

M.O. 737

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR JANUARY, 19 63

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi l}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
1	NE E N	e M M F	20	35	-	20	1	7900	40.2°S., 81.3°E. Indian Ocean. USCGS.
				49	-		1½		
				49	-		20		
			21	15	-				
1	ZV,Z ZV,Z E N NE E N	iP i iS e eL M M F	23	50	19	5	3.3	7900	Compression. 56.6°N., 157.7°W. h about 50 km. Alaska Peninsula. USCGS.
				50	37	10	11.7		
				59	29				
				59	53				
			24	12	-	20	2½		
				21½	-	20	1½		
2	NE E N	eL M M F	15	45	-	20	1½	7900	4.1°S., 135.2°E. Near New Guinea. USCGS.
			16	10	-	20	3		
				10½	-				
2	NE	e F	16	55	-			7900	Small. 52.9°S., 118.2°W. South Pacific Ocean. USCGS.
			17	40	-				
3	NE E N E N Z	eL M M M M M F	03	50	-	22	5	7900	29.7°N., 130.1°E. Ryukyu Islands. USCGS.
				56½	-	22	2		
				56½	-	16	6½		
			04	03	-	16	6		
				03	-	16	5		
				03	-	16	5		
	03	-							
			30	-				M .: m = 6	

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			h.	m.	s.				
3	NE N	e F	10	40	-	22	1 1/2	km.	5.3°S., 151.5°E. h about 74 km. New Britain. USCGS.
			11	57	-				
4	ZV,Z ZV,Z N E N	iP i eL M M F	00	33	27	18 18	1 1/2		Compression. 1.2°N., 27.7°W. 1500 km. South of Cape Verde Islands. USCGS.
				33	35				
				47	-				
				52	-				
			01	05	-				
4	NE	e F	06	33	-				Small. 29.7°N., 142.2°E. Bonin Islands.
			07	05	-				
5	NE	e F	13	55	-				17.8°S., 167.9°E. New Hebrides Islands. USCGS.
			14	45	-				
5	ZV	eP	17	55	07				
6	ZV,Z	eP	06	30	07				7.0°S., 72.1°W. h about 544 km. Brazil. USCGS.
6	ZV	eP	21	33	05				1.8°S., 80.7°W. h about 51 km. Near Ecuador. USCGS.
7	NE E N	e M M F	12	35	-	20 20	2 3		47.4°N., 155.9°E. Kurile Islands. USCGS.
			13	59	-				
			13	00	-				
8	ZV	iP	15	59	13				Mag.: M = 5 3/4
11	NE E N Z	e M M M F	12	30	-	20 20 20	3 3 1/2 3		45.0°S., 75.7°W. Near coast of southern Chile. USCGS.
			13	24	-				
				24	-				
				24	-				
12	ZV,Z	iP	03	52	22			Mag.: M = 6	
12	ZV	eP	06	29	06			Compression. 4.8°N., 76.7°W. h about 102 km. Colombia. USCGS.	
14	NE E N	e M M F	12	30	-	1 1/2 2			36.1°N., 69.6°E. h about 97 km. Hindu Kush. USCGS.
			13	04	-				
				04	-				
15	ZV NE E N	iP eL M M F	01	36	49	20 20	3 3 1/2		21.2°S., 169.3°E. Loyalty Islands. USCGS.
				41 1/2	-				
				43	-				
			02	43 1/2	-				
			02	05	-			68.9°N., 17.1°W. Denmark Strait. USCGS.	
								Mag.: M = 4 1/2	

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			h.	m.	s.				
15	ZV,Z	eP	05	27	43			Confused by microseisms. 69.0°N., 16.6°W. Jan Mayen Island region. USCGS.	
	N	eL		32	-				
	E	M		34 $\frac{1}{2}$	-	20	5 $\frac{1}{2}$		
	N	M		34 $\frac{1}{2}$	-	20	7		
	Z	M		34 $\frac{1}{2}$	-	20	4		
		F	06	10	-			mag.: M = 5	
15	ZV,Z	iPKP	19	45	21			Compression. 20.5°S., 177.9°W. h about 496 km. Fiji Islands. USCGS.	
	ZV,Z	iPKP ₂		45	26				
	ZV,Z	i		45	32				
15	NE	eL	22	52	-			31.3°S., 13.4°W. South Atlantic Ocean. USCGS.	
	E	M		59 $\frac{1}{2}$	-	20	2		
	N	M	23	05	-	20	1 $\frac{1}{2}$		
		F		15	-				
16	NE	eL	06	48 $\frac{1}{2}$	-			54.2°N., 34.9°W. Southwest of Iceland. USCGS.	
	E	M		50 $\frac{1}{2}$	-	18	1		
		F	-	-	-			overlapped by next shock.	
16	E	M	06	56 $\frac{1}{2}$	-	18	1	54.3°N., 35.2°W. Southwest of Iceland. USCGS.	
		F	07	05	-				
16	NE	eL	12	42	-			54.4°N., 35.0°W. Southwest of Iceland. USCGS.	
	e	M		44 $\frac{1}{2}$	-	18	1 $\frac{1}{2}$		
		F		50	-				
22	ZV,Z	e(P)	05	06	07			31.5°N., 89.3°E. Tibet.	
	NE	eL		22	-				
	N	M		32	-	16	2		
		F		40	-				
24	NE	e	04	08	-			Small.	
		F		20	-				
24	NE	e	13	20	-			15.2°S., 173.6°W. Tonga Islands region. USCGS.	
	N	M		29	-	20	1 $\frac{1}{2}$		
		F		40	-				
24	NE	eL	23	15	-			8.0°N., 126.8°E. h about 67 km. Off coast of Mindanao, P.I. USCGS.	
	E	M		25	-	20	2 $\frac{1}{2}$		
	N	M		25	-	20	4		
		F	24	10	-				
27	ZV,Z	eP	19	42	10	5	1.0	41.2°N., 49.8°E. Caspian Sea, near Azerbuijan S.S.R. USCGS.	
	ZV	i		44	40				
	E	eS		47	40				
	N	eL		52	-	22	3 $\frac{1}{2}$		
	E	M		56	-	20	5		
	N	M		57	-				
	F	20	30	-			mag.: M = 5 $\frac{1}{2}$		
28	N	eL	04	38	-			43.5°N., 144.6°E. Near coast of Hokkaido, Japan. USCGS.	
	E	M		52	-	22	3 $\frac{1}{2}$		
	N	M		52	-	22	2 $\frac{1}{2}$		
		F	05	20	-				

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			h.	m.	s.				
28	ZV,Z	e(PF)	12	33	11				2.6°S., 149.9°E. New Britain. USCGS.
	NE	eSS		50	20				
	N	eL	13	04 $\frac{1}{2}$	-				
	E	M		30	-	20	11		
	N	M		30	-	20	18		
		F	-	-	-			mag.: M = 6 $\frac{3}{4}$ overlapped by next shock.	
28	ZV,Z	iP	13	12	15	6	2.9		54.7°N., 161.6°W. Alaska Peninsula. USCGS.
	N	M		46	-	22	27		
	E	M		46	-	21	26		
	Z	M		46	-	22	14		
		F	16	10	-				
29	ZV,Z	iP	09	32	54	4	1.9	8600	Compression. Depth = 126 km. 49.7°N., 154.9°E. h about 126 km. Kurile Islands.
	ZV	ipP		33	26				
	NE	eS		42	32				
	E	M	10	12	-	20	1 $\frac{1}{2}$		
	N	M		12	-	20	1		
		F		30	-			mag.: M = 6	
30	NE	ePP	10	28	49	20	1.6(H)		55.6°S., 28.3°W. Sandwich Islands region. USCGS.
	NE	eSKS		34	59				
	NE	eS		36	39	16	7.2(H)		
	NE	ePS		38	25				
	NE	eSS		44	25				
	NE	eL		55	-				
	E	M	11	10	-	20	14		
	N	M		10	-	20	29		
	Z	M		10	-	20	12		
		F	13	35	-				
31	ZV,Z	iPP	05	23	08	5	3.0		Compression. 27.9°N., 126.3°E. Ryukyu Islands. USCGS.
	ZV,Z	ePPF		25	04				
	NE	eSKS		30	05				
	E	eSS		36	11				
	N	eL		49	-				
	N	M	06	04	-	18	28		
	E	M		04 $\frac{1}{2}$	-	16	22		
	Z	M		04 $\frac{1}{2}$	-	16	16		
	F	07	50	-				mag.: M = 6 $\frac{3}{4}$	
31	ZV,Z	iP	15	11	58				35.8°N., 21.9°E. Ionian Sea, west of Crete. USCGS.
	NE	eL		19 $\frac{1}{2}$	-				
	E	M		20	-	18	1		
	N	M		20 $\frac{1}{2}$	-	16	2 $\frac{1}{2}$		
		F		30	-				

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			h.	m.	s.				
1	N NE E N	e(s) eL M M F	08	27	13	18	2.2		
				28 $\frac{1}{2}$	-	-	-		
				29 $\frac{1}{2}$	-	20	1 $\frac{1}{2}$		
				30 $\frac{1}{2}$	-	12	2 $\frac{1}{2}$		
1	N E N	e(s) M M F	23	43	37	18	1.3		Aftershock of preceding earthquake.
				47	-	20	1 $\frac{1}{2}$		
				47 $\frac{1}{2}$	-	12	2 $\frac{1}{2}$		
				55	-	-	-		
4	ZV,Z	iP	23	33	02			Compression. 48.5°N., 154.9°E. Kurile Islands. USCGS.	
5	NE NE E N Z	e eL M M M F	21	07	51				38.4°S., 73.2°W. Near coast of Chile. USCGS.
				27	-	20	7		
				42	-	20	10		
				42	-	20	5		
6	NE E N	eL M M F	23	00					Mag.: M = 6 $\frac{1}{4}$
				02	16	-			
				24	-	20	3		
				24	-	20	4		
6	NE E N	eL M M F	03	15	-				Mag.: M = 6
				11	11	-			
				35	-	20	1 $\frac{1}{2}$		
				35	-	20	2		
6	N	F	12	00	-				3.5°S., 146.0°E. Bismarck Sea. USCGS.

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
8	NE	e	04	35	-			36.4°N., 137.9°E. Central Honshu, Japan. USCGS.	
	E	M		41	-	20	1½		
	N	M		41	-	20	1½		
		F	05	05	-				
10	N	M	16	46	-	20	1½	44.6°N., 28.1°W. Azores Islands. USCGS.	
	E	M		46	-	20	1½		
		F		55	-				
12	ZV,Z	iPKP	23	26	04			17.8°S., 178.6°W. h about 583 km. Fiji Islands. USCGS.	
✓ 13	ZV,ZNE	eP	09	02	54	4	2.5	9850 Compression. 24.5°N., 121.8°E. Northern Formosa. 3 killed, 15 injured and moderate damage. USCGS.	
	E	iSKS		13	20				
	E	iS		13	36	12	3.2(H)		
	Z	ePS		14	45				
	NE	eSS		19	34				
	NE	eL		27	-				
	Z	M		45½	-	21	115		
	N	M		45½	-	21	290		
	E	M		46	-	20	190		
		F		13	20	-			Mag.: M = 7.3
✓ 13	NE	ePKS	18	35	53			9.9°S., 160.8°E. Solomon Islands. USCGS. Mag.: M = 6¼	
	NE	eL	19	14	-				
	Z	M		36	-	20	4		
	N	M		36	-	20	8½		
	E	M		38½	-	20	6½		
	F		20	50	-				
✓ 14	ZV	iPKP	07	23	09			FPZ 8 sec. 2.7 μ 7.2°S., 128.2°E. h about 197 km. Banda Sea. USCGS. Mag.: M = 6½	
	ZV	i		23	17				
	NE	e		34	37				
	NE	eL		53	-				
	E	M	08	06	-	26	9½		
	N	M		06	-	26	8½		
	N	M		16	-	20	5		
	E	M		18	-	20	3		
	F		50	-					
14	NE	eS	12	26	41	20	6.3(H)	Confused by strong microseisms. 0.9°N., 30.0°W. Mid-Atlantic Ocean. USCGS. Mag.: M = 5¾	
	N	eSS		30	21				
	NE	eL		33	-				
	N	M		37	-	24	7½		
	E	M		37	-	24	5		
	E	M		40	-	20	4		
	F		13	10	-				
✓ 14	NE	eL	23	00	-			Confused by microseisms. 5.0°S., 144.6°E. New Guinea. USCGS. Mag.: M = 6¼	
	E	M		24	-	20	3		
	N	M		24	-	20	5½		
		F		55	-				

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			h.	m.	s.				
17	NE	e F	00	12	-				Very small. 54.0°N., 35.1°W. Atlantic Ocean. USCGS.
17	NE N	e M F	20	17	-	14	1½		43.9°N., 17.2°E. Yugoslavia. USCGS.
18	NE	e F	19	12	-				Small. 57.9°N., 32.2°W. Atlantic Ocean. USCGS.
20	NE	e F	20	20	-				Small. 24.6°N., 122.1°E. Near Formosa. USCGS.
21	NE	e F	15 16	45 10	-				Very small. 20.5°S., 173.9°W. Tonga Islands. USCGS.
21	ZV,Z ZV NE NE E N	iP eFP iS eL M M F	17	19	52	5	1.2	2980	32.7°N., 20.9°E. Near coast of Libya. 300-500 dead; 500 injured, 12000 homeless. USCGS.
				20	29	12	14.7(H)		
				24	24				
				26	-	20	4½		
				31½	-	20	12½		
			18	05	-				Mag.: M = 5.6
21	ZV ZV NE N	eP i eS M F	20	32	02			2950	32.6°N., 21.0°E. Near coast of Libya. USCGS.
				32	09	12	2.4(H)		
				36	31	20	1½		
			21	00	-				Mag.: M = 4.7
22	ZV NE E E N	iP eS eSS M M F	07	18	10	14	1.8(H)	4450	85.0°N., 98.9°E. North Polar region. USCGS.
				24	13	16	2		
				26	59	18	1½		
				43	-				
				43½	-				
			08	15	-				Mag.: 5.1
22	ZV,Z	iPKP	08	17	37				17.8°S., 178.8°W. h about 550 km. Fiji Islands. USCGS.
22	ZV N N E N	iP eS eL M M F	14	17	08	12	1.1	2100	40.6°N., 20.5°E. Albania, Greece border. USCGS.
				20	32	16	2½		
				22	-	16	6		
				23½	-				
				23½	-				
				45	-				Mag.: M = 4½
22	ZV	iP	21	24	41				18.1°N., 71.3°W. Dominican Republic region. USCGS.
24	ZV,Z	iP F	13 14	46 30	07				14.6°N., 91.4°W. h = 135 km. Guatemala. USCGS.
25	NE N	e M F	17 18	55 08	-	18	1½		24.4°N., 123.4°E. Near coast of Formosa. USCGS.
				25	-				

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			h.	m.	s.				
1	NE	e F	11	25	-				Small. 41.2°N., 142.9°E. Near Japan. U.S.C.G.S.
1	NE E N	eS	19	31	50	14	2.9(H)		1.4°N., 29.6°W. Atlantic Ocean. U.S.C.G.S.
		M		42½	-	20	2½		
		M F	20	00	-	20	4		
2	ZV	iPKP	22	35	47				Mag.: M = 5.4 17.1°S., 175.0°W., h about 240km. Tonga Islands. USCGS.
3	ZV	iP	23	11	52				30.7°N., 136.9°E. h about 491km. Near Japan. USCGS.
4	ZV ZV E E N	eP	07	48	12				Confused by microseisms. 82.9°N., 7.7°W. North Polar region. USCGS. Mag.: M = 4½
		e		48	19				
		e		53	46				
		M		47½	-	18	2		
		M		48½	-	20	2		
4	NE E N N E	eL	14	17	-			Confused by microseisms. 24.2°N., 121.7°E. Formosa. USCGS. Mag.: M = 6¼	
		M		28	-	24	14		
		M		28	-	24	17		
		M		29	-	20	10		
		F		29	-	20	20		
4	ZV,Z NE N E	iP	15	15	37			2900 Dilatation. 35.2°N., 25.4°E. h about 42km. Crete. USCGS.	
		eS		20	02	14	3.9(H)		
		eL		23	-				
		M		24	-	20	3		

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

MARCH, 19 63.

