Chur		93·8	43	e 13 20	0	e 23 58	[+ 4]	—		—	—
Stuttgart		93·9	41	i 13 20a	− 1	i 23 58	[+ 3]	e 17 3		PP	40·1
Apia		94·1	255	e 13 31	+ 9	e 24 18	{+ 6}	e 17 43		PP	e 50·1
Bergen		94·3	28	i 13 28	+ 5	i 24 33	+ 1	16 56		PP	44·1
Florence		94·4	46	i 13 33	+10	i 24 3	[+ 5]	—		—	—
Rome		95·0	48	i 13 25a	− 1	e 24 5	[+ 4]	e 26 11		PS	e 44·5
Jena		95·9	40	e 13 34	+ 4	e 24 10	[+ 4]	e 31 28		SSP	e 40·1
Cheb		96·2	39	e 13 35	+ 4	i 24 14	[+ 6]	e 17 31		PP	e 46·1
Triest		96·5	45	e 13 31	− 1	i 24 10	[+ 1]	i 17 24		PP	—
Collmberg		96·8	39	e 13 51	+17	e 24 9	[− 2]	—		—	—
Johannesburg		96·8	118	e 13 38	+ 4	e 24 56	+ 2	e 24 8		SKS	e 44·1
Potsdam		97·0	37	e 13 55	+20	i 24 58	+ 3	e 24 2		SKS	e 41·1
Prague		97·5	40	13 38	+ 1	e 24 20	[+ 6]	e 26 20		PS	38·1
Copenhagen		97·7	34	e 13 37	− 1	i 25 1	0	i 24 16		SKS	47·1
Wellington	Z.	98·0	225	13 38	− 1	26 56	PS	14 16		pP	44·3
Zagreb		98·0	45	e 13 51	+12	e 24 21	[+ 4]	27 4		PPS	e 41·8
Arapuni		98·5	229	—	—	25 14	+ 6	e 27 44		PPS	45·9
Auckland		99·5	230	13 38	− 8	i 24 29	[+ 4]	17 53		PP	48·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Kalossa		100·2	44	e 13 57	+ 8	e 24 38	[+10]	e 25 32	S		e 41·1
Budapest		100·3	43	13 59	+ 9	24 30	[+ 2]	25 27	S		e 40·1
Upsala		100·3	31	e 13 51	+ 1	e 24 20	[− 8]	25 26	S		e 41·1
Belgrade		101·1	46	e 13 54	+ 1	i 24 34	[+ 2]	e 18 0	PP		e 41·1
Warsaw		101·8	38	13 59?	+ 3	24 36	[0]	18 8	PP		e 40·1
Helsinki		103·9	30	e 14 22	+16	e 24 48	[+ 2]	e 18 24	PP		e 43·1
Istanbul		107·3	50	e 13 48	P	—	—	i 18 11	PP		—
Helwan		109·2	62	e 14 34	P	25 8	[− 1]	19 2	PP		—
Yalta		110·9	46	e 19 50	PP	—	—	—	—		—
Moscow		111·3	33	14 43	P	25 13	[− 5]	18 15	PKP		—
Ksara		113·0	58	e 14 53	PP	29 10	PS	19 33	PP		—
Sotchi		115·0	46	18 49	[+ 6]	—	—	—	—		—
Tananarive		116·2	117	20 5	PP	25 45	[+ 9]	26 53	SKKS		51·9
Riverview		117·9	223	i 18 59a	[+10]	e 25 48	[+ 5]	i 20 0	PP		e 54·7
Leninakan		118·5	49	18 53	[+ 3]	21 41	PKS	20 5	PP		—
Erevan		119·1	50	e 20 31	PP	—	—	—	—		—
Grozny		119·3	45	e 20 5	PP	—	—	—	—		—
Brisbane		120·2	230	i 20 14	PP	i 25 50	[− 1]	e 36 30	SS		—
Sverdlovsk		121·5	27	e 15 37	P	27 37	{+13}	i 19 2	PKP		—
Ashkabad		130·1	50	e 19 15	[+ 3]	i 22 43	PKS	—	—		—
Tchimkent		135·7	38	i 19 35	[+12]	23 10	PKS	—	—		—
Tashkent		136·0	39	19 30	[+ 7]	29 2	{+ 5}	22 14	PP		—
Perth		136·6	194	i 21 8	PP	i 27 11	[+37]	i 35 11	PPS		i 68·7
Mizusawa		137·1	318	e 19 45	[+20]	23 10	PKS	—	—		—
Stalinabad		137·2	42	i 19 22	[− 3]	i 23 1	PKS	—	—		—
Sendai		137·7	317	e 19 33	[+ 7]	—	—	—	—		e 63·2
Andijan		138·3	37	e 19 34	[+ 7]	e 23 32	PKS	e 41 2	SSP		—
Irkutsk		138·3	1	e 19 44	[+17]	29 10	{− 1}	e 23 12	PKS		—
Almata		139·2	31	i 19 37	[+ 8]	—	—	—	—		—
Kumagaya		139·8	315	e 19 19	[−11]	—	—	—	—		e 73·1
Tokyo		139·8	314	e 19 29	[− 1]	—	—	—	—		—
Vladivostok		140·0	329	19 20	[−10]	23 0	PKS	i 22 16	PP		—
Nagano		140·4	316	e 19 30	[− 1]	—	—	—	—		—
Shizuoka		141·1	314	e 19 40	[+ 8]	22 54	PKS	—	—		—
Nagoya		142·0	315	e 19 39	[+ 5]	—	—	—	—		e 90·6
Osaka		143·3	316	e 19 48	[+12]	—	—	—	—		—
Kobe		143·5	316	19 38	[+ 1]	—	—	—	—		78·2
Siomisaki		143·8	314	e 19 39	[+ 2]	—	—	—	—		81·2
Hukuoka		147·2	318	i 19 49	[+ 6]	24 19	PKS	—	—		—
Bombay		147·7	71	e 19 46	[+ 2]	i 30 12	{+ 6}	i 42 20	SS		63·5
Dehra Dun	N.	148·0	47	e 21 9	?	—	—	—	—		e 80·9
Kodaikanal	E.	152·8	87	—	—	30 38	{+ 4}	—	—		—
Hyderabad	N.	153·3	72	20 17	PKP_2	43 35	SS	—	—		—
Colombo	E.	154·8	96	20 2	[+ 8]	34 21	?	—	—		79·5
Calcutta	E.	160·0	51	19 52	[− 9]	i 30 55	{−17}	i 24 12	PP		76·5

Additional readings :—
La Paz iP* =2m.37s.
Bogota iPP =2m.55s., i =4m.32s.
La Plata iPPP?N =8m.6s., PPP?Z =8m.26s., N =10m.8s., iSS?E =11m.25s., E = 13m.14s.
Port au Prince i =6m.24s. and 6m.37s., PPP =7m.12s., SS =12m.39s.
Tacubaya iP_cP =9m.34s., isS =13m.56s., iS_cS =17m.34s.
Bermuda iP =8m.12s.
Columbia ePPP =11m.51s., iSS =17m.49s.
Philadelphia i =9m.12s. and 9m.32s., iP_cP =9m.55s., iPPP =11m.57s.
St. Louis i =15m.54s.
Pennsylvania eEN =18m.8s.
Cleveland eE =9m.23s. and 9m.30s., iN =10m.29s., iE =10m.36s., iPPPN =12m.18s., iN =12m.38s., iE =13m.11s., iN =14m.29s., eE =16m.23s., iE =16m.37s.
Weston iSS =20m.48s.
Chicago iP =9m.28s., eS_cS =19m.14s., iSS =20m.58s.
Tucson eSS =21m.30s.
Ottawa PPP =12m.48s., PS =18m.0s., SS =23m.18s., SSS =24m.50s.
Halifax PS =17m.48s., SS =21m.8s., SSS =22m.44s.
Shawinigan Falls PPP =13m.20s., PS =18m.14s., SS =21m.44s.
Temiskaming PP =12m.20s., PS =18m.15s.
Seven Falls SS =21m.44s., SSS =24m.26s.

Continued on next page.

Kirkland Lake PP =12m.48s., PPP =13m.56s., SSS =24m.44s.
La Jolla ePKP,PKPZ =39m.41s.
Palomar iZ =10m.9s., 13m.10s., 16m.43s., 16m.48s., and 20m.13s., ePKP,PKPZ = 39m.36s.
Pierce Ferry i =10m.29s. and 15m.6s., iS_cP =18m.6s., i =52m.49s.
Riverside i =10m.15s., ePKP,PKPZ =39m.31s.
Mount Wilson iP_cPZ =10m.20s., ePKP,PKPZ =39m.39s.
Pasadena ipP? =10m.28s., iZ =11m.5s., iS_cPZ =14m.42s., iZ =18m.47s. and 19m.27s., ePKP,PKPZ =39m.23s.
Salt Lake City iP =10m.36s., eSS =23m.18s.
Santa Barbara ePKP,PKPZ =39m.45s.
Logan iP =10m.28s.
Tinemaha iP_cPZ =10m.33s., ePKP,PKPZ =39m.29s.
Bozeman iP =10m.52s., iP_cP =11m.22s., ePPP =15m.2s., iS =19m.32s., iS_cS =20m.40s., iSS =23m.40s.
Berkeley eN =19m.54s.
Butte ePP =14m.11s., ePPP =15m.36s., e =22m.31s., eSS =23m.18s., eSSS =25m.59s.
Ukiah eP_cP? =11m.51s.
Shasta Dam i =11m.2s., e =12m.21s.
Victoria PS =21m.47s.
Ivigtut i =11m.46s., 12m.11s., 12m.35s., 21m.50s., SS =26m.8s.
Lisbon Z =12m.8s. and 18m.40s.
Malaga iPPZ =15m.37s., iPPPZ =17m.8s., iPSNW =23m.26s., iSSZ =27m.36s., QZ = 34m.24s.
Granada P_cP =12m.34s., PS =23m.11s., SS =28m.15s., SSS =31m.21s.
Almeria iPP =15m.30s., iPPP =17m.48s., S_cS =23m.0s., PPS =24m.5s., SS =28m.23s., SSS =31m.48s., Q =35m.36s.
Sitka i =22m.57s., ePKKP =30m.37s.
Reykjavik ePPEN =13m.14s., iSKKS?EN =23m.18s.
Alicante i =14m.16s., PP =15m.56s., PPP =17m.52s., PS =23m.38s., PPS =24m.8s., SS =28m.38s., SSS =31m.33s.
Tortosa PPE =16m.23s., PPPN =18m.27s., SKKSEN =23m.24s., SN =23m.31s., S_cSN =23m.45s., iE =24m.19s., PSEN =24m.36s., PPSEN =25m.5s., SSE = 29m.3s., SSSE =32m.49s., QN =36m.50s.
Kew eSNZ =23m.42s., ePSZ =24m.43s., eSSE =29m.39s.?, eSSSNZ =33m.10s.?
Scoresby Sund 13m.46s., SKS =23m.28s., 24m.9s., 24m.46s., 25m.11s., 27m.28s., 29m.37s., 30m.26s.
Durham iN =13m.24s., iE =18m.24s., iEN =23m.40s., iSEN =23m.49s.
Clermont-Ferrand iP =13m.4s., i =20m.2s., iSS =29m.57s., i =36m.13s.
Aberdeen iPPE =18m.17s., iPSE =24m.12s., iE =27m.0s., iSSE =29m.47s.
Paris i =3m.12s., iPP =16m.46s., iPPP =18m.45s., i =23m.59s., iS =24m.3s., iPS = 25m.0s., iSS =29m.54s., iSSS =33m.28s., i$SKKS_2$? =37m.23s., iQ =40m.4s., iPKP,PKS =42m.25s., i =43m.50s.
Uccle i =13m.13s., iSZ =24m.12s., eSSEN =30m.8s., eQ?E =37m.39s.
De Bilt iZ =13m.18s., iSKS =23m.50s., eSSS =33m.44s.
College eS =24m.24s., ePS =25m.36s.
Strasbourg iP =13m.17s., ePPP =19m.29s., i =21m.8s., iS =24m.24s. and 24m.30s., iSP =25m.37s., iSPP =26m.31s., i =27m.58s., iSS =30m.40s., iSSS =34m.12s. and 34m.20s.
Zürich eSKS =23m.29s.
Stuttgart i =13m.25s., e =18m.41s. and 23m.8s., ePS =25m.38s., eSS? =32m.8s.
Bergen SKSEN =23m.52s., PPSEN =26m.12s., eSSEN =30m.43s., QN =39m.38s.
Rome eEN =13m.34s., ePPN =16m.15s., iPPZ =16m.50s., iSKSZ =24m.12s., eSE = 24m.48s.
Jena ePN =13m.37s., ePEN =13m.40s., eN =13m.49s., eS =24m.48s.
Cheb ePPP =19m.58s., e =22m.26s., ePS? =26m.23s., e =27m.40s., eSS =32m.42s., eSSS =36m.16s.
Triest iPPP =19m.32s., iSKKS =24m.33s., iS =24m.54s., iPS =26m.9s., iPPS =26m.38s., iSS =31m.36s.
Collmberg Z =14m.6s., eEN =20m.41s., 24m.9s., 28m.33s., and 30m.29s.
Johannesburg ePSN =26m.8s.?, eN =29m.32s., eSSEN =31m.20s., eQEN =39m.8s.?
Potsdam ePPE =17m.43s., eSN =25m.2s., eSSE =31m.56s.
Prague ePPP =20m.8s., eSS =32m.8s.
Copenhagen i =13m.42s., iPS =26m.37s.
Wellington sPZ =14m.28s., iZ =14m.59s., PPZ =17m.35s., sPPZ =18m.22s., PPPZ = 19m.43s., iZ =28m.49s., PKKPZ =29m.49s.
Zagreb eP_cP =14m.4s., eE =16m.8s.
Arapuni e =26m.44s., 32m.8s , and 39m.8s.
Auckland PPP =19m.35s., SKS =23m.59s., S =25m.17s., SS =33m.16s., SSS =37m.38s.
Kalossa eE =14m.3s. and 14m.43s., eN =25m.38s.
Budapest ePPN =17m.35s., ePPE =17m.38s., ePPPEN =19m.28s., SN =24m.36s., SE =24m.40s., SKKSE =25m.28s., PPSE =25m.51s., SSSN =32m.51s., SSSE = 32m.54s.
Upsala eN =14m.41s., eE =16m.45s., ePPN =17m.43s., iN =25m.49s., PSN =26m.47s., ePSE =26m.51s., eN =31m.8s.?, SSE =32m.24s., eN =35m.8s.
Belgrade e =16m.2s., ePPP? =20m.20s., ePS? =25m.47s., eSS =32m.29s.

Continued on next page.

Warsaw PE = 14m.4s., iZ = 14m.11s., PN = 14m.16s., PPE = 18m.14s., PPPZ = 20m.17s., SKSZ = 24m.30s., SKKSE = 25m.12s., SKKSN = 25m.15s., SN = 25m.43s., SZ = 25m.46s., PSZ = 27m.9s., PSN = 27m.15s., PPSE = 28m.4s., PPSZ = 28m.19s., PPSN = 28m.23s., PKKPE = 30m.12s., eN = 31m.27s., SSN = 32m.51s., iSSE = 32m.55s., PKKSE = 33m.18s., PKKSN = 33m.28s., eN = 34m.15s., iE = 35m.33s., SSSE = 36m.48s., eE = 37m.35s., eN = 37m.39s., PKP,PKPE = 38m.13s., 39m.29s.
Helsinki e = 17m.35s., ePPP = 20m.39s., e = 39m.15s. and 42m.23s.
Helwan iZ = 18m.23s., SN = 26m.52s., PSE = 28m.32s., PPSE = 29m.28s., SSE = 34m.31s.
Moscow PP = 19m.11s., PS = 28m.49s.
Tananarive PS = 29m.56s., SS = 36m.26s., SSS = 40m.33s., Q = 48m.51s.
Riverview iZ = 20m.16s., and 20m.31s., iPPPN = 22m.15s., iE = 24m.56s., iN = 26m.1s., eEN = 26m.57s., iPSE = 29m.44s., iEN = 29m.58s., eSSN = 36m.18s., eSSE = 36m.27s., ePSPSN = 36m.56s., iN = 39m.30s., iSSSN = 40m.57s., eQ?N = 46m.32s., eQN = 49m.38s.
Leninakan PPP = 22m.42s.
Brisbane iSKSPEN = 30m.12s., iEN = 37m.15s.
Sverdlovsk iPP = 20m.40s., iS = 28m.36s., iPS = 30m.33s.
Perth i = 23m.3s., 41m.15s., and 54m.17s.
Tashkent iPKS = 23m.2s.
Andijan ePPS = 35m.45s.?
Irkutsk iPP = 22m.19s. and 22m.35s., iPS = 32m.30s., PPS = 35m.19s., iSS = 40m.26s. and 40m. 46s.
Bombay iSSSE = 49m.12s.
Calcutta ePKP$_2$E = 20m.31s., iPPPE = 27m.52s., iPPSE = 38m.10s., iSSE = 44m.30s.

Nov. 1d. Readings also at 1h. (Palomar, Riverside, Pierce Ferry, and Tucson), 3h. (Wellington and Auckland), 4h. (Shasta Dam), 5h. (Sitka, La Plata, and Antarctica) 12h. (Antarctica, Stuttgart, and near Mizusawa), 13h. (Shasta Dam), 15h. (Stuttgart, Kirkland Lake, Temiskaming, Nanking, near Granada, and Alicante), 16h. (Temiskaming, Kirkland Lake, La Paz, Huancayo, Balboa Heights, Mount Wilson, Pasadena, Tinemaha, Riverside, Tucson, Shasta Dam, Pierce Ferry (3), and Stuttgart), 17h. (Stuttgart and La Paz), 18h. (Huancayo, Bogota, and La Paz (3)), 19h. (La Paz (2), Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Shasta Dam (2), Pierce Ferry (2), and Stuttgart), 20h. (Temiskaming and La Paz), 21h. (Kirkland Lake, La Paz (2), Bogota, Shasta Dam, and Pierce Ferry), 22h. and 23h. (La Paz).

Nov. 2d. 1h. 32m. 12s. Epicentre 10°·5S. 74°·9W. (as on Nov. 1d.).

$A = +\cdot2562$, $B = -\cdot9495$, $C = -\cdot1811$; $\delta = -1$; $h = +6$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		1·6	195	i 0 23	− 7	—	—	—	—	—
La Paz		8·9	133	i 2 12	0	i 3 52	− 3	i 4 32	S*	5·7
Bogota	z.	15·0	3	i 3 41	+ 6	i 6 51	+28	—	—	—
Balboa Heights		19·9	348	e 4 39	+ 3	—	—	—	—	—
San Juan		30·0	17	e 6 11	− 1	e 11 7	+ 3	e 7 23	PP	e 12·6
Cleveland	z.	52·1	354	i 9 17	+ 3	—	—	—	—	—
Tucson		54·6	322	i 9 32$_a$	0	—	—	—	—	—
Temiskaming		57·0	357	e 9 46	− 4	—	—	—	—	—
Kirkland Lake		58·6	356	e 9 54	− 7	—	—	—	—	—
Palomar	z.	59·1	320	i 10 4	0	—	—	—	—	—
Pierce Ferry		59·2	324	i 10 14	+ 9	—	—	—	—	—
Riverside	z.	59·9	320	i 10 9	− 1	—	—	—	—	—
Pasadena	z.	60·5	320	i 10 11	− 3	—	—	—	—	—
Mount Wilson	z.	60·5	320	i 10 13	− 1	—	—	—	—	—
Tinemaha	z.	62·4	322	i 10 26	− 1	—	—	—	—	—
Shasta Dam		67·2	323	e 10 54	− 4	—	—	—	—	—
Grand Coulee		70·1	331	e 11 16	0	—	—	—	—	—
Stuttgart		93·9	41	e 13 20	− 1	—	—	—	—	e 50·8
Ksara		113·0	58	e 21 2	PPP	—	—	—	—	—

La Paz also gives S_e = 5m.13s.
San Juan also gives e = 6m.59s.
Long waves were also recorded at Alicante.

Nov. 2d. 6h. 59m. 32s. Epicentre 10°·5S. 74°·9W. (as at 1h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Huancayo		1·6	195	i 0 20	−10	—	—	—	—
La Paz		8·9	133	i 2 10	− 2	i 4 0	+ 5	i 4 42	S•
Bogota	z.	15·0	3	i 3 46	+11	—	—	—	—
La Plata	E.	28·8	150	—	—	10 58	+ 7	13 40	Q
Tucson		54·6	322	i 9 33	+ 1	—	—	—	—
Palomar	z.	59·1	320	i 10 5	+ 1	—	—	—	—
Riverside	z.	59·9	320	i 10 10	0	—	—	—	—
Pasadena	z.	60·5	320	i 10 13	− 1	—	—	—	—
Mount Wilson	z.	60·5	320	i 10 14	0	—	—	—	—
Tinemaha	z.	62·4	322	i 10 27	0	—	—	—	—
Shasta Dam		67·2	323	e 10 55	− 3	—	—	—	—

Additional readings :—
La Paz iP =2m.33s., S_g =5m.7s.
Long waves were recorded at Riverview.

Nov. 2d. 7h. 0m. 27s. Epicentre 40°·6N. 126°·4W. (as on 1946, Jan. 15d.).

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ferndale	N.	1·6	91	e 0 38	P_g	i 0 52	S_g	—	—	—
Ukiah		2·9	121	e 0 48	0	e 1 2	P_g	—	—	—
Shasta Dam		3·0	88	i 0 53	+ 3	e 1 41	S_g	—	—	—
Mineral		3·7	93	i 1 4	+ 4	i 1 56	+11	i 1 8	PP	—
Berkeley		4·2	130	i 1 9	+ 2	i 2 8	S•	i 1 16	PP	—
San Francisco		4·2	132	e 1 9	+ 2	i 2 3	+ 6	i 2 6	S•	e 2·6
Branner	E.	4·6	133	i 1 14	+ 2	i 2 17	+10	i 2 22	SS	e 3·2
Santa Clara		4·8	132	e 1 16	+ 1	—	—	—	—	e 2·5
Lick		4·9	130	i 1 20	+ 3	i 2 25	S•	i 1 31	PPP	—
Tinemaha		7·3	117	i 2 0	+10	i 3 40	S•	—	—	e 5·0
Seattle		7·6	21	e 1 51	− 4	—	—	e 2 8	P•	—
Haiwee		8·0	122	e 2 2	+ 2	e 4 0	S•	—	—	—
Santa Barbara		8·1	137	i 2 7	+ 5	i 3 36	+ 1	—	—	—
Victoria		8·2	14	1 57	− 6	3 31	− 7	—	—	—
Grand Coulee		9·0	33	e 2 11	− 2	e 4 48	S_g	—	—	4·5
Mount Wilson		9·2	132	i 2 19	+ 3	e 4 12	+ 9	—	—	—
Pasadena		9·2	132	i 2 18	+ 2	i 4 7	+ 4	—	—	—
Riverside		9·7	130	i 2 28	+ 6	i 4 23	+ 8	—	—	e 4·4
Palomar		10·5	131	i 2 40	+ 5	—	—	—	—	—
Logan		11·1	79	i 2 44	+ 1	i 4 48	− 1	i 3 8	PPP	i 5·0
Salt Lake City		11·1	85	e 2 49	+ 6	—	—	—	—	e 5·9
Butte		11·4	57	e 2 49	+ 2	e 5 9	+13	e 5 35	SSS	e 6·0
Bozeman		12·3	61	i 3 1	+ 2	e 5 15	− 3	e 5 55	SSS	e 6·4
Tucson		15·0	119	i 3 23	−12	e 7 4	SSS	e 4 45	?	e 7·4
Rapid City		17·5	71	i 4 7	0	i 8 1	SSS	—	—	i 9·9
Saskatoon		17·8	44	4 8	− 3	7 38	+10	—	—	9·5
Sitka		17·9	345	e 3 57	−15	i 7 27	− 3	e 7 19	S	e 7·9
St. Louis		27·8	83	e 5 55	+ 2	i 10 47	+12	i 11 15	SS	—
Chicago		29·1	75	e 6 5	+ 1	e 10 57	+ 1	e 7 14	PPP	e 14·6
Cleveland		33·6	73	i 6 51	+ 7	e 12 9	+ 3	—	—	i 17·4
Kirkland Lake		33·6	60	i 6 51	+ 7	—	—	e 8 10	PPP	—
Temiskaming		34·4	62	i 6 56	+ 5	—	—	e 8 14	PP	—
Pennsylvania	E.	36·4	73	e 7 8	0	i 12 59	+ 9	e 8 35	PP	—
Ottawa		36·9	66	7 14	+ 2	13 2	+ 4	15 33	SS	19·6
Georgetown		37·6	76	e 7 21	+ 3	e 13 17	+ 9	—	—	19·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Philadelphia		38·6	74	e 7 1	−25	e 12 36	−47	e 8 19	PP	e 17·4
Fordham		39·3	72	e 7 31	− 1	i 13 42	+ 8	e 9 1	PP	—
Seven Falls		39·9	61	7 40	+ 3	13 51	+ 8	9 11	PP	21·6
Harvard		40·5	69	e 7 48	+ 6	e 13 52	0	—	—	e 22·6
Bermuda		49·4	79	e 7 54	−59	e 14 7	?	e 10 48	PP	e 20·0
San Juan		55·8	95	e 9 40	− 1	e 17 19	− 9	e 10 14	P_cP	—
Fort de France		61·8	95	e 9 47	−36	—	—	—	—	—
Vladivostok		70·8	311	e 11 4	−16	i 20 22	−13	—	—	—
Kew		77·0	32	i 11 57	+ 1	e 21 54?	+ 9	e 26 31	SS	e 36·1
Irkutsk		77·6	331	11 52	− 8	e 21 44	− 7	—	—	—
De Bilt		78·6	28	i 12 1a	− 4	e 22 1	− 1	e 15 1	PP	e 33·6
Uccle		79·3	30	e 12 7	− 2	e 21 55	−14	—	—	e 41·6
Paris		80·2	32	i 12 9	− 5	—	—	i 12 18	P_cP	e 40·6
Jena		81·7	26	e 12 25	+ 3	—	—	—	—	—
Collmberg	z.	81·9	25	e 12 22	− 1	—	—	e 12 28	P_cP	—
Strasbourg		82·4	29	e 12 18	− 7	e 22 33	− 8	e 23 38	PS	—
Cheb		82·7	26	—	—	e 22 51	+ 7	e 22 55	S_cS	e 48·6
Sverdlovsk		82·8	356	i 12 21	− 6	e 22 37	− 8	—	—	—
Stuttgart		82·8	28	e 12 19	− 8	e 23 38	PS	e 12 59	?	e 39·6
Clermont-Ferrand		82·9	34	e 12 30	+ 2	—	—	e 15 51	PP	39·6
Moscow		83·1	10	e 12 28	− 1	e 22 55	+ 7	—	—	—
Basle		83·2	30	e 12 16	−13	—	—	—	—	—
Warsaw		83·3	20	e 12 27	− 3	—	—	(e 15 33?)	PP	e 15·6
Prague		83·4	25	—	—	e 22 39	−12	e 24 51	?	—
Zürich		83·7	30	e 12 18	−14	—	—	—	—	—
Chur		84·5	29	e 12 21	−15	—	—	—	—	—
Tortosa	N.	85·7	38	e 12 44	+ 2	29 3	SS	—	—	—
Granada		86·5	43	i 12 42k	− 4	—	—	12 52	P_cP	—
Malaga	z.	86·5	44	i 11 20k	−86	i 22 56	[−15]	—	—	41·0
Triest		87·0	27	e 12 46	− 2	e 23 31	+ 4	e 23 15	SKS	—
Alicante		87·2	40	e 12 52	+ 3	e 23 33	+ 5	24 37	PS	41·7
Almeria		87·4	42	12 32	−18	23 4	[−13]	23 28	S	41·5
Rome	z.	89·8	30	e 12 57a	− 5	e 24 4	+11	e 16 36	PP	—
Istanbul		95·7	19	e 12 33	−56	—	—	e 16 33?	?	—
Andijan		97·3	346	e 13 37	+ 1	—	—	—	—	—
Stalinabad		100·0	348	i 13 52	+ 4	i 26 48	PS	i 17 53	PP	—
Ksara		104·2	16	e 13 53	−14	27 47	PS	18 20	PP	—
Helwan	z.	106·9	21	e 14 33	P	—	—	i 21 5	PPP	—

Additional readings :—
Berkeley iN =1m.12s., and 1m.25s.
San Francisco iEN =1m.17s.
Branner iE =1m.21s.
Lick eN =2m.50s., eE =2m.59s.
Butte e =3m.21s.
Bozeman e =3m.33s. and 4m.43s.
St. Louis iP =5m.0s., iS =10m.51s.
Cleveland eZ =6m.58s., iZ =7m.11s., eE =12m.14s., iSEN =12m.20s., iE =13m.11s.
Ottawa PPP =8m.41s.
Kew eP_cP? =12m.4s.?, ePP?Z =15m.3s.?, ePPP?EZ =16m.44s.?, eSKS? =22m.4s.?, ePS?EN =22m.29s.?, ePPS?NZ =22m.47s.?, eSSS?E =30m.9s.?
De Bilt ePS =22m.53s.
Strasbourg eP =12m.21s., ePP? =15m.3s., eSS? =28m.45s.
Warsaw eZ =12m.33s.
Malaga iPPZ =14m.26s., iPPPZ =16m.36s., iSZ =21m.52s., iSSZ =27m.32s.
Almeria PS =24m.28s., PPS =24m.56s., SS =29m.1s., SSS =32m.12s.
Helwan eZ =16m.51s. and 18m.7s.
Long waves were also recorded at Aberdeen, Florence, and Columbia.

Nov. 2d. 21h. 19m. 33s. (I).
21h. 28m. 47s. (II). } Epicentre 10°·5S. 74°·9W. (as at 6h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Huancayo	1·6	195	i 0 22	− 8	i 0 41	−10	—	—	i 1·0
II		1·6	195	e 0 13	−17	—	—	—	—	—
I	La Paz	8·9	133	i 2 37	+25	i 4 37	S*	i 5 22	?	—
II		8·9	133	2 13	+ 1	i 4 11	+16	i 4 50	S_g	i 5·9
I	Bogota z.	15·0	3	i 3 28	− 7	i 6 27	+ 4	—	—	—
II	z.	15·0	3	i 3 39	+ 4	i 6 54	+31	—	—	—
II	Balboa Heights	19·9	348	e 4 48	+12	e 8 40	+25	—	—	—
I	La Plata	28·8	150	—	—	11 23	+32	—	—	16·6
I	Tucson	54·6	322	i 9 33	+ 1	—	—	—	—	—
II		54·6	322	i 9 32	0	—	—	—	—	—
II	Temiskaming	57·0	357	e 9 55	+ 5	—	—	—	—	—
II	Kirkland Lake	58·6	356	e 10 1	0	—	—	—	—	—
II	Palomar z.	59·1	320	e 10 8	+ 4	—	—	i 10 13	?	—
I	Pierce Ferry	59·2	324	e 10 12	+ 7	e 19 20	+68	i 11 6	?	—
I	Riverside z.	59·9	320	e 10 3	− 7	—	—	—	—	—
II	z.	59·9	320	i 10 7	− 3	—	—	i 10 15	?	—
I	Mount Wilson z.	60·5	320	e 10 14	0	—	—	—	—	—
II	z.	60·5	320	i 10 9	− 5	—	—	i 10 20	?	—
II	Pasadena z.	60·5	320	i 10 8	− 6	—	—	i 10 20	?	—
I	Shasta Dam	67·2	323	e 10 55	− 3	—	—	—	—	—
II		67·2	323	e 10 55	− 3	—	—	—	—	—
II	Grand Coulee	70·1	331	e 11 18	+ 2	—	—	—	—	—
II	Malaga z.	81·0	50	i 12 12_s	− 6	—	—	12 24	P_cP	—
II	Paris	89·7	40	i 13 6	+ 5	—	—	—	—	—
II	Stuttgart	93·9	41	e 13 16	− 5	—	—	—	—	e 50·2
II	Ksara	113·0	58	e 18 52	[+13]	—	—	e 14 44	P	—

Additional readings :—
I La Paz iS_g = 5m.47s.
II La Paz iS_g = 5m.20s.
II Malaga iS_gZ = 12m.20s., readings given as for local shock.
Long waves to the second shock were also recorded at Bermuda.

Nov. 2d. Readings also at 0h. (Mount Wilson, Palomar, Riverside, Pierce Ferry, Shasta Dam (2), Tucson, La Paz (3), Bogota, and Huancayo), 1h. (near Pierce Ferry), 2h. (La Paz), 3h. (La Paz (2)), 5h. (Shasta Dam), 6h. (Kew, Huancayo, La Paz (3), Bogota, Tucson, Shasta Dam (3), and Riverside), 7h. (Shasta Dam (2)), 8h. (Shasta Dam (2), Tucson, Mount Wilson, and La Paz), 9h. (La Paz, Shasta Dam (2), and near Mineral), 11h. (near Huancayo), 12h. (Shasta Dam, Tucson, Mount Wilson, Riverside, and La Paz), 13h. (Huancayo, La Paz, Stuttgart, and near Malaga). 15h. (Huancayo and La Paz), 16h. (Auckland, Arapuni, Wellington, Brisbane, Riverview, Helwan, Ksara, Istanbul, Malaga, Rome, and Stuttgart), 17h. (Paris, Shasta Dam, Tucson, Mount Wilson, La Paz (2), Bogota (2), and near Huancayo), 18h. (near Mizusawa), 19h. (La Paz and near Sotchi), 20h. (near Lick (2)), 21h. (Bogota and Huancayo), 22h. (La Paz, Huancayo, and Pierce Ferry).

Nov. 3d. Readings at 2h. (La Paz), 3h. (near Grozny), 4h. (near Florence), 5h. (La Paz), 8h. (Pierce Ferry and near Berkeley), 9h. (Pierce Ferry and near Granada), 10h. (La Paz (2)), 11h. (La Paz), 12h. (Kew), 13h. (near Florence), 14h. (La Paz and near Granada), 15h. (La Paz (2)), 16h. (Pierce Ferry, Shasta Dam, and Santa Lucia), 17h. (La Paz and Rome), 18h. (Paris, Strasbourg, Stuttgart, Istanbul, Ksara, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, and near Apia), 19h. (Kulyab, near Granada, near Kirkland Lake and Temiskaming), 20h. (Baku, Copenhagen, Helsinki, Upsala, Cheb, Warsaw, Stuttgart, and Paris), 21h. (Bogota, San Juan, Shasta Dam, and Stuttgart), 22h. (Bogota, La Paz (2), Shasta Dam, and near Huancayo), 23h. (near Mineral and near Seven Falls).

Nov. 4d. 0h. 9m. 7s. Epicentre 43°·8N. 141°·0E.

Intensity VI at Rumoe and Hahoro; V at Asahigawa, Suttsu, Sapporo, and Mori; IV at Muroran, Wakkanai, and Hakodate; II-III at Urakawa and Aomori. Some damage to coast and shipping caused by the accompanying tidal wave of amplitude, 2 metres. Macroseismic radius over 300km. Shallow. Epicentre as adopted.

Seismo. Bull. Cent. Met. Obs., Japan for 1947, Tokyo, 1950, pp. 40, 41, with macroseismic chart.

$A = -·5627$, $B = +·4557$, $C = +·6897$; $\delta = -2$; $h = -3$;
$D = +·629$, $E = +·777$; $G = -·536$, $H = +·434$, $K = -·724$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sapporo		0·8	161	0 21k	+ 3	0 39	+ 8	—	—	—
Aomori		3·0	183	0 56	+ 6	—	—	—	—	—
Hatinohe		3·3	173	1 3a	P_g	1 54	S_g	—	—	—
Nemuro		3·4	96	0 59a	+ 4	1 57	S_g	—	—	—
Morioka		4·1	179	1 12a	P*	2 3	S*	—	—	—
Miyako		4·2	170	1 22	P_g	2 18	S_g	—	—	—
Mizusawa		4·7	179	1 22	P*	2 24	P_g	—	—	—
Sendai		5·5	181	1 31	+ 6	2 40	+10	—	—	—
Hukusima		6·0	184	1 20	−12	—	—	—	—	—
Vladivostok		6·7	267	i 1 39	− 3	i 2 52	− 8	—	—	—
Onahama		6·8	181	1 56	P*	3 48	S_g	—	—	—
Wazima		7·1	208	1 57	+ 9	3 37	S*	—	—	—
Utunomiya		7·3	187	1 55	+ 5	—	—	—	—	—
Mito		7·4	183	1 57k	+ 5	3 33	+15	—	—	—
Nagano		7·4	198	1 57a	+ 5	3 34	+16	—	—	—
Kakioka		7·5	185	1 59	+ 6	3 59	S_g	—	—	—
Maebasi		7·5	192	2 1	+ 8	3 24	+ 4	—	—	—
Tukubasan		7·6	186	1 55	0	3 26	+ 3	—	—	—
Kumagaya		7·7	190	2 6k	+10	3 53	S*	—	—	—
Toyama		7·7	204	2 5k	+ 9	3 45	S*	—	—	—
Tokyo		8·2	187	2 9k	+ 6	4 0	S*	—	—	—
Hunatu		8·5	193	2 11a	+ 4	4 11	S*	—	—	—
Misima		8·8	191	2 20	+ 9	4 41	S_g	—	—	—
Mera		8·9	186	2 28	+16	4 34	S*	—	—	—
Gihu		9·0	203	2 19a	+ 6	4 25	S*	—	—	—
Shizuoka		9·0	194	2 24	+11	4 24	S*	—	—	—
Nagoya		9·2	201	2 22a	+ 6	4 18	+15	—	—	—
Omaesaki		9·4	194	2 25	+ 7	4 26	+19	—	—	—
Kameyama		9·6	203	2 29	+ 8	—	—	—	—	—
Kobe		10·1	208	2 38	+10	4 51	+26	—	—	—
Osaka		10·1	207	2 34	+ 6	4 51	+26	—	—	—
Owase		10·4	203	2 40	+ 6	4 52	+20	—	—	—
Sumoto		10·5	209	2 40a	+ 5	5 3	S*	—	—	—
Siomisaki		11·1	203	2 47	+ 4	4 49	0	—	—	—
Hamada		11·2	221	2 53k	+ 9	5 25	S*	—	—	—
Hukuoka		13·1	223	3 15a	+ 5	5 55	+17	—	—	—
Ituhara		13·2	227	3 15	+ 4	6 1	+21	—	—	—
Kumamoto		13·6	220	3 23a	+ 6	6 18	+28	—	—	—
Unzendake		13·9	221	3 20	− 1	6 19	+22	—	—	—
Miyazaki		14·1	216	3 11	−12	6 7	+ 5	—	—	—
Nanking		21·0	245	i 4 50	+ 3	i 8 48	+11	5 9	PP	10·8
Irkutsk		25·7	304	i 5 33	0	i 9 52?	− 9	—	—	—
College		43·7	36	e 8 16	+ 8	e 14 49	+10	e 10 4	PP	e 18·1
Almata		45·4	294	i 8 24	+ 2	e 14 57	− 7	—	—	—
Calcutta	E.	48·0	262	e 8 46k	+ 3	i 15 50	+ 9	i 19 6	SS	—
Andijan		49·5	292	8 55	+ 1	16 6	+ 4	—	—	—
Sverdlovsk		50·0	316	i 8 55	− 3	i 16 5	− 4	—	—	—
Tchimkent		50·7	296	i 9 2	− 1	i 16 17	− 1	—	—	—
Dehra Dun	N.	50·9	278	e 9 44?	+39	i 17 1	+40	—	—	e 26·4
Tashkent		51·3	295	e 9 6	− 2	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sitka		51·4	44	i 9 9	0	e 16 25	− 3	e 12 26	PPP	e 21·5
Obi-garm		52·3	292	e 9 17	+ 2	e 16 47	+ 7	—	—	—
Kulyab		52·7	290	i 9 31?	+13	i 16 55?	+ 9	—	—	—
Stalinabad		53·0	292	i 9 20	− 1	i 16 44	− 6	—	—	—
Samarkand		53·7	294	i 9 23	− 3	e 16 56	− 3	—	—	—
Honolulu		54·9	93	e 9 39	+ 4	e 17 38	+22	e 13 47	PPP	e 24·3
Hyderabad	N.	58·4	265	9 56	− 4	17 57	− 5	19 40	S_cS	28·2
Ashkabad		60·3	296	10 13	0	18 28	+ 2	—	—	—
Bombay		61·5	270	e 10 18	− 3	e 18 35	− 7	i 23 1	SS	27·9
Moscow		61·7	322	10 18	− 4	18 37	− 7	—	—	—
Victoria		62·1	49	10 30	+ 5	19 5	+16	12 56	PP	30·9
Seattle		63·2	49	e 10 33	+ 1	e 19 0	− 3	e 23 44	SS	e 25·1
Kodaikanal	E.	63·9	260	i 10 33	− 4	i 19 33	+21	12 51	PP	32·3
Helsinki		64·0	332	e 10 35	− 3	e 19 5	− 8	e 11 21	P_cP	e 29·9
Baku		64·2	303	10 44	+ 5	19 22	+ 6	—	—	—
Grand Coulee		64·8	47	e 10 41	− 2	e 19 42	+19	—	—	—
Grozny		65·0	307	e 10 31	−13	19 17	− 9	—	—	—
Scoresby Sund		65·4	355	10 47	0	19 24	− 6	20 2	PPS	—
Ferndale		66·3	56	e 11 2	+10	e 20 18	+36	—	—	—
Upsala		66·8	334	e 10 54?	− 2	19 32	−16	11 36	P_cP	e 30·7
Shasta Dam		67·4	55	e 10 57	− 2	e 20 4	+ 9	—	—	—
Erevan		67·6	305	e 11 2	+ 1	20 0	+ 3	—	—	—
Leninakan		67·7	306	e 11 1	0	e 20 0	+ 2	—	—	—
Ukiah		67·9	57	e 11 3	+ 1	e 20 21	+20	e 14 55	PPP	e 28·8
Mineral	N.	68·1	55	e 11 4	0	—	—	e 12 52	PP	—
Saskatoon		68·1	38	10 51	−13	19 53	−10	13 23	PP	31·9
Sotchi		68·2	311	e 11 3	− 1	e 20 5	+ 1	—	—	—
Berkeley		69·2	58	i 11 10	0	i 20 21	+ 5	i 13 50	PP	e 33·1
San Francisco		69·2	58	i 11 18	+ 8	—	—	—	—	—
Butte		69·4	46	e 11 17	+ 5	e 20 21	+ 3	e 16 11	PPP	e 31·4
Branner	N.	69·6	58	i 11 21	+ 8	—	—	e 13 27	PP	—
Theodosia		69·6	314	e 11 13	0	20 17	− 4	—	—	—
Santa Clara		69·8	58	e 11 15	+ 1	e 20 48	+25	—	—	e 29·6
Bergen		70·0	339	14 17	PP	20 32	+ 6	24 59	SS	30·9
Lick	E.	70·0	58	e 11 16	+ 1	e 20 34	+ 8	—	—	—
	N.	70·0	58	e 11 25	+10	e 20 37	+11	—	—	—
Bozeman		70·4	45	e 11 19	+ 1	e 20 39	+ 9	e 15 26	PPP	e 31·1
Yalta		70·6	314	e 12 47?	PP	—	—	—	—	—
Warsaw		71·3	326	e 11 20	− 3	e 20 44	+ 3	11 52	P_cP	e 28·9
Copenhagen		71·8	333	e 11 23	− 3	i 20 43	− 3	15 26	PPP	34·9
Brisbane	N.	71·8	169	i 11 26	0	i 20 53	+ 7	i 11 35	P_cP	—
Tinemaha		72·2	56	i 11 29	0	—	—	—	—	—
Haiwee	Z.	73·0	56	i 11 33	0	—	—	—	—	—
Santa Barbara		73·0	58	i 11 35	+ 2	—	—	—	—	—
Salt Lake City		73·4	49	e 11 42	+ 6	e 21 13	+ 8	e 22 15	S_cS	e 32·4
Potsdam		74·2	331	e 11 53	+13	—	—	—	—	e 35·9
Mount Wilson		74·2	58	i 11 40	0	—	—	—	—	—
Pasadena		74·2	58	i 11 40a	0	i 21 18	+ 4	e 14 31	PP	e 31·0
Riverside	Z.	74·8	58	e 11 42	− 2	—	—	—	—	—
Aberdeen	E.	74·8	341	i 19 54	?	i 21 23	+ 3	i 30 1	SSS	34·6
Ivigtut		75·1	5	11 42	− 4	21 24	0	22 1	PS	—
Collmberg	Z.	75·1	330	i 11 47	+ 1	—	—	—	—	—
Pierce Ferry		75·3	54	e 11 46	− 1	i 21 42	+16	i 13 56	PP	—
Palomar		75·5	58	i 11 48	0	—	—	i 14 31	PP	—
Rapid City		75·5	43	i 11 50	+ 2	(e 21 26)	− 2	i 14 40	PP	e 32·2
La Jolla		75·6	58	e 11 50	+ 2	—	—	—	—	—
Prague		75·6	328	e 11 50	+ 2	e 21 30	+ 1	e 22 0	PS	e 33·9
Budapest		75·7	324	11 49	0	21 33	+ 3	15 3	PP	e 37·9
Istanbul		75·7	314	i 11 54	+ 5	i 21 38	+ 8	—	—	—
Cheb		76·3	330	e 11 55	+ 3	e 21 42	+ 5	e 14 49	PP	e 41·9
Kalocsa		76·5	324	e 12 0	+ 6	e 21 39	0	e 15 6	PP	e 30·4
Durham	N.	76·8	339	—	—	i 21 48	+ 6	—	—	—
Ksara		77·0	305	i 11 56	0	21 44	− 1	—	—	—
Belgrade		77·1	321	e 11 52	− 5	e 21 47	+ 1	e 16 35	PPP	e 32·9
De Bilt		77·1	335	i 11 58	+ 1	e 21 44	− 2	i 22 27	PS	e 34·9
Riverview		77·8	172	i 12 5k	+ 4	i 22 4	+11	i 12 13	P_cP	e 37·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Zagreb		78·3	325	e 12 2	− 1	e 22 3	+ 4	e 12 21	PcP		e 42·0
Uccle		78·5	335	e 12 1	− 3	e 21 54	− 7	e 22 6	PS		e 37·9
Stuttgart		78·6	331	i 12 3a	− 2	i 22 8	+ 6	i 12 15	PcP		e 40·9
Strasbourg		79·3	331	i 12 7	− 2	i 22 7	− 2	i 15 14	PP		e 37·1
Kew		79·4	338	i 12 7	− 2	i 22 9?	− 1	e 15 15?	PP		e 33·9
Triest		79·4	326	e 12 7	− 2	i 22 4	− 6	—	—		—
Tucson		79·9	55	e 12 12k	0	e 22 27	+11	i 15 19	PP		—
Zürich		80·0	330	e 12 10a	− 3	e 22 14	− 3	i 12 16	PcP		—
Chur		80·1	329	e 12 11a	− 2	e 22 12	− 6	—	—		—
Basle		80·2	330	i 12 12	− 2	e 22 7	−12	—	—		—
Neuchatel		80·9	330	e 12 15	− 2	e 22 29	+ 3	—	—		—
Paris		80·9	334	i 12 15	− 2	i 22 29	+ 3	i 12 21	PcP		39·9
Besançon		81·0	331	e 12 29	+11	e 22 21	− 6	—	—		e 37·9
Kirkland Lake		81·6	27	i 12 20	− 1	e 22 38	+ 5	i 12 28	PcP		—
Florence		81·9	326	i 12 25	+ 2	i 22 34	− 2	—	—		—
Jersey		81·9	338	e 12 21	− 2	22 27	− 9	—	—		—
Helwan		82·5	305	i 12 26k	0	i 22 41	− 1	23 31	PS		—
Rome	z.	83·0	324	i 12 25a	− 3	i 22 49	+ 2	e 15 53	PP		e 40·2
Temiskaming		83·2	27	i 12 28	− 1	e 22 45	− 4	i 12 36	PcP		e 51·9
Clermont-Ferrand		83·3	333	e 12 30	0	e 22 57	+ 7	i 29 5	SS		39·4
Chicago		84·3	35	e 12 34	− 1	e 22 56	− 4	e 15 46	PP		e 35·9
Marseilles		84·6	330	e 12 45	+ 9	e 23 3	0	—	—		—
Seven Falls		85·2	22	12 48	+ 9	23 10	+ 1	28 35	SS		42·9
Shawinigan Falls		85·2	23	12 38	− 1	23 2	[0]	—	—		48·9
Ottawa		85·4	25	12 38k	− 2	23 8	− 3	24 6	PS		44·9
St. Louis		85·8	39	i 12 43	+ 1	i 23 9	[+ 3]	i 24 29	PPS		—
Auckland		86·0	154	12 43	0	22 53?	[−14]	—	—		40·9
Arapuni		87·3	154	—	—	e 24 53	PPS	e 40 53	Q		44·7
Barcelona		87·5	331	e 12 52	+ 1	i 23 37	+ 6	—	—		e 41·8
New Plymouth		87·7	155	12 55	+ 3	—	—	—	—		—
New Kensington		88·4	31	e 12 57	+ 2	i 23 32	− 8	e 23 29	SKS		e 37·0
Tortosa		88·6	331	12 57	+ 1	23 48	+ 6	i 23 23	SKS		e 41·9
Halifax		89·3	18	13 0	+ 1	23 47	− 1	35 5	SSS		41·9
Weston		89·4	24	i 12 59	− 1	i 23 53	+ 4	16 37	PP		—
Wellington		90·0	156	13 4	+ 1	24 7	+13	13 30	pP		41·9
Fordham		90·1	26	e 13 0	− 3	i 24 3	+ 8	e 23 41	SKS		47·4
Philadelphia		90·5	28	e 13 6	+ 1	i 23 48	−11	e 23 37	SKS		e 40·3
Georgetown		90·8	29	i 13 6	0	23 23	[−15]	24 17	S		38·9
Alicante		91·1	331	i 13 23	+15	i 23 47	{− 3}	13 40	pP		e 44·2
Almeria		93·1	332	i 13 20	+ 3	i 24 15	− 7	i 13 39	pP		45·9
Granada		93·2	333	i 13 29k	+12	23 58	[+ 7]	i 17 7	PP		44·9
Lisbon		93·5	337	13 21	+ 2	—	—	—	—		43·4
Columbia		93·6	35	—	—	e 24 41	+15	e 24 5	SKKS		e 46·2
Malaga	z.	93·9	333	i 13 18k	− 3	i 24 10	[+15]	i 13 32	pP		45·5
Bermuda		100·6	22	e 13 58	+ 7	e 25 35	+10	e 17 58	PP		e 45·7
San Juan		113·3	28	e 19 32	PP	e 26 57	S	e 29 9	PS		—
Fort de France		118·3	24	e 18 56	[+ 7]	—	—	—	—		—
Bogota		122·3	43	e 19 3	[+ 6]	—	—	i 20 44	PP		68·9
Huancayo		135·5	56	e 16 29	?	e 23 1	PKS	—	—		e 57·8
La Paz		143·3	51	i 19 19	[−17]	26 41	[− 3]	i 23 1	PP		69·2
Antarctica		151·5	158	19 55	[+ 5]	—	—	e 23 50	PP		e 70·9
La Plata	E.	162·9	65	21 1	PKP,	27 11	[+ 4]	24 47	PP		80·3
	N.	162·9	65	21 1	PKP,	27 19	[+12]	24 50	PP		89·8
	z.	162·9	65	21 3	PKP,	—	—	24 47	PP		—

Additional readings and note :—
Mizusawa eSN = 2m.33s.
Nanking i = 4m.56s.
College e = 8m.57s., eS_cS = 18m.19s.
Sitka i = 9m.16s., iS = 16m.39s.
Honolulu eSS = 22m.5s.
Hyderabad SSN = 22m.1s.
Bombay eE = 14m.9s., iSE = 18m.48s., eN = 25m.49s.
Victoria PPP = 14m.5s.
Kodaikanal SSE = 23m.48s.

Continued on next page.

Helsinki ePPP =14m.21s., eS_cS =20m.31s., eSS =23m.5s., e =25m.29s.
Scoresby Sund 20m.40s.
Ferndale eSKSN =21m.22s., eSKKSE =21m.34s.
Upsala PPE =13m.14s., PPN =13m.26s., eN =15m.5s., eSE =19m.38s., eS_cSE = 20m.48s., S_cSN =20m.51s., eSS =23m.53s., eSSS =26m.53s.
Shasta Dam i =11m.9s., iS =20m.7s.
Berkeley iZ =11m.18s., iSE =20m.29s., eQEN =29·5m.
Butte e =20m.34s.
Branner iN =11m.38s.
Bergen eEN =28m.17s.
Bozeman eSS =24m.58s., eSSS =28m.1s.
Warsaw ePN =11m.23s., eN =13m.15s., PPE =13m.48s., PPZ =14m.0s., PPN = 14m.8s., PPPEN =15m.43s., eN =17m.39s., eSZ =20m.50s., PSE =21m.11s., PPSZ =21m.22s., PPSE =21m.27s., SSE =24m.46s., SSZ =24m.53s., SSN = 25m.2s., SSSN =28m.3s., SSSE =28m.6s.
Copenhagen 21m.25s., SS =25m.26s.
Brisbane iPSN =21m.9s., iSKSN =21m.38s., iSSN =25m.35s.
Santa Barbara iZ =11m.43s.
Mount Wilson iZ =11m.48s.
Pasadena iZ =11m.49s. and 12m.33s., eE =21m.31s., eSSN =26m.41s.
Riverside iZ =11m.51s. and 11m.56s.
Collmberg iZ =12m.0s. and 12m.48s.
Pierce Ferry iPP =11m.56s., i =14m.46s., 16m.39s., and 17m.8s., iPS? =23m.13s.
Rapid City eS? =20m.24s. ; true S is given as S_cS.
Prague eSS =26m.53s., eSSS =30m.23s.
Budapest PPN =15m.9s., PPPN =17m.9s., SN =21m.39s., PSN =22m.12s., eSSE = 27m.1s., SSN =27m.6s., SSSN =29m.54s., SSSE =30m.12s
Cheb ePPP =16m.48s., eSS =27m.4s., eSSS =30m.25s., e =31m.55s.
Kalossa eE =15m.18s. and 22m.8s.
Belgrade e =14m.7s., eSS =25m.56s., e =30m.42s.
De Bilt eSS =27m.23s., eSSS =30m.33s.
Riverview iN =22m.9s., iE =22m.30s., iN =22m.40s., iSSN =27m.32s., eQE =33m.41s.
Zagreb iP =12m.8s., eSSS =30m.59s.
Uccle i =12m.8s., eSSN =27m.39s., eSSSN =31m.4s.
Stuttgart e =17m.59s., ePS =23m.3s., eSS? =26m.53s. and 28m.13s., iSSS =31m.1s., eQ? =36·9m.
Strasbourg iP =12m.12s., ePPP? =16m.38s., i =22m.15s., ePS =22m.44s., eSS = 27m.23s., eSSS =31m.18s.
Kew ePPPNZ =17m.9s.?, eSS =27m.49s.?, eSSS =31m.9s.?
Tucson ePPP? =17m.0s., eSSS? =30m.59s.
Zürich e =22m.20s.
Paris i =12m.26s. and 12m.31s., ipP? =12m.46s., i =15m.7s. and 15m.18s., iPP = 15m.23s., ipPP? =15m.45s., i =18m.36s. and 22m.19s., iS_cS =22m.46s., iSS = 28m.28s.?, isSS? =28m.46s., iSSS =31m.19s., i =31m.40s., isSSS? =31m.58s., Q =37·9m.
Kirkland Lake i =12m.34s.
Helwan iE =24m.8s.
Rome iZ =13m.3s., eZ =17m.27s., eSEN =22m.43s., eZ =32m.39s.
Temiskaming i =12m.42s.
Clermont-Ferrand i =23m.16s., iSSS? =32m.23s.
Chicago iP =12m.46s., ePPP? =18m.32s., iS =23m.6s., eSS =28m.22s., eSSS =32m.38s.
Seven Falls SSS =33m.41s.
New Plymouth i =13m.6s.
New Kensington ePS =24m.39s.
Tortosa P_cPN =13m.6s., S_cSEN =23m.48s., PSE =24m.34s., PPSN =24m.57s., SS?E = 29m.15s., SSSN =33m.23s.
Weston SKS =23m.29s., e =30m.43s.
Wellington iZ =15m.9s., pPPE =16m.37s., PPP =18m.43s., i =19m.34s., SKS = 23m.35s., SS =30m.38s., SSS =33m.38s., Q =39·1m.
Fordham e =15m.30s. and 23m.10s.
Philadelphia e =16m.33s., ePPP =18m.48s., iS_cS =24m.5s., eSS =29m.57s., ePSPS? = 30m.39s., eSSS =34m.15s.
Alicante P_cP =13m.28s., PP =16m.16s., SKS =23m.19s., S_cS =23m.51s., eS =24m.11s., PS =25m.3s., PPS =25m.27s., SS =29m.51s., SSS =33m.35s., Q =39m.12s.
Almeria PP =16m.51s., PPP =18m.55s., SKS =23m.47s., PS =25m.25s., SS =30m.19s., SSS =33m.51s.
Granada SKKS =24m.32s., S =24m.59s., PS =25m.47s., iSS =30m.41s., SSS =34m.11s.
Malaga PPZ =17m.0s., PPPZ =19m.8s., SKSZ =23m.20s., PSZ =25m.12s., QZ = 35m.42s.
Bermuda ePS =26m.38s.
San Juan e =20m.1s., i =29m.12s., iPKKP =29m.41s., eSS =35m.22s.
La Paz PPPN =26m.0s., SSEZ =40m.29s., QEN =62m.17s.
Antarctica i =20m.3s.
La Plata E. 25m.55s., PPP =29m.8s., SKKS =31m.58s., 34m.7s., and 37m.15s., SS = 45m.23s., SSS =53m.55s., Q =76·0m. ;
La Plata N. SKKS =32m.47s., SKSP =35m.44s., ? =37m.33s., PPS =38m.35s., PSS = 46m.23s., SSS =50m.11s., 59m.42s., and 62m.59s., Q =69m.4s.
Long waves were also recorded at Colombo, Harvard, and Tananarive.

Nov. 4d. 0h. 19m. 25s. Epicentre 43°·8N. 141°·0E. (as at 0h.9m.).

		Δ	Az.	P.	O−C.
		°	°	m. s.	s.
Shasta Dam		67·4	55	i 10 59	0
Tinemaha	z.	72·2	56	i 11 30	+ 1
Mount Wilson	z.	74·2	58	i 11 40	0
Pasadena	z.	74·2	58	i 11 40	0
Riverside	z.	74·8	58	i 11 42	− 2
Pierce Ferry		75·3	54	i 11 47	0
Palomar	z.	75·5	58	i 11 49k	+ 1
Stuttgart	z.	78·6	331	e 12 3	− 2
Tucson		79·9	55	e 12 13a	+ 1
Paris		80·9	334	i 12 15	− 2

Nov. 4d. 1h. Apparently not a repetition from epicentre of Nov. 2d.

Huancayo iP =31m.41s., iS =32m.5s., iL =32m.32s.
La Paz iP =34m.0s., iS =35m.48s., S =36m.24s., S_s =36m.54s.
Bogota eP =35m.0s., eS =38m.17s.
Shasta Dam eP =40m.40s.
Pasadena iPZ =40m.45s.
Mount Wilson iPZ =40m.45s., iZ =40m.53s.
Riverside iPZ =40m.46s., iZ =40m.55s.
Palomar iPZ =40m.48s., iZ =40m.56s.
Tinemaha iP?Z =40m.49s.
Pierce Ferry iP? =41m.3s.
Tucson eP =41m.5s., e =41m.10s.

Nov. 4d. 9h. South-west Pacific.

New Plymouth P =49m.36s., P_cP? =52m.1s., i =52m.6s.
Apia eP =49m.38s., eS =52m.5s.
Wellington P =49m.53s., i =49m.57s., P_cP =52m.24s., S =56m.14s., S_cS =60m.44s.
Riverview iP?Z =50m.24s.k, iZ =53m.47s., iS?N =55m.21s., eRZ =57·9m., iS_cS?E = 61m.26s.
Brisbane iPEN =51m.5s., iSE =53m.15s., eSSE =53m.27s., iLE =54m.13s.
Arapuni e =51m.30s.
Auckland S =53m.18s.
Santa Barbara iPZ =58m.9s.
La Jolla iP =58m.13s.a.
Pasadena iP =58m.13s.a, iPPZ =61m.34s., iSN =68m.2s.
Mount Wilson iPZ =58m.14s.a, iZ =58m.32s.
Riverside iP =58m.15s.a, iZ =58m.23s., ePPZ =61m.37s., eSE =67m.53s.
Palomar iP =58m.16s.a, iZ =60m.6s., iPPZ =61m.40s., iSEN =67m.57s., eNZ =68m.8s.
Haiwee iP =58m.20s.a.
Shasta Dam iP =58m.20s., e =61m.43s.
Tinemaha iP =58m.22s.a, iZ =58m.49s., eSE =68m.3s., eN =68m.22s.
Pierce Ferry iP =58m.32s., i =58m.45s., iPP? =62m.6s., ePPP? =64m.39s., iS =71m.44s.
Tucson iP =58m.34s., i =58m.52s., 59m.6s., and 60m.24s., iPP =62m.7s.
Grand Coulee eP? =58m.49s.
Istanbul eP? =64m.0s.?, e =67m.28s.
Kirkland Lake i =64m.19s.
Ksara iPKP =65m.20s., e =81m.36s.
Copenhagen P =65m.26s.
Stuttgart eZ =65m.31s., 66m.2s., and 70m.12s.
Paris iPKP =65m.32s., i =65m.47s., ipPKP =66m.1s.
Strasbourg ePKP =65m.32s., $ePKP_2$ =66m.5s.
Collmberg iZ =65m.38s. and 65m.53s.
Rome eZ =79m.55s. and 81m.57s.

Nov. 4d. Readings also at 0h. (Mount Wilson, Riverside, Tucson, Pierce Ferry, Shasta Dam (2), Grand Coulee, Stuttgart (2), and Mizusawa), 1h. (near La Paz and near Mizusawa), 4h. (Apia), 5h. (Bogota, La Paz, and Shasta Dam), 6h. (Bogota, Stuttgart, Mount Wilson (2), Palomar (3), Riverside (2), Tinemaha, Tucson (3), Pierce Ferry (2), Shasta Dam (3), and near Mizusawa (2)), 7h. (La Paz, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam (2), Paris, Stuttgart (2), Cheb, Rome, Helwan, Istanbul, and near Mizusawa), 8h. (Rome, Temiskaming, Shasta Dam, La Paz (3), near Montezuma and near Mizusawa), 9h. (Helwan, Bogota, La Paz, and near Mizusawa (2)), 10h. (Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Shasta Dam (3), Almata, Ashkabad, near Andijan, Frunse, Kulyab, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 11h. (La Paz (3) and near Montezuma), 12h. (Helwan, near Andijan and near Mizusawa), 14h. (Nanking), 15h. (La Paz, Mount Wilson, Riverside, and Tucson), 17h. (La Paz, Warsaw, Belgrade, Ksara, near Istanbul and near Branner), 18h. (La Paz, Arapuni, Auckland, Wellington, Stuttgart, Mount Wilson (2), Palomar, Riverside (2), Tucson (2), Pierce Ferry (2), Shasta Dam (2), and near Ottawa), 19h. (Istanbul), 20h. (Jena, La Paz, and near Ottawa), 23h. (Nanking, Vladivostok, Stalinabad, Bombay (2), Calcutta, Kodaikanal, Lick, Pierce Ferry, and Shasta Dam).

