

Met. O. 787

METEOROLOGICAL OFFICE, UNITED KINGDOM

 SEISMOLOGICAL BULLETIN FOR JULY 19 67

1. ESKDALEMUIR OBSERVATORY, LANGHOLM, DUMFRIESSHIRE, SCOTLAND

Lat. 55° 19' 00" N., Long. 3° 12' 18" W. Height above M.S.L. 263m.

Foundation: Llandoverly Shales, folded (late Silurian).

Instruments: World-wide standardised seismograms (USCGS).

- (i) Long-Period SPRENGNETHER
(ii) Short-Period BENIOFF

CONSTANTS:

INSTRUMENT	DATE FROM WHICH CONSTANTS APPLY	FREE PERIODS		DAMPING	V
		PENDULUM Tp sec.	GALVANOMETER Tg sec.		
SPRENGNETHER WWSS	N	15	100		} 1500 at 15 sec.
	E	15	100		
	Z	15	100		
BENIOFF WWSS	N'	1.0	0.75		} 25000 at 1 sec
	E'	1.0	0.75		
	Z'	1.0	0.75		

2. KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

Lat. 51° 28' 6" N., Long. 0° 18' 47" W, Height above M.S.L. 4m.

Foundation: River gravel resting on London clay.

Instruments: Kew-type vertical seismograph, period 1.5 sec.

Direct optical registration (ZV):

 Notations: For phases the generally adopted notations are used.
In addition the following symbols are in use:

C = Compression

 Δ = Epicentral distance

D = Dilation

h = Depth of hypocenter

Mag. = Earthquake magnitude, determined in the old Gutenberg-Richter scale (M). The mean value for body and surface waves is given, if agreement is good, otherwise the values for body and surface waves are quoted separately.

The bulletin is prepared at Kew Observatory and all enquiries concerning the seismograms for both Kew and Eskdalemuir should be addressed to Kew.

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
1. ESK	Z'	eP	07	42	30.9				$\Delta = 98.7^\circ = 10970\text{km.}$	
	E	eSKS		53	18					
	NE	eS		53	54	20	0.8	0.3		
	E	M	08	27	-	24		1.2		
	N	M		27 $\frac{1}{2}$	-	23	1.3			
	ZNE	M		34	-	20	1.1	0.9	1.1	
		F	09	15	-				M=5.3(ESK)	
1. ESK	Z'	iP	21	33	19.0	0.9		0.02	21 22 10.0; 54.0°N. 161.0°W. h=19km. Alaska. USCGS.	
1. ESK	Z', Z	iP	23	21	10.1	14	1.5	0.6	3.3	D. $\Delta = 69.3^\circ = 7700\text{km.}$
	NE	iS		30	13	16	8	22		PZ' 1.4 sec. 0.3 μ
	NE	eScS		30	57					
	E	eLQ		39 $\frac{1}{2}$	-					23 10 07.2; 54.4°N. 158.0°W.
	ZN	eLR		43.3	-					h=33km. South of Alaska.
	Z'	eP'P'		49	23.9					USCGS.
	NE	M		50	-	20	29	31		
	NZ	M		54	-	18	39		39	
	F		03	25	-				M = 6.5(ESK)	

SEISMOLOGICAL BULLETIN

JULY 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
KEW	ZV	iP	23	21	35.5				D.	
2. ESK	Z'	eP	03	18	12.7				03 02 03.0; 45.7°N.142.9°E. h=334km. Hokkaido, Japan. USCGS.	
2. ESK	Z', Z	iP	07	16	34.8	1.2		0.15	$\Delta = 86.9^\circ = 9650\text{km.}$	
	E	eSKS		26	50					
	N	eS		27	08	14	1.8	2.6		
	E	eLR		45 $\frac{1}{2}$	-					
	Z	M		59 $\frac{1}{2}$	-	22		8.9		
	E	M		59 $\frac{1}{2}$	-	21		9.1		
	N	M		08 00	-	22	7.9			
	F		09 35	-				M=5.9(ESK).		
KEW	ZV	iP	07	16	30.0					
2. ESK	Z'	iP	20	46	51.3	0.9		0.05	20 34 36.2; 31.2°N.130.1°E. h=181km. Japan. USCGS.	
3. ESK	Z'	iP	05	21	25.7	1.0		0.03	05 09 28.1; 43.6°N.147.0°E. h=33km. Kurile Is. USCGS.	
4. ESK	Z	ePP	14	35	56				14 16 51.6; 38.1°S.73.4°W. h=28km. Near coast of Chile USCGS.	
	NE	ePS		45	30					
	ZNE	M	15	20	-	20	1.6	1.5	1.5	
	ZNE	M	15	23	-	18	1.6	1.1	2.2	
	F		17	15	-				M = 5.5(ESK)	
4. ESK	Z', Z	iP	23	53	53.0	12	0.4	0.2	1.0	C. $\Delta = 75.8^\circ = 8420\text{km.}$ Depth = 160km. (ESK)
	Z	epP		54	30					
	Z	esP		54	50					
	E	eS	24	03	20					
	N	eScS		03	32					
	ZN	eLR		19	-					
		F		25	00	-				
KEW	ZV	iP	23	54	08.0				Depth = 160km. (KEW)	
	ZV	ipP		54	47					
5. ESK	Z'	eP	00	58	37.2				$\Delta = 26.0^\circ = 2890\text{km.}$ 00 53 14.2; 36.8°N.21.3°E. h=22km. Greece. USCGS.	
	NE	eS	01	03	04	14	0.4	0.6		
	N	M		08	-	23	0.8			
	E	M		08	-	20		0.5		
		F		35	-				M=4.1(ESK)	
5. ESK	Z'	eP	06	32	26.7				06 20 30.5; 15.1°N.93.8°W. h=33km. Near Mexico. USCGS.	
6. ESK	Z'	eP	05	16	09.8	0.9		0.03	05 06 13.4; 62.4°N.147.4°W h=59km. Alaska. USCGS.	
KEW	ZV	eP	05	16	37.5					
6. ESK	Z'	eP	08	27	12.1				$\Delta = 26.5^\circ = 2950\text{km.}$ 08 21 50.3; 36.7°N.21.4°E. h=35km. Greece. USCGS. M = 3.6(ESK).	
	NE	eS		31	42	14	0.2	0.3		
	NE	M		36	-	20	0.3	0.1		
		F		50	-					
6. ESK	Z', Z	iP	13	53	45.5	12	1.1	1.9	C. $\Delta = 72.5^\circ = 8050\text{km.}$ PZ' 1.3 sec. 0.28 μ	
	NE	eS	14	03	06	15	1.5	2.1		
	E	eScS		03	52					
	E	eLQ		13 $\frac{1}{2}$	-					
	ZN	eLR		17	-					
	ZNE	M		22	-	24	6.0	3.7	5.1	
	ZNE	M		27	-	20	5.1	6.6	6.3	
		F		17	10	-				M=5.8(ESK).

