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PAKISTAN METEOROLOGICAL SERVICE

GEOPHYSICAL INSTITUTE

QUETTA

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Particulars of Stations and Instruments

(a) Stations

Station	Symbol	Latitude	Longitude	Height (a.s.l.)	Ground
Quetta	Qt	30° 11'·3 N	66° 57'·0 E	1719 meters	Cretaceous Limestone
Lahore	Lh	31° 33'·0 N	74° 20'·0 E	210 "	Alluvium
Karachi	Kr	24° 49'·8 N	67° 02'·2 E	30 "	Alluvium
Chittagong	Ch	22° 21'·5 N	91° 49'·0 E	15 "	Alluvium
Warsak	Wr	34° 09'·0 N	71° 25'·0 E	343 "	River Terrace

(b) Instruments

Instruments	Components	Period Seismo. & Galvo.	Damping	Max. Magnification
<u>Quetta (Central Station)</u>				
Sprengnether	Z	1·9 sec.	Critical	5,500
"	N	1·95 "	"	4,500
"	E	1·95 "	"	5,800
"	N	15·8 "	"	15,000
"	E	16·5 "	"	16,000

(Contd).

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Instruments	Components	Period Seismo. & Galvo.	Damping	Max. Magnification
Willmore	Z, N & E	{ Seismo = 1 sec. Galvo = 1/4 ..	—	—
Milne-Shaw	E	12.0 sec.	20:1	250
Sprengnether Pen recorder	E	1.0 "	—	—
Lahore Sprengnether	Z	1.8 "	Critical	4,900
"	N	1.7 "	"	4,200
"	E	1.6 "	"	4,100
Karachi Sprengnether	Z	1.8 sec.	Critical	5,890
"	N	1.6 "	"	4,700
"	E	1.4 "	"	4,700
Chittagong Sprengnether	Z	1.7 "	Critical	5,200
"	N	1.8 "	"	5,700
"	E	1.5 "	"	3,600
"	N	7.0 "	"	6,600
Willmore	Z	{ Seismo = 1 sec. Galvo = 1/4 ..	—	—
Warsak Sprengnether	N	2.0 sec.	Critical	4,000
Willmore (with Sprengnether galvo. & recorder)	Z	1.0 "	—	—

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	
1	Qt	ePKPZ	13	37	43		Qt	ePZ		27	30	d
		epPKPZ		38	11			USCGS H 14 14 42				
		ePPZNE		41	03			6 S 152 E				
		USCGS H 13 18 23						New Britain				
		14 1/2 S 73 1/2 W					2	Qt	ePnZ	17	21	25
		Southern Peru						ePgZNE				32
		depth about 100 km						eSnNEN*				55
i	Qt	ePZ	17	42	24		Lh	ePnZ				52
		eSNEN*		44	32			ePgZ				22 12
1	Wr	ePZ	18	07	58		Wr	eSgN				23 08
		eSN		08	50			ePnZ				22 02
	Qt	ePZ		09	07			H 17 20 43				
		eSN		10	52			29 1/2 N 69 3/4 E				
		H 18 06 50						Suleman range				
		38 1/2 N 71 1/2 E					2	Qt	ePZ	19	32	30 d
		Tadzhikistan S. S. R.					2	Wr	ePZ	21	46	38
2	Ch	ePZ	06	47	58		Qt	ePZ				47 29
		USCGS H 06 39 08						eSNE				48 47
		18 1/2 N 146 E						H 21 45 47				
		Mariana Islands						Northern Afghanistan				
2	Wr	iPZ	10	30	39 c		2	Qt	ePZE	22	39	50
		eSN		31	12			ePPPZ				40 08
	Lh	ePZ			18			eSNEN*				42 46
	Qt	iPZ			35 c			eSSNE				43 06
		esPZ		32	14			Mu Sec				
		iSZNE			53			PZ 0.9 2.2				
	Kr	ePZ			41			Δ = 15°·8				
		eSE		34	40			Kr	ePZ	22	40	19
		H 10 29 55						Lh	ePZ			55
		36 1/2 N 70 1/2 E						H 22 36 05				
		Hindukush						33 1/2 N 48 1/2 E				
		depth about 200 km						Western Iran				
2	Ch	ePZ	14	25	30							

* indicates long period seismographs, Sprengnether or Milne-Shaw.
 c=compression, d=dilatation, X=unidentified phase.
 Mu=Actual ground motion of the indicated phase in microns.
 Sec=Period of the indicated phase in seconds.
 (Pas), (Berk), (Up), (Ki) stand for seismological observatories Pasadena (U.S.A.),
 Berkley (U.S.A.), Uppsala (Sweden) and Kiruna (Sweden) respectively.
 All times are in Greenwich Mean Time.