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
contd.									
4	N	M F	15	24½	-	19	6½		Mag.: M = 5.0
4	ZV N E N	iP eL M M F	15 16	55 20	53 -	- 20 20	- 3 3		Dilatation. Confused by microseisms. 4.5°S., 81.6°W. Off coast of Peru. USCGS. Mag.: M = 5¾
5	ZV ZV NE	iP i M F	07 08	17 17 53 15	51 54 -	- -		Confused by microseisms. 4.5°S., 81.5°W. Off coast of Peru. USCGS.	
7	NE NE N E E N	eSS eSSS eLQ eLR M M F	05 06 08	59 04 14 21 32 32 15	30 10 -	- 19 19	4½ 2½	Confused by microseisms. 27.0°S., 113.5°W. West of Easter Island. USCGS. Mag.: M = 6-6¼	
7	NE NE E N	e(S) eL M M F	12 13 14	44 06 28 20	30 -	18 19	2 4	44.3°S., 75.3°W. h about 45 km. Near coast of Chile. USCGS. Mag.: M = 6	
8	ZV NE NE E N	eP eS eL M M F	15 16	15 23 30 35 35 10	41 39 -	20 20 20	3.7(H) 2 3	6470 Confused by strong microseisms. 1.1°N., 29.9°W. Mid-Atlantic Ocean. USCGS. Mag.: M = 5.3	
10	NE E N	eL M M F	03 04	37 43 43 15	- -	22 21	11½ 8½	Confused by microseisms. 24.7°N., 122.1°E. Near coast of Formosa. USCGS. Mag.: M = 6¼	
10	NE E N	e M M F	11 12	35 51 52 15	- -	20 20	3 3	Confused by microseisms. 29.9°S., 71.2°W. h about 70 km. Near coast of Chile. USCGS.	
11	ZV,Z E N E N	eP eS eL M M F	07 08	32 37 39½ 43 43 10	40 08 -	4 12 20 20	1.1 5.0 6½ 9½	2900 Confused by microseisms. 38.1°N., 29.3°E. Turkey. Mag.: M = 5.2	
14	NE E N	eL M M F	08 09	39 59 59 20	- -	20 20	3 3	19.0°N., 120.4°E. h about 51 km. Off coast of Luzon, Ph. I. USCGS.	

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

MARCH, 19 63

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
15	NE	e F	01	00	-			Small. 8.4°N., 126.4°E. Philippine Islands. USCGS.	
15	NE	e	06	05	-			Confused by microseisms. 21.7°N., 45.4°W. North Atlantic Ocean. USCGS. Mag.: $\mu = 5$	
	E	M		10	-	20	1½		
	N	M F		10 17	- -	20	1½		
16	ZV,Z	iP	08	56	58	11	19.5	8800 FH 20 sec. 14.7 μ FPH 20 sec. 10.4 μ 46.5°N., 154.7°E. Kurile Islands region. USCGS. Mag.: $\mu = 7.1$	
	ZV,Z	i		57	00				
	ZN	eFP		59	59	11	11.1		
	NE	eSS	09	12	02	18	50.0(H)		
	E	eLQ		18	-				
	E	μ		36	-	22	125		
	N	μ		37	-	21	130		
	Z	M F		37½ 20	- -	20	60		
17	ZV,Z	i(P)	14	21	49			(2300) 39.5°N., 21.5°E. h about 78 km. USCGS. Greece.	
	NE	eS		25	31				
	N	M		28½	-	16	3		
	E	M F		30 40	- -	16	1		
20	ZV	ePKP	05	04	17			Depth = 690 km. 19.6°S., 179.3°W. Fiji Islands. USCGS.	
	ZV	epPKP		06	52				
20	NE	e	17	30	-			Small. 2.4°S., 138.4°E. USCGS. New Guinea.	
		F	18	15	-				
21	ZV	iP	04	12	49			36.5°N., 140.9°E. Near Japan. USCGS.	
24	ZV	iPKP	02	25	57			12800 9.7°S., 120.4°E. Sumba Island region. USCGS. Mag.: $\mu = 6-6½$	
	E	eSKS		32	43				
	N	eSS		42	51				
	N	eL	03	01	-				
	E	M		23	-	20	5½		
	N	M		23	-	20	4½		
	Z	M F		23 04	- 30	20	2		
24	NE	e	10	35	-			9.0°N., 125.6°E. Philippine Islands. USCGS.	
	E	μ		49	-	20	1½		
	N	M F		49 11	- 10	20	1½		
24	ZV,Z	eP	12	51	24	5	1.2	4350 Confused by microseisms. 34.4°N., 47.9°E. Western Iran. 20 injured and minor property damage. USCGS. Mag.: $\mu = 5½$	
	ZV,Z	eFP		52	51				
	NE	eS		57	21	20	2.4(H)		
	N	eL	13	01½	-				
	E	M		08	-	20	10		
	N	M F		08 55	- -	20	22		
25	NE	e	21	30	-			56.3°S., 149.9°E. Macquarie Islands region. USCGS.	
	E	μ	22	51½	-	20	1½		
	N	M F		51½ 23	- 20	20	1½		

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MARCH, 1963

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
25	ZV	iP	22	59	32				0.7°N., 96.5°E. Off coast of Sumatra. USCGS.
	NE	μ	23	50	-				
		F	24	00	-				
26	ZV,Z	ePKP	10	08	16				Confused by microseisms. PFH 18 sec. 6.3 μ 29.7°S., 177.8°W. Kermadec Islands. USCGS. mag.: μ = 6 ³ / ₂ -7
	ZV,Z	iFKP ₂		08	47				
	ZV,Z	ePP		12	23	7	2.2		
	E	eSS		32	31				
	NE	eL		54	-				
	Z	M	11	20 ¹ / ₂	-	20	16		
	N	M		20 ¹ / ₂	-	20	41		
	E	M		23	-	20	28		
		F	13	05	-				
26	ZV,Z	eFKP	13	44	57				Confused by microseisms. 29.8°S., 177.9°W. Kermadec Islands. USCGS. mag.: μ = 6 ¹ / ₂ -6 ³ / ₄
	ZV,Z	eFKP ₂		45	30				
	ZV,Z	ePP		49	09	7	2.0		
	E	eSS	14	09	01				
	N	e	14	17	35				
	N	eL		39	-				
	Z	M		57 ¹ / ₂	-	20	8		
	N	M		57 ¹ / ₂	-	20	13		
	E	M		58	-	20	8		
		F	15	55	-				
26	ZV,Z	iP	19	59	48			Compression. 44.4°N., 146.7°E. Kurile Islands. USCGS.	
26	ZV,Z	iP	21	47	14	7	2.3	9450	Compression. 36.0°N., 135.7°E. Near coast of Honshu, Japan. Minor damage in Honshu. HSCGS. mag.: μ = 6.3
	ZV,Z	ePP		50	29				
	NE	eS		57	39	14	4.1(H)		
	N	eFPS		59	01				
	NE	eL	22	09	-				
	E	M		22	-	22	37		
	N	M		22	-	22	27		
	Z	M		23	-	18	6		
	F	23	30	-					
28	ZV,ZNE	iP	00	19	55	8	34	2100	Dilatation. Compression. PH 14 sec. 51 μ 66.3°N., 19.6°W. Iceland. Several injured and slight damage. USCGS. mag.: μ = 6.7
	ZV	i		19	57				
	NE	iS		23	19	18	169(H)		
	E	M		27	-	16	300		
	N	M		27	-	16	330		
	Z	M		27	-	16	270		
	F	03	50	-					
28	ZV	iP	01	03	45			66.4°N., 19.6°W. Iceland. USCGS.	
29	N	e	03	20	-			Confused by microseisms. 40.4°N., 26.6°E. North western Turkey. USCGS.	
	N	M		21 ¹ / ₂	-	16	2 ¹ / ₂		
		F		28	-				
30	ZV,Z	iPKP	02	12	51			Depth = 164 km. 19.1°S., 169.1°E. New Hebrides Islands. USCGS.	
	ZV,Z	ipPKP		13	34				
	E	e		35	01				
	N	e		36	17				
		F	03	15	-				

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MARCH, 1963

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
✓ 30	ZV,Z	iP	17	04	09	4	2.0	9000	Compression. 44.2°N. 148.0°E. Kurile Islands. USCGS.
	E	eS		14	13	8	2.1		
	NE	eL		34 ¹ / ₂	-	-	-		
	E	M		37 ¹ / ₂	-	24	6		
	N	M		38 ¹ / ₂	-	24	5		
	E	M		44	-	20	3		
	N	M		44	-	20	2 ¹ / ₂		
		F		18	05	-	-		
✓ 31	ZV,Z	ePKP ₂	05	51	17				29.9°S., 177.7°W. Kermadec Islands. USCGS.
	ZV,Z	ePP		54	53				
	E	eSS	06	14	51				
	E	M	07	03	-	20	3		
	N	M		03	-	20	7		
	Z	M		03	-	20	3		
✓ 31	NE	e	08	00	-				6.1°S., 149.0°E. New Britain. USCGS.
	E	M		21	-	22	4		
	N	M		22	-	22	4 ¹ / ₂		
	Z	M		22	-	22	1 ¹ / ₂		
		F		09	15	-	-		
31	NE	e	13	17	-				
	E	M		18 ¹ / ₂	-	16	1 ¹ / ₂		
	N	M		18 ¹ / ₂	-	16	1		
31	NE	e	13	55	-				
	E	M		56 ¹ / ₂	-	16	1 ¹ / ₂		
	N	M		56 ¹ / ₂	-	16	1		
31	ZV,Z	ePKP ₁	19	42	48			17300	30.0°S., 178.0°W. Kermadec Islands. USCGS.
	ZV,Z	ePKP ₂		43	20				
	ZV,Z	ePP		46	55				
	N	M	20	55 ¹ / ₂	-	20	3		
	E	M		56	-	20	1 ¹ / ₂		
	F		21	40	-	-			Mag.: M = 6



I.O. 737

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR MAY, 1963

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi I}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
✓ 1	ZV,Z	ePKP ₁	10	22	43			16300 Depth = 150 km. 19.0°S., 169.0°E., h about 140 km. New Hebrides Islands. USCGS.	
	ZV	ePKP ₂		22	58				
	ZV,Z	ipPKP ₁		23	23	6	12.2		
	ZV,Z	ipPKP ₂		23	39				
	ZV,Z	iPP		26	15	6	2.1		
	Z	e		37	02				
	NE	eSS		44	54				
	NE	eL	11	04	-				
	N	M		25	-	20	5		
	E	M		25	-	20	3		
		F	12	30	-		Mag.: M = 6½		
6	NE	e	19	40	-			39.5°N., 20.6°E. Greece-Albania border. USCGS.	
	N	m		42	-	16	1		
		F		50	-				
7	NE	e	02	45	-			Very small. 36.7°N., 83.1°E. Sinkiang Province, China. USCGS.	
		F	03	05	-				
✓ 8	ZV,Z	iP	10	34	47	6	1.2	9500 Depth = 45 km. 36.6°N., 141.0°E. h about 53 km. Honshu, Japan. USCGS.	
	ZV,Z	epP		35	00				
	N	eS		45	13	11	1.9		
	NE	esS		45	34	16	3.4(H)		
	N	eL	11	01	-				
	E	M		06½	-	32	12		
	N	M		06½	-	32	10½		
	E	M		17	-	20	9		
	N	M		17	-	20	13		
	Z	M		17	-	19	7		
	F	12	15	-			Mag.: M = 5.9		

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

..... MAY, 19 63

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
9	N E N	eL	15	37	-				12.2°N., 86.9°W. Near coast of Nicaragua. USCGS.
		M		46	-	20	1		
		M		46	-	20	1		
		F	16	20	-				
10	ZV,Z ZV,Z NE N E N Z	iP	22	35	10	4	1.4	9370	Confused by microseisms. 2.2°S., 77.6°W. Ecuador. USCGS. Mag.: M = 6.2
		i		35	16				
		iS		45	32	14	3.7(H)		
		eLQ		58	-				
		M	23	11 $\frac{1}{2}$	-	20	9		
		M		11 $\frac{1}{2}$	-	20	3		
		M		11 $\frac{1}{2}$	-	20	4		
11	ZV,Z	iP	01	16	00				32.8°N., 19.4°E. Off coast of Libya. USCGS.
11	ZV	iPKP	05	03	10				15.4°S., 177.1°W. h about 400 km. Fiji Islands. USCGS.
11	NE E N Z	eL	18	33	-				24.2°N., 122.5°E. Off coast of Formosa. USCGS. Mag.: M = 5 $\frac{3}{4}$
		M		44	-	22	2 $\frac{1}{2}$		
		M		46	-	22	4 $\frac{1}{2}$		
		M		46	-	22	1 $\frac{1}{2}$		
12	ZV,Z ZV,Z NE E E N	iP	20	19	44	5	1.2	7900	Confused by strong microseisms. 57.4°N., 153.9°W. h about 80 km. Kodiak Island, Alaska. USCGS. Mag.: M = 5.6
		i		19	55				
		eS		28	56	16	2.4(H)		
		eL		38	-				
		M		52	-	20	2 $\frac{1}{2}$		
		M		52	-	20	5 $\frac{1}{2}$		
		F	21	35	-				
12	ZV	e(P)	20	48	35				55.9°N., 163.1°E. Near coast of Kamchatka. USCGS.
13	NE	e	13	20	-				14.5°N., 92.9°W. Mexico-Guatemala border. USCGS.
		F		45	-				
15	NE E N	eL	03	45	-				3.4°S., 146.8°E. Bismarck Sea. USCGS.
		M	04	08	-	20	1		
		M		08	-	20	1 $\frac{1}{2}$		
		F		25	-				
15	NE E N	e	07	15	-				
		M		21	-	16	2		
		M		21 $\frac{1}{2}$	-	16	1		
		F		35	-				
15	NE N	e	11	23	-				41.8°N., 20.2°E. Albania. USCGS.
		M		25 $\frac{1}{2}$	-	17	2		
		F		30	-				
15	ZV,Z ZV,Z E NE E	iP	12	13	11				38.0°N., 26.4°W. Azores region. USCGS.
		i		13	18				
		e(S)		17	22	8	2.1		
		eL		19	-				
		M		20 $\frac{1}{2}$	-	19	4		

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

MAY, 1963

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
contd. 15	N	M	12	20 $\frac{1}{2}$	-	20	3	km.	
	Z	M		20 $\frac{1}{2}$	-	19	1 $\frac{1}{2}$		
		F		35	-				
✓ 17	ZV,Z	iP	04	18	47				45.3°N., 150.8°E. Kurile Islands. USCGS.
	N	M		58	-	20	1 $\frac{1}{2}$		
		F	05	10	-				
✓ 17	NE	eL	06	50	-				15.7°N., 120.1°E. h about 80 km. Philippine Islands. USCGS.
	N	M	07	08	-	20	1		
		F		35	-				
✓ 17	NE	eL	12	46	-				41.7°N., 141.9°E. South of Hokkaido, Japan. USCGS.
	E	M		59	-	20	1		
	N	M	13	01	-	20	1 $\frac{1}{2}$		
		F		20	-				
17	ZV,Z	ePKP ₁	22	59	56				24.4°S., 177.2°W. Tonga Islands region. USCGS.
	ZV,Z	ePKP ₂	23	00	06				
18	NE	e	06	15	-				29.6°S., 68.5°W. La Rioja Province, Argentina. USCGS.
	E	M		33	-	20	2 $\frac{1}{2}$		
	N	M		34	-	20	2		
		F	07	00	-				Mag.: M = 5 $\frac{3}{4}$
✓ 19	ZV,Z	ePP	01	23	01	6	2.0		Confused by microseisms. 46.5°S., 75.1°W. Southern Chile. USCGS.
	NE	e(PS)		32	38				
	NE	eSS		39	22				
	NE	eL		53	-				
	E	M	02	02 $\frac{1}{2}$	-	26	11		
	N	M		02 $\frac{3}{4}$	-	27	14		
	E	M		11 $\frac{1}{2}$	-	19	9		
	N	M		11 $\frac{1}{2}$	-	20	7 $\frac{1}{2}$		
	Z	M		11 $\frac{1}{2}$	-	20	4		
		F	03	55	-				
✓ 19	ZV,Z	e(P)	10	02	46				46.0°N., 14.7°E. North western Yugoslavia. 3 injured, minor damage. USCGS.
	N	e(Sg)		06	16				
	N	eL		06	-				
	N	M		06 $\frac{1}{2}$	-	14	4 $\frac{1}{2}$		
	E	M		07 $\frac{1}{2}$	-	11	3 $\frac{1}{2}$		
	Z	M		07 $\frac{1}{2}$	-	10	2 $\frac{1}{2}$		
		F		15	-				
✓ 19	ZV,Z	iP	21	43	59	8	3.2	4970	Compression. PH 12 sec. 2.7 μ
	ZV,Z	i		45	53				
	NE	eS		50	33	16	19.3(H)		
	N	eSS		54	09				
	NE	eL		54 $\frac{1}{2}$	-				
	E	M		58	-	20	66		
	N	M		58	-	20	44		
	Z	M		58	-	20	27		
	F	23	50	-				Mag.: M = 6.2	
20	ZV,Z	iPKP ₁	11	57	55			17500	EPN 16 sec. 2.3 μ 30.7°S., 178.3°W. Kermadec Islands region. USCGS.
	ZV,Z	ePKP ₂		58	32				
	N	ePKS	12	01	29				
	ZN	ePP		02	11	8	1.8		
	Z	e		10	33				