Met. O. 787

SEISMOLOGICAL BULLETIN

JULY 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS	
			h.	m.	s.		N	E	Z		
6. KEW	ZV	iP	13	54	09.5						
6. ESK	Z'	eP	13	58	14.5					13 46 53.1; 52.6°N. 168.1°W. h=28km. Fox Is. USCGS.	
6. ESK	Z'	eP	16	25	43.9					16 14 24.7; 52.8°N. 168.1°W. h=33km. Fox Is. USCGS.	
6. ESK	Z'	eP	18	41	56.9					$\Delta = 57.2^\circ = 6360\text{km}$. 18 32 15.1; 18.9°N. 61.9°W. h=57km. Leeward Islands. M=4.8(ESK). USCGS.	
	NE	eS	49	46							
	ZN	eLR	58.3	-							
	ZNE	M	19	04	-	18	0.4	1.0	1.7		
6. ESK	Z'	eP	19	08	37.4					$\Delta = 59.4^\circ = 6600\text{km}$. 18 58 39.7; 13.4°N. 50.8°E. h=44km. Gulf of Aden. M=4.7(ESK). USCGS.	
	N	eS	16	42							
	ZE	eLR	27.3	-							
	N	M	39½	-	18	0.7					
6. ESK	Z'	eP	40	-	20			0.6	0.7	$\Delta = 55.7^\circ = 6180\text{km}$. 19 19 48.4; 8.1°N. 38.5°W. h=33km. Mid-Atlantic Ridge. USCGS. M=5.2(ESK)	
			19	29	15.8	18	1.6	1.0			
	ZN	eS	36	58	18						
	NE	eLQ	42½	-							
	N	M	45	-	26	3.7					
	Z	M	45½	-	26			3.9			
6. ESK	Z'	eP	46	-	24			2.3			
			21	10	-						
KEW	ZV	iP	19	29	06.0						
6. ESK	Z'	iP	23	28	10.7					23 15 57.2; 32.5°N. 130.9°E. h=159km. Japan. USCGS.	
7. ESK	E	eL	01	37	-					01 09 59.0; 13.5°N. 50.8°E. h=32km. Gulf of Aden. USCGS. M=4.2(ESK).	
			ZNE	M	51	-	18	0.3	0.1		0.3
7. ESK	Z'	F	02	05	-					09 42 08.0; 20.3°S. 177.7°W. h=540km. Fiji Is. USCGS. D. $\Delta = 125\text{km}$.	
7. ESK	Z'	iPKP	10	00	43.6						
7. ESK	Z'E'	ePg	14	20	29.7					Local (rockburst) $M_L = 1.6$	
			Z'E	iPn	20	30.1					
			N'	iSg	20	45.1					
			Z'N'E'	M	20	47	0.7	0.027	0.027		0.038
7. ESK	Z'	F	21	30	-					14 49 46.4; 49.6°S. 125.7°E. h=33km. South of Australia. USCGS.	
7. ESK	N	eL	24	19	-					23 49 23.6; 35.5°N. 87.8°E. h=33km. Tibet. M=5.0(ESK). USCGS.	
			ZNE	M	24	-	24	1.4	0.8		0.4
				F	45	-					
8. KEW	ZV	ePKP	01	18	08					00 58 54.7; 15.4°S. 167.5°E. h=137km. New Hebrides Is. USCGS.	
8. ESK	E	eLQ	07	21	-					06 22 52.8; 16.3°S. 166.8°E. h=9km. New Hebrides Is. USCGS. M = 4.9(ESK)	
			ZN	M	43	-	22	0.3			0.4
			E	M	44½	-	20		0.2		
8. ESK	Z'	F	08	40	-					13 13 29.1; 19.9°S. 178.1°W. h=520km. Fiji Is. USCGS.	
KEW	ZV	ePKP	06	42	26						
8. ESK	Z'	iPKP	13	32	05.2						

SEISMOLOGICAL BULLETIN

JULY 1967

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
9. ESK	Z'	iP	03	20	49.0				C. 03 09 03.2; 44.0°N. 144.7°E. h=100km. Hokkaido, Japan. USCGS	
	NE	M		48	-	24	0.5	0.4		
	N	M		55 $\frac{1}{2}$	-	16	0.4			
	E	M		56	-	20		0.3		
	Z	M		56	-	18				0.7
		F	04	05	-					
10. ESK	Z'	iPKP ₁	06	48	01.1				06 29 30.5; 17.6°S. 178.8°W. h=529km. Fiji Islands. USCGS.	
KEW	ZV	iPKP ₂	06	48	11.0					
10. ESK	Z'	iPKP	10	36	58.6				C. 10 18 25.1; 21.6°S., 179.4°W. h=621km. Fiji Is. USCGS.	
10. ESK	EN	M	12	00	-	24	0.3	0.4	10 56 26.2; 3.2°S. 130.0°E. h=33km. Ceram. USCGS. M=4.9(ESK).	
	Z	M		06	-	24				0.4
10. ESK	Z'	epPP	12	21	32				12 01 31.5; 5.9°S. 113.1°E. h=591km. Java Sea. USCGS.	
	N	eS		26	22					
	ZE	eSP		28	04					
	Z	ePS		29	16					
		F		13	15	-				
10. ESK	NE	eS	19	44	19				19 18 14.7; 4.8°N. 127.1°E. h=118km. Talaud Is. USCGS. M = 5.6(ESK)	
	NE	eL	20	03	-					
	NE	M		17 $\frac{1}{2}$	-	26	2.1	2.0		
	Z	M		21	-	26				1.8
		F		45	-					
11. ESK	Z'	iPKP	17	50	11.2				17 31 22.8; 19.4°S. 177.7°W. h=381km. Fiji Is. USCGS.	
12. ESK	Z'	iP	10	43	03.6				$\Delta = 68.9^\circ = 7650\text{km.}$ 10 32 01.6; 54.9°N. 161.1°W. h=33km. Alaska. USCGS.	
	Z'	i		43	06.3					
	E	eS		52	04					
12. ESK	NE	e(s)	14	14	36				No USCGS P.D.E.	
	ZNE	M		24	-	14	0.7	0.7		0.4
		F		35	-					
12. ESK	Z'	eP	21	12	25.4	1.0			$\Delta = 80.1^\circ = 8900\text{km.}$ Multiple P. 21 00 20.9; 5.6°N. 82.6°W. h=33km. South of Panama. USCGS. M = 5.7(ESK)	
	Z'	e		12	27.4					
	NE	eS		22	26	17	1.4	2.7		
	N	eSS		27	24					
	E	e		27	53					
	N	eLQ		33 $\frac{1}{2}$	-					
	ZE	eLR		37.0	-					
	ZNE	M		41	-	22	2.4	6.3		7.3
		F		24	15	-				
13. ESK	Z', Z	eP	02	14	56.1	12	0.5		D. $\Delta = 20.0^\circ = 2220\text{km.}$ PZ' 1.0sec. 0.04 μ 02 10 20.0; 35.5°N. 0.1°W. h=13km. Algeria. 10 killed, 15 injured. USCGS. M=4.7 (surface waves) M=3.4 (body waves)	
	NE	eS		18	34	14	1.0	0.6		
	E	eL		19 $\frac{1}{2}$	-					
	E	M		22	-	13		4.9		
	N	M		23	-	18	2.3			
	Z	M		23	-	16				2.7
		F		03	15	-				
	KEW	ZV	eP	02	14	09				
13. ESK	Z'	iPKP	10	23	48.9				10 04 19.0; 20.4°S. 169.3°E. h=46km. New Hebrides Is. USCGS. M=4.9(ESK).	
	Z'	i		23	50.3					
	ZE	M	11	26	-	20		0.2		0.4
	N	M		26	-	22	0.3			
	F		12	20	-					