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s							
2	Qt	USCGS H 22 36 08 36 N 50 E Western Iran Mag 5.5 (Qt) ePZ	23	13	00	3	Wr Qt	ePZ ePZ	07	29	37	4	Ch Qt	ePZ ePZ	20	58	06	6	Wr Qt	iPZ eSN ePZ eSZNE	08	03	08 c 42 04 09 05 29	
2	Qt	USCGS H 23 02 50 11 S 113 E Off south coast of Java ePZE eSN*	23	37	01	4	Ch	ePZ ePcPZ esPZ ePPZ eSN*	08	07	55	4	Ch Qt	ePZ ePZE	23	34	20	6	Qt Qt	ePZ ePZ ePZ	13	37	39 17 15 30 07 25 39	
	Kr Lh	ePZ ePZ	37	32				esSN*	10	50								7	Qt Wr	ePZ eSN ePZ	08	16	29 49	
		H 23 33 09 34 N 47 3/4 E Western Iran USCGS H 23 33 09 34 1/2 N 48 1/2 E Western Iran					Qt	ePZ	17	31		5	Qt	ePKPZ ePPZ ePKPZ	07	36	31 d 37 41 36 41	7	Lh Qt	ePZ ePZE eSNE			53 17 16 18 10	
3	Ch	iPZ epPZ ePPZ esPZ iSN* esSN*	05	17	50 d	4	Qt	ePZ	18	19		5	Ch	ePKPZ ePPZ							H 08 16 05 33 N 71 1/4 E Near Bannu West Pakistan			
	Wr Qt Kr	ePZ ePZ eSN*	19	27	20 06 d 27 44				09	49								7	Ch Qt	ePZ ePPZ eSZ ePZ	08	45	23 c 47 13 52 10 47 10 c	
		USCGS H 05 10 32 28 N 139 1/2 E Bonin Islands region depth about 550 km				4	Qt	ePZ	12	56	21	5	Qt	ePZ	17	34	52				USCGS H 08 36 54 40 N 143 E Off east coast of Honshu, Japan			
									58	30		6	Qt	ePKPZ eXZ	02	24	41 25 04	7	Wr Qt	iPZ eSN ePZ eSNE	11	33	41 c 34 13 40 35 57	
																					H 11 32 59 Hindukush			



Date	Station	Phase	h	m	s
7	Wr	iPZ	12	27	59 c
		eSN		28	32
	Lh	eSN		29	51
	Qt	ePZ		28	57
		eSNE		30	16
		H 12 27 16			
		36½ N 70¼ E			
		Hindukush			
		depth about 150 km			
7	Wr	iPKPZ	14	05	21
	Qt	ePKPZ		28	d
		ePPZE		06	57
		esPKPZ		08	14
		USCGS H 13 47 28			
		24 S 179½ W			
		Fiji Islands region			
		depth about 500 km			
		Mag 6 (Berk)			
7	Ch	ePZ	20	12	37
	Qt	ePZ		15	09 d
		USCGS H 20 03 37			
		12 N 143½ E			
		Mariana Islands			
8	Qt	iPZ	00	14	32 d
8	Ch	ePZ	08	46	03
	Qt	ePZ		48	09
		USCGS H 08 35 37			
		6 S 147 E			
		New Guinea			
8	Qt	ePZ	22	53	51
9	Qt	ePZ	02	54	09
		USCGS H 02 43 51			
		40 N 143 E			

Date	Station	Phase	h	m	s
		Near east coast of Honshu, Japan			
9	Qt	ePZ	17	12	24
10	Qt	ePZ	02	04	04
		eSZN		05	24
10	Qt	ePZ	05	01	01
		USCGS H 04 49 41			
		12½ N 143½ E			
		Mariana Islands			
		depth about 100 km			
10	Ch	ePZ	13	15	38
		USCGS H 13 07 30			
		Bonin Islands			
10	Ch	ePZ	20	38	18
		ePcPZ		28	12
		ePPZ		41	19 12
		eSN*		48	15
	Wr	ePZ	38	21	
	Lh	ePZ		26	
	Qt	iPZ		50	
		ePcPZ		54	
		eXZE		40	42 12
		eSNEN*		49	15
		eScSN*		28	
		USCGS H 20 26 12			
		53 N 167½ W			
		Fox Islands			
		Aleutian Islands			
10	Qt	ePZ	22	12	06
	Wr	iPZ		24	
		USCGS H 22 05 29			
		Western Turkey			

Date	Station	Phase	h	m	s
	Wr	ePZ	22	33	23
	Qt	ePZ		34	26
		eSZNE		35	43
		H 22 32 45			
		Northern Afghanistan			
	Qt	ePZ	06	27	32
	Wr	ePZ	02	14	49
	Qt	ePZ		15	27
		eSNE		17	05
		H 02 13 20			
		Uzbek, S.S.R.			
	Qt	ePZ	04	29	26
		USCGS H 04 22 35			
		Western Turkey			
	Qt	ePZ	07	22	16
	Wr	ePZ	17	26	47
		eSN		27	22
	Qt	ePZ		48	
		eSZNE		29	06
		H 17 26 06			
		Hindukush			
	Qt	ePZ	20	47	02
		ePPZ		50	
		USCGS H 20 41 10			
		46½ N 96 E			
		Outer Mongolia			
	Ch	ePZ	21	56	44
		ePcPZ		57	16
		eSN*		22	05 26
	Qt	ePZ	21	58	53
		USCGS H 21 46 02			
		3½ S 152 E			
		New Ireland			

