

NO 654

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR JANUARY, 1959

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T. sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi l}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
✓ 1	NE E	eL M F	02	21	-	22	1 1/2	83 1/2° N., 8° W., Off Greenland. USCGS.	
1	NE	eL F	08	48	-	09 30		8 1/2° S., 177° W. Fiji Islands region. USCGS.	
✓ 2	ZV ZV ZV,Z NE NE NE Z Z	iPn i iPg iSn i(S <sub>1</sub> ) i(S <sub>g</sub> ) i i F	05	20	46		500	Superimposed on strong microseisms.  47.7° N., 4° W. Near coast of Brittany, France. BCIS	
3	Z N N	e(P) eL M F	08	04	56	16	1	Confused by strong microseisms. 35 1/2° N., 29 1/2° E. Off south coast of Turkey. USCGS.	
✓ 3	NE E N	eL M M F	11	55	-	20	3	Confused by microseisms. 14 1/2° S., 75 1/2° W. Near coast of Peru. USCGS.	
4	NE N	e M F	04	15	-	19	2 1/2	Confused by strong microseisms. 10° S., 111 1/2° E. South of Java. USCGS.	



KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
5	ZV	iPKP	10	06	35				Confused by microseisms. 22°S., 171½°E. Loyalty Islands region. USCGS.
	ZV	i		06	42				
	NE	eL F		50	-				
			11	20	-				
7	ZV	iP	05	21	43	1.4	0.5		Compression. Confused by strong microseisms. 29°N., 55°E. Southern Iran. USCGS.
		F		50	-				
7	N	eL	22	35	-				Confused by microseisms. 37°N., 29½°E. Turkey. USCGS.
		M		37	-	16	1½		
		F		50	-				
8	ZV,Z	iP	01	43	53	1.7	0.3(ZV)	6600	Dilatation.  15½°N., 61°W. Windward Islands. Mag. 6½-6¾(Pas). h about 100Km. USCGS. Mag. = 6¼
		iS		51	55	12	4.7		
		eScS		53	28				
		eLQ		59.1	-				
		M		59½	-	32	15		
	F	02	25	-					
8	NE	eL	23	38	-				Confused by microseisms. 4½°S., 138½°E. New Guinea. USCGS.
		M		50	-	20	1		
		M		51	-	20	1½		
		F	24	10	-				
9	NE	eL	02	07	-				Confused by microseisms.  Near south coast of Greece. USCGS.
		M		08½	-	16	2½		
		M		08½	-	16	7½		
		F		20	-				
11	N	eL	04	40	-				36½°N., 29°E. Near south coast of Turkey. USCGS.
		M		42	-	16	1		
		F		51	-				
11	ZV,Z	iP	07	34	23			15°N., 90°W. Guatemala. USCGS.	
13	N	eL	02	05	-				Confused by strong microseisms. 13½°N., 146°E. Mariana Islands. Mag. 6¾(Pas). USCGS.
		M		24	-	20	1½		
		M		24	-	20	3		
		B		55	-				
13	N	eL	09	07	-				Confused by strong microseisms. 9°N., 83½°W. Costa Rica. h about 100Km. USCGS.
		M		16	-	20	3½		
		M		17	-	20	2		
		F		35	-				
16	ZV	e(P)	01	43	13				Confused by microseisms.  52½°N., 171°W. Fox Islands. USCGS.
		eL	02	04	-				
		M		19	-	20	2		
		M		22	-	18	1½		
		F		40	-				
16	N	eL	17	23	-				52°N., 131½°W. Queen Charlotte Islands. USCGS.
		M		28	-	26	3		
		M		28	-	26	3½		
		M		32½	-	18	2½		
		F		55	-				



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JANUARY, 19 59.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
16	ZV,Z	iPg	18	10	48			500	The record is very faint and superimposed on microseisms.  49° 12'N., 6° 3'E. Mine collapse at Roncourt, France. BCIS.
	ZV	e		11	38				
	NE	eSg		11	48				
	ZV	e		11	51				
	ZV	i		12	03				
	ZV	i		12	18				
		F		15	-				
18	ZV	iPKP	22	42	12				Depth = 480 Km. 19°S., 178°W. Fiji Islands. Mag. 6 <sup>1</sup> / <sub>2</sub> (Pas). USCGS.
	ZV	i		42	16				
	ZV	ipPKP		44	07				
✓ 22	ZV,Z	iP	05	23	09	8	9.0	9600	Compression. Confused by very strong microseisms. PH = 17sec. 9.7 μ IPH = 17 sec. 10.5 μ  34°N., 142°E. Near east coast of Honshu, Japan. Mag. 6 <sup>3</sup> / <sub>4</sub> -7 (Pas). USCGS.
	ZN	iPP		26	28				
	NE	eSKS		33	28				
	NE	iS		33	41	19	51(SH)		
	N	iPS		34	46				
	NE	iSS		39	20				
	NE	eSSS		42	22				
	NE	eL		49	-				
	E	M	06	03	-	21	146		
	N	M		04	-	22	120		
	Z	M		06 <sup>1</sup> / <sub>2</sub>	-	18	80		
	F	08	50	-			Mag: m = 7.1		
✓ 24	ZV,Z	iP	05	21	08	1.5	0.5(ZV)	9200	Compression. Confused by microseisms. Depth = 80 Km.  37 <sup>1</sup> / <sub>2</sub> °N., 141°E. Near coast of Honshu, Japan. USCGS.
	ZV,Z	ipP		21	30				
	ZV,Z	iPP		24	27				
	NE	eS		31	17	6	2.3(SH)		
	N	e		31	28				
	N	eL		49	-				
	E	M	06	03	-	20	1 <sup>1</sup> / <sub>2</sub>		
	N	M		03	-	20	2		
	F		20	-			Mag. 6.4		
24	ZV	ePKP	16	11	22				Depth = 120 Km. 17 <sup>1</sup> / <sub>2</sub> °S., 175°W. Tonga Islands region. USCGS.
	ZV	epPKP		11	54				
24	ZV	iP	19	54	29				15°N., 92 <sup>1</sup> / <sub>2</sub> °W. Mexico-Guatemala border. USCGS.
✓ 24	ZV,Z	iP	20	00	13	6	5.9	2550	Compression. PZV = 1.6 sec. 2.1 μ PH = 6 sec. 4.5 μ 37 <sup>1</sup> / <sub>2</sub> °N., 24 <sup>1</sup> / <sub>2</sub> °W. Azores Islands. Mag. 6 <sup>1</sup> / <sub>4</sub> - 6 <sup>1</sup> / <sub>2</sub> (Pas). USCGS.
	ZV,Z	iPP		00	34	6	4.2		
	ZE	iPcP		04	12				
	ZNE	iS		04	20	15	43		
	N	eL		05.3	-				
	E	M		06 <sup>1</sup> / <sub>2</sub>	-	16	34		
	N	M		06 <sup>1</sup> / <sub>2</sub>	-	16	47		
	Z	M		10	-	9	18		
	NE	eScS		11	24				
		F	21	25	-				
27	ZV,ZN	iP	03	40	09	1.4	0.6(ZV)	2320	Compression.  71 <sup>1</sup> / <sub>2</sub> °N., 2°W. Jan Mayen Islands region. USCGS.
	NE	eS		43	55				
	N	eL		45	-				
	N	M		46 <sup>1</sup> / <sub>2</sub>	-	20	2		
	E	M		47	-	16	1 <sup>1</sup> / <sub>2</sub>		
		F	04	05	-				

**SEISMOLOGICAL BULLETIN**

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLI- TUDE	Δ	REMARKS
			h.	m.	s.				
27	NE	eL	06	47 $\frac{1}{2}$	-				
	N	M		49 $\frac{1}{2}$	-	18	1 $\frac{1}{2}$		
	E	M		50 $\frac{1}{2}$	-	16	1		
		F	07	00	-				
29	ZV,Z	eP	06	50	54				Confused by microseisms.
	N	e		54	25				
	N	M		56 $\frac{1}{2}$	-	16	2 $\frac{1}{2}$		
	E	M		56 $\frac{1}{2}$	-	18	2		
		F	07	10	-				
29	N	e	21	00	-				
	N	M		08	-	20	1 $\frac{1}{2}$		
		F		25	-				
29	ZV,Z	iP	23	29	05	6	5.5	2240	Dilatation. PH = 14sec. 7.2 μ  71°N., 8°E. Off coast of Norway. USCGS.  Mag. = 5.9
	ZV	iPP		29	22				
	NE	iS		32	45	13	14.0(SH)		
	NE	eL		33 $\frac{1}{2}$	-				
	N	M		35	-	30	25		
	N	M		38	-	16	12		
	E	M		38 $\frac{1}{2}$	-	14	8		
		F	24	20	-				
30	N	eL	01	29	-				10°S., 161°E. Solomon Islands. USCGS.
	N	M		40 $\frac{1}{4}$	-	22	1 $\frac{1}{2}$		
	E	M		40 $\frac{1}{2}$	-	22	2		
		F	02	10	-				
30	ZV	iPKP	18	28	56				31°S., 179°W. Kermadec Islands. USCGS.
	ZV	iPKP		29	40				
	ZV	ePP		33	20				
30	ZV,Z	iP	20	51	14	1.8	0.4(ZV)	9050	Dilatation. Confused by microseisms.  44°N., 144°E. Hokkaido, Japan. USCGS.  Mag. = 6.3
	ZV	ePP		54	16				
	NE	eS	21	01	22	9	3.8		
	NE	eL		12	-				
	N	eL <sub>2</sub>		21	-				
	E	M		25	-	22	18		
	N	M		25	-	22	14		
	Z	M		28	-	19	4		
30	ZV,Z	iP	22	29	04	1.7	0.4(ZV)	9000	Confused by microseisms  44°N., 144°E. Hokkaido, Japan. USCGS.  Mag. = 6.4  All the magnitudes are the "unified magnitudes" denoted by "m".
	NE	eS		39	09				
	NE	eL		49	-				
	E	M	23	03	-	22	31		
	N	M		03	-	22	26		
	Z	M		06	-	20	6		
		F	24	25	-				



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SEISMOLOGICAL BULLETIN FOR.....FEBRUARY,.....19..59..

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T. sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi l}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
1	ZV,Z	iP	03	22	16				Compression. $36\frac{1}{2}^{\circ}$ N., $71^{\circ}$ E. Hindu Kush, h about 200 Km. USCGS.
5	ZV	iP	01	15	55	1.5	0.3		Compression. $57\frac{1}{2}^{\circ}$ N., $157\frac{1}{2}^{\circ}$ W. Alaska Peninsula. USCGS.
5	NE	eL	10	52	-				Near east coast of Honshu, Japan. USCGS.
	N	M	11	02	-	18	$1\frac{1}{2}$		
		F		15	-				
6	NE	eL	08	03	-				Very small. $43\frac{1}{2}^{\circ}$ N., $144\frac{1}{2}^{\circ}$ E. Near Hokkaido, Japan. USCGS.
		F		20	-				
6	ZV	eP	08	20	27				Off coast of Oaxaca, Mexico. USCGS.
6	NE	eL	15	05	-				$51\frac{1}{2}^{\circ}$ N., $175\frac{1}{2}^{\circ}$ W. Andreevof Islands. USCGS. Mag. = 5.8
	E	M		$22\frac{1}{2}$	-	20	1		
	N	M		$22\frac{1}{2}$	-	20	$1\frac{1}{2}$		
		F		40	-				
7	ZV,Z	iP	09	49	42	7	17	9900	Compression. PZV 1.5 sec. 2.9 $\mu$ PH 12 sec. 9.6 $\mu$
	ZV,Z	i		49	59				
	ZV,Z	iPP		53	08	9	4.2		
	E	iSKS	10	00	05				Deeper than normal (70 Km?)
	ZNE	iS		00	25	12	72(SH)		
	Z	i		01	22				
	E	iSS		06	13				$4^{\circ}$ S., $81\frac{1}{2}^{\circ}$ W. Near coast of northern Peru. Mag. $7\frac{1}{4}$ - $7\frac{1}{2}$ (Pas). USCGS.
	N	eLQ		14.0	-				
	ZV,Z	eP'P'		15	39				
	N	M		$16\frac{1}{2}$	-	36	130		
	EZ	eLR		19	-				



**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

FEBRUARY, 19 59

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
contd.									
✓ 7	E	M	10	23 <sup>1/2</sup>	-	25	70		Surface waves not very large.
	Z	M		26 <sup>1/2</sup>	-	19	13		
	E	M		26 <sup>1/2</sup>	-	21	34		
	N	M		27 <sup>1/2</sup>	-	22	32		
		F	13	40	-				Mag. (m) = 7.3
7	NE	eL	20	18	-				38°N., 21°E. Near west coast of Greece. USCGS.
	N	M		21	-	16	1		
	E	M		23	-	16	1		
		F		30	-				
8	NE	eL	00	27	-				
	E	M		28 <sup>1/2</sup>	-	18	1		
	N	M		28 <sup>1/2</sup>	-	14	1		
		F		35	-				
✓ 8	ZV,ZE	iP	01	06	38			2150	Compression (small).
	ZV,Z	i		06	42	7	7.8		Dilatation (large) PZV 1.6 sec. 1.4μ
	ZV,ZE	i(FP)		07	06				PE 10 sec. 6.7 μ
	NE	eS		10	09				
	NE	eL		11	-				49°N., 28 <sup>1/2</sup> °W. North Atlantic Ocean. Mag. 6 <sup>1/4</sup> -6 <sup>1/2</sup> (Pas). USCGS.
	N	M		12 <sup>1/2</sup>	-	15	18		
	E	M		13	-	16	26		
	Z	M		13	-	16	12		
	ZV,Z	eP'P'		42	43				
		F	02	10	-				Mag. = 6.0
✓ 9	ZV,Z	iP	04	54	40	2	0.3(ZV)	8800	Dilatation. Confused by microseisms.
	NE	eS	05	04	37	12	2.0(SH)		50 <sup>1/2</sup> °N., 177 <sup>1/2</sup> °W. Andreanof Islands.
	NE	eL		19	-				
	E	M		35	-	20	1 <sup>1/2</sup>		
	N	M		35	-	20	2		
		F	06	00	-				Mag. = 6.0
14	ZV	iP	22	22	16				28°N., 96°E. Pakistan foreshock. USCGS.
	ZV	i		22	21				
✓ 14	ZV,Z	iP	22	37	21				Confused by strong microseisms.
	ZV,Z	i		37	26				28°N., 97°E. East Pakistan. USCGS.
	N	eL	23	05	-				
	E	M		12 <sup>1/2</sup>	-	20	2		
		F		25	-				
15	ZV	iP	04	11	55				Dilatation. 44 <sup>1/2</sup> °N., 83 <sup>1/2</sup> °E. Sinkiang Province, China. USCGS.
		F	-	-	-				
✓ 15	NE	eS	04	26	53	14	4.0(SH)		Confused by strong microseisms.
	E	eSS		34.5	-				
	E	eSSS		38.7	-				59 <sup>1/2</sup> °S., 25°W. Sandwich Islands. Mag. 6 <sup>1/2</sup> -6 <sup>3/4</sup> (Pas). USCGS.
	NE	eL		45	-				
	E	M	05	01 <sup>1/2</sup>	-	18	11		
	N	M		02 <sup>1/2</sup>	-	20	14		
	Z	M		02 <sup>1/2</sup>	-	19	9		
		F	-	-	-				Mag. = 6.6
✓ 15	E	eSS	05	17	45				Confused by strong microseisms.
	E	M		44 <sup>1/2</sup>	-	18	21		59 <sup>1/2</sup> °S., 26°W. Sandwich Islands. Mag. 6 <sup>1/4</sup> (Pas).
	N	M		45 <sup>1/2</sup>	-	19	27		
	Z	M		45 <sup>1/2</sup>	-	19	13		
		F	07	25	-				Mag. = 6.8

M.O. 024

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

FEBRUARY, 1959.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
✓ 16	ZV,Z	iP	00	52	11			9600	Compression. Confused by microseisms.  1°S., 81½°W. Near coast of Ecuador. USCGS.
	ZV	i		52	16				
	E	e(SKS)	01	02	35				
	N	e		02	41				
	E	eL		15	-	20	2		
	N	M		27	-	20	1½		
16	ZV	iP	18	06	16				Compression. Honduras-Nicaragua border. USCGS.
✓ 17	ZV,Z	iP	12	15	04	5	2.9	8600	Confused by microseisms.  51½°N., 171°W. Fox Islands, Aleutian Islands. Mag. 6-6½ (Pas). USCGS.  Mag. = 6¼
	ZV,Z	i		15	11				
	NE	eS		24	51				
	NE	eL		36	-	20	4		
	N	M		51	-	19	2½		
	E	M		54	-				
✓ 20	ZV	iP	18	28	14				Confused by strong microseisms. 15½°N., 91°W. Guatamala. Mag. 6½ (Pas). USCGS.
	N	eL		54	-				
	E	M	19	04	-	18	1½		
22	N	e	04	07	-				Very small. 28½°N., 91½°E. Tibet. USCGS.
		F		15	-				
23	N	eL	03	02	-				5½°S., 150°E. New Britain. USCGS.
	E	M		15	-	20	1½		
	N	M		16	-	22	2½		
		F		35	-				
23	ZV	iP	10	42	46				Dilatation. 53½°N., 158½°E. Kamchatka. USCGS.
✓ 23	ZV,Z	iP	16	16	43	1.5	0.3 (ZV)		50°N., 157°E. Kurile Islands. USCGS.  Mag. = 6.0
	NE	eL		48	-				
	E	M		53	-	20	1		
	N	M		53	-	18	1½		
24	NE	e	13	45	-				Very small. 11°N., 122½°E. Panay Island. USCGS.
		F		57	-				
✓ 27	ZV	iP	21	09	30				Confused by strong microseisms. 27½°N., 129°E. Ryukyu Islands. USCGS.  Mag. = 6¼
	NE	eL		44	-				
	E	M		50½	-	22	7		
	N	M		51	-	22	5		
		F	22	25	-				

All the magnitudes are the  
"unified magnitudes" denoted  
by "m".





**AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.**

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN FOR MARCH, 1959**

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION : RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS : (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS : FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1918).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub> sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ <sup>2</sup> .	$\frac{Ak}{\pi I}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV.).

TIME SERVICE : MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.	
			h.	m.	s.					
1	ZV,Z	iP	00	36	34	6	4.4	2700	Compression. PZV 3 sec. 1.5 μ PN 8 sec. 2.7 μ 74 <sup>1</sup> / <sub>2</sub> <sup>0</sup> N., 9 <sup>0</sup> E. Arctic Ocean. USCGS.	
	NE	eS		40	48					
	N	eL		42 <sup>1</sup> / <sub>2</sub>	-					
	N	M		46	-					20
	E	M		47	-					20
	F		01	15	-			Confused by strong microseisms. Mag. = 6		
1	ZV,Z	ePKP	17	07	57	25	59	12600	Confused by microseisms. 1 <sup>10</sup> / <sub>2</sub> <sup>0</sup> S., 134 <sup>10</sup> / <sub>2</sub> <sup>0</sup> E. Near north coast of New Guinea. h about 100 Km. Mag. 7 (Pas). USCGS.	
	ZV,Z	ipFP		09	19					
	NE	eS		16	22					
	NE	epSP		18	44					
	E	esSS		25	18					
	N	eLQ		37 <sup>1</sup> / <sub>2</sub>	-					
	NE	eLR		42	-					
	N	M		50	-					
E	M		51	-	24					
	Z	M	18	05	-	20	64			
	F		20	05	-			17	Mag. = 7	
2	N	eL	11	46	-					
		F		55	-				Western Iran. USCGS.	
2	ZV,Z	iP	16	00	25	4	1.3		Compression. PZV 1.8 sec. 1.1 μ Confused by microseisms. 37 <sup>0</sup> N., 70 <sup>10</sup> / <sub>2</sub> <sup>0</sup> E. Hindu Kush. h about 200 Km. USCGS. Mag. = 6.0	
	ZV,Z	ipP		01	12					
	N	e(sS)		08	47					
	F			30	-					
5	ZV	iP	14	21	54				Dilatation. 44 <sup>10</sup> / <sub>2</sub> <sup>0</sup> N., 147 <sup>0</sup> E. Kurile Islands. USCGS.	
7	N	e	10	06	-					
		F		15	-				Very small. 3 <sup>0</sup> S., 102 <sup>0</sup> E. Sumatra. USCGS.	

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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

MARCH, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.	
			h.	m.	s.					sec.
11	NE E N E N	eL	02	18	-				Confused by strong microseisms. 17°N., 145°E. Caroline Islands. Mag. 6 (Pas). USCGS.	
		M		27	-	32	9			
		M		27	-	30	6			
		M		36	-	20	3			
		M		38	-	22	4			
		F	03	05	-			Mag. = 6 $\frac{1}{4}$		
13	ZV,Z	iPKP	16	59	47				21°S., 176 $\frac{1}{2}$ °W. Tonga Islands. USCGS.	
13	ZV E	eP	19	13	49				Mediterranean Sea, near Crete. USCGS.	
		M		26	-					
		F		35	-					
14	NE	e	03	37	-				Very small. 45°N., 151 $\frac{1}{2}$ °E. Kurile Islands. USCGS.	
		F		50	-					
17	Z,ZV NE NE E NE	e(P)	08	38	25			10000	Confused by microseisms. 27 $\frac{1}{2}$ °N., 130°E. Ryukyu Islands. USCGS. M phase lost in the break for changing the charts. Mag = 6 $\frac{1}{4}$	
		eSKS		48	54					
		eS		49	15	12	3.2 (SH)			
		eSS		55	14					
		eLR	09	08	-					
		F	10	15	-					
17	N N	eL	13	52	-				57°S., 25°W. Sandwich Islands. USCGS.	
		M	14	00	-	20	2			
		F	14	15	-					
17	ZV	eP	22	04	48				Jan Mayen Island region. USCGS.	
18	ZV NE E N Z	eP	00	54	12				Confused by microseisms. 27°N., 129°E. Ryukyu Islands. USCGS. Mag. = 6	
		eL	01	28	-					
		M		35	-	20	5			
		M		35 $\frac{1}{2}$	-	19	5			
		M		40	-	16	3			
		F	02	10	-					
19	ZV,Z NE N N E Z	eP	08	31	52	6	1.2	3300	35°N., 36°W. North Atlantic Ocean. Mag. 6 $\frac{1}{4}$ (Pas). USCGS.	
		eS		36	44	18	8.4 (SH)			
		iLQ		38	38					
		M		39 $\frac{1}{4}$	-	21	29			
		M		41 $\frac{1}{2}$	-	18	12			
		M		41 $\frac{1}{2}$	-	18	13			
		F	09	35	-			Mag. = 6.0		
20	NE E N	eL	11	30	-					
		M		34	-	22	1			
		M		36	-	20	1 $\frac{1}{2}$			
		F		45	-					
20	NE N	e	16	32	-					
		M		41	-	16	1 $\frac{1}{2}$			
		F		55	-					
21	ZV,Z ZV,Z ZV,Z	ePIP	04	46	01				19°S., 178°W. Fiji Islands. h about 550 Km. USCGS.	
		epPKP		48	16					
		i		48	20					



**SEISMOLOGICAL BULLETIN**

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
22	ZV	eFn	22	37	59			650	Confused by microseisms.  47 <sup>1</sup> / <sub>2</sub> °N., 3 <sup>30</sup> / <sub>4</sub> °W. Near west coast of France. Felt in Bretagne and Vendee. B C IS.
	ZV	e		38	24				
	ZV	i		38	58				
	ZV, H	eSn		39	07				
	ZV, H	i		39	20				
	H	e		39	31				
	HE	i		39	35				
	NE	iGg		39	42				
	H	M		39	-	9	7		
	H	M		40	-	10	3		
	H	M		40	-	8	3 <sup>1</sup> / <sub>2</sub>		
	H	F	22	47	-				
23	N	eS	07	31	41				40°N., 118°W. Western Nevada. Mag. 6 <sup>1</sup> / <sub>2</sub> -6 <sup>1</sup> / <sub>2</sub> (Pas). USCGS.
	N	eL		42	-				
	H	M		59	-	17	2 <sup>1</sup> / <sub>2</sub>		
	N	M		59	-	16	2 <sup>1</sup> / <sub>2</sub>		
	Z	M		59	-	16	2 <sup>1</sup> / <sub>2</sub>		
	H	F	08	25	-				
24	NE	eL	18	05	-				Confused by microseisms. 34°N., 142°E. Off coast of Honshu, Japan. USCGS.
	H	M		16	-	18	1		
	H	M		16	-	19	1 <sup>1</sup> / <sub>2</sub>		
	H	F		30	-				
25	HE	eL	00	32 <sup>1</sup> / <sub>2</sub>	-				Small.
	H	F		38	-				
26	ZV	ePKS	02	46	22				7°S., 155 <sup>10</sup> / <sub>2</sub> °E. Solomon Islands. h about 60 Km. USCGS.
	HE	eL	03	33	-				
	H	F	04	00	-				
27	ZV	iP	07	12	00	1.5	0.2		Dilatation. 17°N., 61°W. Leeward Islands. USCGS.
27	H	eL	23	39	-				1°N., 85°W. Pacific Ocean. USCGS.
	H	M		42	-	22	2		
	H	F		50	-				
28	ZV	ePKP	20	05	47				Depth = 600 Km. 20°S., 178 <sup>10</sup> / <sub>2</sub> °W. Fiji Islands. Mag. 5 <sup>3</sup> / <sub>4</sub> -6 (Pas). USCGS
	ZV	iPKP2		05	52				
	ZV	epPKP		08	07				
29	ZV	iP	19	20	55				Dilatation. 45 <sup>10</sup> / <sub>2</sub> °N., 137 <sup>10</sup> / <sub>2</sub> °W. Sikhota Alin. USCGS.
30	NE	e	21	10	-				Small.
	H	F		25	-				
31	NE	eL	08	35	-				15°S., 173°W. Samoa Islands region. Mag. 6 (Pas). USCGS.
	H	M		43 <sup>1</sup> / <sub>2</sub>	-	19	2		
	H	M		43 <sup>1</sup> / <sub>2</sub>	-	19	2		
	H	F	09	10	-				

 All the magnitudes are the  
"unified magnitudes" denoted  
by "m".





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**AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.**

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN FOR APRIL, 1959**

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION : RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS : (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS : FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub> sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ <sup>2</sup> .	$\frac{Ak}{\pi l}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE : MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
1	ZV,Z	iP	00	40	19	4	1.3	3200	Compression. PZV 1.5 sec. 0.4 μ  27½°N., 21°W. Canary Islands. Mag. 6¼ (Pas). USCGS  Mag. = 6.0  18°S., 169°E. New Hebrides Islands. USCGS.  Very small. 40°N., 120°W. USCGS California.  17°S., 168½°E. New Hebrides Islands. USCGS.  Confused by microseisms.  Northwestern Turkey. Extensive damage. USCGS  20½°N., 121°E. Batan Islands region. USCGS.
	ZV,Z	i		40	33				
	ZV,Z	i		41	34				
	N	eS		45	04	16	5.0 (SH)		
	NE	e		45	22				
	NE	eL		46½	-				
	E	M		49½	-	16	9		
	N	M		49½	-	16	11		
1	Z	M	50½	-	16	8			
		F	01	45	-				
1	ZV	ePKP	15	07	56				
1	N	e	18	55	-				
		F	19	10	-				
1	ZV	e(PKP)	23	07	26				
2	ZV	eP	04	39	32				
	N	eL		47	-				
	N	M		49½	-	12	1½		
	E	M		50	-	12	2½		
		F		57	-				
2	NE	eL	20	11	-				
	E	M		20	-	16	1½		
	N	M		20	-	16	2		
	Z	M		20	-	16	3		
		F		40	-				

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

APRIL, 1959

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
3	ZV	eP	19	46	39				4°S., 81°W. Near coast of Peru. USC GS.
5	ZV	iP	10	49	56			1000	44.6°N., 6.8°E. BCIS. Southeastern France. Two injured and moderate property damage.
	ZV,E	i		51	32				
	ZV	i		51	37				
	E	e(S)		51	39				
	ZV	i		51	43				
	NE	eL		52.2	-				
	NE	i(Sg)		52	39				
	E	M		52 <sup>3</sup> / <sub>4</sub>	-	12	28		
	N	M		52 <sup>3</sup> / <sub>4</sub>	-	12	19		
	Z	M		52 <sup>3</sup> / <sub>4</sub>	-	8	17		
		F	11	25	-				
5	ZV	eP	20	12	09				46°N., 151°E. Kurile Islands. USC GS.
6	N	eL	00	29	-				5½°S., 146°E. Near coast of New Guinea. USC GS.
	E	M		48½	-	20	1½		
	N	M		48½	-	20	2½		
		F	01	25	-				
6	NE	eL	14	59	-				Confused by strong microseisms. 10°S., 120½°E. Sumba Island. Mag. 6¼ (Pas). USC GS.
	N	M	15	23½	-	24	10		
	E	M		30½	-	20	6		
	N	M		30½	-	20	8		
		F	16	00	-				Mag. = 6½
8	ZV	ePKP	01	42	41				32½°S., 179½°E. Kermadec Islands region. h about 400 Km. USC GS.
	ZV,Z	ePKP2		43	28				
8	ZV	iPKP	01	21	07				17°S., 174½°W. Tonga Islands. USC GS
8	NE	eL	12	35	-				Confused by strong microseisms. 50½°S., 73°W. Chile-Argentina border. USC GS. Mag. = 6¼
	E	M		55	-	20	3½		
	N	M		55	-	20	2½		
		F	13	25	-				
9	NE	eL	07	04	-				Confused by strong microseisms. 36°S., 76°E. Indian Ocean. USC GS. Mag. = 6¼
	E	M		27	-	20	3½		
	N	M		28	-	20	3		
		F	08	10	-				
9	ZV	e(P)	17	48	23			8900	Confused by microseisms. 7°N., 82°W. South of Panama. Mag. 6¼-6½ (Pas). USC GS.
	NE	eS		58	23	12	1.8 (SH)		
	N	eL	18	10	-				
	N	M		12	-	26	4		
	E	M		17	-	22	4		
		F		50	-				Mag. = 6.0
10	ZV,Z	iPKP	06	06	49	1.5	0.6 (ZV)		Compression. 25°S., 178½°E. South of Fiji Islands. USC GS. Depth = 590 Km.
	ZV	epPKP1		09	06				
	ZV	epPKP2		09	29				
11	N	eL	19	04	-				15°S., 173½°W. Samoa Islands region. USC GS.
	N	M		15	-	20	1½		
		F		30	-				



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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
12	ZV,Z	eP	10	06	51	1.8	0.9 (ZV)	8920 Confused by microseisms. Depth = 105 Km.  17½°N., 95°W. Mexico. Damage at Cordoba. USCGS.  Mag. = 6.4	
	ZV,Z	epP		07	18				
	E	iS		16	47	14	4.3 (SH)		
	E	eSS		21	58				
	NE	eL		31	-				
	E	M		42	-	20	2		
	N	M		42	-	20	1½		
	F		11	00	-				
12	N	eL	11	47	-			Confused by microseisms. 24½°N., 122°E. Near Formosa. USCGS.	
	E	M		56½	-	20	1		
	N	M		56½	-	20	1½		
		F		12	10	-			
12	N	eL	16	12	-			Confused by microseisms. 4½°S., 134°E. Near New Guinea. h about 100 Km. USCGS.	
	E	M		34	-	20	4		
	N	M		34	-	20	4		
		F		17	15	-			
12	ZV	e (PKP)	21	13	51			Confused by microseisms. 15½°S., 173°W. Samoa Islands region. Mag. 6-6½ (Pas). USCGS.  Mag. = 6.4	
	N	eLR	22	02	-				
	N	M		14	-	20	6		
	E	M		15½	-	20	3½		
	Z	M		16	-	20	3½		
	F		23	10	-				
14	N	eL	03	31	-			24°N., 109½°W. Gulf of California. Mag. 5¼-5½ (Berk). USCGS.	
	E	M		40½	-	20	2		
	N	M		40½	-	20	1		
		F		55	-				
14	ZV,Z	iP	07	31	31	1.5	0.3 (ZV)	Compression. 57½°N., 155°W. Alaska Peninsula. USCGS.	
15	NE	eL	00	49	-			Confused by strong microseisms. 41½°N., 143°E. Near Hokkaido, Japan. USCGS. Mag. = 6¼	
	E	M	01	04	-	20	7		
	N	M		07	-	20	5		
		F		40	-				
16	NE	eL	17	03	-			Very small. 12½°N., 143°E. Mariana Islands region. USCGS.	
	F		25	-					
19	E	eL	08	17	-			45°S., 82°W. Pacific Ocean. USCGS. Mag. 6 (Pas)	
	E	M		30	-	22	2½		
		F		40	-				
19	N	eL	15	40	-			Confused by microseisms. 58°N., 152½°W. Near Kodiak Island, Alaska. USCGS.	
	N	M		46	-	20	2		
		F		16	00	-			
19	N	e	17	49	-			Very small. Near west coast of Greece. USCGS.	
	F		57	-					
20	NE	eL	04	29	-			Confused by microseisms. 6°S., 149½°E. New Britain. USCGS. h about 100 Km. overlapped by next shock.	
	E	M		42	-	24	4		
	N	M		43	-	24	4		
		F		-	-				
		F		-	-				