Nov. 5d. 2h. 2m. 55s. Epicentre 16°·1S. 168°·3E. (as on 1947, Feb. 2d.).

$A = -\cdot9413$, $B = +\cdot1949$, $C = -\cdot2756$; $\delta = -1$; $h = +6$;
$D = +\cdot203$, $E = +\cdot979$; $G = +\cdot270$, $H = -\cdot056$, $K = -\cdot961$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	N.	18·1	229	i 4 22	+ 8	i 7 45	+10	i 4 30	PP	—
Riverview		23·5	217	i 5 20a	+ 8	i 9 36	+13	i 10 27	SS	e 11·5
Shasta Dam		85·5	46	e 12 39	− 2	—	—	i 13 13	pP	—
Pasadena	Z.	85·9	53	i 12 43	0	—	—	—	—	—
Mount Wilson	Z.	86·0	53	e 12 44	+ 1	—	—	e 13 13	pP	—
Riverside	Z.	86·4	53	i 12 45	0	—	—	i 13 16	pP	—
Palomar		86·6	55	i 12 46	0	—	—	i 13 18	pP	—
Pierce Ferry		89·8	52	i 13 2	0	—	—	i 13 33	pP	—
Tucson		91·0	57	i 13 9	+ 2	—	—	e 13 39	pP	—
Ksara		133·8	301	e 18 5	[−74]	21 1	?	25 5	PPP	—
Cheb		140·9	335	—	—	e 55 56	?	e 66 37	?	e 75·1
Stuttgart		143·2	337	e 19 29	[− 7]	—	—	—	—	e 75·1
Strasbourg		143·9	339	e 19 40	[+ 3]	—	—	—	—	e 66·1
Zürich		144·6	336	e 19 34	[− 4]	—	—	—	—	—
Paris		145·4	334	i 19 36	[− 4]	—	—	—	—	e 79·1
Rome	Z.	146·9	325	i 19 37a	[− 5]	—	—	—	—	—
Clermont-Ferrand		147·9	341	e 19 45	[+ 1]	—	—	—	—	e 78·1

Additional readings :—
Brisbane iN = 4m.57s., iSSN = 8m.10s.
Palomar iZ = 16m.10s.
Tucson i = 13m.18s.
Long waves were recorded at Berkeley and other European stations.

Nov. 5d. 2h. 21m. 30s. Epicentre 20°·5N. 143°·6E.

$A = -\cdot7545$, $B = +\cdot5563$, $C = +\cdot3481$; $\delta = -9$; $h = +5$;
$D = +\cdot593$, $E = +\cdot805$; $G = -\cdot280$, $H = +\cdot207$, $K = -\cdot937$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vladivostok	24·6	339	i 5 7	−16	i 9 14	−28	—	—	—
Almata	59·4	309	e 10 8	+ 2	—	—	—	—	—
Andijan	62·9	306	e 10 33	+ 3	e 18 54	− 6	—	—	—
Tashkent	65·2	307	e 10 39	− 6	e 19 17	−11	—	—	—
Stalinabad	65·9	304	i 10 50	0	i 19 28	− 9	—	—	—
Bombay	66·2	282	e 10 0	−52	i 18 46	−54	—	—	—
Samarkand	67·1	305	e 11 20?	+23	—	—	—	—	—
Sverdlovsk	69·3	325	10 30?	−41	19 30?	−47	—	—	—
Ashkabad	74·1	304	e 11 38	− 2	—	—	—	—	—
Shasta Dam	79·8	50	e 12 10	− 2	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Grand Coulee		79·8	43	e 12 9	− 3	—	—	—	—	—
Leninakan		83·9	311	e 12 31	− 2	—	—	—	—	—
Tinemaha	z.	84·1	53	i 12 34	0	—	—	—	—	—
Haiwee	z.	84·7	53	e 12 38	+ 1	—	—	—	—	—
Pasadena		85·2	55	i 12 40	+ 1	—	—	—	—	e 38·2
Mount Wilson	z.	85·3	55	i 12 41	+ 1	—	—	—	—	—
Riverside	z.	85·9	55	i 12 42	− 1	—	—	—	—	—
Palomar		86·5	56	i 12 46k	0	—	—	—	—	—
Pierce Ferry		87·6	52	i 12 53	+ 2	—	—	e 16 11	PP	—
Tucson		91·6	55	i 13 12	+ 2	—	—	e 13 43	?	—
Istanbul		93·8	316	e 17 18	PP	—	—	—	—	e 58·5
La Paz		149·7	87	e 20 10	[+23]	—	—	—	—	—

Nov. 5d. Readings also at 0h. (Palomar, Riverside, Pierce Ferry, Shasta Dam, Tucson, Kew, Copenhagen, Granada, De Bilt, Paris, Strasbourg, Stuttgart, Jena, Zürich, Cheb, and Ksara), 1h. (Riverview, Wellington, Bogota, and near La Paz (2), 2h. (Kulyab), 5h. (near Lick), 8h. (La Paz), 9h. (Palomar, Pierce Ferry, Shasta Dam, Tucson, and Istanbul), 10h. (La Paz), 12h. (La Paz and near Kulyab), 13h. (Riverview), 14h. (Brisbane, Wellington, Arapuni, and Auckland), 15h. (Apia, La Paz, and near Ashkabad), 16h. (Arapuni, Auckland, Wellington, Riverview, Haiwee, Mount Wilson, Palomar, Pasadena, Riverside, Grand Coulee, Pierce Ferry, ShastaDam, Tucson, Fort de France, Ksara, and Stuttgart), 17h., 18h., and 19h. (La Paz), 22h. (Mount Wilson, Riverside, Shasta Dam, and Tucson), 23h. (Ashkabad).

Nov. 6d. 13h. 1m. 31s. Epicentre 12°·9S. 172°·7W.

$A = -·9672$, $B = -·1239$, $C = -·2218$; $\delta = +2$; $h = +7$;
$D = -·127$, $E = +·992$; $G = +·220$, $H = +·028$, $K = -·975$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		1·3	135	i 0 24	− 1	i 0 42	− 2	—	—	—
Pasadena	z.	69·8	46	e 11 14	0	—	—	i 11 22	?	—
Mount Wilson	z.	69·9	46	e 11 15	0	—	—	—	—	—
Riverside	z.	70·3	46	e 11 9	− 8	—	—	—	—	—
Palomar	z.	70·3	47	i 11 17	0	—	—	—	—	—
Shasta Dam		70·8	38	e 11 20	0	—	—	—	—	—
Tinemaha	z.	71·3	43	i 11 25	+ 2	—	—	—	—	—
Boulder City		73·1	46	e 11 33	− 1	—	—	—	—	—
Pierce Ferry		73·7	47	e 11 36	− 2	—	—	i 13 9	?	—
Tucson		74·2	51	e 11 40k	0	—	—	e 12 1	P_cP	—
Paris		144·0	6	e 19 29	[− 8]	—	—	—	—	—
Stuttgart	z.	144·2	358	e 19 32	[− 6]	—	—	—	—	—
Strasbourg		144·4	359	e 19 47	[+ 9]	—	—	—	—	—
Ksara		146·7	314	e 19 49	[+ 7]	—	—	e 36 8	?	—

Additional readings :—
Paris i = 19m.45s. and 19m.55s.
Stuttgart eZ = 19m.45s., iZ = 19m.54s.
Strasbourg i = 19m.54s.
Long waves were recorded at Wellington.

Nov. 6d. 16h. 18m. 0s. Epicentre 40°·2N. 24°·5E.

Epicentre given by Strasbourg.

A = +·6970, B = +·3176, C = +·6429; δ = 0; h = −1;
D = +·415, E = −·910; G = +·585, H = +·267, K = −·766.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		3·6	74	e 0 5	−53	e 1 40	− 2	—	—	—
Belgrade		5·5	328	e 1 25	0	i 2 11	−19	e 3 10	S_g	—
Zagreb		8·4	315	e 2 32?	P*	e 4 34	S_g	—	—	—
Rome	z.	9·3	285	e 2 19a	+ 2	e 4 0	− 5	—	—	e 4·9
Triest		9·6	309	e 2 24	+ 3	i 4 18	+ 6	—	—	—
Florence		10·5	294	—	—	(e 4 38)	+ 3	—	—	(e 6·4)
Ksara		11·1	121	e 2 49	+ 6	—	—	—	—	e 5·7
Helwan	z.	11·8	149	—	—	e 4 51	−15	—	—	e 6·8
Prague		12·2	327	e 3 45	+47	—	—	—	—	e 7·5
Warsaw		12·3	350	e 3 28	+29	e 6 12	+54	—	—	e 8·0
Chur		12·7	307	e 3 5k	0	e 5 31	+ 3	—	—	—
Zürich		13·5	307	e 3 17a	+ 2	e 5 47	0	e 3 41	PPP	—
Collmberg	z.	13·7	328	e 3 36	PP	—	—	—	—	—
Stuttgart		13·8	313	e 3 18	− 1	e 6 2	+ 8	e 3 34	PP	e 8·9
Basle		14·2	307	—	—	e 6 2	− 2	—	—	—
Strasbourg		14·6	311	e 3 33	+ 3	—	—	e 3 40	PP	e 7·0
Clermont-Ferrand		16·6	297	e 3 41	−15	—	—	—	—	—
Copenhagen		17·4	337	4 24	PP	—	—	—	—	11·0
Uccle		17·6	313	—	—	e 7 48?	SS	—	—	e 10·5
Paris		17·9	306	i 4 6	− 6	—	—	i 4 44	PP	e 11·0
Granada		22·1	271	i 3 32	?	—	—	i 3 49	?	—

Additional readings and note :—
Belgrade iS = 4m.40s., e = 5m.3s.
Zagreb e = 2m.49s., 2m.59s., and 5m.48s.
Florence S and L given as P and S respectively.
Warsaw PPZ = 3m.48s., eSSE = 6m.35s.
Paris ePPP = 4m.59s.
Long waves were recorded at De Bilt, Helsinki, Kew, Budapest, Kalocsa, and Potsdam.

Nov. 6d. Readings also at 0h. (La Paz and near Berkeley), 2h. (Berkeley), 4h. (near Theodosia), 7h. (Shasta Dam), 9h. (Tucson, Bogota, and La Paz (3)), 10h. (Boulder City and Tortosa), 13h. (near Mineral (4)), 14h. (near Tortosa), 21h. (Temiskaming and near Ottawa), 22h. (Andijan, near Kulyab, Samarkand, and Stalinabad), 23h. (Jena).

Nov. 7d. 5h. 14m. 54s. Epicentre 10°·5S. 74°·9W. (as on Nov. 2d.).

A = +·2562, B = −·9495, C = −·1811; δ = −1; h = +6.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		1·6	195	i 0 23	− 7	i 0 52	+ 1	—	—	i 1·7
La Paz		8·9	133	2 30	P*	i 4 22	S*	i 5 8	S_g	—
Bogota		15·0	3	i 3 37	+ 2	e 6 50	+27	—	—	—
Tucson		54·6	322	i 9 33a	+ 1	—	—	—	—	—
Palomar	z.	59·1	320	i 9 49	−15	—	—	—	—	—
Pierce Ferry		59·2	324	i 10 6	+ 1	—	—	i 10 52	P_cP	—
Boulder City		59·6	323	i 10 8	0	—	—	—	—	—
Riverside	z.	59·9	320	i 10 10	0	—	—	i 10 44	P_cP	—
Mount Wilson	z.	60·5	320	e 10 13	− 1	—	—	—	—	—
Shasta Dam		67·2	323	e 10 57	− 1	—	—	—	—	—
Stuttgart	z.	93·9	41	e 13 20	− 1	—	—	—	—	—

La Paz also gives iS_g = 5m.32s.
Long waves were also recorded at Wellington.

Nov. 7d. 23h. 0m. 28s. Epicentre 10°·5S. 74°·9W. (as at 5h.).

Intensity V at La Merced, Oventeni ; IV-V at Huanuco, etc.

E. Silgado.
Datos sismológicos del Perú, 1947. Instituto geológica del Perú, Bol. 11, Lima, 1948, p. 20.

$A = +·2562$, $B = -·9495$, $C = -·1811$; $\delta = -1$; $h = +6$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		1·6	195	i 0 19	−11	i 1 55	+64	—	—	i 2·7
La Paz		8·9	133	i 2 6	− 6	i 4 7	+12	i 4 53	S*	—
Bogota		15·0	3	i 3 41	+ 6	i 6 15	− 8	i 6 39	SS	—
Balboa Heights		19·9	348	e 4 41	+ 5	e 8 32	+17	—	—	—
Fort de France		28·5	30	e 6 1	+ 2	—	—	—	—	—
La Plata	E.	28·8	150	5 50	−12	10 38	−13	8 44	P_cP	16·4
	N.	28·8	150	5 49	−13	10 44	− 7	8 38	P_cP	15·9
San Juan		30·0	17	e 6 11	− 1	i 11 9	− 1	e 8 7	P_cP	e 12·7
Columbia		44·6	353	—	—	e 14 49	− 3	—	—	e 24·1
Philadelphia		50·2	0	e 8 59	− 1	e 16 9	− 2	e 10 23	P_cP	e 20·5
St. Louis		50·9	345	e 9 5	0	i 16 26	+ 5	—	—	—
Fordham		51·1	2	e 9 2	− 4	—	—	i 9 15	P	—
Cleveland		52·1	354	e 9 21	+ 7	e 16 44	+ 6	e 20 25	SS	e 24·3
Harvard		52·8	4	i 9 19	0	—	—	—	—	—
Tucson		54·6	322	i 9 33a	+ 1	—	—	e 10 3	?	—
Ottawa		55·6	359	e 9 40	0	17 32	+ 7	—	—	25·5
Temiskaming		57·0	357	e 9 49	− 1	—	—	—	—	—
Antarctica		57·9	176	e 9 48	− 8	—	—	—	—	—
Kirkland Lake		58·6	356	e 9 50	−11	—	—	—	—	—
Palomar		59·1	320	i 10 6a	+ 2	e 19 31	S_cS	i 10 14	?	—
Pierce Ferry		59·2	324	i 10 6	+ 1	e 17 17	−55	i 11 37	P_cP	—
Boulder City		59·6	323	i 10 9	+ 1	e 17 12	−65	i 11 37	P_cP	—
Riverside	Z.	59·9	320	i 10 12	+ 2	—	—	—	—	—
Mount Wilson	Z.	60·5	320	i 10 14a	0	—	—	—	—	—
Pasadena		60·5	320	i 10 14a	0	—	—	—	—	e 31·3
Haiwee	Z.	61·6	321	e 10 23a	+ 1	—	—	—	—	—
Tinemaha	Z.	62·4	322	i 10 27	0	—	—	—	—	—
Fresno	Z.	63·1	321	i 10 32	0	—	—	i 11 4	?	—
Berkeley		65·4	320	i 10 47	0	—	—	—	—	e 30·7
Shasta Dam		67·2	323	e 10 56	− 2	—	—	—	—	—
Grand Coulee		70·1	331	e 11 15	− 1	—	—	—	—	—
Lisbon		78·3	47	e 12 1a	− 2	21 57	− 2	34 14?	Q	38·3
Malaga		81·0	50	i 12 16k	− 2	i 22 26	− 1	12 24	pP	41·2
Granada		81·8	50	i 12 24a	+ 2	i 22 34	− 1	13 2	pP	i 39·4
Almeria		82·5	51	i 12 23	− 3	22 45	+ 3	12 37	pP	39·5
Alicante		84·5	49	e 12 41	+ 5	i 22 57	− 5	13 3	pP	e 40·9
Tortosa		86·0	48	12 50	+ 7	23 18	+ 1	23 10	SKS	e 37·5
Kew		88·7	37	i 13 0	+ 3	e 23 22?	[− 3]	e 23 38?	S	e 39·5
Clermont-Ferrand		89·2	43	e 12 57	− 2	e 23 35	[+ 7]	—	—	45·5
Paris		89·7	40	i 12 59	− 2	i 23 47	− 5	i 13 6	pP	e 45·5
Uccle		91·4	38	—	—	e 23 40	[− 1]	—	—	e 44·5
Basle		92·6	42	e 13 13a	− 2	—	—	—	—	—
Strasbourg		93·0	41	i 13 22	+ 5	e 23 32	[−18]	e 25 32	PS	e 40·5
Zürich		93·3	42	e 13 16k	− 2	e 23 46	[− 6]	—	—	—
Chur		93·8	43	e 13 18	− 2	—	—	—	—	—
Stuttgart		93·9	41	e 13 18	− 3	e 23 58	[+ 3]	e 25 38	PS	50·5
Florence		94·4	46	e 14 2	+39	—	—	—	—	—
Rome	Z.	95·0	48	e 13 24a	− 2	e 24 36	− 2	e 25 47	PS	—
Cheb		96·2	39	—	—	e 23 49	[−19]	e 30 47	SS	e 48·5
Triest		96·5	45	e 13 31	− 1	e 24 8	[− 1]	e 17 24	PP	—
Istanbul		107·3	50	—	—	e 25 32?	[+31]	—	—	—
Helwan	Z.	109·2	62	e 10 5	?	e 28 26	PS	e 29 28	PPS	—
Ksara		113·0	58	e 14 6	P	e 29 5	PS	—	—	—
Sverdlovsk		121·5	27	21 23	?	28 0	{+36}	30 55	PS	—
Samarkand		135·4	43	20 0	[+38]	—	—	—	—	—
Tashkent		136·0	39	19 19	[− 4]	e 22 48	PKS	25 2	PPP	—
Stalinabad		137·2	42	i 19 22	[− 3]	22 57	PKS	—	—	—
Andijan		138·3	37	19 32	[+ 5]	—	—	—	—	—
Bombay		147·7	71	e 19 47	[+ 3]	—	—	—	—	—

For Notes see next page.

NOTES TO NOVEMBER 7d. 23h. 0m. 28s.

Additional readings :—
La Paz iZ = 2m.40s., iS_g = 5m.24s.
Bogota iSSS = 7m.27s.
La Plata E. PP = 6m.38s., S = 9m.50s.
La Plata N. PP = 6m.44s., PPP = 7m.26s., 9m.38s., SS? = 11m.44s.
San Juan i = 11m.33s.
Cleveland eN = 20m.51s., eSSSN = 22m.4s., eE = 22m.25s.
Boulder City iPPP? = 12m.39s.
Malaga PPZ = 15m.30s., PPPZ = 17m.28s., PSZ = 23m.8s., SSZ = 27m.38s.
Granada P_cP = 12m.41s., sS = 22m.50s., PS = 23m.12s., iSS = 27m.41s.
Almeria PP = 15m.37s., PPP = 17m.29s., S_cS = 22m.57s., PS = 23m.37s., SS = 28m.17s., SSS = 31m.45s.
Alicante PP = 16m.3s., PS = 23m.47s., SS = 28m.21s.
Tortosa P_cPN = 12m.57s., PPE = 16m.0s., PPPN = 18m.8s., S_cSE = 23m.34s., PSE = 24m.25s., PPSN = 24m.46s., SSN = 28m.48s., SSSN = 32m.33s., Q?N = 34m.52s.
Kew ePSE = 24m.16s.?, eQN = 35m.2s.
Paris iP_cP? = 13m.1s., i = 13m.13s., ePP = 16m.39s., iSKS = 23m.29s., iPS = 24m.57s.
Strasbourg e = 14m.41s., ePPS = 26m.50s.
Stuttgart eZ = 13m.26s., eQ? = 41m.32s.
Rome eZ = 20m.50s. and 38m.38s.?
Triest iS = 24m.45s.
Helwan eZ = 10m.54s.
Long waves were also recorded at Salt Lake City, De Bilt, Helsinki, Copenhagen, Upsala, Warsaw, Wellington, Arapuni, and Riverview.

Nov. 7d. Readings also at 1h. (Shasta Dam), 2h. (La Paz (2) and near Lick), 3h. (Bogota, La Paz (2), Huancayo, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Mount Wilson, Pasadena, Riverside, and Bermuda), 4h. (Brisbane), 5h. (Huancayo), 9h. (Apia), 12h. (Brisbane, Riverview, Arapuni, Auckland, Wellington, Pierce Ferry, Shasta Dam, and Bombay), 13h. (Brisbane, Riverview, Wellington, Auckland, Rome, Almata, Samarkand, Stalinabad, Tchimkent, near Andijan and Kulyab), 14h. (Riverview and Stuttgart), 16h. (near Ottawa), 19h. (near Mineral), 21h. (Mizusawa, Pierce Ferry, Shasta Dam, and near Ottawa), 22h. (Pierce Ferry and Shasta Dam), 23h. (Ksara, Paris, and near Triest).

Nov. 8d. 4h. 2m. 16s. Epicentre 43°·6N. 140°·4E.

Intensity IV at Rumoe and Hahoro ; II-III at Sapporo. Macroseismic radius 200-300 kw. Shallow. Epicentre as adopted.

Seismo. Bull. Cent. Met. Obs., Japan, for 1947, Tokyo, 1950, pp. 41, 42, with macroseismic chart.

A = −·5598, B = +·4631, C = +·6872 ; δ = +8 ; h = −3 ;
D = +·637, E = +·771 ; G = −·529, H = +·438, K = −·726.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sapporo	0·9	128	0 22k	+ 2	0 38	+ 4	—	—	—
Mori	1·5	176	0 42k	P*	1 3	S_g	—	—	—
Hatinohe	3·2	165	1 1	P_g	—	—	—	—	—
Nemuro	3·8	93	1 0a	− 1	—	—	—	—	—
Akita	3·9	184	1 38	+36	—	—	—	—	—
Morioka	3·9	171	1 45	+43	—	—	—	—	—
Mizusawa	4·5	173	1 24	P*	2 23	S*	—	—	—
Sendai	5·3	176	1 33	P*	2 40	S*	—	—	—
Aikawa	5·8	197	1 44	P*	—	—	—	—	—
Vladivostok	6·2	268	e 1 39	+ 4	i 2 49	+ 1	i 3 9	S*	—
Nagano	7·1	194	2 1	P*	—	—	—	—	—
Mito	7·2	180	2 9	P*	4 7	S_g	—	—	—
Kakioka	7·3	182	1 59	+ 9	—	—	—	—	—
Maebasi	7·3	189	2 2	P*	3 41	S*	—	—	—
Toyama	7·3	201	2 4	P*	—	—	—	—	—
Kumagaya	7·5	186	2 3	P*	4 5	S_g	—	—	—
Tokyo	7·9	184	2 15	P*	3 46	+16	—	—	—
Hunatu	8·2	190	2 16	P*	—	—	—	—	—
Yokohama	8·2	184	2 1	− 2	4 11	S*	—	—	—
Gihu	8·7	200	2 21	P*	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mera		8·7	183	2 43	P_g	—	—	—	—	—
Nagoya		8·8	199	2 26	P^*	—	—	—	—	—
Omaesaki		9·1	192	3 44	?	—	—	—	—	—
Osaka		9·7	205	3 38	?	—	—	—	—	—
Hukuoka		12·7	221	3 18	+13	—	—	—	—	—
Irkutsk		25·5	304	e 5 30	− 2	—	—	—	—	—
Andijan		49·2	292	e 8 54	+ 2	—	—	—	—	—
Sverdlovsk		49·8	316	8 59	+ 3	e 16 4	− 2	—	—	—
Tchimkent		50·4	296	e 9 3	+ 2	—	—	—	—	—
Tashkent		51·0	295	e 9 4	− 2	e 16 18	− 4	—	—	—
Kulyab		52·3	290	i 9 11	− 4	e 16 37	− 3	—	—	—
Stalinabad		52·7	292	i 9 16	− 2	i 16 45	− 1	—	—	—
Samarkand		53·3	294	e 9 34	+11	—	—	—	—	—
Bombay		61·1	270	e 10 26	+ 8	—	—	—	—	—
Moscow		61·6	322	e 10 21	− 1	—	—	—	—	—
Grozny		64·7	307	e 10 35	− 7	—	—	—	—	—
Grand Coulee		65·3	47	e 10 43	− 3	—	—	—	—	—
Upsala		66·7	334	e 16 9	?	e 19 14	−32	—	—	e 37·7
Leninakan		67·4	306	e 11 9	+10	—	—	—	—	—
Shasta Dam		67·8	55	e 11 4	+ 2	—	—	—	—	—
Tinemaha	z.	72·6	56	i 11 27	− 4	—	—	—	—	—
Haiwee	z.	73·5	56	e 11 36	0	—	—	—	—	—
Mount Wilson	z.	74·7	58	i 11 43	0	—	—	—	—	—
Pasadena	z.	74·7	58	i 11 41	− 2	—	—	—	—	—
Riverside	z.	75·2	58	i 11 46	0	—	—	—	—	—
Boulder City		75·4	55	i 11 47	0	—	—	—	—	—
Pierce Ferry		75·8	54	i 11 49	− 1	—	—	—	—	—
Palomar	z.	76·0	58	i 11 50	− 1	—	—	—	—	—
Cheb		76·3	330	—	—	—	—	e 31 14	?	e 44·7
Ksara		76·8	305	e 11 59	+ 4	e 22 35	PPS	—	—	—
Stuttgart		78·5	331	e 12 3	− 1	—	—	—	—	e 44·7
Strasbourg		79·2	331	e 12 9	+ 1	—	—	e 31 18	SSS	e 42·7
Zürich		79·9	330	e 12 14	+ 2	—	—	—	—	—
Basle		80·2	330	e 12 3	−11	—	—	—	—	—
Tucson		80·4	55	i 12 15a	0	—	—	—	—	—
Paris		80·8	334	e 12 11	− 6	—	—	e 15 1	PP	e 45·7
Kirkland Lake		81·9	27	e 12 20	− 3	—	—	—	—	—
Helwan	z.	82·3	304	e 12 29	+ 4	—	—	—	—	—
Temiskaming		83·6	27	i 12 30	− 1	—	—	—	—	—

Additional readings :—
Upsala eN = 25m.17s., e = 29m.44s.?.
Shasta Dam i = 11m.54s.
Tinemaha iZ = 11m.58s.
Mount Wilson eZ = 12m.2s.
Boulder City i = 12m.14s.
Tucson i = 12m.25s., and 12m.43s.
Paris i = 12m.16s. and 12m.21s.
Long waves were also recorded at other European stations.

Nov. 8d. 5h. 24m. 19s. Epicentre 2°·1S. 76°·8W. (as on 1942, June 12d.).

Suggested deep.

A = +·2282, B = −·9729, C = −·0364; δ = −7; λ = +7;
D = −·974, E = −·228; G = −·008, H = +·035, K = −·999.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bogota	7·2	23	i 3 13	S	(i 3 13)	0	—	—	—
Balboa Heights	11·3	347	e 3 0	+14	—	—	—	—	—
La Paz	16·8	150	i 3 56	− 2	i 7 7	+ 2	i 4 17	PP	9·8
Fort de France	22·8	43	e 5 12	+ 7	—	—	—	—	—
San Juan	22·9	27	e 5 17	+11	i 9 33	+20	i 5 42	PP	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.
St. Louis		42·4	344	i 8 0	+ 2	i 14 17	− 3	—	—	—
Harvard		44·7	6	i 6 22	?	—	—	—	—	—
Tucson		47·0	320	i 8 32k	− 3	—	—	i 8 55	pP	—
Kirkland Lake		50·1	357	e 8 59	0	—	—	—	—	—
Pierce Ferry		51·5	322	i 9 8	− 1	—	—	i 9 31	pP	—
La Jolla	z.	51·7	316	e 9 9	− 2	—	—	e 9 31	pP	—
Palomar		51·7	317	i 9 7k	− 4	—	—	i 9 31	pP	—
Boulder City		51·9	321	i 9 11	− 1	—	—	i 9 33	pP	—
Riverside	z.	52·4	317	i 9 13	− 3	—	—	i 9 37	pP	—
Mount Wilson		53·0	317	i 9 18	− 3	—	—	i 9 41	pP	—
Pasadena		53·0	317	i 9 17	− 4	—	—	i 9 40	pP	—
Haiwee	z.	54·0	319	e 9 24	− 4	—	—	i 9 47	pP	—
Santa Barbara	z.	54·2	316	e 9 27	− 2	—	—	e 9 50	pP	—
Tinemaha		54·8	319	i 9 31	− 3	—	—	i 9 54	pP	—
Fresno		55·6	319	e 9 34	− 6	—	—	i 9 58	pP	—
Lick		57·1	318	e 9 50	0	—	—	—	—	—
Shasta Dam		59·5	321	i 10 2	− 5	—	—	i 10 25	pP	—
Grand Coulee		61·9	330	e 10 21	− 3	—	—	i 10 45	pP	—
Malaga	z.	77·2	52	12 1s	+ 4	—	—	12 5	P_cP	—
Paris		84·5	41	i 11 40	?	e 23 6	+ 4	i 12 4	?	e 66·7
Clermont-Ferrand		84·5	44	e 13 40	+64	—	—	—	—	—
Zürich		88·4	43	e 12 58	+ 3	—	—	—	—	—
Stuttgart	z.	88·9	41	e 12 59	+ 1	—	—	e 13 24	pP	—
Rome	z.	90·9	48	—	—	e 23 53	−10	—	—	—
Cheb		91·1	40	e 20 41?	?	—	—	—	—	—
Ksara		109·9	56	e 15 36	P	e 28 44	PS	—	—	—

Additional readings :—
Bogota iS =4m.52s., iS* =5m.24s., iS_s =5m.55s.
La Paz iSSN =7m.39s.
San Juan eP_cP =6m.52s.
Pierce Ferry isP? =9m.52s.
Palomar iZ =9m.42s.
Riverside iZ =9m.48s. and 9m.55s.
Mount Wilson iZ =9m.53s.
Fresno ePE =9m.37s., eN =9m.40s.
Shasta Dam e =11m.4s.
Malaga iS_gZ =12m.27s., Z =12m.31s. ; readings given as for local shock.
Paris isP =12m.15s., ePP =15m.48s.

Nov. 8d. 6h. 38m. 15s. Epicentre 7°·7S. 127°·8E. Depth of focus 0·020.

A = −·6075, B = +·7831, C = −·1331 ; δ = +2 ; h = +7 ;
D = +·790, E = +·613 ; G = +·082, H = −·105, K = −·991.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		31·0	132	i 6 1	− 3	i 10 59	+ 3	i 12 22	SS	i 12·7
Riverview		33·8	144	i 6 32k	+ 3	i 11 46	+ 6	i 7 52	PP	—
Mizusawa	E.	48·2	14	8 32	+ 6	9 24	?	—	—	—
Colombo	E.	50·0	286	8 12	−28	—	—	—	—	29·1
Vladivostok		50·7	5	i 8 45	0	i 15 45	− 1	—	—	—
Auckland		51·6	131	e 10 27	PP	e 16 51	+52	—	—	—
Wellington		53·3	137	—	—	i 16 24	+ 2	—	—	22·6
Bombay		60·3	297	i 9 57	+ 3	e 17 52	− 2	—	—	—
Irkutsk		63·0	344	10 13	+ 1	18 30	+ 2	—	—	—
Almata		68·5	323	e 10 50	+ 3	—	—	—	—	—
Andijan		70·1	319	e 10 59	+ 2	e 19 56	+ 3	—	—	—
Kulyab		70·5	315	i 10 53	− 6	e 19 53?	− 5	—	—	—
Stalinabad		71·5	316	i 11 5	0	20 8	− 1	—	—	—
Tashkent		72·4	318	i 11 11	+ 1	e 20 19	0	—	—	—
Samarkand		73·2	315	e 11 15	0	—	—	—	—	—
Sverdlovsk		84·2	330	i 12 17	+ 3	22 19	− 5	—	—	—
Baku		85·8	312	12 30	+ 8	e 22 38	− 2	—	—	—
Grozny		89·5	314	e 12 38	− 2	—	—	—	—	—
Leninakan		90·5	311	e 13 0	+15	—	—	—	—	—
Ksara		95·8	303	e 13 13	+ 4	26 14	PPS	16 1	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Moscow		96·4	325	e 13 11?	− 1	23 32	[0]	25 12	PS	—
Helwan		99·4	299	e 17 35	PP	e 23 45	[− 2]	—	—	—
Istanbul		101·6	310	e 16 45?	PP	—	—	—	—	—
Shasta Dam		110·0	49	e 14 15	P	—	—	e 18 14	PP	—
Grand Coulee		111·2	41	e 17 55	PP	—	—	—	—	—
Fresno		112·5	53	e 18 21	[+ 4]	—	—	i 19 6	PP	—
Santa Barbara	z.	112·8	56	e 18 27	[+10]	—	—	—	—	—
Tinemaha	z.	113·7	53	i 18 24	[+ 5]	—	—	i 19 26	PP	—
Rome	z.	113·9	313	e 19 19	PP	—	—	—	—	—
Haiwee	z.	114·1	54	i 18 24	[+ 4]	—	—	—	—	—
Pasadena	z.	114·1	56	i 18 24	[+ 4]	—	—	e 19 16	PP	—
Mount Wilson	z.	114·2	56	i 18 25	[+ 5]	—	—	e 19 17	PP	—
Stuttgart		114·4	320	e 18 23	[+ 2]	—	—	i 19 25	PP	e 57·8
Riverside	z.	114·8	56	e 18 26	[+ 5]	—	—	i 19 23	PP	—
La Jolla	z.	115·1	58	e 19 25	PP	—	—	—	—	—
Palomar		115·3	57	i 18 26	[+ 4]	—	—	i 19 29	PP	—
Strasbourg		115·4	321	e 18 26	[+ 3]	—	—	i 19 26	pPKP	—
Boulder City		116·6	53	i 19 30	PP	—	—	—	—	—
Pierce Ferry		117·2	53	e 18 31	[+ 5]	—	—	i 19 39	PP	—
Paris		118·6	322	i 18 32	[+ 3]	—	—	i 19 27	pPKP	—
Clermont-Ferrand		119·3	318	e 19 31	pPKP	—	—	—	—	—
Tucson		120·5	57	e 18 36s	[+ 3]	—	—	e 20 2	PP	—
Malaga	z.	127·9	311	i 18 49k	[+ 2]	e 26 3	SKKS	20 53	PP	60·2
Kirkland Lake		133·3	25	e 19 3	[+ 6]	—	—	—	—	—
Temiskaming		134·9	25	e 19 2	[+ 2]	—	—	e 22 32	PKS	—
La Paz		151·2	148	i 19 33	[+ 5]	—	—	i 20 59	PKP,	—

Additional readings :—
Riverview iN = 9m.52s., eN = 12m.51s., iS$_c$SE = 16m.55s.
Bombay eE = 18m.4s.
Shasta Dam i = 18m.49s.
Pasadena eZ = 20m.23s.
Riverside eZ = 20m.18s.
Palomar iZ = 19m.2s. and 20m.31s.
Boulder City e = 19m.35s.
Pierce Ferry i = 20m.29s.
Paris isPKP = 19m.49s., iPP = 19m.55s.
Tucson i = 19m.35s.
Malaga PKSZ = 22m.9s., ePPPZ = 23m.31s., iPSZ = 30m.49s., SSZ = 37m.49s., QZ = 53m.3s.
Long waves were also recorded at Copenhagen.

Nov. 8d. 16h. 25m. 48s. Epicentre 36°·1N. 68°·2E.

A = +·3008, B = +·7520, C = +·5866 ; δ = +8 ; λ = 0 ;
D = +·928, E = −·371 ; G = +·218, H = +·545, K = −·810.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stalinabad		2·5	10	i 0 44	+ 1	i 1 14	0	—	—	—
Obi-garm		2·9	25	i 0 51	+ 3	i 1 23	− 1	—	—	—
Samarkand		3·7	345	i 1 1	+ 1	i 1 45	0	—	—	—
Tashkent		5·3	8	i 1 21	− 1	—	—	—	—	—
Andijan		5·6	34	1 28	+ 1	i 2 33	0	—	—	—
Tchimkent		6·3	9	i 1 35	− 1	i 2 47	− 3	—	—	—
Ashkabad		8·1	286	e 2 1	− 1	i 3 41	+ 6	—	—	—
Frunse		8·4	34	—	—	i 3 39	− 4	—	—	—
Almata		9·8	40	e 2 23	− 1	—	—	—	—	—
Bombay		17·6	165	e 4 5	− 3	e 7 12	−11	—	—	e 9·9
Grozny		18·7	299	e 4 17	− 5	—	—	—	—	—
Erevan		19·1	289	e 4 32	+ 5	—	—	—	—	—
Leninakan		19·6	291	e 4 37	+ 5	—	—	—	—	—
Sverdlovsk		21·4	348	i 4 48	− 3	i 8 44	− 1	—	—	—
Calcutta	E.	22·1	122	e 4 54	− 5	e 8 54	− 4	—	—	i 11·9

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sotchi		23·0	298	e 5 20	+13	—	—	—	—	—
Ksara		26·5	273	e 5 37	− 4	e 10 49	+35	—	—	—
Kodaikanal	E.	27·1	159	e 8 20	?	—	—	—	—	—
Moscow		28·6	323	e 5 56	− 4	e 10 54?	+ 6	—	—	—
Colombo	E.	31·0	157	—	—	e 11 17	− 9	—	—	16·7
Helwan	Z.	31·4	269	e 6 23	− 2	—	—	—	—	—
Copenhagen		42·1	316	7 54	− 1	—	—	—	—	23·2
Jena	N.	42·6	308	e 8 6	+ 7	—	—	e 9 42	PP	—
Stuttgart		44·3	306	e 8 12	− 1	—	—	e 18 42	SSS	—
Strasbourg		45·3	306	e 8 29	+ 8	—	—	e 9 37	PP	e 29·2
Paris		48·7	307	e 8 46	− 2	—	—	—	—	e 33·2
Clermont-Ferrand		48·9	302	e 8 48	− 2	—	—	—	—	—
Kirkland Lake		91·5	339	—	—	e 25 18	PS	—	—	—
Temiskaming		92·5	338	—	—	e 24 42	+25	—	—	—

Additional readings :—
Helwan iZ = 6m.32s.
Jena readings reduced by 10m.
Paris i = 8m.54s.
Long waves were also recorded at Dehra Dun and other European stations.

Nov. 8d. 22h. 41m. 12s. Epicentre 39°·4S. 178°·9E. (as on 1947, August 27d.).

A = −·7747, B = +·0149, C = −·6322 ; δ = +6 ; h = −1 ;
D = +·019, E = +1·000 ; G = +·632, H = −·012, K = −·775.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tuai		1·5	294	0 28	0	0 51	+ 2	—	—	—
Arapuni		2·9	297	0 48	0	1 27	+ 3	—	—	—
Wellington		3·7	237	0 56	− 4	1 43	− 2	—	—	—
New Plymouth		3·8	274	1 1	0	1 49	+ 2	—	—	—
Auckland		4·1	307	1 6	+ 1	1 58	+ 3	—	—	—
Kaimata		6·4	239	1 39	+ 1	2 53	0	—	—	—
Riverview		22·9	276	e 5 9	+ 3	i 9 24	+11	1 5 35	PP	e 11·3
Pasadena		93·5	48	e 13 17	− 2	—	—	e 16 59	PP	e 42·8
Mount Wilson	Z.	93·6	48	e 13 17	− 2	—	—	—	—	—
Palomar	Z.	93·7	50	e 13 8	−12	—	—	—	—	—
Riverside	Z.	93·8	48	e 13 14	− 6	—	—	—	—	—
Bombay		114·0	276	e 17 48?	?	e 24 48?	?	—	—	—
Ksara		149·9	272	e 19 52	[+ 5]	—	—	23 22	PP	—
Stuttgart		168·1	325	e 21 12	PKP_2	—	—	—	—	e 88·8
Strasbourg		168·8	328	e 21 23	PKP_2	—	—	—	—	90·4
Rome	Z.	169·4	288	e 25 19	PP	—	—	e 35 41	PS	—
Paris		170·2	346	e 21 31	PKP_2	—	—	e 22 5	PKP_2	—

Riverview gives also iP = 5m.13s., eEN = 9m.38s.
Long waves were also recorded at Berkeley, Tucson, Granada, Malaga, De Bilt, and Florence.

Nov. 8d. Readings also at 0h. (near Andijan and near Balboa Heights), 2h. (Helwan, Ksara, Istanbul, Budapest, Florence, Rome, Basle, Zürich, Stuttgart, De Bilt, Uccle, Paris, Prague, Cheb, Kew, Warsaw, Copenhagen, and Helsinki), 3h. (Antarctica), 4h. (Rome), 7h. (La Paz and Stuttgart), 8h. (La Paz, near Mineral, and Lick (2)), 9h. (La Paz, Antarctica, and near Lick), 13h. (Stuttgart), 14h. (De Bilt, Cheb, Jena, Kew, Paris, Strasbourg, Stuttgart, Clermont-Ferrand, Copenhagen, Tortosa, Scoresby Sund, Ivigtut, and near Reykjavik), 15h. (Auckland, Wellington, Riverview, Mizusawa, Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 16h. (near Mizusawa), 17h. (La Paz and near Balboa Heights), 20h. (Arapuni, Auckland, Wellington, Brisbane, and Riverview), 21h. (Mount Wilson, Palomar, Riverside, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Grand Coulee, and La Paz), 22h. (Kaimata, New Plymouth, Wellington, and near Tuai),

Nov. 9d. 4h. 5m. 33s. Epicentre 41°·8N. 71°·7E. (as on 1947, April 9d.).

$A = +·2348$, $B = +·7099$, $C = +·6641$; $\delta = +12$; $h = -2$;
$D = +·949$, $E = -·314$; $G = +·209$, $H = +·630$, $K = -·748$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Andijan	1·2	155	e 0 23	− 1	i 0 41	0	—	—	—
Tchimkent	1·6	288	i 0 30	0	i 0 54	+ 3	—	—	—
Tashkent	1·9	255	i 0 34	0	i 1 0	+ 1	i 1 6	S_g	—
Obi-garm	3·5	207	i 0 55	− 2	i 1 39	− 1	—	—	—
Stalinabad	3·9	216	i 1 11	P*	2 12	S_g	—	—	—
Kulyab	4·2	202	—	—	2 15	S_g	—	—	—
Almata	4·2	67	e 2 14	S	(e 2 14)	S_g	—	—	—
Samarkand	4·2	241	e 1 7	0	e 2 9	S*	—	—	—

Nov. 9d. 4h. 57m. 47s. Epicentre 23°·3S. 170°·9E. (as on 1947, June 17d.).

$A = -·9078$, $B = +·1454$, $C = -·3933$; $\delta = -7$; $h = +4$;
$D = +·158$, $E = +·987$; $G = +·388$, $H = -·062$, $K = -·919$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland	13·9	167	4 32	+71	6 5	+ 8	5 27	pP	—
Arapuni	15·3	166	3 37	− 2	6 49	+19	—	—	i 9·6
New Plymouth	16·0	171	4 3	+15	7 16	+30	—	—	—
Tuai	16·4	163	4 7	+14	7 14	+18	—	—	—
Brisbane	16·7	252	i 3 48	− 9	i 6 58	− 5	i 3 52	P	—
Wellington	18·2	172	4 22	+ 6	8 8	+31	5 5	pP	—
Apia	18·9	64	e 4 25	+ 1	—	—	—	—	—
Kaimata	19·2	179	4 38	+10	8 26	+27	i 5 6	PPP	—
Riverview	20·2	234	i 4 39a	0	i 8 24	+ 3	i 4 56	PP	9·4
Perth	49·1	248	8 53	+ 2	15 45	−11	19 28	SS	—
Honolulu	53·8	37	e 9 30	+ 4	i 17 3	+ 2	—	—	e 21·8
Yokohama	65·5	332	10 44	− 3	19 27	− 5	—	—	—
Shizuoka	65·6	332	10 43	− 5	19 25	− 8	—	—	—
Tokyo	65·7	333	10 45	− 3	19 30	− 4	—	—	—
Nagoya	66·5	331	10 50	− 4	19 35	− 9	—	—	—
Miyazaki	66·6	324	10 51	− 3	19 48	+ 3	—	—	—
Maebasi	66·6	333	10 48	− 6	19 37	− 8	—	—	—
Osaka	66·7	329	10 52	− 3	—	—	—	—	—
Nagano	67·2	332	i 10 52	− 6	—	—	—	—	—
Sendai	67·4	326	10 54	− 5	19 47	− 8	—	—	—
Mizusawa	68·1	336	11 1	− 3	19 58	− 5	11 8	P	—
Hukuoka	68·5	325	i 11 0	− 6	19 59	− 9	20 43	PS	31·9
Morioka	68·5	336	e 11 1	− 5	20 0	− 8	—	—	—
Hamada	68·6	326	11 1	− 6	20 1	− 8	—	—	—
Vladivostok	75·2	332	i 11 41	− 5	i 21 17	− 8	—	—	—
Antarctica	79·5	161	i 12 12	+ 2	i 22 20	+ 9	—	—	e 41·2
San Francisco	87·2	48	e 12 59	+10	e 23 19	[+ 4]	e 13 9	P	—
Santa Clara	87·3	48	i 13 3	+13	e 23 31	+ 2	—	—	—
Santa Barbara	87·4	52	i 12 54a	+ 4	1 23 22	[+ 5]	—	—	—
Ukiah	87·4	45	—	—	e 23 20	[+ 3]	e 24 37	PS	e 37·0
Lick	87·5	48	e 12 55	+ 4	e 23 23	[+ 6]	—	—	e 41·4
Ferndale	87·5	43	e 13 17	+26	e 23 39	+ 8	e 13 26	P	e 43·5
Berkeley	87·6	48	i 12 53	+ 2	i 23 21	[+ 3]	i 18 13	PPP	e 40·0
Pasadena	88·3	52	e 12 55	0	e 23 36	− 3	i 23 26	SKS	i 37·2
Mount Wilson	88·4	52	i 12 57	+ 2	—	—	i 13 3	P_cP	—
La Jolla	88·4	54	e 12 59	+ 4	i 23 29	[+ 6]	—	—	—
Fresno	88·5	49	i 12 56	0	i 23 26	[+ 2]	—	—	e 43·0
Shasta Dam	88·8	44	e 12 56	− 1	i 23 29	[+ 4]	e 23 38	S	i 39·7
Riverside	88·8	52	i 12 58	+ 1	i 23 31	[+ 6]	i 38 45	P′P′	—
Palomar	88·9	53	i 12 58a	0	i 23 32	[+ 6]	i 16 38	PP	i 39·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mineral		89·1	45	i 13 1	+ 3	e 23 30	[+ 3]	—	—	e 43·9
Haiwee		89·4	50	i 13 3a	+ 3	e 23 33	[+ 4]	i 13 10	PcP	—
Tinemaha		89·7	49	i 13 2	+ 1	i 23 36	[+ 5]	i 39 49	P'P'	—
Boulder City		91·6	51	e 13 11	+ 1	i 24 2	− 7	i 23 50	SKS	—
Sitka		91·9	27	e 13 6	− 5	i 23 43	[− 1]	i 24 15	S	e 38·1
Pierce Ferry		92·3	52	e 13 14	+ 1	e 23 52	[+ 6]	e 24 5	S	e 38·7
Calcutta	E.	92·3	293	e 13 56	+43	i 24 27	+12	i 26 44	PPS	—
Victoria		92·4	38	—	—	23 50	[+ 3]	24 22	S	42·2
Tucson		92·9	56	e 13 18	+ 2	e 23 49	[− 1]	i 17 5	PP	e 38·3
College		93·5	16	e 16 58	PP	e 23 49	[− 4]	e 25 43	PS	e 38·0
Colombo	E.	93·6	275	13 17	− 2	e 25 37	PS	—	—	50·3
Grand Coulee		94·6	39	e 13 24	0	e 23 58	[− 1]	e 17 16	PP	—
Irkutsk		94·9	325	13 21	− 4	i 24 35	− 2	23 57	SKS	—
Salt Lake City		95·8	47	e 13 27	− 2	i 24 11	[+ 6]	e 24 57	S	e 39·3
Logan		96·3	47	e 13 38	+ 6	i 24 11	[+ 3]	e 31 32	SS	e 45·0
Kodaikanal	E.	97·1	278	i 13 41	+ 6	24 12	[0]	26 21	PS	47·1
Butte		97·6	42	—	—	e 24 19	[+ 4]	e 26 23	PS	e 43·4
Bozeman		98·5	44	e 14 1	+19	i 24 25	[+ 5]	e 26 27	PS	e 39·4
Rapid City		103·0	48	e 18 16	PP	i 24 40	[− 1]	e 27 22	PS	e 44·3
Saskatoon		103·6	39	—	—	24 41	[− 3]	25 52	S	48·2
Dehra Dun	N.	103·7	298	—	—	e 27 3	PS	—	—	—
Bombay		104·4	285	e 14 6	− 2	33 15	SS	i 27 36	PS	43·2
La Plata	E.	105·9	140	18 36	PP	25 49	−21	33 13	SS	56·0
	N.	105·9	140	18 32	PP	25 8	[+13]	27 43	PS	57·2
Huancayo		106·3	111	e 18 21	PKP	e 26 39	+26	i 28 33	PPS	—
Almata		108·4	310	e 18 48	PP	—	—	—	—	—
La Paz		110·0	119	e 18 11	[−22]	25 21	[+ 9]	34 31	SS	54·4
Florissant		110·8	56	—	—	i 25 15	[0]	i 26 18	SKKS	—
Stalinabad		113·3	304	i 18 6	[−34]	—	—	34 40	SS	—
Tashkent		113·5	306	e 14 36	P	35 7	SS	e 28 54	PS	—
Chicago		113·5	52	—	—	e 25 28	[+ 2]	e 29 11	PS	e 51·3
Bogota	N.	114·8	95	e 19 47	PP	e 25 52	[+21]	e 35 56	SS	—
Samarkand		114·9	304	e 19 3	PP	—	—	—	—	—
Columbia		117·1	62	—	—	e 25 47	[+ 7]	e 27 2	SKKS	e 56·2
Kirkland Lake		119·5	46	e 18 55	[+ 3]	—	—	—	—	—
Temiskaming		120·1	48	i 19 9	[+16]	—	—	—	—	e 65·2
Sverdlovsk		120·2	323	i 18 51	[− 2]	i 29 54	PS	i 15 13	P	—
Ottawa		122·4	49	18 58	[+ 1]	26 1	[+ 3]	27 33	SKKS	58·2
Fordham		123·6	55	e 19 8	[+ 8]	—	—	e 32 31	PPS	—
Seven Falls		125·8	47	22 23	SKP	26 11	[+ 2]	31 13	PS	59·2
San Juan		126·8	83	e 19 17	[+11]	i 22 27	PKS	e 21 27	PP	—
Baku		128·0	304	e 21 13	PP	—	—	—	—	—
Bermuda		130·6	66	e 19 20	[+ 7]	i 28 26	{+ 2}	e 26 46	SKS	e 61·0
Grozny		130·9	308	e 19 16	[+ 2]	—	—	—	—	—
Halifax		131·0	50	e 22 40	PKS	e 39 49	SSP	—	—	59·2
Erevan		132·1	304	e 19 19	[+ 3]	—	—	—	—	—
Scoresby Sund		132·2	6	22 48	PKS	—	—	—	—	—
Leninakan		132·6	305	e 19 12	[− 5]	—	—	—	—	—
Moscow		132·9	325	e 19 16	[− 2]	31 41	PS	21 53	PP	—
Ivigtut		133·6	25	21 55	PP	22 49	PKS	—	—	—
Helsinki		136·2	337	e 19 23	[0]	e 28 49	{− 9}	e 40 3	SS	e 58·2
Upsala		138·9	340	i 20 49	?	e 40 13?	SS	i 23 0	PKS	e 57·2
Ksara		139·4	294	e 19 23	[− 6]	34 49?	PPS	22 21	PP	—
Bergen	N.	141·6	348	e 23 9	PKS	—	—	—	—	53·2
Warsaw		143·1	329	e 19 34	[− 2]	26 33	[−11]	21 55	PP	e 68·2
Helwan	Z.	143·4	289	19 32	[− 4]	26 28	[−16]	23 3	SKP	—
Istanbul		143·5	308	i 19 31	[− 6]	—	—	i 25 42	PPP	—
Copenhagen		143·9	340	19 34	[− 3]	27 1	[+16]	22 46	PP	63·2
Bucharest		144·4	315	e 19 38	[0]	42 13	SSP	i 23 27	PKS	—
Aberdeen	E.	145·8	353	—	?	i 31 35	?	—	—	83·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Potsdam		146·4	336	i 19 44	[+ 2]	—	—	i 20 2	PKP_2	68·2
Budapest		147·0	323	i 19 43	[0]	e 42 43	SSP	—	—	e 71·7
Collmberg	Z.	147·2	333	i 19 54	[+11]	—	—	e 23 4	PP	—
Kalossa	N.	147·6	323	i 19 49	[+ 5]	—	—	—	—	—
Prague		147·6	331	e 19 46	[+ 2]	e 26 53	[+ 2]	e 42 13	SS	e 65·2
Belgrade		147·7	319	e 19 33	[−11]	e 42 25	SS	e 23 14	PP	66·2
Durham	N.	148·1	352	i 19 50	[+ 6]	i 27 0	[+ 9]	i 33 42	PS	—
Jena		148·1	334	e 19 44	[0]	—	—	e 19 47	PKP	—
Cheb		148·4	334	i 19 49	[+ 4]	e 42 16	SS	e 29 47	SKKS	70·2
De Bilt		149·2	343	i 19 47k	[+ 1]	e 27 28	[+35]	e 42 38	SS	e 62·2
Zagreb		149·7	324	e 19 48	[+ 1]	—	—	—	—	e 88·2
Uccle		150·6	344	e 19 49	[+ 1]	e 29 29	{−53}	e 23 29	PP	e 74·2
Stuttgart		150·7	335	e 19 47	[− 1]	e 33 39	PSKS	i 20 22	PKP_2	67·2
Triest		151·0	326	i 19 44	[− 5]	i 30 16	{− 8]	i 20 25	PKP_2	—
Kew		151·1	349	i 19 49k	[0]	e 30 19	{− 5}	i 42 55	SS	e 71·2
Strasbourg		151·4	337	i 19 51	[+ 1]	e 30 25	{− 1}	e 43 1	SS	e 65·7
Chur		152·1	333	e 19 50k	[− 1]	—	—	—	—	—
Zürich		152·1	334	e 19 51k	[0]	—	—	e 23 33	PP	—
Basle		152·4	335	e 19 50k	[− 1]	—	—	e 23 30	PP	—
Paris		152·9	344	e 19 50	[− 2]	i 26 52	[− 5]	i 20 26	pPKP	e 80·2
Besançon		153·2	337	19 53	[+ 1]	—	—	—	—	84·2
Jersey		153·6	351	e 20 8	[+15]	—	—	—	—	—
Florence		153·6	326	i 19 53	[0]	i 30 23	{−15}	—	—	—
Pavia	Z.	153·6	330	e 18 53	[−60]	—	—	e 19 2	?	—
Rome		154·1	320	i 19 51k	[− 2]	i 43 25	SS	i 20 51	pPKP	e 70·0
Clermont-Ferrand		155·5	339	i 19 56	[+ 1]	i 43 55	SS	i 23 58	PP	66·2
Barcelona		159·6	336	20 14	[+14]	44 21	SS	—	—	77·7
Tortosa	N.	160·8	337	i 20 5	[+ 3]	26 55	[−10]	31 38	SKKS	e 84·2
Alicante		163·3	337	20 0	[− 4]	26 59	[− 8]	20 55	PKP_1	e 79·1
Lisbon		164·6	358	20 7k	[+ 2]	—	—	24 46	PP	81·9
Almeria		165·3	338	i 19 59	[− 7]	26 53	[−16]	20 22	pPKP	87·0
Granada		165·4	342	i 20 5a	[− 1]	i 31 5	{−35}	20 26	pPKP	82·7
Malaga		166·0	344	i 20 7	[0]	—	—	i 21 15	PKP_2	e 85·9

Additional readings :—
Auckland i =7m.17s., P_cS =7m.39s., i =8m.7s., S =8m.28s.
Wellington PP =6m.0s., P_cPZ =7m.11s., sS_cS? =16m.45s.
Riverview iN =5m.19s. and 8m.35s., iSSN =8m.42s.
Perth PP =10m.16s., PS =16m.28s., SSS =20m.43s.
Berkeley iPEN =12m.59s., eSKSE =23m.10s.
Pasadena i =13m.3s., ePPEZ =16m.15s., iEZ =23m.48s., iPSE =24m.44s., iSSE = 29m.21s., ePKP,PKPZ =38m.47s., ePKP,PKP,PKPZ =59m.35s.
Mount Wilson iPKP,PKPZ =39m.45s.
Fresno iE =14m.30s., iPSN =26m.2s.
Shasta Dam iP =12m.59s., i =13m.6s. and 13m.11s., ePKP,PKP =38m.25s.
Palomar iZ =13m.7s. and 16m.16s., iPKP,PKPZ =39m.43s.
Tinemaha i =13m.5s., iZ =13m.12s. and 14m.22s.
Boulder City i =14m.2s., iPKP,PKP =39m.57s.
Sitka ePP =17m.7s., e =21m.0s., ePS =25m.22s.
Pierce Ferry iP =13m.17s., i =14m.14s., iPP =17m.0s., iPKP,PKP? =40m.0s.
Victoria PPS =25m.52s., SS =30m.13s.
Tucson i =13m.48s., iPS =25m.42s., eSS =31m.0s., eSSS? =34m.17s.
College ePKKP =30m.24s., ePKP,PKP =38m.46s., eSKPPKP =42m.48s.
Grand Coulee e =14m.40s.
Salt Lake City eSS =31m.47s.
Kodaikanal PPE =17m.39s., SKKSE =25m.11s.
Butte eSS =32m.4s., eSSS =36m.59s.
Bozeman e =14m.4s., eSS =32m.5s., eSSS =36m.14s.
Rapid City eSS =33m.19s.
Saskatoon PS =27m.30s., SS =33m.25s., SSS =37m.0s.
Bombay iPPE =18m.20s., eN =28m.29s., SSS =37m.36s.
La Plata E. PS =28m.7s., PPS? =31m.49s. and 38m.25s., SSS =39m.37s., 43m.26s., and 44m.51s., Q =49·7m.
La Plata N. 20m.43s., SKS =25m.42s., PPS =29m.39s. and 31m.55s., SS =33m.49s., SSS? =37m.51s., Q =45·3m.
Huancayo ePS =28m.17s., eSS =34m.45s.
La Paz iPPZ =19m.9s., iPS =28m.49s., iPPSEN =29m.43s.
Florissant i =29m.17s.
Tashkent PKP =18m.12s., ePP =19m.7s.?, PPP =21m.39s.
Chicago e =29m.18s., eSS =34m.30s., e =42m.33s.
Bogota ePSN =29m.30s.

Continued on next page.

Columbia ePS =30m.1s., eSS? =35m.17s.
Sverdlovsk iPP =20m.8s., iPPS =31m.25s.. SS =36m.13s.
Ottawa PPE =20m.43s., PS =30m.43s., SS =37m.49s., SSS =42m.13s.?
Seven Falls SS =38m.43s., SSS =46m.55s.
Bermuda iPP =22m.37s., iPKP,PKP =41m.31s.
Moscow PKS =22m.43s., SS =39m.13s.
Helsinki ePKS =22m.53s., ePS =32m.34s., ePKP,SKS =45m.3s., e =47m.55s.
Upsala eE =28m.26s. and 35m.35s., eSSE =39m.49s., eSSS =45m.13s. ?
Bergen eN =24m.17s.?, 27m.17s.? and 43m.30s.
Warsaw eN =22m.23s., eE =22m.37s., SKPE =23m.15s., eE =24m.23s., PPPN =24m.32s., PPPE =24m.43s., eN =25m.18s., 26m.0s., and 27m.28s., eE =28m.2s., SKKSE = 28m.26s., SKKSN =28m.42s., PKKPN =29m.11s., eN =29m.26s. and 30m.26s., eE =31m.16s., PSN =31m.59s., PSE =32m.11s., PPSE =33m.19s., PPSN =33m.29s. $SKKS_2$?N =36m.1s., $SKKS_2$?E =36m.12s., SSN =38m.58s., SSE =39m.28s., eE = 42m.50s., SSSN =44m.13s.
Helwan iNZ =20m.7s., PPZ =22m.43s., iN =35m.7s. and 36m.5s.
Copenhagen 23m.41s., 25m.22s.
Bucharest eN =20m.24s., eE =20m.45s.
Potsdam iEN =20m.32s.
Budapest eE =32m.53s., eN =33m.13s.
Collmberg eZ =21m.16s.
Prague ePP =22m.49s., eSKP =23m.31s., eSKSP =33m.13s.?
Belgrade i =22m.35s., e =25m.37s., eSS? =39m.21s., e =43m.32s.
Durham iN =20m.15s. and 21m.9s.
Jena eN =20m.40s.
Cheb ePP =22m.24s., eSKP =23m.35s.
Zagreb i =19m.54s., 20m.12s., and 20m.24s., iNE =20m.43s., iNW =20m.48s., eNE = 20m.58s.
Uccle eEN =37m.30s., eE =64m.13s.
Stuttgart i =21m.35s., ePPP =27m.33s., ePPS =36m.19s., eSS =43m.13s.
Triest eSS =44m.1s.
Kew eZ =22m.3s., ePKS? =23m.25s.?, ePP?EZ =23m.45s.?, ePPP or SKS =26m.55s., eSKKKS?N =30m.59s., ePSKS?EN =33m.47s., ePPS?N =36m.31s.?, eSSS?N = 48m.38s.
Straebourg ePP? =23m.13s.
Zürich i =19m.54s.
Paris i =19m.53s. and 19m.59s., $iPKP_2$ =20m.10s., isPKP? =20m.44s., iPKS =23m.30s., i =23m.39s., iPP =23m.46s., i =23m.50s. and 26m.14s., iPPP =27m.20s., i = 28m.14s., 28m.52s., 29m.17s., and 30m.30s., iPPP =33m.36s., i =34m.28s., 38m.10s., 39m.30s., and 42m.7s., iSS =43m.19s., i =43m.23s., iPSS =43m.52s., iSSS =49m.19s.
Rome $iPKP_2Z$ =20m.11s., eN =20m.27s., iPPZ =23m.41s., eN =23m.49s., iZ =25m.53s. and 27m.19s., eN =29m.43s., eZ =31m.37s., ePSKSN =33m.53s., iPPSNZ = 36m.47s., eN =49m.17s.
Clermont-Ferrand iPPP =27m.37s.
Tortosa $iPKP_2N$ =20m.45s., SKPEN =23m.37s., PPN =24m.24s., PPPN =28m.8s., SKSPN =35m.10s., SSN =44m.22s., SSSN =49m.50s., SSPN =51m.38s.
Alicante PP =24m.28s., PPP =28m.23s., SKKS =31m.23s., PSKS =35m.17s., PPS = 38m.39s., SSS =51m.19s., Q =67m.50s.
Lisbon Z =77m.13s.
Almeria PKP_2 =21m.1s., PKS =23m.25s., iPP =24m.40s., PPP =28m.41s., SKKS = 31m.25s., SKSP =35m.13s., PPS =38m.22s., SS =45m.25s., SSS =58m.45s.
Granada $iPKP_2$ =21m.8s., iPP =24m.47s., pPP =25m.2s., sPP =25m.39s., iPPP = 28m.43s., pPPP =28m.51s., sSKKS =32m.5s., SKSP =35m.14s., sSKSP =36m.2s., PPS =38m.10s., iSS =45m.30s., sSS =46m.26s., SSS =52m.35s.
Malaga iPPNW =24m.55s., PPPNW =27m.59s., P_cP,PKPNW =28m.53s.
Long waves were also recorded at Philadelphia and Tananarive.