Date	Station	Phase	h	m	s
13	Ch	ePZ	05	02	07
		ePcPZ		20	
		ePPZN*		04	54
		eSZN*		11	41
	Qt	ePZ*		02	50
		USCGS H 04 50 28			
		55 N 175 W			
		Andereanof Islands			
		Aleutian Islands			
13	Qt	ePZ	08	06	33
		USCGS H 07 57 46			
		44½ N 127 E			
		Manchuria			
13	Wr	iPZ	12	36	44 d
		eSN		37	11
	Qt	ePZ		39	
		eSZN		38	47
		H 12 36 10			
		Hindukush			
13	Qt	ePKPZ	12	56	49
		eXZ		57	35
		ePPZE		59	05
		USCGS H 12 37 38			
		15½ N 92½ W			
		Guatemala - Mexico			
		border			
		Mag 5¼ (Berk), 6 (Pas)			
13	Qt	ePZ	13	27	05
		USCGS H 13 14 28			
		52½ N 169 W			
		Fox Islands			
		Aleutian Islands			



Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	
14	Qt	ePZ	00	00	33	15	Qt	ePZ	10	16		16	Qt	ePZ	10	46	09	
14	Ch	ePZ	06	32	32			USCGS H	10	06	20	16	Qt	ePZ	12	23	01	
	Qt	ePZ		35	00			42½ N 143½ E					Lh	ePZ			12	
		USCGS H 06 24 30						Near south coast of				16	Wr	iPZ	20	12	38 c	
		8 S 118 E						Hokkaido, Japan						eSN			13 11	
		Sumbawa Islands region				15	Qt	ePZ	11	14	0		Qt	ePZE			37	
15	Wr	iPZ	00	57	07 d			USCGS H 11 03 45	5	Ch	ePZN*	22	17	27			eSNE	14 56
		eSN			44			42 N 144 E			ePcPZN*			32			H 20 11 53	
	Qt	ePZNE		58	12			Near south coast of			ePPZ			20 34			Hindukush	
		eSNE		59	39	15	Lh	ePZ	11	48	1	16	Ch	ePZ	20	47	33	
		H 00 56 18						Hokkaido, Japan						ePZ			20 47 33	
		Northern Afghanistan												USCGS H 20 35 25				
15	Qt	ePKP ₁ Z	03	45	49									45 N 150 E				
		eXZ			54									Kurile Islands				
		ePKP ² ZE		47	25									ePZ	01	25	23	
		ePPZNE		51	25									USCGS H 01 12 44				
		eSKSZ		52	51									54 N 164 W				
		iXN*		58	31									Unimak Islands region				
		USCGS H 03 25 38												ePKPZ	15	59	04	
		27 S 113 W												USCGS H 15 40 02				
		Easter Islands region												21 S 175½ W				
		Mag 6½ (Pas)												Tonga Islands				
15	Ch	ePN*	04	25	45									ePZ	17	16	50	
		USCGS H 04 13 25												eSN			17 23	
		13½ S 166 E												Lh			31	
		New Hebrides Islands												Qt			46	
		Mag 6½ (Pas)												eSNE			19 04	
15	Qt	ePKPZ	08	52	12									H 17 16 06				
		USCGS H 08 33 08												36½ N 70 E				
		28 S 177 W												Hindukush				
		Kermadec Islands												depth about 150 km				
														ePE	18	39	20	
														eSE			40 38	

Date	Station	Phase	h	m	s
17	Qt	ePKPZE	22	07	27
		USCGS H 21 49 24			
		20 S 180			
		Fiji Islands			
		depth about 500 km			
18	Qt	ePZ	08	16	50 d
		epPZ		18	23
		eSEN*		24	42
		USCGS H 08 07 07			
		28 N 139½ E			
		Bonin Islands region			
		depth about 450 km			
18	Ch	ePN*	09	13	44
		USCGS H 09 01 20			
		13½ S 166 E			
		New Hebrides Islands			
18	Ch	ePZN*	13	13	33
		eSN*		23	45
		USCGS H 13 01 12			
		13½ S 166 E			
		New Hebrides Islands			
18	Qt	ePZ	22	30	46
19	Ch	ePZ	01	22	35
		ePPZ		24	32
	Qt	ePZ			13
		USCGS H 01 13 27			
		46 N 151 E			
		Kurile Islands			
19	Qt	ePnZE	08	45	41 d
		iPgZNE			44
		iSnNE		46	04
		iSgZNE			07
		H 08 45 09			
		Eastern Baluchistan			