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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

APRIL, 19 59

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.		
			h.	m.	s.					sec.	μ
20	E	M	05	03	-	20	2½		8½°N., 83°W. Costa Rica. USCGS.		
	N	M		04	-	20	2				
		F		35	-						
22	ZV,Z	iP	11	06	46	1.5	0.4(ZV)		Compression. 54°N., 167°W. Fox Islands. USCGS.		
22	NE	e	18	16	-				Very small. 7½°N., 72°W. Venezuela-Colombia border. USCGS.		
		F		25	-						
22	NE	eL	19	35	-				11½°N., 86½°W. Near coast of Nicaragua. USCGS.		
	E	M		45	-					20	1½
	N	M		45	-					20	1
	Z	M		47	-					16	½
		F	20	15	-						
23	E	e(SS)	21	04	-				36½°S., 97½°W. Pacific Ocean. Mag. 5¾-6(Pas). USCGS.		
	NE	eL		25	-						
	N	M		32	-					20	1½
	E	M		33	-					20	1½
	Z	M		33	-					20	1
		F	22	05	-						
√24	N	eL	10	06	-				11½°N., 86½°W. Near coast of Nicaragua. Mag. 6¼-6½(Pas). USCGS.		
	E	M		18	-					20	3½
	N	M		18	-					20	2
	Z	M		18	-					18	1
		F		45	-						
√24	ZV,Z	iPKP	18	00	(01)	6	2.2	17500	Beginning in time break.		
	ZV,Z	ePP		22	00	7	1.7				
	ZV,Z	e		30	36						
	ZV,Z	e	30	58						31°S., 178°W. Kermadec Islands. Mag. 6¾-7(Pas). USCGS.	
	N	eLR	19	15	-	22	8				
	N	M		25½	-		8				
	E	M	29½	-	18	5					
Z	M	36	-				Mag. = 6½				
	F	20	40	-							
√25	ZV,Z	eP	00	32	05	5	3.5	3020	Dilatation. 37°N., 28½°E. Turkey. Extensive damage in Mugla Province. USCGS.		
	ZV,Z	ePP		32	46						
	NE	eS		36	40	13	14.5(SH)				
	N	eLQ		39	-	14	17½				
	N	M		41½	-	11	13½				
	E	M		43	-	10	9				
	Z	M		43	-					Mag. = 6.3 overlapped by next shock.	
	F	-	-	-							
25	ZV,Z	iP	01	11	07	12	4.0(SH)	3050	Compression. Turkey aftershock.		
	E	eS		15	44						
	N	eLQ		18	-						
	N	M		20½	-					13	4
	E	M		22	-					12	2½
	Z	M		22	-					10	2
	F	01	40	-			Mag. = 5.8				
25	NE	eL	06	35	-				Very small. 19½°N., 66°W. Puerto Rico region. USCGS.		
		F		55	-						

M.O. 654

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

APRIL, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
26	ZV,Z	iP	14	47	45	1.5	0.4 (ZV)	1150	Confused by microseisms. 46 <sup>1</sup> / <sub>2</sub> °N., 13°E. Italy-Austria border. Minor damage in Italy. USCGS.
	ZV	i		47	49				
	NE	e(Sg)		50	48				
	N	eL		51	-				
	E	M		52	-	12	3		
	N	M		52	-	10	3 <sup>1</sup> / <sub>2</sub>		
	Z	M-F		52	-	8	3		
				55	-				
26	ZV,Z	iP	20	53	19	8	17 <sup>1</sup> / <sub>2</sub>	9900	Compression. Depth = 120 Km. PPH 16 sec. 13 <sup>1</sup> / <sub>2</sub> μ 25°N., 122 <sup>1</sup> / <sub>2</sub> °E. Near northeast coast of Formosa. 2 killed, minor property damage. Mag. 7 <sup>1</sup> / <sub>2</sub> -7 <sup>3</sup> / <sub>4</sub> (Pas). USCGS.
	ZV	ipP		53	52				
	ZV,Z	iPP		56	50	8	16 <sup>1</sup> / <sub>2</sub>		
	ZV	epPP		57	18				
	EN	iSKS	21	03	41	16	80 (SH)		
	EN	iS		03	58				
	EN	eSS		09	46				
	E	e		16	32				
	NE	eLQ		18 <sup>1</sup> / <sub>2</sub>	-				
	N	M		30	-	23	147		
	E	M		31	-	22	147		
Z	M		38	-	16	144			
	F		23	50	-			Mag. = 7.4	
27	N	eL	10	40	-			Very small. 7°S., 129°E. Banda Sea. USCGS.	
		F	11	10	-				
27	NE	e(s)	13	29	24			Confused by microseisms. 33 <sup>1</sup> / <sub>2</sub> °N., 93°E. Tsinghai Province, China. USCGS.	
	N	eL		40	-				
	E	M		47	-	22	3 <sup>1</sup> / <sub>2</sub>		
	N	M		47	-	22	6		
	Z	M		52	-	16	1 <sup>1</sup> / <sub>2</sub>		
		F		14	20	-			
28	ZV,Z	iP	11	21	40			8900	Compression. 15°N., 93°W. Mexico-Guatemala border. Mag. 6 <sup>1</sup> / <sub>2</sub> -6 <sup>3</sup> / <sub>4</sub> (Pas). USCGS.
	EN	eS		31	40				
	ZE	eSKS		31	37				
	E	eSS		37	14				
	E	eSSS		40	31				
	N	eL		43	-				
	N	M		55	-	21	13		
	E	M		58 <sup>1</sup> / <sub>2</sub>	-	18	26		
Z	M		58 <sup>1</sup> / <sub>2</sub>	-	18	12			
	F		14	10	-			Mag. = 6 <sup>1</sup> / <sub>2</sub>	
29	ZV	eP	00	32	23			28°N., 55°E. Iran. USCGS.	

All the magnitudes are the "unified magnitudes" denoted by "m".





M.O. 654.....

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR..... MAY,..... 19 59

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION : RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS : (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS : FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ah}{\pi I}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE : MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
1	N	eL F	06	29	-				Very small. 45 $\frac{1}{2}$ <sup>o</sup> N., 104 <sup>o</sup> E. Outer Mongolia. USCGS.
1	NE N	eL M F	08	18	-	20	1 $\frac{1}{2}$		3 $\frac{1}{2}$ <sup>o</sup> S., 135 $\frac{1}{2}$ <sup>o</sup> E. Western New Guinea. USCGS. overlapped by next shock.
1	Z, ZV N N	iP e(S) M F	08	31	29	18	1 $\frac{1}{2}$	(4400)	Compression. 36 $\frac{1}{2}$ <sup>o</sup> N., 52 <sup>o</sup> E. Near north coast of Iran. USCGS.  in break for chart changing.
3	N N	eL M F	05	15	-	20	1		12 $\frac{1}{2}$ <sup>o</sup> N., 87 $\frac{1}{2}$ <sup>o</sup> W. Near coast of Nicaragua. USCGS.
4	ZN, ZV ZN, ZV ZNE ZN Z NE NE NE ZNE Z, ZV N Z E	iP i i iPP i iS iSS eLQ eLR i(P'P') M M M F	07	27	19	8	26	8200	Compression. PH 20sec. 38 $\mu$  PPH 20 sec. 27 $\mu$  25 230(SH)  52 $\frac{1}{2}$ <sup>o</sup> N., 159 $\frac{1}{2}$ <sup>o</sup> E., Near east coast of Kamchatka. Mag. 8 (Pas). 1 killed and 13 injured. h about 60 Km. USCGS.
	N	M	08	04	-	24	250		
	Z	M		04	-	20	70		
	E	M		06	-	22	150		
		F	11	40	-				Mag. = 7.5

M.O. 654

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

MAY, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
✓ 5	ZV	eP	19	15	55			8300	53°N., 159°E. Kamchatka aftershock. Mag. 6 (Pas). USCGS.
	NE	eS		25	29				
	E	eL		36½	-				
	E	M		48½	-	22	11		
	N	M		49	-	21	6		
	Z	M		54	-	15	2½		
		F	21	15	-				Mag. = 6¼
6	ZV	e (PKP)	17	48	(04)				in time break. 18°S., 179°W. Fiji Islands.
6	NE	e	19	50	-				Very small. 3°S., 128°E. Ceram Islands. USCGS.
		F	20	25	-				
✓ 7	NE	e (SKKS)	00	31	19				3°S., 148½°E. Bismarck Sea. Mag. 6-6¼ (Pas). USCGS.
	N	eL		55	-				
	E	M	01	19	-	21	3½		
	N	M		19	-	21	7½		
	Z	M		19	-	21	2½		
		F	02	20	-				Mag. 6.4
7	NE	eL	18	31½	-				Very small.
		F		45	-				
8	NE	e	07	29	-				Very small. 53½°N., 159½°E. Near Kamchatka. USCGS.
		F		50	-				
✓ 8	ZV,Z	iP	11	46	22	5	1.6		Compression. 53½°N., 160½°E. Near east coast of Kamchatka. h about 60 Km. Mag. 6 (Pas). USCGS. Mag. = 6
	N	eL	12	15	-				
	N	M		20½	-	19	1½		
	E	M		21½	-	19	1½		
		F		55	-				
10	ZV	iP	00	09	18				45°N., 149°E. Kurile Islands. USCGS.
	ZV	i		09	32				
	NE	eL		40	-				
	N	M		48	-	20	1		
		F	01	05	-				
12	N	eL	01	06	-				39½°N., 79°E. Tibet-India border. USCGS.
		M		10	-	17	½		
		M		10	-	17	1		
		F		20	-				
✓ 12	Z	iP	05	09	11	7	1.2	8250	Dilatation. PN 11 sec. 0.6 μ
	Z	ePP		11	57				
	NE	iS		18	41	12	4.2		
	N	eScS		19	18				
	N	eSS		23	30				
	N	eL		33	-				
	E	M		46	-	18	9		
	N	M		48	-	20	5½		
	Z	M		52	-	16	2½		
		F		08	15	-			
12	N	e	09	13	-				Small. 9½°S., 159°E. Solomon Islands. USCGS.
		F		25	-				



M.O. 4024

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

MAY, 1959

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h	m	s				
✓ 12	Z	eP	10	00	12	8	1.5	10400	23½°S., 64½°W. Salta Province, Argentina. Mag. 6½ (Pas). USCGS.
	Z	ePP		03	54				
	NE	eSKS		10	42	12	3.7 (SKSE)		
	NE	eS		11	14	15	4.5 (SE)		
	ZE	ePPS		12	30				
	NE	eLQ		26	½				
	E	M		41	½	18	13		
	N	M		41	½	18	12		
	Z	M		41	½	18	9		
		F		13	15				
✓ 12	ZV,Z	eP	21	52	21				51½°N., 177°W. Andreanof Islands, Aleutian Islands. USCGS.
	Z	M		36	½	18	1		
	N	M		36	½	18	2		
	E	M		39	½	19	1½		
	F		-	-				overlapped by next shock.	
✓ 12	ZV,Z	eP	22	11	56			8900	51½°N., 177°W. Andreanof Islands, Aleutian Islands. Mag. 6 (Pas). USCGS.
	NE	eS		21	56				
	Z	M		56	½	18	2		
	N	M		56	½	19	3½		
	E	M		58	½	17	3		
	F		25	10				Mag. = 6.1	
14	ZV,Z	eP	01	00	30			(2450)	Very small.
	NE	e(S)		04	26				
	N	eL		06	-				
	E	M		07	½	15	1		
	N	M		07	½	15	3		
	Z	M		09	-	08	1		
		F		20	-				
14	NE	e	01	43	-				Very small.
		F	02	00	-				
14	ZV,Z	eP	06	32	19				Crete foreshock. USCGS.
	ZV,	e		32	27				
	NE	e(S)		36	40				
	N	eL		40	-				
	F		-	-				overlapped by next shock.	
✓ 14	ZV,Z	iP	06	42	14	6	9.4	2700	Dilatation. PH 8 sec. 7.2 μ 35½°N., 24½°E. Crete. Mag. 6½ (Pas). USCGS.
	ZV,Z	i		42	21				
	ZV,Z	iPP		42	58	6	4.4		
	N	iS		46	30	13	36 (SH)		
	NE	i		46	37				
	NE	eL		49	-				
	N	M		52	-	18	53		
	E	M		53	-	19	31		
	E	M		53	½	14	38		
	Z	M		53	½	14	20		
	F		08	25				Mag. = 6.5	
14	ZV,Z	iPKP	09	53	09				19°S., 170°E. New Hebrides. USCGS.
	ZV,Z	i		53	16				

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

MAY, 1959

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
14	ZV,Z ZV,Z	ePKP e	11	01	36				19°S., 170°E. New Hebrides. h about 100 Km. USCGS.
14	ZV,Z	ePKP	12	08	59				19°S., 170°E. New Hebrides. USCGS.
14	ZV,Z ZV,Z N	iPKP i eL F	13 14 15	39 39 37 20	05 13 -				19°S., 170°E. New Hebrides. h about 150 Km. USCGS.
14	ZV,Z E N E N Z	eP e(S) eL M M M F	19	26 31 32½ 34 34 36 50	59 48 -			(3250)	
14	N	e F	21	35 45	-				Very small.
✓16	ZV,Z ZV,Z Z NE NE E N Z Z N E	ePKP epPKP ePP ePKS eL M M M M M M F	06 07	35 34 37 38 10 21½ 25½ 25½ 36 36 38 10	27 47 37 50 -				4½°S., 153½°E. New Britain. Mag. 6¾(Pas). h about 60 Km. USCGS.
						32 28 28 22 23 22			
							9½ 12½ 5 2½ 5 2½		
✓19	ZV,Z NE NE E N Z	eP eS eL M M M F	15	26 34 44 49 49 54 30	55 17 -			5800	Mag. = 6½ 33°N., 68½°E. Eastern Afganistan. USCGS.
						21 21 14			
							4 6 2		
20	E E	eL M F	01 02	40 01 15	-				23°S., 114°W. South Pacific Ocean. USCGS.
20	ZV,Z E E N	eP eS M M F	16	42 46 50½ 51½ 05	10 33 -			2800	37°N., 26½°E. Dodecanese Islands. USCGS.
						11 20 14			
							1.6 1 1		
✓20	ZV,Z ZV NZ E N	eP e e(SKS) M M F	19	47 47 57 25 25½ 10	20 42 25 -			(8600)	44½°N., 149°E. Kurile Islands. USCGS.
						18 20			
							1½ 1½		

M.O. 654

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

MAY, 19 59

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
✓ 20	ZV,Z	eP	19	55	26				Superimposed on preceding shock. 41½°N., 42°E. Georgia, U.S.S.R. USCGS.
	N	eS	20	00	23				
	E	M		10	-	16	1		
	N	M		10½	-	17	1½		
	Z	M		11	-	12	1		
		F	-	-	-				
✓ 21	Z	eP	11	48	13			11100 Chile-Argentina border. h about 60 Km. Mag. 6 (Pas). USCGS.  Mag. = 6	
	Z	ePP		52	23				
	Z	e		52	41				
	NE	e(SKKS)		59	09				
	NE	eL	12	18	-				
	E	M		30	-	21	3		
	N	M		33	-	20	2		
	Z	M		33	-	20	1½		
		F	13	30	-				
24	NZ,ZV	eP	13	23	16			1800 37½°N., 4°E. Off north coast of Algeria. USCGS.	
	ZV	e		23	24				
	ZNE	eS		26	26				
	NE	eL		27½	-				
	E	M		29½	-	11	3½		
	N	M		30	-	12	3½		
	Z	M		30	-	12	2		
		F		45	-				
✓ 24	ZV,Z	iP	19	29	47	6	15.5	9100 Dilatation. Depth = 105 Km. PH 8 sec. 6.3 μ pPH 8 sec. 9.5 μ 17½°N., 97°W. Oaxaca, Mexico. 1 killed, 10 injured, and minor property damage. h about 100 Km. Mag. 6¾-7 (Pas). USCGS.  Mag. = 7.1	
	ZV,Z	ipP		30	14	6	24.5		
	ZV,Z	iPP		32	50	6	5.2		
	ZNE	iS		39	52	13	29		
	ZE	iScS		40	11				
	ZNE	isS		40	39				
	E	i		41	06				
	NE	e(SS)		44	46				
	ZNE	eLR		55	-				
	Z	M		58	-	32	20		
	E	M		58	-	32	45		
	N	M		59½	-	29	21		
	Z	M	20	05½	-	20	9		
	E	M		05½	-	20	17		
	N	M		07	-	20	9		
		F	22	25	-				
✓ 26	ZV,Z	iP	04	25	49	4	2	9900 Dilatation. PZV 1.6 sec. 1.3 μ Depth = 110 Km. 27½°N., 126½°E. Ryukyu Islands region. Mag. 6½-6¾ (Pas). h about 100 Km. USCGS.  Mag. = 6.6	
	ZV,Z	epP		26	18				
	ZV,Z	ePP		29	22				
	EN	eSKS		36	10				
	EN	eS		36	29				
	EN	esS		36	51				
	EN	eL		56	-				
	E	M	05	06	-	22	2		
	N	M		09½	-	20	1½		
	Z	M		11½	-	16	1½		
		F		35	-				
26	ZV,Z	eP	05	37	41			17°N., 61°W. Leeward Islands. USCGS.	



