

UNIVERSITY OF WASHINGTON

SEATTLE 5, WASHINGTON

U. S. A.



SEISMOLOGICAL BULLETIN NO. 8

REGISTRATION OF EARTHQUAKES AT SEATTLE, 1954

AND

NOTE ON SEISMOGRAPH SENSITIVITY CONTROLS

By

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STATION CONSTANTS

Latitude: 47° 39.3' North
 Longitude: 122° 18.5' West
 Elevation: 30 meters
 Foundation: Compact glacial till

INSTRUMENTAL CONSTANTS - 1954

VERTICAL component, Sprengnether SHORT-PERIOD pendulum

$$T_o = T_g = 1.4 \text{ sec.}$$

$h_o = h_g = 1.0$ (approximate values to September 12, 1954; a similar instrument having same intrinsic constants but new seismometer-galvanometer circuit installed thereafter.)

$$V_s = 3000 \text{ ca to Sept. 12}$$

$$V_s = 3600 \text{ after Sept. 12}$$

NORTH-SOUTH component, Sprengnether SHORT-PERIOD pendulums.

From January 1 to August 25, 1954 (discontinued):

$$T_o = T_g = 7.9 \text{ sec.}$$

Damping approximately critical, sometimes uncertain.

$$V_s = 750 \text{ ca.}$$

From August 2, 1954 on:

$$T_o = T_g = 1.40$$

$$h_o = h_g = 1.0 \text{ ca.}$$

$$V_s = 3600 \text{ maximum. See note on sensitivity controls.}$$

EAST-WEST component, Sprengnether SHORT-PERIOD pendulums.

From January 1 to August 25, 1954 (discontinued):

$$T_o = T_g = 5.24 \text{ sec.}$$

Damping approximately critical, sometimes uncertain

$$V_s = 450 \text{ ca.}$$

From August 2, 1954 on:

$$T_o = T_g = 1.40$$

$$h_o = h_g = 1.0 \text{ ca.}$$

$$V_s = 3100 \text{ maximum. See note on sensitivity controls.}$$

NORTH-SOUTH component, Sprengnether LONG-PERIOD pendulum

Re-installed August 20, 1954

$$T_0 = 15.0 \text{ sec.} \quad T_g = 1.4 \text{ sec.}$$

$$h_0 = h_g = 1.0 \text{ ca.}$$

The following figures define the magnification curve for maximum sensitivity based on assumptions applicable to Galitzin seismographs:

$T_e = 0$	1.4 sec.	3.0	5.0	7.5	10	15	20	30
$V = 0$	1250 (max.)	930	590	370	230	115	70	45

Also, see note on sensitivity controls.

EAST-WEST component, Sprengnether LONG-PERIOD pendulum

Same as NORTH-SOUTH component.

SENSITIVITY CONTROLS. In order to control the trace amplitudes of background vibrations, more particularly microseisms, circuits were designed and control switches (boxes) constructed so that step reductions or increases could be made in the seismograph sensitivities. The details of this are described in a paper entitled "Sensitivity Controls on Galitzin-type Seismographs" by F. Neumann and will appear in the June, 1956 issue of the Trans. of the Amer. Geophys. Union or shortly thereafter.

In the Galitzin-type circuit the resistances X, Y, and Z are computed from the following equations in which R is resistance of seismometer coil, Z_0 is resistance of galvanometer, Z is shunt resistance, X is resistance between shunt and seismometer, Y is resistance between same end of shunt and galvanometer, A is the galvanometer CDRX, B is the resistance external to the seismometer, and m is the fractional part of maximum sensitivity which is indicated by unity. In a circuit in which the seismometer pendulum remains critically damped m is the ratio between the current allowed to pass through the galvanometer and the maximum current generated when $m = 1$. \bar{m} is the same as m in a circuit in which B has been changed.

When R is greater than A:

$$\bar{m} = mZ_0(B_x + R)/(Z_0 + A)(B_0 + R)$$

B and Z_0 are values used for maximum sensitivity, B_x is a new value used in obtaining fractional reductions in sensitivity over a wide range and theoretically requires a change in the magnetic damping of Galitzin-type pendulums.

When R is less than A:

$$\bar{m} = m(B_x + R)(B_0 + R)$$

$$X = \frac{\bar{m}^2 R(A + \rho) + B(B+R) - \bar{m}(A + \rho)(B + R)}{(B + R) - \bar{m}^2(A + \rho)}$$

$$Y = \frac{B - X}{m} - \rho$$

$$Z = \frac{B - X}{l - m}$$

With Sprengnether instruments it was found that the change in damping due to changing B, the resistance external to the seismometer, was practically negligible.

In general dial settings 7, 6, 5, 4, on the sensitivity control box indicate on the short-period instruments that m, the maximum value of V_s is respectively 1.00, 0.70, 0.50, and 0.25. On the long period instruments the fractions are respectively 0.82, 0.50, 0.25, and 0.10. On the vertical component one circuit yielded .85 the maximum sensitivity possible (3600) or 3000; an alternate circuit yielded .42 of the maximum V_s or 1750. The latter is rarely used. The various circuits used are indicated on the seismograms.