Date	Station	Phase	h	m	s
19	Qt	ePnZE	11	12	30
		eSnNN*			
		Eastern Baluchistan			
		aftershock			
19	Wr	iPZ	17	08	33
		eSN		09	11
	Lh	iPZ			11
		eSN		10	21
	Qt	ePZ		09	31
		eSNE		10	41
		H 17 07 51			
		36½ N 70 E			
		Hindukush			
		depth about 150 km			
19	Ch	ePZN*	19	37	49
		ePcPZN*		38	01
		ePPN*		40	40
		eSN*		47	30
	Qt	ePZ		38	28
		USCGS H 19 26 00			
		51½ N 174 W			
		Andreanof Islands			
		Aleutian Islands			
19	Ch	ePZN*	20	44	40
		ePcPZ			51
		ePPN*		47	30
		eSN*		54	21
	Qt	ePZ		45	21
		USCGS H 20 32 51			
		51 N 172½ W			
		Fox Islands			
		Aleutian Islands			
	Qt	ePZ	14	10	36
	Qt	ePZ	15	49	08
	Wr	iPZ	19	23	53 d
		eSN		24	22
	Lh	ePN			33
		eSN		25	38
	Qt	iPZ		24	51 d
		esPZEN*		25	32
		iSNEN*		26	09
		Mu Sec			
		PZ 0.4 1.0			
		Δ = 6°.9			
	Kr	ePZ	19	25	54 d
		eSE		28	00
		Mu Sec			
		PZ 0.3 1.0			
		Δ = 11°.9			
	Ch	ePZN*	19	28	01
		epPN*			43
		ePPZN*			49
		esPZN*		29	11
		eSN*		32	00
		esSN*		33	14
		H 19 23 11			
		36½ N 71 E			
		Hindukush			
		depth about 200 km			
		USCGS H 19 23 04			
		37 N 71 E			
		Hindukush			
		depth about 200 km			
		Mag 5.5 (Qt, Kr)			
		Felt Warsak & Risalpur			
20	Lh	ePZ	21	01	17
		eSN		02	21
	Qt	ePZ		01	32 d
		eSNE		02	50
	Ch	ePZ		04	41
		H 20 59 50			
		Hindukush aftershock			
20	Ch	ePZ	21	46	04
		ePPZ		48	23
	Qt	ePZ			36
		USCGS H 21 36 41			
		2½ S 140 E			
		Near north coast of New Guinea			
21	Ch	ePKPN*	02	36	25
	Qt	ePKPZ			25d d
		eXZ			42
	Lh	ePKPZ			28
		USCGS H 02 16 29			
		2½ S 110 W			
		Pacific Ocean			
		about 1200 miles of Galapagos Islands			
		Mag 5¾ (Berk)			
21	Qt	ePKPZ	16	41	02
		USCGS H 16 21 57			
		20½ S 174 W			
		Tonga Islands			
22	Qt	ePZ	08	54	59
22	Lh	ePZ	18	56	09
	Wr	ePZ			29
	Qt	ePZ			53

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s					
26	Wr	USCGS H 14 53 53 56 N 155 W Kodiak Islands region	02	16	27	27	Qt	ePZ eSNE	18	12	14	29	Ch	Celebes Mag 5.8 (Qt) ePZ	10	13	25 c					
	Qt	iPZ ePZN	17	32		27	Qt	ePZ	21	16				ePPZ	14	48						
		eSNE	18	54				USCGS H 21 05 51 40 N 142 E Near north coast of Honshu, Japan	28	Qt	ePZ eSNE	15	09	31				19	09			
26	Qt	H 02 15 44 Hindukush region	20	28	05	27	Ch	ePZ	22	49	29	Qt	Wr	ePZ	16	07						
		ePZN	20	28	05			ePPZ	50				Qt	ePZ	23	c						
26	Qt	USCGS H 20 19 10 24½ N 122½ E Off coast of Formosa	21	31	34		Lh	ePZ	51					eXZ	35							
		ePZN*	21	31	34		Qt	ePZ	52					ePcPZNE	17	10						
		ePPZN*	51					ePPZ	54	29	Qt			ePPZN	18	39						
		ePPPZN*	32	01				eSNE	59	29	Qt			eSNN*	24	30						
		eSN*	35	03				eLN*	04					Mu	Sec							
	Wr	ePZ	32	38				USCGS H 22 43 49 18 N 120 E Off coast of Luzon Philippine Islands	29	Ch	ePZ ePPZ ePPPZ	09	04	39				PZ	0.2	1.4		
	Qt	ePZ	33	22				USCGS H 09 16 08 0 12½ E Celebes	29	Qt	ePZ	09	26	18				Δ = 59°·2				
		H 21 27 09 39 N 101¾ E Kansu Province, China	11	00	18	28	Qt	ePZ	01	01				USCGS H 10 06 14 0 122 E Celebes				USCGS H 10 06 14 0 122 E Celebes				
		USCGS H 21 27 12 39 N 101 E Kansu Province, China	17	23	56			USCGS H 00 49 16 53½ N 168 W Fox Islands	29	Ch	ePZ eXZ	10	00	39				Mag 5.9 (Qt)				
27	Qt	ePZN	11	00	18			Aleutian Islands						USCGS H 11 30 47 0 122 E Celebes				ePZ	11	40	57	
27	Qt	ePZ	17	23	56	28	Qt	ePKPZ	02	29				USCGS H 11 30 47 0 122 E Celebes								
		eSN*	34	19				USCGS H 02 10 14 59½ S 26 W Sandwich Islands	28	Qt	ePZ	05	20									
		USCGS H 17 11 30 3½ S 146½ E Bismarck Sea	17	42	16			ePZ	05	20				USCGS H 09 53 26 0 122 E								
27	Qt	ePZ	17	42	16			eSN*	30	3				Mu	Sec							
		eSNEN*	44	14				eScSN*	5					PZ	0.15	1.4						
								ePPSN*	31	4				Δ = 60°								