**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

MAY, 19 59

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
26	ZV,Z	eP	06	44	59	2	0.5(ZV)	37½°N., 70°E. Northern Afganistan-Tadzhik border. USCGS.	
	ZV,Z	e		45	04				
	NE	eL	07	04	-				
	N	M		05½	-	22	2		
	E	M		09½	-	16	1½		
	Z	M		10	-	12	1		
		F		30	-				
27	N	eL	20	45½	-			45¾°N., 20¾°E. Yugoslavia-Rumania border. BCIS	
	N	M		47	-	17	3		
	E	M		47½	-	17	1½		
	Z	M		48	-	12	1		
		F	21	10	-				
28	E	e	19	22	-			Very small.	
		F		30	-				
✓ 29	ZV,Z	iPKP	11	02	25	7	2.2	19°S., 169½°E. New Hebrides Islands. Mag. 6½ (Pas). h about 100 Km. USCGS.	
	ZV,Z	ipPKP		02	49				
	ZV,Z	esFKP		03	07				
	N	eSP		16	25				
	E	e(sss)		25	25				
	N	eL		52	-				
	E	M	12	09	-	22	1½		
	N	M		11	-	22	1		
	F	13	00	-					
29	NE	e	13	32	-			Very small. 21°N., 146½°E. Mariana Islands. USCGS.	
		F							
31	ZV	eP	05	47	38			20°N., 80°W. Cayman Islands. USCGS.	
	N	eL	06	07	-				
	E	M		14	-	20	1½		
	N	M		15	-	20	1½		
	F		30	-					
✓ 31	ZV,Z	ePKP	09	47	28			14400	
	Z	ePP		49	45				
	NE	ePKS		50	49				
	NE	eL	10	29	-				
	N	M		49½	-	20	1		
	E	M		50	-	20	1		
	Z	M		50	-	20	1½		
	F	12	10	-					
31	ZV,Z	eP	12	20	09			2200	
	ZV,Z	e		20	20				
	ZV	e		30	27				
	N	eS		23	47				
	N	e		24	07				
	N	eL		25½	-				
	N	M		27	-	20	1½		
	E	M		29	-	16	1½		
	Z	M		29	-	16	1½		
	F		45	-					
31	NE	eL	13	22	-			Very small.	
		F		40	-				

All the magnitudes are the "unified magnitudes" denoted by "m".



I.O. 924

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR..... JUNE,..... 19 59

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION : RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS : (i) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS : FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T. sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi t}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(ii) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE : MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI-TUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
✓ 1	NE N	eL M F	18	15 28 50	- - -	20	$\mu$ 1	km.	6 $\frac{1}{2}$ ° S., 155 $\frac{1}{2}$ ° P. Solomon Islands. USCGS.
✓ 2	NE E N	eL M M F	01	30 38 $\frac{1}{2}$ 38 $\frac{1}{2}$	- - -	22 20	1 $\frac{1}{2}$ 1		32° N., 131° E. Kyushu, Japan. USCGS.
✓ 2	NE NE N E N Z	e(SKS) e eL M M M F	03	01 01 20 30 30 35 04 10	27 49 - - - - -	- - 20 20 16	- - 5 $\frac{1}{2}$ 6 1 $\frac{1}{2}$		21° N., 121° E. Batan Islands region. USCGS.  Mag. = 6 $\frac{1}{4}$
2	ZV ZV	ePKP ePKP <sub>2</sub>	03	43 43	29 48	-	-		25° S., 176° W. Tonga Islands region. USCGS.
2	ZV ZV N N E	iPKP ePKP <sub>2</sub> eL M M F	03 04	52 52 45 53 53 $\frac{1}{2}$	10 31 - - -	20 20	1 $\frac{1}{2}$ 1 $\frac{1}{2}$		25 $\frac{1}{2}$ ° S., 176° W. Tonga Islands region. USCGS.  overlapped by next shock.
✓ 2	ZV ZV N E	ePKP ePKP <sub>2</sub> M M F	04 05	12 12 12 15	21 41 - -	20 20	1 1		25 $\frac{1}{2}$ ° S., 176° W. Tonga Islands. USCGS.  overlapped by next shock.

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

JUNE, 19 59

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
✓ 2	NE	e(S)	05	21	06				21°N., 121½°E. Batan Islands region. USCGS.  Mag. = 6½ overlapped by next shock.
	Z	ePPS		22	39				
	NE	eL		39	-				
	E	M		49½	-	20	24		
	N	M		50	-	20	24		
	Z	M F		54	-	16	4		
✓ 2	N	eL	06	26	-				21½°N., 121½°E. Batan Islands region. USCGS.  Mag. = 6
	E	M		35	-	20	3½		
	N	M		35	-	20	4		
	Z	M F		42	-	16	2½		
2	N	eL F	20	00	-				Very small. 23°N., 121½°E. Near Formosa. USCGS.
				20	-				
3	ZV	eP	03	55	48				Very small. 4°N., 77°W. Near Colombia. USCGS.
	NE	eL F	04	22	-				
				40	-				
3	NE	e F	06	30	-				Very small. 52½°N., 170°W. Fox Islands. USCGS.
				45	-				
4	ZV	iP	02	10	02				9°N., 84½°W. Near Costa Rica. USCGS.
4	ZV	eP	12	42	40				59½°N., 153°W. Cook Inlet. USCGS.
5	NE	eL	21	15	-				12°N., 86½°W. Near coast of Nicaragua. USCGS.
	E	M		21	-	20	2½		
	N	M		21	-	20	1		
	Z	M		21	-	20	1½		
		F		40	-				
✓ 7	ZV	eP	13	49	02			6020	Confused by strong microseisms.  ½°N., 18°W. Atlantic Ocean. USCGS.
	ZV	e		49	12				
	N	eS		59	35				
	N	eL	14	01½	-				
	E	M		12	-	16	3½		
	N	M F		12	-	18	2½		
9	NE	eL F	23	58	-				Small. 59°S., 7½°W. Bouvet Island region. USCGS.
			24	45	-				
10	ZV	iP	04	21	12	1.5	0.4	2700	Confused by microseisms.  35¾°N., 24¼°E. Crete. BCIS.  Mag. = 5¾
	ZV	i		21	16				
	ZV	i		21	20				
	ZV	iPP		21	56				
	ZV	e		22	03				
	NE	eS		25	26	10	2.5 (SH)		
	NE	eL		27½	-				
	N	M		31	-	16	2½		
	E	M		32	-	16	2½		
	Z	M F		33	-	16	2½		





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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
✓ 18	ZV,Z	eP	15	43	05	20	5.8	8140	Confused by microseisms. Deeper than normal.
	NE	eS		52	30				
	E	eSS		57	04	16	43	54°N., 160°E. Near east coast of Kamchatka.	
	E	eLQ	16	03	-				
	N	eL2		12	-	16	47	USCGS.	
	E	M		20	-				
	N	M		21	1/2	14	15	Mag. = 6 1/2.	
	Z	M		24	1/2				
		F	18	50	-				
✓ 19	E	e(SKS)	02	00	17	22	1 1/2	6°N., 82 1/2°W. South of Panama.	
	E	e(PS)		01	09				
	N	eL		12	-	20	1 1/2	USCGS.	
	E	M		20	-				
	N	M		21	-				
		F	55	-					
23	NE	e	11	15	-			Very small. 41 1/2°N., 82°E. China.	
		F		30	-			USCGS.	
✓ 23	N	eL	15	06	-	16	1 1/2	39°N., 119°W. Western Nevada	
	E	M		17	-				
	N	M		17	-	14	2 1/2	Mag. 6 1/2 (Pas). USCGS.	
	Z	M		20	-				
			F	40	-				
23	E	M	15	46	1/2	16	1	39°N., 119°W. Nevada aftershock.	
	N	M		46	1/2	16	1		
		F	16	05	-				USCGS.
24	NE	eL	05	06	-			Very small.	
	NE	M		15	-				
		F		30	-				
24	NE	e	08	05	-			Very small.	
		F		25	-				
✓ 25	ZV,ZNE	iP	06	51	01	8	3.4	(2250)	Compression PH. 11 sec. 3.3μ
	NE	e		54.0	-				62°N., 27 1/2°W. South of Iceland.
	ZNE	e(S)		54	42			USCGS.	
	NE	eLQ		55	1/2	-	16	6	
	E	M		57	1/2	-			
	N	M		57	1/2	-	16	13	
	E	M		58	1/2	-	12	8	
	Z	M		58	1/2	-	12	6	
		F	07	45	-			Mag. = 5.6.	
25	NE	eL	14	15	-	24	1 1/2	30 1/2°N., 131°E. Ryukyu Islands.	
	E	M		28	-				
	N	M		29	-	20	1	USCGS	
		F		50	-				
25	NE	e	15	45	-			Small. 5°S., 152°E. New Britain.	
		F	16	20	-				USCGS.
26	NE	e	04	45	-			Very small. 6°S., 107°W. Southwest of Galapagos Is.	
		F	05	15	-				USCGS.

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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

JUNE, 19 59.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.		
			h.	m.	s.					sec.	μ
27	ZV,Z	eP	19	20	46	5	1.2	6000	42°N., 80°E. China-U.S.S.R. border. USCGS.		
	ZV,Z	i		20	52						
	ZV	ePP		22	50						
	NE	eS		28	18						
	N	eL		37	-						
	E	M		41	-					20	3½
	N	M		41	-					20	7
	E	M		45	-					13	7½
	N	M		45	-					16	5½
	Z	M		45	-					13	5
	F		-	-	-	-	-	Mag. = 6.1			
27	ZV,Z	iPKP	19	24	21	6	2.4	17900	Depth = 100 Km. 33°S., 179°W. South of Kermadec Islands. Mag. 6¾ (Pas) USCGS.		
	ZV,Z	ePKP <sub>2</sub>		25	08						
	ZV,Z	ePP		28	50						
	ZV,Z	eaPP		29	26						
	E	M	20	38	-					20	2
	N	M		38½	-					21	2½
	Z	M		38½	-					20	1
	F	21	40	-							
28	NE	eL	04	32	-	20	1½	63½°N., 20°W. Near South coast of Iceland. USCGS.			
	N	M		32½	-				13	2½	
	E	M		33	-				12	½	
	Z	M		34½	-						
		F		45	-						
28	ZV	ePKP	20	02	11	23	2½	13000	Depth = 100 Km. 9½°S., 122½°E. Sawoe Sea. USCGS.		
	ZV,Z	ePP		03	29					24	2½
	Z	epPP		03	53					22	1½
	N	eS		11	05						
	N	eSS		19	27						
	N	eL		36	-						
	N	M		56½	-						
	E	M		57	-						
	Z	M		57	-						
		F	22	10	-						
29	ZN	ePKS	07	38	51	20	1½	7°S., 155½°E. Solomon Islands. USCGS.			
	N	M	08	39½	-				1		
	E	M	09	41½	-						
	F		10	-							

All the magnitudes are the "unified magnitudes" denoted by "m".





F.O. 654

**AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.**

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN FOR..... JULY,..... 19.59.**

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION : RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS : (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS : FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1918).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub> sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ <sup>2</sup> .	$\frac{Ak}{\pi I}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE : MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
1	NE	eSKS	02	49	48	20	1	10200	Depth = 530 Km.  28°N., 139½°E. Bonin Islands region. h about 550 Km. Mag. 6(Pas). USCGS
	NE	eS		50	25				
	ZNE	eSP		51	53				
	NE	esS		53	55				
	N	esSP		54	59				
	Z	e		55	02				
	NE	eSS		56	55				
	NE	eL	03	15	-				
	N	M		26	-				
	F		50	-					
2	ZV	iPKP	11	53	01				20°S., 178½°W. Fiji Islands. USCGS.
3	ZV,Z	iPKP	18	14	47	6	2.0	15800	Depth = 170 Km.  16°S., 172½°E. New Hebrides Islands region. Mag. 6¼-6½(Pas). USCGS.
	ZV,Z	ipPKP		15	31	8	5.1		
	Z	epPP		18	49	7	3.3		
	N	epSP		29	04				
	N	ePSS		39	02				
	ZNE	eLR	19	04	-				
	N	M		07	-	36	26		
	E	M		16½	-	21	8		
Z	M		17	-	21	4			
N	M		20½	-	22	9			
	F		20	30	-			Mag. = 6.6	
4	E	e(S)	07	49	11	16	½		
	NE	eL		51	-				
	E	M		52	-				
		F		57	-				

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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

JULY, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
6	ZNE	ePP	09	39	-	8	2.3	2550	PPH 12 sec. 4.6 μ. Timing out of action. 26½°S., 61½°W. Argentina. h about 600 Km. USCGS. Mag. = 6.6
	NE	iSKS		45	-	10	17.0 (H)		
	NE	eS		46	-	8	5.6 (H)		
		F	11	35	-				
8	ZV,Z	eP	02	08	43			2550	71½°N., 19°W. Near east coast of Greenland. USCGS.
	N	eS		12	48				
	NE	eL		14½	-				
		F		30	-				
8	ZV,Z	eP	04	12	44			10300	44°N., 147½°E. Kurile Islands. USCGS.
9	ZV,Z	eP	16	18	28			10300	Depth = 110 Km. 20½°S., 68°W. Chile-Bolivia border. h about 100 Km. Mag. 6¾(Pas). USCGS
	ZV,Z	ipP		18	57	6	1.1		
	ZV,Z	ePP		22	01	7	1.1		
	NE	eSKS		28	51	12	7.0(H)		
	N	eS		29	24				
	NE	esSKS		29	44	12	6.5(H)		
	ZNE	eSP		30	40				
	NE	ePPS		31	31				
	N	eLQ		44	-				
	E	M		56½	-	20	5		
	N	M		56½	-	20	4		
	Z	M		56½	-	20	2		
	F		18	30	-			Mag. = 6½	
10	N	e	18	08	-				Very small. 41°N., 63°E. Kirghiz S.S.R. USCGS.
		F		20	-				
11	ZV	ePKP	05	11	15				18½°S., 169°E. New Hebrides Islands. USCGS
	N	eL		58	-				
	E	M	06	19	-	20	1½		
	N	M		21	-	20	½		
	F		07	10	-				
11	Z	e(PP)	12	21	05				36°S., 78°E. Indian Ocean. USCGS.
	N	eL		49	-				
	E	M	13	16	-	19	4		
	N	M		17	-	18	4½		
	Z	M		17	-	17	2		
	F		14	35	-			Mag. = 6¼	
11	ZV	iP	18	35	17				44½°N., 148½°E. Kurile Islands. USCGS.
12	ZV	iPKP <sub>1</sub>	00	43	09				19½°S., 177½°W. Fiji Islands. h about 400 Km. USCGS.
	ZV	i		43	27				
13	N	e	01	50	-				71½°N., 7½°W. Jan Mayan Islands. USCGS.
		F		58	-				
13	ZV	eP	12	40	38				52°N., 172½°W. Andreanof Islands. Mag. 6½(Pas). USCGS.
	ZV	e		40	44				
	E	M	13	20	-	16	3		
	N	M		20	-	20	4½		
	Z	M		20	-	16	2		
	F		14	25	-			Mag. = 6	