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

MAY, 1963

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
contd.									
20	N	e	12	17	13				
	N	eSS		30	05				
	NE	eL		44	-				via 180°
	E	M	13	04	-	25	14		
	N	M		04½	-	24	12		
	E	M		16	-	20	9½		
	N	M		17	-	20	9½		
	Z	M		18	-	20	4		
		F	14	35	-				Mag.: M = 6½
21	NE	e	18	35	-				Small. 11.1°S., 163.3°E.
		F	19	35	-				Solomon Islands. USCGS.
22	ZV,Z	iP	14	08	43	4	1.1	8600	Compression.
	NE	eS		18	31	12	5.0(H)		48.6°N., 154.7°E.
	NE	eL		32	-				Kurile Islands.
	E	M		48	-	20	8		USCGS.
	N	M		48	-	20	8½		
	Z	M		48	-	20	4		
		F	15	30	-				Mag.: M = 6.2
22	NE	e	16	30	-				4.3°N., 127.9°E. h about 58 km.
	N	M		51	-	20	1½		Molucca Passage.
		F	17	15	-				USCGS.
22	ZV	i(P)	22	12	36				49.3°N., 155.4°E. Kurile Islands.
	E	e		22	54				USCGS.
		F	-	-	-				overlapped by next shock.
22	NE	eL	18	44	-				8.2°S., 115.7°E.
	E	M	23	01	-	24	2½		Java Sea.
	N	M		01	-	24	3½		
		F		35	-				Mag.: M = 6
23	ZV	ePKP	03	52	20				15.0°S., 176.7°W. h about 279 km.
									Fiji Islands region. USCGS.
23	NE	e	04	40	-				Small. 10.9°S., 163.3°E.
		F	05	25	-				Solomon Islands. USCGS.
23	NE	e	08	10	-				Small. 19.2°N., 64.6°W.
		F		45	-				Leeward Islands. USCGS.
25	NE	e	02	25	-				Very small. 24.8°N., 121.9°E.
		F		40	-				Near Formosa. USCGS.
25	NE	e	03	25	-				Very small. 35.6°N., 139.7°E.
		F		40	-				Near Honshu, Japan. USCGS.
25	ZV	eP	08	53	19				42.7°N., 144.3°E. Near Hokkaido,
	ZV,Z	i		53	24				Japan. USCGS.
25	NE	e	16	33	-				56.8°S., 25.0°W.
	E	M	17	07	-	20	3		Sandwich Islands region. USCGS.
	N	M		07	-	20	5		
	Z	M		07	-	20	1		
		F	18	55	-				Mag.: M = 6

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

MAY, 19 63

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
25	NE	e F	19 20	35 05	- -				Very small.
25	NE	e F	20 21	45 05	- -				Very small. 31.8°N., 141.3°E. South of Honshu, Japan. USCGS.
26	NE	e F	05 06	35 05	- -				Very small. 51.5°N. 159.8°E. Near Kamchatka. USCGS.
26	ZV,Z NE N E N	e(P) eS e M M F	23 27 28 53½ 53½ 24	18 47 26 - - 45	24 - - - -	20 20	2½ 1½	8100	55.2°N., 159.9°E. Near coast of Kamchatka. USCGS. Mag.: M = 5¼-5½
27	ZV,Z NE E N	i(P) e(S) M M F	04 19 43 43 05	10 41 - - 30	10 - - -	20 20	1½ 1½		55.3°N., 160.1°E. Near coast of Kamchatka. USCGS. Mag.: M = 5¼
28	ZV ZV	iP e	00 56	56 11	07 11				28.3°N., 52.2°E. Iran. USCGS.
29	ZV,Z ZV,Z	iP i	08 44	44 17	00 17				27.2°N., 59.3°E. Iran. USCGS.
30	NE E N Z	eL M M M F	08 34 34 34 09	12 - - - 25	- - - -	20 20 20	1½ 2 1		54.2°S., 143.7°E. South of Australia. USCGS. Mag.: M = 5¾
30	NE	e F	19 20	50 10	- -				Very small. 59.4°S., 26.9°W. Sandwich Islands. USCGS.
31	NE E N	e M M F	06 07 08	40 28 29 25	- - - -	20 20	1 1		15.1°S., 173.3°W. Tonga Islands region. USCGS.
31	NE E N	e M M F	24 25 25 50	45 21½ 21½ -	- - - -	20 20	½ 1		15.1°S., 173.4°W. Samoa Islands region. USCGS.



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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND
SEISMOLOGICAL BULLETIN

APRIL, 19 63

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLI- TUDE	Δ	REMARKS
			h.	m.	s.				
✓ 30	Z	e (SKS)	01	23	41				0.7°S., 129.0°E. Halmahera region. USCGS.
	N	eL		45	-				
	N	M		57	-	34	12		
	E	M		57	1/2	34	16		
	N	M	02	18	1/2	20	12		
	E	M		18	1/2	20	7		
	Z	M		18	1/2	20	5		
		F	03	50	-				
30	NE	e	07	50	-			Very small. 51.6°N., 178.4°E. Rat Islands. USCGS.	
		F	08	10	-				
30	NE	e	19	20	-				
		M		34	-	20	1		
		M		34	-	20	1		
		F		45	-				

 Mag.: $M = 6\frac{1}{4}$

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AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR APRIL, 19 63

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi l}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
1	ZV,Z NE	iP eS	04	40	19			8700	44.8°N., 141.1°E. h about 255 km. Near Hokkaido, Japan. USCGS.
				49	52				
1	NE N	e M F	09	45	-	20	1½		35.4°N., 69.8°E. h about 100 km. Hindu Kush. USCGS.
			10	05	-				
2	NE	e F	04	45	-			8400	Very small. 55.2°N., 160.3°E. Kamchatka. USCGS.
			05	05	-				
2	NE	e F	06	10	-			8400	Small. 29.7°S., 177.1°W. Kermadec Islands. USCGS.
				30	-				
2	NE	e F	06	33	-			8400	Small. 29.7°S., 177.0°W. Kermadec Islands. USCGS.
				55	-				
2	ZV,Z ZV,Z NE	iP ipP e(S) F	16	30	26			8400	Depth = 170 km. 53.2°N., 171.7°W. h about 142 km. Andreanof Islands. USCGS.
				31	08				
				39	52				
			17	15	-				
2	ZV,Z E M	ePKP M F	15	07	38	24	2¼ 1½	8400	55.4°S., 128.2°W. South Pacific Ocean. USCGS.
			16	04½	-				
			17	04½	-				
Mag.: M = 5¼-6									
7	ZV,Z ZV,Z ZV,Z ZE N	iP ePP e e(SKS) eL	22	49	53			11200	4.9°S., 103.2°E. h about 72 km. Near coast of Sumatra. USCGS.
				53	51				
				54	21				
			23	00	22				
				23	26				

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

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APRIL, 19 63

contd.	DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
				h.	m.	s.				
7	N E Z	M M M F	23 43 44 44 24 30	- - - -	20 20 20	3 4½ 1			Mag.: M = 6	
8	NE	e F	14 52 15 30	- -					Small. 27.7°N., 44.3°W. Atlantic Ocean. USCGS.	
9	ZV	e(P)	01 46	48						
9	ZV,Z	iPKP	02 21	06					17.7°S., 178.7°W. h about 538 km. Fiji Islands. USCGS.	
10	NE E N	e (PFS) M M F	08 20 09 00 00 25	45 - - -	22 22	1½ 1½			9.2°S., 125.0°E. Timor. USCGS. Mag.: M = 5½	
12	ZV,Z N	iP M F	00 51 01 16 25	29 - -					31.9°N., 78.8°E. Northern India. USCGS.	
12	NE	e F	09 50 10 30	- -					Small. 39.0°S., 176.7°E. New Zealand. USCGS.	
13	ZV,Z ZV,Z ZV EN N EN E N	iP epP ePP eS e e eSS eL F	02 33 33 36 43 44 44 49 57 03 30	27 54 49 50 19 39 41 - -	4 12	3.5 3.5 (H)	9500		Dilatation. Depth = 100 km. 6.2°S., 76.5°W. h about 125 km. Central Peru. USCGS. Mag.: M = 6½	
13	NE E N	eL M M F	15 27 46 46 16 15	- - - -	20 20	3 3			3.4°S., 135.4°E. Near New Guinea. USCGS. Mag.: M = 6	
13	NE	e F	16 30 17 10	- -					Small. 3.4°S., 135.7°E. New Guinea. USCGS.	
15	ZV,Z	ePKP	23 59	08					18.5°S., 173.7°W. Tonga Islands. USCGS.	
16	ZV,Z Z NE NE N E N Z	ePP e (SKS) eS eSS eL M M M F	01 48 54 56 02 04 17 35½ 36 36 05 20	42 15 24 48 - - - - -	16 20 20 20	9.7 (H) 96 81 19			0.8°S., 128.0°E. Halmahera region. USCGS. Mag.: M = 7¼	

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

APRIL, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
16	ZV	e (PP)	01	56	22				1.2°S., 128.4°E. Halmahera region. USCGS. Mag.: M = 7 ¹ / ₄ Superimposed on previous shock.
	E	M	02	44	-	20	66		
	N	M		44	-	20	95		
	Z	M		44	-	20	45		
		F	-	-	-				
16	ZV,Z	e (PP)	02	14	40				0.7°S., 128.0°E. Halmahera region. USCGS. Mag.: M = 7 Superimposed on previous shock.
	E	M	03	03	-	20	52		
	N	M		03 ¹ / ₂	-	20	50		
	Z	M		03 ¹ / ₂	-	20	15		
		F	-	-	-				
17	ZV,Z	ePKP ₁	02	31	11				19.6°S., 178.6°E. Fiji Islands. USCGS. Mag.: M = 6
	ZV,Z	iPKP ₂		31	19				
	NE	eSS		53.5	-				
	E	M	03	40	-	20	3		
	N	M		40	-	20	2		
		F	04	35	-				
17	NE	e	17	58	-				Small. 58.3°N., 32.4°W. North Atlantic Ocean. USCGS.
		F	18	15	-				
17	NE	e	19	15	-				Small. 54.9°S., 28.2°W. Sandwich Islands.
		F		40	-				
19	ZV,Z	iP	07	35	34				35.3°N., 25.2°E. Crete. USCGS.
19	ZV,Z	iP	07	46	16	7	4.3	7570	35.8°N., 96.9°E. Tsinghai Province, China. USCGS. Mag.: M = 6.8
	ZV,Z	iPP		48	45	6	2.5		
	ZV,Z	ePPP		50	21				
	NE	eS		55	12	12	16.3(H)		
	E	e		55	37				
	NE	eSS		59	23				
	E	eSSS	08	02	25				
	N	eL		06	-				
	N	M		16 ¹ / ₂	-	20	66		
	E	M		17	-	20	38		
E	M		18	-	16	59			
N	M		18	-	16	62			
Z	M		18	-	14	23			
		F	10	25	-				
19	N	e	17	10	-				Very small. 58.8°S., 26.0°W. Sandwich Islands. USCGS.
		F		25	-				
20	ZV	iP	01	01	58				46.4°N., 151.1°E. Kurile Islands. USCGS.
21	NE	eL	05	21	-				Confused by microseisms. 24.1°N., 122.1°E. Near coast of USCGS. Formosa. Mag.: M = 6
	E	M		35	-	20	4 ¹ / ₂		
	N	M		35 ¹ / ₂	-	20	7		
	Z	M		35 ¹ / ₂	-	20	4		
		F	06	10	-				
23	ZV,Z	iP	03	01	43				46.9°N., 103.7°E. Outer Mongolia. USCGS.
	NE	eL		25	-				
	E	M		31 ¹ / ₂	-	16	1 ¹ / ₂		
	N	M		31 ¹ / ₂	-	16	1 ¹ / ₂		
		F		55	-				

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

APRIL, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.						
			h.	m.	s.					sec.	μ	km.			
23	NE	eL	10	26	-				25.7°N., 99.5°E. Yunnan Province, China. USCGS.						
	N	M		38 $\frac{1}{2}$	-	20	3 $\frac{1}{2}$								
	E	M		38 $\frac{1}{2}$	-	20	1 $\frac{1}{2}$								
		F	11	15	-				Mag.: M = 5 $\frac{1}{2}$						
24	ZV,Z	ePKP	04	14	25				17.2°S., 174.5°W. h about 190 km. Tonga Islands region. USCGS.						
24	NE	e	14	15	-				Very small. 27.0°N., 128.8°E. Ryukyu Islands. USCGS.						
		F		40	-										
24	ZV,Z	ePKP	22	01	30				20.8°S., 179.1°W. h about 603 km. Fiji Islands. USCGS.						
25	NE	e	06	13 $\frac{1}{2}$	-	16	1 $\frac{1}{2}$		42.4°N., 19.4°E. Yugoslavia-Albania border. USCGS.						
		M		14 $\frac{1}{2}$	-										
		F		20	-										
25	ZV,ZE	eP	12	38	17			880	45.2°N., 5.9°E. Southeastern France. Slight damage. USCGS.						
		E								eS	39	46			
		ZNE								iSg	40	34			
		ZNE								eL	41	11			
		E								M	41 $\frac{1}{2}$	-	08	1 $\frac{1}{2}$	
		N								M	41 $\frac{1}{2}$	-	09	1 $\frac{1}{2}$	
		Z								M	41 $\frac{1}{2}$	-	08	1	
	F	47	-												
25	NE	e	17	30	-				Small. 1.3°S., 128.7°E. Halmahera region. USCGS.						
		F		18	15					-					
26	NE	e	24	30	-				Small. 24.1°N., 122.5°E. Near Formosa. USCGS.						
		F		55	-										
27	NE	e	03	51 $\frac{1}{2}$	-				Small. 66.7°N., 19.2°W. Near Iceland. USCGS.						
		F		04	05					-					
27	ZN	eSg	05	32	42				Small. France aftershock. BCIS.						
27	NE	eL	09	30	-	20	2 $\frac{1}{2}$		0.6°S., 128.4°E. Halmahera region. USCGS.						
		M		49 $\frac{1}{2}$	-					20	2				
		N		50 $\frac{1}{2}$	-					20					
	F	10	20	-				Mag.: M = 5 $\frac{3}{4}$							
28	N	eL	00	54	-	16	1 $\frac{1}{2}$		40.5°N., 27.4°E. h about 160 km. Turkey. USCGS.						
		M		55	-										
		F		01	05					-					
29	NE	e	09	50	-				Very small. 17.8°S., 13.2°W. Atlantic Ocean. USCGS.						
		F		10	10					-					
29	ZV,Z	iP	21	56	11	1.8	0.3(ZV)	8800	FN 12 sec. 1.1 μ						
		E								eS	22	06	01	16	1.5(H)
		N								ePS	06	57			
		N								eSS	11	21			
		E								M	38 $\frac{1}{2}$	-	20	4 $\frac{1}{2}$	
		N								M	39	-	20	4 $\frac{1}{2}$	
		Z								M	39	-	20	4	
	F	23	35	-				Mag.: M = 5.6							

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR JULY, 19 63

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi I}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
1	NE	e F	10	35 45	-			Small.	
1	NE	e F	21 22	40 05	-			Very small. 37.0°N., 96.1°E. China. USCGS.	
2	NE N	eL M F	00	40 47 05	-	14	1	43.9°N., 85.2°E. Sinkiang Province, China. USCGS.	
4	NE	e F	07 08	45 05	-			Very small. 24.0°N., 122.4°E. Near Formosa. USCGS.	
4	ZV,Z ZV,Z ZV,Z ZV,Z ZV,Z E E N	ePKP ₁ e ePKP ₂ epPKP ₂ ePP eSS M M F	11	17 17 18 19 21 41	46 56 12 14 44 12	6 6 7	1.8 2.9 2.8	17000	26.3°S., 177.7°W. h about 158 km. Tonga Islands region. USCGS.
	E N	M M F	12	26 $\frac{1}{2}$ 26 $\frac{1}{2}$	-	22 22	4 2		
		F	13	50	-				Mag.: 6.4
4	ZV,Z NE NE N E N E Z	eP eS eSS eL M M M M F	23	07 16 21 30 32 $\frac{1}{2}$ 38 38 38	29 45 14 -			7960	18.5°S., 12.6°W. St. Helena Island region. USCGS.
	F	F	24	15	-				Mag.: " = 5 $\frac{1}{2}$

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

JULY, 19 63

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
15	ZV,Z	eP	06	01	13			10000	11.6°S., 77.5°W. h about 55 km. Peru. USCGS.
	E	eSKS		11	39				
	E	eL		27	-				
	E	M		39	-	20	1		
	N	M		39	-	20	1		
		F	07	05	-				
5	NE	e	13	35	-				Very small. 37.2°N., 73.0°E. Hindu Kush. USCGS.
		F		50	-				
5	NE	e	14	30	-				Very small. 39.1°N., 22.9°E. Greece. USCGS.
		F		45	-				
7	NE	e	19	55	-				Very small. 39.6°N., 111.9°W. Central Utah. USCGS.
		F	20	15	-				
8	ZV	eP	09	06	47				26.7°N., 55.7°E. Iran. USCGS.
8	ZV,Z	eP	11	14	25			5970	0.3°N., 17.8°W. Mid-Atlantic Ocean. USCGS.
	NE	eS		21	55				
	E	M		34	1/2	16	1 1/2		
	N	M		36	1/2	16	1		
		F	12	00	-				
8	NE	e	16	15	-				Small. 36.6°N., 28.0°E. Near south coast of Turkey. USCGS.
		F		25	-				
9	NE	e	03	45	-				Small. 46.3°N., 153.7°E. Kurile Islands. USCGS.
		F	04	15	-				
9	ZV,Z	eP	09	36	35			8850	8.5°N., 83.0°W. Costa Rica- Panama border. USCGS.
	E	eS		46	33				
	N	eL		58	-				
	Z	M		05	1/2	22	1 1/2		
	E	M		05	1/2	22	5		
	N	M		06	1/2	21	2		
			F		50	-			
								Mag.: M = 5 3/4	
10	NE	e	03	50	-				46.3°N., 153.4°E. Kurile Islands region. USCGS.
	E	M	04	08	-	18	1 1/2		
	N	M		08	-	18	1 1/2		
		F		40	-				
10	ZV,ZN	eP	05	35	04	7	1.9	8950	PH 10 sec. 1.3 μ
	NE	eS		45	07	15	4.6(H)		
	N	eSS		50	39				
	E	eL		59	-				
	E	M	06	08	-	22	8 1/2		
	N	M		09	1/2	20	6 1/2		
	E	M		18	-	17	8 1/2		
	N	M		18	1/2	17	12 1/2		
	Z	M		18	1/2	16	5		
		F		-	-	-			