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
January 12	ePZ	23 36 54	Kern County, Calif., near Wheeler Ridge. 35°00'N., 119°01' W. (P). 1430 km.
	iZ	37 09	
	SZ	39 10	
	eZ	39.9	
	LZ	23 40 52	
January 16	PZ	22 46 53	Off coast of Vancouver Is. 49 N, 129½ W. USCGS 550 km ca.
	eSE	47 45	
	LE	48 29	
	LN	22 49 25	
January 20	ePZ	4 24 30	Pacific Ocean, S. of Mex. 8½ N. 129½ W. USCGS 4700 km ca.
February 1	iPZ	1 18 40	Volcano Islands 24½ N, 142½ E. USCGS 8400 km ca.
	SN	28 34	
	SZE	28 40	
	L	1 53	

Date	Phase	Time	Remarks
		(G.C.T.)	
1954		h. m. s.	
February 1	eZ	4 33 22	Lower California 32.3 N., 115.3 W. (P). 1900 km ca.
	eLE	33 30	
	eLN	4 34 10	
February 1	PZ	4 35 57	Same as preceding shock
	iPPZ	36 30	
	SZ	39 40	
	LZNE	41 25	
	LZ	4 42 30	
February	LZE	13 14 54	Aftershock
	LZ	13 16.3	
February 5	ePZ	9 32 49	Off coast of New Britain 4½ S., 153 E. USCGS 10100 km ca
	eZ	33 13	
	eSN	43 36	
	LN	10 08	
February 5	PZ	15 25 27	Chiapas, Mexico 17½ N., 92½ W. USCGS 4200 km ca
	eZ	25.8	
	eZ	27 09	
	eLNE	15 42	
February 7	iPZ	6 28 10	New Hebrides Islands 15 S., 167½ E. USCGS 10,000 km ca.
February 8	iPZ	14 31 34	Northern Chile-Bolivia border 22½ S., 68 W. USCGS 9500 km ca.
February 11	iPZ	0 42 56	Ningsia Province, China 39½ N., 101 E. USCGS 9400 km ca. NS component not operating
	eZE	43 12	
	eSZ	53 12	
	iPSE	53 41	
	PPSE	54 55	
	LE	1 04.0	
February 19	ePZ	0 49 00	Off coast of Nicaragua 11½ N., 87½ W. USCGS 5200 km ca
	eN?	56.9	
	eNE	59.3	
	eLE	07.5	
	eLN	09	
	eLN	1 17	
February 19	eLE	22 03.5	Aftershock

Date	Phase	Time	Remarks
		(G.C.T.)	
1954		h. m. s.	
February 20	eZ	18 52 45	Flores Sea
	eZ	18 53 34	7 S., 124 $\frac{1}{2}$ E. USCGR
	eSE	19 02 14	12300 km ca
	eSN	19 02.8	
February 22	iP'Z	12 22 37	Sandwich Islands
	iPPZ	25 45	66 $\frac{1}{2}$ S., 26 $\frac{1}{2}$ W. USCGR
	eZ	27 50	15100 km ca
	eZ?	12 30 55	
February 22	iZ	18 23 09	Regional shock
March 3	iPZ	6 16 39	Central New Guinea
	ePPZ	6 20 21	5 $\frac{1}{2}$ S., 142 $\frac{1}{2}$ E. USCGR 11100 km ca
March 3	iPZ	20 50 41	Lower Alaska
	iN	51 25	61 $\frac{1}{2}$ N., 146 $\frac{1}{2}$ W. USCGR
	eN	53 36	2100 km ca
	SZ?	54 37	
	eSN?	54 46	
	eZ	20 56.9	
March 6	iPZ	0 41 27	Fiji Island Region
	eZ	0 41 56	24 S. 180 W. h - 550 km USCGR. 9900 km ca
March 9	ePZ	5 48 20	Off S. Coast of Kamchatka 50 N. 157 E. USCGR 5500 km ca
March 11	ePZ	10 38	Guatemala 14 $\frac{1}{2}$ N., 90 $\frac{1}{2}$ W. h - 100 km USCGR. 4800 km ca Heavy microseisms.
March 12	iP'Z?	11 31 25	Sandwich Island Region
	eZ	11 34 36	1400 km?
March 12	iPZ	14 35 47	
	iZ	35 51	
March 16	iPZ	15 56 28.5 R	Lower N.W.slope Mt. Rainier
	iZ	32.2	(Mud Mt.). MM-5 in Enumclaw
	eSZ?	15 56 35.5	area. 47.1N. 121.8W. h-15 56 09. Possibly 70 km deep. No horizontal motion records.

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Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
March 19	ePZ	9 58 13	Santa Rosa Mts. 33° 17' N., 116° 11' W. (P) 1700 km ca
	eNE	58 21	
	eZ	10 01 00	
	eSE	01 36	
	eSN	01 16	
	LZE	10 02 57	
March 21	iPZ	6 18 08	Near S.E. coast of Kamchatka 52 N., 158½ E. USCGS 5600 km ca.
March 21	PZ	23 55 45	Northwestern Burma 24½ N., 95 E. h-150 km. USCGS. Mag. - 7¼ (P) 11200 km ca
	PPNE	59 41	
	eN	24 05 30	
	iSNE	07 12	
	eZN	07 45	
	PSZE	08 38	
	eEN	24 09 00	
March 22	PZ	9 51 44	Kermadec Island region 27 S., 176½ W. 10300 km ca
March 22	ePZ	19 06 39	Kamchatka region 55½ N., 157 E. 5300 km ca
March 29	ePZ	4 14 34	Near N. coast of Luzon, P.I. 19½ N., 121½ E. USCGS 10300 km ca
March 29	iPZ	6 28 12	Near S. coast of Spain 37 N., 3½ W. h - 650 km USCGS. 8800 km ca
	iPPZ	30 36	
	iSE	37 26	
	iSN	6 37 39	
March 30	ePZ	16 47 19	Near N.E. coast of Hawaii, T.H. 20 N., 155 W. Damage at Hilo USCGS. 4250 km ca Mag. 6 (P)
	eZ	47 31	
	SNE	53 36	
	eLNE	57.0	
	LRNE	16 59 18	
March 30	ePZ	18 49 27	Same as preceding epicenter Mag. 6½ (P)
	eE	49 38	
	SNE	55 25	
	SZ	55 30	
	eN	56 04	
	eLNE	58.5	
	LZ	19 01 35	