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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

JULY, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
14	ZV	ePKP	13	19	54	sec.	μ	km.	16½°S., 173°E. New Hebrides Islands. h about 100 Km. USCGS.
	N	M F	14	25	-	20	½		
14	N	e	20	34	-	16	½		
	N	M F		36½	-				
✓ 14	N	eL	23	28	-	20	¼ ½		1°N., 120°E. Near north coast of Celebes. USCGS.
	E	M		44	-				
	N	M F	24	10	-				
16	ZV,Z	iP	15	29	30				50½°N., 177°W. Andreanof Islands. USCGS.
16	ZV,Z	ePKP	19	33	43				21½°S., 169°E. Loyalty Islands. USCGS.
	ZV,Z	i		33	53				
17	N	e F	19	51 57	-				Very small.
✓ 18	ZV,Z	iP	20	08	11	6	2.2	10300	Dilatation. PH 16 sec. 1.5 μ PPH 16 sec. 2.3 μ 15½°N., 120½°E. Luzon. Mag. 6½-6¾(Pas). Felt. USCGS.
	ZV,Z	iPP		12	03	6	2.2		
	NE	iSKS		18	34	10	7.7(H)		
	N	eS		19	10	24	16.4(H)		
	Z	iPS		20	31				
	N	eSS		25	40				
	N	eLQ		35	-				
	E	M		46½	-	25	25		
	N	M		48	-	20	24		
	Z	M F		53½	-	18	6		
				22	40	-			
✓ 19	NE	eL	04	36	-	22	¼ ½		6½°S., 105°E. Sunda Strait. USCGS.
	N	M		45	-				
	E	M F	05	20	-				
✓ 19	ZV,Z	iP	15	18	50	6	1.7	10000	Compression. Depth = 200 Km. PPH 10 sec. 3.0 μ 15°S., 70½°W. Peru. Mag. 7(Pas). h about 200 Km. USCGS.
	ZV,Z	epP		19	39	8	3.4		
	ZV,Z	iPP		22	27	7	3.7		
	ZV,Z	ipPP		23	14				
	ZV,Z	ePPP		24	23				
	NE	iSKS		28	59	13	24.0(H)		
	NE	eS		29	02	12	10.7(H)		
	Z	iSP		30	32				
	E	eSPP		31	02				
	E	eSS		36	00				
	NE	eL		44	-				
	E	M		53	-	24	22		
	N	M		55	-	18	10		
Z	M F		55	-	18	6	Mag. = 6¾		
			18	15	-				
✓ 20	ZV	ePP	02	58	39				Intermediate depth. 6°S., 110°E. Java Sea. USCGS.
	ZV	ePPP	03	00	50				
	NE	eSKS		04	25				
	NE	e		05	16				
	N	e(S)		05	54				
	ZV	ePKP		10	08				

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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

JULY, 19 59

DATE	COMPT	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS	
			h.	m.	s.					sec.
contd. ✓ 20	E	M	03	43	-	20	1 1/2 1 1/2 2			
	N	M		43	-	20				
		F	04	20	-					
21	N	e	01	50	-			9200	Very small. 9°S., 151°E. Near New Guinea. USCGS.	
		F	02	10	-					
21	NE	e	08	45	-			9200	Small. 14 1/2°N., 167 1/2°E. New Hebrides Islands. USCGS.	
		F	09	25	-					
✓ 21	N	eL	09	45	-		1 1/2 1 1 1/2	9200	19°N., 68 1/2°W. Dominican Republic region. USCGS.	
	E	M		59 1/2	-	17				
	N	M		59 1/2	-	18				
	Z	M		59 1/2	-	16				
✓ 21	ZV,Z	eP	12	41	32	6	0.9	9200	16°N., 98°W. Near coast of Oaxaca, Mexico. Mag. 6(Pas). USCGS.	
	Z	ePP		44	44					
	NE	eS		51	51	10	1.8(H)			
	E	ePS		52	44					
	E	eLR	13	09	-					
	Z	M		20	-	18	1 1/2			
	E	M		20	-	18	1 1/2			
	N	M		23	-	18	1			
✓ 21	Z	eP	13	15	53		1 1/2	9200	16°N., 98°W. Near Oaxaca, Mexico. USCGS.	
	NE	eS		26	11					
	N	M		55	-	18				
		F	14	10	-					
22	NE	e	05	35	-			9200	Very small. 15 1/2°N., 97 1/2°W. Near Oaxaca, Mexico. USCGS.	
		F		50	-					
22	NE	e	16	35	-			9200	Very small. 15 1/2°N., 97 1/2°W. Near Oaxaca, Mexico. USCGS.	
		F		55	-					
22	ZV,ZN	iP	19	34	48	5	1.5	8200	Dilatation. Depth = 670 Km. 53°N., 153°E. Sea of Okhotsk. h about 650 Km. USCGS.	
	ZV	i		34	53					
	ZV,Z	iP		37	03					
	ZV,Z	ePP		37	45					
	ZV,Z	eSP		38	02					
	NE	eS		43	28	10	1.8			
	Z	eSP		44	04					
	E	eSS		47	16					
	N	eSS		48	26					
	N	M	20	17	-	18	1			
22	ZV,Z	ePKP	23	21	34		1 1/2 11 7	9200	Mag. = 5 3/4	
		NE	ePKS		24	53				
		NE	e		30	46				
22	N	eL	24	05	-		4 11 7	9200	5°S., 152 1/2°E. New Britain. h about 60 Km. USCGS.	
		Z	M		23	-				20
		N	M		23	-				20
		E	M		24	-				20
22	N	F	26	15	-			9200	Mag. = 6 1/2	

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

JULY, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLI- TUDE	Δ	REMARKS
			h.	m.	s.				
23	ZV N	eP eL F	04	00	13				Very small. 3°N., 71°W. Colombia. h about 60 Km. USCGS.
✓ 23	Z ZV,Z N E	ePKP ePP M M F	15	16	30				24½°S., 176°W. Tonga Islands region. h about 60 Km. Mag. 5¾(Berk). USCGS.
✓ 24	ZV,Z NE N NE E N Z	eP eS eSS eL M M M F	01	35	01	16	3.4(H)	8580	41°N., 125½°W. Off coast of northern California. Mag. 5¾-6(Berk). USCGS.
			02	04	-	20	9		
				05	-	19	9		
				05	-	19	3		
			03	25	-				Mag. = 6.2
24	ZV,Z ZV,Z NE	iP e(pP) eSS F	16	29	12				24½°N., 94½°E. India-Burma border. USCGS.
				29	49				
				43	58				
			17	15	-				
✓ 24	NE E N	eL M M F	23	50	-				56½°S., 28½°W. Sandwich Islands. USCGS.
			24	04	-	18	1½		
				04	-	20	½		
				30	-				
25	NE	e F	02	50	-				Very small.
			03	25	-				
25	N N	e M F	12	45	-	20	½		
			13	15	-				
25	ZV E	eP M F	19	35	35	18	½		49½°N., 142½°E. Sakhalin. USCGS.
			20	09	-				
				25	-				
25	ZV ZV	eP epP	21	33	04				Depth = 80 Km. 37°N., 140½°E. Honshu, Japan. USCGS.
				33	26				
26	ZV,Z ZV,Z NE NZ E N Z	eP ePP eS ePcP M M M F	17	12	00			2400	41°N., 27½°E. Northwestern Turkey. Felt at Istanbul. USCGS.
				12	28				
				16	00				
				16	26				
				21	-	18	3		
				22	-	14	3½		
				22	-	12	1½		
				45	-				
✓ 31	ZV NE NE N E Z	e(P) eS eL M M M F	20	01	55			(5500)	38½°N., 70°E. Tadzhik S.S.R. USCGS.
				09	01				
				20	-				
				23	-	16	1		
				25	-	16	½		
				28	-	12			
				45	-				

All the magnitudes are the "unified magnitudes" denoted by "m".





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AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR AUGUST, 1959

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION : RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS : (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS : FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T. sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi I}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV.).

TIME SERVICE : MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$ .	REMARKS.
			h.	m.	s.				
2	NE E N	eL M M F	21	11	-	20	$\frac{1}{2}$ $\frac{1}{2}$	km.	About 150 miles north of Puerto Rico. USCGS.
4	ZV,Z	ePKP	08	21	04				20 $\frac{1}{2}$ ° S., 178° W. Fiji Islands. USCGS.
5	NE E N	eL M M F	06	04	-	18 18	$\frac{1}{2}$ $\frac{1}{2}$		12 $\frac{1}{2}$ ° N., 125° E. Samar, Philippine Islands. USCGS.
6	NE E N	e M M F	12	21	-	12 10	$\frac{1}{2}$ $\frac{1}{2}$		
7	ZV,Z EN N N E E N Z	eP eS e eSS eLQ M M M F	10 11	54 04	48 00	4	0.9	7900	56° N., 154° W. Kodiak Island region. Mag. 5 $\frac{3}{4}$ (Pas). USCGS.
						16 17 17	2 2 $\frac{1}{2}$ 1 $\frac{1}{2}$		Mag. = 6.1
			12	30	-				



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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS	
			h.	m.	s.					sec.
7	ZV,Z	eP	21	56	41	4	1.0	7920	56½°N., 154°W. Kodiak Island. USCGS.	
	ZV	e		56	50					
	EN	eS	22	05	55					
	N	e		06	17					
	N	eSS		10	17					
	E	eL		16	-					
	E	M		30½	-	17	2			
	N	M		32	-	17	2½			
	Z	M		32	-	17	1½			
		F		23	35	-				Mag. = 6.1
8	ZV	eP	00	59	10			8140	55°N., 162½°E. Near east coast of Kamchatka. Mag. 6½(Pas). USCGS.	
	ZV	e		59	17					
	EN	eS	01	08	35	12	1.2(H)			
	N	eSS		13	29					
	E	eL		19	-					
	E	M		32½	-	19	4½			
	N	M		35	-	18	3			
	Z	M		38	-	16	1			
		F		02	35	-				Mag. = 6.0
	9	NE	e	05	09	-				
E		M		37	-	20	½			
N		M		38	-	20	½			
	F		06	10	-					
9	NE	eL	21	25	-				10°S., 161°E. Solomon Islands. h about 100 Km. USCGS.	
	E	M		53	-	20	½			
	N	M		53	-	20	½			
	F		22	40	-					
10	N	eL	00	50	-				Greece.	
	N	M		51½	-	16	½			
	F		01	00	-					
10	N	eL	01	53	-				55½°S., 146°E. Indian Ocean. USCGS.	
	N	M	02	18	-	20	½			
		F		40	-					
10	NE	eL	23	47	-				35°N., 111°E. Shansi Province, China. USCGS.	
	E	M		55	-	16	½			
	N	M		55	-	18	1			
		F		24	15	-				
11	NE	eL	18	24	-					
	E	M		26	-	16	½			
	N	M		26½	-	18	½			
		F		32	-					
11	NE	eL	23	00	-				11°S., 163°E. Solomon Islands region. USCGS.	
	E	M		16½	-	20	1½			
	N	M		16½	-	20	1			
	F		25	-						
11	N	eL	23	36	-				Greece.	
	N	M		39	-	14	1			
		F		45	-					



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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
12	NE	eL	01	09	-			11½°N., 86°W. Near coast of Nicaragua, h about 60 Km. USC GS.	
	E	M		17	-	20	1 ½		
	N	M		20	-	20			
		F		50	-				
12	ZV	eP	02	13	40			3°S., 80½°W. Near coast of Ecuador. USC GS.	
	ZV	e		13	49				
✓ 12	NE	eL	04	39	-			15°S., 28°E. Northern Rhodesia. USC GS.	
	E	M		43½	-	20	1½		
	N	M		44	-	20	1		
	N	M		52	-	12	2 ½		
	Z	M		52	-	12			
		F		05	10	-			
✓ 12	ZV,Z	iPKP	10	18	05			15900	
	ZV,Z	i		18	16				
	ZN	e		19	21				
	N	eSKSSKS		40	58				
	N	eSSS		45	40				
	N	M	11	12	-	28	12		
	E	M		23½	-	20	6½		
	N	M		23½	-	20	6½		
	Z	M		26	-	18	2½		
		F		13	10	-			
13	ZV	eP	00	40	04			Mag. = 6½	
	N	eL		48	-				
	N	M		58	-	16	½		
		F		01	20	-			
✓ 15	NE	iSKS	09	20	35			10000	
	ZNE	iS		20	51	16	31(H)		
	ZNE	iPS		22	12				
	ZE	iPPS		22	36				
	N	iSS		27	02				
	E	i		27	22				
	N	eSSS		30	18				
	N	eLQ		35	-				
	NE	eLR		38½	-				
	E	M		48	-	21	200		
	N	M		48	-	22	230		
	Z	M		48	-	20	94		
		F		12	15	-			
15	NE	eL	14	35	-			Mag. = 7.2	
	E	M		46	-	18	1		
	N	M		46	-	18	1		
		F		15	25	-			
✓ 16	E	eSS	01	34	12			21°S., 169°E. Loyalty Islands. region. USC GS.	
	NE	eL	02	00	-				
	N	M		13	-	20	5		
	E	M		16½	-	18	5		
	Z	M		19	-	16	2½		
		F		03	10	-			
16	ZV	iPKP	10	12	44			Depth = 350 Km.	
	ZV	ipPKP		14	10				



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			h.	m.	s.					sec.	μ
16	ZV,Z	eP	18	46	55			2450	Greece.		
	ZV	e		47	09						
	NE	eS		50	51						
	N	eL		53	-						
	E	M		55	-	14	1½				
	N	M		55	-	14	2½				
		F	19	10	-			Mag. = 5¼			
✓ 17	ZV,Z	eP	01	37	21	4	2.3	2020	41½°N., 20½°E. Albania-Jugoslavia border. USCGS.		
	ZV,Z	i		37	29						
	ZV,Z	iPP		37	37	4	1.9				
	N	e		40	31						
	NE	iS		40	40	10	5.8(H)				
	N	eL		41.9	-						
	ZN	ePcP		42	27						
	N	M		44½	-	15	51				
	E	M		46½	-	16	40				
	Z	M		47	-	13	17				
		F	02	45	-			Mag. = 5.9			
17	ZV	eP	04	33	09			2030	41°N., 20°E. Albania. USCGS.		
	ZV	e		33	32						
	NE	eS		36	29						
	NE	eL		38.0	-						
	N	M		40	-	14	4				
	E	M		42	-	15	3½				
		F	05	00	-	12	1½	Mag. = 5.4			
17	N	e	05	22	-			18	1		
	N	M		25½	-	18					
		F		35	-						
✓ 17	N	eL	08	48	-			14500	7½°S., 156°E. Solomon Islands. Mag. 7¼(Pas). USCGS.		
	E	M		56	-	16	1				
	N	M		56	-	18	1½				
	Z	M		56	-	16	1				
			F	09	15	-					
	ZV,Z	ePKP	21	23	59					22	63
	ZV,ZNE	ePP		26	24						
	ZN	ePKS		27	27						
	Z	ePS		36	29						
	ZN	ePPS		38	16						
E	eSS		43.2	-							
E	eLQ		59	-							
E	M		07	-	36	41					
N	M		07	-	36	44					
E	M		21½	-	20	35					
N	M		21½	-	20	10					
Z	M		31	-	16						
		F	-	-	-			Mag. m = 7 ; M = 7¼			
								overlapped by next shock.			
✓ 18	ZV,Z	eP	00	46	47	4	0.8	10000	22°N., 121½°E. Near south coast of Formosa. USCGS.		
	ZV,Z	ePP		50	27	5	0.9				
	NE	e(S)		57	28						
	Z	ePS		58	32						
	E	eSS	01	03	32						
	E	M		25	-	20	1½				
N	M		25	-	20	1½					