Met. O. 787

SEISMOLOGICAL BULLETIN

JULY 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
13. ESK	Z'	eP	14	15	15.6					D. Δ = 109km.
	N'E'	iSg		15	29.0					Local (rockburst)
	Z'N'E'	M		15	30 $\frac{1}{2}$	0.5	0.040	0.054	0.054	
		F		16	10					M_L = 1.9
13. ESK	Z'	iP	14	43	38.4	1.1			0.06	
	N	M		51	-	20	0.2			14 38 53.9; 40.7°N. 19.5°E.
	E	M		51 $\frac{1}{2}$	-	24		0.4		h=23km. Albania. USCGS.
	Z	M		54 $\frac{1}{2}$	-	14			0.4	
		F	15	20	-					M = 3.7(ESK).
14. ESK	Z	eL _R	03	52.3	-					02 47 53.0; 11.4°S. 166.2°E.
	N	M	04	05	-	24	0.3			h=80km. Santa Cruz Is.
	Z	M		05 $\frac{1}{2}$	-	24			0.4	USCGS.
	E	M		06 $\frac{1}{2}$	-	24		0.3		
		F	05	00	-					
14. ESK	Z'	iP	14	04	32.9					13 53 23.8; 54.0°N. 164.3°W.
										h=33km. Unimak Is. USCGS.
14. ESK	E'Z'	ePg	14	58	14.9					Δ = 105km.
	E'	eSg		58	28.0					Local (rockburst)
	Z'N'E'	M		58	29 $\frac{1}{2}$	0.7	0.027	0.040	0.036	
		F		58	55					M_L = 1.6
14. ESK	E	eL	23	31	-					22 36 59.9; 3.6°S. 149.4°E.
	ZNE	M		45	-	27	0.3	0.2	0.4	h=33km. Bismarck Sea.
		F	24	15	-					M=4.8(ESK). USCGS.
15. ESK	Z'	iP	03	35	31.8	0.7			0.03	0. 03 26 57.4; 49.8°N. 78.1°E
	KEW	ZV	03	35	35.5					h=0km. Eastern Kazakh SSR.
										C. USCGS.
15. ESK	Z'	iP	08	26	30.9					08 14 59.3; 51.5°N. 176.8°E.
										h=32km. Rat Is. USCGS.
15. ESK	N	eL	14	31	-					
	N	M		37	-	22	0.8			
	E	M		37	-	21		0.4		No USCGS P.D.E.
	Z	M		38	-	20			0.2	
		F		50	-					
15. ESK	NE	eL	15	30	-					14 40 35.0; 6.8°N. 126.3°E.
	E	M		39	-	25		0.7		h=37km. Philippine Is.
	N	M		39	-	23	0.5			USCGS.
	ZNE	M		46 $\frac{1}{2}$	-	20	0.4	0.4	0.6	
		F	16	10	-					M=5.0(ESK).
15. ESK	Z'	ePKP	17	22	49.9					17 04 13.0; 21.9°S. 179.6°W.
										h=574km. Fiji Is. USCGS.
16. ESK	Z'	iP	09	27	21.5					09 15 20.7; 15.3°N. 94.9°W.
										h=55km. Near Mexico. USCGS.
16. ESK	Z	ePP	13	54	14	18	0.4	0.5	1.0	
	ZNE	ePS	14	03	48					
	NE	eSS		10	14					13 34 29.9; 0.8°S. 132.6°E.
	NE	eLQ		23	-					h=33km. New Guinea region.
	Z	eLR		29.1	-					USCGS.
	E	M		33	-	30		18		
	N	M		33 $\frac{1}{2}$	-	28	14			
	Z	M		44 $\frac{1}{2}$	-	22			14	M = 6.1(ESK)
	N	M		44 $\frac{1}{2}$	-	20	10			
	E	M		44 $\frac{1}{2}$	-	21		10		
		F	16	50	-					

Met. O. 787

SEISMOLOGICAL BULLETIN

JULY 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
16. ESK	Z'E'	ePn	14	06	27.3				$\Delta = 9.2^\circ = 1020\text{km.}$ 14 04 11; 47.3°N. 5.4°E. h=20km. France. BCIS.	
	Z'E'	i		06	50.1					
	E'N'	e(Sn)		08	11.1					
	N'	i		08	15.4					
		F		11	00					
KEW	ZV	ePg	14	05	55				$\Delta = 5.1^\circ = 567\text{km.}$	
	ZV	eSn		06	30					
	ZV	e		06	35					
	ZV	e(S*)		06	45					
		F		09	30					
17. ESK	Z'	iP	11	39	43.5				11 28 13.4; 51.1°N. 169.3°W. h=33km. Fox Is. USCGS.	
19. ESK	Z', Z	eP	09	12	06.9				09 06 19.0; 37.9°N. 29.0°E. h=28km. Turkey. USCGS. M = 4.1(ESK).	
	NE	eS		17	04	17	0.3	0.5		
	N	eL		19.0	-					
	N	M		22	-	20	1.7			
	E	M		22	-	18		1.2		
	ZNE	M		25	-	12	0.7	0.7	1.3	
		F		50	-					
KEW	ZV	eP	09	11	36.0					
19. ESK	Z'	iPKP	13	00	06.5				12 41 28.8; 20.3°S. 178.2°W. h=518km. Fiji Is. USCGS.	
19. ESK	Z'	eP	16	23	44.5				16 18 38.4; 38.3°N. 21.2°E. h=33km. Greece. USCGS.	
19. ESK	Z'	eP	17	37	19.8				17 28 32.2; 36.5°N. 70.3°E. h=223km. Hindu Kush. USCGS.	
20. ESK	Z'	eP	13	24	58.4				13 11 35.0; 28.1°S. 66.9°W. h=157km. Argentina. USCGS.	
	NE	eSKS		35	24					
	NE	ePS		37	45					
	NE	M		54	-	26	0.6	0.5		
		F		14	30	-				
20. ESK	Z', Z	eP	14	37	46.0				$\Delta = 73.9^\circ = 8210\text{km.}$ 14 26 14.1; 51.4°N. 178.3°E. h=33km. Rat Islands. USCGS. M=4.7(ESK).	
	NE	eS		47	14					
	N	eSS		52	08					
	ZNE	M		15	09	-	20	0.5		0.4
		F		50	-					
20. ESK	Z', Z	eP	15	50	46	12			15 36 20.1; 7.7°N. 134.9°E. h=8km. West Caroline Is. USCGS. M = 6.3(ESK)	
	Z', Z	ePP		55	14	12	0.7	0.5		1.4
	NE	eSKS		16	01	16				
	NE	eS		02	53	20	2.3	2.6		
	N	eSS		10	32					
	NE	eLQ		20 $\frac{1}{2}$	-					
	ZNE	eLR		27	-					
	E	M		30 $\frac{1}{2}$	-	34		32		
	N	M		30 $\frac{1}{2}$	-	32	17			
	ZNE	M		48 $\frac{1}{2}$	-	18	17	8		13
		F		18	25	-				
KEW	ZV	ePP	15	55	24					
20. ESK	Z'	iP	19	08	10.4	1.0			0.04 19 03 27.3; 40.8°N. 19.8°E. h=33km. Albania. USCGS.	