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
March 31	ePZ	18 44 48	Arabian Sea 13½ N., 58 E. USCGS 13300 km ca
	eE	45 50	
	iPPNE	46 23	
	PPPZ	48 55	
	PPPE	49 36	
	PSN	56 16	
	PPSZ	57 17	
	eZ	18 58 47	
LNE	19 44.0		
April 2	iPZ	15 11 27 C	Kermadec Islands 28½ S., 177 W. USCGS 10,000 km ca
April 5	eZE	19 27 30	Off Vancouver Island 48 N., 128 W. USCGS 400 km ca
	eLNE	28 10	
	eLN	19 29.4	
April 11	iPPZ	10 46 03	Arabian Sea 12 N., 58 E, USCGS. 13250 km ca
April 11	iPZ	11 06 38	Hindu Kush 37 N., 70½ E. USCGS 10500 km ca
	PPZ	11 10 35	
April 15	iPZ	19 20 10	Regional tremor
	eZ	20 12	
	iSZNE	19 20 35	
April 16	eZ	8 30 38	Regional L waves?
April 17	iPZ	20 17 47 D	Adreanoff Islands 51½ N., 179 W. USCGS Mag. 7 (P). 4300 km ca
	eNE	17 58	
	PPE	19 16	
	SNE	23 30	
	SZ	23 43	
	SSE	26 13	
	LNE	20 28.2	
April 21	iPZ	20 34 38	Near coast of Peru 13 S., 77 W. USCGS 8150 km ca
April 23	eZ	19 20	Trace of shock felt near Portland, Oregon

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Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
April 22 to April 26			Some feeble traces of tremors felt in Duwamish R. Valley in Southern suburb area of Seattle.
April 24	iPZ	8 37 47	Southern Alaska 63 N., 148 W. USCGS 2400 km ca
	iZ	38 13	
	eZNE	38 22	
	eLN	8 45 15	
April 25	ePZ	20 36 09	Near coast of Central Calif. 36.8 N., 121.8 W. USCGS 1200 km ca
	eNE	37 20	
	eSE	38 27	
	eSN	38 36	
	iLE	20 39 30	
April 26	iPZ	20 33 33	Kamchatka area. 51 N., 158 $\frac{1}{2}$ E. USCGS 5400 km ca
	ePPZ	34 51	
	SE	40 31	
	SN	20 40 36	
April 27	iPZ	10 15 50	South of Panama 6 N., 82 $\frac{1}{2}$ W. USCGS 5950 km ca
	eSN	23 18	
	SN	23 55	
	eLNE	10 36.7	
April 29	ePZ	10 54 05	Gulf of California 29 $\frac{1}{2}$ N., 122 $\frac{1}{2}$ W. USCGS Mag. 7 $\frac{1}{2}$ - (P). 2200 km ca
	iE	56 39	
	eSN	57 34	
	LNE	10 58.6	
April 29	iPZ	11 39 12	Same as preceding shock Mag. 7 $\frac{3}{4}$ - (P)
	iZ	39 27	
	iSN	42 42	
	iSN	42 50	
	eZ	43 17	
	LNE	11 43 53	
April 30	iPZ	13 15 28 C	Greece. Destructive 39 $\frac{1}{2}$ N., 22 E. USCGS Mag. 7 (P). 9700 km ca
	iE	15 40	
	iSN	26 04	
	iNE	26 17	
	ePSNE	13 26 47	
May 3		15 30 --	Kamchatka recording lost in changing paper.

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
May 5	iPZ iZ eSEZ iSZ	1 42 40.0 42 43.5 42 48.5 1 42 50.5	Dash Point, near Tacoma, Wash. 47°19' N. 122°33' W. 40 km H - 1 42 29. Felt mildly in Tacoma & Surroundg.area.
May 5	eLZNE	11 16 --	
May 5	PZ	11 47 24	Marianas Islands 15 N., 147½ E. USCGS 8800 km ca
May 5	iPZ eZ eZ eSZ SN LNE	13 14 42 15 08 18 48 19.0 19 12 13 21.7	Gulf of California 27½ N., 112½ E. USCGS 2350 km ca. Mag. 5 3/4 (P)
May 5	PZ	17 22 18 C	Kamchatka area 50 N., 156½ E. USCGS 5550 km ca. Mag. 6½ (P)
May 6	PZ eSE eE	9 11 16 18 30 9 20.9	Kamchatka area 50 N., 155½ E. h - 150 km USCGS. 5550 km ca
May 10	iPZ	14 42 04 C.	Fiji Islands 17½ S., 179 W. h - 600 km USCGS. 9800 km ca
May 13	PZ eNE SE eSN eN eN eLNE	14 53 48 54 13 59 34 59 59 15 03.5 05.7 15 09.0	Oaxaca, Mexico 17 N., 95½ W. h - 100 km USCGS. 4100 km ca
May 14	iPZ eNE SNE	22 50 19 R. 50 21 22 59 13	Near coast of Honshu, Japan 36 N., 137 E. h - 250 km USCGS. 7750 km ca
May 15	iPZNE eNE	13 02 20.5 C. 02 24	Primary epicenter 3 miles N.W. of Des Moines, Wash 47°25' N., 122°22' W. H - 13 02 13. h - 40 km ca