Nov. 9d. 15h. 0m. 38s. Epicentre 8°·7S. 110°·8E. (as on 1937, Sept. 27d.).

$A = -·3511$, $B = +·9242$, $C = -·1503$; $\delta = +1$; $h = +7$;
$D = +·935$, $E = +·355$; $G = +·053$, $H = -·140$, $K = -·989$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Colombo	E.	34·5	294	6 55	+ 3	12 18	− 2	—	—	—
Kodaikanal	E.	38·1	298	7 27	+ 5	—	—	—	—	—
Brisbane		44·0	120	8 43	+32	14 41	− 2	—	—	—
Riverview	N.	44·7	130	—	—	i 18 23	SS	—	—	e 23·2
Bombay		46·4	305	e 8 30	0	e 15 13	− 5	e 18 22	SS	—
Vladivostok		55·0	19	i 9 37	+ 2	i 17 20	+ 3	—	—	—
Kulyab		60·1	323	i 10 11	0	i 17 14?	−70	—	—	—
Almata		60·2	332	e 10 23	+11	—	—	—	—	—
Andijan		60·6	326	e 10 14	− 1	e 18 28	− 2	—	—	—
Stalinabad		61·2	324	i 10 17	− 2	i 18 31	− 7	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tashkent		62·7	325	i 10 25	− 4	e 18 46	−11	—	—	—
Sverdlovsk		77·1	334	i 11 56	− 1	21 41	− 5	—	—	—
Ksara		82·5	304	e 12 32	+ 6	e 23 11	+29	—	—	—
Helwan		85·3	300	e 12 40	0	e 23 7	− 3	i 12 58	?	—
Moscow		87·9	327	e 12 52	− 1	i 23 30	− 5	13 5	pP	—
Boulder City		130·4	49	e 19 16	[+ 3]	e 22 36	PKS	—	—	—
Pierce Ferry		131·0	49	e 19 18	[+ 4]	—	—	—	—	—
Santa Lucia	E.	138·1	178	—	—	29 26	{+16}	—	—	—

Moscow also gives sS = 23m.52s.
Long waves were also recorded at Wellington, Auckland, Arapuni, Calcutta, Kew, Stuttgart, Rome, Copenhagen, and Helsinki.

Nov. 9d. Readings also at 2h. (Pierce Ferry), 3h. (La Paz), 4h. (Kulyab), 5h. (Stuttgart), 6h. (Strasbourg and Stuttgart), 7h. (Mount Wilson, Palomar, Pasadena, Tinemaha, Riverside, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Brisbane, and Stuttgart), 8h. (La Paz, Stuttgart (2), near Paris, Basle, Neuchatel, and Zürich), 9h. (Mount Wilson, Palomar, Riverside, Pierce Ferry, Shasta Dam, Auckland, and Wellington), 10h. (Brisbane, Stuttgart, and near Balboa Heights), 12h. (Stuttgart, Boulder City, and near Pierce Ferry), 13h. (Stuttgart), 15h. (Boulder City, Pierce Ferry, La Paz, Bogota, and near Huancayo), 16h. (near Ashkabad), 17h. (La Paz (2) and Bogota), 19h. (Leninakan and near Erevan), 22h. (near Mizusawa), 23h. (La Paz, Bogota, and Shasta Dam).

Nov. 10d. 1h. 50m. 27s. Epicentre 36°·8N. 69°·4E. Depth of focus 0·030.
(as on 1947, Oct. 11d.).

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

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kulyab	1·1	15	i 0 31	− 2	i 0 56	− 3	—	—	—
Stalinabad	1·8	344	i 0 39	0	i 1 8	− 1	—	—	—
Obi-garm	1·9	7	i 0 23?	−17	i 0 53	−17	—	—	—
Samarkand	3·5	327	e 0 59	+ 2	e 1 42	+ 1	—	—	—
Tashkent	4·5	359	—	—	2 3	0	—	—	—
Andijan	4·6	30	—	—	i 1 55	−10	—	—	—
Tchimkent	5·5	1	—	—	i 2 24	− 2	—	—	—
Ksara	27·4	274	e 5 39	+12	—	—	—	—	e 14·6

Nov. 10d. 2h. 22m. 52s. Epicentre 34°·1N. 116°·3W. (as on 1947, July 26d.).

A = −·3677, B = −·7439, C = +·5580; δ = −5; h = 0;
D = −·896, E = +·443; G = −·247, H = −·500, K = −·830.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Riverside		0·9	263	i 0 20k	0	i 0 31	− 3	—	—
Palomar		0·9	212	i 0 25	+ 5	—	—	—	—
La Jolla		1·5	213	i 0 35k	+ 7	i 0 58	+ 9	—	—
Mount Wilson		1·5	275	i 0 28k	0	i 0 45	− 4	—	—
Pasadena		1·6	275	i 0 29$_A$	− 1	i 0 48	− 3	—	—
Boulder City		2·2	47	i 0 38	0	i 1 9	+ 3	i 1 16	S_E
Haiwee		2·4	326	i 0 38	− 3	i 1 12	0	—	—
Pierce Ferry		2·8	43	i 0 45	− 2	i 1 16	− 6	—	—
Santa Barbara	Z.	2·8	277	i 0 47	0	—	—	—	—
Tinemaha		3·4	332	i 0 52	− 3	i 1 38	+ 1	—	—
Fresno		3·9	314	i 1 7	+ 5	i 1 56	+ 6	—	—
Tucson		4·9	110	e 1 21	+ 4	e 2 38	S_E	i 1 45	P_E
Lick	N.	5·4	308	i 1 20	− 4	i 2 51	S_E	1 38	P^*
Berkeley	Z.	6·1	309	i 1 33	− 1	—	—	i 2 1	P_E
Mineral		7·5	328	e 2 4	+11	e 3 54	S*	—	—
Shasta Dam		8·2	326	e 2 3	0	i 4 16	S*	—	—

Lick also gives iEN = 1m.30s., eN = 1m.44s., iN = 2m.58s.
Long waves were recorded at Kew.

Nov. 10d. 3h. 59m. 22s. Epicentre 46°·5N. 27°·5W.

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kew		18·5	64	e 4 15	− 4	e 7 42	− 2	e 4 48?	PP	e 8·9
Malaga	Z.	19·8	111	i 4 35	0	i 8 8	− 5	8 28	PcP	9·7
Granada		20·2	110	i 4 37	− 2	i 8 29	+ 8	i 4 58	PP	i 10·3
Paris		20·3	73	e 4 44	+ 4	i 8 27	+ 4	—	—	e 10·1
Almeria		21·0	108	i 4 45	− 2	8 33	− 4	5 10	PP	10·4
Tortosa	N.	21·0	95	4 49	+ 2	8 48	+11	5 17	PP	—
Clermont-Ferrand		21·2	81	i 4 49	0	e 8 55	+14	—	—	10·1
Alicante		21·5	102	i 4 58	+ 6	8 40	− 7	5 21	PP	e 9·6
De Bilt		21·9	62	e 4 55	− 2	—	—	i 5 25k	PP	e 11·0
Strasbourg		23·8	71	i 5 11	− 4	e 9 37	+ 9	e 5 48	PP	e 11·1
Zürich		24·5	75	e 5 23	+ 1	—	—	—	—	e 15·4
Stuttgart		24·7	71	e 5 20	− 4	e 9 47	+ 3	—	—	e 11·6
Copenhagen		26·4	55	—	—	10 8	− 4	—	—	12·6
Cheb		26·5	67	e 2 38?	?	e 10 14	0	—	—	e 13·6
Florence		27·3	81	e 6 19	PP	e 11 3	+36	—	—	—
Triest		28·4	76	e 5 53	− 5	e 10 47	+ 2	—	—	e 14·3
Rome	z.	28·8	85	e 6 5k	+ 3	e 12 44	SSS	—	—	e 13·8
Ksara		48·8	82	e 8 45	− 4	e 15 58?	+ 6	—	—	—
Sverdlovsk		51·9	45	e 9 15	+ 3	16 30	− 5	—	—	—

Additional readings :—
Kew eEN = 6m.18s.
Malaga S_cPZ = 12m.6s., S_cSZ = 15m.34s.
Granada SS = 9m.35s.
Paris i = 5m.34s., 5m.37s., 5m.47s., 5m.54s., 6m.6s., 6m.14s., and 6m.28s., iS = 8m.15s.
Almeria P_cP = 9m.0s.
Tortosa iEN = 4m.52s., PPPN = 5m.34s., SEN = 8m.54s., SSEN = 9m.48s., SSSN = 10m.0s.
Alicante PP = 5m.16s., PPP = 5m.23s., eS = 7m.56s.
Rome eZ = 7m.21s. and 12m.10s.
Long waves were also recorded at Helsinki and Warsaw.

Nov. 10d. 6h. 26m. 19s. Epicentre 6°·8S. 127°·5E. (as on 1941, Sept. 14d.).

A = −·6045, B = +·7878, C = −·1176; δ = −12; h = +7;
D = +·793, E = +·609; G = +·072, H = −·093, K = −·993.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		31·8	133	i 6 23	− 5	i 11 32	− 6	e 13 24	SS	—
Riverview		34·7	143	—	—	i 12 19	− 5	—	—	e 17·2
Colombo	E.	49·4	285	8 51	− 2	16 1	+ 1	—	—	—
Vladivostok		49·9	5	i 8 57	0	e 16 3	− 4	—	—	—
Bombay		59·6	297	i 10 7	− 1	e 18 15	− 2	—	—	—
Almata		67·6	323	e 11 3	+ 2	—	—	—	—	—
Andijan		69·2	318	e 11 11	+ 1	—	—	—	—	—
Kulyab		69·7	314	i 11 32	+18	—	—	—	—	—
Obi-garm		70·1	316	e 11 4	−12	e 20 19	− 8	—	—	—
Stalinabad		70·7	315	i 11 17	− 3	20 36	+ 2	—	—	—
Samarkand		72·4	315	e 11 31	+ 1	—	—	—	—	—
Ashkabad		78·0	311	e 12 2	0	—	—	—	—	—
Sverdlovsk		83·3	330	i 12 30	0	22 52	+ 2	—	—	—
Leninakan		89·6	312	e 13 9	+ 8	—	—	—	—	—
Ksara		95·1	303	i 18 15	PKP	e 30 23	SS	—	—	—
Stuttgart		113·6	321	e 19 41	PP	e 29 11	PS	—	—	e 56·5
La Paz		152·2	150	19 51	[0]	—	—	—	—	—

Nov. 10d. 6h. 49m. 18s. Epicentre 39°·8N. 122°·7W.

Epicentre given by Berkeley.

A = −·4162, B = −·6483, C = +·6376; δ = +5; h = −1;
D = −·842, E = +·540; G = −·344, H = −·537, K = −·770.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Shasta Dam		0·9	15	i 0 20	0	e 0 33	− 1	—	—	—
Mineral		1·0	57	i 0 21	0	i 0 33	− 3	i 0 27	?	—
Ferndale		1·4	303	—	—	e 0 46	0	—	—	i 1·0
Berkeley	Z.	2·0	170	i 0 34	− 1	i 0 54	− 8	i 1 5	S	—
San Francisco	E.	2·0	175	e 0 38	+ 3	i 1 13	S_g	—	—	—
Lick		2·6	162	e 0 46	+ 2	i 1 16	− 1	e 1 29	S_g	—
Fresno		3·8	143	e 1 2	+ 1	i 1 22	P_g	—	—	—
Tinemaha	Z.	4·4	127	i 1 22	P*	i 2 16	S*	—	—	—
Haiwee	Z.	5·2	133	i 1 33	P*	—	—	—	—	—
Pasadena		6·7	146	i 1 41	− 1	e 3 17	S*	—	—	—

Additional readings :—
Lick iN = 1m.10s. and 1m.33s.
Fresno iSN = 1m.46s., iE = 1m.58s. and 2m.7s.

Nov. 10d. 23h. 51m. 23s. Epicentre 6°·8S. 112°·0E.

A = −·3720, B = +·9208, C = −·1176; δ = +9; h = +7;
D = +·927, E = +·375; G = +·044, H = −·109, K = −·993.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverview	N.	45·1	132	—	—	e 18 7	SS	—	—	e 23·3
Bombay		46·3	304	e 7 26	−63	—	—	e 7 29	?	—
Kulyab		59·3	322	e 10 5	− 1	i 18 10	− 4	—	—	—
Andijan		59·7	326	—	—	e 18 22	+ 3	—	—	—
Obi-garm		59·9	323	—	—	e 18 23	+ 2	—	—	—
Stalinabad		60·4	322	i 10 10	− 3	i 18 22	− 7	—	—	—
Samarkand		62·2	321	e 10 27	+ 1	—	—	—	—	—
Sverdlovsk		76·0	334	i 11 52	+ 1	21 36	+ 2	—	—	—
Ksara		82·3	305	e 11 20	−65	e 22 6	−34	—	—	—
Moscow		86·9	327	e 12 48	0	—	—	—	—	—
Shasta Dam		121·1	45	e 18 54	[− 1]	—	—	—	—	—
Haiwee		125·9	49	e 19 4	[0]	—	—	—	—	—
Pasadena	Z.	126·4	51	e 18 53	[−12]	—	—	i 19 5	PKP	—
Mount Wilson	Z.	126·4	51	e 19 7	[+ 2]	—	—	i 19 25	?	—
Boulder City		128·3	48	e 22 30	PKS	—	—	—	—	—
Pierce Ferry		128·9	47	e 21 39	PP	i 22 30	PKS	—	—	—
Tucson		132·8	50	i 22 44	PKS	—	—	—	—	—

Additional reading :—
Pasadena iZ = 19m.24s.

Nov. 10d. Readings also at 0h. (La Paz), 1h. (Auckland, Arapuni, Wellington, Mount Wilson, Pasadena, Riverside, Boulder City, Pierce Ferry, Shasta Dam (2), Tucson, Fresno, Strasbourg, Paris, Stuttgart, and Copenhagen), 4h. (Stalinabad, near Obi-garm, Kulyab, and Mineral), 5h. (Stuttgart), 6h. (near Mineral), 9h. (Brisbane, Auckland, and Riverview), 10h. (Palomar, Pasadena, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Kew, Stuttgart, Wellington, Arapuni, and near Lick (2)), 11h. (Kirkland Lake, near Obi-garm, Kulyab, and Stalinabad), 12h. (near Mineral and near Mizusawa), 13h. (Mizusawa), 14h. (near Ashkabad), 15h. (Rome), 16h. (Paris, Strasbourg, Rome, Stuttgart, La Paz, Ferndale, and near Lick), 17h. (Samarkand, near Kulyab, Obi-garm, and Stalinabad), 19h. (La Paz), 21h. (Stalinabad, near Kulyab, and Obi-garm).

Nov. 11d. Readings at 3h. (La Paz, Andijan, near Kulyab, Obi-garm, and Stalinabad), 5h. (Ksara, near Kulyab, Obi-garm, and Stalinabad), 6h. (Kew, Warsaw, Ksara, near Kulyab, and Obi-garm), 7h. (La Paz), 9h. (Helwan, Ksara, and near Alicante), 12h. (Samarkand, near Kulyab, Obi-garm, and Stalinabad), 13h. (La Paz), 15h. (Jena), 17th (Istanbul), 18h. (Samarkand, near Kulyab, Obi-garm, and Stalinabad), 22h. (Kew), 23h. (Tucson, Bogota, and near Mizusawa).

Nov. 12d. 1h. 39m. 43s. (I) } Epicentre 29°·3N. 114°·3W.
2h. 43m. 59s. (II) } (as on 1939, December 22d.).

A = −·3594, B = −·7961, C = +·4869; δ = +2; h = +2;
D = −·911, E = +·412; G = −·200, H = −·444, K = −·873.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I Tucson		4·1	45	e 1 0	− 5	i 2 3	S*	—	—	i 2·2
II		4·1	45	e 1 3	− 2	i 1 59	+ 4	—	—	i 2·2
I La Jolla	z.	4·4	325	i 1 22	P*	—	—	—	—	—
II	z.	4·4	325	e 1 8	− 2	—	—	—	—	—
I Palomar	z.	4·6	332	i 1 13	+ 1	i 2 14	+ 7	—	—	—
II	z.	4·6	332	e 1 10	− 2	i 2 15	+ 8	i 1 23	P*	—
I Riverside	z.	5·4	332	e 1 22	− 2	—	—	—	—	—
II	z.	5·4	332	i 1 22	− 2	—	—	—	—	—
I Pasadena		5·8	328	e 1 30	+ 1	—	—	—	—	i 2·8
II		5·8	328	e 1 32	+ 3	—	—	—	—	i 3·0
I Boulder City		6·6	356	i 0 37	−64	i 3 41	L	—	—	(i 3·7)
II		6·6	356	i 1 38	− 3	—	—	—	—	—
I Pierce Ferry		6·8	2	i 0 38	−66	i 3 42	S_g	i 2 7	P*	—
II		6·8	2	i 1 39	− 5	i 3 36	S_g	i 2 21	P_g	—
II Fresno		8·7	330	e 2 42	P_g	i 3 46	− 4	—	—	i 4·6
II Shasta Dam		13·1	332	e 3 13	+ 3	—	—	—	—	—
II Rapid City		17·2	28	e 4 8	+ 5	—	—	—	—	e 8·8
I St. Louis		22·0	58	e 4 59	+ 1	e 9 7	+11	—	—	—
II		22·0	58	e 5 1	+ 3	e 9 9	+13	—	—	—

Additional readings :—
Fresno II iN = 3m.28s.
Rapid City II e = 5m.40s.
Long waves were also recorded for (II) at Stuttgart and for both shocks at other American stations.

Nov. 12d. 10h. 28m. 41s. Epicentre 23°·3S. 170°·9E. (as on 9d.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland		13·9	167	3 28	+ 7	—	—	8 29	P_cP	7·3
Arapuni		15·3	166	—	—	e 6 55	+25	—	—	—
Brisbane		16·7	252	i 3 46	−11	e 6 59	− 4	—	—	—
Wellington		18·2	172	4 21	+ 5	7 58	+21	4 46	pP	i 10·0
Riverview		20·2	234	i 4 36$_s$	− 3	i 8 23	+ 2	i 4 44	pP	e 9·6
Antarctica		79·5	161	e 11 59	−11	e 22 24	+13	—	—	—
Pasadena	z.	88·3	52	i 13 3	+ 8	—	—	—	—	—
Mount Wilson	z.	88·4	52	e 12 57	+ 2	—	—	—	—	—
Fresno		88·5	49	e 13 0	+ 4	—	—	—	—	—
Riverside	z.	88·8	52	e 12 57	0	—	—	—	—	—
Shasta Dam		88·8	44	e 12 42	−15	—	—	—	—	—
Palomar	z.	88·9	53	i 13 3	+ 5	—	—	—	—	—
Tinemaha	z.	89·7	49	i 13 9	+ 8	—	—	—	—	—
Calcutta	E.	92·3	293	—	—	e 24 10	− 5	—	—	—
Bombay	E.	104·4	285	e 18 44	PP	—	—	—	—	—
La Paz		110·0	119	e 19 35	PP	i 29 27	PPS	—	—	e 56·3
Budapest	E.	147·0	323	19 46	[+ 3]	—	—	—	—	—
Stuttgart	z.	150·7	335	e 19 51	[+ 3]	—	—	—	—	—
Strasbourg		151·4	337	e 19 55	[+ 5]	—	—	—	—	—
Zürich		152·1	334	e 19 54	[+ 3]	—	—	—	—	—
Paris		152·9	344	e 19 52	[0]	—	—	—	—	—
Rome	z.	154·1	320	e 19 58	[+ 5]	—	—	—	—	—

Additional readings :—
Auckland i = 10m.15s., record confused with the following and wrongly interpreted.
Brisbane iSN = 7m.4s.
Wellington iZ = 5m.53s. and 8m.6s., PPZ = 8m.46s., pPPZ = 9m.9s., sPPP?Z = 11m.51s., e = 13m.4s.; record confused with the following and wrongly interpreted.
Riverview iE = 8m.34s.
Mount Wilson iZ = 13m.4s.
Fresno iZ = 13m.5s.

Continued on next page.

Riverside iZ = 13m.5s.
Shasta Dam e = 12m.55s., i = 13m.5s.
Stuttgart eZ = 19m.59s.
Strasbourg ePKP = 19m.58s.
Paris iPKP = 19m.58s.
Long waves were also recorded at Bozeman.

Nov. 12d. 10h. 39m. 8s. Epicentre 23°·3S. 170°·9E. (as at 10h. 28m.).

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland		13·9	167	3 28	+ 7	—	—	—	—	9·4
Arapuni		15·3	166	—	—	i 6 52	+22	—	—	—
Brisbane		16·7	252	i 3 43	−14	i 6 41	−22	i 4 0	PP	—
Wellington		18·2	172	4 21	+ 5	8 6	+29	—	—	9·4
Apia		18·9	64	e 4 26	+ 2	e 9 25	L	—	—	e 10·4
Riverview		20·2	234	i 4 36a	− 3	i 8 24	+ 3	i 4 45	pP	e 9·6
Perth		49·1	248	i 13 31	?	i 15 2	?	i 20 57	?	24·2
Vladivostok		75·2	332	i 11 42	− 4	i 21 21	− 4	—	—	—
Berkeley		87·6	48	i 12 52	+ 1	i 23 18	[0]	—	—	e 38·7
Pasadena		88·3	52	i 12 56	+ 1	—	—	—	—	e 40·9
Riverside	Z.	88·8	52	i 12 58	+ 1	—	—	—	—	—
Shasta Dam		88·8	44	e 12 57	0	—	—	—	—	—
Palomar	Z.	88·9	53	i 12 59	+ 1	—	—	—	—	—
Tinemaha	Z.	89·7	49	e 13 3	+ 2	—	—	—	—	—
Boulder City		91·6	51	e 13 11	+ 1	—	—	—	—	—
Pierce Ferry		92·3	52	i 13 16	+ 3	—	—	—	—	—
Calcutta	E.	92·3	293	—	—	e 24 13	− 2	—	—	—
Tucson		92·9	56	e 13 17	+ 1	—	—	e 32 38	SS	e 42·9
Colombo	E.	93·6	275	13 6	−13	23 54	[+ 1]	—	—	—
Irkutsk		94·9	325	e 13 52	+27	23 52	[− 9]	30 52	SS	—
Salt Lake City		95·8	47	—	—	e 23 12	[−53]	e 37 12	Q	—
Bombay	N.	104·4	285	e 18 21	PP	—	—	—	—	—
Huancayo		106·3	111	—	—	e 27 58	PS	e 29 10	PPS	—
St. Louis		110·8	56	—	—	e 25 18	[+ 3]	26 21	SKKS	—
Tashkent		113·5	306	e 19 6	PP	—	—	—	—	—
Cleveland	E.	117·9	54	—	—	i 30 3	PS	i 37 10	SS	—
Sverdlovsk		120·2	323	e 18 52	[− 1]	26 34	[+43]	30 49	PPS	—
Ottawa		122·4	49	e 18 58	[0]	—	—	—	—	56·9
Fort de France		130·3	91	e 22 35	PKS	—	—	—	—	—
Helsinki		136·2	337	e 22 59	PKS	—	—	—	—	e 45·9
Ksara		139·4	294	i 19 30	[+ 1]	—	—	22 24	PP	—
Warsaw	N.	143·1	329	e 19 59	[+23]	—	—	e 22 43	PP	e 83·9
Helwan	Z.	143·4	289	i 19 31k	[− 5]	—	—	i 23 1	PP	—
Istanbul		143·5	308	18 59?	[−38]	e 22 6?	?	—	—	—
Copenhagen		143·9	340	—	—	(32 7]	PS	—	—	32·1
Potsdam		146·4	336	e 19 46	[+ 4]	—	—	—	—	—
Budapest		147·0	323	19 44	[+ 1]	—	—	—	—	—
Kalocsa	E.	147·6	323	e 19 40	[− 4]	—	—	—	—	—
Belgrade		147·7	319	i 19 43	[− 1]	—	—	—	—	—
Zagreb		149·7	324	e 19 45	[− 2]	—	—	—	—	—
Stuttgart	Z.	150·7	335	e 19 49	[+ 1]	e 30 2	{−20}	—	—	—
Triest		151·0	326	e 19 52	[+ 3]	—	—	e 20 25	PKP$_2$	—
Strasbourg		151·4	337	e 19 50	[+ 1]	—	—	—	—	e 51·9
Chur		152·1	333	e 19 55	[+ 4]	—	—	—	—	—
Zürich		152·1	334	e 19 54	[+ 3]	—	—	—	—	—
Basle		152·4	335	e 19 55k	[+ 4]	—	—	—	—	—
Paris		152·9	344	i 19 54	[+ 2]	—	—	i 23 50	PP	e 80·9
Rome	Z.	154·1	320	e 19 50k	[− 3]	e 27 13	[+14]	i 20 49	pPKP	e 75·2
Alicante		163·3	337	24 52	PP	—	—	—	—	e 84·5
Almeria		165·3	338	i 20 4	[− 2]	31 25	{−15}	20 59	PKP$_2$	88·9
Granada		165·4	342	i 20 5k	[− 1]	31 58	{+18}	20 19	pPKP	88·7
Malaga	Z.	166·0	344	i 20 3a	[− 4]	27 9	[0]	i 21 7	PKP$_2$	79·0

For Notes see next page.

NOTES TO NOVEMBER 12d. 10h. 39m. 8s.

Additional readings and notes :—
Auckland 4m.36s., i=6m.33s., i=11m.8s., SSS=16m.37s. ; phases confused with those of previous shock and wrongly identified.
Brisbane iSSEN=7m.4s.
Wellington 4m.56s., SZ=5m.37s., SSZ=12m.42s., eSSZ=14m.13s., SSS?Z=17m.52s. ; confused with previous shock and wrongly identified.
Riverview iE=5m.13s., iN=5m.17s., isSN=8m.35s., iZ=8m.49s., iSSN=8m.55s.
Berkeley iE=23m.24s.
Tinemaha iZ=13m.7s.
Tucson i=13m.24s.
St. Louis e=28m.24s., ePS=28m.48s., e=29m.5s.
Cleveland eN=37m.17s., iE=45m.5s.
Sverdlovsk SS=35m.22s.
Warsaw eN=21m.54s., eE=23m.19s. and 23m.37s.
Helwan eZ=22m.4s.
Budapest L=20m.9s.
Kalocsa eN=19m.47s.
Belgrade e=20m.14s. and 21m.17s.
Stuttgart ePKP?N=19m.55s. and 20m.0s.
Strasbourg e=21m.6s.
Paris i=20m.5s. and 20m.12s.
Rome iPKP$_2$Z=20m.12s., iPPZ=23m.45s., eZ=31m.13s. and 36m.43s.
Almeria PKS=23m.33s., PP=24m.39s., SKS=26m.1s., PPP=28m.41s., PPS=38m.9s., SS=45m.9s., SSS=51m.33s.
Granada pPKP$_2$=21m.25s., iPP=24m.48s., pPP=25m.18s., PPP=28m.55s., SS=46m.58s.
Malaga iPPZ=24m.50s., PPPZ=28m.49s., PPSZ=38m.22s., SSZ=45m.11s., QZ=71m.11s.
Long waves were also recorded at Chicago, Clermont-Ferrand, and Kew.

Nov. 12d. 16h. 18m. 54s. Epicentre 23°·3S. 170°·9E. (as at 10h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Auckland		13·9	167	3 28	+ 7	6 15	+18	8 33	P_cP	—
Arapuni		15·3	166	3 36	− 3	6 36	+ 6	—	—	—
New Plymouth		16·0	171	4 6?	+18	—	—	—	—	—
Tuai		16·4	163	4 5	+12	7 19	+23	—	—	—
Brisbane	N.	16·7	252	i 3 44	−13	i 6 57	− 6	—	—	—
Wellington		18·2	172	4 21	+ 5	7 50	+13	5 2	PP	—
Apia		18·9	64	e 4 25	+ 1	e 8 3	+10	e 8 42	P_cP	e 9·7
Kaimata		19·2	179	4 34	+ 6	8 22	+23	—	—	—
Christchurch		20·2	177	4 49	+10	8 39	+18	—	—	—
Riverview		20·2	234	i 4 36$_a$	− 3	e 8 21	0	i 4 59	PP	e 9·6
Perth		49·1	248	i 11 16	PP	15 51	− 5	—	—	22·6
Honolulu		53·8	37	e 9 28	+ 2	e 17 13	+12	e 19 14	S_cS	e 23·5
Vladivostok		75·2	332	i 11 41	− 5	i 21 22	− 3	—	—	—
Antarctica		79·5	161	i 12 13	+ 3	i 22 19	+ 8	—	—	—
Santa Clara		87·3	48	e 12 54	+ 4	e 23 16	−13	—	—	40·7
Berkeley		87·6	48	i 12 52	+ 1	i 23 20	[+ 2]	i 29 6	SS	e 40·9
Pasadena		88·3	52	i 12 57	+ 2	e 23 26	[+ 4]	e 37 12	Q	e 41·1
Mount Wilson	Z.	88·4	52	i 12 58	+ 3	—	—	—	—	—
Fresno	Z.	88·5	49	i 12 58	+ 2	—	—	—	—	—
Riverside	Z.	88·8	52	i 12 59	+ 2	—	—	—	—	—
Shasta Dam		88·8	44	e 12 57	0	—	—	—	—	—
Palomar		88·9	53	i 12 59	+ 1	—	—	—	—	—
Boulder City		91·6	51	i 13 12	+ 2	e 23 47	[+ 5]	—	—	—
Pierce Ferry		92·3	52	i 13 15	+ 2	e 23 55	[+ 9]	—	—	—
Calcutta	E.	92·3	293	e 13 11	− 2	e 23 41	[− 5]	e 31 41	SSS	48·8
Victoria		92·4	38	13 19	+ 5	23 53	[+ 6]	25 32	PS	42·1
Tucson		92·9	56	e 13 19	+ 3	e 24 0	[+10]	e 17 0	PP	e 40·2
Colombo	E.	93·6	275	13 24	+ 5	22 25	?	—	—	—
Grand Coulee		94·6	39	e 13 24	0	e 23 15	?	—	—	—
Irkutsk		94·9	325	e 13 21	− 4	23 36	[−25]	e 16 56	PP	—
Logan		96·3	47	—	—	e 24 12	[+ 4]	—	—	e 45·4
Kodaikanal	E.	97·1	278	e 13 21	−14	e 24 3	[− 9]	16 53	PP	42·2
Bozeman		98·5	44	—	—	e 24 24	[+ 4]	e 26 42	PS	e 44·2
Hyderabad	N.	98·9	285	e 17 37	PP	24 21	[− 1]	32 2	SS	—
Bombay		104·4	285	e 17 37	PP	e 24 48	[0]	e 33 8	SSP	43·5

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		106·3	111	e 19 13	PP	e 26 37	?	e 28 6	PS	—
La Paz		110·0	119	e 18 34	[+ 1]	26 32	{+27}	i 19 16	PP	e 57·1
St. Louis		110·8	56	e 19 15	PP	e 25 26	[+11]	e 26 21	SKKS	e 51·6
Chicago		113·5	52	—	—	e 36 57	?	—	—	e 46·5
Tashkent		113·5	306	e 14 44	P	e 26 57?	{+27}	e 34 36	SS	—
Samarkand		114·9	304	e 19 31	PP	—	—	—	—	—
Cleveland	E.	117·9	54	e 20 37	PP	i 25 55	[+12]	i 29 58	PS	—
Sverdlovsk		120·2	323	e 15 22	P	29 53	PS	18 52	PKP	—
Ottawa		122·4	49	e 18 56	[− 1]	—	—	(30 6?)	PS	30·1
Seven Falls		125·8	47	—	—	e 28 48	{+55}	—	—	60·1
Baku		128·0	304	e 19 28?	[+20]	—	—	e 21 28	PP	—
Fort de France		130·3	91	e 22 37	PKS	—	—	—	—	—
Bermuda		130·6	66	i 22 38	PKS	e 26 16	[− 5]	e 31 36	PS	e 62·3
Grozny		130·9	308	19 14	[0]	—	—	—	—	—
Scoresby Sund		132·2	6	22 45	PKS	—	—	—	—	—
Leninakan		132·6	305	e 22 46	PKS	—	—	—	—	—
Ivigtut		133·6	25	22 46	PKS	—	—	—	—	—
Helsinki		136·2	337	e 22 53	PKS	e 28 42	{−16}	e 38 12	SS	—
Upsala		138·9	340	e 22 59	PKS	—	—	—	—	e 61·1
Ksara		139·4	294	i 19 32	[+ 3]	34 50	PPS	22 26	PP	—
Bergen	N.	141·6	348	—	—	—	—	e 46 6?	SSS	—
Warsaw		143·1	329	e 25 6?	PPP	—	—	—	—	e 66·1
Helwan	Z.	143·4	289	i 19 33k	[− 3]	23 3	PKS	22 44	PP	—
Istanbul		143·5	308	19 13	[−24]	32 38	PS	—	—	—
Copenhagen		143·9	340	19 34	[− 3]	41 41	SS	i 22 47	PP	65·1
Potsdam		146·4	336	e 19 45	[+ 3]	—	—	e 22 28	PP	—
Budapest		147·0	323	19 43	[0]	—	—	—	—	—
Kalossa	N.	147·6	323	19 48	[+ 4]	—	—	—	—	—
Belgrade		147·7	319	i 19 44	[0]	—	—	—	—	—
Jena	N.	148·1	334	e 19 47	[+ 3]	—	—	—	—	—
De Bilt		149·2	343	i 19 52	[+ 6]	—	—	—	—	e 82·1
Zagreb		149·7	324	e 19 48	[+ 1]	—	—	—	—	—
Stuttgart		150·7	335	i 19 48k	[0]	e 30 6	{−16}	23 22	PKS	e 79·1
Triest		151·0	326	e 19 54	[+ 5]	e 33 55	PSKS	e 42 51	SS	e 67·4
Kew		151·1	349	i 19 49?	[0]	e 44 13?	SS	i 23 33	PP	—
Strasbourg		151·4	337	e 19 50	[0]	e 49 42	SSS	e 23 36	PP	e 66·1
Chur		152·1	333	e 19 56k	[+ 5]	—	—	—	—	—
Zürich		152·1	334	e 19 47	[− 4]	—	—	e 19 55	PKP_3	—
Basle		152·4	335	e 19 52	[+ 1]	—	—	—	—	—
Paris		152·9	344	i 19 51	[− 1]	—	—	i 23 44	PP	e 81·1
Florence		153·6	326	e 19 57	[+ 4]	—	—	—	—	—
Pavia	Z.	153·6	330	e 20 0	[+ 7]	—	—	—	—	—
Rome		154·1	320	i 19 52k	[− 1]	e 43 21	SS	i 23 46	PP	e 71·0
Clermont-Ferrand		155·5	339	19 56	[+ 1]	—	—	—	—	71·1
Alicante		163·3	337	20 34	PKP_3	27 6	[− 1]	24 48	PP	79·6
Lisbon		164·6	358	e 20 6k	[+ 1]	—	—	24 51	PP	—
Almeria		165·3	338	i 20 7	[+ 1]	27 1	[− 8]	24 41	PP	—
Granada		165·4	342	i 20 6a	[0]	32 33	{+53}	20 23	pPKP	89·2
Malaga	Z.	166·0	344	i 20 8a	[+ 1]	i 26 46	[−23]	i 24 40	PP	76·2

Additional readings :—
Auckland i = 5m.1s. and 6m.32s., sS = 7m.1s., SS = 7m.14s.
Brisbane iN = 6m.48s.
Wellington i = 5m.45s., P_cP = 8m.50s., S_cP = 11m.21s., P_cS = 11m.45s.
Christchurch i = 4m.57s.
Riverview iPPPE = 5m.11s., iN = 5m.19s., iSE = 8m.26s., iP_cPN = 8m.40s., iZ = 8m.51s., iSSN = 8m.57s., iN = 9m.21s.
Honolulu eSS = 21m.50s.
Berkeley iN = 12m.58s., iZ = 23m.38s., iE = 23m.44s. and 30m.8s.
Pasadena iZ = 13m.2s.
Calcutta eE = 26m.1s., eSSSE = 35m.31s.
Victoria SS = 31m.0s.
Tucson e = 13m.24s., 13m.43s., and 19m.40s., iPS = 25m.43s., iPPS = 26m.45s., eSS = 31m.39s., iSSS = 35m.12s.
Irkutak S_cS = 24m.36s., SS = 31m.0s.
Kodaikanal eE = 29m.28s.
Bozeman e = 30m.7s.

Continued on next page.

Bombay eE =18m.37s.
Huancayo ePPS =29m.8s., eSS =33m.55s.
La Paz iPSEN =28m.48s., iPPSEN =29m.56s., iSSN =34m.58s.
St. Louis e =24m.20s., iPS =28m.46s., iPPS =29m.51s.
Cleveland iE =28m.32s.
Sverdlovsk iPP =20m.8s., PPS =31m.18s., SS =36m.36s.
Bermuda i =41m.23s., eSS? =42m.36s., e =45m.33s., eSSS =48m.0s.
Helsinki e =29m.32s., 31m.14s., 40m.4s., 44m.42s., and 45m.15s.
Helwan iN =41m.25s.
Copenhagen 23m.26s.
Budapest 20m.8s.
Belgrade e =20m.32s. and 21m.26s.
Stuttgart iZ =19m.53s., iPKPZ =19m.58s., ePSKS =34m.30s.
Kew iPKP?NZ =18m.55s., iPKKP?NZ =26m.58s., ePPP?Z =27m.37s.
Strasbourg ePKP =20m.14s.
Zürich e =21m.36s.
Paris iPKP =19m.56s., iPKP$_2$ =20m.16s., i =20m.36s. and 26m.22s., iPPP? =27m.4s.
Rome eN =19m.57s., iZ =20m.14s. and 20m.53s., ePPN =23m.49s., eN =29m.50s., eZ =30m.5s. and 33m.30s., eN =49m.5s.?
Alicante PKP$_2$ =21m.18s., i =24m.0s., PPP =28m.38s., PKKKS =31m.54s., PPS = 38m.54s., SSP =45m.46s., SSS =51m.26s., Q =70m.12s.
Almeria PKP$_2$ =21m.3s., PKS =23m.27s., PPP =28m.36s., SKKS =31m.17s., SKSP = 35m.3s., PPS =38m.18s., SS =45m.10s., SSS =51m.35s.
Granada PKP$_2$ =21m.4s., iPP =24m.48s., pPP =25m.14s., sPP =25m.49s., PPP = 28m.54s., pPPP =29m.57s., SKSP =35m.21s., iSS =46m.33s.
Malaga iPKP$_2$Z =21m.8s., PPPZ =28m.38s., PPSZ =38m.32s., SSZ =45m.2s., QZ = 68m.22s.
Long waves were also recorded at Butte.

Nov. 12d. Readings also at 0h. (Berkeley and Tucson (2)), 1h. (Berkeley, Tucson (2), Fresno, Salt Lake City, Cleveland, and Philadelphia), 2h. (La Paz, Bogota, Chicago, Berkeley, Salt Lake City, Philadelphia, and near Tucson (3)), 4h. (La Paz), 6h. (near Kulyab and near Lick), 7h. (La Paz, Santa Lucia, and near Lick), 8h. (La Paz), 10h. (Collmberg), 13h. (Branner, near Berkeley, and Lick), 14h. (Stuttgart (2), Basle, Chur, near Zürich, near Berkeley, near Almata, Andijan, Frunse, Kulyab, Samarkand, Tashkent, and Tchimkent), 15h. (Stuttgart), 16h. (Triest), 17h. (Brisbane and Pierce Ferry), 18h. (near Lick), 21h. (Branner, Berkeley, near Fresno, and near Lick (2)), 22h. (Mount Wilson, Pasadena, Palomar, Tucson, Shasta Dam, and Riverview), 23h. (Shasta Dam, Wellington, Auckland, and Riverview (2)).

Nov. 13d. 2h. 44m. 42s. Epicentre 33°·3N. 58°·7E.
(as on 1947, Oct. 6d., and forerunner of larger shock at 3h.).

A = +·4351, B = +·7156, C = +·5464 ; δ = −5 ; h = +1 ;
D = +·854, E = −·520 ; G = +·284, H = +·467, K = −·838.

	Δ	Az.	P.	O−C.	S.	O−C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Ashkabad	4·7	357	e 1 13	− 1	i 2 20	+10	—
Samarkand	9·2	44	e 2 20	+ 4	—	—	—
Stalinabad	9·7	54	i 2 21	− 1	—	—	—
Kulyab	10·1	60	i 2 31	+ 3	—	—	—
Obi-garm	10·4	56	e 2 35	+ 1	i 5 56	L	(i 5·9)
Tashkent	11·6	43	e 3 14	+24	—	—	—
Andijan	13·2	52	e 3 6	− 5	—	—	—
Grozny	14·2	319	e 3 50	+26	—	—	—
Ksara	19·0	276	e 4 50	+24	e 8 34	+39	—

Long waves were also recorded at Helwan.

Nov. 13d. 3h. 26m. 23s. Epicentre 33°·3N. 58°·7E. (as at 2h.).

A = +·4351, B = +·7156, C = +·5464; δ = −5; h = +1;
D = +·854, E = −·520; G = +·284, H = +·467, K = −·838.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ashkabad		4·7	357	e 1 14	0	2 21	+11	—	—	—
Samarkand		9·2	44	i 2 15	− 1	—	—	—	—	—
Stalinabad		9·7	54	i 2 22	0	—	—	—	—	—
Baku		10·0	318	2 33	+ 6	—	—	—	—	—
Kulyab		10·1	60	i 2 30	+ 2	—	—	—	—	—
Obi-garm		10·4	56	i 2 34	0	i 4 25	− 7	—	—	—
Tashkent		11·6	43	e 2 43	− 7	e 4 55	− 6	—	—	—
Tchimkent		12·4	41	i 2 57	− 4	—	—	—	—	—
Andijan		13·2	52	e 3 5	− 6	—	—	—	—	—
Erevan		13·3	305	e 3 22	+ 9	—	—	—	—	—
Leninakan		14·0	307	e 3 27	+ 5	—	—	—	—	—
Grozny		14·2	319	3 27	+ 3	—	—	—	—	—
Frunse		15·7	48	e 3 44	0	—	—	—	—	—
Dehra Dun	N.	16·7	95	—	—	e 7 25	+22	—	—	e 9·3
Almata		17·4	50	(e 4 5)	− 1	—	—	—	—	—
Ksara		19·0	276	e 4 32	+ 6	e 8 14	+19	8 57	SS	—
Bombay	E.	19·1	134	e 4 34	+ 7	e 8 17	+20	—	—	10·8
Theodosia		21·5	310	e 4 52	0	e 8 52	+ 5	—	—	—
Helwan		23·5	268	i 5 18a	+ 6	e 9 42	+19	5 52	PP	i 13·0
Sverdlovsk		23·6	3	5 13	0	i 9 26	+ 1	—	—	—
Istanbul		24·8	297	5 7	−18	9 34	−12	—	—	—
Colombo	E.	32·8	138	14 1	SS	—	—	—	—	—
Warsaw		33·0	316	e 6 40	+ 1	e 12 0	+ 3	e 7 47	PP	e 20·6
Triest		36·4	304	e 7 22	+14	e 12 55	+ 5	i 8 46	PPP	—
Prague		36·5	311	e 9 20	?	—	—	—	—	—
Rome		37·2	297	e 7 18	+ 3	e 15 54	SS	—	—	e 20·4
Upsala		37·8	327	e 8 44	PP	e 13 9	− 2	e 15 37	SS	e 21·1
Stuttgart		39·7	307	e 7 37	+ 1	—	—	—	—	e 22·6
Strasbourg		40·6	308	e 8 7	+24	—	—	—	—	23·3
Bergen		43·8	326	e 8 39	+30	e 15 23	+43	e 10 15	PPP	e 23·6
Malaga	Z.	51·0	294	i 9 5a	− 1	i 11 48	PPP	e 14 22	P_cS	—

Additional readings and note :—
Almata P is given 2m. early in error.
Bombay eSN = 8m.24s.
Helwan P_cPN = 9m.55s., SSZ = 10m.46s.
Warsaw eE = 9m.52s., eSE = 12m.8s., eP_cSE = 12m.37s., eE = 13m.23s., SSE = 14m.23s., SSSN = 14m.54s., SSSE = 15m.3s., eN = 15m.25s., eE = 15m.55s., eN = 16m.3s., eS_cS?E = 16m.41s., eS_cSN = 16m.55s., eE = 17m.19s.
Triest iSSS? = 15m.34s.
Rome eZ = 7m.58s. and 10m.26s., eEN = 16m.14s.?
Upsala eN = 13m.9s., eSSN = 19m.16s.
Stuttgart eZ = 7m.56s.
Malaga Z = 13m.24s., iS_cPZ = 17m.44s., eS_cSZ = 21m.30s.
Long waves were also recorded at other European stations.

Nov. 13d. Readings also at 0h. (Stuttgart and near Malaga), 1h. (Berkeley, Samarkand, near Andijan, Kulyab, and Obi-garm), 3h. (Palomar, Tucson, and Shasta Dam), 4h. (Berkeley and La Paz), 5h. (Collmberg), 9h. (La Paz and Strasbourg), 10h. (Ksara), 11h. (Brisbane, Riverview, Arapuni, Wellington, La Jolla, Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Strasbourg, Stuttgart, Clermont-Ferrand, Basle, Rome, and Ksara), 12h. (near Stalinabad (5)), 13h. (Andijan, Ashkabad, near Frunse, Kulyab, Obi-garm, Samarkand, Stalinabad, Tashkent, and Tchimkent), 14h. (Riverview and Kirkland Lake), 15h. and 16h. (near Alicante), 19h. (Brisbane, Riverview, Wellington, Auckland, near Andijan, Obi-garm, Kulyab, Samarkand, Stalinabad, and Tchimkent), 20h. (Stuttgart, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Grand Coulee), 21h. (Ksara), 23h. (Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, La Paz, and near Montezuma).

Nov. 14d. 5h. 7m. 43s. Epicentre 24°·3N. 122°·3E. (as on 1947, August 17d.).

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		8·3	339	e 2 4	0	i 4 34	+54	i 4 37	S_g	—
Vladivostok		20·4	22	e 4 45	+ 4	i 8 36	+11	—	—	—
Irkutsk		31·1	338	e 6 30	+ 8	e 11 28	0	—	—	—
Hyderabad	N.	41·4	269	—	—	e 14 1	− 4	17 17	SSS	21·3
Almata		41·6	309	e 7 57	+ 6	—	—	—	—	—
Andijan		44·6	304	e 8 19	+ 3	—	—	—	—	—
Bombay		46·1	274	e 8 26	− 2	e 15 11	− 3	—	—	—
Kulyab		46·4	299	i 8 30	0	e 15 18	0	—	—	—
Tashkent		46·9	305	e 8 33	− 1	e 15 21	− 4	—	—	—
Stalinabad		47·2	301	i 8 37	+ 1	i 15 29	0	—	—	—
Samarkand		48·6	302	e 8 48	+ 1	—	—	—	—	—
Sverdlovsk		54·6	324	i 9 33	+ 1	e 17 13	+ 2	—	—	—
Baku		61·6	305	e 10 28	+ 6	e 18 48	+ 5	—	—	—
Riverview		64·0	153	—	—	i 19 5	− 8	—	—	e 35·2
Grozny		64·2	308	e 10 39	0	—	—	—	—	—
Moscow		67·4	323	—	—	e 19 51	− 4	—	—	—
Ksara		74·1	300	i 11 39	− 1	e 21 46	PS	—	—	—
Istanbul		76·8	309	i 11 43	−12	21 41	− 1	—	—	—
Helwan	z.	79·1	298	i 12 6k	− 2	—	—	e 12 32	?	—
Triest		85·0	319	e 12 47	+ 9	—	—	—	—	—
Stuttgart		86·0	322	e 12 43a	0	—	—	—	—	e 47·3
Strasbourg		86·9	323	e 12 47	− 1	—	—	—	—	e 45·3
Rome	z.	87·6	316	e 12 50	− 1	e 23 37	+ 5	—	—	—
Paris		89·6	325	e 12 57	− 4	—	—	i 13 2	P	e 56·3
Clermont-Ferrand		91·1	322	e 13 8	0	—	—	—	—	50·3
Shasta Dam		91·8	44	e 13 12	+ 1	—	—	—	—	—
Boulder City		99·3	44	e 13 47	+ 2	—	—	e 18 49	?	—
Pierce Ferry		99·8	43	e 13 52	+ 5	—	—	e 17 44	PP	—

Paris also gives i = 13m.10s. and e = 13m.42s.
Long waves were also recorded at other American and European stations.

Nov. 14d. 10h. 50m. 18s. Epicentre 43°·9N. 143°·2E. Depth of focus 0·020.

Intensity V at Kushiro and Urakawa; IV at Hakodate and Miyako; II-III at Sapporo, Nemuro, Morioka, and Mizusawa. Epicentre 41°·7N. 145°·7E. Macroseismic radius 300km. Shallow.

The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1947, Tokyo, 1950, pp. 42-43, macroseismic chart p. 42.

$A = -·5788$, $B = +·4330$, $C = +·6909$; $\delta = -16$; $h = -3$;
$D = +·599$, $E = +·801$; $G = -·553$, $H = +·414$, $K = -·723$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nemuro	1·8	109	0 39k	+ 5	1 5	+ 5	—	—	—
Hatinohe	3·6	201	0 58a	+ 2	1 41	+ 2	—	—	—
Miyako	4·4	193	1 6a	0	1 54	− 4	—	—	—
Morioka	4·5	201	1 10a	+ 2	2 0	0	—	—	—
Akita	4·8	210	1 10	− 2	2 5	− 2	—	—	—
Mizusawa	5·0	199	1 19	+ 5	2 32	+20	—	—	—
Sendai	5·9	198	1 27a	+ 1	2 31	− 2	—	—	—
Hukusima	6·5	200	1 34	0	2 52	+ 4	—	—	—
Aikawa	7·0	214	1 42a	+ 1	2 56	− 4	—	—	—
Mito	7·8	197	1 50	− 2	—	—	—	—	—
Kakioka	8·0	198	1 53a	− 1	3 19	− 5	—	—	—
Tukubasan	8·1	199	1 46	−10	3 13	−13	—	—	—
Wazima	8·1	219	1 57a	+ 1	3 30	+ 4	—	—	—
Maebasi	8·2	204	1 50	− 7	3 13	−15	—	—	—
Nagano	8·2	210	1 52a	− 5	3 20	− 8	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vladivostok		8·3	266	i 1 59	+ 1	i 3 30	− 1	—	—	—
Kumagaya		8·3	202	2 0	+ 2	—	—	—	—	—
Toyama		8·6	215	1 56a	− 6	3 27	−11	—	—	—
Yokohama		8·9	199	2 9	+ 3	—	—	—	—	—
Hunatu		9·1	204	2 9	0	3 43	− 7	—	—	—
Shizuoka		9·7	204	2 16	− 1	4 19	+15	—	—	—
Gihu		9·9	213	2 19	0	3 45	−24	—	—	—
Nagoya		10·0	211	2 22	+ 1	4 6	− 5	—	—	—
Omaesaki		10·1	204	2 19	− 3	—	—	—	—	—
Kameyama		10·5	213	2 28	+ 1	—	—	—	—	—
Toyooka		10·6	221	2 29	+ 1	4 11	−14	—	—	—
Kyoto		10·6	216	2 26	− 2	4 16	− 9	—	—	—
Kobe		11·1	217	2 34	− 1	—	—	—	—	—
Sumoto		11·5	217	2 35	− 5	4 23	−23	—	—	—
Siomisaki		12·0	212	2 44	− 3	4 56	− 2	—	—	—
Hamada		12·5	227	2 57	+ 4	5 11	+ 2	—	—	—
Kôti		12·8	219	2 46	−11	—	—	—	—	—
Hukuoka		14·3	228	3 21a	+ 5	5 50	− 1	—	—	—
Ituhara		14·5	233	3 22	+ 3	5 52	− 3	—	—	—
Kumamoto		14·8	226	3 24	+ 2	—	—	—	—	—
Miyazaki		15·1	222	3 37	+11	6 12	+ 3	—	—	—
Nanking		22·5	248	i 4 45	− 1	—	—	—	—	—
Irkutsk		27·0	303	5 28	− 1	i 9 52	− 1	—	—	—
College		42·7	36	—	—	e 13 53	0	—	—	e 18·3
Almata		46·8	295	i 8 15	0	14 50	− 2	—	—	—
Calcutta	E.	49·6	264	e 8 40	+ 4	—	—	i 13 3	?	—
Andijan		51·0	293	8 48	+ 1	e 15 52	+ 1	—	—	—
Sverdlovsk		51·1	316	i 8 47	− 1	i 15 48	− 4	17 14	sS	—
Tchimkent		52·1	297	i 9 24	pP	16 2	− 4	—	—	—
Tashkent		52·7	296	8 59	− 1	i 16 8	− 6	e 17 27	sS	—
Kulyab		54·1	291	i 9 15?	+ 5	i 16 35?	+ 2	—	—	—
Stalinabad		54·5	293	i 9 12	− 1	i 16 33	− 5	i 17 53	sS	—
Samarkand		55·1	295	i 9 16	− 2	i 16 42	− 4	—	—	—
Hyderabad		60·0	267	9 51	− 1	17 50	0	12 3	PP	—
Ashkabad		61·7	297	e 10 3	0	—	—	—	—	—
Moscow		62·6	323	—	—	i 18 17	− 6	i 19 41	sS	—
Bombay		63·1	272	e 10 11	− 2	e 18 26	− 3	e 18 20	S	—
Grand Coulee		63·6	48	i 10 15	− 1	e 18 38	+ 3	e 11 3	pP	—
Helsinki		64·7	332	e 10 28?	+ 5	e 18 44	− 5	e 11 17	pP	—
Scoresby Sund		65·4	355	e 10 26	− 2	e 18 57	0	—	—	—
Baku		65·7	304	—	—	e 19 2	+ 1	—	—	—
Shasta Dam		66·0	56	i 10 32	+ 1	e 19 8	+ 3	i 11 16	pP	—
Colombo	E.	66·1	256	10 33	+ 1	(20 1)	PS	—	—	20·0
Grozny		66·2	308	10 33	0	19 5	− 2	—	—	—
Upsala		67·4	334	e 11 52	+72	i 19 19	− 2	e 24 16	SS	e 33·7
Berkeley		67·8	58	i 10 43	0	i 20 21	+55	i 11 27	pP	—
Erevan		68·9	306	10 45	− 4	—	—	—	—	—
Leninakan		68·9	308	e 10 53	+ 4	e 19 43?	+ 4	—	—	—
Fresno		70·1	58	i 10 57	0	i 19 58	+ 5	—	—	—
Bergen		70·5	340	11 2	+ 3	e 19 44	−14	—	—	—
Tinemaha		70·8	57	i 11 2a	+ 1	—	—	i 11 49	pP	—
Santa Barbara	Z.	71·6	60	i 11 7	+ 1	—	—	i 11 52	pP	—
Haiwee		71·6	57	i 11 6	0	e 20 11	+ 1	i 12 0	pP	—
Warsaw		72·1	327	e 10 40	−29	i 20 14	− 2	e 24 50	SS	e 28·7
Copenhagen		72·4	334	—	—	i 20 18	− 1	21 0	PS	33·7
Pasadena		72·8	59	i 11 13a	0	i 20 26	+ 2	i 11 58	pP	—
Mount Wilson		72·8	59	i 11 13a	0	—	—	i 11 59	pP	—
Riverside	Z.	73·4	59	i 11 16a	0	—	—	i 12 0	pP	—
Boulder City		73·6	56	i 11 19	+ 2	—	—	i 12 6	pP	—
Pierce Ferry		74·0	55	i 11 21	+ 1	—	—	i 12 6	pP	—
Palomar		74·1	59	i 11 21a	+ 1	e 20 42	+ 4	i 12 8	pP	—
La Jolla	Z.	74·2	60	e 11 22	+ 1	—	—	e 12 8	pP	—
Potsdam		74·9	332	—	—	i 20 53	+ 6	i 21 28	PS	e 38·7
Ivigtut		74·9	6	—	—	20 45	− 2	—	—	—
Collmberg	Z.	75·8	331	i 12 32	+62	—	—	i 13 1	?	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Prague	76·3	329	—	—	e 20 58	− 5	e 21 33	PS	—
Budapest	76·5	325	e 12 57	?	e 21 6	+ 1	e 14 12	PP	e 38·7
Istanbul	76·8	315	e 11 32	− 4	i 21 7	− 1	—	—	—
Cheb	77·1	330	—	—	e 21 10	− 1	e 34 42?	Q	e 40·7
De Bilt	77·7	336	—	—	i 21 19	+ 1	—	—	e 30·7
Riverview	77·7	173	i 12 49k	pP	i 21 19	+ 1	i 22 50	sS	e 34·8
Belgrade	78·0	322	e 13 9	+87	e 21 24	+ 3	e 21 40	?	43·7
Ksara	78·2	306	e 11 45	+ 2	21 29	+ 6	12 51	pP	—
Tucson	78·6	56	i 11 46a	+ 1	e 21 33	+ 6	i 12 32	pP	e 29·2
Uccle	79·1	336	e 11 30	−18	e 21 29	− 3	—	—	e 37·7
Stuttgart	79·3	331	e 11 49	0	e 21 27	− 8	e 12 36	pP	e 41·7
Strasbourg	79·9	332	i 11 53	+ 1	i 21 41	0	e 12 46	pP	e 38·9
Kew	79·9	338	—	—	e 21 36	− 5	e 26 50	SS	e 40·7
Triest	80·2	327	e 13 23	sP	e 21 39	− 5	e 22 22	sS	—
Zürich	80·7	331	e 11 56k	− 1	e 21 40	− 9	e 13 0	pP	—
Kirkland Lake	80·8	28	i 11 59	+ 2	—	—	—	—	—
Basle	80·9	331	e 11 57	− 1	—	—	—	—	—
Paris	81·4	335	i 12 0	0	i 21 57	+ 1	i 12 48	pP	—
Temiskaming	82·4	28	i 12 5	0	—	—	—	—	—
Florence	82·7	327	i 12 30	+23	i 22 8	− 1	—	—	—
Rome	83·8	326	e 14 4	?	i 22 18	− 2	e 27 24	SS	e 32·3
Helwan	83·8	306	i 12 12a	0	i 22 24	+ 4	13 2	pP	—
Clermont-Ferrand	84·0	333	e 12 14	+ 1	e 22 20	− 2	—	—	33·2
St. Louis	84·7	40	i 12 19	+ 2	i 22 25	− 4	i 13 5	pP	—
Cleveland	86·0	33	i 12 34a	+11	e 22 42	0	i 13 12	pP	—
Alicante	91·8	333	15 40	PP	i 24 20	SP	—	—	e 44·5
Almeria	93·8	334	e 13 35	+35	23 59	+ 7	30 57	SS	45·7
Huancayo	134·1	59	e 22 14	PKS	—	—	e 23 22	?	—
La Paz	141·9	53	e 19 0	[−13]	29 0	SKKS	40 58	SS	—

Additional readings :—
Sverdlovsk sP =10m.4s.
Tashkent sP =10m.4s.
Helsinki epS =19m.53s., e =26m.0s.
Shasta Dam i =11m.22s., esS =20m.9s.
Berkeley iSN =20m.29s.
Upsala SN =19m.14s., eS_cS? =20m.10s., eSSS?E =26m.19s., eSSSN =26m.42s.?
Fresno iN =12m.9s.
Warsaw SN =20m.10s., ePSE =20m.47s., PPSEN =20m.59s., eN =21m.28s., eE = 21m.50s. and 23m.26s., eSSE =24m.53s., eE =26m.5s., eN =26m.23s., eSSSE = 27m.41s.
Copenhagen 25m.12s.
Pasadena iZ =12m.18s. and 12m.36s., eZ =13m.2s., eSS?N =31m.34s.
Palomar iZ =12m.27s. and 14m.6s., iN =21m.22s.
Budapest eE =21m.9s.
Riverview ipPPZ =15m.38s., ePSE =22m.30s., eN =23m.16s., eSSN =26m.22s.
Tucson i =11m.55s. and 12m.9s., epPP? =15m.28s., eS =20m.48s., e =23m.35s., eSS? = 25m.20s.
Stuttgart e =21m.52s., esS =22m.50s., e =32m.30s.
Strasbourg eS =21m.33s., esS? =23m.14s., eSS =26m.54s., eSSS =31m.0s., e =32m.18s.
Triest iPP =15m.7s., eSSS =31m.47s.
Paris i =12m.13s., isP =13m.12s., iS =22m.0s., i =22m.30s., iSP =22m.42s., i =23m.17s., esS =23m.24s., iPPS =23m.50s., iSS =27m.6s.
Rome eSN =22m.21s., ePSN =22m.42s.
Helwan iZ =15m.27s., PPZ =15m.42s., sSN =23m.44s.
St. Louis eS =22m.21s., i =23m.35s., esS =23m.47s., i =24m.1s.
Cleveland iPPZ =15m.45s., iSE =22m.30s., esSKSE =23m.35s., isSKSN =23m.38s.
Almeria PP =17m.19s., PPP =19m.23s., S =24m.39s., SSS =34m.35s.
La Paz i =20m.15s.

Nov. 14d. 14h.

J. P. Rothé and E. Peterschmitt.
Etude séismique des Explosions de Haslach. Annales de l'Institut de Physique du Globe, Géophysique, t. V., pp. 13-36. Geological maps.
Large explosion near Haslach (Baden, Germany) 48°15′8N. 8°6′9E. T_0 =14h.13m.16·8s.

Strasbourg (0°·4) iP_g =13m.24s., iS_g =13m.30s.
Basle (0°·8) eP_g =13m.32s., eS_g =13m.44s.
Stuttgart (0°·9) eP =13m.33s., iP_g =13m.34s.k, eS =13m.44s., iS_g =13m.47s.
Zürich (1°·0) eP =13m.34s., eS_g =13m.48s.
Neuchatel (1°·5) eP =13m.42s., eP_g =13m.45s., eS_g =14m.5s.
Chur (1°·7) eP =13m.47s., e =13m.54s., eS_g =14m.12s.
Paris (3°·8) eP =14m.16s., eP_g =14m,36s., eS =15m,5s., S_g =15m,25s.