Met. O. 787

SEISMOLOGICAL BULLETIN

JULY

1968

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
20. ESK	Z'	ePKP	23	31	40.3					23 12 54.4; 26.5°S. 178.5°E. h=596km. Fiji Is. USCGS.
	Z'			31	51.3					
21. ESK	Z'Z	ePKP	13	05	15.0					
	ZNE	M	14	05	-	20	0.3	0.3	0.4	12 45 57.4; 21.3°S. 176.2°W. h=199km. Fiji Is. USCGS.
		F	15	00	-					
22. ESK	Z'	ePKP ₁	04	17	54.6					
	Z'	ePKP ₂		18	29.8					
	E	eSS		42	02					03 58 02.4; 33.5°S. 179.0°W. h=39km. South of Kermadec Islands. USCGS.
	N	M	05	30	-	19	1.5			
	ZE	M		30	-	18		1.7	2.4	M=5.7(ESK).
		F	07	10	-					
22. ESK	Z'	iPn	11	00	21.4	0.6	0.041	0.027	0.057	C. $\Delta = 5.0^\circ = 556$ km. 10 59 06; 51° 02' 20"N., 01° 13' 33"E. Strait of Dover. Explosion of the wreck of ammunition ship "Kielce". (Estimated 500 tons of bombs). (KEW).
	Z'E'	iPg		00	42.9	0.6	0.041	0.034	0.068	
	Z'N'	i		01	36.1					
	Z'E'	i		01	52.9					
	N'E'	i		01	55.0					
		F		05	00					
KEW	ZV	iPg	10	59	27.0					C. $\Delta = 1.0^\circ = 111$ km.
	ZV	i		59	51.0	1.0				
	ZV	M	11	00	09	1.3				0.86
		F		02	30					
22. ESK	Z'	iP	16	11	18.8					16 00 04.4; 52.6°N. 159.0°E. h=67km. Off Kamchatka. USCGS.
22. ESK	Z'	eP	17	02	33.4	24	17	62	73	D. Multiple P. PZ' 1.1 sec. 0.60 μ 16 56 53.3; 40.7°N. 30.8°E. h=4km. Turkey. 173 killed, 183 injured and major property damage. USCGS. M = 7.3(ESK).
	Z',Z	i		02	35.0					
	N	e(S)		06	40	28	152			
KEW	ZV	eP	17	02	07.5					
	ZV	i		02	09.0					
	ZV	eS		06	34					
	ZV	M		14 $\frac{1}{2}$	-	16			490	
22. ESK	Z'	eP	17	53	43.5					17 48 06.0; 40.6°N. 30.7°E. h=26km. Turkey. USCGS.
KEW	ZV	eP	17	53	17.0					
22. ESK	Z'	eP	18	15	30.0					18 09 55.7; 40.8°N. 30.4°E. h=33km. Turkey. USCGS.
KEW	ZV	eP	18	15	04.0					
22. ESK	Z'	eP	19	53	01.0					19 47 25.6; 40.8°N. 30.9°E. h=33km. Turkey. USCGS.
22. ESK	Z'	iP	20	41	18.7					20 35 40.8; 40.6°N. 30.4°E. h=16km. Turkey. USCGS.
22. ESK	Z'	IP	23	47	36.1					23 41 59.5; 40.6°N. 30.7°E. h=33km. Turkey. USCGS.
23. ESK	Z	ePP	03	31	06					
	E	eLQ	04	07 $\frac{1}{2}$	-					03 08 43.7; 15.7°S. 167.1°E. h=33km. New Hebrides Is. USCGS.
	Z	M		33	-	22			0.4	
	N	M		33	-	21	0.3			
	E	M		33 $\frac{1}{2}$	-	20		0.3		
		F	05	30	-					M=5.0(ESK).
23. ESK	Z'	eP	05	59	38.1					No USCGS P.D.E.

Met. O. 787

SEISMOLOGICAL BULLETIN

JULY 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
23. ESK	Z'	eP	07	48	00.5					07 42 22.2; 40.8°N. 30.8°E. h=19km. Turkey. USCGS.
	N	eL		54	-					
	ZE	M	08	00 $\frac{1}{2}$	-	18		0.2	0.3	
	N	M		01	-	14	0.1			
23. ESK	Z	ePKP	14	08	18					13 48 05.8; 56.2°S. 158.3°E. h=33km. Macquarie Island region. USCGS. M=5.3(ESK)
	N	eSS		34	10					
	N	eLQ		57.9	-					
	N	M	15	20	-	24	0.7			
	Z	M		21	-	24			0.9	
	E	M		21 $\frac{1}{2}$	-	22		0.8		
	Z	M		27	-	22			1.5	
	E	M		27 $\frac{1}{2}$	-	20		0.5		
	N	M		28	-	20	0.8			
	F	16	25	-						
25. ESK	Z'	e(P)	08	42	22.5					08 37 25.7; 41.9°N. 24.6°E. h=33km. Greece-Bulgaria border. USCGS. M=3.6(ESK).
	NE	M		50 $\frac{1}{2}$	-	16	0.2	0.3		
	F		09	00	-					
26. ESK	Z'N'E'	iPg	00	02	46.9	0.5	0.06	0.18	0.15	C. Δ = 4km. Local. ML = 0.2
	Z'N'E'	iSg		02	47.7	0.6	0.60	0.49	0.33	
		F		03	25					
26. ESK	Z'	iPKP	08	34	34.3	8				08 14 56.3; 22.0°S. 170.1°E. h=30km. Loyalty Is. USCGS. M=5.1(ESK).
	Z'	e		34	45.7					
	E	eL	09	15	-					
	ZNE	M		40 $\frac{1}{2}$	-	20	0.4	0.4	0.7	
	F		10	40	-					
26. ESK	Z', Z	iP	18	59	33.5	14		0.5	0.8	D. Δ = 32.6° = 3620km. PZ' 1.0 sec. 0.10 μ 18 53 01.3; 39.5°N. 40.4°E. h=33km. Turkey. 92 killed, 120 injured and major property damage. USCGS. M=5.8(ESK).
	Z	ePP	19	00	46	14		0.5	0.8	
	NE	eS		04	46	17	2.1	6.5		
	N	eLQ		07	-					
	ZE	eLR		09	-					
	NE	M		14	-	20	31	17		
	ZNE	M		16 $\frac{1}{2}$	-	16	24	13	24	
		F	22	20	-					
KEW	ZV	eP	18	59	13.5					
27. ESK	N	eS	00	23	31					00 00 47.9; 19.9°N. 109.4°W. h=31km. Revilla Gigedo Is. USCGS. M = 4.6(ESK).
	ZE	eL		40 $\frac{1}{2}$	-					
	E	M		49 $\frac{1}{2}$	-	18		0.3		
	Z	M		50 $\frac{1}{2}$	-	16			0.3	
	N	M		51	-	14	0.3			
	F	01	15	-						
27. ESK	Z'	iP	05	20	49.9	1.9			0.25	Δ = 12.7° = 1410km. 05 17 54.0; 64.0°N. 20.7°W. h=34km. Iceland. USCGS.
	N'	eS		23	10.6					
	ZNE	eL		23 $\frac{1}{2}$	-					
	Z	M		24 $\frac{1}{2}$	-	24			3.2	
	NE	M		24 $\frac{1}{2}$	-	22	3.4	2.0		
	NZ	M		25	-	16	2.5		2.4	
	E	M		25	-	14		3.9		
	F	06	00	-						
KEW	ZV	eP	05	21	44.0					
27. ESK	ZN	eL	12	24	-					11 35 33.8; 35.1°S. 54.0°E. h=33km. Indian Ocean. USCGS. M=4.9(ESK).
	ZNE	M		36 $\frac{1}{2}$	-	22	0.4	0.4	0.5	
	ZNE	M		42	-	18	0.5	0.4	0.7	
		F	13	00	-					