Continued on next page

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
			Secondary epicenter determined from intensity distribution map: 47.5°, 121.3° about 5 or 10 miles N.E. of Snoqualmie Pass in Cascade Mts. and 50 miles from primary epicenter. Maximum intensity MM - 6.
May 15	iPE iSE	13 02 43 13 03 09	Readings from seismograph record of F.W.Geitz in downtown Portland, (Oregon).
May 15	iPZ eZE eZ	19 39 15.5 C. 39 21 19 39 25	Aftershock
May 17	iPZ	16 38 29 C.	Aftershock
May 23	iPZ SZ	13 42 42 13 43 26	Felt throughout Methow River Valley, Okanogan Co. Wash. 450 km ca. H - 13 41 42
May 23	eZ eLNE	23 57 -- 23 59.7	Southwestern Calif. (Bakersfield) area. 1430 km ca. Microseisms obscure phases.
May 29	iPZ eZ	5 48 53 5 50 56	Fiji Isl. 18 S.178 W. h - 550 km USC GS. 9100 km ca
June 4	iPZ LNE	7 00 18 7 19 25	Galapagos Is. 1/2 S., 91 1/2 W. USC GS. 6100 km ca
June 4	ePZ eSZN eNE LNE	16 07 27 11 25 14 30 16 14 50	Central Gulf of California USC GS. 2700 km ca
June 4	LNE eZ	20 55 55 20 57 20	Same as preceding shock
June 6	eE eLE	17 18.0 17 40.0	Western New Guinea 3 1/2 S., 136 1/2 E. USC GS 11100 km ca. Mag. 7 (P)
June 7	iPZ iZ eSKSNE iSZNE	10 27 48 29 32 37.7 10 38 08	New Britain 3 1/2 S., 152 1/2 E. h - 450 km USC GS. 9900 km ca. Mag. 6 3/4 (P) (B).

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
June 8	ePZ	0 17 37	Northern Idaho 47½ N., 116° W. USCGS 500 km ca. Felt over limited area
	eSZ	18 20	
	LE	18 31	
	LNE	0 18 52	
June 12	iPZ	5 46 44 C.	Fiji Islands 18 S., 179 W. h - 550 km USCGS. 9250 km ca
June 15	iPZ	13 40 40 C	Northern Peru 5 S., 77 W. h - 100 km USCGS. 7350 km ca
June 15	PZ	18 48 12	Possibly near-by
June 17	PZ	1 47 14	Off S. coast of Kodiak Is. 56 N., 154½ W. USCGS 2700 km ca
	SNEZ	51 32	
	LNE	1 53.3	
June 18	iPZ	15 09 50.0	Near Bremerton, Wash. not felt 47°37' N., 122°44' W. H - 15 09 43. 45 km ca
	iZ	09 52.5	
	iN	15 09 58	
June 19	ePZ	2 08 35	Off S. coast of Kyushu, Japan 30½ N. 130 E. USCGS 8650 km ca
June 19	iPZ	3 35 22	Near coast of Northern Mozambique. 16000 km ca
June 20	iPZ	19 20 33.0	Regional
	iZ	20 39	
	iSN	19 20 47	
June 21	iPZ	2 01 11	Northern Chile 23 S., 68½ W. h - 150 km USCGS. 9550 km ca
June 22	eZ	6 29 03	Four-second waves
	eLNE	6 29 20	
June 24	iPZ	8 09 55	Marianas Isls. 18½ N. 145½ E. h - 200 km. 8500 km ca
June 30	eLZ	15 34.0	Gulf of Calif. Most of record lost in changing paper.

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
July 2		3 01 --	Philippine Island earthquake No time control
July 2		10 48 --	South Central Nevada No time control
July 3	iP'Z eNE eNE eLE	22 50 16 C. 50.4 23 03.2 23 45	Near S.W. coast of Java h - 100 km. $6\frac{1}{2}$ S., 106 E. USCGS. 13550 km ca
July 4	eN iLE LN	16 37 08 37 21 16 37 33	Yellowstone Nat. Park 44.9 N., 110.8 W. USCGS 950 km ca
July 5	ePZ eZ LNE	14 01 17 01 30 14 09 15	Kamchatka area $50\frac{1}{2}$ N., $156\frac{1}{2}$ W. USCGS 5600 km ca
July 6	eSNE	2 24.2	Bismark Sea. 3 S., 148 E. USCGS. 10300 km ca
July 6	ePZN eSN	8 14 07 8 21 55	Kurile Islands. h - 100 km $46\frac{1}{2}$ N., $153\frac{1}{2}$ E. USCGS 6100 km ca
July 6	iPZ eNE iSN eE iLZ	11 15 31 C. 15 33 17 16 18 04 11 18 15	Near Fallon, Nevada. Destructive $39\frac{1}{2}$ N., $118\frac{1}{2}$ W. USCGS Mag. 6 $\frac{3}{4}$ (B) 950 km ca Traces off sheet large part of time
July 6	ePZ iPZN eN LNZ	13 17 16 17 34 19 13 13 19 55	Nevada aftershock
July 6	iPZN SN LNE iLZ	22 09 55 11 40 12.4 22 12 45	Nevada aftershock
July 8	PZ eZ LZ?	2 16.1 18 35 2 21.2	Nevada aftershock Microseisms heavy