Nov. 14d. Readings also at 0h. (Mount Wilson, Palomar, Riverside, Haiwee, Tinemaha, Boulder City, Grand Coulee, Shasta Dam, Tucson, Andijan, Samarkand, near Kulyab, Obi-garm, and Stalinabad), 4h. (Samarkand, Tchimkent, near Andijan, Kulyab, and Stalinabad), 5h. (near Bogota), 6h. (Balboa Heights), 10h. (near Kulyab), 13h. (Stuttgart, Triest, near Rome, and Florence), 16h. (Rome, near Kulyab, Obi-garm, and Stalinabad), 17h. (Samarkand and Tchimkent), 19h. (Belgrade), 20h. (Mount Wilson, Riverside, Tinemaha, Boulder City, Pierce Ferry, and Tucson), 21h. (Santa Lucia), 22h. (La Paz), 23h. (near Mineral).

Nov. 15d. 7h. South Pacific.

Brisbane iPN = 14m.22s., iE = 15m.9s., iSN = 18m.25s.
Wellington PZ = 15m.42s., S = 19m.16s., LZ = 21m.
Auckland P = 15m.44s., S = 19m.15s., S_cS = 27m.55s.
Riverview iPEZ = 16m.0s.a, eSN = 19m.41s., iE = 19m.47s., iEN = 20m.0s., eLN = 20·6m.
Arapuni S? = 18m.36s.
Shasta Dam iP = 22m.44s., epP = 23m.6s., e = 24m.23s., i = 24m.30s.
Mount Wilson iPZ = 22m.52s., ipPZ = 23m.15s.
Pasadena ePZ = 22m.52s., ipPZ = 23m.15s., eZ = 24m.22s.
Riverside iPZ = 22m.54s., ipPZ = 23m.16s., eZ = 24m.20s.
Palomar iPZ = 22m.56s., ipPZ = 23m.19s., iZ = 24m.25s.
Tinemaha ePZ = 23m.1s., eZ = 24m.33s.
Boulder City iP = 23m.7s., i = 23m.30s.
Pierce Ferry iP = 23m.10s., i = 23m.33s.
Tucson eP? = 24m.45s., e = 24m.49s.
Ksara e? = 30m.54s., e = 33m.46s.
Stuttgart ePKPZ = 31m.15s., eZ = 31m.24s.

Nov. 15d. 20h. 22m. 12s. Epicentre 53°·6N. 164°·4W. (as on 1946, Nov. 12d.).

$A = -·5741$, $B = -·1603$, $C = +·8030$; $\delta = +10$; $h = -7$;
$D = -·269$, $E = +·963$; $G = -·773$, $H = -·216$, $K = -·596$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		14·1	30	e 3 23	0	e 6 5	+ 3	—	—	e 7·6
Sitka		16·8	66	(e 3 55)	− 3	e 3 55	P	—	—	e 10·5
Grand Coulee		28·9	82	e 6 0	− 3	—	—	—	—	—
Shasta Dam		30·9	97	i 6 19	− 1	—	—	—	—	—
Hungry Horse		31·6	77	i 6 25	− 1	—	—	—	—	—
Tinemaha		35·7	98	i 7 2	0	—	—	—	—	—
Haiwee	z.	36·5	98	e 7 9	0	—	—	—	—	—
Santa Barbara	z.	36·6	101	i 7 10	0	—	—	—	—	—
Mount Wilson	z.	37·8	100	i 7 20k	0	—	—	—	—	—
Pasadena	z.	37·8	100	i 7 19k	− 1	—	—	—	—	—
Riverside		38·3	100	i 7 22k	− 2	—	—	—	—	—
Boulder City		38·5	96	i 7 25	− 1	—	—	—	—	—
Pierce Ferry		38·8	95	i 8 28	+60	—	—	—	—	—
Palomar		39·1	100	i 7 31	0	—	—	—	—	—
La Jolla		39·2	101	e 7 30	− 1	—	—	—	—	—
Vladivostok		42·2	282	i 8 28	+32	—	—	—	—	—
Tucson		43·4	96	i 8 5k	− 1	—	—	—	—	—
Kirkland Lake		50·5	60	e 9 0	− 2	—	—	—	—	—
St. Louis		51·2	75	i 9 4	− 3	i 16 18	− 7	i 9 11	pP	—
Temiskaming		52·0	60	e 9 18	+ 5	—	—	—	—	—
Sverdlovsk		63·9	334	10 37	0	—	—	—	—	—
Copenhagen		71·0	3	11 22	0	—	—	—	—	—
Paris		77·4	10	i 11 58	0	—	—	—	—	e 48·8
Stalinabad		77·4	320	i 12 1	+ 3	20 51	−58	—	—	—
Stuttgart	z.	77·9	5	e 12 1	0	—	—	—	—	—
Strasbourg		78·0	6	i 12 3	+ 1	—	—	—	—	e 45·8
Basle		79·0	6	e 12 15	+ 8	—	—	—	—	—
Zürich		79·2	6	e 12 9k	+ 1	—	—	—	—	—
Grozny		80·1	338	e 12 18	+ 5	—	—	—	—	—
Clermont-Ferrand		80·4	10	e 12 17	+ 2	—	—	—	—	—
Leninakan		82·9	339	e 12 43	+15	—	—	—	—	—
Ksara		91·2	345	e 12 56	−12	e 24 8	+ 5	—	—	—

For Notes see next page.

NOTES TO NOVEMBER 15d. 20h. 22m. 12s.

Additional readings :—
College eS =7m.24s.
Tinemaha i =7m.11s.
Santa Barbara iZ =7m.18s.
Mount Wilson iZ =7m.28s.
Pasadena iZ =7m.27s.
Palomar iZ =7m.43s. and 8m.2s.
Tucson i =8m.15s.
Paris i =12m.13s. and 12m.30s.
Stalinabad e =12m.19s.
Long waves were also recorded at Berkeley, Bombay, and Helsinki.

Nov. 15d. 23h. 4m. 36s. Epicentre 24°·7N. 123°·2E. (as on 1947, Sept. 26d.).
A = −·4981, B = +·7611, C = +·4155 ; δ = +2 ; h = +3 ;
D = +·837, E = +·547 ; G = −·227, H = +·348, K = −·910.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		8·3	332	e 2 47	P_g	4 38	S_g	—	—	5·2
Vladivostok		19·7	19	e 4 37	+ 3	i 8 23	+13	—	—	—
Irkutsk		31·1	337	e 6 24	+ 2	e 11 24?	− 4	—	—	—
Calcutta	E.	32·0	273	e 10 10	?	e 14 37	?	—	—	17·0
Hyderabad	N.	42·2	269	e 7 56	0	e 14 20	+ 3	17 45	SS	—
Andijan		45·0	304	e 8 31	+12	—	—	—	—	—
Kodaikanal	E.	45·7	261	e 8 39	+15	—	—	—	—	—
Bombay		46·9	273	e 8 15	−19	e 15 25	0	—	—	—
Kulyab		46·9	299	i 8 42	+ 8	—	—	—	—	—
Tashkent		47·4	305	8 41	+ 3	—	—	—	—	—
Stalinabad		47·7	301	i 8 37	− 3	—	—	—	—	—
Samarkand		49·1	302	e 9 0	+ 9	—	—	—	—	—
Sverdlovsk		54·7	323	9 29	− 4	e 17 10	− 3	—	—	—
Ashkabad		55·9	300	e 9 40	− 2	—	—	—	—	—
Moscow		67·5	323	e 10 58	− 2	e 19 52	− 4	—	—	—
Ksara		74·6	300	e 11 42	− 1	e 22 6	+48	—	—	—
Upsala		76·4	330	—	—	e 25 16	?	e 30 53	SSS	e 38·4
Istanbul		77·2	309	e 11 52?	− 5	e 21 42	− 5	—	—	—
Warsaw		77·9	322	e 12 33	+32	e 22 5	+11	—	—	e 41·4
Helwan	N.	79·6	297	—	—	e 22 12	0	—	—	—
Stuttgart		86·2	323	e 12 41	− 3	—	—	—	—	e 46·4
Chur		87·0	321	e 12 46	− 2	—	—	—	—	—
Strasbourg		87·1	323	e 12 47	− 2	—	—	—	—	—
Zürich		87·3	322	e 12 44	− 6	—	—	—	—	—
Uccle		87·6	326	e 12 49	− 2	—	—	—	—	e 45·4
Basle		87·8	322	e 12 49k	− 3	—	—	—	—	—
Rome		87·9	316	—	—	e 23 28	− 7	e 35 26	Q	—
Grand Coulee		88·7	36	i 12 55	− 2	—	—	—	—	—
Paris		89·7	325	i 12 59	− 2	—	—	—	—	e 48·4
Shasta Dam		90·9	44	e 13 4	− 3	—	—	—	—	—
Hungry Horse		91·1	34	i 13 8	0	e 24 8	+ 4	—	—	—
Clermont-Ferrand		91·3	323	e 13 9	0	—	—	—	—	50·4
Tinemaha	z.	95·6	45	i 13 27	− 1	—	—	—	—	—
Haiwee	z.	96·4	45	e 13 30	− 2	—	—	—	—	—
Pasadena	z.	97·4	47	e 13 37	0	—	—	—	—	—
Mount Wilson	z.	97·5	47	e 13 35	− 2	—	—	—	—	—
Palomar	z.	98·8	47	e 13 43	0	—	—	—	—	—
La Paz		166·6	54	i 20 4	[− 3]	—	—	—	—	74·4

Additional readings :—
Nanking eSE =4m.42s.
Bombay eN =15m.30s.
Warsaw eE =31m.33s.
Shasta Dam e =13m.18s.
Hungry Horse e =24m.35s.
Long waves were also recorded at Riverview, Wellington, and at other European stations.

Nov. 15d. Readings also at 0h. (Kirkland Lake), 4h. (Balboa Heights), 5h. (La Paz), 6h. (Auckland and Wellington), 7h. (Stuttgart), 10h. (Palomar and Tucson), 11h. (Huancayo), 15h. (Pierce Ferry), 17h. (Huancayo (2), La Paz, Bogota, Mount Wilson, Pasadena, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Stuttgart, and Ksara), 18h. (Istanbul), 19h. (Kirkland Lake), 22h. (Shasta Dam, Branner, Santa Clara, near Berkeley, Lick, San Francisco, and Mineral), 23h. (Istanbul).

Nov. 16d. 17h. Southern Pacific Ocean.

Apia eEN =37m.30s.
Wellington eZ =40m., LZ =46m.
Mount Wilson iPZ =47m.26s.a
Pasadena iP =47m.26s.
Palomar iP =47m.29s.a, iZ =47m.42s.
Riverside iPZ =47m.29s.a
Fresno ePZ =47m.30s.
Haiwee ePEN =47m.34s.
Shasta Dam eP =47m.34s.
Tinemaha iP =47m.37s.k
Boulder City iP =47m.44s.
Pierce Ferry iP =47m.48s., i =48m.38s.
Tucson iP =47m.49s.a, e =48m.35s.
Grand Coulee eP =48m.9s.
Brisbane eEN =49m.0s.
Stuttgart ePZ =50m.44s., eP =50m.49s., eS?Z =55m.30s., eQ? =56·5m.
Belgrade ePKP =51m.10s., i =51m.56s., e =52m.37s. and 59m.14s.
Paris i =51m.31s., iPKP =55m.32s., i =55m.42s., 56m.27s., and 56m.40s.
Triest e =51m.41s.
Copenhagen P =55m.11s.
Ksara ePKP =55m.26s., PP =59m.10s.
Strasbourg ePKP =55m.31s., i =55m.43s.
Long waves were recorded at Auckland, Arapuni, Riverview, La Paz, Huancayo, and Berkeley.

Nov. 16d. Readings also at 1h. (Nanking, Bombay, Calcutta, Ksara, Stuttgart, Hungry Horse, and Shasta Dam), 2h. (Copenhagen, Helsinki, Warsaw, Cheb, De Bilt, Kew, Triest, Rome, and Granada), 5h. (Bombay, La Paz, and Bogota), 6h. (Riverview, Auckland, and Wellington), 7h. (near Mizusawa), 8h. (Stalinabad, near Kulyab and Obi-garm), 10h. (Calcutta), 11h. (Temiskaming, La Paz, Tucson, near Balboa Heights and near Bogota), 12h. (Kirkland Lake, Pasadena, Palomar, Riverside, Tinemaha, Shasta Dam, Pierce Ferry, Boulder City, and Hungry Horse), 13h. (Pasadena, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, La Paz, near Balboa Heights and near Bogota), 14h. (La Paz and Hungry Horse), 20h. (Baku and near Grozny), 21h. (Tucson, Boulder City, and Pierce Ferry), 23h. (near Lick, near Ashkabad, and near Mizusawa).

Nov. 17d. 8h. 9m. 34s. Epicentre 52°·2N. 173°·9E. (as on 1945, Dec. 25d.).

$A = -·6119$, $B = +·0654$, $C = +·7882$; $\delta = -4$; $h = -6$;
$D = +·106$, $E = +·994$; $G = -·784$, $H = +·084$, $K = -·615$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		23·2	42	e 10 1	S	(e 10 1)	+43	—	—	e 13·6
Vladivostok		29·4	268	e 6 30	+23	e 12 3	+62	—	—	—
Irkutsk		41·1	299	e 7 48?	+ 1	—	—	—	—	—
Grand Coulee		41·9	67	e 7 57	+ 3	—	—	e 9 55	PP	—
Shasta Dam		44·0	78	e 8 6	− 5	—	—	i 10 2	PP	—
Hungry Horse		44·5	65	e 8 10	− 5	—	—	—	—	—
Berkeley		45·9	82	i 8 40	+14	—	—	—	—	e 21·3
Fresno	z.	48·1	81	e 8 47	+ 4	—	—	—	—	—
Tinemaha	z.	48·8	80	i 8 49	0	—	—	—	—	—
Haiwee	z.	49·6	80	e 9 0	+ 5	—	—	—	—	—
Mount Wilson	z.	50·8	82	e 8 59	− 5	—	—	—	—	—
Pasadena	z.	50·8	82	e 9 0	− 4	—	—	—	—	—
Riverside	z.	51·4	82	e 9 8	− 1	—	—	—	—	—
Boulder City		51·6	78	e 9 15	+ 5	—	—	i 10 30	PP	—
Pierce Ferry		52·0	77	e 9 12	− 1	—	—	i 10 32	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Palomar	z.	52·1	82	i 9 11	− 3	—	—	—	—	—
La Jolla	z.	52·2	83	e 9 13	− 2	—	—	—	—	—
Tucson		56·5	78	e 9 42	− 4	—	—	i 10 49	PP	—
Sverdlovsk		58·4	323	10 0	0	e 18 0	− 2	—	—	—
St. Louis		63·8	60	e 10 40	+ 4	—	—	—	—	e 30·7
Andijan		65·2	304	e 10 43	− 2	—	—	—	—	—
Kulyab		68·7	303	i 11 9	+ 2	—	—	—	—	—
Stalinabad		68·7	305	i 11 9	+ 2	—	—	—	—	—
Paris		79·1	354	i 12 8	0	—	—	—	—	—
Ksara		86·8	326	e 16 41	PP	e 30 9	?	—	—	—

Additional readings :—
Hungry Horse e = 8m.18s.
Fresno eE = 8m.17s., eN = 8m.22s.
Mount Wilson iZ = 9m.5s. and 9m.17s.
Pasadena iZ = 9m.8s.
Boulder City i = 9m.30s.
Pierce Ferry i = 9m.40s.
Palomar i = 9m.19s.
Paris i = 12m.17s., e = 12m.34s.
Long waves were also recorded at Sitka and Bombay.

Nov. 17d. 9h. 56m. 34s. Epicentre 15°·2N. 45°·2W. (as on 1940, March 4d.).

$A = +·6803$, $B = -·6851$, $C = +·2606$; $\delta = +8$; $h = +6$;
$D = -·710$, $E = -·704$; $G = +·184$, $H = -·185$, $K = -·966$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fort de France		15·4	270	e 3 33	− 7	—	—	—	—	—
San Juan		20·3	282	—	—	e 8 18	− 5	—	—	i 8·7
Bermuda		24·7	318	e 5 26	+ 2	e 9 49	+ 5	—	—	e 10·6
Bogota	z.	30·3	253	e 4 59	?	—	—	—	—	—
Columbia		37·3	307	—	—	e 13 2	− 2	—	—	e 17·8
La Paz		38·8	216	e 7 26	− 2	i 13 22	− 4	i 8 57	PP	19·3
Lisbon		39·4	46	e 7 36a	+ 3	13 25	−10	9 13	PP	—
Ottawa		39·6	328	e 7 36	+ 1	—	—	(16 26?)	SS	16·4
Huancayo		40·3	229	e 7 37	− 3	e 13 48	− 1	e 9 2	PP	e 19·0
Cleveland		40·9	317	—	—	e 13 47	−11	e 16 57	SS	—
Malaga	z.	42·1	51	i 7 58	+ 3	i 14 22	+ 6	9 52	PP	i 19·5
Temiskaming		42·2	327	e 7 57	+ 1	—	—	—	—	—
Granada		42·8	50	8 16a	+15	i 14 49	+23	10 37	PP	i 19·6
Almeria		43·6	52	i 8 41	+33	14 47	+ 9	10 21	PP	22·5
Kirkland Lake		43·6	327	e 8 7	− 1	—	—	—	—	—
Alicante		45·5	50	11 30	PPP	16 46	?	—	—	i 22·7
St. Louis		45·9	309	i 8 24	− 2	e 15 2	− 9	—	—	—
Tortosa		47·1	48	9 3	+28	e 15 38	+10	15 43	PS	e 21·4
Clermont-Ferrand		50·5	42	e 9 5	+ 3	i 16 24	+ 8	—	—	23·4
Kew		50·9	34	i 15 58	S	(i 15 58)	−23	—	—	e 23·9
Paris		51·3	38	e 9 9	+ 1	i 16 33	+ 7	i 10 39	P_cP	e 23·4
Uccle		53·2	36	—	—	e 16 59	+ 7	—	—	e 24·8
De Bilt		54·2	35	—	—	e 17 14	+ 8	—	—	e 23·4
Strasbourg		54·5	40	e 9 34	+ 2	e 17 16	+ 6	—	—	23·4
Stuttgart		55·4	40	e 9 39	+ 1	e 17 33	+11	e 19 14	S_cS	e 25·4
Rome	z.	56·0	50	e 13 5	PPP	e 17 45	+15	—	—	—
Triest		57·7	44	—	—	i 18 5	+12	—	—	—
Cheb		57·8	39	—	—	e 18 6	+12	e 21 14	SS	e 31·4
Prague		59·1	40	—	—	(e 17 26?)	−45	—	—	e 17·4
Copenhagen		59·5	33	—	—	i 18 24	+ 8	24 40	SSS	27·4
Tucson		61·6	299	e 10 17	− 5	—	—	—	—	—
Warsaw	E.	63·6	38	e 18 21	?	e 19 17	+ 9	—	—	e 23·4
Pierce Ferry		64·2	302	i 10 36	− 3	—	—	i 11 36	P_cP	—
Boulder City		64·9	302	i 10 42	− 1	—	—	—	—	—
Palomar	z.	66·6	300	e 10 54	0	—	—	—	—	—

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.	67·0	301	i 10 58	+ 1	—	—	—	—	—
Haiwee	Z.	67·4	303	e 10 57	− 2	—	—	—	—	—
Mount Wilson	Z.	67·6	301	e 10 59	− 2	—	—	—	—	—
Tinemaha	Z.	67·6	304	e 11 3	+ 2	—	—	—	—	—
Pasadena		67·7	301	e 11 2	+ 1	—	—	—	—	e 28·0
Grand Coulee		68·0	316	e 10 58	− 5	—	—	—	—	—
Istanbul		68·4	51	e 11 6	0	20 14	+ 7	—	—	—
Fresno	Z.	68·8	304	e 11 12	+ 4	—	—	—	—	—
Shasta Dam		70·6	308	e 11 14	− 5	—	—	—	—	—
Helwan		71·1	63	11 29	+ 7	e 20 46	+ 8	e 14 11	PP	—
Ksara		74·4	59	e 11 44	+ 2	e 21 44	+28	—	—	—
Sverdlovsk		85·8	31	12 43	+ 1	23 20	+ 5	—	—	—
Bombay		110·2	63	—	—	e 25 26	[+13]	e 39 1	SSS	—
Calcutta	E.	121·0	51	—	—	i 39 25	?	—	—	—

Additional readings :—
San Juan i =8m.22s.
La Paz iPNZ =7m.32s., PPP =9m.16s., iSSZ =15m.58s.
Lisbon SE =13m.44s.
Huancayo e =7m.43s., eP_cP =9m.18s.
Cleveland eSE =14m.20s., eE =15m.3s., eSSE =17m.1s.
Malaga PPPZ =10m.24s., S_cPZ =13m.6s.
Granada P_cS =14m.43s., SS =17m.52s.
Almeria P_cP =10m.41s., PPP =10m.52s., SS =17m.33s.
Alicante PPP =12m.16s., P_cS =15m.22s., S_cS =19m.50s., SS =20m.22s., SSS =20m.50s., phases wrongly identified.
Tortosa PPS?N =15m.56s., SSN =18m.59s.
Kew eP_cP?EN =19m.10s., eS? =21m.0s., eSS?EN=22m.14s.?, phases wrongly identified.
Paris i =9m.22s., iPP =11m.6s., iPPP =12m.4s., iPS =16m.43s., i =17m.50s.
Strasbourg eS =17m.20s., iS =17m.23s.
Tucson i =10m.31s.
Pierce Ferry i =10m.47s.
Palomar iZ =11m.3s.
Pasadena iZ =11m.11s.
Istanbul P? =11m.15s.
Fresno eE =11m.19s.
Bombay eN =42m.11s.
Long waves were also recorded at La Plata, Chicago, Berkeley, Sitka, Barcelona, Florence, Aberdeen, Helsinki, and Upsala.

Nov. 17d. 11h. 13m. 54s. Epicentre 52°·2N. 173°·9E. (as at 8h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		23·2	42	(e 5 26)	+17	e 5 26	P	—	—	e 9·8
Grand Coulee		41·9	67	e 8 8	+14	—	—	—	—	—
Shasta Dam		44·0	78	e 8 8	− 3	—	—	—	—	—
Hungry Horse		44·5	65	e 8 13	− 2	—	—	—	—	—
Berkeley		45·9	82	e 8 26	0	e 19 30	?	—	—	e 21·2
Tinemaha	Z.	48·8	80	e 8 48	− 1	—	—	—	—	—
Haiwee	Z.	49·6	80	e 8 57	+ 2	—	—	—	—	—
Mount Wilson	Z.	50·8	82	e 9 3	− 1	—	—	—	—	—
Pasadena	Z.	50·8	82	e 9 1	− 3	—	—	—	—	—
Riverside	Z.	51·4	82	e 9 6	− 3	—	—	—	—	—
Boulder City		51·6	78	i 9 44	+34	—	—	—	—	—
Pierce Ferry		52·0	77	e 9 11	− 2	—	—	—	—	—
Palomar		52·1	82	e 9 13	− 1	—	—	—	—	—
Tucson		56·5	78	e 9 45	− 1	—	—	—	—	—
Sverdlovsk		58·4	323	e 10 4	+ 4	18 6	+ 4	—	—	—
St. Louis		63·8	60	e 10 38	+ 2	—	—	—	—	—
Andijan		65·2	304	e 10 47	+ 2	e 19 45	+17	—	—	—
Ottawa		65·9	46	e 10 51	+ 1	—	—	—	—	40·1
Tashkent		66·3	307	e 10 58	+ 6	—	—	—	—	—
Kulyab		68·7	303	i 11 11	+ 4	—	—	—	—	—
Stalinabad		68·7	305	i 11 2	− 5	i 20 15	+ 5	—	—	—
Stuttgart		78·6	349	e 12 16?	+11	—	—	—	—	e 46·1
Paris		79·1	354	e 12 11	+ 3	—	—	—	—	—
Ksara		86·8	326	e 12 34	−13	e 23 40	+15	—	—	—

For Notes see next page.

NOTES TO NOVEMBER 17d. 11h. 13m. 54s.

Additional readings :—
Shasta Dam i = 9m.11s.
Tinemaha iZ = 8m.56s.
Pasadena iZ = 9m.12s.
Riverside iZ = 9m.15s.
Pierce Ferry i = 9m.46s.
Palomar iZ = 9m.25s.
Tucson i = 9m.59s., 10m.11s., and 10m.27s.
Paris eP = 12m.16s., i = 12m.21s.
Long waves were also recorded at Sitka, Chicago, Cleveland, Columbia, Riverview, Calcutta, and other European stations.

Nov. 17d. Readings also at 0h. (near Mizusawa), 1h. (Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Stuttgart), 2h. (Tucson), 6h. (Hungry Horse and near Grand Coulee), 7h. (near Almata), 8h. (Andijan, near Kulyab, Stalinabad, Hungry Horse, and near Mizusawa), 9h. (La Paz, near Huancayo, and near Berkeley), 10h. (Almata, Andijan, Ashkabad, Kulyab, Stalinabad, Tashkent, Sverdlovsk, and Stuttgart), 11h. (Istanbul, Branner, near Berkeley and Lick), 12h. (La Paz), 14h. (La Paz (2), Mount Wilson, Palomar, Tucson (2), near Boulder City, Pierce Ferry (2), and near Fresno), 15h. (La Paz and Hungry Horse), 21h. (Jena and Stuttgart).

Nov. 18d. 14h. Undetermined shock.

Calcutta ePE = 10m.28s., iPE = 10m.46s., iSE = 11m.17s., iS*E = 11m.28s., iS_gE = 11m.40s., P_cPE = 17m.53s.
Bombay eP?EN = 10m.33s., iS = 13m.49s., LE = 15m.33s.
Hyderabad ePN = 10m.34s., LN = 14m.37s.
Almata eP = 10m.58s.
Andijan eP = 10m.58s., eS = 13m.47s.
Kulyab iP = 10m.58s., iS = 13m.48s.
Stalinabad iP = 11m.10s., iS = 14m.10s.
Tashkent eP = 11m.20s., eS = 14m.28s.
Samarkand eP = 11m.25s.
Istanbul e = 22m.

Nov. 18d. 16h. 37m. 30s. I, 17h. 23m. 47s. II } Epicentre 10°·5S. 74°·9W. (as on 7d.).

A = +·2562, B = −·9495, C = −·1811 ; $\delta = -1$; $h = +6$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Huancayo	1·6	195	i 0 17	−13	i 1 3	+12	—	—	i 1·7
II		1·6	195	i 0 23	− 7	i 2 0	?	—	—	i 2·4
I	La Paz	8·9	133	i 1 54	−18	i 4 14	+19	i 4 42	S_g	—
II		8·9	133	i 2 19	+ 7	i 4 19	+24	i 5 1	S_g	—
I	Bogota	15·0	3	e 3 44	+ 9	i 6 44	SS	—	—	—
II		15·0	3	e 3 40	+ 5	i 6 46	SS	i 3 54	PPP	—
II	Fort de France	28·5	30	—	—	e 11 20	+34	—	—	—
I	San Juan	30·0	17	—	—	e 11 8	− 2	—	—	e 13·0
II		30·0	17	e 5 21	−51	e 11 9	− 1	—	—	e 12·4
I	St. Louis	50·9	345	e 9 4	− 1	—	—	e 10 49	PP	—
II		50·9	345	i 9 5	0	—	—	—	—	—
I	Tucson	54·6	322	i 9 32a	0	—	—	—	—	—
II		54·6	322	i 9 32a	0	—	—	i 9 50	?	—
I	Temiskaming	57·0	357	e 9 48	− 2	—	—	—	—	—
II		57·0	357	e 9 55	+ 5	—	—	—	—	—
I	Kirkland Lake	58·6	356	e 10 6	+ 5	—	—	—	—	—
II		58·6	356	e 10 1	0	—	—	—	—	—

Continued on next page.

			Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Palomar		59·1	320	i 10 5a	+ 1	—	—	—	—	—
II		z.	59·1	320	i 10 5	+ 1	—	—	—	—	—
I	Pierce Ferry		59·2	324	i 10 6	+ 1	—	—	i 10 20	?	—
II			59·2	324	i 10 1	− 4	—	—	i 10 54	PcP	—
I	Boulder City		59·6	323	i 10 8	0	—	—	—	—	—
II			59·6	323	e 10 28	+20	—	—	—	—	—
I	Riverside	z.	59·9	320	i 10 10a	0	—	—	i 10 17	?	—
II		z.	59·9	320	i 10 10	0	—	—	—	—	—
I	Mount Wilson	z.	60·5	320	i 10 14a	0	—	—	—	—	—
II		z.	60·5	320	i 10 15a	+ 1	—	—	—	—	—
I	Pasadena	z.	60·5	320	i 10 14	0	—	—	i 10 28	?	—
II		z.	60·5	320	i 10 14a	0	—	—	—	—	—
I	Tinemaha	z.	62·4	322	i 10 27a	0	—	—	—	—	—
II		z.	62·4	322	i 10 28a	+ 1	—	—	—	—	—
I	Fresno		63·1	321	i 10 31	− 1	—	—	e 10 37	?	—
I	Shasta Dam		67·2	323	i 10 56	− 2	—	—	i 11 2	?	—
II			67·2	323	i 11 24	+26	—	—	—	—	—
I	Hungry Horse		68·0	333	e 11 3	0	—	—	—	—	—
I	Malaga	z.	81·0	50	i 12 9a	− 9	—	—	—	—	e 44·5
II		z.	81·0	50	i 12 20k	+ 2	—	—	—	—	—
I	Stuttgart	z.	93·9	41	e 13 15	− 6	—	—	—	—	—
II		z.	93·9	41	e 13 20	− 1	—	—	—	—	—
I	Ksara		113·0	58	e 15 15	?	—	—	—	—	—
II	Bombay		147·7	71	e 19 53	[+ 9]	—	—	—	—	—

Additional readings :—
La Paz I iSN = 3m.37s. ; II i = 2m.45s. and 3m.5s., iS_g = 5m.33s.
Bogota I iS = 8m.18s., iS_g? = 8m.49s. ; II iS = 7m.6s.
Malaga I iS_gZ = 12m.49s., L?Z = 13m.9s ; II SPZ = 12m.26s., iS_gZ = 13m.0s., LZ = 13m.28s. Readings given as for local shocks.
Long waves were recorded to I at La Plata, and Riverview and to II at La Plata.

Nov. 18d. 21h. 59m. 6s. Epicentre 33°·3N. 119°·4W.

Intensity VI at St. Nicholas Island ; V at Los Angeles and Ventura ; IV at Lomita, Redondo Beach, etc. Epicentre 33°16′N. 119°27′W.

L. M. Murphy.
United States Earthquakes, Serial No. 730, Washington, 1950, p. 27.

A = −·4111, B = −·7296, C = +·5464 ; δ = −13 ; h = +1 ;
D = −·871, E = +·491 ; G = −·268, H = −·476, K = −·838.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Santa Barbara	1·2	347	i 0 23k	− 1	i 0 40	− 1	—	—	—
Pasadena	1·3	50	i 0 25k	0	i 0 45	+ 1	—	—	—
Mount Wilson	1·4	51	i 0 27k	0	i 0 48	+ 2	—	—	—
Riverside	1·8	67	i 0 32k	0	i 0 55	− 1	—	—	—
La Jolla	1·9	103	i 0 32a	− 2	i 0 48	−11	—	—	—
Palomar	2·1	89	i 0 36	− 1	—	—	—	—	—
Haiwee	3·1	22	i 0 51a	0	i 1 26	− 3	—	—	—
Fresno	3·5	355	i 0 56	− 1	i 1 36	− 4	i 1 8	P_g	—
Tinemaha	3·9	13	i 1 3	+ 1	i 1 57	S*	—	—	—
Lick	4·4	337	i 1 10	0	i 2 4	+ 2	i 1 59	S	—
Boulder City	4·6	53	i 1 13	+ 1	i 2 2	− 5	i 2 25	S_g	—
Santa Clara	4·6	333	e 1 8	− 4	e 2 1	− 6	—	—	—
Berkeley	5·1	324	i 1 18	− 2	i 2 49	S_g	—	—	e 3·7
San Francisco	5·1	332	i 1 21	+ 1	i 2 15	− 5	e 1 25	P	—
Pierce Ferry	5·3	56	i 1 31	P*	—	—	i 1 36	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.
Ukiah	6·6	334	—	—	e 3 30	S_g	—	—	e 3·8
Mineral	7·2	347	e 1 50	+ 1	i 3 32	S*	i 3 51	S_g	—
Tucson	7·3	96	i 1 50a	0	i 3 24	+ 9	—	—	i 3·7
Shasta Dam	7·8	343	e 1 54	− 4	e 3 21	− 7	—	—	—
Salt Lake City	9·6	37	e 2 56	?	e 5 4	S_g	—	—	e 5·3
Butte	13·7	21	—	—	e 7 19	?	—	—	e 8·3
Grand Coulee	14·6	1	e 3 33	+ 3	—	—	—	—	—
Hungry Horse	15·6	13	e 3 44	+ 1	—	—	—	—	—
St. Louis	24·2	69	e 5 20	+ 1	e 9 46	+11	—	—	—

Berkeley also gives iN = 2m.2s. and 3m.1s.
Readings for Boulder City and Pierce Ferry given as for 20h.
Long waves were also recorded at Philadelphia, Chicago, Riverview, and Auckland.

Nov. 18d. Readings also at 0h. (Santa Lucia), 1h. (near Kulyab), 4h. (Helwan), 5h. (Hungry Horse and Boulder City), 8h. (Santa Lucia), 12h. (La Paz, Bogota, Tucson, Hungry Horse, and near Apia), 13h. (Mizusawa), 15h. (near Alicante and near Almata), 16h. (near Alicante), 17h. (Malaga and near Kulyab), 18h. (Stuttgart and near Istanbul), 19h. (Mizusawa), 20h. (Mount Wilson, Riverside, Palomar, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, and near Mineral), 22h. (near Mineral).

Nov. 19d. 13h. 11m. 47s. Epicentre 30°·5N. 128°·5E. (as on 1942, April 14d.).

Intensity V at Kagosima; IV at Hitoyoshi, macroseismic radius 200-300km. Epicentre 30°·4N. 128°·9E.

Bull. Cent. Met. Obs., Japan, 1947. Tokyo, 1950, p. 43 with macroseismic chart.

$A = -·5373$, $B = +·6755$, $C = +·5050$; $\delta = +2$; $h = +1$;
$D = +·783$, $E = +·623$; $G = -·314$, $H = +·395$, $K = -·863$.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Kagosima		2·1	59	0 34k	− 3	0 55	− 9
Unzendake		2·7	34	0 18	−27	0 53	−26
Miyazaki		2·9	61	0 53k	+ 5	1 23	− 1
Kumamoto		3·0	39	0 53	+ 3	1 26	− 1
Hukuoka		3·5	27	1 0	+ 3	1 53	+13
Izuka		3·6	30	0 47	−11	—	—
Ituhara		3·8	11	1 1	0	1 46	− 1
Hirosima		5·1	40	1 29	+ 9	2 37	+17
Hamada		5·3	34	1 16	− 6	2 49	S_g
Kôti		5·3	53	1 26	+ 4	2 26	+ 1
Kobe		7·1	52	2 20	P_g	3 34	S*
Osaka		7·2	54	1 43	− 6	—	—
Toyooka		7·3	45	2 25	P_g	—	—
Owase		7·4	60	2 28	P_g	4 7	S_g
Hikone		8·1	52	1 56	− 6	3 45	+10
Nagoya		8·5	55	2 5	− 2	—	—
Omaesaki		9·1	61	2 44	P*	—	—
Nagano		10·2	50	2 41	+10	—	—
Stuttgart	z.	84·3	324	e 12 40?	+ 5	—	—

Long waves were also recorded at Bombay, Copenhagen, Warsaw, Cheb, and De Bilt.

Nov. 19d. Readings also at 5h. (Ksara, Istanbul (2), Grozny, Leninakan, Sotchi, and near Erevan), 6h. (Hungry Horse), 7h. (La Paz), 8h. (Palomar and Tucson), 9h. (Santa Lucia, Ksara, and near Grozny), 10h. (Shasta Dam), 12h. and 16h. (Hungry Horse), 18h. (La Paz and Santa Lucia), 20h. (Istanbul).

Nov. 20d. 8h. 19m. 32s. Epicentre 49°·5N. 155°·5E. (as on 1947, Aug. 28d.).

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		14·6	230	e 3 50	+20	e 5 59	−14	—	—	—
Vladivostok		17·5	257	e 4 5	− 2	i 7 34	+13	—	—	—
Irkutsk		31·9	296	e 6 29	0	—	—	—	—	—
Sitka		40·2	52	i 7 45	+ 5	i 13 58	+10	e 9 40	PP	e 17·2
Sverdlovsk		52·9	317	i 9 18	− 2	16 40	− 8	i 9 37	pP	—
Grand Coulee		53·5	57	e 9 25	+ 1	e 16 58	+ 1	i 9 44	PP	—
Hungry Horse		55·9	54	i 9 44	+ 2	e 17 31	+ 2	—	—	—
Shasta Dam		55·9	66	e 9 43	+ 1	e 17 33	+ 4	e 19 56	S_cS	—
Mineral	E.	56·6	66	e 9 48	+ 1	—	—	—	—	—
Berkeley		57·8	69	i 9 55	0	i 17 56	+ 2	i 20 12	S_cS	e 24·0
Tashkent		57·9	298	e 9 53	− 3	e 17 44	−11	e 18 16	sS	—
Kulyab		59·8	294	i 10 10	+ 1	i 18 9	−11	—	—	—
Fresno	Z.	60·0	68	i 10 12	+ 1	—	—	—	—	—
Stalinabad		60·0	296	i 10 8	− 3	i 18 8	−15	—	—	—
Samarkand		60·3	298	e 10 28?	+15	—	—	—	—	—
Tinemaha		60·7	67	i 10 19k	+ 4	—	—	—	—	—
Haiwee		61·5	67	i 10 23k	+ 2	—	—	—	—	—
Santa Barbara		61·6	70	i 10 23k	+ 1	—	—	—	—	—
Mount Wilson		62·7	69	i 10 31k	+ 2	e 19 23	PS	—	—	—
Pasadena		62·7	69	i 10 29k	0	i 19 24	PS	e 39 36	P′P′	—
Riverside		63·3	69	i 10 33k	0	—	—	—	—	—
Boulder City		63·5	65	i 10 36	+ 2	—	—	—	—	—
Helsinki		63·6	336	—	—	e 19 15	+ 7	—	—	e 33·5
Pierce Ferry		63·9	65	i 10 38	+ 1	—	—	—	—	—
Palomar		64·1	69	i 10 38k	0	i 19 17	+ 3	—	—	—
La Jolla		64·2	70	e 10 40	+ 1	—	—	—	—	—
Ashkabad		66·4	302	e 10 43	−10	—	—	—	—	—
Tucson		68·5	65	i 11 6k	0	e 11 45	P_cP	e 39 18	P′P′	—
Hyderabad	N.	68·6	272	e 11 7	0	20 6	− 3	21 0	S_cS	32·8
Bombay	E.	71·2	278	e 11 24	+ 1	e 20 36	− 4	—	—	31·7
Warsaw		71·5	333	e 14 35	PP	e 20 27	−16	e 29 13	SSS	e 38·5
Kirkland Lake		71·6	36	i 11 24	− 1	—	—	—	—	—
Temiskaming		73·2	36	i 11 34	− 1	—	—	—	—	—
Chicago		73·6	45	e 12 3	+26	—	—	e 16 4	PPP	—
St. Louis		74·8	48	i 11 45	+ 1	i 21 1	−19	i 12 11	pP	—
Prague		75·4	336	—	—	e 26 20	SS	—	—	e 39·5
Ottawa		75·5	35	i 11 47	− 1	—	—	—	—	37·5
De Bilt		75·7	342	i 11 49k	0	e 21 33	+ 3	e 22 31	PS	e 38·5
Cleveland		76·5	41	—	—	e 21 35	− 4	e 30 40	SSS	39·1
Stuttgart		77·9	338	i 12 1k	0	e 22 28	PS	e 12 39	P_cP	41·5
Strasbourg		78·4	339	e 12 4	0	e 22 44	PS	—	—	e 39·5
Paris		79·4	343	i 12 14	+ 5	e 22 9	− 1	e 12 21	P_cP	e 39·5
Basle		79·4	339	e 12 20k	+11	—	—	e 17 5	PPP	—
Zürich		79·4	339	e 12 9k	0	e 22 9	− 1	—	—	—
Chur		79·6	337	e 12 14k	+ 4	—	—	—	—	—
Triest		79·6	334	e 12 8	− 2	—	—	—	—	—
Pavia	Z.	81·2	337	e 11 56	−23	—	—	—	—	—
Ksara		81·3	313	e 12 20	0	e 22 53	SKKS	—	—	—
Clermont-Ferrand		82·1	341	e 12 5	−19	—	—	—	—	45·5
Riverview		83·0	184	i 12 42k	+14	e 23 2	+15	i 23 13	S_cS	e 39·0
Rome		83·4	333	i 12 29k	− 1	e 22 47	− 4	e 23 37	PS	e 41·0
Helwan		86·7	314	i 12 47a	0	23 10	[− 2]	23 34	S	—
Tortosa	N.	87·4	341	—	—	23 18	[+ 1]	24 37	PS	e 47·5
Bermuda		91·0	34	—	—	e 23 58	− 5	e 25 32	PS	—
Almeria		91·8	343	e 13 6	− 5	24 10	− 1	16 50	PP	50·5
Malaga	Z.	92·3	344	i 13 9a	− 4	e 24 23	+ 8	i 13 39	pP	46·5
Bogota		111·1	55	e 19 14	PP	—	—	—	—	62·5
La Paz		131·8	64	i 19 14	[− 1]	—	—	21 36	PP	78·5

For Notes see next page.

NOTES TO NOVEMBER 20d. 8h. 19m. 32s.

Additional readings :—
Sitka i = 14m.19s.
Sverdlovsk sS = 17m.14s.
Grand Coulee e = 17m.21s.
Shasta Dam e = 17m.56s.
Berkeley iPZ = 9m.58s., iN = 18m.24s.
Pasadena iZ = 10m.40s. amd 10m.47s.
Palomar iNZ = 10m.52s., iZ = 10m.57s., iEN = 19m.43s.
Tucson i = 11m.12s.
St. Louis iPS = 21m.46s., isS = 22m.8s.
Prague e = 32m.34s. and 36m.16s.
De Bilt eSS = 26m.48s.
Cleveland eSE = 21m.44s., eN = 22m.0s.
Stuttgart e = 18m.4s., eQ? = 37·5m.
Paris epP? = 12m.42s., i = 18m.48s., eS = 22m.15s.
Rome eZ = 35m.5s.
Tortosa PPSN = 25m.5s.
Bermuda eS = 24m.34s.
Almeria PPP = 18m.53s., SKS = 23m.38s., SS = 30m.22s.
Malaga iPPZ = 17m.11s., iPPPZ = 19m.11s., eSSZ = 24m.49s., iPSZ = 25m.32s.
La Paz iPP?EN = 22m.45s.
Long waves were also recorded at Auckland, Wellington, and at other European stations.

Nov. 20d. 9h. 36m. 42s. Epicentre 17°·8S. 178°·8W. Depth of focus 0·070.
(as on 1943, June 25d.).

A = −·9526, B = −·0199, C = −·3038 ; δ = +14 ; h = +5 ;
D = −·021, E = +1·000 ; G = +·304, H = +·006, K = −·953.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		7·9	60	i 1 56	0	i 3 27	− 1	—	—	—
Auckland		19·8	195	4 2	+ 4	7 12	+ 1	—	—	—
Wellington		24·0	192	4 35	− 2	8 23	+ 3	14 35	S_cS	—
Brisbane	N.	27·7	245	i 5 7	− 3	—	—	—	—	—
Riverview		31·2	233	i 5 42k	+ 2	e 10 12	− 1	i 7 11	pP	—
Santa Barbara		76·5	47	i 11 0a	− 1	—	—	—	—	—
Berkeley		76·7	44	e 11 2	0	—	—	e 12 57	pP	—
La Jolla	Z.	77·4	50	e 11 5	− 1	—	—	—	—	—
Pasadena		77·4	48	i 11 4a	− 2	—	—	i 13 0	pP	—
Mount Wilson		77·5	48	i 11 6a	− 1	—	—	i 13 2	pP	—
Fresno		77·7	45	i 11 7	− 1	—	—	i 13 3	pP	—
Palomar		77·9	50	i 11 7a	− 2	—	—	i 13 2	pP	—
Riverside		77·9	48	i 11 7a	− 2	—	—	i 13 5	pP	—
Shasta Dam		78·3	41	i 11 8	− 3	—	—	e 13 6	pP	—
Mineral	N.	78·6	42	e 11 10	− 2	—	—	—	—	—
Tinemaha		78·9	45	i 11 14a	0	—	—	i 13 10	pP	—
Boulder City		80·7	48	i 11 23	0	—	—	e 13 23	pP	—
Pierce Ferry		81·4	48	i 11 26	− 1	—	—	i 13 24	pP	—
Tucson		81·9	52	i 11 28a	− 2	—	—	i 13 26	pP	—
Grand Coulee		84·4	36	i 11 40	− 2	—	—	e 13 46	pP	—
Hungry Horse		87·4	37	i 11 24	−32	—	—	—	—	—
Ksara		145·1	303	e 18 45	[+ 3]	—	—	21 31	pPKP	—
Collmberg	Z.	145·3	349	e 20 55	pPKP	—	—	—	—	—
De Bilt		145·6	356	i 18 43a	[0]	—	—	—	—	—
Jena	N.	145·9	348	e 18 44	[0]	—	—	—	—	—
Stuttgart	Z.	148·4	352	i 18 51a	[+ 4]	—	—	e 20 58	pPKP	—
Strasbourg		148·8	352	i 18 52	[+ 4]	—	—	—	—	—
Paris		149·0	358	e 18 51	[+ 3]	i 21 43	SKP	i 20 44	pPKP	—
Basle		149·9	351	e 18 49	[− 1]	—	—	—	—	—
Zürich		149·9	351	e 18 48k	[− 2]	—	—	e 21 2	pPKP	—
Clermont-Ferrand		152·1	356	i 18 53	[0]	—	—	—	—	—
Malaga	Z.	160·5	13	i 19 49k	PKP_2	i 40 41	SS	i 23 35	PP	—

Additional readings :—
Wellington e = 10m.18s.
Riverview eSSE = 13m.2s., iZ = 13m.11s., iS_cSEN = 15m.15s.
Pasadena isPZ = 14m.4s.
Mount Wilson isPZ = 14m.4s.
Fresno iEN = 11m.17s., iN = 13m.16s.
Palomar iZ = 11m.27s.

Continued on next page.

Riverside isPZ =14m.10s.
Tinemaha iZ =11m.20s., 11m.30s., and 11m.39s.
Boulder City ePKP,PKP =40m.38s.
Tucson i =12m.2s., ePKP,PKP =40m.39s.
Ksara PP? =21m.46s.
Stuttgart esPKP?Z =21m.48s., ePPP?Z =25m.49s.
Paris iPKP =18m.56s., iPKP$_2$? =19m.2s., i =19m.32s., ipPKP$_2$ =20m.57s., iPP = 22m.35s.
Zürich i =18m.53s. a.
Clermont-Ferrand iPKP =19m.0s.
Malaga iPPPZ =25m.33s., isSZ =41m.18s., iPSZ =41m.55s.

Nov. 20d. Readings also at 1h. (Riverview (2)), 2h. (Hungry Horse), 3h. (Ksara), 6h. (Pierce Ferry and near Mizusawa), 8h. (near Boulder City and Pierce Ferry), 9h. (Pasadena, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Grand Coulee, and near Mineral), 10h. (Hungry Horse), 11h. (Shasta Dam), 12h. (near Kulyab), 18h. (La Paz and La Plata), 19h. (near Ottawa), 20h. (Hungry Horse and Rapid City), 21h. (Kirkland Lake and Temiskaming), 22h. (Mizusawa), 23h. (Balboa Heights and Shasta Dam).

Nov. 21d. 3h. 54m. 13s. Epicentre 18°·9N. 107°·8W.

$A = -\cdot2894$, $B = -\cdot9014$, $C = +\cdot3220$; $\delta = -4$; $h = +5$;
$D = -\cdot952$, $E = +\cdot306$; $G = -\cdot098$, $H = -\cdot307$, $K = -\cdot947$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		8·1	85	i 1 56	− 6	i 3 29	− 6	—	—	i 4·9
Tucson		13·6	349	i 3 15k	− 2	i 6 3	+13	—	—	i 6·5
La Jolla	Z.	16·3	331	e 3 54	+ 2	—	—	—	—	—
Palomar		16·5	332	i 3 54k	0	—	—	i 3 57	P	—
Riverside		17·3	332	i 4 4k	0	—	—	—	—	—
Pasadena		17·8	332	i 4 9k	− 2	—	—	—	—	7·4
Mount Wilson		17·8	332	i 4 11k	0	e 7 39	+11	—	—	—
Pierce Ferry		18·0	345	i 4 15	+ 2	e 7 50	SS	—	—	—
Boulder City		18·1	342	e 4 14	0	i 7 51	SS	—	—	—
Santa Barbara		18·8	329	e 4 21	− 2	—	—	—	—	—
Haiwee	N.	19·4	336	i 4 32	+ 2	—	—	—	—	—
Tinemaha		20·3	336	e 4 40	0	e 8 41	+18	—	—	—
Fresno		20·7	333	e 4 41	− 3	i 8 45	+14	i 4 52	PP	e 12·0
Mobile		21·3	51	—	—	e 7 39	−64	—	—	—
Lick	E.	22·0	330	e 5 1	+ 3	e 9 21	+25	—	—	e 11·7
	N.	22·0	330	e 4 58	0	e 9 13	+17	e 6 59	?	e 11·7
Salt Lake City		22·1	353	e 4 55	− 4	i 9 6	+ 8	i 4 58	P	i 9·8
Santa Clara		22·2	330	e 5 1	+ 1	e 9 14	+14	—	—	e 11·7
Berkeley		22·7	330	i 5 5	+ 1	e 9 25	+16	—	—	e 10·6
San Francisco	N.	22·7	330	e 5 4	0	e 8 24	−45	—	—	e 13·2
Logan		23·0	353	i 5 3	− 4	i 9 20	+ 6	i 5 47	PP	e 11·1
Ukiah		24·2	331	e 5 17	− 2	e 9 47	+12	e 5 52	PP	e 10·6
Mineral		24·5	335	e 5 24	+ 2	e 9 51	+11	e 5 30	PP	e 13·5
St. Louis		24·9	34	e 5 23	− 3	i 9 49	+ 2	i 6 5	PP	—
Shasta Dam		25·1	334	e 5 23	− 5	—	—	e 6 13	PP	—
Ferndale		25·8	331	e 6 16	PP	e 10 10	+ 8	e 11 8	SS	e 15·2
Bozeman		26·8	356	e 5 48	+ 4	e 10 21	+ 2	i 6 45	PPP	i 10·8
Butte		27·3	353	e 5 47	− 1	i 10 31	+ 4	e 6 39	PP	i 11·5
Columbia		28·2	51	e 5 55	− 1	e 10 37	− 4	e 8 18	?	e 12·2
Cincinnati		28·5	39	e 5 59	0	i 10 30	−16	6 30	PP	—
Chicago		28·6	31	e 5 53	− 7	e 10 42	− 6	e 7 10	PPP	e 11·7
Balboa Heights		29·1	105	e 6 4	0	—	—	—	—	—
Hungry Horse		29·8	352	e 6 7	− 4	e 11 11	+ 4	—	—	—
Grand Coulee		30·4	346	e 6 14	− 2	e 11 22	+ 6	—	—	—
Cleveland	Z.	31·8	38	e 6 19k	− 9	e 11 34	− 4	i 7 21	PP	—
Victoria		32·1	341	6 27	− 4	11 47	+ 4	7 44	PP	15·8
New Kensington		32·4	41	—	—	i 11 45	− 3	i 14 49	Q	i 17·9
Georgetown		33·2	46	i 6 43	+ 3	i 12 10	+10	7 35	PP	16·8
Saskatoon		33·2	2	6 41	+ 1	12 0	0	7 54	PP	16·8
Philadelphia		35·0	46	e 7 4	+ 8	i 12 25	− 3	i 7 57	PP	i 14·2
Bogota		35·8	108	e 7 0	− 3	e 12 41	0	e 8 9	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Fordham		36·3	45	e 7 3	− 4	i 12 46	− 2	i 8 23	PP	—
Temiskaming		36·4	33	e 7 5	− 3	—	—	i 7 10	P	17·5
Kirkland Lake		36·8	31	e 7 6	− 5	—	—	i 7 14	P	18·8
Ottawa		37·5	37	7 13k	− 4	13 5	− 2	8 45	PP	17·3
Harvard		38·6	44	e 7 23	− 3	i 13 18	− 5	e 8 47	PP	—
Weston		38·7	44	i 7 31	+ 4	i 14 43	?	8 53	PP	i 17·1
San Juan		39·4	83	e 7 29	− 4	i 13 30	− 5	e 9 4	PP	e 16·3
Shawinigan Falls		39·8	38	e 7 42	+ 6	e 13 28	−14	e 16 40	SS	20·8
Bermuda		40·9	62	e 7 31	−15	e 13 51	− 7	i 9 13	PP	e 18·3
Seven Falls		41·3	38	7 51	+ 2	14 4	0	9 29	PP	19·8
Sitka		43·6	339	e 8 8	0	i 14 37	− 1	e 10 31	PPP	i 18·1
Huancayo		44·4	130	e 8 11	− 3	e 14 9	−40	—	—	—
Halifax		44·8	45	8 19	+ 2	14 47	− 8	10 5	PP	22·8
Honolulu		46·9	283	e 8 35	+ 1	e 15 34	+ 9	e 19 10	SS	e 19·4
La Paz		52·5	128	i 9 12k	− 5	i 16 36	− 7	i 11 14	PP	23·6
College		53·1	340	(e 9 18)	− 3	—	—	—	—	—
Ivigtut		59·1	29	10 4	0	18 9	− 2	—	—	29·8
Scoresby Sund		71·0	21	11 33	+11	20 30	− 7	25 11	SS	—
Lisbon		84·9	51	e 12 36k	− 2	23 8	+ 2	16 4?	PP	39·8
Jersey		85·7	39	—	—	e 23 19	+ 5	—	—	—
Kew		85·8	37	i 12 55?	+13	e 23 10?	− 5	e 24 7	PS	e 38·8
De Bilt		88·5	35	e 13 7	+11	i 23 47	+ 6	e 24 44	PS	e 41·8
Paris		88·6	39	e 12 47?	− 9	—	—	—	—	e 42·8
Uccle		88·7	36	—	—	e 23 40	− 3	e 29 27	SS	e 41·8
Malaga	Z.	89·1	51	i 13 1k	+ 3	i 23 47	+ 1	i 13 19	pP	42·8
Granada		89·5	51	i 13 4k	+ 4	i 23 29	[− 1]	25 1	PS	i 43·5
Upsala		89·9	25	e 13 18a	+16	e 23 54	0	e 33 27	SSS	e 36·8
Clermont-Ferrand		90·4	41	e 13 10	+ 6	i 24 4	+ 6	i 25 11	PS	43·3
Almeria		90·5	51	i 13 6	+ 1	23 54	− 5	23 32	SKS	44·4
Tortosa	N.	90·9	46	e 18 34	PPP	e 24 3	0	25 15	PS	e 42·8
Alicante		91·3	48	e 13 6	− 3	24 10	+ 4	25 10	PS	e 42·1
Arapuni		91·4	232	—	—	e 25 47	PPS	e 32 47	?	42·3
Strasbourg		91·7	36	e 13 22	+12	e 24 17	+ 7	i 16 55	PP	e 36·8
Stuttgart		92·5	36	e 13 12	− 2	e 24 20	+ 3	e 16 54	PP	e 38·8
Zürich		92·9	37	e 13 12	− 4	e 24 27	+ 7	—	—	—
Wellington		93·2	227	—	—	24 31	+ 8	36 47?	Q	42·3
Cheb		93·5	33	e 23 13	?	e 25 43	PS	e 29 45	?	e 37·8
Prague		94·5	33	—	—	e 25 35	PS	e 30 47?	SS	e 43·8
Florence		96·4	40	e 16 5	?	—	—	—	—	—
Warsaw	E.	96·4	29	e 13 48	+16	e 26 41	PPS	—	—	e 40·8
Triest		96·8	37	e 17 25	PP	i 24 56	+ 2	e 31 20	SS	—
Vladivostok		97·5	320	i 17 34	PP	i 24 17	[+ 3]	i 31 53	SSP	—
Rome		98·2	41	e 13 44	+ 4	i 24 16	[− 2]	e 26 33	PS	e 44·4
Irkutsk		103·8	340	—	—	24 47?	[+ 2]	e 25 47?	S	—
Sverdlovsk		103·9	7	i 18 20	PP	i 25 49	− 4	i 27 30	PS	—
Istanbul		108·2	33	e 18 47?	PP	e 24 47?	[−18]	—	—	—
Riverview		109·2	240	18 29	[− 2]	e 34 28	SS	e 28 24	PS	e 50·2
Ksara		117·2	34	e 15 9	P	30 13	PS	19 55	PP	—
Helwan		117·5	40	e 19 56	PP	e 28 2	?	e 31 11	PPS	—
Tashkent		120·0	2	e 20 12	PP	27 2	{−12}	i 30 9	PS	—
Stalinabad		122·8	3	19 12	[+14]	i 30 29	PS	i 37 35	SS	—
Kulyab		123·5	2	i 20 29	PP	i 30 44	PS	—	—	—
Bombay		142·4	359	e 19 34	[− 1]	30 28	?	—	—	—
Hyderabad	N.	143·4	350	19 35	[− 1]	42 1	SSP	22 51	PP	—

Additional readings and note :—
Fresno iE = 5m.40s.
Salt Lake City iPP = 6m.31s., ePPP? = 6m.47s.
Logan i = 5m.15s., iPPP? = 6m.54s.
Berkeley iE = 7m.59s., iZ = 8m.7s.
St. Louis i = 5m.39s.
Shasta Dam e = 8m.13s., eP_cP = 8m.33s.
Ferndale eN = 7m.7s.
Bozeman eP_cP = 7m.56s., i = 10m.28s.
Butte eP_cP = 8m.51s.
Cincinnati i = 11m.10s.

Continued on next page.

Cleveland iPZ = 6m.23s.k, iPEZ = 6m.29s.a, iEZ = 6m.35s., iZ = 7m.0s., iPPPZ = 7m.38s., iZ = 8m.1s., eE = 10m.40s.
Victoria SS = 13m.59s.
Saskatoon PP = 7m.34s.
Philadelphia iP_cP = 9m.10s., eS = 12m.6s.
Bogota ePPPN = 8m.30s., eSSN = 15m.24s.
Ottawa SSS = 15m.47s.
San Juan i = 7m.35s. and 7m.43s.
Bermuda eS_cS = 18m.11s.
Seven Falls SS = 16m.51s.
Sitka iS_cS = 18m.15s.
Huancayo i = 8m.15s., e = 8m.47s. and 16m.31s.
Halifax SSS = 18m.17s.
La Paz iPSNZ = 16m.47s., S_cSEN = 19m.1s., SSEN = 20m.17s., SSS = 21m.47s., iE = 22m.7s.
College reading reduced by 10m.
Scoresby Sund 21m.49s.
Lisbon iPZ = 12m.41s.a, SE = 22m.46s.
Kew ePPS?EN = 24m.30s., eSS?EN = 28m.50s.?, eSSS?EN = 32m.14s., eQ?EN = 35m.30s.
De Bilt eSS = 29m.17s.
Uccle eEN = 36m.25s.
Malaga PPZ = 16m.15s., PPPZ = 18m.37s., PSZ = 24m.45s., SSZ = 29m.39s.
Granada P_cP = 13m.12s., iPP = 16m.38s., PPP = 18m.35s., iSKKS = 23m.53s., iS = 24m.5s., iPPS = 25m.23s., iSS = 29m.59s., SSS = 32m.32s.
Upsala PN = 13m.22s., eSN = 23m.46s.?
Clermont-Ferrand iSS = 30m.17s.
Almeria PP = 16m.33s., PPP = 18m.28s., PS = 25m.3s., SS = 29m.48s., SSS = 33m.16s.
Tortosa SSN = 30m.7s., QN = 37m.12s.
Alicante PP = 17m.2s., PPS = 25m.26s.
Strasbourg eSP = 25m.26s., eSPP = 25m.58s., eSS = 30m.25s., iSS = 30m.32s., eSSS = 33m.47s.
Stuttgart e = 17m.35s., ePSP = 25m.31s., eSS = 30m.27s., e = 36m.32s. and 37m.35s.
Prague ePPP($\Delta > 180°$) = 37m.59s.
Warsaw eE = 18m.13s., 22m.49s., and 29m.39s.
Rome ePPZ = 17m.40s., eS?N = 25m.22s., eSS?E = 31m.44s., eEN = 40m.40s.
Vladivostok PPS = 27m.9s.
Irkutsk SS = 32m.47s.?
Sverdlovsk PPS = 28m.27s., SS = 33m.5s., SSS = 38m.11s.
Riverview ePPSE = 29m.35s., eE = 30m.16s., eSSSE = 38m.25s.
Tashkent eS = 28m.11s., SS = 36m.29s.
Stalinabad PPP = 23m.18s., iPPS = 32m.14s., eSSS = 41m.29s.
Long waves were also recorded at Apia, Auckland, La Plata, and at other European stations.

Nov. 21d. 4h. 17m. 37s. Epicentre 18°·9N. 107°·8W. (as at 3h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya		8·1	85	e 1 57	− 5	i 3 30	− 5	—	—	—
Tucson		13·6	349	i 3 15	− 2	—	—	i 3 32	PP	—
La Jolla	z.	16·3	331	e 3 40	−12	—	—	—	—	—
Palomar		16·5	332	i 3 55	+ 1	—	—	—	—	—
Riverside	z.	17·3	332	i 4 6	+ 2	—	—	—	—	—
Mount Wilson	z.	17·8	332	i 4 12	+ 1	—	—	—	—	—
Pasadena		17·8	332	i 4 11	0	—	—	i 4 24	PP	9·2
Pierce Ferry		18·0	345	i 4 4	− 9	—	—	—	—	—
Boulder City		18·1	342	i 4 4	−10	—	—	—	—	—
Santa Barbara	z.	18·8	329	i 4 23	0	—	—	—	—	—
Haiwee	N.	19·4	336	e 4 36	+ 6	—	—	—	—	—
Tinemaha	z.	20·3	336	i 4 39	− 1	—	—	i 4 54	PP	—
Fresno		20·7	333	i 4 46	+ 2	—	—	i 5 5	PP	—
Lick	N.	22·0	330	e 4 58	0	—	—	—	—	—
Mineral		24·5	335	e 5 26	+ 4	—	—	—	—	—
St. Louis		24·9	34	e 5 26	0	e 10 3	+16	i 5 31	P	—
Shasta Dam		25·1	334	e 5 26	− 2	—	—	—	—	—
Hungry Horse		29·8	352	e 6 16	+ 5	—	—	—	—	—
Cleveland	z.	31·8	38	i 6 29	+ 1	—	—	—	—	—
Temiskaming		36·4	33	e 7 11	+ 3	—	—	—	—	—
Kirkland Lake		36·8	31	e 7 14	+ 3	—	—	—	—	—
La Paz		52·5	128	9 24	+ 7	—	—	—	—	—
Stuttgart	z.	92·5	36	e 13 28	+14	—	—	—	—	—

Nov. 21d. 19h. 1m. 58s. Epicentre 5°·1S. 153°·5E. (as on 1942, Feb. 2d.).