Met. O. 787

SEISMOLOGICAL BULLETIN

JULY 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
28. ESK	Z'	iP	03	58	29.2				03 46 29.8; 16.1°N. 96.6°W. h=56km. Mexico. USCGS.	
28. ESK	Z'	ePKP	05	36	05.5				05 16 28.2; 22.1°S. 169.9°E. h=33km. Loyalty Is. USCGS.	
28. ESK	Z'	iP	09	56	13.8	0.8		0.02	09 44 21.1; 42.6°N. 145.4°E h=142km. Hokkaido, Japan. USCGS.	
28. ESK	Z'	iPKP	10	06	49.8	1.0		0.03	09 47 19.3; 49.7°S. 117.0°E. h=33km. South of Australia. USCGS.	
28. ESK	Z'	iPKP	14	44	25.7				14 25 50.1; 20.7°S. 178.5°W. h=555km. Fiji Is. USCGS.	
28. ESK	Z'	eP	15	37	37.2	1.3		0.10	15 35 03.4; 63.9°N. 20.5°W. h=31km. Iceland. USCGS.	
	Z'	i	37	38.1						
	ZNE	eL	40 $\frac{1}{2}$	-				1.9		
	Z	M	42 $\frac{1}{2}$	-	16	1.4	2.1			
	N	M	42 $\frac{1}{2}$	-	14					
	E	M	42 $\frac{1}{2}$	-	15					
		F	16	15	-					
28. ESK	Z'	iP	17	40	55.1				17 27 35.7; 2.1°N., 98.0°E. h=32km. Sumatra. USCGS.	
29. ESK	Z'	iP	02	24	03.5	0.7		0.02	02 21 09.5; 64.0°N. 20.6°W. h=33km. Iceland. USCGS.	
	ZNE	eL	26 $\frac{1}{2}$	-				1.4		
	Z	M	28	-	20	1.0	1.5			
	N	M	28 $\frac{1}{2}$	-	14					
	E	M	28 $\frac{1}{2}$	-	16					
		F	55	-						
29. ESK	Z'	eP	03	09	22.2				02 57 18.1; 42.7°N. 146.7°E. h=33km. Japan. USCGS.	
29. ESK	Z', Z	iP	10	35	38.1	16	1.0	2.9	7.0	C. Δ = 73.0° = 8110km. Depth = 160km. PZ' 3.0 sec. 2.4 μ 10 24 24.6; 6.8°N. 73.0°W. h=161km. Northern Colombia. 10 killed and moderate property damage. USCGS. M = 6.1 (ESK).
	Z'	ipP	36	17.5						
	NE	iS	44	50	21	20.0	9.0			
	Z	iPS	45	40						
	N	isS	45	57						
	ZNE	M	11	08	-	20	3.8	4.7	7.3	
	ZE	M	12 $\frac{1}{2}$	-	18			6.8	8.8	
		F	14	20	-					
29. ESK	ZN	eL	23	10	-					
	ZNE	M	25	-	20	0.3	0.3	0.4	Not in USCGS P.D.E.	
30. ESK	Z', Z	iP	00	10	52.1	9		3.0	Multiple P. Δ = 66.2° = 7360km. 23 59 58.7; 10.6°N. 67.3°W. h=10km. Near coast of Venezuela. 236 dead, 2000 injured and major property damage. USCGS. M = 6.5 (ESK).	
	Z', Z	i	10	57.3						
	Z', Z	iPcP	11	12						
	Z	ePP	13	20	14	0.7	1.5	2.2		
	NE	eS	19	42	14	12.6	2.7			
	NE	eSS	23	48						
	N	eLQ	27 $\frac{1}{2}$	-						
	ZE	eLR	30 $\frac{1}{2}$	-						
	ZNE	M	37	-	20	26	45	61		

Met. O. 787

SEISMOLOGICAL BULLETIN

JULY 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
30. ESK	Z', Z	eP	01	36	38.4	8			1.2	01 31 01.7; 40.7°N. 30.4°E. h=16km. Turkey. USCGS. M=5.1(ESK).
	NE	eS		41	22	14	2.7	3.7		
	N	M		46	-	26	10.0			
	E	M		46	-	22		4.3		
	Z	M		49	-	17			5.8	
	N	M		50	-	14	5.8			
E	M		50 $\frac{1}{2}$	-	16		4.6			
30. ESK	E	eLQ	09	08	-					08 19 28.3; 60.1°S. 28.5°W. h=33km. Sandwich Islands. USCGS. M=4.9(ESK).
	NZ	eLR		15 $\frac{1}{2}$	-					
	ZN	M		21 $\frac{1}{2}$	-	24	0.6		0.8	
	ZNE	M		29 $\frac{1}{2}$	-	18	0.3	0.3	0.6	
		F	10	10	-					
30. ESK	N	eSS	11	34	38					10 49 32.8; 56.2°S. 146.9°E. h=33km. Macquarie Is. USCGS. M = 5.7(ESK).
	NE	eLQ		59	-					
	N	M	12	20	-	24	2.0			
	E	M		23	-	24		1.7		
	E	M		29	-	20		1.2		
	Z	M		31	-	19			3.0	
N	M		31 $\frac{1}{2}$	-	19	2.0				
		F	13	25	-					
30. ESK	ZN	ePP	13	56	10					13 35 14.4; 5.6°S. 153.6°E. h=50km. New Ireland region. USCGS. M=5.6(ESK).
	E	ePKS		57	36					
	E	ePS	14	06	18					
	N	M		50	-	24	1.6			
	ZE	M		50 $\frac{1}{2}$	-	22		1.7	2.5	
	E	M		54 $\frac{1}{2}$	-	20		1.6		
NZ	M		55 $\frac{1}{2}$	-	20	1.4		2.5		
		F	16	25	-					
30. ESK	Z'	ePKP	17	43	12.5					17 24 43.1; 17.8°S. 178.8°W. h=564km. Fiji Is. USCGS.
KEW	ZV	ePKP ₁	17	43	14.5					
	ZV	iPKP ₂		43	22.0					
31. ESK	N	eSS	23	34	48					22 48 35.6; 60.0°S. 159.1°E. h=33km. Macquarie Is. USCGS. M = 5.4(ESK).
	N	eL		59	-					
	ZNE	M	24	26	-	22	1.0	0.7	1.1	
		F	25	00	-					

Met. O. 787

METEOROLOGICAL OFFICE, UNITED KINGDOM

SEISMOLOGICAL BULLETIN FOR DECEMBER 19 67

I. ESKDALEMUIR OBSERVATORY, LANGHOLM, DUMFRIESSHIRE, SCOTLAND

Lat. 55° 19' 00" N., Long. 3° 12' 18" W. Height above M.S.L. 263m.

Foundation: Llandovery Shales, folded (late Silurian).

Instruments: World-wide standardised seismograms (USCGS).

- (i) Long-Period SPRENGNETHER
- (ii) Short-Period BENIOFF

CONSTANTS:

INSTRUMENT	DATE FROM WHICH CONSTANTS APPLY	FREE PERIODS		DAMPING	V
		PENDULUM Tp sec.	GALVANOMETER Tg sec.		
SPRENGNETHER WWSS	N	15	100		} 1500 at 15 sec.
	E	15	100		
	Z	15	100		
BENIOFF WWSS	N'	1.0	0.75		} 25000 at 1sec.
	E'	1.0	0.75		
	Z'	1.0	0.75		

2. KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND

Lat. 51° 28' 6" N., Long. 0° 18' 47" W, Height above M.S.L. 4m.

Foundation: River gravel resting on London clay.

Instruments: Kew-type vertical seismograph, period 1.5 sec.
Direct optical registration (ZV).

Notations: For phases the generally adopted notations are used.
In addition the following symbols are in use:

C = Compression

D = Dilation

Mag. = Earthquake magnitude, determined in the old Gutenberg-Richter scale (M). The mean value for body and surface waves is given, if agreement is good, otherwise the values for body and surface waves are quoted separately.

Δ = Epicentral distance

h = Depth of hypocenter

The bulletin is prepared at Kew Observatory and all enquiries concerning the seismograms for both Kew and Eskdalemuir should be addressed to Kew.