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
July 8	ePZ	12 57.5	Nevada aftershock
	LZ?	13 01.1	
July 8	PZ	19 34 13	Nevada aftershock
	eLNE	36.7	
	iLZ	19 36 58	
July 9	eLZNE	8 55.1	Nevada aftershock
July 9	PZ	12 32 17	Tonga Is. region. h - 100 km 16 S., 174½ W. USCGS 8750 km ca
July 9	iPZ	18 39 18 c.	Off N.W. coast of Honshu 41 N., 138½ E. USCGS 7300 km ca
July 11	eZ?	4 56 47	Weak. Regional?
	eZ	57 19	
	eZNE	4 59 15	
July 12	eZNE	16 10.5	Regional?
July 13	ePZ	8 18.2	New Britain region 3 S., 151 E. USCGS 10,000 km Heavy microseisms
	ePPNE	21.7	
	eSN	28.4	
	eSKSE	28.7	
	eZ	8 31.3	
July 15	ePZ	0 15.8	Wallis Island region 13 S., 177 W. USCGS 8600 km ca
	eZ	16 06	
	eSN	25.8	
	ePSE?	0 26.7	
July 15	eSZ?	13 29 10	Queen Charlotte Islands 54 N., 138 W. USCGS 1200 km ca
	eE	29 20	
	eLNE	29.6	
	iZ	13 30 00	
July 16	iPZ	12 52 15	Off E. coast of Honshu 40 N., 144½ E. USCGS 6900 km ca
July 16	eLNE	9 21.6	
	eLZ	9 23.2	
July 16	eLE	18 23.8	
	eLNE	18 25.7	

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
July 17	eE	1 58.4	
	eN	2 01.4	
July 17	eNE	8 38 33	
	eLNE?	8 39.2	
July 18	eZ	1 02 35	Revilla Gigedo Is. region. USCGS.
	eNE	1 14.0	3000 km ca. Weak record.
July 18	PZ	6 43 03	Kamchatka region. 55 N., 161½ E.
	eSN	6 49.8	USCGS. 5100 km ca
July 18	iPZ	9 18 50 R	Near E. coast of Honshu Island.
	eNE	19.1	35½ N., 140½ E. USCGS
	eSZ	27.8	7600 km ca
	eSE	27 51	
	eSN	9 28 01	
July 20	eZNE	0 17 30	
	eZ	0 18.8	
July 20	eNE	1 46 55	
July 20	eNE	2 23.4	
July 20	eNE	12 18.5	
July 23	ePZ	4 46 31	Central Chile-Argentine border
	ePNE	46.7	31 S., 70½ W. USCGS
	eSKSNE	4 57 20	10500 km ca
July 25	ePZE	15 06 19	
July 26	ePPZ	20 15 45	Central Chile
	eSNE	40 05	41 S., 73 W. USCGS
	ePSZ?	20 40.9	11000 km ca
July 26	eZ	22 23 08	Mid-Atlantic Ocean. 12½N.44 W. USCGS. 8050 km
July 29	iPZ	3 43 23	Kamchatka area
	eN	43 32	49½ N., 158 E. USCGS
	eE	3 51.9	5500 km ca
July 29	SKSN	6 51 25	Kermadec Island region
	eSE	6 52 00	28 S., 179 W. USCGS 10100 km ca.

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
July 30	ePZ	2 02 21	Nevada aftershock 39½ N., 118½ W. USCGS 950 km ca
	eNE	04.2	
	eNE	04 50	
	eZNE	2 05 20	
July 30	ePZ	8 58 55	Pacific Ocean S.E. of Easter Is. 36½ S., 97 W. USCGS. 9600 km ca
	eNE	8 59.4	
		9 09 15	
		09 33	
	eZ	09.7	
	LNE	9 30.8	
July 31	iPZ	1 12 33	Ningsia Province, China 39 N., 104 E. USCGS 9350 km ca
	iZ	12 41	
	eNE	13.0	
	ePPE	15 41	
	SKSN	23 00	
	PSN	24.5	
	eN	27.7	
	LN	1 48	
July 31	eZNE	17 29 13	Regional?
	eLE	17 30.0	
August 2	ePZ	10 21 07	Nevada aftershock. USCGS. Minor damage
	eN	21 14	
	eZ	21 29	
	LNE	23 04	
	LNEZ	23 32	
	LN	10 24.2	
August 3	ePZ	21 27.5	Nevada aftershock?
	eZN	29 52	
	eNE	21 30 15	
August 5	ePZ?	5 05 22	Nevada aftershock USCGS
	eZN	07.8	
	eZE	08 03	
	LNE	5 08.5	
August 5	ePZ	8 57 49	Aleutians, Rat Island 52 N., 176 E. USCGS 4300 km ca
	eZ	59 13	
	eN	8 59 39	
	eE	9 00.7	
	eNE	03.8	
	eZNE	07.2	
	LNE	9 15	