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

JULY, 1963

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
10	N	eL	07	29	-			39.8°N., 23.9°E. h about 127 km. Aegean Sea. USCGS.	
	E	M		31	-	18	1½		
	N	M		31	-	18	4		
		F		45	-				
10	NE	e	10	05	-			Small. 13.4°N., 44.9°W. Atlantic Ocean. USCGS.	
		F		30	-				
10	ZV,Z	eP	14	06	34			46.1°N., 153.9°E. Kurile Islands. USCGS.	
12	ZV,Z	eP	15	40	14	6	0.7	9000	46.8°N., 153.6°E. Kurile Islands region. USCGS.
		eS		50	19	14	1.0(H)		
		M	16	14	-	20	1		
		M		14½	-	20	1		
		M		22½	-	18	1½		
		M		22½	-	18	2		
		F	17	10	-			mag.: M = 5½	
12	NE	e	24	30	-			Small. 33.9°N., 140.7°E. Near Japan, USCGS.	
		F	25	10	-				
13	N	M	07	50	-	16	1		
		M		50	-	16	½		
		F		57	-				
13	ZV	iP	08	32	27			Compression. 29.6°N., 51.0°E. Iran. USCGS.	
13	NE	eL	14	48	-			24.3°N., 122.3°E. Ryukyu Islands. USCGS.	
		M	15	03	-	18	1½		
		M		03½	-	18	2		
		F		25	-				
								mag.: M = 5½	
14	ZV,Z	ePKP	00	22	24			30.5°S., 177.2°W. Kermadec Islands region. USCGS.	
		M	01	31	-	20	1½		
		M		32	-	20	1½		
		F	02	30	-				
14	ZV,Z	eP	05	52	21	5	1.0	7240	PH 10 sec. 1.0 μ
		eS	06	01	00	12	3.8(H)		
		eFS		01	18				
		eL		09	-				
		M		18	-	20	4½		
		M		18	-	20	2½		
		M		24½	-	18	3		
		M		24½	-	18	3½		
		M		24½	-	18	1		
		F	07	25	-				
								mag.: M = 6.1	
14	ZV,Z	i(HKP)	17	26	46			39.4°S., 174.9°E. h about 189 km. North Island, New Zealand. USCGS.	
16	ZV,Z	eP	18	33	18	6	1.1	3240	Compression. PE 12 sec. 2.4 μ
		e		33	58				
		eS		38	07	14	9.3(H)		
		e		38	41				
		eSS		39	35				
		eL		39½	-				
		M		43	-	32	39		
								43.1°N., 41.5°E. Georgia S.S.R. USCGS.	

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			h.	m.	s.				
contd. 16	N E N	M M M F	18	43	-	33	46		Mag.: M = 5.7
				45 ¹ / ₂	-	22	19		
				45 ¹ / ₂	-	21	30		
			22	10	-				
17	NE	e F	04	15	-				Very small. 46.9°S., 33.3°E. Prince Edward Islands. USCGS.
				50	-				
17	NE	e F	12	10	-				Small. 43.1°N., 41.5°E. Georgia S.S.R. USCGS.
				30	-				
18	NE	e F	00	35	-				Very small. 49.1°N., 128.9°W. Vancouver Island. USCGS.
				50	-				
✓ 18	NE E N	eL M M F	05	56	-				61.0°S., 22.3°W. Sandwich Islands. USCGS.
				59 ¹ / ₂	-	18	1		
			06	01	-	18	1		
				55	-				
19	NE	e F	04	35	-				Very small. 7.1°N., 33.6°W. Atlantic Ocean. USCGS.
				45	-				
19	ZV,Z ZV,Z NE	eP iPP iS F	05	47	48	5	0.7	1200	Dilatation. 43.4°N., 8.2°E. Ligurian Sea. USCGS. Mag.: M = 5 ¹ / ₂
				47	53	6	1.8		
				49	48				
			-	-	-				
✓ 19	ZV,Z ZV,Z NE	eP iPP iS F	05	48	26	5	2.2	1200	43.3°N., 8.1°E. Ligurian Sea. USCGS. Mag.: M = 6 ¹ / ₄
				48	34	6	4.4		
				50	28				
			07	40	-				
19	NE E N	e M M F	09	40	-				36.3°N., 141.0°E. h about 70 km. Near coast of Honshu, Japan. USCGS.
				55 ¹ / ₂	-	20	1		
				55 ¹ / ₂	-	20	1		
			10	20	-				
20	NE	e F	00	40	-				Very small. 65.2°N., 133.7°W. Yukon. USCGS.
				55	-				
20	ZV,Z NE NE E N Z	e(PKP) eSS eL M M M F	06	56	28				57.6°S., 148.5°E. Macquarie Islands region. USCGS. Mag.: M = 6 ¹ / ₂
			07	20	54				
				44	-				
			08	12	-	20	7 ¹ / ₂		
				12	-	20	11		
				12	-	20	4 ¹ / ₂		
			09	30	-				
20	NE	e F	15	15	-				Very small. 68.8°N., 4.6°W. Jan Mayen Island region. USCGS.
				25	-				
21	ZV,Z	eP	06	11	47				14.8°N., 56.1°E. Arabian Sea. USCGS.
21	NE	e F	07	03	-				Small. 17.8°N., 46.5°W. North Atlantic Ocean. USCGS.
				20	-				

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			h.	m.	s.				
22	NE	eL	00	28	-				6.1°S., 148.9°E. h about 59 km. New Britain. USCGS.
	E	m		44	-	24	1½		
	N	m		44	-	24	2		
		F	02	35	-				
23	ZV	iP	06	30	02				41.5°N., 141.9°E. h about 91 km. Tsugaru Strait, Japan. USCGS.
	N	M	07	08	-				
		F		20	-				
24	NE	eL	12	10	-				24.6°N., 122.0°E. Near east coast of Formosa. USCGS.
	E	M		26	-	20	7½		
	N	M		26	-	20	5½		
	Z	M		28½	-	20	2		
		F	13	20	-				Mag.: M = 6
26	ZV,Z	eP	04	21	19	6	3.1	1950	PH 6 sec. 4.5 μ 42.1°N., 21.5°E. Southern Yugoslavia. Estimated 2000 killed, 3000-4000 injured, 80% buildings destroyed at Skopje. USCGS.
	ZV,Z	i		21	21				
	ZV,Z	ePP		21	32				
	N	eS		24	31	10	8.9(H)		
	NE	e		24	43				
	ME	eL		25½	-				
	E	m		27	-	22	78		
	N	m		27	-	20	155		
		F	06	15	-	12	28		Mag.: M = 5.7
26	NE	e	19	58	-				Very small. 36.9°N., 29.1°E. Dodecanese Islands. USCGS.
		F	20	10	-				
27	ZV,Z	eP	06	01	02				43.5°N., 8.4°E. Ligurian Sea. USCGS.
	E	M		04½	-	14	4		
	N	M		04½	-	14	2½		
		F		13	-				
27	NE	e	13	55	-				Small. 34.3°N., 23.1°E. Crete. USCGS.
		F	14	05	-				
28	NE	e	08	40	-				Small. 11.3°S., 112.1°E. Near Java. USCGS.
				30	-				
28	ZV,Z	eP	13	29	59			(2230)	Confused by microseisms. 72.0°N., 0.0 Jan Mayen Island region. USCGS.
	NE	e(S)		33	38				
	E	eL		35	-				
	E	M		37½	-	16	1		
	N	m		37½	-	20	1½		
		F		50	-				
28	ZV,Z	eP	19	03	43				46.6°N., 153.1°E. Kurile Islands. USCGS.
	E	m		44	-	20	1		
	N	m		44	-	20	1		
		F	20	10	-				
29	ZV,Z	iP	06	18	59				Compression. 27.8°N., 55.6°E. Iran. USCGS.
	E	M		44	-	18	½		
		F	07	05	-				

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			h.	m.	s.					sec.
29	ZV,Z	e(PKP)	20	34	00				30.2°S., 177.3°W. Kermadec Islands. USCGS.	
	ZV,Z	ePKP ₂		34	36					
	E	e		58	16					
	E	M	21	45 ¹ / ₂	-	19	6 ¹ / ₂			
	N	M		45 ¹ / ₂	-	19	12			
	Z	M		45 ¹ / ₂	-	19	5			
		F	23	40	-			Mag.: M = 6 ¹ / ₂		
29	ZV,Z	iPKP ₂	20	37	06				29.7°S., 177.0°W. Kermadec Islands USCGS.	
30	NE	e	05	50	-				Small. 30.2°S., 177.3°W. Kermadec Islands. USCGS.	
		F	-	-	-					
30	ZV,Z	ePKP	06	05	44			17500	29.6°S., 177.3°W. Kermadec Islands region. USCGS.	
	ZV,Z	ePKP ₂		06	21					
	Z	ePP		09	58					
	E	M	07	15 ¹ / ₂	-	19	4			
	N	M		15 ¹ / ₂	-	19	6 ¹ / ₂			
	Z	M		15 ¹ / ₂	-	19	3 ¹ / ₂			
		F	08	45	-			Mag.: M = 6 ¹ / ₄		
30	ZV,Z	iP	07	04	05				51.7°N., 158.1°E. Kamchatka. USCGS.	
30	NE	e	14	40	-				Small. 55.9°S., 27.5°W. Sandwich Islands. USCGS.	
		F	15	15	-					
30	ZV	e(PKP ₂)	15	25	02				29.9°S., 177.1°W. h about 76 km. Kermadec Islands. USCGS.	
		M	16	38	-	19	1 ¹ / ₂			
		M	17	38	-	19	1 ¹ / ₂			
		F	17	30	-					
31	NE	e	03	05	-				Small. 29.8°S., 177.2°W. Kermadec Islands. USCGS.	
		F	04	00	-					

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AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

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SEISMOLOGICAL BULLETIN FOR JUNE, 1963

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
1	ZV,Z	eP	10	58	55				36.4°N., 71.5°E. h about 70 km. Hindu Kush. USCGS.
	ZV,Z	epP		59	20				
	ZV,Z	e		59	30				
✓1	NE	eL	22	20	-	20	1½		15.2°S., 173.5°W. Samoa Islands region. USCGS.
	E	M		40	-				
	N	M		40	-				
		F	23	35	-				
2	ZV	e(P)	19	09	31				
2	ZV,Z	ePKP	21	27	19				32.8°S., 179.0°W. h about 56 km. Kermadec Islands. USCGS.
✓2	NE	eL	21	51	-	18	3½		58.5°S., 15.6°W. h about 50 km. Sandwich Islands region. USCGS.
	E	M	22	05	-				
	N	M		06	-				
	Z	M		06	-				
		F		55	-				Mag.: M = 6-6½
3	NE	eL	08	12	-	20	4		34.2°N., 138.7°E. h about 43 km. Honshu, Japan. USCGS.
	E	M		25	-				
	N	M		25	-				
		F		55	-				
		F		55	-				Mag.: M = 6
3	NE	e	12	05	-	20	2		5.3°N., 72.9°W. Colombia. USCGS.
	E	M		15½	-				
	N	M		16	-				
		F		30	-				

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
4	ZV,Z	e(PP)	21	24	09				1.2°S., 127.3°E. Halmahera region. USCGS. Mag.: M = 6
	Z	ePKS		26	43				
	E	M	22	16	-	20	3		
	N	M		16	-	20	3		
		F	23	15	-				
4	ZV,Z	eP	22	15	56				39.0°N., 20.6°E. Greece. USCGS.
	N	M		23	-	16	5		
		F	-	-	-				
5	NE	e	15	25	-				Very small. 17.2°S., 176.7°W. Tonga Islands. USCGS.
		F		50	-				
5	NE	e	23	21	-				3.0°S., 119.5°E. h about 75 km. Celebes. USCGS.
	N	M	24	04	-	20	1		
	E	M		05	-	20	1½		
		F		45	-				
✓6	ZV,Z	eP	05	32	01	5	0.4	10150	19.9°N., 120.2°E. Off north coast of Luzon, Philippine Islands. USCGS.
	ZV,Z	eFP		35	41	5	0.7		
	E	eSKS		42	34				
	NE	ePS		44	18				
	E	eSS		49	16				
	E	M	06	11	-	20	3		
	N	M		11	-	20	4		
	E	M		17½	-	16	4½		
	N	M		17½	-	16	9½		
	Z	M		17½	-	16	4½		
		F	07	20	-			Mag.: M = 5.9	
6	NE	e	12	50	-				Very small. 37.8°S., 77.9°E. Indian Ocean. USCGS.
		F	13	30	-				
7	ZV,Z	ePP	16	06	57				19.0°N., 121.8°E. Philippine Islands. USCGS. Mag.: M = 5½
	NE	e(SKS)		13	45				
	NE	eL		30	-				
	E	M		46	-	20	2½		
	N	M		46	-	20	2		
		F	17	35	-				
7	NE	e(S)	19	54	46				8.5°N., 103.1°W. Clipperton Islands region. USCGS. Mag.: M = 5¾
	N	eL	20	09	-				
	E	M		20	-	20	3		
	N	M		20	-	20	1½		
	Z	M		20	-	20	1		
		F	21	20	-				
✓7	NE	e	23	00	-				15.3°S., 173.2°W. Samoa Islands region. USCGS.
	E	M		59½	-	20	1½		
	N	M		59½	-	20	2½		
		F	25	20	-				
8	NE	e	02	10	-				Very small. 15.1°S., 173.0°W. Samoa Islands. USCGS.
		F		50	-				
8	NE	e	04	44	-				22.7°S., 13.7°W. South Atlantic Ocean. USCGS.
	NE	eL		52	-				
	E	M	05	06	-	18	1		
	N	M		06	-	20	1½		
		F		25	-				

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			h.	m.	s.				
9	NE	e F	20 21	54 30	- -				Small. 10.7°N., 41.9°W. Mid-Atlantic Ocean. USCGS.
10	ZV,Z	ePKP ₁	04	36	32				55.4°S., 146.4°E. 800 km. west of Macquarie Islands. USCGS. Mag.: $M = 6$ overlapped by next shock.
	ZV,Z	ePKP ₂		37	17				
	NE	eSS	05	01	08				
	N	eL		33	-	20			
	E	M		50	-	20	3		
	N	M		50	-	20	3		
	Z	M F		50	-	20	1		
10	ZV,Z	ePKP ₁	06	59	00				55.3°S., 146.1°E. 800 km. west of Macquarie Islands. USCGS. Mag.: $M = 6\frac{1}{2}$
	ZV,Z	ePKP ₂		59	43				
	ZV,Z	ePP	07	03	42				
	N	eL		47	-				
	Z	M	08	21 $\frac{1}{2}$	-	20	2 $\frac{1}{2}$		
	E	M		21 $\frac{1}{2}$	-	20	7		
	N	M F		22 $\frac{1}{2}$ 30	-	20	6		
10	NE	e	11	30	-				Small. 50.9°N., 160.2°E. Off coast of Kamchatka. USCGS.
		F	12	00	-				
11	ZV,Z	iP	03	34	38			5500	37.1°N., 70.3°E. Hindu Kush. USCGS.
		i		34	42				
	NE	eS		41	42				
	E	M		56	-	20	$\frac{1}{2}$		
	N	M F		56 20	-	20	1		
11	NE	e	15	55	-				Very small. 31.8°N., 116.2°W. California. USCGS.
		F	16	20	-				
11	NE	e	18	40	-				Small. 30.7°N., 86.9°E. Tibet. USCGS.
		F	19	05	-				
11	ZV ZV	iP	18	46	29				4.9°N., 77.5°W. Near coast of Colombia. USCGS.
		ipP		46	38				
13	NE	e	08	47	-				Very small. 33.7°N., 14.8°E. Near Sicily. USCGS.
		F		55	-				
13	NE	e	18	25	-				Very small. 4.6°S., 153.2°E. New Britain. USCGS.
		F		55	-				
15	NE	e	16	03	-				Small. 36.3°S., 98.9°W. Near central Chile. USCGS.
		F	17	00	-				
16	NE	e	14	35	-				Small. 4.5°S., 153.0°E. New Ireland. USCGS.
		F	15	15	-				
17	ZV,Z	eP	18	42	46				60.4°N., 140.8°W. South-western Yukon. Mag.: $M = 5\frac{1}{2}$ overlapped by next shock.
		e		43	11				
	N	eSS		55	35				
	NE	eL	19	00	-				
	E	M		11	-	18	2		
	N	M		11 $\frac{1}{2}$	-	19	4		
	Z	M F		11 $\frac{1}{2}$	-	19	1 $\frac{1}{2}$		