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
1. ESK	Z', Z	iP	14	08	24.0	14	2.2		3.3	C. $\Delta = 74.3^\circ = 8250\text{km}$. PZ' 1.4sec. 0.98 μ Depth = 146km. (ESK) 13 57 02.4; 49.5°N. 154.4°E. h=136km. Kurile Is. USCGS. M = 5.8(ESK).
	Z'	ipP		08	59.8					
	NE	eS		17	45	15	4.4	3.8		
	N	eScS		18	16					
	ZN	eLR		32	$\frac{1}{2}$	-				
	EN	M		51	-	20	2.5	1.9		
KEW	ZV	F	15	20	-					
1. ESK	Z'	iP	14	08	42.5					16 57 25.2; 60.2°N. 29.6°W. h=33km. North Atlantic Ridge. USCGS. M = 4.1(ESK).
	Z	eP	17	00	58				2.4	
	N	M		05	$\frac{1}{2}$	-	1.3			
	E	M		05	$\frac{1}{2}$	-		1.9		
		F		12	-					
1. ESK	Z'	iP	18	35	40.5					18 31 04; 41.2°N. 20.2°E. Albania. BCIS.
1. ESK	Z'	eP	20	12	32.5					20 07 50.9; 41.2°N. 20.1°E. h=33km. Albania. USCGS.

SEISMOLOGICAL BULLETIN

DECEMBER 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
2. ESK	Z'	eP	00	28	58.3					00 24 15.7; 41.3°N. 20.6°E. h=29km. Albania. USCGS.
2. ESK	Z	eP	00	43	22.4					00 31 18.9; 24.1°N. 108.6°W. h=33km. Gulf of California. USCGS. M=5.4(ESK).
	N	M	01	14	-	20	2.1			
	EZ	M	16	1/2	-	20		1.3	2.5	
		F	30	-						
2. ESK	Z'	iP	09	31	50.7					09 27 09.9; 41.4°N. 20.3°E. h=33km. Albania. USCGS.
2. ESK	Z'	iP	12	49	24.4	1.0			0.09	D. $\Delta = 22^\circ = 2440\text{km}$.
	Z'	i	49	28.6						
	NE	eS	53	20		12	0.8	1.2		12 44 42.7; 41.3°N. 20.3°E. h=17km. Albania. USCGS.
	N	eL	55	1/2	-					
	N	M	58	1/2	-	18	3.5			
	EZ	M	58	1/2	-	20		2.3	3.9	
	ZNE	M	13	00	-	14	2.0	1.4	4.4	M = 4.4(ESK).
	F	15	-							
KEW	ZV	eP	12	48	45.5					
2. ESK	Z'	eP	14	22	42.9					14 18 04.5; 41.4°N., 20.1°E. h=33km. Albania. USCGS.
2. ESK	Z'	eP	20	17	25.4					20 05 52.4; 37.8°N. 115.2°E. h=13km. China. USCGS.
	N	M	46	1/2	-	24	2.3			
	E	M	46	1/2	-	23		2.3		
	ZNE	M	51	-		16	2.9	1.4	2.4	M=5.4(ESK).
	F	21	20	-						
KEW	ZV	eP	20	17	34.0					
5. ESK	Z'	iP	05	25	39.4					05 20 02.9; 36.5°N. 26.9°E. h=138km. Dodecanese Is. USCGS.
5. ESK	Z'	iP	09	16	40.6	1.0			0.04	C. 09 05 13.1; 51.6°N., 173.4°W. h=36km. Andreanof Is. USCGS.
6. ESK	Z'	iP	03	04	49.6					02 53 06.5; 12.5°N. 87.2°W. h=87km. Nicaragua. USCGS.
6. ESK	Z'	iPKP	05	22	17.5	1.0			0.08	D. 05 03 40.8; 21.3°S., 178.8°W. h=559km. Fiji Is. USCGS.
8. ESK	Z'	iP	06	12	32.1	0.7			0.03	06 03 57.1; 49.8°N. 78.2°E. h=0km. Kazakh SSR. USCGS.
8. ESK	Z'	eP	14	37	50.8					14 32 44.4; 37.1°N. 24.5°W. h=33km. Azores Is. USCGS.
9. ESK	Z'	iP	03	14	07.9					03 09 52.2; 42.0°N. 16.5°E. h=33km. Adriatic Sea. USCGS.
9. ESK	Z'	iPKP	05	47	17.1					05 28 38.9; 22.2°S. 179.4°W. h=588km. Fiji Is. USCGS.
9. ESK	ZN	M	12	12	-	20	0.7		1.1	10 50 46.6; 10.9°S. 164.2°E. h=33km. Santa Cruz Is. USCGS.
	ZE	M	14	-		20		1.0	1.2	
	F	F	30	-						M=5.5(ESK)

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
10. ESK	Z'	iP	12	18	21.6	12			0.6	$\Delta = 72.1^\circ = 8010\text{km.}$ PZ' 1.0 sec. 0.08 μ 12 06 50.3; 40.5°N. 124.6°W. h=5km. Near coast of California. USCGS. M = 5.4(ESK).
	Z'	i		18	29.5					
	NE	eS		27	40	19	1.2	0.8		
	NE	eL		37 $\frac{1}{2}$	-					
	N	M		47	-	19	4.0			
	E	M		47 $\frac{1}{2}$	-	20		2.5		
	Z	M		50	-	18			6.1	
	E	M		50	-	18		4.4		
	F		13	30	-					
KEW	ZV	eP	12	18	43.5					
10. ESK	Z'	iP	18	55	05.6				18 43 34.4; 22.5°N. 94.8°E. h=158km. Burma. USCGS.	
10. ESK	Z'	iP	19	41	00.0	0.7		0.02	19 30 00.1; 36.7°N. 107.2°W. h=0km. New Mexico. "GASBUGGY" shot. USCGS.	
10. ESK	Z'	iP	23	02	24.0	10		0.8	1.5	$\Delta = 68.8^\circ = 7640\text{km.}$ 22 51 24.3; 17.7°N. 73.9°E. h=33km. India. About 100 killed, 1300 injured and major property damage. USCGS. M = 6.1(ESK)
	NE	eS		11	24	20	4.3	1.9		
	N	eSS		15	36					
	N	eSSS		19	14					
	E	eL		23 $\frac{1}{2}$	-					
	NE	M		34	-	22	23	15		
	ZE	M		39	-	18		28	34	
	N	M		39 $\frac{1}{2}$	-	19	17			
	F		26	10	-					
KEW	ZV	iP	23	02	13.0				C.	
	ZV	ePP		04	48					
11. ESK	Z'	iP	19	58	41.7				19 48 43.3; 13.7°N. 51.6°E. h=33km. Gulf of Aden. USCGS.	
11. ESK	Z'	iPKP	20	00	26.1				19 40 53.3; 20.6°S. 174.3°W. h=33km. Tonga Is. USCGS.	
11. ESK	Z'	iP	22	40	16.2					$\Delta = 59.5^\circ = 6610\text{km.}$ 22 30 18.3; 13.6°N. 51.6°E. h=33km. (of Aden. USCGS. Gulf)
	NE	eS		48	22					
	ZE	eL		59	-					
	N	M		23	10 $\frac{1}{2}$	-	18 ¹	1.9		
	NE	M		11	-	20		1.5	2.1	
	F		45	-					M = 5.3(ESK).	
12. ESK	Z', Z	iPKP	08	25	58.5					08 06 16.7; 22.7°S. 171.1°E. h=39km. Loyalty Islands. M = 5.4(ESK). USCGS.
	ZN	eLR		09	16	-				
	ZNE	M		31	-	20	0.7	0.8	1.1	
	F		10	20	-					
12. ESK	E	M	15	20	-	20		0.5		No USCGS P.D.E.
	NZ	M		21	-	18	0.7		0.7	
		F		35	-					
13. ESK	Z'	iP	10	49	53.7	1.0			0.13	C. 10 38 23.4; 47.6°N., 152.6°E. h=124km. Kurile Islands. USCGS.
	Z'	i		50	05.8					
KEW	ZV	iP	10	50	11.5					
13. ESK	Z'	iP	11	09	43.1	0.7			0.03	10 58 21.6; 49.4°N. 154.5°E. h=138km. Kurile Is. USCGS.
KEW	ZV	iP	11	10	01.5					
13. ESK	Z'	iP	17	58	57.6					D. 17 47 51.2; 47.1°N., 145.7°E. h=312km. Sea of Okhotsk. USCGS.