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
August 5	eN eZE	15 53.1 15 55.6	
August 7	iPZ iZ eNE LE	9 49 37 9 50 15 10 00 58 10 01 53	Bolivia-Chile-Peru border h - 200 km. USCGS 9000 km ca
August 9	iPZ eNE eN eZ eNE eSNE LN	19 25 22 25.4 25.9 27 02 27.8 32 31 19 41	Kamchatka region 53 N., 161 E. USCGS 5300 km ca
August 13	iSNE eZ LN	13 00 18.2 00 24.5 13 00 29	Local
August 14	ePZ	1 45 28	Kamchatka region 51 N., 160½ E. USCGS
August 15	iPZE	5 51 37	Kamchatka region. USCGS
August 16	iPZ	0 09 52	Near north coast of Formosa 25 N., 122½ E. USCGS 9600 km ca
August 18	iPZNE iZ iSNE	4 54 40 C. 4 55 19 5 04 50	Tonga Islands. h - 150 km 21½ S., 176 W. USCGS 9450 km ca
August 20	eLN	20 55.5	Jan Mayen Is. 70½ N., 15 W. USCGS. 6100 km
August 21	eNE LNE	0 54.3 0 57.3	Jan Mayen Is. USCGS.
August 21	eNE LNE	7 48.3 7 50.0	Jan Mayen Is. USCGS
August 21	eLNE	18 10.3	Jan Mayen Is. USCGS
August 21	eLNE	23 18.5	Jan Mayen Is. USCGS

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
August 23	ePZNE	15 02.3	Kenai Peninsula, Alaska 61 N., 148½ W. USCGS 2300 km ca
	SN	15 06.2	
August 24	iPZNE	5 53 44	Near Fallon and Lovelock, Nevada. Damage. 39½ N., 118½ W. USCGS Mag. 6.8 (P) 950 km ca
	eNE	53 58	
	eZ	54 22	
	LNE	56 10	
	LZ	5 56 26	
August 25	ePZ	2 19 21	Nevada aftershock. USCGS
	eZNE	19 38	
	LNE	21 42	
	eZN	21 52	
	LE	22 00	
	IZE	22 13	
	eZ	23 17	
	LE	2 24 15	
August 25	eN?	22 23 26	Probably Nevada aftershock
	eN?	24 35	
	LZNE	26 07	
	LE	22 26 25	
August 26	ePZ	12 58 34	Nevada aftershock. USCGS
	eZ	12 00 32	
	LNE	13 01 07	
	LE	13 01 48	
August 27	ePZ	11 06 37	Volcano Is. h - 100 km 24½ N., 143 E. USCGS 8400 km ca
	eN	06 47	
	SNE	16 23	
	SE	16 37	
	LNE	11 32	
August 27	iPZ?	20 08 26.3	Local shock
	iSNE	20 08 32.0	
August 29	iPZ	3 43 19	Nevada aftershock. USCGS
	eNE	43 26	
	eZ	43 39	
	eZ	44 32	
	LZNE	45 38	
	LNE	46.4	
	LZ	46 55	
	LZ	3 48.4	

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Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
August 29	iPZ	4 00 17	Nevada aftershock. USCGS
	eNE	00.5	
	LNE	02 45	
	LZNE	03 13	
	LZ	4 04.0	
August 30	ePZ?	8 07 27	Kurile Islands. 44 N., 147 $\frac{1}{2}$ E. USCGS. 6500 km ca
	PZ	8 07 33	
August 30	LNE	19 16.8	
August 30	LNE	20 01.9	
August 31	ePZ?	22 21 39	Nevada aftershock 39 $\frac{1}{2}$ N., 118 $\frac{1}{2}$ W. USCGS Mag. 6 $\frac{1}{2}$ (P)
	eZNE	22 20	
	eNE	22 31	
	iZ	22 46	
	LNE	22 49	
	LNE	24 50	
	iLN	25 07	
iLNE	22 25 25		
September 1	PZ	5 21 01	Nevada Aftershock. USCGS Mag. 6 $\frac{1}{2}$ (P)
	eLN	23 15	
	eLE	23 30	
	LZ	23 41	
	iLE	5 24 00	
September 1	ePZ	11 31 32	Nevada aftershock. USCGS
	eNE	33 50	
	LN	34 04	
	LE	11 34 11	
September 1	iPZNE	12 42 26.7 R.	Mouth of Discovery Bay, Wash. 48°08' N., 122°56' W. H - 12 42 14. 72 km
	iSZNE	42 36.0	
	iZ	12 43 02	
September 2	PZ	13 29 10	Regional
	iLE	31 41	
	eLZ	13 31 47	
September 2	pZ	19 04 04	Santa Cruz Is. 10 S., 166 E. USCGS. 9600 km ca
	iSN	19 14 29	
September 4	PZ	3 42 09	Northern New Guinea 3 S., 139 $\frac{1}{2}$ E. USCGS 10900 km ca
	ePZ	42 24	
	SE	52 45	
	eE	3 55 05	