Date	Station	Phase	b	m	s
	Wr	ePZ	43	12	
	Kr	ePZ		15	c
	Qt	ePZ		27	c
		eXZNE		40	
		ePcPZNE	44	09	
		ePPZNE		41	
		ePPPZ	47	04	
		eSNEN*	51	35	
		ePSN*		52	
		eScSN*	53	15	
		eLN*		58.4	
		Mu Sec			
	PZ	0.3	1.5		
		$\Delta = 59^{\circ}5$			
		USCGS H 13 33 17			
		0 122 E			
		Celebes			
		Mag 6.1 (Qt)			
29	Qt	ePKPZ	13	57	59
		USCGS H 13 38 31			
		30 S 178 $\frac{1}{2}$ W			
		Kermadec Islands			
29	Wr	ePZ	14	41	30
		eSN		42	05
	Qt	ePZ		34	
		eSNE		44	01
		H 14 40 41			
		Northern Afghanistan			
29	Qt	ePZ	14	56	44
29	Qt	ePnZ	17	22	21
		ePgZN		25	
		eSnNE		23	02
29	Lh	ePZ	19	05	15 c

Date	Station	Phase	h	m	s
		eSN		12	
	Qt	ePZ		05	
		ePcPZ		06	
		ePPZ		08	
		USCGS H 18 55 42			
		$\frac{1}{2}$ S 121 $\frac{1}{2}$ E			
		Celebes			
29	Lh	ePZ	19	22	3
	Qt	ePZ		32	0
29	Ch	iPZ	19	39	2
		iXZ		4	
		ePPZ	40	5	
		ePPPZ	41	0	
		ePcPZ		4	
	Lh	ePZ		4	
		eSN	49	2	
	Wr	iPZ	42	0	
	Kr	ePZ		0	
		ePPZ	44	2	
	Qt	iPZ	42	2	
		iXZE		3	
		ePcPZNE	43	0	
		ePPZE	44	4	
		eSNEN*	50	2	
		ePPSN*		50	
		iScSN*	52	11	
		eLN*		57.2	
		ePKPPKPZ	20	11	48
		Mu Sec			
	PZ	1.3	1.5		
	PPZ	0.8	2.2		
		$\Delta = 59^{\circ}0$			

Date	Station	Phase	h	m	s
		USCGS H 19 32 12			
		0 122 E			
		Celebes			
		Mag 6.7 (Qt)			
29	Ch	ePZ	20	51	38
		ePPZ		53	01
		ePPPZ		22	
		ePcPZ		54	00
		eSZ		57	22
	Lh	ePZ		53	59
		eSZ	21	20	40
	Wr	ePZ	20	54	23
	Kr	ePZ		26	
	Qt	ePZ		37	c
		eXZNE		48	
		ePcPZNE		55	23
		ePPZ		56	46
		eSNN*	21	02	48
		iPSN*		03	03
		eScSN*		04	20
		eLN*		09.0	
		ePKPPKPZ		23	57
		Mu Sec			
	PZ	0.5	1.4		
		$\Delta = 60^{\circ}$			
		USCGS H 20 44 27			
		0 121 $\frac{1}{2}$ E			
		Celebes			
		Mag 6.3 (Qt)			
29	Qt	ePZ	21	53	38
29	Qt	ePZ	22	25	41
30	Lh	ePN	00	29	44
		eSN		37	20