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	N.	22·3	181	i 5 0	− 1	i 9 3	+ 1	—	—	—
Riverview		28·7	184	e 6 2	+ 1	e 10 48	− 2	—	—	e 14·0
Auckland		37·2	150	e 13 2?	PcS	—	—	—	—	—
Arapuni		38·5	151	—	—	14 2	+40	—	—	e 18·0
Wellington		40·7	155	13 11	PcS	14 2	+ 7	16 12	SS	19·6
Perth		44·2	228	—	—	i 14 35	−11	i 17 30	SS	i 20·9
Vladivostok		51·8	341	i 9 13	+ 1	i 16 34	+ 1	—	—	—
Calcutta	E.	69·3	296	e 11 4	− 7	e 21 4	PPS	e 25 4	SS	—
Irkutsk		70·7	330	—	—	20 32	− 2	—	—	—
Bombay		82·9	290	e 12 26	− 2	22 43	− 3	—	—	—
Andijan		86·6	311	e 12 45	− 1	—	—	—	—	—
Kulyab		88·2	307	i 12 54	0	—	—	—	—	—
Berkeley		88·6	52	e 15 26	?	i 25 24	PPS	—	—	e 41·3
Shasta Dam		88·8	49	e 13 6	+ 9	—	—	e 14 2	?	—
Stalinabad		89·0	308	i 12 58	0	i 23 44	− 1	i 16 39	PP	—
Tashkent		89·0	312	i 12 57	− 1	23 25	[− 2]	e 24 47	PS	—
Victoria		89·2	42	—	—	e 24 2?	+15	—	—	38·0
Samarkand		90·5	310	e 13 22	+17	—	—	—	—	—
Tinemaha		91·6	53	i 13 21	+11	—	—	—	—	—
Pasadena		92·0	56	i 13 19a	+ 7	—	—	—	—	e 38·7
Grand Coulee		92·1	42	e 13 20	+ 8	—	—	—	—	—
Mount Wilson	Z.	92·1	56	i 13 21a	+ 9	—	—	i 15 29	?	—
Riverside	Z.	92·1	56	i 13 23a	+11	—	—	i 15 31	?	—
Palomar	Z.	92·5	57	i 13 26a	+12	—	—	i 15 39	?	—
Boulder City		94·3	54	i 13 34	+11	—	—	—	—	—
Pierce Ferry		95·0	54	i 13 28	+ 2	—	—	—	—	—
Hungry Horse		95·4	42	e 13 36	+ 8	—	—	—	—	—
Sverdlovsk		95·8	326	e 17 21	PP	24 42	− 3	24 1	SKS	—
Tucson		97·5	58	e 13 48	+11	—	—	e 13 59	?	e 41·8
St. Louis		113·6	50	e 19 55	PP	i 29 23	PS	e 35 37	SS	—
Scoresby Sund		114·6	358	—	—	39 32	SSS	—	—	—
Ksara		115·7	304	e 19 46	PP	e 35 38	SS	—	—	—
Ottawa		121·4	38	e 19 2	[+ 6]	—	—	(36 2)	SS	36·0
Seven Falls		123·6	34	—	—	30 26	PS	—	—	51·0
Stuttgart		127·0	331	e 19 9	[+ 3]	e 31 20	PS	e 21 12	PP	e 61·0
Florence		129·1	326	i 22 34	PKS	—	—	—	—	—
Rome		129·6	323	e 22 39	PKS	e 39 12	SSP	e 32 55	PPS	e 60·2
Paris		129·9	335	—	—	32 2	PS	—	—	e 66·0
Clermont-Ferrand		132·0	333	—	—	e 44 40	SSS	e 34 42	?	63·0
La Paz		133·6	119	19 44	[+25]	—	—	i 23 0	?	63·4
Granada		141·8	330	—	—	i 27 6	[+24]	i 42 56	?	70·6
Fort de France		144·6	72	e 19 45	[+ 7]	—	—	—	—	—

Additional readings :—
Riverview eN = 6m.17s., eSN = 10m.37s.
Wellington ScS = 17m.30s.
Stalinabad PPS = 25m.3s.
Tashkent eSS = 29m.38s.
Sverdlovsk iPS = 26m.9s., iSS = 31m.26s., SSS = 35m.38s.
St. Louis eS = 27m.54s.
Stuttgart e = 23m.56s., 32m.37s., 33m.40s., 43m.20s., and 47m.2s.
Rome eSSSN = 43m.49s.
Long waves were also recorded at other American and European stations.

Nov. 21d. Readings also at 0h. (Kodaikanal, La Paz, Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Hungry Horse, Pierce Ferry, Shasta Dam, and Tucson), 2h. (near Mizusawa), 4h. (La Paz, La Jolla, Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, and Tucson), 5h. (Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Pierce Ferry, and Tucson), 7h. (Stuttgart, Istanbul, and Ksara), 9h. (De Bilt, Stuttgart, Strasbourg, Clermont-Ferrand, Paris, La Jolla, Mount Wilson (2), Palomar (2), Pasadena (2), Riverside (2), Tinemaha (2), Boulder City, Hungry Horse, Pierce Ferry (2), Shasta Dam (2), and Tucson (2)), 10h. (near Stalinabad), 12h. (Hungry Horse and Shasta Dam), 14h. (Stalinabad and near Kulyab), 17h. (Brisbane, Riverview, and La Paz), 21h. (near Ashkabad).

Nov. 22d. 8h. 0m. 48s. Epicentre 8°·5N. 102°·8W. (as on 1944, Dec. 29d.).

$A = -·2192$, $B = -·9646$, $C = +·1468$; $\delta = +5$; $h = +7$;
$D = -·975$, $E = +·222$; $G = -·033$, $H = -·143$, $K = -989$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		24·8	344	e 5 23	− 2	e 9 40	− 6	—	—	e 11·0
Palomar		27·9	334	i 5 53	− 1	—	—	—	—	—
Riverside	z.	28·7	334	e 5 59	− 2	—	—	—	—	—
Bogota		28·8	95	e 6 3	+ 1	—	—	e 7 32	PP	—
Mount Wilson	z.	29·2	334	e 6 2	− 3	—	—	—	—	—
Pasadena		29·2	334	i 6 1	− 4	—	—	—	—	e 13·4
Pierce Ferry		29·3	342	i 6 7	+ 1	—	—	—	—	—
Boulder City		29·5	341	e 6 6	− 2	—	—	—	—	—
Tinemaha	z.	31·7	336	i 6 27	0	—	—	—	—	—
Huancayo		34·1	126	e 7 2	+14	e 12 26	+12	—	—	e 17·0
Rapid City		35·4	0	e 6 51	− 9	e 12 44	+10	—	—	e 16·9
Chicago		35·8	18	e 7 14	+11	e 12 44	+ 3	e 8 32	PP	e 15·7
Shasta Dam		36·5	335	e 7 6	− 3	—	—	—	—	—
Grand Coulee		41·6	343	e 7 41	−10	—	—	i 7 51	P	—
La Paz		42·4	125	7 58	0	i 14 29	+ 9	—	—	22·2
Ottawa		43·6	28	8 6	− 2	14 44	+ 6	—	—	25·2
Kirkland Lake		44·0	22	e 8 9	− 2	—	—	—	—	—

Additional readings :—
Tucson i = 5m.35s., e = 8m.38s.
Palomar iNZ = 5m.57s.
La Paz iS = 14m.38s.
Long waves were also recorded at Salt Lake City.

Nov. 22d. 9h. Epicentre probably region of the Kermadec Islands.

Wellington P = 24m.27s., i = 24m.32s., S = 26m.35s., L¦Z = 28m.
Auckland S = 26m.0s., L = 26·8m.
Arapuni S = 26m.6s.
Brisbane ePN = 26m.43s., eSE = 31m.24s., eLEN = 33m.50s.
Riverview iPZ = 27m.6s.k, ePPE = 27m.43s., eS¦E = 31m.21s., eSS¦E = 32m.23s., eLZ = 33·6m.
Shasta Dam eP = 33m.22s.
Mount Wilson ePZ = 33m.37s.
Riverside ePZ = 33m.41s.
Palomar iPZ = 33m.41s., eZ = 34m.10s.
Tinemaha iPZ = 33m.49s., iZ = 34m.1s., and 34m.9s.
Tucson eP = 33m.57s., i = 34m.17s.
Pierce Ferry eP¦ = 34m.0s.
Boulder City eP¦ = 34m.6s.
Ksara ePKP = 41m.2s., PP = 44m.40s.
Stuttgart eZ = 41m.5s.
Bombay eEN = 52m.10s.

Nov. 22d. 19h. 17m. 50s. Epicentre 21°·4S. 169°·3E. (as on 1947, May 14d.).

Approximate.

$A = -·9157$, $B = +·1730$, $C = -·3628$; $\delta = +6$; $h = +4$;
$D = +·186$, $E = +·983$; $G = +·356$, $H = -·067$, $K = -·932$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Brisbane	N.	16·0	244	e 3 49	+ 1	e 7 0	+14	—	—	—
Auckland		16·1	164	4 34	+45	8 28	L	—	—	(8·5)
Riverview		20·2	229	i 4 37 a	− 2	i 8 26	+ 5	i 4 45	pP	e 9·4
Wellington		20·4	169	4 36	− 5	8 21	− 4	6 15	pP	—
Pasadena	z.	88·3	52	i 12 58	+ 3	—	—	—	—	—
Mount Wilson	z.	88·4	52	i 12 57	+ 2	—	—	—	—	—
Riverside	z.	88·8	52	i 13 0	+ 3	—	—	—	—	—
Palomar		88·9	53	i 13 1	+ 3	—	—	—	—	—
Boulder City		91·6	51	i 13 13	+ 3	—	—	—	—	—
Pierce Ferry		92·3	53	i 13 17	+ 4	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		93·1	57	e 13 21	+ 4	—	—	—	—	—
La Paz		112·3	119	18 34	[− 4]	25 46	[+24]	—	—	—
Ksara		137·2	297	e 19 36	[+11]	—	—	e 22 42	PKS	—
Stuttgart	z.	148·4	335	e 19 54	[+ 9]	e 26 19	[−33]	—	—	—
Strasbourg		149·1	336	i 19 57	[+11]	—	—	—	—	—
Zürich		149·8	334	e 19 55	[+ 8]	—	—	—	—	—
Alicante		161·0	335	—	—	e 47 25	SSP	i 57 9	Q	—

Additional readings :—
Riverview iN = 4m.41s. and 5m.21s., iSSN = 8m.57s.
Wellington eZ = 5m.23s., PPZ = 6m.30s., P_cS? = 9m.55s., phases incorrect.
Palomar i = 13m.8s.
Boulder City i = 13m.23s.
Pierce Ferry i = 13m.26s.
Tucson e = 13m.30s.
Stuttgart eZ = 20m.4s.
Long waves were also recorded at Arapuni, Bombay, and Triest.

Nov. 22d. Readings also at 1h. (De Bilt, Paris, Strasbourg, Stuttgart, Granada, and near Florence), 2h. (near Ashkabad), 4h. (La Paz and near Mizusawa), 5h. (Haiwee, La Jolla, Mount Wilson (2), Pasadena, Palomar (2), Riverside (2), Tinemaha (2), Tucson (2), Pierce Ferry (2), Boulder City (2), Shasta Dam (2), Hungry Horse (2), Grand Coulee, Paris (2), Strasbourg, Stuttgart (2), Zürich, Brisbane, and near Apia), 6h. (Florence), 7h. (near Kulyab), 8h. (Kulyab and near Ashkabad), 10h. (Hungry Horse, Stuttgart, Zürich, and near Basle), 11h. (Bogota and La Paz), 12h. (Auckland, Arapuni, Wellington, Brisbane, Riverview, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, and near Kulyab), 15h. (near Kulyab), 17h. (near Lisbon), 19h. (Paris, Stuttgart, Hungry Horse, Pierce Ferry, La Paz, and near Huancayo), 20h. (Hungry Horse, Pierce Ferry, Andijan, Stalinabad, near Almata, and Frunse), 22h. (Kew), 23h. (Budapest, Copenhagen, and near Bucharest).

Nov. 23d. 9h. 46m. 3s. Epicentre 44°·8N. 112°·0W.

Intensity VIII at Alder, Cameron, Elk Lake Camp, Ennis, Laurin, and Virginia City; VII at Cliff Lake, Dillon, and Hedgeville; VI at Bozeman, Butte, Hamilton, Helena, Grangeville, Livingston, and Saint Anthony.
Macroseismic area 150,000 sq. m.
Much material damage in central region of Madison County, particularly Virginia City and Alder. Rock falls, bores, and mud springs.

L. M. Murphy.
United States Earthquakes, 1947, Serial No. 730, Washington, 1950, p. 8-14. Macroseismic chart p. 9.

S. W. Nile.
Montana Earthquake of November 23rd, 1947. Bulletin of the Geolog. Soc. of America, 1948, Vol. 59, No. 12, part 2, p.p. 1394, 1395.

A = −·2667, B = −·6601, C = +·7023 ; δ = +9 ; h = −3 ;
D = −·927, E = +·375 ; G = −·263, H = −·651, K = −·712.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bozeman		1·1	38	i 0 20	− 1	i 1 51	?	—	—	i 2·6
Butte		1·3	342	i 0 26	+ 1	i 1 26	?	—	—	i 2·0
Logan		3·1	178	i 0 51	0	—	—	—	—	—
Hungry Horse		3·8	340	e 1 0	− 1	—	—	—	—	—
Salt Lake City		4·0	178	e 1 7	+ 3	i 1 56	+ 4	—	—	i 2·0
Grand Coulee		5·8	305	e 1 28	− 1	e 2 31	− 7	—	—	—
Rapid City		6·3	94	i 1 34	− 2	—	—	i 1 50	P^*	i 4·9
Denver		7·2	132	1 48	− 1	3 3	−10	e 2 20	P_g	e 3·7
Seattle		7·7	296	e 2 42	P_g	e 4 0	S^*	—	—	e 4·0
Saskatoon		8·2	24	2 17	P^*	3 57	+19	—	—	—
Mineral	E.	8·4	241	e 2 12	+ 6	—	—	—	—	—
Victoria		8·7	300	2 12	+ 2	3 55	+ 5	—	—	4·4
Pierce Ferry		8·8	191	i 2 16	+ 5	i 4 0	+ 7	i 3 1	P_g	—
Tinemaha		9·0	213	e 2 21	+ 8	i 4 53	S_g	—	—	—
Boulder City		9·1	195	e 2 18	+ 4	i 4 3	+ 3	—	—	i 4·9

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Haiwee		9·8	210	e 2 24	0	—	—	—	—	—
Ferndale		10·0	249	e 2 41	+14	i 4 45	+23	—	—	i 5·7
Fresno		10·0	219	i 2 34	+ 7	—	—	—	—	i 5·4
Ukiah		10·1	240	e 2 37	+ 9	i 4 39	+14	—	—	i 5·0
Berkeley		10·3	232	i 2 41	+ 9	e 4 55	+25	—	—	e 6·4
Lick	E.	10·4	228	i 2 43	+ 9	i 5 38	?	—	—	—
San Francisco		10·5	232	e 2 44	+ 9	e 5 4	+29	—	—	i 5·6
Santa Clara		10·6	229	i 2 45	+ 9	—	—	—	—	e 5·0
Mount Wilson	E.	11·5	206	i 2 55	+ 7	—	—	—	—	—
Riverside		11·6	203	i 2 54	+ 4	—	—	—	—	—
Pasadena		11·7	206	i 2 56	+ 5	i 5 15	+11	—	—	—
Santa Barbara	Z.	11·9	212	i 3 6	+12	—	—	—	—	—
Palomar		12·0	200	i 3 1k	+ 6	—	—	—	—	—
La Jolla	Z.	12·6	201	i 3 9	+ 6	—	—	—	—	—
Tucson		12·6	175	i 3 6	+ 3	i 6 21	L	—	—	i 6·7
St. Louis		17·4	103	i 4 0	− 6	i 7 12	− 7	—	—	—
Chicago		18·0	90	i 4 5	− 8	i 7 32	0	e 5 9	PP	i 8·9
Cincinnati		21·2	95	i 4 53	+ 4	i 8 40	− 1	i 5 15	PP	—
Kirkland Lake		22·2	69	4 58	− 2	9 8	+ 8	—	—	11·2
Cleveland		22·4	87	i 4 58k	− 4	i 9 4	0	i 5 23	PP	i 11·5
Ville Marie		22·6	69	5 4	+ 1	9 16	+ 9	—	—	11·0
Temiskaming		23·0	72	5 4	− 3	9 10	− 4	10 17	SS	11·9
Hamilton		23·1	79	5 9	+ 1	9 22	+ 6	—	—	11·0
New Kensington		24·0	87	i 5 18	+ 1	i 9 37	+ 5	i 6 2	PP	i 12·6
Pennsylvania		25·2	86	i 5 31	+ 2	e 9 53	+ 1	i 6 7	PP	—
Ottawa		25·5	74	5 29a	− 3	9 57	0	6 6	PP	13·0
Columbia		26·1	102	e 5 34	− 3	e 10 7	0	—	—	e 10·5
Georgetown		26·5	89	i 5 40	− 1	i 10 15	+ 1	11 21	SS	13·0
Shawinigan Falls		27·3	71	5 46	− 2	10 28	+ 1	6 13	PP	12·4
Philadelphia		27·5	86	i 5 51	+ 1	i 10 24	− 6	i 6 38	PP	i 11·8
Tacubaya		27·5	152	i 5 59	+ 9	e 10 55	+25	—	—	e 14·8
Fordham		28·1	83	e 5 53	− 2	i 10 41	+ 1	—	—	i 13·7
Seven Falls		28·5	69	5 54	− 5	10 42	− 4	—	—	12·9
Harvard		29·1	79	i 6 3	− 1	e 10 45	−11	e 7 5	PP	e 12·6
Weston		29·3	79	e 6 7	+ 1	e 10 59	0	—	—	i 14·1
Halifax		34·0	72	—	—	e 12 9	− 4	—	—	15·0
Bermuda		38·5	91	e 7 17	− 9	i 13 14	− 8	i 15 57	SS	i 16·2
Ivigtut		40·0	42	7 36	− 2	—	—	—	—	20·0
San Juan		46·3	108	e 8 31	+ 2	e 15 17	+ 1	—	—	e 18·5
Scoresby Sund		48·6	26	—	—	—	—	19 29	SS	23·0
Bogota	Z.	52·0	128	i 9 13	0	—	—	—	—	—
Fort de France		52·2	107	e 8 36	−39	—	—	—	—	—
Aberdeen	E.	62·8	35	—	—	e 23 31	SS	—	—	—
Huancayo		65·6	139	e 10 49	+ 1	e 19 33	0	—	—	e 28·5
Kew		67·5	39	i 10 57	− 3	e 19 53	− 3	e 20 10	PS	e 31·0
Upsala		67·8	25	10 56?	− 6	19 56?	− 4	20 46	S_cS	e 33·0
De Bilt		69·4	36	—	—	e 24 57	SS	—	—	e 34·0
Copenhagen		69·5	30	e 11 10	− 2	e 20 22	+ 2	—	—	30·0
Uccle		70·0	37	e 11 13	− 2	e 25 33	SS	—	—	e 38·0
Paris		70·6	39	i 11 18	− 1	e 28 27	SSS	i 12 23	P_cP	34·0
Lisbon		71·7	53	11 21a	− 5	20 44	− 1	—	—	34·0
Jena	N.	72·9	33	e 11 31	− 2	e 19 6	?	—	—	—
La Paz		72·9	135	i 11 33	0	i 20 57	− 2	i 14 22	PP	37·0
Clermont-Ferrand		73·1	42	e 11 32	− 2	e 21 6	+ 5	i 29 38	SSS	33·4
Strasbourg		73·1	37	i 11 33	− 1	e 21 8	+ 7	e 13 53	PP	33·6
Stuttgart		73·6	36	e 11 35k	− 2	e 21 5	− 2	e 26 21	SS	e 36·0
Basle		73·8	37	e 11 36k	− 2	—	—	—	—	—
Cheb		73·9	33	e 9 57?	?	e 20 3	−67	e 33 57?	Q	e 38·0
Neuchatel		74·0	38	e 11 37	− 2	—	—	—	—	—
Zürich		74·4	37	e 11 39k	− 3	e 21 38	+22	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Chur		75·2	37	e 11 44	− 2	—	—	—	—	—
Warsaw		75·2	28	e 11 45k	− 1	e 21 3	−22	e 14 34	PP	e 37·0
Tortosa		75·5	46	11 48	0	—	—	14 45	PP	e 41·0
Vladivostok		75·6	317	e 11 42	− 6	—	—	—	—	—
Malaga	z.	75·8	52	i 11 49a	− 1	i 22 1	+30	i 11 54	pP	38·9
Granada		75·9	51	i 11 51a	+ 1	i 22 3	+31	12 33	P_cP	40·0
Moscow		76·6	17	11 51	− 3	e 21 38	− 2	—	—	—
Alicante		76·8	48	i 11 59	+ 4	i 21 41	− 1	12 14	pP	e 36·5
Almeria		76·8	51	i 11 47	− 8	—	—	14 57	PP	—
Triest		78·0	36	e 12 1	− 1	e 21 52	− 3	—	—	—
Florence		78·4	38	i 12 5	+ 1	i 22 29	+29	—	—	—
Irkutsk		78·4	338	e 12 4	0	e 21 56	− 4	—	—	—
Sverdlovsk		78·6	4	i 12 2?	− 3	21 58?	− 4	—	—	—
Zagreb		78·7	34	e 12 5	− 1	—	—	—	—	e 40·0
Rome		80·4	39	i 12 13k	− 2	e 22 21	0	e 15 15	PP	e 38·6
Belgrade		81·3	32	e 12 19	− 1	e 22 33	+ 3	e 23 41	PPS	—
Istanbul		87·7	28	12 48	− 4	23 34	+ 1	—	—	—
Grozny		90·0	16	e 13 10	+ 7	—	—	—	—	—
Tashkent		94·3	359	e 13 23	0	23 51	[− 6]	e 16 57	PP	—
Andijan		94·7	356	e 13 11	−13	—	—	—	—	—
Samarkand		95·9	1	e 13 37	+ 7	—	—	—	—	—
Stalinabad		97·0	359	i 13 33	− 2	24 12	[0]	i 17 5	PP	—
Helwan		98·5	32	13 42	0	24 21	[+ 1]	17 45	PP	—
Bombay		116·5	355	e 19 54	PP	e 28 53	PS	—	—	—
Hyderabad	N.	117·3	349	19 59	PP	—	—	—	—	—

Additional readings :—
Logan i = 56s.
Salt Lake City i = 1m.30s. and 1m.51s.
Rapid City i = 1m.43s.
Denver e = 3m.27s.
Mineral iE = 2m.30s. and 2m.42s.
Boulder City i = 2m.23s. and 3m.0s.
Fresno iN = 2m.38s.
Berkeley eEN = 4m.16s., iZ = 5m.11s. and 5m.34s.
Tucson i = 3m.11s.
St. Louis iZ = 4m.5s.
Chicago eS = 7m.6s.
Cincinnati i = 5m.45s., iSS = 9m.20s.
Cleveland iPZ = 5m.2s., iN = 5m.7s., iZ = 5m.19s., iPPPE = 5m.36s., iE = 5m.56s., iSSEN = 9m.35s., iE = 10m.22s.
New Kensington ePPP? = 6m.33s., eP_cP? = 8m.2s.
Pennsylvania iEN = 10m.7s.
Georgetown i = 5m.43s., 10m.31s., and 10m.34s.
Shawinigan Falls SS = 10m.55s.
Philadelphia iPPP = 6m.59s., i = 10m.31s.
Fordham e = 6m.6s.
Harvard i = 6m.30s.
Kew ePPS?E = 20m.28s., eSS?EN = 24m.33s., eSSS?EN = 27m.23s.?
Upsala eSS?N = 23m.57s.?, eSSS?E = 27m.35s., eN = 29m.57s.?
Paris iP = 11m.21s.
La Paz iPSN = 21m.33s., iSSN = 25m.29s.
Strasbourg iP_cP = 11m.38s., ePPP = 16m.7s., eS = 21m.18s., eSP = 21m.36s., eSS = 25m.57s. and 26m.9s., iSSS = 29m.38s. and 29m.44s.
Stuttgart iPZ = 11m.39s.a.
Zürich i = 11m.44s., e = 12m.20s.
Warsaw ePPE = 15m.58s., eE = 19m.9s., SSE = 25m.47s., SSSE = 28m.51s.
Tortosa PPPN = 16m.27s.
Malaga PPZ = 15m.4s., PPPZ = 16m.58s., eSSZ = 27m.28s.
Alicante P_cP = 12m.9s., PP = 14m.54s., PPP = 16m.46s., PS = 22m.8s., SS = 26m.30s., SSS = 29m.32s.
Almeria PPP = 16m.57s.
Rome eSS = 27m.47s.
Long waves were also recorded at Calcutta, Wellington, Riverview, and other European stations.

Nov. 23d. 17h.-18h. Undetermined shock.
Grand Coulee eP =59m.29s., ipP =59m.47s.
Hungry Horse iP =59m.51s., epP? =60m.9s.
Shasta Dam iP =60m.3s., ipP =60m.21s.
Berkeley iPZ =60m.24s., ipPZ =60m.42s.
Fresno iPZ =60m.42s., iN =60m.45s., iE =60m.49s., ipPZ =61m.1s.
Tinemaha ePEN =60m.47s.
Haiwee ePEN =60m.55s.
Santa Barbara iP =60m.59s., ipPZ =61m.18s.
Mount Wilson iP =61m.7s.k, ipPZ =61m.26s.a.
Pasadena iPZ =61m.7s.k, ipPZ =61m.26s., iZ =61m.34s.
Boulder City iP =61m.8s., ipP =61m.27s.
Riverside iPZ =61m.10s.k, ipPZ =61m.29s.a.
Pierce Ferry iP =61m.11s., ipP =61m.30s.
Palomar iP =61m.18s.k, ipPZ =61m.36s.a.
La Jolla iPZ =61m.21s.
Tucson iP =61m.50s., i =61m.58s., ipP =62m.9s., e =63m.41s.
Kirkland Lake e =62m.21s.
St. Louis iP =62m.34s., ipP =62m.53s., iPP? =64m.40s., eS? =71m.42s., ePS? =72m.49s.
Long waves were recorded at Kew.

Nov. 23d. Readings also at 2h. (Brisbane), 3h. (Riverview), 5h. (near Grozny, Piatigorsk, and Sotchi), 7h. (Brisbane, Riverview, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, and near Stalinabad), 9h. (Paris and Strasbourg), 10h. (near Boulder City), 11h. (near Bucharest), 12h. (near Hungry Horse), 13h. (La Paz), 15h. (Wellington, Arapuni, Auckland, Almata, Ashkabad, Samarkand, Tashkent, Tchimkent, near Andijan, and Stalinabad), 16h. (Mount Wilson, Pasadena, Palomar, Tucson, Pierce Ferry, and La Paz), 18h. (Basle, Zürich, Strasbourg, Stuttgart, and near Malaga), 20h. (Santa Lucia), 21h. (Pierce Ferry and Tucson), 22h. (near Almata).

Nov. 24d. 17h. 10m. 5s. Epicentre 37°·6N. 6°·4W.

Intensity V at Guillena, La Palma, and Almaden de La Plata; Intensity IV in the Province of Seville; III at Huelva and Cordoba; II at Badajoz.
Epicentre 37°37′N. 6°25′W. About 50km. West of Seville.

Resumen de las Observaciones solares, meteorologicas y sismologicas efectuades durante el año 1947, Vol. 35, serie A, Tortosa 1950, p.224.

A. G. Riutort.
Movimientos sismicos en España durante 1947, Boletin de la Real Sociedad Española de Historia Natural, Tomo 47, 1949, p.488.

$A = +\cdot7893$, $B = -\cdot0885$, $C = +\cdot6076$; $\delta = 0$; $h = 0$;
$D = -\cdot112$, $E = -\cdot994$; $G = +\cdot604$, $H = -\cdot068$, $K = -\cdot794$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malaga	1·8	119	i 0 34a	+ 2	i 0 56	0	i 0 39	P_g	—
Granada	2·3	101	i 0 40k	0	1 8	− 1	0 48	P_g	—
Lisbon	2·4	297	0 35a	− 6	1 10	− 2	1 15	S^*	—
Almeria	3·1	103	1 4	P_g	1 26	− 3	1 41	S_g	—
Alicante	4·6	79	1 22	P^*	2 5	− 2	1 36	P_g	—
Tortosa	6·2	58	1 34	− 1	2 47	− 1	3 9	S_g	4·6
Clermont-Ferrand	10·8	38	e 2 9	−30	i 4 51	SS	—	—	—
Paris	12·9	27	e 3 3	− 4	—	—	—	—	—
Basle	14·3	42	—	—	e 6 52	SSS	—	—	e 8·1
Strasbourg	15·0	39	—	—	e 7 3	SS	—	—	e 8·1
Stuttgart	15·9	41	—	—	e 5 55	−49	—	—	e 7·9

Additional readings :—
Malaga iSNW =0m.59s., iS_gZ =1m.11s., iNW =1m.17s. and 1m.33s.
Granada P =0m.44s., 0m.57s. and 1m.1s., S =1m.15s., 1m.22s. and 1m.31s., PS = 1m.39s., S =1m.46s.
Lisbon iP^* =0m.39s.k.
Almeria P_g =1m.13s., S_g =1m.49s., P_gS_g =1m.53s., and 2m.6s., S_g =2m.11s.
Alicante P_g =1m.39s., PS =2m.12s., iS_g =2m.36s., S_g =2m.41s.
Tortosa P_gN =2m.1s., P_gS_gEN =2m.26s., P_gS_gN =2m.36s., 2m.52s., 3m.15s., S_gEN = 3m.27s., S_gN =3m.31s. and 3m.37s.
Long waves were also recorded at Zürich.

Nov. 24d. Readings also at 0h. (near Mineral), 4h. (Grand Coulee and near Apia), 5h. (La Paz), 8h. (Pierce Ferry), 9h. (near Mineral (2)), 10h. (near Mizusawa), 11h. (La Paz (2)), 14h. (Haiwee, Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Berkeley, Fresno, and Hungry Horse), 17h. (near Mizusawa), 18h. (near Kulyab (2)), 20h. (Bucharest), 23h. (near Balboa Heights).

Nov. 25d. 12h. 24m. 58s. Epicentre 1°·5N., 126°·0E. (as on 1947, June 28d.).

U.S.S.R. gives 2°N. 126°·5E.

$A = -·5876$, $B = +·8088$, $C = +·0260$; $\delta = +11$; $h = +7$;
$D = +·809$, $E = +·588$; $G = -·015$, $H = +·021$, $K = -1·000$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		38·8	140	e 7 24	− 4	e 13 18	− 8	e 8 54	PP	—
Vladivostok		41·8	7	i 7 50	− 3	i 14 7	− 4	—	—	—
Riverview		42·4	149	e 4 56	?	e 16 18	?	—	—	e 20·5
Hyderabad	N.	49·3	292	—	—	15 55	− 4	—	—	—
Irkutsk		53·7	344	9 25	− 1	16 57	− 2	—	—	—
Bombay		54·9	292	e 12 31	PPP	e 17 12	− 4	e 14 2	P_cS	—
Almata		60·2	321	e 10 19	+ 7	—	—	—	—	—
Andijan		62·1	316	e 10 21	− 4	—	—	—	—	—
Stalinabad		63·9	313	i 10 34	− 3	i 19 6	− 6	—	—	—
Tashkent		64·5	316	e 10 39	− 2	e 19 12	− 7	—	—	—
Tchimkent		64·7	317	i 10 44	+ 2	i 19 22	0	—	—	—
Samarkand		65·6	313	e 10 48	0	—	—	—	—	—
Sverdlovsk		75·5	330	i 11 45	− 3	21 19	− 9	—	—	—
Baku		78·4	311	—	—	e 22 17	+17	—	—	—
Grozny		81·9	313	e 12 23	0	—	—	—	—	—
Ksara		89·3	303	i 13 1	+ 2	24 6	+18	16 51	PP	—
Helwan	z.	93·3	300	13 19	+ 1	—	—	e 17 5	PP	—
Istanbul		94·3	311	e 13 26	+ 3	—	—	—	—	e 55·0
Stuttgart		106·2	322	e 18 37?	PP	—	—	—	—	e 64·0

Long waves were also recorded at Copenhagen.

Nov. 25d. 18h. 15m. 2s. Epicentre 10°·5S. 74°·9W. (as on 18d.).

$A = +·2562$, $B = -·9495$, $C = -·1811$; $\delta = -1$; $h = +6$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Huancayo		1·6	195	i 0 22	− 8	i 1 8	+17	—	—	i 1·6
La Paz		8·9	133	i 2 3	− 9	i 4 7	+12	i 4 48	S_g	6·8
Bogota		15·0	3	i 3 42	+ 7	i 6 43	+20	i 3 55	PPP	i 7·9
Balboa Heights		19·9	348	e 4 41	+ 5	e 8 32	+17	—	—	—
Fort de France		28·5	30	e 5 56	− 3	—	—	—	—	—
Bermuda		43·7	13	—	—	e 14 39	0	—	—	e 18·1
St. Louis		50·9	345	i 9 7	+ 2	e 16 18	− 3	i 9 17	pP	—
Cleveland		52·1	354	i 9 25	+11	—	—	—	—	e 22·8
Tucson		54·6	322	e 9 35	+ 3	—	—	e 11 36	PP	—
Ottawa		55·6	359	e 9 41	+ 1	—	—	—	—	30·0
Temiskaming		57·0	357	i 10 0	+10	—	—	—	—	—
Antarctica		57·9	176	i 9 52	− 4	e 17 54	− 1	e 16 0	?	e 25·0
Kirkland Lake		58·6	356	e 10 3	+ 2	—	—	—	—	—
Palomar		59·1	320	i 10 8	+ 4	—	—	—	—	—
Pierce Ferry		59·2	324	e 10 9	+ 4	—	—	—	—	—
Boulder City		59·6	323	e 10 12	+ 4	—	—	—	—	—
Riverside	z.	59·9	320	i 10 13	+ 3	—	—	—	—	—
Mount Wilson	z.	60·5	320	i 10 17	+ 3	—	—	—	—	—
Pasadena	z.	60·5	320	i 10 17	+ 3	—	—	—	—	—
Tinemaha	z.	62·4	322	i 10 31	+ 4	—	—	—	—	—
Shasta Dam		67·2	323	e 10 59	+ 1	—	—	—	—	—
Hungry Horse		68·0	333	e 11 6	+ 3	—	—	—	—	—
Grand Coulee		70·1	331	e 11 18	+ 2	—	—	—	—	—
Lisbon		78·3	47	e 12 11	+ 8	—	—	—	—	36·0
Malaga		81·0	50	i 12 1	−17	i 22 47	+20	12 15	pP	40·0
Granada		81·8	50	i 12 27a	+ 5	i 22 47	+12	15 14	PP	i 42·4
Almeria		82·5	51	i 12 23	− 3	e 22 47	+ 5	15 33	PP	46·0
Alicante		84·5	49	e 12 35	− 1	23 11	+ 9	16 20	PP	e 41·3
Scoresby Sund		88·7	15	—	—	24 58	PS	—	—	44·0
Clermont-Ferrand		89·2	43	e 13 3	+ 4	—	—	—	—	43·0

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Paris	89·7	40	e 13 4	+ 3	—	—	—	—	—
Basle	92·6	42	e 13 17	+ 2	—	—	—	—	—
Strasbourg	93·0	41	—	—	e 30 58?	SSP	—	—	—
Zürich	93·3	42	e 13 17	− 1	—	—	—	—	—
Stuttgart	93·9	41	e 13 20	− 1	—	—	e 13 27	P_cP	e 47·0
Cheb	96·2	39	—	—	e 29 58?	?	—	—	e 49·0
Ksara	113·0	58	e 14 34?	P	—	—	e 19 28?	PP	—
Bombay	147·7	71	e 19 51	[+ 7]	e 29 58?	{− 8}	—	—	—

Additional readings :—
La Paz iZ = 2m.38s. and 3m.27s., iS_g = 5m.25s.
Cleveland iZ = 9m.32s., 9m.36s., and 9m.40s.
Tucson i = 9m.46s., iP_cP = 10m.17s.
Malaga PPZ = 15m.5s., PPPZ = 16m.59s., iSZ = 21m.49s., SSZ = 26m.57s.
Granada PPP = 17m.30s., iSS = 28m.2s.
Almeria PPP = 17m.25s., PS = 23m.31s., SS = 28m.15s.
Alicante PP = 14m.49s., iS = 21m.15s., PPS = 23m.49s., SS = 27m.23s., SSS = 31m.19s.
Long waves were also recorded at San Juan, Kew, Copenhagen, De Bilt, Warsaw, Helsinki, Riverview, Wellington, and Arapuni.

Nov. 25d. 23h. Region of Samoa.

Apia iP = 23m.9s., iS = 23m.31s.
Mount Wilson iPZ = 34m.0s.k.
Pasadena iPZ = 34m.0s.
Palomar iP = 34m.2s.k, iZ = 34m.20s.
Riverside iPZ = 34m.3s.k.
Shasta Dam eP = 34m.7s.
Haiwee ePEN = 34m.10s.
Tinemaha iPZ = 34m.10s.k.
Boulder City iP = 34m.20s.
Pierce Ferry iP = 34m.23s.
Tucson iP = 34m.26s.k, i = 34m.37s.
Grand Coulee iP = 34m.42s.
Hungry Horse iP = 34m.58s.

Nov. 25d. Readings also at 2h. (Calcutta), 3h. (Stuttgart and near Balboa Heights), 7h. (Andijan, Tchimkent, near Kulyab, Samarkand, and Stalinabad), 8h. (Pasadena, Mount Wilson, Palomar (3), Riverside, Tinemaha (3), Tucson (3), Boulder City (2), Pierce Ferry (2), and Shasta Dam (3)), 9h. (Kew), 10h. (Tucson), 12h. (Brisbane and Riverview), 13h. (Calcutta), 14h. (Stuttgart, Sverdlovsk, near Lick and Mineral), 15h. (near Mineral), 16h. (near Mizusawa), 18h. (Pasadena (2), Mount Wilson, Riverside, Tinemaha (2), Tucson, Shasta Dam (2), Grand Coulee, near Huancayo, near Haiwee, Lick, Berkeley, Fresno, and Mineral), 19h. (La Plata and La Paz), 20h. (Kulyab, Andijan, Stalinabad, Tashkent, and Tchimkent), 21h. (near Ottawa), 22h. (near Tananarive), 23h. (Tashkent, near Stalinabad, Andijan, and Kulyab).

Nov. 26d. 22h. U.S.S.R. suggests 10°S., 130°E.

Andijan eP = 47m.37s., eS = 57m.8s.?
Stalinabad iP = 47m.57s., iS = 57m.28s.
Tchimkent P = 48m.2s.
Tashkent eP = 48m.11s.
Ashkabad eP = 48m.44s.
Brisbane eS?EN = 48m.50s.
Sverdlovsk iP = 48m.50s., eS = 59m.32s.
Shasta Dam eP? = 50m.9s., e = 50m.23s.
Bombay eEN = 52m.
Calcutta eE = 53m.6s.
Ksara e = 55m.29s. and 59m.13s.
Stuttgart eP?Z = 55m.48s., eQ? = 96m.
La Paz PNZ = 56m.16s.
Long waves were also recorded at Riverview, Auckland, Wellington, and at other European stations.

Nov. 26d. Readings at 0h. (Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Pierce Ferry, Shasta Dam, Tucson, and near Hungry Horse), 1h. (Palomar, Pasadena, Riverside, Boulder City, Grand Coulee, Pierce Ferry, Shasta Dam, Tucson, and Stuttgart), 2h. (La Paz, Bogota, and Stuttgart), 3h., 6h., and 7h. (La Paz), 8h. (Brisbane, Branner, Fresno, near Lick and San Francisco), 10h. (La Paz, Bogota, Shasta Dam, and Mizusawa), 13h. (Strasbourg and Stuttgart), 17h. (Kirkland Lake and La Paz), 19h. (near Tananarive).

Nov. 27d. 4h. 33m. 47s. Epicentre 36°·8N. 69°·4E. (as on Nov. 10d.).

$A = +\cdot2824$, $B = +\cdot7513$, $C = +\cdot5964$; $\delta = -11$; $h = 0$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kulyab		1·1	15	i 0 26	+ 4	i 0 48	+ 9	—	—	—
Stalinabad		1·8	344	i 0 40	+ 8	i 1 10	+14	—	—	—
Obi-garm		1·9	7	i 0 38	+ 4	i 1 8	+ 9	—	—	—
Tashkent		4·5	359	e 1 7	− 4	e 2 5	0	—	—	—
Andijan		4·6	30	e 1 6	− 6	e 2 3	− 4	—	—	—
Tchimkent		5·5	1	i 1 22	− 3	i 2 32	+ 2	—	—	—
Frunse		7·3	32	e 1 42	− 8	e 3 10	− 5	—	—	—
Almata		8·7	39	e 1 55	−15	3 39	−11	—	—	—
Ashkabad		8·9	281	e 2 23	+11	4 27	L	—	—	(4·4)
Bombay		18·1	169	—	—	e 7 35	0	—	—	e 9·5
Grozny		19·2	297	4 35	+ 7	—	—	—	—	—
Sverdlovsk		20·9	346	e 4 41	− 5	e 8 34	− 1	—	—	—
Hyderabad	N.	20·9	155	e 4 37	− 9	8 28	− 7	—	—	10·9
Kodaikanal	E.	27·4	163	e 8 43	P_eP	—	—	—	—	—
Ksara		27·4	274	—	—	e 8 20	?	—	—	e 14·0
Stuttgart	Z.	44·7	305	e 8 18	+ 2	—	—	—	—	—
Strasbourg		45·6	305	i 8 30	+ 6	—	—	—	—	—

Nov. 27d. Readings also at 0h. (Andijan, Tashkent, near Kulyab, Obi-garm, and Stalinabad), 1h. (near Kulyab), 3h. (near Tchimkent), 5h. (near Mineral (4)), 8h. (near Reykjavik), 9h. (Stuttgart, near Kulyab and Mineral), 10h. (Hungry Horse, La Paz, and near Stalinabad), 12h. (near Alicante), 15h. (La Paz, Strasbourg, Stuttgart, and near Kulyab), 16h. (Ksara), 17h. (near Kulyab), 21h. (Shasta Dam).

Nov. 28d. Readings at 0h. (near Leninakan), 3h. (Mount Wilson, Riverside, Pierce Ferry, Shasta Dam, Tucson, Andijan, near Kulyab, and Stalinabad), 4h. (Bergen and Ksara), 6h. (Bogota and La Paz), 7h. (Sverdlovsk), 8h. (Palomar, Pasadena, Mount Wilson, Riverside, Tinemaha, Boulder City, Grand Coulee, Pierce Ferry, Shasta Dam, Tucson, Hungry Horse, Temiskaming, and Kirkland Lake), 10h. (Hungry Horse, near Leninakan and near Tchimkent), 11h. (Samarkand, near Kulyab, Obi-garm, and Stalinabad), 12h. (La Paz, Bogota, Mount Wilson, Riverside, Tinemaha, Pierce Ferry, Shasta Dam, and Tucson), 13h. (Andijan, Samarkand, Tchimkent, and near Kulyab, Obi-garm, and Stalinabad), 14h. (Mount Wilson (2), Palomar, Pasadena, Riverside (2), Tinemaha (2), Shasta Dam (2), Brisbane, and Riverview), 17h. (Jena, Stuttgart, and Copenhagen), 19h. (Kirkland Lake), 21h. (Mount Wilson, Pasadena, Riverside, Shasta Dam, Tucson, Hungry Horse, Samarkand, and near Andijan, Kulyab, Obi-garm, Stalinabad, and Tchimkent), 22h. (Bozeman, Chicago, Salt Lake City, and Tinemaha), 23h. (Strasbourg, Stuttgart, Jena, Riverview, Mount Wilson, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, and Tucson).

Nov. 29d. 10h. 13m. 51s. Epicentre 38°·3N. 23°·8E. (as on 1938, September 18d.).

$A = +\cdot7199$, $B = +\cdot3175$, $C = +\cdot6172$; $\delta = 0$; $h = -1$;
$D = +\cdot404$, $E = -\cdot915$; $G = +\cdot565$, $H = +\cdot249$, $K = -\cdot787$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		4·9	54	1 18	+ 1	i 2 32	S*	—	—	—
Bucharest		6·3	15	e 1 39	+ 3	i 3 11	S*	i 3 29	S_g	—
Belgrade		7·0	340	i 2 10	P*	i 3 9	+ 1	i 3 49	S_g	—
Kalossa		9·0	338	e 3 8	P_g	e 3 48	−10	—	—	5·6
Rome	Z.	9·4	296	e 2 38	+20	—	—	—	—	—
Zagreb		9·5	325	e 2 16	− 4	e 4 55	S*	e 3 0	P_g	e 5·2
Budapest		9·8	341	2 31	+ 7	e 5 0	S*	5 34	S_g	6·6
Helwan		10·5	141	2 49	PP	5 31	+56	3 12	f	—
Triest		10·5	318	e 2 52	PP	e 3 51	−44	—	—	i 5·6
Ksara		10·8	111	e 2 53	PP	e 5 54	L	—	—	(e 5·9)
Florence		10·9	304	i 3 32	+52	i 5 24	+40	—	—	—
Prague		13·5	333	e 4 22	+67	—	—	—	—	e 7·1
Warsaw		14·1	354	e 3 0	−23	e 6 0	− 2	e 3 22	P	e 7·1
Cheb		14·3	329	e 5 36	?	e 6 45	SSS	e 7 44	Q	i 7·9
Zürich		14·4	314	e 3 23$_s$	− 4	e 5 57	−12	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stuttgart	z.	14·8	320	e 3 30	− 2	e 6 39	SS	e 3 39	PP	e 7·2
Basle		15·0	313	e 3 32	− 3	—	—	e 4 9	?	e 8·1
Collmberg		15·1	333	e 3 35	− 1	—	—	—	—	—
Jena		15·3	329	e 3 35	− 4	—	—	—	—	e 8·1
Strasbourg		15·4	317	e 3 38	− 2	e 6 39	+ 7	—	—	e 7·7
Besançon		15·8	310	e 3 43	− 2	—	—	—	—	e 8·9
Potsdam		16·0	335	e 3 51	+ 3	—	—	—	—	e 8·1
Clermont-Ferrand		17·0	302	i 4 5	+ 4	—	—	—	—	10·1
Paris		18·6	311	i 4 20	− 1	e 5 15	?	i 4 27	PP	e 8·2
Uccle		18·6	319	e 4 22	+ 1	e 7 46	0	—	—	e 9·4
De Bilt		19·0	325	e 4 27	+ 1	e 7 59	+ 4	—	—	e 8·2
Copenhagen		19·0	341	e 4 24	− 2	e 7 51	− 4	—	—	e 9·4
Moscow		19·7	24	e 4 30	− 4	e 8 8	− 2	—	—	—
Kew		21·5	317	i 4 55a	+ 3	e 8 4?	−43	—	—	—
Sverdlovsk		30·5	40	6 17	0	11 16	− 2	—	—	—
Hungry Horse		85·9	333	e 12 45	+ 2	—	—	e 17 29	PPP	—
Tucson		98·1	323	e 13 43	+ 3	—	—	e 13 57	?	—

Additional readings :—
Bucharest iP*N =2m.0s., iP$_g$N =2m.16s., iSN =3m.14s., iN =3m.34s., iS*E =3m.50s., iS*N =3m.54s., iS$_g$E =4m.5s., iS$_g$N =4m.8s.
Belgrade i =2m.21s., iS =3m.38s.
Kalossa eE =3m.14s., eS?EN =4m.47s., eN =5m.38s.
Budapest ePN =2m.44s., SE =5m.37s., eSSSE =6m.17s., eSSSN =6m.23s.
Triest iS$_g$S$_g$ =5m.10s.
Warsaw eSE =5m.56s.
Cheb eS =7m.21s.
Long waves were recorded at Aberdeen, Durham, and Upsala.

Nov. 29d. 17h. 56m. 4s. Epicentre 27°·9N. 91°·9E.

Felt at Gauhati, and Tezpur. Suggested epicentres 27°N. 92°·5E. (Bombay).
28°·5N. 92°·5E. (Strasburg).

Seismo. Bull. Oct.-Dec., 1947, p. 10, Government of India Meteorological Department.

A = −·0294, B = +·8847, C = +·4654 ; δ = +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 28	− 7	i 2 28	−20	—	—	—
Hyderabad	N.	16·2	233	3 54	+ 4	6 49	− 2	—	—	8·5
Almata		19·5	327	e 4 33	+ 2	e 8 10	+ 4	—	—	—
Bombay		19·6	247	e 4 35	+ 3	i 8 13	+ 5	—	—	—
Andijan		20·5	314	4 48	+ 6	e 8 39	+12	—	—	—
Obi-garm		21·4	308	i 4 53	+ 2	8 48	+ 3	—	—	—
Stalinabad		22·0	306	i 4 58	0	9 0	+ 4	—	—	—
Tashkent		22·8	312	i 5 7	+ 2	e 9 12	+ 1	—	—	—
Tchimkent		23·1	315	i 5 10	+ 2	i 9 21	+ 5	—	—	—
Samarkand		23·7	306	e 5 20	+ 6	—	—	—	—	—
Sverdlovsk		36·4	332	7 6	− 2	12 45	− 5	—	—	—
Baku		36·6	302	e 7 30	+20	—	—	—	—	—
Grozny		40·0	306	e 7 39	+ 1	—	—	—	—	—
Leninakan		41·2	302	e 7 54	+ 6	—	—	—	—	—
Ksara		48·0	291	e 8 41	− 2	e 16 56	?	—	—	—
Stuttgart	z.	65·0	314	i 10 40a	− 4	—	—	e 10 56	P	—
Zürich		65·7	313	e 10 43	− 5	—	—	—	—	—
Strasbourg		65·9	314	e 10 46	− 4	—	—	—	—	—
Basle		66·3	313	e 10 49	− 3	—	—	e 14 53	PPP	—
Clermont-Ferrand		69·8	312	i 11 10	− 4	—	—	—	—	—

Long waves were also recorded at Copenhagen.

Nov. 29d. Readings also at 1h. (Boulder City and Pierce Ferry), 3h. (near Mizusawa), 4h. (near Leninakan), 5h. (Ksara, Berkeley, Branner, near Lick, San Francisco, and near Stalinabad), 6h. (Ashkabad, Tashkent, and Shasta Dam), 12h. (La Paz), 13h. (Boulder City, Pierce Ferry, Santa Lucia, and Antarctica), 14h. (Pierce Ferry, Santa Lucia, and La Paz (2)), 15h. (near Ottawa), 16h. (Warsaw), 19h. (Santa Lucia), 20h. (Kirkland Lake), 21h. (near Ottawa).

Nov. 30d. 13h. 2m. 1s. Epicentre 39°·7N. 143°·9E.

Intensity IV at Miyako, Morioka, and Hatinohe ; II-III at Nemuro, Hukusima, Kakioka, Urakawa, Mizusawa, and Kusiro.
Macroseismic radius greater than 300km. Epicentre as adopted. Shallow.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1947, Tokyo, 1950, p. 44, with macroseismic chart p. 45.

$A = -\cdot6234$, $B = +\cdot4546$, $C = +\cdot6362$; $\delta = +4$; $h = 0$;
$D = +\cdot589$, $E = +\cdot808$; $G = -\cdot514$, $H = +\cdot375$, $K = -\cdot772$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Miyako		1·5	267	0 30k	+ 2	0 47	− 2	—	—
Hatinohe		2·0	295	0 57	+22	—	—	—	—
Morioka		2·1	270	0 40k	+ 3	1 3	− 1	—	—
Mizusawa	E.	2·2	251	0 44	P_g	1 5	− 1	—	—
Sendai		2·8	239	0 46	− 1	1 15	− 7	—	—
Akita		2·9	270	1 3	P_g	—	—	—	—
Hukusima		3·3	235	0 55	+ 2	1 29	− 6	—	—
Nemuro		3·8	19	0 42a	−19	1 23	−24	—	—
Sapporo		3·9	331	1 7	P*	—	—	—	—
Mito		4·3	219	1 5	− 3	1 47	−13	—	—
Kakioka		4·5	222	1 9	− 2	1 56	− 9	—	—
Utunomiya		4·5	226	1 11	0	1 56	− 9	—	—
Tukubasan		4·6	223	1 13	+ 1	—	—	—	—
Aikawa		4·7	252	0 59	−15	—	—	—	—
Kumagaya		5·0	227	1 19	+ 1	2 15	− 3	—	—
Maebasi		5·0	231	1 15	− 3	2 14	− 4	—	—
Tokyo		5·2	221	1 19	− 2	2 14	− 8	—	—
Nagano		5·4	239	1 25	+ 1	2 40	S*	—	—
Yokohama		5·4	220	1 24	0	—	—	—	—
Hunatu		5·8	226	1 30	+ 1	2 32	− 6	—	—
Mera		5·8	216	1 47	P*	—	—	—	—
Wazima		5·9	249	1 41	P*	—	—	—	—
Misima		6·0	222	1 27	− 5	2 33	−10	—	—
Osima		6·1	218	1 33	− 1	2 33	−12	—	—
Shizuoka		6·4	225	1 38	0	2 47	− 6	—	—
Nagoya		7·1	233	1 51	+ 3	3 26	+16	—	—
Hikone		7·5	236	2 1	+ 8	3 2	−18	—	—
Kameyama		7·6	233	2 5	P*	—	—	—	—
Sverdlovsk		54·5	318	e 9 33	+ 1	e 17 7	− 3	—	—
Grand Coulee		66·0	47	e 10 49	− 1	—	—	—	—
Shasta Dam		68·0	55	i 11 1	− 2	—	—	—	—
Hungry Horse		68·5	44	i 11 5	− 1	—	—	—	—
Berkeley	z.	69·6	57	i 11 11	− 2	—	—	—	—
Tinemaha		72·7	56	i 11 32k	0	—	—	—	—
Haiwee	z.	73·4	56	i 11 35	− 1	—	—	—	—
Mount Wilson	z.	74·5	58	i 11 42k	0	—	—	—	—
Pasadena		74·5	58	i 11 40k	− 2	—	—	e 11 48	P_cP
Riverside	z.	75·1	58	i 11 45k	− 1	—	—	—	—
Palomar		75·8	58	e 11 51	+ 1	—	—	—	—
Copenhagen		76·4	335	12 0	+ 7	—	—	12 9	P_cP
Tucson		80·5	56	i 12 14k	− 1	—	—	e 12 48	?
Ksara		81·2	307	e 13 2	+43	—	—	—	—
Stuttgart	z.	83·2	332	e 12 28	− 1	—	—	—	—

Nov. 30d. 21h. 17m. 35s. Epicentre 34°·7N., 137°·9E. Depth of focus 0·050.
(as on 1947, March 11d.).

Intensity IV at Tukubasan, Kakioka, and Mito ; II-III at Tokyo and Onahama. Macroseismic radius greater than 300km.
Epicentre 34°·4N., 137°·5E. Depth of focus 300km.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1947, Tokyo, 1950, pp. 44-45, with macroseismic chart p. 44.

$A = -·6114$, $B = +·5524$, $C = +·5667$; $\delta = +10$; $h = 0$;
$D = +·670$, $E = +·742$; $G = -·420$, $H = +·380$, $K = -·824$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Shizuoka		0·5	57	0 44a	0	1 22	+ 3	—	—
Nagoya		0·9	296	0 42a	− 4	1 15	− 6	—	—
Misima		1·0	64	0 47	+ 1	1 26	+ 4	—	—
Hunatu		1·1	42	0 47a	+ 1	1 26	+ 3	—	—
Gihu		1·2	307	0 43	− 4	1 20	− 4	—	—
Kameyama		1·2	277	0 43a	− 4	1 4	−20	—	—
Osima		1·2	87	0 46k	− 1	1 23	− 1	—	—
Hikone		1·5	293	0 44a	− 4	1 6	−20	—	—
Owase		1·5	246	0 43a	− 5	1 17	− 9	—	—
Mera		1·6	82	0 53	+ 4	1 33	+ 6	—	—
Kyoto		1·8	280	0 44	− 6	1 18	−12	—	—
Tokyo		1·8	57	0 51	+ 1	1 33	+ 3	—	—
Kumagaya		1·9	40	1 1	+10	1 34	+ 3	—	—
Osaka		2·0	271	0 46a	− 6	1 20	−12	—	—
Toyama		2·1	344	0 48	− 4	1 26	− 7	—	—
Siomisaki		2·2	235	0 45	− 8	1 22	−13	—	—
Kobe		2·3	270	0 44a	−10	1 22	−14	—	—
Tukubasan		2·3	29	0 53	− 1	1 35	− 1	—	—
Kakioka		2·4	50	0 55	0	1 38	+ 1	—	—
Sumoto		2·5	262	0 47a	− 8	1 15	−24	—	—
Mito		2·7	51	1 18	+21	2 1	+19	—	—
Toyooka		2·7	288	0 48a	− 9	1 27	−15	—	—
Wazima		2·8	343	0 53	− 5	1 37	− 6	—	—
Aikawa		3·3	5	0 50	−12	1 37	−15	—	—
Onahama		3·3	47	1 4	+ 2	1 54	+ 2	—	—
Muroto		3·4	246	0 54	− 9	1 40	−13	—	—
Hukusima		3·7	33	1 5a	− 1	1 58	0	—	—
Kôti		3·8	254	0 57a	−10	1 45	−15	—	—
Sendai		4·3	33	1 3	−10	2 11	+ 1	—	—
Hamada		4·8	274	1 1	−17	2 0	−19	—	—
Mizusawa	E.	5·1	29	1 23	+ 2	2 27	+ 2	—	—
Morioka		5·6	26	1 27	0	2 35	0	—	—
Miyako		5·9	32	1 31	+ 1	2 39	− 2	—	—
Hukuoka		6·3	263	1 26a	− 9	2 33	−16	—	—
Kumamoto		6·3	255	1 25	−10	2 30	−19	—	—
Hatinohe		6·5	25	1 37	0	2 51	− 3	—	—
Irkutsk		29·7	317	6 43	pP	9 57	− 9	—	—
Tashkent		53·2	300	e 10 25	?	—	—	—	—
Stalinabad		54·4	306	e 9 59	pP	e 15 52	−12	—	—
Sverdlovsk		55·0	320	—	—	i 16 1	−11	—	—
Grand Coulee		72·9	44	e 10 54	+ 1	—	—	e 12 0	pP
Shasta Dam		74·8	51	i 11 5	+ 1	—	—	e 12 22	pP
Hungry Horse		75·4	40	i 11 9	+ 2	—	—	e 12 25	pP
Tinemaha		79·5	53	i 11 32a	+ 2	—	—	e 12 51	pP
Santa Barbara	z.	80·0	55	e 11 35a	+ 3	—	—	—	—
Ksara		80·1	305	e 12 46	pP	e 21 42	SP	—	—
Pasadena	z.	81·2	55	i 11 40a	+ 1	—	—	i 12 58	pP
Mount Wilson	z.	81·3	55	i 11 41a	+ 2	—	—	e 12 59	pP
Riverside	z.	81·9	55	i 11 43a	+ 1	—	—	e 13 0	pP
Boulder City		82·4	52	i 11 47	+ 2	—	—	i 14 3	pP

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.
		°	°	m. s.	s.	m. s.	s.	m. s.
Palomar		82·6	55	i 11 47	+ 1	—	—	i 13 6 pP
Pierce Ferry		82·8	51	i 11 48	+ 1	—	—	i 13 6 pP
Stuttgart	z.	85·2	329	e 11 53	− 6	—	—	e 13 13 pP
Tucson		87·3	51	i 12 11	+ 2	—	—	e 13 30 pP

Additional readings :—
Mount Wilson eZ =11m.59s.
Riverside eZ =12m.5s.

Nov. 30d. Readings also at 0h. (Huancayo and near La Paz), 1h. (Pasadena, Mount Wilson, Riverside, Tinemaha, Tucson, Hungry Horse, and Shasta Dam), 3h. (Ashkabad, Stalinabad, Ksara, and Helwan), 11h. (Stuttgart. Cheb, Sverdlovsk, Grozny, Ashkabad, near Andijan, Obi-garm, Stalinabad, Tashkent, Tchimkent, Samarkand, and Almata), 12h. (near Stalinabad), 13h. (Stuttgart, Riverside, Tinemaha, Tucson, and Shasta Dam), 14h. (Mount Wilson, Tinemaha, Tucson, Shasta Dam, and near Apia), 17h. (Ksara), 18h. (Antarctica), 19h. (La Paz), 21h. (La Paz and Bogota).

Dec. 1d. 4h. Undetermined Shock.

Vladivostok eP =26m.13s.?, S =31m.15s.
Irkutsk eP =28m.4s., eS =34m.34s.
Sverdlovsk eP =30m.34s., eS =39m.54s.
Shasta Dam eP =30m.58s., i =31m.2s.
Hungry Horse eP =31m.18s.
Tinemaha ePZ =31m.21s.
Mount Wilson ePZ =31m.26s., eZ =31m.34s.
Riverside ePZ =31m.27s., eZ =31m.38s.
Palomar eZ =31m.31s.
Pierce Ferry eP =31m.35s.
Tucson eP =31m.58s., e =32m.7s.
Riverview eE =37m.8s., eLE =40·9m.
Tashkent eS =39m.6s.?
Bombay eEN =39m.14s.
Stalinbad S =39m.18s.
Ksara e =41m.25s.
Moscow eS =42m.8s.
Strasbourg e =61m.55s., 68m.12s., and 69m.11s., L =74m.
Long waves were also recorded at Warsaw, Stuttgart and Uccle.

Dec. 1d. Readings also at 0h. (Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Hungry Horse, and Shasta Dam), 2h. (Haiwee, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Grand Coulee, and Chicago), 5h. (Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson, Pierce Ferry, and Shasta Dam), 7h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Stuttgart), 10h. (Istanbul and Ksara), 11h. (Brisbane and Riverview), 13h. (near Berkeley, San Francisco, and Mineral), 16h. (near Balboa Heights), 19h. (Andijan, Samarkand, Stalinabad, Tchimkent, Sverdlovsk, and near Fresno), 21h. (La Paz, Mount Wilson, Tucson, and Pierce Ferry), 22h. (near Stalinabad), 23h. (Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Hungry Horse).

Dec. 2d. 5h.-6h. North Pacific.

Tchimkent eP =59m.22s.
Andijan eP =59m.36s., eS =68m.33s.
Kulyab iP =59m.40s., eS =68m.44s.
Stalinabad iP =59m.45s., iS =68m.53s.
Tashkent eP =59m.50s., eS =69m.1s.
Samarkand eP =60m.0s.
Brisbane eS?EN =60m.17s., eQEN =65m.57s.
Ksara e =60m.30s.
Sverdlovsk iP =60m.50s., S =70m.58s.
Bombay eEN =60m.58s., eN =66m.58s.
Riverview eE =61m.24s.
Leninakan eP =61m.30s.
Vladivostok eS =63m.39s.
Hyderabad SN =65m.43s.