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
September 4	PZ	9 06 34	S.E. of Formosa. $21\frac{1}{2}^{\circ}\text{N}$. $122\frac{1}{2}^{\circ}\text{E}$. USCGS. 10050 km ca
September 5	PZ	7 58 24	Fiji Is. region 19 S., 176 E. USCGS 9600 km ca
	SE	8 08 55	
	LNE	22 30	
	eN	8 29	
September 6	PZ	18 39 42	Kamchatka region 51 N., 158 E. USCGS 5500 km ca
	iZ	39 57	
	iSE	46 51	
	eN	52.0	
	LNE	18 54.5	
September 9	iPZ	1 17 05	Algeria. Destructive 36 N., $1\frac{1}{2}^{\circ}\text{E}$. USCGS Mag. 6 $\frac{3}{4}$ (P). 9150 km ca
	eSN	27 23	
	SE	1 27 30	
September 9	iPNE	9 23 34	Nevada aftershock. USCGS
	eNE	25 43	
	LZE	9 26 00	
September 9	eLNEZ	22 36.2	
September 10	iPZE	5 56 31	Algeria aftershock. USCGS
	eSN	6 06 30	
	eSE	06 52	
	LN	6 30	
September 10	eNEZ	19 54 28	Regional shock
	F	19 57	
September 12	iPZ	7 54 27	Off S. coast Hokkaido Is. 41 N., 143 E. 7000 km ca
September 13	PZ	2 22 15	Tonga Islands. h - 150 km 21 S., $175\frac{1}{2}^{\circ}\text{W}$. USCGS 9200 km ca
	iSEnz	2 32 25	
September 14	iPZ	1 01 28	Luzon, P.I. aftershock 21 N., 121 E. USCGS 10500 km ca
September 15	eZ?	13 25 35	Gulf of California 26 N., 110 W. USCGS 2700 km ca
	iPZ	25 49	
	eSN	30 10	
	LNE	13 33.5	

Date	Phase	Time	Remarks
		(G.C.T.)	
1954		h. m. s.	
September 15	iPZNE	18 07 36	Fiji Islands. h = 600 km 18 S., 178 $\frac{1}{2}$ W. USCGS 9500 km ca
	iN	07 50	
	iSZNE	17 08	
	eZ	36 25	
	eNE	18 36 44	
September 16	iSN	1 29 57.0	Local Shock. Nothing on Z
	eE	1 30 05	
September 16	eLNE	4 59.0	Te = 11 Sec.
September 17	iPZ	1 26 36	New Ireland 4 $\frac{1}{2}$ S., 153 $\frac{1}{2}$ E. USCGS 10,000 km ca
	eSPSN	37 07	
	eSE	1 37.4	
September 17	iPZ	7 46 17	Near N. coast of Formosa 25 N., 122 E. USCGS 9500 km ca
	iSNE	7 56 43	
September 17	iPZNE	11 15 27	Fiji Island region h = 250 km 20 $\frac{1}{2}$ S., 177 $\frac{1}{2}$ W. USCGS Mag. 7 $\frac{1}{4}$ (P)(B). 9400 km ca
	SNE	25 37	
	PKKPZ	33 08	
	PPZ	11 41 43	
September 18	ePZ	15 43 33	Palau Is. USCGS 10500 km ca
	eNE	43.6	
	iSNE	15 53 47	
September 20	eLNE	0 38.0	N. Atlantic O. USCGS 6000 km ca
September 20	eP'ZE	0 59.3	Celebes Is. USCGS 12100 km ca
	ePSE	1 09 53	
September 21	ePZ	9 54 10	Marianas Is. USCGS 9000 km ca
	eNE	9 54 23	
September 21	PZ?	14 44 07	
September 21	PZ?	15 00 12	
September 23	PZ	21 52 47	Kurile Is. region 49 N., 156 E. USCGS 5750 km ca
	eN	57.4	
	eSE	22 00.0	
	LNE	22 11.0	

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
October 1	ePZ	3 08 18	Santa Cruz Is. 11 S., 166 E. USCGS Mag. 7 - (P). 9600 km ca
	iPz	08 20	
	eNE	08.7	
	eSNE	18 53	
	iSNE	19 08	
	eLNE	3 35	
October 1	iPZ	7 02 17	Samoa Is. $14\frac{1}{2}$ S., 173 W. USCGS. 8500 km ca
October 3	iPZ	3 00 07 R	Santa Cruz Is. 10 S., 166 E. USCGS Mag. 7 - (P). 9600 km ca
	eNE	00 23	
	eSPSNE	10 55	
	ePSN	11 28	
	eLNE	3 25.0	
October 3	iPZNE	11 23 27 C.	Kenai Penn., Alaska 50 N., 151 W. USCGS Minor damage. Mag. 7 - (P) 2300 km ca
	eSE	27 30	
	iSNE	27 37	
	eLE	28.3	
	eLN	29.6	
	eLE	11 30.3	
October 3	ePPZ	23 40 18	Molucca Is. $\frac{1}{2}$ S., 127 E. USCGS. 11600 km ca
October 4	iPZ	8 24 40	Ryuku Is. region 27 N., 126 E. USCGS 9000 km ca
October 4	PZ	9 45 43	Santa Cruz Is. 11 S. 166 E. USCGS. 9600 km ca
	eLNE	10 10	
October 5	ePZ	4 29 42	Off coast of Honshu Is. 33 N. 141 E. USCGS 7850 km ca
October 5	PZ	11 39 25	Lake Baikal, USSR 55 N., 109 E. USCGS 7600 km ca
October 5	eZ	13 01 46	Regional?
	eNE	13 02 09	