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			h.	m.	s.				
contd. ✓ 18	Z	M	01	32	-	16	μ	km.	Mag. = 6.2
		F	02	10	-				
✓ 18	ZV,ZNE	eP	06	48	11	8	14.7	7680	PH 16 sec. 19.5 μ
	ZV,Z	i	48	15					
	ZV,Z	i(!)	48	29					
	ZNE	ePP	50	46	8				
	NE	iS	57	13	24				
	ZNE	iPS	57	34					
	NE	e	58	22					
	NE	iSS	07	01	46				
	NE	eL	05	-	-				
	Z	M	17	-	-				
E	M	18	-	-	15	245			
N	M	18	-	-	16	370			
	F	-	-	-	16	435		Mag. m = 7.3 ; M = 7.6 overlapped by aftershock.	
18	ZV,Z	iP	08	07	14	5	1.8		Yellowstone aftershock. USCGS.
18	NE	eL	11	32	-	20	1 1/2	20	45°N., 111°W. Yellowstone aftershock. USCGS.
	E	M	41	-	-				
	N	M	41	-	-				
	Z	M	41	-	-				
	F	12	05	-	19	2 1/2		Mag. = 5 3/4	
18	ZV	eP	15	37	01			2030	S and M phases lost in break during recording. Yellowstone aftershock.
	ZV	e	37	11					
		F	18	20	-				
18	ZV	eP	22	08	08	16	3	2030	Albania. USCGS.
	EN	eS	11	28					
	N	eL	13	-	-				
	N	M	15	-	-				
	E	M	17	-	-				
	Z	M	18	-	-				
	F	30	-	-	14	2 1/2		Mag. = 5 1/4	
19	NE	eS	04	23	56	17	5 1/2	2030	45°N., 111 1/2°W. Yellowstone aftershock. USCGS.
	NE	eSS	28	22					
	NE	eL	31 1/2	-	-				
	E	M	40	-	-				
	N	M	40	-	-				
	Z	M	43	-	-				
	F	05	40	-	14	7 1/2		Mag. = 6.2	
19	NE	eL	07	51	-	18	1 1/2	2030	21 1/2°N., 121°E. South of Formosa. USCGS.
	E	M	08	07 1/2	-				
	N	M	07 1/2	-	-				
	F	30	-	-	17	1 1/2			
20	N	eL	13	10	-	20	1	2030	29°S., 78°E. Indian Ocean. USCGS.
	N	M	38	-	-				
		F	55	-	-				
21	NE	eL	07	48	-	18	1 1/2	2030	38 1/2°N., 104°E. Kansu Province, China. USCGS.
	E	M	52	-	-				
	N	M	52	-	-				
		F	08	10	-				



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			h.	m.	s.				
✓ 21	Z	eFKP2	08	23	32				50 <sup>10</sup> S., 139 <sup>10</sup> E. Indian Ocean south of Australia. USCGS.
	Z	M	09	38	-	20	2 <sup>1</sup> / <sub>2</sub>		
	N	M		38	-	20	4		
	E	M		44	-	19	3		
		F	10	45	-				Mag. = 6 <sup>1</sup> / <sub>4</sub>
✓ 21	N	eL	10	53	-				50 <sup>10</sup> S., 140 <sup>0</sup> E. Indian Ocean south of Australia. USCGS.
	E	M	11	09	-	20	1 <sup>1</sup> / <sub>2</sub>		
	Z	M		10 <sup>1</sup> / <sub>2</sub>	-	20	1 <sup>1</sup> / <sub>2</sub>		
	N	M		13	-	19	2		
		F		55	-				Mag. = 6
22	ZV	eP	23	57	19				
	ZV	e		57	34				
23	NE	eL	03	52	-				Very small.
		F	04	05	-				
23	ZV,Z	eP	22	25	16	5	1.2	2000	36 <sup>0</sup> N., 3 <sup>10</sup> W. Mediterranean Sea. BCIS.
	NE	eS		28	33	8	2.0(H)		
	E	eL		29 <sup>1</sup> / <sub>2</sub>	-				
	NE	e		30	33				
	E	M		31	-	11	8		
	N	M		32	-	10	6 <sup>1</sup> / <sub>2</sub>		
	Z	M		32 <sup>1</sup> / <sub>2</sub>	-	8	5 <sup>1</sup> / <sub>2</sub>		
		F	23	15	-				
✓ 24	ZV,Z	ePKP	21	50	10			(14800)	10 <sup>10</sup> S., 161 <sup>0</sup> E. Solomon Islands. Mag. 7 (Pas). USCGS.
	ZV,Z	e		50	40				
	NE	eFKS		53	05				
	ZNE	e		54	00				
	N	e(SKS)		56	23				
	NE	ePPS	22	03	46				
	NE	e		11	01				
	E	eLQ		26 <sup>1</sup> / <sub>2</sub>	-				
	E	M		48 <sup>1</sup> / <sub>2</sub>	-	20	15		
	N	M		48 <sup>1</sup> / <sub>2</sub>	-	22	22		
Z	M		48 <sup>1</sup> / <sub>2</sub>	-	22	4			
	F	25	50	-				Mag. = 6 <sup>3</sup> / <sub>4</sub>	
25	NE	eL	12	07	-				Very small.
		F		15	-				
✓ 26	ZV,Z	iP	08	37	35	4	5.2	8700	Compression. 18 <sup>0</sup> N., 94 <sup>10</sup> W. Vera Cruz, Mexico. 40 killed, many injured, extensive property damage. Mag. 6 <sup>3</sup> / <sub>4</sub> (Pas). USCGS.
	ZV,Z	i		37	46				
	ZV,Z	ePP		40	32				
	NE	eS		47	27	16	5.3(H)		
	NE	e		47	45				
	NE	ePS		48	19				
	E	eSS		52	29				
	N	eLQ		58 <sup>1</sup> / <sub>2</sub>	-				
	E	M	09	7 <sup>1</sup> / <sub>2</sub>	-	24	14		
	N	M		8	-	24	8		
Z	M		8	-	24	5			
	F	-	-	-				Mag. = 6.6 overlapped by next shock.	
✓ 26	ZV,Z	eP	10	38	55	4	1.0	7800	51 <sup>0</sup> N., 132 <sup>0</sup> W. South of Queen Charlotte Islands. USCGS.
	NE	eS		48	05	14	5.8(H)		
	NE	eScS		48	59				

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			h.	m.	s.				
contd. 26	NE	eSS	10	52	31				
	NE	eSSS		55	49				
	NE	eLQ		58	-				
	E	M	11	07 $\frac{1}{2}$	-	18	25		
	N	M		08 $\frac{1}{2}$	-	18	25		
	Z	M		08 $\frac{1}{2}$	-	18	11		
		F	12	35	-			Mag. = 6.5	
26	NE	eL	12	58	-				
	N	M	13	10	-	18	1 $\frac{1}{2}$		
	E	M		11	-	18	1		
		F		35	-				
27	NE	eL	14	35	-				
	E	M		40	-	20	1		
	N	M		40	-	20	1		
		F	15	10	-				
28	ZV,Z	eP	00	04	53				
	N	eL		32	-				25°N., 96°E. Northern Burma. USCGS.
	N	M		37 $\frac{1}{2}$	-	17	1		
	E	M		40	-	18	1		
		F	01	15	-				
28	NE	e	02	35	-				Very small. 48°N., 155°E. Kurile Islands. USCGS.
		F	03	00	-				
28	NE	e	04	30	-				Very small.
		F		40	-				
28	ZV,Z	ePKP	16	11	49				17°S., 167°E. New Hebrides Islands. USCGS.
	ZV,Z	e		12	22				
29	N	eL	05	58	-				
	N	M	06	03	-	20	1 $\frac{1}{2}$		
		F		15	-				
29	NE	e	13	52	-				Very small.
		F	14	10	-				
29	ZV,Z	eP	17	13	17	6	3.3	6700	PH 12 sec. 2.0 μ
	ZV,Z	i		13	22				
	ZV,Z	i		13	28				
	ZV,Z	ePP		15	31				52°N., 106 $\frac{1}{2}$ °E. Lake Baikal U.S.S.R. Mag. = 6 $\frac{1}{2}$ -6 $\frac{3}{4}$ (Pas). USCGS.
	ZV,Z	ePPP		16	51				
	NE	iS		21	29	12	4.7(H)		
	NE	ePS		21	45				
	NE	eSS		25	27				
	NE	eL		32 $\frac{1}{2}$	-				
	E	M		40 $\frac{1}{2}$	-	17	49		
	N	M		41 $\frac{1}{2}$	-	16	48		
	Z	M		42	-	14	20		
			F	19	20	-			Mag. = 6.5
	30	ZV,Z	eP	03	28	43	4	0.8	1960
NE		eS		31	56	9	1.1		
E		eL		33	-				
E		M		34 $\frac{1}{2}$	-	12	5 $\frac{1}{2}$		
N		M		35 $\frac{1}{2}$	-	12	3 $\frac{1}{2}$		
Z		M		35 $\frac{1}{2}$	-	12	3		
		F		55	-			Mag. = 5 $\frac{1}{4}$	

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SEISMOLOGICAL BULLETIN

AUGUST, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLI- TUDE	Δ	REMARKS
			h.	m.	s.	sec.	μ	km.	
30	N	eL	22	38	-				36½° S., 78½° E. Indian Ocean. USCGS.
	N	M		55½	-	20	3		
	E	M		59	-	18	1½		
	Z	M	23	00	-	18	1		
		F	-	-	-				
31	NE	eL	00	02	-				53° N., 106° E. Lake Baikal aftershock. USCGS.
	E	M		15½	-	16	1½		
	M	M		16	-	16			
	N	F		30	-				

All the magnitudes are the "unified magnitudes" denoted by "m".



AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR SEPTEMBER, 1959.

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T. sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ah}{\pi l}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
1	NE E N	eL	05	47	-				
		M		49 $\frac{1}{2}$	-	18	1		
		M		49 $\frac{1}{2}$	-	18	$\frac{1}{2}$		
		F	06	05	-				
1	ZV,Z E EN Z E N	eP	07	33	15			(2300)	
		e(S)		37	00				
		eL		38	-				
		M		40 $\frac{1}{2}$	-	16	2		
		M		40 $\frac{1}{2}$	-	16	3 $\frac{1}{2}$		
		M		41	-	14	2		
		F	08	15	-				
1	N N N E	e(S)	11	07	56				
		eL		15	-				20°N., 64 $\frac{1}{2}$ °W. North of Puerto Rico.
		M		27	-	16	$\frac{1}{2}$		USCGS.
		M		27 $\frac{1}{2}$	-	18	1		
		F	-	-	-				overlapped by next shock.
1	ZV,Z NE NE E N E Z	iP	11	41	49	4	3.0	2000	
		eS		45	06	13	12.4(H)		41 $\frac{1}{2}$ °N., 20°E. Albania.
		eL		46.0	-				2 killed, 34 injured and extensive property damage. USCGS.
		M		48	-	24	44		
		M		48	-	20	78		
		M		51	-	16	56		
		M		51 $\frac{1}{2}$	-	14	22		
		F	13	40	-				Mag. = 6.1
3	N N E	eL	04	11 $\frac{1}{2}$	-				41°N., 20°E. Albania.
		M		12 $\frac{1}{2}$	-	20	1 $\frac{1}{2}$		
		M		13	-	22	1		
		F		25	-				Mag. = 5

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

SEPTEMBER, 19 59

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
3	ZV,Z	ePP	06	46	59				4½°S., 123°E. Celebes Island. USCGS.
	E	e (SKKS)		54	02				
	N	e		54	52				
	E	e (PS)		56	32				
	NE	eL	07	12	-				
	E	M		38	-	22	5½		
3	N	M		38	-	22	5		Mag. = 6¼
	F		09	55	-				
3	E	e	23	05	-			Very small. 15°S., 175½°W. Fiji Islands region. USCGS.	
	F			20	-				
4	N	eL	00	48	-				
	N	M		50½	-	18	1		
	F		01	00	-				
4	N	e	08	40.0	-			48° 23'N., 7° 43'E. France- Germany border. BCIS	
	N	M		40½	-	12	1		
	F			42	-				
4	ZV,Z	eP	18	36	25			1°S., 24°W. Atlantic Ocean. USCGS.	
	E	M		06	-				
	F			30	-				
5	NE	eL	00	12	-			47°N., 75°W. Near coast of southern Chile. USCGS.	
	E	M		29	-	20	1		
	N	M		30	-	20	1		
5	N	eL	06	53	-			1°N., 129°E. Halmahera Island region. USCGS. Mag. = 6¼ overlapped by next shock.	
	E	M	07	17	-	22	3½		
	N	M		19	-	20	3		
5	N	eL	08	20	-			62°S., 156°E. Balleny Islands region. USCGS.	
	N	M		35	-	20	1½		
	E	M		36	-	20	2		
5	N	eL	16	34	-			1°N., 129°E. Halmahera aftershock. USCGS.	
	E	M		44	-	22	1½		
	N	M		46	-	20	1½		
5	N	eL	17	20	-			51½°N., 179½°E. Rat Islands. USCGS.	
	F				-				
	ZV,Z	e(P)	21	23	39				
5	E	eL	22	05	-			51°N., 179½°E. Rat Islands, Aleutian Islands. USCGS.	
	E	M		17½	-	20	½		
	N	M		18	-	20	½		
5	N	F		45	-			18°S., 178½°E. Fiji Islands. USCGS.	
	ZV,Z	iPKP	23	23	43				
6	NE	eL	01	20	-			5½°N., 126½°E. Philippine Islands. USCGS.	
	N	M		34	-	20	½		
	F			50	-				

M.O. 654

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

SEPTEMBER, 1959

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.	sec.	μ	km.	
8	Z,ZV N	iP M F	10 16 04	59	-	20	1/2		36 1/2° N., 140° E. Honshu, Japan. h about 100 Km. USCGS.
8	EN E N Z	eL M M F	13 58 - 14 19 1/2 -	-	-	20 19 20	1 1/2 1 1/2 1 1/2		South Atlantic Ocean, USCGS.
8	E E N	eL M M F	19 57 - 20 04 1/2 - 20 04 1/2 -	-	-	28 28	1 1		42 1/2° N., 142 1/2° E. Hokkaido, Japan. h about 100 Km. USCGS.
8	N	e F	21 15 - 25 -	-	-				Very small. 58 1/2° S., 24 1/2° W. Sandwich Islands. USCGS.
9	ZV,Z	iP	05 53 29						Hindu Kush. USCGS.
9	ZV ZV	e(Pg) e(Sg) F.	14 07 29 08 02 11 -					240	51° 25' N., 03° 15.5' E. Underwater explosion, Belgium. BCIS.
9	NE E N	eL M M F	18 31 - 32 1/2 - 33 - 40 -			17 14	1 1		
10	N	e F	04 07 - 13 -						Very small.
10	NE N E	eL M M F	06 36 - 52 - 53 1/2 - 07 25 -			22 20	1 1/2 1 1/2		6 1/2° S., 154 1/2° E. Solomon Islands. USCGS.
10	ZV,Z	iP	23 08 41						47° N., 152° E. Kurile Islands. USCGS.
11	ZV,Z ZV,Z N N E Z	iP e eS M M M F	12 35 53 36 05 39 41 41 1/2 - 42 - 43 - 13 15 -			12 14 14 10	3.4(H) 2 1/2 1 1/2 1 1/2		Mag. = 5 1/4
11	ZV,Z N N E	eP eS M M F	14 22 58 26 47 28 1/2 - 29 1/2 - 50 -			14 14 13	1.5 1 1	2360	Aftershock of preceding shock.  Mag. = 5
11	NE	e F	23 50 - 60 -						Very small. 12° N., 87 1/2° W. Near coast of Nicaragua. USCGS.