Date	Station	Phase	h	m	s
	Wr	ePZ		30	06
	Qt	ePZ		20	
		eXZ		30	
		ePPZ		32	34
		eSNEN*		38	26
		eLN*		45.4	
		USCGS H 00 20 09			
		0 122 E			
		Celebes			
30	Ch	iPZ	04	08	44 c
		iXZ		09	02
		ePPZ		10	09
		ePPPZ		30	
		ePcPZ		11	06
		eSZ		14	28
	Lh	ePN		11	02
		eSN		18	38
	Wr	iPZ		11	29
	Kr	ePZ		29	\pm
	Qt	iPZ		43	c
		eXZE		57	
		ePcPZNE		12	30
		ePPZNE		13	55
		iXN*		14	09
		ePPPZNE		15	20
		ePcSN		16	28
		eSNEN*		19	50
		ePSN*		20	09
		iScSN*		21	31
		eLN*		26.5	
		ePKPPKPZ		41	06
		Mu Sec			
	PZ	0.5	1.5		
		$\Delta = 60^{\circ}$			

Date	Station	Phase	h	m	s
	USCGS H 04 01 23				
	0	122 E			
	Celebes				
	Mag 6.4 (Qt)				
30	Wr	ePZ	08	50	58
	Qt	ePZ		51	13
30	Lh	ePZ	10	20	57
	Qt	ePZ		21	33
		eXZ			47
		ePPZ		23	44
		eSN*		29	41
	USCGS H 10 11 23				
	0	121½ E			
	Celebes				
30	Qt	ePKPZ	11	19	08
	USCGS H 11 00 05				
	16 S	173 W			
	Tonga Islands region				
30	Qt	ePZ	13	21	38
30	Qt	ePZ	14	30	26
	USCGS H 14 17 04				
	9 S	157 E			
	Solomon Islands				
30	Qt	ePZ	17	18	52
30	Qt	ePZ	22	03	37 c
30	Ch	iPZ	22	17	14 c
	Lh	ePZ		19	25
	Wr	iPZ			46 c
	Qt	iPZ			56 c
		ePcPZNE		20	21
		epPZ		21	59
		esPZ		22	58
		i!SNEN*		27	51
		eScNSN*		28	50
		esSN*		31	24

Date	Station	Phase	h	m	s
		Mu			
		Sec			
		PZ	0.3		1.1
		$\Delta = 65^\circ.5$			
	USCGS H 22 10 07				
	6 S	124½ E			
	Banda Sea				
	depth about 600 km				
	Mag 5.7 (Qt)				
30	Qt	ePZ	22	49	20
30	Qt	ePZ	23	19	21

Date	Phase	h	m	s	Date	Phase	h	m	s
	Quetta								
1	ePZE	00	24	50	7	ePgZ	21	10	24
	eSNE		25	34		eSgNE			39
2	ePZ	16	16	50	7	iPgZ	23	43	03
	eSNE		17	33		iSgNE			18
3	eXZN	00	39.0		8	eXZ	07	44	27
3	eXZ	11	35	45	8	ePgZ	10	07	32
3	iPgZE	21	10	16.2	8	eSgNE			48
	iSgZE			22.8		ePZ	17	05	31
4	ePZ	04	01	41	8	eSNE			06 04
	iSNE		02	04		eXZ	17	08.4	
5	ePE	02	42	00	10	ePgZ	05	23	10.20
	eSNE		43	06		eSgN			12.0
5	eXZE	07	51.3		10	ePgZ	19	40	00.0
5	ePgZ	08	40	22	11	eSgN			07.7
	eSgN			32	11	ePZN	04	45	50
5	ePZE	09	47	04	11	ePN	18	10	12
	eSZ			25	11	ePZ	22	16	16
5	ePgZ	17	30	02.3	13	eSN			32
	eSgNE			12.5		ePgZ	10	39	00.20
5	ePE	22	24	11	13	iSgZN			01.8
	eSNE		25	27	13	ePZ	15	00	28
5	eXE	23	12.1		13	ePgZ	21	01	44
6	eXZ	02	38	22		eSgZNE			51
6	eXZ	07	01	23	14	eXZ	09	03	0
7	ePgZNE	02	55	27.1	14	ePgZN	09	49	35
	eSgN			29.4		eSgZN			49
7	e(P)Z	05	07	24	14	ePgZN	17	53	32.8
7	ePgZ	05	26	11.0	14	eSgZN			35.4
	eSgN			13.1		eXZ	20	33.3	
7	eXZ	16	31	58	14	eXE	22	12	0
7	eXZ	20	49.0		14	eXE	22	15.6	
					15	ePE	08	27	13.2
						eSZ			56.5