Dec. 2d. 21h. 36m. 59s. Epicentre 20°·5S. 179°·0W. Depth of focus 0·080.
(as on 1944 Dec. 1d.).

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Auckland		17·2	197	—	—	e 7 1	SS	—	—
Tuai		18·6	190	3 49	+ 5	6 41	− 4	14 1	ScS
Wellington		21·4	193	4 15	+ 5	7 30	− 1	14 13	ScS
Riverview		29·6	237	i 4 56	−27	—	—	i 14 54	ScS
Santa Barbara	z.	78·5	47	i 11 6	0	—	—	—	—
Antarctica		78·9	158	i 11 10	+ 2	i 20 25	+ 3	—	—
La Jolla	z.	79·3	49	e 11 10	0	—	—	—	—
Pasadena	z.	79·4	47	i 11 10a	− 1	—	—	—	—
Mount Wilson	z.	79·5	47	i 11 11	− 1	—	—	—	—
Fresno	z.	79·7	45	i 11 8	− 5	i 20 22	− 9	—	—
Riverside	z.	79·8	47	i 11 13a	0	—	—	—	—
Shasta Dam		80·4	39	i 11 15	− 1	e 20 31	− 7	—	—
Haiwee	z.	80·6	46	i 11 18	+ 1	—	—	—	—
Tinemaha	z.	80·9	48	e 11 13	− 6	—	—	—	—
Boulder City		82·7	47	i 11 28	0	—	—	—	—
Pierce Ferry		83·3	47	i 11 36	+ 5	—	—	—	—
Tucson		83·6	52	i 11 33a	+ 1	e 21 13	+ 4	—	—
Grand Coulee		86·7	35	i 11 46	− 1	—	—	—	—
St. Louis		101·6	53	e 16 9	PP	e 23 46	0	e 26 50	PS
Andijan		117·0	305	—	—	e 23 38	[− 7]	—	—
Kulyab		118·8	303	e 17 40	[− 6]	23 38	[−14]	—	—
Tashkent		119·4	307	—	—	e 23 43	[−11]	—	—
Stalinabad		119·6	304	e 17 47	[− 1]	e 23 47	[− 7]	—	—
Samarkand		121·1	305	e 17 53	[+ 2]	—	—	—	—
Sverdlovsk		123·5	326	17 53	[− 3]	i 23 57	[−10]	—	—
Moscow		135·5	331	i 20 49	PP	e 26 50	SKKS	—	—
Grozny		136·4	313	e 20 57	PP	—	—	—	—
Copenhagen		143·8	351	18 31	[− 3]	21 13	PP	—	—
Ksara		146·4	301	i 18 41	[+ 3]	—	—	21 4	pPKP
Jena	N.	148·5	347	e 18 47	[+ 5]	—	—	—	—
Istanbul		148·6	317	e 18 49	[+ 7]	—	—	e 21 13	pPKP
Stuttgart	z.	151·0	350	e 18 45	[0]	—	—	e 21 18	pPKP
Helwan	z.	151·1	295	18 52	[+ 7]	—	—	i 21 16	pPKP
Paris		151·7	358	e 18 47	[+ 1]	—	—	—	—
Basle		152·5	350	e 18 54	[+ 7]	—	—	—	—
Zürich		152·5	351	e 18 46	[− 1]	—	—	—	—

Additional readings :—
Tuai i = 7m.7s.
Riverview iE = 13m.2s.
Tinemaha iP = 11m.19s., iZ = 11m.45s.
Boulder City i = 12m.8s.
Pierce Ferry i = 12m.13s.
Tucson i = 11m. 50s., e = 12m.36s., and 13m.49s.
Ksara PP? = 22m.13s.
Stuttgart iZ = 18m.51s.k, eZ = 19m.2s.
Helwan iZ = 19m.1s.
Paris i = 18m.52s. and 19m.5s.

Dec. 2d. Readings also at 0h. (La Paz), 1h. and 3h. (Santa Lucia), 6h. (near Irkutsk, Tchimkent, near Andijan, Kulyab, and Stalinabad), 7h. (Mount Wilson, Tucson, and Pierce Ferry), 9h. (Helwan, Istanbul, and Ksara), 12h. (La Paz), 15h. (Pasadena, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 17h. (near Kulyab), 18h. (near Andijan, Kulyab, Stalinabad, and near Grozny(2)). 20h. (La Paz), 22h. (Bombay, Bogota, La Paz, and Pierce Ferry), 23h. (Tucson, Boulder City, Pierce Ferry, Helsinki, Warsaw, Stuttgart, Istanbul, Ksara, and Helwan).

Dec. 3d. Readings also at 0h. (Tucson and Pierce Ferry), 5h. (near Kulyab (2)), 8h. (Samarkand, near Kulyab, and Stalinabad), 10h. (near Kulyab), 11h. (Audijan, Stalinabad, Tashkent, Tchimkent, Sverdlovsk, Leninakan, Brisbane, and Riverview), 12h. (Bombay), 13h. and 15h. (Kew), 16h. (near Ottawa), 21h. (near Stalinabad), 22h. (near Tucson).

Dec. 4d. 14h. 16m. 40s. Epicentre 7°·5N. 124°·5E. Depth of focus 0·070.
(as on 1937 March 26d.).

$A = -·5616$, $B = +·8172$, $C = +·1297$; $\delta = +3$; $h = +7$;
$D = +·824$, $E = +·566$; $G = -·073$, $H = +·107$, $K = -·992$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vladivostok		36·1	9	i 8 7	pP	i 11 29	+ 2	—	—	—
Calcutta	E.	37·9	297	e 6 38	+ 2	i 11 48	− 6	e 15 14	SSS	—
Brisbane		44·4	142	i 7 29	+ 1	i 13 20	− 8	i 16 27	SS	—
Hyderabad	N.	45·9	287	e 7 5	−35	13 37	−12	—	—	—
Irkutsk		47·6	343	—	—	i 14 18	+ 6	17 26	sS	—
Riverview		48·3	149	i 7 56a	− 2	i 14 16	− 6	i 16 50	S_cS	—
Bombay		51·4	288	e 8 16	− 5	e 14 52	−12	e 10 0	PP	—
Almata		54·7	319	i 8 47	+ 2	i 15 47	− 1	—	—	—
Andijan		56·9	314	e 9 0	0	i 16 15	− 2	—	—	—
Kulyab		57·8	310	i 9 5	− 1	i 16 22	− 6	—	—	—
Stalinabad		58·8	311	i 9 12	− 1	i 16 35	− 6	11 1	pP	—
Tashkent		59·2	314	i 9 16	0	i 16 43	− 3	i 11 5	pP	—
Tchimkent		59·3	315	i 9 15	− 1	i 16 43	− 4	—	—	—
Samarkand		60·4	311	e 9 23	− 1	e 16 57	− 4	—	—	—
Auckland		64·5	136	—	—	17 44	− 7	—	—	—
Ashkabad		66·6	307	e 10 4	0	—	—	—	—	—
Wellington		66·9	141	e 10 2	− 3	18 6	−14	19 2	S_eS	—
Sverdlovsk		69·6	328	i 10 22	0	i 18 45	− 6	—	—	—
Baku		73·4	309	10 45	+ 1	19 33	− 1	—	—	—
Grozny		76·7	312	e 11 4	+ 2	e 20 4	− 5	—	—	—
Leninakan		78·1	310	e 11 12	+ 2	e 20 22	− 2	—	—	—
Moscow		82·1	325	e 11 29	− 2	20 55	−10	13 28	pP	—
Ksara		84·7	302	i 11 42	− 2	21 28	− 2	14 41	PP	—
Helwan		89·0	300	i 12 2a	− 2	22 5	− 5	i 15 41	PP	—
Stuttgart	Z.	100·6	323	e 17 8	PP	—	—	—	—	—
Grand Coulee		101·6	38	e 15 8	?	e 22 50	[− 3]	e 17 25	PP	—
Shasta Dam		102·2	46	e 13 7	+ 3	e 15 10	?	e 16 18	?	—
Hungry Horse		104·4	36	e 13 20	P	e 23 2	[− 4]	e 20 21	?	—
Tinemaha	Z.	106·6	48	e 17 32	PP	—	—	—	—	—
Riverside	Z.	108·4	51	e 18 13	PP	—	—	—	—	—
Boulder City		109·5	48	e 18 18	PP	—	—	—	—	—
Pierce Ferry		110·1	47	e 18 10	PP	—	—	—	—	—
Tucson		114·1	50	e 18 11	PP	—	—	e 18 54	?	—
Huancayo		159·9	105	e 19 53	[+50]	e 29 30	SKKS	e 43 20	SS	e 60·9
La Paz		164·8	128	e 19 32	[+24]	i 29 46	SKKS	43 50	SS	—

Additional readings :—
Stalinabad sS = 19m.43s.
Helwan iZ = 14m.8s. and 15m. 2s., iN = 24m.40s.
Grand Coulee esS? = 23m.28s.
Huancayo e = 21m.24s., ePKS = 23m.35s., eSKS = 28m.28s., eSKSP = 33m.44s., ePPPS = 36m.24s.

Dec. 4d. 20h. Undetermined Shock. Wellington suggests Epicentre 36°·5S. 177°·9E. and depth 225kms.

Tuai P = 47m.24s., S = 47m.59s.
New Plymouth P = 47m.43s., S = 48m.57s.?
Wellington P = 47m.56s., S = 48m.59s.
Auckland S = 48m.0s.
Kaimata S = 49m.58s.
Pasadena iPZ = 59m.21s.
Mount Wilson iPZ = 59m.22s.
Palomar iPZ = 59m.24s.
Riverside iPZ = 59m.24s.
Shasta Dam eP = 59m.26s.
Tinemaha ePZ = 59m. 31s.
Tucson iP = 59m.38s.

Dec. 4d. Readings also at 0h. (near Andijan, Kulyab, and Stalinabad), 2h. (Hungry Horse), 4h.(La Paz), 5h. (Helsinki), 7h. (Kirkland Lake), 9h. (near Kulyab), 10h. (Helsinki), 12h. (Alicante), 14h. (Riverside, Haiwee, Tinemaha, Tucson, and Shasta Dam), 15h. (Palomar and Tucson), 16h. (Jena), 17h. (Kew), 18h. (near Kulyab and near Mineral), 20h. (Stalinabad, Tchimkent, near Almata, Andijan, Kulyab, and near Ottawa), 21h. (Branner and near Lick).

Dec. 5d. 23h. 21m. 15s. Epicentre 36°·0S. 178°·0W. Depth of focus 0·010.
(as on 1940, June 30d.).

$A = -·8105$, $B = -·0283$, $C = -·5852$; $\delta = +17$; $h = 0$;
$D = -·035$, $E = +·999$; $G = +·585$, $H = +·020$, $K = -·811$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m.	s.		m.
Tuai		4·8	233	1 13	+ 2	2 14	+ 8	—		—	—
New Plymouth		7·0	242	1 45	+ 3	3 6	+ 6	—		—	—
Wellington		7·7	225	1 52	+ 1	3 23	+ 6	—		—	—
Kaimata		10·5	228	—	—	4 28	+ 3	—		—	—
Riverview		25·3	266	i 5 22	+ 3	e 9 41	+ 6	i 6	1	PP	e 11·0
Santa Barbara	z.	88·7	45	i 12 43	− 1	—	—	—		—	—
Pasadena	z.	89·4	46	i 12 45	− 2	—	—	—		—	—
Mount Wilson	z.	89·5	46	i 12 46	− 1	—	—	i 13	1	pP	—
Palomar	z.	89·6	47	i 12 47	− 1	—	—	—		—	—
Riverside	z.	89·7	46	i 12 47	− 1	—	—	i 13	1	pP	—
Fresno		90·3	42	i 12 50	− 1	i 21 28	?	i 13	3	pP	—
Tinemaha	z.	91·4	43	e 12 55	− 1	—	—	e 13	12	pP	—
Shasta Dam		91·8	38	e 12 55	− 3	—	—	—		—	—
Tucson		92·5	51	i 13 2	+ 1	—	—	i 13	17	pP	—
Boulder City		92·6	46	i 13 2	0	—	—	i 13	17	pP	—
Huancayo		93·0	107	e 13 12	+ 8	—	—	—		—	—
Balboa Heights		102·0	87	e 17 34	PP	—	—	—		—	—
Ksara		152·2	276	e 19 41	[+ 4]	—	—	23	27	PP	—
Helwan	z.	154·7	264	e 19 43	[+ 2]	—	—	e 22	48	PP	—
Istanbul		158·3	292	e 18 45?	[−60]	—	—	e 23	39	PP	—
Copenhagen		159·1	344	20 33	[+47]	—	—	—		—	—
Collmberg	z.	162·8	337	e 21 33	?	—	—	—		—	—
Stuttgart	z.	166·2	339	e 20 49	[+55]	—	—	e 29	15	PPP	—

Additional readings :—
Riverview iZ = 5m.39s., iE = 10m.4s., iN = 10m.49s.
Long waves were recorded at Rome, Alicante, and Granada.

Dec. 5d. Readings also at 0h. (Berkeley, Branner, Lick, San Francisco, and near Mizusawa), 3h. (La Paz and Stuttgart) 5h. (Tucson), 13h. (Bombay), 14h. (Hungry Horse), 15h. (Samarkand and near Kulyab and Stalinabad), 17h. (Apia, Mount Wilson, Boulder City, Grand Coulee, Pierce Ferry, Shasta Dam, and Tucson), 18h. (Branner, Berkeley, and San Francisco), 19h. (Brisbane and near Kulyab), 20h. (Istanbul and near San Juan), 21h. (Tinemaha, Chicago, Shasta Dam, Tucson, Wellington, and Auckland), 23h. (Palomar, Riverside, Boulder City, Pierce Ferry, Shasta Dam, and Tucson).

Dec. 6d. Readings at 1h. (Hungry Horse, near Mineral and near Ksara), 2h. (near Kulyab), 4h. (near Mineral and near Kulyab), 7h. (Ksara), 11h. (Barcelona and Hungry Horse), 13h. (Santa Lucia).

Dec. 7d. 1h. 44m. 20s. Epicentre 36°·7N. 70°·5E. Depth of focus 0·030.
(as on 1947, Oct. 29d.).

$A = +·2683$, $B = +·7576$, $C = +·5951$; $\delta = +9$; $h = 0$;
$D = +·943$, $E = -·334$; $G = +·199$, $H = +·561$, $K = -·804$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m.	s.		m.
Stalinabad		2·3	323	i 0 44	0	i 1 17	0	—		—	—
Samarkand		4·1	319	i 1 4	0	i 1 53	− 1	—		—	—
Andijan		4·3	20	i 1 7	0	i 1 59	0	—		—	—
Tashkent		4·7	349	i 1 14	+ 2	i 2 9	+ 1	—		—	—
Tchimkent		5·6	354	i 1 22	− 1	i 2 26	− 2	—		—	—
Frunse		6·9	26	i 1 41	+ 1	i 2 59	+ 1	—		—	—
Almata		8·2	35	i 1 57	0	i 3 32	+ 4	—		—	—
Ashkabad		9·7	277	e 2 18	+ 2	i 4 6	+ 4	—		—	—
Baku		16·5	289	e 3 24	−16	—	—	—		—	—
Bombay	E.	17·8	172	e 3 53	− 1	—	—	—		—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Grozny		20·0	297	e 4 23	+ 6	i 8 0	+16	—	—	—
Hyderabad	N.	20·4	158	4 20	− 1	8 1	+ 9	—	—	—
Erevan		20·6	288	4 1	−22	—	—	—	—	—
Calcutta	E.	20·9	128	e 1 14	?	—	—	e 3 42	P	—
Leninakan		21·1	290	e 4 29	+ 1	—	—	—	—	—
Sverdlovsk		21·2	345	1 4 33	+ 4	e 8 15	+ 9	i 5 7	pP	—
Piatigorsk		22·1	299	e 4 39	+ 2	i 5 43	sP	—	—	—
Ksara		28·3	275	e 6 20	PP	e 11 50	SS	—	—	—
Yalta		28·5	298	e 5 51?	+14	10 37?	+31	—	—	—
Moscow		29·2	322	5 46	+ 3	e 10 24	+ 6	e 6 27	pP	—
Helwan		33·3	270	e 7 1	PP	e 14 7	SSS	—	—	—
Warsaw	E.	37·8	310	e 9 6	PPP?	e 15 31	SS	e 16 9	SSS	—
Copenhagen		43·0	316	7 43	+ 4	i 13 57	+10	—	—	17·3
Jena	N.	43·7	308	e 7 47	+ 2	—	—	—	—	—
Stuttgart		45·5	306	e 8 1	+ 2	—	—	e 10 26	PP	—
Zürich		46·1	304	e 8 4	0	—	—	e 10 22	PP	—
Strasbourg		46·4	306	e 8 3	− 3	—	—	e 10 22	PP	—

Additional readings :—
Sverdlovsk iSP = 5m.34s.
Warsaw eN = 9m.33s. and 13m.57s., eE = 14m.38s., eN = 15m.37s., eE = 15m.56s., eN = 16m.24s., eE = 17m.16s., eN = 17m.35s.
Copenhagen 8m.38s., 8m.50s., 15m.12s.

Dec. 7d. 19h. 23m. 1s. Epicentre 39°·5N. 43°·0E. (as on 1941, Sept. 10d.).

$A = +·5658$, $B = +·5277$, $C = +·6335$; $\delta = -8$; $h = -1$;
$D = +·682$, $E = -·731$; $G = +·463$, $H = +·432$, $K = -·774$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Erevan	1·3	59	e 0 33	+ 8	1 0	S_g	0 37	P_g	—
Leninakan	1·4	27	e 0 28	+ 1	i 0 44	− 2	e 0 54	S_g	—
Grozny	4·4	27	e 1 22	P_g	—	—	—	—	—
Piatigorsk	4·5	0	e 1 13	+ 2	—	—	—	—	—
Sotchi	4·8	330	e 1 2	−13	—	—	—	—	—
Baku	5·4	76	e 1 42?	P_g	—	—	—	—	—
Theodosia	7·9	317	e 1 56	− 3	—	—	—	—	—
Ksara	8·1	228	e 2 23?	P*	e 3 55	S*	—	—	—
Yalta	8·3	310	e 2 0	− 4	—	—	—	—	—
Istanbul	10·8	282	2 35	− 4	—	—	—	—	6·0
Ashkabad	12·1	96	e 3 2	+ 5	—	—	—	—	—
Moscow	16·6	350	e 3 52	− 4	e 7 0	0	—	—	—
Stalinabad	20·0	83	i 4 42	+ 5	—	—	—	—	—
Tashkent	20·1	77	e 4 36	− 2	—	—	—	—	—
Tchimkent	20·3	73	e 4 41	+ 1	—	—	—	—	—
Sverdlovsk	20·8	28	4 44	− 1	—	—	—	—	—
Andijan	22·4	77	e 5 9	+ 7	—	—	—	—	—
Stuttgart	25·8	303	e 5 26	− 8	—	—	e 5 30	P	—
Copenhagen	25·9	320	5 29	− 6	e 11 51	SSS	—	—	—
Hungry Horse	90·2	345	e 12 29	−35	—	—	—	—	—

Long waves were recorded at Helwan and Warsaw.

Dec. 7d. Readings also at 1h. (Bombay, Wellington, and Arapuni), 2h. (Santa Lucia, Tucson, and near Mineral), 3h. (Mount Wilson, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Tucson (2), Bogota, and near Fresno), 4h. (Tchimkent, near Andijan, Stalinabad, Tashkent, and near Apia), 6h. (Pierce Ferry and Stuttgart), 10h. (Mount Wilson, Palomar, Tinemaha, Shasta Dam, Tucson, and Theodosia), 11h. (Mount Wilson, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam (2), Tucson, Hungry Horse, La Paz, Bogota, Arapuni, Auckland, Wellington, Brisbane, Riverview, Cheb, and Mizusawa), 12h. (Theodosia), 13h. (Palomar, Tinemaha, Pierce Ferry, and Tucson), 15h. (Mount Wilson, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Hungry Horse, Stuttgart (2), Erevan, near Ashkabad, Leninakan, and near San Juan), 16h. (Palomar, Tinemaha, Boulder City, Pierce Ferry, Tucson, Hungry Horse, and near Leninakan), 17h. (Mount Wilson, Palomar, Pasadena, Tinemaha, Pierce Ferry, Shasta Dam, and Tucson), 23h. (Boulder City).

Dec. 8d. 17h. 18m. 55s. Epicentre 16°·0S. 167°·3E. (as on 1944, Aug. 30d.).

$A = -·9383$, $B = +·2114$, $C = -·2739$; $\delta = +12$; $h = +6$;
$D = +·220$, $E = +·975$; $G = +·267$, $H = -·060$, $K = -·962$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		17·5	227	i 3 59	− 8	i 7 15	− 6	i 7 32	SS	i 8·8
Auckland		21·8	163	4 57	+ 1	8 26	−26	—	—	9·1
Riverview		22·9	216	i 5 1a	− 5	i 9 12	− 1	i 5 16	pP	e 10·9
Arapuni		23·2	164	—	—	8 5	?	—	—	10·5
Wellington		26·0	168	5 19	−17	9 49	−17	5 51	PP	11·1
Irkutsk		87·0	327	e 12 46	− 2	e 23 23	− 4	25 8	PPS	—
Riverside	z.	87·1	54	i 12 52	+ 3	—	—	i 13 8	?	—
Antarctica		87·5	163	e 13 0	+ 9	—	—	—	—	e 43·1
Tinemaha	z.	87·6	51	e 12 49	− 2	—	—	i 13 12	?	—
Boulder City		89·8	53	e 13 5	+ 3	—	—	—	—	—
Pierce Ferry		90·5	53	e 13 3	− 2	—	—	—	—	—
Tucson		91·7	57	i 13 7	− 3	—	—	—	—	—
Tashkent		106·3	310	e 18 47	PP	e 24 59	[+ 3]	e 28 20	PPS	—
San Juan		129·1	78	e 22 15	PKS	—	—	—	—	—
Bermuda		130·3	61	e 22 33	PKS	(e 33 25)	PPS	—	—	e 33·4
Ksara		133·0	301	e 19 21	[+ 3]	e 34 25	PPS	21 57	PP	—
Istanbul		136·2	314	e 19 23	[− 1]	e 29 5	(+ 7)	—	—	—
Helwan	z.	137·4	296	i 19 26	[0]	—	—	i 22 23	PP	—
De Bilt		141·3	343	e 19 35	[+ 2]	—	—	—	—	e 71·1
Stuttgart		142·7	337	e 19 33	[− 2]	—	—	—	—	e 78·1
Triest		143·1	330	e 19 29	[− 7]	e 22 39	SKP	e 19 47	PKP$_2$	e 80·1
Strasbourg		143·5	337	e 19 34	[− 2]	—	—	e 22 44	PP	51·1
Chur		144·1	334	e 19 37a	[− 1]	—	—	—	—	—
Zürich		144·1	335	e 19 36a	[− 2]	—	—	e 21 16	?	—
Basle		144·4	336	e 19 38	[0]	—	—	—	—	—
Paris		145·0	343	e 19 42	[+ 3]	—	—	e 19 46	PKP	e 98·1
Rome	z.	146·3	326	i 19 43k	[+ 2]	e 23 39	SKP	e 23 8	PP	—
Clermont-Ferrand		147·5	339	i 19 53	[+10]	i 23 23	SKP	i 20 34	PKP$_2$	79·1
Almeria		157·3	339	e 20 10	[+12]	—	—	—	—	e 81·3
Malaga	z.	158·1	342	e 19 59	[0]	—	—	—	—	e 81·1

Additional readings :—
Brisbane iPPEN = 4m.10s., iSE = 9m.9s.
Riverview iPP = 5m.28s., iSN = 9m.5s., iSE = 9m.9s., isSE = 9m.35s., iZ = 9m.41s., iSSE = 9m.54s.
Wellington i = 7m.33s., P_cP = 9m.8s., S_cS = 16m.39s.
Helwan iZ = 19m.43s.
Stuttgart eZ = 20m.3s., 20m.43s., and 23m.37s.
Triest ePP? = 23m.14s.
Paris e = 20m.3s.
Long waves were recorded at other American and European stations.

Dec. 8d. Readings also at 0h. (Mount Wilson, Pasadena, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Hungry Horse, and Stuttgart), 2h. (near Istanbul), 3h. (Nanking, near Malaga, Granada, and near Stalinabad), 4h. (Mizusawa), 6h. (Auckland, Wellington, New Plymouth, and near Tuai), 7h. (Palomar, Riverside, Tucson (2), Mizusawa, and Brisbane), 8h. (Branner, near Berkeley, Fresno, and Lick, La Paz, and near Montezuma), 9h. (Mount Wilson, Riverside, Tinemaha, Shasta Dam, Tucson, and Hungry Horse), 12h. (near Murgab), 16h. (Apia, Bombay, Stuttgart, Tashkent, Stalinabad, Tinemaha, Boulder City, Grand Coulee, Pierce Ferry, Shasta Dam, Tucson, and Hungry Horse), 17h. (Stuttgart, Tucson, and Hungry Horse), 23h. (Hungry Horse).

Dec. 9d. 4h. 28m. 15s. Epicentre 33°·7N. 135°·2E. (as on 1938, January 24d.).

Intensity V at Sumoto, Muroto, Takamatsu, Tokushima, Matsuyama ; IV at Kashiwara, Kobe, Owase, Osaka, Shionomisaki, Tsu, Hikone, Tottori ; II-III at Uwajima, Kyoto, and Nagoya.
Epicentre 33°·8N. 135°·3E. Macroseismic radius 200-300kms. Shallow.

The Seismological Bulletin of the Central Metrological Observatory, Japan for the year 1947, Tokyo 1950, pp. 45-46, Macroseismic Chart p. 45.

$A = -\cdot5916$, $B = +\cdot5874$, $C = +\cdot5523$; $\delta = +6$; $h = +1$;
$D = +\cdot705$, $E = +\cdot710$; $G = -\cdot392$, $H = +\cdot389$, $K = -\cdot834$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Siomisaki	0·5	118	0 21	+ 7	0 31	+ 8	—	—	—
Tokusima	0·6	306	0 9k	− 6	0 18	− 8	—	—	—
Sumoto	0·7	338	0 13k	− 4	0 22	− 6	—	—	—
Muroto	0·9	242	0 21a	+ 1	0 35	+ 1	—	—	—
Owase	0·9	66	0 19k	− 1	0 29	− 5	—	—	—
Kobe	1·0	359	0 17a	− 4	0 28	− 8	—	—	—
Osaka	1·0	16	0 19a	− 2	0 29	− 7	—	—	—
Kyoto	1·4	18	0 28a	+ 1	0 42	− 4	—	—	—
Hikone	1·8	29	0 31a	− 1	0 53	− 3	—	—	—
Toyooka	1·9	350	0 29	− 5	0 52	− 7	—	—	—
Nagoya	2·1	45	0 34a	− 3	0 59	− 5	—	—	—
Gihu	2·1	37	0 37	0	1 5	+ 1	—	—	—
Matuyama	2·1	274	0 39k	+ 2	1 3	− 1	—	—	—
Hirosima	2·4	286	0 43k	+ 2	1 15	+ 3	—	—	—
Hamada	2·8	295	0 51k	+ 4	1 26	+ 4	—	—	—
Shizuoka	2·9	64	0 47	− 1	1 33	S_g	—	—	—
Hunatu	3·4	58	1 1	P*	1 49	S_g	—	—	—
Toyama	3·4	28	1 4	P*	—	—	—	—	—
Misima	3·4	64	1 6	P_g	—	—	—	—	—
Miyazaki	3·6	242	1 45	S	(1 45)	+ 3	—	—	—
Osima	3·6	72	1 1	+ 3	—	—	—	—	—
Izuka	3·7	270	1 0	0	1 57	S*	—	—	—
Kumamoto	3·9	257	1 1k	− 1	2 4	S*	—	—	—
Wazima	3·9	18	1 8	P*	2 1	S*	—	—	—
Hukuoka	4·0	270	1 4	0	2 8	S_g	—	—	—
Mera	4·0	73	1 14	P*	2 15	S_g	—	—	—
Nagano	4·0	38	1 7	+ 3	1 59	+ 7	—	—	—
Maebasi	4·1	49	1 7	+ 2	2 8	S*	—	—	—
Tokyo	4·2	61	1 19a	P*	2 14	S_g	—	—	—
Unzendake	4·3	255	1 2	− 6	2 24	S_g	—	—	—
Kagosima	4·4	243	1 15	P*	—	—	—	—	—
Utunomiya	4·7	52	1 25	P*	2 30	S_g	—	—	—
Kakioka	4·8	57	1 11	− 4	2 29	S*	—	—	—
Tukubasan	4·8	55	1 28	P*	2 22	S*	—	—	—
Ituhara	4·9	279	1 31k	P*	2 35	S*	—	—	—
Mito	5·0	57	1 34	P_g	2 34	S*	—	—	—
Aikawa	5·0	29	1 38	P_g	—	—	—	—	—
Tomie	5·5	261	1 44	P_g	2 47	S*	—	—	—
Sendai	6·4	44	2 2	P_g	3 22	S*	—	—	—
Mizusawa	7·2	39	2 9	P_g	e 3 52	S_g	—	—	—
Irkutsk	28·9	320	e 5 57?	− 6	e 11 11	+18	—	—	—
Shasta Dam	77·1	50	e 11 54	− 3	—	—	i 11 59	P	—
Hungry Horse	77·6	40	i 12 0	0	—	—	—	—	—
Cheb	82·5	327	e 10 45	?	—	—	—	—	e 42·7
Stuttgart z.	84·8	328	e 12 34	− 3	—	—	—	—	—
Pierce Ferry	85·1	49	e 12 41	+ 2	—	—	—	—	—

Long waves were also recorded at other European Stations.

Dec. 9d. 9h. 45m. 47s. Epicentre 83°·0N. 5°·0W.

A = +·1222, B = −·0107, C = +·9924; δ = −9; h = −13;
D = −·087, E = −·996; G = +·989, H = −·087, K = −·123.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Copenhagen		27·8	158	e 6 43	PP	i 10 51	SS	—	—	13·2
Sverdlovsk		31·0	104	—	—	11 28	+ 2	—	—	—
Warsaw		31·8	148	—	—	e 13 46	SS	—	—	e 16·2
Stuttgart		34·6	163	e 6 58	+ 5	—	—	e 7 4	P	e 19·2
Irkutsk		40·7	63	e 7 49?	+ 5	e 13 45	−10	—	—	—
Istanbul		43·4	142	e 9 53?	PP	—	—	—	—	—
Hungry Horse		44·6	296	e 8 14	− 2	—	—	—	—	—
Grand Coulee		45·4	301	e 8 24	+ 2	—	—	—	—	—
Tashkent		47·3	99	e 8 35	− 2	e 15 33?	+ 2	—	—	—
Kulyab		50·8	100	9 3	− 1	—	—	—	—	—
Ksara		51·2	135	e 8 17	−50	—	—	—	—	—
Shasta Dam		53·0	303	e 9 20	− 1	—	—	—	—	—
Helwan	z.	54·7	140	i 9 34k	+ 1	—	—	—	—	—
Tinemaha	z.	56·1	298	e 9 49	+ 6	—	—	—	—	—
Pierce Ferry		56·6	294	e 9 51	+ 4	—	—	—	—	—
Boulder City		56·9	295	e 9 47	− 2	—	—	—	—	—
Mount Wilson	z.	58·9	297	e 10 2	− 1	—	—	e 10 8	P	—
Pasadena	z.	59·0	297	i 10 9	+ 5	—	—	—	—	—
Tucson		60·1	290	e 10 9	− 2	—	—	i 10 17	P	—

Long waves were recorded at De Bilt, Helsinki and Strasbourg.

Dec. 9d. 16h. 32m. 21s. Epicentre 24°·9N. 63°·5E. (as on 1947 August 5d.).

A = +·4052, B = +·8127, C = +·4187; δ = −2; h = +3;
D = +·895, E = −·446; G = +·187, H = +·375, K = −·908.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bombay		10·5	123	e 2 39	− 4	e 3 31	?	—	—	—
Ashkabad		13·7	343	e 3 18	0	5 56	+ 4	—	—	—
Kulyab		14·0	20	i 3 23	+ 1	i 6 25	SSS	—	—	—
Stalinabad		14·3	17	i 3 26	0	6 38	SSS	—	—	—
Samarkand		15·0	10	i 3 37	+ 2	—	—	—	—	—
Hyderabad	N.	15·8	115	e 3 33	−12	6 28	−14	—	—	—
Tashkent		17·1	15	i 3 58	− 4	e 7 29	SS	—	—	—
Tchimkent		18·1	15	4 10	− 4	—	—	—	—	—
Baku		19·2	327	e 3 39	?	—	—	—	—	—
Frunse		20·1	24	e 4 59	PP	—	—	—	—	—
Almata		21·4	27	i 4 55	+ 4	—	—	—	—	—
Calcutta	E.	22·9	90	—	—	e 9 19	+ 6	—	—	e 15·5
Colombo	E.	23·8	137	5 12	− 3	9 46	SS	—	—	12·2
Ksara		25·6	297	i 5 33	+ 1	e 10 42	SS	—	—	—
Helwan		28·9	288	e 6 6	+ 3	e 11 21	+28	e 11 57	SS	—
Sverdlovsk		32·0	357	i 6 28	− 2	e 11 44	+ 2	—	—	—
Moscow		36·2	336	7 4	− 2	—	—	—	—	—
Irkutsk		41·2	38	—	—	e 17 39?	SSS	—	—	—
Stuttgart	z.	48·3	315	e 8 41	− 4	—	—	e 8 50	P	—
Zürich		48·6	313	e 8 42	− 5	—	—	—	—	—
Basle		49·3	313	e 8 50	− 3	—	—	—	—	—
Clermont-Ferrand		52·2	310	e 9 21	+ 6	—	—	—	—	—
Paris		52·8	314	e 9 15	− 4	—	—	e 9 25	P	—

Long waves were also recorded at Copenhagen, Helsinki, Cheb, and Istanbul.

Dec. 9d. 23h. 18m. 48s. Epicentre 41°·1N. 19°·3E. (as on 1939 May 20d.).

$A = +·7133$, $B = +·2498$, $C = +·6548$; $\delta = -4$; $h = -2$;
$D = +·331$, $E = -·944$; $G = +·618$, $H = +·216$, $K = -·756$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Belgrade		3·9	13	i 0 54	− 8	i 1 53	+ 3	i 1 5	P*	—
Rome		5·2	281	e 1 38	P*	i 2 29	+ 7	—	—	—
Zagreb		5·3	334	e 1 22	0	e 2 23	− 2	e 1 50	P_g	—
Bucharest	E.	5·8	55	e 1 36	+ 7	i 3 16	S_g	e 1 58	P_g	—
Triest		6·1	321	e 1 50	P*	i 2 40	− 5	i 3 19	S_g	—
Budapest		6·4	0	1 35	− 3	—	—	—	—	3·2
Florence	N.	6·5	297	e 1 44	+ 5	i 2 56	+ 1	—	—	—
Istanbul		7·4	86	1 54	+ 2	3 54	S_g	—	—	—
Chur		9·1	313	e 2 17	+ 3	e 3 56	− 4	—	—	—
Prague		9·6	341	e 2 22	+ 1	e 4 44?	S*	—	—	—
Zürich		9·9	312	i 2 27k	+ 2	e 4 24	+ 4	—	—	—
Stuttgart		10·5	321	e 2 32	− 3	e 4 20	−15	e 2 38	P	—
Basle		10·6	312	e 2 37	+ 1	e 4 42	+ 5	—	—	—
Strasbourg	Z.	11·1	317	e 3 36	?	e 4 42	− 7	—	—	—
Collmberg		11·1	339	e 2 37	− 6	e 5 4	SS	e 2 49	PP	—
Jena	N.	11·2	334	e 2 43	− 1	e 4 53	+ 1	e 2 58	PP	—
Warsaw		11·2	5	e 2 36	− 8	e 4 55	+ 3	e 5 59	Q	e 6·7
Besançon		11·4	307	—	—	e 4 49	− 7	—	—	—
Clermont-Ferrand		12·6	297	e 4 42	?	—	—	—	—	—
Paris		14·1	303	e 3 42	PPP	—	—	—	—	e 7·2
Ksara		15·0	114	i 3 38	+ 3	e 6 42	SS	—	—	—
Alicante		15·5	266	4 22	?	—	—	—	—	e 9·0
Almeria		17·4	263	4 37	PPP	8 0	SSS	—	—	10·2
Granada		18·2	265	i 4 29k	PP	—	—	—	—	—
Malaga	Z.	19·0	265	i 4 34s	+ 8	—	—	—	—	—
Hungry Horse		81·8	331	i 12 25	+ 3	—	—	—	—	—
Grand Coulee		84·0	333	e 12 36	+ 3	—	—	—	—	—

Additional readings :—
Belgrade iP_gP_g? = 1m.29s., iSSN = 2m.23s.
Rome iP_gE = 1m.55s., iEZ = 2m.4s.
Zagreb e = 2m.11s., iE = 2m.43s., i = 2m.47s.
Budapest iN = 2m.41s., eE = 2m.44s.
Stuttgart eP*? = 2m.55s., eS = 4m.5s., eS*? = 5m.0s. and 5m.8s., i = 5m.45s., e = 5m.55s.
Jena eN = 6m.7s.
Warsaw eE = 3m.13s., eN = 3m.21s.
Alicante readings wrongly identified.
Almeria PP = 4m.56s., P_cP = 9m.12s.
Malaga iPPZ = 6m.1s., P_cPZ = 6m.41s., eSZ = 10m.25s., PSZ = 11m.4s., LZ = 16m.1s.
Long waves were recorded at Cheb, De Bilt, Potsdam, Copenhagen, and Helsinki.

Dec. 9d. 23h. 40m. 0s. Epicentre 36°·6N. 34°·1E.

$A = +·6664$, $B = +·4511$, $C = +·5936$; $\delta = -6$; $h = 0$;
$D = +·561$, $E = -·828$; $G = +·492$, $H = +·333$, $K = -805$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ksara		3·1	152	i 0 46	− 5	1 20	− 9	—	—	—
Istanbul		5·9	320	i 1 36	+ 5	i 3 28	S_g	—	—	—
Helwan	Z.	7·1	200	i 1 45a	− 3	i 3 6	− 4	1 52	P*	—
Yalta		7·9	1	1 57	− 2	—	—	—	—	—
Sotchi		8·2	30	e 1 59	− 4	—	—	—	—	—
Theodosia		8·5	6	2 9?	+ 2	—	—	—	—	—
Leninakan		8·7	58	e 2 5	− 5	—	—	—	—	—
Erevan		8·9	63	e 2 14	+ 2	—	—	—	—	—
Bucharest		9·9	324	e 2 33	+ 8	—	—	e 2 37	PP	i 5·2
Piatigorsk		10·1	40	e 2 24	− 4	—	—	—	—	—
Grozny		11·2	50	e 2 39	− 5	—	—	—	—	—
Baku		13·0	68	e 3 3?	− 6	e 5 30?	− 5	—	—	—
Belgrade		13·2	313	e 3 22	PP	e 6 18	SSS	—	—	e 7·7
Kalossa		15·0	316	e 3 44	+ 9	—	—	e 3 47	PP	e 7·3
Budapest		15·6	319	3 47	+ 4	6 53	SS	7 7	SSS	9·0

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zagreb		16·5	310	e 3 57	+ 3	e 7 5	+ 7	e 4 1	PP	e 9·7
Rome		17·6	295	i 4 12a	+ 4	i 7 41	SS	i 4 23	pP	e 9·2
Triest		17·8	308	i 4 12	+ 1	i 7 40	SS	i 4 24	pP	—
Warsaw		18·2	334	4 17	+ 1	i 7 43	+ 6	4 32	PP	e 10·0
Florence		18·8	301	i 4 28	+ 5	i 8 28	SS	—	—	—
Ashkabad		19·3	81	4 20	− 9	i 7 46	−16	—	—	—
Moscow		19·3	6	i 4 25	− 4	7 57	− 5	—	—	—
Prague		19·6	321	4 32a	0	8 15	+ 7	e 8 44	SS	e 10·5
Pavia	z.	20·6	303	e 5 48	+65	—	—	—	—	—
Cheb		20·7	319	e 4 40	− 4	e 8 35	+ 4	e 5 17	PPP	e 12·0
Chur		20·9	308	e 4 49	+ 3	e 8 48	SS	—	—	—
Collmberg	z.	21·0	321	e 4 46	− 1	—	—	e 5 10	PP	—
Jena	N.	21·6	319	e 4 54	0	e 8 55	+ 6	—	—	e 10·3
Potsdam		21·7	324	—	—	e 8 54	+ 3	—	—	e 11·0
Zürich		21·7	309	e 4 54	− 1	e 8 43	− 8	—	—	—
Stuttgart		21·9	313	i 4 57a	0	i 9 0	+ 6	i 9 50	SSS	e 11·0
Basle		22·6	309	e 5 4	+ 1	e 9 11	+ 4	—	—	—
Neuchatel		22·6	308	e 5 5	+ 2	e 9 14	+ 7	—	—	—
Strasbourg		22·7	312	e 5 5	+ 1	e 9 9	0	—	—	11·5
Besançon		23·4	307	e 5 14	+ 3	e 9 31	+10	—	—	—
Copenhagen		24·1	331	e 5 19	+ 1	i 9 38	+ 4	5 40	PP	11·7
Helsinki		24·3	349	e 5 15	− 5	i 9 33	− 4	e 5 39	pP	e 11·5
Clermont-Ferrand		24·9	303	i 5 28	+ 2	i 10 12	+25	i 6 6	PP	14·0
Barcelona		25·2	293	—	—	e 9 26	−26	—	—	14·8
De Bilt		25·6	318	e 5 30?	− 2	e 9 50?	− 9	—	—	e 12·0
Uccle		25·6	315	e 5 32	0	e 10 1	+ 2	e 11 24	SS	e 12·3
Upsala		25·6	341	5 43a	+11	e 9 47	−12	—	—	e 13·0
Paris		26·0	308	e 5 32	− 4	e 10 20	+14	e 6 16	PP	13·0
Sverdlovsk		26·9	33	i 5 38	− 7	i 10 12	− 8	—	—	—
Alicante		27·4	286	6 15	PP	i 10 59	+31	12 5	SSS	e 13·6
Stalinabad		27·5	75	i 5 43	− 7	i 10 19	−11	—	—	—
Tashkent		27·7	69	i 5 46?	− 6	—	—	—	—	—
Tchimkent		27·9	67	i 5 56	+ 2	—	—	—	—	—
Kulyab		28·3	76	i 5 57	0	e 10 47?	+ 4	—	—	—
Kew		28·5	313	i 6 17	+18	e 10 48?	+ 2	e 7 6	PPP	—
Almeria		29·2	283	i 6 5	0	10 55	− 3	7 3	PP	—
Andijan		30·0	71	e 6 17	+ 5	—	—	—	—	—
Granada		30·0	284	i 6 18	+ 6	i 11 36	+26	i 7 30	PPP	17·4
Malaga	z.	30·8	284	i 6 21k	+ 1	e 11 39	+16	i 6 31	pP	19·2
Murgab		31·5	73	i 6 21	− 5	i 11 27	− 7	—	—	—
Frunse		31·5	66	e 6 31?	+ 5	—	—	—	—	—
Aberdeen	E.	31·6	323	—	—	i 10 39	−56	—	—	e 14·4
Almata		33·2	64	e 6 47	+ 7	—	—	—	—	—
Lisbon		34·1	288	i 6 50	+ 2	12 19	+ 5	12 7	S	16·2
Bombay		38·2	107	e 7 16	− 7	—	—	e 7 27	P	—
Hyderabad	N.	43·4	104	7 29	−37	13 54	−41	9 17	PP	—
Calcutta	E.	48·6	91	e 8 52	+ 5	e 15 47	− 2	—	—	—
Irkutsk		50·5	48	e 8 54	− 8	e 16 3	−13	—	—	—
Colombo	E.	51·1	114	9 7	+ 1	—	—	—	—	26·3
Hungry Horse		90·8	340	i 12 34	−32	—	—	—	—	—
Pierce Ferry		101·8	335	e 14 0	+ 4	—	—	e 18 35	PP	—

Additional readings :—
Belgrade ePP = 4m.5s. Readings wrongly identified.
Rome iPPE = 4m.32s., iPPPZ = 4m.39s., eSSZ = 7m.58s.
Triest isS = 7m.54s., iSS = 8m.9s.
Warsaw PPE = 4m.36s., iSE = 7m.46s., SSN = 8m.9s., iSSE = 8m.13s., SSZ = 8m.22s.
Prague ePP = 5m.11s., ePPP = 5m.44s.
Cheb ePPP = 5m.33s., eSS = 9m.6s., eSSS = 9m.26s., e = 10m.9s.
Collmberg eZ = 6m.8s.
Stuttgart ePP? = 5m.47s.
Strasbourg ePPP = 6m.12s., eS = 9m.13s., iS = 9m.20s.
Copenhagen i = 6m.47s.
Helsinki epS = 10m.6s., e = 10m.26s. and 10m.53s.
Clermont-Ferrand iPPP = 6m.25s.
Upsala PN = 5m.48s., eSN = 9m.42s., eSS = 10m.20s.

Continued on next page.

Paris i=5m.37s. and 5m.50s., e=6m.44s., 6m.54s., 7m.24s., 9m.50s., and 10m.54s.' eSSS=12m.0s.?, e=12m.10s.
Alicante PP=6m.53s., SSS=12m.21s.
Kew eSS?=12m.18s.?
Almeria PPP=7m.19s., P_cP=9m.17s., SS=12m.30s.
Granada P_cS=12m.30s., SS=14m.3s.
Malaga ePPZ=8m.3s., PPPZ=8m.33s., ePSZ=12m.39s., PPSZ=13m.17s.
Long waves were recorded at Bergen, Edinburgh, and Riverview.

Dec. 9d. Readings also at 0h. (near Piatigorsk), 2h. (Tucson), 3h. (Mizusawa), 5h. (Hungry Horse), 7h. (Theodosia), 9h. (Theodosia (2) and near Kulyab, Stalinabad, and San Juan), 10h. (Zürich, near Ebingen and Stuttgart), 14h. (La Paz), 15h. (La Paz), 17h. (La Paz), 19h. (Zürich), 20h. (near Ottawa), 23h. (Pavia and near Huancayo).

Dec. 10d. 12h. Undetermined shock.

U.S.S.R. gives 33°·0N. 71°·0E.

Kulyab eP=39m.4s.
Stalinabad iP=39m.7s., iS=40m.59s.
Murgab eP=39m.22s.?, eS_g=41m.8s.?
Tashkent eP=39m.48s.?, eS_g=41m.54s.?
Andijan eP=39m.54s.
Tchimkent iP=40m.3s., iS=42m.25s.
Ashkabad eP=40m.3s.
Frunse eP=40m.26s.?
Bombay ePEN=41m.30s., eSEN=42m.35s.
Hyderabad eN=43m.15s., S=44m.15s.

Dec. 10d. Readings also at 1h. (La Paz, near Huancayo, near Mineral, near Andijan, Kulyab, and Stalinabad), 2h. (Pierce Ferry and near Boulder City), 3h. (La Paz and Bogota), 4h. (La Paz, Bogota, Pasadena, Riverside, Mount Wilson, Palomar, Tinemaha, Tucson, Boulder City, Grand Coulee, Hungry Horse, Pierce Ferry, Shasta Dam, Cheb, Paris, Stuttgart, Istanbul, Helwan, Ksara, and Helsinki), 5h. (Stuttgart, Belgrade, Strasbourg, De Bilt, Copenhagen, Istanbul (2), Rapid City, and Salt Lake City), 6h. (Frunse, Stalinabad, near Andijan, Murgab, Tashkent, Tchimkent, and Kulyab), 7h. (near Almata), 9h. (Tucson, Boulder City, Hungry Horse, and near Huancayo), 12h. (near Harvard), 13h. (near Strasbourg and near Mizusawa), 15h. (Frunse amd near Almata), 16h. (La Paz), 18h. (near Almata, Frunse, Murgab and Andijan), 19h. (Tchimkent), Kulyab, Stalinabad, Samarkand, Stuttgart, near Ksara and Helwan), 22h. (near Ottawa), 23h. (Stuttgart, near Malaga, Sverdlovsk, Almata, Stalinabad, near Murgab, Andijan, and Kulyab, Mount Wilson, Tinemaha, Tucson, Hungry Horse, Pierce Ferry, Shasta Dam, and near Mizusawa; several shocks).

Dec. 11d. 12h. Japan.

Mizusawa ePN=37m.27s., eSN=38m.27s., SE=38m.56s.
Tashkent eP=46m.8s.?
Sverdlovsk eP=46m.14s., eS=54m.6s.
Shasta Dam eP=47m.50s.
Ksara eP=49m.6s., eSS?=67m.11s.
Stuttgart ePZ=49m.11s., eQ?=86m.
Long waves were also recorded at other European stations.

Dec. 11d. Readings also at 0h. (Grand Coulee, Bogota, La Paz, La Plata, and Santa Lucia), 1h. (Shasta Dam), 7h. (Brisbane and Riverview), 10h. (Bogota), 11h. (near Budapest, Kalossa, and near Stalinabad), 15h. (near Mizusawa), 16h. (Santa Lucia, Samarkand, near Kulyab, Stalinabad, Andijan, and Murgab), 17h. (near Mizusawa), 21h. (Stuttgart, Samarkand, Stalinabad, Kulyab, Tchimkent, near Frunse, Almata, Andijan, Murgab, and near Branner).

Dec. 12d. Readings at 0h. (near Basle, Zürich, and Stuttgart), 1h. (Mineral, Berkeley, Branner, near Lick and near Kulyab), 2h. (Brisbane, Arapuni, Wellington, Riverview, Boulder City, Pierce Ferry, Shasta Dam (2), Grand Coulee, and Hungry Horse (2)), 3h. (Strasbourg), 9h. (Bogota and La Paz), 12h. (near Andijan, Frunse, and Murgab), 14h. (Kulyab), 15h. (near Florence and near Mizusawa), 17h. (Branner and near Alicante), 18h. (La Paz (2), Santa Lucia, Huancayo, Pierce Ferry, near Andijan, Kulyab, Murgab, and Stalinabad), 19h. (Grand Coulee, Hungry Horse, near Branner, near Bozeman and Butte), 22h. (near Florence).

Dec. 13d. 0h. 6m. 49s. Epicentre 42°·9N. 0°·9E.

Epicentre north of Val d'Aran in French territory.
Intensity VI around St. Béat. Macroseismic radius 40km.

Eduardo Fontseré.
"Los Temblores de Tierra Catalancs de los Años, 1946, y 1947." Real Academia de Ciencias y Artes de Barcelona, pp. 77, 78, macroseismic chart, p. 77.

J. P. Rothé, N. Dechevoy.
"La Séismicité de la France de 1940-1950." Annales de l'Institut de Physique du Globe de Strasbourg. 3è partie Géophysique, Tome VII, 1954. Epicentre as adopted.

$A = +\cdot7347$, $B = +\cdot0115$, $C = +\cdot6782$; $\delta = -13$; $h = -3$;
$D = +\cdot016$, $E = -1\cdot000$; $G = +\cdot678$, $H = +\cdot011$, $K = -\cdot735$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Barcelona	1·7	148	0 36	+ 5	0 59	+ 5	—	—
Tortosa	2·1	188	i 0 34	− 3	1 4	0	0 42	P_g
Clermont-Ferrand	3·3	29	e 0 51	− 2	—	—	i 1 3	P_g
Besançon	5·6	38	—	—	3 6	S_g	—	—
Paris	6·0	10	e 2 4?	P_g	e 3 11	S*	e 3 17	S_g
Basle	6·6	43	e 1 59	P*	e 3 38	S_g	—	—
Zürich	7·0	48	—	—	e 3 44	S_g	—	—
Strasbourg	7·4	38	—	—	e 3 42	S*	e 3 59	S_g
Stuttgart	8·2	42	e 3 44?	S	(e 3 44?)	+ 6	e 4 34	S_g

Additional readings :—
Tortosa P_gN = 39s. and 50s., P_gS_gEN = 55s. and 59s., S_gN = 1m.8s. and 1m.13s., 1m.18s., 1m.24s., 1m.33s., and 1m.40s.
Paris e = 3m.24s. and 3m.34s.
Zürich e = 4m.10s.

Dec. 13d. 23h. 0m. 22s. Epicentre 41°·0N. 143°·3E. (as on 1946, Aug. 7d.).

Intensity V at Hatinohe; IV at Hakodate, Marioka, and Urakawa; II-III at Mizusawa and Aomori. Macroseismic radius 200-300km. Shallow.
Seismo. Bull. Cent. Met. Obs., Japan for 1947, Tokyo, 1950, pp. 46 and 47, with macroseismic chart.

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

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Hatinohe	1·4	251	0 22k	− 5	0 34	−12	—	—
Miyako	1·7	216	0 31	0	0 50	− 4	—	—
Aomori	1·9	264	0 32	− 2	—	—	—	—
Morioka	2·1	232	0 34k	− 3	0 56	− 8	—	—
Mori	2·3	298	0 35k	− 5	0 58	−11	—	—
Mizusawa	2·5	222	0 46	+ 3	1 11	− 3	—	—
Sapporo	2·5	325	0 40k	− 3	1 5	− 9	—	—
Nemuro	2·9	44	0 59	+11	1 34	+10	—	—
Sendai	3·3	214	0 55	+ 2	1 29	− 6	—	—
Onahama	4·5	205	1 21	+10	—	—	—	—
Aikawa	4·9	234	1 17	0	2 12	− 3	—	—
Mito	5·1	206	1 18	− 2	2 30	+10	—	—
Utunomiya	5·2	212	1 28	+ 7	—	—	—	—
Kakioka	5·3	208	1 24	+ 2	2 37	+12	—	—
Kumagaya	5·7	213	1 36	+ 8	2 43	+ 8	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Maebasi		5·7	217	1 28	0	2 39	+ 4	—	—
Nagano		5·9	224	1 32	+ 1	2 57	S•	—	—
Tokyo		6·0	206	1 36	+ 4	2 53	+10	—	—
Wazima		6·1	236	1 34	0	2 43	− 2	—	—
Yokohama		6·3	208	1 44	+ 8	3 11	S•	—	—
Toyama		6·4	229	1 34	− 4	3 12	S•	—	—
Hunatu		6·5	213	1 42	+ 3	2 54	− 1	—	—
Mera		6·6	205	1 23	−18	2 53	− 5	—	—
Misima		6·8	211	1 43	− 1	3 19	+16	—	—
Osima		7·0	206	2 13	P_g	—	—	—	—
Shizuoka		7·2	214	1 50	+ 1	3 14	+ 1	—	—
Gihu		7·6	224	1 53	− 2	3 33	+10	—	—
Nagoya		7·7	222	1 56	0	3 28	+ 3	—	—
Hikone		8·0	226	1 57	− 3	3 24	− 9	—	—
Kameyama		8·2	221	2 4	+ 1	—	—	—	—
Vladivostok		8·8	287	i 2 3	− 8	i 3 44	− 9	—	—
Owase		8·9	221	2 20	+ 8	3 13	−42	—	—
Almata		48·1	296	e 8 42	− 1	—	—	—	—
Frunse		49·8	297	8 51	− 5	—	—	—	—
Murgab		52·1	292	i 9 7	− 7	—	—	—	—
Andijan		52·2	294	9 9	− 6	—	—	—	—
Tashkent		54·1	297	e 9 19?	−10	—	—	—	—
Grand Coulee		65·5	47	i 10 45	− 2	—	—	e 10 58	pP
Shasta Dam		67·6	55	i 11 0	− 1	—	—	i 11 16	pP
Hungry Horse		67·9	44	i 11 2	0	—	—	i 11 18	pP
Grozny		68·0	309	e 10 59	− 4	—	—	—	—
Berkeley	z.	69·3	58	i 11 22	+11	—	—	i 11 28	pP
Haiwee	z.	73·1	56	e 11 35	+ 1	—	—	i 11 46	pP
Mount Wilson	z.	74·2	58	e 11 40	0	—	—	i 11 51	pP
Pasadena	z.	74·2	58	e 11 40	0	—	—	e 11 51	pP
Riverside	z.	74·8	58	e 11 43	− 1	—	—	i 11 53	pP
Boulder City		75·2	55	i 11 47	+ 1	—	—	i 12 2	pP
Palomar	z.	75·6	58	e 12 0	+12	—	—	i 12 4	pP
Pierce Ferry		75·6	54	i 11 48	0	—	—	i 12 4	pP
Collmberg	z.	78·4	331	e 11 49	−15	—	—	e 12 8	pP
Ksara		80·0	306	e 12 9	− 4	—	—	—	—
Tucson		80·1	56	e 12 9	− 4	—	—	i 12 29	pP
Stuttgart	z.	81·9	332	e 12 37a	+14	—	—	e 15 23	PP
Kirkland Lake		83·3	27	e 12 27	− 3	—	—	—	—
Zürich		83·3	331	e 12 24a	− 6	—	—	—	—
Basle		83·5	331	e 12 26a	− 5	—	—	e 16 6	PP
Paris		84·1	335	i 12 30a	− 4	—	—	e 12 45	pP
Temiskaming		84·9	27	e 12 35	− 3	—	—	—	—
Rome	z.	86·2	325	—	—	e 34 14	?	—	—
Clermont-Ferrand		86·6	333	e 12 42	− 4	—	—	—	—
St. Louis		86·9	39	e 12 47	− 1	—	—	e 13 2	pP

Additional readings :—
Haiwee iZ = 11m.50s.
Mount Wilson iZ = 11m.56s.
Pasadena iZ = 11m.56s.
Riverside iZ = 11m.59s.
Pierce Ferry e = 14m.52s.
Tucson e = 12m.54s.
Long waves were also recorded at Kew, De Bilt, Uccle, and Istanbul.

Dec. 13d. Readings also at 0h. (near Bogota and near Murgab), 1h. (Brisbane, Riverview, Auckland, Wellington, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Stuttgart, and Ksara), 2h. (Huancayo), 3h. (Haiwee, Mount Wilson, Pasadena, Palomar, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Stuttgart), 4h. (Hungry Horse and Shasta Dam), 5h. (Hungry Horse), 6h. (Huancayo), 8h. (near Berkeley, Branner, and Lick), 9h. (Riverview, Auckland, Arapuni, Apia, Wellington, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Stuttgart), 10h. (Berkeley), 12h. (Stuttgart, La Paz, Bogota, Mount Wilson, Pasadena, Tinemaha, Tucson, Boulder City (2), Pierce Ferry (2), Shasta Dam, Grand Coulee, Hungry Horse, and near Fresno ; several shocks), 13h. (Kew), 19h. (near Triest), 20h. (Bogota, Huancayo, and near Triest), 21h. (La Paz, Mount Wilson, Pasadena, Tinemaha, Tucson, Boulder City, Hungry Horse, Pierce Ferry, Shasta Dam, Palomar, Riverside, and Stuttgart), 22h. (Fresno and near Zagreb).

Dec. 14d. 2h. 16m.12s. Epicentre 26°·3S. 63°·2W. Focus at base of superficial layers.
(as on 1947, January 29d.).

Intensity VI between 27° and 28°S. Macroseismic radius about 150km.
Epicentres : 27°S. 63°W. (J.S.A.) Depth of focus 100km.
26°S. 63°W. (U.S.C.G.S.).

F. Greve.
Lista de sismos sensibles al hombre obstenidos por el serviceo de postales informativas, ano 1947, p. 18, Instituto Sismologico de la Universidad de Chile.

$A = +\cdot4047$, $B = -\cdot8012$, $C = -\cdot4407$; $\delta = -8$; $h = +3$;
$D = -\cdot893$, $E = -\cdot451$; $G = -\cdot199$, $H = +\cdot393$, $K = -\cdot898$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m.	s.		m.
Montezuma		6·3	304	e 1 23	−10	e 1 58	PPP	i 2	7	?	e 2·2
Copiapo	N.	6·5	259	(i 1 37)	+ 1	—	—	(i 2	2)	PPP	—
La Plata		9·7	153	e 3 19	+59	4 13	+ 4	—		—	6·0
Santa Lucia	N.	9·7	221	2 15	− 5	3 13	−56	—		—	3·6
La Paz		10·8	334	2 40	+ 5	i 4 28	− 8	i 3	0	PP	—
Bogota	z.	32·5	340	e 7 4	+34	e 12 9	+28	—		—	—
Fort de France		40·8	4	e 8 59	PP	—	—	—		—	—
San Juan		44·5	357	e 10 34	PPP	e 14 42	0	e 15	13	PPS	e 18·1
Harvard		68·9	354	i 11 47	+44	—	—	—		—	—
St. Louis		69·4	338	e 11 7	+ 1	—	—	i 11	35	pP	—
Cleveland	z.	69·6	346	i 11 17k	+ 9	—	—	i 11	46	pP	—
Ottawa	z.	72·3	351	e 11 36	+12	—	—	i 12	5	pP	—
Tucson		73·8	320	i 11 32	− 1	—	—	i 12	2	pP	—
Temiskaming		74·0	350	e 11 47	+13	—	—	e 12	17	pP	—
Kirkland Lake		75·6	350	e 11 55	+12	—	—	e 12	23	pP	—
La Jolla	z.	78·1	316	e 12 26	pP	—	—	—		—	—
Palomar		78·2	317	i 11 58	0	i 12 43	sP	i 12	28	pP	—
Pierce Ferry		78·4	321	i 11 59	0	—	—	i 12	29	pP	—
Boulder City		78·8	320	e 12 2	+ 1	—	—	i 12	32	pP	—
Riverside	z.	79·0	317	i 12 1	− 1	i 12 44	sP	i 12	32	pP	—
Mount Wilson	z.	79·5	317	i 12 5	0	i 12 50	sP	i 12	35	pP	—
Pasadena	z.	79·6	317	e 12 5	0	i 12 50	sP	i 12	35	pP	—
Santa Barbara	z.	80·7	316	i 12 41	pP	—	—	i 12	48	sP	—
Haiwee	z.	80·8	318	e 12 12	0	—	—	i 12	42	pP	—
Tinemaha		81·9	316	i 12 16	− 2	—	—	i 12	47	pP	—
Fresno	z.	82·3	318	i 12 20	0	—	—	i 12	50	pP	—
Berkeley	z.	84·7	317	i 12 33	+ 1	—	—	i 13	2	pP	—
Shasta Dam		86·4	319	e 12 40	0	—	—	e 13	10	pP	—
Hungry Horse		87·1	330	e 12 48	+ 4	—	—	i 13	19	pP	—
Grand Coulee		89·2	327	e 12 59	+ 5	e 13 45	sP	i 13	28	pP	—

Additional readings and note :—
Copiapo readings increased by 2 minutes.
La Plata N = 3m.50s., SEN = 5m.27s.
La Paz iS = 4m.54s., iZ = 5m.20s., iS^* = 5m.44s., iS_s = 6m.16s.
Fresno eEN = 12m.25s.