M.O. 654

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

SEPTEMBER, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
16	NE N	eL	11	30	-	18	1		29°S., 176½°W. Kermadec Islands. USCGS.
		M		38	-				
		F	12	25	-				
16	Z E NE Z N E	e(PKP)	16	16	58	19	1		28½°S., 176°W. Kermadec Islands. USCGS.
		e(SKSKS)		41	01				
		eL	17	15	-				
		M		27	-				
		M		27	-				
		F	18	40	-				
17	Z N E	ePKP	14	56	09	19	1½		28½°S., 176°W. Kermadec Islands. USCGS.
		M	16	06	-				
		F	17	20	-				
17	NE	e	22	53	-	19	1½		Very small. 30½°N., 114°W. Gulf of California. USCGS.
		F	23	15	-				
17	NE N	eL	21	57½	-	12	1		
		M	22	00	-				
		F		05	-				
18	NE E N Z	eL	02	13	-	14	2		
		M		14½	-				
		M		16	-				
		M		16	-				
		F		27	-				
18	NE Z N E	eL	12	53	-	22	1½		57½°S., 176½°W. Sandwich Islands. USCGS.
		M	13	00	-				
		M		00	-				
		M		01	-				
		F		55	-				
19	E E	e	15	55	-	17	½		
		M	16	04	-				
		F		15	-				
20	NE E N	eL	07	00	-	19	1½		13½°S., 111½°W. Pacific Ocean. USCGS.
		M		12	-				
		M		12	-				
		F		35	-				
21	NE	e	03	10	-				Very small. 9½°S., 149°E. Near New Guinea. USCGS.
		F		45	-				
23	E E N	eL	23	02	-	20	1		35½°N., 138½°E. Honshu, Japan. USCGS.
		M		11½	-				
		F		40	-				
24	NE	e	06	10	-				Very small. 83½°N., 112½°E. Arctic Ocean. USCGS.
		F		25	-				

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**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

SEPTEMBER, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
25	ZV,Z	eP	02	49	52	6	1.4	10000	Compression. PH 10sec. 1.1 μ PPH 10sec. 1.7 μ  22°N., 122°E. Near east coast of Formosa. USCGS.
	ZV,Z	e		50	09				
	ZV,Z	ePP		53	28	8	1.9		
	ZV,Z	e		53	52				
	EN	eSKS	03	00	19				
	EN	eS		00	37				
	Z	ePS		01	48				
	E	eSS		06.5	-				
	N	eL		19	-				
	E	M		36	-	19	44		
	N	M		36	-	19	60		
	Z	M		36	-	18	22		
	F	05	45	-			Mag. = 6½		
26	E	eS	08	42	15	16	1.9	Confused by microseisms.  43½°N., 128½°W. Off coast of Oregon. USCGS.	
	N	ePS		42	28				
	E	eSS		47	00				
	E	eL		51	-				
	E	M	09	02½	-	20	6½		
	N	M		02½	-	18	5½		
	Z	M		02½	-	18	3		
		F	11	25	-				Mag. = 6
28	NE	eL	05	09	-			26½°N., 128°E. Okinawa Islands. USCGS.	
	E	M		18	-	19	1		
	N	M		18	-	19	1½		
		F		35	-				
29	ZV,Z	ePKP1	15	51	54			29°S., 176½°W. Kermadec Islands. Mag. 6½-6¾(Pas). USCGS.	
	ZV,Z	ePKP2		52	25				
	E	e(SKSSKS)	16	15	59				
	NE	eL		47	-				
	Z	M	17	01½	-	19	3½		
	N	M		01½	-	19	9½		
	E	M		04½	-	19	9½		
	F	18	25	-			Mag. = 6.6		
30	NE	e	06	20	-			Very small. Kermadec Islands. USCGS.	
		F	07	05	-				
30	NE	eL	17	06	-			Confused by microseisms.  35°N., 3°W. Near coast of Spanish Morocco. USCGS.	
	E	M		07	-	12	2½		
	N	M		08	-	12	3½		
	Z	M		08	-	12	2½		
		F		20	-				
30	Z	e(PKP)	20	45	36			Confused by microseisms.  18°S., 168°E. New Hebrides Islands. USCGS.	
	N	eSS	21	07.9	-				
	NE	eL		34	-				
	N	M		50	-	22	3		
	E	M		51	-	22	2		
	F	22	50	-			Mag. = 6¼		

All the magnitudes are the "unified magnitudes" denoted by "m".





M.O. 654

**AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.**
**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**
**SEISMOLOGICAL BULLETIN FOR OCTOBER, 1959.**

Lat. 51° 28' 8" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub> sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ <sup>2</sup> .	$\frac{Ak}{\pi l}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.		
			h.	m.	s.						
1	N	eL	04	49 $\frac{1}{2}$	-	18	1 $\frac{1}{2}$				
		M		50 $\frac{1}{2}$	-						
		F		57	-						
3	E	e	22	20	-	20	1				
		M		28	-						
		F		40	-						
5	ZV,Z	eP	18	35	38	6	1.3	4650	Confused by microseisms.		
		eS		41	54	14	2.2(H)				
		e		45	18	18	3				
		M		59	-	18	2				
		M		59 $\frac{1}{2}$	-	18	2				
		F		19	00	-	18			1 $\frac{1}{2}$	
5	ZV,Z	eP	20	38	13	18	8 $\frac{1}{2}$	2030	Confused by microseisms.		
		eS		41	33					16	5 $\frac{1}{2}$
		eL		43	-					12	4 $\frac{1}{2}$
		M		45	-					20	25
		M		47 $\frac{1}{2}$	-					20	15
		F		21	10					-	
7	ZV,Z	iP	08	34	48	4	2.7	2010	Compression.		
		i		34	55	8	3.8(H)				
		eS		38	06						
		i		38	21						
		eL		39 $\frac{1}{2}$	-						
		M		41	-	20	25				
7	N	M		41 $\frac{1}{2}$	-	20	15	2010	Compression.		
		M		42	-						
		M		42	-						
		M		42	-						

 83 $\frac{1}{2}$ <sup>10</sup>N., 112 $\frac{1}{2}$ <sup>10</sup>E. Arctic Ocean.  
Mag. 5 $\frac{3}{4}$ -6 (Berk). USCGS.

Mag. = 5.7

41°N., 20°E. Albania. USCGS.

 Mag. = 5 $\frac{1}{2}$ 

41°N., 20°E. Albania.

M.O. 654

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

OCTOBER, 1959

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS			
			h.	m.	s.							
contd. 7	E	M	08	44	-	15	25	km.				
	Z	M		44½	-	12	9					
		F	09	20	-				Mag. = 5.8			
8	ZV,Z	ePKP	00	23	14				Very small. 19°S., 169°E. New Hebrides Islands. USCGS.			
	N	M	01	28	-							
		F		40	-							
8	N	e	02	20	-				Very small. 52½°N., 171°W. Fox Islands. USCGS.			
		F		35	-							
8	NE	e	14	45	-				Very small. 52½°N., 107°E. Lake Baikal, USSR. USCGS.			
		F		15	00					-		
12	NE	e	01	28	-				Very small.			
		F			40					-		
12	N	e(S)	03	46	13	12	1.3		2°N., 98½°E. Near coast of Sumatra. USCGS.			
		eL		04	01					-		
		M			23½					-	21	2½
		M			23½					-	20	2
		M			23½					-	20	1
		F		50	-				Mag. = 6.0			
12	NE	e	20	05	-				Very small.			
		F			15					-		
14	N	e	07	57	-				Very small.			
		F		08	03					-		
15	ZV	e(P)	04	35	03	18	1		19°N., 104°W. Jalisco, Mexico. h about 200 Km. USCGS.			
	E	M	05	12	-					16	½	
	N	M		13	-							
		F		20	-							
15	ZV,Z	eP	06	30	02	7	4.2	11700	PPH 9 sec. 2.0 μ			
	ZV,Z	iPP			34					35		
	E	eSKS			40					42		
	E	eSKS			41					25		
	N	eS			42					08		
	E	iPPS			44					25		
	Z	i			44					54		
	N	eSS			49.5					-		
	N	eSSS			53.7					-		
	N	eLQ		07	00					-		
	E	M			17					-	24	28
	N	M			17					-	24	41
	E	M			26½					-	22	24
N	M		28	-	20	24						
Z	M		28½	-	19	8						
		F	09	15	-				Mag. = 6.8			
15	ZV	i(P)	07	52	42				44°N., 148°E. Kurile Islands. USCGS.			
18	ZV	iP	17	18	09				Dilatation. 50½°N., 156°E. Near Kamchatka. USCGS.			

**NEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN**

OCTOBER, 1959

DATE	COMPT.	PHASE	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
18	ZV E E N	i(P) eL M M F	19	46	41				Confused by microseisms.
				51½	-	20	1½		
				53	-	20	1½		
			20	05	-				
19	ZV	iP	02	59	06				Compression. 44½°N., 148°E. Kurile Islands. USCGS.
19	N N Z E	eL M M M F	09	44	-	20	4		27½°S., 177°W. Kermadec Islands. Mag. 6½ (Pas). USCGS. Mag. = 6½
				58½	-	19	3		
				59	-	18	3		
			10	55	-				
19	N N NE NE NE E NE N E E N Z	eSKS eSKKS ePS eSS eSSS eLQ eLR M M M M M F	16	20	29				54½°S., 29°W. Sandwich Islands region. USCGS. Mag. = 6½
				21	27	30	7		
				23	49	30	11		
				29	51	20	3		
				33	29	20	4		
				40	-	20	6		
				45	-				
				46	-				
				47	-				
				54	-				
				55	-				
			18	25	-				
24	ZV,Z NE N E N E N Z	eP eSS eL M M M M M F	23	49	18				
			24	03	-	18	5½		
				09	-	18	11		
				09	-	15	9		
				12	-	15	10		
				12	-	15	10		
				40	-				
25	ZV,Z N NE E N Z	eP eS eL M M M F	06	55	58			2240	Confused by strong microseisms. Mag. = 5½
				59	38	10	3.2		
			07	00½	-	15	3		
				02½	-	13	4½		
				02½	-	14	3½		
				20	-				
25	NE	e F	16	10	-				Small. Confused by microseisms. 39°N., 42°E. Eastern Turkey. USCGS.
26	ZV,Z ZV,Z Z Z Z NE E N E E E	iP i i iPP ePPP eSKS eS eFPS eSS eL M	07	47	49	5	3.5	9700	Compression. Confused by microseisms. PH 6 sec. 2.0 μ 37½°N., 142½°E. Near east coast of Honshu, Japan. h about 60 Km. Mag. 6½ (Pas). USCGS.
				47	55				
				48	15				
				50	57				
				52	54				
				58	12				
				58	26	14	7.7(H)		
				59	24				
			08	03	52				
				14	-				
				21	-	28	20		



NEW OBSERVATORY, RICHMOND, SURREY, ENGLANDSEISMOLOGICAL BULLETIN

OCTOBER, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLI- TUDE	Δ	REMARKS
			h.	m.	s.				
contd.									
26	N	M	08	21	-	28	19		
	E	M		26	-	18	20		
	N	M		26	-	18	15		
	Z	M		30	-	18	13		
		F	09	40	-				Mag. = 6.7
27	NE	eL	06	45	-				
	E	M		58	-	18	4½		Confused by very strong microseisms.
	N	M		58	-	18	4		42½°N., 127°W. Off coast of Oregon USCGS.
		F	-	-	-				
27	ZV,Z	iP	07	04	54	8	7.3	8800	
	ZV,Z	i		05	16	18	6.3 (PH)		Compression. Confused by very strong microseisms.
	ZV,Z	i		05	34				
	N	eS		14	50	16	9.7		
	NE	iScS		15	14				45½°N., 151°E. Kurile Islands. h about 100 Km.
	NE	ePPS		15	58				USCGS.
	N	eSS		20	18				
	E	eL		28	-				
	E	M		42	-	22	31		
	N	M		43	-	21	35		
	Z	M		45	-	21	34		
		F	09	45	-				Mag. = 6.7
29	ZV,Z	iP	10	47	33				46°N., 151°E. Kurile Islands. USCGS.
29	ZV	iP	14	41	24	1.5	0.7	8500	Compression. Depth = 540 Km. Confused by microseisms.
	ZV	ipP		43	20				43°N., 131°E. China-Korea border. USCGS.
	ZV	iPP		44	22				Mag. = 5.9
	E	iS		50	26	10	2.4		
29	N	eL	15	35	-				Confused by microseisms.
	E	M		48	-	22	2		29½°S., 176½°W. Kermadec Islands. h about 60 Km. USCGS.
	N	M		48	-	22	2		
		F	16	25	-				
30	NE	e	01	25	-				Very small. 8½°N., 138°E. Caroline Islands. USCGS,
		F		55	-				
30	NE	e	15	20	-				Confused by microseisms.
	E	M		26	-	20	1½		23½°S., 175½°W. Tonga Islands. region USCGS.
	N	M		26	-	20	2		
	E	M		26	-	20	2½		
		F	16	15	-				
31	ZV,Z	iPKP	04	46	01	4	1.7		Depth = 440 Km. 16½°S., 178°W. Fiji Islands. Mag. 6½-6¾ (Pas). USCGS.
	ZV	epPKP		47	48				

All the magnitudes are the  
"unified magnitudes" denoted by  
"m".

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR DECEMBER, 19 59.

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub> sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ <sup>2</sup> .	$\frac{Ak}{\pi l}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.  
 TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.  
 SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD. sec.	AMPLITUDE.	Δ km.	REMARKS.
			h.	m.	s.				
✓ 1	ZV	iP	12	42	22	1.8	0.9	Dilatation. Confused by strong microseisms. 38°N., 21½°E. Near west coast of Greece. USCGS. Mag. = 5½	
	N	eL		48	-				
	N	M		51	-	16	5		
	E	M	13	52	-	16	3		
1	Z	eP	12	56	40			38°N., 21°E. Greece aftershock. USCGS.	
✓ 1	NE	eS	15	45	-				
	E	eL	16	10	-			Confused by strong microseisms. 63°S., 154°E. Ballew Islands region. USCGS. Mag. = 6½	
	E	M		41	-	20	3½		
	N	M	17	43	-	24	6½		
2	NE	eF	08	34	-			Very small. 5°S., 104°E. Near Sumatra. USCGS.	
	F	F		45	-				
✓ 2	ZV,Z	e	09	53	-			Confused by very strong microseisms. 1°S., 123°E. Celebes. Mag. 6½-6¾ (Pas).  Mag. = 6.6	
	EN	e(SKS)		59	24				
	E	ePPS	10	03	48				
	EN	eSS		09	06				
	EN	eL		19	-				
	N	M		42	-	24	16		
	E	M		46	-	24	12		
	M	M		46	-	22	13		
	F	F	12	15	-				