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			h.	m.	s.				
✓ 17	ZV	ePKP ₂	18	51	55				65.8°S., 179.5°W. Scott Island region. USCGS.
	NE	eL	19	41	-				
	N	eLR		51	-				
	Z	M	20	06	-	20	2		
	N	M		06	-	20	5½		
	E	M		08	-	20	3½		
		F	21	05	-			Mag.: M = 6¼	
18	NE	e	04	49	-				29.0°N., 129.9°E. Ryukyu Islands. USCGS.
	E	M		59½	-	20	1½		
	N	M	05	00	-	20	2		
		F		20	-				
✓ 19	N	eL	09	59	-				4.7°N., 126.5°E. h about 83 km. Talur Island region. USCGS.
	E	M	10	14½	-	24	4		
	N	M		14½	-	24	3½		
		F		40	-			Mag.: M = 6	
19	ZV,Z	iP	10	58	48	1.5	0.5(ZV)		Compression. 25.0°N., 92.1°E. h about 51 km. Assam, India. USCGS.
	ZV	i		59	11				
	NE	eL	11	20	-				
	E	M		35	-	22	2½		
	N	M		35½	-	20	1½		
		F		50	-			Mag.: M = 5¾	
19	ZV,Z	eP	23	14	56			10100	31.5°N., 140.3°E. South of Honshu, Japan. USCGS.
	NE	eSKS		25	25				
	NE	eS		25	47				
	E	M		59	-	20	1½		
	N	M		59½	-	20	3		
	Z	M		59½	-	20	1		
		F	24	25	-			Mag.: M = 5½	
20	NE	e	01	40	-				Very small. 36.3°N., 144.5°E. Off Honshu, Japan. USCGS.
		F	02	05	-				
20	N	e(S)	19	54	38				35.8°N., 3.6°W. h about 54 km. Western Mediterranean. USCGS.
	E	eL		55½	-				
	E	M		57	-	18	3		
	N	M		57	-	18	1½		
	E	M		57	-	18	2½		
	N	M		58½	-	10	2½		
	Z	M		58½	-	10	1½		
		M		58½	-	10	1½		
		F	20	10	-			Mag.: M = 4¼	
✓ 20	ZV,Z	ePKP ₁	23	06	09				27.9°S., 176.6°W. Kermadec Islands. USCGS.
	ZV,Z	ePKP ₂		06	38				
	NE	eL		53	-				
	E	M	24	17	-	20	1½		
	N	M		17	-	20	1		
		F	25	25	-				
21	NE	eL	14	18	-				47.9°N., 130.3°E. Eastern Manchuria. USCGS.
	E	M		26	-	18	2		
	N	M		26	-	18	1½		
		F		40	-				

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

JUNE, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
21	ZV,Z	iP	15	37	52				25.2°N., 92.2°E. h about 56 km. India. USCGS.
	N	M	16	10½	-	20	1		
	E	M F		11 30	- -	20	1½		
22	NE	e F	21	20 50	- -				Small. 52.9°N., 121.3°E. Manchuria. USCGS.
23	NE	e F	04 05	50 30	- -				Small. 29.6°S., 177.9°W. Kermadec Islands. USCGS.
23	N	eL	09	39½	-				45.6°N., 14.9°E. Yugoslavia. USCGS.
	N	M F		41 45	- -	14	1½		
24	ZV,Z	iP	04	37	28	6	1.9	7570	PH 12 sec. 1.3 μ
	ZV,Z	ePcP		37	56				
	Z	eFP		39	58	8	1.2		
	E	iS		46	22	12	7.8(H)		59.5°N., 151.7°W. h about 52 km. Cook Inlet. USCGS.
	NE	eScS		47	16				
	E	eSS		50	20				
	E	eLq		54	-				
	N	eLr		58	-				
	E	M		05	03½	-	26	38	
	N	M			04½	-	26	33	
	ZV,Z	eP'P'		05	53	-			
	Z	M		06	-	18	6		
	N	M		06	-	20	22		
E	M F		07½ 50	- -	20	24			
24	ZV,Z	iPKP ₁	15	20	32				Mag.: M = 6½ 45.5°S., 177.5°W. h about 412 km. Fiji Islands. USCGS.
24	ZV	e(P)	16	29	06				52.3°N., 171.2°W. Fox Islands region. USCGS.
	E	M	17	03	-	20	1½		
	N	M F		04 30	- -	20	2		
26	N	eL	05	58½	-				42.0°N., 23.7°E. Bulgaria. BCIS
	N	M F		59½ 03	- -	14	1½		
26	NE	eL	10	35½	-				35.3°N., 3.7°W. Western Mediterranean. USCGS.
	E	M		36½	-	16	2½		
	N	M F		36½ 47	- -	16	1		
26	ZV,Z	iP	14	18	42				36.4°N., 76.9°E. Sinkiang Province, China. USCGS.
	E	M		44	-	20	1½		
	N	M F		44 00	- -	20	1½		
26	ZV	iP	17	54	47			8900	7.1°N., 82.3°W. Near south coast of Panama. USCGS.
	NE	eS	18	04	47	12	1.9(H)		
	NE	eSS		09	57				
	N	eLq		16½	-				
	E	eLr		19½	-				
	N	M		25	-	20	2		
	E	M		26	-	20	3		

FORM 3718

contd.

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

JUNE, 1963

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
contd. 26	Z	M	18	26	-	20	1	8900	Mag.: = 5½
		F	19	25	-				
27	NE	eL	07	35	-		½	8900	60.5°N., 140.7°W. Yukon Territory. USCGS.
	E	M		45½	-	20	1		
	N	M	08	05	-	20			
28	NE	e	03	15	-			8900	Small. 27.5°S., 66.1°E. Indian Ocean. USCGS.
		F		50	-				
28	N	eS	14	12	07		½	8900	1.3°N., 97.4°E. h about 50 km. Near Sumatra. USCGS.
		M		50	-	20	½		
		M		50	-	20			
28	NE	e	16	10	-			8900	Very small. 67.5°N., 18.7°W. Near Iceland. USCGS.
		F		17	-				
28	ZV,Z	iP	22	07	46	7	5.1	8900	Compression. PH 12 sec. 5.8 u PPH 12 sec. 5.0 u 46.5°N., 153.2°E. Kurile Islands region. USCGS.
	ZN	ePP		10	47	8	2.4		
	NE	eS		17	47	13	21(H)		
	N	e		18	25				
	E	eLq		28½	-				
	E	M		50½	-	19	49		
	N	M		51	-	18	43		
	Z	M		51	-	17	17		
28	ZV	eP	26	20	-			8900	Mag.: M = 6.7
		F							
28	ZV	eP	22	37	11			8900	46.7°N., 153.4°E. Kurile Islands. USCGS.
28	ZV	eP	23	01	41			8900	46.6°N., 153.3°E. Kurile Islands. USCGS.
28	ZV	eP	23	09	11			8900	46.4°N., 153.4°E. Kurile Islands. USCGS.
28	ZV	iP	24	06	04			8900	46.4°N., 153.5°E. Kurile Islands. USCGS.
29	NE	e	13	40	-			8900	Small. 11.6°N., 142.7°E. Mariana Islands. USCGS.
		F	14	15	-				
29	ZV	eP	14	33	06			8900	46.1°N., 153.2°E. Kurile Islands. USCGS.
30	ZV	iP	07	48	41			8900	33.3°N., 49.1°E. Western Iran. Extensive property damage. USCGS.
		E	08	06	-	20	½		
		N		06	-	20	½		
30	ZV	iP	22	17	00			8900	46.5°N., 153.3°E. Kurile Islands. USCGS.
		NE		27	03				
		E		52	-	20	½		
		N		52	-	20	1		
		F	23	30	-				

M.O. 737

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR AUGUST, 19 63

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi I}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
1	ZV,Z	eP	09	11	58				56.2°N., 34.1°W. Atlantic Ocean. USCGS.
2	E E N	eL	09	23 ¹ / ₂	-				P lost in break for chart changing. 56.3°N., 34.5°W. Atlantic Ocean. USCGS. mag.: μ = 4 ¹ / ₂
		M		25	-	18	3		
		M		25	-	18	2		
		F		55	-				
2	NE	e	12	58	-				Small. 57.5°N., 38.5°W. Atlantic Ocean. USCGS.
		F	13	10	-				
3	ZV,Z ZV,Z NE NE NE E N E N E	iP	10	30	49	6	5.7	5820	Compression. PH 12 sec. 5.0 μ 7.7°N., 35.8°W. Mid-Atlantic Ocean. Mag. 6.9 (Pas) USCGS. mag.: μ = 6.8
		iFP		32	45	6	2.7		
		iS		33	11	15	85 (H)		
		iPS		38	42				
		eL		43	-				
		M		45	-	19	75		
		M		45	-	19	63		
		M		48	-	22	156		
		M		48	-	22	151		
		M		48	-	22	67		
3	ZV	eP	10	43	38				7.8°N., 35.9°W. Mid-Atlantic Ocean. USCGS.
3	NE	e(S)	20	24	38				Small. 1.4°N., 28.2°W. Mid-Atlantic Ocean. USCGS.
		F	21	05	-				
3	ZV,Z	e(P)	20	46	36				

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

AUGUST, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
3	NE	e F	21	50	-				Very small.
			22	10	-				
4	ZV,Z	iP	12	20	10	20	1/2	9800	Compression. 4.1°S., 80.9°W. Near coast of Peru. USCGS.
	NE	eS		30	49				
	N	M F	13	10	-				
4	ZV,Z	e(FKP)	24	12	55				17.5°S., 179.1°W. h about 515 km. Fiji Islands. USCGS.
	ZV,Z	i		12	56				
5	NE	eL	16	44	-	20	1 1/2		60.7°S., 154.3°E. Macquarie Islands. USCGS.
	N	M	17	14	-				
	E	M F		16	-				
		F		50	-				
6	ZV,Z	eP	13	41	08	9	1.3	2360	HI 12 sec. 1.9 μ 57.0°N., 33.6°W. North Atlantic Ocean. USCGS.
	NE	eS		44	57	14	3.0(H)		
	NE	eL		46	-				
	N	M		47	-	20	5 1/4		
	E	M		47 1/4	-	20	6 1/4		
	Z	M		47 1/2	-	20	2 1/2		
		F	14	25	-				
7	ZV,Z	eP	04	44	55				Very small. 54.0°N., 142.1°E. Sakhalin Island USSR. USCGS.
	NE	M F	05	15	-				
		F		30	-				
7	NE	e F	07	38	-				Small. 7.5°N., 37.2°W. Atlantic Ocean. USCGS.
		F		55	-				
8	ZV,Z	eP	02	26	29	12	1.3	8300	54.2°N., 168.1°E. Fox Islands, Aleutian Islands. USCGS.
	ZV,Z	e		26	43				
	E	eS		36	01				
	F	eSS		40	41				
	N	M	03	01	-				
	E	M F		02	-				
8	NE	e	12	10	-	20	2 1/2		5.8°S., 151.0°E. New Britain. USCGS.
	E	M		34	-				
	N	M		34	-				
	Z	M F		34	-				
		F	13	25	-				
8	ZV	iP	06	08	13	18	5		44.3°N., 12.2°W. Northern Italy. BCIS
	ZV	i		08	18				
	NE	eL		11	-				
	N	M		12 1/2	-				
	E	M F		12 1/2	-				
		F		25	-				
9	ZV,Z	e(FKP)	14	56	19	19	1 1/2		Confused by microseisms. 15.3°S., 175.7°W. Fiji Islands region. USCGS.
	NE	eL	15	44	-				
	E	M	16	02	-				
	N	M		03	-				
		F		55	-				

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

AUGUST, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
10	ZV,Z	i(P)	04	35	54				28.1°N., 53.3°E. Iran. USCGS.
11	NE	e F	02 03	45 45	- -				Small. 60.5°S., 154.9°E. Balleny Islands. USCGS.
12	ZV	iP	07	28	21				27.7°N., 53.2°E. Iran. USCGS.
12	NE	e F	19	00 25	- -				Small. 25.3°N., 62.7°E. Near coast of Pakistan. USCGS.
13	NE	e F	04	25 35	- -				Very small.
13	ZV,Z	iP	07	12	32				Compression. 36.6°N., 70.9°E. h about 244 km. Hindu Kush. USCGS.
13	NE	e F	13	33 50	- -				Very small. 76.2°N., 6.4°E. Svalbard region. USCGS.
13	ZV,Z	eMKP	22	12	20				19.3°S., 173.7°W. Tonga Islands. USCGS.
	ZV	e		12	41				
	E	M	23	16	-	20	1		
	N	M F	24	16 10	- -	20	1		
14	ZV	eMKP	03	06	28				21.4°S., 175.2°W. Fiji Islands. USCGS. overlapped by next shock.
	N	M	04	11	-				
	E	M F	-	12 -	- -				
14	NE	e F	04	35 00	- -				Small. 4.9°S., 152.3°E. New Britain. USCGS.
14	NE	e F	17	05 25	- -				Small. 24.1°N., 122.4°E. Off coast of Formosa. USCGS.
14	NE	e F	19	45 10	- -				Small. 3.4°S., 135.4°E. West Irian. USCGS.
15	ZV,Z	iP	06	24	05	5	4.0	9470	Compression. FH 10sec. 2.1 μ Depth = 57 km.
	ZV,Z	epP		24	21				37.9°N., 141.6°W. h about 59 km. Near east coast of Honshu, Japan. Mag. 6½(Pas). USCGS.
	ZV,Z	eFP		27	24				
	NE	eS		34	31	12	4.6(H)		
	NE	e		34	52				
	NE	eFS		35	22				
	NE	eFS		35	47				
	E	eL		47	-				
	Z	M	07	04	-	22	10		
	N	M		04	-	22	36		
	E	M		05	-	20	22		
		F	09	20	-				Mag.: M = 6.4
15	ZV,Z	eP(A)	17	36	59			9000	Dilatation.
	ZV,Z	i		37	11				Depth = 575 km.
	ZV,Z	iP(B)		37	15	8	10.6		Compression FH 10 sec. 6.3 μ
	ZV,Z	ipF(B)		39	20				FPH 10 sec. 9.2 μ
	ZV,Z	iPP(B)		40	50	9	5.5		13.8°S., 69.3°W. h about 54.3 km.
	NE	1SKS		46	48				Peru-Bolivia border. USCGS.
	N	1S		47	10	12	34(H)		Mag. 7.1(Fas. - recomputed at Kew)
	ZNE	e		48	16				
	NE	eSE		53.0	-				
		F	21	10	-				Mag.: M = 7.0 (Kew)

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

AUGUST, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
15	ZV,Z ZV,Z	eP i	18	02	44 05				Aftershock ?
15	ZV,Z ZV,Z	eP i	18	23	33 51				Aftershock ?
16	NE	e F	23	38	- -				Very small. 12.8°S., 14.5°W. Atlantic Ocean. USCGS.
✓ 17	ZV,Z ZV,Z NE NE NE E N Z	eP eFP eSKS eS eL M M M F	11	25	27 54 51 09 53 09½ 09½ 09½ 00	5 5 20 20 19	1.9 1.1 7.0(H) 41 35 17	9850	PPH 20 sec. 1.8 μ 30.6°N., 130.9°E. Ryukyu Islands. Mag. 6¼ (Pas). USCGS. Mag.: M = 6.4
17	NE	e F	22	25	- 35				Very small. 36.7°N., 59.7°E. Northern Iran. USCGS.
18	ZV,Z NE E N	iP eS M M F	18 19 20	55 05 36 36 10	16 11 - - -	4 10 20 20	0.8 0.8(H) ½ 1	8800	50.3°N., 176.9°W. Andreanof Islands. USCGS. Mag.: M = 5¼
18	NE	e F	21 22	40 40	- -				Small. 32.1°S., 178.1°W. Kermadec Islands. USCGS.
19	NE	e F	05 06	45 10	- -				Very small. 32.0°S., 177.9°W. Kermadec Islands. USCGS.
20	NE E N	e M M F	16	20 36½ 37 15	- - - -	20 20	2½ 1½		41.2°N., 142.7°E. Off coast of Japan. USCGS.
✓ 22	ZV,Z ZV,Z NE E N Z	e (FP) eSKS eL M M M F	20	14 15 47 10½ 10½ 10½ 30	21 14 - - - - -	20 22 22	5½ 8 2½		9.4°S., 158.0°E. Solomon Islands. Mag. 6¼ (Pas), 6-6¼ (Brk) USCGS. Mag.: M = 6¼
22	ZV	iP	23	32	11				4.3°N., 76.4°W. Colombia. USCGS.
25	ZV,Z	iP	05	33	30				45.2°N., 151.3°E. Kurile Islands. USCGS.
25	NE N E	eS M M F	06 07	22 29 30 00	39 - - -	20 20	1½ 1½		38.9°N., 38.4°E. Central Turkey. USCGS. Mag.: M = 4½