Dec. 14d. Readings also at 1h. (San Francisco), 2h. (Kulyab, near Murgab, and Andijan), 4h. (Stuttgart, Andijan, Kulyab, Stalinabad, Almata, Tchimkent, Frunse, and near Calcutta), 5h. (Shasta Dam, near Branner, Fresno, Lick, and San Francisco), 6h. (La Paz), 7h. (San Juan, Samarkand, Tashkent, Almata, Stalinabad, near Kulyab, Frunse, and Andijan), 13h. (Boulder City and Pierce Ferry), 15h. (Tucson, near Ferndale, and near Mizusawa), 16h. (Ksara), 18h. (Andijan, Samarkand, near Murgab, Tchimkent, Stalinabad, and Kulyab), 19h. (Auckland, Wellington, Brisbane, and Riverview), 20h. (Andijan, near Kulyab, Stalinabad, Murgab, and near Mizusawa), 23h. (Shasta Dam and near Apia).

Dec. 15d. 19h. 20m. 24s. Epicentre 59°·4S. 159°·7W.

Pasadena suggests depth 60km.

A = −·4798, B = −·1775, C = −·8592; * $\delta = -6$; $h = -9$;
D = −·346, E = +·938; G = +·806, H = +·298, K = −·512.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Wellington		24·1	306	5 16	− 2	9 36	+ 2	10 34	SS	—
Kaimata		24·5	300	5 25	+ 3	9 59	+19	—	—	—
Tuai		25·4	313	5 31	0	—	—	—	—	—
New Plymouth		26·3	309	5 36	− 3	10 14	+ 3	—	—	—
Arapuni		26·5	312	6 36	+55	10 36	+22	—	—	—
Auckland		27·9	312	6 51	+57	11 34	+57	—	—	14·1
Antarctica		38·0	141	i 7 21	0	i 13 10	− 4	i 8 53	PP	e 18·0
Riverview		41·0	286	i 7 46k	0	i 13 55	− 4	i 8 5	pP	e 18·9
Brisbane		45·4	293	i 8 22	0	i 15 6	+ 2	i 10 11	PP	i 19·0
Perth		60·4	257	11 3	+50	18 51	+23	—	—	26·2
La Plata	E.	66·2	117	10 56	+ 4	19 47	+ 7	13 6	PP	31·8
	N.	66·2	117	10 54	+ 2	19 44	+ 4	13 14	PP	32·5
La Paz		76·8	99	i 11 55a	0	i 21 44	+ 2	14 32	PP	35·9
Huancayo		76·9	90	i 11 56	0	e 21 44	+ 1	e 14 49	PP	e 32·6
Honolulu		80·4	2	—	—	e 22 44	+23	—	—	e 33·5
Bogota		91·7	83	i 13 10	0	i 25 22	PS	e 16 47	PP	—
Tacubaya		92·6	55	e 13 15	0	i 24 33	+15	e 17 21	PP	—
Palomar		99·0	35	i 13 41	− 3	—	—	i 17 44	PP	—
Pasadena		99·3	34	i 13 41	− 4	e 24 29	[+ 5]	i 17 46	PP	45·0
Riverside		99·4	34	e 13 42	− 4	—	—	i 17 47	PP	—
Mount Wilson		99·5	34	i 13 42	− 4	—	—	i 17 46	PP	—
Tucson		99·8	40	i 13 44	− 3	e 24 59	{+ 6}	i 17 50	PP	e 42·9
Haiwee		101·3	33	i 13 51	− 3	—	—	i 17 59	PP	—
Fresno		101·3	31	i 13 52	− 2	—	—	e 17 59	PP	—
Santa Clara	Z.	101·3	29	e 18 3	PP	—	—	—	—	—
Berkeley		101·8	29	i 13 54	− 2	i 24 30	[− 6]	i 18 4	PP	e 51·2
Boulder City		102·0	35	e 13 56	− 1	—	—	e 18 4	PP	—
Tinemaha		102·1	32	e 13 55	− 3	—	—	e 18 4	PP	—
Pierce Ferry		102·4	36	e 13 57	− 2	e 30 3	PKKP	e 18 8	PP	—
Shasta Dam		104·4	28	e 14 4	− 4	—	—	e 18 24	PP	—
San Juan		107·4	83	e 14 19	P	e 24 59	[− 2]	e 18 26	PP	e 46·8
Colombo	E.	111·1	246	25 2	SKS	(25 2)	[−15]	—	—	51·6
Victoria		111·6	24	19 6	PP	25 14	[− 5]	28 44	PS	50·6
Butte		111·9	33	e 19 18	PP	e 28 51	PS	e 35 10	SS	e 48·4
Grand Coulee		112·0	28	e 14 39	P	e 19 15	PP	e 18 37	PKP	—
Bozeman		112·1	35	e 19 18	PP	e 25 16	[− 5]	e 28 51	PS	e 48·9
Rapid City		113·1	41	e 19 4	PP	—	—	e 29 2	PS	e 56·0
St. Louis		113·2	53	i 19 18	PP	i 28 58	PS	i 39 48	SSS	—
Kodaikanal	E.	115·1	246	i 19 54	PP	—	—	—	—	—
Vladivostok		116·6	310	e 19 39	PP	25 37	[− 1]	29 41	PS	—
Chicago		116·9	52	e 29 39	PS	—	—	—	—	e 61·3
Sitka		118·2	14	e 19 17	[+28]	e 29 10	PS	e 36 44	SS	e 48·1
Cleveland		119·2	58	e 18 48	[− 3]	i 29 56	PS	i 20 10	PP	—
Bermuda		119·7	76	e 19 53	PP	e 25 52	[+ 3]	29 56	PS	—
Calcutta	E.	120·3	263	e 20 19	PP	e 27 9	{− 7}	e 22 41	PPP	62·6
Philadelphia		120·8	63	e 19 19	[+25]	e 30 22	PS	e 20 16	PP	e 59·8
Hyderabad	N.	120·9	251	—	—	25 45	[− 8]	—	—	—
College		124·3	5	e 20 43	PP	e 29 18	S	e 30 41	PS	e 54·2
Bombay		124·8	246	e 20 13	?	e 37 40	SS	e 20 33	PP	49·7
Ottawa		124·9	58	18 59	[− 3]	30 36?	PS	20 46	PP	60·6
Kirkland Lake		125·2	53	e 19 1	[− 2]	—	—	e 20 51	PP	—
Seven Falls		128·4	60	e 21 54	PP	—	—	(33 36?)	PPS	33·6
Irkutsk		135·3	299	19 20	[− 2]	39 18	SS	22 51	PKS	—
Murgab		140·3	263	e 19 28	[− 3]	—	—	—	—	—
Almata		142·4	271	e 19 44	[+ 9]	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Frunse		143·3	267	i 19 34	[− 2]	—	—	—	—	—
Samarkand		144·8	257	i 19 40	[+ 1]	—	—	—	—	—
Tashkent		144·9	262	i 19 37	[− 2]	i 34 4	PS	23 23	PKS	—
Tchimkent		145·5	263	i 19 39	[− 1]	—	—	—	—	—
Ivigtut		147·4	57	i 19 42s	[− 1]	—	—	—	—	—
Ashkabad		147·6	246	i 19 58	[+14]	—	—	—	—	—
Helwan	z.	149·5	199	i 19 45k	[− 2]	23 18	SKP	20 15	pPKP	—
Lisbon		152·1	125	i 19 49	[− 2]	—	—	24 9	PP	—
Malaga	z.	152·2	133	i 19 49k	[− 2]	33 35	SKSP	i 23 39	PP	70·9
Ksara		152·4	208	i 19 51	[0]	—	—	23 40	PP	—
Granada		153·0	134	19 22s	[−30]	(26 40)	[−17]	i 23 11	PP	73·3
Almeria		153·1	136	i 19 51	[− 1]	26 53	[− 5]	23 17	PKS	74·8
Baku		153·4	237	e 20 15	[+23]	—	—	—	—	—
Alicante		155·1	137	19 37	[−18]	26 49	[−11]	23 27	PKS	73·2
Leninakan		156·2	229	20 3	[+ 7]	—	—	—	—	—
Grozny		157·6	236	20 2	[+ 4]	—	—	—	—	—
Tortosa	N.	157·6	138	i 20 7	[+ 9]	20 59	PKP_2	23 45	PKS	—
Barcelona		158·7	139	e 20 14	[+15]	—	—	—	—	e 72·2
Sverdlovsk		158·8	281	i 19 56	[− 3]	35 32	PS	i 24 18	PP	—
Scoresby Sund		159·5	39	19 56	[− 4]	37 33	PPS	—	—	—
Istanbul		160·8	199	i 19 59	[− 3]	30 38	(−39)	—	—	—
Rome	z.	161·8	160	i 20 0s	[− 3]	e 23 26	PKS	i 24 30	PP	—
Yalta		162·8	215	20 2	[− 2]	—	—	—	—	—
Clermont-Ferrand		162·9	136	i 20 4	[0]	i 27 11	[+ 4]	i 24 38	PP	76·6
Florence		163·4	156	e 20 10	[+ 6]	—	—	—	—	—
Pavia	z.	164·3	150	i 20 4	[− 1]	—	—	—	—	—
Besançon		165·2	139	e 20 4	[− 2]	i 31 42	(+ 3)	—	—	87·6
Paris		165·2	127	i 20 5s	[− 1]	e 31 36	(− 3)	i 24 49	PP	e 76·6
Neuchatel		165·3	142	e 20 4	[− 2]	—	—	—	—	—
Belgrade		165·4	181	e 20 2	[− 4]	e 45 46	SS	e 25 28	PP	e 70·6
Triest		165·6	161	e 19 58	[− 8]	i 35 23	PSKS	e 45 36?	SS	—
Basle		165·9	142	e 20 5s	[− 2]	—	—	e 24 48	PP	—
Chur		165·9	149	e 20 4s	[− 3]	e 21 4s	PKP_2	e 24 51	PP	—
Kew		165·9	115	i 20 4s	[− 3]	e 26 59	[−10]	i 20 23	pPKP	e 78·6
Zagreb		166·1	167	e 20 7	[0]	e 21 8	PKP_2	e 24 33	PP	—
Zürich		166·1	143	e 20 4s	[− 3]	e 20 41	PKP_2	e 24 52	PP	—
Strasbourg		166·9	140	i 20 3	[− 4	e 31 42	(− 6)	i 24 57	PP	e 79·3
Kalossa		167·1	175	e 20 11	[+ 4]	e 21 38	PKP_2	—	—	—
Stuttgart		167·5	144	i 20 5	[− 3]	e 35 36	PSKS	e 24 59	PP	78·6
Uccle		167·5	124	e 20 5	[− 3	e 35 22	PSKS	e 24 40	PP	e 70·6
Aberdeen	E.	168·0	90	e 20 16	[+ 8]	—	—	—	—	e 79·8
Budapest		168·0	176	20 10	[+ 2]	e 35 10	PSKS	i 25 10	PP	e 82·6
De Bilt		168·8	123	i 20 7s	[− 1]	e 32 29	(+32)	i 25 10	PP	e 78·6
Cheb		169·6	149	e 19 36	[−33]	e 31 55	(− 6)	e 25 30	PP	e 76·6
Moscow		170·0	256	20 5	[− 4]	27 32	[+20]	e 25 52	PP	—
Prague		170·1	157	e 21 21	PKP_2	e 28 6	[+54]	e 25 13	PP	e 74·6
Jena		170·2	148	e 20 6	[− 3]	e 32 5	(+ 1)	e 25 12	PP	—
Collmberg	z.	170·9	147	e 19 58	[−12]	e 21 17	PKP_2	e 25 5	PP	—
Potsdam		171·9	144	e 20 14?	[+ 4]	i 32 22	(+ 9)	i 25 28	PP	e 87·6
Bergen		172·4	73	25 22	PP	32 18	(+ 3)	29 32	PPP	—
Warsaw		172·8	—	i 20 9	[− 2]	32 19	(+ 2)	i 21 37	PKP_2	e 80·6
Copenhagen		174·4	—	i 20 7	[− 4]	32 29	(+ 5)	29 45	PPP	—
Helsinki		177·5	—	e 20 14	[+ 2]	27 42	[+29]	e 25 43	PP	e 79·6
Upsala		178·6	—	21 59	PKP_2	32 37?	(− 7)	e 25 45	PP	—

Additional readings :—
Wellington i = 5m.25s., 5m.49s., 6m.25s., and 7m.6s.
Antarctica e = 16m.29s. and 17m.24s.
Riverview iP_cPEZ = 9m.39s., iN = 13m.33s., iEN = 14m.3s., and 14m.19s., iE = 14m.26s., iSSE = 17m.4s., iN = 17m.13s., $iS_cS?N$ = 17m.22s.
Brisbane eSEN = 14m.56s., iE = 16m.4s.
La Plata E. P_cP = 11m.30s., 17m.36s., SKKS = 22m.24s., SS = 25m.0s., SSS? = 26m.12s., Q = 28·2m.
La Plata N. P_cP = 11m.41s., 12m.8s., 23m.18s., SS = 23m.54s., 26m.4s., SSS = 27m.6s., Q = 29·6m.

Continued on next page.

La Paz PPP? =16m.56s., iSKKSN =22m.24s., iSSEN =27m.4s., SSS =30m.16s., iEN = 31m.30s., QE =32m.36s.
Huancayo e =14m.26s., eScS =22m.28s., eSS =26m.50s.
Bogota iEZ =13m.38s.
Tacubaya ePPP =19m.4s., e =20m.52s., eSKS =23m.50s., ePS =25m.36s., eSSS = 35m.17s.
Pasadena iPSEN =26m.43s., iSSN =32m.25s.
Tucson e =19m.46s., eSKS=23m.48s., ePS=26m.53s., ePKKP=30m.10s., ePKP,PKP= 38m.14s.
Fresno iPPZ =18m.3s.
Berkeley iZ =18m.46s., iN =24m.38s., eZ =27m.13s., iE =32m.20s.
Shasta Dam e =14m.9s.
San Juan e =20m.2s., eSKKS =25m.56s., ePS =28m.9s., ePPS =29m.3s., ePKKP = 30m.16s., eSS =34m.19s., e =43m.4s.
Victoria SS =34m.56s.
Butte ePPS =30m.1s.
Bozeman ePPS =30m.7s., eSS =35m.6s.
St. Louis iPPS =30m.16s., i =34m.8s.
Vladivostok SS =36m.6s.
Sitka ePPS =30m.58s., eSSS =41m.11s.
Cleveland eN =29m.46s. and 29m.50s.
Bermuda eSS =36m.46s., eSSS =40m.43s.
Calcutta ePPPE =25m.39s., eSKKSE =29m.27s.
Philadelphia eSS? =35m.52s., eSSS =42m.16s.
College eSS =36m.56s.
Irkutsk PPP =24m.53s., SSS =44m.18s.
Tashkent PPS =35m.35s., eSS =41m.0s.
Helwan iZ =20m.33s., PPPZ =26m.28s.
Lisbon PKP_2NZ =20m.7s.
Malaga iPKP_2Z =20m.7s., PPPZ =27m.5s., PPSZ =36m.56s., SSZ =42m.59s., QZ = 59m.43s.
Granada PKP =19m.37s., pPKP =20m.0s., sPKP =20m.28s., pPP =23m.40s., sPP = 24m.15s., SKS =25m.37s., sSKS =27m.45s., SKKS =29m.24s., SKSP =33m.7s., SS =42m.33s., SSS =48m.9s., SKS is given as PPP.
Almeria iPKP_2 =20m.14s., iPP =23m.42s., PPP =27m.13s., SKKS =30m.29s., PPS = 36m.33s., SS =43m.5s., SSP =43m.53s., SSS =48m.50s.
Alicante PKP_2 =20m.22s., PP =24m.11s., PPP =27m.50s., PKKS =31m.22s., PSS = 37m.43s., SS =44m.20s., SSP =45m.21s., SSS =49m.55s.
Tortosa PP?N =24m.38s., SKKSN? =31m.19s., SSS?N =57m.49s.
Scoresby Sund 20m.35s., 24m.18s.
Rome iPKP_2Z =20m.55s., iPPPZ =28m.15s., ePSKS =34m.24s.?
Clermont-Ferrand iPKP_2 =20m.53s., iPPP =28m.25s., iSKSP =35m.10s., iSSS? = 51m. 49s.
Paris iPKP_2 =21m.4s., e =29m.33s., ePPP =32m.9s., eSS =45m.32s., eSSP =46m.34s.
Belgrade ePP? =21m.14s. (PKP_2), e =27m.49s., eSKP,SKP =32m.36s.
Triest iPKP_2 =21m.3s.
Kew isPKP?Z =20m.34s., iPKP_2? =21m.4s., epPKP$_2$?E =31m.26s., isPKP_2?Z = 21m.33s., iPKS?EZ =23m.24s., iPP? =24m.53s., ipPPEZ =25m.13s., ePPP?Z = 28m.43s., eSKKS? =31m.37s.?, eSKSP?EN =35m.22s.?, ePPS?E =38m.27s.?, eSS =45m.37s.?
Zagreb ePNE =20m.14s., epPNW =21m.12s., all readings given 20m. early.
Strasbourg iPKP_2 =21m.11s., ePP? =26m.41s., i =35m.36s., eSS =44m.50s., eSSS = 51m.21s., i =58m.33s.
Stuttgart iPKP_2 =21m.12s., e =24m.25s. and 26m.10s., ePPP =29m.10s., eZ = 29m.43s., e =30m.16s. and 33m.36s., eSS =45m.36s, e =46m.54s., eL? =52·6m.
Uccle ePKP_2 =21m.12s., ePPEN =25m.1s., eSSE =46m.16s., eSSSEN =51m.18s.
Budapest eE =21m.13s., iN =24m.14s., and 35m.37s.
De Bilt iPKP_2 =21m.19s., ePPP =29m.8s., iZ =34m.56s., iPPS =39m.0s., eSSP =48m.6s.
Cheb ePKP_2 =21m.12s., eSKP =24m.59s., eSKSP =36m.1s., e =40m.39s., eSS = 46m.13s., e =57m.38s. and 61m.21s.
Moscow SKKS =32m.0s.
Prague ePPP =29m.12s., eSKKS =32m.12s., eSS =45m.36s.?
Jena eE =32m.18s.
Potsdam eE =25m.36s.
Bergen eZ =26m.53s., eSKSPN =36m.21s., SSN =46m.38s.?.
Warsaw ePKPE =20m.14s., SKP?E =24m.8s., PPE =25m.19s., iPP =25m.29s., iPP_2? =26m.35s., iPP_2?N =26m.43s., iPPPZ =29m.23s., PPPN =29m.33s., PPP_1?E =31m.8s., PPP_2?Z =31m.11s., iSKKS$_2$?E =32m.58s., PPS =38m.53s., iSSE = 46m.54s., SSN =47m.9s., SSS?E =51m.24s., and many other readings without phase.
Copenhagen i =21m.44s., and 25m.37s. SKS =26m.52s., 28m.52s., i =36m.12s., SS = 47m.36s.
Helsinki ePKP_2 =21m.57s., e =22m.18s., ePKS =23m.50s., ePP =26m.10s., eP_cP,PKP = 28m.58s., ePPP =30m.17s. and 30m.44s., eP_cP,PKP_2 =32m.4s., eSKKS =32m.45s., e =33m.1s., eSKKS =34m.13s., and 34m.39s. e =35m.11s. and 38m.24s., ePPS =39m.45s., e =41m.36s., 42m.56s., and 46m.6s., eSS =47m.22s., e =55m.6s.
Upsala ePPN =25m.54s., P_cP,PKPE =28m.59s., ePPP =30m.9s., eN =33m.18s. and 35m.7s., eSS = =47m.36s., eSSSE =54m.48s., eSSSN =55m.6s.
Long waves were also recorded at Apia.

Dec. 15d. Readings also at 0h. (Brisbane, Riverview, Mount Wilson, Pasadena, Riverside, Tinemaha and Shasta Dam), 1h. (Palomar, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Fresno), 3h. (near Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Boulder City, and Pierce Ferry), 5h. (near Ashkabad and near Berkeley), 8h. (Mizusawa), 12h. (Kirkland Lake), 13h. (Helwan, Ksara, Istanbul, Triest, Belgrade, Kalossa, Zagreb, Rome, Zürich, Prague, Cheb, De Bilt, Uccle, Strasbourg, Stuttgart, Warsaw, Copenhagen, Helsinki, and Hungry Horse), 17h. (La Paz and near Huancayo), 20h. (near Branner), 23h. (Ksara, near Istanbul (2), and near Yalta).

Dec. 16d. 11h. 26m. 38s. Epicentre 30°·0N. 114°·0W. (as on 1945, November 25d.).

Epicentre given by Pasadena.

$A = -\cdot3528$, $B = -\cdot7925$, $C = +\cdot4975$; $\delta = +3$; $h = +2$;
$D = -\cdot914$, $E = +\cdot407$; $G = -\cdot202$, $H = -\cdot454$, $K = -\cdot868$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tucson		3·5	50	e 1 3	P*	—	—	i 1 12	P_g	—
La Jolla		4·0	317	e 1 2	− 2	i 1 47	− 5	—	—	—
Palomar		4·1	326	i 1 0	− 5	—	—	—	—	—
Riverside	z.	4·9	325	e 1 12	− 5	—	—	i 1 24	P*	—
Pasadena		5·4	321	e 1 25	+ 1	i 2 28	0	i 1 36	P*	—
Mount Wilson		5·4	323	e 1 26	+ 2	e 2 31	+ 3	—	—	—
Boulder City		6·0	354	i 1 27	− 5	i 2 27	−16	i 1 41	P*	—
Pierce Ferry		6·1	1	i 1 47	P*	i 2 35	−10	—	—	—
Tinemaha		7·9	335	e 1 59	0	e 4 6	S*	—	—	—
Fresno		8·3	326	i 2 33	P*	i 4 14	S*	—	—	—
Branner		10·0	320	e 3 19	P_g	e 5 11	S*	—	—	—
Berkeley		10·4	321	e 3 16	P_g	—	—	—	—	e 5·7
Shasta Dam		12·7	330	e 3 13	+ 8	—	—	—	—	e 6·4
Hungry Horse		18·3	0	e 4 18	+ 1	—	—	—	—	—
Grand Coulee		18·3	349	e 4 59	PPP	—	—	—	—	—
St. Louis		21·4	58	i 5 2	+11	e 9 12	SS	—	—	e 11·7

Fresno also gives iN = 2m.52s., iE = 3m.14s., and 4m.20s.
Long waves were recorded at Bozeman, Santa Clara, and Tacubaya

Dec. 16d. 20h. 51m. 22s. Epicentre 52°·0N. 176°·2E. (as on 1943 September 26d.).

$A = \cdot-6168$, $B = +\cdot0410$, $C = +\cdot7860$; $\delta = -8$; $h = -6$;
$D = +\cdot066$, $E = +\cdot998$; $G = -\cdot784$, $H = +\cdot052$, $K = -\cdot618$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		22·4	41	e 5 10	+ 8	e 9 18	+14	—	—	e 11·3
Grand Coulee		40·7	69	e 7 45	+ 1	—	—	—	—	—
Shasta Dam		42·7	80	e 8 0	0	—	—	—	—	—
Hungry Horse		43·3	65	e 8 1	− 4	—	—	—	—	—
Tinemaha	z.	47·4	82	e 8 39	+ 1	—	—	i 8 47	P	—
Haiwee	z.	48·2	82	e 8 52	+ 8	—	—	—	—	—
Santa Barbara	z.	48·3	85	e 8 54	+ 9	—	—	—	—	—
Pasadena	z.	49·4	84	e 8 53	0	—	—	i 9 18	?	—
Mount Wilson	z.	49·4	84	i 8 53	0	—	—	—	—	—
Riverside	z.	50·0	84	e 8 55	− 3	—	—	e 9 20	?	—
Boulder City		50·2	80	e 8 41	−19	—	—	e 10 22	PP	—
Pierce Ferry		50·6	79	e 9 2	0	—	—	—	—	—
Palomar		50·7	84	i 9 3	0	—	—	i 9 11	?	—
La Jolla	z.	50·8	85	e 9 10	+ 6	—	—	—	—	—
Tucson		55·2	81	i 9 35	− 2	—	—	—	—	—
St. Louis		62·7	62	e 10 34	+ 5	e 18 59	+ 2	e 26 14	Q	e 30·7
Helsinki		65·8	346	—	—	e 19 5	−30	e 23 0	?	e 40·6
Copenhagen		71·8	351	11 21	− 5	—	—	—	—	39·6
Warsaw		74·1	344	e 17 7	?	e 21 15	+ 3	e 19 26	?	e 41·6
Cheb		77·4	350	e 10 38?	?	e 19 38?	?	—	—	e 43·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stuttgart		79·0	353	e 12 3	− 4	—	—	—	—	e 43·6
Strasbourg		79·3	353	e 20 42	?	e 21 45	?	—	—	e 41·6
Paris		79·4	356	e 12 7	− 2	—	—	—	—	—
Bombay		83·2	292	—	—	e 22 42	− 7	e 22 35	SKS	—
Ksara		87·7	328	e 13 12	+20	e 23 58	+25	—	—	—
Helwan	N.	92·9	330	—	—	e 23 50	[0]	—	—	—
Antarctica		146·4	142	e 19 41	[− 1]	—	—	—	—	—

Additional readings :—
Mount Wilson eZ = 9m.1s., iZ = 9m.13s. and 9m.17s.
Tucson i = 9m.51s. and 10m.2s.
Long waves were recorded at Prague and Kew.

Dec. 16d. Readings also at 0h. (Tucson, Hungry Horse, Huancayo, and Santa Lucia), 1h. (Haiwee, Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Grand Coulee, Pierce Ferry, Shasta Dam, Tucson, Hungry Horse, and Riverview), 8h. (near Alicante), 9h. (near Berkeley, Santa Clara, Branner, Lick, San Francisco, Fresno, Boulder City, Pierce Ferry, and Shasta Dam), 11h. (Pierce Ferry and Boulder City), 12h. (near Alicante, Almeria, Malaga, and Tortosa), 13h. (Shasta Dam), 14h. (La Paz and near Hungry Horse), 15h. (near Stalinabad), 18h. (Mount Wilson, Pasadena, Fresno, Riverside, Tinemaha, Boulder City, Shasta Dam, Tucson, Hungry Horse, and near Kulyab), 19h. (Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Tucson, and Copenhagen), 20h. (Irkutsk, Sverdlovsk, Fresno, Haiwee, Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Grand Coulee, Pierce Ferry, Shasta Dam, and Tucson), 21h. (Kew, De Bilt, and near Berkeley), 22h. (Bogota and La Paz), 23h. (Fresno).

Dec. 17d. 12h. 38m. 0s. Epicentre 46°·6N. 112°·0W. (as on 1945, June 1d.).

Intensity V at Benchland, Butte, Craig, Hamilton, Helena, Martinsdale, Sand Coulee, and Sappington. IV at Alder.
Epicentre 46°·5N. 112°·0W.

L. M. Murphy, United States Earthquakes, 1947, Serial No. 730, Washington, 1950 p. 14.

A = −·2583, B = −·6393, C = +.7243 ; δ = +3 ; h = −4 ;
D = −·927, E = +·375 ; G = −·271, H = −·672, K = −·690.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Hungry Horse	2·2	322	i 0 35	− 3	i 1 5	− 1
Grand Coulee	4·9	289	e 1 17	0	e 2 13	S^*
Shasta Dam	9·6	236	e 2 23	+ 2	—	—
Pierce Ferry	10·6	189	e 2 53	PPP	e 5 42	S_e
Boulder City	10·8	192	—	—	e 5 57	S_e

Dec. 17d. 22h. 3m. 20s. Epicentre 42°·0N. 78°·0E. (as on 1940 January 26d.).

A = +·1550, B = +·7291, C = +·6666 ; δ = −3 ; h = −2 ;
D = +·978, E = −·208 ; G = +·139, H = +·652, K = −·745.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	S.	m. s.	s.
Almata	1·5	329	i 0 25	− 3	i 0 57	+ 8
Frunse	2·7	289	i 0 50	+ 5	i 1 34	S_e
Andijan	4·4	255	e 1 13	+ 3	e 2 9	+ 7
Tchimkent	6·3	276	e 1 58?	P_e	—	—
Tashkent	6·5	267	e 1 50	P^*	—	—
Kulyab	7·5	240	e 1 51	− 2	e 3 16	− 4
Stalinabad	7·9	246	e 1 45?	−14	e 3 15?	−15
Sverdlovsk	18·6	329	e 4 22	+ 1	e 8 0	+14
Bombay	23·5	193	—	—	e 8 51	−32
Hungry Horse	89·4	7	e 12 41	−19	—	—

Long waves were recorded at De Bilt, Copenhagen, and Stuttgart,

Dec. 17d. Readings also at 2h. (Tucson, Almata, near Frunse, Kulyab, Murgab, Samarkand, Stalinabad, and Tchimkent), 4h. (Boulder City, Pierce Ferry, and Riverview), 6h. (Bogota, La Paz, Riverview, Wellington, and Antarctica), 7h. (La Plata and Hungry Horse), 8h. (Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Grand Coulee, Pierce Ferry, Shasta Dam, Tucson, and Hungry Horse), 10h. (Apia), 11h. (Boulder City (2), Pierce Ferry (2), Shasta Dam (2), Tucson (2), Mount Wilson (2), Palomar (2), Pasadena (2), Tinemaha (2), and near Granada), 13h. (Stuttgart), 14h. (Riverview and Pierce Ferry), 16h. (near Triest), 19h. (near Ottawa), 20h. (Mount Wilson, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, and Tucson,) 21h. (Grand Coulee, Wellington, and Antarctica), 22h. (Helwan and Stuttgart), 23h. (La Paz and Shasta Dam).

Dec. 18d. 0h. 10m. 46s. Epicentre 33°·7N. 135°·2E. (as on 9d.).

Intensity IV at Sumoto, Siomisaki, Muroto, Kobe, Takamatsu, and Tokusima; II-III at Osaka, Matsue, Hirosima, Ibukiyama, Kasiwara, and Owase. Macroseismic radius between 220 and 300km. Epicentre 33°·8N. 135°·3E. Shallow.
The Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1947, Tokyo 1950, pp. 47-48, macroseismic chart p.47.

$A = -\cdot5916$, $B = +\cdot5874$, $C = +\cdot5523$; $\delta = +6$; $h = +1$;

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Siomisaki	0·5	118	0 16k	+ 2	0 24	+ 1
Tokusima	0·6	306	0 35a	+20	—	—
Sumoto	0·7	338	0 16	− 1	0 26	− 2
Muroto	0·9	242	0 18a	− 2	0 30	− 4
Owase	0·9	66	0 20a	0	0 32	− 2
Kobe	1·0	359	0 20k	− 1	0 33	− 3
Osaka	1·0	16	0 22	+ 1	0 35	− 1
Kameyama	1·5	42	0 29k	+ 1	0 50	+ 1
Hikone	1·8	29	0 33a	+ 1	0 54	− 2
Gihu	2·1	37	0 38	+ 1	1 3	− 1
Matuyama	2·1	274	0 33	− 4	1 2	− 2
Nagoya	2·1	45	0 39	+ 2	1 5	+ 1
Hirosima	2·4	286	0 33	− 8	1 3	− 9
Omaesaki	2·6	70	0 54	P_g	1 26	S_g
Hamada	2·8	295	0 53	P*	1 26	S*
Shizuoka	2·9	64	0 56	P_g	1 37	S_g
Hunatu	3·4	58	1 0	+ 5	1 48	S*
Misima	3·4	64	0 54	− 1	—	—
Toyama	3·4	28	1 3	P*	1 45	S*
Kumamoto	3·9	59	1 1	− 1	1 52	+ 2
Wazima	3·9	18	1 8	P*	1 49	− 1
Hukuoka	4·0	270	1 1a	− 3	2 19	S_g
Mera	4·0	73	1 14	P*	—	—
Nagano	4·0	38	1 6	+ 2	2 1	S*
Maebasi	4·1	49	1 12	P*	1 57	+ 2
Yokohama	4·1	63	1 21	P_g	2 24	S_g
Kumagaya	4·2	54	1 10	+ 3	2 0	+ 3
Tokyo	4·2	61	1 8	+ 1	2 15	S_g
Kagosima	4·4	243	1 36	P_g	—	—
Ituhara	4·9	279	1 14	− 3	2 22	+ 7
Aikawa	5·0	29	1 24	+ 6	—	—
Onahama	5·6	54	1 43	P*	—	—
Hungry Horse	77·6	40	e 11 59	− 1	—	—

Dec. 18d. Readings also at 0h. (La Paz), 3h. (Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry and, near La Paz), 4h. (Huancayo), 5h. (near Almata), 9h. (Samarkand, Tchimkent, Almata, near Andijan, Murgab, Kulyab, and Stalinabad), 10h. (near Almata), 11h. (near Berkeley (2), Lick, Branner, Fresno, and San Francisco), 12h. (Triest, near Stuttgart, Zürich, and Chur), 13h. (Kew, Erevan, near Leninakan, near Berkeley, Lick, Branner, Fresno, and San Francisco), 14h. (Shasta Dam, Frunse, Tchimkent, Andijan (2), Murgab (2), Almata, near Ashkabad, Samarkand, Kulyab (2), Stalinabad (2), and Tashkent), 15h. (Riverview), 16h. (Brisbane), 17h. (Riverview, Brisbane, Pasadena, Mount Wilson, Tinemaha, Boulder City, and Pierce Ferry), 18h. (Pierce Ferry), 19h. (near Branner and Fresno), 20h. (near Lick, Berkeley, Branner (3), and San Francisco), 22h. (near Branner and Fresno), 23h. (Wellington and near Samarkand).

Dec. 19d. 2h. 47m. 26s. Epicentre 42°·5N. 82°·5E. (as on 1944 March 9d.).

$A = +·0965$, $B = +·7332$, $C = +·6731$; $\delta = -4$; $h = -3$;
$D = +·991$, $E = -·131$; $G = +·088$, $H = +·667$, $K = -·740$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Almata		4·2	284	i 1 7	0	i 1 57	0	—	—	—
Frunse		5·8	266	e 1 35	+ 6	i 2 42	+ 4	—	—	—
Murgab		7·7	241	e 1 56	0	i 3 18	− 7	—	—	—
Andijan		7·8	260	e 2 5?	+ 7	e 3 30?	+ 2	—	—	—
Semipalatinsk		8·1	351	e 2 6	+ 4	i 3 41	+ 6	—	—	—
Tashkent		9·9	265	e 2 33	+ 8	—	—	—	—	—
Kulyab		10·8	249	e 2 34	− 5	e 4 34	− 8	—	—	—
Stalinabad		11·2	254	i 2 38	− 6	i 4 41	−11	—	—	—
Samarkand		12·0	263	e 2 58?	+ 3	—	—	—	—	—
Ashkabad		19·0	266	e 4 22	− 4	i 8 2	+ 7	—	—	—
Sverdlovsk		20·0	325	4 35	− 2	e 8 21	+ 4	—	—	—
Calcutta	E.	20·5	164	—	—	e 8 20	− 7	—	—	—
Bombay	E.	24·9	202	e 5 30	+ 4	e 9 47	0	—	—	—
	N.	24·9	202	e 5 22	− 4	e 9 51	+ 4	—	—	—
Hyderabad	N.	25·2	190	e 5 19	−10	9 41	−11	—	—	—
Ksara		37·3	272	—	—	e 15 13	SS	—	—	e 19·7
Warsaw		41·6	306	—	—	e 16 18	?	e 18 4	SSS	e 22·1
Upsala	N.	42·3	318	—	—	e 16 34?	SS	—	—	e 21·6
Copenhagen		45·8	313	8 23	− 2	—	—	—	—	21·6
Prague		46·2	306	—	—	—	—	e 20 58	Q	e 24·3
Collmberg	Z.	46·6	307	e 8 34	+ 2	—	—	—	—	—
Stuttgart		49·8	305	e 8 54a	+ 2	—	—	—	—	e 27·6
Paris		53·8	307	i 9 24k	− 2	—	—	—	—	—
Hungry Horse		88·4	12	e 12 49	− 6	—	—	—	—	—
Shasta Dam		94·2	20	e 12 20	−62	—	—	—	—	—

Warsaw gives also eE = 19m.12s., eN = 20m.52s., eE = 21m.16s.
Long waves were also recorded at other European stations.

Dec. 19d. 4h. 37m. 47s. Epicentre 42°·5N. 82°·5E. (as at 2h.).

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Almata		4·2	284	i 1 10	+ 3	1 58	+ 1	—	—	—
Frunse		5·8	266	i 1 32	+ 3	i 3 2	S_g	—	—	—
Murgab		7·7	241	i 1 53	− 3	e 3 15	−10	—	—	—
Andijan		7·8	260	e 1 55	− 3	e 3 20	− 8	—	—	—
Semipalatinsk		8·1	351	e 2 11	+ 9	3 41	+ 6	—	—	—
Tchimkent		9·6	275	i 2 21	0	e 4 6	− 6	—	—	—
Tashkent		9·9	265	i 2 27	+ 2	e 4 17	− 3	—	—	—
Kulyab		10·8	249	i 2 34	− 5	e 4 31	−11	—	—	—
Stalinabad		11·2	254	i 2 39	− 5	i 4 39	−13	—	—	—
Samarkand		12·0	263	i 2 53	− 2	—	—	—	—	—
Irkutsk		17·7	49	4 15	+ 5	e 7 36	+10	—	—	—
Ashkabad		19·0	266	i 4 23	− 3	7 3	−52	—	—	—
Sverdlovsk		20·0	325	i 4 39	+ 2	e 8 23	+ 6	—	—	—
Bombay		24·9	202	e 5 16	−10	i 9 54	+ 7	—	—	11·7
Hyderabad	N.	25·2	190	5 17	−12	9 46	− 6	—	—	12·3
Grozny		26·8	285	i 5 45	+ 1	—	—	—	—	—
Leninakan		28·8	281	e 6 4	+ 2	—	—	—	—	—
Moscow		31·6	311	i 6 27	+ 1	e 11 36	+ 1	—	—	—
Ksara		37·3	272	e 7 15	− 1	13 46	+42	8 42	PP	—
Warsaw		41·6	306	e 7 51	0	e 14 9	+ 1	e 9 37	PP	e 23·7
Upsala	N.	42·3	318	—	—	e 18 0	SSS	e 20 48	Q	e 21·6
Helwan	Z.	42·6	271	i 7 58k	− 1	—	—	e 9 46	PP	—
Copenhagen		45·8	313	8 26	+ 1	e 15 25	+16	18 37	SSS	23·2
Potsdam		46·3	307	e 8 32	+ 3	—	—	—	—	e 24·2
Collmberg	Z.	46·6	307	e 8 38	+ 6	—	—	—	—	—
Cheb		47·4	306	e 11 13?	?	—	—	—	—	e 25·0
Jena		47·6	307	e 8 40	+ 1	—	—	—	—	—
Triest		48·1	300	e 8 43	0	—	—	—	—	—
Bergen	N.	48·3	321	—	—	e 22 37	Q	—	—	—
Stuttgart		49·8	305	i 8 57a	+ 1	—	—	e 19 55	SS	e 27·7

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Chur		50·3	302	e 9 0a	0	—	—	—	—	—
Zürich		50·7	304	e 9 2	− 1	—	—	—	—	e 26·3
Strasbourg		50·8	305	e 9 4	0	—	—	e 10 49	PP	e 26·0
De Bilt		51·0	310	—	—	—	—	e 22 58	SSS	e 26·2
Basle		51·3	304	e 9 8	0	—	—	—	—	e 27·5
Uccle		52·7	309	e 9 14	− 4	—	—	—	—	e 27·2
Durham	E.	53·6	315	e 20 20	SS	—	—	—	—	e 24·5
Paris		53·8	307	i 9 28a	+ 2	—	—	e 10 23	PcP	e 24·8
Kew		54·3	311	i 9 31a	+ 1	e 17 49?	+42	e 21 25?	SS	e 27·2
Clermond-Ferrand		54·8	303	e 9 46	+12	—	—	—	—	32·2
Grand Coulee		88·0	15	e 12 54	+ 1	—	—	—	—	—
Hungry Horse		88·4	12	e 12 51	− 4	—	—	—	—	—
Shasta Dam		94·2	20	e 12 23	−59	—	—	—	—	—

Additional readings :
Bombay ePN = 5m.24s.
Hyderabad iN = 5m.23s.
Warsaw eE = 8m.53s., eN = 11m.11s., eE = 13m.37s., and 17m.1s. eN = 17m.37s., eE = 18m.35s., eN = 19m.7s., eE = 19m.33s., eN = 20m.4s., eZ = 20m.35s., iZ = 21m.47s., eN = 21m.55s., iE = 22m.26s., iZ = 22m.33s., eZ = 23m.13s.
Jena eN = 8m.55s.
Stuttgart eZ = 9m.22s., e = 25m.34s. and 26m.45s.
Paris iP = 9m.26s., ePP = 11m.20s., ePPP = 12m.39s.
Kew eQ?EN = 25·2m.
Shasta Dam i = 12m.31s.
Long waves were also recorded at Helsinki, Prague, and Rome.

Dec. 19d. 16h. 36m. 26s. Epicentre 19°·2N. 121°·2E. (as on 1947, July 9d.).

A = −·4896, B = +·8084, C = +·3269 ; δ = +8 ; h = +5 ;
D = +·855, E = +·518 ; G = −·169, H = +·280, K = −·945.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nanking		13·0	351	e 4 9	+60	—	—	—	—	—
Miyazaki		15·6	34	e 3 52	+ 9	6 49	+12	—	—	—
Hukuoka		16·5	28	i 3 56	+ 2	7 12	+14	—	—	—
Nagoya		21·2	38	4 53	+ 4	—	—	—	—	—
Omaesaki		21·5	41	e 4 49	− 3	9 11	+24	—	—	—
Nagano		22·9	38	e 5 6	0	10 11	+58	—	—	—
Vladivostok		25·5	19	i 5 30	− 2	i 9 55	− 2	—	—	—
Sendai		25·6	39	e 5 8	−24	—	—	—	—	—
Calcutta	E.	30·9	283	e 6 26	?	e 11 7	−17	e 7 7	PP	—
Irkutsk		35·6	343	7 1	0	12 36	− 2	—	—	—
Hyderabad	N.	40·5	275	7 50	+ 8	13 42	−10	—	—	—
Colombo	E.	42·0	259	e 7 54	0	14 11	− 3	—	—	14·9
Almata		44·1	314	8 25	+13	—	—	—	—	—
Murgab		45·1	307	e 8 20	0	—	—	—	—	—
Bombay		45·6	278	e 8 31	+ 7	e 15 0	− 6	—	—	19·0
Frunse		45·7	313	e 8 30	+ 6	—	—	—	—	—
Andijan		46·7	308	—	—	i 15 24	+ 2	—	—	—
Stalinabad		49·1	305	i 8 53	+ 2	i 15 57	+ 1	—	—	—
Tashkent		49·1	309	i 8 53	+ 2	i 15 56	0	—	—	—
Tchimkent		49·1	311	i 8 52	+ 1	i 15 56	0	—	—	—
Samarkand		50·6	306	e 9 4	+ 2	e 16 14	− 3	—	—	—
Ashkabad		57·2	303	e 9 51	0	—	—	—	—	—
Sverdlovsk		58·1	327	1 9 56	− 2	i 17 55	− 3	—	—	—
Riverview		60·0	152	e 10 3	− 8	e 18 14	− 9	e 18 32	PS	e 25·0
Baku		63·7	307	e 10 39	+ 3	—	—	—	—	—
Leninakan		68·3	308	e 11 25	+20	—	—	—	—	—
Moscow		70·8	324	e 11 17	− 3	e 20 30	− 5	—	—	—
Ksara		75·8	300	i 11 49	− 1	e 22 25	PPS	—	—	—
Helwan		80·6	298	i 12 14k	− 2	i 22 18	− 5	15 19	PP	—
Budapest		83·9	319	e 12 34?	+ 1	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Copenhagen		84·4	328	12 34	− 2	e 22 58	− 3	—	—	44·6
Potsdam		85·5	326	—	—	e 23 2?	[− 2]	—	—	e 48·6
Zagreb		86·6	318	e 12 47	+ 1	—	—	e 16 28	PP	—
Scoresby Sund		86·9	349	—	—	23 5	[− 8]	29 4	SS	44·6
Triest		88·0	319	e 13 31	+38	e 23 31	− 5	—	—	—
Stuttgart		89·4	323	e 12 57	− 3	e 23 40	− 9	e 23 22	SKS	e 46·6
Zürich		90·4	322	e 13 2a	− 2	—	—	—	—	—
Aberdeen	E.	90·5	333	—	—	i 23 22	[−14]	—	—	e 48·0
Basle		90·9	322	e 13 3	− 4	—	—	—	—	—
Kew		93·1	328	e 16 20	PP	e 23 44	[− 7]	e 25 26	PS	e 44·6
Grand Coulee		94·2	36	e 13 20	− 2	—	—	i 13 31	pP	—
Clermont-Ferrand		94·5	322	e 17 18	PP	—	—	—	—	—
Shasta Dam		96·2	43	e 13 28	− 3	—	—	—	—	—
Hungry Horse		96·7	33	i 13 26	− 7	(e 24 24)	{− 7}	—	—	—
Tinemaha	Z.	100·8	45	e 18 18	PP	—	—	—	—	—
Mount Wilson	Z.	102·6	47	e 18 13	PP	—	—	—	—	—
Riverside	Z.	103·1	48	e 18 16	PP	—	—	—	—	—
Boulder City		103·7	44	e 18 28	PP	—	—	—	—	—
Pierce Ferry		104·2	43	e 14 10	+ 3	—	—	—	—	—
Tucson		108·6	45	e 17 50	?	e 29 50	PPS	e 18 57	PP	—
Antarctica		130·7	177	i 22 37	PKS	—	—	—	—	—
Balboa Heights		145·3	37	e 19 39	[− 1]	—	—	—	—	—
Fort de France		146·2	3	e 19 41	[0]	—	—	—	—	—
Bogota	Z.	152·0	34	i 19 54	[+ 4]	—	—	—	—	—
Huancayo		162·6	69	e 20 7	[+ 4]	—	—	e 24 36	PP	—
La Paz		170·7	74	i 20 10	[0]	—	—	i 25 18	PP	76·1

Additional readings :—
Calcutta eSSSE = 14m.27s.
Helwan iZ = 12m.25s.
Stuttgart ePPS? = 24m.45s.
Kew ePPPZ = 19m.44s.?, eSKS?Z = 23m.22s., eSS?Z = 31m.16s.?.
Tinemaha eZ = 18m.55s.
Pierce Ferry i = 17m.33s. and 19m.20s., e = 30m.11s.
Bogota iZ = 20m.6s.
Long waves were recorded at other European stations.

Dec. 19d. 17h. 31m. 13s. Epicentre 40°·8N. 33°·4E. (as on 1946, January 21d.).

$A = +·6338$, $B = +·4179$, $C = +·6509$; $\delta = +1$; $h = -2$;
$D = +·550$, $E = -·835$; $G = +·543$, $H = +·358$, $K = -·759$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		3·3	275	i 0 52	− 1	1 39	+ 4	—	—	—
Yalta		3·7	9	i 1 0	0	1 44?	− 1	—	—	—
Theodosia		4·5	19	e 1 15	+ 4	e 2 20	S*	—	—	—
Bucharest	E.	6·5	306	e 1 41	+ 2	i 3 21	S*	i 2 22	P_g	—
Ksara		7·2	164	e 1 53	+ 4	2 58?	−15	—	—	—
Helwan	Z.	11·0	188	2 38	− 4	e 5 11	SSS	—	—	i 6·7
Baku		12·6	87	e 2 47	−16	—	—	—	—	—
Triest		15·1	295	e 3 27	− 9	—	—	—	—	—
Moscow		15·2	9	e 3 41	+ 3	e 6 45	+17	—	—	—
Rome		15·7	281	—	—	e 6 48	+ 9	—	—	—
Stuttgart	Z.	18·9	304	e 4 20	− 4	—	—	—	—	—
Zürich		19·0	300	e 4 19	− 7	—	—	—	—	—
Ashkabad		19·5	90	e 4 38	+ 7	—	—	—	—	—
Basle		19·7	300	e 4 28	− 6	—	—	—	—	e 10·3
Copenhagen		20·3	326	4 47	+ 7	—	—	—	—	11·8
Clermont-Ferrand		22·5	296	e 5 14	PP	—	—	—	—	—
Sverdlovsk		23·8	39	5 19	+ 4	e 9 38	+10	—	—	—
Scoresby Sund		40·7	335	11 20	?	—	—	—	—	—

Additional readings :—
Yalta eP = 40s.?
Bucharest iE = 3m.6s.
Long waves were also recorded at other European stations.

Dec. 19d. Readings also at 0h. (near Branner, Fresno, Lick, and near Granada), 1h. (Riverview, Auckland, Arapuni, Wellington (2), Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Grand Coulee, Tucson, Hungry Horse, Fresno, Collmberg, and Stuttgart), 2h. (Brisbane, Shasta Dam, and near Fresno), 3h. (near Grozny), 5h. (La Paz and near Mizusawa), 6h. (Bogota and Huancayo), 7h. (Hungry Horse and Santa Lucia), 10h. (Samarkand and near Stalinabad), 14h. (Huancayo), 15h. (Pierce Ferry, La Paz, and near Huancayo), 18h. (Fresno, Nanking, Almata, near Andijan, Frunse, Stalinabad, Tashkent, and Tchimkent), 19h. (Alicante), 21h. (Belgrade, Zagreb, Stuttgart, and near Triest), 22h. (Andijan, near Murgab, and Stalinabad), 23h. (Stuttgart).

Dec. 20d. 6h. 24m. 15s. Epicentre 41°·8N. 71°·7E. (as on 1947 November 9d.).

$A = +\cdot2348$, $B = +\cdot7099$, $C = +\cdot6641$; $\delta = +12$; $h = -2$;
$D = +\cdot949$, $E = -\cdot314$; $G = +\cdot209$, $H = +\cdot630$, $K = -\cdot748$.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Andijan	1·2	155	i 0 22	− 2	i 0 41	0
Tchimkent	1·6	288	i 0 31	+ 1	i 0 53	+ 2
Tashkent	1·9	255	i 0 34	0	e 1 2	+ 3
Frunse	2·4	63	i 0 43	+ 2	e 1 13	+ 1
Murgab	3·8	153	e 1 5	+ 4	e 1 53	+ 6
Stalinabad	3·9	216	i 1 2	0	i 1 50	0
Samarkand	4·2	241	i 1 4?	− 3	1 55?	− 2
Almata	4·2	67	1 19	P•	2 8	S•
Kulyab	4·2	202	i 1 8	+ 1	i 2 1	+ 4
Ashkabad	10·9	255	e 2 47	+ 7	e 4 45	+10

Dec. 20d. 20h. 53m. 58s. Epicentre 36°·5N. 71°·0E. Depth of focus 0·030.
(as on 1941, April 14d.).

$A = +\cdot2623$, $B = +\cdot7619$, $C = +\cdot5922$; $\delta = -1$; $h = 0$.
$D = +\cdot946$, $E = -\cdot326$; $G = +\cdot193$, $H = +\cdot560$, $K = -\cdot806$.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Kulyab	1·7	325	i 0 45?	+ 7	i 1 13	+ 6
Stalinabad	2·7	319	i 0 49	+ 1	i 1 25	0
Murgab	3·0	51	i 0 56	+ 5	i 1 36	+ 5
Andijan	4·4	15	1 9	+ 1	i 2 1	0
Samarkand	4·5	317	i 1 10	+ 1	i 2 3	0
Tashkent	5·0	347	e 1 15	− 1	—	0
Tchimkent	5·9	349	i 1 27	0	i 2 33	− 2
Frunse	7·0	23	1 42	+ 1	i 3 0	0
Almata	8·2	33	e 1 57	0	3 28	0
Ashkabad	10·2	282	e 2 21	− 1	4 18	+ 4

Dec. 20d. Readings also at 0h. (Pierce Ferry), 1h. (Leninakan and near Grozny), 6h. (Bogota and Pierce Ferry), 8h. (Kew), 9h. (Istanbul, Ksara, Warsaw, Zagreb, and Stuttgart), 11h. (Stuttgart and near Chur and Zürich), 15h. (Tinemaha), 16h. (Pierce Ferry and Tucson).

Dec. 21d. 0h. Undetermined shock.

Apia eP =7m.58s., iS =9m.8s.
Brisbane eP?EN =14m.30s., eS?EN =18m.50s.
Mount Wilson ePZ =18m.41s.
Pasadena iPZ =18m.43s.
Riverside ePZ =18m.43s., eZ =18m.51s.
Palomar iPZ =18m.43s.
La Jolla ePZ =18m.44s.
Shasta Dam eP =18m.45s.
Fresno iPZ =18m.47s.
Tinemaha ePZ =18m.49s., iZ =18m.57s.
Boulder City eP =19m.4s.
Pierce Ferry eP =19m.4s., i =19m.12s.
Tucson iP =19m.6s., i =19m.13s.
Grand Coulee eP =19m.22s.
Hungry Horse eP =19m.36s.
Riverview eS?E =19m.40s., eQ?E =22·3m., eSS?N =22m.28s., eLZ =24m.
St. Louis eP =20m.33s., e =27m.1s. and 29m.23s.
Istanbul e =26m.0s.
Stuttgart eZ =26m.48s., eL =83m.
Ksara ePKP =26m.49s.?, PP =30m.29s.?
Paris iPKP =26m.50s., e =26m.57s., 27m.1s., and 29m.22s., eL =87m.?
Strasbourg ePKP =26m.54s.
Helwan eZ =27m.15s., 28m.0s., 30m.36s., and 35m.12s.
Long waves were recorded at Uccle, De Bilt, Honolulu, Auckland, Arapuni, and Wellington.

Dec. 21d. 16h.

Intensity IV at Apia. Suggested epicentre 14°·5S. 173°·0W.

Annales de l'Institut de Physique du Globe de Strasbourg, 2éme partie, Séismologie, Nouvelle Série, Tome XII, Strasbourg, 1952, p.39.

Apia iP =46m.3s., iS =46m.20s.
Auckland P =51m.54s., S =56m.24s., L =58m.
Riverview ePZ =52m.55s., iPPEZ =54m.29s., eSE =58m.48s., eLE =63·3m.
Brisbane iS?E =54m.0s.
Pasadena iP =57m.3s., ipPZ =57m.20s.
Mount Wilson iPZ =57m.6s., ipPZ =57m.22s.
Riverside iPZ =57m..7s.k, iZ =57m.26s.
Fresno iPZ =57m.7s.
Palomar iP =57m.8s.k
Haiwee iPZ =57m.12s.
Tinemaha iPZ =57m.14s., ipPZ =57m.29s.
Boulder City iP =57m.24s., ipP =57m.41s.
Pierce Ferry iP =57m.29s., ipP =57m.45s.
Tucson iP =57m.30s.k, ipP =57m.47s., i =57m.57s., eS =66m.32s., eL =79m.44s.
Vladivostok eP =57m.44s., iS =67m.25s.
Grand Coulee iP =57m.47s., ipP =58m.2s.
Hungry Horse iP =58m.3s.
St. Louis eP =59m.0s., epP? =59m.18s., iS =69m.49s.
Paris ePKP =65m.23s., e =65m.48s. and 66m.0s., eL =120m.
Stuttgart ePKP? =65m.24s., iZ =65m.32s.k, ipPKP?Z =65m.40s., eR? =125m.
Basle e =65m.30s. and 68m.6s.
Clermont-Ferrand ePKP =65m.30s., L =125m.
Ksara iPKP =65m.31s., PP =69m.13s., PPS =82m.16s.
Zürich e =65m.32s. and 75m.54s.
Helwan eZ =65m.36s., 66m.21s., and 69m.30s.
Strasbourg ePKP =65m.36s. and 65m.43s.
Alicante PKP =65m.43s., PP =68m.39s., SS =88m.1s.
Malaga iPKPZ =66m.7s.a, iPPZ =69m.51s., iSKSZ =72m.56s., PPSZ =82m.50s., SSZ =89m.0s., QZ =103m.26s., RZ =116m.28s.
Granada iPKP =66m.13s., iPP =69m.45s., SKS =72m.57s., SKKS =76m.36s., SS =89m.50s., L =118·6m.
Almeria ePP? =69m.46s., SKS =73m.9s., SKKS =76m.36s., PPS =82m.29s., SS =88m.53s.
Huancayo eS? =70m.28s., eL =90m.41s.
Sverdlovsk SKS =71m.52s., PS =76m.5s., eSS =82m.48s.
Kew eP? =106m.42s.?, Z =109m.30s.?, 116m.32s.?, eL?N =118m.
Long waves were recorded at Arapuni, Wellington, and at other American and European stations.

Dec. 21d. Readings also at 3h. (Haiwee, Mount Wilson, Riverside, Tinemaha, Grand Coulee, Hungry Horse, Pierce Ferry, Shasta Dam, and Tucson), 5h. (near Mizusawa), 8h. (Santa Lucia and near Mizusawa (2)), 9h. (Calcutta, Shasta Dam, Strasbourg, Stuttgart, Prague, and Zürich), 10h. (Bogota, Huancayo, La Paz, Riverside, Tinemaha, Boulder City, Hungry Horse, Pierce Ferry, Tucson, Jena, and near Triest), 11h. (Haiwee, Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Riverview, Florence, Stuttgart, and near Ashkabad), 12h. (Jena, Hungry Horse, and Temiskaming), 15h. (Samarkand, and near Andijan, Stalinabad, and Tchimkent), 21h. (near Berkeley), 23h. (Bogota, Huancayo, La Paz, and Kulyab).

Dec. 22d. 13h. 7m. 32s. Epicentre 44°·1N. 146°·4E. (as on 1939, July 27d.).

A = −·6001, B = +·3987, C = +·6935 ; δ = +2 ; h = −3 ;
D = +·553, E = +·833 ; G = −·578, H = +·384, K = −·720.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.
		°	°	m. s.	s.	m. s.	s.	m. s.
Mizusawa		6·3	220	1 48	P*	3 5	S*	— —
Vladivostok		10·6	270	e 2 30	− 6	i 4 34	− 3	— —
Irkutsk		28·9	303	e 6 28	+25	—	—	— —
Andijan		53·0	294	e 9 23	+ 2	e 16 45	− 5	— —
Tashkent		54·7	296	e 9 29	− 4	—	—	— —
Kulyab		56·2	292	e 9 38	− 6	—	—	— —
Stalinabad		56·5	293	e 9 41?	− 5	e 17 29	− 8	— —
Grand Coulée		61·6	49	i 10 22	0	—	—	i 10 29 ?
Shasta Dam		64·0	57	e 10 38	0	—	—	— —
Hungry Horse		64·1	46	e 10 39	+ 1	—	—	— —
Tinemaha		68·7	58	i 11 10k	+ 3	—	—	i 11 17 P_cP
Haiwee	z.	69·5	59	i 11 15k	+ 3	—	—	— —
Mount Wilson	z.	70·7	61	i 11 23k	+ 3	—	—	— —
Pasadena		70·7	61	i 11 21k	+ 1	—	—	i 11 29 P_cP
Riverside	z.	71·3	61	i 11 24k	+ 1	—	—	— —
Boulder City		71·6	57	i 11 27	+ 2	—	—	— —
Palomar	z.	72·0	60	i 11 29k	+ 1	—	—	i 12 10 P_cP
Pierce Ferry		72·0	57	i 11 30	+ 2	—	—	— —
Tucson		76·5	58	i 11 55k	+ 1	—	—	i 12 3 P_cP
Stuttgart	z.	80·2	333	e 12 10	− 4	—	—	— —

Additional readings :—
Pasadena iZ = 11m.53s.
Tucson i = 12m.17s.

Dec. 22d. 21h. 45m. 57s. Epicentre 14°·1N. 146°·4E.

A = −·8082, B = +·5369, C = +·2421 ; δ = +6 ; h = +6 ;
D = +·553, C = +·833 ; G = −·202, H = +·134, K = −·970.

		Δ	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Vladivostok		31·5	340	—	—	i 12 1	+27
Irkutsk		50·7	328	e 9 3?	0	e 16 11?	− 7
Kulyab		71·0	307	e 11 23	+ 1	—	—
Tashkent		71·2	309	e 11 21	− 2	e 20 41	+ 1
Stalinabad		71·7	307	e 11 25	− 1	e 20 48	+ 3
Sverdlovsk		76·0	326	—	—	e 21 27	− 7
Shasta Dam		81·9	50	e 12 21	− 2	—	—
Hungry Horse		85·8	41	e 12 42	0	—	—
Haiwee	z.	86·3	54	e 12 46	+ 1	—	—
Pasadena	z.	86·6	56	i 12 48	+ 2	—	—
Mount Wilson	z.	86·7	56	i 12 49	+ 2	—	—
Riverside	z.	87·3	56	i 12 48	− 2	—	—
Palomar	z.	87·9	57	e 12 52	− 1	—	—
Boulder City		88·8	53	e 12 57	0	—	—
Pierce Ferry		89·4	53	i 13 0	0	—	—
Leninakan		90·1	313	e 12 57	− 6	—	—
Tucson		93·0	56	i 13 8	− 9	—	—
Ksara		98·6	308	—	—	e 35 25	SSS
La Paz	N.	146·6	99	e 19 35	[− 7]	i 23 3	PKS

Dec. 22d. Readings also at 0h. (La Paz, Pasadena, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Boulder City, Hungry Horse, Pierce Ferry, Shasta Dam, Murgab, near Kulyab and Stalinabad), 2h. (Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Pierce Ferry, and Shasta Dam), 3h. (Paris, Stuttgart, De Bilt, Uccle, Mount Wilson, Palomar, Tinemaha, Tucson, Boulder City (3), Hungry Horse (2), Pierce Ferry (3), San Juan, Shasta Dam (2), and near College), 6h. (near Andijan and near Triest), 7h. (Triest (2)), 8h. (Triest), 9h. (Shasta Dam), 10h. (Strasbourg, Triest (2), and Tucson), 12h. (La Paz), 14h. (near Almeria and Alicante), 17h. (near Kulyab), 18h. (Collmberg, Triest, Tinemaha, Tucson, Pierce Ferry, Shasta Dam, Bogota, La Paz, and near Tananarive ; more than one shock), 20h. (Hungry Horse), 21h. (Shasta Dam and Ksara).

Dec. 23d. 1h. 56m. 4s. Epicentre 15°·1N. 91°·2W. (as on 1946, January 5d.).