SEISMOLOGICAL BULLETIN

DECEMBER 19 67

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS	
			h.	m.	s.		N	E	Z		
13. ESK	Z', Z	iPKP	19	26	41.1	20	0.7	0.6	1.1	19 07 14.4; 19.1°S. 168.7°E. h=51km. New Hebrides Is. USCGS. M = 5.3(ESK).	
	Z'	i		26	45.0						
	ZN	eLR	20	14 $\frac{1}{2}$	-						
	Z	M		29	-	20					
	NE	M		29	-	22					
		F	21	15	-						
KEW	ZV	iPKP	19	26	52.0						
	ZV	i		27	05.0						
13. ESK	Z'	ePKP	21	06	20.3					20 48 02.2; 5.0°S. 149.7°E. h=382km. New Britain region. USCGS.	
14. ESK	Z'	eP	02	30	31	18	0.9	0.4	0.9	$\Delta = 59.8^\circ = 6640\text{km.}$ 02 20 27.9; 14.3°N. 53.7°E. h=33km. Arabian Sea. M = 4.7(ESK).	
	NE	eS		38	38						
	Z	eL		50	-						
	N	M	03	00	-						
	E	M		01	-						18
	Z	M		02	-						18
		F		30	-						
14. ESK	Z'	eP	03	00	51.2					02 54 47.6; 34.4°N., 26.2°E. h=7km. Crete. USCGS.	
14. ESK	Z'	eP	08	41	12.5					08 35 28.7; 34.9°N., 24.3°E. h=78km. Crete. USCGS.	
14. ESK	Z'E'	iPg	16	05	42.3	0.7	0.067	0.047	0.054	$\Delta = 16\text{km.}$ Local. M _L = 0.1	
	N'	iSg		05	44.5						
	ZNE'	M		05	47						
		F		06	00						
14. ESK	Z'	iP	18	36	23.5	0.7				18 25 16.6; 54.6°N. 160.4°E. h=33km. Near Kamchatka. USCGS.	
16. ESK	Z'	iP	21	05	25.0	0.9	2.5	2.3	3.2	0.07 20 53 58.3; 51.2°N. 157.7°E. h=24km; Near Kamchatka. USCGS. M=5.4(ESK).	
	E	eLQ		25	-						
	ZN	eLR		29	-						
	ZNE	M		44	-						20
		F	22	15	-						
KEW	ZV	iP	21	05	44.5						
17. ESK	Z'	iP	00	34	21.3	1.0			0.03	00 25 15.1; 36.5°N. 71.4°E. h=82km. Afganistan-USSR border. USCGS.	
	KEW	ZV	iP	00	34						15.0
18. ESK	Z'	ePKP	06	43	56.0	0.8			0.03	06 24 19.7; 22.4°S. 170.8°E. h=34km. Loyalty Is. USCGS.	
	Z'	i		43	58.3						
18. ESK	Z'	iP	11	02	04.9	0.9				11 02 04.9; 29.1°N., 81.9°E. h=42km. Nepal. USCGS.	
18. ESK	Z'	iP	14	19	09.7	20	1.9	1.9	2.6	14 07 39.5; 36.2°N. 111.7°E. h=33km. China. USCGS. M = 5.3(ESK)	
	E	M		54	-						
	NZ	M		54 $\frac{1}{2}$	-						18
		F		15	25						-
19. ESK	Z'	iP	08	31	12.1	0.8	1.2	0.7	1.4	08 32 30.9; 41.5°N. 20.4°E. h=19km. Albania. USCGS. M = 4.2(ESK).	
	Z'	i		31	15.8						
	ZN	eL		43 $\frac{1}{2}$	-						
	ZNE	M		46 $\frac{1}{2}$	-						20
		F		09	00						-

SEISMOLOGICAL BULLETIN

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
20. ESK	Z'	iP	05	57	29.0				05 45 30.1; 43.2°N. 146.2°E. h=33km. Kurile Is. USCGS.	
20. ESK	Z'	iP	11	46	50.1	1.0			C. 11 34 25.9; 11.8°N., 93.0°E. h=61km. Andaman Is. USCGS. M = 5.3(ESK)	
	N	eL	12	14	-			0.04		
	NE	M F	27 45	- -		24	1.9	0.8		
21. ESK	Z'	iP	00	14	15.4				D. 00 09 39.0; 42.1°N., 20.7°E. h=19km. Yugoslavia. M=4.0(ESK) USCGS.	
	ZNE	M	23	-		20	0.5	0.8		1.2
		F	30	-						
21. ESK	Z', Z	iP	02	38	45.0	24	4.1	6.6	17.2	C. $\Delta = 92.6^\circ = 10300\text{km}$. PZ' 3.0 sec. 2.4 μ 02 25 21.6; 21.8°S. 70.0°W. h=33km. Near coast of Chile. 1 killed, 30 injured and major property damage. USCGS. M = 7.4(ESK)
	Z'	i	38	49.3						
	Z	iPP	42	34		28	7.8	15.5	24.6	
	NE	eSKS	49	24						
	NE	eS	49	44		33	49	44		
	NE	ePPS	51	44						
	N	eL	03	04 $\frac{1}{2}$	-					
	ZN	M	16 $\frac{1}{2}$	-		23	156		205	
	E	M F	18 07	- 20		21		145		
KEW	ZV	eP	02	38	43.5					
	ZV	ePP	42	33						
21. ESK	Z'	iP	11	48	45.8				11 37 22.5; 7.0°N., 72.1°W. h=33km. Colombia. USCGS.	
21. ESK	Z'	iPKP	12	00	57.1				11 42 25.3; 21.1°S. 179.2°W. h=606km. Fiji Is. USCGS.	
21. ESK	Z'	iP	16	14	55.0				16 03 20.5; 49.2°N. 156.2°E. h=44km. Kurile Is. USCGS.	
21. ESK	Z'	iP	16	24	04.3	0.8		0.03	C. 16 12 30.7; 49.1°N., 156.2°E. h=53km. Kurile Is. USCGS.	
21. ESK	Z'	eP	16	28	14.8	0.8		0.02	16 16 41.0; 49.2°N., 156.2°E. h=49km. Kurile Is. USCGS.	
21. ESK	Z'	iP	23	55	39.7				23 43 11.4; 11.8°N. 93.1°E. h=33km. Andaman Is. USCGS.	
	Z'	i	55	50.4						
23. ESK	Z'	ePKP	13	42	12.3				13 23 15.0; 5.2°S., 151.8°E. h=61km. New Britain. M = 5.4(ESK). USCGS.	
	ZNE	M	14	36	-	22	0.7	1.2		1.3
		F	15	00	-					
23. ESK	Z'	iP	16	16	20.8				16 04 37.9; 48.2°N. 157.3°E. h=26km. Kurile Is. USCGS.	
24. ESK	Z'	iPKP	02	43	47.6				C. 02 24 58.4; 21.0°S., 178.0°W. h=428km. Fiji Is. USCGS.	
24. ESK	Z'	eP	04	25	52.2				04 22 01.2; 71.9°N., 0.9°W. h=33km. Jan Mayen Is. USCGS. M=4.3(ESK).	
	Z	M	30 $\frac{1}{2}$	-		21		1.8		
	N	M	30 $\frac{1}{2}$	-		22	1.5			
	E	M	31	-		16		2.5		
		F	40	-						
24. ESK	Z'	iP	20	13	01.6	12	1.0	3.2	6.9	$\Delta = 58.0^\circ = 6450\text{km}$. PZ' 2.5 sec. 2.6 μ
	Z'Z	i	13	04.8						