Date	Phase	h m s	Date	Phase	h m s	Date	Phase	h m s	Date	Phase	h m s
15	eXZ	10 16.6	17	ePE	21 06 21		ePZ	13 24 20	24	eSgN	21.2
15	ePZ	14 22 08		eSE	07 50		eSE	42	24	iPgZ	22 46 26.2c
15	ePgE	14 52 13.4	17	eXE	21 08.3		ePgZE	00 11 09	25	iSgNE	29.2
	eSgE	23.8	17	ePZE	22 07 27		eSgNE	17	25	ePZ	03 45 02.5c
15	ePgE	16 18 39.0	18	ePgZ	03 51 24		eXZ	08 15.0	25	eSgN	04.8
	eSgE	54.8		eSgNE	35		eXZE	15 12.5	25	ePgZ	04 04 42.2
16	iPgZE	01 42 25.8	18	ePgZ	17 11 16		ePgZ	15 13 29	25	eSgN	45.8
	iSgNE	28.6		eSgNE	19		eSNE	51	25	ePZ	04 10 44
16	ePE	06 50 12	19	ePgZ	20 56 57		eXE	17 03.5	25	eSN	11 45
	eSE	31		eSgNE	57 04		eXE	18 16.5	25	ePZ	05 43 14
16	eXE	08 08 16	19	ePgZ	03 51 54		eXE	19 11.0	25	eSN	36
16	ePE	11 47 34		eSgNE	52 04		ePgZ	22 27 19	25	ePZ	05 57 11
	eSE	54	19	ePgZ	05 43 33		eSgZE	29	25	eSN	41
16	ePgZ	13 32 30		eSNE	56 ²		ePgZE	02 57 13.7	25	ePgZ	16 19 10.6
	iSgN	40	19	ePgZ	06 04 46		eSgE	21.7	25	eSgE	14.7
16	ePZ	18 40 57		eSgNE	56 ²		eXZ	20 14 44	25	ePgZ	16 38 10.0
16	ePgE	19 26 10	19	ePE	11 45 36 ²		eXZ	22 08 00	26	eSgNE	14.0
	eSgE	20		eSNE	46 55 ³		ePNE	20 19 56	26	ePgZ	10 42 26.3
16	eXE	23 05 09	19	eXE	12 00.6		eSNE	20 18	26	eSgN	30.8
17	eXE	00 07.5	19	ePZ	16 42 48 ⁴		eSNE	02 27 58.0c	26	ePZ	15 00 31
17	eXE	08 10.0		eSNE	43 08		ePgZ	28 00	27	ePZ	04 34 19
17	eXE	09 33 0	19	ePZ	16 47 38 ⁴		iSgNE	05 07 32	27	ePE	21 15 23
17	ePgE	14 29 09		eSNE	58		ePgZ	41	27	eSNE	44
	eSgE	24	19	ePZ	16 55 28 ⁴		eSgNE	17 05 15	27	ePgZ	23 56 37.2
17	ePgE	14 42 32		eSN	48		ePgZ	27	28	eSgZ	44.3
	eSgNE	47	19	eXZ	23 36.8 ⁴		eSgNE	18 10 25.2c	28	ePZ	05 23 52
17	ePE	18 56 41	20	eXN	01 13.0		iPgZ	29.2	28	ePZ	05 59 53
	eSE	59	20	eXE	04 28.0 ⁴		iSgNE	18 22 44.8c	28	e(P)Z	10 02 35
17	eXE	19 00.0	20	eXZ	04 35.0 ⁴		ePgZ	48.8	28	ePgZ	10 42 20
17	eXE	19 10.0	20	ePgZ	04 57 07 ⁴		eSgN	18 35 59.0c	28	eSgN	31
17	iPgE	20 13 10	20	eSgZE	22 ⁴		ePgZ	36 03.0	28	ePgZ	14 12 58.7
	eSgE	25.6	20	eXE	09 37.0 ⁴		eSgN	19 24 17.3	28	eSgNE	13 02 1
							ePgZ		28	ePgZ	20 41 45