$A = -\cdot0202$, $B = -\cdot9657$, $C = +\cdot2589$; $\delta = +1$; $h = +6$;
$D = -\cdot1\cdot000$, $E = +\cdot021$; $G = -\cdot005$, $H = -\cdot259$, $K = -\cdot966$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bogota		19·8	120	e 4 36	+ 1	e 8 22	+ 9	e 4 53	PP	10·9
St. Louis		23·5	1	i 5 11	− 1	i 10 32	SSS	i 5 20	pP	—
San Juan		24·2	78	(e 5 20)	+ 1	e 5 20	PP	(e 6 1)	PP	—
Tucson		24·7	317	i 5 24 a	0	i 10 33	SS	i 8 57	P_cP	e 12·7
Cleveland		27·6	15	i 5 51 a	0	—	—	e 6 53	PPP	—
Pierce Ferry		29·2	320	i 6 5	0	e 15 55	L	i 9 9	P_cP	(e 15·9)
Palomar		29·5	313	i 6 7	− 1	—	—	i 9 9	P_cP	—
Boulder City		29·6	319	i 6 9	0	e 12 49	S_cP	i 9 9	P_cP	e 16·3
Riverside	z.	30·2	313	i 6 15	+ 1	—	—	i 9 11	P_cP	—
Mount Wilson	z.	30·8	313	i 6 20 a	0	—	—	i 9 14	P_cP	—
Pasadena	z.	30·8	313	i 6 18	− 2	—	—	i 9 11	P_cP	—
Huancayo		31·2	148	e 6 18	− 5	e 11 18	−11	—	—	e 15·3
Haiwee		31·8	317	e 6 26	− 2	e 12 55	S_cP	e 6 45	?	—
Harvard		32·1	28	i 6 33	+ 2	—	—	i 6 41	pP	—
Santa Barbara		32·1	312	i 9 16	P_cP	—	—	—	—	—
Tinemaha	z.	32·5	317	i 6 34	0	i 12 57	S_cP	i 9 20	P_cP	—
Ottawa		32·9	20	6 38	0	11 56	0	7 50	PPP	13·9
Temiskaming		33·1	14	e 6 40	0	—	—	—	—	—
Kirkland Lake		34·2	13	e 6 50	+ 1	—	—	—	—	—
Santa Clara	z.	35·1	315	e 6 13	−44	—	—	—	—	—
Shasta Dam		37·2	320	e 6 49	−26	—	—	i 9 29	P_cP	—
Hungry Horse		38·1	336	e 7 23	+ 1	—	—	i 9 34	P_cP	—
La Paz		38·8	142	i 7 32	+ 4	i 13 20	− 6	i 8 55	PP	19·0
Grand Coulee		40·0	331	e 7 38	0	—	—	i 9 38	P_cP	—
Copenhagen		85·2	33	12 29	−10	—	—	12 35	P	—
Stuttgart	z.	85·5	40	e 12 37	− 4	—	—	—	—	—

Additional readings and notes :—Many readings were wrongly identified.
San Juan eP? = 0m.40s., readings decreased by one minute.
Tucson i = 5m.38s. and 5m.50s., eS? = 10m.1s., iS_cP? = 12m.32s.
Cleveland iZ = 6m.56s., eSE = 8m.59s., eSN = 9m.2s.
Pierce Ferry i = 6m.30s., iPP? = 6m.43s., eS_cP = 12m.47s.
Palomar iZ = 6m.24s.
Boulder City i = 6m.31s., iPP? = 6m.48s.
Riverside iZ = 6m.31s.
Mount Wilson iZ = 6m.37s.
Pasadena iZ = 6m.36s., eZ = 8m.34s.
Harvard i = 6m.52s.
Shasta Dam i = 7m.30s.
La Paz SS = 16m.14s.
Grand Coulee i = 8m.16s.

Dec. 23d. Readings also at 2h. (near Kulyab, Branner (2), Berkeley (2), and San Francisco), 3h. (near San Francisco, Berkeley, Branner, Lick, near Mizusawa and near Frunse), 7h. (Andijan, Tchimkent, and near Kulyab, Samarkand, and Stalinabad), 8h. (Branner, Lick, and near Berkeley), 9h. (Riverside, Tinemaha, Hungry Horse, Boulder City, Pierce Ferry, Tucson, Lick, near Berkeley (3), Branner, San Francisco, and near Mizusawa), 10h. (Stuttgart, Ksara, Andijan, Ashkabad, Frunse, Murgab, Tashkent, Tchimkent, and near Kulyab, Samarkand, and Stalinabad), 11h. (Pierce Ferry and near Berkeley), 12h. (La Paz, Alicante, Andijan, Ashkabad, Frunse, Murgab (2), Tashkent (2), Tchimkent (2), and near Kulyab (2), Samarkand (2), and Stalinabad (2)), 14h. (Santa Lucia, La Paz, La Plata, and near Berkeley), 15h. (Mount Wilson, Palomar, Pasadena, Riverside, Tinemaha, Hungry Horse, Shasta Dam, and Tucson), 16h. (San Francisco and near Berkeley, Branner, and Lick), 17h. (Shasta Dam, Santa Clara, and near Berkeley (2), Branner, Lick, and San Francisco), 18h. (Hungry Horse, Branner, Andijan, near Stalinabad, Kulyab, Murgab, Berkeley, and near San Francisco), 19h. (Santa Lucia and near Ottawa), 20h. (near Andijan), 21h. (near Ottawa, Kulyab, and Stalinabad), 22h. (Andijan, Tashkent, near Murgab, Samarkand, and near Branner), 23h. (near Lick).

Dec. 24d. 5h. 21m. 47s. Epicentre 55°·0S. 112°·0E.

$A = -\cdot2158$, $B = +\cdot5342$, $C = -\cdot8173$; $\delta = -8$; $h = -7$;
$D = +\cdot927$, $E = +\cdot375$; $G = +\cdot306$, $H = -\cdot758$, $K = -\cdot576$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Perth		23·2	9	5 13	+ 4	9 23	+ 5	—	—	—
Riverview		34·4	68	i 6 56a	+ 5	i 12 24	+ 5	i 8 11	PP	e 16·7
Kaimata		39·9	96	7 47	+10	—	—	—	—	—
Brisbane	N.	40·4	64	i 7 42	+ 1	i 13 48	− 2	i 9 21	PP	i 19·9
Wellington		42·6	97	7 59	0	14 29	+ 6	9 47	PP	20·2
Arapuni		45·3	95	9 13?	?	15 13	+11	—	—	22·8
Auckland		45·6	93	8 34	+10	15 11	+ 5	10 20	PcP	—
Antarctica		57·1	180	i 9 50	0	e 17 45	0	e 11 59	PP	e 29·2
Tananarive		60·1	280	—	—	18 28	+ 4	22 23	SS	e 28·5
Colombo	E.	67·2	325	11 3	+ 5	19 48	− 4	—	—	28·2
Kodaikanal	E.	71·2	324	e 12 51	?	—	—	—	—	—
Hyderabad	N.	77·6	328	11 51	− 9	21 41	−10	14 47	PP	37·4
Calcutta	E.	79·8	338	e 12 15	+ 3	e 22 14	0	—	—	—
Bombay		80·8	322	e 12 19	+ 2	e 22 21	− 4	—	—	33·7
La Plata	E.	90·0	188	13 21	+18	29 49	SS	15 19	PP	53·9
	N.	90·0	188	13 24	+21	34 31	SSS	16 37	PP	54·2
Vladivostok		99·2	14	i 13 42	− 3	i 25 18	+ 4	i 24 24	SKS	—
Kulyab		99·3	327	i 17 53	PP	—	—	—	—	—
Stalinabad		100·3	326	i 17 50	PP	i 24 28	[0]	—	—	—
Tashkent		102·6	327	i 13 53	− 7	e 25 42?	0	e 18 5	PP	—
Irkutsk		107·1	354	e 18 47	PP	27 59	PS	34 13?	SS	—
La Paz		108·8	180	e 18 31	[0]	i 25 5	[− 2]	i 28 27	PS	50·0
Helwan	Z.	108·9	295	i 16 43	?	—	—	i 19 4	PP	—
Huancayo		112·9	172	e 19 27	PP	e 26 32	{+ 7}	e 29 1	PS	e 57·2
Istanbul		118·8	301	e 19 13?	PP	e 29 53	PS	—	—	—
Sverdlovsk		119·0	331	e 20 8	PP	e 29 56	PS	e 36 32	SS	—
Moscow		125·9	318	19 5?	[+ 1]	36 1	SS	e 20 53	PP	—
Bogota		129·5	188	e 19 13	[+ 2]	e 22 42	PKS	e 21 22	PP	—
Triest		129·8	295	i 22 33	PKS	—	—	—	—	—
Florence		129·9	293	e 20 43	PP	—	—	—	—	—
Warsaw		130·6	305	e 19 11k	[− 2]	e 22 35	PKS	i 21 23	PP	e 70·2
Prague		132·4	300	e 20 1	?	—	—	e 22 39	PKS	e 74·7
Alicante		132·7	279	19 36	[+19]	—	—	22 40	PKS	e 64·6
Almeria		132·8	276	i 19 15	[− 2]	26 21	[− 6]	22 38	PKS	71·0
Chur		132·8	294	e 19 16	[− 1]	—	—	e 22 43	PKS	—
Zürich		133·7	294	e 19 15	[− 4]	—	—	e 22 44	PKS	—
Granada		133·7	275	i 19 48k	[+29]	—	—	i 22 26	PKS	—
Malaga	Z.	133·8	274	i 19 18a	[− 1]	—	—	i 22 46	PKS	58·1
Tortosa		133·8	282	22 45	PKS	26 25	[− 4]	28 33	SKKS	56·3
Stuttgart		134·2	296	e 19 17k	[− 3]	e 32 13	PS	e 22 43	PKS	e 73·2
Strasbourg		134·8	295	e 19 20	[− 1]	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Clermont-Ferrand		135·6	289	e 19 23	[+ 1]	—	—	—	—	e 71·0
Copenhagen		136·7	306	e 19 19	[− 5]	45 25	SSS	22 58	PKS	74·2
Paris		137·8	292	e 19 25	[− 2]	—	—	—	—	e 77·2
Uccle		137·9	295	e 19 32	[+ 5]	e 32 31	PS	e 23 1	PKS	e 70·2
De Bilt		138·3	298	—	—	e 45 33	SSS	—	—	e 68·2
Santa Barbara	z.	139·0	98	e 19 31	[+ 2]	—	—	—	—	—
Pasadena	z.	139·7	99	e 19 28	[− 2]	—	—	e 22 17	PP	—
Mount Wilson	z.	139·8	99	i 19 27	[− 3]	—	—	—	—	—
Palomar	z.	139·9	101	e 19 24	[− 6]	—	—	—	—	—
Riverside	z.	140·0	99	e 19 23	[− 7]	—	—	e 22 6	PP	—
Kew		140·8	294	e 19 29?	[− 3]	e 26 47?	[+ 7]	e 22 47?	PP	e 59·2
Haiwee	z.	141·3	97	e 19 34	[+ 1]	—	—	—	—	—
Tinemaha	z.	141·7	96	e 19 30	[− 3]	—	—	—	—	—
Shasta Dam		141·8	88	e 19 27	[− 7]	—	—	—	—	—
Tucson		142·4	108	i 19 29	[− 6]	e 26 1	[−42]	i 22 39	PP	—
Boulder City		142·9	101	i 19 33	[− 3]	—	—	—	—	—
San Juan		143·4	183	e 19 36	[0]	e 28 43	{−58}	e 23 21	PKS	—
Pierce Ferry		143·5	102	i 19 33	[− 4]	—	—	i 23 3	PKS	—
Salt Lake City		147·9	97	e 19 50	[+ 6]	—	—	—	—	e 74·8
Grand Coulee		148·1	80	e 19 44	[0]	—	—	—	—	—
Logan		148·6	95	i 19 47	[+ 2]	—	—	—	—	—
Hungry Horse		151·1	83	e 19 50	[+ 1]	—	—	—	—	—
Rapid City		154·9	100	e 19 56	[+ 2]	—	—	—	—	—
St. Louis		157·8	127	i 19 58	[0]	e 37 47	PPS	i 24 11	PP	—
Cleveland		163·8	139	i 20 6	[+ 1]	e 35 16	PS	e 24 44	PP	—
Temiskaming		169·1	136	e 20 9	[0]	—	—	—	—	—
Ottawa		169·2	150	e 20 8	[− 1]	e 31 13	{−46}	e 25 8	PP	87·2
Kirkland Lake		169·8	128	e 20 12	[+ 3]	e 25 18	PP	e 21 25	PKP,	—

Additional readings :—
Riverview i = 7m.2s., iSSSE = 14m.59s.
Brisbane iQN = 17m.35s.
Wellington P_cPZ = 10m.48s., SS = 17m.38s.
Auckland S_cS? = 18m.45s.
Antarctica ePPP = 13m.11s., iS_cS = 19m.39s., eSS = 21m.43s.
Hyderabad SSN = 26m.40s.
La Plata E = 14m.7s., N = 15m.43s., PPPE = 19m.19s., SKS?N = 22m.1s., N = 41m.55s., QN = 46m.49s., QE = 48m.55s.
Vladivostok PS = 26m.38s., SS = 31m.31s.
Tashkent ePPP = 20m.31s., PPS = 28m.17s.
La Paz iPKPNZ = 18m.45s., iSKSN = 25m.13s., iPPSN = 29m.35s., SSN = 34m.34s.
Huancayo eSS = 34m.41s.
Warsaw PKPZ = 19m.16s., ePPE = 21m.31s., eZ = 23m.32s., ePSZ = 31m.31s., ePSE = 31m.34s., eZ = 35m.52s.
Almeria PKS = 22m.46s., PPP = 25m.51s., PPS = 35m.8s., SS = 41m.12s.
Malaga PPSZ = 35m.22s.
Tortosa SKKSE = 36m.1s., PKP,PKPN = 37m.31s., SSE = 38m.23s., SSSE = 43m.59s.
Stuttgart iPKP?Z = 19m.24s.k, e = 35m.13s.
Copenhagen 39m.25s.
Paris iPKP = 19m.29s.
Uccle ePKPN = 18m.22s., eSSEN = 45m.13s.
Pasadena iZ = 19m.34s., 19m.39s. and 19m.59s.
Mount Wilson iZ = 19m.37s.
Palomar iZ = 19m.32s.
Riverside iZ = 19m.34s.
Kew ePKS?EN = 23m.9s., ePPP?EZ = 26m.0s.?, eSKKS?EN = 29m.43s., ePKKS?EZ = 31m.43s.?
Tucson i = 19m.56s., e = 29m.59s.
San Juan e = 20m.53s., ePS? = 34m.29s., e = 42m.23s.
Logan i = 20m.7s.
Hungry Horse i = 19m.57s.
St. Louis iPKP, = 20m.31s.
Cleveland iPKPZ = 20m.11s., iZ = 21m.0s. and 21m.4s., iZ = 25m.5s., eE = 32m.1s., ePS?N = 32m.9s.
Long waves were also recorded at Chicago, Cheb, and Helsinki.

Dec. 24d. 11h. 3m. 22s. Ecepintre 42°·9N. 11°·7E. (as on 1940, Oct. 16d.).

Intensity IV at Pienza, 40km. S.E. of Siena.
Bulletin séismique mensuel de Triest. Suggested epicentre 43°7′N. 11°35′E.

$A = +·7195$, $B = +·1490$, $C = +·6782$; $\delta = -16$; $h = -3$;
$D = +·203$, $E = -·979$; $G = +·664$, $H = +·138$, $K = -·735$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Florence		0·9	340	i 0 18	− 2	i 0 30	− 4	—	—	—
Rome		1·2	150	e 0 31	+ 7	e 0 41	0	0 56	S_g	—
Pavia	z.	2·9	321	e 0 58	P_g	—	—	—	—	—
Triest		3·2	28	i 1 3	P_g	i 1 38	S*	—	—	—
Zagreb		4·2	45	e 1 20?	P_g	e 2 29	S_g	—	—	—
Chur	N.	4·3	339	e 1 7	− 1	e 1 54	− 6	—	—	—
Zürich		5·0	334	e 1 21	+ 3	e 2 10	− 8	—	—	—
Basle		5·5	330	e 1 22	− 3	—	—	—	—	—
Stuttgart		6·2	343	e 1 33	− 2	e 2 37	−11	—	—	—
Strasbourg		6·3	335	e 1 33	− 3	e 2 53	+ 3	e 3 6	S*	—
Kalocsa		6·3	52	—	—	e 3 27	S_g	—	—	e 4·0

Long waves were also recorded at Budapest.

Dec. 24d. 16h. 36m. 53s. (I).
17h. 36m. 39s. (II). } Epicentre 16°·9N. 98°·7W.

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

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I Tacubaya		2·5	349	0 56	P_g	—	—	—	—	1·7
II		2·5	349	1 0	P_g	—	—	—	—	1·8
I Tucson		18·8	327	i 4 24	+ 1	e 7 24	−26	—	—	e 9·8
II		18·8	327	i 4 23	0	e 8 24	+34	—	—	—
I St. Louis		22·9	17	i 5 6	0	i 9 30	+17	—	—	—
II		22·9	17	i 5 5	− 1	i 9 30	+17	—	—	—
I La Jolla	z.	23·1	318	e 5 8	0	—	—	—	—	—
II	z.	23·1	318	e 5 6	− 2	—	—	—	—	—
I Palomar		23·1	319	e 5 10	+ 2	—	—	—	—	—
II		23·1	319	i 5 9	+ 1	—	—	—	—	—
I Pierce Ferry		23·5	328	i 5 14	+ 2	—	—	—	—	e 12·9
II		23·5	328	i 5 13	+ 1	e 9 48	+25	—	—	e 12·8
I Boulder City		23·8	327	i 5 17	+ 2	—	—	—	—	e 13·0
I Riverside	z.	23·9	319	i 5 16	0	—	—	—	—	—
II	z.	23·9	319	i 5 15	− 1	—	—	—	—	—
I Mount Wilson	z.	24·5	319	i 5 24	+ 2	—	—	—	—	—
II	z.	24·5	319	i 5 24	+ 2	—	—	—	—	—
I Pasadena		24·5	319	e 5 22	0	—	—	—	—	—
II		24·5	319	e 5 28	+ 6	—	—	—	—	—
I Haiwee	z.	25·7	323	e 5 33	0	—	—	—	—	—
II	z.	25·7	323	e 5 32	− 1	—	—	—	—	—
II Salt Lake City		26·4	338	—	—	e 7 41	?	—	—	e 12·7
I Tinemaha	z.	26·5	323	i 5 41	0	—	—	—	—	—
II	z.	26·5	323	i 5 40	− 1	—	—	—	—	—
I Rapid City		27·4	353	e 5 47	− 2	e 11 19	?	—	—	e 14·8
II		27·4	353	e 5 53	+ 4	e 12 4	?	—	—	e 15·0
I Cleveland		28·6	27	e 5 59	− 1	e 11 2	+14	—	—	—
II		28·6	27	e 5 58	− 2	e 10 58	+10	—	—	—
II Shasta Dam		31·3	325	e 6 20	− 4	—	—	—	—	—
I Hungry Horse		33·8	342	e 6 45	− 1	—	—	—	—	—
II		33·8	342	e 6 44	− 2	—	—	—	—	—
I Kirkland Lake		34·7	21	e 6 52	− 2	—	—	—	—	—
II		34·7	21	e 6 56	+ 2	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Grand Coulee	35·1	336	i 6 56	− 1	—	—	—	—	—
II		35·1	336	i 6 56	− 1	—	—	i 9 19	PPP	—
I	Huancayo	36·9	138	e 7 11	− 1	e 12 52	− 6	—	—	—
II		36·9	138	e 7 4	− 8	e 12 38	−20	—	—	e 15·8
I	La Paz	44·8	135	e 8 15	− 2	—	—	—	—	—
II		44·8	135	e 8 13	− 4	—	—	—	—	—

Additional readings :—
Tucson I i = 7m.31s., II e = 6m.47s.
Cleveland I eE = 10m.50s., eN = 10m.57s., II eSE = 11m.1s.
Kirkland Lake I e = 6m.59s.
Long waves for these shocks were also recorded at San Juan and other American stations.

Dec. 24d. Readings also at 2h. (near Mineral), 3h. (Kirkland Lake), 4h. (Boulder City and near Pierce Ferry), 5h. (Huancayo and near Stalinabad), 7h. (near Branner, Berkeley, and Lick), 12h. (near Berkeley, Branner, and Lick), 13h. (near Mizusawa), 17h. (Haiwee, Mount Wilson (2), Pasadena, Palomar (3), Riverside (3), Tinemaha (3), Tucson (3), Pierce Ferry (3), Shasta Dam, Grand Coulee (3), Bozeman, Salt Lake City, and Logan), 20h. (La Paz), 23h. (near Berkeley).

Dec. 25d. 1h. 58m. 0s. Epicentre 3°·2S. 148°·2E. (as on 1945, Sept. 22d.).

A = −·8486, B = +·5262, C = −·0555 ; δ = +9 ; h = +7 ;
D = +·527, E = +·850 ; G = +·047, H = −·029, K = −·998.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Brisbane		24·6	169	i 5 19	− 4	e 9 42	0	i 6 24	PPP
Riverview	N.	30·6	175	—	—	e 11 20	0	—	—
Vladivostok		48·4	344	i 8 46	0	e 15 48	+ 2	—	—
Murgab		79·7	310	i 12 14	+ 3	—	—	—	—
Andijan		81·4	312	e 12 18	− 2	—	—	—	—
Kulyab		82·8	308	e 12 34	+ 7	—	—	—	—
Stalinabad		83·7	309	i 12 36	+ 4	i 23 1	+ 7	—	—
Tashkent		83·8	312	e 12 33	+ 1	e 22 59	+ 4	e 16 3	PP
Sverdlovsk		91·3	327	—	—	23 43	[+ 3]	—	—
Shasta Dam		91·9	50	e 13 11	0	—	—	—	—
Grand Coulee		94·3	42	e 13 21	− 2	—	—	—	—
Tinemaha	z.	94·7	54	e 13 29	+ 5	—	—	—	—
Pasadena	z.	94·8	56	e 13 28	+ 3	—	—	—	—
Mount Wilson	z.	94·9	56	e 13 28	+ 3	—	—	—	—
Riverside	z.	95·5	56	e 13 29	+ 1	—	—	i 14 16	?
Hungry Horse		97·6	42	e 13 37	− 1	—	—	—	—
Pierce Ferry		98·2	54	e 13 45	+ 5	—	—	—	—

Additional readings :—
Brisbane iSN = 9m.55s.
Tashkent ePS = 24m.8s. and eSS = 28m.54s.
Long waves were recorded at Arapuni, Wellington, Auckland, Kew, and Rome.

Dec. 25d. 20h. 42m. 34s. Epicentre 45°·8N. 10°·3E. (as on 1943, January 24d.).

Intensity V-VI at Brescia and Preno. Epicentre 45°·7N. 10°·2E.
Bulletin séismique mensuel de Triest.

A = +·6883, B = +·1251, C = +·7146 ; δ = +6 ; h = −4 ;
D = +·179, E = −·984 ; G = +·703, H = +·128, K = −·700.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Pavia	1·0	232	i 0 16	P_g	e 0 30	S_g	—	—
Chur	1·2	333	e 0 24k	0	e 0 40	S_g	—	—
Zürich	1·8	323	e 0 35	+ 3	e 1 5	S_g	e 0 38	P_g
Florence	2·1	162	i 0 49	P_g	i 1 10	S_g	—	—
Triest	2·3	94	e 0 49	P_g	i 1 21	S_g	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Basle		2·5	313	e 0 42	− 1	e 1 22	S_g	e 0 49	P_g
Neuchatel		2·6	297	e 0 42	− 2	e 1 21	S_g	e 0 49	P_g
Stuttgart		3·1	346	e 0 50	− 1	e 1 30	+ 1	e 1 1	P_g
Strasbourg		3·3	330	e 0 53	0	i 1 32	− 3	i 1 49	S_g
Besançon		3·3	288	e 1 1	P*	i 1 44	S*	—	—
Zagreb		4·0	88	e 1 17	P_g	e 1 59	S*	e 2 14	S_g
Rome		4·2	158	—	—	e 2 24	S_g	—	—
Clermont-Ferrand		5·0	272	e 1 21	+ 3	i 2 45	S_g	e 1 40	P_g
Jena	N.	5·2	8	e 1 32	P*	e 2 54	S_g	e 1 45	P_g
Collmberg	Z.	5·8	18	e 1 56	P_g	e 3 12	S_g	—	—

Additional readings :—
Stuttgart e = 0m.54s. and 1m.4s., i = 1m.10s., eS? = 1m.22s., i = 1m.36s., iS_g? = 1m.42s. and 1m.48s., i = 1m.56s.
Strasbourg iP_g = 1m.2s., iS = 1m.29s.
Clermont-Ferrand iP_g = 1m.44s., i = 2m.5s.
Long waves were recorded at Potsdam.

Dec. 25d. Readings also at 1h. (Stalinabad, near Kulyab, and Murgab), 3h. (near Lick, Branner, and Berkeley), 4h. (Pierce Ferry, Samarkand, Tchimkent, near Kulyab, Murgab, Obi-garm, Stalinabad, and near Apia), 6h. (Palomar, Tinemaha, Fresno, Boulder City, Grand Coulee, Hungry Horse, Pierce Ferry, Shasta Dam, and Tucson), 8h. (near Berkeley and Lick (2)), 9h. (Tucson), 12h. (near Lick), 14h. (Haiwee, Palomar, Pasadena, Riverside, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, and near Ashkabad), 15h. (Tucson and near Kulyab (2)), 16h. (Kulyab, near Andijan, and Murgab), 21h. (Santa Lucia, Piatigorsk, Sotchi, Erevan, Grozny, and Leninakan), 23h. (Strasbourg, near Stuttgart, Basle, and Zürich).

Dec. 26d. 2h. 2m. 3s. Epicentre 37°·7N. 141°·8E. (as on 1947, October 25d.).

A = −·6234 B = +·4905, C = +·6090 ; δ = +10 ; h = −1 ;
D = +·618, E = +·786 ; G = −·479, H = +·377, K = −·793.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Mizusawa		1·5	343	i 0 37	P_g	1 0	+11	1 4	S_g
Vladivostok		9·3	308	i 2 24	+ 7	i 4 16	+11	—	—
Grand Coulee		68·6	45	e 11 6	− 1	—	—	—	—
Shasta Dam		70·5	53	e 11 17	− 1	—	—	—	—
Hungry Horse		71·1	43	i 11 23	+ 1	—	—	—	—
Fresno	Z.	74·4	55	e 11 40	− 2	—	—	—	—
Tinemaha	Z.	75·1	54	i 11 47	+ 1	—	—	—	—
Haiwee	Z.	75·9	55	i 11 50	0	—	—	—	—
Pasadena	Z.	77·0	56	i 11 55	− 1	—	—	—	—
Mount Wilson	Z.	77·0	56	i 11 57	+ 1	—	—	—	—
Riverside	Z.	77·6	56	i 11 58	− 2	—	—	—	—
Boulder City		78·0	54	i 12 3	+ 1	—	—	—	—
Palomar	Z.	78·3	57	i 12 3	0	—	—	—	—
Pierce Ferry		78·5	53	i 12 6	+ 2	—	—	—	—
Tucson		82·9	54	i 12 29	+ 1	—	—	e 12 37	P
Stuttgart	Z.	84·2	234	e 12 35	+ 1	—	—	—	—

Long waves were recorded at Basle.

Dec. 26d. 16h. 43m. 59s. Epicentre 19°·0S. 169°·0E. (as on 1944, November 24d.).

A = −·9288, B = +·1805, C = −·3236 ; δ = −3 ; h = +5 ;
D = +·191, E = +·982 ; G = +·318, H = −·062, K = −·946.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	16·9	237	i 3 55	− 4	i 7 16	+ 9	i 4 11	PP	—
Auckland	18·5	166	4 10	− 9	7 50	+ 6	—	—	9·9
Apia	19·1	79	i 4 26	− 1	—	—	—	—	—
Arapuni	19·9	165	7 1?	?	8 19	+ 4	9 25	Q	10·7
Riverview	21·7	223	i 4 54a	− 1	i 8 56	+ 5	i 5 2	pP	e 10·1

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Wellington		22·8	169	5 2	− 3	9 8	− 3	e 7 19	?	12·5
Perth		49·3	244	—	—	i 17 33	?	i 22 13	Q	i 24·1
Honolulu		51·6	41	—	—	e 16 38	+ 7	—	—	e 21·0
Vladivostok		70·6	333	i 11 20	+ 1	e 20 29	− 4	—	—	—
Antarctica		84·1	163	i 12 30	− 4	e 22 53	− 5	e 28 35	SS	e 39·0
Santa Clara	z.	85·7	49	e 12 38	− 4	—	—	—	—	—
Berkeley	E.	85·8	49	i 12 58	+16	i 23 28	+13	i 24 12	PS	e 39·9
Santa Barbara	z.	86·1	52	e 12 44	0	—	—	—	—	—
Shasta Dam		87·0	46	e 12 46	− 2	i 13 30	?	e 16 17	PP	—
Pasadena		87·1	53	i 12 47	− 2	—	—	i 16 15	PP	e 39·4
Mount Wilson	z.	87·2	53	i 12 50	+ 1	—	—	i 16 15	PP	—
Riverside	z.	87·6	53	i 12 49	− 2	—	—	i 16 18	PP	—
Palomar		87·7	54	i 12 51	− 1	—	—	e 16 12	PP	—
Haiwee	z.	88·1	51	i 12 58	+ 4	—	—	—	—	—
Tinemaha	z.	88·3	51	i 12 55	0	—	—	—	—	—
Calcutta	E.	88·9	294	e 11 49	.−69	e 19 59	?	e 24 24	PS	—
Victoria		90·1	39	—	—	e 23 37	[+ 4]	e 30 1	SS	42·0
Boulder City		90·3	53	i 13 4	0	—	—	e 16 39	PP	—
Irkutsk		90·4	326	e 13 26	+22	—	—	—	—	—
Pierce Ferry		91·0	53	e 13 7	0	—	—	e 16 47	PP	—
Colombo	E.	91·4	277	23 41	SKS	(23 41)	[0]	(29 31)	SS	29·5
Tucson		92·0	57	i 13 11	− 1	e 24 41	+29	i 16 56	PP	e 41·8
Grand Coulee		92·5	40	e 13 16	+ 2	—	—	e 16 57	PP	—
Salt Lake City		94·3	49	—	—	e 24 7	[+10]	—	—	e 44·5
Hungry Horse		95·7	41	e 13 32	+ 3	—	—	—	—	—
Hyderabad	N.	96·0	287	—	—	25 2	+15	—	—	—
Andijan		107·1	307	e 18 55	PP	—	—	—	—	—
Stalinabad		109·4	306	e 28 47	PS	—	—	—	—	—
Tashkent		109·5	308	e 19 4	PP	e 28 37	PS	—	—	—
Huancayo		109·5	111	e 19 5	PP	e 28 50	PS	e 34 47	SSP	e 48·8
Chicago		112·2	52	—	—	e 35 7	SS	—	—	e 57·4
La Paz		113·7	119	i 18 38	[− 2]	i 29 12	PS	19 31	PP	58·0
Sverdlovsk		115·7	325	e 19 49	PP	e 29 32	PS	e 35 56	SS	—
Ottawa		121·0	48	e 18 55	[0]	—	—	—	—	53·0
San Juan		128·0	81	e 22 15	PKS	e 31 14	PS	e 38 13	SS	—
Ksara		135·9	299	e 19 25	[+ 2]	22 59?	PKS	35 55?	?	—
Istanbul		139·4	312	e 19 21?	[− 8]	—	—	e 22 1?	PP	—
Helwan	z.	140·2	294	e 19 31	[0]	—	—	e 22 32	PP	—
Belgrade		143·3	321	e 19 33	[− 3]	e 33 39	PS	e 22 25	PP	—
Uccle		146·0	344	e 19 51	[+10]	—	—	—	—	e 61·0
Stuttgart		146·1	336	e 19 41	[0]	e 47 1	SSS	—	—	e 71·0
Strasbourg		146·8	337	i 19 47	[+ 5]	—	—	—	—	—
Zürich		147·5	335	e 19 45	[+ 2]	—	—	—	—	—
Chur		147·5	334	e 19 54	[+11]	—	—	—	—	—
Basle		147·7	336	e 19 49	[+ 5]	—	—	—	—	—
Paris		148·3	344	e 19 48	[+ 3]	e 20 23	?	e 19 57	PKP_2	e 78·0
Clermont-Ferrand		150·9	340	e 19 56	[+ 7]	—	—	—	—	80·0

Additional readings :—
Brisbane iSSN = 7m.36s.
Auckland PP = 5m.12s., i = 6m.1s., P_cS = 11m.24s., S_cS = 14m.47s., eS_cS = 16m.57s.
Riverview iPP = 5m.21s., iPPPN = 5m.34s., iE = 5m.47s., iEZ = 9m.1s., isSE = 9m.12s., iN = 9m.27s., iSSN = 9m.38s., iSSSE = 9m.52s., eN = 9m.55s.
Antarctica e = 16m.7s.
Victoria eN = 37m.1s.
Boulder City i = 13m.10s.
Tucson i = 13m,17s., ePPP? = 18m.48s., e = 22m.34s.
La Paz PPS = 29m.27s., eSSE = 35m.25s.
Sverdlovsk eS = 27m.42s.?
San Juan eS? = 30m.16s., eSSS = 43m.19s.
Helwan eZ = 20m.15s.
Belgrade e = 23m.19s.
Stuttgart eZ = 19m.49s., e = 19m.55s., eZ = 20m.53s.
Long waves were recorded at New Plymouth and at other American and European stations.

Dec. 26d. 19h.-20h. Undetermined shock.

Auckland S? =56m.14s., L =59m.0s.
Brisbane eP?E =58m.36s., iS?E =63m.19s., iSS?E =63m.45s.
Riverview iPEZ =60m.0s., eLE =66·2m.
La Paz eP? =64m.46s., LE =100m.24s.
Pasadena iPZ =65m.8s., iZ =65m.22s., eLEZ =89·6m.
Palomar iPEZ =65m.11s., iZ =65m.25s., 65m.42s., and 65m.48s.
Riverside iPZ =65m.11s.
Fresno iPZ =65m.13s., eN =65m.19s.
Mount Wilson iPZ =65m.11s.
Santa Barbara eZ =65m.17s.
Shasta Dam e =65m.17s.
Haiwee ePZ =65m.17s.
Tinemaha iPZ =65m.19s., iZ =65m.39s.
Boulder City iP =65m.27s., i =72m.28s.
Tucson iP =65m.29s., i =65m.42s. and 65m.58s.
Pierce Ferry iP =65m.31s., i =65m.46s., 66m.19s., and 72m.33s.
Grand Coulee eP =65m.51s., i =66m.3s.
Hungry Horse eP =66m.3s.
Ksara ePKP =72m.47s., PP =76m.30s.
Stuttgart eZ =72m.50s. and 79m.7s., eL =137m.0s.
Istanbul e =72m.54s.
Paris e =73m.5s. and 73m.22s., eL =133m.
Helwan ePKPZ =73m.8s., eZ =73m.27s.
Berkeley eN =75m.12s., eE =76m.12s., eN =89m.24s.
Victoria e =76m., L =93m.
Calcutta eE =77m.33s.
Long waves were recorded at Arapuni, Wellington, and at other American and European stations.

Dec. 26d. Readings also at 3h. (Rome and near Grozny), 4h. (Huancayo and near College), 5h. (near Grozny), 7h. (Santa Lucia), 10h. (Andijan, Kulyab, Murgab, Obi-garm, Samarkand, Stalinabad, Tashkent, Bombay, Calcutta, Hyderabad, and near Pierce Ferry and Boulder City), 16h. (Ksara), 18h. (Bombay), 19h. (Mount Wilson, Palomar, Riverside, Boulder City, Pierce Ferry, and Tucson), 20h. (Mount Wilson, Palomar (3), Riverside, Tinemaha (3), Huancayo, Chicago, Rapid City, Salt Lake City, and Pierce Ferry (3), Shasta Dam (2), Tucson (3), Bombay, near Andijan, Kulyab, Murgab, and Obi-garm), 21h. (Ksara and near Leninakan), 22h. (Kirkland Lake, Tchimkent, Andijan, near Kulyab, Murgab, Obi-garm, and Stalinabad), 23h. (Mount Wilson (2), Palomar (2), Pasadena, Riverside (2), Tinemaha, Boulder City, Pierce Ferry (2), Shasta Dam (2), Tucson (2), Auckland, Wellington, Arapuni, Riverview, Stuttgart, Bombay, Istanbul, Helwan, Ksara, Ashkabad, Kulyab, Stalinabad, Tashkent, near Almeria, Granada, Malaga, and near Mizusawa; several shocks).

Dec. 27d. 16h. South-west Pacific.

Wellington P =42m.18s., S =44m.58s.
Apia iEN =44m.6s.
Brisbane eS?EN =44m.8s.
Riverview ePEZ =44m.24s., eLN =50·9m.
Auckland S =44m.49s., L =45m.10s.
Arapuni e =46m.
Christchurch S =46m.2s.
Pasadena iPNZ =50m.48s., ipPZ =51m.25s.
Mount Wilson iPZ =50m.50s.a, ipPZ =51m.28s.
Riverside iPZ =50m.51s., ipPZ =51m.29s.
Palomar iPZ =50m.52s.a, ipPZ =51m.27s.
Tinemaha iPZ =50m.58s., epPZ =51m.35s.
Shasta Dam iP =50m.58s., ipP =51m.36s.
Boulder City iP =51m.6s., ipP =51m.43s.
Tucson iP =51m.9s.a, i =51m.28s., ipP =51m.47s.
Pierce Ferry iP =51m.17s., ipP =51m.50s.
Grand Coulee eP =51m.29s., epP? =52m.6s.
Hungry Horse eP =51m.41s.
Istanbul e =57m.54s.
Ksara ePKP =58m.13s.?, PP =61m.57s.?
Copenhagen PKP =58m.15s. and 58m.56s.
Stuttgart eZ =58m.20s. and 58m.51s.
Helwan iZ =58m.42s. and 62m.17s.
Collmberg eZ =63m.36s.

Dec. 27d. Readings also at 0h. (Vladivostok), 1h. (Pierce Ferry and near Kulyab), 3h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Santa Barbara, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Grand Coulee, Hungry Horse, and Stuttgart), 5h. (Riverview, Mount Wilson (2), Pasadena, Palomar (2), Riverside, Tinemaha (2), Tucson (2), Boulder City (2), Pierce Ferry (2), and Shasta Dam (2)), 6h. (La Paz and near Mizusawa), 7h. (Pierce Ferry and near Mineral), 9h. (near Boulder City and Pierce Ferry), 11h. (Hungry Horse, La Paz, and near Apia), 13h. (Ksara), 15h. (Stalinabad, near Kulyab, Murgab, and Obi-garm), 16h. (Riverview), 17h. (Brisbane, Riverview, Mount Wilson, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, and Shasta Dam), 18h. (Riverview, Riverside, Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, and Bozeman), 20h. (Collmberg and near Obi-garm), 21h. (Shasta Dam), 22h. (Nanking, Hungry Horse, and Shasta Dam).

Dec. 28d. 19h. 58m. 17s. Epicentre 45°·3N. 69°·6W. (as on 1943, January 14d.).
Intensity V in the Epicentral Region ; IV at Brownville, Eastport, Greenville, Guildford, etc. Epicentre 45°·2N. 69°·2W. Macroseismic area 60,000 sq. miles.

L. M. Murphy.
United States Earthquakes, 1947, serial No. 730, Washington, 1950, p. 5, macroseismic chart p. 5.

$A = +\cdot2460$, $B = -\cdot6615$, $C = +\cdot7084$; $\delta = -7$; $h = -4$;
$D = -\cdot937$, $E = -\cdot349$; $G = +\cdot247$, $H = -\cdot664$, $K = -\cdot706$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Seven Falls	2·0	335	0 40	P_g	1 5	S*	1 9	S_g
Shawinigan Falls	2·5	300	0 49	P_g	1 20	S*	1 25	S_g
Ottawa	4·3	273	1 9	+ 1	2 0	0	1 20	P_g
Temiskaming	6·8	286	1 44	0	3 6	+ 3	2 5	P_g
Kirkland Lake	7·8	296	2 1	+ 3	—	—	—	—

Ottawa also gives i = 2m.6s. and 2m.18s., S = 2m.25s.

Dec. 28d. Readings also at 3h. (Palomar, Riverside, Boulder City, Pierce Ferry, Tucson, and La Paz), 13h. (Mizusawa, Pierce Ferry, Hungry Horse, and near Mineral), 15h. (Mount Wilson, Palomar, Tinemaha, Boulder City, Pierce Ferry, Shasta Dam, Tucson, Apia, Brisbane, Riverview, Auckland, Arapuni, and Wellington), 16h. (Ksara), 17h. (Kew, De Bilt, and Paris), 18h. (Istanbul and Bozeman), 19h. (Pierce Ferry, Hungry Horse, Bozeman, and near Mineral), 20h. (near Mineral and near Ottawa), 23h. (near Andijan).

Dec. 29d. Readings at 2h. (Butte), 6h. (Andijan, near Murgab, Obi-garm, and Stalinabad), 7h. (Helwan, Istanbul, Ksara, Stuttgart, Hungry Horse, Shasta Dam, Tucson, and near Mineral (3), 11h. (Paris, Stuttgart, Hungry Horse, and Tucson), 12h. (Tucson), 13h. (near Bogota), 14h. (Mount Wilson, Pasadena, Riverside, Tinemaha, Boulder City, Grand Coulee, Pierce Ferry, Shasta Dam, Tucson, and near Calcutta), 15h. (Hungry Horse, Ivigtut (2), Kew, Paris (4), and Stuttgart), 16h. (Paris), 18h. (Tucson (2), Hungry Horse, Philadelphia, Paris (3), Stuttgart (2), Clermont-Ferrand (2), Aberdeen (2), Kew (2), Copenhagen, Scoresby Sund, Reykjavik (2), Ivigtut (2), Triest, Ksara, Istanbul, Prague, Warsaw, Uccle (2), De Bilt (2), Cheb, Samarkand, near Obi-garm, and Stalinabad), 19h. (Istanbul and Cheb), 20h. (Riverside, Shasta Dam, and Tucson), 21h. (Paris, Reykjavik, and Shasta Dam), 22h. (Bozeman, Hungry Horse, and Paris), 23h. (near Ashkabad),

Dec. 30d. 1h. 55m. 14s. Epicentre 9°·8N. 84°·3W. (as on 1940, October 27d.).

$A = +·0979$, $B = -·9807$, $C = +·1691$; $\delta = -5$; $h = +7$;
$D = -·995$, $E = -·099$; $G = +·017$, $H = -·168$, $K = -·986$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		4·8	100	i 1 11	− 4	i 2 4	− 8	—	—	—
San Juan		19·6	62	e 4 30	− 2	e 8 12	+ 4	—	—	i 8·5
Fort de France		23·1	77	e 4 57?	−11	e 9 16	0	—	—	—
Huancayo		23·5	158	e 5 10	− 2	i 9 23	0	—	—	e 11·1
Columbia		24·3	7	e 5 19	− 1	e 9 57	+20	—	—	e 11·9
St. Louis		29·2	350	i 6 5	0	i 11 10	+12	i 6 14	pP	—
La Paz		30·6	148	i 6 18	0	i 11 13	− 7	i 7 18	PP	15·8
Philadelphia		31·1	14	i 7 24	PP	i 11 51	+23	i 7 55	PPP	e 14·6
Cleveland		31·7	4	i 6 27	0	e 11 50	+13	e 7 27	PP	—
Chicago		32·0	354	e 6 28	− 2	e 11 49	+ 7	e 7 55	PPP	e 13·5
Fordham		32·3	15	e 6 31	− 2	—	—	i 7 53	PPP	—
Tucson		33·2	317	i 6 41	+ 1	—	—	i 7 36	PP	—
Ottawa		36·2	10	7 6	0	13 11	+24	8 40	PPP	18·3
Temiskaming		37·0	6	i 7 13	0	—	—	—	—	—
Pierce Ferry		37·6	319	i 7 20	+ 2	—	—	i 9 35	P_cP	—
Rapid City		37·9	339	e 7 22	+ 2	e 13 16	+ 3	e 8 54	PP	e 22·1
Boulder City		38·0	318	e 7 23	+ 2	—	—	i 9 37	P_cP	—
Palomar		38·0	313	i 7 24a	+ 3	—	—	i 9 37	P_cP	—
Kirkland Lake		38·5	5	i 7 26	0	—	—	—	—	—
Riverside	z.	38·7	314	i 7 30	+ 3	—	—	i 9 39	P_cP	—
Mount Wilson	z.	39·3	314	i 7 34	+ 2	—	—	—	—	—
Pasadena	z.	39·4	314	i 7 35	+ 2	—	—	—	—	—
Tinemaha	z.	40·9	317	i 7 49	+ 3	—	—	i 9 47	P_cP	—
Berkeley		44·1	316	i 8 12	0	e 14 50	+ 5	—	—	e 21·2
Shasta Dam		45·6	319	e 8 22	− 2	—	—	e 10 0	PP	—
Hungry Horse		45·8	333	e 8 23	− 2	—	—	i 10 2	P_cP	—
Grand Coulee		47·9	330	e 8 41	− 1	—	—	i 10 10	P_cP	—
Victoria		50·6	328	e 8 46?	−16	—	—	—	—	23·8
Malaga	z.	76·1	55	i 11 49a	− 2	i 21 35	0	i 15 1	PP	37·4
Granada		76·8	54	i 11 51a	− 4	—	—	27 10	SS	—
Antarctica		78·8	173	e 12 6	0	i 22 0	− 4	—	—	e 32·8
Alicante		79·2	53	e 9 38	?	—	—	—	—	40·6
Paris		80·6	42	i 12 14	− 2	—	—	—	—	e 36·8
Clermont-Ferrand		81·3	46	i 12 19	− 1	—	—	e 28 42	SS	39·3
Uccle		81·6	41	e 12 23	+ 2	—	—	—	—	e 38·8
Basle		84·1	43	e 12 32	− 2	—	—	—	—	—
Zürich		84·8	43	e 12 35a	− 2	—	—	—	—	—
Stuttgart		85·0	42	i 12 37a	− 1	—	—	—	—	e 39·8
Copenhagen		85·8	35	12 41	− 1	e 23 26	+11	24 26	PS	41·8
Collmberg	z.	87·0	40	e 12 46	− 2	—	—	—	—	—
Triest		88·6	44	e 12 47	− 9	23 37	− 5	—	—	e 39·8
Warsaw	E.	91·5	37	—	—	e 24 0	− 8	e 25 10	PS	e 46·8
Istanbul	E.	100·7	45	e 16 46?	?	—	—	—	—	—
Ksara		108·6	51	e 14 26	P	30 2	PPS	—	—	—
Riverview	E.	124·0	236	—	—	e 37 58	SS	—	—	e 59·9
Bombay	N.	143·6	39	e 22 50	PP	—	—	—	—	—

Additional readings :—
San Juan iP = 4m.33s., i = 4m.41s. and 5m.15s.
Huancayo eS = 9m.28s.
St. Louis i = 6m.47s., e = 10m.27s.
La Paz PPP = 7m.37s., iP_cPEN = 9m.22s., iSN = 11m.31s., iSSEN = 13m.2s., SSS = 13m.26s.
Cleveland eE = 12m.59s. and 13m.50s.
Tucson eP_cP = 8m.39s., i = 9m.23s.
Ottawa SS = 15m.46s.?
Berkeley eSE = 14m.56s.
Malaga PPPZ = 16m.37s., sSZ = 22m.3s., PSZ = 22m.39s., eSSZ = 26m.51s.
Paris eP = 12m.22s., e = 18m.46s.?
Copenhagen i = 24m.33s.
Warsaw eE = 25m.35s.
Bombay eE = 23m.36s.
Long waves were also recorded at Salt Lake City, Sitka, College, Ivigtut, Kew, De Bilt, Cheb, Potsdam, and Aberdeen.

Dec. 30d. Readings also at 0h. (Copenhagen, Uccle, Ksara, Stuttgart, Clermont-Ferrand, Paris, De Bilt, Warsaw, Kew, Aberdeen, Reykjavik, Scoresby Sund, Ivigtut, and near Alicante), 1h. (Bogota), 2h. (Ivigtut and Paris), 3h. (Bogota), 4h. (Clermont-Ferrand, Paris, Ivigtut, and Scoresby Sund), 5h. (La Paz, and near Huancayo), 7h. (Tinemaha, Tucson (2), Pierce Ferry, Shasta Dam, Grand Coulee, Hungry Horse, Cleveland, Paris, Clermont-Ferrand, Alicante, De Bilt, Kew, Stuttgart, Uccle, Cheb, Warsaw, Prague, Malaga, Ksara, Stalinabad, Tashkent, near Almata, Andijan (2), Frunse, Kulyab, and Murgab), 9h. (Istanbul, Warsaw, Uccle, Stuttgart, De Bilt, Kew, Paris, Clermont-Ferrand, and Hungry Horse), 13h. (Samarkand, near Andijan, Kulyab, and Murgab), 14h. (Tucson, near Grozny and Leninakan), 15h. (Brisbane, Hungry Horse, and Tucson), 16h. (Tinemaha, Tucson, Boulder City, Pierce Ferry, Shasta Dam, Grand Coulee, Ivigtut, and Scoresby Sund), 17h. (Tinemaha, Tucson, Pierce Ferry, Shasta Dam, Grand Coulee, and Temiskaming), 18h. (Arapuni, Wellington, Auckland, Brisbane, Riverview, Riverside, Tucson, Pierce Ferry, Shasta Dam, Stuttgart, and near Branner), 19h. (near Pierce Ferry (2), and Shasta Dam), 20h. (La Paz and Shasta Dam), 22h. (Kirkland Lake), 23h. (La Paz and near Kulyab).

Dec. 31d. 5h. 30m. 42s. Epicentre 48°·0N. 31°·0W. (Rough).

A = +·5757, B = −·3459, C = +·7409 ; δ = +1 ; h = −4 ;
D = −·515, E = −·857 ; G = +·635, H = −·382, K = −·672.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Aberdeen	E.	19·7	51	i 6 17	?	—	—	—	—	—
Paris		22·1	75	i 5 6k	+ 7	e 9 14	+16	i 5 14	PP	—
Scoresby Sund,		23·0	7	5 7	0	—	—	(6 18)	PPP	6·3
Uccle		23·0	69	e 5 8	+ 1	e 9 5?	− 9	—	—	e 10·3
Clermont-Ferrand		23·3	82	e 5 31	PP	—	—	—	—	—
De Bilt		23·4	65	e 5 3	− 8	e 8 58	−23	—	—	e 10·3
Strasbourg		25·6	73	i 5 33	+ 1	—	—	—	—	—
Stuttgart		26·5	73	e 5 39	− 2	e 10 8	− 6	—	—	e 12·3
Copenhagen		27·5	57	e 5 18	−32	e 9 36	−54	—	—	11·3
Cheb		28·2	68	e 9 22	?	e 10 19	−22	—	—	e 13·3
Upsala		30·3	49	i 5 27a	−48	e 9 56	?	e 9 51	?	e 13·3
Trieste		30·4	77	e 6 7	− 9	e 10 49	−27	—	—	e 11·0
Helsinki		33·9	47	e 10 49	?	e 11 34	−37	e 14 54	SS	e 17·5
Istanbul		42·4	76	e 7 52	− 6	—	—	—	—	e 18·3
Helwan	Z.	50·4	87	i 9 14	+13	—	—	i 11 51	PPP	—
Ksara		51·0	80	e 9 5	− 1	e 16 25	+ 3	—	—	—
Hungry Horse		52·7	303	e 8 51	−27	—	—	—	—	—
Tucson		60·4	287	e 10 10	− 3	—	—	e 10 17	P	28·4
Shasta Dam		62·0	301	e 10 0	−24	—	—	—	—	—

Additional readings :—
Paris eSSS = 10m.18s.?
Helsinki e = 13m.21s. and 16m.23s.
Helwan iZ = 11m.11s.
Long waves were recorded at Ivigtut and at other American and European stations.

Dec. 31d. 15h. 6m. 31s. Epicentre 15°·5S. 173°·0W. (as on 1946, April 23d.).

Intensity V at Apia. Epicentre 15°·0S. 176°·0W. (U.S.C.G.S.).
14°·75S. 173°·75W. (Strasbourg).

Annales de l'Institut de Physique du Globe de Strasbourg, 2e partie, Séismologie, Nouvelle Série, Tome XII, 1947, Strasbourg, 1952, p. 40.

\+ A = −·9569, B = −·1175, C = −·2656 ; δ = +1 ; h = +6 ;
D = −·122, E = +·993 ; G = +·264, H = +·032, K = −·964.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia	2·1	35	i 0 35	− 2	i 0 56	− 8	—	—	—
Arapuni	24·6	202	5 47	PP	10 11	SS	—	—	12·7
Tual	24·8	199	5 26	+ 1	—	—	—	—	—
New Plymouth	26·1	203	5 42	+ 5	—	—	—	—	—
Wellington	27·8	201	5 49	− 4	12 40	PcS	i 7 3	PPP	14·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kaimata		30·1	204	6 12	− 1	—	—	—	—	—
Christchurch		30·5	201	6 17	0	—	—	9 29	?	—
Brisbane	E.	33·7	244	i 7 54	+69	—	—	—	—	—
Riverview		37·1	234	e 7 10	− 4	e 13 10	+ 9	i 8 36	PP	e 15·7
Honolulu		39·5	23	—	—	e 13 45	+ 8	—	—	e 16·9
Branner		71·1	41	e 11 22	0	—	—	e 11 45	P_cP	—
Santa Clara		71·2	41	e 11 35	+12	e 20 46	+ 6	—	—	e 32·5
Berkeley		71·3	41	i 11 23	0	i 20 43	+ 2	i 25 31	SS	e 32·1
La Jolla	Z.	71·7	47	e 11 25	− 1	—	—	e 11 40	P_cP	—
Pasadena		71·8	46	i 11 26a	0	e 20 47	+ 1	i 11 39	P_cP	e 32·0
Mount Wilson		71·9	46	i 11 27a	0	—	—	i 14 19	PP	—
Palomar		72·3	47	i 11 29	0	—	—	—	—	—
Riverside		72·3	46	i 11 29a	0	—	—	—	—	—
Shasta Dam		73·0	38	e 11 31	− 2	—	—	e 14 14	PP	—
Haiwee	Z.	73·1	44	i 11 33	− 1	—	—	e 11 47	P_cP	—
Mineral		73·2	39	i 11 35	0	e 21 59	PPS	i 11 45	P	—
Tinemaha		73·4	43	i 11 36	0	—	—	—	—	—
Pierce Ferry		75·7	46	i 11 49	0	e 21 32	+ 2	i 12 10	P_cP	—
Tucson		76·1	51	i 11 51k	0	e 21 34	− 1	e 15 6	PP	e 31·4
Vladivostok		77·1	322	i 11 53	− 4	i 21 40	− 6	—	—	—
Victoria		77·5	32	e 12 21	+22	e 21 29	−21	—	—	34·5
Grand Coulee		79·4	34	i 12 9	0	e 22 4	− 6	—	—	—
Salt Lake City		79·6	43	e 12 37	+27	e 22 7	− 5	—	—	e 35·0
Logan		80·1	42	i 12 11	− 2	e 22 11	− 7	—	—	e 36·8
Antarctica		81·5	158	i 12 23	+ 2	22 37	+ 5	i 23 0	PS	—
Hungry Horse		82·3	35	e 12 20	− 5	—	—	—	—	e 38·7
College		82·4	11	e 12 43	+18	e 22 35	− 6	e 22 57	PS	e 37·9
Bozeman		82·6	39	—	—	e 22 39	− 4	—	—	e 38·0
Rapid City		86·8	43	e 13 0	+13	e 23 23	− 2	e 24 53	PPS	e 40·8
St. Louis		94·0	51	e 13 20	− 1	e 24 53	sS	i 13 36	pP	—
Huancayo		94·1	104	e 13 24	+ 2	e 24 5	[+ 9]	e 17 32	PP	e 44·6
La Paz		99·3	110	e 13 45	0	32 17	SSP	18 17	PP	e 50·5
Cleveland		101·2	50	i 14 8	+14	e 24 31	[− 2]	e 27 15	PS	46·9
Hyderabad	N.	111·8	283	—	—	e 23 42	?	—	—	—
Bermuda		113·4	62	—	—	e 30 4	PPS	—	—	e 58·7
Bombay		117·4	284	e 21 29	?	—	—	e 22 9	PPP	—
Andijan		118·6	308	e 19 12	[+22]	—	—	—	—	—
Kulyab		120·8	306	i 18 54	[0]	—	—	—	—	—
Tashkent		120·8	310	e 18 52	[− 2]	26 0	[+ 7]	27 37	SKKS	—
Stalinabad		121·5	307	i 18 54	[− 2]	—	—	—	—	—
Scoresby Sund		122·2	11	—	—	e 26 28	[+31]	e 30 29	PS	53·5
Sverdlovsk		122·4	329	i 19 21	[+24]	e 37 5	SS	23 29	PPP	—
Ashkabad		129·7	307	e 19 11	[0]	—	—	—	—	—
Helsinki		133·5	349	e 22 57	PKS	—	—	—	—	e 61·5
Moscow		133·5	337	19 18	[− 1]	—	—	—	—	—
Upsala		135·0	354	e 23 4	?	—	—	—	—	e 62·5
Leninakan		139·4	316	e 22 14	PP	—	—	—	—	—
Copenhagen		139·7	356	19 31	[+ 1]	32 41	PS	—	—	64·5
Warsaw	E.	141·8	346	e 21 41	?	e 41 1	SS	e 23 58	PPP	70·5
De Bilt		143·5	3	e 19 31	[− 6]	e 33 21	PS	e 22 59	PP	e 66·5
Jena		144·5	354	e 19 36	[− 2]	—	—	e 20 1	PKP_2	—
Uccle		144·7	5	e 19 37	[− 2]	e 41 29	SS	e 23 11	PP	e 68·5
Cheb		145·2	354	—	—	e 36 29?	?	—	—	e 61·5
Paris		146·6	6	i 19 42	[0]	e 23 18	PKS	—	—	e 67·5
Budapest		146·6	346	19 16	[−26]	—	—	i 19 29?	PKP	—
Stuttgart		146·8	358	e 19 42	[0]	e 33 58	PS	—	—	73·5
Strasbourg		147·0	359	i 19 43	[0]	e 42 47	SSP	e 23 29	PP	e 68·5
Kalossa		147·5	344	e 19 27	[−16]	—	—	e 19 49	PKP	—
Basle		148·0	0	e 19 43	[− 1]	—	—	e 28 11	?	—
Istanbul		148·1	328	19 42	[− 2]	—	—	e 23 17	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zürich		148·2	359	e 19 43a	[− 2]	—	—	—	—	—
Besançon		148·3	2	e 19 48	[+ 3]	—	—	—	—	—
Neuchatel		148·6	0	e 19 44	[− 1]	—	—	—	—	—
Belgrade		148·6	342	i 19 44	[− 1]	—	—	—	—	57·5
Chur		148·7	358	e 19 47	[+ 2]	—	—	—	—	—
Triest		149·4	351	e 19 56	[+10]	e 34 4	PKSS	e 20 12	PKP_2	—
Clermont-Ferrand		149·7	6	i 19 51	[+ 4]	i 23 38	SKP	—	—	71·5
Florence	z.	151·6	354	i 19 55a	[+ 5]	—	—	—	—	—
Rome		153·3	353	19 58	[+ 6]	—	—	—	—	—
Helwan	z.	153·5	307	e 19 53	[0]	e 30 41	{+ 3}	i 23 44	PP	—
Granada		156·4	23	—	—	e 37 11	PPS	—	—	81·9
Malaga	z.	156·5	23	i 20 19a	[+22]	27 21	[+20]	i 21 20	pPKP	76·5
Almeria		157·1	20	19 57	[0]	26 57	[− 5]	24 1	PP	79·5

Additional readings :—
Wellington iZ = 6m.7s. and 7m.59s.
Riverview iPPPEZ = 9m.0s., iN = 9m.22s., iP_cPE = 9m.27s., SE = 12m.50s., eSSE = 15m.11s.
Berkeley iPEZ = 11m.37s., iZ = 20m.46s.
La Jolla eZ = 11m.57s.
Pasadena iZ = 11m.31s. and 11m.47s.
Mount Wilson iZ = 11m.33s. and 11m.45s.
Riverside iZ = 12m.1s.
Pierce Ferry iPPP = 14m.7s.
Tucson i = 11m.57s. and 12m.22s., ePPP? = 16m.47s., e = 24m.1s. and 24m.41s., eSS = 27m.17s.
Victoria eE = 24m.29s.
Antarctica eSS = 28m.26s.
Hungry Horse i = 12m.59s.
Rapid City e = 15m.55s.
Huancayo eS = 24m.59s., ePKP,PKP = 38m.34s.
La Paz iZ = 14m.11s., iPSN = 25m.49s.
Cleveland eE = 25m.4s.
Taskhent ePP = 20m.0s., SS = 36m.5s.
Sverdlovsk PP = 19m.28s., eS = 28m.20s.
Upsala eN = 34m.59s. and 41m.29s.?
Copenhagen i = 19m.54s., 23m.31s.
Warsaw eN = 23m.3s., eE = 23m.10s. and 31m.48s.
De Bilt eSS = 41m.29s.
Jena eN = 23m.0s., eE = 23m.17s.
Uccle i = 19m.52s., $iPKP_2N$ = 19m.57s., ePSKSEN = 33m.29s.
Paris $iPKP_2$ = 19m.56s., e = 20m.25s., ePKS = 23m.23s., e = 31m.29s.?, $ePPP_2$ = 34m.29s.?
Stuttgart i = 19m.57s., e = 20m.7s. and 31m.53s., eQ = 68·5m.
Strasbourg $iPKP_2$ = 19m.58s., $ePPP_2$ = 33m.31s., eSSS = 47m.35s.
Kalossa eE = 20m.39s. and 21m.31s.
Belgrade e = 20m.45s., 24m.43s., and 31m.1s.
Clermont-Ferrand $iPKP_2$ = 20m.12s.
Rome i = 20m.22s.
Helwan PP?Z = 23m.59s.
Malaga $iPKP_2Z$ = 20m.42s., iPPZ = 24m.19s., PPPZ = 28m.13s.
Almeria PKP_2 = 20m.28s., PKS = 23m.29s., PPP = 27m.29s., SS = 43m.33s.
Long waves were also recorded at other American and European stations.

Dec. 31d. Readings also at 4h. (Helsinki (2)), 5h. (Reyhjavik, Prague, and Pierce Ferry), 7h. (Almata, Andijan, Frunse, Kulyab, Murgab, Obi-garm, Stalinabad, Ksara, and Bombay), 9h. (Auckland, Wellington, Arapuni, Brisbane, Riverview, Copiapo, Pierce Ferry, and near Andijan), 11h. (Tucson, near Huancayo, near Tananarive, near Andijan, Kulyab, Murgab, Tashkent, Obi-garm, and Stalinabad), 12h. (near Istanbul and Tucson), 13h. (near Andijan, Kulyab, Murgab, Tashkent, Obi-garm, and Stalinabad), 14h. (Helwan and Istanbul), 15h. (Stuttgart, De Bilt, Warsaw, Copenhagen, and near Pavia), 16h. (Kodaikanal), 17h. (Arapuni and Wellington), 18h. (Istanbul), 20h. (Antarctica and near Kulyab), 21h. (near Branner), 22h. (near Pierce Ferry, Lick, and Branner), 23h. (Andijan near Kulyab, Obi-garm, and Stalinabad).

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained as part of a global earthquake relocation project (Villaseñor et al., 1997) initiated with funding from the US National Science Foundation through grant EAR-9725140 and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of Euroseismos project.

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

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

Villaseñor, A., E.A. Bergman, T.M. Boyd, E.R. Engdahl, D.W. Frazier, M.M. Harden, J.L. Orth, R.L. Parkes, and K.M. Shedlock*, Toward a comprehensive catalog of global historical seismicity,* Eos Trans. AGU, vol. 78, no. 50, pp. 581, 583, 588, 1997.