SEISMOLOGICAL BULLETIN

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
contd.										
24. ESK	NE	eS	20	20	58	18	9.2	24.0		20 03 10.9; 17.4°N. 61.1°W. h=24km. Leeward Is. USCGS.
	E	eSS		24	56					
	EZ	eLR		29 $\frac{1}{2}$	-					
	ZNE	M		33	-	20	15	36	46	M = 6.6(ESK).
24. ESK	Z'	iP	21	42	22.7	12			2.0	D. PZ' 1.6 sec. 0.4 μ
	ZE	eLR		59	-					21 32 31.3; 17.4°N. 61.3°W. h=20km. Leeward Is. USCGS.
	Z	M	22	02	-	20			7.5	
	E	M		02 $\frac{1}{2}$	-	19		5.3		
	N	M		03 $\frac{1}{2}$	-	18	2.0			M = 5.7(ESK).
25. ESK	Z	eP	01	39	16					
	Z', Z	ePKP		42	30					
	Z	ePP		44	32	22	8.5	3.4	16.1	01 23 33.6; 5.3°S. 153.7°E. h=64km. New Ireland. USCGS.
	NE	ePKS		45	40					
	NE	eSKS		49	36					
	N	ePS		54	24					
	N	ePPS		56	01					
	NE	eSS	02	01	40					
	E	eLQ		16 $\frac{1}{2}$	-					
	NZ	eLR		23 $\frac{1}{2}$	-					
	Z	M		31	-	29			108	M = 7.0(ESK).
	N	M		32	-	28	91			
	E	M		34	-	26		72		
	N	M		37	-	22	56			
	E	M		39	-	22		44		
	Z	M		40	-	22			63	
		F	06	20	-					
25. ESK	NE	eSKS	11	05	20					10 41 31.6; 21.5°S. 70.4°W. h=53km. Near coast of Chile USCGS.
	NE	eS		05	50	26	1.9	2.3		
	NE	eSS		12	30					
	N	eLQ		21 $\frac{1}{2}$	-					
	Z	eLR		26 $\frac{1}{2}$	-					
	ZNE	M		32 $\frac{1}{2}$	-	22	3.3	2.4	3.3	M = 5.7(ESK).
		F	12	10	-					
26. ESK	NE	eL	09	59 $\frac{1}{2}$	-					
	N	M	10	07 $\frac{1}{2}$	-	20	2.1			09 29 38.5; 44.5°N. 129.7°W. h=33km. Off coast of Oregon USCGS.
	E	M		08 $\frac{1}{2}$	-	18		3.1		
	NE	M		11 $\frac{1}{2}$	-	17	2.0	1.5		
	Z	M		12 $\frac{1}{2}$	-	16			3.2	M = 5.4(ESK).
26. ESK	N	M	11	18 $\frac{1}{2}$	-	20	0.7			10 40 40.6; 44.5°N. 129.7°W. h=33km. Off coast of Oregon. USCGS.
	E	M		19	-	18		1.1		
	Z	M		22 $\frac{1}{2}$	-	16			1.0	M = 5.0(ESK).
		F		40	-					
27. ESK	Z', Z	iP	09	30	58.5	1.6			0.53	D. Depth = 120km.
	Z	ipP		31	30	14	0.7	1.1	2.3	
	NE	iSKS		41	25	14	5.9	10.8		09 17 55.7; 21.2°S. 68.3°W. h=135km. Chile-Bolivia border. USCGS.
	NE	eS		41	46	17	3.9	4.0		
	ZNE	eSP		43	16					
	NE	eSS		48	30					
	ZNE	M	10	10	-	20	2.8	4.6	6.7	M = 6.3(ESK).
		F	11	50	-					
KEW	ZV	iP	09	30	56.0					
27. ESK	Z', Z	iPKP	16	42	28.3	10			6.7	D.
	Z	ePP		45	53	11			2.1	
	E	eSS	17	04	44					16 22 48.5; 22.3°S. 174.8°W h=33km. Tonga Is. USCGS.
	E	eSKSSKS		06	00					
	NZ	eL		33	-					

contd.

SEISMOLOGICAL BULLETIN

DATE (STN)	COMPT.	PHASE	TIME (GMT)			T s.	AMPLITUDE (μ)			REMARKS
			h.	m.	s.		N	E	Z	
contd.										
27. ESK	ZNE	M	17	45	-	20	3.9	3.2	5.3	M = 6.0(ESK)
	Z	M	18	09	-	20			3.4	
	NE	M		12	-	18	4.3	4.4		
		F	19	05	-					
	KEW	ZV	16	44	34.0					
28. ESK	NE	eS	06	46	44	23	1.5	3.4		06 26 15.8; 44.2°N. 128.8°W. h=33km. Off coast of Oregon. USCGS. M=5.8(ESK)
	N	eSS		51	12					
	NE	eLQ		56 $\frac{1}{2}$	-					
	Z	eLR		59 $\frac{1}{2}$	-					
	E	M		03	-	24		5.5		
	N	M		03 $\frac{1}{2}$	-	22	6.7			
	ZNE	M		06 $\frac{1}{2}$	-	20	3.5	5.4	5.7	
	ZNE	M		10 $\frac{1}{2}$	-	16	4.5	5.1	6.7	
		F	08	10	-					
28. ESK	Z'	iP	17	44	48.2					17 33 39.8; 6.9°N. 72.8°W. h=196km. Colombia. USCGS.
29. ESK	Z'	iP	19	54	02.1	1.1			0.05	C. 19 49 23.6; 41.5°N., 20.4°E. h=39km. Albania. USCGS.
29. ESK	Z'	iPKP	20	49	11.2	1.1			0.05	20 29 32.2; 22.8°S. 175.3°W. h=30km. Tonga Is. USCGS. M=5.6(ESK)
	Z'	i		49	15.2					
	ZNE	M	21	56	-	20	1.1	1.3	1.8	
	ZE	M	22	02	-	18		1.5	2.0	
		F		55	-					
30. ESK	Z'	iPn	04	22	46.0	0.8			0.06	$\Delta = 13.8^\circ = 1530\text{km.}$ 04 19 21.2; 44.7°N. 12.2°E. h=33km. Northern Italy. USCGS. M=4.6(ESK)
	N'	iSn		25	19.5					
	NE	eL		26	-					
	NE	M		27 $\frac{1}{2}$	-	20	5.0	5.0		
	ZNE	M		30	-	12	5.4	8.6	9.9	
		F	05	00	-					
	KEW	ZV	04	21	56					
30. ESK	Z'	eP	21	32	11.2					21 27 21.4; 40.7°N. 21.6°E. h=53km. Greece. USCGS.

Note

The seismological operations of the Meteorological Office at Kew and Eskdalemuir have now been taken over by the Institute of Geological Sciences. Future Bulletins for Kew and Eskdalemuir will be sent to those who replied affirmatively to the questionnaire which was sent out by the IGS in 1968. Those who did not reply to this questionnaire but would like to receive future Bulletins, should write to

The Institute of Geological Sciences
 Geophysical Laboratories,
 6 South Oswald Road,
 Edinburgh 9,
 Scotland.