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

AUGUST, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
25	ZV,Z	ePKP ₁	12	36	48	5	2.2	5700	Dept. = 584 km. 17.5°S., 178.8°W. h about 565 km. Fiji Islands. USCGS.
	ZV,Z	epPKP ₁		39	03				
	E	eSS		58	19				
	E	esSS	13	02	03				
		F	14	45	-				
27	NE	eL	04	12	-	20	1 1/2	45.9°S., 75.3°W. Near coast of Chile. USCGS.	
	E	M		31	-				
	N	M		31	-				
		F	05	00	-				
28	NE	eL	14	10	-	20	1 1/2	61.9°S., 164.5°E. Balleny Islands. USCGS.	
	E	M		23	-				
	N	M		23	-				
		F		50	-				
28	N	e	17	24	-	22	1 1/2	39.1°S., 91.8°W. West of Chile. USCGS.	
	E	M	18	00	1/2				
	N	M		00	1/2				
		F		20	-				
29	ZV,Z	eP	09	02	51	5	2.8	5700	Compression. PH 6 sec. 1.1 μ PPH 10 sec. 1.6 μ 39.6°N., 74.2°E. Sinkiang Province, China. USCGS.
	ZV,Z	ePcP		04	09				
	ZV,Z	eIP		04	47				
	NE	eS		10	07				
	NE	eL		18	-				
	E	M		23	-				
	N	M		23	-				
	Z	M		27	-				
	F	10	55	-			mag.: m = 6.0		
29	ZV,Z	iP	15	43	31	7	6.5	10050	Dilatation. IH 8 sec. 3.4 μ 7.1°S., 81.6°W. Off coast of Peru. USCGS.
	ZV,Z	ePP		46	55				
	E	iSMS		54	01				
	NE	eS		54	21				
	N	eIS		55	23				
	E	eSS	16	00	27				
	E	eSSS		04	13				
	NE	eL		08	-				
	E	M		21	1/2				
	N	M		21	1/2				
	F	19	15	-			mag.: m = 7.0		
29	NE	e	22	00	-	20	1 1/2	15.5°S., 172.9°W. Tonga Islands. USCGS.	
	E	M		19	1/2				
	N	M		19	1/2				
	F	23	15	-					
30	NE	e	05	12	-	15	2 1/2	44.8°N., 80.1°E. China-Kazakh S.S.R. border. USCGS.	
	N	M		15	1/2				
	E	M		18	-				
	F		30	-					



M.O. 737

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR SEPTEMBER, 1963

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi I}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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	e	23	50	-	sec.	μ	km.	Very small. 1.0°N., 28.4°W. Atlantic Ocean. USCGS.	
		F	24	05	-					
2	NE	e	02	00	-	sec.	μ	km.	Small. 33.9°N., 74.7°E. India. 79 killed, 400 injured, major property damage. USCGS.	
		F	25	-	-					
2	NE E N	eL	14	45	-	sec.	μ	km.	25.7°N. 109.5°W. Gulf of California. USCGS.	
		M	52 $\frac{1}{2}$	-	22					1 $\frac{1}{2}$
		F	52 $\frac{1}{2}$	-	22					2
2	ZV,Z N E N	eP	23	57	09	sec.	μ	9000	45.4°N., 150.8°E. Kurile Islands. USCGS.	
		eS	24	07	13					
		M	36	-	20					1 $\frac{1}{2}$
		F	25	15	-					20
3	ZV,Z	eP	05	41	49	sec.	μ	km.	45.4°N., 150.9°E. Kurile Islands. USCGS.	
4	ZV,Z ZV,Z E E N N Z	eP	05	10	29	sec.	μ	1880	Dilatation. PH 6 sec. 2.8 u	
		ePP	10	53	4					2.4
		eS	13	34	8					2.6(H)
		eLQ	14.0	-	-					-
		M	15 $\frac{1}{2}$	-	19					17
		M	15 $\frac{1}{2}$	-	18					7
		M	17	-	16					14
		F	17	-	16					5
06	55	-	-	-	mag.: M = 5.1					

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
4	ZV,Z	iP	13	39	22	5	2.1	4100	Compression. PH 10 sec. 1.8 u PPH 10 sec. 2.7 u 71.4°N., 73.5°W. Near coast of Baffin Island. USCGS.
	ZV,Z	ePP		40	50	5	1.9		
	NE	eS		45	03	12	6.3(H)		
	E	eL _Q		48.0	-	-	-		
	E	M		53	-	20	15		
	N	M		53	-	20	20		
	Z	M		53	-	20	5		
	F		15	55	-	-	mag.: M = 5.9		
4	NE	e	16	20	-	-	-	Very small. 0.9°S., 145.7°E. Admiralty Islands region. USCGS.	
		F	17	10	-	-	-		
5	N	e	11	49	-	-	-	Very small. 43.3°N., 8.2°E. Mediterranean. BCIS.	
		F		55	-	-	-		
5	NE	e	17	20	-	-	-	Very small. 36.0°N., 5.7°E. Near coast of Algeria. USCGS.	
		F		27	-	-	-		
6	ZV	eP	06	16	13	-	-	9250	36.4°N., 130.6°E. Sea of Japan. USCGS.
	N	eS		26	30	-	-		
	E	M		50	-	22	5		
	N	M		50	-	22	4		
	E	M		52	-	17	8		
	N	M		52	-	16	6		
	F		07	55	-	-	mag.: M = 6		
7	ZV	iP	01	29	16	-	-	36.4°N., 130.6°E. Sea of Japan. USCGS.	
	NE	eL		52	-	-	-		
	E	M	02	04	-	20	5½		
	N	M		04	-	20	4		
	E	M		10	-	16	5½		
	N	M		10	-	16	6		
	F		03	00	-	-	mag.: M = 6		
7	ZV	iP	07	25	50	-	-	45.4°N., 150.8°E. Kurile Islands. USCGS.	
	E	M	08	05	-	20	1½		
	N	M		05	-	20	1½		
	F			30	-	-	-		
7	E	M	09	24	-	19	8½	11.7°S., 13.6°W. Ascension Islands region. USCGS.	
				24½	-	19	3		
			10	10	-	-	-		mag.: M = 6.
7	ZV	iP	12	55	25	-	-	54.0°N., 160.3°E. h = 110km. Kamchatka. USCGS.	
	E	M	13	39	-	20	1		
		F	14	00	-	-	-		
7	NE	e	15	52	-	-	-	Small.	
		F	16	20	-	-	-		
8	ZV	ePP	01	10	58	-	-	28.1°S., 176.8°W. h = 57 km. Kermadec Islands. USCGS.	
	E	M	02	19	-	20	1		
	N	M		19	-	20	1½		
		F	03	00	-	-	-		
8	NE	e	09	50	-	-	-	36.2°S., 100.5°W. Pacific Ocean. USCGS.	
		M	10	11	-	22	1½		
		F		30	-	-	-		

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			h.	m.	s.					sec.	μ
8	ZV,Z	iPKP ₁	20	09	24				Confused by strong microseisms. Depth = 540 km. 23.6°S., 179.8°E. h = 550 km. Fiji Islands. USC GS.		
	ZV	iFP ₂		09	36						
	ZV	ipFP ₁		11	32						
	E	eSS		31	54						
		F	21	30	-						
9	ZV,Z	iP	03	04	51				4.4°S., 152.7°E. New Britain. USC GS. Mag.: M = 6		
	ZV	i		04	58						
	NE	eL		37	-						
	E	M	04	03	-					20	3
	N	M		04 ¹ / ₂	-					20	3 ¹ / ₂
	F	05	20	-							
10	NE	e	17	45	-				Very small. 53.8°N., 159.9°W. Alaska Peninsula. USC GS.		
	F	F		55	-						
10	ZV,Z	ePKP	19	34	09	20	1		19.0°S., 175.8°E. Tonga Island Region. USC GS.		
	ZV	e		34	19						
	NE	eL	20	23	-						
	N	M		42	-						
		F	21	25	-						
10	NE	e	24	50	-				Very small. 3.4°S., 131.4°E. Ceram region. USC GS.		
	F	F	25	25	-						
12	NE	e	04	30	-				Very small. 22.5°S., 170.7°E. Loyalty Islands. USC GS.		
	F	F	05	20	-						
12	ZV	e(P)	08	24	49	16	1/2		34.9°N., 32.2°E. Cyprus. USC GS.		
	NE	eL		31	-						
	E	M		35	-						
	N	M		36	-						
		F		55	-						
12	ZV,Z	eP	13	19	30				7.7°N., 35.9°W. Atlantic Ocean. USC GS.		
13	ZV,Z	iP	17	11	44				Compression. 37°N., 116°W. USC GS.		
14	NE	eL	05	00	-	20	2 1/2		Confused by strong microseisms. 31.4°S., 179.0°W. Kermadec Islands. USC GS. Mag.: M = 6		
	E	M		22 ¹ / ₂	-						
	N	M		22 ¹ / ₂	-						
		F	06	10	-						
14	ZV,Z	ePP	07	34	38				19.0°N., 145.0°E. h = 610 km. Mariana Islands. USC GS.		
15	ZV,Z	iPKP	01	06	14	7	5.0	15000	Compression. Confused by strong microseisms. PTH 10 sec. 6.4 μ 10.3°S., 165.6°E. h = 43 km. Santa Cruz Islands. USC GS. Mag.: M = 7.1		
	Z	ePP		08	53	8	8.2				
	N	eSS		27	35						
	N	eSSS		31	45						
	E	eLQ		44	-						
	E	M	02	05 ¹ / ₂	-	20	32				
	N	M		05 ¹ / ₂	-	21	53				
	Z	M		05 ¹ / ₂	-	21	22				
		F	04	35	-						
16	NE	e	16	27	-				Very small. 78.6°N., 6.7°E. Svalbard region. USC GS.		
	F	F		35	-						

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			h.	m.	s.				
16	NE	e F	21	15 35	-				Very small. 13.4°S., 166.5°E. Santa Cruz Islands. USCGS.
17	ZV E E NE E N E N	eP eS eSS eL M M M F	06	07 17 24 32 43½ 43½ 46 46	29 54 12 -			10100	10.6°S., 78.2°W. h = 61 km. Central Peru. USCGS.
			07	15	-				mag.: m = 5½
17	ZV,Z ZV,Z ZV,Z ZV,Z N N N E E N Z	ePKP i i ePP ePKS eSS eSSS eLq M M M F	19	39 39 39 42 43 00 05 16 39 39 39	24 32 42 08 04 32 22 -	7 7	6.3 5.0	15000	PPH 18 sec. 5.6 μ 10.1°S., 165.3°E. h = 17 km. Santa Cruz Islands. USCGS.
			20	00 05	32 22				Mag.: M = 7.1
			24	45	-				
18	ZV,Z ZV,Z NE N E N E N Z	eP i eS eL M M M M F	17	03 03 07 08½ 11½ 11½ 16 16 16	11 13 19 -	6 16 16 17 12 12 12	4.4 18(H) 26 58 63 41 27	2600	PH 6 sec. 3.2 μ 40.9°N., 29.2°E. Turkey. 1 killed and several injured. USCGS.
			18	50	-				mag.: m = 5.9
19	ZV,Z NE E E N	eP eS eL M M F	16	53 56 58 59 59	39 54 -			2000	47.1°N., 27.4°W. North Atlantic Ocean. USCGS.
			17	20	-		1½ 1½		
20	NE	e F	03	12 25	-				Very small. 76.5°N., 7.9°E. Svalbard region. USCGS.
22	ZV,Z ZV,Z NE E N	ePKP i eL M M F	03	16 16 57 21½ 21½	03 06 -				19.3°S., 175.9°E. Fiji Islands region. USCGS.
			04	21½	-	22	1		
			05	15	-	22	2		
22	ZV,Z E	iPKP M F	19	41 47 30	38 -	20	½		19.2°S., 175.9°E. Tonga Islands region. USCGS.
22	NE	e F	22	42 50	-				Very small. 37.5°N., 20.6°E. Ionian Sea. USCGS.

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			h.	m.	s.					sec.
23	NE E N	e M M F	07	10	-	17 18	2½ 1½		16.6°S., 28.6°E. Northern Rhodesia. USC GS. Mag.: M = 5½	
				21½	-					
				21½	-					
				50	-					
23	ZV,Z E N E N	eP M M M F	09	13	18	5	1.0	10000	16.6°S., 28.8°E. Northern Rhodesia. USC GS. Mag.: M = 5.9	
				41½	-	20	5			
				41½	-	20	3			
				43	-	17	10			
				43	-	18	6			
				10	40	-				
23	NE	e F	23	00	-			Small. 16.6°S., 28.7°E. Northern Rhodesia. USC GS.		
				20	-					
24	ZV,Z E N	iP M M F	02	15	45	14	1		Compression. 41.0°N., 29.0°E. Turkey. USC GS.	
				24	-	16	1½			
				24	-					
				40	-					
24	NE	e F	09	50	-			Very small. 16.6°S., 28.7°E. Northern Rhodesia. USC GS.		
				10	10				-	
24	ZV,Z ZV,Z ZV,Z NE NE E E N N Z	iP ipP ePP eSKS eS iPS eSS eLQ M M M F	16	43	12	3	0.9	10000	Depth = 84 km. 10.6°S., 78.0°W. h = 80 km. Near coast of Peru. USC GS.	
				43	35					
				46	53					
				53	36					
				53	53	17	11.1(H)			
				55	14					
				17	00	00				
				08½	-					
				20	-	22	29			
				20	-	21	15			
				20	-	22	11			
				19	15	-				
				25	NE E N	e M M F	07			35
45	-									
45	-									
08	15	-								
26	ZV,Z NE	iP e(S)	05	40	08			8600	Confused by strong microseisms. 50.4°N., 176.9°W. Andreanof Islands. USC GS.	
				49	52					
27	NE E N	eL M M F	11	50	-	20 20	1½ 1½		11.3°N., 126.0°E. Philippine Islands. USC GS.	
				12	05					-
				05	-					
				30	-					
28	NE	e F	04	05	-				Very small. 14.3°S., 13.7°W. Atlantic Ocean. USC GS.	
				15	-					
29	NE	e F	04	15	-				Small.	
				55	-					
29	NE	e F	13	47	-				Small. 36.6°N., 29.2°E. Near coast of Turkey. USC GS.	
				14	00					-

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			h.	m.	s.					sec.	μ
29	NE	e	20	25	-				Small. 6.0°N., 125.3°E. Philippine Islands. USCGS.		
		F	21	00	-						
29	ZV	e(P)	22	21	24				Confused by microseisms. 36.1°N., 18.0°E. h = 47 km. Ionian Sea. USCGS.		
	ZV	e		21	29						
	NE	eS		24	53						
	E	M		30 $\frac{1}{2}$	-					20	1 $\frac{1}{2}$
	N	M		31	-					20	1 $\frac{1}{2}$
		F		45	-			Mag.: $M = 4\frac{1}{4}$			
29	NE	e	23	25	-				Small. 14.4°N., 91.9°W. Guatemala. USCGS.		
		F		50	-						

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AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR OCTOBER, 19 63

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi I}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
1	NE	e F	17	33	-				Very small. 36.1°N., 22.3°E. South of Greece. USCGS.
2	ZV,Z E N	e(FKP)	06	06	52				20.8°S., 174.1°W. Tonga Islands. USCGS.
		M	07	16	-	20	1½		
		F	08	30	-	20	1½		
2	NE	e F	21	16	-				Small. 35.1°N., 23.5°E. Near Crete. USCGS.
3	NE	e F	02	00	-				Very small. 18.3°N., 105.6°W. Near Mexico. USCGS.
3	NE E N	eL	16	35	-				Confused by strong microseisms. 58.5°S., 25.1°W. h = 54 km. Sandwich Islands. USCGS. Mag. M = 5¼-6
		M	16	48	-	20	2		
		F	17	25	-	20	3		
3	NE E N E N Z	e(S)	23	47	39	20	5.6(H)		Confused by strong microseisms. 32.2°N., 134.6°E. Kyushu, Japan. USCGS. Mag.: M = 6¼
		M	24	14	-	20	17		
		M	14	14	-	20	19		
		M	21½	14	-	16	28		
		M	21½	14	-	16	20		
4	NE	M	21½	14	-	14	10		
		F	25	25	-	14	10		
4	NE	e F	04	00	-				Small. 20.7°S., 174.0°W. Tonga Islands. USCGS.