M.O. 654

## KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

## SEISMOLOGICAL BULLETIN

DECEMBER, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	$\Delta$	REMARKS				
			h.	m.	s.					sec.	$\mu$	km.	
8	ZV	i(P)	13	40	24	18	$4\frac{1}{2}$	8600	Confused by very strong microseisms. 42°N., 44½°E. Georgia S.S.R. USCGS. Mag. = 5¾				
	NE	eL								48	-	20	5½
	E	M								53	-		
	N	M								53	-		
		F	14	20	-								
12	E	eL	20	08	-	16	2		Confused by microseisms. 35¾°N., 0¾°W. Near coast of Algeria. B.C.I.S.				
	E	M								09	-	14	1
	E	M								10	-		
	N	F								15	-		
14	ZV,Z	iP	22	12	42	1.3	0.3(ZV)	8600	Confused by very strong microseisms. 52½°N., 168°W. Fox Islands, Aleutian Islands. Mag. 6(Pas). USCGS. Mag. = 6¼ overlapped by next shock.				
	ZV	i								12	45		
	NE	eS								22	29		
	NE	eL								38	-	18	7½
	N	M								52	-	17	7½
	E	M								53	-	17	9
	Z	M								53	-		
		F								-	-		
14	ZV	e(PKP)	23	40	36	27	60	12600	Confused by very strong microseisms. 59½°S., 31°W. Sandwich Islands. Mag. 7(Pas). USCGS. Mag. = 7				
	ZV,Z	ePP								41	28		
	N	eSKKS								48	25		
	E	e(S)								49	19	22	
	N	iPS								51	13	28	
	N	iSEP								57	45		
	E	eSSS								24	01	35	
	E	eLQ								09	-	18	54
	E	M								24	-	19	72
	N	M								25	-	19	58
	Z	M								25	-		
		F								26	20	-	
15	NE	e	11	16	-				Very small. 37°N., 70°E. Hindu Kush. USCGS.				
		F								28	-		
15	NE	e	13	13	-	22	2½		59°S., 24°W. Sandwich Islands. USCGS.				
	N	M								17	-	20	1½
	E	M								18	-		
		F								30	-		
18	ZV	iP	16	21	22				Confused by strong microseisms. 53°N., 168½°W. Fox Islands. Mag. = 6½(Pas) USCGS. Mag. = 6¼				
	ZV	i								21	24		
18	NE	eL	16	59	-	18	4½		Confused by strong microseisms. 53°N., 168½°W. Fox Islands. Mag. = 6½(Pas) USCGS. Mag. = 6¼				
	E	M								17	12	20	7
	N	M								14	-		
		F	18	10	-								
19	NE	eL	15	45	-	20	3		Confused by strong microseisms.				
	N	M								50	-	18	2½
	E	M								53	-		
		F								16	15	-	



M.O. 654

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

DECEMBER

19 59

**SEISMOLOGICAL BULLETIN**

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS	
			h.	m.	s.					sec.
✓ 21	ZV,Z	iP	11	28	55	6	4.7	6250	Confused by very strong microseisms. 14°N., 52°E. Gulf of Aden. Mag. 6 $\frac{1}{2}$ -6 $\frac{3}{4}$ (Pas). USCGS.	
	ZE	e		32	25					
	NE	eS		36	41	20	19			
	NE	eSS		40.6	-					
	N	iLQ		43	10					
	E	M		50 $\frac{1}{2}$	-	28	42			
	N	M		52 $\frac{1}{2}$	-	19	40			
	E	M		56	-	19	27			
Z	M		57	-	18	15				
	F		13	35	-			Mag. = 6.6		
22	NE	e	00	35	-			Very small. Confused by microseisms.		
		F	01	00	-					
25	NE	e	05	10	-			Small. 27 $\frac{1}{2}$ °S., 176°W. Kermadec Islands. USCGS.		
		F		40	-					
✓ 26	ZV	iP	22	14	18			Confused by very strong microseisms. 53°N., 160°E. Kamchatka foreshock. USCGS.		
		E		52	-	19	2 $\frac{1}{2}$			
		N		54	-	20	3			
✓ 27	NE	e	05	33	-			Confused by very strong microseisms. 35°N., 26°E. Near Crete. USCGS.		
		M		41	-	16	3 $\frac{1}{2}$			
		F		55	-					
27	ZV	iP	12	51	39			28°S., 63°W. Argentina. h = 650 Km. USCGS.		
✓ 27	ZV,Z	iP	16	04	21	7	6	8100	Compression. Confused by strong microseisms. 56°N., 162 $\frac{1}{2}$ °E. Kamchatka. USCGS.	
		E		13	44	12	4.5			
		NE	e		13	56				
		N	e		14	24				
		E	eSS		18	36				
		E	eLQ		24	-				
		N	M		36 $\frac{1}{2}$	-	20			33
		Z	M		37	-	20			36
✓ 28	ZV	eP	07	32	18			8540	Mag. = 6.6 Confused by strong microseisms. 52 $\frac{1}{2}$ °N., 160°E. Near east coast of Kamchatka. Mag. = 6 $\frac{1}{2}$ (Pas). USCGS.	
		ZV	e		32	32				
		E	eS		42	02	22			6.7
		E	eSS		46.7	-				
		E	eLQ		51	-				
		N	M	08	07 $\frac{1}{2}$	-	20			15
		Z	M		09 $\frac{1}{2}$	-	19			20
			M		14	-	18			12
✓ 28	ZV	eP	13	16	16			Mag. = 6.4 Confused by strong microseisms. 52 $\frac{1}{2}$ °N., 160°E. Near coast of Kamchatka. USCGS. Mag. = 6		
		E	M		52	-	20		2 $\frac{1}{2}$	
		N	M		52 $\frac{1}{2}$	-	19		4	
			F	14	25	-				
31	ZV,Z	iP	20	57	57	5	2.5	2600	Compression. Confused by microseisms. 37 $\frac{1}{2}$ °N., 25°W. Azores Islands. USCGS.	
		ZV,Z	e		58	06				
		NE	eS	21	02	05	16			4.1(SF)
	NE	eL		03 $\frac{1}{2}$	-					

FORM 3718

contd.

M.O. 654

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

DECEMBER, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
contd. 31	E N Z	M M M F	21	04 $\frac{1}{2}$ 04 $\frac{1}{2}$ 07 25	- - - -	14 14 14	μ 3 5 4	km.	Mag. = 5 $\frac{3}{4}$

All the magnitudes are the "unified magnitudes" denoted by "m".



AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR NOVEMBER, 19 59.

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: (I) GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE"

(LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T. sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi l}$ sec. <sup>-1</sup>
N.	1st August 1957	21.2	21.2	0.00	62.5
E.	1st August 1957	21.1	21.1	0.00	52.0
Z.	17 December 1957	10.7	11.4	-0.05	121

(II) VERTICAL SEISMOGRAPH, PERIOD 1.5 SECS., DIRECT OPTICAL REGISTRATION (ZV).

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
✓ 2	NE E N	eL M M F	09	32	-				Confused by strong microseisms. 22 $\frac{1}{2}$ <sup>o</sup> N., 144 $\frac{1}{2}$ <sup>o</sup> E. Mariana Islands. USCGS.
				47 $\frac{1}{2}$	-	20	1 $\frac{1}{2}$		
			10	15	-	20	2 $\frac{1}{2}$		
2	NE E N	eL M M F	13	52	-				Confused by strong microseisms. 21 $\frac{1}{2}$ <sup>o</sup> N., 92 $\frac{1}{2}$ <sup>o</sup> E. Pakistan-Burma border. h about 100 Km. USCGS.
				58 $\frac{1}{2}$	-	22	2 $\frac{1}{2}$		
			14	20	-	23	4		
✓ 2	ZV,Z NE E N Z	e(PKP) eL M M M F	20	22	36				Confused by strong microseisms. 5 $\frac{1}{2}$ <sup>o</sup> S., 151 $\frac{1}{2}$ <sup>o</sup> E. New Britain. h about 60 Km. Mag. 6 $\frac{3}{4}$ (Pas).  Mag. = 6 $\frac{1}{2}$
				56	-		6		
			21	21	-	22	5		
				21	-	21	6		
			22	15	-				
✓ 3	NE N E	eL M M F	10	34	-				Confused by microseisms. 10 $\frac{1}{2}$ <sup>o</sup> S., 111 <sup>o</sup> E. South of Java. USCGS.
				51	-	20	3		
				52	-	20	3 $\frac{1}{2}$		
✓ 5	N N E	eL M M F	12	55	-				Confused by microseisms. 13 <sup>o</sup> S., 166 $\frac{1}{2}$ <sup>o</sup> E. New Hebrides region. h about 100 Km. USCGS.
			13	11 $\frac{1}{2}$	-	22	2 $\frac{1}{2}$		
				13	-	21	1 $\frac{1}{2}$		
6	NE	eL F	02	15	-				Very small. 9 <sup>o</sup> S., 157 $\frac{1}{2}$ <sup>o</sup> E. Solomon Islands. USCGS.
				30	-				



**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

NOVEMBER, 1959

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLI- TUDE	Δ	REMARKS	
			h.	m.	s.					sec.
6	ZV,Z	e(P)	07	41	23				Albania. BCIS.	
	NE	eL		46.2	-					
	N	M		47	-	16	4			
	E	M		48 $\frac{1}{2}$	-	14	2 $\frac{1}{2}$			
	Z	M		48 $\frac{1}{2}$	-	12	2 $\frac{1}{2}$			
		F		53	-					
6	ZV	eFKP	12	02	59				24°S., 174 $\frac{1}{2}$ °W. Tonga Islands region. USCGS.	
	N	M	13	11	-	20	1			
	E	M		11	-	20	1			
		F		30	-					
7	ZV,Z	eP	02	35	52				Compression.  36 $\frac{1}{2}$ °N., 2 $\frac{1}{2}$ °E. Near coast of Algeria. Several injured. Light damage. USCGS.	
	E	eL		39.3	-					
	N	eL		40.0	-					
	E	M		41	-	13	12			
	N	M		42	-	12	5			
	Z	M		42	-	11	4			
		F		03	05	-				
7	NE	eL	23	36	-				Confused by microseisms. 23 $\frac{1}{2}$ °S., 175 $\frac{1}{2}$ °W. Tonga Islands region. USCGS. Mag. = 6 $\frac{1}{4}$	
	N	M		43	-	20	3			
	E	M		44	-	20	3 $\frac{1}{2}$			
		F		24	30	-				
8	ZV,Z	iP	14	07	04	4	3.4	8900	Confused by strong microseisms.  44°N., 140 $\frac{1}{2}$ °E. Near west coast of Hokkaido, Japan. Mag. 6 $\frac{1}{2}$ (Pas). USCGS.  Mag. = 6.5	
	E	eS		17	05	10	4			
	N	eSKS		17	19					
	NE	eL		28	-					
	E	M		40 $\frac{1}{4}$	-	20	27			
	N	M		40 $\frac{1}{2}$	-	20	19			
	Z	M		47	-	18	18			
		F		15	40	-				
10	NE	eL	21	26	-				Confused by strong microseisms. 36°N., 89°E. Northern Tibet. USCGS. Mag. = 6 $\frac{1}{4}$	
	E	M		32	-	20	5 $\frac{1}{4}$			
	N	M		32	-	20	8 $\frac{1}{2}$			
		F		55	-					
15	ZV,Z	iP	10	34	26	6	2.0	(5800)	Confused by strong microseisms.  38°N., 74 $\frac{1}{2}$ °E. Tadshik S.S.R. USCGS.  Mag. = 6.3	
	E	e(S)		41	49					
	E	eSS		45.5	-					
	N	eL		48	-					
	N	M		55 $\frac{1}{2}$	-	20	13			
	E	M		58	-	21	9			
	Z	M		11	00	-	20	11		
		F			30	-				
15	ZV,Z	iP	17	13	19	7	29	2230	37 $\frac{1}{2}$ °N., 20°E. Near west coast of Greece. Slight damage. Mag. 6 $\frac{1}{2}$ -6 $\frac{3}{4}$ (Pas). USCGS.  Mag. = 6.6	
	ZV,ZNE	i		13	21	16	24(PH)			
	NE	iS		16	58	14	150(SH)			
	NE	eL		18 $\frac{1}{2}$	-					
	E	M		22 $\frac{1}{2}$	-	(20)	(220)			
	N	M		22 $\frac{1}{2}$	-	(20)	(195)			
		F		20	50	-				



**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

**SEISMOLOGICAL BULLETIN**

NOVEMBER, 19 59

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
✓ 16	ZV,Z	iP	10	30	51			6300	1°N., 26½°W. Mid-Atlantic Ocean. USCGS.
	NE	eS		38	42	17	3(SH)		
	NE	eL		44	-				
	E	M		49	-	20	3		
	N	M		49	-	20	3		
	Z	M		49	-	20	3½		
		F	11	35	-			Mag. = 5.8	
✓ 19	ZV	e(PKP)	11	27	33			(2600)	Confused by strong microseisms. 5½°S., 146°E. Near north coast of New Guinea. Mag. 7(Pas). USCGS.
	E	e		34	35				
	N	e		36	41				
	E	e		46	44				
	NE	eL	12	00½	-				
	E	M		15½	-	22	19		
	N	M		15½	-	21	15		
	Z	M		28	-	18	8		
		F	13	25	-			Mag. = 6¾	
19	ZV	e(P)	14	05	32			(2600)	Confused by strong microseisms. 38½°N., 26°E. Off west coast of Turkey. USCGS.
	ZV	e		05	49				
	E	e(S)		09	45				
	E	M		14½	-	16	3½		
	N	M		14½	-	16	7½		
	Z	M		16	-	12	5		
		F		30	-			Mag. = 6-6¼	
20	NE	e	19	50	-				Small. 1°N., 26½°W. Mid-Atlantic Ocean. USCGS.
		F	20	15	-				
22	NE	e	13	50	-				Very small. 3°S., 140°E. Near New Guinea. USCGS.
		F	14	25	-				
✓ 22	NE	eL	17	42	-				Confused by microseisms. 54°S., 136°W. South Pacific Ocean. USCGS.
		E		47½	-	20	3½		
		N		49	-	20	2		
22	ZV,Z	ePKP	19	53	23				Depth = 550 Km. 21½°S., 178½°W. Fiji Islands region USCGS.
		i		53	29				
		epPKP		55	33				
✓ 24	NE	eS	20	23	23				Confused by microseisms. 7½°N., 37°W. Atlantic Ocean. USCGS.
		eL		29	-				
		M		33	-	20	2		
		M		34	-	20	1½		
		M		34	-	20	3½		
		F		50	-			Mag. = 5¾	
✓ 26	E	e(S)	07	31	21				Confused by microseisms. 5½°S., 102½°E. Near coast of Sumatra. Mag. 6½(Pas). USCGS.
		eSS		38.2	-				
		eL		48	-				
		M	08	12	-	24	8		
		M		12	-	24	9		
		M		13	-	24	11		
		F	09	15	-			Mag. = 6½	
✓ 26	E	e	23	34	31				Confused by microseisms. 5½°S., 103°E. Near coast of Sumatra. Mag. 6¾(Pas). USCGS.
		e		35	03				
		e		36	43				



KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
contd.									
✓ 26	NE	eL	23	50	-				
	E	M	24	18	-	20	24		
	Z	M		20	-	19	15		
	N	M		21	-	21	17		
		F	25	30	-				Mag. = 6 $\frac{3}{4}$
27	ZV	iP	00	27	02				
	ZV	e(S)		30	51				38 $\frac{1}{2}$ °N., 20 $\frac{1}{2}$ °E. Greece. USCGS.
27	NE	e	19	50	-				
		F	20	10	-				Very small. 5 $\frac{1}{2}$ °S., 103°E. Off coast of Sumatra. USCGS.
✓ 28	N	eL	03	57	-				
	E	M	04	11 $\frac{1}{4}$	-	21	2		
	N	M		12 $\frac{1}{2}$	-	20	2		26°N., 128 $\frac{1}{2}$ °E. Ryukyu Islands. USCGS.
	E	M		20	-	14	2		
	N	M		20	-	14	2		
	Z	M		20	-	14	3 $\frac{1}{2}$		
		F		50	-	14	3 $\frac{1}{2}$		
									Mag. = 6
✓ 28	EN	ePS	13	02	12				
	EN	eL		18	-				
	E	M		31	-	22	7		28 $\frac{1}{2}$ °S., 71°W. Chile.
	N	M		36	-	19	4		Mag. 6 $\frac{1}{2}$ (Pas). USCGS.
	Z	M		36	-	18	4		
		F	14	30	-				Mag. = 6 $\frac{1}{4}$
29	N	e	20	45	-				
	N	M	21	06	-	18	2		
		F		25	-				
✓ 30	NE	eL	11	36	-				
	N	M		43	-	12	11		
	E	M		45 $\frac{1}{2}$	-	16	8		44 $\frac{1}{2}$ °N., 80 $\frac{1}{2}$ °E. Sinkiang Province, China. USCGS.
	N	M		45 $\frac{1}{2}$	-	16	9		
	Z	M		46	-	14	8		
		F	12	20	-				

All the magnitudes are the "unified magnitudes" denoted by "m".