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
October 17	ePZ	23 01 21	Lower California. Felt 31½ N., 116½ W. USCGS 18500 km ca
	iPZ	01 23	
	ePNE	02 30	
	eSN	04 31	
	eLGE	06 20	
	iLNZ	23 07 10	
October 21	iP'Z	0 30 30	South Indian Ocean 41 S., 81 E. USCGS. 13000 km ca
October 24	PZ	9 48 11	Lower California 31½ S., 116 W. USCGS 1850 km ca
	eNE	48 18	
	SNE	51 31	
	eE	53.2	
	LCNE	53 28	
	LFNE	9 53.8	
October 30	ePZ	15 19 38	Regional?
	eNE	20	
	SNE?	15 23.5	
October 31	PZ	23 25 57	New Hebrides Is. 18½ S. 170 E. 9900 km ca
	eNE	26.4	
	eZ	23 29 30	
November 1	iPZ	21 04 15	Off coast of Guatemala 14 N., 92 W. USCGS 4700 km ca
November 2	ePZ	8 43 17	Sumbawa Is. region 7½ S., 119 E. USCGS 12750 km ca
	eZ	43 39	
	eZ	44 03	
	eZ	8 46 28	
November 2	ePZ	13 03 42	Weak regional shock?
November 2	ePZ	23 10 00	Weak regional shock?
November 3	ePZ	5 35 39	Weak local shock?
November 7	iPZ	5 31 38	Tonga Is. 24½ S., 176 W. USCGS. 9700 km
November 10	iPZ	9 33 12	Weak regional shock?

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
November 11	ePNZ	22 15 42.0	Reported felt near Raymond, Washington. 125 km ca
	iSZNE	15 56.5	
	eE	22 16 18	
November 12	iPZ	12 30 53	Lower California 31½ N., 116 W. USCGS 1800 km ca
	SN	34 12	
	iLE	36 08	
	iLE	12 36 27	
November 15	iPZ	16 38 23 R.	Marianas Is. h = 200 km 19½ N., 145½ E. USCGS 8650 km ca
	ePNE	38 26	
	iSNE	48 02	
	iSZ	16 48 38	
November 19	iPZ	6 06 22 R.	Japan Sea. 41 N., 131½ E. USCGS. 7750 km ca
	eNE	6 06 47	
November 25	PNE	11 18 36	Off Cape Mendocino, Calif 40½ N., 126 W. USCGS 850 km ca. Vertical record lost
	SNE	20 12	
	iLNE	20 36	
	iLN	11 21 00	
November 25	eLNE	21 11.8	Off coast of Chiapas, Mex. 15 N., 94½ W. USCGS 4500 km ca
	LE	21 12.9	
November 25	iPZ	21 45 23	Fiji Is. h = 650 km 21½ S., 179 E. USCGS 9600 km ca
	ePNE	45 30	
	eSN	55.2	
	iSE	55 16	
	SZ	21 55 21	
November 29	PZ	1 47 42	Kamchatka region 53½ N., 160 E. USCGS 5300 km ca
December 2	iPZ	9 06 15	Off Oregon Coast 43½ N., 125 W. USCGS 600 km ca
	ePNE	06 20	
	SNZE	07.4	
	iLZ	9 08 57	
December 3	ePZ	8 47 26	Off Oregon Coast 44 N., 127 W. USCGS 450 km ca
	PNE	47 32	
	SEZ	48 49	
	LNE	49 55	
	LNE	8 50.0	

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Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
December 4	ePZ	7 13 35	New Britain region 5 S., 152½ E. USCGS 10500 km ca
	eLNE	45.4	
	LNE	7 56	
December 4	iPZ	18 41 32	Near Trinidad, W. I. 11 N., 61 W. USCGS 7000 km ca
	eSE	45 05	
	eE	45 52	
	eNE	18 58.0	
December 10	iPZ	13 08 41	West of Jamaica 18½ N., 81½ W. USCGS 5000 km ca
	ePPZNE	10 37	
	SSNE	18.6	
	LN	13 24.4	
December 11	ePZ	13 07 07	North Atlantic Ocean 52½ N., 32 W. USCGS 5800 km ca
	eZ	07 43	
	PPZ	09 40	
	LNE	19.3	
	LNE	13 24.2	
December 16	iPZ	11 09 25	Near Fallon, Nevada 39½ N., 118 W. USCGS 9700 km ca. Damage
	eZ	09 38	
	eNE	11 18	
	eN	11 38	
	eNE	11 55	
	iLNZ	12 10	
	LE	11 12 33	
December 16	PZ	13 17 23	Nevada aftershock
	LN	19 52	
	LZ	13 20 00	
December 16	PZ	14 19 12	Nevada aftershock
	LN	21 48	
	LZ	14 21 54	
December 16	PZ	15 12 02	Nevada aftershock
	LN	14 31	
	LZ	15 14 38	
December 16	LZ	16 05 00	Nevada aftershock
December 16	LZ	19 15 55	Nevada aftershock
December 16	LZ	21 53 45	Nevada aftershock
December 17	LZ	10 20 25	Nevada aftershock
December 17	LZ	10 38 30	Nevada aftershock

Date	Phase	Time (G.C.T.)	Remarks
1954		h. m. s.	
December 17	LZ	10 57 37	Nevada aftershock
December 17	LZ	21 02 10	Nevada aftershock
December 18	LZ	1 50 32	Nevada aftershock
December 19	iPZ	10 35 00	Argentine, Jujuy province. 23 S., 66½ W. h = 250 km USCGS. 9900 km ca
	iZ	37 02	
	eZE	46 25	
	eZ	46 45	
	eZE	10 47 13	
December 21	iPZ	19 58 13	Humboldt Co., California Destructive. 41 N., 124 W. USCGS 750 km ca
	eZ	58 35	
	LE	00 03	
	iLZN	20 00 36	
December 30	ePZ	9 18 16	Aftershock
	eNE	18 25	
	eNE	9 19 51	
December 30	iPZ	11 38 33	Fox Island, Aleutians 53 N., 168 W. USCGS 3200 km ca
	eN	43.7	
	LNE	11 47.0	