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			h.	m.	s.				
5	NE	e F	03	05	-				Small. 16.0°S., 173.2°W. Tonga Islands. USCGS.
5	ZV NE NE NE E N Z	i(P) eS eSS eL M M M F	15	07	03	20	3.2(H)	5800	11.6°N., 42.8°E. French Somaliland. USCGS.
				14	25				
				18	11				
				20 ¹ / ₂	-				
				29	-	18	6		
				30 ¹ / ₂	-	20	6		
				30 ¹ / ₂	-	20	4		
			16	40	-				Mag.: M = 5 ¹ / ₂
5	NE	e F	17	40	-				Small. 11.7°N., 42.6°E. French Somaliland. USCGS.
			18	15	-				
7	NE	e F	13	45	-				Very small. 12.9°S., 76.8°W. Central Peru. USCGS.
			14	15	-				
7	NE E N	e M M F	23 24	55 13	- -	20 20	3 3		42.7°N., 110.5°E. Outer Mongolia. USCGS.
				13	-				
				30	-				Mag.: M = 5 ¹ / ₂
8	Z NE Z N E	eFP eL M M M F	00 01	39 22	43 -				15.1°S., 173.2°W. Samoa Islands region. USCGS.
				37	-	20	2		
				37	-	20	4		
				38	-	20	2 ¹ / ₂		
			02	40	-				Mag.: M = 6.
9	NE	e F	02	12	-				Small.
				30	-				
9	NE N	eL M F	21 22	46 48 00	- - -	20	9 ¹ / ₂		46.3°N., 12.4°E. Italian dam disaster. BCIS.
11	NE	e F	10 11	55 25	- -				Small. 17.8°N., 105.9°W. Near Mexico. USCGS.
12	ZV,Z NE NE E E E E Z	iP eS e eSS eLQ M M M F	11	39	06	5 22	5.9 42(H)	9000	Compression. Confused by microseisms. PH 16 sec. 7.6 μ PPH 16 " 5.4 μ 44.8°N., 149.0°E. h = 40 km. Kurile Islands. USCGS.
				49	11				
				50	25				
				54	21				
			12	00 ¹ / ₂	-	26	71		
				11 ¹ / ₂	-	20	50		
				18	-	20	50		
				20	-	20	23		
			16	20	-				Mag.: M = 6.9
13	ZV	iP	01	38	45				44.4°N., 149.3°E. Kurile Islands. USCGS.
13	ZV	iP	05	22	06				9.8°N., 84.1°W. Costa Rica. USCGS.

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			h.	m.	s.		sec.			μ
13	ZV,Z	iP	05	30	04	6	15.7	9000	Compression. PE 16 sec. 19μ PFE 20 sec. 28 μ 44.8°N., 149.5°E. h = 60 km. Kurile Islands. USCGS.	
	ZV,Z	i		30	08					
	Z	iPP		33	13					
	E	iS		40	13	36	270			
	E	eLQ		51	-					
	E	M		06	08	-	21			455
	Z	M			11	-	20			400
	F		11	40	-			Mag.: M = 7.9		
13	ZV	iP	05	53	11				Kurile Islands aftershock.	
13	ZV	iP	05	54	15				46.5°N., 151.6°E. Kurile Islands. USCGS.	
13	ZV	iP	06	17	34				45.9°N., 151.9°E. Kurile Islands. USCGS.	
13	ZV	iP	06	21	07				45.3°N., 151.3°E. Kurile Islands. USCGS.	
13	ZV	iP	06	35	46				45.4°N., 150.8°E. Kurile Islands. USCGS.	
13	ZV	iP	07	00	34				45.5°N., 151.8°E. Kurile Islands. USCGS.	
13	ZV	iP	07	15	32				45.5°N., 150.6°E. Kurile Islands. USCGS.	
13	ZV	iP	09	28	35				44.6°N., 149.6°E. Kurile Islands. USCGS.	
13	ZV	iP	12	41	48				45.9°N., 151.8°E. Kurile Islands. USCGS.	
13	ZV	iP	12	54	22				44.4°N., 149.4°E. Kurile Islands. USCGS.	
				54	36					
13	ZV,Z	iP	13	10	30	2	1.2		45.0°N., 150.1°E. h = 50 km. Kurile Islands. USCGS.	
	ZV	i		10	43					
	E	M		50	-	19	3			
	F		14	30	-				Mag.: M = 6	
13	ZV,Z	iP	16	11	59	2	3.5	8900	45.6°N., 150.5°E. h = 35 km. Kurile Islands. USCGS.	
	E	eS		22	01	20	2.2			
	E	M		49	-	20	5			
	F		17	55	-				Mag.: M = 6 $\frac{1}{4}$	
13	ZV	eP	16	41	06				44.9°N., 150.3°E. Kurile Islands. USCGS.	
13	E	e	17	26	-				18.4°N., 103.1°W. h = 50 km. Mexico. USCGS.	
	E	M		35 $\frac{1}{2}$	-	18	1 $\frac{1}{2}$			
	F			50	-					
13	ZV	iP	19	39	45				45.7°N., 151.7°E. Kurile Islands. USCGS.	
13	ZV	eP	22	07	11				44.7°N., 152.1°E. h = 50 km. Kurile Islands. USCGS.	
	E	M		43	-	20	1 $\frac{1}{2}$			
	F		23	10	-					
13	ZV	iP	22	15	08				45.1°N., 150.9°E. Kurile Islands. USCGS.	

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN

OCTOBER, 19 63

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
13	ZV	eP	24	04	36			9000	44.5°N., 150.1°E. h = 50 km. Kurile Islands. USCGS.
	ZV	e		04	43				
	E	eS		14	45	15	2.4		
	E	M		42	-	18	3		
		F	25	50	-				Mag.: M = 6
14	ZV	iP	04	18	10				44.9°N., 150.2°E. Kurile Islands. USCGS.
14	ZV	iP	04	23	24			9000	44.7°N., 150.6°E. h = 45 km. Kurile Islands. USCGS.
	ZV	i		23	39				
	E	eS		33	33	14	1.3		
	E	M		59 ¹ / ₂	-	20	3		
		F	05	50	-				Mag.: M = 5 ¹ / ₂
14	ZV	iP	04	25	12				44.9°N., 150.7°E. Kurile Islands. USCGS.
	ZV	i		25	19				
14	ZV,Z	iP	13	33	55	5	2.0	8940	44.8°N., 151.0°E. h = 60 km. Kurile Islands. USCGS.
	ZV,Z	i		34	09				
	NE	eS		43	57	12	3.9(H)		
	E	M	14	11	-	20	3		
	N	M	15	11	-	20	4		Mag.: M = 6.1
		F	15	00	-				
14	ZV	iP	18	02	22				45.2°N., 151.3°E. Kurile Islands. USCGS.
14	ZV	iP	21	20	07				45.0°M., 150.5°E. Kurile Islands. USCGS.
15	NE	e	07	30	-				Small. Confused by strong microseisms.
		F	08	20	-				
15	ZV	iP	08	12	21				45.0°N., 151.1°E. h = 40 km. Kurile Islands. USCGS.
	ZV	i		12	32				
15	ZV	iP	09	14	15				45.3°N., 150.2°E. h = 40 km. Kurile Islands. USCGS.
	E	M		46	-	20	2 ¹ / ₂		
	N	M		46	-	20	2 ¹ / ₂		
		F	10	05	-				Mag.: M = 5 ¹ / ₂
15	ZV	iP	09	44	16				45.2°N., 150.2°E. Kurile Islands. USCGS.
15	ZV,Z	eP	10	03	41	8	2.2	2030	Compression. 67.2°N., 18.4°W. North of Iceland. USCGS.
	E	eS		07	01	14	13.6		
	E	M		09	-	18	32		
		F		50	-				
									Mag.: M = 5 ¹ / ₂
15	ZV	iP	10	59	22				44.6°N., 149.0°E. Kurile Islands. USCGS.
15	E	e	19	00	-				45.3°N., 151.0°E. Kurile Islands. USCGS.
		M		10	-	20	1 ¹ / ₂		
		F		35	-				
16	ZV	iP	15	52	02	1.3	0.4	5770	38.6°N., 73.4°E. Tadzhik S.S.R. USCGS.
	ZV	ePcP		53	17				
	NE	eS		59	21	14	3.6(H)		
	NE	eSS	16	02	55				
	N	eL		05	-				

FORM 3718

contd.

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SEISMOLOGICAL BULLETIN

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
contd.									
16	E	M	16	13	-	20	28		
	N	M		13	-	20	73		
	E	M		16 $\frac{1}{2}$	-	16	42		
	Z	M		16 $\frac{1}{2}$	-	16	20		
		F	17	25	-				Mag.: M = 6
16	ZV	iP	21	43	04				44.4°N., 150.9°E. Kurile Islands. USCGS.
17	E	e	05	00	-				Very small. 45.2°N., 151.7°E. Kurile Islands. USCGS.
		F		20	-				
17	ZV,Z	eP	23	36	42	4	1.3	8950	
	NE	eS		46	45	20	5.0(H)		44.6°N., 149.0°E. h = 45 km. Kurile Islands. USCGS.
	NE	eSS		52	21				
	E	M	24	14 $\frac{1}{2}$	-	18	6		
	N	M		15	-	18	5		
	N	M		22 $\frac{1}{2}$	-	16	7 $\frac{1}{2}$		
	Z	M		22 $\frac{1}{2}$	-	16	2 $\frac{1}{2}$		
		F	25	30	-				Mag.: M = 6.1
17	ZV	iP	24	07	06				44.5°N., 149.0°E. Kurile Islands. USCGS.
18	ZV	iP	09	05	41				
	ZV	e		05	55				44.8°N., 150.2°E. h = 60 km. Kurile Islands. USCGS.
	E	M		44 $\frac{1}{2}$	-	18	1 $\frac{1}{2}$		
	N	M		45 $\frac{1}{2}$	-	18	1 $\frac{1}{2}$		
		F	10	25	-				Mag.: M = 5 $\frac{1}{4}$
18	ZV	iP	18	07	06				45.6°N., 150.6°E. Kurile Islands. USCGS.
18	NE	e	20	50	-				Very small. 31.1°N., 41.1°W. Atlantic Ocean. USCGS.
		F	21	10	-				
18	ZV	iP	21	35	00				45.2°N., 151.1°E. h = 40 km. Kurile Islands. USCGS.
	ZV	e		35	11				
19	ZV,Z	iP	02	30	41	6	1.7	8970	46.8°N., 153.7°E. h = 45 km. Kurile Islands. USCGS.
	E	eS		40	45	20	1.6		
	E	M	03	12	-	19	3		
		F		40	-				Mag.: M = 5 $\frac{3}{4}$
19	ZV	iP	03	46	25			8950	46.6°N., 153.8°E. h = 33 km. Kurile Islands. USCGS.
	E	eS		56	28	16	2.2		
	E	M	04	23	-	19	3 $\frac{1}{2}$		
		F	05	10	-				Mag.: M = 5 $\frac{3}{4}$ -6
19	ZV	iP	03	59	13				46.8°N., 153.8°E. Kurile Islands. USCGS.
20	ZV,Z	eP	00	05	19	8	9.5	9030	PH 16 sec. 10.6 μ
	E	eS		15	26	24	67(H)		PPH 16 sec. 9.2 μ
	E	eLQ		26	-				44.7°N., 150.7°E. h = 25 km. Kurile Islands. USCGS.
	E	M		43	-	20	115		
	N	M		44	-	20	73		
	Z	M		44	-	20	35		
		F	05	30	-				Mag.: M = 7.1

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
20	ZV	iP	02	21	38				44.7°N., 150.0°E. Kurile Islands. USCGS.
20	ZV	eP	06	22	33				43.9°N., 150.7°E. Kurile Islands. USCGS.
20	ZV,Z	iP	09	22	55			8950	44.4°N., 150.0°E. h = 40 km. Kurile Islands. USCGS.
	NE	eS		32	58	16	3.1(H)		
	E	M		59	-	20	4½		
	N	M	10	00	-	20	4		
		F		45	-				Mag.: M = 5.9
20	ZV,Z	iP	12	04	30			9000	Confused by microseisms.
	NE	eS		14	36	16	3.2(H)		44.7°N., 150.2°E. h = 45 km. Kurile Islands.
	E	eL		27	-				
	E	M		43½	-	20	5½		
	N	M		44½	-	19	5½		
		F	13	40	-				Mag.: M = 6.0
20	ZV	iP	13	05	48	1.5	0.2		24.1°N., 5.1°E. h = 0 km. Southern Algeria. USCGS.
20	ZV	iP	13	33	21				45.1°N., 150.5°E. Kurile Islands. USCGS.
20	ZV	iP	18	11	10				44.2°N., 149.6°E. Kurile Islands. USCGS.
21	ZV	iP	15	50	28				45.5°N., 149.7°E. Kurile Islands. USCGS.
22	ZV,Z	iP	03	29	23			9000	
	E	eS		39	32				45.0°N., 150.2°E. h = 45 km. Kurile Islands. USCGS.
	E	M	04	08	-	20	1½		
	N	M		09	-	20	2		
		F		40	-				Mag.: M = 5½
23	ZV,Z	i(P)	09	59	26				41.2°N., 144.2°E. h = 50 km. East of Honshu, Japan. USCGS.
	E	M	10	35	-	20	1½		
	N	M		35	-	20	1		
		F		55	-				
24	ZV,Z	iP	01	18	36	4	1.1	8970	
	ZV,Z	i		18	49				44.5°N., 150.3°E. h = 45 km. Kurile Islands. USCGS.
	NE	eS		28	40	16	2.0(H)		
	E	M		58	-	20	2½		
	N	M		58½	-	19	2½		
		F	02	40	-				Mag. M = 5.7
24	NE	eL	08	10	-				4.9°S., 102.9°E. h = 50 km. Off coast of Sumatra. USCGS.
	E	M		32	-	20	2		
	N	M		32	-	20	1½		
		F	09	15	-				Mag.: M = 5¾
24	NE	e	20	00	-				Small. 28.3°N., 128.5°E. Ryukyu Islands. USCGS.
		F		30	-				
24	NE	e	20	55	-				Small. 44.4°N., 149.7°E. Kurile Islands. USCGS.
		F	21	20	-				

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DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
25	ZV	iP*	04	45	40.5			80	Compression. 04h. 45m. 31s. 50.8°N., 1.1°W. BCIS 04h. 45m. 33s. 51° 4' N., 1° 0' W. h = 25 km. U.K.A.E.A. - Blacknest. 04h. 45m. 30s. 50.9°N., 1.0°W. Kew (Prelim). South Downs, England.
	ZNE	i		45	42.5				
	ZNE	iSg		45	49.5				
	NE	i		45	53				
	NE	i		45	55				
		F		50	-				
25	NE	eL	20	40	-			12.3°N., 144.5°E. Mariana Islands. USCGS.	
	E	M		59½	-	20	1½		
	N	M		59½	-	20	1		
		F	21	40	-				
25	ZV, Z	eP	23	00	26			Very small. 36.9°N., 95.2°E. Tsinghai Province, China. USCGS.	
	NE	M		32	-				
		F		40	-				
26	ZV	eP	04	07	49			8970 44.5°N., 150.1°E. h = 55km. Kurile Islands. USCGS. Mag.: M = 5½	
	NE	eS		17	53				
	E	M		46½	-	20	2½		
	N	M		46½	-	20	3		
		F	05	30	-				
26	ZV	eP	06	11	53			44.5°N., 149.8°E. Kurile Islands. USCGS.	
26	ZV	iP	11	33	57			44.7°N., 149.7°E. h = 55 km. Kurile Islands. USCGS. Mag.: M = 5¼	
	E	M	12	11½	-	20	1		
	N	M		12	-	20	1½		
		F		40	-				
26	ZV	iP	11	44	02			44.6°N., 149.8°E. Kurile Islands. USCGS.	
27	ZV	iP	09	04	17			17.9°S., 178.5°W. h = 586 km. Fiji Islands. USCGS.	
27	ZV	ePKP	18	44	36			24.3°S., 176.1°W. Tonga Islands. USCGS.	
27	ZV	eP	20	17	47			44.5°N., 150.1°E. Kurile Islands. USCGS.	
28	ZV	ePKP	08	15	04			24.3°S., 176.0°W. Tonga Islands. USCGS.	
	E	M	09	26	-	20	1		
	N	M		26	-	20	1		
		F	10	10	-				
28	ZV	eP	12	14	56			52.8°N., 159.8°E. Off coast of Kamchatka. USCGS. Mag.: M = 5¼	
	NE	eL		40	-				
	E	M		51½	-	20	1½		
	N	M		51½	-	20	1½		
		F	13	25	-				
29	ZV	eP	20	49	04			44.8°N., 149.6°E. Kurile Islands. USCGS.	

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
29	NE	e	21	35	-				Small. 26.2°S., 177.8°W. Kermadec Islands. USCGS.
		F	22	20	-				
29	NE	e	22	50	-				
	E	M	23	00	-	14	1½		
	N	M		00	-	16	2½		
		F		20	-				
30	ZV	iP	01	30	10				4.6°S., 77.9°W. Peru. USCGS.
✓ 31	ZV, Z	iPKP	03	37	29				21.8°S., 175.0°W. h = 33 km. Tonga Islands. USCGS.
	NE	eSS	04	00	09				
	E	eL		21	-				
	N	M		48½	-	18	4½		
	E	M		49½	-	18	6		
	S	M		49½	-	18	3		
		F	06	10	-				Mag.: M = 6¼
31	ZV	iP	10	05	38				27.4°N., 55.6°E. Iran. USCGS.