Date	Phase	h	m	s	Date	Phase	h	m	s	Date	Phase	h	m	s	Date	Phase	h	m	s
29	eSgNE			52	5	ePZ	02	40			eSN			46 17		eSN			13 04
	ePZE	08	13	57		eSZ		41	13		ePZ	05	19	52	22	ePZ			13 33 02
	eSNE		14	15	5	iPZ	04	38			eSN			20 41		eSN			38
29	ePZN	10	11	42		eSN		39	13		iPZ	13	15	26 c	22	ePZ			23 27 59
29	eXZ	15	04	29	5	ePZ	20	35			eSZ			15 58		eSN			29 24
30	ePgZE	00	12	17	5	iPZ	22	23	14		iPZ	04	05	35	23	ePZ			11 35 14
	eSgNE			29		eSN					eSN			06 05	23	ePZ			20 09 37
30	ePZ	12	56	57	5	iPZ	22	59	14		iPZ	19	42	40 c		eSN			10 10
	e(S)E		57	39	6	iPZ	02	18			eSN			43 16	24	eXN			15 10 49
30	eXZ	13	44	2		eSN			14		ePZ	22	13	22	25	ePZ			08 18 01
30	ePZN	15	04	32±	6	ePZ	02	39			eSN			55		iSN			15
	e(S)N		07	18	6	ePZ	07	01	16		ePZ	03	40	07	25	iPZ			08 24 27 d
30	e(P)N	20	57	29		eSN		02			eSN			42		eSN			56
	ePZ			33	6	ePZ	07	08	16		iPZ	08	05	56 c	25	ePZ			20 30 17
	Warsak				7	ePZ	05	22			eSN			06 26		eSN			46
1	ePZ	01	28	06		ePZ	10	57	16		ePZ	23	02	52	26	iPZ			04 40 27
1	iPZ	12	07	13 d	7	ePZ	13	57			eSN			03 23		eSN			56
	eSN			41	7	ePZ	16	36	17		iPZ	00	05	08 c	20	ePZ			10 52 31
1	ePZ	13	09	07	7	ePZ	18	38			eSN			05 46		eSN			51
	eSZ			39	7	ePZ	17	18	17		iPZ	01	43	01	26	ePZ			14 57 29
1	ePZ	18	51	48	9	ePZ	17	18			eSN			43 19		eSN			54
1	ePZ	22	44	21		eSN		19	17		ePZ	07	36	47	26	ePZ			20 20 44
	eSN			51	9	ePZ	18	17			eSN			37 34		eSN			21 07
2	ePZ	05	18	50		eSN		18	17		eXZ	18	38	52	26	ePZ			20 47 50
	eSZ		19	19	10	ePZ	17	31	17		ePZ	21	05	16		eSN			48 20
2	ePZ	16	17	32		eSN		32	2		eSN			53	27	ePZ			07 54 37
2	ePZ	22	40	09	11	ePZ	18	36	0	18	ePZ	13	21	56 d		eSN			55 19
3	ePZ	10	04	30		eSN			4		eSN			22 25	27	ePZ			10 58 12
3	ePZ	14	56	40	12	ePZ	01	34	2	19	ePZ	11	43	54		eSN			28
	eSN		57	08		eSN		35	0		iSN			44 22	27	ePZ			12 02 36
3	ePZ	23	32	13	12	iPZ	03	45	3	19	ePZ	11	58	30		eSN			03 14
4	ePZ	08	27	03		iSN		46	1		iSN			59 00	27	ePZ			21 15 34
	eSN		27	43	12	ePZ	20	45	5	21	ePZ	08	12	37	27	ePZ			22 04 01

Date	Phase	h m s	Date	Phase	h m s
	iSN	04 26	20	eXN	18 59 02
26	ePZ	00 08 30	26	eXN	02 18 10
	eSN	09 00	26	eXN	20 22 18
28	ePZ	10 25 14	30	ePZ	23 18 46
	iSN	47		Karachi	
28	iPZ	16 40 32	11	eXE	10 02 13
	eSN	41 12	19	ePZ	11 12 35
30	ePZ	06 00 37		iSE	13 32
	eSN	01 40		Chittagong	
30	iPZ	13 41 54 d	1	ePN	03 07 47
	eSN	42 23	1	ePN	13 39 20
30	ePZ	14 37 18	2	eXZ	22 42 32
	eSN	47	2	eXZ	23 09 49
30	ePZ	15 03 37	2	eXZ	23 39 52
	eSN	05 38	3	eXZ	07 28 55
30	ePZ	17 57 11	3	eXN	17 24 31
	eSN	45	3	eXZ	18 58 39
30	ePZ	22 27 02	4	eXN	12 55 35
	iSN	31	5	eXN	17 40 37
	Lahore		5	eXN	13 40 36
2	eXN	21 48 19	6	eXZ	03 55 27
3	ePZ	23 31 50	7	eXZ	14 04 17
	eSN	32 08	7	ePZ	02 15 02
5	ePZ	20 32 27	8	eXZ	00 14 19
7	eXN	11 35 23	9	eXZ	02 51 37
7	ePN	13 58 21	9	eXN	17 14 51
	eSN	34	9	ePN	00 12 47
10	eXN	22 37 10	10	eXN	05 01 27
12	eXN	17 28 33	10	eXN	22 19 36
12	eXN	20 46 39	11	eXZ	16 12 41
14	ePN	00 58 48	12	eXN	04 32 24
18	eXN	08 23 20	12	eXZ	20 46 29
19	eXN	11 46 09			



Date	Phase	h m s	Date	Phase	h m s
	eXZ	08 03 40			
	eXN	13 26 04			
	eXZ	03 46 31			
	eXN	11 46 54±			
	eXN	12 22 23			
	eXN	15 58 37			
	eXZ	08 15 03±			
	eXN	17 07 55			
	eXN	20 19 39			
	eXN	18 56 05			
	eXZN	06 32 56±			
	eXZ	12 26 31±			
	eXZ	00 14 28			
	eXN	04 22 02			
	eXN	12 57 03			
	ePN	15 05 39±			
	ePZ	05 18 32			
	eXZ	21 13 57			
	eXZ	01 01 00±			
	eXZ	09 23 05			
	eXZ	15 02 34			