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AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR NOVEMBER, 1963

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS	
			h.	m.	s.					
1	ZV,Z	iPKP	21	19	11				22.5°S., 176.8°W. h = 71 km. Tonga Islands. USCGS.	
	ZV,Z	e		19	18					
2	NE	e	20	01	-				Small. 43.3°N., 29.5°W. USCGS. Atlantic Ocean.	
		F		13	-					
3	NE	e	03	00	-				Small. 23.9°N., 122.6°. Near Formosa. USCGS.	
		F		20	-					
3	ZV,Z	iP	03	22	45	4	2.1	9530	Compression. PH 12 sec. 2.1 μ	
		i		22	51					
	NE	eSKS		33	06	18	14.5 (H)		3.5°S., 77.8°W. Peru-Ecuador border. USCGS.	
		eS		33	16					
	NE	eFS		34	06					
		eL		46	-					
	Z	M		57 $\frac{1}{2}$	-	20	6			
	E	M		57 $\frac{1}{2}$	-	20	15			
	N	M	F		58	-	20	9		
					06	25	-			Mag.: M = 6.4
3	N	e	14	20	-				Very small.	
		F		30	-					
3	E	eS	14	44	04	16	11 $\frac{1}{2}$		39.2°N., 21.1°E. Near west coast of Greece. USCGS.	
		eL		46 $\frac{1}{2}$	-					
	M		47 $\frac{1}{2}$	-						
	M		47 $\frac{1}{2}$	-						
N	F		15	00	-				Mag.: M = 4 $\frac{1}{2}$	
3	NE	e	16	07	-				Very small. 38.4°N., 20.5°E. Ionian Islands. USCGS.	
		F		15	-					

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS	
			h.	m.	s.					sec.
4	ZNE	eP	01	32	12	14	2.3		Depth = 65 km. PH 16 sec. 4.3 μ FFH 16 sec. 36 μ 6.8°S., 129.6°E. h = 80 km. Banda Sea. Slight damage at Darwin, Australia. USCGS.	
	ZV,Z	iPKP		35	49	1.5	1.1(ZV)			
	ZV,Z	ipPKP		36	08					
	ZV,Z	iPP		37	08	9	20.7			
	ZV,Z	i		37	16					
	N	M	02	32	-	20	205			
	E	M		35	-	20	200			
4	Z	M		35	-	20	66	Mag.: M = 7.8		
	F	06	30	-						
4	ZV	ePKP	01	33	44	1.5	0.2(ZV)	15.1°S., 167.3°E. h = 154 km. New Hebrides. USCGS.		
4	NE	e	15	00	-			Very small. 44.5°N., 11.0°E. Italy. USCGS.		
		F		57	-					
6	Z	eP	02	33	30			PPZ 7 sec. 1.6μ 2.6°S., 138.4°E. Western New Guinea. USCGS. Mag.: = 6 ³ / ₄		
	N	eL	03	03	-					
	E	M		25 ¹ / ₄	-				22	9
	N	M		27 ¹ / ₂	-				22	11
	Z	M		27 ¹ / ₂	-				22	4
9	NE	e	01	39	-			Small.		
		F		50	-					
9	ZV	eP	02	51	19			56.8°N., 34.6°W. South of Iceland. USCGS. Mag.: M = 5		
	ZV	i		51	29					
	NE	eL		55 ¹ / ₂	-					
	E	M		57 ¹ / ₄	-				20	6 ¹ / ₄
	N	M		57 ¹ / ₂	-				20	5 ³ / ₄
	E	M		58 ¹ / ₂	-				16	6 ³ / ₈
	N	M		58 ¹ / ₂	-				15	4 ¹ / ₄
	Z	M		58 ¹ / ₂	-				15	3 ¹ / ₂
9	ZV	iP	09	03	25			45.3°N., 150.8°E. Kurile Islands. USCGS.		
		F	03	30	-					
9	ZV,Z	iP	21	27	05	8	8.5	9500	Compression. Confused by microseisms. Depth = 609 km. PH 12 sec. 5.3 μ SH 20 sec. 95 μ 9.0°S., 71.5°W. h = 600 km. Western Brazil. USCGS. Mag.: M = 6 ³ / ₄	
	ZV,Z	i		27	07					
	ZV,Z	ipP		29	15					
	ZV,Z	i		29	18					
	E	eSKS		36	34					
	EN	i		36	35					
	N	eSS		42	29					
	NE	e		46	13					
	ZV,Z	e		53	09					
	ZV,Z	e		55	31					
	F	F	00	20	-					
10	ZV,Z	iP	01	12	12	1.5	0.5(ZV)	9450	Confused by strong microseisms. Depth = 603 km. 9.2°S., 71.5°W. Brazil. USCGS. Mag.: M = 6 ¹ / ₄ .	
	ZV,Z	ipP		14	21					
	E	eSKS		21	39					
	NE	eS		21	51	12	13.4(H)			
	NE	eSP		22	49					
	NE	esS		25	35					
	F	F	02	25	-					

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS	
			h.	m.	s.					sec.
10	ZV	iP	17	29	53	1.5	0.6	Confused by very strong microseisms. 44.4°N., 149.0°E. h = 40 km. Kurile Islands. USCGS. Mag.: M = 6 $\frac{1}{4}$		
	ZV	i		30	08					
	N	M	18	08	-	20	15			
	E	M		08	-	20	9			
		F	19	00	-					
11	ZV,Z	ePKP	11	48	20			Confused by strong microseisms. 16.9°S., 174.4°W. Tonga Islands. USCGS.		
	ZV	e		49	20					
15	ZV,Z	iP	21	18	43	6	2.9	9000 PH ' 8 sec. 2.3 μ 44.3°N., 149.0°E. h = 50 km. Kurile Islands. USCGS. Mag.: M = 6.4		
	NE	eS		28	50	14	6.7(H)			
	N	eSS		34	30					
	E	eL		41	-					
	E	M		57	-	20	12			
	N	M		57	-	20	21			
	Z	M		57	-	20	4			
		F	24	25	-					
16	NE	e	03	00	-			44.3°N., 149.0°E. h = 50 km. Kurile Islands. USCGS. Mag.: M = 5 $\frac{1}{4}$		
	E	M		20	-	20	1 $\frac{1}{2}$			
	N	M		20	-	20	1 $\frac{1}{2}$			
		F		45	-					
16	NE	eL	07	41	-			41.3°S., 87.5°W. Off coast of Chile. USCGS. 22.3°S., 175.0°W. Tonga Islands. USCGS.		
	E	M		54	-	20	2 $\frac{1}{2}$			
	N	M		54	-	20	2			
		F	08	30	-					
16	ZV,Z	ePKP	23	03	14					
17	ZV,Z	eP	00	57	17	6	2.0	5950 PE 14 sec. 1.7 μ 7.6°N., 37.4°W. North Atlantic Ocean. USCGS. Mag.: M = 6.3		
	NE	eS	01	04	46	16	23.6(H)			
	NE	e		05	14					
	NE	eL		10	-					
	E	M		15	-	21	70			
	N	M		15	-	22	60			
	Z	M		15	-	21	26			
		F	03	10	-					
18	ZV	iP	14	50	41	18	9.3(H)	8960 Confused by very strong microseisms. 29.9°N., 113.6°W. Gulf of California. Mag.: M = 6.5		
	NE	eS	15	00	44					
	NE	eL		11	-					
	E	M		23	-				20	24
	N	M		23	-				20	37
	Z	M		25	-				18	22
		F	17	00	-					
19	ZV	iP	11	13	05			44.4°N., 149.2°E. Kurile Islands. USCGS.		
	ZV	i		13	14					
19	ZV	iP	17	50	13			53.1°N., 159.6°E. Off Kamchatka. USCGS.		
22	ZV	iP	14	58	04			Confused by microseisms. 44.4°N., 149.0°E. Kurile Islands. USCGS. Mag.M = 5 $\frac{3}{4}$		
	E	M	15	36	-	20	3			
	N	M		36	-	20	3 $\frac{1}{2}$			
	F	16	20	-						

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KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN

NOVEMBER, 19 63

DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
22	NE	e F	20	36 50	- -				37.3°N., 30.1°E. Turkey. USCGS.
✓ 23	NE	eS	08	13	02				30.1°N., 114.0°W.
	NE	eL		24	-				Gulf of California. USCGS.
	Z	M		36	-	20	4		
	N	M		36	-	20	6		
	E	M		37	-	20	6½		
		F	09	45	-				Mag.: M = 6
26	NE	e F	16	30 40	- -				Small. 34.9°N., 27.4°E. Crete region. USCGS.
27	NE	e F	08	20 30	- -				Small. 42.0°N., 76.5°E. Kazakh S.S.R. USCGS.

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AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

SEISMOLOGICAL BULLETIN FOR DECEMBER, 1963

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 ₁ sec.	PENDULUM FREE PERIOD T. sec.	DAMPING CONSTANT μ ² .	$\frac{Ak}{\pi I}$ sec. ⁻¹
N.	1 October 1960	21.3	21.4	+0.01	64.0
E.	1 November 1960	20.7	20.7	-0.01	59.3
Z.	1 September 1960	11.1	9.1	+0.01	156.0

(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 μ	Δ km.	REMARKS
			h.	m.	s.				
2	ZV	iPn	06	51	52	6	4.9	1200	Compression. Confused by strong microseisms. 47.9°N., 16.5°E. Austria. USCGS.
	N	iSg		55	25				
	N	M		56	-				
		F	07	05	-				
2	NE	eS	21	06	41	17	3		Confused by microseisms. 80.1°N., 0.6°W. Svalbard region. USCGS. Mag.: M = 4 $\frac{3}{4}$ -5
	E	M		12	-				
	N	M		12	-				
		F		40	-				
3	NE	e	22	30	-				Small. Confused by microseisms. 12.2°S., 166.0°E. Santa Cruz Islands. USCGS.
		F	23	00	-				
3	NE	e	23	40	-	20	5		Confused by strong microseisms. 22.4°S., 69.3°W. Northern Chile. USCGS. Mag.: M = 6
	E	M		57	-				
	N	M		57	-				
		F	24	30	-				
4	ZV	iP	01	39	49	20	3 $\frac{1}{2}$	9000	Confused by microseisms. 46.2°N., 153.1°E. Kurile Islands. USCGS. Mag.: M = 5 $\frac{3}{4}$
	E	e(S)		49	55				
	N	M		21 $\frac{1}{2}$	-				
	E	M		22	-				
		F		50	-				
4	ZV	i(P)	02	55	41				45.9°N., 153.2°E. Kurile. USCGS.
4	ZV	iP	08	36	27				46.1°N., 152.9°E. Kurile. USCGS.

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS
			h.	m.	s.				
4	NE	e	16	50	-			35.5°S., 102.8°W. Easter Island region. USCGS.	
	E	M	17	06	-	20	4		
	N	M F		08 30	- -	20	3		
7	ZV	ePKP	04	26	43			Depth = 580 km. 22.1°S., 179.4°W. Fiji Islands. USCGS.	
	ZV	epPKP		28	59				
7	ZV	e(Pn)	10	41	04			900 45° 01'N., 5° 32'E. France. BCIS.	
	ZV	e(Sn)		42	37				
	ZV,E	eS*		43	03				
	E	eSg		43	36				
		F		46	-				
8	NE	e	08	35	-			Small. 46.4°N., 153.0°E. Kurile Islands. USCGS.	
		F	09	05	-				
9	ZV	ePKP ₁	11	12	35			Depth = 475 km. 21.1°S., 178.0°W. Fiji Islands region. USCGS.	
	ZV	ePKP ₂		12	39				
	ZV	epPKP ₂		14	33				
9	ZV	eP	12	34	51			45.2°N., 151.2°E. Kurile Is. USCGS.	
10	ZV,Z	ePP	03	50	46			6.2°S., 128.1°E. h = 366 km. Banda Sea. USCGS.	
		F	05	00	-				
10	N	e	07	20	-			Small. 58.1°S., 26.4°W. Sandwich Islands. USCGS.	
		F		40	-				
11	NE	e	01	50	-			15.1°S., 173.6°W. Tonga Islands region. USCGS.	
	N	M	02	08	-	20	3 1/2		
	E	M		09	-	20	1 1/2		
		F		35	-				
11	ZV	iPKP	02	50	00			Compression. 17.8°S., 178.6°W. h = 537 km. Fiji Islands. USCGS.	
11	NE	e	17	45	-			Small. Confused by microseisms. 51.2°N., 179.3°W. Andreanof Islands USCGS.	
		F	18	20	-				
12	ZV	e	13	28	-			Very small. Confused by microseisms 45° 01'N., 5° 32'E. France. BCIS.	
		F		31	-				
12	ZV	e	17	27	-			Very small. Confused by microseisms 45° 01'N., 5° 32'E. France. BCIS.	
		F		30	-				
12	ZV	iP	23	36	36			46.3°N., 150.5°E. Kurile Is. USCGS.	
15	ZV,Z	iP	19	47	48	1.5	0.3(ZV)	11400	Dilatation. Confused by very strong microseisms. Depth = 650 km. PPE 16 sec. 4.0 μ 4.8°S., 108.0°E. h = 650 km. Java Sea. USCGS.
	ZV	esP		51	10				
	ZV	e(PKP)		51	43				
	ZV,Z	ePP		52	15	6	2.0		
	ZV	ePPP		54	38				
	ZV	e		54	45				
	E	iSKS		57	22	12	8.7		
	ZV,Z	eP'P'		20	00	29			
	F		21	25	-			Mag.: M = 6.4	

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLITUDE	Δ	REMARKS	
			h.	m.	s.					sec.
✓ 16	NE	eL	02	35	-				Confused by very strong microseisms. 6.4°S., 105.4°E. Sunda Strait. USCGS. Mag.: M = 6½	
	E	M		54	-	21	10			
	N	M		54	-	21	16			
		F	03	40	-					
✓ 16	Z	iP	13	52	40			2400	Confused by strong microseisms. 37.1°N., 20.9°E. Ionian Sea. USCGS. Mag.: M = 5	
	NE	eS		56	33	16	3.4(H)			
	E	M	14	00½	-	18	6			
	N	M		00½	-	18	17			
		F		30	-					
17	Z	iPKP	00	49	49			16800	Confused by microseisms. PPH 16 sec. 12.0 μ 24.8°S., 176.6°W. h = 46 km. Tonga Islands. USCGS. Mag.: M = 7.1	
	Z	i		50	11					
	Z	i		50	29					
	Z	iPP		53	46	7	7.0			
	N	i	01	01	17					
	E	eSS		12	59					
	E	eLQ		33	-					
	E	M	02	00½	-	21	48			
	N	M		00½	-	21	29			
	Z	M		02	-	20	12			
	F	04	30	-						
19	ZV	iP	17	17	18				Confused by strong microseisms. 9.7°S., 79.1°W. Near coast of Peru. USCGS.	
	E	M		58	-	20	3			
	F		18	20	-					
21	N	e	13	45	-				16.1°N., 119.7°E. Near Luzon, P.I. USCGS. Mag.: M = 5¾	
	E	M	14	05½	-	20	3			
	N	M		05½	-	20	3			
	F		30	-						
26	ZV	eP	08	04	02				76.5°N., 22.4°E. Svalbard region. USCGS.	
26	N	eL	08	58	-				69.3°N., 16.5°W. North of Iceland. USCGS. Mag.: M = 4½	
	E	M		59½	-	18	1½			
	N	M	09	00	-	20	2			
	F		15	-						
28	N	e	18	45	-				60.4°S., 51.8°W. South Shetland Islands region. USCGS. Mag.: M = 5¾	
	E	M		59	-	20	1½			
	N	M		59	-	20	1½			
		F	19	30	-					
30	ZV,Z	iP	13	41	33	1.5	0.6(ZV)		Compression. Confused by microseisms. 45.5°N., 150.6°E. USCGS. Mag.: M = 5¾	
	E	M	14	20	-	20	2½			
	N	M		21	-	20	3			
		F		45	-					
✓ 31	N	eSKS	18	03	32				Confused by strong microseisms. 56.5°S., 26.0°W. Sandwich Islands. USCGS. Mag.: M = 6¾	
	E	eS		04	20	16	3.8(H)			
	N	ePS		06	03					
	N	eSS		12	05					
	E	eLQ		22½	-					
	E	M		39	-	18	10			
	N	M		39	-	19	33			
	Z	M		39	-	19	12			
		F	20	20	-					
31	ZV,Z	iPKP	19	36	26				17.4°S., 174.2°W. Tonga Islands. USCGS.	

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DATE	COMPT.	PHASE	G.M.T.			PERIOD	AMPLI- TUDE	Δ	REMARKS
			h.	m.	s.	sec.	μ	km.	
<p><u>CORRECTION TO BULLETINS FOR</u></p> <p><u>SEPTEMBER, OCTOBER AND NOVEMBER 1963</u></p> <p>Beginning from 13th September till 30th November all the times should be increased by + 2.0 sec.</p> <p>The time error is due to an accidental misadjustment, by clock maintenance mechanic, of the hours and minutes time break by two seconds. This was not noticed and reported at once.</p>									